Enrichment of Ensemble Based Assimilation Scheme using Ocean Forecast and Analysis

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Mercator is the French counterpart to the Global Ocean Data Assimilation Experiment (GODAE) and provides since 2001 operational ocean forecast and analysis. The new generations of operational systems (global and regional) are fully involved in the MyOcean project and deal with Ocean PArallelise (OPA [1]) model and multivariate multi data assimilation scheme. This scheme is a version of the Singular Evolutive Extende Kalman filter (SEEK, [2]) using multi-data sources: SLA from altimetry missions, ARGO profiles of temperature and salinity, SST from satellite. A tree dimensional background error matrix (**B**) is computed using an ensemble of anomaly from a past 8 years free run. A spatial scale treatment is made to apply different corrections depending on the physical structures of the local ocean state. The whole ocean column is corrected, even if the correction is computed on a reduce space (barotropic height, temperature, salinity, 2 components of the velocity). The present study shows how the information included in the operational output can be used to enrich the actual anomaly ensemble. Each week on Wednesday, two weeks forecasts are computed from the analysis of the day, which is a 2 weeks backward best analysis (as all the data available have been collected from data centers, both satellite and in situ measurements.) So for the same week period, best analysis and forecasts are available. The differences between these two fields give some indication on the system error from both model (forcing fields, numerical schemes etc…) and assimilation scheme (choice of the reduced space, choice of **B** etc...) Combination of a new ensemble computed from system outputs and anomalies from free run has been tested over a four month period and shows a modification on the vertical structure of the correction, especially in regions with mesoscale activity. Compared to independent data sets, the analysis is more realistic, even for unobserved states as velocity and salinity and assimilation statistics are improved.
Keywords: data assimilation; ensemble method; in situ data; satellite data

References

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