
**Paleolithic to Neolithic sites in the Belan Valley of India:
early agriculture under an unstable monsoonal
climate following the Last Glacial Maximum**

MARTIN R. GIBLING¹, RAJIV SINHA², NONIGOPAL ROY²,
SAMPAT K. TANDON³, AND MAYANK JAIN⁴

*1. Department of Earth Sciences, Dalhousie University, Halifax,
NS, B3H 3J5 Canada <mgibling@dal.ca> ¶ 2. Department of Civil
Engineering, Indian Institute of Technology, Kanpur, India
¶ 3. Department of Geology, Delhi University, Delhi 110007
India ¶ 4. Risø National Laboratory, Roskilde, Denmark*

Considerable evidence is emerging that early human settlement and migration across Asia and Europe were influenced by rapid climate changes, as global climate adjusted to reduced ice cover following the Last Glacial Maximum. Along the Belan River in northern India, archeological sites have yielded a remarkable assemblage of Paleolithic to Neolithic settlements, with evidence for some of the world's earliest agricultural activity including Neolithic rice cultivation and domestication of animals.

Alluvial strata in the Belan valley yield dates between 85 and 72 ka B.P., implying sustained fluvial activity in Marine Isotope Stage 5 and later, probably under active monsoonal conditions. However, the youngest channel fills below the settlements were abandoned and filled with windblown silt with shell fragments, interbedded with fluvial sediments. Mounds of shell-bearing silt lie inland from the river. Five OSL dates for the channel fills and mounds span the 14 to 7 ka B.P. period, corresponding broadly to the period of Mesolithic settlement. Above the

eolian beds, the main Neolithic settlement rests on floodplain muds, indicating renewed fluvial activity.

The Belan eolian material has a small volume and reflects local deflation of sediment from the nearby river. However, no eolian deposits were observed in the older strata, and the post-LGM period was probably unusually dry in the Belan area. We suggest that the Mesolithic settlements developed against a backdrop of regional climatic instability, with periods of active river flow and drought. This would have been a difficult time for agriculture. In contrast, Neolithic sites were probably established during a period of more intense monsoon rainfall after about 7 ka, when stable agricultural settlements could have been established and rice cultivated.