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## **Quaternary Newsletter**





## **QUATERNARY NEWSLETTER**

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#### Instructions to authors

*Quaternary Newsletter* is issued in February, June and October. Articles, reviews, notices of forthcoming meetings, news of personal and joint research projects etc. are invited and should be sent to the Editor. Closing dates for submission of copy (news, notices, reports etc.) for the relevant issues are 5<sup>th</sup> January, 1<sup>st</sup> May and 1<sup>st</sup> September. These dates will be strictly adhered to in order to expedite publication. **Articles must be submitted at least 6 weeks before these dates in order to be reviewed and revised in time for the next issue of QN, otherwise they may appear in a subsequent issue.** 

Suggested word limits are as follows: obituaries (2000 words); articles (3000 words); reports on meetings (2000 words); reports on QRA grants (800 words); reviews (1000 words); letters to the Editor (500 words); abstracts (500 words). Authors submitting work as Word documents that include figures must send separate copies of the figures in .eps, .tif or .jpg format (minimum resolution of 300 dpi is required for accurate reproduction). Quaternary Research Fund and New Researchers Award Scheme reports should limit themselves to describing the results and significance of the actual research funded by QRA grants. The suggested format for these reports is as follows: (1) background and rationale (including a summary of how the grant facilitated the research), (2) results, (3) significance, (4) acknowledgments (if applicable). The reports should not (1) detail the aims and objectives of affiliated and larger projects (e.g. Ph.D. topics), (2) outline future research and (3) cite lengthy reference lists. No more than one figure per report is necessary. Recipients of awards who have written reports are encouraged to submit full-length articles on related or larger research projects.

**NB:** Updated guidelines on the formatting of contributions are available on the QRA website or from the editor.

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#### **COVER PHOTOGRAPH**

Beatriz Glacier on Isla Santa Inés, Tierra del Fuego *(Photo Credit: Carla Huynh)*. Huynh (this issue) reports on fieldwork supported by the New Research Workers' Award.



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## JAMES CROLL MEDAL

The James Croll Medal is the highest award of the QRA and is named in honour of James Croll (1821-1890). Croll is most closely associated with fundamental work on the astronomical theory of the ice ages, but he also made seminal contributions on the glacial geology of Scotland, on the mechanisms that drive ocean circulation and the impact of that circulation on recent climate, on tidal theory and the rotation of the Earth. These are all major issues that occupy Quaternary scientists to this day. Croll was effectively self-taught. His work and example demonstrate that any individuals from all backgrounds can rise to national eminence and generate science of lasting and major international impact, and that it is not who you are or where you come from but what you do that is important. These are the qualities that the QRA seeks to celebrate in the award of the James Croll Medal.

The Medal is therefore normally awarded to a member of the QRA who has not only made an outstanding contribution to the field of Quaternary science, but whose work has also had a significant international impact.

#### **Professor Mary Edwards**



The QRA is pleased to announce that this year's recipient of the James Croll Medal, the senior medal of the QRA, is Professor Mary Edwards.

Cultural landscapes and the environmental history of the North have remained two key themes in Mary's research. Her early work on historical changes in Atlantic "rainforest" nature reserves in North Wales anticipated the now urgent topic of biodiversity loss and human impact. She is probably best known for research on northern regions: Beringia (NE Siberia, Alaska, NW Canada) and Norway, areas now at the forefront of climate-change impacts. Much of this work has involved international collaborations with scientists from Russia, the USA, and several European countries. Her work in Beringia over four decades ranges from palynological studies to landscape dynamics and palaeohydrology. With colleagues she developed regional vegetation histories, summarizing them for use in vegetation modelling and climatemodel evaluations. An influential study of thaw-lake evolution and methane production led to a range of further studies on lakes (including an ongoing project). Mary and colleagues pioneered the development of fire histories for the Alaskan boreal forest and lakelevel records that demonstrate major late-Quaternary moisture fluctuations.

In the early 1990s, thanks to glasnost, Mary was fortunate to participate in some of the earliest international exchanges with Russian (then Soviet) scientists, investigating the yedoma landscapes of NE Siberia that preserve late-Quaternary palaeoenvironmental records and megafaunal remains. Subsequently, she co-hosted the first ever-and wonderfully amicable-expedition of Soviet scientists to Alaska. She also collaborated with colleagues studying relict mountain steppe in the contemporary landscapes of Russia and Alaska-Yukon, which led to further investigation of microclimatic control over variation in plant communities in Alaska and Norway; this phenomenon is now understood to be an important source of resilience for arctic vegetation in the face of climate change.

Later, Mary joined scientists from across Europe in developing a comprehensive survey of past circumpolar vegetation dynamics using the new approach of ancient sedimentary DNA (*seda*DNA). The project stimulated further work across the palaeo research community; this is one of the fastest growing areas of Quaternary palaeoecology. Several studies followed with colleagues in Norway to examine in more detail how *seda*DNA patterns in lakes and soils reflect vegetation.

In recent years, Mary has returned several times to Russia, setting up the DIMA network along with Russian, American and UK colleagues. DIMA encourages cooperation and exchange of ideas among palaeoecologists in Russian science institutions of Siberia, whose work covers a vast area now strongly affected by climate change, but who have little support for their work. In 2021 its membership included over fifty Russian scientists plus UK researchers. Sadly, DIMA is now on hold until the world returns to its senses.

