INTERNATIONAL OPEN WORKSHOP
Socio-Environmental Dynamics over the Last 12,000 Years: The Creation of Landscapes V
March 20 – 24, 2017 / Kiel University

PROGRAMME AND ABSTRACTS

www.workshop-gshdl.uni-kiel.de
INTERNATIONAL OPEN WORKSHOP
Socio-Environmental Dynamics over the Last 12,000 Years: 
The Creation of Landscapes V
Kiel, March 20-24, 2017

PROGRAMME and ABSTRACTS

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Preface

A warm welcome to Kiel!

When a Graduate School organizes a conference, then this should be visible in the programme. Thus, it makes me happy to see that many early-stage researchers – PhD students and post-doctoral fellows alike – contribute to this event by presenting their research projects in talks and posters as well as by organizing and chairing sessions. I am sure this will help them and all other participants of this conference in building and extending their research networks.

This year’s International Open Workshop “Socio-Environmental Dynamics over the Last 12,000 Years: The Creation of Landscapes” is already the fifth of its kind after 2009, 2011, 2013 and 2015. Each of them has produced considerable scientific output, part of which you can find on the book sales table in the workshop office. The 2017 workshop is the biggest we have ever organized with more than 320 registered participants. Surely, it will not be inferior to the previous events in terms of scientific results.

I wish you a great workshop and some pleasant days in Kiel.

Johannes Müller

Speaker of the Graduate School
Human Development in Landscapes
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**Lunch locations**

Mensa 2, Leibnizstraße 14 (university canteen and café)
Mensa 1, Westring 385 (university canteen and café)
Jack’s Kitchen, Westring 399 (Pizza, pasta, soups and salads)
Pizza World, Olshausenstraße 77 (Pizza, pasta and salads)

**Coffee & snacks**

cUBar, Leibnizstraße 9 (in the University Library)
Bäckerei Günther, Olshausenstraße 77
Campus Suite, Olshausenstraße 74 (in the University Sports Centre)
Campus Suite, Westring 389
Programme overview

Unless otherwise specified, venue is Leibnizstraße 1.

Monday, March 20

Registration
From 9:30 onwards | > Room 104

Introduction and Keynote lectures
> Klaus Murmann Lecture Hall

13:30 | Welcome address by Johannes Müller, Speaker of the Graduate School Human Development in Landscapes

13:45 | Presentation of the Johanna Mestorf Award

14:15 | Keynote lecture: Henny Piezonka (Kiel University) – Early ceramics in Eurasia

15:00 | Coffee

15:30 | Keynote lecture: Carole Crumley (Uppsala University / Swedish University of Agricultural Sciences) – Is there a Future for the Past?

16:15 | Keynote lecture: Andrew Wallace-Hadrill (University of Cambridge) – Transformations of the Roman Cityscape

17:00 | Coffee

Sessions
Please be aware that room allocations might change during the workshop.

17:30 | Session 2 > Room 106a | Session 3 > Room 105 | Session 5 > Lecture Hall | Session 7 > Room 209a | Session 10 > Room 209b | Session 11 > Room 204 | Session 14 > Room 208 | Session 15 > Room 207 | Session 17 > Room 106b

> Please refer to the respective session programmes on the following pages for details.

Icebreaker
19:30 | > Geologisches und Mineralogisches Museum, Ludewig-Meyn-Straße 12

Tuesday, March 21

Sessions
Please be aware that room allocations might change during the workshop.

9:00 | Session 2 > Room 106a | Session 3 > Room 105 | Session 5 > Lecture Hall | Session 7 > Room 209a | Session 10 > Room 209b | Session 11 > Room 204 | Session 14 > Room 208 | Session 15 > Room 207 | Session 17 > Room 106b

> Please refer to the respective session programmes on the following pages for details.

10:30 | Coffee

11:00 | Session 2 > Room 106a | Session 3 > Room 105 | Session 5 > Lecture Hall | Session 7 > Room 209a | Session 10 > Room 209b | Session 11 > Room 204 | Session 14 > Room 208 | Session 15 > Room 207 | Session 17 > Room 106b

12:30 | Lunch

14:00 | Session 2 > Room 106a | Session 3 > Room 105 | Session 5 > Lecture Hall | Session 7 > Room 209a | Session 10 > Room 209b | Session 11 > Room 204 | Session 14 > Room 208 | Session 15 > Room 207 | Session 16 > Room 106a

15:30 | Coffee

16:00 | Session 3 > Room 105 | Session 5 > Lecture Hall | Session 8 > Room 209a | Session 10 > Room 209b | Session 11 > Room 204 | Session 14 > Room 208 | Session 15 > Room 207 | Session 16 > Room 106a

17:30 | Coffee

18:00 | Session 3 > Room 105 | Session 5 > Lecture Hall | Session 8 > Room 209a | Session 10 > Room 209b | Session 11 > Room 204 | Session 14 > Room 208 | Session 15 > Room 207 | Session 16 > Room 106a
Wednesday, March 22

Sessions

Please be aware that room allocations might change during the workshop.

9:00 | Session 1 > Lecture Hall | Session 3 > Room 105 | Session 5 > Room 208 |
Session 8 > Room 209a | Session 11 > Room 204 | Session 13 > Room 106b | Session 15 > Room 207 | Session 16 > Room 106a
> Please refer to the respective session programmes on the following pages for details.

10:30 Coffee

11:00 | Session 1 > Lecture Hall | Session 3 > Room 105 | Session 4 > Room 209 |
Session 5 > Room 208 | Session 6 > Room 207 | Session 11 > Room 204 | Session 13 > Room 106b | Session 16 > Room 106a

12:30 Lunch

14:00 | Session 1 > Lecture Hall | Session 3 > Room 105 | Session 4 > Room 209 |
Session 6 > Room 207 | Session 11 > Room 204 | Session 18 > Room 106a | Session 19 > Room 208

15:30 Joint Poster Session / Coffee

16:30 | Session 1 > Lecture Hall | Session 3 > Room 105 | Session 4 > Room 209 |
Session 6 > Room 207 | Session 11 > Room 204 | Session 18 > Room 106a | Session 19 > Room 208

Conference Dinner

19:30 | > Restaurant Kieler Schloss, Wall 74, 24103 Kiel

Thursday, March 23

Sessions

Please be aware that room allocations might change during the workshop.

9:00 | Session 1 > Lecture Hall | Session 3 > Room 105 | Session 4 > Room 209 |
Session 6 > Room 207 | Session 9 > Room 105 | Session 11 > Room 204 | Session 18 > Room 106a | Session 19 > Room 208
> Please refer to the respective session programmes on the following pages for details.

10:30 Coffee

11:00 | Session 1 > Lecture Hall | Session 4 > Room 209 | Session 6 > Room 207 |
Session 9 > Room 105 | Session 11 > Room 204 | Session 18 > Room 106a | Session 19 > Room 208

12:30 Lunch

14:00 | Session 4 > Room 209 | Session 6 > Room 207 | Session 9 > Room 105 | Session 11 > Room 204 | Session 18 > Room 106a | Session 19 > Room 208

15:30 Coffee

16:00 | Final Plenary Meeting / Session Reports / Poster prize handover > Lecture Hall

Friday, March 24

Excursion to Eastern Holstein

9:00 | Start >in front of Leibnizstr. 1
### Room allocation

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### Starting time clarification

Registration is open from Monday, 9:30 a.m.
Welcome, Mestorf-Award and General Keynote I on Monday 1:30-3:00 p.m.
General Keynotes II on Monday 3:30-5:00 p.m.
Session block on Monday 5:30-7:00 p.m.
Icebreaker starts 7:30 p.m.
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**Starting time clarification**

Registration is open from Monday, 9:30 a.m.
First session block on Tuesday 9:00-10:30 a.m.
Second session block on Tuesday 11:00 a.m.-12:30 p.m.
Third session block on Tuesday 2:00-3:30 p.m.
Fourth session block on Tuesday 4:00-5:30 p.m.
Fifth session block on Tuesday 6:00-7:30 p.m.
### Starting time clarification

Registration is open from Monday, 9:30 a.m.

First session block on Wednesday 9:00-10:30 a.m.

Second session block on Wednesday 11:00 a.m.-12:30 p.m.

Third session block on Wednesday 2:00-3:30 p.m.

Fourth session block on Wednesday 4:30-6:00 (6:30) p.m.

dinner starts 7:30 p.m.
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Third session block on Thursday 2:00-3:30 p.m.
Excursion on Friday starts 9:00 a.m. (return to Kiel ca. 7:30 p.m.)
Programme Session 1

How’s life? Living conditions in Europe in the 2nd and 1st millennia BC


Wednesday, March 22

9:00  Jutta Kneisel [Johanna Mestorf Academy / Kiel University]
Introduction: Archaeology and the View of Prehistory in reconstruction images

9:30  Mark Knight [University of Cambridge]
The Must Farm pile-dwelling – Taste, appearance and lifestyle in Late Bronze Age Fenland

10:00 Yvonne van Amerongen [Leiden University]
Creating an understanding of daily life in and around a Bronze Age house through science-based artist impressions

10:30 Coffee

11:00  Marcin Przybyla [presenting author], Ulana Gocman, Joanna Jedrysik, Magdalena Skoneczna [all Jagiellonian University, Krakow]
Early Bronze Age Houses from the hillfort in Maszkowice [Western Carpathians] – layout, construction and functional organization of floor areas

11:30 Radoslaw Grabowski [Umeå University]
A multidisciplinary approach to living conditions and the use of space on a middle Bronze Age farmstead in West Frisia, The Netherlands

12:00 Marta dal Corso [Kiel University, presenting author], Cristian Nicosia [Université Libre de Bruxelles], Marco Baioni [Museo Archeologico della Valle Sabbia, Gavardo]
The study of waste middens from the Early Bronze Age pile-dwelling of Lucone (Italy): An insight into everyday life

12:30 Lunch

14:00 Elena Marinova [KU Leuven, presenting author] / Bea de Cupere [Royal Belgian Institute of Natural Sciences], Delphine Frémondeau, Plamen Georgiev, Ivanka Hristova, Lazar Ninov, Krassimir Nikov, Hristo Popov
Bioarchaeological and geoarchaeological evidence on the living conditions in south-eastern Bulgaria during the 2nd and 1st millennium BC

14:40 Magdalena Wieckowska-Lüth [Kiel University, presenting author], Immo Heske [Göttingen University]
On-site palaeoecological investigations from the Hünenburg hillfort-settlement complex, with special reference to non-pollen palynomorphs

15:30 Coffee, joint poster session

16:30 Almuth Alsleben [Akademie der Wissenschaften Mainz]
Human Impact on Bronze Age Landscape reflected by a “near-site” pollen diagram from Gönebek, Kr. Segeberg [Schleswig-Holstein]

17:00 Helmut Kroll [Kiel]
The firestorm at Bruszczewo

17:30 Sonja Filatova [presenting author], Wiebke Kirleis [both Kiel University]
(Toxic) legumes in Bronze Age diets

18:00 Lorenz Schwark [presenting author], Marta dal Corso, Stefan Dreibrot, Thorsten Bauersachs [all Kiel University]
Lipid proxies in Reconstruction of Paleovegetation and Landscape Evolution

Thursday, March 23

9:00 Gilberto Artioli [Padua University]
The landscapes of ancient metallurgy*

9:30 Johanna Brinkmann [Kiel University]
Energy Expenditure Calculations for Prehistoric Bronze Artefacts – Comparing the Expenditure for Early and Late Bronze Age Artefacts in Central Europe

10:00 Corina Knipper [Curt-Engelhorn-Zentrum Archäometrie, Mannheim, presenting author], Alissa Mittnik [Tübingen University] Ken Massy [LMU Munich], Fabian Wittenborn, Stephanie Metz [both Heidelberg Academy of Sciences], Johannes Krause [MPI for the Science of Human History Jena], Philipp Stockhammer [LMU Munich]
Female exogamy and patrilocality at the transition from the Final Neolithic to the Early Bronze Age in Southern Germany

10:30 Coffee
11:00 **Gundula Lidke** (NLD Hannover, presenting author), Ute Brinker, Annemarie Schramm, Detlef Jantzen (all Landesamt f. Kultur und Denkmalpflege M-V), Thomas Terberger (NLD Hannover) *Warriors’ lives? The skeletal sample from the Bronze Age battlefield site in the Tollense Valley*

11:30 **István Rácz** (Eötvös Loránd University, presenting author), Zsolt Bernert, Julia Giblin, Vajk Szeverényi, Gyula Gyenis, Orsolya László, Viktória Kiss, Tamás Hajdu *Activity and mobility: a study of entheseal changes in a Middle Bronze Age population from Érd, central Hungary, supported by stable isotope data*

12:00 **Final discussion**

*This presentation is financially supported by the CRC 1266 “Scales of Transformation”.*
Programme Session 2

Structure, network and space:
Neolithic and Chalcolithic settlements and their social meaning

Conveners: J. Müller, H. Tiede, K. Rassmann

Monday, March 20

17:30 Knut Rassmann [DAI]
Density variation of housing in Copper Age Settlements. Indications for population size and social space

18:15 Andrea Ricci (Kiel Univ., presenting author), Mark Iserlis (German Archaeological Institute), Maria Bianca D’Anna [FU Berlin], Khaqani Almammadov [National Academy of Sciences of Azerbaijan, Bakul], Barbara Helwing [University of Sydney]
Early sedentism and the creation of new socio-cultural spaces in the southern Caucasus during the Late Neolithic (6th Mill. BCE)
Programme Session 3

‘Tonight will be a memory too’ – Memory and landscapes

Conveners: C. Horn, A. Haug, G. Wollentz

Tuesday, March 21

9:00 Christian Horn, Gustav Wollentz (both Kiel University)
Introduction

9:10 Richard Bradley (University of Reading)
Commemoration and change: remembering what may not have happened

10:00 Michael Müller (FU Berlin)
TRB Hoards as Boundary Markers inside Neolithic Landscapes

10:30 Coffee

11:00 Christian Horn (Kiel University)
Set in stone? – Transformation and memory in Scandinavian rock art

11:30 Maria del Mar Rodríguez (Complutense University of Madrid)
The construction of memories in the Lacedaemonian landscape.

12:00 Eleanor Betts (Open University)
A Forgotten Memory? The Piceni, the ver sacrum and the longue durée

12:30 Lunch

14:00 Constanze Graml (LMU Munich)
Political Crisis and memory in the ephebeia. Attica as a space of memory and oblivion

14:30 Agnieszka Fulinska (Jagiellonian University, Krakow)
Battlefields, monuments, and memory of battles

15:00 Gustav Wollentz (Kiel University)
Places of looking forward and places of permanence: Landscapes of remembering and forgetting in the Balkans

15:30 Coffee

16:30 Robert Staniuk (Kiel University)
Memories created, memories altered. The case of Kakucus-Turján household and pottery.

17:00 Matthias Bensch (University of Freiburg)
Memory space and visual coining. Aeneas and Romulus in the gallery of the summi viri on the Forum Augustum in Rome

Wednesday, March 22

9:00 James Whitley (Cardiff University)
The multiple pasts of Archaic Greece: the landscapes of Crete and the Argolid 900-500 BCE*

9:40 Przemysław Makarovicz (Adam Mickiewicz University in Poznan)
Living ancestors, living landscape, living memory.
Late Neolithic and Bronze Age barrow cemeteries in East-Central Europe

10:10 Anna Gawlik (presenting author), Marcin Czarnowicz (both Jagiellonian University, Krakow,)
Restoring a memory – the case of Kowary barrow (Lesser Poland, Poland)

10:40 Coffee

11:00 Katarzyna Dudlik (Adam Mickiewicz University, Poznan)
Creation of memory? Tumulus from Lerna in context of EH III – LH I Argolis

11:30 Jennifer Uzzell (Durham University)
Tomorrow’s Ancestors

12:00 Stefan Schmidt (Wuppertal University)
Somatography and nostalgic landscapes

12:30 Lunch

14:00 Erin Kavanagh (University of Wales Trinity Saint David) and Patrick Nunn (University of the Sunshine Coast)
Could Folk Stories encode Memories of coastal Inundation from Millennia ago?

14:30 Christina Videbech (University of Bergen)
The Spoils of Eternity

15:00 Anne Gangloff (University of Rennes)
Art and Practices of Memory, Space and Landscape in the Roman World

15:30 Coffee, joint poster session

16:30 Final discussion

Session 3 contributions to the joint poster session

Erin Kavanagh (Independent researcher)
Interpreting memory: a landscape of stories

Sabrina N. Autenrieth (Leiden)
Stream of Consciousness - Early Bronze Age depositions in the Rhenish river landscape

Aline Souza (Virginia Polytechnic Institute and State University)

Beauty in everyday landscapes: film as a method of investigation of sensual perception, human action, movement and landscape performance in cities

*This presentation is financially supported by the CRC 1266 “Scales of Transformation”.*
Programme Session 4

Lost in the lowlands – complementing the early late glacial puzzle

Conveners: M. Wild, B. Eriksen

Wednesday, March 22

11:00 Morten Fischer Mortensen (National Museum of Denmark)
Life in challenging times – Late Glacial living in the Northern lowlands

11:25 Dorothée Drucker (Universität Tübingen, presenting author), Florent Rivals (ICREA, Barcelona/ Institut Català de Paleoeconomia Humana i Evolució Social, Tarragona/ Universitat Rovira i Virgili, Tarragona), Mara-Julia Weber (Centre for Baltic and Scandinavian Archaeology, Schleswig/ UMR 7041 Ethnologie préhistorique)
Diet and environment tracking of large herbivores in northwest Europe at the onset of the Late-glacial

11:50 Rhiannon Stevens (presenting author), Hazel Reade, Sophy Charlton, Sonja Grimm, Jennifer Tripp, Marc Vanderlinden, Ian Barnes, Thomas Higham (Institute of Archaeology, University College London)
The Late and Final Palaeolithic occupation of the British Isles: An environmental perspective

12:15 discussion

12:30 Lunch

14:00 William Mills (Institute of Archaeology, University of Oxford)
The Channel River: a view from its northern banks at the onset of the Late Glacial

14:25 Mara-Julia Weber (Centre for Baltic and Scandinavian Archaeology/ UMR 7041 Ethnologie préhistorique, presenting author), Ludovic Mevel (CNRS, UMR 7041 Ethnologie préhistorique), Boris Valentin (Université Paris 1 Panthéon-Sorbonne, UMR 7041 Ethnologie préhistorique)
A special relationship – the Hamburgian and the atypical Magdalenian in the Paris Basin

14:50 Andreas Maier (Friedrich-Alexander-Universität Erlangen-Nürnberg)
A question of scale and angle – On the relation between the Hamburgian and the Magdalenian in Central Europe

15:15 discussion

15:30 Coffee, joint poster session

16:30 Martin Street (MONREPOS Archaeological Research Centre and Museum for Human Behavioural Evolution)
...down out of the hills. Ideas on the Lowland Diaspora seen from the Neuwied Basin

16:55 Malgarini Romain (UMR 7041 Ethnologie préhistorique)
Osseous industries in the East of France between 13500 calBC - 11800 calBC: which characters to remember?

17:20 Markus Wild (Centre for Baltic and Scandinavian Archaeology/ UMR 7041 Ethnologie préhistorique)
Absence makes the heart grow fonder or far from eye far from heart? – Dichotomous tendencies in Hamburgian osseous industries

17:45 Sebastian Pfeifer (Friedrich Schiller University Jena)
Projectiles for kids - New evidence of child and youth versions of Magdalenian osseous points from the Teufelsbrücke cave site (Thuringia, Germany)

18:10 discussion

Thursday, March 23

9:00 Sonja Grimm (Centre for Baltic and Scandinavian Archaeology)
And now for something completely different... studying Lateglacial transitions and transformations

9:25 Iwona Sobkowiak-Tabaka (Institute of Archaeology and Ethnology, Polish Academy of Sciences)
The eastern Border of the Hamburgian Culture

9:50 Jacek Kabacinski (Institute of Archaeology and Ethnology, Polish Academy of Sciences)
Hamburgian in Poland: current state of research

10:15 discussion

10:30 Coffee

11:00 Jakub Mugaj (Institute of Archaeology and Ethnology, Polish Academy of Science)
Lithic technology of Hamburgian societies – the western Poland perspective
11:25 **Elisa Caron-Laviolette** (Université Paris 1 Panthéon-Sorbonne/ UMR 7041 Ethnologie préhistorique)
*Time after time. Investigating a Magdalenian group’s inner variability through three successive occupations at Etiolles*

11:50 **Marquardt Lund** (presenting author), Harm Paulsen, Sebastian Pfeifer (Friedrich Schiller University Jena, presenting author), Mara-Julia Weber (Centre for Baltic and Scandinavian Archaeology/ UMR 7041 Ethnologie préhistorique, presenting author), Markus Wild (Centre for Baltic and Scandinavian Archaeology/ UMR 7041 Ethnologie préhistorique, presenting author)
*The Hamburgian Kerbnadel – a projectile component? Experimental approaches for testing the foreshaft hypothesis*

12:15 discussion

12:30 Lunch

14:00 **Peter Vang Petersen** (Nationalmuseet København)
*Paleolithic art, antler and harpoon heads from southern Scandinavia*

14:25 **Jesper Borre Pedersen** (presenting author), Felix Riede (both Aarhus University, Department of Archaeology)
*A geometric morphometric assessment of Late Palaeolithic ‘classic’ and ‘Havelte’-phase projectile points from northern Europe reveals individual flintknapping and dispersal behaviours.

14:50 **Marcel Niekus** (presenting author), Dick Stapert, Lykke Johansen [Stone foundation]
*Poster presentation*

15:00 Final discussion

**Session 4 contribution to the joint poster session**

**Marcel Niekus** (presenting author), Dick Stapert, Lykke Johansen [Stone foundation]
*Typological variability in points during the Early Lateglacial: the Hamburgian as an example*

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*This presentation is financially supported by the CRC 1266 “Scales of Transformation”.*
Programme Session 5

Thinking inside the vessel: Ceramic development in prehistory through the interpretation of vessel use and function


Monday, March 20

17:30 Richard Evershed (University of Bristol)
Milk the Residues: Molecular and Isotopic Signatures from Human Prehistory

18:30 Alexandra Anders (presenting author), Emese Gyöngyvér Nagy (both Eötvös Loránd Univ.)
Episodes from the life history of an ALBK vessel from Polgár (NE Hungary)

Tuesday, March 21

9:00 Ingmar Franz (presenting author), Franziska Faupel (both Kiel University), Jessica Hendy (Max-Planck-Institut für Menschheitsgeschichte in Jena)
A cooking pot or not a cooking pot? The interrelation of vessel shape, vessel body characteristics and vessel use, illustrated by pottery from Çatalhöyük West Mound

9:30 Kristóf Fülöp (Eötvös Loránd University)
A biographical perspective: functions and meanings of pottery in the Late Bronze Age funerary ritual

10:00 Karol Dzigiulewski (Jagiellonian University, presenting author), Michal Mazur
The chaine opératoire concept applied to Late Bronze/Early Iron Age salt-making pottery from western Małopolska (southern Poland)

10:30 Coffee

11:00 Ricardo Fernandes (University of Cambridge, presenting author), Yvette Eley (University of York), Marek Brabec (Academy of Sciences of the Czech Republic), Alexandre Lucquin, Oliver E. Craig (both University of York)
Bayesian approach to the quantitative reconstruction of pre-historic pottery use from fatty acid carbon isotope signatures

12:00 John Meadows (Centre for Baltic and Scandinavian Archaeology, Schloss Gottorf, presenting author)
Ester Oras, (University of Tartu, Estonia), Henny Piezonka (Kiel University), Carl Heron (The British Museum), Oliver Craig, Alexandre Lucquin (both University of York)
Can pottery function be inferred from 14C ages?

12:30 Lunch

14:00 Jonathan Ethier (Heidelberg University)
Foodways among Southeast Europe’s first farmers: interrogating mobility and sedentary subsistence strategies through residue analysis

14:30 Mateja Hulina (Institute of Archaeology, Zagreb, presenting author), Hrvoje Kalafatić, Maxime Rageot, Sara Caisso, Cynthia Debono Spiteri
It’s what’s inside that counts: organic residues and uses of pottery in Eastern Croatia during Middle Copper Age

15:30 Coffee

16:00 Robert Staniuk (Kiel University, presenting author), Christina Karlsson (independent researcher), Gabriella Kulcsár (Hungarian Academy of Science), Mateusz Jaeger (Adam Mickiewicz University in Poznan), Guci László (independent researcher)
Bringing dead pots to life - Vatya ceramics in settlement contexts

16:30 Eszter Melis (Hungarian Academy of Sciences, presenting author), Attila Kreiter, Péter Skoda (Laboratory for Applied Research, Hungarian National Museum)
Remarks on the pottery production and function from the Early Bronze Age in North-western Hungary

17:00 Marta Krüger (Adam Mickiewicz University, Poznan, presenting author), Iwona Sobkowia-Tabaka, Mélanie Roffet-Salque, Arkadiusz Marciniak, Richard Evershed
Between shape and function. The dairying practices among TRB communities of Polish Lowlands

17:30 Break

18:00 Tanja F.M. Oudemans (Kenaz Consult, Berlin, presenting author), Lucy Kubik Martens, Laura Kooijstra (both: Biax Consult, Zaandam, Nether-
lands), Barbara Limmer (Kelten Römer Museum Manching)

Vessel Use in the Neolithic lakeside settlement of Pestenacker

18:30 Mila Shatilo (Ukrainian Academy of Sciences, presenting author), Robert Hofmann (Kiel University)

Meaning and use of Neolithic and Chalcolithic House models in Europe

Wednesday, March 22

9:00 Tobias Torfing (Museum of Southwestern Jutland)

Settling with pottery

9:30 Robert Hofmann (Kiel University)

Quantifications of pottery assemblages in the East and South-East European Neolithic and Chalcolithic – methods and results regarding functional categories

10:00 Bine Kramberger (Univerza v Ljubljani, alumnus)

Pottery from the Early Eneolithic settlement Zgornje Radvanje (North-eastern Slovenia), its variability, distribution and use

10:30 Coffee

11:00 Stefanie Schaefer (Kiel University)

Use and function of prehistoric textile ceramic in Central and Northern Europe

11:30 Final discussion

Subsequently, session 19 presentations will be held in the same room.

Session 5 contributions to the joint poster session

Mateja Hulina (Institute of Archaeology Zagreb, presenting author), Marcel Buric, Maxime Rageot, Sara Cafisso, Cynthia Debono Spiteri

Organic residue analysis of late Neolithic pottery from Bapska-Gradac, Croatia

Piotr Zeman (Adam Mickiewicz University, Poznan)

Functional analysis of pottery assemblage from Mycenaean palace at Pylos

Elżbieta Sieradska (University of Rzeszów, Poland)

Eastern borrowing: lids and Late Neolithic societies of southeastern Poland
**Programme Session 6**

**Exploring inter-regional interactions in the first millennium BC in Europe**

*Conveners: O. Nakoinz, J. Kneisel, F. Faupel, S. Stoddart, J. Martens*

**Wednesday, March 22**

11:00 **Oliver Nakoinz** (Kiel University, presenting author), Simon Stoddart (University of Cambridge), Jes Martens (Oslo University), Jutta Kneisel, Franziska Faupel (both Kiel University)

*Interactions in the first millennium BC in Europe - an introduction*

11:30 **Alessandro Naso** (Università degli studi di Napoli Federico II)

*From South to North and Beyond*

12:00 **Klara Sabatova** (Masaryk University, presenting author), David Parma

*Inter-regional interactions in Bronze Age and Early Iron Age Moravia*

12:30 **Lunch**

14:00 **Joanna Jędrysik** (Jagiellonian University)

*The Early Iron Age settlement of the Polish Karst in the light of new studies. Tracing inter-regional interactions in the economically marginal areas*

14:30 **Anja Hellmuth Kramberger** (University of Ljubljana, presenting author), Sebastian Müller (Institute for Mediterranean Studies, Busan, South Korea), Maja Čuka (Archaeological Museum of Istria)

*Monbrodo - A station of the Amber Road on the coast of Istria in the Iron Age?*

15:00 **Moritz Kiderlen** (HU Berlin, presenting author), Michael Bode (Deutsches Bergbau-Museum Bochum), Veit Vaelske (HU Berlin)

*Kupferhandel vom Wadi Arabah (Jordanien) zum griechischen Festland ca. 950 – 750 v. Chr.*

15:30 **Joint Poster Session / Coffee**

17:00 **Angela Moetsch** (Landesamt für Denkmalpflege im Regierungspräsidium Stuttgart, presenting author), Birgit Schorer, Maxime Rageot, Janine Fries-Knoblach, Stefan Schreiber, Federica Sacchetti, David Bardel, Ines Balzer, Félicie Fougère, Bruno Chaume, Dirk Krausse, Thomas Hoppe, Cynthia Debono Spiteri, Philipp W. Stockhammer

*The "BEFIM" Project: Organic Residue Analysis on Local and Imported Pottery of Late Hallstatt and Early La Tène Hillfort Sites*

17:30 **Aurélia Feugnet** (Université Paris 1)

*Economic interactions between Mediterranean states and Celtic societies between the 3rd and the 1st c. BCE*

**Thursday, March 23**

9:30 **Jonas Enzmann** (Kiel University)

*Transport zones and exchange in Iron Age*

10:00 **Clara Filet** (Université Paris 1 Panthéon-Sorbonne, presenting author), Franziska Faupel (Kiel University)

*Paths through Europe in the LaTène Period*

10:30 **Coffee**

11:00 **Kerstin Kowarik** (University of Vienna, presenting author), Hans Reschreiter (Natural History Museum Vienna)

*Large scale salt production in a transregional context*

11:30 **Lennart Linde** (Goethe University Frankfurt)

*Tracing centrality through small scale interactions - A regional approach*

12:00 **Oliver Nakoinz** (presenting author), Franziska Faupel (both Kiel University)

*Modelling Early Iron Age interaction in South-West Germany*

12:30 **Lunch**

14:00 **General discussion**

14:30 **Summary**
Programme Session 7

Quantitative approaches as a basis for simulation of prehistoric economy and environment

Conveners: W. Dörfler, I. Feser, W. Kirleis, O. Nakoinz, M. Hinz

Part of the session block “Quantitative analysis and modelling in archaeology” (Sessions 7, 8 and 9)

Monday, March 20

17:30 Anne Birgitte Nielsen (Lund University) Combining models and palaeoecological data to reconstruct past anthropogenic landcover changes and analyse their effects on aquatic environments.*

18:00 Martin Theuerkauf (University of Greifswald) Discovering prehistoric land use patterns with the extended downscaling approach

18:20 Sarah Martini (presenting author), Stefan Dreibrodt, Robert Hofmann (all Kiel University) Quantitative Geoarchaeology of Multi-layered Settlements (Tells): Architecture, Population, and Economy in the Neolithic Visoko basin

Tuesday, March 21

9:00 Hans-Rudolf Bork (Kiel University) Quantification of soil erosion processes

9:20 Tim Kerig (University of Cologne) Modelling domestic labour as a key to landscape development

9:50 Jan Kolar (Czech Academy of Sciences, presenting author), Peter Tkáč, Martin Macek, Petr Kuneš, Petér Szabó Prehistoric economies and population dynamics in Central Europe from a perspective of large-scale archaeological databases and modelling

10:30 Coffee

11:00 Manfred Rösch (Landesamt für Denkmalpflege Baden-Württemberg) Food production and consumption at Iron Age central places in southern Germany in comparison with rural sites

11:20 Mans Schepers (University of Groningen, presenting author), S. Arnoldussen, G. Aalbersberg, J.A.W. Nicolay Seeds in context: the relationship between the botanical composition of a sample and a variety of sample properties

11:40 Ferran Antolin (presenting author), Stefanie Jacomet, Marguerita Schäfer, Jörg Schibler, Bigna L. Steiner (all University of Basel), Niels Bleicher (Centre for Underwater Archaeology and Dendrochronology, Office for Urbanism, Zürich) Quantifying the contribution of plant and animal resources to human diet at the late Neolithic lakeshore settlement of Zürich-Parkhaus Opéra

12:00 Poster presentation

12:30 Lunch

14:00 Ricardo Fernandes (University of Cambridge) An integrated Bayesian approach to the reconstruction of past human lifeways

14:20 Walter Dörfler (Kiel University) Limiting factors in the nutrition of humans

14:40 Final discussion

Subsequently, session 8 presentations will be held in the same room.

Session 7 contribution to the joint poster session

Wolfgang B. Hamer (presenting author), Daniel Knitter (both Kiel University) Complex dynamics and perceptive categories. A fuzzy approach for landscape classification.

*This presentation is financially supported by the CRC 1266 "Scales of Transformation".
Programme Session 8

Spatial analysis for an understanding of ancient human-landscape developments

Conveners: N. Grunert, O. Nakoinz, L. Yang

Part of the session block “Quantitative analysis and modelling in archaeology” (Sessions 7, 8 and 9)

Tuesday, March 21

16:00 Andrzej Pelisiak (presenting author), Małgorzata Rybicka (both University of Rzeszów)
Late Neolithic (3500-2200 BC) human activity in south-eastern Poland. Transformations of settlement patterns, economy, demography and social organization.

16:30 Katia Francesca Achino (Autonomous University of Barcelona, presenting author), Juan Antonio Barceló
Spatiality of social activities at intra-site scale: combining a biographic approach and the potentiality of geostatistics

17:00 Michael Kempf (University of Freiburg)
Geoarchaeological analysis - how environmental conditions control economical and social shifting

17:30 Break

18:00 Oliver Nakoinz (Kiel University)
Lines in the landscape - borders and pathways in spatial analysis

18:30 Ricarda Braun (FU Berlin, presenting author), Daniel Knitter (Kiel University), Brigitta Schütt (FU Berlin), Ricardo Eichmann (DAI)
Location of choice: Spatial analysis of affordances and perception at Gobekli Tepe

19:00 Nils Müller-Scheeßel (Kiel University)
‘Apples and Oranges’? Comparing distribution patterns of chipped stone artefacts in contemporaneous Neolithic settlements

Wednesday, March 22

9:00 Sebastian Teska (Adam Mickiewicz University Poznan, presenting author), Annalena Bock (Kiel University), Marcin Ławniczak (Adam Mickiewicz University), Hendrik Raese (Kiel University)
Late Neolithic and Early Bronze Age cultural landscape of Obra Valley region in the view of Łęki Małe burial ground and its surroundings

9:30 Anastasia Nikulina (Sobolev Institute of Geology and Mineralogy, presenting author), Chupina D.A., Zolnikov I.D., Kartozia A.A.
Human Preferences for Paleo-Landscapes of Central Baraba Forest-Steppe (the South of Western Siberia) in the Bronze Age – the Middle Ages

10:00 Marek Hladik (Academy of Sciences of the Czech Republic, presenting author), Petr Dresler, Jakub Tamaško (*[both Masaryk University])
The Hierarchy and Usage of Landscape of the Area of the Morava River Bank and the Socio-Economic Organization of the Great Moravian Society

10:30 Coffee

11:00 final discussion

Subsequently, session 4 presentations will be held in the same room.

Session 8 contributions to the joint poster session

Vincent Haburaj (Freie Universität Berlin, presenting author), Jonas Berking, David Beresford-Jones, Daniel Knitter, Leanne Zeki, Fraser Sturt, Alexander Pullen, Oliver Huaman, Kevin Lane, Charles French
Geo-statistical methods to analyse changes in pre-Hispanic settlement patterns in the Río Ica catchment, Peru

Victor Matasov (Lomonosov Moscow State University, presenting author), Novenko E. Yu.
Modeling of land use history of the Meshchera Lowlands (European Russia) based on paleoecological and historical data

Maria Gelabert Oliver (Kiel University)
Visual prominence of prehistoric monuments within the Mallorcan landscape
Programme Session 9

Agent based modelling of human-environmental interactions in archaeology: Putting models into practices

Conveners: M. Hinz, L. Yang

Part of the session block “Quantitative analysis and modelling in archaeology” (Sessions 7, 8 and 9)

Thursday, March 23

9:00 Kerstin Kowarik (presenting author), Hans Reschreiter, Gabriel Wurzer
Times of Change?

9:30 Martin Hinz (presenting author), Ingo Feeser, Stefan Drebrodt (all Kiel University)
Naturally complex. Effects of seasonality and nutrients in simulating neolithic economic systems

10:00 Cornelis Drost, Marc Vander Linden (both University College London)
Contrasting the influence of environmental feedback and the nature of demographic spread in shaping the early-mid neolithic: and agent based modelling

10:30 Coffee

11:00 Alice Williams (presenting author), Thomas Currie (both University of Exeter)
Simulating the effect of environmental circumscription on the emergence of social complexity

11:30 Wolfgang B. Hamer (presenting author), Daniel Knitter, Oliver Nakoinz, Rainer Duttmann (all Kiel University)
Plans on an agent based model approach on prehistoric scale

12:00 Final discussion

Session 9 contribution to the joint poster session

M. Bradtmöller (presenting author, University of Rostock), M. Solich, A. Arrizabalaga, A. Calvo, M.-J. Iriarte
Using Agent-based scenario building for interpreting the archaeological record – A case study from Northern Spain
Programme Session 10

Understanding inequality: New perspectives

Convener: V. Arponen

Tuesday, March 21

9:00  Ralph Großmann (Kiel University)  
A quantitative and diachronic study about social inequality based on archaeological cultures

9:30  Martin Furholt (Kiel University)  
Social inequality and socio-spatial organisation

10:00 Maria Wunderlich (Kiel University)  
Monumentality as a marker for social differentiation? Recent examples of megalith building in Indonesia and India

10:30  Coffee

11:00  Ditamulu Vasa (Nagaland University)  
House Structures and Social Stratification

11:30  Potshangbam Binodini Devi (D.M. College of Science)  
Inequality in the Practices of Manipur Megalithic Traditions

12:00  Carole L. Crumley (University of North Carolina at Chapel Hill)  
Assembling conceptual tools to examine the moral and political structures of the past

13:00  Lunch

14:00  Lieske Voget-Kleschin (Kiel University)  
Conceptualizing Inequality in the Capability Approach

14:30  Vesa P. J. Arponen (Kiel University)  
Capability Approach in Archaeology: Some Perspectives

15:00  René Ohlrau (Kiel University)  
Inequality research and the role of household archaeology

15:30  Coffee

16:00  Final discussion
Programme Session 11

From pre-urban structures to cities: Urban space as an action context

Conveners: S. Merten, A. Haug

Tuesday, March 21

9:30 Annette Haug and Stephanie Merten (Kiel University) Introduction

A theoretical approach

10:00 Frank Hillebrandt (FernUniversität Hagen) Sociological Theory of Practices. Principles and Outlines

10:30 Coffee

(Urban) agency in a landscape context

11:00 Robinson Peter Krämer (Bonn University) Places of Gods and Men: Social, political and economic interactions within the Etruscan Sacred Landscape

11:30 Felix Pirson (DAI Istanbul) Urban Space- and Landscape-Interaction in Hellenistic Pergamon and its Microregion*

12:00 Asja Müller (Kiel University) Hellenistic Built Space and Its Agency: The Asclepieion of Kos

12:30 Lunch

14:00 Sarah Herzog (Heidelberg University) The Appropriation of Space in the Sanctuary of Poseidon at Isthmia

14:30 Marco Galli (Sapienza University Rome) Negotiating Power in Sacred Landscape: ritual dynamics in Greek sanctuaries under the Roman domination

15:00 Stefan Feuser (Kiel University) City and Shore. Natural change and human action

15:30 Coffee

Urbanites and their perception

16:00 Fanny Opdenhoff (Kiel University)

The perception of the built space: Greek vase painting as a source

16:30 Jeffrey Veitch [University of Kent] The Roman City in Motion: Senses, Space and Experience

17:00 Eleanor Betts [Open University, Milton Keynes] Sensing the City: Multisensory approaches to Roman urban space

Wednesday, March 22

Urban space and questions of governance

9:00 Henrike Backhaus (presenting author), Tobias Helms (both Bonn University) De-centralized Decision-making Processes and the Creation of Urban Space in 3rd Millennium BCE North Mesopotamia: The example of Tell Chuera


10:00 Hannah Cornwell (University of London) The Production of Diplomatic Space in Ancient Rome

10:30 Coffee

11:00 Felix Schulte (Duisburg-Essen University) In celeberrimo loco, in publico et locus datus decreto decurionum – The incorporation of council decrees into the urbanistic design of the city

11:30 Donat Wehner (Kiel University) Getting Around the City: A Space Syntax Perspective on Post-Medieval Nuremberg

12:00 Monika Baumanova (University of Basel/University of Uppsala, presenting author), Ladislav Smejda (Czech University of Life Sciences), Heinz Ruther (University of Cape Town) Urban spaces on the coast of the Sahara: moving goods, people and ideas

12:30 Lunch

14:00 Christiane Richard-Elsner (FernUniversität Hagen) Urban space as an ambivalent place for children and their play
14:30  Lisa Renn (University of Freiburg)
A Churchyard as a Space for Social Action

15:00  Henriette Baron (Römisch-Germanisches Zentralmuseum Mainz)
Filling Urban Structures with Life – Animal Inhabitants of a Byzantine City

15:30  Coffee, joint poster session

16:30  Start of the Simulation Public Culture in Antiquity (Sebastian Schwegesinger, Erika Holter, Una Schäfer)

Thursday, March 23

Shaping the urban

9:30  Nicola Chiarenza (Kiel University)
A tale of two cities? Changing urban space at Selinous between the Classical and Hellenistic periods

10:00  Marion Bolder-Boos (Technical University Darmstadt)
Ideal Rome? Urban building as an action context

10:30  Coffee

Urban patterns and agency

11:00  Ulrich Müller (Kiel University)
Cross-cultural urbanization? Differences and commonalities in the development of high-medieval townscapes between the Baltic coast and the East African coast (10.-14. cent.)

11:30  Felix Rösch (Kiel University)
Patterns of Urbanism in the Western Baltic. An approach via the built environment

12:00  Final discussion

*This presentation is financially supported by the CRC 1266 “Scales of Transformation”.*
Programme Session 13

Interrelations of climate, environment and socio-cultural changes through the Mid- to Late Holocene in the Mediterranean area


Wednesday, March 22

9:00 Jean-Marc Deom (Al-Farabi Kazakh National University, Kazakhstan), Sala R., Sugai T., Sato A., Laudisoit A.  
Geochronology of the Holocene Cultural Deposits of the Ili River Delta (South Kazakhstan)

9:30 Jan Wehberg (presenting author), Stefan Heidemann (both University of Hamburg)  
The Bukhārā Oasis – The Zeravshan Catchment and the Historical Entanglement with Human Activities

10:30 Coffee

11:00 Liang Yang (Kiel University)  
Paleoclimatic change, disaster history and the urbanscape transitions in Athens

11:30 Tobias Kluge (presenting author), Maximilian Schuh (both University of Heidelberg)  
Check extrema. Combining scientific and historical perspectives on floods in premodern Nuremberg (1400-1800)

12:00 Giacomo Capuzzo, Juan Barcelo (both Autonomous University of Barcelona), Marco Zanon, Marta dal Corso (both Kiel University)  
Macro-scale European population trends and the impact of regional climate dynamics towards the Bronze Age-Iron Age transition
Programme Session 14

Extrapolating from the provincial: Linking ancient societies, technologies, and landscape use in Eurasia

Conveners: A. Ventresca Miller, T. Hermes

Monday, March 20

17:30 Sabine Reinhold (DAI Eurasia Department) Highlands – Lowlands: Trajectories of Eurasian interaction spheres in the Bronze Age

18:10 Lynne Rouse (DAI Eurasia Department) Shaping Invisible Networks – Mobile Pastoralists, Local Interactions, and Global Connections in Prehistoric Eurasia

18:40 Elise Luneau (presenting author), Lynne Rouse (both DAI Eurasia Department) Pasting together communities: Material Evidence for Multi-scalar Interactions in Prehistoric Southern Central Asia

Tuesday, March 21

9:30 Ricardo Fernandes (Univ. of Cambridge, presenting author), Ursula Brosseder (Bonn Univ.), Tsagaan Turbat (Mongolian Academy of Sciences) Multi-proxy isotope-based Bayesian diet reconstruction of Xiongnu individuals

10:00 Giedre Motuzaite Matuzeviciute (Lithuanian History Institute) Crops and ritual in the earliest stages of food globalisation in the central Tian Shan

10:30 Coffee

11:00 Alicia Ventresca Miller (Kiel University) Cereal consumption across Asia: A meta-analysis of stable isotopic data as evidence of the spread of domesticates

11:30 Rebecca Roberts (University of Cambridge) The Silk Road was not a bypass: local exploitation of east- and west-moving crops during the Bronze and Iron Ages in Kazakhstan

12:00 Taylor Hermes (Kiel University, presenting author), Michael Frachetti, Paula Doumani, Dmitriy Voyakin, Antonina Yermolayeva, Cheryl Makarewicz Substantial intensity of millet agriculture during the Bronze and Iron Ages in Kazakhstan is revealed in δ13C and δ18O time series of livestock teeth

12:30 Lunch

14:00 Lyudmila Shumilovskikh (Göttingen Univ.), Jens Schneeweß, Vlasta Rodinkova, Alla Troshina Human role in creation of the East-European forest-steppe landscapes: case study Kurilovka

14:30 Birte Ahrens (Kiel University) First results of a landscape-archaeological study in the upper Örkhon valley, Central Mongolia

15:00 Umberto Veronesi (University College London, presenting author), Miljana Radivojević, Antonina Ermolaeva, Albina Eržanova Metal from the Great Steppe. Bronze Age copper production at Taldysaj, central Kazakhstan: A pilot study

15:30 Coffee

16:00 Miljana Radivojevic (Univ. of Cambridge), Michael D. Frachetti (Washington Univ. in St. Louis) Metals, networks and innovation on the crossroads: Bronze Age metallurgy in Semirechye, Kazakhstan

16:30 Tekla Schmaus (H. Washington College) Pastoral Resilience in Prehistoric Semirechye

17:00 Ashleigh Haruda (University of Exeter) Multi-scalar Bronze Age Connectivity: Shared pastoral practice and diverse ovicaprid morphotypes

17:30 Break

18:00 William Taylor (Max Planck Institute for the Science of Human History) Equine Dentistry and Bit Technology in Ancient Eastern Eurasia

18:30 Alan K. Outram (University of Exeter) The Eneolithic Horse Herders of northern Kazakhstan: new research at Botai and Borly.

Session 14 contribution to the joint poster session

Elina Ananyevskaya, G. Motuzaite Matuzeviciute (both Vilnius University) Possible economic drivers behind construction of the Turgai geoglyphs in Central Kazakhstan
Programme Session 15

Riverbanks and seashores: The Baltic Sea basin and adjacent areas in the Early and Mid-Holocene

Conveners: D. Groß, H. Lübke, S. Dreibrodt

Monday, March 20

17:30 Lars Larsson (Lund University)
People living by a changing sea*

18:00 Stefan Dreibrodt (Kiel University)
Early Holocene climate oscillations in northern central Europe - a discussion of the available evidence and its possible implications

18:30 Ole Gred (Norwegian Maritime Museum)
Hunter-gatherer behaviour is more complex than quantum mechanics. Some modelling problems in relation to riverbanks and seashores.

Tuesday, March 21

9:00 Alar Rosentau (University of Tartu)
Mid-Holocene sea-level change and Stone Age coastal settlements in the Baltic Sea region

9:30 Adam Boethius (Lund University)
Early Mesolithic signals of sedentism

10:00 Bjørnar Måge (Museum Lolland Falster)
An Ahrensburgian Site on the North Shore of Femern Bælt with interesting Fauna Content. East meets West at Lolland in Early Holocene time?

10:30 Coffee

11:00 Anton Hansson (presenting author), Björn Nilsson, Arne Sjöström, Svante Björck, Sofia Holmgren, Hans Linderson (all Lund University), Ola Magnell (National Historical Museums, Sweden), Mats Rundgren, Dan Hammarlund (both Lund University)
A lost Mesolithic landscape in the Baltic Sea

11:30 Sandra Söderlind
Beach ridges and Mesolithic sites in central Sweden

12:00 Daniel Groß (Centre for Baltic and Scandinavian Archaeology, presenting author), Stefan Dreibrodt (Kiel University), Harald Lübke, John Meadows (both Centre for Baltic and Scandinavian Archaeology)
Transforming lake shores. Stratigraphy and Chronology at Hohen Viecheln, Germany

12:30 Lunch

14:00 Harald Lübke (Centre for Baltic and Scandinavian Archaeology, presenting author), John Meadows, Ulrich Schmölcke (both Centre for Baltic and Scandinavian Archaeology)
Mesolithic hunter and fisher in transition – A geo-archaeological case study on submerged late Mesolithic sites in Wismar Bay, Mecklenburg-Vorpommern, Germany

14:30 Annabel Zander (University of York)
Tracing human responses to climate change along lakeshores and riverbanks in north-western Europe

15:00 Frederik Hallgren (The Cultural Heritage Foundation, Sweden, presenting author), Fredrik Molin, Jonas Bergman (both Nat. Hist. Museums, Sweden), John Meadows, Harald Lübke (both Centre for Baltic and Scandinavian Archaeology), Karin Berggren (The Cultural Heritage Foundation)
Mesolithic settlement and burial sites in relation to a changing landscape at Motala, eastern Central Sweden

15:30 Coffee

16:00 Michel Guinard (Societas Archaeologica Upsaliensis)
The Middle and Late Mesolithic in the northern part of Central Sweden – Technological change in a coastal landscape

16:30 Satu Koivisto (University of Helsinki)
Searching for inundated Mesolithic and Early Neolithic at lake Saimaa, eastern Finland

17:00 Valdis Bērziņš (University of Latvia)
By the shore of the great lake: the Ancylus stage of the Baltic Sea Basin and its significance for human lifeways in Northern Europe

17:30 Merle Muru (University of Tartu), Alar Rosentau, Aivar Kriska, Lembi Lõugas, Ulla Kadakas, Jüri Vassiljev, Leili Saarse
Sea level changes and Neolithic hunter-fisher-gatherers in the centre of Tallinn, southern coast of the Gulf of Finland, Baltic Sea

18:00 Catherine Jessen (Nat. Museum of Denmark)
Mid-Holocene sea level rise and related archaeology in southern Denmark

18:30 Søren Sørensen (Museum Lolland Falster)
From Hunting ground to Fishing ground
Wednesday, March 22

9:00  Stig Berendt Marstal (Ramboll)
How intensive use of geoarchaeological methods helped improve the re-evaluation of potential buried Stone Age settlements and relics at Kriegers Flak

9:30  Björn Nilsson (Lund University), Giacomo Landeschi, Arne Sjöström
Lost Landscapes found: New visions of the submerged Stone Age of Southern Sweden

10:00  Final discussion

*This presentation is financially supported by the CRC 1266 "Scales of Transformation".

Subsequently, session 6 presentations will be held in the same room.
Programme Session 16

Archaeology and environmental history in lake catchment areas

Conveners: S. Dreibrodt, I. Feeser, W. Dörfler

Tuesday, March 21

16:00 Achim Brauer (Deutsches GeoForschungs-Zentrum Potsdam)
Varved lake sediments in the southern Baltic realm as recorders of Holocene climate change and human impact

16:30 Manfred Rösch (Landesamt für Denkmalpflege Baden-Württemberg)
Palaeoecological studies in south-west Germany lakes

17:30 Break

18:00 Ingo Feeser (presenting author), Martin Hinz, Stefan Dreibrodt (all Kiel University)
Local vs. regional human-environment interactions during the Neolithic in Northern Germany: a multiproxy comparison of records from two catchment areas

18:30 Almut Mrotzek (Greifswald University)
DISQOVER Vilm Island with MARCO POLO

19:00 Susanne Jahns (Brandenburgisches Landesamt für Denkmalpflege und Archäologisches Landesmuseum)
AMS 14C-dating on pollen grains – a suitable method for palynological investigations of lake sediments?

Wednesday, March 22

9:00 Fabian Rey (presenting author), Erika Gobet (both University of Bern), Adrian Gilli (Swiss Federal Institute of Technology), Albert Hafner, Willy Tinner (both University of Bern)
Vegetational and agricultural dynamics during the Neolithic (7000-4200 BC) on the Swiss Plateau

9:30 Sena Akcer-On (Mugla Sitki Kocman University, presenting author) Alan M. Greaves (Liverpool University), Zeki Bora On (Mugla Sitki Kocman University), Sturt Manning (Cornell Institute of Archaeology and Material Studies, New York), Namik Çağatay, Mehmet Sakinc (both Istanbul Teknik Universitesi), Cemal Tunoglu (Hacettepe Universitesi)
When did Latmos Gulf close? Geology versus Archaeology

10:00 Demet Biltekın (Ordu University, presenting author), Kürsad Kadır Erış
Holocene Environmental Changes and Human Response in Eastern Turkey

10:30 Coffee

11:00 Adam J. White (presenting author), Lora Stevens, Varenka Lorenzi (all California State University Long Beach)
A multiproxy approach to interpreting regional population dynamics at Horseshoe Lake, Illinois, USA

11:30 Stefan Dreibrodt (Kiel University)
Comparative investigations on lakes with Holocene annually laminated sediment sequences- Examples from northern Germany

12:00 Final discussion

Subsequently, session 18 presentations will be held in the same room.

