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Development of a regional NEMO-based configuration for the Black Sea in the framework of Copernicus Marine Environment and Monitoring Service: recent developments and future perspectives

Stefania Angela Ciliberti (1), Elisaveta Peneva (2), Andrea Storto (1), Benedicte Lemieux-Dudon (1), Emin Özsoy (3), Giovanni Coppini (1), Simona Masina (1,4), Nadia Pinardi (1,5), and Atanas Palazov (6)

(1) CMCC FOUNDATION, Ocean Predictions and Applications (OPA) Division, Lecce, Italy (stefania.ciliberti@cmcc.it), (2) Sofia University "St. Kliment Ohridski", Sofia, Bulgaria, (3) Istanbul Technical University, Eurasia Institute of Earth Science, Istanbul,Turkey, (4) Istituto Nazionale di Geofisica e Vulcanologia, Sezione di Bologna, Italy, (5) Department of Physics and Astronomy, University of Bologna, Italy, (6) Institute of Oceanology, Bulgarian Academy of Sciences,Varna, Bulgaria

The Black Sea Monitoring and Forecasting Center (BS-MFC) is part of the Copernicus Marine Environment and Monitoring Service (CMEMS) since 2016 and provides regular and systematic information on the time-evolving Black Sea ocean state.

This study focuses in particular on the Black Sea model physics in the frame of CMEMS, as basis of near-real-time products and ocean retrospective analysis, from the modeling and the operational oceanography perspectives. Here, model setup and product quality assessment is introduced, describing the main characteristics of the Black Sea ocean circulation dynamics. The core model is based on the state-of-the art NEMO model and the primitive equations are discretized on a horizontal grid at 1/36°x1/27° resolution. It uses ECMWF (European Centre for Medium range Weather Forecasts) atmospheric fields (analysis and forecast) for computing the momentum, heat and water fluxes at the air-sea interface. Model solutions are corrected by the data assimilation system OceanVar (a 3DVAR variational scheme originally developed for the Mediterranean Sea and later extended for the Global Ocean and the Black Sea by the Euro-Mediterranean Centre on Climate Change).

The contribution will document also future updates in the next system releases, with main focuses on improved vertical resolution, data assimilation scheme and open boundary at the Bosporus Strait. The next BS-Currents model, which will enter into service in April 2018 as V4, is based on some relevant improvements in the model setup such as increased vertical resolution, which is demonstrating to better resolve vertical mixing processes and the Bosporus Strait as open boundary condition to improve the physical representation of the Black Sea general circulation and thermohaline properties at sub-regional scale, and updated data assimilation scheme with increased vertical resolution EOFs for the background vertical error covariance matrix.