

GLOBAL EDDY-PERMITTING OCEAN REANALYSES and SIMULATIONS of the PERIOD 1992 to PRESENT

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The GLORYS (Global Ocean reanalysis and Simulation) Project is motivated by the need of a realistic description of the ocean state and variability over the recent decades, at the global scale, and at the scale of the ocean basins and regional seas (<https://reanalyses.org/ocean/overview-current-reanalyses>). The French research community (CNRS), the operational ocean forecasting center MERCATOR-Ocean (<http://www.mercator-ocean.fr>) and the CORIOLIS data center (<http://www.coriolis.eu.org/>), have gathered their skills and expertise in physical oceanography, ocean modeling and data assimilation, to carry out global ocean reanalyses at eddy scale resolution for the period 1992 to present. This reanalysis effort is part of the project MyOcean granted by the European Commission within the GMES Program (7th Framework Program, <http://www.myocean.eu/>).

This paper will present the GLORYS reanalysis system relies on the ORCA025 global model configuration developed by the DRAKKAR consortium (<http://www.drakkar-ocean.eu/>), on the basis of the NEMO3 ocean/sea-ice general circulation model (<http://www.nemo-ocean.eu/>). ORCA025 uses a horizontal grid resolution of 1/4° and 75 vertical levels, which permits the growth of mesoscale eddies. The data assimilation scheme developed for the operational forecasting systems of Mercator Océan is used in this reanalysis system. It is based on a reduced order Kalman filter (SEEK formulation) and an incremental analysis update, in conjunction with a bias correction scheme for temperature and salinity. AVHRR Sea Surface Temperature, along track Sea Level Anomalies and in situ Temperature and Salinity profile data are assimilated for the ocean component. In parallel, Sea Ice Concentration data (CERSAT, <http://cersat.ifremer.fr/>) are assimilated to constrain the LIM sea ice model. At the surface, the GLORYS reanalyses are forced with atmospheric surface variables from ERA-INTERIM atmospheric reanalysis (<http://www.ecmwf.int/research/era/do/get/era-interim>) at high frequency (3 hours). In parallel, a control experiment with no observation assimilated is integrated, to estimate the benefit of data assimilation.

The paper will present assessments and measures of the quality of GLORYS products obtained from a validation protocol based on recommended GODAE (<https://www.godae-oceanview.org/>) and CLIVAR-GSOP reanalysis diagnostics, and from a comparison with the control simulation. The scientific value of the GLORYS reanalysis products will be illustrated with results from independent scientific studies obtained in a wide range of areas such as climate, seaice, mesoscale processes, mixed layer processes, etc.