

Quaternary Perspectives



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May 2017 - Issue No 24(1)

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INQUA Executive Committee Meeting 2017

The INQUA annual Executive Committee Meeting recently concluded and it is a good time to catch you up on news stemming from the meeting. This year the meeting was held in association with the Hungarian INQUA Committee. Dr. Enikő Magyari and her students at Eötvös University, Budapest, were excellent hosts. Enikő and her colleagues also organized a conference highlighting Quaternary research in Hungary. Following the conference, Dr. Mihály Gasparik and his colleagues at the Hungarian Natural History Museum, provided conference attendees with a tour of the vertebrate fossil collections.

An important business item at this year's meeting was to review candidates for the Sir Nicholas Shackleton Award for outstanding young Quaternary scientist. This year's award winner is Dr. Amaelle Landais from France. We congratulate Dr. Landais on her studies of isotopes in ice cores and the major contributions that she has already made to the understanding of the Earth's climate system.

The annual meeting is also the time when commission presidents present proposals requesting funding for inter-congress activities. This year €138,000 was requested and we were able to fund 25 proposals for €105,000.

INQUA is a member of the International Council of Science (ICSU). During the year we partnered with the International Union of Biosciences (IUB) and several of the Geoscience Unions to make a proposal on climate change education to ICSU's triennium scientific program. ICSU awarded the consortium a €300,000 grant for three years. More information on what this will entail and how Quaternary researchers can become involved will be forthcoming in the next few weeks.

Currently we are studying national membership fees and anticipate that a revised fee banding document will be available this year. The results will be made known to national members but the actual level at which members pay will be left for them to decide as it has been in the past. Currently, all INQUA members have equal voting rights on all issues. Several ICSU unions, however, have membership fees that are linked to voting privileges. All options are being discussed at this time and we can expect that membership privileges will be part of any future proposal.

The INQUA website and how it serves the community have been under discussion for some time. Revisions are



Fig. 1. Participants of the meeting and hosts in front of Eötvös Loránd University. Back row (from left): Alessandro Michetti (Italy, TERPRO), Atte Korhola (Finland-PALCOM), Mauro Coltorti (Italy –SACCOM), Brian Chase (France, S-G), Ildikó Vincze (host), Pete Langdon (U.K. – HABCOM), Thijs van Kolfschoten (the Netherlands, VP). Front row (from left): Craig Sloss (Australia – CMP), Lyudmila Shumilovskikh (Germany, ECR), Enikő Magyari (host), Margaret Avery (R.S.A., Past President), Franck Audemard (Venezuela, VP), Ashok Singhvi (India, VP), Ilona Pál (host), Allan Ashworth (U.S.A., President), Guo Zhengtang (China, VP).

currently underway and a more up-to-date and useable web site will be available later this year. Of course, any web site is only as good as the information it conveys, which means you as Quaternary researchers will need to be continually supplying the webmasters with information and ideas.

INQUA has been in existence since 1928 and perhaps surprisingly we are not a registered organization. We are in the process of registering INQUA as a non-profit organization in the Netherlands. Obviously, registered or not, it has not mattered too much in the past but as we seek alternative funding sources it is important for the future.

Between congresses, much of the work of INQUA is through its commissions. The commissions came into existence in 2003 during the presidency of Sir Nicholas Shackleton. During this year, the activities of the commissions are being reviewed with input from senior and early career Quaternary researchers. The reviews will help the Executive to make a proposal to the International Council during the Dublin Congress in 2019 on whether the five existing commissions should continue or what changes will be needed to make INQUA stronger.

I look forward to hearing from you on how INQUA may better serve the Quaternary community.

*Allan Ashworth
President, INQUA*

INQUA activities calendar 2017

24-27 April, Mauer (Germany)	Workshop " Keep calm and boldly go ". Which factors in the environment drive early human expansions and have an impact on their settlements?" (METHOD, HABCOM)
20-25 May, Chiba (Japan)	Session "Surface Ruptures During Earthquakes: Mapping, Analyses, and Hazard Assessment" at IpGU-AGU Joint Meeting (SURFACE, TERPRO)
13-15 June, Caux (Switzerland)	Workshop " Pollen-Climate Methods Inter-comparison " (PC-MIC, PALCOM)
3-6 July, Uganda	Workshop " Decades of Quaternary Research in Eastern Africa: Implications for Sustainable Future " (Skills)
19-22 July, Italy	International fieldtrip From 1997-2016: Three desctuctive Earthquakes along the central Apennine Fault system Italy (EGSHaz, TERPRO)
14-18 August, Portland, USA	Workshop " Best practices in tephra collection, analysis, and reporting – leading toward better tephra databases " (INTAV, SACCOM)
20-25 August, Finland-Sweden-Norway	INQUA Peribaltic Working Group Field Conference " From past to present - Late Pleistocene, last deglaciation and modern glaciers in the center of northern Fennoscandia " (Peribaltic Working Group, TERPRO)
28 August-3 September, Ukraine	Meeting " The backwoods: at the periphery of the adaptive zone " (Ground squirrels on the march, HABCOM)
10-18 September, Lanzhou (China)	Field meeting " Late Cenozoic evolution of Yellow River and its environs " (HEX, TERPRO)
11-15 September, Tautavel (France)	DATESTRA Session at SEQS 2017 (SEQS, SACCOM)
25-29 September, Dubrovnik, Croatia	Annual meeting "G@GPS: Groundwater and Global Palaeoclimate Signals" at 44th IAH conference (G@GPS, TERPRO)
8-12 October, Gorgan (Iran)	LoessFest (Loess and Pedostratigraphy, SACCOM)
6-11 November, New Delhi (India)	Session "Palaeohydrology and Fluvial Archives - hydrological extreme and critical events (HEX)" at 9th International Conference on Geomorphology (HEX, TERPRO)
13-19 November, New Zealand	8th PATA Days meeting International Workshop on Paleoseismology, Active Tectonics and Archeoseismology (EGSHaz, TERPRO)

Find more about INQUA activities for 2017 at [INQUA webpage](#).

Coastal and Marine Processes



1301F PALSEA2: PALEO constraints on SEA level rise 2

Project Leaders: Anders Carlson (University of Wisconsin-Madison, USA), Andrea Dutton (University of Florida, USA), Antony Long (Durham University, UK), Glenn Milne (University of Ottawa, Canada).

PALSEA2 Workshop: Sea-level budgets at decadal to millennial time scales to bridge the palaeo and instrumental records.

Authors: Anna Glueder¹, Anastasia G. Yanchilina², Heather D. Bervid¹, Michael Sandstrom³.

¹College of Earth, Ocean, and Atmospheric Sciences, USA; ²Weizmann Institute of Science, Israel; ³Lamont-Doherty Earth Observatory, Columbia University, USA

An inspiring three days of informal talks, constructive discussions and a well-attended poster session took place at Timberline Lodge, Mt. Hood Oregon this past September as the participants of the PALSEA2 group INQUA International Focus Group and PAGES Working Group convened for the fourth time with the continued aim to improve reconstructions of past sea level and our understanding of cryosphere variability. The focus of this year's meeting was to discuss the gaps in sea-level budgets between the palaeo and instrumental records on annual to millennial time scales. The group also discussed implementation of new observations and interpretations into current modelling efforts in order to constrain future sea-level changes in response to climate change.

Estimates of modern sea-level change are derived from satellite observations (i.e., the GRACE project) and tide gauges. These data records depend on accurate corrections for glacio-isostatic adjustment (GIA), which in turn relies on well constrained GIA models that synthesize observed deep earth and surficial paleo data. The importance of understanding changes in relative sea level and accounting for GIA highlights the importance of collaboration between the modelling and the data/observations communities.

Sea-level records from modern to Holocene time scales can be obtained from saltwater marsh records. The advantage of using these high-resolution sea-level reconstructions is that they are near continuous in character and can serve as a bridge between the instrumental and palaeo record (as sea-level changes of the 19th century can be particularly well captured). A first global synthesis of Common Era sea-level reconstructions has been compiled (Kopp et al., 2016); however, it should be noted that the distribution of this data set is currently biased towards the North Atlantic. Additionally, future research needs to address improved understanding of regional differences in sediment compaction and variations in tidal range. Coral micro atolls are another successful proxy to aid in the reconstruction of sea-level changes. This method has been successfully implemented in Southeast Asia where mid-Holocene sea-level changes have been reconstructed at two sites.

A second theme of the workshop was the reconstruction of ice sheets and their individual contributions to the global water mass budget from the last interglacial to present. Key research efforts to understand this part of the sea-level story include accurate knowledge of the timing of ice-sheet retreat, respective melt contributions of different ice sheets, and the subsequent GIA effects based on ice volume and spatial distribution. It was noted that in order to fully encompass the complexities of this problem, an emphasis has to be put on the inclusion of all earth-system parameters into current mass water budget models.

In addition to the presentation of the latest scientific findings, a strong emphasis during the workshop was put on open discussion aimed to identify gaps in the current state of sea-level knowledge and ways to move the scientific community forward. Further quantification of uncertainty is crucial for a more correct implementation of sea level in climate models. During these sessions, it was acknowledged that current sea-level reconstructions are biased towards near-field reconstructions in the Northern Hemisphere (specifically the North Atlantic) and abundant records are lacking from the Southern Hemisphere, in particular around



Fig. 2. PALSEA2 Workshop participants in front of Eliot Glacier, Mt. Hood (Paul Walczak).

South America and Africa as low-latitude intermediate-field locations. There is also a large gap in palaeo-sea level reconstructions during Marine Isotope Stage 3, where individual sea-level records vary on the order of 20-40 m between each other, and sea level appears to rise and fall on the order of 10 m on sub-millennial time scales. Another major issue that has not yet been addressed is the lack of widely accessible and easy to use databases and the need for consistent and standardised reporting of shoreline metadata.

Overall, this workshop highlighted how climate science and sea-level reconstruction can greatly benefit from collaboration between climate modellers and observational scientists. Going forward, these types of collaborations must be improved and expanded upon by standardising and facilitating data collection and reporting.

We thank the organizers of the PALSEA2 workshop: Anders Carlson, Andrea Dutton, and Glenn Milne, as well as the funding organizations: the Department of Geological Sciences at the University of Florida, INQUA, and PAGES.

Reference

Kopp, R. E., A. C. Kemp, K. Bittermann, B. P. Horton, J. P. Donnelly, W. R. Gehrels, C. C. Hay, J. X. Mitrovica, E. D. Morrow, and S. Rahmstorf (2016), Temperature-driven global sea-level variability in the common era, *Proc. Natl. Acad. Sci. U. S. A.*, 113(11), E1434–E1441.

Humans and Biosphere

IFG 1604F: METHOD Modelling Environment dynamics and Hominin Dispersals around the Mid-Pleistocene Revolution

Leaders: Jesús Rodríguez, Ana Mateos (CENIEH, Spain); Christine Hertler (Senckenberg Forschungsinstitut, Germany); Maria Rita Palombo (Sapienza Università di Roma, Italy).

Contact: jesus.rodriguez@cenieh.es

Activities scheduled for 2017.

Authors: Jesús Rodríguez¹, Ana Mateos¹, Christine Hertler², Maria Rita Palombo⁴.

1 CENIEH, Spain; 2 Senckenberg Forschungsinstitut, Germany; 3 Sapienza Università di Roma, Italy.

During 2016 the members of METHOD set the bases for the database system that will serve to store, share and analyse data relevant for the study of the human dispersals in the context of the Mid-Pleistocene environmental changes. Moreover, the METHOD-IFG website is already online at <http://www.method-ifg.com>, where people interested in our research will find all the information about our activities and the activities of our associated projects, a gate through which new participants may join the IFG, summaries of our publications and downloadable models produced as part of our research activities.

In its second year of existence, the IFG will focus its attention on a debate about the main questions related to the hominin expansions in the Early and Middle Pleistocene that remain unsolved and a discussion of the analytical tools necessary to address them. A further challenge for 2017 is to achieve a deeper integration with our associated project "Evolution of ground squirrels (Spermophilus) and the Late-Mid Quaternary Environment of the Northern Black Sea Area: ground squirrels on the march".

The activities scheduled for this year include two meetings that are described in detail below. More information on these and other activities organised by the IFG and its associated project (P1501) may be found in our website (<http://www.method-ifg.com/news/>).

Workshop "Keep calm and boldly go – Which factors in the environment drive early human expansions and have an impact on their settlements?"

The workshop organised by Christine Hertler, Ericson Hölzchen (ROCEEH, Frankfurt) and Zara Kanaeva (ROCEEH, Tübingen) will be held on April 24th – 27th, 2017 in Mauer, Germany.

Prior to the Mid-Pleistocene Revolution (MPR) hominins migrated out of Africa and moved into diverse regions on three continents, Africa, Europe and Asia. Yet, hominin distribution patterns in the Early Pleistocene show that their capabilities to cope with extreme environments were limited. After the completion of the early expansion process, hominins managed to settle in East and South Africa, around the Mediterranean, in the Caucasus, the Indian Subcontinent, insular Southeast Asia, China, and potentially in adjacent regions. The climatic transition between 1.2 and 0.8 Ma had a major impact on the environments in these regions. Shifting environments, however, call for appropriate responses by the hominin inhabitants.

In our forthcoming workshop we will have a closer look at the dynamics of hominin distribution patterns in Africa, Europe, and Asia during the Mid-Pleistocene Revolution. Northern Africa and the Mediterranean play an important role in our understanding. Expanding into regions north of the African desert belt signals the first dispersal out of the African continent. Although the event proper was completed by the onset of the MPR, environments in the Mediterranean were subject to re-organisation. This region therefore constitutes an excellent example. We will focus on hominin responses to shifts in the environments. These responses are illustrated by changes in the archaeological record. The role of culture in survival and subsistence strategies and their impact on the dynamics of hominin occurrences are the central topics in our discussion.

In central and northern Europe the period of the MPR is characterized by a scarce and quite punctual record of hominin presence. Is this phenomenon due to preservation bias – or: absence of evidence – or is it caused by population

movements and episodic retreats into refugia during periods in which the environments underwent profound reorganisation? The lack of archaeological and/or palaeontological finds should then be considered as evidence of regional absence. In order to decide between both of the alternatives, a better understanding of the relationship between hominins and environments is required. What are environmental constraints for hominin occupation? What renders a habitat suitable for hominins during the MPR, what constitutes a refugium? What role do resources play and in which way do they constrain hominin occupation? We will provide an overview on the different kinds of evidence which are presently under discussion, their integration and potential interactions between environments, resource availability and behavioural constraints.

