



Evaluation of Vertical Coordinate Systems in a Regional MOM6 for the Northwest Pacific

We have recently established a Northwest Pacific Regional Ocean Model using the Hybrid vertical coordinate configuration (Z^* and isopycnal) of MOM6, developed by GFDL. In this study, we assessed the advantages and disadvantages of the Z^* vertical coordinate model and the Hybrid vertical coordinate model in the Northwest Pacific. Both models exhibit a notable low SST bias in the open ocean of the Northwest Pacific without data assimilation, while displaying some warm biases in the western boundary currents. The Hybrid coordinate model realistically simulates the North Pacific Intermediate Water (NPIW) related to density surface circulation, whereas the Z^* coordinate model does not simulate NPIW well, showing positive temperature and salinity biases. These biases in the intermediate layer of the Z^* coordinate model are attributed to spurious diapycnal mixing found in the traditional Eulerian geopotential coordinate model. When comparing the tidal amplitude and phase with respect to TPXO, both models generally simulate the tidal phases and amplitudes of the waters around the Korean Peninsula well, although tidal amplitudes are overestimated in the East China Sea and underestimated in the interior of the Yellow Sea. To mitigate warm biases in western boundary currents and enhance tidal reproducibility, we plan to conduct additional experiments by reducing the velocity scale for calculating biharmonic viscosity and modifying the bottom topography.

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