

IQUA

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Irish Quaternary Association
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Editor: Susann Stolze

1. Editor's Note

Dear IQUA members,

Welcome to IQUA newsletter No. 67.

This issue contains news and updates on past and upcoming IQUA events and features abstracts of the current IQUA award recipients who were recognized for their contributions to Quaternary research at the Autumn Symposium 2021. The newsletter celebrates Michael O'Connell's exceptional achievements and contributions to Quaternary research and teaching for which he was recently honoured with IQUA's Frank Mitchell Award for Distinguished Service to Quaternary Research and Teaching. Please do not forget to mark your calendars for the upcoming IQUA events that will be held in April 2022.

I would like to thank all who contributed to this edition.

Kind regards,

Susann Stolze, CSM, Colorado, February 2022
 (sstolze@mines.edu)

2. Cúpla Focal

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

Spring has begun in the Irish and Chinese calendars, so it must truly be Springtime. Never mind the primroses and crocuses being advanced this year, here "up north" lavender and rosemary think it's still summer, and the "tender" pineapple sage outside our house remains in bloom. Our ancestors must have noted anomalies such as these in the past too, and at some point, such changes must have become the norm (how long before the wasting ice sheets lost their novelty for any populations venturing near their margins?). What our ancestors made of them we can only ever guess, but palaeoenvironmental records at least provide a window on how they might have adapted to the opportunities and challenges that climate change presented. It can be easy to lose sight of the human timescale when looking far into the past, but in terms of understanding societal responses to environmental change, it is a valuable and interesting exercise to think about how these played out for the individuals, communities and societies who witnessed them.

We might say we've survived another winter, but where was winter this year? Hopefully it's not scheduling a late visit at the end of Spring, because IQUA is planning an action-packed return to normality (of sorts)! We'll kick off in April with the long overdue IQUA fieldtrip to the Sligo area, followed closely by the Spring Meeting and the launch of an Early Career Researcher Workshop in Belfast. More details in the Newsletter.

With the easing of restrictions, we hope that fieldwork and other conference opportunities will start to run again. We especially want to encourage the postgraduate and postdoctoral IQUA members to avail of IQUA support for their research and networking. And as always, the Spring Meeting will particularly focus on the wide-ranging work being done by our next generation Quaternary scientists.

Gill Plunkett, IQUA President

3. IQUA Committee (2022)

President: Gill Plunkett, Queen's University Belfast

Secretary: Graeme Swindles, Queen's University Belfast

Treasurer: Mark Coughlan, iCRAG

Postgraduate Rep: Adrienne Foreman, NUI Galway; Ryan Smazal, Dundalk Institute of Technology

Webmaster: Benjamin Thébaudeau, Trinity College Dublin

Publications Officer: Mark Coughlan, University College Dublin

IQUA Newsletter Editor: Susann Stolze, CSM, Colorado

General Members: Gordon Bromley, NUI Galway; Kieran Craven, Maynooth University, GSI; Catharine Dalton, Mary Immaculate College, University of Limerick; Chris Randolph, retired archaeologist; Sam Roberson, British Geological Survey, Belfast

4. IQUA Autumn Symposium 2021

The IQUA Autumn Symposium on “Abrupt Climate Change in the Quaternary” was held as a virtual meeting on November 26th, 2021. The symposium was opened by IQUA president Gill Plunkett and followed by presentations and the announcement of the 2021 IQUA award winners (see below).

Symposium Abstracts

MIS 11 climate variability in Britain: a possible abrupt climate change signal in lacustrine faunal and geochemical data from Marks Tey, Essex

Anna March ¹, David Horne ¹, Jonathan Holmes ², Simon L. Lewis ¹

¹ School of Geography, Queen Mary University of London

² Department of Geography, University College London

A multiple-proxy study of ostracods was conducted on lake sediments from Marks Tey in Essex, which are considered the most complete British archive of Marine Isotope Stage (MIS) 11. Research focused on the exposed sediments that represent the period following the Hoxnian interglacial (MIS 11c). Oxygen isotope analyses of *Cytherissa lacustris* and temperature ranges reconstructed using the Mutual Ostracod Temperature Range method both provide independent evidence of considerable climate complexity, including up to four stadial-interstadial oscillations that can potentially be correlated with records from Europe and the North Atlantic. The oxygen isotope record is interpreted as recording fluctuations not only of temperature, but also of global ice-sheet extent.

These previously unrecognised MIS 11 climate fluctuations in Britain suggest opportunities for non-coeval migrations of humans into Britain, adding complexity to the interpretation of the archaeological record, which assigns post-Hoxnian human presence to a single interstadial (MIS 11a), following a

single stadial (MIS 11b). The importance of the site at Marks Tey is, therefore, reinforced, not only for its Hoxnian record, but also for its record of MIS 11 beyond the interglacial period, a record that is unparalleled in Britain.

Rapid deglaciation of the Connemara ice dome at the end of the Last Glacial Maximum

Adrienne Foreman ¹, Gordon Bromley ^{1,2}, Brenda Hall ², Margaret Jackson ³

¹ Palaeoenvironmental Research Unit, Geography, NUI Galway

² Climate Change Institute, University of Maine, USA

³ Geography, Trinity College Dublin

This work is a reconstruction of the timing and nature of glacial fluctuations in Connemara, western Ireland during Heinrich Stadial 1 (HS1) through vertical and horizontal transects of cosmogenic nuclide surface-exposure dating, coupled with geomorphic mapping of glacio-fluvial landforms. Fifteen internally consistent cosmogenic beryllium-10 ages of erratic boulders indicate rapid and widespread deglaciation of the former Connemara ice centre at ~17.5 ka. The apparent abruptness of ice retreat, coupled with stratigraphic correlation with geomorphic features indicative of meltwater, suggests that deglaciation was driven by enhanced melting during the summer ablation season. This interpretation supports evidence for enhanced meltwater discharge and summertime warming elsewhere in Europe during HS1 but may conflict with the traditional view of stadials as severe year-round climate cooling events.

