Last improvements in the data assimilation scheme for the Mediterranean Analysis and Forecast system of the Copernicus Marine Service

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The Mediterranean Forecasting System (MFS) is a numerical ocean prediction system that produces analyses, reanalyses and short term forecasts for the entire Mediterranean Sea and its Atlantic Ocean adjacent areas. The system is now part of the Copernicus Marine Environment Monitoring Service (CMEMS) providing regular and systematic information about the physical state and dynamics of the Mediterranean Sea through the Med-MFC (Mediterranean Monitoring and Forecasting Center). MFS has been implemented in the Mediterranean Sea with 1/16o horizontal resolution and 72 vertical levels and is composed by the hydrodynamic model NEMO (Nucleus for European Modelling of the Ocean) 2-way online coupled with the third generation wave model WW3 (WaveWatchIII) and forced by ECMWF atmospheric fields at 1/8o horizontal resolution. The model solutions are corrected by the data assimilation system (3D variational-3Dvar scheme adapted to the oceanic assimilation problem, Dobricic and Pinardi, 2008) with a daily assimilation cycle of satellite Sea Level Anomaly (SLA) and vertical profiles of Temperature and Salinity. In this study we present a new estimate the of the background error covariance matrix with vertical Empirical Orthogonal Functions (EOFs) that are defined at each grid point of the model domain in order to better account for the error covariance between temperature and salinity in the shelf and open ocean areas. Moreover the Error covariance matrix is z-dependent and varies in each month. This new dataset has been tested and validated for more than 2 years against a background error correlation matrix varying only seasonally and in thirteen sub-regions of the Mediterranean Sea. Latest developments include the implementation of an upgraded 3Dvar (Storto et al. 2012) for a high-resolution model, 1/24o in the horizontal and 141 vertical levels

The roles of the sea ice thickness measurements from satellites in the TOPAZ system

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Sea Ice Thickness (SIT) is a key variable both in operational navigation and climate perspectives. Recently, a merged weekly product of SIT from two different satellites CryoSat2 and SMOS has been distributed on meereisportal.de, available during the winter months since October 2010 and named CY2SMOS. At present, the Arctic Marine Forecasting Center ice-ocean system (aka. TOPAZ) assimilates jointly most of the observed ocean and sea ice properties using the ensemble Kalman filter (EnKF), but SIT has not been included yet. The quality of the present operational sea ice thickness TOPAZ simulations are first assessed by comparison against SMOS data and the impact of SIT