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Abstract Book VOLUME II



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 UNIVERSITAT DE
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2018
EUROPEAN YEAR
OF CULTURAL
HERITAGE
#EuropeForCulture

Theme: Archaeology and the European Year of Cultural Heritage

Organisers: Guermandi, Maria Pia (Istituto Beni Culturali della Regione Emilia Romagna) - Demoule, Jean-Paul (Professeur émérite de Protohistoire européenne) - Novakovic, Predrag (University of Ljubljana) - Marciniak, Arek (Adam Mickiewicz University Institute of Archaeology)

Format: Round table

The Malta Convention has already been a subject of reflection for a number of years, at least 10. We can therefore say that we are backed by a rather extensive and up-to-date assessments that show first and foremost that the overall situation is highly fragmented, in terms of both legislative or institutional solutions and the methods applied. In general, we can affirm that despite the indisputable progress in terms of our knowledge of the European archaeological scene and landscape the Convention also raises many critical issues. In addition to the problems inherent in discipline and its practice, in this last quarter of a century the cultural, social and political horizon has changed completely. In many countries the competences of archaeologists are increasingly marginalised when it comes to decision-making processes on the one hand, while on the other overall working conditions have worsened in terms both of pay and protection of the profess. Rewriting the Malta Convention appears to be necessary in light of the experience of the past 25 years, both in order to adapt it in response to the problems that have been highlighted and even more so to update it and bring it into line with present-day reality (in terms of the discipline's development and above all from a social and political standpoint). The purpose of our session is to propose a first basis for moving in this direction.

Theme: Theories and methods in archaeological sciences

Organisers: Tuffery, Christophe (Inrap) - Bruseker, George (ICS/Foundation for Research and Technology)

Format: Other - combination of regular session and workshop

Modelizing archaeological data is a way for archaeologists to organise their information in a standard format by reconsidering their relations to their activities on field and out of it. But for most of archaeologists, using a conceptual reference model, such as CIDOC CRM, is not an easy exercise without initial assistance and teaching. We propose to present as most as simply as possible what is CIDOC CMR as major conceptual reference model useable in archaeology, and the only one standardized. This session offers to non-experts to discover basic principles of CIDOC CRM and being able to start using it for a representative archaeological data set.

The session will combine general presentations on CIDOC CRM and its useful extensions in archaeology, case studies and practical exercises.

ABSTRACTS

01

MIGRATING INFORMATION FROM IRANIAN EXCAVATION REPORTS: COMPARING SEMANTIC MARK-UP TO INFORMATION EXTRACTION

Author(s): Eide, Øyvind (Digital Humanities - Historisch-Kulturwissenschaftliche Informationsverarbeitung, Universität zu Köln) - Nieknia, Massoomeh (Kharazmi University, Tehran; University of Cologne)

Presentation Format: Oral

The existing knowledge in the field of archaeology is generated in some Iranian cultural heritage institutions. The knowledge generated in an archaeological exploration is not integrated with knowledge generated in other archaeological explorations, and therefore, a large part of the valuable experience and knowledge in this field remains unused, which may lead to the loss of national historic heritage. Excavation reports comprise one of the most important types of archaeological publications. In Iran, they are mostly published as grey literature. Based on previous works starting in the 1990's we are exploring two methodologies for extracting information from excavation reports written in English. The first method is manually encoding the reports into XML documents and then extracting information from the encoded reports. The second method is automatically extracting information directly from the reports. The basis for both methods is that various types of elements that are seen as valuable for future use of information about excavation, based on local experience and international standards. These two methods not only lead to variant levels of reproducibility, but also result in unequal levels of human resources investment. We will also show how texts structured using these two methods can be imported into CIDOC CRM compatible databases. The first method has already been conducted and hopefully we will get results from the second method by submitting the time of final paper conference presentation.

02 USING CIDOC CRM AND COMPATIBLE MODELS TO EXPRESS SPATIAL AND TEMPORAL DATA: FROM PRINCIPLE TO PRACTICE

Author(s): Van Ruymbeke, Muriel (ULg Library, University of Liege) - Nys, Gilles-Antoine (Geomatics Unit, University of Liege) - Hallot, Pierre (DIVA - Faculty of Architecture, University of Liege) - Billen, Roland (Geomatics Unit, University of Liege)

Presentation Format: Oral

CIDOC CRM model allows to express archaeological data's localization thanks to E53 Place entity. On another hand, E52 Time-Span entity allows to express data's chronology. Nevertheless, taking into account CIDOC CRM property quantifiers, temporal information related to archaeological object must be unique, i.e. each archaeological object is associated to one and only one temporal instance. On the contrary, objects can be linked to spatial data as many as necessary. Actually using CIDOC CRM, it is possible to suggest several measurements, several shapes or even several different localizations for a same archaeological object, but it is only possible to suggest one dating for it. Nonetheless, archaeological researches revise frequently datasets and chronological interpretation of archaeological elements. In some cases, it is relevant to keep all the proposed interpretations or temporal information related to each objects.

From now on, thanks to the development of CRMgeo that is fully compatible with CIDOC CRM, it is possible to express for one archaeological object several versions of temporal information and several spatial coordinates. Moreover, CRMgeo extension provides an articulation between CIDOC CRM and GeoSPARQL query language. This connection allows perform spatio-temporal queries based on CIDOC CRM instantiated data.

To achieve a working prototype, we downloaded CIDOC CRM and compatible models owl files on the open-source ontology editor Protégé. We then completed these models with an "in-house" extension proposal. This model is dedicated to store several hypotheses related to archaeological data's functional semantic like CRMgeo does for spatial and temporal information. After the implementation, we populated and illustrated the model with instances derived from a real archaeological case study. In this research, we propose to describe our real case prototype development to bring to light principle benefits but also the challenges to face.

03 CIDOC CRM AND CRMARCHAEO: A VISION OF USE FOR THE "FUTURE"

Author(s): Stead, Stephen (Paveprime Ltd; Southampton University ACRG)

Presentation Format: Oral

Recent work by Holtorf and May et al (2018) has highlighted the simultaneous desire to pass archaeological knowledge on to the "future" and uncertainty about what that "future" will actually want of our vision of the past.

The CIDOC CRM provides a framework for the integration of data from the so-called "Memory Institutions". As such it lays the foundations for integrating data from different communities of documentation practice. In addition CRMarchaeo states that it is "intended to provide all necessary tools to manage and integrate existing documentation in order to formalise knowledge extracted from observations made by archaeologists, recorded in various ways and adopting different standards. In this sense, its purpose is to facilitate the semantic encoding, exchange, interoperability and access of existing archaeological documentation."

Any attempt to regulate archaeological documentation is doomed to failure for two reasons. First is the "three archaeologists- four opinions" meme and the second is the real danger of fossilising the discipline.

So how do integrate access to existing archaeological documentation into a strategy for engaging with the future?

This paper sets out a personal perspective on this question. It draws on over 30 years of designing cultural heritage information systems to lay out a vision of why data may be useful to the shadowy and elusive "future" and perhaps more importantly a motivation for current practitioners to engage in the process.

04 INTEROPERABILITY AND USE OF THE INRAP'S DATABASES THROUGH THE UTILIZATION OF EXTENSIONS OF THE CIDOC-CRM ONTOLOGY (CRMARCHAEO, CRMGEO)

Author(s): Le Goff, Emeline - Tuffery, Christophe (INRAP - National Institute for Preventive Archaeological Research)

Presentation Format: Oral

The national institute of preventive archeological research (INRAP) is the only national public institution of preventive archaeology in France whose mission bases on the recording, the archiving, the distribution and the valuation of archaeological knowledges produced during spatial planning works of the territory.

In this context, the data recorded in the field databases establish essential sources, which require to be harmonized for good conservation and interrogation of archeological sites. Although the archaeological discipline already possesses its frameworks, it cannot aspire to a standardization because the conditions on the ground lead it to evolve.

Of this report emerges the existence of "regionalistic" databases in France, which the use to the CIDOC-CRM ontology allows to harmonize and to query. Archaeology is spatialized, in essence; so, the possibility of using the CRMarchaeo and the CRMgeo extensions of the CIDOC CRM, associated with the commun core of the CIDOC, as well as the existence of the 3M tool, allow facilitating the construction of models of description according to the RDF syntax.

Thus, we realized the mapping or the matching of four databases created from different software, then thought of the elaboration of a non-specialized digital architecture because the same methods tend to organize archaeological surveys and excavations.

This communication will present these matchings having used the 3M application ; then, it will make a synthesis of the difficulties and the assets raised during the use of the CIDOC CRM ontology, whether it is for the description of "Datas" or the generation of "Metadatas". Finally, it will be question of the future development from a module (an XML-RDF version or an OBDA system) will make external interrogation of the Inrap's databases, either by means of servers in networks, or by the cartographic collaborative platform CAVIAR of the Inrap (Catalog of Visualization of the Archaeological Information).

