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Hominin response to oscillations in climate and local environments during the Mid-Pleistocene Climate Transition in northern China

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Long-term climate trends superimposed on climate variability changes are recognized to manipulate the living environments, and ultimately ecological resources for hominins, which in turn affect hominin activities. Archaeological evidence from loess sediments from Shangchen on the southeastern Chinese Loess Plateau indicates a suspension of hominin occupation around the time of the early mid-Pleistocene climate transition (MPT), prompting a re-assessment of climate-vegetation-hominin interactions. Our research generated magnetic susceptibility, total organic carbon content and its carbon isotope compositions, black carbon content and brGDGTs-derived mean annual temperature and precipitation records in loess deposits with *in situ* lithic records covering the period of hominin occupation (~2.1–0.6 Ma). The results reveal four distinct climate-vegetation periods (2.1–1.8 Ma, 1.8–1.26 Ma, 1.26–0.9 Ma and 0.9–0.6 Ma). During the early MPT (1.26–0.9 Ma), unprecedentedly high variability in climate-environment and a long-term aridification with C₄ vegetation expansion trend may have driven early humans to move to more hospitable locations in the region. Comparison with the record at Nihewan indicates that large-scale climate oscillations induced disparate hominin responses due to distinctive local environmental conditions.