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Dimension-reduced projection 4DVar based on an orthogonal expansion of filtering function

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The dimension-reduced projection four dimensional variational data assimilation (DRP-4DVar) is a new approach proposed by Wang et al (2010). The ideal experiments (Liu et al, 2011), single-point experiments, observing system simulation experiment, and real case studies have demonstrated its performance is comparable to or even better than some available methods (e.g., standard 4DVar and EnKF). Use of historical prediction samples in DRP-4DVar makes it more time-saving. However, updating of its ensemble samples in assimilation cycles is still expensive. To reduce the size of ensemble could be an efficient way to save its computing time. For this purpose, a new version of DRP-4DVar is proposed here, using much fewer samples that need updating in assimilation cycles and are extended through an orthogonal expansion of filtering function. It is more time-saving than the old version and includes localization implicitly. Numerical tests based on the Lorenz-96 model to assess its performance are also included.

References

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