XIX INQUA 2015
Quaternary Perspectives on Climate Change, Natural Hazards and Civilization
Nagoya, Japan
27th July – 2nd August 2015

The Congress sessions will address the themes of the five INQUA Commissions during six days of oral and poster presentations, plenary presentations, and side meetings. The scientific program will be supplemented with social events at scenic spots, and of course, in the tradition of previous INQUA Congresses, several attractive field trips have been organised before, during, and after the Congress week.

INQUA and the Organising Committee of the congress will offer limited financial assistance for Early Career Researchers (ECRs: less than 8 years since first PhD on 1 August, 2015) and scientists from developing countries with low GDP. INQUA support will partially cover the transportation and registration costs but will not cover accommodation, subsistence, and per-diem.

CONGRESS DEADLINES:

- 20th December 2014: Deadline for abstract submission and financial support submission
- 28th February 2015: Deadline for early registration

Early Career Researchers (ECR) session at INQUA Congress

The International Union for Quaternary Research (INQUA) is committed to developing the next generation of Quaternary scientists. The inaugural INQUA Early Career Researcher (ECR) inter-Congress meeting held in Wollongong, Australia, 2013, allowed MSc/PhD candidates, Post-Doctoral researchers and research-active academics in the early stages of their careers (within 5 years of obtaining their PhD) to attend valuable workshops designed to assist ECRs with career development, to present their science and to gain invaluable mentoring from more senior scientists. The ECR session at the INQUA 2015 Congress will build on the inter-Congress ECR meeting providing an opportunity for ECRs to re-connect with, and develop new, peer networks. The ECR session, early in the conference, will also provide an opportunity for ECRs to have a “practise run” presentation prior to presenting in a Commission session related to their research. We welcome submissions related to all Commission themes and INQUA projects in this ECR session.

It is easy to attend the ECR session: When you are submitting your abstract for your main session there is an option you may choose to also give a presentation at the ECR session.
INQUA Funding

INQUA funding is designed to support and facilitate activities that are considered priorities by its five Commissions. There are three categories of INQUA funding: 1) International Focus Groups (IFGs), 2) Projects, and 3) Skills Enhancement. Please submit the relevant form to the relevant Commission President by the 1st December 2014.

INQUA-Recognised Activity

You may also apply to INQUA for non-financial recognition of international activities. Please submit the relevant form to the relevant Commission President by the 1st December 2014.

Editor-in-Chief: Quaternary International

In 2015 Professor Norm Catto is due to retire as Editor-in-Chief of Quaternary International. We would therefore like to open a call for his successor.

• It is envisaged that the successful candidate will be a senior scientist with considerable editing experience, preferably of an international journal, and with a broad knowledge of Quaternary science. Time to devote to the job is essential.
• The term of office will be one inter-Congress period, initially 1st August 2015 to 31st July 2019. This term will be renewable by mutual agreement for a maximum of two further terms, from 1st August of each Congress year.
• The Editor-in-Chief will be appointed by INQUA and will be contracted jointly to INQUA and Elsevier.
• Duties will involve overall responsibility for the content of the journal and include supervision of an Editorial Team comprising five Associate Editors, Guest Editors (for each issue) and an Editorial Board.
• Because a new editorial structure is being implemented, there will be a changeover period from the current team to the new team. If required, further details may be obtained from Dr Margaret Avery (mavery@iziko.org.za).

Expressions of interest, which should include a statement of intent concerning development of the journal and a two-page CV, should reach the Secretary General, Dr Julius Lejju (lejju2002@yahoo.co.uk) by 31st December 2014.

INQUA Early Career Researchers: Survey

We know you are all busy but if you have a moment we would really appreciate your thoughts on how the INQUA ECR group can better serve you. Click on the link to go to our short survey. It will only take a couple of minutes.

INQUA International Council

The XIX INQUA 2015 Congress is quickly approaching. We are all invited to take part, exchange our latest scientific results, discuss the future of our science and develop research agendas for the years to come. During the Congress there will also be several meetings of the International Council. The International Council is composed of the Executive Committee (including the President and the Secretary General) and one INQUA member from each nation/region. The International Council manages the affairs of the Union, elects the Executive Committee, determines member subscriptions, and selects the host country for the next Congress. The International Council may also recommend the creation of new Commissions. The agenda of the International Council will be circulated in advance of the Congress. Be sure that your opinion is voiced through your national/regional INQUA member. Note that only paid INQUA members are permitted to vote during International Council meetings.
The contribution of region optimum to the current interglaciation. and temporal scales, from the Pliocene climatic extent can be developed over a range of spatial Twenty nine people from seven countries constrain past sea level on the production of composite data INQUA variability that began with the PALSEA (PALeo UK; Un Lochinver, Scotland, 16 and build sea level/ PALSEA2 Workshop: 6 University of Florida, USA), Antony Long Wi Project L PALSEA2 University of Southampton, (Uni (University of Florida, USA), Antony Long: Felicity Williams 5 1301 1 University of Florida, USA), Andrea Dutton, madison, USA), Andrea Dutton: Glenn M Ice S (Carlson et al., 2014). Cutting edge advances in science at the ice sheet scale are only possible through the compilation of large data sets, highlighting the value of databases to the scientific community.

Discussions throughout this workshop highlighted the need for data management plans with a global scope, and consistent and comprehensive treatment of data. Key points of agreement included the necessity of mandating the inclusion of meta-data in order to facilitate use of sample data across multiple scientific disciplines and that the template should attempt to future-proof data against the demands of future analyses. The finalised protocol should also ensure the continuation of valuable conversations between the primary producers and users of the data and subsequent researchers.

Complementary approaches to structuring databases were presented. A.DiSterrus outlined a thematic structure comprising the value, measures of uncertainty, associated expert knowledge, and commentary, whilst M.Hijma presented an existing and highly detailed protocol for a post-glacial database of sea level indicators (Hijma et al., in press).

Bridging the gap between geological and instrumental records, the late Holocene is a prime target for reconstructing sea level and thus providing constraints on volume and extent of ice sheets at the Last Glacial Maximum (LGM). Ben Horton outlined the applicability of low-energy environments, such as the U.S. Atlantic Coast salt marshes, in meeting the exact demands placed on temporal and vertical resolution of sea level through this time (Kemp et al., 2013; 2014). G.Milne highlighted why regional perspectives remain vital to improve projections of relative sea level in areas with a large glacial isostatic adjustment signal, and R.Gehrels presented a palaeo perspective on the sea level hotspot work of Sallenger et al. (2012), indicating that wind-driven intra-site variability also provides significant variation (Andres et al., 2013; Saher et al., in review). Presentations from A.Dutton and F.Hibbert reminded the community not to underestimate the complexity of fossil sea level indicators e.g. specific coral species effects and the changing chemical composition of seawater on glacial timescales (Hibbert et al., in prep.; Dutton, in press).

The use of databases, and the application of statistical techniques to large data sets, is already providing us with exciting steps forward (Briggs and Tarasov, 2013; Horton et al., 2014). The workshop clarified the desire to improve standardisation, and transparency in the treatment of uncertainty, so that our models are more representative of the level of variation found in reality. All of us involved in the generation of data, from field observations through to models, share a responsibility to ensure that our research is as transparent as possible, and communicated via publication vehicles that recognise and support the diverse needs to which database content may be directed. Production of a best practice document and working protocol for collating sea level and ice sheet indicators is anticipated for early 2015.

References


**Fig. 1.** PALSEA2 Workshop participants inspecting glacial outwash.
Modelling human settlement, fauna and flora dynamics in Europe during the Mid-Pleistocene Revolution (1.2 to 0.4 Ma) - 1403P

Project Leaders: Jesús Rodríguez (National Research Center on Human Evolution, ES), Ana Mateos (National Research Center on Human Evolution, ES), Christine Hertler (Senckenberg Forschungsinstitut, DE), Maria Rita Palombo (Università di Roma “La Sapienza”, IT).

