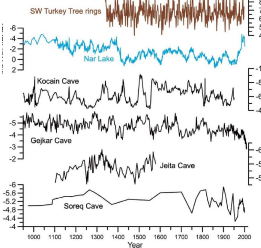
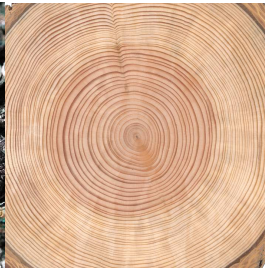




Climate Science & Ancient History

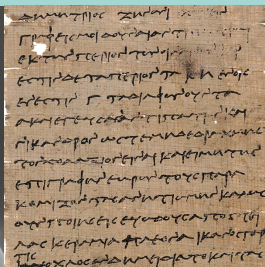
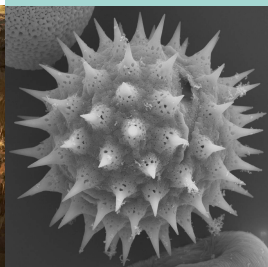
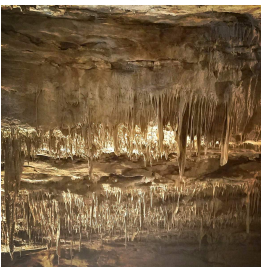
Decoding «Natural» and «Human» Archives



Organizer: Prof. Dr. Sabine R. Huebner

*Basel Climate Science
& Ancient History Lab*

November 27–28, 2018
Kollegienhaus, Regenzimmer 111
Petersplatz 1, 4001 Basel



— DAY ONE: TUESDAY, NOVEMBER 27, 2018 —

Panel Chairs: Sabine R. Huebner & Serena Causo

ADAM W. SCHNEIDER, UNIVERSITY OF COLORADO-BOULDER, USA

**New Data for an Old Question: New Paleoclimate Proxy Archives
and their Potential Implications for Understanding Societal
Disruptions in the Archaic Aegean during the 8th–7th Centuries BC**

Over the past few decades, an increasing amount of scholarly attention has been focused on the topic of the potential historical influences of climatic disturbances and other environmental disasters in the ancient Eastern Mediterranean. In the specific context of the Aegean Basin, this topic has been particularly well explored for the Bronze Age, but there has also been some interest in the relationship of climatic and historical change during the Archaic Period. In 1979, for instance, Camp argued that a prolonged episode of severe drought triggered a period of decline at Athens beginning in the late 8th century; similarly, in 1999, Coldstream, Huxley, and Webb proposed that severe droughts may have been partly responsible for the late 7th century “Archaic Gap” that can be observed in the archaeological record at Knossos. If, how, and to what degree severe drought did in fact help to create these apparent societal disruptions, however, is still being debated. One difficulty which has complicated the study of this issue is that, until quite recently, there has been a relative paucity of well-dated, high temporal resolution paleoclimate proxy archives which provide information about climate trends during this period. This situation has now begun to change, however, thanks to the publication in the past few years of a number of new paleoclimate proxy records from across the Eastern Mediterranean region. In this presentation, I will discuss several of these new paleoclimate archives and the evidence they provide for apparently widespread climatic instability across much of the Eastern Mediterranean—including the Aegean Basin—during the 8th-7th centuries BC, explore how this new paleoclimate information might bear upon our understanding of the available archaeological and historical evidence, and finally, consider some new historical questions that these proxy data appear to raise.

Notes:

Climate Science & Ancient History Decoding «Natural» and «Human» Archives

RUBEN POST, UNIVERSITY OF PENNSYLVANIA, USA
**Perceptions of and Responses to Climate Change
in Classical and Hellenistic Greece**

