

TEX₈₆: A new proxy that quantifies past temperature variability in East Africa

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Our research group at the Large Lakes Observatory recently found a promising new signal of past water temperature preserved in the sediments of large lakes, extending from the tropics to high latitudes. Mean annual temperature of large lakes correlates well with mean annual air temperature, so a signal of lake temperature preserved in sediments provides a reasonably accurate measure of air temperature at the time the sediment was deposited. TEX₈₆ (TetraEther index of tetraethers with 86 carbon atoms), is an index developed by (Schouten et al., 2002) for determining sea surface temperature from marine sediments. The index is based on the composition of tetraether membrane lipids produced by the aquatic microbe, Crenarchaeota. We have found this group of compounds to be preserved in the sediments of many large lakes, and we have determined that the TEX₈₆ index established by Schouten et al. (2002) for SST's in the marine realm holds up remarkably well when compared to mean annual temperature of the lake surface waters (Powers et al., 2004) and subsequent analytical results). Application of the TEX₈₆ index to a piston core from Lake Malawi, East Africa, provides a fascinating and credible history of lake surface temperature spanning the past 24,000 years (Powers et al., 2005).

Powers, L.A., Johnson, T.C., Werne, J.P., Castaneda, I.S., Hopmans, E.C., Sinninghe Damsté, J.S., and Schouten, S., 2005, Large temperature variability in the southern African tropics since the Last Glacial Maximum: *Geophysical Research Letters*, v. 32, p. L08706, doi:10.1029/2004GL022014, 2005.

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Schouten, S., Hopmans, E.C., Schefub, E., and Sinninghe Damsté, J.S., 2002, Distributional variations in marine crenarchaeotal membrane lipids: a new tool for reconstructing ancient sea water temperatures?: *Earth and Planetary Science Letters*, v. 204, p. 265-274.