IQUA SPRING SYMPOSIUM 2021
April 16th

IQUA

Irish Quaternary Association
Cumann Ré Cheathartha na h-Éireann

IQUA Spring Symposium 2021

Zoom Link: https://ucd-ie.zoom.us/j/64483215289

Opens at 9:50

10:00-10:10 Introduction and Welcome	First Session Chaired by: Adrienne Foreman
10:10-10:30 Speaker: Margaret Jackson	Using the Quaternary record to project our future
10:30-10:45 Speakers: M. B. Carney	Reconstructing Retreat Dynamics of the Last Irish Ice Sheet Using Proglacial Lake Sediments
10:45-11:00 Speaker: Fermin Alvarez	Common Era Atlantic Sea Level Change
11:00-11:15 Speaker: Brendan O'Neill	The role of ocean forcing in early deglaciation of the British-Irish Ice Sheet during the Last Glacial Maximum: A micropalaeontological and sedimentological study of sediment cores from the Malin Sea and Slyne Trough
11:15-11:30 Speaker: Ryan Smazal	Preliminary results from a palaeoenvionmental study of Lough Feeagh, Co. Mayo
11:30-11:40 Coffee/Tea/Lunch Break	Next Session Chaired by: Ryan Smazal
11:40-11:45 IQUA Resources Announcement Speaker: Catherine Dalton	Shaping the Landscape – a 2nd Level Teaching Resource
11:45-12:00 Speaker: Benjamin Thébaudeau and Amrine Dubois Gafar	The Joyce Country and Western Lakes geopark project; an asset and a facilitator for education and research.
12:00-12:15 Speaker: Colin Bunce	Digging the Burren – Quantifying Ireland's Dustbowl
12:15-12:30 Speaker: Michael Gibbons	The Newgrange light-box: a triumph of Neolithic architecture or a creation of 1960s engineering?
12:30-12:45 Conference Closing/ Mini Break	
12:45-2:30 IQUA AGM Meeting	Chaired by: Gill Plunkett

Irish Quaternary Association

About Us

The Irish Quaternary Association (IQUA) was founded in the 1970s to co-ordinate and energise all aspects of Quaternary research in Ireland and to pass on existing expertise through conferences and field excursions.

Membership

Membership of IQUA is open to everyone with an interest in the Quaternary period, both amateur and professional. As an IQUA member, you will receive two copies of the *IQUA Newsletter* each year, and will be entitled to attend IQUA meetings, field excursions and symposia. You will also be supporting Ireland's only non-profit body dedicated to research of the Quarternary period in Ireland. For additional queries regarding membership, click the link here: http://iqua.ie/membership/.

Updates/Opportunities

Shaping the Landscape a 2nd Level Teaching Resource

IQUA developed a teaching and learning resource entitled 'Shaping the landscape' sponsored by the Heritage Council. The lesson plan is the first 2nd level teaching aid for Quaternary Science in Ireland and was developed in an iterative process between teachers, geological survey staff (north and south) and IQUA committee members. The instructional aid is focused at 2nd level geography and earth science students and future undergraduates.

IQUA Postgrads

Are you a postgraduate researcher or early career-researcher interested in developing and growing IQUA? Contact iquapostgrads@gmail.com stating your interest and our postgraduate representatives will be in contact with you with various opportunities to contribute to Ireland's only non-profit body dedicated to research of the Quarternary period in Ireland.

Abstracts

Using the Quaternary Record to Project Our Future

Margaret Jackson, Department of Geography, Trinity College Dublin, Dublin, D02 PN40

Anthropogenic forcing is rapidly changing Earth's climate, but exactly how – and how much – climate will change in the future is uncertain. Past climate periods such as the Pliocene, when carbon dioxide was perhaps as high as it is today, may provide a window into potential future scenarios. But while these past time periods offer insight into an altered climate, the rapidity of modern warming is unique and so requires special attention. The Quaternary record holds evidence of rapid climate changes, largely centred in the North Atlantic, that may be useful analogues for the rate of modern warming. However, the nature of these rapid climate shifts and their impacts on terrestrial regions are not yet clear. Glaciers are highly sensitive to changes in climate, and so are an ideal means to investigate past terrestrial climate changes. This presentation will highlight emerging and planned work to utilise Ireland's glacial-geomorphic record to investigate periods of rapid climate change, and what these past climate shifts may mean for our future.

