

Spatial distribution of turbulent mixing in the central Pacific inferred from Argo float data

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*程 靈巧¹

*Cheng Lingqiao¹

1. 上海海洋大学

1. Shanghai Ocean University

A long-term mean turbulent mixing in the depth range of 200-1000 m produced by breaking of internal waves across the middle and low latitudes (40°S-40°N) of Pacific between 160°W and 140°W is examined by applying the fine-scale parameterization depending on strain variance to 8-year (2005-2012) Argo float data. The adequacy of Argo float data was validated by comparing the estimated turbulent dissipation rate (ε) with those from World Ocean Circulation Experiment (WOCE) data. It is found that although some underestimations may exist to estimate the exact intensity of turbulent mixing below 350 m, good correlations between $\varepsilon_{\text{argo}}$ and $\varepsilon_{\text{WOCE}}$ indicate the property of Argo data for investigation of spatial variation. Results show that elevated ε is obtained related to significant topographic regions, along the equator, and on the northern side of 20°N spanning to 24°N throughout the depth range. Two patterns of latitudinal variations of ε and the corresponding diffusivity (K_ρ) for different depth ranges are confirmed: One is for 200-450 m with significant larger ε and K_ρ , and the maximum values are obtained between 4°N-6°N, where eddy kinetic energy also reaches to its maximum; The other is for 350-1000 m with smaller ε and K_ρ , and the maximum values are obtained near the equator, between 18°S-12°S and 20°N-22°N. Most elevated turbulent dissipation in the depth range of 350-1000 m relates to rough bottom roughness (correlation coefficient=0.63), excluding the equatorial area. In the temporal mean field, energy flux from surface wind stress to inertial motions is found not significant to account for the relatively intensified turbulent mixing in the upper layer.

キーワード : Turbulent mixing、 Mean latitudinal variation、 The fine-scale parameterization、 Argo float data

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