

**Re-review of “Proglacial Lakes Elevate Glacier Surface Velocities in the Himalayan Region” (tc-2021-90) by Pronke et al.**

**Overall:** The authors do a thorough job incorporating suggestions from myself at the other reviewer. I think this manuscript is near ready publication, but have a few comments remaining on the text on Lines 594 – 609 & Figure A5 relating to ice thickness differences between the land- and lake-terminating glaciers that should first be addressed. When published, I think this work will be of great interest to the community & I look forward to citing it!

I agree that there is some uncertainty pertaining to the Farinotti et al. (2019) ice thickness dataset, but it is the best resource we have for estimating this important variable.

A few ideas for clarifying & better supporting your claim about the importance of ice thickness:

- 1) Can you provide more quantitative data on the ice thickness difference, rather than just using qualitative terms (e.g., “substantial factor”) and pointing to Fig. A5? For example, by what factor (e.g., 1.5x) thicker are lake-terminating glaciers than land-terminating glaciers? If you used a simple estimate like the shallow ice approximation, what velocity difference would you expect? What fraction of the observed velocity difference could this explain?
- 2) The fact that Fig 6b shows substantially faster flow for lake-terminating glaciers within the same area class suggests that variables in addition to ice thickness are driving the speed differences (because thickness generally scales with area). This may be worth pointing to to better support your claim of ice thickness differences not driving your observation.
- 3) It is not clear to me what you mean by “Concurrently, it is worth considering that the difference in ice thickness between land-terminating and lake-terminating glaciers is also due to the very presence of a lake”. This seems like a “chicken-or-the-egg” problem – is ice thickness different there because the lake exists, or does the lake exist because ice thickness (and/or subglacial/proglacial topography) differ? Lakes are found in basins (to state the obvious), and basins/overdeepenings also promote thick/fast ice. We wrestled a lot with covariance between ice thickness and other variables in the context of proglacial lakes in the paper referenced below (particularly in Secs 4.4 & 5.4). It may be worth reading and referencing those ideas.

Field, H. R., Armstrong, W. H., and Huss, M.: Gulf of Alaska ice-marginal lake area change over the Landsat record and potential physical controls, *The Cryosphere*, 15, 3255–3278, <https://doi.org/10.5194/tc-15-3255-2021>, 2021.

- 4) In Lines 605-607, I don’t think you can say the link is causal because of the above-referenced “chicken-or-egg” issue. You show an association between lakes & faster velocity, but not necessarily lakes causing faster velocity.

Review by William Armstrong