Geophysical Research Abstracts, Vol. 7, 05337, 2005
SRef-ID: 1607-7962/gra/EGU05-A-05337

Latitudinal variation in volatile and particulate inorganic halogens over the eastern North and South Atlantic Oceans

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Multiphase chemical transformations involving halogenated compounds impact important, interrelated chemical processes in the marine boundary layer. The phase partitioning of HCl regulates aerosol pH and associated pH-dependent reactions including halogen activation and S(IV) oxidation. Halogen radical chemistry catalytically destroys O_3, oxidizes hydrocarbons, dimethylsulfide, and S(IV), and modifies HO_x and NO_x cycling. However, spatial and temporal variabilities in most reactant and product species and details of some chemical pathways are poorly characterized. Consequently, the global significance of chemical processes involving tropospheric halogens is very uncertain.

During October and November 2003, near-surface marine air over the eastern Atlantic was sampled from the German research ship *Polarstern* between latitude 51.5˚N and latitude 17.5˚S. Bulk and size-segregated aerosols were analyzed for major ionic constituents and total volatile inorganic Br (Br_t), HCl* (primarily HCl), Cl* (including HOCl and Cl_2), HNO_3, NH_3, SO_2, HCOOH, and CH_3COOH were measured in parallel. Preliminary Br_t mixing ratios (N=31) ranged from $<$2 to 30 pptv (median = 8 pptv). Many of the observed mixing ratios were higher than those reported for other marine regions [Sander et al., *Atmos. Chem. Phys.*, 3, 1301-1336, 2003; Table 3]. Preliminary particulate Br^- deficits relative to sea salt were positively correlated with (r

= 0.75) and generally lower than Br_t. The largest Br^- deficits and highest Br_t were found off the coast of northwest Africa where sea-salt concentrations were relatively high (400-600 nmol Na^+ m^{-3}). Detectable BrO was observed in the same region during a boreal autumn 2001 *Polarstern* cruise along a similar track [Leser et al., *Geophys. Res. Lett.*, 30, 10.1029/2002GL015 811, 2003].