More broadly, Mary has been active in the northern science community, serving variously on the AMQUA Council, steering committees for arctic science policy (NSF PARCS – paleo-arctic sciences; and the UKAAP – Arctic Antarctic Partnership), and the terrestrial working group of IASC (International Arctic Science Council). She served for some years as the Director of the Alaska Quaternary Center. A highlight of her research has been the enthusiastic involvement of students (undergraduate and postgraduate) in work in Alaska-Yukon and Russia.

## LEWIS PENNY MEDALS

This medal, which is named after Lewis Penny, a Quaternary geologist and founder member of the QRA, is awarded to a young or new researcher who has made a significant contribution to any area of Quaternary Research.

This year we are awarding two Lewis Penny Medals, to the worthy recipients Dr Jeremy Ely and Dr Dulce Oliveira.

#### **Dr. Jeremy Ely**

The map of Jeremy's academic career is rather simple. He studied for an undergraduate degree in Physical Geography at the University of Sheffield. This was followed by a Ph.D., on the links (or as he found out the lack of links) between subglacial bedforms and ice surface structures, at the University of Sheffield. He was then employed as a postdoctoral researcher on the BRITICE-CHRONO project, where he undertook



ice sheet modelling and empirical reconstruction of the last British-Irish Ice Sheet, at the University of Sheffield. Surprisingly, he stayed at the University of Sheffield during his NERC independent research fellowship, which focussed on linking numerical ice flow models and empirical data of palaeo-ice sheets. In 2023, Jeremy was appointed as a lecturer, and is now a senior lecturer, at the University of Sheffield. Those of you concerned at this point about Jeremy limiting his horizons to South Yorkshire, will be relieved to know he has occasionally been allowed to leave Sheffield, undertaking fieldwork in Poland, Germany, Sweden, Greenland, Bolivia and Chile.

Jeremy has contributed to a wide range of topics, using multiple methods, across Quaternary Science and glaciology. He spins this lack of focus into a loose aim - to make palaeo observations useful for predicting the behaviour of contemporary ice masses in our warming world. Jeremy brings together techniques such as remote sensing, numerical modelling and fieldwork to grasp towards this goal. Highlights of his work, according to a quick Google scholar search of himself, include the discovery of widespread meltwater on the surface of the Antarctic Ice Sheet, an improved understanding of subglacial bedform formation, contributing to a reconstruction of the last British-Irish Ice Sheet and better methods for integrating numerical ice flow models with palaeodata. He has contributed to over 45 articles in journals such as Nature, Nature Communications, Geology, and JOS.

Jeremy has been awarded over £3,000,000 of funding from NERC as lead investigator and has contributed to numerous other funded research projects (including PALGLAC, an ongoing ERC funded advanced grant). He is currently lead investigator of a NERC highlight project ( $\sim$ £2.5 million) to understand glacier and snow change across the Andes since the Little Ice Age, and the impact this has had upon water resources for the surrounding population. Throughout his career, Jeremy has been privileged to work with a great team of Ph.D. students and postdoctoral researchers, whom he often has trouble keeping up with, especially before morning coffee.

Jeremy would like to thank all his friends and colleagues, too numerous to list individually, in the QRA for their support and for the fun memories (or lack of) and discussions at conferences and field meetings. He would like to especially thank Prof. Chris Clark who has always been very generous with his time, has been a great mentor and has taught him much regarding sheep farming.

#### **Dr Dulce Oliveira**



Dulce Oliveira graduated in Marine Biology, has an MSc in Marine Sciences, and a Ph.D. in

Marine Sedimentology and Paleoclimate from Bordeaux University, France (2017). Her research has contributed to the fields of palaeoecology and palaeoclimate, with a special focus on the vegetation response to past climate change in vulnerable regions. This focus has been developed through specialization in pollen analysis from marine sediments, which provides the unique opportunity to directly compare pollen-based vegetation and terrestrial climate with marine environmental change in the same stratigraphic level. This approach leads to a better understanding of land-atmosphere-ocean systems, bypassing timescale and correlation uncertainties. During her scientific career she has investigated SW European vegetation and climate variability during past interglacials of the Quaternary, through the analysis of IODP Site U1385, the so-called Shackleton Site. In particular, her research has focused on two super-interglacials (globally superwarm conditions): Marine Isotopic Stage (MIS) 31 and MIS 11. This work has remarkably demonstrated that a) both interglacials were not particularly warm in the Mediterranean region, and b) the diverse expression of abrupt cooling events on Mediterranean ecosystems is related to different baseline climate states (Oliveira et al., 2016, 2017). Moreover, it was examined for the first time the forcings modulating the expression of the Holocene and its orbital analogues, MIS 11c and 19c, over SW Iberia using a data-model comparison (Oliveira et al., 2018). This study showed that these interglacials cannot be considered as Holocene analogues in Iberia and demonstrated that Mediterranean tree cover was primarily forced by orbital parameters, whereas CO<sub>2</sub> played a minor role. MIS 13, considered as one of the coolest and most glaciated interglacials of the past 800 kyr, was also investigated by combining terrestrial-marine profiles with model experiments. This contribution revealed that MIS 13 stands out as a prolonged interglacial marked by high levels of humidity in SW Iberia and highlighted the importance of combining insolation and ice-sheet forcing to explain its regional imprint (Oliveira et al., 2020).

