The Methylation index of Branched Tetraethers (MBT) as a temperature proxy in lakes: investigation, calibration, and validation

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Microbial membrane lipids, and in particularly tetraether lipids (GDGTs), are an increasingly important tool used to reconstruct past temperature variations in the oceans. Numerous studies have shown that temperature controls the structures of GDGTs preserved in sediments in the marine environment. However, despite the importance of continental temperature varations to human welfare, there has been little work investigating GDGTs in terrestrial sedimentary environments. Our work seeks to investigate and calibrate the the abundances of nine branched GDGTs, pictured at right, to surface air temperatures using surface sediments from lakes. This work will provide a new method for quantitative air temperature reconstruction to trace the long-term evolution of the Earth's climate system. Notable outcomes from our work include:

- The dominant structures of branched GDGTs preserved in 46 lakes in tropical East Africa respond to surface air temperature changes
- GDGT variations can be statistically calibrated and applied to reconstruct past temperature variations in lake sediments
- GDGTs also vary in response to lake chemistry, indicating an in-situ,
- lacustrine origin for GDGTs in lakes













