



GREP: Evaluation of the Copernicus Marine Service Global Reanalysis Ensemble Product: deriving uncertainty estimates for 3D T and S variability in the ocean.

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Global ocean reanalyses are homogeneous 3D gridded descriptions of the physical state of the ocean spanning several decades, produced with a numerical ocean model constrained with data assimilation of satellite and in situ observations. The evaluation of global ocean reanalyses, and of how well they capture ocean variability, has progressed these recent years thanks to the CLIVAR/GSOP/GODAE Ocean Reanalyses Intercomparison Project ORA-IP (Balmaseda et al 2015). During the MyOcean project, several high resolution ($1/4^\circ$ horizontal grid) reanalyses based on NEMO but produced with different tunings and by different institutes, were evaluated jointly using common validation guidelines (Masina et al, 2015). The Copernicus Marine Environment Monitoring Service CMEMS (marine.copernicus.eu) Global Monitoring and Forecasting Center now takes advantage of the diversity of ocean reanalyses currently developed with that same NEMO model grid (ORCA025 at $\frac{1}{4}^\circ$) to propose a multi-model ensemble product, which spread allows uncertainties or error bars to be estimated. In a number of regions, the ensemble mean may even provide a more reliable estimate than any individual reanalysis product.

Four reanalyses have been selected to contribute to the project; GLORYS2V4 from Mercator Ocean (Fr), ORAS5 from ECMWF, FOAM/GloSea from Met Office (UK), and C-GLORS from CMCC (It). The four different time series of global ocean 3D monthly estimates have been post-processed to create the new product called GREP (Global Reanalysis Ensemble Product), covering the recent period during which altimetry observations are available: 1993-2015. Starting from April 20th 2017, the ensemble mean and standard deviation of the ensemble, as well as the four individual members for the period 1993-2015, are thus made available on a $1^\circ \times 1^\circ$ grid and monthly frequency. The time series will be extended by one year each year.

In the presentation, we will describe the results of the scientific qualification of the ensemble product and compare the ensemble mean performance to that of the individual members, with respect to satellite and in situ observations.