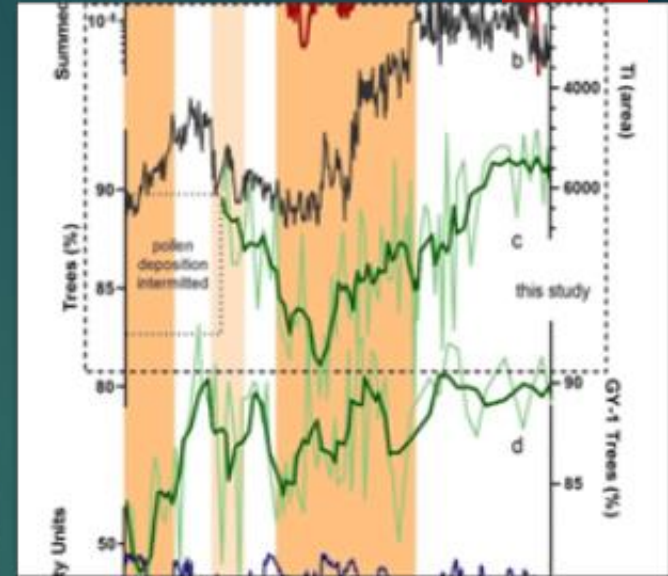


Climate Change & Society Perspectives from Past & Present

International Conference
Brussels, June 16-17 June, 2022
Vrije Universiteit Brussel

Organizer: Paul Erdkamp



Day 1 June 16, 2022

- 9:30 **Samuel A. White** (Columbus, OH)
Abductive inference and Bayesian Methods in Historical Climatology
- 10:15 **Ann Brysbaert** (Leiden, Athens)
Climate and (pre)History. Human-environment interaction in the 13th century BCE in the Argive Plain, Greece
- 11:00 *coffee*
- 11:30 **Guy D. Middleton** (Newcastle)
The Gift that Keeps on Giving: Climate change and Collapse in the Late Bronze Age eastern Mediterranean
- 12:15 **Duncan C. Keenan-Jones** (Brisbane)
Tiber flooding and rainfall: comparisons between written sources, speleothems and lake levels
- 13:00 *lunch*
- 14:30 **Nicolas Schroeder** (Brussels)
Opening the farming blackbox: reframing the impact of climate change on early medieval societies
- 15:15 **Kathleen Pribyl** (Antwerp, Norwich)
Climatic stress and societal responses in late medieval England
- 16:00 **S. Guillet** (Geneva)
Volcanic forcing vs natural climatic variability, a complex attribution using climate proxies: lessons from the 1170-1171 CE eruption

Location on both days: Etterbeek Campus, Building I, Room I.2.02
Via Teams using this [link](#) to the meeting

Day 2 June 17, 2022

- 9:30 **Paul Erdkamp** (Brussels)
Modelling climate, population and resources. A comparison of the Roman world and early-modern Europe
- 10:15 **Heli Huhtamaa** (Bern)
Volcanic eruptions, climate and famines
- 11:00 *coffee*
- 11:30 **Andrea Kiss** (Vienna)
The neighbour's grass is always greener? Town council minutes on weather-related extremes: two West-Hungarian towns in the 17th-19th centuries
- 12:15 **Fiona Williamson** (Singapore)
Atmosphere, environment, society: the typhoon vulnerability nexus in early twentieth-century Hong Kong
- 13:00 *lunch*
- 14:30 **Elaine Lin** (Taipei)
Locust plagues, climate variability and societal responses in the Chinese dynasties
- 15:15 **Vinita Damodaran** (Brighton)
Historical climate vulnerability in South Asia; Floods, droughts, famines and cyclones
- 16:00 **Kari De Pryck** (Paris)
The end of history? The role of history in climate expertise

In person participation is open and free for all, but for logistical reasons, please register by email to perdkamp@vub.be

Abstracts

Samuel A. White (Columbus, OH)

Abductive inference and Bayesian Methods in Historical Climatology

What do we learn about historical weather and climates from the written records? And how can we integrate that knowledge with information from natural archives and climate modelling? This talk shows how the answer to these questions lies in abductive inference and Bayesian reasoning. The presentation will discuss these concepts from both a theoretical and practical standpoint and demonstrate their application to historical climatology. Drawing on a current article manuscript, I will demonstrate that a Bayesian approach can preserve more information in historical records than conventional index methods while better utilising the judgement and background knowledge of historians. The talk will present some of the practical challenges and further promises of this approach, as well as its implications for the study of climate in human history.

