

## Sulfur isotopes ratio of atmospheric carbonyl sulfide: reduction of required sample amount

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Carbonyl sulfide (COS) is the most abundant sulfur-containing gas in the ambient atmosphere, with an average concentration of approximately 500 parts per trillion (ppt) in the troposphere [1]. COS is converted to stratospheric sulfate aerosols in the stratosphere [2], affecting the Earth's radiation balance and ozone depletion. Additionally, COS has been suggested as a potential tracer of gross primary production because of its similar uptake mechanism into plants through the stomata as carbon dioxide, and it is not re-emitted by plants [3]. Therefore, it is important to investigate the dynamics of COS. However, uncertainties in the global COS budget remain large, and bottom-up estimates do not yield a closed COS budget. Stable isotope analysis of COS is useful for constraining the COS budget, but the need for large amounts of COS samples and their easy degradation in flasks have hindered the measurement. Here, we developed a method for measuring the sulfur isotope ratio of COS collected by grab sampling method using a GC-IRMS (MAT253 plus). The required sample amount for this method was 0.5-1 L (7 pmol or more) and the standard deviation of the repeatability was  $\pm 0.5\text{‰}$   $\delta^{34}\text{S}$  value. This is the smallest sample amount reported so far and is as precise as sulfur isotope ratio measurements of COS using nanomolar levels [4]. We also conducted storing test of COS in flasks, which is important when measuring COS isotope ratios in flasks. Storage in the surface-treated flasks for 6 months did not change the COS concentration. At the presentation, we show the results of the COS concentrations and sulfur isotope ratios observed in Tsukuba, Japan.

### References

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