In 2020, Dulce started a junior researcher contract at CCMAR-Algarve Centre of Marine Sciences and IPMA-Portuguese Institute for Sea and Atmosphere, PT, to investigate past Indian vegetation and monsoon response to climate variability. To complement this contract, in 2021 she was awarded a national project to focus on key glacial-interglacial cycles of the Quaternary. Author/co-author of 18 publications, her work has awarded her 5 prizes, including the L'Oréal Medal of Honour for Women in Science and 15 grants

to participate in scientific meetings. Participation in 13 research projects and a member of the international pollen working groups IODP EXP 339, 353 and 397, provided her the opportunity to establish a fruitful network of international collaborations. Conscientious of the importance of dissemination and outreach, Dulce has been very active in this domain, participating in national and international scientific meetings with 101 presentations (44 as 1<sup>st</sup> author). She has also been involved in teaching, supervising students, various outreach initiatives for 1<sup>st</sup>-grade students, and she is co-responsible for the scientific Paleo-Forums organization at IPMA.

## **HONORARY MEMBERS**

Every year we nominate individuals for Honorary Membership of the Quaternary Research Association in recognition of significant, long-standing contributions to the QRA and to Quaternary science more widely. This year I am delighted to say that we have awarded Honorary Membership of the QRA to Paula Reimer and Danny McCarroll.

#### **Professor Paula Reimer**



Paula J. Reimer received her Ph.D. in Geological Sciences at the University of Washington in 1998 working under the supervision of Professor Minze Stuiver in the Quaternary Isotope Lab. She then took up a postdoctoral research fellowship in School of Archaeology and Palaeoecology at Queen's University of Belfast, Northern Ireland, followed by a three-year position at the Center for Accelerator Mass Spectrometry at Lawrence Livermore National Labs. She established the international radiocarbon calibration working group (IntCal) which she chaired from 2002-2020. From 2004-2022, Paula was the Director of the <sup>14</sup>CHRONO Centre for Climate, the Environment, and Chronology at Queen's University Belfast and established the <sup>14</sup>C AMS facility there. Although now retired she continues to be involved with the IntCal Working Group and with research in radiocarbon reservoir offsets and carbon storage in sediments.

#### **Professor Danny McCarroll, FLSW**



Danny McCarroll was born in the steel-works town of Wishaw, near Motherwell, but moved to the carfactory city of Coventry at the age of 2. His father was a factory worker, his mother a barmaid. In 1979 he started his undergraduate studies in Geography at Sheffield University, specialising in geomorphology. Between 1983 and 1986 he undertook a Ph.D. at the University of Wales, based in Swansea, working on Little Ice Age glacier fluctuations in the Jotunheimen mountains of Norway, supervised by Rick Shakesby and John Matthews. During this time he discovered many uses for the Schmidt hammer!? Between 1987 and 1989 he was a post-doc in Earth Science at Cardiff University mapping drift deposits on the Llyn Peninsula of North Wales. He became embroiled in debunking the 'glacimarine' model of deposition for the Irish Sea drift. This required a critique of 'amino acid dating', which ruffled a few feathers. Between 1989 and 1990 he spent a year as a teaching assistant in Geography at Southampton University. Between 1990 and 2021 he was a member of the Geography Department at Swansea University. His research

interests migrated from mapping trimlines with Colin Ballantyne to exploring the potential of using stable isotopes in tree rings to reconstruct the climate of the past. Most of his tree ring research was funded by the EU, including the big 'Millennium' project, with 40 partners and a budget of 12 million, which he coordinated. Over the course of his career Danny has published more than 130 research papers. In retirement he intends to keep rock climbing until he drops dead and maybe do a bit of tree ring isotope research when he can fit it in (his words!).

Professor Jane Hart (QRA President) School of Geography and Environmental Science University of Southampton West Highfield Campus University Road Southampton, SO17 1BJ







## INVESTIGATING POTENTIAL C14-CONTAMINANTS DURING PROCESSING AND STORAGE OF ARCHAEOLOGICAL PLANT AND INSECT SAMPLES

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#### **Background and rationale**

There is concern in the archaeological community to reduce the use of chemicals that contain carbon compounds in plant and insect sample processing and storage. This is to avoid contamination of samples that are otherwise valuable for <sup>14</sup>C measurement. These chemicals (e.g. paraffin, ethanol, glycerine) potentially introduce carbon that has a different <sup>14</sup>C age to that of the sample into the sample matrix. If this carbon cannot be removed during pretreatment, it will compromise the accuracy of a sample <sup>14</sup>C measurement. Yet, these chemicals have significant value for processing and storage (e.g. Rousseau, 2011), significantly reducing sample preparation time and enabling archive samples to be stored and studied at a later date. Whilst individual projects have both successfully dated material after periods of storage (e.g. Zazula *et al.*, 2009) and removed other preservatives (e.g. Brock *et al.*, 2018; Dee *et al.*,



Figure 1. Fieldwork at a) Windsor Great Park; b) Dunham Massey.

