IQUA

Cumann Ré Cheathartha na h-Éireann

Irish Quaternary Association

http://www.tcd.ie/Geography/IQUA/Index.htm

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Editor: Catherine Dalton

1. Introduction

Dear All,

Welcome to IQUA newsletter No. 35. Items in this edition include contributions from Ceridwen Edwards (TCD) on extinct giant deer traced to modern relatives by ancient DNA, news of recent archaeological fieldwork at Belderrig, North Mayo from Graeme Warren (UCD) and a review of Quaternary studies in Ireland by Pete Coxon (TCD).

Postgraduate contributions were received from Karen O'Reilly (TCD), Karen Logan (Queens), Teresa Broggy (UL-MIC) and Claire McLoughlin (UCD) and we have the usual updates on IQUA field-meetings and annual symposium.

Contributions to the Newsletter No. 35 were difficult to source. A big thank-you to all those who took the time and effort to submit articles, abstracts and other items of information and for making the current newsletter possible. The IQUA committee has decided to alter the timing of the newsletter to January/February and July/August so please make every effort to submit or even suggest contributions.

2. IQUA Fieldmeeting 2005

IQUA Autumn Fieldtrip 2005

Sunday 16th October, Bray/Killiney coastal Section, Co. Wicklow
Steve McCarron, IQUA Chairperson.

This years autumn field meeting was abbreviated from the usual weekend/overnighter. An intended cooperation again with the IAH, which worked so well in 2004 with the superbly organised trip to NW Mayo and Pollatomish by the IAH committee and Fionnuala Collins in particular, was cancelled, principally as IQUA has recently visited the intended field area (Kilkenny's environs in 2002). It is very much hoped that the IAH trip was a great success, and that a suitable venue and leaders can be found for a joint trip next year. All suggestions and interest in leading a trip are always welcome from the IQUA membership. Contact the Chair (mailto:stephen.mccarron@nuim.ie) if you'd like to get involved in organising, or helping to organise an event.

Sunday 16th October dawned misty, but promising. The day stayed clear, and only a few small feet got wet (sorry Sky Taylor!) from the high Spring tide. A 10 o'clock start at Bray Harbour car park, near the DART line, was intended to tempt many IQUA members out of bed on a Sunday morning, but unfortunately failed to do so. Attendance was unfortunately limited to half a dozen members.

For those who did brave the outdoors, the visit proved refreshing and stimulating, and allowed some good discussion of the alternate opinions about the origin of the rather complicated sediment pile between Bray and Killiney. Future literature on the site is promised, and should serve to add to the debate. Many sediments in similar positions around the Irish coastline are currently being reinterpreted in literature of predominately British origin, and it behoves Irish workers to avail of the sections' relative accessibility and evaluate the models being proposed.

The excellent exposure is a direct product of the reclaiming by the Irish Sea of a more extensive tidal zone, work which is ongoing rapidly along the east central Irish coastline. Indeed, sites observed by Pete Coxon on the Autumn IQUA excursion in 1979 are now a good 15m more landward.

The site is now central in the debate between the subglacial and glaciomarine origins of sediments in Irish coastal locations, and hopefully the brief IQUA visit allowed some members to appreciate the scale of the section and problems associated with its interpretation. The site is extremely accessible, either by continuing north from Bray Harbour, south from Killiney beach, or by travelling east along Corbawn Lane from Shankill Dart Station. All IQUA members with an interest in glacial sediments are encouraged to walk the beach, check out the section and get informed about the sediments under debate!

Following the trip, we sojourned to Bray for a pleasant lunch and chat. Thanks to everyone who came and took part on the trip. I can only appeal to members to renew efforts to support association activities!

Regards,
Steve McCarron

3. IQUA Spring Meeting & AGM 2006

The date for the next meeting has not yet been selected.

4. IQUA Autumn Symposium

IQUA Autumn Meeting November 2005
Geological Survey of Ireland, Dublin
Friday 25th of November 2005, 10am - 5pm

Reconstructing Changing Climates

KEYNOTE SPEAKER Professor Michael Bird

Michael Bird* David Taylor and Chris Hunt
School of Geography & Geosciences, University of St Andrews, Scotland, UK
Palaeoenvironments of insular Southeast Asia during the Last Glacial Period: A savanna corridor in Sundaland?

