



Frequent remote topographic mapping and lava flux measurement using AVTIS

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The rate at which lava is erupted at the surface of a volcano is a primary observable property of active volcanism. However, means of making accurate and timely measurements of lava flux are rather limited. AVTIS (All-weather Volcano Topography Imaging Sensor) is a mm-wave radarometer that records topographic and thermal data from a distance of up to 7 km. By recording incremental changes in surface topography, we can measure time-averaged flux to within 0.1 cubic metres per second under favourable conditions. In 2006, we recorded a time series of topographic and thermal data of the growing lava dome of the Soufriere Hills volcano, Montserrat. We measured topographic data at a rate of up to three scans per hour from a range of about 6 km from the dome - near the operational limits of the instrument. To optimise the quality of data collected at long range, we have developed processing techniques to mitigate the effects of noise and enhance signal strength. We discuss the findings of our field experiments and our approaches to improving lava flux measurements at erupting volcanoes. AVTIS has demonstrated its potential for real-time monitoring of lava flux, dome morphology and temperature distribution, with clear application to the analysis and mitigation of risk.