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Measurement of SO2 emissions from Popocatépetl volcano by scanning imaging infrared spectroscopy

R. Harig (1), M. Grutter (2), and W. Stremme (2)

(1) Hamburg University of Technology, Germany, (2) Centro de Ciencias de la Atmósfera, Universidad Nacional Autónoma de México, Mexico

Scanning imaging infrared spectroscopy was applied to study the emission of SO2 from Popocatepetl volcano. Measurements were performed from Altzomoni (19.12° N, 98.65°W, 4000 m a.s.l.) which is 11 km NNW of Popocatépetl on the flanks of Iztaccíhuatl volcano.

The instrument used in this study (SIGIS) is comprised of an interferometer with a single detector element in combination with a telescope and an azimuth-elevation scanning mirror system, a video camera, and a PC. The field of view of the system is approximately 7.5 mrad. Imaging is performed by measuring spectra in a raster scan of the mirror within a region of interest defined by the operator using the visible image measured with the video camera.

The spectral range used for the measurements was 680 – 1500 cm-1. The spectral resolution was 4 cm-1 enabling the measurement of approximately 6 spectra per second. Radiometric calibrations were performed by measurements of a reference source at two different temperatures. Measurements were performed passively, i.e. the sky was the background of the field of view. Column densities of SO2 were retrieved by a least squares fitting procedure using high-resolution reference spectra (calculated using HITRAN) in combination with an instrument line shape model that is defined by five parameters. Several images were recorded showing the temporal and spatial variation of the plume.