



Editor: Martha Coleman

1. Introduction

Dear IQUA member,

Welcome to Newsletter no. 64.

What a year it has been! I hope this newsletter finds everyone safe, healthy and coping well with the exceptional circumstances we find ourselves in.

As I am sure you are already aware the 20th INQUA Congress held in Dublin in 2019 was a fantastic success with over 2300 delegates from 75 countries including 22 excursions around Ireland and Britain held before, during and after the congress. It was the largest ever INQUA Congress as well as being the largest geoscience event ever held in Ireland. A lot of work went into it by a lot of people so thanks to all for its success.

This year the AGM on 30th June 2020 was virtual and included the election of a new President, Gill Plunkett, new Secretary, Graeme Swindles, both of Queen's University Belfast. Mark Coughlan, University College Dublin was elected Treasurer. Susann Stolze, University of Colorado Boulder will be taking over as Newsletter Editor for the next issue. Thanks to all the outgoing committee members for their tireless work over the past few years and best of luck to the incoming.

To celebrate the success of the congress the **IQUA Autumn Symposium 2019** titled 'A Selection from INQUA' was held in the Geological Survey Ireland, Beggar's Bush, Dublin on the 29th November. Abstracts are listed below. This event was followed by a field trip to Wicklow the following day and an after party at The Schoolhouse, Dublin.

For the year that's in it, pages 6 and 7 include a small sample of photos from INQUA, the dinner held in the Guinness Storehouse, INQUA field trips and 2019 IQUA Symposium field trip to Wicklow. Thanks to Gayle McGlynn and Peter Coxon for the INQUA

and field trip photos and to Michael O'Connell for the Wicklow field trip photos. In this edition, Michael O'Connell has also contributed a **Newsletter Feature** on the Céide Fields.

In **IQUA Notices** there's a call for IQUA members to have their say regarding funds that have been made available and IQUA introduces 'Shaping the Landscape' for 2nd level students. This edition also details the annual **IQUA Awards** for this year.

Catherine Dalton had great T-shirts printed up for the INQUA Congress (below). There are still some available so get in touch with the committee if you would like to purchase one.



Unfortunately this year's Spring Meeting in Belfast was cancelled due to the pandemic but, have no fear, it's being rescheduled. The Eileen Reilly Memorial lecture also had to be postponed this year but IQUA hopes to hold it in the future. Further details will be provided in due course.

As always keep an eye on the website (www.iqua.ie) and please keep in touch with IQUA news on Twitter using @Quaternary_Irl and/or take a look on Facebook for your IQUA updates. <https://www.facebook.com/IrishQuatAssociation>

Thanks to all of those who contributed to this edition of the IQUA newsletter.

Stay Safe
Martha Coleman

2. IQUA Committee (2020/2021)

President: Gill Plunkett, Queen's University Belfast (elected)

Secretary: Graeme Swindles, Queen's University Belfast (elected)

Treasurer: Mark Coughlan, University College Dublin (elected)

Website Manager: Benjamin Thébaudeau, Joyce Country & Western Lakes (continuing)

Publications Officer: Mark Coughlan, University College Dublin (continuing)

Newsletter Editor: Martha Coleman, Dublin City University, (outgoing), Susann Stolze, University of Colorado Boulder (incoming)

General Members: Kieran Craven, Catherine Dalton, Gayle McGlynn, Sara Benetti, Chris Randolph, Sam Roberson, Gordon Bromley

3. IQUA Autumn Symposium 2019

Friday 29th November 2019, GSI, Beggar's Bush, Dublin 4

A Selection from INQUA

PRESENTATION ABSTRACTS

Keynote:

Reconstructing Quaternary Environments

John Lowe, Royal Holloway University of London
Mike Walker, University of Wales Trinity Saint David & Aberystwyth University

At the XX INQUA Congress held in Dublin in July 2019, the textbook *Reconstructing Quaternary Environments* (John Lowe & Mike Walker) received a Special Recognition Award from the INQUA Executive Committee. This included an invitation, along with the other medal winners, to deliver one of the lectures in the series of Lunchtime Talks. The paper presented today is a reprise of that talk, but with some additional material that could not be included in the original lecture because of constraints of time. We begin by outlining the origins of our own research collaboration at the University of Edinburgh, which involved a combination of palynology and glacial geomorphology of the Lateglacial period, and explain how this interdisciplinary (and subsequently multidisciplinary) approach has informed much of our subsequent research, and indeed has been the leitmotif that

runs through all of our books. We acknowledge our debt to our academic mentors and collaborators, in particular Brian Sissons, Russell Coope, and colleagues at the Centre for Ice and Climate in Copenhagen (Sigfus Johnsen, Jorgen-Peder Steffensen and Sune Rasmussen) and note, in particular, the increasing importance of both ice-core and palaeoceanographical research in Quaternary science during the course of our careers, and which is reflected in all three editions of our book. The multidisciplinary nature of our research has led to our involvement in a number of major international projects, including the North Atlantic Seaboard Programme, INTIMATE (the integration of ice-core, marine and terrestrial records), and collaborations with the Subcommission on Quaternary Stratigraphy to define the Pleistocene-Holocene boundary and to subdivide the Holocene Series/Epoch. All of these initiatives we describe here. We also consider some of the major (and unforeseen) developments in Quaternary science over the thirty years since the publication of the first edition of our book, and note in particular the contribution of tephrochronology as both a correlative and dating tool. Finally, we take a brief forward look into new areas of Quaternary science where we might expect to see significant advances over the coming years.

