

# Monitoring volcanic hazards using satellite- and ground-based radar

Professor Geoff Wadge

## Summary

Techniques have been devised and implemented to improve the monitoring of active volcanoes using radars. These techniques were developed mainly in collaboration with the Montserrat Volcano Observatory (MVO) and have helped them monitor the growth of lava domes and the risks that they pose to the people of Montserrat.

## Background

Island volcanoes in the tropics are often covered in cloud. Active volcanoes such as the Soufriere Hills Volcano on Montserrat, which has been erupting on and off since 1995, are made more dangerous because the cloud obscures what is going on at the summit and makes hazard warnings more difficult. To address this problem we at the Department of Meteorology realised that radar, with its cloud-penetrating capability, could be used to image the growing lava dome at the summit of the volcano and the pyroclastic flow deposits that resulted from collapses of the dome rock.

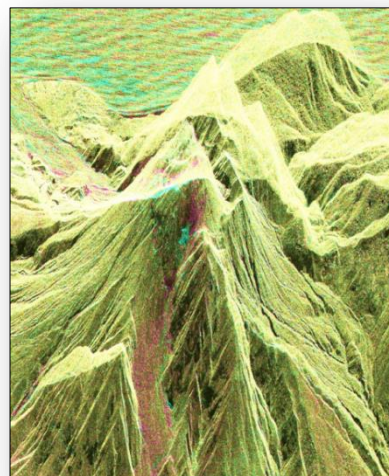
Two separate research programmes were created. In one, ground-based radars that could be used directly by the MVO were designed, built and trialled with colleagues from the University of St Andrews and Lancaster University. In the second programme, radars on satellites, specifically the very high resolution TerraSAR-X satellite, were used to map the location of new vents and deposits from eruptions otherwise shrouded in cloud.

## How is University of Reading research contributing?

Professor Wadge has been the Principal Investigator on a number of research grants that have been used to develop novel ground-based millimetre-wave radars and satellite-based X-band radar techniques for use on volcanoes. Data from these radars have been used to monitor dome growth rates, the rate of advance of lava flows, the location of 'unseen' new explosion vents and to map the extents and thicknesses of pyroclastic flow deposits.

## What impact has our research had?

Our two strands of radar research have been tested over several years on Soufriere Hills Volcano. We have shown their value as monitoring tools for the Montserrat Volcano Observatory, who have taken them up as operational techniques. We have also demonstrated their scientific value at other volcanoes in Costa Rica and Papua New Guinea and anticipate their take-up at other volcano observatories around the world.



***"I am really impressed with these results, and am excited about the other developments that might come."***

**Roderick Stewart**

Director,  
Montserrat Volcano  
Observatory



### Find out more...

- Department of Meteorology, University of Reading, UK
- [www.met.reading.ac.uk](http://www.met.reading.ac.uk)