

The Use of MODTRAN to Estimate the Sulfur Dioxide Content of Volcanic Plumes

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The sulfur dioxide (SO_2) molecule exhibits ultraviolet, infrared, and microwave bands that are amenable to remote sensing techniques. The techniques most commonly applied to the estimation of SO_2 in volcanic plumes and clouds exploit the ultraviolet band. I and my colleagues have found that image data acquired with NASA's Thermal Infrared **Multispectral Scanner (TIMS)** can also be used to study SO_2 plumes. TIMS measures ground radiance in six broad spectral channels between 8 and 12 μm . Three of the channels fall within the broad SO_2 absorption feature between 8 and 9.5 μm . The TIMS estimation procedure is based on the MODTRAN radiative transfer code, which we use to model the radiance observed by the instrument as it views the ground through an intervening SO_2 plume. For this presentation, I will discuss the SO_2 estimation algorithm and show results obtained using TIMS data over Mt. Etna (Sicily) and **Kilauea** (Hawaii) volcanoes. This research was conducted at the Jet Propulsion Laboratory, California Institute of Technology, under contract to the National Aeronautics and Space Administration.