This is a pilot project intended to develop into an International Focus Group (IFG) devoted to the study of the effects of the Middle Pleistocene Revolution on European biota, especially humans. Mathematical approaches involving mathematical modelling and the analyses of large data sets are the main tools considered to achieve these goals. Thus, the project activities during its first year of existence pivoted around the development of: 1) databases, and 2) mathematical tools, in order to answer our research questions.

Our project was presented to the research community in session A2b (First peopling of Europe) at the Union Internationale des Sciences Préhistoriques et Protohistoriques (UISPP) Congress. Several of the participants in this session showed an interest in joining our project.

The Burgos meeting

A workshop entitled “Mathematical approaches for the study of human-fauna interactions in the Pleistocene” was held at the XVII World UISPP Congress in Burgos, on 1st – 7th September 2014. Session B13 was supported by the INQUA Project Code 1403. This workshop focused on the study of human-fauna interactions in the Pleistocene and on the promotion of the use of mathematical tools. Participants from several European institutions discussed, for example, the role of humans in past food webs, the intensity of competition for resources among secondary consumers, and the effect of human hunting on the extinction of large mammal species etc. These researchers came from Senckenberg Research Institute (Germany), Centre for Macroeology, Evolution and Climate (Denmark), Plymouth University (UK), Institut Catalá de Paleontologia Miquel Crusafont and Universitat Autònoma at Barcelona (Spain), Muséum National d’Histoire Naturelle at Paris (France), IPHES and Universitat Rovira i Virgili at Tarragona (Spain), CENIEH (Spain), AMU, CNRS, MCC, LAMPEA UMR 7269 at Aix-en-Provence (France). The following people were funded by the INQUA Project: E.Hoelzchen (PhD) (Germany), K.Giampoudakis (PhD) (Denmark), F.Rowney (ECR) (UK), J.Madurell (ECR) (Spain) and S.Lozano (ECR) (Spain).

Contributions provided a detailed picture of the mathematical approaches relevant to the study of human-fauna interactions in the past, as well as the effects of climate change on Pleistocene communities. C.Hertler, C.Caparrós and R.Rodriguez-Gómez presented three different approaches for studying competition between secondary consumers in past communities - a topic directly linked to human survival opportunities. In addition, the analysis of palaeo food webs, presented by S.Lozano, was considered a promising complementary approach. Modelling human dispersals was dealt with by E.Hoelzchen and K.Giampoudakis using two entirely different, but complementary, methodologies: 1) agent based modelling, and 2) niche modelling. Population dynamics, and how we can approach it from palaeontological data, is also important for the study of human-fauna interactions. J.Martín-González introduced an interesting approach to this problem. J.Madurell and F.Rowney presented case studies to provide key data for more general analyses.

In summary, the workshop showed that a wide variety of mathematical approaches are currently used to study the interactions between humans, climate and biota during the Pleistocene, and that those approaches open a new frontier to the research community.

Database Commission meeting

A meeting between project members directly responsible for the development and maintenance of databases used to store information on Pleistocene communities, human distribution and environmental proxies, was held at Centro Nacional de Investigación sobre la Evolución Humana (CENIEH) on 7th – 8th September 2014. The meeting was organised by C.Hertler and Z.Kanaeva from the project “The Role of Culture in Early Expansion of humans” (ROCEEH), and J.Rodriguez and A.Mateos from CENIEH. This meeting focused on the technical details of connecting the ROCEEH hosted at Senckenberg with the database hosted at CENIEH.

Fig. 2. Participants at the Database Commission meeting, Burgos, 7-8th September.
This training workshop, part of an ongoing project on palaeo-vegetation using phytoliths at palaeolithic archaeological sites in South Asia, focused on providing a holistic perspective on phytoliths in the context of Quaternary palaeoenvironments and archaeology. These issues have been sparsely investigated in the context of South Asian palaeolithic sites, where phytoliths are of great importance owing to the poor preservation of pollen and other proxies. In this context, excavations at Attirampakkam, Tamil Nadu, along the southeast coast of India, uncovered evidence of long-term occupation by prehistoric populations spanning early to late Pleistocene. The earliest Acheulian levels, dated to around 1.5 Ma, provide evidence of the earliest Acheulian occupation of India. Preliminary studies indicate the presence of phytoliths from various horizons at this site with the potential for reconstructing palaeo-vegetation and hominin responses.

The first workshop for a select group of 12 students and ECRs, from India and Sri Lanka, hailing from both archaeological and botanical backgrounds, was held from 27th October - 2nd November, at the French Institute of Pondicherry (IFP), and Sharma Centre for Heritage Education (SCHE), Chennai. Teachers included scientists from the fields of botany, archaeology, anthropology, and geology. The workshop focussed on laboratory studies of phytoliths, understanding lithic knapping and microwear analysis of tool edge damage following use on plant materials. Two field trips were organised: 1) to understand grass ecology, field data collection strategies and stone tool usage on plant material, and 2) a site visit to Attirampakkam. Poster presentations by participants enabled further discussion on their research.

The workshop began with an introduction to Attirampakkam and prehistoric sites in southeast India, by S.Pappu and K.Akhilesh. Palaeobotanical perspectives of this site were introduced by K.Anupama and R.Premathilake, who highlighted aspects of phytolith taphonomy. P.Ravichandran situated phytoliths in the context of grass ecology, leading to a discussion on the antiquity of grasslands in this region. Lectures by V.Prasad on the palaeoenvironmental and archaeological significance of phytoliths, drew examples from various sites in India. P.Binodini Devi brought in modern ecology and plant use in Manipur, with a focus on ethnobotany and ethnomedicine. The archaeological component was expanded by N.Goren-Inbar who spoke on palaeobotanical remains from the Acheulian site of Gesher Benot Ya’qov, Israel, highlighting macrobotanical remains, ethnoarchaeology and conservation. D.Barboni highlighted phytolith studies drawing examples from Plio-Pleistocene hominin sites in east and central Africa. K.Rajan spoke on the context of the Iron-Age to Early Historic Transition in South India. A.Casille raised methodological and theoretical issues in her study of water management in medieval central India. An overview of the geomorphological context of Attirampakkam and other prehistoric sites in the region, by Y.Gunnell, was presented by S.Pappu. S.Balakrishnan provided an introduction to the properties of rocks and minerals used to make tools, leading to discussions on patination and issues related to conservation of phytoliths on tool edges.

A field trip to Project Ecolate, Ousteri, under the guidance of P.Patel and L.Das, introduced participants to the identification of grasses and other herbs, while P.Sinha guided students in the use of tools on plant material (grasses and bamboo).

A practical session introducing the fundamentals of stone tool manufacture and use was held, with practicals and video demos by K.Akhilesh. P.Sinha provided an overview of concepts related to the study of lithics and microwear analysis. K.Akhilesh, P.Sinha and S.Pappu guided students in practical knapping sessions. Students examined polish and striations on tool edges following their use on plant material using polarising incident light microscopes, at the Pondicherry University under the guidance of P.Sinha.

In addition, a visit to the site of Attirampakkam was organised. A detailed description of the stratigraphy, geomorphology and archaeology of the site was provided by K.Akhilesh and S.Pappu, while R.Premathilake spoke about the phytoliths from archaeological horizons at the site.

The workshop was very valuable by providing an introduction to the importance of phytolith studies at archaeological sites in South Asia. It enabled participants to obtain a basic understanding of theoretical and methodological issues in the study of phytoliths and facilitated a holistic approach by uniting this study with various other disciplines. Discussions between teachers and participants enabled creation of research networks, which will allow exchange of information and ideas in future programmes.
Holocene Global Peatland Carbon Dynamics – 1303

Project Leaders: Zicheng Yu (Lehigh University, USA), Dan Charman (University of Exeter, UK), Dave Bellman (University of Hawaii, USA).

Ombrotrophic peatlands as Holocene palaeoenvironmental archives: towards a global network - 0804

Project Leader: Steve Jackson (Wyoming, USA).

A synthesis of northern peatland carbon accumulation history.

