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Nd and Sr Isotopes in South East Atlantic Cores – Looking for Fluctuations in Sediment Provenance and Transport Processes between Interglacial and Glacial Periods

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Oceanic circulation over the Southwest African shelf is of primary importance in the transfer of heat within the World Ocean. Systematic studies of sediment cores have been focussed in this area in recent work (e.g. NAUSICAA - IMAGES program). In an attempt to better explain both the marine and the sedimentary dynamic in this region, numerous proxies have been more or less successfully used and have led to a good preliminary understanding of the regional oceanographic patterns over the past few hundred thousand years. More proxies are now required to complement and improve the present framework of our understanding.

Because radiogenic isotopes retain the signature of their source rocks during sedimentary transport, isotopic analysis of the detrital fraction (i.e. fraction containing the minerals weathered on the continent and brought to the sediment either by rivers, winds or after deposition by oceanic currents) can provide information on both geographical provenance and transport mechanism. High-resolution isotopic studies of sediment cores may be used therefore to deduce sediment input variations and, thus, to constrain any fluctuations in wind-regimes or deep-ocean circulation. Recent work of Goldstein et al. (1998) has demonstrated how powerful this approach may be by using Sr isotopic ratios to bring to the fore the leakage of the Algulhas Current into the Atlantic through time.

Here, we present the record of detrital $^{143}Nd/^{144}Nd$ in two sediment cores taken during the NAUSICAA - IMAGES II cruise. Cores MD96-2091 (14*53S, 10*23E) and MD96-2086 (25*49S, 12*08E) are situated in Angola Basin and Cape Basin, respectively north and south of the Walvis Ridge. The first results show that: 1) Nd isotopes follow the same trend as the O isotope signal, underlining the glacial-interglacial boundaries ; 2) the ε_{Nd} shift between interglacial to glacial periods is constant along the studied section of the cores.

Our work shows clearly that detrital sedimentation in both the Angola Basin and the Cape Basin is driven by climate changes and that the source of the material alternates between warm and cold periods. Further isotopic analyses of samples from potential source areas: - Southern African deserts and Eastern Atlantic core-top sediments, are needed to better constrain the sediment provenance. But some interesting features can already be outlined when plotting Sr and Nd isotope data together. 1) For both cores, the results show rather distinct linear trends pointing toward the Namib desert isotopic signature during glacial periods. It reflects the fact that wind regimes were strengthened over the whole area during glacial periods. The Kalahari desert, however, does not seem to act as an important source. 2) The sediment source end-member during interglacial periods is completely different in both basins. For the Angola Basin core, the "warm" end-member has a radiogenic Sr and a low Nd isotopic signature. The sedimentation in this area is strongly influenced by North Atlantic Deep Water (NADW) which carries poleward huge amounts of material delivered into the ocean by the equatorial rivers such as the Congo River. The trend toward such a radiogenic Sr signature reflects the strengthening of NADW during interglacial periods as has been suggested previously (e.g. Charles and Fairbanks, 1992; Dieckmann et al., 1996). By contrast, interglacial values in the Cape Basin core point toward an nonradiogenic Sr component which seems to exclude any control of NADW on sedimentation in this area. This signature could either be delivered by Southern Component Water (SCW) or reflect input of another local source in Southern Africa.

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Charles CD & Fairbanks RG, *Nature*, **355**, 416, (1992).

Dieckmann et al, *The South Atlantic: Present and Past Circulation. Springer-Verlag*, 621-644, (1996).