The global Mercator Ocean analysis and forecasting high resolution system and its main future updates

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In April 2013, Mercator Ocean has performed a major upgrade of the global 1/12° high resolution system. This system currently delivers daily services, and includes numerous improvements related to the ocean/sea-ice model and the assimilation scheme. 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. 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.

In April 2015, Mercator Ocean will open the Copernicus Marine Environment Monitoring Service and will be in charge of the global ocean at eddy resolving resolution. In this context, R&D activities conducted during the end of the MyOcean2 and MyOcean follow-on projects to deliver an improved version of the global system will continue throughout 2015. The main new updates we plan to integrate in the next version of the global system concern:

1) A new vertical mixing scheme k-epsilon: vertical physics has been explored with a special focus on the turbulent closure problem to improve the representation of temperature and salinity in the Mixed Layer Depth.

2) An adaptive tuning of observations errors: as the prescription of observation errors in the assimilation systems is often too approximate, some diagnostics have been developed. These diagnostics consist in the computation of the Desroziers ratio which is a function of observation errors, innovations and residuals. It helps to identify inconsistency on the specified observation errors and to tune an adaptive weight coefficient acting on the error of each assimilated observation.

3) The assimilation of sea-ice concentration observations: it is introduced in the Mercator operational systems in order to extent the assimilation control to the sea-ice model component.

The presentation is focused on product quality improvements, highlighting the level of performance and the stability of the new updates of the system.