

Quaternary Perspectives



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The first INQUA-PAGES Conference for Early-Career Researchers 2018:

ISLR18: Impacts of sea-level rise from past to present



Fig. 1. Marie-France Loutre (PAGES Executive Director) and Allan Ashworth (INQUA President) at the ISLR18 meeting 'Impacts of Sea-Level rise from past to present'. The meeting in Utrecht, The Netherlands, brought together early career researchers from 23 countries studying various aspects of sea-level rise. This was the first meeting directly co-sponsored by INQUA and PAGES and led by ECR's from both organizations. The meeting was a great success and provides a model for how both organizations can serve the Quaternary community.

In 2018, the INQUA conference for early-career researchers (ECR) was held from Sunday 26 to Wednesday 29 August at Utrecht University, the Netherlands. This conference was the first meeting directly co-sponsored in a joint effort by [INQUA](http://www.inqua.org) and [PAGES](http://www.pages.org), with the title 'ISLR18: Impacts of sea-level rise from past to present' (Fig. 1).

This event brought together more than 70 ECR delegates from 23 countries, to showcase worldwide research in a broad range of disciplines working with sea-level change (Fig. 2).



Fig. 2. ISLR18 official conference photo.



Fig. 3. Local ECR Committee ISLR18.

The organisation of the conference was led by a local committee of ECRs: Aimée Slangen (NIOZ, Utrecht University), Kay Koster (Geological Survey of the Netherlands), Bas de Boer (IMAU, Utrecht University), Robert Barnett (University of Exeter), Xavier Benito (National Socio-Environmental Synthesis Center) and Eduardo Alarcón (UCV) (Fig. 3), and included renowned academics from the Netherlands, INQUA, and PAGES.

The 'ISLR18' meeting started with an ice-breaker in the Botanical Gardens at Utrecht University. The main event included two days of oral and poster presentations by ECRs and invited keynote lectures (Fig. 4) in four different sessions: 'Past sea-level changes', 'Recent and future sea-level changes', 'Mitigation, adaptation and coastal impacts' and 'Submerged landscapes'. Two extra activities included a one-day field trip to the Rhine delta and Holland coastal plain, and a successful public event on 'Science and Society'. The public event attracted over 140 attendees from the scientific community, which facilitated a wonderful opportunity to showcase the consequences of sea-level rise for the Netherlands and elsewhere in the world, and how these changes are managed.



Fig. 4. Public and Society Event opening Prof. Dr. P. Hoekstra.

The conference 'ISLR18: Impacts of sea level rise from past to present' was an international collaboration by INQUA and PAGES, with support from Utrecht University, and cooperation from TNO - Geological Survey of the Netherlands, NIOZ, TU Delft, NESSC, Deltares, and the University of Leiden. Photos and details of the event can be found on the webpage: www.islr18.org.

Eduardo Alarcon, Chair of the INQUA ECRCommittee

INQUA at ISC

INQUA is a member of the International Science Council (ISC) which formed in 2017 with the merger of the International Council for Science (ICSU) and the International Social Science Council (ISSC). In early July, I represented INQUA as chair of a GeoUnions meeting hosted by Nicolas Paparoditis, director of research labs of MATIS (French Mapping Agency - IGN) in St-Mandé, Paris. INQUA is one of [nine scientific unions](#) with shared interests in the earth and its position in space. Research fields include astronomy, cartography, geology, geophysics, geography, geodesy, radio sciences, remote sensing, and soil sciences. The meeting was held in conjunction with ISC, the parent organization, to discuss issues of shared interest. At the meeting we reviewed the credentials of nominees for the new ICS governing board and also discussed possible ways in which we could collaborate on proposals to address selected UN Sustainable Development Goals (SDGs).



Fig. 5. Participants in the GeoUnions meeting in Paris from left to right: Ando Makoto (URSI), William Cavazza (IUGS), Rainer Horn (IUSS), Lena Halounova (ISPRS-cochair), Nathalie Lemarchand (IGU), Menno-Jan Kraak (ICA), Melody Burkins (NAS), Yukio Himiyama (IGU), Allan Ashworth (INQUA), Orhan Altan (ICSU), Michael Sideris (IUGG), Quiming Cheng (IUGS), Alik Ismail-Zadeh (IUGG – Secretary of ISC), Nicolas Paparoditis (ISPRS – host), Piero Benvenuti (IAU), Theresa Lago (IAU).

The founding general assembly for ISC was held in Paris on 3-5 July, at the Maison des Océans. In attendance were delegates from 40 international scientific unions as well representatives from national academies of sciences and research councils (Fig. 5). The meeting was lively with discussion on several membership and governance issues. A governing board and a new president and president-elect were elected. The new president is Daya Reddy (South Africa – computational mechanics) and the president-elect Peter Gluckman (New Zealand – physiology). There was a strong slate of geoscientists and environmental scientists running for various positions and the outcome was that four of the ten positions on the new governing board have backgrounds in Quaternary-related sciences; Geoffrey Boulton (UK) is a glacial geologist, Melody Burkins (USA) has a background in Quaternary science, Martin Visbeck (Germany) is an Oceanographer, and Anna Davis (Ireland) is an environmental scientist. Additionally, the new Secretary for ICS is Alik Ismael-Zadeh (Germany), a theoretical geophysicist and former chair of the GeoUnions.

ISC, representing the physical, biological, and social sciences, has the potential to become a strong spokesman for science to organizations like the United Nations. In its own words it will focus on: (1) Science-for-policy to stimulate and support international scientific research and scholarship, and to communicate science that is relevant to international policy issues; (2) Policy-for-science to promote developments that enable science to contribute more effectively to major issues in the international public domain; (3) Scientific freedom and responsibility to defend the free and responsible practice of science.

Allan Ashworth, INQUA President

Coastal and Marine Processes

MOPP-Medflood - 1603P

Project Leaders: Matteo Vacchi (University of Exeter, UK), Sara Biolchi (University of Trieste, Italy), Alessio Rovere (University of Bremen, Germany), Giovanni Scicchitano (Studio Geologi Associati, Italy).

HOLSEA - 1601P

Project Leaders: Nicole Khan (Nanyang Technological University, Singapore), Erica Ashe (Rutgers University, USA), Benjamin Horton (Nanyang Technological University, Singapore), Robert Kopp (Rutgers University, USA).

Joint MOPP-Medflood/HOLSEA meeting

Siracusa, Sicily, Italy, 22-24 September 2018.

Authors: M. Vacchi¹.

¹University of Exeter, UK.

The 1st Joint MOPP-Medflood/HOLSEA meeting took place in southern Sicily (Italy) in the scenic landscape surrounding of the city of Siracusa (Fig. 6). The idea to jointly organize the meeting was conceived to increase the possible aspects of collaboration between the two projects, which have complementary aims.

In the last two years, MOPP-Medflood significantly enlarged its community by encouraging the participation of experts in coastal geomorphology and geo-archaeology as well as engineers and hydrodynamic modellers. The major aim of MOPP-Medflood is to define strategies adopted since antiquity to design coastal structures, considering not only the palaeo-geomorphology of the coastal area but also the palaeo-coastal hydrodynamics obtained through numerical modelling of palaeo-nearshore processes. A further aim is to provide new approaches to better reconstruct the historical impacts of major coastal changes and catastrophic coastal events (such as major storms or tsunamis) along the Mediterranean.

The overarching goal of the Geographic variability of HOlocene relative SEA level (HOLSEA)

working group is to produce a global synthesis of Holocene relative sea-level data using a common and standardized framework. Over the life of the project, the group has been successful in soliciting submissions to a special issue of Quaternary Science Reviews, entitled "Inception of a Global Atlas of Sea Levels since the Last Glacial Maximum" that should be published near the end of 2018. The special issue will present the first iteration of a global database compiled within a standardized way. Of significant importance to the reconstruction of relative sea level is the interpretation of an indicators relationship to sea level at the time in which the feature formed. This relationship is intrinsically related to coastal processes under consideration of the MOPP-Medflood group.

The coastal landscape of Siracusa contains an abundance of sea-level indicators and evidence of past high energy events. This facilitated conversation about archiving and interpretation of these features. In fact, this area has been continuously settled since the Neolithic period (~7 ka BP) and has experienced major development since 2.7 ka BP, notably during the Hellenistic and Roman periods. Furthermore, geomorphic, archaeological and sedimentary evidence of both relative sea level changes and high energy wave events are reported in this sector of the Sicilian coast. The meeting, coordinated by Dr Matteo Vacchi and Dr Giovanni Scicchitano, was structured over three days, and consisted of field activities and workshops (Fig. 7). The 26

participants were mostly ECRs coming from Italy, USA, Canada, New Zealand, Germany, UK, Slovenia, Cyprus and Turkey.

The first field day was developed in collaboration with the IGCP Project 639 "Sea-Level Change from Minutes to Millennia." The participants visited several coastal sites between the towns of Siracusa and Marzamemi. In the morning, the group observed large boulder accumulations that demonstrate the effects of multiple tsunami inundations occurring over the last two millennia on the Maddalena peninsula. In the afternoon, the group moved to the area of Marzamemi, where the evidence of tsunami flooding could also be observed in the cores collected from coastal lagoons. The remaining part of the day was dedicated to measuring underwater archaeological quarries from the hellenistic period and their possible use to reconstruct the sea-level evolution over historical timescales.

The second day was entirely dedicated to the site of Ognina, a stunning location of major archaeological importance that has been continuously settled since the Neolithic period. In the morning the participants travelled by boat to a small islet where evidence of Bronze Age occupation is still present. There, the meeting leaders Matteo Vacchi and Giovanni Scicchitano introduced the best practices and the open issues related to the use of archaeological markers for sea-level reconstructions. In addition, the leaders demonstrated a series of practical examples of data acquisition (e.g. drone photogrammetry and georadar) in this geomorphic setting.

The first part of the afternoon was dedicated to the stratigraphic analysis of high energy deposits found at the bottom of the narrow fjord of Ognina. A trench was opened by the participants and the accurate description of the different sedimentary horizons was performed under the guidance of Dr Jessica Pilarczyk (University of Southern Mississippi), an expert in sedimentary signatures of extreme waves. This activity was followed by the HOLSEA workshop, where the participants had the possibility to extensively discuss recent progress in the global synthesis of Holocene relative sea-level data. The workshop, led by Dr



Fig. 6. Participants of the joint MOPP-Medflood/HOLSEA meeting.

Keven Roy (Earth Observatory of Singapore), focused on recent advancements in glacio-isostatic adjustment (GIA) modelling techniques and on open questions related to the variability of Holocene RSL changes at a global scale. The second day ended with a dinner where the participants had the opportunity to taste local food in a typical Sicilian restaurant.

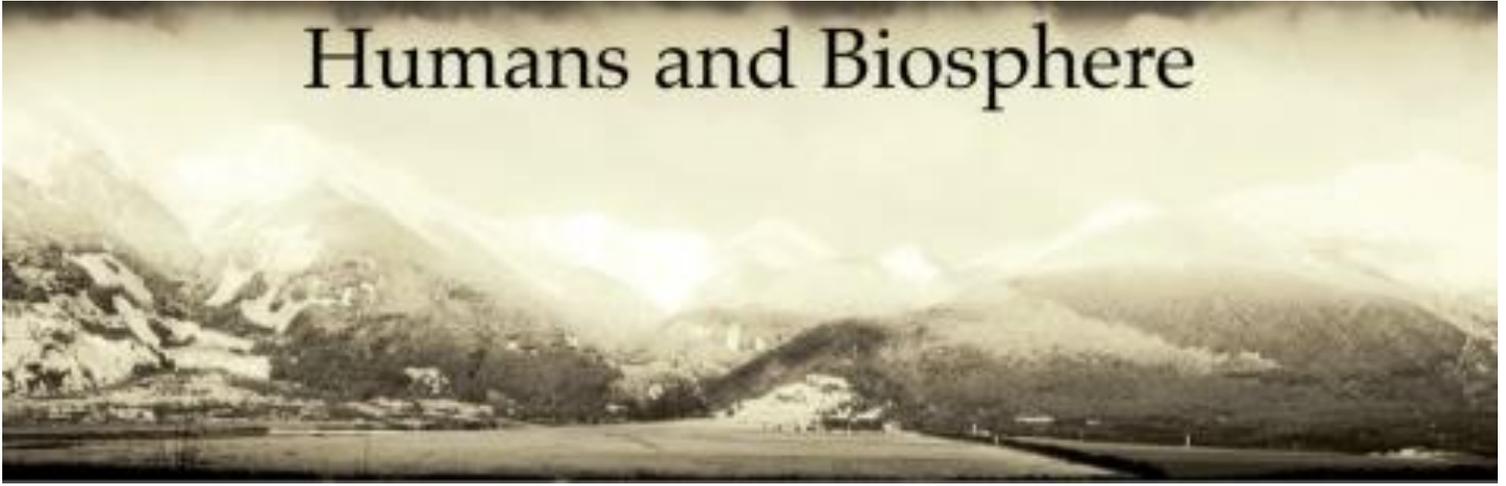
On the third day, the ECRs attending the meeting presented their PhD and MSc projects in the beautiful venue of the Marine Protected area of Plemmirio, in the centre of historical Siracusa. The workshop, convened by Dr Giovanni Scicchitano, provided an opportunity to discuss different aspects of palaeo coastal processes with examples that ranged from the Mediterranean to oceanic coasts.



Fig. 7. Participants of the meeting during the excursion.

Overall, the joint MOPP-Medflood and HOLSEA meeting was successful in significantly broadening the topics of discussion of both projects. The meeting provided a strong basis for future collaborations and partnership among the participants.

Humans and Biosphere



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

Project Leaders: Lilia Popova (Taras Shevchenko National University of Kyiv, Ukraine), Lutz Christian Maul (Senckenberg Research Institute, Research Station of Quaternary Palaeontology, Weimar, Germany).

Contact: liliapopovalilia@gmail.com

Events of 2018

Authors: L. Popova¹, L. C. Maul², P. Pazonyi³
¹Taras Shevchenko National University of Kyiv, Ukraine, ²Senckenberg Research Institute, Research Station of Quaternary Palaeontology, Weimar, Germany, ³Hungarian Academy of Sciences-Hungarian Natural History Museum-Eötvös Loránd University.

The Ground Squirrel Story: 3 years of research on geographical barriers, expansion, and speciation in the Quaternary of the Circum-Pontic area and surroundings.

Workshop coordinated by Piroska Pazonyi, Hungarian Natural History Museum (HNHM)

Budapest (Hungary), 8-11 May 2018.

This meeting was especially fruitful in discussing palaeo-geographical issues, and we achieved the answer to a thorny question on the absence of the expected isolating effect of great rivers in case of the Danube River (Fig. 8). On the example of the Quaternary evolution of this river (the report and the part of the field excursion has been led by Krisztina Sebe), participants were introduced to the main patterns of the river history influenced by tectonic subsidence, and in the opportunities for expansion opened by such a tectonic situation. Other reports were devoted to the Early Pleistocene Dniester River (Bogdan Ridush), and to the lithological features of soils as important constraints for expansion of both biota and humans (Yuriy Veklych).

Another important success of the meeting was the emergence of a new barrier-sensitive group on the horizon of the project: mole-rats (reports by Attila Németh; Igor Zagorodniuk).

Humans as barrier-sensitive group have always been in focus, both for HABCOM and for METHOD (Modelling Environmental Dynamics and Hominin Dispersals Around the Mid-Pleistocene Revolution), the research group linked to our project. This meeting allowed the exchange of ideas and results of the both research teams, and was the focus of the Agent Based Modelling (ABM) section, where Ericson Hölzchen guided the participants through general aspects of ABM applications in the study of species expansion.

An impromptu training session was conducted by Attila Virág on the application of landmark analysis in recent and fossil ground squirrels (report of Piroska Pazonyi, Attila Virág). Together with data on the phylogeographic and population genetic structure of the Pannonian ground squirrel populations, which were also discussed during the meeting (the talk of Levente Laczkó), results of landmark analyses are expected to reveal geographic pathways of Central European ground squirrel species expansion and the role of the Carpathian Basin as a refuge area during the Pleistocene, as well as new results about the taxonomic status and phylogenetic relations of the extinct *S. citelloides*.

