

# Atmospheric chemistry at the ocean surface: Connecting the laboratory to the field

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The exchange of chemical species across the ocean-air interface is an important source or sink of many climate-active species including aerosols, ozone, halogens, and volatile organic compounds. Such exchange is a key component of Earth's biogeochemical cycling and exerts a profound influence on the chemistry of the atmosphere with impacts on climate, regional air quality and marine biological productivity. The sea surface microlayer (SML, the uppermost few microns of the water in contact with the air) represents a particularly reactive region that can lead to the production of chemicals and particles at the ocean surface and/or modify air-sea exchange rates (1). For example, deposition of ozone and subsequent reactions at the sea surface is an important pathway for production of volatile ozone-destroying halogens. Small volatile carbonyls including formaldehyde, glyoxal and methylglyoxal are attracting considerable attention in the study of air-sea interactions as key precursors of secondary organic aerosol (SOA) in the marine atmosphere. The precise mechanisms and the environmental relevance for processes occurring in the SML are highly uncertain. A major barrier is that it remains exceptionally challenging to study chemical processes in this microscopic interfacial region. Furthermore, in most cases appropriate model and experimental frameworks for extrapolating laboratory results to the atmosphere do not exist. This presentation demonstrates the use of novel lab-on-a-chip technology to measure chemical processes in a simulated air-sea interface in both liquid and air phases, with process modelling to understand the importance of such mechanisms in the environment.

## References

(1) Carpenter, L.J.; Nightingale, P.D. *Chem. Rev.* **2015**, 115, 4015-4034.