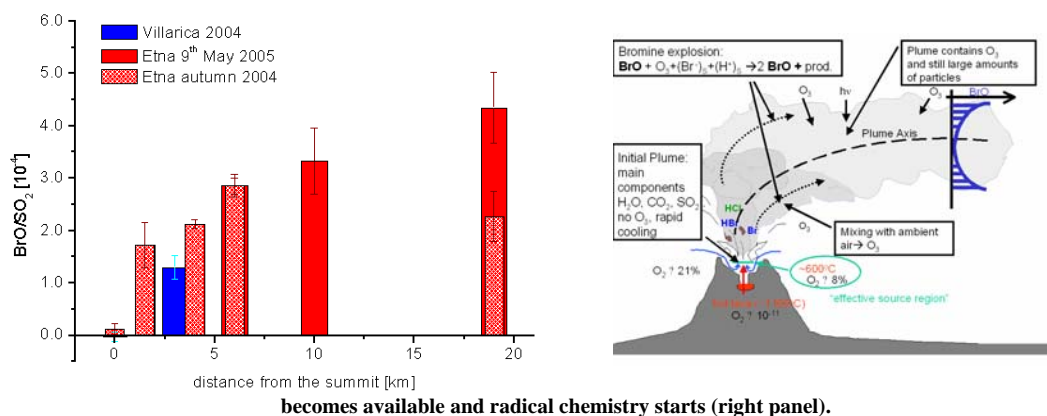


O2-02 MEASUREMENTS OF SULFUR DIOXIDE AND HALOGEN OXIDES IN VOLCANIC PLUMES

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The chemistry of volcanic plumes can give insights into volcanic processes, which could help improving the forecast of volcanic eruptions and is also of atmospheric relevance as the volcanic source of aerosols and trace gases can have a significant climatic impact. Remote sensing techniques provide a potential valuable possibility to do it. During the last years DOAS measurements were carried out with the new Mini-MAX-DOAS instrument combined with a Pocket PC.

Figure 1: The BrO/SO₂ ratios for the different distances from the summit (left panel). Sketch of processes in a volcanic plume: after emission the plume mixes with ambient air, thus ozone



The main results, which will be presented are: BrO is formed downwind, although it is not yet clear by what chemical processes. Nevertheless a suggestion of a possible chemistry will be given (see also Figure 1).

Experimental studies at two volcanic sites, Mt. Etna and Mt. Villarica, were carried out and showed similar results. No BrO was detected in proximity of the active vents of the volcanoes. An experimental study of the increase of the BrO/SO₂ ratio with the aging plume was conducted.

CIO and OCIO were detected for the first time as further active halogen compounds in volcanic plumes. CIO was already detected next to the source (in contrast to BrO), and shows no significant increase in the CIO/SO₂ ratio in the aging plume.

The BrO/SO₂ variations studied at Mt. Etna show differences of the feeding systems of the North East Crater and Voragine Crater. The North East Crater showed larger BrO/SO₂ ratios than the Voragine Crater.

The miniaturized instrument made it also for the first time possible to determine an SO₂ flux for the remote volcano Ollague.

A comparison between an SO₂ flux calculation assuming no scattering due to the volcanic plume and an SO₂ flux estimating the enhancement of light path by scattering in the plume will illustrate the present uncertainty in the flux measurements today.