Session 16 contributions to the joint poster session

Z. Bora On (Mugla SK Univesitesi, presenting author), Sena Akcer-On, M. Sinan Ozeren, K. Kadir Eris, Alan M. Greaves, N. Namık Çağatay
Revealing the precipitation and temperature records of Lake Hazar (Eastern Anatolia) from μXRF data, for the last 17.8 ka via Independent Component Analysis

Marie-Claire Ries (presenting author), Benjamin Dietre, Werner Kofler (all University of Innsbruck), Andreas G. Heiss (Austrian Academy of Sciences), Michael Strasser (University of Innsbruck), Timothy Taylor (University of Vienna), Jean Nicolas Haas (University of Innsbruck)
Palynological and Archaeobotanical Investigations of the Neolithic Lake Village of Weyregg II (Lake Attersee / Upper Austria)

Piotr Kittel (University of Lodz, presenting author), Antczak O., Brooks S.J., Elias S., Krapiec M., Luoto T.P., Okupny D., Pawłowski D., Płóciennik M., Rzod-
kiewicz M., Sikora J., Stachowicz-Rybka R., Wacnik A.
Palaeoecological research on the moat fill: case study of the Late Medieval motte at Rozprza, Central Poland

Markus Schwab (GFZ German Research Centre for Geosciences, presenting author), Achim Brauer, Mirostaw Błaszkiewicz, Florian Ott, Nadine Dräger, Ulrike Kienel and the ICLEA Team
Bridging long proxy data time series and instrumental observation - The Virtual Institute of Integrated Climate and Landscape Evolution Analyses ICLEA

Luigia Cristiano (Kiel University, presenting author), J.Stampa, I.Feeser, W.Dörfler, J.Meadows, T. Meier
Multi-component time, spatial and frequency analysis of Paleoclimatic Data.
Programme Session 17

Comparative studies in Stone and Bronze Age demography

Conveners: B. Eriksen, R. Hofmann, J. Müller, R. Ohlrau

Monday, March 20

17:30 Paul Roscoe [University of Maine, USA]
The Influence of Demography on Social and Political Organization in Neolithic Societies: Evidence from Contact-era New Guinea

18:00 Aleksandr Diacheko [Institute of Archaeology of the NAS of Ukraine]
Lessons we learned too well: the impact of ethno-geographic evidence on archaeological interpretations

18:30 Hermann Gorbahn [Kiel University]
Contribution to population studies from a perspective of Andean Archaeology

Tuesday, March 21

9:00 Robert Hofmann, Marcel Rodens [both Kiel University, presenting authors], Ildiko Medovic [Museum of Vojvodina Novi Sad], Joca Bakalov (Zrenjnanin), Tijana Stankovi-Pešterac, Aleksandar Medovic [both Museum of Vojvodina Novi Sad], Martin Furholt [Kiel University]
Demography and Social structure in a micro-region in the Serbian Vojvodina between Neolithic and Bronze Age

9:30 Heiko Tiede [Kiel University]
Trends in Demography in Southeast Europe – The reconstruction of eneolithic population densities

10:00 Hrvoje Kalafatic [Institute of Archaeology, Zagreb, Croatia]
The more, the merrier: Late Bronze Age peak in population growth of the southern Carpathian Basin and northern Balkans

10:30 Coffee

11:00 Kristian Kristiansen [University of Gothenburg]
From relative to absolute population numbers in Early Bronze Age Denmark: implications for trade, consumption and wealth*

11:30 Beata Kaczmarek [Laboratory of Archaeology of the Bronze Age Mediterranean, Adam Mickiewicz University in Poznan]
Where childhood ends and adulthood begins? Problems in the study of the Mycenaean demographic structure on the basis of Linear B inscriptions

12:00 Final Discussion

*This presentation is financially supported by the CRC 1266 "Scales of Transformation".
Programme Session 18

Lakescapes and seascapes of Neolithic and bronze Age societies

Conveners: S. Hansen, J. Müller, M. Savu

Wednesday, March 22

14:00 Albert Hafner (University of Bern)
Northern alpine lake settlements of the Neolithic. A review on structures and patterns*

14:45 Irenäus Matuschik (Landesdenkmalamt Hemmenhofen)
The pile dwellings of Sipplingen at Lake Constance, 3919–933 BC dendro

15:30 Coffee, joint poster session

16:30 Jadranka Verdonkschot (Eberhard Karls Universität Tübingen)
Making waves in the Neolithic. A theoretical and interdisciplinary approach to the question why people settled wetlands in the European Neolithic.

17:00 Benjamin Jennings (University of Bradford)
Lakescapes and networks of exchange & visibility

17:30 Martina Karle (Lower Saxony Institute for Historical Coastal Research, Wilhelmshaven, presenting author), Friederike Bungenstock
The Wadden Sea of the Eastfrisian Penninsula through time: paleolandscape maps for the Holocene

18:00 Frank Schlütz (Lower Saxony Institute for Historical Coastal Research, Wilhelmshaven, presenting author), Lyudmila Shumilovskikh (Georg-August-Univ., Göttingen), Felix Bittmann (Lower Saxony Institute for Historical Coastal Research)
Holocene coastal landscapes in the Wadden Sea – first palynological results and perspectives within the cooperative project WASA (Wadden Sea Archives)

18:30 Janusz Czebreszuk, Matheusz Jaeger (both Adam Mickiewicz University in Poznan), Jutta Kneisel, Johannes Müller (both Kiel University)
A lake or/and a river. What could be relevant in the settlement preferences of residents in Early Bronze Age Bruszczewo

Thursday, March 23

9:30 Ekaterina Dolbunova (The State Hermitage Museum, presenting author), A. Mazurkevich, A. Tsybrii, V. Tsybrii, M. Sablin
Using waterscapes in Early Neolithic: new investigations in the southern Russia (site Rakushechny Yar)

10:00 Henny Piezonka (Kiel University, presenting author), Nadezhda Nedomolkina, Wiebke Kirleis, Sebastian Lorenz, John Meadows, Magdalena Wieckowska-Lüth
Veksa, Northwest Russia – 8000 years of settlement history in a dynamic palaeolake landscape

10:30 Coffee

11:00 Jan Piet Brozio (Kiel University)
Aspects of transformations in contrast to Neolithic lakeside and seaside places in Schleswig-Holstein, Germany

11:30 Dirk Nowacki (presenting author), Jürgen Wunderlich (both Goethe University Frankfurt)
‘Lacul Gorgana’ – A paleolake connecting Copper-Age settlements along the Lower Danube valley, Romania

12:00 Kenneth Ritchie (Moesgård Museum, presenting author), Mihaela Savu (Kiel University)
Life on the water: The Lower Danube River during the Copper Age (5th millennium BC)

12:30 Lunch

14:00 Eugenia Loizou (independent researcher)
Seascapes in the Late Bronze Age Aegean. The example from harbour-sites

15:00 Final discussion

Session 18 contributions to the joint poster session

Jos Kleijne (Kiel University)
A Thousand Blistering Barnacles! Catching Haddock in European Prehistory

Mari Yamasaki (Johannes-Gutenberg-Universität Mainz)
Coastal worlds in the Eastern Mediterranean Bronze Age
*This presentation is financially supported by the CRC 1266 “Scales of Transformation”.
Programme Session 19

Archaeological heritage management – the practical side

Conveners: K. Iwe, U. Müller, J. Steigerwald

Wednesday, March 22

14:00 Thomas Meier (University of Heidelberg)
Doing heritage – A view from Faro

14:30 Gai Jorayev (University College London)
The holistic approach to heritage management; from philosophy to implementation.

15:00 Sergiu Musteata („Ion Creanga” State University, Chisinau)
Preservation by development of sustainable strategies for a better protection of the UNESCO world heritage sites

15:30 Coffee, joint poster session

16:30 Dmitriy Voyakin (National World Heritage Committee of the Republic of Kazakhstan)
New powerful tool in urban rebranding and forming of a new concept of the modern city development – creation of the Taraz Archaeological Park in Kazakhstan

17:00 Michael Strobel (Landesamt für Archäologie Sachsen)
Problems and perspectives of archaeological heritage management in intensively used agricultural landscapes - best-practice models from Saxony

10:00 Dragana Filipovic (Serbian Academy of Sciences and Arts, presenting author), Nenad Tasić (University of Belgrade), Milorad Ignjatović (Belgrade City Museum)
Exploiting the Vinča site – examples of public use and abuse of archaeological heritage in Serbia

10:30 Coffee

11:00 Thomas Westphalen (Landesamt für Archäologie Sachsen)
Stepping Stones into the Past – Archaeological Practice in Dresden

11:30 Jelena Steigerwald (Hauptstaatsarchiv Dresden)
The creation of a heritage landscape in the 19th century: The specific case of the Danish-German border region

12:00 Matthias Maluck (State Archaeological Department of Schleswig-Holstein)
UNESCO World Heritage Sites in Archaeological Heritage Management

12:30 Lunch

14:00 Della Scott-Ireton (Florida Public Archaeology Network)
Archaeological Heritage Management Underwater: The Florida Example

14:30 Closing discussion

Thursday, March 23

9:00 Christoph Doppelhofer (Durham University)
Increasing Archaeological Literacy: Benefits of Cultural Heritage Management and Public Archaeology

9:30 Marte Spangen (Stockholm University)
Power and Stereotypes in the (Re-)Creation of Sami Cultural Heritage

Session 19 contribution to the joint poster session

Ewelina Werner (Wroclaw University of Environmental and Life Sciences)
How to collect data about our National Heritage? 3D cadastre in archaeology and archaeological cadastre.
Abstracts

General Keynote Lectures

Early Ceramics in Eurasia
Henny Piezonka (Kiel University)
No abstract available.

Is there a Future for the Past?
Carole L. Crumley (Uppsala University / Swedish University of Agricultural Sciences)

The health of our planet and our species is jeopardized by a host of dangers to environmental, political, and social security brought on by a now-familiar litany: anthropogenic pollution, climate change, increasing inequity and conflict, and the global-scale loss of biodiversity. We have entered the Anthropocene, when human activity must be considered a component (a “driver”) of global environmental change. The dynamic nonlinear system in which we live is not in equilibrium and does not act in a predictable manner. If our and other species are to continue to thrive, it is of utmost importance that we identify the conditions, ideas and practices that nurture both species and the planet. Historical ecology is neither a discipline nor a theory. It is a research framework for merging many kinds of evidence (e.g., documents, archaeology, ethnography, ecology and a broad array of environmental studies) to reach new understandings about the human-environment relationship. While novel questions, insights and methods for combining and analyzing different sources of information stimulate research, they also raise new questions. Historical ecology is an emerging field of study that can identify and address challenging inter-disciplinary issues.

Transformations of the Roman Cityscape
Andrew Wallace-Hadrill (University of Cambridge)

Roman archaeologists have shown persistent interest in the landscape over the last fifty years, pioneered perhaps by John Ward-Perkins in his South Etruria Survey. But work on the Roman city as urban settlement has followed a separate track. Until recently, there has been little interest in the city as an inherent part of the landscape, nor in how the city itself can be viewed as a landscape. The spread of geophysical survey has helped to change that, with work on smaller centres like Falerii Novi, Teano and Otricoli. But the city is also a landscape that can be read in its transformations through time in surviving centres, above all Rome itself. This talk will explore the potential and the difficulties.
Abstracts Session 1

How’s life? Living conditions in Europe in the 2nd and 1st millennia BC

Archaeology and the view of Prehistory in reconstruction images
Jutta Kneisel (Johanna Mestorf Academy / Kiel University)

The presentation concentrates on the comparison of reconstructed images of the past and the archaeological reality. Today, archaeologists have a wealth of information that can be combined into reconstruction images of life in past societies. Even though these images are largely intended for a popular scientific audience, they contain all the information the archaeologist could provide about the past. Looking at the large number of images or dioramas, they often have an idyllic impression at least for prehistoric times. Houses, cattle and individuals are represented. A lot of pictures are only made for a single purpose, to show houses, craftsmanship or the ancient clothes worn. Landscape is used as a decorative background. Whereas for the Mesolithic often hunting scenes are staged as violent action scenes to illustrate the dangerous life of these people, and battle scenes are typical for the Roman period, the period from the Neolithic to the Bronze Age mostly occurs as a peaceful period in these images. But do these images reflect the real life? In the meantime, a large number of scientific analyses have yielded new insights about past environment, diet and health conditions that have only slowly been adopted in the reconstruction images. In the example of the site Bruszczewo, Greater Poland, a slightly different picture of the living conditions of an early Bronze Age settlement could be designed which has little in common with the idyllic settlements in reconstructions of the last 50 years.

Creating an understanding of daily life in and around a Bronze Age house through science-based artist impressions
Yvonne van Amerongen (Leiden University)

Subsistence in its purest form is a form of survival, which means that there are five basic requirements that must be met: food, water, shelter, fire, and clothing. For the fulfilment of each of these basic needs, it is necessary to identify the different activities that are required to make subsistence a success. Most of these activities will take place within or from the place of shelter. In the Bronze Age, shelter is provided by the house. But what do we really know about the house? Scale models and actual reconstructions of Bronze Age houses have been made, which provide an idea of the (relative) dimensions and possible appearance of such buildings. Still, these reconstructions commonly focus on architectural details, and do not (sufficiently) include the tools, equipment and furniture needed for everyday subsistence. This is remarkable, since numerous examples of furniture, household supplies, tools, and equipment have been discovered at several Bronze Age sites throughout Europe (e.g. Hauerive-Champréveyres, Switzerland; Must Farm, United Kingdom). These finds provide a direct insight into prehistoric life. Even though not every individual Bronze Age site always yields all the objects related to daily life, the combined European Bronze Age finds together hold a wealth of information on which objects, knowledge and skills must at least have
Early Bronze Age houses from the hillfort in Maszkowice (Western Carpathians) – layout, construction and functional organization of floor areas

Marcin Przybyła (presenting author), Ulana Gocman, Joanna Jedrysik, Magdalena Skoneczna [all Jagiellonian University, Krakow]

During the excavations conducted on Zyndram’s Hill in Maszkowice in 2010-2016 relics of some EBA houses were discovered which constitute single row extended along the massive stone fortifications. Their floors are rectangular and up to 11 meters long. According to radiocarbon dates older of them were build around 1700 BC and younger just after a fire event around 1650 BC. In the paper we are going to examine way of construction and internal space organization of both older and younger houses by combining archaeological (stratigraphy, preserved architectural elements, distribution of finds), archaeobotanical, archaeozoological, micromorphological and geochemical observations.

A multidisciplinary approach to living conditions and the use of space on a middle Bronze Age farmstead in West Frisia, The Netherlands

Radoslaw Grabowski (Umeå University)

The archaeology of the middle Bronze Age (c. 1800-1100 BC) in West Frisia in the Netherlands is characterised by several large settlement excavations performed from the 1960’s onwards. These investigations have provided rich insights about the domestic architecture and the large-scale structuring and phasing of habitation. Understanding of activities and living arrangements on the scale of individual households is, however, more limited. This is in part due to the relative scarcity of preserved house floors and functionally indicative artefacts on West Frisian settlements. This contribution presents a multidisciplinary investigation of a middle Bronze Age house site at Markerwaardweg which was excavated in response to the construction of a new motorway through West Frisia. The site was subject to a detailed multidisciplinary analysis in order to generate empirical data about poorly understood aspects of middle Bronze Age households. The analysed site consisted of a three-aisled longhouse and several ditches, pits and other ancillary features with unknown function. The main research questions were: Can a high-resolution multiproxy analysis provide evidence about the presence or absence of farm animals in or around the house? If animals were present, can the analysis indicate possible means of stalling? Was the longhouse sub-divided into spaces with different use, such as a dwelling area, a food preparation space with a hearth and a byre/stable? Can the analysis provide evidence about waste management on the farmstead? The above questions were researched through six proxies selected for their complementary ability to read relevant settlement activities:

1) artefact distribution analysis,
2) analysis of carbonised and waterlogged plant macrofossils,
3) analysis of faunal remains,
4) phosphate analysis,
5) measurement of soil organic matter by loss-on-ignition and
6) magnetic susceptibility analysis.
The inferences from this multiproxy approach were furthermore compared against previous interpretations of middle Bronze Age household activities which are mainly based on the architectural traces documented during the numerous large-scale settlement excavations in the region. The results of the study show several patterns in the use of space at Markerwaardweg, both inside the house and in the surrounding farmyard. Importantly, the analysis provides new and concrete empirical observations relevant for the ongoing discussion about the extent and nature of farm animal stalling on middle Bronze Age settlements in the region. Lastly, the study also demonstrates that current excavation procedures used in Dutch development-led archaeology can limit the effectiveness of certain archaeological techniques, making this study relevant for the improvement of similar investigations in the future.

Bioarchaeological and geoarchaeological evidence on the living conditions in south-eastern Bulgaria during the 2nd and 1st millennium BC

Elena Marinova (KU Leuven, presenting author), Bea de Cupere (Royal Belgian Institute of Natural Sciences), Delphine Frémondeau, Plamen Georgiev, Ivanka Hristova, Lazar Ninov, Krassimir Nikov, Hristo Popov

During the Late Bronze Age and Iron Age period (1600 BC – 100/50 BC), modern south-eastern Bulgaria represented a core area between the Carpatho-Danubian zone in the north and the Aegean region in the south, constituting a unique interacting world between prehistoric societies. Major social and economic changes took place, including among others the beginnings of urbanization, production intensification and the development of market economies. All this resulted in a large human impact on the natural environment. The aim of this paper is to present the agricultural economy and animal husbandry practices of ancient societies within this region throughout the considered periods, in parallel to the palaeoenvironmental context and their implications for the living conditions of the people. The methodological approach is based on a synthesis of archaeozoological, archaeobotanical and stable isotope analyses, combined with the results from catchment analysis and pollen records from the region. This study forms part of an interdisciplinary project, which is still ongoing. The bioarchaeological data are obtained from 24 archaeological sites, and the stable isotope analysis is performed on a selection of both plant and animal samples. The palynological evidence presents the synthesis of pollen profiles in the area. The catchment analysis is based on GIS-modelling, which is interpolated from several parameters of the modern ecological environment, including vegetation and climate. All together, they will allow describing the relation between natural environment and human impact on the landscape, in the quest of humans for survival and economic prosperity.

On-site palaeo-ecological investigations from the Hünenburg hillfort–settlement complex, with special reference to non-pollen palynomorphs
Human Impact on Bronze Age Landscape reflected by a "near-site" Pollen diagram from Gönnebek, Kr. Segeberg (Schleswig-Holstein)

Almuth Alsleben (Akademie der Wissenschaften Mainz)

Studying the Bronze Age section of regional pollen-diagrams from the younger moraine in Schleswig-Holstein, only a moderate human impact is visible. We observe a slight decrease in arboreal pollen taxa, correspondingly a marginal increase of the taxa of the secondary settlement indicators. At the transition from the Late Neolithic to Early Bronze Age, changes in vegetation occur gradually whereas the transition to the Early Iron Age is performed by a distinct increase of "open-land" indicators. Excavated settlements so far, give evidence of small farmsteads with no more than two/three houses at the same time. In this case the estimated land use might be not very high. The vicinity of settlement as reflected by the local "near-site" pollen diagram from Gönnebek show an intensively used landscape. Aboreal pollen values go down to 30%; values of self-pollinating cereals reach 5% up to 10%. The high diversity of wild species, thereunder many of those which are pollinated by insects, is a distinct indicator of arable and pastoral farming. The presence resp. absence of spores of coprophilic fungi might give insights into livestock-breeding and water-eutrophy.
by all people in society during famine times. The value and utilisation of these crops during pre- and protohistoric times, thus including the Bronze Age, is less well understood. Preliminary results of the analysis of botanical samples indicate the presence of four species of legumes in the Middle Bronze Age (MBA) Vatyca-culture settlement of Kakucs-Turján, located in the Hungarian Carpathian basin. Predominantly, the finds consist of remains of lentil and pea, and to a lesser extent of bitter vetch. Grass pea has only been identified in a very small amount in a single layer. The bitter taste and toxic content of bitter vetch makes its presence rather interesting, as it raises questions regarding the reasons behind its cultivation. Could the cultivation of the bitter vetch, and other toxic legumes such as the grass pea, provide an insight into the living conditions in the Carpathian basin in the MBA? Does the presence of such legumes signify famine? Or were the legumes only consumed by animals? This paper thus aims to investigate the living conditions during the Bronze Age by using the presence of (toxic) legumes as a proxy.

Lipid proxies in Reconstruction of Paleovegetation and Landscape Evolution
Lorenz Schwark (presenting author), Marta dal Corso, Stefan Dreibrodt, Thorsten Bauersachs (all Kiel University)

Reconstruction of paleovegetation and landscape evolution commonly relies on palynology and plant or charcoal macroremains. An alternative methodological approach is based on analysis of plant cuticular waxes, which possess high chemotaxonomic potential but to a lesser degree may also reflect environmental adaption. Wax lipids constitute complex mixtures of different compound classes amongst which n-alkyl lipids (alkanes, alcohols, carboxylic acids, esters and ketones) and di- or triterpenoids (abietanes, oleananes) are most diagnostic. The preservation potential of hydrophobic and recalcitrant wax lipids in geological archives is high, thus allowing to use these molecular markers for paleobotanical reconstruction. An actualistic approach will be applied, where modern analogues of Bronze Age plants will be analyzed for their plant wax constituents and compared to wax lipids archived in natural and managed soils. Soil wax lipid composition will then be interpreted for changes in human inducted landscape evolution, in particular the conversion of forest ecosystems into pastoral and arable agroecosystems.

The landscapes of ancient metallurgy
Gilberto Artioli (Padua University)

Metal extraction from ores and the metallurgical activities for the production of raw metal and tools are processes that significantly affected human society and the living landscape since the beginning of metallurgy (Tylecote 1987, Craddock and Lang 2003). They need technical skills, human labour, and intensive energy consumption (Rehder 2000). The metallurgical cycle from ores to tools will be briefly reviewed, with special focus to copper-based metallurgy. The archaeological evidence of ancient metallurgical activities (Hauptmann et al. 1999) will be described, with an eye on their effect on resources, landscape, and urban development. The recent research on the Alpine region will be summarized.

Energy Expenditure Calculations for Prehistoric Bronze Artefacts – Comparing the Expenditure for Early and Late Bronze Age Artefacts in Central Europe
Johanna Brinkmann (Kiel University)

The importance of the material bronze is attested by it being eponym for a whole period, the Bronze Age. But how much of its daily working time spends a person producing a bronze artefact? Bronze is an alloying of copper and tin. The production of this material was studied by many scholars, but rarely all the time-consuming production steps from ore to artefact were part of the research. By focusing on casting and ornamentation techniques the costly mining, processing and smelting procedures required for producing bronze artefacts are neglected. There are clear differences between the Copper and Early Bronze Age and the Middle and Late Bronze Age production sequence. This discrepancy can also be seen in the energy expenditure, which is calculated using results of experimental archaeology. Thus the production of one axe with 200 g in weight took on average 45.6 person hours using Early Bronze Age production techniques and 36.5 person hours using Middle and Late Bronze Age technology. The calculations include all production steps from mining to post-processing of the cast object and thus give an impression of the expenditure of time for the production of different kinds of bronze objects. During the Early Bronze Age we can identify a small scale production of bronzes, even though long distance exchange is visible in the material culture. In contrast, at the end of the Early and beginning of the Middle Bronze Age a standardisation of the production process is established. This is visible in the composition of the alloying and the structure of the
Female exogamy and patrilocality at the transition from the Final Neolithic to the Early Bronze Age in Southern Germany

Corina Knipper (Curt-Engelhorn-Zentrum Archäometrie, Mannheim, presenting author), Alissa Mittnik (Tübingen Univ.), Ken Massy (LMU Munich), Fabian Wittenborn, Stephanie Metz (both Heidelberg Academy of Sciences), Johannes Krause (MPI for the Science of Human History Jena), Philipp Stockhammer (LMU Munich)

The transition from the late Neolithic to the Early Bronze Age in Central Europe is a time period for which human mobility has been vividly debated in archaeological research. This presentation contributes to these considerations using an interdisciplinary approach that integrates ancient mitochondrial DNA analysis, the determination of stable isotope ratios of strontium and oxygen in tooth enamel, and archaeological analysis of radiocarbon dated skeletal remains. They represent 83 human individuals from 6 sites of the Bell Beaker Complex and the early Bronze Age in the Lech Valley in Southern Bavaria, Germany. Mitochondrial DNA analysis documented a diversification of haplogroups over time. Strontium and oxygen isotope ratios disclosed more than half of the females to be non-local, while there were only single occurrences among the male and subadult individuals. This striking pattern of patrilocality and female exogamy prevailed between about 2500 and 1700 BC. It was independent of individual sites and their archaeological assignments to the Bell Beaker Complex or the Early Bronze Age. While the males ensured settlement continuity in a spatially limited area, the results indicate that the females were driving forces for regional and supra-regional communication and exchange at the dawn of the European Metal Ages.

Warriors’ lives? The skeletal sample from the Bronze Age battlefield site in the Tollense Valley

Gundula Lidke (NLD Hannover, presenting author), Ute Brinker, Annemarie Schramm, Detlef Jantzen [all Landesamt f. Kultur und Denkmalpflege M-V], Thomas Terberger (NLD Hannover)

Research on the Bronze Age battlefield site in the Tollense Valley (Mecklenburg-Western Pomerania, 13th cent. BCE) has uncovered remains of up to now more than 130 individuals, predominantly adult men, representing a very special Bronze Age skeletal sample. The bones show perimortal as well as healed lesions, documenting the actual fighting in the valley on the one hand, but at least in some cases also violent encounters in previous life situations. Questions arise whether violence played a more than occasional role in some men’s lives, and whether special activities possibly associated with a warrior lifestyle – routinely use of weapons (e.g., shooting a bow), riding horses, marching long distances – may have left discernable traces on the bones. The paper presents possibilities and problems that arise in accessing these questions on the basis of the Tollense Valley material.

Activity and mobility: a study of entheseseal changes in a Middle Bronze Age population from Érd, central Hungary, supported by stable isotope data

István Rácz (Eötvös Loránd University, presenting author), Zsolt Bernert, Julia Giblin, Vajk Szeverényi, Gyula Gyenis, Orsolya László, Viktória Kiss, Tamás Hajdu

The aim of our study is to present the preliminary paleopathological data of a Middle Bronze Age site in central Hungary, where a series of human skeletons were discovered. Altogether the remains of 37 individuals from the Bronze Age and Roman Period were excavated from a series of storage pits at the Érd site. In this study, 26 more or less complete Bronze Age skeletons were included in the analysis. Burials of a similar kind (‘mass graves’ or ‘irregular’ pit burials) have been found at other sites from the Middle Bronze Age. Such finds are often assumed to be the result of warfare; however, this site seems to be more complex in nature. A preliminary study of the Érd skeletal material showed that pathological features are commonly present on the skeletons (such as evidence for severe physical strain and periostitis on the lower limbs), which suggests that the general welfare of the population was rather
The skeletons also showed signs of possible increased physical activity at muscle attachment sites (Hajdu et al. 2010). The aim of this study is to add to our understanding of past physical activity of this specific population, since this material has not been thoroughly recorded in terms of entheseal changes. We also will evaluate current methodology for recording entheseal changes using the following methods: Mariotti et al. (2004), Villotte (2010), and Henderson et al. (2015). Furthermore, ongoing stable and radiogenic isotope research on these burials (oxygen, carbon, and strontium) may provide additional insights into variability in diet and population dynamics in the Bronze Age pit burials from Érd. In this study, we focused on the comparison of local and non-local individuals. The project was supported by the Hungarian National Scientific Research Fund (OTKA K-108597), the Momentum Mobility Project and the János Bolyai Research Fellowship of the Hungarian Academy of Sciences.
Abstracts Session 2

Structure, network and space: Neolithic and Chalcolithic settlements and their social meaning

Density variation of housing in Copper Age settlements. Indications for population size and social space
Knut Rassmann [Deutsches Archäologisches Institut]

Decades of excavations on Copper Ages settlements revealed many houses, rarer house groups, whereas the knowledge on general structures of settlements was limited. The increasing number of magnetic prospection during the last 15 years deliver data to reconstruct for the first time the general structure of Copper Age settlement. Regardless these new qualitative data, the case study Okolište (Bosnia) demonstrate both the limitation of magnetic data especially the variation in dating the revealed features as well as the potential of a combined analysis of excavation and prospection date.

The excavation in Okolište enables us to date precisely more than 40 houses and the different phases of the fortification system. The combination of magnetic and excavation data enable us to reconstruct the settlement history generally. Starting from Okolište the paper discussed new magnetic prospection on Vinca sites and their potential to reconstruct spatial structure and population size. A key parameter for the reconstruction of latter is the calculation of building density.

Social conflict and reorganization of settlement space
Sławomir Kadrow [Instytut Archeologii i Etnologii, Krakow]

There are many Chalcolithic settlement sites excavated on Polish territories. For some of them a detailed reconstruction of the sequence of various changes in longer time was made. These reconstructions include transformation in inner settlement space, population size, subsistence, ritual activities, pottery stylistics and so on. Settlements at Oslonki, Bronocice and Iwanowice functioned as central places, represent various cultural traditions and are located in various geographical and environmental zones. Nevertheless, in their evolution there is one crucial moment. In periods of maximal demographic development of these settlements
occurred there to ‘sudden’ changes in settlement spaces. Inhabitants used to start new burial places and stopped to use the currently existing cemeteries. It was accompanied by changes of rituals and/or style of pottery and other artifact groups. Current demographic trends also turned away in this time. These settlements began slowly or quickly depopulate until their complete disappearance. These changes were not correlated with climatic or economic factors. Their main reason was social internal conflicts.

Social dimensions and spatial levels: a multiscalar approach of a Late Neolithic tell-like settlement at Öcsöd-Kováshalom (Hungary)

Andras Fuzesi (Eötvös Loránd University Budapest, presenting author), Pál Raczky, Alexandra Anders

A complex analysis of a sustainedly inhabited settlement can provide numerous approaches and perspectives from the detailed micro-histories of here-and-now to the broad frameworks of cultural models. The Late Neolithic tell-like settlement of Öcsöd-Kováshalom (app. 5210–4850 cal BC) is well known in the international research. The field surveys, excavations, drillings, and various finds from the 1980’s provide a strong basis for this multilevel analysis: the study of finds, settlement features and the microregion. We try to give an overview of the complex life of this community through some typical, although casual examples. We present two special vessels among finds, a group of houses among settlement features, and the Late Neolithic settlement patterns of the Tiszazug microregion. These three levels of analysis appear together within the examination of a characteristic material, the ochre: the decoration of pottery, the burial customs and the procurement of raw materials are phenomena in a gradually widening point of view. Our examples represent different dimensions of spatiality. Through the traceable relations between them we try to draw the socio-ecological network of Late Neolithic communities in the Great Hungarian Plain, and try to find the place of Öcsöd-Kováshalom within.

Walk the line: the spatial organization of the LBK settlements of Vráble/Southwest Slovakia

Martin Furholt (presenting author), Nils Müller-Scheeßel (both Kiel University)

In recent years, there has been a growing debate about the structure of houses and settlements of the Linearbandkeramik (LBK), superficially very similar over very long distances, which lead to the questioning of long standing beliefs. This involves the construction of houses as well as the sequence and relationship of homesteads. Such questions bear immediate relevance not only for the reconstruction of LBK settlement features but even more so for the exploration of the visual and haptic perception of such settlements by their inhabitants. Even in smaller settlements, houses are most often not isolated, but part of a larger agglomeration. Interestingly, the questions of accessibility to and movements within such settlements have up to now largely been ignored. In larger settlements like Vráble, these questions gain even more importance. To answer them, it is pivotal to establish models about the succession and contemporaneity of houses. On a house-centered level, there is a need to get to grips with the features which actually formed part of longer-term physical barriers and boundaries (mainly houses and pits, but also other features like fences or ditches). Building on large-scale geomagnetic prospections and recent excavations with high-resolution C14-datings, we will develop a model for the succession of houses and the setting up of the settlements of Vráble which will also be of relevance for LBK settlements in other regions.

Pots in different contexts. The patterns of pottery discard and deposition at the Münchshöfen site in Riedling

Marton Szilagyi (Universität Hamburg; Eötvös Loránd University Budapest, presenting author), Daniela Hofmann

The almost fully excavated site of Riedling in Lower Bavaria provides an exceptional opportunity to study a whole late Neolithic settlement. As part of a DGF-funded project on the Münchshöfen culture, we are currently reconstructing the spatial and temporal dynamics of the site, with a special focus on pottery. As at most Neolithic settlements, pottery provided the highest number of finds in Riedling. Beyond the traditional typochronological analysis of the more than 40.000 sherds, our main goal is to understand the role of pottery in the life of the Neolithic community. Even during excavation, it was clear that in some archaeological features pottery appeared in large numbers and extensive concentrations, and these were sometimes accompanied by human bones or concentrations of other types of finds. In the first year of the project, we have processed the
pottery finds and identified a varied picture regarding these presumably special contexts. However, it is essential to know the patterns of pottery discard and pottery deposition at this settlement more generally in order to understand the role of pottery in special features. Furthermore, the analysis of ceramic assemblages allows us to explore pottery use in different contexts. This presentation gives an overview of the diversity of pottery deposition and discusses the possible underlying rules, including the relations between ordinary and special assemblages.

Late Neolithic dispersed settlements: structure, network and social meaning
Marzena Szmyt (Adam Mickiewicz University, Poznan)

The purpose of my presentation is to consider the possibilities and limitations of social interpretation in relation to the reconstruction of dispersed settlement systems. The example is the so-called Lowland settlement system of Late Neolithic communities whose principal traits are defined in reliance of late 4th and early 3rd millennia BC sources from the Central European Lowland, namely from its eastern part located between the Oder and Vistula rivers.

Big settlements in the Eneolithic of the south-eastern Poland
Marta Korczyńska (Polish Academy of Sciences, presenting author), Klaus Cappenberg (Leipzig University), Marek Nowak (Jagiellonian University), Jakob Ociepka (University of Cologne), Aldona Mueller-Bieniek, Magdalena Moskal-del Hoyo (both Polish Academy of Sciences)

At the beginning of the fourth millennium BC, in south-eastern Poland (historical province of Lesser Poland – Polonia Minor) appeared the Funnel Beaker culture (TRB). From archaeological perspective, this culture, till mid-4th millennium BC, replaced earlier units of the so-called Younger Danubian Neolithic (aka Lengyel-Polgár Complex). From ca. 3600 BC, the growth of the area occupied by some settlements of the TRB can be seen; this process seems to intensify with time. It is possible that such big settlements gained the status of micro-regional centers, around which the whole settlement network was organized. There are opinions that a two- or even three-tier hierarchical system of the TRB settlement was formed in some regions of Lesser Poland in that time. At the end of the fourth and in the first half of the third millennium BC, the biggest sites of the TRB reached a size of 20-30 hectares. Consequently, one can assume that a greater part of the local populations concentrated in these big settlements. Interestingly enough, such large sites are often characterized by archaeological materials of a mixed character. The so-called Beaker-Baden Assemblages in western Lesser Poland are the classical example of such correlation; i.a. they are known from phases IV and V of the site at Bronowice, the Piczów district (ca. 3300-2850 BC). A phenomenon of this kind has also been observed in Lesser Poland beyond the TRB. For example, in the large settlement in Złota, the Sandomierz district (ca. 2900-2600 BC), the widespread coexistence of elements of the Baden culture, the Globular Amphora culture and the Corded Ware culture were recorded. It is significant that this site is actually the only settlement of the local archaeological unit called Złota culture. Other sites of this culture are cemeteries and numerous single graves. Therefore, it can be assumed that this resulted from concentration of the whole population in one central point of the settlement area, of the mezo-region scale. The presentation has the objective of clarifying what kind of economic processes and social structures conditioned the emergence of big, Eneolithic settlements in south-eastern Poland. Some interpretative problems associated with such settlements will be also examined, e.g. questions of “invisibility” of houses within them and their relationship to the monumental, sepulchral structures of the TRB. For this purpose, a series of complementary analyses were performed (mainly at the newly investigated TRB site of Mozgawa, Pińczów district, which occupies the area of approximately 33ha), including: 1) the internal arrangement of anthropogenic structures within big settlements, 2) the internal dynamics of their development, 3) the location of such sites in terms of environmental conditions, 4) their potential activity zones, 5) the degree of human interference in the environment around them, and 6) the relationship between them and other surrounding sites. The analyses are based on the results of wide-scale surface survey combined with geomagnetic and aerial prospection, excavations, as well as paleoenvironmental studies.

“Clusters” of houses at large Trypillia Culture sites
Nataliia Burdo (Institute of Archaeology NAS of Ukraine), Mykhailo Videiko (Kyiv Borys Grinchenco University)

Planning structures of large sites, as Nebelivka, Maidenetske, Talianky and others consist of few
types of structures: 1) large rows of houses; 2) lines – “streets”; 3) “quarters”. Inside these structures we can see linear groups from 3-1 (sometimes more) houses – “clusters”. Similar structures are widespread on many sites from V-IV th mil. BC in different cultural unities – from Vinča to Cucuteni-Trypillia. Now it is impossible to say, are they equal from the point of view of internal organization of sites or not. There are few samples of such groups of houses, explored last 40 years by archaeologists at Maidanetske and Talianky. We also can combine data from their excavations with information about other explored objects, which position is clear according to magnetic prospection. The largest area with clusters was explored at Maidanetske between 1974-1991 four and 26 structures in two places. One of them related with central (4 houses) and the second rows of houses. It gives data about architecture, chronology, economical and ritual activities. All data are important for reconstruction of social context of clusters. All houses in both mentioned above areas were contemporary. It is visible from their construction (houses were blocked and burnt at one time) and collections of painted pottery. The most of houses were relatively small (4-4,5 m wide and 10-14 m long), two storeyed, with one oven, located on the first floor. Finds of tools were few and related mainly with food production (millstones). Traces of looms found only in parts of buildings. Any traces of flint processing or other tools manufacturing were found, the same with pottery production. Against this background, were few larger buildings or groups of buildings nearby. They were different also by finds – ritual vessels, figurines, pit with more than 40 fragmented figurines in ashes at house “T”.

Such central place was discovered in each of explored clusters in Maidanetske. Data from Talianki and Volodymyrivka are similar. It seems that houses were basic social units, but clusters were basic economical units at large sites. For other hand distribution of tools and places of pottery production reflecting existence of division of labor at large sites. Finds of imports of ceramics from other local groups at some clusters possibly documenting existence of groups of mixed origin. Clusters of houses are known from Trypillia A stage (5000-4600 BC) and later (4200-3500 BC) they became a basic unity for large sites. Perhaps they involve a large family institution, known for ancient cities of Mesoopotamia. According to research by I.M. Diakonoff, based on written sources, such family included several generations of family, cultural personalities as well dependent persons and consisted of 30 to 60 people. It should be noted that the available information is insufficient to resolve the issue of Trypillia sites, so the research of “clusters” to be considered as one of the promising areas of feature studies.

Connections between Gordinesti group and Tripolye sites in Northern Bug, Horyn and Northern Dniester regions
Dariusz Krol (University of Rzeszow, presenting author), Ghenadie Sirbu (Academy of Sciences of Moldova), Malgorzata Rybicka, Dmytro Verteletskyi (both University of Rzeszow)

This paper presents the results of excavations conducted in 2014 – 2016 and made possible by the NCN project ‘Between Sunset and Sunrise: Dynamics of socio-cultural changes between the Carpathians and the Dnieper in 4 – the beginning of 3 mil. BC’. Materials are obtained from settlements Gordinesti in Northern Moldova, Vinniki-Zhupan near Lyov and Kurgany-Dubowa in Western Vholnia and contributed by the data from old excavations in Žveniachyn in Podolia and Holyshiv in Western Vholnia. These complexes make possible the verification of numerous hypotheses considering Baden component in socio-cultural changes among Late Tripolye populations in Western Ukraine. The obtained radiocarbon dates also allow precise discussion considering the chronology of these interactions and influences from the south.

Ipoly-Szécsény Archaeological Project [ISzAP] (poster)
Szilvia Fábián (Hungarian National Museum Budapest, presenting author), Roderick B. Salisbury, Gábor Bácsmeghi, Szilvia Guba, Nicklas Larsson, Szabolcs Czifra, Katalin T. Biró, Kata Szílágyi, Tibor Marton, Gábor Serlegi

Interpreting social structures, social interactions, and human-environmental interactions from archaeological data is essential both for understanding the past and informing the present. The Ipoly-Szécsény Archaeological Project [ISzAP] is a new research project examining interregional trade networks, cultural change, and human-environmental interactions in the northern Carpathian Basin and its surroundings. The ISzAP project area centers on the Szécsény-Ültetés archaeological site and includes its surrounding area in the Nógrád Basin at the northern part of Cserhát Mountain and Ipoly Valley. Previous research on the Neolithic of the Nógrád basin and Ipoly valley is very limited. Excavations at Szécsény-Ültetés and another local site, Karancsság-Alsó-rétek, indicate that the earliest farming occupation of the region was likely during the
Neolithic cohesion and post-Neolithic 'dispersed sociality' in the central Balkans: insights from environmental archaeology (poster)

Dragana Filipovic (Serbian Academy of Sciences and Arts, presenting author), Jelena Bulatovic (University of Belgrade), Miroslav Marić (Serbian Academy of Sciences and Arts, Belgrade)

The period of transition from the Late Neolithic to the Early Chalcolithic in the central (and northern) Balkans (c. 4500-4000 BC) saw dramatic shifts in the settlement pattern presumably reflecting fundamental changes in the social organisation, economy and symbolism. A range of possible external and internal reasons for the "end of the Vind(μ=ııa world" (Borid(μ=ıı) have been listed and discussed in an attempt at understanding the cause-and-effect of this transformation. The high-resolution archaeological evidence from this period, though still scarce, has grown in recent years and has provided some basis for examination of the previously offered models of change that refer to factors such as weakening of Neolithic social networks, social conflict, foreign invasion, climatic change, and diminished natural resources as possibly leading to the disintegration of the Neolithic society in the Balkans. We here look at the available environmental (archaeobotanical and...
zooarchaeological) record from the final Neolithic and from the Chalcolithic contexts in the central Balkans and use it to evaluate postulated changes in the economy and resource use from the mid-5\textsuperscript{th} millennium onwards. Reference: Bori, D. 2015. The end of the Vina world: Modelling Late Neolithic to Copper Age culture change and the notion of archaeological culture. In: Hansen, S., Raczyk, P., Anders, A. and Reingruber, A., (Eds.) Neolithic and Copper Age between the Carpathians and the Aegean Sea: Chronologies and Technologies from the 6\textsuperscript{th} to the 4\textsuperscript{th} Millennium BCE, p. 157-217. Bonn: Habelt.
Abstracts Session 3

'Tonight will be a memory too' – Memory and landscapes

Commemoration and change: remembering what may not have happened
Richard Bradley (University of Reading)
As studies of oral literature have shown, human memory is fallible and narratives that are meant to remain true to a traditional format actually change over time. Certain elements are more durable than others, but, unless specialised techniques are employed to preserve their content, the past is recalled with less clarity over time. That also applies to the construction of monuments. On a short time scale their development might have been foreseen, but over the course of a protracted history their appearance and significance changed. There was also a crucial distinction between timber monuments, which could decay or be set on fire, and earthworks or stone structures which would probably leave a trace behind. This paper will follow the history of a series of recently excavated structures in Scotland which were first built around 3000 BC. They were used and reused discontinuously from the Early Bronze Age to the Early Medieval period, and this account will consider the ways in which they were modified and the contexts in which they took on a new significance. Their history is still continuing and my paper will end by illustrating their reinvention in modern times.

TRB Hoards as Boundary Markers inside Neolithic Landscapes
Michael Müller (FU Berlin)
The Funnelbeaker culture (4100–2800 cal BC; in short TRB Culture) is the first Neolithic culture in Northern Europe. In its main distribution area, of what is now Northern Netherlands, Northern Germany, Northern Poland, Denmark and Southern Sweden, three groups were divided, the so-called Western, Eastern and Northern Group. The last one is deemed to be the most important due to being the one from which most of the cultural and technical impulses for the other parts of this culture were coming from. The TRB was forming their environment with: the construction of several thousand megalithic tombs, made of monoliths weighing tons; the first measurable deforestation in their distribution area for building settlements and practicing agriculture; the construction of causewayed enclosures, where ceremonies must have taken place; involving at least the deposition of flint objects, typically massive flint axe heads in wetland areas. With all of the mentioned features, the bearers of the TRB culture seemed to have divided their space into different assigned areas, namely places for life, places for death, places for ceremonies and places for offerings. Even more, the chosen areas for the different features are believed to have had a special meaning in themselves. It can be shown that the deposition places for hoards of flint axe heads mark areas between culture and nature, visible and invisible, dry and wet, as well as between stagnation and motion. The number of objects in these depositions varies between one and several dozen and for each item a lot of time and effort for mining the flint, as well as for knapping and grinding it was investigated. And even if we must expect that these precious and fully functional axe heads were still visible at their place of deposition, they were not taken away. We could suppose that this might have destroyed the function and maybe also the meaning of the territory whose entrances they were marking.

Set in stone? – Transformation and memory in Scandinavian rock art
Christian Horn (Graduate School Human Development in Landscapes), Rich Potter (Göteborgs Universitet)
Scandinavian rocks were engraved for over a millennium, from the Late Neolithic through to the Bronze Age. Once the rocks had been engraved for the first time they were inevitably changed; in a sense, entangled with the past. However, the rock art was not ‘set in stone’. The panels were transformed by the addition of other motives. Particular lines on individual images were re-engraved to emphasize those features. Recent use of new imaging techniques such as Reflectance Transformation Imaging (RTI) and Structure from Motion (SfM) reveal chains of transformative action on individual figures and the use of the rock topography as landscape. By exploring the manifold transformations of rock art, this paper seeks to investigate the spatio-temporal frame represented by the rocks and ask how people engaged with the images. What is the relationship between memory and the present, ritual and everyday life?
The construction of memories in the Lacedaemonian landscape

Maria del Mar Rodríguez [Complutense University of Madrid]

Plato insists on the interest of Spartans to learn History [Plat. Hipp. Maj. 285d-e]. The reason for this insistence is that the classical and Hellenistic Spartans were always indebted to the conquests of his ancestors, since this was the moment of Spartan institutional development and the territorial growth. After it moment, Spartans tried to perpetuate the glory of their history. In the stories about the conquest of Lakonia it is especially important the institution of certain shrines, whose rituals are still interpreted as civic, although the interest of historians has traditionally been focused on their origin and its initiatory nature. If we focus on the location and events associated with them in historical times we see that the shrines of Orthia, Apollo Amyklaios, Artemis Limnatis and others have a fundamental weight in the narrative of the phases of the conquest of Lakonia and Messene. The first of them is associated with the initial boundary related to the Eurotas River. The main Orthia’s rite is the diamastigosis, the flogging of the epheboi. This rite has a strong archaic character, allegedly originated in a quasi barbaric era in which human sacrifices to the goddess were allowed. In fact, Spartans wanted to show the sanctuary as a borderline, both in the nature of the ritual, associated with education, and in its location, linked to the initial border of Sparta, the river Eurotas, which is also the boundary in the sanctuary of Apollo Pittheus, strongly related to the confrontation with Argos in the region Tireatis [Xen., Hell., 4,5,27; Paus., 3,11,1]. The second shrine, the Amyklaion, had a strong civic impact from archaic to Roman times, but there is one aspect of the ritual especially associated with the conquest. The shell of Timomachus, an important Spartan aristos, was carried in procession commemorating the conquest of Amyklai [Aristot., Fr. 532/489 Rose = schol., Pind., Isthm., 7,18], while they came about another series of inclusion rites. The capture of Amyklai was the accelerator of the conquest of all Lakonia, which was allegedly conducted by the king Teleclus. This monarch was precisely the one whose death had caused the outbreak of the First Messinian War [Str. 4,3,3] by the defence of the girls in the sanctuary of Artemis Limnatis on the Taygetus border, a boundary spot that also remains in medieval times as sacred in the religious centre of Mystra. The sanctuary of Artemis Limnatis also had a direct association with Orthia, whose sanctuary was located in the area of Limnas, on the Eurotas’ initial border. We also know that Messene and Sparta disputed the area of Denteleatis at the moment of the Messinian independence and in Roman times. It is especially interesting to analyze the contradictions between the two versions of the legend of the violation of Spartan girls in the sanctuary because it looks like a reinterpretation of the ethnic affiliation of the place to one or another community and it is a key to know more about the origins of the Messenian identity. In conclusion, these cases reveal a direct association between the configuration of the Spartan landscape and the sanctuaries whose rites were associated with the construction of tradition, civic identity and the rites related to youths. Thus, rites and shrines seem to correspond to what Connerton called “inscribing practice”, the attempt to preserve the memory through the landscape.

Political Crisis and memory in the ephebeia. Attica as a space of memory and oblivion

Constanze Graml [Ludwig-Maximilians-Universität München]

The Athenian ephebeia, the military and educational training for Athenian youths to attain full citizenship, was strongly interwoven with Attica itself. During the two years of training, the young ephebes were involved in different rituals associated with sanctuaries in the Athenian chora, but rituals were also performed in the asty. Moreover, the attribution of the ephebes to eponymous heroes - who functioned as patrons for certain phylai - underlined their ties to the Athenian land. Many of the known ephebic rituals were connected to sanctuaries, which functioned as memory places (lieux de mémoire, see P. Nora), be it for events from the mythic past related to heroes [e. g. Aias] or for historical events, such as the Persian wars [Battle of Marathon, Battle of Salamis]. The locations of these sanctuaries were not necessarily close to the location where the remembered event had actually happened. For example, the Battle of Marathon was commemorated by celebrating the Charisteria at the sanctuary of Artemis Agrotera in Aigrae [IG II² 1028; Xen. ana. 3, 2, 11-12; Plut. de Herod. mal. 862a]. The annual performance of and participation in these rituals inscribed a long gone past into the cultural memory [see J. Assmann] of the Athenian city state. In later times, from the 2nd century BC on, some of the ephebic rituals seem to reenact the commemorated event. For example, the Battle of Salamis was annually celebrated with a boat race from the Munichia bay to the Kynosoura Peninsula on Salamis, later even with a sea battle...
Battlefields, monuments, and memory of battles

Agnieszka Fulinska (Jagiellonian Univ., Krakow)

Battles, ancient and modern, take space. Essentially, the planning of a battle requires detailed examination of the terrain and landscape, in order to establish the strong and weak points and design tactics; victories often depend on such strategic reconnaissance. In short, battles are among others about controlling space and using it to one’s advantage. However, when they are commemorated, the space usually disappears, and the “battlefield” shrinks into the very limited area where a monument (or a number thereof) is erected. Moreover, over the time, the large expanses of the actual battlefields change due to natural and anthropogenic development of the terrain. In result, what we experience now as battlefields, are only symbolic places, chosen at some point for commemoration due to various factors, and not necessarily crucial for the actual fighting. In many cases there are no monuments from the period, which would relate directly to the memory of the participants, but modern practice of indicating historical places supplements them with information and explanations for the tourists. The latter sometimes include simplified maps, but the recreated historical landscape rarely corresponds with what the visitors see. It would be practically hardly possible to transform the whole battlefields into memory spaces, and even if a large amount of terrain is devoted to commemoration, it does not really allow for the “mental reconstruction” of the battle itself. Even historical re-enactments rarely take place in the actual terrain, let alone employ the same numbers of participants. In my presentation I would like to demonstrate, by examples of the commemoration of selected battles from the Napoleonic period (in Italy, Germany, Belgium, the Czech Republic, and Poland), the interplay between our detailed knowledge of how the battles were fought, iconographic sources from the period and the following decades of the 19th century, and today’s landscape in which the monuments are located. The relationship of commemoration to space is far from being uniform; it includes e.g. monumental commemorative structures which dominate over generic agricultural or urban landscapes (Austerlitz and Leipzig), taking away the actual experience of the battlefield; detailed markers indicating the positions of specific troops spread over a vast expanse of terrain (Jena/Auerstedt); a spatially vast and rich in monuments complex at Waterloo, covering, however, only a part of the huge battlefield, which, moreover, changed its appearance dramatically over the past two centuries and despite all efforts does not evoke the actual circumstances of the battle. These modes of relation between space, landscape and commemoration (including simplified reconstructions of the fights) will serve as examples of our perception of battles and battlefields, with the argument that the real experience is intangible and unattainable, not only in the human dimension, but also as far as the spatial factor is concerned. I will also discuss in short the possible reasons for choosing various modes of commemoration, and the role of the landscape in this particular process.

