IQUA

Cumann Ré Cheathartha na h-Éireann
Irish Quaternary Association
http://www.iqua.ie
@Quaternary_Irl
/IrishQuatAssociation

February 2025
NS: 73
ISSN: 0790-4096

Editor: Susann Stolze

1. Editor's Note

Dear IQUA members,

Welcome to IQUA Newsletter No. 73.

This issue features abstracts of the IQUA Autumn Symposium 2024 and the recipients of IQUA awards that were announced at the meeting. The newsletter also includes information on upcoming IQUA events, the abstracts of two graduate theses, a long list of recent publications from our members and a book review among other items.

I would like to thank all who contributed to this edition of the IQUA newsletter.

Kind regards,

Susann Stolze, Colorado, February 2025 (sstolze2021@gmail.com)

2. Cúpla Focal

[lit.] A couple of words ... from the President

Stormy times we live in! It's not often we see a red weather alert across both jurisdictions on the island of Ireland, but Storm Éowyn battered north and south with equal brutality. Yet another meteorological record was broken, with a top wind gust of 114 kmph at Mace Head, Co. Galway. While the structural damage and loss of facilities was extensive—for some particularly devastating and indeed tragic—a lasting environmental legacy will be the loss of many mature trees in gardens, estates and through the countryside. Will their loss be sufficient for us to recognise Éowyn's impact in centuries to come?

Storm Éowyn was the prodigy of an unusual cold front emanating from the southeastern USA encountering warmer air over the North Atlantic, its manifestation aggravated by its interaction with a strong jet stream. Storms with the ferocity of Éowyn are a relatively unusual occurrence, with some media sources reporting this as a once-in-a-century event. Yet a perusal of Met Éireann and Met Office data shows that similarly intense or even stronger storms have occurred in recent decades. Now that satellites enable real-time observation of the formation and evolution of storm systems, we have the capacity to prepare for and mitigate their impacts.

Not so on the Night of the Big Wind, which hit on 6–7 January 1839, causing untold damage and claiming the lives of hundreds of individuals. By and large, those who lost their lives on land were afforded a decent burial and structures were repaired and rebuilt, the event leaving little by way of an archaeological footprint, or even a palaeoenvironmental one. If it weren't for historical records, would we even know it had happened?

With warmer ocean surfaces contributing to storm intensity and frequency, we may need to prepare ourselves for more winds with the power of Éowyn on a more frequent basis. But the scientific jury is presently out on whether this particular event is a symptom of anthropogenically forced climate change. To understand the relationship of storms to climate change more generally, we require better information about past storm frequency and timing. As very transient events, storms are particularly difficult to detect in traditional paleoenvironmental studies, much less the archaeological record. There has nevertheless been a growing and diverse body of palaeostorm research in recent years that's starting to shed light on changing storm patterns through the Late Glacial period and Holocene. Just because it's tricky doesn't mean we shouldn't try…

Methinks reconstructing past storms, their drivers and their impacts might be an apt topic for a future IQUA Autumn Symposium. We currently have an opening for a theme for this year's Autumn Symposium, if any members are willing to throw caution to the wind and step forward to organise it! It would be rather fitting for the Year of the Snake, predicted in some quarters to be signalling chaotic times ahead. Stormy times, as I said…

Gill Plunkett, Queen's University Belfast

3. IQUA Committee (2025)

President: Gill Plunkett, Queen's University Belfast

Secretary: Michelle McKeown, University College Cork

Treasurer: Mark Coughlan, iCRAG, University College Dublin

Postgraduate Rep: Jack Mason, Ulster University

Webmaster: Adrienne Foreman, NUI Galway

Event Liaison Officer: Ryan Smazal, Dundalk Institute of Technology

Publications Officer: Sam Kelley, University College Dublin

IQUA Newsletter Editor: Susann Stolze, Colorado

General Members: Gordon Bromley, NUI Galway; Catherine Dalton, Mary Immaculate College, University of Limerick; Sam Roberson, British Geological Survey, Belfast; Graeme Swindles, Queen's University Belfast

4. IQUA Autumn Symposium 2024

The IQUA Autumn Symposium 2024 was held at the Geological Survey of Ireland in Dublin on Friday, 29th November 2024. The theme of the symposium was *Peatlands: Past, Present and Future*. Peatlands are recognised as a pivotal part of the landscape and have had a major impact on the development of culture, history and science. Recent studies estimate that ~23% of Ireland's Quaternary landscape can be considered as peat soils. These environments continue to be important for society as we face environmental challenges of the present and future.

The 2024 Autumn Symposium was the first event hosted in the recently refurbished GSI headquarters in Beggar's Bush and marks the final step in reestablishing the usage of the facility for organisations supported by the GSI. The event was organised by Dave O'Leary (Teagasc), Michelle McKeown (University College Cork) and Gill Plunkett (Queen's University Belfast).

The symposium was divided into three sessions. In keeping with the theme reflecting on the significance of past, present and future peatlands, keynote speakers included Dave Beilman (University of Hawai'I at Mānoa), John Connelly (Trinity College Dublin) and Kate Flood (University College Dublin).

The symposium was concluded with the announcement of the IQUA awards winners.

S1 Keynote: Lessons learned from past peat worldwide

Dave Beilman

University of Hawai'i at Mānoa
Corresponding author: beilman@hawaii.edu

Peatlands are well-known hotspots of carbon storage and biodiversity, making them recognized providers of ecosystem services globally. But their value as information hotspots, the archive of environmental change as peat accumulates, is equally important. Two aspects of peatlands worldwide are highlightable. First, peatlands are distributed widely, yielding unique information in regions where other data can be lacking. Fifty thousand years of atmospheric inputs and influence in the Pacific is evident in tropical peat from Hawaii. Second, peatlands are sensitive Earth system components, and subject to losses and even disappearance from global change pressures in many regions, yet expanding in others. Studying centennial scale peat dynamics in the Antarctic Peninsula are helping to constrain anticipated future changes in plant growth as amplified polar warming progresses. Many opportunities for new understanding of our past and future world are available to peatland science, making the conservation and study of peatlands an important goal among the grand challenges of coming decades.

S1-T1: Deciphering the origin and spread of blanket peat in the Mourne Mountains, County Down

Helen Essell *, Gill Plunkett

Archaeology & Palaeoecology, School of Natural and Built Environment, Queen's University Belfast, Belfast BT7 1NN
* Corresponding author: hessell01@qub.ac.uk

Today, blanket peat dominates Ireland's uplands. Its origin is typically ascribed to the Bronze Age (~4450–2650 BP) and it is viewed as a consequence of farming activity. Considerable spatial and temporal divergence in the timing of peat formation and pollen evidence, however, show that the history of blanket peat differs between Ireland's uplands, warranting long-term, regionally specific studies of landscape history. The environmental and human history of the Mourne Mountains, County Down, is poorly understood due to sparse palaeoenvironmental study and archaeological enquiry. Here, we adopt a palaeoecological lens to report on the Holocene landscape history of the Mournes in order to

understand the status of blanket peat in the landscape. We determine the timing of local peat initiation, and using five cryptotephra dated pollen records, we answer extant questions regarding the status of mid-Holocene woodland, the degree of landscape openness through the past and the roles of natural and anthropogenic drivers of landscape change. We find that blanket peat has been a feature of the Mourne uplands since mid-7th millennium BP, and thus its origin in this area much predates other upland areas. We discuss the implications for this for past land-use in the area and future conservation activities.

