Abstract View

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Vertical Mixing in the Equatorial Undercurrent

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ABSTRACT

Vertical mixing in the ocean affects the formation of water masses as well as the vertical distribution of nutrients and dissolved substances. This study is an investigation of the vertical mixing in the Pacific Equatorial Undercurrent (Cromwell Current). This major ocean current, described in 1954 (Cromwell *et al.*), is a thin, narrow let in the thermocline layer, extending from about 160E to just west of the Galapagos Islands. Among the noteworthy features in the eastern portion of this circulation are the strong vertical shear in the velocity field, and the thick, relatively homogeneous layer located below the velocity core, called the Equatorial 13C Water (13C Water).

A study of previous observations reveals that the 13C Water is continually enlarged in the layer of relatively high shear below the velocity maximum of the Undercurrent. This enlargement is related to the transfer of energy consumed in mixing and is accompanied by a decrease in speed and transport at the eastern end of the circulation.

New techniques for determining the vertical distributions of density and velocity make it possible to investigate the mechanism for formation of this water mass. From *in-situ* measurements of the profiles of temperature and salinity, one can examine the distribution of static stability as described by the Väisälä frequency. Measurements with paired current meters yield the vertical velocity shear. A combination of these two kinds of measurements permits an evaluation of the dynamic stability in terms of the Richardson number. In order to evaluate the vertical mixing process, a relationship is developed between the vertical eddy coefficient for momentum and the Richardson number.

In the 13C Water which lies well below the velocity core, eddy coefficients have large values. By using the values for shear and for the vertical exchange of momentum, it is shown that energy dissipation in the eastern part of the

Undercurrent is compatible with that required for formation of the 13C Water.

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