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Kinetic energy backscatter (KEB) parameterizations for ocean circulation models with intermediate resolution and their testing in NEMO ocean model

Eddy-permitting numerical ocean models resolve mesoscale turbulence only partly, that leads to underestimation of eddy kinetic energy (EKE). Mesoscale dynamics can be amplified by using kinetic energy backscatter (KEB) parameterizations returning energy from the unresolved scales. We consider two types of KEB: stochastic and negative viscosity ones. The tuning of their amplitudes is based on a local budget of kinetic energy, thus, they are 'energetically-consistent'KEBs. In this work, the KEB parameterizations are applied to the NEMO ocean model in Double-Gyre configuration with an eddy-permitting resolution (1/4 degree). To evaluate the results, we compare this model with an eddy-resolving one (1/9 degree). We show that the meridional overturning circulation (MOC), meridional heat flux, and sea surface temperature (SST) can be significantly improved with the KEBs. In addition, a better match has been found between the time power spectra of the eddy-permitting and the eddy-resolving model solutions.

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