Satellite remote sensing of volcanic plume from Infrared Atmospheric Sounding Interferometer (IASI): results for recent eruptions.

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IASI is on board of METeorological Operational Satellite program (METOP), a European meteorological satellite that has been operational since 2007. METOP-A is the first of three polar satellites planned for the next fourteen years. It crosses the equator at the local time of 9:20. IASI is a Fourier transform spectrometer, but measures the spectral range 430 to 2780 cm\(^{-1}\) (3.82-15.5\,μm) with a spectral sampling of 0.25 cm\(^{-1}\) and an apodised spectral resolution of 0.5 cm\(^{-1}\). Radiometric accuracy is ±0.25%K. The IASI field of view (FOV) consists of four circles of 12 km diameter (at nadir) inside a square of 50 x 50 km, step-scanned across track (30 steps). It has a 2000 km swath and routinely acquires global coverage in 12 hours (although there are some gaps between orbits at tropical latitudes). Radiations are collocated with the Advanced Very High Resolution Radiometer (AVHRR) that provides complementary visible/near infrared channels, for cloud and aerosol retrievals.

The thermal infrared spectra of volcanic plumes shows a rapid variation with wavelength due to absorption lines from atmospheric and volcanic gases as well as broader scale features. The signature of sulphur dioxide depends on its amount and vertical profile. The thermal infrared spectra of volcanic plumes shows a rapid variation with wavelength due to absorption lines from atmospheric and volcanic gases as well as broader scale features. The signature of sulphur dioxide depends on its amount and vertical profile. The RTTOV output for a clean atmosphere (containing no gas or aerosol) is combined with an ash layer using the same scheme as the for the Ozone Monitoring Instrument (OMI) Aerosol and Cloud (ORAC) algorithm.

IASI spectra simulated using retrievals made from a lab by the Aerosol and Cloud (ORAC) algorithm. Ash samples: for different optical depths (at the reference wavelength of 550 nm).

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