Special Issue: The Impact of Upper Pleistocene Climatic and Environmental Change on Hominin Occupations and Landscape Use, Part 1

An Introduction to Part 1 of the Special Issue

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ABSTRACT

This is the first part of a special issue on the impact of Upper Pleistocene climatic and environmental change on hominin occupations and landscape use. In this part there are six contributions:

- Davies, W., and Nigst, P.R.: An Introduction to Part 1 of the Special Issue
- Maier, A., Ludwig, P., Zimmermann, A., and Schmidt, I.: The sunny side of the Ice Age: Solar insolation as a potential long-term pacemaker for demographic developments in Europe between 43 and 15 ka ago
- Golovanova L.V., Doronichev V.B., Doronicheva E.V., and Nedomolkin A.G.: Dynamics of climate and human settlement during the Middle and Upper Paleolithic in the northwestern Caucasus
- Taller, A. and Conard, N.J.: Were the technological innovations of the Gravettian triggered by climatic change? Insights from the lithic assemblages from Hohle Fels, SW Germany
- Fontana, L.: Is the Solutrean linked to climatic and environmental changes of the Upper Pleniglacial? Searching for the drivers of the changes in the economy and mobility of Solutrean groups in Southwestern France
- Kuijjer, E.K., Haigh, I.D., Marsh, R., and Farr, R.H.: Changing tidal dynamics and the role of the marine environment in the maritime migration to Sahul

The session "*The impact of Upper Pleistocene climatic and environmental change on hominin occupations and landscape use*" was organized as part of the XVIIIth UISPP congress at Paris, France, in June 2018. This special issue is guest-edited by William Davies (Centre for the Archaeology of Human Origins, Archaeology, Faculty of Humanities, University of Southampton) and Philip R. Nigst (Department of Prehistoric and Historical Archaeology and Human Evolution and Archaeological Sciences Research Network, University of Vienna).

This special issue originates in a session of the same name organized as part of the XVIIIth UISPP congress in Paris, France, on 5 June 2018. The session brought together researchers interested in the impact of climatic and environmental change on hominin occupation and landscape use in the Upper Pleistocene. Specifically, we aimed to showcase studies very diverse in geographic focus and methodologies applied.

The impact of climatic and environmental change on hominin evolution and behavioral diversity has been a focus of archaeological research for a long time. Climate has been argued to be a driver for huge transformations in human evolution (e.g., Foley 1994; Potts 1998; Trauth et al. 2021). Climatic conditions are often argued to limit hominin occupation of regions (or even continents) and the effects of environmental conditions on hominin mobility and technological organization are widely studied, albeit at different scales – both spatially and temporally. Changes in climate and environment have effects, among others, on moisture availability—both in terms of quantity as well as spatial and seasonal distribution—and hence on biomass production, which is intrinsically linked to a number of

key resources exploited by hominins. Hence, variation in resource availability will have effects on hominins and stimulate potentially quite diverse responses across time and space.

In our session we discussed Neanderthal and modern human adaptations and responses to climatic change using a variety of different approaches, from case studies focused on one site to big data analysis answering the questions around the role and impact of climatic and environmental change on hominin behaviors. Key themes addressed during the session in Paris through contributions and discussion included:

i. The spatio-temporal scales of climatic and environmental changes in the Upper Pleistocene.
ii. The extent to which abrupt environmental transitions can be linked to changes in hominin occupation or behavior.
iii. The extent to which energetic considerations (e.g., metabolism, mobility strategies) can be used to explain changes in hominin behavior.
iv. How we can link changes in behavior—regardless of if they are long-term or abrupt—to climatic and environmental drivers.
v. How social networks and material culture might have been used to mitigate environmental and climatic changes.

A key issue that came up during the session was shifting scales of analysis and linking climatic and behavioral data. With regard to scale, the issues center on different scales of climatic and environmental change recorded in the usual proxies—be they local archives like the sedimentary bodies at the sites under study or terrestrial/marine archives often quite distanced from the archaeological sites but linked to them via dates or otherwise correlated—and of hominin behavior as recorded in archaeological assemblages. Both of course can be quite variable and probably often time-averaged, although to different degrees. Linking behavioral data and climatic proxy archives can hence be challenging. Scales of analysis also depend on research questions.

