

Baltic Sea Model Assessment Study (BaltMASt)

A project suggestion

Hans Burchard, Frank Janssen, Martin Schmidt, and Torsten Seifert

hans.burchard@io-warnemuende.de

Baltic Sea Research Institute Warnemünde, Germany

Statements about Baltic Sea Modelling

- There is a number of research 3D models for the Baltic Sea, and most of them are MOM-type models.
- There is a number of operational 3D models for the Baltic Sea, but most of them are similar.
- It is the impression that most models still have problems in either properly resolving the inflow events or maintaining the stratification or reproducing the barotropic exchange with the Kattegat.
- Some new model approaches have been initialised (Finite element model, general vertical coordinates).

Conclusion:

We need a Baltic Sea model intercomparison study.

Aim of the study

- Assessment and improvement of the skills of numerical simulation models for the Baltic Sea dynamics.
- Comparison of existing numerical models on the European level (operational models and research models) idealised and realistic scenarios.
- Identification of model shortcomings of the and recommendations for improvements.
- Invitation of new model groups to enter the field of Baltic Sea modelling.
- Organisation of workshops and summer schools in order to facilitate the exchange of information between scientists and to raise the level of knowledge on Baltic Sea modelling among young researchers.

Organisation of the project

- All institutions on the European level which apply or intend to apply 3D Baltic Sea models are invited to participate in this project.
- One institution with high expertise in Baltic Sea dynamics not operating a 3D Baltic Sea model will be project partner, mainly for assessing the skills of the individual models.
- All project partners will develop idealised and realistic test scenarios and quality assurance measures for the numerical models.
- During the runtime of the study, other institutes will be welcome to join the project at no funding.

Workplan

A number of relevant idealised and realistic scenarios will be defined for the model skill assessment.

Idealised scenarios:

- Lock exchange in rectangular basin and in the Øresund.
- Coastal upwelling scenario.
- Wind and convective entrainment scenario.
- Sloping plume and river plume experiment.
- Inverted sea mount experiment.
- Arkona Sea experiment (stationary idealised density forcing).
- Stationary or climatological Baltic Sea circulation.

Workplan, continued

Realistic scenarios:

- Complete simulation of medium resolution Baltic Sea (around 3 nm resolution) with full atmospheric, open boundary and river forcing. Groups are free to choose their own setup. Simulation period: 2002-2004. Comparison of various parameters to observations during this period in which several inflow events of different characteristics happened. See e.g. the literature by *Feistel et al.*
- Furthermore any group may feel free to compare results of simulations with higher resolution to the data and the results of the medium resolution models.

Some principles

- All simulations have to be carried out with the same model set-up (e.g. turbulence closures, advection schemes, etc. must be the same as much as possible). Therefore, all idealised simulations must be repeated if changes to the model setup are made during the realistic simulations.
- All realistic results shown by any group for one model scenario must all be from the same model simulation.
- All relevant data (bathymetry, meteo forcing at reference stations, river runoff, open boundary data) have to be delivered.
- All relevant information for the model setup (smoothing of bathymetry, filtering of boundary data, ...) have to be given.

Funding

- First, the research ideas must be clear and the partners must have agreed upon a concept before funding is sought.
- Funding must be on international level: In principle the EU should be interested. Maybe other funding sources like the BONUS programme could be asked.
- There should be positions funded for the coordinator and the model comparison partner. All other partners should receive communication funds (travel and accomodation, consumables). Further funding should be provided for workshops and summer schools.

Lessons from previous projects

Two previous model intercomparison studies on the European level should inspire BaltMASt:

- **NOMADS: EU Concerted Action for North Sea model intercomparison, coordinated by POL, UK: Errors for all models: 70 % of natural variability for temperature and 90 % for salinity. This is caused by meteo forcing, boundary conditions, and model features.**
- **MEDMEX: EU Concerted Action for Mediterranean model intercomparison, coordinated by ULG, Belgium: Too much intercomparison, too little benchmarking. Recommendations: Modelling requires systematic model intercomparison, to reduce errors, speed-up model calibration, detect errors more rapidly. Possibility of ensemble forecasts by using several models.**

Lessons from previous projects

Speaking in terms of sport:

**This project will be
more training than competition.**