

Meeting title	What is the sea surface microlayer? Towards a unified physical, chemical and biological definition of the air-ocean interface.			
Working Group	WG2 & WG3			
Meeting convener	First name	Michael	Surname	Cunliffe
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Meeting dates	25 th – 26 th January 2011			
Meeting location	Institute	Marine Biological Association of the United Kingdom		
	City	Plymouth		
	Country	UK		

Meeting background and aims

There have been several recent scientific developments concerning the sea surface microlayer and the air-sea interface, including;

- A shift from the classic “wet/dry” lipid-protein layer model to a gelatinous film model of the sea surface microlayer.
- The role of transparent exopolymer particles (TEPs) in microlayer formation.
- Microbially mediated gas processes, especially in the context of air-sea gas transfer.
- Marine-derived aerosols.

It was timely to review the implications of these developments in the context of air-sea fluxes. As the science of the air-sea interface develops by becoming more interdisciplinary, a workable overarching definition of the sea surface microlayer is required, along with the establishment of a network of scientists involved in microlayer research.

The meeting aimed to deliver a detailed scientific description of the sea surface microlayer based on current understanding and recent developments in the field. The programme extended from “*the sea surface microlayer is within the top 1 mm of the ocean*” to a systematic physical, chemical and biological definition based upon empirical evidence.

Summary of discussions

The meeting started with a detailed synopsis of the physicochemical properties of the sea surface microlayer, including defining principal biochemical components and reviewing their role in specific properties of microlayers. For example, lipids are present in relatively low concentrations yet they have a significant impact on microlayer surface active properties, and can be used as biomarkers to determine the source of microlayer material.

Discussions progressed to focus on the sources of surface microlayer components. It is still clear that most surface microlayer material is biogenic, but it is unclear to what extent microlayer layer material comes from subsurface water or is formed within the interface layer. A substantial amount of discussion was focused on the emerging significant role of transparent exopolymer particles (TEPs) in surface microlayers.

Microbiological research highlights were discussed alongside physicochemical properties, and it was concluded that both together must be considered the sea surface microlayer. Microbial life in the sea surface microlayer plays a driving role in key biogeochemical processes, such as gas cycling.

The implications of the physicochemical and microbiological properties of sea surface microlayers were then discussed in relation to air-sea flux of climate and pollution relevant gases. A substantial amount of evidence was present from research supported by the UK Natural Environment Research Council through its Surface Ocean Lower Atmosphere Study (SOLAS) directed programme.

Future perspectives and outlook:

It was clear that significant advances have been made in our understanding of the sea surface microlayer and the air-sea interface. The logical way to progress is to embrace a multidisciplinary approach. Concerns were raised for a need to know how these systems will be affected by future climate change. However there was a unanimous conclusion that a better understanding of the *status quo* must be a research priority.

Meeting Outcomes

- Beyond obvious scientific merits, the meeting has provided an excellent opportunity to establish new international research links and develop collaborations.
- The participants covered a diverse range of scientific disciplines; each has left the meeting with new perspectives on air-sea processes and interactions.
- A group of European researchers has now been established with a common interest in the air-sea interface and sea surface microlayer.

Goals and plans for future activities (please include details of further meetings, publications research proposals and a timeline for these activities)

- The group is currently pursuing funding to support further meetings which will specifically allow the design and formation of a wider European network of sea surface microlayer scientists able to submit Europe-wide research proposals.
- A publication discussing the key findings from the meeting is currently in preparation. It is anticipated to be submitted for peer review early this summer.

Any other comments