Dear Editor,

We thank you and the reviewers for their constructive comments in this and the previous round of review, which have substantially improved the manuscript.

We have addressed all the comments of the reviewer and revised the manuscript accordingly.

Our point-by-point responses are provided in the accompanying response letter, and all changes are marked in the tracked-changes version of the manuscript.

We hope the revised manuscript is now suitable for publication in The Cryosphere, and we look forward to hearing from you.

Best regards,

Ankit and co-authors

Dear Ankit and Co-authors,
Not all of the original reviewers were available for this round of revisions, and I struggled to find a second one.

The available reviewer points to clear improvements in the manuscript. However, they do point to some aspects that could further develop the manuscript.

A small note on my part: Please considering making a comment in the captions for Figs 4 and 7 about which configuration results in greater thickness or velocity. This could help the reader understand the figure more clearly.

Thank you for your help and I am looking forward to your response.
Best regards, Ian

AP:

We have added a sentence in the caption of Figure 4 and 7 indicating which configuration shows greater ice thickness and velocity as "Differences in ice thickness and velocity are largest at Year 100, and extend furthest upstream."

Dear Authors,

I am glad that the authors have painstakingly and sincerely addressed all the comments. The manuscript is much improved. While there would still be much to learn from applying a more complex simulation that could incorporate calving and real world

bed topography (as mentioned in my previous response), the focus of the study on glacier response to lake level changes alone is valuable. I therefore have only a handful of minor comments to aid the publication of this article.

AP: *Thank you for the constructive comments in this and the previous round of review, which have substantially improved the manuscript. Our point-by-point responses follow below.*

Introduction: This now reads well from start to finish, sets up the problem and scope clearly. However some more case studies here would help set up your experiments perfectly. While you cite Sattar et al., 2025 (South Lhonak) I would recommend describing this event (and a few others if these can be found), including how much lake level change was observed here, in order to tie this into your rapid drainage experiment. It also might be worth including some specific details from the Teller/Lake Agassiz paper in regards to those historical drainage events, and how much lake lowering is estimated.

AP: *Thank you for the suggestion of adding estimated lake level fall observed in reality. We have added the following sentences in this regard. "A lake level drop of 28-32 m, releasing ~50 million m^3, in around 3 hours was, for example, recorded during the 2023 catastrophic outburst flood from South Lhonak proglacial lake in the Indian Himalaya (Sattar et al., 2025; Shashivardhan Reddy et al., 2024). At ice sheet scale, the geological record provides evidence of lake-level lowering by tens of metres, draining 100s-1000s km^3 water. Lake Agassiz fell ~90 m over 0.5 years (Clarke et al., 2004; Leverington et al., 2002), for example; the Central Jämtland Ice Lake in Scandinavia drained by 80 m over a period between 8 days and one season (Regnéll et al. 2025)."*

Results: *Experiment 3b* is a valuable contribution to the study giving us new insight into the changing stress response of a glacier to genuine rapid changes in lake level.

*Line 303/ Fig 10***:** For the 0 to 200 line and possibly the 0 – 175 line, we see a pre-year-50 taper in mass flux, i.e., the 0–200 m scenario slows down between years 40 and 50. I would be interested to know why this is the case given that the floating area continues to rapidly increase until the 50-year mark on the right-hand plot. I couldn't find any explicit discussion on this issue which appears counterintuitive.

AP: *The 0-200 and 0-175 line slows down between year 40 and 50 is a result of decreased ice thickness due to negative mass balance and dynamic thinning from lake level rise. Grounding line mass flux is a competition between floatation and thinning where later leads to decrease in GL mass flux. In higher lake-level experiment, ice thinning rate is faster (Experiment 2). As a result, in experiments above 0-150, ice thins faster to counteract the mass flux early compared to experiments below 0-150. Thinning rate increases with lake level and the attenuation of GL mass flux becomes elongated. Therefore, we observe longer attenuated profile in 0-200 than in 0-175.*

We have added the following text in the manuscript after line 301:

"In our two highest lake-rise experiments, flux more than doubles over 25 years before enhanced thinning (e.g. Experiment 2a) partly offsets the effect of lake-level rise, attenuating further flux increase. "

Discussion: There is still a bit of contextual overreach linking modelling of a Greenland outlet glacier to Himalayan/mountain glaciers and GLOFs while you have caveated this slightly at lines 540 – 544 some comment on what the anticipated differences between these two systems could be added here. This might include noting that the bed slopes, subglacial hydrology, and topographic relief of Greenlandic fjords differ significantly from the high-altitude, lake-terminating glacier dynamics found in Himalayan/mountain catchments.

Again it would be great to see more case studies included in the discussion which would help to contextualise your findings allowing you to say whether we see similar glacier responses to this study where we have seen lake lowering events of comparable magnitude.

AP: *We agree that high-altitude lake-terminating glacier setting would be quite different than Greenlandic one. We add the following lines here "We chose a Greenland domain and aimed to explore generic ice-lake interactions, enforcing a flat lake bed in order to minimise the influence of local topography. However, locally retrograde or normal bed slopes and the shape of the regional topography will influence the size of proglacial lakes, the likelihood of repeated damming or interconnected lake systems, and the magnitude of glacier impact; such aspects differ between Greenland and high mountain domains. "*

Regarding case studies: We are solely focussing on impact of lake level on glacier dynamics whereas reality is convoluted with multiple processes including frontal ablation and non-uniform bed topography. Therefore, it is not feasible to find one to one connection between our findings and reality in general. There is no comparable artificial lake-lowering to our experiment. However, there are GLOFs which led to tens of metres of lake level drop. Post GLOF icebergs had been observed in South Lhonak lake but it is not established whether those are due to lake level drop or independent event. Therefore, we refrain from stating it in our discussion.

Other minor comments:

Line 79: Missing comma in Carrivick citation

AP: *Corrected throughout the manuscript*

Line 394: Tsutaki, Baurley, Holt, Sato et al., all missing commas as well.

AP: *Corrected throughout the manuscript*

Line 357: Reynolds et al., 2025 is missing from the reference list

AP: *Added in the reference list*

Line 514: ICIMOD 2011 also remains unreferenced.

AP: *Added in the reference list*