Another problem we tried to untangle during the meeting was the relationship between the most ancient ground squirrel species in Europe (*S. primigenius*, *S. nogaici*, and *S. polonicus*). The question is much more complex than the previous one, simply because of wider geographical and stratigraphical ranges. Presentations of Maxim Sinitsa and Lilia Popova contributed to solving this problem.

The field of ecology and ethology of ground squirrels was presented by Olivér Váczai, Zoltán Barkaszi, Arlet Ulbricht, and Attila Németh.

Along with reports, participants had the opportunity to visit the Palaeontological and Mammalian Collections of the HNHM, and its exhibition. A one-day field excursion on 10 May

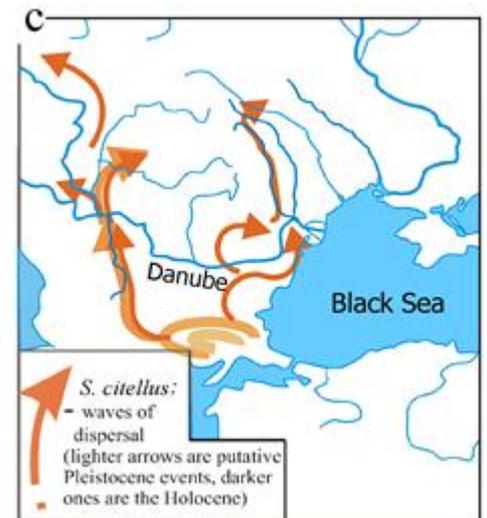


Fig. 8. Surprisingly, for the extant ground squirrel *S. citellus*, the Danube has never been an obstacle (for an overview see Popova et al., 2018). The same was obviously the case for the extinct *S. citelloides*.

2018 was a highlight of the meeting. We enjoyed the chance to observe a colony of European ground squirrel that occupy an area on the modern Danube flood-plain. It was of high importance to watch recent Danube channel changes presented spectacularly in the Town Museum of Parks. This creates the sense of presence at an event of the overcoming of a great river barrier by a ground squirrel population.

To sum up, the meeting in the frame of the "Ground Squirrel Story" brought together researchers from Hungary, Germany, Ukraine, Czech Republic, Russia, and Poland, and among them, 10 ECRs. In all, 24 presentations were made, which show that three years of project life have resulted in creation of an effective multidisciplinary team. During this meeting, a real co-operation between palaeo-zoologists and palaeo-geographers has begun; the list of barrier-sensitive species is expanding, and the scientific outcomes of our cooperation give us material to work on for several years to come. One national project devoted to the study the Pleistocene ground squirrel is already up and running (Czech

Republic), and other applications are currently being developed.

An optimistic view on the future of the “Ground Squirrel Story” is reflected by the following short information about the last event of the project – the NICHE workshop.

NICHE - a working meeting coordinated by Leonid Rekovets, National Museum of Natural History NAS of Ukraine.

Kyiv, Ukraine, 11-15 September 2018.

The format and foci of this meeting included joint studies on the correspondence of morphology and trophic niche in extinct species, which provided ample opportunities for the exchange of data, expertise and ideas (Fig. 9).

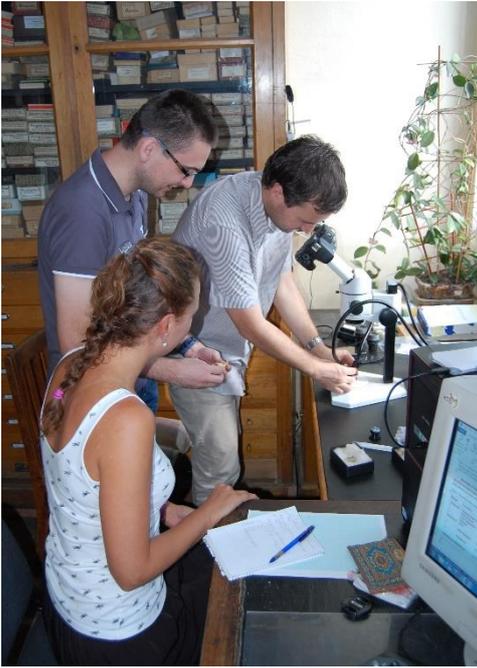
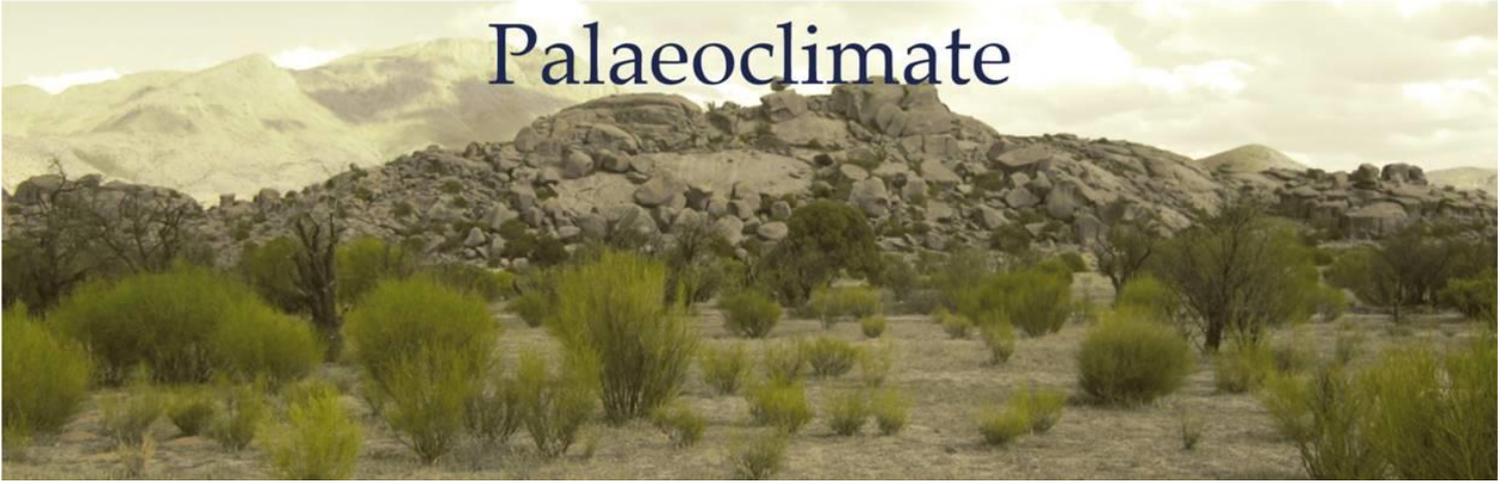


Fig. 9. Early carrier researchers – participants of NICHE workshop in National Museum of Natural History, Kyiv.

References

Popova L.V., Maul L.C., Zagorodniuk I.V., Veklych Y.M., Shydlovskiy P.S., Pogodina N.V., Strukova T.V., Parfitt S.A. (2018). Good fences make good neighbours’: Concepts and records of range dynamics in ground squirrels and geographical barriers in the Pleistocene of the Circum-Black Sea area. *Quaternary International*, doi.org/10.1016/j.quaint.2018.03.023.

Palaeoclimate



A forward modeling approach to palaeoclimatic interpretation of peat cores - 1801P

Project Leaders: Julie Loisel (Texas A&M University, USA), Angela Gallego-Sala (University of Exeter, UK), Atte Korhola (University of Helsinki, Finland).

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Report on a joint PAGES-INQUA meeting of the C-PEAT working group

College Station Texas, USA, 10-13 May 2018.

Authors: J. Loisel¹, A. Gallego-Sala²

¹Texas A&M University, USA; ²University of Exeter, UK.

C-PEAT (Carbon in Peat on Earth through Time) is a PAGES working group that works in synergy with INQUA. Over the past few years, C-PEAT has developed a large database containing over 500 peat records that have been primarily used to reconstruct Holocene carbon sequestration rates across the northern peatland domain, and connect centennial- and millennial-scale changes in carbon sequestration rates to key climatic forcings and environmental controls (e.g. Charman et al., 2012; Loisel et al., 2014; Treat et al., 2015; Gallego-Sala et al., 2018). C-PEAT is in the process of making its entire peatland database available on WDS-PANGAEA; 164 sites are readily available under the project name PAGES_C-PEAT. An article in Earth System Science Data, describing the entire database, is also in development.

A total of 17 members of the C-PEAT working group met at Texas A&M University in May 2018 (Fig. 10). The meeting's emphasis was on: (1) discussing future research directions for C-PEAT, and (2) developing a framework to make peatlands a more prevalent climate archive. The peat core synthesis work that has been accomplished by the C-PEAT working group over the past five years could be used to complement other widely used terrestrial archives such as tree rings, ice cores, and lake sediments. In addition, peatlands are abundant and easy to access, making them important yet undervalued archives for past

environmental change. However, peat-core-based palaeoenvironmental records remain widely under utilised by the palaeo community, in part because there are some knowledge gaps in terms of how proxies get encoded within the peat matrix, and how sensitive those proxies are to external vs internal forcing mechanisms.

An array of traditional and novel peat-based proxies for temperature and hydrology were discussed in detail during the meeting. Of particular interest to the C-PEAT group are combinations of compound-specific stable isotope measurements that could be used to back-calculate changes in rainfall regimes (presentations led by Jonathan Nichols and Dan Charman). The novel use of organic biomarkers from peat such as GDGTs, which are sensitive to temperature and pH, or that of amino acids such as hydroxyproline that can provide insight into the carbon cycle, were also discussed (presentations led by Jerome Blewett and Michael Philben). New spins on more "classic" peat-based proxies such as plant macrofossils and testate amoebae were presented and included the use of plant communities to reconstruct changes in peatland nutrient status and the use of testate amoebae functional traits to reconstruct specific variables such as disturbance (presentations by Atte Korhola and Simon van Bellen). The integration of such proxies into process-based peat models such as DigiBog (Baird et al., 2012) and the Holocene Peat Model (Frolking et al., 2010) would further help us understand the encoding of these proxies into the peat matrix over time (presentations led by Andy Baird and Claire Treat). Last but not least, the current omission of peatlands from all CMIP5 Earth System Models (ESM) was highlighted and discussed (presentation led by Thomas Kleinen). As ESMs become more complex and integrate elements of disturbance (e.g. fire and permafrost thaw) as well as changes in land use, the role of peatlands as C hotspots, nutrient mediators, sediment suppliers to the oceans, and food, fibre, and fuel providers will have to be integrated (presentations led by Phil Camill and Sakonvan Chawchhai).

In addition to improving and promoting multi-proxy peatland records as palaeoclimatic archives, the C-PEAT community will focus its future efforts on expanding the peatland database to encompass



Fig. 10. Workshop discussions.

sites from the tropics and extra-tropics, as well as predicting peatland responses to natural and anthropogenic disturbance. Workshop participants are preparing a manuscript that addresses these new research directions and highlights the relevance of peatland dynamics in land surface models.

Lastly, take note of C-PEAT's proposed session at INQUA 2019 (Dublin, Ireland): Peatland dynamics through time: from low to high latitudes.

References

- Baird A.J., Morris P.J., Belyea L.R. (2012). The DigiBog peatland development model. 1: rationale, conceptual model, and hydrological basis. *Ecohydrology* 5, 242-255, doi: 10.1002/eco.230.
- Charman D., Beilman D., Blaauw M., Booth R.K., Brewer S., Chambers F., Christen J.A., Gallego-Sala A.V., Harrison S.P., Hughes P.D.M., Jackson S., Korhola A., Mauquoy D., Mitchell F., Prentice I.C., van der Linden M., De Vleeschouwer F., Yu Z., Alm J., Bauer I.E., McCorish Y., Garneau M., Hohl V., Huang Y., Karofeld E., Le Roux G., Loisel J., Moschen R., Nichols J.E., Nieminen T.M., MacDonald G.M., Phadtare N.R., Rausch N., Sillasoo Ü., Swindles G.T., Tuittila E.-S., Ukonmaanaho L., Väliranta M., van Bellen S., van Geel B., Vitt D., Zhao Y. (2013). Climate-related changes in peatland carbon accumulation during the last millennium. *Biogeosciences* 10, 929-944, doi: 10.5194/bg-10-929-2013.

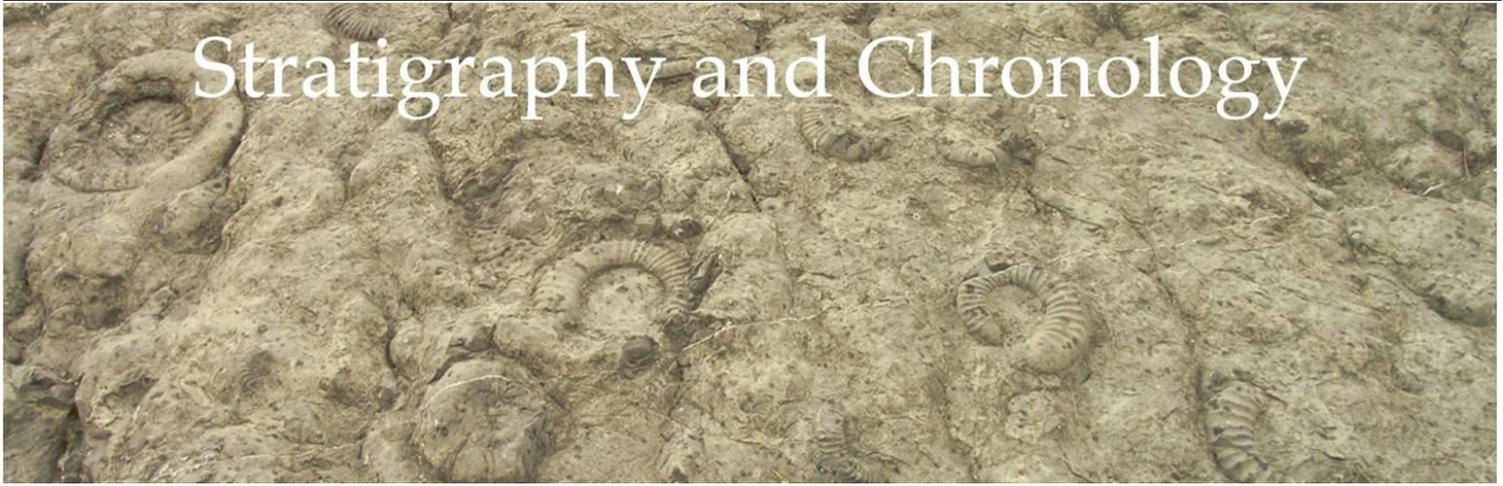
Frolking S., Roulet N.T., Tuittila E., Bubier J.L., Quillet A., Talbot J., Richard P.J.H. (2010). A new model of Holocene peatland net primary production, decomposition, water balance, and peat accumulation. *Earth Systems Dynamics*, doi: 10.5194/esd-1-1-201.

Gallego-Sala A.V., Charman D.J., Brewer S., Page S.U., Prentice I.C., Friedlingstein P., Moreton S., Amesbury M.J., Beilman D.W., Björck S., Blyakharchuk T., Bochicchio C., Booth R.K., Bunbury J., Camill P., Carless D., Chimner R.A., Clifford M., Cressey E., Courtney-Mustaphi C., De Vleeschouwer F., de Jong R., Fialkiewicz-Koziel B., Finkelstein S.A., Garneau M., Githumbi E., Hribljan J., Holmquist J., Hughes P.D.M., Jones C., Jones M.C., Karofeld E., Klein E.S., Kokfelt U., Korhola A., Lacourse T., Le Roux G., Lamentowicz M., Large D., Lavoie M., Loisel J., Mackay H., MacDonald G.M., Makila M., Magnan G., Marchant R., Marcisz K., Martínez Cortizas A., Massa C., Mathijssen P., Mauquoy D., Mighall T., Mitchell F.J.G., Moss P., Nichols J., Oksanen P.O., Orme L., Packalen M.A., Robinson S., Roland T.P., Sanderson N., Sannel B., Silva-Sánchez N., Steinberg N., Swindles G.T., Turner T.E., Uglow J., Väiranta M., van Bellen S., van der Linden M., van Geel B., Wang G., Yu Z., Zaragoza-Castells J., Zhao Y. (2018). Latitudinal limits to the predicted increase of the peatland carbon sink with warming. *Nature Climate Change*, doi: 10.1038/s41558-018-0271-1.