Dr Jasper Knight
Department of Geography, University of Exeter, Tremough Campus, Penryn, TR10 9EZ, UK
Evaluating climatic and environmental events from periglacial slope deposits: a perspective from the southern Irish Sea Basin

Dr Fraser Mitchell, Pirita Oksanen and Bettina Stefanini
Department of Botany, School of Natural Sciences, The University of Dublin, Trinity College, Dublin
Reconstructing climate variation in Ireland over the last 4,000 years from peat proxy records

Dr Kieran Hickey
Department of Geography National University of Ireland, Galway
Documentary evidence for climate reconstruction with particular reference to weather diaries and other observational data sources

Jenny Watson, Postgraduate Research Student
Centre for Chronology, Climate and Environmental Change (14 CHRONO), Palaeoecology Centre, School of Archaeology and Palaeoecology, Queens University Belfast
Quantifying climate change across northern Europe during the Last Glacial-Interglacial Transition (LGIT; 15-10ka BP): Testing hypotheses of climate change using two separate insect proxies

Karen Rogers, Postgraduate Research Student
Centre for Chronology, Climate and Environmental Change (14 CHRONO), Palaeoecology Centre, School of Archaeology and Palaeoecology, Queens University Belfast
Climate and environmental change in New Zealand at the end of the last ice age: testing hypotheses of inter-hemispheric climate change using fossil Coleoptera

Dr Manel Leira
Department of Geography, School of Natural Sciences, The University of Dublin, Trinity College, Dublin
Title to be confirmed

Professor David Taylor
Professor of Geography and Head, School of Natural Sciences, The University of Dublin, Trinity College, Dublin
Title to be confirmed

Nora C Bermingham
Department of Geography, University of Hull, Hull
Autogenic versus allogenic: Irish rasied bogs and 'climate memory'

Graeme Swindles, Postgraduate Research Student
School of Geography, Archaeology and Palaeoecology, Queen's University Belfast
Examining the evidence for solar forcing of Holocene climate from peatlands in the north of Ireland

Dr Freea Itzstein-Davey
Department of Geography, School of Natural Sciences, The University of Dublin, Trinity College Dublin
Are environmental changes during the terminal Neolithic in the lower Yangtze, China, synchronized with human cultural changes?

Cost €5, includes book of abstracts, morning and afternoon tea. Enquires to Freea Itzstein-Davey, Telephone: +353 1 608 3871; email: itzsteif@tcd.ie

6. Research

Extinct Giant Deer Traced to Modern Relative by Ancient DNA
Ceiridwen Edwards (TCD)

Copyright: National Museum of Ireland.
The Irish elk is the largest deer that ever lived. The name 'Irish elk' itself is a misnomer, because the animal is neither an elk (it is a relative of the fallow deer), nor is it particularly Irish, though many finds have been made in Irish peat bogs.

Researchers at the **Smurfit Institute of Genetics, Trinity College Dublin**, in collaboration with University College London, have found the closest living relative to the extinct giant Irish deer – the largest deer ever to have lived. Using a combined approach of molecular DNA analysis and morphological measurements, they found that the giant deer is related to the modern fallow deer, a much smaller species that is still present across Europe. This is the first time this multidisciplinary approach has been used to reveal an extinct animal's living descendants.

The results, published in the prestigious journal Nature, contradict recent morphological studies that placed the giant deer closer to the living red deer, and end a century-long debate about how the extinct giant mammal is related to smaller living deer.

Dr. Ceiridwen Edwards, working in the laboratory of **Prof. Daniel Bradley** and supported by an IRCSET grant, joined forces with Prof. Adrian Lister and Dr. Ian Barnes from UCL, to help prove this link to the fallow deer. The findings were based on the analysis of 74 key morphological characteristics (such as antlers, skull and teeth size/shape) and DNA sequence evidence. DNA was extracted from the bones of two extinct giant deer – one was 13,000 years old and found in Co. Waterford, while the other was an 8,000 year old sample from Siberia. These data were then compared with deer from around the world to find its relationship to the modern species.

The giant deer (or *Megaloceros giganteus* – meaning gigantic antlers) roamed Europe and Central Asia until its extinction some 8,000 years ago, although it became extinct in Ireland around 2,500 years earlier, before humans arrived in the island. Reaching a shoulder height of around two metres, it would have towered over its living descendant. However, although modern day fallow deer are now comparatively diminutive (around 90 cm), this is due to their becoming smaller and sleeker since the split from giant deer, around four million years ago.

It is probable that different evolutionary forces created such drastic differences, with fallow deer adapting to new habitats more readily. This may explain why the fallow deer survived the climate change at the end of the Ice Age. Arguably the most striking aspect of the giant deer, the gigantic antlers (spanning up to 4 metres) are now believed to have been the ultimate cause of their disappearance. After the last glaciation, as dense forests replaced cool, arid grasslands, the dietary intake of minerals would have been insufficient to meet requirements for antler mineralisation, leading to osteoporosis, malnutrition, enfeeblement and, eventually, extinction.

Note: this article also appeared in Trinity Research News

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Quaternary studies in Ireland and the Irish Quaternary Association (IQUA)
Pete Coxon (TCD)

pp. 229-231 from Quaternary Perspectives INQUA Newsletter Volume 15(1) 2005 (www.elsevier.com/ locate/qp)

Ireland has a long and respected history of Quaternary research dating back to the nineteenth century and the widespread coverage of Quaternary deposits has ensured that the subject has remained one in which researchers have found many fruitful avenues for their efforts ever since.