Post glacial climate change in the Burren

Colin Bunce

Palaeoenvironmental Research Unit, Geography, NUI Galway

The Burren is an iconic example of glacio-karst with widespread examples of till deposits, striae and erratics overlapping with limestone pavements, dolines and caves; however, the interplay of these two processes is largely unknown. There is evidence that the Burren had a greater soil cover in the geologically recent past which prompts the question: *How did soils originate on a glaciated limestone substrate?* This project is examining a thin but widespread silt deposit found in the Burren, and elsewhere, that appears to be an immediately post-glacial loess deposit that may have been the parent material of the original soil in this area.

Here we present the results of some initial grain size measurements showing the strong predominance of silt sized material; describe its mineralogy,

we will show S.E.M. images of individual grains which show typical loess textures and describe some unusual stratigraphy we have found at a number of Burren locations. This initial evidence supports the hypothesis that following deglaciation of the Burren there was a period of cold but dry climate allowing formation, transportation and deposition of glacially derived 'dust'.

A fresh look at abrupt climate variability (a glacial perspective)

Gordon Bromley

Palaeoenvironmental Research Unit, Geography, NUI Galway

Climate change is the greatest socio-economic force of the 21st Century, creating uncertainty and threatening to overthrow basic societal foundations. Just as pandemics can quickly upend the human landscape, our climate system also exhibits sudden shifts. Geochemical evidence from ice cores suggests that, in the geologically recent past, mean temperatures in the North Atlantic region have repeatedly jumped as much as 10°C, equivalent to the difference between the modern-day and ice age world, within a human lifespan. Today, anthropogenic greenhouse emissions are upsetting the planet's radiative balance, causing an overall warming the rate and uniformity of which are unprecedented in at least the last 2000 years. Global civilisation has thrived on a large degree of certainty and environmental stability, highlighting the importance of predicting the shape and form of the climatic disruption to which we are now committed.

As a front-line tool for climate projection, the numerical models used to simulate future climate and guide national adaptation strategies are first 'tested' against proxy-based reconstructions of past climate (palaeoclimate) events, such as the last glacial maximum. Here, I discuss the growing contribution that geologic records of glacial change are making to our understanding of the timing, rate, and manifestation of abrupt climate change during the geologically recent past. Coupled with recent refinements in cosmogenic nuclide geochronology, the abundance of relict glacial deposits at almost all latitudes on Earth affords a potentially massive trove of terrestrial palaeoclimate data that can help inform targets for climate models. Emerging glacial chronologies from the Southern Hemisphere, tropics, and Northern Hemisphere also show, however, that the traditional view of abrupt climate change – drivers, mechanisms, and impacts – is potentially more complex (and interesting!) than previously thought.

The 4.2 kyr event in the Indian Ocean, and its impact on the Harappan civilization

Nick Scroton

Geography, Maynooth University

The 4.2 kyr event is one of the largest abrupt climate changes of the Holocene, yet it remains something of a climatic enigma. What is the global significance of the event? How did it impact past civilizations? And could the event really be a "Global Megadrought"? Limiting progress is uncertainty over the nature and spatial extent of the 4.2 kyr event outside the data-rich heartland of the Mediterranean and Middle East.

In this study we investigate hydroclimate variability around the Indian Ocean basin and Middle East during societal collapse and deurbanization of the Harappan civilization in the Indus Valley between 4.2 and 3.4 kyr BP. Through a synthesis of high-resolution paleoclimate data we determine there was no summer monsoon drought during the 4.2 kyr event in the Indus Valley. Instead we document consecutive winter and then summer rainfall droughts over 800 years. Our Double Drought hypothesis provides more detailed climatic context for the Harappan civilization, resolves the cropping paradox, acknowledges societal resilience and adaptation strategies, and fits the spatial-temporal pattern of urban abandonment. The consequences for the new mid- to late- Holocene Global Boundary Stratotype Section and Point in a stalagmite from Meghalaya are explored.

Does size matter? Why some eruptions cause abrupt climate change and others do not

Gill Plunkett

Archaeology & Palaeoecology, School of Natural and Built Environment, Queen's University Belfast, Belfast BT7 1NN

Volcanic eruptions are a leading natural cause of abrupt climate variability, arising chiefly from the scattering effects of stratospheric sulphate emissions on incoming solar radiation. With tens of eruptions occurring every year, what determines which eruptions have the potential to alter the climate system? It has long been thought that large eruptions – those capable of high atmospheric injection and with a recurrence interval of one or two per century – are the main culprits. Tephra preserved in annually resolved Greenland ice cores provides insights into which eruptions are linked to periods of documented climate and societal impacts during the Common Era. Amongst the tephra found in Greenland are those from the 946 CE Millennium Eruption.

tion, 852/3 CE Churchill eruption and 1362 CE Öraefajökull eruption (Iceland), all large events (Volcanic Explosivity Indices of 7, 6 and 5, respectively) and none of which is clearly associated with an observed climate or societal impact beyond their immediate areas. Here, I consider the characteristics of those eruptions that correspond with documented environmental effects, and attempt to identify commonalities amongst them that might provide insights into the kinds of eruptions that trigger abrupt climate change. I posit that eruption characteristics other than magnitude are critical factors in determining the climate impact of a given eruption.

