



Editor: Ellen OCarroll

1. Introduction

Dear IQUA member,
Welcome to Newsletter no. 57.

The IQUA spring meeting was held at the University of Ulster Coleraine and was a great success including a wonderful field trip along the North Coast which took us through medieval landscapes, castles as well as glacial landscapes. Our thanks to Sara Benetti, Peter Wilson and Colin Breen for organising such a varied and stimulating meeting. The postgraduate presentation prize was awarded to Edward Lockhart from Bangor University with an excellent and very well delivered talk on "Glacial sculpting and post-glacial drowning of the Celtic Sea."

The AGM included the election of a new secretary (Dr Benjamin Thebaudeau), a new treasurer (Dr Kieran Craven), a new website manager (Chris Randolph), publications officer (Sabrina Renken) and also new ordinary members (Darren Barry, Dr. Sara Benetti, Dr. Frank Ludlow, Dr. Bettina Stefanini and Dr. Gayle McGlynn). We would like to welcome the new committee members and thank most sincerely the continuing and outgoing members who have contributed to the growing success of IQUA and its associated events. Gayle McGlynn then presented the financial report at the AGM.

IQUA would like to extend their sympathies to the family and friends of Valerie Hall on her recent passing. Valerie not only made a major contribution to Quaternary research in Ireland but also served on the IQUA committee for a number of years (including as secretary). She will be very greatly missed by many, many people, and our thoughts are with her family during this difficult time.

Looking towards the second half of 2016, we have included the programme for the annual fieldtrip. This year's field meeting will take place in the Burren,

Co. Clare, over the weekend of the 30th September (see item 4 for further details).

We all look forward to the symposium in the autumn which is on the "Early Human Occupation of Ireland" and will be held on the 25th of November in GSI, Beggars Bush, Haddington Rd, Dublin 4.

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

Kind regards,
Ellen OCarroll

2. IQUA Committee (2016/2017)

President: Dr Catherine Dalton, MIC, University of Limerick (continuing)

Secretary: Dr Benjamin Thebaudeau, Maynooth University (elected)

Treasurer: Dr Kieran Craven, Geological Survey of Ireland, Beggars Bush, Haddington Rd, Dublin 4, (elected)

Postgraduate rep: Margaret Brown, MIC, University of Limerick (continuing)

Website manager: Chris Randolph (elected)

Publications Secretary: Sabrina Renken, Department of Geography, TCD (elected)

Newsletter editor: Dr Ellen OCarroll (continuing)

Ordinary members: Dr Steve Davis, UCD (continuing), Dr Rory Flood, QUB (continuing), Dr Gill Scott, GSI (continuing), Martha Coleman, Maynooth University (continuing), Darren Barry, MIC, University of Limerick (elected), Dr. Sara Benetti, University of Coleraine (elected), Dr. Frank Ludlow, TCD (elected), Dr. Bettina Stefanini, Maynooth University (elected), Dr. Gayle McGlynn, Department of Geography, TCD, (elected).

3. IQUA Spring meeting 2016

IQUA Spring Meeting and AGM, Ulster University, Coleraine Campus Abstracts 2016



PRESENTATIONS

An All-Ireland Quaternary Map.

Sam Roberson*¹, Xavier Pellicer², Mike Sheehy², Mark Cooper¹

1. Geological Survey of Northern Ireland

2. Geological Survey of Ireland

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Ireland has a rich history of Quaternary mapping. After 150 years a comprehensive map of Irish Quaternary deposits has yet to be published. The nearest equivalent is the BRITICE project, a database of glacial landforms. As a result knowledge of Quaternary deposits are often only localised. The absence of an All-Ireland Quaternary map is brought sharply into focus now that the next International Quaternary Congress will be held in Dublin in 2019.