Windsor and Dunham Massey resampled samples



**Figure 2.** Experimental workflow. Paraffin flotation after Kenward *et al.* (1980) and Rousseau (2011) and 'Kew Mix' mixed as in Natural Science Collections Association (2019).

2011), there has been no systematic chemical analysis of this particular problem.

We have undertaken a series of experiments on modern-day seeds and insects designed to address this problem. Samples that have been paraffin-floated (after Kenward *et al.*, 1980; Rousseau, 2011) and stored in ethanol for c. 10 years (since work reported in Smith *et al.*, 2010) will be compared with recently resampled material from identical locations that have been subjected to a range of controlled treatment and storage protocols. Fieldwork was undertaken in July 2022 at Bears Rails Pond, Windsor Great Park and Smithy Pond, Dunham Massey to resample these locations (Figure 1). Samples have been processed and stored as shown in Figure 2.

After the various periods of storage, Fourier transform infrared (FTIR) spectroscopy was undertaken on these samples and on chitin soaked in each relevant chemical, to determine whether traces of processing chemicals are retained in the sample matrix. In this way we aimed to fully characterise the spectra and monitor the removal of processing chemicals. This technique was trialled on previous archive samples before undertaking this project and it suggested both that FTIR could be used for investigation and that there was significant loss of solvents after only 10-15 minutes of air drying.

#### **Initial results**

Whilst not all samples and treatments have yet been assessed, initial results suggest that paraffin is the chemical used on the samples that is most likely to be detectable on samples using FTIR, possibly because it is less volatile than the solvents used for storage. The key area of interest in all spectra is between 3000 and 2700 cm<sup>-1</sup>. Figure 3a shows clearly that paraffin has three distinctive peaks in this region that are



**Figure 3.** Initial results from FTIR spectroscopy on samples from Dunham Massey: a) baseline spectra for chitin powder (used to replicate insects) and paraffin, b) spectra for seeds sieved with paraffin flotation and stored in ethanol, c) spectra for insects water rinsed and freeze dried after sieving and storage in ethanol.

different from those seen in the chitin powder. These peaks are also different from those in ethanol, which has only two peaks in the same region. Similar peaks are sometimes seen in samples that have been paraffin floated (Figure 3b), although not all samples show evidence of retained paraffin. More experiments and measurements are planned, but Figure 3c suggests that the water rinse and subsequent freeze dry used in all radiocarbon dating preparation protocols is very effective at removing excess chemicals.

Further work remains to be done on samples from Windsor (although recovery rates were lower from this location) and also on these samples from Dunham Massey, based on the initial findings presented above. However, these findings presented already show the power of FTIR spectroscopy in accurately tracking potential contamination.

#### Significance

This project has important implications for the workflows used in environmental archaeology. If researchers can be confident that paraffin-floated samples of seeds are not contaminated and can still be <sup>14</sup>C dated it will significantly increase the efficiency of sample processing. It is possible based on these initial results that this might be the case, but more work is needed to conclude this robustly.

#### Acknowledgments

We are very grateful to the Crown Estate for access to and support during fieldwork at Windsor Great Park and the National Trust for access to and support during fieldwork at Dunham Massey.

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## LATE GLACIAL AND HOLOCENE GLACIATION IN TIERRA DEL FUEGO

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This report summarises the fieldwork conducted by Carla Huynh, Andy Hein, Rob Bingham and Juan-Luis García in Tierra del Fuego in November and December 2023 as part of Carla Huynh's ongoing Ph.D. research at the University of Edinburgh.

#### **Background and Rationale**

Tierra del Fuego, the archipelago of remote islands in

southern Patagonia, intersect the core of the Southern Westerly Winds (SWWs), which play an important role in global climate. The region experiences very unique climatic conditions and as the most southerly continental landmass outside Antarctica, it is an interesting region for studying past glacier change. During the global Last Glacial Maximum (gLGM), a large outlet glacier of the former Patagonian Ice Sheet extended nearly 200 km down the Straits of



**Figure 1.** (A) Location of Tierra del Fuego, an archipelago of islands in southernmost Patagonia. (B) Our two study regions in the Tierra del Fuego archipelago and the route travelled.

Magellan, the body of water that separates Tierra del Fuego from the South American mainland. The gLGM ice extent in the region is well understood because it is underpinned by significant previous research (e.g. Clapperton et al., 1995; Coronato and Rabassa, 2011; Darvill et al., 2015a; 2015b; Kaplan et al., 2007; 2008; McCulloch et al., 2005; Peltier et al., 2021; Rabassa et al., 2000). However, a series of small moraines just a few kilometres outside the present-day ice extent are less well studied because scientists seldom visit the islands surrounding the Santa Inés and Cordillera Darwin Icefields. The islands of Tierra del Fuego are remote and experience challenging weather conditions, making the islands logistically difficult to access. These moraines, which we believe were deposited during the Late Glacial or Holocene, are interesting because they record a past glacier re-advance, during a period of time generally characterised by warmer and wetter conditions than

the preceding glacial period. By constraining the timing of their deposition, we can better understand past environmental conditions on these remote islands.