Bog-timbers in Ireland: recent investigations into bog-pine provide fresh insights into Holocene climate change

Michael O'Connell

Palaeoenvironmental Research Unit, Geography, NUI Galway

Bog deal and especially pine timbers (stumps and trunks) are a feature of many blanket bogs in lowland and upland Ireland. In this lecture, data presented in recent publications, e.g., O'Connell, Molloy and Jennings 2020; O'Connell 2021; O'Connell, Jennings and Molloy 2021, will be discussed and evaluated as to its potential as an indicator of Holocene climate change, with particular reference to western Ireland.

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.

O'Connell, M. 2021. Post-glacial vegetation and landscape change in upland Ireland with particular reference to Mám Éan, Connemara. *Review of Palaeobotany and Palynology*, 290, 104377.

O'Connell, M., Jennings, E., Molloy, K. 2021. Holocene vegetation dynamics, landscape change and human impact in western Ireland as revealed by multidisciplinary, palaeoecological investigations of peat deposits and bog-pine in lowland Connemara. *Geographies*, 1, 251–291.

5. IQUA Award Winners

Bill Watts 14CHRONO Awards

Ryan Smazal and Fermin Alvarez were awarded three and two radiocarbon dates, respectively, for

their research. The awards were generously supported by the ¹⁴CHRONO Centre, Queen's University Belfast.

Ryan Smazal

Centre for Freshwater and Environmental Studies, Dundalk Institute of Technology

SEQUESTER: SEDiment Quantities – UndERstanding Sediment Temporal Environment Records

In the second year of his PhD, Ryan's project is utilising palaeolimnological techniques to assess carbon sequestration and environmental change at centennial/millennial time scales. An 8 m long sediment core from Lough Feeagh, part of the well-studied Burrishoole Catchment in Co. Mayo, was recovered for the investigation as part of the BEYOND 2020 Project. This study will use physical and geochemical techniques as well as biological fossils to provide context on long-term catchment environmental conditions through the Holocene.

Ryan has been an IQUA member since 2020 and is currently serving as one of two post-graduate representatives for IQUA. His project is co-funded through the Higher Education Authority's Landscape Funding and Dundalk Institute of Technology and is supervised by Eleanor Jennings (DKiT) and Catherine Dalton (Mary Immaculate College – University of Limerick).

Fermin Alvarez

Geology Department, Trinity College Dublin

Saltmarshes as Geological Tide Gauges to reconstruct Sea Level Change

Sea level rise (SLR) is one of the most challenging consequences of climate change (e.g., IPCC, 2021). SLR varies in time and space in response to a suite of different controlling mechanisms. The World Climate Research Programme set the quantification and understanding of the mechanisms causing local to regional scale sea level variability as one of its Grand Challenges. However, modern-day sea level instrumental measurements are too short to reliably establish secular rates of SLR and unravel the relative contributions of the processes driving them.

As an island nation, Ireland will be profoundly influenced by future SLR. My PhD research from part of the A4 project (Aigéin, Aeráid, agus Athrú Atlan-taigh), which seeks to improve our projections of future SLR by better understanding the drivers of

Irish sea level change over the past two centuries. This aim will be achieved by expanding the Irish tide gauge dataset through data archaeology and resurveying historical benchmarks around Ireland, and by the application of the “geological tide gauge” approach. This technique, based on the analysis of sea-level indicators in buried high-saltmarsh sediment, capable of producing multi-decadal relative sea level (RSL) reconstructions from saltmarsh environments extending back several centuries to millennia. The geological tide gauge approach will be also applied in a wider context, developing a record of Common Era (past 2000 years) RSL change that will contribute to a growing network of high-resolution RSL reconstructions from the western coast of the North Atlantic. Spatio-temporal modelling of this expanded dataset will provide new insights into the relative contributions of global, regional and local mechanisms that drive sea level variations along the North Atlantic coastal areas.

Project links:

<https://a-ceathair.github.io/>

<https://www.maynoothuniversity.ie/icarus/active-research-grants/a4>

IQUA Research Awards

Lisa Orme and Robin Lewando were awarded three and two radiocarbon dates, respectively, generously sponsored by the ¹⁴CHRONO Centre, Queen's University Belfast.

Lisa Orme

ICARUS, Geography Department, Maynooth University

Holocene carbon accumulation in an upland blanket bog

Blanket bogs in Ireland are important carbon sinks, but the rates of carbon sequestration and storage may be sensitive to changes in the climate. Plant productivity and peat decomposition may both be enhanced by drier and warmer conditions in future, but it is not known whether the balance between these processes will have positive or negative consequences for carbon accumulation. By measuring past changes in the carbon accumulation rate of an upland blanket bog, this project is assessing whether climate variability, and particularly past warm intervals, resulted in altered carbon accumulation rates. A 3 m long peat core was sampled in summer 2021 from a blanket bog in the Wicklow Mountains. Measurement of the carbon content of the peat along the core has been supported by the Geologi-

cal Survey Ireland-funded Earth Surface Research Laboratory at Trinity College Dublin. The IQUA Research Award has provided three radiocarbon dates along the core, and these are currently being analysed by the ¹⁴CHRONO Centre at Queens University Belfast. Developing a good age-depth model will be an important step in calculating the carbon accumulation rates accurately. It is anticipated that the carbon accumulation rate record, along with supplementary records of plant macrofossils and testate amoebae along the core, will enable a greater understanding of the decadal to centennial response of Irish blanket bogs to climate variability during the Holocene.

Robin Lewando

West Cork Palaeoecology project

Receipt of the 2021 IQUA Research Grant to fund two radiocarbon dates was gratefully received by the West Cork Palaeoecology project. This project is currently a self-funded and independent study focusing on a site situated in West Cork, about halfway between Drimoleague and Dunmanway, just by the side of the road. This is an area containing three lakes, and hence it is called Three Lakes, surrounded by a slightly acidic mire pH c. 6.5. The valley runs in an SW NE direction and narrows towards the NE quite dramatically. This appears to be an ice gouged depression in which, as the valley narrowed, the gouging action of the ice reduced, resulting in a rock lip that today holds the drainage back into the three lakes area. The Three Lakes area is about 2.5 km long.