In total, the UISPP session in Paris comprised 27 oral and poster contributions from Europe, Africa, Asia, Australasia, and America, presenting a huge variety of approaches that explored changing hominin occupation patterns and landscape use in the light of different scales of climatic and environmental change. While some contributions have now been published as individual papers elsewhere, this special issue groups together a number of studies quite diverse in their topics, ranging from case studies to review papers. The first part of the special issue presents five papers. The contributions include studies of Neanderthal and modern human occupation patterns in the Caucasus, solar insolation as a long-term pacemaker for Upper Paleolithic human occupation of Europe during Marine Isotope Stage (MIS) 3 and MIS 2, modelling of tidal dynamics to explore the role and impact of changes in maritime/coastal environments in relation to the first occupation of Australasia, lithic technological innovations of the Gravettian in southwestern Germany and the question of whether they were triggered by climatic change, and the factors driving changes in economy and mobility of Solutrean groups in southwestern France.

In this special issue, Maier et al. (2022) explore the effects of solar radiation on human demographic developments in the western and central European Upper Paleolithic between 43 and 15 thousand years ago (kya) by comparing paleodemographic datasets to estimates of solar insolation from a regional climate model. The study shows a pronounced decrease in populations between 29 and 25 kya, while between 25 and 20 kya populations are growing both in terms of numbers and densities. The results suggest that solar insolation and the resulting effects on plant and animal biomass provided a driver for the long-term demographic development of Upper Paleolithic groups in western and central Europe.

Another contribution to this special issue, Golovanova et al. (2022), provides a detailed review of the dynamics of Neanderthal and modern human settlement of the northwestern Caucasus against climatic changes. As a general observation, Golovanova et al. highlight that the most important factors driving Upper Pleistocene hominin occupation of the northwestern Caucasus were favorable climatic and environmental conditions. They show that during favorable climatic conditions the numbers of sites increased significantly and sites, i.e., hominin presence, occurred in more varied landscape settings. They argue these patterns represent a wider exploitation of the northwestern Caucasus region's various landscapes. The long-term view on presence and absence in hominin occupation of the region highlights the appearance of the Middle Paleolithic in MIS 5, while the majority of Middle Paleolithic occupation occurred between 90 and 40 kya. There are two major phases of Upper Paleolithic modern human occupation, basically before and after the Last Glacial Maximum (LGM). One point raised is the abandonment of regions at an elevation greater than 350masl between 24 and 20 kya.

With regard to landscape use, Golovanova et al. (2022) state—based on raw material supply networks—that Neanderthals used exclusively local raw materials, while modern humans used local but also far-distant raw materials, suggesting increased mobility. This observation is similar to what Adler et al. (2006) have concluded for the southern Caucasus and suggests wider social networks for early modern humans.

In their paper, Taller and Conard (2022) provide a detailed overview of the lithic technological strategies of the Gravettian of Hohle Fels cave in southwestern Germany, and tackle the question of whether the technological innovations of the southwestern German Gravettian were triggered by climatic change. Regarding the emergence of the Gravettian and its technological innovations, Taller and Conard (2022) argue it appears at a time of steadily decreasing temperature, fauna, and vegetation. Taller and Conard (2022) make the interesting observation that not only latitude but also altitude of a region has implications for the settlement history, especially when considering abandon-

ment of a region by humans due to climatic deterioration. This is something that has been noted for the Gravettian occupation of other regions (Klima 1961; Skrdla 2005; Svoboda 1996). Similarly, Golovanova et al. (2022) mention the abandonment of higher altitudes during the LGM of the northwestern Caucasus.

Fontana (2022) presents a study on economy and mobility of Solutrean groups in southwestern France, based on faunal remains and explores the question whether the Solutrean is linked to LGM climatic and environmental changes. She observes no difference between the Solutrean and the preceding Late Gravettian and the following Magdalenian with regard to animal exploitation systems. It seems more that the animal exploitation fits a reindeer economy model not changing between the Late Gravettian and the end of Middle Magdalenian, and thus indicates ecological stability in the region.

In their contribution Kuijjer et al. (2022) provide an exploration of constraints on human landscape use and migration to Sahul based on quite different evidence. They explore changing tidal dynamics and currents in addition to sea level changes and their impact on coastal environments, which are arguably important not only when considering maritime migration to Sahul but also living in coastal landscapes and general seafaring. Their modelling suggests substantive changes in the dynamics of the tidal system and the coastal environments of northern Sahul throughout the Upper Pleistocene.

This collection of five papers reflects a range of approaches and diverse methodologies to explore the influence and impact of climatic and environmental change and variability on hominin occupation and landscape use during the Upper Pleistocene (130–11.7 kya). Similarly, they represent different questions, especially with regard to scale—both geographically as well as chronologically.

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