

## Coupling Holocene climate variability and cultural shifts in Cappadocia, central Turkey

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This PhD project work, partially sponsored by the British Institute at Ankara, aims to develop new ideas relating to the complex interactions between changes in climate/environment and human culture during the last 10,000 years in central Anatolia. The former can be identified through sedimentary and geochemical analysis of sediment core material extracted from lakes, while the latter can be identified by documenting occupational histories for central Anatolia, primarily from systematic archaeological site surveys. Archaeological material can record effectively the success or failure of people during times of cooler, warmer, wetter or drier climatic conditions. A key focus of the project is to detail periods of stability and instability of past lifestyles as documented by changing settlement histories and to compare these shifts against variability in regional climate. By understanding the longer-term dynamics of the two, research will bring to light new ways of understanding people's exposure to climate systems and their ability to react to such changes. The lake sediment record can also provide a history of human impact upon the landscape, via deforestation and soil erosion.

Nar Gölü in Cappadocia, central Turkey, was cored under the general direction of Professor Neil Roberts (Plymouth University) in 2010, as part of a multi-collaborative project to investigate Holocene climatic and environmental change. A successful coring season resulted in 21.6m of sediments, most of them annually laminated (or varved), dating back into the Late Glacial (~16 kyrs BP) (see Roberts 2010; 2011). This continuous and highly resolved lake record provided material which is ideal for comparison with archaeological studies over *longue-durée* timescales. Varved deposits recovered at Nar lake present a way of correlating climate and culture with a higher temporal control than is usually achievable. In light of this and previous successful analyses of Nar lake material to investigate the links between climate, people and environmental change (for example Eastwood et al. 2009; England et al. 2008), my PhD project work was developed to study long-term patterns of cultural change in the context of dynamic interactions with the environment and changing climatic conditions of the Holocene.

To document spatial and temporal variability in settlement histories, a study grant provided by the Institute in 2011 was used to support desk and archival research of primary and secondary archaeological sources. Work centred on the Institute's library resources to document settlement numbers and sizes for broad archaeological time periods, mainly for the three key provinces (Aksaray, Nevşehir and Niğde) of modern Cappadocia. These data have been collated alongside settlement patterns gathered primarily by the Institute's Research Scholar, Michele Massa, to provide a synthesised picture of occupation for central Anatolia. Over 900 archaeological sites have so far

been included, of which the majority date to the Early Bronze Age (5000–4000 BP) and Iron Age (3200–2330 BP). A significant proportion of sites is datable to the ceramic Neolithic (9000–8000 BP) and Hellenistic/Roman times (2330–1605 BP). Whilst there are clear biases associated with the record, linked to investigator specialities and site visibility, for at least parts of the Early Bronze Age and Iron Age, there are clear indications of more extensive human occupation.

Comparing preliminary analyses conducted on the Nar lake material to the spatial and temporal changes in past occupational activity has begun to highlight some interesting results. The growth of Neolithic populations in the area and the development of 'mining factories' on nearby Nenezi Dağ for obsidian abstraction coincide with periods of increased landscape instability as witnessed by geochemical variations in the lake sediment profile. Similarly, at times of greatest instability in the lake sediment record, we see an increase in Phrygian, Persian, Hellenistic-Roman and Byzantine rule, suggesting an increase in human landscape disturbance during these periods. Interestingly, when archaeological survey data suggest less intensive occupation of Cappadocia, more stable environmental conditions are indicated around the lake. The question remains therefore whether more intensive resource gathering during Neolithic times had an adverse effect on landscape stabilisation or whether geochemical changes at this time were caused by a period of explosive volcanic activity in the region. From a climate perspective, parts of the Bronze Age, in particular, are documented as having experienced some of the driest climatic conditions of the Holocene, with low lake levels indicated at Nar. This period of climatic down-turn coincides with the growth of complex societies and extensive trade networks in the area, and large-scale settlement complexes like those seen at Acem Höyük and Alaca Höyük. In summary, it seems that the Nar lake geochemical record, coupled with archaeological survey data, details notable changes in both natural (for example climatic) and human-induced processes, with the balance between them changing over time.

## Bibliography

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