



Inter-comparison of vertical mixing schemes in a global ocean general circulation model

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We here investigate the effect of vertical mixing scheme on the oceanic circulation and mixed layer depth in a global ocean modeling. The Ocean General Circulation Model (OGCM) used in this study is the Modular Ocean Model version 5.0 (MOM5.1.0) with 1° horizontal resolution and 52 vertical levels. We compare the three different vertical mixing schemes; K-profile scheme, Noh and Kim scheme and a modified Noh and Kim scheme, which includes the parameterization of the Langmuir circulation. The NCEP reanalysis CORE2-normal year forcing dataset are used to calculate heat, salt and momentum fluxes with a bulk formula at the sea surface. The sea surface salinity is restored to the climatological monthly mean surface salinity of the Polar Science Center Hydrographic Climatology on a 60-day timescale, to make up the fresh water flux at the sea surface. Three models with different vertical mixing schemes are integrated during 150 years.

A series of numerical experiments with different vertical mixing schemes shows significant differences in the mixed layer depths at the high-latitude region, especially in the Southern Ocean, as well as the strength of meridional overturning circulation and heat transport.