PROJECT TITLE: Machine learning for understanding extreme weather in a changing climate

Project Science Theme: Climate Change and Risk

Project keywords: climate change, extremes, machine learning

Lead Institution: Bristol
Lead Supervisor: Peter Watson, Bristol, Geographical Sciences
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Project aims and methods:

This project will focus on better understanding high-impact extreme weather events in the present and future under climate change. Due to limited numbers of observed extreme events, we need to use computer simulations to study them. New machine learning (ML)-based weather models provide great promise for increasing realism. However, their performance at simulating extremes has not yet been rigorously tested. This project will fill that gap and lead development of ML-based approaches to study extreme weather risks. Key research questions will be how much more realistic are extreme events in these models, how can methods for determining their trustworthiness be employed, what can we learn from them about extreme weather, and can these models be improved further? The direction of the project will be developed jointly by the student and supervisors, regarding particular phenomena to study and methods to apply.

The supervision team has interdisciplinary expertise across climate science and machine learning, and will train the student in state-of-the-art methods in these fields, including use of high performance computing (including through university courses). The Met Office are giving CASE support and their “AI4Climate” team will host student visits and provide expertise in producing societally impactful results.

Project CASE partner:

The Met Office will provide co-supervision, expert guidance on producing societally relevant applications and hosting student visits.

Useful recruitment links:

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