Cores have been taken at several points near the middle lake, principally because access is easiest here. The initial core taken with a Russian corer a couple of years ago gave 6.00 metres in total, 5.90 metres of peat, and 10 cm of silt at the bottom. Three radiocarbon dates were funded through IQUA's Bill Watts award for which whole peat samples were sent to Queen's from 1.00 m, 2.89 m and 5.80 m depths. These yielded dates of 1,400 BP, 10,000 BP and 11,500 BP respectively. To investigate whether there was another layer of organics below the silt, the site was revisited this last summer and with a piston corer 6.56 m was extracted from the lake bed, including a layer of silt between 5.88 and 5.97 m, underlain by a layer of organic sediment, and then silt in the bottom, between 6.52 to 6.56m.

The funding for two radiocarbon dates received from IQUA as Research Grant is being used to ascertain whole peat dates for the top (5.99 m) and

bottom (6.50 m) of the lowermost layer of organic sediment.

Further site investigations in this last year, as well as revealing the lower organic layer, have resulted in discovery of a diatomaceous layer in a separate area from where the initial core was retrieved, and also yielded initial results in determination of the basin profile.

Pollen, diatom, and microfossil analysis are ongoing on samples from the cores, and will be supplemented by botanical and diatom analysis of the current lakes. If any IQUA members are interested to be involved in the examination of samples, please email westcorkpalaeo@gmail.com

Valerie Hall Award

Cristiana Giglio

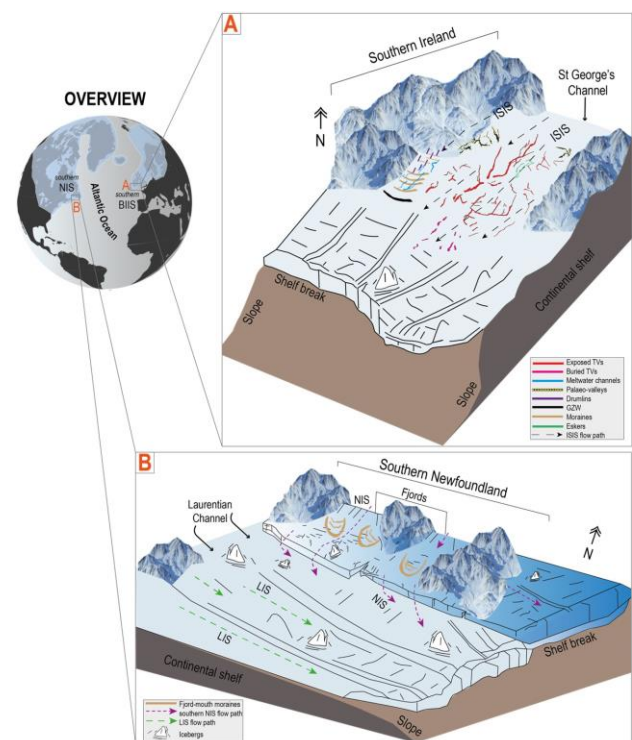
Ulster University, UK

Cristiana received the Valerie Hall Award for the best student or early-career researcher-led paper published by an IQUA member for her paper published in *Boreas*.

“A Late Pleistocene channelized subglacial meltwater system on the Atlantic continental shelf south of Ireland”

Cristiana Giglio is a PhD researcher at Ulster University, UK. Her project involves the reconstruction of two palaeo glaciated areas at opposite sides of the North Atlantic Ocean: the southern sectors of the British Irish Ice Sheet (BIIS) to the east and the Newfoundland Ice Sheet (NIS) to the west. Located at similar latitudes (ca. 55°N), both ice sheets terminated in the marine environment, they were grounded below sea level and had extensive marine margins likely exposed to changes in large-scale ocean and atmospheric circulation. For this reason, Cristiana is particularly interested in the former ice configuration, dynamics and retreat patterns of the BIIS and NIS as they extended onto the continental shelves during the last glacial period in order to assess and compare the main drivers of ice sheet change. High-resolution multibeam echosounder data, shallow acoustic data and sediment cores were used to investigate the geomorphology and sedimentation across both study areas. Landforms such as tunnel valleys, grounding-zone wedges, fjord-mouth moraines, drumlins and meltwater channels were mapped at and below the seafloor. Lithofacies analysis showed subglacial till and laminated glacialine sediments deposited respectively during the last ice advance and retreat across the

southern Irish and Canadian continental shelves. Comparison between the two study areas revealed different topographic settings and asynchronous ice-sheet behaviour, with the onset of retreat around 10 ka apart across the North Atlantic. Internal glaciological factors, if compared to proxy data for atmospheric and oceanic changes in the North Atlantic region, appear to be the main drivers for ice sheet initial retreat in the study areas during the Late Quaternary. This demonstrates that ice sheets with marine-terminating ice margins can internally trigger their own demise in very different glaciological settings and within overall cold conditions. Such information provides a better understanding of ice sheet response to past environmental changes which, in turn, enables improved predictions of ice sheet behaviour in the future. Cristiana submitted her PhD thesis in December 2021 for examination at the end of February 2022. Some of her research on the BIIS is already published in *Boreas*. <https://doi.org/10.1111/bor.12536>.



Frank Mitchell Award

Michael O'Connell

Palaeoenvironmental Research Unit, Geography, NUI Galway

Michael O'Connell was awarded the Frank Mitchell Award for Distinguished Service to Quaternary Research and Teaching in 2021. The honorary speech held by Walter Dörfler of Kiel University in Germany during the IQUA Autumn Symposium 2021 is reproduced below.



