Geophysical Research Abstracts
Vol. 16, EGU2014-13355-2, 2014
EGU General Assembly 2014

Iodine Speciation in Marine Aerosol of the Atlantic Ocean (AMT21)

Chan Yodle, Roland von Glasow, and Alex Baker

Centre of Ocean and Atmospheric Sciences (COAS), School of Environmental Sciences, University of East Anglia, Norwich, NR4 7TJ United Kingdom

Iodine chemistry in marine aerosol plays important roles in the marine boundary layer such as ozone destruction and new aerosol particle formation. In both cases, the speciation of iodine is an important factor in determining the role of iodine in these processes. Iodine has a complex chemistry in the gas and aerosol phases and to date the interactions and roles of individual iodine species are not well understood.

This study will present results of a research cruise from the Atlantic Ocean, AMT21, which travelled from Avonmouth in the UK to Punta Arenas, Chile during September to November 2011. Aerosol samples were collected for 24 hours onto pre-cleaned glass fibre filters with a flow rate of $\sim$1 m3 min-1, using a total suspended particulate sampler. Collected aerosol samples were extracted into ultra-pure water using mechanical shaking at room temperature. Iodine speciation in these extracts was measured using ion-chromatography coupled to Inductively Coupled Plasma-Spectrometry (IC-ICP-MS). Soluble organic iodine (SOI) was then determined by differences between the sum of inorganic iodine (iodide and iodate) and total soluble iodine determined by ICP-MS. Chemical analysis of major ions was also analysed by ion chromatography. Back trajectories were used to categorise air masses of aerosol, according to their origins and transport pathways.

Results show considerable differences in the iodine speciation of fine and coarse aerosol particles. These differences of iodine proportions in both aerosol modes agree well with previous studies in the Atlantic. Iodate was dominant species in coarse mode aerosol, its concentration ranged from 4.4 to 58.4 pmol m-3 (median proportion 80%), while SOI and iodide were found in lower concentrations. SOI concentrations ranged from 0.5 to 6.4 pmol m-3 (median proportion 12%) and iodide concentrations ranged from 0.6 to 4.6 pmol m-3 (median proportion 9%) respectively. For fine mode aerosol, lower iodate concentrations were observed with its concentrations ranged from 0.2 to 11.8 pmol m-3. Both iodate and SOI contributed almost equally to total iodine with 40% and 38% respectively. Iodide concentrations in the fine mode ranged from 0.5 to 7.0 pmol m-3 (median proportion 24%).

Findings of iodine speciation indicated that iodate is strongly associated with coarse mode aerosol of Sahara dust. Strong Saharan dust influences in coarse mode aerosol resulted in undetermined SOI. The distribution of iodine species was rather unusual for fine aerosol samples which have strong influences of biomass burning air masses. For these fine aerosol samples, proportions of SOI were observed higher than other air masses aerosol samples. Very low iodide distribution was found in aerosol samples of the southern Atlantic remote.

Key words: Iodine speciation, Soluble Organic Iodine (SOI), AMT21, Marine aerosol