5th International Landscape Archaeology Conference

17th-20th September 2018
Newcastle and Durham, UK
5TH INTERNATIONAL LANDSCAPE ARCHAEOLOGY CONFERENCE

17TH-20TH SEPTEMBER 2018

The McCord Centre for Landscape and the School of History, Classics and Archaeology, Newcastle University and The Department of Archaeology, Durham University

NEWCASTLE AND DURHAM, UK
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Newcastle and Durham Universities are very pleased to welcome you to LAC2018, the fifth meeting in the biennial series of conferences organised under the banner of the International Association of Landscape Archaeology (IALA). From the first LAC held in 2010 at the Free University of Amsterdam, the LAC conferences have steadily grown in size, attendance and depth through conferences in Berlin (2012: Free University), Rome (2014: jointly organised by the Dutch and the Swedish Institutes in Rome) and Uppsala (2016: Uppsala University). The International Association of Landscape Archaeology is also growing; its founding meeting as a formally-constituted membership association was held at the 4th conference in Uppsala in 2016 and the 2018 conference will host an annual business meeting, with opportunities for all participants to become members.

This fifth conference takes place in North-East England, one of the cradles of early Christianity in Britain and a birthplace of the Industrial Revolution. It is a distinctive region rich in prehistoric remains, with the best-known of the Roman imperial frontiers and significant medieval landscapes, townscapes and cityscapes. Four excursions have been arranged for the afternoon of Wednesday 19th September (with travel in the evening back to Newcastle) to allow participants a glimpse of some of the region’s archaeological and historic landscapes, but we also hope some of you will be able to arrive early or stay later to visit more of the region.

The conference has been organised jointly by Newcastle University (The McCord Centre for Landscape [http://www.ncl.ac.uk/mccordcentre/] and the School of History, Classics and Archaeology) and Durham University (the Department of Archaeology and its partners). Sessions will be held in Newcastle University on 18th and 20th September, and in Durham during the morning of 19th September. The two Universities share an almost century-long tradition of archaeological research and teaching, which is spread across the world as well as closer to home. They both also attract many non-UK teachers and students, from first degree to post-doctorate, and contribute to many European projects and networks, most recently the McCord Centre’s CHeriScape project and Durham’s REFIT project, both supported by the JPI Cultural Heritage Programme, and (from 2019) a major Marie Curie Skłodowska innovative Training Network, led by VU Amsterdam, called Heriland.

The trajectory of growth and expansion of the first four conferences is continuing with LAC2018. Over 300 people have registered, and sessions, papers and posters have been submitted by colleagues from over 40 countries (predominantly from European countries but also from the Americas, Africa, Asia and Oceania). The academic programme is larger than any of the previous conferences, with a very broad disciplinary and thematic range amongst the 35 separate sessions which will run in nine parallel strands through the whole conference. We hope participants will be able
to navigate their way around this conference-scape using this Programme and Abstracts Book: all the sessions and presentation abstracts are presented in a hierarchy of detail moving from the Outline Timetable via a simple list of session and paper titles in ‘day order’ to the full session abstracts and then oral and poster abstracts.

As always with such conferences, its success – indeed its very existence – depends upon the partnership of very many people, from the Sjoerd Kluiving, IALA Chair, who very kindly invited us to organise LAC2018, to our local organising committee and conference helpers whose names are listed below, to every session organiser – including especially our four plenary (keynote) speakers (Meggen Gondek, Alfredo Gonzalez-Ruibal, Elif Koparal and Nicki Whitehouse) - and to all participants, the true foundation of any conference, particularly one like LAC which frequently welcomes back a large number of regular, recurring attendance. In particular, although it is perhaps invidious to single out a few individuals, Francesco Carrer built and maintained the Conference webpage as part of the McCord Centre website, Niels Dabaut marshalled and co-ordinated the poster presentations, Caron Newman designed and coordinated the four excursions, and we are very grateful of course to our colleagues who will lead the excursions: Rob Collins, Al Oswald, John Pendlebury and Matthew Symonds. We are grateful in Durham to Penny Wilson, Kate Mees and the Event Durham team, and in Newcastle University, particularly for the assistance of Lizzie Bell, who throughout the whole process has provided the constancy, efficiency, patience and multiple skills needed to organise the conference, very ably supported in the past few months (not least in producing this Programme and Abstracts book) by Kerry Shaw and Nicky Garland.

We are also grateful to the cooperation of both of our Universities who have made the conference possible.

We hope you enjoy the conference,

Graham Fairclough, Dan Lawrence and Sam Turner

LAC2018 Conference Organising Committee

Graham Fairclough (HCA - Newcastle)
Mark Kincey (Geography - Durham)
Andy Large (GPS - Newcastle)
Dan Lawrence (Archaeology - Durham)
Lisa-Marie Shillito (HCA - Newcastle)
Maggie Roe (Architecture, Planning & Landscape – Newcastle)
Sam Turner (HCA - Newcastle)
Penny Wilson (Archaeology - Durham)
Elizabeth Bell (HCA - Newcastle)
Francesco Carrer (HCA - Newcastle)
Niels Dabaut (HCA - Newcastle)
Nicky Garland (HCA - Newcastle)
Kate Mees (Archaeology - Durham)
Caron Newman (HCA - Newcastle)
Kerry Shaw (HCA - Newcastle)

LAC2018 Volunteers
Kayt Armstrong (Archaeology - Durham)
Daniel Borkowski (Archaeology - Durham)
Peter Brown (Archaeology - Durham)
Ashley Coutu (HCA - Newcastle)
Perry Gardner (Archaeology - Durham)
Israel Hinojosa-Balino (Archaeology - Durham)
Freya Horsfield (Archaeology - Durham)
Adam Leigh (HCA - Newcastle)
Louisa Matthews (HCA - Newcastle)
Jonathan Quiery (Archaeology - Durham)
Max Ratcliffe (Archaeology - Durham)
Nelli-Johanna Saari (Archaeology - Durham)
Tudor Skinner (Archaeology - Durham)
Eric Tourigny (HCA - Newcastle)
Emma Watson (Archaeology - Durham)
STRUCTURE OF THE CONFERENCE

Day 1 – Monday 17th September

The conference begins with an evening reception held in Newcastle at the Wylam Brewery, Palace of Arts, Exhibition Park, Newcastle upon Tyne, NE2 4PZ. Founded in 2000 Wylam is a 30 Barrel Micro Brewery that resides at the Palace of Arts in Exhibition Park, just to the north of Newcastle University. The reception will begin at 16.00. A registration desk will be set up at Wylam Brewery for delegates to register while enjoying a complementary drink and canapes. It is possible to register later in the conference. Please ask a member of staff for further information.

Day 2 – Tuesday 18th September

The first full day of the conference will be held at Newcastle University. Registration will be open from 08.00 in the foyer of the Armstrong Building. The day will start with the opening ceremony and two plenary lectures followed by a coffee break and two session blocks (11.00-13.00 and 14.00-16.00) will take place across the day separated by lunch. All sessions will be held on the ground, 1st and 2nd floors of the Armstrong Building while coffee breaks and lunch will take place in the foyer of the Armstrong Building and the King’s Hall. A ‘Dreamwork’ session will take place from 09.00 in the Armstrong Building in Room 1.05 (see p.19 for details). A poster session will take place from 16.30 in the foyer of the Armstrong Building and The Recital Room, on the ground floor. Poster presenters will be at hand to answer any questions delegates may have. A prize will be presented to the best poster, kindly donated by BAR Publishing.

The day will end with a conference dinner at The Boiler Shop, 20 South Street, Newcastle upon Tyne, NE1 3PE. Delegates can arrive by 19:00 and dinner will begin 19.30. Dating back to the 1820s, the Boiler Shop was a focal part of the Stephenson Co locomotives works but is now used to hold food and music events. A three course dinner will be served, followed by a live band and a DJ.

Day 3 – Wednesday 19th September

This day’s activities will be held at Durham University. Buses will depart from Claremont Road, Newcastle University (outside the Great North Museum) at 8am to transport delegates to the Durham campus. The sessions will be spread across a number of buildings in the centre of the Mountjoy campus. Volunteers will be available to guide delegates to the different buildings upon their arrival. Buses will drop off delegates outside the Chemistry Building. Two Session blocks (09.00-10.30 and 11.00-13.00) will take place in the morning, separated by a coffee break. Coffee breaks will take place in each building, except the Archaeology building. The ‘Dreamwork’ session (p.19) will continue in the morning from 09.00 at Durham University and will be held in Palatine Centre in Room PCL057.
In the afternoon, delegates may attend one of four excursions (see p.232 for details); a walking tour of Durham Historic City and World Heritage Site, a visit to Epiacum Roman Fort, a visit to Hadrian’s Wall and a tour of Historic Sunderland. Choices of excursion were made via web form prior to the conference. Buses will depart from outside the Chemistry Building (shown on maps) promptly at 13.30. A packed lunch will be provided and must be collected from 13.00 from the Scarborough Café on the Ground Floor of the Chemistry Building. Following the excursions the buses will drop delegates back to Newcastle University. If delegates have chosen not to attend an excursion then a coach will take people back to Newcastle University at 16.30. This coach will depart from the same location as the excursions.

In the evening a documentary film entitled ‘The Hidden Landscapes of Naxos’ will be shown at the Tyneside Cinema, 10 Pilgrim St, Newcastle upon Tyne NE1 6QG. The documentary, a collaboration between the McCord Centre, Newcastle University and ERT, explores some of these hidden landscapes of Naxos, the largest island of the Cyclades, through its archives, its monuments and the stories of people who live and work these. The film will be shown at 8pm and will be followed by a questions and answer session with the documentary film makers. Please note that this is film is additional to the main conference. Tickets are free but limited to 100 places due to the size of the cinema and are available via Eventbrite.

**Day 4 – Thursday 20th September**

The final day of the conference returns to Newcastle University. Three session blocks (09.00-11.00; 11.30-13.30 and 14:30-16.00) will take place across the day, separated by coffee breaks and lunch. Again all sessions will be held on the ground, 1st and 2nd floors of the Armstrong Building while coffee breaks and lunch will take place in the foyer of the Armstrong Building and the King’s Hall. From 09.00 onwards The ‘Dreamwork’ session will take place from 09.00 in the Armstrong Building in Room 1.05 (p.19).

The IALA Business meeting will take place across lunch break in Room 1.28. The final two key note speakers and a closing ceremony will take place in the King’s Hall from 16:00.

If you have any questions about the schedule of the conference please ask any of the staff or volunteers present throughout the four days.
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>08:00-10:30</td>
<td><strong>Registration</strong> - Ground Floor, Armstrong Building</td>
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<tr>
<td>09:00-10:30</td>
<td><strong>Conference Opening and Plenary</strong> (1. Nikki Whitehouse and 2. Meggen Gondek) - Kings Hall</td>
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<tr>
<td>10:30-11:00</td>
<td><strong>Coffee</strong></td>
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<tr>
<td>11:00-13:00</td>
<td><strong>Lecture</strong> (Details in the table below)</td>
<td>G.08, G.09, G.11, G.15, G.17, 1.03, 1.04, 2.16, 2.98</td>
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<tr>
<td>13:00-14:00</td>
<td><strong>Lunch</strong></td>
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<tr>
<td>14:00-16:00</td>
<td><strong>Lecture</strong> (Details in the table below)</td>
<td>G.08, G.09, G.11, G.15, G.17, 1.03, 1.04, 2.16, 2.98</td>
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<tr>
<td>16:00-16:30</td>
<td><strong>Coffee</strong></td>
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<tr>
<td>16:30-18:30</td>
<td><strong>Poster Session</strong> - Armstrong Building Foyer / The Recital Room</td>
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<tr>
<td>19:00-00:00</td>
<td><strong>Conference Dinner</strong> - The Boiler Shop, 20 South Street, Newcastle upon Tyne, NE1 3PE</td>
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**OUTLINE TIMETABLE**

**Tuesday 18th September 2018 - Newcastle University, Armstrong Building**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>11:00-13:00</td>
<td>Landscape Archaeology as Landscape Planning (52D Part 1)</td>
<td>G.08, G.09, G.11, G.15, G.17, 1.03, 1.04, 2.16, 2.98</td>
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<tr>
<td>11:00-13:00</td>
<td>Landscape as Excavation (45E Part 1)</td>
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<td>11:00-13:00</td>
<td>Archaeological prospection in high-mountain environments (26G Part 1)</td>
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<td>11:00-13:00</td>
<td>Understanding Cultural Landscapes from Space (6C)</td>
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<td>11:00-13:00</td>
<td>Speaking Monuments - the stories behind the stones (21F)</td>
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<td>11:00-13:00</td>
<td>Dynamic Landscapes (11B)</td>
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<td>11:00-13:00</td>
<td>Landscape Archaeology in Africa’s later prehistory (27G)</td>
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<tr>
<td>11:00-13:00</td>
<td>Roman Military Landscapes (49G Part 1)</td>
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<tr>
<td>11:00-13:00</td>
<td>Geo-Archaeology and Landscape (1A Part 1)</td>
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<tr>
<td>14:00-16:00</td>
<td>Landscape Archaeology as Landscape Planning (52D Part 2)</td>
<td>G.08, G.09, G.11, G.15, G.17, 1.03, 1.04, 2.16, 2.98</td>
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<tr>
<td>14:00-16:00</td>
<td>Landscape as Excavation (45E Part 2)</td>
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<tr>
<td>14:00-16:00</td>
<td>Archaeological prospection in high-mountain environments (26G Part 2)</td>
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<td>14:00-16:00</td>
<td>Food in the Urban Landscape (47D)</td>
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<td>14:00-16:00</td>
<td>Movescape (40E)</td>
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<td>14:00-16:00</td>
<td>Converting the Landscape (50F)</td>
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<tr>
<td>14:00-16:00</td>
<td>Coastal Dynamics of the Eastern Mediterranean (51B)</td>
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<tr>
<td>14:00-16:00</td>
<td>Roman Military Landscapes (49G Part 2)</td>
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<tr>
<td>14:00-16:00</td>
<td>Geo-Archaeology and Landscape (1A Part 2)</td>
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**Coffee - 16.00-16.30**
### Wednesday 19th September 2018 - Durham University (Various Buildings)

**From 08:00**
**Transport to Durham** - Buses leave 8am from Claremont Road, outside Great North Museum, Newcastle upon Tyne
Drop off outside Chemistry Building, Durham University

| Sessions |
| --- | --- | --- | --- | --- |
| **Building** | **Earth Sciences (Second Floor)** | **Chemistry (Ground)** | **Palatine** | **Archaeology** |
| Room | ES228 | ES229 | ES230 | ES231 | ES236 | CG060 | CG093 | Hogan Lovells | D210 |
| **09:00-10.30** | Multi-proxy environmental archaeology in aquatic settings (55 & 3A) | Remote sensing in Landscape Archaeology Research (29C) | Archaeology, Methods, Action! (22E Part 1) | Where Next for Historic Landscape Characterisation (39D Part 1) | Agricultural Landscapes of the past (53D Part 1) | Landscapes and Heritage on a National Scale (48C Part 1) | Geo-archaeology and Landscape (1A Part 3) | Landscape and Belief (24F Part 1) | Towards a Landscape Archaeology of Wetlands (38A Part 1) |
| **Coffee** - 10.30-11.00 | | | | | | | | | |
| **11:00-13.00** | Urban Heritage Appeals - Or What? (54D) | Landscape Archaeology and Reproducible Research (44C) | Archaeology, Methods, Action! (22E Part 2) | Where Next for Historic Landscape Characterisation (39D Part 2) | Agricultural Landscapes of the past (53D Part 2) | Landscapes and Heritage on a National Scale (48C Part 2) | Geo-archaeology and Landscape (1A Part 4) | Landscape and Belief (24F Part 2) | Towards a Landscape Archaeology of Wetlands (38A Part 2) |
| **Excursions** (including packed lunch) – Pick up packed lunches from Scarborough Café (Chemistry Building Ground Floor) | | | | | | | | | |
| | **Buses depart from Stockton Road - Return to Claremont Road, outside Great North Museum Newcastle upon Tyne, between 18.30-19.00** | | | | | | | | |
| | **20:00-22.00** | **Documentary showing of ‘The Hidden Landscapes of Naxos’** - Tyneside Cinema, 10 Pilgrim St, Newcastle upon Tyne NE1 6QG | | | | | | | |
### Thursday 20th September 2018 - Newcastle University, Armstrong Building

<table>
<thead>
<tr>
<th>Time</th>
<th>Sessions</th>
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<tr>
<td>09:00-11.00</td>
<td><strong>Archaeo-hydrology as a Discipline?</strong> (43A Part 1)</td>
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<td>Resilience, Adaptation and Innovation in the Wake of Natural Disasters (37B)</td>
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<td>Further Horizons - People, myths, beliefs (57.1H)</td>
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<td>Markers and Mobilities: Interpreting Dynamic Landscapes (34E Part 1)</td>
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<td><strong>Trans-humance</strong> (20G Part 1)</td>
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<td>Settlement Desertion and Cultural Landscape Transformation s (8G)</td>
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<td><strong>Landscape and Belief</strong> (24F Part 3)</td>
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<td><strong>Aerial Approaches in Landscape Archaeology</strong> (28C)</td>
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<td></td>
<td><strong>Classical Archaeology and Landscapes</strong> (42E Part 1)</td>
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<tr>
<td>11:30-13.30</td>
<td><strong>Archaeo-hydrology as a Discipline?</strong> (43A Part 2)</td>
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<td>A ‘natural’ place for landscape archaeology (56D Part 1)</td>
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<td>Further Horizons - Histories of landscapes (57.2H)</td>
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<td>Markers and Mobilities: Interpreting Dynamic Landscapes (34E Part 2)</td>
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<td>Trans-humance (20G Part 2)</td>
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<td>The ‘Why’ in Landscape Archaeology (32E Part 1)</td>
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<td>A Sense of Place: Community Archaeology in the Landscape (35D)</td>
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<td>Climate, Heritage and Environments (18B)</td>
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<td></td>
<td><strong>Classical Archaeology and Landscapes</strong> (42E Part 2)</td>
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<tr>
<td>14:30-16.00</td>
<td><strong>Archaeo-hydrology as a Discipline?</strong> (43A Part 3)</td>
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<td>A ‘natural’ place for landscape archaeology (56D Part 2)</td>
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<td>Further Horizons - Making &amp; (Mis)using Landscapes (57.3H)</td>
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<td>Trans-humance (20G Part 3)</td>
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<td>The ‘Why’ in Landscape Archaeology (32E Part 2)</td>
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<td>16:00-18.00</td>
<td><strong>Plenary</strong> (3. Elif Koparal and 4. Alfredo González-Ruibal) &amp; <strong>Closing Ceremony</strong> - Kings Hall</td>
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**Coffee** - 11.00-11.30

**Lunch** - 13.30-14.30, **IALA annual business meeting** (room 1.28)

**Classical Archaeology and Landscapes** (42E Part 2)
Dr. Nicola Whitehouse,
Associate Professor (Reader) in Physical Geography, School of Geography, Earth and Environmental Sciences, Plymouth University, UK

Nicola Whitehouse is an environmental archaeologist with a broad inter-disciplinary interest in human-environment interactions, mostly over the Holocene, looking at the complex relationships between humans, climate, landscape, society, and ecosystems. Nicola studied a BA in Archaeology at the University of Newcastle upon a Tyne, then an MSc in Environmental Archaeology and Palaeoeconomy at the University of Sheffield, followed by a PhD entitled ‘The evolution of the Holocene wetland landscape of the Humberhead Levels from a fossil insect perspective’. Following a brief stint at the University of Exeter as a post-doctoral researcher, Nicola moved onto Queen’s University Belfast as a lecturer and then senior lecturer in Palaeoecology, before moving to Plymouth in 2013 to take up a Readership in Physical Geography.

Nicola’s research uses environmental proxies, alongside archaeological records and chronological methodologies to explore human-environment relationships. Nicola is interested in the processes of physical and ecological development of the Holocene landscape and their relationship to the emergence of the cultural landscape and the transition to agriculture. The geographic focus of Nicola’s research is primarily on the North Atlantic region, in Ireland and Britain and their Atlantic fringe context.

Prehistoric land-use history and food production in early agricultural societies

The transition to agriculture, and the dietary opportunities afforded by it, represents a major factor in Holocene global landscape change and signalled the start of many key cultural developments across many regions of Europe and elsewhere. The landscape consequences of this major shift in subsistence strategy likely also played a significant role in the onset of many of the major environmental and climatic challenges we now face. Consequently, there is now a global level effort to develop an integrated understanding of prehistoric land-use history, relationships to
food production and effects on biophysical systems. This work is being driven by the PAGES-funded Landcover6k project (http://www.pages-igbp.org/ini/wg/landcover6k/intro, an international and interdisciplinary working group dedicated to reconstructing global Holocene land use and land cover. The goal of the project is to provide relevant, empirical data on global past anthropogenic land-cover and land-use change to climate modellers. I outline why land-use change is important for understanding climate forcing, why its effects on climate remain poorly understood and some of the modelling approaches that have been developed to understand the role of land-use change on the climate system. However, modelling approaches do not fully capture the real changes shown in the climate record, indicating that human-environmental effects are not currently fully captured, whilst comparisons between models and pollen and archaeological data indicate significant differences. Pollen-based reconstructions of past land cover use pollen-vegetation modelling approaches, with mapping of pollen-based land-cover change using spatial statistics; historical and archaeological data are up-scaled and summarized onto maps of major land-use categories, linked to quantitative attributes. Alongside these developments, there has been an enhanced appreciation within the archaeological community of the value of creating synthetic archaeological narratives that are at the spatial and temporal scales necessary to address questions of land cover change, as well as a wish to improve understanding of the broader patterns around food production at a regional/continental scale. New approaches to chronology, especially Bayesian approaches, have also allowed the tempo and pace of change of the archaeological and palaeoecological record to be assessed on a common time-scale. Using case studies from Ireland, Britain and Europe some of these issues are explored, that allow a more nuanced understanding of the human-environment relationship that can often be surprising and unexpected. Often, these run contrary to progressive evolutionary expectations that may be implicit in some land cover change models, whilst also offering significant new insights into intensity of agricultural usage, practice and change over long time scales.
Professor Meggen Gondek
Department of History and Archaeology, University of Chester,
UK

Meggen Gondek is an archaeologist with interests in early medieval northern Britain, especially sculptured stones and their landscapes. An undergraduate degree in Archaeology at Tufts University (Medford, MA) eventually led to an MPhil and PhD at the University of Glasgow and the beginning of both a taste for malt whisky and Scottish carved stone monuments. Most recently she has co-directed a project At Rhynie, Aberdeenshire, a Pictish power centre of the 5th -6th centuries AD. Rhynie’s impressive structural evidence and finds assemblage is providing opportunities for not only reconsidering Pictish power and settlement, but also the use of sculptured monuments and the chronology of Pictish art. Her ‘day job’ involves being the Head of the Department of History and Archaeology at the University of Chester.

For those about to rock - carved stone monuments, materiality and landscape in early medieval Scotland

Recent developments in the archaeology of early medieval Scotland have highlighted that even familiar and iconic categories of material culture, such as carved stones and crosses, still have much more to tell us about the past. The tradition of carving stone monuments with a range of early Christian symbols, memorial inscriptions, and Pictish symbols begins as early as the 5th century AD in some places in Scotland. The relationship of such monuments to their landscapes has played a significant role in scholarship. This has ranged from the traditional large-scale distribution map, to regional mapping of particular symbols across landscapes, to large scale mapping against other monuments to detect ideological and political changes and focus on the contextual landscapes of particular stones sometimes with direct archaeological investigation at sites or settings of monuments. This paper takes the opportunity to build on these landscape approaches of varying scales to consider how carvings and the process of creating them, the stones themselves and their settings remodel and recreate landscape in an early medieval context. Primarily focusing on mainland Scotland and those areas associated with the Picts, the paper seeks to explore how and why stone is used in a landscape that is largely dominated by upright elements of timber in its remodelled (e.g. planks or posts in the built landscape) and natural state (trees and woodlands). The juxtapositions of timber and stone uprights and the different practices of shaping and transforming those raw materials will be considered alongside the symbolic statements perhaps communicated by carved monuments. By doing this the paper aims to provide a way of engaging with early medieval concepts of landscape and its reformation and recreation.
Politcal Ecologies and Cultural Landscapes: New Perspectives in Community Archaeology

Archaeological survey is still the most efficient scientific method to document the cultural landscapes and its features. Approaches in archaeological survey are changing, however, as methodologies move away from an anthropocentric understanding of the landscape. Taking archaeological landscape as a component of the current landscape, we can see it as an evolving, shifting and transforming part of the landscape in which we live - current one - in this sense archaeological surveys are aimed at defining past landscapes not as the "remains" of the past but as a living part of today’s environment. Making past cultural landscapes more visible for the non-academic communities brings up the issue of its sustainable preservation. This is a difficult task particularly in countries with neo-liberal governments. Neoliberal activities sponsored by the governments such as hydroelectric power plants, quarries, mines etc. are the main threat for the preservation of cultural landscapes. Thinking of political ecologies in survey areas and engagement with local NGO’s is potentially creating a resistance against the destruction. KLASP (Klazomenai Survey Project) is a case study from Western Turkey which takes the responsibility of defending the archaeological landscape by facilitating co-creative approaches to landscape with local communities. It develops innovative methods for landscape archaeology, building a new...
approach to historic landscapes through a series of successive steps, which includes the use of Historic Landscape Characterization to model and present the changing historic character of the research area making use of the survey data. The resulting models are being used to develop skills, create knowledge and promote understanding of landscape as cultural heritage amongst both academic researchers and non-specialist community groups. By engaging local actors in the definition and valorisation of cultural landscape as heritage. In several parts of the world archaeological projects have begun to promote the landscape as a vector for socially engaged planning and development. These approaches are also reflected in methodologies of community archaeology which avoid hierarchical and didactic dialogues, and aim to shift the position of the local communities from passive to active positions in implementing a sustainable preservation of the landscapes.

Dr. Alfredo González-Ruibal
Institute of Heritage Sciences, CSIC (Consejo Superior de Investigaciones Científicas-Spanish National Research Council), Spain

Alfredo González-Ruibal is an archaeologist with the Institute of Heritage Sciences of the Spanish National Research Council. His research focuses on the archaeology of the contemporary past and African archaeology. His two main projects at the moment have to do with the transformation of urban landscape in Madrid as a result of the Spanish Civil War and the making of the borderland between Sudan and Ethiopia from Prehistory to the 21st century.

Terrain Vague. An archaeology of interstitial landscapes

Archaeology has devoted plenty of attention to the most visible forms of landscape: theatres of power, ritual spaces, urban scenarios, agricultural landscapes. Whether we are interested in the sense of place or in site catchment analysis, it is the normative dimension of landscape that has been, understandably, more thoroughly researched. In this talk, I would like to explore instead those territories that lie in-between and are not even perceived in terms of landscape, but often as a void, a stain or a leftover. They have been, however, the focus of attention by artists, photographers, poets and architects. To make sense of these interstitial landscapes, I will be drawing on their work. I find particularly useful the concept of terrain vague, developed by architect de Solà-Morales. The notion of “vague”, as deployed by de Solà-Morales, is related not only with emptiness
(vacuum), but also with the idea of something that is not occupied and therefore free, available, indeterminate. From this point of view, terrain vague can become a space of promise, contestation and creativity. I will illustrate the concept with archaeological examples from the 20th and 21st centuries, a period for which interstitial landscapes have been particularly well researched. In particular, I would like to present a terrain vague that I met by chance when conducting archaeological research in the middle of Madrid. This will help me prove the usefulness of archaeology for exploring a dimension that has been often neglected in artistic interventions: historicity. At the same time, I will try to show that interstitial landscapes are almost everywhere to be found and that they may provide a radically different view of hegemonic space—in the past as well as in the present.
**DREAMWORK SESSION**

The Worldwide Indigenous Science Network (WISN) invites conference participants to join us each morning for an immersion in Indigenous Dreamwork. This is an opportunity to better understand your own creative process and its link to your science as well as furthering the development of a collective model of Archaeological Dream Research.

Based in Dr. Apela Colorado’s Oneida traditions, WISN’s dreamwork is refined for contemporary times and disciplines through a decade of research on Sacred Sites with indigenous people and scientists in South Africa, Hawaii and France.

What to Expect: Sessions begin daily at 09.00. We open with music, burning of cedar and a prayer. Participants, seated in a circle, are invited to share a dream or to listen in silence. We record each dream (via Scribe and Glypher) and later a team reviews, analyzes, and synthesizes the dreams, which will be shared with conference participants following the conclusion of the conference. We end punctually, with a prayer, and participants may come and go quietly throughout the session. Typically the session last from between 45minutes to 1 hour, depending on the number of participants.

The Dreamwork Session will take place from 09.00 on each day of the conference in the following locations:

Newcastle University – Armstrong Building Room 1.05 (1st Floor)

Durham University - Palatine Centre Room PCL057
MAPS AND FLOOR PLANS

Newcastle University
Armstrong Building
2nd Floor

- Men's Toilets
- Women's Toilets
- Disabled Toilet
- Stairs
- Lift
- Spencer Watson Lecture Theatre (Room 2.98)
- Business School Office
- Room 2.16
- Men's Toilets
- Disabled Toilet
- Women's Toilets
- Disabled Toilet
MAPS AND FLOOR PLANS

Durham University
Buildings where sessions take place. Key: 15 = Chemistry Building; 41 = Archaeology Building; 43 = Calman Learning Centre and Earth Sciences; 60 = Palatine Centre

Note: There is no floor plan available for the Archaeology building - please see notices on the day for directions to lecture rooms.
## SCHEDULE OF SESSIONS AND PAPERS

**Tuesday 18th September, 11:00-13:00, Newcastle University**

### SESSION 52D – Part 1 (of 2) LANDSCAPE ARCHAEOLOGY AS LANDSCAPE PLANNING

**(Burgers & van Manen)**

**Armstrong Building – Room G.08**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>11.00</td>
<td>Introduction to Session (Gert-Jan Burgers &amp; Niels van Manen)</td>
</tr>
<tr>
<td>11.20</td>
<td>Using heritage for development in abandoned landscapes (Guillermo Reher)</td>
</tr>
<tr>
<td>11.40</td>
<td>Ancient Appia Landscapes Project: archaeological research and landscapes planning (Alfonso Santoriello)</td>
</tr>
<tr>
<td>12.00</td>
<td>Historic Landscape Characterization (HLC) for a proposed Geopark in the USA (Charlie Yuill)</td>
</tr>
<tr>
<td>12.20</td>
<td>Betwixt and between: post-industrial wastelands in the 'gap between past and future' (Karin Stadhouders)</td>
</tr>
<tr>
<td>12.40</td>
<td>Mapping Adriatic Landscape project. Non-invasive diagnostics for the archaeological impact assessment: in search for a balanced planning strategy between research, conservation and territorial planning (Federica Boschi)</td>
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</tbody>
</table>

### SESSION 45E – Part 1 (of 2) LANDSCAPE AS EXCAVATION

**(Aldred & Knight)**

**Armstrong Building - Room G.09**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>11.00</td>
<td>Introduction to Session (Oscar Aldred &amp; Mark Knight)</td>
</tr>
<tr>
<td>11.20</td>
<td>The habitual and social landscapes of late Mesolithic hunter-gatherers and early Neolithic farmers in the Eden Valley, Cumbria (Fraser Brown)</td>
</tr>
<tr>
<td>11.40</td>
<td>A landscape through time: The West Mainland of Shetland (Claire Christie)</td>
</tr>
<tr>
<td>12.00</td>
<td>Landscape process as excavation: The Magdalenian site of Les Varines, Jersey (Chantal Conneller)</td>
</tr>
<tr>
<td>12.20</td>
<td>Slots, pots and landscape (Oscar Aldred)</td>
</tr>
<tr>
<td>12.40</td>
<td>Discussion (Oscar Aldred &amp; Mark Knight)</td>
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</tbody>
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### SESSION 26G – Part 1 (of 2) ARCHAEOLOGICAL PROSPECTION IN HIGH-MOUNTAIN ENVIRONMENTS

**(Carrer & Gonzalez-Alvarez)**

**Armstrong Building - Room G.11**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td>11.00</td>
<td>Introduction to Session (Francesco Carrer &amp; David Gonzalez-Alvarez)</td>
</tr>
<tr>
<td>11.10</td>
<td>Upwards over the mountains. Archaeological Field Surveys, Kleinwalsertal (Austria) (Caroline Posch)</td>
</tr>
<tr>
<td>11.35</td>
<td>Landscape survey in the High Caucasus: Power and persistence in the Dariiali Gorge, Georgia (Kristen Hopper, Lisa Snape-Kennedy &amp; Dan Lawrence, Lana Chologauri &amp; Davit Naskidashvili)</td>
</tr>
<tr>
<td>12.00</td>
<td>Aerial approach between Archaeology, History and Ethnography on Cretan Mountains (Gianluca Cantoro)</td>
</tr>
<tr>
<td>12.25</td>
<td>Surveying beyond the comfort zone. Research strategies in the Central Apennine, Italy (Jesus Garcia Sanchez)</td>
</tr>
<tr>
<td>12.50</td>
<td>Discussion (Francesco Carrer &amp; David Gonzalez-Alvarez)</td>
</tr>
</tbody>
</table>
**Tuesday 18th September, 11:00-13:00, Newcastle University**

**SESSION 6C - UNDERSTANDING CULTURAL LANDSCAPES FROM SPACE IN THE ERA OF OPEN, BIG AND MULTI-TEMPORAL DATA (Tapete & Cigna)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00</td>
<td>The use of old and recent satellite sensors to detect archaeological sites (Andrea Ciampalini, Monica Bini, Giovanni Zanchetta, Adriano Ribolini &amp; Ilaria Isola)</td>
<td>Armstrong Building - Room G.15</td>
</tr>
<tr>
<td>11.20</td>
<td>The reconstruction of the Bronze Age landscapes of South Asia: a large-scale, multi-temporal and multi-source approach using cloud parallel computing (Hector A. Orenge, Arnau Garcia, Adam S. Green, Francesc C. Conesa &amp; Cameron Petrie)</td>
<td></td>
</tr>
<tr>
<td>11.40</td>
<td>Identification, documentation and monitoring historic landscapes: new data, new challenges, old problems (Dominik Ruciński &amp; Włodzimierz Rączkowski)</td>
<td></td>
</tr>
<tr>
<td>12.00</td>
<td>Monitoring archaeological looting and urbanisation in cultural landscapes using Copernicus Sentinel-2 time series (Deodato Tapete &amp; Francesca Cigna)</td>
<td></td>
</tr>
<tr>
<td>12.20</td>
<td>Traces through time: automating object detection in archaeological landscape time series imagery (Arianna Traviglia)</td>
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<tr>
<td>12.40</td>
<td>Widening the landscape perspective on a road trace between Birrens and Ladyward, Dumfriesshire (Ruth Beusing)</td>
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</tbody>
</table>

**SESSION 21F - SPEAKING MONUMENTS - THE STORIES BEHIND THE STONES (Freikman & Gassner)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00</td>
<td>Introduction to Session (Michael Freikman &amp; Evie Gassner)</td>
<td>Armstrong Building - Room G.17</td>
</tr>
<tr>
<td>11.05</td>
<td>Local Landscapes and Soundscapes and the Location of Ancient Stone Circles: A Multi-Disciplinary Investigation (Keith Harvey &amp; Sarah Best)</td>
<td></td>
</tr>
<tr>
<td>11.25</td>
<td>Constructing cosmogonical landscapes in ancient Thebes, Egypt (Angus Graham, Willem Toonen &amp; Jan Peeters)</td>
<td></td>
</tr>
<tr>
<td>11.45</td>
<td>Living in the villa. New data on the historical and ideological dynamics of the Volusii Saturnini suburbanum at Lucus Feroniae (Armando Cristilli)</td>
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<tr>
<td>12.05</td>
<td>Completing the landscape: the Acropolis of Athens (Eva Andronikidou)</td>
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</tr>
<tr>
<td>12.25</td>
<td>Portage crosses are witnesses of the development of historical waterways of the Russian Plain (Natalia Erman, Olga Aleksandrovskaya &amp; Viacheslav Nizovtsev)</td>
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</tr>
<tr>
<td>12.45</td>
<td>Discussion (Michael Freikman &amp; Evie Gassner)</td>
<td></td>
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</table>

**Session 11B - DYNAMIC LANDSCAPES: THE HUMAN ROLE IN RESHAPING THE GEOMORPHOLOGY OF ARID ENVIRONMENTS (Abu-Jaber & Hamarneh)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00</td>
<td>Changing fluvial landscapes in northwest India: using geoarchaeology to assess human-environment interactions in the Rakhigarhi hinterland, NW India (Joanna Walker &amp; Charles French)</td>
<td>Armstrong Building - Room 1.03</td>
</tr>
<tr>
<td>11.20</td>
<td>Roman Land Use Patterns in Wādī al-‘Arab (Jordan) (Linda Olsvig-Whittaker, Katja Soennecken &amp; Patrick Leiverkus)</td>
<td></td>
</tr>
<tr>
<td>11.40</td>
<td>Prehistoric Modification of the Basalt ‘Harra’ Landscape (Jordan) for Ease of Access (Stefan Smith)</td>
<td></td>
</tr>
<tr>
<td>12.00</td>
<td>Modelled Landscape Dynamics: Role of Past Climate &amp; Land Use in Landscape Deterioration (Peter Wigand, Myles McCallum &amp; Masoud Asgharianrostami)</td>
<td></td>
</tr>
<tr>
<td>12.20</td>
<td>Environmental history, populating of area and terraced agro-landscapes of mountainous Dagestan (Eastern Caucasus, Russia) (Natalia Ryabogina, Alexander Borisov &amp; Idris Idrisov)</td>
<td></td>
</tr>
<tr>
<td>12.40</td>
<td>Seeing a changing landscape using carbonate crusts: Wadi Heremeyeh (Nizar Abu-Jaber &amp; Catreena Hamarneh)</td>
<td></td>
</tr>
</tbody>
</table>
**Tuesday 18th September, 11:00-13:00, Newcastle University**

### Session 27G - LANDSCAPE ARCHAEOLOGY IN AFRICA’S LATER PREHISTORY: NEW METHODS AND CURRENT RESEARCH (Khalaf)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00</td>
<td>Using remote sensing for Islamic archaeology in Ethiopia</td>
<td>Nadia Khalaf</td>
</tr>
<tr>
<td>11.20</td>
<td>Methodological Approach for Historic Landscape Characterization of Ile-Ife, Southwest Nigeria</td>
<td>Akinbowale Akintayo</td>
</tr>
<tr>
<td>11.40</td>
<td>Surveying Saharan landscapes: a case study from southern Morocco</td>
<td>Martin Sterry, David Mattingly, Youcef Bokbot</td>
</tr>
<tr>
<td>12.00</td>
<td>Comparative Study Of Archaeological Sites Of Karimama And Banikoara (North Benin, West Africa): Spatial Distribution, Physical Characteristics And Interests For A Better Knowledge Of The Settlement History</td>
<td>Barpougouni Mardjoua, Didier N'Dah</td>
</tr>
<tr>
<td>12.20</td>
<td>Remote-sensing training in Libya and Tunisia</td>
<td>Matthew Hobson, Julia Nikolaus, Louise Rayne</td>
</tr>
<tr>
<td>12.40</td>
<td>Discussion</td>
<td>Nadia Khalaf</td>
</tr>
</tbody>
</table>

### Session 49G - Part 1 (of 2) ROMAN MILITARY LANDSCAPES (Oswald, Jones & Hardwick)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00</td>
<td>And all of a sudden, they are everywhere! The need for narratives to assess the diachronic impact of the Roman army in NW Iberia</td>
<td>José Manuel Costa-García</td>
</tr>
<tr>
<td>11.20</td>
<td>The defensive wall of Giribaile, Andalucia in context</td>
<td>Luis Gutiérrez, María Alejo, Antonio Ortiz</td>
</tr>
<tr>
<td>11.40</td>
<td>The landscapes of Julius Caesar’s landing sites in Britain: 55 and 54 BC</td>
<td>Andrew Fitzpatrick</td>
</tr>
<tr>
<td>12.00</td>
<td>The landscape of Julius Caesar’s first major battle in Britain: Bigberry, Kent, England</td>
<td>Al Oswald</td>
</tr>
<tr>
<td>12.20</td>
<td>The Roman assault on Burnswark Hill, Dumfriesshire, Scotland</td>
<td>John Reid</td>
</tr>
<tr>
<td>12.40</td>
<td>The Harzhorn Incident: a Germanic-Roman battlefield site in Central Germany</td>
<td>Philipp Hoelzmann, Michael Meyer, Michael Geschwinde</td>
</tr>
</tbody>
</table>

### Session 1A – Part 1 (of 4) GEOARCHAE/OLOGY AND LANDSCAPE (Shillito, Mackay and Blong)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00</td>
<td>Introduction to Session</td>
<td>John C. Blong</td>
</tr>
<tr>
<td>11.05</td>
<td>Terminal Pleistocene Diet and Land Use Patterns at the Paisley Caves, Oregon</td>
<td>John C. Blong, Lisa-Marie Shillito, Dennis L. Jenkins</td>
</tr>
<tr>
<td>11.30</td>
<td>From the river to the sea - Archaeolandscape research and the North/South Metro Line project in Amsterdam (NL) - I: From River Amstel history to palaeogeography</td>
<td>Jerzy Gawronska, Peter Kranendonk, Sjoerd Kluiving, Peter Vos &amp; Simon Troelstra</td>
</tr>
<tr>
<td>11.55</td>
<td>From the river to the river - Archaeolandscape research and the North-/South Metro Line in Amsterdam (NL) - II: From palaeogeography to River Amstel history</td>
<td>Jerzy Gawronska, Peter Kranendonk, Sjoerd Kluiving, Peter Vos &amp; Simon Troelstra</td>
</tr>
<tr>
<td>12.20</td>
<td>Humans and Landscape in Ancient Latium. Considering Landscape Transformation Processes</td>
<td>Michael Teichmann</td>
</tr>
<tr>
<td>12.45</td>
<td>Discussion</td>
<td>Lisa-Marie Shillito, John C. Blong</td>
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</tbody>
</table>
**Tuesday 18th September, 14:00-16:00, Newcastle University**

### SESSION 52D – Part 2 (of 2) LANDSCAPE ARCHAEOLOGY AS LANDSCAPE PLANNING
(Burgers & van Manen)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter(s)</th>
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</thead>
<tbody>
<tr>
<td>14.00</td>
<td>Archaeological heritage and territorial planning in Cilento (Southern Italy). The territory of Elia/Velia.</td>
<td>Francesco Uliano Scelza, Jessica Elia &amp; Maria Tommasa Granese</td>
</tr>
<tr>
<td>14.20</td>
<td>Cultural heritage and sustainable planning in small island landscapes: the case of Therasia island</td>
<td>Emeri Farinetti &amp; Kostas Sbonias</td>
</tr>
<tr>
<td>14.40</td>
<td>Woodland Futures: The Potential and Challenges of Forestry Expansion</td>
<td>Caron Newman</td>
</tr>
<tr>
<td>15.00</td>
<td>Final Discussion</td>
<td>Gert-Jan Burgers &amp; Niels van Manen</td>
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</table>

### SESSION 45E – Part 2 (of 2) LANDSCAPE AS EXCAVATION (Aldred & Knight)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00</td>
<td>How's life in the mountains? Evidence from the prehistoric Hallstatt salt mines</td>
<td>Kerstin Kowarik, Hans Reschreiter &amp; Michael Grabner</td>
</tr>
<tr>
<td>14.20</td>
<td>The Fox and the Hedgehog: site and landscape in the Cambridge region</td>
<td>Jonathan Last</td>
</tr>
<tr>
<td>14.40</td>
<td>Deeply buried spaces of temporal extension – excavating Fenland’s Holocene succession</td>
<td>Mark Knight</td>
</tr>
<tr>
<td>15.00</td>
<td>Final Discussion</td>
<td>Oscar Aldred &amp; Mark Knight</td>
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</table>

### SESSION 26G – Part 2 (of 2) ARCHAEOLOGICAL PROSPECTION IN HIGH-MOUNTAIN ENVIRONMENTS
(Carrer & Gonzalez-Alvarez)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter(s)</th>
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<tbody>
<tr>
<td>14.00</td>
<td>Searching for shepherds’ footprints in the uplands of Babia (NW Iberia)</td>
<td>David González-Álvarez, Jorge Canosa-Betés, Kayt Armstrong &amp; Kristen Hopper</td>
</tr>
<tr>
<td>14.25</td>
<td>Micro-scale remote sensing in the Dolomites: magnetometer survey at the Busa delle Vette</td>
<td>Michele Mazzurana, Francesco Carrer &amp; Fabio Cavulli</td>
</tr>
<tr>
<td>14.50</td>
<td>Final Discussion</td>
<td>Francesco Carrer &amp; David Gonzalez-Alvarez</td>
</tr>
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</table>
**Tuesday 18th September, 14:00-16:00, Newcastle University**

### SESSION 47D – FOOD IN THE URBAN LANDSCAPE (Sarlöv-Herlin)

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<thead>
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<th>Time</th>
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</tr>
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<tbody>
<tr>
<td>14.00</td>
<td>Introduction to Session ‘Food in the Urban Landscape’</td>
<td>(Ingrid Sarlöv Herlin)</td>
</tr>
<tr>
<td>14.20</td>
<td>Dietary diversity among urban populations in ancient ZhengHan city, China</td>
<td>(Yu Dong, Kate Pechenkina &amp; Wenquan Fan)</td>
</tr>
<tr>
<td>14.40</td>
<td>Growing Maya Cities: The Agricultural Transformation of Maya Cities</td>
<td>(Nicholas Dunning &amp; David Lentz)</td>
</tr>
<tr>
<td>15.00</td>
<td>Traces of urban agriculture in medieval and post-medieval Trondheim</td>
<td>(Julian Cadamarteri)</td>
</tr>
<tr>
<td>15.20</td>
<td>Feeding a 17th century Swedish city. Production and consumption in the city-toll accounts</td>
<td>(Ådel Franzén)</td>
</tr>
<tr>
<td>15.40</td>
<td>Food Stories: Revealing the interactions between people and species in urban river landscapes</td>
<td>(Maggie Roe)</td>
</tr>
</tbody>
</table>

### SESSION 40E – MOVESCAPE: TOWARD AN INTEGRATED STUDY OF MOVEMENT, PATHWAYS AND SETTLEMENT DYNAMICS (Nuninger, Verhagen & Opitz)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenter/Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00</td>
<td>Introduction to Session</td>
<td>(Laure Nuninger, Philip Verhagen &amp; Rachel Opitz)</td>
</tr>
<tr>
<td>14.20</td>
<td>Old long-distance routeways in England: towards a more open and flexible perspective</td>
<td>(Andrew Fleming)</td>
</tr>
<tr>
<td>14.40</td>
<td>A combined GIS and remote sensing approach for the modelling and identification of Roman roads. The case of the iter XVII (NW Iberia)</td>
<td>(João Fonte, César Parcero-Oubiña, José Manuel Costa-García &amp; Andrés Menéndez Blanco)</td>
</tr>
<tr>
<td>15.00</td>
<td>Movement Hills Region through the Lens of Hollow ways</td>
<td>(Benjamin Fele)</td>
</tr>
<tr>
<td>15.20</td>
<td>Movement and perception as tools to understand landscape change in pre- and protohistoric western Sicily</td>
<td>(Christopher Sevara, Michael Doneus &amp; Roderick Salisbury)</td>
</tr>
<tr>
<td>15.40</td>
<td>How far can we go? Maps, mobility &amp; medieval settlement in North-West Norfolk, England</td>
<td>(James Albone)</td>
</tr>
</tbody>
</table>

### Session 50F – CONVERTING THE LANDSCAPE: MAPPING RELIGIOUS CONVERSION AND CONTESTED RELIGIOUS SPACE THROUGH LANDSCAPE ANALYSIS (Marron, Chenal & Chevassu)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Presenter/Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00</td>
<td>Cosmologies and ecologies transforming the Nile Delta. Egyptians, Greeks and Romans</td>
<td>(Israel Hinojosa-Balino)</td>
</tr>
<tr>
<td>14.20</td>
<td>Strange ways of dying: funerary landscapes at Kourion’s Amathous Gate Cemetery, Cyprus</td>
<td>(Michael Given)</td>
</tr>
<tr>
<td>14.40</td>
<td>Christianising landscapes in the early medieval Aegean</td>
<td>(Sam Turner)</td>
</tr>
<tr>
<td>15.00</td>
<td>Tombs and cells: the hermitic landscape of Christian Petra</td>
<td>(Andrea Vanni Desideri &amp; Silvia Leporatti)</td>
</tr>
<tr>
<td>15.20</td>
<td>Exploring the desertum with GIS – A comparative landscape study of Early Medieval monastic landscapes in the Post-Roman West</td>
<td>(Emmet Marron)</td>
</tr>
<tr>
<td>15.40</td>
<td>Ottoman Conversion Landscapes in Southern Crete</td>
<td>(Lucia Nixon)</td>
</tr>
</tbody>
</table>
**Tuesday 18th September, 14:00-16:00, Newcastle University**

**Session 51B – Coastal Dynamics Integrated in Landscape Archaeology of the Eastern Mediterranean (Kluiving, Avramidis & Unkel)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>14.00</td>
<td>Introduction to Session (Sjoerd Kluiving &amp; Pavlos Avramidis)</td>
</tr>
<tr>
<td>14.20</td>
<td>Coastal Evolution of the Ancient Maritime Trade City of Tel Akko, Israel</td>
</tr>
<tr>
<td></td>
<td>(Matthieu Giaime, Gloria I. López Cadavid, Michal Artey, Christophe Morhange</td>
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<tr>
<td></td>
<td>&amp; Nick Marriner)</td>
</tr>
<tr>
<td>14.40</td>
<td>Murder of AQHT in the light of coastline changes of the Kinneret lake</td>
</tr>
<tr>
<td></td>
<td>in the Bronze Age, Israel (Mike Freikman)</td>
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<tr>
<td>15.00</td>
<td>Multi proxy reconstruction of Late Holocene coastal depositional environments</td>
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<td></td>
<td>in a highly seismic region, Corinth Gulf, Greece (Alexandros Emmanouilidis,</td>
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<td></td>
<td>Maria Triantaphyllou, Ingmar Unkel &amp; Pavlos Avramidis)</td>
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<tr>
<td>15.20</td>
<td>Major floods recorded in the uplifted Ladiko-Makrisia basin near ancient</td>
</tr>
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<td></td>
<td>Olympia (Lea Obrocki, Andreas Vött &amp; Timo Willershäuser)</td>
</tr>
<tr>
<td>15.40</td>
<td>A Geoarchaeological Reassessment of the Theran Tsunami Hypothesis at Palaikasto, Crete (Rachel Kulick)</td>
</tr>
</tbody>
</table>

**Session 49G - Part 2 (of 2) Roman Military Landscapes**

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
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</thead>
<tbody>
<tr>
<td>14.00</td>
<td>The Place-Making Effects of Roman Military Tropaea in the Provinces: Roman</td>
</tr>
<tr>
<td></td>
<td>and Barbarian Identities (Jonathan Quiery)</td>
</tr>
<tr>
<td>14.20</td>
<td>Recent Researches of Late Roman Defensive System of Claustra Alpium Iuliarum</td>
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<td></td>
<td>(Josip Višnjić)</td>
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<tr>
<td>14.40</td>
<td>Planning the Antonine Wall: an archaeometric reassessment of its installation</td>
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<td>spacing (Nick Hannon)</td>
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<tr>
<td>15.00</td>
<td>Hadrian’s Wall: overview of a military landscape (Matt Symonds)</td>
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<tr>
<td>15.20</td>
<td>Final Discussion (Al Oswald, Chris Jones &amp; Ian Hardwick)</td>
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</tbody>
</table>

**Session 1A – Part 2 (of 4) Geoarchaeology and Landscape**

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
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<tbody>
<tr>
<td>14.00</td>
<td>Chronostratigraphic Context for the Establishment and Development of the</td>
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<td></td>
<td>Urban Fabric of Moissac (France) (David Leigh, Ted Gragson &amp; Bastien</td>
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<td>Lefebvre)</td>
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<tr>
<td>14.25</td>
<td>Assessment of Early Middle Ages human-induced impact on hydrological</td>
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<td></td>
<td>dynamics of Pecora River Basin (Tuscany, Italy) (Davide Susini &amp; Pierluigi</td>
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<td>Pieruccini)</td>
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<tr>
<td>14.50</td>
<td>The Harbour of Halmyris (Danube delta): A Geoarchaeological Perspective</td>
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<tr>
<td></td>
<td>(Matthieu Giaime, Alexandra Bivolaru &amp; Christophe Morhange)</td>
</tr>
<tr>
<td>15.15</td>
<td>Discussion (John C. Blong)</td>
</tr>
</tbody>
</table>
### Wednesday 19th September, 09:00-10:30, Durham University

#### SESSION 55/3A - MULTI-PROXY ENVIRONMENTAL ARCHAEOLOGY IN AQUATIC SETTINGS: MARINE, LAKE AND WETLAND SEDIMENT ARCHIVES (van Hardenbroek, Mackay & Henderson)

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
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<tbody>
<tr>
<td>09.00</td>
<td>A multi-proxy approach to the settlement dynamics and landscape of the Gironde estuary (SW France) (Elias Lopez-Romero, Florence Verdin, Pierre Stephan &amp; Frédérique Eynaud)</td>
</tr>
<tr>
<td>09.20</td>
<td>The evolution of Güllübahçe Alluvial Fan (Söke/Aydın) Preliminary Results of Sedimentological and Paleontological Analysis (Rifat Ilhan Adiyaman &amp; Ertuğ Öner)</td>
</tr>
<tr>
<td>09.40</td>
<td>Applying sedaDNA and biomarkers at lakeside archaeological sites (Maarten van Hardenbroek, Tony Brown &amp; Helen Mackay)</td>
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<tr>
<td>10.00</td>
<td>Discussion (Maarten van Hardenbroek &amp; Andrew Henderson)</td>
</tr>
</tbody>
</table>

#### SESSION 29C - REMOTE SENSING IN LANDSCAPE ARCHAEOLOGY RESEARCH (Rayne, Brooke & Donoghue)

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
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<tbody>
<tr>
<td>09.00</td>
<td>Ground-based remote sensing in the examination of historic buildings and structures (Christopher Brooke)</td>
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<tr>
<td>09.15</td>
<td>New RS-based advances and concepts in the development of transcontinental route models (Hector A. Orengo &amp; Toby C. Wilkinson)</td>
</tr>
<tr>
<td>09.30</td>
<td>Site Recognition and Definition as Addressed through High Resolution Remote-Sensing: Results from the Fragile Crescent Project (Graham Philip, Dan Lawrence &amp; Nikos Galiatsatos)</td>
</tr>
<tr>
<td>09.45</td>
<td>Satellite remote sensing for site protection in sub-Saharan Africa: examples from East and West Africa (Nadia Khalaf)</td>
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<tr>
<td>10.00</td>
<td>Mapping the scale of threats to archaeology across North Africa (Louise Rayne)</td>
</tr>
<tr>
<td>10.15</td>
<td>Questions and discussion (Louise Rayne, Chris Brooke &amp; Danny Donoghue)</td>
</tr>
</tbody>
</table>

#### SESSION 22E – Part 1 (of 2) ARCHAEOLOGY, METHODS, ACTION! - RIGOROUS METHODOLOGIES FOR UNDERSTANDING PAST MOBILITIES (de Gruchy & Caswell)

<table>
<thead>
<tr>
<th>Time</th>
<th>Presentation</th>
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<tbody>
<tr>
<td>09.00</td>
<td>Introduction to Session (Michelle de Gruchy &amp; Ed Caswell)</td>
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<tr>
<td>09.10</td>
<td>Data-driven approach to identify early modern humans’ ecological niche and optimal dispersal routes in Eurasia (Yasuhisa Kondo)</td>
</tr>
<tr>
<td>09.30</td>
<td>Modelling human movement with limited landscape knowledge (Irmela Herzog)</td>
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<tr>
<td>09.50</td>
<td>Identification of ancient pathways in the loess landscape of W Romania (Moritz Nykamp, Brigitta Schütt, &amp; Daniel Knitter)</td>
</tr>
<tr>
<td>10.10</td>
<td>Understanding Landscape Mobility during the Middle Pleistocene in Calerizo de Cáceres, Extremadura, Spain (Akinbowale Akintayo &amp; Antoni Canals)</td>
</tr>
</tbody>
</table>
### Wednesday 19th September, 09:00-10:30, Durham University

#### SESSION 39D – Part 1 (of 2) WHERE NEXT FOR HISTORIC LANDSCAPE CHARACTERISATION? (Herring, Dabaut & Last)

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>09.00</td>
<td>Introduction to session (Peter Herring, Niels Dabaut &amp; Jonathan Last)</td>
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<tr>
<td>09.10</td>
<td>Historic Landscape Characterisation: authorised egalitarianism? (Peter Herring)</td>
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<tr>
<td>09.30</td>
<td>Climate Change and the Vulnerability of the Historic Landscape (Isabel Cook)</td>
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<tr>
<td>09.50</td>
<td>'Hidden Landscape Characterisation': some thoughts on the relationship of HLC to archaeological data (Jonathan Last)</td>
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<tr>
<td>10.10</td>
<td>Historical Landscape Characterisation: Case Study of Amasra, Turkey (Kemal Onur Ozman &amp; Sevgi Görmüş)</td>
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</table>

#### SESSION 53D – Part 1 (of 2) AGRICULTURAL LANDSCAPES OF THE PAST THAT EFFECT THE PRESENT AND INFORM THE FUTURE (Lang, Richer, Stump & Ferro-Vazquez)

<table>
<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>09.00</td>
<td>Introduction to Session (Daryl Stump)</td>
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<tr>
<td>09.10</td>
<td>Challenge of oasian farming: past resilience in the oasis of Dhayah (U.A.E.) (Sophie Costa, Hatem Djerbi, Maël Crépy, Julien Charbonnier &amp; Gourguen Davtian)</td>
<td></td>
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<tr>
<td>09.30</td>
<td>Understanding the historical Engaruka community: Modelling historical water-management in 15th – 18th CE Engaruka, Tanzania (Tabitha Kemunto Kabora, Daryl Stump &amp; John Wainwright)</td>
<td></td>
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<tr>
<td>09.50</td>
<td>Why built terraces? Dry-Farming Terracing and Rural Revival in Late Medieval Palestine (Yuval Gadot, Omer Zeevi &amp; Bethany Walker)</td>
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<tr>
<td>10.10</td>
<td>The Viking Age Slavs as pioneers of an environmentally sustainable land use (Jens Schneeweiss &amp; Katja Wiedner)</td>
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</table>

#### SESSION 48C – Part 1 (of 2) LANDSCAPES AND HERITAGE ON A NATIONAL SCALE (Banaszek & Cowley)

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<thead>
<tr>
<th>Time</th>
<th>Session Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>09.00</td>
<td>Introduction to Session (Łukasz Banaszek)</td>
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<tr>
<td>09.10</td>
<td>Past, Present &amp; Future: Aerial Investigation and Mapping (NMP) in England (Sally Evans)</td>
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<tr>
<td>09.30</td>
<td>The condition and scale of national conservation datasets (Lacey Goldberg)</td>
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<tr>
<td>09.50</td>
<td>Religion for the future. Mapping the religious landscape of the Netherlands over the last thousand years (Rowin van Lanen)</td>
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<tr>
<td>10.10</td>
<td>Developing an approach to national mapping - preliminary work on Scotland in miniature (Dave Cowley &amp; Łukasz Banaszek)</td>
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</tr>
</tbody>
</table>
**Wednesday 19th September, 09:00-10:30, Durham University**

### Session 1A – Part 3 (of 4) GEOARCHAEOLOGY AND LANDSCAPE (Shillito, Mackay and Blong)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00</td>
<td>Vegetation development and drift-sand dynamics in the Kootwijkerveen, The Netherlands: the role of human impact and climate variability</td>
<td>Marlon Dijkshoorn, Marjolein Gouw-Bouman &amp; Wim Hoek</td>
</tr>
<tr>
<td>09.25</td>
<td>Late Roman period and Early Middle Ages. A changing climate, landscape and society</td>
<td>Marjolein Gouw-Bouman, Harm Jan Pierik &amp; Nelleke van Asch</td>
</tr>
<tr>
<td>09.50</td>
<td>An ethnographic analogue of pre-Columbian raised fields of Amazonia in present-day Africa</td>
<td>Leonor Rodrigues, Marion Comptour &amp; Tobias Sprafke</td>
</tr>
<tr>
<td>10.15</td>
<td>Discussion (John C. Blong)</td>
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</table>

### SESSION 24F – Part 1 (of 3) LANDSCAPE AND BELIEF (Horsfield)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers</th>
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</thead>
<tbody>
<tr>
<td>09.00</td>
<td>Introduction To Session (Freya Horsfield) – Chaired by Beatrice Widell</td>
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<tr>
<td>09.10</td>
<td>Monastic gardens (James Bond)</td>
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<tr>
<td>09.30</td>
<td>Similarities and/or differences of a Benedictine and a Cistercian abbey in medieval Transylvania as reflected in the landscape (Únige Bencze)</td>
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<tr>
<td>09.50</td>
<td>Insula Dei - a Cistercian landscape from Denmark (Poul Heide)</td>
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<tr>
<td>10.10</td>
<td>Belief-powered landscape transformation? Cistercian Rievaulx Abbey and Henry II’s Wasteland (Freya Horsfield)</td>
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</tbody>
</table>

### SESSION 38A – Part 1 of 2 TOWARDS A LANDSCAPE ARCHAEOLOGY OF WETLANDS: ON-SITE DATA TO MACRO-SCALAR VIEW (Gearey, Van Beek & Whitehouse)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speakers</th>
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</thead>
<tbody>
<tr>
<td>09.00</td>
<td>Peat People. On the function of medieval man-made platforms in a coastal wetland (Eelder-and Peizermaden, NL) (Bert Groenewoudt &amp; Jan van Doesburg)</td>
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<tr>
<td>09.20</td>
<td>From sites to macrosapes. Moxos, Bolivia (Marcos Michel)</td>
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<tr>
<td>09.40</td>
<td>Predicting the distribution of Mesolithic archaeology in the Kennet Valley (Michael Grant, Catherine Barnett &amp; Martin Bell)</td>
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<tr>
<td>10.00</td>
<td>Beyond Bog Bodies: changing perspectives on Dutch bog landscapes (Roy van Beek)</td>
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<tr>
<td>10.20</td>
<td>Discussion (Benjamin Gearey, Roy Van Beek &amp; Nicki Whitehouse)</td>
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</table>
### Wednesday 19th September, 11:00-13:00, Durham University

#### SESSION 54D – URBAN HERITAGE APPEALS – OR WHAT? (Swensen & Simon)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
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</thead>
<tbody>
<tr>
<td>11.00</td>
<td>Grotesque and Picturesque: A Dynamic Archaeological Approach to Urban Landscape</td>
<td>Santiago Villajos</td>
</tr>
<tr>
<td>11.20</td>
<td>The Temporal Dimension in Planning for the Compact City</td>
<td>Grete Swensen</td>
</tr>
<tr>
<td>11.40</td>
<td>Collective heritage and urban politics: An uncertain future for the living culture of Rio de Janeiro</td>
<td>Véronique Karine Simon &amp; Einar Braathen</td>
</tr>
<tr>
<td>12.00</td>
<td>Sustainable landscape redevelopment of Kano traditional city through cultural heritage revitalization</td>
<td>Mohammad Falaki &amp; Idris Ilyasu</td>
</tr>
<tr>
<td>12.20</td>
<td>Enable the Deep City in Urban Design: The planning and public reception of a ruined building in downtown Oslo, Norway</td>
<td>Torgrim Sneve Guttormsen &amp; Véronique Karine Simon</td>
</tr>
<tr>
<td>12.40</td>
<td>Redeveloping landscapes of war – archaeological heritage from the German occupation of Norway in the context of urban planning</td>
<td>Kristoffer Eliassen Grini</td>
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</tbody>
</table>

#### SESSION 44C – LANDSCAPE ARCHAEOLOGY AND REPRODUCIBLE RESEARCH – A HANDS-ON SESSION (Knitter & Hamer)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
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</thead>
<tbody>
<tr>
<td>11.00</td>
<td>Introduction to Reproducible Research using open source software</td>
<td>Daniel Knitter &amp; Wolfgang Hamer</td>
</tr>
<tr>
<td>11.20</td>
<td>fieldwalkr: an R package for spatial sampling and field survey simulation</td>
<td>Joe Roe</td>
</tr>
<tr>
<td>11.40</td>
<td>FuzzyLandscapes - A reproducible approach to analyse uncertain parameters</td>
<td>Wolfgang Hamer, Daniel Knitter &amp; Rainer Duttmann</td>
</tr>
<tr>
<td>12.00</td>
<td>Hyperspectral imaging for improving stratigraphic interpretation in Yeha, Ethiopia</td>
<td>Vincent Haburaj, Jan Krause, Brígida Schüt, Björn Waske, Iris Gerlach &amp; Sarah Japp</td>
</tr>
<tr>
<td>12.20</td>
<td>Settlement and territory in the north of the district/taifa of Lárida (northeast of the al-Andalus 11th and 12th centuries)</td>
<td>Jesus Corsà</td>
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<tr>
<td>12.40</td>
<td>Discussion (Daniel Knitter &amp; Wolfgang Hamer)</td>
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#### SESSION 22E – Part 2 (of 2) ARCHAEOLOGY, METHODS, ACTION! - RIGOROUS METHODOLOGIES FOR UNDERSTANDING PAST MOBILITIES (de Gruchy & Caswell)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>11.00</td>
<td>Evaluating Arabia’s trade routes with Least Cost Path analysis. An approach towards the identification of pathfinding strategies</td>
<td>Alexander Städtler</td>
</tr>
<tr>
<td>11.20</td>
<td>Past mobility in New Zealand: Calculating the number of Maori movements to and from Maniatutu</td>
<td>Caroline Phillips</td>
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<tr>
<td>11.40</td>
<td>A Crossroad in Time: Focus on an Infrastructural Palimpsest</td>
<td>Aspassia Kouzoupi</td>
</tr>
<tr>
<td>12.00</td>
<td>Final Discussion (Michelle de Gruchy &amp; Ed Caswell)</td>
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</table>
**Wednesday 19th September, 11:00-13:00, Durham University**

### SESSION 39D – Part 2 (of 2) WHERE NEXT FOR HISTORIC LANDSCAPE CHARACTERISATION? (Herring, Dabaut & Last)

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>11.00</td>
<td>Monitoring Landscape Change (Piers Dixon, Mike Middleton &amp; Laura Campbell)</td>
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<tr>
<td>11.20</td>
<td>Defining Character: meaning and implications in historic landscape characterisation (Charina Jones)</td>
</tr>
<tr>
<td>11.40</td>
<td>Historic landscape character and people’s perception, towards a participatory HLC (Niels Dabaut)</td>
</tr>
<tr>
<td>12.00</td>
<td>Simulating change in cultural landscapes: the integration of Historic Landscape Characterisation and computer modelling (Nurdan Erdoğan, Francesco Carrer &amp; Ebru Ersoy)</td>
</tr>
<tr>
<td>12.20</td>
<td>Final Discussion (Peter Herring, Niels Dabaut &amp; Jonathan Last)</td>
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### SESSION 53D – Part 2 (of 2) AGRICULTURAL LANDSCAPES OF THE PAST THAT EFFECT THE PRESENT AND INFORM THE FUTURE (Lang, Richer, Stump & Ferro-Vazquez)

<table>
<thead>
<tr>
<th>Time</th>
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<tbody>
<tr>
<td>11.00</td>
<td>Resilient Landscapes: Terraces and Settlement Ecology of the Lowland Maya (Timothy Murtha, Charles Golden, Andrew Scherer &amp; Armando Anaya)</td>
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<tr>
<td>11.20</td>
<td>Final Discussion (Daryl Stump)</td>
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### SESSION 48C – Part 2 (of 2) LANDSCAPES AND HERITAGE ON A NATIONAL SCALE (Banaszek & Cowley)

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<tr>
<td>11.00</td>
<td>Archaeological sites in relation to landscape in the Holocene (Sæbjerg Walaker Nordeide &amp; Kari Loe Hjelle)</td>
</tr>
<tr>
<td>11.20</td>
<td>Integrating cultural and natural resources for large landscape conservation: the case of the North American Landscape Conservation Cooperatives (Madeline Brown)</td>
</tr>
<tr>
<td>11.40</td>
<td>Our feat of clay – populating the landscape of north Bedfordshire (Steve Crowther, Amanda Adams &amp; Matthew Tuohy)</td>
</tr>
<tr>
<td>12.00</td>
<td>Snowdonia’s Early Fieldscapes: developing a regional mapping methodology (Emily La Trobe-Bateman)</td>
</tr>
<tr>
<td>12.20</td>
<td>Interpreting recent and distant past settlements in South East Northumberland (Alison Deegan)</td>
</tr>
<tr>
<td>12.40</td>
<td>Chronology from Topography (Michael Doneus)</td>
</tr>
</tbody>
</table>
### Session 1A – Part 4 (of 4) GEOARCHAEOLOGY AND LANDSCAPE (Shillito, Mackay and Blong)

**Chemistry (Ground Floor) - CG060**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00</td>
<td>Surface pottery and sub-surface geoarchaeology in southern Levant (Paula Kouki &amp; Bernhard Lucke)</td>
</tr>
<tr>
<td>11.25</td>
<td>The potential of karst sinkhole infillings as archives for cultural and climate change (Simon Meyer-Heintze, Birgit Terhorst &amp; Tobias Sprafke)</td>
</tr>
<tr>
<td>11.50</td>
<td>Environmental changes around the early medieval Santok, NW Poland (Kinga Zamelska-Monczak, Andrzej Piotrowski &amp; Pawel Sydor)</td>
</tr>
<tr>
<td>12.15</td>
<td>The soil remembers: the use of OSL for dating Lime Kilns (Nitsan Ben Melech, Erez Ben-Yosef &amp; Naomi Porat)</td>
</tr>
<tr>
<td>12.40</td>
<td>Final Discussion (John C. Blong)</td>
</tr>
</tbody>
</table>

### SESSION 24F – Part 2 (of 3) LANDSCAPE AND BELIEF (Horsfield)

**Palatine Centre (Ground Floor) – The Hogan Lovells Lecture Theatre**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00</td>
<td>Introduction to Session (Freya Horsfield)</td>
</tr>
<tr>
<td>11.10</td>
<td>The Hermits of the King – The Hermits of the People: The Monastic Space of the Pauline Order (OSPPE) in Medieval Hungary (Zsuzsa Pető)</td>
</tr>
<tr>
<td>11.30</td>
<td>Blood, Tears and Belief at Neville’s Cross, 1346: The Spirituality of a Medieval Conflict Landscape (Beatrice Widell)</td>
</tr>
<tr>
<td>11.50</td>
<td>Mapping Magnus: visualising saintly impact in a North Atlantic rural landscape (James Moore)</td>
</tr>
<tr>
<td>12.10</td>
<td>Losing the Way: The Post-Dissolution Fate of Walsingham’s Pilgrimage Routes (James Albone)</td>
</tr>
<tr>
<td>12.30</td>
<td>Discussion (Freya Horsfield)</td>
</tr>
</tbody>
</table>

### SESSION 38A – Part 2 of 2 TOWARDS A LANDSCAPE ARCHAEOLOGY OF WETLANDS: ON-SITE DATA TO MACRO-SCALAR VIEW (Gearey, Van Beek & Whitehouse)

**Archaeology Department (Second Floor) - D210**

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.00</td>
<td>Medieval genesis and development of wetlands in Central Po Plain (N Italy) (Filipp Brandolini &amp; Mauro Cremaschi)</td>
</tr>
<tr>
<td>11.20</td>
<td>Linking archaeological and palaeoenvironmental records to quantify past human activity in and around wetlands (Michelle Farrell, M.Jane Bunting, Alex Bayliss, Peter Marshall &amp; Alasdair Whittle)</td>
</tr>
<tr>
<td>11.40</td>
<td>Rediscovering the ‘Wildscape’: Reconstructing Hidden Landscapes through a Case Study in the Humberhead Levels (Nika Shilobod, Nicki Whitehouse, Kimberley Davies, Ben Gearey &amp; Henry Chapman)</td>
</tr>
<tr>
<td>12.00</td>
<td>Lost Contexts? A New Approach to Preserving and Studying Submerged Archaeological and Paleo-Environmental Sites (Andrea Pintar &amp; Evert Verhoeven)</td>
</tr>
<tr>
<td>12.20</td>
<td>Final Discussion (Benjamin Gearey, Roy Van Beek &amp; Nicki Whitehouse)</td>
</tr>
</tbody>
</table>
### Thursday 20th September, 09:00-11:00, Newcastle University

