Geophysical Research Abstracts, Vol. 9, 10518, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10518

High-resolution microfacies and μXRF analysis of lacustrine sediments from the equatorial East African Lake Challa, spanning the last 1000 years (CHALLACEA, ESF programme EuroCLIMATE)

I. Kristen (1), P. Dulski (1), G. H. Haug (1), D. Verschuren (2)

(1) GeoForschungsZentrum Potsdam, Germany, (2) Ghent University, Belgium

(kristen@gfz-potsdam.de / Fax: 0049-331-2881302 / Phone: 0049-331-2881379)

In discussions on the impact of global warming on hydrology and human water resources, natural archives of past hydrological variability in tropical regions are attracting increasing attention. The EuroCLIMATE project CHALLACEA studies the lake-sediment archive of Lake Challa, a 4.2 km^2, 97 m deep crater lake located on the lower east slope of Mt. Kilimanjaro, with the aim to produce a continuous, high-resolution and multi-proxy reconstruction of past temperature and moisture-balance variability in equatorial East Africa during the past 25,000 years.

Lake Challa is a permanently stratified freshwater lake with a water budget controlled by sub-surface in- and outflow; this inflow derives mainly from percolation of precipitation falling in the montane forest zone higher up the mountain. Because of its very steep inner crater walls, the lake's catchment area is very small and lacustrine deposits are dominated by autochthonous components (organic matter, carbonate, and biogenic silica) and allochthonous mineral input of mostly aeolian origin. However, our new results indicate that at least in the recent past also detrital mineral input from within the crater catchment has been significant.

Here we present high-resolution data on laminated sediments of Lake Challa covering the last $\sim$1000 years of lake history. Microscopic petrographic analysis and the distribution of major elements (Ti, Fe, Ca, Al, Si) analysed by μXRF scanning reveal both intra- and inter-annual variability in the lake system and its external input factors. Preliminary results suggest that the geochemical profiles can be correlated with instru-

mental rainfall records. For example, high Ca/Ti ratios associated with detrital layers originating from the local calcareous tuffs appear to reflect periods of increased precipitation, whereas increased Si signals are connected to drier periods. Before $\sim$200 yr BP, however, high Ca intensities are associated with laminae of authigenic aragonite that mask the detrital signal. These preliminary results emphasize the potential of combining μXRF scanning with detailed petrographic analysis to provide insights into the seasonal characteristics of past rainfall in equatorial East Africa.