CAM QUA

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GODWIN INSTITUTE FOR QUATERNARY RESEARCH

ISSUE TWENTY ***MICHAELMAS TERM 2001***

Past Climate Variability Through Europe and Africa

PAGES – PEP-III Conference

Aix-en-Provence, 27-31 August 2001

I'd half-expected some trouble with the language barrier – my A-level French is a bit rusty, and to be fair I had a hard time explaining to a security guard at Marseilles station that my poster tube wasn't harbouring a dangerous weapon – but understanding all the acronyms at this conference was by far my biggest problem. A brief glossary: PAGES (Past Global Changes) is a core project of the IGBP (International Geosphere-Biosphere Programme). Within PAGES, three projects have synthesised palaeoenvironmental data from terrestrial sites across Pole-Equator-Pole (PEP) transects: PEP-I covered the Americas, PEP-II, eastern Asia, while PEP-III, the subject of this meeting, concerns Africa and Europe.The focus was on terrestrial palaeoenvironmental archives, with a smaller element from palaeoceanographers working off the coast of Africa and in the Mediterranean.

The PEP projects, and PEP-III in particular, have been extremely useful for three reasons. Firstly, they have given the terrestrial research community a much-needed focus; unlike ice core and marine workers, we terrestrial types have a tendency to work in small groups or alone on numerous sites – in part a consequence of the low cost of acquiring material. PEP has encouraged us to work together. Secondly, the PEP transects have encouraged research and aired results from regions which have hitherto tended to be neglected for practical and political reasons. One of the most notable aspects of this meeting was that the majority of delegates were working on European sites, covering an area which is tiny compared to Africa. Generous allocation of conference time to African research helped to redress this imbalance. Thirdly, the PEP projects have been important in synthesising the wealth of data from hundreds of sites using dozens of palaeoenvironmental proxies. At this meeting, around 300 participants were able to pool their data and draw regionally-applicable conclusions.

Comparisons between the three PEP transects will hopefully make the most of terrestrial palaeoenvironmental work in adding to our understanding of natural change – including measuring and predicting the impact of climate change and human activities on the environments that support us.

The meeting was organised into talks by invited speakers, which were mostly syntheses or reports of major developments, and the poster sessions, which gave an opportunity to examine a wealth of primary data – and indulge in a little more acronym-spotting. A competition seemed to have erupted for the most marketable project branding (some of the logos were pretty sophisticated, too). A runner-up, which won respect for the sheer effort put into making the project title fit the acronym and for its dot.com sensibilities, was Dalton *et al*'s CHILL-10,000 @ Lochnagar (**C**limate **HI**story as recorded by ecologically sensitive arctic and alpine **L**akes in Europe during the **L**ast **10,000** years). The contest was over, however, as soon as a poster from the MUPPETS project appeared.

The first part of the meeting was given over to Africa. Here much research focused on the history of land-use and human impact on the vegetation, due in part to the relevance of this to modern socio-economic problems such as soil erosion and desertification. Researchers are beginning to exploit the potential for long records of environmental change that exist in Africa. Lake Malawi, for example, has already provided a 25 ka record, and plans are afoot for a much deeper borehole which may go back to 1 Ma. The results so far are enticing: for example, while the diatom record suggests that glacial periods were generally cool and dry in the African tropics compared with today, Lateglacial climate changes appear to be out of phase with the Allerød/Bølling – Younger Dryas progression in Europe.

The second part of the meeting looked at European data, and here we got the impression of a region where gaps in our

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QRA Yorkshire/Lincolnshire Short Field Meeting

13-16th September 2001

Introduction

38 people attended various parts of the QRA Short Field Meeting to East Yorkshire and North Lincolnshire from the 13th to the 16th of September 2001; the only QRA field-trip to run in this year of foot-and mouth-restrictions. The area has not been visited comprehensively since 1972, and the revisit is timely, especially given the large amount of work recently undertaken and currently ongoing in the area. Stephen Thompson and Dave Evans from Glasgow are investigating glacial systems in Holderness. Work in various parts of North Lincolnshire has been undertaken by Mark Bateman, Paul Buckland, Charles Frederick, Mark Dinnin and Nicki Whitehouse, all past or present Sheffield-ites. Archaeological study has also been undertaken during the Hull-based Humber Wetlands Project represented on the trip by Malcom Lillie and Ben Gearey. Many of these recent workers were present as were some of the 'old-guard' such as John Catt, Allan Straw and Geoff Gaunt.

