



## WORKING GROUP on GEOARCHAEOLOGY

International Association of Geomorphologists (IAG)  
Association Internationale des Géomorphologues (AIG)

# Newsletter 17

December 2016

Edited by Yasuhisa Kondo

*The Working Group defines Geoarchaeology as “the geosciences and geographical methods and techniques applied to prehistory, archaeology, and history”. Its aim is to promote Geoarchaeology in an open-minded way and from an interdisciplinary point of view. (Fouache et al. 2010: 307)<sup>1</sup>*

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<sup>1</sup> Fouache, É., Pavlopoulos, K., Fanning, P. (2010): Geomorphology and geoarchaeology: cross-contribution. *Geodinamica Acta* 23: 207–208. <http://doi.org/10.1080/09853111.2010.9736394>



## Chair's word

Dear members,

Wishing you a pleasant winter with enjoyable missions.

Under the auspice of International Associations of Geomorphologists (IAG), our Working Group on Geoarchaeology has been actively organising scientific sessions in a number of international conferences for years. This academic community keeps growing with the aid of social network services.

In the next year 2017, the Working Group will coorganise a series of very important International Conferences with special sessions in geoarchaeology. Among these are the geoarchaeology sessions titled 'Geoarchaeology: Human impact, adaptation and response to climatic and environmental change from the past to the present' and 'Geoarchaeology in tectonically active regions', which is to held at the European Geosciences Union (EGU) General Assembly 2017. For detail, please see the call for papers in this newsletter. Your contributions to this session will highly be appreciated.

Let me remind you that the aim of this newsletter is to broadcast all information's that Working Group on Geoarchaeology members which to announce in the field of Geoarchaeology. You are thus invited to send any information you would like to read in the next Newsletter planned in Fall 2017.

December 2016



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## Activity report 2015–2016

The IAG/AIG Working Group on Geoarchaeology (hereafter called WGG) was founded by Professor Morgan De Dapper and his colleagues at the 4<sup>th</sup> International Conference of Geomorphology (ICG) held at Bologna in 1997.

### Board members 2013–2017

The current board members were nominated and approved at the 8<sup>th</sup> ICG held at Paris in August 2013, and will work for the Working Group until August 2017:

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### **Main objective for 2013-2017**

- 1) To structure an international network of national associations, and scientists (including geomorphologists, geologists, archaeologists, paleoenvironmentalists, and more) involved in the field of geoarchaeology and to increase the distribution of the electronic newsletter.
- 2) To promote regional area of interest on the point of view of geoarchaeology.
- 3) To publish a collective geoarchaeological field book.
- 4) To organize at least two intensive field trips for young geoarchaeologists.
- 5) To continue to encouraged regional syntheses in geoarchaeological studies.

### **Conferences**

Sjoerd Kluiving coorganised the session titled 'Geoarchaeology: Human adaptation to landscape changes, landscape resilience to human impact and integrating palaeoenvironmental and archaeological record' with Wiebke Bebermeier, Maurits Ertsen, Andy Howard, Tony Brown, Vanessa Heyvaert, Lisa-Marie Shillito, Julie Durcan, and Robyn Inglis at the European Geosciences Union General Assembly 2016, held in Vienna on April 17-22, 2016. Tara Beuzen-Waller, Friederike Stock, and Yasuhisa Kondo organised the session titled 'New Contributions to Geoarchaeology' at the eighth World Archaeology Congress, held in Kyoto on August 28 to September 2, 2016. It is also noted that the International Association of Geomorphologists (IAG) entered in Memorandum of Understanding with the International Geography Union (IGU) on the occasion of the 33rd International Geographical Congress (IGC), held in Beijing in August 2016.

### **Publications**

#### *Journal special issues*

Four of the papers read in the geoarchaeology session in the 8<sup>th</sup> ICG were published in *Archaeological and Anthropological Sciences* (<http://link.springer.com/journal/12520>) in 2014 and 2015.

#### *Newsletter*

The WGG publishes the *Newsletter, IAG Working Group on Geoarchaeology* once a year to diffuse information in the field of geoarchaeology, such as conferences, field trips, publications, and calls for scientifically projects to be announced. The WGG published the 16th issue of Newsletter in November 2015 and the current issue in December 2016 in an electronic format, which is available at the WGG's website (<https://sites.google.com/site/iaggeoarch/newsletter>). The next issue will be published in

late 2017.

## **Web services**

The website of WGG was launched in September 2013. The website is associated with a variety of social network services. These online services are expected to facilitate our academic networking and communications, together with newsletters to be issued annually in an electronic format. This section briefly introduces the WGG's web-based services.

### ***Website***

<http://iag-geoarch.org/>

The WGG's website functions as a gateway and hub of the online services. The site is powered by Google Sites. On the top page, widgets show a timeline of the twitter account (@IAG\_geoarch) and Google Groups, news headlines and links to Facebook and LinkedIn Group sites. The site includes static contents such as the history of the WGG, a list of board members and contact information. The site also serves back number of this Newsletter. A shared Google Calendar is embedded. Only webmasters can edit the pages.

In 12 months between October 1, 2015 and September 30, 2016, 1,715 unique users viewed 3,458 pages in total, accessed from 82 countries, topped by the United States (19.4 %), United Kingdom (12.4 %), unknown origins (11.1 %), Japan (7.58 %), Germany (5.75 %), France (5.24 %), Russia (5.05 %), Italy (3.27 %), Spain (2.99%), and Brazil (2.15 %),

### ***Google Groups***

[https://groups.google.com/forum/#!forum/iag\\_geoarch](https://groups.google.com/forum/#!forum/iag_geoarch)

The WGG uses Google Groups for the group's interactive mailing list. Any students, researchers and professionals are welcomed to join by registering at <https://sites.google.com/site/iaggeoarch/contact-us>. The registration is free of charge but requires a Google account. Once enrolled, subscribers may receive mails from the WGG members as posted, and are allowed to post their own messages. As of December 12, 2016, 221 members subscribed the mailing list (15 new members in the last 14 months), and 109 topics had been posted since its launch in September 2013.

### ***Facebook***

<https://www.facebook.com/IAGgeoarch>

Facebook (<https://www.facebook.com/>) is one of the most popular social networking services today. The WGG manages a Facebook page, which functions as an alternative

open and interactive website of the group. News and information posted to the mailing list is replicated in the Facebook page. Every Facebook user is allowed to post comments to it. We have received 470 Total Page Likes until December 12, 2016 (206 new Likes in the last 14 months).