Loisel J., Yu Z., Beilman D.W., Camill P., Alm J., Amesbury M.J., Anderson D., Andersson S., Bochicchio C., Barber K., Belyea L.R., Bunbury J., Chambers F.M., Charman D.J., De Vleeschouwer F., Fialkiewicz-Koziel B., Finkelstein S.A., Galka M., Garneau M., Hammarlund D., Hinchcliffe W., Holmquist J., Hughes P., Jones M.C., Klein E.S., Kokfelt U., Korhola A., Kuhry P., Lamarre A., Lamentowicz M., Large D., Lavoie M., MacDonald G.M., Magnan G., Mäkilä M., Mallon G., Mathijssen P., Mauquoy D., McCarroll J., Moore T.R., Nichols J., O'Reilly B., Oksanen P., Packalen M., Peteet D., Richard P.J.H., Robinson S., Ronkainen T., Rundgren M., Sannel A.B.K., Tarnocai C., Thom T., Tuittila E.-S., Turetsky M., Väiranta M., van der Linden M., van Geel B., van Bellen S., Vitt D., Zhao Y., Zhou W. (2014). A database and synthesis of northern peatland soil properties and Holocene carbon and nitrogen accumulation. *The Holocene* 24, 1028-42, doi: 10.1177/0959683614538073.

Treat C.C., Jones M.C., Camill P., Garneau M., Gallego-Sala A., Harden J.W., Hugelius G., Klein E.S., Kokfelt U., Kuhry P., Loisel J., Mathijssen P.J.H., O'Donnell J.A., Oksanen P.O., Ronkainen T.M., Sannel A.B.K., Talbot J., Tarnocai C.M., Väiranta M. (2015). Effects of permafrost aggradation on peat properties as determined from a pan-arctic synthesis of plant macrofossils. *Journal of Geophysical Research – Biogeosciences* 121, 78-94. doi: 10.1002/2015JG003061.

Stratigraphy and Chronology



International Focus Group on Tephrochronology and Volcanism - INTAV

Project leader: David J. Lowe (University of Waikato, New Zealand)

Report on the INTAV international tephra conference "Crossing New Frontiers: Tephra Hunt in Transylvania"

Moieciu de Sus, Romania, 24 June-1 July 2018.

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The International Focus Group on Tephrochronology and Volcanism (INTAV) held a tephra conference, "Crossing New Frontiers: Tephra Hunt in Transylvania", at Moieciu de Sus, near Braşov in the southern Carpathian Mountains of Transylvania, Romania, from 24 June to 1 July, 2018. INTAV is a long-standing (from 1961) global tephra research group active within the Stratigraphy and Chronology Commission (SACCOM) of INQUA. It organises specialist tephra meetings every four years or so on average, although the most recent meeting (before this one in Romania) was in 2010 in Kirishima, Japan. The Romanian tephra meeting was convened by Daniel Veres (Romania) and Ulrich Hambach (Germany), together with support from the INTAV executive committee of Britta Jensen (Canada), Peter Abbott (UK/Switzerland), Takehiko Suzuki (Japan), Siwan Davies (UK), and David Lowe (New Zealand). By all measures, the conference must be judged a tremendous success, helping to advance the seven objectives of INTAV's underpinning EXTRAS project (EXTending tephRAS as a global geoscientific research tool stratigraphically, spatially, analytically, and temporally), allowing insight into much of the excellent research being undertaken in Romania and nearby countries, and, in part because of the special venue and the conference programme construction, providing great opportunities for discussion, networking, and interactions between the wide range of participating researchers, and also, not least, because of the warmth, friendliness, and

helpfulness of the hosts at the venue and during the field trips. No stone was left unturned by Daniel Veres and Ulrich Hambach, and their friendly student and postdoctoral helpers, to ensure that all participants felt very welcome and were well looked after for their entire stay in Romania.

The conference also featured, notably, strong contributions in volcanology as well as many papers representing the explosion of research on cryptotephra in a range of environmental settings, and on new methods for detecting and analysing them including the use of X-ray fluorescence core scanners (such as ITRAX) and computed tomography (CT) imaging, new methods for analysis including trace element mapping of small glass shards using multiple line scans with LA-ICP-MS, new dating applications, and a number of novel applications of tephra deposits that are best described as 'beyond isochrons'.



Fig. 11. Participants at the tephra conference awaiting the opening talk. Photo: David Lowe.

Held at the spectacular mountain resort 'Cheile Gradistei' Fundata, the meeting involved 92 participants (Fig. 11) – a record number for an INTAV meeting – from 20 countries. The greatest numbers were from the UK (24), Germany (14), Romania (7) and the USA (5) with up to four representatives from each of Denmark, Russia, Norway, Sweden, Canada, Italy, Switzerland, Turkey, Japan, China, Poland, Serbia, Hungary, Singapore, Iceland, and New Zealand. The total included 22 students, with 17 of these undertaking PhDs.

Participants were treated to 94 stimulating papers, including 41 oral papers in seven sessions and 53 poster papers presented in three sessions. All the



Fig. 12. Participants in front of columnar basalt in the Perşani volcanic field (active from 1.2-0.6 Ma) in the southern Carpathians during the mid-conference field trip. Photo: Pierre Oesterle.

poster papers remained on display for the entire conference. Seven outstanding (invited) keynote presentations were made, one in each oral session, by Sabine Wulf (UK), Michael Sigl (Switzerland), David Karátson (Hungary), Caroline Bouvet de la Maisonneuve (Singapore), Maarten Blaauw (UK), John Westgate (Canada), and Vera Ponomareva (Russia). A special evening lecture was given by Ioan ('Nino') Seghedi (Romania) entitled "Geological and volcanological outline of the Carpathian-Pannonian region with emphasis on the Romanian territory", which summarised the complex regional geological setting and very active tectonism as well as local volcanism in the southern Carpathians. The presentation helped to set the



Fig. 13. Bran (Dracula) Castle, Transylvania, visited during the mid-conference excursion. Not far from the conference venue at Moieciu de Sus, the castle in Bran was completed in 1388 AD. Photo: David Lowe.

scene for the one-day mid-conference field excursion in the region (and the later post-conference excursion). The mid-conference trip was led by Ioan Seghedi, Daniel Veres, and Ulrich Hambach (Seghedi et al., 2018) and included a visit to the basaltic Perșani volcanic field (Fig. 12) and a very popular viewing of Dracula's castle in Bran at the end of the day (Fig. 13).

The conference abstract volume is available at the conference website (Hambach and Ulrich, 2018). Papers arising from the conference are to be assembled into a special tephrochronology volume of Quaternary International (in preparation).

The conference was supported financially and in kind by a number of sponsors (all listed in the programme and abstracts volume and on the conference website) and an INQUA grant (1710P) of €4600 obtained by INTAV through SACCOM (supported by commission president, Mauro Coltorti). The generous INQUA grant was used to help 18 early career researchers (ECRs) and students to travel to the meeting (Fig. 14). Most were from within Europe (14) but four travelled from beyond Europe including several from as far away as New Zealand.



Fig. 14. Ten of the 18 happy ECR and student recipients of the INQUA travel grants. Photo: David Lowe.

Another feature of the conference was an excellent Bayesian-based age modelling workshop (Fig. 15) led by Maarten Blaauw (UK) following his insightful keynote paper, "More dates and use Bayes © recommendations for robust age-depth models". Maarten's presentation is available on the conference website. Steve Kuehn (USA) reported on progress on the development of the INTAV global database project and provided new updated protocol sheets for evaluation by tephra community in the next few months.

Four students were awarded certificates and cash prizes (sponsored by the University of Waikato, New Zealand) for first and second places in poster



Fig. 15. Maarten Blaauw (right) leading the age-modelling workshop for around 25 participants. Photo: David Lowe.

and oral presentations (Fig. 16). As noted by the judges, the standards of presentation were uniformly high throughout the conference and so their job was a difficult one.



Fig. 16. The winners and runners-up for best student oral and poster papers. From left, Jayde Hirniak, Jennifer Saxby, Hannah Buckland, and Ali Monteath. Photo: David Lowe.

A number of awards were presented at the conference dinner, which also featured traditional Romanian dancing and music. Two INTAV Honorary Life Memberships were awarded to Gudrun Larsen (Iceland) (the award was received on Gudrun's behalf by her colleague Esther Ruth Gudmundsdottir; Fig. 17) and to (a surprised) David Lowe (New Zealand). Their achievements in tephrochronology were described in brief by Andrew Dugmore (UK) and Peter Abbott, respectively. Only 14 such awards have been made internationally since they were instigated formally about 20 years ago by INTAV.



Fig. 17. Esther Ruth Gudmundsdottir (Iceland) receiving the INTAV Honorary Life Member certificate on behalf of Gudrun Larsen (Iceland) from INTAV president Takehiko Suzuki. Photo: David Lowe.

John Westgate (Canada) was awarded, to universal acclaim, a special framed certificate to mark the 50th anniversary of the publication of his pathfinding paper (with the late D.G.W. Smith) in 1969 on the use of the electron probe to characterise glass shards in tephra to enable them to be correlated over long distances (Figs. 18) (Smith and Westgate, 1969). The venue hosts also baked a commemorative chocolate layer-cake to mark the occasion (Fig. 18).

On the last day of the conference, a business meeting was held by the executive of INTAV at which the future of INTAV as a global tephra community was discussed, including possible roles in INQUA and IAVCEI or as a stand-alone organisation (see Lowe et al., 2018, pp.3-4). The forthcoming INQUA congress in Dublin (2019) was also noted, in which four sessions relating to tephrochronology are currently open for abstracts.



Fig. 18. Certificate and special chocolate (layer) cake prepared to commemorate the 50th anniversary of the publication of John Westgate's pioneering paper (with D.G.W. Smith) in 1969. From left, Takehiko Suzuki, Cora and John Westgate, Britta Jensen, Peter Abbott, and David Lowe.

The conference was followed by a compelling three-day post-conference field trip involving 32 participants. It was led by David Karátson, Daniel Veres, and Ulrich Hambach (Karátson et al., 2018) along with student/ECR helpers. The excursion, which ended in Bucharest, included a visit to a huge and impressive underground salt mine at Slănic; proximal rhyolitic and dacitic tephra deposits, domes, and craters; the mountainous impacts of dynamic and complex tectonism; beautiful monasteries, churches, walls and castles and other buildings from Romania's rich history; loess encompassing distal tephra and palaeosols on the Wallachian plains; landsliding landscapes; and spectacular mud volcanoes (Fig. 19).



Fig. 19. Top of a mud volcano in a natural reserve at Berca belching mainly methane derived from deposits ~3 km below. In the background are hills that have been subject to very fast rates of mass movement (landsliding). Photo: David Lowe.

References

- Froese D.G., Alloway B.V., Lowe D.J. (2008). John A. Westgate – global tephrochronologist, stratigrapher, mentor. *Quaternary International* 178, 4-9.
- Hambach U., Veres D. (eds) (2018). Book of Abstracts. *Crossing New Frontiers: INTAV International Field Conference on Tephrochronology, 'Tephra Hunt in Transylvania', Moieciu de Sus, Romania, 24 June-1 July 2018*, 131 pp. Available in full at http://www.bayceer.uni-bayreuth.de/intav2018/en/key_dates/5001/1/16443/INTAV_Programm_final_vers2-2.pdf

Karátson D., Veres D., Hambach U. (2018). Late Quaternary Carpathian volcanism and Lower Danube palaeoclimate: implications for establishing an integrated tephrostratigraphic framework, 29 June-1 July. Crossing New Frontiers: INTAV International Field Conference on Tephrochronology, 'Tephra Hunt in Transylvania', Moieciu de Sus, Romania, 24 June-1 July 2018, 28 pp.

Lowe D.J. and members the local organising committee and INTAV executive committee (2018). Foreword: Crossing New Frontiers. In: Hambach, U., Veres, D. (eds), Book of Abstracts. Crossing New Frontiers: INTAV International Field Conference on Tephrochronology, 'Tephra Hunt in Transylvania', Moieciu de Sus, Romania, 24 June-1 July 2018, pp. 1-5.

Seghedi L, Veres D., Hambach U. (2018). Perşani basaltic volcanic field, southeastern Transylvania, Romania, 26 June 2018. Crossing New Frontiers: INTAV International Field Conference on Tephrochronology, 'Tephra Hunt in Transylvania', Moieciu de Sus, Romania, 24 June-1 July 2018, 35 pp.

Smith D.G.W., Westgate J.A. (1969). Electron probe technique for characterising pyroclastic deposits. Earth and Planetary Science Letters 5, 313-319.

DATESTRA - 1612F

Project Leaders: Pierluigi Pieruccini (University of Torino, Italy), Markus Fiebig (University of Natural Resources and Life Sciences Vienna, Austria), Guzel Danukalova (Russian Academy of Sciences, Russia).

Report from the Section on European Quaternary Stratigraphy (SEQS) with special attention to the IFG Project 1612F (DATESTRA)

Authors: P. Pieruccini¹, M. Fiebig², G. Danukalova³
¹University of Torino, Italy; ²University of Natural Resources and Life Sciences Vienna, Austria; ³Russian Academy of Sciences, Russia.

The SEQS-project DATESTRA for the 2016-2019 intercongress period will aim to build a Database of Terrestrial European Stratigraphy (DATESTRA). This is seen as an European Geographic Database of the key-sites of Quaternary importance across Europe following the activities carried out by SEQS during the previous Intra-Congress periods.

The launch of the SEQS project DATESTRA occurred at the INQUA-SEQS 2016 Meeting in Armenia, and a prototype (25 specially compiled Quaternary sites for Italy) was presented by the Italian team (P.Pieruccini, M.Coltorti, M. Palombo, A. Bertini, B. Sala, D. Magri, C. Ravazzi) to the SEQS audience at the 2017 SEQS-DATESTRA workshop and meeting held in Tautavel, France, 9-15 September. About 30 participants joined this meeting, organized by Vincenzo Celiberti and his collaborators and hosted by the EPCC CERP Centre Européen de Recherches Préhistoriques de Tautavel in collaboration with UMR 7194 "HNHP" du CNRS, MNHN-UPVD-CERP de Tautavel and UPVD Université de Perpignan.

An extra DATESTRA workshop was held on Sunday the 10th of September (Fig. 20). 35 oral and poster contributions authored by 125 scientists were presented during the meeting. Thijs Van Kolfschoten gave a touching speech in memoriam of Wim Westerhoff, past SEQS President and Secretary who passed away last May 2017. The scientific presentations focused on cross-disciplinary and cross-regional correlation of geological, palaeontological, geochronological, geomorphological, archaeological, and environmental records in order to develop Quaternary stratigraphy all over Europe and adjacent territories. Mauro Coltorti presented advances of the INQUA-Project CROSSTRAT on the reliability of radiometric dating in a test-region like Sardinia, in Italy. A dedicated DATESTRA session was held as well, including contributions from Italy, Russia and Poland. Contributions will be published in a Special Issue of Quaternary International (already accepted) titled "Quaternary stratigraphy and hominids around Europe: SEQS 2017 meeting". The meeting continued with a three-day fieldtrip that allowed participants to visit the well-known Caune de l'Arago where, within a complex but well-exposed Middle Pleistocene sequence, the remnants of *Homo heidelbergensis* (Arago XXI) were found (Fig. 21).

original palaeoanthropological collection. Afterwards the fieldtrip moved to Les Orgues-Ille sur Tet where Marc Calvet and Magali Delmas (Université de Perpignan) showed us the litho-, morpho- and chronostratigraphical setting of the Pleistocene continental successions and their relationships with the coastal marine Pliocene record. Moreover, the staircase of alluvial terraces along the Roussillon were visited and the field trip ended at the Grottes Canalettes, in the Pyrenees.

