

## **Retrieval of BrO and its enhancement analysis in polar sea ice regions from satellite measurements**

**Sora Seo**  
(IUP)

### **Abstract**

Bromine compounds play an important role in atmospheric chemistry in particular as a catalytic element in depleting ozone with high efficiency. Global distributions of bromine monoxide (BrO) have been monitored by satellites since the launch of the GOME in 1995. The TROPOMI instrument, launched on the Sentinel-5 Precursor platform in October 2017, provides daily global coverage as the predecessor instruments, but with an unprecedented high spatial resolution of  $3.5 \times 5.5 \text{ km}^2$ . Satellite observations have shown large areas of elevated BrO covering several thousand  $\text{km}^2$  in the Arctic and Antarctic sea ice regions in polar spring. These enhancements of total BrO columns result from increases in stratospheric or tropospheric bromine amounts or both, and their occurrence may be related to meteorological conditions.

In this study, the spatial distributions of the occurrence of enhanced total BrO columns and the associated changes in meteorological parameters are investigated in both the Arctic and Antarctic sea ice regions using 10 years of GOME-2 measurements and meteorological model data. Statistical analysis of the long-term datasets presents clear differences in the meteorological conditions between the mean field and the enhanced BrO situations with pronounced spatial patterns in both polar regions, which demonstrates that specific meteorological parameters have a significant impact on the BrO enhancement.

In addition to the statistical analysis of long-term satellite measurements, a tropospheric BrO vertical column retrieval algorithm has been developed and validated with ground-based MAX-DOAS measurements in Ny-Ålesund, Svalbard. Comparisons between the satellite and the ground-based tropospheric BrO vertical columns show generally good agreement.