

Simulating carbon dynamics in the Baltic Sea

BONUS BLUE BALTIC: INTEGRAL - Integrated carbon and Trace Gas monitoring for the bALTIC sea

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In Short

- Use the MOM/ERGOM model system as a tool to estimate regional carbon budgets and air-sea CO₂ fluxes of the Baltic Sea.
- Perform parameter studies with non-Redfieldish particulate organic matter and its mineralisation in the water column.
- Implement vertical migrating zooplankton, thereby increasing the export of particulate organic matter from the surface layer.
- Determine temporal trends and spatial patterns in surface pH and pCO₂.

Within the BONUS project INTEGRAL we explore the potential added value of measured and modelled ocean surface fields of CO₂ for the assessment of the Baltic Sea ecosystem. The INTEGRAL-measurements are embedded within the framework of the Integrated Carbon Observation System (ICOS), that provides European-wide CO₂ concentrations. In addition to the *in situ* field measurements, we will apply a high-resolution coupled physical-biogeochemical model with a full expression of the carbonate system. Our ERGOM biogeochemical model does explicitly describe the carbonate system and links it to the nitrogen and phosphorus cycle, so far in fixed stoichiometry. As we aim to use the MOM/ERGOM model system as a tool to estimate regional carbon budgets and fluxes of the Baltic Sea, and to determine temporal trends in surface pH and pCO₂, it needs to capture the natural pCO₂ signal sufficiently well. We will therefore scrutinize the carbonate system implementation in ERGOM, with a special focus on the seasonal and spatial variability of surface water pCO₂. This will include the implementation of newly developed parameterization for air-sea gas fluxes. To improve model parameters and process descriptions of the carbonate system in the MOM/ERGOM model system, we will perform parameter and process studies with the biogeochemical model ERGOM coupled to the 3D ocean circulation model MOM. We will study the impact of non-Redfieldish particulate organic matter and its mineralisation in the water column and vertical migrating zooplankton.

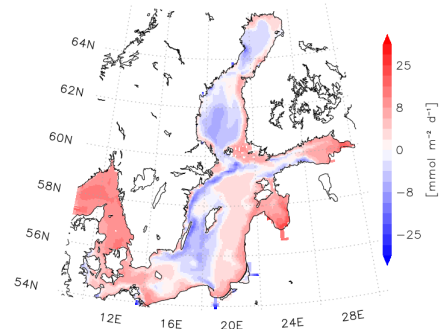


Figure 1: 30-year mean of air-sea CO₂ flux of the Baltic Sea, calculated with 3D-3nm-MOM/ERGOM model.

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<https://www.io-warnemuende.de/integral-home.html>

More Information

Project Partners

Uppsala University, Sweden / Finnish Meteorological Institute, Finland / Institute of Oceanology of the Polish Academy of Sciences, Poland / Tallinn University of Technology, Estonia / GEOMAR Helmholtz Centre for Ocean Research Kiel, Germany / Swedish Meteorological and Hydrological Institute, Sweden / University of Exeter, United Kingdom.

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