<table>
<thead>
<tr>
<th>SESSION 43A – Part 1 (of 3) ARCHAEOHYDROLOGY AS A DISCIPLINE?: DEVELOPING A NEW APPROACH TO THE STUDY OF ANCIENT WATERSCAPES (Charbonnier, Ertsen &amp; Hopper)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Armstrong Building - Room G.08</strong></td>
</tr>
<tr>
<td>09.00  Introduction to Session (Julien Charbonnier, Maurits Ertsen &amp; Kristen Hopper)</td>
</tr>
<tr>
<td>09.20  Landscapes without water - a case for archaeohydrological approaches from NW Egypt (Thomas Vetter &amp; Anna-Katharina Rieger)</td>
</tr>
<tr>
<td>09.40  Long term evolution of water supply in the oasis of Masafi (UAE): an archaeohydrological approach (Julien Charbonnier, Sophie Costa &amp; Maël Crépy)</td>
</tr>
<tr>
<td>10.00  Water-Management in Arabian's northwest badia (desert): ArchaeoHydrological approaches and Bedouin lessons (Amer Alsoulaiman &amp; Hans Gebel)</td>
</tr>
<tr>
<td>10.20  Multiscale approaches of past waterscapes in Pasargadae, Iran (Marie-Laure Chambrade, Sébastien Gondet, Jörg Fassbinder &amp; Kourosh Mohammadkhani)</td>
</tr>
<tr>
<td>10.40  Discussion (Julien Charbonnier, Maurits Ertsen &amp; Kristen Hopper)</td>
</tr>
</tbody>
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<thead>
<tr>
<th>SESSION 37B – THE FLIP SIDE OF THE COIN: RESILIENCE, ADAPTION AND INNOVATION IN THE WAKE OF NATURAL DISASTERS (Forlin &amp; Jusseret)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Armstrong Building - Room G.09</strong></td>
</tr>
<tr>
<td>09.00  Rethinking the archaeology of natural disasters: an introduction to the LAC2018 session ‘The Flip Side of the coin’ (Paolo Forlin)</td>
</tr>
<tr>
<td>09.10  Diverting the deluge: Approaching flooding from a landscape perspective (Peter Brown)</td>
</tr>
<tr>
<td>09.30  Post-glacial sea-rise, oral history, and resilience in Mediterranean area during Early – Mid Holocene: a cross-cultural approach (Loredana Lancini)</td>
</tr>
<tr>
<td>09.50  Deconstructing disaster: when ontological understanding of natural disasters and archaeological research provide key information for past and present disaster response (Ashley Pickard)</td>
</tr>
<tr>
<td>10.10  The plains of South Bengal, Flood and The British East India Company: Insight into the company’s approaches to deal with natural disasters (Sayantani Neogi, Sean Taylor &amp; Nath Singh)</td>
</tr>
<tr>
<td>10.30  Micromorphological and sedimentary studies on Tsunamis and Catastrophic Extreme Events in Coast of Andalucía, Spain (Carlos Arteaga, Sayantani Neogi, Sean Taylor, José Maria Tomassetti, Iván García, Ildefonso Navarro Luengo &amp; Carlos Narvaez)</td>
</tr>
<tr>
<td>10.50  Conclusions of ‘the flip side of the coin session’ (Paolo Forlin)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SESSION 57.1 - FURTHER HORIZONS, A ‘GENERAL’ SESSION: PEOPLE, MYTHS AND BELIEFS (LAC2018 Organising Committee)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Armstrong Building - Room G.11</strong></td>
</tr>
<tr>
<td>09.00  Palaeolithic art as a social network study tool: an application to bison depictions in the Later Magdalenian (Blanca Occhoa, Marcos García-Diez &amp; Irene Vigiola-Tofta)</td>
</tr>
<tr>
<td>09.20  Sun temples, pyramids and the ritual landscape of the fifth dynasty (Massimiliano Nuzzolo, Jaromír Krejčí &amp; Katarína Arias Kytinrova)</td>
</tr>
<tr>
<td>09.40  Landscapes in Indian Literature (Uma Sekar)</td>
</tr>
<tr>
<td>10.00  Changing Landscape and Sacred Myth: Ethnohistorical Archaeology of the Naga in Northern Thailand (Piyawit Moonkham)</td>
</tr>
<tr>
<td>10.20  Of ghosts, treasures and the landscape. Tales from Naxos Island, Greece (Stelios Lekakis)</td>
</tr>
<tr>
<td>10.40  Crafters of Kingship: Smithcraft, gender and elite power in early medieval Europe (Duncan Wright)</td>
</tr>
</tbody>
</table>
**Thursday 20th September, 09:00-11:00, Newcastle University**

<table>
<thead>
<tr>
<th>TIME</th>
<th>SESSION 34E – Part 1 (of 2) MARKERS AND MOBILITIES: INTERPRETING DYNAMIC LANDSCAPES (Heide &amp; Aldred)</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00</td>
<td>Introduction to Session (Poul Heide &amp; Oscar Aldred)</td>
</tr>
<tr>
<td>09.05</td>
<td>Marking moving memories. The social importance of trackways in late prehistoric and Roman Britain (Adrian Chadwick)</td>
</tr>
<tr>
<td>09.25</td>
<td>New currents in the chronology of Celtic fields in southern Scandinavia (Mette Løvschal, Søren Munch Kristiansen &amp; Nina Helt Nielsen)</td>
</tr>
<tr>
<td>09.45</td>
<td>Do Landscape Move? (Jan Kolen, Eduardo Herrera Malatesta &amp; Joseph Sony Jean)</td>
</tr>
<tr>
<td>10.05</td>
<td>The first home (Poul Heide)</td>
</tr>
<tr>
<td>10.25</td>
<td>Resilience, fluidity and reiteration in movement systems (Oscar Aldred)</td>
</tr>
<tr>
<td>10.45</td>
<td>Discussion (Poul Heide &amp; Oscar Aldred)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>TIME</th>
<th>SESSION 20G – Part 1 (of 3) TRANSHUMANCE (Bowden &amp; Herring)</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00</td>
<td>Introduction to Session: The recognition of transhumance in Britain (Mark Bowden)</td>
</tr>
<tr>
<td>09.10</td>
<td>Frequently the winter grazing grounds are many miles away from the summer” (Varro 2.2.9): Transhumance in Central Italy (Mariella Pasquinucci)</td>
</tr>
<tr>
<td>09.35</td>
<td>The TraTTo project: paths and pastures from prehistory to modern age in southern Tuscany. Approaches and activities (Giovanna Pizziolo, Nicoletta Volante, Andrea Zagli, Michele De Silva &amp; Davide Cristoferi)</td>
</tr>
<tr>
<td>10.00</td>
<td>‘Lowland transhumance”? Seasonal movements of people and animals in late prehistoric and Roman Britain (Adrian Chadwick)</td>
</tr>
<tr>
<td>10.25</td>
<td>Response Diversity and the Evolution of Pastoral Landscapes in the Western Pyrenees from the Middle Holocene to the Present (Ted Gragson, Michael Coughlan &amp; David Leigh)</td>
</tr>
<tr>
<td>10.50</td>
<td>Discussion (Mark Bowden)</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>TIME</th>
<th>SESSION 8G – SETTLEMENT DESERTION AND CULTURAL LANDSCAPE TRANSFORMATIONS (Kučera &amp; Latocha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00</td>
<td>Introduction to Session (Zdeněk Kučera &amp; Agnieszka Latocha)</td>
</tr>
<tr>
<td>09.10</td>
<td>Landscape archaeology of an abandoned territory: the case study on Arpi (Foggia, S. Italy) (Amato, Santoriello &amp; Terribile)</td>
</tr>
<tr>
<td>09.30</td>
<td>Finding the Middle Ages in a palimpsest agrarian landscape of southern Sweden (Joachim Regnél &amp; Pär Connelid)</td>
</tr>
<tr>
<td>09.50</td>
<td>Settlement abandonment and the meanings of ruins in the Czech borderland (Zdeněk Kučera)</td>
</tr>
<tr>
<td>10.10</td>
<td>Modern transformations of deserted settlements in the Sudetes Mountains, SW Poland (Agnieszka Latocha)</td>
</tr>
<tr>
<td>10.30</td>
<td>Discussion (Zdeněk Kučera &amp; Agnieszka Latocha)</td>
</tr>
</tbody>
</table>
### Thursday 20th September, 09:00-11:00, Newcastle University

**SESSION 24F – Part 3 (of 3) LANDSCAPE AND BELIEF (Horsfield)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker and Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00</td>
<td>Introduction to Session (Freya Horsfield)</td>
</tr>
<tr>
<td>09.10</td>
<td>Architectural Landscape of Phra Nakorn Khiri Palace: A Replica of Buddhist Heavens on Earth (Vacharee Svamivastu)</td>
</tr>
<tr>
<td>09.30</td>
<td>Transformation of Thai Ceremonial Sacred Landscapes from the Past to the Present: Religious and Royal Significance to Socio-Political Realm (Kattika Kittiprasan)</td>
</tr>
<tr>
<td>09.50</td>
<td>The Kamakhya Peetha: Understanding the Significance of Water Bodies in the Formation of a Religious Landscape (Priyanka Tamta &amp; Sukanya Sharma)</td>
</tr>
<tr>
<td>10.10</td>
<td>Nuragic Ritual Landscapes: the East Coast of Sardinia (Cezary Namirski)</td>
</tr>
<tr>
<td>10.30</td>
<td>Final Discussion (Freya Horsfield)</td>
</tr>
</tbody>
</table>

**SESSION 28C – AERIAL APPROACHES IN LANDSCAPE ARCHAEOLOGY: PAST, PRESENT AND FUTURE (Davis & Opitz)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker and Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00</td>
<td>Rethinking the archaeological record. UAVs, photogrammetry, and GIS (Israel Hinojosa-Balino &amp; Gerardo Gutierrez)</td>
</tr>
<tr>
<td>09.20</td>
<td>Birdoswald in 3D: surveying landscapes using Structure from Motion (Dave Knight)</td>
</tr>
<tr>
<td>09.40</td>
<td>Aerial archaeology and changing land use in medieval Ireland (Michael Corcoran &amp; Stephen Davis)</td>
</tr>
<tr>
<td>10.00</td>
<td>Mapping the landscape of occupation at Lade, Norway Using historic aerial photographs (Julian Cadamarteri)</td>
</tr>
<tr>
<td>10.20</td>
<td>LiDAR and field archaeology in Giribaile archaeological site (Antonio Ortiz, Luis Maria Gutierrez &amp; Maria Alejjo)</td>
</tr>
</tbody>
</table>

**SESSION 42E – Part 1 (of 3) CLASSICAL ARCHAEOLOGY AND LANDSCAPES (Kennedy & Eser)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker and Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.00</td>
<td>Classical Archaeology and Landscapes – An Introduction (Will M. Kennedy &amp; Raphael A. Eser)</td>
</tr>
<tr>
<td>09.20</td>
<td>Approaches to Landscapes in Classical Archaeology – a comparative view. Reconsidering the continental divide (Michael Teichmann)</td>
</tr>
<tr>
<td>09.40</td>
<td>Landscape Archaeology and Digital Approaches in the Micro-Region Pergamon (Daniel Knitter, Bernhard Ludwig &amp; Felix Pirson)</td>
</tr>
<tr>
<td>10.00</td>
<td>The Application of Remote Sensing and GIS in detecting Ancient Piracy (Adam Dawson)</td>
</tr>
<tr>
<td>10.20</td>
<td>The Geraki Archaeological Project: Classical Archaeology, rocks, sediments and soils in the southern Peloponnesos, Greece (Mieke Prent, Sjoerd Kluiving &amp; Andrea Kay)</td>
</tr>
<tr>
<td>10.40</td>
<td>Discussion (Will M. Kennedy &amp; Raphael A. Eser)</td>
</tr>
</tbody>
</table>
### Thursday 20th September, 11:30-13:30, Newcastle University

#### SESSION 43A – Part 2 (of 3) ARCHAEOHYDROLOGY AS A DISCIPLINE?: DEVELOPING A NEW APPROACH TO THE STUDY OF ANCIENT WATERSCAPES (Charbonnier, Ertsen & Hopper)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.30</td>
<td>The very model of a modern archaeologist: Archaeohydrology and Modelling</td>
<td>John Murphy &amp; Maurits Ertsen</td>
</tr>
<tr>
<td>11.50</td>
<td>Modelling Mesopotamia: Landscapes of Power</td>
<td>Maurits Ertsen</td>
</tr>
<tr>
<td>12.10</td>
<td>The importance of historical system information for modern climate adaptation strategies</td>
<td>Menne Kosian &amp; Rowin van Lanen</td>
</tr>
<tr>
<td>12.30</td>
<td>A Quantitative Analysis of the Surface Drainage System at Pompeii</td>
<td>Davide Motta, Eric E.Poehler &amp; Duncan Keenan-Jones</td>
</tr>
<tr>
<td>12.50</td>
<td>Archaeohydrology applied to Early Byzantine Constantinople</td>
<td>Martin Crapper, Kate Ward &amp; Francesca Ruggeri</td>
</tr>
<tr>
<td>13.10</td>
<td>Discussion</td>
<td>Julien Charbonnier, Maurits Ertsen &amp; Kristen Hopper</td>
</tr>
</tbody>
</table>

#### SESSION 56D – Part 1 (of 2) A ‘NATURAL’ PLACE FOR LANDSCAPE ARCHAEOLOGY: PERSPECTIVES IN INTERDISCIPLINARY RESEARCH AND LANDSCAPE MANAGEMENT IN NATURAL PARKS (Panetta & Stagno)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.30</td>
<td>Introduction to Session</td>
<td>Alessandro Panetta &amp; Anna Maria Stagno</td>
</tr>
<tr>
<td>11.50</td>
<td>Enhancing mountain archaeological heritage in the natural park of Nuria and Coma de Vaca Valleys (Girona, Spain)</td>
<td>Pau Olmos &amp; Josep Maria Palet Martinez</td>
</tr>
<tr>
<td>12.10</td>
<td>Excavating the past, rebuilding connections, projecting the future. Natural and cultural heritage management and social value development in the Majella national Park</td>
<td>Annalisa Colechcia</td>
</tr>
<tr>
<td>12.30</td>
<td>Breaking down the ‘nature-culture divide’ in Northern Spanish Natural Parks</td>
<td>David Gonzalez Alvarez</td>
</tr>
<tr>
<td>12.50</td>
<td>The 5T.ERA project. Historical and archaeological study of local rural practices in the UNESCO site of Cinque Terre National Park (Liguria, Italy)</td>
<td>Alessandro Panetta, Osvaldo Raggio, Diego Moreno, Carlo Montanari, Roberta Cevasco, Nicola Gabellieri &amp; Valentina Pescini</td>
</tr>
<tr>
<td>13.10</td>
<td>Concealed by Nature and Segregated by Culture: Coal Camp Cemeteries in the New River Gorge National River</td>
<td>Elisabeth Orr</td>
</tr>
</tbody>
</table>

#### SESSION 57.2 - FURTHER HORIZONS, A ‘GENERAL’ SESSION: CONSTRUCTING LANDSCAPE HISTORIES (LAC2018 Organising Committee)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Presenter(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.30</td>
<td>From Site to Landscape: Nuceriola and the territory of Beneventum</td>
<td>Cristiano Benedetto De Vita &amp; Daniela Musmeci</td>
</tr>
<tr>
<td>11.50</td>
<td>Roads and landscape colonization in the periphery: an approach to the evolution of the historical landscape in agrarian areas of the Iberian Peninsula</td>
<td>Jesús Martínez Fernández</td>
</tr>
<tr>
<td>12.10</td>
<td>Gone with the wind. A wind-affected cemetery called Schichtgräberfeld</td>
<td>Deborah Schulz</td>
</tr>
<tr>
<td>12.30</td>
<td>The Landscape of the Norse in Skye and the Western Islands</td>
<td>Joseph Ryder</td>
</tr>
<tr>
<td>12.50</td>
<td>Little Flanders beyond Wales: A landscape archaeological approach to verify transregional settlement patterns</td>
<td>Gerben Verbrugghe, Wim De Clercq &amp; Veerle Van Eetvelde</td>
</tr>
<tr>
<td>13.10</td>
<td>Marl Pits and Me: How farm-scale extraction shaped an AONB</td>
<td>Cain Hegarty</td>
</tr>
</tbody>
</table>
**Thursday 20th September, 11:30-13:30, Newcastle University**

### SESSION 34E – Part 2 (of 2) MARKERS AND MOBILITIES: INTERPRETING DYNAMIC LANDSCAPES  
(Heide & Aldred)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
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</thead>
<tbody>
<tr>
<td>11.30</td>
<td>Mountain – Cemetery – Fjord: the Iron Age mortuary landscape of Hardanger</td>
<td>Anne Drageset</td>
</tr>
<tr>
<td>11.50</td>
<td>Exploring Mobility and Directionality at Late Iron Age oppida</td>
<td>Nicky Garland</td>
</tr>
<tr>
<td>12.10</td>
<td>Maritime mobility and geographical information in Stone Age Rock Art</td>
<td>Jan Magne Gjerde</td>
</tr>
<tr>
<td>12.30</td>
<td>Final Discussion</td>
<td>Poul Heide &amp; Oscar Aldred</td>
</tr>
</tbody>
</table>

### SESSION 20G – Part 2 (of 3) TRANSHUMANCE (Bowden & Herring)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
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</thead>
<tbody>
<tr>
<td>11.30</td>
<td>Cross-ridge dykes on the South Downs in their landscape context</td>
<td>David Lea, Judie English &amp; Dick Tapper</td>
</tr>
<tr>
<td>11.55</td>
<td>Transhumance in British prehistory: the case for the longue durée</td>
<td>Andrew Fleming</td>
</tr>
<tr>
<td>12.20</td>
<td>On the Move: Material and Environmental Imprints of Mobile Pastoralism in Northern Eurasia</td>
<td>Karen Milek, Alexander Oehler &amp; David Anderson</td>
</tr>
<tr>
<td>12.45</td>
<td>Movement as Ontology: Transhumant Pastoralists in the Velebit Mountain</td>
<td>Igor Kulenović, Šime Vrkić &amp; Neda Kulenović Ocelić</td>
</tr>
<tr>
<td>13.10</td>
<td>Discussion</td>
<td>Pete Herring</td>
</tr>
</tbody>
</table>

### SESSION 32E – Part 1 (of 2) THE ‘WHY’ IN LANDSCAPE ARCHAEOLOGY  
(Opitz, Glatz & Given)

<table>
<thead>
<tr>
<th>Time</th>
<th>Title</th>
<th>Speaker(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.30</td>
<td>Introduction to Session</td>
<td>Rachel Opitz, Claudia Glatz &amp; Michael Given</td>
</tr>
<tr>
<td>11.40</td>
<td>A Monumental Presence? (exercises in prehistoric place making)</td>
<td>Mark Gillings</td>
</tr>
<tr>
<td>12.00</td>
<td>Placing identity in landscapes: which monuments are 'relevant'?</td>
<td>Hamish Forbes</td>
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<tr>
<td>12.20</td>
<td>Questioning interpretations: Examining the value of a multiple causality approach in understanding small-scale culture change in Maori settlements along the Waihou River in New Zealand</td>
<td>Caroline Phillips</td>
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<tr>
<td>12.40</td>
<td>From paths to Landscape: why does movement contribute to land-use dynamics?</td>
<td>Laure Nuninger, Xavier Rodier, &amp; Rachel Opitz</td>
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<tr>
<td>13.00</td>
<td>Discussion</td>
<td>Rachel Opitz, Claudia Glatz &amp; Michael Given</td>
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</tbody>
</table>
### Thursday 20th September, 11:30-13:30, Newcastle University

#### SESSION 35D – A SENSE OF PLACE: COMMUNITY ARCHAEOLOGY IN THE LANDSCAPE

(Gannon, Shaw & Barrett)

Armstrong Building - Room 1.04

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>11.30</td>
<td>Introduction to Session (Angela Gannon)</td>
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<tr>
<td>11.40</td>
<td>Enabling communities: a Scottish perspective (Eve Boyle)</td>
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<tr>
<td>12.00</td>
<td>#EnrichTheList: Public engagement with England’s statutory List (Eric Branse-Instone)</td>
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<tr>
<td>12.20</td>
<td>A ‘Chase Through Time’ with volunteers (David Went &amp; Helen Winton)</td>
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<tr>
<td>12.40</td>
<td>Archeox: community archaeology in East Oxford (Olaf Bayer)</td>
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<tr>
<td>13.00</td>
<td>Reflections on Public Engagement in Landscape Survey in central southern Britain (Nathalie Barrett &amp; Lawrence Shaw)</td>
</tr>
<tr>
<td>13.20</td>
<td>Discussion (Angela Gannon, Lawrenee Shaw &amp; Nathalie Barrett)</td>
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#### SESSION 18B – CLIMATE, HERITAGE AND ENVIRONMENTS: COLLABORATIVE APPROACHES TO THE STUDY OF CLIMATE CHANGE IMPACTS ON THE HISTORIC ENVIRONMENT

(Barker, Davies & Henry)

Armstrong Building - Room 1.06

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>11.30</td>
<td>Introduction to Session (Sarah Davies)</td>
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<tr>
<td>11.35</td>
<td>Understanding dynamics of heritage landscapes in a changing climate regime (Lesley Davidson, Jon Mills, Ian Haynes, Charles Augarde, Paul Bryan and Mark Douglas)</td>
</tr>
<tr>
<td>11.55</td>
<td>Collaboration: First Line of Defence - HES Approach to Climate Change Risk (Mairi Davies, David Harkin &amp; Emily Tracey)</td>
</tr>
<tr>
<td>12.15</td>
<td>From the Air, on Land and Sea: Investigating Climate Change in the Coastal Zone of Ireland and Wales. Introducing the CHERISH project (Louise Barker, Sarah Davies &amp; Sandra Henry)</td>
</tr>
<tr>
<td>12.35</td>
<td>Palaeoenvironmental perspectives on risks to coastal heritage in Ireland and Wales (Sarah Jane Davies, Patrick Robson, Geoff Duller, Hywel Griffiths, Cerys Jones, Henry Lamb, Helen Roberts &amp; Hollie Wynne)</td>
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<tr>
<td>12.55</td>
<td>STORM: Developing a European-wide Approach to Managing Environmental Changing and the Historic Environment (Michael Nevell &amp; Rob Williamson)</td>
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<tr>
<td>13:15</td>
<td>Discussion (Louise Barker, Sarah Davies &amp; Sandra Henry)</td>
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#### SESSION 42E – Part 2 (of 3) CLASSICAL ARCHAEOLOGY AND LANDSCAPES

(Kennedy & Eser)

Armstrong Building - Room 2.16

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<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>11.30</td>
<td>From temple to landscape in Ancient Greece: the case of Berekla sanctuary (Maria Cruz Cardete)</td>
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<tr>
<td>11.50</td>
<td>Roman centuriation in Mediterranean landscape: the case of Istria. (Robert Matijasic, Sara Popovic &amp; Giovanni Boschian)</td>
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<tr>
<td>12.10</td>
<td>Reading the Roman landscape in the Venetian alluvial plain (Michele Matteazzi)</td>
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<tr>
<td>12.30</td>
<td>Surveying the Po valley plain: the case of Livorno Ferraris (Vercelli, Northern Italy) (Maria Elena Gorrini, Benedetta Peverelli, Francesca Garanzini &amp; Elena Smoquina)</td>
</tr>
<tr>
<td>12.50</td>
<td>Exploring Roman landscapes: burial and settlement patterns in Italy and Spain (Chiara Botturi &amp; Maria del Carmen Moreno Escobar)</td>
</tr>
<tr>
<td>13.10</td>
<td>Discussion (Will M. Kennedy &amp; Raphael A. Eser)</td>
</tr>
</tbody>
</table>
Thursday 20th September, 14:30-16:00, Newcastle University

**SESSION 43A – Part 3 of 3** ARCHAEOHYDROLOGY AS A DISCIPLINE?: DEVELOPING A NEW APPROACH TO THE STUDY OF ANCIENT WATERSCAPES (Charbonnier, Ertsen & Hopper)

- **Armstrong Building - Room G.08**
  - **14.30** Irrigation systems, gardens, agrarian landscapes and rural settlement patterns in Islamic and Norman Sicily (Angelo Castrorao Barba, Giuseppe Barbera & Giuseppe Bazan & Antonio Rotolo)
  - **14.50** Qanats, Canals, & CORONA: Remote Sensing of irrigation systems in Iran and Turkmenistan (Kristen Hopper, Michelle de Gruchy & Dan Lawrence)
  - **15.10** A remote-sensing approach to Early Islamic water management (Louise Rayne & Danny Donoghue)
  - **15.30** Finding Maori houses at Kaikokopu: Could surface hydrology provide a key? (Caroline Phillips)
  - **15.50** Final discussion: Archaeohydrology as a new discipline? (Julien Charbonnier, Maurits Ertsen & Kristen Hopper)

**SESSION 56D – Part 2 of 2** A ‘NATURAL’ PLACE FOR LANDSCAPE ARCHAEOLOGY: PERSPECTIVES IN INTERDISCIPLINARY RESEARCH AND LANDSCAPE MANAGEMENT IN NATURAL PARKS (Panetta & Stagno)

- **Armstrong Building - Room G.09**
  - **14.30** Incorporating historic data into historic landscape studies: A Case Study on Kazdağı National Park, Turkey (Seyma Sengur, Engin Nurlu & Yasemin Polat)
  - **14.50** Historical and archaeological perspectives in the study of the cultural & natural heritage of the commons: contributions to enhance the local dimension (Anna Maria Stagno)
  - **15.10** Bogs as past commons shaping natural parks. Examples from the Low Countries, 1500-1900 (Maurice Paulissen)
  - **15.30** Commons and rural communities in al-Andalus: natural resources and social cohesion as peasant strategies (José María Martín Civantos)
  - **15.50** Final Discussion (Alessandro Panetta & Anna Maria Stagno)

**SESSION 57.3 - FURTHER HORIZONS, A ‘GENERAL’ SESSION: MAKING AND (MIS)USING LANDSCAPES (LAC2018 Organising Committee)**

- **Armstrong Building - Room G.11**
  - **14.30** Bronze Age landscapes of irrigation along the Syrian Middle Euphrates (18th-13th c. BCE) (Herve Reculeau)
  - **14.50** Prison Break(down): Spatializing Resistance in the Nineteenth-Century Prison Landscape (Linnea Kuglitsch)
  - **15.10** Creators as Destroyers: Salvage of Archaeological Landscape of Sacred City of Kandy Sri Lanka (Chulani Rambukwella)
  - **15.30** Protecting cultural heritage in conflict: a landscape perspective (Emma Cunliffe)
  - **15.50** Relics of the traditional cultural landscape in mining and industrial areas as tourist attractions (Tomáš Hájek)
### Thursday 20th September, 14:30-16:00, Newcastle University

#### SESSION 20G – Part 3 (of 3) TRANSHUMANCE (Bowden & Herring)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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<tbody>
<tr>
<td>14.30</td>
<td>Social practice in seasonal upland settlements of northern Europe (Eugene Costello)</td>
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<tr>
<td>14.55</td>
<td>Extremes of British transhumance: Bronze Age &amp; Inter-War; Dartmoor &amp; Lewis (Peter Herring)</td>
</tr>
<tr>
<td>15.20</td>
<td>Intangible cultural heritage in transhumance landscapes - examples from France and Norway (Véronique Karine Simon &amp; Bolette Bele)</td>
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<tr>
<td>15.45</td>
<td>Final Discussion (Mark Bowden &amp; Pete Herring)</td>
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#### SESSION 32E – Part 2 (of 2) THE ‘WHY’ IN LANDSCAPE ARCHAEOLOGY (Opitz, Glatz & Given)

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
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<tbody>
<tr>
<td>14.30</td>
<td>Small places, large implications. Interpretative frameworks and hidden landscapes in northern Calabria (Italy) (Wieke de Neef &amp; Kayt Armstrong)</td>
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<tr>
<td>14.50</td>
<td>The Introduction of Terracing in the highlands of Jerusalem: Time and Motivations (Yelena Elgart Sharon)</td>
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<tr>
<td>15.10</td>
<td>Recent Archaeological Investigation of the Upper Punjab plains and its significance (Navjot Kour &amp; Sidra Gulzar)</td>
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<tr>
<td>15.30</td>
<td>Landscape Archaeology as Social History on the Deccan Plateau of Southern India (Andrew Bauer)</td>
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<tr>
<td>15.50</td>
<td>Final Discussion (Rachel Opitz, Claudia Glatz &amp; Michael Given)</td>
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</table>

#### SESSION 42E – Part 3 (of 3) CLASSICAL ARCHAEOLOGY AND LANDSCAPES (Kennedy & Eser)

<table>
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<tr>
<th>Time</th>
<th>Topic</th>
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<tbody>
<tr>
<td>14.30</td>
<td>Integrated studies on centuriated landscapes in Mediterranean Hispania tarraconensis: new methods and perspectives (Josep Maria Palet Martínez, Xusa Ortega &amp; Héctor A. Orengo)</td>
</tr>
<tr>
<td>14.50</td>
<td>From Valentia to Balansiya: social resilience and landscape change in the Early Islamic period in a Mediterranean alluvial plain (8th- 9th centuries) (Maria Jesús Ortega &amp; Ferran Esquilache)</td>
</tr>
<tr>
<td>15.10</td>
<td>Final discussion (Will M. Kennedy &amp; Raphael A. Eser)</td>
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SESSION AND PAPER ABSTRACTS

SESSION 1A - GEOARCHAEOLOGY AND LANDSCAPE

Lisa-Marie Shillito, Helen Mackay and John C. Blong (Newcastle University, UK)

KEYWORDS. geoarchaeology; interdisciplinary; environment; sustainability.

Geoarchaeology in its broadest sense applies the methods of earth sciences to address archaeological questions, but it is more than just a methodological approach. Geoarchaeology is an interdisciplinary subject area that utilises methods ranging from soil chemistry to limnology, and from geophysical survey to GIS. What makes it different from related subjects is that it considers the data from such analyses in the context of archaeology, i.e. the cultural perspective. It forms a bridge between the physical reconstruction of past landscapes, with interpretative approaches concerning the human experience and behaviour.

How did aspects of landscape such as vegetation cover and landforms change in the past? How did people inhabit and use these landscapes? What impact has the physical landscape had on socio-cultural development? And finally, what lessons from the past can we learn for modern day landscape conservation and management?

This session at LAC2018 will bring together geoarchaeologists from archaeological and geoscience backgrounds, to consider the different approaches to landscape and to address these questions.

1A Part 1 - Tuesday 18th September, 11:00-13:00, Newcastle University

Introduction to Session

John C. Blong (Newcastle University, UK)

253 Terminal Pleistocene Diet and Land Use Patterns at the Paisley Caves, Oregon

John C. Blong, Lisa-Marie Shillito (Newcastle University, UK) & Dennis L. Jenkins (University of Oregon Museum of Natural and Cultural History, USA)

The process of adapting to new and changing landscapes is an integral part of human history, yet in North America, there are still key questions about how initial settlers adapted to ecologically diverse landscapes across the continent. The first people to migrate into the Great Basin region of North America in the terminal Pleistocene entered a rapidly changing landscape that was much wetter than today, with extensive wetlands in most valley bottoms. Archaeological site data suggests that initial settlers organized their land-use systems around these wetland resources, and current research predicts that initial settlers of the region were tethered to productive wetlands. However, we have little direct evidence for human diet at this time, so it has been difficult to test this wetland land-use model.

The Paisley Caves in south-central Oregon provide a unique opportunity to investigate terminal Pleistocene diet and land-use patterns. Archaeological investigations at the caves have produced an assemblage of terminal Pleistocene human coprolites that provide an important resource for a study of human diet in the region. This paper presents the results of pollen, phytolith, and plant macrofossil analyses of terminal Pleistocene coprolites from the Paisley Caves. These analyses provide direct evidence for human dietary patterns and can be used to test models emphasizing a broad-based wetland-focused subsistence economy in the terminal Pleistocene Great Basin. This study has broader implications for understanding the process of the initial human settlement of North America and how humans adapted to the diverse ecological landscapes they encountered upon arrival.
From the river to the sea - Archaeolandscape research and the North/South Metro Line project in Amsterdam (NL) - I: From River Amstel history to palaeogeography.

Jerzy Gawronski, Peter Kranendonk (Monuments and Archaeology, City of Amsterdam, Netherlands), Sjoerd Kluiving (Vrije Universiteit Amsterdam, Faculty of Humanities, Department of Archaeology, Netherlands), Peter Vos (Deltares/Geological Survey of the Netherlands, Netherlands) & Simon Troelstra (VUA, Science, Earth & Climate Cluster, Netherlands)

The construction of the North-/South Metro Line (‘Noord-Zuid lijn’) in Amsterdam started in 2003 and will be completed in the summer of 2018. The Metro Line will have 7.1 km of underground railway which was drilled in the historical city centre at an average depth of 25 m. In the city centre the metro followed the route of the River Amstel. Here at Damrak and Rokin two main building sites were located which gave access to different levels from several landscape periods. Between 30 and 12 metres below NAP (Amsterdam Ordnance Datum) the landscape levels dated from 124,000 to 10,000 BC. Between 12 and 0 metres below NAP the deposits of the historical river Amstel and its prehistoric forerunner were encountered, dating from the Holocene epoch. Archaeological research was integrated in the civil engineering programme and executed by the office of Monuments and Archaeology of the City of Amsterdam. The excavations of the river bed of the Amstel yielded almost 700,000 finds. The main part of this varied collection dates from 1200 AD up till the present and was related to the urban activities on the river bank, but some smaller series of remains were related to pre-urban activities before the existence of the medieval settlement, going back to the Neolithic period. A multidisciplinary research programme was developed, which was not only aimed at the study of the archaeological objects, but also on the geological deposits from where the finds originated. The cooperation between archaeologists and geologists has proved beneficial to both parties. Also, the archaeological findings were used to date the exposed sediments of the Amstel. In the presentation the relevant construction sites will be presented and the long-term landscape evolution of the Amstel River system will be discussed by means of lithological-, palaeo-ecological and archaeo-stratigraphical correlations.

From the sea to the river - Archaeolandscape research and the North-/South Metro Line in Amsterdam (NL) - II: From palaeogeography to River Amstel history.

Peter Vos (Deltares/Geological Survey of the Netherlands, Netherlands), Sjoerd Kluiving (Vrije Universiteit Amsterdam, Faculty of Humanities, Department of Archaeology, Netherlands), Peter Kranendonk, Jerzy Gawronski (Monuments and Archaeology, City of Amsterdam, Netherlands) & Simon Troelstra (VUA, Science, Earth & Climate Cluster, Netherlands)

The archaeo-/palaeolandscape data of the North-/South Metro Line construction sites have been integrated into the regional landscape reconstruction around Amsterdam. In prehistoric times the Amstel was at the landward side connected with the Oude Rijn, the main tributary of the Rhine up to the Roman period. Seaward, the Amstel River led to the Oer-IJ tidal system which at that time had a tidal inlet near the town of Castricum. Focussing on the habitability of the Dutch coastal zone in the so-called ‘Bell Beaker’ archaeological period in the Late Neolithic (2400–2000 BC), the North-/South Metro Line finds may shed a new light on this specific period in Dutch coastal archaeology. With the integrated regional palaeolandscape approach, it explains why during the last stage of marine phase occupation in the Late Neolithic along the channel side was possible despite the mean sea-level rise of about 0.3 m in hundred years. During this period the surrounding area was changed in a large peat landscape. From the Amsterdam data it is suggested that the gully remained open and had a local drainage function in the Bronze Age. Fluvial deposits indicate that around 1050 BC the Amstel River got contact with the fluvial hinterland of the River Rhine. Also the reactivation of the Amstel River after 500 BC can be well understood from a regional landscape perspective of the Oer-IJ tidal system. In a regional overview the Late Neolithic period will be palaeogeographically-analysed, and it will be discussed where, based on the Amsterdam data, other ‘Bell Beaker’ occupation evidence might be present. In the presentation the
relevant palaeo-environmental archaeological finds of the construction sites will be combined in a regional perspective of the long-term landscape evolution of the Amstel River / Oer-IJ system with the help of a palaeo-geographical map series. 172 Humans and Landscape in Ancient Latium. Considering Landscape Transformation Processes

172 Humans and Landscape in Ancient Latium. Considering Landscape Transformation Processes

*Michael Teichmann (German Archaeological Institute, Berlin, Germany)*

The present paper discusses the complex relationship between people and their surrounding landscape in the area between Rome and the Tiber, the Alban Hills, the Lepini and Ausoni Mountains and the Tyrrenian Sea in the timeframe of the 4th century BC to the early 4th century AD. An interdisciplinary approach was chosen to solve this Task: Besides historical data, archaeological, epigraphic, geoarchaeological, palynological, anthracological, archeozoological and palaeoclimatological data was considered and embedded in a holistic discussion. In a historical perspective the study area is most important as it was closely tied in numerous ways to Rome, the centre of the Roman Empire.

**Discussion**

*Lisa-Marie Shillito and John C. Blong (Newcastle University, UK)*

1A Part 2 - Tuesday 18th September, 14:00:-16:00, Newcastle University

207 Chronostratigraphic Context for the Establishment and Development of the Urban Fabric of Moissac (France)

*David Leigh, Ted Gragson (University of Georgia, USA) & Bastien Lefebvre (Universite Toulouse, France)*

Our objective is to understand the establishment and development of the town of Moissac relative to the Tarn River, sedimentation patterns in the river valley, and archaeological and historical reconstructions of the urban fabric. The town is located on the right bank near the outlet of the Tarn River, which drains a basin of 15,400 km2 in Southern France. We have developed a detailed chronostratigraphic framework for Moissac from three auger holes that provide a record of ca. 6.5 m, an archaeological excavation that provides a record of ca. 3.5 m, and archival research on urban parcel geography. The humid subsoil environment in Moissac provides unusually good preservation of organic archaeological materials including wood, leather, plant and skeletal remains that were combined with radiocarbon dating and standard field and laboratory characterization of sediments including particle size, magnetic susceptibility, organic matter, and quantitative soil color analyses. Results indicate that Moissac spawned from the Abbey of Saint-Pierre ca. AD 850, which is located on the apex of a small alluvial fan surrounded by backswamps. Urban growth radiated down the fan toward the river bottomlands over the next several centuries. At ca. AD 1000-1200 human-induced soil erosion in the watershed caused very rapid aggradation of surrounding alluvial backswamps with a long-term average sedimentation rate of 20-30 mm per year. Such rapid bottomland accretion was probably driven by rampant agricultural soil erosion linked to wet climatic periods and enhanced flooding. This bottomland accretion enabled urban expansion and agricultural activities to cover the former backswamp and wetlands by the Late Middle Ages (ca. AD 1300-1500). While numerous Roman villa are recorded in the Tarn River Basin from the end of Antiquity, Moissac provides the first evidence of urbanism in this area.
97 Assessment of Early Middle Ages human-induced impact on hydrological dynamics of Pecora River Basin (Tuscany, Italy)

Davide Susini (Dipartimento di Scienze Fisiche, della Terra e dell'Ambiente, DSFTA - University of Siena, Italy) & Pierluigi Pieruccini (Dipartimento di Scienze della Terra, DST – University of Torino, Italy)

River valleys have strongly influenced the strategies of the populations for exploitation of the inland slopes and valley floors, the latter being a natural migration, commercial and communication paths or due to factors such as the availability of water, suitable topography for settlements and productive activities. In this context, we present an ongoing case-study focusing on the reconstruction of the changes which occurred to the Pecora River Basin during the Early Middle Ages. The Pecora River Basin is located in the Maremma region of south-west Tuscany (Italy), between the towns of Massa Marittima and Follonica (Grosseto, Italy), with a catchment of about 250 km². The morphology of the area in the upper part (close to Massa Marittima) is characterized by hilly and tabular landscape, corresponding to alluvial terraces and Calcareous Tufa system, whilst downstream the landscape grades into an alluvial plain, which ends in the Follonica coastal plain. Field analysis along the Pecora basin have been coupled with remote analysis of multitemporal aerial photos, spanning from 1954 to 2016, as well as with a highly detailed DTM (Digital Terrain Model) derived by LiDAR and 10 m DTM. Sedimentary record from the distal part of the basin revealed an early Middle Ages chronology for the erosion and deactivation of the Calcareous Tufa environments, related to running water management and land reclamation. Thus, the importance of this area is marked by the unique chance to reconstruct the fluvial landscape before and during the early Middle Ages and to evaluate the influence of human impact on the environment of the river basin due to its proximity to the medieval archaeological site of Vetrieella. Moreover, the Pecora river case-study provides an excellent regional proxy for understanding the changes in water management in the littoral corridor between the Apennines and the Mediterranean Sea.

116 The Harbour of Halmyris (Danube delta): A Geoarchaeological Perspective

Matthieu Giaime (Department of Geography, University of Durham, UK), Alexandra Bivolaru & Christophe Morhange (Aix-Marseille Université, CEREGE, France)

In Northern Dobrogea, north of the Dunavăţ promontory, the Roman fortress of Halmyris was founded in the late 1st century on a Getae settlement dated back the middle of the 1st millennium BC. 8000 years ago, the area of the later Danube delta was a vast open marine bay. Since the end of the post-glacial marine transgression, the Danube delta has prograded and divided into several arms, first along the Dunavăţ promontory and then to the north and the south leading to the progressive retreat of the sea. The ancient fortress of Halmyris, the most eastern Roman fortification on the Danube, faces the St. George arm that has been the most active arm of the river during Antiquity. Our objectives were: (i) to understand landscape changes of the area of the latter Halmyris since ca. 7500 years BP, (ii) to identify the fluvial environments close to the city in Roman times in order to locate and characterise the harbour. We concentrate on the study of bio-sedimentological content of the core HAIll that shows a classic regressive sequence dominated by a marine environment at the base of the core, overlain by fluvial sediments. The progress of the delta front seaward led to the formation of a floodplain from the fifth millennium BC onwards. The Roman harbour was probably installed in a secondary channel of the St. George whose depth was at least 175 cm at the end of the 7th century.

Discussion

John C. Blong (Newcastle University, UK)
1A Part 3 - Wednesday 19th September 09:00-10:30, Durham University

186 Vegetation development and drift-sand dynamics in the Kootwijkerveen, The Netherlands: the role of human impact and climate variability

Marlon Dijkshoorn (ADC ArcheoProjects, Netherlands), Marjolein Gouw-Bouman & Wim Hoek (Utrecht University, Netherlands)

In this study, a reconstruction of the vegetation development and drift-sand dynamics from the Roman period to Medieval times near the Kootwijkerzand is presented. Correlations were made between the palynological and Loss-on-ignition analyses from a core in the Kootwijkerveen. The resulting trends were placed in regional context by comparison with other palynological studies, AMS 14C and OSL dating. This enabled the reconstruction of the role of human impact and climate variability from 1-1500 AD. This study indicates that the vegetation development in the area was predominantly influenced by human impact. However, a short phase of deforestation recorded in the first stages of peat growth could have been related to a decrease in moisture. Relatively closed woodland was present in the region until human influence increased, which eventually led to large deforestation in the 8th century. Both archaeological and palynological data indicate that in this region, human influence on the environment further intensified from the 10th century onward. Only during the final stage of peat growth in late medieval times, a slight increase in drift-sand influx was recorded in the Kootwijkerveen record. Simultaneously, the palynological records shows that vegetation opened up and an increase in anthropogenic indicators was found. Peat growth ceased when aeolian influx increased abruptly in the 15th century AD. The results of this study suggest that the origin of the Kootwijkerveen drift-sand was related to human impact rather than caused by climate variability.

226 Late Roman period and Early Middle Ages. A changing climate, landscape and society.

Marjolein Gouw-Bouman, Harm Jan Pierik (Utrecht University, Netherlands) & Nelleke van Asch (ADC Archeoprojecten, Netherlands)

In NW Europe the late Roman period (AD 300-500) and the Early Middle Ages (AD 500-1000), sometimes called the Dark Ages, is a period with large cultural changes. New data shows that in the Netherlands a shift to a colder climate, forest regeneration, geomorphological changes and a population decline all occurred simultaneously during this time period. The collapse of the Roman Empire is often seen as the main factor controlling the subsequent population decline and the Dark Age reforestation. However, the timing of all these changes suggests that a cooling climate probably affected the landscape and cultural trends. Here we present the first chironomid-inferred summer temperature reconstruction for this period in the Netherlands, a unique overview of regional vegetation development and landscape changes, as well as detailed population data. In the summer temperature record from lake Uddelermeer, we identified the presence of a Roman Warm Period and the Dark Age Cold Period. In this record the Dark Age Cold Period seems contemporaneous with a reforestation phase. This Dark Age reforestation phase is recognized in numerous palynological records throughout the Netherlands. The intensity of this reforestation trend varies as a result of landscape setting and varying population densities. Additionally, large-scale landscape changes occurred in the coastal and river area during this time period. Here increased flooding and the emergence of new tidal inlets and river systems is noted. These landscape changes were mainly the result of human interference, environmental/climatic changes however, probably played a significant role. These developments led to the abandonment of marginal areas which were previously used for habitation and agriculture resulting in reduced human impact. Overall this study highlights the importance of understanding the relation between landscape and humans to explain complex changes in geomorphology, vegetation and population densities.
120 An ethnographic analogue of pre-Columbian raised fields of Amazonia in present-day Africa

Leonor Rodrigues (CNRS, Centre d'Écologie Fonctionnelle et Évolutive, France), Marion Comptour (CNRS, OHM Oiapock, France) & Tobias Sprafke (University of Bern, Switzerland)

Raised fields (RF) - elevated earthen agricultural platforms - are found in diverse environments. The characteristics and properties of RF vary depending on the environment in which they are (or were) constructed and on the purpose for which they are (or were) designed. Our study compares past and present RF in similar wetland environments but very different historical contexts: vestiges of RF that were cultivated in pre-Columbian South America and present-day RF cultivated today in Africa. Since the discovery of thousands of hectares of pre-Columbian RF in Amazonia beginning in the 1960's, researchers have been trying to understand their functioning, for two main reasons: 1) to understand pre-Columbian livelihoods and their impact on ecosystems in Amazonia, and 2) to better appreciate the potential value of raised-field agriculture as an alternative to industrial agriculture today. Studying pre-Columbian RF has proven to be a challenging task, as it requires multidisciplinary knowledge and approaches including archaeology and environmental studies. Archaeological studies alone have been unable to fully explain how RF were managed and how raised-field agriculture functioned as an ecological and cultural system. Raised-field agriculture is still practiced today in several regions in Africa, within environmental settings overall comparable to those in which it was practiced in South America. In this study, we compare our previous geo-archaeological results on pre-Columbian wetland RF in the Bolivian Amazon, South America, with new results on the pedology of present-day wetland RF in the Cuvette Centrale of the Congo basin. We describe how RF are constructed and managed in cultivation/fallow cycles. We use a multi-methodological approach including sedimentology, geochemistry and micromorphology to evaluate the soil properties and functioning of currently used wetland RF and discuss the utility of this ethnographic analogy for the understanding of past raised-field agricultural systems in Amazonian wetlands.

Discussion

John C. Blong (Newcastle University, UK)

1A Part 4 - Wednesday 19th September 11:00-13:00, Durham University

266 Surface pottery and sub-surface geoarchaeology in southern Levant

Paula Kouki (University of Helsinki, Finland) & Bernhard Lucke (FAU Erlangen-Nuremberg, Germany)

The “Holocene landscape change in the southern Levant in the context of dust deposition and land use” project, directed by Dr. Bernhard Lucke, FAU Erlangen-Nürnberg, is a trilateral co-operation between the German Jordanian University in Amman, Jordan, and Ben Gurion University in the Negev, Israel. The project carried out archaeological survey and geoarchaeological research in the surroundings of Petra in September 2016. While the geoarchaeological studies in southern Jordan covered a range of sites from Pre-pottery Neolithic to Early Islamic, the field survey concentrated in the surroundings of the city of Nabataean (Hellenistic) to Byzantine Petra, which was also reflected in the surface archaeology and archaeologically datable structures. A similar research setting was also carried out in November 2016 in the Negev, Israel, at the site of Horvat Haluqim, where the fields on the fills of three wadis were surveyed as well as sampled for geoarchaeological analyses. In Horvat Haluqim the main period of settlement reflected in the pottery and structures was late Early Bronze Age, with Roman, Byzantine and Late Islamic (pre-modern) periods forming a smaller component of the archaeological evidence. In addition, lithic material from the surrounding slopes extended back to the Epipalaeolithic period (tentatively Natufian), and included, e.g., sickle blades. Several bed rock mortars were also found in the area. The aim of the combined field survey and geoarchaeological studies was to find evidence of long-term environmental change and cultivation practices through comparing surface pottery distributions with sub-surface geoarchaeological information about changes in landscape and cultivation. Here we
will present the preliminary conclusions from the analysis of soil samples and surface pottery scatters. Understanding the interplay between environmental change and human actions in the past can be vital for finding the keys to sustainable food production and irrigation in the arid areas.

239 The potential of karst sinkhole infillings as archives for cultural and climate change

Simon Meyer-Heintze, Birgit Terhorst (Institute for Geography and Geology, University of Würzburg, Germany) & Tobias Sprafke (Institute of Geography, University of Bern, Switzerland)

Gypsum formations within Upper Triassic (Keuper) marls and claystones located in the north of the sandstone escarpment of the Frankenöhöhe in Central Franconia (Germany) are in parts subject to intensive karst processes resulting in sinkholes or dolines. The onset of intensive subrosion processes is most probably related to the end of the Pleistocene. Emerging depressions were filled by colluvial material related to increasing agricultural activity in the region. Beside pedosediments with different characteristics, archeological material from the Neolithic to the pre-Roman Iron Age occur in these sedimentary traps. Signs of occupation (post holes) appear in close proximity to the sinkholes. The geoarcheological archives become accessible through ongoing explorative mining of the gypsum. Physicochemical and micromorphological investigations on the pedosedimentary infillings yield information on the Holocene landscape development. We underpin our study with radiocarbon ages and dating based on archaeological findings and artefacts. The studied sediments and soils have a high clay content due to the local geology. For the genesis of the sedimentary archives, we assume a continuous solution of gypsum in the underground and a consistent filling and lowering of the emerging depression. In many cases, the lowermost layer of the infilling consists of local mudstone and sandstone transported from the local escarpment and mixed by solifluction. This unit corresponds to a basal layer in the concept of periglacial cover beds. It is overprinted by early Holocene pedogenesis. Above, a Gley horizon developed which indicates water saturation during the initial stage of the sinkhole development. It is buried by colluvial layers of the mid-Bronze age. The overlying strata consist of material from the eroded agricultural soils of the surrounding, which accumulated since the Urnfield period.

29 Environmental changes around the early medieval Santok, NW Poland

Kinga Zamelska-Monczak (Institute of Archaeology and Ethnology of the Polish Academy of Sciences, Centre for Prehistoric and Medieval Studies, Poznań, Poland), Andrzej Piotrowski (Polish Geological Society, Poland) & Paweł Sydor (Polish Geological Institute – National Research Institute, Pomeranian Branch in Szczecin, Poland)

Santok was ‘the watchtower and key’ to the Polish kingdom. Similarly to its past significance, nowadays it is the key geoarchaeological site to understand the environmental conditions of people living in this part of Europe in the Early Middle Ages. The aim of the study was to reconstruct the natural conditions from the beginning of settlement, the period of building a stronghold to its expansion between branches of the Warta and Noteć rivers in the north-western Poland. The fieldwork involved drilling boreholes, geophysical survey (GPR) and excavating archaeological trenches. From boreholes and trenches samples for laboratory analysis were collected. The expansive Toruń-Eberswalde meltwater valley underwent significant evolution from the beginning of its existence almost fifteen thousand years ago. Initially, the bottom of valley was shaped by high water discharges enforcing braided river pattern. These deposits were later incised when the river pattern changed to meandering. Both the geophysical data and detail topography revealed by LIDAR images showed that the early settlers chose an elevated area, probably a remnant of sandy river terrace, which could also have been modified by aeolian processes. Archaeological studies confirmed that the oldest settlement in Santok was established in the 8th Century. Initially it was a seasonal settlement, acting as a centre of exchange and service point on waterways connecting Baltic economic zone with the interior. In the 10th century, a well-fortified fortress was built as strategic centre at the border of the first Polish state. Santok developed for over
600 years, during which its citizens definitely took advantage of its natural inaccessibility and the water pathways joining the neighbouring territories. The stronghold was also threatened by the risk of flooding which required a lot of work on building flood defences. The research was funded by the National Science Centre, Poland (project Sonata Bis No.2015/18/E/HS3/00425)

241 The soil remembers: the use of OSL for dating Lime Kilns
Nitsan Ben Melech, Erez Ben-Yosef (Tel Aviv University, Israel) & Naomi Porat (The Geological Survey of Israel, Israel)

The formation processes that led to the transformation of the natural environment into human shaped landscape are notoriously difficult to unfold. This is essentially because landscapes are palimpsests, making the identification of initial operations by traditional dating methods close to impossible. However, the importance of reliable dating of man-made feature in the landscape cannot be underestimated, as it holds the key for accurate reconstructions of reciprocal relations with cultural trajectories in the Mediterranean highlands and elsewhere. The research presented in this lecture is an attempt to bridge the gap by applying OSL dating, acknowledging the fact that the soil is the main man-made artifact when it comes to past agricultural exploitation. This will be done by focusing on the OSL dating of lime kilns, as a case-study for this methodology. Ancient Lime kilns are seen today scattered throughout the landscape, reflecting the importance of lime production in antiquity. Since it is very difficult to date the lime kilns, lime production technologies and associated archaeological remains received very little attention in past research. The integration of various analytic methods into archaeological research in recent years has helped this problem to a limited extent, as researchers from around the world used various methods such as C14 dating and archaeomagnetism to try and date the lime kilns. However, due to understandable limitations these researches were not able to offer a clear, accepted method for systematic dating of lime kilns. In this lecture we will show how the OSL method can be used for the dating of lime kilns and its compatibility as a go-to method for dating this type of installation. Furthermore, we aim to show how this methodology can be applied successfully for other features of the landscape, thus giving context to other man-made features.

Final Discussion
John C. Blong (Newcastle University, UK)

Related posters (for poster abstracts, see p.213-230)

151 The reconstruction of a buried coversand landscape near Kampen (The Netherlands) using a geoarchaeological approach: geomorphology, vegetation and human habitation
Johanna A.A. Bos, Marlon Dijkshoorn & Nelleke van Asch (ADC ArcheoProjecten, Netherlands)

154 Down by the River. Landscape-archaeological research into the use of an early Holocene pointbar of the River Meuse between Well and Aijen (the Netherlands)
Johanna A.A. Bos (ADC ArcheoProjecten, Netherlands), Leo A. Tebbens (BAAC: Archeologisch en bouwhistorisch, Belgium) & A. Muller (BAAC: voor archeologisch en bouwhistorisch, Netherlands)

161 Legacies of historic charcoal production in Brandenburg, Germany
Anna Schneider, Alexandra Raab, Alexander Bonhage, Florian Hirsch & Thomas Raab (BTU Cottbus-Senftenberg, Germany)

188 Tipping the balance off: human overprint on mountain landscape changes in the high Northern Apennines (Italy)
Guido Stefano Mariani, Mauro Cremaschi & Luca Trombino (Università degli Studi di Milano, Italy)

204 A preliminary geoarchaeological approach of landscape morphology in Western Patraikos Gulf area, Peloponnese, Hellas.
SESSION 6C - UNDERSTANDING CULTURAL LANDSCAPES FROM SPACE IN THE ERA OF OPEN, BIG AND MULTI-TEMPORAL DATA

Deodato Tapete & Francesca Cigna (Italian Space Agency, ASI, Italy)

KEYWORDS. Archaeological remote sensing; open data; multi-sensor; time series analysis; computing science

Archaeological remote sensing from space has reached such a level of maturity that many established research methods and image processing tools are now available to practitioners, not only to characterise the physical components of the landscape (e.g. geology, topography, soils, water resources, climate, vegetation) but also to capture the human footprint (e.g. urbanization, use of natural resources) and assess environmental changes (e.g. drought, natural hazards) across space and in time. Satellite data (including from sensors operating in different bands such as microwave) is becoming embedded in archaeological practice. Freely accessible long time-series of multi-spectral satellite images such as Landsat providing coverage of wide and remote regions of the world over decades are considered an asset by landscape archaeologists. Two particular factors play a key role in shaping the research methods of landscape archaeology from space: (1) new multi-temporal data accessed at planetary scale via either open databases and platforms (e.g. the ESA’s Sentinel satellites with multi-sensor capabilities in radar, multi-spectral and thermal infrared domains) or open calls for scientific proposals (e.g. the Italian Space Agency’s COSMO-SkyMed images); and (2) cloud computing facilities and infrastructure (e.g. Google Earth Engine) that allow users to undertake their research running their own codes and processing routines. This session will explore the archaeological and remote sensing community’s perception and understanding of the opportunities given by these new space and computing science technologies. It aims to facilitate an interdisciplinary exchange of ideas and promote discussion on current capabilities and challenges in the use of open, big and multi-temporal satellite data. We welcome interdisciplinary papers presenting novel research methodologies of satellite time-series analysis for landscape archaeology, as well as developed case studies, for example dealing with condition or damage assessment of cultural landscapes.

Tuesday 18th September, 11:00-13:00, Newcastle University

314 The use of old and recent satellite sensors to detect archaeological sites

Andrea Ciampalini, Monica Bini, Giovanni Zanchetta, Adriano Ribolini (Università di Pisa, Italy) & Ilaria Isola (Istituto Nazionale di Geofisica e Vulcanologia, Pisa, Italy)

Satellite Remote-Sensing (RS) data have been effectively used to detect archaeological features in remote areas since the second half of the last century following the launch of the first Landsat mission in 1972. Relevant achievements were obtained thanks to the most recent Landsat missions (providing imagines at higher spatial resolution) and by the declassification of the CORONA imagery, acquired between 1960 and 1972 but available in 1995. In the last decades, the availability of high-resolution satellite images has made remote-sensing analysis one of the most powerful tools for low-cost investigations in archaeological contexts. The launch of the Sentinel-2 sensors (23 July 2015 and 7 March 2017), developed within the ESA Copernicus initiative, has fostered new applications based on multispectral imagery. Despite the absence of a long archive of images, the high resolution (10m) combined with rapid and repeated coverage, makes Sentinel-2 constellation a step ahead with respect to Landsat imagery in many fields of research such as gearchaeology. In this work we would like to show two examples focused on the contemporaneous use of different RS data for the detection of archaeological features. The first example regards the identification of levelled tells in the Cheyan River alluvial plain (Turkey.) where the combined use of Sentinel-2 and CORONA was helpful to detect these archaeological features today no more morphologically evident. The second example is focused on the
identification of archaeological remains in a very wide area (between Syria and Saudi Arabia) where the combined use of Google Earth and Bing imagery allow identifying hundreds of archaeological features of different ages. In both cases, the combined use of modern (high resolution) and old (historical documentation predating archaeological features destruction/obliteration) RS datasets has demonstrated to be a striking strategy for detecting archaeological sites.

17 The reconstruction of the Bronze Age landscapes of South Asia: a large-scale, multi-temporal and multi-source approach using cloud parallel computing

Hector A. Orengo, Arnau Garcia, Adam S. Green (McDonald Institute for Archaeological Research, University of Cambridge, UK), Francesc C. Conesa & Cameron Petrie (University of Cambridge, UK)

TwoRains is an ERC-funded project investigating the nature of human adaptation to changing environmental conditions, in particular water availability, in South Asia’s Indus civilisation. The reconstruction of the palaeo-hydrologic network and its relation to Indus settlements constitute a core objective of the project. Satellite data can be an important resource to map palaeorivers and sites. However, our research presents important obstacles to traditional satellite-based approaches: (1) relict river channels are not visible today and settlements have been flattened and hidden by modern agriculture; (2) the study area spans more than 100,000 km² and has important differences in geomorphology, climate and land-use; and (3) the area has been object of important modifications, including the creation of an extensive network of modern irrigation channels, which obscures subsurface features. To overcome these problems, we adopted a multi-temporal, multi-source approach, which employs nearly forty years of multi-spectral satellite data, Synthetic Aperture Radar and the new TanDEM-X high-resolution topography. These data have been treated using parallel cloud computing through three purposely-built algorithms:

1. Seasonal Multi-Temporal Vegetation Indices (SMTVI) and other multi-temporal approaches based on spectral decomposition techniques (http://www.mdpi.com/2072-4292/9/7/735/htm)
2. Multi-Scale Relief Model (MSRM), which is capable to highlight micro-reliefs of variable size (http://onlinelibrary.wiley.com/doi/10.1002/esp.4317/full)
3. Multi-temporal, multi-source, machine learning algorithms for the identification of flattened sites (still in development but the results of initial tests are promising).

These have allowed us to map 20,000 km of river palaeo-channels covering the Holocene fluvial history of the area with important implications for past and current occupation, land-use and resource management and the study of the impact of climate change and desertification in human populations. This paper will discuss our methods, the results obtained and the future direction of large-scale multi-temporal big-data applications, which often require purposely-built approaches and methodological developments.

99 Identification, documentation and monitoring historic landscapes: new data, new challenges, old problems

Dominik Ruciński (Wasat Sp. z o.o, Poland) & Włodzimierz Rączkowski (Adam Mickiewicz University, Poznań, Institute of Archaeology, Poland)

The protection and management of material cultural heritage is usually focused on individual architectural objects or archaeological sites and their clusters. Past landscapes should be protected as well, however in practice they are sporadically in the area of interest of conservation institutions. There are many reasons for this situation, among them, the lack of developed methods to assess the historical value of landscapes, their definition or the possibility of identification can be listed as the most important one. The issue of the definition is to some extent set by the European Landscape Convention that defines landscape as ‘the result of the action and interaction of natural and/or human factors’. Although such a definition does not take into account the humanistic understanding of the landscape, it is widely
accepted. The spatial scale relating to landscapes protection and management requires the introduction
of new methods allowing to obtain relevant data and to process, analyse and share them. One of the
use cases implemented during EO4SEE project (Earth Observation for South East Europe) funded by
the European Space Agency attempted to address this problem. Its purpose was to develop methods
allowing for the identification and classification of landscapes (including past landscapes) using mainly
data available in frame of the Copernicus Programme. The implemented automatic and semi-automatic
classification methods allowed for the identification of landscapes with traditional features. Assessment
of the degree of transformation of past landscapes as a consequence of contemporary activities, when
is registered on a regular basis may allow for the development of strategies for their protection and
sustainable management. The web-based platform, which could be created as a result of further work
on the issue, would be addressed at institutions related to the conservation of monuments, spatial
planners, and local authorities at various levels.

166 Monitoring archaeological looting and urbanisation in cultural landscapes
using Copernicus Sentinel-2 time series
Deodato Tapete & Francesca Cigna (Italian Space Agency, ASI, Italy)

Sentinel-2 is a constellation of the European Commission’s Earth observation programme Copernicus,
made of two twin satellites providing, since mid 2015, open access multispectral imagery across the
globe with large swath (290 km per frame), short revisiting time (5 days) and high spatial resolution (up
to 10 m in the visible bands). These properties make Sentinel-2 a space facility worth testing for the
systematic condition assessment of heritage sites, over large areas and at high temporal frequency,
despite the general idea that ‘high resolution’ (HR) satellites are of limited use compared to sensors
operating at ‘very high resolution’ (VHR). This paper presents the results recently published by Tapete
& Cigna (2018) for hotspot mapping of archaeological looting and dynamic detection of changing
features due to urban development across cultural landscapes. By screening 57 Sentinel-2 images
covering Apamea in Syria from 2015 to 2017, we demonstrate that new and expanding looting can be
logged with temporal accuracy, and the assessment undertaken with Sentinel-2 can complement further
ad hoc investigations relying on VHR imagery. The cultural landscape of the World Heritage Site of
Cyrene and the coastal ancient Greek sites of Tocra, Ptolemais, and Apollonia in Cyrenaica, Libya,
serve as demonstration sites to explore how Sentinel-2 could be used to monitor the impact of
urbanisation via feature extraction analysis by searching for urban features that are distinctive and
change according to a known life cycle. With the future development of tailored machine learning
approaches of feature extraction and pattern detection, Sentinel-2 appears promising to screen wider
regions and undertake comparative condition assessment analyses of different heritage sites.

Tapete, D.; Cigna, F. Appraisal of Opportunities and Perspectives for the Systematic Condition Assessment of
doi:10.3390/rs10040561

128 Traces through time: automating object detection in archaeological
landscape time series imagery
Arianna Traviglia (Ca’ Foscari University of Venice, Italy)

The current easy access to remote sensing data for archaeological research provided by open
databases and platforms, such as Copernicus, is putting the spotlight on the urgency of developing or
advancing automated workflows able to streamline the examination of such data and unearth
meaningful information from them. While in other disciplines availing remotely sensed data discussion
and advancement are already well articulated, automated detection of ancient human footprint on
aerial/satellite imagery has seen limited progress within the archaeological sphere. Advances in fine-
tuning workflows for the automatic recognition of target landscape patterns are being trailed within the
framework of VEiL, a landscape archaeology project based in NE Italy and focused on the engineered
landscape of the Roman city of Aquileia (Udine). Here, the centurial grid deployed at the closing of the 2nd century BC still characterises the modern landscape and has affected space organisation development even in the centuries after the fall of the Roman domain. One of the major issues when tackling the detection of centurial systems is the identification of land division boundaries as they might have been formed by a variety of different natural or artificial elements (roads, fences/hedges, ditches, drainage channels, tree lines and other landmarks). Thus, the objects of interest in the detection are not archaeological features per se, but rather consist of a variety of similarly oriented scene elements that concur to structure the landscape organisation. This paper will expand on approaches in Feature extraction that can reveal anthropogenic landscape components and patterns based on recognition of recurring patterns and regularities in a variety of multitemporal imagery derived from local and freely accessible RS archives. The paper will cover the workflow’s utilisation of the textural and shape properties of real-world elements forming field patterns using multiscale analysis of dominant oriented response filters.

273 Widening the landscape perspective on a road trace between Birrens and Ladyward, Dumfriesshire.

Ruth Beusing (Römisch-Germanische Kommission des Deutschen Archäologischen Instituts, Germany)

The trace of the Roman Road in the area between Birrens and Ladyward is uncertain. In 2015 and 2017 survey campaigns were launched by the Romano-Germanic Commission with the intention of studying the archaeological structures in the vicinity of the assumed road trace. The Roman forts of Birrens and Ladyward were chosen as start- and end-points of the test area. Starting from known monuments and incorporating areas of accumulated surface finds, as well as evidences from aerial photography further sites have been integrated in the study. Based on these initial observation an investigation mainly employing magnetometry survey in combination with xrf-soil analysis has been started to identify the traces of the road in the vicinity of the Roman structures but also to follow up structures along the road, in order to better understand the usage and the impact of this infrastructure especially for the Iron-Age and Roman population in the area. The fieldwork and landscape analysis is presented and discussed in the paper. It refers to the course and nature of the roads alignment, purpose and destination are hypothesised based on the results from all the work undertaken to date. This project is part of an ongoing series of fieldwork and various aspects of work are planned for future seasons.

Related posters (for poster abstracts, see p.213-230)

122 Long-term land use and water management strategies in arid margin landscapes (MarginScapes)
Francesc C. Conesa, Hector A. Orengo & Cameron Petrie (University of Cambridge, UK)

167 Detection of landscape disturbance in the Nasca Lines UNESCO site with COSMO-SkyMed InSAR
Francesca Cigna & Deodato Tapete (Italian Space Agency ASI, Italy)

272 Applications of multi-temporal data and cloud computing for the study of past settlement and landscape dynamics in the Punjab region
Arnau Garcia, Hector A. Orengo & Cameron A. (McDonald Institute for Archaeological Research, University of Cambridge, UK)
Cultural landscape is a palimpsest and a multi-period heritage. Landscape is subject to constant transformation and (re)interpretation, and settlement desertion or abandonment is an inevitable part of landscape development. Even in entire areas, many settlements have been abandoned only recently and remnants of former inhabited places from various periods are identified worldwide. For a landscape to become cultural, it has to be inhabited. Settlements are established by people for people, they are used by them, become part of their identities, are perceived, interpreted and evaluated. Settlements evoke a certain sense of stability. Deserted settlements are thus often perceived as a symbol of particular and extreme discontinuity in landscape cultivation. However, once abandoned, deserted settlements often do not transform into completely forgotten places, as their remnants or ruins are integrated with continuing, ongoing social and cultural activities. Thus, the story of settlement desertion is not only the story of loss, destruction and oblivion. Through their material inertia, abandoned settlements may become a part of local and regional heritage and be integrated in the activities of those people that strive for the maintenance or creation of a relationship with certain historical and intergenerational continuity to the lived-in landscape. The session thus seeks papers that do not only discuss the causes and consequences of settlement desertion in various regions in the distant as well as the recent past but also pay attention to the present condition, functions and meanings of abandoned settlements, and of their remains and ruins.
but also to pay attention to the current conditions, functions and meanings of the archaeological traces and landforms. The new researches focus on the distinction between some residual landforms that evoke a certain sense of stability of the archaeological landscape and the sectors of the settlement completely loss, destructed and transformed. In many cases the archaeological traces are still preserved into actual landscape, as the articulated little-hills system and the interconnected depressions, as the fluvial and interfluvial environments bordering and intersecting the settlement.

262 Finding the Middle Ages in a palimpsest agrarian landscape of southern Sweden.

Joachim Regnéll (Kristianstad Unversitet, Sweden) & Pär Connelid (Independent, Sweden)

Until recently (1990s) the knowledge has been rather poor about medieval farms and field systems in southern Sweden, particularly regarding the recession during the late medieval period. In spite of all the deserted farmsteads indicated in written sources, only a limited number of archaeological sites have been identified. This is in great contrast to several European countries, e.g Great Britain. However, investigating large prehistoric and early medieval (i.e. the 11th and 12th centuries) field systems during the last two decades has gradually lead to the awareness that many of the deserted farms are to be found in the contexts of clearance cairn fields and strip field systems. Accordingly, the agrarian environment surrounding the late medieval farms is to a high degree reflecting the long term development of the landscape in which they appear. For an understanding of how these units worked and what the conditions for spatial organization and the design of the farming systems looked like, the notion of landesque capital is essential. Here we present a project that was among the first in succeeding to identify deserted medieval farms in the field. Historical geographers, archaeologists, historians and paleoecologists cooperated to study the establishment and abandonment of medieval farms in the southern part of province Östergötland, a woodland area. We will focus on results from detailed mapping and excavation of fossil fields and pollen analysis of small peatlands. The many well preserved areas of ancient fields in southern Sweden are not only of great value for landscape history research. The ‘readability’, the long term perspective and the fact that the archaeology on ground represents the history of ‘everyday life’ also mean that they are of great educational interest and important for the creation of local identities.

203 Settlement abandonment and the meanings of ruins in the Czech borderland

Zdeněk Kučera (Charles University, Faculty of Science, Czechia)

For a landscape to become cultural, it has to be inhabited. Settlements are established by people for people, they are used by them, become part of their identities, are perceived, interpreted and evaluated. Settlements evoke a certain sense of home and stability. During the period following the end of World War II, Czech borderland witnessed almost total population exchange connected with significant cultural change. With the transfer of the Czech Germans the continuity of its settlement, cultivation and interpretation was broken. The new residents had to conform to living in a new environment as well as they have in many ways adapted the landscape that was new to them according to their needs. Part of this process of the borderland transformation was also settlement desertion. In the Czech borderland, more than 2 000 settlements have been deserted due to various reasons during the second half of the 20th century. Recently, there has been gradual growth in the interest to understand the past landscape transformations in the entire borderland. The aim of these activities, however, is not to return the landscape its original character, but to create a relationship with certain historical and intergenerational continuity to the inhabited environment. Landscape heritage in the form of particular localities is being (re)created, (re)presented, transformed and (re)interpreted. Former places of memory are either being abandoned or reused as well as new are being created around the remains of the once ordinary material structures. The paper discusses the reasons and consequences of the process of settlement desertion, continuities and discontinuities in the use of deserted settlements localities as well as present character and meanings of abandoned places.
218 Modern transformations of deserted settlements in the Sudetes Mountains, SW Poland

Agnieszka Latocha (University of Wrocław, Poland)

In the Sudetes Mountains there are many areas which were subject to large-scale depopulation. It started in the 1880s and intensified after the 2nd World War due to various political, socio-economic and environmental reasons. For many decades the abandoned villages were neglected and forgotten, and numerous ruins of former buildings were the only witnesses of past human activities. However, in the recent years an increase in the interest in the history of the region can be observed and the pre-war heritage is re-appreciated and sometimes also renovated or reconstructed. In some areas new developments can be observed, such as new housing, second homes and tourist infrastructure. There are also examples of a few educational paths which were established recently in the deserted villages in order to reveal the importance of past cultural landscape and to teach, how it can be read and interpreted. The aim of the study is to present and classify the current processes which are observed within the depopulated areas and to assess the present condition, functions and meanings of deserted settlements, and what are the potential paths of their further transformations. The study is based on field investigations, inventories and interviews, as well as on studies of historical documents and current spatial development plans.

Discussion

Zdeněk Kučera (Charles University, Faculty of Science, Prague, Czechia) & Agnieszka Latocha (University of Wrocław, Institute of Geography and Regional Development, Poland)

Related posters (for poster abstracts, see p.213-230)

44 Nieuw-Roeselare: A landscape archaeological research on the site of a lost medieval settlement

Gerben Verbrugghe & Wim De Clercq (Ghent University, Belgium)
SESSION 11B - DYNAMIC LANDSCAPES: THE HUMAN ROLE IN RESHAPING THE GEOMORPHOLOGY OF ARID ENVIRONMENTS

Nizar Abu-Jaber (German Jordanian University, Jordan) & Catreena Hamarneh (Von Humboldt University, Germany)

KEYWORDS. paleoenvironments; arid environment; Anthropocene; tectonics; human settlements.

Landscapes in tectonically active areas are by nature dynamic, which means that humans living in such areas need to factor this into their landscape management. Climate fluctuations also come into play as well. Humans are accustomed to their surrounding landscape, considering it the natural condition in which they live. Changes over several generations are difficult to perceive, and mutual interactions with the landscape may go largely unnoticed. Environmental studies, however, point to a long relationship of interchangeable roles between humans and their surrounding landscape. Archaeological evidence coming from tells (artificial mounds with several occupation settlement layers) frequently shows uninterrupted human settlement through many centuries, periods and even dominant powers. Other evidence shows the transformation of human livelihood patterns between nomadic to settled farmers and vice versa, while some sites become totally abandoned. The question is whether this a reaction to human adaptation to a changing environment, or a result of humans modifying the landscape, causing drastic changes in environmental conditions, for better or for worse. Various evidence exists in the surroundings of settlements showing human interference with geomorphology, including the diversion of rivers and gullies, creation of artificial dams that collect water, building of terraces, creation of soil covers, introducing new crops while eradicating others, or exhausting water tables. This session calls for participants to share their research that covers the following topics: palaeo-environmental studies focusing on human modification; Hydrogeological cataclysms affecting surrounding landscapes (drying of springs, change of water table, floods; Constructions modifying the surface morphology, such as dams, terrace or barrages; Archaeological evidence of human resilience and adaptation to changeable environmental conditions; Archaeological evidence for human modification of the plant cover.

