Geophysical Research Abstracts,
Vol. 11, EGU2009-12983, 2009
EGU General Assembly 2009

Paleoceanographic interpretations of late Pleistocene to Holocene sedimentological and geochemical proxy-data from SE-Atlantic abyssal plains (Cape, Angola and Guinea Basin)

W.E. Piller and S. Müllegger

University of Graz, Institute of Earth Sciences, Graz, Austria (werner.piller@uni-graz.at, stefan.muellegger@uni-graz.at)

Sediments of the deep abyssal regions of the Southeast Atlantic (Cape Basin, Angola Basin and Guinea Basin) were studied to reconstruct changes in surface and deep water circulation, bioproductivity, and terrigenous sediment flux. To gain these results various sedimentological and geochemical proxies were imposed, including grain size data, foraminiferal fragmentation, carbonate and organic carbon content, as well as stable oxygen and carbon isotope contents of foraminiferal tests. Samples were gained with a multicorer device during Meteor cruise 63/2 (2005) in water depths between ~5,100 and ~5,600 m. The superficial 30 cm of sediment, sampled in 1/2, 1 and 5 cm steps, were processed for this study. The record covers parts of the Pleistocene and Holocene.

Even if the sedimentation conditions seem to be similar in the deep-sea regions of the SE-Atlantic there are clear differences between the three sampled locations. This is caused by major changes in deep water corrosiveness leading to fluctuations in the sedimentation rate and carbonate preservation.

Cape Basin localities show a pattern of enhanced carbonate preservation around 12 ka BP possibly indicating a delayed Last Glacial Maximum signal. This pattern, which is typical for Indo-Pacific records, clearly points to an influence of Antarctic Bottom Water (AABW) at water depths below 5000 m in the Northern Cape Basin. The non-correlation between carbonate content and grain size distribution is owing to a coccoliths' dominated carbonate production possibly caused by low nutrient availability in surface waters and the higher dissolution susceptibility of foraminiferal tests.

Angola Basin samples delivered highest sand contents, a carbonate peak and low organic carbon values around 8.2 ka BP which indicate a reduced bioproduction and nutrient supply in superficial waters. A connection of the 8.2 ka cold event in the northern hemisphere and central African precipitation, equatorial East Atlantic (EEA) upwelling intensity and bioproduction is likely. Thus we expect the observed peak to be a response to the mentioned cold event at about 8.2 ka. The overall sedimentological record indicates that the Northern Angola Basin sedimentation may not be triggered by changes in the influence of North Atlantic Deep Water (NADW) and AABW as observed in the Northern Cape Basin. Therefore, the Walvis Ridge is expected to be an effective barrier for AABW.

Studied Guinea Basin sediments (>5000 m) show quite uniform spatial bioproduction caused by the EEA divergence zone overlying the sample sites. Concerning the Holocene, temporal variations are mirrored in the grain size distribution which can possibly be correlated to changes in the thermocline depth. The trend to higher sand contents, especially in the uppermost sediment layers hints to increasing bioproductivity (foraminifers) and thus upwelling intensity during the Holocene. Dissolution, even in the deepest parts of the Guinea Basin, is minimal during the sampled timespan (low foraminferal fragmentation) owing to a predominant influence of NADW north of the Guinea Rise. Differences in the carbonate content are therefore expected to be caused by dilution by terrigenous material delivered by fluvial (Niger River) and eolian (Trade Winds) transport in combination with a change in bioproductivity.