In recent years, the increased quantity and quality of palaeoclimatic proxy evidence available from Greece has begun to improve immensely our understanding of climate change in the ancient Greek world. Ancient historians, however, have largely not integrated this rapidly accumulating body of data into their research. Nonetheless, historical sources provide insights into the ways in which climatic fluctuations might have impacted ancient Greek societies that are crucial for contextualizing this new body of palaeoclimatic data. In this paper I analyze written sources mainly from Classical and Hellenistic Greece to address the perception of and responses to climatic fluctuations in these periods. I draw on four main bodies of written evidence: the farmer's almanac in Hesiod's *Works and Days* (7th c. BC), as well as similar inscribed and literary *parapegmata*, or astrometeorological calendars (4th–1st c. BC); the meteorological treatises of Aristotle and Theophrastos (4th–3rd c. BC); the botanical treatises of Theophrastos (4th–3rd c. BC); and the corpus of more than 4,300 inscribed oracular inquiries from Dodona (6th–2nd c. BC). These sources, which represent viewpoints ranging from the elite to the subaltern, reveal a tension between two bodies of knowledge: almanacs, fixed calendars implying a static climate (reflected in Hesiod's *Works and Days* and various *parapegmata*); and parochial traditions of folk agrometeorology, which imply a much more flexible and nuanced understanding of climate (reflected especially in Theophrastos' botanical works). Interestingly, the Dodona oracles suggest that in Classical and Hellenistic Greece management of climatic and agricultural risk lay primarily in the domain of household decision-making without much outside consultation, unlike in many other pre-modern cultures. This in turn meant that perceptions of and responses to climate change were more localized and idiosyncratic in Greece during these periods than in other regions of the ancient world, such as Mesopotamia and Egypt.

Notes:

ANTON BONNIER AND MARTIN FINNÉ, UPPSALA UNIVERSITY, SWEDEN

Domesticated Landscapes of the Peloponnese: Speleothem Data, Climate Variability and Land-Use Dynamics in the Hellenistic and Roman Peloponnese

New palaeoclimatological data from the Peloponnese is gradually transforming our knowledge of ancient climate variability in southern mainland Greece. Stable oxygen isotope data derived from speleothems collected in Kapsia, Mavri Trypa, and Alepotrypa caves offer information about moisture variability for many periods of archaeological interest. Since 2015, a project based at Uppsala university, *Domesticated Landscapes of the Peloponnese* (DoLP), has been aimed at examining how we can compare these climate records with evidence of socio-economic activity as derived from both archaeological evidence and historical sources in a Peloponnesian context. While the project adopts a long-term perspective from the Neolithic until the period of Roman rule, I will here be primarily concerned with the Hellenistic and Roman imperial periods (ca. 300 BC to 300 AD). In general, the Peloponnese offers a rich record in terms of archaeology and historical evidence offered by literary texts and inscriptions. But there are also huge gaps in our understanding of land-use dynamics occurring over time and changes in local economic strategies in tandem with processes of geopolitical shifts and new forms of market integration occurring throughout the period, demanding that we incorporate new evidence derived from the paleoenvironmental sciences. For instance, how did economic strategies and land-use trajectories react to decadal scale climate change that may have altered the predictability of weather patterns? The current presentation therefore aims at discussing how we can integrate different classes of evidence to define complex relationships between land-use strategies, socio-economic processes and past climate variability. In this context we will highlight some of the problems and possibilities of multidisciplinary research on human-environment interactions, based on research carried out within the framework of the DoLP project.

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JOANA SEGUIN, CHRISTIAN-ALBRECHTS-UNIVERSITY KIEL, GERMANY

Lake Stymphalia Sediment Record Reveals Late Antiquity Temperature Fluctuations in Southern Greece

Studying natural lakes as geo-archives in the direct vicinity of archaeological sites holds an enormous potential for interdisciplinary research on the interconnection of climate with human history. Relative changes in the chemical composition of lake sediments can be traced back to changes in palaeoenvironmental conditions. The chemical composition can be measured with an X-ray fluorescence (XRF) line scanner, which is a useful method to obtain continuous, high-resolution climate proxies that reveal climate fluctuations in the past. Within the German Collaborative Research Center 1266 “Scales of Transformation”, our project focuses on transformations in early Greek societies and landscapes around the Gulf of Corinth. Particular emphasis is placed on the complex interplay between natural and anthropogenic forcing of landscape change and the identification of suitable geochemical proxies. Here, we present first results from the Northern Peloponnese. Sediment cores have been recovered from Lake Stymphalia, the last remaining natural lake of the Peloponnese, and two adjacent paleo lakes. The approach to study several lakes in the same region aims at deciphering local from regional palaeoenvironmental changes and allows for a transfer of the results to neighboring archaeological sites. We use our XRF proxies in combination with Bayesian age-depth-modeling of ^{14}C dates. Our most meaningful proxy is the Rb/Sr ratio, a proxy usually interpreted as indicating chemical weathering intensity, which nicely depicts temperature fluctuations for the late Holocene. To sustain our interpretation, we additionally applied a Principal Component Analysis (PCA), a more complete interpretive approach that indicates the same trends. Based on the geochemical data from Lake Stymphalia, we determine a cold anomaly for the period 550 – 760 AD. Büntgen et al. (2016) use the term Late Antique Little Ice Age (LALIA) to describe this climatically cold interval within the migration period for the Alps and the Altai mountains. Our data provides the first record for Southern Greece.