Places of looking forward and places of permanence: Landscapes of remembering and forgetting in the Balkans

Gustav Wollentz (Graduate School Human Development in Landscapes, Kiel University)

Within heritage studies, memory is often understood as endangered, while heritage is approached as a medium to counter the fading of memories. This is based on the assumption that the loss of memories is an inherently negative process, i.e. by forgetting elements of our past we forget elements of ourselves. However, if we accept that forgetting can be an active and even conscious process, and that all narratives constructed about the past include silencing parts of history, such a premise is difficult to maintain. In other words: forgetting is part of creating the person we are and the person we want to be. Thus, heritage is not only concerned about remembering, but also about forgetting. However, there is no need to face this with distress since it is unavoidable within the process of making meaning to the past. Even though these ideas are not especially controversial within the academic field, the implications of them are seldom recognized. The loss of memories is usually studied in connection to political top-down attempts at controlling and aiming certain narratives of the past, while silencing un-
wanted ones. It is necessary to underline that forced forgetting can be a real concern for marginalized people, and is often used as a form of oppression. This is not about diminishing the importance of studying and trying to understand these cases, but about recognizing that there are also cases of wilful and much-needed forgetting among individuals, which can be especially important in post-war contexts, and should be approached without presupposed ideas of positive or negative values. Since memory also has spatial dimensions, the landscape plays a highly important role within this process. Consequently, this paper aims to challenge some routinely made assumptions concerning remembering and forgetting through discussing the need of creating places of looking forward and places of permanence in post-war contexts. I will do this through presenting parts of ongoing research that I have been carrying out in Bosnia Herzegovina and Kosovo between 2014 and 2016.

A Forgotten Memory? The Piceni, the ver sacrum and the longue durée
Eleanor Betts (Open University)
This paper explores the foundation myth of the ancient Italic tribe known as the Piceni, from three aspects. It begins by considering the role of the landscape in generating a lasting myth-memory and the possible origins of that myth as it was inscribed on the landscape. Then, it evaluates the Roman re-intepretation of the myth and consequent appropriation of both the Picene landscape and myth-memory. Finally, the impact recent seismic activity in the area might have on reinventing the memory is given brief attention. The foundation myth of the Piceni, a ver sacrum (‘sacred spring’), was bound intrinsically to the landscape of the Tronto river valley running from Arquata del Tronto to Ascoli Piceno, an area recently shattered by earthquakes which left hundreds dead, much of the population displaced, and towns and villages in ruins. This paper looks back from this recent catastrophe to ask why this area has been largely neglected within archaeological studies of ancient Italy, despite having a cultural memory based on a vivid migration myth. In the myth, the youth of Sabinum are cast out into the forest and led by a woodpecker (picus) to the Tronto River, at the mouth of which Ascoli Piceno was founded. This broke their connection with Samnium, despite the Iron Age material culture from the two regions bearing some distinctive parallels, but locates the origins of the Piceni firmly in Sabinum. Myth is a significant feature of identity formulation and representation, intrinsically bound up with consolidation of power within socio-cultural groups (Smith 1986:2; Gosden 1994:167). Perhaps the most significant question in discussion of the ver sacrum myth of the Piceni is whether it was constructed and perpetuated by part or all of the population of Picenum or by the later Roman colonists. Emma Dench has argued convincingly that the ver sacrum myths of the Picenes, Sabines and Samnites were not Roman antiquarian inventions, and that they could be attributable to the fifth to fourth centuries BCE and related to the ‘Safin’-, a term known from monumental inscriptions, almost exclusively on grave-markers. After the Roman conquest in the third century BCE, elites of the Iron Age period continued to hold authority in parts of Picenum, if only on a local scale; notably at Ascoli Piceno and the sanctuaries of Cupra scattered across the region. Myth is strongly bound up with both political and ritual contexts, so it is plausible that the Picene ver sacrum myth was reworked during the third to first centuries BCE to apply specifically to Ascoli Piceno, reaffirming its legitimacy as the political centre of the region, as a new cultural identity emerged, that of the Picentes socii. If it was reworked then, this would suggest that it was perpetuated by the Picentes socii of Ascoli, rather than the Picentes Romani who predominated in the central and northern areas (the Tenna to Esino river valleys).

Memories created, memories altered. The case of Kakucs-Turján household and pottery.
Robert Staniuk (Graduate School “Human Development in Landscapes” at Kiel University)
Spatial positioning of memories can be most effectively displayed by archaeological sites and their life-stages. By analysing their formation processes, recovering artefacts and reconstructing particular development stages it becomes possible to access, or at least project, their significance as places of memory. The arrangement of material culture, persistence of activity areas and their alterations might serve as a medium to study the embodiment of memories and, consequently, allow identifying changes and modifications of habits. However, it is tempting to recognise space as a mere container. Such an approach removes an essential aspect of memory-construction, since undermines its emotional significance and its impact on human experience. Space becomes less an effecting factor or even actor, in favour being merely a setting for the events taking place. The excavated household in Kakucs-Turján [Central Hungary] provides a case where it is possible to observe constant habitation
since the final stage of the Early Bronze Age until the end of the Middle Bronze Age, represented by the so-called Koszider phase. In this particular case the constancy of habitation is exemplified by the steady development of pottery styles ranging from the late Nagyrév to Vatya III. However, this persistency of settlement occupation is contrasted by the alteration of space itself. Inhabitants were effectively modifying space, with the abandonment not representing a final stage of space management but simply an interval, one which provided new opportunities and shaped new memories. The purpose of the presentation is to display the dynamics of memories related to space. It is argued that such an approach allows picturing space in a dynamic fashion and by relating it to human experience, demonstrating that non-memorial sites remain vital places of memory.

Memory space and visual coining. Aeneas and Romulus in the gallery of the summi viri on the Forum Augustum in Rome
Matthias Bensch (Universität Freiburg, SFB 948)
The Forum Augustum in Rome (cf. Zanker o.J.; Spannagel 1999) is certainly the central monument of Roman cultural memory at the beginning of the principate. U. Walter provocatively related it to the end of »Geschichtskultur, soweit es die nunmehr vergangene Republik betraf. [...] [K]ohärente und komplexe Deutungen lagen [u.a. durch es] vor.« [Walter 2004, 426]. Of great importance concerning memory are the statues of members of the Iulian gens, family of the benefactor and caesar Augustus, on the one side and the summi viri of other families on the other side. The authority of the benefactor and the sacred context of these galleries (in the templum of Mars Ultor) made this a most relevant memory space and visual coining. Aeneas and Romulus in the gallery of the summi viri on the Forum Augustum in Rome. The purpose of the presentation is to display the dynamics of memories related to space. It is argued that such an approach allows picturing space in a dynamic fashion and by relating it to human experience, demonstrating that non-memorial sites remain vital places of memory.

The multiple pasts of Archaic Greece: the landscapes of Crete and the Argolid 900-500 BCE
James Whitley (Cardiff University)
The landscapes of almost all European societies we know of were shaped by ‘memories’ (that is ideas about the past) to some extent. Of all ancient European peoples who had imagined pasts it is the past (or pasts) of the Greeks we know most about (partly because we know so much about Greek myth). This paper looks in detail at the evolution of two well-known Greek landscapes in two very different regions. The Argolid (containing the ancient sites of Argos, Mycenae and Tiryns) is rich in ‘memories’ known from literary sources that were probably transmitted orally. The Argolid is also rich in various archaeological phenomena (offerings in earlier Mycenaean tombs, the ‘referencing’ of Cyclopean masonry in major constructions around 700 BC) that seem to reference a ‘past’ quite different from our literary picture. Archaic Crete presents a complete contrast. Here we know from literary sources that in the East of the island a past (the realm of Minos) was used to buttress a notion of ethnic distinctiveness. This Cretan past is less well known (in a purely literary sense) than that of the Argolid, and does not
appear to have manifested itself quite so concretely in material terms. Only in the phenomenon of ‘ruin cults’ do we see anything comparable to the Argolid. The hypothesis put forward is that there is no single ‘Greek past. Greek pasts were always multiple, contested and subject to major regional variations. This is likely to have been true of other times and places in the European past.

Living ancestors, living landscape, living memory. Late Neolithic and Bronze Age barrow cemeteries in East-Central Europe

Przemysław Makarowicz (Adam Mickiewicz University in Poznan)

In the 3rd and the first half of the 2nd millennium BC, the borderland between the forest-steppe and the forest zone of east-central Europe was settled by communities burying their dead in barrow necropolises. For 1,500 years, this type of funerary architecture had a share in the way the funerary landscape of successive cultural groups looked. They included the groups of the Corded Ware culture followed by the Trzciniec circle that left behind peculiar mortuary or barrow landscapes. In this incredibly long process of space structuring, an important role was played by Middle Bronze Komarov culture communities, forming the southern branch of the Trzciniec circle. Several hundred years after ‘Corded’ barrow builders, in a relatively short time, they incorporated the already existing necropolises of their predecessors and restructured the cultural landscape they had found upon their arrival by building new barrows and using old ones for new burials. As a result, stable and long-lasting funerary-sacred spaces were created, peculiar long durée landscape units, having a palimpsest nature, multi-faceted symbolism and many functions. The necropolises were similarly arranged across the area in question: barrows formed linear or group-linear patterns, stretching sometimes for several, over ten or even tens of kilometres. This article proposes an interpretation, taking a genealogic approach and employing the concept of collective memory in studying the inter-generational transmission of barrow-necropolis restructuring/transforming patterns. A key role in this approach is played by the concept of memory landscape or a space where a physical dimension meets the transcendent.

Restoring a memory – the case of Kowary barrow (Lesser Poland, Poland)

Anne Gawlik (presenting author), Marcin Czarnowicz (both Jagiellonian University)

In a hilly area to the north-east of Kraków, a prominent barrow about 25 metres in diameter and 4 m high rises to the sky near the village of Kowary. This is by no means an exceptional element in the cultural landscape of the region, as barrows of various age can be found in other localities as well. But the one from Kowary is the best preserved structure of that kind in Lesser Poland, a fact which probably inspired early 20th-century archaeologists to open the first survey trenches in the central part of the mound in 1905. No prehistoric burials were found at that time, and numerous human skeletons discovered in the mound were interpreted as a collective burial of an early medieval date. This chronology had later to be changed after the analysis of pottery from this first excavation, and today the monument is referred to in archaeological literature as an Early Bronze Age barrow. But even more interesting than the chronology of the barrow is the history of its later, secondary use in the modern period, and to some extent even today. As evidenced by pottery finds, the barrow was built around 1800-1600 BC by a community known to archaeologists as the Trzciniec culture as a collective burial and - possibly - place of cult. Geomagnetic surveys suggest that the mound must have originally been much bigger and probably reached a diameter of 35 m. After the digs of 1905 the site was forgotten and remained so throughout the 20th century. In the beginnings of the 21st century, in connection with the action of restoring WWI cemeteries and burials, information emerged that the Kowary barrow might hold the remains of soldiers allegedly moved there from a number of WWI battlefields. This was one of the reasons why archaeological works were resumed on the site in 2013. Indeed, like our early 20th-century predecessors, we found numerous human remains, but the anthropological examination left little doubt that they belonged primarily to women, little children, and elderly people. It turned out that the barrow was indeed used again as a place of collective burial, but those interred there were not soldiers but the victims of a plague, probably cholera, from the 16th-18th century. Clashes between the Austrian and Russian troops were reported in the area in 1914, but they took place to the south of Kowary village and thus where war cemeteries are situated, while the barrow and its vicinity was not directly affected by the fighting. As we can see, twice in its history the barrow was used as a place of burial and twice the fact got later forgotten. If this comes as little surprise with respect to the original burial, then the complete lack of information about the second epi-
sode is striking. Burial grounds of cholera victims are well attested in historical accounts, sometimes even place names suggest their original function, and some were marked with crosses. But no such evidence survived in the case of the Kowary barrow. The episode connected with WWI deserves particular attention, as it perfectly illustrates how imprecise and distorted can be the information passed between the generations. Except for accounts embedded in religion or myth, whose form and message is protected by ritual warrants, orally transmitted information is vulnerable to change, distortion, and finally oblivion. In this context, archaeology is the only tool capable of restoring this lost memory of a cultural landscape and bringing it back to society. Hopefully, this time for good.

Creation of memory? Tumulus from Lerna in context of EH III – LH I Argolis
Katarzyna Dudlik (Adam Mickiewicz University in Poznan)

Lerna was one of the biggest settlements during Early and Middle phase of Bronze Age in Southeast Peloponnese. The feature, which distinguishes the site from the others of that region, was a monumental building in type of a corridor house dated to EH II. "House of the Tiles" was most probably the center of live of the local community, with the administrative and representative function. The building collapsed after a fire in EH II late. Above the remains a tumulus was built. Around 500 years later, two shaft graves were dag into it – they outstood from typical mortuary behaviors in Argolis. Based on construction type and set of offerings, it might be speculated that the people buried there belonged to the upper class of society. Latest ceramic material from shafts is dated to LH IIIA2 period, when the graves were purposely emptied (from the offerings and bones). Tumuli were one of the main interferences into the natural landscapes during Bronze Age in Greece. The basic interpretation of ground mounds is to visibly mark the graves and to commemorate the ancestors, who were buried in tombs below tumuli. The other concept is to understand tumuli as a connection between present and past and as a creation of a sphere between living and death worlds. The ground mound from Lerna had every feature, which are typical for the grave tumuli. Although, it was built first above the remains of public building (it marked the presence of the architectural feature from the past, not a person) and then two extraordinary graves were dug inside. From the other sites in Argolis, tumuli are known only from the grave’s contexts (Asine, Argos, Mycenae). The aim of this paper is to place the phenomenon of tumulus from Lerna in context of memory creation process in Argolis during the period before well-developed Mycenaean culture. In the first part, the changes which took place in the center of settlement will be presented in details. The second part will take on interpretation about creation of memory through the visible interference into the local landscape, which is typical to the pre-Mycenaean society. It will be important to place Lerna in context of the grave’s tumuli from the other sites in Argolis, which are characterized by the long term use and they were probably reserved for the local elites. To clearly understand the situation from Lerna, it need to be compared to the concept of creation of the memory about the past and ancestors in pre-Mycenaean society through the visible mortuary rituals and though the emphasizing of the power, status etc. It can also be noted that the concept of visibility progressed even further in mortuary behaviors of upper classes of Mycenaean society, who manifested the presence of ancestors through tholoi, which were the predominant type of tomb. The proposed conclusion of the analyzed process will be to connect the changes from Lerna with two terms – transmission and transformation. In the first one, the continuation of the idea needs to be emphasized. Local society created the memorial of the passed power and then decided to re-establish that place in relation to the burial sphere, again connected to the local elites and power. That idea need to be attached with the concept of memory known from the usual mortuary practices, which was transformed by the local society to their own needs.

Tomorrow’s Ancestors
Jennifer Uzzell (Durham University)

The ancient landscape of Britain is littered with monuments to the dead. Structures such as Stone Henge may well be connected with mortuary ritual but more obviously the landscape is punctuated with thousands of ‘barrows’ containing the remains of the dead from the Neolithic period. These barrows were once very prominent features of the landscape and many are still visible. They have been engaging with the popular imagination for many hundreds of years and although pre-dating the Druids by many centuries, they played a major role in the ‘Druid Revival of the late Eighteenth and Early Nineteenth Centuries. In 2011, the first such structure to have been built in Britain for over 2,000 years was opened in Wiltshire, at a site called ‘All Cannings’. In many ways it was similar to its ancient predecessors. It is built to resemble a Neolithic long barrow, aligned to the mid-
winter sun. It was constructed from local stone with a corbelled roof and using traditional building techniques. However, its purpose seems very different to its ancient antecedents. Like them, it is a place of the dead, but redesigned as a repository for urns containing human cremated remains. All Cannings has proved so popular with people of very diverse backgrounds that over 95% of the available space has been reserved, and a second barrow has recently been opened at Willow Row near Cambridge, with a newly formed company specializing in designing such monuments currently seeking planning permission for a number of new sites. This paper will explore the reasons why people are drawn to the idea of the barrows. What sort of person wishes their remains to lie here and why? What does it say about ideas of continuing bonds, dividuality and networks of social relationships that embrace both the living and the dead? In this paper I will seek to will explore the impact of this innovation in funerary custom both now and over the coming generations.

Somatography and nostalgic landscapes

Stefan Schmidt (Universität Wuppertal)

The purpose of my paper is to examine nostalgia as a form of “involuntary memory.” Unlike voluntary memory, which refers to the intentional effort to remember, involuntary memory is like a force that comes over us, that affects us. And this is especially the case with nostalgia. I intend to reactivate the original meaning of nostalgia to deepen our understanding of memory in general and of memory of place in particular. In nostalgia we can find a revision of the past, but the revised version is not primarily about the production of a new representation of memory. Rather, it is a case of re-experiencing the same past through returning to it, particularly in an embodied manner. Nostalgia in its original Greek meaning is a particular mode of “memory of place.” Places we inhabit or pass through leave an impact on us, for we are bodily subjects and, as such, we have a relationship with the places that surround us. At any time we are situated, located in a place. Thus, being under the influence of place over time defines and structures our sense of self. Usually we don’t notice this but once we are displaced, it becomes apparent as seen in cases of homesickness. But unlike in homesickness, places we are nostalgic for are lost in time, we can no longer return to them. When it comes to memory of place, landscapes play an important role. Edward Casey coined the term “somatography” which describes the inscribing of geography into the body. The human subject is a “geographical subject,” because it is always oriented and situated in a place— and landscapes are always part of a place whether they are traditional ones with mountains and meadows, or in a less usual sense like urban landscapes. This also has an impact on our identity. As Casey points out, for a geographical subject the self is fundamentally entwined with place. In my paper I want to analyse the aspects of nostalgia as a form of lived body memory and show how the spatiotemporality of the present is “haunted” by the superimposed appearance of past places with their landscapes, in particular. Nostalgia is a movement of seeping returns. We find ourselves overwhelmed by the desire to be in a place that is imprinted in our bodies. An essential part of the structure of nostalgia is the distinctive fixation, qualitatively positive or negative, of an image that binds the self to a place and time. The past transpires in the present. Thus, nostalgia shows how we experience time through our lived bodies.

The Spoils of Eternity

Christina Videbech (University of Bergen)

During Late Antiquity, the Basilica of St. Peter became increasingly important, taking over functions previously reserved for other public places, sometimes even rivaling the old fora. On several occasions did the church become a part of the adventus and the triumphal representation of the imperial family. Furthermore, imperial decrees were announced here and the aristocracy increasingly used the church for self-representation. This paper is a study of the basilica, focusing on the transition of functions and political ideologies from the fora to the church and the basilica as a place of collective memory. It will explain this transition of functions through the debated use of spolia and discuss the arguments for and against such an interpretation. Was spolia used as a reference to the past and a tool for manipulating the collective memory of Roman Aeterna, hereby legitimizing Christianity? Was the past used as a stabilizing factor in an Empire, which was in constant flux and did the basilica thus serve as a spatial framework, giving memories the illusion of stability? How did the memory stored in the basilica evolve over time? Did several kinds of memories coexist? In regards to such questions, the basilica is a valuable case study, not only for the study of Late Antique Rome, but also contributing to the discussion of the decline and fall of what we call “Roman culture”.

Art and Practices of Memory, Space and Landscape in the Roman World
Anne Gangloff [University of Rennes]

In this keynote, I would like to present a framework for the study of possible connections existing between memory and landscape in the ancient Roman world, while also referring to the various concepts and modern approaches pertaining to the subject. The organisers of this workshop have related to the scientific work conducted by the historian Pierre Nora on "the realms of memory" (lieux de mémoire). Among the "realms of memory" mentioned by him, places can indeed be considered and are particularly appropriate to Antiquity, because Romans were well aware of the spatial dimension of memory. Landscape may thus indeed be considered as a legitimate frame for remembrance or memory. The notion of "realms of memory" may not be entirely applicable to the ancient world: the notion could be accused of being too static, since it is related to the notion of patrimony, whereas memory and landscape are still changing and evolving over time. Thomas Späth has recently suggested substituting the idea of "acts of memory" for that of "realms of memory", so as to shed light on the natural human tendency for organisation – both materially and conceptually – in regard to landscapes. Did the Ancients organise their landscapes to commemorate events, or to save memories? Were monumenta important in the Roman perception of landscape? Can we speak about Roman « memory policies »? Did these policies exist thanks to inscribing or incorporating practices which impact on landscape?

Meyer’s assertions with philosopher Arthur Danto’s idea of finding beauty in unusual places, to look anew at the urban landscape, can beauty be found in urban agriculture?

The type of beauty Meyer refers to is that of experience. Authors that she cites help understand this definition. Wendy Steiner explains that "Beauty is an unstable property because it is not a property at all. It is the name of a particular interaction between two beings, a 'self' and an 'Other': 'I find an Other beautiful'. This act of discovery has profound implications."2 There is a decentering that occurs with experiencing beauty: one is taken from an egocentric to a bio-centric perspective.

This paper presents a three part examination. Part one presents the question "Can beauty be found in urban agriculture?" by explaining how it was motivated by the literature review of Meyer and other authors on beauty, a research in definitions of beauty and a literature review in urban agriculture. Part two explains the methodology for this study, including the use of film as an important means of investigation, revealing aspects of landscape including narrations, movement, time, action, and storytelling, that contribute to an experience of beauty. Included in part two are investigations of a site and case studies through film. Part three revisits the site, explaining what was learned.

The selected site for the investigation is the farmers market in downtown Blacksburg, VA. Farmers markets and other urban everyday spaces that involved urban agriculture had been subjects of interest in my research. The farmers market is an ideal setting, as it gathers many elements together: various types of local produce, local arts and crafts, local food, music and performance presentations, people, their families, pets and kids, various possible interactions by being at the market. These elements are gathered because of the relationship of the rural supporting the urban, and the urban supporting the rural. However, that landscape supports more than the rural-urban relationship: it is a community space, a place for exchange and encounters, for connections with animals and people, it has aspects of a park, and it also supports local artists.

Film became a central tool for this investigation to capture and document inherent aspects of that landscape, interactions between people and those aspects, how the space performs and to reveal beauty. Beauty in the landscape involves action, narratives, attitude, feelings, images, sensory experiences, movement and time. At the farmer’s market, all these combine in complex ways to constitute an experience of beauty.

Beauty in everyday landscapes: film as a method of investigation of sensual perception, human action, movement and landscape performance in cities [Poster]

Aline R S Souza (Virginia Polytechnic Institute and State University)

The challenge that beauty is a superficial concern in landscape design has been examined by Elizabeth Meyer in her manifesto "Sustaining beauty. The performance of appearance": It aims to persuade people about the idea that beauty is important in sustainable design. For Meyer, beauty is a secret mechanism which alters consciousness, that involves a social and cultural awareness. The main implication of this is a transformation: "A beautiful landscape works on our psyche, affording the chance to ponder on a world outside ourselves. Through this experience, we are decentered, restored, renewed and reconnected to the biophysical world. The haptic, somatic experience of beauty can inculcate environmental values.”1 Combining
Interpreting memory: a landscape of stories [poster]

Erin Kavanagh, Independent researcher (Wales)

"There is no denying that tales were associated with phenomena or events... but it is naïve to assume that any tale would arise directly from facts” at the most they may make a “secondary, partial reference to something of collective importance.” (Burkert, 1979)

The notion that tales arise out of phenomena or events is inherent within normative explorations into geographic myths, wherein if tangible data can be presented to fit the story then it is concluded that said story is therefore a cultural memory. Sometimes, these claims can suggest a memory breadth of many thousands of years (Nunn, 2014; Rappenglück et al, 2015). When this professional interpretation of a geomyth is broadcast into the wider community, it can change the way people view the land and seascapes within which they reside. It can also distort how the story is remembered in the future. In this paper, I argue that such authoritative claims need to be wielded with care. I posit an alternative approach, suggesting that interdisciplinary study into the relationship between narratives of land, sea and memory is required to counter this contested space between knowledge - and belief.


Stream of Consciousness - Early Bronze Age depositions in the Rhenish river landscape [poster]

Sabrina N. Autenrieth (Faculty of Archaeology, Leiden)

When we discuss memory and landscapes, we also think about monuments. And when we think about (prehistoric) monuments, examples like the Moai on the Easter Islands, the Ring of Brodgar or the Carnac Stones come to mind. But what about river landscapes? Can rivers and the landscape surrounding them also act as monuments? A landmark, used by individuals or groups to remember, but also to create new memories. The main upcoming concerns are: What kind of events and practices can we associate with this commemorative river landscape and how can we approach a topography of elapsed memories? During the Bronze Age, different kinds of objects were deposited in various locations with the highest depositional density from the Atlantic Coast to the Black Sea and from Southern Sweden to the Mediterranean. This tradition was practiced by specific rules that defined what objects were appropriate to deposit and how to deposit them. Depending on time and space, we seem to be able to distinguish recurring patterns: preferred forms and defined combinations. In the Early Bronze Age of Scandinavia for example, magnificent objects such as swords were mainly deposited individually in bogs, while in the Western part of Central Europe, various objects were plunged in groups into rivers such as the Rhine. The Rhenish river landscape is one of the best known examples of the excessive use of depositional practices of objects in rivers. In this region (South-West Germany, South-East France, Luxembourg and South-East Belgium), the opportunity is given, to compare a variety of depositional practices in wet and in dry contexts, that have so far never been studied together. Identifying a potential correspondence between the rise and fall of watery depositions and dry-land depositions, the inner structure of depositions, as well as revealing a supposable shared ideology of this practice within an supraregional scale, will not only readjust the previous one-sided focus on river finds, but also reveal whether objects deposited in arid lands represent a practice steered by memories, ideas and motivations contrasting to those of river depositions.
Abstracts Session 4

Lost in the lowlands – complementing the early late glacial puzzle

Life in challenging times – Late Glacial living in the Northern lowlands
Morten Fischer-Mortensen [National Museum of Denmark]

Northern Germany and Denmark marked the known limit of humans in the northern lowlands during the Late Glacial warm period. These earliest migrating people belonged to the Hamburg’s Havelte phase and the archaeological evidence shows a spread in both an easterly and a westerly direction which are thought to reflect the summer and winter migration routes of reindeer. Our knowledge of the environment met by these cultures has been restricted by the availability of only a limited number of vegetational reconstructions. Detailed vegetational histories representing two late Palaeolithic sites (Slotseng and Hasselø) in southern Denmark are presented here and shed light on the environment which met these early hunters. The Slotseng studies also include a climatic reconstruction based on insects and knowledge of hunting seasons based on discarded reindeer antlers.

Diet and environment tracking of large herbivores in northwest Europe at the onset of the Late-glacial
Dorothée Drucker [Universität Tübingen, presenting author], Florent Rivals [ICREA, Barcelona; Institut Català de Paleoeologia Humana i Evolució Social (IPHES), Tarragona; Universitat Rovira i Virgili (URV), Tarragona], Mara-Julia Weber [Centre for Baltic and Scandinavian Archaeology/UMR 7041 Ethnologie préhistorique]

The Late-glacial, characterized by rapid oscillations between warm and cold episodes, is a key period between the cold Pleniglacial and the definitive global warming of the early Holocene. For a large part of northwest Europe, it corresponds to an expansion and intensification of human settlement, which is reflected by a large number of archaeological sites delivering faunal remains. Among them, reindeer (Rangifer tarandus) persists during part of the Late-glacial interstadial (GI-1e) before its range shifts to northern Europe. Other deer species, such as red deer (Cervus elaphus) and roe deer (Capreolus capreolus) in the southern regions, seem to be favoured by the GI-1e warming climate and subsequent forest development. The stable carbon and nitrogen isotopes of bone collagen provide interesting insights into the diet and environment of large herbivores at the onset of the Late-glacial. The comparison of the collagen isotopic signature (13C, 15N) of reindeer, red deer, roe deer and horse (Equus sp.) over different regions extending from southwest France to north Germany shows interesting similarities in the geographical gradient by species, but also contrast among the different species for a given region. We will consider how the amounts in 15N of the ungulates can reflect the degree of soil activity and thus the ecosystem productivity, which is inherited from the Last Glacial Maximum conditions [1,2]. The abundances in 13C of bone collagen are linked to dietary specialisation, with the striking example of the 13C-enriched lichen contribution to the reindeer [e.g. [1]]. Degree of habitat closure and amount of precipitation are environmental factors that can also be of influence. Such factors will be examined considering the isotopic signature of the different ungulate species according to their geographical location. Comparison among species will be conducted to decipher possible change in ecological niche partitioning over time. Tooth wear analyses permit to infer the dietary traits and environmental context at the time of death. From the study of extant populations of reindeer, it was established that the increase in lichen consumption is reflected by microwear patterns with high numbers of pits and low scratch/pit ratios and by low mesowear values (less abrasive food). Focusing on reindeer, we will estimate their dependence on lichen between the Late-glacial interstadial and the cold episode of the Younger Dryas (GS-1) based on the 13C abundances in bone collagen [3] and the tooth mesowear and microwear patterns [4]. A general picture of the geographical and temporal pattern of the environment reflected by large herbivores will be tentatively drawn from the presented data. Acknowledgments: The analyses of the animal remains from north Germany were funded by Stiftung Schleswig-Holsteinische Landesmuseen Schloss Gottorf with the support of Berit Eriksen and Ingrid Ulbricht. This work is part of a joined collaboration with the PCR ‘Paléolithique final et Mésolithique dans le Bassin Parisien et ses marges’ and supported by Boris Valentin and Françoise Audouze. [1]
The Late and Final Palaeolithic occupation of the British Isles: An environmental perspective

Rhiannon Stevens (presenting author), Hazel Reade, Sophy Charlton, Sonja Grimm, Jennifer Tripp, Marc Vander Linden, Ian Barnes, Thomas Higham (University College London)

The precise relationship between the Creswellian, Magdalenian and Hamburgian Palaeolithic technologies is highly debated. Here we aim to further understanding of the Late and Final Palaeolithic occupation of the British Isles. We provide an overview of the spatial distribution of known Late and Final Palaeolithic find locations in the British Isles and consider the radiocarbon record of human presence in the region after the last glacial maximum. Through stable isotope analysis reindeer, horse, red deer and bovid bones and teeth recovered from archaeological sites, we aim to reconstruct the climate and environment in which Late and Final Palaeolithic populations lived. Here we present preliminary isotope results from sites such as King Arthur’s Cave, Gough’s Cave, Kent’s Cavern and Mother Grundy’s Parlour.

The Channel River: a view from its northern banks at the onset of the Late Glacial

William Mills (University of Oxford)

Following the last Glacial Maximum the first signs of human occupation north of the Channel River occur around a major climatic shift at the onset of the Late Glacial. These changes coincide with other palaeoenvironmental and human patterns can be integrated. The Channel River network could even be explored as a physical ‘map’, periodically linking and dividing peripheral regions which have significant signatures of final Magdalenian occupation. Using riverscapes could facilitate mobile groups and possibly archaeologists – to ‘find their way’ through the Western Lowlands.

A special relationship – the Hamburgian and the atypical Magdalenian in the Paris Basin

Mara-Julia Weber (Centre for Baltic and Scandinavian Archaeology/UMR 7041 Ethnologie préhistorique), Ludovic Mevel (CNRS/UMR 7041 Ethnologie préhistorique), Boris Valentin (Université Paris 1 Panthéon-Sorbonne/UMR 7041 Ethnologie préhistorique)

The relationship between the Hamburgian and the Upper or Final Magdalenian has various aspects. Since the discovery of the Marsangy (Yonne) and Cepoy (Loiret) sites in the 1970s, Magdalenian sites in the Paris Basin which are reminiscent of the Hamburgian from a lithic typological point of view have been interpreted as the origin of the Hamburgian, as influenced by the Hamburgian through contacts or as the result of a reflux of Magdalenian groups who had previously moved to the North European Plain. Supplemented in the 1990s by further sites, this group has been distinguished within the regional Magdalenian based on typotechnological characteristics and got designated as the so-called Cepoy-Marsangy facies. In particular due to its technological peculiarities, it has been assigned a chronological signification in the Azilianisation process, constituting a step between the Upper Magdalenian and the Early Azilian. Recently, the interpretation as a Magdalenian facies has been challenged, while its resemblance to the Hamburgian has been underlined on technological grounds. In this presentation, we will summarize the state of research on the Cepoy-Marsangy facies approaching it from two opposite angles: firstly, how does it differ from the Upper Magdalenian in the Paris Basin and what possible explanations for these differences do exist? Secondly, what similarities and differences in relation to the Hamburgian does it present and how could its relationship to this northern group be characterized? Proceeded by an evaluation of the relative chronology of the three entities in focus, we will address these questions by comparing the techno-economic behaviour manifested in the lithic industries, the subsistence economy and the artistic expressions of the Upper Magdalenian in the Paris Basin, the Cepoy-Marsangy facies and the Hamburgian. 

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gian. Finally, we will use this synopsis to identify further fields worth studying in a comparative manner in order to improve our answers to the raised questions.

A question of scale and angle – On the relation between the Hamburgian and the Magdalenian in Central Europe

Andreas Maier (Friedrich-Alexander-Universität Erlangen-Nürnberg)

Similarities and differences between the Hamburgian and the Magdalenian are a long-standing topic of a still ongoing debate that centers on the question of the relation between these two Paleolithic entities. Answers to this question range from the notion of two separated industries on the one hand to the reading that the Hamburgian represents a seasonal facies of the Magdalenian on the other. Arguments in the discussion are derived from various aspects, such as land-use and settlement patterns, hunting strategies, as well as technology and typology of lithic and organic tools. In this paper, I will focus on the latter aspect – the typological composition of lithic Magdalenian and Hamburgian assemblages – to discuss the problem of scale in comparative analyses of Paleolithic entities. On the scale of single site comparisons, typological analysis can lead to the conclusion that Magdalenian and Hamburgian sites are either very similar or very different, depending on the sample at hand. This is not terribly surprising. However, this observation also holds true when site-clusters from entire regions are compared. Depending on which region is selected for comparison, for instance the Magdalenian sites in the Rhine-Meuse area or in Eastern Germany, the outcome of the analysis might either reveal stronger similarities (Eastern Germany) or stronger dissimilarities (Rhine-Meuse area) with the Hamburgian, particularly when viewed from the angle of simple distribution maps. However, when a large-scale perspective is adopted and the typological composition of Magdalenian and Hamburgian lithic assemblages is seen from the angle of multivariate statistics (more precisely from the angle of a Linear Discriminant Function Analysis), the results speak in favor of a clear segregation between the two entities. Eventually, when the relation between the Hamburgian and the Magdalenian is discussed, scale and angle seem to play an important role.

...down out of the hills. Ideas on the Lowland Diaspora seen from the Neuwied Basin

Martin Street (MONREPOS Archaeological Research Centre and Museum for Human Behavioural Evolution)

No abstract available.

Osseous industries in the East of France between 13500 calBC - 11800 calBC: which characters to remember?

Romain Malgarini (UMR 7041 Ethnologie préhistorique)

The eastern part of France, especially the Jura and the northern Alps, is very remote from the Hamburg territories and the great plains of northern Europe (classical Hamburgian and the Havelte group). In terms of geography and topography, these entities are highly dissimilar. Apart from some Swiss open-air deposits (Monruz and Champréveyres), sites inventoried in the Jura and the northern Alps are only located in caves or under rock-shelters. Even if there is no connection between the Hamburgian and the Magdalenian of our study area, let us not forget that these two zones are connected by a major axis: the Rhine. Very often, links between northern territories focusing on the Rhine, or more southerly regions located in the Rhone valley have attracted attention with the circulation of specific raw materials (shells, amber, lignite), including on the Jura. Based on the chronological data of the Hamburgian, we will attempt to draw a parallel with the bone industries of the upper and final stages of the Magdalenian and with the ancient Azilian. During the upper and final Magdalenian, we can observe a true material homogeneity realized mainly in reindeer antler (and a great variability of the points) and in bone. However, for the following period, the changes are notable, due to climatic changes and changes in wildlife initiated during the Bølling. The bone equipment will be profoundly altered mainly due to the disappearance of the reindeer. In fact, for the period between 13500 calBC and 11800 calBC, we will define the main characteristics of the osseous industries on the typological and technological level by attempting to make some comparisons with the Creswellian and Hamburgian osseous industries.

Absence makes the heart grow fonder or far from eye far from heart? – Dichoto-
mous tendencies in Hamburgian osseous industries
Markus Wild (Centre for Baltic and Scandinavian Archaeology/UMR 7041 Ethnologie préhistorique)
Osseous artefacts dating to the Early Lateglacial (GI-1e & GI-1d) are rare in northern Central Europe and southern Scandinavia. However, the few excavated sites with organic preservation on the Cimbrian Peninsula give the opportunity for a comparative study of worked osseous objects on intersite and interregional level. Here, I report the differences between the toolkit of these hunter-gatherers and that of their Magdalenian equivalents and highlight the similarities in their technological behaviour. The aim of this paper is the development of an explanation why these two pieces of the overall Early Lateglacial puzzle – osseous typology and technology – do not seem to match accurately. This hypothesis shall lead to an interpretation of the Hamburgian within the cultural context of the Early Lateglacial from a solely osseous techno-typological perspective. In the course of the other contributions within the session this picture will be relativised.

Projectiles for kids: New evidence of child and youth versions of Magdalenian osseous points from the Teufelsbrücke cave site (Thuringia, Germany)
Sebastian Pfeifer (Friedrich Schiller University Jena)
The Magdalenian Teufelsbrücke cave site (Thuringia, Germany) yielded a big inventory of osseous projectiles that was reexamined by the author. According to the metric data, the great majority of the points, having a mesial width of 7–10 mm, are comparatively delicate. That can be due to functional requirements or because the quality of the locally available raw material – in most cases reindeer antler – didn’t allow for making them bigger. Additionally, there is a group of points that are even smaller, actually too small to be used effectively for horse and reindeer hunting. Against the background of similar specimens in other Magdalenian inventories, these particularly tiny points are interpreted as child and youth weapons. The worldwide ethno-graphic record shows the ubiquity of small-scale infantile projectiles in hunter-gatherer societies: To become a good hunter, the use of projectile technology had to be trained from early childhood on and thus the weapons ‘grew up’ with their owners.

And now for something completely different... studying Lateglacial transitions and transformations
Sonja B. Grimm (Centre for Baltic and Scandinavian Archaeology)
Transitions and transformations are an integral part of archaeological studies. How and why do these appear? And why do they not appear at other times? The detailed analysis of how transitions and transformation develop is a matter of high-resolution chronologies, precise and comprehensive presentation of the transforming part of the archaeological record, and the examination of variations at different scales of analysis. Therefore, the study of change needs several steps that combined deliver a more holistic picture of social decision making processes in the past. As part of the DFG-funded SFB 1266 “Scales of Transformation: Human-environmental interaction in prehistoric and archaic societies”, the project “Pioneers of the North: Transitions and transformations in Northern Europe evidenced by high-resolution datasets [c. 15000 - 9500 BCE]” (B1) aims to understand the transitions and transformations of socio-environmental interactions of those humans that colonised new and unfamiliar landscapes in Northern Europe at the end of the Weichselian. Before this aim can be approached, some methodological questions have to be addressed such as what are transformations and transitions and how do we identify those in the occasionally very sparse archaeological record? What makes pioneers a particularly fruitful subject to be studied in this context and how can their settlement remains be identified? Moreover, the early part of the Weichselian Lateglacial additionally suffers from several problems relating to chronology. How can we approach a solid chronological frame? Based on Late Magdalenian to Federmesser-Gruppen material from northern France, southern Belgium, and western Germany, an attempt is made to study transformation and transitions in detail and offer possible explanations for the observed pattern. Finally, the meaning of those results for the study of change and change management at the end of the Weichselian in the North European Lowlands will finally be discussed.

The eastern Border of the Hamburgian Culture
Iwona Sobkowiak-Tabaka (Polish Academy of Sciences)
The early 1930s saw the discovery of the first Hamburgian sites in the area of present-day Poland: Liny...
Hamburgian in Poland: current state of research

Jacek Kabaciński [Polish Academy of Sciences]

Western part of Poland was relatively intensively settled by Hamburgian populations. Several sites, including that lately recovered, point to existence of a developed network of diversified occupations. The paper characterizes various aspects of Hamburgian in Poland, including its spatial distribution, subsistence, functional aspects and chronology. Gaps and possible pitfalls concerning previous interpretations are discussed as well.

Lithic technology of Hamburgian societies – the western Poland perspective

Jakub Mugaj [Polish Academy of Science]

The paper presents new research on lithic technology of Hamburgian societies. The basic goal of research is to characterize a Hamburgian lithic technological system based on lithic refittings from Liny site 1, Krągola site 25 and Mirkowice site 33 - en-campments of Hamburgian Culture localized in Greater Poland area. The characteristic of lithic technological system contains: reconstruction of general operational chain through reconstruction of individual nodule operational chains, reconstruction of original volume and shape of nodules, description of tools production method, identification of technique, description of production mode on each phase of processing: preparation phase, early stage of treatment, semiproduc production, advanced exploitation phase. Therefore, goals contains whole spectrum of technological behaviors of Hamburgian societies western Poland area. The thesis of convergence between Hamburgian and Magdalenian lithic technologies and the resulting origin relationship (confirmed for Northern Germany lithic inventories) will be also recognized.

Time after time. Investigating a Magdalenian group’s inner variability through three successive occupations at Etiolles.

Elisa Caron-Laviolette [Université Paris 1 Panthéon-Sorbonne / UMR 7041 Ethnologie préhistorique]

Since the 1960s and the introduction of ‘palethnological’ methods and ambitions, by André Leroi-Gourhan, spatially oriented techno-economical studies of a few key open-air sites in the Paris basin, such as Pincevent, Marsangy, Verberie, and Etiolles, have been essential to our comprehension of late Upper Palaeolithic behavioural patterns. These few sites, along with other open-air sites in Western Europe such as Marolles, Champréveyres-Monruz, Gönnersdorf or Andernach, have since served as major points of reference for the Magdaleni-Hamburgian-Creswellian complex. While these well-preserved occupations have usually been the object of detailed studies that are largely synchronic in focus, a more chronological approach has dominated research on Early Lateglacial societies for the past 20 years. These ‘paleohistorical’ investigations aim at evaluating diachronic change within the Lateglacial, mostly by way of inter-site lithic comparisons, and the support of radiocarbon dates when possible. We believe it is now time to bridge these two approaches, in part by returning to the study of open-air sites, some of whose important stratigraphies could be revisited to complement absolute dating, which is not accurate enough to understand the sequencing of fine-grained changes in the late Magdalenian. Here we present an ongoing attempt to meld palethnology and paleohistory, through the comparative analysis of three successive Magdalenian occupations at Etiolles. The D71 occupational
units have indeed an exceptional configuration within the site. Stratigraphically close to one another, yet each belonging to a distinct archaeological level, they are organised around the same central fire structure. We believe them to be the result of three consecutive settlements by the same group of individuals within only a few years, and so far the combined study of the different types of artefacts preserved at D71, as well as regularities in spatial patterning, tends to confirm this hypothesis. Therefore, the comparative analysis of the D71 occupations constitutes a rare occasion to consider an intermediate span of time between the short-term events of a seasonal settlement and the long-term cultural evolution of late Magdalenian societies. More specifically, we intend to explore the different degrees of variability associated with each of these three time scales. If the D71 units are indeed the products of the same Magdalenian group, then we can consider that little cultural or environmental change has taken place within such a short sequence of time between the first and last occupations. Provided that a fine-grained palaeontological study of each D71 occupational unit, mostly through flint refitting and spatial analysis, allows us to distinguish between intra- and inter-occupation variability, then we can focus on what individualises each unit. Comparing the choices made by what we presume to be the same family group during each settlement will allow us to determine the degree of technical and economical stability, as well as understand the subtle changes that happen from one occupation to the next. This measure of variability within the same cultural tradition can then be used as a new reference to evaluate and hierarchise the differences between Magdalenian settlements on a larger scale, thus providing a new angle to discuss long-term cultural mutations in the Early Lateglacial of Northwestern Europe.

The Hamburgian Kerbnadel – a projectile component? Experimental approaches for testing the foreshaft hypothesis

Marquardt Lund (presenting author), Harm Paulsen, Sebastian Pfeifer (Friedrich Schiller University Jena, presenting author), Mara-Julia Weber (Centre for Baltic and Scandinavian Archaeology/ UMR 7041 Ethnologie préhistorique, presenting author), Markus Wild (Centre for Baltic and Scandinavian Archaeology/ UMR 7041 Ethnologie préhistorique, presenting author)

Foreshafts are a very common phenomenon in projectile technology: Placed between the wooden main shaft and the point itself, the foreshaft acts as an intermediate piece that balances the forces between the relatively soft main shaft and the hard point making the projectile both more effective and durable. Additionally, foreshafts render it possible to equalize the mass of different projectiles in a set, to quickly maintain or repair a projectile, and to employ a lithic point as cutting implement by serving as a handle. Because of these benefits, foreshafts of osseous materials, wood, or metal are widely distributed in the ethnological record as integral parts of arrows, harpoons, darts, or lances. Regarding the European Upper Paleolithic, foreshafts are connected to the Magdalenian, typically being rare but common finds in big inventories of osseous projectiles. Yet, from the contemporaneous northern entity, the Hamburgian, there are no foreshafts known so far. This study deals with Marquardt Lund’s (1993) suggestion that the osseous tool type Kerbnadel, terminally notched reindeer antler rods, could actually have served as foreshaft. To test that hypothesis, true replica of Kerbnadeln made of reindeer antler were equipped with Hamburgian lithic shouldered points and hurled on an organic target employing different mounting techniques and acceleration media. Combining data from the experiments with osseous and lithic technology, typology and macroscopic use-wear analysis shall help to elucidate the raised question. The preliminary results are presented here.

Paleolithic art, antler and harpoon heads from southern Scandinavia

Peter Vang Petersen (Nationalmuseet København, Denmark)

Late Glacial settlement sites with preserved organic remains are extremely rare in southern Scandinavia. On the other hand many stray finds of harpoon heads as well as other artefacts made from bone and antler. Direct AMS dating sheds light on the reindeer hunters’ activities from late Bølling to mid Preboreal. During the Allerød period elk hunting gained importance, and along with brown bears elks became important symbols of Ice Age art.

A geometric morphometric assessment of Late Palaeolithic ‘classic’ and ‘Havelte’-phase projectile points from northern Europe reveals individual flint-knapping and dispersal behaviours.

Jesper Borre Pedersen (presenting author), Felix Riede (both Aarhus University)
The pioneer colonization of northern-central Europe and southern Scandinavia is associated with the Hamburgian culture (~14,700-14,000 cal BP), which is traditionally divided into an earlier and more eastern ‘classic’ and a later and more north-western ‘Havelte’ phase. Curiously, these two phases differ only in their diagnostic projectile point forms, rather than in any other aspects of their lithic repertoire or their subsistence economy. A chronological as well as spatial overlap is also observed, making the basis for this division of phases somewhat problematic. A qualitative and 2D geometric morphometric analysis of classic and Havelte-phase projectile points from sites across the Hamburgian range is presented. The results of this analysis show that there is an overlap in the morphology and occurrence of classic and Havelte elements, indicating that the two cannot be strictly separated by site: Many ‘classic’ sites contain forms that fall squarely within the Havelte spectrum. Furthermore (and fully in line with previous research), the Havelte-phase material does represent a distinct cluster within the overall shape spectrum of Hamburgian projectile point forms and by extension, reflects a more restricted variability within the overall Hamburgian material. In the very northern Havelte-phase sites, virtually identical point variants can be identified, at different sites. These two variants are present in all southern Scandinavian assemblages. We tentatively interpret this as representing either ‘mini-traditions’ or even the craft signature of individual flintknappers closely related socially and temporally. If correct, this contraction of the Havelte time-span has significant implications for how the colonization of southern Scandinavia is understood. If it is possible to trace individual technological and ecological decision making within these Late Glacial hunter-gatherers, then we can also infer how prehistoric populations – in the sense of very small groups indeed - responded to changing climates. The Hamburgian presence in southern Scandinavia has always been seen as ephemeral, but we suggest that it may have been no more than a few northward excursions spread of a handful of seasons.

Typological variability in points during the Early Lateglacial: the Hamburgian as an example (poster)

Marcel Niekus (Stone foundation, presenting author), Dick Stapert, Lykke Johansen

It has since long been noted that there exists considerable variability in point typology between different Lateglacial traditions. This is not surprising and can largely be ‘understood’ in terms of time and space variables. More intriguing is the existence of such variation between sites attributed to one and the same tradition and even within individual sites. The Havelte phase of the Hamburgian tradition (the Late Hamburgian) may serve as an example. At Havelte sites not only tanged (or tapered) points occur (the type fossils of this tradition), but often backed points (or Federmesser) and other types such as Creswellian points as well. Further south, several Magdalenian sites contain Hamburgian-style points. In this contribution we will focus on several aspects of this observed variability by discussing the point assemblages of a number of Hamburgian sites in particularly the Netherlands. Many possible hypotheses that may explain the observed variation in point typology may be proposed, such as arrow exchange (as described for the San by Wiessner), inter-group migrations of males, different functions relating to seasonality or types of prey species, violent and non-violent contacts between groups (including war), the existence of prestige objects, recycling and resharpening, presence of children’s toys, changes in stylistic traditions with the passing of time, admixtures (palimpsests) - to name just a few. Is it possible to develop arguments for or against these and other hypotheses in specific cases, or should we accept that we cannot reach any definite conclusions concerning this question?
Abstracts Session 5

Thinking inside the vessel: Ceramic development in prehistory through the interpretation of vessel use and function

Milking the Residues: Molecular and Isotopic Signatures from Human Prehistory
Richard Evershed (University of Bristol)
The value of archaeological pottery has been substantially expanded in the last two decades or so with the realisation that unglazed porous ceramic fabric provides an exceptional repository of biomolecular and stable isotope information. The major chemical components absorbed and preserved are lipids, raising numerous possibilities for reconstructing past food acquisition and dietary habits, ritual practices and technological activities. At Old World sites degraded animal fats are by far the most common class of organic residue encountered. Intensive investigation of these residues are providing a range of critical new insights into the ways early farmers managed their stock and how prehistoric people were able to consume milk products despite being lactose intolerant.

A cooking pot or not a cooking pot? The interrelation of vessel shape, vessel body characteristics and vessel use, illustrated by pottery from Çatalhöyük West Mound
Ingmar Franz (Graduate School Human Development in Landscapes, Kiel University, presenting author), Franziska Faupel (Kiel University), Jessica Hendy (Max-Planck-Institut für Menschheitsgeschichte in Jena)
Archaeological pottery yields diversity of information, which can be used to answer specific research questions. This paper integrates three analytical approaches to pottery vessels from the West Mound of Çatalhöyük to evaluate the interrelation of vessel shape, vessel body characteristics and vessel use. First, techno-morphological characteristics are used for differentiating vessel shapes and assumed functions, second, organic residue analysis provides information on the use of specific vessels, and third, the chemical composition is used to differentiate samples based on provenance or technological aspects. The pottery spectrum of Çatalhöyük West Mound shows different vessel shapes associated with a specific use, which is based on their techno-morphological characteristics, like mass and weight, fabric, morphological features, surface treatment, use wear and burning traces. As a result of this archaeological reasoning three main groups could be distinguished: table wares, storage jars, and cooking pots. Surprisingly, some bowls from the spectrum of table ware and some storage jars show thick whitish crusts on their interior. These deposits were interpreted as limescale deposits, which accumulated during repeated water boiling or similar activities using calcareous water. Preliminary results of protein analyses show that these limescale deposits originate from cooking activities, and revealed evidence of grains, milk and peas. Fabric descriptions together with IR-Spectroscopy and pXRF analyses prove that the pottery and its unfired variants were made of the same material compositions of local sediments. A presumed clear distinction between fired pottery and unfired pottery, or between table ware and cooking pots, could not be supported by chemical composition analyses, suggesting very

Episodes from the life history of an ALBK vessel from Polgár (NE Hungary)
Alexandra Anders (presenting author), Emese Gyöngyvér Nagy (both Eötvös Loránd University)
In 2006–2007, part of a Middle Neolithic, Eastern Linear Pottery Culture (Alföld Linearbandkeramik/ALBK) settlement was uncovered in an area called Piócási-dűlő on the eastern outskirts of Polgár, NE Hungary. During this excavation, a special big vessel came to light from one of the settlement features. The vessel is decorated with different type of impressed designs and five human figures in relief, depicting four figures dancing around a standing female figure. This presentation will offer one possible reconstruction of the various episodes of the life history of this vessel from its birth, through its use, burial, recovery and restoration. While writing this story, we drew from pottery making techniques, use-wear analyses, the reconstruction of the decorating tools, and photogrammetric and 3D techniques. It is our belief that the processes of the vessel’s creation, its decoration and its fragmentation were most likely performed by a greater community as part of some kind of ritual activity.
similar raw materials and manufacture. By bringing all these different analytical results together it is indicated, that with multi-methodological approaches one can meet the requirements for a solid analysis of the complexity of pottery vessels as formerly active objects.

