



Irish Quaternary Association (IQUA)

Spring Meeting and AGM 2015

25 April 2015

Computer Science Lecture Hall 1,

Callan Building,

Maynooth University

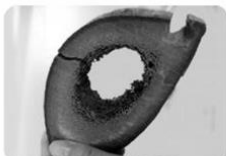
Programme and Abstracts



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Programme

9:30-10:00: Registration, Callan Building entrance Hall

10:00-10:05: Welcome and house-keeping

10:05-10:25: Jasper Knight - *Subglacial processes and environments: a view from Clew Bay*

10:25-10:45: Sabrina Renken - *Ice Sheet - Ocean Interaction in the North Atlantic, West Porcupine Bank, Offshore Ireland: A Palaeoceanographic Perspective*

10:45-11:05: Carlos Chique - *A Palaeolimnological Investigation in a Polluted Freshwater Lake – Lough Muckno, Co. Monaghan*

11:05-11:40: Coffee break and poster session

11:40-12:00: Karen Taylor - *A high resolution palaeoenvironmental assessment of the Neolithic at the Carrowkeel-Keshcorran complex, County Sligo, Ireland*

12:00-12:20: Alwynne McGeever - *Investigating the population dynamics of Pinus and Ulmus in Europe during the Holocene*

12:20-12:40: Martha Coleman - *A reconstruction of North Mayo's Late Quaternary Glacial Landscape using AMS 14C Dating and Palaeoenvironmental Evidence*

12:40-14:00: Lunch Break

14:00-14:20: Seamus McGinley - *A Palaeolimnological Investigation of Lough Lugh at the Mythical Center of Ireland*

14:20-14:40: Kathleen Crossen - *Genetic diversity of ancient Scots pine populations in Ireland and Scotland*

14:40-15:00: Coffee break and poster session

15:00 IQUA AGM

INQUA 2019



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Subglacial processes and environments: a view from Clew Bay

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Abstract

Subglacial sediments are preserved along the southern margin of Clew Bay (Co. Mayo, western Ireland) and are particularly well-exposed within drumlins at Thornhill, Carrowmore Quay and Askillaun. The regional sediment stratigraphy, of a grey limestone-rich till (Askillaun Till) overlain by a red sandstone-rich till (Newport Till), conceals considerable variability as to the internal sedimentary structures within the drumlins. These structures are important, however, because they can inform on subglacial processes and environments, including subglacial water availability, degree of ice-bed coupling, and glacitectonic processes behind the ice terminus. This study presents sedimentary and structural evidence from Thornhill, Carrowmore Quay and Askillaun that illustrates changing subglacial processes and environments across Clew Bay during the late Midlandian glaciation. A particular focus is placed on brittle (clastic dikes, hydrofractures) and ductile structures (folds, soft sediment deformation), because these reflect variable patterns of ice-bed coupling. A model for drumlin development, incorporating both stratigraphic and structural data, is presented.

Ice Sheet - Ocean Interaction in the North Atlantic, West Porcupine Bank, Offshore Ireland: A Palaeoceanographic Perspective

Sabrina J. Renken¹; Robin J. Edwards¹; Stephen G. McCarron²; Sara Benetti³; Andrew J. Wheeler⁴; Lee T. Toms⁵; Nicholas L. Owen¹

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Abstract

The North Atlantic region is a key site for understanding the role of oceanographic and climatic changes. Since the Greenland Ice Sheet exhibits ice sheet collapses over the last decade, concerns about the potential contribution to alterations in temperature, sea level and the Atlantic Meridional Overturning Circulation (AMOC) configuration and strength are reinforced.

The British Irish Ice Sheet (BIIS) is a useful past analogue for the behaviour of a marine-based ice sheet in a warming world. Sediments accumulating along the Porcupine Bank and in the adjacent Rockall Trough have provided potential insights into the evolution and demise of the former BIIS.

X-ray images confirm the appearance of ice rafted debris (IRD) throughout the last glacial within sediment cores taken from the lower slope of the Porcupine Bank (>2700 m water depth). The IRD can be well differentiated from Heinrich Events (HE) which appear as distinct grey bands with a dense presence of IRD and accompanied high magnetic susceptibility. Accordingly, the Porcupine Bank region west of Ireland seems clearly influenced by the BIIS and by imprints coming from Laurentide Ice Sheet (LIS) triggered HE. The chronology of the cores will be given by lithostratigraphic and foraminifera based

event-stratigraphy correlations to already existing cores and data. The acknowledged radiocarbon dates will work as age markers and enhance stratigraphic 'tie-points' of the sedimentary sequence with previous work.