Authors: Julie Loisel1, Zicheng Yu2, & Dan J. Charman2.

1Lehigh University, Bethlehem, US; 2University of Exeter, UK.

Overview

In 2009 the peatland palaeoclimate community initiated a collaborative effort to help answer fundamental questions related to peatland-carbon-climate interactions. Our work has been focusing on understanding the key controls on peatland carbon sequestration rates at the millennial and centennial scales so as to help predict the fate of peatland carbon stocks in a warmer world. In this report, we briefly present a review of the workshops, databases, and publications that have come out of our continuing, community-wide effort. We also present our future research directions and extend an invitation to the broader community to interact with us via data and idea sharing. Finally, we lay out the importance of our work for calibrating and evaluating the Earth system and climate models that must account for the role played by peatlands in the global carbon cycle.

The role of peatlands in the global carbon cycle

Peatlands store about 600 billion tons of carbon and account for one third of the world’s soil carbon (Gorham, 1991; Yu et al., 2010). These carbon-rich ecosystems are mainly found in the high-latitude regions of the world, where they have been storing carbon since the last deglacialion (ca. 16 - 6 ka BP depending on geographic location). Peat deposits accumulate on the landscape as the result of a positive balance between plant primary production and peat decomposition. However, there is substantial concern that rising temperatures, changing seasonality, shifting precipitation patterns, and other effects such as increasing atmospheric nitrogen deposition and fire frequency could modify the wet, acidic conditions favourable for the preservation of peat, and shift peatlands from carbon sinks to sources (Frolking et al., 2011). The partial release of this massive carbon stock would constitute an important positive feedback on climate warming.

In northern peatlands, modern-day gas-flux measurements repeatedly have shown that net ecosystem carbon balance (NECB) fluctuates between a sink and source to the atmosphere over annual and seasonal timescales (Roulet et al., 2007). In general, surface moisture conditions are responsible for shifting the peatland carbon balance on these short timescales, with drier conditions lengthening peat residence time in the acrotelm (the upper unsaturated peat layer), which prolongs peat decay and increases the release of carbon dioxide (CO2) to the atmosphere (Belyea and Clymo, 2001). Temperature also exerts a control on peatland NECB by positively affecting both plant production (carbon uptake) and microbial respiration (carbon release) throughout the year. Likewise, plant communities, which are primarily dependent upon water table depth, have significant effects on the net rate of peat accumulation over decades and centuries, with vascular plant material generally decomposing faster than Sphagnum mosses. Therefore, the effects of surface moisture, temperature, and plant communities on carbon sequestration are closely linked, making it particularly challenging to assess the peatland response to ongoing and projected climatic changes.

Peat core analysis as a means to study past ecosystem carbon balance

Past rates of carbon accumulation can be measured along radiocarbon-dated peat profiles and compared with past hydroclimatic conditions inferred from local and regional palaeoclimatic reconstructions. Such peat-core studies have shown that millennial- and centennial-scale fluctuations in the mean state of climate influence the apparent rate of peat carbon accumulation, with warmer periods generally associated with higher rates of carbon accumulation (e.g. Mauquoy et al., 2002; Yu et al., 2009; Jones and Yu, 2010). These results are contrary to the general notion that warming increases peat decay and reduces the peatland carbon-sink capacity (e.g. Ise et al., 2008). It also implies that peatlands could provide a negative feedback to climate warming, rather than a positive one.

To further test the hypothesis that carbon accumulation is sensitive to long-term climatic conditions, and specifically that warming could promote the peat carbon sink capacity, we developed and analysed two extensive peat-core databases that include over 200 northern peatland sites. The first data synthesis aimed at reconstructing centennial-scale changes in carbon accumulation rates over the past millennium. The second synthesis focused on millennial-scale changes over the Holocene. Brief descriptions of these collaborative projects are presented in the following sections.

Project 1: Centennial-scale peat carbon accumulation rates over the past millennium

An extensive database of 90 peat profiles (Fig. 5) from across the northern high latitudes was developed to analyse spatial and temporal patterns of carbon accumulation over the past millennium (Charman et al., 2013). This effort was initiated during a workshop in Vihula (Estonia) in 2009, funded by a United States National Science Foundation (US-NSF) grant to Steve Jackson and supplementary funding from International Geosphere Biosphere Programme (IGBP)/PAGES and the UK QRA (Quaternary Research Association). It was followed by another workshop at Dartington (UK), convened by Sandy Harrison and funded by the UK Natural Environment Research Council (NERC) Quantifying & Understanding the Earth System (QUEST) programme. The aims of these workshops were to collate the extensive data from
the research community and to work with climate data analysts and models to better understand patterns of carbon accumulation in relation to climate variability, and assess the extent to which peatlands have affected the global carbon cycle over the last millennium.

We analysed spatial relationships between total carbon accumulation over the past 1000 years and modern-day climate parameters derived from the CLIMATE 2.2 dataset (Kaplan et al., 2003). Results showed that total carbon, accumulated over the last 1000 years, was related linearly to contemporary growing season length and photosynthetically active radiation, suggesting that variability in net primary productivity is more important than decomposition in determining long-term carbon accumulation in peatlands. Furthermore, we found that northern peatland carbon sequestration rate declined over the climate transition from the Medieval Climate Anomaly (MCA) to the Little Ice Age (LIA), suggesting that lower temperatures combined with increased cloudiness could have suppressed plant net primary productivity during the LIA. This demonstration of a negative feedback to climate warming from northern peatlands over the last millennium suggests that many peatlands may actually increase accumulation rates under future climate change. Whether this is enough to counter the damaging impact of climate change on peatlands in regions that are more marginal for peat development, remains to fully be assessed.

**Project 2: Millennial-scale peat carbon accumulation rates over the Holocene**

A second workshop that was co-sponsored by US-NSF, INQUA and PAGES took place in October 2013 in Bethlehem (USA) to expand the synthesis effort to the entire Holocene period. We built the most comprehensive compilation of Holocene peat maps (232 cores from 181 sites) and peat carbon accumulation records (151 cores from 127 sites) for northern peatlands (Fig. 5; Loisel et al., 2014). The database encompasses regions within which peat carbon data have become only recently available, such as the West Siberia Lowlands, the Hudson Bay Lowlands, Kamchatka in Far East Russia, and the Tibetan Plateau. This effort also constituted a major expansion from a previous large-scale synthesis that contained carbon accumulation records from 33 sites (Fig. 5; Yu et al., 2009).

Time-weighted peat carbon accumulation rates averaged 23 ± 2 g C/m²/yr during the Holocene, with the highest rates of carbon accumulation (25-28 g C/m²/yr) recorded during the early Holocene when the climate was warmer than the present (Fig. 6). An overall slowdown of carbon accumulation was found for the mid- and late Holocene, particularly after 4 ka during the Neoglacial period. This temporal pattern in carbon accumulation is similar to that described by Yu et al. (2009). However, the mean Holocene value of 23 ± 2 g C/m²/yr presented here is approximately 24% higher (18.6 g C/m²/yr; Fig. 6). Our larger dataset probably better represents the northern peatland carbon accumulation rates, which implies that current peat carbon stocks might be underestimated. The database is being further analysed in relation to past bioclimatic records of seasonal temperature, moisture, and photosynthetically active radiation to further explore the relationship between these climatic parameters and rates of peat accumulation. The database used for the synthesis is archived at https://peatlands.lehigh.edu and will be linked to other public databases such as Neotoma (neotomaDB.org). Several of the new peat carbon records presented in the database have been published in a Special Issue on Holocene Peatland Carbon Dynamics in the Circum-Arctic Region in *The Holocene* (guest-edited by Yu et al.).