The 2018 SEQS meeting was held under the organization of Andrej Mihevc and Nadja Zupan at the Karst Research Institute, Postojna, Slovenia, 12-18 September. On the first day of the meeting, fourteen talks were presented. Topics included local geology in Slovenia, especially including karst features and tectonic developments, and contributions from British, Croatian, Russian, Polish and Ukranian colleagues. On the early afternoon of the first day participants took a three-hour train ride into the amazing Postojna cave. Andrej Mihevic introduced the group to fascinating outcrops and supplied all kinds of interesting facts around the previously called "Adelsberger Grotte". After the exciting field trip another seven talks with focus on palaeontology were offered. The next morning included presentations on field work from Italy, Turkey, France, Poland and the Transbaikal region. In the afternoon the DATESTRA session showcased advances in the project from Ukraine, Lithuania, Russia and Poland. In the final poster session nine scientific inputs were presented and announced. During the final day of field trips the SEQS group acquired new knowledge about classical Karst systems including the UNESCO site Skočjanske Jame, blind valleys, the amazing Alpine cave Snezna jama and the Ljubljana basin. The 2018 meeting brought exposed all participants (Fig. 22) to valuable information about Quaternary stratigraphy in cave and karst environments.



Fig. 21. SEQS meeting in France 2017.

Christian Perrenoud, Anne Marie Moigne and Vincenzo Celiberti presented the geological, lithostratigraphical, biostratigraphical, morphostratigraphical, chronostratigraphical, palaeoanthropological and archaeological setting of the site and the participants were allowed to observe in detail the stratigraphical section opened in the excavations. The fieldtrip continued with the visit to the Prehistory Museum of Tautavel and the European Research Centre of Tautavel, where Marie-Antoinette de Lumley showed the famous



Fig. 22. SEQS meeting 2018 in Slovenia.

We are looking forward to the next SEQS meeting in 2019 during the INQUA congress in Dublin, where a session with the name: "The Quaternary of Europe: stratigraphical perspectives and tools for correlations" is scheduled. Please submit abstracts and participate!



Fig. 20. DATESTRA meeting 2017 France.

Terrestrial Processes, Deposits and History

EGSHaz: Earthquake Geology and Seismic Hazards - 1618F

Leaders: Ioannis Papanikolaou (Greece); Petra Štěpančíková (Czech Republic); Christoph Grützner (Germany).

9th International INQUA Workshop on Palaeoseismology, Active Tectonics and Archaeoseismology (PATA Days).

Author: Christoph Grützner¹

¹Institute of Geosciences, Friedrich-Schiller-Universität Jena, Germany.

The 9th PATA Days Workshop took place in Possidi, Greece, 25-27 June, 2018. The meeting commemorated the 40th anniversary of the Thessaloniki Earthquake and was organized by Alexandros Chatzipetros and Spyros Pavlides from Aristotle University of Thessaloniki.

PATA Days is the annual event of the INQUA focus group "Earthquake Geology and Seismic Hazards" (IFG EGSHaz). Its purpose is to discuss the latest research, to develop new ideas, to get to know new techniques in earthquake geology, and to help young scientists connecting with the community. The 9th PATA Days had 112 participants from 21 countries and four continents. More than 30% of the participants were early career researchers (ECRs) and developing-country researchers (DCRs). 13 ECRs and DCRs were supported by an INQUA grant, which highlights the great support that INQUA provides for the next generation of Quaternary scientists.

The 2018 PATA Days started with a pre-conference excursion led by Alexandros Chatzipetros, George Syrides, and Spyros Pavlides to the local faults between Thessaloniki and Kassandra peninsula, where we could also visit tectonically uplifting shorelines.

The main part of the workshop concentrated on oral and poster presentations from 25-27 June. All aspects of palaeoseismology, earthquake geology, and tsunami studies were represented in the programme, including talks on archaeoseismology, seismology, earthquake engineering, geomorphology, and many other

related topics. A jury of senior scientists selected three outstanding students' posters for the PATA Poster Awards: 1st - Qi Ou (Fig. 23); 2nd - Taehyung Kim; and 3rd - Takahashi Naoya. All abstracts of the meeting are peer-reviewed, 4-page short papers that can be downloaded [here](#).

Hereby we continue a long-standing PATA tradition that turned out to be extremely beneficial. All previous abstract books (and field trip guides!) can also be downloaded from the [IFG website](#) - almost 1,000 articles in total!

During the workshop we also held the INQUA Business meeting, in which the IFG leaders provided information about the progress of the IFG and its associated projects. More than 50 participants engaged in a lively discussion about future plans and the directions in which our community should develop.

A summer school designed for ECRs and students was held on 28 June. Please find a detailed report on the summer school by Francesca Ferrario [here](#).

Eight speakers (Klaus Reicherter, Tom Rockwell, Jim McCalpin; Shmulik Marco, Spyros Pavlides, Manuel Sintubin, Ioannis Papanikolaou, and Georgios Syrides) gave lectures on tsunami and earthquake geology science to more than 40 attendees.

The workshop finished with a post-conference excursion to the Eastern Halkidiki and the Mygdonia Graben.

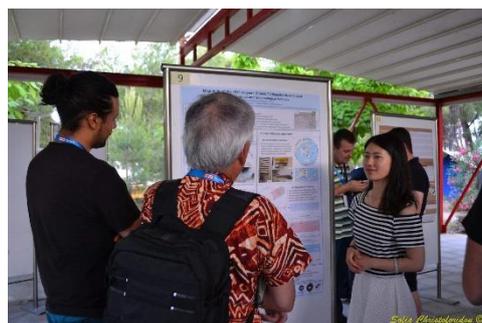


Fig. 23. Qi Ou (Oxford University) talks Koji Okumura and Joaquín Cortés about her award-winning poster on the 1920 Haiyuan Earthquake. Photo: © Sofia Christoforidou.

The 9th PATA Days not only showed the most recent advances in the field of earthquake geology and related disciplines, but were also used to establish new co-operations and joint projects. Again, this format showed its value especially for ECRs and DCRs, who got to meet and with established scientists from all around the world, and who found the workshop a unique opportunity to build a strong scientific network. We thank the organizers for a perfect meeting.

In 2019, the main activity of the IFG EGSHaz will be the [10th PATA Days](#) in Israel from 19-27 September, 2019.

TERPRO will also have a strong presence at the INQUA congress in Dublin. Please make sure to check the following palaeoseismology-related sessions which are (co-)organized by our IFG:

- Development of soft-sediment deformation structures (SSDS) and differences between non-seismic and seismic structures
- Earthquake geology and seismic hazards: From earthquake mapping of historical and prehistoric earthquakes to palaeoseismology
- Palaeoseismology of plate interiors under Pleistocene climate changes.

QUASAP: Quaternary soils and palaeosols - 1621F

Leader: Daniela Sauer (Germany).

[Website](#)

QUASAP Workshop 2018

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The key activity of our IFG in 2018 was a QUASAP Workshop in the Yukon Territory, Canada. It focussed on soils and palaeosols in cold climates (including permafrost-affected soils), which have not yet been in the focus of any earlier workshops of our group. The final QUASAP Workshop will be organised in Belgium in 2019. It will concentrate on

soils and palaeosols in humid-temperate climates. Both workshops address the overall scientific questions of QUASAP: (1) How much time is needed for a certain soil to form? (2) Which environmental conditions are required for certain soil characteristics to develop?

The two workshops complement the earlier workshops of QUASAP and the previous INQUA Project RAISIN, which were organised in Mediterranean climate (RAISIN Workshop 2013 in southern Italy), desert environments (RAISIN Workshop 2014 in the Mojave Desert, USA), humid-tropical climate (QUASAP Workshop 2015 in Brazil), and subtropical climate (QUASAP Workshop 2016 in Mexico).

Thus, after the workshop in Belgium in 2019, by the end of the inter-congress period, the group will together have examined soils and palaeosols of six major climate zones of the world. This common experience will improve interpretations of palaeosols in Quaternary sediment-soil sequences with respect to the duration of soil formation and the climatic conditions reflected in the palaeosols. Studies that contribute to this knowledge will be published in another Special Issue of Quaternary International.

The QUASAP Workshop 2018 in the Yukon Territory was organized in an absolutely perfect way by Paul Sanborn, with help from Chris Jackson (both from the University of Northern British Columbia, Prince George, Canada). The INQUA support enabled us to give travel grants to four PhD students (Fig. 24).



Fig. 24. The IFG leader and the four PhD students who received the travel grants in front of a skeleton of a mammoth in the Beringia Centre in Whitehorse, where the welcome dinner on the first evening took place. From left to right: Pedro Martinez, Vance Almquist, Daniela Sauer (IFG leader), Nora Pfaffner, Alexander Bonhage.

In the Kluane Lake area, we were able to observe active loess production (Fig. 25), which was probably the most impressive experience of this workshop. In addition, we examined sites where

Holocene loess covers had accumulated. Further topics included recent glacial drainage changes and soil patterns in a boreal grassland-forest mosaic.



Fig. 25. Active dust production on the dry Slims River delta at Kluane Lake.

Other key study objects of the Yukon Workshop included a chronosequence of soils on progressively older glacial surfaces (Wisconsinan, penultimate glacial period, early Pleistocene). In this case, the scientific questions were: (1) What rates of soil formation are observed under the cold climate of the Yukon Territories? (2) Which influence of tephra and aeolian deposition can be observed?

In the Klondike Goldfields, we visited a formerly unglaciated area with upland soils in weathered bedrock, as well as old colluvium and early Pleistocene glacial outwash. This is a very special situation, because usually soil formation in cold climates started after the deglaciation at the Pleistocene-Holocene transition. The Klondike Goldfields offer a rather rare opportunity to answer the scientific questions: (1) How do soils in cold climates continue to develop if they have (much) more than 12000 years in time to continue developing? (2) What weathering intensity can they reach in which time-spans?

During a trip on the “Top of the World Highway” between Dawson and the U.S. border, which is above tree-line most of the time, we observed cryoplanation terraces, solifluction lobes, and patterned ground (Fig. 26), as well as strong control of soil formation and permafrost distribution by slope aspect. Thus, the group had the chance to study and discuss active geomorphological processes, which create features that also occur in Pleistocene palaeosols in temperate climates. The observation of these processes was very instructive for palaeoclimatic interpretation of the respective features in Pleistocene palaeosols.



Fig. 26. Patterned ground examined during our trip along the “Top of the World Highway”.

Programme of the QUASAP Workshop 2018

Day 1 (Saturday 28 July): Orientation meeting and welcome dinner in the Beringia Centre in Whitehorse.

Day 2 (Sunday 29 July): Drive to Kluane Lake Research Station (KLRS), paper presentations, observation of active dust release at Kluane lake in the evening, discussion of recent glacial drainage changes.

Day 3 (Monday 30 July): Paper presentations at KLRS in the morning, local field trip at Kluane in the afternoon: Modern and Holocene loess production; soil patterns in a boreal grassland-forest mosaic, return to Whitehorse in the evening.

Day 4 (Tuesday 31 July): Drive to Dawson City, along the way examining a chronosequence of soils on progressively older glacial surfaces (Wisconsinan, penultimate glaciation, early Pleistocene), influence of tephra, aeolian deposition, periglacial processes.

Day 5 (Wednesday 1 August): Visit sites in the adjacent Klondike Goldfields: unglaciated uplands with soils formed in weathered bedrock and colluvium, and early Pleistocene glacial outwash.

Day 6 (Thursday 2 August): Drive on the “Top of the World Highway” between Dawson and U.S. border. Most of the route is above treeline, and provides great views of unglaciated landscapes similar to much of interior Alaska and eastern Siberia, with cryoplanation terraces, solifluction lobes, and strong control of soil formation and permafrost distribution by slope aspect.

Day 7 (Friday 3 August): Return to Whitehorse.

Day 8 (Saturday 4 August): Air departures for participants.

Outlook to 2019

The QUASAP Workshop 2019 will concentrate on soils and palaeosols in humid-temperate climates. It will start on the evening of Thursday 1 August, directly after the INQUA Congress in Dublin. The workshop will be organised in Belgium by Peter Finke (Ghent University). He is one of the internationally leading modellers of soil formation. If his model SoilGen is fed with data on the initial properties of a given type of sediment, the climatic conditions, vegetation, topography, and time, it is able to predict the soil that should develop under the given combination of factors. Thus, comparisons of the model outcomes with the real soils that developed under the given conditions is extremely instructive, because especially the mismatches between modelled and real soil properties can help us to identify, which of the processes and influencing factors we have not yet fully understood.

The QUASAP Workshop in 2019 will include presentations by the participants and several excursion days, with a focus on the relations

between the soil forming factors and the field soil, by looking at soils developed in various parent materials, in different topographic positions and also some palaeosols. Some of the soils that we observe will also be modelled. We will do this in a PC-workshop format, building the required model inputs (parent material, climate, vegetation, topography) and evaluating results of model runs. Discussion would focus on additional value of modelling relative to field observations, missing model functionality and possibilities, etc.

Programme of the QUASAP Workshop in Belgium 2019

Day 1 (Thursday 1 August): Travel from Dublin to Ghent, welcome reception in the evening.

Day 2 (Friday 2 August): Presentations of participants in the morning, field workshop on soils developed in variable parent materials (periglacial relics) in the afternoon.

Day 3 (Saturday 3 August): Field workshop on Holocene soils in variable parent materials in the morning, modelling soil genesis as a function of parent material in the afternoon.

Day 4 (Sunday 4 August): Free day for individual visits of Ghent, Bruges, Antwerp, etc.

Day 5 (Monday 5 August): Presentations of participants in the morning, field workshop on man-influenced soils and palaeosols in cover sands in the afternoon.

Day 6 (Tuesday 6 August): Field workshop on palaeosols in cover sands and loess in the morning, field workshop on loess soils and topography in the afternoon.

Day 7 (Wednesday 7 August): Modelling loess soils and palaeosols.

Timeline

October 2018: First announcement and opening of the [website](#).

December 2018: Second announcement.

1 February 2019: Pre-registration and abstract submission opens.

27 March 2019: Deadline for pre-registration (corresponds to deadline of INQUA early-bird registration).

1 April 2019: Decision about Go/NoGo based on number of pre-registrations.

1 June 2019: Deadline for final registration, payment and abstract submission.

18 July 2019: Distribution of the final workshop programme.

1 August 2019: Start of the workshop.

10th PATA Days

Israel

19 - 27 September 2019

Technical meeting: 22-27 September 2019;

Pre meeting field trip: 19-22 September 2019

The meeting is a part of the successful series of Palaeoseismology, Active Tectonics and Archeoseismology (PATA) meetings organized by the INQUA-TERPRO group. The 2019 meeting will mark the 10th annual PATA Days event. PATA meetings bring together researchers from around the world to present the newest research and innovations in the fields of earthquake geology and seismic hazard. The 2019 meeting will take place in two locations, one along the Mediterranean shores and the other near the Sea of Galilee. There will be several oral and poster sessions interspersed by two half-day and one full day intra-meeting field trips. The field trips will visit world-class archaeological and geological sites in the area, related to the main themes of the meeting.

The meeting will be preceded by a two-day field trip to the Dead Sea area. The field trip will cover topics such as active faults and their geomorphic expression, soft sediment deformation, tectonics and sinkholes, and salt tectonics.

More information can be found [here](#).

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

Project Leaders: Alessandro Fontana (University of Padova, Italy), Willem Toonen (University of Leuven, Belgium), Juergen Herget (University of Bonn, Germany), Rajiv Sinha (Indian Inst. of Technology Kanpur, India).

Reports on the workshop EX-AQUA 2017 and next activities

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

¹University of Padova, Italy; ²University of Bonn, Germany; ³University of Leuven, Belgium; ⁴Indian Inst. of Technology Kanpur, India.

EX-AQUA is a project related to the IFG HEX: "Palaeohydrology and fluvial archives - extreme and critical events" and it aims to gather data about Quaternary hydrological events, focusing mainly on the Holocene. The project deals with floods and droughts and aims at building the network of researchers dealing with palaeohydrological investigations, spreading information about methods, concepts and archives of past events. The quantification of the recurrence time of catastrophic events and their magnitude is a challenging task and the use of palaeohydrological tools can strongly extend the temporal and spatial records. For achieving this goal, it is essential to standardize palaeohydrological techniques, and discuss the interpretation, uncertainties and

general quality of different proxies used for the reconstruction of events. The project has a special focus on understanding the relationship between evolution of ancient societies and palaeohydrological phases.