A biographical perspective: functions and meanings of pottery in the Late Bronze Age funerary ritual
Kristóf Fülöp (Eötvös Loránd University)
Funerary ritual serves many functions which affect the whole living community with its members besides the deceased himself. These psychological, social and transforming functions of the funerary process – beside the deceased persona – essentially determine the entire funeral accessory, among others, the vessels’ quantity and quality, as well as their use and meaning. However, to understand their complex and diverse functions and meanings in this peculiar context we have to extend our common analytical spectrum incorporating new aspects like the material compound, manufacturing technology and quality, and the use-alteration traces. Through such extensive analysis of pottery from a Late Bronze Age (Tumulus culture) cremation cemetery (Jobbágyi, Nógrád County, Hungary) it is possible to raise and examine a series of new questions, such as the use of new and second-hand grave goods, their secondary burning, their diverse manipulation and also the differences in their quality. At the same time, we also have the chance to throw new light upon former aspects and explanations regarding, among others, vessel’s positioning, the problem of fragmentation or the correlation of typology and function. Archaeology can only observe a short phase of the funerary ritual manifested in the burial. The micro-level biographical approach gives us the opportunity to dissolve this frozen depositional moment of the funerary process. Based on this deliberate momentum complemented by other equally detailed elements (e.g. the human remains, the infill, the grave construction, taphonomy) a reconstruction of the funerary ritual as a process various in space and time becomes possible.

The chaîne opératoire concept applied to Late Bronze/Early Iron Age salt-making pottery from western Małopolska (southern Poland)
Karol Dziegielewski (Jagiellonian University, presenting author), Michal Mazur
Such cases, where a bulk of pottery from an archaeological site – not to speak of groups of sites – is easy recognisable in terms of function, are rather unique. At first glance, this is the case of salt-making pottery. However, precise placing of particular vessel forms in salt production operational sequences is often hampered by insufficient recognition of the contexts. A sizeable body of new evidence from ‘producing’ and ‘using’ settlements from limited area near Cracow and Wieliczka, obtained thanks to large-scale rescue excavations and examined partially in frames of “Inheritance, social network or local adaptation? Bronze and Early Iron Age societies in western Małopolska” project, enabled us to shed some new light at virtually all stages of the local Late Bronze/Early Iron Age salt-making techniques and strategies. These stages include acquisition of clay, making various kinds of vessels and tools, evaporating brine, preparing the final product to transport, and eventually disposing of the temporary containers. Some of these stages were executed on, and some off the salt-making sites. We consider what it depended on. Given that rather whole chaînes opératoires connected with each stage of salt production, than particular technical details, were the matter of vertical (inherited) or horizontal (social) transmission, we will explore social and/or technological determinants behind the observed diachronic changes and differences between neighbouring contemporaneous sites.

Bayesian approach to the quantitative reconstruction of pre-historic pottery use from fatty acid carbon isotope signatures
Ricardo Fernandes (University of Cambridge, presenting author), Yvette Eley (University of York), Marek Brabec (Academy of Sciences of the Czech Republic) Alexandre Lucquin, Oliver E. Craig (both University of York)
Carbon isotope measurements of individual fatty acids (C16:0 and C18:0) recovered from archaeological pottery vessels are widely used in archaeology to investigate culinary and economic practices. Typically, such isotope measurements are matched with reference food sources for identification or simple linear models are used to investigate mixing. However, in cases where multiple food sources were processed in the same vessel, unequivocal solutions are not possible using this approach. To address this issue, we successfully tested the use of a Bayesian mixing model to determine the proportional contribution of different food sources to data generated by simulation and experimentally. The model was then employed to offer a better understanding of pottery
use during prehistory relying on isotopic data from pottery assemblages from the UK (Durrington Walls) and Germany (Neustadt). Bayesian estimates provided some interesting observations regarding the deliberate mixing and separation of foodstuffs. Overall, we show that the Bayesian approach to the reconstruction of pottery use offers a reliable probabilistic interpretation of source contributions and, as such, should become standard practice in organic residue analysis.

**Can pottery function be inferred from 14C ages?**

John Meadows [Centre for Baltic and Scandinavian Archaeology, Schloss Gottorf, presenting author], Ester Oras [University of Tartu], Henny Piezonka [Kiel University], Carl Heron [The British Museum], Oliver Craig, Alexandre Lucquin [both University of York]

The first pottery in Estonia, Narva Ware, was made by hunter-gatherer-fisher communities, and was used mainly or exclusively for cooking food – a pattern observed in many areas across the north European forest zone. Potsherds are often encrusted with carbonised food remains, which occasionally include visible plant macrofossils. Under the right preservation conditions, a high proportion of these food crusts, and of the potsherds themselves, retain significant quantities of lipids, which can be analysed to identify other ingredients, if these leave resistant and diagnostic biomolecules (‘biomarkers’). In Estonian Narva Ware, such lipids are generally dominated by biomarkers which occur mainly in fish and other aquatic species; this is particularly evident at the inland site of Kääpa [Oras et al. forthcoming], which supports the interpretation, based on stable isotope ratios in food crusts, that Narva pottery at Kääpa was used primarily to cook fish [Piezonka et al. 2016]. Radiocarbon (14C) ages of food crusts on Narva Ware from Kääpa also appear to be significantly too old, given dates of fully terrestrial material associated with the pottery, which suggests that much or all of the carbon in these food crusts was derived from aquatic species, and that there was a significant freshwater 14C reservoir effect (FRE) in the local river, the Vohandu. As part of INDUCE, a new 5-year programme of research into the function of early pottery in the northern forest zone, we have measured FREs in modern fish from the Vohandu, showing not only that the FRE of river water is very large, but that FREs and other isotope ratios vary between species. Consequently, if the date of a potsherd was constrained by other evidence, we could use 14C and other isotopes and biomarkers to infer how much fish, or even what type of fish, was cooked in that pot. This approach will be extended to other parts of the study region in the course of the INDUCE project.

**Foodways among Southeast Europe’s first farmers: interrogating mobility and sedentary subsistence strategies through residue analysis**

Jonathan Ethier [Universität Heidelberg]

In research of the past, subsistence strategy and food consumption have always been a central topic for archaeologists. Consequently, in the last decades, modern technologies and methods from different fields of natural sciences shed new lights on these old questions. Within these recent possibilities, residue analysis addresses a diversity of questions from cultural choices towards food consumption and preparation to vessel function and use. As a young technique, data are still limited to few regions, but the results are nonetheless impressive and deepen our understanding of the past. In this paper, I will present the results of an ongoing investigation on the foodways among Southeast Europe’s first farmers. This study will focus on the residue analysis of eight archaeological sites scatter across the Balkans. The diversity of material cultures, ecosystems and landscapes that constitute this region offers a great overview of the first Neolithic groups in Europe. From the semi-arid Mediterranean littoral zone of Thrace with a traditional Neolithic culture including permanent settlements, sedentary communities and the adoption of agricultural and husbandry techniques, the investigation will continue to the temperate Central Europe zone and more precisely to the Central and Northern part of the Balkans, where the Starčevo-Körös-Criş complex resides and seem to favour a mobile economy. Although research on the material culture is, since a long time, well established and thoroughly conducted, little is known about subsistence strategies or economic choices in these regions. The contrast between both entities is at the heart of many researches and debates, and this study is no exception. Therefore, the aims of this paper are, first, to give a regional perspective of food consumption in the Balkans through residue analysis, and second, to investigate the contrast between the Karanovo I culture in the Thracian region and the Starčevo-Körös-Criş groups in relation to their food practices. With the advancement of new techniques like residue analysis, it is now possible to shed some lights on these topics, but more importantly, to rethink our
It’s what’s inside that counts: organic residues and uses of pottery in Eastern Croatia during Middle Copper Age
Mateja Hulina (Institute of Archaeology, Zagreb, presenting author), Hrvoje Kalafatić, Maxime Rageot, Sara Cafisso, Cynthia Debono Spiteri

The second quarter of 4th millennium BC in southern Carpathian Basin (or to be more specific Eastern Croatia) belongs to Retz-Gajary culture, which is known to be part of larger cultural complex of pottery with furrowed incisions. Pottery assemblage of the Retz-Gajary culture is characterized by various jug forms, deep pots and bowls which can be decorated with incised or furrowed incised decorations, as well as with appliqués, and often have handles. In this paper we combine typological approach with organic residue analysis to determine the uses and function of pottery from two sites of Retz-Gajary culture – Čeminac-Vakanjac and Ivanđor. It should be noted that both sites have a clear context of Retz-Gajary culture which is fundamentally important as it is usually not present in that state in the area. Both sites are situated in Eastern Croatia, and were excavated as part of rescue works during motorway construction. Čeminac-Vakanjac has a somewhat larger area belonging to a Retz-Gajary settlement – several large pit dwellings surrounded with smaller pits, while Ivanđor has only one large pit dwelling and several smaller pits grouped around it. Both pottery finds and animal bones are abundant on both sites and we are planning to use their combination to shed some light on dietary habits of their inhabitants. We selected a small pottery sample from each site for organic residue analysis. Different parts of vessels of different types were chosen to provide a better understanding of uses for various pottery types. Lipids were extracted by direct acid extraction and extracts analysed using Gas Chromatography - Mass Spectrometry (GC-MS) and Gas Chromatography-combustion-Isotope Ratio Mass Spectrometry (GC-c-IRMS). Preliminary results show traces of possible animal and plant lipids and here we will present these results and combine them with typology of our pottery to determine its uses and function.

Bringing dead pots to life - Vatya ceramics in settlement contexts
Robert Staniuk (Graduate School ‘Human Development in Landscapes’, Kiel University, presenting author), Gabriella Kulcsár (Hungarian Academy of Science), Mateusz Jaeger (Adam Mickiewicz University in Poznan), Gucsi László (Independent researcher)

Hungarian Middle Bronze Age Vatya pottery style is mainly associated with burial rites in the second millennium BC. As such, the primary function of vessels is perceived as a container for human remains (large vessel forms, mainly the so-called urn-shaped vessels), lids (mostly bowls) and accompanying finds (cups or so-called jars). Settlement pottery from the Middle Bronze Age, especially considering the Vatya style, is scarcely published but there is a general consensus that there is typological similarity of pottery found in both contexts. The yet unexplored possible differences result from the quantity of pottery recovered, fragmentation of vessels and complex stratigraphy of settlement sites in the Carpathian Basin. However, it already seems a viable perspective to assume that some of the vessels used for burial practices were actually re-used vessels from a settlement context. The arguments in favour of this assumption result from observed use-wear traces (e.g. abraded surfaces, breakages on protruding parts). As such, it seems that in order to grasp the entire spectrum of ceramic economy and its significance in the second millennium BC, it is necessary to establish the primary function of vessels. The presentation focuses on a selection of pottery recovered from the household context of a flat, fortified settlement in Kakuc-Turján-mögött, located ca. 30km SE of Budapest. Relative chronology shows that the excavated area was intensively occupied since the Early Bronze Age 3 period to the early stage of the Koszider horizon, marking the transition from the Middle to the Late Bronze Age. As such it covers an extensively long period of time, app. 2000-1500/1450 BC. A number of vessels were recovered during excavations and due to their state of preservation it was possible to select them for lipid analysis. The examination was conducted in order to identify their primary use, which eventually would shed light on Bronze Age food economy, as well as determine the actual use of vessels. As stated above, until now such vessels were only assigned function on the basis of typological estimations or contextual studies. The 21 samples selected are parts of: cups (8), sieves (7), urns (2), cooking pots (2), bowl (1) and a jar (1). The analyses are carried out using Gas Chromatography-Mass Spectrometry and conducted at the Archaeological Research Laboratory in Stockholm. Since the selected vessels represent different types within vessel categories it provides the opportunity to explore diachronic and synchronic aspects...
Remarks on the pottery production and function from the Early Bronze Age in North-western Hungary

Eszter Melis (Hungarian Academy of Sciences, presenting author), Attila Kreiter, Péter Skoda (Hungarian National Museum)

North-western Hungary between the Alps and the Carpathians is considered the gate to the Carpathian Basin and to the western part of Central Europe, because it is situated at the meeting-point of the Danubian transport line with the joining Morava Valley and the communication channel following the River Rába. This region is the border zone of Kis-apostag/Transdanubian Encrusted Pottery and Gáta-Wieselburg ceramic styles at the turn of Hungarian Early and Middle Bronze Ages (EBA according to the Central European terminology). Former studies focused more on the intermingling and changing of vessel types and decorations (Kiss 2012b; Melis 2011; Melis 2014). In this paper we attempt to determine different functions (storage, processing, consumption) in the investigated ceramic assemblages from an EBA settlement (e.g. Ménfőcsanak), complemented by grave pottery from the area (e.g. Ménfőcsanak, Mosonszentjános) and the available typology of the Encrusted Pottery (Kiss 2007; Kiss 2012a) and Gáta-Wieselburg ceramic styles (Hicke 1987; Leeb 1987). We would also like to distinguish the possibility of serving and consumption functions based on the variability of closed and open forms. In the Laboratory for Applied Research, Hungarian National Museum, petrographic analysis on more than 60 vessels or fragments of different vessels, assigned to different functions, was carried out. The results showed the predominant use of local raw materials in ceramic production. Furthermore, variability in ceramic raw materials decreased through time showing some sort of unification towards the end of the EBA. Considering assumedly imported vessels, petrographic analysis suggests that in several cases they were locally made but possible imports could also be identified. Considering pottery production and vessel function, we have more data from the beginning of the lifecycle of the pots in the investigated material, however the context of the fragments (mainly refuse pits) in most cases was less informative about their usage, and the fragmentation and restoration limited the visibility of use wears. Several instances prove that the re-use of vessels in the ceramic assemblages (e.g. spindle whorls from wall fragments). In addition we undertake to analyse the distribution of vessel functions in the excavated settlement parts.

Between shape and function. The dairying practices among TRB communities of Polish Lowlands

Marta Krüger (Adam Mickiewicz University Poznan, presenting author), Iwona Sobkowiak-Tabaka, Mélanie Roffet-Salque, Arkadiusz Marciniak, Richard Evershed

Pottery is the most numerous and informative category of the movable utensils of homesteads. Recognition of the vessel’s usage is one of the most crucial problems in study on ceramic assemblages. Pots serving as containers were involved in many everyday activities related to preparing or processing food and household production. Unfortunately, identification of vessel use is still very problematic and being far from satisfactory. For many years the study on function of vessels was limited to assignment of the pots to one of the general classes of use (for instance cooking, storage, transport). This simplified classification, based mainly on morphological or sporadically also technological attributes of sherds, was due to lack of any clear defined criteria. More recent studies, focused on use-wear traces (use-alteration analysis) or ethnographic analogies, were important steps towards recognition of pot use, however they very rare allow unambiguous identification or move beyond these general classifications. This barrier was crossed thanks to the application of organic residue analysis which shed a new light on this problem and gave the analytical tool to directly determine vessel use in prehistory. Despite of an increasing number of studies using modern methods of investigation and connecting chemical analysis with traditional ones, there is still noticeable lack of one coherent analytical system including all mentioned earlier methods and approach complexly connected to the studied ceramic material. The main goal of this paper is to make an attempt to fill in this gap and propose to use other strategy of the investigation of vessels function which comprises of complex studies on morphological and technological attributes of pots, the ethnographic analogies, use-alteration analysis, organic residue analysis and careful examination of the sherd contexts in order to identify the vessels which might have been involved used in process of acquisition, storage, preparation and consumption of milk and dairy products by TRB communities of the Polish Lowland. The investigated
set of vessels was retrieved from various TRB features of Kopydłowo, site 6: such as storage pits, dwelling pit, refuse pits, production pits and secondary contexts. This ceramic assemblage is characterized by a great diversity in terms of technology, manufacturing, decoration and morphology. The most common form of pots were funnel beakers, bowls and collared flasks, however the other forms of vessels occurred as well. The group of 30 vessels encompasses 17 funnel beakers, one conical pot, two collared flasks, two amphorae, one open bowl, one casserole bowl, one bowl without base, three big pots and two undefined vessels which were selected for organic residue analysis. The recovery rate of lipids from examined pots was very good (74 per cent) and of the 30 analysed sherds, 22 showed significant concentrations of lipids. It was possible to observe an astonishing correlation between vessel forms and recognized type of lipids in case of funnel beaker. This might have suggested the occurrence of specialization of usage this kind of pot among TRB communities of Kopydłowo, however other possible hypotheses have to be taken into consideration and discussed as well.

**Vessel Use in the Neolithic lakeside settlement of Pestenacker**
Tanja F.M. Oudemans (Kenaz Consult, Berlin, presenting author), Lucy Kubiak Martens (Biax Consult, Zaandam), Barbara Limmer (Kelten Römer Museum Manching), Laura Kooijstra (Biax Consult, Zaandam)

The Neolithic lakeside settlement of Pestenacker (Bayern, Germany) is dated very precisely and was shown to have been in use for a very brief period ca. 25 years. Many well-preserved ceramic vessels from this site contain visible organic residues on the inner surface. The combined microbotanical study using Scanning Electron Microscopy (SEM), and chemical analysis using Fourier Transform IR-spectroscopy (FTIR) and Direct Temperature-resolved Mass Spectrometry (DTMS) of these residues, resulted in the identification of food remains and birch bark tar as reoccurring elements. The occurrence of such residues in different kinds of ceramics from Pestenacker was studied, in order to identify the actual vessel-use of vessels with different morphological and technological characteristics. The identification of specific use-areas within the site will also be addressed.

**Meaning and use of Neolithic and Chalcolithic House models in Europe**
Mila Shatilo [Ukrainian Academy of Sciences, presenting author], Robert Hofmann [Kiel University]

House models are a special category of ceramic objects which emerged in Europe as part of the ‘Neolithic package’ in the Early Neolithic and which were used subsequently during long periods of Prehistory. They are also frequent in Cucuteni-Tripolye societies in the 4th millennium BCE. Different basic categories of house models have been distinguished which partly show features of vessels or have been attached as additions to vessels. In our paper, we would like to present an overall look at Neolithic and Chalcolithic house models and make an attempt to explore their function and use throughout long periods. Possible functions and meanings of house models will be reflected based on analysis of their formal structure and stylistic development under consideration of further analogies. In our view three further aspects are important: firstly, it is necessary to consider also the occurrence of other categories of miniature objects in the same cultural complexes. Secondly, explicitly taken into account should be the possibility that such objects had different functions in different cultural contexts. Thirdly, is has to be clarified to what extent such differences and the actual use of house models is reflected in variations regarding the depositional contexts.

**Settling with pottery**
Tobias Torfing [Museum of Southwestern Jutland]

The paper will analyse the interrelation between pottery production (coiling technology, firing), practical use (shape of the vessel, various traces of use) and the social function of the vessels as the key carrier of artistic expressions during the Early Neolithic and Early Middle Neolithic Funnel Beaker Culture (4.000cal BC-3.200calBC). The paper will discuss the early development of pottery use within the Funnel Beaker Culture, leading up to the beginning of the Middle Neolithic, a period often regarded as the height of pottery production during the prehistory of the region: Pottery was produced in great quantity and was often well-formed and exquisitely ornamented. The use of pottery is one of the most significant changes at the start of the Neolithic period in Northern Europe, where identity and pottery are intrinsically connected. It is not that pottery was not used before the start of the Neolithic in the region: during the latest Mesolithic period (Late Ertebølle) the hunter-gatherers in the region also used pottery. But the use of the pottery changed dramatically. This is seen in several key-aspects of pottery use:
• Change in vessel forms
• Changes in pottery technology
• Changes in social use (different depositional practices, increased focus on ornamentation)

In the paper, it will be demonstrated that these changes follow a pattern closely related to developments in the social structure of the society. New ways of interacting with the world changed the purpose of the pottery, creating the need for different shapes, but the development also places the pottery at a central stage in both daily and ritual life. Thus in addition to changes in the form of the vessels related to new needs of the population, there is also a shift in artistic focus, from the Mesolithic towards the Neolithic. This change reflects a change from mobile groups with focus on items carried around (paddles in the canoe and antler tools) to objects related to the household (pottery). It will be argued that this focus on pottery production is an integrated part of stabilising the newly formed Neolithic identity, and shaping the future. Gradually an ever increasing demand for increased complexity and quantity of pottery production affects the technology of the production [changes in firing techniques, additional tools], and, in the end, also the social structure of society. The mass production of pottery for large communal rituals forms a stage where various social groups participate and compare craftsmanship. Thus, pottery does not only reflect the social development but is an integrated part of shaping it.

Quantifications of pottery assemblages in the East and South-East European Neolithic and Chalcolithic – methods and results regarding functional categories
Robert Hofmann (Kiel University)

Present or ethnographic analogies allow to a certain extent and probability assignments of vessels to functional categories on the basis of their shape, capacity, decoration and technological properties. In consequence, quantifications of such properties in ancient vessel assemblages can reveal much about the purposes of vessels in ancient societies. Although we know from countless studies how variable the composition of vessel assemblages is in space and time, unfortunately, there are so far hardly any overviews trying to draw a long-term development of such properties or even of functional categories of vessels. Even if the paper cannot solve such a large task it wants, on the one hand, to put up for discussion a procedure to quantify vessel assemblages and reconstruct annual production rates of vessels in archaeological contexts. On the other hand, the potential of such quantifications regarding the identification of shifts in quantities of functional vessel-categories is to be demonstrated on the basis of data from different case studies in Neolithic Bosnia and Serbia, and Chalcolithic Ukraine.

Pottery from the Early Eneolithic settlement Zgornje Radvanje (North-eastern Slovenia), its variability, distribution and use
Bine Kramberger (Univerza v Ljubljani, alumnus)

This paper focuses on the use of ceramic finds in the Eneolithic period with the case study that was based on the ceramic assemblages obtained at Early Eneolithic settlement Zgornje Radvanje. The settlement is dated to the last third of the 5th millennium BC and it is known as one of the biggest, and the most prominent settlements of the Lasinja Culture in Slovenia (Kramberger 2010; id. 2014.241-244, Fig. 15; Murko 2012.141-142; Arh 2012). It was probably circular in form and consisted of around 23 settlement structures with sunken floor and probably of 8-9 structures without it. For the purpose of functional analysis, we have chosen the ceramic assemblages from 17 different structures. They yielded a wide range of pottery types. The possible function of different vessel types was investigated through analysis of their shape, size, ceramic manufacturing technology, use-alterations (traces of secondary burning, remains of carbonized residues) and ethnographic parallels. Several connections were recognized and it can be concluded that there is a relationship between different vessel shapes and their particular use. Besides the analysis of the forms and function of the vessels from Zgornje Radvanje, we also studied the distribution of pottery in different settlement structures. Namely, the studied settlement structures differ in size, shape, the amount of post holes and the presence/absence of hearths. Also in this connection it is interesting to mention, that these analyses indeed show some deviations between various building types, probably related to their specific use.

Use and function of prehistoric textile ceramic in Central and Northern Europe
Stefanie Schaefer (Kiel University)

Prehistoric textile ceramic is known from all periods and regions. The function of this particular surface treatment was not subject to severe discussion despite the large number of finds. Integration of textile
Abstracts Session 5

Organic residue analysis of late Neolithic pottery from Bapska-Gradac, Croatia (poster)

Mateja Hulina (University of Zagreb, presenting author), Marcel Buric, Maxime Rageot, Sara Cafisso, Cynthia Debono Spiteri

Bapska-Gradac is a tell settlement in the eastern part of Croatia. Its layers span from Early Neolithic (Starčevo culture) to Late Neolithic (Vinča culture) and Early Copper Age (Baden culture). In this paper we are presenting the results of organic residue analysis on Late Neolithic pottery from the northern side of the tell. Several wattle and daub houses were excavated there, one with a domed oven, complete with pots standing on it. Late Neolithic pottery from this site belongs to Sopot and Vinča cultures and is characterized by fine ware that is often highly polished and/or decorated with incised and channelled decorations, and coarse pottery that can be decorated with plastic decorations and impressions. Most common types are different hemispherical and carinated bowls, bowls on pedestals, cups, amphorae, pythoi and pans. Preliminary zooarchaeological data shows that cattle were predominant in the bone assemblage, followed by pigs and then sheep/goat. A lot of grains were also found. This paper shows the results obtained from analysis of lipid residues extracted from several pottery vessels using Gas Chromatography-Mass Spectrometry (GC-MS) and GC-combustion-Isotope Ratio Mass Spectrometry (GC-c-IRMS). We selected different parts of vessels and different types of vessels to get a better understanding of the use of various pottery types. Preliminary results show possible animal fats. We combined the organic residue results with zooarchaeological and botanical data to explain how pots were used and what it tells us about the dietary habits of Neolithic population on this site.

The function of the Linear B inscriptions on the stirrup jars (poster)

Beata Kaczmarek (Adam Mickiewicz University in Poznan)

The poster focus on problems with interpretation of the inscriptions appearing on the stirrup jars. It was a coarse vessel used in the Late Bronze Age as a container for olive oil and unguents. They were inscribed with Linear B signs and we have around 180 examples in the Aegean and Levant. Recent ceramic analyses of these vases show that the place of origin is located in West Crete and mainland Greece, except Pylos. The function of the Linear B inscriptions is still discussed, because short words painted on stirrup jars do not provide clear answers. Are these signs a trademark of sorts? Do they have communicative function? Is it just decoration? Research has shown that the inscribed jars may have both decorative and communicative functions. The difference can be proved only in relation to the primary and secondary use.

Vessels for the living and for the dead? Comparative studies on pottery from the Late Bronze Age - Early Iron Age settlement complex in Janowice (Lesser Poland) (poster)

Marta Korczyńska (presenting author), Michał Borowski (both: Jagiellonian University), Maria Lityńska-Zając, Magdalena Moskal-del Hoyo (both: Polish Academy of Sciences)

The starting point of our Presentation is the contextualisation of particular pottery forms (with accent on the ‘common’ division on storage vessels and forms, which might be used for food processing activities), dated to the Late Bronze Age/Early Iron Age, at the open hilltop-settlement in Janowice (south-western part of Lesser Poland). This study focuses on pottery forms, connected with the youngest settlement phase together with artefacts interpreted as waste of daily homestead activities, such as stone and flint artefacts, devices connected with textile production, or remains of destroyed households (e.g. daub with imprints of wood, or burnt wooden construction elements) and other ar-
chaeobotanical data. Subsequently, the forms of ‘settlement’ pottery will be compared with vessels, found on the contemporaneous cremation cemetery, located approximately 1.5 km away from the settlement, in order to define similar types. In the case of analogue vessels, comparative studies of the technology of pottery will be presented, followed by precise fabric examination. As a goal of this research, certain types of vessels shall be identified being used apart from their primary (?) storage and/or cooking function at the settlement, during the funeral rite.

Functional analysis of the pottery assemblage from the Mycenaean palace in Pylos (poster)

Piotr Zeman [Adam Mickiewicz University, Poznan]

Pottery from Mycenaean palace at Pylos in Messenia was first published by excavators – Carl W. Blegen and Marion Rawson in 1966 [Blegen and Rawson 1966]. Since then vessels from palatial ceramic assemblage were analysed on several occasions. However, in the last years we could observe a significant progress in examining and reinterpreting material from various pantries. This was possible mostly thanks to Hora Apotheke Reorganization Project, focused on the re-analysis and publication of artefacts excavated by Blegen (Lis 2016, see Stocker and Davis 2014 for summary). Those new interpretations are centred around functional analysis of assemblages from different parts of the palace. I would like to gather those sources together to present a broader analysis of function and use for all parts of the palatial pottery assemblage, together with spatial and contextual linking them together, using the theory of entanglement (Hodder 2012). Destruction context of the palace at Pylos belongs to the Late Helladic IIIB period. It is the climax of Mycenaean palatial civilisation, containing most of available archaeological remains, dated roughly to the 13th century BC. The palace at Pylos, after 300 years of development was at that time a complex, bureaucratic, administrative and industrialized structure [Wright 1986]. It had multiple ways of controlling the regional economy, including production and acquisition of pottery. Palatial pottery assemblage was diverse and had various functions (food preparation, daily use, olive oil production, funerary practice, feasting). It was concentrated mainly in three areas: pantries 18-22 in western corner of the Main Building, rooms 67-68 in Southwestern Building and room 60 close to southern corner of the Main Building [Lis 2016]. Characters of the specific assemblages of shapes stored in each of them, points strongly that they were stored in a planned, very organized way, to help support certain, vital functions of the palace. Analysis of this system helps also to understand various ways in which the palace was entangled with the society and economy [Hruby 2014]. Bibliography: Blegen, C. W. and Rawson, M. 1966. The Palace of Nestor at Pylos in Western Messenia: I. The Buildings and Their Contents. Galaty, M. L. 1999. Nestor’s Wine Cups: Investigating Ceramic Manufacture and Exchange in a Late Bronze Age “Mycenaean” State [BAR International Series 766]. Hodder, I. 2012. Entangled: An Archaeology of the Relationships between Humans and Things. Hruby, J. 2014. Moving from ancient typology to an understanding of the causes of variability: a Mycenaean case study. In A. Kotsonas [ed.], Understanding Standardization and Variation In Mediterranean Ceramics Mid 2nd to Late 1st Millennium BC [BABesch Supplement 25], p. 49-58. Lis, B. 2016. A foreign potter in the Pylian kingdom? A reanalysis of the ceramic assemblage of room 60 in the palace of Nestor at Pylos. Hesperia 85, p. 491-536. Stocker, S. R. and Davis, J. L. 2014. ‘Re-excavating’ the palace of Nestor: The Hora Apotheke Reorganization Project. In D. Nakassis, J. Gulizio, and S. A. James [eds.], KE-RA-ME-JA: Studies Presented to Cynthia W. Shelmerdine, p. 239-248. Wright, J. C. 1986. Changes in Form and Function of the Palace at Pylos. In C. W. Shelmerdine, and T. G. Palaima [eds.], Pylos Comes Alive: Industry and Administration in a Mycenaean Palace. p. 19-29.

Eastern borrowing: lids and Late Neolithic societies of South-eastern Poland (poster)

Elżbieta Sieradzka [University of Rzeszów, Poland]

The idea of covering a vessel with a ceramic lid was for a long time an alien idea for Neolithic societies of South-eastern Poland. We can only speculate that some bowls may have served as lids, or that covers made from organic materials could have been employed. Proper ceramic lids were introduced as a result of contacts with Eastern European societies, namely Tripolye culture. This type of vessel was adopted by the Globular Amphora culture, as well as related Złota culture communities. Only exceptional ceramic covers are found within the Funnel Beaker culture assemblages. Analysing Late Neolithic lids from South-eastern Poland, and comparing them to
their Tripolye prototypes, we can trace how function and symbolic meaning of this specific type of vessel varied in different societies.
Abstracts Session 6

Exploring inter-regional interactions in the first millennium BC in Europe

Interactions in the first millennium BC in Europe - an introduction
Oliver Nakoinz, Jutta Kneisel, Franziska Faupel (all Kiel University), Simon Stoddart (University of Cambridge), Jes Martens (Oslo University)

Regional and interregional interaction forms the background of many local economic, social and cultural phenomena and hence, the understanding of each region. While some aspects, the relationship between Mediterranean and Hallstatt regions for example, have been addressed many times, other inter-regional relationships have been neglected. Currently, we are not able to draw a valid picture of the European system of interaction. This talk will discuss the significance of interregional interaction and present a research agenda for the field of research.

From South to North and Beyond
Alessandro Naso (Università degli studi di Napoli Federico II)

According to the theoretical model of cultural contacts developed by Christopher Ulf, cultural contacts are a bi-directional process, in which producers and transmitters can, and do, become recipients as well. Exploring inter-regional interactions in the first Millennium BC in Europe means that one can look both for Mediterranean influences in central and northern European cultures and central and northern European influences in Mediterranean cultures. This permits the consideration of central and northern European reciprocal influences. The traffic was not simply one way, because the distribution of raw materials helped the spread of people, goods and ideas in both directions. Trade and relationships favoured the existence of a vast network of links among elites, in which long distance and regional trade played different roles, which can themselves change through the time.

The history of the cultural contacts between southern and northern Europe already began in prehistory, when the relationships were based exclusively on the exchange of raw materials. In the fifth millennium BC, jadeite from Liguria in north-western Italy was brought to Central Europe and Great Britain. A high concentration of this material is documented in north-western France in Brittany, where the jadeite was worked at some specialised sites into polished stone axes of a particular shape, used as impressive signs of power. The axes of jadeite from Brittany have been found as far afield as several sites in northern Spain, northern Germany and southern Italy.

From the Bronze Age onwards, the raw material par excellence from the North was Baltic amber, which reached not only central and southern Europe, but also Egypt and the Near East. The amber trade stimulated new routes and new contacts, as the adoption of similar stools in areas as distant from Northern Europe as Egypt demonstrates. In the fourteenth century BC, wooden folding stools are documented both in Egypt and in northern Europe in burials belonging to high ranking male individuals.

In the Early Iron Age, bronze vessels and weapons show reciprocal formal connections both in northern Europe and Italy, speaking in favour of the existence of a network of links among elites. In the scholarly research, these relationships have been connected to the amber trade, which, around 850-800 BC, reached a very high level and assumed great importance in a wider European context. For a long period of archaeological research, the hypothesis of the so-called amber route was followed, whose existence is based on evidence of Roman period. An amber route did not exist in prehistory, because the amber, which is a peculiar material quite easy for archaeologists to identify, was traded together with other products, which are perishable and not visible in the archaeological record. To identify these products one can use as a working list the imports from the area north of the Alps mentioned by ancient Greek authors and so think of resin, pitch, wax, honey, cheese, salted meat, animal skins and slaves.

The import of wine in Central Europe from several Mediterranean regions, including Greece, western Greece and Etruria is well documented in the other direction from 550 BC onwards. The wine trade favoured the spread not only of southern European ceremonies and items connected to the wine drinking, but also of unsuccessful experiments: the mud brick wall built in the sixth century BC on the Heuneburg settlement in south-western Germany was unsuited to the Central European climate.
Inter-regional interactions in Bronze Age and Early Iron Age Moravia

Klara Sabatova (Masaryk University), David Parma

Culture-historical archaeology is based on a distinction between individual cultures with clearly determined geographic boundaries. These were mostly set out on the basis of material evidence, which was present at particular sites of the one or another geographic area. All artefacts which were found outside the boundaries of their original geographic culture have usually been interpreted as the so-called “imports” or “foreign influences”. Common everyday interactions between nearby regions were not really paid attention to. The aim of this paper is to try to identify long-term trends in the way of interactions for the territory of Moravia during the Bronze Age and Early Iron Age. On the basis of new knowledge it becomes apparent that the boundaries between cultures are arbitrary and, at the same time, that the targeted separation of cultures can also lead to an intentional separation of chronology between regions which, however, developed in a close relation. The research which also reaches high intensity due to rescue excavations shows that we cannot speak of any clear boundaries between cultures but, on the contrary, that ceramic styles overlap and are often not connected with geographic area but rather with functional use of several ceramic forms for ceremonial purposes. At the same time, ceramic styles appear (“Atting ornament”, “Silesian pottery”) which were produced and used outside their so-called parental geographic regions, particularly in the milieu of large centres. The system of ceramic production, as it is studied, supplied the localities of central function mainly with products from their close hinterland (micro-region Bludína in the Early Bronze Age, micro-region Podolí in the Final Bronze Age). The extent of distribution areas in Moravia probably did not change until the beginning of the La Tène Period. Nevertheless, at the same time elements can appear which indicate a sort of otherness, for example in the form of burial rites and small imports (Mezőcsát Group) which, however, mostly used elements of local ceramic production (Pohofelice). This remote interaction is also reflected in sharing of metal artefacts in highly supra-regional contexts. True long-distance imports play only a marginal role with regard to quantity and quality. Significant is the influx of raw materials, above all copper, and in several time periods amber as well.

The Early Iron Age settlement of the Polish Karst in the light of new studies.
Tracing inter-regional interactions in the economically marginal areas

Joanna Jędrysik (Jagiellonian University)

The Kraków-Częstochowa Upland, also called Polish Karst or Polish Jura, is a geographic region located in the Southern Poland. This distinctive landscape is demarcated from the neighbouring areas of the Silesian Upland and the fertile Western Małopolska (Little Poland) by cuestas and big river valleys. The presence of caves and shelters, deeply indented rocky valleys and limestone monadnocks creates exceptional relief. However this area is characterized by water scarcity and infertile soils. The paper presents the Kraków-Częstochowa Upland as a margin zone with its own independent economy which was adapted to the local environmental conditions. The existence of this phenomenon in the Early Iron Age can be determined in a result of my studies conducted on settlement structures and field research which brought not only archaeological but also first palynological and paleobotanical data from the Polish Karst. The region covers an area of nearly 1.5 thousand km$^2$ but before the beginning of 1st millennium BC it was almost uninhabited. The colonisation of the Polish Karst takes place in the Late Bronze Age and at the beginning of the Hallstatt Period. This occupation (peculiar in its form) is related to the Lusatian Culture and lasted till the Early La Tène Period. We are observing island-like microregions represented by small settlements often located on the monadnocks, as well as in the plateaus in front of the entrances to the caves and traces of the penetration of caves and shelters. However it is also important to emphasise that in the Early Iron Age this region play a significant role as a contact zone and as an important route for the local populations which existed in the neighbourhood areas. This was manifested in the material culture e.g. in a form of artefacts associated with the Scythian influence and presence of the Pomeranian Culture.

Monbrodo - A station of the Amber Road on the coast of Istria in the Iron Age?

Anja Helmut Kramberger (University of Ljubljana, presenting author), Sebastian Müller (Institute for Mediterranean Studies, Busan), Maja Čuka (Archaeological Museum of Istria)

In 2016 started new investigations on the Gradina Monbrodo, located directly at the sea on a 30 m high elevation, at the west coast of Istria in the munici-
pality Rovinj as a Korean-Croatian joint project. Monbrodo is just 3 km away from the famous Gradina Monkodonja (HänSEL/Mihovili/Teržan 2015) and has also been established by the recent findings in the Early Bronze Age. Unlike Monkodonja, which was destroyed in the middle of the 2nd millennium in consequence of a presumably military event and then not resettled, Monbrodo has also been used in the Iron Age. There are hints that the in the Early Bronze Age constructed annular walls of the Acropolis were rebuilt in the 1st millennium BC and that on Monbrodo, based on the discoveries of two Certosafibulae type VII (Teržan 1976, 355ff., Fig. 42, 44) and ceramic of the type Alto Adriatico (Landolfi 1996) a fortified settlement existed in the 5th-4th/3rd century BC. We are therefore dealing with a period for which in Istria are mostly graveyards known and explored. Among the most outstanding discoveries, which are linked to the late 5th/early 6th century BC in Istria, counts the situla from the grave vault of Nesactium that depicts a sea-battle (Mihovili 1996, 47-48, Appendix 3). Among the rare finds that integrate the Iron Age Istria in an extensive trading network, reaching as far as to the Baltic Sea, belong amber beads. An amber bead, which finds comparison in one piece from Nesactium (Mihovili 2001, 233, Pl. 77.2), came to light in the first excavation campaign on Monbrodo. Especially the ceramic of the type Alto Adriatico denotes access of Monbrodo to a trading network that likely went by sea. Our contribution would like to introduce the site Monbrodo and the ongoing project and present, with a contribution would like to introduce the site Monbrodo and the ongoing project and present, with a view concerning the question of its role in the context of an Iron Age maritime trade as a settlement site situated directly on the coast, first contexts and findings. Literatur Hänsel/Mihovili/Teržan 2015, B. Hänsel/ K. Mihovili/ B. Teržan, Monkodonja. Istarske, Knjiga 1—Iskopavanje i nalazi grada 1981. godine/ Nesactium — The Discovery of a Grave Vault in 1981. Monografije i katalozi Arheološki muzej Istre 6 (Pula 1996). Mihovili 2001: K. Mihovili, Nezakcij – Prapovijesni nalazi 1900.-1953./ Nesactium — Prehistorich finds 1900-1953. Monografije i katalozi Arheološki muzej Istre 11 (Pula 2001). Teržan 1976: B. Teržan, Certoška fibula/ Die Certosafibel. Arheološki vestnik 27, 1976, 317-536.

Kupferhandel vom Wadi Arabah [Jordanien] zum griechischen Festland ca. 950 – 750 v. Chr.

Moritz Kiderlen (HU Berlin, presenting author), Michael Böde (Deutsches Bergbau-Museum Bochum), Veit Vaelse (HU Berlin)


The “BEFIM” Project: Organic Residue Analysis on Local and Imported Pottery of Late Hallstatt and Early La Tène Hillfort Sites

Angela Moetsch (Landesamt für Denkmalpflege im Regierungspräsidium Stuttgart), Birgit Schorer, Maxime Rageot, Janine Fries-Knoblach, Stefan Schreiber, Federica Sacchetti, David Bardel, Ines Balzer, Félicie Fougère, Bruno Chame, Dirk Krausse, Thomas Hoppe, Cynthia Debono Spiteri, Philipp W. Stockhammer

“BEFIM - Meanings and Functions of Mediterranean Imports in Early Iron Age Central Europe” is an interdisciplinary research project. Participants of the project are the Universities of Munich and Tübingen, the Cultural Heritage Department of Baden-Württemberg (Esslingen) and the Landesmuseum Württemberg (Stuttgart). Mediterranean ceramics and metal vessels are well known within the corpus of finds from late Hallstatt and early La Tène hillfort sites. Traditionally, they have been interpreted as luxury goods serving the social elites not only to display their wealth, but also to imitate Greek feasting practices. The aim of the BEFIM project is to obtain closer insight into the function and meaning
of these imports.Were they really used for Greek-style symposia where wine was served or did their function and meaning change within the late Hallstatt and early La Tène societies? Which goods did Greek transport amphorae found north of the Alps really contain? What was the function and meaning of the local fine ware pottery used simultaneously to the imports? Were Mediterranean vessels exclusively used for exotic food and drinks while local food was only served in local pottery? In order to elucidate these questions, BEFIM does organic residue analyses on samples from both imported and local ceramics found at early iron age hillfort sites in south-west Germany and France, namely the Heuneburg, Vix/Mont Lassois, Bourges, Breisach Münsterberg, and Glauberg. The first results tend to draw a picture rather different from traditional interpretations.

**Economic interactions between Mediterranean states and Celtic societies between the 3rd and the 1st c. BCE**

Aurélia Feugnet (Université Paris 1)

During this talk, I would like to present my PhD researches, started in 2011, at the University Paris 1 and under the direction of the Prof. Patrice Brun. The work I conduct concerns the very selective choices of Greek and Roman imports in the Celtic world (exit the Mediterranean fringe), between the 3rd and the 1st c. BCE. I particularly study the interactions between the Mediterranean and the Celtic world, from the commercial point of view, but also with an approach on their politico-cultural consequences. The work of data compiling is now finished. The corpus I gathered contains 1914 occupations, distributed on 14 European countries, including almost 58 000 imports (MNI), divided in 10 main functional categories. The major PhD issues are divided in two main parts. The first field I would like to explore was the diffusion of these imports inside the Celtic area. It allowed me to have a global point of view on the extent of this diffusion phenomenon. The second field I am currently examining is the integration of these exogenous products inside the La Tène period. I have recorded the main information on the import discoveries (types of sites, types of functional contexts and dating) and I now would like to interrogate these data to better understand their domestic, religious or funerary functions and the role they could have played in the evolution of Celtic societies (ways of acculturation or isolationism?, ways of supply or demand?, etc.). To complete these researches, I proceeded to mapping studies by chronological step, in order to picture the imports systems through time. I also used statistic tools as correspondence factor analysis (CFA) to better understand the relations between the main variables (types of objects, effective, time, location and function of contexts). In the end of Mars, I would be able to present the first results of this CFA. The expected results of the analysis, in terms of diffusion and integration, should highlight European imports schemas as well as local particularities, perceptible at a regional scale or even at a political unity level (Celtic civitates). I assume that all the Celtic societies imported Mediterranean products late sensu (common choice – European scale) but all the Celtic societies also made their own blend in the Mediterranean offer (particular choices – regional scale). This is that specific choices, answering to different economic, political or social needs, I want to evidence. Thus, the idea of this talk is to present my PhD work, almost achieved and to share the first main study results of these economic interactions between Mediterranean and Celtic worlds, through the imports diffusion and integration at the end of the La Tène period.

**Transport zones and exchange in Iron Age**

Jonas Enzmann (Kiel University)

As mentioned in the session description, it is currently very difficult to reconstruct a valid picture of the European system of interaction in the first millennium BC. This fact applies in a lesser degree for the Roman Iron Age beyond the Limes as well. In his Master-Thesis the author was able to develop a model explaining the exchange of imported goods based on the distribution of rotary querns made of basaltic lava from the Eifel. The distribution was analyzed on the basis of an extended definition of Christer Westerdahls transport-zones. The established model in which one can correlate the distribution of artefacts with data of the natural environment as well as data of cultural elements such as settlement density on a macro-regional scale should be further established in the PhD-Thesis of the author. To gain insights in long term processes in the development of the inner-Germanic interaction system it is necessary to take the Pre-Roman Iron Age into focus as well. Due to the dominant regional studies and only few usable artefacts the study of the Pre-Roman Iron Age must be less detailed. But nevertheless, a summary of the interaction spheres of regions in northwestern Europe should be sufficient to gain some ideas of how the inner-Germanic interactions developed through time. In his presentation the author would like to show the general
theoretical background of the transport zone model and how it might be usable for the Pre-Roman Iron Age.

Paths through Europe in the LaTène Period

Clara Filet (Université Paris 1 Panthéon-Sorbonne, presenting author), Franziska Faupel (Kiel University)

Long distance trade in Latenian Europe is already well attested by archaeology. Such large-scale exchanges are particularly documented by artefacts for which their assumed origin differs from the place where they were discovered, as thousands of Roman amphorae identified in Latenian Europe. It is, however, still beyond the reach of archaeologists to determine the time requirements, the privileged axis, the human and material means or the segmentation of such journey. This presentation aims at introducing a collaborative project on goods transportation times during the last two centuries BC. It suggests a set of temporal orders of magnitude for long distance trade journeys from all likely connections between Latenian agglomerations. A network connecting larger agglomerations (more than 5ha as a threshold) is created to represent all probable links. To estimate a realistic distance between agglomerations, the Euclidian distance for example is not applicable as it results in a distance as the crow flies. In reality, paths across a landscape are following certain parameters to be efficient in sense of transportation costs and time. The Least Cost Path approach enables to respect terrain dependent costs. Additionally, a multimodal Least Cost Surface was developed to take navigability on rivers, river crossings and the change in mode of transportation (from wagon to boat) into account. In a last step, the needed time to travel to each agglomeration is calculated using the suggested estimations of speed by Salač (2013). To illustrate this approach some specific far distance connections between important sites will be demonstrated to discuss some facets on the organisation of trade.

Large scale salt production in a transregional context

Kerstin Kowarik (University of Vienna), Hans Reischreiter (Natural History Museum Vienna)

The archaeological findings in the Iron Age salt mines of Hallstatt evidence large scale salt production. Currently it is estimated that more than hundred tons of salt left Hallstatt every year. Except for the Dürrnberg salt mines there is no evidence for salt production in a wide area around Hallstatt. In addition the Hallstatt cemetery demonstrates a wide – transregional and transalpine – network. The present paper aims to explore the possible trading routes for salt on a transregional level as well as procurement systems for the salt mines. We also aim to discuss the organization of mobility in the alpine area based on a regional case study. GIS studies in the region surrounding Hallstatt have brought new insights into the development of the organization of alpine and transalpine mobility.

Tracing centrality through small scale interactions - A regional approach

Lennart Linde (Goethe University Frankfurt)

Patterns of interaction and the analysis of corresponding networks have started to become a more widely used approach in current archaeology. Yet most studies focus on large geographical scales often bridging hundreds of kilometers. These studies often yield distinct results since quantifiable archaeological remains are related to fall off curves and therefore increase over spatial distance. While macro scale interactions are an important topic to gain insights in trans-regional dynamics the same methods might also proof useful on the micro scale. Since the relations of villages in micro regions are also shaped by zones of interactions. Furthermore they also leave explorable patterns that can deepen our understanding of common processes within a settlement landscape such as centralization. The presentation will discuss the research design and preliminary results of a micro scale study regarding the relationship between Bronze Age settlements and hillforts. The aim is to trace processes of centralization in a bottom up approach through shifts in the micro region surrounding the hillforts. The study region covers three hillforts from which two reach the Iron Age while one gets abandoned during late Bronze Age. In most archaeological narratives hillforts are dubbed as central places which amass social, economical and military power. But this narrative is rarely put to test by a quantified approach. The presented study tries to use Brainerd-Robinson correlations to quantify material similarities between the hillforts and nearby sites. These calculated similarities are about to be used to synthesize a network graph. Various analytical methods will be applied to this graph regarding different measures of centrality, identification of subgroups and spatial relations. These network centric approaches are about to get complemented with spatial applications like triangulations, viewsheds, determination of soil use and path cost calculations. A close evaluation of
changes within the dynamics in spatial organisation and social networks are supposed to give insights into the process of centralization. What does really change when a hillfort rise? Which pattern can we identify? What does centrality mean on the micro level?

**Modelling Early Iron Age interaction in South-West Germany**

Oliver Nakoinz (presenting author), Franziska Faupel (both Kiel University)

There are many different approaches, which allow to model interaction. Each approach has certain strength and shortcomings. In archaeology, empirical models tend to use a rather limited number of empirical observations while theoretical models apply complicated concepts and unrealistic assumptions. We try to circumvent the problems by applying the data to an extensive database and by using a very simple theoretical model. The usage of cultural distances as inverse proxies of interaction enables us to include all data from an extensive database which produces a very detailed and significant result. We apply a generalized version of Renfrew’s fall-off curves (distance diagrams) as empirical model to the data. Different variants of distance diagrams focus on different aspects of interaction. In contrast to Renfrew’s rather sophisticated mathematical functions, we are using the simplest theoretical model, a monotonic increasing (because it is inverse) function. Many influencing factors are included in the empirical model. For example, the interaction can be measured in a reconstructed road system. Cost distances can be used instead of geometrical distances. The gravity law can be used in order to consider different densities of population. Though, we are presenting an ongoing project, the result is a multifaceted picture of the systems of interaction in Iron Age.
Abstracts Session 7

Quantitative approaches as a basis for simulation of prehistoric economy and environment

Combining models and palaeoecological data to reconstruct past anthropogenic landcover changes and analyse their effects on aquatic environments

Anne Birgitte Nielsen (Lund University)

Quantitative reconstructions of prehistoric landscapes and analyses of the interaction between societies and their environment at long time scales requires collaboration between many disciplines. Subfossil pollen data provide one of the entry points to understanding the past landscape in terms and vegetation and land-cover composition. Thanks to the development of quantitative models of pollen/vegetation relationships over the last few decades, we are now closer to being able to quantify past land-cover changes at different spatial scales, from local forest areas to large regions, depending on the sites and models applied.

Comparisons of pollen-based land-cover reconstructions from the relatively recent past to historical maps in different parts of Europe shows that the method provides meaningful results, although it is still not perfect, and specific uncertainties are highlighted. The comparisons nevertheless provide some confidence that we can also reconstruct older land-cover changes, and by combining pollen data with models try to specify the anthropogenic impact on the landscape at different spatial and temporal scales.

This quantification also provides possibilities for analyzing less direct interactions between humans and their environment. By combining land-cover reconstruction with other palaeoecological and geochemical proxies, we can look for potential effects of past land-use/land-cover changes on the aquatic environments of lakes and coastal areas.