In which extend the oceanographic conditions at the Porcupine Bank were influenced by the BHS or how the conditions changes during HE is distinguished by foraminifera based analyses. Planktonic foraminifera assemblage data and an approach combining stable isotopes ($\delta^{18}\text{O}$) and trace elements (Mg/Ca) of planktonic foraminifera are performed to explore changes in sea surface temperatures (SST), sea surface salinities (SSS) and water mass characteristics.

A Palaeolimnological Investigation in a Polluted Freshwater Lake – Lough Muckno, Co. Monaghan

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Abstract

This project involves the analysis of a number of ecological indicators in a sediment core obtained from Lough Muckno located in Co. Monaghan, Ireland. L. Muckno has experienced long-term eutrophication which has severely impacted the water quality of the lake and associated systems. Given the lack of long-term monitoring data for L. Muckno, a ‘palaeolimnological’ approach involving the reconstruction of water quality parameters and catchment land-use through the use of chironomid (non-biting midge fly) and pollen grains was implemented. This reconstruction is based on a comprehensive time-span aimed at identifying human impacts on the system across timescales. A link between (neo-) limnology and palaeolimnology will be established by integrating the palaeolimnological reconstruction with contemporary data on chironomid spatial distribution within the lake basin. This link will allow for a better understanding of modern lake conditions and to fully interpret past changes in fossil assemblages observed throughout the sediment sequence. The results of this project will aid in the identification of ecological ‘reference’ conditions in L. Muckno, but are also expected to document multiple eutrophication and recovery episodes through time. The project involves the first reconstruction of vegetation cover change based on pollen evidence in Co. Monaghan during the Holocene, and one of the few in the wider region. Emphasis has been given to periods of anthropogenic disturbance in the catchment area starting in the Neolithic (c. 4000 BC). The presentation will provide an overview of the project, methodology, and results to date including the outcome of pollen analysis.

A high resolution palaeoenvironmental assessment of the Neolithic at the Carrowkeel-Keshcorran complex, County Sligo, Ireland

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Abstract

This study provides a high resolution palaeoenvironmental assessment of the Neolithic at the Carrowkeel-Keshcorran complex, County Sligo. Using a high sampling resolution (160 samples with a 6.5 - 15 year sampling interval (mean = 9.9 years)) combined with a multiproxy analysis of a lake sediment core, allowed for detailed information on the timing of within-lake responses to Neolithic human activity. Chironomid (non-biting midge fly) subfossils and lake sediment geochemistry ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$ and C:N) were used to assess changes in limnological conditions through time. The limnological data were compared with macroscopic charcoal concentration and pollen data to examine the potential influence that early farmers had on a freshwater lake system within a prehistorically active catchment.

This study was successful in detecting evidence of anthropogenic activity and subsequent impacts to the lake system through nutrient loading and lake eutrophication. The most intensive period of human activity occurred from 3775 - 3610 BC - Early Neolithic farming. This was followed by a period of decline in human activity from the Middle to Late Neolithic, with a return of small scale activity at the end of the Late Neolithic. The nutrient enrichment during the Early Neolithic, was presumably as a result of substantial input of animal waste into the lake, as indicated by increased levels of $\delta^{15}\text{N}$ and decreased levels of $\delta^{13}\text{C}$ and C:N during this time. This study emphasises the usefulness of chironomids in archaeological research and provides further affirmation of this methodological approach for investigations into prehistoric farming.

Investigating the population dynamics of *Pinus* and *Ulmus* in Europe during the Holocene

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Abstract

Pollen data from *c.*300 sites on the European Pollen Database (EPD) were used to investigate the decline dynamics of pine (*Pinus*) and elm (*Ulmus*) tree populations in Europe during the Holocene. The R package Bchron was used to create a time-depth chronology for each core and construct a dataset of 10'000 values within the time range a decline event occurred. Using the mean and standard deviation of these 10'000 values, a series of maps were made to show when a decline was happening at each site.

The earliest *Pinus* declines cluster around the Alps at the beginning of the Holocene. By 8000calBP decline events occur in the British Isles, spreading through Ireland from 6000calBP-2200calBP. Two peaks in the frequency of decline events occurred at 8500calBP and 5500calBP.