Wetter winters and drier summers in the UK explained by data errors and biases

Conor Murphy, Maynooth University

Long-term, quality assured records underpin our understanding of climate variability and change. Globally, few such records extend to the 18th Century, particularly for precipitation. The England Wales Precipitation (EWP) series is a notable exception that provides a continuous monthly record from 1766. EWP has found widespread use across diverse fields of research including; trend detection, evaluation of climate model simulations, as a proxy for mid-latitude atmospheric circulation, a predictor in long-term European gridded precipitation datasets, the assessment of drought and extremes, tree-ring reconstructions and as a benchmark for other regional series. A key finding from EWP has been the trends towards wetter winters and drier summers. We statistically reconstruct winter and summer EWP using independent, quality-assured temperature, pressure and circulation indices. Using a sleet and snow series for the UK derived by Prof. Gordon Manley and Prof. Elizabeth Shaw to examine reconstructions, we show that precipitation totals for pre-1870 winters are biased low due to gauge under-catch of snowfall and a higher incidence of snowfall during this period. When these factors are accounted for the trend to wetter winters in EWP is no longer evident. For summer, we find

that pre-1820 precipitation totals are too high due to decreasing network density and uncertain data at key stations. A significant trend to drier summers is not robustly present in our reconstructions of the EWP series, with significance depending on start/end year and predictors used in model reconstructions. Our findings challenge current assumptions about historic climate variability and change in north-western Europe. It is also likely that the identified biases in EWP have distorted many other long-term European precipitation series.

Lake Sediments & an Irish Palaeoecological Database

Catherine Dalton, Mary Immaculate College, University of Limerick

Lakes are important components of our landscape and provide a range of important ecosystem services and natural capital. Additionally, lake sediments contain signals of their physical, chemical and biological ontogeny reflecting natural system dynamics as well as anthropogenic activity. A summary of the available lake data is vital to help shape research efforts to determine catchment and lake system contributions to biogeochemical processes, for example, carbon burial. This is particularly important in the context of global climate change. This presentation will summarise the publicly available spatial data on Ireland's lake population. Although small in area, lakes play a critical role in biogeochemical cycling by storing organic carbon produced by the catchment/lake and by releasing CO₂ and CH₄ to the atmosphere. While Ireland has considerable peat and lake rich landscapes, quantitative data on carbon sequestration/burial in lake sediments are largely lacking. A synthesis of the lake sediment geochronologies that have been established for Irish lacustrine systems will be outlined and sediment accumulation rates quantified to-date will be used to establish key patterns and trends in relation to lake type. This in turn will provide invaluable context in terms lake sediment studies and interpretations of Anthropocene change in this north-west Atlantic coastal region.

Intensive dairying in 4th millennium BC Ireland? The Céide Fields complex, Co. Mayo, northwest Ireland

Jessica Smyth, University College Dublin

The Céide complex of drystone co-axial field systems in north Mayo, northwest Ireland, has been extensively mapped and partly excavated over a number of decades and is argued to be the oldest in Europe, emerging in the 4th millennium BC. While recent research has demonstrated dairying is

contemporary with the arrival of farming in Ireland, by at least 3800 BC, there is as yet no proven relationship between the sophisticated land management evidenced at Céide and dairying, although soil lipid analyses have indicated arable farming is unlikely. This landscapes/foodscapes relationship will be elucidated through molecular and isotopic analyses of lipid residues preserved in Neolithic pottery sherds recovered from excavations within the field systems, which provide a powerful proxy for animal husbandry and consumption practices. This new evidence will be set alongside detailed analysis of the dating evidence for the Céide Fields complex, demonstrating unequivocally the Neolithic date of the field systems and rebutting recent suggestions of a later, Bronze Age date for the activity.

