



Press Release

Early humans in South Africa were quarrying stone as long as 220,000 years ago

International research team led by the University of Tübingen shows long-term use of a source of raw materials in Paleolithic South Africa

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As long as 220,000 years ago – far earlier than previously thought – people quarried rocks for their tools in places they specifically sought out. An international research team led by the University of Tübingen has demonstrated this behavior at the Jojosi site in South Africa, challenging the prevailing view that Paleolithic hunter-gatherers collected their raw materials incidentally during other activities. The study was published in the journal *Nature Communications*.

“At Jojosi, we found numerous traces of the quarrying of hornfels – a metamorphic shale – including blocks that were tested for their quality, flakes of various sizes, thousands of millimeter-sized pieces of production waste and hammerstones,” says Dr. Manuel Will from the Department of Early Prehistory and Quaternary Ecology at the University of Tübingen. Hornfels is a fine-grained rock that was frequently used to produce tools in the Stone Age. “People worked cobbles on site here and knapped the material until they had achieved the desired shape from the rock – probably to make tools from it later.”

The researchers almost exclusively found ‘production waste’ here. The absence of both the end products and other traces of activity and settlement indicate that the people of Stone Age Jojosi were solely and deliberately seeking to extract the coveted raw material. Remarkably, they were doing this for tens of thousands of years, at least until 110,000 BCE, as can be seen from the luminescence dating of the finds. Given its great age and long period of use, Jojosi adds new facets to the image of early *Homo sapiens*, indicating that they planned the long-term acquisition of resources much earlier than previously thought.

The Jojosi excavation site lies in vast grasslands in eastern South Africa, roughly 140 kilometers from the Indian Ocean coast. Geological processes during the Pleistocene formed a landscape characterized by

erosional gullies, also exposing large hornfels layers. An interdisciplinary team headed by Manuel Will has been studying the geology and archeology of this landscape since 2022.

“On our very first visits, both on foot and using drones, we discovered about a dozen sites where perfectly-preserved, unweathered hornfels flakes were visible in eroded sediment – an absolute rarity for an open-air site,” says Will. During their excavations, the researchers uncovered clearly defined, stratified artefact horizons with high concentrations of 200,000 to two million finds per cubic meter. All sediment was sieved to retain even the smallest fragment.

Gunther Möller, PhD student at the Institute of Prehistory, Early History and Medieval Archaeology of the University of Tübingen, successfully assembled 353 of the left-behind pieces into ‘refits’. “With these 3D puzzles, we were able to see precisely where and how material was chipped off and in what order. Several of these puzzles together then allow us to draw conclusions about the form of the actual end product, before it was taken to another place,” explains Möller.

“The finds from Jojosi reveal a rare, clear view of the early roots of humanity’s ability to plan. They show that the ability to select resources deliberately and organize activities stretches across generations,” says Professor Dr. Karla Pollmann, president of the University of Tübingen.



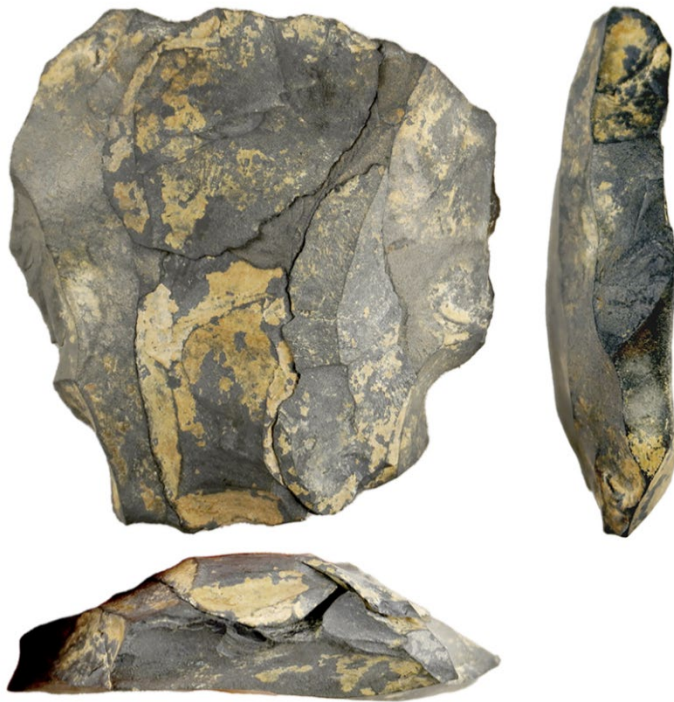
Panoramic view of the Jojosi site. Clearly visible are gullies formed by erosion, where stone artifacts were observed on the surface during site visits, both on foot and using drones. Photo: University of Tübingen / Christian Sommer