05 FAIR SURVEYS: FROM PILOT STUDY TO IMPLEMENTATION

Author(s): van Leusen, Martijn (University of Groningen) - Haas, Tymon (University of Cologne)

Presentation Format: Oral

Dozens of field walking surveys take place every year across the Mediterranean, using a wide range of approaches and adding to the hundreds of surveys conducted since the 1950s. There is now some degree of consensus about good practice in designing and conducting these surveys, and in processing and analyzing the finds; this is currently being documented by the IMS network of Mediterranean survey practitioners (Bintliff et al. forthcoming). Researchers have long expressed the desire to conduct comparative and complementary analyses across surveys (e.g. Francovich/Patterson 2000, Cherry/Alcock 2004, Launaro 2011) but have so far been frustrated by the (often undocumented) differences between datasets.

In a separate development, ten years of experience with the archiving of survey project data at repositories such as DANS-EdNA (Netherlands) and ADS (UK) is confronting PI's with the realization that the deposited datasets are Findable (i.e. structured metadata about them is available online), Accessible (the archives themselves can be consulted under a system of rights management), and Interoperable (provided in formats that can be read and interpreted); but sadly they are not yet Re-usable – that is, the meaning, scope, and limitations of the data in the archives remains unclear. Thus the last of the FAIR principles is not yet met.

This paper sketches the work done at the University of Groningen to resolve this issue by following the CIDOC CRM route, starting from a pilot study conducted in 2016 to draft and test a Conceptual Reference Model for survey datasets. This was presented and discussed during EAA Maastricht 2017 and at meetings of the CRM Special Interest Group in early 2018. We now present follow-up steps including the results of further extensive tests on colleagues' datasets and a roadmap towards the real goal: high quality Linked Open Access to survey data.

06 AN OUTSIDER'S PERSPECTIVE ON THE ARCHAEOLOGICAL POTENTIAL OF CIDOC CRM

Author(s): Ozturk, Huseyin (ASCSA; College Year in Athens)

Presentation Format: Oral

In 2014-2015, in order to contribute to the design of a technical manual and an on-field documentation system for a field project, I studied the history of archaeological documentation, from the early 20th century diaries to MoLAS style field forms and entirely computational on- and off-field recording systems and databases. Later, while designing a course on digital archaeology in 2017, I got familiar with new and innovative ways of organizing archaeological/cultural data. It is in this latter context that I encountered and examined CIDOC CRM, though I was, as an archaeologist, some two decades late to the CRM world – which seems to be not that unusual.

Since then, I have contemplated the potential of CIDOC CRM in archaeological studies and discussed it with colleagues and students alike. The major pitfalls of such an endeavor seem clear. As correctly indicated in the "session content," a steep learning curve might prove problematic and/or discouraging for the uninitiated archaeologists. Furthermore, questions about its flexibility and, perhaps more importantly, concerns regarding its integrability to existing archaeological data structures should also be addressed for a fruitful collaboration.

In my contribution to this discussion session, I will try to summarize an archaeologist's major concerns regarding such a standardized ontological framework and will propose a way forward with a view to establishing communication between unfamiliar archaeologists and CIDOC CRM specialists.

557 GEOARCHAEOLOGY OF BRONZE AGE EUROPE

Theme: Theories and methods in archaeological sciences

Organisers: Nicosia, Cristiano (Università di Padova, Italy) - Ayala, Gianna (University of Sheffield) - Dreibrodt, Stefan (Institute for Ecosystem Research/CRC1266, University of Kiel) - Niebieszczański, Jakub (Laboratory of Mediterranean Bronze Age Archaeology, Institute of Archaeology, Adam Mickiewicz University, Poznań) - Pető, Ákos (Institute of Nature Conservation and Landscape Management, Faculty of Agricultural and Environmental Sciences, Szent István University)

Format: Regular session

The European Bronze Age is regarded as a period of pre-modern 'globalisation', marking a significant change from the interconnectivity in the Neolithic. Mobility and migrations played a fundamental role in shaping the European Bronze Age, with circulation of people, artefacts, and raw materials (metals, amber, wool) along north-south and east-west axes. This session aims to bring together geoarchaeologists and landscape

archaeologists working on Bronze Age contexts from different parts of Europe to highlight similarities and differences observable at different scales of geoarchaeological research. The following themes will be dealt with:

(a) At the micro- or intra site-scale, the application of geoarchaeological methods to specific archaeological features, such as floors, rubbish pits and middens, combustion features, earth-based construction materials, activity areas, etc.

(b) At the site scale, the geoarchaeology of all types of Bronze age sites (e.g., pile dwellings in lacustrine or floodplain settings, sites enclosed by ditches and ramparts, tells), on their distribution patterns and on the landscape modifications they brought about.

(c) At the landscape, regional or supra-regional scale, the challenge to integrate archaeological interpretations with documented palaeo-environmental trends to construct a robust diachronic understanding of landscape development. This new understanding will perhaps enable the detection of processes or triggers (i.e. natural triggers such as climate; human triggers such as societal developments, trade, exchange, pests) driving these key developments.

One additional aim is to allow for the presentation and discussion of records from European sites that are not published in English and therefore failed to reach the larger audience.

ABSTRACTS

01 GEOARCHAEOLOGICAL RECORD OF THE BARROWS STRUCTURE OF THE KOMAROV CULTURE (BRONZE AGE) AND POST-DEPOSITIONAL PROCESSES IN BUKIVNA (WEST UKRAINE)

Author(s): Hildebrandt-Radke, Iwona - Makarowicz, Przemyslaw (Adam Mickiewicz University) - Matwiishina, Zhanna Nikolaevna (National Academy of Sciences of Ukraine)

Presentation Format: Oral

One of the largest concentrations of the Bronze Age Komarov culture is the burial mound in Bukivna, where the surface studies documented 59 barrows. The area is located on the right side of the Dniester River, in the South-Podolian Upland (west Ukraine). Micro-morphological soil studies on and below the barrows allow to state that they were created under different environmental conditions. The soils under the barrows show the features of leached black earth soils developed in the conditions of the forest steppe, under the grassy vegetation, in a temperate warm climate with enough precipitation. The black earth character of the soil-forming processes is confirmed by numerous molehills indicating activity of soil fauna. On the surface of the barrows, on the other hand, there are turf-podzolic soils with clearly visible eluvial and illuvial levels and the hardpan layer. This proves the change of environmental conditions between the period in which the communities of barrow builders functioned and the period of the formation of the modern soil profile on the barrow surface. The nature of the soil-forming processes related to the development of modern soil influenced the state of archaeological remains in the barrows as well as the mineral and geochemical composition of their embankments.

The mounds of the barrows are dominated by the silt fraction with admixtures of clays and very fine-grained sands. There is a similar deposit in the upper layers of the barrows, but with larger proportions of sandy fraction and a smaller of the clay fraction, usually better sorted. In the Ukrainian soil-related literature, attention is paid to podsolization as a process contributing to the transfer of clay elements from the eluvial layer and their washing into the illuvial layer. Geochemical analyses indicate the diversity of the content of micro- and macroelements in the barrow sediments.

02 WASTE-DISPOSAL AT THE MBA FORTIFIED SETTLEMENT KAKUCS-TURJÁN MÖGÖTT: INTERGRATING PHYTOLITHS AND MACROBOTANICAL STUDIES

Author(s): Peto, Ákos (Szent István University, Institute of Nature Conservation and Landscape Ecology) - Filatova, Sonja - Kirleis, Wiebke (Kiel University, Institute for Pre- and Protohistoric Archaeology)

Presentation Format: Oral

Based on the similar ceramic style and typography, the homogenous cultural identity that emerged during the Middle Bronze Age (app. 2000/1900–1500/1450 cal. BC) in the central territory of the Carpathian Basin is called the Vanya culture. Populations of this cultural complex inhabited different environments, such as the loess covered Mezőföld directly on the western bank of the Danube, or the sand-dominated flatlands and marshy meadows of the Danube–Tisza interfluvium.

From 2013–2016, a house structure of the Vanya culture was excavated at the fortified settlement Kakucs-Turján mögött. First botanical results indicate that the most important economic plant species were einkorn and lentil, followed by barley and field pea, respectively. The presence of only small numbers of weeds and cereal by-products suggests that kitchen-ready cereal grains and legume seeds were present in the house. As of yet, there are no indications that large-scale crop processing took place at the house.

Analysis on phytolith samples taken from two probable waste pits in a different part of Kakucs-Turján mögött has shown the presence of morphotypes indicative for cereal by-products. Consequently, the results suggest that cereal-processing activities did take place in the settlement area. A comparison of the results of the macrobotanical and phytolith analyses might thus provide a greater insight into agricultural activities that took place at the site and in this respect suggest a spatial, functional differentiation.

