IQUA

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Editor: Susann Stolze

1. Editor's Note

Dear IQUA members,

Welcome to IQUA newsletter No. 69.

This issue has information on the IQUA Autumn Symposium 2022, the upcoming IQUA Spring Meeting 2023, and a call for submissions for the Eileen Reilly Postgraduate Research Award. It features a research project on a hillfort in Co. Galway and a long list of recent publications by our community.

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

Kind regards,

Susann Stolze, CSM, Colorado, February 2023 (sstolze@mines.edu)

2. Cúpla Focal

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

The day after the Turkey-Syria earthquake I was presenting my usual Level 1 lecture on reconstructing natural catastrophes, updated as it often is with reference to the latest calamity: earthquakes, typhoons, forest fires, droughts, floods... Each year I pull up the most recent graphics from Munich RE on the increasing societal impact of natural catastrophes, some of which reflect the economic costs from an insurance perspective, others the number of events over the last decades or their geographical spread. I point out that geophysical events – earthquakes, volcanic eruptions and tsunamis – are fairly steady over time, the rising threats emanating instead from more numerous and severe extreme weather events that we're experiencing in the wake of a warming global climate. Data on fatalities are fortunately more variable, even in decline as mitigation strategies and aid help alleviate the human cost. Information on the many millions whose lives are turned upside down by the same events I do not have, but I suspect this number will be on the rise, simply because there are more and more of us to be impacted upon.

My lecture is biased – predictably given my own research interests – towards volcanic impacts, but earthquakes feature, as do tsunamis, forest fires and the rarer cosmic impacts. I try to impress upon the class the relevance of Quaternary science (and studies of deeper time) for identifying the occurrence of such events in the past so that we may recognise the risks and possible recurrence intervals. It's hard for populations to avoid living near fault lines and active volcanoes, but knowing the hazards, there is an imperative to build and to plan for greater resilience. In Ireland, we are relatively sheltered from geophysical events (save, perhaps, for an occasional tsunami and the odd Ice Age) but we cannot escape entirely the increasing frequency of extreme weather. We are nevertheless fortunate to have a wealth of sedimentary, proxy and historical records with which to reconstruct past environmental change and its effects on societies.

Last year's Autumn Symposium, organised by Helen Shaw and Nick Scroxton at the University of Maynooth, considered the impact of Quaternary science itself, reflecting on the growing expectation that research should have real-world relevance beyond academia. The Spring Meeting, to be held in University College Cork and organised by Michelle McKeown, will follow up on this theme, and we look forward to hearing from the Early Career Researchers and postgraduates who will be making their own impacts in the field in the years to come. More information about both events can be found in this edition of the IQUA Newsletter.

Gill Plunkett, IQUA President

3. IQUA Committee (2022)

President: Gill Plunkett, Queen's University Belfast

4. IQUA Autumn Symposium 2022

The IQUA Autumn Symposium was held at Maynooth University on Friday 2nd December 2022. Themes of the symposium centred on Irish Quaternary, sea level change, and international Quaternary sciences. Professor Jason Kirby from Liverpool John Moores University gave a keynote talk on Holocene relative sea-level changes in northwest Ireland. Following the oral presentations, Gill Plunkett and Graeme Swindles led a workshop on research impact and the wider relevance of Quaternary science.

Abstracts

Mountain glacier fluctuations in the Glen of Imaal, Ireland, during the Last Glacial Maximum and Termination 1

Margaret S. Jackson [1], Gordon R.M. Bromley [2], Brenda L. Hall [3], Shaun R. Eaves [4], Adrienne Foreman [2]

[1] Geography, School of Natural Sciences, Trinity College Dublin
[2] Geography and Palaeoenvironmental Research Unit, University of Galway
[3] Earth and Climate Sciences, University of Maine
[4] School of Geography, Environment and Earth Sciences and Antarctic Research Centre, Victoria University of Wellington

