Iodine Speciation in Aerosols over the Atlantic, Indian and Pacific Oceans

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There are a number of significant interactions between iodine and ozone in the marine boundary layer (MBL): Iodide (I^-) in surface waters promotes the deposition of ozone to the sea surface and, in the process, produces volatile species (I_2, HOI) that enhance the sea-air flux of iodine to the lower atmosphere. These species photolyse to iodine atoms, which cause catalytic ozone destruction in the MBL. Under some conditions, the higher iodine oxides (e.g. I_2O_4, I_2O_5) produced as a result of this chemistry can form new aerosol particles and cloud condensation nuclei (CCN).

Atmospheric iodine has a complex heterogeneous chemistry. The reactivity of several iodine species in the aerosol phase (I^-, iodate (IO_3^-) and soluble organic iodine species) determine its lifetime in the MBL and the extent to which iodine can be recycled to the gas phase, where further ozone destruction can occur.

Currently, the processes that control the speciation of iodine in aerosols are very poorly understood. This hampers efforts to predict the impacts of iodine chemistry on ozone and the oxidative capacity of the atmosphere, and the extent to which these processes might be affected by future changes in climate.

This work will report analysis of the speciation of iodine in aerosols collected in the MBL over the remote Atlantic, Indian and Pacific Oceans. It will highlight the influence of background chemistry on iodine speciation in various different aerosol types, including clean background air, polluted continental outflow and mineral dust-laden airmasses. Preliminary results of the model simulations of aerosol iodine speciation in representative air masses using the 1 dimensional MBL model MISTRA will be presented.