03 MICROMORPHOLOGY OF RITUAL. GEOARCHAEOLOGICAL STUDIES OF A CREMATION URN AND ACCOMPANYING VESSEL OF THE LUSATIAN CULTURE

Author(s): Krupski, Mateusz (Archeolodzy.org Foundation; Institute of Archaeology, University of Wrocław) - Hałuszko, Agata (Archeolodzy.org Foundation) - Sady, Agata (Archaeology Department, Silesian Museum) - Malkiewicz, Małgorzata (Institute of Geological Sciences, University of Wrocław) - Grześkowiak, Marek (Institute of Archaeology, University of Wrocław)

Presentation Format: Oral

The rise of Bronze Age Urnfield cultures resulted in widespread introduction of cremation as a dominant funeral rite across large areas of Europe. The Lusatian culture, a local variant of this phenomenon, thrived in the lands of present-day Poland roughly between 1300 and 400 BC. According to current knowledge, these communities practiced burning of their dead and depositing the remains in the ground – typically in an urn placed in a shallow pit, sometimes with additional vessels; the type and abundance of grave goods differs chronologically. Known cemeteries consist(ed) of hundreds or even thousands of graves and were probably used for considerable periods of time. Still, some aspects of the “Lusatian” funerary ritual remain a mystery: little is known about post-cremation treatment of human remains and their deposition in the urn. Another question pertains to the contents of the accompanying vessels.

Attempting to fill in some of these blanks, we conducted a pilot geoarchaeological study of a cremation urn and accompanying vessel, discovered in a Lusatian culture grave dated to the HaC-period at a cemetery in Rolantowice, near Wrocław, Poland. In order to explore the depositional and post-depositional circumstances, the structural and compositional properties of the vessels infills were investigated by CT scanning, micromorphology, physico-chemical and botanical analyses. Our results suggest that after cremation, which most likely hadn't been too protracted in time, the bone fragments might have been meticulously picked from the pyre and packed into the urn with the aid of crushing. Investigations of the accompanying vessel delivered as yet inconclusive data (some analyses still in progress). A similar research protocol applied on a larger scale, with targeted sampling in different zones of cemeteries and at cemeteries of various chronology, may provide promising information about possible changes of funerary ritual in time.

04 SEDIMENTOLOGICAL INVESTIGATIONS OF A BRONZE AGE HOUSE: A GEOARCHAEOLOGICAL STUDY OF A HOUSE STRUCTURE IN KAKUCS-TURJÁN MÖGÖTT (HUNGARY)

Author(s): Niebieszczański, Jakub (Adam Mickiewicz University in Poznań) - Pető, Ákos (Szent István University, Gödöllő) - Hildebrandt-Radke, Iwona (Adam Mickiewicz University in Poznań) - Serlegi, Gábor (Hungarian Academy of Sciences) - Jaeger, Mateusz (Adam Mickiewicz University in Poznań) - Kulcsár, Gabriella (Hungarian Academy of Sciences) - Staniuk, Robert - Taylor, Nicole (Kiel University) - Galas, Joanna (Adam Mickiewicz University in Poznań)

Presentation Format: Oral

The following presentation concerns the results of a geoarchaeological study of a defensive settlement from the Middle Bronze Age in Hungary. The research project KEX (Kakucs Archaeological EXpedition) combined a variety of non-invasive and interdisciplinary methods with precise excavations. The interdisciplinary approach was aimed at recognizing and investigating, macroscopically and on-site, the remains of habitation-related practices in the second millennium BC which are invisible on the surface

Spatial organization of the settlement was investigated by means of magnetometry, ERT, GPR and drillings for a preliminary characteristic of archaeological features. A complimentary intra-site evaluation of the sedimentological record of prospected house structures was also carried out.

The latter was purposely applied as a combination of magnetometry-based spatial analyses for targeting archaeological features. Raster evaluation was applied for distinguishing particular house structures. It provided the basis for a targeted excavation project.

The level representing house structures was selected for granulometric and geochemical analysis. Investigated was the sedimentary environment and functional properties of the house structure.

Geoarchaeological investigations discovered a division of sedimentological parameters outside and inside the investigated structure, with sorting and mean grain size of the deposit being the key markers. Distribution of compounds (P, Zn and Cu) provided supplementary information on the intensity of the sedentary activity.

Synergy of the acquired data (geophysical imagery, archaeological planigraphy, sedimentological and geochemical investigations) has proven to be a valid interdisciplinary methodology for studying site formation processes and spatial differentiation of multi-layered settlements in the Carpathian Basin.

05 FOUR POSTDEPOSITIONAL PROCESSES IN THE BRONZE AGE TELL BORSODIVÁNKA-NAGYHALOM, (HUNGARY) AND THEIR GEOARCHAEOLOGICAL AND ARCHAEOLOGICAL IMPLICATIONS

Author(s): Röpke, Astrid (Ur- und Frühgeschichte, Universität zu Köln) - Pusztainé Fischl, Klára (Miskolci Egyetem) - Kienlin, Tobias (Ur- und Frühgeschichte, Universität zu Köln)

Presentation Format: Oral

Intense anthropogenic deposits create specific geochemical environment. In particular tells are known for complex and continuous habitation. In general they are composed of formal and informal floors as well as domestic waste. However, in the case of Bronze Age Tell Borsodivánka-Nagyhalom the stratigraphy is very heterogeneous indicating a pre-settlement phase, habitation and layered middens. This results in different geochemical environments. Four different postdepositional processes with characteristic micro-

morphological features and geochemical signatures can be observed: translocation of clay, formation of apatite, decalcification and silicification. Under the tell sediments translocation of clay takes place in a former colluvial layer, visible by clay coatings. The soil is covered by an occupation deposit consisting of all kinds of waste such as dung, macro remains, fish and animal bones, burnt material, chert. Apatite is formed as well as macro remains were mineralized by calciumphosphate. Processes which occur in highly phosphorous deposits. Formal floors are composed of lime causing decalcification. Secondary calcite coatings and hypocoatings are proven in thin section. The most uncommon process is silicification in the midden deposits which have been repeatedly covered with plant fragments of Poaceae. Opal silica from phytoliths has been dissolved and silicified whole plant fragments. Our results indicate that different man-made deposits trigger and might even accelerate specific geochemical dynamics.

06 GEOARCHAEOLOGICAL OBSERVATIONS AT THE MBA SITES OF THE DANUBE-TISZA INTERFLUVE (HUNGARY)

Author(s): Peto, Ákos (Szent István University, Institute of Nature Conservation and Landscape Ecology, Gödöllő) - Serlegi, Gábor (Hungarian Academy of Sciences, Research Centre for Humanities, Institute of Archaeology, Budapest) - Niebieszczański, Jakub (Adam Mickiewicz University, Institute of European Culture, Poznań) - Jaeger, Mateusz (Adam Mickiewicz University, Institute of Archaeology, Poznań) - Molnár, Marianna (Szent István University, Institute of Nature Conservation and Landscape Ecology, Gödöllő) - Kulcsár, Gabriella (Hungarian Academy of Sciences, Research Centre for Humanities, Institute of Archaeology, Budapest)

Presentation Format: Oral

Based on the similar ceramic style and typography, the homogenous cultural identity that emerged during the Middle Bronze Age (app. 2000/1900–1500/1450 cal BC) in the central territory of the Carpathian Basin is called the Vatya culture. The settlement network of the Vatya culture implies fortified, multi-layered tells and open air horizontal settlements in various size and inner structure. These archaeological sites are not only important parts of the cultural heritage of the Carpathian Basin, but are significant elements of the natural heritage. The importance of these structures lies within the potential of studying their buried soils and anthropogenic sediments. Data gained by the means of soil scientific methods not only forms the basis of environmental historical conclusions, but reveals mosaics of the interaction between ancient human populations and their environment.

By the means of shallow geological corings the stratigraphy of four Bronze Age settlements were identified (Kakucs–Turján mögött, Kakucs–Balla-domb; Dabas–Dabasi szőlők; Dömsöd–Leányvár). To accomplish the horizontal and vertical mapping of these sites high resolution and focused coring series were planned based upon the geophysical prospection of the sites. The coring series aimed at precisely identifying the soil properties, the stratigraphy of the anthropogenic and natural sediments of the settlements and its surroundings, but also to facilitate our understanding of the site formation processes within the geographical setting of the Danube-Tisza Interfluve.

The modern soil cover of the site was characterised based on on-site soil description protocols (macro-morphological description) and basic laboratory measurements (H%, TOC%, Ptotal, pH [HOH, KCl], salt%, CaCO₃%, KA). By implementing high-resolution coring series, we were able to precisely identify the stratigraphy and possible processes of site formation of different Bronze Age sites within the Danube–Tisza Interfluve.

