

**(1) HIROMB-BOOS Model (HBM)** – High Resolution Model for the Baltic Sea - Baltic Operational Oceanography System; coupled ocean and sea ice model at regional scale

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**(3) Available modes for the model runs:** Research & Operational

**(4) Components & processes:** Hydrosphere, Cryosphere & Physical.

### **(5) Brief model description**

HBM is a three-dimensional, hydrostatic, free-surface, baroclinic ocean circulation and sea ice model. The model has fully dynamic two-way nesting (She et al. 2007, Berg and Weismann Poulsen, 2012), which makes it an excellent tool to model the complex configuration of basins and different types of coastlines of the Baltic Sea. The model has a high level of rigorous testing and standardisation, an efficient hybrid OpenMP-MPI memory parallelization. Portability and model correctness in term of reproducible output are key pillars of HBM model development (Weismann Poulsen *et al.*, 2014).

HBM has been shown to forecast sea level and its extremes with high accuracy (Golbeck *et al.*, 2017). Furthermore, it can describe the transports and dynamics between the North Sea and Baltic Sea, which was shown e.g. in the simulation of the Major Baltic Inflow events in the past few years. Recent model developments include improvements of sea ice thermodynamics, which gives better ice coverage both in ice formation and melting, and fast ice description in the ice module, accounting for the formation, consolidation and disintegration of fast ice, and advance and retreat of its front. HBM has been used not only as an operational forecasting system for the regional sea and local scales (in fjords), but also as a part of coupled atmosphere-ocean-ice system for climate change simulations (Tian et al. 2013). Through coupling with wave model, suspended particle matter model, oil spill model and ecosystem models, HBM is applied in a wide range of applications on oil drift forecast, plastic litter drift modelling, environment assessment and ecosystem prediction and modelling etc. (Wan et al. 2013). In the future HBM is expected to be developed as a seamless regional and coastal ocean modelling tool (She, 2018).

### **References:**

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