Geophysical Research Abstracts
Vol. 12, EGU2010-11184, 2010
EGU General Assembly 2010

Volcanic SO2 Flux Derived From Satellite And From NOVAC Ground-based Systems

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The main objective of the NOVAC project (Network for Observation of Volcanic and Atmospheric Change) is to establish a global network of stations for the quantitative measurement of volcanic SO2 emissions by UV absorption spectroscopy.

The data from the network (more than 21 volcanoes are currently monitored) are primarily used for risk assessment and volcanological research, but the data are also valuable for the study of tropospheric and stratospheric gas composition (SO2, NO2, CH2O, BrO and O3). Since volcanic SO2 is also monitored from satellite (e.g. the SACS service, http://sacs.aeronomie.be/) the NOVAC project provides an excellent opportunity to explore and inter-compare the different satellite SO2 data-sets under volcanic conditions. Furthermore the NOVAC ground-based data can then be used to validate satellites estimates of gas flux emissions.

In this work, we present an investigation focusing on GOME-2 and OMI SO2 data sets. Their mutual consistency is analysed and comparisons of SO2 flux estimates are performed using NOVAC ground-based network measurements. A case study over Etna involving OMI (Ozone Monitoring Instrument) and ASTER (Advanced Spaceborne Thermal Emission and Reflection Radiometer) is presented that illustrates the impact of spatial inhomogeneities in the SO2 field inside the area covered by an OMI pixel. This study illustrates the importance of external information (as the height of the volcanic plume) to reduce the error on the SO2 estimation.