Shifts in Southeast Asian ecosystems represent the last region to be discussed in our meeting. Hominin dispersal into the region presumably correlates with the onset of the MPR. Unlike continental systems as they are represented by African and European ecosystems, the environments in Southeast Asia are located in insular contexts. The arrival of hominins and their dispersal patterns are determined by glacial/interglacial cycles. Insular environments are subjected to episodic isolation. Hominin presence, however, seems to be uninterrupted, although not unaffected by environmental dynamics. We will discuss hominin behaviour, resource use and availability, as well as dispersal modelling.

Comparisons between the way hominins responded to shifting ecosystems in particular regions widens the perspective and opens up new lines for discussion. Finally, contributions from modelling approaches and GIS systems will be introduced.

Training Lab: How to use modelling approaches in the study of hominin dispersals and settlements?

This 3 day course will be held in Burgos (Spain) in October 2017, and it will be organised by Jesus Rodríguez and Ana Mateos at the Centro Nacional de Investigación sobre la Evolución Humana (CENIEH). In this Training Lab we intend to practice diverse modelling approaches, for instance

foodweb analyses on the basis of network modelling and environmental niche modelling. It is expected that many participants in the April Workshop and participants in the associated project will also assist to the training Lab. We will make use of the data sharing infrastructure made available as a result of our 2016 Training Lab "Data availability, management and storage – Working with databases". The aim is to formalise hypotheses according to the discussions maintained in the spring 2017 workshop translating them into models. What can we achieve by modelling, and how can we validate the conclusions drawn from models, are crucial

Project 1605P: Mapping pre-Columbian land use in Amazonia

Leader: Umberto Lombardo (Universitat Pompeu Fabra, Spain).

Contact: umberto.lombardo@upf.edu

PROJECT AIM: To bring together archaeologists, geographers and paleoecologists working in the Amazon basin in order to produce the first land use maps of pre-Columbian Amazonia.

The reconstruction of pre-Columbian land use patterns in Amazonia is a prerequisite in order to assess the possible influence that pre-contact deforestation and post-contact re-forestation had on global climate. To what extent pre-Columbians modified Amazonia's "pristine" ecosystems is one of the most controversial topics in South American palaeoecology and archaeology. While some authors argue that pre-Columbians occupied only small areas of Amazonia and that their impact was minimal and localized, others suggest that the pre-Columbians modified the landscape on a wide scale, with long lasting legacies in terms of forest biodiversity and the creation of anthropogenic soils. This debate is polarised also in terms of the discipline involved, with mostly palaeoecologists supporting the "localized disturbance" scenario and mostly archaeologists and anthropologists supporting the "widespread disturbance" scenario. Assessing to what extent pre-Columbians deforested Amazonia is key in order to understand how anthropogenic land cover change influenced climate in the past. This project aims to bring together an international group of Amazonists, Senior and Young Researchers from different disciplines, including archaeologists, historians, geographers and palaeoecologists, in order to develop a common methodology to assess and map how the land was used in Amazonia 6K, 4K, 2K years BP and 1000, 1500 and 1850 AD.

Our goals include:



Fig. 4. Pre-Columbian raised fields in the Bolivian Amazon. Raised fields, known locally as *camellones*, are pre-Columbian agricultural surfaces. By elevating a part of the landscape, pre-Columbians improved the local drainage and protected the crops from the floods. The area shown in the picture is now covered by forest, suggesting that pre-Columbians cleared the forest in order to build the fields. The forest grew back after the fields were abandoned, following the arrival of the Spaniards.

1) The creation of an open access, web-based repository of the data and metadata associated to the currently documented Amazonian archaeological sites

2) The production of pre-Columbian land-use maps of Amazonia for the periods 6K, 4K, 2K years BP and 1000, 1500 and 1850 AD.

3) The consolidation of an international and multidisciplinary community of researchers committed to the continuous update of the database of Amazonian archaeological sites, the improvement of the pre-Columbian land-use maps and the scaling up of the mapping project to the whole of Latin America

Project 1606P: Ground squirrels on the march: expansion and speciation in the Quaternary of the Circum-Pontic area and surroundings

Leaders: Lilia Popova (T. Shevchenko University, Ukraine), Lutz Christian Maul (Senckenberg Research Station of Quaternary Palaeontology, Germany).

Contact: lmaul@senckenberg.de; liliapopovalilia@gmail.com

Workshop "Taxonomy and identification of Eurasian Pleistocene Ground Squirrels", Weimar, Germany.

Authors: Lutz Christian Maul¹, Lilia S. Popova².

¹ Senckenberg Research Station of Quaternary Palaeontology Weimar, Germany; ² T. Shevchenko University Kiev, Ukraine.

Ground squirrels are an important element of Eurasian Pleistocene faunas. Unfortunately, most fossil samples consist of isolated teeth. Since dental morphology in ground squirrels is rather uniform, it is not easy to distinguish between species. Literature on this subject is still limited. In the frame of the INQUA HABCOM project 1606 we will investigate taxonomy, phylogeny, and palaeobiogeography of Palaeartic ground squirrels on a broad scale, from their origin in the late Pliocene to the present day.

The INQUA project unites specialists in palaeontology, zoology and geology from several countries. After a first meeting in Kaniv (Ukraine) in 2015, the group met for a workshop in January 25-27, 2017 at Senckenberg Research Station of Quaternary Palaeontology in Weimar, Germany (fig. 1). The objectives of the meeting were to compile previous results and hypotheses, discuss standards, and establish a database.

In order to create a 'common language', we agreed on various standards concerning validity of higher taxa and extant species, cusp nomenclature, measuring points, figure alignments. Using these standards we constructed a database for fossil records with original and updated taxonomical referral and dating, for measurements according to the standard protocol, for photos in standard



Fig. 3. Logo of the [METHOD International Focus Group](#).

questions that will be addressed in this workshop.

Workshop "Keep calm and boldly go - Which factors in the environment drive early human expansions and have an impact on their settlements?"

April 24 - 27, 2017,

Mauer, Germany.

Organisers: Christine Hertler, Ericson Hölzchen (ROCEEH, Frankfurt) and Zara Kanaeva (ROCEEH, Tübingen).

Supported by: INQUA IFG METHOD (1604F)

In this workshop we will have a closer look at the dynamics of hominin distribution patterns in Africa, Europe, and Asia during the Mid-Pleistocene Revolution. We will focus on the hominin responses to shifts in the environments reflected by changes in the archaeological record. The role of culture in survival and subsistence strategies and their impact on the dynamics of hominin occurrences will be the central topics of focus. We will provide an overview of the different kinds of evidence which are presently under discussion, their integration and potential interactions between environments, resource availability and behavioural constraints.

More information [here](#)

alignment, and for literature on first description and of taxonomical discussion.

Based on cusp patterns and morphometry, we aim to identify new diagnostic characters for species distinction considering regional variability of these characters (particularly in *Spermophilus citellus*, *S. suslicus*, *S. xanthoprymnus*, *S. pygmaeus*, *S. odessanus*, *S. major*, *S. fulvus*, *S. superciliosus*, *S. citelloides*, *S. servekensis*, *S. nogaici*, *S. polonicus*, *S. primigenius* etc.). This issue was a major theme of the workshop, which will be discussed and updated as the project progresses.

The database of fossil ground squirrel records will be used for GIS analyses and the production of distribution maps. We intend to document biogeographic changes between defined time slices. The oldest European records of *Spermophilus* so far date to the late Villanyian. For biogeographic and biostratigraphic comparisons, we use the following time slices: Holocene (0.01-0 Ma), late Weichselian (0.03-0.01 Ma), early Weichselian (0.1-0.03 Ma), Eemian (0.13-0.1), early Toringian (0.78-0.13 Ma) (temperate faunas), early Toringian (0.78-0.13 Ma) (cold faunas), late Biharian (0.9-0.78 Ma), early Biharian (1.8-0.9 Ma), late Villanyian (2.5-1.8 Ma), and early Villanyian (3.0-2.5 Ma).

Establishing phylogenetic relationships is reliant on better taxonomical distinction between species and more precise biostratigraphical correlations. These issues are also being addressed by the working group. The palaeoecological constraints of fossil species will be inferred using various methods, such as the co-existence approach, mesowear, taxonomic habitat index, mutual climatic range and habitat weighting methods.

The format of the workshop was successful: it focused on particular questions, the number of participants was large enough to cover various fields of ground squirrel research, but small enough for effective discussion; participants brought material, photographs and literature, and demonstrated new and traditional identification methods. The next workshop is planned for September 2017 in the Ukraine.



Fig. 5. Participants of the ground squirrel workshop in front of the Senckenberg Research Station of Quaternary Palaeontology in Weimar, January 26, 2017 (photo: S. Döring).

International field workshop "Populations in the non-optimal environment".

Authors: Lilia Popova¹, Bogdan Ridush², Juiy Veklich³.

¹ Kyiv National Taras Shevchenko University, ² Yuriy Fedkovych Chernivtsi National University, ³ Ukrainian Geological Survey.

The project "Ground squirrels on the march: expansion and speciation in the Quaternary of the Circum-Pontic area and surroundings" is aimed on connections between/among species expansion and speciation events, species expansion and environmental constraints, survival of small isolated populations, survival on the frontiers of the species ranges. Thereby, the populations withstanding unfavourable conditions turn out to be one of the focus. "Populations in the non-optimal environment" will be a motto of the next meeting, the international field workshop (the end of September 2017, Chernivtsi region (Northern Bukovyna), Ukraine).

The choice of the venue has been based on the position of the Chernivtsi region just next door to

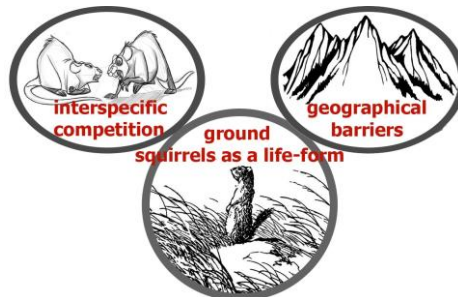


Fig. 6. The backgrounds: (1) isolating geographical barriers, (2) interspecific competition (on the first place, the closest relatives), (3) peculiarity of ground squirrel morphology, ecology and behavior corresponding to their lifestyle ('ground squirrels as a life-form').

the one of the most important geographical barriers of Europe, the Carpathians. The north-eastern slopes of the Eastern Carpathians there change into the steppe plains; mountain, forest and steppe fauna can be met in the same vicinity. It meant availability of refugia of any type required during the Pleistocene. Additional advantages are various karst forms, including large gypsum caves that diversify the area landscape and the deep terraced valley of the Dniester: for the fauna, it was a refugium and the way of dispersal; for geologists it is a natural stratigraphical framework. Numerous multilayered Palaeolithic sites along the Dniester are evidence that humans did not turn their back on these benefits also.

All the mentioned so far does not look as much inhospitable, as it is implied by the workshop title. However, Bukovyna can be thought as a rich collection of bottlenecks of all kinds to fit any taste. Really, the Quaternary history of the area conceals both successful and failed attempts of populations to seek for a place in the sun. The valley of the Prut river is likely to be the gate for entry of the European Ground Squirrel to the Precarpathian

(one of the most recent, and, respectively, the most certain events of the ground squirrel expansion). Another possible invader is an extinct Ground Squirrel of the Western Europe, *S. citelloides*. Both the species had not succeeded to anchor here.

The frame of the meeting will not be confined to ground squirrels. Our aim is to provide a broad interdisciplinary and international forum to exchange data and ideas on species expansion and speciation in the Quaternary and related population processes. 'Ground squirrels on the march' is more than an appropriate symbol for any species overcoming environmental constraints, and a good test object. Any data on populations being a short step from extinction or populations after the natural introduction, as well as related phenomena (small population isolates and populations in fragmented landscapes, hybridisation of all kinds, competitive exclusion, changes in the population niche and so on) will be welcomed. For humans, it is the same phenomena described in other terms (terminal phases of cultures, cultural interactions etc). And, last but not least, we are very interested in detailed information on state of palaeogeographical barriers through the Quaternary of the Circum-Pontic-Sea area.

Activities started in 2016 are also to be continued (collecting of data to map European *Spermophilus* species ranges throughout the Quaternary and works on taxonomy and species identification of ground squirrel fossils), so all the reports on these issues are welcomed as well.

Researchers who are interested in this event are kindly invited to contact Bogdan Ridush, the coordinator of the workshop, ridush@yahoo.com, or Lilia Popova, liliapopovalilia@gmail.com.

Stratigraphy and Chronology

IFG-1614P CROSSTRAT: Cross checking of stratigraphic data

Leader: Sahra Talamo (Max Planck Institute for Evolutionary Anthropology, Germany).

Preliminary Report on the 2016 Research.

Authors: Stefano Andreucci¹, Mauro Coltorti², Federico Di Rita³, Fabienne Godefroid⁴, Pascal Kindler⁴, Manfred Frechen⁵, Katrin Lasberg⁶, Vincenzo Pascucci⁷, Laura Sanna⁸, Daniele Sechi⁷, Sahra Talamo⁹.

¹ University of Cagliari, Italy; ² University of Siena, Italy; ³ University of Rome, Italy; ⁴ University of Geneva, Switzerland; ⁵ Leibniz Institute Hannover, Germany; ⁶ University of Tartu, Estonia; ⁷ University of Sassari, Italy; ⁸ Institute for Biometeorology - CNR Sassari, Italy; ⁹ Max Planck Institute, Leipzig, Germany.

Successions containing coastal sediments in small bays or in beach ridges close to a slope or river mouth can provide useful information on the relationship between sea-level elevation and slope, fluvial, lagoonal and aeolian deposition. Sedimentary deposits can be dated using different methods such as: luminescence (siliciclastics), ESR (electron spin resonance), radiocarbon (on shells, organic matter) and U-Th series methods (corals).



Fig. 5. Location of the sites mentioned in the text.

