

Response to Editor

Dear Dr. Hauck,

Thank you for your handling of our manuscript and for the opportunity to submit this revised version of our manuscript egosphere-2025-3628.

In this revision, we have focused on the remaining issue concerning terminology and definition, and have revised the manuscript accordingly. We hope that the revised manuscript is now suitable for publication in *The Cryosphere*.

Thank you again for your time and consideration.

Best regards,

Jinhao Xu, on behalf of all authors

Response to Referee

Hereby I acknowledge that the authors revised their manuscript according to my previous comments. My main comments on the terminological issues have been addressed by adding a chapter on "Classification framework" (2.2). Here the authors elaborated on a general classification of glacial lakes based on the formation processes and damming conditions. From my perspective however, this does not resolve the mentioned problem of distinction between "glacial" and "non-glacial" lakes provided by the study. A classification of different glacial lake types is not required here, since they cannot be differentiated based on the methods applied and are not in the scope of the study, as mentioned by the authors.

Thus, I still believe that the terminological problem requires to be resolved. Please note that I am interested in a successful publication of this manuscript. My concerns however relate to the scope of the journal and the potential audience. In a journal like *The Cryosphere*, terminology matters, at least as far as I understand this journal. To better illustrate my point, please imagine what happens to your mapped glacial lakes in the future, when glaciers in this region have melted. Would they turn into non-glacial lakes? I think not, because the formative process did not change. And this also refers to the past.

My suggestion would be to find a way to distinguish between the temporary nature of the lakes under observation. Even though we don't have detailed information on the timing of lake evolution or the changes of glaciers within the study, we may find a way to address the temporal condition of the glacial lakes while keeping with the right terminology. Thus, I would suggest that the lakes termed now "glacial lakes" are labelled "contemporary glacial lakes", which will be defined as: lakes formed by glacial processes in the forefield of contemporary glaciers fed by meltwater. Contemporary then refers to the presence of glaciers at the timing of the study. I acknowledge that this goes back to some extent to your previous definition ("...water bodies mainly supplied by modern glacier meltwater..."). In contrast, all other lakes currently termed "non-glacial" lake could be labelled "past glacial and non-glacial lakes". They would be defined as: lakes that formed by glacial processes of previous times (potentially early Holocene, Pleistocene) or non-glacial processes. I think this would allow you to keep your results as they are and still produce non-biased data that many people can understand in the same way. Additionally, this definition also fits better with your example in figure 9. Here, your "correct" glacial lakes appear to be in good relation to the glacier distribution shown. All "false" lakes however can be attributed to previous glacial presence.

I hope you can better understand my point of view and you agree to adopt a different definition of the objects in focus.

Response: Thank you very much for your patient and detailed explanation of this terminological issue across the review rounds. We recognize that, in our previous revisions, we did not fully appreciate the importance of this point for the accuracy and clarity of the manuscript. After carefully reconsidering your comment, we now understand that this issue is indeed essential, because the previous terminology could be read as conflating lakes related to contemporary glaciers with lakes of past glacial origin and lakes of non-glacial origin. We therefore revised the manuscript accordingly.

In the revised manuscript, we have aligned the terminology suggested in your comment with the operational classification framework adopted in this study. Specifically, in Section 2.2 we no longer use the binary terms “glacial lakes” and “non-glacial lakes” as the formal names of the mapped classes. Instead, lakes showing glacier-related interpretation characteristics under the adopted framework are now termed contemporary glacial lakes, whereas the remaining mapped lakes are grouped as past glacial and non-glacial lakes (hereafter, other lakes). This revision incorporates the temporal condition emphasized in your comment while avoiding the implication that lakes outside the contemporary glacial lake class are necessarily of non-glacial origin.

To ensure consistency throughout the manuscript, we also revised the corresponding terminology and related descriptions in the Introduction, Section 3.3, Section 4.2, Figure 9, and the Conclusion.

Please also reconsider your spatial analysis in chapter 3.3 based on the potential new definitions. Your observation that “glacial lakes” are “broadly consistent with present distribution of glaciers” is therefore of course not a surprise given the definition required.

Response: We agree with your point. In the revised manuscript, we removed the wording that stated that the mapped “glacial lakes” were “broadly consistent with the present distribution of glaciers.” Section 3.3 is intended only to provide a brief description of the observed distribution patterns, rather than a spatial analysis or interpretive result.

All other comments have been addressed successfully.

I am looking forward to the publication of this manuscript.

Response: Thank you very much for your positive evaluation and for your patient, careful, and constructive comments throughout the review process. We sincerely appreciate your time and effort, which have helped us substantially improve the manuscript. We hope that the present revision has adequately reflected the intent of your comments and has led to a clearer and more

rigorous manuscript.