

# Quaternary Perspectives



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and the other INQUA ECR Committee members

[Quaternary Perspectives website](http://www.inqua.org/quaternary-perspectives-website)

## Perspectives on the XXth INQUA Congress Dublin, Ireland

INQUA Congress XX is in the books and my sense is that for all those who attended it was a great success. The meeting was organized by the Irish Quaternary Association (IQUA). A team headed up by Pete Coxon (Ireland), and consisting of Fraser Mitchell (Ireland), Keith Bennet (UK), Catherine Dalton (Ireland), Steve McCarron (Ireland) and others orchestrated a program of symposia, plenary lectures, field trips and social events that was first-rate. The management of events was in the very capable hands of Keynote PCO. The organization started almost immediately following the congress in Nagoya, Japan, and the hard work of the last four years paid off with a very well-organized scientific meeting. The congress got off to a great start with an



*The INQUA Executive and Commission Presidents of the 2015-2019 inter-congressional period meeting before the Congress in the Geography department at Trinity College: from left to right they are: Craig Sloss, Zhengtang Guo, Freek Busschers, Brian Chase, Thijs van Kolfschoten, Margaret Avery, Allan Ashworth, Lewis Owen, Franck Audemard, Ashok Singhvi, Eduardo Alarcón, Nikki Whitehouse, Atte Korhola, Alessandro Michetti.*



*INQUA presidents former and current attending the INQUA Congress: from left to right, Nat Rutter (1987-1991), John Clague (2003-2007), Allan Chivas (2007-2011), Margaret Avery (2011-2015), Allan Ashworth (2015-2019), and Thijs van Kolfschoten (2019 - ).*

inspiring talk by Mary Robinson, former President of Ireland, currently Chancellor of Trinity College, Dublin, and president of the Mary Robinson Foundation for Climate Justice, which deals with climate change, inequality, poverty and woman's rights.

The congress was the largest ever with 2305 delegates from 64 countries. Four countries provided over 100 delegates each with the UK leading, followed by China, Germany and the United States. By gender 56% of the registrants were male and 44% female. There were 22 pre-, mid- and post-congress field trips that were attended by about 25% of the delegates. Most of the field trips were to various parts of Ireland but some, organized by the Quaternary Research Association (QRA), were to England, Scotland and Wales.





*Members of the INQUA organizing committee of the XX INQUA Congress surrounding the Giant Irish Deer (*Megaloceros giganteus*) in the Geography Department at Trinity College: from left to right, Gayle McGlynn, Bettina Stefanini, Kieran Craven, Keith Bennett*

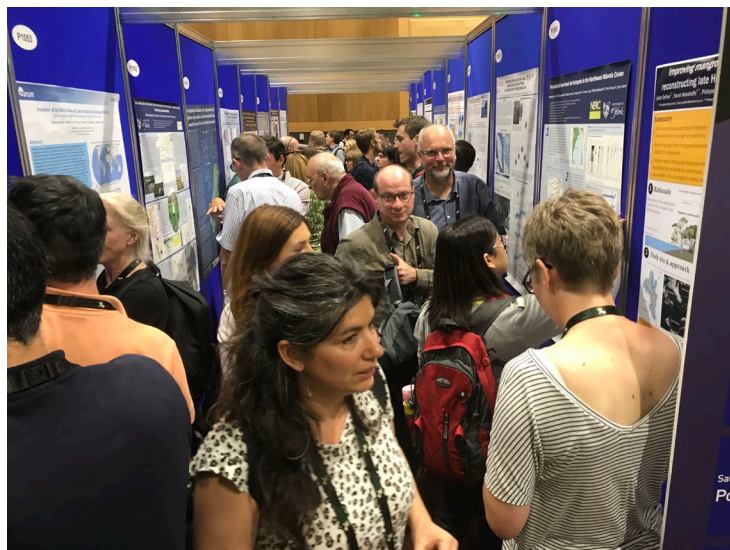
The scientific program, organized by Keith Bennett, was held in the modern facilities of the Convention Centre Dublin, located on the north bank of the River Liffey. In all there were 139 sessions in which 1185 talks and 1476 posters were presented. INQUA, through its travel bursary program, was able to support 281 early career and developing nation scientists to attend the congress and make their presentations. The program also included six well-attended plenary lectures by Eric Wolff (UK), Beth Shapiro (USA), Xiaoping Yang (China), Helen Bostock (New Zealand), Yohannes Haile-Selassie (USA) and Kathy Willis (UK) as well as lunchtime lectures by INQUA medal and special recognition awardees, Amaelle Landais (France-Sir Nicholas Shackleton medal 2017), Qiuzen Yin (Belgium-China-Sir Nicholas Shackleton medal 2019), Marie-France Loutre (Belgium-INQUA Distinguished Service medal), and to John Lowe and Mike Walker (UK-Special Recognition Award) for their contribution 'Reconstructing Quaternary Environments'. Nick Lancaster (USA- Liu Tungsheng Distinguished Career medal) was unable to attend the congress. Further, six researchers were named as INQUA Honorary Life Fellows for their contributions to the science. They are Margaret Avery (South Africa), Allan Chivas (Australia), Hisao Kumai deceased (Japan), Jiaqi



*INQUA medal and special recognition awardees attending the congress with INQUA president Allan Ashworth: from left to right, Mike Walker (Special recognition for his contribution 'Reconstructing Quaternary Environments' co-authored with John Lowe), Qiuzen Yin (The Sir Nicholas Shackleton Medal for Outstanding Young Quaternary Scientists, 2019), Allan Ashworth (President of INQUA through the Congress), Amaelle Landais (The Sir Nicholas Shackleton Medal for Outstanding Young Quaternary Scientists, 2017), Marie-France Loutre (INQUA Distinguished Service Medal, 2019), John Lowe (Special recognition for his contribution 'Reconstructing Quaternary Environments' co-authored with Mike Walker). Nick Lancaster was awarded the 2019 Liu Tungsheng Distinguished Career Medal but unfortunately was unable to attend the Congress.*

Liu (China), Giuseppe Orombelli (Italy), Yong-Ahn Park (South Korea) and Christian Schlüchter (Switzerland).

In addition to the scientific sessions there was a pre-congress business meeting of the INQUA Executive and Commission Presidents held in the Freeman Library at Trinity College. Also, there were three business meetings held during the congress between the Executive and the International Council, which is made up of representatives from the dues-paying member nations of INQUA. Several changes to the way in which the INQUA executive and commissions are organized were discussed and changes in operation approved by the International Council. Support was given for the continued development of the INQUA Foundation, and plans for the reorganization of the Quaternary International editorial board were approved. Rome was selected as the venue for Congress XXI after stiff competition from India. A new suite of officers was elected including Thijs van Kolfschoten (Netherlands-President), Allan Ashworth (USA-Immediate Past President), Eniko Magyari (Hungary-Secretary General), Freek Busschers (Netherlands-Treasurer), Brian



*Poster session attendees at the XX INQUA Congress.*



*INQUA's new commission officers for the 2019-2023 inter-congress period: from left to right Rob Barnett (CMP-secretary, UK), James McAlpine (TERPRO-President, USA), Sarah Woodroffe (CMP-President, UK), Lewis Owen (SACCOM-President, USA), Brian Chase (INQUA Executive, V-P for Commission Activities, France), Manuel Chevalier (PALCOM-Secretary), Tom Johnson (PALCOM-President, USA), Anupama Krishnamurthy (HABCOM-President, India).*

Chase (France-Vice-President for Commission Activities), Zhengtang Guo (China-Vice-President for Membership Issues), Laura Sadori (Italy-Vice-President for Communications), Francesca Ferrario (Italy-ECR Chair), Sarah Woodroffe (UK-President, Coastal and Marine Processes - CMP), Anupama Krishnamurthy (India-President, Humans and Biosphere - HABCOM), Tom Johnson (USA-President, Palaeoclimates - PALCOM), Lewis Owen (USA-President, Stratigraphy and Chronology - SACCOM), James McAlpine (USA-President, Terrestrial Processes - TERPRO).

I just want to add it has been an honor for me to have served as your president. The congress was my final act and what a pleasure it was to see and meet so many young scientists involved in Quaternary research and for me to step down from office knowing that the science is alive and well. Finally, I thank members of the extended executive who have served INQUA well, some for many years, whose terms ended during or at the close of the Congress. They are Margaret Avery (South Africa-Past President), Marie-France Loutre (Belgium-Treasurer), Maria Rita Palombo (Italy-Treasurer), Eduardo Alarcón (Chile-ECR Chair), Lyudmila Shumilovskikh (Germany -ECR Chair), Franck Audemard (Venezuela-Vice-President), Ashok Singhvi (India-Vice-President), Craig Sloss (Australia-President, CMP), Atte Korhola (Finland-President PALCOM), Nikki Whitehouse (UK-President HABCOM), Mauro Coltorti (Italy-President SACCOM) and Alessandro Michetti (Italy-President TERPRO).

*Allan Ashworth  
Immediate Past President*



# XXI INQUA Congress

## Rome, Sapienza University campus

### 13-20 July 2023



The XXI INQUA Congress will be held in Rome (Italy) and will focus on “a Mediterranean perspective on Quaternary Sciences”, to highlight the extreme relevance that Quaternary disciplines have in geologically-active and environmentally-critical regions. Over 100 scientific sessions will be organized in agreement with the themes of the 5 INQUA Commissions. Italy and the Mediterranean region are an encyclopaedia of Quaternary Sciences that will be on display during the 30 proposed pre-, mid- and post-congress fieldtrips.



The organizing committee would like to invite PhD students and Early Career Researchers (defined as someone within 8 years since the award of their PhD or equivalent professional training) from developing countries wishing to present their work at XXI INQUA. We will be waiving registration fee for 100 participants belonging to PhD students and ECRs categories. The waiving of the registration fee will be competitive and will require the acceptance of an abstract (first authorship) for oral presentation at the congress. AIQUA – Italian Association for Quaternary Research - will provide a limited number of attendance support awards. AIQUA's awards are usually open to non-tenured researchers, scholarship holders and research fellows. One award will be reserved to a researcher holding Italian nationality.



Aiming to support families attending the XXI INQUA Congress, childcare services will be offered to registered participants. With an average of 3000 attendees, the INQUA congress usually has an important environmental impact. To minimize the environmental footprint of the congress, the organizing committee of INQUA Rome 2023 is implementing several greening measures such as the reduction of print paper, the use of reusable water bottles and coffee cups and the selection of a catering partner that offers a sample of menus from the huge repertoire of the Italian cuisine, including vegan, vegetarian and gluten free options. We look forward to welcoming all Quaternary scientists in Rome in 2023!