These approaches were used in several parts of the Sardinian coastlines in the past. However, results have been controversial with different methods providing contrasting results and various groups proposing different interpretations based on the data that most suited their expectations. The uncertainties also depend on the diverse interpretations of the sedimentology, the stratigraphic relationships, and the importance given to the unconformities. Located in the middle of the Western Mediterranean and far from collisional mountain chains, Sardinia is supposed to be tectonically stable, and could thus provide useful information on the position of mean sea level during the Last Interglacial and the Mid-Holocene. Moreover, the type section of the Tyrrhenian Stage, later associated with MIS 5e, has been defined on the island. In reality, there is no real evidence that the island is tectonically stable. Messinian marine deposits are found at over +500 m in elevation, and Pliocene marine deposits occur at ca. +50 m in elevation in the few places where they are preserved. Moreover, the southern part of the island comprises a major tectonic depression, the so called "Campidano graben". Middle and especially Late Pleistocene tectonics in this area have also been debated.

The project idea was to bring together people who have worked in these successions to review the geological evidence, and to possibly bring new light to these controversial uncertainties. The areas to be re-investigated are located in different parts of the island and were chosen because they exhibit deposits reflecting the complex interactions between climate-induced sea-level changes and tectonic movements.

The research aims to establish:

1. Reliable and comparable stratigraphic schemes for different Middle/Late Pleistocene and Holocene deposits and landforms in different key sites of the island;
2. Facies variations in time and space and clear distinctions between beach, aeolian, lagoonal, interdunal pond and colluvial deposits;
3. Significance of unconformities and their recognition for mapping purposes. In particular,

we shall investigate the rank of unconformities that is the main criterion to establish the existence of Unconformity Bounded Stratigraphic Units (UBSU);

4. Maximum sea-level elevations reached during the Last Interglacial and the Holocene. The Holocene sea-level history has great implications for scenarios of future sea-level evolution.

5. Importance of tectonic movements and their contribution to the present-day position of MIS 5 coastal deposits.

6. Validity of an integrated approach using litho-, morpho-, bio-, pedo- and chrono-stratigraphic criteria in the establishment of Unconformity Bounded Stratigraphic Units;

7. Reliability of different dating methods (AMS, Luminescence, ESR, U/Th) during the cross checking of the different layers;

8. Exchange and dissemination of experience and development of a common methodological approach.

From October 3rd to 8th 2016, after a meeting to discuss the existing evidence, the working group visited a series of key sites across the island.

The successions in the northwestern side of the island (Alghero, Porto Palmas, Bosa) contain one single marine layer, more rarely two usually superimposed on one another, lying unconformably over the bedrock. These deposits are usually covered by a thick sequence of colluvial and aeolian sediments (Andreucci et al., 2006; 2010). Chronological data (luminescence) allowed a general attribution of both, the marine deposits and the overlying aeolian sediments to the early Late Pleistocene. However, aeolian deposits located inland at a certain distance from the coast have been attributed to the end of Last Glaciation based on the ¹⁴C age of an interlayered soil within the underlying fluvial sediments. It seems difficult to explain a diachronism in aeolian activity as the source area of the sediments was the continental platform. Evidence also emerged in the last years of Mid-Holocene marine sediments with an



Fig. 6. Beach deposits overlain by debris and aeolian sediments to the south of Alghero.

elevation reaching 4-5 masl that have been sampled.

One day was devoted to the investigation of San Giovanni di Sinis and of the Capo San Marco peninsula, one of the most intriguing areas of the island. In San Giovanni, sandy beach sediments overlie a marine erosional surface and are buried under aeolian deposits the deposition of which was interrupted several times by the evolution of thin steppe soil horizons (Davaud et al., 1991; Kindler et al., 1997; Lecca & Carboni, 2007; Andreucci et al., 2009; Coltorti et al., 2010; 2014; Thiel et al., 2010). Laterally, there are also well-exposed lagoonal deposits that were associated by some authors to a nearby sea level and by others to interdune pond deposits. Luminescence ages allowed the attribution of the aeolian deposits to the early Late Pleistocene with some of the lowermost layers also attributed to the Middle Pleistocene. However, interlayered paleosoils were radiocarbon dated to the terminal part of the Last Glaciation and the Early Holocene. The nearby Capo San Marco peninsula hosts a series of gravelly beach sediments that stratigraphically overlies aeolian deposits forming a terrace and a notch at ca. 4-5 m asl (Coltorti et al., 2014; Thiel et al., 2014), although nearby beach gravels lying inside a tidal notch were erroneously set below the aeolian deposits (D'Orefice et al., 2012). U/Th dating of corals would allow the attribution of the beach to the Last Interglacial, although the absence of an aeolian cover and paleosoils suggests a Holocene age.

One day was devoted to Cala Gonone and Orosei in the central east coast. The rocky cliff to the south of Orosei preserves one of the longest tidal notches of the Mediterranean area attributed to MIS 5e (Carobene & Pasini, 1982) or to a later stage of the MIS 5 (D'Angeli et al., 2015). In Orosei, a series of beach ridges and lagoonal deposits are found inside the bay that hosts the Cedrino river mouth (Coltorti et al., 2010). At the rear of the southern part of the bay, alluvial deposits radiocarbon dated to the Last Glaciation form a wide coalescent alluvial fan. The beach ridges occur seaward of a marine cliff that cuts the alluvial-fan sediments, thus indicating a Holocene age. However, luminescence dating of the sandy beach sediments allowed an attribution to the Last Interglacial which triggered a new controversy. A trench was luckily found across the main beach ridge that

allowed a more detailed sedimentological investigation.

The last days were devoted to the SE side of the island in the Cagliari Gulf, and slightly to the SW in Nora. The S. Elia promontory splits the Gulf in two, and Cala Mosca hosts the type section of the Tyrrhenian stage (Issel, 1914). To the east of the cape, there are a series of beach ridges and lagoons. The main sandy and gravelly beach ridge at Is Arenas is classically attributed to the Tyrrhenian, an attribution apparently confirmed by luminescence ages (Orri et al., 2011). However, the stratigraphic relationship with the Upper Pleistocene alluvial-fan deposits that are cut by the valley hosting the beach ridge, and the radiocarbon dating of lagoonal organic mud found below it, both indicate a Holocene age and question the reliability of the luminescence dates (Coltorti et al., 2010). Finally, the group visited the Nora beach ridge that locally hosts a Roman settlement. In this area, the beach ridge reaching ca. 3 m in elevation is also attributed to the Last Interglacial (Kindler et al., 1997) and a series of samples were collected to verify this attribution.

The Sardinian successions bear many still unsolved questions, but also provide opportunities to investigate the Late Pleistocene deposition as well as the events that occurred during the Holocene. This period is crucial for understanding the interaction between climatic and tectonic events worldwide, and to make reliable previsions about the possible consequences of future sea-level rise related to anthropologically induced global warming.



Fig. 7. A photo of the group at Capo San Marco. At the back there are bioclastic gravelly and boulders beach deposits inside a notch carved in aeolianites.

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IFG-1706P INTAV: International focus group on tephrochronology and volcanism

Leaders: David J. Lowe (New Zealand), Takehiko Suzuki (Japan), Victoria Smith (UK), Britta Jensen (Canada), Peter Abbott (Switzerland).

Report from INTAV: exciting events ahead.

Author: David J. Lowe¹.

¹ University of Waikato, Hamilton, New Zealand

INTAV, the International Focus Group on Tephrochronology and Volcanism, an IFG within the Stratigraphy and Chronology Commission (SACCOM) but also relevant to all the other commissions, continues to flourish in what seems a 'golden age' of new and exciting developments in the world of tephrochronology and cryptotephra studies and applications. Recent news, events, and information are provided regularly on our Facebook site (<https://www.facebook.com/groups/INTAV/>) and via JISCMail-TEPHRA. Please join us to find out what's happening and to engage with our global tephra community.



Special tephrochronology issue of *Quaternary Geochronology*, March 2017

We are very pleased to report the publication of a terrific special issue on tephras (stemming in part from papers presented in tephra sessions at Nagoya, 2015) "Advancing tephrochronology as a global dating tool: applications in volcanology, archaeology, and palaeoclimatology" in *Quaternary Geochronology* (2017) edited by Prof Christine Lane and others. The INTAV-led issue comprises 11 papers and two editorials. Go to the *Quaternary Geochronology* website to see an excellent assemblage of interesting and topical papers that encompass almost all of the objectives of the EXTRAS project, "EXTending tephRAS as a global geoscientific research tool stratigraphically, spatially, analytically, and temporally" and span the globe from Australia to the Azores, together with a lead editorial that provides an overview of the studies in the issue and current activity in the discipline.

INTAV workshop, Portland, USA, 19 August 2017

Our EXTRAS project underpins much of our work through a series of objectives, one being objective 5: "To develop regional and ultimately global databases of high-quality mineral, geochemical, and other data (stratigraphic, chronologic, spatial) for tephra and cryptotephra deposits". In mid-

August this year, an INTAV Workshop "Best practices in tephra collection, analysis, and reporting – leading toward better tephra databases" is being run in association with the IAVCEI Meeting in Portland, Oregon, USA, that helps make further progress towards achieving this objective. The workshop, set for Saturday 19th August 2017 (9 am to 5 pm), and following the full IAVCEI conference 14-18th August, is being led by Dr Steve Kuehn, Kristi Wallace, Dr Marcus Bursik, and Dr Andrei Kurbatov. IAVCEI (The International Association of Volcanology and Chemistry of the Earth's Interior) is a 'sister' group to INQUA and a considerable number of INTAV members have interests in volcanology (eruption history, petrology, volcanic hazard, etc), hence this workshop represents a great opportunity to engage with the IAVCEI community in a critically important and increasingly urgent area of development in tephra studies. Please email Kristi for further information (kwallace@usgs.gov).

Tephra hunt in Transylvania, 25-29th June, 2018

The next inter-INQUA tephra field conference and workshop, "Tephra Hunt in Transylvania", is to be held in Brasov, Romania, from 25-29th June, 2018. A medieval city in the Transylvanian region of Romania, Brasov (Fig. 1) lies in the southern Carpathian Mountains and is easily accessible from Bucharest. It is near several late Quaternary volcanic centres in the eastern Carpathian Mountains (see Karatson et al., 2017) (Fig. 2) and the loess fields of the Danube-Black Sea area, where distal tephra deposits have played an important role in chronology. Marine-terrestrial connections via tephrochronology are also being developed for the wider region. As well as intra-conference field trips, pre- and/or post-conference field trips are being planned by convenor, **Dr Daniel Veres**



Fig. 8. View of Brasov. Photo by Constantin Barbu. (<https://commons.wikimedia.org/w/index.php?curid=11002974>)

(Romanian Academy and Babes-Bolyai University, Cluj, Romania), and his local, multidisciplinary organising committee from Romania, Hungary, and Germany. Daniel is at daniel.veres@ubbcluj.ro

This will be the first fully-fledged field conference centred on tephrochronology to be held since the seminal tephra-focussed meetings in Kirishima, Japan, in 2010, and in Dawson City, Yukon Territory, Canada, 2005, and so will be an opportunity not to be missed. Catch up with friends old and new and find out the latest advances in our discipline and its application to numerous subjects ranging from archaeology to

volcanology whilst enjoying the hospitality of friends and colleagues in Romania, and adjacent countries, and their fantastic landscapes and rich cultures. A special feature will be a 50th anniversary commemoration of the publication of the first paper on the use of the electron probe to analyse glass shards as a correlational tool for tephrochronology (D.G.W. Smith and J.A. Westgate, 1968, *Earth & Plan. Sci. Letters* 5, 313-319).

INTAV and the LOC are applying for funding support from INQUA, PAGES, and other sources to help support students, early career researchers (ECRs), and scientists from countries with low GDPs, to attend the conference.



Fig. 9. View of Ciomadul lava dome complex, East Carpathians, Romania, that has seen explosive eruptions between c. 51,000 and 29,000 years ago (from Karatson et al., 2017).

Further information including detailed dates and trips will be available soon – please keep an eye on the INTAV Facebook and JISCMail-TEPHRA and other media. We note that a tephra field conference we had planned/announced earlier for Chile/Argentina has been cancelled.

Please support INTAV

Finally, all INTAV members and supporters: could you please acknowledge INTAV, and especially the EXTRAS project, when you publish your next paper involving tephras or cryptotephras. As an IFG, INTAV and the EXTRAS project co-exist symbiotically in this intercongress period (2016-2019) to maintain and enhance the functioning of our active international tephra group. An acknowledgment in your paper in many cases could simply be a note along the lines "This paper is an output of the EXTRAS project 'EXTending tephRAS as a global geoscientific research tool stratigraphically, spatially, analytically, and temporally' led by the International Focus Group on Tephrochronology and Volcanism (INTAV) of the International Union for Quaternary Research (INQUA)". Such an acknowledgment therefore means that we can include your paper in our annual reports to the INQUA Executive (or to other funders), who help decide and provide the funding that is used primarily to support ECRs and scientists from low GDP countries attend conferences or workshops initiated and organised by INTAV.

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1613P NAQS: International Focus Group Northeastern African Quaternary Stratigraphy

Leaders: Leszek Marks (University of Warsaw, Poland), Fabian Welc (Cardinal Stefan Wyszyński University, Poland), Jerzy Nitychoruk (Pope John Paul 2nd State School of Higher Education, Poland).

Webpage: www.geoarcheologia.uksw.edu.pl

Report of past activities and upcoming events.

Authors: Leszek Marks¹, Fabian Welc².

¹University of Warsaw, Poland; ²Cardinal Stefan Wyszyński University, Poland.

The International Focus Group Northeastern African Quaternary Stratigraphy (NAQS) initiated its activity in 2017. The group operates under the umbrella of INQUA Stratigraphy and Chronology Commission (SACCOM). An establishment of a uniform and formal Late Pleistocene and Holocene climatostratigraphic division of Northeastern Africa is among the main goals of NAQS. We plan also to organise international field workshops and symposia, focused on issues connected with Late Quaternary climatostratigraphy of Northeastern Africa (particularly Egypt and Sudan) reflected in lake and playa sediments, combined with a wide range of geoarchaeological data with special attention devoted to Egypt and Sudan. NAQS invites all interested in the issue of formal Late Pleistocene and Holocene climatostratigraphic division of Northeastern Africa.

One of the first project realized by NAQS was the Field and Laboratory Workshop: *Methodology of stratigraphic and climatostratigraphic correlations of Holocene lake sediments and geoarchaeological data based on selected sites from Egypt (Lake Qarun in Faiyum Oasis, Lake Saqqara, Nile Delta lakes) And Poland (Lake Jeziorak region, paleolakes in Biala Podlasie region)*. The workshop was held in Biała Podlaska in eastern Poland on April 9-11, 2016. It was a complementary issue to the Fourth Geoarchaeological Conference on *Late Pleistocene and Holocene Climatostratigraphy of North Africa Reflected in Lake Sediments and Geoarchaeological Data* held in Warsaw on April 8-9, 2016.

