A multidisciplinary survey with RV Poseidon off Angola and Northern Namibia in April 1999 crossed the Angola-Benguela Frontal Zone (ABFZ). The data set comprises meteorological and hydrographical data and biological and chemical data as well. Sequences of NOAA satellite SST images and ERSS2 wind stress provide intermittent synoptic information.

The monthly mean of sea surface temperature anomaly in April 1999 derived from NOAA satellite images indicates a Benguela Niño Situation (Figure 1). At the Angolan and Namibian coast the sea surface temperature (SST) exceeds the climatological mean value by 2-3°C.

Along the continental slope the Angola Current advected warm and less saline surface waters (originating from the great rivers in the Gulf of Guinea) to 13°C, and warm tropical waters to 19’S (Figure 1 and 2). Water temperature of northern Namibia exceeded 25°C near-shore and 23°C offshore. The mean thermal gradient was weak corresponding to a unusually southern position of the ABFZ.

The coastal dynamic is maintained by both poleward moving Kelvin waves originating from the equatorial wave guide and local atmospheric forcing. North of the front at 12°S Kelvin wave driven downwelling in the surface layer is overlaid with wind driven upwelling. (Figure 4). Near the ABFZ at 15°S vanishing downwelling indicates the disruption of the Kelvin wave. South of the ABFZ a wind driven upwelling regime was observed. Whereas north of the ABFZ the Angola Current transported warm water poleward, in the south the coastal jet advected cold upwelled water northward.

Shape and position of the ABFZ change in response to atmospheric forcing. During the cruise an entire cycle of generation development and decay of a front could be observed.

During a period with weak wind in the beginning of April the whole coastal north of 15°S was covered with tropical water (see Figure 5 and 6). With increasing equatorward winds from 10 April onwards, strong coastal upwelling developed south of 15°S. Ekman transport shifted the tropical water offshore and detached the surface part of the Angola Current westwards. At the coast a band of cold upwelled water developed, filaments propagated upwelled water rapidly towards the open ocean. A new upwelling front formed with its northern boundary at 16°S. On 19th April the upwelling was fully developed, the SST image shows filaments and several eddies. With decreasing wind on 23th April the intensity of upwelling decreased rapidly. The sea surface temperature at the Namibian coast was rising probably due to local warming and a surge of warm Angola current water was penetrating southward.

In contrast to the rapid development of the ABFZ near the coast, the conditions offshore were more persistent. The streaky longshore SST pattern off the coast seems to be a result of alternating periods of weak and heavy trade winds.

The dynamic topography was calculated for geostrophic analysis from the CTD data. The reference level was estimated with help of ADCP data. Although the results are not symmetric the large scale circulation is represented well. It shows the Angola Current as a continuation of the South Equatorial Counter Current (Figure 3), which bends poleward at the African coast. Near 15°S the Angola current converges with the north-westward flowing Benguela Current and turns westward. Below the thermocline the gradients in the dynamic topography are generally weaker but show the same structure. The subthermocline Angola Dome was centered at 8.5°S, 8°E embedded in a larger area of low dynamic height well known as the Angola Gyre.

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