The second year of the project aimed to involve researchers from Asia, in particular, from the Indian subcontinent and neighbouring countries. For this purpose the main external activity in 2017 was the workshop "EX-AQUA 2017: Palaeohydrological extreme events, evidence and archives", held in Noida (Uttar Pradesh, India), near New Delhi, at the Outreach Centre of the Indian Institute of Technology, 1-5 November, 2017. A total of 18 scientists from 6 countries participated in this meeting. The meeting was organized by Rajiv Sinha (Fig. 27). The generous funding of INQUA was used for sponsoring the travel and subsistence costs of 11 participants including 4 ECR, 6 PhD and 2 SS from Indian universities and research institutions.

The workshop involved 16 oral communications and 4 poster presentations covering various topics such as the evolution of alluvial systems affected by extreme events, floods and palaeohydrology, alluvial geoarchaeology and palaeohydrology. An important issue discussed by some researchers was the flood of 2013 in the Himalayan Region, which highlights the relationship between the magnitude of events and the connectivity of sediment along the river network in the present and in the Quaternary. Management of the sediments transported along the main fluvial channels and their interactions with territorial planning is a major issue for the next decades in the Himalayan basins. The assessment of volume of sediments and magnitude of floods is carried out also through the use of palaeohydrological methods.



Fig. 27. Participants of the meeting EX-AQUA 2017 in IIT Kanpur Outreach Research Center in Noida (India), 1-5 November 2017.

After the conference, a fieldtrip of two days, guided by Sampat Kumar Tandon and Vimal Singh, brought 15 participants to visit some key sites for palaeohydrological research of the Sub-Himalayan range and related foothills in the sector between the city of Chandigarh and the valley of Pinjaur.

On the first day, 4 November, the group drove north of Delhi through the alluvial plains of the Yamuna River, crossing the states of Haryana and Punjab. Some stops were planned for discussing the information supported by the palaeohydrological research when considering the sediment management and the flood risk along the Yamuna River. Near Chandigarh, the group crossed the alluvial fan of the Ghaggar River that has been partly affected by the activity of a major

anticline structure. In the evening, the group reached Parwanoo (Himachal Pradesh), in the area where some alluvial sequences of early and mid-Pleistocene are present, documenting the hydrological aspects of that period.

On the second day, 5 November, the field trip was focused on the Pinjaur Dun that is the intermontane valley north of Chandigarh where the palaeohydrological evolution was strongly influenced by the tectonic setting. In particular, the Quaternary climatic variations superimposed on the structural trend and the area was used as a key example for discussing the problems connected with the recognition of different forcing factors over the alluvial record. The group also visited the area of Pinjaur Garden, where the fault system related to the Barshar Thrust displaced the fluvial sequence of the mid and late Pleistocene, creating a staircase of terraces.

The last stop was near Nada Sahib Gurudwara, where the activity of the Main Frontal Thrust, that separates the Himalayan chain from the Indo-Gangetic Plain, allowed the exhumation of the alluvial sequence of the upper Siwalik Group. This consists of thick sands and muds deposited between 2.5 - 1.7 Ma, that represent an important site for investigating the hydrologic characteristics during the rising of the Himalayan chain (Fig. 28). In the evening the group drove back to Delhi.



Fig. 28. The cliff of Nada Sahib Gurudwara, near Chandigarh, whit the spectacular outcrop of sandy alluvial sequence of 2.5-1.7 Ma.

The day after, 6 November, the 9th IGC - International Geomorphological Conference started in New Delhi. The EX-AQUA group organized on behalf of the FLAG members (Fluvial Archives and Architecture Group) the scientific session "Palaeohydrology and Fluvial Archives - hydrological extremes and critical events (HEX)". The session was chaired by Juergen Herget and Alessandro Fontana (representatives of EX-AQUA) and Martin Stokes (FLAG) and was an opportunity to present the project EX-AQUA to the international geomorphological community and to show some of the results obtained by different research groups. The session consisted of 13 oral presentation and 3 posters considering different aspects of palaeohydrology and fluvial archives: geochronology of palaeoflood sequences with radiocarbon and OSL dating, calculations of hydraulic parameters for quantifying the discharge of floods and megafloods, extreme events in fluvial systems of arid and temperate regions.

Between 6 and 9 September 2018 a workshop of the project was organized at the University of Szeged (Hungary) by Sandor Gulyas. This event consisted of 2 days of presentations and discussion and 1 day of field trip, visiting some of the key sites between Szeged to Baja for reconstructing the palaeohydrology of Tisza and Danube river systems.

The workshop in Szeged gave the opportunity to show some of the results of the different groups working on the palaeohydrological records in Europe and Asia. In particular, the meeting gave the possibility to present a standardized database of the events that characterized the late Pleistocene and Holocene evolution of some selected areas (e.g.: Northern Mediterranean (Northern Italy), circum-Alpine regions (Rhine Valley; Dolomite catchments), Carpathian region (Hungary, Ukraine), and Pede-Himalayan Plains (India). Thanks to INQUA support, it was possible to cover travel and accommodation costs for 10 ECRs and DCRs.

After the conference held in Padova in 2016, a special issue of Quaternary international entitled "EX-AQUA: Palaeohydrological Extreme Events" is going to be published. A book focused on the main topics of Palaeohydrology and new research perspectives is in preparation in collaboration with other members of the IFG HEX.

For next year the workshop EX-AQUA 2019 is planned at the University of Atacama in Copiapó (Chile), with Tatiana Izquierdo as local organizer. The meeting will be followed by a field trip to the Atacama Desert, along the basin of the Copiapó River. This stream was characterized by a devastating flash flood during 2015, which hit the city of Copiapó. In the upstream catchments the flood exhumed many stratigraphic sections which opened new archives for studying the palaeohydrological evolution of the area and investigating the possible connection between extreme events and climatic cycles.

At the INQUA Conference in Dublin 2019, the project EX-AQUA will join the scientific session Palaeohydrology and Fluvial Archives - Hydrological Extremes and Critical Events (HEX), which is organised in cooperation with the groups of Global Continental Palaeohydrology GLOCOPH, Fluvial Archives Group FLAG and the PAGES Flood Working Group: for information write to secretary.glocoph@gmail.com.

HEX - Palaeohydrology and fluvial archives - extreme and critical events - 1622R

Project Leaders: Jürgen Herget (Department of Geography, University of Bonn), Alessandro Fontana (Department of Geosciences; University of Padova).

[Webpage](#)

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Author: Jürgen Herget¹

¹University of Bonn, Germany.

Palaeohydrology addresses all components of the water cycle (rivers, lakes, groundwater, etc), although in practice most of the previous research has been focused on river channels and discharges, especially related to geomorphological and stratigraphic indicators. Moreover, as we further understand the quantification of hydrology and rates of sediment production in the past, research on palaeohydrology is increasingly focused on the last glacial-interglacial cycle, and Holocene hydrological changes.

Discussions in the context of a previous IFG indicated the potential of performing cross-disciplinary studies between fluvial archives, historical records, and their hydrological and climatic interpretation considering active and passive human impact. There is now an opportunity to re-think and update the objectives of the focus area on fluvial palaeohydrology, building upon the ability of INQUA to foster multidisciplinary international research and to emphasize collaboration between groups. Recent floods around the world (e.g. Northern Europe, Balkans, Brazil, USA, China, Pakistan, Bangladesh and Australia) have attracted attention due to the strong impact these floods have on societies and economies. In the context of global environmental change, the assessment of magnitude, frequency, and other characteristics of extreme hydrological events in the last centuries and millennia is of critical importance. This highlights the collaboration required among researchers dealing with different expertise from geology, geomorphology, palaeoenvironmental analysis, archaeology, and history. The Focus Group aims to foster inter- and transdisciplinary cooperation at a local and continental scale, which consequently requires further international collaboration. To achieve this multidisciplinary research we propose a focus on palaeohydrological research initiatives that will incorporate timely topics and each involve new cross-disciplinary research groups including:

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

In 2018, two meetings were held to address the objective of the IFG:

- 6-9 September 2018: "EX-AQUA 2018 - Palaeohydrological extreme events: evidence and archives", Szeged, Hungary;

- 2-7 September 2018: "Small country, great diversity: Belgian rivers from the Pliocene to the Anthropocene", Liège, Belgium.

The first meeting was held in Szeged and organized by Dr Sandor Gulyas. The meeting was planned as a workshop and focused on the integration of young early career scientists from Eastern Europe and India into the project (cf. individual report on the activities of the EX-AQUA project). INQUA kindly provided financial support.

The second meeting in Belgium was organized by the Fluvial Archive Group, the second core unit of the International Focus Group, as a biennial meeting. The established foci of the group includes: (i) fluvial responses to climate and sea-level change, tectonic activity and anthropogenic forcing from the Plio-Quaternary to the present day, (ii) palaeoenvironmental, biostratigraphical and geoarchaeological studies related to fluvial archives, (iii) application of field/lab techniques and geochronological tools to fluvial sediments, (iv) quantification and modelling of short- and long-term evolution of fluvial systems, and (v) applied elements of fluvial archives: economic geology, baseline information for river restoration and planning for future climate change where considered with a regional focus. The proceedings of the meeting will be published during the second half of 2019 as a special issue of the journal *Geomorphology*. Abstracts and the fieldtrip guidebook are available via the homepage of the [Fluvial Archive Group](#).

In addition to numerous publications by individuals being active in the Focus Group, the main joint publications in progress include:

- Alessandro Fontana and Jürgen Herget are editing the book "Palaeohydrology - traces, tracks and trails of extreme events". The book published by Springer consists of invited review papers illustrating recent progress and future perspectives and challenges of the topic and will be available during the next INQUA congress in Dublin in July 2019.
- Rajiv Sinha and Edgardo Latrubesse are editing a special issue of the journal *Geomorphology* based on presentations dealing with fluvial geomorphology given during the International Conference on Geomorphology in November 2017 in New Delhi, India. Parts of the content are coming from the session of the Focus Group at this conference. The issue is expected to be published in 2019.

Programme for 2019:

2019, July: [Session "Palaeohydrology and fluvial archives – hydrological extreme and critical events \(HEX\)"](#) at the INQUA congress in Dublin, 25-31 July 2019.

2019, October: workshop EX-AQUA 2019 is planned at the University of Atacama in Copiapó (Chile), with Tatiana Izquierdo as local organizer (for details contact secretary.glocoph@gmail.com).

SKILL GRANTS

AFQUA - 1805S

Project Leaders: Brian M. Chase (Université de Montpellier, France).

AFQUA 2018 Conference report

Author: Brian M. Chase¹

¹Université de Montpellier, France

The 2nd AFQUA Conference (The African Quaternary: environments, ecology and humans) recently took place in Nairobi at the National Museum of Kenya. AFQUA was conceived to bridge the existing gap between large international meetings (>500 delegates) and regional African conferences (~50 delegates) and create a forum to share results and foster communication and collaboration at both regional, continental and international scales. Further, AFQUA recognises that the global distribution of research and educational funds favours developed world researchers to become the recognized leaders in African Quaternary studies, but often their interactions with the local scientific communities is limited to their direct collaborators. AFQUA therefore seeks to 1) create a more fully integrated African research network and 2) provide opportunities for African researchers to develop, access and share capacity that will allow for their participation in research projects at the highest level. AFQUA brings developed and developing world researchers together, but it also goes beyond the standard structure of most conferences, with equal time being dedicated to a series of focus groups and training workshops. These include thematic discussions of cutting-edge research topics as well as workshops that introduce and train researchers in the skills they need to develop and communicate their science in the modern research environment. Working in concert, PAGES and INQUA provided substantial support to enable early career and developing country researchers to interact with some of the most influential scientists working in Africa today.



In Nairobi, 86 researchers from 19 countries came together to share their work from the Pliocene to the projected future and spanning diverse subjects from human evolution, to climate change and vegetation dynamics, fire ecology, risk management and the history and impacts of humans on their environments. Linking key conference themes with plenaries and sessions, Andy Cohen kicked off the conference showcasing the role that continental drilling of the large East African lake basins has had on our understanding of Quaternary environments in Africa. Subsequent plenaries included Sharon Nicholson discussing African climate change and appropriate ways to use modern systems to understand past climates; Boris Vanni re and Daniele Colombaroli highlighting the past and future work of the

PAGES Global Palaeofire Working Group and the potential for fire ecology research in Africa; David Nash describing of historical documentary sources can be used to study climate change history and impacts; and Daniel Olago discussing what climate change means in the African context, and how land and water resources may be impacted. These presentations served as keystones for daily themes, which include papers on regional phenomena from across the continent, as well as papers presented in focus sessions on 1) Quantitative palaeoclimatology, modelling and data-model comparisons; 2) the state-of-the-art and perspectives about fire history, fire ecology and fire-vegetation-climate interactions across tropical biomes; 3) the environmental context for hominin evolution and dispersal; 4) African Archaeological Landscapes; 5) applying the Quaternary: the role of the past in supporting the future, and 6) Dating and correlation of African archives of environmental change and archaeology; and 7) African palaeoecology and archaeology perspectives on land use transformation: Africa Landuse6K.

Following the five days of presentations, three days of workshops were held to provide training and foster collaboration on research projects. Participants had the opportunity to engage in international drilling programmes, improve their knowledge of using lake sediments, animal remains and charcoal to understand palaeo-systems, learn how to integrate GIS methods in their work and how to best apply radiocarbon techniques to create reliable chronologies (including the award of five free radiocarbon ages from the 14Chrono Centre to one lucky participant!).

Building on the success of this meeting and the inaugural AFQUA conference held in Cape Town in 2015, we intend to hold the 3rd AFQUA Conference in 2021. If you would like to be added to the AFQUA mailing list, and informed of future developments and meetings, please write to us at afqua.congress@gmail.com.

DIG - 1802S

Leaders: Ljerka Marjanac (Institute of Quaternary Palaeontology and Geology, Croatia), Tihomir Marjanac (University of Zagreb, Croatia).

DIG - 4th International Workshop on Dinaric Glaciation: Early/Middle Pleistocene glaciations of NE Mediterranean - filling the gaps in reconstructing its geological history and climate change. Focus on glaciogenic sedimentary palaeoenvironments of Krk Island, Croatia

Authors: Ljerka Marjanac¹

¹Institute of Quaternary Palaeontology and Geology, Croatia.

The Croatian National INQUA Committee, established in 2009, dedicated most of its activities

to enhance an interdisciplinary approach to Quaternary studies and research, and to attract Masters into the field of Quaternary Science. Thus, the DIG workshops dedicated to the glacial history of Dinaric Alps aim to gather researchers and train students on the topics. Unfortunately, national research funding is thematically restrictive and limited, thus in many ways disabling research and young scientists' start-up. On the other hand, the lack of knowledge in sedimentary processes, field logging and facies analyses, and the ability to recognize and interpret glaciogenic deposits and palaeoenvironments has been repeatedly noticed during former DIG workshops, mainly as a result of limited field training during undergraduate and graduate years of study.



Fig. 29. Location  rnac - observation of impact breccias on Krk Island.

The DIG 4th Workshop held in Ba ka on Krk Island in Croatia from 21 to 26 May is the fourth consecutive meeting since 2013. The aims of the DIG Workshops are: (a) organize annual or biannual workshops, (b) encourage young researchers to choose these topics as their research focus, (c) accomplish skills and competencies, (d) preparation of a summer school on sedimentology of glaciogenic palaeoenvironments in karst regions, and (e) conservation and presentation of glacial geoheritage.