Ann Brysbaert (Leiden, Athens)

Climate and (pre)History. Human-environment interaction in the 13th century BCE in the Argive Plain, Greece

In the region of the Argive Plain during the 13th century BCE, several factors were at work that may have had an influence on the demise of the Mycenaean polities around 1200/1190 BCE. Through a large-scale study on the labour efforts that were poured into monumental construction in the region of the Argive plain and beyond, the ERC-funded SETinSTONE project looked into the possibilities of human and other resource exhaustion, combined with climate changes as some of the factors that may have influenced this demise. Having combined (Timonen and Brysbaert 2022) the potential effects of negative climate patterns and monumental building efforts, we assessed the outcome of these on Mycenaean societies in the region and did not recognize signs that these would have caused any major stress leading to the 1200/1190 BCE events. Since 2019, several other types of labour cost factors have been added into the equation (Brysbaert 2020,

2022). This paper presents these tested and accumulated labour efforts, and any potential effect on society as a whole during that 13th century BCE that these efforts would have had. Finally, these efforts will also be modeled into more realistic patterns of time periods within that century. The potential of negative climate patterns will be taken into account again in these new models in order to understand if and when these combined factors start making an impact on society as a whole.

Guy D. Middleton (Newcastle)

The Gift that Keeps on Giving: Climate change and Collapse in the Late Bronze Age eastern Mediterranean

It is almost sixty years since Rhys Carpenter first suggested that the collapse of the Mycenaean kingdoms of Late Bronze Age Greece might have been caused by climatic shifts. Studies by meteorologists in the 1970s appeared to support Carpenter's reconstruction, but archaeologists responded with the charge that the patterns did not fit the archaeological evidence on the ground. Climate change then became associated with another supposed prime mover of collapse – migration. Changes in climatic conditions spurred Balkan peoples to rush down into Greece and Anatolia, pushing the local peoples out and causing the creation of new mixed groups of peoples – the Sea Peoples, who promptly left these areas and went east, where they caused the Hittite collapse and even attacked Egypt. The most recent set of climate-collapse-migration hypotheses published over the 2000s also claim that eastern Mediterranean megadrought caused collapses and vast movements of people. Yet the evidence for megadrought remains thin and contradictory. Other climatic evidence points to no drought before collapse. In this presentation, I discuss some of the problems with the climate-collapse-migration hypothesis as it now exists. I argue that, as in other cases of supposed climate-induced collapse, the case and the narrative are weak.

Duncan C. Keenan-Jones (Brisbane)

Tiber flooding and rainfall: comparisons between written sources, speleothems and lake levels

The Tiber river and its floods were important to life at ancient Rome, but the city's past climate remains comparatively unknown. The changes in the ancient flood record have been considered more affected by changes in surviving documentation and land use than by rainfall. This paper will present a new, improved reconstruction of Tiber flooding from written sources. We will compare the flood reconstruction to nearby published speleothem records, RL4 and RL12 (Zanchetta et al. 2021) from the Buca della Renella in the Apuan Alps near Pisa (Italy), to assess the relationship of Tiber flooding to rainfall. While other speleothems from the area have produced records of precipitation, both RL4 and RL12 continue only to the 10th century CE and so cannot be compared to rainfall measurements. The age of RL4 is constrained by 3 U-Th dates, and RL12 by 10, over the period of the flood record.

The RL4 flowstone has been shown to record hydroclimatic changes associated with the "4.2" ka event (Drysdale et al., 2006; Zanchetta et al., 2016). We find that RL4 $\delta^{18}O$ records wet and dry intervals consistent (within age uncertainties) with higher and lower frequency periods of Tiber floods and with lake levels in Central Italy over the core of this period. RL12 provides detail on a period poorly documented by historical records.

Nicolas Schroeder (Brussels)

Opening the farming blackbox: reframing the impact of climate change on early medieval societies

Over the last two decades, many research projects and publications have focussed on the impact of climate change on early medieval societies. A central assumption in these discussions is that farming is the main causal link between changing precipitation or temperature patterns on the one hand and social, economic, and demographic processes on the other. While this is, of course, a sound assessment, it is also somewhat problematic. Early medieval farming is too often treated as an analytical blackbox in the

literature. The vulnerability of farming systems is assumed rather than demonstrated. A more rigorous assessment of our understanding of early medieval farming, but also climate change, social, economic, and demographic trends during the period is needed. In particular, problems of spatial scale have to be addressed much more rigorously. This exercise then leads to an uneasy conclusion, whose consequences have to be reflected upon: we might not be sufficiently equipped, as of now, to fully understand the impact of climate change on early medieval societies. The final part of this paper briefly discusses the implications of this acknowledgement of uncertainty.

