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A shadowing-based inflation scheme for ensemble data assimilation

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Abstract

Artificial ensemble inflation is a common technique in ensemble data assimilation, whereby the ensemble covariance is periodically increased in order to prevent deviation of the ensemble from the observations and possible ensemble collapse. This manuscript introduces a new form of covariance inflation for ensemble data assimilation based upon shadowing ideas from dynamical systems theory. We present results from a low order nonlinear chaotic system that supports using shadowing inflation, demonstrating that shadowing inflation is more robust to parameter tuning than standard multiplicative covariance inflation, outperforming in observation-sparse scenarios and often leading to longer forecast shadowing times.

Keywords: data assimilation, shadowing, covariance inflation, chaotic

10 dynamics, ensemble methods

2010 MSC: 37C50, 62M20, 93E10, 93E11

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