# The new INQUA Executive Committee

## PRESIDENT: Thijs van Kolfschoten

Thijs van Kolfschoten (1952) is emeritus professor in mammalian palaeo- and archaeozoology and Quaternary biostratigraphy. He studied Geology and Biology and obtained his Ph.D. in Palaeontology, at the Institute of Earth Sciences, University of Utrecht (The Netherlands). After a research position at the Institute of Palaeontology, University of Bonn (Germany) he moved in 1992 to the Faculty of Archaeology, Leiden University where he retired in August 2018. Since October 2018, he is Guest Professor at Shandong University in China.

His main fields of interest are Quaternary mammals, biostratigraphy, palaeoecology and taphonomy. His palaeontological research focuses on continental deposits ranging from the Early Pleistocene until the early Holocene. A major research project is the study of the mammalian vertebrate fossils from a sequence exposed at Schöningen (Germany); a sequence that is important in the debate on late Middle Pleistocene climatic, faunal history and hominin subsistence and behaviour.

He is President of INQUA (International Union for Quaternary Science) since July 2019 and he was Vice President of INQUA 2015 - 2019. He was President of the INQUA-Subcommission on European Stratigraphy (SEQS) 1995-2003 and Vice-president of the INQUA Commission on Stratigraphy and Chronology (2003 – 2007) secretary of that commission (2007 – 2015).

The President's mandate for the 2019-2023 inter-congress period is to serve the Quaternary Research Community, to increase the visibility of INQUA and to get more countries/communities involved in INQUA activities e.g. by supporting early-career and developing-country researchers.



## SECRETARY GENERAL: Enikő Katalin Magyari



Enikő Magyari (1973) is professor in Earth Sciences. She studied Biology and Ecology and obtained her Ph.D. in Palaeontology at the Institute of Earth Sciences, University of Debrecen (Hungary). After two postdoctoral fellowships in the UK (Newcastle, Durham) she took up a research position at the Research Group for Paleontology, Hungarian Academy of Sciences in Budapest (Hungary), she moved in 2017 to the Institute of Geography and Geology, Eötvös Loránd University (Budapest), where she is currently a full time professor and also the Head of the Department of Environmental and Landscape Geography.

Her main fields of interest are Quaternary palaeoecology and climate change. Her research focuses on the environmental history of the Carpathian-Balkan Region during the last 30,000 years. Using pollen, plant macrofossil and multi-proxy paleoecological methods she studies how rapid climate change events and human impact have shaped the forest and steppe environment, what was the amplitude of climate change during the last glacial termination and what are the region's climate change characteristics. Her studies also address questions connected to the protection of Hungary's semi-natural landscapes, she seeks baseline conditions in the lowland forest steppe environment prior to major human transformation of the land, studies natural forest composition in the mid mountains and focuses on the Holocene land cover reconstruction, tree and timberline changes in the Carpathians, studies the refugial role of the Carpathian Basin for temperate and

boreal tree taxa during the Last Glacial Maximum. She also applied novel ancient DNA techniques to reconstruct past vegetation from soils and lake sediments.

She is the Secretary General of INQUA (International Union for Quaternary Science) since July 2019 and she has been National Representative and chair of the Hungarian INQUA group since 2014, while she has been member of the Hungarian INQUA Committee since 2008.

The Secretary General's mandate for the 2019-2023 inter-congress period is to increase the involvement of African and some Eastern European and Asian countries in INQUA inter congress activities. Coming from East-Central Europe, one of her missions as Secretary General of INQUA is to help involving more actively scientists from these countries and encourage their joining to INQUA.



## TREASURER: Freek S. Busschers

Freek Busschers is a geologist at TNO - Geological Survey of the Netherlands, working mainly on the landscape evolution and sediment record of the North Sea area during the late Neogene, Quaternary and Holocene. His key focus is the response of paleo fluvial (Rhine, Meuse) and coastal systems to changes in climate, sea-level, ice-sheet dynamics and glacio-isostasy. For this work, sedimentary and provenance analysis, 2D and 3D geological modelling techniques and dating techniques like OSL and biostratigraphical analysis are used. Freek has a long-track record of North Sea Basin research and proposal contributions. He is also the project manager of the Survey's Research and Development project, which includes the cooperation with other research institutes in the Netherlands and abroad.

Freek is an active INQUA member and regards the organisation essential for connecting different Quaternary groups and disciplines all over the world. During the past inter-Congress period, he was secretary of INQUA-SACCOM and since 2017 the Treasurer of INQUA. Freek lives in the countryside in the east of the Netherlands with his wife and their horses, cats, rabbits and cows.

Halfway the past inter-Congress period, Freek stepped in as the new Treasurer of INQUA and started with updating the financial working procedures. His tasks for the upcoming period are:

- to handle financial transactions on behalf of the INQUA Executive and give advice to the INQUA Executive Committee on financial aspects of decisions and policies.
- to obtain the dues from INQUA Members and disburse monies for all activities, IFGs and projects.
- to provide an overview of the INQUA finances, including providing annual summaries of the finances for the INQUA Executive.

Freek will continue optimizing the financial workflow of INQUA in order to keep INQUA in a healthy financial state. He is looking forward to work with all members of the INQUA community during the next inter-Congress period!



## VICE-PRESIDENT IN CHARGE OF COMMISSION OVERSIGHT: Brian M. Chase



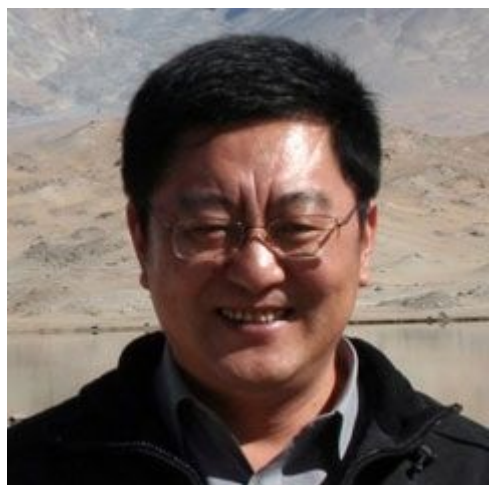
Brian Chase is a Director of Research with the Centre National de la Recherche Scientifique (CNRS) with training and interests in palaeoclimatology, palaeoecology and archaeology. Working primarily in southern Africa, he is engaged in the development and evaluation of new palaeoenvironmental archives and proxies in arid to sub-humid environments and the study of low latitude climate change.

Having previously been involved in the study and dating of the region's extensive dune fields, he now works on developing proxies and obtaining records from fossilised rock hyrax middens. Using stable isotopes, fossil pollen and charcoal, and through the development of pdf-based botanical-climatological transfer functions, and detailed data-model assimilation studies, Brian is working to reconstruct detailed synoptic scale patterns of past climate change and ascertain their impact on vegetation dynamics and human activity and evolution.

During the last inter-congress period, Brian served as the INQUA Secretary-General. He is also the founder and steering committee director of the AFQUA (African Quaternary: Environments, Ecology and Humans) and a steering committee member of the Southern Deserts research group. He has served as a co-leader of Past Global Changes (PAGES) Africa2K Working Group, the President of Southern African Society for Quaternary Research (SASQUA), as a member of the South African National Committee for INQUA and as Vice President and an Advisory Board member for the INQUA Humans and Biosphere Commission (HABCOM). Brian also serves on the Editorial Boards of Quaternary International and Quaternary Science Advances.

During the past inter-Congress period, Brian initiated and developed the restructuring of INQUA Commissions with the aim of improving: 1) their engagement and accessibility regarding their communities of Corresponding Members, 2) their integration in the larger context of the INQUA structure, and 3) their visibility and impact within and beyond the Quaternary science community. Moving from what have in some cases been isolated groups, serving only small groups of scientists, Brian's goal for the current inter-congress period is for each Commission to be a community focal point for the disciplines they represent; with clear, transparent structures, active officers, and no barriers for any interested individual to participate as a Corresponding Member. As the INQUA Vice-President in Charge of Commission Oversight, Brian is tasked with ensuring optimised functioning, communication and integration between the Executive Committee, the Commissions and the Corresponding Members.

## VICE-PRESIDENT IN CHARGE OF MEMBERS: Zhengtang Guo



Zhengtang Guo is a research professor in the Institute of Geology and Geophysics, Chinese Academy of Sciences (IGG-CAS) and also a professor in the University of Chinese Academy of Sciences (UCAS). His research interests are centered on the Cenozoic/Quaternary Geology, ranging from Paleoclimatology, Paleopedology, Biogeochemistry and human-environment interactions. He has particular expertise in exploring the climate information from the Neogene-Quaternary eolian deposits in China across a wide range of time scales. He and his colleagues extended the near-continuous loess-soil records in China from 8 Ma (million years) to 22 Ma that attest to the formation of the monsoon-dominated climate and inland deserts in Asia by the early Miocene due to the uplift of the Himalayan-Tibetan complex.

Zhengtang served as the vice-president of the INQUA Commission on Paleoclimates (1995-2003), as a member of PAGES Scientific Steering Committee (1996-2001) and as a co-leader of PAGES' Australasian Pole-Equator-Pole (PEP-II) international project (1999-2002). He is now a vice-president of the China Association of Quaternary Research (CHQUA), an editor of *Global and Planetary Change*, and a deputy editor-in-chief of *Science China: Earth Science*. He was elected as academician of Chinese Academy of Sciences in 2013.

Zhengtang serves in the Executive Committee as Vice President in charge of the relation with INQUA member countries. His role and aim during this Inter-Congress Period will be to organize and strengthen the relations between the Executive Committee and the INQUA affiliated Quaternary associations of all countries.

## VICE-PRESIDENT IN CHARGE OF PUBLICATIONS: Laura Sadori

Laura Sadori, full professor of Systematic Botany, is an Italian palynologist and palaeobotanist working at Dipartimento di Biologia Ambientale of Università "La Sapienza" of Rome, in Italy.

Laura carries out palaeoecological studies, focusing on research aimed at palaeoenvironmental and palaeoclimatic reconstructions in the Mediterranean basin. Her research centers on understanding the response of flora and vegetation to variations in climatic forcing using long lacustrine European pollen records. She is also interested in evaluating the degree of human as well as climate change impact on the environment. In recent years she produced data aimed at pointing out the strong link between natural and human agency, with particular attention to the effects of human impact and to the dynamics of past populations resilience.

