PROJECT TITLE: AI-accelerated global greenhouse gas emissions evaluation

Project Science Theme: Science for Environmental Solutions
Project keywords: Machine learning, methane, carbon dioxide

Lead Institution: Bristol
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Co-Supervisor: Alistair Manning, Met Office, Hadley Centre
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Project aims and methods:

The new generation of greenhouse gas (GHG) observing satellites open the possibility of evaluating national methane and carbon dioxide emissions almost globally and in near-real-time. Such a capability will be transformative for our ability to evaluate international climate agreements such as the Global Methane Pledge. However, the enormous data volumes that these systems are now generating cannot be fully utilised by existing emissions inference frameworks. To address this challenge, our team have built the world's first machine learning emulator of an atmospheric GHG dispersion model, an essential component of an emissions inference system. Our surrogate model can simulate GHG transport many thousands of times more efficiently than 3D simulators. The challenge to be addressed in this project is to further develop the algorithm and help to extend our proof-of-concept system into an operational global emissions inference tool.

The successful student will have a strong background in computing, mathematics or physical sciences, but no direct experience with atmospheric science or machine learning is necessary. You will be embedded in a rapidly growing research team focused on all aspects of this problem, and will be taught the relevant atmospheric science, machine learning and Bayesian inference methods.

Project Collaborative partner:

The Met Office will provide training on dispersion modelling and inverse modelling.

Useful recruitment links:

For information relating to the research project please contact the lead Supervisor via:
matt.rigby@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