Tuesday 18th September, 11:00-13:00, Newcastle University

146 Changing fluvial landscapes in northwest India: using geoarchaeology to assess human-environment interactions in the Rakhigarhi hinterland, NW India

Joanna Walker & Charles French (University of Cambridge, UK)

One of the main theories postulated for decline of the Indus Civilisation is that unpredictable monsoon rainfall and water availability as a result of the 4.2 ka event influenced the decline of large urban centres (e.g. Giosan et al. 2012). However, very little work has been done to investigate the relationship between Indus-era sites and the landscapes in which they existed, with water sources often left unidentified outside of major channels. Recent high-resolution GIS analysis of the Indo-Gangetic Plain has shown a considerably larger network of meandering channels in this region than previously imagined. These river channels have rarely been ‘ground-truthed’ though, and often insufficient geological and sedimentological data exists for claims of river losses impact on urban decline to be assessed. Here, results are presented from a substantial coring survey undertaken around the Indus Civilisation settlements of Lohari Ragho and Masudpur, located in the hinterland of Rakhigarhi in northwest India. The high-density of cores analysed by this study allows for an unprecedented comprehensive palaeo-environmental reconstruction of the proximal area around Indus Civilisation sites to be made. The sedimentological and geochemical analysis has shown there was a far more hydrologically complex land setting than present, with various channels identified, alongside a raft of other palimpsest features. Indus resilience to this changing environment and water availability, and ways in which humans have continued to modify of the landscape in this region shall be discussed.
37 Roman Land Use Patterns in Wādī al-‘Arab (Jordan)

Linda Olsvig-Whittaker, Katja Soennecken (DEIAHL, German Protestant Institute of Archaeology in the Holy Land, Israel) & Patrick Leiverkus (University of Wuppertal, Germany)

As an integral part of the Gadara-Region-Project, a survey of the Wādī al-‘Arab region was conducted during the years 2009-2012, by Biblical-Archaeological Institute Wuppertal and German Protestant Institute for Archaeology. The aim was to achieve a better understanding of the hinterland of Tall Zirā´a and to provide answers concerning settlement pattern, trade relationships and the importance of sites throughout time. The main focus was laid on the Tall Zirā´a hinterland, but all important sites of the Wādī al-‘Arab region were re-visited, GPS points taken, pottery collected and the situation today documented. Even though many sites – which were documented by the pioneers Schumacher and Glueck in the early 20th century – were nowadays built over, destroyed or integrated in modern settlements, we could map more than 200 sites. On the basis of this survey we used ecological approaches to see what correlation might exist between archaeological sites and habitat. Since more than half the sites in this survey had Roman occupation, we asked what difference, if any, was there in the distribution of Roman sites compared to previous occupations. A comparison was made of ‘new’ Roman sites (those not previously occupied in the Hellenistic period) with those that had both Roman and Hellenistic occupation. The analytical approach was ordination (multivariate analysis, correspondence analysis). The ordinations suggested interesting relationships. Open water, riverine habitats, and large archaeological sites all seemed connected. In addition, analysis indicated a correlation of older (more successful or established?) sites with open water. Analysis also suggested that new Roman sites were less related to water. We knew that Roman engineering both of cistern systems and aqueducts opened new areas (such as plateaus) for settlement and exploitation. Hence the weaker correlation of new Roman sites with water also made sense.

208 Prehistoric Modification of the Basalt ‘Harra’ Landscape (Jordan) for Ease of Access

Stefan Smith (University of Ghent, Belgium) & Marie-Laure Chambrade (CNRS, Archéorient, France)

The Harra desert of north-eastern Jordan is part of the Harra’t al-Sham, a basaltic plateau of around 50,000 km² that stretches from southern Syria into the north-western corner of Saudi Arabia. Archaeological investigations over the last few decades, and in particular the last few years, have identified a dense prehistoric site distribution across this region. The ‘Western Harra Survey’ is one such project, conceived to study the western edges and interior of the Harra. This includes not only its prehistoric structures (such as morphology, material remains, and dates of occupation), but also the crucial question of human modification of the landscape to combat the two main difficulties of subsistence in this region: 1) very low levels of precipitation, and 2) extreme access difficulties due to the dense scatter of basalt rocks over almost its entire surface. The results of the 2015 and 2017 fieldwork seasons provided a wealth of data that allow some preliminary interpretations to be made. These include the identification of a complex network of paths cleared through the basalt, some of which extend long distances of up to several tens of kilometres, linking sites along roughly linear trajectories. Others appear to emanate from individual sites towards necessary resources, such as down to wadi beds for seasonal water. As such, this network has similarities to the ‘hollow way’ phenomenon of north-eastern Syria and north-western Iraq. Such modifications of the Harra landscape must have required significant effort, organisation, and skill, especially for pathways that straddle steep topography. This suggests that longevity of purpose was intended for these features, and they may in turn have influenced choices for settlement locations in later periods. This paper will disseminate these results in the context of site morphologies, resource locations, and landscapes of the Harra.
108 Modelled Landscape Dynamics: Role of Past Climate & Land Use in Landscape Deterioration

Peter Wigand (University of Nevada, Reno, USA), Myles McCallum (Saint Mary's University, Canada) & Masoud Asgharianrostami (Independent, USA)

The country straddling the Puglia and Basilicata border in southern Italy (the Mezzogiorno), due to its geology, is extremely sensitive to climate and human impact upon its surficial processes. Climate was the main driver of landscape dynamics prior to the Middle Holocene in the region. However, after ~7,300 cal. B.P. land use has played an increasing role in landscape dynamics. Today the relative effect of people and climate upon the landscape is obvious, however, their relative impact is now being assessed for the Holocene. Research, combining paleoecological and archaeological data, is now providing data on the roles of climate and land use in landscape dynamics. Climates similar to today's have occurred previously and are providing understandings of past relationships between climate, people and landscape. Through the application of past analogues and modelling we are using them to predict future landscape response to global climate change. Integration of a mesoscale climate model (MCM), and relationships between effective precipitation and sediment yield developed in the American Middle West, has been correlated to currently available alluvial histories near the southern coast of the Mezzogiorno. We have established correspondences between past effective precipitation, vegetation cover, land use and erosion. We are refining our input data with a more robust regional alluvial history, and with GSI conversion of archaeological surveys into spatial distributions of human distributions and land use. The model indicates that cycles of erosion are related to increased spring drought during the last 6,000 years, and increased summer rainfall events since then. It also identifies erosional episodes at 7,000 and 3,000 B.P as being the result of land use changes, rather than climate, and indicates that increased erosion during the last 2,000 years is related to the impact of land use during cycles of drought and summer rainfall.

88 Environmental history, populating of area and terraced agro-landscapes of mountainous Dagestan (Eastern Caucasus, Russia)

Natalia Ryabogina (Tyumen Scientific Centre SB RAS, Russian Federation), Alexander Borisov (Institute of Physicochemical and Biological Problems of Soil Science RAS, Russian Federation) & Idris Idrisov (Institute of Geology DSC RAS, Russian Federation)

The Mountainous Dagestan has a unique historical development within the Caucasus and this area known as one of the oldest place of crops domestication in the world. Traces of large-scale agricultural land use in different periods have been preserved in the form of agricultural terraces, the mapping and detailed study of which only began in recent years. However, there was little to no data on the changes in natural conditions during the settlement of this region. New pollen record of Shotota swamp span most of the Holocene from the Neolithic to the Middle Ages, including all periods of occupation and agricultural development. This study presents an analysis of vegetation history, climate dynamics and their comparison with the settlement history of the mountainous zone of the Eastern Caucasus, based on maps showing the location of archaeological sites for various historical periods. According to our data, early agro-pastoral settlements appeared in the Neolithic at the turn of the 9th-8th millennium BP, and later reappeared in Chalcolithic and Bronze Age mainly in very dry conditions, surrounded by steppe landscapes. And, on the contrary, the increase in moisture did not lead to the settlement of these areas, despite more favorable conditions for farming. The creation of non-irrigation terraces started in Bronze time, but only from the Early Middle Ages and onward, with the creation of terraced agro-landscapes a new stage begin for the colonization of the mountainous in a cold climate. Study was supported by the Russian Science Foundation, project 17-18-01406.

27 Seeing a changing landscape using carbonate crusts: Wadi Heremeyeh

Nizar Abu-Jaber (German Jordanian University, Jordan) & Catreena Hamarneh (Von Humboldt University, Berlin, Germany)
Wadi Heremeyeh is one of the main tributaries of the drainage system that drains into the core of the ancient Nabatean city of Petra. Petra is characterized by an annual rainfall of around 100 mm year/a, which falls in few short, intense events. As such, it is a major source of flash floods that bedevil the site. In order to control flooding in Petra, the Nabateans built an elaborate hydrological system throughout the drainage area. In doing so, they also managed to harvest water for agriculture as well. The drainage area is around 3km², and consists of a limestone outcrop at the headwaters and sandstone outcrops downstream. The area is affected by running water on barren rock surfaces with fallen derbies. It is partially covered by a thin soil layer. Little modern intervention helped preserve its original condition and make it an excellent case study. In the intervening two millennia since the system was in use, both deterioration and loss of the dams and terraces has occurred and base levels have changed as a result of ongoing tectonism. This makes the restoration of the system challenging, as it is often not clear exactly how it was. Destroyed check dams and terraces leave few clues as to where they were. Traces of the past landscape in the form of a variety of carbonate crusts that can inform where streams, soils and dams were present. Various types of crusts indicate the presence of water flow and accumulation. In this study, detailed mapping of the crusts and their typologies is used to distinguish where the ancient installations were placed and how high they were. In addition, changing stream levels due to ongoing tectonism can be identified. Based on these results, detailed understanding of the landscape configuration and management can be achieved.

Related posters (for poster abstracts, see p.213-230)

242 Geomorphology, hydrology and archaeology at Qurayyah (NW Arabia)
Philipp Hoelzmann, Laura Hüneburg (Freie Universität Berlin, Germany) & Marta Luciani (Universität Wien, Austria)
SESSION 18B - CLIMATE, HERITAGE AND ENVIRONMENTS: COLLABORATIVE APPROACHES TO THE STUDY OF CLIMATE CHANGE IMPACTS ON THE HISTORIC ENVIRONMENT

Louise Barker (Royal Commission on the Ancient and Historical Monuments of Wales, UK), Sarah Davies (Aberystwyth University, UK) & Sandra Henry (Discovery Programme Ireland, Republic of Ireland)

KEYWORDS. climate; heritage; environment; climate change.

Climate change brings a number of significant global challenges to the historic environment. This session seeks to explore the methodologies and collaborative approaches that researchers are employing to study the past, present and future impacts of climate change on cultural heritage. The session organisers are part of the five-year EU-funded CHERISH Project - Climate, Heritage and Environments of Reefs, Islands and Headlands of the Irish and Welsh regional seas. CHERISH brings together a cross-disciplinary, cross-border team of specialists from a variety of fields including climate change, hydrography, geology, archaeology, remote sensing, environmental science and scientific dating. The project seeks to target data and knowledge gaps in the coastal zone of Ireland and Wales, establish new coastal baseline data and recording standards, link land and sea through tackling the ‘white ribbon’ zone and reconstruct past environments and weather histories. The session brings together papers which showcase collaborative and innovative research and fieldwork approaches, whose principal aim is to raise knowledge and awareness of the impacts of climate change on heritage sites and landscapes. We are keen to promote an exchange of ideas and active discussion between researchers on projects tackling a variety of climate challenges on land-based, coastal and maritime heritage.

Thursday 20th September, 11:30-13:30, Newcastle University

Introduction to Session

Sarah Davies (Aberystwyth University, UK)

223 Understanding dynamics of heritage landscapes in a changing climate regime

Lesley Davidson, Jon Mills, Ian Haynes (Newcastle University, UK), Charles Augarde (Durham University), Paul Bryan (Historic England) and Mark Douglas (English Heritage)

Understanding the dynamics of cultural heritage landscapes is important for effective management of the historic environment, especially given the challenges posed by the current changing climate regime. Coastal zones are preferential locations for past human activities and are vulnerable to deterioration from adverse weather conditions and sea level rise. The Solway Firth on the Cumbrian coast, for example, is rich in archaeological resources, including globally significant remains within of the Hadrian’s Wall World Heritage Site, and is vulnerable to flooding and erosion. The Solway Dunes and Mawbray Bank Site of Special Scientific Interest, characterised by a sand dune system, has been shown to be susceptible to erosion during extreme weather conditions. In 2006, a cremation cemetery associated with the Roman Fort at Beckfoot was seen eroding from the shoreline and prompted rescue excavations. Continued shoreline retreat of this area demonstrates the need for a scientific understanding of coastal processes of the Solway Firth, within the heritage industry. Using time-series analysis, consisting of historic maps and coastal charts, lidar, and 3D models produced from archival aerial photographs, this paper will characterise historic coastal change. It will identify the advantages
and disadvantages of each data type, discuss spatio-temporal data fusion issues and examine various 2D and 3D techniques and best practise for detecting change. This approach seeks to identify and understand past landscape change and its influence on the cultural heritage of the Outer Solway Firth to predict future natural environmental impact on cultural heritage assets.

199 Collaboration: First Line of Defence - HES Approach to Climate Change Risk

Mairi Davies, David Harkin (Historic Environment Scotland, UK) & Emily Tracey (British Geological Survey, UK)

Historic Environment Scotland has a strong legislative foundation from which it has planned an informed and pragmatic approach to recognising and understanding the risks, and opportunities, that a changing climate presents the historic environment with. This includes understanding the risk and impacts of climate change on our own estate of 336 Properties in Care (PICs) of the Scottish Ministers, which are spread across every corner of Scotland. Our approach to identifying ‘at risk’ sites on our estate has been shaped by working in close partnership with other organisations, such as the British Geological Survey (BGS) and the Scottish Environment Protection Agency (SEPA). We have collated datasets, from these organisations, detailing current risk from natural hazards such as slope instability and flooding, and used these as indicators of susceptibility to our changing climate. Our climate change risk assessment has also been influenced by our involvement in Adaptation Scotland’s Learning Exchange Programme. This brought together various public sector bodies from across Scotland to share knowledge and best practice in conducting climate change risk assessments. From the outset working in partnership has been key to furthering our understanding of climate change risk on our estate. The results of this initial assessment have directly informed key corporate documents, such as our Asset Management Plan (2018) and our Strategic Investment Plan (2018). This has placed our risk assessment at the centre of the decision making process with regard to the conservation and maintenance of our PICs. This approach to monitoring and managing climate change risk will help to safeguard our PICs for future generations.

168 From the Air, on Land and Sea: Investigating Climate Change in the Coastal Zone of Ireland and Wales. Introducing the CHERISH project.

Louise Barker (Royal Commission on the Ancient and Historical Monuments of Wales, UK), Sarah Davies (Aberystwyth University, UK) & Sandra Henry (Discovery Programme Ireland, Republic of Ireland)

The winter of 2017/2018 was a stormy one in the coastal zone of Ireland and Wales, the area of study for the CHERISH (Climate, Heritage and Environments of Reefs, Islands and Headlands) project. More frequent extreme weather events, warmer temperatures, rising sea levels and changing rainfall patterns are the effects of the changing climate that we are already experiencing and indeed have experienced in the past, and how we monitor and study the impact of this on the historic environment is one of the major themes of CHERISH and the focus of this paper. We will look at the ways in which a cross-disciplinary, cross-border team of specialists has been developing a field methodology and toolkit for the study of both terrestrial and marine environments. From the air, aerial survey and LiDAR has targeted areas where data and knowledge gaps exist, for example the Islands of Wales, whilst on land detailed survey and investigation of threatened sites using a variety of remote sensing and invasive techniques provides highly accurate baseline data for future monitoring and offers mitigation towards what is likely to be the inevitable loss of historic assets. Palaeoenvironmental sequences from coastal lagoons and wetlands, along with luminescence dating of sand dune sequences, are being used to establish records of past storminess. Combined with documentary evidence, these provide a long-term context to current and near future risks and provide insights into the nature of extremes faced by past
communities in these dynamic coastal environments. In the marine environment CHERISH aims to monitor and record the changes to submerged cultural heritage. Wreck sites will be monitored that are located in the intertidal, shallow and deep water zones to understand the physical, chemical and biological impacts.'

299 Palaeoenvironmental perspectives on risks to coastal heritage in Ireland and Wales.

Sarah Jane Davies, Patrick Robson (Aberystwyth University, UK), Geoff Duller, Hywel Griffiths, Cerys Jones, Henry Lamb, Helen Roberts & Hollie Wynne (CHERISH team members, UK)

CHERISH (Climate, Heritage and Environment of Reefs Islands and Headlands) is a five-year project, funded by the EU Ireland Wales Territorial Co-operation Programme (2014-2020). It is a partnership between the Royal Commission on Ancient and Historic Monuments of Wales, the Geological Survey of Ireland, the Department of Geography and Earth Sciences at Aberystwyth University and the Discovery Programme: Centre for Archaeology and Innovation Ireland. Interdisciplinary research is focusing on risks to cultural heritage around the coasts of Wales and Ireland from climate change, sea level rise and extreme events. A key element of our research involves investigation of the record of past storm events in the Irish sea zone, to place contemporary risks within a long term context. Previous research indicates periods of increased storminess around the Wales and Ireland during the mid-1300s and during the Little Ice Age (c. 1400 – 1850 CE). However, records which extend beyond the last 1,000 years are limited and often rely on discontinuous geomorphological evidence. Continuous records from coastal lagoons and peat bogs have the potential to provide a more complete record of the changing nature of storminess. Integration with other lines of evidence, such as from sand dunes and cliff top storm deposits provides the opportunity to explore how they relate to changing sea level and periods of known climatic variability, providing insights into current and future risks in the coastal zone. Here we present preliminary results from coastal wetland sites in West Wales. A combination of geochemical, physical and biological proxies is used to identify periods of increased sea spray and aeolian influx as well as direct evidence of overwash caused by storm activity. Chronological control is provided through a combination of radiocarbon and luminescence dating. Developing a regional scale dataset is important in order to capture the range of storm impacts in the Irish sea zone during the Holocene.

6 STORM: Developing a European-wide Approach to Managing Environmental Changing and the Historic Environment

Michael Nevell & Rob Williamson (University of Salford, UK)

This paper looks at the EU-funded Horizon 2020 project STORM with the focus on results from the UK pilot site. This project aims to devise management systems for identifying and coping with slow and acute disasters on cultural heritage sites brought about by environmental change. The emphasis is on the needs of the cultural heritage site owners and the development of web-based systems in collaboration with museums, site owners, emergency services and the voluntary sector. Working with museum and voluntary sector partners from Greece, Italy, Portugal, Turkey, and the UK a draft system has already been devised, elements of which are being tested in the partner countries. This paper introduces the project and looks at the initial results from the UK partner site (the most northerly of the case-studies based at the upland area of Mellor on the Greater Manchester/Derbyshire border). It discusses the collaborative work involved needed to identify the environmental threats, to develop a user-friendly warning system, and the results of testing environmental monitoring and modelling techniques.
Discussion
Louise Barker (Royal Commission on the Ancient and Historical Monuments of Wales, UK), Sarah Davies (Aberystwyth University, UK) & Sandra Henry (Discovery Programme Ireland, Republic of Ireland)

Related posters (for poster abstracts, see p.213-230)

169 From the Air, on Land and Sea: Investigating Climate Change in the Coastal Zone of Ireland and Wales. Introducing the CHERISH project.
Louise Barker (Royal Commission on the Ancient and Historical Monuments of Wales, UK), Sarah Davies (Aberystwyth University, UK) & Sandra Henry (Discovery Programme Ireland)
SESSION 20G - TRANSHUMANCE

Mark Bowden (Landscape Survey Group, UK) & Pete Herring (Cornwall Council Historic Environment Service, UK)

KEYWORDS. transhumance; pastoralism; agriculture; shieling

Transhumance has been extensively and deeply studied in many parts of Europe and elsewhere in the world but has in Britain received relatively little attention away from the northern and western highland zones. There have been some local studies, some survey and excavation on the physical remains of shieling sites, some consideration of the place name evidence associated with the practice, some application of ethnographic models derived from early modern accounts, and a few attempts to consider the experiential or phenomenological aspects of moving to and from the summer pastures spending several months away from home. But there has not been the sustained academic attention paid to this important aspect of rural economy and society that has been seen, for instance, in France, Italy and Spain, or in Scandinavia and Ireland. Transhumance - 'summering' in traditional English terminology - is a group of differing but related systems. They involve seasonal movements of livestock over long or short distances to exploit pasture in complementary ecological zones. It is an economic activity, a widespread aspect of pastoralism, but also driven by the needs of arable agriculture. The movement of flocks and herds, however, also involves the movement of people, and this has profound social implications. There is widespread evidence of its prevalence in the British Isles in historical periods, and strong suggestions in prehistoric arrangements that are still visible today of deeper roots and a wider influence on the development of the British landscape. There is, however, little understanding of how it worked, its origins and development, its impact on social practice or, indeed, its decline.

20G Part 1 - Thursday 20th September, 09:00-11:00, Newcastle University

195 Introduction to Session: The recognition of transhumance in Britain

Mark Bowden (Landscape Survey Group, UK)

In historic periods it is relatively easy to identify archaeological remains that relate to transhumant practices, aided by available texts, and indeed for recent periods through ethnographic approaches. In prehistoric periods the challenge is greater – evidence which might point to transhumance is capable of alternative explanations. Nevertheless, several excellent studies have been undertaken. In mainland Britain work on this topic has been somewhat sporadic until now, perhaps because transhumance has been regarded as a peripheral, unimportant and small-scale activity. This paper will introduce these issues and set the background for later papers in the session.

252 ‘Frequently the winter grazing grounds are many miles away from the summer’ (Varro 2.2.9): Transhumance in Central Italy.

Marinella Pasquinucci (University of Pisa, Italy)

Transhumance has characterized many areas of Italy since antiquity. In Central Italy, in particular, the Apennines and the adjacent coastal plains offered large seasonal pasturages, while the markets of Rome and other cities, as well as military supply (which included dairy products, meat, hides), made it highly profitable. Here in some periods (2nd-1st cent. BC to the end of the Roman Empire; Modern times: 15th to 19th cent) transhumance was carefully organized and conspicuous capitals were invested especially in flocks but also in herds. Ancient written sources (both literary and epigraphic) provide relevant evidence about all aspects of transhumance in Central Italy and other areas from the 1st cent. BC to the end of the Roman Empire, and beyond. Such evidence can be compared with archaeological data, providing a relevant framework for the archaeology of pastoralism and for the study of
transhumance in areas where only archaeological data is available. As for Modern times (15th to 19th cent.), written documents and cartographic evidence is provided by the Archives of the institution Dogana della mena delle Pecore di Puglia (Foggia) created by the king of Naples in 1447.

276 The TraTTo project: paths and pastures from prehistory to modern age in southern Tuscany. Approaches and activities

Giovanna Pizzio, Nicoletta Volante, Andrea Zagli (University of Siena, Italy); Michele De Silva (University of Firenze, Italy) & Davide Cristoferi (Universiteit Gent)

The paper presents the interdisciplinary approach developed for the TraTTo project related to the study of transhumance’s paths and pastures in Southern Tuscany in a long-term perspective, from Prehistory to Modern Age. The project is carried on by a research group of the Department of History and Cultural Heritage of Siena University in collaboration with the École Française of Rome. The TraTTo project (acronym of Transhumance and Territory in Toscana (Tuscany) is dedicated to analysing features of Tuscan transhumance through a landscape archaeology perspective and using a strong GIS structure for analyses and data-gathering. The contribution presents some results of the ongoing activities including field survey and archives researches.

57 ’Lowland transhumance’? Seasonal movements of people and animals in late prehistoric and Roman Britain

Adrian Chadwick (University of Bristol, UK)

In ‘classic’ European modes of transhumance, there are regular movements of people and animals from lowland areas of permanent inhabitation to highland pastures for the summer months. In Britain, such lowland – highland movements were the origins of medieval and post-medieval Scottish shielings, Welsh hafodeth, and similar seasonal settlements. The form and distribution of some later prehistoric and Romano-British roundhouses and enclosures, however, suggests such practices may have had earlier antecedents. Later prehistoric and Romano-British rural landscapes were often divided up into extensive field systems and trackways, with areas of open, unenclosed land on higher ground, but also in lowland river floodplains. These periods saw large-scale movements of livestock and their herders onto such river floodplains, the evidence for which has only emerged relatively recently, much of it through developer-funded investigations. Initially, these areas would have been too wet and waterlogged for permanent inhabitation, and so settlement there too must have been seasonal. These areas and seasonal practices pose challenges to landscape archaeologists. Due to the relatively ephemeral nature of the evidence and formation of alluvial deposits and peat, some river floodplains do not produce cropmarks, and lidar and geophysical survey are often ineffective. Trackways, enclosures, roundhouses and other features have all been identified and excavated following strip and record procedures. This paper presents case studies of such seasonal occupation, drawn mostly from the river valleys of the Thames, Trent, Idle, Wharfe, and Calder. In order to write richer narratives of social life during these periods, we must engage more fully with such evidence for ‘lowland transhumance’.

232 Response Diversity and the Evolution of Pastoral Landscapes in the Western Pyrenees from the Middle Holocene to the Present

Ted Gragson (University of Georgia, USA), Michael Coughlan (University of Oregon, USA) & David Leigh (University of Toulouse, France)

We have used a place-based research strategy that incorporates geoarchaeological, biophysical and socio-ecological factors to examine the evolution of pastoral landscapes in the western Pyrenees from the Middle Holocene to the Present. Our research brings particular attention to the timing and spatial
patterning of converting mid-elevation forests to grassland pastures at a landscape level, a long-term, dynamic and spatially heterogeneous press process. The relation between places in a pastoral landscape – e.g., cabins, pathways, corrals, caves, springs, overhangs – defines the occurrence of pastoral movement at varying social scales while a herder adjusts his livestock portfolio in response to environmental stochasticity using experience and knowledge to evaluate the risks and opportunities encountered. Places thus serve as the arena in which repeated circulation and activities reflecting herder response diversity produce meaningful material patterns on the landscape. For example, over at least the last 1000 years pastoral production in the Western Pyrenees has been organized at the scale of a valley and centered on a seasonally occupational unit variously called a cayolar, olha, cujala, etc. While at its root the word means a cabin, it refers practically and legally to the social institution that regulates the collective use and management of mountain pastures and forests by herders distributed across the landscape at named places serving as gateways to the common resources exploited by sheep and people. Human response diversity across the millennia in the Western Pyrenees has structured the landscape creating resilient and durable agropastoral production systems and the underlying pathways and mechanisms of pedogenesis. The outcomes have and continue to have important consequences for ecosystem-level rates of sediment accumulation and organic matter decomposition.

Discussion

Mark Bowden (Landscape Survey Group, UK) & Pete Herring (Cornwall Council Historic Environment Service, UK)

20G Part 2 - Thursday 20th September, 11:30-13:30, Newcastle University

104 Cross-ridge dykes on the South Downs in their landscape context

David Lea, Judie English & Dick Tapper (Independent, UK)

Cross dykes, bank and ditch complexes crossing ridges and spurs in several areas of Britain, are a poorly dated and understood class of monument. They are generally thought to date to the Late Bronze Age / Early Iron Age and represent the physical manifestation of a change in way in which land was organised and, presumably, used. The project described here utilised non-invasive methods to study cross dykes on the chalk of the South Downs with particular emphasis on their place within the landscape. The total number of certain and probable cross dykes has been increased from 98 to over 180, with the majority concentrated on the periphery of the chalk blocks. A large number the main ridge and the spurs protruding north from it, forming a display to the Low Weald in the north and the Levels at the eastern end of the downs. Others cluster around the heads of the dry valleys that form possible routes cutting the downs, and on the northern scarp overlooking major rivers. Some are found on spurs within the downland blocks but very few overlook the English Channel. While some form groups appearing to either enclose or divide areas their relationships with other monuments, round barrows, settlements, enclosures and hillforts, are variable and only occur in a small number of examples. An attempt will be made to set cross dykes within a chronological framework and to suggest reasons for their placement in the landscape. Theories will revolve around directing movement of travellers ‘permitted’ routes including, possibly, seasonal transfers of grazing stock.

80 Transhumance in British prehistory: the case for the longue durée

Andrew Fleming (Independent, UK)

Although the practice of transhumance has not been incorporated into mainstream narratives of the agrarian history of the mid/late first millennium AD, landscape historians often postulate it on the basis of place-names, documents, detached parts of estates or parishes, and patterns of coaxial droveways.
and boundaries apparently heading towards seasonally-used resource zones. The practice involves not just upland areas but also wood pasture and wetland; these studies now relate to substantial areas of central and southern England. The question is, how much older are such practices, and how ‘continuous’ were they? It is argued that transhumance had an inherent stability; it should be seen as a complex, multi-faceted cultural institution, a persistent cultural practice. Coaxial landscape patterns, developing organically, may bear witness to its (perhaps intermittent) continuity from the Bronze Age onwards into the early historic period. Isotopic studies are beginning to demonstrate the ‘mobility’ of both humans and livestock from the early Neolithic onwards, providing a new impetus for the exploration of transhumance’s deep roots.

229 On the Move: Material and Environmental Imprints of Mobile Pastoralism in Northern Eurasia

Karen Milek (Durham University, UK), Alexander Oehler (University of Northern British Columbia, Canada) & David Anderson (University of Aberdeen, UK)

Early modern accounts of transhumant pastoralism in Britain provide a useful starting point for understanding the potential interrelations between people, domestic animals, and landscapes deeper in the past. However, for a broader and more nuanced perspective of how mobile pastoralism might have originated and developed in the British Isles earlier in prehistory, it may be beneficial to look at more northerly regions, such as the North Atlantic Islands, Northern Fennoscandia, and Siberia, where different types of mobile pastoralism are still practiced or were only recently abandoned. Ethnographic, ethnohistoric, ethnoarchaeological and archaeological research in these regions has shown that there are in fact many models of movement of human-animal communities, with humans often adapting their residential strategies to the needs and desires of animals. In multi-species households, where different animal species have different needs, complex systems of labour allocation and movement are sometimes in place, wherein groups of kinsmen break apart for periods of time to care for different categories of animals. The various models of movement and (sometimes) different human-animal group configurations at different times of the year result in variations in landscape use and a diverse range of material and environmental imprints on the landscape. In this talk we will give a taste of some of this variety, as well as some specific examples of the material culture and environmental impacts associated with different modes of mobile pastoralism in northern societies.

123 Movement as Ontology: Transhumant Pastoralists in the Velebit Mountain

Igor Kulenović, Šime Vrkić (University of Zadar, Department of Tourism and Communication Studies, Croatia) & Neda Kulenović Ocelić (Independent, Croatia)

The Velebit Mountain (Croatia) is one of the most significant Dinaric Karst environments. Throughout the long history of inhabitation in this region, the movement was the most crucial element in the constitution of landscape. The onset of modernization following WWII resulted in the severe depopulation of the area. However, the movement as a defining feature of the region was reconstituted as tourism and mountaineering. The Early Modern period saw the constitution of a particular and distinctive cultural system. Various built and natural features were consolidated into a consistent landscape and the impact of this system is still felt in the landscape today. The basic subsistence strategy during this period was transhumant pastoralism which created a specific landscape featuring various paths and tracks which connected different places such as hamlets, dolines, ponds, a cemetery, mirila (a pseudo-grave built at the place where the funerary congregation rested with the deceased on their way to the cemetery) etc. Traditional literature tended to extract various features of this cultural system and use them to describe and define certain phenomena such as belief, subsistence, customs etc. This literature strived to provide meaning for the different observed phenomena. However, the constitution of landscape is not reducible to discursive representations or cost-effectiveness in a measurable and predefined Cartesian space. Rather, landscape is experiential, embodied and
performed and contingent upon the very practice that constitutes a relational and emergent world. The purpose of this paper is to understand this landscape in terms of embodied practice where movement is not simply a means of transportation but an ontologically constitutive element of the everyday life. This landscape will be represented using a case study from the southern part of the Velebit Mountain.

Discussion

Pete Herring (Cornwall Council Historic Environment Service, UK)

20G Part 3 - Thursday 20th September, 14:30-16:00, Newcastle University

53 Social practice in seasonal upland settlements of northern Europe

Eugene Costello (National University of Ireland, Galway, Republic of Ireland)

This paper investigates the social significance of herding in upland and outland pastures of post-medieval northern Europe, particularly the role of summer settlements as gathering places for young women. Using previously-neglected ethnohistorical information and comparing it with the results of recent archaeological fieldwork, I explore the extraordinary freedoms which herders experienced at seasonal sites in Ireland, Scotland, Sweden, Norway and Iceland. At the same time, I discuss how lifelong gender roles were reinforced during time spent in these ‘marginal’ places and show that the autonomy of summer pastures was curtailed by the economic importance of what people were doing in the hills, namely, looking after livestock. Adult males maintained subtle control over the architecture of seasonal sites and formed a noticeable presence in the wider landscape thanks to occasional extractive industries. Seasonal sites underwent symbolic and practical subordination by their home settlements.

39 Extremes of British transhumance: Bronze Age & Inter-War; Dartmoor & Lewis

Peter Herring (Cornwall Council Historic Environment Service, UK)

Landscape archaeology demonstrates that transhumance was of fundamental importance to the sustainable operation of British farming systems for millennia: detectable from the early 2nd millennium BC, continuing in places into the late 2nd millennium AD, to within living memory. Transhumance made productive use of seasonally available rough grazing and in removing livestock facilitated production on core farmland of winter fodder and crops. It would have been central to rural culture, as it still is in parts of Europe. The contribution of the experience of transhumance to aspects of British identity and norms, including those derived from customs required to manage commons may not yet be fully appreciated. The effects on rural society of many or most young women spending half the year with the community’s dairying livestock in distant hills, going and returning at the two most vividly celebrated festivals (Mayday and Halloween, Beltane and Samhain) have been considered by few historians. This paper pursues that last observation by personalising and colouring a sometimes drily-presented process. It examines the remarkably well-preserved and moving material culture associated with the body of a young Early Bronze Age woman, tentatively interpreted as an early transhumant, who was buried in the heart of the highest, northern part of Dartmoor, possibly as remote from her ‘home’ as she could be, unless she was interred where her spiritual home was, a place where she was happy. It draws on how older women fondly reflect on the significance to themselves and their communities of their youthful days in the hills, vividly illustrated by recently recorded memories of a former transhumant who as a girl took the family’s cattle to the Barvas Moors on Lewis, a place where she too was happy.
54 Intangible cultural heritage in transhumance landscapes - examples from France and Norway

Véronique Karine Simon (Norwegian Institute for Cultural Heritage Research, Norway) & Bolette Bele (Norwegian Institute of Bioeconomy Research, Norway)

Transhumance practices are still alive in mountainous regions in France and in Norway, reflecting long-standing and persistent traditions. However, the local and traditional land use systems attached to those practices are today threatened by socio-economic changes and natural ecological processes. This paper shows two cases from the French Alps and the mountains of Central Norway and discuss some of the solutions adopted by the local populations in collaboration with local NGOs, experts and governmental institutions. The intangible cultural heritage connected to transhumance systems includes knowledge about land-use traditions (e.g. preparation of local dairy products, meat production, traditional ecological knowledge, handicrafts, regional languages, etc.). It conveys the local people’s history, it helps us understand how upland society structures emerged and developed, and how high-altitude landscapes evolved into balanced ecosystems. Grazing, winter fodder harvesting and food production over hundreds and thousands of years shaped a mosaic of endemic semi-natural vegetation types with high biodiversity values. Today, transhumance practices both in France and in Norway rely on a more simplistic structure than in the past and the transhumance areas face the rapid disappearance of their representative intangible cultural heritage. Especially, the loss of accumulated knowledge (TEK) about the utilization of natural resources and architectural infrastructures impinges the local communities’ capacity to manage and preserve such landscapes. Transhumance represents a real asset and an opportunity for local communities to pursue economical activities in the locality they live in. The continuity of land-use activities is of crucial importance for the preservation of intangible cultural heritage, nature types and biodiversity connected to human activities. Gathering knowledge about details of upland land-use system, its transmission to younger generations and public education are thus necessary to the development of sustainable local initiatives and to the sound management of those highly sensitive areas.

Final Discussion

Mark Bowden (Landscape Survey Group, UK) & Pete Herring (Cornwall Council Historic Environment Service, UK)
SESSION 21F - SPEAKING MONUMENTS - THE STORIES BEHIND THE STONES

Michael Freikman (Ariel University, Israel) & Evie Gaessner (The Hebrew University of Jerusalem, Israel)

KEYWORDS. Monuments; Landscape; Ideology; Propaganda; Mythology

Monuments are the most conspicuous anthropogenic element of virtually any landscape. These monuments are defined not only by their scale and architectural complexity but also (and possibly even more) by their exceptional visibility in the landscape; their primary function is to be seen and admired (though not necessarily physically accessed) by spectators. Sometimes they are visible from long distances, thus becoming, intentionally or not, a kind of beacon in the local space. But a monument is more than a highly visible feature. Planted in the centre of a local landscape, over time it becomes a connecting spot that turns various unrelated spatial features like roads, rivers, gardens, and private and public buildings into parts of a single system, like a huge body of which the central monument is the heart. Even more important, these relations between different elements are an embodiment in stone and timber of stories told by the builders to explain their appearance in the landscape to future generations. The reasons behind the construction of such monuments can be many things – for example imperial propaganda, founding myths or historical events, episodes of religious significance, etc. It is only rarely, however, that an ancient monument is eager to tell us its story, especially in the absence of textual evidence. Archaeological evidence directly related to the monument itself is usually very scarce, and so the monument stays, conspicuous but silent in the middle of the field, stimulating our imagination. It is the landscape that often surrounds it which can be helpful in revealing the story behind the monument. Therefore, the main goal of this session is to present case studies from various periods and regions of the Mediterranean basin and beyond which can illustrate the phenomenon of transmitting ideology through an interaction between monument and landscape. The outcome of this session should hopefully be a set of tools which will help us to read and analyse the landscape context of monuments and understand its language in a better way.

Tuesday 18th September, 11:00-13:00, Newcastle University

Introduction to Session

Michael Freikman (Ariel University, Israel) & Evie Gaessner (The Hebrew University of Jerusalem, Israel)

201 Local Landscapes and Soundscapes and the Location of Ancient Stone Circles: A Multi-Disciplinary Investigation

Keith Harvey (University of the Islands and Highlands, UK) & Sarah Best (Independent, UK)

This multi-disciplinary project seeks to develop an understanding of how historical landscapes and soundscapes may have influenced the selection of locations for megalithic monuments such as Stone Circles in Scotland and the wider United Kingdom area. The research is being conducted by a team of undergraduate and postgraduate students from a range of academic disciplines including Archaeology, Anthropology, History, Art, Music, and Audio Engineering, in order to formulate a novel and multifaceted comprehension of the topic. The project aims primarily to investigate the potential cultural and environmental factors influencing the choice of location for these monuments, and how the relationships between people and the visual and auditory settings in which they were located may have directly affected how and why these structures were built. Building on previously published works on the historical and cultural significance of these monuments, as well as a significant body of research in material archaeological analysis, this project also integrates perspectives from the emergent discipline of Archaeoacoustics, as well as artistic and musical interpretations in order to attain an end result that is both academically informative and creative and engaging. In addition to a review and comparison
with previously published works surrounding Stone Circles and other ancient monuments, the project will use a wide range of other research methodologies, including the analysis of material culture and other physical evidence, on-site audio analysis, and the digital recreation of sites and simulation of historical soundscapes.

254 Constructing cosmogonical landscapes in ancient Thebes, Egypt
Angus Graham (Uppsala University, Sweden), Willem Toonen (University of Leuven, Netherlands) & Jan Peeters (Utrecht University, Singapore)

The Egypt Exploration Society/Uppsala University Theban Harbours and Waterscapes Survey (THaWS) has been conducting a geoarchaeological, geophysical and topographic survey in the floodplains of the West and East Bank of Luxor since 2012. THaWS has carried out a survey of 41 boreholes (hand augering and percussion coring) in and around the Temple of Millions of Years of Amenhotep III (Kom el-Hettan), which was located in the floodplain and not on the desert edge like all his predecessors and successors. We have established that it was founded on a sand body in the floodplain with deep flood basins surrounding it. This work completely changes prior Egyptological interpretations as we relate flood history in the region to the biography of the temple and the decision-making to locate the temple in order to reproduce Egyptian cosmogony on earth. Work continues in and around the cult temple complex of Amun-Re at Karnak, which lies in the centre of the Nile valley (c. 5km east of Kom el-Hettan). The geoarchaeological and geophysical survey reveal a much more complex geomorphological history than was conceived by earlier work, but which again supports the founding of this temple on a mythological primeval mound. Our work reveals how the ancient Egyptians use the land- and waterscapes of the Nile valley to marry their notions of the origins of the universe with the annual and daily cycles of rejuvenation that take place within these temple complexes. This enabled those who did not have access to the temple complexes to see and understand some of their meanings from without.

287 Living in the villa. New data on the historical and ideological dynamics of the Volusii Saturnini suburbanum at Lucus Feroniae
Armando Cristilli (University of Rome ‘Tor Vergata, Italy)

The villa of the gens Volusii Saturnini at Lucus Feroniae has always been a special monument in the local landscape, both because it is an estate of an important Roman family and because of the elegance and the ideological message of its interior: for these reasons, it is an interesting case study about what a monument can speak of its past story and its meaning. The scholars have been highlighted its self-representational and didactic role, based on the inscriptions found in the c.d. lararium in the centre of the large peristyle. But more recently, my studies are demonstrating how the marble sculptures and the structural organization of the interior spaces have also contributed to visually emphasize the owners' self-celebration in an exclusive link between the family, the house staff and the high-ranking guests. So not only it confirms what was highlighted in the past researches, but also it develops the available data. The Volusii Saturnini inhabited and shaped their villa as the hot spot of exaltation of the public life of their family, transforming it into a formidable artistic medium to celebrate their adherence to the propaganda of the establishment. Thus, the villa of the Volusii family, real protagonists in the Julio-Claudian history and members of the Roman aristocracy, glorify their political actions and the weight of their name in Rome through the homage to the imperial family and the reorganization of furniture and interior spaces.

33 Completing the landscape: the Acropolis of Athens
Eva Andronikidou (National Technical University of Athens, Greece)
This paper investigates the design of the Athenian Acropolis and the way its buildings are related, by finding connections to the surrounding environment, and the extent to which this affects the design. In particular, the paper explores the relation of this site of worship with the ancient "Attic landscape", and the evolution of this relation through time, up until the current tissue of the Athenian metropolis. The theories formulated in the work of Vincent Scully (The Earth, the Temple, and the Gods: Greek Sacred Architecture) and the work of Constantinos Doxiadis (Architectural Space in Ancient Greece) serve as the starting point to detect analogies and correlations that can be traced nowadays in the integration of the remains in the Athenian urban fabric. Due to its topographical characteristics and its social, political and religion importance, the Acropolis of Athens has a particular relation with the environment; not only the natural landscape, but also the urban surrounding environment that has been changing rapidly through the years. Plans, collages, photographs, descriptions, maps and a wide bibliography are used to investigate the connections among the Acropolis buildings throughout history, as well as the linkages developed between the temenos and its surrounding landscape. The graphic material -created in situ- leads to the conclusion that the buildings of the Acropolis are deeply linked to the surrounding environment, and that there are geometrical relations among the buildings that reveal an underlying internal design. The theoretical material of Scully and Doxiadis is depicted in plans that confirm this claim, thus revealing additional information. Finally, it is concluded that the Attic landscape and topography are deeply related to the design of Acropolis, and that the contemporary Athenian environment dramatically affects the perception of this relation among the buildings, in the eyes of the modern visitor.

107 Portage crosses are witnesses of the development of historical waterways of the Russian Plain.

Natalia Erman, Olga Aleksandrovskaya (S.I. Vavilov Institute for the History of Science and Technology of the Russian Academy of Sciences, Russian Federation) & Viacheslav Nizovtsev (Lomonosov Moscow State University, Russian Federation)

The waterways and the portages connecting them played a huge role in the settlement and economic development of forest landscapes of the vast territory of the centre and North of the Russian Plain. Since the 8th to 11th centuries, water transport and trade routes have been formed: 'The Great Volga Route', 'From the Varangians to the Greeks'. It was possible to move from one river basin to another in forest areas on the interfluves only by the shortest paths between the upper reaches of the rivers - the places of the transitions - portages, where boats, ships and cargoes were moved on dry land. The main signs of the direction to the portages on the forested difficult terrain were large boulders or their clusters, and with the adoption of Christianity, so-called "portage" crosses. Stone crosses were set as landmarks on waterways on key portages. These original traffic signs were created from granite, sandstone, limestone and other local materials with an average height of 1 to 2 m. One of the most famous crosses of the chronicles: Ignach cross (1238), which was on the watershed section of the 'Seregersk waterway' on the Novgorod land. The Sterzhensk cross on the Tver land (1133) was established as a pointer to the confluence of the river Volga into the lake Sterzh. Today, the Sterzhensk cross is located in the Tver regional natural history museum. The portage crosse of the IX–X centuries are in the expositions of local history museums in the town of Ostashkov (Tver region). There are crosses that were preserved in their historical places of origin: for example, the portage cross at the Malskoye lake, which is 4 km from the town of Izborsk (Pskov region, Russia). At present, these monuments are reliable witnesses to the development of ancient waterways.

Discussion

Michael Freikman (Ariel University, Israel) & Evie Gaessner (The Hebrew University of Jerusalem, Israel)
SESSION 22E - ARCHAEOLOGY, METHODS, ACTION! - RIGOROUS METHODOLOGIES FOR UNDERSTANDING PAST MOBILITIES

Michelle de Gruchy & Ed Caswell (Durham University, UK)

KEYWORDS. Past Mobility, Movement, Routes, Wayfinding/Navigation, Traffic Patterns.

It is an exciting time for those interested in past mobilities. As described by Jim Leary (2014) in the introduction to the book Past Mobilities, researchers working around the world are continuing to develop new methodologies, including quantitative methodologies, for exploring mobilities and movement within landscape (and vice versa). By definition such study areas embrace a broad range of regions and time periods and (rarely having the chance to meet in the same room) researchers find it easy to lose track of relevant or inspiring methodological developments in other regions or periods. The aim of this session is to bring together researchers from a wide range of fields and regions. This session will be coordinated with two other session at LAC2018; the focus of this session is on methodology, rather than applications, including particularly quantitative methods, for modelling and understanding movement from the individual to the societal scale. Current topics on which papers are invited include (but are not limited to) reconstructing/predicting routes, understanding past route choice decisions, identifying traffic patterns, and examining the travel of individuals; more broadly, how can we track the impact of travel on culture?

22E Part 1 - Wednesday 19th September 09:00-10:30, Durham University

Introduction to Session
Michelle de Gruchy & Ed Caswell (Durham University, UK)

302 Data-driven approach to identify early modern humans’ ecological niche and optimal dispersal routes in Eurasia
Yasuhisa Kondo (Research Institute for Humanity and Nature, Japan)

Using a combination of ecological niche analysis and least-cost path analysis, this paper presents a data-driven approach to estimate the optimal dispersal routes of early modern human population groups. The timing and routes of early modern human dispersals ‘Out of Africa’ is one of the hot topics in prehistoric archaeology and anthropology. While dating of dispersal is done using scientifically advanced and reliable methods, the possible dispersal routes are usually drawn in a rather subjective way. In the proposed method, niche probability is predicted by MaxEnt, an ecological niche model based on the maximum entropy theory. Location of known archaeological sites and environmental factors derived from palaeoterrain and palaeoclimate models are the inputs for the model to calculate the niche probability at each spatial pixel and the weight of the environmental factors. The inverse of the probability score is then used as an index of the relative dispersal rate to accumulate the travel cost from a given origin. Based on this cumulative cost surface, least-cost paths from the origin to the given destinations are visualised. This method was applied to the Initial Upper Palaeolithic population group (probably of modern humans) in Eurasia during 47 to 45 kya. The model identified three possible migration routes from the Levant to (1) Central Europe via Anatolia and Eastern Europe, (2) the Russian steppe via Caucasus Mountains, and (3) the Altai region via the southern coastal Iran and Central Asia.

125 Modelling human movement with limited landscape knowledge
Irmela Herzog (The Rhineland Commission for Archaeological Sites and Monuments, Germany)
During the past two decades an increasing number of archaeological studies appeared with the aim of reconstructing the movements of past humans on land surfaces by computational methods. Many of these apply least-cost path (LCP) calculations. If implemented properly, the LCP is a most cost-effective path connecting two locations A and B. Several paths accumulating the same costs may exist, but the algorithm picks only one of them. Moreover, the LCP algorithm is based on total knowledge of the landscape which is not even realistic for all past travels motivated by economic reasons. Several approaches have been proposed to model limited knowledge of the landscape ahead. For instance, the toolbox Circuitscape selects the path of least resistance taking only the immediate neighbours of the current raster cell into account. This is unrealistic as well. Computationally intensive agent-based programs can be developed to model limited knowledge and may also take additional aspects of human movement into account such as preference of a certain direction or avoiding sudden turns. In my view, the most flexible approach allowing to define the radius of knowledge are accessibility maps that are based on least-cost kernel density estimation using a kernel with bounded support. The methodology of this approach will be presented as well as some results for hilly regions in the Rhine area, Germany.

194 Identification of ancient pathways in the loess landscape of W Romania
Moritz Nykamp, Brigitta Schütt (Freie Universität Berlin, Institute of Geographical Sciences, Germany), & Daniel Knitter (Christian-Albrechts Universität zu Kiel, Department of Geography, Germany)

This study presents methods to identify and date ancient pathways in the built-up area of the Late Bronze Age enclosure Corneşti-larcuci, western Romania. Our interdisciplinary approach integrates archaeological datasets (magnetic prospections and systematic field walking) with morphometric terrain analyses and 14C-dated sediments to provide a rigorous reconstruction of patterns of past human mobility. We demonstrate our approach with a case study from Corneşti-larcuci. The site is composed of four ramparts covering an area of c. 17.6 km². Several gates to the enclosure and different settlement clusters, within the two innermost ramparts, have been identified. The landscape in the surroundings of the site is characterized by slightly undulating loess covered plains and wide saucer-shaped valleys. Numerous tributaries are developed in the hillslopes of the valleys. Some of these tributaries show unnatural courses, e.g. sections that run reverse to the direction of the general surface gradient or strongly bending upper reaches. We show that the occurrence of unnaturally bending tributaries cluster in the built-up area in comparison to catchments in the vicinity, but beyond the site. It is shown these tributaries tend to link different settlement clusters or run through gates. By applying the principle of “active association” (Wilkinson, 2003, 66) a first estimation regarding their formation period is postulated. 14C-dated sediments from alluvial fans that originate from these tributaries are used to verify their formation period and discuss their formation as hollow ways contemporaneous with the settlement history. This approach is valuable for two main reasons: 1) it can serve as a tool to predict so far unknown gates in the ramparts of Corneşti-larcuci and 2) it can be tested in a wide range of locations along the “loess-belt”—an area of intensive settlement activities throughout prehistory.


12 Understanding Landscape Mobility during the Middle Pleistocene in Calerizo de Cáceres, Extremadura, Spain
Akinbowale Akintayo & Antoni Canals (Universitat Rovira i Virgili, Spain)

This work presents the study of the mobility of human groups which inhabited a broad landscape of the Calerizo de Caceres, Spain during the Lower and Middle Pleistocene using the archeological record of the Santa Ana cave. The Calerizo de Cáceres is a granitic territory with quartzitic hills confined between them and availability of surface and groundwater resources all year round. The availability of water throughout the year was key to the biodiversity in this area thereby making it a place for early human groups to settle in prehistoric times, as opposed to the surrounding granitic landscape with seasonality of food resources and lack of water throughout the year. The streams and rivers which drain the Calerizo
also bring sediments downslope and this has led to the formation of riparian forest along river courses which attracted animals to these areas. Through the analyses of the archaeological record of the Santa Ana Cave in relation to other sites found within the region, the study enabled us to understand the use of space and landscape mobility of these early human groups from archaeological sites to resource provisioning areas on the landscape – (water, lithic, plants and animal resources) which further informed our understanding of different activities which took place at individual site endowed with resources and model landscape mobility with regard to resource procurement and transport.

22E Part 2 - Wednesday 19th September 11:00-13:00, Durham University

102 Evaluating Arabia’s trade routes with Least Cost Path analysis. An approach towards the identification of pathfinding strategies.
Alexander Städtler (Free University of Berlin, Germany)

The development of the camel caravan operated trade routes on the Arabian Peninsula reached its peak during the late 1st millennium BC and early 1st Millennium AD in the context of the trade with aromatics originating from Southern Arabia. This study aims at evaluating this routes network using a GIS-based least cost path analysis (LCP). Routes will be calculated combining a cost function based on topography and land cover. The results will be compared to the routes proposed by antic sources and archaeological research in order to 1) evaluate the established model and 2) define whether cost-efficiency was the sole and primary motivation and/or to which extent different factors influenced the formation of this communication and transport system, and, if so, if these factors can be identified and quantified. The ultimate goal is to identify pathfinding strategies as a proxy for perception of space.

7 Past mobility in New Zealand: Calculating the number of Maori movements to and from Maniatutu
Caroline Phillips (Anthropology, University of Auckland, New Zealand)

Maori practised swidden cultivation, which necessitated mobility. The inhabitants of a village would cut and burn forest or shrub vegetation, cultivate kumara (sweet potato, Ipomoea batatas) for a few years at which point the fertility of the soils, in particular the potassium levels, would become exhausted requiring the establishment of a new garden elsewhere. Traditional information refers to Maori groups moving across their territory, establishing different gardens and associated settlements. Early European eyewitness accounts recorded some of these practices, which together with recent experiments have enabled a better understanding of Maori cultivation techniques. Due to the requirements of the crops, it has been estimated that gardens could have been maintained for up to five years before fallowing for around 15-30 years. However, the frequency of movement to any particular location is hard to determine. In this paper, a method of calculating the number of movements is explored by using the size of garden plots and their estimated productivity, which is compared with the size and number of semi-subterranean pits used to store the crops. The example comes from the Maniatutu excavations in the Bay of Plenty, in the North Island of New Zealand. The results suggest that Maori established gardens to which they returned on at least seven different occasions between 1450 and 1625 AD.

275 A Crossroad in Time: Focus on an Infrastructural Palimpsest
Aspassia Kouzoupi (Independent, Greece)

The present study pertains to an area of North-Eastern Peloponnese; precisely in the proximity of the ancient walled city of Cleonæ. South-West of its walls, an important transport axis of antiquity would bifurcate: its eastern branch connected Corinth to Argos via the Tretos pass [modern Dhervenakia], and...
its western branch would lead to Nemea through a steep valley. The hill of Drymoni, with its numerous dispersed ancient quarries, imposed this bifurcation. One of the main factors of mobility during archaic to early roman antiquity on this area’s road-system, was the extraction of a great quantity of rock blocks from the multiple quarrying sites of Drymoni hill. The specific focus of this study pertains to the optical relationship between the quarried Drymoni hill and the ancient road linking Corinth to Argos. The collection of data has been based on bibliographic research comprising on one hand contemporary sources and on the other the registers of the Early Travellers, the inspection of historic maps and aerial views, and in situ field trips at the respective area. The scope of this research is to approach the ways the quarried hill has been optically perceived as a possible roadscape through time: during the ancient times when the quarrying landscape was still operating, by the Early Travellers of the 19th century who visited the area, and under the present situation. This research was triggered by the fact that the new motorway linking Corinthos to Tripoli crosses the ancient Corinth-Argos road, and the Drymoni hill. This situation has created an ‘infrastructural palimpsest’. We attempt to approach ways of signalising the presence of the ancient quarries next to the new motorway, aiming to render the ancient infrastructural landscape of the area perceivable to the passengers that drive-through and/or stop at the area.’

**Final Discussion**

*Michelle de Gruchy & Ed Caswell (Durham University, UK)*
SESSION 24F - LANDSCAPE AND BELIEF

Freya Horsfield (Durham University, UK)

KEYWORDS. belief-powered; reclamation; transformation; adaptation; mundane

Papers are invited which consider the impact of belief on landscape. Archaeology has long engaged with belief, often through study of specific places, features or religious movements. More recently, archaeologists have also become interested in the impact on the wider landscape of the behaviour of people who have been motivated by religious belief but whose actions may appear mundane. For example, landscape-scale water management such as wetland reclamation and waterway diversion for agricultural purposes enabled religious institutions such as Medieval monasteries both to adapt their physical environment and also to incorporate such activities into a wider narrative about the relative agency of seen and unseen actors. Such actions might be termed belief-powered rather than overtly religious. The session welcomes papers from researchers working on landscape change associated with any religious tradition, and from all parts of the world. What are the challenges and opportunities in understanding such belief-powered behaviour, and its long-term impact on landscape? What are the implications of this type of understanding, for research, and for contingent decisions?

24F Part 1 - Wednesday 19th September 09:00-10:30, Durham University

Introduction to Session

Freya Horsfield (Durham University, UK) – Chaired by Beatrice Widell (University of Reading, UK)

296 Monastic gardens

James Bond (Independent, UK)

This paper will explore the interplay of Landscape and Belief in the context of one small component of monastic landscapes, the gardens within the precinct. Gardens have been associated with monastic life from its very beginnings, in the hermit traditions of the Desert Fathers and in the earliest rules drawn up for coenobitic communities. Three different types of garden are depicted on the early ninth-century plan of the abbey of St Gallen in Switzerland, a kitchen-garden, physic garden and cemetery planted with fruit and nut trees. Investigating monastic gardens demands a multi-disciplinary approach. Much of our knowledge comes from documentary records, particularly monastic chronicles and obedientiars’ accounts; also herbals relayed from classical sources, which represent a literary tradition rather than a practical guide. However, there is an expanding contribution from archaeology, through aerial photography, geophysics, excavation, and scientific examination of pollen and plant macrofossils, which have shed light upon the location, extent, boundaries and internal plans of gardens, and on the plants grown in them. Monastic gardens had always served basic subsistence needs, providing vegetables and fruit for consumption, along with medicinal herbs. However, they had a much wider significance. The Biblical account of the Creation places Adam and Eve in the Garden of Eden, and ideas about the nature of Paradise may have influenced the planning of some monastic gardens. Some plants, notably the Madonna Lily, acquired considerable symbolic significance. Gardening provided opportunities for physical exercise, at least in theory meeting the Benedictine requirement that monks should contribute to their own support by the labour of their hands. The belief in God’s benevolence produced an interest in studying, teaching and recording the uses and values of plants; and gardens were valued as places of peace and solace, providing aesthetic enjoyment and space for quiet contemplation.
135 Similarities and/or differences of a Benedictine and a Cistercian abbey in medieval Transylvania as reflected in the landscape.

Ünige Bencze (Central European University, Budapest, Hungary)

This paper looks at the landscape from the perspective of water management of the two largest, easternmost Benedictine and Cistercian abbeys in Europe, located in today’s Romania, in Cluj-Mănăștur/Kolozsmonostor and in Cârța/Kerc (once part of the Hungarian Kingdom). Such research usually and almost exclusively focuses traditionally on the Cistercian monasteries, which as it is generally known and accepted, in many cases, actively changed their landscape and environment. However, in my opinion it can also be fruitful to look at the Benedictines and their activities affecting the landscape in a comparative manner with other religious communities, especially those which lived in the same historic region and functioned in the same time. In the present paper I wish to focus only on the two selected abbeys. Also, because Kolozsmonostor abbey owned at least 44 villages or parts of villages, on this occasion I wish to look only at the core possessions on the abbey, located in the historic county of Kolozs. While the abbey of Kerc might have had less possessions, their landscape shaping activities were more intense concerning water management, and the paper shall focus again on its central possessions (situated in the surroundings of the abbey) only. The paper seeks to draw parallels on ownership, use, and maintenance of features connected to the use of water, such as mills and fishponds. It will seek to answer the effects of the settlement of the religious communities on the landscape, and to what extent did they actually take part in water management. How did they manage their mills and fishponds? How were such lay tasks corroborated with religious life? Also, known that both communities followed the Rule of St. Benedict, what differences or similarities can be grasped in the way they managed the landscape?

222 Insula Dei - a Cistercian landscape from Denmark

Poul Heide (Faaborg Archipelago Museum, Denmark)

**Insula Dei**, or Holme Kloster, was founded in 1172 when Cistercian monks arrived from Herrevad (now in Sweden), settling on a small holm in the wetlands between the three large lakes Arreskov Sø, Nørresø and Brænлогård Sø on Southwest Funen, Denmark. But why on Earth would they settle right here? The monks did by no means arrive in a pristine landscape, waiting to be shaped by holy labour, quite the opposite. This area has been inhabited by humans throughout the Holocene, and during the Iron and Viking Ages, a number of high status sites appeared on the shores or in the hills in the area. In the early Middle Ages The Crown, however, gained interest in the area and founded both a castle (Arreskov) and the only Cistercian monastery on Funen. **Insula Dei** (now the manor Brahetrolleborg) is one of the best-preserved Cistercian monasteries in Denmark – both the buildings and the grounds. In this paper I would like to attempt an answer to the question of why the monastery was founded at this exact location. The site seems to have been balanced between on the one hand the need of the king to create stability and financial growth in the area, and on the other hand the monks desire for isolation as well as a suitable estate – a tricky balance. The landscape thus plays a key role in the foundation process and allows us to explore not only at the economic and infrastructural resources, but also the intangible sacral connotations this particular place must have carried to the monks. This project is carried out under the BROR-program – collaboration between Faaborg Archipelago Museum and the universities of Southern Denmark (SDU), Aarhus (AU) and Aalborg (AAU) as well as numerous local volunteers.

297 Belief-powered landscape transformation? Cistercian Rievaulx Abbey and Henry II’s Wasteland

Freya Horsfield (Durham University, UK)
Interpretations of monastic activity have long been linked to overtly religious behaviour such as performance of the liturgy, intercessory prayer, and care for the needy. Monastic land management has however tended to be interpreted in more mundane terms, despite evidence for complex motivation by donors and the monasteries themselves. Archaeological research into Rievaulx Abbey, the first Cistercian monastery in Northern England, Scotland, and Ireland, is suggesting more complex interactions between landscape and belief than are allowed for in the traditional interpretation of monastic granges as entirely economic in purpose. The Cistercian order acquired a particular reputation for turning wilderness into economic productivity, yet relatively few examples of such transformation have been physically investigated. Based solely on the documentary evidence, Donkin (1978) considered the Vale of Pickering to contain one of the few Cistercian granges founded entirely on new land. This was an estimated 4,000 hectares of marshy land south of Pickering given to Rievaulx Abbey in AD 1157-58 by Henry II, King of England and Count of Anjou. Using multidisciplinary data and investigative techniques ranging from medieval charters to remote sensing, a complex blend of power, spirituality, and pragmatism is being revealed in the relationships between people and landscape. The concept of belief-powered activity is here offered as means to understand the king’s motivation, the monastery’s response, and the implications of these for future management of this complex landscape.

24F Part 2 - Wednesday 19th September 11:00-13:00, Durham University

Introduction to Session

Freya Horsfield (Durham University, UK)

142 The Hermits of the King – The Hermits of the People: The Monastic Space of the Pauline Order (OSPPE) in Medieval Hungary

Zsuzsa Pető (Hungarian National Museum/Central European University, Hungary)

The medieval Order of St. Paul the First Hermit is the only monastic order that was founded in Hungary (1250s), thus it has always been in the centre of scholarly interest and a subject of emotionally loaded attention in the narrative of Hungarian history. Although a great deal of research has been done by historians to collect all the available written sources, most of the surviving texts are limited to reports on different kinds of possessions, prices and locations of properties and establishments. Most of the historical documents have perished since the end of the Middle Ages, and at the same time, the medieval period of the Pauline order also came to an end in the 1520s, when most of the Pauline monasteries were demolished. Beginning in the 1970s, several studies aimed to identify and localize these monasteries and the first small scale landscape study was only published around the turn of the millennium. As part of the present researches, several aspects of the medieval estate management were revealed, but the investigation of monastic clusters and regional networks have yielded some new results as well. Our presentation focuses on the short research history of the Pauline landscape and the process of the order’s foundation, when some eremitic communities have decided to give up their ‘desertum’ for the ‘gardens of heaven’. This conversion was rather swift: it started at the same time when the Augustinian order was approved by Pope Alexander IV (1256) and emerged to a privileged status in the 1320s. The Pauline order was elevated among the favoured monastic communities by the Angevin kings during the fourteenth century, and some remarkable changes that can be observed in some of the order’s spatial characteristics (e. g. site location, architecture, estate management) could be attributed to this period. Our study aims to identify and describe the transformation of these characteristics by analysing the written sources, the archaeological results and the landscape features.
72 Blood, Tears and Belief at Neville’s Cross, 1346: The Spirituality of a Medieval Conflict Landscape
Beatrice Widell (University of Reading, UK)

Previous research on the performance of rituals and spirituality of medieval soldiers has tended to interpret these acts of belief as political ideology or propaganda. Such an overtly military approach, coupled with battlefield archaeology which attempts to identify battlefields in the landscape by searching for battle objects by metal-detector surveys, has therefore overlooked the fundamental aspects of human belief of these actions and as a consequence ignored archaeological evidence of an ‘irrational’ nature in these landscapes; medieval conflict sites have rarely been placed in broader landscape contexts of belief. This paper offers a new perspective on medieval conflict landscapes by analysing the ritual and devotional actions that were performed by soldiers before, during and after conflicts in the landscape, in northern Britain. The Anglo-Scottish battle of Neville’s Cross (1346) will be used as a case study, and will draw on archaeological evidence, such as ritual deposits, monuments, pilgrimage routes in the conflict landscape and historical sources etc. It will be argued that the landscape was used and ritualised during the conflict aligned with medieval ideals of chivalry, affective devotions such as the *imitatio Christi* and also local and regional folklore, sacred topographies, myths and traditions. Furthermore, it will be argued that spiritual sites were determining factors in the choice of location for the battle. This paper thus provides a holistic landscape approach of medieval belief, which unites evidence of warfare and religious belief, and probes into the way we interpret human belief-actions in such ‘contradictory landscapes’. It employs a broad temporal framework to understand the multifaceted (belief-powered and religious) human engagement with and impact on the landscape and how it transformed over time. Its synthesis of evidence will suggest a fresh methodology that will create a better understanding of the visible landscapes of medieval belief today.

117 Mapping Magnus: visualising saintly impact in a North Atlantic rural landscape
Sarah Jane Gibbon & James Moore (University of the Highlands and Islands Archaeology Institute, UK)

This paper will present a methodological approach which allows the spatial and temporal veneration of a saint to be explored in the landscape using Saint Magnus of Orkney as a case study. Saint Magnus was martyred in Orkney in c.1117 and by 1135 had been canonised by the local bishop. His cult spread throughout the Nordic world, with his feast day being officially recognised in Norway, Iceland, Denmark and Scotland. Dedications, altars and church furnishings further demonstrate his international recognition, but aside from three Magnus dedicated churches, there is little known of his veneration within the local landscapes of Orkney. By collating a wide range of evidence (archaeological, onomastic, folkloric, historic, hagiographic) to form a dataset of Cultural Remains of veneration, the impact of Magnus on the community since his martyrdom to the present day can be mapped. By creating a means of differentiating between sources the variability and variety of evidence can be distinguished, thus allowing concentrated pockets of veneration through time to be identified as well as areas where his impact is no longer evidenced. Furthermore, by linking the Cultural Remains, ‘remembered’ processional and pilgrimage routes can be identified. In doing so, the impact of belief in Magnus as a saint and his continuing influence as a symbol of Orcadian identity can be visually demonstrated.

234 Losing the Way: The Post-Dissolution Fate of Walsingham’s Pilgrimage Routes
James Albone (Norfolk County Council, UK)

The Dissolution of the Monasteries in the period 1536-41 is one of the most significant events in English religious history. Its consequences for monastic landscapes - the loss of parent institutions and the
appropriation and redistribution of landholdings - is well-attested. However, the changes in religious practices that the Dissolution brought about had much wider landscape implications that were both spatially and temporally far-reaching. One such change was the abrupt ending of domestic pilgrimage, something which had been commonplace at all levels of medieval society. The Shrine of Our Lady of Walsingham in North Norfolk was, after Canterbury, the second most important pilgrimage destination in medieval England. Its suppression affected not only the town of Walsingham but also removed the raison d'être of the long-distance pilgrimage routes that served it. Whilst the disappearance of the pilgrim traffic was relatively sudden, the effect on the landscape of the pilgrimage routes was played out over the centuries that followed. Without their primary function, the routes succumbed to localised decline, disuse and fragmentation. Ultimately this process, which had been initiated by changes in religious behaviour, resulted in a level of road-loss that is exceptional for long-distance routes in the post-medieval landscape of Eastern England. This paper explores the landscape implications of the cessation of pilgrimage to Walsingham in the mid-sixteenth century and the processes involved in the subsequent physical loss of the pilgrimage routes. In doing so it examines how the breakdown of belief systems can be as powerful an agent of landscape change as the development and routine practice of religion. By discussing the impact of changing patterns of religious travel in the landscape, this paper also has resonance with other sessions on movement and mobility at LAC2018.

Discussion

Freya Horsfield (Durham University, UK)

24F Part 3 – Thursday 20th September 09:00-11:00, Newcastle University

Introduction to Session

Freya Horsfield (Durham University, UK)

34 Architectural Landscape of Phra Nakorn Khiri Palace: A Replica of Buddhist Heavens on Earth

Vacharee Svamivastu (Architectural Department, Faculty of Architecture, KMITL, Thailand)

The Phra Nakorn Khiri palace in Thailand’s western province of Phetchaburi sits atop the Khao Mahasawan mountain range (the Great Heaven Mountains). The buildings and structures on the palace compound bore the names of the celestial beings and objects on the Cā-tum-mahā-rājiga and the Tā-va-tim-sa heaven realms. Both are the realms of deva (deities) in Thai Buddhist Cosmology. This paper examines the architectural design and landscape of Phra Nakorn Khiri, which was constructed as a replica of the heaven realms on earth. The findings are described by referencing Te-bhūmi, a Buddhist treatise of parables about the three worlds: the worlds of humans, devas, and Brahmas.

103 Transformation of Thai Ceremonial Sacred Landscapes from the Past to the Present: Religious and Royal Significance to Socio-Political Realm

Kattika Kittiprasan (Silpakorn University, Thailand)

Thailand has many sacred practices, which includes Buddhist festivals, royal ceremonies, and rituals, as well as numerous religious sites. Sacred practices during gathering of devotees, pilgrimage, processions, and ritual performances are categorised as processional sacred landscapes. Some royal ceremonies have been practiced from Ayutthaya (1438-1767 C.E.) up to early Rattanakosin periods (1782-1850 C.E.) for the purpose of prosperity. From the 19th to 20th Century, some ceremonies were
changed due to the influence of Westernization and modernization and are still carried out today. Royal ceremonial landscapes are considered temporarily sacred. Their physical engagements affect the city spatially and functionally; however recognition of their significance remains unclear and complex. Abstract engagement is temporal, for instance, sacredness, blissfulness, sympathy, effort, collaboration, value, meaning, emotional and spiritual experience. After ending, ceremonial landscapes turn profane and their engagements fade away. Modern royal ceremonies have been recently invented for special celebrations which make a city lively, for example the Golden Jubilee and the Sixtieth Anniversary Celebrations of Rama IX’s Accession to the Throne, Bike for Mom, Bike for Dad, and Royal Cremation Ceremony. These ceremonies are related to modern contexts - economic and socio-political issues, healthcare, decentralization, and globalization - which strengthen the perception of their sacredness, landscape value and meaning. Significant traditional and modern ceremonial sacred landscapes in Bangkok are analysed and divided into three periods: prior to westernized (before the 19th C.E.), westernized (the 19th -20th C.E.), and modernized (the 20th – 21st C.E.). The aim is to identify the changes in social, economic, political, and ritual organization of the landscape and to understand the city’s spatial structure and organization. The results will be beneficial in practices of various fields: historical and religious studies, politics, sociology, city planning and urban design, and landscape conservation and management.

134 The Kamakhya Peetha: Understanding the Significance of Water Bodies in the Formation of a Religious Landscape

Priyanka Tamta & Sukanya Sharma (Indian Institute of Technology Guwahati, India)

The significance of water resources has mentioned in various ancient Hindu scriptures and texts. Vastu Shastra, like Manasara and Mayamata, mentions the importance of water bodies while selecting the site for pilgrimage and for temple construction. Thus, the presence of water bodies in any ritualistic site become necessary for its own sanctification. The archaeological site of Kamakhya temple in Assam also shares this essential feature to be an important pilgrimages place in India. The present temple site is considered as one of the important Shakti Peethas in India also known as a center of Tantrism. There are more than seventeen temples dedicated to different forms of deities of Shakta (Dasamahavidya) and Shaivite sect (Bhairavas). In the sanctum sanctorum of the majority of the temples, the deity is worshiped in a laconic form, as a peetha (a small pond). Most of the temples are constructed on the top of a small cave and the water inside the sanctum emerged from the perennial underground stream spurted from the granite crevices. The water in the site has no gender as the majority of the deities are worshipped in the same manner irrespective of their forms and their nature. However, the sacredness of the peetha might vary from female deity to male deity. For instance, the water from peethas of few temples is open for public use, especially the peethas dedicated to Bhairavas. So, while looking into the site and its integrated beliefs system, the major query can be examined such as: Which evolved first, the temple site or the beliefs system? What parameters are used to decide the sacredness of the water bodies on the site? And last but not least how the particular belief system reshaped the landscape and have an everlasting impact on its existence?

270 Nuragic Ritual Landscapes: the East Coast of Sardinia

Cezary Namirski (Durham University, UK)

Although religious aspects of the Nuragic culture which developed in Sardinia in Bronze Age and Early Iron Age are known primarily through studies of the Late Bronze Age sacred wells and bronze figurines (bronzetti), important contributions in this area of research were made also through studies of the Nuragic megalithic tombs (tombe di giganti), their usage, as well as their spatial relations with nuraghi and other types of domestic sites in the landscape of Bronze Age Sardinia (Blake 2001, 2002). Considering significant evidence for the use of tombe di giganti as sites of ritual gatherings, it would be a mistake to treat them solely as burial sites (Perra 2008). Thus, their significance for the studies of
Nuragic beliefs goes beyond burial practices, which are still scarcely known due to limited amount of preserved material. The author’s research project in the eastern part of the island offers, among other results, a new look at the Nuragic megalithic tombs and other types of ritual sites, their distribution patterns and implications for our understanding of ritual landscapes of the Sardinian Bronze Age. The dataset was obtained through a series of site-based landscape surveys carried out in two selected sample areas of the east coast of Sardinia – Sarrabus (South-Eastern part of the island) and Barisardo-Cardedu. Observations from these areas will be compared to results of research on ritual sites from the western part of the island and placed in a wider context of our knowledge about the impact of Nuragic beliefs on Sardinian landscape.