Fostering these aims, the workshop gathered a multi-disciplinary group of early career researchers. Participants were M. Poletto (master student in geology, University of Zagreb, Croatia), O. Altinay (master student in geography, University of Istanbul, Turkey), M. Kornas (master student of geography and geology, University of Poznan, Poland), I. Kajtez (master student of archaeology, University of Belgrade, Serbia), and M.  alogovi  (PhD student in chemistry and geology, University of Zagreb, Croatia) who also was a co-leader. Guest-participants were T. Verbi  from the Institute of Geoarchaeology (Slovenia) who joined for the first three days, then G. Monegato from CNR - Institute of Geosciences and Earth Resources (Milano, Italy), and S. Furlani from The Department of Mathematics and Geosciences, University of Trieste (Italy) who joined for two days, and M. Poljak from the Slovenian Geological Survey joined for the last day. Unfortunately, P. Hughes (School of Environment and Development, University of Manchester, UK) had to cancel participation but he prepared a presentation "Glacial history of the Mediterranean Mountains: from Morocco to Montenegro".

The programmes included an introductory evening, four fieldwork days, and one day for student presentations and discussion. Fieldwork covered the following topics: (a) Pleistocene impact structure and associated sediments (Fig. 29), (b) sedimentology of kame-terraces (Fig. 30), and (c) Pleistocene sediment complex consisting of 14 allostratigraphic units (Fig. 31).



Fig. 30. Location Jurandvor – on top of the Pleistocene kame-terrace with well developed slope-dipping stratification, overlooking Baščanska Draga valley, which had been occupied by a valley glacier during the Middle Pleistocene (MIS 12 time equivalent).

The topics were observed and discussed at four key-locations on Krk Island. After the fieldwork, an introductory presentation for the next day was given. Since the group was interdisciplinary, a lot of basic geology was covered regarding sedimentary processes, field analyses of sediments, validity and usage of particular analyses (especially dating methods of predominantly carbonate clastics), processes in glacial environments, and glaciation of karst, etc. Palaeoclimate issues were discussed regarding the importance of “reading” palaeoclimate from sediments. For the first time, the impact structure of Krk Island was included, but poor weather conditions prevented full field observation, and the group continued work indoors. On the last day of the workshop, each student-participant presented their research work in progress, under following titles: Pleistocene Glaciations in the Teke Peninsula SW of Turkey (O. Altınay), Analyses of Tectonic Evolution of Dinarides by Analog Modeling (M. Poletto), Palaeolithic and the Pleistocene River Terraces (I. Kajtaz), Defining changes of terrain morphology in front of the glacier after glacial floods (M. Kornas), and Krk impact melt rocks (M. Čalogović). A fruitful discussion went on, as well as the exchange of knowledge in Quaternary sciences between young and senior researchers.

The key-locations Baška-Zarok and Baška-Gajevi were discussed in particular with colleagues from



Fig. 31. Location Zarok – a part of an extensive coastal section of the Pleistocene sedimentary complex consisting of 14 allostratigraphic units, predominantly glacialfluvial.

Italy. Future collaboration in correlating sites and solving the chronostratigraphy was also considered.

The details about the DIG Workshop, including guidebooks for download, are still available at the [web page](#).

1804S - Mezhyrich International Archaeology Summer School, interdisciplinary study of an Upper Pleistocene site

Project Leaders: Pavlo Shydlovskiyi (Taras Shevchenko National University of Kyiv, Ukraine), Stéphane Péan (Muséum National d’Histoire Naturelle, France)

[Webpage](#)

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Investigating a Prehistoric mammoth bone dwelling: from field and lab research to education

Authors: Pavlo Shydlovskiyi¹, Stéphane Péan², Laurent Crépin², Ostap Tsvirkun³

¹Taras Shevchenko National University of Kyiv, Ukraine; ²Muséum National d’Histoire Naturelle, France; ³Institute of Archaeology NAS of Ukraine

Among Upper Pleistocene archaeological sites of the Eastern European Plain, open air settlements with monumental dwellings made of mammoth bones, in the Middle Dnieper region dating to 15 ka BP, are particularly famous. Four such sites were uncovered in Ukraine during the 20th century: Mizyn, Dobranichivka, Hintsy and Mezhyrich. In the latter one, a specific type of Epigravettian lithic industry, belonging to the Late Upper Palaeolithic, was named Mezhyrichian, which is similar to Dobranichivka, Hintsy and two other, Semenivka I-III, and Buzhanka II.

In Mezhyrich, the cultural layers have been well preserved down to 2.5-3 meters below the modern surface, yielding stone and osseous artefacts made of bone, antler and ivory. Since its discovery 50 years ago, four dwellings made of mammoth bones surrounded by archaeological structures were found, which are grouped in different household complexes. The first uncovered mammoth bone dwelling was reconstructed by I.G. Pidoplichko and exhibited in the National Museum of Natural History of Ukraine. Its basal part was made of 25 mammoth skulls, which were surrounded by mammoth mandibles stacked in piles. The fourth dwelling, discovered in 1976, was partially excavated and left in place for the purpose of future museum construction.

Since 2010, a Ukrainian-French expedition, led by P. Shydlovskiyi in collaboration with S. Péan, has been excavating the site. Research has been focused on the pits and working areas surrounding dwellings nos. 1 and 2. Interdisciplinary studies have been carried out to determine the geological

and chrono-stratigraphical setting of the cultural layers, the palynological, microcharcoal, microfauna and malacofauna content, the zooarchaeological interpretation of the mammal bone material, and typo-technological features of the lithic industry. Mezhyrich is a unique site for conducting both research and for teaching the application of different natural science methods in archaeology within the context of an International Archaeology Summer School: because of a precisely described loess stratigraphy, the very well preserved cultural layers have been yielding representative collections of lithic and osseous artefacts, made of bone, ivory and antler, and faunal remains (Fig. 32).



Fig. 32. Working with the bones of fourth dwelling construction.

The 2018 Mezhyrich International Archaeology Summer School, which took place from 15 to 30 July, was dedicated to young scientists in archaeology, especially Master students, PhD students and post-graduate early career researchers, from the following institutions of Ukraine and France: Taras Shevchenko National University of Kyiv, National University “Kyiv-Mohyla Academy”, Institute of Archaeology NAS of Ukraine, Muséum National d’Histoire Naturelle in Paris. In the frame of an international field expedition, students were able to learn modern methods related to field work, analyses and interpretation of Upper Palaeolithic materials: methods of archaeological materials analysis, sampling, lithic industry analysis, preservation and storage of faunal materials and interdisciplinary analyses including geology, zooarchaeology and palynology.

The teaching team gathered scientists from different Ukrainian and French institutions: Taras Shevchenko National University of Kyiv, National Academy of Sciences of Ukraine, Muséum National d’Histoire Naturelle, Paris, France. They are experienced in field excavation of prehistoric sites, methods of processing archaeological materials and are specialized in techno-typological analyses of lithic industries, zooarchaeological and archaeobotanical analyses.

Mezhyrich is the base site each year for conducting excavations and teaching field archaeological practice for master students from from the Department of Archaeology and Museology at Taras Shevchenko National University of Kyiv. From 1 to 15 July a limited area of the cultural layer, related to the first mammoth bone dwelling, was opened. This area was ready for the training of

students during the summer school, which took place from 15 to 30 July.



Fig. 33. Mezhyrich. The fourth mammoth bone dwelling.

Research works at Mezhyrich were funded within the framework of the Ukrainian State Fund for Fundamental Research project (No. F77/82-2017) "Mezhyrich mammoth-hunters' settlement: archaeological research and museum studies". This project includes a cleaning of the stratigraphical sections of the cultural layers, the study of pit No.6 and the partial restoration of the fourth mammoth bone dwelling construction remains, still preserved at the site.

One of the tasks of the expedition was to carry out work to strengthen the construction of the fourth dwelling, the consolidation of the bones used as building elements, and the preliminary excavations inside the structure.

The remains of dwelling no.4 are configured in an accumulation of mammoth bones in the shape of an elongated oval (5.85 x 4.62 m), the long axis being oriented from west to east (Fig. 33). The accumulation is 0.6 m high above the ancient surface, which resulted from the collapse of the construction made of mammoth bones as raw material. Building elements include mammoth skulls, mandibles, long bones, scapulae and pelvis bones. The sequential and symmetric use of mammoth bones shows the technical, functional and aesthetic aspects of this type of ancient architecture.

Conservation techniques were accomplished first on bone samples out of the dwelling. Chemical compounds and modes obtained from their application were identified for a better preservation of bone remains. Available adhesive substances based on polymers and synthetic resins were used, notably with the advice and practices of associated French zooarchaeologists.

Sweeping of the internal space of the fourth dwelling enabled investigation of the heterogeneity of the cultural layer in filling the construction. In the south-eastern part the remains of small and medium-size mammals in anatomical order were identified in association with tools for skin processing – four awls made from long bones of a hare. In the opposite part of the house, directly next to the skulls of the mammoth, forming the "base" of the dwelling, accumulations of flint products were recorded. The accumulation represents production wastes, cores and several tools, which testifies to the presence of a flint-

processing workshop here. Such a spatial distribution of finds could result from a functional specification of different sectors within this structure.

In addition, archaeological excavations were carried out in the first and second dwelling complexes: respectively, 6 m² of a dense cultural layer among a working area at the south of dwelling no. 1, and the northern sector of pit No.6 associated to dwelling no. 2.

Lithic and faunal remains were analysed during the summer school, which gave students the opportunity to learn both field and lab research techniques: mapping of uncovered finds, developing an inventory of lithic and osseous artefacts and faunal remains, and the restoration of bones.

Lectures and practical lessons were taught to a group of Ukrainian and French Early Career Researchers and students. These lectures and lessons focused on field work methods of recording and mapping the archaeological materials excavated at the Mezhyrich site. Lectures were devoted to the specificities of studying archaeological material from Upper Pleistocene sites, in peculiar Upper Palaeolithic settlements attributed to Gravettian and Epigravettian cultural facies.

An important aspect of the work was the exchange of experience between Ukrainian and French scientists, in terms of field methodology of excavation and the application of zooarchaeological methods to the study of Palaeolithic sites.

A separate part of our activities consisted of excursions in the vicinity of the Mezhyrich site in order to study the archaeological and palaeoecological context: archaeological prospection of the surrounding area; review of collections of Pleistocene faunal remains from the "Tarasova Hora" National Reserve and the Kaniv Historical Museum; visit the mammoth bone dwelling remains of the Epigravettian Dobranichivka site preserved in situ in a museum.



Fig. 34. Participants of the Mezhyrich International Archaeology Summer School.

The 2018 Mezhyrich International Archaeology Summer School (Fig. 34) provides students with the training required for them to conduct future field and lab work on other prehistoric sites. For postgraduate students, participation in a summer school will be useful for writing and defending their dissertations.

In the future, based on the experience of leading the summer school, we aim to form an international focus group focused on the cultural, chronological, seasonal, and palaeoeconomy of Upper Palaeolithic sites in the Middle Dnieper basin area.

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REGIONAL AND NATIONAL MEMBERS

GERMANY

Central European Conference on Geomorphology and Quaternary Sciences

Giessen, Germany, 23-27 September 2018.

Author: Thomas Kolb¹

¹University of Giessen, Germany

Following the title “Geomorphology and Quaternary Sciences: Connecting disciplines”, for the first time a joint meeting of the German Quaternary Association (DEUQUA – Deutsche Quartärvereinigung) and the German Association on Geomorphology (Arbeitskreis für Geomorphologie) took place in the Hessian university town of Giessen. The conference was hosted by the Department of Geography, Justus-Liebig-University Giessen, and was organised by the working group in Physical Geography (Prof. Dr. Markus Fuchs).

Over 260 scientists from 19 different countries participated in the meeting, which had been promoted as a Central European Conference bringing together the closely related disciplines of Quaternary Sciences and Geomorphology (Fig. 35). In addition to 46 scientific talks, three keynote lectures and an evening lecture, the conference programme included in particular 158 scientific posters, which presented cutting edge research from both disciplines with their individual perspectives and gave rise to extensive and lively discussions. The versatile conference contributions clearly reflected the broad and interdisciplinary research programme of the two associations, ranging from the investigation of geomorphological process-response-systems, to the characterization of climate and landscape archives for palaeo-environmental research and geo-archaeological questions arising from the complex field of human-environmental interactions.



Fig. 35. Conference participants in front of the entrance of the Justus-Liebig-University main building in Giessen.

The evening lecture by the Frankfurt palaeoanthropologist Prof. Dr. Friedemann Schrenk entitled "Human origins: 7 million years of diversity" provided insights into a highly dynamic field of research that offers manifold links to research approaches from the fields of geomorphology and Quaternary sciences (Fig. 36).



Fig. 36. Prof. Dr. M. Fuchs introducing the evening lecture given by Prof. Dr. F. Schrenk (Frankfurt a.M.) entitled “Human origins: 7 million years of diversity”.

The conference, which was generously supported by the German Research Foundation (Deutsche Forschungsgemeinschaft, DFG), also offered the opportunity to take part in various field trips with different thematic foci from the fields of landscape and quaternary research, geo-archaeology and soil sciences.

The organizers would like to take this opportunity to thank all participants for contributing to the meeting by providing fascinating talks, interesting posters and inspiring discussions.

POLAND

Trees as bio-indicators of industrial air pollution during implementation of pro-environmental policy in the Silesia region

Project Leader and Author: Barbara Sensuła (Silesian University of Technology, Poland)

The main aim of the project titled “Trees as bio-indicators of industrial air pollution during implementation of pro-environmental policy in Silesia region” (Acronym: BIOPOL) was to carry out advanced research on changes in isotopic composition of young needles and annual tree-rings of pine (*Pinus sylvestris* L.) collected in the forest of the most industrial part of Poland - in Silesia (Fig. 37). Since 2012, I have been using trees as spatial and temporal indicators of climate changes, anthropogenic CO₂ emission and industrial air pollutants in Silesia during the implementation of pro-ecological policy (Sensuła 2015, 2016a, 2016b; Sensuła et al. 2015a, 2015b, 2016, 2017a, 2017b, 2018a, 2018b) (Fig. 38). In research, I use whole wood matter, cellulose and glucose to determine their isotopic composition. To analyse changes in time and space, it was necessary to collect local environmental records of climate change and anthropogenic stress. Spatial analyses, however, often depend on the availability to access to climatic and emission data of selected factories. Meteorological data for the studied area have been received thanks to the kindness of IMiGW staff. However, it was a huge problem to obtain the

emission data due to limited access or lack of such data in the companies. I received part of the data for analysis thanks to the kindness of the employees of the Main Inspectorate for Environmental Protection (GIOŚ), Voivodship Inspectorate for Environmental Protection of WIOŚ (also provide full names) and Environmental Protection Office (ZAK S.A., Huta Katowice), and some data were collected from the annual reports of companies or statistical years. Unfortunately, not all desirable emission data for the studied area are available. The difficulty in the analysis of statistical data may be also due to the changes associated with new administrative division of the country.

The study of environmental changes in Silesia using trees as an archive, allows analysis of environmental changes with annual resolution. Climate change and Anthropocene forcings affect changes in the annual tree ring width (Sensuła et al. 2015a, 2015b, 2016, 2017a, 2017b, 2018a, 2018b) and also affect changes in the carbon and oxygen isotopic composition of each individual annual ring (Sensuła et al. 2018a).

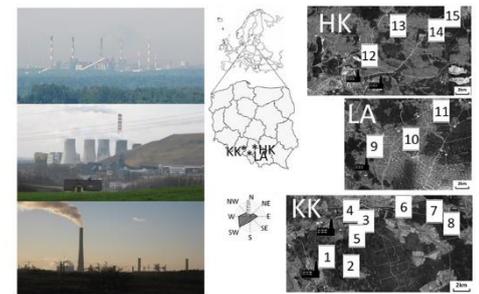


Fig. 37. Sampling sites. The dendroclimatological sampling reported in this project included 16 pine sites in three regions – Dąbrowa Górnicza near Huta Katowice (HK), Kędzierzyn-Koźle (KK), and Łaziska (LA). The sampling sites were located at varying distances from industrial factories (distance range: 1–20 km from the factories).

