Uptake of Dimethyl Sulfide and Its Oxidized Products by Sea Spray Aerosol above the Antarctic and the Equatorial Pacific Oceans

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Dimethyl sulfide (DMS), which is the most dominant sulfur (S) source in the marine atmosphere, is oxidized to H_2SO_4 in the atmosphere, and this acid is considered as important factor to control climate change because H_2SO_4 acts as cloud condensation nuclei [1, 2]. Thus, it is essential to consider the S cycle in marine environments for the evaluation of climate change. However, atmospheric behaviors of DMS and intermediates from DMS to H_2SO_4 have not been clear. In this study, S speciation using X-ray absorption fine structure (XAFS) spectroscopy was conducted to clarify atmospheric behavior of DMS and its oxidized products. In addition, speciation of sodium (Na) and magnesium (Mg) were also conducted to decide sink of DMS and its oxidized products accurately.

Size-fractionated aerosol particles above the Antarctic and the equatorial Pacific Oceans were collected during cruise of KH-14-6 (R/V *Hakuho-Maru*, GEOTRACES). Speciation experiments of Na, Mg and S for aerosols were conducted by XAFS spectroscopy at BL27SU in SPring-8, Japan and BL10.3.2. in Advanced Light Source, U.S.A.

Reduced S were significantly concentrated in submicron aerosols obtained the both eutrophic and oligotrophic oceanic regions, although DMS is unstable due to the high reactivity with OH radical. Considering the co-existing elements in the submicron aerosols, reduced S was contained within sea spray aerosol (SSA) together with Na and Mg. On the other hand, S species in submicron aerosols without Na and Mg were sulfate. It is considered that SSA is one of the important sink of DMS and its oxidized products. As results of speciation of Na and Mg, a part of Na species was Na-organic complex, whereas Mg species were $MgSO_4 \square 7H_2O$. These results suggested that uptake of reduced S is related to Na. It is important and direct evidence for uptake of DMS and its oxidized products into SSA. It is considered that SSA is one of the important sink of DMS and its oxidized products in the marine atmosphere.

[1] Charlson *et al*. (1987) *Nature*, **326**, 655-661. [2] Barnes et al. (2006) *Chem. Rev*. **106**, 940-975.