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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Evaluating residual error approaches for post-processing monthly and seasonal streamflow forecasts" *by* Fitsum Woldemeskel et al.

Anonymous Referee #1

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This review is for Manuscript ID: hess-2018-214, entitled Evaluating Residual Error Approaches for Post-processing Monthly and Seasonal Streamflow Forecasts, authored by Fitsum Woldemeskel and coauthors. With this manuscript the authors' aim is to evaluate different residual error models, including logarithmic (Log), Log-Sinh, and Box-Cox transformation schemes, for postprocessing monthly and seasonal streamflow forecasts. Overall, the postprocessed streamflow forecasts demonstrate skillful, reliable and sharper forecasts compared to the uncorrected forecasts. Furthermore, postprocessor employing the Box-Cox transformation scheme demonstrate the sharpest forecasts, without sacrificing skill and reliability. This manuscript is generally clear, however, it reads like a book chapter rather than a journal article. I believe the results

and conclusions are of interest to the HESS community, as well as to the operational forecasters. Thus, this manuscript is worthy of publication if the issues below are addressed.

Major Comments

1) The introduction needs better organization. Consider removing the unnecessary details about the statistical modelling system and hybrid system (P4-5, L86-95), which are irrelevant in the context of dynamic modeling. The literature review can be focused on the usefulness of POAMA-2 in advancing seasonal hydrological forecasting.

2) Make a separate subsection for the study area, dataset and hydrological model.

- Study area: Provide general information on the hydroclimatic conditions, types of events across different seasons, basin size range, and reason for selecting the particular catchments.

- Dataset: Provide detail information on rainfall forecast dataset from POAMA-2, including forecast lead time, total number of ensemble members, and forecast initialization time and frequency. POAMA-2 information (P7, L189-194) should be integrated into the "Section 3.1 Data".

- Hydrological model: I am concerned about the details of the rainfall-runoff model GR4J used for the study. It is necessary that you explain better the following aspects of the model: lumped conceptual model or physically based model, spatial resolution of the model, and the selected routing method. How often is the model initialized to make the forecast runs?

3) If the model is calibrated, then consider adding a subsection to discuss the simulation performance. You need to mention the calibrated parameters, model warm-up period, calibration period and validation period. The simulation performance can be discussed using correlation coefficient, percent bias and Nash-Sutcliffe efficiency between the observed and simulated streamflow.

4) In order to support the operational forecasting system, the conclusions drawn here should be valid in the context of extreme events. Does the conclusions apply to flood events? For this, verification metrics can be computed by considering the flow amounts greater than that implied by a non-exceedance probability, in the sampled climatological probability distribution, of 0.95.

5) Considering an operational forecasting situation, how feasible is it to run 166 ensemble members using 40 GR4J parameters, and produce 6640 daily streamflow forecasts?

6) In the context of seasonal forecasting, different studies have demonstrated the combined ability of preprocessing meteorological forcing and postprocessing streamflow forecast to produce better streamflow forecasts. However, the study here only implements postprocessing. Was the meteorological forcing preprocessed? If not the case, it could be a topic of discussion, as a recommendation for future work to investigate the performance of residual error models in the context of preprocessing and postprocessing.

Minor Comments

1) Figure 8: Mention the units in the Y-axis for streamflow.

2) Figure 8: Is there any reason for selecting Dieckmans Bridge catchment as a representative site for the analysis. Why is the time series plotted only for the period of 2003-2007? Is this a random selection?

3) Figure 9a: Replace “CRPS” with “CRPSS” in the Y-axis.

4) P8 L200-204: Integrate this paragraph into the introduction.

5) P9 L233: Provide a reference to the statement: “the parameters are estimated based on the methods of moments.”

6) P13 L365: Define the variable “y” in Equation 11.

7) P13 L367: How do you define the Heaviside step function?

8) P16 L444: Fix the typo for “Figure 45i”.

9) P18 L495: Replace “unprocessed” with” uncorrected”.

10) P18 L501: Define the acronyms: “NSW”, “QLD” and “NT” when used for the first time.

11) It may be good idea to provide a standard name for the streamflow postprocessing technique implemented in the study, is it a new technique? If not, then provide a suitable reference to the postprocessing technique.

Please also note the supplement to this comment:
https://www.hydrol-earth-syst-sci-discuss.net/hess-2018-214/hess-2018-214-RC1-supplement.pdf

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