A unique bog-yew sculpture by Kevin Casey was handed over to Michael at his home by Gordon Bromley during the Autumn Symposium 2021.

"After 10 years, the Frank Mitchell Award for Distinguished Service to Quaternary Research and Teaching as an honour for extraordinary work for palaeoenvironmental sciences was bestowed to Michael O'Connell from NUI Galway. It is a great honour for the author to write a few words about his career and his outstanding engagement for Quaternary Science and for IQUA in particular. The award was presented at the IQUA autumn symposium on November 26th, 2021.

After undergrad studies in Dublin Michael O'Connell went to Galway and finished his PhD under supervision of J.J. Moore in 1977. The topic of his PhD was The Phytosociology and Ecology of Scragh Bog,

Co. Westmeath. The strong relations of John Moor to Germany and German colleagues may have influenced Michael to choose a German vehicle for his first trips to the environmental highlights of Ireland.



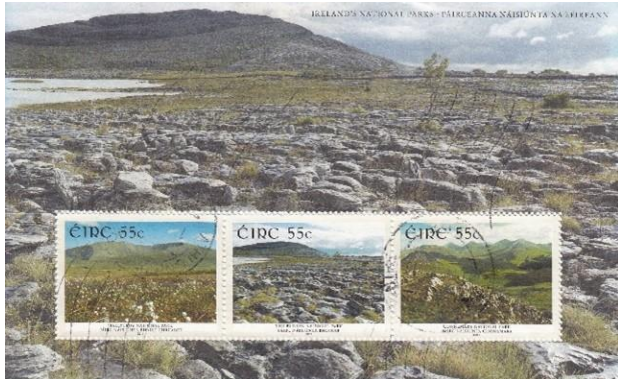
In December 1974 he had become lecturer of the National University of Ireland, Galway. Beside his palaeoenvironmental interests he focused on phytosociological research and dealt with Lough Boora, Co. Offaly (1980) and Shannawoneen Wood, Co. Galway (1982). His impressing publication record (https://scholar.google.com/citations?hl=de&user=-FY-RAwAAAAJ&view_op=list_works) lists further phytosociological studies in Mayo and Sligo together with his Galway colleague Micheline Sheehy Skeffington and many others.

As a fellow of the German Alexander von Humboldt Foundation Michael stayed 1982/83 in Wilhelmshaven at the Institut für historische Küstenforschung. With Karl Ernst Behre as host he studied the Holocene vegetation history of East Friesland in Northern Germany. Back in Galway his interest went on to human environmental interaction as e.g., expressed in a publication of Carrowmaglogh prehistoric field system in Co. Mayo. Just by chance, many of the areas Michael worked in, like Connemara, were also perpetuated on Irish stamps. What a fortune for a passionate stamp collector.



Connemara was also the topic of his first IQUA field guide edited together with William P. Warren. Other field guides he has compiled on the Burren and Clare Island with Inishbofin.

But Connemara with its granite-, gneiss- and shist-dominated landscapes needed some contrast and Michael jumped across Galway Bay into the carboniferous limestone area of the Burren.



The Late Glacial became one of his main interests: studies are connected to the names L. Namackanbeg, Lurga, Illauncronan, and Tory Hill. These investigations are connected to Valerie Andrieu, Aagus Paus, and Chun Chang Huang, who stayed as international guests at UCG.



In 1994 I got the opportunity to proceed this tradition as a visiting fellow in Distillery Road. It was a great experience to join the IQUA excursion to Clare Island and Inishbofin in this year.

There is not enough space for a complete list of Michael's activities and areas of interest. One important research topic became Céide Fields, in Mayo – reflected in many publications together with Karen Molloy.

In 1996 he initiated the international TIMECH programme with colleagues from The Netherlands, Great Britain, Germany, Finland and Switzerland, focusing on the environmental history of An Loch Mór at Inis Oírr, Aran Islands.



In the early 2000s, also new investigations started in the Burren after Michael had come back from a second von Humboldt fellowship in Germany, this time at Hannover University hosted by Richard Pott.

In the 2010th, Co. Sligo went into his focus with emphasis on the Neolithic.



He was invited to further research stays in 1997 to Shaanxi Normal University in Xian (at visiting Professor at Chung Chang Huang's department) and in 2011 as Visiting Fellow at Geo Forschungszentrum Potsdam (Achim Brauer). Michael has left significant footprints on the map of Ireland as this most probable incomplete figure shows, and he is still very productive.



All this was done beside his teaching obligations that he fulfilled with enthusiasm and the supervision of PhD students (Brian MacGowran, Karen Molloy, Enda Mooney, Neil Lockhart, ChunChang Huang, Eneida Jennings, Edel Ní Ghráinne, Annette Overland, Ingo Feeser, Ann Bingham, Beatrice Ghilardi). Beside many international congresses he often joined the International Moorexursions organised by Bern University, like here in Massiv Central in France."



Written by Walter Dörfler (Kiel University, Germany).

6. IQUA Award News

Valerie Hall Award

IQUA proudly offers the newly established Valerie Hall Award for the best student or early-career researcher-led paper published by an IQUA member.

This award is in memory of Professor Valerie Hall, who passed away in 2016. Valerie was a highly esteemed Quaternary scientist from Belfast. She began her career in botany and palynology but made a truly international mark in the field of distal tephrochronology. She was particularly supportive of PhD students and early career researchers and a great inspiration and fantastic mentor to both Gill Plunkett (IQUA President) and Graeme Swindles (IQUA Secretary) and many others.

