



Circulation of Circumpolar and Pacific Deep Waters near the Shackleton Ridge, Drake Passage

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Six expeditions were carried out onboard Russian research vessels "Akademik Sergey Vavilov" and "Akademik Ioffe" in 2003-2010 in the region of the Shackleton Ridge, Drake Passage. The CTD and ADCP measurements in the entire water column were executed during these expeditions. During these expeditions CTD and ADCP measurements were executed in the entire water column. Properties and propagation paths of Circumpolar Deep Water (CDW) and its components: Circumpolar Bottom Water (CBW), Lower, and Upper Circumpolar Deep waters (LCDW and UCDW), and also Pacific Deep Water (PDW) in the region of the Shackleton Ridge are investigated on the basis of these measurements and WODB2009 database. The PDW is found in the north Drake Passage in the same isopycnal range as LCDW and UCDW. It is shown that the Hero, Shackleton, and North-Scotia ridges form a unified system of the obstacles essentially affecting the propagation paths and transformation of the entire CDW. This transformation occurs due to diapycnal and isopycnal mixing of CDW with PDW, Bransfield Strait Water and Weddell Sea Water. The North-Scotia Ridge partially blocks the eastward propagation of CBW, LCDW, and also PDW in the Antarctic Circumpolar Current. However, direct measurements of current velocity in the Drake Passage reveal a steady eastward transport of a few Sverdrups of PDW. The most probable mechanism for the PDW transport through the Scotia Sea is the formation of anticyclonic eddies of the Subantarctic Front and their subsequent dissipation, accompanied by a rise of isopycnals from the depths and isopycnal mixing with the surrounding waters.