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Contourite drifts as indicators of Cenozoic bottom water intensity in the eastern Agulhas Ridge area, South Atlantic

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High-resolution multichannel seismic reflection profiles acquired in the Agulhas Ridge area (eastern sub-polar South Atlantic) were used in conjunction with multibeam bathymetry and Ocean Drilling Program Leg 177 borehole data to characterise deep water contourite formation in the area of the northeastern Agulhas Ridge and the Cape Rise Seamounts. The transverse ridge separates the Cape Basin from the Agulhas Basin and controls the exchange of water masses between these two basins. Small scale buried drifts, moats and sheet like deposits indicate that sedimentation was controlled by bottom currents since the late Eocene. After a pronounced early Oligocene erosional event resulting from the onset of Lower Circumpolar Deepwater (LCDW) flow, drift formation intensified. The type, position and formation history of the interpreted drifts suggest that the pathways of LCDW flow have undergone little change during the last ~33 Ma and followed roughly todays 4900 m depth contour. Northwest of the Cape Rise Seamount we found a mounded drift with an oval shape, a height of ~400 m and a width of ~50-60 km indicating a clockwise circulating bottom water gyre in that area. Extensive drifts in the Cape Basin occur as features confined between the Agulhas Ridge and Cape Rise seamounts and as mounded and sheeted drifts further to the West. The confined drifts show erosional features on both flanks suggesting a West setting bottom water flow along the northern flank of the Agulhas Ridge and an opposing eastward directed flow along the southern rim of the Cape rise seamount group. In contrast to the large drift deposits in the Cape Basin smaller, confined drifts showing more erosional features are found south of the Agulhas Ridge. Together these findings suggest that the deepest LCDW flowed anticlockwise around the Agulhas Ridge before taking a major clockwise loop in the Cape Basin. The returning bottom water then flowed around the Cape Rise seamounts before entering the Indian Ocean.