

Job title	Arnell Post-Doctoral Research Associate
Grade	7
Salary range	£32,348 - £42,155
Staff Group	Research
Department / Institution	Geography

## Role-specific information

### Role Summary

*Quantifying the long-term effects of volcanic clusters using palaeoclimate modeling*

Applications are invited for the Arnell Post-Doctoral Research Associate position for a fixed-term of 24 months to work on a project funded by the [Centre for Climate Repair](#) at the University of Cambridge. The post holder will be based at the Department of Geography and will work under the guidance of [Dr Francesco Muschitiello](#).

Stratospheric injection of aerosols by explosive volcanic eruptions results in a complex set of responses driving climate effects on a variety of time and spatial scales. However, the mechanisms by which volcanic forcing causes global and regional cooling on long timescales remain insufficiently examined. In particular, the climate feedbacks and responses to a close succession of strong volcanic eruptions are still poorly quantified, which hinders assessing future climate projections to volcanic activity (Zanchettin et al., 2016).

Past analogues offer an ideal laboratory to improve our understanding of the mechanisms that triggered long-term natural cooling periods and may help assess the potential for such events in the future. Climate model simulations show that hemispheric-wide multidecadal- to millennial-scale cold events of the Holocene cannot be fully explained by a combination of external forcing and internal feedbacks, and require the additional influence of volcanic activity on the coupled ocean–atmosphere system (Bader et al., 2020; Kobashi et al., 2017; Neukom et al., 2019). However, beyond the Holocene the impact of volcanic forcing on climate change is still heavily under-explored. New-generation ice-core records of volcanism (Lin et al., 2021; Sigl et al., 2022) suggest that series of large explosive eruptions preceded some of the abrupt climate shifts that punctuated the past 60,000 years (Lohmann and Svensson, 2022; McConnell et al., 2017), including dramatic millennial-scale cooling events (Abbott et al., 2021). This hints to a possible role of volcanic clusters in reversing global warming trends and triggering long-lasting natural modes of climate cooling.

This project aims at investigating the potential of clusters of strong volcanic eruptions to cause sustained cold events under pre-Holocene climate scenarios. The successful applicant will design and run transient climate model experiments using Earth system models that include atmospheric chemistry-aerosol-climate coupling, i.e. one or two of the following models: UKESM1, MPI-ESM1.2, and HadCM3. The simulations will be performed under a range of glacial boundary conditions to determine the cooling potential of volcanic clusters and assess short- and long-term memory of

regional and global climatic variability. Particular attention will be paid to how volcanic cluster signals propagate into the subsurface ocean and the associated determinant processes, the ocean memory effects and the coupling between northward heat transport, Arctic sea ice and the Atlantic Meridional Overturning Circulation. Finally, the experiments will be evaluated using a wide network of proxy-climate data by comparing reconstructed and simulated spatial temperature and precipitation patterns.

Eligible candidates must have a PhD (or equivalent degree) in Climate Physics, Applied Mathematics, Earth Sciences or allied disciplines. A background in palaeoclimate modelling is desirable. They must be highly motivated and should have excellent time management, organisational and communication skills, and be able to work well as part of a team. The successful candidate will be based in Cambridge and work closely with Dr Francesco Muschitiello and an international network of collaborators, i.e. Dr Thomas Aubry (University of Exeter), Dr Peter Hopcroft (University of Birmingham), Dr Claudia Timmreck (Max-Planck Institute for Meteorology), Dr Davide Zanchettin (University of Venice). They will have the opportunity to participate in a wide range of activities within the Centre for Climate Repair and the Department of Geography, including the departmental 'Climate and Environmental Dynamics' research group, and reading groups and seminars across the University.

The Arnell Post-Doctoral Research Associate will be invited to become a member of Downing College and of its Middle Common Room (MCR) with associated privileges, and it is expected that the candidate will make an active contribution towards College life, educationally and socially.

## References

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- Bader, J., Jungclaus, J., Krivova, N., Lorenz, S., Maycock, A., Raddatz, T., Schmidt, H., Toohey, M., Wu, C.-J. and Claussen, M.: Global temperature modes shed light on the Holocene temperature conundrum, *Nat. Commun.*, 11(1), 1–8, 2020.
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- McConnell, J. R., Burke, A., Dunbar, N. W., Köhler, P., Thomas, J. L., Arienzo, M. M., Chellman, N. J., Maselli, O. J., Sigl, M. and Adkins, J. F.: Synchronous volcanic eruptions and abrupt climate change~ 17.7 ka plausibly linked by stratospheric ozone depletion, *Proc. Natl. Acad. Sci.*, 114(38), 10035–10040, 2017.
- Neukom, R., Barboza, L. A., Erb, M. P., Shi, F., Emile-Geay, J., Evans, M. N., Franke, J., Kaufman, D. S., Lücke, L. and Rehfeld, K.: Consistent multi-decadal variability in global temperature

reconstructions and simulations over the Common Era, *Nat. Geosci.*, 12(8), 643, 2019.

