

Anonymous Referee #3

General:

This paper studied the recent droughts in Poyang Lake (China) and the possible influencing factors. The authors used the standardized lake stage index (SLI) to quantify the severity of droughts and used a water balance method to identify the major causing factors. I notice that there have been quite a number of studies published on the same issue. However, the methodology used in this study is not advanced over those in previous studies. For the complexity of the interactions between the lake, catchment and the Yangtze River, I am not convinced that the methodology used in this study was adequate to explore the causing factors on the increased droughts, and to distinguish the relative contributions from hydrological variables. In fact, I noted that the conclusions in this study were somewhat contradictory to previous studies. For example, the authors concluded that the Three Gorges Dam should not be responsible for the increased droughts, which is contradictory to the study by Zhang et al., 2012, GRL, where a more sophisticated modeling approach was adopted. I also do not agree totally to the percentage of contributions to the droughts from each climatic or hydrological factor. This was drawn from a simple water balance for the lake region, but for this lake-catchment-river system, a simple water balance analysis alone may not be sufficient to draw these conclusions. In my opinion, this study needs a significant improvement, and the conclusions need to be re-considered. The authors are encouraged to consult all previous studies to seek for hydrological and hydrodynamic basis to justify their results.

Response:

Thank you for the time to review and comment on the paper. The overall evaluation highlights the importance of adequate description of our work. In the revision, we carefully consider the comment. We substantially expanded descriptions in regard to existing studies related either closely or loosely, the unsolved problems to be addressed, the adopted methodology being quantitative and operational. The results and conclusions were updated with reanalysis of the updated data sets. The problems in the existing studies were also highlighted and comparison was also performed.

Specific comments:

(1) This study used the water level observations at Hukou gauging station, to quantify the droughts in the lake. Since Hukou is located at the junction of the lake and

Yangtze River, it reflects the combined effects of the lake and the river. Using the observed water levels at this station cannot reflect the real situation of the lake hydrology. Additional water levels at other locations in the lake are necessary and should be included in this study;

Response:

In the revision, we made analysis of five stations across the lake from the south to the north and finally determined to use the lake stage data at Xingzi in replace of Hukou (Line 335-341).

(2)The effects of the Yangtze River on the hydrology of the lake were significant, as indicated by previous studies, e.g. Guo et al., 2012; Zhang et al., 2012; Zhang et al., 2014. The authors of this study are encouraged to peruse these publications, and consider the river effects in this study. The simple water balance analysis in this study cannot fully reflect the river effects, and may lead to misleading results. For instance, the authors concluded that the decreased catchment inflow to the lake was the major reason for the increased droughts. However, this is not completely right, because even for a normal catchment inflow, the lake may still encounter droughts as long as the river effects were significantly weakened (more lake water will be discharged). I feel like that the conclusions in this study were not well supported by the methods adopted.

Response:

The lake is affected by both inflow and outflow. When the outflow is larger than the inflow the lake shrinks; otherwise, it expands. If the outflow is normal, abnormal inflow may also incur droughts. So does the inflow. Both outflow and inflow are one parts of the whole story for droughts. The present study focuses on droughts spanning from several months or longer, but the existing studies referred here focused on 1-2 autumn months. The abnormal change of the outflow may not produce substantially effects on the total water deficiency of a drought event, especially those covering a longer time period. In the revision, we expanded the pages to more clearly state the differences between the present and the existing studies (line 95-124, 611-622).

(3)In discussion on the effects of TGD (section 4.4), the authors ignored previous research, e.g. Zhang et al., 2012. However, they drew conclusions that were not supported by the materials in this study.

Response:

Zhang et al (2012) focused on seasonal change of water level especially low water level in autumn. The present study focused droughts spanning several months or longer. Their conclusions are not the whole story of the droughts.

(4)I found that the layout of the five sub-catchments in Fig.1 was different from those in previous publications. Specifically, the layout of Xinjiang and Raohe is different from others', please check if this is right?

Response:

Corrected as pointed out.

(5)Please indicate the locations of the thirteen national weather stations in Fig. 1. How many are located within the lake region? How accurate was the calculated rainfall for the lake region?

Response:

In the revision, we used the data from 73 rainfall stations instead. Their locations are indicated in Figure 1b. Nine stations are located within the lake region.

(6)How was the evapotranspiration obtained for the lake region?

Response:

The evapotranspiration covering the lake region was extracted from the whole image of the MOD16 datasets.

(7)This study did water balance analyses for the zones of lake region and the whole lake basin, why “multi-spatial scales” used in the title? This is a bit confusing.

Response:

The words were removed from the title.