



Abstract View

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Deep Antarctic Convection West of Maud Rise

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ABSTRACT

In February 1977 a column of water (14 km radius), within the central region of the Weddell Gyre west of Maud Rise, was observed in which the normal Antarctic stratification sequence of temperature-minimum to temperature-maximum was absent. The column appeared as a cold, low-salinity, high-oxygen, cyclonic flowing (surface velocity above 50 cm s^{-1}) eddy extending to at least 4000 m. It is hypothesized that similar eddies were common in this region (at least in Austral summer 1977) and represent winter structures which have survived into the summer period. Eddy formation is explained as a product of winter period static instability, similar to the MEDOC observations in the Mediterranean, but without the subsequent sinking and spreading phase. Winter period static instability in the Weddell Gyre is shown to be a likely condition and may be related to the frequent occurrence of a large polynya within the central region of the Weddell Gyre. Deep penetration of winter surface water within the eddy supplies the characteristics of a deep, low-salinity, high-oxygen intrusion near sigma-2 stratum 37.21 to 37.23 (between 1500 and 2000 m). This intrusion may represent a distinct water type formed within the Weddell Gyre. It would represent a variety of Antarctic Bottom Water [or Antarctic Deep Water (Wüst 1933)] with an open ocean origin. It may spread by isopycnal processes north of the Argentine Basin over the Rio Grande Ridge. The continental-margin-produced Antarctic Bottom Water may be partly topographically confined within the Weddell-Argentine-Crozet Basin trio.

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