Title:	Late Pleistocene Environments Across North-Central India and Implications for Hominin Adaptations with Special Reference to Lower son Valley, Sonbhara, Uttar Pradesh
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Abstract:	Climate change is increasingly recognised as a significant component in the biological evolution and cultural development of our species. It is widely assumed that it has an impact on behavioural plasticity, as well as the development of more efficient technologies and associated subsistence strategies. However, detailed research on such possibilities has not yet been explored in South Asia, despite the fact that our knowledge of palaeoenvironmental records from the Late Pleistocene have improved in this region and South Asia plays an important role in human migrations outside of Africa. Late Pleistocene habitation in South Asia currently spans a diverse range of ecologies, from desert to tropical rainforest and from large low-lying river basins to high-altitude settings. North-central and western India probably acted as vital biogeographic dispersal corridors and cultural and biological crossroads for diverse hominin populations, including modern humans, for a large part of the Quaternary. The current study aims to better understand the hominin-environmental interface by investigating various types of paleoanthropological sites in western India (Gopnath, Gujarat), central India (Different localities in Narsinghpur, and Nehlai in Madhya Pradesh) and north-central India (Doma in Uttar Pradesh). It also explicitly focuses on understanding the Palaeolithic/microlithic assemblages and related palaeoenvironmental dynamics of the Lower Son Valley (LSV) in the Sonbhadra District of Uttar Pradesh in north-central India. This research incorporates three different aspects: 1) A. To carry out surveys to locate new Palaeolithic and microlithic sites in the LSV, Sonbhadra, Uttar Pradesh, B. To collect sediment samples from a geological trench to characterise the Quaternary stratigraphy and palaeoenvironments of the study area. 2) Compile published sources for the Late Pleistocene palaeoenvironmental reconstruction of South Asia; 3) To visit the previously reported Late Pleistocene Palaeolithic and fossil sites or museum/university collections to collect enamel samples of fossil teeth and carbonates for the reconstruction of Late Pleistocene vipaleoenvironments. To achieve the objectives, five seasons of geological, palaeontological and archaeological field surveys have been conducted from 2017-2021. During these surveys, 61 new Palaeolithic and microlithic sites have been identified along with three vertebrate fossil sites in the LSV, Sonbhadra, Uttar Pradesh. Furthermore, a ~11-meter-deep geological excavation was also conducted to reconstruct the regional Late Pleistocene palaeoenvironmental framework and date the associated sediments through collaboration. Along with that, fossil enamel samples or carbonate samples were collected from select sites mentioned above for palaeoenvironmental reconstructions. It is the first such project that attempts to understand the Late Pleistocene environments and hominin adaptations in the Indian subcontinent via multidisciplinary techniques and through a multi-site study. The study incorporates the lithic analysis of Palaeolithic and microlithic artefacts, the stable isotope analysis on fossil tooth enamel, calcrete collected from western and central India, grain size analysis, X-ray fluorescence (XRF) geochemistry and OSL dating on sediments from LSV. For lithic analysis, Palaeolithic and microlithic artefacts were collected from seven sites in LSV belonging to periods ranging from Late Acheulean to microlithic age, probably spanning from ~140 kyr to 48 kyr based on currently-known evidence. The Late Acheulean to Upper Palaeolithic sites were generally located on the south side of the Son River, while microlithic sites were found all around the study area. The dominant raw material porcellanite is quite versatile and unique in nature which allowed Late Acheulean to microlithic populations to exploit it for artefact production. Preference for other raw materials was observed for successive technologies, especially those found away from the raw material sources. Compiled published resources: Late Pleistocene environmental studies conducted to date in South Asia and associated implications are broadly derived from different proxies, i.e., sediment, carbonate, ostrich eggshell, pollen, speleothem, and multiproxy approaches, including some archaeological sites. The compiled records tentatively show that the period viifrom 125-80 kyr was predominantly characterised by humid environments and was followed by varied results/changes in climatic conditions at 79-70 kyr and arid environments at 69-60 ka. Between 59 and 30 kyr, South Asia's environmental conditions were again generally humid. The period from 29-20 kyr again represents varied results, which were later followed by arid conditions from 19-11 kyr, following the Last Glacial Maximum or LGM.
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