The research carried out by Laura is based on morphology and taxonomy of plant micro- and macrofossils. Most of her analytical research is aimed to improve the knowledge of past biodiversity and to the detection of plant extinctions during the Quaternary. In this perspective palynology of natural and historical archives is used to understand present environmental dynamics and future scenarios under climate changes. She applied the study of stable isotopes to archaeological plant remains to infer paleoclimate and cultivation practices. Laura cooperates with archaeologists, geologists and architects in the multidisciplinary study of a number of Italian and foreign natural, historical and prehistorical sites.

She participated and coordinated units of several national and European Union projects on past climate changes and cultural heritage. She vice-president of IFPS (International Federation of Palynological Societies), member of AIQUA (Associazione Italiana per lo Studio del Quaternario), IAS (International Association of sedimentologists), past member of the advisory board of EPD (European Pollen Database), past coordinator of the work group of Palynology and of the work of Palaeobotany for SBI (Società Botanica Italiana).

Laura is at present enrolled as vice-president of INQUA for publications and intends to create and maintain close links with the editorial board of Quaternary International and with the ECR (Early Career Researches) which are responsible for QP (Quaternary Perspectives). Her aim is to improve the diffusion of Quaternary sciences, starting from updating both content and layout of QP, the INQUA newsletter, thanks to the efforts and enthusiastic work of young researchers.



## VICE-PRESIDENT IN CHARGE OF COMMUNICATIONS: Lynne J. Quick



Lynne Quick is a Senior Research Fellow associated with the African Centre for Coastal Palaeoscience at Nelson Mandela University (NMU) in South Africa. She is a palynologist with interests in palaeoecology and palaeoclimatology. She is working on the development of new palaeoenvironmental records in southern Africa and has a key focus on the vegetation history and past climate dynamics of the Cape Floristic Region. She has spent the last year establishing a state-of-the-art palaeobotanical laboratory at NMU and hopes that through her leadership, this facility will produce new, innovative, palynological research.

Lynne is the President of Southern African Society for Quaternary Research (SASQUA), a member of the South African National Committee for INQUA and a member of the scientific steering committee of the AFQUA (African Quaternary: Environments, Ecology and Humans) initiative.

Lynne is a new member of INQUA's Executive Council and is excited to serve as the Vice-President in Charge of Communications. She plans to optimise communication channels and promote the dissemination of content relevant to the Quaternary Science Research Community as a whole. She hopes that the development and

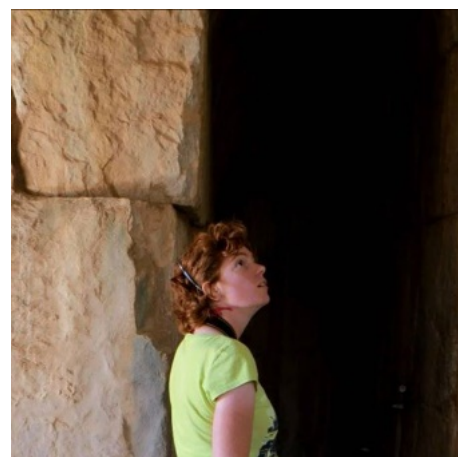
implementation of new digital marketing strategies will successfully promote INQUA and its activities and, most importantly, lead to greater engagement within the community.

## ECR (EARLY CAREER RESEARCH) COMMITTEE CHAIR: M. Francesca Ferrario

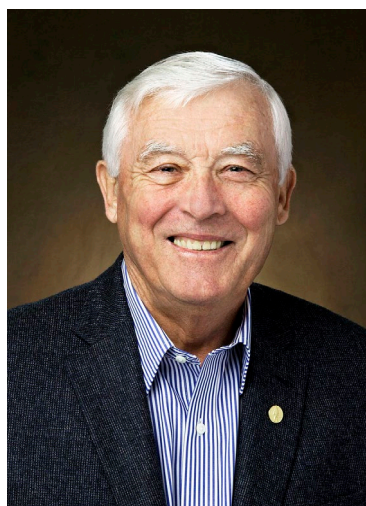
Francesca is a post-doc researcher at the Insubria University (Como, Italy), where she is part of the Environmental Geology group (<https://perigeo.uninsubria.it/>). Her expertise is in the field of active tectonics, including paleoseismology and earthquake environmental effects. Her current research focuses on fault displacement hazard assessment and the analysis of earthquake environmental effects through the ESI scale. She has been involved in field surveys in the aftermath of seismic sequences in Italy (Po Plain 2012, Central Italy 2016, Ischia 2017, Mt Etna 2018) and in archaeoseismological studies at Tiberias (Israel). She also uses satellite images and remote sensed data to analyze earthquake-triggered landslides. She is always looking for methods and ideas to build bridges across (geoscientific) disciplines and to involve the non-scientific audiences.

After the INQUA congress in Dublin, she has been elected as Representative for the TERPRO Commission and as Chair of the ECR (Early Career Research) Committee. Her role is to link the INQUA ECRs community and the Executive Committee, representing the views and needs of Early Career researchers.

Given the multidisciplinary nature of INQUA, a key step is to find a common ground for communication beyond the limits of each discipline. Her aim is to 1) pursue and promote such interdisciplinary research, 2) promote the INQUA mission and activities to ECRs, and 3) encourage networking among ECRs, with particular reference to under-represented groups.



## PAST PRESIDENT: Allan Ashworth



Allan Ashworth is a researcher and a teacher in paleoecology at North Dakota State University who specializes in insects and their response to climate change. He was educated at the University of Birmingham, UK, where he was a student of Quaternary researchers Russell Coope and Fred Shotton. He has worked on Quaternary projects in several countries. Currently, he is studying full-glacial insect assemblages from the Lake Region of Southern Chile and from the Olympic Peninsula, U.S.A.

Additionally, he works on Miocene-aged fossiliferous deposits in Antarctica where modern organisms evolved adaptations to cold earlier than they did in the northern hemisphere. He is also collaborating with a large group of scientists from around the world to develop the Neotoma Paleocology Database. His research is featured in the film 'Ice People', the NOVA documentary 'Secrets Beneath The Ice' and in Science magazine. Fossil discoveries made in Antarctica are featured in articles in National Geographic and in the world press, and are recognized in the New Zealand Geographic Board citation for the Ashworth Glacier.

He has previously served as the Chair of the USNC INQUA and as a Vice-President of INQUA from 2007-2011.

Allan sits in the Executive Committee in his role as past INQUA President, with the aim of maintaining continuity in the purpose and activities of INQUA and of providing guidance from his previous experience.



## The new ECR (Early Career Research) Committee

The ECR Committee was ratified at the Inqua congress held in July in Dublin. We are a group of 10 ECRs, two for each Inqua Commission (<https://inqua.org/ecr/people>). Francesca Ferrario (Italy) and Nivedita Mehrotra (India) were elected as Committee Chair and Secretary for the 2019-2021 period, respectively. ECRs are intended as people within 8 years (excluding time taken not working as an academic or because of taking time off because of family responsibilities) after completion of the last degree.

CMP	<b>Annie Lau</b> , The University of Queensland, Australia; <b>Martin Seeliger</b> , Goethe-University, Frankfurt, Germany
HABCOM	<b>Aliyu Adamu Isa</b> , Ahmadu Bello University, Zaria-Nigeria; <b>Kimberley Davies</b> , University College Cork, Ireland
PALCOM	<b>Emuobosa Akpo Orijemie</b> , University of Ibadan, Nigeria; <b>Nivedita Mehrotra</b> , Birbal Sahni Institute of Palaeosciences, India
SACCOM	<b>Sourav Saha</b> , University of California, USA; <b>Mokshada Salunke</b> , Deccan College Post-Graduate and Research Institute, India
TERPRO	<b>Maria Francesca Ferrario</b> , Università degli Studi dell'Insubria, Italy; <b>Guido Stefano Mariani</b> , University of Cagliari, Italy

The ECR Committee was established in 2012 and has the duty to represent and provide support to young scientists within Inqua. Our mission is to:

- Increase the dissemination of information between INQUA, the Commissions and young scientists through ECR networks, social media and the Inqua website.
- Represent the views of ECRs and provide feedbacks between the ECR Community and Inqua Executive Committee.
- Promote research and networking among ECRs through organization of devoted activities and spread Inqua mission beyond the scientific community.

Join Inqua and get in touch with us!

We encourage all those interested (not only ECRs!) to visit the website (<https://www.inqua.org>) and to join one (or more!) commission. ECR registered member are eligible to apply for travel grants to attend international congresses, so why not to join Inqua?

Plus, follow us on Twitter, Facebook... and soon on Instagram, WeChat and more! We look forward to hearing from you!

# Quaternary International 500 – a milestone

Quaternary International provides a vital service to the INQUA community and is a platform for the publication of the scientific proceeding of conferences, symposia and workshops.

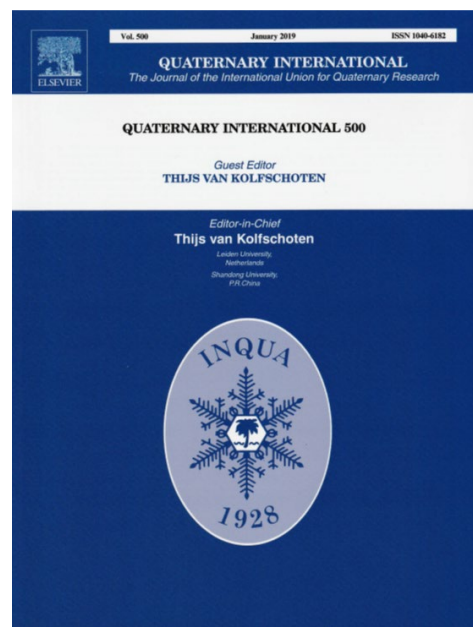


Figure 1: Cover of Quaternary International 500

At the XII INQUA Congress in Ottawa in July 1987, the International Council agreed to launch Quaternary International, the official journal of the International Union for Quaternary Research (INQUA). The first issue appeared in 1989; now three decades later, in January 2019, we reach a milestone with Quaternary International, issue number 500 (Fig. 1). QI 500 is a Special Issue comprising a collection of articles of very high quality that reflect Quaternary research in its broadest scope. It is a tribute to the Founding

Editor of Quaternary International, Nat Rutter who served as Editor-in-Chief until 1999, to Norm Catto Editor-in-Chief from 1999 – 2016 and to Min-Te Chen Editor-in-Chief from August 1, 2015 to June 30, 2018.

