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Low-frequency variability of circulation in the northern Japan/East Sea based on numerical simulations

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Interannual and interdecadal variability of circulation in the northern Japan/East Sea (JES) is investigated using an ocean model INMOM (Institute of Numerical Mathematics Ocean Model). INMOM is a three-dimensional, σ-coordinate, nonlinear, finite difference model which uses the hydrostatic and Boussinesq approximations. Using $1/10^{\circ}$ mesh with 15 sigma levels, the basin-scale circulation of the JES was reproduced. Nudging conditions for temperature and salinity were applied in the straits of the JES. To represent the coastline and topography $ETOPO_2$ was used. We used the initial temperature and salinity fields from Levitus data and the atmospheric forcing from CORE database. The basin-scale circulation of the JES was reconstructed from 1958 to 2006. To study the variability of circulation in the northern JES we analyzed the relative vorticity variability both in the layer from 500 m to 2500 m and at depths of 500, 800 and 2500 m. Harmonics with periods of 4-5 and 10 years dominate in the variability of circulation in the Japan Basin. It is supposed that the interannual variability is determined by the Japan Basin geographical features. We analyzed the potential density field during winter and established a connection between winter cooling and decadal variability of deep water circulation.