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Extending terrestrial climate information into the marine realm: palynological information as a key to seismic interpretation

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The sedimentary sequences of the continental margin off southwest Africa have been shaped by different forces: So, the interaction of climate, oceanic currents and sea level fluctuations left a significant imprint in the sedimentary structures along the continental margin. Additionally, tectonic movements affected the sedimentary sequences. Our aim is to unravel the development and modifications of the depositional system in the Northern Cape Basin. Especially we want to concentrate on the effect of the Initiation of the Northern Hemisphere Glaciation on the depositional environment.

As a first step we present a seismostratigraphic model for the Neogene and Quarternary sedimentary layers in the Northern Cape Basin based on a combination of reflection seismic lines with drill site records of the ODP Leg 175 Site 1082 assisted by palynological data.

We defined seven seismic units NCB-1a to NCB-5 for the Cenozoic sediments in the Northern Cape Basin according to the reflection pattern. These units, their acoustic base reflectors as well as some discontinuities own a laterally marked continuity on the existing seismic lines. Thus, they can be traced about 250 km over the northern Cape Basin, along the outer shelf, slope and slope basin. We suggest that the continuity of the reflectors indicates a relatively widespread and uniform depositional environment.

A striking observation is an unconformity dated at 2.2 Ma. The reflectors above onlap onto this interface, whereas the internal reflectors of the unit below show toplap termination. The outbuilding of the slope in the lower unit indicates a low relative sea level. In contrast the sigmoid reflection configuration in the unit above the unconformity is

an indication for a gentle rise of relative sea level which indeed corresponds to a rise in eustatic sealevel. Since we can identify this Late Pliocene unconformity 250 km along the margin of the Northern Cape Basin we infer a large regional change in deposition regime. It coincides with a marked change of pollen assemblages. The palynology of ODP Site 1082 revealed profound changes in the terrestrial environment of south-western Africa at 2.2 Ma. The accumulation rate of pollen suddenly drops from 50-60 pol/a/ccm in older layers to 8 pol/a/ccm in average after 2.2 Ma. This marked reduction of pollen input into the ocean is interpreted as the result of a loss of a perennial river discharge, indicating in turn a change of hinterland climate from humid to drier conditions in the late Pliocene.