Discovering prehistoric land use patterns with the extended downscaling approach

Martin Theuerkauf (University of Greifswald)

The type and magnitude of human land use activities differs in response to numerous parameters, e.g. climate, soil conditions, transportation and technology. Reconstructing past land use patterns is thus valuable for a better understanding of the organization and functioning of human societies and the impact of technological advancements. A detailed understanding of human activity is also needed to define baselines of the natural state of landscapes and lakes, which are required for proper management of nature conservation areas and lakes. Archaeobotanical studies can provide very detailed qualitative information, e.g. about which crops have been cultivated in what regime. Such studies are usually less suited to reconstruct the extent of land use activities - they provide little detail about land use patterns. Pollen data from large lakes and peatlands on the other hand represent vegetation composition on a large scale because pollen is easily dispersed over long distance. Also here spatial resolution remains low because each such pollen spectrum only approximates mean vegetation composition of a large area of thousands of square kilometres. The extended downscaling approach (EDA) aims to increase spatial resolution in vegetation reconstruction by combining pollen data from several sites with robust landscape patterns. To that end the EDA applies forward modelling, i.e. the approach searches for that vegetation composition within the known landscape pattern which produces pollen deposition most similar to the empiric data. Tests on simulated data have shown that the approach is well applicable in species rich settings with a number of landscape units. The approach will be illustrated using example data from 50 lakes in NE-Germany. EDA is applied for three major periods of high land use intensity, i.e. Bronze Age, Iron Age and the medieval settlement period. Results will be compared with vegetation patterns in times of low human activity.

Quantitative Geoarchaeology of Multi-layered Settlements [Tells]: Architecture, Population, and Economy in the Neolithic Visoko basin

Sarah Martini [presenting author], Stefan Dreibrodt, Robert Hofmann [all Kiel University]

With their layers of occupation and clear visibility in a landscape, tells have always attracted archaeolo-
gists. For geoarchaeologists, the layering of anthropogenic sediments produced by human-based matter fluxes in tells represent a unique opportunity to apply their methods. With their help, archaeologists have developed numerous models of human behavior based on both geochemical signatures and geomorphological characteristics. However, geochemical signatures and the micro-remains of anthropogenic activity are often considered in a relative qualitative manner. As shown by Dreibrodt et al. (2013), quantifying geoarchaeological data can provide a very different outlook. In this paper we present the results of an expansion of Dreibrodt et al’s (2013) quantification of geoarchaeological data from the Neolithic Visoko basin, Bosnia. Our approach is based on the assumption that the studied layers represent a mean of settlement activity during respective settlement phases. This is based on a comparison of profile data with data acquired from horizontal archaeological plans. Additionally the data are considered to represent minimum rates of matter fluxes since postdepositional processes such as erosion, recycling, and pedogenic alteration have to be accounted for. The intensity of postdepositional processes is estimated based on analysis of the layer continuity, number of pits, and soil formation within the archaeosediment sequence of the site profiles. Beginning with the estimation of total phosphorous content at Kundruci and Donje Mostre, we calculate changes in P-content at these sites by occupation phase, extend quantification to other anthropogenic chemical signatures and embedded objects, and analyze these same characteristics at other sites in Bosnia. These quantifications allow an exploration of diachronic and spatial changes in matter fluxes through which we then evaluate population, subsistence, and architectural models. The results reflect the different conclusions drawn from the analysis of quantified data, allowing a discussion of both the importance of quantification and, possibly, a new general model for analyzing matter fluxes in tells.

Quantification of soil erosion processes

Hans-Rudolf Bork (Kiel University)

Soil erosion comprises the processes of erosion, transport and deposition of soil particles namely by surface runoff and wind. Most soil particles, which were eroded on an agriculturally used slope were deposited on concave lower slope areas and adjacent flood plain. The volume of these deposits – coluvial layers on slopes and alluvial layers in flood plains – can be quantified by intensive excavations and drilling campaigns. Dating of the layers allows the quantification of soil erosion and deposition processes for different settlement, land use and climate periods. The method and examples from Central Europe, the northern Chinese Loess Plateau and Easter Island (Chile) will be illustrated.

Modelling domestic labour as a key to landscape development

Tim Kerig (University of Cologne)

The effect of demographical growth on landscapes is obvious: more people need more food, they add more labour to natural environments and at the same time they consume more land. But the relationship between labour and environment is much more differentiated. Crop choices may serve as an example.

Case studies from the Neolithic of Southern Scandinavia and from the Northern Alpine foreland show demographic proxies correlated with crop choices, reflecting the local history of domestic labour.

The most time-consuming task in agrarian economies is crop processing which could already be identified and estimated for Neolithic societies.

In the case studies, available demographic proxies are 1) summed probability distributions of calibrated radiocarbon-dates well as 2) palynologically derived ratios of land-cover classes showing human impact on the landscape.

Due to the outstanding record of botanical macro-remains from Alpine Foreland dendrochronologically dated wet-preserved cultural layers, the evolution of the mix or choice of cereals in use can be described in some detail.

In principal, the use of cereals evolves towards a reduction of labour. But each case study follows its own trajectory. As a rule of thumb, the reduction in (most probably female) workload correlates with an increasing number of people – as one would expect from recent demographic research focusing the impact of innovation on fertility.

Prehistoric economies and population dynamics in Central Europe from a perspective of large-scale archaeological databases and modelling

Jan Kolar (Czech Academy of Sciences, presenting author), Peter Tká, Martin Macek, Petr Kuneš, Petér Szabó

Archaeology asks often questions about the nature of prehistoric economies, subsistence strategies,
periods. In Hessen, there are slight differences in crop Triticum spelta and Hordeum vulgare. The fertility of import which was focused on the Hulled cereals hints that the honey might be gathered from rather scapes with extensive animal browsing. There are ing a very high plant diversity of rather open land-
mead, made from honey gathered in the wild, show-
tents of central sites studied contain originally
diversity, which seems less. All Bronze vessel con-
tents of central sites studied contain originally mead, made from honey gathered in the wild, show-
ing a very high plant diversity of rather open land-
scapes with extensive animal browsing. There are hints that the honey might be gathered from rather large areas. In Wetterau seems to have been a con-
siderable deforestation during Hallstatt. Latène material is lacking. At Hochdorf is evidence for beer production. The best investigated central site is Heuneburg with an impressive list of cultivated plants, due to wet conservation in ditches. Especially to mention are Cicer arrietinum, Satureja hortensis, Ruta graveolens, Vitis, Castanea sativa, and Juglans regia. Pollen analysis from ditches, from honey resi-
dues, and from moss caulking of a cauldron indi-
cates a very open landscape. The tree and shrub diversity was high, including surprising species as the conifers Abies alba, Picea abies, Taxus baccata. Pollen analysis of lake sediments southeast of Heu-
neburg up to a distance of 60 km show no clear gra-
dient of less deforestation in bigger distance: The whole landscape seemed to be used to a high de-
gree. If there are more central places apart from the Heuneburg which the land organized the use, or if the influence of the Heuneburg went so far, is an archaeological question.

Seeds in context: the relationship between the botanical composition of a sample and a variety of sample properties

Mans Schepers [University of Groningen / Groningen Institute of Archaeology, presenting author], S. Arnoldussen, G. Aalbersberg, J.A.W. Nicolay

One of the first things one learns in archaeology nowadays is the importance of a thorough and cor-
correct description and administration of the archaeo-
logical context of the finds or samples. This has also widely been acknowledged in archaeobotany. Nowa-
days, close cooperation between field archaeologists and botanists allows for an in-depth analysis of the relationship between the remains retrieved and a variety of archaeological, and thus archaeobotanical, properties of the samples. Sample properties can be defined as all information assembled, be it in the field or during post-excavation analysis, that provide background to the interpretation of an assemblage. On a site level, these properties include chronology (absolute age or phase), spatial distribution and type of context (feature, layer). Within a feature, often subdivided in several fillings, these properties may include color, humic content and lithology, but poten-
tially information from other proxies as well. Numerous studies did indeed succeed in finding interpretable relationships between the seed contents of the samples studied and one or more sam-
ple properties. In this paper, for ca. eighty samples from the terp site of Jelsum, the relation between

Food production and consumption at Iron Age central places in southern Germany in comparison with rural sites

Manfred Rösch [Landesamt für Denkmalpflege im RP Stuttgart]

The paper deals with land use, especially agricul-
ture, during the Iron Age in Southwest Germany and adjacent regions. It is based on results of ar-
chaeobotanical on-site and off-site research and compares data from central places with such from rural sites. The cereals of central sites show a low diversity compared with rural sites, a result of food import which was focused on the Hulled cereals Triticum spelta and Hordeum vulgare. The fertility of the fields was sufficient and better than in later pe-
riods. In Hessen, there are slight differences in crop diversity, which seems less. All Bronze vessel con-
tents of central sites studied contain originally mead, made from honey gathered in the wild, show-
ing a very high plant diversity of rather open land-
scapes with extensive animal browsing. There are hints that the honey might be gathered from rather large areas. In Wetterau seems to have been a con-
the properties mentioned above and the botanical composition of the samples will be systematically explored. Partly, this is done by translating qualitative descriptions on for example colour and lithology into simple quantitative descriptions. In addition, quantitative indicator values are calculated during the analysis. These include basic sample characteristics, such as (relative) residue volume, non-ecological seed characteristics for the sample (e.g. seed density, charred/uncharred ratio), and finally ecological values (e.g. salinity, moisture etc.) for the samples, calculated in various ways. This exploratory paper aims to find possible relations, positive or negative, between various sample properties. Numerous simple hypotheses can be formulated, such as: there is a positive relation between humic content, the colour ‘brown’, and a high seed density. Ultimately, this highly detailed approach to context descriptions is critically evaluated, both for the actual results, however modest, and on a more general practical it addresses the time investment/added knowledge balance.

Quantifying the contribution of plant and animal resources to human diet at the late Neolithic lakeshore settlement of Zürich-Parkhaus Opéra

Ferran Antolín (presenting author), Stefanie Jacomet, Marguerita Schäfer, Jörg Schibler, Bigna L. Steiner (all University of Basel), Niels Bleicher (Centre for Underwater Archaeology and Dendrochronology, Office for Urbanism, Zürich)

Anthropogenic deposits in wetland sites have a unique interpretative potential thanks to their extraordinary preservation conditions. These deposits contain accumulations of dung and other organic debris like leftovers of food preparation (both animal and plant remains), as well as other plant remains (incl. cultivars) resulting from on-site crop processing activities and of building activities. The site of Zürich-Parkhaus Opéra (Switzerland) offered the exclusive opportunity of sampling a well-preserved waterlogged settlement phase (dendrodated to ca. 3165 BC) that spread over a surface of 3000 m². A systematic sampling strategy was conducted and an ambitious multidisciplinary evaluation project was put up by the local authorities in Zurich. This allowed the recovery and identification of over 200,000 plant remains and 15,000 animal bone fragments. These data were used to estimate the total amount of plant and animal remains found at the site and eventually calculate the caloric contribution of each type of resource to human diet at the site. It is the first time that such calculations are possible at the scale of a village.

An integrated Bayesian approach to the reconstruction of past human lifeways

Ricardo Fernandes (University of Cambridge)

The reconstruction of past human lifeways can be complex given the multiple causes that underlie human behavior and some characteristic limitations of historical or archaeological evidence. Thus, it is proposed that the diachronic study of past human lifeways should be performed under an integrated approach bringing together a diversity of expertise and having the following key components: - Employment of Bayesian modelling to quantitatively reconstruct past human lifeways. Aspects of specific interest are those of chronology, subsistence, and mobility. - The starting point for the quantitative study of past human lifeways is a multi-isotopic analysis of organic remains. - Isotopic data from controlled feeding experiments is employed to characterize the physiological mechanisms of signal transfer from the diet to consumers. - Implementing open-access data repositories such as the isotopic database IsoMemo. - Placing humans within the context of climatic and environmental histories reconstructed from isotopic and non-isotopic palaeo-records. - Incorporating diverse archaeological and historical information (e.g. written sources, archeofaunal or botanical analysis, etc) into Bayesian models. - Under an iterative process social, economic, and cultural multi-causal models are put forward. Relevant archaeological case studies that illustrate the application of the proposed approach will be presented.

Limiting factors in the nutrition of humans

Walter Dörfler (Kiel University)

The human body is dependent on the regular intake of specific essential amino-acids as well as on minerals that can’t be stored in body tissue. Quantitative reconstructions of human nutrition must take this into account to give a realistic picture of former living condition. This fact delimits the potential range of variability of plant and animal components as base for the nutrition in prehistoric societies. Quantification also needs to consider food availability in different seasons of the year and storage capabilities of the prehistoric populations studied. The talk will give examples of different diets and their consequence for the supply with essential amino-acids
Complex dynamics and perceptive categories. A fuzzy approach for landscape classification (poster)

Wolfgang B. Hamer (presenting author), Daniel Knitter (both Kiel University)

Investigating (pre-)historic societies and their relation to the natural environment is a challenging task. On the one hand we know that the modern environmental characteristics do not necessarily correspond to that of the people and societies we are interested in. Besides this, people create their landscape based on their specific reading and engaging with the environment and therefore mixing up the signal of natural or human-induced environmental dynamics. A third issue remains: scale. Reconstructions of proxy data are (a) only locally available or (b) have a low spatial and chronological resolution. Hence, we have two problems: we do not exactly know what the people liked about their landscape and we do not exactly know how this landscape was characterized naturally. To deal with these problems we employ a methodology that is explicit about the uncertain character of our data: fuzzy. We present a first implementation of a fuzzy-logic system that uses regionally scaled environmental information in order to arrive at environmental categories people were able to perceive as different. We compare these categories to the location of Neolithic archaeological sites from Schleswig-Holstein, Germany.
Abstracts Session 8

Spatial analysis for an understanding of ancient human-landscape developments

Late Neolithic (3500-2200 BC) human activity in south-eastern Poland. Transformations of settlement patterns, economy, demography and social organization
Andrzej Pelisiak [presenting author], Małgorzata Rybicka (both University of Rzeszów)

Significant changes in human activity (settlement system, economy, and social organization) in south-eastern Poland and western Ukraine took place between ca. 3200 and 2800/2700 B.C. Around 3200 BC most large Funnel Beaker and Trypolie cultures settlements disappeared and then sedentary way of life was gradually replaced by mobile husbandry and pastoralism. Economic crisis corresponds with demographic decrease and intensity of conflicts. The timing of the rise of mountain pastoralism and the extent of the seasonal mobility of early shepherds are also key issues in the research on the Late Neolithic of this area. It should also be noted that the beginnings of this period is synchronized with significant and global climatic event, which is expressed in rapid cooling and rise in humidity. Results of the archaeological and palaeogeographic investigations carried out during recent years in the Rzeszów-Przemyśl loess zone, as well as in the western Ukraine, Moldavia, and in the eastern part of Polish Carpathians can be a strong basis for the discussion of these problems.

Spatiality of social activities at intra-site scale: combining a biographic approach and the potentiality of geostatistics
Katia Francesca Achino [presenting author], Juan Antonio Barceló (both Autonomous University of Barcelona)

The last fifty years of research and related theoretical advances have proved that the preserved archaeological record can rarely be considered as a frozen snap-shot mirroring the past; it is rather a changing palimpsest, partially or definitively modified by depositional and post-depositional processes of both natural and cultural nature. In this paper, we propose a biographic approach that dissects the contexts under analysis in an attempt to reach valuable reconstructive explanations. More specifically, we will explore the alterations of the archaeological deposit to distinguish each step of the related formation (and deformation) processes. This will lead to the improvement of our awareness of the processes themselves, thus making the tiles of our archaeological puzzle more understandable. Consequently, we will achieve a deeper insight into the organisation of past societies. By clarifying the effects and the strength of distortion provoked by depositional disturbances into the original record, this “travel back in the past” would also allow us to explore the main social activities and daily practices performed in the site during its life. Traces of those actions are fossilised in discrete aggregations of artefacts, bones, stones and debris; as these consist predominantly of derived waste, their analysis can provide manifold insights into the nature of the activities themselves. In addition, intra-site analyses can inform about the spatial distribution of social activities performed during the past. We assume, in fact, that where frequency of materials is higher, the probability that related actions were carried out in the retrieving areas or in close locations is higher. In most archaeological contexts, the only available spatial information consist of frequencies of observations, rather than single x y coordinate data, due to the condition of recovery (for instance, from sieving activity) and/or to the nature of the research itself (for example, surveys). This limitation of data is therefore reflected on existing research. In this paper a full range of spatial data as well as geostatistical tools (as, for instance, spatio-temporal interpolations) will be applied to probabilistically reconstruct the spatiality of social activities in specific contexts. The related results will be finally discussed by using a biographic approach, in light of the formation-deformation processes of each site.

Geoarchaeological analysis - how environmental conditions control economical and social shifting
Michael Kempf (University of Freiburg)

This work combines environmental conditions and data with archaeological structures like settlements and graves and their spatial dispersal. I determine possible social effects, reactions, change and adaptation to alterations in the geomorphological balances around the settings of the Alsation Niedernai region and furthermore scrutinise significant evi-
idence for migration or even population exchange from analysing the environmental circumstances. The geoscientific patterns are constructed by pedological, geological and topographical maps showing potential shifts in tillage and settlement structures from the local Roman Period over the so-called 'Barbarian Migration' until the early middle ages and the Merovingian Period. Considering the fact that there is no digital soil-map for the Alsace region, it was important to digitize and georeference analog plans deriving from the ARAA (Ass. pour la Relance Agronomique en Alsace). By aligning and integrating the different soil types to a general map, two sheets were merged and converted to shape-files. The same procedure was used to transfer the geological map into QGIS. Later on, both maps were underlaid with a hill shading and digital elevation model extracted from satellite imagery. To determine the archaeological background and the dispersion of settlement and grave findings through all specified times, I could access the database ArkeoGis constructed by Dr. Loup Bernard composing several chronologically and spatially different finding-spots in Alsace and its south-western German counterpart. After having transferred the spatial distribution in the GIS, it was possible to illustrate diverse patterns regarding the chronological notes imported by the database. The converted maps allow recognizing changes in agricultural and demographical distribution in a highly fluctuating and continuously populated region. The unique combination of a climatically and pedologically favoured area reflects a high-ranking pull factor through all times - disregarding political, economical and social trends expected by traditional scientific paradigm. We can state that it is not possible to locate migration processes of large ethnic groups into what is called Alamania in the Migration Period. The following conversion of primarily non-used districts into arable land is probably just the result of an economical enhancement and not mandatorily forced by social pressure due to large amounts of immigrating foreigners.

**Lines in the landscape - borders and pathways in spatial analysis**

Oliver Nakoinz (Kiel University)

Borders and pathways, limitations and connections are playing an essential role in the spatial organisation of societies. Various empirical and theoretical models have been developed in order to construct and reconstruct, to plan and to understand these lines, which are controlling social, economical and cultural actions, interactions and connections. This paper deals with the concepts of analysing and interpreting linear landscape features such as borders and pathways. The different approaches will be described, compared and their relationship is considered. The paper hence provides the basis for a decent evaluation and understanding of different approaches. In particular the complementarity and substitivity of approaches is addressed and the fundamental difference between empirical and theoretical models discussed.

**Location of choice: Spatial analysis of affordances and perception at Göbekli Tepe**

Ricarda Braun [Excellence Cluster TOPOI/ Freie Universität Berlin, presenting author], Daniel Knitter [Kiel University], Brigitta Schütt [Freie Universität Berlin], Ricardo Eichmann [Deutsches Archäologisches Institut]

The monolithic circular plants at the Pre-Pottery Neolithic site Göbekli Tepe in Southeastern Turkey are interpreted as a hill sanctuary, serving as a cultic center during the time when the transition from a foraging lifestyle to sedentism took place. The complex is located on a limestone plateau of the Germu range on the northern edge of a vast, fertile plain. However, the immediate surroundings are a barren landscape without water within a range of about 5 km. In the wider region the choice of such a location is, in the current state of knowledge, unique in its kind. In order to make sense of this choice the paper analyses the given affordances of the site’s environment. The aim is primarily to explore the physical characteristics, as for example the availability of natural resources, game or shelter. In this context the accessibility, an important factor determining the exploitation of a site, will be described on the basis of cost surfaces. Complementary to the material prerequisites of the site this study approaches possible perceptions of Göbekli Tepe, drawing on methods of visibility studies, among others. By means of an affordance-viewshed of the site the potential prominence can be reconstructed, while the visibility from several positions on the mound gives an impression of different benefits of the location. The findings are to be compared with those of other hilltop sites. The integrative perspective of the site and the affordances of its location allow gaining a more comprehensive picture of the role of Göbekli Tepe than a mere sanctuary.
‘Apples and Oranges’? Comparing distribution patterns of chipped stone artefacts in contemporaneous Neolithic settlements

Nils Müller-Scheeßel (Kiel University)

On the one hand, the “Linearbandkeramik” (LBK) is supposed to be one of the most well investigated archaeological groups of Central European prehistory. On the other, our understanding of daily life is severely hampered by the fact that almost nowhere direct evidence of a living floor has survived, making it hard to infer patterns of activity areas or discard. Still, it is commonly supposed that the remains of material culture – usually only found in sub-surface features like pits – allow meaningful interpretations of daily life of the inhabitants of LBK houses. In order to shed light on this issue, the spatial patterns of the chipped stone tools in the settlements of the LBK settlements of Vráble is analysed and compared to that of the roughly contemporaneous settlements in the Late Neolithic of the Visoko basin in Bosnia-Hercegovina. Contrary to the situation of LBK houses, there multiple floors have survived forming multi-layered settlements. However, from a purely technological point of view, the range of stone tools used and manufactured as well as the technological expertise seems comparable. The comparison is carried out with respect to the amount of material culture having survived at all and their spatial patterning, relying on spatial methods like tests for autocorrelation and non-spatial explorative techniques like correspondence analysis.

Late Neolithic and Early Bronze Age cultural landscape of Obra Valley region in the view of Łęki Małe burial ground and its surroundings

Sebastian Teska (Adam Mickiewicz University Poznan, presenting author), co-authors: Annalena Bock, Hendrik Raese (both Kiel University), Marcin Ławniczak (Adam Mickiewicz University)

One of the key aspects of the project “The Late Neolithic and Early Bronze Age developments in the south-west Baltic area (2500-1500 BC). Why did the Bruszczewo-Łęki Małe type of power structures appear?”, cooperatively conducted by Adam Mickiewicz University and Christian-Albrechts-University of Kiel, is the enhancement of data concerning organisation, development and functioning of Late Neolithic and Early Bronze Age societies in the Obra Valley region – especially in the vicinity of the burial ground in Łęki Małe. To fulfil this aim, the first steps are long-term field survey and geophysical survey. Research conducted in early phase has provided us with data, which influenced our view on a matter of cultural landscape in studied time span and space. In result, we were impelled to modify following survey campaigns to adjust it to current conditions. During this talk, we would like to present those data in comparison to initial expectations and actual state of knowledge in order to discuss the matter of two specific aspects: spatial dispersal of Late Neolithic and Early Bronze Age activity traces in the research area and potential in studies of the tumuli burial ground in Łęki Małe. Thereafter we would describe next stages of research with regard to previous assumptions and preliminary results in a context of the main aims of the project.

Human Preferences for Paleo-Landscapes of Central Baraba Forest-Steppe (the South of Western Siberia) in the Bronze Age – the Middle Ages

Anastasia Nikulina (Sobolov Institute of Geology and Mineralogy, presenting author), Chupina D.A., Zolnikov I.D., Kartozia A.A.

In this work the Landscape Archaeology approach was applied to the study of Central Baraba Forest-Steppe. The purpose of this investigation is to clarify modern ideas about human preferences concerning paleo-landscapes.

A database comprises information about 134 archaeological sites attributed chronologically to the Bronze Age, the Early Iron Age, and the Middle Ages. Lists of archaeological sites were used for creating the database which was supplemented by information taken from the Scientific Center of Historical Heritage Preservation. Each cultural component of multilayered sites was added as an individual element of the database. GPS coordinates and geomorphologic positions of selected sites were determined during field investigations [Kuzmin et al., 2013]. Landforms and relief types were mapped according to the methodology [Chupina, Zolnikov, 2016] based on morphometric analysis with DEM SRTM. Several parameters were measured for each site.

The significant number of the Early Bronze Age settlements is situated in river paleovalleys and basins of paleolakes that is the evidence of arid climate. Settlements are located on all landforms in equal percentage with slender prepotency of ridge and gently rolling plain positions which could be explained by the presence of mobile hunters-gatherers.
Increasing number of the Middle Bronze Age habitation sites situated not far from water sources could be related to the emergence of cattle-breeding. Some settlements are located in basins of paleolakes. This fact gives evidence of relatively dry climate.

Sedentism of ancient people determined a decrease in their mobility in the Late Bronze Age. Thus, people occupied the edges between river paleovalleys and a gently rolling plain. Increasing number of settlements situated on automorphic landscapes (ridges, outliers and etc.) indicates the beginning of moistening.

Even more the Iron Age habitation sites are located on automorphic landscapes. There are no sites situated on hydromorphic landscapes (basins of paleolakes and river paleovalleys). These facts indicate progressively humid climate. In this case people were bound to move around in search of convenient places for living that increased human mobility.

Climate in the Middle Ages was humid, and people occupied automorphic landscapes. But aridization started in the Late Middle Ages with tendency to present time.

Thereby, geomorphologic positions of archaeological sites were determined by intensity of paleoclimate humidification and type of ancient economy. These two factors influenced on human mobility.

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The Hierarchy and Usage of Landscape of the Area of the Morava River Bank and the Socio-Economic Organization of the Great Moravian Society
Marek Hladík (Academy of Sciences of the Czech Republic, presenting author), Petr Dresler, Jakub Tamaškovič (both Masaryk University)

The middle and lower area of the Morava river bank (on the border between Slovakia, Czech Republic and Austria) offers us an opportunity to study the development of the socio-economic organization of the Great Moravian society and how it interacted with this landscape. In the 9th century, 4 important fortified settlements were located in this area – Mikulice, Pohansko, Devin and Bratislava. Each one of them played a specific role in the socio-economic organization of Great Moravia. In the 9th and 10th century, the studied region underwent a dynamic evolution. In the 9th century, it was the center of the region. In the 10th century [during the geopolitical changes], it was pushed to the periphery. This development is also reflected in the settlement network. In its changes and hierarchy, we see an opportunity to study how the landscape was utilized and also to create a socio-economic model of the Great Moravian society. Via the interconnection of several database sets, which are based on previous research, we can approach this topic as a study of a complex system, in which the representation of the individual entities is not limited by regional activities of the individual researchers and by their methodical differences in data processing. In the first part of paper, we will introduce the basic issues which we are studying in this region. The main topic will be the hierarchy and function of the main settlements, their economic strategies and the interactions between the settlements and their peripheries. In the second part, we will introduce the case studies from each of the micro regions, in the centers of which always stands one of the central agglomerations. The applied methods in each of the studies were built upon the spatial analyses in the GIS application (centrality, availability, visibility analysis etc.), as well as on more complex archeological prediction models. These have the ability to describe the different types of relationships on several levels. On the first level, they describe the relationship between the natural environment and the settlement. On the second level, they describe the basic relationships between entities of the settlement structure. Both of these levels point to a deliberate deployment of these settlements and therefore to a non-random usage and structuring of the landscape. The second important tools in our search for causal relationships were the...
exploratory statistical analyses (FA, PCA). Based on these processes, we formulated our theoretical models. We explored the questions related to these processes (how stable is the exploratory model, how close are the socio-historical models to the data, does the APM defined causality relate to causality found in living cultures) in the Structural Equations Modeling (AMOS, IBM, SPSS), which calculates quantitative tests of theoretical models. APM models were also tested based on new archeological data. In the last part of paper, we will connect the results of the partial analyses into a unified whole, which will be a model of the socio-economic organization of the Great Moravian society. This model will take the landscape into account, which is a determining factor of the studied processes and also a phenomenon created by these processes.

Visual prominence of prehistoric monuments within the Mallorcan landscape (poster)

Maria Gelabert Oliver [Graduate School Human Development in Landscapes, Kiel University]

A monumentality phenomenon emerged in Mallorca, the largest island of the Balearic archipelago, during the late II millennium BC. This phenomenon started with the construction of a few monuments presenting variable architectonic features. In the following centuries the building of monuments became well-established, the monuments spread throughout the island, and architectonic features were standardized. These new architectonic forms are linked to a new organization model of the social space and represent the nodal social structures of past communities. The monuments, built using cyclopean masonry, are tower-like structures giving them a visual prominence. Furthermore, the monuments are usually located in elevated places and in some instances the local topography is exploited to further increase the prominence of the monuments. Thus, the visual prominence of the tower-like monuments relies on architectonical and geomorphological criteria and its analysis has to be addressed considering both the construction volume and the relief surrounding the monument. Therefore, variables such as visibility, height of the monument, and the local topographic variability are analysed. The diachronic analysis of the visual prominence of the tower-like monuments provides a better understanding of the architectonic phenomenon as well as the perception of space by Mallorcan prehistoric communities.

Geo-statistical methods to analyse changes in pre-Hispanic settlement patterns in the Río Ica catchment, Peru (poster)

Vincent Haburaj [Freie Universität Berlin, presenting author], Jonas Berking, David Beresford-Jones, Daniel Knitter, Leanne Zeki, Fraser Sturt, Alexander Pullen, Oliver Huaman, Kevin Lane and Charles French

Within arid regions allochthonous rivers as a main source of fresh water play a significant role in the spatial organisation of human occupation. This study aims at a comprehensive view on changes in the prehistoric occupation patterns within the Río Ica catchment on the southern coast of Peru. Results of different research projects are integrated. The heterogeneous character of the catchment allows us to define three sub-sections which differ greatly in terms of vegetation, relief and water regime. Based on quantitative geo-statistical methods we analyse spatio-temporal changes in human occupation from the Early Horizon (c. 1000 - 200 BC) through to the Inca Late Horizon (AD 1450 – 1532) in the context of environmental conditions, as well as socio-economic processes. Examining known archaeological sites we are able to assess the significance of environmental location factors for pre-Hispanic settlements. In addition, areas of high human interaction are identified on the basis of a classification of archaeological sites according to their function (craft/industry, cult, cooperation and trade). We thereby transfer the concept of central place theory to the spatial distribution of archaeological remains, introducing a novel approach to identifying central functions in a spatially explicit way. Our results crystallise the changing character of occupation in the study area over more than two millennia. They contribute to the ongoing debate on the decline of the Nasca culture, endorsing a complex combination of natural and socio-economic reasons. Furthermore, the results support the concept of a more widespread exchange and cooperation during ‘Horizon’ periods in the study area and likewise indicate that the disappearance of a supra-regional administrative polity during ‘Intermediate’ periods might have led to higher human activity in smaller scale societies, as reflected in a more diverse spatial organisation in terms of geomorphometric units and central areas.
Modeling of land use history of the Meshchera Lowlands (European Russia) based on paleoecological and historical data (poster)

Victor Matasov (Lomonosov Moscow State University, presenting author), E. Yu. Novenko

The analysis of land use history of the Meshchera Lowlands since the Neolithic has been realized on three key areas, located in the north of Ryazan region in different natural conditions. The first area is located at the lowest part of the Meshchera Lowlands, with many lakes, wetlands and poor sandy soils. The second one is situated at the junction of low, largely swamped area, with poor sandy soils and better drained territory, with loamy soils. The third study region includes elevated eroded karst plateau with loess fertile soils and a part of the Oka River valley with sandy terraces and meadows on floodplains. The archeological and paleobotanical data (Middle and Late Holocene), maps of the General Land Survey (XVIII century), Atlas of Mende maps (XIX century), satellite imagery Corona (XX century) and modern satellite images (XXI century) were used to reconstruct long-term landscape changes. Combining this different information could make use of the strengths of all these datasets while mitigating their weaknesses. Different limitations may potentially be overcome by modeling with using the Multiple Scenario Approach (Bunting and Middleton, 2009) and CLUE-S model (Verburg et al., 2002). These models allow us to understand spatial-temporal distribution of land cover and land use. The obtained results show that the first key region was characterized by early human settlements on shores of lakes (Neolithic-early Bronze Age), the lowest percent of arable land and a relatively low population density. The second area was populated later, the share of arable land was permanently low, and the population was concentrated along the main road. The forestry dominated in land use structure. The third area, so called “Kasimov Opolie”, was intensively used by human since the Neolithic up to now. The territory is marked by highest population density and share of arable land.
Abstracts Session 9

Agent based modelling of human-environmental interactions in archaeology: Putting models into practices

Times of Change?
Kerstin Kowarik (University of Vienna, presenting author), Hans Reschreiter, Gabriel Wurzer

The current developments in archaeological research practice might very well be seen as times of change for the application of numerical modelling in archaeology (cf. Hinz / Yang Session Call, Kristiansen 2014). The number of computer based models applied to archaeological questions has been on the increase ever since the 2000s (Lake 2014). The field of applications is wide and divers. Amongst these the question of human-environment relations emerges as a promising area for several reasons. In the first part of this talk I will give an overview of current trends in the field with a special focus on ABMs dealing with human-environment relations. I will then go on to argue that the field faces several challenges if a successful and sustainable development is to be achieved. Amongst these the connection to the mainstream of archaeological research ranks high. Of course the rapidly rising level of computer application skills especially in younger researchers will do much to bridge this gap. But to achieve a sustainable development we also need to address the question of theoretical sophistication. I do not intend to argue for more complicated models(!), but stress the need to embed ABMs firmly within a sociological and anthropological perspectives.


Naturally complex. Effects of seasonality and nutrients in simulating Neolithic economic systems
Martin Hinz (presenting author), Ingo Feeser, Stefan Dreibrodt (all Kiel University)

It is certain that human action and the peculiarities of human decision-making (free will or not) increase the complexity of CHANS to a large extent. However, there are also very basic facts such as seasonality, which have a great influence on the character and trajectory of economic processes. An analysis of such processes must therefore account for these effects, or, more precise, they may produce incorrect results if seasonality is not a factor. This is even more true when such an investigation focuses on prehistoric settings, in which the influence of nature and also of the cycle of the year plays a much greater role, as appropriate buffering systems such as storage, division of labor and exchange networks with regard to the staple goods of daily needs were much less pronounced than they are in historical times or in the present. One role model for ABMs dealing with the interlinkage between population dynamics and agricultural production and their dependence on environmental and social factors may be the well known Artificial Anasazi. Although this model produce impressive results and might be well suited for the geographical situation it was developed for, we think that for analysing the European neolithic a more complex approach is necessary. The more pronounced seasons, the importance of livestock and the probable shift of focus in subsistence economy make it necessary to go beyond the yearly resolution of modelling and also to incorporate additional limiting factors, such as the different quality, composition and availability of different nutrietal components in the yearly cycle. Our agent-based simulation of the neolithic subsistence economy therefore especially considers these aspects. The development of settlement demography, their agriculture and livestock farming, their demand for calories and other nutrients and their demographic development are simulated. The seasonal distribution of resources and work tasks is modeled. Precisely from this seasonality and the consideration of physiologically necessary of non-caloric supplements arise complex and emergent phenomena with regard to the trajectory of the whole system, especially in respect to the ratio of animal and plant based nutrition.
Contrasting the influence of environmental feedback and the nature of demographic spread in shaping the early-mid Neolithic: and agent based modelling

Cornelis Drost (presenting author), Marc Vander Linden (both University College London)

The development of early farming (i.e. agriculture and stock-breeding) is arguably a fundamental technological revolution. In the European case, both plant and animal domesticates were introduced from an external center of domestication located in the Near East, so that we are dealing with a process of technological diffusion and adaptation (rather than de novo innovation). As evidenced by an impressive quantity of archaeological data, the spread of agriculture and stock-breeding across Europe is a long and uneven spatio-temporal process which lasted over three thousand years and, without much surprise, was paralleled by a variety of archaeological assemblages. Over the past fifteen years, extensive computational models of this diffusion have been put forward. With few exceptions, these all trace their origins to the Fisher-KPP reaction-diffusion system, i.e. they focus upon evaluating the speed of the dispersal and the corresponding parameters (e.g. demography, local carrying capacity, physical properties of the landscape). In this sense, these models rely upon suggested properties of the transition to farming (a change in demographic regime favoured by new food production and diet), but hardly consider either the nature of the technologies involved, nor the mechanisms of their transmission between actors. These models are also mostly silent regarding the material variability of this process, which, ultimately, remains our main archaeological source of information. As part of an ongoing ERC-funded project (EUROFARM; PI: Dr M. Vander Linden), we are developing alternative computational models, based upon Axelrod’s seminal paper on the dissemination of culture (Axelrod 1997). In this agent-based model, each actor is placed on a fixed location on a grid. Each actor possesses several features (e.g. 1, 2, 3 and 4), each of which being characterised by a given trait out of several possibilities (e.g. a, b, c or d). At each step, neighbouring agents can interact together, with a higher proportion of shared traits leading to a higher probability of exchanging traits for other features. Although this model is by definition extremely simple, we consider that it provides a robust proxy for archaeological assemblages, where each feature corresponds to a category of evidence (e.g. pottery, lithics) and each trait to the corresponding variability (e.g. pottery type). Building upon its simple elegance, we have introduced new rules in the model in order to explore the role of other factors upon the dissemination of traits. These new rules concern both the physical geography within which the model is framed – mountains that block interaction, or seas that aid it – the mode by which features are able to spread, and the adaptive linkage between environment and specific traits. In doing so we aim to examine the relative importance of environmental adaptation and the demographic spread of the early Neolithic, in determining the spatial distribution of both adaptive (e.g.: farming and stock rearing practice) and non-adaptive (e.g.: ceramic style) features. References Axelrod, R. 1997. The dissemination of culture: a model with local convergence and global polarization. The Journal of Conflict Resolution 41 (2): 203-226.

Simulating the effect of environmental circumscription on the emergence of social complexity

Alice Williams (presenting author), Thomas Currie (both University of Exeter)

Archaeological and anthropological data suggest that while the history of each society is unique there may be common underlying factors shared among societies which developed large and hierarchically organised populations. One such factor may be environmental limitations on population movement and access to resources. Pressure on access to resources can arise where a growing population begins to exceed the resources of its current area but expansion into neighbouring areas is limited by environmental boundaries and adjacent societies. Our hypothesis is that the increased incidence of conflict in environmentally circumscribed areas will lead to increased likelihood of the emergence of social complexity. This effect of environmental circumscription, as argued by Robert Carneiro, highlights how human-environment interaction may influence the development of human society. We are building an agent-based model to test the circumscription hypothesis by simulating the decisions of a population of villages in areas of different levels of environmental circumscription. The model shows the extent to which environmental circumscription could lead to the emergence of social complexity in a hypothetical world. Emergent patterns of agent behaviour are compared with predictions for the circumscription hypothesis to test its validity in an abstract environment. The model is also being adapted to fit real-world environmental data from the Valley of Oaxaca in highland Mexico. The results will be used...
to test the extent to which the formation of social complexity in Oaxaca could be predicted by its highly circumscribed, mountainous environment.

**Plans on an agent based model approach on prehistoric scale**

Wolfgang B. Hamer (presenting author), Daniel Knitter, Oliver Nakoinz, Rainer Duttmann (all Kiel University)

This contribution presents different approaches that are utilized in the subproject A2 "Integrative Modelling of Socio-environmental Systems Dynamics" of the SFB 1266 to model prehistoric landscapes and simulate potential interactions with the prehistoric societies. Simulation is a common tool in archeology when it comes to the testing of hypotheses or to the building of theories. According to Kohler et al. (2012) simulations even offer the ability to resolve many problems which get along with intuition and ethnographic analogy. Lake (2014) sees the current developments on the one hand in dynamic system models and on the other hand on agent-based models. While dynamic system models are ultimately deterministic due to their mathematical structure, agent-based models have a more flexible structure (Lake 2014). As a combination of multi-agent systems and cellular automata agent-based models allow not only the interaction between agent and environment, but also include the agents knowledge and the individuals and groups knowledge gain (Lake 2014). Our upcoming work aims at the combination of different modeling approaches. The first step is the reconstruction of prehistoric landscapes and environments using a combination of recent elevation models, pollen and soil data and climatic reconstructions. The second step is the potential view on this landscape of the humans of this time using fuzzy analysis. The third step is the combination of these input variables with an agent based model to evaluate potential interactions of the society with the environment. Thereby the people or groups of people should not only react but also interact with the environment. This interaction triggers not only changes the environment but also the agents view on it. Hence we present a first view on how such a model approach could look like for a set of Neolithic archaeological sites from Schleswig-Holstein, Germany. Kohler T.A., R. K. Bocinsky, D. Cockburn, S. A. Crabtree, M. D. Varien, K. E. Kolm, S. Smith, S. G. Ortman and Z. Kobti (2012): Modelling prehispanic Pueblo societies in their ecosystems. In: Ecological Modelling (241), p. 30 – 41. Lake M. W. (2014): Trends in Archaeological Simulation. In: Journal of Archaeological Method and Theory (21), p. 258 – 287.

**Using Agent-based scenario building for interpreting the archaeological record – A case study from Northern Spain (poster)**

M. Solich (University of Cologne), M. Bradtmöller (University of Rostock), A. Arrizabalaga, A. Calvo, M.-J. Iriarte (all Univ. of the Basque Country)

By providing a rich archaeological record and a long research tradition, Northern Spain is an interesting area for investigating complex adaptive behavior of Pleistocene Hunter-Gatherer societies. At the center of our particular research interest stands the analysis of specific adaptation processes resulting in an increased subsistence-related specialization that while dealing with continuous environmental alterations can lead to reduced behavioral flexibility of a hunter-gatherer society.

However, a diachronic investigation of behavioral patterns remains challenging, with studies of hunter-gatherer land-use and subsistence strategies leading to contradictory results. This inconsistency is primary due to the fragmented nature of available human and paleo-environmental records and is a central obstacle for understanding the ability of hunter-gatherer societies to adapt to their (ever-changing) environment. To partly overcome the given inconsistencies and to provide a better scope for interpreting the archaeological records, the benefit of computational-based simulation models was tested in the course of our study. As illustrated by our poster, agent-based scenario simulations of ideal-typical hunter-gatherers can serve as a useful tool to provide a framework of possible and plausible human system configurations. Scenario simulations, based on regional topographic models and paleo-environmental dynamics, can be used for a more enhanced archaeological model building and can be easily cross-evaluated by the archaeological records.
Understanding inequality: New perspectives

A quantitative and diachronic study about social inequality based on archaeological cultures

Ralph Großmann (Kiel University)

In the last decade, social inequality in ancient societies received increasing attention in archaeological research (e.g. International Conference in Kiel 2015). This project deals with social inequality from a diachronic perspective. The focus goes on multiple archaeological cultures, situated within a small-scale region in Southern Germany. Following questions will be studied: What evidence of social equality or inequality can we find? Is it possible to identify a trend towards an increasing inequality? Which political institutions can be reconstructed? As methodological approach statistical economic concepts, such as the Lorenz curve and the Gini coefficient, will be applied. For this purpose, the distribution of grave goods will be quantified and artifacts will be assigned with values. However, this approach leads to methodological problems and we have to consider if we can use economic methods for archaeological cases and if we can allocate values to artifacts from today's perspective. This paper gives an overview of an ongoing research project.

Social inequality and socio-spatial organisation

Martin Furholt (Kiel University)

While phenomena of social inequality are clearly dependent on both political and economic factors, in this paper I want to concentrate on the political dimension of intra- and inter-group social relations. With respect to this topic, one aspect which is accessible by archaeological methods, but is until now both theoretically and empirically under-developed is the role of socio-spatial systems, the role of socio-spatial organisation as a condition for the development of egalitarian or non-egalitarian community structures. Drawing mainly from Neolithic and Bronze Age case studies, I will explore the impact of factors like group cohesion and social homogeneity or permeability and social heterogeneity of local communities, the impact of the strength and reach of trans-local social relations and the rate and structure of mobility on the emergence or avoidance of social inequality in prehistory.

Monumentality as a marker for social differentiation? Recent examples of megalith building in Indonesia and India

Maria Wunderlich (Kiel University)

The construction of megalithic monuments and how it is connected with the socio-economic organisation of the communities building them has been a long discussed issue in archaeology. Recent examples of societies building megalithic monuments might give us valuable insights into the social organisation of this specific tradition. My paper will deal with two recent examples of megalith building traditions in Sumba, Indonesia, and Nagaland, India. Investigations in Sumba and Nagaland showed that megalith building is clearly connected to the availability of resources and wealth among persons and communities. These factors may for example influence the size or the type of the monuments. Thus, megaliths can be seen as a symbol of status and social differentiation connected to the distribution of wealth and therefore can be a marker for economic inequality. Nevertheless, there are several other important factors influencing the capability of people to build megalithic monuments, including such as competitive behaviour, cooperation or kinship systems. These results can be of interest for archaeological studies, because they show that traceable factors such as the monument size and type can indeed be connected to social factors. Nevertheless, they can only be understood in connection with other parameters.

House Structures and Social Stratification

Ditamulu Vasa (Nagaland University)

Megalithic tradition of Nagaland is of prehistoric origin and the Megaliths are considered to be the most common object for transmitting social memory. And although the craftsmanship in wood carvings depicted on the houses is connected to the Megalithic culture signifying persons of higher status that has already performed the feast of merit with the community yet the cultural memory that is visible on the decoration of the house of a feast giver is not known fully. This paper is a brief report on the reflective anecdote of a feast giver and the symbol-
ism that can be interpreted through the indigenous house designs and the recognition that lives as a cultural memory among the Chakhesang tribe.

Inequality in the Practices of Manipur Megalithic Traditions
Potshangbam Binodini Devi (D.M. College of Science)

Manipur is one of the small hilly states of North East India. This state is populated by many ethnic groups. Of them there are three major groups. They are the so called Naga groups, the Kuki-Chin- Mizo groups, who inhibiting the hilly areas; and the Meeteis/Meiteis occupying the valley areas. Megalithic tradition is a death cultural phenomenon which could not be seen in different parts of the world. It could be seen in North East India, particularly in Manipur, as a living tradition. Different structural types of megaliths are planted in this area with varied but living megalithic traditions. Most of them are belonged to the Naga and the Kuki-chin Mizo groups. In this paper the present author would like to discuss the various megalithic traditions practised by the different communities of this state. The main objective of this paper is to throw light on the similarities and differences in the process of erecting each huge rough stone and also the differences while performing various rites and rituals associated with each monolith. More focus is given to the unequal performance of megalithism under the influence of Christianity.

Assembling conceptual tools to examine the moral and political structures of the past
Carole Crumley (University of North Carolina at Chapel Hill)

Anarchaeology comes to speak with us, the band of travellers into the Past that is the profession of archaeology. The message is that archaeological theory and archaeological practice do not have to go their separate ways, nor must the Past say nothing to the Future. Anarchaeologists see no reason to privilege the excitement of figuring out how to study the past from the equally alluring necessity to make sense, and use, of what we find. Of importance is a commitment to better understand the past and create vision[s] of our human future. This pivot toward the future can take many forms, but it is ultimately an ethical and moral stance from which to critique power and to seek nonauthoritarian forms of past and present organizations. Anarchaeology works both below ground and at ground level. The human relations that count most are trust, empathy, creativity, the value of the individual, and reliance on the community fabric. Such old and basic needs will not be absent in a liveable future.

Conceptualizing Inequality in the Capability Approach
Lieske Vogt-Kleschin (Kiel University)

Developed since the 1970s by economist Amartya Sen and Philosopher Martha Nussbaum, the Capability Approach (CA) represents a clear paradigm alternative to many classic views of human well-being. The capability perspective stresses that human well-being is neither about what humans have (e.g. wealth) nor about preference satisfaction, but rather about what humans are able to do and to be (capabilities and functionings). The CA acknowledges that humans need resources (i.e. wealth) to be and do certain things. Meanwhile, it stresses that besides access to resources, there exist three further factors affecting what human beings are able to do and to be. These encompass personal heterogeneities (e.g. a blind person needs other and possibly more resources to be able to achieve the same functionings as a person who is able to see), social conditions (e.g. in a society with a high level of crime a person needs more resources to achieve a certain level of security than in a society with a lower crime rate) and environmental conditions (e.g. in a colder climate people need more and different clothes to keep warm). In so far as human wellbeing in terms of capabilities and functionings arises from an interplay of four factors [resources, personal heterogeneities, social and environmental conditions], different combinations of these factors may yield a similar level of wellbeing. While intuitively plausible, this implies that determining a person’s level of wellbeing requires a broad amount of information and ranking and comparing different levels of wellbeing becomes challenging, to say the least. The contribution introduces the CA and discusses its implications regarding inequality.

Capability Approach in Archaeology: Some Perspectives
Vesa P.J. Arponen (Kiel University)

From the 1970s, the economist Amartya Sen’s Capability Approach has been shaking accepted conceptualizations of justice, well-being, inequality and more in international human scientific debate. Yet, amazingly, the Capability Approach has not yet really
touched in Archaeology. This talk discusses selected theoretical and practical issues pertaining to the introduction of the Capability Approach in archaeology.

**Inequality research and the role of household archaeology**

_René Ohlrau (Kiel University)_

Besides burials, households are the main source for interpretation of social inequality in archaeology. But like in burial archaeology the analysis of household remains is in need of rigorous source criticism. Whether there is an intentional tradition of artefacts or not, archaeology seems to be bound to the materialistic realm of inequality. New considerations like the capability approach try to overcome traditional narratives in archaeology. The question remains if we are also able to find new measures for well-being and quality of life. Here, a suggestion by Smith (2015) will be considered. The paper will discuss the application of the capability approach on household remains and if we are able to overcome traditional measures of inequality in archaeology.
Abstracts Session 11

From pre-urban structures to cities: Urban space as an action context

Sociological Theory of Practices. Principles and Outlines
Frank Hillebrand (Fernuniversität Hagen)

To capture the own eminence of the appearance of practices sociologies of praxis focus on the materiality of artifacts and human bodies. This turn to the materiality of social life is related to a new concept of physical objects and human bodies. Both are conceptualized as dynamic basics of social life. Thus material is not faced static; it is understood as moldable through practices. So the sociological praxis research has to be conceptualized in contrast to structuralism focus on structural properties and the action theory focus on indented actions. Praxis research doesn’t posit such theoretical assumptions as prerequisites, but rather as the effects of the praxis. It is likewise shortsighted to reduce all praxis to certain structural principles, which appear as the unmoving mover of the praxis. Those principles involved the performance of the praxis for its continuity are, in turn, effects of past or current praxis, and therefore cannot be accepted as timeless, but must rather be investigated as poststructuralist in their historic conditionality and genesis. Similar to that intended actions are results of praxis; they are not timeless starting points of sociality. To further clarify this central point of sociology of practice, I will figure out the most important consequences of the proposed definition of the praxis as a nexus of physically conceived practices concerning body and thing. This allows me to relate the six principles derived from sociology of practice to the question how urban spaces can be conceptualized as material conditions for practices.

Places of Gods and Men: Social, political and economic interactions within the Etruscan Sacred Landscape
Robinson Peter Krämer (Rheinische Friedrich-Wilhelms-Universität Bonn)

Sanctuaries and ritual places are main features of the urban space and important indicators for addressing issues of social, political and economic interaction. Until recently, the Etruscan sanctuaries have been studied within a landscape framework only to elaborate a topographical typology [e.g. urban, sub-urban, extra-urban], or in order to understand general functions based on topographical and architectural features [e.g. arx, emporion]. A systematic study on the roles and functions of sanctuaries in a broader landscape perspective, addressing specific social, political and economic interactions, is still missing. This paper focuses on the genesis, development and political economy of the Etruscan sacred landscapes from the 8th to the 5th centuries BCE. It covers therefore the beginning of the Etruscan Culture, the intensified social stratifications and shifts during the urbanization and elite politics of the 7th–6th centuries BCE, as well as the economic crisis of the 5th century BCE. The paper will attempt to reconstruct ritual behavior and social interactions between human agents, socio-political transformations deriving from these interactions, as well as economic and social reasons behind these modifications. I shall analyze not only topographical features, but also pottery assemblages, inscriptions, theonyms and names of cult participants, architectural changes and processes of monumentalization as proxies for understanding the interaction of human agents within the Etruscan sacred landscapes. In this way, Etruscan sanctuaries become significant interlocutors not only when attempting to reconstruct the broader sacred landscapes within a broader socio-political and economic network, but also when trying to understand processes of interactions between human agents within the urban and extra-urban space.

Urban Space- and Landscape-Interaction in Hellenistic Pergamon and its Microregion
Felix Pirson (DAI Istanbul)

The ancient city of Pergamon in western Anatolia served as a dynastic seat in the Hellenistic period (3rd–1st C BC) and continued as an urban center into the Byzantine period. Due to intensive archaeolog-ical research since the late 19th C, Pergamon provides us with a rich data set for various topics of ancient urban culture, including interdependencies and interaction between city and landscape. Since 2006 a new research program on the urban organism and the micro-region of Hellenistic Pergamon contributed to a much more integrative picture thanks to a multidisciplinary approach including
archaeology, ancient history as well as natural and geo sciences.

