

# Earth Institute News

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## Periodic Megadroughts Hit West Africa, Says Study *Global Warming Could Worsen Newly Seen Pattern*



Partially submerged tree, Lake Bosumtwi, Ghana  
*Images courtesy Jackson School of Geosciences, University of Texas at Austin*

Researchers have developed the first year-by-year record of rainfall in sub-Saharan West Africa for the past 3,000 years, and identified a daunting pattern: a 30-to-60-year cycle of serious droughts that last a decade or more, punctuated by killer megadroughts that last for centuries. The last great dry periods, from about AD 1100 to 1300, and 1400 to 1750, dwarfed the recent notorious Sahel drought, which killed some 100,000 people and displaced millions in the 1970s and 1980s. The region is now home to tens of millions of the world's poorest

people. Global warming could worsen this natural cycle, say the researchers. [Their study](#) appears in the April 17 issue of the [journal Science](#).

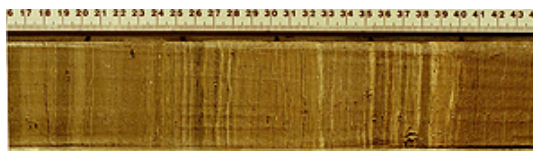
" It suggests that the most recent drought was relatively minor," said lead author Timothy Shanahan, a geoscientist at Jackson School of Geosciences at the University of Texas, Austin. Coauthor [Kevin Anchukaitis](#), a paleoclimatologist at Columbia University's [Lamont-Doherty Earth Observatory](#), added, "What's scary is that we don't know precisely what causes the megadroughts. That is cause for great concern."

The researchers drew their climate portrait from Ghana's Lake Bosumtwi, where they took cores of yearly sediment layers holding isotopes and elements that reflect lake levels. They combined this data with outlines of old beaches both above and below the present water line, which indicate dramatic rises and falls in water levels. They also dated dead trees that sprouted when lake levels fell but were later drowned as levels rose again. During the 20th-century Sahel drought, the lake fell 5 meters (15 feet); but during the megadroughts, it fell as much as 31 meters (95 feet).

The study shows that the shorter-period droughts have been a regular occurrence for many centuries. It also tends to confirm many scientists' belief that these droughts come during natural cycles when temperatures decrease over the northern Atlantic Ocean—one phase of the so-

called Atlantic Multidecadal Oscillation. Instrumental records of sea-surface temperatures go back only 80 or 100 years, but the new study matches well with these, and other evidence, including tree rings from widely scattered locations. Instrumental records suggest also that the patterns shown in Lake Bosumtwi match the weather across much of West Africa.

The scientists say that both the shorter cycles and the larger droughts could be exacerbated by global warming. "Dry periods will occur against hotter background temperatures, and so



Sediment core showing annual mud deposits, Lake Bosumtwi  
*Images courtesy Jackson School of Geosciences, University of Texas at Austin*

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they will be that much worse,” said Anchukaitis. In the paper, the scientists raise the possibility that warming could also slow down the overturning circulation of the Atlantic itself—an event thought to have occurred during warm periods of the past—which could create conditions for the centuries-long droughts. But “that’s a fairly unknown aspect,” cautioned Anchukaitis. “The timing and magnitude of past and future circulation changes at these time scales, and what they produce, are still pretty uncertain.”

In a [New York Times article](#) about the study, [Richard Seager](#), a climate modeler at Lamont-Doherty who was not involved in the research, described the work as “startling.” Seager, who has studied droughts in the American Southwest, said the new study showed the need to refine computer models so that shifts can be predicted in specific time frames. “The most pressing problem we now face is to predict climate in the near-term future—years to decades,” he said.

Some climate models predict a wetter climate for west Africa, while others predict drying. In either case, the study shows that periodic changes can be far more severe than suggested by historical records alone, said Anchukaitis.

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[University of Texas press release on the study](#)

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