nonlinear/non-Gaussian Lagrangian data assimilation

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The assimilation of oceanic or atmospheric data that takes into account path information is generally highly non-linear and non-Gaussian. The assimilation problem is compounded by the operational necessity to relate statistics along paths to statistics on fixed grids, which are more commonly used for the numerical computation of model flows.

I will present a comparison of the Path Integral method (PIMC), the Diffusion Kernel Filter (DKF), and the more common Extended and Ensemble-based Kalman Filter estimation strategies in the assimilation of model and data. The outcomes are compared to a benchmark calculation of the same. The comparison will highlight the relative merits of the methods, particularly of the PIMC and DKF. Moreover, the calculation will be used to argue that statistical convergence and the choice of the right estimator are crucial in arriving at meaningful nonlinear/non-Gaussian estimators.