The paper will discuss some of the new results on two levels:

[1] Interaction between urban lay-out and the topography of the micro-region including various environments such as land and sea. This will be illustrated by the external prospect of Pergamon and the use of visual satellites such as gravemounds, and by the bipolarity of Pergamon’s main harbor-city Elaia.

[2] The function of so-called natural sanctuaries both inside and outside the city for the dialogue between human and nature. In this context, the paper will touch on the visual configuration of the interrelations between the nonhuman and the human, the agentive qualities of natural formations in styled settings and finally the role of religion in the development of aesthetic practices towards nature.

This broad overview of different topics and levels of human-nature interaction aims to promote ecological aspects in the study of ancient urbanism. At the same time it argues in favor of integrative approaches which overcome the hierarchic dichotomy of “city and countryside” and look at interdependencies within micro-regions instead.

Hellenistic Built Space and Its Agency: The Asclepieion of Kos

Asja Müller (Kiel University)

According to current theoretical research, space cannot be held as a physical given entity, or a pre-existing container in which action takes place, but is intrinsically linked to human behaviour. Human actors appropriate and shape their environment through their activities. During this process of social construction, built space gains an own sort of agency that reacts back on its originators. The present paper aims to draw attention on the way how built space directed human behaviour over a period of time, in which anthropogenic intervention on the environment can be regarded as extraordinary strong, e.g. the Hellenistic age. One building complex of that date, the Asclepieion on Kos, has been selected as a case study. This well preserved sanctuary permits an in-depth discussion of the interlinkage between natural environment, architecture and human behaviour. The way how agency is obtained by the Asclepieion during the building process can be addressed by the following questions: Which interferences on the natural environment can be detected? In which way does the architecture react on its environment or even benefit from it? How does it stage certain natural/built features? How have natural environment and architecture been entangled in order to create a coherent building complex? Having answered these prerequisite questions, the central part of the paper is dedicated to the analysis of human behaviour in this built space, e.g. during religious festival activities. It will be discussed how the architectural complex and its setting interact in order to direct human action according to three different dimensions: The first dimension refers to physical movement through built space, which is channelled by roads, steps, framing structures like stoai and statues or restrictions of the natural terrain, in which the architecture is set. The second dimension concerns the structuring of views. It will be discussed, how built space guides human sight in carefully selected directions by staging architectural elements or blocking and thus channeling the view and creating impressive vistas from distance as well as outlooks to the surrounding area. The third part aims to understand how cognitive processes are influenced by built space. This regards the communicative function of architecture and environment, which draws the actor’s attention on certain aspects. That could be realized, for example, by creating links to other places of human presence in the surrounding area. Taking into account these different foci, the present paper can be considered as an approach to analyse the mutual interference of built space and human action in the Hellenistic age.

The Appropriation of Space in the Sanctuary of Poseidon at Isthmia

Sarah Herzog (Heidelberg University)

Extraurban sanctuaries played a key role in the urbanization process of the cities they belonged to. The sanctuary of Poseidon at Isthmia provides a highly interesting example for the kind of functions these sanctuaries could fulfill. As roadside shrine at the main overland route between Corinth and Attica and the important short connection between two sea routes across the isthmus, it was predisposed to be a meeting point for people, and not necessarily solely Corinthians. In its early history this seems to have been the main purpose of the sanctuary. Later on it developed into the most important extraurban sanctuary of Corinth, which is evident at least since the 7th century with the construction of the early archaic temple designed to mark the territory of the city. In addition, panhellenic games were established in the 6th century. This paper aims to analyze how the sanctuary was organized in order to fulfill these potentially contradictory functions. Considering literary sources as well as archaeological evidence,
namely architecture, votive and import practices, I will address the following questions: How was space appropriated in the geometric and archaic sanctuary of Poseidon at Isthmia? How can we come to a closer understanding of how the appropriated space was perceived by the Corinthians and others? What was the function of the cult of Poseidon at this spot for citizens and for foreigners? How did the sanctuary and its architectural as well as its non-architectural design contribute to the urbanization process of Corinth?

Negotiation Power in Sacred Landscape: ritual dynamics in Greek sanctuaries under the Roman domination

Marco Galli (Sapienza Università di Roma)

The paper is focusing on the process of dynamic interactions and power relationships in Greek sacred landscape during the Roman domination. The manifestation of the "sacred" is to be examined both as a concrete physical space and as a symbolic-communicative space of social and ritual interaction. Some key studies are intended to visualize forms of negotiations of power through agency: for examples, transfer of venerable images to new contexts (i.e. Rome), transfer of local ritual knowledge under the supervision of ritual experts or ritual mediators, incorporation of external authority into the sanctity of traditional places: all these aspects reflect multifaceted strategies of control and leadership progressively enacted by Rome of the sacred landscape. A selection of archaeological evidences in a wide chronological sequence (2rd cent. BCE - 2nd cent. CE) illuminates recurring patterns in ritual behavior that characterize the representatives of Roman power in the decisive phase of Roman expansion and consolidation in the Greek East.

City and Shore. Natural change and human action

Stefan Feuser (Kiel University)

In the history of mankind shores were places of intensive settlement action. These shores are highly fragile spaces influenced by different natural impacts such as wave action, tides, eustatic sea-level changes as well as tectonic up- or down-lifts. In this constantly changing environment harbours and settlements were erected with the intent of being permanent and stable. Thus, on the one hand these settlements transformed the natural environment into a human shore as on the other hand the natural impact was a constant challenge and threat for the built environment. The paper explores how humans reacted to the fragile environment of the shore from Archaic to Roman Imperial times. It is methodologically based on the latest results of geoarchaeological research and archaeologic excavations in port cities as well as on the iconological analysis of images. Basic questions are: What actions were undertaken to stabilize the shore to install harbours and permanent settlements there? What are the different reasons for change in the urban design of port cities? How was the shore incorporated in the urban fabric and what role did it play for the daily practices? Furthermore, the paper wants to highlight how the human shore might have been perceived in Roman Imperial times.

The perception of the built space: Greek vase painting as a source

Fanny Opdenhoff (Kiel University)

In this paper I will investigate the representation of architecture and built space in greek vase painting. In greek vase painting, we find numerous examples of images that show human figures acting in spaces defined as such by architectural elements or features like stones, trees, water etc. These images show different modes of representing architecture and space and therefore can provide insights into the perception of buildings and built spaces and the ways they were considered as action contexts. When we take on a diachronic perspective, we can observe changes in the modes of representation from archaic to late classical depictions of myths and other scenes that involve specific buildings or defined spatial settings. With regard to the representation of urban space, I will concentrate on three main questions that I will direct at different depictions of actions taking place in architectural contexts from the archaic and classical period: - which buildings and spaces used to be depicted and how can they be identified as 'urban'? - How are architecture and space represented in different periods and styles? - How do the depicted human figures move and behave in relation to these spaces?

The Roman City in Motion: Senses, Space and Experience

Jeffrey Veitch (University of Kent)

At several points, Henri Lefebvre makes reference to two topics taken up in this paper: the senses and the Forum, although neither is in reference to the other. Lefebvre, following Nietzsche and Marx, highlights the senses as theoretical tools for under-
sensing the city: Multisensory approaches to Roman urban space

Eleanor Betts (Open University, Milton Keynes)

Underpinned by Henri Lefebvre's concept of 'a pedagogy of the body' (2014, p. 34) and his categorisation of sensations (2014, pp. 114-15), this paper develops archaeological methods for understanding the multisensory Roman city. Its focus is on how the multisensoriality of everyday life can be characterised if due attention is paid to sense data and the affectiveness of urban architecture. The multisensory body is the locus of human identity, experience and memory, and the body in motion gives meaning to space and place. Bringing these perspectives together, this paper applies sensory methods and approaches to Roman urban landscapes, with a particular focus on the cities of Rome and Ostia. It argues that the senses played a central role in the recognition, understanding and use of Roman urban space. Consideration will be given to the impact sensory stimuli (via architecture and associated material culture) had on the experiences of inhabitants of Rome and Ostia, and the distinctive cultural, social, political and economic activities which affected those participants. A key question addressed is the extent to which sensory stimuli helped characterise particular locales, and movement within them, and how evaluating sensory data alters our perceptions of the use of Roman urban space.

De-centralized Decision-making Processes and the Creation of Urban Space in 3rd Millennium BCE North Mesopotamia: The example of Tell Chuera

Henrike Backhaus (presenting author), Tobias Helms (both Bonn University)

The site of Tell Chuera (North Syria) has often been discussed as a prime example of a planned Early Bronze Age city. The site, which covers about 70 hectares (including walled space and extramural areas), most likely formed the political center of a city-state and belongs to a distinct group of early North Mesopotamian cities, which are characterized by a radio-concentric layout. Excavations revealed that some elements of Chuera's urban layout can be dated back to the very beginning of the local Early Bronze Age sequence (about 3100 BCE), when the site was founded de novo, and persisted for nearly a thousand years. Yet, despite the striking evidence for central planning, Chuera's urban landscape was also subjected to transformations rooted in decentralized decision-making processes and agendas of the urban commoners. In order to alter the narrative of Chuera as a planned city per se, our shared paper will focus on the impact bottom-up processes had on the spatio-functional makeup of the settlement. We will focus in particular on three important components of the site, namely the residential zones, public/semi-public space (street network and open "plazas"), and the defensive infrastructure. By analyzing the relationship between aspects of central planning on the one hand and the decentralized appropriation of space on the other hand we will provide new insights regarding the social impact on the spatial organization of an early state level society.
Simulating Public Culture in Antiquity: Public Assemblies and Addresses on the Forum Romanum and the Agora and Pnyx in Athens

Sebastian Schwesinger [Humboldt-Universität zu Berlin, presenting author], Christian Kassung, Susanne Muth, Stefan Weinzierl, Erika Holter, Una Ulrike Schäfer, Christoph Böhm

Within archaeology, it has become increasingly customary to reconstruct historical spaces digitally. These reconstructions manage to convey a visual sense of these places, however «sanitized», which correlates with research questions into the visual function of spaces for representation. Going beyond questions of architectural legacies and moving towards analyzing concrete historical cultural situations requires leaving a bird’s eye view and diving deep into spatial scenarios. In order to investigate cultural performance as the relationship between «software» (habits, cultural codes, etc.), «wetware» (people, animals, etc.), and «hardware» (architecture, natural landscape, etc.), the «sense» of space needs to be created in the experience of it. Thus it is necessary first to recreate a visitor’s perspective and a plausible scenery and, second, to include the other senses apart from simply the visual when seeking to understand ancient spaces (Blesser/Salter 2006). When it comes to the most famous and most important public spaces in antiquity, such as the Forum Romanum in Rome and the Agora and Pnyx in Athens, the focus has been primarily on their architectural appearance, i.e. the individual buildings and building complexes that putatively constitute these locations. However, these squares were characterized by a multitude of experiences, such as political speeches, bustling markets, and law courts, which engaged all the senses (Muth 2014, Wallace-Hadrill 2014). In this paper, first-person lifeworld simulations including physically reliable reconstructions of the auditory dimension will show how a specific spatiotemporal situation for these public spaces was formed and how we can use acoustic simulations in particular to fully understand the multivalent experience of these spaces. Based on our existing scientific digital models of the Forum Romanum (Muth/Holter) and the Athenian Agora and Pnyx, we have designed virtual 3D scenarios for these spaces and have conducted virtual acoustic surveys (Weinzierl et al. 2015). Our paper will present and discuss our case studies on the simulation of public addresses and assemblies in both of these important public locations. In doing so, we are going to analyze the different venues that were designated for addressing large crowds from a participant’s perspective, and will show how the situational, and especially the auditory characteristics of these spaces can explain their many functional and structural changes. By comparing different simulated scenarios, it is possible to gain an understanding of how these spaces were configured for specific audiovisual experiences, as well as to identify obstructions in these functional ensembles. Simulation techniques prove, therefore, not only to be an excellent tool for illustrating ancient public culture, but also to foster and support alternative research questions.


The Production of Diplomatic Space in Ancient Rome

Hannah Cornwell (University of London)

Diplomacy, as a system of communication (both verbal and non-verbal) and a means through which the identity of different groups is articulated, is inherently spatial. As Neumann has stressed in his work Diplomatic sites: a critical enquiry (2013), sites, as physical places, are to be understood as a process of human negotiation, which in turn results in the construction of social space. In the ancient world, even though there were no permanent embassies or consulates, the sites chosen for the reception, housing and entertainment of foreign envoys, as well as those chosen for the deposition and display of treaties and alliances, allow us to consider how inter-state relations were played out as part of social life. Whilst any site of diplomacy will be defined by boundaries of identity and will articulate power relations through the construction of the space, which permits and regulates interactions between actors, the use made of the urban fabric of Rome and its environs to shape and manipulate Rome’s self-presentation and relations with other polities in the Mediterranean world is particularly striking. The control of the urban space, and the access, restriction, and movement through it serves to emphasise the legal and social status of individuals in relation to the city (and indeed subdivisions of the urban space), and therefore their relationship to
Rome as a Mediterranean power. This paper will address the question of how the urban space was defined in relation to foreign embassies, examining a few key arenas of interaction in terms of the loci chosen. It is necessary to understand the wider socio-political relevance of these sites in order to appreciate the ways in which Rome used the urban space as a means of diplomatic communication. In this respect Rome, as a site of diplomacy, was a key aspect in the diplomatic body language employed to structure relations between Mediterranean polities.

In celeberrimo loco, in publico et locus datus decreto decurionum – The incorporation of council decrees into the urbanistic design of the city
Felix Schulte (Duisburg-Essen University)
In the de jure autonomous cities of imperial Italy self-government by local councils was an important and openly displayed part of civic life. The ruling ordo decurionum regulated local politics in passing of decrees. Optional epigraphic publication led to inscribed monuments communicating these decrees. The inscriptions were purposely commanded and created for public reception and therefore needed to be placed in areas where access to and reading of the text was possible. In my talk I am going to examine the groups which could influence the positioning of these monuments and how these epigraphic objects were incorporated into the functional and urbanistic structure of the cities. I will also raise the question to what extent text and material design interacted with the placement of the inscription in the urbanistic framework, since these factors are crucial for the reception of inscribed information published in the decrees. My presentation shall thus deal with the political utilization of designed urban space by various players of the municipal elite through the publication and presentation of municipal administrative documents with high significance for local political life.

Getting Around the City: A Space Syntax Perspective on Post-Medieval Nuremberg
Donat Wehner (Kiel University)
Cities are the biggest and most complex artefacts humans have ever created. They are concentrations of buildings connected by public space. Clustered patterns of diverse contacts between different actors originate from movement in this space. They can be held as an essential reason for the existence of cities. In space syntax theory, public space – the layout of the city – is determined as a network whose geometry and topology stay in close connection to the kinesic behavior of people and thus with their interactions and freedom of action. Therefore, space syntax theory does not understand public space as a scene for human actions but rather relates actions to physical structures. What happens in one space is always based on the collocations and interdependences of that space with others. One cannot conclude that the layout of the city determines individual movement but rather that human movement follows predictable patterns. The applied space syntax method is first of all based on a radical reduction of a city to an axial map. Thereby, the complex city structure is displayed in its entirety as a compilation of linear connections. The lines can be considered as nodes and the intersections as edges to detect key data, visualizations and descriptions of movement potential such as integration and betweenness of urban space in computer based network models. Because an empiric pedestrian counting is not possible for post-medieval Nuremberg, another model of step depth analysis should be compared with in which the closeness of known important interaction nodes like markets, city hall and castle is captured. The comparison of the models by a regression analysis shows how the kinesic behavior drawn from the city layout relates to the concentration of actual activities in urban space.

Urban spaces on the coast of the Sahara: moving goods, people and ideas
Monika Baumanova (University of Basel / University of Uppsala, presenting author), Ladislav Smejda (Czech University of Life Sciences), Heinz Ruther (University of Cape Town)
In an urban context, movement may be understood as the omnipresent social action. Public encounters and general moving of goods, ideas and people all happen on the streets and open places of the city, still within the built environment but outside the buildings. In many ways it can be said that the city is its streets. A number of archaeological theories have been put forward that strive to make sense of urban spatial organisation in pre-colonial West Africa. Some of the most influential ones deal with the phenomena closely connected to this region, described as dual or twin settlements, and with liminal or secondary cities. In many areas, it is difficult to gain more information relevant for further advancement of these theories through excavation, especially given the difficult environmental and political circumstances. Our case study is taken from
the "coast of the Sahara" and focuses on Timbuktu Old Town. Timbuktu is a historic city on the edge of the Sahara that was famous as a major trade centre, ecological crossroads and intellectual focal point of Muslim West Africa at least since the 14th century AD. These characteristics that defined its urban life took place through interaction and public encounters, which can be studied by analysing the spatial patterns inherited from the past and visible until the present day in the city layout. Using GIS, satellite imagery and spatial integration analyses we examine under what spatial terms the encounters of people, goods, traditions and ideas could have taken place and determined the configuration of the city. Towns of trade and learning are always major meeting points. Considering the preserved pre-colonial street layout and spatial organisation of the town into quarters, we derive how the physiognomy of the town could have structured the movement network. We investigate the spatial layout of the Old Town to learn about the ways it mediated interaction of residents and travellers and how it fitted in the overall picture of African pre-modern urbanism.

Urban space as an ambivalent place for children and their play
Christine Richard-Elsner (Fernuniversität Hagen)
In history as well as in sociology and other humanities, throughout the last years research has been done on the relationship between human beings and space. Interdependencies were investigated between the mental constructions of spaces and their physical reality and the influence of humans on physical spaces. What is the role of the urban area in this regard? It appears to be plausible, that the town and the city were strongly influenced by humans’, more precisely adults’ needs for defence, trade and craft production. This artificial space in turn influenced human behaviour. Some scholars point out that living in towns led to changes in adults’ behaviour, as a higher population density rises the likelihood of conflict. Good manners and the regulation of affects might have been suitable to reduce conflicts. But also towns are the living space of children. Children have other needs than adults. Play, experimenting, chasing and running needs space. In rural areas everyday activities of children were play, watching and imitating adults’ actions concerning work or rituals. Chores in agriculture were assigned, which were often accompanied by play. Space for play and materials for play were mostly available. In contrast to the current situation in western societies, in the past the percentage of children in towns and urban areas was much higher due to lower life expectancy. It is estimated that in the Middle Ages around 30% of the town residents were children. Thus, children had enough playmates, but space in mostly walled towns and cities was often rare, crowded, dirty and dangerous. Play in nature and rural spaces have mostly been connoted with vitality and pleasure, highlighted as part of an idyllic rural life or just seen as normal child’s behaviour. In comparison children’s stay in the streets and on the places of towns has often been associated with unmoral behaviour, noise and trouble – and on the other hand with adventure and curiosity. It has widely been regarded to be inept for well-educated children, as sources from ancient Middle East, classic antiquity, the Middle Ages to post-modern times indicate. So compared to traditional rural agricultural life, adults have to spend more time and energy to provide alternative occupations and to supervise and discipline children. In my presentation I will give examples mainly from the outgoing Middle Ages, when towns in the Old Reich were densely populated. Paul Schneevoogel, latinised Paulus Niavis, was schoolmaster in Chemnitz and author of school books with dialogues of school children’s everyday life. In his autobiography Johannes von Butzbach wrote about his childhood in Miltenberg. The authors give us some insights into rules and restrictions for children, their space for play, education, work and mobility. These will be illustrated with town and house plans from late medieval Chemnitz and Miltenberg on the background of everyday economic and religious life of these busy and prosperous towns at that time.

A Churchyard as a Space for Social Action
Lisa Renn (Albert-Ludwigs-Universität Freiburg)
Apparently at Freiburg’s beginning in the 12th century, there was at first no intention of constructing a central, open space as a room for action. Instead, a place meant for a different purpose took over this role and served as a religious and profane centre: The churchyard of the Freiburg Münster, the present-day Münsterplatz. This site had numerous functions and became one of the main spaces of action for the citizens of medieval Freiburg. Despite its primary role as a graveyard, the churchyard served as a meeting place, as a place for jurisdiction and, in later times, as a market place. As the city grew and changed, the churchyard changed its physical appearance and its social functions within the urban design of the changing city. This also changed the perception of the churchyard itself by the inhabitants of Freiburg. The Idea of a space of...
action to be empty, as it is known for other medieval
cities, does not apply to Freiburg. In fact, the design
of the churchyard as an empty, open place as we
know it today, represents only the last stage of its
development. Based on archaeological and written
sources this paper will present the Münsterplatz as
a site for changing functions and roles in the context
of Freiburg’s urban design.

Filling Urban Structures with Life – Ani-
mal Inhabitants of a Byzantine City
Henriette Baron (Römisch-Germanisches Zen-
tralmuseum Mainz)
The 6th century AD was a time of transforming ur-
banism in the Mediterranean. It was a major con-
cern of emperor Justinian I. (527-565) to restore the
magnificence of the Roman Empire, not only by ex-
panding it to the extent it had had when it was di-
vided in 395 AD, but also by redesigning its cities,
thus adapting them to the demands of the time and
the transformed systems of value of the now Chris-
tian East Roman Empire.

When walking through the ruin cities of Ephesos
(Turkey) or Justiniana Prima (Carićin Grad, Serbia),
or when watching the 3D-animations that exist for
the Byzantine periods of these cities, one can marvel
at the splendour of the many churches, fortifications
and houses. Nonetheless, they give the impression
of ghost towns, not of formerly bustling dirty cities,
crowded by merchants, artisans, soldiers and peas-
ants, with horses, dogs and poultry in the streets
and pigeons on the roofs.

A recent project of the Römisch-Germanisches Zen-
tralmuseum in Mainz focuses on the urban ecology
of the 6th century city of Carićin Grad. This city was
erected by Justinian I. close to his birthplace in or-
der to become the new administration centre of Illyricum. Its layout was meant to comprise charac-
teristics of the Classical city (e. g., an acropolis, an
upper town, a lower town, a horreum and a bath) while at the same time it incorporated the main fea-
ture of the new Christian identity: a large number of
churches. Moreover, there is evidence that parts of
the city were used for typically rural activities, e. g.,
the processing of grain, seemingly another adaption
to the demands of the time that characterises the
concept of »city« of this time. However, the endeav-
our failed and after a mere 80 years the city was
abandoned and never again repopulated.

One part of this project deals with the wild verte-
brate fauna of the city unearthed in different archi-
tectural structures: wild birds, reptiles, amphibians
and small mammals. In the urban architecture,
these animals found shelter, nesting places and
plenty of food. They animated the urban surrounding
and made it a place of Human-Animal-Interaction
far beyond the well-known interactions with live-
stock. The encounters with these wild urban inhabi-
tants shaped the human perception of their urban
surroundings. Some of them – first and foremost the
rodents – were vermin, while others might have
been perceived as beneficial: e. g., the songbirds
singing in the trees or owls and other predators
preying on mice. Hence, these animals played both
an ecological as well as a social and economic role
in the city. These aspects of animal inhabitants of
past cities, however, are still poorly understood. For
the Byzantine Period, only few publications of faunal
materials yield information on these animal groups
because their bones are both difficult to retrieve and
to identify. Even for the comparably well analysed
Roman period we do not know much. Hence, for
most species not even the point in time when they
began to colonise urban environments is known.

The paper presents an approach to assess the role
of the urban wild fauna in an Early Mediaeval city.
This can first and foremost add to our understanding
of the sensual (or experiential) perception of the
urban surrounding and can lead to an understanding
of action and reaction in urban human-animal rela-
tionships.

A tale of two cities? Changing urban
space at Selinous between the Classical
and Hellenistic periods
Nicola Chiarenza (GSHDL, Kiel University)
“the city of Selinous, one of the biggest and richest
Greek colonies in the Mediterranean, has repre-
sented, since its foundation around the third quarter
of the 7th century BC, a border between three main
“cultural landscapes”: Greek Sicily to the east,
Phoenician-Punic cities to the west and indigenous
settlements to the north, in the inland territories.

After the Carthaginian destruction of the city in 409
BC, a new organized settlement arose under the
Carthaginian authority, starting from the second half
of the 4th century BC. Deep changes affected many
areas of the previous classical city and modified the
urban space, where new human agents acted. The
physical and ideological limits of the city changed
and the functional purposes of several areas were
modified. Some of the previous temples still pre-
served their function while others were abandoned
or modified for a different use. New cult places
arose too.
The paper will provide an overview of the changes of Selinous' urban space between the Classical and Hellenistic periods and will investigate the reasons of transformations. It will also suggest new ways to reconstruct how the urban perception of this border settlement was modified.

Ideal Rome? Urban building as an action context
Marion Bolder-Boos (Technical Univ. Darmstadt)
Aulus Gellius famously reported that colonies were quasi effigies parvae simulacraque of Rome (Gell. 16.13). This dictum has in the past been cited to argue that many towns, both in Italy and in the Roman provinces, were striving to copy the Urbs, often linked to the process of Romanization. This view may have been influenced by the colonial experience in the modern era, where we can find replications of European architecture in many overseas colonies. In recent years, this model has come under scrutiny. Stimulated by works in the field of modern urban sociology, the individuality and intrinsic logic of cities has come into focus. In this paper I want to take a closer look at Roman and Latin colonies established in Republican times to trace their individual urban development from their foundation to the outbreak of the Social War. Rome could of course influence the shape of its colonies, but individual factors were at work as well. The decisions and actions of the communities or of individual members of these communities significantly shaped the urban makeup of the colonies. In some cases those human agents may have decided to emulate a building or an architectural feature from Rome, in other cases they did not. Building projects thus become areas of action which can bear witness to political, socio-economic, symbolic, functional or ideological activities within a community.

Patterns of Urbanism in the Western Baltic. An approach via the built environment
Felix Rösch (Kiel University)
In my lecture I am going to present an envisaged architectural-sociological approach on medieval urbanism in the Western Baltic. The investigation focuses on urban centers in four regions that are exceptional in having an outstandingly dynamic urban development: Schleswig-Holstein, Scania, the lake Mälaren area and the estuary of the river Oder. Here the built environment between the 8th and 13th centuries at different sites is analyzed. Following concepts developed by sociology, space can be understood as a relational order of living beings and social goods that appears both materially and symbolically. Based on this understanding, the concentration of specific material culture and practices in one area should be understood as an essential manifestation of urbanisation in the planned study. Bundled, they can be indications of an urban lifestyle and an urban identity. Of central importance are questions addressing the nature and extent of practices in the interaction between human actors and the built environment. The built environment is approached by Environment-behavior theory, making it possible to investigate the relationship and mutual influence of material culture and human actors. By this the phenomenon of urbanisation is examined at a topographic sphere of activity, which refers to the geographical space, as well as the socio-cultural sphere of activity, which is expressed through an "urban" lifestyle. Finally conclusions will be drawn on the degree of urbanism in each site based on archaeological features. To get behind common patterns and individual developments in Northern European urbanisation, these urban spaces are finally compared and contrasted.
**Abstracts Session 13**

Interrelationships of climate, environment and socio-cultural changes through the Mid- to Late Holocene in the Mediterranean area

**Geochronology of the Holocene Cultural Deposits of the Ili River Delta [South Kazakhstan]**
Jean-Marc Deom (Al-Farabi Kazakh National University)

The Ili delta is a complex geo-environmental system characterized by active distributaries and inactive paleocourses, with relevant centennial and millennial anomalies and major relocations from the start of the Holocene until the last 200 years. In spite of its ecological potential, the human occupation of the territory has been poorly studied. Until recently, the only known historical human settlements in the Ili delta were a series of 4 medieval tortkuls (square forts) located between the Bakanas village and the Uzunaral straight, supposedly aligned along a northward caravan road paralleling the Shett-Bakanas paleo-distributary and crossing the Balkhash lake through the Saryesik Peninsula. During the years 2007-2012, in the frame of a Japan-Kazakh research project studying Late Quaternary geological-environmental changes in the Balkhash basin, in order to reconstruct the successive phases of activity of the distributaries of the Ili delta, a system of 5 terraces of the water courses were dated by OSL analyses from their upper sedimental cover. Terraces have been established during arid phases, and paleo-courses have been partly activated during pluvial phases, both events corresponding respectively to regressions and transgressions of the water levels of the Balkhash lake as reconstructed in the frame of the same project. The team of geoarchaeologists participant to the fieldworks collected and documented all the cultural objects found on the datable surfaces, assembling in that way archaeological findings with high resolution geochronological attribution. Such task was extended for 3 more years in the context of a second project and, as a whole, resulted in a chronologically calibrated data-base of the human occupation of the different branches of the delta between 5000-200 BP. The discovery has a double significance, for geological and archaeological sciences: on one side it witnesses phases of humidity and partial reactivation of some paleocourses; on the other it underlines the economical complementarity of the desert and piedmont human habitats, which has been totally ignored by previous archaeological works and theoretical reconstructions. The study concerned chosen segments of the entire area of the delta (more precisely, of the 3 successive deltas of the Ili, 2 paleo and 1 active), at the heads of the distributaries and at their middle and final course. Cultural finds consist in microliths, potsherds and few slags, in the relative proportion of: microliths 6%, potsherds 93%, others 1%. Their chronology spans from Eneolithic (turn of the III millennium BC), Bronze, Early Iron, Medieval until the Ethnographic period (200 AD), with the periods represented in slightly different proportions in all sites, evidencing a full use of the entire delta from the earliest periods all along history. Most numerous are samples attributed to the Bronze Age (51% of the total findings), followed by Early Iron (31%), Medieval (12%), Ethnographic (0.2%).

Correlative analyses of cultural materials, locales and time periods allow inferring some paleoeconomical and paleo-ethnological considerations. The economical importance of the area of the Ili delta always had a double aspect: for hunting and for winter pastoralism. The upper courses, by hosting the highest concentration of microliths, obviously constituted the favored hunting area; the middle and lower courses, by hosting the highest proportion of potsherds and slags, have been apparently reached and used as seasonal pastoralist dwellings (winter camps). The intensive occupation of the entire delta by part of Bronze Age communities (Pre-Andronovo and Andronovo) points to an early stage of seasonal mobile pastoralism already using complementarily 3 residential zones, as witnessed by similar ceramic assemblages: piedmont settlements, summer camps in alpine meadows, and winter camps in variable places of the desert depending from climatic-environmental conditions and snow cover.

**The Bukhārā Oasis – The Zeravshan Catchment and the Historical Entanglement with Human Activities**
Jan Wehberg (University of Hamburg)

The Bukhārā oasis within the catchment of the Zeravshan River is extraordinary well suited for a comprehensive study of the historical entangled relation
between man and biosphere. The valley was formed in a much earlier geological period than most of the other Turanian river valleys. The Zeravshan catchment never underwent any considerable geo-physical changes. The stable geological history favors an in-depth analysis of its surface area, its soils, and sediments. “The correlation between a precise scenario of Late Pleistocene and Holocene climate changes with stages of settlement and de-population in Central Asia seems at present one of the most promising research directions, in line with the substantial course of interdisciplinary research on the interaction between humans and the natural environment”. The term “landscape” is the interface to the GIS process and climate modeling. In general, GIS tools offer the option of mapping topologies. This of course applies to the historical structures and landscape in the same way: settlement pattern, industrial sites, roads, irrigation systems, shifting riverbeds and lakes, and other interaction of humans with landscape can be identified and mapped.

A soil and landscape evolution model (SaLEM) will be designed for relevant surface processes, meaning the course of erosion, deflation, weathering, sediment transport, and other environmental phenomena. The physio-geographical project identifies processes and stages of the natural evolution of the Zeravshan catchment and separates them from other human influenced events. In order to delineate the geological, climatological, and human induced changes of land use the close co-operation with the independent archaeological and the historical project on Bukhārā is fundamental. The period we look at lies approximately between the first detectable settlements in the 6th century BCE and the present day. The joint approach allows insight into the natural conditions of the Bukhārā oasis area at different stages of its development. Due to the data provided by the archaeological project, a special focus lies on the period between the first Achaemenid settlements and their irrigation efforts in the 6th c. BCE and the Mongol destruction of the oasis in the early 13th c. From the point of the wealth of narrative sources (in Arabic and Persian) provided by the historical project, special attention is given to the peak of the expansion of the irrigation system between the 7th and the 10th century. For the development of the 16th to the 20th century archival sources (documents of endowments of land) are available. In order to include successfully the historical and archaeological project a web-based GIS will be provided as project interface and platform hosted in Hamburg, and sustained as a geo-data infrastructure (GDI) after the project’s duration.

Paleoclimatic change, disaster history and the urbanscape transitions in Athens
Liang Yang (Kiel University)

Past abrupt climate changes on millennium time scales have received wide attention among natural and social scientists, also because of today’s rapid climate changes and their extensive impacts on our society. In the eastern Mediterranean area, coherent patterns and synchronous events in history suggest obvious links between urban development and climate forcing. The city of Athens as the origin of ancient Greek civilization experienced many periods of prosperity and decay. Though the transitions were mostly dominated by wars and power changes between empires, severe climate events and natural disasters may also considerably have shaped the process of Athens’ development. Among natural disasters, earthquake, tsunami, flood and wildfire were the main forces that stressed the development of Athens. To recover from and respond to these disaster impacts, the city was thereafter developed in ways that either changed the ever existed city patterns or guided sensitive areas to specific directions, which could have transformed the urbanscape gradually. However, the possibility that these transitions may have been responses/resilience strategies triggered by abrupt climate events has so far hardly been explored. With extensive literature review, existing archaeological records and paleoclimate reconstruction modelling results, this study analyzes the large scale climate variations, related environment changes in mesoscale, aiming at setting into context the local natural disasters in Athens and its surrounding areas during the Holocene period.

The study treats a number of important climate events in the area and urban transitions of the city, of which the integration of all these elements and insights from recent analysis throw some new light on understanding the forcing-transition process. Preliminary results indicate unclear link of climate forcing and urban transition over the whole city, but a few signs of possible linkages were recognized at specific blocks of Athens. Along with the population growth and land sprawl, more areas and more sections of the city were becoming susceptible to climate events and increased consideration of disasters in their development. The findings have significance for our in-depth understanding of the ancient city construction and development, as well as for the future urban development in facing of global climate change. Keywords: Climate change, natural disasters, urban transition, Holocene, Athens.
Check extrema. Combining scientific and historical perspectives on floods in pre-modern Nuremberg (1400-1800)
Tobias Kluge (presenting author), Maximilian Schuh (University of Heidelberg)

Extreme climate events and their consequences were a common threat for premodern societies. A single discipline can hardly study the interdependency of natural impacts and human reactions. Therefore, interdisciplinary approaches are of essence. The proposed paper will discuss the relevance of historical research on medieval and early modern extreme climate events for the calibration and interpretation of data environmental physicists and chemists draw from proxy data from the ‘archives of nature’. Preliminary results of the ongoing research project will show how the close examination of administrative records offers a far more accurate perspective on flooding events in Nuremberg than the hitherto used narrative sources. These precise findings help the natural sciences to evaluate proxy climate data drawn from the analysis of stalagmites situated in the area surrounding Nuremberg. The analysis of past societal reactions on extreme climate events may help to find answers to today’s challenges. Furthermore, this collaborative case study allows reflecting on the advantages and problems of interdisciplinary research of the humanities and the natural sciences.

Macro-scale European population trends and the impact of regional climate dynamics towards the Bronze Age-Iron Age transition.
Giacomo Capuzzo (presenting author), Juan Barcelo (both Autonomous University of Barcelona), Marco Zanon, Marta dal Corso (both Kiel Univ.)

Increasing and decreasing population trends represent a common denominator in prehistoric research. Traditionally, the 2nd millennium and the beginning of the 1st millennium BC in prehistoric Europe are characterized by several phases of crisis regarding settlement strategies, exchange networks and, at regional scale, demographic density. Nowadays, archaeologists interested in quantifying long-term human population changes have used the frequency of radiocarbon dates in order to detect changes in the demographic intensity. The most used technique is the construction of SCPD (Summed Calibrated Probability Distribution) of sequences of 14C dates. In this paper, we test the capabilities of such methods between 1800 and 800 BC using the updated EUBAR database including more than 1700 radiocarbon dates from archaeological contexts from the Ebro to the Danube River (namely, north-east Iberian Peninsula, Southern France, Northern Italy, Switzerland, Austria and Southern Germany). Our results suggest a slow process of demographic growth on the macro scale with evidences of phenomena of discontinuity detectable locally. Additionally, we compared these smaller-scale trends with regional pollen-based climatic reconstructions, identifying variable degrees of correlation between population trends and temperature/precipitation dynamics.
Abstracts Session 14

Extrapolating from the provincial: Linking ancient societies, technologies, and landscape use in Eurasia

Highlands – Lowlands: Trajectories of Eurasian interaction spheres in the Bronze Age

Sabine Reinhold (German Archaeological Inst.)

Eurasia is a continent that extends from West to East across more than 8000 km without major north south barriers. Unlike the high mountain ranges in the South like the Caucasus, the Iranian plateau, the Himalaya, Pamir and Tien Shan massive, the only North-South range – the Ural – is comparatively easy to cross. Therefore, Eurasia during most of its history witnessed large-scale movements from East to west and vice versa. The manifold interplay of latitude, climate & terrain on the other hand create an abundance of small, local environments that foster cultural and economic diversification and flexibility. In the consequence, Eurasian history and archaeology has always operated under the perspectives of the “local” and the “global” simultaneously. This “global” could e.g. be the movements of ideas, commodities, styles or people across the Eurasian steppe belt, while the actual communities in their total kept to rather small territories – the “local”. In particular at the beginning of mobile pastoral economies during the late 4th and early 3rd millennium the interdependence of highland and lowland lifescapes played a key role in economic and social configurations in forming such local foci in ecological niches that were, however, likewise integrated into larger, global interaction spheres. Due to the seasonal shift in the accessibility of resources, e.g. pastures, but likewise raw material resources, the interplay of these antagonistic landscapes forces populations into mobile lifestyles. Mobility, on the other hand, is a precondition to interact beyond the local scope. In this talk I would like to evaluate the role of highland-lowland interactions for Eurasian interaction spheres in the Bronze Age both as hubs of technological innovations as and corridors of movement. Focussing on basic subsistence strategies, i.e. pastoral and/or agro-pastoral exploitation and the exchange of commodities or raw materials such as metal or precious stones, we can follow the development of small-scale and large scale networks. Case studies can be discussed from the Caucasus or the mountain corridors of Inner Asia.

Shaping Invisible Networks – Mobile Pastoralists, Local Interactions, and Global Connections in Prehistoric Eurasia

Lynne Rouse (German Archaeological Institute)

Few terms conjure such vivid images in historical thought as “nomad”, calling to our collective imagination galloping horsemen sweeping in droves toward the shiny plunder of bustling cities, or a lonely tent standing watch over a still horizon. But as archaeology across Eurasia increasingly reveals the daily lives of prehistoric nomads to be layered within rich social and material networks, are we prepared to recast our perceptions of their role as antithetical to civilization? More precisely, might we view prehistoric encounters between “the steppe” and “the sown” as instrumental to the spread of goods, technologies, and ideas that ultimately gave rise to cosmopolitan cities and intercultural phenomenon such as the Silk Roads? The research presented here tackles just this question, drawing on excavations conducted at nomadic campsites in the desert of modern Turkmenistan, an ancient intersection of social, cultural, and ecological zones. These campsites provide key datasets for critically assessing vectors of technological, dietary, and aesthetic interaction between communities of the later Bronze Age (ca. 1900-1300) in southern Turkmenistan, a time and place of social upheaval generally labeled as the “collapse” of local urban civilization and culture. These campsites are situated at the geographical and temporal juncture of commonly thought-of binaries between center/periphery, state/tribe, and civilization/barbarian, but against traditional interpretations that paint an eternal antagonism between these stereotyped social formations, this analysis reveals overlapping scales and intensities of exchange that defy easy categorization. Instead, I argue that flexible local practices allowed nomadic communities in the ancient world to simultaneously participate in multiple cultural-institutional networks, and that these complex, overlapping affiliations helped shape civilization across the broader landscape of (pre)historic Eurasia.
Pasting together communities: Material Evidence for Multi-scalar Interactions in Prehistoric Southern Central Asia

Elise Luneau (presenting author), Lynne Rouse [both German Archaeological Institute]

Against the backdrop of “steppe pastoralism” as a way of life across much of prehistoric Eurasia, archaeology reveals an array of local adaptations, interactions, and variations that give texture to this vast landscape. A comparative examination of material culture from several distinct but culturally-related communities can thus inform us about the overlaps in social, political, and economic networks across multiple scales. In this paper, we focus on so-called “steppe” ceramics of the 3rd – 2nd millennium BCE in southern Central Asia as one window into the complex relationships between local communities of herders and farmers and their connections to broader cultural identities. We look at convergences and divergences in ceramic production technology, aesthetics, use, and trade at sites in Turkmenistan and Uzbekistan to assess various scales of interconnectedness, and tie these findings into the broader narrative of life in prehistoric Eurasia.

Multi-proxy isotope-based Bayesian diet reconstruction of Xiongnu individuals

Ricardo Fernandes [presenting author, University of Cambridge], Ursula Brosseder [University of Bonn] Tsagaan Turbat [Mongolian Academy of Sciences]

The Eurasian Steppe is characterized by temperate grasslands and defines a vast geographical area that connects Europe to Central Asia. Past populations, living within this ecological biome, are often associated with nomadic pastoralism that, once adopted, became a predominant mode of subsistence. An isotopic study was undertaken to investigate the subsistence strategies followed by humans buried at the Burkhan Tolgoi cemetery (Mongolia) dating to the Xiongnu period (3rd century BC – 1st century AD), the time of the first steppe empire in Central Asia. The archaeological materials employed for analysis were human and animal bone remains. Isotopic measurements ($\delta^{13}C$, $\delta^{15}N$, and $^{14}C$) were made on extracted bulk collagen and single amino acids isolated from bulk collagen. This included the novel use of radiocarbon measurements of single amino acids. Multi-proxy isotopic results were modelled using the Bayesian mixing model FRUITS to provide caloric dietary estimates. Bayesian dietary estimates showed that the diets of Burkhan Tolgoi individuals were relatively homogenous. The main source of dietary protein was terrestrial animals but there were also significant contributions from freshwater fish. Bayesian estimates also showed that C4 plants, likely including cultivated millet, were a major source of calories. These results suggest a socially undifferentiated population with a pattern of mobility constrained within a relatively uniform ecosystem.

Crops and ritual in the earliest stages of food globalisation in the central Tian Shan

Giedre Motuzaitė-Matuzevičiūtė (Lithuanian History Institute)

In prehistory, the high altitude marginal zones of the Tian Shan Mountains constituted a series of gateways for the further dispersal of human groups together with domesticated plant and animal species across Eurasia during the end of 3rd-2nd millennium BC. These mountainous regions contain important clues to past human adaptation and the mechanisms behind domesticated species translocation in prehistory. In this presentation I will present preliminary result of archaeobotanical and zooarchaeological analysis from two 2nd mill. BC sites located in the highlands of Tian Shan Mountains (Kyrgyzstan). I will discuss the meaning and role of the earliest domesticates for prehistoric societies by studying how these newcomers were incorporated into the ritual practices and daily diet of the local peoples.

Cereal consumption across Asia: A meta-analysis of stable isotopic data as evidence of the spread of domesticates

Alicia Ventresca Miller [GSHDL / UFG / ASIL, Kiel University]

This paper examines evidence for dietary transitions among Bronze and Iron Age populations as evidence for the adoption of domesticated grains. The palaeobotanical record has been integral in tracing the spread of domesticates across East and Inner Asia, yet the available data thinly covers this vast region. Our aim is to focus on direct and indirect indications for the presence of domesticated grains including millet, wheat, and barley. We undertook a comprehensive meta-analysis of previously published carbon and nitrogen stable isotopic data from humans and co-occurring livestock to account for environmental variation. Isotopic data is paired with information on broad political developments occurring during these periods to demonstrate links between the spread of domesticates and associated network
expansion. This paper expands upon a previous study that examined the Eurasian steppe zone from the Caucasus in the west to central Mongolia in the west to clarify the multiple pathways through which cultivars were transmitted.

**Substantial intensity of millet agriculture during the Bronze and Iron Ages in Kazakhstan is revealed in δ13C and δ18O time series of livestock teeth**

Taylor Hermes (Graduate School Human Development in Landscapes, Kiel University, presenting author), Michael Frachetti, Paula Doumani, Dmitriy Voyakin, Antonina Yermolayeva, Cheryl Makarewicz

This paper presents carbon and oxygen isotopic values that were incrementally sampled from mandibular molars of domesticated livestock from pastoralist sites in eastern, central, and northern Kazakhstan with Bronze and Iron Age occupations. The intra-tooth patterning of δ13C and δ18O values are used to characterize millet consumption by foddering and grazing on stubble in harvested fields. Results indicate that some animals were seasonally consuming large proportions of C4 plants as early as 2400 cal BC. Seasonal variation in diverting this resource to animals is observed across sites, but by the Iron Age, millet-based biomass appears to have been used to support the nutritional intake of livestock throughout the winter. This finding elucidates a substantial scale of millet availability to livestock, which is corroborated by macro-botanical evidence of domesticated grains and by archaeological evidence for an intensive socio-political coalescence during the Iron Age. Additional isotopic findings in livestock teeth reveal evidence for limited access to high-elevation pasturage but clear evidence of intense physiological stress marked by tooth enamel hypoplasias that formed during the harsh winters. These ontogenetic defects occurred more commonly prior to the Iron Age agricultural amplification. The results of this research suggests that Central Asian pastoralists had a symbolically intimate and behaviorally tethered relationship with intensive farming practices which developed into strategies that promoted sedentism and boosted the productivity of livestock. For pastoralism to flourish in this region, it seems as though ancient herders embraced the labors of cultivating domesticated grains rather than the wide-ranging mobility used to seek out greener pastures.

**The Silk Road was not a bypass: local exploitation of east- and west-moving crops during the Bronze and Iron Ages in Kazakhstan**

Rebecca Roberts (University of Cambridge)

This paper will present archaeobotanical and palaeoclimatic evidence from the Semirech'ye region of Kazakhstan during the Bronze and Iron Ages, which points to complex patterns of land use across different environmental zones and a steep altitudinal gradient. Of particular interest is the exploitation of wheat, barley, and millets. These crops moved east and west respectively from their centres of domestication, crossing, it is presumed, Central Asia on their journeys of distribution, although direct evidence for the dating and routes of dispersal in Central Asia remains sparse. It is argued here that the local populations of Central Asia were not simply a ‘conduit of trade’ for these crops, but also actively exploited these domesticates and incorporated them into flexible subsistence strategies suited to the environmental demands of the region in increasingly sophisticated ways over time.

**Human role in creation of the East-European forest-steppe landscapes: case study Kurilovka**

Lyudmila Shumilovskikh (Georg-August-University Göttingen, presenting author), Jens Schneeweiß, Vlasta Rodinkova, Alla Troshina

The East European forest-steppe zone represents a transition between woodlands and grasslands in semi-arid regions. It crosses Europe and covers vast areas from Carpathians to Urals. Today this large region is highly exploited by humans and present agricultural landscapes. It is still open question, how the landscapes were looking in the past. In order to study the forest-steppe dynamics and human role in it, archaeological site Kurilovka (Kursk region, Sudzha river) was studied palynologically. Archaeological data reveal that Kurilovka was settled first in the Neolithic and the following Bronze Age. After a longer period of low settlement activities there is increasing evidence from the 3rd-8th century AD, basically represented by remains of the Kiev, Kolochin and Sakhnovka Proto- and Early Slavonic archaeological cultures and 9th-12th century by Kievan Rus. The medieval ancient Rus site was abandoned because of the Mongol invasions and was settled again only in 17th century AD. Archaeological data were compared to pollen data of the off-site core Sudzha and on-site profiles. The core Sudzha
covers the last 2500 years and reveals dynamic vegetation changes. Dominance of Quercus pollen together with Tilia, Ulmus, Fraxinus excelsior suggests established oak mixed forests, which were lumbered and transformed in the agricultural landscapes at around 16th-17th century AD. Earlier phases of human occupation did not show such strong impact on the vegetation. Pollen evidence importance of Secale, Cannabis and Fagopyrum in the agricultural practises during the last three hundred years.

First results of a landscape-archaeological study in the upper Orkhon valley, Central Mongolia

Birte Ahrens (Kiel University)

The upper Orkhon valley in central Mongolia contains a unique concentration of archaeological monuments from the Stone Age to modern times. In the course of a landscape archaeological study started in 2008, nearly 800 archaeological monuments have been detected and documented by surveys, above ground recording and geophysics. The present study, a PhD project, is devoted to the investigation of this region. The landscape archaeological approach of the study is to address questions for the identifications of site categories in their chronological and cultural context as well as to work out the relation of men and environment through the course of time. An important aspect concerns the vicinity of this mountain region to the core area of major settlements and Nomadic Empire capitals and famous historical sites such as Khöshöö Tsaidam, Karakorum or Karabalgasun in the middle Orkhon valley further north. In contrast to this burial and memorial sites of prehistoric periods dominate the landscape of the upper Orkhon valley with its steep slopes and large river terraces, creating a ritual landscape. However partially intensive ground interventions for utilization and further processing of natural raw materials are related to the needs of the settlements and cities in the middle Orkhon valley mentioned above. During the fieldwork connected to the present study various important sites were discovered, which have been studied in detail or are topics of recent research projects. A number of monument types were identified, which have been rarely, if at all, noticed in the scientific discussion up until now. Among them are rock inscriptions written in Soyombo script and other alphabets indicating a religious meaning of specific landscape elements in the context of local Buddhist tradition. Another example are arrangements of stone settings and small depressions that seem to represent a new, hitherto unknown type of archaeological monument, which might be related to military activities of Medieval and/or early modern times. On the basis of scientific data (pollen profiles, geographic data) and GIS-based spatial analyses a reconstruction of the cultural landscape considering the above-mentioned sites and monument types through the various epochs is the main focus of the ongoing research. In this talk/paper, different monument types of the upper Orkhon valley are presented and illustrated in their chronological, cultural and spatial context.

Metal from the Great Steppe. Bronze Age copper production at Taldysaj, central Kazakhstan: A pilot study

Umberto Veronesi (University College London, presenting author), Miljana Radivojevic, Antonina Ermolaeva, Albina Eržanova

The Bronze Age settlement of Taldysaj is situated in the vicinity of copper-rich deposits of Jezkazgan-Ulytau, oblast Karaganda in central Kazakhstan. Its convenient location next to the sources of copper prompted extensive research campaigns starting from 1994, which uncovered substantial remains of massive metal production throughout this settlement. Two horizons of occupation reveal intensive metallurgical activities belonging to the Andronovo cultural complex (c. 1700 -1400 BC) and LBA culture of Alekseevka-Sargary (c. 1300 – 1000 BC). Large workshop areas dotted with a number of pit-furnaces and slags evidence intensive metallurgical activities, which, along with the discoveries of numerous metal artefacts, shed light on the scope of metal production at this site and its wider importance in the Karaganda oblast, and beyond. Previous metallurgical studies have thus far concentrated on detailed archaeological interpretation of field finds as well as experimental reconstructions of pit-furnace operating. However, little has been done to investigate the knowledge of Taldysaj smiths involved in the process of metal-making. Here we present preliminary results of analyses of copper slag samples coming from four different smelting installations / furnaces. We investigated them for microstructure and composition, and explored similarities and differences in relation to their context. Our main questions target the knowledge of metal making, and how standardised it became at the time of flourishing of metal production in the wider area of central Asian steppes, which is understood to make a core part of the Eurasian Metallurgical Province, as termed by E.N. Chernykh. The preliminary analytical study we conducted on this settlement is set to pose more questions on the character of or-
The core of the emerging power of the 3rd and 2nd millennium BC Eurasian Steppe societies is deeply intertwined with the knowledge of metalmaking, and resources of copper and tin that were controlled and exploited by them. The scale of trade and exchange of copper and bronze objects carried out by these communities at the time grows with the ascent of the first urban societies across Eurasia, which emphasises the importance of both the knowledge of metalmaking and cultural ties forged during the Bronze Age. Extensive studies of typology, composition and distribution of metal implements discovered throughout the Eurasian steppes highlighted the innovative practices of resident metalsmiths and laid the building blocks of narratives explaining cultural dynamics of Bronze Age societies in this region. The widely accepted model of metallurgical provinces, established by E. N. Chernykh, stands for widely shared knowledge of metalmurgy that spread from the West to the East, and differentiates multiple core areas - innovative centres of copper and bronze making industry across the Eurasian steppes and throughout the Bronze Age. Nevertheless, although these core metal production centres constitute foundations of the trade and exchange network across Eurasia, little has been done to address the adoption and transmission of metalmaking knowledge outside the core 'grid', and the effect it had on the everyday life of pastoralist nomads. Here we present archaeometallurgical analysis of artefacts and production evidence from Begash and Dali, two Bronze Age settlements located in Semirechye, southeast Kazakhstan, dated from the late 3rd to mid 2nd millennium BC. These high-altitude sites are set on the crossroads of important trading routes, yet distant from currently known ore sources and large-scale metal production centres. The analyses reveal rare metal production evidence in Semirechye, a continuous use of copper and tin bronze artefacts, as well as sourcing of several ore deposits along the Inner Asian Mountain Corridor. Metallurgical innovations are interpreted in the context of increased specialisation in pastoral herding and political complexity in the 2nd millennium BC Semirechye, and beyond. Complex networks analyses provide a glimpse into the interconnectedness of pastoralist societies on broader scale, and encapsulate the dynamics of metallurgical innovation on the Bronze Age trading crossroads.