Final Discussion

Freya Horsfield (Durham University, UK)

Related posters (for poster abstracts, see p.213-230)

233 The symbolic landscape around Göbekli Tepe
Ricarda Braun Freie Universität Berlin, Germany), Brigitta Schütt & Daniel Knitter (Christian-Albrechts-Universität zu Kiel, Germany)
SESSION 26G - ARCHAEOLOGICAL PROSPECTION IN HIGH-MOUNTAIN ENVIRONMENTS

Francesco Carrer (McCord Centre for Landscape, Newcastle University, UK) & David Gonzalez-Alvarez (Instituto de Ciencias del Patrimonio, CSIC, Spain)

KEYWORDS. Upland archaeology; archaeological prospection; remote sensing; geophysics; predictive modelling

In the last two decades, upland archaeology has emerged in Europe as a new and vibrant field of research. This new branch of landscape and environmental archaeology investigates the interaction between human communities and high-altitude ecosystems in the long-term. In this context, there are significant methodological challenges that need to be addressed to maximize the interpretative potential of archaeological evidence in the uplands. Archaeological prospection is one of these challenges. Remote sensing, field survey and geophysical survey at high-altitude are quite different from the traditional large-scale prospections in the Mediterranean lowlands. The difficult accessibility of the uplands, the low surface visibility of alpine and subalpine grasslands and the complex morphology of the terrain affect the use of the aforementioned methods in the mountains. For this reason, researchers working in different mountainous areas face similar or complementary problems. Discussion and confrontation are necessary to generate synergies, learn from each other’s experiences and reinforce the methodological strength of archaeological prospection in high-mountain environments. This session aims to bring together contributions focused on the use of archaeological prospection in different mountain region. We welcome papers investigating case-studies in Europe and beyond, with different chronological and thematic focuses. We are also interested in papers discussing new methodologies and new techniques, specifically aimed at the study of mountain landscapes. We are particularly interested in the following topics: 1) New approaches to address surface visibility problems in field survey, testing the suitability of specific geophysical methods and calibrating their use according to local environmental conditions; 2) The use of remote-sensing methods (satellite and aerial imagery, LiDAR, drone survey, 3D modelling and photogrammetry, etc.) to inform field survey and archaeological excavation; 3) Assessing the reliability of inductive and deductive predictive modelling to identify target areas for field and geophysical survey.

26G Part 1 - Tuesday 18th September, 11:00-13:00, Newcastle University

Introduction to Session

Francesco Carrer (McCord Centre for Landscape, Newcastle University, UK) & David Gonzalez-Alvarez (Instituto de Ciencias del Patrimonio, CSIC, Spain)

42 Upwards over the mountains. Archaeological Field Surveys, Kleinwalsertal (Austria)

Caroline Posch (Department of Archaeology, University of Innsbruck, Austria)

At the end of the last ice age and with the melting of the glaciers, the Alps, formerly covered almost entirely by ice, became again inhabitable for plants, animals and humans alike. One of those new ice-free regions was the Kleinwalsertal (province of Vorarlberg, Austria), which represents one of the numerous little known archaeological areas of the Northern Alps. Here, about 65 mainly Mesolithic sites of various sizes and functions were found over the last thirty years. This paper will present the results of the field surveys of 2017 and 2018, which are carried out in the context of the author’s doctoral project. Within it, the methodological strategies, and the possibilities and problems one encounters during a survey in an alpine landscape will be discussed. Hereby, the focus lies on two aspects: First, the evaluation of the ‘old’ already known sites regarding their locations, topographies, extensions, and
preservations. Second, the search for potential new find areas within the region, using a predictive model to define favourable areas with reference to their landscape morphology, sun exposure, access to raw materials (e.g., flint), and availability of water sources. In doing so, we hope to generate a better understanding concerning the mobility and subsistence patterns of Early Holocene hunter-gatherer groups in alpine environments. Also, the recording and studying of the sites will hopefully help to protect the find spots from external disturbance and destruction in the future.

238 Landscape survey in the High Caucasus: Power and persistence in the Dariali Gorge, Georgia

Kristen Hopper, Lisa Snape-Kennedy & Dan Lawrence (Durham University, UK), Lana Chologauri & Davit Naskidashvili (Tbilisi State University, Georgia)

The Dariali Gorge, Georgia, is one of the most accessible passes through the High Caucasus and the location of the imposing Dariali Fort, a feature likely associated with the Caucasian or ‘Caspian Gates’ referred to in classical sources. During Late Antiquity, this pass was the source of much interest to both the Roman and Sasanian Empires who sought to control incursions into the South Caucasus by northern enemies such as the Alans via the Dariali pass. As part of the Persia and its Neighbours Project, settlement and land use patterns in this region, known historically as Khevi, were undertaken by a team from Durham University, Edinburgh University and the Tbilisi State University with the aim of reconstructing settlement history of the region. This included remote sensing and pedestrian survey, both of which were not without their challenges; in this mountainous landscape almost all relatively flat landforms were reused with frequency, affecting the archaeological visibility of, in particular, pre-Medieval settlement. It was therefore important to adapt our survey to the local environment, and to use imagery from multiple sources, dates and seasons. Furthermore, we also undertook geoarchaeological investigations of terrace field systems, identified in ground-based survey, to enable a more in-depth understanding of the site-formation processes and chronostratigraphies of these particular landscape features. This was supplemented by a survey of the available literature regarding historical land use practices that further aided us in expanding our understanding of human-environment interactions over the long-term. The results of these investigations have allowed us to interpret the variability in local land use practices through time, and to consider them in the context of periodic intervention by major political forces such as empires and nation states.

180 Aerial approach between Archaeology, History and Ethnography on Cretan Mountains

Gianluca Cantoro (Institute for Mediterranean Studies - Foundation for Research and Technology [IMS-FORTH], Greece)

Aerial archaeology in Greece is still an exceptional and uncommon practice. Archaeological or historical projects making use of historical or modern aerial photographs can be counted in half dozen so far. A recent small-scale project, ‘Crete from Above’, brings prominently the bird eye view in the complex and pluri-stratified Cretan archaeological and historical context. The approach aims at identifying and mapping abandon and forgotten historical and modern artefacts on mountainous landscapes of the major Greek island. The project originates from the consideration that the space which surrounds us and with which we continuously interact, is not a static entity. It is the result of the complex relations and influences of humans (and their cultures), animals and landscapes. Material and tangible results of such interactions (which often involve many more variables than the above outlined) are normally reshaped, repurposed, obliterated, damaged or endangered in view of the ‘development’ of certain areas. However, sometimes, past standing structures become iconic elements of the landscape of which they are part, in a certain spontaneous monomialization process, as almost fossil or fossilized built landscapes. Their embodiment in the surrounding landscape is such that their presence is often
underestimated, misinterpreted or simply ignored. Main goal of the project is therefore to ‘tag’ abandoned and collapsing artefact with archaeological and historical facts, promoting at once the involvement of local communities and (oftentimes) contemporary users of such artefacts (or what remains of them) with a dedicated web-portal, an originally presented photographic exhibition and a workshop for young researchers. The paper will present ‘views’ of the Cretan mountainous landscape through historical and modern aerial photography, highlighting the difficulties of working in such a challenging context and the ongoing activities for community engagement in an attractive and expanding touristic destination.

19 Surveying beyond the comfort zone. Research strategies in the Central Apennine, Italy.

Jesus Garcia Sanchez (Leiden University, Spain)

The Matese mountain range is located in the Central Apennines, Italy, and forms a borderline between different geographic and cultural areas, the Campanian plains and the long valleys at the Adriatic face of the Matese. As well as natural barriers, mountains have played a major role in Hellenistic society before the Roman conquest in the 3rd century BC. In this mountainous environment we encounter some clues to understand fortified settlement patterns, warfare, religiosity and economy. The aim of this paper is to introduce a discussion about how the Matese range was used in Hellenistic times and which are the best approaches to acquire new datasets to build up new ideas about Iron Age and Hellenistic society dwelling in the mountain. After several years exploring hillfort sites in forested areas in the Matese foothills, and in the head of the main river basins (Volturino and Longano) using remote sensing, and an original adaptation of the LERC project intra-site point sampling method, we want to extend our understanding to the mountainous plains of the Matese mountain, an ill-known area despite its relevance in economical contacts and transhumance, as the presence of the sanctuary of Cole di Campo points to. We aim to apply a set of non-invasive methods, namely Lidar DEMs, historic aerial imagery from RAF and USAF from the 1940’s, legacy data and old excavation’s assessment, and case-oriented survey might contribute to the understand the use of the high-mountainous environment by the Samnite society. Despite this program has not been implemented yet, I will introduce the case-study area, from the Boiano plain, in the Adriatic face of the Matese mountain, to the Volturino river basin in the Campanian plain. This area includes areas several high-altitudes mountain plains creating East to West corridors around the Monte Mileto peak, 2050 m asl.

Discussion

Francesco Carrer (McCord Centre for Landscape, Newcastle University, UK) & David Gonzalez-Alvarez (Instituto de Ciencias del Patrimonio, CSIC, Spain)

26G Part 2 - Tuesday 18th September, 14:00-16:00, Newcastle University

224 Searching for shepherds’ footprints in the uplands of Babia (NW Iberia)

David González-Álvarez, Jorge Canosa-Betés (Institute of Heritage Sciences [Incipit], CSIC, Spain), Kayt Armstrong & Kristen Hopper (Durham University, UK)

The humanization of the uplands can be best studied by taking a long-term approach relying on a number of different datasets. Palaeoenvironmental sequences reveal the earliest anthropization of alpine and subalpine areas in the Western area of the Cantabrian Mountains during the Neolithic. Forested areas progressively gave way to grasslands throughout Late Prehistory, and pastoral indicators increased. The Roman period and the Middle Ages also brought significant impacts to the environment. The archaeological evidence, while relatively scarce, combined with ethnographic models
has helped us to build up diachronic narratives about the exploitation of these uplands, mostly linked to transhumant pastoralist activities. Within these interpretations, a different degree of anthropogenic pressure on upland landscapes may relate to diverse herding strategies, fluctuations in the demographics, or climate change. However, archaeological research in this area has not yet provided us with enough evidence about the anthropization of the uplands that would allow us to establish interdisciplinary discussions between Paleoecology and Archaeology. Aiming to explore this line of enquiry and join in Europe-wide discussions on Upland Archaeology, a research project was launched in 2017 in the mountainous region of Babia (León, Spain). The study area is located in the Southern slope of the Cantabrian Mountains. This pilot project is applying different archaeological prospection methods in order to detect the presence of pastoral communities in these alpine and subalpine areas throughout time. The archaeological strategies include remote sensing techniques (satellite imagery, aerial historical and modern photographs, LiDAR-based DTMs, UAV-based photogrammetric surveys), field-walking, geophysics survey, and the excavation of test-pits at selected locations. In this paper, we will assess the results of our methodology in high-altitude areas, emphasising the current challenges and outcomes.

162 Micro-scale remote sensing in the Dolomites: magnetometer survey at the Busa delle Vette (1850m asl, Sovramonte, Italy)

Michele Mazzurana (Università di Ferrara, Italy), Francesco Carrer (McCord Centre for Landscape, Newcastle University, UK) & Fabio Cavulli (Università di Trento, Italy)

Magnetometer surveys are often carried on alluvial large and flat area, but they are also particularly useful to plan stratigraphic investigations in mountain environments, where surface visibility is usually limited and standard field walking can be ineffective. However, the use of magnetometer in a mountain context implies numerous operational difficulties. The main reason of these difficulties is the local morphology, characterised by stony surfaces, sink holes and rock outcrops. To test the suitability of this approach, geophysical surveys with magnetometer have been carried out in the Busa delle Vette, and high-altitude area within the Dolomites National Park (Italy). During the fieldwork campaign of 2016 and 2017, two different instruments have been used and compared: a differential magnetometer Bartington Grad601 and a proton magnetometer Gem System Overhauser. An area of 4800 m² has been covered, following a 20 x 20 m and 10 x 10 m topographic grid. The elaboration of survey data has enabled the identification of an area with significant magnetic anomalies, where a 30 m² excavation trench has been opened in 2017. Subsequently, the maps obtained with the magnetometers have been compared with the excavation plans and the artefacts found, to assess the spatial accuracy of the geophysical markers and interpret the individual anomalies according to the archaeological assemblages investigated. The results of this accurate work are extremely interesting and confirm the applicability of magnetometric techniques in mountain contexts. These techniques can be employed to identify anthropic activity areas, and to maximise the cost-effectiveness of stratigraphic excavation, which can be extremely difficult and time consuming in high-altitude environments.

Final Discussion

Francesco Carrer (McCord Centre for Landscape, Newcastle University, UK) & David Gonzalez-Alvarez (Instituto de Ciencias del Patrimonio, CSIC, Spain)
SESSION 27G – LANDSCAPE ARCHAEOLOGY IN AFRICA’S LATER PREHISTORIC: NEW METHODS AND CURRENT RESEARCH

Nadia Khalaf (University of Exeter, UK)

KEYWORDS. African archaeology; GIS; remote sensing; geophysics, heritage management

African research is often omitted from prominent debates in landscape archaeology, but this does not reflect its absence in research on the continent. This session therefore focuses on the unique position of landscape archaeology in Africa. African landscapes provide a deep-time history that have provided some important discoveries which are valuable for global archaeology discussions. Furthermore, the spatial complexity of historic landscapes in the continent challenges colonial assumptions of a primitive and empty past. A vast amount of new landscape data is being collected in Africa, and researchers are innovative in their method and interpretation. The use of GIS, remote sensing and photogrammetry is becoming more frequent, although we have yet to see these technologies used on the same scale as other regions of the globe. This session showcases new and ongoing research projects from a range of areas across the continent, discussing current trends and methodological advances in African landscape archaeology.

Tuesday 18th September, 11:00-13:00, Newcastle University

212 Using remote sensing for Islamic archaeology in Ethiopia

Nadia Khalaf (University of Exeter, UK)

This paper will discuss results of a remote sensing survey on four important Islamic sites in Ethiopia. Islamic sites are often neglected in archaeological research in Ethiopia and some face threats from the growing population and increase in urbanism. This paper will demonstrate how freely available satellite imagery and Google Earth has been used to trace the landscapes of these sites for the past twenty years and illustrate how it has changed.

13 Methodological Approach for Historic Landscape Characterization of Ile-Ife, Southwest Nigeria

Akinbowale Akintayo (Universitat Rovira i Virgili, Spain)

Ile-Ife is a renowned town located in the southwestern part of Nigeria and it is claimed to be the cradle of the Yorubas who are one of the major ethnic groups in Nigeria. Owing to the myth that surrounds its foundation and as a centre of commerce in historic past, several archaeological expeditions have been carried out in the town and this has been able to shed some light on the ways of life of the earlier settlers, owing to this, the town has been drawing the attention of global researchers. Archaeological excavations from the 1960’s have produced many archaeological materials of note such as terracotta figurines, glass beads, ancient walls, etc. However, as a result of urbanization, the growth and development pattern of the town over the past 30 years has been rapid and judging by the rich nature of its archaeological assemblage, archaeological sites which are yet to be discovered are being destroyed. Previous works have tried to describe the land use and land cover changes over these periods using the Computed Land Consumption Rate (LCR) and Land Absorption Coefficient (LAC) analyses on satellite imagery and the results of the analyses revealed the estimated annual rate of urban expansion in Ile-Ife to be about 3.5%. This research work is aimed at developing a methodology for predicting the existence of sites in areas that have not been developed so that archaeological excavations can be carried out in these areas and as such, salvage the cultural materials which would
have hitherto, been destroyed on the one hand, and to carry out a Historic Landscape Characterisation of the area for planning and development control purposes.

213 Surveying Saharan landscapes: a case study from southern Morocco

Martin Sterry (Durham University, UK), David Mattingly (University of Leicester, UK) & Youssef Bokbot (INSAP, Morocco)

This paper presents an overview of the methods and approach of the Middle Draa Project (2015-2018). This is a landscape survey of a Saharan river valley in southern Morocco with a settlement and funerary record dating from late prehistory to the early modern period. This area is of key importance for understanding the formation of the first oases in the Western Sahara. The project utilised satellite remote sensing to frame the survey alongside three seasons of ground survey to assess dating, material culture and preservation. From the project's onset we sought to integrate geomatics as a fundamental part of our survey approach alongside detailed ceramic study and a programme of radiocarbon dating. This was for two reasons: to take advantage of technologies such as GIS, UAVs and photogrammetry, but also to more directly answer questions on the role of irrigation, agriculture and metallurgy from a landscape perspective. Thus, satellite remote sensing (including the use of SAR and Landsat) was used to identify sites and prepare plans for use in the field, but also to locate past hydrological systems and regions that may have been used for mining. UAV mapping was used to develop detailed models of settlements and a wide range of smaller sites (tombs, walls, fields, canals, camps) within their wider landscape. Structure-from-motion was used to construct building and monument typologies as well as rapid and detailed recording of test-trenching. However, we also found that these methods were most useful when bridging the different scales of analysis – remote, pedestrian survey and intensive site survey – thus enabling us to inform and update our interpretations, target key sites and expand the scope of our survey.

257 Comparative Study Of Archaeological Sites Of Karimama And Banikoara (North Benin, West Africa): Spatial Distribution, Physical Characteristics And Interests For A Better Knowledge Of The Settlement History

Barpougouni Mardjoua (Université d’Abomey-Calavi, Benin Republic) & Didier N'Dah (Université Libre de Bruxelle, Belgium)

Karimama and Banikoara are two communes located in the North of the Republic of Benin and they cover an area around 10,000 km². Before 2011, the geographical space occupied by these two administrative communes had not benefited from extensive archaeological research. Following the fieldwork of the Project Crossroads of Empires in Karimama (2011-2015), whose support extended the research to Banikoara, we have several data on the archaeological potential of this region of North Benin. This communication proposal focuses on the archaeological potential of the outskirts of the cities of Karimama and Banikoara. The fundamental objective of this paper is to review the spatial distribution of archaeological sites around these cities, then to expose the physical characteristics of these sites and finally to show the interest of undertaking preventive archaeology and rescue archaeology for a better reconstruction of the settlement history of these two cities concerned as well as the whole region.

258 Remote-sensing training in Libya and Tunisia

Matthew Hobson, Julia Nikolaus & Louise Rayne (University of Leicester, UK)

This paper presents an evaluation of the programme of training courses currently underway in North Africa delivered by the Endangered Archaeology of the Middle East and North Africa project (EAMENA). We are training archaeologists and heritage professionals in the use of EAMENA's online open-access database and in using the technologies of GIS and remote sensing to record and monitor sites. So far,
over 40 participants from Libya and Tunisia have participated in the training and have produced data for several case-study areas which we outline in our presentation. A primary aim of the training is to encourage use of heritage databases as HERs (Historic Environment Records). This includes the possibility of implementing uptake of our own database or the creation of new databases using our methodology. So far, our participants’ recording has highlighted some key threats to archaeology including vandalism, looting, and urban and agricultural expansion. The other main aim is to promote the use of remote-sensing and GIS skills in heritage management in the Middle East and North Africa generally. This has already generated some case studies and collaborations which will be outlined here. In particular, the wide scale view facilitated by remote sensing has allowed analysis of entire landscapes. Ultimately, GIS, remote sensing and database skills have given our trainees additional options for contextualising their research within a wider landscape context and to rapidly identify threats to their preservation. The next steps for our courses involve more advanced training in GIS and remote sensing.

Discussion

Nadia Khalaf (University of Exeter, UK)
**SESSION 28C - AERIAL APPROACHES IN LANDSCAPE ARCHAEOLOGY: PAST, PRESENT AND FUTURE**

Stephen Davis (University College Dublin, Ireland) & Rachel Opitz (University of Glasgow (UK))

**KEYWORDS.** Aerial photography; lidar; UAV; theoretical approaches

Aerial methods have been at the forefront of landscape archaeological studies for over a century. They range from traditional air photo interpretation through to the ‘lidar revolution’ of the last decade and the increasing use of both drone-based technologies and spaceborne sensors. In combination with GIS, such methods form the basis for the majority of landscape-scale archaeological projects undertaken today. This session, organised by the Aerial Archaeology Research Group, aims to focus principally on the use and integration of aerial methods with other forms of survey. We seek papers that can incorporate the modern interpretation or reprocessing of historical aerial archives, the use of novel sensors and methodologies or integrated projects with aerial methodologies at their core. We also welcome contributions of a more theoretical nature, exploring the tension between aerial approaches and physical engagement with the landscape, and looking also to the future development of this important sub-discipline of landscape archaeology.

**Tuesday 18th September, 09:00-11:00, Newcastle University**

**158 Rethinking the archaeological record. UAVs, photogrammetry, and GIS**

Israel Hinojosa-Balino (Durham University, UK) & Gerardo Gutierrez (University of Colorado Boulder, USA)

If you learnt how to use a computer office suite in the eighties, now it is time to learn the computerised field suite (UAVs, photogrammetry, and GIS). The use of drones in archaeology, along with GIS and photogrammetry, has recently become an essential part of the archaeological enterprise. Nonetheless, just as it was the case almost three decades ago for any computer-based office suite, it still is a new toy for computer and gadget enthusiasts. A methodological approach to these advancements is required to improve our understanding and management of the archaeological record; by combining these technologies, we can save time during fieldwork, either in survey or excavation, and optimise office work. Additionally, these technologies (that altogether could be classified as a field suite) record the archaeological remains accurately and efficiently. What are the problems with their implementation on a broader basis? Which goals do they allow us to pursue? What would the implications be?

**14 Birdoswald in 3D: surveying landscapes using Structure from Motion**

Dave Knight (Historic England, UK)

New technologies have revolutionised how we record archaeological data over the past two decades, none more so, from a landscape perspective, than the use of digital elevation models. Lidar and Structure from Motion have become commonplace in archaeological landscape survey and new technologies, alongside an increasing number of freely available software applications, have made these techniques available to a wider range of practitioners and interested non-specialists. The Roman Fort of Birdoswald, or Banna, is one of the most important sites of its kind along the northern frontier of Hadrian’s Wall. The fort and the neighbouring sections of wall have been the focus of survey and excavation over many years, creating an invaluable record. Research along the wall however has mostly concentrated on the forts, milecastles and on Hadrian’s Wall itself. As part of a programme of re-visualising the public display of the fort, the English Heritage Trust, who are its custodian, requested Historic England to carry out research to understand the fort in its wider landscape, both as part of the
Hadrian’s Wall Roman frontier and through time. Unfortunately, much of the countryside around Birdoswald is poorly covered by Environment Agency lidar. The project had no budget to commission lidar and the project area, at 8km², was too large to be flown by drones. The solution devised, was for Historic England’s Aerial Reconnaissance Unit to photograph the entire area from a manned aircraft, and use that photography to produce a 3D model using Structure from Motion. The result was a high-resolution 3D model of the landscape, which allowed the most detailed and accurate mapping of the area’s archaeology to date. The model effectively showed how Structure from Motion can be used to map archaeology on a landscape scale and how this can be successfully achieved using manned aerial photography.

298 Aerial archaeology and changing land use in medieval Ireland

Michael Corcoran & Stephen Davis (University College Dublin, Ireland)

No other aspect of medieval Irish life and society is more scantily served by the surviving evidence than the economic basis of society, the cultivation of the land” - K. W. Nicholls, 1972. Much of what is currently understood about agricultural space and practice in medieval and post-medieval Ireland is based around an arguably out-dated narrative built around a system of dichotomies – Gaelic Irish vs. Anglo-Norman, dispersed vs. nucleated settlement, pasture vs. arable, etc. There has been insufficient effort aimed at employing modern archaeological evidence to refine this narrative to construct an appropriately complex and dynamic picture of how medieval societies interacted with their landscapes. Field systems and cultivation ridges are indicative of a number of different cropping strategies and, as such, are created in a number of different ways, varying in length, width, spacing, phasing and area of coverage. Like field systems, they correspond to an array of potential chronologies from prehistory to the early-modern era. Given their ubiquity across the landscape, it is astounding that so little archaeological or historical geographic research has been carried out on these important earthwork monuments. In recent years, the availability of high-resolution geospatial data (e.g. LiDAR, satellite imagery), in addition to findings from modern excavations, has resulted in the identification of archaeological remains that do not conform to traditional models and likely the result of agricultural decision making by individual agents or small communities. It has also enabled the more nuanced understanding of the interaction between recorded settlement sites and their landscape environs. This paper will present some of the findings from recent research into archaeological field systems and cultivation ridges in Ireland using a combination of data from airborne LiDAR survey, aerial and satellite imagery. From these findings, models of land-use will be suggested that can contribute enormously to our understanding of the development of Irish rural landscapes and society.

Nicholls, K.W. (1972) Gaelic and Gaelicised Ireland in the Middle Ages. Dublin: Gill and Macmillan

143 Mapping the landscape of occupation at Lade, Norway Using historic aerial photographs

Julian Cadamarteri (NIKU, Norway)

In April 1940 Norway was invaded by the axis Powers and for the duration of World War 2 was occupied by German forces. The occupation lead to large scale changes to the mostly agricultural landscape of pre-war Norway. Large scale building works to modernize the infrastructure and the construction of military bases and defences for the effective defence of the country for the defence against an anticipated allied counter-invasion lead to a militarized landscape. Today few traces of this military landscape remain, especially in urban areas. Using historic aerial photographs taken before, during and after the war it has been possible to map the impact the occupation had on the landscape of Lade near Trondheim. To what degree was the landscape transformed during the occupation and how was it reclaimed for civilian use after the occupation ended.
26 LiDAR and field archaeology in Giribaile archaeological site

Antonio Ortiz, Luis María Gutierrez & María Alejjo (Universidad de Jaén, Spain)

The General Investigation Project on Giribaile archaeological site called: “Innovaciones técnicas aplicadas al conocimiento y puesta en valor de Giribaile” funded by Junta de Andalucía, started in 2014. Although initially were not planified any LiDAR studies, due to the possibilities this technic has, recently have been applied for the study of this place to complete the information given by diverse investigation technics like GPR and ERI, orthophotography, archaeological prospection and excavation. In spite of the logical order to apply LiDAR technology it is not followed here, the information given by LiDAR dataset obtained from public repository dated on 2006, previous to the archaeological excavation campaign hold on 2014, shows the terrain before any archaeological excavation so it can be compared with the results obtained during the investigation project like a way to contrast the reliability of this dataset for future investigation and implement a new methodology for archaeological investigation in which the LiDAR dataset analysis will play an important role. So the aim of this report is to show the comparison made between the different technics explained above specially GPR, ERI, and orthophoto. The results obtained are encouraging us to implement it in future investigation projects. What it is more, it will be the base for a new investigation line based on the study of the Oretania region and its spatial distribution.

Related posters (for poster abstracts, see p.213-230)

182 Buried Italian landscapes. A new perspective from Bing Maps.
Davide Mastroianni (University of Sassari, Italy)

189 Archaeological missing landscapes and UAVs. A case study from San Salvatore Telesino (BN) in the Telesina Valley, Campania (Italy).
Davide Mastroianni (University of Sassari, Italy)
SESSION 29C - REMOTE SENSING IN LANDSCAPE ARCHAEOLOGY RESEARCH

Louise Rayne (University of Leicester, UK), Chris Brooke (University of Nottingham, UK) & Danny Donoghue (University of Durham, UK)

KEYWORDS. Remote sensing; photogrammetry; lidar; image classification; thermal imaging; cloud parallel computing

This session assesses the status of remote sensing applications in landscape archaeology and explores how their use could in future have a more significant impact on archaeological research and cultural heritage protection. It is organised in conjunction with the Remote Sensing and Photogrammetry Society (RSPSoc), which has an Archaeology Special Interest Group. Remote sensing and GIS have rapidly been adopted by archaeologists for several key reasons: fast mapping of entire landscapes, analysis of large datasets, and a way of recording features in areas rendered inaccessible, for example in places affected by current conflict and by land-use change. In recent years many image interpretation-based studies, classifications and automated detection projects (and thermal imaging, photogrammetry, lidar, SAR [Synthetic Aperture Radar] and the relatively low-cost and user-friendly sfm ["structure-from-motion"] software packages) have been applied to cultural heritage protection and recording. Applications have also sought to demonstrate the use of remote sensing for specific regions, sites, buildings and even objects. The value of many of the products of these analyses needs to be established more robustly, however, reflecting on the need for them to enhance our understanding of past landscapes rather than primarily acting as aesthetically-pleasing visualisations. The session presents a number of relevant remote sensing tools and case studies across a wide temporal and spatial range including Europe, Africa and the Middle East, and will assess the impact of an increasingly open-source research environment. The session will also promote a discussion of how to increase the impact on landscape archaeology and cultural heritage of remote sensing and GIS techniques. The use of remote sensing to detect archaeological soils and topographies and make condition assessments based on monitoring land use and changes to structural features will be evaluated. The potential offered by cloud parallel computing for answering questions about wider landscape dynamics in high resolution is also highlighted in this session.

Wednesday 19th September 09:00-10:30, Durham University

211 Ground-based remote sensing in the examination of historic buildings and structures

Christopher Brooke (University of Nottingham, UK)

The archaeological examination of standing buildings, particularly when still in use, is frequently compounded by the need to hidden examine areas where the use of destructive techniques is not practicable. Sections of building fabric and historic structures frequently suffer from the actions of erosion and decay, and sometimes from vandalism and unsympathetic repair, resulting in incomplete or incomprehensible details. Ground-based remote sensing techniques, based on scientific digital imaging and mathematical image-enhancement, have been developed specifically to assist with the non-destructive recovery of archaeological information in standing buildings and their associated fittings. Examples include the multispectral analysis of complex, multiphase construction, thermal imaging, and the visual enhancement of damaged or eroded inscriptions and decorative detail through laser surface profiling. Several of the techniques are also applicable to the examination of archaeological sites both before and during excavation.
284 New RS-based advances and concepts in the development of transcontinental route models

Hector A. Orengo & Toby C. Wilkinson (McDonald Institute for Archaeological Research, University of Cambridge, UK)

Mobility is essential for the development of links between communities and therefore forms the basis of human social-shaping processes such as trade, warfare, migration, acculturation and the spread of genes, germs, goods and ideas. Long-distance routes were formed through the large-scale aggregation of regional paths and roads, which joined previous habitation nuclei and boosted the development of new ones along them. The study of long distance mobility can offer important insights on the character of human culture, population density, urbanism and so on. Despite this, few studies have tackled long-term transcontinental movement with any degree of accuracy. This is mainly due to:

1. The enormous computing power necessary to develop route analysis over such large territories with a meaningful spatial resolution.
2. The changing nature of transport, human settlement and the basis and types of mobility in different historical periods.
3. The ample variability in ecological conditions over large distances, which prevents the use of particular environmental factors to cost movement.

Recent advances in remote sensing, however, have made it possible to tackle the analysis of transcontinental mobility. New satellite data sources have significantly increased the spatial, temporal and spectral resolution available. Also, the development of platforms, which employ cloud parallel computing to process large amounts of data through purposely built scripts, have set the scene for the development of new approaches for the modelling of transcontinental routes. These new possibilities require a rethinking of the nature of and factors affecting movement and how these can be tentatively modelled. We will present the principles and methods we are currently employing to develop transcontinental probabilistic route networks. These are conceived as exploratory tools aimed at investigating long-term large-scale movement in the past through the combination of historical/archaeological data, multi-temporal satellite environmental modelling, least-cost route analysis, spatial/social network analysis and statistical analysis.

190 Site Recognition and Definition as Addressed through High Resolution Remote-Sensing: Results from the Fragile Crescent Project

Graham Philip, Dan Lawrence & Nikos Galiatsatos (Durham University, UK)

In recent years, satellite imagery has been widely used by landscape archaeologists working in the Middle East to provide detailed information on the quantity, nature and extent of ancient settlement, and has allowed comparative analysis of settlement across multiple regions. The resulting data has provided the evidence-base for research projects that are reshaping the practice of landscape archaeology in the Middle East, and our understanding of the scale, pattern and nature of past settlement. However there still remain questions around the causes of the increased reflectance associated with archaeological deposits, and the interaction of these factors with the rather different spectral, spatial and temporal characteristics recorded by various types of satellite imagery. These differences will affect the nature and size of archaeological features detected by different image types, all of which may differ from the indications given by surface-collections. This point is important if we want to be able to compare data generated by surveys which make use of satellite imagery in different ways, and also with the results of surveys which did not use remote sensing data, but focused on surface artefacts. In short, while the enhanced reflectance visible in satellite imagery is real, neither its relationship to the composition of soil deposits, nor therefore to the extent of human occupation is simple. Our paper seeks to explore these issues using case studies drawn from the Fragile Crescent Project, which examined settlement remains in the Homs region of Syria, using both remote sensing and in-field surface collection.
245 Satellite remote sensing for site protection in sub-Saharan Africa: examples from East and West Africa

Nadia Khalaf (University of Exeter, UK)

There are many archaeological sites in sub-Saharan Africa that have yet to be discovered, as there are few researchers working in this expansive continent in comparison to other areas of the globe. Those sites that have been discovered are facing destruction from human and environmental impacts, which are difficult to monitor in such a vast landscape. This paper will discuss two case studies, in two very different landscapes of Africa, where there is a vast amount of archaeology. The first case study looks at the Niger River in the Republic of Benin, where Landsat imagery has been used to analyse the change in the landscape and the subsequent threat to the sites there. The second case study considers two Islamic period sites in eastern Ethiopia that are facing destruction from growing population and urbanisation of Ethiopia. I will demonstrate in both case studies how people working in Africa might address site protection using free satellite imagery in the future.

16 Mapping the scale of threats to archaeology across North Africa

Louise Rayne (University of Leicester, UK)

Since 2015, the Endangered Archaeology in the Middle East and North Africa (EAMENA) project has been using remote sensing to document archaeological sites across the MENA region and the threats posed to them in an online database. We have focused on using open-source software and data so that the EAMENA database and methodology is as widely available as possible to registered users. In this paper we present a discussion of the distribution of EAMENA’s data for archaeological sites in North Africa and of the trends relating to damage and threats which we have identified. In North Africa expansion of agriculture into abandoned areas of oasis has been ongoing much more recently than it has in the Near East, meaning that high-resolution modern satellite imagery (e.g. WorldView, GeoEye, images available via Google Earth) is of particular value. Our methodology primarily comprises image interpretation and classifications of freely-available satellite data using defined and standardised terminologies. For targeted sample areas we are also developing methods which utilise historical satellite and aerial observation systems including 1940s-50s aerial photographs and 1960s declassified satellite imagery. We have so far recorded over 8000 sites from case study areas in North Africa. In particular we have identified the significant risks posed by rapidly expanding irrigated agriculture and urban growth. Now that the initial database has been established and data entry is underway, EAMENA is working on disseminating our methodology to archaeologists and heritage professionals across the MENA region through a programme of training courses focusing on open-source database recording using remote sensing techniques. We hope to demonstrate how data and resources developed by the project could be adopted as a longer-term record for the MENA countries, to assist with improving the protection of the cultural heritage in the region.

Questions and discussion

Louise Rayne (University of Leicester, UK), Chris Brooke (University of Nottingham, UK) & Danny Donoghue (University of Durham, UK)

Related posters (for poster abstracts, see p.213-230)

170 Remote Sensing research on motte and bailey castle along the via Herculia

Rosanna Montanaro & Paola Guacci (University of Salento, Italy)
Landscape archaeology as a set of methods, and ‘archaeologies of landscape’ as a type of study and set of questions, should go together, but often make an odd couple. When preparing to study a landscape we pick our data and methods and declare our intellectual framework and research questions. Some of us choose settlement patterns and spatial statistics that quantify distance, declaring that they are doing landscape history and professing an interest in whether or not urban political change is reflected in where farmers live. Others see monuments as fundamental building blocks of landscape in spatial, political and social terms and analyse their physical and experienced qualities. We then set about trying to interpret our inevitably ambiguous data, to say why we think what we think. We have various ways of formalising structures of knowledge through a range of ontologies and quantitative and modelling approaches as a result of trying to clarify and formalize the question ‘why’. This session invites papers that explicitly connect data and ideas or attempt to develop new approaches to building the intellectual scaffolding between the data we have and the questions we want to answer.

32E Part 1 - Thursday 20th September, 11:30-13:30, Newcastle University

Introduction to Session
Rachel Opitz, Claudia Glatz & Michael Given (University of Glasgow, UK)

157 A Monumental Presence? (exercises in prehistoric place making)
Mark Gillings (University of Leicester, UK)

This paper focuses on a particular piece of intellectual scaffolding and its role in contemporary landscape archaeology – the slippery, yet ubiquitous notion of place. Some researchers have used it as shorthand for ‘meaningful node’ – a static, yet significant location that serves as a key building block for looser heuristics such as landscape. Others have seen this nodal conceptualisation as limiting and bounding, reducing profoundly relational loci to static containers. Places are instead dynamic knots and entanglements in the on-going flow of everyday inhabitation. Vibrant, potent webs of other times, places, people, practices. So what are places and where do they come from? Why do stories accrue in some locations and not others? What is it that causes the lines we trace to snag, knot and tangle? Are places made or do they emerge? If the former, is this by accident or design? Is there an essential quality to certain locations that makes them stand out and have the power to affect, and is it safe to assume that perceptually striking locales will always accrue significance? Attract stories? Anchor memories and/or serve as powerful reminders to forget? Contrast, for example, the elegant didactic landscapes discussed by Basso to those described by Stewart, where accident, loss, despair and tragedy have gouged out a more visceral Geography. Here I will explore these questions and how we might effect a ‘platial’ archaeology through discussion of two late Neolithic megalithic monuments. One a thoroughly mundane and quotidian location that managed, through a conscious process of elaboration and construction, to draw a host of other potent places into its here and now. The other a spot with ‘holding power’ and the ability to ‘charm’. A strongly affective location where the monumental fabric was almost an afterthought.

18 Placing identity in landscapes: which monuments are ‘relevant’?
Hamish Forbes (University of Nottingham, UK)
This paper uses ethnographic data to contrast indigenous ideas with exogenous archaeologists’ approaches on the ‘importance’ of monuments for generating and maintaining identity. Taking examples from rural communities in the wider Greek world (Central Greece, the Peloponnese and a Greko-speaking area of Italy) it challenges the dominant archaeological discourse, shared by many urban middle-class Greeks, that the archaeological monuments of the Classical and Hellenistic past are key elements in Greek identity. While more highly educated Greeks have used their ancient Greek monuments as symbolic capital to assert Greek specialness and cultural superiority in contrast to other nationalities, many members of rural communities may largely ignore what archaeologists consider ‘important monuments’ preferring to identify with alternative pasts within their local landscapes. On occasions, moreover, ‘monuments’ chosen to (re)present community identity may be invisible and/or only a few decades old.

9 Questioning interpretations: Examining the value of a multiple causality approach in understanding small-scale culture change in Maori settlements along the Waihou River in New Zealand

Caroline Phillips (Anthropology, University of Auckland, New Zealand)

Research in four different disciplines (environmental, archaeological, historical and traditional) relating to Maori settlements along the Waihou River in New Zealand, resulted in four sets of data, each of which hinted at a series of small-scale changes in the environment, economy, population, settlements and politics over a 350 year period (1450-1800 AD). A simple listing of changes in those aspects does not lead to an understanding of the relationship and feedback between the separate events or adequately address why the changes occurred. This is a dynamic system in which the people living along the Waihou and those elsewhere and the environment itself were all actors. Understanding the dynamic and complex relationships between these interconnected elements requires an approach that can accommodate the different sets of data. In this paper a multiple causality approach is used to examine three possible causes of each change: the evolutionary or selective processes that allowed the probability of change; the immediate reasons that motivated the change; and the intentions and choices made by the inhabitants. Importantly, it was found that this approach could link diverse observations, test existing presuppositions and force the researcher to be openly reflective. It also suggests future research directions to test and examine assumptions, in a way that would not always be apparent otherwise.

126 From paths to Landscape: why does movement contribute to land-use dynamics?

Laure Nuninger (CNRS, Besançon (Chrono-Environnement/ MSHE C.N. Ledoux, France), Xavier Rodier (CNRS, Tours,Citeres / MSH Val de Loire, France), & Rachel Opitz (University of Glasgow, School of Humanities, UK)

In this paper we ask why it is so complex to combine detection and modelling approaches to study the materiality of movement within the framework of settlement dynamics, and consider the paired ideas that “paths structure the landscape” and “landscape is structuring pathways”. There are many challenges. While they may all be grouped under ‘material traces of movement’, the objects studied in different domains interested in this subject are not necessarily direct parallels for one another. The concepts used in discussing movement, as studied through detection or modelling, carry underlying ideas of scale, social paradigms, environmental context, and more, rarely discussed in the literature. Consequently, it is rather difficult to compare or integrate different approaches, or across regional studies. To overcome this problem, we propose an ontological analysis of several cases studies using detection- and modelling- led approaches. Through this analysis, we attempt to provide a new perspective on the human practices and activities linked to movement and flows, as observed at several scales. The first aim of our proposed approach is to build a common conceptual framework bringing to the fore the relationship between concepts used in detection- and modelling- led approaches in an explicit
schema. The second aim is to expand our conceptual scope when studying landscape, from a simplistic view of a single network in the form of formal road infrastructure to a rich set of materialisations of movement. In this paper we focus on part of our ontological analysis that highlights some unexpected types of paths (e.g. headlands or terraces), that supplement the standard, formal pathways that form communal infrastructure. Case studies from various part of the world will be used to illustrate and explain the interest of our approach.

Discussion

Rachel Opitz, Claudia Glatz & Michael Given (University of Glasgow, UK)

32E Part 2 - Thursday 20th September, 14:30-16:00, Newcastle University

240 Small places, large implications. Interpretative frameworks and hidden landscapes in northern Calabria (Italy)

Wieke de Neef (University of Ghent, Belgium) & Kayt Armstrong (Durham University, UK)

This paper highlights the conscious and unconscious biases in the archaeological record of the Sibaritide in northern Calabria (southern Italy) and their impact on the construction of socio-economic and socio-political models. The impacts of research traditions and their political underpinnings, the process of agricultural mechanization, and the ongoing abandonment of upland zones on our understanding of (late) prehistoric occupation of this area will be discussed. The results of landscape archaeological studies (2000-2010) by the Groningen Institute of Archaeology (GIA) in the Raganello basin exposed small Metal Age artefact scatters in the upland valleys for which no interpretative framework existed. The finds from remote mountain locations such as caves, rock ledges and debris slopes, reported by a speleology club, were further evidence for non-incidental highland exploitation. High-resolution investigations of a selection of these sites including re-surveys, geophysics, pedological studies and test pits (2010-2016) showed that the surface artefacts are only the tip of the iceberg of a buried prehistoric landscape obscured by complex site and landscape formation processes. This previously unknown prehistoric mountain landscape now has to be integrated in existing settlement models and the longue durée cycles of human presence in the Sibaritide. This requires an understanding of the sustainability of mountain communities, their agro-pastoral cycles, and interaction with lowland zones. We will show how, also here, conscious and unconscious modern views on how mountain landscapes work influence our archaeological interpretation.

216 The Introduction of Terracing in the highlands of Jerusalem: Time and Motivations

Yelena Elgart Sharon (Tel Aviv University, Israel)

Terraces attract the attention of scholars from a range of disciplines covering geomorphological and hydrological processes, ecological modelling and human-environment interplay, as well as human subsistence strategies and social history. When asked why ancient societies built terraces for dry farming most scholars would answer that demographic pressure coupled with shortage in cultivatable land pushed rural population to terrace the mountain slopes that are otherwise out of reach. In other words, terrace construction is a necessity. In this paper the results of a landscape study that challenges the above-mentioned paradigm will be presented. The study was conducted along the Upper Soreq Catchment (Israel). By using OSI for dating the terrace walls, 2 or 3 cycles of terrace construction were recognized, the earliest of them dates to approximately (ca 2500 years ago). These results were then compared to regional settlement maps of over 350 sites dating from the Middle Bronze Age up to the Ottoman period. The results show that there is no correlation between terraces construction events and demographic peaks. Instead terraces seem to be a reflection of landownership patterns.
Recent Archaeological Investigation of the Upper Punjab plains and its significance

Navjot Kour (The Maharaja Sayajirao University of Baroda Vadodara, Gujara, India) & Sidra Gulzar (Department of Historical studies, University of Gothenburg, Sweden)

The Geographic zone consisting of the upper Punjab plains includes the area of Jammu which is culturally important mainly owing to its location. This area has played an important role in shaping the history of the upper plains especially during the Early Historic period. The lack of proper archaeological investigation in the area has led to the formation of a fragmented history. This article therefore aims to document the archaeological sites from the plains of Jammu for developing a settlement pattern perspective of this zone. The settlement data from the region is based on the field work carried out by the author in the area of Jammu and would therefore be helpful in bringing out the importance of this region for future archaeological investigations dealing with the overall cultural development of the entire region.

Landscape Archaeology as Social History on the Deccan Plateau of Southern India

Andrew Bauer (Stanford University, USA)

The archaeology of landscapes has come to mean many things in archaeological method and practice. In some uses it emphasizes a concern for regional analyses and the assessment of land use features and artifact distributions that spatially extend beyond narrow definitions of archaeological ‘sites’ or settlements. In others it represents a concern for the social and political production of space, in which social relationships are understood to be inherently spatial phenomena and the production of meaningful spaces and places to be integrally tied to social histories. In this paper I seek to integrate several of these different uses. More specifically, I combine ‘off-site’ regional artifact distributions indicative of ancient land use with multispectral remote sensing analyses of soils to evaluate the development of socially differentiated and culturally meaningful space. These analyses will draw on archaeological survey results of a 64 sq. km region around the multiple component site of Maski, in Raichur District northern Karnataka, southern India. Combined analyses of artifact distributions, agricultural land use features, soil distributions, and inscriptional sources suggest that social access to more valued soils contributed to the production of a politicized landscape by at least the 13th century and point to the role of landscape archaeology to interrogate and complement the historical record in understanding the social history of the Medieval Deccan.

Final Discussion

Rachel Opitz, Claudia Glatz & Michael Given (University of Glasgow, UK)

Related posters (for poster abstracts, see p.213-230)

Interpretation is not the end. A test system for joint interpretation of past landscape and its integration with existing data sets.

Alexis Pantos (University of Copenhagen, Denmark)
SESSION 34E - MARKERS AND MOBILITIES: INTERPRETING DYNAMIC LANDSCAPES

Poul Heide (Øhavsmuseet Faaborg, Denmark) & Oscar Aldred (University of Cambridge, UK)

KEYWORDS. Mobility, Movement, Landmarks, Practice, Theory.

This session (one of three sessions on movement and mobility at LAC 2018) foregrounds mobility as both a method of enquiry and as an interpretative framework. Markers are features in the landscape whose histories continue to resonate in the present day. Examples include the large and diverse group of small markers that have aided transportation and mobility across the landscape on land and at sea, or monuments to the dead such as burial mounds that through time have taken on new community meanings at boundaries or trackway nodes. Markers have a strong connection to their immediate surroundings, and their permanence, directionality, and inert/latent intentionality gives them agency that shaped/s the way landscape was/is perceived and how it was/is acted upon. In many environments, markers of stone or with high degrees of material investment tend to outlive their original contexts, and can be extremely resilient while the landscape around them changes. They offer important interpretative frameworks for representing and researching the dynamism of landscape and have great potential for both archaeological research and presentation; how are markers and their landscapes managed, and what kinds of future landscapes will we offer the next generations of landscape archaeologist? To open discussion about markers and the role of mobility in understanding past, present and future landscape, this session aimed to bring together colleagues from different disciplines and geographic areas. Discussion will include – but will not be limited to - the field archaeological identification and dating of mobility markers, discovering how people engaged in wayfinding/navigation, the use of movement or mobile methods as a research tool, the explanation of markers, routes and mobilities to the public, and management strategies for securing marker systems in landscapes.

34E Part 1 - Thursday 20th September, 09.00-11:00, Newcastle University

Introduction to Session
Poul Heide (Øhavsmuseet Faaborg, Denmark) & Oscar Aldred (University of Cambridge, UK)

58 Marking moving memories. The social importance of trackways in late prehistoric and Roman Britain.
Adrian Chadwick (University of Bristol, UK)

Trackways were an important component of many Iron Age and Roman-period rural landscapes in Britain. They linked settlement enclosures, and also led to areas of pasture. Often visible on aerial photographs and geophysical survey plots as double-ditched or embanked linear features, many had funnel-shaped entrances, ‘crushes’ and passing places, and were often linked to large ‘corrals’ or smaller pens appended to domestic enclosures. Such features indicate the economic importance of livestock herding and pastoralism during these periods when landscape inhabitation and tenure is assumed to be permanent, focused on particular tracts of land. In many archaeological narratives, trackways are often relegated to the relatively dull agrarian ‘bits in-between’ settlements and are not considered as inhabited places in and of themselves. This is evident in some landscape-scale studies; but especially in more interpretative discussions of gender and identity, ritualization, deposition, social memory and everyday movement that have tended to focus on the ‘domestic’ realm alone. Yet for these small-scale agrarian communities, trackways would have represented spaces where people and animals were on the move – in daily and seasonal cycles of mobility. Certain sections of these
communities may have been absent from main domestic enclosures for days or even months; whilst some enclosures assumed to be permanently occupied may have only formed seasonal dwellings. Routes of trackways were ingrained into the muscle memories of individual people and animals, and the social memories of communities, herds and flocks. Trackways persisted for many centuries, in some dated instances for millennia; whereas settlement enclosures could be abandoned after a few decades or generations. These routeways were thus significant markers of permanency and memory within landscapes that were themselves in flux, on the move. This paper will explore the need for more dynamic accounts of these trackways, landscapes and communities.

181 New currents in the chronology of Celtic fields in southern Scandinavia

Mette Løvschal, Søren Munch Kristiansen (Aarhus University, Denmark) & Nina Helt Nielsen (Museum Silkeborg, Denmark)

Still present in contemporary landscapes, embanked and lynchetted field systems, also known as Celtic fields, represent one of the most widespread late prehistoric land division form across southern Scandinavia. The field systems changed the appearance of the landscapes in radical ways and were intimately associated with new concepts of time and tenure. Therefore, it is also of vital importance to know when these permanent field systems emerged. However, due to a number chronological shortcomings and difficulties with dating these features, a more nuanced understanding of their emergent character is fundamentally missing as is precise knowledge of their time depth. In this paper, we present new scientific results from case-based geoarchaeological investigations of five Celtic field systems in eastern Jutland, Denmark. The investigations were specifically targeted towards dating the field banks and lynchets as well as investigating the prehistoric manuring strategies within the fields. The methods included radiocarbon (14C) and optically stimulated luminescence (OSL) dating of vertical sections, as well as geochemical analyses (e.g. multi-element analysis by ICP-MS), micromorphology, μXRF, NPP, and pollen analysis of soil samples. Here, we present new chronologies for the five-field system and contextualize these into the existing chronological model of the emergence of Celtic fields in southern Scandinavia in an attempt to increase understanding of the longevity of their use and the timing of the emergence of the Celtic field systems.

255 Do Landscape Move?

Jan Kolen (Faculty of Archaeology, Leiden University & LDE Centre for Global Heritage & Development, Netherlands), Eduardo Herrera Malatesta & Joseph Sony Jean (ERC Nexus 1492, Leiden University, Netherlands)

Do landscape move? Do landscapes simply trigger or attract migration and ‘absorb’ its effects? Or do landscapes –in one or another - move and ‘migrate’ as well – together and in interaction with people and things? And if so, what could this mean for the role of markers in landscape in relation to movement, identification and orientation? This paper deals with these questions, criticizing the common conviction that landscapes are external to people - both physical and in terms of human experience, that landscapes are fixed and therefore provide and environmental and cultural frame of reference for movement, travel and exile, and that landscapes consist first and foremost of solid substance, making them immovable. Instead, starting from the observation that landscapes by definition include people who take landscapes with them in their minds, designs and practices, it is argued that landscapes migrate as well – like people, things and ideas. In this context landscape markers, both functional and commemorative, achieve alternative roles and meanings. We furthermore suggest that this asks for a reconceptualization of the life histories of ‘biographies’ of landscapes, their physical structures and monuments. Examples are taken from (pre) historic North-western Europe and from (early) colonial contexts in Asia and the Americas.
261 The first home

Poul Heide (Faaborg Archipelago Museum, Denmark)

How do you make yourself at home in an entirely new part of the world? The questions resonates with present day effort to establish colonies on new planets. The topic for this paper is, however, from a time less technologically advanced, but just as eager to explore and exploit new worlds. This paper discusses a small group of monuments that were found close to the famous late Viking Age houses at L’Anse aux Meadows in Newfoundland – four cairns. The cairns were situated on the ridge right behind the settlement, and based on their topography and visual capacities, I will argue that they should be understood as a tool for creating a home in this, to the Vikings, pristine landscape. In order to do so, I draw on extensive surveys of cairns in Iceland and Greenland, in order to determine if there was a set way of marking a sense of ‘home’ in the North Atlantic landscapes. The paper addresses the special conditions that relate to small monuments like cairns, and the techniques that can be employed in order to understand them in the landscape they are part of. I will particularly discuss the perceptional perspectives that relate to the study of this type of monuments in these particular landscapes.

221 Resilience, fluidity and reiteration in movement systems

Oscar Aldred (University of Cambridge, UK)

In this paper, I examine two inter-related aspects of markers and mobility. First, the role of markers as attractors in generating mobility; and second, the way that markers tend to outlive the systems in which they were originally intended, becoming resilient to physical change, but also pliable in taking on new roles. I will explore two different examples, one in north-west Iceland, and the other in east England; on the one hand, stone-built markers identified from field surveys, and on the other, trackways defined by ditches revealed during excavation. Of interest is not so much the different techniques of investigation, although this has defined the two different forms of evidence, but how a more movement-orientated thinking helps to address specific issues associated with the understanding of markers and movement in the past, and their entanglement.

Discussion

Poul Heide (Øhavsmuseet Faaborg, Denmark) & Oscar Aldred (University of Cambridge, UK)

34E Part 2 - Thursday 20th September, 11.30-13:30, Newcastle University

60 Mountain – Cemetery – Fjord: the Iron Age mortuary landscape of Hardanger

Anne Drageset (University of Bergen, Norway)

This paper emphasizes the landscape as a key factor in maintaining the use of the Iron Age (500 BC - 1050 AD) cemeteries in Hardanger, Western Norway. Fjord tributaries that meander between steep mountainsides characterize the Hardanger fjord landscape. The fjord has continually served as the main communication lane between the hamlets along the fjord, and between the inland and the coast. Its proximity to the vast Hardangervidda mountain plateau, Europe’s largest, has always distinguished the region. Just about all of the Hardanger fjord villages have graves from the Iron Age, approx. 1500 in total. From a new materialist perspective, the Hardanger landscape served as a co-agent upon constructing a regional mortuary order. In the case of Hardanger as a whole, both single and multiple gravesites are found in association with Iron Age farms across the region. Their arrangement represents a rational response to the hilly topographical surroundings. The cemeteries of Hardanger draw our attention to landscapes that facilitated movement. This paper will discuss how the social significance of
wayfaring and outfield resources were conveyed in all of the large and medium sized cemeteries in the region.

191 Exploring Mobility and Directionality at Late Iron Age oppida

Nicky Garland (Newcastle University, UK)

Late Iron Age oppida in the UK are settlements characterised by significant quantities of imported goods, high status burials and large-scale linear earthwork systems (Haselgrove 2000). These settlements acted as places of assembly, specifically constructed to forge/reinforce social relations between groups through shared feasting and ritual practice (Haselgrove 1995, Fernández-Götz 2014). The ‘illogical’ linear earthwork systems that surrounded oppida have been subject to extensive investigation, but remain little understood, with many unsure what they demarcate (Haselgrove and Moore 2007). Moore (2012) has argued that these earthworks defined areas of landscape, directed movement and helped to form specific impressions of space. Acting as territorial ‘markers’, the earthworks manipulated how people approached these sites by influencing directionality and thus shaped the agency of, and interaction between, Iron Age societies at these meeting places. This paper aims to develop a ‘person-centred’ perspective to understand how earthwork systems were experienced in the past by exploring them in the present. Oppida and the earthworks that surround them continue to form a central feature of modern landscapes. By understanding routeways in the Iron Age, we can better understand how oppida acted as centres of social, political and ritual life. An experiential analysis of these sites will use mobility as a research tool, and experiment with different media (images, videos) to present results. Vital to this approach is experimentation and movement through the modern landscape to determine how earthworks may have acted as markers for movement in the Late Iron Age. A pilot project has been undertaken for the Colchester oppidum (Davidson and Garland 2017), however, this paper will focus on examining the earthworks surrounding Stanwick, North Yorkshire. Utilising recently published research (Haselgrove 2016), experiential fieldwork and GIS analysis, this paper will create a holistic understanding of mobility across Iron Age oppida.

28 Maritime mobility and geographical information in Stone Age Rock Art

Jan Magne Gjerde (UiT - The Arctic University of Norway, Norway)

The backdrop of the study area is the Alta-fjord region in northern Norway, northernmost Europe. A seascape favouring maritime mobility where boats were a prerequisite in the Stone Age. The area hold the largest concentration of Stone Age rock art in northern Europe with more than 7000 carvings made over 5000 years, dated to between 5000BC and 0AD. Contemporary with the rock art, the Alta-fjord region also holds an impressive settlement record and quarries from the Stone Age. The boat would have been central in the web of movement between settlements and other nodes in the landscape such as travelling to and from fishing grounds and hunting grounds, acquiring raw material, making rock art and other activities. It is argued that hunter-gatherer rock art are not merely related to cosmological and imaginary landscapes, but at times refer to actual places and spatial relations between places. Thereby, rock art refers to cosmological and real landscape intertwined as a cosmography of the hunter-gatherer lived world. Geographical and ethnographical sources suggest animals refer to areas, landscapes and seasonality. Animals cannot be removed from hunter-gatherer landscapes, hence holds a central place in hunter-gatherer rock art. It is further argued that rock art is part of hunter-gatherer geographic knowledge stored in the rocks. These memoryscapes include geographical information where rock art sites are interpreted as part of the mapping the hunter-gatherer world focused on Cynegetic activities; activities connected to hunting, referring to travelling, hunting, trapping and fishing. These activities are mirrored in the rock art by representations of bearhunting, elk hunting, reindeerhunting, halibut fishing, sealing and whaling. The paper includes rock art and settlement data from the Alta-fjord region in northernmost Europe and applies archaeology, anthropology, ethnography and geography in the interpretation of rock art, geographical information and maritime mobility in the Stone Age.
Final Discussion

Poul Heide (Øhavsmuseet Faaborg, Denmark) & Oscar Aldred (University of Cambridge, UK)

Related posters (for poster abstracts, see p.213-230)

181 New currents in the chronology of Celtic fields in southern Scandinavia
Mette Løvschal, Søren Munch Kristiansen (Aarhus University, Denmark) & Nina Helt Nielsen (Museum Silkeborg, Denmark)

193 The path network of the Late Bronze Age enclosure Cornești-larcuri, Romania
Moritz Nykamp, Brigitta Schütt (Institute of Geographical Sciences, Freie Universität Berlin, Germany)
& Daniel Knitter (Christian-Albrechts-Universität zu Kiel, Germany)
SESSION 35D - A SENSE OF PLACE: COMMUNITY ARCHAEOLOGY IN THE LANDSCAPE

Angela Gannon (Historic Environment Scotland, UK), Lawrence Shaw (New Forest National Park Authority, UK) & Nathalie Barrett (Winchester University, UK)

KEYWORDS. Community Archaeology; Participation; Engagement; Place

Gone are the days when public participation in archaeology involved turning up as a volunteer to help excavate a site with the promise of free board and lodging for a few weeks over the summer holidays. Today, Community Archaeology is a diverse and growing area of research and practice offering opportunities beyond those of archaeological process. Many projects now involve public participation as a primary objective and can be seen as gateways to stimulate interest, learn new skills and create a sense of belonging both spatially and temporally. Engagement with the historic environment can deliver wide-ranging benefits to individuals and communities and this is acknowledged in the funding streams that support these projects, either wholly for some or as a precondition for most. Far from excavation, such projects are often interested in less invasive techniques from locally based survey and recording initiatives to nationwide citizen science projects. Public engagement can range from following a series of prescribed tasks, either desk-based or on the ground, to the learning and adoption of new skills and the creation of knowledge. The session is supported by the Landscape Survey Group (http://landscapesurvey.org/) and will adopt a workshop format, introduced by several papers, to stimulate thought and provoke involvement from participants in discussing how best to deliver and support community engagement projects and consider challenges and lessons learned to create an understanding of future best practice.

Thursday 20th September, 11.30-13:30, Newcastle University

Introduction to Session

Angela Gannon (Historic Environment Scotland, UK)

303 Enabling communities: a Scottish perspective

Eve Boyle (Historic Environment Scotland, UK)

Over the last decade or so, a distinct strand has emerged in Scottish community archaeology, one that places emphasis on building capacity within communities to enable them to record their local history, heritage and archaeology on their own terms. An important driver here was Scotland’s Rural Past which, from 2006 to 2011 shared the methodology and the skills of RCAHMS field archaeologists with community groups across the country, and encouraged volunteers to upload their records, drawings and photographs directly to the National Record. Since then, community groups have become markedly more confident in their engagement with their heritage and also with the archaeology profession, commercial units have become increasingly involved with local groups, productive partnerships have been established, and this year has seen the beginnings of a national Community Heritage Network, to enable local groups to support and strengthen each other. This paper will review these developments across Scotland and reflect on the impacts they have had on both the professional and community sectors.

83 #EnrichTheList: Public engagement with England's statutory List.

Eric Branse-Instone (Historic England, UK)
The National Heritage List for England (NHLE) is the official up-to-date online database of all of England’s nationally designated heritage assets including: Scheduled Monuments, Listed Buildings, Protected Wreck Sites, Registered Parks & Gardens and Registered Battlefields. Since June 2016, Historic England has encouraged the public to #EnrichTheList: to upload photographs and other information which, following moderation, is then published at the foot of the relevant NHLE entry. In the first 18 months of operation, over 10% of the NHLE had been enriched, with more than 70,000 contributions from nearly 900 individuals, including over 100,000 images; the level of engagement snowballing month by month. As well as contributions by individuals, a number of established local heritage groups have engaged with #EnrichTheList. The scheme is now starting to be used as the basis for new community archaeology projects, engaging new groups with England’s historic environment. An example is a collaborative project with the Stephen Lawrence Charity Trust: using Enriching the List to introduce people from multi-cultural backgrounds to the heritage sector. Schools have also become involved via Historic England’s Heritage Schools Programme. #EnrichTheList is a concept that is still evolving, with several new developments in the pipeline. The State of Victoria, Australia, which also allows direct public contributions to its statutory List, has a facility for people to design and upload tours based around designated sites. Historic England is very open to new ideas to promote public engagement and understanding of the historic environment and welcomes suggestions for #EnrichTheList.

71 A ‘Chase Through Time’ with volunteers

David Went & Helen Winton (Historic England, UK)

Between 2016 and 2018 the ‘Chase Through Time’ project explored the rich history of the Cannock Chase in Staffordshire. Prolonged human activity has left marks all over this protected landscape, but much of this evidence, including that of one of the best-preserved First World War training camps in England, is now largely hidden by woodland and heathland scrub. With the Great War centenary providing a spur to action, Historic England, in partnership with Staffordshire County Council, approached the Heritage Lottery Fund to support an archaeological survey of the Chase. This support included funding for airborne laser scanning (lidar) which not only allowed us to see the wartime landscape beneath the trees, but also to map a wide range of archaeological remains dating from the Bronze Age to the medieval period and beyond. An important strand to this project was the involvement of volunteers. Historic England archaeologists shared skills, provided training and promoted the use of non-invasive survey techniques with people interested in exploring the history of the Chase. At the outset it was envisaged that a large amount of volunteer time would be taken up by sweeping ground surveys in areas of dense vegetation where effective lidar penetration seemed unlikely. However, the lidar results exceeded expectation, providing outstanding results for the whole of the Chase landscape. This called for a fundamental review of the initial project design to create a lasting programme of engagement, and to ensure that the volunteers’ enthusiasm and training was appropriately supported. This paper explores the assumptions which were made at the project’s outset, the volunteer structure which was established as a consequence, and the way in which that structure had to be modified. It deals with technological advances, the volunteers’ expectations and the development of longer term community research underpinned by the aerial investigations.

202 Archeox: community archaeology in East Oxford

Olaf Bayer (Historic England, UK)

Archeox, the Archaeology of East Oxford Project ran between 2010 and 2015. Hosted by Oxford University’s Department for Continuing Education the project worked with over 100 volunteers from the diverse community of East Oxford. The project adapted the normally rural techniques of landscape archaeology to a suburban context. Allotments and vegetable gardens were fieldwalked; geophysical surveys were conducted in parks and playing fields; test pits were excavated in back gardens; and
historic mapping was studied for place names. The project provided opportunities for volunteers to engage with the entire archaeological process from archive research, to fieldwork, post-exavcation analysis, report writing and preparation for publication. This paper will give an overview of the project and present a case study from Donnington Recreation Ground. Here a combination of lidar data, geophysics, museum research, test pitting and targeted excavation gave a glimpse of prehistory amongst Saturday morning football matches and dog walkers.

250 Reflections on Public Engagement in Landscape Survey in central southern Britain

Nathalie Barrett (Winchester University, UK) & Lawrence Shaw (New Forest National Park Authority, UK)

Public engagement with archaeology can enable a wide range of people to get directly involved in the investigation and preservation of their local heritage in a constructive and meaningful way. As the increasingly important role of community projects in the future of archaeological research is recognised, so is the need for standards and guidance in the wider archaeological community. Public interest and involvement in the local historic environment and opportunities to participate in activities and events are facilitated by a varied network of stakeholders. Discussions on the provision of support, information and training includes making existing community archaeology groups more confident in carrying out independent fieldwork, and the provision of practical training directly from professionals to communities. Practitioners could also benefit from guidance in methods of working with groups and societies and promoting wider engagement. Reflecting on our own experiences and perspectives of a range of initiatives in central southern Britain and considering factors affecting public engagement such as funding, opportunities and time, the aim of this paper is to identify themes and challenges which may instigate discussion in the ensuing workshop. Stimulating enquiry and promoting active involvement through appreciation of our heritage has wider benefits. By commenting on both the archaeological results and the experience of participants, we will reflect on contributions of landscape survey to more than local knowledge. Gaining experience in the observation and understanding of landscapes goes beyond the development of technical skills. By evaluating project objectives with regard to engagement and whether outcomes were met, or other achievements resulted, we will reflect on the impact on participants and other stakeholders and consider what lessons could be learnt for the future.

Discussion

Angela Gannon (Historic Environment Scotland, UK), Lawrence Shaw (New Forest National Park Authority, UK) & Nathalie Barrett (Winchester University, UK)
Natural disasters such as volcanic eruptions, earthquakes, tsunamis, floods, extreme weather events and abrupt climate changes are key agents in transforming landscapes, sometimes in largely irreversible ways. From an archaeological perspective, these sudden and unpredictable events are often investigated as part of an ever-popular ‘collapse paradigm’ or through the paradigm of long-term evolutionary changes. As a counterpoint, this session aims to explore the impact of natural disasters, and the adaptive responses of affected communities, from a landscape archaeological perspective, understanding landscapes in their physical and socio-cultural dimensions. Instead of traditional categories such as ‘continuity’ and ‘discontinuity’, we seek to explore more fluid concepts of vulnerability, resilience, cultural change and risk reduction, focusing primarily on how adaptive strategies adopted in the aftermath of natural disasters impacted the cultural and physical fabric of landscapes. We particularly welcome contributions that highlight the creative role played by natural disasters in shaping cultural landscapes, either as ‘windows of opportunity’ or ‘exploitation’ (allowing the emergence and proliferation of alternative lifeways), ‘stimuli to innovations’ (providing new material conditions amenable to the development of innovative ideas) or ‘teachable moments’ and ‘learning reviews’ (allowing societies to reflect on their own practices, infrastructures and vulnerabilities). We invite papers that take account of the varied aspects of disaster archaeological research, bringing together case studies, methodological approaches and theoretical perspectives without geographical or chronological restrictions. We also encourage contributions showcasing ideas and reflections on the possible role of archaeological approaches to contemporary risk assessment and hazard communication in disaster-prone regions. Session participants will be invited to contribute to a collective scientific article focused on the creative impacts of natural disasters on ancient societies and the landscapes they inhabited.

Thursday 20th September, 09.00-11:00, Newcastle University

244 Rethinking the archaeology of natural disasters: an introduction to the LAC2018 session ‘The Flip Side of the coin’

Paolo Forlin (Durham University, UK)

The paper aims to introduce the session focusing on the 'state of the art' of the archaeology of natural disasters and to discuss briefly the different perspectives offered by the papers presented in our session.

111 Diverting the deluge: Approaching flooding from a landscape perspective

Peter Brown (Durham University, UK)

Through a combination of various archaeological techniques, including LiDAR analysis, comparisons of historical maps and place name evidence, this paper will examine the relationship between society and the hazard of flooding in medieval Marshland, Norfolk, England. From at least the Norman period this low-lying region developed a complex system of flood defence infrastructure to defend against the constant threat of inundation. Using dikes, ditches and drainage architecture, the populations which inhabited this region were able to reliably keep their farm-land dry. Alongside these physical defences, a sophisticated web of social customs and obligations emerged in tandem in order to maintain and
renew the material system of defence. Tenants were required to contribute financially and through labour towards the upkeep of these flood defences and local systems of enforcement developed to ensure that such duties were fulfilled. Although breaches did repeatedly occur, leading to flooding, destruction and substantial losses, the system of flood defence in medieval Marshland, stood the test of time, allowing the region to grow prosperous on the produce of the rich agricultural land won from the sea. In particular, this paper will examine the ways in which society managed the ever-present risk from flooding, what courses of action were taken when flooding occurred and what coping strategies were employed in the aftermath. Medieval Marshland therefore represents an historic episode of continued exposure to risk from a natural hazard and the continued resilience of a medieval community. The choices they took to protect themselves and the society which emerged to regulate these decisions sheds light on how risk and social vulnerability were managed in the pre-modern era.

46 Post-glacial sea-rise, oral history, and resilience in Mediterranean area during Early – Mid Holocene: a cross-cultural approach.

Loredana Lancini (CReAAH - Le Mans Université, France)

According to geo-archaeological studies, postglacial sea-level rise around Australia ceased about 7000 years ago. In the last few years, it has been demonstrated that ancient aboriginal stories of coastal drowning – mostly preserved orally – can be matched with this process, which did not continue after this time (NUNN, 2016, NUNN and REID, 2016). It can be hypothesized that the same phenomenon happened in Europe as well. In fact, there are many drowning stories (e.g., Deucalion and Pyrrha flood, the submersion of Atlantis…) about the Mediterranean and Black Sea coasts that have usually been regarded as fictional, but some of them may actually be based on ancient observations of sea-surface rise after the end of the last ice age (BURROUGHS 2005, YANKO-HOMBACH et alii 2007). Some flood myths (such as the Noah Flood myth or the Gilgamesh myth), are much too widespread all over the Ancient world to be taken into account; however, others, related to a precise geographical location where archaeological and geological research shows postglacial sea-level rise, deserve accurate analysis. Such is the case for the stories of Cerambos (Ov., Met., VII, 352-356) and Dardanos (Nonnus, Dion., III 188-219) who fled from Thessaly and Samothrace respectively because of a flood (PERISSORATIS and CONISPOLIATIS 2003, VACCHI et alii 2014). It is worth considering that while sea level rise was a terrifying threat to people, it was necessary to keep alive the memory of it. Thus, many societies found in myth a way to respond to environmental changes. This research proposes an analysis of drowning stories from the Mediterranean and Black Sea areas supplemented by geo-archaeological observations of key sites, which express the capacities of resilience of coastal populations.

308 Deconstructing disaster: when ontological understanding of natural disasters and archaeological research provide key information for past and present disaster response.

Ashley Pickard (University of Leicester, UK)

In order to discuss how distinct past cultures may have understood and reacted to natural disasters, there must first be a common understanding of what both disasters, and survival of such disasters, meant to those cultures. These terms might be mistaken as universal norms, while they are actual bound within the ontological perspective of the given individual or society. Thus, this paper aims to place an emphasis on the crucial role ontology has played in the understanding of, and reactions to, natural disasters in the past. Diverse geographic and chronological archaeological examples of societies dealing with disasters will highlight the impact that an ontological perspective had on the nuanced concepts of, disasters, resilience, and safety. To do so, this paper will discuss the theoretical and methodological approaches that integrate ontology within archaeological and modern disaster
research, teasing out their complexities. The use of those ontologically influenced approaches will be illustrated through the use of peer review journals, primary historical sources and archaeological reports. A case study from Western Christian Europe, Indigenous Caribbean and the Pacific Ring of Fire will be utilized as illustrative case studies. Finally, these themes will be applied to the conversations of modern disasters; laying a foundation, upon which archaeological research can examine past natural disasters and draw parallels to modern concepts of disasters, resilience, and safety.

311 The plains of South Bengal, Flood and The British East India Company: Insight into the company’s approaches to deal with natural disasters
Sayantani Neogi (Durham University, UK), Sean Taylor (University of Cambridge, UK) & Nath Singh (Banaras Hindu University, India)

The British East India Company was the first joint stock company in the world. It was hugely successful commercially and the unlikely vehicle by which Britain colonized not only the Indian Sub-continent but parts of the Far East as well. In many ways it forms the template for modern multinational global corporations. To date there has been very little research on the influence of natural ‘disasters’ and flooding on fluvial systems in the creation of this mercantile empire. The East India Companies’ early factories and settlements were focused on parts of the Ganges that were in close proximity to established urban trading and manufacturing centres. The company's fortunes were not particularly successful until the establishment of Calcutta in the 1690's. The development of this settlement which became the second city of the British Empire and the major hub in a global trading network has much to do with natural processes as with strategic decisions made by the governing council of the company in London and agents in Bengal. Flooding events and river avulsions made many of the early factories untenable. These are documented in company archives stored in the British Library in London and can be recognized in the field using satellite data and geoarchaeological field techniques. This paper explores the evolutionary changes in the fortunes of the company from the perspective of vulnerability and risk reduction from long established natural processes and demonstrates that these were as much an opportunity to exploit and sustain commercial opportunity and to mitigate against ‘collapse’.