We present the 1st draft of an All-Ireland Quaternary map at 1:500000 scale. The amalgamation of Quaternary maps from Republic of Ireland and Northern Ireland is not a straightforward process, due to differences in mapped scale, lithological codes and polygon distribution. Data from the Geological Survey of Ireland, the Geological Survey of Northern Ireland and the BRITICE project are simplified to produce a seamless data set of 17 sediment types and 4 geomorphological features. Soil geochemistry and airborne radiometric data from the Tellus and Tellus Border projects are used to differentiate till deposits in Northern Ireland. Tracts of geochemically similar

till are identified by cluster analysis of principal component scores. These data are used to delineate seven different till types in Northern Ireland and create a seamless map with the Republic of Ireland.

The first Quaternary map of an Irish offshore region: the Porcupine Bank, West of Ireland.

Benjamin Thébaudeau^{1,2}, Xavier Monteys¹ and Stephen G McCarron²

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²Maynooth University, Geography, Maynooth, Ireland

The Porcupine Bank's location on the north eastern fringe of the Atlantic Ocean, in a critical position between the shelf edge and the main land and along the line of the Polar Front, means it may contain significant indications of glacial/interglacial changes in northern hemisphere climate and in North Atlantic Ocean circulation. But it also means that it consists of strategically important marine environments with very likely future developmental pressures. Peer-reviewed publications on the geology of the Bank are very limited and this current state of knowledge will hamper any marine ecosystem research and protection. This paper will describe the first results of a research project aiming at filling the gap of our understanding of the region's shallow geology and subseabed resources and characteristics.

New geological mapping of the Quaternary shallow stratigraphy of the bank was undertaken using 2D seismic from research cruise and legacy industry datasets as well as sub bottom profiler data collected at a high density correlated with recently collected vibro-cores and oil and gas exploration wells and shallow boreholes. The seismic units (some correlated to groundtruthing) are consistently described and a regional map built.

Population dynamics of *Pinus* and *Ulmus* in Europe during the Holocene.

McGeevee, AH¹ and Mitchell, FJG²

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This work investigates and compares the population dynamics of *Pinus* and *Ulmus* in Europe, during the Holocene, at varying temporal and spatial scales, by using recently developed and novel modelling methods.

The first component characterises the European-wide post glacial rise and mid-Holocene decline experienced by both genera. Pollen data was extracted from 330 sites on the European Pollen Database (EPD). The depth of rise and decline events for each genus in each site core was defined by applying a spline curve, to remove stochastic noise from the pollen data, and identifying the range of depths along which the pollen values increased or decreased. The R package Bchron was used to calibrate radiocarbon dates and produce an age-depth model for each site, using stochastic linear interpolation and Monte Carlo methods. The age-depth model data was applied to the event depth range to produce a probability distribution of when the rise and decline events occurred.

The second component characterises *Ulmus* and *Pinus* when they were abundant on the European landscape. Depth and magnitude data of maximum pollen values for both genera were gathered from the EPD. The age-depth models were used to determine the age of the maximum pollen value depths.

These data were then plotted on maps and empirical Bayesian kriging was used to interpolate the spatial and temporal dynamics of these population events in the two tree genera.

This work, therefore, presents novel techniques to quantifying tree population dynamics, and also provides insight into the specific dynamics of two major tree genera in Europe.

Late Pleistocene incised-valleys filling in Lagoa dos Patos lagoon, Southern Brazil

Eduardo Bortolin¹, Dr. Andrew Cooper², Dr. Jair Weschenfelder¹

¹Universidade Federal do Rio Grande do Sul, Brasil

²Ulster University, Coleraine, UK

Modern studies have been focused in continental shelves response to sea level changes. Coastal plain environments are a clue to identify the landscapes variations occurred during Quaternary; for example, lagoons and estuaries are indicative of paleoriver courses. The Rio Grande do Sul (Southern Brazil) continental shelf is very gentle (0,03° - 0,08° slope), hence very vulnerable to sea level changes. This area shelters the biggest choked lagoon in the world, Lagoa dos Patos lagoon (10.000 km²), which represents a significant area flooded during the post-glacial event.