Together with my project team, firstly, we have determined changes in the width of annual tree-rings, which therefore extended this research by determining the isotopic composition in wood and its components as well as in pine foliage. Since 2013, as part of bilateral cooperation with the University of Liege (Belgium), we have been developing a method of geochemical analysis of pine wood and the needles of young shoots (Sensuła et al. 2017b). This type of comprehensive study of environmental changes in the areas in the vicinity of industrial factories during the implementation of pro-ecological strategies have not been described in foreign and domestic publications. Investigations of trees growing in industrial areas allow for analysis of ecosystem changes recorded in tree responses during the implementation different standards and limitations of greenhouse gas emissions and pollution by industrial factories according to

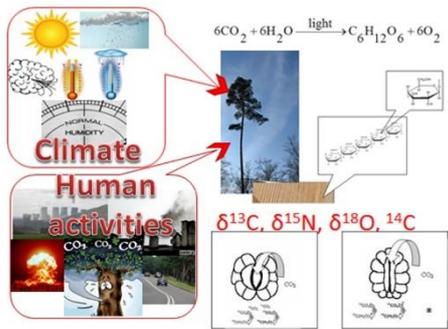


Fig. 38. Scots pine as bio-indicator.

European Union law. However, it should be mentioned, that in Silesia the problem of pollution from so-called low emissions seems to be more and more significant.

Since 2012, we have been conducting temporal and spatial analysis of the impact of climate change and air pollution emissions, and anthropogenic CO₂ emissions on trees growing nearby three different industrial factories during the development of industry (since the 1970s) and the implementation of pro-ecological policies in Silesia (Fig. 39):

- spatial analyses and comparison of the pattern of the environmental signal (climate change and the impact of industrial pollution) recorded by pine populations growing in the area nearby different factories (steelworks, combined heat and power plants, nitrogen plants),

- spatial analysis of the environmental changes (climate change and the impact of industrial pollution) recorded in the width of annual tree-rings, in the period since 1975 up to now,

- analysis of environmental change signals recorded in the composition of stable isotopes in three components of annual tree increments: total wood ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ isotopes), cellulose ($\delta^{18}\text{O}$ and $\delta^{13}\text{C}$) and glucose ($\delta^{18}\text{O}$ and $\delta^{13}\text{C}$) in 1975-2012,

0-analysis of changes in radiocarbon concentration in annual tree-rings relative to ¹⁴C concentration in CO₂ of the current atmospheric background, in the period from 1975 to 2012, with particular emphasis on the implementation of European standards (since 2000),

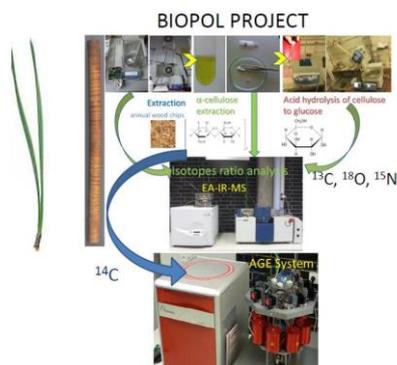


Fig. 39. BIOPOL methodology (extraction and hydrolyses) and the instruments at the Institute of Physics, The Silesian University of Technology.

- temporal and spatial analysis of the record of environmental changes in the isotopic composition of trees in the vicinity of each of the selected factories (at different distances from industrial plants) on the basis of analyses of the isotopic composition of annual pine shoots in three consecutive years: from 2012 to 2014),

- estimation of emission components from industrial environmental pollution for each individual factory.

We observed some phenomena that the project team was unable to explain based on the studies planned in the BIOPOL project, for example: higher ¹⁴C concentration in pine needle samples than ¹⁴C concentration in the current atmospheric background. This phenomenon has not been clarified at present. To understand this phenomenon, advanced research on changes in carbon isotopic composition in the needles collected from the pine populations growing in Silesia is required. Lastly, an application for funding a research project for conducting more detailed research was submitted to the National Science Center.

Project funded by the National Science Centre allocated from decision number DEC-2011/03/D/ST10/05251.

References

Sensuła B. (2015). Spatial and short-temporal variability of $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ and water-use efficiency in pine needles of the three forests along the most industrialized part of Poland. *Water Air & Soil Pollution* 226(362), 1-13.

Sensuła B. (2016a). $\delta^{13}\text{C}$ and water use efficiency in the glucose of annual pine tree rings as ecological indicators of the forests in the most industrialized part of Poland. *Water Air & Soil Pollution* 227(68), 1-13.

Sensuła B. (2016b). The impact of climate, sulfur dioxide, and industrial dust on $\delta^{18}\text{O}$ and $\delta^{13}\text{C}$ in glucose from pine tree rings growing in an industrialized area in the southern part of Poland, *Water Air & Soil Pollution*, 227 (106), 1-13.

Sensuła B., Wilczyński S. (2017a). Climatic signals in tree-ring width and stable isotopes composition of *Pinus sylvestris* L. growing in the industrialized area nearby Kędzierzyn-Koźl. *Geochronometria* 44 (1), 240-255.

Sensuła B., Wilczyński S. (2018a). Tree-ring widths and the stable isotope composition of pine tree-rings as climate indicators in the most industrialised part of Poland during CO₂ elevation. *Geochronometria* 45,130-145.

Sensuła B., Opała M., Wilczyński S., Pawełczyk S. (2015a). Long- and short-term incremental response of *Pinus sylvestris* L. from industrial area nearby steelworks in Silesian Upland, Poland. *Dendrochronologia* 36, 1-12.

Sensuła B., Wilczyński S., Opała M. (2015b). Tree growth and climate relationship: dynamics of scots pine (*Pinus sylvestris* L.) growing in the near-source region of the combined heat and power plant during the development of the pro-ecological strategy in Poland. *Water Air & Soil Pollution* 226(220), 1-17.

Sensuła B., Wilczyński S., Piotrowska N. (2016). Zastosowanie metod dendrochronologicznych oraz spektrometrycznych w monitorowaniu drzewostanów sosnowych na obszarach przemysłowych (Application of dendrochronology and mass spectrometry in bio-monitoring of Scots pine stands in industrial areas). *Sylwan* 9, 730-740.

Sensuła B., Wilczyński S., Monin L., Allan M., Pazdur A., Fagel N. (2017b). Variations of tree ring width and chemical composition of wood of pine growing in the area nearby chemical factories. *Geochronometria* 44(1), 226-239.

Sensuła B., Michczyński A., Piotrowska N., Wilczyński S. (2018b). Anthropogenic CO₂ emission records in Scots pine growing in the most industrialized region of Poland from 1975 to 2014. *Radiocarbon*, DOI:10.1017/RDC.2018.59.

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2. Dating methods and the creation of absolute time scales for palaeoclimatic reconstructions.
3. Isotopic methods in research of palaeo- and modern environments.
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The scientific programme includes plenary and poster sessions. The working language of the conference is English. The conference will be accompanied by a workshop for young scientists with lectures covering the basics of isotope and dosimetric dating methods

Deadlines

Early registration and payment: 31 January 2019
 Submission of abstracts: 15 March 2019
 Conference: 5-7 June 2019

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JAPAN

Report on the PO-5 field trip to the GSSP candidate for the Middle Pleistocene Subseries on the Yoro River (Chiba Section, Japan), held during the XIX INQUA Congress 2015, 3–4 August 2015

Organisers: Osamu Kazaoka (Research Institute of Environmental Geology, Chiba, Japan), Koji Okumura (Hiroshima University, Japan), Hisao Kumai (Osaka City University, Japan), Hisashi Nirei (Japan Branch of Geoscience for Environmental Management, Japan), Makoto Okada (Ibaraki University, Japan), Yusuke Suganuma (National Institute of Polar Research, Japan), Takeshi Yoshida (Research Institute of Environmental Geology, Chiba, Japan), Yoshimi Kubota (National Museum of Nature and Science, Japan), Kentaro Izumi (Chiba University, Japan).

Authors: Makoto Okada¹, Yusuke Suganuma²
¹Ibaraki University, Japan; ²National Institute of Polar Research, Japan.

Contact: makoto.okada.sci@vc.ibaraki.ac.jp.

The PO-5 field trip on “the GSSP candidate for the Lower–Middle Pleistocene Boundary on the Yoro River (Chiba Section)” took place over two days along the Yoro River gorge and looked at the Lower and Middle Pleistocene Kazusa Group. Thirty-nine participants including researchers from the two Italian GSSP teams and a number of members of the SQS Lower–Middle Pleistocene Boundary Working Group took part (Fig. 40). The regional distributions of the participants were as follows: 14 from Japan, 9 from China, 6 from Italy, 4 from The Netherlands, 2 from Austria, and one each from Canada, UK, India, and Kenya.

The Kazusa Group, ranging from the Lower Pleistocene to the lower Middle Pleistocene, was deposited rapidly in bathyal to shelf palaeoenvironments in the western Pacific Ocean. The average sedimentation rate is about 2.0 m ky⁻¹. The lithofacies of the Kazusa Group, mainly consisting of massive siltstone horizons and alternations of sandstones and siltstones, can be observed almost continuously along the Yoro River gorge from 2.0 Ma through to 0.6 Ma. Regarding the Kazusa Group, a substantial number of stratigraphic studies have been conducted over the past ca. 100 years, but most have been published domestically. Consequently, the Kazusa Group has received little international recognition historically, although it is one of the best preserved on-shore



Fig. 40. A group photograph for this excursion taken in front of the Chiba section outcrop.

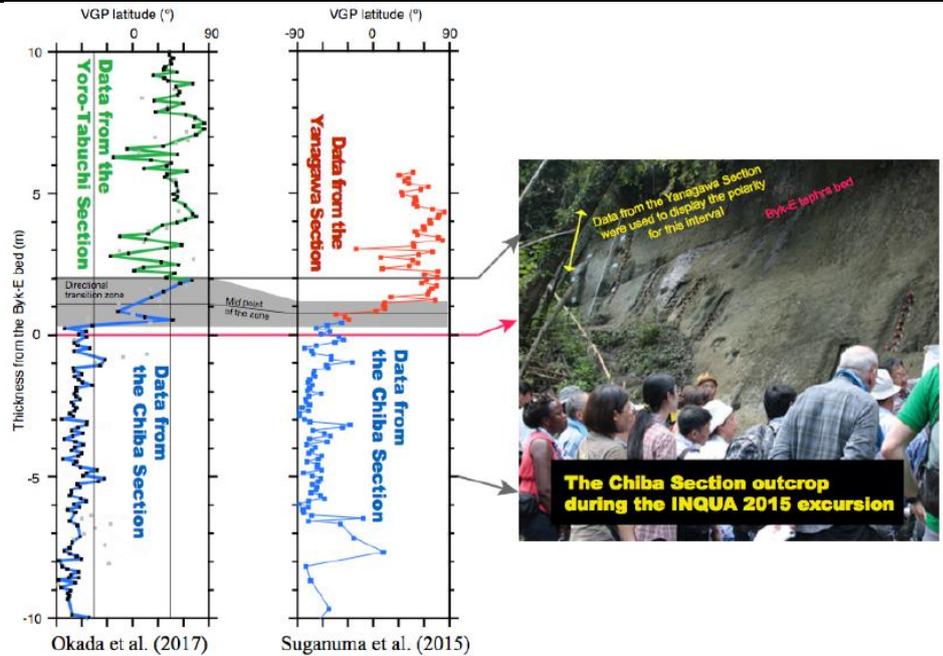


Fig. 41. Explanation for the VGP polarity display at the Chiba Section. The Chiba section extends from 15 m below to 2 m above the Byk-E tephra bed. The photograph shows the topmost 7 m horizon. The right hand VGP diagram shows the results of Suganuma et al. (2015) deploying data from the Yanagawa Section for the interval higher than 55 cm above the Byk-E bed. On the other hand, the newly taken data of Okada et al. (2017) (shown on the left VGP diagram) consists of data from the full range of the Chiba section and data from the Yoro-Tabuchi section, which is immediately adjacent to the Chiba Section, for the upper horizon. The resulting VGP latitudes of both papers exhibit very consistent variations.

marine sequences for the Lower–Middle Pleistocene in Japan and is one of three candidates for the Middle Pleistocene GSSP (Head and Gibbard 2015).

On the first day (3 August), we observed some spectacular views of the typical lithofacies of the Kazusa Group at extensive outcrops along the deeply incised Yoro River. At Stop 1, we walked on a riverside circuit trail around the meandering part of the Yoro River in the Yoro Keikoku region. We observed the upper most part of the Otadai Formation consisting of alternations of sand and siltstones, and the lowermost part of the Umegase Formation consisting of alternations of thick sandstone and thin siltstone layers. After that, we moved to Stop 2 which is at the foot of the Awamata Falls at the upper stream of the Yoro River. At Stop 2, we observed the KD18 tephra layer intercalated in the Kiwada Formation and adjacent lithologies. On the night of the first day, we stayed in the Takimien Ryokan, a traditional Japanese hotel beside the Awamata Falls, and enjoyed local Japanese food and an open-air bath at the onsen facilities.

On the second day (4 August), we stopped at the Chiba section, a candidate GSSP for the Lower–Middle Pleistocene Boundary, near the Tabuchi village along the Yoro River. At the Chiba section, we were able to observe in detail the regionally important Byk-E tephra bed intercalated within a bioturbated siltstone succession. The Middle Pleistocene GSSP will be proposed at a point along the base of the Byk-E tephra bed at this locality. At this stop, we also observed palaeomagnetic polarity data displayed on the outcrop using colored plugs placed in the sample holes. The colors indicated red for reversed, green for normal,

and yellow for transitional polarity states. Those states followed Suganuma et al. (2015).

This polarity display at the Chiba section was based exclusively on Suganuma et al. (2015). Although samples below 55 cm above the Byk-E bed were indeed from the Chiba section, those shown above were transposed from the Yanagawa section 1.7 km to the west. This display and its schematic figure used in the conference were for illustrative purposes, but its construction and intent were not explained during the excursion, for which we apologize. Samples since analyzed from the Yoro-Tabuchi section (Okada et al. 2017) now extend the palaeomagnetic record upwards in the immediate vicinity of the Chiba section and replicate the results of the Yanagawa section (Fig. 41).

References

Head M.J., Gibbard P.L. (2015). Formal subdivision of the Quaternary System/Period: Past, present, and future. *Quaternary International* 383: 4-35.

Okada M., Suganuma Y., Haneda Y., Kazaoka O., (2017). Paleomagnetic direction and paleointensity variations during the Matuyama-Brunhes polarity transition from a marine succession in the Chiba composite section of the Boso Peninsula, central Japan. *Earth, Planets and Space* 69:45, doi:10.1186/s40623-017-0627-1

Suganuma Y., Okada M., Horie K., Kaiden H., Takehara M., Senda R., Kimura J., Haneda Y., Kawamura K., Kazaoka O., Head M.J. (2015). Age of Matuyama–Brunhes boundary constrained by U–Pb zircon dating of a widespread tephra. *Geology* 43, 491–494.

OBITUARIES

In memoriam Waldo H. Zagwijn (1928-2018)



Prof. Dr. Waldo Heliendoor Zagwijn passed away on 26 June 2018 at the age of 89. Waldo dedicated his life to Quaternary geology and palaeobotany. His work was very influential for the establishment of the chronostratigraphical framework of Western Europe. The combination of his palaeobotanical and geological skills placed in a palaeogeographical context clarified the geological and vegetational developments through time for The Netherlands and Western Europe. He was much interested in vegetation development during the relatively warm interglacials and interstadials. In these periods he could use his palynological expertise and put it in a bio-, climate-, and chronostratigraphical context. He defined and named several of these warm intervals, particularly those of the early Pleistocene. These climatostratigraphical names are still used today. To facilitate geological mapping Prof. Zagwijn was also involved in the lithostratigraphic subdivision for the Netherlands and surroundings. He can be regarded as one of the most eminent stratigraphic experts for the North Sea Basin, and was active within INQUA at several positions, particularly in the Stratigraphy Commission.

Waldo Zagwijn received several awards and honors for his work, including the *Albrecht Penck Medal* (1973) of the German Quaternary Association (DEUQUA), an honorary membership of the Quaternary Research association (QRA) and International Union of Quaternary Research (INQUA). In the Netherlands he received the highest distinction in Dutch earth sciences, the *Van Waterschoot van der Gracht Medal* (1974) issued by the Royal Netherlands Geological and Mining Society. For his scientific contributions to Dutch society, he was appointed by the Queen 'Officier in de Orde van Oranje Nassau'. In 1980 he was elected a member of the Royal Netherlands Academy of Sciences (KNAW) and from 1989 to 1993 he was appointed as professor in Quaternary Palynology at the Vrije Universiteit Amsterdam.