The main objective of the workshop was to raise the qualification and dissemination of

interdisciplinary geoarchaeological research skills. The emphasis was put on the issue of stratigraphic correlation of Holocene lake sediments with archaeological chronology, based on selected lake geological cores and archaeological data from the sites in Egypt (Faiyum, Sakkara, Nile Delta) and Poland (northern and eastern palaeolake region).



Fig. 13. Mollusc shells in Holsteinian lake sediments at Ortel Królewski in eastern Poland.

The workshop was originally designed for graduate and PhD students, early-career researchers from developing countries as Egypt, Ukraine and Belarus and also from Poland. This thematic workshop allowed the participants to become familiar with the most modern methodology of stratigraphic correlation of geological and archaeological units, essential in any geoarchaeological research. The training was performed by researchers with great experience and knowledge. The basic benefit was to combine methodological approaches in Earth sciences and archeology to attain perfection in geoarchaeological research.



Fig. 10. Collecting a core of palaeolake sediments.

The workshop was focused on practical training of young scientists and included drilling, sampling and laboratory analyses of Pleistocene and Holocene lake deposits and their lithostratigraphical and chronostratigraphical correlation. The workshop was dedicated to geoarchaeological training. It promoted climatostratigraphic research based on the examination of Pleistocene and Holocene lake sediments in different climatic zones and stimulated reference to adjoining archaeological sites. The workshop was funded by INQUA, the Faculty of Geology of the University of Warsaw, the Institute of Archeology of the Cardinal Stefan Wyszyński University in Warsaw and the Faculty of Economics and Technical Sciences of Pope John Paul 2nd State School of Higher Education in Biała Podlaska.

The first meeting of NAQS

30th-31st May, 2017

Poznań (Poland)

On 30th May, 2017, the Institute of Archeology of the Polish Academy of Sciences in Poznań (Poland) will host the first NAQS meeting focused on *Tracing the Holocene climatic markers (8.2, 5.9, 4.2 ka BP and others) and their impact on past cultures and civilizations in the Nile Basin and beyond*. We invite all who are interested in this subject to participate in the meeting. There will be a scientific session where 15 minute presentations will be delivered.

To apply to attend the meeting and sessions please contact Leszek Marks (leszek.marks@uw.edu.pl) or Fabian Welc (f.welc@uksw.edu.pl). The meeting will be a good chance to discuss approaches to climatostratigraphic subdivision of Northeastern Africa. Detailed information is available on the NAQS official [webpage](http://www.geoarcheologia.uksw.edu.pl)

1612F DATESTRA: a Database of Terrestrial European Stratigraphy

Project Leaders: Pierluigi Pieruccini (University of Siena, Italy), Markus Fiebig (University of Wien, Austria), Guzel Danukalova (Russian Academy of Sciences, Russia).

IFG activities, future perspectives and events.

Authors: Pierluigi Pieruccini¹, Markus Fiebig², Guzel Danukalova³.

¹ University of Siena, Italy; ² University of Wien, Austria; ³ Russian Academy of Sciences, Russia.

During 2016 the SEQS-DATESTRA IFG already enlarged the network of scientists interested in the project, starting the discussion about the conceptual structure and the contents of the database. At the same time, ECR and Low GDP countries scientists were encouraged to present and share among the SEQS community the main Quaternary sites, together with their significance, for single countries or regions across Europe. This occurred during the SEQS 2016 Meeting in Armenia where the SEQS-DATESTRA session has seen the participation and the contribution of many of them such as Tivadar Gaudenyi (Serbia), Katrin Lasberg (Estonia), Guzel Danukalova (Russia), Natalia Gerasimenko (Ukraine). Moreover, models of geographic databases under development or already in use for stratigraphic or cartographic purposes have been presented and discussed.

Programmed activities for 2017:

January-May 2017, preparation and structuring of a geographic stratigraphic Database to provide a



Fig. 12. Ortel Królewski, presentation of the site with Holsteinian lake sediments.

geographic based summary of the main knowledge about the significance of the Terrestrial Quaternary that can be compiled, shared and updated easily and at low costs. Sharing such information by easy-to-use platforms (Story Maps ESRI ©, GIS based and Google Earth©) meets also the needs of a pan-European shared knowledge in order to improve the capacity of European and non-European Scientists to apply both for National or UE based funding. The Database will be an open-source tool that will work as a starting point for European Quaternary Stratigraphy knowledge, to be implemented and updated by scientists that especially in the future could face problems with old terminology or old references about key-sites that in many cases disappeared or faded away in memory

May-June 2017, preparation and release of Guidelines for data collection. The Guidelines will provide a sort of format for tables containing a minimum set of basic information for each site. This is crucial to make as more uniform as possible the data collection and therefore as easier as possible the compilation of the Database.

10th September 2017, DATESTRA Workshop at Tautavel, France (information and details, including pre-registration at <http://datestra-seqs.strikingly.com/#tautavel-2017>). Here the structure and the prototypal outputs of the Database will be presented and discussed, in order to have a starting point for its compilation. Moreover, single responsibility for homogeneous regions of Europe will be assigned to specific individual, and they will be in charge of the collection and compilation of the Database.

11-12th September 2017 DATESTRA Session During the SEQS-DATESTRA Meeting in Tautavel (France). Here contributors are invited to present the main sites to be included in the Database from different countries of Europe.

The participation to SEQS-DATESTRA 2017 Meeting is open to anyone is interested in the project (information and details, including pre-registration at <http://datestra-seqs.strikingly.com/#tautavel-2017>).

Moreover, SEQS-DATESTRA can partially fund the participation of ECR's and low GDP countries researchers following the INQUA policy on IFG funding. The application for grants will be released soon, please check <http://datestra-seqs.strikingly.com/#tautavel-2017>.

September-December 2017 compilation and collection of data coming from different countries, implementation of the Database and updating of the output.

The main outcome expected by the activities of this IFG is a GIS-based Geographic Database (DATESTRA) containing the basic information about the key-sites of the Terrestrial Quaternary Stratigraphy of Europe. The Database will be shared and made available to all the Quaternary audience on open GIS based Web platforms. The platform will be managed through web-based facilities where it will be possible to open forums and blogs for discussion, implementation and updating. The Database will be made available as web-GIS applications like "Story Maps" in order to give to the wider audience as possible, also at informative level, the chance to have an overview of the European Terrestrial Quaternary setting.

At the next INQUA Congress (2019 Dublin), SEQS will apply for a dedicated session for DATESTRA where the final results and outputs will be presented and shared among all the Quaternary audience.

The publications roadmap is as follows:

2017 SEQS-DATESTRA 2016 Meeting (Armenia) Quaternary International Special Volume: first contributions to DATESTRA.

2018 SEQS-DATESTRA 2017 Meeting (France) Quaternary International Special Volume: contributions about the advances of DATESTRA and presentations of the proposed sites.

For enquiries about the SEQS-DATESTRA project, how to join the project, SEQS-DATESTRA 2017 Meeting, email Pierluigi Pieruccini pieruccini@unisi.it

SEQS 2017: Quaternary stratigraphy and hominids around Europe

11-15 September 2017

Tautavel, France

[Webpage](#)

Sunday 10th workshop INQUA IFG SACCOM SEQS-DATESTRA a Database of Quaternary Stratigraphy of Europe

Monday 11th Meeting at the Meeting hall of the Centre Européen de Recherches Préhistoriques in Tautavel

Tuesday 12th Meeting at the Meeting hall of the Centre Européen de Recherches Préhistoriques in Tautavel – SEQS Bussiness Meeting

Wednesday 13th Caune de l'Arago, Middle Pleistocene sequence, Prehistory Museum and European Research Centre of Tautavel. Visit to the palaeontological, archeological and palaeoanthropological collections (Homo heidelbergensis, Arago XXI)

Thursday 14th Alluvial terraces and alluvial sequence along the coastal rivers (Tet, Tech and others)

Friday 15th Coastal and continental sequences: Ramaldis Cave (Port La Nouvelle), Arbreda Cave (Catalonia), Olot: volcanic sequences.

The participation to the workshop is open to all you who are interested to participate to the IFG activities. More information on: <http://datestra-seqs.strikingly.com/>

Terrestrial Processes, Deposits and History

IFG 1616F: G@GPS: Groundwater and Global Palaeoclimate Signals

Leaders: Jianyao Chen (Sun Yatsen University, China), Dioni I. Cendón (Australian Nuclear Science and Technology Organization (ANSTO), Australia), Rein Vaikmäe (Tallinn University of Technology, Estonia), Najiba Chkir Ben Jemâa (University of Sfax, Tunisia), Jason J. Gurdak (San Francisco State University, USA), Sylvi Haldorsen (Norwegian University of Life Sciences, Norway), Roland Purtschert, (University of Bern, Switzerland), Martine J van der Ploeg (Wageningen University, The Netherlands), Marcela Perez (Universidad Nacional del Litoral, Argentina).

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Summary of Results in 2016.

Authors: Jianyao Chen¹, Sylvi Haldorsen², Jason Gurdak³, Dioni I. Cendón⁴.

¹Sun Yatsen University, China; ²San Francisco State University, USA; ³Norwegian University of Life Science, Norway; ⁴ANSTO, Australia.

1. Overview of G@GPS

The primary objective of **project IFG 1616** is to report on the apparent ages of deep groundwater at the global scale and to correlate these ages with other palaeoclimate proxies. Data has been collected from seven “flag basins” that represent each populated continent in the world (Fig. 1 in Haldorsen et al. (2016)), including the following:

Africa: North West Sahara Aquifer System (NWSAS),

Asia: North China Plains Aquifer (NCPA),

Europe: Baltic Artesian Basin (BAB),

North America: High Plains Aquifer (HPA),

Oceania: Great Artesian Basin (GAB) and the coastal Sydney Basin aquifers (SBa), and

South America: Guaraní Aquifer System (GAS).

All seven aquifer systems are major water resources that supply the population in large areas with water used for drinking, irrigated agriculture, industry, and support surface-water ecosystems. The G@GPS project has compiled comprehensive data describing the groundwater flow systems, apparent groundwater ages, and important water/rock interactions and geochemical data. While some of the aquifers include unconfined aquifers, large parts of the seven basins consist of confined aquifers.

The current methods available for determining the apparent age of groundwater can only provide relatively low-resolution records. This limitation is further constrained by the dispersion and vertical mixing of water of different ages during the flow through such large aquifer systems, as well as the rock-water interactions that limit more accurate dating. The best conditions for dating groundwater occur when there is considerable recharge over short periods and rapid transitions from very dry to very wet climatic conditions. Gradual climate change over long time spans is difficult to interpret from groundwater age and climatic indicator data. The first challenge is to accurately date the water, and the second challenge is to interpret the temperature and wetness of the paleoclimate during recharge.

Despite the limitations outlined above, palaeogroundwater ages are calculated for all the seven flag basins listed above, as described below in the summary of Haldorsen et al. 2016. Both data



Fig. 11. A well screened to an approximate depth of 2,000 m in the North West Sahara Aquifer System (NWSAS), near Tozeur, Tunisia.

collected by members of the INQUA G@GPS Focus Group and data in published literature are used as a basis for our calculations. Results of our calculations indicate that palaeogroundwater represents the largest volume of the total groundwater resources in these globally important aquifer systems (Haldorsen et al. 2016). The sustainability of many of these aquifer systems is in question because the present-day recharge rates in many of these aquifers (e.g. NWSAS in Photo 1) is very limited and often is much smaller than present-day groundwater abstraction rates.

2. Publications

Summary of the paper published in the journal *Episodes* (in Haldorsen et al. 2016):

All of the seven groundwater basins contain water that has been radiocarbon dated to the Early Holocene and estimates of palaeotemperatures based on stable isotopes. Groundwater recharged in the Early Holocene is generally characterized by high $\delta^{18}\text{O}$ and $\delta^2\text{H}$ values that reflect the relatively warm/mild and wet conditions of the Early Holocene, compared to the Late Pleistocene. These results are particularly characteristic for NWSAS, which correspond to the Holocene Wet Period in North Africa. A mild and moist Holocene has also resulted in significant recharge to the HPA in North America, where much of the dated water is older than 9 ka (radiocarbon years), and water up to ages of 14 ka (radiocarbon years) has been reported. In the NCPA, the groundwater in the upper part of the basin is of Holocene age, but the lack of older age determinations makes it difficult to interpret the palaeotemperatures. The available data from GAB (inland), SBa (coastal), and GAS also indicate regional variations in the calculated Late Pleistocene (MIS2) and Holocene (MIS1) recharge temperatures.

The maximum age is 30 ka for a reliable age determination of groundwater based on ^{14}C dating. Therefore, there is still a lack of data for groundwater recharged before MIS2. However, recent age determinations based on ^{36}Cl and ^{81}Kr can now be used to date much older water. In some of the flag basins such analyses are already available. For instance, new age determinations indicate that a major recharge of groundwater in

NCPA may have taken place 770 ka BP (MIS 17, Middle Pleistocene) and that BAB contains water, which was recharged 1.3 Ma.. Theoretical calculations indicate that some of the water in NWSAS may have a residence time of at least 1 Ma. However, it should be noted that the accuracy of the age determinations decreases when the storage time of the groundwater increases. In most of the flag basins, $\delta^{18}\text{O}$ and $\delta^2\text{H}$ values are the basis for calculations of temperature conditions. However, analysis of noble gases in groundwater may now provide accurate palaeoclimate estimates. We believe that we soon will know much more about continental and global recharge periods during and before MIS3-MIS5 as more laboratories carry out new and relevant analyses and such data become available for a larger group of hydrogeologists.

References:

Haldorsen, S., van der Ploeg, M.J., Cendón, D.I., Chen, J., Najiba Chkir, N.B.J., Gurdak, J.J., Roland Purtschert, R., Tujchneider, O., Vaikmäe, R., Perez, M., Zouari, K. (2016). Groundwater and Global Palaeoclimate Signals (G@GPS). *Episodes* 39, 556-567.