The focus of the journal is the Quaternary, a term that originated in the middle of the eighteenth century. Phil Gibbard, in his contribution Giovanni Arduino - the man who invented the Quaternary, describes how the Italian mining engineer and field geologist Giovanni Arduino (Fig. 2) classified the mountain and rocks in northern Italy, dividing them into four basic units (or orders) which were based on lithology, position and internal structure (Gibbard, 2019). Arduino's classification system of divisions laid the foundations of modern stratigraphy.

Cohen & Gibbard (2019) who present a substantially updated version of the correlation table showing chronostratigraphical subdivisions of late Cenozoic geological time, spanning the last 2.7 million years. Martin Head describes the present status (e.g. the formal subdivision of the Holocene) and future directions including the continuing discussions on the status of the 'Anthropocene' (Head, 2019).

One of the active groups within INQUA is the International Focus Group on Tephrochronology and Volcanism (INTAV). Four contributions (Loame et al. (2019); Pearce et al. (2019); Jensen et al. (2019) & Srivastava and Sing (2019)) discuss the importance of

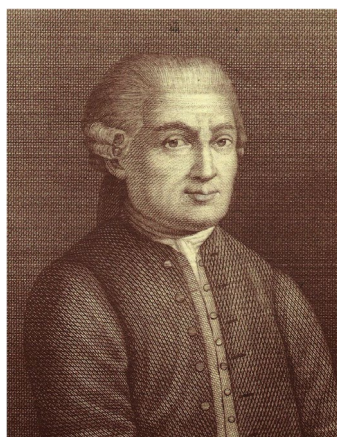


Figure 2: Giovanni Arduino (Library of the Correo Museum, Venice). (see Gibbard, 2019)

tephrochronology in facilitating the disentanglement of complex geological deposits. The Toba eruption of Sumatra, Indonesia (~75 ka age) is the largest volcanic activity on Earth during the Quaternary Period and the fine pyroclastic material ejected during this eruption covered a huge area. Srivastava and Singh (2019) investigated the distinction between primary and reworked ashes and the effects of weathering or, aqueous solution on the geochemistry of the volcanic ash. The authors also discuss the palaeoclimatic implications of the YTT eruption on the regional plant and animal communities.

As all will be aware, the Quaternary is a period that is characterised by major palaeoclimatic changes which have had a substantial impact on terrestrial ecosystems, and in particular on the vegetation that is sensitive to changes in temperature and humidity. Li et al. (2019) present an overview of the Large-scale vegetation history in China and its response to climate change since the Last Glacial Maximum. Here they show that precipitation exerted a more significant effect on vegetation change in northern China, whereas temperature and precipitation played a more important role in southern China.



Figure 3: Map of North-eastern Siberia with the locations of the fossil mammoth remains (indicated with black open circles) analysed by Kuitens et al. (2019)

During the past decades the importance of stable isotope data in palaeoenvironmental research, increased dramatically. Stable carbon ( $\delta^{13}C$ ) and nitrogen ( $\delta^{15}N$ ) data from fossil vertebrate remains, for instance, reflect the diet of animals and are an indirect indication for the environment during the past. Kuitens et al. (2019) analysed  $\delta^{13}C$  and  $\delta^{15}N$  data of directly radiocarbon-dated woolly mammoth (*Mammuthus primigenius*) skeletal samples from North-eastern Siberia (Fig. 3) including numerous Holocene samples from Wrangel Island, that acted as a refugium where the icon of the Quaternary survived until ca. 3685  $\pm$  60 yr BP.

A societally very relevant topic is the present global warming and the related rapid rise of the sea level that will force mangrove forests to migrate landward; however, the future maintenance of viable mangrove forests depends on the available accommodation space. This topic is addressed by Englong et al. (2019) present valuable observations on the impact of sea-level change on mangrove forest. Other sea level rise related contributions are: Karkani et al. (2019) who present new Relative Sea Level (RSL) data from sedimentary records on Paros Island (Cyclades, Greece) and discuss the Late Holocene sea-level evolution in that specific sensitive region; Hamilton et al. (2019) who investigate the importance of sediment supply and barrier dynamics as driving mechanisms of coastal change throughout the Holocene on the Suffolk coast, southeast England.



Reynard and Henshilwood (2019) investigated the faunal remains recovered from recent excavations in the Still Bay beds in Blombos Cave (South Africa) to explore subsistence behaviour during this significant period in behavioural modernity combining taphonomic and palaeoecological analyses.



Figure 4: John Speth

Speth (2019) (Fig. 4) in his contribution Neanderthals, Vitamin C, and Scurvy states that in order to stave off scurvy, such foragers had to obtain a minimum of about 10 mg per day of vitamin C. However, there is little to no vitamin C in muscle meat, being concentrated instead in various internal organs and brain. In addition, vitamin C is also the most unstable vitamin, rapidly degrading or disappearing. His observations offer insights into critical nutritional constraints that probably had to be addressed by Neanderthals and later hominins in any context where their diet was heavily meat-based for a substantial part of the year.

The extinction of a large number of megafaunal species, including the woolly mammoth (*Mammuthus primigenius*) had a major impact on the ecosystem. Lister and Stuart (2019) showed, based on new radiocarbon dates of the famous giant deer, *Megaloceros giganteus* (Fig. x5), the pattern of its extinction, and compared this, on a region-by-region basis, with evidence of environmental change and human occupation. Finds from the Maloarchangelsk region of European Russia have provided the latest date for the species known so far; the data indicate a survival in this region to ca. 7600 cal BP.

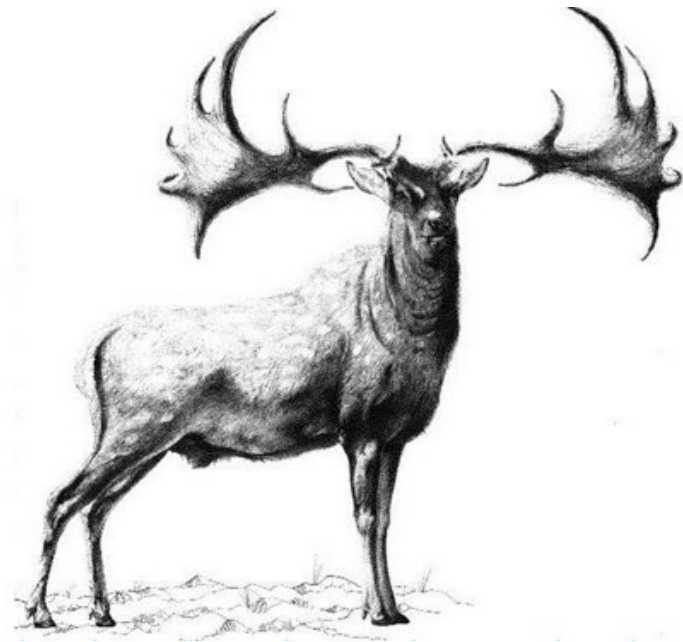


Figure 5: *Megaloceros giganteus* (see Lister and Stuart (2019))

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## Most Downloaded Quaternary International Articles

(<https://www.journals.elsevier.com/quaternary-international/most-downloaded-articles>)

Despite the fact that QI 500 appeared only in June 2019, today (November 19, 2019) 5 of the 15 research papers in the QI 500 volume are already among the 25 most downloaded Quaternary International articles with on the 3rd place Lister, A.M., Stuart, A.J., 2019. The extinction of the giant deer *Megaloceros giganteus* (Blumenbach): new radiocarbon evidence. *Quaternary International* 500, 185-203.

Most downloaded is: Benjamin, J., Rovere, A., Fontana, A., Furlani, S., Vacchi, M., Inglis, R. H., Galili, E., Antonioli, F., Sivan, E., Miko, S., Mourtzas, N., Felja, I., Meredith-Williams, M., Goodman-Tchernov, B., Kolaiti, E., Anzidei, M., Gehrels, R. (2017). *Late Quaternary sea-level changes and early human societies in the central and eastern Mediterranean Basin: An interdisciplinary review*. *Quaternary International*, 449, 29-57.

## New Editorial Team

In July 2019, a new editorial team has been established. Hema Achyuthan (India), Marian Berihuete Azorin (Germany), Alexander Francke (Australia), Qingzhen Hao (China), Pierluigi Pieruccini (Italy), Patrick Roberts (Germany), Jan-Berend Stuut (the Netherlands), Jule Xiao (China) and Andrea Zerboni (Italy) form the new team. Emilie Wang (Beijing (China) is the new Elsevier publisher of Quaternary International. More information about the new team will be published in the next issue of Quaternary Perspectives.

## New Special Issues

The policy of Quaternary International is to publish thematic issues, including peer-reviewed collected research papers from symposia, workshops and meetings sponsored by INQUA's Commissions, Sub-Commissions and working groups. Please consider the publication of Special Issues in Quaternary International and contact the Editor-in-Chief (Thijs van Kolfschoten) for further details.

During the past few years, standalone manuscripts of outstanding quality presenting advanced research that were deemed to be of broad interest for the global Quaternary research community as a whole are also accepted after passing the review process, published in a restricted number/year regular issues.



# Coastal and Marine Processes

2019 marks the last year of the first phase of HOLSEA (2016-2019). To inform projections of sea-level rise in response to future climate change, this project aims to address two fundamental questions: a) how did global mean sea level (GMSL) change since the Last Glacial Maximum (LGM) and what were the contributions of the Greenland and Antarctic ice sheets and temperature-driven variations, and b) what were the trends, magnitudes, and driving mechanisms of spatial variability in relative sea level (RSL) during this period? To answer these questions, we aim to 1) produce the first spatially-comprehensive, standardized global compilation of geological relative sea-level reconstructions from the LGM to present; 2) incorporate the geological data into hierarchical statistical models to address our research questions and make projections of spatial variability of RSL for regional scenarios of future sea-level rise; and 3) distribute the global dataset to the glacial isostatic adjustment modelling community to provide a high-quality standard for model tuning and optimization. The database and model outputs will be made freely available on a web-based platform and will provide a much-needed resource to the paleoclimate community. Progress towards these goals were discussed at a one-day workshop held alongside the 2019 PALSEA meeting at Trinity College, Dublin prior to the INQUA Congress. At the meeting, we discussed challenges in archiving and standardizing RSL datasets from different locations across the globe and considered the key remaining questions regarding Holocene sea levels and what data or methodological gaps need to be filled to answer them.