In his PhD thesis '*Aspects of the Pliocene and early Pleistocene vegetation of The Netherlands*', Waldo Zagwijn showed for the first time that the Pleistocene included more than the four ice ages, which was the state of the art in the 1950s. Already in 1957 he argued that the onset of the Pleistocene should be placed at the occurrence of the first significant glaciation in the northern hemisphere, evidenced by the first decrease of thermophilous trees during the Praetiglian. Some earlier, less significant cooling phases had already been recognized by Zagwijn during the preceding Reuverian. Stratigraphically, above the 'Tiglian' interglacial, Zagwijn (1957, 1960) defined the 'Eburonian' glacial, 'Waalian' interglacial and 'Menapian' glacial, based on the palynological occurrence of the thermophilous taxa *Carya*, *Pterocarya* and *Tsuga* in these interglacial deposits. Based on the same species, he argued that the boundary between Early and Middle Pleistocene should be placed between the 'Menapian' and 'Cromerian'. In 1984, Zagwijn & de Jong described the 'Bavelian' interglacial complex chronostratigraphically located between the 'Menapian' and 'Cromerian', which marks the end of the Early Pleistocene. Waldo Zagwijn also worked on the Middle Pleistocene and Late Pleistocene warm phases where he focused on particularly the 'Amersfoort', 'Moershoofd' and 'Hengelo' interstadials (Zagwijn, 1989). At the end of his professional career, Waldo focussed on Eemian and Holocene climate reconstructions based on climate indicator species, and also made an estimate of Eemian sea-level fluctuations (Zagwijn, 1996). With his last papers, he covered most interglacials and interstadials that are currently known within the Quaternary.

The Quaternary community has lost an inspiring scientist who literally worked along the full Quaternary time scale. Waldo Zagwijn will be remembered for his contributions to the subdivision of the terrestrial Pleistocene of Western Europe, and to Quaternary geology in general.

Wim Hoek, Utrecht University & Henry Hooghiemstra, University of Amsterdam, The Netherlands

Selected references

- Zagwijn W.H. (1957). Vegetation, climate and time-correlations in the Early Pleistocene of Europe. *Geol. Mijnb.* 19, 233-244.
- Zagwijn W.H. (1960). Aspects of the Pliocene and early Pleistocene of The Netherlands. PhD thesis, University of Leiden. *Mededelingen Geol. Stichting, Serie C-III-1(5)*, 1-78.
- Zagwijn W.H. (1974). The Pliocene –Pleistocene boundary in western and southern Europe. *Boreas* 3, 75-97.
- Zagwijn W.H., de Jong J. (1983). Die Interglaziale von Bavel und Leerdam und ihre stratigraphische Stellung im niederländischen Früh-Pleistozän. *Meded. Rijks Geol. Dienst*, 37, 155-169.
- Zagwijn W.H. (1985). An outline of the Quaternary stratigraphy of The Netherlands. *Geol. Mijnb.* 64, 17-24.
- Zagwijn W.H. (1989). Vegetation and climate during warmer intervals in the Late Pleistocene of western and central Europe. *Quat. Int.* 3/4, 57-67.
- Zagwijn W.H. (1992). The beginning of the ice age in Europe and its major subdivisions. *Quat. Sci. Rev.* 11, 583-591.
- Zagwijn W.H. (1996). An analysis of Eemian climate in western and central Europe. *Quat.Sci.Rev.*15, 451-469.

In memoriam Louis J. Maher, Jr. (1933-2018)



This well-known Quaternary palynologist died on 22 August, 2018 after a long illness. He was born in Iowa City in 1933 and did his undergraduate studies at the University of Iowa. He studied palynology with Professor H.E. Wright, Jr. at the University of Minnesota for his Ph.D. Lou and his wife Jane moved to the University of Wisconsin-Madison (UW) in 1962 following a NATO-supported post-doctoral year in Cambridge, England. At UW, Lou began a long career of giving lectures in Introductory Geology classes in which he taught thousands of students. He also regularly taught Quaternary Palynology. Lou earned his flying license in a University-owned Cessna 170 and acquired a treasure trove of aerial photographs of geology in the American West that enhanced his teaching. They can be viewed [here](#).

Lou was a Fellow of the American Association for the Advancement of Science and the Geological Society of America. He was a member of the American Association of Stratigraphic Palynologists, the American Quaternary Association, the Ecological Society of America, the Palaeobotanical Section of the Botanical Society of America, Sigma Xi, and the Wisconsin Academy of Science, Arts and Letters. He was a member of the Editorial Board of *Review of Palaeobotany and Palynology* from 1985-1991. He served on the Advisory Board of the North American Pollen Database beginning in 1990, and worked on the Global Pollen Database beginning in 1999. He also served on the Board of the International Quaternary Association (INQUA) Holocene Sub-commission Working Group on Data-Handling Methods, 1987-2002; and was editor from 1990-1997.

Lou is remembered by Quaternary colleagues for his work on mathematical methods for estimating uncertainty in pollen assemblages (Maher, 1972; 1981; 1985; 2012; Grimm et al., 2009), for his generosity in sharing programmes he wrote for data analysis through the INQUA file boutique, and for his contributions to the Quaternary history of Colorado (Maher, 1963; 1972), New Mexico (Wright et al., 1973), and the Great Lakes region (Maher, 1977; Baker et al., 1992; Maher and Mickelson, 1996; Maher et al., 1998), including his classic study of the history of Devil's Lake, Wisconsin (Maher, 1982). He often employed innovative and creative approaches, including using *Ephedra* pollen to document long-distance dispersal (Maher, 1964) and analysing pollen in deposits of bat guano in caves (Maher, 2006). He especially enjoyed the informal field meetings of the Friends of the Pleistocene. After his retirement he co-authored "Geology of the Ice Age National Scenic Trail" (2011) with David Mickelson and Susan Simpson. Lou's cheerful attention to detail and ready laugh continue to remind us that we are lucky to do such interesting work.

David M. Mickelson & Sara C. Hotchkiss, University of Wisconsin-Madison, USA

References

- Baker, R., Maher, L., Chumbley, C., & Van Zant, K. (1992). Patterns of Holocene Environmental Change in the Midwestern United States. *Quaternary Research*, 37(3), 379-389.
- Grimm, E.C., Maher, L.J., & Nelson, D.M. (2009). The magnitude of error in conventional bulk-sediment radiocarbon dates from central North America. *Quaternary Research* 72, 301-308.
- Maher, Jr., L.J. (1963). Pollen Analyses of Surface Materials from the Southern San Juan Mountains, Colorado. *GSA Bulletin* 74, 1485-1503.
- Maher, Jr., L.J. (1964). *Ephedra* Pollen in Sediments of the Great Lakes Region. *Ecology* 45, 391-395.
- Maher, L. (1972). Absolute Pollen Diagram of Redrock Lake, Boulder County, Colorado. *Quaternary Research*, 2, 531-553.
- Maher, L.J. (1972). Nomograms for computing 0.95 confidence limits of pollen data. *Review of Palaeobotany and Palynology* 13, 85-93.
- Maher, L.J. (1977). Palynological Studies in the Western Arm of Lake Superior. *Quaternary Research* 7, 14-44.
- Maher, L.J. (1981). Statistics for microfossil concentration measurements employing samples spiked with marker grains. *Review of Palaeobotany and Palynology*, 32, 153-191.
- Maher, L.J. (1982). The Palynology of Devils Lake, Sauk County, WI. *Quaternary History of the Driftless Area*. University of Wisconsin Extension, Geological and Natural History Survey, Madison, WI.
- Maher, L.J. (2006). Environmental information from guano palynology of insectivorous bats of the central part of the United States of America. *Palaeogeography, Palaeoclimatology, Palaeoecology* 237, 19-31.
- Maher, L.J., & Mickelson, D.M. (1996). Palynological and Radiocarbon Evidence for Deglaciation Events in the Green Bay Lobe, Wisconsin. *Quaternary Research* 46, 251-259.
- Maher, L.J., Miller, N.G., Baker, R.G., Curry, B.B., and Mickelson, D.M. 1998. Paleobiology of the Sand Beneath the Valdres Diamicton at Valdres, Wisconsin. *Quaternary Research* 49, 208-221.
- Maher L.J., Heiri O., & Lotter A.F. (2012). Assessment of Uncertainties Associated with Palaeolimnological Laboratory Methods and Microfossil Analysis. In: Birks H., Lotter A., Juggins S., Smol J. (eds) *Tracking Environmental Change Using Lake Sediments. Developments in Paleoenvironmental Research*, vol 5. Springer, Dordrecht.
- Mickelson, D.M., Maher, Jr., L.J., & Simpson, S.L. (2011). *Geology of the Ice Age National Scenic Trail*. University of Wisconsin Press, Madison.
- Wright, Jr., H.E., Bent, A.M., Hansen, B.S., & Maher, Jr., L.J. (1973). Present and Past Vegetation of the Chuska Mountains, Northwestern New Mexico *GSA Bulletin* 84, 1155-1180

In memoriam John Shaw (1943-2018)



Over a long and influential career, John Shaw did much to advance understanding of glacial and fluvial landscapes, sediments, and processes, while seeding the field with provocative ideas. His work rested on keen and careful observation accompanied by meticulous notes and sketches, astute analysis, application of fundamental physics and process mechanics, and innate curiosity, along with occasional flights of insightful imagination.

After a childhood spent in Glasgow and Leeds, John was awarded a BSc and PhD from the University of Reading. As a graduate student he was supervised by Peter Worsley and was persuaded of the value of the process-based analysis of sedimentary processes that he learned from John R.L. Allen. Traces of Allen's influence can be seen in much of John's work throughout his career. During his PhD, John had an extended visit to University of Uppsala which was a centre for quantitative and experimental analysis of fluvial and glacial landscapes. He returned to Sweden for research at Uppsala in 1975 and in Lund in 1978 and 1980, and gave his last lecture at Lund.

John began his academic career at the University of Alberta (Edmonton, Canada) in 1969. The glacial sediments and landforms of Canada inspired his work on glacio-lacustrine sediments in the Okanagan Valley, British Columbia, and on till genesis and glacial landforms on the plains of Alberta. An expedition to Antarctica (with Terry Healey) during a sabbatical leave at University of Waikato, New Zealand, produced work on Antarctic fluvial processes and foundational analysis of sublimation till. For his contributions the Shaw Trench was named after him. He returned to New Zealand for a sabbatical leave at Auckland in 1986-87. While at Alberta he also collaborated on topics in fluvial geomorphology with river engineers Rolf Kellerhals and Gary Parker, and his friend and geomorphology colleague Bruce Rains, leading to studies of gravel anti-dunes, seminal analysis of downstream fining in large Alberta rivers, and collaboration in experiments on pro-glacial, braided-river sedimentary processes.

During the 1970s and 1980s, John made significant contributions to understanding till genesis and developing classification criteria for tills. He was a member of two INQUA Commissions on till genesis and classification: Commission on Glacigenic Sediments and Commission on Formation and Properties of Glacial Deposits, 1973-1989. John was a lively contributor and some remember his intense exchanges with Geoffrey Boulton and others. His experiences and interactions as part of his Commission work inspired his work on melt-out till and Rogen moraine based partly on field work in Sweden in the late 1970s.

In the early 1980s, John began to contemplate larger scale subglacial meltwater processes inspired initially by drumlins in the Livingstone Lake area in northern Saskatchewan. From 1982-1990 John was a Professor in the Geography Department at Queen's University, Kingston, Ontario. At Queen's he and Bob Gilbert worked on local glacial erosion marks and larger scale subglacial tunnel valley networks. From these studies he laid the groundwork for development of the 'meltwater hypothesis' for subglacial bedforms linking erosional forms to detailed flow structures over many orders of magnitude. His research on erosional marks was supported by experimental and theoretical collaborations with mechanical engineer colleague Andrew Pollard, who helped to provide the fluid dynamic basis for some of John's observations and concepts. During this time he also co-authored, with Gail Ashley and Norm Smith the widely cited (and still available) SEPM handbook on Glacial Sedimentary Environments.

John continued his work on subglacial meltwater processes after he returned to the University of Alberta (1990-2011) as Chair of Geography, then as a member of the Department of Earth and Atmospheric Sciences. With Bruce Rains and their students he did both detailed and synoptic work on glacial landforms of Alberta in relation to the glacial meltwater hypothesis. He also collaborated with the Geological Survey of Canada on a map of large, regional-scale flow tracts of subglacial bedforms across Canada. John and his students pursued his ideas on drumlins, hummocky terrain, tunnel channels and eskers, relating them to the meltwater hypothesis, including a re-assessment of the sources of water to the Channeled Scablands of Washington state. He also initiated and continued work on the stunning meltwater erosional bedrock landscapes around Georgian Bay, Lake Huron where he carried out his last field session in summer 2017.

John raised fundamental questions about glacial processes and glacial landscapes leading to ideas about which some are highly critical but that have undeniably stimulated the field. The global implications of this work extend to marine records, on which he did research at Bedford Institute, Nova Scotia in the 1990s, and have implications for understanding of catastrophic sea-level rise and thick glaciomarine flood deposits. John was a nominee for the Kirk Bryan Award of the Geological Society of America, and was awarded a D.Sc. (2000) by the University of Reading for the advancement of learning and distinguished research.

As a teacher John engaged students with his enthusiasm, clarity of ideas and his encouragement for them to have confidence to think for themselves. His approach to field observation and the grounding in physical theory served many a student very well in their research and future careers. He was an early proponent of applying physical theory to geomorphic processes and pushed his students to do the same. Many will think of him standing in a gravel pit pushing students to observe, think, imagine (but not too much!) what was there and what processes and events might explain things.

John and Jean Frost were married in Edmonton in 1979. John was always devoted to his wife, two sons, two grandsons and his extended family, and they supported him through his personal challenges. Away from work, he was a life-long lover of soccer, playing for the University of Reading team and remaining active throughout his life both as an excellent player and a coach of youth, including his two sons', and Jean's teams. He was generous in all aspects of his life, and was a lively companion and conversationalist, with a sly and lively sense of humour, keen to learn from others and always wanting to know what his former students were working on. And he was always up for a good argument.

John dared to disrupt complacent ideas about glacial landscapes and persuaded many to look at them in new ways. He raised the level of scientific inquiry of landscape for all of us with a persistence and enthusiasm to pursue ideas wherever they led, and with dignity and humanity despite the personal toll. His discoveries of some of the secrets of glacial landscapes, and his career as a researcher and teacher, were driven by a fundamental respect for people, science, landscape, integrity and ideas.

A special session was held at CANQUA-AMQUA conference in Ottawa in August this year to celebrate John and his career. John's family and many of his former students, colleagues, and friends contributed, including: Gail Ashley, Peter Ashmore, Victor Baker, Peter Barnett, Don Boyes, Tracy Brennand, Paul Carling, Mike Church, Timothy Fisher, George Gorell, Neale Gorrell, Sylvi Haldorsen, Claire Hay, Norman Jones, Alan Kehew, Don Kvill, Guy Leduc, Joan McCalla, Mandy Munro-Stasiuk, Dana Naldrett, Gary Parker, Jan Piotrowski, Andrew Pollard, Chris Smart, Dan Smith, David Sharpe, Norm Smith, Peter Worsley, Willem Vreeken. We are grateful to all who supported and attended the session.

The closing presentation by Dave Sharpe was of John's final lecture, at Lund University, and Guy Leduc's short video of John during his last field campaign at Georgian Bay in the summer of 2017 which can be viewed via the following [link](#).

Prepared using input from several of John's former students: Peter Ashmore, Tracy Brennand, Tim Fisher, George Gorrell, Jerome Lesemann, Mandy Munro-Stasiuk, David Sharpe, Darren Sjogren, Shawn Slattery, Chris Smart and Rob Young, with additional information from Jean Frost and Sylvie Haldorsen.

Photo credit: Willem Vreeken.

Peter Ashmore, Western University, Canada