Job Description

Internship Title: Changes in atmospheric nitrogen deposition in the UK between 1960 and 2020

Department/ School	Land-Atmosphere Interactions, UK Centre for Ecology & Hydrology (UKCEH), Edinburgh
Reports To	Yuanlin Wang, yuawan@ceh.ac.uk, UK Centre for Ecology & Hydrology Ajinkya Deshpande, AjiDes@ceh.ac.uk, UK Centre for Ecology & Hydrology PhD Mentor: Damaris Tan, damtan@ceh.ac.uk, School of Chemistry

Job Purpose
In this placement, the intern will analyse spatiotemporal variations of atmospheric nitrogen deposition over the UK from 1960 to 2020 based on EMEP atmospheric chemistry transport model outputs. This role involves both data analysis and brief fieldwork to gain a practical understanding of the measurements behind atmospheric research, contributing to the broader goal of improving knowledge about the status and environmental impacts of reactive nitrogen.

Main Responsibilities
- **Data consolidation (20%)**
  Download and preprocess EMEP nitrogen deposition model outputs from 1960 to 2020 (10-year intervals). Ensure data quality and consistency across different time periods.
- **Spatial and statistical analysis (30%)**
  Use Python or R to examine temporal trends in NO_y, NH_x, wet and dry deposition forms. Compare deposition patterns with NO_x and NH_3 emissions.
- **Fieldwork (10%)**
  Participate in one week of field -based measurement to understand sampling and calibration methods.
- **Interpretation (20%)**
  Integrate analysis results with policy changes over the 5 decades and discuss how nitrogen deposition trends relate to environmental policy developments.
- **Reporting (15%)**
  Prepare data visualization (maps, charts) and a concise written report.
- **Collaboration and communication (5%)**

Maintain regular communication with the project team and join team meetings to discuss ongoing progress and any arising issues.

Knowledge Skills and Experience (required for the role)

Attribute	Essential	Desirable
Education, Qualifications & Training	- An undergraduate student in Environment Science, Atmospheric science, Geography, Data Science or a related discipline. - Strong motivation to learn about air quality modelling - Good communication skills and teamwork mindset.	- Understanding of environmental sciences principles, especially atmospheric chemistry and deposition process.
Knowledge & - Experience	- Familiarity with data analysis in Python, R or similar environments. - Basic knowledge of data visualization techniques. - Interest in participating in field work and willingness to work outdoors, sometimes in harsh weather conditions.	- Experience with field-based measurements. - Processing long-term atmospheric datasets.

Person Specification

Planning and Organising
- The intern will develop a clear project timeline, coordinating with the project supervisors to prioritize data processing, analysis and fieldwork. Weekly chats with the project team will ensure tasks are completed.
- Demonstrate general organizational skills and data analysing skills/best practices as the intern will be working with large datasets.
- The intern is expected to take initiative in scheduling tasks (data analysis, report drafting) while balancing fieldwork.

Problem Solving
- Collaboration with the research team will help navigate challenges in integrating and analysing multiple datasets including policy review.
- The intern will be encouraged to incrementally develop strong data handling skills during the placement.
- The intern will be encouraged to apply various technical and statistical approaches or techniques with unexpected issues.

Decision Making
- In the period, the intern will make day-to-day decisions regarding data processing methods and analytical steps.
- Strategic decisions, such as refining the scope of analysis, selecting appropriate statistical models, or understand ambiguous results, will be made in discussion with the supervisors and related stakeholders.
- The intern's recommendations on data trends and policy implications will inform future directions for research.

Key Contacts:
- Yuanlin Wang, project supervisor
- Ajinkya Deshpande, project co-supervisor
- Damaris Tan, PhD Mentor

Dimensions
Closing date for applications: Wednesday 14th May 2025 (Midnight)
Preferred start date: **30th June 2025 for 6 weeks**
Hours per week and preferred pattern/ restrictions (if applicable): 35 hours per week

Additional Information

Host Organization
This REP is hosted by UK Centre for Ecology & Hydrology (UKCEH), a research group dedicated to improving our understanding of air quality and its impacts on public health and ecosystems. We collaborate with the NERC and other partners to support innovative projects that help inform environmental policy and sustainable development.