Sigl, M., Toohey, M., McConnell, J. R., Cole-Dai, J. and Severi, M.: Volcanic stratospheric sulfur injections and aerosol optical depth during the Holocene (past 11,500 years) from a bipolar ice core array, *Earth Syst. Sci. Data Discuss.*, 1–45, 2022.

Zanchettin, D., Khodri, M., Timmreck, C., Toohey, M., Schmidt, A., Gerber, E. P., Hegerl, G., Robock, A., Pausata, F. S. R. and Ball, W. T.: The Model Intercomparison Project on the climatic response to Volcanic forcing (VolMIP): experimental design and forcing input data for CMIP6, *Geosci. Model Dev.*, 9(8), 2701–2719, 2016.

## Key Responsibilities

Set-up and run of volcanic cluster climate model simulations	50%
Analysis of climate model output and proxy-model data comparison	30%
Production of academic publications	15%
Presenting findings at conferences and interacting with project partners and collaborators	5%

For further details, please contact Dr Francesco Muschitiello, [fm476@cam.ac.uk](mailto:fm476@cam.ac.uk) (tel: 01223 333193).

## Person Profile

This section details the knowledge, skills and experience we require for the role.

<b>Education &amp; qualifications:</b>	Essential: Completed PhD in a relevant discipline, e.g. Climate Physics, Applied Mathematics, Earth Science.
<b>Specialist knowledge &amp; skills:</b>	Essential: A background in climate modelling and climate model simulations. Desirable: modelling the climatic influence of volcanoes.
<b>Interpersonal &amp; communication skills:</b>	Essential: Ability to work as part of a team.
<b>Relevant experience:</b>	Desirable: Experience in palaeoclimate modelling and climate-proxy reconstructions.

## Terms and Conditions

<b>Location</b>	Department of Geography, Downing Site, Cambridge CB2 3EN
<b>Working pattern</b>	Monday to Friday
<b>Hours of work</b>	37 hours per week (100%)
<b>Length of appointment</b>	24 months
<b>Limited funding</b>	This post is funded by the Centre for Climate Repair at Cambridge and in the event that this funding should cease, the post may be at risk of redundancy. In the first instance, the funding supporting this role is available for a duration of 24 months, and the head of department (or his/her nominee) will keep the role holder informed of the funding situation.
<b>Probation period</b>	6 months
<b>Annual leave</b>	33 days
<b>Pension eligibility</b>	Universities Superannuation Scheme (USS) Pension scheme details, including information about the legal requirement for the University to automatically enrol its eligible jobholders into a qualifying workplace pension scheme from 1 March 2013, is available at: <a href="http://www.pensions.admin.cam.ac.uk/">http://www.pensions.admin.cam.ac.uk/</a> .
<b>Retirement age</b>	The University does not operate a retirement age for research staff.

## Screening Check Requirements

We have a legal responsibility to ensure that you have the right to work in the UK before you can start working for us. If you do not have the right to work in the UK already, any offer of employment we make to you will be conditional upon you gaining it. If you need further information, you may find the Right to Work page within the 'Applying for a job' section of the University's Job Opportunities pages helpful (please see <http://www.jobs.cam.ac.uk/right/have/>).

## Application Process

To submit an application for this vacancy, please click on the link in the 'Apply online' section of the advert published on the University's Job Opportunities pages. This will route you to the University's Web Recruitment System, where you will need to register an account (if you have not already) and log in before completing the online application form.

Please ensure that you upload your Curriculum Vitae (CV) and a covering letter in the Upload section of the online application. If you upload any additional documents which have not been requested, we will not be able to consider these as part of your application. Please quote reference LC34026 on your application and in any correspondence about this vacancy.

Closing Date for Receipt of Applications: 13<sup>th</sup> January 2023

Interview date: 30<sup>th</sup> January 2023

Anticipated Start Date: 1<sup>st</sup> May 2023 (or as soon as possible)

# General Information

## The University of Cambridge

The University is one of the world's leading academic centres. It comprises 150 faculties and departments, together with a central administration and other institutions. Our institutions, museums and collections are a world-class resource for researchers, students and members of the public representing one of the country's highest concentrations of internationally important collections.

