

PROJECT TITLE: From Forests to Climate Mitigation: Advanced Earth System Modelling of Aerosol-Cloud Feedbacks

Project Science Theme: Climate Change and Risk

Project keywords: climate, biosphere, afforestation, projections, aerosol

Lead Institution: Bristol

Lead Supervisor: Paul Griffiths, Bristol, Chemistry

Co-Supervisor: Garry Hayman, UKCEH, Land-surface processes

Co-Supervisor: James Weber, University of Reading, Meteorology

Co-Supervisor: Jane Mulcahy, UK Met Office, Climate Sciences

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Project aims and methods:

The interactions between the biosphere, atmospheric composition, and climate represent significant uncertainty in climate projections. IPCC assessments highlight aerosol-cloud interactions in Earth System Models as a key source of this uncertainty, fundamentally impacting our ability to predict future change and understand past climates. This interdisciplinary PhD develops new capability to study volatile organic compounds from vegetation, their oxidation into secondary organic aerosols, and the resulting global aerosol-cloud interactions. Current models oversimplify this chemistry, potentially obscuring crucial feedbacks between warming, emissions, and radiative forcing. This project will assess how these processes alter historical climate forcing, biosphere-climate feedbacks, and the mitigation potential of afforestation strategies.

This project will train the researcher for leadership at the intersection of atmospheric chemistry, biosphere, climate science, and Earth system modelling. They will develop unique skills by integrating state-of-the-art chemical knowledge into modelling, using land-surface models to assess future scenarios, and pioneering probabilistic coding methods for uncertainty assessment, gaining broad experience in climate science. Potential research foci include aerosol chemistry (Griffiths), land-atmosphere interactions (Hayman), or climate mitigation (Weber). Strong partnerships, including UKMO liaison (Mulcahy) for UKESM development, ensure access to UKESM and JULES training. Our internationally leading team provides expertise and supervision across all these areas.

Useful recruitment links:

For information relating to the research project please contact the lead Supervisor via:
paul.griffiths@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