07 GEOARCHAEOLOGICAL INVESTIGATION OF TELL SITE NEA RAEDESTOS TOUMBA IN ANTHEMIOUS VALLEY (NORTHERN GREECE): LANDSCAPE CHANGES ON AN ALLUVIAL PLAIN

Author(s): Niebieszczański, Jakub - Hildebrandt-Radke, Iwona (Adam Mickiewicz University in Poznań) - Vouvalidis, Konstantinos - Syrides, Georgios (Aristotle University in Thessaloniki) - Czebreszuk, Janusz (Adam Mickiewicz University in Poznań) - Andreou, Stylianos (Aristotle University in Thessaloniki) - Pappa, Maria (Ephorate of Antiquities of Thessaloniki Region)

Presentation Format: Oral

The archaeological site of Nea Raedestos, located in the Anthemous River Valley (Central Macedonia, Northern Greece), comprises a tell (a specific hill-like form of settlement known as *toumba*) from the Bronze Age and remains of a Neolithic settlement buried beneath. The position of the tell on the alluvial plain prompted a multidisciplinary geoarchaeological investigation to reconstruct the influence of landscape changes on prehistoric settlement in the valley, with an emphasis on alluvial sequences. Using the ERT survey and vibracoring in the close vicinity of the site, a different sedimentary environments were documented, including water body sediments, flood deposition, terrestrial pre-Holocene deposits and anthropogenic sediments. In result it appeared that the oldest habitation layers at the site being dated to the Middle and Late Neolithic, were located at the edge of a small periodically drying water body surrounded by ruderal vegetation adjacent to the settlement. The diatom analysis revealed the probable saline/brackish (ground) water supply of this water body. This water body functioned up to the Early Bronze Age, when it was fulfilled and buried by flood sediments thus indicating landscape change. The flooding phase at Nea Raedestos was simultaneous to an increase in fluvial aggradation in the Thessaloniki Plain at the beginning of 3rd millennium BC. Thus, it was possible to conclude that the settlement from the Later Bronze Age functioned in different environment than the one from the Early Bronze Age and Neolithic.

Following presentation focuses on the geoarchaeological potential for investigating the Bronze Age tell sites, in order to reconstruct their natural environment, as well as it brings up the data concerning the reconstruction of settlement patterns and its changes.

08 HOW GEOARCHAEOLOGICAL AND MULTISCALAR APPROACH PROVIDES NEW INSIGHT ABOUT RAPID-CLIMATE CHANGES AND SOCIAL DYNAMICS CONSEQUENCES ONTO MEDITERRANEAN LANDSCAPES DURING BA

Author(s): Glais, Arthur (LETG-Caen at Normandy University) - Lespez, Laurent (LGP-University of Paris-East Créteil) - Lopez-Saez, José-Antonio (Archaeobiology Group, Institute of History, CCHS, CSIC, Madrid) - Darcoque, Pascal - Tsirtsoni, Zoi (Arscan, Maison de l'archéologie et de l'Ethnologie, University of Paris 10, Nanterre) - Malamidou, Dimitra (Ephorate of Prehistoric and Classical Antiquities, Greek ministry of culture, Kavala)

Presentation Format: Oral

The research is conducted in Northern Greece onto two distinct but connected river basins, the southern part of lower Strymon Valley and his last tributary (Angitis) draining the former Tenaghi-Philippon marsh, 30 km to the east. Four terrestrial cores, will be presented in order to bring new information about climate instability and social dynamics occurred in the region during Bronze Age. Two cores spaced from 2km each other were carried out in the wetland between the Tenaghi-Philippon former marsh and the multi-period tell of Dikili Tash currently investigated by archaeologists. We attempt to use these archives to identify periods of landscapes and socio-cultural changes around the inhabited area. Another two cores, equally spaced from 2km each other, are situated on the riverbank of contemporary large river systems (Strymon and Angitis) into Lower-Strymon-Valley. The latter fluvio-lacustrine deposits (from 7 to 10 meters thick) describing the interval between 3200 to 800 cal BC (EBA to Antiquity in this region) offer a significant potential for high-resolution palaeoenvironmental studies. They give us new insight into the complex puzzle of Human-Environment relationships at this cultural time.

For each sequence, two sources of palaeoecological investigations have been conducted: geomorphological and palynological. They give an overview of climate variability in the Eastern Mediterranean, particularly for some RCCs episodes and thereafter a comprehensive view of anthropogenic responses and impacts on the vegetation cover.

This case study highlights the interest to (1) combine geomorphological with palynological evidence and multiscalar approach to discuss on the Climate/Environment/Society relationships. (2) It points out the necessity to assess the effects of specific farming practices as of the Climate Change on the dynamics of mosaic landscapes. This long term analysis about Bronze-Age landscape dynamics provides (3) food for thought to fill the archaeological shortcoming for this period, guiding the future investigations.

09 FROM DEPOSIT TO SOCIAL PRACTICES: INTEGRATED MICROMORPHOLOGICAL ANALYSIS OF FLOOR SEQUENCES AT MIDDLE BRONZE AGE ERIMI-LAONIN TOU PORAKOU, CYPRUS.

Author(s): Amadio, Marialucia (University of Reading, School of Archaeology, Geography and Environmental Science; Italian archaeological project at Erimi-Laonin tou Porakou)

Presentation Format: Oral

Floors are key data-set of cultural evidence in archaeological contexts as they offer potentials for detecting and interpreting the spatial conventions, through which economic and social relationships are represented and negotiated during the life-history of buildings and settlements. In this study, floor sequences from the Middle Bronze Age site of Erimi-Laonin tou Porakou (c. 1950-1650 BC), in the southern region of Cyprus, have been analysed through an interdisciplinary approach based on integration of stratigraphic, micromorphological, spectroscopic (FTIR) and geochemical (XRF) analyses. The methodological framework applied in this study is aimed at generating an interdisciplinary data-set with which to analyse the study context at different spatial and temporal scale and to investigate the socio-cultural and economic transformations at Erimi-Laonin tou Porakou during Middle Bronze age Cyprus by analysis of:

- source materials, properties and technologies in the manufacture of floors as indicators of accessibility and selection to natural resources, labour organisation and technological specialisation;

- impact of environment, activities and events on floor surfaces as indicators of continuity and change in use of space and related socio-cultural and economic implications.

The multi-scalar data-set provided an effective framework to reconstruct every-day practices in the construction, use and maintenance of floor plasters within buildings, and to examine the importance of these routine activities in the formation and reproduction of socio-cultural identities, roles and relations at Middle Bronze Age Erimi-Laonin tou Porakou.

10 URBAN NEIGHBOURHOODS AT BRONZE AGE KNOSSOS: GEOARCHAEOLOGICAL INVESTIGATIONS OF THE KNOSSOS GYPSADES PROJECT

Author(s): Ayala, Gianna (University of Sheffield) - Bogaard, Amy (University of Oxford) - Hatzaki, Eleni (University of Cincinnati) - Pouncett, John (University of Oxford)

Presentation Format: Oral

Despite more than a century of continuous archaeological research at Knossos, the occupation of the area surrounding the palace is still poorly understood. Arthur Evans's excavation strategy created a distorted picture of the town, dominated by elite buildings floating in a largely unexplored urban landscape. The research conducted since 2014 by the members of the Knossos-Gypsades project, a synergasia between the Herakleion Ephoreia and the British School at Athens, has uncovered several structures and outdoor occupation spaces dating to the Bronze Age, including an internal burnt storage room and two external middens. This presentation

will focus on the methods and preliminary results from systematic geoarchaeological sampling within and around the structures. Methods including sediment analysis (magnetic susceptibility, particle size, organic content and pXRF), micromorphology along with coring form the backbone of the geoarchaeological sampling and analysis. This data is placed within the broader excavation strategy including environmental sampling and geophysical research. The results of this research have provided a rare opportunity to investigate, at high resolution, the formation and duration of these complex deposits as well as the occupation history of the structures themselves. These different data sets combine to provide a unique understanding of a Bronze Age Knossian neighbourhood. These datasets will hopefully offer an invaluable contribution into the broader discussions of Mediterranean Bronze Age cityscapes and the domestication of the countryside.

11 WASTE HEAPS IN THE EBA PILE DWELLING OF LUCONE (N. ITALY): TOWARDS A GEOARCHAEOLOGY OF DAILY ACTIVITIES

Author(s): Nicosia, Cristiano (Dipartimento dei Beni Culturali, Università di Padova) - Dal Corso, Marta (Inst. of Prehistoric and Protohistoric Archaeology and CRC1.266 Scales of Transformation, Kiel University) - Baioni, Marco (Museo Archeologico della Valle Sabbia - Fondazione "Piero Simoni", Gavardo) - Mangani, Claudia (Museo Civico Archeologico "G. Rambotti", Desenzano del Garda)

Presentation Format: Oral

The Lucone settlement is one of the pile dwellings belonging to the UNESCO "Prehistoric Pile Dwellings around the Alps" serial transnational site. Its chronology is well-established thanks to dendrochronology on the numerous vertical and horizontal wood elements recovered. The earliest fellings date to the year 2034 BCE and the latest to the year 1967 BCE, placing the inhabitation of the site in the Early Bronze Age, and more precisely in the "Polada" culture. Yearly excavation campaigns begun in 2007 and highlighted the presence of several finely stratified or laminated "heaps", containing large quantities of archaeological materials. The heaps are convex-shaped or sometimes more laterally spread out, resulting in a lenticular morphology. They are attested in both the phases of occupation identified at the site (separated by an episode of destruction by fire) and are often superimposed to each other. These heaps are important witnesses of the activities taking place on the platforms, which are never preserved in most pile dwellings. They have been made object of a combined study employing soil micromorphology and phytolith analysis, integrating the evidence from excavation. The results are evaluated in terms of daily activities, choice of combustibles, use of earth-based construction materials, waste management, and environment of deposition.

