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An overview of ensemble covariance developments in NEMOVAR

Monday, 17 May 2021 14:35 (15 minutes)

This presentation provides an overview of methods for using ensembles to define background-error covariances in variational data assimilation (DA) with an emphasis on the global ocean. The methods that are described have been developed for NEMOVAR in support of operational DA at ECMWF and the Met Office. Various localized-ensemble and hybrid formulations of the background-error covariance matrix (**B**) have been implemented in NEMOVAR. While the basic methodologies are similar to those used in NWP, the underlying modelling and estimation algorithms are substantially different in order to account for specific characteristics of the ocean DA problem, such as the presence of irregular lateral boundaries and the diversity of ocean scales. The computational cost of applying ensemble-based covariance operators with high-resolution global ocean models is significant, so considerable effort has been devoted to the design and optimization of the algorithms. Key features include the use of inexpensive and scalable iterative diffusion solvers for parameter filtering and correlation modelling; the capacity to apply a diffusion-based localization operator on a coarse-resolution global grid; and the availability of an affordable method for estimating accurate normalization factors when vertical correlation parameters are flow dependent. This presentation will focus on the computational aspects of ensemble **B** modelling in NEMOVAR. Other presentations at the workshop will describe results from the ECMWF and Met Office NEMOVAR-based systems which use different ensemble **B** formulations.

Which theme does your abstract refer to?

Data assimilation methods (algorithmic developments in variational, ensemble and hybrid DA, covariance modelling, etc)

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