During 2019, HOLSEA launched a website ([www.holsea.org](http://www.holsea.org)) and also completed a special issue in *Quaternary Science Reviews* that presents the standardized template used to archive RSL data and the first iteration of the global database (Khan

et al., 2019). In the special issue, we have published RSL data from ten geographical regions including new databases from Atlantic Europe, the Russian Arctic, and Israel, and revised/expanded databases from the British Isles, the Netherlands, the western Mediterranean, the Adriatic, Atlantic Canada, Peninsular Malaysia, Southeast Asia, and the Indian Ocean. In total, the database derived from this HOLSEA special issue includes 5634 (5290 validated) index ( $n = 3202$ ) and limiting points ( $n = 2088$ ) that span from ~20,000 years ago to present. However, the regional databases presented in the special issue only represent a first step in developing a standardized, high-quality, spatially-comprehensive global atlas. As we move forward, we will continue our momentum and use traction gained in previous years and an INQUA CMP project to hold workshops that address the following objectives:

- ii. fill spatial (Fennoscandia, the Baltic Sea, Arctic Canada, Pacific Central and South America, Africa, and the Pacific Islands) and temporal (early Holocene and deglacial) data gaps;
- iii. develop an online visualisation platform to access the data;
- iv. use the dataset to validate GIA models or to be assimilated into statistical models to address questions about driving mechanisms of sea-level variability;
- v. design sensitivity tests (or use other methods) to identify critical unsampled locations;
- vi. engage with other disciplines (web developers, statisticians, etc.) to tackle problems from multiple angles.

Khan, N.S., Horton, B.P., Engelhart, S., Rovere, A., Vacchi, M., Ashe, E.L., Törnqvist, T.E., Dutton, A., Hijma, M.P. and Shennan, I., 2019. **Inception of a global atlas of sea levels since the Last Glacial Maximum.** *Quaternary Science Reviews*, 220, pp.359-371.

## PALeo-constraints on SEA-level rise (PALSEA)

Leaders: Jaqueline Austermann, Columbia University USA; Natasha Barlow, University of Leeds UK; Alessio Rovere, University of Bremen Germany; Jeremy Shakun, Boston College USA

2019 is the first year of the new phase of PALSEA (2019-2021) under the current PAGES funding cycle, though the final in its current IFG status. The overarching goal of PALSEA is to improve our understanding of past sea-level change in order to inform predictions of future sea level and cryosphere evolution. In particular within this phase, PALSEA is focusing on working with complementary disciplines in order to establish an interdisciplinary network of researchers that is equipped to target critical research gaps around the development of palaeo-records and the physical processes (ice sheet and solid earth) of sea-level change. In the first step towards this, the 2019 PALSEA workshop was held at Trinity College, Dublin prior to the INQUA Congress in collaboration with Dr Robin Edwards. The meeting focused on developing and refining RSL reconstructions with improved age and elevation uncertainties, and increasing the spatial and temporal distribution of standardised RSL and ice sheet datasets. Invited speakers included Prof Chris Perry, University of Exeter, an expert in coral ecology and Dr Christina Obert, University of Cologne, an ECR developing innovative approaches to U-series dating. Expertise such as this, from beyond the traditional ice sheet and sea level communities, is critical to advance understanding in the field. The third day of the meeting focused on developing standardised databases, in collaboration with the INQUA HOLSEA project led by Dr Nicole Khan (see further details in HOLSEA report), and the WARMCOASTS ERC-funded program led by Dr Alessio Rovere. These focus groups provided a forum for training, discussion and leading to more cohesion within the sea-level science community, particularly as we utilize more “big data” approaches in the discipline.

2019 also saw PALSEA lead a special issue of the PAGES magazine (Barlow et al., 2019), reflecting on

a decade of research resulting in over 100 peer-reviewed articles, whilst also providing a stimulus into critical areas of research for PALSEA and the wider community. PALSEA organised and chaired sessions at EGU, the INQUA Congress and have a centennial session at the 2019 AGU Fall meeting, as well as supported the MOPP-MEDFLOOD summer school in Sardinia and the HOLSEA Quaternary Science Reviews special issue. PALSEA leaders and members have contributed to the recent IPCC Special Report on the Cryosphere, and the development of IPCC AR6. The 2020 PALSEA meeting will focus on improving understanding of ice sheet and solid earth processes driving palaeo sea level change, at Columbia University, USA.

Barlow, N.L.M., Milne, G.A., Shakun, J.D., Eggleston, S., 2019. **Palaeo constraints on sea level rise**, in: Eggleston, S., Loutre, M.-F. (Eds.), *PAGES magazine*. PAGES, Bern, Switzerland.



*Delegates at the 2019 PALSEA workshop "Using ecological and chronological data to improve proxy-based sea level reconstructions", Trinity College Dublin.*

## INQUA CMP 1603P (MOPP-Medflood, Modelling paleo processes)

**Team Leaders:** Matteo Vacchi, University of Pisa, Italy; Sara Biolchi, University of Trieste, Italy; Alessio Rovere, Marum, University of Bremen, Germany; Giovanni Scicchitano, Studio Geologi Associati, Italy.

In the last three years, MOPP-Medflood significantly enlarged its community by encouraging the participation of experts in coastal geomorphology and geo-archaeology as well as engineers and hydrodynamic modellers. The major aim of MOPP-Medflood is to define strategies adopted since the antiquity to design coastal structures, considering not only the paleo-geomorphology of the coastal area but also the paleo-coastal hydrodynamics obtained through

numerical modelling of paleo-nearshore processes. MOPP-Medflood provided new approaches to better reconstruct the historical impacts of major coastal changes and catastrophic coastal events (such as major storms or tsunamis) along the Mediterranean. These approaches were the basis of more than 20 peer-reviewed publications that were published in the last four years.

After three meetings in Bremen (Germany), Palau (Sardinia, Italy) and Siracusa (Sicily, Italy), the final workshop was organized in collaboration with the EGU in Oristano (Sardinia, Italy). Twenty participants were selected according to their CVs and the motivation letters. They were all Postdocs, PhD and master students coming from Italy, USA, Canada, Cyprus, Germany, UK, France, and Mexico. Thanks to the joint EGU-INQUA organization, the organizing committee was able to fund the travel and/or the accommodation for all the participants.

The focus of the workshop embraced a wide spectrum of both field methods and modelling tools to analyze the coastal evolution. Participants were able to discuss on methods to quantitative reconstructions of Holocene relative sea level, on recent advances of UAV platforms as tools to study coastal environment, as well as on the recent improvements in glacio-isostatic adjustment modelling.

During the field-days, the participants visited several sites between the Sinis and the Sulcis coasts. One day of the workshop was entirely devoted to the interaction between human settlements and coastal environment. The group headed to the Nora archaeological site, which is among the best-preserved Punic/Roman town of the west Mediterranean. Participants were able to observe the archaeological maritime structures presently lying underwater by snorkeling.

The final day focused on the innovative modelling techniques to interpret coastal changes, with particular attention on the techniques to model the coastal response to climate changes in the last interglacial. In the afternoon, the participants successfully analyzed a very important geological outcrop which recorded the sea-level variations during the last interglacial.

With this final workshop, MOPP-Medflood concluded its activity. The balance of the project is extremely positive. Apart from the important scientific outputs that arose from the project, the main outcome of the MOPP-Medflood activities is the creation of a young and dynamic community which significantly innovated the approaches to analyze past coastal changes.



*The participants at the coastal archaeological site of Nora during the 4th MOPP-Medflood meeting*



*Field measures on the Sinis MIS5e outcrop during the 4th MOPP-Medflood Meeting in Sicily.*



## Retreat Dynamics of Marine-based Ice Sheets (READY)

**Team Leaders:** Lilja Bjarnadóttir (Geological Survey of Norway), Sarah Greenwood (Stockholm University), Lauren Simkins (University of Virginia), Monica Winsborrow (CAGE, UiT - The Arctic University of Norway in Tromsø)

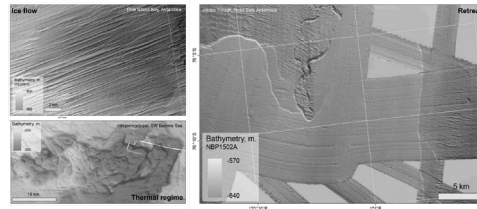
Processes occurring at the interface between the base of an ice sheet and the substrate on which it rests are key to determining ice flow and margin behaviour. However, the specific and local scale processes which govern ice flow and margin behaviour in a diverse range of marine settings can be highly variable, and their wider significance remains poorly understood. In the absence of methods to systematically study the active beds of modern ice sheets, the exposed beds of palaeo-ice sheets in formerly glaciated areas are an easily accessible means of studying past ice flow and ice sheet margin behaviour.

In an attempt to move away from geographically constrained, landform-based reconstructions of marine-based ice sheet flow and retreat, we have compiled a large dataset of glacial landform assemblages from 101 locations on deglaciated continental margins of Antarctica, Greenland, the Norwegian Sea to the Barents Sea, the Irish Sea, eastern Canada, Patagonia and sub-Antarctic islands. We use this to compare the behaviour of these vulnerable ice sheet sectors and test fundamental controls that have been theoretically and conceptually postulated to be important for contemporary systems. We noted all landforms that relate to ice flow, basal thermal regime, and retreat (Fig. 1), thereby providing a valuable and unique dataset that we are preparing to share with the glacial community as a shapefile and a detailed attribute table with data sources, resolutions, and site metrics. We used the landform assemblages to classify ice flow and retreat styles objectively and independent of chronology, which is a notoriously difficult parameter to constrain on glaciated continental margins. For each site included in our project, we determined the topographic setting, bed slope and bed substrate type – all of which numerical and conceptual models indicate are key players in ice flow and retreat.

We asked whether, and to what degree, flow and retreat styles correspond systematically to certain bed settings and evaluate behaviour across a diverse geographical range, encompassing variable sea level, climate, and ocean conditions. An overarching goal is to be able to determine those bed properties under which we can expect consistent (i.e., predictable) ice sheet behaviour, and those bed properties under which either flow or margin retreat is instead unpredictable. Across the 101 sites, we found there is a predominance of warm-based thermal regime. We also demonstrate high predictability of the occurrence of ice streaming in troughs, the occurrence of consistent retreat on normal or variable bed slopes, and the occurrence of inconsistent retreat or unmarked retreat on reverse bed slopes. Overall, we see a low degree of predictability associated with bed substrate controls; however, substrate-modulated

variability in subglacial hydrology likely contributes to spatial and temporal variability (i.e., inconsistency, unpredictability) in flow and retreat behaviour.

With all proposed goals achieved, the funded work provided an unprecedented attempt to systematically characterize marine ice sheet behaviour across glaciated continental margins worldwide and assess the controls on that behaviour.



