PROJECT TITLE: Earth's Evolving Oceans

Project Science Theme: Earth Science and Hazards
Project keywords: Ocean, Biogeochemistry, Habitability, Oceanography

Lead Institution: University Bristol
Lead Supervisor: Lewis Alcott, Bristol, School of Earth Sciences
Co-Supervisor: Alex Krause, Cardiff University, School of Earth and Environmental Sciences
Co-Supervisor: Richard Stokey, University of Southampton
Co-Supervisor: Michael Henehan, University of Bristol, School of Earth Sciences

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Project description:

The chemical composition of Earth's ocean has varied dramatically through time, impacting its capability to host complex life. To try and understand the mechanisms which have driven these changes and its subsequent effect on marine life, researchers build numerical models of the Earth system. While some models change their ocean geometry, they either use few configurations and/or can only be run for snapshots of time. On the other hand, those models capable of continuous long timescales do not include changes to ocean geometry, thus miss the ability to identify regions of the ocean susceptible to biogeochemical change impacting marine habitability.

The project aim is to develop a biogeochemical model of Earth's oceans as they have geometrically evolved through Earth history, capturing for example, the impact of sea level changes or the opening and closing of ocean basins. Once developed, the researcher can then choose several possible future avenues of investigation such as determining spatially, the worst places impacted during mass extinctions or the most likely regions to experience anoxia. Following this, the researcher will work to couple this new model to an existing continental weathering model, to create an evolving land-ocean model capable of fully capturing Earth's evolution.

The researcher will be trained in the use of programming languages, such as MATLAB, to construct numerical models of the Earth system, and will be encouraged to attend other programming courses. The researcher will be expected to present their findings at conferences nationally and internationally, and will be supported in this by the research team and the University's internal training programmes.

Dr Alexander Krause (Cardiff University) will provide guidance on the coupling of the new model to the established continental weathering model, and Dr Richard Stockey (Uni. Southampton) will provide assistance in constraining the evolving geometry of Earth's ocean through time.

Useful recruitment links:

For information relating to the research project please contact the lead Supervisor via: lewis.alcott@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