Paleoaltimetry potentiality of branched GDGTs from southern Tibet

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Paleoaltimetric reconstructions of the southern Tibetan Plateau (TP) are crucial to understand the processes and mechanisms concomitant with the tectonic collision of the Indian and Eurasian continental plates. We measured the branched glycerol dialkyl glycerol tetraethers (brGDGTs) indices from 88 surface soils from the southern TP and found that alkaline soils exhibited lower MBT′ and MBT′/CBT-derived MAT (Mean annual temperature), while MBT′/CBT-derived MAT exhibited a strong correlation with altitude (R^2 = 0.84; n=63) for all of the localities with neutral and acidic soils. Differently, we found that MBT'_{5ME}-derived MAT exhibited a strong relation with altitude envn though a mixture of alkaline samples (R^2 = 0.72; n=83). As a result, two regional calibrations were developed, including a neutral and acidic soil calibration based on MBT′/CBT-MAT and a calibration suitable for both acidic and alkaline soils based on MBT'_{5ME}-MAT for the southern TP.

Based on this new soil calibration dataset, and a recent global soil calibration dataset founded on MBT'_{5ME}, we calculated paleo-MAT of ~9.49±1.15°C to 10.38±1.47 °C at ~15 Ma, respectively, for the Namling Basin. Applying these soil calibrations, the paleoaltitudes of the Namling Basin can be calculated to have been between 4.36±0.41 km above sea level (asl) and 4.43±0.36 km asl at ~15 Ma, respectively, similar to the paleoaltitudes of ~4.7-5.4 km asl at ~15 Ma inferred from the floral physiognomy of Namling Basin fossils and stable isotopes. These findings would suggest the applicability of MBT′/CBT (and/or MBT'_{5ME}) indices as paleotopographic and paleotemperature proxies on the southern TP.