IQUA was founded in the late 1970s in part as a response to the need to organise and document field excursions in Ireland as part of the INQUA Congress held in Birmingham in 1977 and also because Irish work on the Quaternary was widespread and achieving international scientific interest through the work of notable experts such as Marshall McCabe, Frank Mitchell, Francis Synge, and Bill Watts. Indeed the late Frank Mitchell was the president of INQUA for the intercongress period 1969–1973.

The Royal Irish Academy (http://www.ria.ie/) is the adhering body in Ireland to INQUA and the link between the Academy and INQUA is positively fostered by active Quaternary scientists represented via the Academy's Geoscience Committee (formerly the National Committee for Geology). Indeed the RIA has in the past funded IQUA members to attend INQUA Congresses as National Delegates hence promoting the standing of Quaternary research in the country as a whole.

Currently IQUA has 100 members and disseminates information about its activities through its webpage (see below). IQUA holds a number of meetings each year. Our first meeting is usually an annual speaker meeting, often with postgraduate and current research topics to the forefront and followed by the Annual General Meeting of the Association. This year we had talks on topics as diverse as Irish ribbed moraine, Cenozoic development of the Proteacea in SW Australia and the geophysics and archaeology of a submerged medieval bridge over the River Shannon. IQUA also holds an annual (usually thematic) one-day symposium in late November. To this latter meeting we invite keynote speakers from home and abroad and build a program to suit a wide audience of geographers, botanists, archaeologists and geologists amongst others. The symposium attracts an audience of 80–100 people and in recent years has covered Multiple Proxies for Environmental Reconstruction (2002), Ireland after the ice: early migration and landscape development (2003) and Atlantic Coastal and Offshore Quaternary: Deposits, Sea-level Changes and Archaeology (2004). IQUA also holds an annual fieldmeeting that has been located in different areas around the country over the years (since 1978) and some of the fieldguides published for these meetings are still available (see www for details). This year IQUA and the UK's Quaternary Research Association are holding a joint meeting in western Ireland in April.

Many varied aspects of Quaternary research are covered in Ireland by a number of research groups (e.g., in Universities in Belfast, Coleraine, Cork, Dublin and Galway). However, it is the cover of Holocene sediments preserving palaeoecological, archaeological and climate archives and the superbly sculpted glacial landscapes that first spring to mind when reviewing current Irish research (overviews of the Pleistocene and Holocene geology of Ireland are given in Holland, 2001 and Knight et al., 2004 review glacial events).

Irish research is naturally centred on topical issues and modern analytical techniques. Although it is somewhat invidious to choose specific areas of research activity there are a number of critical Quaternary topics currently under investigation in Ireland.

These key areas include the mapping of glacial landforms, glacial extent and deglacial patterns in the landscape (e.g., Clark and Meehan, 2001). This is work that may one day explain the pattern of ice streams and deglaciation in Ireland during and after the LGM. Another 'hot topic' being researched is the exact nature and timing of deglaciation and the influence of the Atlantic Ocean, tidewater glacier margins around Ireland and of Heinrich events (e.g., McCabe and Clark, 1998; Clark et al., 2004). Finally, Ireland's widespread cover of peat and a plethora of lake sites have preserved marvelous palaeoenvironmental information from the last glacial–interglacial transition (e.g., O'Connell et al., 1999) and archaeological and palaeoenvironmental records from the Holocene (e.g., Molloy and O'Connell, 2004). The implications of elucidating tephrochronologies from Irish sequences also stand out as being particularly exciting (Chambers et al., 2004).

An article like this cannot hope to cover all of the avenues of contemporary Irish Quaternary research but by joining IQUA such information comes easily! New IQUA members are always welcome and full details of our meetings, field excursions, publications and membership are all available on the www: http://www.tcd.ie/Geography/IQUA/Index.htm

Pete Coxon (Former Chairperson of IQUA 2001–2005)

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Recent archaeological fieldwork at Belderrig, North Mayo

Dr Graeme Warren, UCD School of Archaeology

This July saw the completion of the second season of archaeological fieldwork in an ongoing project in the UCD School of Archaeology examining a late Mesolithic quartz scatter and associated pre-bog field walls at Belderrig, Co. Mayo (F992415). Located immediately above the cliffs of the eastern side of Belderrig Harbour, the site overlooks the dolerite inclusion and banks of shelly drift for which the area is well known (as reviewed in the IQUA Field Guide to North Mayo). The site, which was initially identified by Patrick and Seamas Caulfield by surface collection in a prominent erosion scar, is characterised by a substantial lithic assemblage, structural remains and faunal preservation, all sealed by blanket bog.

