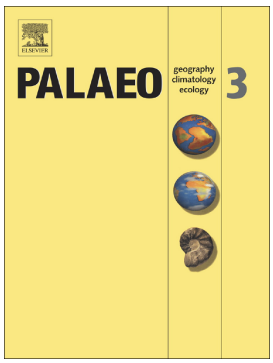

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High-frequency climate fluctuations over the last deglaciation in the Alboran Sea, Western Mediterranean: evidence from calcareous plankton assemblages

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Abstract

A high resolution study, with a centennial scale resolution, has been performed on the calcareous plankton assemblage (coccolithophores and planktonic foraminifera) at Ocean Drilling Program Site 976, Alboran Sea (Western Mediterranean), focusing on the interval between 20 and 9 ka, in order to reconstruct changes in surface and subsurface water dynamics and productivity. The biotic surface water proxies integrate the extremely detailed (multi-decadal scale) geochemical data set and the pollen record already available at the core, thus providing a complete paleoenvironmental/paleoceanographic reconstruction. The results highlight the sensitivity of the calcareous plankton in recording stadial/interstadial phases and higher-frequency climatic events, that produced changes in sea water features. Wind-induced upwelling and river discharge during the Last Glacial Period favored nutrient availability and moderate productivity. During Heinrich Stadial 1 (HS1), the arrival of cold and fresher waters from iceberg melting in the North Atlantic, significantly hampered productivity, at its lowest values of the whole investigated interval. Calcareous plankton behavior supports the hypothesis that HS1 is a composite event, marked by three phases: HS1a characterized by the coldest SST, polar Atlantic water inflow into the basin and a first step toward a dry climate on the continent; HS1b recording enhanced freshwater inflow and drought on land, and HS1c indicating reduced polar water influx. The Bølling-Allerød (BA) interstadial sees the highest rate of productivity in the entire interval and accompanies the deposition of Organic Rich Layer 1; during the BA coccolithophore assemblage also marks higher frequency changes in hydrographic conditions, apparently in