PROJECT TITLE: To collapse or not: the stability of the AMOC in a warming climate

Project Science Theme: Climate Change and Risk
Project keywords: Climate, oceanography, AMOC, sea-level, AI

Lead Institution: Bristol
Lead Supervisor: Dr Rory Bingham, Bristol, School of Geographical Sciences
Co-Supervisor: Jonathan Baker, Met Office, Ocean, Cryosphere and Climate Group
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Project aims and methods:

The Atlantic Meridional Overturning Circulation (AMOC) influences global climate, weather, and sea level. Although climate models project weakening under global warming, the AMOC's future—including the possibility of collapse—remains uncertain. This project asks: what controls AMOC stability, how is it likely to change this century, and how can observations and models reduce uncertainty? Working with supervisors at the Universities of Bristol and Liverpool, and the Met Office, the student will combine two complementary perspectives to assess past fluctuations and future stability of the AMOC: (1) understanding and monitoring AMOC signals in boundary density and pressure, and (2) applying an overturning pathways framework to explore connections between the Atlantic, Indo-Pacific and Southern Oceans. The research can draw on sea level, ocean-bottom pressure, hydrographic and current observations, and climate model diagnostics. The student will also help shape the project's direction, with options ranging from developing physics-informed AI methods to running ocean simulations using powerful emerging tools such as Oceananigans. Training includes advanced climate data analysis, Earth observation, HPC, AI, coding and data science courses, alongside close mentoring from leading ocean-climate scientists. This is an exciting opportunity to tackle one of the most urgent and consequential open questions about Earth's future climate.

Project Collaborative partner:

The student will spend time at the Met Office, receiving on-the-job training in AMOC pathway diagnostics from an international expert. They will have access to Met Office climate model runs and extensive observational archives, and may attend in-house courses, including AI in climate science.

Useful recruitment links:

For information relating to the research project please contact the lead Supervisor via:
rory.bingham@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 Monday 8 January 2026 at 2359 GMT.