### *LinkedIn*

The WGG also uses LinkedIn (<https://www.linkedin.com/>), a social networking service specialising in professional networking and job seeking. It is a closed service, and acts as another alternative of the website and mailing list for LinkedIn users. Posts to the mailing list are replicated. Group members are allowed to post discussions, job calls and other promotions. As of December 12, 2016, the LinkedIn group had 168 members (12 new members in the last 14 months).

### *Twitter*

[https://twitter.com/IAG\\_geoarch](https://twitter.com/IAG_geoarch)

Twitter (<https://twitter.com>) is a broadly used micro blogging service. It was employed for the WGG to make instant and short announcements for followers. It also facilitates to aggregate information associated with geoarchaeology on the web. Tweets are posted by anonymous administrators. Until December 12, 2016, the WGG's twitter account (@IAG\_geoarch) had 225 followers (82 new followers in the last 14 months).

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*Yasuhisa Kondo*

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**Acknowledgement:** Yaning Wang, Technical Assistant of the Research Institute for Humanity and Nature and doctoral student of the Department of Archaeology, Kyoto University, kindly helped me editing this issue, to which I am deeply grateful.

Scientific essays

## Open discussion: Geoarchaeology as *Geoarchaeology*

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In 2011 K. Butzer considered that the main dichotomy of the current geoarchaeological research is whether its practice gives priority to technical issues or, by contrast, to its objectives. And although this observation is absolutely right, really it only talks about of the dissension between an orientation conducive to a subsidiary consideration of the discipline, against another one that encourages a proactive approach, more autonomous and integral of them. Thus, this disagreement is not something specific to the current geoarchaeological praxis, but, on the contrary, is a matter that could be considered inherent to the discipline itself since its beginning. Since the sixties of the last century (Brothwell and Higgs, 1963), indeed, technical and scientific applications at the service of archaeological research not ceased to grow and diversify (Miskovski *et al.*, 1987), such that auxiliary sense of the geoarchaeology above mentioned soon became one of its main hallmarks. From there, there was but a small step to think of it as in an "auxiliary branch of archaeology", making of the application of the concepts and methods of Earth Sciences to archaeological research its main task (*i.g.* Rapp and Gifford, 1985; Waters, 1992; Cardoso, 1996; Rapp and Hill, 1998). Thus, the geoarcheologists were progressively choosing among a discipline understood as an archaeology that uses procedures other sciences in his research, that is, a *geoarchaeology as archaeology*; or a discipline understood as a geology that finds its study subject in the archaeological sites, that is, a *geoarchaeology as geology*.

However, whereas this notion of the geoarchaeology conceived as an accessory instrument progresses in either of its two variants (*geoarchaeology as archaeology* or *geoarchaeology as geology*), a different way of understanding the role that geoarchaeology can play in the study of History gradually emerges. Seen from the present, this other concept was not an alternative within said subaltern notion of the geoarchaeology, but a new strategic overview from which must be consider: first, that the commonly known

issues as "archaeological problems" really are geoarchaeological troubles (Renfrew, 1976), so all stratigraphic sequence concerned by human action could be read as a *geoarchaeological record*, because is the result, both genetic sense as chronological, of the joint action of natural and cultural processes; second, that the geoarchaeology should only be responsible for solving geoarchaeological problems, and not of the other kind, meaning those that are derived from historically established relations between human groups and their natural environment (Schiffer, 1987); and lastly, that the final characterization of any human occupational context depends, ultimately, of the historical process of "anthropization" (that is, of the particular evolution of the human activity and its capacity to modify the structure and/or functioning of the natural system), so that any transformed area by humans should be categorized as a "anthropized environment"; that is to say, as a sector of the earth's surface whose configuration and / or dynamism can be explained, at any time of historical evolution, as the result of the combination of natural and human factors (Borja, 1993). Therefore, emphasizing the importance of the natural component of the historical process from a comprehensive perspective, the geoarchaeology not only hopes to obtain its own interpretation of the archaeological evidence (Cremaschi, 2000), but also aims to enunciate a specific scientific narrative and, consequently, to have its own subject of study, objectives and methodology (Borja, 1993; 2014), and, thus, become a *geoarchaeology as geoarchaeology*.

This other conception of the geoarchaeology provides it a sufficient autonomy to raise new questions and answer them for itself; new issues, therefore, arising from the historic co-evolution among humans and nature, that never before were considered neither from the archaeology nor the geology. This would mean further a discipline able to reconcile the natural and anthropogenic causes of the recent evolution of the natural environment, both in terms of balance between each other, as in terms of thresholds, which allows a interpretation differentiated of the effectiveness of morphogenesis according to what extent the alteration that human action may have led to a certain territory (through land use change, mainly); that, in current terms, could be equated with the concept of resilience.

Seen from this strategic way, the natural environment acquires a positive role as an ingredient of the human society evolution, as a component of the historical process understood in its widest possible sense (Gladfelter, 1981; Leveau, 1995). In this way thinks, for example, C. French (2003), who argues that the geoarchaeology should focus on the combined study of archaeological and geomorphological records, and to recognize how any process, both natural (*i.e.* climate change) or manmade (*i.e.* land use), can modify the functioning of the physical environment. This author also believes that the mission of this discipline is to build integrated models such as "human system / natural-system", asking nature what is the sequence and the natural or human causes of landscape changes. Three



years later, Goldberg and Macphail (2006) insist on this idea, specifying that the goal of the geoarchaeology should be to help understand "human impact on the landscape", arguing, as it did in the early nineties concerning to the concept of, in Spanish, *formaciones superficiales antrópicas* (Borja, 1993), that "old soils and deposits occupation" are the real object of study of discipline.

