of GOCE geoid, new adaptive tuning of some observational errors, new Quality Control on the assimilated temperature and salinity vertical profiles, assimilation of satellite sea-ice concentration, week constraint imposed on temperature and salinity in the deep ocean (below 2000 m) to prevent drift. Since the real-time implementation of this system, the validation exercise continued, with for instance, the validation of the performance of the forecasts. Moreover, in parallel with the operational system, two other simulations over the same period have been performed. The first one is a free simulation (without any data assimilation) and the second one benefits only of the 3D-VAR large-scale biases correction in temperature and salinity. Some comparisons between the three simulations have been conducted to try to quantify the impact of each component in the system.

Overview of CMEMS BAL MFC Service and Developments

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Copernicus Marine Service (CMEMS) model component for the Baltic Sea is provided by a consortium formed by five national oceanographic institutes around the Baltic Sea: DMI-Denmark, BSH-Germany, FMI-Finland, MSI Tallinn University-Estonia and SMHI-Sweden. All five institutes have national obligations within operational oceanography. The consortium builds on a philosophy to join forces within operational oceanography in the Baltic Sea and shares the operational work load behind the Baltic service. We will present progress of our provided Baltic model products during the past 2.5 years within the CMEMS contract with Mercator-Ocean. This includes scientific progress and upgrades made in the modelling systems, improvements in the quality of the products and new products and parameters included in our service product portfolio.

A 1/24 degree resolution Mediterranean analysis and forecast modeling system for the Copernicus Marine Environment Monitoring Service

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The Mediterranean Forecasting System (MFS) is a numerical ocean prediction system that operationally produces analyses, reanalyses and short-term forecasts of the main physical parameters for the entire Mediterranean Sea and its Atlantic Ocean adjacent areas. This work is specifically focused on the description and evaluation of the analysis and forecast modeling system that covers the analysis of the current situation and produces daily updates of the following 10 days forecast. The system has been recently upgraded in the framework of the Copernicus Marine Environment Monitoring Service (CMEMS) by increasing the grid resolution from 1/16o to 1/24o in the horizontal and from 72 to 141 vertical levels, by increasing the number of fresh water river inputs and by updating the data assimilation scheme. The model has a non-linear explicit free surface and it is forced by surface pressure, interactive heat, momentum and water fluxes at the air-sea interface. In order to validate the modeling system and to estimate the accuracy of the model products, a quality assessment is regularly performed including both pre-operational qualification and near real time (NRT) validation procedures. Pre-operational qualification activities focus on testing the improvements of the quality of the new system with respect to the previous version and relies on past simulation and historical data, while NRT validation activities aim at routinely and on-line providing the skill assessment of the model analysis and forecasts and relies on the NRT available observations. The focus of this work is to present the new operational modeling system and the skill assessment including comparison with independent (insitu coastal moorings) and quasi-independent (insitu vertical profiles and satellite) datasets.

High resolution operational analysis and forecasts for the Mediterranean Sea biogeochemistry

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In the framework of the Mediterranean Monitoring and Forecasting Centre (Med-MFC) embedded within the European Copernicus Marine Environment Monitoring Services (CMEMS), we have upgraded the current operational modelling system for the analysis and short-term forecast of the biogeochemical state of the Mediterranean Sea, increasing the spatial resolution from 1/16 degree and 72 vertical levels to 1/24 degree and 125 vertical levels.

The high resolution version is based on the upgrade of the 3DVARBIO-OGSTM-BFM model system, which has been aligned with the Mediterranean physical model system in terms of the free-surface formulation and the river inputs configuration. Moreover, the data assimilation module that integrates the satellite surface chlorophyll concentration in the OGSTM-BFM has been parallelized, contributing, together with the optimization of the OGSTM, to increase the performance of the upgraded model system and to keep the total computational time within the target time set by CMEMS requirements.