Recent work focused on offshore and near-shore glacial sediments in the northeastern North Atlantic provides insight into the dynamics, and ultimate demise, of the ice sheet that once covered Britain and Ireland during the Last Glacial Maximum. However, ground-truthed chronologic information on the terrestrial pattern of British-Irish Ice Sheet retreat remains relatively sparse, limiting our ability to reconstruct ice sheet response to Quaternary climate changes. Here we report a new glacial chronology from the Glen of Imaal, in Ireland's Wicklow Mountains, constrained with cosmogenic beryllium-10 surface-exposure ages of moraines. These data provide direct chronologic constraint on the extent and timing of mountain glacier fluctuations at the Glen of Imaal and indicate that mountain glaciation was most extensive at the site approximately 23 ka. Our preliminary data also suggest that glaciers disappeared from the catchment entirely during Heinrich Stadial 1. Because mountain glaciers can exist only in the absence of an overlying ice sheet, these data place a minimum limiting age on the timing of Irish Ice Sheet retreat in the region. These data offer new insight into the response of Ireland's cryosphere to past climate change and provide discrete terrestrial targets for ice sheet and glacial modelers.

A Turlough-bound hillfort in Doonowen, Coole Park, Co. Galway

Michael Gibbons

A unique turlough-bound hillfort has been identified in the karst lowland landscape of South Galway. This extraordinary monument was first mentioned in a one-line reference in a guide to Coole Park written by Professor John Feehan in the 1980s. It was then quietly forgotten. Subsequently, a short stretch (29 m) of its ramparts was visited and described by archaeologists but they concluded that it was perhaps a "dummy fort", of "questionable antiquity". This interpretation may have been influenced by its extraordinary location, crowning the southern end of a limestone island rising almost ten meters over the surface of Lough Doo, Garryland and Coole lakes, as well as its situation within the extensive Gregory Estate at Coole near the town of Gort.

Recent research, published on the prehistoric settlement of the region, speculated that there may be an as-yet unrecognized Hillfort in the strategically important corridor bordering the Burren lowland. Doonowen may fill this gap. Recent fieldwork confirmed that the site is a heavily fortified walled island that seems to have been destroyed in Antiquity. The ten-acre fortified island is morphologically related to Bronze Age Hill forts, island cashels and promontory forts and represents an extraordinary adaption by prehistoric elites to a unique turlough-bound watery world.

Assessing the process and timescale of megagravel emplacement in a coastal boulder deposit, Annagh Head, western Ireland

Samuel E. Kelley [1], Ronadh Cox [2], Lee B. Corbett [3], Paul R. Bierman [3], Marc Caffee [4]

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[2] Williams College
[3] University of Vermont
[4] Purdue University

We measure *in-situ* produced ^{10}Be from a wave-emplaced coastal boulder deposit (CBD) located on Annagh Head in County Mayo. CBD often contain megagravel weighing 10s to 100s of tonnes and are an indicator of high energy wave events. Recent work has demonstrated that these deposits are dynamic, with documented displacement of megagravel by storm waves at Annagh Head and other sites in western Ireland, though the long-term history of these deposits is poorly constrained. Here we make the first attempt to quantify CBD emplacement history using *in-situ* produced cosmogenic ^{10}Be from 20 quartz-bearing boulders. Our sampling focused on the largest boulders in the deposit, ranging from just over 1 to ~59 t mass. Initial results yield a range of ages encompassing much of the Holocene, indicative of a combination of pre-erosion bedrock inheritance, in addition to a protracted history of deposition and remobilization in response to wave action and rising post-glacial sea level. In total, this dataset provides a quantitative view on a dynamic feature of coastal landscapes, allowing for investigation into the geomorphic processes at work, as well as exploration of possible linkages to climate and landscape evolution.

