

An improved simulation of the deep Pacific Ocean using optimally estimated vertical diffusivity based on the Green's function method

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An improved vertical diffusivity scheme is introduced into an ocean general circulation model to better reproduce the observed features of water property distribution inherent in the deep Pacific Ocean structure. The scheme incorporates (a) a horizontally uniform background profile, (b) a parameterization depending on the local static stability, and (c) a parameterization depending on the bottom topography. Weighting factors for these parameterizations are optimally estimated based on the Green's function method. The optimized values indicate an important role of both the intense vertical diffusivity near rough topography and the background vertical diffusivity. This is consistent with recent reports that indicate the presence of significant vertical mixing associated with finite-amplitude internal wave breaking along the bottom slope and its remote effect. The robust simulation with less artificial trend of water properties in the deep Pacific Ocean illustrates that our approach offers a better modeling analysis for the deep ocean variability. This presentation is based on Toyoda et al. (2015) published in Geophysical Research Letter (42, 9916-9924, doi:10.1002/2015GL065940).

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