**A24C-2609: Surfactant photo-reactivity and air-sea gas exchange**

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### Key points

1. CDOM photo-bleaching occurred at ~11-20% d⁻¹ a⁻300).
2. 0.2 µm filtered, irradiated DTS ULW samples showed variable temporal changes in SA: no seasonal or geographical trends.
3. Irradiation of 0.2 µm filtered and unfiltered estuarine water resulted in greater SA in all irradiated samples than in dark controls, with a consistent SA increase within the initial 12 hours of irradiation.

### Irradiations

**0.2 µm filtered DTS ULW SA:**

1. Variability in SA over time (Fig. 2).
2. 2.7 out of 14 samples had greater SA than dark controls.
3. 3.10 out of 14 samples showed an increase in SA over 24-72 hours.
4. 4. Filtration removes a significant portion of surfactants but precursors remain and allowed initial study of SA in the absence of the majority of the microbial community.

**0.2 µm filtered and unfiltered estuarine ULW SA:**

1. Increases in SA within the initial 12 hours of irradiation in all 3 samples (Fig. 3).
2. Variable results up to 24-48 hours.
3. Irradiated water largely showed higher SA than dark controls for the experiment duration.
4. Changes in dark control SA follow that of the irradiated sample; abiotic cross-linking of labile biomolecules can still occur in the dark.

### Estuarine ULW absorbance:

1. CDOM photobleaching (11-20% d⁻¹ a⁻300)) occurred following irradiation (Fig. 4).
2. Despite the role of CDOM as a photosensitizer, organic matter composition may be the driving factor in the behaviour of SA following UV exposure.

### Next steps

1. Determine SA in Tyne estuary transects.
2. Repeat irradiation experiments with SML water samples.
3. Repeat irradiation experiments with estuarine and coastal water samples covering a spectrum of salinities.
4. Quantify the effect of surfactant photochemistry on kₘ using a purpose built gas exchange tank.

### References