12 DEGRADED EARTH-BUILDING MATERIAL OF A RECENT BRONZE AGE HUT: SEDIMENT CHARACTERIZATION THROUGH COMBINED GEOARCHAEOLOGICAL ANALYTICAL TECHNIQUES AT BROGLIO DI TREBISACCE

Author(s): Magno, Laura Matilde (Université Catholique de Louvain)

Presentation Format: Oral

Tracing evidences of earth-made construction material in very weathered and eroded archaeological deposit may be challenging for archaeologist, especially during excavation.

The application of geoarchaeological laboratory techniques proved to be effective in the investigation of the sediments related to the occupation and the abandonment of a hut-structure in the Recent Bronze age site of Broglio di Trebisacce (Cosenza, Southern Italy).

The research focused, in particular, on the study of the order of the calcite crystal structure and on the structural alteration of the clay mineral components. Sediments have been characterized by combining analytical techniques such as micromorphology, Fourier transforms infrared spectrometry (FTIR) and X-ray fluorescence spectrometry (XRF) and carbonate insoluble fraction. Several control samples of clay collected from deposits near the site have been used for a series of burning experiments in order to analyze clay behavior under heat stress. Experimental results have been then compared to those coming from the archaeological record.

Overall, resulting data show how the earth construction material used for the hut is characterized by sediments derived from the yellow natural substratum mixed with anthropogenic material such as ash and plaster. They also proved that the abandonment/collapse of the structure cannot be related to strong burning event since the clay material looks not altered by heat.

13 THE LATE BRONZE AGE SETTLEMENT OF FONDO PAVIANI (ITALY) IN ITS TERRITORIAL SETTING. GEOMORPHOLOGICAL ISSUES, IN-SITE ANALYSIS AND SETTLEMENT DYNAMICS

Author(s): Nicosia, Cristiano - Dalla Longa, Elisa - Cupitò, Michele - Leonardi, Giovanni (Dipartimento dei Beni Culturali, Università di Padova)

Presentation Format: Oral

The Bronze Age settlement dynamics in the lowest part of the Veneto plain (North-Eastern Italy) have been long at the centre of scientific debate. The settlements of this area played an important role in the emergence and growth of the "Terramare Culture". Moreover, they had a particular development between 13th and 12th century BCE, when some key-sites survived the general crisis of the Po Valley, and a reassessment of the settlement system took place. This process led to the birth of the "Fratresina system" (from the eponym site) since the 12th century BCE. We investigated the reasons of this settlement pattern change between the 13th and the 10th/9th century BCE through a multi-scalar approach, considering: a) geomorphological issues; b) in-site geomorphological

and archaeological analysis; c) general settlement dynamics of the area. Our case-study is the fortified settlement of Fondo Paviani (14th-12th/11th century BCE), investigated since 2007. This site was the central place of a large territorial polity in the 14th-13th century B.C. It controlled other fortified and non-fortified sites within a complex hydrographical net involving the paeleo-channels of rivers between the Alps, the Garda Lake, the Po river and the northern Adriatic Sea. This socio-political role and the geographical position explain the richness of the settlement and the large volume and extent of its international relationships (from Central Europe, to peninsular Italy, to the Eastern Mediterranean) testified in the archaeological record. Our study integrates geomorphological and paleo-environmental data with archaeological and micromorphological evidence (using a microstratigraphic-processual analysis to verify the hypotheses about the formation processes of the deposit). This allows for a privileged perspective not only towards the understanding of the specific setting of Fondo Paviani, but also in order to make some inferences on the location choices of other sites in the study area.

14 CONNECTING MATTER FLUXES AND HUMAN BEHAVIOR IN BRONZE AGE MULTI-LAYERED SETTLEMENTS FROM ANATOLIA TO CENTRAL EUROPE

Author(s): Martini, Sarah (Institut fuer Ur- und Fruehgeschichte Kiel) - Dreibrödt, Stefan (Institute for Ecosystem Research University of Kiel)

Presentation Format: Oral

By the beginning of the Bronze Age tells and multi-layered settlements are recognized across a vast section of the Eurasian continent, stretching from the Indus Valley in the East to the Atlantic in the West and from Germany down to Anatolia. As an outcome of generations continuously inhabiting the same area and constructing their surroundings on the remains of earlier habitation, tells represent excellent sites in which to examine intra-site diachronic changes in human behavior and to compare inter-site/inter-regional behaviors staged in a similar setting. Furthermore, the layering of anthropogenic sediments produced by human-based matter fluxes, which forms these settlements, provides an excellent opportunity for geoarchaeologists to apply their methods. While geoarchaeologists and archaeologists have developed numerous models of human behavior based on both geochemical signatures and the micro-remains of anthropogenic activity, data is often viewed in a relative, qualitative manner. The quantification of geoarchaeological data can both significantly change and expand interpretations.

In this paper we compare matter fluxes representing the human behavior from multi-layered settlements with Bronze Age occupation – Niederröbblingen (Germany), Fidvar (Slovakia), Jagnilo (Bosnia-Herzegovina), Bresto (Bulgaria), Asagi Pinar, and Arslan Tepe (both Turkey) – forming a transect from Northern Europe to Turkey based on the quantification of geochemical and micro-artifact proxies. An emphasis is placed on identifying intra-site diachronic changes reflecting a difference in human behavior starting in the Bronze Age and the existence of a Bronze Age pre-modern “globalization” recognizable through on-site geoarchaeology is questioned. Do we see significant changes indicating a new, pan-European set of human behaviors that can be connected with a Bronze Age “globalization”? Do local solutions and behaviors present in the Neolithic/Chalcolithic remain important? What role does the vast difference in environmental setting along this transect play?

15 BOOM AND BUST CYCLES DURING THE BRONZE AGE? PALYNOLOGICAL EVIDENCE FROM THE NORTH EUROPEAN PLAIN.

Author(s): Feeser, Ingo - Dörfler, Walter - Kneisel, Jutta (Institut fuer Ur- und Fruehgeschichte Kiel)

Presentation Format: Oral

The concept of boom and bust cycles in archaeology has become increasingly discussed during the last decades with the widespread use of radiocarbon dates as proxy for population density. Hereby it is used to refer to evidence for large scale, regional to over-regional, demographic changes with phases of population growth followed by a distinct decline.

A further approach allowing a detailed cross-regional diachronic comparison of demographic developments is offered by the combined evaluation of palynological records. The increasing availability of high quality records, with respect to dating uncertainties and temporal resolution, even allows the synchronization and comparison on a short-term, sub-centennial resolution.

In this paper we present evidence for population changes during the 3rd to 1st millennium BC based on well-dated, high-resolution pollen diagrams from annually laminated lake sediments along a west-east transect from northern Germany to Greater Poland. Based on the spatial extent of changes regional vs. over-regional population dynamics can be identified. At present our results suggest a general growth phase (boom) at centered around 2000 cal BC and at least two phases of over-regional population decline at around ca. 1500 and 1100 cal BC. A comparison with selected archaeological and climate proxies aims at identifying potential environmental and/or cultural factors and drivers behind these developments.

16 GEOARCHAEOLOGICAL INVESTIGATIONS OF DANISH CELTIC FIELDS

Author(s): Nielsen, Nina (Museum Silkeborg) - Kristiansen, Søren Munch - Ljungberg, Thomas (Department of Geoscience, Aarhus University) - Løvschal, Mette (Department of Archaeology and Heritage Studies, Aarhus University)

Presentation Format: Oral

In the past decade, a number of geoarchaeological investigations have been conducted on selected Danish ‘Celtic fields’. This type of prehistoric field system was used throughout large parts of northwestern Europe in the Late Bronze Age and Early Iron Age and

was characterized by a netlike pattern of field boundaries, in the form of low banks or lynchets, that enclosed small fields. Some field systems were after abandonment overgrown by forests or heaths – presumably in the first centuries AD – and left undisturbed until today.

A series of recent investigations have been conducted on some of these preserved field systems in woodlands as well as in heathlands. Through geoarchaeological analyses and geochronological dating, it has been possible to obtain more information about manuring practices and the chronological dimensions of the Celtic fields. The applied methods include multi-element analysis by ICP-MS, micromorphology, μ XRF, pollen analysis, and radiocarbon and OSL dating. The analyses were carried out on soil samples taken from vertical sections through field boundaries and, regarding the geochemical analyses, also on representative samples of topsoil from several fields. The latter sampling strategy made it possible to investigate the intra-site variation of manuring practices. Lidar maps proved essential for identifying natural, undisturbed reference sites.

In this paper we not only present our scientific results, but also discuss our experiences regarding the application of the different methods and sampling strategies.

17 SOME PECULIARITIES OF ENVIRONMENTAL HISTORY DURING THE CENTRAL EUROPEAN BRONZE AGE AS DEDUCED FROM SOILS AND SEDIMENTS

Author(s): Dreibrodt, Stefan (University of Kiel, CRC 1266/ Institute for Ecosystem Research)

Presentation Format: Oral

Compilations of historical soil erosion records reflect climate variability during the early Holocene and the past intensity of land use since the onset of agriculture.

In Germany, there is a clear increase of field use since ca. 7.500 yrs. Since then, a general long-term trend of increasing soil erosion indicates an expansion of agricultural fields. Nevertheless, there are some obvious deviations from this long-term trend.

