PROJECT TITLE: Impacts of rainfall on the stability of ice shelves in the Antarctic Peninsula

Project Science Theme: Climate Change and Risk
Project keywords: Antarctica, rainfall, ice-shelves, observations, modelling

Lead Institution: British Antarctic Survey
Lead Supervisor: Dr Andrew Orr
Co-Supervisor: Dr Tom Chudley, University of Bristol, Bristol Glaciological Centre (BGC), School of Geographical Sciences
Co-Supervisor: Gareth Marshall, BAS, Atmosphere, Ice, & Climate (AIC)

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Project description:

Scientific background

Ongoing warming is driving major changes over Antarctica, including more frequent rainfall and above-freezing air temperatures. By enhancing surface melt, this can influence Antarctic Ice Sheet stability by inducing ice shelf collapse as meltwater flows into and deepens pre-existing fractures ("hydrofracture"). Ice shelves act as floating barriers that buttress the flow of glaciers into the ocean and hence exert a critical control on Antarctica's contribution to sea-level rise. However, current and projected rainfall amounts over Antarctica's ice shelves, and its glaciological impacts, remains hugely uncertain.

Research methodology

The Doctoral Researcher will combine both observations and modelling to improve our understanding of the impacts of rainfall on ice shelf and ice sheet stability in the Antarctic Peninsula (AP), a region especially prone to rain. Research directions include using:

- Satellite-based datasets to identify case-studies of rainfall over AP ice shelves and its glaciological.

- Atmospheric model datasets to investigate present-day and future rainfall characteristics over AP ice shelves.

- Glacio-hydrology modelling to evaluate the impacts of rainfall on AP ice shelf stability.

The Doctoral Researcher will have the option to focus on particular research questions or methodologies. Through the combined research expertise of BAS (atmosphere) and BGC (glaciology), they will be exposed to interdisciplinary methods at the intersection of critical questions for the future of the Earth's climate.

Training

The Doctoral Researcher will receive training in Antarctic atmosphere, ice, and climate, “big data” analysis, atmospheric and glacio-hydrological modelling, scientific python programming, statistical techniques, and scientific writing. They will have an opportunity to attend field-specific training (e.g., the Karthaus summer school on ice sheets and glaciers in the climate system), and seminar series at BAS and BGC. They will be able to work alongside other BAS scientists on a parallel project focused on the impacts of rainfall on Antarctic sea-ice.

Useful recruitment links:

For information relating to the research project please contact the lead Supervisor via: anmcr@bas.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