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

Early Career Scientist

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Abstract:

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 (Chin and Davis, 1995) and possess great potential for tracer of carbon cycle. OCS is taken up by vegetation during photosynthesis like absorption of carbon dioxide but OCS is not able to emit by respiration of vegetation, suggesting possible tracer for gross primary production. However, 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^+ (Hattori et al., 2015). 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 and measured sulfur isotopic composition of OCS in air.
For developing large volume collection system, we referred to the large volume collection system for carbon isotope measurement method for halocarbons (Bahlmann et al., 2011). 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.