Seismic-stratigraphic records recorded incised valleys in the Lagoa dos Patos lagoon depositional sequence, suggesting that each morphologic lagoon cell is a drowned paleovalley. Around 1000 km of high resolution (3.5 kHz) seismic data was collected, mainly parallel to lagoon margins. Three SPT (Standard Penetration Test) and eight gravity drilling cores have been analysed to calibrate the seismic data interpretation. In addition, C-14 datations were carried out to provide chronological information.

Based on the analysis, a stratigraphic framework is being established for the depositional sequence. Furthermore, a comparison between the influence of allogenic and autogenic controls has being performed, affording new interpretations about back-barrier autogenic process.

Past and modern environments of Galway Bay.

Denise McCullagh¹, Sara Benetti¹, Ruth Plets¹, Robin Edwards².

¹Ulster University, Coleraine, UK

²Trinity College Dublin, Ireland

Quaternary environmental studies are essential to understand the speed and scale of modern day climatic and environmental change. The impact of these variations can be significant, and awareness

of how the environment reacts to these changes gives important information on the sensitivity of different ecosystems. A dynamic ice sheet extended off the western continental shelf of Ireland during the last glacial maximum (LGM), and its retreat left a strong signature in the form of submarine and terrestrial landforms. The period following the LGM was characterised by rapid and abrupt changes in relative sea level, especially in Galway Bay, however knowledge of the effects of these drastic changes in Galway Bay are limited.

This research is a multi-disciplinary investigation into the elements that have shaped Galway Bay, since the post glacial. So far, a detailed seismic stratigraphy has been created using 20,000km of high resolution pinger (3.5kHz) data. Alongside this the sedimentological evidence from 22 sediment cores is being investigated in order to construct a complete sequence stratigraphy for the area. Three AMS radiocarbon dates (awarded by IQUA) will contribute to the chronology, something which underpins the timing of the depositional processes, interpretation of the stratigraphy and reconstruction of environmental changes.

Glacial sculpting and post-glacial drowning of the Celtic Sea

Edward Lockhart¹, James Scourse¹, Katrien Van Landeghem¹, Dei Huws¹, Daniel Praeg², Claire Mellett³

¹Bangor University

²Pontifícia Universidade Católica do Rio Grande do Sul

³British Geological Survey

The stability of marine terminating ice sheets has global implications due to meltwater production and subsequent sea-level rise. By reconstructing the ice streams of the former British-Irish Ice Sheet, mechanisms of deglaciation can be inferred. The Irish Sea Ice Stream (ISIS) extended into the Celtic Sea and deposited fine-grained glacimarine sediments across the shelf during retreat. In four vibrocores, these sediments exhibit high shear strengths (>120 kPa) and visible laminae deformation. Additional geotechnical tests indicate lower mean void ratio and moisture content values

compared to glacimarine sediments from the Irish Sea. These tests were validated using multi-sensor core logger data which show similar differences in mean void ratio, suggesting different states of consolidation. Two hypotheses are presented to explain this; loading by the migration of large ridges present in the Celtic Sea or overriding by the readvancing ISIS. Subglacial processes are favoured here, due to the presence of shear deformation which cannot be attributed to vertical loading by migrating bedforms. This process of glacial overriding has not been constrained and warrants the further investigation into the glacial history of the Celtic Sea using newly acquired sediment cores and geophysical data to study the advance-retreat cycle of the ISIS.

Improved constraints on the extent and retreat pattern of the British Irish Ice Sheet from new offshore data in the Malin Sea.

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During the last glacial period ice streams drained much of western Scotland and northwest Ireland onto the continental shelf of the Malin Sea. This hypothesis is supported by terrestrial evidence and the presence of the Donegal-Barra fan on the

continental margin, the largest glacimarine sedimentary depocentre fed by the British-Irish Ice Sheet (BIIS). However, there has been limited research constraining the extent and timing of ice advance and retreat on and off the shelf during the last glacial period. This contribution presents new marine seismic, sedimentological and chronological data collected as part of the BRITICE-CHRONO project. Subglacial tills and glaciogenic debris flows in cores from the shelf and adjoining slope support evidence of ice at the shelf edge. The chronology shows that retreat from the shelf edge was underway by 24.4 ka cal BP with the majority of the continental shelf ice free by 22.6 ka cal BP. Cosmogenic nuclide dates onshore indicate that coastal sites were deglaciated as early as 21.5-20.8 ka cal BP. This timing is supported by a deglacial date of 20.1 ka cal BP from a core in the inner Malin Sea. Collectively these results indicate that the majority of the shelf was clear of grounded ice by ~21.5-20.1 ka cal BP. These are the first ages that constrain the retreat of the BIIS in this marine sector.

