



Ice-ocean-ecosystem operational model of the Baltic Sea

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3D-CEMBS is a fully coupled model adopted for the Baltic Sea and have been developed within the grant, which is supported by the Polish State Committee of Scientific Research. The model is based on CESM1.0 (Community Earth System Model), in our configuration it consists of two active components (ocean and ice) driven by central coupler (CPL7). Ocean (POP version 2.1) and ice models (CICE model, version 4.0) are forced by atmospheric and land data models. Atmospheric data sets are provided by ICM-UM model from University of Warsaw. Additionally land model provides runoff of the Baltic Sea (currently 78 rivers). Ecosystem model is based on an intermediate complexity marine ecosystem model for the global domain (J.K. Moore et. al., 2002) and consists of 11 main components: zooplankton, small phytoplankton, diatoms, cyanobacteria, two detrital classes, dissolved oxygen and the nutrients nitrate, ammonium, phosphate and silicate. The model is configured at two horizontal resolutions, approximately 9km and 2km ($1/12^\circ$ and $1/48^\circ$ respectively). The model bathymetry is represented as 21 vertical levels and the thickness of the first four layers were chosen to be five metres. 3D-CEMBS model grid is based on stereographic coordinates, but equator of these coordinates is in the centre of the Baltic Sea (rotated stereographic coordinates) and we can assume that shape of the cells are square and they are identical. Currently model works in a operational state. The model creates 48-hour forecasts every 6 hours (or when new atmospheric dataset is available). Prognostic variables such as temperature, salinity, ice cover, currents, sea surface height and phytoplankton concentration are presented online on a the website and are available for registered users. Also time series for any location are accessible. This work was carried out in support of grant No NN305 111636 and No NN306 353239 - the Polish state Committee of Scientific Research. The partial support for this study was also provided by the project Satellite Monitoring of the Baltic Sea Environment – SatBaltyk founded by European Union through European Regional Development Fund contract no. POIG 01.01.02-22-011/09. Calculations were done at the Academic Computer Center in Gdansk.