#### Methods and results

In order to constrain the timing of these glacial readvances, we conducted fieldwork in two regions that experience contrasting environmental conditions today (Figure 1). Site 1, the Beatriz valley on the northern margin of the Santa Inés Icefield, is situated on the western side of the Andes mountain chain and hence experiences very high annual precipitation. Here, the low-lying glacial foreland was characterised by peat bog, the moraines were covered in a dense *Nothofagus betuloides* forest and the moraine boulders were buried under a thick layer of moss. We collected 13 rock samples from this site which were



**Figure 2.** (A) Boulders on the prominent 'B1' moraine in the Beatriz valley were covered in a moss layer up to 10 cm thick. (B) Boulders outboard of the 'B1' moraine were even more vegetated, with 20 cm thick moss cover. (C) and (D) Boulders from moraines in the drier Arroyo Pagels valley had only thin and patchy moss cover, with trees growing between and on top of the boulders in some locations.

comprised of 6 boulder samples from the prominent, inner 'B1' moraine, 5 boulder samples from an outer densely vegetated moraine and two bedrock samples outboard of these to give us a minimum age constraint for deglaciation.

Site 2, the Arroyo Pagels valley on the eastern margin of the Cordillera Darwin Icefield, is ~250 km to the south-east and in the shadow of the Andes, experiencing considerably lower annual precipitation. Here, the valley is greatly modified by the non-native North American beaver, with peat bogs punctuated by beaver dams and dense woodland that has been partly cleared by beaver felling. We collected 21 moraine boulders from three regions within the valley: 9 from prominent left-lateral moraines at ~400 m a.s.l. on the northern flank of the valley, 7 from a series of smaller cirque moraines on the southern flank and 5 from a moraine in the valley bottom ~2 km from the head of the valley. The varying degrees of tree growth on and around the moraine boulders suggest that at least 2-3 periods of glaciation are recorded in the sampled moraines, likely spanning from the Late Holocene to the Early Holocene/Late Glacial.

## Significance

The difference in vegetation cover and peat development between different moraine crests in both valleys studied suggests there may have been a significant time gap between their deposition (Figure 2). This is interesting because it suggests multiple periods of cooling and/or increased precipitation that was sustained enough to drive glacial re-advances and stabilisation during the Late Glacial and Holocene periods. The 34 rock samples collected will now be dated using cosmogenic nuclide exposure dating in order to reconstruct the Late Glacial and Holocene glacial history on these remote islands. This glacial reconstruction will then be used alongside numerical glacier modelling to better understand the climate required to drive these glacial re-advances.

## Acknowledgments

I would like the thank the QRA for the provision of this New Research Workers' Award, to support this fieldwork in Tierra del Fuego. I am also grateful for the financial support from the Mount Everest Foundation, John Muir Trust, the Jeremy Willson Charitable Trust, SAGES and the Geological Society, without which this fieldwork would not have been possible. The fieldwork was also endorsed by the Scientific Exploration Society. I would like to thank my Ph.D. supervisors, Andy Hein and Rob Bingham, and external collaborator, Juan-Luis García, for their support and guidance in the field. I would also like to thank Bob McCulloch, Manuel San Roman, Eñaut Izagirre and Isaac Gurdiel for their planning guidance and Whalesound for their logistical support in accessing Isla Santa Inés. This work was undertaken as part of Carla Huynh's NERC E4 Ph.D. studentship.

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Report



## ENSURING THE LONGEVITY OF THE PAL(A)EOPERCS SEMINAR SERIES IN AN EQUITABLE, DIVERSE, INCLUSIVE AND ACCESSIBLE WAY

Pal(a)eo PERCS Steering Committee: Rehemat Bhatia, Pedro Godoy, Chrissy Hall, Natasha Sekhon, Neha Sharma, Elizabeth Sibert, Isaiah Smith paleopercs@gmail.com

Pal(a)eoPERCS (Paleo EaRly Career Seminars) is a weekly, virtual, inclusive, accessible, grassroots, institution-independent, global seminar series featuring Early Career Researchers (ECRs) in all fields of pal(a)eo-sciences. We launched the series in June 2020 in response to the COVID-19 pandemic, and have had a very positive response from the palaeo community, with over 2000 sign ups to our mailing list from individuals from all career stages and paths worldwide. Seminars are held weekly on zoom, and have an asynchronous participation option via our YouTube channel.

We are an international coalition of early career researchers and professionals, and are highly committed to showcasing the wide diversity in our community. Pal(a)eoPERCS is an independent endeavour and does not reflect the views of our respective affiliated organisations, institutions and financial supporters. We are grateful for the support of the QRA Outreach Award, which allowed us to support a wide diversity of speakers on Quaternary themed research topics.

The series is interdisciplinary by nature, with an aim of broadening the frameworks and networks of those interested in Earth's past across the geologic timescales by bringing those working under the "Pal(a)eo-umbrella" and related fields, while highlighting diversity in thought and presenters. Seminars feature a 30-minute talk, a 15-20 minute question-and-answer discussion, and informal "teatime" to foster collaboration and networking. We actively ensure diverse speaker demographics, with a specific focus on the participation of historically excluded groups in the geosciences (those who identify as women, ethnic minorities, having a disability, LGBTQIA+, first generation, from a lowincome background). We are now sponsored by seven international learned societies and groups, and were very grateful to the Quaternary Research Association

for their support over the past year.

