Geophysical Research Abstracts,
Vol. 10, EGU2008-A-09889, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-09889
EGU General Assembly 2008

Lake Challa (Kenya/Tanzania) sediments as archive of climate and environmental variability in equatorial East Africa

C. Wolff (1), G. Haug (2), B. Plessen (1), D. Verschuren (3) & CHALLACEA Participants

(1) GeoForschungsZentrum Potsdam, Section 3.3: Climate Dynamics and Sediments, Telegrafenberg, D-14473 Germany (wolff@gfz-potsdam.de)

(2) ETH Zürich, Geologisches Institut, Universitätstrasse 6, CH-8092 Zürich

(3) Ghent University, Department of Biology, Limnology Unit, Belgium

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 at providing a continuous high-resolution multi-proxy record of temperature and moisture-balance variability in equatorial East Africa from the Last Glacial Maximum (25 ka BP) to the present.

Lake Challa is located in Southern Kenya about 40 km east of Mt. Kilimanjaro at an altitude of 880 m a.s.l..

The lake occupies a crater nearly two kilometres in diameter and has a surface area of 4.51 km^2. 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. The lacustrine deposits mainly consist of autochthonous components (organic matter, carbonate, and biogenic silica) and aeolian mineral inputs.

The present study focuses on microfacies analyses and isotope measurements.

Fine laminations are preserved almost continuosly in the upper part of the sediment record. Microfacies analyses revealed that the light/dark couplets represent true calcite varves. The darker layers consist of endogenic calcite precipitating in the dry season when water temperature was high and the lake was biological productive. The lighter layers reflect abundant diatoms frustules but also detrital sediments fluxes of organic and minorogenic matter. The varve chronology was established by repeated counting of varves in thin sections under a petrographic microscope.

This record will be complemented by carbon and oxygen isotope measurements on the carbonate fraction of the sediments.

Preliminary analyses on bulk carbonates highlighted the potential of these sediments for reconstructing past variations in temperature and precipitation.

Stable isotope analyses (δ^{18}O and δ^{13}C) on bulk carbonates were carried out in the upper 5.3 m of the 22 m long profile where carbonates are present.

However, the analysed samples contain different amounts of calcite and aragonite, which make it difficult to interpret the changes in stable isotope values.

Therefore, for the work on isotopes, we will try to separate calcite and aragonite by sampling single homogeneous layers, chosen amongst the thickest ones. These records will possibly help reconstructing temperature changes, while changes in isotope values of aragonite will possibly be linked to changes in hydrological conditions of the lake.

Finally, these data will contribute enhancing our knowledge about climate changes of highly sensitive climate region of the Mt. Kilimanjaro area.