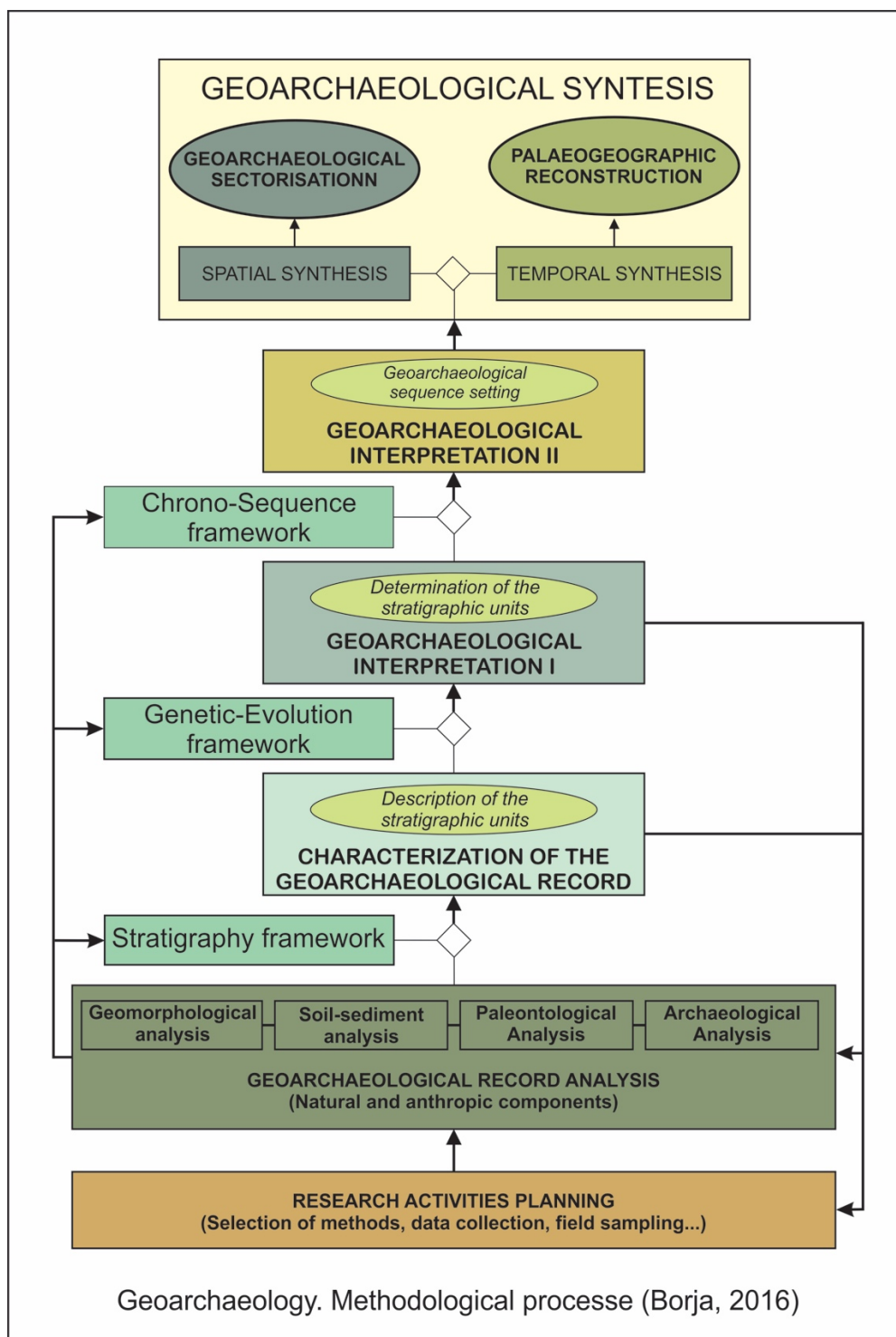


Figure 1. Methodological process of geoarchaeology.

Hence, the geoarchaeology can be seen as a field of science which aim would be to contribute by itself, providing a specific meaning, according with K. Butzer, as an independent knowledge but necessarily interdisciplinary, at the study of the History; that is, geoarchaeology would deals the systematic analysis of the linkage between human activity and the dynamics of the natural environment, both from the point of view of its temporal dimension, as in regard to their spatial expression (Borja, 2014). So, from a generic approach, this substantive conception of geoarchaeological discipline concerned with the study of the *anthropized* environment, while from an operational point of view, soils and sediments affected by human activity (*formaciones superficiales antrópicas*) would be its true study subject.

Finally, as regards the methodological procedure (*Figure 1*), this integral vision of the geoarchaeology also must operate with a specific protocol, whose ultimate goal is to access the geoarchaeological synthesis in terms of palaeogeographic reconstruction (temporal dimension) and of geoarchaeological sectorization (spatial dimension). The first one consists to identify different developmental stages of the relationship established between the physical environment and human occupation, determining the causes of the transition from one stage to another, and whether they are of natural or anthropogenic kind; while the target of the second one is determine potential areas into the man-made environments (the sites, in the broadest possible sense of the term) which share similar geoarchaeological records, and proceed with the elaboration of its cartographic delimitation.

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## **Out of Africa:**

### **Geoarchaeological research in the Eastern Desert of Egypt**

Karin Kindermann, Felix Henselowsky, Philip Van Peer and Olaf Bubenzer

It is generally agreed upon that modern man came from Africa to Eurasia sometime in the last 100,000 years; academics do not, however, always agree on the routes that were taken. This question is the focus of the Collaborative Research Centre 806 (CRC 806; <http://www.sfb806.uni-koeln.de>) “Our Way to Europe: Culture-Environment Interaction and Human Mobility in the Late Quaternary” based at the universities of Cologne, Bonn and Aachen. Within the framework of this large-scale project (funded by the Deutsche Forschungsgemeinschaft, DFG) academics of different disciplines are investigating possible routes that anatomical modern humans (*Homo sapiens sapiens*) may have taken to Eurasia. In this context, Northeast Africa can be considered a key region, as it connects Africa with the southern Levant by the bottleneck of the Sinai Peninsula. The focus of the archaeological and geoarchaeological investigations is on the ancient context of climate, natural environment and culture with a major perspective on the dispersal of human populations.

Initial point for the research in Northeast Africa was Sodmein Cave (*Figure 1*), which is located about 40 km north-northwest of the modern town Quseir in an isolated limestone complex of the Egyptian Red Sea Mountains. Although it was discovered over 30 years ago (Prickett 1979), a systematic scientific research was not carried out until the 1990s by the “Belgian Middle Egypt Prehistoric Project” (BMEPP) of the University Leuven (i.a. Moeyersons et al. 2002; Vermeersch and Van Peer 2012). Nevertheless, many issues are still outstanding at this important archaeological site. Hence, research has resumed since 2010 through cooperation between the universities of Cologne and Leuven within the CRC 806 project A1: “Out of Africa - Late Pleistocene Rock Shelter Stratigraphies and Palaeoenvironments in Northeastern Africa” (Kindermann et al. 2013).