S1-T2: Project DRYPEAT: Developing a new isotopic proxy for bog evapotranspiration

Pete D. Akers *, Zenobia Kusi-Afrakoma

Geography, School of Natural Sciences, Trinity College Dublin
* Corresponding author: pete.akers@tcd.ie

Blanket bog carbon storage and biodiversity are critical components of a sustainable Ireland, but a warming and drying climate may push blanket bogs beyond a tipping point into ecological collapse. Although the exact conditions that lead to this threshold are unknown, we can better understand bog resilience by identifying and quantifying past droughts that the bogs survived. In our new project DRYPEAT (Deuterium-excess Reconstruction to Yield Peatland Evaporation, Aridity, and Transpiration), we aim to develop a new peatland evapotranspiration (ET) proxy using the deuterium-excess (dxs), a second-order stable isotopic parameter, of bog plant cellulose. Uniquely, DRYPEAT will use the differences in cellulose dxs between non-vascular Sphagnum and vascular bog plants (e.g., Calluna, Eriophorum) to capture the previously unquantified transpiration component of ET. Our proxy development will be achieved through sustained monitoring of bog precipitation, surface waters, and vegetation in the Wicklow Mountains and then applied to local peat cores to compare past periods of high ET that the bogs survived with predicted future ET extremes. The technical and methodological advancements achieved in DRYPEAT will thus aid Irish climate mitigation planning around the future survival of blanket bogs while also expanding knowledge of Irish geoscience and its paleoenvironment.

S1-T3: Botanical and chemical factors impacting recent carbon storage dynamics in temperate peatlands

Gosse Bootsma [1]*, Maarten Blaauw [1], Dmitri Mauquoy [2], Gerard Barrett [1]

[1] Archaeology & Palaeoecology, School of Natural and Built Environment, Queen's University Belfast, Belfast BT7 1NN
[2] School of Geosciences, University of Aberdeen
* Corresponding author: gbootsma01@qub.ac.uk

Peatlands are a key terrestrial ecosystem, especially in the British Isles, which support unique biodiversity and form a major carbon store. This ecosystem is highly dependent on climatic factors and can be significantly influenced by human activity. Going into the future, improving understanding of how carbon is sequestered and released is key, as carbon dioxide and methane are major greenhouse gases. Therefore, carbon storage dynamics of peatlands could have a significant impact on future climate change.

This project aims to improve understanding of peatland carbon storage dynamics over the last few centuries, by combining information on species diversity and composition, pollution, and the chemical composition of peat, using methods including a range of radiocarbon dating techniques, ramped pyrolysis, bulk density, loss-on-ignition, and X-Ray Fluorescence. The work primarily focuses on peatlands in Northern Ireland and in Scotland. In this way, the project hopes to improve understanding of how recent challenges have impacted temperate peatlands.

In this talk I will focus on some unusual methods of radiocarbon dating, especially applying ramped pyrolysis and combustion to peat.

S1-T4: Testing the replicability of palaeoenvironmental records from a raised bog

James Dill-Russell [1]*, Gill Plunkett [1], Graeme Swindles [1,2], Jo Smith [3]

[1] Archaeology & Palaeoecology, School of Natural and Built Environment, Queen's University Belfast, Belfast BT7 1NN, United Kingdom
[2] Ottawa-Carleton Geoscience Centre and Department of Earth Sciences, Carleton University, Ottawa, Ontario, Canada
[3] School of Biological Sciences, University of Aberdeen, Aberdeen, UK
* Corresponding author: jdillrussell01@qub.ac.uk

Ombrotrophic peatlands are sensitive to climatic changes due to their reliance on precipitation for nutrients and water. For this reason, peat archives are commonly used for palaeoclimate investigations, providing a range of proxies that shed light on past bog surface conditions. Most typically, palaeoenvironmental studies entail the investigation of a single core from a bog, which is then compared with individual cores from other bogs. Here we consider the extent to which cores from different locations on a bog yield common palaeoenvironmental signals.

We focus on the period between 6000–5000 BP, during which several climate oscillations are thought to have occurred, and examine three cores from Sluggan Moss, Northern Ireland. Using tephrostratigraphies to align the sequences, we examine pollen, plant macrofossil and testate amoebae records from the cores. Initial results show that the general trends of signals between two cores follow similar directions, with increased ericaceous material coincident with environmental shifts towards drier conditions. Results from the third core diverge, however. We consider possible reasons for the discrepancies and the implications for reconstructing past environments from single-core records.

S1-T5: Ground Penetrating Radar to understand peatlands in the past, present and future

Raymond Flynn [1]*, Andrew Trafford [1,2], Michael Bennet [1]

[1] School of the Natural and Built Environment, Queen's University Belfast
[2] AT Geophysical Consultant
* Corresponding author: r.flynn@qub.ac.uk

Ground penetrating radar (GPR) has received widespread attention as a non-invasive geophysical tool for investigating the subsurface. Across Ireland, GPR has permitted high resolution mapping of bog substrates, while allowing quantification of the volume of peat underlying an area, when considered with topographic data. Despite these benefits, considerable potential remains for using GPR to better understand peatland development. Profiles showing internal variations in signal have allowed tree stumps and irregular shell marl surfaces to be identified, and suggest diachronous deposition of marl as peat accumulated and forced water tables in glacial deposits to rise. This is further corroborated by profiles, and associated coring, across mounds protruding through early Holocene lake beds, which reveal development of ombrotrophic peat directly on glacial till. Within the peatland sequences, variations in the elevation of the fen peat/bog peat interface can be related to impacts of more recent artificial drainage, which has lowered bog water tables. This has also affected bog surfaces and their ecohydrology, with GPR revealing greater sensitivity in bog peat than underlying fen peat, in line with compressibility measurements. Results highlight GPR's potential as a tool for better understanding peatland development and for better characterising current and future responses to anthropogenic activity.

S2 Keynote: Ireland's Hidden Peatlands – a geographical perspective

John Connolly

Trinity College Dublin
Corresponding author: John.Connolly@tcd.ie

Although peatlands cover only 3% of the land area, they contain 33% of all terrestrial soil organic carbon stocks. In addition, they support a broad range of environmental services such as water quality and biodiversity. Anthropogenic activity, particularly drainage and land use change has degraded many peatlands with consequences for environmental services. This has long been the case in Ireland and across Europe and more recently in tropical regions.

They play a crucial role in the global carbon cycle as well as providing many of nature's contributions to people. However, degradation impacts the many ecosystem services that peatlands provide including carbon (C) storage and greenhouse gas exchange, water quality and biodiversity. The degradation of peatlands can lead to fire, GHG emissions, dissolved and particulate matter emissions and, heavy metal mobilisation with consequences for human health and the environment.

