

General:

This study attempted to make comprehensive evaluations on the characteristics of draught events in the Poyang Lake basin in China during recent decades based on long-term lake stage data, and to identify the main cause of the severe draughts over the first decade of 2000s by exploring contributions of meteorological (precipitation and evaporation) and hydrological (inflow and outflow) factors within a general water balance model and at multi-spatial scales. Although previous studies have addressed this topic from different aspects with different datasets and methods, this study is highlighted by its attempting on quantitative estimation of contributions rather than qualitative comparisons or simple correlation analysis between lake stage/area and individual contributors. The main conclusions of the study include that decreased inflow which are mainly attributable to decreased precipitation in the lake basin accounts for the largest contribution (45%) to worsening draught in recent decade and that the role of TGD impoundment may probably be ‘enhancement of draught magnitude’ rather than ‘responsible for increased occurrence’. The implication is that draught occurrences in Poyang Lake region may still have persisted in recent decade even without TGD impoundment, given the significantly reduced precipitation and increased evaporation in the lake basin, but the magnitude may upgrade with influences from TGD. The information provided in this study is useful for understanding water budgets in the Poyang Lake basin, but the conclusions are exposed to uncertainties and doubts due to limitations of used data and failure in providing solid evidences and logic reasoning to support the arguments. The authors therefore need to clarify and address the following aspects to justify their conclusions before the paper may be accepted for publication.

Specific comments and suggestions:

- 1) A discussion part is needed to compare the methods and results of this study with previous studies. Previous studies addressed the lake draught occurrence in recent decade and its possible connections with TGD impoundment, by using other sources of data including remotely sensed observations and different analysis methods including modeling and correlation analysis. The authors should make a summary of conclusions, problems or uncertainties existing in previous studies and highlight the novel points (methods or conclusions) of this study. Particularly

some of previous studies drew contradictory conclusions about the causes of Poyang Lake droughts, therefore the authors need to justify why conclusions of this study is more reliable than that of prior studies.

- 2) There are several confusing aspects regarding the application of the water balance model at different spatial scales (Poyang lake, lake region and lake basin). First it seems that water balances were only investigated at lake region and lake basin scale, and the connection between the two scales is not clearly stated. Secondly it is unclear which water components are included at different scales and the data used for estimates of the components. For example, normally the discharge records of rivers are measured at the conjunction between the river and the Poyang Lake, therefore the discharge observations not only include runoff originating outside of the lake region but also may contain considerable runoff from small brooks or rivers originating in the lake region. For the lake region scale, inflow in definition refers to runoff from regions outside the region and should be measured around the boundary of the lake region. Instead of a general list of datasets used, it is logically clear to introduce water balance model at each spatial scale with detailed specification of estimates for each of the water components.
- 3) There is lack of full discussion about the effect of TGD on the water budgets of Poyang Lake. The authors can look into lake stage conditions and outlet to the Yangtze River during specific periods of TGD impoundments to evaluate the effect.
- 4) Uncertainty analysis is necessary to address limitations on data and methods. One major concern is whether the lake stage data at Hukou outlet can be used to represent drought conditions of Poyang Lake, considering the large lake area and this outlet connects with Yangtze River. The authors need to refer to other lake stage data if available or other sources of measurements such as satellite altimetry measurements. At least, the authors need to compare the results with previous studies reporting lake area/level changes or documented lake droughts records, to support that the determination of lake droughts based on this data is reliable. Besides, uncertainties about precipitation and evaporation data (accuracy and

spatial representativeness) on the results are not mentioned or evaluated. And similarly main conclusions about the changes of these variables need to be supported by previous studies or other evidences (e.g., different sources of precipitation data).