Keynote - Holocene relative sea-level changes in northwest Ireland: implications for glacio-isostatic adjustment models and contemporary sea-level change

Jason Kirby [1], Ed Garrett [2], W. Roland Gehrels [2]

[1] School of Biological and Environmental Sciences, Liverpool John Moores University
[2] Department of Environment, University of York

The late-Quaternary relative sea-level (RSL) history of Ireland is complex, positioned at the margins of the former British-Irish Ice Sheet, and subject to the influence of ice unloading and forebulge collapse. In the northeast of Ireland (closest to the centre of ice mass), geophysical models of post-glacial isostatic adjustment (GIA) indicate a falling RSL until the early Holocene, after which RSL rises to a mid-Holocene highstand. In contrast, the southwest of Ireland (within the area of forebulge collapse) is characterised by progressive RSL rise during the Holocene. For the region of northwest Ireland, there is a significant disparity between the pattern of RSL change simulated by GIA models and the available empirical data used to test and validate these reconstructions. However, there is a paucity of high-quality RSL data and therefore the evidence to support GIA model predictions of a mid to late-Holocene RSL highstand of between +0.5 and +2 m above present is equivocal.

This paper tackles this model-data mismatch with a new RSL record reconstructed from a salt-marsh sequence at Bracky Bridge, Donegal, spanning the last ca. 2500 years. A transfer function model is used to reconstruct the vertical position of sea level. This uses a regional diatom training set to quantify the indicative meaning and predict the palaeomarsh elevation of the core samples. A chronology is provided by a combination of ^{14}C and ^{210}Pb data, with sample specific ages derived from an age-depth model using a Bayesian framework.

The reconstruction shows ca. 2 metres of RSL rise in the past 2500 years. This is not compatible with some previously published sea-level index points from the region, which are re-interpreted as freshwater/terrestrial limiting data. The results do not provide any evidence to support a mid-Holocene RSL highstand above present sea level. Whilst none of the available GIA models replicate the timing and magnitude of the late Holocene RSL rise in the reconstruction, those which incorporate a thick and extensive British-Irish Sea Ice Sheet provide the best fit. These findings have important implications for instrumental records of RSL change based on tide gauges which require correction for land motion, which in formerly glaciated regions is dominated by GIA.

Two centuries of relative sea-level rise in Dublin, Ireland, reconstructed by geological tide gauge

Zoë A. Roseby [1], Katherine Southall [1], Fermin Alvarez Agoues [1], Niamh Cahill [2], Maeve Upton [2], Gerard McCarthy [3], Robin Edwards [1]

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[2] Hamilton Institute, Mathematics and Statistics, Maynooth University
[3] Irish Climate Analysis & Research UnitS, Maynooth University

Spatial patterns of relative sea level (RSL) provide critical insight into the drivers of sea level change. Saltmarsh-based 'geological tide gauge' (GTG) records of RSL change, supplement and extend records provided by instrumental tide gauges and have been used in combination with spatiotemporal mod-

elling to distil global sea-level changes over the Common Era. Whilst a rich dataset is available from the eastern seaboard of North America, comparatively few GTG records exist from north-western Europe, and this spatial bias constrains the questions that can be addressed by this approach.

Ireland's location on the Atlantic edge of Europe means it is ideally placed to refine our understanding of sea level variability in the North Atlantic region. In this study, we test the application of the GTG approach in Ireland by reconstructing two centuries of RSL change in Dublin from duplicate sediment cores. Our records show strong agreement, indicating that RSL in Dublin rose by 33 cm since 1786 CE, at an average rate of 1.47±0.95 mm yr^{-1}. This is consistent with the regional rates of mean sea level rise inferred from tide gauge data. We discuss the implications of our results for the production of longer GTG records from Ireland and similar European contexts.

Surface distribution of modern intertidal saltmarsh foraminifera in Southern Ireland: development of a regional dataset and implications for relative sea level reconstructions

Fermin Alvarez, Zoë A. Roseby, Robin J. Edwards

Geography, School of Natural Sciences, Trinity College Dublin

The reliable reconstruction of past relative sea-level (RSL) from foraminifera buried in high-saltmarsh sediment requires accurate species-height relationships to be developed from appropriate modern analogues. However, the species distribution from a saltmarsh is the product of numerous, complex interactions among the organisms and their environment where the specific composition and elevational range of foraminifera assemblages varies in time and space responding to the influence of different secondary variables. Understanding the variability of saltmarsh foraminiferal assemblages in the study area is a prerequisite for making informed choices about training set construction, but such data are currently lacking from the Irish coast.