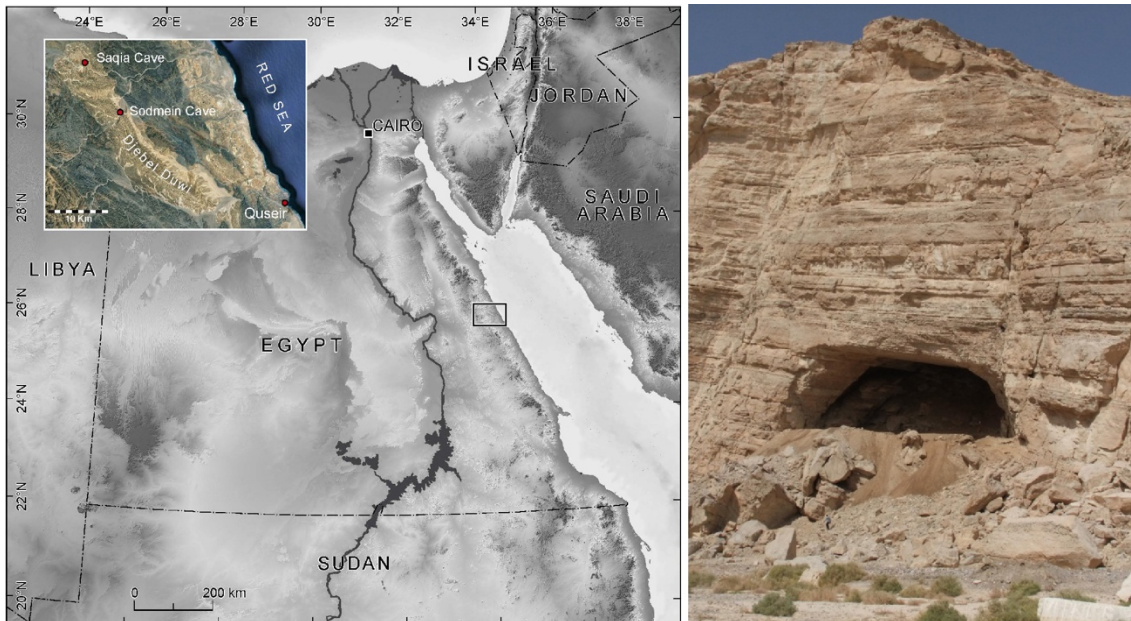


Figure 1: Left: Location of the research area at Sodmein Cave in the Egyptian Eastern Desert (square). The inlay illustrates Djebel Duwi and the site Sodmein Cave. Right: Wadi Sodmein with the cave during excavation 2010.

The sequence of Sodmein Cave – with more than 4 m, containing stratified human occupation debris – indicates that the cave was visited regularly by humans during the Pleistocene, as well as later during the Holocene. The lowest levels can be attributed to the early Nubian Complex, the regional manifestation of the Middle Stone Age (MSA) in Northeast Africa, and have been dated by TL-dates of flint artefacts about 120 ka (Mercier et al 1999; Schmidt et al. 2015). It attests human presence during the last Interglacial and indicates that the environmental conditions were considerably more favorable than the current dry desert climate. The archaeological excavations were accompanied by sedimentological and micromorphological investigations for a better understanding of the site formation processes (Figure 2).



*Figure 2: Archaeological and geotechnical investigations at Sodmein Cave – i.a. archaeological excavation, micromorphological sampling, sediment analysis and laser scanning.*

In the nearer surrounding of the cave several geotechnical surveys were conducted, giving a good insight into the former Late Pleistocene landscape development of the area and help to identify potential locations of archaeological finds. By analyzing satellite images in the area around Sodmein Cave, for instance, numerous well-preserved surface remnants (terraces) were documented. Surveys on these old terraces, showing mainly dark desert pavement, yielded preferentially Pleistocene artefact concentrations. Hence, it became increasingly clear that these terraces represent parts of the former Pleistocene surface. Such old wadi terraces and small playa basins in correlation with archaeological finds give us information about the human behavior in this area and provide palaeoenvironmental evidences, derived from sedimentological and morphometrically analysis of the given landscape features.

Unfortunately, the political situation in Egypt changed after the Arab Uprisings in autumn 2010 and fieldwork was not always possible as planned because of unrests, elections or permit delays. Therefore, some of the scheduled field investigations, laboratory analyses as well as datings had to be postponed. Another modern threat is the mining of limestone by heavy machinery in the immediate surroundings of Sodmein Cave (Kindermann et al. 2013). On the satellite images from the years 2003, 2011 and 2016 the influence and destruction of the mining is clearly visible over the years (*Figure 3*).

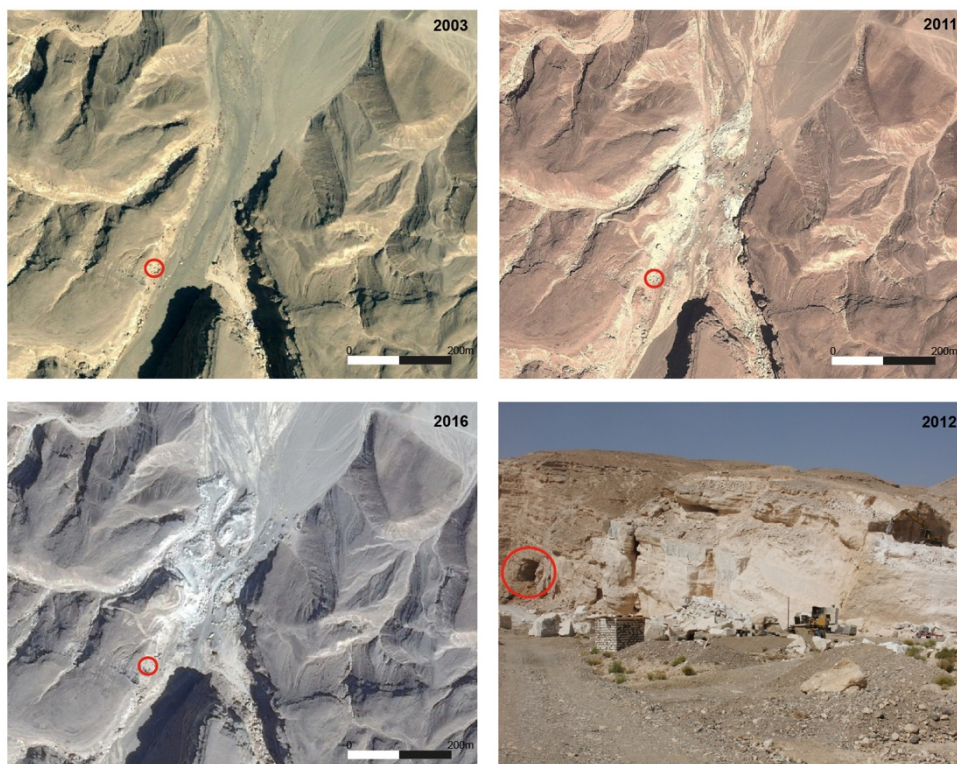


Figure 3: Satellite images (GoogleEarth) from 2003, 2011 and 2016 visualizing the disturbance over the years by the mining company. The photograph from 2012 is showing the limestone exploitation by heavy machinery. The red circle marks the location of Sodmein Cave.