Speleothems as recorders of centennial- to millennial-scale climate variability

Frank McDermott, University College Dublin

Caves are unique environments that offer physical protection for speleothems and other climate-sensitive archives, particularly during glacials when surficial deposits may be removed or reworked by erosion. Speleothems (calcitic or aragonitic stalagmites, stalactites and flowstones) are ideal materials for U-series dating, permitting the construction of exquisitely detailed chronologies for depositional phases, well beyond the c. 50ka limit of radiocarbon dating. Crucially, speleothem deposition requires that liquid water is available to percolate downwards through soils and bedrocks, and so during glacials, intervals of speleothem deposition indicate episodic absences of permanently frozen ground and the availability of biogenic CO₂. Results of 1-D thermal modelling of heat conduction through soils and bedrock will be presented, along with a discussion of new and published U-series dates from selected European caves, with specific examples from Ireland, the Alps and Georgia to constrain the duration of the onset of climate amelioration during the Dansgaard-Oeschger (DO events). Previously published U-series dates from Crag Cave, SW Ireland (Fankhauser et al., 2016), augmented by additional dates for key speleothems from this site provide evidence for short-lived climate-driven centennial to millennial scale episodes of deposition. These occur during Marine Isotope Stage 5 (MIS-5) through to the Last Glacial Maximum (LGM), into the Late Glacial. New U-series dates will also be presented for stalagmites collected from Solkota Cave in western Georgia during 2016. Stalagmite SKK 16-3 from Solkota Cave exhibits intense but short-lived depositional phases that are contemporaneous with DO events in the Greenland ice cores. In detail, SKK 16-3 shows rapid but intermittent growth around 84 ka,

coinciding with climatic amelioration during Marine Isotope Stage (MIS) 5a, and specifically during the short-lived Greenland Interstadial 21.1e (GI-21.1e). Following a long-lived hiatus, a short interval of deposition resumed at 57 ka, coinciding with a warm interval in MIS3, Interstadial GI 16.1, indicating a strong climatic control. Coeval episodes of speleothem deposition are seen at Crag Cave and in the published results from caves in the European Alps. Finally, the new results permit snapshot comparisons of elevation-corrected Last Glacial speleothem longitudinal $\delta^{18}\text{O}$ gradients during selected DO events across Europe, from the Irish Atlantic margin in the west to the Black Sea in the east, with those of the Holocene.

An overview of the IntCal20 radiocarbon calibration curve

Paula Reimer, Queen's University Belfast

The IntCal20 radiocarbon calibration curve has been constructed from carefully screened ^{14}C and calendar age data using a newly developed Bayesian framework. New data include ^{14}C measurements of the U-Th dated Hulu cave speleothem back to 54ka cal BP, late glacial tree-rings from New Zealand and Europe, and thousands of decadal and single year tree-rings from around the world. It also includes the extension and revision of the Lake Suigetsu varve counts. In addition, floating series of glacial age tree-rings have been wiggle-matched to the ^{14}C calibration data. A GCM ocean model has been used to estimate marine reservoir age changes over time. The new curve compares well to other independently dated records such as wood buried by the Campanian Ignimbrite. IntCal20 provides more robust atmospheric ^{14}C values and uncertainties than IntCal13 particularly for calendar ages older than 12ka cal BP.

Beyond the bog: the importance and value of small-scale stratigraphic deposits in the landscape as archives for applied palaeoecology

Helen Shaw, Maynooth University

A growing desire for both high-nature value farming and rewilding as conservation strategies has highlighted a pressing need to understand long-term dynamic change in natural and semi-natural vegetation systems. Palaeoecology can, and does, contribute much to our understanding of ecological dynamics in these systems. Modern palaeoecology is increasingly focussed on linking with ecosystem models at regional and global scales, and scaling up collated datasets from lake and bog archives. However much information of application to nature

conservation requires scaling down. There are still surprising gaps in our knowledge-base: areas where paleoecology is either missing, or at too coarse a temporal or spatial resolution to provide useful data for modern application. In order to develop understandings of local-scale ecological dynamics and their drivers new local-scale palaeoecological histories, from mosaics of small sites, in landscapes of interest are required. Scaling down and collecting new data can also assist in filling in the considerable spatial gaps in the current set of regional-scale palaeoecological models. Whereas large areas of peat, or lake systems, are increasingly recognised, as carbon stores and for biodiversity value, with ecosystem service valuation driving protection, preservation and conservation of the geoheritage archive within them; in contrast, local-scale palaeoecological archives are seldom considered and are potentially being lost. Much ecologically relevant palaeoecology relies on samples from small peat hollows, ponds etc. within cultural and woodland landscapes. These deposits are often disturbed or drained with little thought for the historical and palaeoenvironmental records that they contain. This paper will present and explore examples of local-scale palaeoecological research especially in the context of social-ecological systems in traditional agricultural and wooded landscapes. Examples from personal research in Ribblesdale, north Yorkshire, Scotland and the English Lake district will be presented, as well as some review of other studies. Via these examples, the paper aims to highlight the value of a range of non-standard palaeoecological sites within the landscape, and to urge consideration of a wider range of sites as contributing to a valuable palaeoecological geoheritage.

