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Quaternary deep water mass configuration at the transition zone between South Atlantic, Southern Ocean and Indian Ocean

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The transition zone between the South Atlantic, the Indian Ocean and the Southern Ocean south of Africa is an important mixing region for northern and southern deep water masses. Here, the North Atlantic Deep Water (NADW) extends southward into the Circumpolar Deep Water (CDW) of the Antarctic Circumpolar Current (ACC), dividing it into an upper (UCDW) and a lower (LCDW) layer. Marine sediments from this area are a sensitive recorder for changes in the paleocirculation and deep water formation in the northern Atlantic and the Antarctic region. Using multi-proxy data of 5 Polarstern sediment cores, taken along a NW-SE transect from the southern tip of the African continental slope towards the Conrad Rise at abyssal water depths between 3000 to 5200 m, we reconstruct changes in the deep water advection at different glacial, interglacial and transitional conditions. The oldest core reaches back approx. 3.5 Ma into the late Pliocene. Here we present the first results of this ongoing research. A dominance of northern-derived NADW is evident during the interglacial periods, whereas in glacial periods the site is dominated by southern-derived LCDW. Preliminary results of the kaolinite/chlorite-ratios suggest a fast southward advance of NADW-dominance during the last two terminations. In contrast, the northward retreat of NADW with onset of glacial conditions is retarded and points to a more gradual decline in NADW production in the Northern Atlantic. The grain size in the sortable silt fraction (10 μ to 63 μ) shows maxima at the early stages of the last two glacial periods. However, due to generally weakened bottom current strength as a result of reduced deep water formation and extended sea ice coverage we would expect smaller

values compared to interglacial conditions. We therefore assume that, especially in glacial periods, eolian dust input from the Patagonian region plays a significant role. Desertification of large continental areas as well as the exposure of continental shelf areas with low sea level under glacial conditions may increase the amount of dust available for eolian transport. The more vigorous westerly winds during glacials are capable of transporting larger grains, thus resulting in larger mean grain sizes of the sortable silt fraction. As the amount of material prone to wind transport diminishes towards the end of the glacial, eolian influx is reduced and grain sizes of the sortable silt decrease significantly. Thus the sortable silt is again mainly controlled by transport through bottom currents.