

Thank you very much to the reviewer for their thoughtful review and commentary. It has lead to several substantial improvements to the manuscript. We have responded to each of your comments in bold below.

Reviewer 1:

This study reveals the influence of background climate oscillations such as the El Nino Southern Oscillation, and the North Atlantic Oscillation on worldwide lake level changes (117 large lakes). The authors compared the lake level trends before and after removing of background climate variation. The idea of this study is novel. However, this manuscript still needs improve its quality for publications. In addition, I am a remote sensing hydrology scientist, but not a hydroclimatology scientist. The most content of this manuscript is about climatic effects on lake level changes. I suggest to add a review from hydroclimatology science for objective evaluation of this manuscript, and for some comments to improve the quality of this study.

My very limited comments are as follows:

1) The method of this study can be displayed by a tree-structure such as Figure 3a in <http://dx.doi.org/10.1002/2015GL066235> ?

We welcomed the suggestion of including a regression tree in our analysis. We opted for a boosted regression tree analysis because it tends to outperform simple regression trees according to a variety of performance metrics. This additional analysis will be included in our revision as supplementary material.

2) Figures 1 and 2 can be combined together, as Figure 1 shows the lake level characters and Figure 2 shows the corresponding p-value?

We are grateful to the reviewer for this suggestion. We have combined Figures 1 and 2 into the same figure. We agree that the content of Figures 1 and 2 were related enough to justify their merging.

3) Figure color: it is usually a warm color (red) for water loss and cold color (blue) for water gain. In addition, a title in head of each figure could be removed? You can use such as “a) PCENSO” for Figure 4a in upper left, and others are similar.

Thanks to the reviewer for these suggestions. We reversed the colour schemes so that red stands for water loss and blue stands for water gain. This improved colour scheme is more intuitive and more in agreement with norms in the literature. We also removed the title heads on each of the figure panels and replaced them with over-plot panel labels as suggested. This change reduces the clutter in the figures.

4) L20: “The water level of a lake is an integrative indicator of local and regional hydrology.” Two related citations are suggested here:
<http://dx.doi.org/10.1016/j.rse.2011.03.005>; <http://dx.doi.org/10.1007/s10712-016->

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Thanks for these suggested citations, we enjoyed reading them and have added citations to them in the manuscript.

5) L25: 1 meter to 1 m.

Thanks for this suggestion. We have corrected it.

6) L30: “On average, water levels in the world’s large lakes are increasing but are highly variable from lake to lake.” This conclusion is not consistent with a recent paper “Recent global decline in endorheic basin water storages” in Nature, <https://doi.org/10.1038/s41561-018-0265-7>. Could you explain which is right and reason?

The difference can be reconciled by differences in the methods used. The recent article in Nature Geoscience used shorter time series (only 14 years), analysed terrestrial water storage generally as opposed to lake water storage specifically, and are based on water volumes not water levels. We have added a brief discussion of this topic to the manuscript and cited the recent paper that was mentioned.