

# Alkenone-Derived High-Resolution Sea Surface Temperature Reconstruction in the Eastern South Pacific off Mid-latitude Chile over the Past 33 kyr

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The climatic change of the surface ocean during the transition from the Last Glacial Maximum (LGM) to the Holocene, the so-called Termination I, has been intensively studied in various regions of the world oceans (e.g. Broecker et al., 1988). However, there still exists very little information on the behaviour of the eastern South Pacific during this time. Sediment cores GIK 17748-2 and GeoB 3302-1 recovered from the continental slope off Chile at approximately 33°S provide the potential to obtain high-resolution climatic records for this area (e.g. Lamy et al., 1999). We present here new sea surface temperature (SST) records from these cores, based on temporal variations in the alkenone unsaturation ratio (UK'37 index) for the last 33 kyr B.P.

The comparison of SST estimates from surface sediments with modern atlas values (Levitus and Boyer, 1994) suggests that off Chile the alkenone-based estimates represent annual mean temperatures of the surface mixed layer, as is proposed by the global core-top calibration for this method (Müller et al., 1998). SST values have increased from about 12°C within the LGM to 19°C in the Holocene climatic optimum between 6 and 7.5 cal kyr B.P. This magnitude in the glacial to interglacial SST increase is more than 2°C greater than that of the CLIMAP (1981) reconstruction based on faunal transfer functions in the eastern South Pacific. Moreover, the alkenone SST record indicates temperature variations of about 2 to 3°C in the Humboldt Current probably associated with Northern Hemisphere climatic perturbations at millennial time scales, e.g. the Heinrich Events (HE) and the Younger Dryas (YD). In the North Atlantic, the HE and YD are characterised by cooling, conversely, the Chile record implies a warming for these time

intervals. Such an antiphase climate behaviour between hemispheres has also been detected between the South Atlantic eastern boundary current systems, at least for the HE 1 (Kim et al. in prep.). Different to the alkenone SST record from the South Atlantic, a very rapid warming pulse of about 2.5°C occurred in eastern South Pacific during the early Holocene, at 7.5 to 7.7 cal kyr B.P.. After the Holocene climatic optimum the South Pacific SST's decreased by about 3°C towards modern temperatures of about 16°C in this area, which is similar to a late Holocene SST decrease observed in the Benguela Current. Obviously, the SST record off Chile provides new information on the magnitude of LGM to Holocene climate change and helps to elucidate similarities and discrepancies in the transient climatic behaviour of different oceans, thus improving understanding of interhemispheric and inter-oceanic teleconnections associated with paleoclimatic changes at time scales of millennia.

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