



Remote measurement of lava flux at Arenal and Soufriere Hills volcanoes using AVTIS

G. Wadge (1), D.G. Macfarlane (2), M. James (3), D.A. Robertson (2), H. Pinkerton (3), H.M. Odbert (1) and L.J. Applegrath (3)

(1) ESSC, University of Reading, UK, (2) School of Physics and Astronomy, University of St. Andrews, UK (3) Environment Centre, Lancaster University, UK (gw@mail.nerc-essc.ac.uk / Fax: 44 118 378 6413 / Phone: 44 118 378 6412)

AVTIS (All-weather Volcano Topography Imaging Sensor) is a mm-wave radarometer designed to measure the shape and temperature of lava flows and domes remotely, particularly through cloud. In 2005 we used it to measure the lava flowing from two active volcanoes: Arenal in Costa Rica and Soufriere Hills in Montserrat. At Arenal in April-May 2005 we measured, from a distance of about 3 km, a 10-15m thick basaltic andesite lava flow advancing from the summit down the southern flank of the volcano. Over a period of ten days the difference in the surfaces measured by the radar gave a lava flux of 0.2 ± 0.08 cubic metres per second. The reflectivity of the lava flow surfaces at these wavelengths (~ 3 mm) was considerably greater than that of neighbouring ash covered areas. At Soufriere Hills during October-November 2005 we measured, from a distance of about 1.2 km, the new andesitic lava dome that had begun to grow in August. Over a period of nine days the near side of the ~ 100 m high lava dome advanced many tens of metres towards the instrument. The AVTIS-measured flux over this period was 1.0 - 1.2 cubic metres per second. In addition, a brightness-temperature image of the lava dome surface was collected with AVTIS in its passive, radiometric mode. These results, the first for a lava dome obtained at mm-wavelength, agreed well with those from a thermal infrared camera. The operating principle of the AVTIS instrument is now fully proven.