

## ***Interactive comment on “Socio-hydrologic perspectives of the co-evolution of humans and water in the Tarim River Basin, Western China: the Taiji–Tire Model” by Y. Liu et al.***

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Response to general Comments:

1. This paper summarizes the development of a large catchment over a period of 2000 years within a socio-hydrology context. The paper attempts to arrange the history into the different stages and some of the discussion presented to contextualize and justify the stages are good.

Answer: We thank the reviewer very much for the positive comment and all the advices.

2. Nevertheless with paper suffers from having so much information available over  
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the long historical period. It would benefit from a rigorous and disciplined approach to presenting the data and discussion. In particular section 3 and 4 should be integrated so that information is neatly presented into the different stages (e.g. 4 SHS types in section 7). Each stage should have a socio-hydrology focus. I can see that the Taiji-Tire model fits with the discussion presented. However it needs to be better integrated into the paper and in particular with the different stages (SHS).

Answer: The authors thank the reviewer's suggestion to clarify the relation between 3 periods (TRB) and 4 SHS types (general). In the revised manuscript, a new table is added (Table 1), which shows the relation between the 3 periods and the 4 types of SHSs in Tarim River basin. We did not focus each kind of SHSs in a specific section because that the history of coupled human-water system in TRB are continuous and complex and it is difficult to divided it into separated part that single type of SHS exists. We divided the 2000 yrs. into 3 periods in terms of the human-water relation and the dominant driving forced in the interaction, while we divided the SHSs into 4 types mainly due to the social economical formations. The two classifications are based on different context and logics. As for the Taiji-Tire model, we have moved this part earlier as Sect. 3 (please also refer to our reply to general comment #2 by Referee #1). Thanks.

Response to specific comments:

1. The change in climate through history is interesting. Being a large catchment, are the authors able to give an indication of the extent to which the climate change was local or did it follow predominantly global trends. Perhaps a comparison with global temperature change.

Answer: The authors did compare the temperature variations during last two millennia in Northwestern China and the whole China, and tried to compare the set of temperatures with the human history (see Fig. 5a and 5b). The regional pattern roughly marches with that in whole China. It is interesting that there appears to exhibit a rela-

tion between the temperature change and the human society evolution (see Fig. 5 and Sect. 4.2). We also searched for data on temperature over a larger area or globe. We found some results and therefore learnt about the temperature variation in other parts of the world as well as the global one, as indicated in Fredrik's work (2009) and Mann and Jones' work (2003). The surface temperature, according to Mann and Jones, seems quite stable when accounts for the globe, comparing with those only concerning northern hemisphere or southern hemisphere. The results are not presented in the manuscript. They beyond the scope of this study. However, just as the reviewer commented, the comparison of temperatures over distinct spatial scales with the human system could be very interesting and important for understanding the global human-water system from a synthetic perspective, which could be done in a future separate study.

2. P12772L20 – wetting signal – the meaning of this term is not clear

Answer: We use “wetting signal” to express the meaning that the precipitation as well as the runoff in Kaidu-Kongqi River Basin is obviously higher than average level before 1987, which enabled water transfers. The evidences can be found in Fan et al. (2011). Thanks.

3. P12773L2 – ground water depths increased (??) ...

Answer: Revised. Now it reads as: The groundwater table in the lower reach of the Tarim River rose from a depth of 6-8m to a depth of 2-4m... Thanks.

4. P12773L20 – more explanation required, since the previous paragraph gives some evidence that the water transfer was positive.

Answer: We have given more explanation about the opposite aspect of the water transfers as an emergency measure alone, as presented in revised manuscript p. 23 Line 690-692 with a new reference of Scott et al. (2013) in p. 30 Line 895-897. What we wanted to address is that, the measures like water transfers alone cannot solve

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the problem. A set of systematic measures that are carefully designed are needed. Thanks.

5. P12774L 20 – the term water “centered inner eco-environment” needs rephrasing or explanation

Answer: We have revised the sentence, as shown in revised manuscript p. 8 Line 229-231. Now it reads: Within the inner circle, the water and human parts interact via their water-centered eco-environment (water is the key factor in the eco-environment) in a complex way,... Thanks.

#### References

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Please also note the supplement to this comment:

<http://www.hydrol-earth-syst-sci-discuss.net/10/C7432/2014/hessd-10-C7432-2014-supplement.pdf>

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Interactive comment on *Hydrol. Earth Syst. Sci. Discuss.*, 10, 12753, 2013.

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