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Estimate of Diapycnal Mixing from eight Hydrographic Surveys in the Subpolar North Atlantic

Mingming Li, Christian Mertens, Maren Walter, and Monika Rhein
Institute of Environmental Physics, University Bremen, Germany (cissylee421@163.com / +49 421 218 7018)

The transformation of water masses in the subpolar North Atlantic is essential to maintain the oceanic stratification and support the Atlantic Meridiornal Overturning Circulation. Previous studies based on finestructure observations yield mean diapycnal diffusivity K_ρ of the order 10^{-5} m^2s^{-1}, which is an order of magnitude less than the theoretical value suggested by Munk in 1966.

In the area between 42° and 62°N deep water formation provides dense abyssal water masses, which are part of the global overturning circulation. Eight cross-Atlantic large-scale hydrographic surveys were carried out during the years 2003-2010 with combined CTD/LADCP measurements.

Turbulent diffusivity K_ρ is estimated from the energy dissipation rate, which is inferred from parameterisation of velocity and strain of the density field. Observational data are analysed to get an overview of the regional variability in the strength of the mixing and to identify the dependencies of K_ρ in this area. The analysis of RV Meteor cruise M59/2 carried out in 2003 shows that mean value of diffusivity in the open ocean is 6.8×10^{-5} m^2s^{-1}, higher values are found in the area of the Deep Western Boundary Current and over rough topography, where they exceed 10^{-3} m^2s^{-1}.