Against this background of the current threats we will continue with the geoarchaeological research in this area, to obtain as much information as possible. In order to reconstruct regional human-nature interactions, it is planned to focus on modeling and the reconstruction of the regional settlement history. Sodmein Cave is an exceptional archaeological site in north-eastern Africa, with a unique stratigraphy of human occupation debris ranging from MIS 5 until the Holocene and hence its investigation promises further insights for the 'Out-of-Africa' debate.

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## **Seismic faulting and palaeo-liquefaction in an ancient harbor**

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Remains of a 2300 years-old mole have been identified at Palairos, SW Greece mainland. This mole is submerged a few meters due to tectonic effects and global sea-level rise, and has an unusual Z-type shape: its main axis seems to be laterally shifted by several meters (*Figure 1*) with no signs of a substantial vertical deformation.

Hence the question arising is whether this shape reflects an original construction (for example a mole built above certain shoals), or a post-construction deformation?

Clearly, the area is prone to earthquakes and to strike slip faulting tending to produce lateral (strike-slip) displacements, but the apparent offset in *Figure 1* is too large to have been produced by tectonic deformation associated with the faults expected in the area.

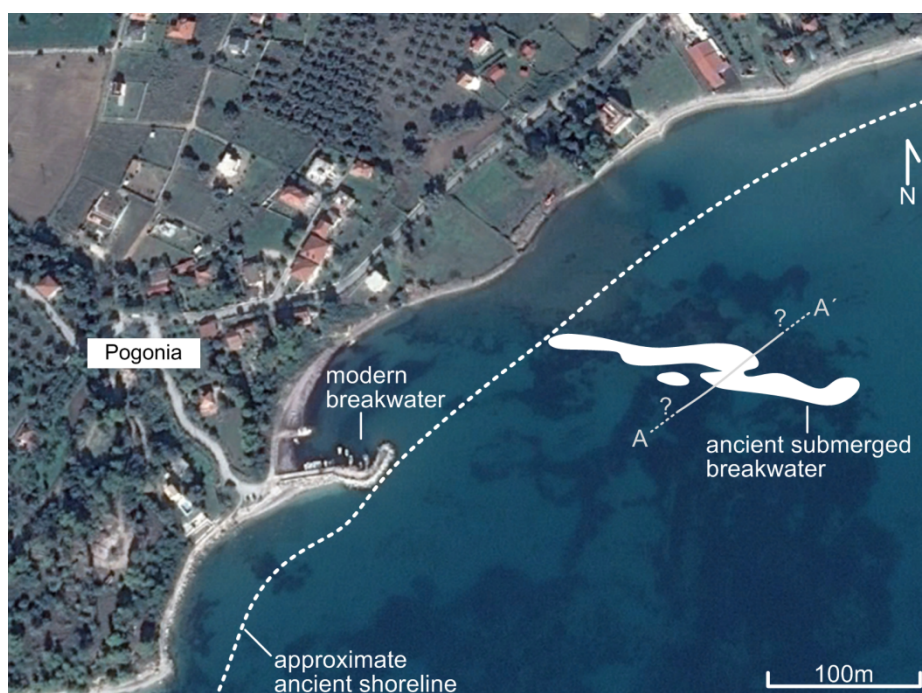


Figure 1. The Palairos mole superimposed on Google Map Imagery (after Stiros and Saltogianni, 2016). The unusual shape of the mole is explained as a combined result of seismic tectonic faulting and of seismic sliding on sediments liquefied during the first part of the earthquake. Several other possible explanations were examined, but they were discarded.

### **Proposed Scenario**

In order to provide a plausible explanation for the shape of the ancient mole, we examined all possible scenarios which may explain its present-day pattern: original construction, uneven erosion, tectonic offset, sliding, etc. Still, all these explanation seemed unlikely. For example gravitational sliding would shift the east part of the mole to the east, towards the deep part of the gulf, not towards SW.

Only the following scenario was likely:

- (i) A strike slip fault crossing the ancient structure reactivated during an earthquake of rather medium size (magnitude around 6 in the Richer scale) and produced minor *tectonic* offset (<1m) in the mole.
- (ii) The first part of the seismic motion (strong motion) produced liquefaction of the fine sediments underlying the mole.
- (iii) Because of the liquefied foundations, during the continuing strong seismic motion the lateral motion was amplified, and at the end of the earthquake the overall offset was far exceeding the original tectonic motion.

Hence an unusual combination of a tectonic displacements and of surficial movement led to a permanent lateral motion about one order of magnitude larger than the original tectonic/seismic motion.

***Feasibility of the Proposed Scenario***

This scenario is reasonable because

- (1) Strike slip faults, relatively strong earthquakes, seismic ground deformation and liquefaction are frequent in the wider region.
- (2) During an earthquake dynamic seismic displacements next or close to a strike slip fault are NOT characterized by oscillatory movements, but by displacements essentially in one direction, parallel to the fault.
- (3) Liquefaction is observed at the early parts of an earthquake and its effect is that sediments lose their strength and behave like a viscous liquid (sometimes producing mud volcanoes etc.). Liquefied strata can produce large scale dislocations, even without earthquakes (“static liquefaction”), such as sliding on ice. A superb example of such a motion is the failure at a quay at Barcelona some years ago: some parts slid nearly horizontally by up to 90 (ninety) meters!