Friday 14th September

The main focus of the trip was on the Late Devensian deposits preserved in the area, and the main question – how does an ice-margin behave in a lowland situation? We started at the type-site of the Dimlington Stadial, where the main area of debate was over the age of the Basement Till exposed on the foreshore and beneath the Devensian Skipsea and Withernsea Tills. More debate about the nature of the Devensian ice-margin was possible at Gembling, where an ice-ridge complex has been identified in the low relief landscape using a digital elevation model. Exposures we visited within this ridge showed thick sequences of glacio-fluvial deposits. Detailed sedimentological study by Stephen Thompson has shown that these sands were deposited by meltwater entering a standing water body from the north and the east, suggesting a complex lobate ice-margin rather than the straight edge traditionally envisaged. The dynamic nature of the ice front is also inferred from the presence of a till unit at the top of the sequence, representing a slight oscillation. The final site of the day, at Sewerby, brought the issues raised during the rest of the day together. The age of the Basement Till is constrained by the Ipswichian age raised beach, observed by John Catt to overlie it. In addition, the Sewerby Gravels overlying Skipsea Till at the top of the sequence further strengthen the evidence seen at Gembling for complex deglaciation of the area.

Saturday 15th September

At the first stop of the day at South Ferriby, Skipsea Till exposed in the cliff points to the blocking of the Humber Gap by ice. These cliffs have been described for over a century, but current exposures are the first observation of coversands here. These are interpreted as having been reworked from local deposits into a gully in the surface of the till. An OSL sample taken from this location offers the possibility of constraining the end of ice advance into the Humber Gap, and thus the formation of Lake Humber. This ice advance was a significant event, since it also filled the northern end of the Ancholme valley, where our second stop was to see part of the associated glacio-fluvial succession.

The main focus of the afternoon visits was the Late-glacial as we looked at some of the extensive coversands of North Lincolnshire. At Yarborough Quarry we were shown a sequence with the first evidence for periglacial conditions during the Loch Lomond Stadial in the English coversand record, in the form of a sand vein identified by Julian Murton. This vein overlies a regionally extensive peat layer, containing beetle faunas suggesting cold conditions, though not necessarily colder summers than today. The coversand is dated to the Loch Lomond Stadial by analogy with the well-dated regional stratigraphy built up by Mark Bateman. OSL dates at this site are yet to be finalised, since preliminary dates are too young in comparison with the regional stratigraphy. At the final section of the day, Black Walk Nook, significant variability was seen in sedimentary structures, suggesting reworking of wind-deposited material by water. This may challenge our traditional concepts of coversand deposition indicating uniform aridity. The nature of the coversand geomorphology was discussed at Twigmoor Woods, where a dune complex has been investigated by Ground Penetrating Radar (by Charlie Bristow and Ian Livingstone). This suggests that the dunes may have been 'pinned' in position by vegetation, thus cautioning that it may not be possible to determine palaeowind directions from topography alone.

Sunday 16th September

Sunday took us back to the Late Devensian with a vengeance, starting at a vista overlooking the southern end of the area covered by Lake Humber (within the Vale of York). BGS mapping of the area by Geoff Gaunt suggests evidence for two levels of Lake Humber, the first at 30m O.D. and the second, for which the evidence is more widespread, at 8m O.D. By now we were keen to see some Lake Humber clays, and so it was quite a surprise to be taken to a sand quarry at Cove Farm! Trough cross-bedded sands and gravels (OSL dated to ~14ka B.P. at the base) grade upwards into a massive finer sand, in which an organic channel fill has accumulated at one end of the pit. Beetles and pollen from this channel fill suggest an environment consistent with Late-glacial Interstadial age. No convincing evidence for lacustrine deposition is seen, which left us with an interesting situation. Paul Buckland suggested that we were seeing the upstream results of a catastrophic drainage of Lake Humber, which had caused an incision of about 6m, followed by rapid aggradation. However, the interpretation is not simple, as the northerly flow seen in the palaeocurrents seems to be contradicted by the presence of northerly-provenanced coal in the gravel

