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Interactive comment on "An Offline Framework for High-dimensional Ensemble Kalman Filters to Reduce the Time-to-solution" *by* Yongjun Zheng et al.

Anonymous Referee #1

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The paper "An offline Framework for High-dimensional Ensemble Kalman Filters to Teduce the Time-to-solution" by Zheng et al. is, as far as the reviwer is aware, the first empirical study of the maximized wall-clock efficiency of both online and offline approaches to ensemble Kalman filterting as used in an operational context.

1 General Comments

- The paper utilizes the LESTKF, yet the only mathematical description is of a general ETKF-like filter. A subsection on how the ESTKF, and a section on localiza-

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Discussion paper

tion (and implementation challanges with localization therein) would greatly help the reader.

- In the experimental design section (4.2.1 in this draft), the choice of randomly selecting the observation points is concerning, a more uniform, or atleast reproducible approach would instill more confidence in the methodology.
- Again in the experimental design, if the aim is to reproduce operational conditions, why is more realistic data, say generated from some model like SPEEDY or WRF not used?
- Again in the experimental design section, operationally we consider the amount of observations as being three orders of magnitude lower than the state space, yet the choice made in this paper is only one order of magnitude lower. This might bias the results in favor of the offline approach.
- Equation 17 on page 22 should have 14 in the denominator as the mean is estimated, and not exactly known. This fact is used earlier in the EnKF description.
- In the conclusions (section 5 in this draft) maybe don't use bullet points, and try to more fluidly outline the main results? Though this is not that much of an issue.

2 Technical Corrections

- p1l17, 'for intermittent'.
- p3l32, 'demands substantial'
- Figure 7 is of a particularly low DPI, and looks jarring compared to the other figures. Perhaps a flat 2D figure could convey the same information more clearly?

- p22l11, maybe use 'longer' instead of 'larger' in reference to time?

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