The extent and condition of peatlands nationally, regionally and globally is not clear. In Ireland, peatlands have undergone extensive degradation through land use change and conversion. Recent studies estimate that peat soil extent, including shallow peat soil, is 1.66 million hectares with about 2 billion tonnes of Carbon stored in the soil. Much of this soil is located under a variety of different land cover types and in different drainage states. This leads to some uncertainty regarding greenhouse gas fluxes.

This presentation focuses on the geospatial techniques that we have used to refine and quantify the spatial extent and condition of peat soils in Ireland from 1809 to the present.

S2-T1: Potential of SAR remote sensing for monitoring Irish raised bogs

Mahdi Khoshlahjeh Azar [1]*, Alexis Hrysiewicz [1], Shane Donohue [1], Shane Regan [2], Eoghan P. Holohan [1]

[1] SFI Research Centre in Applied Geosciences (iCRAG), University College Dublin
[2] National Parks and Wildlife Service, Ireland
* Corresponding author:
mahdi.khoshlahjehazar@ucdconnect.ie

Synthetic Aperture Radar (SAR) remote sensing is potentially useful for spatio-temporal monitoring of temperate peatlands, especially given that radar

penetrates clouds and so offers a higher temporal resolution than optical satellites. However, accurately tracking bog condition and restoration progress by using SAR requires a comprehensive understanding of how bog characteristics relate to SAR parameters in both space and time. To facilitate this understanding, six ecologically well characterised and hydro-geologically well-instrumented raised bogs — Mongan, Clara, Killyconny, Ardagullion, All Saints, and Castlegar — have been selected. These represent a spectrum of peatland condition from relatively intact to industrially degraded. Our observations show the potential of SAR remote sensing, particularly VV and VH time series backscattering for monitoring peatland restoration. The amplitude of backscatter oscillations is a key indicator of degradation, with more noticeable fluctuations in degraded areas compared to near-intact bogs. SAR backscatter signals can detect the impact of rewetting works, but the subtle differences in post-rewetting backscatter require detailed temporal analysis to track progress effectively. The correlation between SAR backscatter and GWL weakens with inundation (flooding), making it essential to filter out inundated periods for accurate monitoring. SAR intensity standard deviation and polarization differences can provide insights into peatland ecological conditions, aiding in restoration assessment and the identification of key ecological changes.

S2-T2: AI2Peat: Toward the automated mapping of raised peatland ecology at national scale

Corrado Grappiolo [1]*, Eoghan Holohan [2], Shane Regan [3]

[1] CeADAR (UCD School of Computer Science)
[2] UCD School of Earth Sciences and iCRAG
[3] National Parks and Wildlife Service
* Corresponding author: corrado.grappiolo@ucd.ie

Peatland ecology is a critical indicator of peatland condition and can be used as a proxy for greenhouse gas emissions. In Ireland, a major challenge is to map peatland ecology across the 15–20% of the country's land area that is characterised by peat soils.

We present a machine learning approach - a hierarchy of neural networks - to classify the ecology of temperate raised peatlands. The approach leverages Sentinel-2 multispectral satellite imagery - which has 10 m resolution ground sampling distance and revisit time of 5–10 days - and detailed field-surveys of raised peatland ecology in the form of ecotope maps (8 ecotopes). Our preliminary experimental setup aimed at training the neural hierarchy with 15 ecotope maps and imagery, and subsequently testing its performance on 3 previously unseen imagery, recorded an averaged weighted F1 score of 0.71 (0.07 std. dev.).

We show how such an neural network approach can automatically infer the ecology of over 11,000 raised peatlands in Ireland. This work shows the promise of artificial intelligence and satellite data to support monitoring of Irish peatlands at national scale, e.g. by producing island-wide peatland ecology maps on yearly basis.

S2-T3: Viability of surcharging as a means of limiting long-term settlement in peat

Farimah Fattahi Masrour [1]*, Bryan McCabe [2], Mike Long [1], Fintan J. Buggy [3]

[1] Civil Engineering Department, University of Galway
[2] School of Engineering, University of Galway, Galway, Ireland
[3] Roughan and O'Donovan Consulting Engineers, Sandyford, Dublin 18, Ireland
* Corresponding author:
f.fattahimasrour1@universityofgalway.ie

Peat soils exhibit low shear strength and high compressibility (especially post-construction settlements) which render them challenging from a geotechnical engineering standpoint. The traditional practice of excavating and replacing peat with more component material gives rise to CO_2 release from the peat and is therefore unsustainable. The focus of this research is on the potential of surcharging, a ground improvement technique commonly deployed in mineral soils, to reduce long term settlement (creep) in peat while enabling it to remain in situ. The research project involves three strands. The first strand, which is almost complete, involved interpretation of field data from instrumented embankments along the N56 at Glenties, Co. Donegal. These embankments were subjected to various levels of surcharge, with supporting data from an unsurcharged 'control' embankment. The second phase involves long-term large diameter oedometer tests on block samples of peat, with a focus on the impact of surcharge on the magnitude and duration of creep settlement reduction. Particular challenges include repeatability of testing and limiting peat decomposition during testing. Finally, the field and oedometer tests will be modelled using PLAXIS 2D finite element software in conjunction with the Soft Soil Creep model to help broaden the parameter space.

S2-T4: Examining the relationship between rainfall and water table position in grassland peat soils

Hilary Pierce [1]*, Dave O'Leary [2], Eve Daly [1], Owen Fenton [3], Asaf Shnel [2], Mark G. Healy [4], Patrick Tuohy [2]

[1] School of Natural Sciences, Earth and Life, Ryan Institute, College of Science and Engineering, University of Galway
[2] Teagasc, Animal and Grassland Research and Innovation Centre, Moorepark, Fermoy, Co. Cork
[3] Teagasc, Environment Research Centre, Johnstown Castle, Co. Wexford
[4] Civil Engineering and Ryan Institute, College of Science and Engineering, University of Galway
* Corresponding author: h.pierce1@universityofgalway.ie

Using artificial drainage on peat soils is a common practice to increase agronomic production on waterlogged lands but leads to the release of carbon dioxide to the atmosphere. There are an estimated 300–350,000 ha of permanent grassland on peat soils in Ireland, with varying degrees of drainage, and 80,000 ha of such soils are targeted for 'reduced management intensity' in the National Climate Action Plan. This may involve removal or blocking of existing artificial drainage features to raise the water table and reduce net carbon emissions. The Department of Agriculture, Food and The Marine-funded project, REWET, aims to provide a deeper understanding of the hydrologic impacts of active water table management on grassland peat soils. To achieve this goal, six field sites on grassland farms were selected and classified into peatland type. The sites are instrumented with rainfall gauges and dipwells with sensors to monitor the water table position. One aim of the project is to determine the relationship between rainfall and water table position at the different sites. Such results will ultimately inform water table management strategies to reduce the impact of greenhouse gas emissions on the environment and support sustainable land management practices on grassland peat soils.

