Remarks on **"Global glacier volumes and sea level – effects of ice below the surface of the ocean and of new local lakes on land"** ***by Haeberli & Linsbauer***

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The title is alarming, the idea is notable, but the manuscript itself does not give useful insights about the issue raised – except for those "first order" estimates of correction. There are several other issues of, perhaps, similar magnitude of importance: for instance, what fraction of melt water will be lost on its way from glacier to the sea due to seepage and evaporation? what fraction will be consumed for industrial and agricultural purposes? For "systematic" correction to the contemporary method of computing sea level equivalent of land ice (cf. p. 5170, l. 13), these might also need to be considered, particularly in the context of this manuscript, even though such effects would be negligible. I advise that authors should talk a bit about it in the introduction.

For me, this is more a concept note than a research article. Because I am not entirely certain about the policy of *The Cryosphere*, I leave it over to the Editor to decide whether it is worthy of publishing. If yes, the following comments should be addressed properly.

p. 5170, l. 24: To be precise, equation (1) should be as follows:

$$V_r = V_{gic} - V_s - \frac{V_l}{0.9}$$

where 0.9 is the correction term (based on the water/ice density: $\rho_w = 1000$ and $\rho_i = 900$ kg m^{-3}) in order to account for the fact that, theoretically, future lakes hold more ice in its liquid form (i.e., after melting). Assumptions are that lakes hold brimful of water, and that lakes do not outburst due to weak moraines.

In the above equation, the presence of V_s term only means that the ice below sea level is left out of the calculation. But the fact that when this ice melts it actually contributes lowering the sea level (p. 5173, l. 4) has not been accounted for. I suppose

$$V_w = 0.9 \times V_r - 0.1 \times V_s$$

would be the total volume of water, V_w, to be spread over the "ocean area" while calculating sea level equivalent. The second term in the RHS accounts for the contribution of ice that is below sea level on lowering the sea level when it melts. Also, authors may discuss the fact that there is no such thing like "fixed" area of ocean, as it expands when it rises. This makes it difficult to accurately calculate the future sea level rise from glaciers and ice caps under ongoing climate warming.

p. 5172, l. 16: Citation needed for this part of sentence "…rising long-term greenhouse gas concentrations in the atmosphere…"

p. 5173, l. 11: Citation needed for "…a rough order of magnitude estimate already shows that $V_l \ll V_s$".

p. 5173, l. 21: How does this affect sea level, as the water after hydropower production is usually drained back to the river? I think this sentence "Other lake volumes may be artificially enhanced…" is completely out of place.

p. 5174, l. 3: How come "half" of 3 – 6% of present-day ice volume as first-order estimate of V_l? Authors mention (i) these figures (i.e., 3 – 6%) are based on the estimates for Swiss alps where glacier over-deepening is thought to be shallow and narrow (p. 5173, l. 27), (ii) over-deepened beds could be larger in other regions, such as central Alaska and the Canadian Rocky Mountains (p. 5174, l. 1), and (iii) contemporary models suggest strong underestimation of depth of over-deepening (p. 5173, l. 22). Do not these all suggest that 3 – 6% (instead of half the magnitude) of present-day ice volume should be the first-order, "lower bound" value for V_l?

p. 5174, l. 14 – l. 17: Do not these last two points mean the same? That is ca. 50% of large glaciers (e.g., Bering and O'Higgins) is below sea level?

p. 5174, l. 18: Based on the information provided above (p. 5174, l. 8 – l. 17), I am not sure how you come up with 10 – 15% as a first order estimate for V_s. And, why is this an "upper bound" value?

p. 5174, l. 20: What are you combining here? V_l and V_s? If yes, how do you end up with 5 – 10% as a reasonable value? If this is supposed to be the "mean" of so-called "lower bound" (p. 5174, l. 5) and "upper bound" (p. 5174, l.18) values, this is wrong because the former magnitude is associated with V_l and the latter one is with V_s, and hence they are additive (cf. equation (1)).