

Aposteriori Error Estimates in Variational Data Assimilation

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In this talk we focus on variational data assimilation, specifically, on both weak and strong constraint 4D-Var.

The analyses provided by data assimilation are affected by errors in the data and in the model, as well as by errors in the misspecification of various error covariances. We develop a posteriori error estimates that quantify the effect of each of these errors on the analysis. The resulting estimates are of the form

$$E[\Delta x_0^a] = \langle \alpha, \Delta y \rangle + \langle \beta, \Delta M \rangle + \langle \gamma, \Delta R \rangle + \langle \theta, \Delta B \rangle$$

where E is a scalar metric of accuracy for the analysis, and $\langle a, \Delta b \rangle$ are dot products in appropriate spaces. The rigorous procedure to find the weights of each of the errors is a new methodology that will be presented in this talk.

The application of the new error estimation methodology to relevant testcases will also be presented.