Indication of climate change in the Holocene in sediments from Cabo Frio (Brazil) upwelling

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Geomorphologic aspect and wind regime in the south-eastern coast of Brazil are responsible for a seasonal upwelling whose frequency and intensity is greatly influenced by larger scale ocean-atmosphere phenomenon as the ENSO. In the absence of upwelling the poor waters of the Brazil Current infer very low levels of primary production to the entire southeast region. Although the upwelling off Cabo Frio is a discontinuous event it has measurable effects on the primary production of the Cabo Frio coastal region. Such effects extend over more than 400 km down the southeast Brazilian coast nevertheless with minor intensity. In the present work we used organic carbon and sterols as markers of changes in primary production and in microbiological structure over the time in the period between 3500 and 1000 years BP. Sediment core was sampled and sliced in 2 cm segments which were dated by ^{14}C. Determinations were carried out using a TOC analyser for organic carbon and a GC/MS system for sterols.

Organic matter is strongly influenced by autochthonous material derived principally from diatoms and dinoflagellates. The 24-ethylcholest-5-en-3b-ol (29D5), the major allochthonous sterol in our samples, is probably derived from plankton sources, due to its high and significative correlation with 24-methylcholesta-5,22E-dien-3b-ol (28D5,22) and cholest-5-en-3b-ol (27D5) (Figure 1). A millennial increasing trend in autochthonous sterol accumulation rates occurs between 3600 BP and 2100 BP superimposed by 100-200 years variations. Peak production of diatoms appear between 2600 and 2100 BP when ENSO negative oscillation frequency was reduced[1] concurring with more persistent upwelling events.

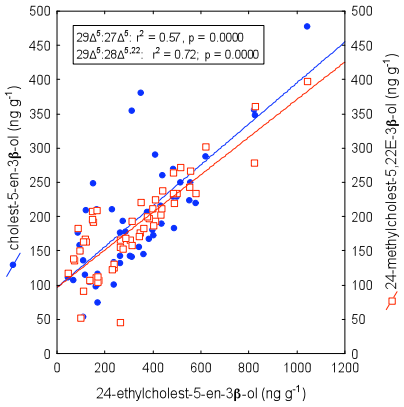

Figure 1 – Relation between autochthonous and allochthonous sterols.

[1] Moy et al (2002) *Nature* **420**, 162-165.