Team finds Southern East Africa getting wetter, not dryer

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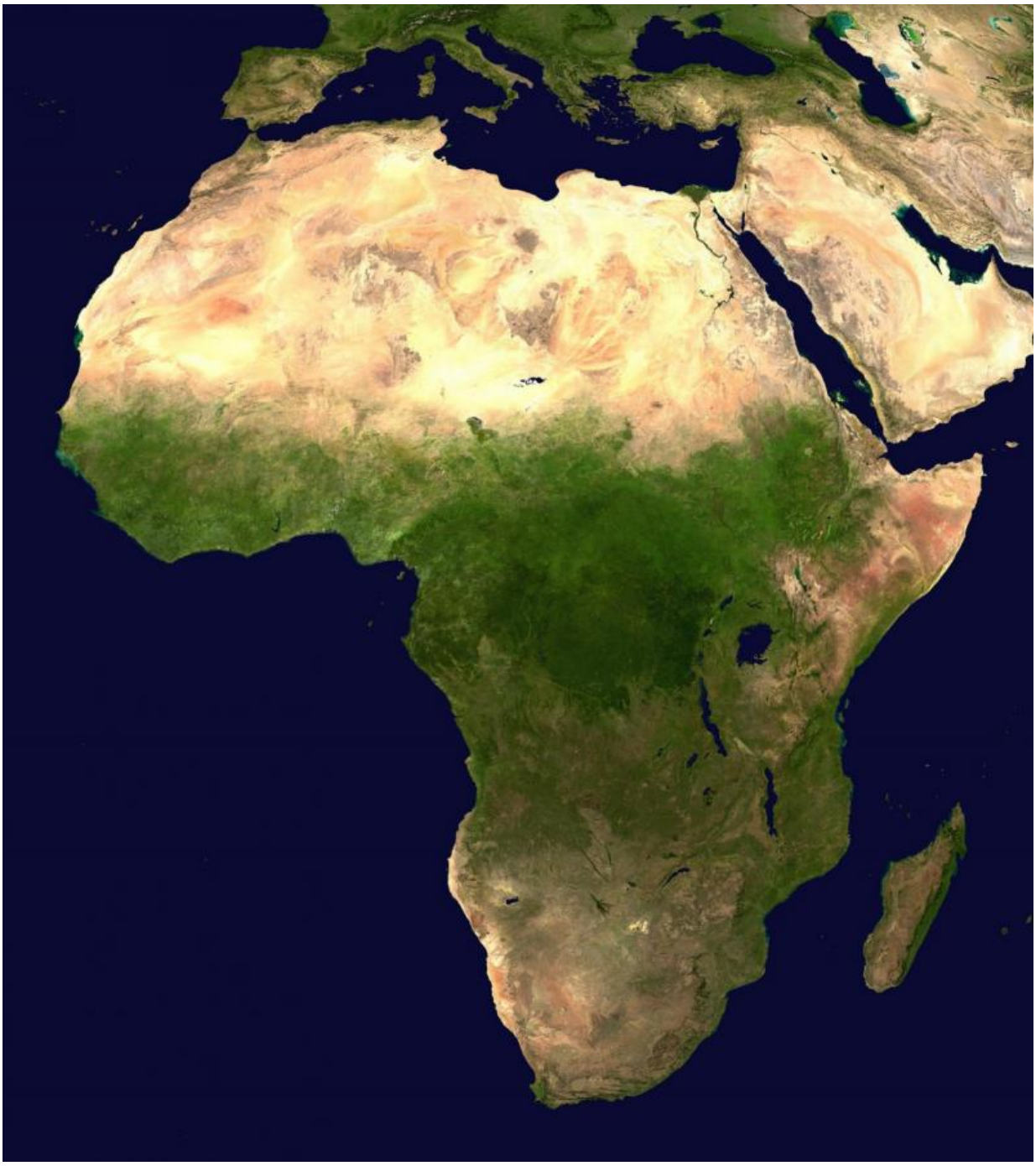

Satellite imagery of Africa. Credit: Public Domain

The prevailing notion that the African continent has been getting

progressively drier over time is being challenged by a new study that finds that drought has actually decreased over the past 1.3 million years and that the continent is on a 100,000-year cycle of wet and dry conditions. These new findings add a wrinkle to one of the keys to human evolutionary theory, the savannah hypothesis, which states that the progressively drier conditions in Africa led to prehuman ancestors migrating from forests and moving into grasslands.

Josef Werne, associate professor of geology and environmental science in the University of Pittsburgh's Kenneth P. Dietrich School of Arts and Sciences, along with colleagues from universities in the United States, Australia, Chile, and the Netherlands, made the discovery by examining core samples extracted from the bottom of Lake Malawi, one of the world's largest lakes, located between Malawi, Mozambique, and Tanzania in southeastern Africa. Their paper, "A progressively wetter climate in southern East Africa over the past 1.3 million years," was published in the journal *Nature*.

Previous studies of the climate of Africa focused on the northern part of the continent, Werne explained, and were responsible for the origin of the savannah hypothesis that the continent was getting drier. The 100,000-year cycles the researchers found correspond with the beginnings and endings of the great ice ages.

Lake Malawi had not been explored previously because the depth of the waters—700 feet—exceeded researchers' ability to get core samples from the bottom.

The researchers were able to overcome that limitation by using a barge and modifying oil-rig equipment to obtain a 380-meter-long sediment core sample. The core was dated using a combination of radiocarbon, volcanic ash, and magnetic polarity reversals and examined for "molecular fossils" indicating changing temperature and rainfall.

Temperature was derived by studying the distribution of the membrane lipids of a single-celled microbe, which was analyzed by mass spectroscopy, and the aridity and rainfall were measured by calcium content and the distribution and carbon isotope composition of fossil leaf waxes, which differ between those originating in trees and shrubs, which thrive in wetter conditions, and those originating in grasses, which can outcompete trees in dry conditions.

By noting the changes in temperature records and especially rainfall, the team determined that the continent was getting wetter over time in southern East Africa, as well as identifying the 100,000-year climate cycles.

The research project was more than 20 years in the making, with the solution to obtaining the core samples only completed in 2005. Analyzing the molecular fossils from these cores was under the purview of Werne at Pitt.

More information: T. C. Johnson et al, A progressively wetter climate in southern East Africa over the past 1.3 million years, *Nature* (2016). DOI: 10.1038/nature19065

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