2.019 Iodide and ozone, an ongoing story: New insights from lab experiments in the ozone-iodide reactivity at the sea interface .

Early Career Scientist

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Abstract:

Ozone loss over the open ocean is governed mainly by mechanisms of dry deposition at the surface of the ocean and through homogeneous gas phase reactions. Observations have demonstrated the influence of atmospheric iodine as a sink for ozone (Read et al., 2008) and model studies indicate that iodine chemistry has significant impact on the global tropospheric ozone burden (Sherwen et al., 2016). It is believed that the main source for iodine in the atmosphere is the reaction of ozone with dissolved inorganic iodide (I^-) at the ocean's surface, but the factors influencing the surface reaction between ozone and iodide are not entirely understood (Carpenter et al., 2013). Uncertainties in the currently used interfacial model include the prediction of HOI/I_2 fluxes at ambient levels of ozone and iodide and the influence of organic material, because organics can compete for ozone or form a physical barrier for the transfer of iodine species to the atmosphere.
Here, a laboratory study using natural and spiked (I^-) seawater samples and relevant ozone concentrations (50 pbb – 130pbb) is presented using a flow reactor where molecular iodine (I_2) is measured *in situ* by BBCEAS (Ball et al., 2010), with high sensitivity, thus exploring this reaction around ambient conditions for the first time. I_2 emissions are compared to those from artificial seawater solutions using similar iodide and ozone concentrations, but without organics. Our results confirm that the overall effect of organics is to suppress the I_2 emissions and correspond well with the interfacial model. Furthermore, quantitative offline analysis by TD-GC-MS showed a novel production of different iodinated halocarbons in the gas phase. The qualitative high-resolution mass-spectrometry analysis of SPE-DOM extracts before and after ozonolysis provides supplementary insights in the changes of the organics. These experiments will be used to

validate and refine the current interfacial model.