



Water droplets and ice retrievals in volcanic clouds using multispectral TIR satellite data. Correction procedure for SO₂ estimation

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Among ash and gases, the volcanic clouds generated from several 2011-2014 Etna (Italy) lava fountains, were characterized by the huge presence of water droplets (wd) and/or ice. In some cases the wd/ice presence totally masked the ash signal and always significantly influenced the SO₂ retrievals.

Here the MODIS multispectral measurements are used to retrieve the volcanic wd and ice particles by means of two different techniques based on BTDR (Brightness Temperature Difference) algorithm and VPR (Volcanic Plume Removal) approach. As test case the MODIS-Aqua images collected on Etna volcano the 10 April 2011 at 12:30 UTC and the 12 August 2011 at 11:15 UTC have been considered.

Similarly to volcanic ashes, the wd/ice particles reduce the top of atmosphere radiance in the entire TIR spectral range, including the channels used for the SO₂ retrieval. The net effect is a significant SO₂ overestimation. Here two procedures for the correction of the wd/ice influence on SO₂ retrieval are proposed. The results obtained from the MODIS 10 April 2011 MODIS image have been compared with the measurements collected by the FLAME ground-based network of DOAS instruments deployed on Mt. Etna.