A 14,200 year sea-surface temperature reconstruction from the western Indian sector of the Southern Ocean

Lisa Orme, Maynooth University

The temperature of the Southern Ocean is dependent on factors including the temperature of the atmosphere and upwelling water, shifts in the position of the Antarctic Circumpolar Current and the southern westerly winds, and the amount of heat transported northwards by the Atlantic Meridional Overturning Circulation (AMOC). Over recent decades, a slowdown of the AMOC has led to heat accumulating in the subsurface of the Southern Ocean, while surface waters poleward of 50°S have cooled, particularly in the Pacific sector (Armour et al., 2016; Jones et al., 2016). Given the scarcity and short length of Southern Ocean temperature records (Jones et al., 2016) palaeoclimate reconstructions can be used to investigate if the observed patterns are outside the

range of natural variability and how temperature has varied in response to past changes in the climate system. We present a diatom-based sea-surface temperature reconstruction from core KH-10-7 COR1GC, sampled from the western Indian sector of the Southern Ocean (54°16.04'S, 39°45.98'W), which was produced using the Modern Analogue Technique. The record spans from 14.2 to 1.0 ka BP (calibrated kiloyears before present) and has an average resolution of 60 years, allowing an improved understanding of the millennial-centennial variability since the deglacial. The record shows that temperatures varied in parallel with atmospheric temperatures over Antarctica, supporting synchronous changes in ocean and atmospheric temperatures across the southern high latitudes. Temperatures were low during the Antarctic Cold Reversal and gradually increased during the Younger Dryas (13-11.8 ka BP) to reach higher and stable values during the early Holocene (11.8-8.7 ka BP). Subsequently, cooler and variable conditions prevailed. The results support that during the Younger Dryas a slowdown in the AMOC along with rising atmospheric CO₂ levels caused the inferred warming of the Southern Ocean. A cool interval at 8.2 ka BP may be a southern hemisphere response to the '8.2 event' seen in records primarily in the northern hemisphere.

Reconstructing Neolithic to Post-Medieval land-use dynamics and human activity from Lough Catherine, Northern Ireland: a sedaDNA and lipid biomarkers approach

Tony Brown, University of Southampton

A molecular approach to lake sediments used for artificial islands (crannogs) is here used to reconstruct the environmental record from a natural island in Lough Catherine Northern Ireland. The island, named 'Island McHugh', was excavated in the 1940s-1950s and again in the 1970s. It has yielded artefacts from most periods including; Neolithic worked flint, a Bronze Age sword, worked wood, and charcoal, an early medieval crannog, and lastly a post-Medieval castle. The excavations by in the 1940s revealed a complex stratigraphy which has been re-evaluated as part of the Celtic Crannogs Project. A core from just off the island has revealed a complex stratigraphy extending back to the early Neolithic. Extracellular sedaDNA from the site shows three principal phases of human activity including both domesticates and synanthropes. In the first phase provisionally dated to the Iron Age open ground and grazing taxa increase with a small increase in arable indicators. There is also the appearance of cattle, pigs and sheep. In the second phase more securely dated to the early Medieval period there is a larger increase in both grazing and arable indicator taxa and a very strong increase in

domesticated animals. In the Post-Medieval period horse is present and there is a comprehensive reflection of 18th century landscaping. The later two periods (Early Medieval and Post-medieval) are well represented in the excavations but the earlier phase (Iron Age) is not, so we are undertaking a further review of the existing excavation data as well as proposing re-excavation of some, somewhat enigmatic, features. The lipid biomarker evidence is also strong with high faecal stanols from the Iron Age to the Medieval levels. A clear peak at c. 600 BC enables the identification of the source as almost certainly of human origin. The faecal stanols record is shown to mirror the animal sedaDNA results. This study illustrates the ability of sedaDNA to identify both the impact of human activity on local ecology, but also the causes - from the presence of cultivars to domesticates such as cattle, pig and sheep. The presence of horse only in the Post-Medieval levels suggests stabling of horses at the castle on the island. Taken with the direct evidence of human habitation from the faecal stanols we can see how these techniques could be used to provide an archaeological record of sites that had never been excavated.

Morphology, seismo-stratigraphy and sedimentology of the Wicklow Trough, western Irish Sea: tunnel valley development and contemporary seabed dynamics

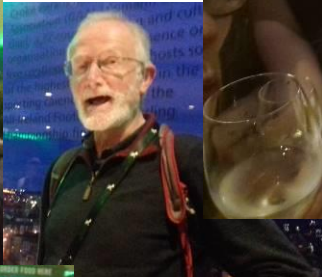
Mark Coughlan, University College Dublin

Wicklow Trough is one of several deeps in the Irish Sea. The morphology and sub-seabed stratigraphy of the deep is described from ship based multibeam echosounder data and 60 km of sparker seismic profiles across and along the deep. The deep is asymmetrical and closed to the north by sediment waves and an adjacent bank. The floor of the deep reveals a variety of sediment wave types, ridges and four over-deepened sections. Groundtruthed by five vibrocores, the sub-seabed reveals sediment wave drifts, glaciofluvial and glaciomarine fills overlying a rock basement. The Trough fill sediments are predominantly heterogeneous glacial outwash sediments with indications of slumping on the flanks. Strong contemporary currents create sand and gravel dominated sediments at the seabed with mobile sediment generating sediment waves migrating between 7 and 43 m a⁻¹. A bedload parting zone is inferred in the Trough. Eroded seabed and scour pits are also apparent. Collectively, the evidence suggests that the Wicklow Trough is a tunnel valley formed under the last Irish Sea Ice Stream by a composite of time transgressive glacial processes, with pressurised meltwater acting as the dominant agent during gradual or slow ice sheet retreat. Its location may be fault controlled.

