Author's response

Dear Professor Lelys Bravo de Guenni

We have carefully revised the manuscript according to your valuable comments and suggestions. On behalf of all authors, I am pleased to submit the revised version of our manuscript titled "Quantify and reduce flood forecast uncertainty by the CHUP-BMA method".

The manuscript has been revised along with the review suggestions. All comments have been modified or addressed in the revised version. All newly added parts (except minor language corrections) are marked in BLUE for easy review. We sincerely hope that you will find the revised version to your satisfaction. All authors have reviewed the revision and agree to the submission.

Thank you very much for your time and efforts on our manuscript again.

Best Regards,

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May 6, 2024

<u>**Reply to Lelys Bravo de Guenni (editor)**</u>

<u>**Legend**</u>

Reviewers' comments

Authors' responses

<u>Direct quotes from the revised manuscript</u>

Editor:

Thank you very much to the authors for providing this revised version including all referee comments. I still have some minor comments on the manuscript. After these comments are addressed the paper should be ready for the final step.

Response: We deeply appreciate your constructive comments and the time you spent on reviewing the paper. We have accepted all the revision comments. Point-by-point replies to the comments or suggestions made can be found below.

1. Lines 15-16 in Abstract: Can you please check the wording in these two-lines? It is not clear what is the message here.

Response: We have rewritten the sentences as following:

Compared with the HUP-BMA method, the forecast interval width and continuous ranked probability score metrics of the CHUP-BMA method are reduced by a maximum of 28.42% and 17.86% within all forecast horizons, respectively.

2. Lines 47-48: Can you please revise wording here?

Response: We have rewritten the sentences as following:

The BMA method has been applied to temperature, precipitation, and wind speed ensemble forecasts of meteorological forcing.

3. Line 239: Acronym of second model for precipitation forecast (HBCWRC) does not coincide with the acronym in Figure 2.

Response: We have replaced HBCWRC with HBYRWRC.

4. Line 243-244: Please review wording. It looks like something is missing.

Response: We have carefully checked the wording and have made the following changes.

The observed and forecasted precipitations are converted into the effective

precipitation in the three sub-basin areas, which accounts for the losses of plant reception, infiltration, evaporation, etc.

5. Line 248: Please define Pa,t

Response: We have added relevant content to the article:

$P_{a,t}$ denotes the antecedent precipitation index on the t-th day.

6. Figure 3: What are the units of Pa?

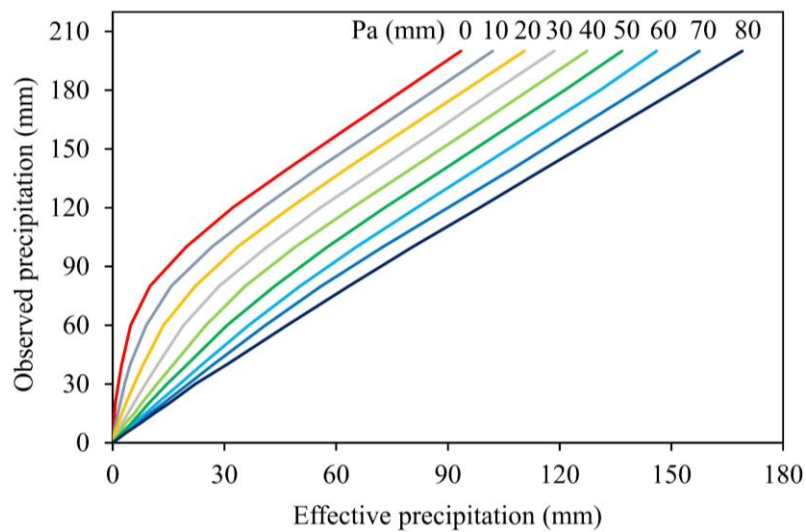Response: Units of Pa have been added to Figure 3.

Fig. 3 Rainfall-runoff relationship between Xiangjiaba and Three Gorges dam-site uncontrolled interval basin

7. Line 287: Replace "to neural network" by "to the neural network".

Response: We have replaced "to neural network" by "to the neural network".

8. Line 303: Replace "is the input variables" by "is the input variable".

Response: We have replaced "is the input variables" by "is the input variable".

9. Line 311: Replace "types data" by "data types".

Response: We have replaced "types data" by "data types".

10. Line 343: Replace "cate" by "rate"

Response: We have replaced "cate" by "rate".

11. Line 420: Replace "expectation" by "expected"

Response: We have replaced "expectation" by "expected".

12. Figure 13: Can you include the values of α_{index}, IGS and CRPS in parenthesis after its corresponding meaning, in the legend of the Figure 13? That will make the figure easier to read without having to back to the meaning of the metrics.

Response: Due to the size constraints of the figure, we have added the meanings of the metrics to the figure name to make it easier to read.
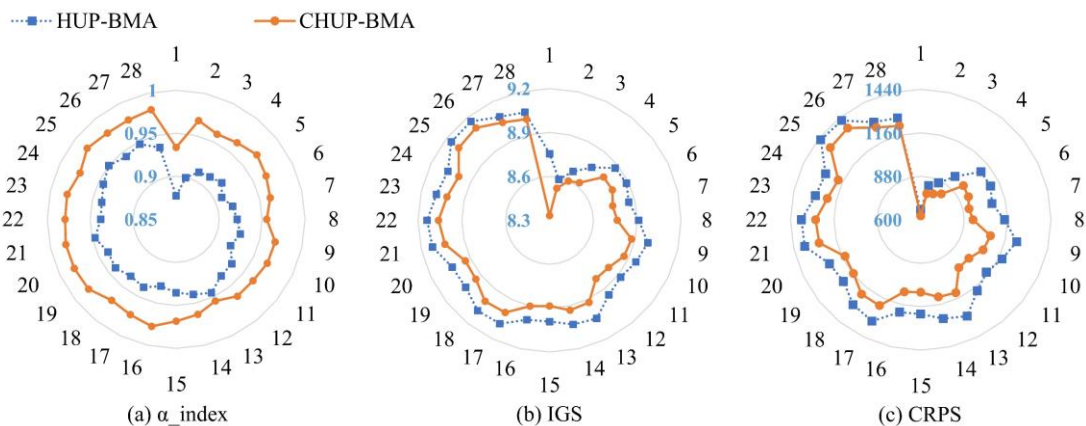
Fig. 13 Evaluation metrics of α_index, IGS, and CRPS metrics of two ensemble forecasts. The α_index metric can assess the reliability of ensemble forecasts, while the IGS and CRPS metrics can reflect the reliability and sharpness of the ensemble forecasts. The closer the α_index metric is to 1, and the smaller the IGS and CRPS metrics are, the better the performance of the ensemble forecast.

13. Line 558: Can you please check the wording in this sentence?

Response: We have rewritten the sentences as following:

In this study, we proposed a novel CHUP-BMA method, which not only can consider the influence of the initial state on the ensemble forecast, but also can avoid the assumption of normal distribution in the HUP-BMA method and derive the posterior distribution function more accurately.