

Project Title: Machine learning for understanding extreme weather in a changing climate

Lead Institution/Department: University of Bristol, School of Geographical Sciences

Primary Supervisor. Peter Watson

Co-supervisors. Oliver Ray (Computer Science, University of Bristol), Rui Zhu (Geography, University of Bristol), Doug McNeill (Met Office)

Scholarship: The Bristol Postgraduate Research Scholarship covers full fees, a stipend at UKRI (UK Research and Innovation) rates (£20,780 for 25/26) for living expenses, and up to £2,100 per year for research expenses, for a registration period of 4 years. Study will begin in September 2026.

The deadline for applications is 19th January 2026.

<https://www.bristol.ac.uk/science-engineering/postgraduate-research/pgr-scholarships/>

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. The Met Office are giving CASE support and their “AI4Climate” team will host student visits and provide expertise in producing societally impactful results.

Candidate Requirements

Candidates should have strong quantitative skills (e.g. from studying a physical science, mathematics or a related subject) and some experience with computer programming – it would be particularly beneficial to have used a language like Python or Matlab. Experience with using Unix-like systems would also be an advantage. Candidates do not need prior experience with machine learning, but should have at least a basic understanding of statistical modelling, for example an understanding of a method like linear regression.

Further Information

Please contact Peter Watson (peter.watson@bristol.ac.uk) for informal enquiries.

- <https://www.bristol.ac.uk/geography/courses/postgraduate>
- <https://www.bristol.ac.uk/geography/courses/postgraduate/physphd.html>
- <https://www.climatebristol.org/research/ai/>

How to Apply: Please apply to the “Geography (PhD)” programme at <https://www.bristol.ac.uk/study/postgraduate/apply/>