

# **A practical ensemble technique for the estimation of spatially inhomogeneous, model-dependent observational errors**

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Most least-squares algorithms for data assimilation require estimates of both background error covariances and observational error variances. The relative size of observational and background errors guides the influence of an observational increment, making the specification of these errors an important part of designing an assimilation system. Observational error estimates typically lump together measurement (and instrumental) error sources and representativeness error. When doing data assimilation with a coarse-resolution dynamical model, the errors of representation can be the dominant contribution to observational errors. Unlike resolved model errors, which influence the background error estimates, representativeness errors are associated with unresolved scales and physical processes in the model. The size of these errors will vary by geographic region and will also vary from model to model.

Here we present a practical approach for estimating model-dependent, spatially varying observational error variances. The method uses ensemble model simulations to compute an expected value and uncertainty associated with the observational error variance. We illustrate the method with a low-order model and show its application in the POP2 global ocean general circulation model.