INQUA 25-31 July 2019



Guinness Storehouse 30 July 2019



INQUA Field Trips July 2019



Wicklow 30 November 2019



4. Newsletter Feature

Céide Fields — how old are the pre-bog, stone-wall fields at Céide Fields, north Mayo?

Michael O'Connell, Karen Molloy, Eneda Jennings, Palaeoenvironmental Research Unit, School of Geography, Archaeology and Irish Studies, NUI Galway



Céide Fields, situated on the spectacular north Mayo coast, is one of the best preserved ancient farming landscapes not only in Ireland but in Europe as a whole, thanks to the extensive growth of blanket bog that covered and preserved for posterity these landscapes (see photos). Widely regarded as dating to the Neolithic, i.e. 4000–2400 BC, and hence of great cultural importance, Céide Fields has been the subject of detailed study by archaeologists and other researchers for well over half a century. The dating of the stone-wall field systems to the Neolithic relies on evidence derived from, *inter alia*, archaeological surveys and excavations, pollen

analysis, study of bog-pine timbers, i.e. bog deal, and radiocarbon dating.

In 2017, the available evidence and the interpretations proffered by archaeologists and palaeoecologists were seriously questioned by A. Whitefield who argued for a much younger age (Bronze Age or even Iron Age; see “Céide Fields could be 2,500 years younger than thought, expert claims”, Irish Times, February 3, 2017;

<http://www.irishtimes.com/news/ireland/irish-news/c%C3%A9ide-fields-may-be-2-500-years-younger-than-thought-1.2961569>).

In the meantime, palaeoecologists, M. O'Connell, K. Molloy and E. Jennings — researchers in the Palaeoenvironmental Research Unit, NUI Galway (NUIG) — have compiled and critiqued all available palaeoecological datasets from Céide Fields and the north Mayo region that have been generated by themselves and others over the course of some sixty years. Their findings are now available (open access and hence free to download) in the international journal *E&GQSJ*, published by Copernicus, the EU publishing house (O'Connell et al. 2020). This new synthesis not only confirms the early Neolithic age of the field systems but also leaves no doubt as to the intensity of the initial phase of Neolithic farming in north Mayo. This started at 3800 BC and lasted for 400 years. Not only was it of long duration, but the fossil pollen evidence suggests that it was more intensive than any farming of Neolithic age so far recorded in Ireland or Britain.

In all likelihood, construction of the regular system of field walls at Céide Fields took place during the earlier part of the intensive farming phase in the early Neolithic. The fossil pollen evidence, taken in conjunction with the large fields (many fields are at least 4 ha, i.e. 10 acres, in size), indicates that the farming was mainly pastoral — more than likely a cattle-based farming economy. Cereal cultivation, however, also took place and was undoubtedly an integral part of the local farming economy.



The intensive, early Neolithic farming phase was followed by a period — about three centuries — with reduced, though still substantial farming activity. After that, there was a lull in farming that lasted several centuries. It was during this lull, in the late Neolithic and prior to the onset of the Bronze Age, that major expansion of blanket bog occurred. Blanket bog, today a dominant landscape feature in north-west Mayo, is sometimes referred to as 'climatic peat' because of its requirement for high and frequent rainfall. The NUIG researchers show that a shift towards wetter and cooler climate, in itself, does not provide a satisfactory explanation for the way in which Neolithic farming waxed and waned at Céide Fields. Other factors that were possibly involved include deforestation, soil acidification, and impoverishment though prolonged use with little or no replenishment of essential nutrients. However, abandonment of farming, in the context of a considerable population decline triggered by cultural and socio-economic factors, was probably more important than any fluctuations in climate.



As well as exploring the various issues touched on above, the phenomenon of pine growing within blanket bog contexts — a frequent occurrence in the past — is discussed at length in the light of the many radiocarbon dates now available from fossil pine timbers preserved by bog, not only at Céide Fields but also elsewhere in Co. Mayo, including Erris, Garrynagran and Shanvallycahill. This new information sheds much light on landscape development and indeed the dating of the field systems.

The substantial and multi-disciplinary body of evidence now available demonstrates, beyond all reasonable doubt, that the pre-bog field system at Céide Fields pertains to the Neolithic and indeed the earlier part of the Neolithic as known from Ireland, Britain and much of north-western Europe including Scandinavia, a view that is also shared by most archaeologists and other palaeoecologists.

