

During May and June 2004, we tested a novel, millimetre-wave ground based, dual-mode radar and radiometer on Soufrière Hills Volcano, Montserrat. AVTIS (All-weather Volcano Topography Imaging Sensor) has an active (radar) mode designed to image the distance to lava domes on volcanoes whose summits are commonly obscured by persistent cloud, such as Soufrière Hills Volcano. The passive (radiometer) mode can be employed to measure the surface temperature of the imaged topography. In its current form, AVTIS can be deployed by two people and takes 50 min to acquire a $20^\circ \times 5^\circ$ scene at 0.1° increments. During the fieldwork period the lava dome was not growing and only the radar mode was used. The data recorded indicate that the maximum distance imaged was about 3800 m. Combining datasets acquired from different viewpoints can potentially provide a full 3D topographic model. The accuracy and completeness of this reconstruction are reduced by two factors. Firstly, relatively small grazing angles of the ground-based line-of-sight rendered incised valleys invisible. Secondly, methods currently used to orient the instrument limit the accuracy of the resulting topographic information. Nevertheless, valuable information on new topographic surfaces was obtained in an area north of the lava dome where a valley has been infilled by deposits and in the amphitheatre created by the giant collapse event of July 2003.