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Global and regional impacts of tropospheric halogen chemistry

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Over the last decade, experimental and process level studies have demonstrated the role of halogens in the troposphere. It appears the chlorine, bromine and iodine chemistry may, to some degree, be ubiquitous in marine and continental environments, at the surface and in the free troposphere. With the development of global and regional chemistry transport models with some representation of halogen chemistry, the impact of halogens on tropospheric composition, air-quality and climate can now be explored.

The GEOS-Chem model has recently been extended to include a representation of iodine, bromine and chlorine chemistry with both gas and heterogeneous phase chemistry. A range of direct emissions (halocarbons, ocean inorganic iodine compounds) as well as indirect emissions from sea-salt and from the stratosphere are included. We will discuss the changes that occur in the composition of the troposphere with the inclusion of halogens – lower background ozone and OH concentrations, a new source of aerosols, a change in the oxidation of hydrocarbons etc. We will also discuss some of the significant uncertainties in this chemistry and the observational needs to better constrain this important aspect of tropospheric chemistry.