321 Micromorphological and sedimentary studies on Tsunamis and Catastrophic Extreme Events in Coast of Andalucía, Spain
Carlos Arteaga (Department of Geography, Universidad Autónoma de Madrid, Spain), Sayantani Neogi (Durham University, UK), Sean Taylor (Sidney Sussex College, University of Cambridge, UK), José María Tomassetti (Independent, Malaga, Spain), Iván García (Conjunto Arqueológico de Baelo Claudia, Consejería de Cultura de la Junta de Andalucía, Spain), Ildefonso Navarro Luengo (Ayuntamiento de Estepona, Malaga, Patrimonio Historico, Spain) & Carlos Narvaez (Department of Geography, Universidad Autónoma de Madrid, Spain)

The Iberian Peninsula, though not amongst the most seismically active zones of the world, has been subject to infrequent but major catastrophes. Mention can be made of the earthquake-tsunami in 1755 which killed more than 60,000 people and devastated the city of Lisbon. Knowledge about such events has been increasing in recent years through the incorporation of geoarchaeological techniques in archaeological research. For example, we now know of at least 18 tsunamis of varying size that affected the peninsula during the last 1000 years. Historical and sedimentary archives are the primary evidence for these events. In the case of the latter, bioindicators (such as ostracods, corals and foraminifera) and inland accumulations of heterogeneous shoreline deposits including very large boulders serve as important indicators. This paper is based on the ongoing interdisciplinary research that has incorporated evidence from both historical records and geoarchaeological studies. The technique of soil micromorphology is being used, which facilitates the description and interpretation of sediments at a microscopic level and allows us to spatially demarcate tsunami deposits. These data are being compared with sedimentological studies and historic documentations. We have selected two locations.
First, the Roman site of Baelo Claudia (Cádiz, Spain), whose destruction in the 4th century AD was due to an earthquake-tsunami. Second, a high-energy event located near the 9th century Muslim city of Estepona (Malaga) for which there exists documentary evidence but no other record of similar sedimentary archive throughout the peninsula.

246 Conclusions of 'the flip side of the coin session'
Paolo Forlin (Durham University, UK) & Simon Jusseret (University of Texas, USA)

At the end of the session we will discuss the papers presented, aiming to underline the novel aspects offered by this session on the study of natural disasters from a landscape archaeology perspective. We will be stressing the need to undertake new and systematic projects focussing on the aftermath of disasters and in particular on ‘windows of opportunity’, ‘stimuli to innovations’, ‘teachable moments’ and ‘learning reviews’. Along with the participants to our session, we will discuss the opportunity to publish a collective scientific article centred on the creative impacts of natural disasters on ancient societies and the landscapes they inhabited.’
SESSION 38A - TOWARDS A LANDSCAPE ARCHAEOLOGY OF WETLANDS: ON-SITE DATA TO MACRO-SCALAR VIEW

Benjamin Gearey (University College Cork, Republic of Ireland), Roy Van Beek (Wageningen University, Netherlands) & Nicki Whitehouse (University of Plymouth, UK)

KEYWORDS. Wetlands; chronology; scale, human activity.

Wetland archaeology has long been dominated by a focus on single archaeological sites and palaeoenvironmental sequences, in part due to the time and expense required for investigation. Consequently, the broader spatial and chronological patterns of landscape scale processes in the evolution of wetland systems are in general poorly understood. Reconstructing wetland evolution and wider environmental change from site scale to landscape is critical for understanding the role of different ‘drivers’ (e.g. Climate, relative sea level, human impacts etc.) And for contextualising the archaeological record and human activity. Such investigations present significant problems and little concerted effort has to date considered the methodological and theoretical challenges faced by wetland archaeological, palaeoenvironmental and chronological research seeking to understand how to move across and between spatial and chronological scales. In addition, questions concerning the character of human activity in wetland landscapes and between wetlands and drylands necessitate an integrated approach drawing on scientific and humanities-based research. In this session we intend to move beyond single sites and records to discuss progress in method and theory, moving towards a landscape archaeology of wetlands. We especially welcome contributions addressing the following themes: Methodological approaches addressing the theoretical challenges of ‘scaling up’ site specific palaeoenvironmental records to larger spatial and temporal scales; Potentials and problems of connecting archaeological records from wetlands and dryland to better understand macro-scale processes of environmental and cultural change; Recent insights gained from landscape-scale research projects or from studies on the specific archaeological sites within their wider landscapes; Integration of humanities and scientific data and approaches at various scales, and the difficulties of ‘disentangling’ social and environmental drivers of resilience and change.

38A Part 1 - Wednesday 19th September, 09:00-10:30, Durham University

5 Peat People. On the function of medieval man-made platforms in a coastal wetland (Eelder-and Peizermaden, NL)

Bert Groenewoudt & Jan van Doesburg (Cultural Heritage Agency of the Netherlands, RCE, Netherlands)

Living in unembanked coastal plains and estuaries requires flexibility and adaptability. Settlements, both individual farms and hamlets, on large artificially raised platforms (‘terps’) are widely distributed in the extensive coastal lowlands along the southern shores of the North sea (the Northern Netherlands, Germany and Southwest Denmark). The prevent farms from flooding and are part of subsistence strategies to optimally exploit coastal wetlands. In our paper we will investigate the numerous less-known, small and short-lived house(?) platforms (‘peat terps’) situated predominantly somewhat more inland, on the edge of the extensive peat bogs that until medieval times covered much of the lowlands of the present-day Netherlands. What was their function, background and context? And how do result fit into existing models on the dynamics of human colonization and exploitation of coastal wetlands? We will start by introducing these models and then confront them with data from the Eelder- and Peizermaden area, situated in the (former) North-Drenthe peatlands south of the town of Groningen (Netherlands). Inter-regional similarities as well as major spatio-temporal differences will be pointed at. In our research area between AD 1000 and 1300 a succession of land-use modes occurred that is very
similar to (possibly cyclical) developments in the western-Netherlands Oer-IJ estuary one millennium earlier. These different strategies to utilize coastal wetlands are quite similar to those elsewhere along the North Sea. ‘Peat terp’ habitation represents two specific land-use phases (strategies), in both areas: farming and transhumance. The occupation of coastal peat bogs turns out to be rather different and even more dynamic than that of other coastal wetlands. In peatlands human activity (drainage) rapidly causes deteriorating living conditions.

11 From sites to macroscapes. Moxos, Bolivia
Marcos Michel (Universidad Mayor de San Andrés, Bolivia)
In the ‘Llanos de Moxos’ in the tropical Bolivian lowland was discovered large seasonally humid savannas covered with earthworks in the form of raised fields, canals, causeways, reservoirs, dikes and mound settlements. Geographical and archaeological research developed a landscape archaeology describing sites and components of small scale that do not permit understanding of the characteristics and function of the macro scale systems that controlled the biggest flooded regions. The use of new free technology works as a telescope that shows a big panorama that will permit understand this anthropogenic landscape. The difficulties of visibility, obstrusivity between others, impeded aa real appreciation of the archaeological remains. A complete new panorama emerge with a clear visualisation of the big communication, agricultural and habitation complex never seem before, giving a beautiful perspective of the management and domestication of this neotropical place at a scale not previously considered.

32 Predicting the distribution of Mesolithic archaeology in the Kennet Valley
Michael Grant (University of Southampton, UK), Catherine Barnett & Martin Bell (University of Reading, UK)
The Middle Kennet Valley, Berkshire, contains one of the greatest concentrations of Final Upper Palaeolithic and Early Mesolithic hunter-gatherer sites in Britain. Many of these sites are intrinsically associated with the floodplain deposits, resulting in unique preservation and clear evidence of prehistoric activity along the wetland edge. The combined national importance of many of the archaeological sites coupled with pressure from development, notably aggregate extraction and housing, has resulted in a profound requirement to identify areas of the valley floor where key sediments remain, and to characterise how they may most effectively be investigated, preserved, or both. In 2012 Historic England funded a collaborative project by the University of Reading, Wessex Archaeology and West Berkshire Council to directly address these issues. The overall aim was to inform awareness of the finite and significant archaeology of the area, and provide guidance to West Berkshire Council in identifying appropriate mitigation measures in response to development proposals. To achieve this existent published and unpublished early prehistoric archaeological and geoarchaeological data was used to create a deposit-based predictive model for the entire catchment. The model was designed to identify areas with highest archaeological and palaeoenvironmental potential for this period. The model was then ground-tested at four key sites: Thatcham, Ufton Bridge, Wawcott and Victoria Park, Newbury. Ground testing included geophysical survey, coring, excavation and palaeoenvironmental investigations. This combined approach has provided the tools necessary to anticipate the potential distribution of sites within the wetlands and at their margins, their relationship to particular strata, and a flexible and robust curatorial tool embedded within the HER to help manage and mitigate impacts upon the early prehistoric resource in this area as a whole.

67 Beyond Bog Bodies: changing perspectives on Dutch bog landscapes
Roy van Beek (Wageningen University & Research, Netherlands)
Relations between archaeological data and Dutch peatlands have been studied from two perspectives. The first approach focuses on (often spectacular) single finds or structures that were discovered in the distant past during peat-cutting, such as bog bodies and trackways. These feature prominently in (some) academic and (mainly) popular literature but have hardly been contextualised properly yet. This both applies to their original environmental and social setting. The second approach centres on the links between lateral bog expansion and regional habitation patterns. All work in this field started from an archaeological perspective and is environmentally deterministic, as habitability is the central topic. Therefore, our current knowledge on the landscape history of bogs is very one-dimensional and biased. Additionally, Dutch archaeological peatland research has virtually stopped since the 1990s. No new finds are to be expected any time soon, as peat-cutting has stopped in the 1960s and the few remaining bog relics are situated in nature preserves. A new approach is desperately needed. In this paper it will be argued that a combination of approaches at various scales is the way to go, combined with an integration of data from humanities and sciences. This will be demonstrated by a number of case-studies, amongst which a recent study of the landscape setting of the most iconic Dutch bog body: Yde Girl.

Discussion

Benjamin Gearey (University College Cork, Republic of Ireland), Roy Van Beek (Wageningen University, Netherlands) & Nicki Whitehouse (University of Plymouth, UK)

38A Part 2 - Wednesday 19th September, 11:00-13:00, Durham University

81 Medieval genesis and development of wetlands in Central Po Plain (N Italy)

Filipp Brandolini & Mauro Cremaschi (Università degli Studi di Milano, Italy)

The landscape evolution in the Central Po Plain, and especially the development of freshwater environments, has a long-lasting connection with human activities. Protohistoric human-environmental interactions have been widely investigated, less is known on more recent natural and anthropic forcings on the evolution of the hydrology of the central Po Plain. To fill this gap, we applied geoarchaeological tools to reconstruct the Medieval genesis and development of wetlands in a wide area (1700 Km2) between the cities of Parma and Reggio Emilia (N Italy). After the collapse of the Roman Empire that coincides with a cooling climate phase, the natural depressions on the right bank of the Po River turned into vast swamps. The alluvial plain aggraded quickly, and Roman roads and ditches were often buried under fluvial and marsh sediments. Historical documents report that local communities exploited the wetland environment for food resources (fishing and gathering), and waterways (commercial transports) between 5th –10th centuries AD. Only after the 10th century AD, in coincidence with consistent demographic growth, the needing of new farmland led the communities to reclaim cultivable land from swamps. The exploitation of fluvial sediments through flood management activities modified the wetlands shape and extensions creating new ‘higher’ fields than the surrounding swampy meadows. Despite these Medieval land and water management practices, the wetlands persisted until the 15th century AD, when a large-scale operation of land reclamation started, turning the palustrine environment in the nowadays farmland. This study aims to detect and disentangle the mutual interaction between human and environment along ten centuries of history (5th – 15th centuries AD) integrating geomorphological analysis to historical-archaeological data. The application of a multidisciplinary approach highlights the role both of historical hydrography and human activities in the wetland environmental development during the Middle Ages.
178 Linking archaeological and palaeoenvironmental records to quantify past human activity in and around wetlands

Michelle Farrell (Coventry University, UK), M.Jane Bunting (University of Hull, UK), Alex Bayliss, Peter Marshall (Historic England, UK) & Alasdair Whittle (Cardiff University, UK)

The preservation conditions afforded by wetlands offer a unique opportunity to integrate archaeological and palaeoenvironmental datasets to provide a holistic overview of past human activity in these dynamic landscapes. Since pollen records contain a signal from both the wetlands and surrounding dryland areas, spatially explicit reconstructions of past land-cover can enable partial quantification of human activity in and around wetlands. Here we present quantitative reconstructions of Neolithic land-cover for two contrasting UK landscapes, derived from multiple pollen records taken from wetlands. These reconstructions depend on development of a strong chronology for each record, so that data from different sites can be grouped into synchronous horizontal zones (‘time-slices’), and model the relationship between land-cover and pollen assemblages to generate maps of likely past land-cover for the whole landscape for each time-slice. These maps can be presented visually, or quantitative measures of landscape properties such as the amount of open land or land under cultivation can be extracted, and changes tracked over time. Chronological modelling of dates from archaeological contexts allows comparison between archaeological and land-cover measures of human activity levels in the landscape. For landscapes where remains of settlements and other dryland structures are rare, such as the Somerset Levels and Moors, changes in dryland vegetation provide a proxy for human activity/settlement. In landscapes like Mainland, Orkney, where archaeological evidence is abundant, land-cover records offer a different perspective on wider patterns of human engagement with and modification of the landscape that people inhabited. Methods for scaling up from single-site palaeoecological records to landscape reconstruction are still in their infancy, and these case studies show their potential, both for extracting greater value from published datasets and for contributing to the development of richer, more nuanced research frameworks for future work.

316 Rediscovering the ‘Wildscape:’ Reconstructing Hidden Landscapes through a Case Study in the Humberhead Levels

Nika Shilobod, Nicki Whitehouse, Kimberley Davies (University of Plymouth, UK), Ben Gearey (University College Cork, Republic of Ireland) & Henry Chapman (University of Birmingham, UK)

The Humberhead Levels, located in north-eastern England, holds few parallels for its extent of palaeoecological and archaeological work. Today, the landscape appears as a featureless area of flat agricultural land with long drainage ditches crisscrossing the landscape and its small villages. Evidence of the former mosaic of raised mires, heathlands and wetlands can be seen on the remnants of Thorne and Hatfield Moors. Surrounding the Moors are extensive areas of former floodplain wetlands and old river channels, many of which were diverted or canalized during drainage and reclamation works in the 17th century, although some may date as far back as the Roman period. While there is great evidence for human activity and passage through the region, the archaeology remains still curiously unclear regarding the extent and nature of anthropogenic activity prior to the area’s drainage. Many of the archaeological sites and finds for this region can be accredited to antiquarians during the 17th-19th centuries and finds during field walking for the Humber Wetlands Project (1992-2000). It is difficult to draw firm conclusions from these large datasets because of the many uncertainties regarding the questionable provenancing of the artefacts. This paper investigates the relationships between wetland and dryland communities through an improved understanding of the spatial distribution of the archaeology and palaeoecology in the Humberhead Levels. Syntheses of palaeoenvironmental records provide important an environmental context demonstrating the landscape’s evolution and development, allowing the archaeological datasets to be investigated at a regional scale. Archaeological records are based on the field work conducted by the Humber Wetlands Project. GIS data from this survey, combined with data from the Sites and Monuments Records (SMRs), as well as Historic Environment
Records (HERs), a campaign of core sampling and a LiDAR generated DEM are used to uncover spatio-temporal trends of anthropogenic activity over time.

243 Lost Contexts? A New Approach to Preserving and Studying Submerged Archaeological and Paleo-Environmental Sites

Andrea Pintar & Evert Verhoeven (Independent, Netherlands)

The subject of archaeology in wetland and riverine environments is still under debate. Two main problems threaten many of these aquatic sites around the globe: (1) climate change is creating shifts in precipitation, water levels, and evapotranspiration; (2) economic activities disturb archaeological sites, of which aggregate extraction and dredging are two of the most common. There is a prevailing attitude that disturbance of submerged archaeological sites seems to equal (almost) total loss of scientific value since many of the finds no longer have context or stratigraphy. Despite these challenges, wetland sites have many advantages over dry land sites. Waterlogged remains such as timber, leather and bone suffer less degradation than when buried in dry soil. It would be ideal to link these remains with paleo-environmental data and the relationship of humans to a changing landscape, which would expose settlement (and possible migration) patterns, usage such as ritual deposition, and the way humans in the past adapted to climatological and environmental stress. Due to the preservative nature of wetlands, critical data such as dendrochronology, carbon dating, strontium isotopic signatures and pollen samples can be gathered to create a more complete picture of prehistoric activities. Thus, these sites should not be discarded or ignored, and should be preserved in ways that fit the environments in which they are found. In our vision, discussion about submerged archaeological and paleo-environmental sites should not only focus on threats, but on opportunities as well. Dredging and aggregate extraction are worldwide practices, necessary for the management of waterways and providing building material. We aim to create a future-oriented focus on the involvement of archaeologists in dredging activities and the creating of predictive maps, with the goal of understanding the destructive nature of economic exploitation, better analysis and interpretation of the collections, and a more productive debate.

Final Discussion

Benjamin Gearey (University College Cork, Republic of Ireland), Roy Van Beek (Wageningen University, Netherlands) & Nicki Whitehouse (University of Plymouth, UK)

Related posters (for poster abstracts, see p.213-230)

101 The Avellino event: A Bronze Age landscape reconstruction from the Pontine plain and the Fondi basin, southern Lazio, central Italy

Marieke Doorenbosch (Faculty of Archaeology, Leiden University, Netherlands) & Wouter van Gorp (Faculty of Arts, Groningen University, Netherlands)
SESSION 39D – WHERE NEXT FOR HISTORIC LANDSCAPE CHARACTERISATION?

Peter Herring (Cornwall Council Historic Environment Service, UK), Niels Dabaut (Newcastle University, UK) & Jonathan Last (Historic England, UK)

KEYWORDS. Historic Landscape Characterisation; Place; Perception; Values; Empowering.

Landscape archaeology helps us better understand particular places. But through a classically typological, generalising approach, characterisation, it can also extend that understanding to other similar places in a region. Historic landscape characterisation (HLC) was developed in the UK to maximise the benefit of investment in landscape archaeology by spreading as widely as is reasonable a certain level of understanding to the more numerous areas that have not been studied in detail. Most places are not wholly unique but can be characterised on the basis of distinguishing attributes shared with other places to form a more generic type. For example, understanding gained by detailed study of one Vietnamese terraced field system, one 19th-century china-clay working complex in Cornwall or one walled hilltop town in southern Italy, can be extended through characterisation to numerous others in their regions. The shared understanding is of course shallower and less precise than that available in the closely studied places, but not substantially so. HLC-type methods have been applied (if less extensively) outside the UK as well, and in several other European countries and from the Amazon to Texas. This session will encourage exploration of HLC methods (are they sound?), its principles (are they helpful?), its application and its future. To what extent can it be used reflexively and predictively to guide further research in urban and rural landscapes? How can HLC help the people that live in, work in and use the landscape to develop their sense of place? Can it empower people to participate in the management of their surrounding heritage? Can it be used to judge the relative sensitivity of places to certain types of change? Or can it be made interoperable with the characterisations that natural environmentalists develop, to more subtly inform the understanding of ecosystem services? Can more socially inclusive futures then be designed for ecosystems that are based on greater awareness of their history and thus of the communities that created, nurtured and maintain them?

39D Part 1 - Wednesday 19th September, 09:00-10:30, Durham University

Introduction to Session

Peter Herring (Cornwall Council Historic Environment Service, UK), Niels Dabaut (Newcastle University, UK) & Jonathan Last (Historic England, UK)

40 Historic Landscape Characterisation: authorised egalitarianism?

Peter Herring (Cornwall Council Historic Environment Service, UK)

To contextualise consideration of the future of historic landscape characterisation (HLC) in England, now that the virtually the whole country has been characterised and a national HLC has been prepared, we might usefully revisit its birth a quarter of a century ago. Bodmin Moor and Cornwall were characterised as part of an exploration by the then English Heritage, Countryside Commission and Cornwall County Council into development of more inclusive approaches to caring for landscape. All landscape is historic: characterise it all. All has value: don’t decide at the outset that some hasn’t. HLC attempted to include all parts, not only those that might be regarded as heritage assets by specialists, and to include attributes that would be understood and appreciated by all actors and all interested parties, not only by the heritage and landscape sectors. Egalitarianism was built into the principles that drove a transparent and systematic method, but the devisers of principles and method were, in the end, from central and local government: well-intentioned, but more or less remote from the...
people whose places, whether owned, used or visited, loved or loathed, they were characterising. How successful were they in designing a way of framing or enabling debate about the future (and past) of places and landscape? How easy is it for contrary views to be raised and responded to? These are not marginal questions, more or less irrelevant when set against veracities of the interpretative schemes that HLC also develops. As decisions depend on establishing value, communal as well as evidential, as much as on more formally established judgements on significance, or importance, they are central questions.

3 Climate Change and the Vulnerability of the Historic Landscape

Isabel Cook (University of Sheffield, UK)

The impacts of climate change, such as sea-level rise, coastal erosion, and flooding have the potential to damage or destroy archaeology and cultural heritage assets. Research that predicts potential threats to cultural heritage is needed to appropriately manage and mitigate against the risks. Several studies have modelled or measured the impact of coastal and climatic processes on archaeological features, often using vulnerability indices to assess which sites are most at risk. However, these studies consider each feature as a separate entity rather than part of the historic landscape. Therefore, the results can only inform a comparison between single sites and do not reveal threats to the wider cultural heritage and historic landscape. With a focus on the Dysynni valley and estuary, west Wales, this paper proposes using Historic Landscape Characterisation as an alternative approach to vulnerability assessment. This landscape-level perspective will assess the vulnerability of the character of the historic landscape to climate change, rather than which individual assets are most at risk. A vulnerability index will be developed that assesses the vulnerability of the landscape character types within the Dysynni valley. The outcomes of this may be used to inform a holistic, proactive approach to the sustainable management of Dysynni’s cultural heritage. With an increasing threat to coastal archaeology from the impacts of climate change across Britain (and indeed worldwide), it is unlikely that the resources exist to protect all archaeological sites at risk. Therefore, it is important to consider a broader perspective on cultural heritage management, to identify the key areas of importance to local heritage.

55 'Hidden Landscape Characterisation': some thoughts on the relationship of HLC to archaeological data

Jonathan Last (Historic England, UK)

In 2009 the 9th annual English Heritage Characterisation Seminar addressed the subject of 'Hiddenscapes'. The programme for the meeting stated that having so far emphasised the visible, more recent aspects of landscape, an HLC approach now needed to be applied to the less accessible hidden layers of the historic landscape. This reflected the growing availability of large-scale digital datasets from aerial investigation and mapping, geophysics and excavation, alongside the recognition that too often the archaeological resource was still treated in a site-based, dots-on-map way, rather than in terms of the wider landscape. Nearly a decade on from that seminar, archaeologists studying the prehistoric and Roman periods in England still make relatively little use of HLC data. At the same time, various projects have analysed archaeological data for these periods at a regional or national scale in other ways. It is therefore timely to reconsider the potential contribution of HLC to the development of area-based approaches to the buried archaeological landscape. This presentation draws on recent large-scale remote sensing projects in Wiltshire and Cambridgeshire to consider the relationship between HLC and archaeological data and offers some suggestions for further work.

106 Historical Landscape Characterisation: Case Study of Amasra, Turkey

Kemal Onur Ozman (Bartın University, Turkey) & Sevgi Görmüş (İnönü University, Turkey)

Historical landscape character assessment is considered as an effective approach in the management of cultural heritage sites and conservation planning. Historical landscape character assessment, which
is also the most important tool for understanding and interpreting historical landscapes, differs from the Landscape Character Analysis technique, which has entered our country’s agenda with the European Landscape Convention, in terms of detailing the historical and archaeological aspects. Due to this feature, it is considered as an effective method in managing heritage sites and historic environment in our country that hosts different cultures. Starting from this necessity, this method was applied in the Black Sea coastal city of Amasra that is under the pressure of tourism and housing and that faces the risk of losing its historical texture completely. In the study, the time depth, historical landscape characters and historical landscape character components of the city of Amasra were revealed using literature review, oral history/subjective mapping and photo analysis techniques. Two different spatial maps from the years of 1920-1960 and 2016-2018 were created and the spatial changes of these periods were shown. 143 photos shared by the visitors on the internet were traced according to their GPS locations with the help of QGIS program thus, the tracks of the visitors were determined and compared with the visible tangible cultural heritage sites in order to reveal the current perception.

39D Part 2 - Wednesday 19th September, 11:00-13:00, Durham University

112 Monitoring Landscape Change

Piers Dixon, Mike Middleton (Historic Environment Scotland, UK) & Laura Campbell (Scottish Natural Heritage, UK)

Following on from the publication in 2014 of ‘Our Place in Time’ – Scotland’s strategy for the historic environment – Scottish Natural Heritage (SNH) and Historic Environment Scotland (HES) agreed to carry out a variety of joint initiatives to address the strategy in relation to landscape. One strand of this has been to monitor landscape change using remote means. A joint approach has been developed using oblique aerial photographic monitoring of known survey points over time. The approach will include National Scenic Areas and randomly selected examples of medieval and earlier Historic Land-use Types from the HES Historic Land-use Assessment (HLA) data, as well as 50 randomly selected sites across Scotland. All the sites will be flagged in the Canmore database and imagery taken by the HES Aerial Survey team will be logged in the National Record of the Historic Environment and the results analysed. Alongside this, HES is developing a system of automated updating of the HLA data and SNH is in the process of reviewing the Landscape Character Assessment of Scotland with input from HES on the historical element of the landscape. This paper will outline the approaches that are being taken for these initiatives and will discuss how they are contributing to the wider strategy for the historic environment and overall landscape characterisation and monitoring.

119 Defining Character: meaning and implications in historic landscape characterisation.

Charina Jones (Swansea University, UK)

The distinctive nature of something. Defining Character: meaning, representation and implications in historic landscape characterisation. This paper presents a comparative study of ‘practice-led’ historic landscape studies in Scotland, England and Wales. The varying approaches are examined in terms of how cognisant definitions of character as well as landscape have guided and influenced their development. It has long been considered that how one defines landscape has a bearing on how one approaches its study. It is considered that varying definitions of what we mean by character should not be mutually exclusive or be held in opposition to one another. Much as the term landscape is now seen positively as being all-encompassing, fluid, ambiguous and reflexive, approaching the term character in the same way can allow deeper, multi-layered characterisations of landscape to be made. The effectiveness of the resultant characterisation ‘products’ produced in Britain in conveying landscape character (and the multiplicity thereof) is investigated through GIS. The results of the research so far,
are framed within current political and policy agendas on well-being. Investigating potential inter-
relationships between historic landscape character, well-being and social deprivation may reveal the
degree to which varying perceptions and definitions of character impact upon or reflect these social
indicators. This therefore, allows us to consider the future of characterisation - what is it's role and how
can it help to achieve the aims of wider policy in practice? The beginnings of a case study examining
such relationships is presented to encourage discussion and feedback on the future direction of the
research.

185 Historic landscape character and people’s perception, towards a
participatory HLC

Niels Dabaut (Newcastle University, UK)

Cultural heritage and historic landscape management in the UK and in Europe are often ‘top-down’:
experts develop tools and methodologies to define heritage and generate ideas about the historic
landscapes inhabited by communities. However, the ways these communities perceive the historic
environment and value its changing landscape heritage is often neglected in management policies. One
of the methods that can provoke a certain discussion between different landscape stakeholders is
Historic Landscape Characterisation (HLC). HLC is particularly interesting to develop a participatory
tool since it aligns with the European Landscape Convention’s (ELC) definition of landscape, as an area
as perceived by people. The HLC approach recognizes that landscape character is a fundamental
element of the historic environment and acknowledges that landscape heritage can be enriched by
centuries of change. The HLC approach has been criticised on the grounds that it lacks a human
perspective, others have made similar criticisms of the processual school of landscape archaeology.
This paper will focus on how HLC makes it possible to integrate historic landscape character and the
historic landscape as part of people’s identity and will then integrate the human perspective into HLC.
The paper will show ongoing research that uses various existing participatory approaches, commonly
used in geography, planning and environmental psychology. These approaches such as PPGIS and
walking and talking interviews are now used to come to a new layer for HLC that makes it possible to
develop recommendations for planners and policy makers while understanding how landscape
stakeholders live in, work on and use their historic landscape.

210 Simulating change in cultural landscapes: the integration of Historic
Landscape Characterisation and computer modelling.

Nurdan Erdoğan (Izmir Democracy University, Turkey), Francesco Carrer (Newcastle University, UK)
& Ebru Ersoy (Adnan Menderes University, Turkey)

Today, more than 80% of World’s landscapes have already been influenced by human activities and
are generally characterised by different levels of modification and change. Recent studies suggest that
landscape change is likely to increase at a significant rate within the next years (particularly in
developing countries), depending on the trends in main driving forces of land-use/cover change.
Landscape management and planning should guide, harmonize and manage landscape changes
instead of completely stopping the change, as in traditional conservation approaches. To do so, there
is an urgent need for effective methods and tools for identifying threats and opportunities in future
landscapes and also advocating positive landscape change, based on a well-investigated base of
evidence that includes both natural and cultural heritage. As today’s landscapes are the result of past
processes, understanding their long-term evolution is of critical importance to infer their future
development. Historic landscape characterization (HLC) is a GIS-based method employed to represent
and study anthropogenic landscapes, with a particular focus on their historical development. But, to
date it has not been possible to develop an integrative characterisation approach that incorporate and
analyse historic and ecological dynamics. The main objective of this study is to produce a new
methodological protocol to model the evolution of historic landscapes and simulate future scenarios of
cultural landscape change. A computer based simulation framework, derived from landscape ecology
will be implemented using the HLC as a reference dataset. HLC datasets recently created for Turkey will be the ideal case-studies to preliminarily test this novel methodology. The development of an integrated cultural and ecological modelling protocol will inform and support landscape planning and management, towards a more holistic and accurate approach to landscape change.

Final Discussion

Peter Herring (Cornwall Council Historic Environment Service, UK), Niels Dabaut (Newcastle University, UK) & Jonathan Last (Historic England, UK)
KEYWORDS. pathways; movement; memory of landscape; network; settlement system

Settlement patterns and path networks represent different but connected perspectives on human-environment interaction through movement, manifested through the appropriation and organisation of landscape by societies. Settlement patterns and path networks evolve with out of sync temporalities, but nevertheless are in constant interaction, rendering holistic territorial studies challenging. When analysing path networks in the context of territories, the questions are usually related to origins, variations, and duration over time. Why and when were the paths created, how long did they persist, and at what level of intensity were they used? Can the concept of corridors of movement be used to encapsulate the remains of flexible structures of travel? In this session we want to discuss the theoretical and methodological implications of an integrated study of movement, pathways and settlement dynamics. What concepts can successfully link these fields of study? What is needed to study the co-evolution of path networks and settlements patterns at different temporal and spatial scales? How should we deal with data quality issues? What is the contribution of state-of-the-art digital technology? This session brings together research addressing archaeological studies of movement and path, and which focus on the integration of detection and modelling, or work at the confluence of studies of settlements and paths.

Tuesday 18th September, 11:00-13:00, Newcastle University

Introduction to Session

Laure Nuninger (CNRS, Univ. Bourgogne Franche-Comte, France), Philip Verhagen (VU Amsterdam, Netherlands) & Rachel Opitz (University of Glasgow, UK)

79 Old long-distance routeways in England: towards a more open and flexible perspective

Andrew Fleming (Independent, UK)

Old long-distance routeways (OLDRs) in England and Wales can quite frequently be shown to go back to the mid/late first millennium AD, and many of them are likely to be a good deal older than that. There are various reasons why landscape archaeologists have preferred not to study ‘old roads’, the most obvious being the problem of dating their early phases. However, such a difficulty is hardly unknown in archaeology; it should not prevent the study of important phenomena. If we are to make progress, we need first to create a recognised ‘watch list’ of potential OLDRs. We also need to study and understand their ‘behaviour’. At this stage, OLDRs appear to be similar to coaxial patterns of field boundaries and communication routes; in Tom Williamson’s memorable phrase, ‘in one sense they have no date at all’, having developed ‘organically’. There are good historical and geographical reasons why the physical length of an OLDR may accompany a long chronology, along with a persistent and robust field presence, and a complex narrative. To study OLDRs in the field means setting the conventional ‘rules’ of horizontal stratigraphy aside and developing some new working principles. We need to be aware of eccentricities in the behaviour of OLDRs; in this field, over-hasty scepticism may cause more problems than the suspension of disbelief.
49 A combined GIS and remote sensing approach for the modelling and identification of Roman roads. The case of the iter XVII (NW Iberia)

João Fonte (Institute of Heritage Sciences [Incipit], Spanish National Research Council, CSIC, Spain), César Parcero-Oubiña (Department of Archaeology, University of Exeter, UK), José Manuel Costa-García (University of Santiago de Compostela, Spain) & Andrés Menéndez Blanco (Newcastle University, UK / University of Oviedo, Spain)

Building on previous papers (Güimil-Fariña and Parcero-Oubiña 2015, Fonte et al. 2017, Parcero-Oubiña et al. in press), this study aims to gain a better understanding of the territorial logic of Roman roads based on the use of digital technologies, namely GIS and remote sensing. The paper explores various factors, both natural and cultural, which may have been determinant in the layout of the iter XVII, a Roman itinerary which connected Bracara Augusta and Asturica Augusta in Northwest Iberia and was taken as a case study. To do it so, we have followed a non-reconstructive methodology based on GIS-based digital tools for the modelling and analysis of ancient roads. This effort crystallized on a proposal of the most probable routes of the road, which was subsequently used to sustain a remote sensing approach -largely based on airborne LiDAR data- for the identification of unknown potential sections of this road on the terrain. This methodology and the results may be relevant not only for the analysis of Roman roads elsewhere but also for the analysis of ancient roads as a whole.


137 Posavje Hills Region through the Lens of Hollow ways

Benjamin Fele (Independent, Slovenia)

The author wishes to succinctly present his master's degree thesis, where he showed how contemporaneous landscape concept and (Aldred's) model of movement could be implemented on the selected part of Posavje hills region, depending on the phenomenon named Hollow ways (or Sunken lanes), that weren’t yet examined systematically. Consulting Lidar and other cartographic sources, he examines whether and how Hollow ways are legitimate archaeological clues, and how they could testify about past movements. The author is interested in the dynamics of these lanes, their relation to other archaeological and historical information, and finally how they are included in the concept of Landscape archaeology.

113 Movement and perception as tools to understand landscape change in pre- and protohistoric western Sicily

Christopher Sevara, Michael Doneus & Roderick Salisbury (University of Vienna, Department of Prehistoric and Historical Archaeology, Austria)

In recent years, researchers have theorized that the abandonment of numerous indigenous settlements and subsequent changes in land-use in western Sicily during the mid-first millennium BC may have been due to regional catastrophic events, external pressure, or to socio-political/religious/economic processes causing native populations to centralise under emerging elite power structures. Increasing aridity, possibly brought about partly by inhabitants’ own intensification of land use, might also have
played a role in the restructuring of the landscape. Evidence suggests that people living in the west during this period were embroiled in an array of environmental, social and political processes whose consequences likely had cumulative and iterative effects on settlement stability in the region. Recent results from the Prospecting Boundaries project (http://mazaro.univie.ac.at) raise several queries about human-landscape interactions during this period. How might people have been moving in and perceiving the environment as they created and exploited changing landscapes? What insights can regional-scale spatial analytical approaches provide on movement, occupation, and social transformation in western Sicily during the early to mid-first millennium BC? From these, what can we infer about human decision-making processes that led to changes in the use and exploitation of the environment? This paper examines these issues from a geospatial perspective, rooted in the available archaeological data while taking advantage of recent advances in spatial modelling, data collection, and analytical tools for terrain, visibility and movement. These analyses shed further light on the effects of these past events in the physical and cultural landscape. In addition, they illuminate the limits of and current gaps in our spatial, archaeological, and environmental knowledge of the period. Through this research, we seek to contribute to the wider discussion of how effective these approaches may be regarding issues of scale, data quality, and context when used in archaeological research.

219 How far can we go? Maps, mobility & medieval settlement in North-West Norfolk, England

James Albone (Norfolk County Council, UK)

One of the fundamental problems affecting the integrated study of settlement and mobility is the ephemeral nature of many past pathway networks. This is particularly the case in lowland arable landscapes where the route choices of travellers were not necessarily topographically-constrained and where the physical traces of unmade paths have frequently been erased by later agricultural practices. In these landscapes establishing a comprehensive picture of former pathway networks can often be challenging, if not impossible. But given an ideal set of circumstances, in which we can confidently identify former road and pathway networks, how far can we go towards understanding settlement-routeway-landscape relationships? How far, not only in terms of establishing their temporal and spatial extents, but also how far in developing a broader methodological approach for their integrated study?

Just such an opportunity exists in North-West Norfolk, England, where an exceptional group of seventeenth-century maps covering contiguous parishes depict an extensive pattern of roads and paths in their contemporary landscape. The structure of settlement and mobility that they reveal is, it is argued, a fossilisation of the medieval, and potentially earlier, pattern of land-use. In this paper, the baseline cartographic evidence is analysed in conjunction with aerial photographic and lidar data, metal detector finds, excavation and field survey records, and historical documents to elucidate the inter-relationships between settlements, pathways, and the landscape that they occupied. Through this process it is possible to begin to address the ‘who and why’ questions concerning past mobilities in this landscape, both in the medieval period and before

Related posters (for poster abstracts, see p.213-230)

84 Settlement and path networks from Prehistory to Roman Age in Trexenta, Sardinia.
Riccardo Cicilloni, Dario D’Orlando, Marco Giuman, Felice Di Gregorio (University of Cagliari, Italy), Marco Cabras & Manuel Todde (University of Granada, Spain)

114 Madonie Survey Project. Investigating the settlement dynamics and cultural transmission mechanisms from a high mountain context through the analysis and reconstruction of ancient pathways
Alessandra Canale (Università di Palermo, Italy)
130 Life, routes and defence in the late Middle Ages in SE Italy (Monti Dauni area, Foggia). A study on visibility and movement through spatial analysis in an Open Source GIS.

Luca d'Altilia & Pasquale Favia (University of Foggia, Italy)
SESSION 42E – CLASSICAL ARCHAEOLOGY AND LANDSCAPES

Will M. Kennedy & Raphael A. Eser (Humboldt University Berlin / Excellence cluster Topoi, Germany)

KEYWORDS. classical archaeology; landscape archaeological methodologies; Mediterranean archaeology.

Classical Archaeology has traditionally been defined as the study of predominantly Greek and Roman material culture between the Aegean Bronze Age and the Late Roman Period (with a clear focus on the Classical Greek and Roman phases), and with an emphasis on Italy and Greece. The study of neighbouring cultures in the wider Mediterranean region has however increasingly attracted scholarly interest among classical archaeologists, whilst the later Byzantine and Early Islamic Periods are now also further integrated within Classical Archaeology. Additionally, the methodological scope of Classical Archaeology has expanded significantly in the last decades, from a focus on elite cultures to an increasingly diversified approach researching more general aspects and a far wider social sphere of cultures. Despite these developments, however, the disciplinary core of Classical Archaeology remains deeply rooted in art-historical and philological research, while other, more interdisciplinary approaches struggle to find scholarly acceptance within the field. This session will assert, agreeing with Achim Lichtenberger and Rubina Raja in their 2017 monograph The Diversity of Classical Archaeology, that it is time to redefine classical archaeology in a broader geographical, chronological and methodological frame. In particular, in the context of LAC and following Michael Teichmann who calls for a stronger interdisciplinary integration of the discipline within landscape archaeology, we aim to provide a discussion platform for bridging the still-persisting gap between traditional Classical archaeology and landscape archaeology and to establish landscape archaeological methodologies as part of modern Classical Archaeology. We thus invite speakers with a background in Classical Archaeology and related fields to present case studies with a strong landscape archaeological approach, to demonstrate that landscape archaeology does not stand in contrast to the more traditional approaches of the discipline and further to highlight the diversity of modern Classical Archaeology.

42E Part 1 - Thursday 20th September, 09:00-11:00, Newcastle University

305 Classical Archaeology and Landscapes – An Introduction

Will M. Kennedy & Raphael A. Eser (Humboldt University Berlin / Excellence cluster Topoi, Germany)

This presentation serves as an introduction into the main themes of session 42E ‘Classical Archaeology and Landscapes‘. It aims at highlighting the persisting challenge of bridging the gap between Classical Archaeology and Landscape Archaeology – not only by introducing the geographically and chronologically wide range of the session’s papers – but also by briefly showcasing two examples of original landscape archaeological research carried out within the field of Classical Archaeology: 1) An interdisciplinary archaeometallurgical study on the island of Elba researching how ancient iron production affected the cultural landscape of the island during Classical antiquity and 2) An archaeological landscape characterization of the rural hinterland of the Nabataean capital of Petra in modern-day southern Jordan. By doing so, we hope to emphasize the unique diversity of modern Classical Archaeology specifically concerning the critical application of landscape archaeological methodologies that do not stand in contrast to more traditional approaches of the discipline. It is exactly this underlying theme that will guide the following session papers in order to provide a stimulating discussion platform at the end of the session.
171 Approaches to Landscapes in Classical Archaeology – a comparative view. Reconsidering the continental divide.

Michael Teichmann (German Archaeological Institute, Berlin, Germany)

This paper reviews theoretical concepts of Landscape Archaeology alongside practical research approaches to ancient Mediterranean Landscapes. North American and European perspectives are compared to each other with a particular focus on Archaeology in the United States, Classical Archaeology in Germany and Ancient Topography in Italy. It is argued that the point of view varies significantly due to national traditions and the historic development of Archaeology in the respective countries. A primary scope of the paper consists in raising the awareness of the diversity of approaches and in stimulating discussion and exchange among European and North American archaeologists.

68 Landscape Archaeology and Digital Approaches in the Micro-Region

Pergamon

Daniel Knitter (Christian-Albrechts-Universität zu Kiel, Germany), Bernhard Ludwig & Felix Pirson (German Archaeological Institute, Germany)

The transition from the Hellenistic to the Roman Imperial Period is characterized by a phase of significantly increased urbanization. Within the city, this is mirrored by an extension of the city’s build space, while many settlements and farms in the Kaikos river valley may have been abandoned. This development raises various questions in terms of resource availability, transport, production, and exchange. The socio-economic configuration of the entire Pergamenian Micro-Region must have been changed considerably and new modes of organization were necessary in order to supply the city itself and to link its reduced complementary, supplying hinterland. In this study we use quantitative models to investigate the potential distribution and supply system of key resources during Hellenistic as well as Imperial Roman times. Based on this diachronic approach we aim to derive general hypotheses about the economic system and the changing relationship between the city and its hinterland.

65 The Application of Remote Sensing and GIS in detecting Ancient Piracy

Adam Dawson (University of Oxford, UK)

This paper will focus on research undertaken as part of an 8-week collaborative project with the Satellite Applications Catapult. This involved using remote sensing and GIS to find and locate archaeological sites related to Cilician piracy in the Late-Republic-Early-Imperial era. Although typically portrayed as a major power in the Eastern Mediterranean prior to Pompey’s invasion, very little is known about the nature and structure of Cilician pirates. This is further confused by the fact that the term ‘Cilician’ in the Roman era appears to refer to a number of groups from several geographic locations throughout the Mediterranean, ranging from the Balearic Islands near Spain, all the way to the easternmost points of Turkey. On top of this all primary sources regarding the Cilicians were written by Roman authors, which leads to a large amount of bias. As a result of all these points, archaeological research is vital for both understanding the geographic Cilicians and distinguishing them from other non-roman maritime powers at the time. As part of the placement a mixture of satellite imagery and GIS was used to create a system which showed areas most likely to be associated with Greco-Roman piracy. Several of the areas were then examined in closer detail and revealed archaeological sites which were either under-researched or completely unknown academically. This research created a loose typology for Cilician coastal sites in Southern Turkey and a semi-autonomous system for the identification of archaeological sites. The results found, the process of devising the system and the impact this could have of research into Greco-Roman piracy, are all points which will be discussed. Furthermore, over the summer of 2018 the sites discovered were visited both to ground truth the results of this project and to gain a better understanding of the Cilician maritime cultural landscape.
The Geraki Archaeological Project (GAP) since 1995 has the aim to reconstruct the detailed history of human settlement at the ancient fortified acropolis in Geraki, Laconia. Laconia is best known as the homeland of the Spartans, who in Archaic and Classical times create one of the most powerful poleis of Greece. Research in Laconia has therefore long been guided by the use of ancient literary sources and focused on the city of Sparta itself. GAP examines one of the surrounding ‘periöike’ communities, subordinate to Sparta, about which little is known from ancient texts. Moreover, the site provides an opportunity to engage in a long-term history, as the acropolis has yielded evidence for human activities in the Final Neolithic period, Early and Middle Bronze Ages, and again from Protogeometric to Hellenistic and late Roman/early Byzantine times. This enables us to trace changes and transitions in human-environment interactions over the past 6000 years in changing social and political circumstances. GAP uses an integrated approach, including archaeological survey and excavation, architectural study and archaeometric, geomorphological and ecological analysis. Archaeobotanical and -zoological analyses were carried out in tandem with the excavations and have already shown significant shifts in agricultural regimes through time. Currently, questions still exist concerning the formation of the ancient landscape around Geraki and the available natural resources during the different periods of human exploitation. A pilot project was begun focusing on the complex geology and colluvial fan stratigraphy in the study area. New and expected results of the study of outcrops, coring data, and absolute ages promise further insights into a) evolution of the landscape and ecology around Geraki of the last 6000 years, incl. multiple periods of soil formation and colluviation and b) natural resources (wood, water, clays, rocks, arable soils) available over the various periods of human occupation.

Discussion

Will M. Kennedy & Raphael A. Eser (Humboldt University Berlin / Excellence cluster Topoi, Germany)

160 From temple to landscape in Ancient Greece: the case of Berekla sanctuary

Maria Cruz Cardete (Complutense University of Madrid, Spain)

The long process from the isolated religious figure (the temple, the god, the votive offering ...) to the historical context (the integrated landscape) in ancient Greek religion studies is marked by two intertwined theoretical principles: on the one hand, the construction and evolution of the concept of landscape and its application to the study of religion; on the other, the continuous qualification of the most traditional postulates of Classical Archaeology, anchored in more aesthetic and philological perspectives than properly archaeological or historical principles. The combination of both phenomena lets us to argue that we are not dealing with spiritualities separated from social processes, but with beliefs, rites and religious practices of human groups which constitute social processes in the same way as any other important factors. So, concepts such as religious landscape turn religious practice into a mesh of social interaction in which the religious is not only expressed through myths, beliefs, images or rites, but also through political, identity, economic, philosophical, sociological, cultural or domestic realities. We present here a particular case study, the temple of the god Pan in Berecla, Arcadia, an exceptional point of confluence between Arcadia, Messenia-Sparta and Triphylia. The study
that we propose evidences the great possibilities of analysis that opens the combination of Classical Archaeology with Landscape Archaeology and that benefits both disciplines. Berecla is a little monumentalized sanctuary (today practically destroyed) and reduced aesthetic-artistic value according to traditional standards; however, its historical significance is great, since it helps us to understand a border landscape that connects different poleis, ways of appropriation and exploitation of the territory, identity rites and modes of social organization. Thus, the Berecla sanctuary is another node of the community landscape of the Southwestern frontier, and not only in religious terms, but also in economic, social and political ones.

256 Roman centuriation in Mediterranean landscape: the case of Istria.

Robert Matijasic, Sara Popovic (Juraj Dobrila University of Pula, Croatia) & Giovanni Boschian (Universita di Pisa, Italy)

The Istrian Peninsula (Croatia) is rich with Roman villas and farms within the territories of the two colonies: Pola and Parentium. There are some 330 villas and farms in the centuriated area, thus presenting an interesting classical landscape that can be visualised and reconstructed today with the aid of modern technologies. The analysis of LiDAR data of an area on the west cost of Istria (Vrsar – Orsera) is underway since 2017, and is beginning to yield interesting information on the relationship between centuriation and rural settlements, which has been within our interest for decades. It is only now, with various possibilities of visualisation of data obtained from LiDAR that we are reaching new frontiers of knowledge about classical landscape. The aim is to virtually reconstruct not only the Classical landscape, but also to study its transformation through the ages, before and after Classical Antiquity.

36 Reading the Roman landscape in the Venetian alluvial plain

Michele Matteazzi (Catalan Institute of Classical Archaeology, [Tarragona, Spain], Italy)

The stretch of Venetian alluvial plain that extends between the cities of Vicenza and Padova, since millennia crossed and continually re-shaped by the rivers Bacchiglione and Astico-Tesina (and, in its most eastern part, also by the river Brenta), shows evidences referable to a stable occupation starting at least from the Neolithic and, in particular, developing throughout the Bronze Age and the subsequent Iron Age: at this time, the main resources are proven to have been the watercourses, on whose sides lies the majority of the known settlements. During Roman times the territory, then under the control of the municipia of Vicetia/Vicenza and Patavium/Padova, was redefined by the passage of some important routes: to the North, the Via Postumia from Vicetia to Opitergium/Oderzo and the road from Vicetia to Tarvisium/Treviso; to the South, the Vicetia-Patavium road, a route remembered by all the major Roman itineraria; to the North-East, the road known as ‘Arzeron della Regina’, leading from Patavium to the Asiago plateau and to Retia. Archaeological data and territorial studies also suggest the plain was at this time characterized by a scattered peopling centred around the villa rustica and by the setting of at least two different centurial field systems belonging to the civitates of Vicetia and Patavium. With this paper we want to propose a new study of this territory that, starting from the principles of Landscape Archaeology and developing throughout an archaeo-morphological approach that considers the integrated use of historical, archaeological and paleoenvironmental data, carries out an archaeological reading of the current landscape for recognizing within it the traces referable to the Roman structuring of the plain.

85 Surveying the Po valley plain: the case of Livorno Ferraris (Vercelli, Northern Italy)

Maria Elena Gorrini, Benedetta Peverelli, Elena Smoquina (Università degli Studi di Pavia, Italy) & Francesca Garanzini (Soprintendenza Archeologia, Belle Arti e Paesaggio, di Biella, Novara, Verbano-Cusio-Ossola e Vercelli, Italy)
In October 2001, the works for the construction of the new railway TAV Milan - Turin, 1.5 km North of the modern settlement of Livorno Ferraris, in Piedmont (Northern Italy), brought to the light a necropolis consisting of over 200 tombs datable between the 1st and the 4th century A.D. The discovery provided the opportunity for the University of Pavia, in collaboration with the Soprintendenza, to increase the knowledge of the territory especially for what concerns the ancient landscape – both natural and anthropic -. The area is placed West of the Roman municipium of Vercellae, developed on the site of an oppidum of the Libii or Libici (Livy 5, 35: Plin. Nat. 3, 124), whose name is preserved in the modern site of Livorno. The five-year project started in 2016 with the dual purpose of identifying, in a synchronic perspective, the settlement - or the settlements - related to the necropolis and of investigating, in a diachronic perspective - from the Late Bronze Age to the Middle Ages -, the dynamics of population, the exploitation of the territory and the road-networks of an area located at the intersection of important land and river communication axes. The team has started investigating the area through a series of walking surveys, in parallel with the collection of the existing data into a GIS DB (including archive maps, historical aerial photographs, satellite images), in an interdisciplinary approach. The paper will present the preliminary results of the first four survey campaigns discussing the methodological approach and the problems that we faced doing survey in the Po valley plain, specifically in an area strongly modified by modern anthropic activities.

153 Exploring Roman landscapes: burial and settlement patterns in Italy and Spain

Chiara Botturi (Independent, UK) & Maria del Carmen Moreno Escobar (University of Southampton, Spain)

This paper aims to emphasise the aptness of the landscape approach to answer research questions about socio-cultural aspects in the Classical period. We aim to do so by presenting two case studies concerned with the pre-Roman/Roman transition as understood through ancient landscape strategies. The first applies the landscape approach to the funerary evidence of an area in Gallia Cisalpina. Classical funerary landscapes have rarely been object of research, trapped in the dichotomy constituted by the material culture of burials on one side, and rural (non-mortuary) landscapes on the other. Through a multifaceted methodology that addresses the rural space in its entirety, funerary landscapes can be unravelled and their interrelationships with the natural and anthropic/non-funerary counterparts clarified. This is deemed preliminary and fundamental to understanding the pervasiveness of the Roman conquest and the times and ways of cultural change, tackled not only by studying the material culture of the tombs, but through the ‘lens’ of burial patterns in the landscape. The second case study explores cultural change in Hispania Ulterior Baetica through the identification of continuities and transformations within these provincial landscapes. Such work relies on the relationship established between territories and the communities that inhabit and shape them according to their needs and ideas, and more specifically on how these develop through time as a means to approach societies in the past. Applying a combination of archaeological spatial analysis and statistics, this research has successfully identified changes in settlement patterns that provide new interpretations about the romanisation of Baetica. By considering the past manipulation of the landscapes of the dead and the living crucial to grasping socio-cultural needs of local communities in the transition from the pre-Roman to the Roman era, we intend to contribute to the Classical landscapes debate and stimulate further discussion.

Discussion

Will M. Kennedy & Raphael A. Eser (Humboldt University Berlin / Excellence cluster Topoi, Germany)

42E Part 3 - Thursday 20th September, 14:30-16:00, Newcastle University
73 Integrated studies on centuriated landscapes in Mediterranean Hispania tarragonensis: new methods and perspectives

Josep Maria Palet Martínez, Xusa Ortega Pérez (Catalan Institute of Classical Archaeology, Spain) & Héctor A. Orengo (McDonald Institute for Archaeological Research, University of Cambridge, UK).

Landscape archaeology has greatly contributed to the advance of centuriation studies, which was the most characteristic way of structuring, dividing and squaring rural areas in the ager of an ancient city. However, during the last decades the study of centuriations has been considered a marginal discipline. This is largely due to the multiplication of unreliable studies on centuriations developed from the 70s to the 90s, some of which have been proved wrong by large-scale archaeological excavations. Nonetheless, the last decade has seen a revival of centuriation archaeomorphology-based studies that has helped putting this discipline ‘back on the map’. At present, interest is focused on the dynamics of landscape features over time. In this sense, the inclusion of these studies in the field of landscape archaeology has become essential, providing a much needed interdisciplinary and diachronic perspective. Current research has adopted approaches, which include geoarchaeology, geophysics, survey, historical written documents or palaeoenvironmental analyses. The incorporation of historical and environmental data has been extremely useful to improve the identification and proposed chronology of traces. Environmental sources can offer important insights on the effects a deductio had on the landscape. The few cases in which environmental data have been applied to the study of centuriations show a complex relationship between Roman field systems, settlement and landscape change. In addition to this, the incorporation of new digital methods, specifically Geographic Information Systems (GIS) represent a major qualitative leap forward in terms of the planimetric accuracy of the restitution of field systems. They have meant an improvement of the quality and reliability of archaeomorphological analyses. These new methodological advances will be presented using several case studies from Mediterranean Hispania tarragonensis in which interpretation has moved from economic or materialistic approaches to more social and cultural focussed explanations.

228 From Valentia to Balansiya: social resilience and landscape change in the Early Islamic period in a Mediterranean alluvial plain (8th- 9th centuries).

Maria Jesús Ortega (Catalan Institute of Classical Archaeology, Spain) & Ferran Esquilache (Jaume I University, Spain)

A recent study has proved that, in Augustan times, a great centuriated system was designed in the territory of Valencia, just after the city was rebuilt between 5 BC-5 AD. However, the implementation of the centuriation process and an increase of settlements took place from the second half of 1st century AD onwards when the city also experienced significant urban growth. This territorial structuration was kept in use throughout the entire Roman period and the system’s main components (roads, field systems, singular settlements) continued to be used during the Visigoth period (6th to 8th centuries), although in a very different economic and social setting. The self-evident change did not take place until the end of the 8th century, associated with the arrival of new societal structures from North Africa with new global parameters. Although Valencia may have experienced a short period of abandonment between the 7th and 8th centuries, archaeological evidence suggests that the city had urban features at the beginning of the 9th century. It is rather in Valencia’s immediate rural surroundings where more spectacular and deeply transformative landscape changes took place. First, by the creation of new settlements, second, by the implementation of a new radiocentric road network and, finally, by the establishment of a complex irrigation canal network. This irrigation network was further developed in the following centuries and a new field system was introduced that differed greatly from the original Roman system. Nonetheless, some of the Roman elements (main roads etc.) still persist in the present Valencia landscape …Why?
Final discussion

Will M. Kennedy & Raphael A. Eser (Humboldt University Berlin / Excellence cluster Topoi, Germany)

Related posters (for poster abstracts, see p.213-230)

22 New data from the territory of Locri Epizephiri: archeology and documentary sources.
Gianluca Sapio (Università di Torino, Italy)
SESSION 43A – ARCHAEOHYDROLOGY AS A DISCIPLINE?: DEVELOPING A NEW APPROACH TO THE STUDY OF ANCIENT WATERSCAPES

Julien Charbonnier (CEPAM-University of Nice, France), Maurits Ertsen (Delft University of Technology, Netherlands) & Kristen Hopper (Durham University, UK)

KEYWORDS. water; methods; hydrology; multidisciplinarity.

In recent years, archaeological studies of water, its use, management and meaning, have grown in number and thematic richness. Previous LACs have offered many excellent examples, and many studies have been published in Water History, the journal of the International Water History Association, including the work of the late Tony Wilkinson and his students at Durham University. Successful cooperation within the German Archaeological Institute has further increased our understanding of archaeological approaches to hydrological and hydraulic features. This increased attention enables and provokes a closer study of the theoretical and methodological issues related to water studies in landscape archaeology. For example, how do we relate archaeological research on communities living in arid or irrigated lands with hydro-engineering and hydrological disciplines? Conversely, how do we ensure that scholars from these backgrounds understand the socio-cultural contexts of archaeological sites and features? The main aims of this session are to explore how water studies within archaeology can be developed along similar or different lines as vegetation or animal studies, and to identify and define an applied archaeohydrology that could be used to inform present-day sustainable use of water, heritage education and protection. What does a disciplinary concept of archaeohydrology mean compared to archaeobotany or zooarchaeology? The session offers papers that discuss (combinations of) case studies and theoretical and methodological approaches to the subject.

43A Part 1 (‘Defining Archaeohydrology’) - Thursday 20th September, 09:00-11:00, Newcastle University

Introduction to Session

Julien Charbonnier (CEPAM-University of Nice, France), Maurits Ertsen (Delft University of Technology, Netherlands) & Kristen Hopper (Durham University, UK)

282 Landscapes without water - a case for archaeohydrological approaches from NW Egypt

Thomas Vetter (Independent, Germany) & Anna-Katharina Rieger (University of Graz, Austria)

Landscape archaeology is in its core multidisciplinary and offers comprehensive approaches encompassing human interaction with the environment and its individual factors as soils, climate, relief and the pertaining disciplines pedology, climatology, hydrology, geomorphology. However, marginal landscapes seem to be of little interest, since archaeology concentrates on fertile places, with natural resources, densely inhabited, and hence, not only richer in quantity, but also variations of material remains. Areas without noticeable relics do not trigger archaeological attention. Such areas are often characterised by scarce natural resources – foremost water. But scarcity of natural resources entails not only the landscape’s natural conditions but also its social ones. Here an articulated archaeohydrology enters the stage, which the paper exemplifies with ancient Marmarica (NW-Egypt), an arid region without remote sources that could make water available by canals and aqueducts. Its scarce resources were managed by minimum but smart interventions and opportunistic livelihoods allowing the local population even surplus production. We describe the trans-disciplinary approach of a hydrologically-oriented landscape-archaeological study in the Marmarica, discussing weaknesses and
strengths of either archaeological or hydrological methodology that are feasible to recognize water-induced and anthropogenic features, to explain hydrological, societal or economic phenomena, to date various kinds of material, or to integrate data to picture of past societies. Only an interwoven methodological strategy – surveys, followed by historical map- and satellite-image interpretation, aerial photography, soil investigations, climatological analyses, hydrological modelling, bio-archaeology, ceramology, archaeological and scientific dating methods) – allows for achieving resilient results. This allows the sub-field of archaeohydrology to emerge. Finally, comparisons to studies in similar regions are made to evaluate how conclusions can be drawn with wide and problem-oriented investigation methods. Archaeohydrology cannot only better our knowledge of marginal landscapes, but help reactivate ancient water-management-systems, fallen into oblivion, as model for sustainable resource management and as cultural heritage.

118 Long term evolution of water supply in the oasis of Masafi (UAE): an archaeohydrological approach

Julien Charbonnier, Sophie Costa (CEPAM-University of Nice Côte d’Azur, France) & Maël Crépy (Archéorient-University Lumière Lyon 2, France)

Since 2006, the work of the French Archaeological in the UAE has revealed that the area of Masafi (Fujairah), in the northern part of the Hajar Mountains, had been settled from the 2nd millennium BC (Wadi Suq period, 2000-1600 BC) onwards. In particular, the valley was densely populated during the Iron Age II (1100-600 BC) and during the Late Islamic period (after 1500 AD). In parallel, a paleo-environmental program has been set up since 2011 in order to retrace the history of the oasis and understand the respective role of social and environmental factors in its development. This program is now funded by the Agence Nationale de la Recherche (project OASIWAT, dir. L. Purdue). The present paper aims at addressing the specific question of the evolution of water supply on the long term, and its impact on settlement pattern in Masafi, as well as to discuss our multidisciplinary approach combining archaeology, geoarchaeology, geomorphology, geomatics, ethnography and absolute dating. Today, the oasis is mainly fed by drilled wells and water resources are located deep below the ground. Several abandoned hydraulic structures (wells, tanks and canals) were identified both on the surface and in test pits dug in the current palm grove and near the Iron Age site of Masafi-1. This approach has allowed us to put forward the evolution of water technology in Masafi over the last 3000 years. While both runoffs and groundwater, with the help of wells, were used to irrigate the fields during Protohistory, only the aquifers have been exploited during later periods: wells, springs and a qanat being attested during the Islamic period. Furthermore, our program has identified artesian conditions in the past, related to a specific geological setting. The ethnographic study has confirmed that these conditions maintained until the end of the 20th Century AD.

175 Water-Management in Arabian’s northwest badia (desert):
ArchaeoHydrological approaches and Bedouin lessons

Amer Alsoulaiman (University of Ferrara, Italy) & Hans Gebel (Freie Universität Berlin, Germany)

Water plays an important role, past and present, in demography and civilizations. Settlements concentrate around rivers and becomes sparse away from water. The Badia (desert) of northwest Arabia has limited and seasonal water resources which has controlled settlement distribution in the northwest Arabian Badia for thousands of years. The palaeo-environment, the palaeo-climate and climate changes have affected water resources and forced people to establish water management systems and strategies to adapt to the extreme environmental conditions and less water. These water management systems and strategies developed through time and proved to be compatible with the topography and the geology of the region. This paper sheds light on water management systems and strategies of the chalcolithic pre-oasis culture of northwest Arabia, and on Bedouin knowledge of water
management systems and strategies for harvesting water. Furthermore, it will discuss the land use, topographical and hydrological experiences of pre-oasis peoples and the Badu which gave them the ability to choose and build appropriate water management systems appropriate to their environmental conditions.

237 Multiscale approaches of past waterscapes in Pasargadae, Iran

Marie-Laure Chambrade, Sébastien Gondet (CNRS Archéorient, France), Jörg Fassbinder (LMU Munich, Germany) & Kourosh Mohammadkhani (Shahid Beheshti University, Iran)

Founded by Cyrus the Great, Pasargadae, in the province of Fars (South Iran) was one of the regional centres of the Achaemenid Empire (539-331 BC) such as the later founded Persepolis and Susa. These centres served for multiple purposes like regional administration but also as royal residences and symbols of power. Firstly-known through monumental buildings, its spatial organisation have recently begun to be understood thanks to the combination of archaeological survey methods. These investigations revealed in Pasargadae an open cityscape of several dozen of hectares composed of a mosaic of inhabited and green areas structured by hydraulic features including basin and irrigation canals. This local waterscape needs to be considered as part of a regional hydraulic landscaping composed of monumental dams and canals of dozen of kilometres in length demonstrating a huge investment in water management. In such a semi-arid region, controlling water resources is of critical importance for the territorial development as well as of symbolic value for the Power. In the framework of the ANR-DFG program Paradise, we are investigating these features and landscapes in order to better understand their functioning and, more generally, how water sources were managed in the Achaemenid Empire. Since we are dealing with a site and its territory, and difficulties linked to landscape taphonomy in an intensive agricultural area, we have organised a multiscale and interdisciplinary approach combining archaeological, geoarchaeological and geophysical methods. Through this case study, we would like to foster a discussion on how to deal with multiscale water landscapes and on archaeohydrology as a comprehensive way to approach them.

Discussion

Julien Charbonnier (CEPAM-University of Nice, France), Maurits Ertsen (Delft University of Technology, Netherlands) & Kristen Hopper (Durham University, UK)

43A Part 2 (‘Modelling ancient water systems’) - Thursday 20th September, 11:30-13:30, Newcastle University

235 The very model of a modern archaeologist: Archaeohydrology and Modelling

John Murphy (University of Chicago, USA) & Maurits Ertsen (Delft University of Technology, Netherlands)

Models and modelling have played a key role in the history of science through the 20th century and into the 21st. This role, and the important relationship of models to theory, have changed through time, and, for a wide variety of reasons ranging from limitations of positivist approaches to advances in computing technology, the space that models occupy in science has shifted. Models offer a possible bridge between hydraulic and civil engineering and an anthropological archaeology; models can serve as boundary objects and can play a unifying role between practitioners of both sciences and between the disciplines at large. But the uses of models in engineering vs. anthropology can be quite different, and the customary practices of modelling- and even the conception of a ‘model’ itself- can vary widely between the two fields. In considering a new discipline of archaeohydrology, models may play a helpful
role, but to achieve this these differences must be understood. Despite its long use, modelling in archaeology remains contentious, and the ways that modelling can be used to help reconstruct past societies- and the limits of this- are not fully mapped. This uncertainty may impact the ways that modelling can be used in a new joint field. Some of the contours of the challenges that arise can be foreseen and will be discussed here. An extended example from a model of Hohokam irrigation will be presented as an illustration for discussion.

174 Modelling Mesopotamia: Landscapes of Power

Maurits Ertsen (Delft University of Technology, Netherlands)

Small-scale activities many thousands of years ago in southern Mesopotamia changed the capacity of such regions to sustain large populations over long periods of time. Mesopotamia’s early anthropogenic irrigated landscapes seem to have emerged from short-term activities, but long term effects were massive. Water and irrigation can bring wealth and stability to communities and nations, but can also harm landscapes and food production on the long term. A narrow environmental threshold may separate stable, irrigated landscapes from unstable, over-used ones. Ancient Mesopotamia would have ‘collapsed’ because of salinization due to over-irrigation. However, as did the emergence of Mesopotamian society, its ‘downfall’ would have unfolded over centuries too. It is very likely that full scale effects of interventions are only visible by humans after some time has passed, possibly only in the next generation – which should make it very difficult for these next generations to relate the effects back to actions of their predecessors. The archaeological record of Mesopotamia is rich, and as such allows building mathematical agent-based models within which all different kinds of (human and non-human) agents ‘act’ and ‘link’ in building a computer-based society – which in this case would shape itself as the closely controlled irrigated landscapes of Mesopotamia. This contribution will show the results of first modelling efforts for early Mesopotamian agriculture. These results are based on close cooperation between modellers, irrigation experts and archaeologists. Therefore, this paper will also discuss how such cooperative efforts can be shaped in order to maximize productive outcomes.

31 The importance of historical system information for modern climate adaptation strategies

Menne Kosian & Rowin van Lanen (National Heritage Agency of the Netherlands [RCE], Netherlands)

As a low-lying part of the northwest European river delta into which almost all of the great west European rivers drain, the Netherlands are prone to flooding. From the medieval period onwards, an elaborate organisational system was set up for their maintenance: the water boards. Next to these administrative bodies, the cities of Holland often had their own political needs, strategies, and ideas for water quality and safety. Modern research into historical maps and archives on water management show how an integrated policy connecting urban and water board administrations in the past has led to a safe (living) environment. In contrast, places where this integrated policy was traditionally lacking often still are characterized by persisting flooding and subsidence problems. This characterization underlines the importance of old policies and visions, since they still have a clear influence on the present-day landscape. Consequently, better understanding these systems might provide solutions to future problems we face regarding amongst other climate change, soil erosion and subsidence. In this paper we will present the development of a historical GIS on water systems which is currently conducted at the Cultural Heritage Agency of the Netherlands. The focus of this paper will be on the methodology of integrating maps, archives and historical solutions by means of GIS modelling into an integrated source for recommendations on climate-adaptation strategies. This new integrated historical landscape GIS will not only guarantee the preservation of cultural heritage in present-day dynamic environments, but also demonstrating its importance for facing modern challenges.
205 A Quantitative Analysis of the Surface Drainage System at Pompeii

Davide Motta (Northumbria University, UK), Eric E. Poehler (University of Massachusetts Amherst, USA) & Duncan Keenan-Jones (Collegium de Lyon, France)

Research on stormwater surface drainage and underground sewerage in Roman ancient cities (e.g., Cozzi and Sogliano 1900, Nishida 1991, Jansen 2002, Poehler 2011, 2012) is limited when compared to the research on water supply (source, conveyance channels, and distribution networks). In this paper we present the results of a numerical model of Pompeii’s drainage system and evaluate the system’s hydraulic performance (i.e., water depths, flow velocities, flow rates in Pompeii’s streets during and after a rainfall event). Computations are carried out using numerical modelling techniques adopted in the modern Civil Engineering practice for urban drainage analysis. The Pompeii Bibliography and Mapping Project provide topographic data for our model; additional quantitative data were gathered from fieldwork and published sources. Our calculations support the common understanding of the high curbs and canal-like form of the street to be for the purpose of containing high levels of water runoff. Furthermore, we identify correlations between the locations of objects in the streets of Pompeii, identified as Water Management Mechanisms, and areas of high water depth and/or high flow rate. These results hint at interesting urbanistic responses to points of stress and potential failure within the surface drainage at Pompeii and suggest a need for some systematic control. This study shows how the use of modern Hydrology and Hydraulics modelling techniques can help identify the rationale behind the technologies that the ancient Romans, although not in possession of such modelling techniques, implemented to mitigate street flooding at Pompeii.

47 Archaeohydrology applied to Early Byzantine Constantinople

Martin Crapper (Northumbria University, UK), Kate Ward & Francesca Ruggeri (The University of Edinburgh, UK)

The water system of Constantinople, the capital of the Eastern Empire has been relatively little studied, but remains one of the most outstanding achievements of Roman water engineering. A recent project funded by the ‘s Leverhulme Trust has allowed a joint archaeology-engineering study of the system, using modern civil engineering thought and techniques to shed light on the sometimes confusing archaeological remains. Specific achievements of the project have included: a new GIS-based study of the 4th and 5th century Valens aqueduct system, defining its line, slope and extent; a hydrological investigation attempting to quantify the seasonal variation of flow of water to the city; a detailed engineering study of the water infrastructure within the city walls, examining the distribution and volume of cisterns and the likely routes of the 2nd and 4th century aqueducts; and a further study examining the distribution of water demand within various areas of the city based on available data and engineering analysis. Associated with these have been attempts to carry out hydraulic and hydrological modelling of water management within the Roman city, using modern software as a basis. These studies provide an opportunity to investigate the creative link between archaeology and hydraulic and hydrologic engineering; a clear conclusion is that the approach of engineering design (as opposed to the more widely known scientific method) is a powerful tool in understanding ancient systems and filling in gaps where no clear archaeology has survived.

Discussion

Julien Charbonnier (CEPAM-University of Nice, France), Maurits Ertsen (Delft University of Technology, Netherlands) & Kristen Hopper (Durham University, UK)

43A Part 3 (‘From geoarchaeology to remote sensing’) - Thursday 20th September, 14:30-16:00, Newcastle University
294 Irrigation systems, gardens, agrarian landscapes and rural settlement patterns in Islamic and Norman Sicily

Angelo Castrorao Barba, Giuseppe Barbera & Giuseppe Bazan (University of Palermo, Italy) & Antonio Rotolo (Independent researcher/ Ludwig SRLS, Italy)

Starting from the Muslim conquest (early 9th century CE), in Sicily occurred specific phenomena related to the so-called Islamic ‘agrarian revolution’ or ‘green revolution’. This paper aims to frame the impact of the widespread use of water in Medieval Sicilian landscapes. The most radical innovations concerned the irrigation systems and the diffusion of new varieties suitable for irrigated crops. The creation of a proper ‘irrigated landscape’ stimulated the technological innovation in terms of hydraulic machines, mills, soil arrangements, rotations, selected crops. The suitable use of water connected in a rational system various factors (irrigation, energetic, micro-climatic and aesthetic). The Islamic knowledge on irrigation science improved the technologies of the classic world with a larger application of hydraulic machines. In Palermo (Madīnat Balarm), are still preserved some drainage tunnels (qanat) for catching the groundwater, probably date back to the Middle Ages. Some hydraulic machines, still present in traditional Sicilian agricultural systems, are indicative of significant technological development. The noria (na ura) generally indicates a large wheel with pottery recipients activated directly by the river flow, which raises the water up to an aqueduct. The senia (saniya in Western Mediterranean, saqiya in the Near East) is a gear wheel moved by animal traction (usually a donkey) aimed to the irrigation of small fields. This role of irrigation technics strongly influenced the Sicilian landscape not only in rural area but also in the formation, especially during the Norman age, of suburban Royal palaces with gardens, such as the buhayra of Favara/Maredolce. The relationship with water and irrigation was also a decisive factor in rural settlement patterns that saw a large increase of density between the Islamic and Norman age, especially in western Sicily. Recent archaeological research in the hinterland of Palermo and in the north-western coast of Sicily have showed that the spatial distribution of medieval site appeared to be mainly oriented by the necessity of exploiting water sources and its relationship with the grow of irrigational agriculture practices.