Ice sheet - ocean interaction in the eastern North Atlantic: evidence of millennial-scale climate events at the western Porcupine Bank

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The British Irish Ice Sheet (BIIS) is a useful past analogue to study the behaviour of a marine-based ice sheet in a warming world. Sediments taken from the lower slope of the Porcupine Bank (>2700 m water depth) have provided potential insights into the evolution and demise of the former BIIS.

Sediment grain size analyses and X-ray images confirm the appearance of ice rafted debris (IRD) during the last glacial period. Three IRD bands are associated with Heinrich Events (HE) which appear as distinct grey layers with a dense presence of IRD and accompanied high magnetic susceptibility. The remaining smaller IRD bands are inferred to be

linked with local European sources such as the BIIS.

Planktonic foraminifera census data register a slight increase in warm water species shortly before or during HE, but do not show significant links to the potential BIIS related IRD bands. Therefore, additional high resolution census data will be collected and geochemical approaches combining stable isotopes ($\delta^{18}\text{O}$) and trace elements (Mg/Ca) of planktonic foraminifera will be performed to explore changes in sea surface temperatures (SST), sea surface salinities (SSS) and water mass characteristics.

POSTERS

Mapping Malin: Using Geophysics to Understand the Quaternary

Kieran Craven¹

¹Maynooth University

In recent years (2000-present), the Irish National Seabed Survey (INSS) and Integrated Mapping for the Sustainable Development of Ireland's Marine Resources (INFOMAR) (Geological Survey of Ireland [GSI] and Marine Institute collaborations) have provided unprecedented quantities of high quality data on Ireland's offshore territories. Bathymetric, backscatter and shallow seismic data collection continues in near shore regions as multiple industries seek to develop the Shelf regions (e.g. fisheries, marine renewable energy, hydrocarbon exploration). This project aims to use available, high-resolution geophysical data and associated seabed sediment samples to map approximately 25,000km² of the shallow geology of the Malin Shelf (54°-56° North and 7°-10° West, <500m water depth) off the north and northwestern coasts of Ireland. The determination of sediment type and quantity (i.e. extent and thickness) will be a crucial component of any future evaluation of the region's capacity to host industrial activity. Seabed geology forms the architecture upon which biological habitats build. This recently started study will map this physical framework and provide new knowledge in a region with significant development potential to ensure best practice, including the highest levels of environmental protection, in any development.

Estimation of slip during paleoearthquakes using a genetic algorithm.

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Along the Sunda trench, the annual growth rings of coral microatolls store long-term records of tectonic deformation. Spread over large areas of an active megathrust fault, they offer the possibility of high-resolution reconstructions of slip for a number of paleo-earthquakes. These data are complex with spatial and temporal variations in uncertainty. Rather than assuming that any one model will uniquely fit the data, Monte Carlo Slip Estimation (MCSE) modelling produces a catalogue of possible models for each event. From each earthquake's catalogue, a model is selected and a possible history of slip along the fault reconstructed. By generating multiple histories, then finding the average slip during each earthquake, a probabilistic history of slip along the fault can be generated and areas that may have a large slip deficit identified. However, the MCSE technique requires the production of many hundreds of billions of models to yield the few models that fit the observed coral data. In an attempt to accelerate this process, we have designed a Genetic Algorithm (GA). The GA uses evolutionary operators to recombine the information held by a population of possible slip models to produce a set of new models, based on how well they reproduce a set of coral deformation data. Repeated iterations of the algorithm produce populations of improved models, each generation better satisfying the coral data. Preliminary results have shown the GA to be capable of recovering synthetically generated slip distributions based their displacements of sets of corals faster than the MCSE technique. The results of the systematic testing of the GA technique and its performance using both synthetic and observed coral displacement data will be presented.