Declines in *Ulmus* populations also started in the Alpine region at the beginning of the Holocene. These decline events spread quickly across Europe, reaching the north coast of The Netherlands by 9400calBP, and reaching Scotland by 8600calBP. The peak in the frequency of declines occurred at 5000calBP.

This work shows how the decline of these tree populations spread across Europe, and demonstrates a method that incorporates the uncertainty of defining where in a core an event happens, and the uncertainty associated with extrapolating dates of depths from a radiocarbon dated core.

A Reconstruction of North Mayo's Late Quaternary Glacial Landscape Using AMS ^{14}C Dating and Palaeoenvironmental Evidence

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Abstract

Six new AMS ^{14}C dates widen and strengthen the British-Irish Ice Sheet reconstruction along the North Mayo coast between ~19573 – 20691 cal. BP. Results concur with previous literature and brings evidence of late Quaternary glacial activity further west along the coast to Seal's Bed, 1km from Belderg. The dating of an articulated *Macoma calcaria* bivalve at Fiddauntawnanoneen Valley (19842 – 20328 cal. BP) infers an *in situ* depositional environment with little or no reworking. Dates are further enhanced by X-Ray Diffraction on mollusc samples and use of the new Marine13 calibration curve. The dominance of foraminifera, *Elphidium excavatum clavatum* and *Cassidulina reniforme*, both cold water species, reinforces the inferred Arctic conditions and previously hypothesised glaciomarine environment. Dating and palaeoenvironmental evidence points to a deglacial sequence correlating with the end of the Last Glacial Maximum. The previously inferred model of rapid sedimentation indicative of meltwater discharge during tidewater glacier conditions is agreed with by the results of this study. Previously only dated once, Fiddauntawnanoneen Valley provides substantial evidence for *in situ* depositional conditions due to the presence of dated articulated bivalves, no recrystallisation on mollusc samples dated, bedrock exposure indicating no break in sequence exposure and the presence of pristine foraminifera assemblages.

A Palaeolimnological Investigation of Lough Lugh at the Mythical Centre of Ireland

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Abstract

Lough Lugh is a pond that lies at the heart of the ancient ceremonial complex on the Hill of Uisneach, the ancient mythological centre of Ireland. This presentation marks a continuation of the Discovery Programme's Late Iron Age Roman Ireland (LIARI) project (Schot et al., 2014) that used evidence from chironomid, pollen and loss-on-ignition (LOI) testing to reconstruct Lough Lugh's history. This presentation expands on the earlier chironomid data and introduces additional techniques including stable isotope ($\delta^{15}\text{N}$, $\delta^{13}\text{C}$ and C:N ratios) to analyse the lake sediments in order to develop a better understanding of the pond's history. The geochemical and chironomid evidence show a shift from open water to semi-terrestrial marsh conditions from the Early Holocene. There is an abrupt shift to open lake conditions in the more recent past, indicating that Lough Lugh is likely an artificial/reconstituted pond, dug out at some time(s) since the start of human activity on the Hill. Drawing the palaeolimnological results together with the archaeological, historical, placename and folklore evidence we suggest that while the pond was probably dugout on multiple occasions, Lough Lugh may possibly have acquired a more prominent role in ceremonial activity at Uisneach in later prehistory.

Genetic diversity of ancient Scots pine (*Pinus sylvestris* L.) populations in Ireland and Scotland

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Abstract

Indigenous populations of Scots pine in the British Isles are now limited to north-west and central Scotland. However, palaeoecological evidence suggests that Scots pine was much more widely distributed in the past. According to fossil pollen and other plant macrofossil evidence, the species entered south-east England at least 10,000 years ago and expanded across Britain to west Ireland and north Scotland. Approximately 4000 years ago, a widespread decline was observed in pollen frequencies of Scots pine and indigenous populations have become limited to their current localities as a result. Previous research has investigated possible causes of the Holocene pine decline, however the results of this research has been inconclusive. I am carrying out a population genetic analysis of 2 ancient populations of Scots pine using DNA markers developed from the chloroplast genome. DNA markers are being amplified from fossil pollen grains preserved in lake sediment cores from County Donegal, northwest Ireland (where the indigenous populations are now extinct) and Loch Maree, northwest Scotland (where an indigenous population still exists). This research will help to determine when these populations last had a common ancestor and what the genetic diversity is like between ancient populations, and whether the Irish and Scottish populations are each other's nearest relative, or have separate origins within the total diversity of European Scots pine. This may give some indication as to why the only native populations now survive in north-west and central Scotland.