

Hydrol. Earth Syst. Sci. Discuss., referee comment RC3
<https://doi.org/10.5194/hess-2022-432-RC3>, 2023
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Comment on hess-2022-432

Anonymous Referee #3

Referee comment on "Statistical post-processing of precipitation forecasts using circulation classifications and spatiotemporal deep neural networks" by Tuantuan Zhang et al., Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2022-432-RC3>, 2023

Review on "Statistical post-processing of precipitation forecasts using circulation classifications and spatiotemporal deep neural networks"

In this manuscript, the authors have proposed a statistical post-processing method that can simultaneously take into account the effects of large-scale circulation patterns and local spatiotemporal information to calibrate the ECMWF forecast dataset for the Huaihe River basin. The study is well developed and the expected results have been achieved. The new model proposed by the authors has the best calibration capability for different seasons, lead times and precipitation intensities. Overall, the study is innovative and has a high degree of completion which deserves to be published, but some issues still need to be corrected or further clarified.

Major comments:

- In the construction of the SOM-CNN-LSTM post-processing methodology, the SOM model was used to identify and classify different large-scale circulation patterns. In selecting of the SOM node, the authors have tested that the 2×3 configuration is physically interpretable. It should be explained what the node here refers to in the SOM model and what their role is. Also explain why 2×3 is interpretable.
- The authors used three statistical metrics in their study to evaluate the prediction skill and the ability of the correction, but only one of them was used to evaluate and present the results in each of the relevant experiments shown in Figures 7 to 9, respectively. Consideration could be given to including the results of all evaluation metrics from the relevant experiments in the supporting material to more fully demonstrate the features and advantages of the SOM-CNN-LSTM method
- The study focuses on the Huaihe River basin in China. The application and development of similar research in the region should be described in the manuscript to further highlight the main purpose and innovation of this study.

Minor comments:

- L82,305 'we' => 'We'.
- L95 'contains' => 'contain'.
- L102 The title of section 3 is wrong.
- L123 The formula is incomplete.
- Change the use of color table in Figure 8. The authors use only one color table in Figure 8 to represent two types of data, correlations and changes in correlations, which can be confusing. Also, this color table is more appropriate to represent the variation between positive and negative values, which is not the case for the two variables in this figure.
- In Figure 9, the conclusion the authors most wanted to express would have been the difference between the precipitation predictions for different years, but at the same time they also point out that the SOM-CNN-LSTM method performs the best. However, the color table used and the type of Figure 9 make the latter conclusion very unclear, at least compared to the other figures in the paper. Also, the correspondence between color table and value is not fixed. Therefore, the author should consider a more appropriate way of presenting the relevant conclusions.
- L307 Is the 'SHAP' used here incorrectly? If not, it is needed to clarify this abbreviation.