Metals, networks and innovation on the crossroads: Bronze Age metallurgy in Semirechye, Kazakhstan
Miljana Radivojevic (University of Cambridge, presenting author), Michael D. Frachetti (Washington University in St. Louis)

This paper considers the implications of new seasonality data from Semirech’ye, Kazakhstan for our understanding of mobile pastoralism in the region. I use the results of a cementum annulation study to determine seasonal occupation patterns at three archaeological sites in the region: Tuzusai, Tasbas, and Begash. The robust dataset from the Iron Age settlement at Tuzusai is used to create a model for deposition patterns in a place that was occupied year-round. The results from the multi-phase sites of Tasbas and Begash are then compared to this model. The comparison raises questions about how mobile the people occupying these sites really were. These questions contribute to our reevaluation of prehistoric economies in the region based on the recent discovery of agricultural production there. However, an even more surprising result is that occupation patterns at Tasbas and Begash remained constant through the Bronze and Iron Ages, despite the major political changes that took place. I argue that people must have managed their pastures in a resilient manner that allowed them to incorporate both agriculture and pastoralism, and also to adapt their use of natural resources to the requirements of a new political system. If change occurred at the local level, the demands of the Iron Age elite must not have been overly burdensome on local systems of resource use. The idea of a new elite mapping onto (or emerging out of) extant governance strategies fits well with discussions of how nomadic states emerged in later, historic periods.

Pastoral Resilience in Prehistoric Semirech’ye
Tekla Schmaus (Harold Washington College)

This paper considers the implications of new seasonality data from Semirech’ye, Kazakhstan for our understanding of mobile pastoralism in the region. I use the results of a cementum annulation study to determine seasonal occupation patterns at three archaeological sites in the region: Tuzusai, Tasbas, and Begash. The robust dataset from the Iron Age settlement at Tuzusai is used to create a model for deposition patterns in a place that was occupied year-round. The results from the multi-phase sites of Tasbas and Begash are then compared to this model. The comparison raises questions about how mobile the people occupying these sites really were. These questions contribute to our reevaluation of prehistoric economies in the region based on the recent discovery of agricultural production there. However, an even more surprising result is that occupation patterns at Tasbas and Begash remained constant through the Bronze and Iron Ages, despite the major political changes that took place. I argue that people must have managed their pastures in a resilient manner that allowed them to incorporate both agriculture and pastoralism, and also to adapt their use of natural resources to the requirements of a new political system. If change occurred at the local level, the demands of the Iron Age elite must not have been overly burdensome on local systems of resource use. The idea of a new elite mapping onto (or emerging out of) extant governance strategies fits well with discussions of how nomadic states emerged in later, historic periods.

Multi-scalar Bronze Age Connectivity: Shared pastoral practice and diverse ovicaprid morphotypes
Ashleigh Haruda (University of Exeter)
Models of cultural change and connectivity across the Eurasian steppe have been formulated via changes in material culture, the presence of wheeled vehicles, and supported by the potential for long distance pastoral circuits. Increasing intensification of connectivity in the Late and Final Bronze Age has led to assumptions of uniform flocks of...
sheep and goats, shared and connected across vast distances in the same pattern as ceramic styles and metal objects via long distance migration patterns. Three Final Bronze Age settlement sites were evaluated to compare animal husbandry practices and to discern between flocks in the Final Bronze Age, a period of increasing regional cultural connectivity. Each is located in a distinct localised microenvironment but all belong to a common material culture group, the Begazy-Dandybaevsky, of the Final Bronze Age (1300–900 B.C.E.). Geometric morphometric analyses of ovicaprids from these sites reveal that flocks of Ovis aries and Capra hircus were morphologically distinct with clear adaptations for specific local microenvironments. Yet zooarchaeological analyses indicate a common pastoral strategy for animal management. It is apparent that material culture and pastoral traditions were exchanged and reinforced as an identifier of cultural membership, but livestock was not circulated across this broad region. This discrepancy in connectivity between cultural practice and animal exchange suggests tiered levels of connectivity within regional networks.

Equine Dentistry and Bit Technology in Ancient Eastern Eurasia

William Taylor (Max Planck Institute for the Science of Human History)

Owing to the animal’s unique, ever-erupting dentition and the sensitive equipment used in riding, horsemanship often entails proactive dental care. Contemporary horse herders in Mongolia pay careful attention to equine dentition, removing deciduous teeth that may erupt incorrectly and interfere with feeding or development. In addition to their typical incisors, cheekteeth, and canines, young horses often develop a vestigial first premolar during their first year of life. These “wolf teeth” are not used in chewing, but are innervated and may cause pain if the animal is bitted. Mongolian nomads remove these teeth in the spring following the animal’s first year, before the tooth has fused to the surrounding bone. Equine dentition from archaeological sites belonging to the Slab Burial, Pazyryk, Xiongnu, and Turkic periods indicate that the practice of wolf tooth removal may date to the early Iron Age, circa 700 BCE. While post-mortem removal or post-depositional loss should also be considered as formation processes, nearly all juvenile specimens analyzed from these contexts exhibited empty first deciduous premolar sockets. In contrast, most juvenile horses recovered from late Bronze Age (ca. 1200–700 BCE) ritual features retained their wolf teeth, even those with other evidence of bridle use. Nonetheless, anthropogenic modifications to deciduous incisors indicate that herders from this period practiced other forms of equine dentistry. When considered alongside evidence that organic bits were used in Mongolia prior to the early Iron Age, I argue that the practice of wolf tooth removal may have developed as a deliberate response to the requirements of metal snaffle bit use. Results imply a detailed understanding of equine dentistry among ancient pastoralists in eastern Eurasia, and may shed light on other key osteological questions related to the study of early horse transport.

The Eneolithic Horse Herders of northern Kazakhstan: new research at Botai and Borly.

Alan K. Outram [University of Exeter]

Over many years there has been significant debate over whether the horses at Botai are domestic or wild. In recent years it has become clear that multiple lines of evidence point to the controlled use of horse herds for both meat and secondary products (milk and riding). Whilst Botai might not be the only or earliest example of horse domestication, it currently represents the culture with the earliest unambiguous evidence for a form of equine pastoralism. The date and region fits well with current genetic models for horse domestication. The lines of evidence used in this debate will be briefly summarized in this paper. These include the changing faunal record, material culture, settlement structure, geoarchaeology and lipid residues. Whilst it seems that steppe pastoralism in this region may have started with a form a specialized equine herding, we still have a very limited understanding of the form that took and what its precise origins were. Of equal significance, we have a poor understanding of the legacy of these Eneolithic cultures. Was this the origin of domestic horse stock more widely or a more isolated innovation? Did this culture contribute significantly to later pastoralism in the region?

Possible economic drivers behind construction of the Turgai geoglyphs in Central Kazakhstan (poster)

Elina Ananyevskaya [presenting author], G. Motuzaitė Matuzevičiūte (both Vilnius University)

Recently the Turgai region in the Eurasian steppe has been attracting much attention from archaeologists. Findings of the massive earthwork structures (also called geoglyphs) have been reported in
Kostanay oblast of Central Kazakhstan. Geoglyphs are massive geometrical figures created by removing or adding the top soil along the lines of an ornament. Some earthwork structures are so massive, they are only visible from the air. More than 60 geoglyphs have been reported in the Turgai region. Majority of them have geometric shapes: squares, circles, crosses, lines, etc. Several mounds of the earthwork structures were excavated but did not provide any organic material to be dated by radiocarbon method. Therefore, current dates of the earthworks have been obtained by Optically Stimulated Luminescence (OSL) dating showing their construction between 800-750 BC. The aim of the presentation is to provide a collation of all existing bioarchaeological and palaeoenvironmental data from the period of the earthworks construction (end of Bronze Age and beginning of the Early Iron Age) from Central Kazakhstan, in order to evaluate economical circumstance of that time. This data would shed light on the economical drivers that were fueling geoglyphs phenomenon and provide possible explanations for the reasoning behind construction of these massive earthworks.
Riverbanks and seashores: the Baltic Sea basin and adjacent areas in the Early and Mid-Holocene

People living by a changing sea
Lars Larsson (Lund University)
During the Early and Mid Holocene, people living around the Baltic Sea experienced great variations in their relationship to their environment. After pal-pable changes, in some cases catastrophic events, in the relationship between land and water during the Late Palaeolithic, the changes that occurred in the subsequent millennia were slower but they had just as deleterious an effect on settlements. Isostatic and eustatic processes caused widely different changes to environments around the Baltic Sea. In the northern part, at the latitude of Central Sweden, an archipelago arose and grew. Early use of this landscape required developing a knowledge of boats. The archipelago landscape gradually came to serve as a bridge in contacts between present-day Sweden and Finland. The results of shoreline displacement with increased land masses were also significant for settlement inland, not least for the relationship between the coast and the bigger lakes. Further south, Gotland was colonized. There is also evidence of contacts between coast and inland on the Baltic side. Still further south, shoreline displacement went the other way, as considerable areas of land were gradually submerged. In southeast Scania, southernmost Sweden, a submarine landscape has been found where the oldest known permanent form of fishing equipment has been found. The changing shoreline meant that Bornholm was gradually isolated from the continent. A noticeable submerging of the coast need not always have had negative consequences for settlement. The nutrient content of the water increased and the coastline may have changed in a way that benefited fishing. From southern Denmark and northernmost Germany there is extensive knowledge today about submarine settlement remains. The changes to the landscape did not only have physical consequences. They must also have helped to shape the conceptual world that governed ideas and regulations.

Early Holocene climate oscillations in northern central Europe— a discussion of the available evidence and its possible implications
Stefan Dreibrodt (Kiel University)
Early Holocene climate oscillations are seldom considered so far to have had a significant impact on Mesolithic communities in central Europe. Instead often the long term rapid and strong warming trend of the Early Holocene is referred. Since a couple of years there is a growing record of data about Early Holocene climate oscillations from a variety of palaeoenvironmental archives. Some scholars argue that climate oscillations have had a considerable influence on the onset and development of seden-tary communities in the circum-Mediterranean region. Little is known about the possible effects of Early Holocene climate oscillations on Mesolithic people so far. In the talk the available data from different palaeoenvironmental archives in central Europe and their possible maintenance are discussed against the background of the overall picture (mainly the circum-Mediterranean data sets).

Hunter-gatherer behaviour is more complex than quantum mechanics. Some modelling problems in relation to riverbanks and seashores
Ole Grøn (Norwegian Maritime Museum)
In quantum mechanics objects exist more as ‘mists of possibilities’ of being here or there and everywhere at the same time, but with a regularity in their ‘fuzzyness’ that allows statistical modelling of their behaviour. With hunter-gatherers this is not so. Different cultural groups can display significantly different behaviours in similar environments related to rivers and seashores. Different family groups within territorial groups can likewise display significantly different behaviour. Ethnoarchaeology reveals the drivers behind these variations as being differences in ideology, in preferences (cultural or individual), in wealth, subtle environmental differences, impossible to reconstruct with the available methods, etc. The paper discusses the possibilities of behavioural modelling on the basis of ethnoarchaeological cases.
Mid-Holocene sea-level change and Stone Age coastal settlements in the Baltic Sea region

Alar Rosentau (University of Tartu)

In the early phases of cultural development, Mesolithic and Neolithic human populations in the Baltic region experienced times of significant marine transgressions and regressions owing to the melting of the continental ice sheet and glacial isostatic land uplift. Geological–archaeological studies in the southern Baltic Sea area have revealed a number of Mesolithic and Neolithic traces of human occupation off from the Danish and German coasts as a result of Holocene sea-level rise. Prehistoric coastal sites in the northern Baltic Sea areas have, however, been uplifted and are located successively at different altitudes as a result of glacial rebound. In transitional areas, prehistoric man experienced transgressions and regressions of the shifting coastline owing to competition between glacial rebound and sea level rise. In current presentation, I will demonstrate how archaeological data together with geological record can provide information about relative sea level changes and palaeogeography of the Baltic Sea coastal zone with special focus for the mid-Holocene. Interdisciplinary approach in sea-level research is important to improve our understanding on the ongoing interplay between sea-level rise and glacial rebound for better relative sea level predictions of the future Baltic Sea.

Abstract. Syltholm VII – an Ahrensburgian Site on the Norths Shores of Femern Bælt with interesting Fauna Content. East meets West at Lolland in early Holocene time? During the archaeological excavations prior to the construction of the fixed link across the Fehmarn Belt, Museum Lolland Falster excavated an Ahrensburgian site with rich fauna content. The site, a small hunting station, was located low in the terrain, and was by this located quite differently from the Ahrensburgian sites previously found on Lolland. The site was placed by a by a small bog hole or depression – maybe at a fossil riverbank. The site lay between two Northwest-Southeast landscape stripes created by the ice age. The good preservation conditions have allowed us to find quite large amounts of bone material on site – both burned, lightly burned and unburned material. Two C14-datings of the bone material have been conducted, which both placed it at around 9500 BC calibrated. These datings fit well with the material of Ahrensburgian tanged points found at the site. The bones we found were all very fragmented, most likely due to their exposure to the elements. This means that so far only a portion of the material has been classified by species. Based on the datings, we expected the majority of the material to be reindeer but our expectations have been proven wrong. Instead of reindeer, the material turned out to contain red deer, roe deer and wild boar – three species that have not previously been found in connection with Ahrensburgian sites in Denmark. These species are normally associated with environments of more well-established preboreal forests. Further dating of the bone material is in the making which will hopefully confirm the previous datings. If this surprising find of species is verified, we would need to reassess our view of the fauna that existed in Denmark in the very earliest part of the Holocene period. Included fragments, 15 examples of tanged points were recovered. The length of the points varies from 4,7 to 5,5 cm, with an average length of 5,16 cm. Contrary to what you see at many other Ahrensburgian sites, Syltholm VII showed very little variation in size of the tanged points. The small tanged points seem to be completely absent in the material. The reason behind its absence may lie in the very nature of the activities carried out on site or it could by caused by chronological circumstances where there only have been one or very few visits in a short timespan at the site. It is also possible that the rather large arrows area regional feature that may help us determine where the hunters originated from. Or it could be a combination of all of the abovementioned circumstances. The variation lacking in the size the tanged points is made up for when we when we look at the

Early Mesolithic signals of sedentism

Adam Boethius (Lund University)

Subsistence strategies are argued to set the condition and thereby limit foraging life choices. Thereby, if a society is highly dependent on aquatic resources and practice delayed-return strategies other signs or signals of sedentism should be apparent in the human interaction with their surrounding environment. Because a freshwater fish diet is difficult to prove I will explore what other signals are available on the site Norje Sunnansund, to see if extrapolations can be made on sites without a proven freshwater fish diet base.

An Ahrensburgian Site on the North Shore of Femern Bælt with interesting Fauna Content. East meets West at Lolland in Early Holocene time?

Bjørnar Måge (Museum Lolland Falster)
production technique used to make the points. In our limited material we found that tangs worked from the ventral side to the dorsal side and also propel retouched tangs. The tip of the point was sometimes located at the distal end of the blade and other times at the proximal end of the blade. In this still early stage of the investigation, the data indicates that we might have to reassess the hunting-prey opportunities available for hunter in the southern part of Denmark in the very earliest Holocene period.

A lost Mesolithic landscape in the Baltic Sea
Anton Hansson (presenting author), Björn Nilsson, Arne Sjöström, Svante Björck, Sofia Holmgren, Hans Linderson (all Lund University), Ola Magnell (National Historical Museums, Sweden), Mats Rundgren, Dan Hammarlund (both Lund University)

A submerged landscape has been found off the coast of Haväng in the Hanö Bay, southern Sweden. The landscape consists of organic-rich sediment ridges, abundant wood remains and several archaeological artefacts. The landscape reaches almost 3 km outside the present coastline, down to a depth of about 25 m b.s.l. The landscape was formed during two low-water phases during the Baltic Sea history, during the Yoldia Sea and Ancylus Lake stages (c. 11,500-10,200 cal BP), and during the Early Littorina Sea stage (c. 9,800-8,000 cal BP). The submerged landscape is the focus of a geoarchaeological project based at Lund University with the aims of reconstructing the early Holocene environment and water-level changes in the area, and to understand how Mesolithic humans exploited the coastline and its resources. A high-resolution bathymetrical map over the area has been retrieved with a Multibeam Echo sounder, which together with a 3.5 m long sediment sequence obtained at 8 m b.s.l. forms the basis for the environmental reconstruction. Surveillance and sampling has been performed by archaeologically and geologically experienced divers. Positioning of the samples was performed with a GPS buoy attached to the divers, which gives an error of only a few meters. The sediment sequence was radiocarbon dated and analysed for pollen, diatoms and organic and inorganic elements. The results indicate a productive, stable lagoonal environment dated to c. 9,100-8,600 cal BP, with an unusually high sediment accumulation rate. The diatom flora shows a fresh-water environment with a weak, but continuous brackish signal indicating a saline inflow to the Initial Littorina Sea before the establishment of the Öresund strait. A destabilization of the environment, reflected by changes in the diatom assemblages and element composition, can be seen in the uppermost meter of the sequence. The destabilization is interpreted as a response to an increased brackish influence due to the approaching coastline during the Littorina transgression. Based on the bathymetrical map, the Initial Littorina regression lowered the water level with c. 10 m, to about 12 m b.s.l., before the following Littorina transgression drowned the area. Among the archaeological artefacts are eight stationary fishing constructions found in the sediments throughout the former lagoon. They are dated to c. 9,200-8,400 cal BP, the oldest known in Northern Europe, and indicate that Mesolithic communities in the Hanö Bay area preferred the ecotopes of river mouths and lagoonal areas. The fishing constructions raise new questions about the population size and the degree of sedentism during the Mesolithic in southern Sweden. An elk antler pick-axe dated to c. 8,700 cal BP and bones and antlers with slaughter marks show the use of terrestrial resources. The Haväng site shows the exceptional potential of submerged landscapes and demonstrates the importance of coastal resources for Mesolithic communities. The research at the Haväng site is ongoing and the methodology developed will be applied to other newly discovered submerged sites in southern Sweden.

Beach ridges and Mesolithic sites in central Sweden
Sandra Söderlind

The settlement of central and northern Sweden, after the last Ice Age, is a subject that has been rather unexplored up until recent years when several small scale research-excavations have been carried out as a part of the Nordic Blade Technology Network. One research focus has been to investigate the pioneer settlement of humans in Fennoscandia at the beginning of the Holocene. This period is characterised by a constantly changing landscape due to isostatic and eustatic effects following the melting of the Weichselian ice sheet. The people arriving in this dynamic landscape must have had to adjust and respond to these changes in various ways. The present work presents the human responses to the environmental setting around the Siljan Lake, situated in central Sweden. During the early Holocene, the Siljan Lake was a gulf connected to the Ancylus lake. In this area, the isostatic and eustatic factors lead to the creation of beach ridges, which still remain today. On these beach ridges large amounts of archaeological material has been
found, to a large degree as stray finds but also through excavations. Due to variations in the local bedrock there are many different lithic raw materials in use during prehistory, which can aid in the understanding of contacts and mobility patterns of the people moving in the area. There are also several methods of lithic production being used in the area throughout the Mesolithic period, which will give an indication on when the lithic material was created. Through mapping of Mesolithic sites on beach ridges in the area, using arcGIS in combination with studies of the lithic characteristics on these sites, an understanding of the landscape use can be reached. Furthermore, this can give an indication of the choices and movement patterns of the people arriving just after the retreat of the ice.

Transforming lake shores. Stratigraphy and Chronology at Hohen Viecheln, Germany

Daniel Groß (Centre for Baltic and Scandinavian Archaeology, presenting author), Stefan Dreisbrodt (Kiel University), Harald Lübke, John Meadow, Ulrich Schmölcke (all Centre for Baltic and Scandinavian Archaeology)

The site Hohen Viecheln on the northern shore of Lake Schwerin, Mecklenburg-Vorpommern, is one of the most important Early Holocene archaeological sites in Northern Germany. During the excavation in the 1950s it became clear that erosion events have severe influenced the stratigraphy of the site. Though the archaeological assemblage is of major relevance for cultural transformations in the Early Holocene, its dating has been a subject of discussion since the site monograph was published in 1961. One reason for this uncertainty was inconsistency between the excavator’s and palynologist’s age estimations which were based on different interpretations of the sedimentary sequence. In this study we will present new data on the site including new radiocarbon dates of finds and of the stratigraphy, sedimentological analyses, and cultural implications. Based on over 40 radiocarbon dates we can revise the old interpretations and understand and date the archaeological activity and sedimentological processes at the site far better than before. Furthermore, we will give a short outlook on cultural transformations during the Early Holocene and their reflections in archaeological material.

Mesolithic hunter and fisher in transition – A geo-archaeological case study on submerged late Mesolithic sites in Wismar Bay. Mecklenburg-Vorpommern, Germany

Harald Lübke (presenting author), John Meadow, Ulrich Schmölcke (all Centre for Baltic and Scandinavian Archaeology)

In the 7th and 6th millennium BC the hunter-gatherer populations of the North European plain were confronted by massive changes to their environment, not only by the increasing reforestation of the landscape but also by the rapid sea-level rise of the world ocean. This process led to the final flooding of the Baltic basin and to the origin of the present Baltic Sea.

The investigation of the human reaction to this fundamental environmental change was a main task of the geoarchaeological work group of the interdisciplinary DFG Research Unit Sincos (www.sincos.org) from 2002 until 2009. One of the main regions of investigation was Wismar Bay in western Mecklenburg-Vorpommern. Thirty Stone Age sites were located during surveys in water 2.5 to 11 m deep, north and west of Poel Island.

The excellent preservation of organic material allows detailed archaeological and scientific studies about the transformation of settlement structures, economy and ecology of the latest hunter-gatherer societies at the German Baltic coast before they were superseded by the early Neolithic Funnelbeaker Culture around 4100-4000 cal BC.

The paper will give a brief overview of the most important and newest results of the ZBSA’s investigations after the end of the SINCOS project in 2009 by a careful re-evaluation of the older data and an integration of newly available data.

Tracing human responses to climate change along lakeshores and riverbanks in north-western Europe

Anabell Zander (University of York)

11,500 years ago an episode of intense climatic warming ended the last Ice Age and transformed the vegetation and fauna. The hunter-gatherers living in north-western Europe during this transition were exposed to extreme fluctuations in the flora and fauna and therefore needed to adapt their hunting strategies as a response to the environmental changes. Despite the broadly undefined complex developments of cultural traditions at this interface,
the arbitrary division between Palaeolithic, glacial archaeology and Mesolithic, post-glacial archaeology remains the status quo. In recent years several scholars have come to realise that the technological changes at the Pleistocene-Holocene interface are far more complex than previously thought (Terberger, Barton & Street, 2009; Groß 2014; Zander 2016). As such the Palaeolithic-Mesolithic transition in north-western Europe is characterised by a variety of assemblages which seem to overlap in time and are often located along ancient lakeshores and riverbanks. On the basis of an analytical survey of lithic artefacts from Final Palaeolithic and Early Mesolithic assemblages, in combination with an investigation of the faunal record, this PhD project questions this artificial division between Palaeolithic and Mesolithic while offering a broader European perspective on human adaptations to climate change. Groß, D. 2014. Welt und Umwelt frühmesolithischer Jäger- und Sammler. Mensch-und-Umwelt-Interaktion im Frühholozän in der nordteleuropäischen Tiefebene, Archäologische Informationen 37, 213-224. Terberger, T., Barton, R.N.E. & Street, M. 2009. The Late Glacial reconsidered – recent progress and interpretations, in T. Terberger, R.N.E. Barton and M. Street (eds.) Humans, environment and chronology of the Late Glacial of the North European Plain. Tagungsbander des Römisch-Germanischen Zentralmuseums Mainz 6 (Workshop 14 for Commission XXXII, 15th U.I.S.P.P. Congress, Lisbon, September 2006): 189-207 (Mainz: RGZM). Zander, A. 2016. Heek-Nienborg and Werl-Büderich: The transition from Palaeolithic to Mesolithic in Westphalia, Archäologische Informationen 39, 285-291.

Mesolithic settlement and burial sites in relation to a changing landscape at Motala, eastern Central Sweden

Fredrik Hallgren (presenting author, The Cultural Heritage Foundation, Sweden), Fredrik Molin, Jonas Bergman (both National Historical Museums, Sweden), John Meadows, Harald Lübke (both Zentrum für Baltische und Skandinavische Archäologie, Schleswig), Karin Berggren (The Cultural Heritage Foundation, Sweden)

Archaeological excavations during the last two decades at Motala, in the province of Östergötland, Sweden have unearthed a series of settlement and funerary sites from the Mesolithic. This site-complex is situated by the current outlet of the large lake Vättern into the river Motala Ström, which drains into the Baltic Sea. This has not always been the situation, however, as the local landscape has changed quite dramatically since the end of the Glacial. The remains at Motala span the Preboreal, Boreal and Atlantic periods. During these times the local conditions changed from coastal by a sea still littered with icebergs, to a shallow Preboreal wetland, and then transformed to the shores of the rising waters of Ancient lake Vättern, all due to the isostatic uplift of the land. As a consequence, an ongoing transgression of lake Vättern came to an end in the Early Atlantic when the pressure of the water eventually caused the collapse of a ridge creating a new out-flow channel that became the current course of the river Motala Ström. In our paper we discuss human activities at Motala in light of the changing environment and geographical as well as geological conditions. While some of the changes were gradual and slow, others were quite sudden and should have made a distinct impression on the humans living in the region. The assemblage from the Preboreal consists of lithic scatters, indicating sporadic utilisation of the area. The finds from the transgression phase of Ancient Lake Vättern during the Boreal and Early Atlantic include lithics, occasional artefacts of bone and stationary fish traps. The creation of the new outflow channel in the Early Atlantic caused in the end a drop of no less than 2,5 m in water level of Ancient Lake Vättern, around 7700 cal BP. A large Late Mesolithic settlement was established on the new lands along the banks of the newly formed river course. On the southern bank of the river a cemetery with inhumation graves was established, while ritual placement of disarticulated human remains took place in the river and in a small isolated lake just north of the river. We present results from the archaeological excavations as well as geological and paleobotanical data from the sites. The formation of the river Motala Ström is emphasized by data from a series of corings of lake sediments downstream of Motala.

The Middle and Late Mesolithic in the northern part of Central Sweden – Technological change in a coastal landscape

Michel Guinard (Societas Archaeologica Upsaliensis)

In this paper I will discuss the results from excavations and surveys during 2007-2014 of Mesolithic sites in the northern part of Central Sweden – The Torsåker project. In this area the land upheaval has been continuous since the end of the latest ice age. The sites can be dated from middle Mesolithic, ca 7500 BC, to the transition of the Neolithic, ca 4000 BC. Sites have been excavated on levels from ca 130 to 60 masl. In the area a local shore-displacement...
curve has been established and used as a basis for preliminary dating of the sites. The paper will consider both the change of blade technology during this time span which is also evidenced in the use of different raw materials of both local and more exotic provenience. During this time the landscape changed from an archipelago not far from the retrieving ice sheet to be located at the mouth of the river Dalälven.

Searching for inundated Mesolithic and Early Neolithic at lake Saimaa, eastern Finland

Satu Koivisto (National Board of Antiquities; University of Helsinki)

The Saimaa Lake complex in eastern Finland has constituted one of the major water systems in the interior of Finland, transmitting technical and cultural influences between vast regions throughout millennia. In the earlier stages, the water level of the lake was relatively low. Due to the post-glacial land uplift and lake tilting, the Saimaa basin continued to transgress in the southeast direction and thus inundating the earlier lakeshores. Circa 6000 years ago, the Ancient Lake Saimaa reached its maximum extent, nearly 9000 km$^2$ in size which culminated in the outburst of the Vuoksi River in the south ca. 4000 cal BC. Because of this, the Mesolithic and Early Neolithic sites predating the transgression are to be found under water and in wetlands surrounding the present-day lake. An experimental project entitled ‘Lost Inland Landscapes’ was launched at the University of Helsinki in 2015 with the aim of finding paludified and submerged Mesolithic and Early Neolithic sites by means of wetland and underwater archaeology. On dryland conditions, practically all the organic materials from the Mesolithic and Early Neolithic have deteriorated, but in wet environments fairly much of them might have survived. A desk-based evaluation work constituted the basis for planning the activities of the project and archaeological fieldwork. A fieldwork period in wetland and shoreline areas was conducted in the southeastern Lake Saimaa area on the archaeologically potential hot-spots detected already in the preliminary desk-based analysis. Some new observations were made in peatlands and lake mud in the municipalities of Savitaipale and Taipalsaari and the results make it the most likely to discover well-preserved, paludified and submerged sites in the region in the project continuation in 2017.

By the shore of the great lake: the Ancylus stage of the Baltic Sea Basin and its significance for human lifeways in Northern Europe

Valdis Bērziņš (University of Latvia)

The freshwater Ancylus Lake stage of the Baltic Sea Basin, occurring in the Boreal climatic period, has remained somewhat enigmatic in evaluations of Early Holocene human subsistence. The focus on the rich environments represented by the marine stage beginning at about 6500 calBC, namely the Littorina Sea, when the basin experienced an influx of marine species that became important as aquatic food resources for humans, has tended to overshadow consideration of the food sources and aquatic environments represented during the preceding Ancylus Lake stage. There has been a gradual accumulation of palaeoenvironmental data, faunal refuse collections and other kinds of evidence that allow us to consider the Ancylus Lake in terms of the aquatic resources available to humans. The archaeological material, too, provides valuable hints concerning the role of the great lake in human subsistence during this phase of the Mesolithic. The Ancylus stage also presents us with certain conceptual difficulties, accustomed as we are to thinking about relatively small bodies of freshwater (i.e., lakes), on the one hand, and vast expanses of salt/brackish water (i.e., oceans and seas), on the other. The Ancylus, much larger than any of the world’s present-day freshwater lakes, corresponds to neither of these conceptual categories, being a rather unique phenomenon that provided special conditions and opportunities for the human inhabitants of its shores. The paper examines the current state of knowledge regarding the Ancylus Lake stage with respect to human subsistence and particularly the use of its aquatic resources.

Sea level changes and Neolithic hunter-fisher-gatherers in the centre of Tallinn, southern coast of the Gulf of Finland, Baltic Sea

Merle Muru (University of Tartu), Alar Rosentau, Aivar Kriiska, Lembi Lõugas, Ulla Kadakas, Jüri Vassiljev, Leili Saarse

Relative sea level changes and palaeogeography of a Neolithic hunter-fisher-gatherer settlement site covered by 2.5-m-thick historical suburban soil in the city centre of Tallinn were reconstructed by implementing GIS in landscape modelling based on archaeological, sedimentary and shore displace-
Mid-Holocene sea level rise and related archaeology in southern Denmark
Catherine Jessen (National Museum of Denmark)
The relationship between rising sea levels and cultural practices is investigated in a large archaeological project on the Danish southern coast excavated prior to the construction of the Femern Bælt tunnel. Data from almost 400 boreholes covering c. 187 hectare allows the detailed stratigraphic reconstruction of the changing landscapes associated with the coastline transgression of the mid-Holocene. After c. 6500 cal BP the gently sloping forested land area of two adjacent fjords firstly show evidence of rising groundwater levels and then flooding, with the associated shift from dry land to boggy conditions and then to a shallow, protected lagunal environment. Excavation of over 20 sites has shown pronounced archaeological activity during each of these phases and precise correlation and dating are required for the integration of the large archaeological and stratigraphic/environmental datasets. Further work from profiles and new boreholes will detail changes in, for example, the local flora and more regional vegetation, water salinity and water depth. The combination of the archaeological evidence with the stratigraphic and environmental evidence gives not only a detailed image of the landscape and how it changed with rising sea levels, but also if and how these changes are associated with patterns of cultural practices. The first stage of this study is presented here with the reconstruction of the now buried landscape and of how the process of flooding relates to the archaeological evidence.

From Hunting ground to Fishing ground
Søren Sørensen (Museum Lolland-Falster)
During the Early and Mid-Holocene the landscape around Rødbyhavn changed from dry land hunting ground exemplified by a small Ahrensburgian hunting camp, over a phase with ritual coastal activities, to a regular fishing ground in the Funnel Beaker Culture. The transformation of the landscape was continuously followed by human adaption to the changing environment. To understand the different archaeological records, it is of vital importance to know and reconstruct the contemporary landscape in all its details. This paper will focus on the landscape and the use of the landscape from c. 4,600 cal BC to c. 3,300 cal BC, a period dominated by ritual depositions from late Ertebølle and Early Funnel Beaker culture. Excellent conditions for preservation of organic materials have led to the recognition of a new kinds of ritual depositions made from wood.

How intensive use of geoarchaeological methods helped improve the re-evaluation of potential buried Stone Age settlements and relics at Kriegers Flak
Stig Berendt Marstal (Ramboll)
By extensive use of ‘geoarchaeological’ methods (such as detailed analysis of seismic, side scan sonar and bathymetrical data, C-14 dating of sediment samples, 3D geological modelling and updated sea level curves), detailed paleo-geographical maps for selected time slices during Early and Mid-Holocene have been constructed in order to assess the likelihood of prehistoric people having lived, and the potential for the relics to have been preserved, at Kriegers Flak in the Baltic. Prior to the tender and construction of the 600 MW Danish offshore wind farm Kriegers Flak, an EIA had to be carried out. The EIA and marine pre-investigations were ordered and managed by the Danish TSO Energinet.dk on behalf of the Danish Energy Agency. As a part of the EIA, the Danish Agency for Culture (SLKS) was consulted in order to assess the risk of encountering objects of cultural heritage at the seabed or buried in the sediments below within the depths of potential wind farm structures. The SLKS tasked the local museum with the marine archaeological responsibility, the Viking Ship Museum in Roskilde, to be the lead in this assessment. Hitherto the “concept” for having museums assess the risk for findings of relics of cultural heritage, was, and still is, to let the archaeologists have a say in the design of the preinvestigations, and afterwards let the same archaeologists make the final assessments. While the archaeolo-
gists are very well-experienced in assessing possible archaeological relics lying on, or partly buried in, the seabed - based on geophysical data - Energinet.dk found that the archaeologists were a bit more ‘reluctant’ when it came to assessing relics potentially fully buried under the seabed. The archaeologists did try to make delineations of buried landscapes that potentially could have hosted Stone Age settlers, e.g. small inlets relevant for e.g. fishery from land. However, the archaeologists would only classify these delineations as ‘preliminary’ due to the ‘uncertainty of data’. When receiving these preliminary assessments, the geologist at Energinet.dk could tell, that the whole dataset, including the now ended borehole/geotechnical campaign and an integration of data into a 3D geological model, would still lack the following geological inputs, in order for the archaeologists to make their final assessment of the buried Cultural Heritage risk: a) C14-dating of the sediments/seismic horizons, b) integration of the relevant seismic horizons, and/or the bathymetry, with site specific sea level fluctuation curves, and c) assessment of the erosive, or preservation, character of relevant horizons That’s why experts from the Geological Survey of Denmark and Greenland (GEUS) at this stage were consulted on this issue. Meanwhile the archaeologists were asked to evaluate if there exist settlement patterns/models that for the revised ‘potential zones’ and time slices derived from the paleo-geographical maps, would allow a delineation of relatively well-defined areas, which most likely could potentially show evidence of human activity. Due to a successful multidisciplinary collaboration between all the institutions involved, including a couple of mutual workshops, the ‘risk’ for encountering buried relics from Early to Mid-Holocene was re-evaluated. Based on the good results from this site, the same procedure was used on 6 other wind farm sites, and a Best Practice guide was hereafter established.

Lost Landscapes found: New visions of the submerged Stone Age of Southern Sweden

Björn Nilsson (Lund University), Giacomo Landeschi, Arne Sjöström

In the coming four years new research program at Lund University - “Blue Archaeology” - will strengthen the knowledge of submerged Early Holocene landscapes of Sweden. Several new areas have been found during the latter years, and some of these will now become more thoroughly explored and documented. In order to facilitate visualization and communication of these landscapes within and outside the heritage sector, the use of digital archaeology will play an important role. The presented paper will describe the overall aims of the project, some of its sites, and further discuss how a digital work flow could enhance both research and outreach.
Abstracts Session 16

Archaeology and environmental history in lake catchment areas

Varved lake sediments in the southern Baltic realm as recorders of Holocene climate change and human impact
Achim Brauer (Deutsches Geoforschungszentrum Postdam)

This presentation reports about climate change and environmental evolution in the southern Baltic region reconstructed from annually laminated lake sediments that have been achieved within the Helmholtz Virtual Institute ICLEA ‘Integrated Climate and Landscape evolution analyses’. A dual lake approach with two key varved lake sediment records in northeastern Germany (Lake Tiefer See) and northern Poland (Lake Czechowskie) including their synchronisation based on the first established regional tephrochronology will be presented. The focus of this presentation will be on both, proxy reconstructions from Holocene sediment records and on lake system monitoring applied for proxy calibration and observation of ongoing change. Natural climatic versus anthropogenic influences on lake sedimentation will be discussed.

Palaeoecological studies in south-west Germany lakes
Manfred Rösch (Landesamt für Denkmalpflege Baden-Württemberg), Elske Fischer, Angelika Kleimann, Jutta Lechterbeck, Lucia Wick

Palaeo-ecological studies in south-west Germany lakes are dealing with ten sites at western Bodensee and Hegau, eight sites in northern Schwarzwald, four sites in southern Schwarzwald, three sites in Oberschwaben and one site in Allgäu. These were the regions of Baden-Württemberg were, caused by former glaciation, lakes do occur. Besides one mire and two litoral sequences of Bodensee, central cores from small lakes were used. The main tool to get evidence about the past is pollen analysis, including microcharcoal and some non-pollen palynomorphs. After overview analyses of the total core, the sediment covering the last seven millennia was sampled without gaps with a sample thickness of 0.5 or 1 cm, resulting in pollen profiles with between 150 and more than 1000 samples each and a time resolution between 20 and 2 years for the time interval studied, depending on the sediment accumulation rate. The time models are based on radiocarbon dating, using between 15 and about 50 dates in each profile. With a pollen sum of 1000 tree pollen in each sample the chance to catch also rare, not wind-pollinated types is rather good, allowing better insight into the characteristics and changes of land use. Some examples concerning useful plants as well as weeds shall be presented, giving evidence of economics and land use patterns and their changes, as well as possible reasons. Our own sedimentological studies are restricted to loss-on-ignition analyses. For further and more sophisticated palaeolimnological and geochemical studies we cooperate with the Universities of Besancon, Braunschweig, Dresden, and with the GFZ Potsdam.

Local vs. regional human-environment interactions during the Neolithic in Northern Germany: a multiproxy comparison of records from two catchment areas
Ingo Feeser (presenting author), Martin Hinz, Stefan Dreibrodt (all Kiel University)

When interpreting palaeoenvironmental data from a single site it remains often difficult to distinguish local from regional signals. An insight into the nature of processes evoking these signals, identifying their source and their spatial significance can only be achieved by a comparison of multiple records within a region. In doing so it is possible to single out similar synchronous developments that indicate developments on the regional scale. In contrast, signals not found in other sites are likely to reflect local phenomena. The potential for the comparison of processes of different temporal scales and rhythms, i.e. long-term vs. short-term processes, is thereby constrained by sampling resolution and dating uncertainties of the records. Increasingly detailed archaeological chronologies, e.g. often reflecting short-term centennial or multidecadal developments, raise the demand for appropriate palaeoenvironmental records. In this context especially annually laminated lake sediments offer the possibility for high resolution multiproxy studies on a well constraint time scale. This paper aims at presenting examples for such an approach by comparing data spanning the Neolithic period (4500-2000 cal. BC) from Lake Woserin and Lake Belau two sites with annually laminated sediments ca. 130km
apart in the young moraine area of Northern Germany. We combine different signals from the palynological and geochemical record with information of archaeological developments to come to an integrated picture of local and regional developments.

DISQOVER Vilm Island with MARCO POLO
Almut Mrotzek (Greifswald University)
The MARCO POLO model is a tool for quantitative vegetation reconstruction at the stand scale from pollen records of small sites. MARCO POLO compares a pollen record from a small site with an adjacent regional record from a large water body to determine the (extra-)local component that dominates pollen deposition at the small site. The tool uses correction factors (R-values) for productivity and dispersal. Whereas correction factors are available for (most) arboreal taxa, they are generally lacking for taxa indicative of open vegetation and human activity. Yet, the tool is able to detect presence/absence of taxa even if correction factors are not available. The Baltic Sea island of Vilm is located just south of the larger island of Rügen in northeastern Germany. Its isolation by the surrounding waters ensures that the extracted (extra)local pollen signals reflect the environmental history of the island exclusively. Therefore, it serves as a good test field for interpretation and calibration of (extra)local signals especially from herb pollen as indicators of open landscapes. Reconstructed forest succession can be used to refine and support interpretation of past phases of human activity. Two small sites (ca. 2000 m apart) were studied at Vilm Island. They reveal up to 10,000 years of environmental development for the direct surroundings of the sites. Both sites show evidence for pasture and arable fields since around 800 CE until the 19th century. At one of the sites there are additional indications for human activities between 2800 and 100 BCE. At the other site indicators of human activity are more pronounced, but restricted to between 1500 and 1 BCE. The period before 3200 BCE is difficult to interpret for both sites as herb pollen cannot unequivocally be attributed to human disturbances. Possibly, human activities reach back to 4200 and 6200 BCE, respectively. The pollen records show that disturbed, open landscapes facilitated light demanding arboreal taxa like Corylus, Betula, Quercus, Juniperus and Rosaceae. Phases of decreased disturbance are associated with the spread of the shade-tolerant taxa Tilia, Taxus and Fagus. MARCO POLO is part of the DISQOVER R-package for quantitative vegetation reconstruction available at http://disqover.botanik.uni-greifswald.de.

AMS 14C-dating on pollen grains – a suitable method for palynological investigations of lake sediments?
Susanne Jahns (Brandenburgisches Landesamt für Denkmalpflege und Archäologisches Landesmuseum, presenting author), Ingo Feeser (Kiel University)
For palynological investigations good radiocarbon dating is an important issue. Without a reliable age model the interpretation of pollen diagrams is difficult and often of limited value. Terrestrial plant remains are the preferred material for such 14C measurements; however, unfortunately these are not always available. Especially in sediments from big lakes such plant remains can be so rare, that dates in an appropriate number cannot be carried out. On several cores from the state of Brandenburg in Germany and furthermore from Croatia and Greece, attempts have been made to use pollen concentrates from lake sediment samples as a substitute. In some cases this proved to be successful. However, this material has also some problems, which will be pointed out and discussed in this paper.

Vegetational and agricultural dynamics during the Neolithic (7000-4200 BC) on the Swiss Plateau
Fabian Rey (presenting author), Erika Gobet (both University of Bern), Adrian Gilli (Swiss Federal Institute of Technology Zurich), Albert Hafner, Willy Tinner (both University of Bern)
We present two new sites with partly varved sediments that cover the period of first increasing human impact during the Neolithic (7000-4200 BC). The two small lakes are Burgäschisee (465 m a.s.l., 21 ha) and Moossee (521 m a.s.l., 31 ha). For both lakes, Neolithic pile dwellings from the Cortaillod Culture (3900-3500 BC) are known. One settlement at Burgäschisee ("Burgäschi Ost") is part of the UNESCO World Heritage (Prehistoric Pile Dwellings around the Alps). Mostly, the Neolithic settlement phases were rather short-lived (less than 20 years). However, the high precision of the chronology together with a 8-year resolution sampling allows identifying these short-term settlement phases. Cultural indicators such as Cerealia-t. (t.= type), Plantago lanceolata-t., Linum usitatissimum-t., Papaver rhoes-t. and others, light-loving shrubs such as Corylus avellana and Juniperus (indicator for more openness of the landscape), macroscopic
When did Latmos Gulf close? Geology versus Archaeology
Sena Akcer-On (Mugla Sitki Kocman University, presenting author), Alan M. Greaves (Liverpool University), Zeki Bora On (Mugla Sitki Kocman University), Sturt Manning (Cornell Institute of Archaeology and Material Studies, New York), Namik Cagatay, Mehmet Sakiç (Istanbul Teknik Üniversitesi), Cemal Tunoglu (Hacettepe Üniv.)

In previous studies, the date of the closure of the Gulf of Latmos and the formation of Lake Bafa has been mainly based on interpretations of historical and archaeological materials. Moreover, the geomorphological model of the progradation of Büyük Menderes River is constructed and dated using historical knowledge of the political power of the ancient cities of the Menderes graben. A 2.9 m long core was recovered from 2.0 m water depth at the NE of Lake Bafa. The cores were analysed at 5 mm and 0.2 resolution using Multi Sensor Core Logger (MSCL) and X-Ray Fluorescence (XRF) core scanner, respectively. Stable oxygen isotope data were obtained from ostracoda and benthic foraminifera shells at resolution of 50 mm along the core. We have used the AMS 14C analysis from three in situ bivalvia shells. The multi-proxy data, faunal changes and calibrated 14C dates suggests three different phases occur. First phase is shallow marine conditions which is ended at around first millennium BC, second phase is isolated lagoon conditions where the water level has decreased and ended at around first millennium A.D., finally present day brackish phase.

Holocene Environmental Changes and Human Response in Eastern Turkey
Demet Biltekin (Ordu University, presenting author), Kürsad Kadir Eriş

The south-eastern Turkey was an important site for the historical and archaeological events, including some of world’s oldest Neolithic farming villages (i.e. Çayönü). Until today, a very few pollen and non-pollen records have been published for vegetation and land cover from this region. Therefore, pollen analysis is a significant proxy in the investigation of past climate, vegetation records and the human influence on the environment. To achieve the reconstruction of paleoenvironmental changes, two sediment cores were extracted from Lake Hazar in the Eastern Turkey, for multi-proxy analysis, including pollen, algae, fungi, Magnetic susceptibility, XRF, TOC and C14 dating, covering the last 17 ka BP. The forest development started at the beginning of Early Holocene and this trend continued to until Middle-Late Holocene, indicating humid and warm climate existed in the region. Additionally, the existence and abundance of Pediastrum boryanum, is a green algae, demonstrates that lake waters were nutrients rich water during this time period. After ca. 2.1 14C yr BP, anthropogenic plants are seen like Plantago, Rumex and Centaurea with Juglans, Vitis and Olea during the Late Holocene. The presence of Glomus shows that cold and dry climatic conditions existed around lake vicinity with lake level descending during the Late Holocene.

A multiproxy approach to interpreting regional population dynamics at Horsehoe Lake, Illinois, USA
AJ White (presenting author), Lora Stevens, Varenka Lorenzi (all California State University Long Beach).

Understanding the population history of the Cahokia archaeological complex, southern Illinois, USA, is a
major objective of American archaeology; however, traditional archaeological methods deliver only a coarse narrative of population events. We studied sediment from Horseshoe Lake in Cahokia’s catchment to determine the timing and magnitude of Cahokia’s demographic rise and decline and to weigh the impact of environmental drivers on the site’s population history. We used fecal stanol analysis to provide a 1200 year proxy of regional population change by identifying variations in the amount of trace human waste products retained in lake sediment. We then used oxygen-isotope analysis to reconstruct local hydroclimate, adding these findings to previous Horseshoe Lake environmental studies [Munoz et al. 2014, 2015] to assess the role of drought and flooding on Cahokia’s decline. What emerges is a complex picture of human-environmental interactions: no single environmental driver is responsible for initiating a sudden collapse; rather, environmental and cultural factors combined to produce a prolonged demographic decline. By employing multiple proxies on lake sediment cores, the intricate nature of the human story on a landscape may be observed.

Comparative investigations on lakes with Holocene annually laminated sediment sequences- Examples from northern Germany

Stefan Dreibrodt (Kiel University)

Lake sediments offer a key potential for high resolution reconstructions of the Holocene palaeoenvironmental history. If these sediments are varved their analysis results in highly valuable calendars of Holocene landscape dynamics influenced by human activity or natural processes and thus are usable as backbones of archaeological chronologies (prehistory). Comparative investigations of synchronously deposited sediments from different lake catchments allow further a disentangling of complex signals of human-environmental interdependencies. In the talk examples from lake catchments investigated during the past years are presented and an outlook to forthcoming work in the frame of the CRC-project “Scales of Transformation” will be given.

Revealing the precipitation and temperature records of Lake Hazar [Eastern Anatolia] from μXRF data, for the last 17.8 ka via Independent Component An (Poster)

Palynological and Archaeobotanical Investigations of the Neolithic Lake Village of Weyregg II [Lake Attersee / Upper Austria] (poster)

Z. Bora On [Mugla SK Universitesi], Sena Akcer-On, M. Sinan Ozeren, K. Kadir Eris, Alan M. Greaves, M. Namik Çağatay

Past climate proxies are, usually, nonlinear combinations of statistically independent or quasi-independent processes, and this make them as indirect indicators. In this study, we propose the method of Independent Component Analysis (ICA) as a tool to extract statistically independent climate signals from μXRF data of cores. ICA’s advantage over traditional dimension reduction methods is that it aims maximal independence rather than uncorrelatedness, whereas independence is a mathematically stronger proposition. The 3.5 m long Hz11-P03 core was recovered at a depth of 54 m depth from Lake Hazar, Eastern Anatolia. Eastern Anatolia is the main water source for Mesopotamian rivers, Tigris and Euphrates. Lake Hazar lies on the upstream of a tributary of the Tigris river, which previously was an outlet of the lake. According to the age model it spans the last 17.8 ka. A hiatus at 270 cm reveals that the lake level must have dropped by at least 54 m below today’s level between 12.46 ka and 11.76 ka BP. Applying the ICA method, we selected two out of six independent components by the distance correlation similarity measure. We propose that one of the selected components can be read as a proxy for temperature and the other for precipitation in this region. Our results indicate that the region was cold and humid between 17.8 ka and 14.8 ka BP but it was wet and warm during Bølling-Allerød. Following this, the observed hiatus effectively masks any data for the Younger Dryas stadial. At the start of the Holocene, while precipitation values were high, the temperature gradually increased until 8 ka BP. Between 8 ka and 5 ka BP, the region was warm but extremely dry. After 5 ka BP, around 3.5 ka BP the temperatures fell suddenly, and three abrupt dry phases are observed around 3.5 ka, 2.8 ka and 1.8 ka BP. The project is supported by the Scientific and Technological Research Council of Turkey (TUBITAK) project no. (111Y045).

Palynological and Archaeobotanical Investigations of the Neolithic Lake Village of Weyregg II [Lake Attersee / Upper Austria] (poster)

Marie-Claire Ries [University of Innsbruck/ University of Vienna, presenting author], Benjamin Dietre [University of Innsbruck/ Laboratory Chrono-environnement UMR CNRS 6249, University Burgundy Franche-Comté], Werner Kofler [University of Innsbruck], Andreas G. Heiss [Aus-
Prehistoric lacustrine settlements are key sites for the understanding of socio-economical and ecological changes during the Neolithic and Bronze Age Periods in the pre-Alps. In Upper Austria, the medium-sized lakes Attersee and Mondsee house numerous of such prehistorical and inundated villages. Within an interdisciplinary research programme dealing with palynological, archaeobotanical, dendrochronological, archaeological, geological, sedimentological issues as well as GIS-analyses a row of prehistoric lake dwellings and their surrounding flora and vegetation are studied. The objectives were to understand past agricultural sustainability, livestock husbandry systems, climatic alterations, fire history, as well as the use of natural forests and subsequent diversity cycles and regeneration processes. One aim of the project is to gain insight into past environmental conditions using onsite palynological studies including the quantification of Non-Pollen Palynomorphs (NPP) such as spores from coprophilous fungi or algal cysts. Therefore sediment cores were obtained during an underwater-archaeological excavation from the site Weyregg II in 2016. Today the settlement remains are located in shallow water along the eastern shoreline of Lake Attersee. They are associated with the so-called Mondsee-group, which appeared between the 30th and 25th centuries BC. Systematic investigations of the cultural layers rich in organic matter and comparison with preceding and overlying lake marl sediments of natural origin revealed detailed information on the local flora and vegetation changes under climatic and anthropogenic constrains. First results display strong emergence of cultural indicators such as Cerealia-type pollen reflecting very local crop cultivation and/or processing. High frequencies of particular fungal spore types possibly imply the important local presence of livestock. Furthermore patterns in sedimentation at the site represent different stages of depositional and erosive processes (e.g. Glomus fungal spore finds) which may be traced in the spectrum of NPP diversity changes. Additionally, focus is given to the comparison with adjacent palaeoenvironmental records in order to track similarities and differences for short and long-term transformation processes in prehistorical cultural landscapes.

