Dear editors and reviewers,

We sincerely appreciate your constructive comments and suggestions to improve this manuscript. We have revised the manuscript and addressed these comments point by point. We hope that this revised manuscript fulfills the editor's and reviewers' high standards for the *Hydrology and Earth System Sciences*.

The reviewers' comments are shown in black, our responses are highlighted in blue, and the revised text in the manuscript is highlighted in orange.

We look forward to your feedback.

Yours sincerely,

Yao Li

This research proposes a novel bathymetric mapping method, which is interesting to estimate the water depth and lake water storage using multiple data resources. I think that the revision of this round is satisfied, and the authors have done an excellent job revising the manuscript. Their detailed and thoughtful responses effectively address most of the concerns raised by the reviewers in the previous round. The revised version is significantly clearer and easier to follow. I suggest a few minor revisions before accept for publication, the detailed comments as below.

1. In Eq. (7), an average slope threshold of 5° is adopted based on statistics from over 4,000 lakes. While this approach is reasonable, it remains somewhat empirical. It would be helpful for the authors to briefly clarify, either in the main text or in the supplementary materials, whether this threshold is region-dependent and whether recalibration may be required for application in other regions. Such clarification would enhance the general applicability of the method.

Response: Thank you for this valuable suggestion. We agree that the average slope threshold of 5° used in Eq. (7), although derived from statistical analysis for more than 4,000 lakes on the Tibetan Plateau, remains partly empirical. In response to your suggestion, we have revised the manuscript to include the following text: "It should be noted that α was derived from lakes on the Tibetan Plateau and may therefore have regional limitations. When applying this method to other regions, the value of α should be adjusted according to local topographic and geomorphological conditions." (Lines 291-294)

2. A few individual lakes, such as Dong Co, exhibit relatively large errors, for which the authors have provided explanations. It would be beneficial to include a brief summary in the Conclusion section outlining the main types of conditions associated with higher errors. This would make the discussion more complete and informative.

Response: Thank you for this insightful comment. In the original conclusion, we only discussed the influence of error propagation and DEM quality on the results, but did not adequately summarize the role of lake-specific characteristics. In response to your concern, we have revised the manuscript to include the following text: "Relatively large errors were primarily observed in lakes with shallow water depth, complex basin morphology, or strong local sedimentation effects, where the topographic continuity between the shoreline and the underwater terrain may be weaker. Under such conditions, the uncertainty of bathymetric reconstruction is more likely to increase." (Lines 525-529)

3. Although the source code has been provided, the methodological framework relies on pixel-wise calculations. Therefore, the projection information of the input data should be explicitly stated in the main text to improve transparency and reproducibility.

Response: Thank you for this helpful suggestion. Specifying the spatial reference information of the input data enhances the transparency and reproducibility of the study. In the revised manuscript, we have added a clarification regarding the coordinate reference systems and projection used in this study: "Since the proposed method relies on pixel-wise calculations and involves area estimation, all spatial data were processed using the Albers equal-area projection to ensure consistency and reliability. The geographic coordinate system of the Tibetan Plateau lake data is WGS84, whereas that of the Lake Mead data is NAD83." (Lines 98-101)

4. In Table 2, the in situ depth value for Longmu Co should be formatted consistently with the rest of the table, using two significant figures. Please review the table formatting carefully.

Response: Thank you for pointing this out. We have corrected the formatting of the in situ depth value for Longmu Co in Table 2 and have carefully reviewed the formatting of the entire table to ensure consistency.

5. I also suggest to correct the "cuo" by "Co" in Table 1, e.g., Angzi Co, Buruo Co.

Response: Thanks for this suggestion. We have corrected all instances of "cuo" to"Co" or "co".

6. I also suggest to correct the "Lake volume" by "Lake water storage" through the whole manuscript, as same as lake water depth.

Response: Thanks for this suggestion. "Lake volume" has been revised to "lake water storage" throughout the manuscript to ensure consistency with the term "lake water depth."

