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Sequential data assimilation of satellite data into a coastal hydrodynamic model.

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An important issue in Ensemble Kalman Filter (EnKF) application that has not been widely addressed is maintaining realistic spread between the ensemble members, so that model prediction error is well described. We present a new approach to this problem and compare with the standard approach widely used in the literature of applying spatially correlated noise just prior to the analysis step. We demonstrate that through the use of stochastic forcing data, model error can be introduced in a physically realistic fashion. The approach is demonstrated using a series of EnKF twin experiments for a hydrodynamic ocean circulation model of Port Phillip Bay, Australia. Synthetic observations of sea-surface temperature were generated at intervals of two days by contaminating a single model run output with white noise of known variance. These sea-surface temperature observations were then assimilated into a simulation of Port Phillip Bay using the same ocean model but with degraded initial conditions. The experiments show that both methods produce reasonable results, but the new approach typically yielded superior results.