Projected ensemble data assimilation

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Ensemble data assimilation is unable to reduce the error estimate for high-dimensional systems when used with small ensemble size. A typical remedy is dimesion reduction by localization. Though localization reduces the error substantially for both linear and nonlinear data-assimilation methods, the former ones considerably outperform the latter ones in a quasi-linear regime. We propose a further dimension reduction based on projection and show substantial error decrease of a nonlinear data-assimilation method in a challenging data-assimilation setup with small ensemble size and ample observations.