fraction. A further larger question was raised by Allan Straw, on the basis of this (and other) sites, as to why Lake Humber appears never to have drained to the south, despite gaps in the southerly bedrock outcrops. A further complication in the Lake Humber story was seen at Lindholme Island where we saw one of several gravel-capped ridges which emerges above Lake Humber II deposits. This was mapped by Geoff Gaunt as a Devensian ice limit, but its relationship to Lake Humber development is unclear – does it relate to the higher level lake or is it earlier still?

Our final stop of the day was at one of the best sites of the trip, the former RAF airfield at Finningley. This site is marginal to the Lake Humber II system, and newly exposed just before the summer. Littoral sands and silts relating to Lake Humber here overlie a diamictic deposit which greatly absorbed the glacial experts among us – was it a till or a mass-flow deposit? This diamict in turn overlies 'older river gravels' - a unit in which Ipswichian deposits have been observed. At Finningley these contain an organic bed for which preliminary beetle analysis by Paul Buckland suggests a cold climate origin. All present agreed on the importance of the site. It provides an opportunity to constrain the age of deposition of Lake Humber II by OSL dating. It should also increase our understanding of the 'older river gravels' of the area, and their relation to overlying deposits, both by detailed palaeoecological analysis and by OSL dating.

Summary

Those of us who participated in this field meeting were treated to a comprehensive tour of some superb sedimentary sections in Late Devensian ice-marginal environments, much discussion of processes, and a real sense of research in progress. Much credit goes to the organisers: Mark Bateman, Paul Buckland, Charles Frederick (Sheffield) and Nicki Whitehouse (Queen's, Belfast) for an intellectually stimulating and well-run trip. The sites seen provided plenty to think about, and further questions still remain to be answered, for example:

- The palaeogeography of Lake Humber –
- what is the relationship between and timing of the two phases of lake development?
- which gaps in the surrounding landscape were open and when?
- why is the general drainage (both of the lake and of subsequent river systems) northwards to the Humber Gap?
- The detailed chronology of Late Devensian glacial and deglacial activity
- The rather more intractable issue of the age of the Basement Till and of glacio-fluvial and fluvial deposits seen further west – do we have in this region evidence for the elusive 'Wolstonian' glaciation?

Becky Briant
Quaternary Palaeoenvironments Group
Department of Geography

Quaternary Science on the Web

A comprehensive list of Quaternary links can be found on the QPG site at
http://www-qpg.geog.cam.ac.uk/outcamlinks.html
and also the Earth Sciences site at
http://www.esc.cam.ac.uk

The QPG website has recently been updated with the inclusion of a series of palaeogeographical maps illustrating the evolution of the northern European drainage system over the last 3 million years, produced by Phil Gibbard. The drainage maps represent a contribution to International Geological Correlation Programme, IGCP 449: Global correlation of Late Cenozoic fluvial sequences. Although they were originally published by Phil in 1988, the maps were updated in spring 2001 for presentation at the final meeting of the Netherlands NEESDI project held in Amsterdam. They are available in downloadable format, for use by anyone interested in the longterm development of river systems via the QPG website at http://www-qpg.geog.cam.ac.uk

In addition, your editors have stumbled across the following sites in the process of their 'research' since the last issue of CAMQUA.

Quaternary Environments Network: Review and Atlas of Palaeovegetation.
http://www.esd.ornl.gov/projects/qen/adams1.html

FAUNMAP: A database documenting Late Quaternary distributions of mammal distribution.
http://www.museum.state.il.us/research/faunmap

Japan Association for Quaternary Research
http://wwwsoc.nacsis.ac.jp/qr/index-e.html
This site has interesting link relating to global and oriental research. However, several links are not yet in English.

MUST SEE SITE OF THE TERM!
http://www.nh.ultranet.com/~mwcquinn/icecore.html
A strange one this! The site is described as 'a Musical Visualization of Ice Core Data', comprising a symphony, audible on the web, based upon climate change as recorded in a Greenland ice core over the last 110 000 years.
Try it!