Notes:

PAUL ERDKAMP, VRIJE UNIVERSITEIT BRUSSEL, BELGIUM
**Climate Change and the Productive Landscape in the
Mediterranean in the Roman period**

The impact of changes in temperature and precipitation on landscape and agricultural productivity are much more diverse and complex than is intuitively assumed in some recent studies. We should distinguish between long-term shifts and short-term phenomena caused by volcanic eruptions. The latter on many occasions, clearly visible after the development of modern meteorology, cause abrupt changes in the weather. Longer-term events, on the scale of the Roman Optimum and the Climatic Dark Ages, are much more gradual. The weather undeniably plays a crucial role in inter-annual fluctuations of agricultural production, and gradual long-term changes in the pattern of temperature and precipitation caused transformations in landscape and agriculture, and hence potentially also in food supply and diet. However, climate change is often claimed to have a much more fundamental impact on human society: warm periods increased the carrying capacity of the land and thus allowed populations to grow and prosper, while cold periods exactly did the opposite. We have to keep in mind though, that the fluctuations in temperature remained well within the range of growing conditions of the main crops. Though ecologically optimal conditions for each crop/(sub)species can be defined, most plants do just fine within a wider range of conditions, ensuring some resilience against minor fluctuations. Climate change has the greatest impact where conditions of temperature and precipitation are on the margins of biological requirements, such as on the fringes of deserts or on mountain slopes, and on crops that are sensitive to temperature and precipitation, such as the olive, grapes or walnuts. Hence, we must take into account the geographic variability of the Mediterranean landscape, which does not allow general conclusions on the impact of climate change on the productive landscape.

Notes:

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COSIMO DAMIANO DIELLA, UNIVERSITÀ DEGLI STUDI DI FIRENZE, ITALY
SARAH MURGOLO, UNIVERSITY OF BONN, GERMANY

Between Archeology and Geology. Climate Changes and Variation of the Coastline in Central – Northern Apulia: The Roman city of Salapia and Ariscianne District (Barletta, Italy)

The target of this work is to present two case studies, of Central – Northern Apulia, with the aim of showing how climate change has played an important role in conditioning the population of the coastal area (numerous times over the course of time it has changed position in relation to climate change). The first case is the Roman city of *Salapia*. This city was in ancient times on Lake Salpi (lake today disappeared). The city is described in the ancient Latin text *De Architettura* by Vitruvio. This history is relative to the movement that the city was forced to suffer because the lagoon of Salpi, as a consequence to climate and coastal changes, became a swamp, causing diseases and pestilence in the inhabited center. The citizens then obtained from Rome to move the town of 4 miles in a healthier area. The other case study is that of Ariscianne Felce del Viaggio area (Barletta), about 20 km further south. Also this area was characterized, since prehistoric times, from the presence of a lagoon and it was a place where the ancient Aveldium stream flowed, today disappeared. Here too, climate change and the coastline brought numerous changes in Roman and Medieval times in the human settlement system. These changes characterized the progress of the road and the presence of a port structure. This work will try to cross the archaeological data with the geological ones with the aim of highlighting the importance of climate change for the history of human settlement in this territory of Central – Northern Apulia.

Notes:

– KEYNOTE LECTURE –

18:30, Hörsaal 115
Kollegienhaus, Petersplatz 1

JÜRIG LUTERBACHER, JUSTUS-LIEBIG-UNIVERSITY GIESSEN, GERMANY

**Reconstructing Climate back to Greek and Roman Times:
Challenges, Opportunities and Uncertainties**

Palaeoclimatic information provide fundamental means for the characterization of natural decadal to centennial time-scale changes and put the recent anthropogenic warming in the long-term perspective. Here we present an overview of historical and natural proxies from marine and terrestrial archives across the Central and Eastern Mediterranean back to Greek and Roman times. We discuss the principal methodologies to convert climate proxy information to quantitative and qualitative climate information and associated uncertainties and show recent advancement in our physical and dynamical understanding of temperature and hydroclimatic changes, variations, trends and extremes. We compare reconstructions with climate model experiments and diagnose the potential role of internal variability and external forcing in shaping Central and Eastern Mediterranean climate response across time and space. The final part of the talk presents future perspectives, challenges and opportunities in Mediterranean palaeoclimate science.

