UNIVERSITY OF LEEDS

CANDIDATE BRIEF

Research Fellow in Atmospheric Ice Nucleation, Faculty of Environment

Salary: Grade 7 (£41,064 – £48,822 p.a. depending on experience)

Reporting to: Professor Benjamin Murray

Reference: ENVEE1853

Fixed term for up to 29 months to complete specific time limited work

Location: University of Leeds (with scope for hybrid working)

We are open to discussing flexible working arrangements

Overview of the Role

Would you like to help to help to reduce uncertainty in cloud-climate feedbacks through new field work, do you have an established background in experimental cloud and aerosol research and do you want to further your career in a one of the world's leading atmospheric science institutes?

You will become a key member of the Ice Nucleation group in the School of Earth and Environment at the University of Leeds. You will work on the M-Phase (Resolving climate sensitivity associated with shallow mixed phase cloud in the oceanic mid- to high latitudes) and also the new IceSO (Measuring the variability in ice-nucleating particles over the Southern Ocean to reduce uncertainty in cloud-climate feedbacks) projects. These projects are tackling important questions at the core of one of the largest uncertainties in global climate projections – the properties of low-level oceanic clouds and the influence or aerosol particles. Model radiative biases over the Southern Ocean (SO) are largely due to a lack of low-level supercooled liquid clouds that results in far too much solar radiation making it to the surface, a sea that is too warm and global cloud feedback that is too negative. The balance between supercooled water and ice is central to defining the effects of clouds on climate and climate change, yet this balance is very poorly represented by current climate models. A key goal is to substantially improve our understanding of the sources and properties of the ice-nucleating particles (INPs) that initiate these critical changes in cloud phase, and thereby reduce uncertainty in climate projections.

Our knowledge of the enigmatic particles that trigger ice formation in clouds is particularly poor for remote oceans, such as the SO. Available data are limited by being of low time resolution (many hours to days) and short-term campaign-based (weeks, months) that only provide a snapshot. The available measurements show substantial variability in INP concentrations, and an unexplained decrease in SO INP concentrations over several decades.

At present we do not understand short- or long-term variability in INP and furthermore the sources, seasonal cycle and temperature dependence of INPs remain poorly defined; this hinders the development of realistic treatments of cloud physics in climate models. To accurately represent INPs in our models we need long-term high time resolution (~1 hr or better) measurements, but until now we have not had the tools to make these measurements. We have broken this deadlock with the development of PINE (Portable Ice Nucleation Experiment), a mobile cloud chamber, which we propose to deploy in the SO region. In IceSO PINE will be



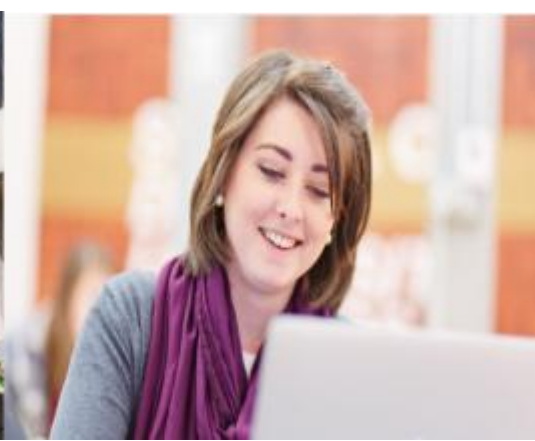
installed at the Kennaook/Cape Grim Baseline Air Pollution Station (KCG-BAPS; 40°S, 144°E) through our partners at CSIRO (Ruhi Humphries). KCG-BAPS is situated at the latitude band of greatest low-cloud feedback on Earth and has been used as a SO baseline station for over 40 years.

You will work closely with Dr Mark Tarn (Leeds), who led the M-Phase cruise and collected filter samples from the FAAM aircraft that we will study with electron microscopy; Dr Ross Herbert (Leeds) and Prof. Ken Carslaw (Leeds), who are our global aerosol modellers who will make use of our new SO data; Dr Paul Field (Leeds and Met Office) who will work with Herbert on cloud modelling; Dr Ruhi Humphries who will assist us in deploying PINE at KCG-BAPS; and Dr Ottmar Möhler who co-developed PINE with Leeds.

