Abstract View

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The Origin of the Pacific Equatorial 13°C Water

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ABSTRACT

Examination of the vertical distributions of temperature, salinity, oxygen, and nutrient salts in the thermostad of the Equatorial 13°C Water in the eastern Pacific Ocean indicates that local vertical mixing is unimportant in creating the thermostad and the characteristics of the 13°C Water. Maps are presented that show the oceanwide distributions of depth, geostrophic flow, salinity, oxygen, phosphate, silica and nitrate on the 160 cL t^{-1} isanosteric surface, which nearly coincides with the core of the 13°C Water. The maps suggest that the original characteristics of the 13°C Water are acquired in the surface and thermocline layers to the northeast of New Zealand and in the Tasman Sea by winter convection and vertical mixing. The acquired characteristics are advected to the thermostad in the eastern Pacific via a long route. Starting from the source region, the flow is first eastward in high latitudes and then returns westward in low latitudes around the anticyclonic subtropical gyre of the South Pacific; near the coast of Australia, the flow turns northward to reach the equator through the Coral and Solomon seas; eastward from here, the principal dew takes two separate paths along the Equatorial Undercurrent and the subsurface South Equatorial Countercurrent. Vertical sections of thermosteric anomaly, temperature, salinity, oxygen and phosphate also are prepared to examine the downstream changes in the characteristics in relation to the overlying and underlying waters. Lateral mixing, consumption of oxygen and regeneration of nutrients account for the observed gradual changes in the characteristics along these paths leading to the ultimate form of the Equatorial 13°C Water.