

Increase the total column of Carbonyl sulfide (OCS) observed with FTIR at Tsukuba

*Isao Murata¹, Hideaki Nakajima², Isamu Morino²

1. Graduate School of Environmental Studies, Tohoku University, 2. National Institute for Environmental Studies

The total, stratospheric, and tropospheric columns of OCS have been observed with a high-resolution Fourier transform spectrometer at Tsukuba, Japan since 2001. SFIT4 spectral fitting program was used to derive the columns from 5 spectral windows in 5 micrometer region.

OCS is the main source for the stratospheric aerosol layer called the “Junge Layer” and is emitted mainly from the ocean, wetlands, and volcanos, but there are also anthropogenic sources such as paper / pulp production, biomass burning, rayon manufacture. Some reports have indicated that the amount of stratospheric aerosol is increasing and that OCS is also increasing. The increase of stratospheric aerosol constrains global warming due to its reflection of solar irradiation. Therefore, a global network observing solar MIR spectra with ground-based high-resolution FTs, the Network for the Detection of Atmospheric Composition Change/Infrared Working Group (NDACC/IRWG) is analyzing the OCS observed at many stations around the world.

We analyzed the spectra taken at Tsukuba between 2001 and 2016. Although there is a data gap between 2003 and 2010, the temporal variation of the OCS total and tropospheric columns observed at Tsukuba shows that there is an increase from 2001-2002 to 2010-2011. Similar increasing trends were observed in the troposphere at more than 20 sites of the NDACC/IRWG. On the other hand, stratospheric columns show complicated aspect. The columns increase at all sites in the southern hemisphere but decrease or increase at sites in the northern hemisphere.

Keywords: FTIR, Carbonyl sulfide, Trend