7. I also suggest to correct the "-" by "–" in Table 4, also for the whole manuscript.

Response: Thank you for pointing this out. We have corrected "-" to "–" in Table 4 and have reviewed the manuscript to ensure consistent formatting throughout.

8. Whether there is a value for the density of "high" and "low" to show the density of

these points in Figure 7, if it is, please add the value for this figure.

Response: Thanks for this comment. To ensure a consistent color scale across all subplots, the point density in each panel was normalized. Therefore, “low” and “high” correspond to 0 and 1, respectively. In response to your suggestion, we have revised Figure 7 and replaced the color bar labels with explicit numerical values.

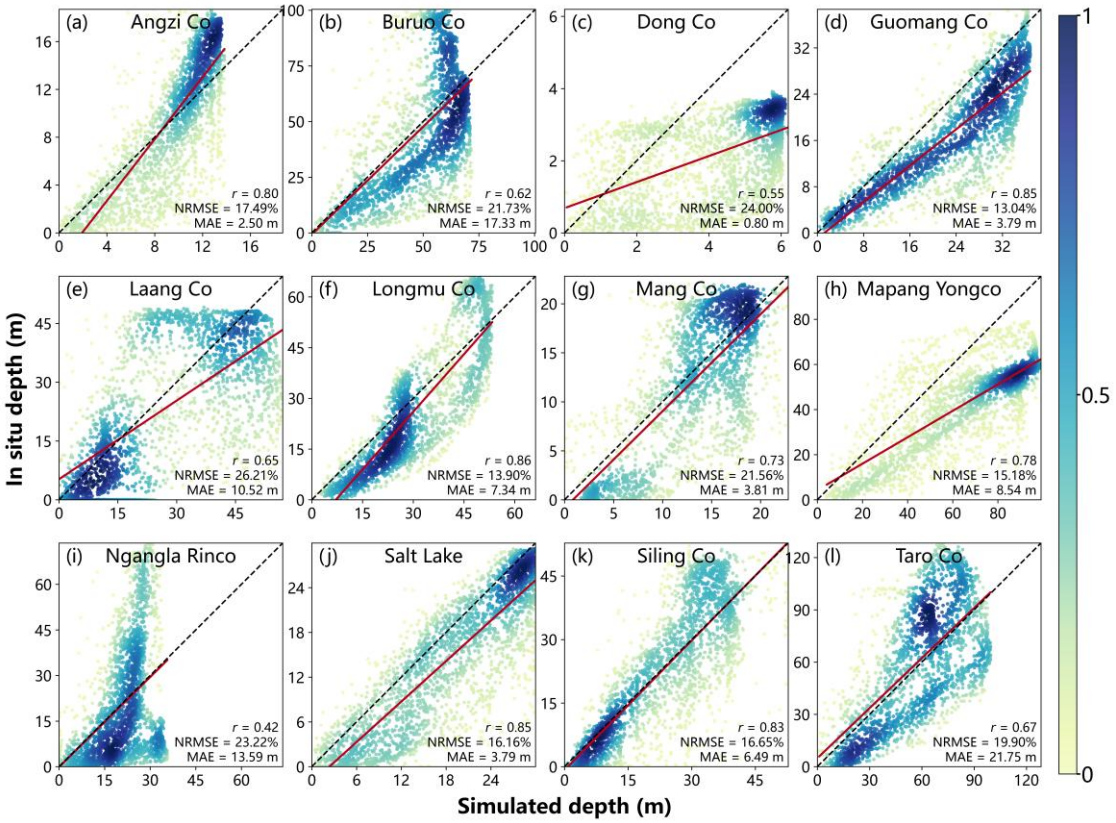

Figure 7: Scatter plots comparing simulated lake depths with in situ measurements. The dashed line indicates the 1:1 line, and the red line represents the linear regression fit.