Project Description
Atmospheric nitrogen deposition is known to have detrimental impacts on ecosystems, especially those in which sensitive plant species are critical to the ecosystem integrity. This project focuses on assessing historical changes in atmospheric nitrogen deposition in the UK over 1960 to 2020. Nitrogen deposition includes both oxidized (NO_y) and reduced (NH_x) forms of deposition, deposited through wet (rain, snow, fog) and dry processes. Existing EMEP model outputs at 3km resolution, simulated every 10 years, will be used to quantify total deposition as well as its individual components (NO_y, NO_x, dry and wet deposition). By analysing the spatiotemporal trends of these variables across diverse UK landscapes, this project will assess the influences of shifts in emissions on nitrogen deposition patterns and highlight implications for ecological and human health studies. Additionally, the candidate will join fieldwork at the Auchencorth Moss Observatory, gaining practical experience in measuring air pollutants and learn the on-ground considerations required for air quality monitoring.

Timelines
- Week 1-2: Introduction to the research group and understanding the NERC summer REP guidelines and expectation. Familiarization with EMEP model datasets and identification of relevant air pollutants.

- Week 3-4: Spatial analysis of nitrogen deposition over time. Comparative assessment of NO_y, NH_x and wet vs dry deposition. Linking deposition changes to historical emission trends.
- Week 5: One week of field-based measurements at Auchencorth Moss Observatory, to understand data collection, verify model outputs and gain practical experience in sampling techniques.
- Week 6-7: Further in-depth analysis comparing spatiotemporal patterns, drafting visual outputs (maps, time-series, graphs), and interpreting results in the context of policy changes and broader environmental impacts.
- Week 8: Finalizing data visualization and results summary, preparing of a short project report and trying to reflect on findings and challenges for future research.

References

- Tomlinson, S. J., Carnell, E. J., Dore, A. J., and Dragosits, U.: Nitrogen deposition in the UK at 1 km resolution from 1990 to 2017, Earth Syst. Sci. Data, 13, 4677–4692, https://doi.org/10.5194/essd-13-4677-2021, 2021.
- Liu, L., Wen, Z., Liu, S. *et al.* Decline in atmospheric nitrogen deposition in China between 2010 and 2020. *Nat. Geosci.* 17, 733–736 (2024). https://doi.org/10.1038/s41561-024-01484-4

Budget
A maximum of £500 towards project costs is available.

Location
UKCEH Edinburgh, Easter Bush Estate, Penicuik, Midlothian EH26 0QB (close to the University of Edinburgh Vet School). **Field site access and transport to the field site will be provided but the candidate should have their own personal protective gear such as weatherproof clothing and boots.**

Health & Safety Requirements for the role
None

Key Job hazard information specific to the role
- Exposure to sun.
- Exposure to wind and cold weather.
- General field hazards such as tripping, slipping and falling.

Programme Information
The Research Experience Programme (REPs), funded by NERC, offers paid research opportunities for undergraduate students. The programme is designed to address both demographic and diversity challenges in the environmental sciences, as well as thematic skills gaps, such as quantitative skills.

This is a valuable opportunity to gain hands on research experience, boost your employability, and explore potential pathways into further study or careers in environmental science.

For full details on how to apply and the selection process, please visit our REP webpage

Application Support

The University's Careers service provides a wide range of resources to support your application, including guidance on CVs, cover letters, and interview preparation. Students undertaking a REP placement will also have the opportunity participate in the Edinburgh Award - a structured programme that helps you reflect on and gain recognition from the University for the skills and attributes developed during your internship. For more information, you can book an appointment with a Careers Consultant via MyCareerHub.

Eligibility Criteria

To be eligible for a REP placement, applicants must meet **all** of the following criteria:

• Be currently studying towards their first undergraduate degree studies (including integrated Master's degrees) in a UK Higher Education institution, in any science discipline
Note: *Final year students are eligible if they still hold student status at the **start of the placement**, even if the student graduates during the course of the placement.*

- Be eligible for subsequent NERC PhD funding as defined here:
- A UK citizen who has been living in the UK for at least the past 3 years OR
- An EU citizen with pre-settled or settled status under the EU Settlement Scheme OR
- A non-EU citizen who has obtained the right to remain in the UK - known as 'indefinite leave to remain' (ILR) OR
- An International/EU student currently studying in the UK under a Tier 4 or Student Route Visa with validity until at least September 2025.

REPs **do not** meet the requirements for visa sponsorship. As such, students who are not currently residing in the UK or who do not hold a valid UK visa are not eligible to apply.

You cannot take part if you are a visiting student, or have previously taken part in REP programme.

Privacy Statement

In addition to the University's HR Privacy Information Notice, please read the Student and Graduate Privacy Statement: Internships and work experience programmes to understand how your personal information will be collected, used, and stored as part of the application process. .

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