The Award is for early career researchers or postgraduate students who have written a top-quality research publication that puts Irish Quaternary science on the international stage. We hope that the award will help encourage early career researchers to consider a career in Quaternary research. One award of €250 will be given on an annual basis.

Papers can be nominated by colleagues, supervisors, or other IQUA members. Nominations should be sent in writing (no more than 100 words of justification) to the IQUA secretary (Graeme Swindles –

g.swindles@qub.ac.uk) for review by the IQUA executive committee. The nominated paper should be attached to the email. The paper must be in the general area of Quaternary studies but does not have to be focused on Ireland.

The deadline for application submissions is November 15 at 5 pm.

The first winner of the Valerie Hall Award, PhD researcher Cristiana Giglio from Ulster University, was announced at the IQUA Autumn Symposium 2021 (see article above).

Eileen Reilly Postgraduate Research Award

We now invite applications for the Eileen Reilly Postgraduate Research Award!

The award consists of a grant of €500 and can be used for conference attendance, a training course, and fieldwork or laboratory analysis by a postgraduate student. Applicants must be IQUA members in good standing for at least six months and be enrolled at an institution on the island of Ireland or conducting Quaternary research in Ireland. For further details, please visit iqua.ie/awards.

The application deadline is 1 March 2022, and the winner will be announced at the IQUA Spring Meeting 2022.

7. Recent Graduates

Margaret Ann Browne

Department of Geography, Mary Immaculate College

PhD completed in November 2021

Mediterranean sea surface temperatures and planktonic foraminifera palaeoecology during short-term climate oscillations of the Late Pleistocene

The Mediterranean is a semi-enclosed sea, ideally located for recording and amplifying global climate signals. Heinrich Stadial 1 (HS1), the Bølling-Allerød (BA) and Younger Dryas (YD) are periods of extreme climatic change that occurred during the last deglacial. Planktonic foraminifera were utilised to address the extent the Mediterranean Sea responded to these events, and how they impacted sea surface temperatures (SSTs), hydrology and distribution of planktonic foraminifera on a basin-wide scale. This was further expanded upon in the

Gulf of Lion, in order to determine the palaeoenvironmental impacts and main drivers in this region during the deglacial.

A database of planktonic foraminiferal counts from 67 cores located across the Mediterranean Sea were compiled. SSTs were reconstructed using Artificial Neural Networks (ANN) and mapped for each chronozone, along with key planktonic foraminifera and palaeoenvironmental proxies. Mean annual SSTs ranged from 13.57°C and 14.19°C during HS1 and the YD, both cooler than the Last Glacial Maximum (LGM). SSTs during the BA increased to 15.03°C. The western basin, Adriatic and Aegean Seas remained cool and strongly eutrophic, dominated by *Neogloboquadrina* species, *G. bulloides*, *T. quinqueloba* and *G. inflata* since the BA. The eastern basin was more productive than today, with a mix of eutrophic species and *G. ruber plexus*, though it became increasingly seasonal, oligotrophic and stratified as SSTs warmed during the BA and YD. These reconstructions highlight the complexity of these chronozones across the Mediterranean Sea. They also illustrated how global drivers such as the southerly position of the polar front, North Atlantic atmospheric circulation, precipitation and wind strength, sea level, summer insolation and position of the ITCZ governed these signals. River discharge and meltwater pulses were regionally important along northern margins.

Analysis of the high-resolution Gulf of Lion core M40/4 82-2SL focused the late HS1 to mid Holocene (~15.5 to 7.4 kyr). SSTs were predicted using ANN, and a combination of faunal abundance, multivariate statistics (PCA) and palaeoenvironmental proxies were utilised to reconstruct the palaeoenvironment. Predicted SSTs showed strong correlation with Greenland $\delta^{18}\text{O}$ ice cores, especially during the BA (15.19°C). SSTs during the late HS1 (10.18°C) and YD (8.3°C) were cooler than the LGM. The assemblage was strongly eutrophic throughout, with a more diverse, seasonal assemblage restricted to the early Bølling and Holocene. Holocene SSTs were cooler than expected (15.06 to 15.76°C), as the early Holocene was overprinted by a strong cyclical river/meltwater signal. This freshening of surface waters impacted the depth of the pycnocline, which had significant impacts on *N. incompta*. Variations in wind-strength, precipitation, river discharge and Alpine meltwaters were the main factors governing the Gulf of Lion during the Late Pleistocene to mid Holocene transition.

8. Research Reports

Constraining the end of the ice age in the Burren: setting the stage for Ireland's dustbowl

Colin Bunce and Gordon Bromley

PRU NUI Galway

The Burren region of north County Clare is very well known as a karst landscape with excellent examples of dolines, cave systems and grykes. Perhaps less well known are the many glacial features found in the same area including perched erratics, tills and striae. The interplay between these two contrasting processes (karst = warm climate; glacial = cold climate) is poorly understood and some of the larger karst features potentially pre-date the last glacial maximum (LGM).

One persistent question is when the Burren became ice free after the LGM. In 1995, Dr Frank McDermott (UCD) published a date of 17.97 ka for the onset of stalagmite growth in Poulmagollum Cave (McDermott and Swabey, 1995), a process that could not have occurred prior to deglaciation. Yet that age was, at the time, considered anomalously old because it did not fit with the prevailing view of deglaciation occurring at the onset of the Bølling, 14.7 ka. Until now, the general lack of suitable lithologies for cosmogenic surface-exposure dating has prevented accurate dating of this important event in the Burren, which also marks the onset of postglacial landscape evolution that continues to this day. In 2009, a new cave was discovered in the Burren that had developed on a series of silica rich hydrothermal veins (Bunce, 2010), these veins can also be found as surface outcrops (Figure 1). The veins contain abundant quartz, making them suitable for cosmogenic beryllium-10 (^{10}Be) dating, although their relatively high concentrations of intramatrix, hydrothermally derived impurities (e.g., Al, Ca, Ti) mean they require more pre-treatment than typical ^{10}Be targets.

