A randomisation method to quantify the size of the initialisation constraint term in 4D-Var.

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Diagnosing appropriate operational 4D-Var covariances is an important task in order to produce an efficient and accurate assimilation. We consider using a randomisation method to diagnose the combined variance of the background error term and the initialisation constraint term (Jc) used operationally at the UK Met Office by solving an alternate assimilation problem. The result can then be compared with the background error variance to identify the size of Jc. This is useful as this gives an additional measure for tuning Jc which complements information given by an examination of the components of the final cost function J.