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Recent developments of the statistical parameterisations for sequential operational assimilation scheme

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The French MERCATOR project is developing several operational ocean forecasting systems to take part in the Global Ocean Data Assimilation Experiment (GODAE). Prototype systems are designed to simulate (1) the Atlantic and Mediterranean Sea (from 1/3° to 1/15°), and (2) the global ocean circulation (from 2° to 1/4°). A new generation of fully multivariate assimilation system referred to as SAM2v1 has been developed from the SEEK (Singular Evolutive Extended Kalman) algorithm (developed at LEGI, Grenoble) and will be operationally operated on 2006. As the previous operational multivariate system, it allows to assimilate vertical profiles and SST in addition to altimetry (JASON, ERS-2 and GFO), but in larger quantity at a lower cost. The SAM2v1 scheme is a Reduced Order Kalman Filter using a 3D multivariate modal decomposition of the forecast error covariance. The use of the SEEK filter and its 3D modal representation for the error statistic is intended to overcome some of the limitations of the previous OI scheme in highly inhomogeneous, anisotropic, and nonseparable regions of the world ocean such as shallow areas, as well as in the surface layer. Unlike the original SEEK filter, the SAM2v1 scheme does not evolve the error statistics according to the model dynamics. This would require prohibitive costs given the size of the operational systems. However, some form of evolutivity of the background error is taken into account by considering different error sub-spaces related to the season for each analysis. An adaptive scheme adjusting the variance of the forecast error has also been implemented in order to improve the internal coherency. The major features of the SAM2v1 parameterisation will be presented and a particular focus will be done on the specification of the forecast error sub-spaces. The impact of the SAM2v1 scheme will be illustrated using realistic hindcast experiments.