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Impact of volcanic ash on SO2 retrieval in tropospheric and stratospheric eruption plumes using satellite measurements.

S. Corradini (1), L. Merucci (1), A. J. Prata (2), and A. Piscini (1)

(1) INGV, Istituto Nazionale di Geofisica e Vulcanologia, via di Vigna Murata, 605 – 00143 Roma (Italia) (corradini@ingv.it / 06 51860541), (2) Norwegian Institute for Air Research, Instituttveien 18 Kjeller, Norway 2027

During volcanic eruptions ash and SO2 can be emitted simultaneously. The ash plume particles reduce the top of atmosphere radiance in the entire thermal infrared spectral range, including the channels used for the SO2 retrieval. The net effect is a significant SO2 overestimation.
In this work an ash correction procedure is described and applied to different satellite platforms and volcanic eruptions.
A necessary condition for the ash correction is a sensor spectral range that includes the 7.3 and 8.7 microns SO2 absorption bands and the 11 and 12 microns split window bands used for ash retrieval. This implies the possibility of a simultaneous retrieval of both volcanic SO2 and ash in the same data set.
As test case the ash correction procedure has been applied to tropospheric and stratospheric eruptions considering the Moderate Resolution Imaging Spectroradiometer (MODIS) and the Spin Enhanced Visible and Infrared Imager (SEVIRI) measurements.
The SO2 and ash have been retrieved using a least squares fit method and the brightness temperature difference procedures, respectively. The simulated top of atmosphere radiance look-up table, needed for the SO2 columnar abundance and the ash retrievals, have been computed using the MODTRAN 4 radiative transfer model.
The results show that the ash correction procedure is meaningful for the SO2 retrieval at 8.7 microns while at 7.3 microns the correction result much less important and only significant for low SO2 columnar abundances.