Reconstructing Retreat Dynamics of the Last Irish Ice Sheet Using Proglacial Lake Sediments

M. B. Carney[1], K. R. Adamson[1,] C Delaney[1], P. D. Hughes[2]*

[1] School of Science and the Environment, Manchester Metropolitan University, Manchester, UK, M15 6BH [2]Quaternary Environments and Geoarchaeology Research Group, Geography School of Environment, Education and Development, The University of Manchester, Manchester, M13 9PL M.carney@mmu.ac.uk*

Understanding the rate and pattern of current deglaciation relies on long-term records of ice sheet behaviour spanning several millennia. Such a record can be found in Irish Midlands in the form of landforms and sediments preserved from the retreat and breakup of the Irish Ice Sheet (IIS) during the Last Glacial Termination (LGT, c.21-14 ka).

Existing reconstructions of the IIS are based on geomorphological mapping of landforms, which are inherently discontinuous in their distribution and preservation. A more continuous archive is preserved in proglacial lake sediments. These lakes are sinks for glacially-derived meltwater and sediment, and enable continuous, spatially-integrated reconstructions of glacial and foreland environmental change, including annually or seasonally-resolved (varved) records that far exceed the temporal resolution of geomorphological techniques. Thick sequences of laminated, varved, proglacial lake sediments from Palaeolake Riada are well-preserved in the Irish Midlands and provide valuable insights into IIS behaviour and lake sedimentation.

We present a new high-resolution analysis of laminated glacial lake sediment cores from Co. Offaly, close to IIS marginal landforms (moraines and eskers). A suite of physical and chemical analyses are used to reconstruct ice marginal processes and fluctuations of the IIS during the LGT. This paleoenvironmental reconstruction is put into context of wider ice sheet dynamics through radiocarbon dating of organic material extracted from these cores. This will produce

insights into long term retreat patterns and behaviours of ice sheets during periods of climate amelioration, applicable to current and future dynamics of existing ice sheets.

Common Era Atlantic Sea Level Change

Fermin Alvarez, PhD Candidate in Sea Level Change, Trinity College Dublin

Sea level rise (SLR) is one of the most challenging consequences of climate change (e.g., IPCC, 2019). SLR varies in time and space in response to a suite of different controlling mechanisms. The World Climate Research Programme (WCRP) 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 Atlantaigh), 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. My PhD will produce a record of Common Era (past 2000 years) RSL change that will contribute to a growing network of high-resolution RSL reconstructions from the Atlantic coast of north America. Spatio-temporal modelling of this expanded dataset will provide new insights into RSL variability.

The role of ocean forcing in early deglaciation of the British-Irish Ice Sheet during the Last Glacial Maximum: A micropalaeontological and sedimentological study of sediment cores from the Malin Sea and Slyne Trough

Brendan O'Neill, Department of Geography, Durham University
Supervised by Prof. Colm Ó Cofaigh & Dr Jerry Lloyd
Thesis submitted December 2020 for the degree of Master of Science by research

The contribution of the polar ice sheets to global sea level rise has tripled within the last two decades, and remains the largest yet most uncertain source of future sea level rise. Critical to this problem are the sensitive marine-terminating margins of ice sheets, which can propagate marine- forced changes into the ice-sheet interior but whose responses remain insufficiently understood and difficult to simulate. Improving our understanding of ice sheet-ocean interactions is therefore an essential prerequisite to accurate projections of future sea level rise. Geological records of ice sheet-ocean interaction are valuable to this effort, as they can span centennial to millennial timescales, providing longer-term context to instrumental observations and important means of informing and testing numerical ice-sheet models used in predictions of sea-level rise. The last British-Irish Ice Sheet (BIIS) has important potential in this regard, due to its largely marine-based configuration and proximity to pathways of poleward heat transport in the northeast Atlantic. This study availed of this by investigating whether ocean forcing played a role in early deglaciation in two sectors along the Atlantic margin of the BIIS, the Malin shelf and Porcupine Bank-Slyne Trough region, using foraminiferal assemblages. The results suggest that warm Atlantic Water was present during early deglaciation (from ≥25.5 ka cal BP) in the Porcupine Bank-Slyne Trough region, and passively drove retreat offshore central western Ireland. In contrast, deglaciation on the

Malin shelf occurred in a cold glacimarine environment from ≥25.9 ka cal BP and was likely internally-driven through glacioisostatic adjustment-induced relative sea-level rise, consistent with recent results from two other sectors along the BIIS' Atlantic margin. The findings expose the role of bathymetry in locally conditioning the BIIS to ocean forcing, and imply a BIIS influence by Atlantic Water advection in the northeast Atlantic during the coldest stadials of the last glacial period.