S2-T5: Testate amoebae are informative bioindicators of critically high ammonia deposition on peatlands

Callum R.C. Evans *, David A. Hatton, Graeme T. Swindles

Geography, School of Natural and Built Environment, Queen's University Belfast
* Corresponding author: cevans12@qub.ac.uk

The global nitrogen cycle has been majorly disrupted by anthropogenic activity. While nitrogen emissions in the UK and Ireland are declining, ammonia remains a significant exception. Ammonia emissions are mostly agriculturally sourced and deposited on nearby habitats at high rates in both countries. Peatlands are vulnerable to ammonia deposition, and essential peatland restoration risks being diminished by excessive ammonia deposition, leading to the loss of valuable ecosystem services. We investigated testate amoebae (indicators of contemporary and historic peatland conditions) as bioindicators of seasonal ammonia deposition on six peatlands across Northern Ireland. Sphagnum, an ammonia-sensitive bryophyte, was sampled adjacent to ammonia monitoring sites once per season for a year. When ammonia deposition was critically high, multivariate analysis demonstrated a link between ammonia and testate amoebae assemblage change. Similarly, at high ammonia deposition sites, testate amoebae taxa diversity was observed to be significantly reduced in springtime, when it is expected to be highest. Although, in response to high ammonia deposition large algivorous taxa did not proliferate as was anticipated, and mixotrophic taxa abundance decreases could not be linked primarily to ammonia. Our research demonstrated the continued potential of testate amoebae as highly informative peatland bioindicators.

S3 Keynote: Changing landscapes, changing values: reimagining social and cultural values for Irish peatlands

Kate Flood

Trinity College Dublin
Corresponding author: kateflood@gmail.com

Peatlands are important archives of historical information, providing insights into past human activity and environmental change. In Ireland, peatland landscapes have been highly modified and degraded by human activities, often driven by economic, political, and socio-cultural factors which are, in turn, underpinned by societal values and behaviours. The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) emphasises that modifying values and behaviours is critical for the transformative change required to address current environmental challenges. Researchers have long advocated for integrating social insights with ecological data, and various frameworks, such as social-ecological systems and ecosystem services, have been developed to support this integration. Yet critical knowledge gaps persist concerning the social and political dimensions of peatland conservation, restoration and management. This presentation will explore the role of values in shaping the past, present and future of peatland management in Ireland, as priorities shift from economic exploitation to more sustainable and equitable models. In the past, socio-cultural traditions have often constrained transformational change. Current societal and cultural values also underlie resistance to change, with a variety of actors opposing peatland restoration, rewetting and other sustainable management strategies. However culture in all its forms can also be a force for posi-

tive change, fostering adaptation, social-ecological resilience and guiding a shift from values of individualism and consumption towards more collaborative values. Envisioning different land uses for Ireland's peatlands requires attention to values and how we transmit knowledge to future generations in ways that open possibilities for new forms of valuing and appreciation. Interdisciplinary and transdisciplinary research will be essential, with contributions from the arts, humanities and social sciences (AHSS) needed to develop more integrated and holistic understanding of peatland landscapes alongside traditional scientific research. Such contributions can also help expand our concepts of time and temporality, shifting from short-term thinking to long-term management and planning. This presentation will also draw on insights from the Peat Hub Ireland project, and its use of scenario planning to better understand how future social, economic and environmental worlds will be served by the choices that are made for peatlands today.

S3-T1: Twelve bogs: history, politics, ecology

Jamie Rohu

Trinity College Dublin
* Corresponding author: jrohu@tcd.ie

Intact peatlands are now widely recognised as carbon stores and habitat for wild plants and animals. Humans have extracted turf from these spaces for millennia in order to meet their domestic heating and cooking needs. However, these use values are largely incompatible given the slow natural rate of peat accumulation.

In response to increased environmental awareness and directives from the European Union, successive Irish governments have enacted legislation to protect and rehabilitate the country's best remaining raised bogs. The transition of landscapes from one use to another presents both economic and technical challenges. Restorative activities by the state have brought it into direct conflict with people in possession of turbary rights to cut turf. Therefore, I argue that the greatest barrier to ecological remediation is a political one.

Contemporary peatland research focuses on physical aspects, notably greenhouse gas emissions from agricultural, post-industrial, rehabilitated and restored bogs. I aim to fill the gap in the literature concerning the socioeconomic consequences of peatland transformation through the publication of a scholarly monograph entitled Twelve Bogs: History, Politics, Ecology. This fellowship, based in the Department of History at Trinity College Dublin, is co-funded by Research Ireland and the National Parks and Wildlife Service.

S3-T2: Engaging with Irish farmers managing upland blanket peatlands through agri-environment schemes to effect biodiversity practice change

Catherine Keena [1]*, Jim Kinsella [2]

[1] Teagasc
[2] University College Dublin, School of Agriculture and Food Science, Dublin, Ireland
* Corresponding author: catherine.keena@teagasc.ie

There are approximately one million hectares of uplands in Ireland, 45% of which is blanket peatland. Some 340,000 hectares are farmed as commonages by up to 15,000 farmers, other areas are privately owned and farmed. Farming in these vast upland areas is experiencing socio-economic decline, presenting unique challenges including low farm incomes and an aging farming population. Issues of overgrazing, undergrazing and abandonment have resulted in some of these peatland areas failing to attain Favourable Conservation Status with reduced biodiversity including declines in iconic upland bird species such as red grouse and hen harrier, encroachment of Invasive Alien Species, and a reduction in high status water quality.

EU policies and in particular the Common Agriculture Policy (CAP), impact significantly on Irish uplands. In order to effect biodiversity practice change on farms, engagement with farmers is key. A study on biodiversity knowledge exchange with Irish farmers using face-to-face questionnaire-based interviews on-farm on concluded that while farmers were positive towards biodiversity, it was not a priority. There was a lack of understanding of biodiversity, requiring effective training. Farm advisors were identified as the key source of environmental information, and along with other farmers and family members were key influencers of farming decisions.

S3-T3: Irish peatlands past? The anatomy of a national archaeological resource

Ellen O Carroll [1]*, Cathy Moore [2], Benjamin Gearey [1], Lauren Shotter [1], Benjamin Spillane [1], Clare Nolan [1]

[1] University College Cork
[2] Archaeology and Built Heritage
* Corresponding author: eocarro@tcd.ie

"There is some argument for saying that the Irish bogs hold more information about the past, than any other wetland in Europe." (Coles and Coles, 1989, 159).

In the three and a half decades since the 'bogland' archaeological record of Ireland was described as such, drainage and peat extraction continued to expose, and destroy, archaeological sites and deposits, ironically proving the above argument to be correct. With the 'official' end of industrial cutting, compiling and assessment of the archaeological datasets has been carried out by the Irish Peatland Archaeology Across Time Project (IPeAAT; funded by the IRC COALESCE INSTAR+ scheme). This paper outlines the approaches and initial outputs of this project, which has included the construction of a relational database incorporating a comprehensive range of information drawn from a detailed investigation of archaeological excavations, and associated data including palaeoenvironmental assessments and analyses, and chronological 'hygiene' of radiocarbon dates. Ongoing spatial and chronological modelling is analysing patterns of past human activity in peatlands across Ireland. These data also have implications for future 'afteruses' of peatlands; not least the preservation of surviving archaeological sites in situ during programmes of peatland rehabilitation and the wider communication of the value and fragility of the resource.

