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THE BOOS MODELLING PROGRAMME (BMP) – ACTIVITIES, WORKING GROUPS AND PLANS

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Abstract

The BOOS modelling program (BMP) has recently undergone the effort to update and define new research and development priorities as a community. As an association of operational and research institutes in the Baltic Sea Region, BMP works on enhancing and integrating operational modelling capacities. On a goodwill basis, the institutes support and inform each other on their operational ocean modelling activities, exchange know-how and tools. Communities networking activities and programs have been either established or strengthened. The operationalization of research will be intensified through interactions with external research groups (e.g. through workshops). One of the main objectives of the BMP is the scientific coordination of modelling activities under the BOOS and connected advancement of methodologies, such as coastal downscaling, coupling between different model compartments, data assimilation. Under the umbrella of BOOS, now joint working groups and projects have been formed on various future-relevant topics (e.g. coastal modelling, marine plastics, region-specific NEMO model development, data assimilation, validation and multi-model ensemble). The BMP activities' outcomes are primarily thought to support operational model developments of the BOOS/Eurogoos Strategic Agenda. We will present the BMP in general and the individual working groups and their future plans in particular.

Keywords: operational modelling, Baltic Sea, BOOS, international cooperation, networking

1. Introduction

In response to a HELCOM (Helsinki convention on the Protection of the Marine Environment of the Baltic Sea Area) recommendation regarding the development of an oil drift model in the Baltic, Federal Maritime and Hydrographic Agency (BSH) and Swedish Meteorological and Hydrological Institute (SMHI) developed a High Resolution Operational Model for the Baltic (HIROMB). As a result, the HIROMB cooperation for the joint development of operational modelling was formed, which was contractually fixed in the mid-1990s and which was joined by other institutes in the following years. The main task was to provide a state-of-the-art operational, basin-wide forecast for all partners.

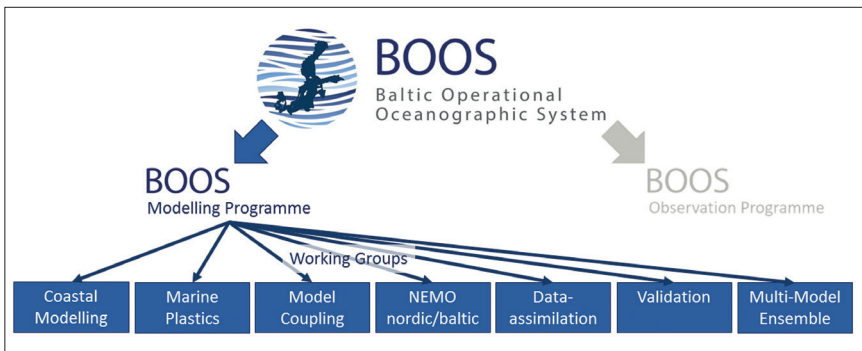


Fig. 1. The BMP in the BOOS structure.

In 2015, the cooperation moved under the umbrella of the Baltic operational oceanographic Service (BOOS, She *et al.*, 2020) and had since been called BOOS modelling programme (BMP). Today the BMP consists of 17 partner institutes from all nine Baltic Sea countries. Since the availability of a state-of-the-art operational basin-wide forecast is now ensured by the marine Copernicus service (CMEMS), the BMP concentrates on coordinating and improving national operational modelling capacities and has recently undergone efforts to update and define research and development priorities supporting the strategic objectives of BOOS and EuroGOOS (Capet *et al.*, 2020). It works towards enhancing and integrating seamless marine system modelling capacity from open sea to coastal-estuary continuum and from near-real time to climate scale. On a voluntary basis, the partners support and inform each other on modelling activities, exchange know-how, methods and tools, whereby the BMP has either established working groups (Figure 1) or strengthened networking activities.

2. Working Groups

Among the seven working groups, the *NEMO*, *Data assimilation and Validation WGs* have worked on a common model, assimilation approach and evaluation software. The *multi-model ensemble (MME) WG* produces multi-model prediction based on real-time exchange of observations and multiple forecast data, which can be accessed daily on www.boos.org. The prediction skill of sea level is significantly improved by using the MME approach (Golbeck *et al.*, 2015).

The rest three WGs were newly established in 2020: *Marine plastics WG* focuses on developing modelling tools to simulate the sources, pathway and fate of micro-, meso- and macroplastics in catchment, inland waters and in the sea. An Eulerian microplastic drift model developed in CLAIM (www.claim-h2020project.eu) is capable of modelling multi-category microplastic transport in rivers, lakes, coastal and open sea (Figure 2). *Model Coupling WG* deals with the exchange of experience and model components on the way to Earth system models. The coupling of ocean, wave and atmosphere components addresses the complex interactions, considering the nonlinear feedback between them. *Coastal modelling WG* focuses on a better representation of near-shore processes, such as wave shoaling and breaking or turbulent kinetic energy injection, among others. Seamless modelling capacities have been developed ensuring coastal-estuary to open sea continuum (Figure 2).

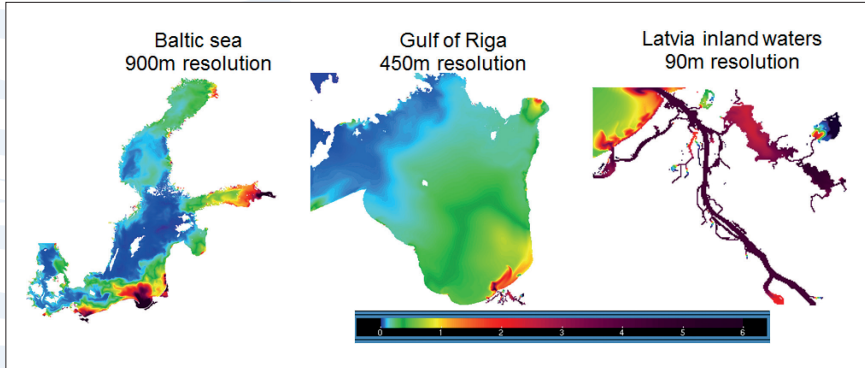


Fig. 2. Microplastic concentration modelled by a two-way nested seamless modelling system HBM in inland waters, coastal and open sea.

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