Geophysical Research Abstracts
Vol. 17, EGU2015-8925, 2015
EGU General Assembly 2015

Renewed circulation scheme of the Baltic Sea – based on the 40-year simulation with GETM.

Ilja Maljutenko and Urmas Raudsepp
Marine Systems Institute at Tallinn University of Technology (ilja.maljutenko@msi.ttu.ee)

The general circulation of the Baltic Sea has been characterized as cyclonic in all sub-basins based on numerous measurements and model simulations. From the long-term hydrodynamical simulation our model results have verified the general cyclonic circulation in the Baltic Proper and in the Gulf of Bothnia, but the Gulf of Finland and the Gulf of Riga have shown tendency to anticyclonic circulation. We have applied the General Estuarine Transport Model (GETM) for the period of 1966 – 2006 with a 1 nautical mile horizontal resolution and density adaptive bottom following vertical coordinates to make it possible to simulate horizontal and vertical density gradients with better precision. The atmospheric forcing from dynamically downscaled ERA40-HIRLAM and parametrized lateral boundary conditions are applied. Model simulation show close agreement with measurements conducted in the main monitoring stations in the BS during the simulation period. The geostrophic adjustment of density driven currents along with the upward salinity flux due to entrainment could explain the anticyclonic circulation and strong coastal current. Mean vertical velocities show that upward and downward movements are forming closed vertical circulation loops along the bottom slope of the Baltic Proper and the Gulf of Bothnia. The model has also reproduced patchy vertical movement across the BS with some distinctive areas of upward advective fluxes in the GoF along the thalweg. The distinctive areas of deepwater upwelling are also evident in the Gdansk Basin, western Gotland Basin, northern Gotland Basin and in the northen part of the Bothnia Sea.