

## **A DETAILED LIST OF RESPONSES TO THE EDITOR**

We greatly appreciate your careful reading of the manuscript, insightful comments, and valuable suggestions. Your thoughtful review has enhanced our paper considerably. The manuscript has been revised thoroughly according to your comments and those of the individual reviewers, with our point-by-point responses detailed below.

(1) When preparing the response, the authors should be careful to address the reviewers comments. I recommend to take particular care about the question regarding uncertainty quantification of the drought indicators. This is of particular importance given the fact that there is a low station density in western half of the dataset (especially Qinghai-Tibetan Plateau and Xinjiang).

**Response:** Many thanks for your comments. Two reviewers both mentioned the problem of quantification of uncertainty: one suggests making each index generate an uncertainty graph, and the other suggests we discuss whether uncertainty is caused by the sparseness of sites or by interpolation methods. We have responded to these two reviewers in detail. Let's summarize here: (1) We used standard deviation alone to quantify the uncertainty of the drought index in different data sources (Figure S4). In Figure S4, we found that the region with greatest uncertainty was mainly the northwestern region, with its low density of meteorological stations. (2) The accuracy of different interpolation methods was more consistent in regions with uniform distribution and high density of meteorological stations. This has been demonstrated in previous work by our team (Han et al., 2023) In areas with sparse stations, the ADW method is slightly better than other methods due to its consideration of distance and angular weighting (Han et al., 2023). Refer to Question 6 from Reviewer #1 and Question 4 from Reviewer #2 for our specific responses, and for the selection of the ADW method, refer to Question 2 from Reviewer #1.

(2) I also have a question about the comparison to CRU on a 0.5x0.5 degree grid. It seems that the figures displaying this have some interpolation/ smoothing indicating a

higher resolution than stated in the manuscript, which should be either removed or clearly explained.

**Response:** Many thanks for your comments. For visualization, we had used the python method *plot.contourf*, which does have a smoothing and beautifying effect when drawing, and we have now redrawn all the figures to show the original spatial resolution.

References:

Han, J., Miao, C., Gou, J., Zheng, H., Zhang, Q., and Guo, X.: A new daily gridded precipitation dataset for the Chinese mainland based on gauge observations, *Earth Syst Sci Data*, 15, <https://doi.org/10.5194/essd-15-3147-2023>, 2023.

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For your convenience, to make the review of our revisions easier, we have marked all responses and related revisions in light blue.