S3-T4: Irish peatlands present and future? Communication, collaboration and peatland archaeological heritages

Claire Nolan [1,2]*, Benjamin Gearey [1], Caitríona Moore [2], Ellen O'Carroll [1], Lauren Shotter [1], Benjamin Spillane [1]

[1] University College Cork
[2] Archaeology and Built Heritage Ltd.
* Corresponding author: clairenolan@ucc.ie

While organic archaeological remains from peatlands provide often vivid and immediate evidence of past human activities, communication and promotion of the broader heritage value of this resource in Ireland has been, at best, rather uneven. The number of sites and artefacts that have been destroyed or damaged as a direct result of peat extraction, means that much tangible heritage now only survives as record, or sometimes behind museum glass. Moreover, the sociocultural context of the exploitation of peat is tied to complex expressions of intangible cultural heritage, leading to extended and ongoing debates around the 'green future' of these environments, which tend to overshadow the archaeological context. This paper provides an overview of work by the Irish Peatland Archaeology Across Time Project (funded by the IRC COALESCE INSTAR+ scheme), and previous UCC projects, that has attempted to encourage communities of practice outside the Academy to consider the place of the past, in the present and future of peatlands. What might trans-disciplinarity offer in such tightly contested spaces, specifically the interface between archaeology, and modes of representation/communication via the arts? Can we seek to create nuanced, hopeful narratives around peatland rehabilitation and the past loss of tangible archaeological sites?

S3-T5: New peat initiation under 20th-century climate change in New Zealand's Southern Alps

Richard Fewster [1]*, G.T. Swindles [2], J. Carrivick [3], M. Gałka [4], T. Roland [5], M. McKeown [6], J. Sutherland [7], F. Tweed [8], D. Mullan [1], C. Graham [1], A. Gallego-Sala [5], P.J. Morris [3]

[1] Geography, School of Natural and Built Environment, Queen's University Belfast
[2] Geography, School of Natural and Built Environment, Queen's University Belfast, and Ottawa Carleton Geoscience Centre and Department of Earth Sciences, Carleton University
[3] School of Geography, University of Leeds
[4] Department of Biogeography, Paleoecology and Nature Conservation, Faculty of Biology and Environmental Protection, University of Lodz
[5] Department of Geography, University of Exeter
[6] Department of Geography, University College Cork, Cork
[7] School of Built Environment, Engineering and Computing, Leeds Beckett University
[8] Geography, Staffordshire University
* Corresponding author: r.fewster@qub.ac.uk

Emerging peatlands represent a growing, though presently unquantified, carbon sink in the global climate system, with important implications for radiative forcing. Rising temperatures and shifting precipitation patterns have made regions towards the latitudinal and altitudinal limits of the peatland bioclimatic envelope increasingly conducive for peat formation, due to increases in plant productivity and moisture availability. While renewed peat growth has been well-documented in warming high-latitude regions, direct observations of new peat initiating in response to 20th-century climate change remain scarce. In our ongoing study, we explore evidence for recent peat initiation in a deglaciating valley in New Zealand's Southern Alps. Our results reveal that montane peats have developed across the upper valley within the past 75 years, during a period of steady regional warming and glacial retreat. Additionally, we observe consistent patterns of ecological succession in these nascent peatlands, including shifts from herbaceous- to moss-dominated vegetation. Our results indicate the potential for broader peat expansion in montane regions undergoing rapid deglaciation in warmer and wetter climates. Further bioclimatic modelling is now needed to identify plausible locations for future peatland initiation and expansion at regional scales.

5. IQUA Award Winners 2024

The following IQUA awards were announced at the IQUA Autumn Symposium 2024 that was held at the Tom Johnson House, Beggar's Bush, in Dublin on Friday, 29th November 2024. Congratulations to all our awardees on their excellent work.

Bill Watts ^{14}C Award

The Bill Watts ^{14}C Award recognises researchers who demonstrate excellence and innovation in applying radiocarbon dating to advance Quaternary science.

Leanne O'Donoghue

University College Cork

Leanne received two ^{14}C dates for her project on "Pacific Island Countries are on the frontline of climate change".

Rachel Healy

University College Dublin

Four ^{14}C dates were awarded to Rachel for her project on "Dating key changes in sea-level during the late Holocene in Inner Galway Bay".

Research Award

The Research Award supports outstanding and innovative Quaternary research projects, with the aim of supporting progress in the field. In recognition of existing funding already in place for applicants' projects, and as discussed at the Committee meeting, the committee decided to make a single Research Award this year.

Nannan Li

Maynooth University

Nannan Li received the prestigious Research Award for his project titled "The triple oxygen isotope composition ($\delta^{17}O$, $\delta^{18}O$, and ^{17}O-excess) of peat bog waters in Ireland".

Valerie Hall Award

Named in honour of Professor Valerie Hall, this award celebrates significant contributions to Quaternary research, particularly through impactful publications or outreach.

Amy Lally

Queen's University Belfast

Amy received this prestigious award is for her publication in the journal *Geomorphology*.

Lally, A., Ruffell, A., Newton A.M.W., Rea, B.R., Spagnolo, M., Storrar, R.D., Kahlert, T., Graham, C. 2024. Geomorphological signature of topographically controlled ice flow-switching at a glacier margin: Breiðamerkurjökull (Iceland) as a modern analogue for palaeo-ice sheets. *Geomorphology* 454, 109184.

6. IQUA Spring Meeting

Date: Saturday March 29th, 2025

Venue: TARA Building Room, Room T116

Mary Immaculate College

Join us for the 2025 IQUA Spring Meeting (and members AGM) at Mary Immaculate College in Limerick, on the majestic River Shannon! This annual event will celebrate and support Early Career Quaternary Researchers. We welcome presentations from Master's students, PhD students, Postdoctoral Researchers, or experienced academics on a broad range of Quaternary research topics in oral and poster form.

Come share your work and connect with fellow researchers in the field!

Email: catherine.dalton@mic.ul.ie (with speaker name and provisional title)

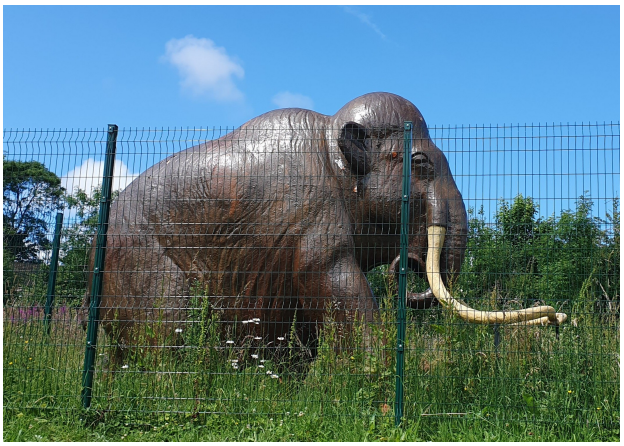
Catherine Dalton, Mary Immaculate College

7. IQUA Field Meeting 2025

Hold the date! – County Cavan, 5–7 September 2025

We are pleased to announce that the next field meeting will take place on 5–7 September 2025, destination Co. Cavan. We are starting to put together an itinerary, but the trip promises to take in a range of Quaternary landscape features and archaeology in this under-celebrated area of south Ulster where one may even encounter a life-sized mammoth (see below). IQUA members are invited to propose potential stopping points. We anticipate being based in Cavan town, and travel between sites will be via car-pooling. Further details will be circulated in due course.

