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The Copernicus Marine Environment Monitoring Service global ocean 1/12° physical reanalysis GLORYS12V1: description and quality assessment

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Over the past years, Mercator Ocean has been regularly upgrading its global ocean physical reanalysis through improvements in the ocean model, assimilation scheme and assimilated data sets. The last upgrade concerned the eddy-permitting reanalysis GLORYS2V4 (1/4° horizontal resolution and 75 vertical levels) covering the altimetry era (1993-2016). R&D activities have been conducted at Mercator Ocean to propose, in the framework of Copernicus Marine Environment Monitoring Service (CMEMS), a global eddy-resolving physical reanalysis GLORYS12V1, covering the same time period and based on the current real-time global forecasting CMEMS system (1/12° horizontal resolution and 50 vertical levels).

The model component is the NEMO platform driven at the surface by ECMWF ERA-Interim reanalysis. Observations are assimilated by means of a reduced-order Kalman filter. Along track altimeter data (Sea Level Anomaly – SLA), satellite Sea Surface Temperature (SST), Sea Ice Concentration and in situ temperature and salinity (T/S) vertical profiles are jointly assimilated. Moreover, a 3D-VAR scheme provides a correction for the slowly-evolving large-scale biases in temperature and salinity.

Compared to GLORYS2V4, GLORYS12V1 reanalysis benefits from the following main updates: global steric effect added to the model sea level, new seasonal observation error for assimilation of in situ T/S vertical profiles, adaptive tuning of observational SLA and SST errors, additional Quality Control on the assimilated T/S vertical profiles based on dynamical height criteria, assimilation in the deep ocean (below 2000m) of climatological T/S vertical profiles using a non-Gaussian error at depth.

This presentation will provide an overall assessment of this first global 1/12° ocean reanalysis highlighting the level of performance and the reliability of this new eddy-resolving physical reanalysis. The results of the latter will also be compared with those of reanalysis at 1/4° resolution.