*Each site was characterized by landform-based evidence of ice flow (streaming, non-streaming, and inconclusive), basal thermal regime (warm, cold, or mixed warm and cold), and retreat (consistent, inconsistent, readvance, and inconclusive). The three examples here show evidence of streaming ice flow marked by mega-scale glacial lineations, mixed warm and cold thermal regime marked by hill-hole pairs, and a transition from consistent retreat marked by recessional moraines to readvance marked by an overriding grounding zone wedge.*

# Humans and Biosphere

## Project title and number: Mapping Past Land Use in Africa

**Project Leaders:** Oliver Boles (Department of Anthropology, University of Pennsylvania, USA); Paul Lane (Department of Archaeology, University of Cambridge, UK); Stefano Biagetti (CaSEs - Department of Humanities, Universitat Pompeu Fabra, Barcelona Spain)

**Title of the report:** Mapping Past Land Use in Africa – an INQUA/LandCover6k workshop

**Authors of the report:** Oliver Boles (Department of Anthropology, University of Pennsylvania, USA)

**Venue:** McDonald Institute for Archaeological Research/Magdalene College, University of Cambridge, 12-13th September 2019

**Convenors:** Oliver Boles, Paul Lane, Stefano Biagetti, Stefania Merlo

**Funding:** INQUA (HABCOM) and the McDonald Institute for Archaeological Research

The workshop on mapping Past Land Use in Africa organized at Cambridge's McDonald Institute for Archaeological Research and Magdalene College was a joint event between the INQUA-HABCOM IFG Holocene Global Land Use (HoLa) and the PAGES LandCover6k (LC6k) Working Group. HoLa is an interdisciplinary focus group (IFG) dedicated to building capacity, creating new, internationally-shared databases, and producing initial models of the relationships between human land use and climate.

The workshop brought together 21 researchers from across the UK, Europe and Africa for two days of wide-ranging and productive discussion around the theme of past land use in Africa. Various approaches have been taken in exploring the relationship between land use and land cover in Africa, mainly focussing on particular regions and periods. The principle aims of this meeting were to establish the nature and spatial-temporal coverage of existing datasets, and to foster collaborative efforts by which to fill in the gaps. Kept in mind were the goals of the PAGES LandCover6k initiative and the

INQUA\_HABCOM IFG HoLa, which seek to reconstruct anthropogenic land cover change (ALCC) across the Holocene. The workshop built on discussions held at Stockholm in 2016, the Society of Africanist Archaeologists (SAfA) meeting in Toronto, the EAA meeting at Barcelona in 2018, and the Pan-African Archaeological Association conference in Rabat in 2018, as well as other meetings convened under the auspices of HoLa and LandCover6k.

The majority of participants were archaeologists with research interests across the continent – we had representatives from Nigeria, South Africa, Zimbabwe, Kenya, and Botswana, as well as many based at UK and European institutions. We were also joined by scholars working on land use elsewhere in the world, who could offer a different perspective on how to approach our reconstructions, and paleoecologists who helped maintain a link with related endeavours in land cover reconstruction using pollen data and other proxies.

The first day of the workshop took place at Cambridge's McDonald Institute for Archaeological Research. We began with several talks introducing the project: Marco Madella (Universitat Pompeu Fabra – HoLa and LandCover6k global land-use coordinator) described the rationale behind the work and how we might contribute towards efforts by the climate modelling community to improve the data that underpins reconstructions of past ALCC and paleoclimate systems; Oliver Boles (University of Pennsylvania, LandCover6k Land Use coordinator for Africa) outlined the system for classifying and recording land use types that has been developed by LandCover6k and will form the architecture of our future work; Marc Vander Linden (University of Cambridge – LandCover6k data manager) presented work undertaken by the Europe working group of LandCover6k, providing an example of a method for inferring the broad spatial-temporal distribution of land use systems using site-based archaeological data.

After lunch, participants were asked to give short, informal presentations of their own work on land use in the African past, and explain how their data might contribute towards the collaborative

syntheses we are developing. This was done region-by-region: we heard about a comprehensive database of radiocarbon dates compiled for North Africa (Cyprian Broodbank/Giulio Lucarini) and how such resources have been used elsewhere to reconstruct past demography and land use strategies in the Sahara (Kat Manning, Stefano Biagetti). In contrast to these geographically-extensive studies, Jane Humphris gave a very site-specific description of socio-ecological dynamics at the site of Meroe in Sudan. Moving to West Africa, Olu Aleru presented a detailed site database for Nigeria, and Nadia Khalaf showed how satellite imagery has been used to enhance archaeological survey data in Benin. Leanne Phelps presented a broader, almost continental approach to mapping ecological niches and the kinds of land use that might be present in particular environmental contexts. From eastern Africa, Emmanuel Ndiema and Oliver Boles presented site databases from Kenya and the wider region, along with the beginnings of efforts to develop those into land use maps; Federica Sulas ranged far and wide with examples of land use data from Ethiopia, Zambia and South Africa. Southern Africa has seen perhaps more concerted attention than other regions as far as targeted efforts in land use mapping; Mats Widgren and Matthew Hannaford presented maps for more recent periods (1500-1850) generated using archaeological and documentary evidence, while Thembi Russell and Munya Manyanga described archaeological data that might be used to push this back further into the past; Stefania Merlo and Malebogo Mvimi described similar opportunities in Botswana and Namibia, and Emma Loftus presented a new database of radiocarbon dates for southern Africa that includes useful tools for exploring past human activity at a regional scale.

Many points of discussion were raised during these presentations and over dinner in Cambridge that evening – these issues were returned to more formally on day two of the workshop, this time within the hallowed walls of Magdalene College. The most pressing concerns related to how to fit the diverse land use strategies seen in Africa – both in the past and the present – into the necessarily narrow parameters of the LandCover6k classification system. While similar issues have been raised at meetings of other regional working



groups, in Africa not only is there clear and widespread mixing of land use forms that can change drastically on a seasonal basis, but there are highly-sensitive and seemingly-intractable political implications surrounding subsistence that must be considered; numerous conflicts in the continent have been related to perceived associations between subsistence and ethnicity (e.g. the Rwandan genocide) and therefore we must be extremely careful when we produce data that might be open to misuse. For both these reasons, it was decided that our priority should be developing a methodology that was relevant and tailored to Africa, and that our global contribution must not take precedence over our ethical responsibilities. However, we felt this was not an insurmountable problem, and a useful contribution would be possible given further consideration.

As a first step, we broke into regional groups to assess how our individual datasets might be integrated and to produce preliminary and very basic maps of land use for several important time periods, using the data we had to hand. This exercise was intended not as a definitive attempt at mapping, but in order to establish where the gaps in our data lie and what measures might be taken as we move forward. Nevertheless, preliminary maps were sketched by almost all the sub-groups. This exercise, along with a discussion of 'next steps', the assignment of regional coordinators, and a vote of thanks to our supporters (INQUA, PAGES and the McDonald Institute), brought the workshop to close.



*L-R: Matthew Hannaford; Marco Madella; Mats Widgren; Stefano Biagetti; Oliver Boles; Leanne Phelps; Jonathan Olu Aleru; Cyprian Broodbank; Kat Manning; Emma Loftus; Munya Manyanga; Paul Lane; Marc Vander Linden; Federica Sulas; Thembi Russell; Emmanuel Ndiema; Stefania Merlo; Jane Humphris; Malebogo Mvimi; Nadia Khalaf; Rob Marchant*

# Palaeoclimate



I am a Regents Professor Emeritus of the University of Minnesota Duluth and is now an Adjunct Professor in the Department of Geosciences at the University of Massachusetts Amherst. I received my formal training in geological oceanography, first as an undergraduate at the University of Washington and then in graduate study at Scripps Institution of Oceanography, with a focus on deep-sea sedimentation and paleoceanography. While I kept one foot in the oceans, I became interested in many aspects of sedimentation in large lakes based on some early experience on Lake Superior, where I applied oceanographic techniques to examine both physical and geochemical processes, ranging from identification of erosional features in the deep, offshore basins caused by strong bottom currents, to the geochemical cycling of silica and carbon. I moved on to other large lake systems, including Issyk Kul in Kyrgyzstan and Lake Nicaragua in Central America, and especially the great lakes of the East African Rift Valley, where I have devoted much of my research career to unraveling the climate history of tropical East Africa based on geochemical analyses of sediment cores. My full cv can be accessed at <http://www.geo.umass.edu/faculty/johnson/>.

**Manuel Chevalier**, *Secretary of the Paleoclimate Commission*

I am an early-career researcher at the University of Lausanne, Switzerland. I originally graduated as an engineer in statistics and modelling before becoming more interested in palaeoclimate studies during my PhD. My work is primarily focused on developing and employing new uncertainty-based statistics to analyse palaeorecords, with the ultimate goal of bridging knowledge between understudied regions. I work with fossil pollen data because these are excellent climate sensors and are found everywhere. So far, studying past African climates has been my prime focus. My pan-tropical interest is now taking me to South America to study the spatial patterns of climate change across the Amazonian basin since the LGM. More details about my research can be found at <https://chevaliermanuel.wixsite.com/webpage>.



# Stratigraphy and Chronology

Over the past four years, SACCOM has continued its mission to study the Quaternary period through Quaternary stratigraphy and chronology, and to provide a forum to discuss and establish stratigraphic investigations and classification throughout the world. SACCOM continues to help promote and co-ordinate international co-operation and integrate the unification of regional and national chronostratigraphic nomenclature, promote stratigraphic methods, and disseminate of stratigraphic knowledge. Of particular note during the past year was the ratification of the subdivisions of the Holocene, which involved key members of SACCOM working with the ICS (International Commission on Stratigraphy) Subcommission on Quaternary Stratigraphy (SQS). SACCOM members convened numerous sessions at the INQUA Congress, in Dublin last July in addition to their international focus group, projects and workshops activities. These activities are involving several hundred scientists and more than one hundred early career researchers from distant parts of the world. Please see details of SACCOM's activities at: <https://www.inqua.org/commissions/saccom>.

SACCOM members are busy developing new initiatives for the next Inter-Congress period helped by its newly elected President Lewis Owen, Vice-Presidents Helen Roberts and Adele Bertini, Secretary Susan Ivy-Ochs, and advisory members. The executive members of SACCOM very much welcome advice and comments from the community.

As SACCOM develops its activities, it will continue to emphasize the importance of stratigraphy and geochronology in providing the foundation and framework for all we do as Quaternary scientists. Of particular note will be focussing on regional correlation, crossing the terrestrial, marine, and cryosphere record and linking with the other INQUA commissions. The Commission's activities will aim to span the whole of the Quaternary period, and will identify critical times to focus on for the benefit of the broader community. SACCOM is particularly aware of the need for societal relevance and outreach, diversity and inclusion, supporting ECRs, and training the future workforce. Please join SACCOM at: <https://www.inqua.org/commissions/saccom/join>.

