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First biomarker and stable isotope results from afro-alpine Lake Garba Guracha, Bale Mountains, Ethiopia - potential for paleovegetation and paleoclimate reconstructions

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In February 2017, we retrieved together with colleagues of the DFG research group FOR 2358 “The Mountain Exile Hypothesis - How humans benefited from and re-shaped African high altitude ecosystems during Quaternary climate changes" Late Glacial and Holocene sediment cores of the afro-alpine Lake Garba Guracha, Bale Mountains, Ethiopia. Aiming at contributing a piece of a puzzle to the reconstruction of the landscape, human and climate history of our study area, we apply biomarker as well as stable carbon, nitrogen, hydrogen and oxygen isotope (δ13C, δ15N, δ2H and δ18O) analyses to both modern plants and topsoils along climate transects and the sedimentary record.
First lipid, lignin and hemicellulose biomarker results will be presented in order to evaluate and discuss their potential to (i) chemotaxonomically distinguish the prominent vegetation types of the study area (Erica, Helichrysum and Poaceae) and (ii) complementary to pollen analyses by our colleagues reconstruct vegetation changes from the sedimentary record. Compound-specific δ2H and δ18O results of leaf wax-derived alkane and hemicellulose-derived sugar biomarkers from the climate transect will be presented and evaluated in order to discuss whether they reflect the isotopic composition of precipitation or whether they are strongly affected by relative humidity-controlled isotopic enrichment caused by leaf water evaporation (cf. Zech et al., 2015). By applying a recently developed δ2H and δ18O biomarker approach to the sedimentary record of Lake Garba Guracha(cf. Hepp et al., 2015; Zech et al., 2014), we aim at reconstructing the lake evaporation history, establishing a Late Glacial – Holocene relative humidity and δ18O/δ2H precipitation record and overall contribute to a better understanding of the variability of the East African Summer Monsoon.

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Zech, M., Zech, R., Rozanski, K., Gleixner, G. and Zech, W., 2015. Do n-alkane biomarkers in soils/sediments reflect the δ2H isotopic composition of precipitation? A case study from Mt. Kilimanjaro and implications for paleoaltimetry and paleoclimate research. Isotopes in Environmental and Health Studies 51(4), 508-524.