Gill Plunkett, Ryan Smazal and Jasper Knight



Belturbet woolly mammoth. Photo credit: Clare Glanville.

8. IQUA Autumn Symposium 2025

Call for Research Themes

IQUA members are invited to propose a research theme for this year's Autumn Symposium. We hope to avail again of the conference room at Tom Johnson House in Beggars Bush, and the meeting is usually held on the last Friday of November (give or take a week, if needs be). Please email IQUA Events Liaison Officer Ryan Smazal (ryan.smazal@ucd.ie) with proposals by the end of February 2025.

Gill Plunkett, Queen's University Belfast

9. Recent Graduates

Helen Essell

Queen's University Belfast
Viva: 4 November 2024
Supervisor: Prof. Gill Plunkett (Queen's University Belfast)
External Examiner: Althea Davies (University of St. Andrews)

Holocene Landscape Evolution of the Mourne Mountains, Northern Ireland

The Mourne Mountains are an upland area in County Down, Northern Ireland. Today, the Mournes host an open landscape characterised by degenerating blanket peat and heath communities. Archaeological and historical records attest to human presence here over preceding millennia. The environment, however, is under immense pressure due to recent land-use activities; conservation is critical if the natural and cultural heritage of the Mournes is to be preserved. This thesis aims to use a palaeoenvironmental approach to disentangle the Holocene landscape of the Mourne Mountains in order to inform conservation and to enhance understanding of cultural heritage in the region.

This study shows that blanket peats began forming from at least ~8700 BP and by the mid-7th millennium BP blanket bog was widespread across the uplands. Radiocarbon dating is shown to return erroneous ages of peat initiation; cryptotephra analysis is demonstrated as a reliable means to independently date blanket peat deposits. Samples of modern pollen rain from across the Mournes emphasise that uplands are susceptible to long-distance pollen transport; this knowledge guides interpretation of landscape evolution from deep-peat sequences. Pollen analyses show that contrary to common thought, the high hills of the Mournes were not wooded during the mid-Holocene. Pinus woodland was formerly local to lower mountain slopes (less than 350 m above sea level) until its decline around ~6750 BP. The high hills of the Mournes have hosted heath over the last ~9000 years and this replaced local Pinus woodland on the lower slopes after its decline. Analysis of pollen and non-pollen palynomorphs from samples adjacent to former transhumant sites show occupation from the mid- to late 12th century CE until ~1800 CE; activities included cereal-growing and grazing. Cereals were also grown in cultivation ridges that lie relict from year-round settlement in the mountain foothills during the late 18th to early 20th century CE.

This thesis demonstrates that the Mournes have hosted a distinct landscape relative to other Irish uplands during the Holocene. Humans were present in prehistoric times, but activity and impact on the environment was limited – possibly due to the early origin of blanket bog. Results hint that significant human impact may have begun during the Early Medieval period, but intensified activity since ~1850 CE, which is analogous to other Irish uplands, has been most impactful to the landscape. Conservation in the Mournes is, therefore, challenging as a balance must be struck between preserving the blanket bog and heath communities that are natural to the uplands and ingrained in cultural traditions.

Sarah Ferrandin

Queen's University Belfast
Viva: 5 August 2024
Supervisor: Prof. Gill Plunkett (Queen's University Belfast)
External Examiner: Dr. Jennifer Jones (University of Central Lancashire)

Investigating the Timing and Causes of Nitrogen Cycle Changes in Bronze Age Ireland

The onset of the Industrial Revolution has often been suggested as the beginning of the Anthropocene, because the rapid increase in fossil fuel consumption, alongside swift societal transformations, marks a significant and unprecedented event in human history. For example, the early-twentieth-century development of the Haber–Bosch process, which enables the conversion of atmospheric nitrogen into ammonia for use as fertiliser, has so fundamentally changed the global nitrogen cycle that the closest suggested geological comparison dates back approximately 2.5 billion years. Emerging discussions around the 'Palaeoanthropocene' suggest that significant human impacts on Earth systems may have begun much earlier than commonly thought. This manuscript-based PhD thesis explores this premise by examining the timing and causes of changes in the nitrogen cycle during Bronze Age Ireland, a period characterised by substantial prehistoric human activity as well as climate change. The research focuses on elucidating the extent and origins of nitrogen (N) isotopic shifts by analysing herbivore bone collagen and the geochemistry ($\delta^{15}N$, $\delta^{13}C$, and C:N) of lake sediments and peat cores. Pollen analyses of sediments, as well as testate-amoebae water table approximations of peat sequences, were used for reconstructing land-use and palaeohydrological conditions. This multi-proxy approach allowed for a nuanced understanding of both climate- and human-driven changes to the nitrogen cycle. The study elucidates that the timing and extent of shifts in the terrestrial nitrogen cycle were asynchronous, varying between herbivore remains and lake systems, and reflecting local land-use patterns. A permanent shift in herbivore $\delta^{15}N$ values was identified around 3000 cal BP, persisting through the Iron Age, and reaching maximum values in the early medieval period. This event is not immediately reflected in the sediment sequences, calling into question its extent at this time in the Late Bronze Age. Two of the three lake sequences, however, exhibit a permanent enrichment starting around 2600 cal BP, with peak values around 1500 cal BP. At both sites, the permanent shift is associated with renewed anthropogenic impacts, suggesting that the N cycle underwent gradual alteration over the course of the Late Bronze and Iron Ages. The sequential changes observed in lake sediments indicate that this was not an abrupt shift occurring solely during the Middle to Late Bronze Age. Instead, it was an asynchronous process that began in the Late Bronze Age, continued into the Early Iron Age, and reached its peak values by the early medieval period.

The study also considered the potential impact of climate, such as droughts, in sustaining elevated $\delta^{15}N$ values even during periods of lesser human impact, challenging previous assumptions about the direct correlation between human activity and nitrogen enrichment. This suggests a complex interplay where climatic changes can amplify or modulate the effects of human land use. This thesis substantially enhances our understanding of early human impacts on the nitrogen cycle, advocating a re-evaluation of the onset of significant anthropogenic environmental change, and proposing that the origins of the Anthropocene may extend deeper into prehistory than commonly acknowledged. The findings emphasise the necessity for interdisciplinary research to unravel the long-term interactions between humans and the natural environment, offering valuable insights for current environmental management and conservation strategies. Future research should expand these investigations to other regions and timescales to further refine our comprehension of humanity's influence on Earth's biogeochemical cycles.

10. IQUA Outreach

Dr. Carla Mateus, Assistant Professor in the Geography Department at Maynooth University, has received a Public Engagement Grant from the European Geosciences Union (EGU) to undertake the project ‘Prison talks: bringing climate change conversations into the Irish prisons’. This project aims to raise awareness of climate change among people in prison, a hard-to-reach audience who don’t have much access to science outreach activities.