Climate Science & Ancient History Decoding «Natural» and «Human» Archives

— DAY TWO: WEDNESDAY, NOVEMBER 28, 2018 —

Panel Chairs: Matthias Stern, Irene Soto Marín & Jürg Luterbacher

JOSEPH MANNING, YALE UNIVERSITY, USA

Volcanic Forcing of Nile Variability and Ptolemaic History

The key insight from which our project got its start is the observation that explosive volcanic eruptions can be linked (“teleconnected”) to the reduction in global precipitation. This is particularly dramatic in the case of the African monsoon that drove the annual flood of the Nile. By exploring the many new techniques that integrate climate proxy with historical data to understand a new dimension of historical dynamics, our aim is to establish a new historical ontology for pre-industrial Egypt by describing, for the first time, a detailed example of a coupled natural-human system. This also has wider implications for the entire pre-industrial world. I provide a few examples in this presentation.

Notes:

SABINE R. HUEBNER, UNIVERSITY OF BASEL, SWITZERLAND

MARKUS STOFFEL, UNIVERSITY OF GENEVA, SWITZERLAND

Reconstructing Egyptian Climate during the Graeco-Roman Millennium: Natural and Human Archives

The importance of the Nile on Egypt's agriculture, society, culture, and political history can hardly be overrated. Egypt is the gift of the Nile, as already Herodotus noted (Hdt. 2.5). Any changes to its annual flood had a strong and direct impact on livestock and crops and an indirect impact on nutrition, livelihoods, migration, and conflicts in a country with virtually no rain. A society so closely circumscribed by its environment closely linked to just one variable provides an excellent case for studying social vulnerability and resilience to environmental change. From recent publications one could win the impression that we actually have abundant documentary evidence to reconstruct ancient Nile floods for the Graeco-Roman period. This paper argues that this evidence is hardly reliable and presents a pioneering interdisciplinary collaboration between Huebner as an ancient historian and Stoffel as a dendroclimatologist in order to reconstruct Nile summer floods from the first to the fourth century CE based on tree rings of local provenance (mummy labels of sycamore and tamarisk). An analysis of well-datable and highly temporally resolved natural proxies (tree rings) allow the reconstruction of Egyptian climatic conditions and the quality and quantity of Nile summer floods over the course of the Roman period and allows historical research of human resilience, social vulnerability, and responses to abrupt environmental changes.

Notes:

Climate Science & Ancient History Decoding «Natural» and «Human» Archives

PAUL KELLY, KING'S COLLEGE LONDON, UNITED KINGDOM

Climate Risks and the Economy of Roman Egypt

This paper will deal with how the results of climate science research could be used to improve our understanding of the ancient economy, and in particular that of Roman Egypt. Climate naturally had a direct and important impact on this essentially agrarian economy. Stochastic models for determining the risks and returns from land ownership and tenancy and for the credit market have been developed and will be presented. These models are based on the evidence within the documentary papyri of Roman Egypt, particularly in relation to land sales, leases and loans and take a 'bottom up' microeconomic approach by simulating financial outcomes for contract participants based on specific leases and loans. As such, many input variables to the model, such as rental levels, interest rates and land sizes are pre-defined. However, many of the critical input variables for the model are strongly weather and climate dependent and should be informed and guided by the available evidence from climate science. For the land ownership and tenancy model, key assumptions relate to the variability of cereal yields and their associated prices and the risk of flood failure. The model for the credit market is also dependent on climate since most loans were only able to be repaid after the harvest and thus there is a causal relationship between climate, harvest quality and credit default risk. The results of the models will be presented in probability distributions. The expected probability of ruin or prosperity for tenants and borrowers will be given as will the expected rates of return on capital for landowners and lenders. Finally the sensitivity of these results to different climate-driven assumptions will be addressed.

