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# Detection of BrO plumes over various sources using OMI and GOME-2 measurements

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Reactive halogen species (RHS) play important roles in the chemistry of the stratosphere and troposphere. They are responsible for ozone depletion through catalytic reaction cycles, changes in the $OH/HO_2$ and $NO/NO_2$ ratios, and oxidation of compounds such as gaseous elemental mercury (GEM) and dimethyl sulphide (DMS). Thus, monitoring of halogen oxides is important for understanding global atmospheric oxidation capacity and climate change. Bromine monoxide (BrO) is one of the most common active halogen oxides. In the troposphere, large amounts of bromine are detected in Polar Regions in spring, over salt lakes, and in volcanic plumes. In this study, we analyse BrO column densities using OMI and GOME-2 observations. The measured spectra from both UV-visible nadir satellites were analyzed using the differential optical absorption spectroscopy (DOAS) method with different settings depending on the instrumental characteristics.

Large amounts of volcanic BrO from the Kasatochi eruption in 2008 were detected for 6 days from August 8 to August 13. Especially large BrO amounts were found in the plume center for 3 days from August 9 to 11 with slant column densities (SCD) of up to $\sim$1.6x$10^{15}$ molecules $cm^{-2}$ and $\sim$5.5x$10^{14}$ molecules $cm^{-2}$ in OMI and GOME-2 measurements, respectively. In addition to the volcanic sources, events of widespread BrO enhancements were also observed over the Arctic and Antarctic coastal regions during the spring time by both satellites. As the overpass time of the two instruments is not the same, differences between the two data sets are expected. In this study, the agreement between OMI and GOME-2 BrO data is investigated using both the operational products and different DOAS fits. Systematic differences are found in BrO slant columns and fitting residuals, both being larger in the case of OMI data. In addition, results are sensitive to the choice of fitting window.

From a monitoring point of view, due to the higher spatial resolution of OMI compared to GOME-2, OMI results are better suited for observing the shape variation and transport pattern of volcanic BrO. This will be further improved with upcoming the European Sentinel 5 Precursor satellite which has an even higher spatial resolution (3.5 / 7x7 $km^2$).