We present the first regional training set of modern intertidal saltmarsh foraminifera from Southern Ireland, comprising twelve transects from eight saltmarshes, with the aims of: 1) determining whether saltmarsh foraminifera in this region are vertically zoned: 2) assessing whether these vertical distributions are consistent among sites. We conclude that tidal range appears to be the principal factor influencing inter-site assemblage variability, and that reconstructions based on a regional training set can be improved by careful screening of samples associated with saltmarsh cliffs, high energy regimes and areas of human modification.

Researching historic sea level change: from mud to maths and more

Maeve Upton [1], Andrew Parnell [2], Niamh Cahill [2]

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The 2021 Intergovernmental Panel on Climate Change report highlighted how rates of sea level rise are the fastest in at least the last 3000 years. As a result, it is important to understand historical sea level trends at a regional and local level in order to comprehend the drivers of sea level change and the potential impacts. The influence of different sea level drivers, for example thermal expansion, ocean dynamics and glacial – isostatic adjustment (GIA), has changed throughout time and space. Therefore, a useful statistical model requires both flexibility in time and space and have the capability to examine these separate drivers, whilst taking account of uncertainty. The aim of our project is to develop statistical models to examine historic sea level changes for North America's and Ireland's Atlantic Coast. For our models, we utilise sea-level proxy data and tide gauge data which provide relative sea level estimates with uncertainty. A Bayesian statistical approach is employed which uses Generalised Additive Models (GAMs) to examine separate components of sea level to be modelled individually and efficiently and for smooth rates of change to be calculated.

This work is part of the larger nationally funded Irish A4 project (Aigéin, Aeráid, agus Athrú Atlantaigh — Oceans, Climate, and Atlantic Change), funded by the Marine Institute. It aims to examine ocean and climate changes in the Atlantic Ocean. The project targets three aspects of the Atlantic: its changing ocean dynamics; sea level changes; and Irish decadal climate predictions. In the future, we will apply this modelling technique to produce a long-term historical record for relative sea level change in Ireland.

Línte na Farraige is a collaborative outreach project which seeks to bridge the gap between the scientific community, the artistic realm and government bodies at a local and national level. In doing so, the project demonstrates to the general public the importance of the collective in mitigating climate change and future sea level rise. The project is inspired by the stunning light installations of Finnish artists Timo Aho and Pekka Niittyvirta. This art and

science collaboration involved scientists from Trinity College Dublin and Maynooth University, the Climate Action Regional Offices (CAROs) and Local Authorities, as well as designers from Algorithm and Native Events. Línte na Farraige is a recipient of the inaugural Creative Climate Action fund, an initiative from the Creative Ireland Programme in collaboration with the Department of the Environment, Climate and Communications.

Madagascar's Megafaunal Crash: combining paleoclimatology and paleoanthropology to uncover how, when, and why Madagascar's megafauna went extinct

Nick Scroxton [1], Laurie Godfrey [2], Stephen Burns [3]

[1] Irish Climate Analysis & Research UnitS, Maynooth University
[2] Department of Anthropology, University of Massachusetts Amherst
[3] Department of Geosciences, University of Massachusetts Amherst

The relative roles of climate change and human activity as triggers of megafaunal extinction are subject to widespread debate, including the Madagascar megafauna population crash between 700 and 900 CE. To assess competing influences on local flora and fauna we determined climate and land-use change using stable oxygen and carbon isotopes from stalagmites from Anjohibe cave, north-west Madagascar. A rapid land-use change at 900–1000 CE was not accompanied by a significant change in climate. Indeed, the period is likely one of the wettest of the last 2000 years. To investigate alternative possible causes of the megafaunal population crash we brought together evidence from numerous sources, including radiocarbon dates on subfossil bones, butchery records, genetic studies, and the new speleothem records. Both the rapid megafaunal decline and dramatic vegetation transformation in NW Madagascar coincide with a major transition in human subsistence on the island from hunting/foraging to herding/farming. Here we lay out a new hypothesis, called the "Subsistence Shift Hypothesis" to explain megafaunal decline and extinction in Madagascar. Counter-intuitively, the shift from hunting/foraging to herding/farming, plus settlement by new immigration groups, increased human population, hastening the crash of the megafaunal population despite reduced reliance on hunting.

