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

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We present a global ocean-ice system (NEMO-LIM) at high resolution (1/16°), GLOB16, developed at CMCC. The configuration employs a tripolar grid with a horizontal spacing of 6.9 km at the equator decreasing to ~2 km at high latitudes, and uses 98 vertical levels. A 11-year integration, run with ERA-Interim reanalysis as surface forcing, is described and performance of the model is evaluated against observations and a corresponding coarse-resolution configuration.
Analysis of the model zonally-averaged temperature and salinity, MLD, overturning circulation and associated northward heat transport, lead us to conclude that the model average state is realistic, and that the model realistically represents the variability in the upper ocean and at intermediate depths. GLOB16 model configuration showed good skill in simulating exchanges of mass between ocean basins and through key passages. The contributions from the individual straits in the exports from the Arctic Ocean are within the uncertainties of the observational estimates. The seasonal cycles of total ice area and volume are close to satellite observations and the sea ice extent distribution is very well reproduced in both hemispheres, although sea ice concentration and thickness can be further improved together with sea ice drift. The model is able to hindcast the position and strength of the surface circulation. Comparisons between the SSH variability from the model and from gridded observations indicate that the model variability is acceptable, with local maxima and minima in the same locations as observations. Extension and separation of western boundary currents are better resolved compared to the eddy-permitting run. However, a clear weakness of the GLBO16 model is its ability in reaching the observed magnitude of the SSH variability, especially in the Southern Ocean.