The project is funded by the Royal Irish Academy, with further support from the School of Archaeology, UCD. It is a pleasure to acknowledge our gratitude to these bodies. Fieldwork in 2005 involved an international team, with student volunteers from Ireland, Britain, Canada, North America, Germany, Austria and Belgium. Our thanks go to our hosts in the community of Belderrig for greeting an invasion of 25 students so warmly.

Excavations in 2004 and 2005 have established the existence of an important archaeological landscape. The lithic assemblage is dominated by quartz, which is abundant at Belderrig, but includes important components of chert, flint, and silt/mudstones, the latter probably from the Minnaun formations to the east of Belderrig. The stone tool industry, despite the use of materials traditionally considered recalcitrant, is clearly later Mesolithic in type, characterised by an emphasis on large blades and flakes. Detailed analysis of this material provides an important opportunity to understand quartz technology in Irish prehistory, hopefully enabling the identification of more sites in areas where this super-abundant material was used instead of scarce flint.

Small pieces of structural evidence – a pit, and certain and possible stake holes – were identified, and post-excavation work is focusing on the interpretation of large stony spreads with artefact beneath, within and overlying them. Whilst an erosive origin cannot be excluded at this stage, these may represent stone surfaces, possibly platforms, as known on other later Mesolithic sites in Ireland.

A small area of faunal preservation was mainly comprised of fragmented bone (unburnt), with some carbonised macrofossils and stone tools also included. This deposit is of considerable importance as faunal assemblages from pre-bog contexts in north-west Ireland are exceptionally rare. Preliminary analysis of material has identified wrasse and possible conger eel. Samples of faunal material and macrofossils are currently being selected for radiocarbon dating, but from the

field interpretations of the stratigraphy, the bulk of the lithic and faunal material is likely to be Mesolithic.

North Mayo is rightly famous for its Neolithic archaeology, especially the substantial pre-bog field systems, best known at Céide, but found more widely in the area. This preserved landscape plays a key role in defining our understandings of Neolithic community and settlement. Aside from Belderrig, however, the Mesolithic of the region is badly understood, with little more than a few stray finds in Connaught in total (see for example Michael Gibbons review in the April 2004 IQUA newsletter). Dykes of the pre-bog field systems are present at Belderrig, within 20 metres of the Later Mesolithic concentrations, and excavations this year aimed to clarify the relationship between the features. Certainly, the proximity of the remains suggests that the excavations at Belderrig thus have considerable potential to contribute to our understandings of the Mesolithic and Neolithic in one of Ireland's most important archaeological landscapes. It is already clear that the site is of international significance and further fieldwork is planned, funding permitting, for 2006.

For further details, please contact:

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For further updates, please :
http://www.ucd.ie/archaeology/research/belderrig

6. Postgraduate Research

Reconstruction of Holocene climate change from laminated diatomaceous marine sediments, British Columbia, Canada.

Karen Logan (klogan01@qub.ac.uk)
School of Geography, Archaeology and Palaeoecology, Queen's University Belfast
Supervisors: Dr H.M. Roe, Prof. R.T. Patterson

The aim of this research is to identify changes in atmospheric and oceanic conditions during the Holocene from the sediment records of the Seymour-Belize Inlet complex of central British Columbia, and Effingham Inlet on Vancouver Island, Canada. This region is a particularly sensitive recording area for the study of Holocene palaeoceanographic and climatic change in the northeastern Pacific region both because of its location and the nature of the sediment accumulation within the inlets. The marine archives often accumulate at very high resolution under dysoxic to anoxic conditions and are therefore undisturbed by bioturbation. The result is a very instructive record, which documents palaeoceanographic and climatic change over millennial to annual, and even sub-annual scales. Specifically the study region is in a prime location

to record changes in the phases and position of the 'Aleutian Low' and the 'North Pacific High' pressure systems and has the potential to detect former changes in frontal position and associated patterns of upwelling. These systems have in turn been linked to solar cycles such as the Gleissberg cycle and the Schwabe sunspot cycle. As a result of global teleconnections, changes attributable to El Niño, the Pacific Decadal Oscillation and the Quasi Biennial Oscillation have also been detected in similar studies as well as tectonic and flood events. The research objectives will be achieved through diatom and sedimentological analysis of the laminated sediments including X-ray diffraction analysis, petrographic and textural analysis, particle size analysis, Scanning Electron Microscopy, Backscattered Electron Imagery analysis, and geomagnetic analysis. Radiocarbon dates will establish a chronology for events and a framework for temporal analysis. The results of the above investigations will then be compared with regional instrumental datasets to provide improved insights into regional patterns of palaeoceanographic and climatic change.

