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Performance and quality assessment of the recent updated CMEMS global ocean monitoring and forecasting real-time system

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Since May 2015, Mercator Ocean opened the Copernicus Marine Environment and Monitoring Service (CMEMS) and is in charge of the global eddy resolving ocean analyses and forecast. In this context, Mercator Ocean currently delivers in real-time daily services (weekly analyses and daily forecast) with a global 1/12° high resolution system. The model component is the NEMO platform driven at the surface by the IFS ECMWF atmospheric analyses and forecasts. Observations are assimilated by means of a reduced-order Kalman filter with a 3D multivariate modal decomposition of the forecast error. It includes an adaptive-error estimate and a localization algorithm. Along track altimeter data, satellite Sea Surface Temperature and in situ temperature and salinity vertical profiles are jointly assimilated to estimate the initial conditions for numerical ocean forecasting. A 3D-Var scheme provides a correction for the slowly-evolving large-scale biases in temperature and salinity.
R&D activities have been conducted at Mercator Ocean these last years to improve the real-time 1/12° global system for recent updated CMEMS version in 2016. The ocean/sea-ice model and the assimilation scheme benefited of the following improvements: large-scale and objective correction of atmospheric quantities with satellite data, new Mean Dynamic Topography taking into account the last version of GOCE geoid, new adaptive tuning of some observational errors, new Quality Control on the assimilated temperature and salinity vertical profiles based on dynamic height criteria, assimilation of satellite sea-ice concentration, new freshwater runoff from ice sheets melting, ...
This presentation will show the impact of some updates separately, with a particular focus on adaptive tuning experiments of satellite Sea Level Anomaly (SLA) and Sea Surface Temperature (SST) observations errors. For the SLA, the a priori prescribed observation error is globally greatly reduced. The median value of the error changed from 5cm to 2.5cm in a few assimilation cycles. For the SST, we chose to maintain the median value of the error to 0.4°C. The spatial distribution of the SST error follows the model physics and atmospheric variability. Either for SLA or SST, we improve the performances of the system using this adaptive tuning.
The overall behavior of the system integrating all updates reporting on the products quality improvements will be also discussed, highlighting the level of performance and the reliability of the new system.