Comparison of four independent paleotemperature records over the last 800 ka in the South-West Indian Ocean: similarities and differences

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Résumé

Well-dated paleotemperature records are essential for detecting natural climate variations beyond the instrumental period and to validate climate models that provide past climate scenarios and climate forecasts. Paleoclimate records are often derived from proxies based on sedimentary inorganic and organic matter. Proxies based on inorganic remnants include those based on foraminiferal assemblages (Imbrie and Kipp, 1971) and trace element composition (Anand et al., 2003) of carbonate shell. Organic proxies include the alkenone unsaturation index (e.g. Brassell et al., 1986) based on long-chain unsaturated alkenones synthesized by haptophyte algae and TEX86 (TetraEther indeX of tetraethers consisting of 86 carbon atoms) based on glycerol dialkyl glycerol tetraethers (GDGTs) derived from the membrane lipids of Marine group Thaumarchaeota (Schouten et al., 2002). More recently, TEX86 has been modified with a logarithmic function, called TEX86H (Kim et al., 2010). The availability of multiple proxies allows the reconstruction of more than one temperature record from a single sediment core. We will present four independent temperature records (Mg/Ca on G. ruber planktonic foramninifera, Uk'37, TEX86H, and foraminifera transfer function using the Modern Analogue Technique) covering the last 800 ka from a sediment core located in the precursor region of the Agulhas Current (MD96-2048, 26∘10'482S, 34∘01'148E, 660 m). We observe both similarities and differences among four records in terms of changes in variation and amplitude. The possible biasing factors for each proxy such as seasonality, salinity effect and lateral transport will be discussed in detail.

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