# Terrestrial Processes, Deposits and History

## TERPRO ANNUAL REPORT 2019

The Terrestrial Processes, Deposits & History Commission (TERPRO) facilitates studies of Quaternary continental environments, earth surface processes/landforms, hydrology, and tectonics. In 2019 TERPRO was composed of five International Focus Groups (IFGs), four Projects, and one Working Group. At the 2019 Dublin Congress TERPRO organized 39 of the 139 Technical Sessions (28%), being the second most active Commission.

### IFG 1616F Groundwater and Global Palaeoclimate Signals (G@GPS)

The G@GPS IFG coordinates palaeogroundwater research, with the aim of interpreting links between palaeoclimate archives and paleogroundwater observations at continental and intercontinental scales.

#### Activities:

- G@GPS organized a session at the Dublin INQUA Congress, with seven posters and one oral presentation. G@GPS progress was also presented at the TERPRO Business Meeting.
- Our Special Issue of Quaternary International is still in review, on the topic of palaeoclimatic signals from large aquifers. We anticipate publication in late 2019 or early 2020.
- A GIS-based version of the database on palaeoclimatic signals is still in progress, but will contain data from more than 500 wells.
- A proposal was submitted to the Natural Science Foundation of China (NSFC) and Israel Science Foundation (ISF) on "Groundwater age and paleoclimatic signals based on novel dating method of radioactive noble gases" in January 2019. This proposal was approved and is to be funded jointly during the period of Oct. 2019 and Sept. 2022 (around 2,000,000 RMB from China, and 278,000 US\$ from Israel) with Chinese PI Jianyao Chen, and Israeli PI Prof. Yoseph Yechieli.

**Publications:** five publications by the Chinese cadre, which appeared in *Acta Scientiae Circumstantiae*; Archives of Environmental Contamination and Toxicology; Chemosphere; Hydrological Processes; and Marine Chemistry. The European contingent published one paper in *Geochimica et Cosmochimica Acta*.

Project 1711P: Understanding of Paleoclimate change and Pathways to Increasing Resilience in a Changing Climate among Urban Communities of Cox's Bazar Municipality and its adjacent area, Bangladesh (UPACCOBB)

**Activities:** arranged a Seminar on Hydrogeochemical and isotopic signatures for the identification of seawater intrusion in the paleobeach aquifer of Cox's Bazar - Teknaf Town and its surrounding area, South-east Bangladesh, arranged at Cox's Bazar, October 11, 2019. More than 100 people in attendance from different organizations.

**Publications:** six papers published in: Groundwater for Sustainable Development; International Journal of Environmental Protection and Policy; Rabindra Journal (2); and Journal of Agricultural Sciences (2).

### IFG 1618F Earthquake Geology and Seismic Hazards (EGSHaz)

The main scope of EGSHaz was to increase the understanding of past earthquakes and future seismic risks by investigating the Quaternary geology of seismically active areas.

This includes multiple disciplines that contribute to understanding Quaternary earthquake activity, such as palaeoseismology, active tectonics and neotectonic studies, tectonic geomorphology, archaeoseismology, and seismology. IFG EGSHaz promoted interdisciplinary approaches and multi-proxy studies to comprehensively understand the effects that seismic events have on society and on the environment and to improve seismic hazard prediction. This was done in part by co-operation with other IFGs, especially those that work on Quaternary dating methods, Quaternary stratigraphy and soil science, and liaisons with a broader spectrum of Quaternary researchers.

#### Activities:

- EGSHaz had a strong presence at the XX INQUA Congress in Dublin, organizing one oral session and 2 poster-only sessions. The session "Earthquake Geology and Seismic Hazards: From earthquake mapping of historical and prehistoric earthquakes to paleoseismology" contained three slots with a total of 19 oral presentations and 18 posters. Several posters were presented in poster sessions only including "Paleoseismology of plate interiors under Pleistocene climate changes" and "Development of soft-sediment deformation structures (SSDS) and differences between non-seismic and seismic structures". Many more IFG members presented their science in related sessions of other commissions such as "Subduction zone paleoseismology" and "The sedimentary record of tsunamis and storms".
- During the INQUA congress, we held the IFG business meeting, in which we discussed future challenges and strategies of earthquake research. IFG members also constituted a large part of the TERPRO business meetings, which dealt with the future of TERPRO.
- 24-27 September 2019: EGSHaz organized an International Summer School on Active Tectonics



& Tectonic Geomorphology in Prague aimed for students and early career researchers

The school was hosted by the Institute of Rock Structure and Mechanics, Academy of Sciences of the Czech Republic, Dept. Neotectonics and Thermochemistry. Main organizer was IFG co-leader Petra Štěpančíková. We would also like to thank MSc. Jakub Stemberk, Monika Hladká, Jana Šreinová, the deputy director Dr. Filip Hartvich, and all the staff involved for their professionalism and warm hospitality. Overall, 50 participants and 14 lecturers from 25 countries participated in the summer school. Thematic lecturers were given by internationally recognized experts in their field: Historical and archaeoseismology (Luca Guerrieri); Interpretation of paleoseismic events from trenching and geomorphic studies, and dating strategies to develop quantitative age constraints (Tom Rockwell); Difficulties in trenching in intraplate settings (Petr Špacek); Alternative Quaternary Dating Techniques for Paleoseismic Studies (Tom Rockwell); Secondary seismic hazards – liquefaction, landslides, tsunamis; recent and ancient (Klaus Reicherter); Seismically triggered landslides – criteria allowing identification of past seismically triggered rockslides and on the controversies and complexities of their discrimination from slope failures of other genesis (Alexander Strom); Seismites vs periglacial features - difficulties in their discrimination (Gosia Pisarska); Tectonic geomorphology - Great new data and how to get them (Christoph Grützner); Active faults from a geodetic point of view - Seismic and aseismic slip on active faults: how space geodesy has changed our vision of the seismic cycle (Cecile Lasserre); and Seismic hazard assessment, PSHA, DSHA (Ioannis Papanikolaou). The participants also visited the laboratories of the Institute of Rock Structure and Mechanics and were introduced into the topic of thermochronology by Annika Szameitat.



After two days of lectures, most participants joined a two-days field trip (guide book is available for download here: <http://www.earthquakegeology.com/index.php?page=publications&s=6>). Main target was the Cenozoic Eger Rift system in the western Czech Republic. On the first day, we got an introduction to the rift and visited the southern marginal fault. The next steps included paleostress and landslide sites, fault outcrops, and a demonstration of UAV remote sensing. This day was led by M. Coubal and F. Hartvich. The second day was mainly devoted to the Cheb Basin, where the youngest surface-rupturing earthquake in Central Europe was recently found in a paleoseismological trenching study at the Mariánské Lázně Fault. The day

started with a visit of the Soos CO<sub>2</sub> emanation site within the famous Vogtland earthquake swarm area. We were then introduced to the nearby geodynamic observatory and seismic station at Skalná, where also an extensometer experiment is ongoing for several years. At the trench site, different geophysical techniques for imaging faults were demonstrated and the trenching results were explained. The day ended with a visit of the Hartoušov and Bublák moffette field\* and a social dinner. This second day of the field trip was led by T. Fischer, F. Hartvich, P. Štěpančíková, and P. Tábořík.

\*moffette: An opening in the earth from which carbon dioxide and other gases escape, usually marking the last stage of volcanic activity.



#### Project 1620R: SURface FAulting Catalogue – Earthquakes (SURFACE)

One of the IFG's principal aims for the past inter-congress period was to establish a worldwide and homogenous database on historical surface ruptures (primary and secondary). This database is now established and is currently being filled with data from all over the world ([link](#)). It will become a principal publically available tool for seismic hazard assessment.

#### Activities:

- SURFACE became a collaborator on the new Fault Displacement Hazard Initiative (FDHI) project in the USA. After the Menlo Park workshop in Dec. 2016, the University of California-Los Angeles started the FDHI project in 2018. This is a multi-year, community-based research project. <http://www.risksciences.ucla.edu/nhr3/project/s/fdhi>
- Baize et al. gave a preview poster of the SURE database at the 4th Fault2SHA Workshop held in Barcelona from 3-5 June 2019.

**Publications:** Baize, S. et al., 2019, A Worldwide and Unified Database of Surface Ruptures (SURE) for Fault Displacement Hazard Analyses: Seismological Research Letters, Data Mine.

#### **INQUA IFG 1622R Palaeohydrology and Fluvial Archives - Extreme and Critical Events (HEX)**

Palaeohydrology addresses all components of the water cycle (rivers, lakes, groundwater, etc.), however most previous research has been focused on river channels and discharges, especially related to geomorphological and stratigraphic indicators. In 2019 we took a more multidisciplinary approach focused on palaeohydrological research initiatives that incorporated timely topics and involved new cross-boundary research groups, including:

- extreme hydrological events;
- collation and presentation of palaeohydrological research results;
- human perception and impact;
- new methods and techniques.

#### Activities:

- 20-25 July 2019: pre-congress field trip at XX INQUA congress: "The Quaternary Fluvial Archives of the major English Rivers" (organized by Fluvial Archives Group within the IFG)
- 25-31 July 2019: Session of the Focus Group in combination with the PAGES Working Group on Floods at the Dublin INQUA congress (with 28 oral presentations and approximately 38 posters, it was one of the largest sessions of the Congress).

**Publications:** the two leaders of HEX edited a book-length compilation of invited review articles on "Palaeohydrology - traces, tracks and trails of extreme events", published by Springer in July 2019. The volume summarized parts of HEX activities during the 2015-2019 inter-congress period and was available at the Dublin INQUA Congress. Topics of the manuscripts cover the range of aspects of investigations of palaeohydrological events dating back from early Pleistocene to historic times. In addition, HEX organized a special issue of Quaternary International based on the EX-AQUA workshop 2016 in Padova (Italy), "Palaeohydrological extreme events - evidence and archives" HEX members also contributed to the special issue of Geomorphology "Tropical rivers", including contributions from the IAG conference in New Delhi 2017 with the session "Palaeohydrological extreme events - evidence and archives" Reviews of both Special Issues are in progress, to be completed by end of 2019.

#### Project 1623P: Palaeohydrological extreme events: evidences and archives (EX-AQUA)

#### Activities:

- 28-29th July 2019 – Dublin INQUA Congress. Organized the session "Palaeohydrology and Fluvial Archives - hydrological extreme and critical events" in collaboration with the PAGES Working Group on Floods and FLAG community (Fluvial Archives Group). The session was the opportunity to show to a broad international audience some of the results of the EX-AQUA project.