Kathleen Pribyl (Antwerp, Norwich)

Climatic stress and societal responses in late medieval England

In the fourteenth and fifteenth centuries England experienced the transition from the Medieval Climate Optimum towards the Little Ice Age. The average temperatures declined over the long-term, while superimposed over this trend the inter-annual and decadal variability of temperature as well as precipitation was substantial. Additionally, sequences of summers with cool and wet weather were interspersed throughout the period and these were liable to cause shortfalls in agrarian production and hence subsistence crises, amongst them the famine 1315-17 or the period of food shortages in the late 1430s. The impact of the deteriorating climatic conditions and their potential to cause social upheaval depended not only on the strength of the climatic stressor, but also on other factors such as population numbers, economic and agricultural developments, the state of technology or the strength of government and administration. This paper looks at the interaction of these factors and their moulding of vulnerability and resilience in an epoch of rapid change, and analyses the perception of the climate and the severe subsistence crises as well as short- and long-term strategies employed and considered by contemporary elites to relieve their impacts.

S. Guillet (Geneva)

Volcanic forcing vs natural climatic variability, a complex attribution using climate proxies: lessons from the 1170-1171 CE eruption

Whereas the prominent role of volcanism in Common Era (CE) climate variability is well established, uncertainties remain regarding its effects on past societies. Using the revised timescale of CE volcanism and state-of-the-art climate reconstructions, several studies noticed a coincidence between abrupt summer cooling and periods of conflict and economic decline, which in turn led to speculation about potential direct links between volcanic eruptions and societal crises. Here, we explore possible pitfalls that studies may face when focusing on the interactions or interdependencies between volcanism, natural climate variability and human history, and discuss the complex transition from coincidence to causality. Drawing on a previously undocumented high-magnitude medieval eruption that occurred at the end of the 12th century, this study exemplifies the complexities inherent to studies looking at eruptions and likely repercussions on contemporary societies, but also underlines the need for a precise dating of volcanic cooling to properly detect and attribute climate anomalies to volcanic eruptions. Our study case also stresses that a critical analysis of historical sources and a deep understanding of the socio-economic and political contexts in which the climatic event occurred is critically needed before any conclusive attribution of plagues, famines and societal unrests to the climatic effects of a volcanic eruption should be attempted.

Paul Erdkamp (Brussels)

Modelling climate, population and resources. A comparison of the Roman world and early-modern Europe

Recent studies that claim that the Roman Empire prospered and expanded during the so-called Roman Warm Period and declined when the climate became drier and colder have received acclaim among the general public, but criticism among historians and paleoclimatologists. Recent paleoclimatological studies shed doubt on the idea of clear-cut warm and

cold climate eras, but also the conjectures underlying the assumed negative impact of climate change on Roman society can be questioned. Did a long-term sequence of relatively cold climate conditions indeed cause demographic and economic decline? The Roman world does not offer sufficient quantitative data to offer solid answers to these questions. Early-modern Europe, on the other hand, offers much clearer evidence on population, living standards and economic performance. Valuable lessons can be learned from this evidence for our understanding of the impact of climate shifts in the Roman world. One of these lessons is that the impact of climatic changes on population and resources is predominantly determined by and in interaction with societal factors.

Heli Huhtamaa (Bern)

Volcanic eruptions, climate and famines

Large volcanic eruptions can have a substantial impact on climate and these climatic disturbances can, in turn, have severe consequences on food production far away from the eruption location. Consequently, recent research has detected several historical subsistence crises resulting from volcanic-induced climatic shocks. However, attributing any societal event to climate variability, volcanic forced or any other, is very challenging. Thus, commonly the critical assessment on the differences between coincidence and causation is rather limited in previous studies.

This talk addresses the challenges and introduces some possible approaches to establish causal linkages between volcanic eruptions, climate anomalies and subsistence crises, mostly with case studies on early modern Nordic famines. To what degree the detected food crises can be attributed to volcanic-induced climatic disturbances, and to what degree existing socio-environmental conditions and emerging human actions explain these events? For example, is famine mortality directly correlated with production failures, or can we identify some indirect pathways that determine where and when the human consequences were the most profound?