References

O'Connell, M., Molloy, K. and Jennings, E. 2020. Long-term human impact and environmental change in mid-western Ireland, with particular reference to Céide Fields — an overview. *E&G Quaternary Science Journal*, **70**, 1–32; <https://doi.org/10.5194/egqsj-70-1-2020>

Whitefield, A. 2017. Neolithic 'Celtic' fields? A reinterpretation of the chronological evidence from Céide Fields in northwestern Ireland. *European Journal of Archaeology*, **20**, 257–179.

5. IQUA Notices

New secretary, Graeme Swindles, asks IQUA members to consider the matters below:

Please respond to Graeme by email - deadline 1st September:

G.Swindles@qub.ac.uk

1. This year IQUA has more funds than usual (after INQUA). Please send any thoughts or ideas on how you think these funds should be used – for example, events, workshops, resource development, research awards. The committee will then discuss all the ideas before making a strategic plan.

2. Field meeting 2020: Owing to the ongoing COVID19 crisis, the IQUA committee decided that it is not appropriate to have an organised field meeting this autumn (Sligo). Instead small regional groups are encouraged to meet for ½ day in the field. These meetings will be informal get-togethers, without a need for a formal field guide. All activities must consider social distancing as a key consideration. Offers from Sam Roberson for NI, Gordon Bromley for Connemara and Steve McCarron for the Dublin area have already been tendered (among others). Would anyone else be willing to lead an informal field get-together in their region?

IQUA received Heritage Council Funding to develop a 2nd level teaching resource last year. Along with geoscience teacher Nicole Sloane, Catherine Dalton has developed a Quaternary Workbook and Study Notes on 'Shaping the Landscape' which are now available for download on the Outreach and Research page on the IQUA website. <http://iqua.ie/outreach-and-research/>

Catherine extends her thanks to Sam Roberson as well as Ben and Kieran in particular for helping with edits and also to Kirstin Lemon (GSNI) and Siobhan Power (GSI) for casting their eye over the content.

The **Discovery Programme:** Centre for Archaeology and Innovation Ireland is committed to working with partners and engaging with the wider archaeological sector to identify research gaps and coherent themes for future research. Developing a research framework is a key recommendation of Archaeology 2025 and to promote discussion the Discovery Programme is organising a series of seminars on different approaches to and applications of research frameworks.

Seminars will take place online, on Thursday during lunch time 1- 2.30pm and you can book a place via Eventbrite at <http://bit.ly/38Of0zS>

10 September: The Brú na Bóinne, World Heritage Site Research Framework a decade on Dr Jessica Smyth, School of Archaeology, UCD

1 October: The Irish National Strategic Archaeological Research [INSTAR] Programme: Addressing research through partnerships. Ian Doyle, The Heritage Council

8 October: Gendering the narrative of research frameworks. Dr Karen Dempsey, School of Geography, Archaeology and Irish Studies, N.U.I, Galway

15 October: Transport Infrastructure Ireland policy on archaeology: The process and the relevance of a research framework. Rónán Swan, Transport Infrastructure Ireland

22 October: The Early Medieval Archaeology Project (EMAP): A model for a period-based approach to a research framework? Prof Aidan O'Sullivan, School of Archaeology, UCD.

25th QRA Postgraduate Symposium 2020

University of Chester

26/08/20-28/08/20

The 25th QRA Postgraduate Symposium will be hosted in a virtual environment for the first time from the University of Chester on the 26th-28th August. This event will be held via a mixture of online platforms to offer a flexible and comfortable space to interact and meet fellow postgraduate researchers and discuss all things Quaternary. Postgraduate students are invited to submit

abstracts for this event. More details at <https://www.qra.org.uk/field-and-discussion-meetings/>

6. IQUA Awards

Eileen Reilly Award

Adrienne Foreman of NUI Galway.

Bill Watts Awards

Cristiana Giglio, University of Ulster
Luke O'Reilly, University College Cork

Research Awards

Ruth Plets, University of Ulster
Kieran Westley University of Ulster
Andrew Cooper, University of Ulster
Jonathan Small, Queen's University Belfast

7. Recent Publications

Bangelesa, F., Adam, E., Knight, J., Dahu, I., Ramudzuli, M. and Mokotjomela, T.M. 2020. Predicting soil organic carbon content using hyperspectral remote sensing in a degraded mountain landscape in Lesotho. *Applied and Environmental Soil Science*, 2020, 2158573, doi:10.1155/2020/2158573.

Burningham, H., Knight, J. 2020. Biological zonation and bedrock strength on a high energy granite shore platform. *Journal of Coastal Research*, S195, 23-28.