3. Conferences and Meetings

G@GPS: Annual Meeting – Working Meeting of G@GPS Leadership Members

The annual G@GPS meeting was held on Tuesday, December 13 during the same week as the 2016 AGU Fall meeting in San Francisco, California, USA. The G@GPS meeting was organized by Jason Gurdak and held at San Francisco State University. Photo 2 shows the meeting participants.

The Meeting Objectives were:

- A. Discuss current and future funding levels for G@GPS;
- B. Outline plans for future G@GPS activities (meetings, conference sessions, publications, etc.);
- C. Next steps: Develop list of action items and responsibilities.

The following activities were proposed in 2017:

- A. Training course on groundwater dating in Guangdong Province, China in Nov/Dec.;
- B. Annual meeting in Croatia in September, together with IAH conference (iah2017.org);
- C. Publication as a special issue in international journals;
- D. Organize session at the 5th Past Global Change (PAGES) Science Meeting, May, 2017, Zaragoza, Spain: G@GPS members Abi Stone, Marine van der Ploeg, and Jason Gurdak are co-conveners of the PAGES session 28. Climate variability signals in groundwater and unsaturated zone archives, May 11.
- E. Present at EGU conference, April, 2017 in Vienna, Austria

Many of the G@GPS participants presented at the 2017 AGU Fall meeting in a session that was organized and co-convened by G@GPS members Dioni Dendon, Abi Stone, and Jason Gurdak. The title of our AGU session was: H43M: Climate variability and change and subsurface hydrology: Impacts, Mitigating Measures, and Predictions.

The following G@GPS members presented at AGU in our session:

Oral presentations:

- Dioni Cendon: A Nine-year record of groundwater environmental tracer variations in a weathered sandstone plateau aquifer
- Abi Stone: Palaeoclimate records in dryland dunes: progress and remaining challenges utilizing the unsaturated zone palaeomoiure reconstruction
- Joanna Doummar: Artificial sweeteners: sucralose and acesulfame-k, emerging pollutants indicators of specific transport in karst systems: Application semi-arid regions.
- Scott Jasechko: Western USA groundwater drilling

Poster presentations:

- Shuiming Hu: Radio-krypton dating with 20 kg of water or ice
- Yuta Shimizu: Modeling the effect of abandonment process of cultivated land on water quantity and quality using SWAT in a hilly watershed of western Japan.
- Rein Vaikmae: Groundwater residence time and paleohydrology in the Baltic Artesian basin: isotope geochemical data.
- Laura Scheiber: Genesis of the gossan at the Las Cruces Ore Deposit (SW Spain), Groundwater-rock interaction.
- Jianyao Chen: Paleoclimatical signals from large aquifers: comparative study of North China Plain, North America and Great Artesian Basin
- Ren Wang: Variation of extreme precipitation events and its associations with ENSO in Leizhou Peninsula, southern China, 1984-2013

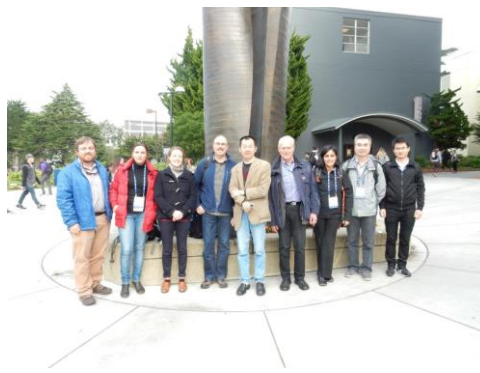


Fig. 12. G@GPS Annual Meeting, San Francisco State University, San Francisco, California, USA participants Jason Gurdak, Laura Scheiber, Abi Stone, Dioni Cendon, Jianyao Chen, Rein Vaikmäe, Joanna Doummar, Shuiming Hu, Ren Wang (from the left to the right).

IFG 1617F: GEODUST: GEOMorphology of DUST sources and dynamics of dust emission from different geomorphic units

Leaders: Onn Crouvi (Geological Survey of Israel), Andrea Zerboni (University of Milano, Italy), Kerstin Schepanski (Leibniz Institute for Tropospheric Research, Germany), Frank Eckardt (University of Cape Town, South Africa), Matthew Baddock (Loughborough University, UK).

Contact: crouvi@gsi.gov.il

Webpage

Report on the first meeting of the GEODUST International Focus Group of the INQUA TERPRO Commission (Tropos – Leipzig, 21st-22nd November 2016) and future actions.

Authors: Onn Crouvi¹, Andrea Zerboni².

¹ Geological Survey of Israel; ² University of Milano, Italy.

Mineral dust 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. One of the approaches to study the environmental effects of dust is through numerical models in varying spatial scales. These models depend on a realistic representation of dust source areas, and dynamics of dust emission from these sources. Although progress has been made in identifying the geomorphic units that are the major dust sources, and in evaluating the dynamics of dust emission, these first stages of the dust cycle remain fundamental knowledge gaps and need to be further addressed.

To address these knowledge gaps, which are among the main limiting factors for existing global models of dust cycle, the GEODUST International Focus Group of the INQUA-TERPRO Commission was established in 2016. The main scientific issue to be addressed by participants to the group is a more comprehensive treatment of the geomorphic controls on dust emission, transportation, and deposition to improve the performance of dust-cycle models, through the investigation of field and remote sensing geomorphology of dust sources and dynamics of dust emission.

The 1st meeting of the GEODUST IFG of the INQUA TERPRO Commission was organized by the authors and hosted by K. Schepanski at the TROPOS (Leibniz Institut für Troposphärenforschung in Leipzig, Germany) the 21st and 22nd November 2016. The meeting gathered together ca. 30 participants from 9 countries around the world; and thanks to the financial contribution of INQUA, we were also able to support the travel costs of 4 early career researchers (ECR) from Israel, Italy, and UK.

The scientific session of the meeting was on the 21th of November and included a full day lectures and

discussions. The workshop started with a short opening on the rationale and goals of the GEODUST IFG by A. Zerboni, followed by a detailed presentation on geomorphology of dust sources and the possible actions of the IFG by O. Crouvi. After the opening, 3 invited speakers presented specific case studies on the issue of dust source, emission, and sink. D. Kroehling (Universidad Nacional del Litoral, Argentina) talked about current dust sources in South America, their identification and correlation with long distance transportation; she also introduced a palaeo-perspective on the main aims of the GEODUST IFG, discussing on the identification of the main dust sources for the South American loess. She emphasized the importance of studying Quaternary dust deposits as a key for understanding current dust cycles. F. Eckardt (University of Cape Tow, South Africa) talked about current Southern African dust sources and emphasized the importance of availability-limited sources, reporting on case studies mostly from arid Namibia. Finally, K. Schepanski (TROPOS, Germany) showed the spatio-temporal distribution of current dust sources in North Africa and the importance of supply-limited sources in this region, including a robust modelling approach for the interpretation of the land-atmosphere interaction.

The open session of the meeting comprised 6 oral presentations and started with the reports of the three ECR supported by INQUA. T. Mockford (Loughborough University, UK) presented a study on the control on current dust emission from Iceland. This presentation also highlighted the importance of cold deserts and active volcanic fields in the formation and mobilization of dust. N. Swet (Ben Gurion University of the Negev, Israel) discussed first results from experimental study on dust emission from sand dunes, including possible explanation mechanisms in dust emission and modelling. O. Lavi-Bakin (Ben Gurion University of the Negev, Israel) showed his first results of high-resolution mapping of current North-African dust sources, focusing the attention of the complexity of identifying recurrent emission areas on the basis of remote sensing data. Finally, D. Fugazza (University of Milano, Italy) showed the impact of local and Saharan dust on Alpine glaciers. This contribution highlighted the importance of short-distance dust transportation in high alpine environments and the role played by dust deposition on glacier ablation tongues.

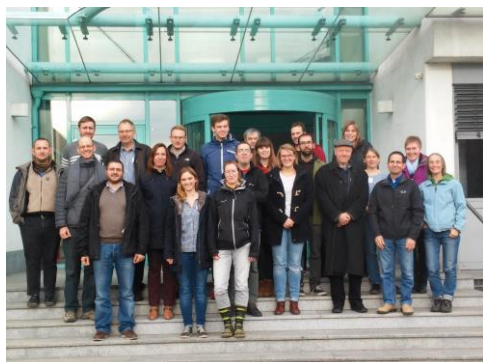


Fig. 13. Participants to the 1st GEODUST IFG meeting at TROPOS in Leipzig.

Before the general discussion, two more presentations discussed case studies from Central Asia and North America. M. Baddock (Loughborough University, UK) discussed the linkage between geomorphology and dust emission in the Chihuahuan Desert of North America. He presented the results of a comparative study between predicted ranked importance of each geomorphic type for dust emission and the actual ranked importance as determined from the long-term satellite dust loading. C. Opp (Philipps-Universität Marburg, Germany) presented dust deposition data from Central Asian deserts (Kyzylkum, Aralkum, Karakum, Khorezm) and in particular focused on the consequence of the desiccation of the Aral Sea and the subsequent intensification of the aeolian dust and sand transport in the region.

Based on the presentations, we had a discussion on future research directions and activities under the umbrella of the GEODUST IFG, which can be summarized in the following 3 points

- It is suggested to follow the land-surface classification of preferential dust sources developed by Bullard et al. (2011). The scheme was shown in the past to provide reasonable prediction of areas of emission in the Chihuahuan Desert and in Australia. Thus, it is suggested to adapt this scheme and test it in additional arid and semi-arid regions worldwide.

- Overlooked types of dust source are Quaternary dust deposits, including loess. These relate to the aeolian system sediment state, described in Bullard et al. (2011) and discussed during the meeting. Efforts should be made to differ between supply-limited to availability-limited to transport-capacity-limited sources. In this regard, Quaternary dust deposits are either availability-limited or transport-capacity-limited sources, since in most cases they are not limited by the presence of sediments. Few presentations showed that current dust sources are in fact Quaternary dust deposits, i.e., these sources were in the past dust sinks.

- More emphasis should be given to anthropogenic disturbances. Today, the human factor is important in controlling the spatio-temporal distribution of dust sources worldwide, as many natural landforms are currently being disturbed by agriculture activity, herding, grazing, etc. This provides a challenge in identification of dust sources in large-scale studies, as there are not enough data regarding the spatio-temporal distribution of anthropogenic activity. Moreover, most of dust sources are in remote arid regions, where field control is sometimes not possible and thus remote sensing in these cases is the only feasible way to learn on these sources.

The meeting brought together large number of specialists working on the same scientific topic with different approaches and different experience, which covered the most of the arid lands of the world (North Africa, South Africa, the Levant, Central Asia, Iceland, North America, South America, Australia). This was highlighted in the general discussion that resulted in creating a large

working group, whose establishment was one of the main goals of the GEODUST IFG 1st meeting, and it was accomplished. The future interactions between participants and joint researches will be the core of the next years of scientific activities of the GEODUST IFG.

The most important of the activities planned for the 2017 will be the 2nd meeting, taking place in October (schedule to be confirmed). The location of the meeting will be the desert of Namibia and we are planning a field trip meeting along the Namib Desert, and based in the Gobabeb Research & Training Centre. The meeting (organized with the help of F. Eckardt) would have two days dedicated to oral presentations, and few days of field trip to active dust sources and to Quaternary dust deposits (that are either current sources of dust or not). This will have the main aim to accomplish a specific research activity, coupling many methods (remote sensing, sedimentology, modelling, geochronology...) in the definition of current and past dust sources at the margin of the Namib. The publication of the data collected during the fieldwork and in the labs may represent a paradigmatic methodological approach to be shared to the community of the dust researchers.

References

Bullard, J.E., Harrison, S.P., Baddock, M.C., Drake, N., Gill, T.E., McTainsh, G., Sun, Y. (2011). Preferential dust sources: A geomorphological classification designed for use in global dust-cycle models. *Journal of Geophysical Research* 116, F04034.

Late Cenozoic evolution of the Yellow River and its environs

10-17 September 2017

Lanzhou, China

The meeting will comprise one day of lectures at Lanzhou University, plus a week's excursion (by minibus) on the theme of the Late Cenozoic evolution of the Upper-Middle reaches of the Yellow River, including the fluvial sequence, the loess of the region through which the river flows, Miocene-Quaternary lacustrine environments at Lake Qinghai (the largest inland lake in China) on the Tibetan Plateau and the relation of this (and related lakes) to the evolution of the fluvial system, as well as glacial evidence in the upper reaches of the system on the Tibetan Plateau. There is ample scope for visits to cultural sites, including preserved water wheels along the Yellow River and a fine geological and cultural heritage museum in Lanzhou and the Taer Monastery and temples, ~25 km from Xining.

Registration deadline: May 1st 2017

Payment and abstract submission: June 1st 2017

Further [information](#) and [Information letter](#)

IFG 1618F: EGSHaz: Earthquake Geology and Seismic Hazards

Leaders: Ioannis Papanikolaou (University of Athens, Greece), Petra Štěpančíková (Institute of Rock Structure and Mechanics, Czech Republic), Christoph Grützner (University of Cambridge, UK), Beau Whitney (University of Western Australia, Australia), Yael Braun (Hebrew University of Jerusalem, Israel), Jakub Stemberg (Institute of Rock Structure and Mechanics, Czech Republic).

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Report on EGSHaz activities.

Christoph Grützner¹, Stéphane Baize².

¹ University of Cambridge, UK; ² IRSN, France.

The IFG EGSHaz' main activity in 2016 was the 7th PATA (Paleoseismology, Active Tectonics and Archaeoseismology) Days meeting in Crestone, CO (USA) from 30 May - 3 June. In 2017 the main activity of the IFG will be the 8th PATA Days meeting in New Zealand 13-18 November 2017 (<https://www.gns.cri.nz/Home/News-and-Events/Events/PATA/Welcome>). For the first time, the PATA Days will be held in Oceania, expanding the outreach to scientists previously not involved with INQUA activities (especially those from New Zealand and Australia). The conference will include both scientific sessions and field trips, and include participants from industry and civil protection agencies. This meeting was initially planned to take place in April, but the Kaikoura Earthquake made it necessary to postpone the event to November. This earthquake now offers the great opportunity to study in detail some of the most complex surface ruptures that ever occurred. Special field trips will be dedicated to the epicentral area.

The IFG also supports a field trip to the epicentral area of the 1997-2016 Central Apennines earthquake series in Italy. This field trip is organised by the University of Camerino and will be held from 19-22 July, 2016: <http://geologia.unicam.it/news/1997-2016-three-destructive-earthquakes-along-central-apennine-fault-system>.