Notes:

IRENE SOTO MARÍN, UNIVERSITY OF BASEL, SWITZERLAND

Beyond the Nile: Wells, Desertification, and Economic Resilience in the Western Oases of Roman Egypt

Able to provide natural, perennial irrigation from underwater aquifers, the oases of Egypt, particularly Dakhleh, were known since Pharaonic times as wine producers within the Egyptian territory. The artesian wells scattered throughout the oases facilitated the irrigation of the soil and provided the oases with an economic advantage over the rest of Egypt, allowing for the development and commercialization of other high-value cash crops, such as dates and olive oil, the latter which might have been even exported to the Nile Valley during the Roman period. Geomorphological analyses undertaken in recent years have shown, however, that between the third and fourth centuries CE (though also having occurred in earlier periods), environmental changes, such as hyperaridity and erosion, are evident from the depletion of spring mounds, which fostered the digging up of new wells. Yardangs (formed by the deflation of surrounding soft soil), also indicate a period of flash floods during this time. This climatic degradation of the environmental system was severe and could have potentially contributed, or even caused, the abandonment of the sites of *Trimithis* in the Dakhleh Oasis and *Kysis* in the Kharga Oasis, during the fourth and fifth centuries, respectively. The aim of this paper is to present the environmental changes which occurred during the third and fourth centuries in the oases of the western desert, in light of recent studies; to view the human reaction to these changes evident in the archaeological record, both in terms of population movement and economic response; and to place and explore these climatic changes within the wider context of the economy of Egypt during this time, when irrigation and wine production intensifies in the Nile Valley.

Notes:

Climate Science & Ancient History Decoding «Natural» and «Human» Archives

JOSEPH R. MCCONNELL, DESERT RESEARCH INSTITUTE (NEVADA), USA

Lead pollution archived in Greenland ice as a proxy for economic activity during European antiquity

Lead pollution in Arctic ice reflects mid-latitude emissions from ancient lead/silver mining and smelting, with silver an important driver of ancient economies. Ice-core records of lead pollution, therefore, are a proxy for overall economic activity. As with other natural archives – including those used for establishing causal linkages between climate, climate forcing, and societal impacts – ice-core records used as historical proxies must be accurately dated and of sufficient temporal resolution to capture relevant processes. Here we describe an 1100 BCE to AD 800, annually resolved proxy of western European economic activity developed from >21,000 lead and other chemical measurements in >420 m of a central Greenland ice core. We focus on record development, with particular attention to creating and confirming the chronology (accurate to within two years), as well as the detailed atmospheric modeling necessary for process-level understanding of the linkages between European lead emissions and pollution deposition in Greenland. Results show that Greenland lead pollution and estimated European lead emissions closely tracked wars, plagues, and social unrest during antiquity. For example, emissions were declining and low for much of the 1st century BC during a period known as the Crisis of the Roman Republic. This was in sharp contrast to high emissions during the apogee of the Roman Empire from 17 BCE to AD 165, a period known as the Pax Romana. Furthermore, emissions dropped sharply during the great Antonine Plague and Plague of Cyprian, and did not recover to Imperial Roman-era levels until the early Middle Ages >500 years later, suggesting low societal resilience and far-reaching economic effects.

Notes:

JONATHAN P. STANFILL, UNIVERSITY OF PORTLAND, USA

**A Deafening Silence: The Challenges of Writing
an Environmental History of the Goths**

A new development in the historiography of the Goths is the appearance of two studies concerned with the impact of climate change on the Goths in the fourth century (Drake 2017; Stanfill and Schneider 2017). These studies, however, diverge quite significantly from each other. For example, Drake proposes that the Gothic migration in 376 was prompted by a period of drought. Alternatively, Stanfill and Schneider argue the Goths' decision to surrender to Valens during his first Gothic war, which occurred several years before the migration, was motivated by the impacts of unprecedented severe flooding. Such a divergence in findings calls attention to the need to further study of the environmental history of the Goths. In this presentation, I will address the challenges of writing such a history and, in doing so, offer a way forward. First, I will examine the impediments to utilizing the surviving human archives; namely, our dependence on Greco-Roman sources and the difficulties of properly interpreting them. Second, I will consider the current state of the available natural archives, and make the case for pursuing paleoclimate proxy data that attend to the particularities of the specific region, especially its weather system, inhabited by the Goths during the fourth century.