Through the generous support of a QRA Outreach Grant, we were able to increase accessibility of these seminars by providing high-quality transcriptions of Quaternary Science seminars that are publicly available on YouTube and through the Pal(a)eoPERCS Website, as well as provide modest speaker honoraria for several speakers who gave talks on their Quaternary-focused research. The QRA funding has been imperative to continue supporting early career individuals globally. It enabled us to acquire transcripts for nine Quaternary talks and provide honoraria for seven ECRs who presented a talk with a Quaternary Science focus from a range of topics including micropalaeontology, vertebrate palaeontology, geochemistry, palaeoanthropology, and palaeoclimatology. These speakers were affiliated with universities in Chile, India, Germany, Norway, South Africa, Sweden, Morocco, UK, and USA at the time of their presentations.

Our seminars are open to those from all stages and workspaces, but feature early career speakers: those in the more precarious stages of their career, and who are generally funded on short-term contracts and studentships. The majority of our speakers are late-stage graduate students or in non-faculty post-Ph.D. positions. Occasional seminars are given by assistant professors/permanent lecturers, early-stage graduate students and individuals who do palaeoscience work outside academia. Our audience base consists of individuals from varying career stages and palaeo-disciplines. An asynchronous participation option is provided for those who cannot join live, via posting the seminars on the Pal(a)eoPERCS YouTube Channel, following speaker preferences on length of time their seminar remains available. We encourage speakers to use colour-blind friendly graphics, providing resources to help. If particular accessibility requirements are requested from speakers/attendees,

we work with them to find an option that best supports their participation.

We advertise the series to universities and learned societies globally, and palaeo-focused mailing lists, and leverage social media to connect with the wider palaeo-community. Nominations, including self-nominations, are openly invited from the community. ~80% of speaker invitations so far have been to community-nominated ECRs, with remaining invitations coming from committee suggestions to ensure that each season of Pal(a)eoPERCS maintains our standards of topic, speaker, and geographic diversity.

Our efforts have been recognised internationally. Particular highlights include an invited interview with Communications Biology, an invitation to co-author the most recent edition of the 500 Women Scientists Inclusive Meetings Guide and being mentioned in Professor Roy Plotnick's book (Explorers of Deep Time: Paleontologists and the History of Life).

While Pal(a)eoPERCS began as a response to the COVID-19 pandemic in 2020, its growth and community engagement have grown into a community resource, and we intend for Pal(a)eoPERCS to be a long-term feature in the broader Palaeo research community for years to come. It has been a key feature of many early career palaeoscientists' lives over a continually challenging time. We would also like to stress that inclusion, diversity, equity and accessibility are imperative to scientific success, and we centre this in our series. We are incredibly proud to have created an inclusive initiative which is highly valued by the palaeo-community, has supported many early career individuals at a particularly precarious time in their careers, and are excited to see how it evolves in the future.

QRA-supported publicly available seminars can be viewed below. Please note that while we encourage speakers to allow their seminars to be recorded and circulated to improve asynchronous participation, many speakers elect to have their seminar removed from Youtube after a brief interval, usually 1 week. The seminars listed below are the speakers who have elected to have their seminars available publicly and indefinitely.

• Vijayananda Sarangi (Sweden): "Neglecting vegetation fires as a geochemical process could undermine the reliability of paleoecological

interpretations"https://youtu.be/NABqP1Qno5Ed

- Robert Patalano (USA): "Usambara Mountains Archaeology and Palaeoecology Project (UMAPP)" https://youtu.be/y2yWn16KCfl
- Natalia Villavicencio (Chile): "Late Quaternary extinction in South America: different approaches, one quest" https://youtu.be/dyOh7motuQo
- Marion McKenzie (USA): "Differential impacts of subglacial bed conditions on paleo-ice flow and subglacial processes" https://youtu.be/8-9CAH40eoU
- Melissa Kemp (USA): "Extinction, Colonization, and Conservation in a biodiversity hotspot: Lessons from the Caribbean fossil record" https:// youtu.be/trE5BzsXUrE
- Sofía Barragán Montilla (University of Bremen, Germany): "Climate change in the North Atlantic Ocean: Lessons from the Recent Past" https:// youtu.be/\_JIP6KRdNvA
- Abraham Dabengwa (South Africa): "Examining resilience and long-term rangeland health using multiple-proxy palaeoecological methods: an example from a South African grassland" https:// youtu.be/\_pqlm6hj6JE
- Tyler Kukla (USA): "Terrestrial ecosystem resilience in the geologic past" https://youtu.be/ DO1JIACIXHk
- Jihad Rachid (Morocco): "Tracking climate variability and environment changes of carbonate mounds sediments in the western Mediterranean over the last 14 000 years" https://youtu.be/ EjwRJYmk36Q
- Andrew Christ (USA): "The Story of Camp Century: the Fossil Ecosystem Under Ice" https:// youtu.be/SIWthhoas60
- Abdur Rahman (India): "History of the forest fire in the western Himalaya and its linkage to climate and human" https://youtu.be/-uaoOUZATlQ
- Nichola Strandberg (UK): "Biotic homogenisation of South Pacific Island vegetation through the Holocene" https://youtu.be/1Ea2LX2\_jW





