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A 1/16° eddying simulation of the global ocean/sea ice system

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Analysis of a global eddy-resolving simulation using the NEMO general circulation model is presented. The model has 1/16° horizontal spacing at the equator, employs two displaced poles in the Northern Hemisphere, and uses 98 vertical levels. The simulation was spun up from rest and integrated for 11 model years, using ERA-Interim reanalysis as surface forcing. Primary intent of this hindcast is to test how the model represents upper ocean characteristics and sea ice properties.
Numerical results show that, overall, the general circulation is well reproduced, with realistic values for overturning mass and heat transports. Analysis of the zonal averaged temperature and salinity, and the mixed layer depth indicate that the model average state is in good agreement with observed fields. Comparisons against observational estimates of mass transports through key straits indicate that most aspects of the model circulation are realistic. As expected, the simulation exhibits turbulent behaviour. The spatial distribution of the sea surface height variability from the model is close to the observed pattern. Despite the increase in resolution, the variability amplitude is still weak, in particular in the Southern Ocean. The distribution and volume of the sea ice are, to a large extent, comparable to observed values.
Compared with a corresponding coarse-resolution configuration, the performance of the model is significantly improved, although relatively minor weaknesses still exist. We conclude that the model output is suitable for broader analysis to better understand upper ocean dynamics and ocean variability at global scales. This simulation represents a major step forward in the CMCC global ocean modelling, and constitutes the groundwork for future applications to short-range ocean forecasting.