Development of a large volume sampling system for measuring stable isotope analysis of carbonyl sulfide

*Kazuki Kamezaki[1], Shohei Hattori[1], Enno Bahlmann[2], Naohiro Yoshida[1,3]

1. Department of Chemical Science and Engineering, School of Materials and Chemical Technology, Tokyo Institute of Technology, 2. Leibniz-Centre for Marine Tropical Research (ZMT) GmbH , 3. Earth-Life Science Institute, Tokyo Institute of Technology

Carbonyl sulfide (OCS) is the most abundant sulfur-containing gas in the ambient atmosphere, with an average mixing ratio of 500 parts per trillion (ppt) by volume in the troposphere. OCS is suggested as a sulfur source of the stratospheric sulfate aerosols (SSA) which plays an important role for Earth of radiation budget and for ozone depletion. Moreover, since leaves consume OCS whenever they are assimilating CO_2 with same process but plant does not emit OCS to atmosphere by respiration, OCS provides a means to partition net ecosystem exchange into gross primary production (GPP) and respiration on land. Nevertheless, current figures for tropospheric OCS sources and sinks carry large uncertainties.

Recently, our group developed new method measuring sulfur isotopic composition of OCS using fragmentation ions S^+. However, for applying our method to air, there is problem in collection over 8 nmol of OCS from air. Therefore, we developed OCS collection system in air.
For developing large volume collection system, we referred to the large volume collection system for carbon isotope measurement method for halocarbons. The large volume sampling system were collected volatile organic compounds including OCS from up to 500 L in air for 100 min. At the presentation, we report that OCS collection efficiency by using our collection system and the OCS isotopic compositions in air were presented. Additionally, we introduce the collected volatile organic compound with OCS in this system and discuss the possibility of a new development to atmospheric chemistry.

Keywords: Carbonyl sulfide, Sulfur isotope, atmospheric trace components

©2018. Japan Geoscience Union. All Right Reserved.