



Evolution of the deep and bottom waters of the Scotia Sea, Southern Ocean, during 1995-2005

M.P. Meredith (1), A.C. Naveira Garabato (2), A.L. Gordon (3) and G.C. Johnson (4)

(1) British Antarctic Survey, Cambridge, U.K. (2) National Oceanography Centre, Southampton, U.K. (3) Lamont Doherty Earth Observatory, New York, U.S.A. (4) NOAA/Pacific Marine Environmental Laboratory, Seattle, U.S.A.

A repeat hydrographic section in the eastern Scotia Sea has been occupied in 1995, 1999 and 2005, enabling investigation of the variability in deep and bottom waters of Southern Ocean origin. Significant changes are observed in the properties of Warm Deep Water (an initial warming followed by a cooling, echoing changes seen upstream in the Weddell Sea) and Weddell Sea Deep Water (WSDW, most notably a reduction in volume). Variations in the abyssal circulation of WSDW are also observed. The WSDW changes are best explained by interannual variations in the density of the deepest waters exiting the Weddell Sea, superimposed on a longer-term (decadal) warming trend. The interannual variations are related to changes in the strength of the Weddell Gyre, reflecting large-scale atmospheric variability that possibly includes the El Niño / Southern Oscillation phenomenon. The Scotia Sea is the most direct pathway for WSDW to penetrate northward and fill much of the world ocean abyss as the densest component of Antarctic Bottom Water, thus the regional changes observed have potentially global climatic implications.