

Middle Paleolithic records of control fire events in north-central India

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The paleosols preserved in the fluvial cliff sections of the Belan valley, situated in north-central India, provide a gradual change in typotechnology from the Lower Paleolithic (~100 ka) to Neolithic (~3 ka). These archaeological sites would provide a platform to comprehend the hominin landscape and fire activities during the Late Quaternary. The wildfire in modern ecosystem acts as a vital component in shaping the vegetation composition and land surface process and dynamics. Thus, the identification of fire use events in paleo-records would improve our understanding of the prehistoric human-environment in India. However, apart from climate and vegetation, prehistoric humans could have equally contributed to past fire activity. Therefore, disentangling the wildfire from prehistoric human-induced fire is crucial to comprehend the environmental conditions at a regional and global scale.

In this study, paleosol samples were collected from six archaeological sites of the Belan River valley. The samples were used for analyses of macro-charcoal (CHAR) to reconstruct the past fire events. CHAR values suggest paleofire events at i) ~58 ka, ii) ~26 ka and iii) ~8 ka. Our previous study based on isotopic studies of *n*-alkanes biomarker has shown that high rainfall events occurred at i) ~60 ka, ii) ~26 ka and iii) ~10-3 ka, which is contemporaneous to observed fire activities. The period between ~30 and 25 ka indicates the dominance of grassland (C_4 plants) in a cool and dry environment, which was a suitable condition for natural fires to occur. The CHAR peaks observed in this study overlap with high rainfall conditions, which were an uncondusive condition for wildfires. Additionally, fire disturbance surges during the early-Holocene to mid-Holocene correspondence to the timing of agricultural practices in the Belan valley. Therefore, this study suggests that prehistoric humans controlled fire during the Middle Paleolithic phase.

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