Nitrate isotopes provide new insight into Antarctic glacial mass balance

Pete Akers

Geography, School of Natural Sciences, Trinity College Dublin

Antarctica's reservoir of glacial ice plays a key role in setting the global sea level as changes in its mass balance are linked to rises and falls in sea level throughout the Quaternary. Despite its importance to the global environment, our understanding of how the local mass balances of the Antarctic ice sheets spatially vary through time are limited by sparse observations. Reconstructions of past snow accumulation from deep ice cores usually rely upon water isotopes to infer atmospheric moisture capacity based on temperature, but this indirect method can be uncertain due to other environmental factors that affect water isotopic values. We developed an alternative proxy for local Antarctic surface mass balance using nitrogen isotopes of nitrate based on the isotopic fractionation that occurs when nitrate is lost from the snowpack through photolysis. Using modern observations from 114 sites across East Antarctica, we determined a transfer function to translate nitrate isotopic ratios preserved in ice cores into histories of snow accumulation change. Our proxy was successfully applied and verified in two ice cores from the Aurora Basin and WAIS Divide drill sites. This approach gives us a new geochemical tool for understanding past global changes and projecting how Antarctica may respond to future warming.

Can testate amoebae provide long-term baselines for monitoring peatland degradation and restoration success: applications from New Zealand to Ireland

Michelle McKeown

School of Biological, Earth & Environmental Sciences, University College Cork

The goal of this paper is to assess the sensitivity of peatland soil protozoa and vegetation to stress induced from anthropogenic activities with the aim of identifying a tool to provide rapid, reliable, and realistic analogues for peatland degradation. The paper focuses on lessons learned from New Zealand peatlands and have implications for assessing integrity of Irish peatlands and developing long-term baselines. Testate amoebae (single-celled free-living protozoa) are a powerful tool for assessing peatland integrity in response to changing ecological and hydrological conditions. We analysed vegetation structure, testate amoebae community assemblages and functional traits from two peatland complexes

across a gradient of perturbation. We found that the community structure of plants and testate amoebae follow different patterns depending on disturbance regimes across the two peatland complexes, and that they are not surrogates of one another. We also demonstrate that test compression and aperture position are promising indicators of disturbance, likely related to peatland soil moisture. Inferences are made from other functional trait characteristics, but further work is needed to hone our understanding. Overall, we show that testate amoebae are valuable bioindicators to assess below-ground integrity of New Zealand's peatlands and a similar pattern is observed from blanket bogs in the southwest of Ireland.

5. IQUA Spring Meeting 2023

Michelle McKeown

University College Cork
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We would like to invite you to the IQUA 2023 Spring Meeting, which will be held at University College Cork (UCC) on Saturday the 25th of March 2023 (see advertisement posted in this newsletter issue).

We welcome abstracts for oral presentations and posters from IQUA's postgraduate and early career researchers (ECRs). You may have just started your masters or doctoral studies or be in the final throws of thesis writing. You may be a freshly minted 'Dr' navigating your career in academia or industry, or a more seasoned early career researcher establishing your research group. Regardless of your career stage, we would like to invite you to present your research at the IQUA Spring Meeting. While the event celebrates IQUA's young talent, we encourage all IQUA members to attend for some lively discussions. The theme will be Quaternary Research and Societal Impact.

The event is being organised by Michelle McKeown from the School of Biological, Earth and Environmental Sciences (BEES). Please send abstracts (max. 200 words) to mmckeown@ucc.ie no later than 3rd of March 2023 (5 pm) under the email title IQUA2023. Registration fee is €20 for full members, €10 for student members, €30 for non-members, €15 for student non-members. Payable at the door.