One of these deviations, surprisingly, is visible during the central European Bronze Age. After a clear maximum of erosion during the Late Neolithic (ca. 2450 BCE) a decreasing intensity of land use is indicated until the onset of Urnfield culture around 1350 BCE. Pronounced minima are visible at ca. 2050 BCE (aftermath of 4.2 ka phase?) and at ca. 1550 BCE (Unetice collapse). A comparison along a south-north gradient shows that the signal of ca. 2050 BCE is visible across all of Germany, whereas the minimum at ca. 1550 BCE is not visible in southern Germany. There, rather increased land use intensity is indicated. Similar patterns are visible in lake sediments and pollen diagrams from central Europe. Thus, looking from the regional perspective of landscape history we might ask: Do the observed differences reflect changes in Bronze Age land use intensity and/or subsistence strategies?

Another Bronze Age phenomenon in central Europe is the onset of intensive flooding activity in the river valleys after ca. 2250 BCE. Since we find around that time the first indication for severe erosion at mountain sites we might ask, too: How large is the Bronze Age role in late Holocene central European alluvial activity? (Until today?)

To foster a better understanding of human-environmental transformations during the Bronze Age across Europe, it is suggested to compare regional phenomena as the outlined examples with developments in other European regions.

18 THE SETTLEMENT OF LA DOU (NE IBERIAN PENINSULA) DURING THE LATE BRONZE AGE: AN INTEGRATED GEOLOGICAL AND ARCHAEOLOGICAL APPROACH

Author(s): Cámara Manzaneda, Javier - Saña, María (Universitat Autònoma de Barcelona, Departament de Prehistòria) - Alcalde, Gabriel (Universitat de Girona, Departament Història i Història de l'Art) - Navarrete, Vanessa - Pons, Enriqueta - Revelles, Jordi - Rosillo, Rafael (Universitat Autònoma de Barcelona, Departament de Prehistòria) - Sala, Roger (SOT Archaeological Prospection) - Yousef Pouran, Kaveh (Universitat Autònoma de Barcelona, Departament de Prehistòria)

Presentation Format: Oral

This paper presents the correlation between the geophysical survey data and the archaeological excavation results obtained for the archaeological site of La Dou (Vall d'en Bas, NE Iberian Peninsula), occupied during the Late Bronze Age (1200-900 cal BC). The site was discovered in 2005, identifying an open-air Neolithic settlement dated from the 5th millennium BC. The application of magnetic and GPR surveys in 2009-2011 and its subsequent excavation also revealed a Late Bronze Age human occupation represented by a large ditch with a burnt layer inside. The layer was characterized by a high amount of organic matter and different archaeological remains: pottery vessels broken inside, faunal and plant remains, sun-dried clay, metal and lithic artefacts and charred wood remains. Latter fieldwork results have also revealed the ditch was related to different alignment of post holes identified in the geophysical map which could belong to a building.

The aim of this work is to present the results of the interdisciplinary research combining the 3D digital model of the site with the geophysical survey map as well as the ditch stratigraphy and spatial analysis of each category of archaeological remains. The results obtained by the integrated analysis has finally improved our knowledge about La Dou site during its last occupation phase: which was the formation process of the burnt level inside the ditch, how it was linked with a hypothetical building structure and what were the social practices involved in the formation of the site.

19 MICROSTRATIGRAPHIC ANALYSIS IN THE DITCHED ENCLOSURE OF PERDIGÕES SITE (PORTUGAL)

Author(s): Milesi, Lara - Gutiérrez-Rodríguez, Mario (Universidad de Granada. Facultad de Filosofía y Letras) - Duarte, Carlos (Universidad de Cantabria)

Presentation Format: Oral

Iberian neolithic and chalcolithic ditched enclosures have been studied under different perspectives and incorporating new methodologies throughout the last two decades. However, no profound research has been done in the study of the sedimentary formation processes of the deposits that fill almost all their features – mainly ditches and pits.

The paper presents the first microstratigraphical study carried out in the filling of one of the late chalcolithic ditches of Perdigões site (ditch 2). The research aims to test microstratigraphical analysis efficacy as part of a necessary multiproxy approach to the interpretation of this complex archaeological context. Methodology and results of 15 thin sections will be discussed considering: i) sedimentary components, ii) microfacies analysis and iii) postdepositional processes. Discussion will include evidences of vegetation clearance, refuse deposits, and colluvial deposits. Also, short-term and long-term formation processes will be proposed for natural and anthropic deposits. This information will be related to indirect evidences of a bank structure located next to the ditch and decreases of human activity in the area nearby the structure during some periods.

The results will also be discussed in the context of the southern Iberian prehistoric enclosure phenomenon end, that is coinciding with the transition to new cultural traits associated to Bronze Age societies.

a. MULTIDISCIPLINARY RESEARCH OF THE ARCHEOLOGICAL MINING AND METALLURGICAL COMPLEX OF THE BRONZE AGE SYRLIBAY (KAZAKHSTAN).

Author(s): Noskevich, Vladislav (Institute of Geophysics, Ural Branch of RAS, Ekaterinburg) - Tkachev, Vitali (Institute of the steppe UB RAS, Orenburg) - Yuminov, Anatoli (Institute of Mineralogy, Ural Branch of RAS, Miass) - Baitleu, Darkhan (Branch of the Institute of Archeology, A. Kh. Margulan in Astana)

Presentation Format: Poster

The discovery of the Mugalzhay mining and metallurgical center of the Late Bronze Age, whose activity is related to the production of the metal of the Kozhumberdy cultural group on the western flank of the Andronovo cultural-historical community, actualized the task of ascertaining the mechanisms for the functioning of this historical metallurgical formation. Studies have shown that groups of archaeological monuments of various categories (settlements, burial grounds, cult objects) form compact micro districts, confined to ancient mining workings on copper. To solve this problem, the brightest complex of monuments in the middle reaches of the Sarlibay River was chosen. The proposed work is devoted to interdisciplinary research of the Sarlibay archaeological micro district. A series of monuments of the Late Bronze Age was found on a 4 km long section. Detailed geological and geophysical research and archaeological excavations revealed two copper mines, an unfortified settlement, several mounds and a sanctuary with petroglyphs. On one of the mines consisting of three quarries, GPR survey was carried out and a model of the ancient surface of the mine was constructed, which estimated the amount of mined ore and smelted copper. On the territory of the sanctuary, a “ringing” stone was discovered. He was named for his unique ability to make a high, sonorous sound when struck, like a blow on a railway rail.

b. MUD ‘N’ ROLL IN THE TERRAMARE: MICROMORPHOLOGICAL ANALYSIS OF WHEEL RUTS AT THE BRONZE AGE VILLAGE OF QUATTROCASE (CREMONA, ITALY)

Author(s): Peinetti, Alessandro (Laboratoire Archéologie des Sociétés Méditerranéennes, UMR 5140 (CNRS, Univ. Paul Valéry Montpellier 3, MCC); LabEx Archimède; Università di Bologna) - Wattez, Julia (INRAP) - Bronzoni, Lorenza (AR/S Archeosistemi soc. coop.)

Presentation Format: Poster

The remains of a Bronze Age village have been investigated at Quattrocasse (Casalmaggiore, Cremona district, Northern Italy) by preventive archaeology in 2016. The material culture, typical of the “Terramare culture”, refers to the central and the final phase of the Middle Bronze Age (about 1550-1340 BC). The excavated area probably corresponds to the periphery of the site, showing some dwellings, a large area without buildings and a ditch coupled with a palisade. The stratigraphy is here well preserved but quite undifferentiated and homogeneous, probably corresponding both to the life and abandonment of the site.

An undisturbed sample of sediments for micromorphological analysis has been collected during the excavation, in order to characterize the activities performed in this peripheral area of the site and to understand the formation processes leading to the observed undifferentiated stratigraphy.

The micromorphological analysis shows the presence of a courtyard area more or less cleaned and maintained at the beginning of the occupation. After, the traces of a pathway and wheel ruts characterize the sampled area. The wheel rut shows the marks of compression made by the passage of a wheel, alternated to the partial infilling of the rut in dry or moist climatic conditions. The aim of this poster is to describe and make a model about the traffic and the trampling traces recognized at the micro-scale. Wheel traces will be also commented by the geoarchaeological and archaeological literature on the subject.

WETLANDS VS. DRYLANDS? CHALLENGING DIVIDES AND CHANGING ARCHAEOLOGICAL PERSPECTIVES ON PREHISTORIC WETLAND SITES, LANDSCAPES AND SOCIETIES

Theme: The archaeology of material culture, bodies and landscapes

Organisers: Huisman, Floor (Durham University) - Naumov, Goce (Center for Prehistoric Research / Goce Delčev University)

Format: Regular session

Prehistoric wetland sites have great potential for informing us about the past as they tend to provide better preservation than dryland sites. Yet this potential is currently not fully realised as many wetland sites and societies are studied in isolation. This divide, although noted by many scholars, continues to exist, mostly due to our modern perceptions of these landscapes and the people who live here as 'different' from drylands and their inhabitants. Thus, our notions about landscape and environment are the primary reference for understanding social diversity, leading to biased perspectives on prehistoric societies.

