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# SO2 volcanic plume retrieval using TES nadir measurements. Feasibility study.

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This work investigates the feasibility of using the nadir Tropospheric Emission Spectrometer (TES) measurements to retrieve the abundance and altitude dependence of sulphur dioxide from a volcanic plume. TES, one of the four instruments on board on NASA's Aura satellite, is a high-resolution, infrared (650 - 2250 cm-1) imaging Fourier transform spectrometer that observes both in the nadir and in the limb with a high spectral resolution (from 0.1 to 0.025 cm-1). This study has been carried out using an information content approach which describes how many independent pieces of information can be extract from the measurements. It has been applied for different plume configurations and SO2 column abundances. The extremely low information content obtained suggests the use of a singular vector decomposition (SVD) approach to reduce the instrumental noise. The SVD reconstructed spectra with reduced noise increases the information content. As an example a tropospheric plume of 100 DU has only 0.3 degrees of freedom for signal (DFS) but this improve to 3 DFS using an SVD approach. A procedure to optimise the selection of the spectral measurements is also described.