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Monitoring of volcanic SO_2 emissions using the GOME-2 satellite instrument

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Volcanic eruptions are a major hazard to the local population near large volcanoes and to aviation, they also play an important role in global climate change. Ground based monitoring is carried out only for a limited number of volcanoes. Space based atmospheric sensors like GOME, SCIAMACHY and OMI make it possible to detect the emissions of volcanic SO_2 and monitor volcanic activity and eruptions on a global scale. This is important as satellites are often the first, and sometimes the only, source of information on volcanoes in remote locations.

The GOME-2 instrument on the satellite MetOp provides measurements of the SO_2 columns with a spatial resolution of 80x40 km^2 and a global coverage within about one day. Volcanic sulfur dioxide emissions are determined from solar backscatter measurements in the ultra-violet spectral range around 320 nm, applying the Differential Optical Absorption Spectroscopy (DOAS) method. This retrieval technique uses the high spectral resolution of the instruments to determine the total column density of SO_2. With GOME-2 it is possible to detect and track volcanic SO_2 in near-real time (NRT), which is particularly important for early warning services, as large increases in SO_2 fluxes are an important indicator for new episodes of volcanic unrest. The GOME-2 measurements of volcanic SO_2 will be implemented in a new Volcano Fast Response System (Exupéry), that includes both ground-based and satellite observations.

In this contribution, we present first results of volcanic SO_2 retrieved from GOME-2 data using the Differential Optical Absorption Spectroscopy method, including exemplary results for volcanic eruptions and volcanic degassing detected by GOME-2.