The CMEMS Mediterranean analysis and forecasting physical system latest upgrades: description and skill assessment

Emanuela Clementi (1), Jenny Pistoia (1), Damiano Delrosso (2,3), Romain Escudier (1), Massimiliano Drudi (1), Alessandro Grandi (1), Rita Lecci (1), Stefania Ciliberti (1), Sergio Cretí (1), Vladyslav Lyubartsev (1), Simona Masina (1,2), Giovanni Coppini (1), Nadia Pinardi (1,3)

(1) CMCC FOUNDATION, LECCE, Italy (emanuela.clementi@cmcc.it), (2) Istituto Nazionale di Geofisica e Vulcanologia, Bologna, Italy, (3) Department of Physics and Astronomy, University of Bologna, Italy

The Mediterranean Analysis and Forecasting System is a numerical ocean prediction system that operationally produces analyses and 10 days forecasts of the main physical parameters for the entire Mediterranean Sea and its Atlantic Ocean adjacent areas in the framework of the Copernicus Marine Environment Monitoring Service (CMEMS).

The 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 forecast initial conditions are produced by a 3D variational data assimilation system which considers a daily assimilation cycle of Sea Level Anomaly, vertical profiles of Temperature and Salinity from ARGO and ship CTDs and heat flux corrections with satellite SST.

The system has been recently upgraded by increasing the grid resolution from 1/16 to 1/24 degree in the horizontal, thus becoming fully mesoscale resolving and from 72 to 141 vertical levels; by increasing the number of fresh water river inputs and by updating the data assimilation scheme. Additional developments will be implemented in the next release of the operational system (April 2019) by including an upgraded SST relaxation to satellite observations close to midnight and the implementation of the Dardanelles strait as a lateral open boundary condition.

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.