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Researchers find that change from arid to wet climate in Africa had significant effect on early human evolution

Note to editors: Christopher Scholz of Syracuse University, lead investigator on the project, is available for interviews. He can be reached at (315) 443-4673 (daytime) or (315) 685-5786 (evening) or at cascholz@syr.edu. Additional information and photos can be found at http://malawidrilling.syr.edu.

A team of scientists from around the globe has determined that a drastic change in the climate of tropical Africa may have significantly driven early human evolution.

The team's findings will be published in the Sept. 4–7 installment of Early Edition, published online in the Proceedings of the National Academy of Sciences. Among the findings: A transition from a long period of time (about 135,000 to 75,000 years ago) that included several extreme droughts to a stable, wetter climate may have stimulated the expansion and migration of early human populations.

The team includes researchers from Syracuse University, the University of Minnesota-Duluth, the University of Arizona, the University of Rhode Island, the University of Akron, the University of Bergen (Norway), the Malawi Geological Survey Department, the Geological Survey Department of Ghana, the University of Illinois-Chicago, the Scottish Universities Environmental Research Centre and the University of Wisconsin-Eau Claire.

The researchers studied lake cores from Lake Malawi, at the southern end of East Africa's Rift Valley, and found that the megadroughts were some of tropical

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Africa's driest periods in the last million years or more. During the most severe episodes, the lake was below 15 percent of its current level—only 100 meters rather than 700 meters deep (more than a 95 percent water volume reduction). Before about 70,000 years ago, the climate was highly variable, African lakes dried up completely and then refilled, and plant and animal populations grew and died out.

Around 70,000 years ago, the climate became wetter and stabilized, and African lake levels rose dramatically, the researchers found. Once that happened, human populations grew rapidly and migrated. "Our research suggests that the population expansion and subsequent spreading of 'Out of Africa' colonizers may have been aided by the newly stabilized climate," says Christopher A. Scholz, associate professor of earth sciences at Syracuse University and lead investigator on the project.

"Previously it was thought that the migrations and population changes of early modern humans were driven by the growth and collapse of high-latitude ice sheets," Scholz says. "Our research suggests that instead, prior to 70,000 years ago, wet-dry cycles in Africa were driven by shifts in the Earth's orbit around the sun."

"The findings from the Lake Malawi Drilling Project and other similar lake drilling projects in the tropics are likely to make major changes in our understanding of the Earth's climate history and its effects on our planet's ecosystems," says Andrew S. Cohen, a research team member from the Department of Geosciences at the University of Arizona. "This study shows what a rich record of surprises in climate change can be learned from deep and ancient lakes like Malawi."

The latest findings are part of a multi-year, multi-institution project funded by the National Science Foundation and the International Continental Scientific Drilling Program to contribute to a better understanding of African and global climate history.

Lake Malawi, more than five million years old and more than 2,300 feet deep, is one of the world's oldest and deepest lakes and is considered by many scientists to be one of the natural wonders of the world.

The research team faced numerous severe operational challenges in retrieving the cores. "Drilling in Lake Malawi presented many of the most difficult aspects of both continental and ocean scientific drilling, including a very remote location lacking infrastructure and very deep, 'blue water' drilling operations," says Scholz. Drilling in the deepest site, which was 600 meters, required the construction of a dynamically positioned drilling vessel. The 26 members of the science and drilling teams lived and worked aboard a 160-foot converted fuel barge for six weeks while recovering the cores. Aboard the drilling barge, the teams lived in converted shipping containers, which were crammed in between the drilling rig and the large thruster engines that were required for stabilizing the vessel.

Professor Tom Johnson of the Large Lakes Observatory and Department of Geological Sciences at the University of Minnesota-Duluth, remarks, "A number of us in the African lakes research committee built the justification for a major drilling program on one of the East African great lakes for well over a decade, and finally made it happen in early 2005 with funds from the U.S. National Science Foundation and the International Continental Drilling Program. It is gratifying to see that our efforts are paying off with such spectacular early results."

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