Abstract View

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Large-Scale Vertical Eddy Diffusion in the Main Pycnocline of the Central North Pacific

Warren White and Robert Bernstein

Scripps Institution of Oceanography, La Jolla, CA 92093

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ABSTRACT

Indirect procedures are used to estimate the latitudinal distribution of the large-scale vertical eddy diffusivity coefficient in the main pycnocline from the interannual change in T_θ, ρ_θ structure of the water column in the central midlatitude North Pacific from 35–44°N, 150–170°W. Using *T*, *S* data from two identical hydrographic surveys, one made in June 1976 and the other in May 1977, the interannual change in potential temperature is recorded on three potential density surfaces (i.e., ρ_θ = 26.6, 27.0 and 27.2) that lie in the upper, middle and lower part of the main pycnocline, respectively. By relating these interannual changes to the vertical gradients of the average potential temperature on each surface (i.e., through the heat conservation equation), the large-scale vertical eddy diffusivity coefficient and its vertical gradient were determined by least-squares estimate procedures. The vertical eddy diffusivity coefficient *K* is found to have been positive over the entire region, with magnitudes ranging from 0.1–0.4 cm^2 s^{-1}, larger south of 40°N (>0.2 cm^2 s^{-1}) than north of there (<0.2 cm^2 s^{-1}). In general, there existed up to a 60% reduction in magnitude of *K* with depth from the upper potential density surface (i.e., 26.6) to the lower one (i.e., 27.2). These estimates of *K* are similar to that required (K = 0.32 cm^2 s^{-1}) to account for the downward propagation of anomalous temperature (i.e., 50 m year^{-1}) observed in the upper portion of the main pycnocline during this time period.