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Climatic changes and social transformations in the Near East and North Africa during the 'long' 4th millennium BC: A comparative study of environmental and archaeological evidence

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ABSTRACT

This paper explores the possible links between rapid climate change (RCC) and social change in the Near East and surrounding regions (Anatolia, central Syria, southern Israel, Mesopotamia, Cyprus and eastern and central Sahara) during the 'long' 4th millennium (~4500–3000) BC. Twenty terrestrial and 20 marine climate proxies are used to identify long-term trends in humidity involving transitions from humid to arid conditions and vice versa. The frequency distribution of episodes of relative aridity across these records is calculated for the period 6300–2000 BC, so that the results may be interpreted in the context of the established arid episodes associated with RCC around 6200 and 2200 BC (the 8.2 and 4.2 kyr events). We identify two distinct episodes of heightened aridity in the early-mid 4th, and late 4th millennium BC. These episodes cluster strongly at 3600–3700 and 3100–3300 BC. There is also evidence of localised aridity spikes in the 5th and 6th millennia BC. These results are used as context for the interpretation of regional and local archaeological records with a particular focus on case studies from western Syria, the middle Euphrates, southern Israel and Cyprus. Interpretation of the records involves the construction of plausible narratives of human–climate interaction informed by concepts of adaptation and resilience from the literature on contemporary (i.e. 21st century) climate change and adaptation. The results are presented alongside well-documented examples of climatically-influenced societal change in the central and eastern Sahara, where detailed geomorphological studies of ancient environments have been undertaken in tandem with archaeological research. While the narratives for the

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Near East and Eastern Mediterranean remain somewhat speculative, the use of resilience and adaptation frameworks allows for a more nuanced treatment of human–climate interactions and recognises the diversity and context-specificity of human responses to climatic and environmental change. Our results demonstrate that there is a need for more local environmental data to be collected ‘at source’ during archaeological excavations.

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1. Introduction

In this paper we argue that the period from ~4500 BC to ~3000 BC¹ in the Near East, Eastern Mediterranean and North Africa was one in which climatic changes, some of which were rapid and of high amplitude, had discernable impacts on human groups. These impacts are evident in the archaeological record as changes in modes of subsistence, social organisation and settlement patterns, which manifested differently in different locales. In some cases links between climatic, environmental and societal change are quite clear, for example in the Sahara where a period of hyper aridity between ~4300 BC and ~3200 BC brought about a major population shift (Kuper and Kröpelin, 2006; Manning and Timpson, 2014, 30). In other cases they are much more opaque. In Mesopotamia, the expansion and subsequent contraction of the Uruk Culture from the middle and upper Euphrates during the 4th millennium BC broadly coincided with periods of rapid climatic change (RCC) at ~3700/3600 BC and at ~3200 BC, but both of these processes may have been due entirely to social and economic factors.

What is evident is that, during the late 5th and 4th millennia BC (the ‘long’ 4th millennium BC) across the Eastern Mediterranean, Near East and North Africa, there were widespread cultural disruptions that proceeded at different rates, at different scales and in different ways, but all approximately at the same times. Many of these upheavals appear to have coincided with periods of RCC. However, linking social changes to RCC is extremely problematic. Our ability to identify the effects of climatic change on societal change is impeded by the enormous number of other possible explanations for the evidence we observe in the archaeological record. There has been considerable criticism in recent years of the ways in which both archaeologists and environmental scientists have tackled the potential impacts of RCC on cultural systems (Rosen, 2007; Maher et al., 2011) including the tendency to gloss over the archaeological evidence. The assumption implicit in previous literature has been that abrupt arid ‘events’ impacted cultural behaviour in the past and brought about migrations, transitions and disruptions, including societal ‘collapse’ (e.g. Staubwasser and Weiss, 2006, 379). Although this may be applicable, the Early and Middle Holocene also included periods of high climatic variability, which may have posed challenges for human societies. In addition, the ‘collapse’ model is somewhat unidirectional, and ignores the fact that RCC may mediate social change in other, more nuanced ways (Brooks, 2006, 2013).

The aim of this paper is to describe in detail the cultural transitions that took place in regions surrounding the Eastern Mediterranean where climate proxies indicate rapid and/or high amplitude changes. The paper compiles, analyses and interprets published environmental proxies alongside archaeological records, and situates the results within current thinking around the concepts of resilience and adaptation. We aim to highlight the

complexity of the evidence and we acknowledge that caution is needed when constructing narratives around the relationships between climatic and cultural changes. We will demonstrate, through our detailed presentation of the archaeological evidence, where rapid climate change provides a plausible explanation for cultural change in the period between 4500 BC and 3000 BC, where there are other explanations for cultural change, and where there is simply not enough evidence to make a definitive statement either way.

The concept of resilience has been defined by the International Panel on Climate Change (IPCC, 2014, 1772) as “*The capacity of a social-ecological system to cope with a hazardous event or disturbance, responding or reorganizing in ways that maintain its essential function, identity, and structure, while also maintaining the capacity for adaptation, learning, and transformation.*” For any given society, the magnitude of a disturbance is likely to be more important than the direction of change (e.g. wetter to drier).

When faced with a climatic disturbance, a society might respond in one of the following ways:

1. Accommodate the disturbance through existing coping strategies and mechanisms without the need for longer-term adaptation;
2. Accommodate the disturbance through ‘incremental adaptation’, involving “*adaptation actions where the central aim is to maintain the essence and integrity of a system or process at a given scale*” (IPCC, 2014, 1758);
3. Change (aspects of) its character through ‘transformational adaptation’, involving “*Adaptation that changes the fundamental attributes of a system in response to climate and its effects*” (IPCC, 2014, 1758);
4. Collapse as a result of its inability to cope with the disturbance coupled with a lack of capacity for either incremental or transformational adaptation (it might be argued that collapse is a form of transformational adaptation, for example involving the de-intensification of production and settlement in response to increased resource scarcity).

Different societies might pursue different adaptation strategies when faced with the same changes in climate, depending on existing environmental and cultural factors. Resilience and adaptation frameworks therefore help us move away from deterministic models of human–environment interaction and beyond existing causal models of climate-induced collapse (Brooks, 2013). The four different responses to climatic disturbances listed above will have different levels of visibility in the archaeological record.

In this paper we use these different possible responses as a framework for interpreting periods of transition and stability evident in the archaeological record, in conjunction with palaeoclimatic and palaeoenvironmental evidence (see Fig. 1).

2. Regional setting

2.1. Global and regional palaeoclimatic contexts

Abundant evidence indicates that the Middle Holocene was a

¹ In this paper both Calibrated BC and Calibrated BP dates are used. When discussing the archaeological evidence the convention is to use Calibrated BC and when discussing environmental data the convention is to use Calibrated BP. We have maintained these conventions throughout the paper.

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