Another activity of our IFG was to set up a new website: <http://www.earthquakegeology.com>. The website provides information on our aims and scopes, about future meetings and upcoming events, and a section on the history of our IFG. Furthermore, we maintain a list of IFG members. One section is devoted to document the progress of the two projects of the IFG: 1) GEMAP and 2) SURFACE. A special feature of [earthquakegeology.com](http://www.earthquakegeology.com) is an extensive download section. Here the interested reader can find the PATA Days proceedings of past meetings with hundreds of peer-reviewed short papers, all of them open access. We also provide field trips guides from the meetings and a collection of field reports on recent earthquakes compiled by IFG members.

1620R SURFACE: Surface Faulting Catalogue - Earthquakes

Leaders: Frank Audemard (FUNVISIS, Argentina), Stéphane Baize (IRSN/PRP-DGE/SCAN BERSSIN, France), Francesca R. Cinti (Istituto Nazionale Geofisica e Vulcanologia, Italy), Carlos Costa (Universidad Nacional de San Luis, Argentina), James McCalpin (GEO-HAZ Consulting, USA), Alessandro Maria Michetti (Università degli Studi dell'Insubria, Italy), Koji Okumara (Hiroshima University, Japan), Oona Scotti (IRSN/PRP-DGE/SCAN BERSSIN, France).

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Fault Displacement Hazard Analysis Workshop in Menlo Park, USGS facility- Synthesis and Perspectives – 8 and 9 December 2016.

Authors: Stéphane Baize¹, Oona Scotti¹, Timothy Dawson², David Schwartz³, Francesca R. Cinti⁴.

¹ IRSN, France; ² CGS, USA; ³ USGS, USA; ⁴ INGV, Italy.

Fault Displacement Hazard Analysis (FDHA) plays an important role in the risk assessment and design of both new and existing infrastructure located across and near active and potentially active faults. The primary objective of FDHA is to quantify the spatial distribution and magnitude of surface displacements and deformation caused by tectonic faulting and the hazard for structures impacted by this deformation.

Lessons learned from recent earthquakes, new research, and implementation of FDHA methodologies in projects, as well as recent guidance documents (e.g. American Nuclear Society - Criteria for Assessing Tectonic Surface Fault Rupture and Deformation at Nuclear Facilities) provide the current perspective on FDHA in the assessment of tectonic surface deformation of engineering concern. However, compared to other types of seismic hazard analysis (ground motion, liquefaction, slope failure), this field is still considered by many to be in its early stages of development.

After a kick-off meeting in Paris (October 2015), sponsored by IRSN, this Menlo Park workshop, organized by USGS, CGS, INGV and IRSN, aimed at bringing together researchers, practitioners, and stakeholders interested in the topic of fault displacement, to discuss issues pertaining to FDHA, and to develop a plan for moving FDHA research forward. The workshop was very successful in terms of the quality of presentations and discussions, as well as in attendance. It attracted more than 100 participants from 8 countries, 8 major infrastructure stakeholders, 11 universities, 12 government agencies and laboratories, and 17 geologic engineering consulting companies. One of the primary motivations of this workshop was to develop a community-sourced, worldwide, unified database of surface rupturing earthquakes with a rich list of parameters for the basis of empirical regressions used in FDHA. This database is currently in

development within the framework of an International Union for Quaternary Research (INQUA) project (Surface Rupture during Earthquakes Database - SURE) and IAEA working group.

The workshop included talks on "*Lessons Learned from Recent Earthquakes*" (6 talks), "*Observational Data for the Surface Rupture during Earthquakes (SURE) Database*" (6 talks), the "*Application and Advances in Deterministic and Probabilistic Fault Displacement Hazard Analysis*" (10 talks) and possible ways for "*Moving Forward*" (2 talks). The complete list of talks, as well as the attendance list and the program are available on the INQUA TERPRO IFG EGSHaz Website at http://www.earthquakegeology.com/index.php?page=dir&szlozka=materials/other_materials/menlo_park_docs&s=4. Time was also allotted to some attendees to present surface faulting cases or their top lessons learned in the applications of FDHA during 2-4' flash-talks. Some scientists could also share their experience thanks to discussion around posters.

Take away points

- There is broad interest, worldwide, in probabilistic estimates of the amount of slip and its distribution during future earthquakes for engineering design of infrastructure. Distributed deformation is a key concern, particularly for long baseline structures such as a pipelines, tunnels, and bridges.
- Worldwide researchers, especially from the US, Europe, Japan and New Zealand, are currently updating and compiling existing fault rupture data that will be incorporated into the SURE database.
- Following the Menlo Park meeting and the project dissemination, new fault rupture data from recent earthquakes have been provided by some of the participants, to feed the SURE database.
- The Database structure as well as additional fault parameters needed (like surface geology or structural complexity) for its implementation that were discussed in Paris at the first SURE database meeting were validated at the Menlo Park meeting.

The US stakeholder community has identified potential funding partners (currently PEER [Pacific Earthquake Engineering Research Center] and PG&E [Pacific Gas and Electric Company]) for improving the Database with western US observations. The US initiative will soon nominate an Executive committee to guide and manage this research effort. The International community will participate in this as much as possible and, in parallel, will identify sources and request funding for its own activities.

1623P EX-AQUA: Palaeohydrological extreme events: evidence and archives

Leaders: Alessandro Fontana (University of Padova, Italy), Willem Toonen (University of Aberystwyth, UK), Jürgen Herget (University of Bonn, Germany), Rajiv Sinha (Indian Institute of Technology, India).

Contact: alessandro.fontana@unipd.it

Reports on the conference EX-AQUA 2016 and planned activities for 2017.

Authors: Alessandro Fontana¹, Juergen Herget², Willem Toonen³, Rajiv Sinha⁴.

¹University of Padova, Italy; ²University of Bonn, Germany; ³University of Aberystwyth, United Kingdom; ⁴Indian Inst. of Technology Kanpur, India.

The project EX-AQUA is related to the IFG HEX: "Palaeohydrology and fluvial archives - extreme and critical events" and it mainly concerns about floods and droughts. These are some of the most serious natural hazards affecting human societies. The quantification of the recurrence time of the catastrophic events and their magnitude is mainly based on direct measures. These are available in few areas and only for the last decades or a few centuries, at best. The use of palaeohydrological tools can strongly extend the temporal and spatial records of extreme events and can be used in the quantification of flood risk and in the water stress assessment.

The EX-AQUA project proposes to gather data about Quaternary hydrological events, mainly considering the Holocene and with a special focus on the late-Holocene (i.e. about last 5000 years) as this includes historic times for many regions. In a global perspective, this period allows us to apply a multidisciplinary approach that takes into account sedimentological, geomorphological, biological, archaeological and documentary data (e.g. historical and written sources, chronicles). These different sources of information allow us to produce high-resolution records of extreme events, which could be used as a standard dataset for comparison with other environmental records. Several members of the project are also particularly interested in checking the relationship existing between societal crisis and palaeohydrological phases, as often claimed for the collapse of some cultural groups, but rarely clearly demonstrated.

The scientific community involved in EX-AQUA aims to share information about palaeohydrological series and the methodology for their investigation in the different continents. The project wants to improve the network of researchers dealing with palaeohydrological investigations, spreading information about methods, concepts and archives of past events dealing with flood and drought series. The main objective of bringing together these experts is to standardize palaeohydrological techniques, discuss the interpretation, uncertainties and

general quality of different proxies used for the reconstruction of events, and to discuss the different settings (their advantages vs. complications for interpreting events and their relation to climate change).

The first year of the project aimed at increasing the visibility of the research and attracting new scientists for sharing ideas, methodologies and data. For this purpose the main activity in 2016 was the organization of the conference "EX-AQUA 2016: Palaeohydrological extreme events, evidence and archives", held at the Department of Geosciences in Padova (Italy), September 26th – October 1st. A total of 62 scientists from 14 countries participated to the meeting and took part to the first workshop of the project (Fig. 17). The kindly provided funding of INQUA was totally used for sponsoring the travel and subsistence costs of 15 participant composed of 14 ECR and 1 DCR.

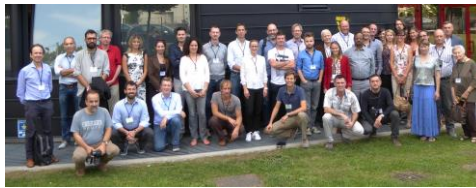


Fig. 18. Participants of the meeting EX-AQUA 2016 in Padova, September 2016.

The conference consisted of 37 oral communications and 11 poster presentations that were divided in scientific sessions: Alluvial system evolution and extreme events; Floods and palaeohydrology; Coastal extreme events; Floods and palaeofloods outburst floods; Alluvial geoarchaeology and palaeohydrology. An issue of Quaternary International with the proceedings of the conference is in preparation.

After the conference, a fieldtrip of 3 days, guided by A. Fontana, P. Mozzi and S. Rossato, brought 21 participants to visit some key sites for palaeohydrological research between the Venetian Plain, the area of the Dolomites, the Adriatic coast and the regions of Karst and Istria.

The first day, September 29th, the group focused on the problems related to fluvial evolution and river management in the Alpine catchment of Piave River and Carnic Pre-Alps. The participants visited the Vajont Valley (Fig. 18), where in 1963 the construction of an artificial reservoir induced a mass failure of about 240 millions of m³, which collapsed in the artificial lake and generated an impulsive wave that splashed the area of Longarone, claiming about 2000 victims. The group passed through the karstic plateau of Mount Cansiglio and after reached the foothill, where the springs of the Livenza River crop out.

The second day, September 30th, was dedicated to the alluvial fans and megafans that characterize the Friulian Plain. In particular the group discussed the relations between Alps, large landforms of the alluvial plain and the hydrogeological circuit. The participants visited the Tagliamento River, that is a reference system for natural braided channel morphologies of the Alpine rivers (Fig. 19). In the late Quaternary the Tagliamento formed an alluvial megafan that has been investigated in



Fig. 19. The fieldtrip group in the town of Longarone, where in 1963 the wave induced by a mass failure in the artificial lake caused 2000 victims.

detail in the last decades and allowed us to characterize the architecture and the chronology of the LGM and post-LGM fluvio-glacial and alluvial evolution. In the afternoon the group arrived in the coastal plain, near Concordia Sagittaria. This site was a Roman city that has been buried by a catastrophic phase of floods occurred between 6th and 8th centuries. This location stimulated discussion about the relationships existing between geoarchaeological and palaeohydrological research. The burial of Concordia is coeval with the activation of the present branch of Tagliamento River, now flowing 15 km eastward, near the city of Latisana. In this town the tides are felt and the river channel is only 170-m wide, whereas it is almost 1500 m until 2 km upstream. This setting leads this place to be strongly prone to hydraulic risk, as experienced in the disastrous floods of the 1965 and 1966. The area stimulated the discussion about river management vs. environmental conservation of the fluvial channels, benefits and disadvantages.

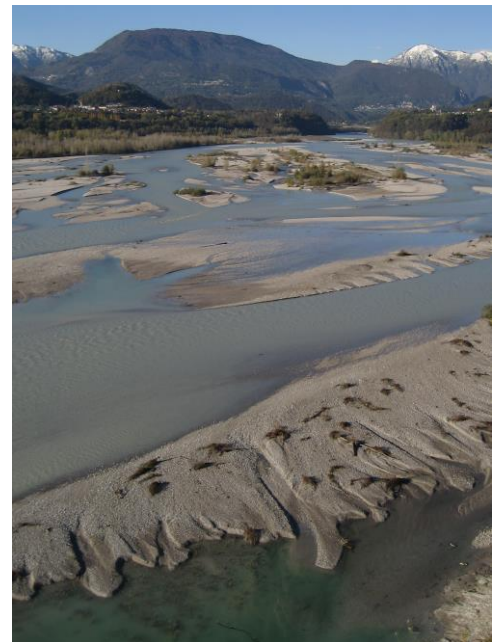


Fig. 14. The Tagliamento River near Pinzano, where the river comes out of its Alpine valley.

The last day, October 1st, the participants left from Trieste to reach the Croatian Istria and visit the delta of Mirna River, an unconventional river in a karstic environment. Here the stratigraphic investigations allow us to recognize the Holocene

alluvial events, evidencing the natural-forced and the human-induced floods. The fieldtrip ended with at the Škocjan Caves (Slovenia), visiting the spectacular area where the River Timavo (in Italian) or Reka (in Slovenian) enters in its underground tract.

During 2017 the project EX-AQUA is involved in a scientific session of the 9th IGC - International Geomorphological Conference, planned in New Delhi (India), 6-11th November 2017. The title of the session is "Palaeohydrology and Fluvial Archives - hydrological extreme and critical events (HEX)", as the name of the INQUA IFG (1622F), formed by the community of EX-AQUA and FLAG (Fluvial Archives and Architecture Group). The session is chaired by Juergen Herget and Alessandro Fontana (representatives of EX-AQUA), Stephan Cordier and Martin Stokes (representatives of FLAG). The session is the opportunity to present the project EX-AQUA to the international geomorphological community.

The main individual open activity of the year will be the workshop "EX-AQUA 2017: Palaeohydrological Extreme Events", that is planned in New Delhi (India) immediately after the International Geomorphological Conference, taking advantage that part of the people collaborating in the project will be in New Delhi. The preliminary program consists of 1 day of presentations and 1 day of fieldtrips, but changes are possible, according with the number and composition of participants. This workshop can give the possibility to involve in the project several researchers from India and, in a broader perspective, researchers throughout the Asian continent. The entire INQUA funding available for 2017 will be used for sustain travel and subsistence expenses of early-career researchers attending the workshop in new Delhi. Invitations to join the meeting including the programmatic discussions were sent to FLAG (Fluvial Archives Group), the Focus Group on Palaeogroundwater both within TERPRO, GloSS (Global Soil and Sediment transfer in the Anthropocene) and FLOODS (Flood working group) within PAGES and IWHA (International Water History Association).

(For details on the session of the IGC and the workshop EX-AQUA 2017 please contact alessandro.fontana@unipd.it).

