



Coupled assimilation of satellite temperature and chlorophyll observations for improved ecosystem predictions in the Baltic Sea

The CMEMS Monitoring and Forecasting Center for the Baltic Sea (BAL-MFC) uses NEMO coupled to ERGOM to compute reanalysis and forecasts for the Baltic Sea. Operationally, in situ observations of nutrients and oxygen are assimilated using the parallel data assimilation framework (PDAF, <https://pdaf.awi.de>) with a fixed ensemble read from model snapshots. In the EU-project SEAMLESS, the operational model setup builds the basis for enhancements by a fully dynamical data assimilation approach. For this, the coupled NEMO-ERGOM model system is augmented by the data-assimilation functionality of PDAF and NEMO-ERGOM is run in ensemble mode. Using an ensemble of 30 members, satellite surface temperature and chlorophyll observation are assimilated daily. We assess the impact of the assimilation on the forecast skill with a focus on the biogeochemical variables. In addition, additional ecosystem indicators, like trophic efficiency, pH, and phytoplankton community structure are analyzed. The developments on the data assimilation system are in wide parts generic and can also be applied with other model configurations or components. While the developments in SEAMLESS are independent from the BAL-MFC operational developments, they are made available to the operational service.

Lars Nerger, Yuchen Sun, Sophie Vliegen (Alfred Wegener Institute, Bremerhaven, Germany)