Geophysical Research Abstracts
Vol. 15, EGU2013-5711-1, 2013
EGU General Assembly 2013

Bromine and Chlorine Chemistry at Santiago crater, Masaya Volcano - Nicaragua

Nicole Bobrowski (1), Julio Alverez (2), Deanna Donohoue (3), Christoph Hörmann (4), Friedrich Wilhelm Klappenbach (5), Angelica Munoz (2), Roland von Glasow (3), and Ulrich Platt (1)

(1) University of Heidelberg, Institut für Umweltphysik, Heidelberg, Germany (nicole.bobrowski@iup.uni-heidelberg.de), (2) INETER, Managua, Nicaragua, (3) University of East Anglia, Norwich, Great Britain, (4) Max-Planck-Institut für Chemie, Mainz, Germany, (5) Karlsruhe Institute of Technology, Karlsruhe, Germany

In March 2011 a measurement campaign took place at the Santiago crater the currently only degassing crater of Masaya volcano, Nicaragua. Multi-Axis-Differential Optical Absorption Spectroscopy (MAX-DOAS) measurements were carried out at the crater rim and downwind in a valley about 1.5 km south-west from the emission source on eight consecutive days. These passive DOAS data were evaluated for BrO and SO_2 slant column densities (SCDs) and BrO/SO_2 ratios were calculated to overcome dilution effects and investigate the BrO formation processes of a volcanic plume in the planetary boundary layer as Masaya is located just 600 m.a.s.l. The BrO/SO_2 ratios ranged from minimum values of 1.3•10-5 at the crater rim to a maximum value of 7.2•10-5 taken 1.5 km downwind. Interestingly on two days the BrO formation lead to a significant stronger enhancement BrO/SO_2 ratio for the downwind measurement site in comparison with the other days. Furthermore, a generally small increase of the BrO/SO_2 ratios could be observed for downwind as well as crater rim measurements after the first three days.
On six days and three nights filter-pack measurements were undertaken as well to determine the halogen/sulphur ratios. These resulted in Br/S ratios of the order of 10-4 and Cl/S ratios of 10-1. A clear difference in the halogen/sulfur ratio between night and day-time measurements could be observed and will be discussed. In parallel to the in-situ and remote sensing measurements meteorological data were collected with a meteorological station situated on the eastern side of the Santiago crater. Additionally on two days SO_2 fluxes were determined by mobile measurements, traversing under the plume with a car in a distance of about 15 km.
The 2011 measurements will be put into a broader context comparing them to data taken during the last 15 years by various scientific groups. The data, their variation and possible causes for variations will be discussed. In particular for 2011 the discussion will be focused on meteorological influences. We will compare the data with results from a 1D numerical model that has been used for the investigation of volcanic plumes in the past.