

Anonymous Referee #2

Review

The paper titled “Emulation of an ensemble Kalman filter algorithm on a flood wave propagation model” has compared the ensemble Kalman filter (EnKF) to a method based on the Best Linear Unbiased Estimator (BLUE) algorithm, for a shallow water flood wave propagation model.

The main contribution the authors seemed to make is that the background error in the EnKF can be replaced with a computationally cost-effective background error estimator based on the BLUE algorithm. The authors have gone at great length to describe their experiment around this objective, but have rarely quantified the level of cost effectiveness achieved. Without a demonstration of this contribution, there is nothing new in the paper.

Answer 1:

Concerning the cost effectiveness of the EEnKF (BLUE) method compare to the EnKF one, we now state clearly the $O(10000)$ members are necessary in order to achieve and order 1% accuracy in the statistics of the assimilation procedure. We also indicate that each member requires the integration of the model during the time separating two observations, which is the typical time for a forecast run. Consequently, the parameterisation of the EEnKF error covariance matrix reduced by a factor $O(10000)$ the computational time of the propagation between two assimilation cycles. We now discuss this point more clearly in the manuscript.

Additionally, the paper needs to be better organized. For example, in the introduction section in lines 7-25, so much detail was presented without providing enough back-ground information first. The presentation of the results needs improvement, with clear connection and rational between the results.

Answer 2:

We have written a new version of the abstract and the introduction to avoid redundancy and useless information. The main results of the work are now more clearly stressed.

Grammar should be improved (check your use of ‘is’ and ‘was’), please proof read before re-submission.

Few corrections are below:

- Page 6965, line 12: insert ‘have’ between ‘studies’ and ‘shown’
- Page 6965, line 14: change ‘variational’ to ‘variational’
- Page 6975, line 7: remove the brackets around “Li and Xiu, 2008” and change to “Li and Xiu (2008)”

Answer 3:

This last remark can't be taken into account because the brackets around “Li and Xiu, 2008” are caused by the HESS template reference system.

- Page 6978 line 3: change 'is' to 'was' Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 6963, 2013.

Answer 4:

We thanks Reviewer #2 for these useful remarks that we have taken into account.