PROJECT TITLE: Hazard generation from pyroclastic density currents entering water

Project Science Theme: Earth Science and Hazards
Project keywords: volcanology, fluid-dynamics, experimental, sediments, hazards

Lead Institution: University Bristol
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Webpage: https://www.bristol.ac.uk/earthsciences/research/volcanology/

Project description:

Pyroclastic currents from explosive eruptions can generate a range of hazards when entering oceans and lakes: i) displacing water, generating a tsunami; ii) triggering ash-rich currents that surge across the water surface; iii) and plunging beneath the water to generate submarine volcanic turbidity currents. We lack a first-order understanding of what happens when pyroclastic mixtures encounter water and how this controls subsequent hazard generation.

This project will explore three main science questions: (1) What happens to particle, gas and energy transfer as a PDC moves from the atmosphere into water? (2) How do these behaviours change in response to e.g. temperature, grainsize and slope? (3) Do these behaviour changes result in deposit signatures that can be read in existing core deposits to infer behaviours of historic eruptions and those in the geological record?

The project will use novel flume experiments to quantify the behaviour of a variety of volcanic and analogue materials under a range of conditions. The successful candidate will assist in apparatus design and development, lead the experiment design, selection of the experimental parameter space, and identify and analyse the natural datasets most appropriate for comparison to the experiments.

This will be guided by collaboration with colleagues at the National Oceanographic Centre, with training on core analysis and access to the BOSCORF core library which includes relevant deposits from a range of ocean island and submarine volcanic systems. You will be based at the University of Bristol, with full training on the use of experimental flumes, sustained granular fluidisation mechanisms, high speed video and particle imaging velocimetry analysis, as well as particle size analysis and other standard volcanological techniques. You will benefit from the wider support and networking of the long-standing Catastrophic Flows cross-institutional research cluster, as well as the Bristol Volcanology Group.

Collaborative Partner:

The National Oceanography Centre will provide supervision, access to BOSCORF marine core repository and training in core logging.

Useful recruitment links:

For information relating to the research project please contact the lead Supervisor via: pete.rowley@bristol.ac.uk

Bristol NERC GW4+ DTP Prospectus:
https://www.bristol.ac.uk/study/postgraduate/research/great-western-four-doctoral-training-partnership-nerc/

How to apply to the University of Bristol:
http://www.bristol.ac.uk/study/postgraduate/apply/

The application deadline is Thursday 7 January 2027 at 2359 GMT