

Vortex structures in the southeastern part of the Baltic Sea: results of oceanographic experiments and satellite observations

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Author(s): Evgeny V. Krayushkin, Space Research Institute of RAS (Russian Federation); Olga Y. Lavrova, Ksenia R. Nazirova, Space Research Institute (Russian Federation)

In 2014-2016, in summer months oceanographic experiments were held by the Space Research Institute in the southeastern part of the Baltic Sea along the coastline of Kaliningrad Region. The main aim was to provide comprehensive in situ oceanographic data to verify remote sensing data. During the experiments, ADCP surveys were conducted to measure current profiles from surface to bottom. In 2014, we managed to detect and describe a complex dynamic vortex structure near Cape Taran. This vortex structure was identified using Radarsat-2 images and optical data, obtained by OLI Landsat-8, ETM+ Landsat-7, Modis Terra/Aqua and confirmed by ADCP data. Results of ADCP surveys showed a great amount of different dynamic patterns in the coastal zone of southeastern Baltic Sea. Along with Euler methods, Lagrangian drifters launched simultaneously with ADCP surveys were also used in the experiments. The drifters' trajectories revealed a complex picture of coastal dynamics in the near-shore area that could add information to ADCP results. The drifters' trajectories differed completely from one year to another influenced by both complex wind situations in the region and propagation of mesoscale eddies. During the experiments, CTD-surveys were also conducted along the ADCP tracks to determine the thermohaline structure in the studied area as well as specific distribution of turbidity with the use of optical backscatter sensor. Turbidity is a core parameter for remote sensing data verification as it can be clearly identified from optical images. A separate part of the research was devoted to the Vistula Lagoon outflow to the Baltic Sea. The experiment showed that Vistula Lagoon waters propagated 5 m deep near the shore and their influence could be tracked as far as Cape Taran on the east and Hel Peninsula on the west. The work was supported by Russian Science Foundation Grant #14-17-00555.