Reading the rocks: Geologist finds clues to ancient climate patterns in chert

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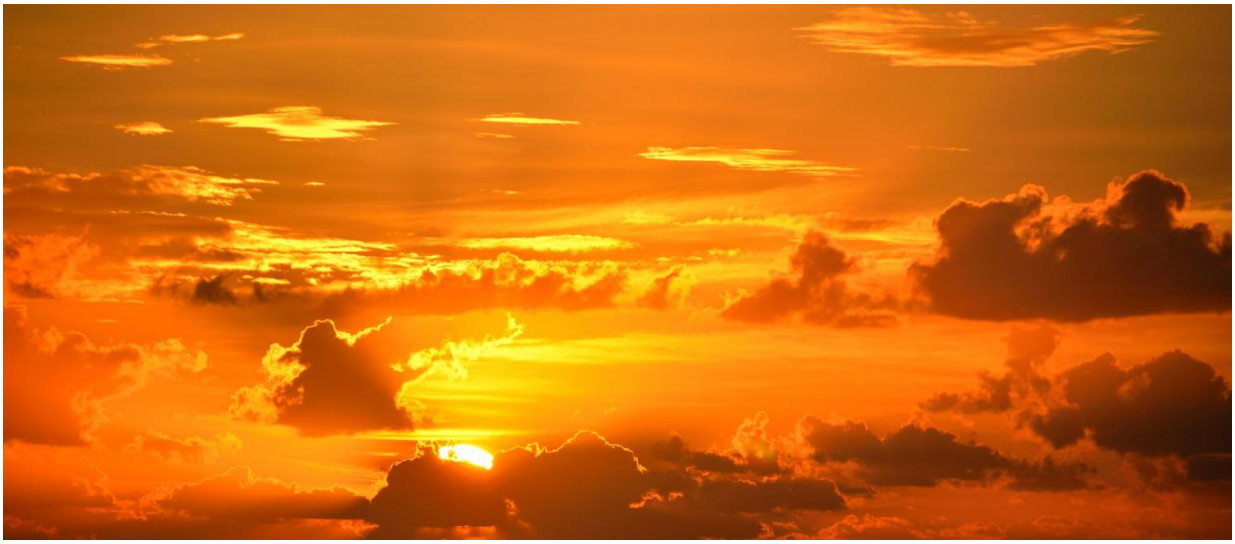

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A million years ago, dry seasons became more frequent and forests retreated before the encroaching savanna. Meanwhile, clustered around a nearby lake, our ancient ancestors fashioned stone tools.

During the long press of years, mud and sediment in that East African lake turned to stone, trapping pollen and microscopic organisms in its lattice. Today, researchers like Kennie Leet analyze samples of these ancient sediments, known as sediment cores, to create a picture of the environment early humans called home.

A doctoral student in geological sciences, Leet is the first author on "Labyrinth patterns in Magadi (Kenya) cherts: Evidence for early formation from siliceous gels," published in a recent issue of *Geology*, the leading journal in the field. Co-authors include Distinguished Professor of Geological Sciences and Environmental Studies Tim Lowenstein, her advisor, as well as Robin Renaut of Canada's University of Saskatchewan, R. Bernhart Owen of Hong Kong Baptist University and Andrew Cohen of the University of Arizona.

Leet's research is part of the National Science Foundation-funded Hominin Sites and Paleolakes Drilling Project (HSPDP), which looks at how the climate may have impacted hominin evolution in the East African rift. Overall, the project looks at the last 5 million years; Leet's portion of the project considers the last million.

She particularly focuses on the origin of the chert found in Kenya's Lake Magadi. A fine-grained rock that forms from siliceous material, chert is "cryptocrystalline," composed of crystals so small that they can't even be seen by high-powered microscopes, much less the naked eye.

Scientists believe that chert forms on the earth's surface and thus contains information about the environment at the time of its formation, she explained. Because of this quality, they can use chert to calculate the time period for particular climactic events, such as droughts—not unusual in East Africa, where the climate oscillates between wet and dry periods.

Opening a window into the distant past, the chert points to an even larger trend.

"One of the surprising things we found was that there has been a progressive drying trend for the last million years in East Africa. It's just been progressively getting drier and drier," she said. "But in that, we still

have the oscillation between wet and dry."

In the *Geology* article, she explores a labyrinth pattern she found in the rocks of this period. Patterns are common in nature, and this specific one is formed by drying, she explained.

"It tells us that all of the chert formation and solidification occurred near the surface, where there was exposure to air," she said. "Because this happened before the sediments were buried and compacted, there is other supporting evidence, such as really beautifully preserved plant fragments and single-celled organisms called diatoms."

The time period coincides with the region's transition from trees and forests to grasslands, which biologists and microbiologists on the team are able to track through pollen preserved in the sediment core. During that period, the early humans of Lake Magadi were also creating stone tools in new ways. Researchers wonder: Were these ancient communities moving about and trading more, prompted by drought?

Interestingly, the trend has reversed over the last decade, with the region becoming wetter. In fact, one of the places she stayed during a visit to Kenya in 2019 is now underwater, she said.

More information: Kennie Leet et al, Labyrinth patterns in Magadi (Kenya) cherts: Evidence for early formation from siliceous gels, *Geology* (2021). DOI: 10.1130/G48771.1

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