

Xing Yuan  
Professor/Dr  
Institute of Atmospheric Physics  
Chinese Academy of Sciences  
Beijing 100029, China  
Email: [yuanxing@tea.ac.cn](mailto:yuanxing@tea.ac.cn)  
Tel: +86-10-82995385  
<http://www.escience.cn/people/yuanxing>  
September 29, 2017

Prof. Dennis Lettenmaier  
Special Issue Editor  
Hydrology and Earth System Sciences

RE: manuscript #hess-2016-592

Dear Prof. Lettenmaier,

Thank you for your kind decision letter on our manuscript entitled “Understanding and seasonal forecasting of hydrological drought in the anthropocene” (hess-2016-592). We have carefully considered the third reviewer’s comments and incorporated them into the revised manuscript to the extent possible. We hope that you find the revised manuscript and the response to the reviews acceptable to *HESS*.

The detailed responses to the comments are attached.

We appreciate the effort you spent to process the manuscript and look forward to hearing from you soon.

Sincerely yours,



Xing Yuan

### **Responses to the comments from Editor**

*Please respond to the reviewer's comment. I think the reviewer's main complaint is that you've basically dismissed issues with the naturalized flows, which underlie your analysis. As the reviewer points out, it's pretty much impossible to know how well or poorly the estimates reproduce actual natural conditions. The reviewer points out the issue of interactions among the management effects for instance.*

*I suggest what you do is write a couple of sentences acknowledging that the analysis is dependent on the naturalized flows, and state some of the limitations (don't appear to dismiss them). But i don't see that there is much more you can do. Once you've made that change, I'm prepared to accept the paper.*

**Response:** Thanks for the positive comment and helpful suggestion. We have acknowledged the uncertainties by adding a few comments in the revised manuscript. Please see our response below.

### **Responses to the comments from Reviewer #3**

*This latest revised manuscript has responded to all the comments of the last version. Particularly, the authors answered the questions related to my concerns about non-stationarity caused by natural elements such as sedimentations of the Loess Plateau on downstream channels and human elements such as over-pumping of groundwater on surface-subsurface interactions. They also provided a reply to the concern about how naturalized streamflow was created. I have no problem with the writing of the paper. It is mostly well presented.*

**Response:** Thanks for the positive comments.

*Reading those replies, however, I found that the authors are too eager to dismiss the issues raised in previous comments, instead of acknowledging and opening up to the limitations of the study in the revision. For example, naturalized streamflow has obvious limitations as they are derived under very strong assumptions. Based on what I read from the manuscript, the way the naturalized streamflow is derived in this study is simple summations and deductions and it did not consider the interactions different elements. Nobody knows for sure how naturalized streamflow compared to streamflow under the natural conditions. This is a given fact no matter how the creator of the naturalized streamflow data defends it. Granted, naturalized streamflow is probably the best information available to us, but there is considerable uncertainty associated with it, and the uncertainty is probably not easy to quantify. I think the authors should just acknowledge this limitation explicitly in the text where naturalized streamflow first appeared and in the conclusion sections.*

*Overall, I recommend further revision.*

**Response:** Thanks for the positive comments. We have acknowledged uncertainty in the revised manuscript as follows:

#### **Section 2.1**

“Definitely, there are uncertainties in the naturalized streamflow which is difficult to quantify because of absent “real” streamflow under natural conditions over Yellow River.” (P4, L21-23)

#### **Concluding Remarks**

“However, these estimations are heavily based on the quality of naturalized streamflow data. Current procedure of generating naturalized streamflow is basically data driven, where the interaction among different elements is not explicitly considered. In the future, more sophisticated method such as assimilating those precious data into a physical hydrology model that explicitly considers surface water-groundwater interactions and human influences, is necessary for a more robust estimation of naturalized streamflow. Multisource satellite retrieval data (e.g., GRACE terrestrial water storage change, SMAP soil moisture, and MODIS

evapotranspiration) could also be a useful complement to in-situ data and hydrological modelling for the estimation.” (P10, L15-21)