More information:

https://www.maynoothuniversity.ie/geography/news/prison-talks-bringing-climate-change-conversations-irish-prisons

Carla Mateus, Maynooth University

11. Research Project

Overburden Mapping Opportunity, Passage East, County Waterford — Undated Peat Horizon at High Erosion Risk

Thanks to rising sea level and storm activity, there has been a major increase in eroded, non-vegetated, fully exposed glacial overburden cliffs along the Waterford Coast of the Waterford Estuary between Passage East and Woodstone Beach. This 5 km stretch of coast has some 4 km of high-quality exposure, often extending to fresh bedrock exposure. This exposure runs north-south parallel to the ice direction.

The basal sequence includes a variety of clays and the peat material first reported by W.A. Watts in 1959 and seen by Coxon (pers. comm.) in the 1960s. This peat was observed/discovered and GPS located by the author in 2021 but remains unstudied in modern times nor has it been dated. A sample on tillite further south along the coast at Credan Head was studied by the GRA team as part of the Portalis Project gave a radiocarbon date of 29,040±160 years. Currently the known peat horizon location is protected by beach boulders and sands not more than 1.5 m thick. Visual observation would indicate that the strike extent has reduced by say 50% since 2021. It is not unreasonable to fear that the entire occurrence may well have been stripped to bedrock by this time next year.

It is hoped that this item in the IQUA Newsletter will result an interested party arranging timely study and research in this coastal area and that a date is obtained from this peat horizon while time and wave action permit. The author is happy to introduce any interested parties to the study area.

Dr. Bill Sheppard, billsheppard.liamin@gmail.com

12. Book Review

A new comprehensive publication on the vegetation history of landscapes in Germany

In mid-January, a substantial new publication, *Vegetationsgeschichte der Landschaften in Deutschland*, was published by Springer (Feeser et al. 2025). The book is in German, but even for those with little or no German the many illustrations facilitate access to the wide-ranging subject matter of this 670-page, A4-size, hardback book. The illustrations include photographs, maps, summary pollen diagrams and schematic sketches that serve to visualise the landscapes involved, to simplify the wealth of data presented, and to understand the underlying driving forces and processes involved in the changes through time that are described. In all, there are over 300 illustrations, mostly in colour. Unofficially, the book is referred to as 'Firbas2' in recognition of the last major comparable synthesis by Franz Firbas (1949, 1952).

The new publication, plans for which were initiated in 2010, has involved 65 authors from various parts of Germany and beyond. The production of the volume that has been overseen by six editors, four of whom have spent substantial periods researching in the Palaeoenvironmental Research Unit (PRU), University of Galway (UoG). The lead editor, Dr. Ingo Feeser (Kiel University), gained a PhD at UoG (2009) for his research into the vegetation history of the Burren. Dr. Steffen Wolters (Lower Saxony Institute for Historical Coastal Research, Wilhelmshaven) obtained an MSc for his palaeoecological research in Dingle (1996), and Dr. Walter Dörfler (Kiel University) carried out research in the Burren (1993/94) as well as participating in several lake-coring campaigns in western Ireland including coring of An Loch Mór, Inis Oírr, the cores from which were investigated within the context of the EU-funded project, TIMECHS (cf. Molloy and O'Connell 2014). Professor Arne Friedmann (Geography, Augsburg University), who has substantial contributions in the volume, spent a sabbatical at the PRU in 2000/01.

It is also pleasing to see the inclusion of research carried out by me, as a Humboldt Fellow, at a once-extensive bog, Spolsener Moor (also referred to as Lengener Moor), near Wilhelmshaven, N. Germany, while on sabbatical in Wilhelmshaven (1982/83). No trace remains today of the small bank of peat that was cored in 1982 and provided the source material for a regional, Holocene pollen diagram (O'Connell 1986).

A photo of mine, taken during a 'Moorexkursion' fieldtrip (8/09/2014), of Przewalski horses (wild horses) at the paläon Forschungsmuseum, Schöningen, N. Germany, is reproduced on p. 429 as a front piece to Section VIII. In this section (and also elsewhere in the book), topics of general interest are discussed. In this particular section, the topics are: (a) the phenomenon of woodland regeneration and succession, (b) the Vera hypothesis (the potential role of mega-herbivores in creating semi-open woodlands prior to the start of farming), (c) *Magerrasen*, i.e. nutrient-poor grasslands maintained in earlier times by intensive grazing, and (d) the classic Elm Decline as represented in pollen diagrams from various parts of Germany.

All in all, there is much of interest in this book which is aimed at the interested reader as much as the specialist who is interested in long-term environmental change in central Europe. All involved — editors, contributors, funders and the publisher — are to be congratulated on a most satisfactory outcome to a herculean task, namely compiling, summarising and presenting more than 70 years of research carried out since F. Firbas published his ground-breaking volumes on the same topic.

Further background information is available on Bluesky:

https://bsky.app/profile/moconnell007.bsky.social/post/3lhqwrcrihk2q

References

Feeser, I., Dörfler, W., Rösch, M., Jahns, S., Wolters, S., Bittmann, F. (eds.) 2025. Vegetationsgeschichte der Landschaften in Deutschland. Springer, Berlin. https://doi.org/10.1007/978-3-662-68936-3

Firbas, F. 1949, 1952. Spät- und nacheiszeitliche Waldgeschichte Mitteleuropas nördlich der Alpen, vols. 1 and 2. Gustav Fischer, Jena.

Molloy, K. and O'Connell, M. 2014. Post-glaciation plant colonisation of Ireland: fresh insights from An Loch Mór, Inis Oírr, western Ireland. In: Mind the Gap II. New insights into the Irish postglacial. A special supplement of the Irish Naturalists' Journal. Eds. Sleeman, P.D., Carlsson, J. and Carlsson, J.E.L. Irish Naturalists' Journal, Belfast, p. 66–88

O'Connell, M. 1986. Pollenanalytische Untersuchungen zur Vegetations- und Siedlungsgeschichte aus dem Lengener Moor, Friesland (Niedersachsen). Probleme der Küstenforschung im südlichen Nordseegebiet 16, 171–193.

Michael O'Connell, Palaeoenvironmental Research Unit, School of Geography, Archaeology and Irish Studies, University of Galway

13. Recent Publications

Bollati, I.M., Masseroli, A., Al Kindi, M., Cezar, L., Chrobak-Žuffová, A., Dongre, A., Fassoulas, C., Fazio, E., Garcia-Rodriguez, M., Knight, J. et al. 2024. The IGCP 714 Project "3GEO – Geoclimbing & Geotrekking in Geoparks" – Selection of Geodiversity Sites Equipped for Climbing for Combining Outdoor and Multimedia Activities. *Geoheritage* 16, 79. https://doi.org/10.1007/s12371-024-00976-4

Devaney, J., Shaw, H., Leniston, T., Mitchell, F.J.G., Darcy, E., Roche, J. 2024. Mapping, monitoring, and protecting ancient and long-established woodland in Ireland. *Irish Wildlife Manuals* No. 153. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Dublin.

