

Interactive comment on “Operational hydrological data assimilation with the Retrospective Ensemble Kalman Filter: use of observed discharge to update past and present model states for flow forecasts” by H. K. McMillan et al.

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I am afraid that the setup of the Retrospective EnKF (REnKF) is not theoretically correct. The REnKF described in this paper is totally different from that described in the original papers [Pauwels and De Lannoy, 2006; Pauwels and De Lannoy, 2009].

The REnKF should update the model states within $t-n$ to t simultaneously, and then rerun the model from $t-n+1$ to $t+1$ for model prediction [Pauwels and De Lannoy, 2009].

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However, in this paper, the author update the states at $t-n$ first and run the model from $t-n$ to t to recalculate the flow prediction; and then update the states at $t-n+1$ using the SAME observation and run the model from $t-n+1$ to t to recalculate the flow prediction... This process is repeated from $t-n$ to t , which means they are using one observation for n times. The prediction recalculated based on the updated states contains the information from the observation, which violates the basic assumption of EnKF that model prediction error and observation error should be independent.

I think the authors may need further check the papers by Pauwels and De Lannoy [2006] and Pauwels and De Lannoy [2009] to make sure the setup of REnKF is correct.

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