Welcomes.....

New term new people!

Dr. Harriet Allen joins the Quaternary Palaeoenvironments Group in the Department of Geography as a University Lecturer. Previously associated with Homerton College (an association which will be ongoing), Harriet specialises in Mediterranean palaeoecology.

Kirsty Simpson joins the Department of Geography as research student, working on the project 'Dinoflagellate cyst assemblages from the Holocene of the Baltic Sea'. She is supervised by Martin Head, Phil Gibbard (both Department of Geography) and Barrie Dale (Oslo).

Will Fletcher, an alumnus of the Quaternary MPhil course, joins the Department of Geography, working on the Holocene vegetation history of southern Portugal. He will be supervised by Harriet Allen and Phil Gibbard.

Brian Pittman will be working in the McBurney Lab, using phytolith and soil micromorphological techniques to examine pastoralist sites in the Negev desert, Israel.

Chris Rolfe has joined the Department of Geography as a senior research technician in the Physical Geography labs. Chris already has a family connection with the Godwin Institute as his brother James is a technician in the Godwin lab!

As we go to press, final numbers for the Quaternary MPhil have yet to be confirmed, but it looks like there will be at least 3, probably six students taking the course, which has proved to be a remarkably successful training ground for future PhD work.

New arrivals in Earth Sciences include Rebecca Brodie, Tamsin Mather and Neil Sime. Sorry, we don't know what you are working on so can't mention it here!

Camqua would like to welcome all new arrivals, and wish them success in their time here at Cambridge! Don't be too disheartened by the cartoon below.....

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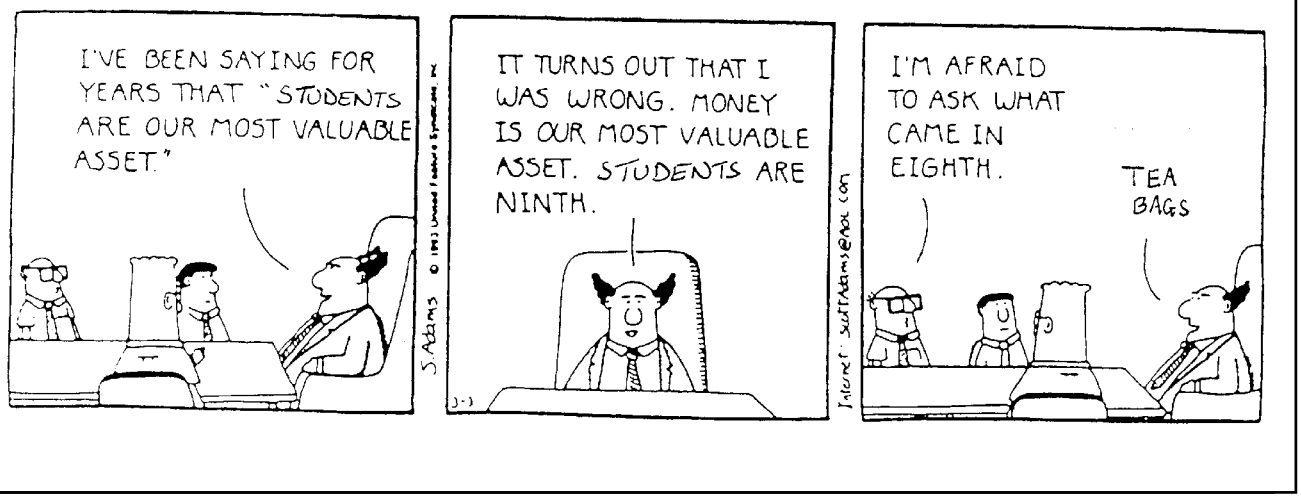
knowledge are rapidly being filled with ever-improving geographical coverage, temporal resolution, and precision of palaeoenvironmental and chronometric data. In particular there seems to be a general shift towards quantitative climate reconstructions based on proxies such as stable isotopes, diatoms and chironomids. There was also much evidence of rigorous testing of proxies in a bid to generate more reliable data sets. For instance, Miryam Bar-Matthews pointed out that speleothem work demands attention to the mechanisms responsible for stable isotope fractionation at every studied site, as variations in local climatic and hydrological conditions can strongly influence the recording characteristics of the speleothems. Vera Markgraf followed this theme up by stressing the need to understand the mechanisms, if any, underpinning observed correlations between climate records from different parts of the globe, driving her point home with a comparison between a Late Glacial $\delta^{18}O$ record from Greenland and a near-identical graph of US Dollar/Deutschemark currency fluctuations.