Working with Dr Brenda Hall (University of Maine), one definite exposure age has been generated for one of these veins, along with ages from neighbouring granite erratics that our team discovered in 2020 and 2021.



Figure 1. Outcrop of silica rich vein in the Burren at 200 m altitude with the upper surface exposure dated to approximately 18 ka. Vein has a relief of 75 cm above the surrounding bedrock surface.

NUI Galway PhD candidate, Adrienne Foreman, who is researching the last deglaciation of Connemara and Galway Bay, has also dated granite erratics in the Aran Islands (Foreman, 2021), which serve as a geological extension of the Burren and thus expand the geographical context of our work. Thus, there are now 8 ages obtained using different techniques and rock types, which together indicate complete, and rapid, deglaciation of the wider Burren area between 18 and 17 ka.

These dates are also supported by a number of other, sedimentary studies; Diefendorf et al. (2006) indicated lacustrine sediments in Lough Inchiquin on the SE edge of the Burren as dating from c. 16 ka B.P., while farther south at Tory Hill, Co. Limerick, O'Connell et al (1999) described a Late Glacial pollen record showing establishment of a steppe-like environment there by 16.8 ka B.P. In both instances, the basal ages of these post-glacial lacustrine sediments provide minimum-limiting age control for the terminal melting of the last ice sheet.

Our initial dates for deglaciation of the Burren indicate widespread ice-free conditions despite the extremely cold winters associated with stadial conditions in the North Atlantic. We posit that such conditions are ideal for the entrainment, transportation, and deposition of loess.

Small deposits of a silty material occur in many of the karst features in the Burren and a GSI funded project based at NUIG is working to define the characteristics of this sediment. Grain size analysis by Marta Cabello (NUIG) shows that this deposit

has a very high percentage of the silt sized material (2-50 microns, see Figure 2) that is typical of loess, although a small percentage of larger sized material is present in some samples.

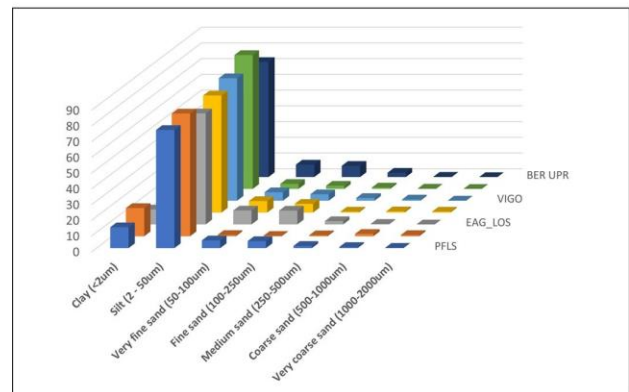
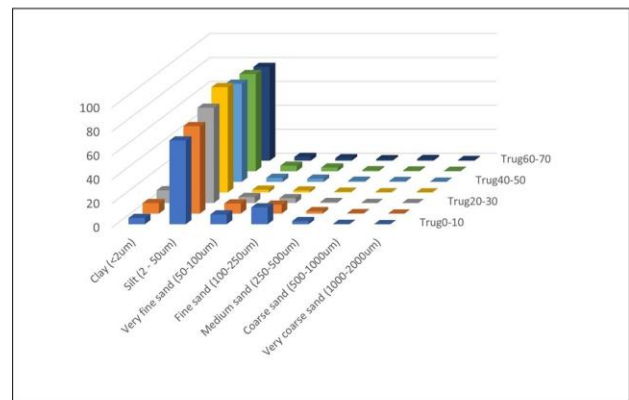
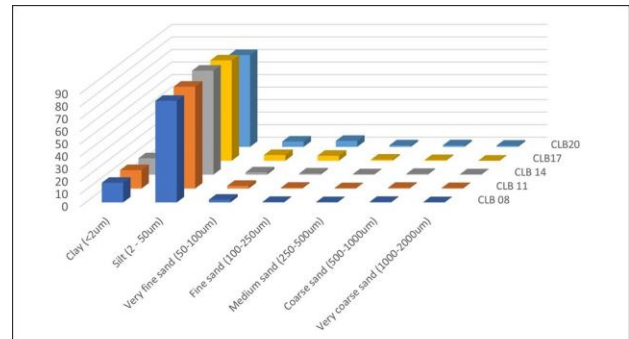


Figure 2. 3 graphs showing the general grain size distribution of sediments from several locations across the Burren.

Zircons have been identified in the silt by Dr Martin Nauton-Fourteu (NUIG) which is useful for two reasons: firstly, the Burren limestones contain almost no zircons proving that this deposit is not entirely derived from weathering of the local limestone. Secondly, zircon is almost as resistant as diamond and, once formed in igneous rocks, will pass through many cycles of erosion, transportation, and

deposition, thereby providing a geochemical tool for tracing sediment origin. Individual zircons can also be dated so that a sedimentary deposit can be given an 'age fingerprint' based on its zircon content.

Dating of these zircons by Dr David Chew (TCD) and analysis by Dr Shane Tyrell (NUIG) shows an almost identical zircon age match with the Tullig Sandstone Formation of the Upper Carboniferous, as seen at the Cliffs of Moher and other parts of southwest Clare. This implies that the silt found in the Burren has not been transported a long distance; this may also be indicated by the apparent lack of aeolian microtextures visible in SEM images of the silt grains and also by the presence of many perfect euhedral quartz crystals, at multiple scales, which may be derived from the quartz rich veins in the Burren described earlier.