**Research directions and future work**

Workshop participants discussed strategies and plans for further analysis of peat carbon data to improve our estimates of Holocene peatland carbon fluxes and better our predictions regarding the fate of peatland carbon stocks in a warmer world. Of particular importance are the following topics: 1) developing more realistic models for reconstructing NECB and “true” Holocene rate of carbon accumulation (Yu, 2011; Froliking et al., 2014); 2) reconstructing Holocene peatland lateral expansion rates at the regional scale (Ruppel et al., 2013); 3) improving peatland age models; 4) describing decadal-scale peatland dynamics due to their critical role in determining the present and future peat carbon balance; 5) further analysing peatland-climate relationships (Charman et al., 2013), and 6) better understanding peatland self-regulation mechanisms such as peat growth and vegetation succession, and their impact on carbon accumulation (Belyea, 2009).

New projects are also taking shape in the community, including a global-scale peat carbon synthesis for the last millennium, several tropical and southern peatland studies, an analysis of pre-Holocene peat carbon accumulation, and an investigation into the structural and functional differences between permafrost and non-permafrost peatlands. Our latest initiatives also include the formation of a new PAGES working group named C-PEAT (Carbon in Peat on Earth through Time) (leaders: Zicheng Yu and Dan Charman). The working group will allow us to look into peat growth and decay processes at several timescales, from centuries and millennia and up to millions of years. For more details, see C-PEAT webpage at http://www.pages-igbp.org/workinggroups/peat-carbon.

**References**


IPODS: Investigating Past Ocean Dynamics - 1408F

Project Leaders: Luke Skinner (University of Cambridge, UK), Andreas Schmittner (Oregon State University, USA).

Website

IPODS Workshop, Bern, Switzerland, 29th September – 3rd October 2014.

Authors: Luke Skinner* & Andreas Schmittner*

*University of Cambridge, UK; *Oregon State University, USA.

Website

Understanding ocean circulation is crucial to understanding the climate system, including its response to natural and anthropogenic perturbations. Projections of the rate of atmospheric CO2 increase and global warming rely on accurate estimates of the thermal inertia of the ocean and its approach to chemical equilibrium with the atmosphere, both of which are influenced by large-scale ocean circulation and its stability under changing climatic conditions.

In order to understand how ocean and climate interact, we may employ fluid dynamical theory (in complex numerical models or simplified thought experiments), study empirical data (covering the last few decades), or look to the geological record. The latter is unique for observing ocean behaviour under conditions that differ significantly from today’s conditions. In short, the geological record allows us to test our theories of ocean-climate interaction outside the historical ‘calibration sample’.

The IPODS focus group aims to improve our understanding of the ocean’s large scale overturning circulation over the last 26 ka by: 1) reviewing recent developments in oceanographic theory, 2) compiling and assessing key palaeoceanographic data sets, 3) developing novel numerical modelling approaches that are optimised for integrating and assessing emerging palaeoceanographic data compilations, and 4) disseminating findings and recommendations through reports and publications aimed at both the scientific community and the wider public.

The first IPODS meeting was held at the Oeschger Centre for Climate Change Research at the University of Bern, in conjunction with the sister PAGES working group Ocean Circulation and Carbon Cycling (O3C) that focuses on the compilation and study of past stable carbon isotope data, also with a view to better understanding past ocean dynamics. Over 60 scientists, from a wide range of backgrounds and origins, attended the meeting to discuss, over four days, the objectives of IPODS and of O3C. The Bern IPODS meeting had three main objectives: 1) to consider the use of radiocarbon as a relatively sparsely sampled proxy/tracer that may yet provide invaluable information on past ocean dynamical changes of direct relevance to the marine carbon cycle, 2) to consider similarly the utility of long-lived radiogenic isotopes (e.g. Nd isotopes, sedimentary Pa/Th ratios), for which there is also a relative paucity of data, and 3) to consider opportunities for applying numerical models of varying complexity to the study of these tracers and their implications for ocean dynamics and carbon cycling. Finally, the group also discussed what activities IPODS might motivate in the immediate and medium-term future that might contribute to the more effective use of such proxies/models towards a greater understanding of their implications for past ocean dynamical (and marine carbon cycle) change.

One important issue that emerged from discussions at the Bern IPODS meeting was the need for a clear and systematic review of (and protocol for) reporting metrics of ocean-atmosphere radiocarbon disequilibrium or 3C age offsets, often but not exclusively referred to as
taphrochronologists in preparation for the next open IPODS meeting.

As suggested above, utilising marine proxy data will be expressed best by combining them with numerical modelling approaches, both forward and inverse. The divergent ocean circulation simulations that have emerged from the General Circulation Models (GCMs) of the Palaeoclimate Modelling Intercomparison Project (PMIP) exercise, and their apparent disagreement with existing proxy data (or at least the standard interpretation of these data) is clearly an important topic for future analysis. Some fundamental issues in numerical modelling come to the fore in this context, including: 1) the occurrence of ‘disequilibrium’ circulations in complex model runs that are not long enough, 2) sensitivities to highly uncertain boundary conditions (especially winds and freshwater/buoyancy budgets at high latitudes), and 3) the emergence of multiple equilibria in simulations of ocean circulation, and therefore the importance of initial conditions and long integration times, as well as the possibility of ‘unforced’ changes in overturning. In addition to addressing these topics, discussions at the IPODS meeting also focused on model perspectives on the link between ocean dynamics and atmospheric CO₂, which are currently as divergent and complex as the LGM PMIP ocean dynamics simulations. Future efforts within PMIP, including the motivation of a carbon-cycle focused PMIP section, will no doubt drive progress in this area, making a tight link between IPODS and PMIP, which will be important to maintain. However, discussions at the IPODS meeting also underlined the importance of adopting and developing a hierarchy of modelling approaches, from the purely conceptual (e.g. fluid dynamical continuous models) to zero dimensional box models, to intermediate complexity models (EMICs) and fully coupled GCMs. The application of inverse methods, using conservative (e.g. δ18O calcite) and/or pseudo-conservative (δ13C activity) proxy observations, and the adoption of offline simulation techniques (especially for tracers with long equilibration times like radiocarbon) were identified as particularly interesting areas of activity, to be tracked and motivated by IPODS in future.

Finally, despite a focus at the Bern IPODS meeting on radiocarbon methods, it should be emphasised that our understanding of past ocean dynamics should ideally be informed by, and tested against, a host of different (proxy) ocean tracers. In this respect, proxy reconstructions and indeed model simulations of long-lived radiogenic isotopes, such as Nd and Pa/Th isotopes in particular, have a key role to play. Following recent efforts to compile and assess modern seawater Nd isotopes as part of the NEDymium isotopes in marine environments: Synergy between Modern, Modelling and PAleo communities (NEOSYMPA) project (and in light of the ongoing International Study of Marine Biogeochemical Cycles of Trace Elements and their Isotopes (GEOTRACES campaign) it was concluded at the Bern IPODS meeting that the time was right for a similar compilation and review of existing Nd isotope records that span the LGM and last deglaciation. The results of this effort will be presented at the next open IPODS meeting.

LaACER: Latin American Abrupt Climate Changes and Environmental Responses – 1209P

Project Leader: Dunia Urrego (University of Exeter, UK).

LaACER has recently published a PAGES program news article outlining the objectives of the initiative, some of the open questions identified during the past two workshops in Colombia 2012 and Brazil 2013, and identifying ways forward to improve our understanding of millennial-scale events in the American tropics and subtropics. The programme news article can be read in the Latest PAGES magazine, vol. 22, no. 2, October 2014, pages 94-95.

The LaACER project will also be convening a session at the INQUA 2015 Congress in Nagoya, Japan. The session is entitled “Abrupt climate changes in the tropics and subtropics: integrating palaeo-records from the biosphere, atmosphere, oceans and modelling approaches - LaACER and beyond”, and is convened by Dunia H. Urrego, Cristiano M. Chiesi, Flavio B. Justino, Paul Baker & Mitchell Power.