Funded by: DEL Northern Ireland

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Eileen Reilly (eireilly@tcd.ie)
PhD candidate at the Department of Botany, School of Natural Sciences, Trinity Collge, Dublin 2
Supervisor: Dr Fraser Mitchell

This project aims to examine sub-fossil insect remains from small hollow sites and mor humus deposits in selected extant woodlands to answer questions regarding woodland structure, degree of canopy openness and prevailing ground conditions during the Late Holocene. It is hoped that this work will contribute to the current debate on the structure of natural woodland in Europe during the Holocene through comparison of results derived from sub-fossil insects with vegetational history derived from other proxies.

The sampling sites are in woodland with known continuous vegetational history since the early Holocene: Derrycunihy and Camillan woods, Killarney National Park, Co. Kerry, Southwest Ireland and Brackloon Wood, Westport, Co. Mayo, Western Ireland (e.g. Mitchell 1988; Little *et al*, 2001). For the purposes of this study, the sites chosen are located on similar bedrock and within a similar prevailing climatic regime.

Precise chronology for this project is crucial to assess the rate of change and response time of vegetation during the time period covered by the study (primarily the 'Historic Period'). Tephrochronology has been chosen as the chronological tool most likely to provide the level of precision required. Discreet tephra layers have already been identified and dated from the small hollow and mor humus deposits in Derrycunihy Wood (see *QRA Newsletter* January 2006). This is one of the most exciting aspects of this project as tephrochronology has rarely been attempted from small hollows or mor humus and, in conjunction with analysis of sub-fossil insect remains from such deposits, represents an advance in the development of both tephrochronology and palaeoentomology.

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Project funded by:
Trinity College Studentship; Wingate Foundation, London; QRA New Researcher's Award Scheme (tephra); Trinity College Postgraduate travel grant (tephra).

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Coiling trends of *Globorotalia truncatulinoides* in the Mediterranean Sea

Teresa Broggy (teresa.broggy@mic.ul.ie
MA candidate at the Department of Geography, Mary Immaculate College, University of Limerick
Supervisor: Dr. Angela Hayes

Certain species of planktonic foraminifera display specific morphological characteristics that may be genetic or controlled by environmental parameters. For example *Globorotalia truncatulinoides* varies in the direction in which it coils. Previously this has been attributed to changes in the sea surface temperature (SST) however, previous research has proved inconclusive that this is the only controlling influence. To date, the coiling direction of *G. truncatulinoides* has not been extensively studied

in the Mediterranean Sea. This project aims to assess the coiling direction of this species in the western Mediterranean Sea in relation to physical parameters. In turn this can also be used to assess the applicability of *G. truncatulinoides* as a biostratigraphic marker based on the coiling direction of individual specimens.

Norwegian Arctic Research Experience

Claire Mc Loughlin,
School of Geography, Planning and Environmental Policy, University College Dublin.

Professor Brian Whalley of Queens University, Belfast led an expedition to the Lyngen Peninsula in Northern Norway this summer for five weeks. A team of eight researchers (two GIS technicians, two PhD postgraduates, three undergraduates and a botanist) accompanied Professor Whalley on the expedition. Four researchers travelled by landrover to the study area carrying equipment and food for the trip while other members joined the expedition at varying stages throughout the five weeks. The overall aim of the trip was to extend the extensive research Professor Whalley has carried out previously in the Lyngen Peninsula to other areas that have been given little attention in the past. Data was also collected for both a PhD thesis and two undergraduate final year projects.

The Lyngen Peninsula encompasses an area of high (up to 1700m) alpine-like peaks dissected by deep valleys and fjords to the east of Tromso in northern Norway. Mountain-top plateaus occur frequently in the study area. Geologically, the area consists of rocks, and tectonics associated with Caledonide activity. Owing to time restrictions, three valleys were focused on: Elsnesdalen, Lyngsdalen and Steindalen Valley. Elsnesdalen valley is occupied by a plateau glacier. The plateau glacier Galbmariehppi was named by the local Samie tribe. Lyngendalen valley is occupied by three glaciers: Vestbreen, Midbreen ad Sydbreen. Steindalen valley is occupied by Steindalsbreen glacier. This was the only glacier which had stakes planted into the ground by the local people showing the glacier margin location in the past. For example, there was a stake marking the location of the margin in 1998. It is alarming to see the evidence of such a rapid rate of retreat of this glacier. Falsnesfjellet plateau (1157m) was the only plateau that research was carried out on. Well preserved block fields were evident on the plateau.

A routine was established quickly once in the field. It involved one to two days hike/ bush whack into the chosen valley. The evening of arrival involved setting up base camp and study of aerial photography of the area. The following day was spent hiking about the valley establishing what was there and what major glacial features were present. The research team was then divided into two groups. One group began mapping the morainic features using a differential GPS. The mapping formed part of the research of one of PhD students. The other group carried out lichenometry in the valley. This also formed the basis for two undergraduate final year projects. Roles were reversed after a number of days so that every researcher experienced and learned how to use the equipment employed in the field. When all team members were satisfied that all the research was completed in the valley, camp was packed up and the group travelled to another valley.