Main duties and responsibilities

- Working with and in support of Professor Ben Murray, the M-Phase team and the IceSO teams to ensure the objectives and deliverables of the projects project are successfully met;
- Work with a technical member of staff (Lesley Neve) to adapt our electron microscopy based size resolved composition analysis for higher throughflow and run through filter samples collected at KCG-BAPS as well as stored samples collected in the M-Phase project from marine locations in the northern hemisphere;
- Contribute to the analysis and archiving of data from the 2022 M-Phase cruise where we measured a range of aerosol properties, including INP concentrations in the Labrador Sea;
- Lead the deployment of PINE to the KCG-BAPS site, manage the data flow, work with local technicians to remotely ensure a complete dataset;
- Lead a small team to do a ~1 month long intensive observation period at the KCG-BAPS site where we will do comparisons of INP measurements using different filter types, size resolved INP measurements and heat tests for biological INPs.
- Working closely with our collaborators in CSIRO and Karlsruhe Institute of Technology;
- Process the resulting data and upload to a publicly accessible site with appropriate documentation;
- Generating and pursuing independent and original research ideas in the appropriate subject area;





- Developing research objectives and proposals and contributing to setting the direction of the research project and team including preparing proposals for funding in collaboration with colleagues;
- Evaluating methods and techniques used and results obtained by other researchers and to relate such evaluations appropriately to your own work;
- Preparing papers for publication in leading international journals and disseminating research results through other recognised forms of output;
- Working both independently and also as part of a larger team of researchers, engaging in knowledge-transfer activities where appropriate and feasible;
- Maintaining your own continuing professional development and acting as a mentor to less experienced colleagues as appropriate;
- Contributing to the training of both undergraduate and postgraduate students, including assisting with the supervision of projects in areas relevant to the project.

These duties provide a framework for the role and should not be regarded as a definitive list. Other reasonable duties may be required consistent with the grade of the post.

Qualifications and skills

Essential

- A PhD or near completion - i.e. the initial thesis needs to have been handed in at the point of application in a relevant Physical Science or field of Engineering or a closely allied discipline;
- Experience in experimental science working with complex instrumentation;
- Experience of working with experimental data and of processing experimental data to address scientific questions and hypotheses;
- Good time management and planning skills, with the ability to meet tight deadlines, manage competing demands and work effectively under pressure without close support;
- A track record of high-quality peer-reviewed publications in reputable journals;
- Excellent written and verbal communication skills including presentation skills;
- A proven ability to work well both individually and in a team;
- A strong commitment to your own continuous professional development.



Desirable

- Experience working with aerosol particles and knowledge of aerosol science;
- A strong background in scientific programming (e.g. Python, Fortran);
- Knowledge of aerosol-cloud interactions;
- Knowledge of atmospheric ice nucleation.

Additional information

Please note: If you are not a British or Irish citizen, from 1 January 2021 you will require permission to work in the UK. This will normally be in the form of a visa but, if you are an EEA/Swiss citizen and resident in the UK before 31 December 2020, this may be your passport or status under the EU Settlement Scheme.

Find out more about the Faculty of Environment.

Find out more about the School of Earth and Environment.

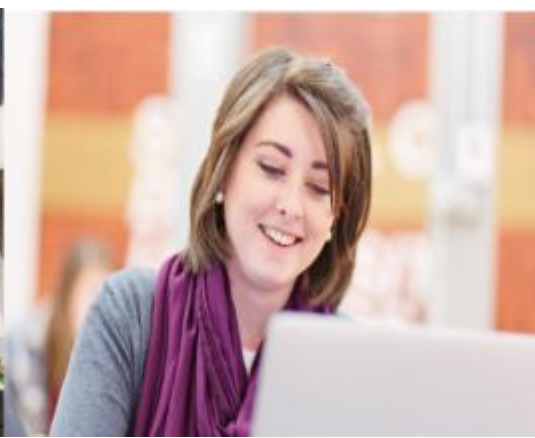
Find out more about our Research and associated facilities.

Find out more about Equality and Inclusion in the faculty.

Working at Leeds
We are a campus-based community and regular interaction with campus is an expectation of all roles in line with academic and service needs and the requirements of the role. We are also open to discussing flexible working arrangements. To find out more about the benefits of working at the University and what it is like to live and work in the Leeds area visit our Working at Leeds information page.

Our University
As an international research-intensive university, we welcome students and staff from all walks of life and from across the world. We foster an inclusive environment where all can flourish and prosper, and we are proud of our strong commitment to student education. Within the Faculty of Environment we are dedicated to diversifying our community and we welcome the unique contributions that individuals can bring, and particularly encourage applications from, but not limited to Black, Asian, people who belong to a minority ethnic community; people who identify as LGBT+; and disabled people. Candidates will always be selected based on merit and ability.





The Faculty of Environment has received a prestigious Athena SWAN silver award from Advance HE, the national body that promotes equality in the higher education sector. This award represents the combined efforts of all schools in the Faculty and shows the positive actions we have taken to ensure that our policies, processes and ethos all promote an equal and inclusive environment for work and study.

Information for disabled candidates

Information for disabled candidates, impairments or health conditions, including requesting alternative formats, can be found on our Accessibility information page or by getting in touch with us at hr@leeds.ac.uk

Criminal record information

Rehabilitation of Offenders Act 1974

A criminal record check is not required for this position. However, all applicants will be required to declare if they have any 'unspent' criminal offences, including those pending.

Any offer of appointment will be in accordance with our Criminal Records policy. You can find out more about required checks and declarations in our Criminal Records information page.