Abstract submissions are invited from a wide-ranging community including palaeo-reconstructions (from the biosphere, atmosphere, and oceans) and modelling approaches, helping to disentangle the environmental signature of abrupt climate changes in the tropics and subtropics. We also invite contributions that use pollen, charcoal, stable isotopes, geochemistry, diatoms, and other markers to provide high-quality records from continental and marine archives spanning Marine Isotope Stages 3 to 1. We also welcome contributions using model simulations and data-model comparisons. We hope that this session will provide a venue in which to discuss the oceanic, land-surface and atmospheric processes involved in abrupt climate changes in the American tropics and subtropics, and beyond.
The Quaternary of the Urals: Global trends and pan-European Quaternary records.

INQUA-SEQS Annual Meeting, 10th – 16th September 2014, Ekaterinburg (Russia).

Authors: Markus Fiebig1, Wim Westerhoff2 & Guzel Danukalova3.

1University of Natural Resources and Life Sciences, Austria; 2Geological Survey of the Netherlands, Netherlands; 3Ufa Scientific Centre of the Russian Academy of Science, Russia.

The 2014 annual meeting of INQUA-SEQS was hosted by the Institute of Animal and Plant Ecology Ural branch of the Russian Academy of Science (IPAE) and the Institute of Natural Science (UrFU NS) at the Ural Federal University in Ekaterinburg, Ural Russia. The meeting was organised by Prof. Alexandr Borodin together with Dr Evgenia Markova and their wonderful team of 22 co-organisers.

The focus of the excursions to the Ural area was broadly extended by a wide range of presentations form several parts of Quaternary science mirrored in 34 oral presentations and 38 poster presentations.

The 2014 annual meeting brought together scientists form several parts of Europe interested in Quaternary stratigraphic matters and pan-European correlation. It was very important for further scientific relations and correlation between the Russian speaking part of the Eurasian area and the western part of Europe. It contributed to the aims of INQUA, Stratigraphy and Chronology Committee (SACCOM) and INQUA-SEQS by improving and fostering knowledge of global climate change during the Quaternary period.

All the participants were really impressed by the hospitality of the local organisers, the beautiful landscape of the Urals and the interesting geological record of the area. For the future, the community of INQUA-SEQS is looking forward to the INQUA Congress in Nagoya where a session entitled “Progress in European Quaternary Stratigraphy” is scheduled.

Fig. 9. The second field trip was devoted to the beautiful karst cave Ignatievskaya, where archaeological heritage was discussed. The organising team ensured full access to the cave allowing participants to study the local deposits and palaeoenvironments.

Fig. 8. The field trip to the eastern slopes of the southern Urals started with the stratigraphic sequences in the Baturino coal quarry. With beautiful weather, several perfectly cleaned outcrops were visited and questions about ice or desiccation wedge structures, soils, channels and sediment facies were discussed.

Fig. 10. Photo of participants at INQUA-SEQS Annual Meeting 2014 in front of the building of the Ural Federal University in Ekaterinburg (Russia).
DIG – 1st Workshop on Dinaric Glaciation: Early/Middle Pleistocene glaciations of NE Mediterranean - 1306S

Project Leaders: Ljerka Marjanac (Institute of Quaternary Palaeontology and Geology, Croatian Academy of Sciences and Arts, Croatia), Tihomir Marjanac (University of Zagreb, Croatia).

Glacial History of Dinaric Alps – 1411

Project Leaders: Ljerka Marjanac (Institute of Quaternary Palaeontology and Geology, Croatian Academy of Sciences and Arts, Croatia), Tihomir Marjanac (University of Zagreb, Croatia), Philip Hughes (University of Manchester, UK).

Even though the European continent is one of the most significant and densely investigated regions in the world, there are still “blanks” in terms of compatible data sets from multidisciplinary studies of the Quaternary period. This includes the Dinaric Alps, which extend through Slovenia, Croatia, Bosnia and Herzegovina and Montenegro.

About twenty years of research conducted in the area of the Croatian Dinarides, particularly in the coastal region and on the island, has provided sedimentological evidence of extensive glaciation in this part of the Mediterranean during the middle Pleistocene. Evidence is documented by U-series dating of secondary calcite cements sampled from moraines found at the present sea level. Recent studies of the Quaternary period in the coastal area of Montenegro and Greece, it is hypothesised that a large ice cap used to cover the Dinaric Alps. This is supported by sedimentological data in several areas of coastal Dalmatia. This data is the focus of a series of five field workshops to be held yearly. This evidence will distinctly change our present perception of Pleistocene climate in the Mediterranean region, and thereafter may change the current data that is used for modelling the climate of the future.

Considering that collected data remain largely insufficient (scattered over a very large area) and incompatible for precise reconstruction of early/middle Pleistocene glaciations in the Mediterranean, we found it necessary to organise a workshop for 1) field discussions, and 2) preparation of a transnational project to study and preserve all unique type sections.

Further detailed multidisciplinary studies and dating of sediments found in this region will provide more evidence on past climates during the Quaternary. The glacial and interglacials recorded in sedimentary sequences (marine, lacustrine, glacial, fluvial, aeolian) will provide data for correlation with other regions of the Mediterranean.

Previous research of the region was based predominantly on sedimentological investigation and methods. Future research will be based on a multidisciplinary approach conducted by a team of specialists (with expertise in stratigraphy, sedimentology, geomorphology, geochronology, glaciology and associated climatology). The project will also involve young scientists at the beginning of their research careers in order to provide a lasting legacy and promote Quaternary research in the Dinaric Alps region.

The first DIG Workshop was a formal initiative to involve an international team for further research into the hypothesised extensive Dinaric glaciation as well as the Quaternary stratigraphy and chronology of Croatia. In addition, the workshop aimed to increase capacity and skills development by motivating and providing opportunities for graduate and doctoral students to work in Croatia and to focus their research on the Quaternary period. Development of research collaboration and networking between countries of the Dinaric Alps realm and Alpine countries will benefit the unification of regional and national chronostratigraphical nomenclature related to glacial and interglacial.

DIG – 1st Workshop on Dinaric Glaciation: early/middle Pleistocene glaciations of the northeast Mediterranean – filling the gaps in reconstructing its geological history and climate change, Starigrad-Paklenica, May 2013 (1306S).

Workshop organiser: Croatian National INQUA Committee.

TOPIC 1: Sedimentology of moraines on carbonate bedrock - problems and perspectives. Deposition of glacially-derived debris on previously karstified carbonate bedrock happened in very specific conditions (processes, hydrology, pre-karstification, subglacial karstification, temperate climate conditions etc.), and was discussed at selected key localities.

TOPIC 2: Proglacial lacustrine sediments and their response to climate forcing. A section of varved lacustrine sediments with abundant fossil macroflora, indicative of temperate and colder climates (today found only at high latitudes), was a place for field discussion. The varved sediments, dated to a minimum age of 350 ka, accumulated in a proglacial lake. Diversity and complexity of those varves reflect cyclic variations conditioned by changes from seasonal to climatic forcing. Therefore, this sediment succession, about 20 m thick, presents an unexplored source of valuable data, which will contribute to climate modelling for the Mediterranean region.

TOPIC 3: Fossil ice-marginal sedimentary bodies and processes. Sediments accumulated in various ice-marginal environments (glaciofluvial, glaciolacustrine) during the early/middle Pleistocene are well preserved in this region and enable reconstruction of the glacial extent. Sedimentary facies associations, event stratigraphy and chronostratigraphy were discussed at selected key-localities.

Expected outcomes:

- Annual or biannual DIG workshops.
- Trans-national project proposal on Dinaric glaciation under the tentative title of “Eastern Mediterranean glacial chronology, sedimentology and climate modelling”.
- Engagement of young scientists to develop their research careers in these topics.
- Preparation of summer school programme on sedimentology of ancient glaciogenic sediments related to Dinaric glaciation and glaciation of karst.

Fig. 11. Coring varved sediments at Ždrilo.

Fig. 12. Participants (1st workshop) at Novigrad.

Fig. 13. Discussion at Ždrilo.

Fig. 14. Participants (2nd workshop) at Novigrad.
DIG - 1st Workshop Outcome

The 1st Workshop on Dinaric Glaciations brought together 13 leaders, including senior scientists, ECRs and Master’s students from four countries: Croatia, Slovenia, Switzerland and Germany.