*For a detailed study and documentation:*

Stiros, S., Saltogianni, V. 2016. Deformation of the ancient mole of Palairos (Western Greece) by faulting and liquefaction, *Marine Geology* 380: 106-112.  
(doi: 10.1016/j.margeo.2016.08.001)

*The mapping and the archaeological study of the mole were reported in:*

Murray, W.M. 1985. The ancient harbour of Palairos. In: *Harbour Archaeology. Proceedings of the First International Workshop of Ancient Mediterranean Harbours*, edited by Raban, A., BAR Int. Ser. 257, pp.67–80.

## Conference reports

### **Geoarchaeological and palaeoenvironmental approaches of water resources management in Antiquity**

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The third international symposium of the HYDRΩMED program (<https://hydromed.hypotheses.org/>), entitled "**Geoarchaeological and palaeoenvironmental approaches of water resources management in Antiquity**" was held Friday, March 11, 2016 at the *Maison Méditerranéenne des Sciences de l'Homme* (MMSH) in Aix-en-Provence, France. The symposium gathered several specialists in palaeoenvironmental researches (palaeoclimatology, palaeohydrology) and geoarchaeological problematics dealing with water resources issues in ancient times.

The symposium was opened by Prof. Sophie Bouffier (Aix-Marseille University), coordinator of the HYDRΩMED program, and by the organizers and coordinators of the meeting, Julien Curie (PhD, ArScAn, University of Paris 1-Panthéon-Sorbonne) and Joël Guiot (CNRS, CEREGE). These introductory words have helped to host researchers from France, Germany, England, Scotland, Spain and Austria, by presenting synthetically the major themes of the HYDRΩMED program and setting out the scientific benefits of this meeting that illustrates a rich schedule with a dozen scientific talks (lasting 30 minutes each) separated by several discussion sessions.

With an introductory communication, Julien Curie showed the true need of geoarchaeological and palaeoenvironmental approaches to the study of water resources past managements, through different spatial and temporal scales.

The first session of the day was devoted to palaeoenvironmental, palaeoclimatic and palaeohydrologic reconstructions. Michel Magny (CNRS, University of Franche-Comté, France) has exhibited many great works on palaeoclimate refunds based on lakes levels fluctuations and pollen data and then depicted the climate of Antiquity in its Holocene context. Then Joel Guiot outlined a reconstruction of the Holocene climate in the Mediterranean area through a mathematical modelling based on pollen data from different sites. Both communications have shown the potential to demonstrate the major features of past climate variations, and pointed out the complexity of establishing a relevant climate model for Antiquity. Studies and discussions are still ongoing regarding the Mediterranean climatic context during this period.

Continuing to deal about palaeoenvironmental thematics, Laurent Dezileau (University of

Montpellier, France) had exposed a precise reconstruction of extreme floods of the Gardon River (France) since the 14th century through a paleohydrological study, by mixing historical and archaeological data with sedimentological and geochemical analyzes.

The next speeches then focused on the Mediterranean area during Classical Antiquity, first with the communication of Duncan Keenan-Jones (University of Glasgow, Scotland) on palaeoenvironmental reconstructions (storm events, palaeohydrologic variations) and the water managements (repairs of hydraulic structures) through a study of carbonate deposits preserved in some ancient aqueducts of Rome, Italy, then with the talk of Gul Surmeli Hindi (University of Berlin, Germany) about environmental factors controlling the distribution and development of ancient hydraulic technologies.

The rest of the day was devoted to several study cases with the presentations of Herbert Weingartner (University of Salzburg, Austria) about some ancient qanats in Europe, especially in Eastern Macedonia (Greece) seen through an environmental approach and of Hector Orengo (University of Sheffield, England) about the identification of strategies implemented in water management and agricultural practices in Spain since the Bronze Age to Roman times. Then was held the presentation of Philippe Leveau (Aix-Marseille University, France) and colleagues about the carbonate deposits preserved in the site of *Les Moulins de Bargéal* and their contribution to the restitution of the wheel of the mills. The last session of the day saw the communications of Cécile Allinne (University of Caen Normandie, France) who has shown remarkable examples of water constraints in the Roman world (managements of excess water in urban contexts and managements of riverbeds and shorelines), and of Ferréol Salomon (University of Southampton, England) and his team about geoarchaeological problematics involved in the study of water management in the Roman city of Ostia (Italy).

The symposium took place in a friendly and serious atmosphere, enjoying the generous hospitality of the MMSH and with the help from members and actors of the HYDRΩMED program. The meeting was rich in scientific discussions, exchanges between the specialists and provided beneficial controversies and debates. It emphasized a true need to continue such multidisciplinary approaches to study water resources managements by past societies. The proceedings of the symposium will be published to the *Bibliothèque d'Archéologie Méditerranéenne et Africaine* (BiAMA) in a special issue devoted to the HYDRΩMED program.

**Acknowledgement:** This work has been carried out thanks to the support of the A\*MIDEX project (n° ANR-11-IDEX-0001-02) funded by the « Investissements d'Avenir » French Government program, managed by the French National Research Agency (ANR).

## **“Inside-Outside - Integrating Cave and Open-Air Archives” international science meeting at the University of Cologne**

Karin Kindermann

*Institute of Prehistoric Archaeology, University of Cologne, Germany*

The scientific challenge of integrating cave and open-air archives was the subject of the International Science Meeting “Inside - Outside” held from 6th to 9th of April 2016 by the Collaborative Research Centre 806 “Our Way to Europe” at the University of Cologne. About 90 scientists from 10 different countries were welcomed. A main objective of this geoarchaeological meeting was to bring experts from different fields of research (i.e. geology, geography, and archaeology) into dialogue on this topic. The workshop yielded fruitful discussions and a lively scientific exchange between the different disciplines.

After a welcoming reception on the first evening, the workshop continued with two days of intensive scientific exchange with 25 short talks, numerous poster presentations and discussions about the current state of knowledge. The meeting ended with a guided excursion to the lignite opencast mine at Garzweiler (ca. 45 km northwest of Cologne), to the terraces of the River Rhine and to the exhibition of the LVR-LandesMuseum Bonn.



*Participants of the International Science Meeting “Inside-Outside” (Photo: Hannah Parow-Souchon)*

## **'New Contributions to Geoarchaeology' Session at the World Archaeological Congress**

Yasuhisa Kondo

*Research Institute for Humanity and Nature, Japan*

The Eighth World Archaeological Congress was held at Doshisha University, Kyoto, Japan, on August 28 to September 2, 2016. Members of the IAG Working Group on Geoarchaeology, Tara Beuzen-Waller, Friederike Stock, and Yasuhisa Kondo, organised the Session T10D 'New Contribution to Geoarchaeology' under Theme 10 'Science and Archaeology', directed by Robin Torrence. The session had 11 orals and 1 poster listed below. Some of papers demonstrated cutting-on-edge methods for understanding site formation processes, and others present recent discoveries in the field.