Peribaltic Working Group 2017

International Field Symposium: From past to present - Late Pleistocene, last deglaciation and modern glaciers in the centre of northern Fennoscandia

Aug 20 – 25, 2017

Finland, Sweden, Norway

The field symposium will be held in north-western Finland, northern Sweden and northern Norway. The topics include the Late Pleistocene glacial deposits and morphology, pre-glacial weathering patterns, last deglaciation history, and the Holocene mires in southern and western Finnish Lapland, and in northern Sweden, as well as modern glacial environments at the Steindalsbreen Glacier in northern Norway. The excursion will focus on ice sheet dynamics, glacial landforms, stratigraphy, Late Pleistocene changes in palaeogeography of proglacial lakes and surface drainage pathways, glacial and interglacial/-stadial events including visit to the Rautuvaara-Hannukainen stratigraphical key site area in the central area of the former Scandinavian Ice Sheet and around the Last Ice-divide Zone. In addition, the symposium offers a forum to all participants for presentations and discussions of recent achievements in Quaternary geology, stratigraphy, palaeogeography and glacial processes.

Organizers: Geological Survey of Finland, Oulu Mining School at the University of Oulu, University of Stockholm, INQUA Finnish National Commission, INQUA Peribaltic Working Group (INQUA TERPRO Commission)

Deadline for abstracts: April 30, 2017

End of registration: June, 2017

Contact: peter.johansson@gtk.fi and pertti.sarala@gtk.fi

PATA-days 2017

8th International Workshop on Paleoseismology, Active Tectonics and Archaeoseismology

13th – 16th 2017

Blenheim, New Zealand

[Website](#)

The meeting will be held in Blenheim, at the top of the South Island, at the northern end of the Marlborough Fault System and 30 km above the southern Hikurangi subduction zone. The first full day of the meeting will be a field trip to view some of the northern fault ruptures of the 2016 Kaikoura earthquake. This will be followed by three days of talks and presentations at conference venues in Ward and Blenheim. Meeting attendees are advised to arrive in Blenheim by the 12th November, and to arrange accommodation in Blenheim for 5 nights (12th-17th November). There will also be an optional post-meeting field trip from Friday 17th - Sunday 19th November. The post-meeting field trip will start in Blenheim and finish in Christchurch.

Supported by: INQUA IFG EGSHaz

Meeting registration and abstract submission will open on the 22nd May 2017.

Abstract submission closes on the 7th July 2017

REGIONAL and NATIONAL MEMBERS

Debut of Hungarian Quaternary scientists at the INQUA Board Meeting in Budapest

Author: Enikő Magyary¹.

¹ Eötvös Loránd University, Hungary.

Hungarian researchers dealing with the events of the youngest time period in Earth history, the Quaternary, were excited to report the newest research results to members of the INQUA Executive Committee (EC) on the occasion of the second inter-congress yearly meeting held in Budapest between 3-7 March (Figure 1).

Climatic signals preserved in stalagmites, tree rings, pollen studies, Holocene sea level changes, the recession of Carpathian glaciers, palaeoenvironmental and palaeoclimate signals in loess sediments, Holocene changes in the Carpathian mountain tree and timberline were all on a carpet. Hungarian and American scientists from Debrecen, Mihály Molnár and Timothy Jolly introduced several new instruments, such as the MICADAS accelerator mass spectrometer (AMS) for ¹⁴C measurements. It is equipped with a graphite target and also with a direct gas ion source capable to measure the ¹⁴C content of tiny samples containing 0.1-0.001 mg carbon. Several other equipment planned for acquisition this year have also been shown to the audience, such as the MC-ICP-MS and the Clumped Isotope mass spectrometer. These will be used for dating stalagmites, measuring clumped isotopes in carbonate precipitates, overall leading to more precise reconstruction of paleotemperatures and other paleoclimatic parameters. Hosted by the HEKAL AMS, Isotope Climatology and Environmental Research Centre in Debrecen (Hungarian Academy of Sciences (HAS) Nuclear Research Institute), the new instruments will also be used to measure the age of ground water and infer ambient air temperatures at the time of ground water infiltration. On the whole, several promising new research directions were demonstrated.

Outstanding results of cave stalagmite stable isotope studies at the HAS Geological and Geochemical Research Institute were

demonstrated by Attila Demény. Giant speleothems are frequent in the world heritage Aggtelek Baradla Caves, from where a stalagmite dating to the Eemian interglacial has been studied recently. Stable isotope signals indicated rapid climate change ~125 ka ago in this stalagmite. Fluid inclusions were measured and suggested rapid temperature decline at that time in the Carpathian Basin connected with increasing precipitation in the winter season. This rapid climate change event was connected to ocean current changes in the North Atlantic region at the same time, and these research results warranted that the Atlantic Ocean has decisive climate regulating role in the Carpathian Basin, similarly to other, more northerly and westerly regions of Europe.

There were exciting new releases from tree ring research as well. This winter was particularly cold in the Carpathian Basin with ice flows in our major rivers, particularly damaging along the river Tisza. Such ice flows can bring tremendous giant tree trunks that are buried in alluvial deposits. Such events were frequent in the past as well, and buried trunks are numerous, sometimes becoming exposed with further incision of the river. Such buried trees have been studied by Zoltán Kern and his team at the Geological and Geochemical Research Institute and collaborating teams at several other Hungarian institutes (Eötvös Loránd University (ELTE), University of Szeged, HAS Soil Science and Agrochemistry Research Institute, HAS Geological and Geochemical Research Institute). Tree ring thickness provides information on the mean temperature of the vegetation season and in some cases also about changes in available moisture. The aim of the Hungarian scientists is to build tree ring based paleoclimate records for the Holocene. The team reported exciting new results from oak and elm trunks recently collected along the Sajó, Hernád and Mura rivers in Hungary.

Quaternary loess studies have a long tradition in Hungary. As professor Lászkó Kordos (former president of the National INQUA Committee) pointed out, one of the leading loess scientists of Hungary, Márton Pécsi, was chairing the Loess Focus group of INQUA for 14 years between 1977-1991. The thickness of loess deposits can reach 60-70 m in the basin, and accumulated dust offers exceptional possibility for paleoenvironmental and paleoclimate reconstruction. Loess research flourishes in Hungary nowadays due to the activities of several research groups, such as loess group at ELTE lead by Erzsébet Horváth and the loess research group at the Hungarian Academy Research Institutes (both Geography and Geochemistry). The milder interstadials were characterised by soil development in these loess deposits, and current research focuses on the dating of these paleosoils as Gabriella Barta demonstrated it on an Eemian and early Weichselian loess profile from Verőce. Optically stimulated luminescence dating has also been used intensively in the last decades to date loess formations in Hungary at the Geological and Geophysical Institute of Hungary, as Edit Tamó-Bozsó demonstrated. Gábor Újvári talked about the

detection of the 1000-1500 year climatic fluctuations, so called Dansgaard-Oeschger events in the Hungarian loess profiles, and their connection to the North Atlantic palaeoclimate records. Possibly the world's best dated profile is the Dunaszekcső loess, which was dated by both OSL, AMS ¹⁴C on more than 100 samples. Such high resolution chronology allowed the team to calculate loess accumulation rates and study possible leads and lags in climate in comparison with the Greenland isotope records. High amplitude climatic fluctuation resulted in considerable vegetation fluctuation in the Carpathian Basin, with steppe tundra dominance and scattered tree presence during the cold periods and mosaic taiga - steppe tundra environment during the warmer periods. These climatic fluctuations were in line with the North Atlantic region, but some DO stadials had seemingly very weak impact only in the basin.

Some exciting new releases on Holocene tree- and timberline fluctuations in the South Carpathians were demonstrated by Enikő Magyari (ELTE Quaternary Paleoecology Research Group). Glacier formed lakes are popular touristic targets in the South Carpathians, and probably the nicest of these mountain ranges is the Retezat. Lakes were formed here after glacier retreat, some 15-16 thousand years ago. Lake sediments preserve the remains of trees once growing along their shores, the chitinous larvae of non-biting midges, airborne pollen and valves of siliceous algae living in the water. These biological remains offer exceptional possibility for multi-proxy palaeoenvironmental and palaeoclimate research. Among others, the reconstruction of former tree and timberlines can be achieved. One consequence of the predicted near future warming is the upslope migration of the tree and timberline in high mountains. But what do the past warmer than present periods tell us about the amplitude of treeline and timberline fluctuation in the past 15000 years? This new research based on the study of four lakes at different altitudes suggests that timberline run 100-150 m higher than today until 3000 years ago in the Retezat. Were humans or climate causing timberline to descend? Similar studies from the Alps claim human impact (mountain grazing and connected woodland/shrub land clearance) as the primary driver of climate change around 3000 years ago, but an earlier decline around 6000 years was at least partly driven by climate change. Similar research in the Carpathians is in its infancy. Results so far suggest that climate change likely played an important role in timberline descent at 3000 years, as timberline descent predates the onset of pollen inferred human impact and coincides closely with a non-biting midge inferred July mean temperature decrease of 1.5 °C. Human impact since the Mid Iron Age likely escalated the timberline descent by clearing trees and shrubs in the treeline ecotone and thereby enlarging the extent of mountain pastures.

Further photos of the meeting: http://inqua-mnb.ggki.hu/?page_id=103



Fig. 15. Hungarian and international participants of the INQUA scientific meeting 'Quaternary Research in Hungary' (Source: Ildikó Mészáros).

5th Regional Scientific Meeting On Quaternary Geology Dedicated To Geohazards

9 – 10th November,

Starigrad-Paklenica, Croatia

Official website

The Organizing and scientific committee invites you to participate in the Meeting that will take place in a geologically attractive area with beautiful scenery. The Meeting will host the final conference of the LoLADRIA Project "Submerged Pleistocene Landscapes of the Adriatic Sea" organized by the Croatian Geological Survey.

Topics include geological hazards, Quaternary stratigraphy, sedimentology, limnology, modern and past glacial and periglacial environments, geomorphology, geoarchaeology, geoheritage and geoconservation.

Organizers: Croatian National INQUA Committee (Croatian Academy of Sciences and Arts, Department of Natural Sciences), Institute of Quaternary Palaeontology and Geology, Slovenian National INQUA Committee, Slovenian Geological Society, Geological Survey of Slovenia, Croatian Geological Survey.

Supported by: INQUA International Union for Quaternary Research, National Protection and Rescue Directorate of Croatia, Department of Geology (Faculty of Science, University of Zagreb), Faculty of Mining, Geology and Petroleum Engineering (University of Zagreb), Faculty of Natural Sciences and Engineering (University of Ljubljana), Geological Survey of Austria, Institute of Geosciences and Earth Resources (Italian National Research Council), Institute for the Dynamics of Environmental Processes (Italian National Research Council).

Field trips: The meeting will be preceded by a 3-day field trip from Slovenia to Croatia and followed by a 3-day field trip in Croatia, both covering related topics.

A – Pre-meeting field trip (6 – 8th November 2017)

Starts in Zagreb and ends in Starigrad-Paklenica (venue).

Short description of the field trip: The field trip offers insight to Quaternary sediments and processes in the southwest Slovenia and west Croatia. Geological stops will cover seismic hazards, slope processes and landslide hazard, palaeoflood sediments, glacial sediments and geomorphological features of the area. Idrija Fault Quaternary activity and its seismic hazard will be presented in Kanomlja valley. Palaeofloods and palaeovegetation history will be presented in

Renče. Quaternary slope processes, landslide hazard and geomorphological characteristics will be presented in the Vipava valley. Glacial deposits will be observed in the Gomance karst polje environment, as well as in Grobničko polje and Senjska draga. Quaternary deposits will be also observed in Bakar bay.

Leaders: P. Jamšek Rupnik, G. Monegato, C. Ravazzi, T. Popit, J. Jež, M. Žebre, R.R. Colucci, Lj. Marjanac, T. Marjanac

Physical demands: Easy walks.

Field equipment: Rain and wind gear required. Comfortable waterproof light hiking shoes recommended.

Field trip cost: 350 € (includes field trip guidebook, accommodation, transport, meals and traditional St. Martin's new wine tasting in Vipava valley).

Maximum number of participants: 25.

The program of the field trip may be subjected to changes according to weather conditions.

B – Post-meeting field trip (11 – 13th November 2017)

Starts and ends in Starigrad-Paklenica every day.

Short description of the field trip: The field trip offers insight into Quaternary glacial and marine sediments in the area of Velika Paklenica Canyon (The National Park Paklenica), southern Velebit Channel and Northern Dalmatia (Fig. 22). The Pleistocene glacial sediments and features, and recent slope deposits and hazardous events will be observed in Velika Paklenica. The Middle Pleistocene glacial sediments and palaeoenvironments will be observed at the Novigrad Sea and Karin Sea coastal sections, at coast of Ždrilo and in Northern Dalmatia. The Holocene sediments and palaeoenvironments of the Novigrad Sea and Karin Sea will be presented based on geoacoustic geophysical survey and high

resolution multiproxy analysis of long sediment cores.

Leaders: Lj. Marjanac, T. Marjanac and O. Hasan

Physical demands: easy, short walks.

Field equipment: Rain and wind gear required. Comfortable waterproof light hiking shoes recommended.

Field trip cost: 250 € (includes field trip guidebook, transport and meals). Accommodation is not included. Every participant should book extra overnights in Starigrad-Paklenica at the accommodation place during the meeting.

It is possible to register for a single day of the field trip or the whole 3 days. Look for details at the official website.

Maximum number of participants: 25.

The program of the field trip may be subjected to changes according to weather conditions.

Conference registration deadline: 1st May 2017

Field trips registration deadline: 15th May 2017

Registration fee payment deadline (for conference and field trips): 1st July 2017

Abstract submission deadline: 1st September 2017.