Andrea Kiss (Vienna)

The neighbor's grass is always greener? Town council minutes on weather related extremes: two West-Hungarian towns in the 17th-19th centuries

Because extensive damages usually required central administrative actions of a self-governing community, town council minutes are a particularly valuable contemporary source for reconstructing extremes. Covering an over 200-year period, through the examples of two neighbouring towns, we provide a systematic overview of the types of weather-related information and the analysis possibilities, strength and weaknesses of this invaluable source type. The occurrence and intensity of anomalous or extreme weather and weather-related extremes – such as temperature and precipitation extremes, strong winds, convective events, floods, droughts and related hazards such as (unintentional) fires – were detected through their direct (e.g. damages) and indirect (e.g. phenological information) socio-economic impacts. Most of the great European (mid-/late) Little Ice Age extremes, and the Maunder minimum and Maldá anomaly extremes of this period within (e.g. 1690s, 1710s, 1740s, 1780s, 1813-1816), are detectable in these town council minutes. Despite little difference in climatic, topographic and hydrological conditions, the two series mostly complement each other, and overlaps are detectable only in a few cases. The reasons originate mainly in the different land-use and economic priorities and the (temporarily varying) differences in their socio-economic vulnerability towards extreme events, and in the minor differences of urban legislation, documentation.

Fiona Williamson (Singapore)

Atmosphere, environment, society: the typhoon vulnerability nexus in early twentieth-century Hong Kong

Recent scholarship has argued the necessity of bringing both a climatic and an historical lens to the discussion of resilience and vulnerability studies within towns and cities. Resilience and vulnerability comprise multiple factors, including the state of the local economy, social equality, cohesion and adaptability, infrastructure and land-use, scientific innovation, policy,

planning and preparedness. The rapid urbanisation that came with colonisation is associated with poor infrastructural capacities, land-use change, poverty, overcrowding and limited mitigation for extreme weathers. Combined with a centralised disaster risk management that was often predicated on limited, or reactive planning, social and political failings disenabled communities and individuals in the path of disasters from becoming resilient in the face of one, or multiple, extreme events. This human-climate-environment nexus situates human interposition in the natural world firmly within a hazard causation narrative and compromised human and ecosystem resilience. This paper explores this nexus during the major 1906 and 1937 Hong Kong typhoons, arguing that the situation on the ground at the time and space at which the typhoons struck was as much of a catalyst for disaster as the strength of the typhoons themselves.

Elaine Lin (Taipei)

Locust plagues, climate variability and societal responses in the Chinese dynasties

Locust plague is one of the most disastrous ecological threats that have been widely documented in the human history. The earliest records of desert locust plague can be dated back in the Pharaonic Egypt. In ancient China, as early as in the oldest Book of Odes (Chinese pronunciation Shijing) in 1100-700 BC, locust infestation has been described in the poetry. And throughout the Chinese dynasties, locust plagues and their consequences on food shortage, severe famine, social unrest, and disaster relief have been periodically documented. This study reports two important dimensions related to locust plague: one investigates climate conditions in favor of locust outbreak to be escalated for a catastrophe, and the other studies ancient society's adaptive strategies for dealing with the problem as disaster mitigation. The first question is answered through using a great quantity of digitized records in the REACHES database (Wang et al., 2018), by combining various variables, to perform spatial and multivariate statistical analysis. And the second question is investigated through textual analysis to discover the ancient knowledge and regulation system from

imperial decrees to grassroots reactions as societal responses. This study advances the present understanding about ancient knowledge for locust infestation control and their relations to climate variability.

Vinita Damodaran (Brighton)

Historical climate vulnerability in South Asia; Floods, droughts, famines and cyclones

South Asia has long been subject to periodic fluctuations of the monsoon sometimes resulting in droughts, floods, and famine with devastating consequences for communities and infrastructure. British colonial surveys, in such contexts were efforts to establish rule and control over uncertain events and marginal landscapes. Local knowledges, syncretic histories and pastoralist narratives however convey past social worlds that were more adept at handling environmental shocks. As such, the archival record on calamitous events, natural catastrophes and environmental shocks as catalogued by colonial sources is very rich. At the same time, the scope of such historical data available to refine climate anomalies is underestimated and large amounts remain untapped, but with concerted data rescue activities this situation can be dramatically improved, both back through time and wider in space. As extreme events increase the predictability of these events becomes more important. Thus, improving the historical weather and climate data base will provide a platform with which to address key concerns in climate change. This talk explores some of these questions in the context of India.

Kari De Pryck (Paris)

The end of history? The role of history in climate expertise

In this presentation, I will discuss the role of history as a discipline and topic in the reports of the Intergovernmental Panel on Climate Change (IPCC). The IPCC is known for its assessment of the scientific literature on climate change, its impacts and solutions. Overtime, it has played a key role in constructing our current understanding of climate change. Climate change has long been framed as a global environmental problems, detached from

its social, political, ethical and historical roots. Looking at who participates in the IPCC and how the assessment process is organised, this contribution explores why insights from the social sciences (including history) are difficult to integrate into the assessment work. It also reviews recent attempts to bring new perspectives into the organisation.

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