



Scenario
DOCTORAL TRAINING PARTNERSHIP

NERC
SCIENCE OF THE
ENVIRONMENT

Measuring the pulse of Bagana volcano

Bagana is a singular volcano. It erupts viscous andesite lava flows almost continuously, for decades, together with the strongest plume of volcanic gases of any of the Papua New Guinea volcanoes. Occasionally it explodes and produces ash and, rarely, pyroclastic flows. Remarkably, there seems to be a distinct pulsatory character to the extrusion of lava, with pulses lasting several months. The volcano is ideal for satellite remote sensing because of its strong, dependable, surface signals, the large plume of gas and its remoteness on Bougainville island in Papua New Guinea.

The main aim of this studentship would be to improve our understanding of the pulsatory character of Bagana, mainly through remote sensing. In particular, we will use the InSAR technique to measure the rate of emission of the lava and also the accompanying deformation of the ground surface using the C-band data from the Sentinel-1 satellite and Xband data from TerraSAR-X/COSMO SkyMed satellites. These results will be correlated with the emission rate of SO₂ measured by the OMI and IASI sensors and the TropOMI sensor to be launched in 2016. The combined time series of these 3 data sets (magma flux, deformation and SO₂ flux) will enable conceptual models of the pulsatory magma dynamics to be posed and tested (*Wadge et al., 2012, Geochem. Geophys. Geosystems. 13/11 Q11011*).



A second aim of the studentship will be to use the insight gained from the model testing to evaluate the risk posed by the current activity and its occasional extremes. We have very good relationship with the Rabaul Volcano Observatory who are responsible for monitoring Bagana. RVO are keen to improve their satellite monitoring capabilities and to improve risk assessment and the student will use this to forge joint analysis of the pulses and the risk implications.

This PhD work would be supervised by Professor Geoff Wadge (Department of Meteorology, University of Reading) and Dr Julia Crummy (British Geological Survey) and would be based at Reading. Remote meetings with RVO staff will enable regular guidance on progress. We would also expect the student to be closely involved with other workers in the COMET (Centre for Observation, Modelling of Earthquakes, Volcanoes and Tectonics) network of students and researchers. In particular, collaboration with Dr Marie Edmonds at Cambridge University and Dr Elisa Carboni at Oxford University who have valuable gas plume expertise would be encouraged.

The studentship is funded by COMET(NERC), is available from October 2016, would suit a student with a good background in geophysics, an ability to program and an outgoing, collaborative perspective. Training in Earth Observation techniques would be given. Fieldwork is not mandatory but may be developed.

For informal enquiries about the studentship contact g.wadge@reading.ac.uk.