Rather than assuming such differences and isolating wetland sites and communities, we need to develop methods and theories that allow us to study wetland(er)s in relation to dryland(er)s. For instance, by studying the landscape settings of wetland and dryland sites through new scientific methods, which demonstrates that some landscapes were altered recently and not as different as originally proposed. Recent comparative studies of wetland and dryland material culture also indicate exceptional similarities and confirm the established networks between societies that were previously considered different. Even in cases where there were real differences between wet and dryland landscapes and communities, it is unlikely that wetlanders lived in complete isolation, urging us to consider their role and place in the wider socio-cultural landscape. Therefore, we invite papers that present new perspectives on wetland sites and communities in relation to dryland(er)s. Methodological and theoretical approaches breaking down the wetland/dryland divide and drawing wetland(er)s out of isolation are particularly welcome.

ABSTRACTS

01 WETLANDS VS. DRYLANDS? CHALLENGING DIVIDES AND CHANGING ARCHAEOLOGICAL PERSPECTIVES ON PREHISTORIC WETLAND SITES, LANDSCAPES AND SOCIETIES

Author(s): Huisman, Floor (Durham University) - Naumov, Goce (Center for Prehistoric Research; Goce Delčev University)

Presentation Format: Oral

Prehistoric wetland sites have great potential for informing us about the past as they tend to provide better preservation than dryland sites. Yet this potential is currently not fully realised as many wetland sites and societies are studied in isolation. This divide, although noted by many scholars, continues to exist, mostly due to our modern perceptions of these landscapes and the people who live here as 'different' from drylands and their inhabitants. Thus, our notions about landscape and environment are the primary reference for understanding social diversity, leading to biased perspectives on prehistoric societies. Rather than assuming such differences and isolating wetland sites and communities, we need to develop methods and theories that allow us to study wetland(er)s in relation to dryland(er)s. For instance, by studying the landscape settings of wetland and dryland sites through new scientific methods, which demonstrates that some landscapes were altered recently and not as different as originally proposed. Recent comparative studies of wetland and dryland material culture also indicate exceptional similarities and confirm the established networks between societies that were previously considered different. Even in cases where there were real differences between wet and dryland landscapes and communities, it is unlikely that wetlanders lived in complete isolation, urging us to consider their role and place in the wider socio-cultural landscape. Therefore, we invite papers that present new perspectives on wetland sites and communities in relation to dryland(er)s. Methodological and theoretical approaches breaking down the wetland/dryland divide and drawing wetland(er)s out of isolation are particularly welcome.

02 A SEMI-DRY DUTCH PREHISTORY?

Author(s): Muller, Axel (ADC ArcheoProjecten)

Presentation Format: Oral

The Dutch delta is famous for its wonderful wetland sites, especially the Mesolithic sites in the river area on submerged river dunes. On the edges of the Rhine-Meuse Delta there are numerous contemporary drylands sites. The relation between these two areas and their sites have been the subject of many studies.

One of the challenges for these studies, is the relative small number of wetland sites that have been excavated. However in the last 15 years some large scale projects were conducted in wetland contexts.

These recent CRM excavations in the delta, on early prehistoric (Mesolithic) sites, are located in submerged cover sand areas or on the edges of river systems. Although these sites are currently often situated in a typical wetland setting (covered by thick layers of peat and clay and under groundwater), the excavations showed that many of these sites were located in typical drylands, so we miss the ecological data and artefacts from organic materials.

However, palynological data from geological features such as fossil oxbow lakes, closely related to these sites, can supply very important data about the contemporary landscape and ecological settings. Therefore we can gain insight in the possibilities to

explore these areas in the early prehistory and compare them with the typical wetland sites from the submerged river dunes and the drylands on the edges of the delta. These palynological resources can alter our view on the Dutch semi-dry wetlands.

In the presentation I will discuss three case studies on wetland sites (Dronnten, Well Aijen and Kampen) where most of the information about the landscape comes from these palynological resources.

03 BEYOND LAKE VILLAGES: INVESTIGATIONS AT BURGAESCHISEE (SWITZERLAND) AND NEW INSIGHTS IN NEOLITHIC SETTLEMENT, LAND USE AND VEGETATION DYNAMICS.

Author(s): Hafner, Albert (Institute of Archaeological Sciences, University of Bern; Oeschger Centre for Climate Change Research, University of Bern) - Tinner, Willy - Rey, Fabian - Laabs, Julian (Institute of Plant Sciences, University of Bern; Oeschger Centre for Climate Change Research, University of Bern)

Presentation Format: Oral

Interdisciplinary research within the "Beyond lake villages: Studying Neolithic environmental changes and human impact at small lakes in Switzerland, Germany and Austria" project focused on Neolithic settlement activities, human impact on the environment and vegetation history in three alpine foreland areas with small lakes (Central Switzerland, Westallgaeu, Germany and Salzkammergut, Austria). Laminated sediment sequences form the basis for palaeoecological time series on Holocene vegetation, land use and fire dynamics that reach unprecedented time resolutions and precisions. Here we propose to present research results from the Swiss project part of the "Beyond lake villages" project at Lake Burgaeschi on the Swiss Plateau. Our research focused on Neolithic wetland sites on the lakeshores, sites on (dry) mineral soils in the hinterland and the Holocene vegetation of the lake basin. The earliest traces of agriculture start with the onset of the 5th millennium BC, landnam phases were likely coupled to climate dynamics, with warm and/or dry conditions resulting in more intense agriculture and settlement expansion, while cold and/or wet conditions resulted in land abandonment and forest closure. The joined interpretation of palaeoecological and archaeological results shows the establishment of sedentary agro-pastoral societies around 5000-4800 BC in the Burgaeschisee area. Palaeoecological proxies show clear cycles of fire-based deforestation followed by successional forest recovery stages.

04 A SPARK IN THE DARK. 'LA MARMOTTA' LAKESHORE VILLAGE IN THE FRAMEWORK OF THE IMPRESSED WARE NEOLITHIC

Author(s): Mazzucco, Niccolò (Université Paris Lumières postdoctoral fellow, UMR 7055 PreTech, CNRS / Université Paris Nanterre) - Mineo, Mario (Museo delle Civiltà - Museo Preistorico Etnografico) - Gibaja, Juan Francisco (Archaeology of Social Dynamics group - ASD, Milá i Fontanals Institution - IMF-CSIC) - Mozota, Millán (Archaeology of Social Dynamics group - ASD, Milá i Fontanals Institution - IMF-CSIC) - Gassin, Bernard (TRACES, UMR 5608, CNRS / Université de Toulouse II Jean-Jaurès)

Presentation Format: Oral

The lakeshore settlement of 'La Marmotta' (Anguillara Sabazia, Metropolitan City of Rome) represents one of the earliest evidence of seafaring farmers in the Italian Peninsula (ca. 5900-5600 cal BC) and one of the earliest lakeshore villages of the entire Central Mediterranean Basin. The site is unique for the richness and variety of organic materials preserved (i.e. foodstuff, wood and plant crafts, house remains, pirogues, etc.), especially if compared with the rest of Early Neolithic settlements in the Italian Peninsula, and, more in general, in the Central and Western Mediterranean area. Nevertheless, due to several reasons, the site has still been little integrated within the debate on the Neolithization process. How can the huge amount of data obtained from La Marmotta be transposed to the surroundings, contemporaneous, dryland sites? This is a compelling challenge, especially considering that often no comparable records exist in the archaeological contexts characterized by drier preservation conditions. In this presentation we will focus on the flaked stone assemblage and on the several wooden sickles recovered from this settlement. The integration of both records can help us understanding the harvesting techniques adopted during the Early Neolithic, providing a fundamental reference for the rest of Impressed Ware sites of the Central and Western Mediterranean area.

05 WETLAND VS DRYLAND SITES: ANIMAL MANAGEMENT PRACTICES DURING THE EARLY NEOLITHIC IN WESTERN MEDITERRANEAN

Author(s): Navarrete, Vanessa - Saña Seguí, Maria (Laboratory of Archaeozoology, Universitat Autònoma de Barcelona)

Presentation Format: Oral

Animal management strategies present a high variability degree during the Early Neolithic. This variability has been characterized mainly by the following parameters: number of exploited animal species, wild and domestic component of assemblages and animal productions exploited (meat, wool, milk...). A comparison between Early Neolithic wetland and dryland sites from the Mediterranean region and from the Alps has been carried out. The main objective is to test if animal management strategies in wetland environments present a specific pattern compared to dryland sites. In addition to the characterization of animal production strategies practiced during the early Neolithic in wetland environments, the role and influence of lake environment in subsistence strategies of the first farming societies will be evaluated. The results reveal the factors involved in the composition of assemblages, the site type and the characteristics of the environment (terrestrial or lacustrine). The evaluation of the impact that the different taphonomic processes have had on the settlement allows verifying if the representation of the social dynamics is affected. In addition to the characterization of animal production strategies practiced during the early Neolithic in wetland environments, the role and influence of lake environment in subsistence strategies of the first farming societies will be evaluated.

