Geophysical Research Abstracts
Vol. 13, EGU2011-5943, 2011
EGU General Assembly 2011

Halogen chemistry at the Cape Verde islands - A model study

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This paper reports the results of a model study of halogenated species (chlorine, bromine, iodine) in the tropical marine boundary layer (MBL). Measurements of inorganic halogens (Cl_2, HOCl, BrO, IO) have been made at the Atmospheric Observatory on Sao Vicente island (Cape Verde) in 2007 and 2009; these observations have shown that significant concentrations of chlorine, bromine and iodine species are present in the tropical MBL throughout the year.

We have used a one-dimensional model (MISTRA v7.4.1) to simulate the observed concentrations of HOCl, Cl_2, IO and BrO and study the chemical processes in which these species are involved. The model includes a detailed description of the meteorology and the microphysics and an up-to-date gas and aqueous phase chemical mechanisms.

Using the model results and the field observations we found that the fluxes of organic iodine are not able to explain the observations of inorganic iodine in Cape Verde, which suggests that other sources may exist in the open ocean. The model results were used to investigate the impact of the observed levels of halogens on the concentrations of ozone and of dimethyl sulphide (DMS) in the tropical MBL and how they impact the nitrogen and sulphur budgets. These results will be discussed in detail.