# 2.118 Halogenated organic compounds production by photosensitized reactions at the air/water interface .

Early Career Scientist

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Abstract:

Air/water interfaces are omnipresent in the environment, and the largest one is clearly to be found at surface of oceans. The latter is generally enriched in organic compounds, as compared to the underlying bulk water, and this layer is called the sea surface microlayer (SML). Previous studies showed that dissolved organic carbon (DOC) leads to the emission of volatile organic compounds (VOCs) via photochemical processes[1]. Halide anions ($Cl^-$, $Br^-$, $I^-$) are massively present in the SML but also in marine aerosols, and they may be involved in these processes. However, an understanding of the associated chemistry is still missing.
Here, the photochemical reactions between 4-benzoylbenzoic acid, used as a photosensitizer and halides was investigated. Gas phase products were monitored by high-resolution mass spectrometry, more particularly by (+/-) means of an atmospheric pressure chemical ionization (APCI) source coupled with an Orbitrap. Under illumination simulating solar conditions, halogenated organic compounds were produced and detected in the gas phase. 4-benzoylbenzoic acid's triplet states lead to organics radical' formation but also halide radicals in the bulk water; together they can react and give gas halogenated VOCs. The presence of surfactant or proton donor affects also these formation processes.
This kind of photochemical reactions taking place at the interface can therefore be a source of halogenated compounds in the atmosphere, and participate in the tropospheric halogen cycle. Moreover, they could be also precursor for secondary organic aerosol formation like non-halogenated VOCs founded by Bernard et al.[2]. This contribution will highlight our recent findings on these processes.

1 Ciararu, Fine *et al.,* 2015, *Scientific reports*, 5, 12741
2 Bernard, Ciararu *et al*., 2016, *Environ. Sci. Technol.,* 50, 8678-8686