High-resolution reconstruction of late-Glacial and Holocene climate variability in equatorial East Africa based on laminated lake sediments from Mt. Kilimanjaro (CHALLACEA, FP28)

Assessing how tropical climate dynamics might drive or amplify climate change in temperate regions is a central issue for understanding natural climate variability and predicting the outcome of its future interaction with anthropogenic climate change. Climate-proxy records from across Africa and Asia testify to the fact that tropical climates during the Holocene have been anything but stable, but the regional synchrony and extra-tropical links of even the stronger, millennium-scale moisture-balance fluctuations remain uncertain because of the lack of continuous, highly-resolved continental archives with good age control. Also contentious is whether reconstructed lake-level changes and oxygen-isotope signatures in tropical glacier ice, cave stalagmites and fossil diatoms mainly reflect variations in rainfall and drought, or of temperature and its effect on evaporation. We propose to answer some of these questions by reconstructing -with excellent time resolution and age control- the complete post-Glacial history of temperature and moisture-balance variation in equatorial East Africa from the continuous and finely laminated sediment record of Lake Challa, a crater lake on the lower East slope of Mt. Kilimanjaro. This reconstruction will significantly advance understanding of tropical climate variability by 1) establishing the detailed patterns and timing of late-Glacial and Holocene moisture-balance fluctuations in continental East Africa; 2) by distinguishing between contributions of temperature change and monsoonal rainfall variation to those moisture-balance fluctuations; and 3) by placing the highly resolved but poorly dated Mt. Kilimanjaro ice-core record of atmospheric chemistry and dust content in an absolute temporal framework.

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