Registration fees

Regular participant - 100 € (registration before deadline)

Regular participant - 125 € (registration after July 15th)

Students, PhD students and postdocs - 50 € before deadline, or 65 € later

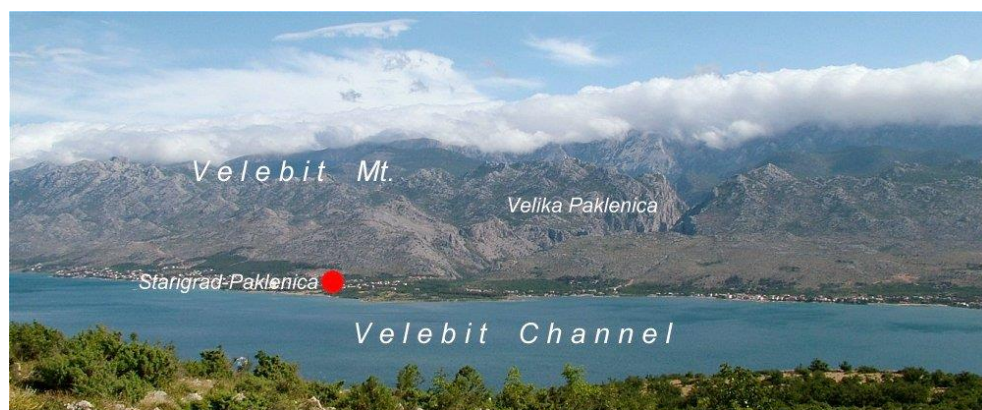


Fig. 16. Quaternary glacial and marine sediments in the area of Velika Paklenica Canyon (The National Park Paklenica), southern Velebit Channel and Northern Dalmatia

OBITUARIES

In memoriam Luc Ortlieb (1948 - 2016)



Fig. 22. Dr. Luc Ortlieb during a break of the Congress on Marine Sciences held at Universidad de Antofagasta in 2013 (photo courtesy of Valdés Saavedra).

Luc Ortlieb, renowned French Quaternary scientist of the *Institut de Recherche pour le Développement* (IRD; former ORSTOM), author and PI of invaluable research conducted on the Neotectonics and Paleoclimatology of the western coast of Mexico, Peru and Chile, has passed away in Paris on November 4th.

Dr. Ortlieb was born in Bou Izakarne, Morocco, where he lived until his teenage years. Early on he expressed his interest and scientific curiosity for arid littoral areas and their genesis. In France, young Luc studied Geological Sciences at *Université de Paris VI*, where he defended his PhD thesis (Troisième Cycle) on Plio-Quaternary formations of the western coastlands of the Sahara in 1975.

Since 1973, Luc was tied to ORSTOM-IRD for life. He initially joined on a volunteer basis, while still studying Geology. In 1976, he became a researcher for ORSTOM after receiving a job offer for a permanent position. Abroad, Dr. Ortlieb worked successfully for IRD in México between 1975 and 1981, in Perú from 1987 to 1991, and in Chile between 1991 and 1997, before returning to France to hold several IRD leading positions. We will subsequently review his Latin-American Pacific-sided adventure in chronologic order.

Ensenada, México

Vicente Ferreira particularly recalls “Lucas”, as he was named by colleagues from Ensenada (Baja California, México), arriving in an old Jeep in 1975, with a very rudimentary knowledge of Spanish, with the aim of making an inventory of the marine terraces of the Pacific and Gulf coasts of La Peninsula. At that time, Luc worked at the *Regional Station of the Northwest of the Institute of Geology*, from 1975 to 1981. Results of this work became the core of his thesis for the now extinct “Doctorat d’Etat” in Natural Sciences from *Université d’Aix-Marseille III*. The collection of mollusks he gathered through the years in Baja California was recently donated to the *Universidad de Sonora*. In México, he also actively participated in projects of geodetic measures with laser (before any GPS had appeared) and also organized the international Symposium on “*Neotectonics and sea level variations in the Gulf of California*”.

Perú (mainly prepared by IRD-Perú with contributions from José Macharé, Amanda Díaz, Thierry Calmus & Miriam Soto. And substantial contributions from IMARPE)

Dr. Ortlieb moved to Perú in 1987 with the aim of implementing a cooperative program on Neotectonics and Paleoclimatology with *Instituto Geofísico del Perú* (IGP). The agreement comprises two components: on one hand, the disentangling of the contributions of eustatic sea level changes and Quaternary tectonic uplift, along the 2000 km long coastal strip of Perú; on the other hand, the study of ENSO and particularly its past occurrences (including evidence from historic records). This pioneering research, which comprised much fieldwork, is a compulsory reference to more recent investigations, which rely on the study of coastal sand barriers, uplifted marine terraces, mollusks fossil records and ENSO evidence, as well as trying to decipher the climatic and oceanographic fluctuations of the Humboldt Current system.

Luc also spent many hours in the laboratory identifying and classifying thousands of collected fossil and modern mollusk species from Baja California. This long time consuming effort, mostly unpublished due to its extent, enabled the development of a reference collection for future investigations in Perú. In 1991, the collection was given to Universidad Ricardo Palma, which led to the creation of the Museum of Natural History of that university, which just celebrated its 25th anniversary at Luc’s passing.

Chile (taken from Dr. Jorge Valdés Saavedra)

Dr. Luc Ortlieb arrived in Chile in 1992 with a vast experience in Quaternary Geology, gathered from his previous stays in México and Perú. Luc settled in *Universidad de Antofagasta* (UA), a public institution with experience in Marine Sciences, as a basecamp to develop his ideas and form a new research program. Both objectives were fully fulfilled. As for Perú, Ortlieb was a pioneer in coastal palaeo-oceanographic investigations in Chile, making a significant contribution to the study of marine terraces of Atacama and promoting the study of fossil mollusks as evidence of climatic changes in the last millennia, as well as constructing an integrated vision on the ENSO record, based on historical accounts from both Chile and Perú.

His work at UA took place in the *Faculty of Marine Sciences and Biological Resources*, where he also advised 15 under-graduate and 6 graduate theses, and gave courses and conferences during his several years of collaboration. As for México and Perú, he built a large collection of fossil mollusks of Northern Chile, which will be made available to specialists soon.

From IRD-Paris

In recent years, Dr. Luc Ortlieb was leader of the Research Unit “Paléotropical” and also reached the Vice-Direction of the Mixed Research Unit UMR LOCEAN, which associates *Université de Paris VI* and *Museum of Natural History of Paris* with IRD. From this latter position, Luc played a major role in conceiving and rapidly implementing “CIENPERU” (“*Coastal Impacts of El Niño in Peru*”), jointly with IMARPE, during the development of the latest ENSO 2015-2016, which led to the installation of a sensor array along the Peruvian coast, as well as deployment of gliders and ARGO buoys during the advance stage of the event. The collected data is still under processing by IRD and IMARPE researchers. This collaboration with IMARPE had been set on by Ortlieb since the turn of century through diverse projects and creation of International Mixed Laboratories (e.g. LMI “DISCOH”). In that way, he was IRD co-PI of the project ‘PALEOPECES’, whose objective was to perform palaeo-oceanographic and palaeo-ecological research of the last-Millennium marine sediments of the continental margin of Perú in order to shed light on the natural fluctuations of fish populations along coastal outcrops. Likewise, he was behind other

collaborative initiatives, such as the projects “PALEOCONCHAS”, el LMI “PALEOTRACES” and the young team “MIXPALEO”, among others, in which IMARPE was also participating.



Fig. 23. Dr. Luc Ortlieb in Paracas, Southern Perú. This is how the translator remembers him during fieldwork (Photo courtesy of Miriam Soto).

his friendship. Our future work and development will keep that memory alive. His Peruvian colleagues add that Luc Ortlieb, in the best of the scientific tradition of France, was a naturalist, with a holistic vision of knowledge, complemented with a rigorous and reflective character. Last but not least, we would like to stress that his integrity, generosity and simplicity made him much loved by his peers, disciples and students.

Dr. Ortlieb’s legacy is much assured with the Latino-American “legions” of younger enthusiastic colleagues he formed both formally (graduate and undergraduate levels) and informally, along the long coastal way he pursued to understand the Recent Geology of the raised Pacific coastlands of Northern and Southern America. This conviction is shared by Vicente Ferreira (Mexico), Jorge Valdés Saavedra (Chile) and his Peruvian colleagues from IMARPE, IRD, IGP and other institutions, as well as by the translator of this obituary, who shared with Luc a short incursion along the Southern Caribbean coasts of Venezuela. During Audemard’s PhD fieldwork, Luc was invited to provide advice on the Quaternary tectonics of marine landforms and formations of Paraguaná and Eastern Falcón coasts. Beside his scientific rigor and field observational skills and experience, Audemard recalls from him his heavy smoking of Venezuelan havano-type “puros”, accompanied by frequent drinking of dark black Italian-Expresso coffee, while walking torso-naked in shorts and sandals along beaches and marine terraces.

As indicated by Valdés Saavedra, Luc’s legacy has gone beyond science, because all those who had the luck of sharing work with him have learnt that human relationships are a cornerstone in scientific collaboration. In that sense, a cooperation network, to which he was influential and gave his unselfish contribution, is currently established, comprising friends and colleagues from France, Mexico, Perú, Brazil and Chile.

Those of us who have met and worked with Luc keep a great memory of his scientific and human qualities, his commitment, his concern for our wellbeing, his love for deserts and

- <http://www.peru.ird.fr/toda-la-actualidad/vida-del-instituto/falecimiento-de-luc-ortlieb-investigador-emerito-del-ird-1948-2016>

(with the help of José Macharé, Amanda Díaz, Thierry Calmus and Miriam Soto).

- <http://www.comunicacionesua.cl/2016/11/08/en-memoria-de-luc-ortlieb-1948-2016/>

by Dr. Jorge Valdés Saavedra (Facultad de Ciencias del Mar y Recursos Biológicos, Universidad de Antofagasta, Chile)

- Obituary by IMARPE, Perú (in pdf format).

Caracas, December 2016.

Free collage and free translation into English by
Franck A. Audemard M.
 (Vice-President INQUA,
 2011-2015 and 2015-2019;
 FUNVISIS, 1986-to present)

OTHER NEWS

"Landscape and Quaternary Environmental Change in New Zealand" edited by J. Shulmeister (2017)

Volume 3 of *Atlantis Advances in Quaternary Science* published by Atlantis Press in conjunction with Springer (334 pp.)



DOI: 10.2991/978-94-6239-237-3

Hardcover ISBN: 978-94-6239-236-6 eBook ISBN: 978-94-6239-237-3

Reviewed by David J. Lowe¹.

¹School of Science, University of Waikato, Private Bag 3105 Hamilton 3240, NEW ZEALAND (david.lowe@waikato.ac.nz).

James Shulmeister (University of Queensland) has assembled and edited an excellent new book about New Zealand's Quaternary – arguably one of the most interesting and informative places for such a study on the planet. After a preface/editorial by Shulmeister about New Zealand's attractiveness and uniqueness as a dynamic 'natural laboratory' of international significance, and the rationale behind its gestation, development, and publication, the book comprises nine substantial thematic chapters written by hand-picked authors – many of whom are among the best, if not *the* best, in the business – that cover a range of compelling topics accessing the latest techniques and findings:

1. Quaternary tectonics of New Zealand (NZ)
2. The southern end of the Pacific Ring of Fire: Quaternary volcanism in NZ
3. The climate of NZ through the Quaternary
4. Quaternary stratigraphy of Wanganui Basin: a globally significant archive
5. Blowing on the west wind: the most recent Quaternary glaciation of NZ
6. Mountain process geomorphology: conceptual progress in the Southern Alps
7. Evolution and ecological change during the NZ Quaternary
8. The human landscape: population origins settlement and impact of human arrival in Aotearoa/NZ
9. Adrift in the Anthropocene.

The chapters are mightily impressive. That there are 'only' nine is not limiting (although Shulmeister acknowledges that other topics, notably the evolution of the loess/soil record for example,

could readily have warranted additional chapters). All the chapters show depth of understanding and insight, highlight new directions, and cross disciplinary boundaries, bringing new techniques and ideas to bear on long-standing and newly-identified problems, sometimes from refreshingly unexpected angles. They are well written and illustrated, comprehensively referenced, and, somewhat unusually for a book format, include informative abstracts.

This book is therefore a very welcome and timely addition to the literature. It nicely complements the profusely-illustrated second edition of "A Continent on the Move: NZ Geoscience Revealed" (ed I. Graham) that was published in December 2015, and matches an impressive surge of high-quality Quaternary-focussed research in the journal literature over the past decade or so by New Zealand and Australian researchers. Such a surge may well relate at least in part to the impetus provided by the advent and completion of the Australasian INTIMATE project, the benchmark INQUA Cairns congress (2007), and the growing strength and dynamism of the community making up the Australasian Quaternary Association (AQUA).

"Landscape and Quaternary Environmental Change in New Zealand" has something for everyone, not just Quaternarists, and will be informative and useful both for New Zealand-based geoscientists (especially graduate students) and geanthropologists, and for numerous others in nearby Australia and around the globe who are interested in the topics encapsulated and exemplified so well in the book.

GeoBremen 2017

September 24 – 29, 2017

Bremen, Germany

[Website](#)

GeoBremen 2017, organized by the Deutsche Mineralogische Gesellschaft (DMG) and the Deutsche Geologische Gesellschaft – Geologische Vereinigung (DGGV), will provide a multidisciplinary stage with a focus on the exciting themes and topics of the Earth and Material Sciences of the 21st century.

From seafloor to summit, from the Harz Mountains to the Himalayan, from geology to oceanography, from petrology to mineralogy, from inorganic geochemistry to geobiology, from low to high temperatures and pressures, from the crust to the core, from the field to the lab, and from the Earth to the stars, we expect exciting scientific contributions, hot discussions, and new ideas.

We welcome you to participate and are looking forward meeting you in Bremen in September 2017!

Open Quaternary

Open Quaternary is now looking for submissions for publication in 2017. After a successful 2016 (seeing over 17,200 pages views) and article views/downloads now totaling over 16,000, we've started the year with some excellent new publications. The broad scope of the journal covers a range of specialisms such as paleoecology, palaeolimnology, geomorphology, palaeoclimatology, palaeobotany, palynology, vertebrate and invertebrate palaeontology, zooarchaeology, geoarchaeology, biological anthropology and Palaeolithic archaeology. Open Quaternary is published by Ubiquity Press and is the only gold open-access, online journal publishing Quaternary science.

We are also inviting proposed special issues and guest editors to publish themed collections of articles in the future. Should you have a suggested theme, conference proceedings, or existing collection of research output then please get in touch and we can discuss the options available.

We welcome submissions via our journal website, openquaternary.com

We're also looking to expand our existing editorial board. If you are interested in joining the journal then please get in touch. In addition to expanding the current geographical base of our members, we're particularly interested to hear from: geomorphologists, geochronologists, palaeoclimatologists.

Finally, we are recruiting a new member of the editorial team to help manage day to day activities, with a focus on our social media and blog accounts. If you're social media savvy and would like to help the team develop the journal and increase its impact then we'd love to hear from you.

Applications for both the editorial board and the media editor should be made by Monday 3rd April by contacting the journal email, editor@openquaternary.com, with your name, affiliation and brief summary of interests/ongoing research.