196 Qanats, Canals, & CORONA: Remote Sensing of irrigation systems in Iran and Turkmenistan

Kristen Hopper, Michelle de Gruchy & Dan Lawrence (Durham University, UK)

From at least the first millennium BC, it can be argued that the extension and control of irrigation systems was increasingly associated (either directly or indirectly) with the rise of large territorial empires across the Near East. Recent fieldwork has demonstrated that by mid to late first millennium BC, large-scale canal systems were likely in operation in the steppe margins of the Gorgan Plain of NE Iran, and similar systems developed in the Misrian Plain of SW Turkmenistan, an even more arid region c. 100 km to the north. An increase in the size and scale of canal systems reaches its peak in the Sasanian and Islamic periods, though geographical variations in land use and settlement patterns are visible, associated with environmental subzones, and local and imperial politics. Furthermore, hundreds of qanat systems have also been mapped within the broader region; such systems are attested in historical and ethnographic sources and continued to be constructed through the 20th century. This paper will discuss the contribution of remote sensing to mapping water management systems in northeast Iran and southwest Turkmenistan, focusing how such data can be used in conjunction with evidence from surveys, excavations, palaeoenvironmental and palaeo-botanical studies to identify and interpret periods of investment in water management systems between the Iron Age and the present day. In particular, we will emphasise the value of using historical and modern high-resolution satellite imagery, along with historical maps, and ethnographic accounts to record and relatively date traces of water management systems.
**15 A remote-sensing approach to Early Islamic water management**

*Louise Rayne (University of Leicester, UK) & Danny Donoghue (Durham University, UK)*

This project mapped the development of the ‘hydraulic landscapes’ of Northern Mesopotamia at the time of the later territorial empires (c.1200 BC to 1500 AD). Archaeologists have identified specific irrigation systems but many earlier studies were restricted to using ground-based data which limited comprehensive views of the layout of irrigation systems. The role of the Early Islamic empires in investing in water management has been debated and downplayed as a continuation of earlier activity. However, we identified extensive networks of irrigation dating to this period across Northern Mesopotamia, transforming formerly marginal regions into productive landscapes. Recently, the contribution of remote sensing to archaeohydrology has been considerable. In this case, satellite data enabled recording of the scale and distribution of ancient water management across large geographical areas. In particular, we used 1960s-70S satellite images to identify the layout of features prior to the recent land-use changes which have destroyed many of them. Digital Elevation Models allowed the hydraulic properties of canals to be established. Fieldwork at selected sites provided validation. These data revealed many new features and allowed the complexity of extensive irrigation networks to be understood. While known traces of large-scale canal systems had existed from at least the Iron Age, we found that irrigation activity reached a peak in the Early Islamic period. This included canals alongside rivers considered difficult to control in earlier periods, dense networks of irrigation in the tributaries of the Euphrates, and qanats. Historical evidence indicates that the Early Islamic empires used policies such as tax breaks to incentivise the cultivation of formerly marginal lands, promoting increased agricultural intensification. How this trajectory was established in other parts of the Early Islamic world can also be considered. The transformative power of empires in both creating hydraulic landscapes and in maintaining them needs further exploration.

**10 Finding Maori houses at Kaikokopu: Could surface hydrology provide a key?**

*Caroline Phillips (Anthropology, University of Auckland, New Zealand)*

Kaikokopu is an area measuring approximately 160 km², located in the Bay of Plenty in the North Island of New Zealand. It has numerous food storage sites, with a few fortified sites, garden plots and artefact finds relating to Maori occupation dating between 1400 and 1800 AD. Notably no undefended house sites, small hamlets or villages have been recorded. Clearly, these dwellings must have once existed, but equally clearly archaeological field walking surveys have not observed evidence of them and excavation has not uncovered them. This is likely to be because the undefended house sites and small villages would leave little surface evidence and the visible features are principally storage pits on the ridges, which is where excavation has mainly been undertaken. In contrast with the situation common elsewhere in New Zealand it seems that the dwellings were located elsewhere on the landscape and not within 100 m of the storage sites. Although the area has 1500-2000 mm of rainfall per year and there are numerous valleys, only a few of these valleys contain streams. This is very unusual in New Zealand. Sources of water were 500 m away from the 18 excavated pit sites, and generally down a steep-sided valley 30-60 m high. As water is a basic requirement, it seems likely that the houses are nearer the sources of drinking water. This paper examines the unusual surface hydrology and attempts to identify all surface water sources in the Kaikokopu area (the current maps are inaccurate) as a key for identifying the likely locations of houses. This will be field tested in the near future.

**Final discussion: Archaeohydrology as a new discipline?**

*Julien Charbonnier (CEPAM-University of Nice, France), Maurits Ertsen (Delft University of Technology, Netherlands) & Kristen Hopper (Durham University, UK)*
Related posters (for poster abstracts, see p.213-230)

197 Ancient texts as source to analyse the ancient water harvesting system in Sri Lanka

Nuwan Abhayawardana, Wiebke Bebermeier & Brigitta Schütt (Freie University Berlin, Germany)
SESSION 44C – LANDSCAPE ARCHAEOLOGY AND REPRODUCIBLE RESEARCH – A HANDS-ON SESSION

Daniel Knitter & Wolfgang Hamer (Christian-Albrechts Universität zu Kiel, Germany)

KEYWORDS. Reproducible Research; Open Source; Open Data; Live Coding.

In the last years, Landscape Archaeology has opened up more and more towards quantitative approaches. Reproducibility and open data are crucial - especially when dealing with highly subjective aspects like perception - to providing sound methodological analyses and inspiring discussions. Besides, they are also a contribution to the necessary and important debate between model supporters and critics at the most transparent level of data preparation, selection, modification, and interpretation. But it is clear reproducibility is not for free. It is an approach to conduct research in a way where we as researchers must prepare our data and provide our methods in an accessible form in order to enable colleagues to reproduce our results and to use these as well as our methodological approach in their own research. Currently within archaeology experience is limited as to what the best practices are to achieve such conditions. Hence, we can learn a lot from each other, especially in a practical manner. In this experimental live hands-on session, we invite everybody to present and discuss different approaches of how to conduct reproducible landscape research using open software and data. Our aims are to introduce curious colleagues to this new form of conducting research, and to strengthen collaboration and exchange ideas and approaches between colleagues already conducting reproducible research.

Wednesday 19th September, 11:00-13:00, Durham University

305 Introduction to Reproducible Research using open source software.

Daniel Knitter & Wolfgang Hamer (Christian-Albrechts Universität zu Kiel - Department of Geography, Germany)

Nowadays landscape archaeological research is seldom conducted without statistical or GIS analyses. The published studies show a large variety of methodological approaches and exciting new ways of processing and interpreting data. However, there is also a drawback: since the available software tools and environments are numerous it is difficult to comprehend the computational details and decision made during data analyses of the presented approaches. Due to this it is rather difficult, if not impossible to reproduce a study using the description in a paper’s methods section. In this contribution we want to present and discuss an easy way to overcome this unnecessary limitation of landscape archaeological research. Using different open-source software solutions, we illustrate how easy it is to set up and use a reproducible research environment for landscape archaeological studies. Our aim is to foster a more open and collaborative way of conducting our everyday research.

131 fieldwalkr: an R package for spatial sampling and field survey simulation

Joe Roe (Københavns Universitet, Denmark)

Recent efforts to promote reproducibility in archaeology have focused primarily on data analysis and dissemination. However, open science begins earlier, with a transparent experimental design and well-defined data collection protocol. The ‘experiments’ performed by archaeologists—field investigations and physical analyses of unique objects—are rarely actually repeatable. However, the reproducibility of particular results in similar archaeological contexts is still strongly affected by choices made in the field, such as where and how to survey or excavate, and what sampling strategy to use. In this session, I will demonstrate fieldwalkr, an R package for simulating spatial sampling that I developed to try and address some of these issues in archaeological surveys. The package includes tools for modelling the
effect of different sampling strategies, survey parameters, and detection functions on the estimation of spatial point patterns. The target distributions can either be generated from a variety of null models or extrapolated from real archaeological landscapes. Its aim is to facilitate more informed and statistically rigorous survey design, as well as provide a framework for post-hoc and theoretical analyses of sampling effects. A shiny web interface makes it accessible for exploratory use and in the classroom, whilst the underlying package can be used to document the research design process as an open, reproducible R script.

91 FuzzyLandscapes - A reproducible approach to analyse uncertain parameters

Wolfgang Hamer, Daniel Knitter & Rainer Duttmann (Christian-Albrechts-Universität zu Kiel - Department of Geograph, Germany)

Perception, visibility, the ritual character of landscapes, its social coherence, etc. all of these theoretical notions do have one thing in common: they cannot be measured precisely; they are uncertain parameters. The method of fuzzy logic allows to deal with such notions by employing linguistic variables as elements of numerical analysis. A fuzzification of uncertain parameters, i.e. a transformation to a mathematical expression, enables their reproducibility and application in different settings. In this contribution, we present our implementation of fuzzy logic for landscape archaeological research. To enable widespread reproducibility, we choose a script based programming language that is platform independent, freely available and open-source. R, a free software environment for statistical computing, fulfills these criteria. We use it to write a package that implements different methods of fuzzy logic to create fuzzy rule-based systems. Bundled with the package we provide an exemplary study that is based entirely on open access data to ensure complete reproducibility. Interested researchers are able to apply, investigate and modify our methodological approach in the context of their projects or to reproduce the exemplary case study. Within our presentation, we present the basic building blocks of package development in R as one way to conduct reproducible landscape archaeological research.

198 Hyperspectral imaging for improving stratigraphic interpretation in Yeha, Ethiopia.

Vincent Haburaj, Jan Krause, Brigitta Schütt, Björn Waske (Freie Universität Berlin, TOPOI Excellence Cluster EXC 264, Germany), Iris Gerlach & Sarah Japp (Deutsches Archäologisches Institut, Germany)

While traditional tools for defining stratigraphic layers offer some degree of objectivity e.g. by comparing the observed material to established colour standards, the initial act of delimiting largely remains dependent of the excavators’ perception and thus subjective. Recent work of the presenting working group gives an idea of the potential that semi-automated analysis of (i) RGB and (ii) hyperspectral image data holds for the delimiting of stratigraphic layers (Haburaj et al., in preparation). Attentive pre-processing of the image data in combination with an unsupervised classification allows for the creation of cluster groups, representing archaeological features. Building upon these results, the presented study focuses on the further advancement of the used methods by including physical and chemical sediment properties, derived from soil samples. We compare the performance of multiple supervised classification methods to assess how far we can reproduce the original stratigraphic interpretation by the respective excavator. Furthermore, the developed method allows for complementing the original interpretation by transferring sediment properties into a spatial context. We thereby offer a possibility to increase objectivity in the process of stratigraphic interpretation. Reproducibility of our results is ensured by the usage of open-source software. Profile data of an ongoing excavation in Yeha (Tigray, Ethiopia) is used throughout this study. The examined trenches were excavated west of the ethio-sabean Temple of Almaqah dating to the 1st millennium BC. The presentation at LAC 2018 will cover first results of the study.
The presence and distribution of the rural settlements in the northeast of the Superior Landmark of al-Andalus throughout the 11th and 12th centuries is a delicate question. In order to explore this reality, we are studying the mountainous area associated with the city of Balaguer and most northern frontier of the district/taifa of Lleida. In this poster, the methodological tools of landscape archaeology and the results obtained through its application in the research of the rural world in the north-eastern sector of al-Andalus around the 11th and 12th centuries will be presented. Through this methodology (documentary sources, historical cartography, aerial photography, GIS -geographic information system-, toponymy and archaeological prospecting), what emerges is an inhospitable landscape, configured by fortifications, settlements, agricultural exploitation and large forests. The study considers the debate surrounding the way of organizing habits: in the general field, based on Glick's model hisn/qarya, in the Superior Landmark, determined by Souto's model (qarya) and also the fortified settlements discovered by Sénac. The research project takes into account the aspect of the fortified borders where networks like husun and towers/watchtowers have been used and also the established debate about the exploitation of the natural resources. We have discovered that the border between Muslims and Christians is a dynamic and changing space because it is a constant communication route. Therefore, the border must be understood as something permeable, though each period has its own conditions (military campaigns, land expansion, state, insurrections...) that define the border reality. The border is the result of a movement, evolution or historic transformation. This idea challenges the traditional thesis that defends the role of borders as barriers that block the access of the enemy.

Discussion

Daniel Knitter & Wolfgang Hamer (Christian-Albrechts Universität zu Kiel, Germany)
SESSION 45E - LANDSCAPE AS EXCAVATION

Oscar Aldred & Mark Knight (University of Cambridge, UK)

KEYWORDS. Excavation; Site; Non-site; Culture; Nature.

When is a site a landscape? At what point can we say we are excavating a landscape? Is scale the measure, or is it complexity? Alternatively, is it a matter of persistence, both in terms of the temporal extent of occupancy and the time spent investigating a particular locality? In this session we aim to explore the contribution that excavation makes to investigating and interpreting landscapes by looking at different versions of ‘landscape as excavation’. These will include the idea that ‘excavating a landscape’ means opening a very large area, i.e. an aperture equivalent to a landscape-scale; the idea of exploring landscapes within an excavation, drawing not only on the economic resources of the wider landscape but being able to evaluate from the material remains what it was like to inhabit a landscape (i.e. landscape as process); and the idea that excavation is used more as a metaphor to explore the different ‘layers’ in a landscape – which might involve excavation, but also other non-intrusive techniques of investigation. In other words, this session aims to examine and tease out ideas associated with landscape as a container and as a medium for action. This demands scrutiny of what is meant and implied by ‘landscape archaeology’ and ‘excavation’. Through a series of papers exploring such issues, this session hopes to challenge the very nature of landscape archaeology by considering the impact that excavation has on understanding tenure and temporality.

45E Part 1 - Tuesday 18th September, 11:00-13:00, Newcastle University

Introduction to Session

Oscar Aldred & Mark Knight (University of Cambridge, UK)

87 The habitual and social landscapes of late Mesolithic hunter-gatherers and early Neolithic farmers in the Eden Valley, Cumbria

Fraser Brown (Oxford Archaeology, UK)

In advance of road construction, at Stainton West, near to Carlisle, Cumbria (UK), a palaeo-channel of the River Eden was excavated by Oxford Archaeology. In the shadow of Hadrian’s Wall, an extraordinarily complex and temporally deep sequence of prehistoric archaeological remains was discovered, spanning the transition from hunter-gathering to agriculture. The waterlogged deposits in the channel included evidence for late Mesolithic woodworking, a beaver lodge and dam, and a well-preserved palaeoenvironmental sequence. On an island flanked by the channel, were traces of a hunter-gatherer encampment, associated with an in situ assemblage of c 300,000 struck lithics. During the earliest part of the Neolithic period, a wooden platform acted as the focus for the ritualised deposition of objects, such as polished-stone axe-heads and wooden ‘tridents’. By the later Neolithic, burnt mounds, possibly used for purification rites associated with a henge, began a tradition that was to last for well over a thousand years. This riverside location seems to have been a ‘persistent place’, repeatedly acting as a focus for human activity for millennia, and eventually becoming embedded within a monumentalised landscape. However, because people were drawn to there bringing with them a diverse range of lithic materials, the analysis has also enabled the site to be situated within a much more extensive geography than that explored by the road scheme. Wider patterns of seasonal hunter-gatherer mobility can be inferred, which seem influenced not only by economic factors, but also by social networks of communication stretching for hundreds of kilometres up into Scotland, across the Pennines, and possibly beyond.
136 A landscape through time: The West Mainland of Shetland
Claire Christie (University of Aberdeen, UK)

The archaeology of Shetland can best be described in terms of landscapes as opposed to sites. The rarely paralleled preservation of extensive prehistoric houses, field systems and burial monuments in the West Mainland of Shetland affords unique opportunities for understanding prehistoric societies. This paper presents a discussion of a programme of mapping, using high resolution aerial photographs, which aimed to explore the extent and spatial distribution of these enigmatic remains. Agricultural practices from past to present in Shetland have created complex palimpsest landscapes of upstanding stone built features. The approach taken was to map all stone built remains from present to prehistoric systematically assessing and removing features to reveal the prehistoric landscapes. The results allow for the impact of later land-use to be assessed and the variety and complexity of prehistoric features to be understood. The programme of mapping has revealed both extensive field systems and foci of activity providing insights into the organisation of prehistoric settlement and land use. This has allowed for extent, spatial distribution of the houses, fields, monuments, relationships between settlements and wider landscape boundaries to be understood and interpreted. Due to the complexity of the upstanding remains the ‘excavation’ of the landscape, in the removal of layers of later activity, explicitly beings with the mapping. The process of exploring the palimpsest landscapes through time was mirrored in the excavation of a house and field system site at Troni Shun, West Mainland. The excavation revealed a site with evidence of use in the Bronze Age and Iron Age with later historic truncation. The results have led to a re-evaluation of the chronology of landscape features. The approach and results of the landscape mapping and excavation provide an opportunity to consider the process of landscape archaeology.

192 Landscape process as excavation: The Magdalenian site of Les Varines, Jersey
Chantal Conneller (Newcastle University, UK)

In this contribution we will explore how landscape processes emerge through the excavation of a relatively small area. Les Varines, in Jersey, is a late Magdalenian site, dating to around 15000BP. The site was originally discovered as a ploughzone scatter; but test-pitting, coring and geophysical survey has revealed that the scatter had moved down-slope through cold-weather colluvial processes from an area where in situ archaeology still exists. The archaeological and geophysical techniques used to understand the site, and analysis of the flint sources used, reveal a much broader and temporally-extended picture of a changing landscape, one in which humans played a minor part. While the potential of small archaeological sites for understanding the broader landscape has previously been noted, sites such as Les Varine offer also temporal depth – allowing knowledge of landscapes in process at a variety of temporal scales.

220 Slots, pots and landscape
Oscar Aldred (University of Cambridge, UK)

Through excavations north of Cambridge, I will examine the different facets that constitute landscapes as excavation. Amongst other concerns, in scope for this discussion will be the sheer size of the excavations under scrutiny, the materiality within the features inside the excavation limits, as well as the contextual role that other ‘sites’ forge, as if a network, in making a wholly connected landscape, alongside the long-term presence from a range of communities. In other words, this session aims to examine and tease out ideas associated with landscape as a container and as a medium for action. This demands scrutiny of what is meant and implied by ‘landscape archaeology’ and ‘excavation’. Through a series of examples, this paper challenges the general binary assumptions which pair site with excavation, and survey (or many sites) with landscape. I will explore the idea that landscape as excavation is to do with the multifaceted ways archaeological evidence is related to and connected with different parts of the landscape, whether this is near (local) or far (global). I will offer a multi-sited view
of landscape in an excavation without jeopardising the thick description of archaeological practice and the interpretative potential of material culture.

Discussion
Oscar Aldred & Mark Knight (University of Cambridge, UK)

45E Part 2 - Tuesday 18th September, 14:00-16:00, Newcastle University

148 How’s life in the mountains? Evidence from the prehistoric Hallstatt salt mines
Kerstin Kowarik, Hans Reschreiter (Natural History Museum Vienna, Austria) & Michael Grabner (University of Life Sciences Vienna, Austria)

For millennia the Hallstatt High Valley, located in the Eastern Austrian Alps, was home to intensive underground salt mining. Large scale mining structures such as the Bronze Age and Iron Age salt mines of Hallstatt have a strong impact on their environment. Through the necessities of the mining process (transport, trade, production of raw materials and tools) the mining community is closely connected to the surrounding landscape in different ways and on various spatial scales. The high natural dynamic of the alpine environment and the weak material signal of ‘off-site’ activities, such as woodland management or transport of goods, combine to drastically reduce the visibility of the mining communities’ actions in the landscape surrounding the mines. One of the most important, and singularly informative sources of evidence can be found up to 100 m below the surface. The mine waste left behind by the prehistoric miners consists of thousands of broken tools and working materials. Grass and bast ropes, wooden tools, woolen textiles, skin and fur fragments, perfectly preserved due to the salt, document a broad spectrum of activities from woodland management to herding to bast harvest to trade and transport. Different taskscapes and skill sets are in evidence. Seasonal patterns can be identified.

156 The Fox and the Hedgehog: site and landscape in the Cambridge region
Jonathan Last (Historic England, UK)

Landscape archaeology has traditionally been the preserve of ‘non-intrusive’ techniques like earthwork survey, aerial mapping and fieldwalking, while excavation has been concerned with individual ‘sites’. However, the advent of very large-scale development-led fieldwork throws into question this simple equation between methods on the one hand and objects/scales of investigation on the other. Meanwhile Graham Fairclough has argued that archaeologists have often failed to engage with the full potential of the idea of ‘landscape’, in part because a focus on the ‘site’ represents a limiting and outdated approach to archaeological data. This paper reflects on the relationship between site/excavation and landscape/survey through consideration of the results of a Historic England project in South West Cambridgeshire, an area with a long history of innovative landscape archaeology, beginning with the pioneering work of Cyril Fox that has also seen a significant amount of development-led excavation. I wish to suggest that rather than doing away with the site, we can reformulate the interface between site and landscape in terms of the concepts of emplacement and assemblage.

263 Deeply buried spaces of temporal extension – excavating Fenland’s Holocene succession
Mark Knight (Cambridge Archaeological Unit, UK)

Landscapes are superficial. Landscapes are deep. Depending on your perspective, the peat fens of Cambridgeshire can be both. This part of the fens is epitomised by sites discovered or exposed, at least
partially, at the present surface. As a result, it is a landscape characterised more by its margins than its
midst. This has created an awkward disconnect between settlement (tenure) and sediment (texture),
and Fenland’s prehistoric sites remain in a kind of abstracted ecotonal stasis: permanently situated
beside the environment, never in it. The fluid, mutable and invasive sediment dynamic of the peat fens
takes place in clear contradiction to the static and contained understanding of settlement patterns.
People always lived at the edge, or so the narrative goes………

Final Discussion
Oscar Aldred & Mark Knight (University of Cambridge, UK)

Related posters (for poster abstracts, see p.213-230)

145 Excavation the Viking age landscape of Trondheim, Norway
Julian Cadamarteri (NIKU, Norway)

230 A geomorphological – archaeological map of a ritual landscape in North Germany
Philipp Hoeltzmann, Stephanie Hauschulz (Freie Universität Berlin, Germany) & Jens May
(Brandenburgisches Landesamt für Denkmalpflege und Archäologisches Landesmuseum, Germany)
SESSION 47D – FOOD IN THE URBAN LANDSCAPE

Ingrid Sarlöv Herlin (SLU – Alnarp: Sveriges lantbruksuniversitet, Swedish University of Agricultural Sciences, Sweden)

KEYWORDS. food culture; urban landscape; urban -rural interaction; urban commons; urban agriculture; archaeology and history of food.

This session takes a landscape perspective on the history and archaeology of food culture with a specific focus on the influence of food consumption and production on the urban fabric. Growing crops and keeping animals for sustenance have been carried out in and near cities and towns around the world throughout history. From the Middle Ages to the nineteenth century, grain was the common source of most people’s diet in for example the Nordic countries, eaten or drunk in various forms as porridge, gruel and bread or beer. Where vegetables occurred, they were commonly types that could be easily stored or fermented such as roots and cabbages or dried such as peas and broad beans. Most European towns founded before the mid-19th century had access to agricultural fields with a considerable level of self-sufficiency, and particularly within the towns located in agricultural areas, large amounts of grain (and later potatoes) were produced. In capital cities, the court held central kitchen gardens, orchards and hops gardens, today often remembered through urban place names What was the detailed relationship between food culture, food consumption, food production and the surrounding landscape? Urban commons could play a significant role, including in particular to support women’s economy, for example through the sale of butter from cattle kept on urban commons. Animals for food production, such as pigs, sheep, cattle and poultry were commonly held in the cities along with working horses; the products however were not necessarily used by the urban farmers themselves but sold on. Was urban farming for the majority of the population mainly driven by the need for relatively basic sustenance, with more varied including more vegetables limited to the higher classes? This topic also includes studies on for example drovers’ roads, food transport systems and food markets. Papers are especially invited on research on theory, method and interpretation of these intricate relationships between food culture and the urban (and rural) fabric. Papers are encouraged from any parts of the world, and in archaeological and related paleogeographic and historical fields.

Tuesday 18th September, 14:00-16:00, Newcastle University

319 Introduction to Session - ‘Food in the Urban Landscape’

Ingrid Sarlöv Herlin (SLU – Alnarp: Sveriges lantbruksuniversitet, Swedish University of Agricultural Sciences, Sweden)

184 Dietary diversity among urban populations in ancient ZhengHan city, China

Yu Dong (Shandong University, P R China), Kate Pechenkina (City University of New York, USA) & Wenquan Fan (Henan Provincial Institute of Cultural Relics and Archaeology, P. R. China)

Ancient ZhengHan city was the capital of two successive states Zheng and Han between 770-221 BC. It is located in the middle reaches of Yellow River Valley and close to the modern city of Zhengzhou, China. A dozen of archaeological sites at ancient ZhengHan city have been excavated in the past few decades to meet the need of the expanding modern city. Even though some written records dated to that period or shortly after were available, we still do not know much about how people living at different segments of the city may have consumed different kind of food. We carried out stable isotope analysis on human remains from several sites of ancient ZhengHan city to reconstruct their diet. Preliminary results of this project will be shared at the conference.

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129 Growing Maya Cities: The Agricultural Transformation of Maya Cities
Nicholas Dunning & David Lentz (University of Cincinnati, USA)

Ancient Maya cities are increasingly understood as having produced a significant portion of the food that sustained their population. Mapping and excavation over many decades has generated a growing database on the varied ways in which the Maya transformed urban landscapes in support of food production. The introduction of airborne lidar survey in the past decade has increased the breadth and detail of that database tremendously. Different Maya cities chose varied paths to urban food production, in part exploiting topographic and edaphic opportunities within the landscape. Examples of terraforming included a range of terracing and a wide array of drainage modification. While the landesque capital underlying urban agriculture is becoming increasingly well defined, the nature of cultivation practices, including crop selection remains less well understood. However, accumulating data indicate that a wide range of seed and root crops were cultivated in urban gardens and fields, as well as many kinds of tree crops. Taken together data support a picture of a heavily cultivated urban landscape. As more and more archaeological and paleoecological investigations take place, the varied evolution of these landscapes is also becoming apparent.

144 Traces of urban agriculture in medieval and post-medieval Trondheim
Julian Cadamarteri (NIKU, Norway)

Recent excavations in the medieval city of Trondheim in Norway has investigated the areas occupied by the medieval fields outside the urban areas. The large-scale excavations of the town square laid out in 1681 has uncovered thick cultivation layers dated from the Viking age to the 17th century. From historic sources it was known that both cereal production and gardens were located in the area prior to and after the city expanded and encroached on the area. Using the excavations of the town square as a point of departure and drawing on all traces of urban agriculture uncovered in Trondheim since the 1970s it is possible to shed light on how the urban fields were developed and used until the city expanded to cover the last fields within the city boundary in the 19th century.

69 Feeding a 17th century Swedish city. Production and consumption in the city-toll accounts
Ådel Franzén (Jönköping County Museum, Sweden)

In 1622 a new tax was launched in Sweden, the small toll, which implied that a duty had to be paid on every kind of goods and victuals that were imported in to a town. The duty was 3% of the goods value and the reason why this tax was not met with general uprising lay probably in the fact that the tax rate was fairly low and equal for all: peasant, citizen, nobility and clergy. From the city of Jönköping in the southern part of Sweden detailed lists of taxes goods are available from 1623–1625. Apart from what the citizens themselves brings in to the town, the documents list hundreds of farmers who are taxed for their goods. By examining the lists we can point out districts of local specialization of goods or victuals. We can also view the distribution of goods against the models of the 18th century economist J H von Thünen. The supply of necessities for a Swedish city differed in many ways from the model, due to the degree of self-sufficiency. Never the less we also find similarities. In variance to former historians who saw the Swedish farmers as a homogenous group of grain and meat producers we now can point at the importance of side-line production. In the South Swedish uplands dominated by forests and fens and with limited opportunities for farming, very likely sideline production was the most important production economically. The studies also show patterns of consumption in the city of Jönköping. Aside from this there are several questions that can be forwarded when it comes to source criticism. Archaeobotanical investigations shows that wild berries from the forests around Jönköping was a part of the diet in Jönköping in the 1620ties. Why do we not see the berries in the toll-lists?
320 Food Stories: Revealing the interactions between people and species in urban river landscapes

Maggie Roe (McCord Centre for Landscape, Newcastle University, UK)

Meanings, traditions and associations of landscapes are often expressed through art and literature, and embedded within culinary traditions and cultures. Human/non-human interactions are expressed in the earliest prehistoric cave paintings depicting hunting for food, while culinary cultures reflect people’s interactions with non-human species as well associating creativity with landscape character/affordances for food (Roe et al., 2016; Roe, 2016). River landscapes provide rich research possibilities for understanding how the often hidden or forgotten histories of such interactions give insights into both past and present meanings and associations as well as into the changing ecological and cultural processes that contribute to landscape character. In a collaborative arts-based project focussed on the Tyne and Avon river corridors, people’s relationships with water, and their awareness of human-non-human relationships, was explored to bring together past, present and possible futures. The project used the concept of ‘communitas’ (Turner 1991) to examine the human/non-human species relationships and took inspiration from Shklovsky’s (1998 [1917]) ‘ostranenie’ (defamiliarization) and Morton’s (2016) Dark Ecology. Methods were based on ‘story gathering’ through archival research, documentary evidence and artistic interpretation based on a series of activities, including river trips and walks, and extensive discussions between researchers exploring the sensory and associative, conscious and unconscious relationships between human/non-human and landscapes. These stories were then reinterpreted and represented in six designs printed on T-towels, an everyday kitchen object. These were then used to mediate and engage passers-by in conversations during three pop-up market stalls in locations in Bristol and Newcastle, conversations that revealed further stories of peoples’ engagement with the cultural significance, meanings and mythologies of water-based species and the wider issues of river landscapes. This presentation reflects on this engagement process and in particular on the dark gastronomic histories of two species, the Black-legged Kittiwake (Rissa tridactyla) and the European Eel (Anguilla anguilla).

SESSION 48C – LANDSCAPES AND HERITAGE ON A NATIONAL SCALE

Lukasz Banaszek & Dave Cowley (Historic Environment Scotland, UK)

KEYWORDS. national mapping programme; large-scale prospection; data integration; landscape research; heritage management.

National Mapping Programmes (NMP) in the UK and similar large-scale prospection projects elsewhere have profoundly affected landscape understanding across the world. Immense and complex databases have been created using many traditional prospection methods (aerial and field-walking surveys, interpretation of historic maps and other sources). These resources are used both for heritage management purposes and research-oriented approaches and are often available to the public. Additionally, in recent years the application of newer remote sensing techniques such as airborne laser scanning, spaceborne Earth observation, and extensive geophysical surveys has generated massive datasets, with consequent implications for NMPs, especially for data integration and coherence. New techniques are also allowing prospection in areas that have not been easily accessible before, offering new insights into past landscapes. This session invites papers that discuss different approaches to national and regional mapping programmes and the use of information derived from them. It is designed to bring together researchers and professionals dealing with NMP, whether data suppliers, surveyors, mapping specialists, database managers or scholars using the NMP outcomes in landscape investigations. Topics and issues for papers may include (but do not have to be limited to): recent technological development of NMPs, data accessibility; open-access and its impact on heritage protection; integrating alternative, often contradictory, prospection techniques; level-of-confidence assessments of remotely-acquired data; landscape evaluation and modelling past societies and population on the basis of NMP results; data bias; tourism and community usage of NMP records; NMP legal environments; big data processing and automation; intangible heritage mapping; site and landscape monitoring; contemporary heritage and other layers of NMP; crowd-sourcing and non-professional input; landscape narratives built over the NMP data.

48C Part 1 - Wednesday 19th September, 09:00-10:30, Durham University

Introduction to Session

Lukasz Banaszek (Historic Environment Scotland, UK)

70 Past, Present & Future: Aerial Investigation and Mapping (NMP) in England

Sally Evans (Historic England, UK)

Historic England, and its predecessors, developed Aerial Investigation & Mapping (AI&M) Standards (formerly National Mapping Programme (NMP) Standards), to ensure effective use of aerial photographs and lidar to identify, map, record and better understand archaeological sites and landscapes. Just over half of England has been covered by NMP/AI&M projects and there has been a significant enhancement of the historic environment record resulting in improved protection and management. Over 120,000 archaeological sites have been discovered and each year thousands more are added to the record as a result of AI&M projects. In early 2018 a technical review of AI&M projects was undertaken focussing on methods for carrying out and disseminating large-area aerial investigation and mapping projects; this paper will explore the results. A series of case studies will explore how scope and methods have changed over time. The review also examined the many factors that may impact on project timetables. Further case studies will explore the challenges relating to the archiving and management of this vast dataset. This paper will discuss the results of feedback from users of AI&M
project data, including local authority HER staff and academics, and consider how AI&M projects’ results are used currently. The paper will also consider the potential opportunities for the reuse and repurposing of these datasets. Finally this paper will explore how technological advancements provide increasing opportunities for better ways of gathering information, sharing data, and increasing the potential for innovative analyses and studies. This will inform best practice for future large area AI&M projects.

200 The condition and scale of national conservation datasets

Lacey Goldberg (Pennsylvania State University, USA)

This paper discusses issues of scale and data acquisition challenges that arise when attempting to create a cohesive national dataset for a country as large as the USA or regional datasets for landscape regions that are nearly four times the size of the UK. In order to develop conservation plans at the regional scale, data availability, compatibility, and coverage are crucial. As part of a collaboration with the US National Park Service and the Appalachian Landscape Conservation Cooperative, we are compiling cultural and scenic resource data in the National Capital Region of the United States. The goal is to integrate cultural resource management into landscape conservation planning and design by adapting methods used in ecological conservation planning. The datasets we are gathering for the US National Capital Region, like many other large -scale datasets from government organizations, are managed at the state (or district) level, rather than the regional level. Thus, these datasets may not be comparable, as comprehensive, or openly available from one municipal area to another. In addition, data are both more prevalent and accessible in urban versus non-urban areas. We discuss the application of a regional scale method for cultural resource inventorying, analysis, and conservation planning, and the process and problems associated with data collection across multiple states and districts. We will also discuss the potential for using crowdsourced data to document cultural resources and intangible heritage in landscapes spanning across multiple municipal boundaries. We suggest that the regional scale Landscape Conservation Cooperatives and crowdsourced data repositories, e.g. Databasin, are noteworthy options for organizing conservation efforts and data at these scales.

59 Religion for the future. Mapping the religious landscape of the Netherlands over the last thousand years

Rowin van Lanen (Cultural Heritage Agency of the Netherlands (RCE), Netherlands)

In the course of the first millennium AD the Netherlands witnessed the steady formation of a new religious landscape. Originally dominated by Roman or pagan polytheism, Christianization slowly took hold of the country as early as the 5th century AD (starting in the very south of the country). The first generation churches mainly were constructed out of wood but towards the end of the first millennium became increasingly replaced by stone counterparts. Over time many of these churches have been repaired, rebuilt or have disappeared altogether. In order to preserve these often monumental buildings, many have been designated as national heritage sites during the twentieth century. Currently the state protects 2351 (mainly historical) churches as heritage sites. However, mainly due to declining attendance an increasing number of these churches, which often greatly define the historical town centres, are now in danger of becoming vacant. Since current prospects only point towards an increase of these vacancy numbers, this has become a direct threat in the conservation of these monumental buildings. In mid-2017, the Cultural Heritage Agency of the Netherlands therefore issued a nation-wide mapping programme aimed at creating a present-day overview of state-protected churches. The main goal of this exercise was to increase descriptive metadata (knowledge gain), location-coordinate resolution (geometry), chronology and add current functionality on a national level. Our first results underline the importance of national mapping programmes, both for conservation purposes and knowledge gain. During the process many descriptive (meta)data on amongst other location coordinates or current function were enhanced. This new information has led to new insights on the current religious landscape, but also to an improved cooperation with municipalities and (private)
heritage organisations. Current prospects include the development of a durable digital overview of the religious landscape in the Netherlands, monumental as well as non-monumental.

76 Developing an approach to national mapping - preliminary work on Scotland in miniature

Dave Cowley & Lukasz Banaszek (Historic Environment Scotland, UK)

The increasing availability of remotely sensed data in Scotland presents opportunities and challenges. While complete coverage of orthophotos have been available for a few years now, availability of ALS is patchy, though there is an aspiration to greater or even complete coverage. This raises a challenge to how Historic Environment Scotland, as the national body of survey for Scotland, deals with the rapidly increasing remote sensed data in defining an approach to national mapping. Established approaches to archaeological prospection emphasise field reconnaissance, supported by remote sensed data, but this is a relatively resource intensive operation. Ongoing work on the Island of Arran, which is colloquially known as ‘Scotland in Miniature’, to develop national-scaled mapping is discussed, including presentation of new discoveries, aspects of multi-scaled data and an aspiration to develop streamlined workflows that foreground remote sensed data and automated object detection. This is requiring development of new workflows, but also the renegotiation of aspects of established practice.

48C Part 2 - Wednesday 19th September, 11:00-13:00, Durham University

48 Archaeological sites in relation to landscape in the Holocene

Sæbjørg Walaker Nordeide & Kari Loe Hjelle (University of Bergen, Norway)

This paper has its background in a Czech-Norwegian research project, HACIER, 2015-2017: Human, Agriculture and Climatic Impact on Ecological Rules: macroecological analysis of paleo-biological datasets (http://ecology.cts.cuni.cz/). The project was funded by Norway Grants. In this multidisciplinary project, evolutionary dynamics of ecosystems were studied, and two main data components were constructed: an archaeological and a pollen database that could be correlated through a similar chronological framework. Time was given in calibrated years BP, enabling us to compare the two very different countries of Norway and the Czech Republic. Archaeological data was systemised through activities which potentially made an impact on the environment, in a radius of 2000 m surrounding each pollen site. Pollen data was collected from bogs and lakes, as well as from archaeological sites. On a Norwegian scale, we have compiled the data into time intervals of 500 years and made local vegetation reconstructions using the program LOVE within the Landscape Reconstruction Algorithm (Sugita 2007). The resulting vegetation cover has been analysed in relation to archaeological data using gradient analyses. Methods applied in this project could be interesting for others, and we would be interested in discussing our approach. In this paper, we will present our methods with a few examples of our results, based on cases from Norway.


265 Integrating cultural and natural resources for large landscape conservation: the case of the North American Landscape Conservation Cooperatives

Madeline Brown (Pennsylvania State University, USA)
Large-landscape mapping programmes are increasingly used to manage natural and cultural resources at the landscape scale. In North America, the Landscape Conservation Cooperatives (LCCs) have been a powerful force for developing quantitative models, multi-layered resource maps, and collaborative partnerships to promote landscape-level conservation. Although these partnerships are largely driven by U.S. federal agencies, they aim to bring together diverse partners - including states, nongovernmental organizations, and research institutions - to develop shared regional conservation priorities and pool collective resources. Across the continent, the 22 LCC partnerships have each followed separate paths towards addressing regional cultural and natural conservation issues. In so doing, novel landscape assessment models and conservation outcomes are produced. Importantly, although these partnerships were uniquely designed to follow ecological regional boundaries, these ecoregions often cross internal political and land ownership boundaries leading to unanticipated consequences. This paper investigates how the LCCs have integrated cultural heritage and natural resources in landscape-level conservation, both ideologically and through the creation of multi-layered spatial models. Using the Appalachian Region LCC as a case study, I assess how data availability, stakeholder representation, and differential institutional priorities influence partnership activities. Specifically, I trace the iterative creation of a regional landscape conservation design (LCD), efforts to translate cultural resource issues into quantitative models, and processes of interdisciplinary and multi-institution cooperation. This case study may have broad implications for promoting integrated cultural and natural resource assessment both in North America and elsewhere.

86 Our feat of clay – populating the landscape of north Bedfordshire

Steve Crowther, Amanda Adams (Historic England, UK) & Matthew Tuohy (Bedfordshire Borough Council, UK)

Bedfordshire is an archaeologically rich County that has a diverse landscape mixing East Anglia’s fenland, southern England’s wooded hills and the Midlands’ rolling farmlands. The north of the County is dominated by a swathe of Oxford Clays, cut through west to east by gravel terraces of the River Great Ouse and its tributaries. The properties of clay soils have traditionally been seen as a limitation to identifying buried archaeology, but previous aerial mapping research in the region demonstrated the potential density and extent of early populations on the Oxford Clays. Over a few key recent years, Historic England’s aerial reconnaissance programme has identified and photographed extensive and exciting new cropmark sites in north Bedfordshire of potentially regional and national significance. Currently in its final phase, mapping results from the 875 square kilometres of the Bedford Borough National Mapping Programme (NMP) project is providing new insights on what was an intensive and complex Iron Age and Roman settlement pattern. Working closely with the County’s HER, the Aerial Investigation and Mapping (AIM) digital dataset is being disseminated to local archaeological professionals to aid landscape investigations, who pro-actively feedback relevant research results. The Bedford Borough NMP project is being undertaken by Skylarkeology, its two aerial archaeology specialists sharing 25 years of experience in aerial investigation and mapping and other historic landscape projects.

149 Snowdonia’s Early Fieldscapes: developing a regional mapping methodology

Emily La Trobe-Bateman (University of Sheffield, UK)

The paper will outline the development and application of a mapping methodology for my doctoral research on late prehistoric and Roman field boundaries and settlement in north-west Wales. These early fieldscapes are among the most complex in Europe, distributed across the northern and western fringes of the Snowdonia uplands. They are best preserved where later agriculture has had the least impact, meaning that their full extent, character and cohesion has become apparent from remote sensing data, initially aerial photography, but more recently through LiDAR. A large and rich LiDAR
dataset has formed the basis for the research, allowing rapid mapping at a regional scale. The paper will explore the wider methodological research context, focusing on the differences between Wales, where there is no active National Mapping Programme (NMP), and other countries, such as England, where there is. The contribution of uplands mapping and survey work to the formation of the archaeological record in north-west Wales will be evaluated and contrasted with other mapping programmes. A historiographical approach will be used to explore the link between methodology and data use, including its integration into regional and national records, influence on archaeological fieldwork and broader understanding of the past. The paper will go on to describe and critically review the methodology developed to map Snowdonia’s early fieldscape. This has involved: the use of the Relief Visualisation Toolbox (RVT), developed at the Research Centre of the Slovenian Academy of Sciences and Arts; an iterative approach to transcribing archaeological features from LiDAR which integrates with field survey work; developing criteria for digitising; the application of International and UK data standards for geodatabase schema; and approaches to analysing transcribed features. The main points will be illustrated with preliminary research results.

63 Interpreting recent and distant past settlements in South East Northumberland

Alison Deegan (Independent, UK)

The South East Northumberland Air Photo and Lidar Mapping Project (funded by Historic England) is creating a map and records of buried and upstanding multi-period archaeological remains from a wide range of historical and recent air photos and from lidar imagery. This area is rich in the remains of two particular types of settlement: enclosed settlement of known or likely Iron Age and/or Roman date and the pit villages of the mid-19th century and later. Investigations into the latter benefit from contemporary sources: maps, ground photography, business accounts, narratives and journalism and of course surviving examples. The more distant past settlements are understood through a small but growing sample of archaeological excavations, surface finds and the evidence of the cropmarks and earthworks. Do studies of the enclosed settlements and pit village have the potential to cross-over and mutually enlighten on themes of longevity, spatial organisation of activities, impetus of change, and monument preservation? Can a tangible link to the recent past mining communities help foster an appreciation of the less tangible earthwork and buried remains of much older populations? This paper will use a small number of case studies to explore these issues.

147 Chronology from Topography

Michael Doneus (University of Vienna, Austria)

Detailed topographic models derived from high-resolution airborne laser scanning (ALS) have become an essential source for archaeologists and heritage managers. So far, ALS is the only prospection technique, which can give detailed information on archaeological structures surviving under canopy on a regional and national scale. Additionally, ALS-derived digital terrain models come as 3-D datasets and a set of 2-D visualizations, which can be directly integrated with any other geographical data source and mapped in a GIS environment. In current practice, archaeological structures from ALS-based DTMs are mapped on different levels ranging from a site-based strategy (i.e. identifying and inventorying a distinct group of structures as a site) to a detailed interpretation of each individual archaeologically relevant feature in spatial databases. While all of these approaches aim at a more or less coherent map of archaeological sites and structures, they cannot account for the complex sequence of (pre-)historic occupation of woodland, where areas have become repeatedly subject to a variety of uses. Any systematic mapping of these kind of ‘palimpsest’ landscapes will result in a multitude of intersecting lines squares, curvilinear and round features representing its long-term use. In order to understand this ‘palimpsest’, functional units need to be identified and chronologically put in order. The presentation will demonstrate the use of a harris matrix to build a coherent chronological model of all mapped features.
from a complex case study. Each intersection displays a temporal succession of its features and therefore functions as a node within a stratigraphic sequence. Linking the resulting harris matrix with the GIS-based interpretation map, a relative sequence of archaeological structures can be inferred and functionally interpreted. The result is a diachronic sequence of human activity in a dynamic landscape.
SESSION 49G - ROMAN MILITARY LANDSCAPES

Al Oswald (Landscape Survey Group, UK), Chris Jones (Northumberland National Park Authority, UK) & Ian Hardwick (University of York, UK)

KEYWORDS. Roman; military; landscapes; army

Across Europe, the past fifteen years have seen a remarkable surge in archaeological research into the installations, battlefields and tactics employed by the Roman army, particularly in the late Republican era, most notably in Spain. This research has also extended to the social and economic impacts of the Roman military presence on native populations. In Britain the first major programme of research since 1907 into Caesar's invasions of Britain in 55 and 54 BC is under way, involving survey and excavation of Roman and native fortifications and a review of the socio-economic consequences of the campaigns. It hardly needs to be said that LAC 2018 will be held at the eastern end of Hadrian's Wall, a World Heritage landscape which overlaps to a significant degree with the Northumberland National Park and in which diverse and extraordinarily well-preserved military remains sit alongside abundant native settlements and their fieldscape. Archaeological survey continues to extend our knowledge of these remains, while excavation, notably at Vindolanda, is shedding new light onto the social landscapes inhabited by Roman soldiers and camp-followers. Unsurprisingly, differences across Europe in methodological approaches and theoretical expectations remain apparent. With much research ongoing and more not yet in print, this international session offers an opportunity to showcase some of the most important recent and current research in the archaeology of Roman military landscapes across Europe.

49G Part 1 - Tuesday 18th September, 11:00-13:00, Newcastle University

105 And all of a sudden, they are everywhere! The need for narratives to assess the diachronic impact of the Roman army in NW Iberia

José Manuel Costa-García (Universidade de Santiago de Compostela, Spain)

In the last two decades, Roman military studies have experienced a remarkable leap forward in Spain. The increase in open access to new geospatial datasets, the gradual digitalisation process experienced by the archaeological discipline as a whole, and the confluence with other European scholarly traditions have been decisive in this regard. In north-west Iberia, this impetus has led to the detection of several new sites related to the Roman army, many of them far away from the areas where the military presence was traditionally believed to concentrate. Despite its positive effects, this ‘discovery frenzy’ cannot hide the fact that we still know very little about these sites. Since many were temporary installations, it is usually difficult to recover enough material evidence for their proper characterisation and dating. Unfortunately, no real attention has been paid to the potential of landscape archaeology approaches to overcome these difficulties. The availability of new data actually stresses the need for their systematic management and analysis in order to develop holistic views on the impact of the Roman military presence in these territories. The study of aspects such as the morphology, defensive system or locational pattern of these sites allows us to understand the rationale behind their construction. Added to the data provided by visibility and mobility analyses, this can help us next to identify the dynamics of the Roman military deployment in a given territory. However, not all the questions related to the Roman conquest and occupation of north-west Iberia can be answered just by analysing the remains of one of the agents involved in the whole process. It is in the meeting of two strong archaeological traditions, the Roman military and the Late Iron Age studies where the foundations of new, postcolonial narratives on the matter can be laid.
41. The defensive wall of Giribaile, Andalucia in context

Luis Gutiérrez, María Alejo & Antonio Ortiz (Universidad de Jaén, Spain)

Giribaile is an Iberian oppidum, in the Guadalquivir region, close to Baecula, one of the best studied battlefield landscapes in Spain. Since 2014, we have been excavating inside the oppidum. At the moment, we are studying four main aspects of the fortification, including its defensive wall, through four extensive area excavations. The defensive wall is about 250 m long and 10 m high with a series of compartments in the top. This is not a normal design in the in this area of the Iberian Peninsula and we are trying to understand its function in the context of Second Punic War (218 – 202 BC). Recently, we have found a lead sling-shot of this period in the top of the barrier wall and other similar examples beside the wall, confirming the violent end of the settlement. The excavation campaign in the summer of 2018 will hopefully provide further evidence.

309. The landscapes of Julius Caesar’s landing sites in Britain: 55 and 54 BC

Andrew Fitzpatrick (University of Leicester, UK)

Julius Caesar invaded Britain twice, in 55 and 54 BC. For centuries, scholars have argued about the location of the places of Caesar’s embarkation and landing. In 1913, Francis Haverfield, one of the founding fathers of Roman archaeology in Britain, was moved to describe the subject as ‘a hopeless problem of scholarship’. Haverfield’s despair is understandable. The only tools available to him were the ancient historical sources and an understanding of the modern landscape. Today, a wider range of data is available and new tools allow the question to be examined in different ways. The new data includes evidence for landscape changes caused by natural processes such as coastal change, and by human activity, particularly land reclamation, and data from archaeological excavations. The new tools include Lidar, GIS, and Historic Environment Records. Combined with a critical re-reading of the ancient sources, it is now possible to identify the archaeological landscapes in which Caesar’s fleets landed and, in one case, the actual landing site. These conclusions also inform us about the landscapes in France from which the fleets set sail.

310. The landscape of Julius Caesar’s first major battle in Britain: Bigberry, Kent, England

Al Oswald (Landscape Survey Group, UK)

Soon after his landing in 54BC, Julius Caesar’s forces successfully stormed a British oppidum which he described, in a conventional phrase, as ‘a place admirably defended both naturally and artificially’. Since the early 18th century, this native stronghold has been equated with Bigberry, a hillfort near Canterbury in Kent. Based on his analysis of the local topography, the great Romanist Sheppard Frere suggested as long ago as 1967 that a Roman base should lie just to the north of the hillfort. With the recent discovery by LiDAR of a well preserved and very large enclosure (34 ha) in ancient woodland only a kilometre north of Bigberry, his prediction now appears to have been vindicated. This supposed Roman camp has a number of unusual features surviving as earthworks, some of which can be compared with Caesar’s better-understood siegeworks of 52BC at Alésia and Gergovie in central France. In addition, Bigberry itself has several features long recognized as being unusual, which fresh analysis suggests may relate to the Roman attack. Although the assault was ultimately concluded very quickly, when the 7th legion breached the hillfort’s defences using a ramp, consideration of the landscape as a whole suggests that Caesar may have been anticipating a need for a more prolonged effort.

312. The Roman assault on Burnswark Hill, Dumfriesshire, Scotland

John Reid (Trimontium Trust, Melrose, UK)
Burnswark Hill, topped by a hillfort and flanked by two Roman camps of unusual design and location, has drawn the attention of scholars and archaeological investigators for the last three centuries. Recent research using techniques and technologies common to battlefield archaeology has helped us recognise the true extent and ferocious character of the Roman assault on this hilltop. Using data retrieved from three seasons of work, we can now go some way to reconstruct this dramatically choreographed episode of warfare, which probably took place in the 120s or 130s. Our findings demonstrate the lengths to which the Roman army could go to secure a definitive outcome, especially when the reputation of the Emperor was riding on the result.

231 The Harzhorn Incident: a Germanic-Roman battlefield site in Central Germany

Philipp Hoelzmann, Michael Meyer (Freie Universität Berlin, Germany) & Michael Geschwinde (Niedersächsisches Landesamt für Denkmalpflege, Brunswick, Germany)

The Harzhorn forms a topographic bottleneck obstructing the north-south passage west of the Harz Mountains, about 150 km north of the Limes. The battlefield here, arguably the best-preserved in the Roman world, probably belongs to a campaign by the Emperor Maximinus Thrax (235 – 238). It is the focus of interdisciplinary research conducted by the Freie Universität Berlin and the Heritage Service of Lower Saxony. Detailed analysis of well-preserved, in situ finds have been used to reconstruct a sudden Germanic attack on Roman troops on the Emperor’s return from the northern plains to Mogontiacum (modern Mainz) in the autumn of 235. For example, Roman hobnails indicate the direction of troop movements, while projectiles define the positions of Roman artillery. The heterogeneous geology of the Harzhorn creates varying soil types and varying chemical and physical soil properties, resulting in different preservation conditions for the numerous and diverse artefacts, which are mainly metallic. The project presented here has two major parts. First, the finds are being analysed, interpreted and published, with a consideration of their archaeological context. Second, supplementary surveys and further pedological research should offer detailed information about the depositional circumstances and conditions influencing the conservation of the finds and features, in order to facilitate location and focus on key areas for future prospection. Besides pedological and geomorphological mapping, results from laboratory analyses are presented to define soil types and conservation conditions. Archaeological finds are concentrated reveal the focal points of the battlefield. The archaeological finds, together with laser-scan-based topographic analyses and geoscientific results, contribute to a geoarchaeological interpretation of this Germanic-Roman battlefield.

49G Part 2 - Tuesday 18th September, 14:00-16:00, Newcastle University

269 The Place-Making Effects of Roman Military Tropaea in the Provinces: Roman and Barbarian Identities

Jonathan Quiery (Durham University, UK)

Roman military victory monuments – tropaea – represent a unique form of architecture and artwork. My research utilises current place-making theories to investigate the cultural significance of tropaea erected in the Roman provinces and frontier regions from the late Republican period to the 2nd century AD. I am employing a cross-cultural and transdisciplinary approach to examine archaeological and literary evidence in order to explore the circumstances under which tropaea were constructed, the history of the relationship between the Roman and native peoples, ethnogenesis, and cultural assimilation. Why did the Romans manly build tropaea to commemorate military campaigns against the peoples of continental Europe and not elsewhere? Why did they cease to erect them after the 2nd century AD? A main strand of my research involves the use of GIS to analyse tropaea within their respective landscapes; this highlights their environmental significance in the making of Roman provincial and frontier places. The premise of the research contends that the Romans constructed provincial tropaea under certain conditions and that these monuments connote more than simply military strength; they
also address ancient identities and cultural elements of their interaction with the native people in conquered territories.

127 Recent Researches of Late Roman Defensive System of Claustra Alpium Iuliarum

Josip Višnjić (Croatian Conservation Institute, Croatia)

The defensive system known as Claustra Alpium Iuliarum is one of the largest and most complex monuments of Late Antiquity in the Northern Adriatic and Eastern Alps: an archaeological landscape. It stretches in an arc for over 130 km from the eastern foothills of the Alps, over the Slovenian Karst, which ancient writers called the Julian Alps or Alpes Iuliae, towards Kvarner Bay in the Northern Adriatic. Unfortunately, despite many centuries of interest and a century of research, international awareness of the significance of this remarkable defensive system is still at the earliest stage. The defensive system consisted of walls in the most vulnerable zones, together with watchtowers and fortresses. By using the dramatic topography of the landscape to best effect, it blocked all the important crossing-points that allowed passage from the east toward north-east Italy. At the same time, the system directed traffic towards the main, controlled roads of Tarsatica (Rijeka) - Tergeste (Trieste) - Aquilea (Aquila), Emona (Ljubljana) - Tergeste and Emona - Aquilea. This talk will present the findings of a comprehensive programme of research that has been conducted over the past decade, significantly increasing our knowledge about the organization, function and date of the Claustra Alpium Iuliarum. Due to the very large area that the defensive system covers and dense vegetation that covers it, up-to-date non-destructive methods of recording have been combined with traditional excavation.

141 Planning the Antonine Wall: an archaeometric reassessment of its installation spacing

Nick Hannon (Canterbury Christ Church University, UK)

The topic of the intervals between the Antonine Wall’s installations has frequently been debated, leading to the production of a number of hypothesised models. With the recent availability of LiDAR data covering the entire World Heritage Site, the opportunity has arisen to reassess this question. My presentation will argue that through the more detailed analysis of the measurements contained within this LiDAR data, rather than through their visualisation, new answers to existing archaeological questions can be obtained. It argues that a three-dimensional approach to measuring the frontier confirms that the siting of the fortlets on the Antonine Wall was based upon intervals of one Roman mile. However, local topological considerations determined the exact location of each installation. The use of a total viewshed analysis in a GIS environment allows the spacing-based model to be fine-tuned to produce a nuanced rationale for how the builders positioned the fortlets.

313 Hadrian’s Wall: overview of a military landscape

Matt Symonds (Current World Archaeology, UK)

The image of Hadrian’s Wall lodged in the popular mindset is that of a stout stone rampart majestically cresting picturesque crags. While the drama of this setting makes the appeal of the image understandable, focusing on it ultimately creates a misleading picture of the Roman frontier. Only about 12 Roman miles of the Wall’s 80 mile length traverses such terrain, with far longer stretches serving to divide gently undulating farmland. The Roman military’s stubborn determination to position the posts along Hadrian’s Wall at set spacing intervals has encouraged a belief that marked differences in the productivity and severity of the terrain were in any case a secondary concern. Factoring in both the human and physical geography on the Tyne – Solway isthmus illustrates how the army responded to, rather than ignored, the pre-existing situation on the ground and tackled the challenges presented by varied environments. This paper will explore why Hadrian’s Wall offers an excellent example of the
military’s struggle to perfect a method of movement control, set against a landscape of retreat, war, and entrenched local lifestyles.

**Final Discussion**

_Al Oswald (Landscape Survey Group, UK), Chris Jones (Northumberland National Park Authority, UK) & Ian Hardwick (University of York, UK)_

**Related posters (for poster abstracts, see p.213-230)**

225 _A new light on the Roman military complex of North Tawton (Devon, UK)_

_Chris Smart (Department of Archaeology, University of Exeter, UK) & João Fonte (Institute of Heritage Sciences, Incipit, Spanish National Research Council (CSIC) / Department of Archaeology, University of Exeter, UK)_
SESSION 50F – CONVERTING THE LANDSCAPE: MAPPING RELIGIOUS CONVERSION AND CONTESTED RELIGIOUS SPACE THROUGH LANDSCAPE ANALYSIS

Emmet Marron (Newcastle University, UK), Thomas Chenal (CNRS – Besancon, France) & Valentin Chevassu (University of Franche-Comte, France)

KEYWORDS. Conversion, cult sites, socioreligious networks, remote sensing, GIS.

Religious monuments are one of the most ubiquitous features on the palimpsest of landscape because these landscape provide a highly visible canvas on which agents (states, communities, individuals, religious groups) advertise the presence, dominance, or claimed dominance of their belief system. This session will examine the key role played by landscape in the case of contested religious space, particularly how the process of large scale conversion from one religion to another is manifested in the landscape. In recent years advances in remote sensing techniques, geophysical prospection and landscape analysis have enabled researchers to map the ebb and flow of religious tendencies more precisely and have allowed for more nuanced narratives for the processes of conversion. This session will explore a variety of approaches used to map this change from Late Antiquity to the Post-Medieval Period and will consider a range of questions that are still relevant to this continuously evolving field of research. Is it possible to distinguish a hierarchy of roles played by various site types in the conversion process (for example parish churches, private oratories and monasteries in the case of Christianisation in the post-Roman West)? How do the results from landscape analyses compare with the picture from written sources? How can we effectively map the interaction between religious, secular, economic and political networks? Is it possible to detect strategies of resistance and resilience by the pre-conversion religion? How have modern religious nationalist narratives and interventions affected religious landscapes? The session welcomes papers from researchers working on landscapes of conversion from Antiquity through to the Post-Medieval period. It is hoped such a wide perspective will allow for a fuller discussion of the common mechanisms by which the landscape is utilised during the process of conversion across a range of temporal and spatial scales.

Tuesday 18th September, 14:00-16:00, Newcastle University

159 Cosmologies and ecologies transforming the Nile Delta. Egyptians, Greeks and Romans

Israel Hinojosa-Balino (Durham University, UK)

The discussion about the city has been permeated with an idealisation of the urban form as conceived by the ancient Greeks and the Romans, even though in the entire world several urban forms were and are still created. A separation between what we think now, and what ancient people could have thought, must be made. Nowadays, scientific cosmology leads most of our understanding of the world. Most of our behaviour tends to be oriented by this knowledge. This cosmology is relatively recent, and while most of us take it for granted, it has been part of a long historical process of re-conceptualisation. Hence, we cannot extrapolate it to understand what the world was and how it functioned for people in antiquity. Years ago, some cultures used to believe in religion as a corpus of knowledge that could explain natural phenomena: religion created their cosmology. Some of them, for instance, thought that the Sun was turning around the Earth that the latter was flat and that there were some forces controlled by the supernatural, yet, in their realm, it worked perfectly. The hypothesis presented in this paper, suggests that these cosmologies and ecologies oriented the way they behave and can be perceived archaeologically in the way they transformed the landscape or built their settlements.
How was the world explained by the Egyptians, the Greeks, the Romans, the Byzantines, or the Arabs? Could this knowledge improve our understanding of the ancient world, particularly, the urbanism of the Nile Delta? If so, can we create a cosmologically oriented Geographic Information System (GIS), such that, by integrating all these cosmologies in a single framework, could help us to trace changes in the way they perceived their world, but also, to what extent this world was transformed accordingly?

52 Strange ways of dying: funerary landscapes at Kourion’s Amathous Gate Cemetery, Cyprus

Michael Given (University of Glasgow, UK)

The cult of the dead lay at the core of Cypriot polytheism of the 1st–3rd centuries CE in Cyprus. This can be seen in the wide range of commemoration practices at Kourion’s Amathous Gate Cemetery in southern Cyprus, including libation pipes, tombstones, funerary feasting, and funerary streets that mirrored the residential streets of the city above. These formal acts, movements, views, social interactions, and associations between places were essential for maintaining what were felt to be proper ways of dying. These were gravely challenged by the ‘strange ways of dying’ (De laude martyri 14.1, mid-3rd century CE) brought about by plague, war and other forms of mass death. It is striking that the demons invoked by 3rd-century CE curse tablets from Amathous were ‘buried in a communal grave, violently dead, untimely dead, not properly buried’. In Kourion, this was dramatically demonstrated by the earthquake of the 370s: the entire SW domestic quarter was destroyed, the houses never rebuilt, and, until modern excavations, the dead never recovered. Polytheism was unable to cope with these strange ways of dying. When Kourion was rebuilt in the 5th century, it was a Christian city apparently focused on a major basilica and the orthodoxy and paternalism of its bishops. For all the size of the basilica and its mass-conversion baptistry, however, only a fraction of the city’s residents worshipped there. The cemetery was reformulated as cist graves cut into the newly quarried surface, and even though grave goods were greatly reduced, there were still cooking pots and other artefacts associated with the old polytheism. This ongoing cult of the dead found its greatest expression in the martyr cults of the ‘strangely dead’ Christian martyrs, especially the cult that grew round the tomb of the fourth-century Saint Ermoyenis.

322 Christianising landscapes in the early medieval Aegean

Sam Turner (McCord Centre, Newcastle University (UK))

To understand the impact of religious change in the landscapes of the early Middle Ages is a significant challenge in many parts of Europe and the Mediterranean. Our knowledge of the structure and experience of sacred space after Late Antiquity is not only restricted by the difficulty of identifying sacred sites, but also by our relatively limited understanding of contemporary settlements and land-use patterns. Across much of the eastern Mediterranean, early medieval material remains have been hard to identify and there are few documentary sources relating to daily life. This paper discusses recent collaborative fieldwork on Naxos in the Cyclades which has begun to unravel previously unsuspected complexities. The island provides exceptional scope to explore the nature of Christianisation in the Early and Middle Byzantine periods in both rural and urban landscapes between the seventh and the tenth centuries.

236 Tombs and cells: the hermitic landscape of Christian Petra

Andrea Vanni Desideri & Silvia Leporatti (University of Florence, Italy)

The paper presents a first overview on the topography and typology of the Christian hermitic settlement according to archaeological data collected after the identification of a rupestrian chapel at the site of al-Wu’ayra, at the east border of the ancient town area of Petra, to be interpreted as a possible focal point.
of a monastic settlement preceding the Crusader castle. Beside the monumental religious buildings, mainly located in the middle of the town or in specific spots in the surrounding area, the less known hermitic settlement has been an important part of the religious geography and devotional life of Christian Petra, which even survived to the disappearance of the long lasting religious institutions, demonstrating its vitality as devotional reference point. Being simple reoccupations of Nabataean cultic or funerary complexes, through more or less substantial modification, or new foundations purposely accommodating natural cavities, some of the most interesting aspects of the phenomenon are the reasons guiding the choice of the spot, the building techniques and the organization. The paper is a preliminary report on a still progressing survey on hermitic installation, enriching the available panorama for Southern Jordan.

271 Exploring the desertum with GIS – A comparative landscape study of Early Medieval monastic landscapes in the Post-Roman West.

Emmet Marron (Newcastle University, UK)

The desertum is a regular motif in narrative accounts of the foundation of early medieval monastic sites – a remote wilderness, where the holy man and his followers can extricate themselves from the distractions of secular life and achieve a greater level of spirituality. The original monastic desert was that of St. Anthony in Egypt, but the term is used regularly in other saint’s lives in relation to monasteries founded in Post-Roman western Europe. As a result, monasteries have been traditionally seen as representing the vanguard of Christian activity in rural areas. While it is becoming increasingly clear that the desertum (in some cases heremus) was essentially a motif used to emphasise the religiosity of early monastic founders through a clear separation with secular life, this paper will examine, in practical terms, the reality of the deserta in question. The Marie Curie funded ChroMoLEME project (The Character of Monastic Landscapes in Early Medieval Europe) is using GIS to apply Historical Landscape Characterisation to a number of early monastic settlements across Europe. The paper will present the preliminary results from the comparative landscape study of sites in France, Italy, Switzerland and Belgium, examining how the reality of the archaeological record and the landscape setting of the site contrasts with the assertion in the textual sources that the monasteries in question were founded in a vast wilderness, demonstrating instead how they were closely tied into the pre-existing local social and political networks - and how they interacted with the pre-existing religious sites, both pagan and Christian. The fact that this project incorporates numerous sites, in distinct geographical contexts, means that it is well placed to provide an example of the challenges posed by applying geomatic approaches to areas with varying levels of coverage under the same overarching research question.

315 Ottoman Conversion Landscapes in Southern Crete

Lucia Nixon (Wolfson College, Oxford University, UK)

The conquest of Crete by the Ottoman Turks began with the capture of Khania in 1645; by 1669 the whole island had been conquered. The Ottoman Turks held the island until 1898. Cities were the first to be Ottomanised, through buildings and institutions, and these urban landscapes have been well-studied. On the whole, however, there has been less investigation of non-urban landscapes in Ottoman Crete. We know from documentary sources such as the British traveller Robert Pashley (1837) and the census of 1881 that a very high proportion of Cretans converted to Islam. Archaeological survey and other landscape work have produced additional data. This paper looks at three adjacent areas in southern Crete: Selino, Sphakia, and the Western Mesara Plain. Each of these areas has a different conversion landscape in term of conversion statistics, and sacred structures, both Ottoman and Greek Orthodox. These areas are relatively small – the area of Crete as a whole is some 8000 km. sq., and Sphakia, for example, is 472 km. sq. Such variation would not have been expected, especially given
that these areas are adjacent. I shall explore these differences and attempt to suggest some possible explanations.
**SESSION 51B – COASTAL DYNAMICS INTEGRATED IN LANDSCAPE ARCHAEOLOGY OF THE EASTERN MEDITERRANEAN**

Sjoerd Kluiving (Vrije Universiteit of Amsterdam, Faculty of Humanities, Netherlands), Pavlos Avramidis (University of Patras, Department of Geology, Greece) & Ingmar Unkel (University of Kiel, Institute for Ecosystem Research, Germany)

**KEYWORDS.** landscapes; eastern Mediterranean; coastal dynamics; archaeological narratives.

*Early Mediterranean civilizations made broad use of the coastal areas of the eastern Mediterranean, as is clear from Greek, Roman and Phoenician settlements. Coastal areas provided them with accessible food sources, as well as a geomorphological setting for harbours for transporting goods. From the geological point of view coasts are dynamic sedimentary environments, whose characteristics and nature change from time to time due to sea level fluctuations, changes in the sediment budget, tectonics and human impact. Coastal transitional environments also constitute important archives for the study of Holocene palaeoenvironmental changes, shoreline dislocation as well as sea level and paleoclimatic changes. This session contains interdisciplinary contributions that integrate sedimentological, archaeological, archaeometrical, historical palaeobotany, archaeozoological or landscape modelling and any other relevant approaches. Contributions from excavations that link the narrative of coastal eastern Mediterranean archaeology compared to physical processes are encouraged. The results of this session will be published in a special section of a peer-reviewed journal of landscape archaeology.*

**Wednesday 19th September, 09:30-10:30, Durham University**

**Introduction to Session**

Sjoerd Kluiving (Vrije Universiteit of Amsterdam, Faculty of Humanities, Netherlands) & Pavlos Avramidis (University of Patras, Department of Geology, Greece)

**115 Coastal Evolution of the Ancient Maritime Trade City of Tel Akko, Israel**

Matthieu Giaime (Department of Geography, University of Durham, UK), Gloria I. López Cadavid (CENIEH, Spain), Michal Artey (University of Haifa, Israel), Christophe Morhange (Aix Marseille Université, CNRS UMR 7330, France) & Nick Marriner (CNRS UMR 6249, Université de Bourgogne-Franche-Comté, France)

The layout of a coastal city is dictated by the position of the shoreline and any neighbouring river. The natural anchorages or harbours – lifelines of ancient coastal sites – may change and/or evolve overtime depending on the progradation or regression of the coast, leading to corresponding adaptations of habitation patterns, substantial changes to the main axis of settlement, and as importantly, land use changes and strategic positioning of the maritime lifeline of the site, the anchorage/harbour. Several attempts to reconstruct the ancient coastal landscape around Tel Akko have been pursued over the last five years using geological, geophysical and archaeological approaches. So far, these have been successful at depicting part of the ancient coastal interface and location of two of the ancient anchorage sites serving the prominent ancient Port City of Tel Akko. Our results demonstrate that from Bronze Age to Early Persian period, the southern facade of Tel Akko was privileged for the location of the anchorage because of the presence of the Na’amans River mouth. The anchorage shifted to the ‘open’ western coast of the tell during the Persian Period before its subsequent relocation to the rocky promontory of Akko in Hellenistic times.
77 Murder of AQHT in the light of coastline changes of the Kinneret lake in the Bronze Age, Israel

Michael Freikman (Ariel University, Israel)

The myth of AQHT, one of the most dramatic stories of the Ancient Near East, was uncovered in Ugarit and discussed by numerous scholars. AQHT, a long waited son of Dan’el, was given a magic bow by the gods. The Goddess Anat, who craves this bow, murders AQHT, leaving the body to be discovered by AQHT’s father, who buries it and curses the place where the murder took place in his grief. While the most intuitive approach was to treat this myth as a fictional story, several scholars, beginning with the legendary Albright, suggested identifying the lower Galilee as the geographical setting of the whole story. This suggestion was mainly based on the appearance of toponyms such as Beth Shemesh in Galilee, Beth Yerah, and even the lake of Kinneret. However, some aspects of the story keep puzzling scholars to this day. For instance, scholars had difficulties explaining how Dan’el was able to bury his son in the depth of Kinnereth. However, the results of the recent studies of the Galilee sea conducted by the geologists from Tel Aviv University can provide us with the clarification of the relation between the myth and the landscape. A circular megalithic monument, some 60m in diameter, discovered with the help of the sonar in the course of the survey conducted by this team, which is located on the bottom of the lake, perfectly fits the description of location of the burial of AQHT in the myth. In this talk I will present a comparative analysis of the landscape setting of the monument, along with the textual evidence and geological survey of the bottom of the Kinneret and propose that its construction is an evidence for an extreme change of the coastline of the Kinneret reflected in both textual tradition and architecture.

