

Hybrid ensemble/variational data assimilation in the North-West European shelf at 7km resolution

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Abstract

The Met Office is developing a hybrid-3DEnVar data assimilation (DA) system for the North-West European shelf. Initial development is being conducted within the AMM7 CO9 configuration, a 7 km resolution shelf-seas model, with the longer-term goal of transferring this capability to the higher-resolution AMM15 (1.5 km) system currently producing operational deterministic forecasts. While the Met Office has experience applying hybrid ensemble data assimilation in the global ocean, this represents its first implementation within a regional shelf-seas system.

The ensemble is generated by running an ensemble of data assimilations (EDA) with perturbed observations, with each member forced at the surface by a different member of the Met Office atmospheric ensemble and including stochastic ocean model perturbations and lateral boundary perturbations. The ensemble then provides a flow-dependent estimate of the background error covariances which is combined with the existing modelled background error covariances in a hybrid-3DEnVar scheme in the DA for each member.

We present progress on the implementation of the ensemble system in AMM7 CO9, focusing on ensemble performance and spread. We assess how well the ensemble represents underlying uncertainty by validating against observations; identifying where spread is appropriately captured, as well as where it may be underestimated.