Response to Reviewer Comments

Manuscript ID: egusphere-2025-4454
Title: Simulating avalanche-triggered lake overspill and downstream impacts at Birendra Lake using RAMMS and HEC-RAS
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Dear Editor and Reviewers,

We thank the reviewers and community members for their insightful and constructive feedback on our manuscript. We have addressed the comments, particularly regarding the manuscript structure, technical terminology, and overspill volume calculations.

Our point-by-point responses are provided in the table below:

Response to Referee #2 (RC2)

ID	Reviewer Comment	Author Response
RC2.1	*Structure – the study suffers from rather unusual structure (intro section seems unusually long; separate discussion section is definitely needed; results section should be structured according to objectives / methods used and needs to only present results; study area section is not a part of the methods, …); as a result, it is difficult to read it and understand the work done*	Manuscript restructured for clarity: • Introduction: Condensed to focus on core research gaps. • Study Area: Moved to Section 2, preceding Materials and Methods. • Results and Discussion: Separated into distinct sections. • Alignment: Results sub-sections now follow the sequence of the methodology and study objectives.
RC2.2	*Methods – the use of some of the methods doesn't seem suitable / justified (the Bühler et al. 2013 methodology was developed for snow avalanches but here the authors model ice-avalanches (different mechanisms / processes); since the time of famous Huggel et al., 2004 lake area-volume scaling relationship, many other Himalaya-focusing methods for estimating lake volume have been developed and published since, providing better performance).*	Acknowledged. We replaced the Huggel et al. (2004) relationship with the Himalayan-specific empirical equation from Zhang et al. (2023). This yields a more regionally accurate and slightly higher volume estimate. Clarified that the Bühler et al. (2013) method was used strictly as a preliminary GIS-based filtering tool to identify potential release zones based on terrain characteristics.
RC2.3	*Modelling parameters and assumptions – parameters that are used need justification other than the use in previous studies (e.g. Manning) - please not only use the values but also discuss the performance / sensitivity evaluations from previous studies;*	A formal discussion on sensitivity based on Poudel et al. (2025) which conducted the Manning's n sensitivity analysis is provided.

ID	Reviewer Comment	Author Response
	what is the unit of curvature 50? and standard deviation of terrain roughness 15m? - please check;	We have clarified the modeling parameters and units. The curvature value of 50 is unitless (dimensionless coefficient) following the Bühler et al. (2013) algorithm. The terrain roughness value of 15m represents the standard deviation of elevation (in meters).
	Calculated % of released volume are not correct (800,000 m3 of a large scenario is not 0.18% of the lake volume);	Correction: The overspill range is 1.0% to 18% of total lake volume, not 0.01% - 0.18%. This decimal error will be corrected throughout the manuscript.
	Why is x axis and the shape of all hydrographs the same, regardless the scenario? How they were created (considering dam overtopping mechainsm and lake dynamics, the shape would be a series of waves rather than one several minutes-lasting wave)?	We used a single-peaked hydrograph to capture the primary overspill pulse and the peak discharge. This was generated using a discharge multiplier to simulate a rapid, impulsive release. We focused on the initial wave because it defines the maximum flood depth and earliest arrival times at downstream sites. While real events have multiple waves, modeling the secondary wave series was beyond the current scope of this hazard assessment.
RC2.4	*Terminology – the terminology is not used properly (Exposure – the authors write about exposure in abstract and text but no exposed elements are mapped at the end, flow depth is not a characterics of exposure; vulnerability – the lake is not vulnerable to avalanches but prone to avalanche impacts, …) undermining the work done*	"Exposure" was replaced with "hazard assessment" throughout. However, We have tried to show the impacts in terms of population, settlements and infrastructures and discuss accordingly. "Vulnerability" corrected to "proneness" or "susceptibility" to reflect physical conditions accurately.
RC2.5	*The 2024 GLOF event mentioned in the intro provides an opportunity for evaluation the performance of used models; however, no detailed info of this event and its impacts nor further analysis are provided*	Added a comparison between simulation results and documented findings from recent literature regarding the 2024 event to evaluate model performance.
RC2.6	*Recommendations - the list of recommendations are predominantly general and tru for all potential GLOF sites; what site-specific recommendations can be derived from the results of the study?*	Specific recommendations will be incorporated based on revised discussion on the manuscripts.