164 Multi proxy reconstruction of Late Holocene coastal depositional environments in a highly seismic region, Corinth Gulf, Greece

Alexandros Emmanouilidis (Department of Geology, University of Patras, Greece), Maria Triantaphyllou (Department of Geology and Geoenviroment, National and Kapodistrian University of Athens, Greece), Ingmar Unkel (Institute for Ecosystem Research, Christian-Albrechts-Universität zu Kiel, Germany) & Pavlos Avramidis (Department of Geology, University of Patras Greece)

The study of Mediterranean lagoonal environments, has given us the opportunity to have a better perspective about the palaeoenvironmental and geomorphological evolution of coastal systems as well as to how these changes interacted and affected the human societies. The study area is located at the northern part of the Gulf of Corinth, Greece. Being one of the most seismically active areas of Mediterranean with dozens of different seismic events been recorded, the study of a coastal systems in this region can provide useful information about how these seismic events affected the sedimentation and the depositional environments, as well as the coastal geomorphology. In order to reconstruct the palaeoenvironmental evolution of the lagoon three different cores were retrieved; one at the center part of the lagoon (depth 5 m) and two smaller transect cores (depth 2 m). A multi proxy analysis was conducted in the sediment sequence, including: a) high resolution geochemical analysis (XRF core scanning), b) grain size analysis, c) Total Organic Carbon (TOC %) and calcium carbonate content (CaCO3 %), d) micropalaeontological analysis, e) mineralogical analysis and f) magnetic susceptibility measurements. The sediments age was estimated through 14C radiocarbon dating. The interpretation of the collected data seems to coincide well with high dynamic events that took place in Corinth Gulf for the last 3000 yrs BP. A very well preserved soft sediment deformation structure was marked in the center core and seems to be associated with seismic events that have been documented in the region. The interpretation of geochemical proxies indicates different depositional environments and climatic conditions, characterizing the Aliki lagoon as a highly dynamic system but also as a great geological coastal archive for rapid palaeoenvironmental changes.
**82 Major floods recorded in the uplifted Ladiko-Makrisia basin near ancient Olympia**

Lea Obrocki, Andreas Vött & Timo Willershäuser (Institute for Geography, Johannes Gutenberg-Universität, Mainz, Germany)

Detailed palaeoenvironmental studies were conducted in the Ladiko and Makrisia basins near the Alpheios River and ancient Olympia (western Peloponnesse, Greece) to assess major landscape changes during the Holocene. Previous studies and literature data document that the area experienced crust uplift of minimum 13 m to 30 m since the mid-Holocene. Geological archives were sampled along a vibracore transect connecting the Ladiko and Makrisia basins. Sediment cores were analysed using sedimentological, geochemical and micropalaeontological methods. Geochronological reconstruction of major landscape changes is based on a set of 24 radiocarbon dates. Geophysical studies were carried out using electrical resistivity tomography (ERT) and Direct Push-Electrical Conductivity (DP-EC) measurements to detect stratigraphic changes and subsurface bedrock structures. Different hypotheses concerning the characteristics, potential trigger mechanisms and causes of the flood events were tested using a variety of different methodological approaches: Geomorphological and granulometric aspects, micropalaeontological contexts, geochronological data sets, numerical simulation of flooding events, local tectonic uplift, and the palaeo-climate background. We hypothesize that, during the mid-Holocene, the study area was affected by tsunami events, namely between 4360-4330 cal BC and 4320-4080 cal BC (H1) and between 2830-2500 cal BC and 2270-2140 cal BC (H2). Two younger flood events H3 and H4 during the 13/14th cent. AD and the 17-19th cent. AD, respectively, are possibly related to increased precipitation and flooding activity in the Mediterranean or to land-based geomorphological processes triggered by regional tectonic events. Neolithic, Chalcolithic as well as Early and Middle Helladic human activities documented at ancient Olympia were most probably affected by tsunami events H1 and H2. Sandy deposits of tsunami event H2 seem to have been used as a higher and dry base to construct the Apsidenhäuser in the Altis at Olympia. The site, already abandoned, was subject to major flood events associated with events H3 and H4.

**281 A Geoarchaeological Reassessment of the Theran Tsunami Hypothesis at Palaikastro, Crete**

Rachel Kulick (University of Toronto, Canada)

Twenty years after The Troubled Island (Driessen and Macdonald, 1997), the processes that led to the transformation of Minoan society and material culture in the Late Bronze Age, following the Theran eruption, remain up for debate. Multiple narratives of ‘collapse’ and crisis situations have been hypothesized as leading to the end of the Neopalatial period (end of LM IB, ca. 1470/1460 B.C.) (Cunningham and Driessen, 2017; Middleton, 2017; Cline, 2014; Driessen, 2013). One significant development has been the trend towards viewing Neopalatial changes as longer-term processes and discrete local processes that need to be treated on site-by-site bases. Anthropological research on concepts of crisis have further added to this discussion of social change and ‘crisis’—a term used differently by individuals, communities, and societies (Vigh, 2008; Visacovsky, 2017). Questions of crisis have also been important for individual sites on Crete, with the recognition of local and regional factors in collapse scenarios. Palaikastro has been studied in this regional narrative of collapse, and efforts to understand the post-Theran processes of transformation are on-going. Bruins et al. (2008) suggested that evidence from the coastline at Palaikastro proved the Theran tsunami significantly impacted the site; recently, Lécuyer et al. (2018) discusses a tsunami at Palaikastro as fact. However, on-site micromorphological and archaeological data does not support the hypothesis for a post-Theran tsunami (Kulick, in press). Together with coastal geomorphological and archaeological analyses (2018), new multi-proxy local narratives are being proposed for this Neopalatial period. This paper reassesses the tsunami hypothesis with recent micromorphological results from the archaeological settlement (2012-2015) and geomorphological observations from the excavations of Bronze Age structures on the
coastal promontory (2018) to suggest a more nuanced approach to understanding this complex coastal environment, within the broader background of ‘crisis’ situations and recent tsunami and storm surge literature.
SESSION 52D – LANDSCAPE ARCHAEOLOGY AS LANDSCAPE PLANNING

Gert-Jan Burgers & Niels Van Manen (Clue+, VU Amsterdam, Netherlands)

KEYWORDS. Landscape Archaeology; critical heritage studies; spatial planning and design.

Professional conservation ethics regarding archaeological heritage have experienced a paradigmatic change during the last decades. They are increasingly diverging from traditional approaches focused on protection through isolation of the heritage from its contemporary spatial and socio-economic contexts. As an alternative, they emphasize the potential role of heritage as a resource for regeneration and sustainable development is emphasised. This is stimulated by national policies and international conventions, promoting the integration of heritage in spatial planning and design projects (e.g. the Dutch Belvedere Memorandum, the English Sustaining the Historic Environment and Power of Place, the European Landscape Convention and the UNESCO Recommendation on the Historic Urban Landscape (HUL). In this developmental approach of 'heritage planning' the spectrum of archaeological heritage has come to include landscape at large, urban and rural; heritage is now commonly approached through the lens of landscapes, perceived as spatial and temporal palimpsests of memories and meanings, socially constituted and continuously redefined and designed. In current planning practice, those palimpsests are often considered vital building blocks and sources of inspiration with which to guarantee place-making, community cohesion and economic exploitation. Implementation of these (inter-) national policy frameworks is however faced with uncertainties that pose urgent questions to archaeologists. What are the critical spatial planning and related societal issues to focus on? How can scientific narratives inform and inspire design and decision making? How participatory concepts be developed that can support communities in formulating conservation aims and having their voices heard in heritage planning? New methods and tools are required to integrate scientific, professional and community perspectives on heritage in the planning process. This session invites papers that seek to address these challenges.

52D Part 1 - Tuesday 18th September, 11:00-13:00, Newcastle University

Introduction to Session

Gert-Jan Burgers & Niels Van Manen (Clue+, VU Amsterdam, Netherlands)

1 Using heritage for development in abandoned landscapes

Guillermo Reher (CSIC, Spain)

That establishing heritage at the heart of development is all but a dream in most places outside the Netherlands is no secret. But the application of that philosophy effectively underlies all calls for modern heritage management. In this paper we present the case study of Las Médulas (Spain), part of a landscape of abandonment and ageing. It will be the starting point of a reflection on the challenges brought about by multi-layered governance and the lack of research-to-planning transfer. In addition, the nature and impact of this heritage-led development will be assessed. Tourism, which is often seen as the ultimate lifeline for depressed heritage landscapes, needs to be part of a long-term solution to a cultural landscape, not the goal in itself. In the case study the role that tourism has will also be critically analyzed, given the potential long-term effects it may have. Part of the solution may lie precisely in granting greater power over this development process to the local inhabitants, and rely more heavily on the close coordination of researchers, planners and stakeholders. This paper, therefore, intends to challenge the audience with difficult questions, complicated problems, and few solutions.
74 Ancient Appia Landscapes Project: archaeological research and landscapes planning

Alfonso Santoriello (Dipartimento di Scienze del Patrimonio Culturale-Università di Salerno, Italy)

Benevento and the area east of the city (Southern Italy) are the subject of a research programme carried out by University of Salerno as part of the ‘Ancient Appia Landscapes Project’, to recognise environmental phenomena, socio-economic and production activities which have helped to settlement dynamics and population along the Appia in the Samnite territory. The ‘global’ approach of the study in the landscapes has allowed to formulate hypothesis of development of the route in this area (from Benevento to the so-called Ponte Rotto, near Apice) and to highlight, beyond a frustule of the Regina Viarum track, also the remains of structures related to a productive area. In addition to the scientific application, a further strand of work has focused on provision and communication of the results of the research and on the enhancement of the territory under investigation, according with the rules of Faro Convention: ‘... the conservation of cultural heritage and its sustainable use have human development and quality of life as their goal’. In such direction, the project aims to support and enrich the knowledge of the context in all aspects and forms, to bring out not only the relationship between environment and community, but also cultural essences as resources functional to development and self-preservation, through project proposal and memoranda of understanding aimed at promotion, enhancement and enjoyment of touring in rural fabric.

94 Historic Landscape Characterization (HLC) for a proposed Geopark in the USA

Charlie Yuill (West Virginia University, USA)

A three county region of the Eastern Highlands of the State of West Virginia in the USA (almost a million acres) is proposed for establishing a UNESCO Geopark for the Appalachian Mountain Region – one of two aspiring Geoparks in the USA. Geoparks are United Nations sponsored areas that serve to link and interpret important geologic and cultural histories and how they are often critically joined determinants of regional settlement patterns. Currently, there are no Geoparks in the USA, though there are numerous worldwide with the majority in Asia and Western Europe. The proposed Geopark region is internationally environmentally and culturally significant containing a major karst region with numerous extensive cave systems, as well as, the earliest coal mines and mining communities in the Appalachian Mountains. For example, the abandoned town and coal mine of Red Ash, which is in the region, is the location of the earliest commercial coal mine in the USA (circa 1870). Red Ash also represents a literal translation of Welsh coal mining practices into the Appalachian Mountains. Efforts have been underway for over a decade documenting archaeological and historic / cultural remnants in the region; first utilizing intensive fieldwork then various remote sensing methods, then airborne and terrestrial Lidar and most recently very high-resolution satellite data. The objective of this intensive data collection effort is to develop detailed archaeological feature and historic landscape characterizations of the region based on adaption of European historic landscape character methods (HLC) to the rugged landscape of the Appalachian Mountains. This presentation / paper will discuss data collection methods and results as well as our efforts focused towards adapting HLC methods to a mountainous forested landscape with a wealth of Native American, as well as African American and European American settlement remains and ruins.

177 Betwixt and between: post-industrial wastelands in the 'gap between past and future'

Karin Stadhouders (Faculty of Archeology Leiden University / LDE Centre for Global Heritage and Development, Netherlands)
Closely connected to this session’s theme is the topic of former working landscapes that have fallen into disuse and subsequently turned into archaeological wastelands existing in the ‘gap between past and future’: vacant and pending new developments, often valued as useless, loaded with negative connotations, or even forgotten. In my paper I enter into the specific category of post-industrial wastelands, that entails major challenges from the perspectives of both heritage and planning. I explore if and how a conceptual approach of their ‘interstitial state’ may help to better understand processes of landscape revaluation and transformation. Such interstitial wastelands are often rediscovered by ‘cultural pioneers’ - individuals or groups such as urban explorers, artists, squatters, activists, industrial archaeologists. With spontaneous, informal activities and on-site interventions, and by engaging in issues of reuse and redevelopment, these pioneers apparently influence processes of revaluation during which wastelands acquire new meanings, forms and functions. This phenomenon points to the potential emergence of a ‘creative force’ in interstitial wastelands - not as the fruit of formal planning instruments, but rather intrinsically unplannable. Aiming at an in-depth understanding of the origins and agency of this creative force I turn to the work of philosopher Hannah Arendt. Arendt argues that the quality of thinking needed to create something new, originates in the so-called nunc stans (‘standing now’) - a timeless in-between space incorporating both past and future. I connect this theory to the concept of liminal landscapes: landscapes between, or belonging to, different places or states. Thus I sketch the outline of an interpretive spatio-temporal framework for analysing real-life cases. I illustrate the topic and my approach with findings from my case study of the Quarantine Station in Rotterdam Harbour, elaborating on the material and intangible characteristics of the long-extended interstitial state of this heritage site.

247 Mapping Adriatic Landscape project. Non-invasive diagnostics for the archaeological impact assessment: in search for a balanced planning strategy between research, conservation and territorial planning

Federica Boschi (University of Bologna, Department of History and Cultures, Italy)

Throughout Europe, and especially in Italy, there is a growing need to reconcile the everyday development and demands of city life and an increasingly busy countryside with the interests of archaeological research and the protection of the cultural heritage passed down to us. The incoming Italian regulation on preventative archaeology suggests an analogous procedure to that adopted many years ago in other European countries, according to which diagnostic field evaluation techniques may support the preparatory desk-based assessment, assuming a relevant role for establishing the subsequent steps in the evaluation process. Nevertheless, recent experience in various Italian regions has demonstrated the existence of a patchwork of variations in putting the designated procedures into effect, partly because of uncertainty about the content of the procedures themselves and partly because of the operators’ varying attitudes and confidence concerning the effectiveness of non-destructive methods of investigation. Pursuing a balanced planning strategy, a way to go can be a concerted effort to achieve collaborative working between government agencies, commercial sector and universities with the aim of enhancing knowledge creation, conservation and public understanding of heritage sites and landscapes at a wide variety of scales. Within this ‘policy’, geophysics and non-invasive techniques can play a key role. In the last 10 years the University of Bologna has strongly worked on this way and gained experience in the non-destructive field evaluation. The paper focus on the most recent activities carried out within the Mapping Adriatic Landscapes project, based on the employment of geophysical and remote sensing techniques for the archaeological evaluation of a territory in the central Marche region, in agreement with Superintendency and local Municipalities. The case history discussed concerns the recent discovery of an important pre-roman archaeological site during an impact assessment operation and represents an example of this sought synergic work.
259 Archaeological heritage and territorial planning in Cilento (Southern Italy).

The territory of Elia/Velia.

Francesco Uliano Scelza (Parco Archeologico di Paestum, Italy), Jessica Elia (Independent, Italy) & Maria Tommasa Granese (Soprintendenza Archeologia, Belle Arti e paesaggio per le province di Salerno e Avellino, Italy)

This paper addresses the relationship between the archaeological heritage, the public administration and the territorial planning. In particular we introduce an archaeological project carried out by University of Salerno and the University of Amsterdam (VU) in partnership with the Soprintendenza Archeologia, Belle Arti e Paesaggio per le province di Salerno e Avellino, which aims at analysis of the organization of the territory of Elea/Velia (Southern Italy), city founded by Greek colonists in the VI century B.C. At the present state, the heritage condition of this territory does not constitute the object of a general and systemic policy. The archaeological knowledge is not exhaustive and complete; it is not organized in any public archives and it is not available for any use (public or private). In few words it cannot inspire investment (public and private) in order to valorise and promote the territory. In this general context our project follows two main guidelines: to renew and to collect archaeological knowledge; to seek new approach of using ancient remains. Our methodological approach comes from the awareness that there is no valorisation of the heritage without a valorisation of the territory and vice-versa. In this context the definition of cultural resource becomes the instrument, tangible or intangible, able to increase the quality of the territory. In the paper, first of all, we will focus on the scientific aspects of the project, with particular attention to the definition of archaeological source. Secondly, we will consider the issues of the public planning with the purpose to illustrate the current administrative situation of territory and its growth potential. In the third part we will show the Archaeological Resource Map, a system-tool which aim to integrate scientific activity into territorial policy. At the end we will promote a new definition of cultural valorisation of the territory.

260 Cultural heritage and sustainable planning in small island landscapes: the case of Therasia island

Emeri Farinetti (Roma Tre University, Italy) & Kostas Sbonias (Ionian University, Corfu, Greece)

Therasia, a small island opposite Thera (Santorini), has been under investigation since 2007 onwards through a multidisciplinary research, to trace the evolution of the small island which once was part of the larger volcanic island of Thera and to investigate the physical, historical and cultural characteristics of the landscape in a diachronic perspective. The case of Therasia offers key features for spatial and heritage planning in small scale island communities. Such environments are characterized by their small scale, isolation, and fragility of the natural and cultural environment, as well as by a distinctive identity. These features create advantages and attractiveness along with disadvantages as a result of marginality. Nevertheless, such small-scale landscapes usually preserve important ecosystems with distinctive archaeological, geological and historical characteristics, where the landscape palimpsest plays a crucial role in the creation of the island collective memory, to be taken into account in heritage planning and regeneration. Heritage landmarks of the island of Therasia, such as traditional anonymous architecture, settlement and spatial organization and a built environment adapted to the distinctive volcanic landscape, need to be taken into consideration for an alternative model of sustainable development, approaching the island as a whole. The scientific narrative on the island's landscape, generated through the Therasia landscape project, is currently being embedded into the process of decision making and spatial planning through the active participation of the local community.
288 Woodland Futures: The Potential and Challenges of Forestry Expansion

Caron Newman (Newcastle University, UK)

The paper sets out the results of the Woodland Futures project, which used GIS approaches to examine the ways in which the impact of woodland expansion on the historic environment and historic landscape can be measured. Woodland coverage in the UK is less than half the European average of 30%, and in England tree cover stands at around 10% of the country. The Government has made a commitment to increase the area of forestry coverage by another 2% by 2060. Woodland is seen as beneficial as it can deliver increased social, environmental and economic benefits to society. It also helps to safeguard clean water, help manage flood risk, can improve biodiversity and is a source of renewable energy. Woodland planting schemes, however, can have a significant direct impact on the historic environment and on the character of the historic landscape. The project plotted a series of historic and natural environment datasets across the whole of England. The datasets chosen had to be available for the whole country, with well-defined attributes allowing the application of a scoring system. The result was a thematic GIS-based map, showing the potential for areas to absorb new woodland. The aim of map was to identify and avoid areas of negative impact, as well as areas where the historic environment offered opportunities to inform and benefit planting schemes. The map was then compared to National Character Area, which are used by governmental and non-governmental bodies to inform a range of activities and to help monitor landscape change, including forest and woodland plans and strategies. The paper will consider how the spatial analysis can inform national policy and understanding of the historic environment at a landscape scale, as well as ways in which the GIS-based mapping can be enhanced.

Final Discussion

Gert-Jan Burgers & Niels Van Manen (Clue+, VU Amsterdam, Netherlands)
SESSION 53D – AGRICULTURAL LANDSCAPES OF THE PAST THAT EFFECT THE PRESENT AND INFORM THE FUTURE.

Carol Lang, Suzi Richer, Daryl Stump (University of York, UK) & Cruz Ferro-Vazquez (University of York, UK/ Universidad de Santiago, Spain)

KEYWORDS. Agriculture; resilience; sustainability.

Under current and future climate change predictions, natural resources (plants, animals, soils, water) will change in ways that will fundamentally affect all ecosystems, but of particular importance to the global community is the effect that it will have on food availability. ‘Future proofed’ farming systems, that deliver food and fuel security for an increasingly expanding market, must incorporate strategies that will enable farming landscapes to increase resilience and adapt to impacts caused by variability in natural resources and climate. New and innovative agricultural landscape management systems and farming practices, including conservation, multi-functional and climate-smart agriculture are attempting to develop precise, efficient and resilient farming methods. Alongside and within these advances there is a growing call to utilise traditional, historic and locally relevant evidence of past agricultural techniques to inform future agricultural practices. Landscape archaeology, through trans-disciplinary and multi-sectoral approaches well situated to contribute to discussions that:

1. test existing narratives around historic farming
2. provide case studies demonstrating reasons for agricultural change in the past;
3. investigate long-term change in terms of thresholds and tipping points
4. provide data to validate or test models of long-term change, such as climate models,
5. address issues of agricultural resilience and sustainability

The session focuses on the investigation of archaeological agricultural systems and how these can inform present day farming practices and management, notably relating to the points above.

53D Part 1 - Wednesday 19th September, 09:30-10:30, Durham University

Introduction to Session

Daryl Stump (University of York, UK)

132 Challenge of oasian farming: past resilience in the oasis of Dhayah (U.A.E.)

Sophie Costa (CEPAM, France), Hatem Djerbi (EVEHA, France), Maël Crépy (Archéorien, France), Julien Charbonnier & Gourguen Davtian (Université Côte d’Azur, France)

Agriculture in semi-arid oases is a balance between environmental variations and anthropic activities. Today in the United Arab Emirates, oases are progressively abandoned because of profound socio-economic mutations: extensive urban migration, mechanical pumping, groundwater salinization and desertification. Because oases are landscapes which have been exploited and transformed for millennia, we can suspect that these major socio-environmental changes have also occurred during historic times, probably since the last 5 thousand millennia when oases emerged in SE Arabia. Current oases, their state, organisation and exploitation result from these long-term interactions and dynamics. We consider that reconstructing them is necessary to understand the sustainability and resilience of agricultural communities. Which events and challenges did they face? How did they adapt? What was the short and long-term impact of their decisions on the landscape? The Ras al-Khaimah Emirate, at the crossroad between the Arabian Gulf, the Rub’al Khali desert and the al-Hajar Mountains, has been
occupied and cultivated for the last five millennia, but has also benefited from access to maritime resources and inter-regional exchanges with Mesopotamia and Indus. The coastal oasis of Dhayah in this Emirate is a key area to understand socio vs environmental changes and thresholds. This oasis has been investigated based on a diachronic and integrated study. We identified cultivation/abandonment cycles, evolution of soil and water management, and land degradation processes based on chrono-stratigraphy, pedo-sedimentary and soil geochemical analyses combined with source to sink studies, mapping and ethnographical interviews. Confronted with regional archaeological and climatological records, the long-term history of the Dhayah oasis will help us question the sustainability of oasian agriculture through the challenges it faced, visible shifts in subsidence strategies, the forcing events that impacted them, and the resilience of oasian communities.

306 Understanding the historical Engaruka community: Modelling historical water-management in 15th – 18th CE Engaruka, Tanzania

Tabitha Kemunto Kabora, Daryl Stump (University of York, UK) & John Wainwright (Durham University, UK)

The study of water-management systems in eastern Africa has been limited. Archaeological sites such as in Engaruka, Tanzania have long been studied due to the evidence of historical and contemporary water management practices. The abandoned agricultural system of Engaruka, located in a semi-arid region, has an extensive irrigation system made of a complex of irrigation canals and stone-bound fields covering approximately 20km². However, while stratigraphic and archaeological research point to the extent and structure of the extensive irrigation system in Engaruka, little is known about the dynamics of human-environment interactions that influenced its development and expansion. Agent-based modelling presents an opportunity to combine archaeological evidence with modelling techniques to develop reconstructions of the Engarukan system. These reconstructions would demonstrate the interaction of socioeconomic and environmental factors across a temporal-spatial scale in order to understand how this system developed. By representing the dynamic human-environment interactions and the key feedbacks, the study can represent the reciprocal impacts of human activity on natural systems and the effects of human landscape modifications on the environment. In this way, the research aims to identify some of the key factors that influenced the expansion of these systems and the effects of intensive agriculture on ecosystem resilience systems by providing a long term view of historical data. The research aims to refine our understanding of the sustainability and resilience of the historical Engarukan system, as well as having applications in modern water management.

217 Why built terraces? Dry-Farming Terracing and Rural Revival in Late Medieval Palestine

Yuval Gadot, Omer Zeevi (Tel Aviv University, Israel) & Bethany Walker (University of Bonn (Germany)

Terraced hillsides are one of the characteristic elements of the topography of the highlands of Bilâd al-Shām. Intimately tied to certain patterns of land use, land tenure, and water management (including the control of drainage from run-off irrigation), and requiring extensive coordination in labor for construction and maintenance, ancient agricultural terraces are an insufficiently explored window on pre-modern rural societies, which directly reflect traditional land use and labor organization. This paper utilizes the preliminary results of a newly launched, multi-disciplinary investigation of Khirbet Beit Mazmil in its terraced landscape. The project, The Medieval Jerusalem Hinterland Project, which is funded by the German-Israeli Foundation for Scientific Research and Development, combines archaeological excavations of a late Mamluk and Ottoman farmstead with survey, excavation, and OSL dating of relic terraces that historically belonged to its lands coupled with a critical analysis of medieval Arabic and Ottoman Turkish texts (legal treatises and fatwa manuals, agricultural manuals, geographies, local chronicles, and tax registers). Preliminary results unable us for the first time to place events of terraces
and fences construction within their social and economic context and evaluate how communal decision-making and family-based economy facilitated these events.

45 The Viking Age Slavs as pioneers of an environmentally sustainable land use

Jens Schneeweiss (Leibniz Institute for the History and Culture of Eastern Europe [GWZO], Germany) & Katja Wiedner (Martin Luther University Halle-Wittenberg, Institute of Agricultural and Nutritional Sciences, Germany)

In the Viking Age (between 8th and 11th century A.D.) the South and East of the Baltic Sea area was to a great extent inhabited by Slavs. In general, they used to feed largely on subsistence farming within local communities. New interdisciplinary research on the genesis and historical significance of Slavic deep black anthrosols (‘Nordic Dark Earth’) suggest intentional soil amelioration connected to effective faeces management, generating long-term sustainable high yields on limited areas. Even today abandoned Slavic settlement sites often provide the most fertile land in modern fields. The existence of the Nordic Dark Earth in the temperate zone of Europe demonstrates the capability of sandy-textured soils to maintain high soil organic matter contents and nutrient retention over hundreds of years. Furthermore, the extraordinary high fertility allows the development of new models for agricultural practices. One focus of the research is the role of Slavic cultivation of land for the sustenance of Viking Age central settlements in the East European forest zone. The latter are the first early urban entities in that part of Europe, faced with problems of supply and disposal. A resource management (including faeces) oriented on farming could have provided an exemplary solution for those problems and could have had a great impact on the development of those sites. High yields from relatively small areas allowed to provide many people in a limited space with food. Many socio-economic changes are connected to the end of the Viking Age, such as the consolidation of princely states, internal colonization, land development or the transformation to market-oriented grain production. Little research has been done on their influence on agricultural land use until now, although the contrariety between market-independent sustainability and market- or toll-oriented economic strategy can be seen as a supra-epochal aspect of modern globalized societies.

53D Part 2 - Wednesday 19th September, 11:00-13:00, Durham University

277 Resilient Landscapes: Terraces and Settlement Ecology of the Lowland Maya

Timothy Murtha (University of Florida, USA), Charles Golden (Brandeis University, USA), Andrew Scherer (Brown University, USA) & Armando Anaya (Universidad Autónoma de Campeche, Mexico)

This paper will investigate the long-term human impacts of agricultural intensification on landscape in the Maya lowlands of southern Mexico. We do so through a comparative inventory and analysis of (LIDAR) transects extending from the states of Chiapas north to Yucatan and Quintana Roo. Originally collected for environmental purposes as part of the REDD+ carbon inventory of southern Mexico, these data offer a uniquely expansive survey of anthropogenic landscape modification (terraces) and land use resilience across the region. Preliminary analysis of these data suggests important variation in the form and distribution of terraces as compared to evidence for past household remains and settlement densities. Unlike traditional archaeological studies of agricultural landscapes, this paper and our project in general investigates resilience in the past to inform the present in several key ways. First, our macro-regional comparison of settlement and terracing will transect the most extensive range of ecological settings yet analyzed for the Maya Lowlands. The data and analytical methodology used in our macro-regional comparison samples contiguous transects over multiple topographic and ecological regions,
across a diversity of hydrological and precipitation regimes, critical for understanding modern land use change. Past studies explored the role of landscape intensification focused on political organization, but, ours evaluates how settlement and ecological conditions influence intensification patterns at the household and community scale. Second, our approach offers a new method for sampling and re-purposing existing airborne LIDAR data in archaeology and specifically, lowland archaeology, thus broadening the scope of data available for research in the region and tightly linking modern studies of the forest to past land use. Shrouded by a canopy, the lowland landscape is embedded with a critical narrative of landscape, agriculture, household, and community resilience that can offer critical information about modern land use change across the diverse ecology of the lowlands.

**Final Discussion**

*Daryl Stump (University of York, UK)*

**Related posters (for poster abstracts, see p.213-230)**

30 Agricultural landscape development of the Meshchera Lowlands (European Russia) - reconstructions by palaeoecological and historical data

*Victor Matasov & E. Yu. Lovenko (Lomonosov Moscow State University, Russian Federation)*

56 Initial stages of anthropogenic transformation of landscapes in Central Russia

*Viacheslav Nizovtsev (Lomonosov Moscow State University, Russia Federation) & Natalia Erman (IHST RAS, Russian Federation)*
Urban transformation – for example new housing and infrastructure – alter urban landscapes and represent challenges and opportunities for cultural heritage. The cities that will prosper in the future are those that can handle change and have the capacity to adapt to new needs while at the same time activating their long-term memory as a vital resource. Politicians and planners regularly make decisions on which existing structures and archaeological remains must give way to new land use, and which should be protected for the future. Urban heritage regularly appears in policy papers and strategic documents, where it is generally described in positive terms and portrayed as a historic asset in need of long-term safeguarding. In everyday planning practice, however, cultural heritage is rarely given top priority and is even neglected in favour of developments claimed to be better suited to modern economic conditions. In this session, we will ask when, where and how urban heritage becomes marginalised, and when, where and how it is activated? Planning sometimes uses heritage as a kind of ‘camouflage’ to hide other purposes, but heritage can also in various ways rejuvenate and transform towns and cities. We wish to know more about the extent to which urban heritage appeals to the actors involved in city planning and to the users of the city; we also wish to gain insight from cities that have chosen to give priority to heritage as a vital driving force in planning for the future. We welcome papers from many countries and from several disciplines, perspectives and scales to allow comparative discussion of current theoretical and methodological approaches. We hope the session will instigate a rich discussion of the role urban heritage is playing in urban transformation and the creation of future urban landscapes, in the context of the complex nature of contemporary heritage issues regarding sustainable development, resilience, and social justice.

Wednesday 19th September, 11:00-13:00, Durham University

268 Grotesque and Picturesque: A Dynamic Archaeological Approach to Urban Landscape
Santiago Villajos (Autonomous University Madrid, Spain)

This paper introduces a theoretical and methodological framework to landscape for producing archaeological studies in urban settings. It starts by introducing the notions of grotesque and picturesque, which have a long tradition tracing back to the Eighteenth and Nineteenth centuries. By considering the notion of the grotesque in William Kent and Charles Dickens, they are related to particular contexts in which urban colonisation of either natural or rural resources acquires a crucial role as a process. These aesthetic approaches are engaged with post-colonial theory from the critical ecologic positioning of landscape archaeology. Then, a hybrid methodology is introduced for analysing landscape within a particular kind of urban setting which, though contemporary, can be characterised to be in a protohistoric state of knowledge. By following John Ruskin's notion of the grotesque and stratigraphic procedures, it develops an analytical mean for producing dynamic analyses to urban landscape that allow detecting different spatial facies from clustered graphical expressions of the standing buildings’ chronological dimensions and their overlaying on a sequence of historical maps and aerial photographs in a GIS. In addition, this procedure is combined with cultural studies in order to shape a particular contextuality for any significant strata, both from relevant literature, painting, photo archival records and film manifestations attached to the area of study. Research results presented here demonstrate the potential of this method for contextually understanding the social construction of processes of urban colonisation and landscape transformation at particular spatial settings where
historical sources are scarce or inexistent. Further lines of research should be driven to further incorporate ethnographic means for safekeeping and enhancing intangible heritage attached to the spatial entities, in order to better understand migrations, interculturality and diasporas within the colonising processes. Finally, the resistance of local authorities to support these investigations reveals the tensions of public archaeology.

38 The Temporal Dimension in Planning for the Compact City
Grete Swensen (NIKU - Norwegian Institute for Cultural Heritage Research, Norway)

After years of scattered and spread-out building in urban regions, more sustainable urban development is pursued. The ideal of densification and planning for the ‘compact city’ is generally considered to represent a sustainable urban form. Parallel with the growing environmental consciousness of the general public, the urban lifeform has changed status. Whereas previously it was identified with environmental problems and social and economic injustice the city is now viewed as an arena of vast potential. It is imbued with vitality, creativity and diversity and regarded to represent a wide range of opportunities. Increased use of private-public partnerships can result in cooperation that enables new building projects as well as the redevelopment and revitalisation of dilapidated neighbourhoods. However, frequent use of plans initiated by the private sector might, in certain national contexts, can lead to greater fragmentation and thereby undermine long-term planning. In this paper the main research question is: How does planning for the compact city comply with the need to ensure that urban heritage and its temporal dimension is safeguarded? Two neighbourhoods in the city of Bergen are selected as case studies. One is a transformation project that was completed in 2006 (Solheimsviken) while the other is just starting up (Laksevåg). They are both situated on brownfields from the shipbuilding and mechanical industry that closed down recently (est. 1855). The heritage structures in the two areas are well documented. But to what extent are they still visible and play an active role in urban life, and what methods are used to mediate the history of the area? The close-up study of the sites illustrates how history can be linked to a selection of key symbols (industrial machinery used as ornaments, place-naming, etc.) or to a composed and designed reactivation of historic traces (functions as well as forms).

35 Collective heritage and urban politics: An uncertain future for the living culture of Rio de Janeiro
Véronique Karine Simon & Einar Braathen (NIKU - Norwegian Institute for Urban and Regional Research, Norway)

Brazil is in the midst of great political and economic crisis and social upheaval that accompany severe cases of corruption, agro-industrial expansion in the Amazonas, questionable environmental and indigenous politics, deployment of military force against the poor, and population displacements. In the city of Rio de Janeiro, recent urban transformations since the early 2000 led to significant changes in the historic core of the city and the favelas. The population removals, evictions and physical destruction of neighbourhoods that followed resulted in violent forms of local and national protest and visible resistance from the residents, activists and scholars. The societal cost was widely reported in the literature and the media. But what happens to the cultural heritage, identity and memories attached to the displaced people and the disrupted places? We draw attention to the collective nature of the cultural heritage of the favelas and argue that the current authoritarian and globally-informed political and planning decisions made about favelas cannot accommodate the living culture which lies in the collective social practices and everyday rituals of social life. To support our arguments, we combine a case study of two favelas of Rio – Vila Autódromo and Morro da Providência – that have been severely affected by the recent planning projects of the mega-events of 2014 and 2016. The results reveal that urban transformations cause, along with social and psychological trauma, undue stress on the collective heritage of these communities. They highlight the potential of collective heritage in participation processes in urban development projects as an insurgent factor.
292 Sustainable landscape redevelopment of Kano traditional city through cultural heritage revitalization

Mohammad Falaki & Idris Iliyasu (Ahmadu Bello University, Zaria, Nigeria)

Kano walled city is one of the largest cities in sub-saharan Africa. The city’s spiritual, historical and cultural significance got it on the tentative list of UNESCO World Heritage Sites. Most of the cultural and historic activities take place in the traditional open spaces at the city hub. The traditional open spaces frequently face challenges due to urban transformation, such as traffic generated at peak periods and inconvenience to pedestrians and spectators during festivities and cultural events such as the Durbar processions which are chaotic. The core of the city is losing its face as the traditional node of the State. The Emirate Council is the custodian of cultural heritage of the city and is responsible for managing traditional open spaces. The council is lacking in employing Planning strategies in conserving the heritage value of traditional open spaces. The paper assessed the cultural heritage of Kano walled city as it relates to traditional open spaces and provided a framework for sustainable cultural landscape redevelopment. A qualitative approach was adopted by conducting interviews with stakeholders and review of literature on the history, planning and regulations governing the management of Urban heritage in the city. The findings identified challenges facing the management of the traditional open spaces which includes; competition for space between public and Emirate uses, absence of defined planning strategies in place, rigidity in the management and use of cultural spaces, and poor regards to landscape features in the area. The recommendations made are the need for the enforcement of urban planning laws, adoption of effective management strategies for use of cultural spaces, the need for a landscape development plan that will provide guidelines for management and development of cultural elements for a sustainable and resilient cultural city.

4 Enable the Deep City in Urban Design: The planning and public reception of a ruined building in downtown Oslo, Norway

Torgrim Sneve Guttormsen & Véronique Karine Simon (NIKU - Norwegian Institute for Cultural Heritage Research, Norway)

A concept of deep cities that includes new ways of thinking about archaeology as a metaphoric concept of temporality and the long-term duration of time will be a valuable resource in urban planning and urban development projects, as it combines the need for change, the need for new cultural imprints in the city, and the deep historic continuity of the city. In this presentation we will discuss how a fragmented past is ‘negotiated’ into urban projects and how the public (the reception) reacts to the results of such projects. The project investigates how archaeological heritage, such as ruins, is included in urban environments and the reasons for the choices that are made when the deep city is involved urban planning. The case study used for our discussion is how and to which extent the aesthetical qualities associated with the decline and ruins of ‘Tukthusgården’ – a 18th century prison or house of correction in downtown Oslo – are successfully integrated in the city.

304 Redeveloping landscapes of war – archaeological heritage from the German occupation of Norway in the context of urban planning

Kristoffer Eliassen Grini (Norwegian University of Science and Technology, Norway)

During the Second World War, Norwegian landscapes and cities in Norway underwent radical material changes. The German occupation forces’ annexation of existing infrastructure and the implementation of large and small construction enterprises transformed central urban areas. The material remnants of the occupants are still very much a part of contemporary Norwegian land- and cityscapes, physical and mental reminders of complex historical circumstances. A central hub in Hitler’s plan for a Nazi-dominated Europe, German construction activity changed the city of Trondheim in ways that still defines it today. Airports, railway lines, roads, camps, air defence and coastal fortifications, and buildings of all sorts redrew the map of the city. The most spectacular construction of all was the U-boat base project
Dora. Through its solidity and size, Dora is, despite 70 years of post-war use, well preserved and perceptually highly present. The hundred thousand tons of concrete and brick is a prominent trait of the landscape. Dora provide exemplary material to shed light on a whole series of heritage issues. It bears material witness to the role played by Norway in the greater German war strategy, to war historical issues, but also to the occupants’ use of forced labour and national collaboration. In addition, the post-war uses and redevelopment of the site, offers material to understand how the Norwegian society related to its wartime history, and in different ways negotiated the presence of this massive piece of painful heritage. Through diachronic landscape analysis, the examination of the site shows how post-war Norway dealt with the memories of war and occupation. Several distinct strategies stand out, such as demolition, disregard, continuous use and redevelopment. Current plans of redeveloping Dora as a part of a harbour redevelopment program, brings to the fore a plethora of issues related to cultural heritage management. Given the discipline’s emphasis on the physical traces of human history and behaviour, an archaeological analysis of the site will provide both material perspectives and tangible evidence to the planning process of the ongoing modern landscape development. Such an undertaking is fit to show that these material traces and landscapes make visible aspects of the past that otherwise elude conventional historical narratives. As the case of Dora carries with it the whats, hows and whys concerning preservation of material heritage, it is a point-on case in a dialogue between present and past in relation to the development of urban environments.
**SESSION 55/3A - MULTI-PROXY ENVIRONMENTAL ARCHAEOLOGY IN AQUATIC SETTINGS: MARINE, LAKE AND WETLAND SEDIMENT ARCHIVES**

Maarten van Hardenbroek, Helen Mackay & Andrew Henderson (Newcastle University, UK)

KEYWORDS. environmental archaeology; sedimentary archives; multi-proxy; taphonomy.

Paleoenvironmental records provide long-term perspectives on human activities and climate with resulting changes in vegetation and fauna. Coastal settlements expanded after the Holocene marine transgression came to a halt interacted with erosional-sedimentological processes and migrating shorelines. Similarly, lake and wetland settlements also provide evidence of human activities in sedimentary archives. Recently, several interdisciplinary studies have shown that the combination of geomorphological, geophysical, palaeoecological, biomolecular, and geochemical methods is an especially powerful and effective approach to evaluate coastal and lacustrine archives. A better understanding of the biases and uncertainties related to taphonomic processes and analytical procedures are especially desirable. We particularly welcome studies that showcase methodological developments of geophysics and use of sedimentary biomarkers (e.g. DNA and compounds that can be linked to specific human/animal activity). Studies that combine abovementioned approaches to provide an integrated picture of palaeo-landscapes will also be highly appreciated.

**Wednesday 19th September, 09:00-10:30, Durham University**

179 A multi-proxy approach to the settlement dynamics and landscape of the Gironde estuary (SW France)

Elias Lopez-Romero (LabEx LaScArBx - Univ. Bordeaux, France), Florence Verdin (CNRS-UMR5607 AUSONIUS, France), Pierre Stephan (CNRS-UMR6554-EPOC, France) & Frédérique Eynaud (CNRS-UMR5805-EPOC, France)

Located in the Nouvelle Aquitaine region in SW France, the Gironde estuary is the largest estuary in Western Europe, having been a region of population attraction since prehistoric times. During the 1970s and 1980s, intense research was undertaken in the southern margin of the estuary, an area with a long and highly dynamic coastal façade. In the last few years, the combined action of increased coastal erosion and human pressure seriously threatened the integrity of one of the most relevant archaeological sites in the region (La Lède du Gurp in the municipality of Grayan-et-l’Hôpital) and exposed a whole array of previously unrecorded archaeological remains across the coastal band between this site and the northern sandy beaches (Amélie area in the municipality of Soulac-sur-Mer). In this context and since 2014, new interdisciplinary research in this area is providing fresh information on the settlement and landscape dynamics and on the long term interaction between human societies and the environment. Owing to the sedimentary context and of the exceptional preservation conditions of organic remains a multi-proxy approach has been possible which combines archaeological, geomorphological, palaeoecological and geophysical methods. In this paper we will discuss the different methods that have been set up so far for the analysis of these settlement and landscape dynamics in the Gironde estuary from prehistoric times to antiquity, some of the preliminary results obtained as well as the new perspectives implemented in the ECOREST project (funded by the LaScArBx cluster of excellence at Université de Bordeaux) that will run from 2018 to 2020.
The evolution of Güllübahçe Alluvial Fan (Söke/Aydın) Preliminary Results of Sedimentological and Paleontological Analysis

Rifat İlhan Adiyaman (University Department Geography, Turkey) & Ertuğ Öner (Ege University Department of Geography, Turkey)

Preliminary results of the sedimentological and paleontological analysis of the samples taken from the drilling were presented in this study. Drilling was performed at the junction of alluvial plain and Güllübahçe alluvial fan. The coring depth is 19 m below ground surface. Eighty – one samples for laboratory analyses were taken from the open sediment cores. Sedimentological characteristic of this core was determined using the some sedimentological analysis such as colour, magnetic susceptibility and grain size. Color analyzed using SpectraMagic colour measurement software package. The magnetic susceptibility of sediment was measured by a Bartington diameter (bart soft program) attached to an external dual frequency sensor. Grain size analysis for drilling was determined using a laser particle size analyser (LS13320). Grain size parameters (mean, mode, median, standard deviation, skewness and kurtosis) were used to represent the grain size properties of the sediment. Macro and microfossil analysis were carried out for 81 samples. Taken sediment samples were wet-sieved with a 120µ mesh for microfossils analysis of the core samples. Ostracod, foraminifera and mollusca (including gatropada and bivalvia) were picked from the residues of every sample under a microscope. All macro and microfossil have been documented by microscopic photography. Macro and microfossils were found in several of the freshwater, brackish water and marine environments. Different sedimentological analysis and macro – micropaleontological data have been used to understand geomorphological development of the Güllübahçe alluvial fan.

Applying sedaDNA and biomarkers at lakeside archaeological sites

Maarten van Hardenbroek (Newcastle University, UK), Tony Brown & Helen Mackay (University of Southampton, UK)

Wetland sites, including settlements on lake shores and artificial islands, often provide a wealth of well-preserved archaeological material, but are generally difficult and expensive to excavate conventionally. An alternative, or complimentary approach, can be the retrieval archaeological data from lake sediments, which can under certain conditions contain a continuous record of the archaeological site, the lake and its surrounding catchment. Here we present early data from a study of three crannogs (artificial island settlement) and an Iron Age lakeshore village in Scotland where sedaDNA data was analysed from proximal sediment cores. The sedaDNA provides detailed information about the plants and mammals that lived, died, or were kept on the sites in different periods of site use. This information is compared with a range of traditional palaeolimnological proxies that allow us to differentiate between (i) changes that happened regionally in the lake catchment (based on pollen, x-ray fluorescence scanning, stable carbon and nitrogen isotopes, n-alkanes), (ii) changes that happened in the lake ecosystem (based on loss-on-ignition, diatoms, biogenic silica, invertebrates, C:N ratios), and (iii) changes that occurred very locally at the sites (based on pollen and spores, invertebrates, sterols, PAHs, and sedaDNA). Our sedaDNA results complement data from both archaeological excavation and traditional palaeoenvironmental proxies to provide a more detailed and robust image of the environment in which our ancestors were operating. We also show that different proxies in the same sediment core provide insights in past environments at different spatial scales.

Discussion

Maarten van Hardenbroek & Andrew Henderson (Newcastle University, UK)
Related posters (for poster abstracts, see p.213-230)

20 Multiproxy analysis of submerged coastal palaeolandscapes and the application of sedimentary DNA: the impact of inter-tidal environmental variability on ancient DNA preservation
Rosie Everett, Roselyn Ware & Robin Allaby (University of Warwick, UK)

155 Weichselian Lateglacial environmental and vegetation development in the Moervaart palaeolake area (NW Belgium); implications for former human occupation patterns
Johanna A.A. Bos, Nelleke van Asch (ADC ArcheoProjecten, Netherlands) & Philippe Crombe (University of Ghent, Belgium)
SESSION 56D - A ‘NATURAL’ PLACE FOR LANDSCAPE ARCHAEOLOGY: PERSPECTIVES IN INTERDISCIPLINARY RESEARCH AND LANDSCAPE MANAGEMENT IN NATURAL PARKS

Alessandro Panetta (Laboratory of Environmental Archaeology & History [LASA], University of Genoa, Italy) & Anna Maria Stagno (Laboratory of Environmental Archaeology & History [LASA], University of Genoa, Italy/Cultural Heritage & Landscapes Research Group [GIPyPAC], University of the Basque Country, Spain)

KEYWORDS. Natural parks; heritage; landscape management; environmental resources; common-lands

Natural Parks’ are very peculiar places. Commonly perceived and labelled as mostly ‘natural’ places from the perspective of rural/natural heritage, they are nevertheless, just as any other landscape, the result of interactions between humans and their environment. ‘Natural Parks’ is a contemporary category, which breaks the continuity of landscape into discrete entities, subject to ‘external’ fields, subjected to conservation, protection and research. But there is a further category in the middle of those entities: these are the resident communities, historical and in the present. The present heritage of natural parks was shaped by local communities through agro-forestry-pastoral practices, in which the organisation of husbandry and the juridical status of common-lands played a key role. Most natural parks are in mountain areas; it is no coincidence that in many medieval documents the Latin noun monte defines both the geomorphological object and its jurisdictional nature of shared area (commons). Investigating this superposition of concepts requires a holistic approach, which gives rise to new reflections about the present management of Natural Parks. This session will tackle strategies shared by archaeology with other disciplines. Among them the most relevant one is historical geography, which is essential for the comprehension and reconstruction of the historical processes which shaped current Natural Parks. Then, through the interdisciplinary approach, it is possible to connect historical reconstruction with present management, find new approaches for the management of landscape, and involving local actors and communities both as a historical source for the reconstruction of local practices and as an active force for current conservation. This session will include papers from Europe and the USA which will 1) engage with natural/cultural interrelationships, going beyond the dichotomies between on-site archaeology and off-site landscape archaeology or environmental archaeology; 2) explore case studies from natural parks of different sizes (from regional to national ones), highlighting their archaeological character and social and jurisdictional dimensions; 3) present good practices of public engagement and discuss the role of archaeology in the construction of a more complex perception of the heritage and landscape of parks, emphasizing the impossibility of dividing their natural and cultural aspects and the possibility of using archaeology in planning park management (e.g. the reintroduction of historical practices), and 4) engage with various temporalities: even though the long-term perspective is important, practices and activities can also have other significant temporal and life cycles.

56D Part 1 - Thursday 20th September, 11:30-13:30, Newcastle University

Introduction to Session
Alessandro Panetta & Anna Maria Stagno (University of Genoa, Italy)
248 Enhancing mountain archaeological heritage in the natural park of Nuria and Coma de Vaca Valleys (Girona, Spain)

Pau Olmos & Josep Maria Palet Martinez (Catalan Institute of Classical Archaeology, Spain)

The Research Group in Landscape Archaeology (GIAP) of the ICAC has been carrying out since 2010 a research project in landscape archaeology at the natural park of Nuria and Coma de Vaca valleys in the eastern Pyrenees (Catalonia). Thanks to its easy access and its well preserved natural heritage, this is one of the most important areas for mountain tourism in Catalonia. In this area, the decline of traditional activities and the touristic pressure is one of the main dangers for heritage conservation. In order to reduce the risk of destruction of cultural heritage and raise public awareness among local communities, some specific training in mountain archaeology has been carried out with local stakeholders, such as refuge guards, forest rangers and mountain guides. As we have noticed, in this area, cultural heritage to be preserved is mainly unknown to park visitors, so our first step has been to promote activities to the wider public which integrates cultural and natural heritage. Thanks to the collaboration of natural park owners, some cultural heritage itineraries adapted to families and trekkers have been created. Recently, to bring landscape archaeology to younger people, we have started a pilot project with the collaboration of high school students of the Ripoll IES, transmitting to a pilot group of young people aged 15-16 years the research carried out by the GIAP-ICAC in this area, as well as giving training in methods and techniques and the development of a scientific project in landscape archaeology. Our final aim is to awaken in young students and in local communities the interdisciplinary perception of Archaeology and Heritage as useful cultural resources to enhance high mountain landscapes of the area and to promote integrated cultural and natural landscape as a responsible touristic resource.

251 Excavating the past, rebuilding connections, projecting the future. Natural and cultural heritage management and social value development in the Majella national Park (Abruzzo, Italy)

Annalisa Colecchia (Territorialists' Society, Florence, Italy)

Cultural heritage, identity and brand play an important role in local development strategies, characterized by the patrimonialisation of territories as the basis for the social production of wealth. This assumption is now shared and accepted by professionals and institutions involved in the management of cultural and natural properties. Furthermore, the participation of local communities is an essential factor in valuing specific aspects of cultural heritage, and it can achieve a deeper understanding of traditional practices. These strategies find a fertile field for action in natural parks, which are the result of interactions between human beings and their environment. Most of them are in mountain areas, disadvantaged by socio-economic marginality and affected by increasing depopulation. These ‘fragile areas’ require restoration works to be reconverted into resources, within the framework of a global territorial development plan. Among the various possible examples, I’m going to focus on the Majella National Park. It provides a variety of educational experiences and a wide range of high-quality tourism proposals; it also takes part in research activities and promotes long-term collaborative partnerships between different stakeholders, such as business enterprises, universities, municipalities, local associations, and volunteer groups. The Park boasts remarkable natural and cultural heritage, such as archaeological sites, historical monuments, dry-stone tholos huts and walls, abandoned mines. It preserves different types of cultural landscapes shaped by traditional economic activities and perceived as testimonies of the communities’ history, including agro-forestry-pastoral landscapes, mining and industrial districts, cave and karst landscapes, and religious places. The holistic reading of landscapes is expressed in thematic projects, and requires an interdisciplinary approach, in order to define the relationships between the past and the present. The good practices evidenced through my study lead
to envisage future scenarios that improve (even on legislative level) the integration between research, innovation, participatory management and sustainability.

183 Breaking down the ‘nature-culture divide’ in Northern Spanish Natural Parks

David González Álvarez (Institute of Heritage Sciences [Incipit], CSIC, Spain)

Natural Parks in the mountains of Asturias and León (North of Spain) have been primarily considered (and managed) as ‘natural landscapes’. Preserving wildlife, emphasising the beauty of the uplands, and promoting their ecological values for tourism and education have been the main goals for regional administrations during the last decades. However, these landscapes are the result of human-environment interactions throughout time as archaeological research and palaeoenvironmental studies have shown. After the introduction of agriculture and the effort deployed by local communities in agrarian production transformed the image of these areas through history. Nevertheless, educational narratives, tourism marketing discourses and public governance practise in the Natural Parks still sustain the ‘nature-culture divide’: Natural Sciences are often responsible for constructing these narratives, in contrast with Humanities or Social Sciences which are not well integrated within the ‘naturalistic’ approach. In addition, different regulations affect how the landscape is managed, emphasising its cultural or natural aspects, often in isolation from each other. This can create tensions between the diverse (and sometimes contradictory) interests of different stakeholders. Rural families inhabiting Natural Parks find themselves in the middle of this discursive battle, being marginalised from the policy-making levels and used by political parties or private interests according to their own agendas. Can we as landscape archaeologists help to suture this conflict? This is one of the main goals of our archaeological research in the Western area of the Cantabrian Mountains. Based on several case studies comprised by the Natural Parks of Babia-Luna (León), Somiedu (Asturias) and Las Ubiñas-La Mesa (Asturias) we are exploring the long-term landscape biographies in upland common-lands. In this way, we can emphasise human agency in the making of cultural landscapes and provide reasons that support local rural communities’ claims to be involved in land-use and cultural landscape management around their villages.

267 The 5T.ERA project. Historical and archaeological study of local rural practices in the UNESCO site of Cinque Terre National Park (Liguria, Italy)

Alessandro Panetta, Osvaldo Raggio, Diego Moreno, Carlo Montanari, Roberta Cevasco, Nicola Gabellieri & Valentina Pescini (Cir-Laboratory of Environmental Archaeology and History, University of Genoa, Italy)

This paper presents the ‘5T.ERA’ project carried out by the Laboratory of Environmental Archaeology and History (LASA) of the University of Genoa in collaboration with the Cinque Terre National Park, the Italian Environment Fund (FAI), the Compagnia di San Paolo (banking foundation) and the Soprintendenza Archeologia, Belle Arti e Paesaggio per la città metropolitana di Genova e le province di Imperia, La Spezia e Savona. Its main research focus is in Environmental Resources Archaeology (and History). By this term we mean the historical, environmental and archaeological analysis - starting from the present condition of the site/landscape and going back in times - to bring out the localized production/consumption/activation systems through the reconstruction of the related social practices that have qualified over time the resource and its present peculiar environmental state. The aim, in short, is the archaeological reconstruction of local environmental resources management practices. Starting from the historical ecology approach, we can recognize how the present vegetation cover is not a ‘natural’ product but truly an ‘artefact’, an historical one, whose actual state is the result of both environmental and social (interrelated) processes. This is particularly crucial in areas like natural parks, especially because cultural and natural heritage are too often still separated. Another important
theoretical issue of this project is the landscape biography of ‘individual’ landscapes, that is, ways of characterizing present landscapes, starting from individual, local processes to deepen our historical knowledge that enables to enhance management plans linking landscapes and local products histories.

92 Concealed by Nature and Segregated by Culture: Coal Camp Cemeteries in the New River Gorge National River

Elisabeth Orr (West Virginia University, USA)

The New River Gorge National River (NERI), established in 1978 by the National Park Service, is well known today for its nearly 73,000 acres of rugged, topographically isolated wilderness. At the turn of the 20th century, however, over fifty coal company towns were located here, home to thousands of miners and their families. Today most, but not all, physical evidence of these places – houses, industrial structures, community buildings, and landscapes – has been erased by time and the relentless force of nature. Although the coalfields of southern West Virginia were booming for many decades, robust documentation and analysis of coal camps and their associated cultural landscapes, such as cemeteries, does not exist. Very little is known about burial grounds located within NERI’s boundaries. For example, several graveyards for black miners and their family members were recently discovered in the densely wooded, narrow strip of land between the banks of the New River and the railroad tracks and road. This study focuses on burial areas related to settlement locations along a 2-mile stretch of the New River, between Stone Cliff and Claremont, and on the relationship between these cemeteries and the ‘natural’ area in which they are located.

56D Part 2 - Thursday 20th September, 14:30-16:00, Newcastle University

206 Incorporating historic data into historic landscape studies: A Case Study on Kazdağı National Park, Turkey.

Seyma Sengur (Ordu University, Turkey), Engin Nurlu & Yasemin Polat (Ege University, Turkey)

Landscapes, whose characters are the results of the actions and interactions of natural and/or human factors, are dynamic. From several aspects through different disciplines, our common concerns with the shaping of landscapes at various scales have been to create, enhance, maintain and protect places so as to be functional, aesthetically pleasing, meaningful, sustainable and appropriate to diverse human needs and goals. Proper understanding of today’s landscapes is possible through the definition of current landscape characters and also their historical dimensions. For understanding and management of the landscape, it is necessary to provide comprehensive and systematic collection of historic landscape characters. Historic maps, ancient travellers’ and geographers’ diaries, aerial photographs and images, field survey notes and photos taken from the study area have been used as main data sources to understand the historic dimension of the present landscape for the landscape architects. This paper briefly shows the use of an incorporation of historical data into historic landscape studies within the landscape of the Kazdağı National Park from 1890’s to today, including the valleys with their rich variety of flora and fauna. It is covered almost entirely with ancient natural woodlands, including Abies nordmanniana subsp. equi-trojani, which is a narrow endemic that naturally grows in Kazdağı Mountain, giving a very strong and impressive sensation of biological diversity. This study was supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK-No.106O694).
Historical and archaeological perspectives in the study of the cultural & natural heritage of the commons: contributions to enhance the local dimension

Anna Maria Stagno (University of Genoa, Italy)

Mountain areas in Europe represent a cultural and natural heritage, as demonstrated by the overlapping of Sites of Communitarian Interest, Natural Parks and UNESCO Sites. Most of these areas are nowadays, and were historically, common-lands, and a great part of them is still managed by local communities. However, many areas are suffering increasing depopulation and abandonment. These processes endanger this heritage. This paper aims at discussing the need of a multidisciplinary approach to address the study of commons, not only for understanding specific phases of human history, but also for providing elements to enhance the importance of the local dimension in their management. The paper will analyse the jurisdictional value of agro-silvi-pastoral practices in mountain management and their meaning as the driving force of deep environmental transformations in the long term, by means of archaeological and historical research methods. Case-studies, result of a recent research project focused on the archaeology of commons, will be presented in this contribution. The objective is to illustrate the potential of such an approach for reflecting on the role of mountain natural parks, often considered ‘marginal’ areas, as possible tools for the involvement of local communities and local actors in their planning.

Bogs as past commons shaping natural parks. Examples from the Low Countries, 1500-1900

Maurice Paulissen (Wageningen University, Netherlands)

Large parts of Northwest Europe and the Low Countries (present-day Netherlands and Belgium) in particular were once covered by raised bogs (peat moss-dominated organic soil wetlands). In the Low Countries, most bogs have disappeared since medieval times due to reclamation and peat exploitation. The surviving bog remnants are designated protected areas, often in the context of natural parks. Scientific studies and site management generally focus on the ecological and hydrological functioning of bogs, their conservation and restoration. Less attention is paid to landscape historical or cultural geographical aspects of bogs. Moreover, no proactive strategies have been designed for sustainable management of bog-related cultural phenomena. This is remarkable given the historical importance of these peatlands. For centuries, bogs functioned as commons, used collectively by a group of entitled commoners. While studies of historical commons tend to focus on how free-riding was prevented or sanctioned and ‘tragedies of the commons’ were avoided, changed valuing of bog utility by outsiders and/or commoners may have been more decisive for the survival of bog landscapes. This paper presents the first results of a study focusing on the contestation and cultural connections of bogs in the eastern Low Countries, c. 1400-1900. The main research questions are: Which role did bogs play in local collective arrangements, how did these arrangements contribute to shaping the current landscape, how did conflict and external actors impact endurance of bog commons, and what can be learned from this for future sustainable bog management in a natural park context?

Commons and rural communities in al-Andalus: natural resources and social cohesion as peasant strategies.

José María Martín Civantos (University of Granada, Spain)

Traditional irrigation systems are a main issue in southeast Spain cultural landscapes. They are managed communally by local communities organized in institutions responsible for sharing and
governing water, solving conflicts and the maintaining the whole system. Most of those systems are dated in the early medieval period, after the Arab conquest of the Iberian Peninsula in the 8th century. They are also related to other communal uses linked to land, pastures or forest, which resulted in a very well socially united rural communities and territories. This is a key element to understanding social and political relationships in al-Andalus and the way they evolved. We will present a case study based on the National and Natural park of Sierra Nevada (Granada, Almería) and their surroundings. Part of these structures are quite difficult to identify archaeologically as many common practices disappeared after the Moorish expulsion in the 16th century and much later during the liberal processes of 19th century. Nevertheless, many of the irrigation systems have been preserved and are still in use keeping many of the communal practices and knowledge. Those systems are nowadays threatened by Global Change and the processes of agrarian industrialization.

Final Discussion

Alessandro Panetta & Anna Maria Stagno (University of Genoa, Italy)
SESSION 57H - FURTHER HORIZONS, A ‘GENERAL’ SESSION

LAC2018 Organising Committee (McCord Centre for Landscape, Newcastle University, UK & Department of Archaeology Durham University)

So broad and rich is the current (and still expanding) scope of landscape archaeology studies, with its great range of theory, methods, techniques and subject matter, that the 40 sessions that framed the conference call for papers were nonetheless unable to provide an appropriate home for every paper proposed. Collected in this session are those submitted abstracts whose themes and research explore this new terrain (beyond the limes, so to speak). It seems possible that some of these abstracts and the discussions they provoke at the conference will even turn out to be the seeds for full sessions at the next (10th anniversary) LAC2020. The chronological range of this session extends from today back to the Magdalenian Palaeolithic, and the range of landscape archaeological disciplines represented is a microcosm of the whole conference. Thematically, the 18 abstracts have been grouped into three sub-sessions: 57.1H, a set of seven abstracts (to which the session 3 related posters also belong) which in diverse ways reflect upon the visibility of myth and belief and on people’s perceptions of landscape, for India and Egypt to western Europe and Greece; 57.2H, a set of six abstracts that describe ways in which the landscape histories are explored and created in a variety of European contexts; and 57.3H, a set of five papers about the making, reaction to and use (and in some case mis-use) of landscapes from Australia to the Euphrates and central Europe, and from the Bronze Age to the 21st century.

SESSION 57.1 - PEOPLE, MYTHS AND BELIEFS

Thursday 20th September, 09:00-11:00, Newcastle University

173 Palaeolithic art as a social network study tool: an application to bison depictions in the Later Magdalenian

Blanca Ochoa (Durham University, UK), Marcos García-Diez (Universidad Isabel I, Spain) & Irene Vígiola-Toña (Universidad del País Vasco, Spain)

In recent decades, several authors have studied Palaeolithic art as an indicator of social dynamics of hunter-gatherer groups during the Upper Palaeolithic. This is especially relevant in the Magdalenian period when the evidence of art is more abundant, and the chronological precision is better. The study of graphic convergences and divergences in Palaeolithic art is a way of understanding the culture, territories and interaction systems of human groups. This study examines the stylistic and formal relationships of the representations at sites in Spain and France dated to the later Magdalenian. Graphic representations of bison on portable objects, on cave walls, or in both modalities, have been documented at a total of 62 Magdalenian sites. Two graphic morphotypes – Pyrenean (or Niaux type) and Perigordian (or Font-de-Gaume type) – have been defined based on style and technique. Their geographic distribution and the density of sites and figures enable a reappraisal of their territorial significance and hypotheses are proposed to explain the distribution and co-existence of these graphic models. With these we discuss the possible existence of cultural networks between the Pyrenean and Cantabrian region.

283 Sun temples, pyramids and the ritual landscape of the fifth dynasty

Massimiliano Nuzzolo, Jaromír Krejci & Katarina Arias Kytnarova (Charles University in Prague, Czechia)

The role of temples and pyramids as cult pivots for the arrangement of the ancient sacred landscape is a topic of great interest in Egyptology for its practical and symbolic implications in both topography and architecture. Concerning the Old Kingdom, over the last twenty years, scholars have investigated this promising avenue of research with particular attention to the issue of the interconnection and inter-

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visibility between the main sites of Giza, Saqqara and Heliopolis. In this regard, however, less attention has been devoted to the main Fifth Dynasty sites of Abusir and Abu Ghurab, where a unique concentration of divine temples (sun temples) and royal monuments (royal pyramids) was built in a limited geographic area (about 1 sq. km) and chronological horizon (about 70 years). This paper investigates the strategies and dynamics of construction of this architectural landscape with a twofold aim: to analyse the specific interrelations between monuments and their impact in terms of visual and symbolic presentation of royalty and divine power; to explore the role that these monuments in daily and extraordinary cult practice and their significance for the final accomplishment of the necessary rituals. By combining the specific features of these monuments with the characteristics of the rituals carried out therein, which involved a precise calendrical sequence of feasts and specific categories of people (both priests and officials), the comprehension of the ritual landscape of the area will become more clear and, at the same time, will also open new research questions.

51 Landscapes in Indian Literature

Uma Sekar (Independent, USA)

This paper is based on the assumption that verbal and literary traditions can inform our understanding of the physical landscape in the absence or paucity of material remains. The rich literary heritage of India, specifically poetry, forms the basis for this study of the country’s landscape heritage. The poetry is sourced from different parts of India, to explore both the richness of the literary tradition, and the diversity of landscapes within the region. Three types of landscapes are studied: the cultivated garden, the city and the vernacular. The cultivated garden is studied through three plays of Kalidasa, originally written in Sanskrit, during the 5th - 4th century CE. These plays provide accounts of three types of cultivated landscapes of the time: a pleasure garden, a penance grove and a conserved forest. The second piece of literature studied, also in Sanskrit, is the fifth volume, or Sundarakanda, of the epic poem Ramayana, presumed to be written between the 5th – 1st century CE. This volume provides descriptions of the city of Lanka, considered to be the most beautiful city of the time. Lastly, vernacular landscapes of south India are explored through the free verse of the Kuruntogai. This is an anthology of Tamil poetry with origins in the 7th – 6th century CE. The paper describes the attributes/tangible forms of the physical landscapes portrayed in these manuscripts, without placing an emphasis on any spiritual/religious symbolism or philosophical meaning. This is a quest for verbal imagery that reveals the intent, form and elements of the depicted landscapes and the moods they evoke. The verbal imagery is further brought to life through physical imagery: illustrations that are purely based on the words used within the poetry to describe the landscapes.

109 Changing Landscape and Sacred Myth: Ethnohistorical Archaeology of the Naga in Northern Thailand

Piyawit Moonkham (Washington State University, USA)

A northern Thai myth tells that the naga came and destroyed the town known as Yonok after its ruler became immoral. Despite this divine retribution, the people of the town chose to rebuild it. Many archaeological sites also indicate people’s resettlement during the early historical period. Although many temple sites were constructed in accordance with the Buddhist cosmology, the building patterns vary from location to location and illustrate what I will call nonconventional pattern distinct from Buddhist cosmology. Many local written documents and practices today also reflect influences of the naga myth on building construction. This article argues that the people in the Chiang Saen basin not only believe in the naga myth but have also applied the myth as a tool to interact with the surrounding landscapes. The myth is used as a communicated element by the local people to modify and construct physical landscape in such a way that Buddhist cosmology alone is insufficient to understand them.
Of ghosts, treasures and the landscape. Tales from Naxos Island, Greece

Stelios Lekakis (McCord Centre, Newcastle University, UK)

The folk tradition of island Greece is haunted by mischievous creatures as sinister fairies, zombies and poltergeists that are enmeshed in the social life of rural communities, carrying elements of identity and historical consciousness (Stewart 2012). These symbols of reversed normality, usually occupy places outside settlements -most commonly residing in monuments and sites coming from 'the time of the Hellenes'- and interact with locals that tend to matters outside their village, at inappropriate times of the day. Sometimes these creatures guard treasures that can be revealed to people, through dreaming, story-telling and complex rituals that form a body of an uncanny, pre-modern "occult archaeology" (Lekakis in prep), very different from the regular archaeological practices. Apart from the anthropological interest and the information on the reception of antiquities by the local communities of the 19th and early 20th centuries, these processes, embedded in local schemata, reveal people’s understandings of the landscape and nature as an animate agency that can respond to people’s needs and reveal "vresimata", i.e. treasure findings (coin hoards, statues, icons and other artefacts) in times of distress or indeed ‘financial recess’. This paper, part of a long ethnographic research in South Aegean, will examine creatures encountered in the folk history and oral traditions of the island of Naxos, as a social and spatial phenomenon, fulfilling a metaphysical aspect of archaeological remains but also revealing lingering interpretations of the landscape in the island communities of Greece. Stewart, C., 2012. Dreaming and historical consciousness in island Greece. University of Chicago press; Lekakis S., (in prep). The unseen landscape of Naxos. Cultural heritage and the social dynamics in the Aegean Sea.

318 Crafters of Kingship: Smithcraft, gender and elite power in early medieval Europe

Duncan Wright (Bishop Grosseteste University, Lincoln, UK)

In the earliest medieval centuries, skilled metalsmiths were of great value to leaders who required impressive metalwork to maintain social links and the loyalty of their retainers. In spite of their clear importance to elite society, smiths are regularly depicted by contemporary sources as marginal characters, in what seems to represent an attempt to limit the extent of their influence. Strategies of exclusion saw artisans live and die on the fringes of high status landscapes, but archaeological and documentary evidence demonstrate that they were also perceived as embodying a distinct gender. Such characteristics have numerous anthropological parallels but bear closest resemblance to the two-spirit people of native North American communities; individuals who were honoured for their crafting skills but also acted as curators of liminality, spiritual figureheads who directed rituals integral to the reproduction of society. Using the documented phenomena of the two-spirit as an interpretive framework, it can be seen that leading smiths in early medieval societies likewise acted as sacerdo, orchestrating symbolic cycles of creation and destruction. Ultimately, the emerging forms of rulership which accompanied the growing establishment of the Church saw the symbolic potency and economic primacy of smith-craft wane, although notable continuities in the practice and status of leading metalworkers is discernible over the course of the Christian conversion.
SESSION 57.2 - CONSTRUCTING LANDSCAPE HISTORIES

Thursday 20th September, 11:30-13:30, Newcastle University

214 From Site to Landscape: Nuceriola and the territory of Beneventum

Cristiano Benedetto De Vita & Daniela Musmeci (Università degli Studi di Salerno – DISPAC, Italy)

The Ancient Appia Landscapes project, carried out by the University of Salerno aims at reading the territory of Benevento (Campania, Italy) from an historical point of view, in its anthropic assets and spatial forms (agricultural divisions, road axes, etc.). The research involves several steps of analysis, with various methods and tools of investigation, from a territorial to an infrasite scale. In this essay we intend to offer new ideas for reflection regarding to archaeological excavations in Masseria Grasso (at about 6km from Benevento). They revealed an ancient rural settlement that we identify with Nuceriola, known from the Tabula Peutingeriana as a statio along the ancient Appia way. Archaeological digs have brought to light an ancient road, recognised as a section of Via Appia, with the orientation of N42°E, according to the Triumviral-Augustan centuriation. A further dig has revealed a production complex dating between the Augustan-Tiberian era and the half of 1st century AD and producing "pareti sottili" ceramics. More information comes from a cultural area (dated between the middle of 4th and the 3rd century BC) excavated by local “Soprintendenza” in the surrounding area, and from an infra-site survey in Masseria Grasso. The archaeological excavation has been planned with a global information network acquired by geophysical prospections, aerial photography interpretations, analysis of historical maps and archeo-morphological surveys. Results have allowed to identify Nuceriola as a central point for development of the territory throughout centuries. Before roman ages, the settlement appears already structured; in the Roman period becoming an economic focus and a landmark in the centurial system of Beneventum, especially since the Triumviral-Augustan colony (42/1 BC). Nuceriola has a symbolic and functional value that persists in late antiquity and early medieval age, when it stands out for its essential role in the Langobardic history, according to historical sources.

61 Roads and landscape colonization in the periphery: an approach to the evolution of the historical landscape in agrarian areas of the Iberian Peninsula.

Jesús Martínez Fernández (Catalan Institute of Classical Archaeology – ICAC, Spain)

In recent decades, archaeology has been enriched enormously with new research techniques, methodologies and approaches pertaining to Landscape Archaeology. With the application of multiple techniques, such as archaeomorphological study, the aim of this research is to demonstrate the importance of a better approach to the ancient landscape to complement the archaeological and historical information available in certain contexts. The regressive study together with the analysis of the evolution of historical communication routes and their uses, movements of populations and settlement dynamics offers great information in cases in which archaeological information in general is not abundant, as it usually happens in rural areas. In this project, the application of these study methodologies integrated within a GIS environment allows us to deepen our knowledge of the organization of the landscape from a diachronic perspective from Classical times, in an agrarian context belonging to a peripheral area of the Roman Empire. This rural area, located in the NW plateau of the Iberian Peninsula, is far from classic organizational schemes such as the centuriation model. Besides, the centuries of transition towards the Middle Ages supposed a dynamic period of great social and economic changes. However, the available archaeological information is quite scarce, outside of large urban centers. In this context, the historical reconstruction of these geographically marginal zones through Landscape archaeology, allow us to have a better understanding of the development of the communities and their interaction with the landscape up to the present time. At the same time, it serves to revalue the study and historical importance or rural landscapes that have been transmitted until our days.
150 Gone with the wind. A wind-affected cemetery called Schichtgräberfeld

Deborah Schulz (Freie Universität Berlin, Germany)

The phenomenon of Schichtgräberfeld is a type of cemetery built up in one or more layers of different, overlapping and inseparable cremations in the Late Roman Iron Age/Migration Period (3rd – early 5th century) in Central Europe. One of these cemeteries – Jänschwalde (Germany) – is an exceptionally well-preserved location that is situated within and on top of a post-glacial dune, which was reactivated with the beginning of settlement in this area. The cremation graves are mainly built in thin layers, separated by drifting sands, which accumulated during the main occupancy of the cemetery. These drifting sands made it possible to separate graves and develop a chronology of the site. This particular occurrence of individual graves within drift sand layers is extremely rare. For this type of cemetery, the site is in a remarkable condition. The exceptionally well-preserved graves made it possible to reconstruct and assume burial rituals as well as the development of the whole cemetery and the nearby settlement. The graves were mainly the untouched remains of the pyre, which were conserved by the naturally covering of drift sands. Drifting sands and the development of dunes are always due to special environmental conditions, such as an open landscape, a non-cohesive soil, and a certain aridity of the soil. The cemetery and the nearby settlement were abandoned during this time period, after about 100 years of settlement. It is likely that the significant ground movement caused by Aeolian erosion led to siltation of fields and the desertion of this place. Agricultural land use and timber requirement for iron melting required large-scale deforestation. This human alteration of the plant cover not only caused the devastation of the area but also led to a remarkable change in the burial rituals in a very short period of time.

