PROJECT TITLE: Do MERMAIDs hear volcanoes?

Project Science Theme: Earth Science and Hazards
Project keywords: volcanic processes, seismo-accoustics, oceanic seismology

Lead Institution: University Bristol
Lead Supervisor: Dr Jessica Irving, Bristol, School of Earth Sciences
Co-Supervisor: Pete Rowley, University of Bristol, School of Earth Sciences
Co-Supervisor: Isobel Yeo, National Oceanographic Centre

Project Enquiries: jessica.irving@bristol.ac.uk

Webpage: https://www.bristol.ac.uk/earthsciences/research/geophysics

Project Description:

Submarine volcanic eruptions present significant global hazards, yet they are often poorly observed or even go undetected. A novel autonomous underwater seismic sensor – MERMAID (Mobile Earthquake Recorder in Marine Areas by Independent Divers) – has detected seismic signals generated during a volcanic eruption from thousands of kilometers away (Simon et al., GJI, 2026), as well as presumed volcanic signals whose origin is unknown (Pipaprathaporn, GJI, 2022). MERMAID data have been used to assess earthquakes and Earth's internal structure, but MERMAID's ability both to detect and quantify submarine volcanic events remains largely unexplored.

At the intersection of seismology and volcanology, this project will interrogate and interpret MERMAID data to determine what it can reveal about ocean volcanism, and how we could use these, and other seismo-acoustic sensors, for better hazard assessment. The researcher will work on large hydroacoustic datasets, exploring continuous time-series data and targeted event-specific waveforms corresponding to distant volcanic events. MERMAID data are collected by the EarthScope-Oceans consortium (earthscopeoceans.org); this project will enjoy access to data from several deployments in the Pacific and Indian Oceans.

Driven by the specific interests of the doctoral researcher, this project will be supported by training in several areas, including advanced training in signal processing and volcanic phenomena offered in-house. Training in machine learning or high-performance computing will be delivered in collaboration with the University of Bristol's Jean Golding Institute. Training on submarine volcanic processes, complementary cutting-edge observational systems and linking sediment systems to eruption processes through core logs will be supported by the National Oceanography Centre. The collaborative partnership and co-advising arrangement with the National Oceanographic Centre will allow the doctoral researcher to benefit from world-leading expertise in oceanographic process and geohazards. A training visit to US-based MERMAID experts will be facilitated by the supervisory team.

Collaborative Partner:

The National Oceanographic Centre will provide:

• Supervisory input and scientific guidance throughout the project, particularly relating to submarine volcanism, marine geohazards, volcanic processes and their oceanographic expression.

• Training and support in interpreting seismo-acoustic observations in the context of submarine volcanic processes and integrating these observations with complementary marine geological and geophysical datasets.

• Access, where relevant to the direction of the Doctoral Researcher's project, to existing NOC and collaborative datasets from submarine volcanic environments, including high-resolution seafloor mapping, water-column and other geophysical observations.

• Access to relevant marine sediment cores and volcanic samples held at NOC, including through the British Ocean Sediment Core Research Facility (BOSCORF), together with training in the logging and interpretation of volcanic deposits. These materials provide opportunities to relate remotely detected signals to the physical products and impacts of submarine volcanic events.

• Access to the wider expertise available at NOC in marine volcanology, marine geophysics, submarine sediment transport, oceanographic processes and marine geohazards.

Useful recruitment links:

For information relating to the research project please contact the lead Supervisor via: jessica.irving@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