PALEOCEANOGRAPHY OF THE CONTINENTAL SHELF OF CABO FRIO (BRAZIL) IN THE LAST 13,000 YEARS INFERRED BY A PLANKTONIC FORAMINIFERA STATISTICAL MODEL

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Résumé

The upwelling system of Cabo Frio (CFUS), located on the continental shelf off the state of Rio de Janeiro (Brazil) is influenced by various types of water masses: the Tropical Water (TW), the Brazil Current (BC) that has high temperature and low productivity; the South Atlantic Central Water (SACW) upwelling with low temperature and high productivity. Each water mass contains different planktonic foraminifera species. Thus the objective of this study is to associate foraminifer assemblages with different oceanographic settings in the Rio de Janeiro continental margin for developing a statistical-ecological similarity model to be applied in fossil assemblages. We identified planktonic foraminifera assemblages in 34 box-core tops covering the areas with the targeted oceanographic settings (Santos Basin: BC meanders and eddies, Cabo Frio: upwelling and Campos Basin: BC front) and one gravity core recovered from Cabo Frio Shelf (CF10-01B) for the reconstitution. The model identified four geographically separated biofacies: the Santos Basin (SB) which is characterized by occurrence of BC eddies; the Campos Basin (CB), characterized by warm and oligotrophic waters of BC front; North Cabo Frio (NCF) characterized by the occurrence of TW and the SACW upwelling associations; and South Cabo Frio (SCF) which has a high productivity due to SACW upwelling and influence of Santos Basin eddies. The gravity core CF10-01B, currently belonging to SCF biofacies, showed low similarity values during the Pre-Holocene (13 – 11 cal kyr BP), which may be associated with the occurrence of a currently unknown or non-existent biofacies. Between 11 and 4.0 cal kyr BP, the paleo-water mass was similar to NCF indicating that the region was mainly influenced by TW and SACW; between 4 and 3 cal kyr BP, increased CB similarity and decreased similarity to the other biofacies indicate a weakening of SACW upwelling and strong TW predominance; after 3 cal kyr BP, the

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greatest similarity with SCF indicated an abrupt shift to a scenario of high productivity and low temperatures, between 3.0 and 2.0 cal kyr BP there is a major contribution of the SB eddies, and after 2.0 cal kyr BP the region becomes primarily influenced by the resurgence of SACW. The separation of CFUS in two biofacies showed the complexity of this system. And finally, the similarity model capability in separating geographically biofacies and apply them to fossil assemblages shows the planktonic foraminifera efficiency in responding to oceanographic variability, and that this type of model can be applied for other regions of Brazil and the world.