

The Cryosphere Discuss., referee comment RC2
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Comment on tc-2021-364

Adam Emmer (Referee)

Referee comment on "Inventory and classification of the post Little Ice Age glacial lakes in Svalbard" by Iwo Wieczorek et al., The Cryosphere Discuss.,
<https://doi.org/10.5194/tc-2021-364-RC2>, 2022

This study of Iwo Wieczorek and colleagues aims at creating lake inventory of Svalbard, analysis of their spatial and evolution patterns. Such studies are – in my opinion – needed for several reasons (enhanced understanding to the post-LIA glacier and lake dynamics, enhanced GLOF hazard identification and risk management) and may be of interest for readers of The Cryosphere. The authors compile and analyze remote sensing data going back to 1938, i.e. beyond the satellite era, which is an advantage compared to similar studies done recently around the globe. However, the authors do not exploit these data in needed detail, or fail to present their results in a well-arranged and systematic way, and so the study looks more like a preliminary version of a future paper. For instance, not even basic statistics are provided for location (e.g. elevation, position in the lake-glacier system) and characteristics (e.g. area, geology, lake-glacier interaction) of individual lake dam types in individual steps in time. The authors briefly mention an impressive number of past GLOFs which they do not further elaborate on at all. The methodology is partly unclear and not enough details are provided for individual steps mentioned in 3.2, fairly limiting replicability of the work done. The integration of existing data with newly created data is not presented or discussed. The section on GLOF risk (better use susceptibility here) assessment is overall weak and needs to be improved substantially (analysis of past GLOFs could help you to derive indicators of potential future GLOFs). Discussion section needs some work (please discuss your data and methods, interpret your observations, compare your observations with other regions, ...). Finally, I'm not a native English speaker, but I feel that the writing would benefit from careful proofreading and language polishing.

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L1: I found the use of the LIA slightly misleading since you go back to 1930s (and actually

there is not so much gained from the 1930s images)

L13: in Section 3.1, you present that some lake inventory is available from the NPI

L13: maybe 'formation' is more suitable than 'genesis'

L19-20: this is not really supported by your results

L24: attention to

L32: this definition is unusual; if a glacier is gone (not present anymore), a lake is no more defined as a glacial lake?

L36-37: see also <https://doi.org/10.1016/j.geomorph.2020.107178>

L39-43: this becomes weak considering existing lake inventories of NPI

L63: in general, more details are needed to make your methodology replicable; for instance – what is the minimum lake mapping size in different existing NPI inventories? How were they done? How are they methodologically compatible with your approach? Did you orthorectify the 1930s images? If yes, what digital elevation model was used? Did you manually delineate each lake in each analyzed period?

L68: please cite these data properly

L91-113: maybe a flowchart would work better than this description which is confusing in places

L92: what landscape conditions?

L94: it is not clear how lakes which are ice-distal or became ice-distal during the analyzed period are treated

L103: there are four decades between the end of the LIA and 1930s images; maybe you could change your wording

L131: please provide details about the DEM (acquisition date, resolution) and cite it properly

L136: dam material

L138-140: this is not clear to me

L141: this section is methodologically weak and should be substantially revised or left out

L153: please consider providing at least some descriptive statistics of characteristics of individual lake dam types

L176: this is confusing; please consider arranging your writing in this section chronologically

L181-182: this is not corresponding to what is shown in Fig. 7F

L197-198: how do you know these were GLOFs or fast drainages? For instance, you have no data in between 1938 and 1990s; is there any geomorphological evidence of past GLOFs? 183 GLOFs in one decade sounds exaggerating

L199-200: this is very interesting, but more analyses and data about these assumed GLOFs are needed

L205: how do you know that the dam has a low stability?

L205-206: what is the basis for this assumption?

L201-211: please support your statement by data / analysis or avoid

L218-225: referencing needed

L226: potential instability

L232: what seasonal variability? This is not analyzed in the study

L242: are located

L255 often have

L258: the majority of world's GLOFs actually originated from ice-dammed lakes (see <https://doi.org/10.1016/j.gloplacha.2016.07.001>)

L259: please support your hypothesis with data / references

L270-271: clearly, this is a difference between high mountain and high latitude regions

Figures: most of your figures show spatial distribution of lakes, however, the evolution in time and trends are not visible from those; please consider enhancing your figures in a way that also evolution trends and patterns could be easily distilled; to save some space, Figs 4-6 could be merged (one map)

Fig. 1: please consider displaying basic topography

Table 3: please consider presenting lake counts as well as total lake areas for all studied periods

Table 4: decrease of lake counts from 2008-12 to 2013-19 (!); this surprising disappearance of 300 lakes in one decade and subsequent appearance of 100 new lakes are not discussed by the authors

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To sum up, I'm convinced this study needs substantial revisions before it can be considered for publication. Considering current length of the text (less than 300 lines), there is certainly a room for improvements. I encourage the authors to revise their manuscript and I'm happy to review the revised version of this study, if requested to do so.