Although registration is available on the day, we would appreciate it if you could let us know if you intend to come using the form:

https://docs.google.com/forms/d/e/1FAIpQLSdjbO4PUg-wks7Xh7uuLcn8B1P5ng1HiNsZlllQKjm8DEspLVA/viewform?usp=sf_link

6. IQUA Award News

Eileen Reilly Postgraduate Research Award

IQUA proudly sponsors the Eileen Reilly Postgraduate Research Award, in memory of Eileen Reilly, an active member of IQUA who passed away in 2018.

The Award consist of one grant of €500 to be used for either conference attendance, a training course, fieldwork or laboratory analysis by one of our postgraduate members, with each winner describing their research and the use of the award in articles in the IQUA Newsletter. Please note that if this award is to be used to purchase radiocarbon dates these should preferably be carried out at the ^{14}Chrono Centre for Climate, the Environment and Chronology.

Applicants must be working towards a Masters or PhD degree and be a paid up member of IQUA for a minimum of six months when the application is made.

The Eileen Reilly Postgraduate Research Award is now open for submissions. **The deadline is the 1st of March 2023.** Please send application forms directly to IQUA secretary Graeme Swindles (g.swindles@qub.ac.uk). The application form and terms and conditions can be found at http://iqua.ie/awards/.

7. Other IQUA News

Gill Plunkett

Geography, Archaeology and Palaeoecology, School of Natural and Built Environment, Queen's University Belfast
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Autumn Field Meeting 2023

The Autumn Field Meeting will focus on County Louth. Details will be announced in due course.

Prof. Emerita Paula Reimer

Prof. Reimer, long-standing but now retired Director of the ^{14}Chrono Centre for Climate, Environment and Chronology at Queen's University Belfast, was appointed as Honorary Officer of the Order of the British Empire (OBE) for her services to radiocarbon dating, calibration and chronology. Congratulations!

8. Research Reports

Doonowen, Coole Park, Co Galway: A Fortified Seasonal Island and Possible Centre of a Bronze Age Chieftainship

Michael Gibbons

Archaeologist

A unique turlough-bound hillfort has been identified in the karst lowland landscape of South Galway. This extraordinary monument, roughly oblong in shape (365 m N-S, 30–80 m E-W), was first mentioned in a one-line reference in a guide to Coole Park written by Feehan and O'Donovan (1993). It was then quietly forgotten. Subsequently, a short stretch (29 m) of its ramparts was visited and described by archaeologists but they concluded that it was perhaps a "dummy fort", of "questionable antiquity" (GA122-085 – RMP Files – pers. comm. Olive Alcock, National Monuments Service). This interpretation may have been influenced by its extraordinary location, crowning the southern end of a limestone table rising almost ten meters over the surface of Lough Doo, Garryland and Coole lakes, as well as its situation within the extensive Gregory Estate at Coole near the town of Gort.

Recent fieldwork by the author has confirmed that the site is a heavily fortified, walled seasonal island that seems to have been destroyed in Antiquity. The monument consists of a large (10 acre) walled enclosure, oriented N-S. It sits on a limestone table rising above the surrounding turloughs. The southern, narrow, end of the table is bisected by a large dump-rampart, 3–5 m in height and 29 m long (arrowed in Figure 1). The rampart continues along the western end of the table, although in this area much of the wall has fallen down the cliff-face. The wall is better preserved in the NW sector of the fort, although it is heavily overgrown (see Figure 2). The eastern face runs along the edge of a ravine and the rampart in this area is also heavily overgrown and difficult to trace.

Figure 1. Doonowen seasonal fortified island.

For roughly a third of the year, the rise in lake levels makes the site into a fortified island, while for the rest it serves as a hillfort. Following a detailed field inspection, the author was able to confirm that it is morphologically related to Bronze Age Hillforts and promontory forts.

Figure 2. Line of rampart close to possible ramped entrance at northwest.