Notes:

Climate Science & Ancient History Decoding «Natural» and «Human» Archives

ADAM IZDEBSKI, MAX PLANCK INSTITUTE (JENA), GERMANY

Was Byzantium Resilient to Climate Change? State of the Question and Ways Forward

The Roman Empire was one of the longest running pre-modern socio-political systems, and certainly one of the most complex. Despite the collapse that occurred in the West in the fifth century CE, the Eastern Roman Empire existed for another thousand years, becoming the Roman Empire of the Middle Ages, today known as Byzantium. Moreover, when the Byzantine capital fell to the Ottomans in 1453 CE, many of Byzantium's social-ecological structures were maintained, or even further developed in response to the highly diverse and unstable environments of the Mediterranean. This unique continuity in the face of natural challenges, such as unstable precipitation patterns, extreme winters, or generations-long droughts, makes the Eastern Mediterranean one of the best laboratories for the study of human interaction with the environment and changing climates. In my talk, after summarising the current status questionis on how the Eastern Roman (Byzantine) Empire coped with climatic change, I will explain how the Eastern Roman world serves us as a case study for developing a new methodology that will integrate traditional methods of historical research with those of the natural sciences, in particular palaeoecology and palaeoclimatology.

Notes:

MATTHEW JACOBSON, UNIVERSITY OF READING, UNITED KINGDOM

**A Collapse of Himyar? Correlative Causality
and South Arabia in the 6th Century CE**

A precisely-dated and highly-resolved speleothem-based palaeoclimate record from Hoti Cave, Northern Oman, reveals unprecedented droughts in the region during the 6th and 7th centuries C.E. Said droughts may have amplified socio-political instability across Arabia, which was the context within which Islam originally emerged. The decline of Himyar, the dominant power in Arabia until 525 C.E., led to general socio-economic and political decline, strengthened tribal communities across Arabia and raised the influence of pilgrimage centres such as Mecca. However, not a single historic text referencing weather has survived from this period and a number of key archaeological sites have been destroyed in more recent conflicts, or remain undiscovered. This paper will explore whether extreme aridity can be linked to the aforementioned societal changes, highlight methodological issues in drawing conclusions about causal links, and identify the very different conclusions that may have been drawn about this period if our original assumptions were not adequately questioned.

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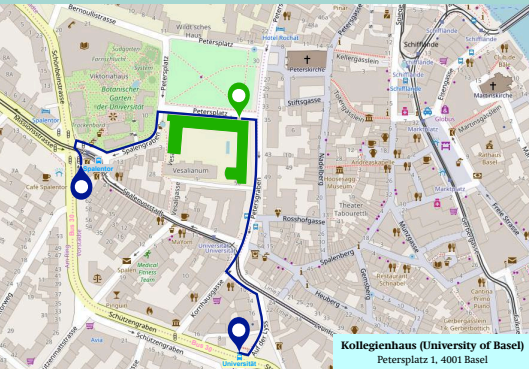
Climate Science & Ancient History Decoding «Natural» and «Human» Archives

LIANG EMLYN YANG, CHRISTIAN-ALBRECHTS-UNIVERSITY (KIEL), GERMANY

The Role of Environment in the Socio-Cultural Changes along the Historical Silk Road in Central Asia

The Silk Road is a modern concept for an ancient network of trade routes that for centuries facilitated and intensified processes of cultural interaction and goods exchange between West China, Central Asia, the Middle East, and the Mediterranean. There is increasing discussion that climate and environmental factors may also have played a role in fostering economic and socio-cultural changes along the Silk Road and in a broader area. Coherent patterns and synchronous events in history suggest possible links between social upheaval and climate/environment forces in specific periods and regions in Central Asia; in some cases, environmental factors have been claimed as multipliers that accelerated socio-cultural changes. This study re-analyzes the climate and environment disasters, the historical water and agriculture systems, and the maintenance of local livelihoods in the broad Tianshan-Pamir mountain areas in Central Asia. It further investigates both perspectives of the socio-environmental interactions, such as that climate change provide better hydrological resources for the golden era of Silk Road trade, and water withdraw for human activities resulted in dramatic landscape changes including the near and complete desiccation of large lakes in the arid western part of today's China Xinjiang. Preliminary results indicate that local communities was able to reinforce their resilience through simple but effective initiatives, such as investing infrastructures, sharing responsibilities, diversifying livelihoods, networking recoveries. The findings further highlight the importance of understanding how human society maintains living under environment stresses in a long historical period.

