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BrO/SO_2 ratios from the NOVAC network

Peter Lübcke (1), Nicole Bobrowski (1), Bo Galle (2), Guastavo Garzon (3), Leif Vogel (1), and Ulrich Platt (1)

(1) Universität Heidelberg, Institut für Umweltphysik, Heidelberg, Germany (pluebcke@iup.uni-heidelberg.de), (2) Department of Radio and Space Science, Chalmers University of Technology, Gothenburg, Sweden, (3) Colombian Geological Survey, Geohazards Division, Colombia

The halogen/sulphur ratio is an important indicator for dynamical changes in the upper part of a volcanic system. In particular, the BrO/SO_2 ratio was recently suggested to be an indicator for changes in volcanic activity. This ratio can be assessed by Differential Optical Absorption Spectroscopy measurements in the UV. SO_2 is emitted by volcanoes and relatively stable on time-scales usually observed during ground-based remote-sensing measurements. On the other hand, BrO is not directly released from volcanoes, but probably a product of photochemical oxidation of primary emitted HBr in the atmosphere.

This study presents BrO/SO_2 ratios measured from the Network for Observation of Volcanic and Atmospheric Change (NOVAC). NOVAC has so far installed 64 spectrometers at 24 volcanoes world-wide, some of which measure volcanic gas and their fluxes for 7 years. This vast database will allow to correlate changes in the BrO/SO_2 ratio with volcanic activity and to investigate other parameters that might influence the formation of BrO in the volcanic plume, i.e., meteorology and time since release from the volcano.

We show that it is possible to obtain BrO/SO_2 ratios from the Type 1 NOVAC instrumentation at Nevado del Ruiz, Colombia, and present an adapted data evaluation scheme. Issues in the evaluation of automatically acquired spectroscopic data will be discussed and possible solutions will be suggested and application to the data will be shown. This includes the correct parameter settings for the BrO and SO_2 evaluation, the availability of reference spectra and problems with the variation of the instrument temperature. Measurement results and BrO/SO_2 time-series will be presented and the possibilities of the data set will be illustrated.