

## **Expanding Options for Low-cost Instruments to Remotely Measure Volcanic Gas Emissions**

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Two objectives of a new NASA interdisciplinary investigation of the environmental effects of volcanoes are: (1) to develop predictive atmospheric models for the dispersion of eruption plumes; and (2) to understand the rate of conversion of sulfur dioxide emissions into sulfate aerosols as they are transported downwind. In order to achieve these objectives, we have developed, concurrently with researchers at Cambridge University, portable instrumentation for the remote measurement and field analysis of volcanic gas emissions, primarily SO<sub>2</sub>. The centerpiece of this system is a new miniaturized UV correlation spectrometer (FLYSPEC) which, with a handheld computer, can be used as a stand-alone device and operated in a similar fashion to the widely used COSPEC. The total mass of this battery operated system, including power is less than 1 kg. Results of measurements at Kilauea, Masaya, and Poas volcanoes show good agreement with concurrent COSPEC measurements. Additionally, due to significant power, size, weight, and cost savings realized with the new instrument, several different operational modes can potentially be used to provide both base-line and ground-truth measurements including: (1) multiple instruments deployed as an array to measure the instantaneous spatial distribution of a plume from the ground, and (2) a real-time, remote system for long-term continuous monitoring and analysis of the vent and the plume dispersion behavior. Over the next few months, we plan to determine site specific gas to aerosol conversion rates via deployments in tandem with a portable lidar system.