95 The Landscape of the Norse in Skye and the Western Islands

Joseph Ryder (University of Bergen, Norway)

Research on the relationship between the Norse and the pre-Norse, Iron Age people in Skye and the Western Islands has mostly focused on place name evidence. This has been due to a lack of archaeological evidence for the Viking and Norse periods of this area. However, in the last few decades, excavations, surveys, and metal detector finds in the islands has revealed more of the Norse presence. I will present a landscape analysis that incorporates all of the Norse archaeological data on the islands which can allow for a fuller interpretation of the Norse and pre-Norse landscapes. A visual analysis based on the ALAV method (Archaeological Landscape Analysis by Visual Methods) and GIS viewsheds will be utilized to explore potential relationships of Norse settlements, burials and hoards with the pre-Norse landscape. Some results from fieldwork conducted in June-July 2018 will be presented in this paper.

43 Little Flanders beyond Wales: A landscape archaeological approach to verify transregional settlement patterns

Gerben Verbrugghe, Wim De Clercq & Veerle Van Eetvelde (Ghent University, Belgium)

Following the Norman-Conquest, Flemings settled in Britain. The only relatively well-documented community was in Pembrokeshire, South Wales, where King Henry I between 1107 and 1111 sought to send all Flemings living in England. Shortly after establishing the colony, Flemish lay elites immigrated directly from Flanders to plant new settlements which have striking similarities with settlements in their homeland. What impact these new immigrants had on the British settlement landscapes, whether these impacts are still perceptible today and which social and cultural processes were involved, is unknown. This landscape archaeological research aims to verify the hypothesis that there has been a translocation of the Flemish planted rural settlement system to the British Isles.
following direct immigration from Flanders. Socioeconomic opportunism, ecological stress and demographic pressure following a wave of extension on marginal grounds along the margins of exploited lands in Flanders, caused this transfer of skills to areas equally hostile, both geographically and politically. By combining multi-proxy archaeological, geographical and historic data with innovative landscape archaeological, remote-sensing and geophysical methods, a comparative model for Flemish and Welsh case studies is created. This will permit understanding of commonalities and contrast in Flemish cultural impacts on rural settlement structures and related field systems from the place of origin to dispersal to the British Isles, thereby offering insights into how culturally distinctive land-use and planning traditions were an expression of cultural identity or were modified in response to political circumstances, local traditions and environments. The project 'Little Flanders beyond Wales' started in November 2016 as the PhD research of Gerben Verbrugghe at Ghent University; its main supervisor is Prof. Wim De Clercq (archaeology, is co-supervisors Prof. Veerle Van Eetvelde (geography) and Prof. Steven Vanderputten (history), and it runs in close collaboration with Prof. Stephen Rippon (archaeology) from the University of Exeter (UK).

98 Marl Pits and Me: How farm-scale extraction shaped an AONB

Cain Hegarty (AC Archaeology/Devon County Council, UK)

Straddling the Devon and Somerset border, the Blackdown Hills are defined by open plateau divided by steep side river valleys, the slopes dominated by dense woodland, with smaller plantations, copses and orchards characterising the largely medieval and post-medieval farming landscape. The hills have formed a cultural, economic and agricultural watershed between the south-west peninsular and central England from at least later prehistory, resulting in a complex landscape containing elements of both centralised and dispersed settlement, moorland and parliamentary enclosure, and evidence of the industrial exploitation of geological resources, from Roman iron ore extraction to post-medieval whetstone mines. The isolated and marginal nature of much of the agricultural landscape has meant that the effects of these former extractive industries remain clear on the landscape. However, it is in only in recent years that research has begun to address the evolution of this understudied landscape, mostly through limited excavation or parish-based studies. This paper will concentrate on one theme to emerge from the first systematic assessment of the AONB’s landscape archaeology and its environs, the recent Historic England funded Aerial Investigation and Mapping (previously National Mapping Programme) survey. Extractive pits were the class of monument most frequently recorded during this survey, and this paper will examine how these almost ubiquitous but archaeologically neglected features have both reflected and influenced the changing character of the Blackdown Hills, perhaps even contributing to their designation as an Area of Outstanding Natural Beauty (AONB) in 1991.

"I read the news today, oh boy
Four thousand holes in the Blackdown Hills, Devon and Somersetshire
And though the holes were rather small
They had to map them all"
SESSION 57.3 - MAKING AND (MIS)USING LANDSCAPES

Thursday 20th September, 11:30-13:30, Newcastle University

110 Bronze Age landscapes of irrigation along the Syrian Middle Euphrates (18th-13th c. BCE)

Herve Reculeau (University of Chicago, USA)

Being located in a semi-arid environment, present-day South-Eastern Syria relies on irrigation agriculture for its subsistence. Before mechanization and the introduction of diesel pumps in the second half of the 20th c. CE, irrigation was concentrated in river valleys, using gravity-flow to water the terraces of the Euphrates and its East-bank tributaries, the Khabur and Balikh rivers. While there have been much debates on the dating of archaeological remains of massive canals still present in the Syrian Middle Euphrates valley (with proposals ranging from the Early Bronze Age to the Late Ummayad Caliphate), cuneiform records from the Middle and Late Bronze Ages (18th-13th c. BCE) offer a securely dated and very detailed (if often difficult to interpret) information on ancient river valley-irrigation at sites such as 18th c. BCE Mari (near the Syro-Iraqi border) or 13th c. BCE Emar (on the Bend of the Euphrates) and Dur-Katlimmu (on the Lower Khabur). These documents attest the co-existence of both large and small-scale irrigation, with the latter sometimes used exclusively (Emar). Massive investments in large-scale canals are discernible at both 18th c. BCE Mari, under the auspices of the local city-state, and at 13th c. BCE Dur-Katlimmu, as part of the Assyrian expansion into the Western Jazirah. In the first case at least, these however never entirely superseded the use of local water-places for agrarian purposes. These complex patterns of irrigation and agrarian practices —and the landscapes they shape— point to the use of irrigation agriculture for both winter and summer crops, as well as to the exploitation of a multiplicity of water sources alongside perennial rivers, such as wells, wadis, oxbow lakes and humid depressions.


Linnea Kuglitsch (University of Manchester, UK)

Most archaeological scholarship relating to the prison addresses the power relations that typify this landscape, concentrating on resistance in the form of portable material culture. Yet, the wider spatial context in which the physical correlates of resistant behaviour occurs rarely receives attention. Building on the work of Eleanor Casella, this paper addresses this theoretical gap, scrutinizing the relationship between the tactics of resistance and the built environment of the Ross Female Factory, a Tasmanian convict depot that maintained pregnant women and their young children. Where does archaeological evidence of resistant behaviour materialize and how does this reflect the inmate experience? Introducing a methodological approach that blends archival and archaeological materials, this paper reframes the carceral landscape in terms of the opportunities that an imperfect architecture and human error introduced into the landscape. These gaps in control allowed the Ross inmates to better navigate the complex and multifaceted power structures that characterized networks of power relations inherent in prison life. In doing so, it emphasizes the strategies that Ross' inmates used to counteract the mechanisms of carceral discipline, thereby contesting the processes of institutional reform.

209 Creators as Destroyers: Salvage of Archaeological Landscape of Sacred City of Kandy Sri Lanka

Chulani Rambukwella (Independent, Sri Lanka)
Archaeological Landscape is a construct of human beings through ascriptions to its mythological creations or physical actions and depicts the human activities in a given area. Research findings reveal that the sacred city of Kandy and its suburbs have a vivid and continuous archaeological landscape since the Pre-historic period indicating unbroken sequence of human activities and habitations. As a result, the area has Prehistoric to Late historic rich archaeological landscape comprising prominent drip-ledge cave shelters with or without Early Brahmi inscriptions and Stupa sites etc. Currently, creators are acting as destroyers too, legal or illegal. Hence, archaeological landscapes all over the world are at continuous risk due to human-induced hazards in addition to natural hazards. Sri Lanka is a rapidly developing country and experiencing a rapid urbanization and industrialization for several decades to achieve targeted current and future economic development goals. This continuing process play a major part as the human induced factors for legal destruction of the landscape and it seems that most of the archaeological sites scattered throughout the country are at or will be at risk of destruction, displacement, isolation and neglecting in the economical milieu. In this scenario archaeological landscapes in high altitude areas like Kandy are especially at risk due to gravity hydropower projects, and other urban development projects. This research paper will give a comprehensive picture of damage to archaeological sites in the vicinity due to current and previous major development projects in the area. Then it will discuss measures that could have been taken and should be taken to safeguard of archaeological landscape of the area, which could be moulded as a national module for archaeological impact assessments of future development projects in Sri Lanka.

**290 Protecting cultural heritage in conflict: a landscape perspective**

*Emma Cunliffe (Newcastle University, UK)*

Although significant attention has been paid recently to the destruction of sites and monuments in the armed conflicts taking place across the world, far less has been paid to the wider loss of natural and cultural landscapes, and even less to the problems of protecting it and possible solutions. This paper will present the work of Blue Shield, an organisation dedicated to protecting heritage during armed conflict and natural disasters. After examining the threats to landscapes in armed conflicts and noting the gaps in the international legal protection framework it will focus on the role placed by geospatial intelligence in heritage protection. The paper will showcase potential data templates for data collection, the role played by heritage valuation, and give examples of how such data can contribute to the protection of heritage – at both the site and the landscape level – during armed conflict.

**187 Relics of the traditional cultural landscape in mining and industrial areas as tourist attractions**

*Tomáš Hájek (Independent, Czechia)*

The values of the Czech cultural landscape are unostentatious. Naturally the mining and industrial landscapes of Northwest Bohemia mean a number of qualities of the Czech cultural landscape disappear, whilst at the same time underlining what, as a relic of traditional cultural landscapes, has remained in the midst of the radical change represented by mining and industrial landscapes. This scientific paper deals with illustrating the relationship between a mining, industrial landscape and the traditional Czech cultural landscape and its use in the framework of tourism. From the standpoint of possible methodological approaches, the paper analyses a project that the author of this paper, in cooperation with his colleagues, realized in the village of Březno near Chomutov. This can be described as a system of information boards over an extremely large area where the distances between each information board are in the region of kilometres. The civil parish of the village of Březno is remarkable for its assemblage of contradictions: it is a valuable archaeological site (dating back to the Palaeolithic), it preserves the landscape heritage of the Gothic and, in particular, the Baroque, it is an eloquent testimony of the centuries-old coexistence of Germans and Czechs; likewise it is an area of open cast lignite mining and power production, with the monumental effects of the Náštup mine and the Tušimice...
and Pruněřov power plants. The nature trail includes seven information boards. As has already been suggested, the usual procedures for creating similar projects would have had a different outcome. The reasons why the design and implementation did not proceed in the usual direction, what can be a tourist attraction in industrial mining landscapes, opens the way for a methodological enrichment of the scientific discourse on the theme of restoring mining and industrial landscapes by means of tourism.

**Related posters (for poster abstracts, see p.213-230)**

50 Lake Albano volcanic activity in Roman times: a geomythological approach.
*Loredana Lancini (CReAAH - Le Mans Université, France)*

100 Finding pets in the landscape – A crowdsourcing project
*Eric Tourigny (Newcastle University, UK)*

152 Castra in altum erigenda: a landscape made of stone, wood and clay.
*Daniele Sacco (Università degli Studi di Urbino Carlo Bo, Italy)*

274 Soundscapes and Dreamscapes of the Paleolithic Caves of Southern France
*Ryan Hurd (John F. Kennedy University, USA), Apela Colorado & Matthew Tucker (Worldwide Indigenous Science Network, USA)*
151 The reconstruction of a buried coversand landscape near Kampen (The Netherlands) using a geoarchaeological approach; geomorphology, vegetation and human habitation

Johanna A.A. Bos, Marlon Dijkshoorn & Nelleke van Asch (ADC ArcheoProjecten, Netherlands)

At Kampen, the Netherlands, a large water basin is constructed by Isala Delta as a passage for the River IJssel during high-water levels. Prior to this construction, a large archaeological excavation was carried out. In order to reconstruct the geomorphology of the landscape, the area was mapped in detail, while the vegetation development was reconstructed based on three palynological records. The longest palynological record was obtained from a residual channel and reflects the late Mesolithic to Medieval period. A chronology of the 7000-year record was provided by AMS 14C dating. The location of the residual channel is rather unique as the shores were inhabited during the Mesolithic and early Neolithic. Two other palynological records reflect smaller time slices of the Roman and Medieval periods. Based on the botanical analyses, a direct relation could be made between human occupation, vegetation changes in the landscape and introduction of domesticated crops. During the late Mesolithic, possibly as a result of human interactions, the vegetation remained in a boreal state as woodlands with birch and pine (and some hazel) were present, while in the rest of the Netherlands already mixed oak-woodlands developed. Hazelnuts were probably collected, and the hazel-pollen curve shows a distinct minimum. Indicators for disturbance (Artemisia, Rumex acetosella, Pteridium, Scleranthus annuus) and dung (coprophilous fungi) were recorded, suggesting the presence of humans and/or animals. Fire indicators (charcoal, charred remains of Poaceae, Cyperaceae, pine) point to (human-induced) fires during this period, which is in agreement with the presence of a large number of charcoal pits recorded at the site. Dense mixed oak-woodlands developed from the Neolithic onwards and from the Bronze Age onwards there is evidence for cereal cultivation in the surrounding area. During the Roman period large heathlands developed, followed by cultivation of cereals, including rye and buckwheat, during the medieval period.

154 Down by the River. Landscape-archaeological research into the use of an early Holocene pointbar of the River Meuse between Well and Aijen (the Netherlands)

Johanna A.A. Bos (ADC ArcheoProjecten, Netherlands), Leo A. Tebbens (BAAC: Archeologisch en bouwhistorisch, Belgium) & A. Muller (BAAC: voor archeologisch en bouwhistorisch, Netherlands)

A detailed reconstruction of the palaeogeography and vegetation in the Meuse River area between Well and Aijen (the Netherlands) is discussed in relation to former human occupation patterns. In order to investigate human-environmental relationships a combination of geoarchaeological methods were applied; geomorphological, micromorphological and botanical (pollen and macrofossils) analyses. AMS 14C- and OSL-dating provided an accurate chronology for the sediments. Our research shows that the early holocene pointbar of the River Meuse near Well-Aijen was more or less continuously inhabited from the Early Mesolithic onwards. The distribution of the archaeological remains shows that there was a strong interaction between people and their physical environment. Humans adapted to the changing landscape as most remains were found on the higher elevated areas of the early holocene pointbar, at a short distance to the river. Because of the higher setting of these locations, they were occasionally
flooded and formed an excellent location for habitation. Based on combined geoarchaeological research, maps were made showing changes in the palaeogeography and vegetation of the area in 16 time slices: At the end of the Lateglacial the Meuse River had a braided river pattern and the area was sparsely vegetated with dwarf shrubs, herbaceous vegetation and scattered birches. In the Early Holocene, the Meuse River changed to a meandering pattern and infilling of the residual channels started. Initially, the area became forested with birch and pine, but later dense mixed oak-woodlands developed. Hunter-gatherers occupied the River Meuse banks along the early Holocene pointbar. From 4365 BC (early Neolithic) onwards small-scaled openings were made in the woodlands for cereal cultivation and woodland areas slowly became more open. In the late Roman period, large floods occurred, caused by deforestation of the hinterland, and people were forced to move to the higher terraces. This situation continued during early medieval times.

161 Legacies of historic charcoal production in Brandenburg, Germany
Anna Schneider, Alexandra Raab, Alexander Bonhage, Florian Hirsch & Thomas Raab (BTU Cottbus-Senftenberg, Germany)
The remains of historic charcoal hearths (RCHs) occur in many landscapes as characteristic small-scale relief features, and are valuable archives of land use history. In addition, the modifications of the soil profile on these legacies of past forest use affect current ecosystems. Despite numerous studies on historic hearth sites in Central Europe, a mapping and analysis of RCH site distribution for larger continuous areas was hardly attempted. Our project therefore aims at describing and assessing the spatial dimensions of historic charcoal production in Brandenburg, Germany. We present the results of a GIS-based mapping and analysis of RCH distribution in several charcoal production areas. Charcoal production areas were prospected and individual hearth sites were mapped based on digital elevation models from airborne laser scanning. The geometry and spatial distribution was analyzed in relation to natural and cultural landscape structures. Relict charcoal hearths were found in many large forest areas all over Brandenburg, with a concentration of hearth sites in areas around historic industry, especially ironworks. Several thousand hearth sites could be mapped in the charcoal production areas around the historic ironworks in Eberswalde, Gottow, Peitz and Zehdenick, and around historic glassworks in northern Brandenburg. Very high densities of hearth sites were also found in forests in the Berlin Ice Marginal Valley, where no relation to historic industry sites is apparent. GIS analyses indicate that charcoal production areas are concentrated on relatively poor, sandy soils, and that hearth site distribution is related to historic forest structures and transport networks. The results affirm that RCHs are a widespread and underestimated legacy of past land use in the Northern European Lowland, even in forest areas that cannot directly be related to major historic industrial locations.

188 Tipping the balance off: human overprint on mountain landscape changes in the high Northern Apennines (Italy)
Guido Stefano Mariani, Mauro Cremaschi & Luca Trombino (Università degli Studi di Milano, Italy)
High mountain environments are peculiarly vulnerable and sensible to change, especially when human pressure on natural resources is high. These landscapes are highly resilient but respond to external impact with fast and intense fluctuations: in such cases the contemporary combination of both natural and anthropogenic factors is at times able to force the system out of balance and cause abrupt, long-term shifts in land use. In the Northern Apennines, the intervention of human practices during periods of climate instability has occurred several times in the span of the last few millennia, heavily transforming the landscape and conditioning both vegetation successions and geomorphic processes on wide extensions. The comparison of proxy data from geomorphological and paleosol records as well as archaeological excavations from the highest portion of the N Apennines revealed a series of changes in the evolution of the landscape during the Middle and Late Holocene. Distinct phases of fire events could be recorded and related to clearance practices during the inset of colder climate conditions at the passage between the Subboreal and Subatlantic period, and at the beginning of the Little Ice Age. The
impact of this combination of events caused stable shifts from the original natural closed forest to the modern landscape of pastures and patched heathlands. Denudation processes were also heavily enhanced, starting periods of general slope destabilisation, also promoted by intense grazing, with larger consequences for landslide hazard and potential repercussions on human activities. These results show how small communities have the potential to make large and lasting effects on vulnerable environments. High mountains have been influenced by human presence in stronger ways and for far longer than usually considered, highlighting the need for a reassessment of their value as a cultural landscape shaped since the beginning of an early Anthropocene.

204 A preliminary geoarchaeological approach of landscape morphology in Western Patraikos Gulf area, Peloponnese, Hellas.

Georgios Alevizos, Helene Simoni, Leonidas Stamatopoulos (Department of Geology University of Patras, Greece) & Kostas Papagiannopoulos (Institute of Local History, Vrachneika, Greece)

Geology has strong links with archaeology and combined they can unravel the history of an area. Interpreting archaeological data-sets and their link with paleoclimatic data and human intervention, is a useful tool that can greatly assist the researcher to decode their connection and deliver a new understanding of the morphological past of the studied landscape. Our coastal study area is located in the Western part of the South coast of Patraikos Gulf, an area of great geological and archaeological interest. It lies approximately 100 km east of the Hellenic trench, immediately behind the Plioquaternary fold belt, parallel to Western Greece coast, at an altitude that ranges from 0 to 210m. It consists mainly of semiconsolidated Neogene sediments or Quaternary fluvial, alluvial and over bank deposits. Numerous artefacts have been recorded in more than 70 sites, in an area of 27 km², stretching at a distance of 9 km from side to side. During Holocene, human groups almost continuously occupied the area. The finds consist of pottery and other traces of human activity (temples, baths, houses, etc.) that date from the Early Helladic to the Late Roman period (c. 3000 BC-AD 600). The material was discovered superficially or at depths ranging from 1.5 to 3.2 m. The deepest buried finds, met in 7 of the sites, were found under fluvial and alluvial sediments indicating some locally focused major events that can be tied to palaeoenvironmental and climatic shifts that took place in the area. These climate induced morphological changes were aided by the local tectonic activity in the area and especially a pre-existing fault scarp. Along with the tectonic movement of listric faulting in the area, an excess of sedimentary material can be created, forming alluvial fans and flooding events that repeatedly buried the material.

SESSIO 6C - UNDERSTANDING CULTURAL LANDSCAPES FROM SPACE IN THE ERA OF OPEN, BIG AND MULTI-TEMPORAL DATA

122 Long-term land use and water management strategies in arid margin landscapes (MarginScapes)

Francesc C. Conesa, Hector A. Orengo & Cameron Petrie (University of Cambridge, UK)

MarginScapes is a MSCA-IF funded project that aims to identify long-term land use and water management strategies in the arid landscapes of South Asia, focusing on the Cholistan Desert and the northern boundaries of the Thar Desert. The area was core to the development of the Indus Civilisation (ca. 3300-2500 BC) and it has been the subject of considerable historical interest due to the presence of an extensive network of relict riverbeds that may have supported several ancient settlements in what is today an extreme arid margin. MarginScapes integrates multi-temporal and multi-source Earth Observation (EO) data to 1) accurately detect and map landscape features of archaeological, historical and environmental interest (i.e. ancient sites, relict geomorphological and hydrological features, and seasonal monsoonal water dynamics); and 2) identify the historical and modern landscape alterations
of anthropic origin that have changed traditional land and water management strategies, with a specific focus on taphonomic biases affecting archaeological visibility and preservation. Most of the EO-based research to date in marginal areas has been often limited due to poor satellite coverage and limited temporal and spatial resolution. These limitations are changing today thanks to a) the availability of global, high-resolution satellite imagery from new EO missions, such as the European Union Copernicus Programme; and b) the implementation of multi-petabyte image catalogues and geospatial datasets in cloud computing environments, allowing for planetary-scale analysis on the Earth’s surface. This poster will discuss data integration in Google Earth Engine (ranging from optical, radar an DEMs) and will present preliminary results of a set of machine-learning algorithms tested and implemented in R open software to assess the accuracy of supervised and unsupervised remote classifications of landscape features and distinct soil surfaces.

167 Detection of landscape disturbance in the Nasca Lines UNESCO site with COSMO-SkyMed InSAR

Francesca Cigna & Deodato Tapete (Italian Space Agency ASI, Italy)

In this work, we exploit X-band COSMO-SkyMed synthetic aperture radar (SAR) StripMap HH-polarised scenes at 3-m spatial resolution to track two events of human-induced landscape disturbance that occurred in December 2014 and January 2018 within the “Lines and Geoglyphs of Nasca and Palpa” UNESCO World Heritage site in Peru (Cigna & Tapete, 2018). This is an exemplar of UNESCO site where heritage assets cannot be separated from their natural and anthropogenic environment and, as such, are exposed to interactions with natural processes, as well as human presence. The detection of temporal decorrelation associated with the two landscape disturbance events at Nasca was carried out by exploiting pre-, cross-, and post-event COSMO-SkyMed interferometric SAR (InSAR) pairs characterised by small temporal and normal baselines. The extent and time reference of the observed decorrelation indicating the occurrence of the disturbance match with online photographic and video evidence, published literature, web news, and press releases by the Ministry of Culture in Peru. Further elements enhancing the understanding of the 2018 event come from 10-m resolution Sentinel-2B satellite data that reveal the occurrence of apparent changes of surface reflectance due to uncovering of the light grey-yellow clay underneath the darker pebble constituting the fragile surface of the Pampa de Jumana. This scientific study confirms that SAR imagery archives, such as those being built by COSMO-SkyMed for Nasca, prove valuable for the retrospective analysis and digital recording of human-induced landscape disturbance events from space. These archives therefore act as essential sources of geospatial information on the conservation history of heritage sites and assets.

Cigna, F.; Tapete, D. Tracking Human-Induced Landscape Disturbance at the Nasca Lines UNESCO World Heritage Site in Peru with COSMO-SkyMed InSAR. Remote Sensing, 2018, 10 (4), 572; doi:10.3390/rs10040572"

272 Applications of multi-temporal data and cloud computing for the study of past settlement and landscape dynamics in the Punjab region

Arnaud Garcia, Hector A. Orengo & Cameron A. (McDonald Institute for Archaeological Research, University of Cambridge, UK)

This contribution will present the first results of the MSCA-IF funded project Water management strategies and climate changes in the Indus civilization (WaMstrIn). This project participates in a coordinated program carried out by researchers from the McDonald Institute for Archaeological Research with the aim to develop consistent methodologies for the use of big sets of multi-temporal satellite images in the study of prehistoric and historical landscapes. The specific object of study is the relationship between the settlement dynamics and the changing hydrographic network during the Indus Civilisation, first urban culture in South Asia (3300-1900BC). The methodological approach is based on
the analysis of large repositories of multi-temporal multi-spectral satellite images and other types of satellite-derived data, using purposefully created algorithms and parallel cloud computing applications for the detection of (1) paleo-channels and (2) signatures of disappeared human settlements. These data will be complemented with the creation of a geodatabase of historical sources, which will serve to validate the results obtained and support the implementation of machine-learning processes. WaMStrIn project is applying this methodological approach in the Indus middle basin (historical region of Punjab, Eastern Pakistan and North-western India). It represents one of the world’s most productive agricultural areas, capable of sustaining large populations, including the Bronze Age Indus cities. The poster will discuss the potentialities and difficulties in using large multi-temporal datasets and cloud computing in highly anthropized landscapes affected by important transformations in recent periods.

SESSION 8G - SETTLEMENT DESERTION AND CULTURAL LANDSCAPE TRANSFORMATION

44 Nieuw-Roeselare: A landscape archaeological research on the site of a lost medieval settlement

Gerben Verbrugghe & Wim De Clercq (Ghent University, Belgium)

The medieval County of Flanders was one of the most urbanized and densely populated regions of Europe. The large number of important towns with its high amounts of city dwellers had a major impact on the rural landscape, resulting in an intensification of the landscape exploitation during the so called Great Reclamation Period (1000-1300 AD). However, archaeological research on medieval rural settlements in the county has been scarce and research has been limited to historical studies. Therefore, archaeological data has been lacking to support interpretations on the origin of grouped rural settlements and their morphological and spatio-temporal characteristics in Flanders. Believed to be settled by Gosuwin de Roeselare before 1243, the lost village of Nieuw-Roeselare (Sint-Laureins, East Flanders, Belgium) suffered several major floods during the late 14th century and was finally abandoned in 1399 in favour of the nearby village of Sint-Margriete. Despite extensive historical research and small scale archaeological excavations during the 1970’s, little is known about the location and morphology of the settlement itself. This ongoing research aims to locate and study the planted settlement of Nieuw-Roeselare, which now lies beneath fertile farmland in the North Flemish ‘polder’ region. Existing historical research is therefore incorporated with innovative landscape archaeological remote-sensing and geophysical methods to locate the lost village of Nieuw-Roeselare. This will allow new insights into the village its morphology and site location in relation to the surrounding field systems and landscape.

SESSION 11B - DYNAMIC LANDSCAPES: THE HUMAN ROLE IN RESHAPING THE GEOMORPHOLOGY OF ARID ENVIRONMENTS

242 Geomorphology, hydrology and archaeology at Qurayyah (NW Arabia)

Philipp Hoelzmann, Laura Hüneburg (Freie Universität Berlin, Germany) & Marta Luciani (Universität Wien, Austria)

The archaeological site of Qurayyah, situated in the NW of the Tabuk Province of Saudi Arabia, has been repeatedly described as one of the largest and most significant oases of Northwestern Arabia. Presence of human occupation in the oasis started at least in the early Holocene and continued to the Nabatean, Roman and late Byzantine period. We present a geomorphological map that is based on the interpretation of a high-resolution satellite image and a detailed control in the field. The geomorphological map of Qurayyah integrates archaeological, hydraulic and natural features in order to illustrate the profound background of the founders of this man-made oasis. The site made use of the hydrologically favoured location at the confluence of two supra-regional wadis as mirrored in the
remains of water-harvesting measures encompassing the entire site. Furthermore, the sheltered position at the foot of the Rock Plateau points to the risk awareness of the inhabitants to occasional flooding and erosive events within the striking distance of the larger wadis. Size and complexity of the anthropogenic landscape reveals a deep knowledge of the geomorphology of the extended micro-region, resulting in the conceptual design of a settlement with agricultural fields spreading over several hundred hectares and reaching many kilometers beyond the walled site. The residential and funerary areas of the settlement were located on higher flood-free positions. The mud-brick-walled Residential Area in the center of the site overlooked the artisanal areas in the south-west, benefited from direct water accessibility without the risk of flooding. The agricultural fields occupy transitional areas just above linear or braided run-off of smaller tributaries and often anthropogenic regulated wadis. Therefore, artisanal areas were out of reach of erosive heavy rainfall floods but profited from fertile alluvial substrates distributed during non-erosive or even tamed flooding events.

**SESSION 18B - CLIMATE, HERITAGE AND ENVIRONMENTS: COLLABORATIVE APPROACHES TO THE STUDY OF CLIMATE CHANGE IMPACTS ON THE HISTORIC ENVIRONMENT**

169 From the Air, on Land and Sea: Investigating Climate Change in the Coastal Zone of Ireland and Wales. Introducing the CHERISH project.

*Louise Barker (Royal Commission on the Ancient and Historical Monuments of Wales, UK), Sarah Davies (Aberystwyth University, UK) & Sandra Henry (Discovery Programme Ireland)*

Climate change brings a number of significant global challenges to the historic environment and this poster explores the methodologies and approaches that the CHERISH (Climate, Heritage and Environments of Reefs, Islands and Headlands of the Irish and Welsh regional seas) project is employing to study the past, present and future impacts of climate change storminess and extreme weather events on the rich cultural heritage of our sea and coast. These range from terrestrial and aerial laser scanning, geophysical survey and seabed mapping, through to palaeoenvironmental sampling, excavation and shipwreck monitoring. CHERISH is a five-year Ireland-Wales project, bringing together four partners across two nations: the Royal Commission on the Ancient and Historical Monuments of Wales; the Discovery Programme, Ireland; Aberystwyth University: Department of Geography and Earth Sciences; and Geological Survey Ireland. It began in January 2017 and will run until December 2021; it will receive €4.1 million of EU funds through the Ireland Wales Co-operation Programme 2014-2020.

**SESSION 24F - LANDSCAPE AND BELIEF**

233 The symbolic landscape around Göbekli Tepe

*Ricarda Braun Freie Universität Berlin, Germany), Brigitta Schütt & Daniel Knitter (Christian-Albrechts-Universität zu Kiel, Germany)*

Landscape cannot only be seen as a deciding or limiting factor and backdrop for human action but also as a cultural product. The perception of landscape – if only in response to subliminal stimuli – plays an important role, since it determines human behaviour. For prehistoric times Tilley (2005) assumes an intimate and affective relationship between people and landscape, whereby landscapes are not only to be seen as natural but as encultured. People create meaningful places out of physical spaces through their everyday activities, beliefs, and values. During the transition from the Palaeolithic to the Neolithic this construct of landscape underwent a significant transformation, as symbolic (or sacred) landscapes for the first time where physically manifested by monuments. The neolithic site Göbekli Tepe in southeastern Turkey serves as an example, where a symbolic landscape was constructed and manifested.
The enclosures of Göbekli Tepe, consisting of huge monolithic stone pillars, probably served as cultic centre during the time when the transition from a foraging to a food-producing lifestyle took place. This paper analyses the crucial factors that determined the choice of location at Göbekli Tepe using the concept of affordance by means of visibility, cost surface and resource analyses. It is being examined whether belief-powered or mundane reasons influenced this decision or if the decision was being motivated autotelically or strategically for achieving an external effect. This leads to the question, how landscape was perceived and if the erection of the monuments served as a conscious influence on this perception. Therefore, the focus lies on the interaction between both the natural environment as a limiting and adaptation requiring factor and the acquisition and transformation processes of humans against the background of their belief system.

**SESSION 28C - AERIAL APPROACHES IN LANDSCAPE ARCHAEOLOGY: PAST, PRESENT AND FUTURE.**

182 Buried Italian landscapes. A new perspective from Bing Maps.

*Davide Mastroianni (University of Sassari, Italy)*

During the last years, the aerial archaeology has confirmed the importance and the potentiality in the studies of ancient and modern landscapes. In this last field, the aerial photograph is most important if it is used as instrument of knowledge and research. The aerial view is sure the most useful method to observe the real changes in the landscape. Bing Maps, a web mapping service of Microsoft™, is a revolutionary instrument to visualize the landscape, using vertical and oblique aerial images. This approach has been fundamental to observe several traces (cropmarks, dampmarks, soilmarks) of buried archaeological elements in Italy.

189 Archaeological missing landscapes and UAVs. A case study from San Salvatore Telesino (BN) in the Telesina Valley, Campania (Italy).

*Davide Mastroianni (University of Sassari, Italy)*

The use of unmanned aerial vehicle (UAV), commonly known like a drone, is changing the way we do research in a landscape studies. In the last decade archaeologists tested several platforms and sensors for 3D documentation of archaeological excavations, monuments and historical buildings; for aerial survey of archaeological sites and landscape archaeological investigations. In this study, the potential use of drones is presented by case study in South Italy (Campania), exactly in the Telesina Valley in Benevento, where the experiments have revealed important information about the existence of subsurface elements of the roman town of Telesia.

**SESSION 29C - REMOTE SENSING IN LANDSCAPE ARCHAEOLOGY RESEARCH.**

170 Remote Sensing research on motte and bailey castle along the via Herculia

*Rosanna Montanaro & Paola Guacci (University of Salento, Italy)*

This paper aims to present some unpublished medieval fortified sites located in Irpinia (northeastern Campania, Italy). The study is set in the frame of the ten-year topographical researches led by the LabTAF of Univesity of Salento, focused on the reconstruction of the route of “via Traiana”, “via Herculia” and their relationship with the roman site of “Aequum Tuticum”. Along the “via Herculia” path, set in the area of Ariano Irpino modern city, some surveys and aerotopographical data acquired in these years let to recognize the presence of some medieval fortified sites, also known with the name of “motte and bailey castle”. This kind of settlements are very common in the north Apulian region and belong to
the Norman period but they are not studied for the Irpinia territory. Thanks to the analysis of some historical air photos and cartography, it is possible to recognize in two localities named Macchiacupa and Masseria Imbimbo (and perhaps near Masseria Ospitale) some morphological features that could be related to this kind of settlements. Their identification is enforced by the analysis of the Italian LiDAR survey that have a 1 meter resolution DTM and cover this area. These data allow to better detect the micro-relief of these settlements and the filter elaboration of DTM help the identification of their topography. The integrated analysis of these records have the purpose to relate the characteristics of these settlement with the geomorphological elements of the area, with the roman “via Herculia”, still used in medieval time, and with the relict roman presence in order to draw the landscape development of the area.

**SESSION 32E - THE ‘WHY’ IN LANDSCAPE ARCHAEOLOGY**

**124 Interpretation is not the end. A test system for joint interpretation of past landscape and its integration with existing data sets.**

*Alexis Pantos (University of Copenhagen, Denmark)*

Interpretation of paleo-landscapes necessarily draws upon a wide variety of fragmentary evidence, and distinct specialisms. Traditionally these different and sources are mediated and interpreted through academic discourse, at times encoded and interrogated as geographical data sets, while at others distilled into text or graphical representations. Advances in computer graphics, the resurgence of VR and immersive technologies provide new opportunities for rendering past landscapes for diverse audiences in ways beyond the traditional 'artists impression', not only graphically but also aurally, temporally and experientially (e.g. modelled acoustics, non-linear travel or significance highlighting). At the same time our analytical toolsets are incorporating more advanced visualisation that give human-centric views of our mapped data. While the capabilities of the different visualisations remain distinct, there is a trend to bridge this gap in both academia and in the software industry (for whom landscape archaeologists may not be the target audience, see current developments in the construction sector and BIM solutions), and to provide a system or workflow that not only combines analytical data with visceral dynamic visualisations but provide a platform for the collaborative discussion that is central to academic discourse. The move toward integrating data with complex dynamics visualisations challenges the perceived dichotomy between representation and data and brings both technological and theoretical challenges. This poster looks at how more traditional modes of synthesis and discussion associated with analogue or digital ‘recreations’ influence our data and how it could be incorporated, even interrogated alongside our computationally driven data sets. It presents a case study of an experimental system with a bi-directional link between GIS and a games engine. The system was used in the collaborative development of an audio-visual reconstruction of an epi-palaeolithic landscape in Jordan, providing insights into the potential challenges and shortcomings of the system and wider visualisation tools in interpretation.

**SESSION 34E - MARKERS AND MOBILITIES: INTERPRETING DYNAMIC LANDSCAPES**

**181 New currents in the chronology of Celtic fields in southern Scandinavia**

*Mette Løvschal, Søren Munch Kristiansen (Aarhus University, Denmark) & Nina Helt Nielsen (Museum Silkeborg, Denmark)*

Still being present in contemporary landscapes across southern Scandinavia, embanked and lynchotted field systems, also known as Celtic fields, represent a remarkably long-term land tenure form from later prehistoric times. The field systems changed the appearance of the landscapes in radical ways and were intimately associated with new concepts of time, land and labor. Therefore, it is also of vital
importance to know when, more precisely, these permanent field systems emerged as well as the
temporal dynamics involved in their long-term construction and reconstruction. However, due to a
number short-comings and difficulties with dating these features, a more nuanced understanding of
their emergent character is fundamentally missing as is precise knowledge of their time depth. Here,
we present new scientific results from case-based geoarchaeological investigations of five newly
discovered Celtic field systems in eastern Jutland, Denmark, carried out in 2015-2017. The
investigations were specifically targeted towards dating early allotment phases, the field banks and
lynchets, as well as manuring strategies. The methods included radiocarbon (14C) and optically
stimulated luminescence (OSL) dating of vertical sections, as well as a series of geochemical analyses
(e.g. multi-element analysis by ICP-MS), micromorphology, µXRF, NPP, and pollen analysis of soil
samples. On this basis, we propound new chronologies for the five cases and contextualize these into
existing chronological models of the emergence of Celtic fields in southern Scandinavia in an attempt
to increase the understanding of the timing of their emergence and the longevity of their use.

193 The path network of the Late Bronze Age enclosure Corneşti-Iarcu, Romania
Moritz Nykamp, Brigitta Schütt (Institute of Geographical Sciences, Freie Universität Berlin,Germany)
& Daniel Knitter (Christian-Albrechts-Universität zu Kiel, Germany)
This study integrates geoscientific and archaeological data to identify the intra-site pattern of past
human mobility in the environs of the Late Bronze Age enclosure Corneşti-Iarcu, western Romania.
Corneşti-Iarcu, i.e. the largest known enclosure of European prehistory, is composed of four earth-
filled wooden ramparts covering an area of c. 17.6 km². Settlement clusters of varying density have
been identified within the two innermost ramparts applying magnetic prospection and systematic field
walking. Gates to the enclosure, which direct the passage of people and control pathways, were usually
identified from magnetograms. The landscape in which the enclosure was erected is characterized by
slightly undulating loess covered plains and wide saucer-shaped valleys. In these silt-dominated
sediments the repeated passage of humans led to the development of a system of hollow ways within
the enclosure. The hollow ways developed due to increased surface runoff triggered by soil compaction
along frequently used pathways. Often, they show an unnatural course, e.g. sections that run reverse
to the direction of the general surface gradient or strongly bending upper reaches. Partly, they are
backfilled with local slope sediments today resulting in faint linear hollows. However, they still form
identifiable markers of past mobility. These mobility markers are identified using morphometric terrain
analyses based on a high-resolution LiDAR-DEM and linked to archaeological features, such as
settlement clusters and gates. In order to provide independent age control for the formation period of
the hollow ways correlative sediments from alluvial fans are 14C-dated. The 14C dates yield maximum
deposition ages that are roughly contemporaneous with the settlement history in the area of Corneşti-
Iarcu. Thus, our study shows how the integration of geoscientific and archaeological data may lead to
the identification and dating of past mobility markers and also provides explanations for the formation
of these markers.

SESSION 38A - TOWARDS A LANDSCAPE ARCHAEOLOGY OF WETLANDS: ON-SITE DATA TO MACRO-SCALAR VIEW

101 The Avellino event: A Bronze Age landscape reconstruction from the Pontine plain and the Fondi basin, southern Lazio, central Italy
Marieke Doorenbosch (Faculty of Archaeology, Leiden University, Netherlands) & Wouter van Gorp
(Faculty of Arts, Groningen University, Netherlands)
The major Early Bronze Age eruption of the Monte Somma Vesuvius (1995+-10 BC) must have had an enormous impact on the landscape and inhabitants of the Campania region. The so-called Avellino (AV) eruption buried the landscape around the volcano in a deep layer of volcanic ash. However, a small initial eruption had probably allowed the population to flee before this devastating event, heading inland rather than towards the sea. A multi-disciplinary research involving geology, palaeoaeobotany and archaeology has been set up to unravel the project’s hypothesis, that a significant percentage of the refugees must have decided to resettle in the nearest coastal plains to the north - the Pontine Plain and Fondi Basin of South Lazio, and that we should therefore be able to prove this by tracing the ecological, demographic and cultural impacts that this immigrant population must have had. A detailed palaeogeographical reconstruction was made to identify the different lake-marsh settings in which the distal AV-tephra has been preserved within the context of Middle to Late Holocene evolution and to combine these locations with areas suitable for Early Bronze Age habitation. The palaeobotanical research, palynological and macrobotanical, has focused on reconstructing the regional and local vegetation in this area before and after the AV eruption, to detect the environmental impacts that should have been brought about by the influx of possible immigrants from Campania. The distal ash from the AV is present in the sediments, acting as a stratigraphic marker. Where possible, terrestrial plant macrofossils were radiocarbon dated allowing the construction of a precise chronology for the profiles.

With the project about to reach its end, this paper will present a detailed overview of the palaeogeographical and palaeobotanical investigation that allowed the reconstruction of the Bronze Age landscape in the Pontine plain and the Fondi basin.

**SESSION 40E - MOVEscape: INTEGRATED STUDY OF MOVEMENT, PATHWAYS AND SETTLEMENT**

**84 Settlement and path networks from Prehistory to Roman Age in Trexenta, Sardinia (Italy)**

*Riccardo Cicilloni* - Dario D’Orlando, Marco Giuman, Felice Di Gregorio (University of Cagliari, Italy), Marco Cabras & Manuel Todde (University of Granada, Spain)

This poster is in the range of archaeological landscape studies which has developed in Sardinia over the last decades of the 20th century and allowed a better documentation of archaeological heritage. This contribution is intended to represent the first step of a research project developed by L.Ar.P. (Laboratorio di Archeologia del Paesaggio – Landscape Archaeology Laboratory - University of Cagliari), focused on a homogenous geomorphological sample area located inside the historical-geographic region of Trexenta in South-Eastern Sardinia-Italy (Western Mediterranean) with the goal to analyse a series of insights about settlement systems from prehistory to Roman times, the general framework of the archaeological landscape and landforms, the path network and their transformations through the epochs. The landscape is characterized by hilly convex forms, not very pronounced, and weak slopes modelled on marly-arenaceous rocks of the Miocene, quite alterable and erodible, that are connected to small concave valleys or wider floodplains (Holocene). The numerous monumental traces span from the Neolithic to the Middle Ages, and show different settlement configurations related to changing forms of the landscape. The Authors, using a series of statistical and spatial GIS analyses, have evaluated the locational preferences at different times and how these are strongly connected to geomorphological conditioning of the movement and pathways of this region. After this analyses it might be possible to argue pathways that create a network between Nuragic sites of the area and to compare this data with the roman way known as A Karalibus Olbiam which localisation in this territory is attested by ancient and epigraphic sources. The diachronic analysis of the area’s population, considered in its relationship with the landscape, has highlighted several settlement choices and different systems of pathways, also linked to the succession of different forms of economy and society.
114 Madonie Survey Project. Investigating the settlement dynamics and cultural transmission mechanisms from an high mountain context through the analysis and reconstruction of ancient pathways

Alessandra Canale (Università di Palermo, Italy)

The ‘Madonie Survey Project’ aims to reconstruct the historical and cultural dynamics of the westernmost part of the Sicilian Apennines, through the analysis of the ancient road system. Most of these studies about Sicily focus on long-distance routes drawing attention especially to the itinerary and the estimate of the distance. Recent analyses, however, have shown the importance of “secondary” paths (the “diverticula” of the “Itinerarium Antonini”) as alternative connections between main roads and rural settlements. Through a probabilistic methodology, based on targeted inspections, the field survey will focus on the record of the settlements gravitating around the area between Polizzi Generosa and Cefalù (Palermo, Sicily). Medieval sources, indeed, suggest that during the eleventh century ancient paths, covered by Christian pilgrims, connected the two hospitalia existent in these towns. The project focuses on defining these aspects of the landscapes incorporating with the archaeological documentation: historical research, aerial photography, current cartography, ancient maps, as well as the found pottery analysis. By using an open source software such as GIS - used for the development of archaeological maps - it will be possible to conduct a spatial analysis excluding the subjectivity implicit in the interpretation of cartography data. The study of ancient pathways helps us to interpret meaningfully the relationship between urban and rural cultures over time; to enlighten on how a central power can extend control on an internal territory; to look into different issues, for instance: methodological approach in high mountain contexts; the development of transhumance and the deep connection between man and nature; the cultural phenomenon of pilgrimage; the relationship between Greeks – Byzantine, Muslims and Normans; as well as to study different kinds of pottery. In conclusion, it's a very timely topic for the potential it has to preserve and enhance the Cultural Heritage, through the consolidation of historic memory.

130 Life, routes and defence in the late Middle Ages in south-eastern Italy (Monti Dauni area, Foggia). A study on visibility and movement through spatial analysis in an Open Source GIS.

Luca d'Altilia & Pasquale Favia (University of Foggia, Italy)

This project, since 2016, aims at studying the topics of visibility and movement of human beings and goods in a specific area (Monti Dauni, Foggia, South-eastern Italy) in the late Middle Ages, through the use of spatial analysis in an Open Source GIS. The use of Digital Terrain Models in a hilly area has been crucial to analyse the influence of geo-morphological contexts on the genesis and development of settlements, in a strategically important region for Italy's Middle Ages. A single and cumulative Viewshed analysis has been applied, to figure out if and how these settlements could visually control each other, the surroundings and the communication routes in the area. By means of a Cost Surface Analysis, some Site Catchment Areas and possible Least Cost Paths between some of these settlements have been generated. Results are included in a much wider perspective of research, which features archaeological, historical and bibliographical sources, for a comprehensive and integrated study of ancient landscapes.

SESSION 42E - CLASSICAL ARCHAEOLOGY AND LANDSCAPES

22 New data from the territory of Locri Epizephiri: archeology and documentary sources

Gianluca Sapio (Università di Torino, Italy)
The poster presents data that are part of a PhD research in History of Archaeological and Artistic Heritage (XXVIII cycle) carried out with the University of Turin. The survey covered a sample trench of about 30 square kilometers, between the Bruzzano and La Verde rivers, in south Calabria (Italy), in what was to be the southern sector of the territory of the polis magnogreca of Locri Epizephiri, along the coast of the Ionian Sea. Various types of documentary sources have been investigated: cartography and historical cartography; historical and cartographic archives; toponymic data; aerial photographs (source IGM). The data obtained were cataloged in specially prepared forms, and studied and then inserted into a digital territorial information system. A series of intensive and systematic surveys have made it possible to identify and georeference almost a total of 20 new sites that have never been documented before. The dating of the contexts goes from protohistoric to medieval age. Through the research the main characteristics of the rural population of the Greek and Roman age have been identified. After the sudden abandonment of pre-Greek sites within the last quarter of the 8th century a.C., the first contexts related to small self-sufficient farms date back to the end of the 6th century B.C. and are located near the Cape Zefirio (current Bruzzano) mentioned by ancient sources (Strabo, VI, 1, 7). Between the fourth and first century B.C. the distribution of the farms became more widespread and widespread with an organization of the territory that also provided for preferential crossing paths, fortified and productive sites. In the Roman imperial age there was a great change with the birth of the great property. The documentation of the stone mills (34 structures) for the production of wine certainly dates back to the Greek age.

SESSION 43A - ARCHAEOHYDROLOGY AS A DISCIPLINE? - DEVELOPING A NEW APPROACH TO THE STUDY OF ANCIENT WATERSCAPES

197 Ancient texts as source to analyse the ancient water harvesting system in Sri Lanka

Nuwan Abhayawardana, Wiebke Bebermeier & Brigitta Schütt (Freie University Berlin, Germany)

A remarkable number of written and epigraphic sources report about the development of the ancient water harvesting system in Sri Lanka. This poster presentation aims to close the gap of a lacking systematic assessment of the information given by epigraphic and written sources on the spatio-temporal development of the tank-cascade system in Sri Lanka. Altogether, 255 text passages containing 837 different records on ancient irrigation activities were compiled for the period from the 5th century BCE to the 10th century CE. The majority of the 625 analysed records resulted from ancient inscriptions, 212 records are originating from chronicles. Geocoding was successfully performed for 40 records. A chronological link of 173 text passages to a specific reign of a king could be achieved. Altogether 362 records (43.2 %) mention a tank or its construction. The categories grants of irrigation and irrigation incomes are represented with 276 records and 75 records. Records on canals and irrigation management occur with a share of 8.2 % and 6.2 %, equalling 69 and 52 records. The spatial distribution of records in general matches in large parts with the extent of the dry zone and northern intermediate zone of Sri Lanka. The present-day district of Anuradhapura shows with 490 records the highest density of information on the ancient water harvesting system. Records on irrigation are not equally distributed throughout the investigated period and show a distinct peak in the 2nd century CE. In summary the conducted analysis documents the potential of the analysed source genres for the derivation of information on different aspects related to the spatial, temporal and administrative development of the ancient water harvesting system in Sri Lanka.
SESSION 44C - LANDSCAPE ARCHAEOLOGY AND REPRODUCIBLE RESEARCH - A HANDS-ON SESSION

2 Settlement and territory in the north of the district/taifa of Lárida (northeast of the al-Andalus 11th and 12th centuries)

Jesús Corsà (University of Lleida, Spain)

The presence and distribution of the rural settlements in the northeast of the Superior Landmark of al-Andalus throughout the 11th and 12th centuries is a delicate question. In order to explore this reality, we are studying the mountainous area associated with the city of Balaguer and most northern frontier of the district/taifa of Lleida. In this poster, the methodological tools of landscape archaeology and the results obtained through its application in the research of the rural world in the north-eastern sector of al-Andalus around the 11th and 12th centuries will be presented. Through this methodology (documentary sources, historical cartography, aerial photography, GIS -geographic information system-, toponymy and archaeological prospecting), what emerges is an inhospitable landscape, configured by fortifications, settlements, agricultural exploitation and large forests. The study considers the debate surrounding the way of organizing habits: in the general field, based on Glick’s model hisn/qarya, in the Superior Landmark, determined by Souto’s model (qarya) and also the fortified settlements discovered by Sénac. The research project takes into account the aspect of the fortified borders where networks like husun and towers/watchtowers have been used and also the established debate about the exploitation of the natural resources. We have discovered that the border between Muslims and Christians is a dynamic and changing space because it is a constant communication route. Therefore, the border must be understood as something permeable, though each period has its own conditions (military campaigns, land expansion, state, insurrections...) that define the border reality. The border is the result of a movement, evolution or historic transformation. This idea challenges the traditional thesis that defends the role of borders as barriers that block the access of the enemy.

SESSION 45E - LANDSCAPE AS EXCAVATION

145 Excavation the Viking age landscape of Trondheim, Norway

Julian Cadamarteri (NIKU, Norway)

The medieval city of Trondheim, Norway is situated on a river bend promontory in the delta of the river Nid. The river and the promontory created an ideal harbour in the medieval and viking age. Charting the height of the natural river gravel underneath the occupational layers in Trondheim from the 1970s it has been possible to build an GIS terrain model of the delta landscape. The natural landscape lies underneath up to 5 m of man-made deposits and the terrain model makes it possible to understand the Viking and medieval use of the promontory and the medieval town plan in relation to the landscape.

230 A geomorphological – archaeological map of a ritual landscape in North Germany

Philipp Hoelzmann, Stephanie Hauschulz (Freie Universität Berlin, Germany) & Jens May (Brandenburgisches Landesamt für Denkmalpflege und Archäologisches Landesmuseum, Germany)

The Late Bonze Age Royal Tomb (‘Königsgrab’) of Seddin, one of the few elite tombs with a monumental architecture, is situated in the lower moraine landscape of the Saalian glaciation in N-Germany. It is considered as one of the most outstanding evidence of late Bronze Age sepulchral culture and together with other rich burials in the same area, it provides evidence for the presence of an elite in the Prignitz region and southern Mecklenburg from the 9th to 6th centuries BCE. The Seddin region probably developed on the basis of its favourable strategic position for trade and its control of
trade routes. Following a hiatus of nearly a century, archaeological research in and around Seddin resumed in the year 2000 and continues to date within the Excellence Cluster 'TOPOI - The Formation and Transformation of Space and Knowledge in Ancient Civilizations' financed by the German Research Foundation (DFG). Here, we present a map of the ritual landscape around the royal tomb of Seddin that combines geomorphological and archaeological layers. Thus, the map not only correlates the interrelated spatial distribution of the archaeological excavations of this landscape with each other, but also includes their topographic, geologic and geomorphological situation.

SESSION 49G - ROMAN MILITARY LANDSCAPES

225 A new light on the Roman military complex of North Tawton (Devon, UK)

Chris Smart (Department of Archaeology, University of Exeter, UK) & João Fonte (Institute of Heritage Sciences, Incipit, Spanish National Research Council (CSIC) / Department of Archaeology, University of Exeter, UK)

The Roman military complex of North Tawton has long been recognised as one of the most outstanding and promising areas for the study of the Roman military presence in Southwest England, comprising different Roman military enclosures. However, the data available so far only provide us with a partial picture of this area located nearby an important river-crossing of the Roman road supposedly leading westward from Exeter. A reassessment of this area’s archaeological complexity regarding the temporal and permanent character of the Roman military sites and their phasing and interrelations was enabled by a recent project funded by the Devon County Council. This included a geophysical survey in combination with airborne LiDAR data and archive oblique aerial photos analysis, as well as literature, ‘grey literature’, gazetteer data and historical sources review. Nevertheless, there are still several open questions, so more future surveys are needed in order to evaluate in more detail its full archaeological potential and its wider implications on the Roman conquest and occupation of Southwest England.

324 Outposts of Empire, from the Air – Landscape and Identity beyond Hadrian’s Wall

Ian Hardwick (University of York, UK)

The northern frontier of Roman Britain has long been a focus for archaeological study in England and Scotland, one of the best-preserved military borders of the ancient world. Aerial survey has been a major tool utilised in the past few decades for investigating and monitoring the condition of Hadrian’s Wall and its environs, with largescale projects such as the Hadrian’s Wall National Mapping Programme (2002-2008) and ongoing reconnaissance and testing of new techniques within and beyond the World Heritage Site. The aim of the current PhD project, based at the University of York and in collaboration with Historic England, is to reassess existing aerial survey data and create new mapping for key areas from aerial sources including historic and specialist photography, satellite and lidar imagery. This will then be evaluated alongside other forms of non-intrusive survey and evidence from excavations through a theoretical framework constructed from the current body of identity, landscape and frontier theory. The objective is to look at how we can best use large-area survey data to address research questions such as the impact of the frontier’s establishment and ongoing occupation, both on the natural and cultural landscapes of the region, and the identities of the people, native and Roman, living within them. The first phase of the project has looked at different archaeological landscapes around two outpost forts beyond the line of Hadrian’s Wall – Netherby (Castra Exploratorvm) in the west and High Rochester (Bremenivm) in the east, in order to investigate the nature of interaction and activities in the frontier landscape between local people and newly-arrived Roman garrisons.
SESSION 53D - AGRICULTURAL LANDSCAPES OF THE PAST THAT EFFECT THE PRESENT AND INFORM THE FUTURE

30 Agricultural landscape development of the Meshchera Lowlands (European Russia) - reconstructions by palaeoecological and historical data

Victor Matasov & E. Yu. Lovenko (Lomonosov Moscow State University, Russian Federation)

The main aim of the work is to assess how natural and positional factors influence spatial distribution of agriculture. Long-term development of agricultural land use showed on three study sites, located in the north of Ryazan region (European Russia) in different natural conditions. The first study site includes elevated eroded karst plateau with loess fertile soils and a part of the Oka River valley with sandy terraces and meadows on floodplains. The second one is situated at the junction of low, largely swamped area, with poor sandy soils and better drained territory, with loamy soils. The third study site is located at the lowest part of the Meshchera Lowlands, with many lakes, wetlands and poor sandy soils. The archaeological and palaeobotanical data (Middle and Late Holocene), maps of the General Land Survey (XVIII century), Atlas of Mende maps (XIX century), satellite imagery Corona (XX century) and modern satellite images (XXI century) were used to reconstruct long-term anthropogenic influences on landscapes. Spatial explicit multinomial logistic regression model was used to assess the contribution of biophysical and socio-economic drivers of long-term agricultural land use change. It allowed us to test assumptions about allocation of arable land for early periods if they are not supported with cartographic data. The results show that the first study site was intensively used by human since the Neolithic up to now. The territory is marked by highest population density and share of arable land. The second area was populated later, the share of arable land was permanently low, and the population was concentrated along the main road. The forestry dominated in land use structure. The third key region was characterized by early human settlements on shores of lakes (Neolithic-early Bronze Age), the lowest percent of arable land and a relatively low population density. The study was supported by RSF, project № 16-17-10045.

56 Initial stages of anthropogenic transformation of landscapes in Central Russia

Viacheslav Nizovtsev (Lomonosov Moscow State University, Russia Federation) & Natalia Erman (IHST RAS, Russian Federation)

The first anthropogenic landscape complexes emerged with the transfer from the appropriating type of economy to producing one. In Central Russia such transition, or the Neolithic revolution, dates back not earlier than the Bronze Age. During that period the land became a means of work. Landscape-transforming anthropogenic influence stemmed from the development of cultivation and grazing, formation of permanent settlements and specific features of their spatial distribution. During the Meso-Neolithic stage only anthropogenic modifications of natural landscapes were formed; and in the Bronze Age there were already anthropogenic-derivative and even anthropogenic landscape complexes. Some of them are preserved till now. These are the pastoral agro-geosystems with flood-plain meadows and woodlands. At the turn of IX-VIII centuries there was the expansion of the tribes of the Iron Age in Central Russia. Along with cattle breeding the cultivation, both slash-and-burn and field, gained an important role in the economy. Artificial fortifications were built around ancient settlements: ground walls with palisades and deep ditches at not protected sides. As a rule settlements were located in those parts of river valleys where the landscape structure was extremely complex and included a plenty of diverse and even contrasting natural territorial complexes that allowed developing a "flexible" integrated economy. In the Iron Age the development of permanent long-term settlement and agricultural structure had led to the formation of true anthropogenic and cultural landscapes. The main types of anthropogenic landscape complexes of that time were settlements, located on the capes and
spits between the banks of rivers and the gullies opening into them; and pastures which occupied floodplain and valley-gully natural-territorial complexes. At the same time the most extensive original natural-anthropogenic landscape complexes were formed, i.e. forest-pasture-arable with small-leaved forests replacing the primary broadleaved-coniferous and complex nemoral pine forests.

**SESSION 55/3A - MULTI-PROXY ENVIRONMENTAL ARCHAEOLOGY IN AQUATIC SETTINGS: MARINE, LAKE AND WETLAND SEDIMENT ARCHIVES**

**20 Multiproxy analysis of submerged coastal palaeolandscapes and the application of sedimentary DNA: the impact of inter-tidal environmental variability on ancient DNA preservation**

*Rosie Everett, Roselyn Ware & Robin Allaby (University of Warwick, UK)*

The application of sedimentary DNA analysis for multi-proxy palaeoenvironmental reconstruction has already demonstrated successful extraction and metagenomic sequencing from deep-sea and lacustrine sediment. Analysis of the preservation of this ancient DNA has suggested that the stable cool saline conditions of submerged environments provides suitable conditions for reduced processes of DNA degradation, therefore providing an additional proxy for local-scale palaeoenvironmental reconstruction and identifying palaeoecological diversity. In contrast, little research has been undertaken to understand how this rate of degradation is reflected within sedaDNA extracted from coastal environments. In particular, the field is lacking an understanding on the impact of the environmental instability of changing tides and processes of erosion associated with intertidal zones, on sedaDNA deposition and degradation. Using boreholes extracted from the intertidal zone at Borth beach, this project aims to sequence sedaDNA from areas of intertidal deposits, in order to assess the extent in which changing saline conditions through tidal cycles, impacts on processes of DNA degradation. This data will then be compared with pollen and potential diatom records, in order to assess the taxonomic resolution in which the sedaDNA provides, as a tool for palaeoenvironmental reconstruction. The known depositional history at Borth beach will provide a robust environment to test the understanding of sedaDNA preservation, as the recorded stratigraphy not only demonstrates the variability in deposits (peat, clay, areas of submerged woodland), but also provide a temporal framework for the analysis. SedDNA is a relatively novel field of palaeoenvironmental research, and as with more traditional proxies, requires a better understanding of key analytical issues such as taphonomy and environmental constraints. The changing salinity and processes of erosion expected within this intertidal zone at Borth beach, provides an opportunistic environment for answering some of these questions around the process of deposition and preservation of sedaDNA within coastal environments.

**155 Weichselian Lateglacial environmental and vegetation development in the Moervaart palaeolake area (NW Belgium); implications for former human occupation patterns**

*Johanna A.A. Bos, Nelleke van Asch (ADC ArcheoProjecten, Netherlands) & Philippe Crombe (University of Ghent, Belgium)*

A detailed vegetation and environmental reconstruction for the Lateglacial interstadial in the Moervaart area (NW Belgium) is discussed in relation to former human occupation patterns. The reconstruction is based on a multi-disciplinary research carried out on calcareous deposits of a large palaeolake (~25 km²). The combination of geophysical (magnetic susceptibility, micromorphology, organic matter, calcium carbonate), botanical (pollen, macrofossils, diatoms), zoological (chironomids, molluscs, ostracods) and geochemical analyses (stable carbon and oxygen isotopes) allowed for a highly detailed reconstruction of the lake ecosystem and vegetation surrounding the lake. The chronology of the lake
record was provided by radiocarbon dating and comparison with the nearby Rieme sites and regional biostratigraphy. During the Bølling phase, the Moervaart palaeolake formed as result of a major rise of the groundwater table in the area. Waterlevel rise continued during the early Allerød phase and a rich waterflora and fauna developed in the lake. From this period onwards, the area provided a suitable landscape for the Federmesser Culture hunter-gatherers with fresh drinking water, extensive and fertile woodlands and lake edges for wild game hunting, plant gathering and fowling. Waterlevels rose to a maximum at the end of the early Allerød. Thereafter, an outlet for the lake was formed in the east. As a result, water levels gradually decreased during the middle to late Allerød and eventually the Moervaart lake turned into a swamp and ceased to exist. In combination with the prevailing colder conditions, this led to a marked population decrease with probably temporary abandonment of the region.

SESSION 57H - FURTHER HORIZONS, A ‘GENERAL’ SESSION

50 Lake Albano volcanic activity in Roman times: a geomythological approach.

Loredana Lancini (CReAAH - Le Mans Université, France)

In the last twenty years, archaeological excavations and public works have uncovered new information about the stratigraphy of Lake Albano maar and the results have engaged researchers in a discussion about the real occurrence of volcanic activity and consequent CO2 release and lake overflow. A key question remains regarding how far in the past this activity can be dated. On the bias of a multidisciplinary approach called geomythology, this poster sheds light on a much-debated issue concerning the supposed volcanic activity of Lake Albano maar (Colli Albani – Rome) in Antiquity. In fact, Latin and Greek sources speak of the marvel of the spillover of Lake Albano in 398 BC during the war against Veio and the hub of the modern debate turns on whether to put confidence in it or not. Latin mythology provides evidence that the Romans somehow preserved the memory of the geological nature of the lake: the overflowing of the lake was perceived as a punishment from Neptune; during Volcanalia, real fishes were thrown into the fire and bronze ones were offered as sacrifice on Mount Albano. The recurring image of the fire in the water is remarkable for its repeated occurrence. Even though there is still need to prove the veracity of events reported by ancient sources, it is undeniable that Romans were indeed aware of the volcanic origin of the lake - and that they may have witnessed some sort of manifestation related to the volcano. Mythology can suggest an interpretation of events which are only partially recorded, thus leading to understand that the Romans were aware of the link between fire and water in the Colli Albani region and that it was possible to find both in the lake, where gas exhalation was the product of the two elements.

100 Finding pets in the landscape – A crowdsourcing project

Eric Tourigny (Newcastle University, UK)

The post-medieval period in Britain saw pronounced changes in the ways people related to animals, both in life and in the afterlife. Memorials to treasured non-human companions began appearing in the back gardens of stately homes and eventually made their way to the public sphere in the form of pet cemeteries by the late 19th century. The inscriptions on these memorials can be revealing of changing attitudes towards animals: indicative of whether or not pets were considered important members of the family and whether or not human and animal would reunite in the afterlife. While memorialisation of animals as a trend moves from the elite countryside into working-class urban centres, does the same hold true for shifting attitudes towards animals? To further explore, the locations of these memorials must first be identified. Many cities and towns throughout the UK feature such memorials and most local residents know of them. This poster introduces a crowdsourcing project that draws on this local knowledge to identify the locations of these memorials throughout the landscape. Find out how you can contribute!
Castra in altum erigenda: a landscape made of stone, wood and clay.

Daniele Sacco (Università degli Studi di Urbino Carlo Bo, Italy)

The work presents the results of an extensive research project in landscape archaeology / geomorphology and archaeology of architecture, carried out in Italy by the teaching of Medieval Archaeology of the University of Urbino Carlo Bo. The project aimed at identifying the areas supplying building material (especially stone) and at studying working and building techniques of the time, in order to understand the relation between buildings and landscapes. Stone quarries in the area were located and studied thanks to a long and thorough geomorphological / petrographic analysis phase. The result of twenty years of research is a land resource management model closely connected to the building of both civil and religious structures. It is further proof of the close link and spatial proximity, in medieval times, between supply areas and fortified centres, also located in morphologically unstable areas. The result is a cross-section of Italy's landscape, between the X and the XV century, which is compared to other European models. It shows, in a diachronic perspective, the evolution of the relation between content and container, between architectural forms and landscapes, alternating narrow and broad focus and shifting from the single architectural component to the background around it.

Soundscapes and Dreamscapes of the Palaeolithic Caves of Southern France

Ryan Hurd (John F. Kennedy University, USA), Apela Colorado & Matthew Tucker (Worldwide Indigenous Science Network, USA)

At the Worldwide Indigenous Science Network (WISN) we emphasize research as a living practice. In 2016, WISN brought an inter-disciplinary team of scholars and indigenous practitioners to the Painted Caves in the south of France. In Cougnac and Pech Merle, we engaged in a participatory research methodology that incorporates indigenous practices, archaeoaoustics and action research to “hear,” “see” and “feel” what these chthonic spaces reveal for modern people. Metaphorically, we will explore how descent into the caves invites a shift of consciousness akin to dreaming and what this shift implies from emotional, interpersonal and ecopsychological levels. This work explores the multi-layered relationships between landscape and experience, with the hope of developing shamanic research protocols for archaeology that necessitate heart-felt conscious participation in a living multi-dimensional world (Colorado & Hurd, in press). Participants will be invited to view 3D “maps” of impulse response recordings that visualize the acoustic landscape of these caverns, as well as soak in a sensorial recreation of the caves vibrating with the sounds of bullroarer, conch, song and drum. In addition to the experiential poster session, we would like to invite participants to a morning session of community dream work. WISN is committed to embracing the potentials of action research in meeting rather than simply presenting our methods and data. Through gathering in a circle, and listening deeply to each other as we honour the living nature of the symbolic interior, we would like start the day in communion, wonder, reflection, and profound reverence for the enigmatic gifts of the night that live through us.

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Durham Historic City and World Heritage Site

The distinctive landscape of Durham is dominated by the Cathedral and Castle sitting on a dramatic peninsula formed by a loop of the River Wear, and around which lies the historic city streets. The fortified peninsula was inscribed as a World Heritage Site in 1986 (https://www.durhamworldheritagesite.com/). Its significance lies in the continuity of the site as a place of religious worship, learning and residence over 1000 years, the political and religious powers of the prince-bishops, the exceptional architecture of its Cathedral and Castle, and its visually dramatic location. The walking tour will comprise a route of around 1.5 to 2 hours around the historic city, including the World Heritage Site. It will be led by one of Durham’s experienced and knowledgeable Blue Badge tour guides and will include the Cathedral and Castle, as well as the Bodies of Evidence exhibition on Palace Green. The entry costs to the Castle, Cathedral and exhibition will be covered by the tour.

Epiacum Roman Fort

Epiacum (https://www.epiacumheritage.org/), high in the North Pennines Area of Outstanding Natural Beauty, is arguably one of the best preserved Roman forts in the western Empire. Now known as Whitley Castle, this remote outpost was built to control the mining and export of lead and silver, resources which this region has in abundance. The multiple ramparts and the unique diamond-shaped plan are spectacular, while in the interior, the footings of the barracks blocks, the commandant’s house and principia are clearly visible on the surface, even though they have never been excavated archaeologically. Epiacum is the antidote to the manicured, heavily-conserved forts along Hadrian’s Wall! For the past 250 years, the site has been bisected by a drystone field wall, which makes it difficult for visitors to move around the interior and understand what can be seen but in the fortnight immediately before the conference, the wall will be dismantled and removed by a team of volunteers, allowing visitors to appreciate the site properly for the first time. The excursion will be led by Al Oswald, who is overseeing the removal of the field wall. The site is on a working farm in the Pennine uplands. Appropriate footwear, e.g. trainers, walking/hiking boots, and a waterproof jacket are recommended.
Hadrian’s Wall

The 118-km-long Hadrian’s Wall forms part of the Frontiers of the Roman Empire World Heritage Site, and was built on the orders of the Emperor Hadrian around AD 122 at the northernmost limits of the Roman province of Britannia. It is a striking example of the organization of a military zone and illustrates the defensive techniques and geopolitical strategies of ancient Rome (http://hadrianswallcountry.co.uk/). Providing a focus for the militarised occupation of the northern frontier of Roman Britain for approximately 370 years, Hadrian’s Wall is a testament to the ability of the Roman Empire to shape and control the landscape. The excursion will visit one of the better-preserved sectors of the Wall between Gilsland and Birdoswald in Cumbria. The excursion will start at Milecastle 48 at Poltross Burn, near the village of Gilsland on the Cumbria/Northumberland county boundary, and will finish at the fort of Birdoswald, a distance just under 2 miles. This length of the Wall complex offers the opportunity to view all the major components of the monument (turrets, milecastles, ditch, Vallum, curtain, and a fort) as well as providing tantalising evidence for our interpretations of why and how the Wall was built. The excursion will be led by Rob Collins, Lecturer in Material Culture of the Northern Frontier at Newcastle University, and Matt Symonds, Editor of Current World Archaeology Magazine, whose main research interest is Roman frontiers, particularly Hadrian’s Wall. The walk will encompass several gentle slopes and one steep slope along the Hadrian's Wall National Path. Appropriate footwear, e.g. trainers, walking boots, and a waterproof jacket are recommended.

Historic Sunderland

Sunderland is a former industrial town and port that grew rapidly during the 18th and 19th centuries, based on the expansion of glass-making, coal mining and shipbuilding. Industrial decline in the 20th century was reflected in the town, with the commercial heart migrating westward and the post-World War II redevelopment of large areas of the urban landscape, including historic buildings and streets. Today, Sunderland is one of the most-deprived areas of the country, yet it also has a close-knit community and thriving voluntary sector. Two conservation areas, Old Sunderland and Old Sunderland Riverside, are the subject of a Heritage Action Zone, which aims to bring life back to historic Sunderland and reconnect it to the modern city centre. Feeding in to the Heritage Action Zone is Open Heritage, a new EU Horizon 2020 project. The project is a consortium from across Europe that will create and test inclusive and innovative models of adaptive reuse of historic buildings, with a series of test Co-operative Heritage Labs at its heart. One of these is centred upon the historic buildings of Sunderland. The excursion will focus on the Heritage Action Zone and the potential offered by the Open Heritage project. It will be led by John Pendlebury, Professor of Urban Conservation at Newcastle University, and Loes Veldpaus, also of Newcastle University, and an expert in historic urban landscape.
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Garanzini, Francesca; Soprintendenza Archeologia, Belle Arti e Paesaggio per le province di Biella, Novara, Verbano-Cusio-Ossola e Vercelli (Italy). Paper: 85 - 42E.
Garcia, Arnau; McDonald Institute, University of Cambridge (UK). Paper: 17 - 6C; Poster: 272 - 6C.
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Granese, Maria Tommasa; Soprintendenza Archeologia, Belle Arti e paesaggio, Salerno e Avellino (Italy). Paper: 259 - 52D.
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Large, Andy; McCord Centre for Landscape, Newcastle University (UK). Conference Committee
Latouche, Agnieszka; University of Wroclaw, Institute of Geography and Regional Development (Poland). Session organiser - 8G. Paper: 218 - 8G.
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Mariani, Guido Stefano; Università degli Studi di Milano (Italy). Paper: 188 - 1A.
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Moreno Escobar, Maria del Carmen; University of Southampton (Spain). Paper: 153 - 42E.
Morhange, Christophe; University of Haifa / Aix Marseille Université, CNRS UMR 7330 CEREGE (Israel / France). Paper: 115 - 51B; Paper: 116 - 1A.
Motta, Davide; Northumbria University (UK). Paper: 205 - 43A.
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Narvaez, Carlos; Department of Geography, Universidad Autónoma de Madrid (Spain). Paper: 321 - 37B.
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Navarro Luengo, Ildefonso; Ayuntamiento de Estepona (Malaga) (Patrimonio Historico) (Spain). Paper: 321 - 37B.
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Orengo, Hector A.; McDonald Institute, University of Cambridge (UK). Paper: 17 - 6C; Paper: 284 - 29C; Paper: 73 - 42E; Poster: 122 - 6C; Poster: 272 - 6C.
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Ortega, Maria Jesús; Catalan Institute of Classical Archaeology (Spain). Paper: 228 - 42E.
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Papagiannopoulos, Kostas; Institute of Local History, Vrachneika (Greece). Poster: 204-1A.
Parcero-Oubiña, César; Institute of Heritage Sciences (Incipit), Spanish National Research Council (CSIC) (Spain). Paper: 49 - 40E.
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