



Application of a three-dimensional hydrodynamic model to the Himmerfjärden, Baltic Sea

Alexander Sokolov

Stockholm University Baltic Sea Centre, Stockholm, Sweden (alexander.sokolov@su.se)

Himmerfjärden is a coastal fjord-like bay situated in the north-western part of the Baltic Sea. The fjord has a mean depth of 17 m and a maximum depth of 52 m. The water is brackish (6 psu) with small salinity fluctuation (± 2 psu). A sewage treatment plant, which serves about 300 000 people, discharges into the inner part of Himmerfjärden. This area is the subject of a long-term monitoring program.

We are planning to develop a publicly available modelling system for this area, which will perform short-term forecast predictions of pertinent parameters (e.g., water-levels, currents, salinity, temperature) and disseminate them to users. A key component of the system is a three-dimensional hydrodynamic model.

The open source Delft3D Flow system (<http://www.deltaresystems.com/hydro>) has been applied to model the Himmerfjärden area. Two different curvilinear grids were used to approximate the modelling domain (25 km \times 50 km \times 60 m). One grid has low horizontal resolution (cell size varies from 250 to 450 m) to perform long-term numerical experiments (modelling period of several months), while another grid has higher resolution (cell size varies from 120 to 250 m) to model short-term situations. In vertical direction both z-level (50 layers) and sigma coordinate (20 layers) were used. Modelling results obtained with different horizontal resolution and vertical discretisation will be presented.

This model will be a part of the operational system which provides automated integration of data streams from several information sources: meteorological forecast based on the HIRLAM model from the Finnish Meteorological Institute (<https://en.ilmatieteenlaitos.fi/open-data>), oceanographic forecast based on the HIROMB-BOOS Model developed within the Baltic community and provided by the MyOcean Project (<http://www.myocean.eu>), riverine discharge from the HYPE model provided by the Swedish Meteorological Hydrological Institute (<http://vattenwebb.smhi.se/modelarea/>).