View Letter

Dear Editor and Reviewers:

Many thanks for the review comments that we received with respect to our paper. Those valuable comments have significantly enhanced our paper. We have carefully addressed the reviewers' comments and suggestions, which lead to significant revisions in many parts of the paper.

Below we hereby provide our point by point responses to the reviewer's comments.

COMMENTS FROM EDITORS AND REVIEWERS

Responses to comments of Referee #2:

The authors evaluated the predictability and forecast skill of meteorological and hydrological drought in the Heihe River basin based on the dynamic forecast from NMME and a hydrologic model DTVGM. The drought prediction performances for different lead time and seasons were assessed. Overall, the manuscript is well crafted with clear structures. Some grammatical errors exist and need careful proofreading. I have some minor comments.

Response: Thank you for your review and comments.

1. Page 6, line 119-120: Do you use some downscaling techniques in generating the daily hindcast based on monthly data? Suggest to give some details.

Response: Yes, you are right. We use the temporally downscaled techniques by sampling from the observation dataset and rescaling to match the monthly hindcasts. We have added the details in our manuscript.

> *The daily hindcasts were then generated using a temporally downscaled technique by matching the monthly hindcasts with the daily samples from observations. In this approach (Luo and Wood, 2008), a randomly selected daily observation time series from the entire historical period (1961-2016) is used as a candidate for each member, and they are adjusted to match the predicted monthly values from the distributions obtained in the previous step.*
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> *Luo, L. and Wood, E. F.: Use of Bayesian Merging Techniques in a Multimodel Seasonal Hydrologic Ensemble Prediction System for the Eastern United States, J. Hydrometeorol., 9, 866-884, 2008.*

2. Page 6, line 135: The NSE value for the MHRB is 0.52. This may lead to some uncertainties in the simulated streamflow or hydrological drought and thus the performance evaluation. Suggest to mention/discuss the potential uncertainties.

Response: Yes, you are right. Due to vast human activities, the NSE value for the MHRB is lower, and do lead to some uncertainties. We evaluated the hydrological predictions compared with offline simulations, which can reduce influence of model error but also can also lead to some uncertainties from human activities module. We have mentioned them in our manuscript.

> *In the MHRB, except for input and structural errors, unrefined human activities module also increases the uncertainties of the hydrology model, leading to the NSE value lower than that in the UHRB.*
>
> *(2) The NSE value for the MHRB is greater than 0.52, which is still unsatisfactory. Unrefined human activities module in the hydrology model can lead to some uncertainties in the simulated streamflow and hydrological drought and thus the performance evaluation. For example, inaccurate calculations of irrigation water requirements and groundwater can increase errors in river flow and uncertainties in the influence of human activities on hydrological droughts. Therefore, refining the human activities processes in the hydrological forecasting system, which could facilitate the understanding of the hydrological predictions over the regions with vast human activities;*

3. Page 9, line 187-188: The authors showed that the meteorological predictability was higher in autumn and winter (than summer and spring). Any explanation/reason for this?

Response: Thank you for your suggestions. We have added the explanation.

> *Most climate anomalies (i.e., SST anomaly) occur in winter and autumn, and SST is also a potentially important predictor (Becker et al., 2014). In addition, the climatic noise of monthly precipitation over China has obvious seasonal variation and it is greater in summer than in winter (Liu et al., 2000).*
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> *Becker, E., Van Den Dool, H., and Zhang, Q.: Predictability and forecast skill in NMME, J. Climate, 27, 5891-5906, 2014.*
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> *Liu, Y., Ma, K., and Lin, Z.: Potential predictability of monthly precipitation over China, J. Meteor. Res., 14, 316–329, 2000.*

4. Figure 4: The caption is not quite informative. Suggest to give details to describe the Figure.

Response: Thank you for your suggestions, we have added the details to describe the Figure 4.

Figure 4. *Brier score (BS) of NMME forecast for meteorological drought events. (a-b) Meteorological drought predictability in the upstream (a) and upstream (b); (c-d) Meteorological drought forecast skill in the upstream (c) and midstream (d). Here, a meteorological drought event happens when the SPI3 value is below -1. The BS is negatively oriented (0 ⩽ BS ⩽ 1), with perfect forecast exhibiting BS=0. The color from deep blue to deep red (0-0.4) means increasing BS values, i.e., decreasing predictability or forecast skill.*