Earth Syst. Sci. Data Discuss.,
https://doi.org/10.5194/essd-2019-34-RC1, 2019

Earth System Science Data Discussions

Interactive comment on "Densified multi-mission observations by developed optical water levels show marked increases in lake water storage and overflow floods on the Tibetan Plateau" *by* Xingdong Li et al.

Anonymous Referee #1

Received and published: 7 May 2019

In this study, the authors developed a lake level dataset with dense samples for large lakes in 2000-2017 in the Tibetan Plateau (TP). The lake level product is validated by in situ water level measurements for Yamzhog Yumco. The water volume changes of 52 lakes with lake level were also estimated. This dataset is very valuable for studies of lake variations and their response to climate change in the TP and lake water balance. I recommend this manuscript to publish in ESSD, but some improvements based on comments below are necessary.

General comments: 1) The uncertainties for lake volume changes and other number

should be added through the manuscript.

2) What is optical water level? It is estimated by the correlation between lake area and level, and then to reconstruct the corresponding lake level using known lake area?

3) How all the lake level datasets are converted to same geoid?

4) In this study, lake boundaries were extracted using GEE. The visual checking and manual editing of delineated lake boundaries with original Landsat images are very necessary. How this was done at GEE platform?

5) How the in situ water level for Yamzhog Yumco is converted to consistent datum with satellite altimetry data? For validation of lake water classification with UAV, how about classification accuracy?

Specific comments:

1) Page1: "There are more than 1,200 alpine lakes larger than 1 km2 (Zhang et al., 2017a)" This result should come from Zhang, G. et al., 2014. Lakes' state and abundance across the Tibetan Plateau, Chinese Science Bulletin, 59(24):3010−3021. Please correct this cite here.

Page 2: ETM should be ETM+, not a superscript symbol of +, others are similar.

2) Page 4: "examine long-term", 2000-2017 is not long-term.

3) "The TP can be generally divided into 12 major basins. . .". Two suggested reference here:

Wan, W. et al., 2016. A lake data set for the Tibetan Plateau from the 1960s, 2005, and 2014, Scientific Data, 3:160039.

Zhang, G. et al., 2013. Increased mass over the Tibetan Plateau: From lakes or glaciers?, Geophysical Research Letters, 40(10):2125−2130.

4) Lake Selin Co-> Selin Co, others are similar

5) Page 5: “a lake shape data set generated by Wan et al. (2016) was used”, This lake shape data was derived from GF data. How about the shift of lake outline? Did you check it with original Landsat images or Google Earth?

6) “we managed to make use of some images with gaps in generating lake shore changes.” How to understand it?

7) “a half of them were excluded from the final results due to cloud contamination or gaps.” How this is determined? Some lakes are missed? How to make sure a high-quality output of lake boundary, especially lake with little ice or turbid water?

8) Table 2: “d, m, km” can be put first row of table, then others below can be removed.

9) “either comparing the mean water level of the overlap period or comparing the two water level time series with changes in lake shoreline” How about the uncertainty and it is reasonable?

10) As the differences of extracted lake outlines, it is better to use a unique NDWI or MNDWI in classification of water and other land-cover in the study period? In addition, the differences from NDWI or MNDWI are not apparent?

11) “we selected images with less than 5% cloud cover” Some images with free-cloud coverage on lake shorelines are still useful?

12) Figure 11: background of this figure is not clear?

13) Figure 12: What is a high peak in Figure 12 in about 2010?

14) Figure 13: The trend of lake storage change is more robust than the result from Yao et al (2018) from Yao, F. et al., 2018. Lake storage variation on the endorheic Tibetan Plateau and its attribution to climate change since the new millennium, Environmental Research Letters:1-16. What is the cause for this difference?

15) Figure 15: How to understand the difference of lake level between these different datasets, especially polylines for optical water levelïij§

16) “5.3 Lake overflow flood monitoring” Many similar Chinese papers have been published. It is not need to include in the Title of this manuscript and put some in discussion is enough? In addition, some sentences such as equation can be moved into Method section?

17) Xiaojun et al., 2012 -> Yao et al., 2012

18) “Water loss was more likely to be found among the southern TP lakes. In the Selin Co basin, a more complicated spatial pattern of lake storage changes was detected, as small lakes were slowly losing water whereas the large lake was gaining water, which we speculated to be caused by lake-river interactions that need further investigation.” These conclusions have found in previous studies. The summary here should more focus on the lake level data developed in this study.

19) Section 4 is too long? It can be shorten?

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