

Paleotemperature variations in the south-eastern Brazilian shelf during the Holocene based on organic geochemical proxies ($U_{37}^{K'}$, TEX_{86}^H and LDI)

Milena Ceccopieri¹, Renato S. Carreira¹, Angela L. R. Wagener¹, Letícia Lazzari¹, Jens H. Hefter², Gesine Mollenhauer²

¹LabMAM, Chemistry Department, Pontifical Catholic University of Rio de Janeiro (PUC-Rio), 20550-013
Rio de Janeiro, Brazil

²Alfred Wegener Institute, Helmholtz Center for Polar and Marine Research (AWI), DE-27515
Bremerhaven, Germany

Paleotemperature variability during the Holocene period in the subtropical southwest Atlantic are of great interest given its role in the global heat transport and on the climate of south-eastern South America. This study uses organic geochemical proxies as indicators of paleotemperature, namely: the alkenone unsaturation index ($U_{37}^{K'}$), the tetraether index (TEX_{86}^H) and the long-chain diols index (LDI) as registered in two sediment cores retrieved from the Cabo Frio and Rio de Janeiro shelves to reconstruct the paleotemperature during the last 14.5 kyr. The $U_{37}^{K'}$ - and LDI-estimated core-top SST agree with the observed mean annual SST, while the TEX_{86}^H proxy underestimate the recent temperature, especially in the Cabo Frio shelf, probably reflecting the peak upwelling events or a subsurface temperature. In the Rio de Janeiro shelf, a distinct phase before 7.5 cal kyr BP coincides with the period when the sea level was low and gradually increased. In the Cabo Frio shelf, the transition between mid- and late Holocene is well marked by the SST-proxies and, after 4.05 kyr BP, warm SST- $U_{37}^{K'}$ and LDI-SST coincides with a less/more intense AMOC/BC activity. A decrease in reconstructed temperature after ca 2 kyr BP may be explained by the upwelling enhancement. Differences between Rio de Janeiro and Cabo Frio are probably related to the local BC instabilities near de Cabo Frio upwelling system. Overall, SST-LDI correlate better with summer temperatures, SST- TEX_{86}^H seems to record subsurface temperatures and SST- $U_{37}^{K'}$ was more affected by the sea level variations. Oscillations in SST- TEX_{86}^H may be related to variations in the thermocline depth. The differences between the SST proxies are likely derived from local environmental factors other than temperature, which are variable throughout the time and affect the source organisms distinctly. Thus, our results allow a better understanding of the paleoclimatic changes during the Holocene in the south-eastern Brazillian margin.