Timing, forcing and onshore-offshore correlations on the western margin of the British-Irish Ice Sheet

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Ice sheets grow and decay in response to climate change. When disappeared they leave a rich geological record of their former behaviour and extent (e.g. sediments, drumlins, moraines). Although the British-Irish Ice Sheet (BIIS) has been investigated for over 100 years, little is known about its offshore ice extent. However, evidence for grounded ice masses have been discovered recently on the western Irish shelf. Understanding the dynamics of the last BIIS can provide vital information on long-term climate change and allows predicting the behaviour of Greenland and Antarctic ice sheets in the future.

The aim of this study is (1) to map the spatial extent of glacial deposits on the shelf (using seismic data), (2) to identify glacial processes occurring during ice sheet maximum extent and retreat (by sediment cores and seismics), (3) to assess the timing of the ice sheet retreat (by ¹⁴C and CN dating) and (4) to reconstruct the pattern of ice sheet retreat from offshore to onshore.

The results of this multi-proxy approach and their implications will be of great value for future detailed reconstructions of the dynamics of the BIIS during the Quaternary period and in greater detail during the last glacial period.

The Impact of Urbanization on the Regional Aeolian Dynamics of an Arid Coastal Dunefield

Alex B. Smith¹, D.W.T. Jackson, J.A.G. Cooper

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The rise of the tourism industry at Maspalomas has led to this site's intensive urbanization over the past fifty years. Construction has been centered on an elevated paleo alluvial terrace that extends into the central section of an active transgressive dune field and has modified regional airflow patterns. Maspalomas is comprised primarily of highly active barchans and barchanoid dune ridges that migrate to the south west in relation to high magnitude north east Trade Winds that predominate in the fall and winter months. A combination of in-situ measurements and modelling techniques has been used to identify the impact of the urban area on airflow dynamics across the entire dunefield. Results show that the urban area has led to the deflection and acceleration of airflow around the terrace. In downwind locations flow velocity has been greatly diminished while producing large scale eddies as turbulent airflow conditions are produced as winds are forced over the urban area. Regional airflow changes are leading to increased surface stress in locations where flow acceleration have been magnified. These altered airflow patterns have contributed to a dunefield that is experiencing a negative sediment budget at a rate that is unsustainable for future of this natural resource.

The reconstruction of the British-Irish Ice Sheet (BIIS) dynamics from deep-water sediments on the NW Irish continental margin.

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The British-Irish Ice Sheet (BIIS) was a partially marine-based, dynamic ice-sheet that during its last extension in the Late Quaternary followed sub-milankovitch climatic oscillations. In deep-water these advance and retreat events are displayed by changes in the sedimentation styles. Presence of Ice Rafted Debris (IRD) and mass transport deposits such as turbidites are typical of cold intervals, whereas hemipelagites and contourites are deposited during warm periods.

Three different depositional systems are part of this research, the Rockall Trough, the Donegal-Barra fan and three channels on the Irish continental shelf.

Lithofacies based on sedimentological identification, physical properties and X-rays, together with abundance of *Neogloboquadrina pachyderma* left coiling and IRD concentration are the methodologies used. Isotopic analysis is being carried out on core CE10008-20A from the Rockall Trough for reconstruction of paleotemperature and paleoproductivity. Grain size analysis is being used to reconstruct paleocurrents and quantify their speed. Two radiocarbon dates, in collaboration with the BRITICE-Chrono consortium, allow the addition of a preliminary chronostratigraphy.

The results obtained will allow the correlation of the three different environments and will be used to reconstruct and chronologically constrain the variability of the BIIS in this specific deep-water sector. Particular interest will be focused on grain size analysis and the possible role of the BIIS in the North Atlantic Oceanic Circulation.

4. IQUA/QRA Annual Fieldtrip 2016 to the Burren: 30th Sept – 2nd Oct 2016



This year's field meeting will take place in the Burren, Co. Clare, over the weekend of 30th September to 2nd October.

