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MS TITLE: Comprehensive evaluation of hydrological drought and the effects of large reservoir on drought resistance in the Hun River basin, NE China

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RESPONCES TO THE REVIEWERS' COMMENTS

We do appreciate all useful comments and suggestions on our manuscript.

The MS was thoroughly revised, against all revision comments from the editors and reviewers. We have taken this opportunity also to read through and tried to perfect the analysis details, discuss the results more comprehensively and pick up any minor grammar, wording or format problem and made corrections accordingly so that it strictly follows the Journal formatting requirements. Detailed corrections and revisions are listed below point by point. And, all the revisions have been addressed in the reply and highlighted in the manuscript with yellow background.

Reviewer # 3:

1. Improvement of structure of the manuscript, good definition of the objectives and clear presentation of the methodologies used. The above presentation should be so detailed as to help the reader.

[Authors' response]: We gratefully appreciate for your valuable suggestion. We rewrote the section of Introduction, stating the main research questions addressed in the work and referencing the authors that have tackled these questions before, summarizing their results and identifying the gaps to be filled by this work (Page 2 to 3). Meanwhile, the SRI and SPI (Page 4 line 20 to 30), trend analysis (Page 5 line 4 to 9) and the schematic of determining the drought propagation threshold (Page 9 line 1) were added in Methodology section to make the presentation of methodology clearer.

2. Linguistic improvement of the text.

[Authors' response]: We are very sorry for the mistakes in this manuscript and inconvenience they caused in your reading. The manuscript has been thoroughly revised and edited by a native speaker, so we hope it can meet the journal' s standard. Thanks so much for your useful comments.

3. Correction of errors that should be avoided:

(3a) BKQ station is not presented in Figure 1.

[Authors' response]: We are very sorry for the mistakes in this manuscript and inconvenience they caused in your reading. The graphic error in the original manuscript has been corrected (Page 5 line 1).

(3b) page 3, lines 17-18, change 'agricultural irrigation' to "irrigation".

[Authors' response]: We gratefully appreciate for your valuable suggestion. As suggested, we have changed 'agricultural irrigation' to "irrigation" (Page 4 line 8).

(3c) page 3, line 27, change 'tyson polygon' to 'Thiessen polygon'.

[Authors' response]: We gratefully appreciate for your valuable suggestion. As suggested, we have changed 'tyson

polygon' to 'Thiessen polygon' in our revised manuscript (Page 4 line 16 to 18).

(3d) Although indexes SPI and SRI are well known, they should be more detailed (refer to normal standardization).

[Authors' response]: We thank you for reminding us this importing. We have already added the introduction of SRI and SPI in the Methodology section (Page 4 line 20 to 30).

(3e) page 5, line 4, '..., otherwise it is defined as no drought event (c).' According to table 1 when SRI is $-1.0 < SRI \leq -0.5$ there is Mild drought.

[Authors' response]: We gratefully appreciate for your comment. Combined with the actual situation of HRB, when SRI is less than -0.5 and greater than -1 only lasts for a month, it would hardly show drought, so it is not defined as a drought event in the process of drought identifying by using the run theory.

(3f) Figure 4, XWP change in XJWP.

[Authors' response]: We are very sorry for the mistakes in this manuscript. As suggested, we have changed 'XWP' to "XJWP" in Figure 4 (present Figure 5) (Page 12 line 1 to 2).

(3g) page 7, line 24, present in a figure the linear slope of SRI changed from -0.089/10a to 0.469/10a.

[Authors' response]: We thank you for reminding us this importing. As suggested, the linear slope change of SRI have been added to Figure 5 (Page 11 line 13).

(3h) page 9, line 6 and table 2 use the same value -0.83 or -0.84.

[Authors' response]: We are very sorry for the mistakes in this manuscript. After careful calculation and verification, the trend characteristic value U of DHF was -0.84, which has been corrected in our revised manuscript (Page 11 line 4 to 5).

(3i) page 11, lines 7-9, the values presented are out of the range of axes in the figure 6.

[Authors' response]: We are very sorry for the mistakes in this manuscript and inconvenience they caused in your reading. The error in Figure 6 (present Figure 7) has been corrected in our revised manuscript (Page 14 line 12).

(3j) page 9, line 23, 'the districts in the wast (XJWP)' change in 'the districts in the west (XJWP)'

[Authors' response]: We gratefully appreciate for your valuable suggestion. As suggested, we have changed 'the districts in the wast (XJWP)' change in 'the districts in the west (XJWP)' (Page 12 line 11 to 13).

(3k) page 12, line 12-13, '...PTMH ranged from 3 to 14 months, while the correlation coefficients were lower from late winter to early summer with PTMH ranged from 4 to 23 months at BKQ and DHF' the values are out of range in figure 7.

[Authors' response]: We are very sorry for the mistakes in this manuscript and inconvenience they caused in your reading. The error in Figure 7 (present Figure 8) has been corrected (Page 16 line 4). We feel sorry for our carelessness.

(3l) page 14, lines 3 and 4, 'Higher temperature in summer low PTMH of spring and winter' change to 'Higher temperature in summer long PTMH of spring and winter'

[Authors' response]: We gratefully appreciate for your valuable suggestion. As suggested, we have changed 'Higher temperature in summer low PTMH of spring and winter' change to 'Higher temperature in summer long PTMH of spring and winter' (Page 17 line 2 to 4).

4. Figure 9 was presented (page 16, lines 2 and 3) but it was not discussed.

[Authors' response]: We appreciate for your valuable comment. More description on the Figure 9 (present Figure 11) has been added in our revised manuscript (Page 18 line 14 to 19).

5. MAIN COMMENT. Page 16, lines 7-8: '...strengthened the drought resistance in the lower reaches of DHF reservoir while weakened the drought resistance in the upper reaches of DHF reservoir.' It is necessary to explain how the construction of the reservoir affected the upper reaches of DHF reservoir.

[Authors' response]: We gratefully appreciate for your comment. After our further discussion, we decided that it would be imprecise to attribute the differences in results obtained at different sites to reservoir construction. Indeed, it would be more convincing if we get a comparative assessment on the data before and after the construction of the reservoir. However, the data before the construction of DHF reservoir are lacking. Therefore, in this paper, based on the calculation of drought propagation threshold for triggering different scenarios hydrological droughts, we discussed the drought resistance capacity of the basin and the influence of factors including the operation of Dahuofang reservoir on the drought resistance of the basin (Page 20 line 1 to 30 and Page 20 line 1 to 10).

6. MAIN COMMENT. Page 16, lines 11-13: 'With the increase of hydrological drought level,at severe hydrological drought level'. It is not enough to make an observation; authors should try to explain why this happens.

[Authors' response]: We gratefully appreciate for your comment. After our further discussion, we decided that it would be imprecise to attribute the differences in results obtained at different sites to reservoir construction. Therefore, in this paper, based on the calculation of drought propagation threshold for triggering different scenarios hydrological droughts, we discussed the difference of drought resistance capacity of the four sub-basins and the influence of factors including the operation of Dahuofang reservoir on the drought resistance of the basin (Page 20 line 1 to 30 and Page 20 line 1 to 10).