Japan Geoscience Union Meeting 2011
(May 22-27 2011 at Makuhari, Chiba, Japan)

MIS029-P10 Room:Convention Hall Time:May 23 14:00-16:30

Observation of VOCs in the ambient air and in cloud water at the top and foot of Mt. Fuji during the summer

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Hydrophobic organic compounds such as PAHs, PCBs, and VOCs are harmful to humans and have adverse affects on ecosystem, so it is important to elucidate the fate of HOCs. In recent years the presence of HOCs, which is considerably larger than expected from the surrounding gas-phase concentration and Henry's law constants, has been reported in fog water and rainwater. There are several hypotheses to explain the discrepancy between the observed and the estimated concentration, for example the effect of dissolved and colloidal organic materials in atmospheric droplets and the effect of the large specific air-water interfacial area available for adsorption of hydrophobic organics. However, the wet scavenging mechanism of those toxic organic compounds as well as the dry deposition mechanism has been poorly understood.

Simultaneous sampling of cloud water along with atmospheric VOCs was performed at the top and foot of Mt. Fuji during summer observational campaign. We here report the concentration of VOCs in cloud water as well as that in the ambient air. Chlorinated hydrocarbons (CHs) and monocyclic aromatic hydrocarbons (MAHs) in cloud were determined by Head Space-Solid Phase Micro Extraction (HSSPME) / GCMS. The concentration of MAHs was higher than that of CHs both in cloud water and in the ambient air and toluene was the most abundant among VOCs. Cloud water contained higher amounts of VOCs than would have been expected from the gas-phase concentrations and Henry's law constants. We will also discuss the enhanced dissolution of atmospheric VOCs into atmospheric droplets.

Keywords: Free Troposphere, Background Concentration, Henry's law