This was definitely a worthwhile experienced for all those who travelled to the Lyngen Peninsula with Professor Brian Whalley. Much was learned by everyone in terms of glaciology and geomorphology. But also, and some would say more importantly, people learned the necessary skills required to survive in the wild for a substantial period of time.

7. Notices

^{14}CHRONO AMS Dating Facility

The Queen's University Belfast Radiocarbon Laboratory is now accepting samples for AMS radiocarbon dating at the new ^{14}CHRONO AMS Dating Facility. The lab specialises in dating bone and cremated bone but can handle almost any type of sample with sufficient carbon preservation. We are happy to discuss dating or calibration issues at anytime during the project.

Required sample sizes are much less than were formerly needed for dating with the scintillation counters. Precision for a single AMS date is similar to or better than routine counting dates. More specific information on sample size and cost can be found at http://www.chrono.qub.ac.uk/Resources/Radiocarbon/.
The lab offers a fast turn-around (currently on the order of 60 days) and full service including $\delta^{13}C$ measurement for fractionation correction, providing there is sufficient sample. Stable isotope measurements of bone collagen $\delta^{13}C$ and $\delta^{15}N$ for dietary analysis are available on request for a small additional fee. Samples are pretreated and converted to graphite in-house and the targets are currently measured at the Oxford Radiocarbon Accelerator Unit until the commissioning of our own 0.5 MV NEC accelerator in 2006.

The sample submission process has been streamlined with an on-line form with direct input into our database through http://calib.qub.ac.uk/radiocarbon/customer. The submitter needs to have a personal identification number (PIN) to submit sample information. A PIN can be obtained by contacting either Stephen Hoper (s.hoper@qub.ac.uk) or Paula Reimer (p.j.reimer@qub.ac.uk). A UB number will be assigned to the samples on submission to aid in tracking the progress throughout pretreatment and measurement. We ask that the submitter print two copies of the submission form; one to physically send along with the samples and one for their records. We hope that the new database system is seamless, but please let us know if you encounter any problems.

Paula Reimer

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IUGG Electronic Journal

International Union of Geodesy and Geophysics IUGG Electronic Journal. This short, informal newsletter is intended to keep IUGG Member National Committees informed about the activities of the IUGG Associations, and actions of the IUGG Secretariat. Past issues are posted on the IUGG
http://www.iugg.org/publications/ejournals/05-09

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Postgraduate Short Courses

2005/2006 short-courses in Environmental Palaeoecology and Aquatic Ecology being offered by the Environmental Change Research Centre, University College London in collaboration with Queen Mary College (QMUL) and the Centre of Ecology and Hydrology (CEH).

Environmental Palaeoecology
Quantitative Environmental Palaeoecology
Introduction to Benthic Foraminiferal Analysis
Introduction to Pollen Analysis
Introduction to Plant Macrofossil Analysis
Palaeoceanography
Introduction to Diatom Analysis (Courses in February and June)
Ostracod Analysis
Stable Isotopes and Environmental Change

Aquatic Ecology
Introduction to Diatom Analysis (Courses in February and June)
Introduction to the Ecology and Identification of Aquatic Macrophytes
Chironomids: Water Quality and Climate Change
Introduction to Fish Ecology
Numerical Analysis of Biological and Environmental Data

For full details, dates and an application form for the courses please visit
http://www.geog.ucl.ac.uk/ecrc/teaching.stm or contact the course co-ordinator David Hunt at d.s.hunt@ucl.ac.uk

8. Recent Publications

Horton B.P., Edwards R.J. (2005). The application of local and regional transfer functions to reconstruct former sea levels, north Norfolk, England. The Holocene 15 (2),216 - 228.

Dalton C., Birks H.J.B., Brooks S.J., Cameron, N.G., Evershed, R.P., Peglar S.M., Scott J.A., and Thompson R. (2005). A multi-proxy study of lake-development in response to catchment changes during the Holocene at Lochnagar, north-east Scotland. *Palaeogeography, Palaeoclimatology, Palaeoecology* Volume 221, Issues 3-4:175-201.

Leira, M. (2005) Diatom responses to Holocene environmental changes in a small lake in northwest Spain. Quaternary International 140–141 90–102.

9. News items

IGBP Science Highlights

The scientific results of IGBP's work are presented
http://www.igbp.kva.se/cgi-bin/php/frameset.php

An Off-The-Shelf Carbon Pump [August -04]
http://www.igbp.kva.se/cgi-bin/php/frameset.php

Recent work [1] has revealed the importance of the North Sea – a marine shelf – as a so-called "continental shelf pump" for carbon. It is estimated that about 8 million tonnes of carbon are exported each year from the Sea to the North Atlantic Ocean – representing about 93% of the CO2 that the Sea takes up from the atmosphere. Extrapolated across the world's coastal and marginal seas this level of sequestration suggests that these areas (just 7% of the world's oceans) may account for around 20% of the global oceanic annual uptake of anthropogenic CO2 – much higher than previously thought.

