Physicists aim to predict volcano eruption

August 29 2007

University of St Andrews scientists have been awarded a three year grant to create an on-site life-saving device to help predict volcano eruption.

The work is funded by nearly £400K from the Natural Environment Research Council (NERC), bringing the team's recent research funding to just over £1 million, following a £700K sub-contract from ERA Technology Limited for new work on military security.

The unmanned monitoring instrument, to be trialled at Montserrat in the West Indies, will be developed by the Millimetre Wave and High-Field ESR Group in the School of Physics and Astronomy.

The new volcano radar project builds on the success of the Group's previous NERC funded project which developed the unique portable

volcano mapping instrument 'AVTIS' (All-weather Volcano Topography Imaging Sensor). AVTIS uses millimetre waves to see through the smoke, gas and cloud that frequently cover volcanoes for months at a time to measure the size, shape and temperature of a growing volcanic lava dome. The Scots team will continue to work with a team of volcanologists from the Universities of Reading and Lancaster and the Montserrat Volcano Observatory (MVO) on the new AVTIS project, with the aim of helping MVO provide round the clock coverage of volcanic activity.

Dr David Macfarlane, lead scientist on the project explained, "AVTIS was the first millimetre wave instrument to ever be used on a volcano, proving the concept that a small battery powered radar could be used to map the lava dome from distances of up to six kilometres. We worked on the only active UK volcano, the lava dome at the Soufrière Hills in Montserrat. This type of volcano can change pretty quickly and the local observatory needs to know what is happening up on the mountain on a daily, if not hourly, basis. AVTIS measured the 3D shape of the lava dome, showing 60 metres growth over a ten day interval as well as gathering thermal images of the dome through thick cloud. It is the all-weather capability that sets this technology apart, allowing us to monitor the volcano from a safe distance all of the time".

He added, "The first instrument had to be manned, using a laptop computer to control the scanning, and could only operate for about eight hours before the batteries ran out. This new funding will allow us to build an unmanned version that lives on the volcano crater rim with its own power supply, beaming the radar images and data back to the observatory every few minutes using WiFi technology. With constant coverage of the evolving lava dome we aim to capture the all of the significant activity leading up to an eruption and eventually we hope to be able to help predict where and when the volcano might explode. In Montserrat, where we'll trial the instrument, people are continuing to be

evacuated from their homes as the volcano continues to grow and becomes ever more dangerous so there is a real need for this technology".

Dr Duncan Robertson, also of the Millimetre Wave and High-Field ESR Group said, "We're absolutely delighted to have won this funding which will allow us to expand significantly our activities in electromagnetics research. The awards reflect our continuing capability to deliver state-of-the-art instruments for tackling novel measurement problems".

Dr Graham Smith, group leader added, "Much of this has been made possible by leveraging expertise and technology developed during our other successful research projects, in particular the £2.6m HIPER Basic Technology project, building a next-generation, ultrafast, millimetre wave spectrometer used for probing electron structure, particularly in chemical and biological samples".

Source: University of St Andrews