Dear Editor and Reviewers,

Thank you very much for your valuable comments and suggestions, which were crucial in improving the manuscript (MS). The MS has been extensively revised based on each point of the reviewers' comments and suggestions (see point-to-point responses below), and the updated sections of the revised MS have been highlighted.

In addition, we would like to acknowledge the valuable guidance provided by Professor Zhifang Zhao during the revision process and in the preparation of the figures. As a result of his significant contributions, we have included him as the third author in this revision.

Thanks again to the reviewers for their valuable comments and suggestions. We hope you find the revised MS and revision notes in order. If you have any questions, please do not hesitate to contact us (qmm@mail.ynu.edu.cn or shiyin.liu@ynu.edu.cn). Many thanks for your time and consideration.

Referee #1

Thank you for detailed reply to my comments. Remaining issues: (i) I still think that the 4 bathymetries should not be used for both training and testing;

Explanation and revision: Thank you for your comment and for raising this concern. In this study, the four lakes (Bienong Co, Maqiong Co, Tanong Co, and Jialong Co) are not entirely used for training the model. Instead, they were employed to determine the buffer distance around the lakes. Our model for estimating water volume relies on several parameters, such as w, m, n, r, l, and a, which are manually defined rather than derived from training. Then, to validate the model's parameterization (Here, we are referring to the accuracy of the automated calculation of the model's input parameters w, m, n, r, l, and a), we tested it using bathymetric measurements from four representative glacial lakes surveyed between 2020 and 2021. These four lakes, along

with data from additional lakes, were then used as an independent sample set to evaluate and compare the performance of our model against other methods.

In summary, our model is not trained on these four lakes but is instead an idealized model defined based on field measurements and lake basin morphology. We appreciate your insightful feedback, which has allowed us to further clarify this point.

(ii) for the application part, it is written that "We conducted a thorough review and made revision to ensure that we retained only those GULs classified as moraine-dammed lake." - this procedure should be described in detail in the Methodology;

Explanation and revision: Thank you for your valuable suggestion regarding the description of our procedure. We have revised the text to include a detailed explanation of the methodology based on Yao et al.'s (2018) classification criteria for moraine-dammed lakes. The revised description clarifies our approach and ensures that the methodology is transparent and comprehensive. Please review the revised manuscript to check our updated description.

Line 291-299: *"It is important to note that in his dataset, GUL refers specifically to glacier lakes that do not contact glaciers, which may not necessarily all be moraine-dammed lakes. To ensure the accuracy of our analysis, we conducted a thorough review based on the classification criteria proposed by Yao et al., (2018) which identify three types of moraine-dammed lakes: (1) lakes situated between the end moraine ridge and the glacier terminus, (2) lakes beside the lateral moraine ridge, and (3) lakes on the moraine ridge. Each GUL in the dataset was individually assessed against these criteria, and only those meeting the classification as moraine-dammed lakes were retained for further analysis……"*

Yao, X. J., Liu, S. Y., Han, L., Sun, M. P., and Zhao, L. L.: Definition and classification system of glacial lake for inventory and hazards study. J. Geogr. Sci., 28, 229–241, https://doi.org/10.1007/s11442-018-1467-z, 2018.

(iii) please better highlight the importance of this work; the claim of more precise

prediction of a peak discharge is not supported by any example (the study only concerns the estimation of lake volume).

Explanation and revision: Thank you for your valuable feedback regarding the emphasis on the importance of our work. In response, we have revised the manuscript to better highlight the significance of estimating lake volume in the effective management of GLOF hazards. Specifically, we have removed the claim about the precise prediction of peak discharge and instead emphasized the critical role of understanding lake volume as a key factor in assessing GLOF likelihood and magnitude. We sincerely appreciate your thoughtful comments, which have helped us improve the clarity and focus of our study. Thank you for your efforts to strengthen our work. Please review the revised manuscript to check our updated description.

Line 72-79: *"Effective management of GLOF hazards hinges on the ability to assess both the likelihood and magnitude of such events (Clague et al., 2000). This typically requires understanding several critical factors, including the water storage of MDL, the structural integrity and stability of the dam, potential external triggers, and the flood's anticipated flow path (e.g., Richardson and Reynolds, 2000; Westoby et al., 2014; Mergili et al., 2020; Sattar et al., 2021). Estimating glacial lake volume, however, presents significant challenges. Many glacial lakes are situated in remote, physically demanding, and hazardous environments, complicating bathymetric surveys of the lake basins (Cook and Quincey, 2015; Qi et al., 2022)……"*

Referee #2

Thank you to the authors for clarifying the methodology and stating that the method presented applies geometry equations, the parameters of which are derived from observations. I have one last couple of questions:

-For the models, you need to estimate the depth using the angle of a buffer area around the lake. In equation 8, you use alpha, but in Table 2, 3, and Figure 6, you used "a". Do alpha and "a" represent the same parameter?

-If so, you should use the same, and it would be good to indicate which lakes were used to determine that 80 meters is a good buffer distance from the lake (Lines 232-240).

Explanation and revision: I sincerely apologize for any misunderstanding caused by my unclear explanation. Here, we used the parameter "*a*" to refer to slope angles of the glacial lake, they represent the same parameter. Please refer to Line 206 "Finally, the water depth (*h*) can be derived from the *w* and slope angles (*a*) of the glacial lake" in the original text.

Based on your suggestion, we specified in the description that the lakes Bienong Co, Maqiong Co, Tanong Co, and Jialong Co were used to determine the optimal buffer distance.

L232-234: *"By comparing the simulated results with the measured data (lakes Bienong Co, Maqiong Co, Tanong Co, and Jialong Co), we found that the water storage estimation using the median value of a within 80 m external buffer zone had a lower relative error and higher overall accuracy*……."

Regarding my comments about the axis, I suggested that indicating the direction of the axis in the figure would help to follow the article. However, after rereading that section, it now seems unnecessary.

Explanation and revision: Thank you for reassessing your comment on the axis direction. I'm glad the current presentation feels clear now. I truly appreciate your thoughtful feedback and efforts to improve the article.