06 TELLS IN WETLANDS: RECONSIDERATION OF LANDSCAPES AND NETWORKS IN THE NEOLITHIC BALKANS

Author(s): Naumov, Goce (Museum of Macedonia; Center for Prehistoric Research)

Presentation Format: Oral

Commonly the tells were perceived as settlements established in drylands and consequently were studied as such. But the recent research indicate that highest density of the Balkan tells was in the valleys that were Neolithic wetlands, but dried in the 20th century due to the strategy of melioration in many countries. The recently modified environment induced altered perspective of tells and focused the research more on the settlements and not on their surroundings. Nevertheless, the current geoarchaeological research in Konya (Turkey), Thessaly (Greece) and Pelagonia (Republic of Macedonia) specify the wetland character of valleys inhabited by the first farming societies that were establishing the tells since the Early Neolithic. In the process of Neolithization, besides the advantages such like agriculture, stock-breeding, daub dwellings, pottery, figurines and new tools, the Anatolian farmers that settled the Balkan Peninsula also introduced the life on tells particularly located in the wetlands. Gradually these tell societies developed solid networks with communities inhabiting the lakeside pile-dwellings that were previously studied as isolated units due to diverse environmental features. Therefore this paper will be focused on the Balkan Peninsula and Thessaly, Pelagonia, Korça, Mačva and Lower Danube in particular in order to reconsider the tells and their wetland environment, as well as the networks some of these societies had with pile-dwellings in the regions of Amindeon Basin and Lake Ohrid.

07 LINKING DRYLAND AND WETLAND AT THE VIVERONE MIDDLE BRONZE PILE-DWELLING SITE

Author(s): Jennings, Benjamin (University of Bradford)

Presentation Format: Oral

The prehistoric site of Viverone, has been known about for many decades, with excavations recovering many artefacts, including assorted metalwork items and abundant ceramics.

Recent excavations at the Viverone Middle Bronze Age pile-dwelling, a member of the "Prehistoric Pile Dwellings Around The Alps" UNESCO World Heritage Status Sites, aimed at gaining a greater understanding of the environmental and cultural context of the settlement, have highlighted the inter-connections between the prehistoric populations residing on the lake-shore and those further inland.

Ceramic typological studies and metal analysis demonstrate links to societies both locally in northern Italy, and further afield in central and northern Europe.

On and off site environmental analysis, enabled by sediment coring, has highlighted the development of the environmental setting over time, changing from a sand bar area to the present offshore situation.

Ongoing dendrochronological analysis, in addition to the excavation and identification of cultural layers, have helped to define the potential duration of the settlement occupation.

The recent excavation has demonstrated the potentially significant role that this settlement played in linking northern Italy to northern Europe. Although the settlement does not continue in to the Late Bronze Age, the area appears to have held significance during this period with artefacts still found. However, where the pile-dwellers occupied after the end of the settlement remains unknown.

08 INVESTIGATING HUMAN OCCUPATION OF LAKESIDE SETTLEMENTS USING PALAEOENTOMOLOGICAL TECHNIQUES; AN IRON AGE CASE STUDY FROM BLACK LOCH OF MYRTON, SCOTLAND

Author(s): Davies, Kimberley - Whitehouse, Nicola (Plymouth University) - Allison, Enid (Canterbury Archaeological Trust) - Cavers, Graeme - Crone, Anne (AOC Archaeology Group) - Brown, Antony (University of Southampton)

Presentation Format: Oral

Black Loch of Myrton is an Iron Age lochside settlement situated in south-west Scotland. It consists of a number of round house structures constructed on peat/fen material at the margins of a small, productive loch. Here we present palaeoentomological data from archaeological excavation deposits from a single structure at the site, excavated in 2015. The main aim of the palaeoentomological work is to inform our understanding of the living conditions on the site, the environmental context in which the site was constructed and explore wider implications for our understanding of lakeside settlements of this period.

Beetles, flies and ectoparasites (e.g. fleas) indicate decomposing floor litter layers and the presence of dung materials within the house structure. Of particular interest is the presence and persistence of a dry synanthropic insect fauna, typically associated with roofing and thatching, that are commonly found in settlement sites of later time periods. Such communities likely reflect links with larger settlements, whilst understanding how these taxa became adapted to synanthropic environments is likely crucial to our understanding of prehistoric rural sites such as Black Loch of Myrton and their interactions between nearby dryland communities and how these developed through time. Additionally, there are species associated with storage of cereals that are typically viewed as Roman introductions within the Iron Age deposits, suggesting more diverse and long distant links than previously appreciated. We explore these themes within the context of other wetland sites of similar age to define a rural wetland settlement indicator package.

The results of this work form part of a larger archaeological project to study patterns in construction, function and longevity of these Iron Age wetland sites and to place them within the context of the wider prehistoric landscape.

09 LIVING ON WATER: EARLY IRON AGE LOCH DWELLING AT LOCH TAY, SCOTLAND

Author(s): Stratigos, Michael - Cook, Gordon - Hamilton, Derek - Jacobsson, Piotr (SUERC - University of Glasgow)

Presentation Format: Oral

Crannogs were a feature of the Scottish wetland landscapes since sometime in the earlier Iron Age to the early modern period. However, despite over a century of study, these sites are only beginning to be integrated into narratives of Scottish history and later prehistory. Living on Water is a three-year project conducting underwater excavation to develop a social history of life on Loch Tay. Our understanding of the Early Iron Age (800-400 BC) in this region is dominated by crannogs, but we still have a relatively poor grasp of their emergence and development. The project is addressing this through building a high-precision chronology for the earliest lake dwellings of Loch Tay, Perthshire, through the combination of radiocarbon dating, dendrochronology and Bayesian analysis on structural timber material excavated from six crannogs in the loch. Within the Loch Tay region, the high-resolution chronology will provide a firm foundation from which basic, but still unresolved, questions can be addressed to integrate crannogs into a wider understanding of the Scottish Iron Age, such as;

1. Were any of the crannogs within the same loch occupied at the same time?
2. What relationships did crannogs have to the wider terrestrial landscape and how did this change through time?
3. What specific practices can be identified at these sites, how these practices relate to the site surroundings and how do they change through time?

This paper will review the methodologies and results of the Living on Water project from the first year of the project.

10 THE PARADOXES OF WETLAND PERCEPTIONS - BEFORE AND PRESENT

Author(s): Pantmann, Pernille (Museum of North Zealand)

Presentation Format: Oral

Danish Iron Age wetland sites are studied in high numbers these years. Yet, several paradoxes emerge. Amongst others the continued need of segregating wetlands from drylands when they are often closely related. In Denmark, wetlands have repeatedly been perceived as markers of the settlement limits, hence rarely been excavated. However, recent excavations and studies of wetlands have revealed that some of them were indeed part of the settlement structure. They had multiple functions: rubbish disposals, peat cuttings, breaking of bog bore iron, sacred activities, and probably hay and reed harvesting as well. Some wetlands even fulfilled several functions simultaneously.

Despite the many examples of profane resources that the wetlands supplied, the wetlands still maintain a position as "sacred places" in the minds of many scholars. The attention to the sacred activities in the wetlands has caught far more interest than the profane activities, whereby the traditional idea of the wetlands as particular sacred is maintained. The fact that some wetlands even show signs of being used for both sacred and profane activities simultaneously seems to be neglected.

The separation of the sacred and the profane activities maintain the idea of the wetlands as marginal areas thus reflecting the modern perception of wetlands rather than the Iron Age perception, despite numerous archaeological examples. During the last 200 years, Danish agriculture has strived for efficient drainage of as many wetlands as possible hence turning them into fertile agrarian land. The wetlands are in a modern capacity considered useless. However, agriculture as well as valuation of nature was different during the Iron Age, suggesting that wetlands were used and perceived differently than today.

This presentation is based upon a current Ph.D. thesis regarding differences in wetlands perception and valuation during the Iron Age compared to the modern period.

11 WHY LIVE ON THE LAKESHORE? SOME INTERNATIONAL, INTERDISCIPLINARY AND THEORETICAL THOUGHTS ON THE MATTER

Author(s): Verdonkschot, Jadranka (Universität Tübingen; Universidad de Alcalá)

Presentation Format: Oral

The theme to this session is discussed through the assessment of four archaeological case studies (Egolzwil 3, Switzerland; Hörnle IA, Germany; La Draga, Spain and Dispilio, Greece) and two anthropological examples of pile dwellings (the Ribeirinhos, Amazon Floodplains/Brasil and Amsterdam, the Netherlands). The exploitation of different kinds of resources, the relationship of the lake-dwellers with the landscape and ritual evidences are all taken into account, contributing thoughts to the discussion why people would settle lakeshores in distinct regions, considering the influence of the lake on their life and identity and a broader assessment of culture and identity as a „liquid“ concept. This line of research was inspired by the observation that most explanations for initial wetland settling in prehistoric archaeology are overly simplified in current literature. Existing tendencies often rely on environmentally deterministic and exclusively practical arguments. This study aims to contribute a higher diversity of arguments. Moreover, as several regions are represented, this study assesses a broad and diverse lakeside settling panorama. This work does not aim to reach a definitive answer, a single reason explaining the settling of the lakeshore, but should rather be viewed as a theory-based exercise that tries to move beyond conceptual and modern borders.