Notes:



Kollegienhaus (University of Basel)
Petersplatz 1, 4001 Basel

Tuesday, November 27

13:30 Welcome & Introduction

– 20 Minutes of Paper Presentation & 10 Minutes of Discussion –

Panel Chair: Sabine R. Huebner

- 14:00 ADAM W. SCHNEIDER (UNIVERSITY OF COLORADO BOULDER):
“New Data for an Old Question: New Paleoclimate Proxy Archives and their Potential Implications for Understanding Societal Disruptions in the Archaic Aegean during the 8th–7th Centuries BC”
- 14:30 RUBEN POST (UNIVERSITY OF PENNSYLVANIA):
“Perceptions of and Responses to Climate Change in Classical and Hellenistic Greece”
- 15:00 ANTON BONNIER (UPPSALA UNIVERSITY):
“Domesticated Landscapes of the Peloponnese: Speleothen Data, Climate Variability and Land-Use Dynamics in the Hellenistic and Roman Peloponnese”
- 15:30 JOANA SEGUIN (CHRISTIAN-ALBRECHTS-UNIVERSITY, KIEL):
“Lake Stymphalia Sediment Record Reveals Late Antiquity Temperature Fluctuations in Southern Greece”
- 16:00 *Coffee Break*

Panel Chair: Serena Causo

- 16:30 PAUL ERDKAMP (VRIJE UNIVERSITEIT BRUSSEL):
“Climate Change and the Productive Landscape in the Mediterranean in the Roman period”
- 17:00 COSIMO DAMIANO DIELLA & SARAH MURGOLO (UNIVERSITÀ DEGLI STUDI DI FIRENZE & UNIVERSITY OF BONN):
“Between Archeology and Geology. Climate Changes and Variation of the Coastline in Central – Northern Apulia: The Roman city of Salapia and Ariscianne District (Barletta, Italy)”
- 17:30 General Discussion
- 18:00 *Apéro*
- 18:30 **Keynote Lecture**
JÜRIG LUTERBACHER (JUSTUS-LIEBIG-UNIVERSITY GIESSEN):
“Reconstructing Climate back to Greek and Roman Times: Challenges, Opportunities, and Uncertainties”
- 20:00 *Conference Dinner*

Wednesday, November 28

Panel Chair: Matthias Stern

- 09:00 JOSEPH MANNING (YALE UNIVERSITY):
“Volcanic Forcing of Nile Variability and Ptolemaic History?”
- 09:30 SABINE R. HUEBNER & MARKUS STOFFEL (UNIVERSITY OF BASEL & UNIVERSITY OF GENEVA):
“Reconstructing Egyptian Climate during the Graeco-Roman Millennium: Natural and Human Archives”
- 10:00 PAUL KELLY (KING’S COLLEGE LONDON):
“Climate Risks and the Economy of Roman Egypt”
- 10:30 *Coffee Break*
- 11:00 IRENE SOTO (UNIVERSITY OF BASEL):
“Beyond the Nile: Wells, Desertification, and Economic Resilience in the Western Oases of Roman Egypt”
- 11:30 General Discussion
- 12:00 *Lunch Break*

Panel Chair: Irene Soto

- 14:00 JOSEPH R. MCCONNELL (DESERT RESEARCH INSTITUTE, NEVADA):
“Lead Pollution Archived in Greenland Ice as a Proxy for Economic Activity during European Antiquity”
- 14:30 JONATHAN P. STANFILL (UNIVERSITY OF PORTLAND):
“A Deafening Silence: The Challenges of Writing an Environmental History of the Goths”
- 15:00 ADAM IZDEBSKI (MAX PLANCK INSTITUTE, JENA):
“Was Byzantium Resilient to Climate Change? State of the Question and Ways Forward”
- 15:30 *Coffee Break*
- 16:00 MATTHEW JACOBSON (UNIVERSITY OF READING):
“A Collapse of Himyar? Correlative Causality and South Arabia in the 6th Century CE”
- 16:30 LIANG EMLYN YANG (CHRISTIAN-ALBRECHTS-UNIVERSITY, KIEL):
“The Role of Environment in the Socio-Cultural Changes along the Historical Silk Road in Central Asia”
- 17:00 Final Discussion

Panel Chair: Jürg Luterbacher

