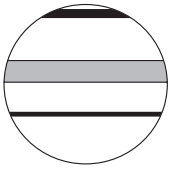

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New evidence of mid- to late- Holocene vegetation and climate change from a Neolithic settlement in western fringe of Central Ganga Plain: Implications for Neolithic to Historic phases

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Abstract

Here we present a continuous palaeoclimatic record of 5980 years (7230 cal BP–1250 cal BP) from Hetapatti, a Neolithic site situated on the western fringe of the Central Ganga Plain. The region was a center of reurbanisation following the decline of the Harappan civilisation and is considered a hub of economic, political and religious evolution since the sixth millennium BC. Hetapatti contains an uninterrupted sequence from Neolithic to Historic (Gupta) period. The study integrates two different approaches (phytoliths and carbon isotope analysis) to infer vegetational and climatic changes and to understand their relationship to the cultural sequence. Our results show a gradual transformation from a warm and humid climate into a warm and dry climate from the Neolithic to Historic (Gupta) period. We find an abrupt weakening of the ISM at ~2080 cal BP driving a warm and dry climate. The comparison of our data with other high resolution regional and global records led us to hypothesise a synchronicity in this warm and dry trend, coeval with the Roman warm period (RWP). The observed variation in vegetation and climate might have driven by the fluctuations in the Indian Summer Monsoon (ISM). Additionally, the phytolith analysis provides evidence of cereal crops including rice, wheat, barley, millets, etc. suggesting a crop affinity with the earlier Indus crop package. It is interesting to note that the site displays an uninterrupted cultural sequence from Neolithic to Historic times, with artefacts of each phase exhibiting technological and stylistic developments from the preceding culture. From this we infer that the well adapted socio-ecological strategies and availability of perennial rivers may have helped the ancient civilisation to absorb the stress relating to a varying climate.

Keywords

carbon isotope, Central Ganga Plain, Hetapatti, ISM, Neolithic, phytolith

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Introduction

The Ganga Plain, one of the largest alluvial tracts of the world, located between the Himalaya and Peninsular India, has been cradle of human settlement sites right from the terminal Pleistocene period (Singh, 1971). The region was a center of reurbanisation following the decline of the Harrapan civilisation and is considered hub of economic, political and religious evolution since the sixth millennium BC (Singh, 2014). While following the decline of Indus Valley civilisation, the cultural and economic focus of the subcontinent was gradually shifted towards Ganga plain, however the nearby Vindhyan-Kaimur hilly terrain was already occupied from the Stone Age. The Neolithic populations first occupied the Middle Ganga Plain (6500–2200 BCE) while the Upper Ganga Plain was occupied by Ochre Coloured pottery (OCP) (2200–1800 BCE) or Copper Hoard Culture (Saraswat, 1992; Tripathi, 2017). The Neolithic way of life in Ganga plain lasted for a long time starting somewhere between eighth–seventh millennium BC and third–second millennium BC (Singh, 2014).

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