This conference offered a snapshot of the state of international terrestrial palaeoenvironmental research, and the good news is that the data sets are rising to the challenge set by GRIP/GISP2 for high-resolution, well-dated, quantitative palaeoenvironmental data sets. However, to truly match the quality of the Greenland data sets requires a concentrated use of resources. While the PEP programmes have been useful in synthesising and drawing regionally-applicable conclusions from disparate terrestrial data, the increasing demand for high-quality data sets suggests that we will see in future a tendency towards larger projects working on very detailed records from a smaller number of key sites.

Ian Lawson, Department of Geography



DIARY

Geography Research Seminars

Thursday 18th October
'Reconstructing climate change: Palaeoclimate records from New Zealand speleothems and implications for interhemispherical synchronicity'
Professor Paul Williams, University of Auckland

Thursday 8th November
'Fluvial processes and riparian habitat diversity on wandering gravel bed rivers'
Dr. David Gilvear, University of Stirling

All seminars start at 4.15pm and are held in the Seminar Room, Department of Geography.

BAS Seminars

Thursday 11th October
'Why size matters: Long Continental Sequences and Quaternary Climate Change'
Dr. Mick Frogley, University of Sussex

Seminar starts at 4.15 in the conference room at BAS, Madingley Road, Cambridge.

Plant Sciences Seminar

Thursday 25th October
'Life in a polar greenhouse. The effects of high CO_2'
Dr. David Beerling, University of Sheffield

Seminar takes place at 4.00 in the large lecture theatre, Department of Plant Sciences.

Earth Link Seminar Series

As we go to press the final programme has not been confirmed. Check the Earth Sciences website for details.

TV Times.....

Channel 4 is currently showing a series of programmes on the theme of 'extinction' on Tuesday nights (9pm from 25th September for six weeks). The programme will look at the possible causes and mechanisms behind the extinction of, amongst others, the sabre tooth tiger, the mammoth and the giant Irish elk.

HELP EXPAND OUR CIRCULATION!

Although most of you find CAMQUA in your pigeonhole, you may have picked this issue up from one of a variety of high class common rooms in the University. If you think CAMQUA is the newsletter for you, or know of someone who should be reading this, contact the editors at the address below! This is particularly important at the beginning of the new academic year, as we don't know every new face!

It's your CAMQUA!

Camqua wouldn't exist without your contributions. In order to carry on we need more involvement from all relevant departments (Zoology, Earth Sciences etc). Always of use are reports on meetings or conferences. Don't presume someone else is already doing one, get in touch with your editors and volunteer! Invariably, we will gladly accept!

Deadlines

Copy for the next issue of ***Camqua*** should be submitted by **8th January 2002** to the editors at the Geography Department.

Credits

Editors: Chris Glaister (cg10016@cus.cam.ac.uk)
Phil Hughes (pdh27@cam.ac.uk)

Camqua would like to thank the Department of Geography for generously supporting the production of this issue.

QUATERNARY DISCUSSION GROUP

MICHAELMAS TERM 2001

All meetings are held at 8.30pm at Clare Hall West Court, at the far end of Herschel Road, Cambridge.
For further details contact Richard Preece; rcp1001@cus.cam.ac.uk

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October 12th

A new glacial stratigraphy for eastern England

Jim Rose, Brian Moorlock, Richard Hamblin & Jon Lee

November 2nd

The Storegga Slide tsunami: the anatomy of an extreme event circa 7000 ^{14}C years ago

David Smith, Coventry University

November 23rd

Record of a Pleistocene Glacial-Interglacial-Glacial cycle in the lacustrine sediments of the Pianico-Sellere Basin, Italy

Andrea Moscariello, Shell UK.