**Palaeoecological research on the moat fill: case study of the Late Medieval motte at Rozprza, Central Poland (poster)**


Wet moat depositional environment is similar to small lake basins such as ox-bows and can be examined with the use of multiproxy palaeoecological methods. Palaeoenvironmental research on moat fill is not often however undertaken during archaeologica l works. The Medieval stronghold at Rozprza (Central Poland) was located in the valley floor of the Luciąža River valley (3rd-order river in Vistula R. basin). It was situated on the terrace remnant adjoining the floodplain. The fort functioned as a motte-and-bailey with moats’ system and was a seat of a noble family in the 14th-15th cent. AD. The intense investigations allowed for the recognizing of the moat system remnants. And the moat fill could be examining in detail in the trench exposures. The moat had a trapezoidal cross-section with a depth up to 1.3 m and a width of 21 meters. An earthwork from 1944 AD covers a moat fill. The moat fill consists of: clayey organic mud in the bottom, coarse-detritus gyttja, peat with wood fragments and organic mud in the top with fragments of wood and roots. The wooden elements were dendrochronologically dated to the 14th c. AD. The artefacts discovered within the moat’s fill are not older than the 14th c. A core of organic deposits was collected as a monolith for detailed multiproxy palaeoecological analyses. According to the pollen record, the vicinity of the motte was partly deforested and used as meadows and farmland. Presence of Triticum-type, Avena-type, Secale cereale, Cannabiss/Humulus, and Fagopyrum pollen, confirms local cultivation, but agricultural activity became weaker with time. Patches of local woods were composed of Alnus, Salix, Betula, Populus and Fraxinus. The moat fill could be used as a rettery. It is not confirmed however by pollen analysis results. Remains of other plants used in human economy were also identified. In the later period, there is clear evidence for the shallowing and overgrowing of the basin. The diatom analysis indicates two stages of environmental development, with eutrophic and benthic taxa in the
first phase and disappearance of diatoms in the swampy phase. Chironomidae subfossils indicates the presence of two general stages, with dominating limnetic taxa in the first stage and only single terrestrial taxa in the second stage. Eutrophic and nearly hypertrophic conditions were reconstructed for the moat basin. Episodic small floods are confirmed by species associated with lowland streams and ditches. A few episodes show an increase of mineral substrates associated taxa demonstrating increase in inorganic matter. Similar events were noted in the Cladocera assemblages and also confirmed by decreasing LOI values. The Rozprza moat was established in mid-14th c. AD. The changes from open water with coarse-detritus gyttja to a swamp with peat deposition took place in 16th c. The overbank organic mud accumulation within the moat ditch was initiated in 17th c. These results are providing data crucial for the reconstruction of the Late Medieval palaeoenvironmental conditions of the motte situated in the valley floor. The research project was financed by a grant from The National Science Centre No. DEC-2013/11/B/HS3/03785

Bridging long proxy data time series and instrumental observation - The Virtual Institute of Integrated Climate and Landscape Evolution Analyses ICLEA (poster)

Markus Schwab (GFZ German Research Centre for Geosciences, presenting author), Achim Brauer, Mirostaw Błaszkiewicz, Florian Ott, Nadine Dräger, Ulrike Kienel and the ICLEA Team

Understanding causes and effects of present-day climate change on landscapes and the human habitat faces two main challenges, (i) too short time series of instrumental observation that do not cover the full range of variability since mechanisms of climate change and landscape evolution work on different time scales, which often not susceptible to human perception, and, (ii) distinct regional differences due to the location with respect to oceanic/continental climatic influences, the geological underground, and the history and intensity of anthropogenic land-use. Both challenges are central for the ICLEA research strategy and demand a high degree of interdisciplinary. In particular, the need to link observations and measurements of ongoing changes with information from the past taken from natural archives requires joint work of scientists with very different time perspectives. On the one hand, scientists that work at geological time scales of thousands and more years and, on the other hand, those observing and investigating recent processes at short time scales. The GFZ, Greifswald University and the Brandenburg University of Technology together with their partner the Polish Academy of Sciences strive for focusing their research capacities and expertise in ICLEA. The long-term mission of the Virtual Institute is to provide a substantiated data basis for sustained environmental maintenance based on a profound process understanding at all relevant time scales. Aim is to explore processes of climate and landscape evolution in an historical cultural landscape extending from northeastern Germany into northwestern Poland. The northern-central European lowlands will be facilitated as a natural laboratory providing an ideal case for utilizing a systematic and holistic approach. In ICLEA five complementary work packages (WP) are established according to the key research aspects. WP 1 focused on monitoring mainly hydrology and soil moisture as well as meteorological parameters. WP 2 is linking present day and future monitoring data with the most recent past through analyzing satellite images. This WP will further provide larger spatial scales. WP 3-5 focus on different natural archives to obtain a broad variety of high quality proxy data. Tree rings provide sub-seasonal data for the last centuries up to few millennia, varved lake sediments cover the entire research time interval at seasonal to decadal resolution and palaeosoils and geomorphological features also cover the entire period but not continuously and with lower resolution. Complementary information, like climate, tree ecophysiological and limnological data etc., are provided by cooperation with associated partners. Further information about ICLEA: www.iclea.de

Multi-component time, spatial and frequency analysis of Paleoclimatic Data. (Poster)

Luigia Cristiano (Kiel University, presenting author), J. Stampa, I. Feeser, W. Dörfler, J. Meadows, T. Meier

In the framework of the project Timescale of Change - Chronology of cultural and environmental transformations (subproject of SFB 1266 "Scales of Transformation") , we focus on the development and applications of data analysis tools to paleoclimatic data. The interest is to have robust analysis to answer the key questions about time dependence of proxies, time and spatial correlation of the observables and to address the problems of uneven data sampling of the reconstructed time series, uncertainty associated to the proxy under investigation and the elaboration of a data model. In particular we are interested to understand the complexity of the
system and understand the cause of sudden as well as the slow changes in the time dependence of the observables. Here we present the visualization tool as well as data processing tools and their application to synthetics and real databases. In particular we show the preliminary results on multi proxy pollen data from Lake Belau and Lake Woserin in Schleswig Holstein. To identify the sharp changes in the waveform an AR-method is apply. In addition a trend is extract from the data in order to identify additional short period components. The results of different approached for the trend extraction are compared (polynomial fit and smoothing). To the data is applied a sinc-interpolation in the evenly sampled depth-domain and a depth-time transformation to obtain an evenly spaced grid in the time domain. In addition to that we show the cross-correlation and cross spectrum of different pollen data from same location and same pollen data from different locations in order to identify and quantify the similarities in time and frequency domain.
Comparative studies in Stone and Bronze Age demography

Abstracts Session 17

The Influence of Demography on Social and Political Organization in Neolithic Societies: Evidence from Contact-era New Guinea
Paul Roscoe (University of Maine, USA)
Archaeologists have recently made great strides in estimating demographic trends in such widely separated regions as prehistoric Australia, South America, and Northern Europe. In this talk, I draw data from 130 contact-era New Guinea societies to review how and why demographic variation shapes social and political organization in neolithic communities. Particular topics include the relation of subsistence regime to population density and nucleation, and how density and nucleation shaped (and were shaped by) the forms of war, settlement patterns, polity formation, and political leadership.

Lessons we learned too well: the impact of ethnographic evidence on archaeological interpretations
Aleksandr Diacheko (Institute of Archaeology of the NAS of Ukraine)
Application of ethnographic evidence to archaeological information is critically discussed for decades. Meanwhile, correlation between the demography and social structure in archaeology is still, to a great extent, based upon ethnological schemes. This paper discusses the cases of settlement organization, population estimates and social organization against methodological backgrounds, impacted by ethnology.

Contribution to population studies from a perspective of Andean Archaeology
Hermann Gorbahn (GSHDL, Kiel University)
The Andes and especially their central section have witnessed an autochthonous cultural development from hunter-gatherers to horticulturalists, agriculturalists, early complex societies, cities, and early states up to the Inka Imperium. Next to this cultural development - which is rather multilinear and many-faceted than straightforward evolutionary - the Andes are characterized by a high variety of ecological diversity which in turn influenced the cultural developments. In the past two decades or so, several intensive projects in archaeological research were carried out especially in Peru, which brought to light enormous new information about pre-Columbian cultural developments in this area. Based on this new published results and by applying recent methods on palaeodemography it is most probably possible to come to new and finer estimations on the sizes and densities of past populations and their diachronic developments. Furthermore, it is in some cases possible to link palaeodemographic trends with cultural or environmental changes and transitions. This paper aims to present case studies from the Andes to provide comparison possibilities for developments in the "Old world".

Demography and Social structure in a micro-region in the Serbian Vojvodina between Neolithic and Bronze Age
Robert Hofmann, Marcel Rodens (both Kiel University, presenting authors), Ildiko Medović (Museum of Vojvodina Novi Sad), Joca Bakalov (Zrenjanin), Tijana-Stanković-Pešterac, Aleksandar Medović (both Museum of Vojvodina Novi Sad), Martin Furholt (Kiel University)
Since 2014 comprehensive field work has been carried out at the spatial scale of a micro-region near the town of Novi Bečej at the Tisza River (loess plateaus of 11 m² size) in the Serbian Vojvodina in a Serbian-German cooperation. The investigations included a method mix of geomagnetic and geoelectric surveys, core drillings, systematic surface collections and targeted excavations. In the paper the attempt is undertaken to reconstruct the population sizes and dynamics, settlement patterns, rank size distributions and social structure in this micro-region from the Early Neolithic to the Late Bronze Age based on our collected data and older finds. The results will be faced with data regarding subsistence and economic strategies on the one hand and settlement patterns on a wider spatial scale. In this way basic lines of population development can be drawn for the south-eastern Carpathian Basin.

Trends in Demography in Southeast Europe – The reconstruction of neolithic population densities
Heiko Tiede (GSHDL, Kiel University)
At the End of the 5th millennium BC in the region of the Balkans and in the middle of the 4th millennium BC in the Carpathian Basin the existens of fortified settlements ended. The question comes up whether this “collapse” of the tell settlements can be also expected as a decline in population sizes. For example, on the Titeler plateau in Serbia there are no traces of settlements available over a period of 1000 years. In the period of the Tiszapolgar- or Bodrogkeresztt culture there are many cemeteries in the Danube area known, but settlement organizations are poorly researched. At the beginning of the Bronze Age, the number of settlement sites increases again. In demography research, no systematic connection of settlement and burial ground investigation was carried out. That’s the point, where our research starts. The aim of the presented work is the study of population sizes. For this purpose, as many of Eneolithic cemeteries and settlements from Southeast Europe will be collected. Based on the anthropological analysis of the cemeteries and the size of the existing settlements, the number of individuals of regional populations will be estimated. The lecture presents results based on Eneolithic cemeteries and settlements in Hungary, Romania and Bulgaria. For the cemeteries mortality tables will be calculated. They show for example the life expectancy, mortality rates and as well the possible number of living individuals at the same time. Dug, evaluated and published settlements are rare for the Chalcolithic Southeast Europe, the database based on collected surveys and archaeological catalogs. For most of the settlements conclusions about the number of the population can only be concluded from their area sizes. These figures should be compared with the small regional calculated numbers of cemeteries and are scaled to conclude on a multi-regional level for South East Europe.

The more, the merrier: Late Bronze Age peak in population growth of the southern Carpathian Basin and northern Balkans
Hrvoje Kalafatic (Inst. of Archaeology, Zagreb)
Detailed demographic analysis of the Bronze Age population in Croatia has yet to be made although some aspects have been addressed, mainly as part of monographical publications. The lack of specialized demographic research into this prehistoric period is due to a number of complex challenges. One of main challenges was framework in which chronology oriented paradigms in archaeology have influenced disciplinary ideas and research focus for many years. In past decade several Late Bronze age sites have been thoroughly excavated, so today it is possible to discus settlement patterns and population dynamics in more details. These excavations are mostly results of intensive construction activity. Good point is that highways and pipelines as longitudinal objects are ideal as cross-sections all over the landscape so archaeology got the opportunity to have deep insight in land occupation during all prehistory and historical periods. This paper will present some insights in the Late Bronze Age population dynamics in River Sava Basin, today part of continental Croatia and northern Bosnia and Herzegovina, which was inhabited by population known as Barice-Gredani group. This community is known for significant increase in settlement number, large number of cemeteries, well established chronological sequence and defined territory of occupation. In that way, it is excellent data source for population studies.

From relative to absolute population numbers in Early Bronze Age Denmark: implications for trade, consumption and wealth.
Kristian Kristiansen (University of Gothenburg)
Recent research on number of farms and population numbers in Denmark is used to calculate the stock of metal, yearly replacement rates, as well as other economic parameters for wealth, such as textiles.

Where childhood ends and adulthood begins? Problems in the study of the Mycenaean demographic structure on the basis of Linear B inscriptions.
Beata Kaczmarek (Adam Mickiewicz University)
The article presents problems resulting from possibilities to recognize frames of childhood in the Mycenaean society. Studies are based on Linear B inscriptions from Knossos, Pylos, Thebes and Mycena, where appear words connected with childhood: “boy”, “girl”, “younger”, “son”, “mother” and “father”. The main research question focus on identification, in which moment of life in Mycenaean society, child ceases to be a child and takes over responsibilities of adult. The research shows that from youth, boys and girls learn their future specialization and they can make some simple works controlled by the Mycenaean “palace”. Key words: childhood, Mycenaean society, Linear B writing.
Abstracts Session 18

Lakescapes and seascapes of Neolithic and Bronze Age societies

Northern alpine lake settlements of the Neolithic. A review on structures and patterns.
Albert Hafner [University of Bern]
In the pre-alpine landscape north of the Alps numerous well-documented Neolithic lake settlements offer insight into the structure of their architecture and their temporal development. This review highlights examples of settlement plans from different regions and defines types and recurrent patterns. Key regions are Southern Germany and Switzerland; main sources are sites in bogs or lakes.

The pile dwellings of Sipplingen at Lake Constance, 3919-933 BC dendro
Irenäus Matuschik [Landesdenkmalamt Hemmenhofen]
Excavations in the years 1978-2012 by the Landesamt für Denkmalpflege Baden-Württemberg provide a rather complex history of settlement. The analysis of the deposits and the dendrochronological examination of the documented wood allow distinguishing fifteen occupation phases. Organic deposits are preserved from the twelve older of them, but data about extensions, durations, settlement structures and house constructions were collected for all phases. In addition, the preserved deposits provided abundant ensembles of artefacts and samples for archaeobotanical and zooarchaeological examination. By combining the results of the particular phases it is possible to observe a remarkable change of features over time. Due to its abundance of well stratified and exactly dated ensembles, Sipplingen is a key site for examining the prehistoric development at Lake Constance.

Making waves in the Neolithic. A theoretical and interdisciplinary approach to the question why people settled wetlands in the European Neolithic.
Jadranka Verdonkschot [Eberhard Karls Universität Tübingen]
This project centres on the question why people in Neolithic Europe decided to settle lakesides, not only in the most extensively studied circum-Alpine area, but also in southern Europe. The answer to this question is sought for in the assessment of four archaeological case studies (Egolzwil 3, Switzerland; Hörnle IA, Germany; La Draga, Spain and Dispilio, Greece) and two ethnographical and modern examples of pile dwellings (the Ribeirinhos, Amazon and Amsterdam, the Netherlands). The exploitation of resources, the relationship of the lake-dwellers with the landscape and ritual evidences are all taken into account in order to make observations regarding the reasons the first people could have had to settle on lakeshores in distinct regions, the influence of the lake on their life and identity and a broader assessment of culture and identity as a ‘liquid’ concept. This research proposal originally stems from the observation that any explanation for initial wetland settling in prehistoric archaeology is overly simplified. Existing approaches rely on fishing (although no specialisation can be proven), a defensive character (although no conflicts are evident from those chronologies) or fertile soil (although many settlements maintain a mixed subsistence pattern in which hunting and gathering is equally or more important). Aspects such as the agency of the landscape or nuanced views regarding identity are generally omitted. The current study aims to change this. Apart from this it is aimed to implement and at the same time assess the use of theoretical considerations such as symmetrical archaeology, following the ontological turn and the possibilities of interdisciplinary research. There is a strong emphasis on landscape archaeology and the accompanying methods, GIS, are implemented in the work. The added advantage is that several regions are represented, making this study the first of its kind in assessing such a broad and diverse lakeside settling panorama. A regional overview is included in each case study, which adds shifting conditions and different regional dynamics. This work does not pretend to reach a definitive answer, a single reason explaining the settling of the lakeshore, but is rather a theory-based exercise that moves beyond conceptual and modern borders.
Lakescapes and networks of exchange & visibility

Benjamin Jennings (University of Bradford)

The Late Bronze Age in the northern Alpine region is represented by the occurrence of a large number of lakeshore settlements. With this area, the region of Lake Neuchatel, Lake Biel, and Lake Bienne in western Switzerland sees a relatively high density of settlement on the lakes margins between c. 1100 and 800 BC. Dendrochronology provides secure dating for some of these sites, while others are dated to broader ranges based upon typological classifications. Such typologies can be used to suggest approximate dating of occupations and contemporaneity between sites. However, considering elements of typology can also offer a greater understanding of production and exchange networks. The application of network analysis to bronze jewellery from Late Bronze Age sites across Switzerland suggests that the lake-dwelling sites were relatively well connected to wider areas, but also highlights some interesting elements of connectivity within the Lake Neuchatel region. Combining the network analysis of bronze jewellery, with a GIS based visibility analysis of known Late Bronze Age sites from within the region of Lake Neuchatel provides an opportunity to relate the influence of the lakescape and wider terrestrial environment to the networks of interaction and communication in the region. Does the intervisibility of sites influence the levels of exchange or interaction between sites in a relatively confined area? Given the relatively limited size of the three lakes under consideration, it is possible to observe relatively significant proportions of the lake perimeter from any given point. Therefore, settlements on the lakeshore would also be widely visible. Does this visibility relate to greater levels of interaction as observed through the artefact record? Or does the lack of visibility between sites at greater distance and separated by land bridges result in a greater perceived level of interaction? Exploratory analysis and research seeks to resolve these questions, and the social models of interaction which may lie behind the distribution of material culture, and lakeshore settlements within the broader lakescape.

The Wadden Sea of the Eastfrisian Peninsula through time: paleolandscape maps for the Holocene.

Martina Karle (NIHK Wilhelmshaven)

The Wadden Sea area is characterized by strong tidal changes and sediment movements. Since the end of the last glacial period this amphibian landscape has gone through innumerable changes, and is still in motion. We attempt to interpret the region’s coastal depositional environments in the light of Holocene environmental change observing the interacting controls of local relative sea-level, climate and sedimentary processes. By analysing a variety of basic geological data of the Holocene coastal sediments, geographical changes of the modern coastal area have been reconstructed. The results are depicted in palaeo-geographical maps. The targeted landscape reconstructions are realized for defined time slices (8000 BP, 5000 BP, 3500 BP and 1200 BP). The joint project WASA [“The Wadden Sea Archive”] funded by Lower Saxony and the VW foundation started in 2016. Within this project interdisciplinary research (sedimentology, geophysics, geochemistry, palaeobiology, archaeology and offshore engineering) aims to identify and evaluate terrestrial archives of the East Frisian Wadden Sea in order to reconstruct the Holocene development of landscape, environment and settlement in greater detail.

Holocene coastal landscapes in the Wadden Sea – first palynological results and perspectives within the cooperative project WASA (Wadden Sea Archives)

Frank Schlütz (Lower Saxony Institute for Historical Coastal Research, Wilhelmshaven, presenting author), Lyudmila Shumilovskikh (Göttingen University), Felix Bittmann (Lower Saxony Institute for Historical Coastal Research, Wilhelmshaven)

Before the Holocene sea level rise, vast areas, today covered by marine sediments, were emerged land and potential habitats of Mesolithic hunters and gatherers. Within the cooperative project WASA (Wadden Sea Archives) financed by the VW-foundation and the Ministry of Science and Culture of Lower Saxony, we investigate the changes in vegetation over time related to the progress of the sea level rise. Profiles drilled during low tides are analyzed palynologically by means of pollen, fungal infested pollen grains, fern, moss and fungi spores, testate amoebae, as well as remains of marine microorganisms (Foraminifera, dinoflagellate cysts) and burnt plant fragments (“charcoals”). The very first results point to an early coverage of the Pleistocene sands by heathlands (Calluna vulgaris, Erica tetralix) since at least the start of the Holocene. The heathlands continued until they became covered by raised bogs during the Atlantic. In the course of the Holocene sea level rise the whole landscape was drowned and buried by tidal sediments with clay, silt, sand and shell layers. The exact extent and tim-
ing of the development of raised bogs have to be
tested as well as the appearance of the landscapes
that developed during regression phases on the
marine sediments.

A lake or/and a river. What could be rele-
vant in the settlement preferences of
residents in Early Bronze Age
Bruszczewo
Janusz Czubeszuk, Matheusz Jäger (both Adam
Mickiewicz University in Poznan), Jutta Kneisel,
Johannes Müller (both Kiel University)
No abstract submitted by printing deadline.

Using waterscapes in Early Neolithic:
new investigations in the southern Rus-
sia [site Rakushechny Yar]
Ekaterina Dolbunova (The State Hermitage Mu-
seum, presenting author), A. Mazurkevich,
A. Tsibrii, V. Tsibrii, M. Sablin
Site Rakushechny Yar, situated on the low Don River,
in the south of Eastern Europe, is one of the earliest
Neolithic sites of this region. This is a unique site,
with 4 meters sediments including 23 cultural lay-
ers, which conserved the remains of material cul-
ture of the 7th–1st mill BC. Excavations at this site
were conducted in the 1960-1970s by T.D. Bela-
ovskaya. Only a small part of the low layers dated
to 7th mill BC was uncovered, with the remains of
adobe constructions, shell middens, and fire-places.
The faunal remains found during the excavations in
the 1960s-70s are represented both by domesticated
species: sheep, cattle, pig, dog, and by wild animals:
red deer, boar. Also a particular ceramics assem-
bles, flint and stone inventory was found. Forty
years later it appeared crucial to discover the par-
ticularities of ancient settlement organization,
whether such ancient evidences of cattle-breeding
can be really recorded in the south of Eastern
Europe, and what other elements of Neolithic pack-
age can be traced here. New researches and exca-
vations were started in 2008 and were later contin-
ued by P.M. Dolukhanov, A.V. Tsibrii, V.V. Tsibrii,
A.N. Mazurkevich, A.F. Gorelik A. and E.V.
Dolbunova. New researches allowed revealing un-
disturbed strata of cultural layers, including the
most ancient one, which were inaccessible before
due to a high level of the Don River. A series of ra-
dioisotope dates was obtained, that reveals different
periods of formation of cultural layers located on
diverse parts of the site. It confirms also a hypothe-
sis of T.D. Belanovskaya that cultural layers were
accumulated unevenly on different areas of the site,
reflecting inhabitation of only definite parts of the
settlement. Nowadays due to the dates made on
organic crusts, bones and charcoal, the oldest lay-
ers can be dated to the first half of the 7th mill BC.
Part of this site, located on the island/semi-island
on the river shore in the past, can be regarded as a
specialized place for the use of water resources.
Fishing activity and Unio shells’ processing was held
here, demonstrated by a specific flint industry, a
great amount of Unio shells and fish bones. A defi-
nite set of fish bones (fish-tails) can be traced in
some parts. Besides Unio shells middens, also a pit
was found with several levels, filled with different
shells, fish bones and artefacts. The bottom of the
upper level was covered by Unio shells, a middle
level was filled with Viviparous shells, the levels
below – by crashed Unio shells in combination with
Viviparous and one level was filled with Unio shells.
Walls of the pit were covered by clay, which created
a waterproofing layer of this construction. Almost
complete broken vessel and large grinding stones
were found in low levels of this pit. Pits from stak-
es were also found in low layers within the shell mid-
dens. Resources of not only waterscapes were used
by inhabitants of this site. Based on faunal remains,
we might suppose that several ecological niches
were in use – woodlands with water basins and open
steppe landscapes. Finds of bones of domesticated
species (sheep and pig) in the lowest layers could be
the evidence of even more complicated organization
of this society. Further investigations will allow us to
precise the time of their appearance and, probably,
to find other evidences of origin of these new-
comers who left this particular settlement.

Veksa, Northwest Russia – 8000 years of
settlement history in a dynamic palae-
olake landscape
Henny Piezonka (Kiel University, presenting au-
thor), Nadezhda Nedomolkina, Wiebke Kirleis,
Sebastian Lorenz, John Meadows, Magdalena
Wieckowska-Lüth
The settlement remains of Veksa c. 400 km north of
Moscow represent a pivotal site with regard to the
cultural development in northwestern Russia. The
site is located in the Former basin of a Late Glacial
palaeolake, which in the early Holocene developed
into a river landscape. The exceptional significance
of Veksa is due to the clearly stratified sequence of
archaeological layers up to 3 m thick which encom-
passes all periods from the Early Neolithic through
to the Medieval period. Veksa yields the rare oppor-
tunity to follow the local cultural, typological and
economic developments and their links to environmental history over eight millennia. A Russian-German field project led by Vologda State Museum and the German Archaeological Institute/Kiel University started in 2015. It combines archaeological research with archaeobiology, palaeogeography and dendrochronology in order to generate new high-quality data on human-environment interactions on a diachronic level. In 2015 and 2016, two field campaigns were conducted, during which several excavation trenches have been opened along the river bank. New radiocarbon dates form the basis of the dating sequence at Veksa and, at the same time, contribute to the assessment of freshwater reservoir effects in Northwestern Russia. In addition, 27 drillings were put down to investigate the sedimentological sequence, and two cores were retrieved for palinology. The results of the multidisciplinary investigation of the archaeological sequence show that both the cultural horizons and the sterile layers between them consist of numerous thin sub-layers representing the sedimentological accumulations of annual floodings. Thus the sterile layers are not the result of single events, but represent longer periods without settlement activity. Well-preserved remains of the later Stone Age include a concentration of almost 2000 wooden stakes and piles standing upright on the river bank. Radiocarbon dates place the main concentration in the Late Neolithic around 3000 cal BC. Thus, the concentration of wooden piles at Veksa is chronologically associated with a period of pile dwelling construction in the Late Stone and Early Metal Ages, noticeable from the Alps in the south-west to the Onega region in the north-east. A test trench within the pile concentration yielded for the first time information on the stratigraphic association of the timber constructions. Silty and multiple layered sediments rich in organic remains point to lacustrine environments, where the area was probably not a river bank but part of a shallow lake. Among the piles, several well-preserved wooden fish traps have been found, indicating multiple uses of the shore area. First results of the analysis of botanical macro-remains from the archaeological contexts starting in the 6th millennium cal BC have found charred seeds of water lily, adding new surprising evidence to the exploitation of aquatic plant resources. New insights also come from the pollen cores, the first in this region, which show several phases of intensified human activity at Veksa over the millennia that correlate to phases of increased siltation and drying-up of the environment. Preliminary chronological information from the pollen sequence indicates that cereal cultivation might have been established in this area exceptionally, in the Middle Ages, shedding new light on one of the most pressing archaeological issues in this region, the question of the transition to agriculture.

Aspects of transformations in contrast to Neolithic lakeside and seaside places in Schleswig-Holstein, Germany
Jan Piet Brozio (Kiel University)
From 2009 to 2016 several researches took place on Neolithic lakeside and seaside places in Schleswig-Holstein, Germany. They were integrated in the research programs of the SPP1400 and the SFB1266, both founded by the DFG. The results of excavations, the analysis of material culture, the organic macro remains and the prehistoric environment allow presenting detailed aspects of settlements at lakeside and seaside places. The paper focuses on varying Neolithic landscapes, structures and developments of settlements, subsistence strategies and changing settlement systems in different regions at the coastal zone of the Baltic Sea, in contrast to interior regions of the moraine landscape in Schleswig-Holstein. A comparison of different archaeological landscapes and their development in time proves various strategies of lakeside and seaside regions in contrasts with other formed Neolithic regions in Schleswig-Holstein. A focus will be the integration of processes of transformations like aspects of monument building, demographic changes and variations in forms of social organisations or the introduction of new technologies in different landscapes.

‘Lacul Gorgana’ – A paleolake connecting Copper-Age settlements along the Lower Danube valley, Romania
Dirk Nowacki (presenting author), Jürgen Wunderlich (both Goethe Univ. Frankfurt a.M.)
Geoarchaeological research conducted at the Lower Danube in southern Romania aims to decipher the relationship between landscape evolution and human settlement activities during early and mid-Holocene. Archaeological excavations at Măgura Gorgana (Pietrele) are complemented by corings to reconstruct the environmental conditions and the fluvial network of the Danube. The study focuses on the Neolithic and Copper Age period when, besides Măgura Gorgana, numerous settlements existed along the valley of the Lower Danube.
During our ongoing research, more than 190 sediment cores with up to 18 m depth were taken by means of a percussion drilling equipment in the
Danube floodplain between Giurgiu and Oltenia with a strong focus on the area close to Pietrele. Sedimentological and chronological analyses of the cores indicate that nearly the whole floodplain in the study area was covered by a vast palaeolake during middle and late Holocene, hereinafter referred to as 'Lacul Gorgana'. The palaeolake connected the Copper Age settlements along the valley. A multi-proxy approach based on geochemical analyses of the lake sediments allows us to draw conclusions about the ecological conditions within the lake. Specific geochemical signals of the lake sediments, which were accumulated during Copper Age, testify the presence of algae blooms together with the formation of a eutrophic milieu. These conditions very likely emerged from human impact on the lake system.

Until now the processes which caused the formation of the palaeolake Lacul Gorgana as well as its extension to the East are still unknown. Did Lacul Gorgana develop as a result of the blocking action of fan like structures, which were accumulated in the Danube valley by tributaries further downstream, or was it the westernmost part of a vast bay (ria), which formed as a result of the post glacial rise of the Black Sea level? To answer these questions, the study area has been extended further downstream. New corings in former Lake Boian, in the floodplain next to Călărași and next to Bordană, provided very promising results. The sediment stratigraphy is similar to that in the floodplain between Giurgiu and Oltenița indicating that the palaeolake had a much larger extent as previously assumed. Ongoing geochemical and chronological analyses should verify these conclusions.

In conclusion, our work combines sedimentological studies of palaeolake sediments with archaeological research and highlights the importance of such an interdisciplinary approach to estimate the influence of human societies on the environment.

Life on the water: The Lower Danube River during the Copper Age (5th millennium BC)
Mihaela Savu (Kiel University, presenting author), Kenneth Ritchie (Moesgård Museum)

Aquatic environments have been of great importance for prehistoric human groups in different times and places because of the role they play in transportation, communication, ideology – and not least, subsistence. While some cultures with intimate ties to waterscapes are well studied in this regard (e.g. the Mesolithic of the Northern European coastal areas and the Viking period), others have received less attention. The Copper Age of southeastern Europe is an area that has been the focus of many investigations because of the impact of metalurgy and the signs of incipient social stratification – but the impact of aquatic resources and environments on these developments remains underappreciated. Using new data from Pietrele and published data from other sites of the Romanian Copper Age (Gulmenița culture) along the Lower Danube River, the contribution of waterscapes to cultural developments in this period will be discussed. In particular, the importance of fish and fishing to aspects of society beyond (but including) subsistence will be highlighted.

Seascapes in the Late Bronze Age Aegean. The example from harbour-sites.
Eugenia Loizou (Independent researcher)

The notion of a seascape, especially a prehistoric one, is still debatable among the scholars. However, the significance of the seascape for the prehistoric people in economic, cultural and ideological aspects is unquestionable. In this paper it is attempted to approach the Late Bronze Age seascapes in the broader Aegean area through the examination of the harbours. Firstly, the physical characteristics of a LBA harbour are presented along with the environmental features that determine a probable harbour. Questions regarding the location of an aegaean harbour, the natural and the artificial –if any- elements that constitute a harbour and the function of it are to be answered. In addition, attention is drawn on the terrestrial compounds of a harbour and how they form the idea of a cultural seascape. What is more, harbours can also be seen as a medium between the people of the sea and the landsmen. Consequently, the marginal role of a seascape is discussed and also how it can trigger or hinder cultural interactions and technological advances. Finally, complex or simpler networks of trade and communication are examined through the material culture on harbour sites.

A Thousand Blistering Barnacles! Catching Haddock in European Prehistory
(Poster)
Jos Kleijne (Kiel University)

At the Late Neolithic (c. 2800-2500 BC) site of Mienakker in the Netherlands, a large quantity of haddock (Melanogrammus aeglefinus) was found (Brinkhuizen/Zeiler 2013 in Kleijne et al 2013). The occurrence of this fish species in prehistory is
unique for the Netherlands, no other sites exist. Haddock is generally only to be found in colder and deeper waters, not in the shallow waters of the Dutch coast. In this small project, I inventoried all the prehistoric sites along the North Sea and North Atlantic border where haddock was found. Did people really do something special at this site of Mienakker?

Coastal worlds in the Eastern Mediterranean Bronze Age (Poster)
Mari Yamasaki (Johannes-Gutenberg-Universität Mainz)

During the Bronze Age, city kingdoms, territorial empires, and the polities that dotted the coasts of the Middle Sea found themselves engaged in an intense trade and cultural network. Central to the development of such connections were the many coastal communities striving along its shores. Liminal in their position, nested between land and sea, they became nodes of exchange between the foreign and the local, but also mediators between the hinterland and the sea, in virtue of their quasi-amphibian experience of both worlds.

However, geographic proximity to the sea is not sufficient for a community to be called coastal. Other factors, such as dietary customs, the existence of a sea-specific lexicon, familiarity with navigation and the presence of coastal landmarks, intervene to its definition. In this respect, the conceptualization of the landscape – or seascape, in this case – has little to do with geographical objectivity and much more with perception.

One of the primary goals of this dissertation project is to identify a series of archaeologically identifiable, objective parameters that can be used to recreate a cognitive geography of ancient Eastern Mediterranean coastal zones through the exam of material culture dispersion patterns, textual sources and iconographical evidence. From an archaeological point of view, particular focus is placed on the evidence for the exploitation of maritime resources, and the possible relationship between the latter and a cultural openness – or lack thereof – towards the sea. This poster provides an overview of the research, as well as of the theoretical and methodological criteria adopted in approaching this subject.
Abstracts Session 19

Archaeological heritage management – The practical side

Doing heritage – A view from Faro

Thomas Meier [University of Heidelberg]

In 2005 the Council of Europe issued its „Framework Convention on the Value of Cultural Heritage for Society“ in Faro (www.coe.int/faroconvention). Up to now it has found little interest in politics, heritage management and the wider society, because, it is assumed, of its rather abstract contents. While the Convention on Archaeological Heritage (Valletta 1992) and the Landscape Convention (Florence 2000) focus on rather practical aspects of heritage- and landscape-management, the Faro-Convention aims at a fundamental framework. The Faro-Convention draws on Article 27 of the Universal Declaration of Human Rights (1948) and Articles 13 and 15 of the International Covenant on Economic, Social and Cultural Rights (1966). These articles declare an individual right of participation in culture and with its convention the Council of Europe attempts to fill this hitherto unsubstantiated human right with meaning and obligations. With this fundament in Universal Human Rights the Faro-Convention has potentially more legal impact than other Council of Europe’s conventions, which are basically nothing more than letters-of-intent by the signatories. Moreover in this convention the Council of Europe draws on its ideal of democratic participation of the civil society and the new framework is nothing short of a fundamental change in the concept of heritage and heritage practice. In contrast to the Valletta-Convention and the European Union’s legislation, which is driven by a clear top-down approach placing educated heritage experts (archaeologists, art historians etc.) in the first place to decide on matters of heritage, the Faro-Convention is based on a fundamental bottom-up-approach: Heritage is no longer defined and enrolled by experts, but „cultural heritage is a group of resources inherited from the past which people identify […] as a reflection and expression of their constantly evolving values, beliefs, knowledge and traditions“ (Art. 2). I.e. not experts, but social groups of whatever self-definition („heritage communities“) are the sole legitimate actors in defining heritage, irrespective of any academic training or reasoning – heritages are defined as the tangible and intangible anchors of these groups’ identities. Even more the Faro-Convention mentions experts only marginally and as one stakeholder among others with a special role in managing heritage sites. This is a consequence of its participatory and democratic approach and – as a result – completely redefines the roles, competences and influences of experts, „the public“ and heritage communities. A serious legal challenge is addressed in Art. 2a, where the Convention emphasizes that defining a community’s heritage is independent from ownership of the heritage site. In combination with the Universal Right of cultural participation it is an easy step to develop that every member of a heritage community must have the right to access and use the heritage of its community. Such a right of access and use is in tension with the owner’s right to control access and use his/her property. The Faro-Convention is very vague on issues of management, asking all groups to respect and care not only for their own heritages, but also for the heritages of any other group. It seeks to implement “shared responsibility” involving citizens and civil society in order to bring together all the stakeholders and to allow dialogue to become one of the main forces.

The holistic approach to heritage management; from philosophy to implementation.

Gai Jorayev [University College London]

The holistic approach to archaeological heritage management, in its widest possible implementations, is gradually becoming a mainstream concept for managing complex sites with competing range of values across the globe. However, the support of the philosophy does not necessarily mean ease of implementation, especially in the more complex sites such as the World Heritage properties where the challenges are often quicker to come to forefront because of increased visibility and attention. This paper will focus on some major hurdles and complexities as well as on some potential ways forward based on author’s experience in academic research and heritage consultancy work. It will look at the concepts of values and stakeholder engagement, keeping in mind the multifaceted interactions of different interest groups around the heritage sites. It will discuss the ways of monitoring change over time, especially using high-tech documentation and open-access approach to information, and bring up the questions about the long-term feasibility as well as about management of heritage information. It will try to talk about the social and economic benefits that have undoubtedly great potential for ensuring
long term safeguard, looking at the concepts such as sustainable cultural tourism and support for the local culture and creative industries. Combining these issues together, it will also briefly touch upon the potential of practice driven policy making in localised, national and international levels. In general, following the main questions posed by the session, it will attempt to discuss the range of issues related to holistic approach of heritage management in the sites of recognised universal value and will bring examples from several sites to open up the debate about the sustainable ways forward.

Preservation by development of sustainable strategies for a better protection of the UNESCO world heritage sites

Sergiu Musteata („Ion Creanga” State University, Chisinau)

Cultural Heritage is a common resource of people across the world, representing humanity’s relationship with the past and its traditions. Cultural heritage is diverse, and people have a common responsibility to understand and safeguard it for future generations. Since 1972 UNESCO established a frame of protection for cultural and natural heritage (a convention concerning the protection of World Cultural and Natural Heritage) and the “World Heritage List”, which it considers as having outstanding universal value, now listing 1031 properties from 163 countries, including 802 cultural sites. In 1994, at the Nara Conference the Document on Authenticity was established, stating that “the protection and enhancement of cultural and heritage diversity in our world should be actively promoted as an essential aspect of human development”. Today, many factors affect the authenticity and integrity of cultural heritage: intensive tourism, over-restoration works, new inappropriate investments or uncorrelated private interventions, etc. The debates on cultural heritage research, preservation and management have increased in recent years as the effect of UNESCO standards, namely to establish “an effective system of collective protection of the cultural and natural heritage of outstanding universal value, organized on a permanent basis and accordance with modern scientific methods”. Every six years, the States Parties are invited to submit to the World Heritage Committee a periodic report on the application of the World Heritage Convention, including the state of conservation of the World Heritage properties located on its territories. The reports concerning the situation of the WHS sometimes are very general. The real problems could be prevented through better monitoring and management methods, while regional cooperation could be a driver for identifying the best solutions. Protection of authentic heritage recognized by UNESCO was recently reconfirmed at the 39th Session of the World Heritage Committee in Bonn, Germany (2015). Participants pointed the need to review the state of conservation of World Heritage sites and inscribe new sites on the World Heritage List. In this context, we need a critical approach to the real situation of each site, starting a discussion on a Policy Document for World Heritage Sites preservation and promotion, and establishing a model for heritage management according to the needs and specificities of each site. The integration approach is the only adequate way to sustainably manage the World Heritage Sites. Furthermore, the need for a relevant, balanced and realistic approach is strongly encouraged by UNESCO in the World Heritage Convention Operational Guidelines. Preservation strategies and management plans should be based on following areas: physical protection, increased visibility, reminders and references, presentation of the content and site’s branding. Cultural sites protection and management should be a dynamic complex approach and follow the principles of the Preservation by Developing Sustainable strategies of the World Heritage List. Sustainable site management should be followed by a permanent consultation process between responsible bodies, in both professional and local communities. As an ICOMOS expert, I have in recent years evaluated some sites nominated for the UNESCO World Heritage List and my presentation will be focused on cultural landscape sites from Romania.

New powerful tool in urban rebranding and forming of a new concept of the modern city development – creation of the Taraz Archaeological Park in Kazakhstan

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In the end of October of 2012 the Zhambyl region (administrative unit in south part of Kazakhstan) administration made a very historically important decision to close down the Central Market situated in the downtown in Taraz city and to begin a large-scale archaeological investigation of the territory. This decision was very complicated due to its unpopularity among the city people involved in the trading activities of the Central Market. Various estimates show that this category of city people counts 100 up to 150 thousand people, or more than 30% of
modern Taraz population. Initial public reaction to the decision was explicitly negative and local spontaneous rallies and protests took place following it. However, the leadership of the region and the city, confident in reasoning of their decision, demonstrated political will and continued with the implementation of the project... Despite the fact that the history of Taraz counts for more than 2 millennia, the modern city, unfortunately, does not have an authentic, vibrant and recognizable face. That is the most feature of so-called Soviet cities – cities developed during Soviet time. One of the main ideas and strong ground for design makers for creation of an archaeological park in the center of modern city in addition to preservation of archaeological site and through this the history was rebranding concept. Contemporary urban trends include marketing of the areas (places) or, in other words, elaboration and implementation of a set of measures aimed at creation and development of a unique and recognizable image - a brand - in the minds of residents and non-residents. City branding is a kind of "aerobatics" marketing, its most sophisticated form. City brand is valuable not by itself, but only because it helps in the marketing of the city - namely in promoting interests of the city in terms of solving specific problems of its development. Owning a strong brand is the best competitive advantage, which any city can have today. Speaking of cities, branding is a relatively new phenomenon, but it found quick response among city managers, since it allows the city to "catch the moment", i.e. to find the extraordinary, fresh and stunning from within and to show this to the country and the world. This statement serves as a pretext for practical renovation of the urban unit. Currently, there are several approaches to the process of forming an urban brand. The most interesting approach from our point of view is based not on inventing new symbols designed to create a new ideal city, but on a translation of already existing reality of the city into the language of symbols. Including all of its advantages and disadvantages. It allows municipalities to avoid wasting budget on "brand building" or "image creation". Such reality already exists and, at the same time, is almost unused for the benefit of the city. In case of modern Taraz it is the ancient history and its material evidence - the huge archaeological potential of Taraz archaeological site. In practical terms, the primary objective in the creation of the brand of Taraz is the inclusion of the ancient city of Taraz in the list of the UNESCO World Heritage List. This move, by itself, will create a unique image of the city in the international arena and will generate interest among local population and foreigners.

Problems and perspectives of archaeological heritage management in intensively used agricultural landscapes - best-practice models from Saxony
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The destruction of archaeological monuments is nowhere else more creeping and slower than in intensively used agricultural landscapes. Sites are still degraded by erosion, cultivation and pollutant inputs to the soil. But the implementation of concrete measures needs more than sensitive archaeological institutions. Without the cooperation with farmers, agricultural administrations, nature conservation agencies and organisations as well as through the mobilisation of agro-environmental funds, archaeologists will never achieve an efficient heritage management in intensively cultivated areas. In order to protect the rural archaeological heritage in Saxony various strategies have been developed since 2000. The paper presents best-practice models of managing monuments in intensively used agricultural landscapes. Especially the conversion of ploughed sites into grassland, as well as the application of precision farming systems, are different approaches to a better conservation of archaeological remains at risk.

Increasing Archaeological Literacy: Benefits of Cultural Heritage Management and Public Archaeology.
Christoph Doppelhofer (Durham University)

Development, agriculture, treasure hunting and other invasive interventions are constant threats to archaeological sites. However, damage and destruction inflicted upon cultural heritage is usually not wilful but a product of ignorance caused by a lack of proper archaeological awareness. Archaeology is also often seen as a burden rather than a valuable asset. While being already well-established in countries such as the United States and the United Kingdom for many years, the emergence of Cultural Heritage Management and Public Archaeology is a relatively new phenomenon in most European countries. Even though 'Denkmalpflege' is the closest equivalent in German-speaking areas, Cultural Heritage Management distinguishes itself by having a more holistic approach. Having its roots in the 1960s when large-scale development demanded for different approaches in environmental and cultural policies, Cultural Heritage Management does not only aim to protect cultural heritage but also to research
the meaning of the past in the present and raise awareness about the importance and benefits of cultural heritage. One way of achieving this is Public Archaeology. This paper sets out to demonstrate how stakeholder management and public engagement is one of the most effective ways of securing and conserving cultural heritage for future generations by fostering support from the broader public and increasing archaeological awareness in society. Archaeologists and cultural heritage authorities must be on equal footing with non-professionals and give them the opportunity to be actively involved into the archaeological process. By doing this the public can be educated how archaeology works and why its preservation important to society.

Power and Stereotypes in the (Re-) Creation of Sami Cultural Heritage
Marte Spangen (Stockholm University)

People and things work together to create nodes of historical trajectories and physical settings that end up constituting meaningful monuments, objects or places. Some of these are defined today as «cultural heritage». «The material turn» in archaeology and the subsequently increasing focus on materiality over the last decade has emphasised the inherent value and influence of such items and sites. While things do affect our emotions and considerations, I would maintain that these reactions and hence the definition of cultural heritage still heavily depend on the socio-political context and the prevailing power-knowledge distributions, including the available technologies for recording knowledge and the dissemination of specific hegemonic narratives about the past. This paper builds on my recently published PhD thesis «Circling Concepts» (Spangen 2016, Stockholm University) and explores the trajectories that have led to a widespread definition of stone circles and similar structures in northern Fennoscandia as Sami offering sites, despite the questionable validity of this notion. I discuss structural, political and emotional reasons as to why an explanation related to religious rituals has been so readily accepted and upheld in this indigenous context, both by professional researchers and local Sami users. I further describe how the interplay between these stakeholders risks recreating stereotypes and asymmetric power relations despite intentions of and efforts to achieve the opposite.

Exploiting the Vinča site – examples of public use and abuse of archaeological heritage in Serbia
Dragana Filipovic [Serbian Academy of Sciences and Arts, presenting author], Nenad Tasić [University of Belgrade], Milorad Ignjatović [Belgrade City Museum]

The Neolithic site of Vinča near Belgrade in Serbia has been, on and off, investigated since the beginning of the 20th century. Despite of its indisputable scientific and cultural importance locally but also in a broader context, little has been achieved in terms of its physical protection and self-sustainability. A number of archaeologist and other specialists, as well non-specialist enthusiasts and so-called ‘amateur archaeologists’ have been directly or indirectly involved in the research, interpretation and public presentation of the site and the site’s discoveries. The ‘public use’ of the archaeology of the site has included multiple and diverse ways of presenting and promoting the research itself and the knowledge acquired through decades of intensive work. The ‘public abuse’ on the other hand, either on purpose or unintentionally, encompasses erroneous presentation and misinterpretation of the site and the archaeological findings, on which it draws groundless conclusions and thus trivialises the work of archaeologists whilst at the same time underestimates or even disrespects the audiences. Our contribution showcases the examples of these two tendencies as well as possible ways of their reconciliation for the benefit of both professional and non-professional groups involved, and towards ‘exploiting’ the site in ways that would stimulate the policymakers and the wider community to engage into managing and maintaining this heritage site.

Stepping Stones into the Past – Archaeological Practice in Dresden
Thomas Westphalen (Landesamt für Archäologie Sachsen)

The town of Dresden is one of the main focus areas of the monument preservation and conservation strategies of the federal state of Saxony. The post world war development is a unique case for the county as a whole, which is not only due to the heavy destruction of February 13 and 14, 1945 but also due to the ideologically determined urban redevelopment. The consequences were large empty spaces, some covered in vegetation and others with asphalt, which were successively built upon after 1990. The discussion about the preservation and integration of the historic monuments was quickly reduced to an application only to the basement levels, as these had mostly survived the post war years intact. There are two lines of thought regarding the preservation of the basements. One is a more rational approach
taking into account criteria such as state of preservation, representative status and the appropriateness of effort, whereas the other is a more emotional call for the preservation of the entirety of surviving basements.

The creation of a heritage landscape in the 19th century: The specific case of the Danish-German border region

Jelena Steigerwald (Hauptstaatsarchiv Dresden)

The question on how people deal with archaeological sites after excavations is nearly as old as the scientific research in this field. In addition to the conservation of artefacts in museums and collections, sites themselves can develop special meanings. In such cases, they act as an authentic background for different interests. Today as well as in the past, archaeological sites and monuments have been and continue to be implemented for the creation of identities, as touristic attractions, to mark borders, and for research. In my presentation, I will provide an overview of the underlying concepts of archaeological heritage preservation in the 19th and 20th centuries, which I analysed in my PhD thesis. Based on examples from the Danish-German border region, I will raise the question on who creates archaeological sites and how they are mediated. With this talk, I would like to enrich the session with aspects from a historical point of view in order to add to the discussion on practical archaeological heritage management by contributing a further perspective.

UNESCO World Heritage Sites in Archaeological Heritage Management

Matthias Maluck (State Archaeological Department of Schleswig-Holstein)

In heritage management important archaeological sites are regularly protected by statutory designation, e.g. by listing or scheduling the sites as monuments. Beyond the national scope, a few international schemes do also exist that support the safeguarding of archaeological sites. The UNESCO World Heritage List (WHL) is the most renowned and the most successful among them. The talk discusses the WHL as instrument of archaeological heritage management in connection with but also to contrast to national or regional statutory schemes and other, not legally binding approaches. The nomination of the archaeological sites of Hedeby and the Danevirke for the WHL will be used as example to showcase the implications of a bid, first as a transnational serial project and now as a national attempt - as cultural landscape. What are the challenges of cooperation with various local stakeholders but also international partners? What advantages can the inscription on the WHL have? Is there also a downside to it? Practical examples from Hedeby and the Danevirke and other nominations will be applied to explain the process of a Nomination and to highlight ways of community involvement, for raising awareness and for “valorising” archaeological heritage sites.

Archaeological Heritage Management Underwater: The Florida Example

Della Scott-Ireton (Florida Public Archaeology Network)

The issue of managing archaeological heritage sites occupies archaeologists, cultural resources managers, museum curators, and all manner of heritage professionals. In many cases, and certainly in the United States where much archaeological research is performed on public lands using public funding, the sites and artifacts discovered belong, both theoretically and literally, to the public who have a right to know about their heritage. In this way “management” often expands into strategies for visitation, interpretation, and public engagement. Cultural heritage sites in submerged environments are subject to the same considerations, although their placement in an underwater context creates additional challenges for heritage managers. In the state of Florida, several strategies for underwater archaeological site management through public interpretation and involvement have been developed. This paper will describe these approaches, which range from the creation of underwater archaeological preserves and maritime heritage trails, to the development of training workshops to involve sport divers in “citizen science” projects, to guided diving tours of historic shipwrecks, including foundational concepts and practical considerations.

How to collect data about our National Heritage? 3D cadastre in archaeology and archaeological cadastre. [Poster]

Ewelina Werner (Wroclaw University of Environmental and Life Sciences)

The purpose of this presentation is to discuss whether we need special kinds of registers to collect data about historical places. Some examples of available registers from Greece and Poland and also the idea of 3D cadastres for archaeology will be provided and compared. The project intends to illustrate measures, which are stipulated by legislation in
order to protect monuments and/or archaeological sites, including: the delimitation of buffer zones, the implementation of appropriate zoning and planning regulations, and restrictions in the construction, alteration, restoration and use of buildings. These measures involve 3D aspects, which are relevant for land management and are of assistance in the efficient protection of monuments and archaeological sites.
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