We will be based in the Lady Gregory Hotel, Gort, Co. Galway. The hotel is holding 15 rooms at a discounted rate for IQUA members of €85 per night for a double room /€75 single, including breakfasts. Anyone wishing to book should ring the hotel as soon as possible and quote "the Irish Quaternary Association" or "IQUA" to avail of the discount.

As we are planning to hire a coach to reduce the problem of a large convoy of cars on the narrow roads of the Burren we need to know numbers. So please let us know as soon as you can if you intend to participate so that we know what size of coach will be needed.

The itinerary is as follows:-

Friday evening - we will meet at the Lady Gregory Hotel in Gort for registration and two presentations. Pete Coxon will talk about the type site for the Gortian inter-glacial, and Maria Long will show us some of the botany that we would have seen earlier in the year. She will be talking more during the visits tomorrow.

Saturday morning - We will board the coach and travel to Turlough Hill. Here we will look at the archaeology with Ros O'Maolduin, the botany with Maria Long and Richard Moles will talk about Burren soils (or lack of them!).

Lunch will be at Cassidy's of Carran. They have agreed to open for us (it's out of season) and do soup and sandwiches for €10 a head.

After lunch David Drew and Colin Bunce will lead us around the Carran Polje. Then to the NUIG Research Station where Michael Lynch will show some of the finds from his sites at Fanore an Fisher Street which we will be visiting the next day. We may also make short stops along the way to look at places of interest, for instance Kilnaboy church and the mushroom stones. Any suggestions on suitable stops will be gratefully received.

Then back to Gort for dinner, etc.

On Sunday morning the coach will take us to several sites on the coast between Fanore and Doolin. Mike Simms and Michael Lynch, will lead us there. On the way we plan to take a look at Poulabrone. Anne Lynch has recently published a splendid book on her excavations there and we are hoping that she will be able to come and talk about it. We need to be there fairly early before the Grockles arrive. We, of course, are not to be counted amongst their number!

Finally, there will be a lunch stop, possibly in Kilfenora, before we disperse for home.

5. IQUA Autumn Symposium 2016

Venue: Geological Survey of Ireland Lecture Theatre, Ballsbridge, Dublin 4.

Date: Friday 25th November 2016

"IQUA's **2015 Autumn Symposium** will take place on **Friday November 25th** in the Geological Survey of Ireland's Lecture Theatre, Beggars Bush, Dublin 4. This year's symposium theme is entitled, "Early Human Occupation of Ireland".

6. Notices and Awards

* Dating and analysis awards 2016 *

The official call for the postgraduate and general awards will go out before the end of September. The deadline for applications is 31st October. The awards will have the same structure as in previous years and the final winners will be announced at the IQUA symposium on the 25th November 2016.

* PhD awards 2016 *

We would like to congratulate our colleague Dr Jared Peters for the award of his PhD <http://www.ulster.ac.uk/es/resstudent/jared-peters/>. Jared's PhD project was on 'Late Quaternary glaciation of the continental shelf offshore of west Ireland'

* GSI Funding *

Congratulations to people in the Quaternary community who were awarded funding at the last GSI short call. A list of funded projects can be found here

<http://www.gsi.ie/Research/Research+Short+Call+2015.htm>

7. Workshops, seminars, conferences & news

*** INQUA organisation update ***

Since the great success of the Irish bid to host the next INQUA congress there has been much progress with regards organisation and collaborating. The Local Organisation Committee and Scientific committee have met fully once and has organised itself in subcommittees:

- a. The fieldtrip subcommittee has reported updates on the soon to be published guidelines for proposal of fieldtrip with a reminder that all the fieldtrips on offer in the bid document were promised to be run.
- b. The outreach subcommittee has reported their strategy in a coherent Quaternary brand for media, education and research to boost the general awareness of our field and enhance the benefits to IQUA post congress.
- c. The early career subcommittee has highlighted their plan for workshops, informal events and academic speed dating as well as ideas for some method courses and a special event on “women in science”.

