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A 1/24 degree resolution Mediterranean analysis and forecasting physical system for the Copernicus Marine Service: description and skill assessment

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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 ocean state and produces daily updates of the following 10 days forecast.
The analysis and forecast system is composed by the hydrodynamic model NEMO (Nucleus for European Modelling of the Ocean) 2-way coupled with the third generation wave model WW3 (WaveWatchIII) and forced by ECMWF (European Centre for Medium-range Weather Forecasts) atmospheric fields. The model solutions are corrected by the 3DVAR data assimilation system (3D variational scheme adapted to the oceanic assimilation problem) with a daily assimilation cycle of Sea Level Anomaly and vertical profiles of Temperature and Salinity.
The system has been recently upgraded in the framework of the Copernicus Marine Environment Monitoring Service (CMEMS) by increasing the grid resolution from 1/16 to 1/24 degree 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.
The validation of the modeling system and the estimate of the accuracy of the numerical products are key issues to ensure reliable information to users and downstream services.
The focus of this work is to present the latest modeling system upgrades and the related improvements achieved by showing the model skill assessment including comparison with independent (insitu coastal moorings) and quasi-independent (insitu vertical profiles and satellite) datasets.