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Comment

## ***Interactive comment on “Generalized drought assessment in Dongliao river basin based on water resources system” by B. S. Weng et al.***

**B. S. Weng et al.**

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Thank you for your affirmation of our study. The manuscript has been carefully revised. We appreciate the detailed and useful comments and suggestions from you. The point-by-point answers to the comments and suggestions were listed as below.

1. On line 18-19 (6706) it seems like the three stages that are being referred to correspond to a time period when a certain drought index was developed, however, this is not clear and maybe not necessary. Answer: We classified the development of drought indices into three stages (the germination stage, the growth stage, and the development stage). It was helpful to analysis the characteristic of drought indices in different periods. For example, drought indices were simple to calculate during the germina-

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tion stage (from 1900 to 1964), but the universality and the mechanism of water cycle were lacked. And it was helpful to compare the difference between drought indices in different periods. So it is necessary.

2. There is a bit of an awkward transition between discussion of all the drought indices and the methodology section. This should be used to emphasize the novelty of the following research and its importance. Answer: We accept the referee's suggestion; this error has been corrected in the revised manuscript. Line 3 (6708): Combined with the advantages and disadvantages of the above indicators, we propose the generalized drought assessment index (GDAI) based on water resources system for assessing drought events.

3. There needs to be a discussion on why the drought indices used for assessment are selected. The General Drought Assessment Index (GDAI) used in this study appears to be the only one that considers water use, however, it is not clearly stated whether there is any other indices to test that consider this in some way? Answer: We accept the referee's suggestion. The reasons we choose the SPI and the PDSI are that they are more widely used at present. So they are representative. The GDAI is not the only one that considers water use, the RWD also considers water use, but it doesn't consider surface effective evapotranspiration. Line 17-20 (6713): The method of the RWD is similar to the GDAI. The differences are that the RWD is defined as the ratio of the water resources shortage and the water demand, and the water supply here did not consider surface effective evapotranspiration, it equals to special water resources.

4. Comparison of the drought indices can be improved. For example, in Figures 8-9 GDAI is compared with SPI as a time series that is not very distinguishable. Answer: We accept the referee's suggestion; this error has been corrected in the revised manuscript.

5. It is not clear what drought indices have performed the best and what is the merit in using the GDAI. Answer: We compare the difference between the GDAI and the

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standard precipitation index (SPI), the Palmer drought severity index (PDSI), and the rate of water deficit (RWD) from the temporal distribution and the spatial distribution, respectively. The results simulated by the GDAI fit well with the drought disasters actual happened in Lishu country and in Gongzhuling city than the SPI, the PDSI and the RWD. Taking the SPI for example, the results simulated by the SPI for 1 and 12 month are generally greater than the drought disasters actual happened in Lishu country and in Gongzhuling city during drought periods. The results are also greater during crop growth periods. The differences of drought frequency of sixty-four assessment units are little; they changed from 28 % to 34 %. It is hard to express the spatial distribution of drought events. However, the results simulated by the GDAI fit well with the drought disasters actual happened in Lishu country and in Gongzhuling city, and it can express the spatial distribution of drought frequency. The drought frequency of assessment units changed from zero to 90 %. The drought frequency of the upper reaches is higher. It is lower in Lishu irrigation district of the lower reaches because of the regulation of Erlongshan reservoir.

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