The University has an annual income of £1.66 billion. Research income, won competitively from the UK Research Councils, the European Union (EU), major charities and industry, exceeds £400 million per annum and continues to grow.

The Colleges and the University remain committed to admitting the best students regardless of their background and to investing considerable resources both in widening access and financial support. The 31 Colleges are self-governing, separate legal entities which appoint their own staff. Many academic staff are invited to join a College as a Teaching Fellow, which provides a further social and intellectual dimension. The Colleges admit students, provide student accommodation and deliver small group teaching. The University awards degrees and its faculties and departments provide lectures and seminars for students and determine the syllabi for teaching and conducting research.

The University's estate is undergoing the most significant transformation in its history. Cambridge has been able to create a new science and technology campus to the west of the city centre, and is now expanding further to the north west of Cambridge including investing in affordable homes for University key workers and community facilities. Even with our continued development, the University remains within walking or cycling distance across the campus. The University is a major partner on the Cambridge Biomedical Campus and we continue to redevelop our historic city centre sites demonstrating our determination to ensure that we can offer the best facilities and opportunities for our staff and students.

Our instinct for seeking out excellence and setting up enduring and mutually beneficial collaborations has led us to establish strategic partnerships across the globe. Whether it is the successful Cambridge-Africa Programme involving universities in Ghana, Uganda and elsewhere on the African continent; or the close association with the government of India to pursue new research in crop science; or the creation, with Germany's Max Planck Institutes, of a Cambridge-based centre for the study of ethics, human economy and social change – international partnerships are now an inextricable part of the University's make-up.

There is much more information about the University at <http://www.cam.ac.uk/univ/works/index.html> which we hope you will find helpful.

## Department of Geography

The Department of Geography at the University of Cambridge has a long-established international reputation as one of the leading centres of innovative geographical thought and education; it celebrates one hundred years of teaching Geography in Cambridge in 2019.

The Department is a friendly and inclusive scholastic community with wide-ranging research interests spanning the natural and social sciences and the humanities. The University of Cambridge values diversity and is committed to equality of opportunity, and the Department would particularly welcome applications from members of under-represented groups.

The last UK Research Excellence Framework exercise (2014), based on an overall metric measuring publications, research environment and societal impact judged as 4 star (world-leading), ranked the Department second in the country. It is ranked top in the 2019 Complete University Guide in the category of Geography and Environmental Science and third in the 2019 QS World University Rankings for Geography. The Department is housed on the University's Downing Site in central Cambridge, with the Scott Polar Research Institute (a sub-Department of Geography) a short distance away.

Visit our website at <http://www.geog.cam.ac.uk>.

## Research

The Department's research activities are organised into six (non-exclusive) thematic research groups: *Vital Geographies*, *Infrastructural Geographies*, *Geographies of Knowledge*, *Biogeography* and *Biogeomorphology*, *Climate and Environmental Dynamics*, and *Glaciology and Glacial Geology*. These overlap with two centres of excellence – the Cambridge Group for the History of Population and Social Structure, which is co-hosted with the Faculty of History, and the Scott Polar Research Institute.

Geographers have strong research links with other University departments, with area centres (Development Studies, South Asian Studies, Latin American Studies and African Studies), and with interdisciplinary centres, such as the Centre for Research in the Arts, Social Sciences and Humanities (CRASSH), the University of Cambridge Centre for Gender Studies and the Centre for Science and Policy. There is active engagement with University Strategic Initiatives and the Department provides the home for the University of Cambridge Conservation Research Institute (UCCRI). The Department commands a high level of externally-generated grant income from a wide range of sources and attaches considerable importance to maintaining and enhancing such support for its research.

For further information see: <http://www.geog.cam.ac.uk/research/>

## What the University can offer you

We offer a comprehensive reward package to attract, motivate and retain high performing staff at all levels and in all areas of work. The University offers a wide range of competitive benefits, from family leave entitlement, to shopping and travel discount schemes. Our generous annual leave package contributes to the positive wellbeing of our University employees. Sabbatical leave enables academics to focus on research and scholarship, whilst still maintaining their full salary. The University also has a [career break scheme for academic and academic-related staff](#), with additional flexible working policies for all other staff.

### **CAMbens employee benefits**

We offer a CAMbens scheme for University employees, providing access to online and in-store shopping discounts and cashback. With more than 2,000 participating retailers, employees can save money on a wide range of household expenses, from groceries and clothes, to holidays and insurance and much more. A range of local discounts are also available, helping employees to save money whilst also supporting local Cambridge businesses and a CAMbens Cycle to Work salary sacrifice schemes is also available, which enables employees to save money on transport costs. A 10% discount rate on the [purchase of train season tickets, bulk buy tickets](#) and an interest free travel to work loan are also available for staff of the University of Cambridge.