Carden, R.F., Higham T.F.G., Woodman, P.C. A reconsideration of the radiocarbon dating of the Marine Isotope Stage 3 fauna from southern Ireland, *Boreas*, Vol 49, 3 (2020) 674-684

Chique, C., Potito, A.P. 2019. Distribution of chironomid sub-fossil assemblages in sediments of an Irish lake: controls and potential for paleoenvironmental applications. *Inland Waters* 9: 534-550.

Cooper, C.L., Savov, I.P., Patton, H., Hubbard, A., Ivanovic, R.F., Carrivick, J.L., Swindles, G.T. 2020. Is there a Climatic Control on Icelandic Volcanism? *Quaternary Science Advances* 1, 100004.

Curran, M.J., Rosenthal, Y., Wright, J.D., Morley, A., 2019. Atmospheric response to mid-Holocene

warming in the northeastern Atlantic: Implications for future storminess in the Ireland/UK region. *Quaternary Science Reviews*, 225, 106004.

Fewster, R.E., Morris, P.J., Swindles, G.T., Gregoire, L.J., Ivanovic, R.F., Valdes, P.J., and Mullan, D. 2020. Drivers of Holocene palsa distribution in North America. *Quaternary Science Reviews* 240, 106337.

Galka, M., Lewandowska, A., Niedzielski, P., Sim, T., Swindles, G.T., Szczurek, G. 2020. Late Glacial and early Holocene development of an oxbow lake in Central Europe (Poland) based on plant macrofossil and geochemical data. *The Holocene* 30, 178-289.

Harrison, S., Mighall, T., Stainforth, D.A., Allen, P., Macklin, M., Anderson, E., Knight, J., Mauquoy, D., Passmore, D., Rea, B., Spagnolo, M. and Shannon, S. 2019. Uncertainty in geomorphological responses to climate change. *Climatic Change*, 156 (1-2), 69-86.

Holmes, J.A., Leuenberger, M., Molloy, K. and O'Connell, M. 2019. Younger Dryas and Holocene environmental change at the Atlantic fringe of Europe derived from lake-sediment stable-isotope records from western Ireland. *Boreas*, <https://doi.org/10.1111/bor.12425>

Knight, J. 2019. A new model of rock glacier dynamics. *Geomorphology*, 340, 153-159.

Knight, J. 2019. The need for improved ethics guidelines in a changing research landscape. *South African Journal of Science*, 115 (11/12), 6349, <https://doi.org/10.17159/sajs.2019/6349>.

Knight, J. 2019. Coeval brittle and ductile deformation beneath the late Wisconsinan Puget Lobe, Washington State, USA. *Annals of Glaciology*, 60 (80), 100-114.

Knight, J. 2020. An environmental history of southern Africa. In: Mitchell, P. (ed), *Oxford Research Encyclopedia of African History*. Oxford University Press, New York, doi:10.1093/acrefore/9780190277734.013.370.

Knight, J. and Burningham, H. 2020. What controls bedrock shore platform hardness? A field study from South Africa. *Journal of Coastal Research*, SI95, 537-541.

Knight, J. and Burningham, H. 2019. Sand dunes and ventifacts on the coast of South Africa. *Aeolian Research*, 37, 44-58.

Knight, J., Harrison, S. 2020. Land's End: Landscape and mining heritage at the tip of England. In: Goudie, A.S. and Migoñ, P. (ed), *Landforms and Landscapes of England and Wales*. Springer, Switzerland, 269-280.

Knight, J., Harrison, S. 2020. Physical Geography, Human Geography, and Geographies in the Anthropocene. In: Kobayashi, A. (Ed.), *International Encyclopedia of Human Geography*, 2nd edition. vol. 10. Elsevier, Amsterdam, 113–116.

Knight, J., Harrison, S. and Jones, D.B. 2019. Rock glaciers and the geomorphological evolution of deglaciating mountains. *Geomorphology*, 324, 14–24.

Knight, J. and Strzelecki, M. 2020. Paraglacial coasts: challenges for coastal conservation in the Anthropocene. *Journal of Coastal Conservation*, 24, 28, doi:10.1007/s11852-020-00748-6.

Mandishona, E., Knight, J. 2019. Users' perceptions and understanding of two urban wetlands in Harare, Zimbabwe. *South African Geographical Journal*, 101 (3), 326-348.

Matthews, J.A., Wilson, P., Winkler, S., Mourné, R.W., Hill, J.L., Owen, G., Hiemstra, J.F., Hallang, H. & Geary, A.P. 2019. Age and development of active cryoplanation terraces in the alpine permafrost zone at Svartkampan, Jotunheimen, southern Norway. *Quaternary Research* 92, 641-664.

McCullagh, D., Benetti, S., Plets, R., Sacchetti, F., O'Keeffe, E., Lyons, K. 2020, Geomorphology and substrate of Galway Bay, Western Ireland, *Journal of Maps*, 16:2, 166-78, DOI: 10.1080/17445647.2020.1717656

McKeown, M., C.J. Caseldine, G. Thompson, G.T. Swindles, R.F. Ivanovic, T.P. Roland, P.J. Valdes and A.P. Potito (2019) Complexities in interpreting chironomid-based temperature reconstructions over the Holocene from a lake in Western Ireland. *Quaternary Science Reviews* 222: 105908.

