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A full lipid biomarker based record from Lake Challa, Tanzania

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The climate of the regions surrounding the Indian Ocean – East Africa, Arabian and Indian peninsulas – is strongly dominated by the dynamics of the seasonal monsoon. To understand the long and short term driving forces behind the natural climatic variability in this region it is highly important to reconstruct climatic changes in the past and, thereby, predict future changes taking into account also anthropogenic activities. Most low latitude locations lack continuous, highly resolved continental records with good age control. From the few existing records acquired from tropical glacier ice, cave stalagmites and fossil diatoms a thorough understanding of the climatic variations reflected (rainfall and drought or temperature and its effect on precipitation) is scanty.
Chemically stratified crater lakes accumulate high-quality climate-proxy records as shown in very recent studies done on the continuous and finely laminated sediment record of Lake Challa situated on the lower East slope of Mt. Kilimanjaro (Verschuren et al. 2009; Wolff et al. 2011). The unique location of this lake in equatorial East Africa implies that the climate variability is influenced by the Indian Ocean and not by the Atlantic due to the Congo Air Boundary (Thierney et al. 2011). The objective of this study is to fully explore the biomarker content of the Lake Challa sedimentary record already characterized by an excellent time resolution and chronology. Various normal chain lipids (n-alkanes, n-fatty acids, n-alcohols), sterols, long-chain diols, triterpenoids and glycolipids in sedimentary organic matter, were determined in their solvent-extractable (free) and saponification-released forms (bound). The changing composition of organic matter content from the investigated lake is used as a framework to trace palaeo-humidity, terrestrial input, algal input, temperature in sediment traps and underlying sediments of Lake Challa to further our palaeo-environmental knowledge based on GDGT's and alkanes (Sinninghe Damsté et al. 2009, 2011).

References

Sinninghe Damsté J.S., Ossebaar J., Abbas B., Schouten S., Verschuren D. (2009) Fluxes and distribution of tetraether lipids in an equatorial African lake: Constraints on the application of the TEX86 palaeothermometer and BIT index in lacustrine settings. Geochim. Cosmochim. Acta 73, 4232-4249.

Sinninghe Damsté J.S., Verschuren D., Ossebaar J., Blokker J., van Houten R., van der Meer M.T.J., Plessen B., Schouten S.(2011) A 25,000-year record of climate-induced changes in lowland vegetation of eastern equatorial Africa revealed by the stable carbon-isotopic composition of fossil plant leaf waxes. Earth Plan. Sci. Lett 302, 236-246.

Tierney, J.E., Russell, J.M., Sinninghe Damsté, J.S., Huang, Y., Verschuren, D. (2011) Late Quaternary behavior of the East African monsoon and the importance of the Congo Air Boundary. Quaternary Science Reviews 30, 798-807.

Verschuren, D., Sinninghe Damsté, J. S., Moernaut, J., Kristen, I., Blaauw, M., Fagot, M., Haug, G. H. (2009) Half-precessional dynamics of monsoon rainfall near the East African Equator. Nature 462, 637-641.

Wolff, C., Haug, G. H., Timmermann, A., Sinninghe Damsté, J. S., Brauer, A., Sigman, D. M., Cane, M. A., Verschuren, D. (2011) Reduced interannual rainfall variability in East Africa during the last ice age. Science 333, 743-747.