- 26-29th September 2019 – Workshop “EX-AQUA 2019 - Palaeohydrological extreme events: evidences and archives”, Zagreb (Croatia). It consisted of one day of workshop at the Croatian Academy of Science and Arts and two days of field trip in the area of Plitvice Lakes and of Lonjsko Polje. The meeting was attended by 25 people and the financial support of INQUA was used to cover totally or partly the costs of travel, accommodation and food of ECRs and DCRs. The workshop was the opportunity to present in detail some of the case studies investigated during the project EX-AQUA, especially in Balkan region, Northern Italy, India, Russia.
- 11th November 2019 – Meeting of the Flood group of PAGES (PAst Climate ChanGES) at the University of Geneva (Switzerland), where some EX-AQUA members presented project results.

#### INQUA IFG 1621F Kinds and Rates of soil-forming processes reflected in Quaternary soils and paleosols and their use as palaeoenvironmental archives (QUASAP)

QUASAP aims at assessing rates of soil forming processes in different climates, obtained from soils and paleosols in settings where climatic conditions and duration of soil development are known. In annual meetings and field workshops, achievements and knowledge gaps are identified, and a present state of the art is defined with respect to rates of soil forming processes, and application of this to Quaternary sediment-paleosol successions.

#### Activities:

- April 8, 2019; EGU General Assembly (Vienna). QUASAP organized the session “*Pedogenic processes of soils and paleosols across scales – influence of various factors, including imprints of human activities*” (13 oral presentations and 22 posters). Conveners were Daniela Sauer together with Anna Schneider, Joscha Becker, Markus Egli, Klaus Kaiser.
- July 25-31, 2019; Dublin INQUA Congress. QUASAP sponsored one oral session (*Multiproxy studies on continental carbonates: Palaeoclimates and palaeoenvironments*) and two poster sessions (*Loess-paleosol sequences; and Terrestrial Processes, Deposits and History: Soil formation – its rates and its use for reconstructing Quaternary landscape evolution*)

#### Publications:

- Special Issue of Quaternary International; **Landforms, sediments, soils and paleosols as records of present and former environmental conditions and human-environment interactions**, Editors: Bernhard Lucke, Daniela Sauer, Maria Bronnikova, Florian Hirsch, Eric McDonald; Quaternary International, Volume 502, Part B, Pages 179-326 (January 30, 2019).
- The Paleopedology Newsletter, June 2019; <https://www.iuss.org/newsroom/newsletters/paleopedology-newsletters-commission-16/>
- Targulian, V.O., Bronnikova, M.A., 2019. **Soil Memory: Theoretical Basics of the Concept, Its Current State, and Prospects for Development**. Eurasian Soil Science, 52(3), pp. 229-243.

#### INQUA IFG 1617F GEOMorphology of DUST sources and dynamics of dust emission from different geomorphic units (GEODUST)

During the Quaternary mineral dust played, and today still plays, multiple roles in mediating physical and biogeochemical exchanges among the atmosphere, land, and ocean, and thus is an active component of the Earth system. Deposited dust accumulates in soils, and in areas close to the sources, coarse dust (coarse silt grains) forms loess, which is an aeolian deposit representing an important archive of Quaternary climate changes, providing one of the most complete terrestrial records of interglacial-glacial cycles. One of best approaches to study past, current, and future impacts of dust on the climate, on the environment and humans is through numerical models. However, accurate simulation of the dust cycle depends on a realistic representation of dust source areas and dynamics of dust emission from these sources. These gaps are one of the limiting factors for existing global models of dust cycle.

The aim of the GEODUST is to address missing knowledge gaps regarding dust source geomorphology and dust emission dynamics, using innovative remotely sensed techniques and ground measurements. The IFG focuses on 5 different geomorphic units (e.g., dune field, playa, active washes, floodplains, loess) from 5 different semi-arid to arid regions in the world (SW US, Negev, South America, South Africa/Namibia, Australia, Sahara).

**Activities:** GEODUST organized a session at the Dublin INQUA Congress: “Dust sources and emission dynamics from different geomorphic units during the Quaternary and at present”, conveners: Onn Crouvi, Andrea Zerboni, Rivka Amit. Invited speakers were Mark Sweeny, Frank Eckardt, Daniela Kroehling, and Kathleen Nicoll, who described dust cycles in different geographic regions. The session covered two blocks, with case studies from all around the world (Southern Africa, Central Asia, Australasia, North Africa, US, Mediterranean Europe, Central Europe, India, China, Southern America). For more details, go to: (<http://www.geodust-ifg.com>).

**Publications:** in 2019 GEODUST members published in Geomorphology (Ben-Asher et al; Zerboni & Nicoll), Quaternary International (Delpiano et al); Jour. Of Quaternary Science (Hirniak et al); and Quaternary Research (Shemer et al). Of particular interest was the cross-disciplinary paper of Livio et al. (Jour. Of Structural Geol.) where aeolian paleosols were used to illuminate the history and style of tectonic surface faulting.



# INQUA WORKING GROUP 1624R: Peribaltic Working Group (PWG)

The Peribaltic Working Group is a scientific community from 12 countries located in the area of the Pleistocene Scandinavian Ice Sheet (SIS) influence. Our members are involved in the wide range of studies, including:

1. Chronology, dynamics and scope of SIS in the Pleistocene.
2. Reconstruction of climate change and depositional environments based on mineral and organic deposits.
3. Palaeoecological studies and interaction of natural environments with early human activities.
4. Palaeoseismic activity in the Quaternary.

Our activities are focused on creating international projects and cooperation. Their results are presented during annual meetings organized in particular countries. Special attention is paid on improving young scientist's skills during workshops and summer schools.

**Activities:** the 2019 PWG conference ("From Weichselian ice-sheet dynamics to Holocene land use development in Western Pomerania and Mecklenburg") was held September 07–13, 2019, in Greifswald, Germany. 70 participants from 9 countries (Russia, Germany, Poland, Finland, Lithuania, Latvia, Estonia, Belarus and Mexico) participated in the conference. The meeting was

organized by the University of Greifswald, the Geological Survey of Mecklenburg-Vorpommern, and the German Research Centre for Geosciences Potsdam (GFZ). PWG attendees included geologists, geographers, botanists, ecologists and other natural scientists interested in Quaternary geology, palaeoecology and climatology. Oral and poster sessions took place in the University of Greifswald, Institute for Geography and Geology. During the 2019 PWG Meeting, the ECR (Early Career Research) Committee was established to support young scientists of Quaternary science related to PWG. Main aims of the PWG-ECR are: sharing information about meetings, conferences, projects, and jobs; organizing workshops to develop skills and knowledge suitable for Quaternary research; support financial opportunities for travelling and accommodation during meetings and conferences.



Officers chosen for 2020-2023 inter-congress period:

- Damian Moskalewicz (Chair, University of Gdańsk, Poland)
- Lilit Pogosyan (National Autonomous University of Mexico, Mexico)
- Pavel Kust (Lomonosov Moscow State University, Russian Federation)
- Gosia Frydrych (University of Łódź, Poland)

## Publications:

- Börner, A., Hüneke, H., Lorenz, S. (Eds.) (2019), Field Symposium of the INQUA PeriBaltic Working Group "From Weichselian Ice-Sheet Dynamics to Holocene Land Use Development in Western Pomerania and Mecklenburg". Abstract Volume. Scientific Technical Report STR 19/01, Potsdam: GFZ German Research Centre for Geosciences. DOI: <https://doi.org/10.2312/GFZ.b103-19012>
- H. Hüneke, A. Börner, and S. Lorenz (eds.), 2019, From Weichselian ice-sheet dynamics to Holocene landscape changes in Western Pomerania and Mecklenburg – field trips on geology, geomorphology and geoarchaeology. DEUQUA Special Publication, Volume 2, 2019: <https://www.deuqua-spec-pub.net/2/index.html>

## BELGIUM

**Report on the Training course in Quaternary Geochronology**

Brussels, Belgium, 8-11 October 2019.

**Organisers:** Koen Beerten (Belgian Nuclear Research Centre SCK·CEN), Nathalie Fagel (University of Liège), Matthieu Boudin (Royal Institute for Cultural Heritage KIK-IRPA), Veerle Vanacker (University of Louvain), Dimitri Vandenberghe (Ghent University)

**Contact:** Nathalie.fagel@uliege.be

The first training school in Quaternary Geochronology was co-organised by the Belgian Quaternary Association (BELQUA), the UGent Doctoral School Natural Sciences (DS NS) and the thematic doctoral school UNITER. Five Belgian institutions were involved in the organisation of the training course: the Belgian Nuclear Research Centre SCK·CEN, the Department of Geology of the University of Liège, the Royal Institute for Cultural Heritage KIK-IRPA, the Earth and Life Institute of the University of Louvain, and the Department of Geology of Ghent University.

The 4-day training course in geochronology was hosted by the National Committee of BELQUA at

the Royal Academies of Science and the Arts of Belgium (RASAB), in Brussels, from 8 till 11 October 2019. In total, 47 people attended the training course: 2 MSc students, 20 PhD students, 6 postdoctoral researchers, 9 professionals and 10 senior scientists. About 49% (23 of 47) were female participants.

The training school provided lectures on radiocarbon dating, dendrochronology, varve counting, thermoluminescence and optically stimulated luminescence dating, electron spin resonance dating, U/Th dating and speleothem dating, cosmogenic nuclide dating and age-depth modelling, as well as several dedicated practical exercises. In addition, the programme included a poster session during lunch/coffee breaks and a one-day excursion to the Campine Region. The excursion led us to two type-localities of Belgian Quaternary lithostratigraphical units. In the morning, we visited the geological section of the Middle Pleistocene river Meuse deposits at As (Zutendaal Gravels), where intensive geochronological studies have recently been conducted. In the afternoon, we observed the Late Glacial deposits at Opgrimbie (aeolian sands from the Opgrimbie Member), consisting of a well-dated sequence of wind-blown sands and intercalated bleached horizons. Participants were introduced to the local and regional geomorphological evolution of the region, as well as the recent chronometric

insights and challenges, and were given hands-on experience with sample collection for dating methods applicable to these Quaternary clastic materials.

The organisation of the training school was facilitated by UNITER and UGent DS NS, with additional funding from the Fonds de la Recherche Scientifique, FNRS.



*Participants of the first BELQUA training course on Quaternary Geochronology, about to tackle the Late Glacial record preserved at Opgrimbie.*