Monitoring and Understanding Volcanic Processes with InSAR

Supervisors

Main supervisor: Doctor Juliet Biggs (University of Bristol)
Co-supervisor: Doctor Sue Louglin (British Geological Survey)

Project enquiries - Email: juliet.biggs@bristol.ac.uk **Contact number:** +44 (0) 0117 331 5001

Host Institution: University of Bristol

Project description

Interferometric Synthetic Aperture Radar (InSAR) is increasingly used as a satellite-based method of measuring the deformation of the surface of volcanoes and can be used to infer the location of magma underground and the dynamics of its transport to the surface during eruptions. However, much of the use of volcano InSAR has been retrospective; only now are volcano observatories starting to use InSAR before and during an eruptive event. Furthermore, satellite radar can also be used to measure changes in surface properties (e.g. ice cap melting) or topographic changes (e.g. dome growth, lava extrusion rates), which can be equally important for understanding evolving hazards. Scientifically, linking satellite observations to other geophysical and petrological constraints is vital for understanding the volcanic processes that drive unrest and eruption.

The CEOS Volcano Pilot Programme is providing unprecedented access to data from a range of satellites over Latin American volcanoes. This ensures that all volcanoes are routinely monitored, and that there is a frequent series of high-resolution data to allow specific events to be captured in detail. This studentship will make use of the wealth of available data to investigate volcanic processes and develop new ways to integrate satellite observations into traditional volcano monitoring. Due to the unpredictable nature of volcanic events, the project is designed to be flexible in order to take advantages of new opportunities as they arise. Our primary geographical focus is the Northern Andes and Central America, and the student will spend time working with a volcano observatory, most likely IG-EPN in Ecuador. Likely projects include:

- Near real-time studies of volcanoes in unrest and eruption, and integration with ground-based observations.

- Exploratory InSAR surveys of remote volcanoes with ALOS 2 and Sentinel.

- Development of observation and models of dome growth or lava effusion fields as appropriate.

- Placements with volcano observatories in Ecuador, Costa Rica or Colombia as appropriate.

We are looking for students with a quantitative background (geophysics, physics, mathematics, engineering) with an interest in Earth Sciences, Natural Hazards or Volcanology. The student will receive training in geophysical methods and volcanology, specifically InSAR processing, time series and modelling and be expected to engage with the Space Agencies and Volcano Observatories. The studentship will provide ideal training for a future career within academia, the space sector, volcano monitoring or the wider geophysical and risk assessment communities.