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The Cryosphere Discussions

Interactive comment on "Terminal motions of Longbasaba Glacier and their mass contributions to proglacial lake volume during 1988–2018" *by* Junfeng Wei et al.

Anonymous Referee #2

Received and published: 7 April 2020

The manuscript focuses on a peri-glacial lake expansion of Langbasaba Glacier in the Central Himalaya. The topic is relevant to TC but manuscript is has some major flaws and is not ready for publication in TC. My decision is "Reject". The language is sloppy and many times difficult to follow.

Authors have estimated the contribution of glacier surface lowering, snout retreat and changes in glacier velocity to the glacier lake volume. All the data to derive these estimates are from gridded sources, no comparison or validation is done using field data (surface lowering or surface velocities). In this situation, it is difficult to constrain the actual uncertainties in their estimates. Authors assumed evaporation or sublima-

tion processes to be negligible. In the central Himalaya, evaporation/sublimation were estimated to be quite high (up to 21% of annual snowfall) (Stigter et al., 2018). Ignoring sublimation would lead an overestimation of the mass contributions of the glacier changes to the lake water volume, as highlighted by the authors. Authors, estimated the water volumes coming from different sources but did not discuss how much discharge is generated from the lake. They should have discussed the complete water cycle of the lake. The discussion part (section 5.2 and 5.3) reads like literature review and could not bring any new science based on their results. Author should discuss the key questions: 1) what is the threshold water volume (capacity of moraine dam) Longbasaba lake can hold, 2) is this lake potentially dangerous (if there is any habitat downstream), 3) when the lake may burst if the lake expansion rate continues in similar fashion, and possible remedies to control the GLOF (if there is downstream habitat that can be affected).

Some minor suggestions: L 21: replace "lowing" with "lowering"

L 25: "Due to the areal expansion, decreasing mass contributions from parent glacier shrinkage, and some mitigation measures by local governments to improve the drainage systems, the potential risk of outburst for Longbasaba Lake has continuously decreased during the last decade." I could not see any mitigation measure from government on this glacier discussed in this manuscript. Further, I don't understand how authors concluded that the decreasing mass contribution from glacier led to decreased risk over the last decade. In any case, the lake volume is continuously increasing so as the risk.

L 34: "lake-terminating"

L 51: "downstream communities"

L 66: what is "floe masses"?

L 77: show the lake stream in figure 1A.

L 131: “. . .ice flow and were. . .”. Remove “and”.

L 239: “the estimated accuracy. . .”

L 237-243: How the uncertainty in surface velocity was estimated?

L 250-252: Rephrase the sentence. Not clear.

L 255: “decreased dramatically”

L 259: what are those other periods? Describe here.

L 263: which period?

L 268: it is confusing to see length changes in % a-1, please give the changes in meter. % a-1 is mostly used for areal changes.

L 279: which period, glacier showed reduced mass wastage?

L 280: are these glacier-wide elevation changes?

L 293: I would suggest to use “sides” than “flanks”

L 327-329: The sentence is not clear, please rephrase.

L 373: “. . .fluctuation in the variations in the changes in the glacier area.” Not clear to me. Please rephrase.

L 421-422: reference for the assumption?

L 433: “infiltration in the ground’ would lead to underestimation in mass contributions of glacier changes. Please check.

L 489: it is Banerjee and Shankar, 2013.

Reference: Stigter, E. E. et al. 2018. The importance of snow sublimation on a Himalayan glacier. Front. Earth Sci. 6, 108.

Please also note the supplement to this comment:
https://www.the-cryosphere-discuss.net/tc-2019-259/tc-2019-259-RC2-supplement.pdf

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2019-259, 2020.