Excavations have shown hillforts to be primarily Bronze Age occupation sites (McKeon and McCarthy, 2012, p.18; Molloy and O'Connell, 2012, p.118). The Bronze Age in the area to the south of Coole Park has recently been the focus of a publication on the route of the M18 Gort to Crusheen Road Scheme. The researchers discovered that the area was intensively inhabited throughout the Bronze

Age and a Middle Bronze Age Landnam phase was identified between c.1200 and 950 BC

Research on prehistoric farming in the vicinity of Caheraphuca Lough in north east Clare, close to the village of Crusheen by Karen Molloy and Michael O'Connell (2012, p. 120) demonstrates that "By far the greatest impact, in terms of woodland clearance and farming activity (pastoral but also with cereal growing) occurred towards the end of the Bronze Age" with the most intensive farming activity in the pollen record relating to the last two centuries of the second millennium BC: i.e., within the date range for the majority of Hillforts excavated in Ireland to date (Molloy and O'Connell, 2012, pp.109,118–120).

A separate discussion of the social organisation of the wider area within the same publication assumed that the settlement in the area would have come under the authority of a local hillfort, "While the area between Gort and Crusheen lies beyond the main North Munster Project, that territory may have come under the political influence of Mooghaun Hillfort, circa 30 km south of Crusheen. Alternatively, the area may have operated within a similar spatial and social hierarchy with its own political focus elsewhere – perhaps at some as yet unidentified hillfort." The authors go on to speculate that "it is possible that a large stone enclosure circa 225 m in diameter on Turlough hill, on the north east edge of the Burren c.14 km to the southeast" (note: the distance is more like 22 km to the south east – incorrect in original) "was a Bronze Age hillfort that functioned in the same capacity as Mooghaun and Dun Aonghusa, and controlled the area between Gort and Crusheen" (McKeon and McCarthy, 2012, pp.14–15). In contrast to McKeon and McCarthy, and in the absence of an identified hillfort, Molloy and O'Connell (2012, p. 121) proposed that "high levels of human activity need not necessarily be connected with high status site such as hill forts".

The newly identified site at Doonowen may represent the previously unidentified fort. Of the proposed hillfort sites, Turlough Hill remains undated and is morphologically unlike other hillforts, it has sixteen entrances, which would have complicated its role as a defensive site, and Mooghaun Hillfort is further away from the study area than Doonowen. Doonowen fort is 15 km north of Caheraphuca and shares many of the characteristics of a hill fort, including a large dump rampart similar to the ramparts at Mooghaun. It is in a visually commanding position within the lakeland corridor between the Burren Uplands to the west and the Slieve Aughty Hills to the east. As such Doonowen is a better candidate for a focal hillfort than either the Turlough Hill enclosure or the Newtown enclosure (which seems likely to be a univallate hillfort – although morphologically it is closer in form to a large ringfort of early Christian date than a Bronze Age Hillfort), approximately 18 km north of Caheraphuca. The fort at Doonowen represents an extraordinary adaption by prehistoric elites to a unique, turlough-bound, watery world. It seems likely to have been the centrepiece of a Bronze Age Chieftainship and possible to have been the origin of the Dun in Doonown.

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9. Recent Publications

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NOTE: IQUA members are reminded that they can link their work to the Irish Quaternary Research project on ResearchGate. Contact Gill Plunkett (g.plunkett@qub.ac.uk) if you wish to be added as a collaborator on the project.

IQUA Spring Meeting 2023

Date: Saturday 25th March

Venue: School of Biological, Earth and Environmental Sciences, Distillery Fields, North Mall, University College Cork (UCC)

Registration Opens: 09:00 am
Talks Begin: 09:30 am
AGM: 16:40 pm
Expected Closing: 17:30 pm

Registration Fee: €20 for full members, €10 for student members. €30 for non-members, €15 for student non-members. Payable at the door.

Organiser: Michelle McKeown, School of Biological, Earth and Environmental Sciences (BEES).

Please send abstracts (max 200 words) to mmckeown@ucc.ie no later than 3rd of March 2023 under the email title IQUA2023.

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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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