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Benthic foraminifera as indicators of hydrologic and environmental conditions in the Ross Sea (Antarctica)

E. Bertoni (1,2), L. Bertello (1,3), L. Capotondi (1), C. Bergami (1), F. Giglio (1), M. Ravaioli (1), C. Rossi (1,3), and A. Ferretti (2)

(1) Institute of Marine Science (ISMAR), National Research Council, Bologna, Italy, (2) Università di Modena & Reggio Emilia, Dipartimento Scienze della Terra, Modena, Italy , (3) Università di Bologna, Dipartimento Scienze dellaTerra & Geologico Ambientali, Bologna, Italy

This study, present data on benthic foraminiferal assemblages from four box cores collected in different areas of the Ross Sea during the 2005 oceanographic cruise in the framework of the Italian Antarctic Research National Programme (PNRA).
Based on magnetic susceptibility, biosiliceous content, and micropaleontological analysis, the sediment cores provide a record of glacial retreat and Holocene environmental changes in the Ross Sea during the last 11 kyr BP. Sediment lithologies range between diamicton to surficial diatomaceous mud, the intermediate levels being glacial-marine sediment. The sedimentary sections include diatomaceous glacial-marine deposit over transitional (proximal grounding zone) glacial-marine sediment.
The study revealed that the Ross Sea contains typical Antarctic foraminifera fauna with the dominance of agglutinated taxa. Relatively elevated abundances, richness and diversity were common in the northernmost site, where the water column was characterized by relatively warmer intermediate waters and by the presence of the colder High Salinity Shelf Water (HSSW) occupying the deepest part of the basin. Here, the assemblage was dominated by Miliammina arenacea and the more abundant species were Trochammina quadricamerata and Lagenammina difflugiformis. In the southernmost site and in the eastern Ross Sea, richness and diversity were low and the most significant species were Trochammina sp., and Reophax sp.
M. arenacea was ubiquitous in all the samples and sites, confirming its tolerance to cold corrosive bottom waters and salinity fluctuations as well as its uniquely high preservation potential.
Moreover, elevated abundances, richness and diversity were common in the upper portion of the core which represents the youngest climatic phase characterized by the presence of some calcareous specimens too. This may indicate a deeper Carbonate Compensation Depth, probably due to relatively stable and warmer environmental conditions.
Results document that diversity of benthic foraminifera, number of specimens and variations in test morphology are related to regional differences in water properties (temperature, salinity, carbonate chemistry).