GROUND-BASED IMAGING OF VOLCANIC PLUMES

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This presentation will provide an overview of how an imaging interferometer can be used to provide high spectral and spatial resolution image data regarding the composition of volcanic plumes from the ground. The technique we describe offers the possibility to allow high spectral resolution imaging of volcanic emissions in the thermal infrared, a region in which silicate ash, sulfur dioxide and carbon dioxide have spectrally distinct (and measureable) absorption features. The instrument acquires approximately 40 separate spectral bands in the 8 to 14 micron wavelength region, at 15 wavenumber resolution. Rather than using filtering or dispersion to generate the spectral information, the instrument uses an interferometric technique. Light from the scene is focused onto an uncooled microbolometer detector array through a stationary interferometer (Sagnac configuration), causing the light incident at each detector at any instant in time to be phase shifted by an optical path difference that varies linearly across the array in the along-scan dimension. By scanning across the plume at 30 Hz (equal to a spatial sampling of one pixel per frame), an interferogram can be generated for each scene element.