Workshop structure: Two introductory lectures were given by leaders on the regional geology and key locations that document Dinaric glaciation. Two presentations were given by ECRs, who discussed palaeobotanical evidence of glacial periods and geomorphology (e.g. moraines) in Montenegro. Varved sediments at the Zdrilo site were discussed in detail with experts B. Zolitschka and C. Mayr. A sediment core was taken for test analyses at the University of Bremen.

DIG - 2nd Workshop on Dinaric Glaciation: early/middle Pleistocene glaciations of the northeast Mediterranean – filling the gaps in reconstructing its geological history and climate change. Focus on glacial-interglacial transitions (sediments and processes), Starigrad-Paklenica, May and October 2014.

Workshop organiser: Croatian National INQUA Committee.

This project was a follow-up of the DIG - 1st Workshop on Dinaric Glaciation, which took place in Starigrad-Paklenica in May 2013, supported by the INQUA Commission “Stratigraphy and Chronology”. It was a one-year pilot project, which aimed to propose and formalise an IFG under SACCOM, that will, in the next inter-Congress period, devote its work to the glacial history of the Dinaric Alps, including the extent of glaciations and chronology, palaeoclimate, and the establishment of a regional stratigraphic division. Development of research collaboration and networking between countries of the Dinaric Alps and circum-Dinaric countries will benefit the unification of regional and national chronostratigraphical nomenclature related to glacial and interglacials. This project followed the conclusions outlined from the DIG 1st Workshop: to promote Quaternary research of Dinaric Alps, to engage young researchers in annual DIG workshops and research, and to promote activities by creating a web site and using public networks. In addition, with evident correlation to glacial stages in Greece, and possibly Albania, the aim was also to engage researchers from those regions.

Objectives: Network of researchers from Dinaric Alps countries, and other researchers working on relevant topics, DIG web page created and in function (information about activities, e-publications, interactive Google generated map with database of published scientific results), List of palaeo-glacial geohistory sites, Collaboration with Loess Focus Group and Commission TERPRO.

Workshop conclusions: ECRs considered the workshop very useful, instructive and motivating; Senior scientists encouraged the leaders to 1) organise annual workshops, 2) support an initiative to establish a formal IFG, 3) propose a trans-national project, and 4) propose a summer-school programme. The leaders considered all discussion and suggestions very helpful for further research and networking on related topics.

Workshop follow up: Preliminary collaboration has started between several institutions, and further cooperation and projects are being planned. Several scientific papers are in preparation. The Workshop Field Guidebook (pdf) is available by e-mail request to ljerka@hazu.hr.

Fig. 15. Discussion at Seline (glacio-deltaic).

Fig. 16. Visit to the Velika Paklenica moraine.

Fig. 17. Student group at Novigrad.

Workshop structure: Introductory lectures on regional geology and glacigenic sediments were given by workshop leaders, and all participants were engaged in discussion. All four days were spent in the field observing and discussing the following topics: regional geology and glacial sediments in the Velika Paklenica Canyon, transitional sedimentary successions (glacial-proglacial-periglacial-interglacial) at the Novigrad Sea coastal section, glacio-deltaic succession at the Seline section, and glacialicustrine sediments at Novigrad, Karin and Zdrilo with Pleistocene macroflora and evidence of glaciotectonics.

Workshop conclusions: The field discussion was particularly useful for students and young researchers. Participation in this workshop was crucial for those Bachelor students who wish to take a Master’s programme in (Quaternary) geology. New contacts were made for further studies and project collaboration.

Workshop Field Guidebook (pdf) is available by e-mail request to ljerka@hazu.hr.

The DIG web portal is now under construction. It is expected that the forthcoming INQUA Congress in Japan will be a good opportunity to discuss the possibilities of the planned IFG, and also to collaborate with other IFGs.

XIX INQUA CONGRESS 2015

Session S07 “Glacial history of circum-Adriatic mountains – contributions to Quaternary glaciations in the Mediterranean”

The session convenors invite you to participate with a talk or a poster

INFO

DIG – 3rd Workshop on Dinaric Glaciation: early/middle Pleistocene glaciations of the northeast Mediterranean – filling the gaps in reconstructing its geological history and climate change. Focus on glacial sedimentary palaeoenvironments and their extent.

2nd – 6th May 2015,
Starigrad-Paklenica, Croatia

Deadlines:
Final registration: 15th March 2015
Registration fee: 30th March 2015
Contact: ljerka.marjanac@gmail.com
RAISIN – 1216P

Project Leaders: Daniela Sauer (University of Technology Dresden, GER), Sergey Sedov (UNAM University City, MX), Dennis Dahms (University of Northern Iowa, USA), Markus Egli (University of Zurich, Switzerland), Fabio Scariglia (University of Calabria, IT), Pauline da Costa (University of Lomé, Togo), Mike Akaegbobi (University of Ibadan, Nigeria).

Website


Organising committee: *Eric McDonald, Daniela Sauer & Bruce Harrison.

1Desert Research Institute, USA, 2University of Technology Dresden, Germany, 3New Mexico Tech University, USA.

This workshop and field trip was the major event of the INQUA project RAISIN (Rates of soil forming processes obtained from soils and palaeosols in well-defined settings) in 2014.

After a small welcome reception on the evening of Sunday October 26th, we had a one-day workshop at the Desert Research Institute in Las Vegas (Monday October 27th), where eight papers on soil development and palaeosols from eight different parts of the world were presented and discussed. Extended presentation times lead to very intensive and fruitful discussions that continued during coffee and lunch breaks.

In the evening the group travelled from Las Vegas to the Desert Studies Center, located in the Mojave Desert, near the Providence Mountains. Tuesday (October 28th) and Wednesday (October 29th) were devoted to soil formation in well-dated sequences of alluvial fans coming from the Providence Mountains. On the first day, we examined soils on alluvial fans composed of sediments predominated by granitic rock, whereas on the second day we studied soils on alluvial fans of the same ages but different parent materials, namely sediments comprising volcanic rock and limestone.

E.McDonald and B.Harrison introduced the general soil-forming processes in these arid environments, and the group compared and discussed soil formation in two soil chronosequences on different parent materials. Spending two days in this landscape with enough time at each soil profile (more time than on most field trips) led to very intensive and deep discussions and helped participants to develop a better understanding of the landscape development and dynamics, the formation on soils, and the effects of differences in parent materials on soil formation.

In the evenings of Monday and Tuesday, we continued with the workshop after dinner with additional presentations. These presentations focused on desert soils in the Mojave and in other deserts, and on dating of parent materials of soil formations by using cosmogenic and luminescence methods.

On Thursday (October 30th), the group travelled to Death Valley, with stops at Badwater Basin and Devil’s Corn Field, and a lunch break at Furnace Creek Ranch. In the afternoon, we reached Panamint Valley, where we studied several soils formed in dated parent materials near the ghost town Ballarat, on the eastern flank of Panamint Valley. We stayed overnight in Ridgecrest, southwest of Panamint Valley and came back on the next day (Friday October 31st) to explore soils formed in dated parent materials on the western flank of Panamint Valley. Numerous shattered clasts, both in the soils and in the desert pavement, demonstrated impressive physical weathering. Hydration/dehydration of salt crystals was assumed to be the main process responsible for clast shattering. However, other possible processes were discussed as well. The older soils (in the age range of 60 - 85 ka) exhibited intensive reddish-brown colours and were characterised by distinct clay illuviation (compared to the younger soils). This created discussion on the presence/absence of clay coatings in younger soils. The older soils clearly reflected periods of more humid climate during the Pleistocene.

Selected outcomes of the discussion about important soil-forming processes in deserts

- Formation of desert pavement: not by deflation but by accretion of dust that is trapped between pebbles; the rougher the surface, the more efficient the dust trap; pebbles pop up when gas bubbles underneath them are entrapped during water infiltration; hence, they stay at the surface as dust progressively accumulates in the soil.
- Optimum clast size for formation of desert pavement: 2 - 5 cm; if they are too small the air
under the pebbles may escape without causing great pressure and uplifting the pebbles; if they are too large the pebbles pop up less frequently because of their greater weight.

