Assessment of the hindcast, nowcast and forecast capabilities of the Mercator-Ocean high resolution ocean forecasting system in the Global and Atlantic and Mediterranean basins.

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In the framework of the European project GMES/MyOcean, Mercator-Ocean has been designing a hierarchy of ocean analysis and forecasting systems based on numerical models of the ocean and data assimilation methods. Since April 2008, Mercator-Ocean runs an Atlantic and Mediterranean system at 1/12° between 20°S and 80°N. Since a few months, a global system, with the same horizontal and vertical resolution (50 levels on the vertical with a surface refinement), runs also in an operational mode. These two systems are eddy resolving. The ocean and sea ice models are based on the NEMO code. The data assimilation algorithm is a reduced order Kalman filter using 3D multivariate modal decomposition of the forecast error covariance. The system assimilates conjointly altimeter data, SST and in situ observations (temperature and salinity profiles, including ARGO data) in order to provide the initial conditions required for numerical ocean prediction.

The main characteristics of the assimilation system are (i) the background error covariances calculated from a free oceanic simulation, (ii) the adaptive error variance, (iii) the use of the localization technique and (iv) the use of the IAU (Incremental Analysis Update) procedure where analysis increments are inserted at every time step over the same period as the data assimilation window.

The real time operation of these systems produce each week realistic 3-dimensional oceanic conditions (temperature, salinity, currents,. . .) two weeks back in time (hindcast and nowcast) and a one or two weeks forecast, driven at the surface by atmospheric conditions from the European Center for Medium Range Weather Forecast (ECMWF). Moreover, the Atlantic and Mediterranean system is operated daily to produce 7 days ocean forecasts with daily updates of the ECMWF atmospheric forcing.

A new version of the regional system is planned to replace soon the actual one with many improvements concerning the ocean model and the assimilation scheme. Improvement, assessment and validation of the high resolution regional system is of crucial importance because it represents a benchmark for the future global high resolution forecasting system which will be the reference at the end of the European MyOcean project in 2012.

After a brief description of the systems, we will present recent validation results. Different comparisons with other systems or independent data as well as the impact of daily updates of the atmospheric forcing will be shown.