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Stratigraphy and geochemistry of post-Glacial lacustrine sedimentation (21 ka BP to present) in Lake Challa, East Africa

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Recently an increasing number of climate records from low-latitude regions underscore the importance of tropical atmospheric processes in the global climate system. Nevertheless, the regional synchrony of temperature and humidity variations as well as teleconnecting mechanisms between high and low latitudes are still poorly understood. The EuroCLIMATE CHALLACEA project aims to provide a continuous high-resolution multi-proxy record of temperature and moisture-balance variability in equatorial East Africa from the Last Glacial Maximum (21 ka BP) to the present.

For this purpose we use the sediment archive of Lake Challa, a 4.2 km^2, 97 m deep crater lake located on the lower East slope of Mt. Kilimanjaro. This freshwater lake has a permanently stratified water column and its water budget is controlled by sub-surface in- and outflow. The sub-surface inflow derives mainly from percolation of precipitation falling in the montane forest zone higher up on the mountain. Because of its very steep crater walls, the catchment area of the lake is negligible. Consequently, lacustrine deposits consist mainly of autochthonous components (organic matter, carbonate, and biogenic silica) and aeolian mineral inputs.

Three parallel piston core profiles of 20 to 22 m length consist of banded to finely laminated sediments intercalated with some homogenous sections. From these we constructed a 21.65 m long continuous composite profile, using visual point-to-point cross-correlation of sediment laminae aided by high-resolution (2mm interval) magnetic susceptibility measurements.

Here we present the composite core log and magnetic susceptibility data as well as the depth distribution of geochemical elements (Fe, Ca, Al, Ti, Sr) determined by XRF core scanning. According to our preliminary age model based on 5 AMS ^{14}C dates, this composite sediment profile covers the time interval from 21 ka BP to present. These preliminary data reveal significant changes in lake water chemistry, biological productivity and variation in detrital mineral input of presumably aeolian origin.