The sites Jojosi 5 (left) and Jojosi 6 (right), with clearly visible accumulations of stone artifacts – Stone Age knapping workshops – which were uncovered during excavations. Dozens of large and small flakes and production waste can be seen. Photo: University of Tübingen / Manuel Will



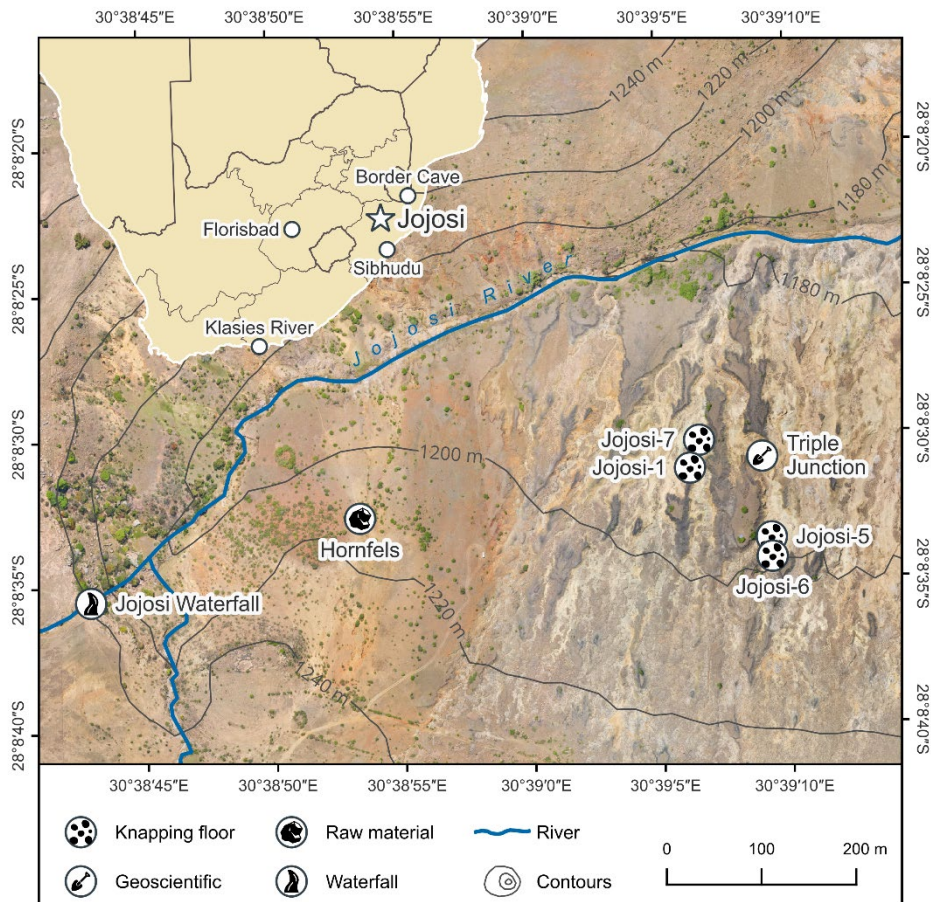
Archaeological excavations at the Jojosi 6 site in 2024. The tachymeter uses a laser to document the exact location of all the artifacts in 3D. Photo: University of Tübingen / Manuel Will



A reassembled stone artifact – known as a refit – found at the Jojosi 1 site, from three perspectives. The last three strikes made by a human knapper are visible in this 3D refit, which consists of four conjoining fragments. Photo: University of Tübingen / Gunther H. D. Möller



Various views of a reassembled stone artifact from the Jojosi 5 site. The refits show 19 matching fragments from a single operation, in which the stone's surface was first removed from the block before it was further knapped to produce blades. Photo: University of Tübingen / Gunther H. D. Möller



Location of the Jojosi landscape in South Africa and the spatial distribution of sites in the excavation area: Jojosi 1, 5, 6, and 7 were researched in the current study; Jojosi 2-4 derive from earlier excavations from the 1990s.

Diagram: Christian Sommer

Publication:

Will, M., Sommer, C., Möller, G. H. D., Botha, G. A., Blessing, M. A., Msimanga, L., Mazel, A., Val, A., Venditti, F., Riedesel, S: Specialised and persistent raw material procurement by humans in the Middle Pleistocene. *Nature Communications*, <http://doi.org/10.1038/s41467-026-70783-8>

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