### **Sub-theme 1: Micromorphology and microstratigraphic analyses**

- Micromorphological analysis of building materials: Toward the reconstruction of past processes  
Cécilia Cammas
- Geoarchaeology of paleoindian combustion features: new data from the early Holocene levels of Lapa do Santo (Central Brazil)  
Ximena Suarez Villagran; André Strauss; Christopher Miller
- Micromorphological analysis of Roman roads functioning in Northeastern France: Evidence of rhythms of human trampling and vehicle traffic  
Marie-Caroline Charbonnier, Cecilia Cammas (poster)
- Microstratigraphic analysis on a modern central Sahara pastoral campsite. Ovicaprine pellets and stabling floors as ethnographic referential data  
Natalia Égüez, Andrea Zerboni, Stefano Biagetti, Carolina Mallol, Cheryl Makarewicz,

### **Sub theme 2: Soil composition**

- Geoarchaeological survey of anthropogenically modified soils at the site of Tel Burna, Israel (Bronze to Iron Ages)  
Ladislav Smejda; Michal Hejcman; Itzhaq Shai
- New Bioavailable Strontium Data for Corsica, France and an Archaeological Case Study  
Hannah James, Malte Willmes, Patrice Courtaud, Ian S. Williams, Rainer Grün,

### **Sub theme 3: Dating and studying rock shelter and cave**

- Multi-disciplinary methods for understanding early hominin bearing palaeokarst in South Africa  
Andy Herries; Brian Armstrong; Ashleigh Murszewski; Tara Edwards; Tom Mallett

- New methods in high-throughput microvertebrate species identification using ZooMS collagen fingerprinting  
Mike Buckley
- OSL Dating and Detection of Mining Galleries through Seismic Methods: New insights on the mining archaeology of Timna Valley, Israel  
Craig Smitheram, Erez Ben-Yosef, Noami Porat, Neta Welchser, Galina Faershtein

**Sub Theme 4: New investigations on well-known sites**

- First steps towards the U-Th dating by LA-HR-ICP-MS of ostrich eggshells from the MSA site Hoedjiespunt 1 (South Africa)  
Loïc Martin, Chantal Tribolo, Christophe Pecheyran, Norbert Mercier, Nicholas J. Conard, Christopher E. Miller, Andrew W. Kandel, Manuel Will
- How can PXRF in the identification of raw materials? The case of a red jaguar sculpture in Chichen Itza, Mexico  
Denisse Argote; Octavio Juarez; Pedro Lopez

**Sub theme 5: Sea-level change and coastline reconstruction**

- New insights into landscape development, coastline changes and human impact in Ephesus and the Küçük Menderes graben (Western Turkey)  
Friederike Stock, Maria Knipping, Anna Pint, Sabine Ladstätte

A selection of papers will be published as the special issue of *Quaternary International* in 2017 (see the next section for more information).



New books and research articles

Sous la direction de Matthieu Ghilardi  
Avec la collaboration de Franck Leandri,  
Jan Bloemendal, Laurent Lespez et Sylvian Fachard

Sous la direction de Matthieu Ghilardi  
Avec la collaboration de Franck Leandri,  
Jan Bloemendal, Laurent Lespez et Sylvian Fachard

# Géoarchéologie des îles de Méditerranée

Geoarchaeology of the Mediterranean Islands

Géoarchéologie des îles de Méditerranée  
Geoarchaeology of the Mediterranean Islands



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Special issue in *Quaternary International*

**Revealing latent data in geoarchaeological archives**

Edited by Friederike Stock, Tara Beuzen-Waller, and Yasuhisa Kondo

Geoarchaeology, defined as the application of geosciences and geographical methods to prehistory, archaeology, and history, is now widely applied to study key subjects such as occupation patterns, territory and site exploitation, palaeoclimatic, palaeoenvironmental, and palaeogeographical changes, as well as anthropogenic impacts and system responses. The multidisciplinary and multiscale dimensions of geoarchaeological approaches have encouraged continuous development and innovation of methods and approaches that have opened new possibilities for explorations in geographical sectors previously inaccessible (aerial, submarine, and underground), the development of large-scale data acquisitions and treatment (through spatial analysis and the use of GIS), and also the development of microscopic scale analysis precision (micro fauna or vegetal remains, micromorphology).

This special issue aims to promote innovative methodologies in geoarchaeology that provide critical progress in dealing with key archaeological sites/ areas, that face issues with important taphonomic biases, extreme fieldwork environments and/or a lack of 'visible' data. Studies that have developed cutting edge methodologies, multi-scale and multi-proxy approaches to successfully handle these difficulties are welcome to propose their results in this special issue. The methodologies and tools selected by the authors might be related to a difficult/challenging archaeological context in which an adaptive geoarchaeological research strategy has/ is being conducted.

The topics are largely divided into three different approaches regarding the different kind of archaeological contexts:

1. New methods for data exploitation or acquisition on key sites that require a forefront approach;
2. On-site methodologies that promote a better understanding of destroyed sites, sites with important taphonomic biases and/ or a complex stratigraphy; and
3. Off-site methodologies or a large-scale approach that highlight human impacts or occupation in areas where archaeological sites are not immediately visible (destroyed, covered, submerged...).

The special issue will be published in 2017.

*Selected books and articles*

Conyers, L. B. 2016. *Ground-Penetrating Radar for Geoarchaeology*.

<http://doi.org/10.1002/9781118949993>

Corrà, E., Mozzib, P. 2016. Water matters. Geoarchaeology of the City of Adria and Palaeohydrographic Variations (Po Delta, Northern Italy). *Journal of Archaeological Science: Reports*.

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<http://doi.org/10.1002/gea.21595>

Desruelles, S., Eric Fouache, E., Eddargach, W., Cammas, C., Wattez, J., Beuzen-Waller, T., Martin, C., Tengberg, M., Cable, C., Christopher, T., C., Murray, A. 2016. Evidence for Early Irrigation at Bat (Wadi Sharsah, Northwestern Oman) Before the Advent of Farming Villages. *Quaternary Science Reviews* 150(2016): 42-54.