*** ITN GLANAM Meeting ***

In addition to hosting the IQUA Spring meeting, Ulster also hosted the final Marie Curie ITN GLANAM (Glaciated North Atlantic Margins) meeting (<http://www.glanam.org/>). GLANAM (Glaciated North Atlantic Margins) is an Initial Training Network (ITN) funded under the EU Marie Curie Programme. It comprises 10 research partners from Norway, UK and Denmark, including 6 University research teams, 2 industrial full partners and 2 industrial associate partners. The GLANAM network will employ 15 early career researchers (‘Fellows’) to undertake a co-ordinated research programme on the Glaciated North Atlantic Margins.

*** Heritage Week events across the Country:
August 20th to August 28th, 2016 ***

<http://www.heritageweek.ie/>

Thursday – August 25th

Dublin – City Wall Space, Wood Quay Venue, Dublin Civic Offices

Road, Rail and Rebellion

This public seminar will present a number of papers considering aspects of Ireland’s turbulent history from the 1830s to the 1920s. Emer Dennehy will present an account of a 19th-century cholera burial ground rediscovered during the Luas Cross City project; Padraig Clancy will relate how the 1916 insurgents used the trams during the Rising; and Donncha Ó Dúlaing will consider how the statutory erected in Dublin from the 19th to the 20th century reflects the ebb and flow of different political movements and ideals. Finally, Faith Bailey will discuss a War of Independence ambush site at Coolnacaharragh, Co. Cork, on the N22; reconstructing the ambush using records from the military archives.

Time: 15:45 to 20:00

Booking is essential, please register using Eventbrite – <https://www.eventbrite.ie/e/road-rail-and-rebellion-a-tii-heritage-week-event-tickets-25809311345?aff=es2>

8. Recent Publications

Dunlop, P., Wilson, P., Cooper, M., Roberson, S. & Donald, A. 2015. From rocks to ridges: the formation of upland landscapes in the north of Ireland. *Mountaineering Ireland*, Dublin.

Evans W., Benetti S., Sacchetti F., Jackson D., Dunlop P., Monteys X. (2015). *Bedforms on the northwest Irish Shelf: indication of modern active sediment transport and interaction with paleo-glacial sedimentary deposits*. *Journal of Maps*, 11(4), p. 561-574 doi: 10.1080/17445647.2014.956820.

Eze, P.N., Knight, J. and Evans, M. 2016. Tracing recent environmental changes and pedogenesis using geochemistry and micromorphology of alluvial soils, Sabie-Sand River Basin, South Africa. *Geomorphology*, 268, 312-321.

Flood, R.P., Bloemsa, M.R., Weltje, G.J., Barr, I.D., O'Rourke, S.M., Turner, J.N. and Orford, J.D., 2016. Compositional data analysis of Holocene sediments from the West Bengal Sundarbans, India: Geochemical proxies for grain-size variability in a delta environment. *Applied Geochemistry*. doi: <http://dx.doi.org/10.1016/j.apgeochem.2016.06.006>

Jarman, D. & Wilson, P. 2015. Anomalous terrain at Dove Crags 'cirqueform' and Gasgale Gill asymmetric valley, English Lake District, attributed to large-scale rock slope failure of pre-LGM origins. *Proceedings of the Yorkshire Geological Society* 60, 243-257. Mayet, N., Knight, J. and Grab, S.W. 2016. Spatial and temporal patterns of lightning strikes in the eastern Lesotho Highlands, southern Africa. *South African Geographical Journal*, 98 (2), 321-336.

Knight, J. and Grab, S.W. (eds) 2016. *Quaternary Environmental Change in Southern Africa: physical and human dimensions*. Cambridge University Press, Cambridge, 468pp. ISBN 978-1-107-05579-7.

Lord, T.C., Thorp, J.A. & Wilson, P. 2016. A wild boar dominated ungulate assemblage from an early Holocene natural pit fall trap: Cave shaft sediments in northwest England associated with the 9.3 ka BP cold event. *The Holocene* 26, 147-153.

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