The carbon export occurs because the thermal stratification of the northern section of the Sea allows particulate organic carbon from algal production in the warmer surface waters to be exported down into the cooler sub-surface layer.

Most of the CO2 that is subsequently released from heterotrophic respiration of this particulate organic carbon, is transported northwards to the North Atlantic Ocean by sub-surface ocean circulation (Figure 1). The shallower non-stratified southern section does not contribute to this carbon transport, since both algal production and heterotrophic respiration occur within the year-round mixed water column, thus preventing significant exports.

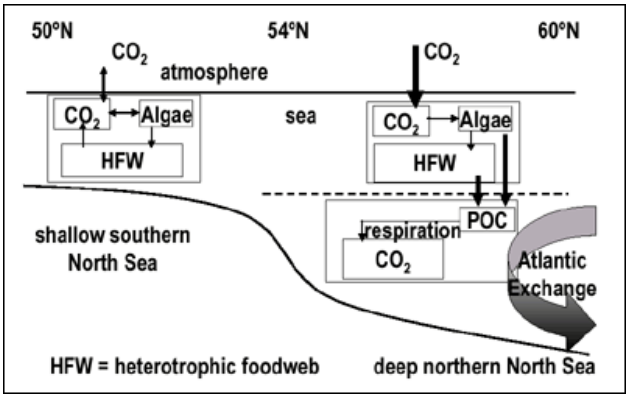

Figure 1: South-north section through the North Sea. In the shallower southern part production and respiration processes occur in the mixed layer, whereas in the north the respiration processes mainly occur in the separated subsurface layer, which is subjected to the exchange circulation with the North Atlantic Ocean. The dashed line indicates the thermocline and the darkening of the arrow implies the increase of dissolved inorganic carbon in the North Atlantic Ocean water circulated through the North Sea.

These findings are based on four cruises of four weeks each, spread across a year to reveal seasonal and spatial patterns in measured air-sea partial CO2 pressure differences and calculated air-sea CO2 fluxes. The seasonal variations of partial pressure differences (Figure 2a) – measured and interpolated – for 13 sectors of the North Sea (Figure 2c), coupled with 6-hourly wind field data [2] enable the seasonal variations in CO2 flux and the spatial patterns in annual CO2 flux to be calculated (Figures 2b and 2c respectively).

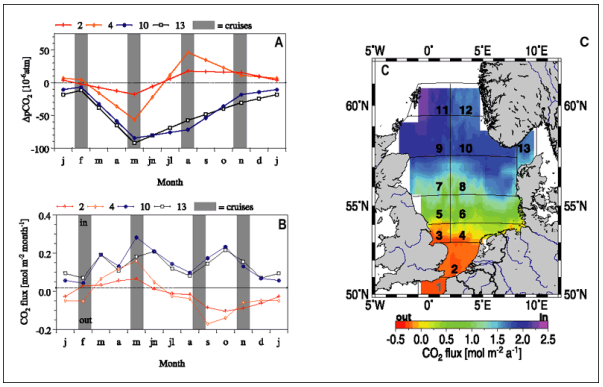

Figure 2: Annual cycles of air-sea partial CO2 pressure differences (A) and calculated fluxes (B) for selected areas in the North Sea, with shading indicating periods of observation. The spatial pattern of air-sea CO2 fluxes across the North Sea is shown in C.

The data reveal that much of the North Sea acts as a CO2 sink all year round. The only source – though still minor – is from the southern areas during the late summer. The greatest fluxes occur in firstly in May during the spring algal blooms, and secondly in October, when storms force CO2 uptake. Only about 1% of the algal carbon that is produced is sequestered in the North Sea sediments [3], the majority, as described above, is exported to the North Atlantic Ocean.

References

1. Thomas H, Bozec Y, Elkalay E and de Baar HJW (2004) Enhanced open ocean storage of CO2 from shelf sea pumping. Science 304, 1005-1008.
2. European Centre for Medium-Range Weather Forecasts.

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ROCK SETS FOR SCHOOLS

Academy Committee for Geosciences Bulletin 3 – September 2005. Julian Menuge (Secretary).

