Yearly averaged BrO and SO_2 emissions from Ambrym volcano as seen by the GOME-2 satellite instrument

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Since bromine monoxide (BrO) of volcanic origin was detected for the first time in the plume of the Soufrière Hills volcano by ground-based differential optical absorption spectroscopy (DOAS) measurements in 2003, this species has been regularly observed by ground-based instruments at several quiescent-degassing volcanoes worldwide. Recently, the Global Ozone Monitoring Experiment satellite instrument (GOME-2) has proven to be capable of monitoring volcanic BrO in volcanic plumes also from space, during both, minor and major eruptions. However, long-term measurements of BrO at continuous passively degassing volcanoes are usually only provided from ground-based observations due to their higher sensitivity to weaker emissions.

Here, we present the first space-based observations of enhanced BrO abundances in the vicinity of the mostly quiescent-degassing Ambrym volcano (Vanuatu) by yearly averaged GOME-2 satellite data in the years 2007-2012. The observed spatial BrO distribution in the plume is compared to the corresponding mean distribution of volcanic sulphur dioxide (SO_2), which is commonly used as a tracer for volcanic emissions due to its relatively long lifetime and strong absorption features in the UV wavelength range. The averaged data shows distribution patterns of both species up to distances of $\approx$ 100 km from the volcano and a clear linear correlation with mean BrO/SO_2 ratio of $\approx 5 \times 10^{-5}$ to 1×10^{-4} throughout the investigated time period. In addition, an estimation of the lower limit of the total sulphur and bromine emissions will be given.