

Meridional heat transport in the Japan/East Sea from 1990 to 2010

*Dmitry Stepanov¹

1. Pacific Oceanological Institute, Far Eastern Branch, Russian Academy of Sciences

By using eddy-resolving ocean circulation model outputs, the meridional heat fluxes in the upper 300m layer, induced by the basin-scale circulation and mesoscale dynamics, are studied in the Japan/East Sea (JES) from 1990 to 2010. The estimation of the long-term mean meridional heat flux induced by the basin-scale circulation (MHF) showed that MHF was positive (northward) in the JES. In the southern JES, MHF is higher than that in the northern parts of the JES. The estimation of the long-term mean meridional heat flux induced by the mesoscale dynamics (MEHF) showed that the MEHF is positive over the JES and reaches maximal values at the separation latitude of the East Korea Warm Current. There are eddy-induced heat fluxes across the Subpolar Front along the western and eastern boundaries of the JES. This study has established that the eddy-induced heat transport is associated with the basin-scale currents in the JES. Analysis of the eddy kinetic energy budget showed that the baroclinic instability mechanism predominates over the barotropic instability mechanism to the mesoscale dynamics generation. At the same time, the barotropic instability promotes the mesoscale dynamics generation. The comparison of the MHF and MEHF has shown that the former exceeds the latter. At the same time, the MHF variances and MEHF variations are comparable, which points out the importance of the MEHF as a mechanism of the heat content variations in the JES. This work was supported by the Russian Scientific Foundation, project no. 19-17-00006.

Keywords: eddy-resolving numerical simulations, Japan/East Sea, mesoscale eddies, meridional eddy heat flux, baroclinic and barotropic instability