Hydrology and
Earth System
Sciences
Discussions

Interactive comment on "Relative effects of statistical preprocessing and postprocessing on a regional hydrological ensemble prediction system" *by* Sanjib Sharma et al.

Anonymous Referee #3

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The manuscript describes a comparative analysis of pre and post processing approaches and their contributions to flood forecasting performance in the Middle Atlantic Region. The analysis starts by evaluating the hydrology model performance. Then authors evaluate one pre processor and confirm that it improves the skill of raw precipitation forecasts. Next they evaluate two post processors and select the most performing one. Finally, authors evaluate multiple cases : raw, with or without pre and post processors. The analysis focuses on two periods for the evaluations, and 4 basins of different sizes. Authors conclude that post processing for flood forecasting is necessary and provides the largest skill increase. Pre –processing appears unnecessary.

The paper is very well written and organized. The approach, application and conclusion are of interest to the HESS community which has published extensively on ensemble flow forecasting. I have some moderate and minor comments below that would need to be addressed.

Moderate comments:

- The pre-processor is evaluated for 6 hourly 95th percentile events but is not evaluated for aggregated period events, which ultimately drive to floods. There is therefore a disconnection between the "value" of the post processor when evaluated independently, and the "value" of the pre –processor when verifying floods. The pre-processor has not been evaluated for the same "events".

- The conclusion that post processing only is needed to improve the skill of flow forecast seems to be based on statistics only and therefore you might get the right answer for the wrong reasons. The post processor maybe have the largest "value" but it does not mean that pre-processing steps should be skipped. I strongly recommend the authors to modify the conclusion to reflect that nuance.

- Literature review and contribution of the paper and conclusion: A HEPEX blog by Boucher A. M. (2015) provides a summary of the contribution of previous papers. She refers to the papers also mentioned below. 1) The literature and the insight provided by this experiment should be put in perspective with what has been done and found by others before.

2) The fact that spatially disaggregated modeling is used might not be enough because there is no insight related to that modeling structure to the results. I would suggest framing the contribution differently.

Boucher A. M. (2015) Pre-, post-processing or both? HEPEX Blog - (https://hepex.irstea.fr/pre-post-processing-or-both/).

Kang T.-H., Kim Y.-O. and Hong I.-P. (2010) Comparison of pre- and post-processors

for ensemble streamflow prediction, Atmospheric Science Letters, 11, 153-159.

Roulin E. and Vannitsem S. (2015) Post-processing of medium-range probabilistic hydrological forecasting: impact of forcing, initial conditions and model errors, Hydrological Processes, 29, 1434-1449.

Verkade J.S., Brown J.D., Reggiani P. and Weerts A.H. (2013) Post-processing ECMWF precipitation and temperature ensemble reforecasts for operational hydrologic forecasting at various spatial scales, Journal of Hydrology, 501, 73-91.

Zalachori I., Ramos M.-H., Garçon R., Mathevet T. and Gailhard J. (2012) Statistical processing of forecasts for hydrological ensemble prediction: a comparative study of different bias correction strategies, Advances in Science and Research, 8, 135-141.

Minor comments:

- Study domain – this corresponds to the Susquehanna Basin – why use MAR instead of the Susquehanna River Basin?

- Warm and cold seasons: can you describe the type of events expected in both seasons?

- PG 6 L31: change to "hourly"

- PG9 L4: add "observed" to "gridded precipitation"

- PG9 L4: please specify the source of the gridded observed precipitation

- PG9 L24: confusing; you mean " high precipitation events defined as 6-hourly accumulated precipitation events with a .95 non exceedance probability"? Also – see comment for the need to evaluate aggregated events

- PG10 – Line 35: how do you specify flood events? Are those also 6 hourly discharge event with a .95th non exceedance probability? Please clarify.

- Basins are not independent, could you add one comment how this might affect the

results? In the result section at PG11 L34 it looks like you could see consistent results. It did not seem to be the case on the previous section.