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Interactive comment on "Drought propagation and construction of a comprehensive drought index based on the SWAT-$K_{C'}$: A case study for the Jinta River basin in Northwestern China" *by* Zheng Liang et al.

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Thank you very much for the reviewers' useful comments and suggestions on our manuscript. We have meticulously read your comments, and modified the manuscript accordingly. Detailed corrections are listed below point by point. Our responses to several comments are listed below:

Comment 1: There are too many words in the abstract, so it needs to be simplified. Response: Thanks for the reviewer's suggestion. As suggested by the reviewer, we have

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revised the abstract and further simplified the language of the abstract. The specific changes are as follows: (1) Line 11, “drought information” were corrected as “drought conditions”. (2) Line 12, “proposes” was corrected “proposed” and “Kendal” was corrected as “Kendall”. (3) Line 14-17, “Three univariate drought indexes, namely meteorological drought (SPEI), agricultural drought (SSI), and hydrological drought (SDI) were constructed using parametric and non-parametric methods to analyze the propagation time of meteorological drought to agricultural drought and hydrological drought.” were corrected as “Three univariate drought indexes, namely meteorological drought (SPEI), agricultural drought (SSI) and hydrological drought (SDI), were constructed using parametric or non-parametric method to analyse the propagation time from agricultural drought and hydrological drought to meteorological drought.”. (4) Line 18, “takes” was corrected as “took” and “analyze” was corrected as “analyse”. (5) Line 19-21, “The results show that agricultural and hydrological drought have a seasonal lag time for meteorological drought. The degree of drought in the river basin is high in the northern and low in the southern regions.” were corrected as “The results showed that agricultural and hydrological drought had a seasonal lag time from meteorological drought. The degree of drought in this basin was high in the northern and low in the southern regions.”. (6) Line 21-24, “The MAHDI captured drought conditions characterized by a univariate drought index; however, the ability to characterize mild and moderate droughts is stronger than severe droughts. The index also captured the occurrence and end of drought time; therefore, it is an acceptable comprehensive drought index.” were corrected as “The MAHDI was proved to be acceptable for that it can catch drought conditions characterized by a univariate drought index and capture the occurrence and end of drought time. Nevertheless, its ability to characterize mild and moderate droughts was stronger than severe droughts.”. (7) Line 24, “drought trends” were corrected as “aggravating trends”. (8) Line 25, “warm and humidification” were corrected as “alleviating”. (9) Line 26-27, “This method may be applied for drought monitoring in other watersheds with a shortage of measured data.” were corrected as “This method provided the possibility for drought monitoring in other watersheds lacking measured

data.”.

Comment 2: The sentence “Reliable drought monitoring and mastering the laws of drought propagation are . . .” should be changed to “Monitoring drought and mastering the laws of drought propagation are . . .”. Response: Thanks to the reviewers for their helpful comments. According to the reviewer’s comments, we modified this sentence. Line 9-10, “Reliable drought monitoring and mastering the laws of drought propagation are the basis for regional drought prevention and resistance.” were corrected as “Monitoring drought and mastering the laws of drought propagation are the basis for regional drought prevention and resistance.”

Comment 3: In the sentence “however, too short or missing hydrological variables in cold and arid regions make it difficult to monitor drought.”, “too short hydrological variables” is unclear. Response: Thank you very much for your valuable comment. We have corrected this sentence as “However, too short or missing series of hydrological variables in cold and arid regions make it difficult to monitor drought.”.

Comment 4: Drought control is mentioned in lines 48-49, but is not the subject of this manuscript. You should pay attention to the preciseness of the paper. Response: Thank you very much for your valuable comment. We changed “drought control” into “drought monitoring” in Line 26.

Comment 5: Line 70-71: please check the grammar. Response: Thank you very much for your valuable comment. We have deleted “. It is used to develop comprehensive drought indexes” in Line 69. And “, for example” were corrected as “. For example” in Line 70.

Comment 6: Line 192: “DIp” should be the parametric drought index value, please check it. Response: Thanks to the reviewers for your helpful comments. We have checked this “DIp” and corrected “non-parametric” in Line 189 as “parametric”.

Comment 7: Line 209-210: please add related references about “warming and humid-

ification of the Shiyang River Basin". Response: Thanks for the reviewer's suggestion. As suggested by the reviewer, we found the location of "warming and humidification of the Shiyang River Basin", and we corrected "The reason for SPEI to exhibit the lowest degree of drought might be due to the warming and humidification of the Shiyang River Basin, which increased rainfall and temperature." in lines 305-307 as "The meteorological drought degree reflected by SPEI is the lowest, which is similar to that described by Thornthwaite aridity index (AI) constructed by Zhang et al. (2017) using rainfall and potential evapotranspiration.".

Comment 8: Line 278-280: this sentence is not clear, please revise it. Response: Thank you very much for your valuable comment. We corrected "lag time of agricultural drought to meteorological drought" in line 279 as "propagation time from meteorological drought to agricultural drought". "lag time of hydrological drought to meteorological drought" in line 280 were corrected as "lag time from meteorological drought to hydrological drought". Special thanks to you for your good comments.

Please also note the supplement to this comment:
https://nhess.copernicus.org/preprints/nhess-2020-237/nhess-2020-237-AC1-supplement.pdf

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