Environmental parameters affect palaeothermometry of Alkenones and GDGTs: A case study at the Southern Chilean Margin (46° S)

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Isoprenoid glycerol dialkyl glycerol tetraethers (isoGDGT) and alkenones are widely used tools for reconstructing past sea surface and subsurface temperatures. IsoGDGTs are membrane lipids synthesized by ammonia-oxidizing *Nitrososphaerota* and contain up to four cyclopentane moieties. Alkenones are unsaturated carbon chains, whose origin is mainly the coccolithophorid algae *Emiliania huxleyi*. The number of moieties of the isoGDGTs, as well as the degree of unsaturation of the alkenones depends on the ambient water temperature. Both biomarker-synthesizing organisms (*Nitrososphaerota* and *E. huxleyi*) are subject to several environmental influences, like nutrient availability, light conditions, salinity changes, changes in the biomarker-producing community, or terrigenous input, that can bias the temperature signal. In this study, we focus on the influence of terrigenous input and changes in salinity on both biomarkers. We use the 17 m-long piston core MR16-069 PC03, which is located at 46° S and ~150 km offshore the Chilean margin. This core covers a full glacial-interglacial cycle (140 ka) and shows recurring high inputs of terrigenous material and freshwater during the glacial period. This extreme contrast between interglacial and glacial is suitable for examining the influence of high terrigenous input on the temperature signal. Due to changes in the depositional setting, our results show a significant change in the expected temperature signal in both proxies during phases of high terrigenous input. We further discuss which temperature calibration is most appropriate for both biomarkers and conclude that for GDGT-based temperatures at this site, a calibration based on the TEX⁸⁶ index is more suitable, while for alkenone-based temperatures the U°³⁷ index appears to be most accuracy.