• Formation of an Av horizon: air, possibly also carbon dioxide from microbial activity, gets entrapped by infiltrating water.

• The Av horizon develops a columnar structure; hence, its surface shows a polygonal pattern.

• Dust that is trapped between pebbles forming the desert pavement may be washed down the cracks and accumulate below the Av horizon, or, if it arrives in the center of a polygon, it may accumulate on top of it.

• Development of an Av horizon decreases water infiltration capacity of soils.

• Desert pavement is not static: it is obvious that gravel moves downslope (pebbles pop up during water infiltration by gas bubbles entrapped under the pebbles, fall back downslope, according to gravity); in addition, the distribution of rock varnish on pebbles indicates that pebbles are also rotated.

Fig. 19. Workshop participants studying a 30 ka-old soil in Panamint Valley. Photo: Alessandro Batezelli (Brazil.)

Fig. 20. Trying to understand the landscape setting and evolution. Photo: Alessandro Batezelli (Brazil.)
POLAND

Holocene climate change in northeastern Africa and its impact on ancient Egyptian civilisation.

Project Leaders: Leszek Marks (University of Warsaw, Poland), Alaa Salem (Kafir-el-Sheikh University, Egypt).

Contributors: Fabian Wele (Cardinal Stefan Wyszynski University in Warsaw, Poland), Jerzy Nitychoruk (Pope John Paul II State School of Higher Education in Biala Podlaska, Poland), Zhongyuan Chen (East China Normal University, Shanghai, China), Marta Chodyka (Pope John Paul II State School of Higher Education in Biala Podlaska, Poland), Aleksandra Majeczka (University of Warsaw, Poland).

The aim of the project, funded by the Polish National Centre of Science, is climate change during the Holocene on local and regional scales and its impact on development and decline of ancient civilisation in Egypt. The project is focused on the examination of complex drill cores from the Egyptian lakes located in Faiyum Oasis (Qarun Lake) and from the northern part of the Nile delta (Maryut, Idku and Burullus Lakes), which will be correlated with palaeoclimatic and geoarchaeological data.

Among the well-known Holocene climate disasters is the one at 4.2 ka BP, expressed by drastic collapse of the first human civilisations, connected with the so-called Bond Event 3. In Egypt, the pharaonic power got radically weaker and there is textual evidence of serious famine. In Mesopotamia, the Acadian Empire disintegrated whereas in Indies a civic civilisation of the Indus valley collapsed. Scientists already suspect that these problems were created firstly by a drastic climate change, with catastrophic impact on agriculture of these riverine civilisations.

Therefore, in the current project we aim to reconstruct climate and environmental relations in the Lower Nile drainage basin and to correlate these relations with the development and decline phases of ancient Egypt. Connection of climate change with historical events creates an exceptionally favourable situation for precise dating on a global scale.

Planned boreholes were drilled in March 2014 on a beach of selected lakes in the Faiyum Oasis and in the Nile delta. Macroscopic description of the cores was supplemented with detailed examination with a use of Hitachi TM 3000 SEM with EDS microprobe. Cores of lake sediments were sampled at every 5 cm for different analyses, including among others examination of lithology, geochemistry (including isotopes), diatoms, pollen, molluscs and ostracods, and also for radiocarbon dating.

Lake sediments demonstrated very detailed records of climate and environmental transformations. Among the examined lakes, three were coastal reservoirs in front of the Nile delta, in which seawater inflows have been gradually decreasing. The sediments of these lakes reflect changing inflow of the Nile water during annual floods, but with occasional increased supply of seawater.

In contrast, the Qarun Lake (located in an isolated depression) has been supplied occasionally with the Nile water only; therefore, a sedimentary record in this lake probably reflects a regional climate change. The record from the Qarun Lake comprises successive phases of development of a Holocene reservoir. The initial, early Holocene phase of a deep and rich lake starts at 20 m core depth. The following distinct lithological change was noted at 13.05 m depth where regularly laminated lake sediments have been replaced by irregularly distributed and thick diatomite interbeds.

Ferruginous interbeds indicate progressive aridification (smaller and shallower lake area). In spite of that, the lake is still quite deep and rich in organic life to a core depth of 6.8 m. Starting from this depth, a new sedimentary environment of middle and late Holocene has changed significantly, with more fines in lake sediments, indicating progressive erosion and therefore, disappearance of vegetation cover around the lake but presumably also in the Lower Nile drainage basin.

Among the most important palaeoclimatic indices in sediments of the Qarun Lake there were diatoms of the species *Aulacoseira granulata*, starting from 17 m depth, which corresponds to gradual lake shallowing. Diatoms of the genus *Aulacoseira* have very specific ecological demands; therefore, they are excellent palaeoclimatic indicators.

The recorded climate change cycles could be presumably correlated with Bond events, occurring at every 1470±500 years and are well-known from the North Atlantic region. These events could also be strengthened by some extreme climate disasters in the Mediterranean region including, among others, catastrophic volcanic eruptions that were responsible for short (generally 2-3 years) decreases in solar radiation.

The project attempts to determine magnitude and frequency of climate change in northern Egypt but partly also for the whole drainage basin of the Nile. The results will inform global climate change in the Holocene.
Symposium on the Quaternary of Taiwan

Organiser: Min-Te Chen (National Taiwan Ocean University, Keelung, Taiwan) and Taiwan Quaternary Research Group.

The Quaternary Research Group in Taiwan has been considered as one of the most energetic groups in geological and environmental science communities in Taiwan. The island has experienced quite unique and dynamic climatic, oceanic, tectonic, and geo-hazard events during the Quaternary. Since 2012, the Quaternary Research Group includes many young researchers who are currently active in thematic research coherent with those represented by the INQUA commissions (http://taiwan-pages.mgac.nsysu.edu.tw/Homepage_INQUA.html). All Quaternary research activities in Taiwan are strongly supported by the Ministry of Science and Technology (MOST), the Geological Society located in Taipei (http://www.gst.org.tw), and the National Committee of International Council of Science (ICSU), R.O.C. located in Academia Sinica, Nankang (http://icsu.sinica.edu.tw/en_about.htm), while Dr Yuan-Tseh Lee is currently serving as President of ICSU.

Over the past three years, the Quaternary Research Group held a symposium on the “Quaternary of Taiwan” (Fig. 25). Local and international participants contributed a total of 182 presentations to the first meeting in 2013 in Kaohsiung. Two special issues with the main theme of the “Quaternary of East Asia and the Western Pacific” have collected many good papers relevant to the main theme, and were published by Quaternary International (volumes 333 and 349). In 2014, another workshop “Earth’s Environments, Palaeoclimates, and Geohazards: a Focus on the Western Pacific Marginal Seas and its Islands with global implications” was held in April 2014 in Keelung. This meeting put more emphasis on the presentation of geological records of geo-hazards (tsunami, earthquake, landslide etc.) in the Western Pacific marginal seas and its islands (Dongsha, Xisha). The focus of the meeting attracted much attention from the geo-science community and the public because increases in anthropogenic carbon dioxide in the atmosphere and stronger typhoons with heavy precipitation, are thought to be responsible for geo-related natural hazards. Such a complex issue requires an interdisciplinary approach and the collaboration of Quaternary research groups. This conference included 70 participants and scheduled 20 oral presentations and a five-day field trip to southern and eastern Taiwan, and Lanyu (the Koto island) in offshore eastern Taiwan to observe the geological evidence of past Tsunami (Fig. 26). The papers presented in the meeting are now under editing and scheduled to be published in a special issue of the Journal of Asian Earth Sciences in 2015.

