

## ***Interactive comment on “Understanding the water cycle over the upper Tarim basin: retrospect the estimated discharge bias to atmospheric variables and model structure” by Xudong Zhou et al.***

### **Anonymous Referee #2**

Received and published: 3 July 2018

The manuscript addresses the different sources of precipitation and the effect on discharge, and also did the attribution analysis of discharge bias to forcing variables and model structure by using the Budyko assumption. The analysis of resources of precipitation and discharge is very important for the water cycle of the cold regions, and the attribution analysis contributes to the understanding and the simulation of water cycle. The research in this paper is very interesting and important. The content and the quality of the paper fit into the HESS standards. However, the innovation is not outstanding and some of the results is not well explained. Specific comments are as follows:

1) The logical structure, the abstract as well as the conclusions should be adjusted to

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highlight the innovation of the manuscript.

2) More details on the methodology to identify the bias from the model structure and forcing inputs, as well as the evaluation index should be provided.

3) For bias from the model structure, in section 4.1.2 the bias of the model structure is identified as the discharge difference between WFDEI-CCG and WFDEI-CCG-SF. While in section 4.4.1, the change caused by ET with unchanged P and PET is identified as the bias affected by the model structure. They are inconsonant, and what is the difference between these two?

4) For the results analysis, more in-deep reason should be put forward instead of just describing the phenomenon. For example, why there exists deviation between WFD-CRU and WFDEI-CRU after 1990, as shown in Page 12? Why the discharge correlation decreases for the upper Aksu, shown in Page 13.

5) How do you calculate the biases range in Table 5 since there is no observations for each of the forcing variables? The manuscript declares that the observations in the nearby regions or the regions with similar climatic and regional characteristic are used. But only the underestimate or overestimate can be concluded compared to the observations nearby regions instead of an exact value.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2018-88, 2018.

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