## **QRA UNDERGRADUATE DISSERTATION PRIZE 2023**

It is our great pleasure to announce that the joint winners of this year's QRA Dissertation Prize are Jemima Lane (University of Oxford) for her dissertation on "Insights into the luminescence chronology of a linear dune from the Thar Desert, India, and its implications for regional paleoenvironmental reconstructions", and William Spicer (University of St. Andrews) for his dissertation on "Reconstruction and palaeoclimatic implications of Younger Dryas glaciation in the Southeast Grampians, Scotland".

The judges commend the very impressive quality of work. It was a pleasure to read all the dissertations that were submitted for the award and the broad scope of the topics and skills employed indicate the health of Quaternary research in Britain. Topics included glaciology, palaeoecology, palaeolimnology and geochemistry. With such high-quality work, it proved impossible to identify a single winner, so we are pleased to award the QRA dissertation prize jointly to Jemima and William.

Jemima Lane's dissertation, entitled Insights into the luminescence chronology of a linear dune from the Thar Desert, India, and its implications for regional paleoenvironmental reconstructions, demonstrated a comprehensive grasp of analytical techniques and sedimentary processes, presented using a fluent, concise and mature writing style. The critical evaluation of chronology, synthesis of sedimentation rates and effort to integrate complementary evidence from other proxies indicate her understanding of the evidence and its contribution to existing knowledge. The work was all the more impressive in that Jemima was working on material collected by others and she therefore did not have a chance to observe firsthand the context or wider desert mosaic that she has very ably written about.

William Spicer's dissertation, on *Reconstruction* and palaeoclimatic implications of Younger Dryas glaciation in the Southeast Grampians, Scotland, demonstrated a strong ability to connect local evidence to broader processes and models, using an impressive combination of detailed mapping, modelling and palaeoclimate inference. The mapping (based on remote sensing and fieldwork) and the writing were clear and succinct, presented in a manner that explained the details very effectively for an informed but non-expert audience. William used these lines of evidence alongside other published proxies to reconstruct potential precipitation gradients across Scotland, thus demonstrating his ability to not only generate and present new evidence to a high standard, but to also use this to extend our understanding of palaeoclimate variability.

Judges: Althea Davies School of Geography & Sustainable Development University of St. Andrews Ald7@st-andrews.ac.uk

> Phil Gibbard Department of Geography University of Cambridge plg1@cam.ac.uk

#### Insights into the luminescence chronology of a linear dune from the Thar Desert, India, and its implications for regional paleoenvironmental reconstructions

Arid landscapes constitute a dominant proportion of Earth's landmass and support an increasingly large population. Understanding how these drylands interact with both anthropogenic forces and environmental fluctuations is necessary to explain how such landscapes form and how they may change in the future. We can understand the relationship between arid landscapes and climatic conditions through paleo-reconstructions that link environmental fluctuations with geomorphological responses. The Thar desert in northwest India is a rich repository of paleoclimatic information in the form of proxy records which can be interpreted through sedimentological and statistical analysis. One such form of analysis is luminescence dating, which can be used to date sediment deposition in sand dunes. Luminescence chronologies reveal limited contextual information but can be incorporated within multi-proxy frameworks of paleoenvironmental change to evidence linkages between desert morphology and climatic forcing. This project carried out sedimentological analysis and optically stimulated luminescence (OSL) dating on a linear dune in the northeastern Thar desert (adjacent to the city of Lunkaransar) to produce a robust and repeatable chronology. This chronology was then compared with nearby dune records and accumulation intensity models to clarify and verify the linear dune's accumulation history. This history was considered alongside multi-proxy records of Thar climatic change to investigate Holocene conditions in the desert. OSL ages reveal five distinct points of accumulation throughout the Holocene which are aligned with early Holocene and late Holocene accumulation phases and a weakening in accumulation in the middle Holocene. This timeline corresponds with the sediment record at the adjacent Lunkaransar paleolake and reinforces multi-proxy evidence of a relationship between the Indian Summer Monsoon (ISM), aridity, and Holocene dune accumulation in the Thar desert.

> Jemima Lane University of Oxford

## Reconstruction and palaeoclimatic implications of Younger Dryas glaciation in the Southeast Grampians, Scotland

Glacial landform evidence provides an excellent opportunity to reconstruct past glaciers and climates. Scotland's distinct and well-preserved geomorphological signature associated with Younger Dryas (12.9-11.7 ka BP) glaciers has received considerable research attention and provided detailed reconstructions of glaciers and climate. However, several areas remain where glaciation remains speculative or poorly constrained. The southeast Grampians is one area largely absent from recent research and has benefitted from a much-needed reevaluation in this study.