### **Family-friendly policies**

The University recognises the importance of supporting its staff. We have a range of family-friendly policies to aid employees' work-life balance including a generous maternity, adoption and shared parental leave entitlement of 18 weeks full pay and emergency family care support via My Family Care. In addition, our Ofsted rated 'outstanding' workplace nurseries, childcare vouchers, a childcare salary sacrifice scheme and a high quality holiday play scheme are available to help support University employees with caring responsibilities. The [Newcomers and Visiting Scholars Group](#) is an organisation within the University run by volunteers whose aim is to help newly arrived wives, husbands, partners and families of Visiting Scholars and members of the University to settle in Cambridge and give them an opportunity to meet local people.

### **Your wellbeing**

The University's Sport Centre, Counselling Services and Occupational Health are just some of the support services available to University employees to promote their physical and mental wellbeing. There are many societies in Cambridge catering for almost every taste and interest. Whether you want to take part in a sport, participate in music or drama, pursue a hobby, or join a political group, you will almost certainly find that a society exists for this purpose.

The University also hosts the [Cambridge Science Festival](#) and [Cambridge Festival of Ideas](#), as well as [Open Cambridge](#) weekend, which together attract over 50,000 visitors per year. The festivals are a great

opportunity to get your first taste of public engagement, through volunteering, supporting hands-on activities or proposing a talk.

### **Pay and benefits**

The University salary structure includes automatic service-related pay progression in many of its grades and an annual cost of living increase. In addition to this, employees are rewarded for outstanding contribution through a number of regular pay progression schemes. The University offers attractive pensions schemes for employees, with an additional benefit of a salary exchange arrangement providing tax and national insurance savings. Payroll giving is also a simple, tax-efficient way for employees to make monthly donations to charity.

### **Relocating to Cambridge**

The University Accommodation Service exists to help employees in their search for a rental home in Cambridge. A new University development at North West Cambridge called Eddington offers subsidised rented accommodation to University staff. The development consists of high quality furnished one and two bedroom apartments. For more information about the development and how to apply please visit the website [www.nwcambridge.co.uk](http://www.nwcambridge.co.uk)

The importance of helping individuals settle into a new area is also recognised by the University. The Shared Equity Scheme <https://www.hr.admin.cam.ac.uk/pay-benefits/cambens-employee-benefits/financial/shared-equity-scheme> provides financial assistance to qualifying new members of staff with the purchase of living accommodation, where they have to relocate to take up their appointment. Removal expenses are also available for qualifying new members of staff.

### **Equality & diversity**

The University has a vibrant and varied community. We support and encourage under-represented groups and we value diversity. We welcome applications from individuals with disabilities. Our recruitment and selection procedures follow best practice. We have an Equal Opportunities Policy, along with a range of diversity networks for women, black and minority ethnic and lesbian, gay, bisexual and transgender staff. More details are available here: <http://www.equality.admin.cam.ac.uk/>

### **Development opportunities**

We support new employees to settle in through various activities. The encouragement of career development for all staff is one of the University's values and we put this into practice through various services and initiatives. Our Personal and Professional Development Department provides development opportunities and courses for all University employees. These include face-to-face sessions, online learning modules and webinars. Employees may also apply for financial support to undertake training that will lead to a qualification. We offer reduced staff fees for University of Cambridge graduate courses and the opportunity to attend lectures and seminars held by University departments and institutions. The CareerStart@Cam programme also supports employees in assistant staff roles who do not hold higher education qualifications to develop their skills, experience and qualifications.

## **Information if you have a Disability**

The University welcomes applications from individuals with disabilities and we are committed to ensuring fair treatment throughout the recruitment process. We will make adjustments to enable applicants to compete to the best of their ability wherever it is reasonable to do so, and, if successful, to assist them during their employment. Information for disabled applicants is available at <http://www.jobs.cam.ac.uk/applying/disability/>.

We encourage you to declare any disability that you may have, and any reasonable adjustments that you may require, in the section provided for this purpose in the application form. This will enable us to accommodate your needs throughout the process as required. However, applicants and employees may declare a disability at any time.

If you prefer to discuss any special arrangements connected with a disability, please contact, Nadine Keating, who is responsible for recruitment to this position, on 01223 339099 or by email on [nadine.keating@geog.cam.ac.uk](mailto:nadine.keating@geog.cam.ac.uk). Alternatively, you may contact the HR Business Manager responsible for the department you are applying to via [hrenquiries@admin.cam.ac.uk](mailto:hrenquiries@admin.cam.ac.uk).