# Reconstruction of palaeoceanographic changes in the Somali Basin during the last 460 ka: geochemical proxies versus biogenic markers

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Oceanic sediments deposited in the Somali Basin (northwestern Indian Ocean) include carbonaceous pelagic deposits accumulated under the equatorial productivity belt, and carbonaceous to siliceous oozes deposited under the Somalian upwelling system. High resolution records of variations in geochemical proxies (total organic carbon, trace and major elements, and total carbonate and terrigenous fractions) were obtained from 5 piston cores distributed within the equatorial and upwelling

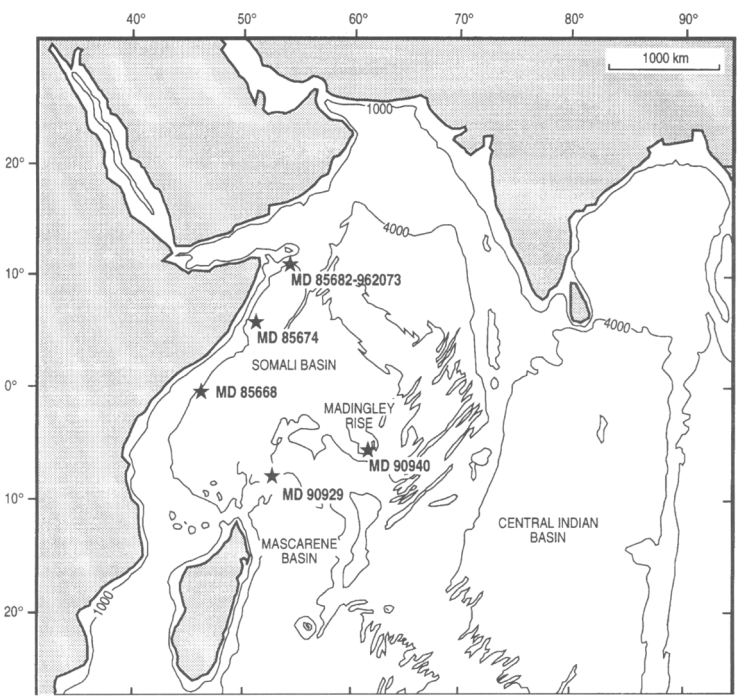


FIG. 1.

areas (Fig. 1), and spanning a time interval of less than 460 ka. Geochemical data were then compared to results from a statistical analysis of foraminiferal and radiolarian associations. Factorial analyses of these microfossil associations provide a detailed record of the proportional changes in surface dwellers versus deep living forms, which can be used as an index of palaeoproductivity. Preliminary results show palaeoproductivity and palaeocirculation variations in the equatorial belt, north and south of the Seychelles Plateau. South of the Seychelles Plateau, all geochemical markers (trace elements and Ba) are related to Al and Ti, and cannot be used as palaeoproductivity proxies. Changes in carbonaceous mass accumulation rates are strongly related to variations of the surface/deep living radiolarian index, suggesting that palaeoproductivity was higher during glacial intervals between 460 and 200 ka. From 200 ka to the Recent, no significant palaeoproductivity variations could be recorded, thus pointing out a local oligotrophic episode that can be interpreted as a northern shift of the gyre at 8ES. North of the Seychelles, this oligotrophic interval was not observed, and glacial intervals are characterized by higher rates of accumulation corresponding to enhanced surface productivity. Barium values are higher and generally related to changes in surface productivity. Organic matter is not present due to oxic conditions at the water/sediment interface. On the western side of the Somali Basin, close to the African coast, pelagic sedimentation is subjected to terrestrial input. Trace and major elements, as well as organic matter, cannot be used as palaeoproductivity proxies. Foraminiferal and radiolarian assemblages indicate higher productivity levels during glacial intervals and oligotrophic conditions during deglacials. These oligotrophic conditions are interpreted as resulting from a strong stratification of the warmer and more saline surface water outpouring from the Indonesian Straits. Records of geochemical proxies from sediments deposited under upwelling systems indicate that organic matter and Ba can have both a terrestrial and marine origin. Palaeoproductivity peaks are not related to interglacial/glacial cycles, but to local changes in upwelling activity.

Enhanced precision of palaeocirculation and palaeoproductivity models can be obtained by combining the results from geochemical and biological markers.