Everard, A., Schofield, J.E., Mighall, T., Timpany, S., Plunkett, G. in press. The missing woodland story: Implications of 1700 years of stand-scale change on 'naturalness' and managing remnant broad-leaved woodlands. *People and Nature*. https://doi.org/10.1002/pan3.10752

Hutchison, W. Gabriel, I., Plunkett, G., Burke, A., Sugden, P., Innes, H., Davies, S., Moreland, W.M., Krüger, K., Wilson, R. et al. 2024. High-resolution ice-core analyses identify the Eldgjá eruption and a cluster of Icelandic and trans-continental tephras between 936 and 943 CE. *Journal of Geophysical Research: Atmospheres* 129, e2023JD040142.

Hutchison, W., Sugden, P., Burke, A., Abbott, P., Ponomareva, V.V., Dirksen, O., Portnyagin, M.V., MacInnes, B., Bourgeois, J., Fitzhugh, B., Verkerk, M., Aubry, T.J., Engwell, S.L., Svensson, A., Chellman, N.J., McConnell, J.R., Davies, S., Sigl, M., Plunkett, G. 2025. The 1831 CE mystery eruption identified as Zavaritskii caldera, Simushir Island (Kurils). *Proceedings of the National Academy of Sciences USA* 122, 2416699122.

Knight, J. 2024. Biophysical system perspectives on future change in African mountains. *Transactions of the Royal Society of South Africa* 79, 177–180.

Knight, J. 2024. Global environmental change: from past to present. In: Beylich, A.A., Vázquez Tarrío, D., Li, D., Oliva, M., Morellón Marteles, M. (eds.) Climate and Anthropogenic Impacts on Earth Surface Processes in the Anthropocene. Elsevier, Amsterdam, p. 3–15.

Knight, J., Abd Elbasit, M.A.M. 2024. Spatial and temporal patterns of rainfall erosivity in southern Africa in extreme wet and dry years. *Atmosphere* 15, 1283. https://doi.org/10.3390/atmos15111283

Knight, J., Bollati, I.M. 2024. Rock climbing sites as locations for geoheritage and geoscience engagement in mountains. *Geology Today* 40, 223–227.

Knight, J., Evans, M. 2024. Flood dynamics on the upper Letaba River, South Africa, deduced from luminescence dating. *South African Geographical Journal* 106, 423–445.

Knight, J., Lourenço, M. 2025. Wetlands of Angola: locations, biodiversity, and conservation. In: Pullaiah, T. (ed.) Wetlands of Tropical and Subtropical Asia and Africa: Biodiversity, Livelihoods and Conservation. Wiley, 137–160.

Knight, J., Evans, M., Mugwabana, T. 2024. Sediment source areas and the role of floods in sediment mixing on the Letaba River, South Africa. *South African Geographical Journal* 106, 368–398.

Knight, J., Burningham, H., Madoc-Jones, J., O'Driscoll, L. 2024. Controls on saltmarsh sediment

stratigraphy and morphodynamics in northwest Ireland. *Quaternary International* 706, 7–20.

Knight, J., Nakagawa, K., Abd Elbasit, M.A.M., Sakata, Y., Amano, H. 2024. Enhancing the climate resilience of semiarid river systems and their catchments. In: Ujikawa, K., Ishiwatari, M., van Hullebusch, E. (eds.) Environment and Sustainable Development. Proceedings of the 2023 8th Asia Conference on Environment and Sustainable Development, Springer, Cham, 193–205.

O'Leary, D., Brown, C., Hodgson, J., Connolly, J., Gilet, L., Tuohy, P., Fenton, O., Daly, E. 2025. Airborne radiometric data for digital soil mapping of peat at broad and local scales. *Geoderma* 453, 117129.
https://doi.org/10.1016/j.geoderma.2024.117129.

Li, K., Qin, X., Plunkett, G., Presslee, S., Spengler, R., Xu, B., Wu, Y., Tian, X., Wei, D., Wang, C., Shao, H., Mu, G., Jia, H., Li, W., Feng, J., Liu, J. 2024. Multi-proxy investigations of Bronze Age diet and environment in the hyper-arid eastern Tarim Basin (LopNur), northwest China. *Journal of Archaeological Science* 171, 106089.

McConnell, J.R., Chellman, N.J., Plach, A., Wensman, S.M., Plunkett, G., Stohl, A., Smith, N.-K., Vinther, B.M, Dahl-Jensen, D., Steffensen, J.P., Fritzsche, D., Camara-Brugger, S.O., McDonald, B.T., Wilson, A.I. 2025. Pan-European atmospheric lead pollution, enhanced blood lead levels, and cognitive decline from Roman-era mining and smelting. *Proceedings of the National Academy of Sciences USA* 122, 2419630121.

Smith, L., Oliver, J., Plunkett, G., Britton, K., Schofield, J.E. 2025. Exploring the effects of post-medieval crofting on the modern hillside ecosystem: vegetation history as cultural legacy. In: Shepherd, C. (ed.) Cultural Landscapes of North-east Scotland – Collaborative Research in History and Archaeology. Oxbow, Oxford, 148–158.

Sun, C., Plunkett, G., Park, J., Guo, Z., Liu, J. 2024. Major Holocene cryptotephras layers identified from Jeju Island, Republic of Korea: Implications for regional volcanic eruptions and environmental changes. *Palaeogeography, Palaeoclimatology, Palaeoecology*, 112530.

Wilson, P. 2025. Block/Rock Streams. In: Elias, S.A. (ed.) The Encyclopedia of Quaternary Science. 3rd ed., vol. 5, Elsevier, Amsterdam, p. 230–242.

IQUA Membership Form

Please let your students and colleagues know about IQUA and encourage them to join. Join or renew IQUA membership online via PayPal. We encourage all our members to update their annual subscription for 2025. If you have any queries about your current IQUA membership status, or general IQUA membership queries, please contact the IQUA Treasurer Mark Coughlan (mark.coughlan@icrag-centre.org).

The annual membership cost is: €25 waged; €15 students/unwaged. IQUA offers a fast, safe, online payment system already familiar to many (PayPal) for joining IQUA or renewing your membership, and for purchasing past field guides (where available). PayPal allows you to pay securely with your credit/debit card via the IQUA website: http://www.iqua.ie/membership.html. If you do not have access to our online PayPal system, please complete the following form and send it with a cheque for the relevant annual subscription to the IQUA Treasurer Mark Coughlan at the address below. Cheques should be made payable to IQUA.

Mark Coughlan
iCRAG (Irish Centre for Research in Applied Geosciences)
O'Brien Centre for Science (East)
University College Dublin
Belfield
Dublin 4
Ireland

Name: .....

Address: .....

.....

.....

.....

Telephone: .....

E-Mail: .....

New Membership: ☐

Renewal: ☐

Total amount enclosed: .....

Thank you to our sponsors!

Geological Survey
Suirbhéireacht Gheolaíochta
Ireland | Éireann

ARUP

UCD DUBLIN
UCD School of Archaeology