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Temperature and Salinity Structure in the Weddell Sea

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ABSTRACT

The general circulation of water in the Weddell Sea is part of a large cyclonic gyre. A section taken across this gyre from the Scotia Ridge to Cape Norvegia shows that the Warm Deep Water forms an asymmetric lens-like structure with the thickest portion south of the center of the sea. This large-scale feature of the Weddell Sea is evidently due to a divergent Ekman flux driven by the general atmospheric circulation and upwelling in the center of the gyre. Vertical profiles of temperature and salinity in the center of the gyre show small step-like structures in the upper part of the transition from colder, less salty Winter Water to the warmer, saltier Warm Deep Water below and large step-like structures in the tower part of the transition region. Double-diffusive convection can take place in both regions. Circumstantial evidence leads one to believe that the cabbeling instability is effective in the large-step region. Internal waves and shear instabilities may also be mechanisms that contribute to the formation of the step-like structures.

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