**Hydrology and
Earth System
Sciences**

Open Access

Discussions

Interactive
Comment

Interactive comment on "Accounting for three sources of uncertainty in ensemble hydrological forecasting" *by* A. Thiboult et al.

Anonymous Referee #2

Received and published: 14 October 2015

General comments

The paper analyses different descriptions of uncertainty for hydrological ensemble forecasting and discusses their relative merit. It provides a valuable contribution to the research on probabilistic hydrological forecasting. However, different assumptions are made that may have a significant impact on the results and the general conclusions of the study. More elaborate discussions of the impact of these assumptions are needed (see specific comments below).

Specific comments

Page 7183, line 15. The term 'open loop scheme' may not be familiar to all readers. It is explained later in Section 2.

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

Page 7185, line 7-8. Not clear why conversion to local time reduces the forecast horizon?

Page 7185, line 10-14. Why first downscale and then aggregate to catchment rainfall? You could derive catchment rainfall directly from the ECMWF forecast.

Page 7185, line 14-18. Pre-processing of meteorological forecasts is widely used in hydrological forecasting systems to improve forecast accuracy and reliability. Since this is not done in the study, the value of the rainfall forecast will most probably be underestimated.

Page 7187, line 20. The H operator has an index t in the equation. I would not expect H to be time varying.

Page 7188, line 5-6. Different variants of the EnKF have been proposed in literature. Which method is applied here, and why?

Page 7188, line 21-22. How is reliability and accuracy evaluated in the tuning of the EnKF?

Page 7188, line 22-27. Only uncertainty in model forcing is assumed, and hence this uncertainty should compensate also for other model uncertainties such as parameter uncertainty. Model parameter uncertainty could be included in the EnKF. This would most likely improve the reliability of the EnKF since this would add uncertainty in the forecast period by propagation of parameter uncertainty.

Page 7188, line 27-28. The definition of the state vector is not clearly described. The state vector is uniquely defined by the system model. Typically, for lumped, conceptual rainfall-runoff models it will consist of storages of the different conceptual reservoirs.

Page 7194, line 7-8. This illustrates the problem of not pre-processing rainfall forecasts cf. comment above.

Page 7195. The results for the EnKF are due to an incomplete description of the

uncertainty. It provides a good description of the initial uncertainty but this is quickly washed out of the system as forecast lead time increases. Use of a more elaborate description of the uncertainty in the EnKF would improve the reliability, e.g. by including model parameter uncertainty cf. comment above.

Page 7196. I think the lack of pre-processing of the rainfall forecast ensemble can explain the small impact observed of using a probabilistic rainfall forecast.

Page 7198, line 20-23. Not clear why this would correspond to an optimal EnKF?

Page 7198, line 26-28. Not clear.

Page 7198. Figure 12 is not referred in Section 3.5.

Page 7200, line 5-10. There seems to a contradiction here. First, it is stated that the EnKF does not provide a satisfactory uncertainty propagation. And then it is stated that the EnKF is the component that provides the most dispersion.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 7179, 2015.