O'Connell, M., Molloy, K. and Jennings, E. 2020. Long-term human impact and environmental change in mid-western Ireland, with particular reference to Céide Fields-an overview. *E&G Quaternary Science Journal*, 70, 1–32; <https://doi.org/10.5194/egqsj-70-1-2020>

Parry, L., Harrison, S., Betts, R., Shannon, S., Jones, D. and Knight, J. 2020. Impacts of climate change on Himalayan glaciers: processes, predictions and uncertainties. In: Dimri, A.P., Bookhagen, B., Stoffel, M. and Yasunari, T. (eds),

Himalayan Weather and Climate and their Impact on the Environment. Springer, Switzerland, 331-349.

Peters, J.L., Benetti, S., Dunlop, P., Wheeler, A.J. 2020, Sedimentary and foraminiferal records of Late Quaternary environmental change west of Ireland and implications for the last British–Irish Ice Sheet. *J. Quaternary Sci*, 35: 609-624. doi:10.1002/jqs.3208

Plunkett, G., Brown, D.M., Swindles, G.T. (in press). Siccitas magna ultra modum: Examining the occurrence and societal impact of droughts during the Holocene in Ireland. *Proceedings of the Royal Irish Academy C*.

Shaw, H., Whyte, I., 2020. Interpretation of the herbaceous pollen spectra in paleoecological reconstructions: A spatial extension of Indices of Association and determination of individual pollen source areas from binary data. *Review of Palaeobotany and Palynology*, 104238. <https://authors.elsevier.com/a/1axiO7uTvVLBQ>

Spencer, D.E., K. Molloy, A.P. Potito and C. Jones (in press) New insights into Late Bronze Age settlement and farming activity in the southern Burren, western Ireland. *Vegetation History and Archaeobotany*. <https://doi.org/10.1007/s00334-019-00746-1>

Strzelecki, M.C., Szczuciński, W., Dominiczak, A., Zagórski, P., Dudek, J., Knight, J. 2020. New fjords, new coasts, new landscapes: the geomorphology of paraglacial coasts formed after recent glacier retreat in Brepollen (Hornsund, southern Svalbard). *Earth Surface Processes and Landforms*, 45 (5), 1325-1334.

Swindles, G.T., Roland, T.P., Amesbury, M.J., Lamentowicz, M., McKeown, M.M., Sim, T.G., Fewster, R.E., Mitchell, E.A.D. 2020. Quantifying the effect of testate amoeba decomposition on peat-based water-table reconstructions. *European Journal of Protistology* 74, 125693.

Tarlatti, S. Benetti, S., Callard, S.L., Ó Cofaigh, C., Dunlop, P., Georgiopoulou, A., Edwards, R., Van Landeghem, K., Saher, M., Chiverrell, R., Fabel, D., Moreton, S., Morgan, S., Clark, C.D. 2020. Final deglaciation of the Malin Sea through meltwater release and calving events. *Scottish Journal of Geology*, 6 May 2020, <https://doi.org/10.1144/sjg2019-010>

van Asperen, E.N., Kirby, J.R., Shaw, H.E. 2020. Relating dung fungal spore influx rates to animal density in a temperate environment: Implications for

palaeoecological studies. *The Holocene*, 30 (2), pp.218-232.

Wilson, P. 2020. The West Strand Peat. *Portrush Heritage Group, Heritage Newsletter* 9, 1-3.

Wilson, P., Dunlop, P., Millar, C., & Wilson, F.A. 2019. Age determination of glacially-transported boulders in Ireland and Scotland using Schmidt-hammer exposure-age dating (SHD) and terrestrial cosmogenic nuclide (TCN) exposure-age dating. *Quaternary Research* 92, 570-582.

Wilson, P., Linge, H., Matthews, J.A., Mourne, R.W. & Olsen, J. 2019. Comparative numerical surface exposure-age dating (¹⁰Be and Schmidt hammer) of an early-Holocene rock avalanche at Alstadfjellet, Valdalen, southern Norway. *Geografiska Annaler* 101, 293-309.

Wilson, P. 2019. Blanket peat. *Irish Mountain Log* 130, 41-44.

Wilson, P., Smith, R. 2020. The deglaciation of Cumbria: insights from some recent dating studies. *The Cumberland Geologist* 1, 14-21.

Winkler, S., Matthews, J.A., Haselberger, S., Hill, J.L., Mourne, R.W., Owen, G., Wilson, P. 2020. Schmidt-hammer exposure-age dating (SHD) of sorted stripes on Juvflye, Jotunheimen (central South Norway): Morphodynamic and palaeoclimatic implications. *Geomorphology* 353, 107014.

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