**Hydrology and Earth System Sciences Discussions**

## *Interactive comment on* "Adaptive correction of deterministic models to produce accurate probabilistic forecasts" *by* P. J. Smith et al.

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This is an interesting paper that presents a framework for implementation data assimilation procedure and Kalman filter to existing deterministic hydrologic model. The authors claim that the procedure is practical and easy to implement. There is a definitely a need for such a procedure although I'm not entirely convinced that the procedure is easy to implement regardless of the deterministic method that is used.

My comments below which are mainly editorial: Title: There are commonly used adjectives that are associated with probabilistic forecast. If the described procedure improved the accuracy of the mean of the forecast you might want to consider adjectives such as skill and/or reliability. Accuracy might be a better fit for a deterministic forecast.

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The introduction presents a concise review of techniques and issues in DA. It is mainly point to the difficulties in describing the stochastic nature of the various error sources due to their time and processes dependency. There is a missing statement in the introduction with respect to the objective/s and the knowledge gap or the specific problem/s that this study desire to solve.

P. 598 – Paragraph 1: You might want to look at: Shamir et al., 2010 (reference below) which is an example for ensemble extended Kalman Filter, another practical approach that deals with non linearity of the filtering problem.

I assume that the novelty of the manuscript is presented in this section. The gain which is a dynamically derived variable as function of the variance of the forecast and the observation error variance, in this manuscript being described as 9 different statistical models. - q is undefined

P 600 below eqn. 3 - unclear statement " evolved stochastically according to local level or generalized random walk models - please explain.

p. 608 bottom of the page – please explain the statement such biases often exist . . . to achieve acceptable forecasting model'

I am unclear for the purpose of presentation of the upper panes in figures 3 and 4 and their diagnostic inference. You might want to elaborate.

Figure 1 (map) is unclear. I cannot see the forecast points and relevant auxiliary information that is being expected by looking at a map.

Figure 5 and 6 the shaded uncertainty bound are barely visible.

Reference: Shamir, E., B-J. Lee, D-H. Bae, and K. P. Georgakakos (2010). Flood Forecasting in Regulated Basins Using the Ensemble Extended Kalman Filter with the Storage Function Method. J. Hydrol. Eng. 15, 1030