



Absolute geostrophic currents over the SR02 section south of Africa in December 2009

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The structure of the absolute geostrophic currents is investigated on the basis of CTD-, SADC- and LADCP-data over the hydrographic section occupied south of Africa from the Good Hope Cape to 57° S along the Prime Meridian, and on the basis of satellite data on absolute dynamic topography (ADT) produced by Ssalto/Duacs and distributed by Aviso, with a support from Cnes (<http://www.aviso.altimetry.fr/duacs/>). Thus the section crossed the subtropical zone (at the junction of the subtropical gyres of the Indian and Atlantic oceans), the Antarctic Circumpolar Current (ACC) and terminated at the northern periphery of the Weddell Gyre. A total of 87 stations were occupied here with CTD-, and LADCP-profiling in the entire water column. The distance between stations was 20 nautical miles. Absolute geostrophic currents were calculated between each pair of CTD-stations with barotropic correction based on two methods: by SADC data and by ADT at these stations.

The subtropical part of the section crossed a large segment of the Agulhas meander, already separated from the current and disintegrating into individual eddies. In addition, smaller formed cyclones and anticyclones of the Agulhas Current were also observed in this zone. These structural elements of the upper layer of the ocean currents do not penetrate deeper than 1000-1500 m. Oppositely directed barotropic currents with velocities up to 30 cm/s were observed below these depths extending to the ocean bottom. Such large velocities agree well with the data of the bottom tracking of Lowered ADCP. Only these data were the reliable results of LADCP measurements because of the high transparency of the deep waters of the subtropical zone.

The total transport of absolute geostrophic currents in the section is estimated as 144 and 179 Sv to the east, based on the SADC and ADT barotropic correction, respectively. A transport of 4 (2) Sv to the east was observed on the northern periphery of the Weddell Gyre, 187 (182) Sv to the east was in the ACC zone (up to Subtropical front), 47 (5) Sv to the west was in the subtropical zone. The total transport of abyssal barotropic currents in the subtropical zone was 18 to the west (7 to the east).