The "Promotion of geoscience education in schools" working group (Chair: Dr Ian Sanders) has produced 900 rock sets. Six different kinds of rock – sandstone, mudstone, limestone, granite, basalt and schist – from six carefully selected locations in Ireland have been assembled into packaged sets and are currently being distributed to every second level school in the 26 counties. Several pieces of each rock type are included in each set, so that every pupil will have time to make personal observations and handle the rocks. An explanatory booklet to accompany the rock sets with suggestions for classwork exercises will be on its way to schools shortly. The project has been made possible by a generous donation from Whelan's Limestone Quarries Limited of Ennis, Co. Clare.

http://www.ria.ie/committees/geosciences/

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THE CASE FOR GEOSCIENCE FUNDING

Academy Committee for Geosciences Bulletin 3 – September 2005. Julian Menuge (Secretary)

Following consultation of the geoscience sector in Ireland, in late August a document was submitted to the Government's Chief Science Adviser and to the Department of Communications, Marine & Natural Resources. It outlines the case for greatly increased state funding in the Republic for geoscience research, focusing on four research themes:

1. Energy: Secure and Diversified Supplies
2. Environment and Health: Addressing Emissions to Air and Water
3. Marine: Developing a Unique Source
4. Infrastructure: Building on Sound Foundations with Quality Materials

"The Case for Geoscience Funding" is available from the GSI home page: http://www.gsi.ie/

The total sum sought is about 160 million euro over a five year period. Although the document has been submitted, further comments are welcome, particularly on the impact of the geosciences sector on the economy, including multiplier effects, i.e. indirect economic benefits of geoscience. Additional suggestions on implementation of research projects within the four themes are also very welcome. Comments should be sent to GSI Director Dr Peadar McArdle: Peadar.McArdle@gsi.ie
http://www.ria.ie/committees/geosciences/

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10. Forthcoming Workshops Seminars & Conferences

Irish Postgraduate Training Consortium for Geography

The 7th Irish Postgraduate Training Consortium (IPTC) for Geography will take place in Glencree, Co Wicklow, from 3-5 February 2006. Students and staff from third level colleges across Ireland will take part in the weekend, which involves a combination of talks by invited speakers, research seminars and project work. The purpose of the weekend is to introduce new PhD and MLitt students in geography to the nature of academic research, to give them experience in presenting and talking about their research projects, and to facilitate their interaction with students and staff from their own and other institutions. A feature of recent IPTCs has been the growing proportion of physical geography students.

This year's IPTC is being organised by Gerald Mills (gerald.mills@ucd.ie) and Mary Gilmartin (mary.gilmartin@ucd.ie) of UCD. Please contact either Gerald or Mary if you would like any further information about the weekend.

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Department of Geology, Trinity College, Dublin
'Brown Bag Seminars'

Nov. 17 **Eoghan Holohan** (TCD): *Stirring the Embers-reinvestigating the classic British Tertiary Volcanic Centres.* M4, Museum Building 1-2pm

Nov. 24 **Brian O'Driscoll** (TCD): *Micro-magnets in mobile magmatic mushes: mechanisms of fabric acquistion in layered mafic intrusions.* M4, Museum Building 1-2pm

Dec. 1 **Brian McConnell** (Geological Survey of Ireland): *New found view from Newfoundland: Iapetean affinities.* M4, Museum Building 1-2pm

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2006

1st iLEAPS Science Conference **- interfaces between land-biosphere-atmosphere.** 21 - 26 January 2006 Colorado, USA
http://www.atm.helsinki.fi/ILEAPS/boulder/

IODP Workshop on Climate-Tectonic Drilling in Southeast Asia. 25 - 27 January 2006 Kochi, Japan

Environmental Change in Lakes, Lagoons & Wetlands of the Southern Mediterranean Region (ECOLLAW): 1st International Conference **Cairo 4-7th January 2006**
http://www.geog.ucl.ac.uk/melmarina/ecollaw2006/

The 36th Annual Arctic Workshop
INSTAAR, University of Colorado
Boulder, Colorado 16-18 March 2006
http://instaar.colorado.edu/meetings/AW2006

Climate variability and ecosystem impacts on the North Pacific: A basin-scale synthesis.
PICES/GLOBEC Symposium 19 - 21 April 2006 Hawaii, USA
http://www.pices.int/meetings/international_symposia/Honolulu2006/default.aspx

2nd International Workshop on Ice Caves (IWIC - II)
08 - 12 May 2006 Demänovská dolina, Slovak Republic http://users.unimi.it/icecaves/IWIC-II/

Holivar2006 Open Science Meeting - Natural climate variability and global warming. Environmental Change Research Centre, University College London, UK 12th-15th June 2006. http://www.holivar2006.org/

10th International Paleolimnology Symposium - Past Ecosystem Processes and Human-Environment Interactions. Duluth, Minnesota, USA June 25-29, 2006
http://www.geo.umn.edu/paleolim10/

NMR Spectroscopy in Soil, Geo and Environmental Sciences. Freising, Germany, 6-9 August 2006
http://www.wzw.tum.de/bk/nmr06

2007

XVII INQUA congress Cairns, Australia 28th July to the 3rd August 2007.
http://www.aqua.org.au/AQUA/INQUA2007.html

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