Preliminary results from a palaeoenvionmental study of Lough Feeagh, Co. Mayo

Ryan Smazal [1e] Supervised by Eleanor Jennings[1], & Catherine Dalton[2]
[1]Centre for Freshwater and Environmental Science, Dundalk Institute of Technology [2]Dept. of Geography Mary Immaculate College – University of Limerick

An 8m long sediment core was extracted from Lough Feeagh, a large freshwater lake in the Burrishoole catchment County Mayo. Stratigraphic, geochemical and chronological analysis including stratigraphy, Loss On Ignition (LOI550), wet density, dry weight and 14AMS Radiocarbon sampling have been conducted. 14AMS Radiocarbon sampling suggests that this core is at least 10000 YBP, suggesting a long-term record of environmental change in the catchment can be achieved. The sediment includes glacial clay at its oldest part of the core, and a transition from clay to lake sediment. This transition is also noted with an increase in LOI550 values. LOI550 values vary throughout the core, suggesting the possibility for various environmental interactions in the catchment.

The Joyce Country and Western Lakes geopark project; an asset and a facilitator for education and research.

*Benjamin Thébaudeau 1 *, Amrine Dubois Gafar 1,2 and Siobhán Power 2 .*
1. Joyce Country and Western Lakes Geopark Project, Halla Phobail Thuar Mhic Éadaigh, Co. Mhaigh Eo, F12D990. 2. Geological Survey Ireland, Beggars Bush, Haddington Road, Ballsbridge, Dublin 4, D04K7X4. Corresponding author's email: geologist@jcwlgeopark.ie

The Joyce Country and Western Lakes (JCWL) geopark project 2020-2021 is an initiative led by Geological Survey Ireland and funded by Project Ireland 2040 under the Rural Regeneration Development Fund (RRDF) with significant contributions from Údarás na Gaeltachta, Mayo and Galway County Councils and other partners. The aim of the project is to apply for UNESCO Global Geopark status at the end of 2021 and become the newest Irish member of this international network by 2023.

The JCWL region is well-known to geologists, particularly in Ireland, Britain, and North America, for having the most complete record of the Grampian-Taconic Orogeny. Outcrops of note include Connemara Marble, the Lakes Marble in Cur Hill and the pillow basalts of the Lough Nafooey Arc. But the region is also rich with Quaternary features with Ireland's only fjord at Killary Harbour, a range of corries, glaciated valleys and moraines in the uplands, drumlin islands and the karst and epikarst

landscape on the shores of Loughs Carra, Mask and Corrib. Notwithstanding a rich biological and archaeological landscape. This talk will introduce how the geopark project aims to foster and facilitate the organisation of student fieldtrips, mapping projects and research projects' fieldwork by providing the link to accommodation providers, landowners, and any other local resources at our disposal.

Digging the Burren – Quantifying Ireland's Dustbowl

Colin Bunce, NUI Galway, colin.bunce@nuigalway.ie

The Burren is an iconic example of glacio-karst; however, the quaternary history of the Burren is largely unknown. This GSI-funded project, based at NUIG with collaborators at Uppsala and Max Planck Institute, is examining a Late Quaternary deposit which is widely spread over the hillsides of the Burren and in dolines and caves. Pilot geochemical and grain-size analyses describe a quartz-rich silt that cannot be attributed to local bedrock. Our working hypothesis is that this deposit is an aeolian silt ('loess'). While previous researchers have speculated that similar deposits are loess, these Burren sediments have escaped rigorous geologic assessment; existing maps do not include these deposits. At this early stage of the project, we will present initial results and outline the project's direction, and elaborate on the types of information that this deposit might reveal. This will be the first ground-based survey seeking to characterise the Burren silts and identify their extent, origin, transport, and environmental/climatic relevance.

There is evidence that the Burren had a greater soil cover in the geologically recent past, prompting the questions: How did soils originate on a glaciated limestone substrate? Where have these soils gone subsequently? Loess is the ideal candidate to answer both these questions. Blown in from glacial outwash deposits after ice retreat, colonized by vegetation in the early Holocene, then potentially eroded following woodland clearance by early settlers.

The Newgrange light-box: a triumph of Neolithic architecture or a creation of 1960s engineering?

Michael Gibbons

Originally known as the false lintel, the feature now known as the Newgrange light-box was discovered in the 1840s and first documented by William Wilde in in 1847. Its discovery was one of the outcomes resulting from more than two centuries of episodic antiquarian diggings on, around and within the mound; no doubt spurred on by the repeated discovery of important gold artefacts.

During the course of the next one hundred and thirty years, further digging and conservation works took place before the entire monument was transformed under the direction of Professor M.J. O'Kelly in the 1960 and 1970s. This talk subjects the feature to a preliminary authenticity analysis: focused on a rigorous evaluation of the published work and of previously unexamined photographic, stratigraphic and documentary evidence. The results challenge the widespread acceptance that the original and authentic purpose of the light-box was to capture the beam of winter solstice sunlight and to direct it to the back of the chamber.