

## ***Interactive comment on “Tracking the impacts of the Aru glacier collapses on downstream lakes” by Yanbin Lei et al.***

**Anonymous Referee #3**

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This study titled “Tracking the impacts of the Aru glacier collapses on downstream lakes” by Lei et al. is very interesting and is a good fit for the journal. This study investigated the long-term dynamics of two lakes located in the Western Tibetan Plateau in terms of physical characteristics, i.e. lake area, level, and volume using long records of remote sensing data and short in-situ records as well as field surveyed data. Moreover, this study specifically studied the consequences of glacier collapses in the catchment, which provides some implications for similar situations in the Tibetan Plateau. Although it is a very specific study, the results are worth publishing. However, there are a few concerns to be addressed before consideration for publication.

General comments: After reading the manuscript, I feel that the title is a bit too specific and does not contain what has been done in this work. I suggest rephrasing the title.

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The hydrological connection is very interesting in my point of view. However, the reasoning of the buffering effect of the Aru Co on the Memar Co is not very convincing. L175, “discharge from Aru Co only accounted for 20-30% of the lake volume increase at Memar Co in the cold season”. How is this conclusion made? Simply assume that the decline in water level completely attributes to outflow? From Lei et al. (2019 GRL), it seems the seasonality of  $\sim 0.5$  m is reasonable for endorheic lakes in the same region. It could be also possible for the Aru Co presenting a 0.5 m annual fluctuation without outflow. Outflow may happen in summer when the recharge is larger. But in cold season, whether outflow happens is questionable. It simply depends on the elevations of the Aru Co and the channel connecting the two lakes. So it needs to be careful when calculating the contribution of outflow of the Aru Co to the rising of the Memar Co by simply comparing the decline of the Aru Co and rising of the Memar Co. Another concern is the altimetry data processing, which affects the reconstruction of historical lake levels. Current methodological description is very vague. What are the data sources? How is the water level generated? How is the bias between the two data sets handled? The results relating elevation changes are heavily dependent on the bias of the two data sets.

Specific comments: L21: “collapsed suddenly” suddenly is not necessary, I think. L52: “dramatic increase”, I do not think there is a dramatic increase in precipitation. Before 2014, the increasing of precipitation is not significant, and a plethora of studies debated the reason of lake expansion. Until recent years, the increasing of precipitation is much clear but not dramatic. L65-69: Do you think the bathymetry have significant change? L90: How was the snow measured? L177-178: This sentence is not clear to me. Please rephrase it. L191: “Sential” -> “Sentinel”, please also change it in the caption of Figure 4. L192: Figure 3a should be Figure 4a. L209-214: How many pairs of level and area are used to build this regression model? Extrapolation based on data of six years could be problematic. This needs to be better explained. L217-218: It seems that the satellite data did not capture the sudden rise (pink dotted line) revealed in Figure 5b. Is the pink coded line indicating the reconstruction? L256-257: The seasonality revealed

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by satellite data is not very clear due to the coarse temporal resolution.

Conclusion: I would suggest the authors try to concise the conclusions, right now too many repetitive statements from the results.

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