Geophysical Research Abstracts
Vol. 20, EGU2018-10465, 2018
EGU General Assembly 2018

If only mud could talk…what we can learn from minerals and grains in the Chew Bahir sediment cores (southern Ethiopia)

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Deciphering climate information from lake sediments is challenging, due to the complex relationship between climate parameters and sediment composition. Establishing a reliable climate proxy for a coring site, such as the Chew Bahir basin in southern Ethiopia, requires the stepwise development of a profound understanding of both climate-controlled and non-climate controlled processes in the catchment.

Here, we will present new results in our efforts to develop such a reliable climate-proxy tool box for Chew Bahir, the HSPDP (Hominin Sites and Paleolakes Drilling Project) key coring site in southern Ethiopia. The 280 m-long Chew Bahir sediment records, recovered from a deep tectonically-bound basin in the southern Ethiopian rift in late 2014, cover the past 550 ka of environmental history, a time period that includes the transition to the Middle Stone Age, and the origin and dispersal of modern Homo sapiens. By deconvolving the relationship between sedimentological processes and geochemical parameters and strongly climate-controlled processes in the Chew Bahir basin, such as incongruent weathering, transportation and authigenic mineral alteration, site-specific indicators for climate shifts on different magnitudes are developed to eventually provide a detailed and reliable climate record. This study uses a multi proxy approach including whole rock and clay mineral analyses (XRD), XRF geochemistry and sedimentology such as grain size analysis. The precise time resolution, largely continuous record and (eventually) a detailed understanding of site specific proxy formation, will give us a continuous record of environmental history on decadal to orbital timescales. Our data enable us to test current hypotheses of the impact of a variety of climate shifts on human evolution and dispersal.