EGU2020-11322
https://doi.org/10.5194/egusphere-egu2020-11322
EGU General Assembly 2020

Thermohaline structure and transport of mesoscale eddies in the Lofoten Basin from in situ and altimetry data

Nikita Sandalyuk
Saint-Petersburg State University, Oceanography, Russian Federation (sherlok@inbox.ru)

The Lofoten Basin is one of the most dynamically unstable regions of the North Atlantic and represents a 'hot spot' of the mesoscale eddy activity in the Nordic Seas. A quasi-stationary, deep, anticyclonic eddy is located in the central part of the basin. One of the key features of the Lofoten Basin circulation is a separation of eddies from the main branch of Norwegian current and their westward propagation towards the central part of the basin. Because of these processes, warm and saline Atlantic waters are transported to the deeper part of the basin. Understanding the physical processes responsible for the water mass transformations in this area is of particular interest in order to apprehend the climate of the region.

In this study we obtain three-dimensional structures of cyclonic and anticyclonic eddies for the LB region by combining the observational data set covering the 2000-2017 period with satellite altimetry data. The results reveal that significant eddy-induced anomalies are concentrated within a distance of 1 radius of the composite AE and CE and extend vertically to the depth of 1000 m. The core of the composite AE is located in the 200-400 m while the composite CE has a double-core structure with the maximum anomalies centered in the upper layer above 100 m and a negative peak located at 700 m. The difference in the structure of AE and CE is referred to the upwelling and downwelling processes in the AEs and CEs respectively.

The study also provides an estimation of the depth-integrated heat and salt transport as well as zonal volume eddy-induced transport. Each AE (CE) generates volume transport of 1.98 Sv (1.87 Sv), heat transport of 2.9*1014 W (-8.3*104 W) and salt transport of 2.3*106 kg/s (-1.6*1013 kg/s). Zonal eddy-induced transport has a general westward propagation direction reaching maximum of 0.6 Sv in the north-eastern part of the study area. The northward transport takes place predominantly in the southern and eastern parts of the study region and has significantly smaller magnitude.

This work was supported by Russian Science Foundation [project № 18-17-00027];