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## Monitoring volcanic SO<sub>2</sub> emissions with the Infrared Atmospheric Sounding Interferometer

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Satellite remote sensing has been widely used to make measurements of sulphur dioxide (SO<sub>2</sub>) emissions from volcanoes. The Infrared Atmospheric Sounding Interferometer (IASI) is one such instrument that has been used to examine the emissions from large explosive eruptions. Much less work has been done using IASI to study the emissions from smaller eruptions, non-eruptive degassing or anthropogenic sources, and similarly it is rarely used for examining long term trends in activity. Now, when there are three IASI instruments in orbit and with over ten years of data, is the perfect opportunity to explore these topics. This study applied a 'fast' linear retrieval developed for IASI in Oxford, across the globe for a ten-year period. Global annual averages were dominated by the emissions from large eruptions (e.g. Nabro in 2011) but elevated signals could also be identified from smaller volcanic sources and industrial centres, suggesting the technique has promise for detecting lower level emissions. A systematic approach was then taken, rotating the linear retrieval output for each orbit at over 100 volcanoes worldwide, with the wind direction at the volcano's vent, or in cases where the plume was emitted at a greater height, using the observed plume direction. This isolates the elevated signal downwind of the volcano. The rotated outputs were then averaged over monthly, annual and multi-annual time periods. Analysis of the upwind and downwind values establishes whether there is an elevated signal and its intensity. An inventory was then constructed from these observations which show how these emissions varied over a ten-year period. Trends in SO<sub>2</sub> emission were compared against fluxes generated for the Ozone Monitoring Instrument (OMI) and the number of thermal anomalies detected by the MODVOLC algorithm developed for MODIS. It was identified for example, that long term trends are more easily identified at high altitude volcanoes such as Popocatepetl, Sabancaya and Nevado del Ruiz. This is consistent with the idea that the instrument performs better in regions with lower levels of water vapour (e.g. above the boundary layer).