Ongoing work with our project collaborator, Dr Thomas Stevens of Uppsala University in Sweden, is studying the magnetic fabric of this deposit to determine how it was deposited and the extent of reworking. OSL dating, with the help of Dr Kathryn Fitzsimmons in Tübingen University in Germany, will hopefully provide a date of deposition.

Ultimately, a plausible scenario based on our data so far is as follows: By 17.5 ka, the last ice sheet to cover the Burren and surrounding lowlands had melted away (presumably in response to summer-time warming), leaving extensive subaerial exposures of freshly abraded Tullig sandstones and glacial till, all of which was ripe for remobilisation (by wind, water, etc.) and the entrainment of silt by the wind. The location of these deposits implies, on a first-order basis, that prevailing south-westerly wind directions persisted throughout the last deglaciation and postglacial period.

More information on this GSI funded project is available at <https://sites.google.com/view/burrenloess/home>

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9. New interdisciplinary research group at UCD

Sam Kelley

School of Earth Sciences, University College Dublin

We are pleased to announce the formation of the UCD Mountain Research Group (MRG), sponsored as a strategic priority of the UCD Earth Institute. This project, co-led by Prof. Graeme Warren (School of Archaeology), Dr. Christine Bonnin (School of Geography), and Dr. Sam Kelley (School of Earth Sciences) seeks to promote interdisciplinary work on mountain landscapes at UCD, as well as among the broader community.

Mountain and upland areas are often overlooked but form important and dynamic landscapes here in Ireland as well as globally. Specifically, our research group will strive to:

- Highlight the importance of mountain landscapes and the value of interdisciplinary study of mountains
- Raise broader awareness within and beyond UCD of dynamism of mountains and their role in Sustainable Development Goals
- Promote research on mountain landscapes within UCD and provide platform for expansion
- Establish networks of researchers and relevant agencies within and outside of UCD
- Support the development of grant applications and capacity building within UCD

To fulfil these goals, we will host a public lecture series this spring. The first lecture will be delivered by Dr. Margret Jackson (Trinity College Dublin) on March 8th. The lectures will be delivered virtually,

recordings of which will be available after the live lecture on our website. Additionally, we will be hosting a one-day stakeholders forum entitled 'A Future for Ireland's Mountains' at UCD with representation from Irish Uplands Forum and Mountaineering Ireland in October 2022, with an interdisciplinary fieldtrip to follow.

More information is available on our website here: <https://mountainresearch.ucd.ie/>

10. News from the Quaternary Research Association

Professor Paula Reimer has been awarded the James Croll Medal 2022.

James Croll Medal 2022



Professor Paula Reimer

The James Croll Medal is highest award of the Quaternary Research Association and is normally awarded to a member who has not only made an outstanding contribution to the field of Quaternary science, but whose work has also had a significant international impact.

Paula's research on radiocarbon (^{14}C) dating and its applications, and radiocarbon calibration in particular, is world-leading and of international significance. She has worked for several decades on extending and refining the internationally ratified ^{14}C calibration curves which are used by geoscientists and archaeologists to correct radiocarbon ages for the variability of atmospheric or marine ^{14}C in the past. The latest version of this, IntCal20, is the state-of-the-art tool for all archaeologists, geologists, geographers and environmental scientists to calibrate radiocarbon dates to meaningful time-scales.

(The text and image have been retrieved from <https://www.qub.ac.uk/schools/NBE/news/ProfessorPaula>

[ReimerwinsprestigiousJamesCrollMedaloftheQuaternaryResearchAssociation.html](https://www.qub.ac.uk/schools/NBE/news/ProfessorPaula)).

11. Recent Publications

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12. Upcoming Events

IQUA Early Career Researcher workshop

Adrienne Foreman

IQUA is planning an Early Career Researcher workshop on the 28th and 29th of April in Queen's University, Belfast with Dr. Maarten Blaauw (Queen's University Belfast) and Dr. Niamh Cahill (Maynooth University) for anyone interested in Bayesian statistics in Quaternary research. Further details, including an Eventbrite link and full agenda, will follow soon!

Follow us on Twitter (@Quaternary_Irl) and Facebook (/IrishQuatAssociation) for more updates.

IQUA Spring Meeting 2022

Graeme Swindles

The Spring Meeting will be held as an in-person event at Queen's University Belfast on Saturday 30th April 2022.

Location: Elmwood Building – Geography Building, Queen's University Belfast, Elmwood Avenue, Belfast, BT9 6AZ

The fee will be €10/€5 for members and students/concessions respectively and €20 for non-members (pay on the day).

Postgraduate and post-doctoral students are especially welcome and there will be a prize for the best postgraduate presentation (20 min). £GBP will also be accepted.

Registration opens at 9.30 am. The meeting will be followed by the IQUA AGM in the afternoon.

IQUA Spring Meeting 2022 in Co. Sligo

Susann Stolze

This year's IQUA Spring Meeting will take place April 22–24, 2022.



The excursion will focus on the landscape history and archaeology of Neolithic County Sligo. We will examine the archaeological and paleoenvironmental evidence and will visit the early Neolithic causewayed enclosure at Magheraboy and the spectacular Neolithic megalithic sites of Carrowkeel and Carrowmore. The extensive paleoenvironmental research that has been conducted in County Sligo over the past decade will be presented. It will establish how the landscape character changed during the Neolithic due to increased anthropogenic pressure associated with the adoption of a more sedentary lifestyle and arable farming practices. This excursion will include an easy to moderate hike uphill on gravel road to the Carrowkeel site located on the plateau of the Bricklieve Mountains.

More information to follow. If interested in attending, please contact Susann Stolze (sstolze@mines.edu).

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The annual membership cost is: €20 waged; €10 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.

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