This dissertation presents the results of a highly detailed geomorphological assessment of the southeast Grampians. The detail of the mapping effort, combined with ice surface profile modelling, provides evidence for the reconstruction of a ~55 km<sup>2</sup> plateau icefield and surrounding valley and corrie glaciers. The findings contest the previous understanding of an alpine style of glaciation and present evidence for a polythermal icefield centred on the Mounth Plateau. Given the change in the style of glaciation, palaeoclimatic variables are updated using the reconstructed Mounth Icefield. An equilibrium line altitude of 738 m and a precipitation value at sea-level of  $845 \pm 150$  mm a-1 are calculated here to suggest that the climate of the southeast Grampians was ~21% drier than present. Palaeoclimatic variables are used to re-evaluate previously inferred climatic gradients across Scotland and support a strong westeast precipitation gradient during the Younger Dryas.

Overall, the study has thoroughly re-assessed the geomorphological evidence in the southeast Grampians and produced results more consistent with our current understandings of glaciation and climate in Britain during the Younger Dryas.

> William Spicer University of St Andrews





## JOURNAL OF QUATERNARY SCIENCE OUTSTANDING ECR PAPER 2023

# The patchwork loess of Central Asia: Implications for interpreting aeolian dynamics and past climate circulation in piedmont regions

Journal of Quaternary Science (2023), 38(4), 526-543

Aditi K. Dave, Lenka Lisá, Giancarlo Scardia, Saida Nigmatova, and Kathryn E. Fitzsimmons

Reconstruction of mass accumulation rates (MARs) in loess deposits are widely used for interpreting long-term aeolian transport and climate dynamics terrestrial environments. However, in these interpretations are often driven by a preponderance of reconstructions from individual or selected sites, which can bias our understanding of past climate, especially in the absence of other proxy information. Recent studies on MARs from multiple loess sites in Arid Central Asia (ACA) reveal disparities in the timing of peaks in accumulation between sites, as well as asynchronies with loess flux in the Chinese Loess Plateau (CLP). We investigate this issue by (1) dating five new sites from the western Ili Basin, therefore

extending the spatial cover of loess chronologies across ACA and (2) combining that with MARs from >30 sites across ACA and the CLP over the last 60 ka. Our results indicate spatio-temporal inhomogeneity in the timing and rate of loess deposition across the ACA, and highlight the importance of interrogating local and regional influences on dust supply and transport. Our synthesis of MARs from ACA and the CLP suggests that the timing of peak dust flux as an indicator of large-scale climate dynamics is best derived from an aggregate of sites; this removes sitespecific bias where local processes or topographic settings outweigh the climate signature.

## JOURNAL OF QUATERNARY SCIENCE OUTSTANDING ECR PAPER 2023: RUNNER UP

## Lateglacial and Early Holocene Palaeoenvironmental Change and Human Activity at Killerby Quarry, North Yorkshire

Journal of Quaternary Science (2023), 38(3), 403-422 Samuel M Hudson, Clive Waddington, Ben Pears, Natalie Ellis, Luke Parker, Derek Hamilton, Inger Greve Alsos, Paul Hughes, and Antony Brown

The hunter-gatherers that entered the British peninsula after ice-retreat were exploiting a dynamic, rapidly changing environment. Records of vegetation change and human occupation during the Lateglacial to Early Holocene in northern Britain are more commonly found at upland and cave sites. However, recent research highlights many areas of the Swale-Ure Washlands that preserve extensive environmental sequences in low-lying ice-wastage basins, channels and depressions. The Lateglacial-Early Holocene environment of Killerby Quarry, North Yorkshire, is investigated here using a multi-proxy approach of sedimentary ancient DNA (sedaDNA), pollen, sedimentological (geochemistry and portable optically stimulated luminescence), and rare and

well-preserved archaeology (Lavvu structures and lithics). Results show that the wetland basins and kettleholes were small lakes or ponds in the Lateglacial surrounded by sedge-fen and birch woodland. A gradual (centennial scale) succession to reed-swamp and then marsh is seen by the Early Holocene. This environment formed the resourcescape for hunter-gatherer transitory settlement in both the Lateglacial (Late Upper Palaeolithic) and Holocene (Early Mesolithic), attracted by the rich communities of pond-related flora and fauna as well as easy strategic landscape access by way of the River Swale, an arterial route through the landscape connecting the North Sea Basin with the Pennine uplands via the palaeolakes around Killerby.

## **QUATERNARY RESEARCH ASSOCIATION**

The Quaternary Research Association is an organisation comprising archaeologists, botanists, civil engineers, geographers, geologists, soil scientists, zoologists and others interested in research into the problems of the Quaternary. The majority of members reside in Great Britain, but membership also extends to most European countries, North America, Africa, Asia and Australasia. Membership (currently ~1000) is open to all interested in the objectives of the Association. The annual subscription is £30 with reduced rates (£15) for students, retired and unwaged members and an institutional rate of £60.

The main meetings of the Association are Field Meetings, usually lasting 3–4 days, in April, May and/or September, and a 2-3 day Annual Discussion Meeting held at the beginning of January. Short Study Courses on techniques used in Quaternary work are also occasionally held. The publications of the Association are the *Quaternary Newsletter* issued in February, June and October; the *Journal of Quaternary Science* published in association with Wiley; and the QRA Field Guide and Technical Guide Series.

The Association is run by an Executive Committee elected at an Annual General Meeting held during the January discussion meeting. Current officers of the Association are:

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