Next year, the Quaternary Research Group in Taiwan will prepare to attend and present new results at the INQUA Congress in Nagoya, Japan, and also the next symposium on the “Quaternary of Taiwan”. Overall, Quaternary research activities in Taiwan continue to be promoted and are expected to tackle many interesting and challenging environmental issues in this unique geographic setting.

Fig. 24. Participants on the field trip to Lanyu (the Koto Island), offshore eastern Taiwan.

Fig. 23. Min-Te Chen (3rd from the right) was chairing the 2013 symposium on the “Quaternary of Taiwan”.

XIX INQUA CONGRESS

Session P09 “Holocene rapid climate changes recorded in marine and terrestrial archives”

INFO

Workshop "Quaternary of Taiwan"

Date and place TO BE CONFIRMED.

Contact Prof. Min-Te Chen (陳明德):
mtchen@ntou.edu.tw
International Conference on Data Sharing and Integration for Global Sustainability.

New Delhi, India, 2nd - 5th November 2014.

There is increasing recognition that palaeodata is important for understanding current environmental problems and for evaluating the reliability of models used for future projections. We at INQUA hope that this recognition will lead to palaeo-science playing a key role in international programmes such as The International Council for Science’s (ICSU) Future Earth programme. However, to ensure that palaeo-science is taken seriously, INQUA needs to engage actively in making palaeodata more widely available to the scientific community. Here we report on a recent conference, SciDataCon2014, which addressed issues related to data sharing and data management.

SciDataCon2014, the “International Conference on Data Sharing and Integration for Global Sustainability”, ran from 2nd - 5th November in New Delhi. The conference was motivated by the understanding that the most significant research challenges – and in particular the pressing issues relating to global sustainability in the face of ongoing natural and human-induced changes to the planetary system – cannot be properly addressed without paying attention to issues relating to equitable access to quality-assured and interpretable data sets and their long term management.

We live in a data-rich world, and this provides the opportunity to investigate societally relevant issues in new ways and to develop evidence-based approaches for planetary management and the formulation of policy. However, managing the vast amounts of data currently being generated poses significant challenges. In particular: How do we assure the continuity of monitoring programmes? How do we assure the quality and reliability of the available data? How do we combine diverse data sets from different scientific disciplines? How can we maximise the use of data sets to answer new questions? How do we assure the long-term preservation of data sets? How do we ensure that data is available to all? By seeking to address these questions SciDataCon 2014 represented a milestone in the discussion about data management to address the issues of global change and global sustainability.

SciDataCon2014 was hosted by the Indian National Science Academy and sponsored by two bodies of the ICSU: the World Data Service (WDS) and CODATA (the Committee on Data for Science and Technology). This was the first time that WDS and CODATA have joined forces to sponsor an international meeting designed to confront data issues.

The mission of WDS is to enable universal and equitable access to quality-assured scientific data, services, products and information, by providing mechanisms to facilitate and improve access to data and products. WDS works to ensure long-term data stewardship, while fostering compliance to data standards and conventions, across the natural and social sciences and the humanities.

WDS is building a global “community of excellence” through certifying that the holders and providers of data, data products or data services who are members of WDS, conform to internationally recognised management standards and practices. This allows the scientific community who use the data to have confidence in both the quality of the data and in its continuity, while ensuring that the fundamental evidence on which our research endeavours are based is transparently available to all.

While SciDataCon2014 addressed many important issues, the data battle is not over. There are many areas of science where data sharing and data archiving is not the norm. There is a vast amount of data from the pre-electronic era, languishing in the archives of individual researchers, which could be useful for providing the longer-term perspective on current monitoring programmes. These need to be rescued and made available. There is still no clear model for how to support data archives and services into the future. And despite the excitement surrounding “big data”, there is still much to do to develop the conceptual, analytical and management tools required to handle such data sets. The issues of data sharing and data rescue are particularly important for INQUA, as is the development of tools that allow our data to be used in new and creative ways. WDS will continue to engage with its members and the wider scientific and policy communities to address these issues, so that scientific data can play a role in transforming our world and moving toward greater equity and sustainability. INQUA needs to play a role here too, and particularly to engage with WDS and those data centres, which provide a natural home for palaeodata (e.g. PANGAEA, NOAA-NGDC) to ensure that palaeodata play their part in this transformation.

Progress in Quaternary archive studies in the Iberian Peninsula.

Seville, Spain.

12th – 13th March 2015.

Archive investigation for the purpose of environmental and climate change is a large interdisciplinary research field in geoscience. Twenty-five years ago a group of young Quaternary researchers published the first Quaternary archive studies on the western Andalusia region. Twenty-five years later, our conference aims to follow up the Quaternary research of the Iberian Peninsula and give insight into new methodological and conceptual approaches. New results of different archive studies should be presented in a broader context.

We would like to discuss standpoints and perspectives of researchers from different geoscientific disciplines. We welcome contributions (oral and poster presentations) from ECRs and young scientists in particular.

Researchers with an interest in attending the meeting are kindly invited to register under: cpacheco@us.es

Upon registration you will receive details in terms of abstract submission and payment.

Proceedings

Proceedings of both oral and poster presentations may be eligible for peer-reviewed publication in the journal Quaternary International. The official language of the conference is English.

IMPORTANT DATES

Registration by 20th November 2014.

Submission of Abstract by 10th December 2014.

Second circular with program details by 20th January 2015.

Website
Climate-change and palaeo-modelling workshop.

All Africa House, University of Cape Town.

27th – 29th January 2015.

You are cordially invited to join us in a collaborative workshop on long-term climate variability, land cover change and ecosystem dynamics in southern Africa. The workshop is intended as a first step in building a regional biome and climate change model based on palaeodata that will enable the monitoring, mitigation and prediction of biome and micro-biome changes in southern Africa. The workshop is sponsored by the Swedish Secretariat for Environmental Earth Systems Science and co-organised by the Universities of Cape Town and KwaZulu Natal and Uppsala and Stockholm University.

The January workshop will draw together Swedish and southern African researchers and stakeholders, together with modelling experts, with the aim of exploring the possibilities of developing joint research proposals that address the following regional challenges: detecting, interpreting and modelling environmental change, including interactions between climate, vegetation and land-use; and identifying linkages between global change, livelihoods and ecosystem services - thereby contributing to long-term sustainability in the face of global change.

The aims of the workshop are to:

• Identify crucial questions concerning the management, mitigation and prediction of biome shifts where palaeodata and palaeomodelling may be of use.
• Identify temporal and geographical gaps in knowledge when it comes to vegetation and climate change (and develop a long term plan to enhance knowledge gaps).
• Identify crucial factors that need to be considered in the development of a forecasting and hindcasting model, based on palaeoclimatic modelling and future climate scenarios. Assess the potential of different modelling platforms and tools.

We would be delighted to have your input at the workshop, with the aim of developing future collaborations using palaeoecological data to understand the effects of environmental change at regional, landscape and local scales.

Please RSVP to Lindsey.Gillson@uct.ac.za

AfQUA conference and SASQUA Biennial conference.

UCT, Cape Town.

30th January – 7th February 2015.

Registration has closed but contact afqua2015@gmail.com

Please visit our website for the latest conference updates

We look forward to seeing you in Cape Town in 2015!

35th International Geological Congress.

Cape Town, South Africa.


South Africa will be hosting the 35th ‘World Cup of Geosciences’ in 2016 – the prestigious International Geological Congress (IGC), which is undoubtedly the most important activity of the International Union of Geological Sciences (IUGS).

The Council for Geoscience, together with the Geological Society of South Africa and other collaborators from academia and industry, are currently spearheading the preparations for the 35th IGC in South Africa.

The objectives of the IGC are as follows:

i) Contribute, in collaboration with and under the sponsorship of the IUGS, to the advancement of fundamental and applied research in the geological sciences.

ii) Provide a general assembly of geoscientists, spanning a wide range of geoscience disciplines, where ideas and information can be freely exchanged.

iii) Emphasise the geological specialties or challenges of the host country or region.

iv) Provide the opportunity, by way of geological excursions, to examine geological problems and features in the field.

Website