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Fischer, P., Wunderlich, T., Rabbel, W., Vött, A., Willershäuser, T., Baika, K., Rigakou, D., Metallinou, G. 2016. Combined Electrical Resistivity Tomography (ERT), Direct-Push Electrical Conductivity (DP-EC) Logging and Coring - A New Methodological Approach in Geoarchaeological Research. *Archaeological Prospection* 23(3): 213-228.

<http://doi.org/10.1002/arp.1542>

Fouache, E., Rante, R., Mirzaakhmedov, D., Ragala, R., Dupays, M., Vella, C., Fleury, J., Andrieu-Ponnel, V., Zink, A., Porto, E., Brunet, F., Cez, L. 2016. The Role of Catastrophic Floods Generated by Collapse of Natural Dams Since the Neolithic in the Oases of Bukhara and Qaraqöl: Preliminary Results. *International Journal of Geohazards and Environment* 2(3): 150-165.

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Guedes, J. d'Alpoim., Austermann, J., Mitrovica, J. X. 2016. Lost Foraging Opportunities for East Asian Hunter-Gatherers Due to Rising Sea Level Since the Last Glacial Maximum. *Geoarchaeology* 31(4): 255-266.

<http://doi.org/10.1002/gea.21542>

Kázmér, M., Bhatt, N., Ukey, V., Prizomwala, S., Taboroši, D., Székely, B. 2016. Archaeological Evidence for Modern Coastal Uplift at Diu, Saurashtra Peninsula, India. *Geoarchaeology* 31(5): 376-387

<http://doi.org/10.1002/gea.21575>

Morley, M. W., Goldberga, P. 2016. Geoarchaeological Research in the Humid Tropics: A Global Perspective. *Journal of Archaeological Science*.

<http://doi.org/10.1016/j.jas.2016.11.002>

Nicu, I.C. 2016. Cultural heritage Assessment and Vulnerability Using Analytic Hierarchy Process and Geographic Information Systems (Valea Oii Catchment, North-eastern Romania). An Approach to Historical Maps. *International Journal of Disaster Risk Reduction* 20: 103-111.

<http://doi.org/10.1016/j.ijdrr.2016.10.015>

Osypinski, P., Morley, M.W., Osypinska, M. and Kotarba-Morley, A.M. 2016. Affad 23: Settlement Structures and Palaeoenvironments in the Terminal Pleistocene of the Middle Nile Valley, Sudan. *Antiquity* 90(352): 894-913.

<https://doi.org/10.15184/aqy.2016.110>

Rabett, R., Ludgate, N., Stimpson, C., Hill, E., Hunt, C., Ceron, J., Farr, L., Morley, M. W, Reynolds, T., Zukswert, H. and Simpson, D. 2016. Tropical Limestone Forest Resilience and Late Pleistocene Foraging During MIS-2 in the Trảng An Massif, Vietnam. *Quaternary International*.

<http://doi.org/10.1016/j.quaint.2016.06.010>

Schott, A. M. 2016. Site Formation Processes and Depositional Environment of a Fine-Grained Alluvial Floodplain at La Playa Archaeology Site, Sonora, Mexico. *Geoarchaeology*.

<http://doi.org/10.1002/gea.21596>

Stewart, B.A., Parker, A.G., Dewar, G., Morley, M.W. and Allott, L.F. 2016. Follow the Senqu: Maloti-Drakensberg Paleoenvironments and Implications for Early Human Dispersals into Mountain Systems. In: *Africa from MIS 6-2*. Springer Netherlands, pp. 247-271.

[https://doi.org/10.1007/978-94-017-7520-5\\_14](https://doi.org/10.1007/978-94-017-7520-5_14)

Sutikna, T., Tocheri, M. W., Morwood, M. J., Saptomo, E. W., Jatmiko, Due, R. A., Wasisto, S., Westaway, K. E., Aubert, M., Li, B., Zhao, J.-x., Storey, M., Alloway, B. V., Morley, M. W., Meijer, H. J. M., van den Bergh, G. D., Grün, R., Dosseto, A., Brumm, A., Jungers, W. L., Roberts, R. G. 2016. Revised Stratigraphy and Chronology for *Homo floresiensis* at Liang Bua in Indonesia. *Nature* 532: 366–369.

<http://doi.org/10.1038/nature17179>

Tarlano, F., Bogdani, J., Priore, A. 2016. Upper Agri Valley (Basilicata) Between Geomorphology and Ancient Settlements. *LAC 2014 proceedings*.

<http://doi.org/10.5463/lac.2014.57>

*Please let us know your latest publications to be listed in the next issue!*



## Call for papers

### **Geoarchaeology Sessions in the European Geosciences Union General Assembly 2017**

Vienna, Austria, April 23–28, 2017

#### **SSP 4.8**

##### **Geoarchaeology in tectonically active regions**

Convener: Iain Neill (Iain.Neill@glasgow.ac.uk)

Co-Conveners: Keith Wilkinson (keith.wilkinson@winchester.ac.uk), Stathis C. Stiros (stiros@upatras.gr)

#### **GM7.3/CL1.09/SSS3.11**

##### **Geoarchaeology: Human impact, adaptation and response to climatic and environmental change from the past to the present**

Convener: Sjoerd Kluiving (s.j.kluiving@vu.nl)

Co-Conveners: Julie Durcan, Wiebke Bebermeier, Robyn Inglis, Vanessa Heyvaert, Andy Howard, and Lisa-Marie Shillito

#### **SSS3.8/GM8.7**

##### **Soil evolution in Space and Time: From polar to tropical - from Paleogene to Anthropocene - towards sustainable management futures**

Convener: Daniela Sauer (daniela.sauer@geo.uni-goettingen.de)

Co-Convener: Sjoerd Kluiving

For more information: <http://egu2017.eu/>

**The abstract submission deadline is January 11, 2017, 13:00 CET.**

The meeting programme will be available on March 2, 2017.

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## **You are welcome to contribute!**

You are encouraged to post any of (but not limited to) the following items to the next Newsletter, which will be published in late 2017:

- Short scientific essay related to your projects, regions, or fields of research;
- Report of the latest conferences, workshops, and training schools;
- Books and research articles published in late 2016 and 2017;
- Call for papers, and
- Job opportunities.

Texts and figures (if any) should electrically be sent to the editor (Dr. Yasuhisa Kondo; *geoarch.IAG@gmail.com*) by the end of October 2017. Texts should be written in good English. Please feel free to ask the editor if you have any questions or requests.