The spatial distribution of diapycnal mixing in the abyssal ocean: An empirical parameterization and preliminary results from its implementation into an earth system model.

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Abstract

Observations of turbulence in the abyssal ocean indicate that diapycnal mixing is patchily distributed in the horizontal and depth-dependent. In contrast, Ocean General Circulation Models (OGCMs) generally use spatially uniform parameterizations of diapycnal mixing. It is now recognized that large-scale ocean circulation patterns are sensitive to the spatial distribution of diapycnal mixing and thus more realistic parameterizations are required.

We here present an empirical parameterization for the spatial distribution of diapycnal mixing in the abyssal ocean based on some 300 microstructure profiles. The parameterization, dubbed roughness diffusivity model or RDM, is dependent on topographic roughness. Preliminary results from LOVECLIM, an earth system model of intermediate complexity, show that the marine biogeochemistry is significantly affected by the spatial distribution of diapycnal mixing.