# Why does the $TEX_{86}$ seem to work in sediments of Lake Malawi?

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The East African Rift Lakes in general and Lake Malawi in particular, appear to be ideal systems for application of the $TEX_{86}$ paleothermometer. A suite of recent studies have produced plausible high resolution temperature reconstructions spanning the past <70 kyr from these lakes, showing consistent trends of deglacial warming, a cooler Younger Dryas, and a warmer mid-Holocene [1-3]. While some lacustrine studies support the surface water source of of isoprenoid GDGTs [4,5], others suggest that the Thaumarchaeota producing the $TEX_{86}$ do not live in surface waters, but rather deeper in the water column [6,7]. Furthermore, the potential for seasonal bias in the TEX86 has been suggested [4, 7]. To address the questions of depth and timing of isoprenoid GDGT formation, and the potential impact it may have on sedimentary paleotemperature records, we carried out a study in the water column of Lake Malawi. On a cruise in January 2010, we filtered water column samples for particulate organic matter, and analyzed both core and intact polar GDGTs. In addition, we extracted DNA for analysis of total archaeal and marine Crenarchaeota group 1.1a genes by quantitative PCR for comparison with the GDGT data. Finally, in January 2012 a pair of sediment traps were deployed in Lake Malawi, and core GDGTs analyzed to identify seasonal bias. Our results suggest minimal seasonal bias, but potentially maximum GDGT production just below the thermocline at ~50 m water depth.

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