Response to Reviewers' Comments

We sincerely thank the reviewers for their constructive feedback and valuable suggestions. We appreciate the recognition of our work's novelty and timeliness, particularly regarding the integrated framework for typhoon-induced landslide hazard assessment. We acknowledge the identified weaknesses and are committed to addressing all concerns through comprehensive revisions. Below, we provide our detailed responses and planned modifications:

Major Issues:

1. Inconsistency in landslide numbers

Response: We acknowledge this critical error and apologize for the confusion. We will conduct a thorough verification of our landslide inventory and ensure consistency throughout the manuscript. We will double-check all data sources, recount the landslide events, and provide a clear explanation of any excluded samples due to data quality issues. All figures, tables, and text will be updated to reflect the accurate and consistent landslide count.

2. Geological context missing

Response: We agree that geological context is essential for proper interpretation. We will add a comprehensive geological/lithological map of Zixing City showing the spatial distribution of different rock types, structural features, and geological formations. Additionally, we will expand Section 2.1 to include detailed geological background, including rock weathering patterns, structural geology, and their relationship to landslide susceptibility. This will provide readers with necessary context for understanding the geo-environmental controls on slope stability.

3. Grid resolution limitations

Response: We will add a dedicated subsection addressing spatial resolution limitations. We will explain our treatment of landslides smaller than 60m × 60m grid cells, discuss potential bias in landslide representation, and provide statistical analysis of landslide size distribution. We will also discuss how resolution affects model performance and acknowledge this as a limitation while suggesting future research directions using higher-resolution data.

4. Negative sampling buffers

Response: We will provide comprehensive justification for buffer distance selection based on: (a) literature review of buffer distances used in similar geological settings, (b) geomorphological rationale considering slope unit characteristics in Zixing City, (c) sensitivity analysis showing how model performance varies with buffer distance, and (d) comparison with other negative sampling strategies. We will also discuss the theoretical basis for buffer-based sampling in the context of spatial autocorrelation and landslide clustering.

5. Single-event validation

Response: We acknowledge this significant limitation. While we cannot add additional typhoon events to the current study due to data availability, we will: (a) extensively discuss this limitation and its implications for model generalizability, (b) compare our threshold values with those from other typhoon-induced landslide studies in similar geological settings, (c) analyze rainfall characteristics of Typhoon Gaemi relative to historical typhoons in the region, and (d) propose a framework for updating thresholds as new typhoon data becomes available. We will also emphasize that this study represents a methodological advancement that requires validation across multiple events.

6. Evaluation metrics

Response: We will expand our model evaluation to include: (a) precision, recall, and F1-score for both models, (b) confusion matrices showing detailed classification

performance, (c) sensitivity and specificity analysis, (d) true skill statistic (TSS), and (e) Cohen's kappa coefficient. We will also provide statistical significance testing and confidence intervals for performance metrics.

7. Rainfall threshold interpolation

Response: We will add comprehensive validation of our Kriging interpolation including: (a) cross-validation analysis with RMSE, MAE, and bias metrics, (b) assessment of interpolation uncertainty using kriging variance, (c) validation against independent rain gauge data where available, and (d) discussion of spatial interpolation limitations in mountainous terrain.

8. Climate change context

Response: We will add a substantial discussion section addressing: (a) projected changes in typhoon intensity and rainfall patterns under climate change scenarios, (b) implications for landslide threshold evolution, (c) framework adaptability for non-stationary climate conditions, (d) recommendations for periodic threshold updates, and (e) integration potential with climate projection models for future hazard assessment.

Minor Issues:

1. Typhoon name consistency

Response: We will standardize the typhoon name throughout the manuscript, using "Gemi" consistently and providing a note explaining any alternative naming conventions.

2. Figure quality and clarity

Response: We will significantly improve all figures by: (a) adding scale bars and north arrows to all maps, (b) enhancing legend clarity and font sizes, (c) improving color schemes for better visibility, (d) simplifying complex figures by splitting them

into multiple panels, and (e) increasing overall resolution and quality.

3. Equation clarity

Response: We will provide clearer explanations for all equations, including: (a) detailed variable definitions immediately following each equation, (b) physical interpretation of mathematical relationships, (c) assumptions and limitations of each method, and (d) examples of calculation procedures where appropriate.

4. English expression

Response: We will conduct thorough English editing to: (a) eliminate repetitive phrases, (b) improve sentence structure and flow, (c) use more precise technical terminology, (d) ensure consistency in technical terms throughout, and (e) engage a native English speaker for final proofreading.

5. Abstract simplification

Response: We will revise the abstract to: (a) reduce technical details while maintaining scientific rigor, (b) emphasize methodological novelty and practical significance, (c) highlight key findings in accessible language, (d) remove excessive numerical values, and (e) improve overall readability for a broader audience.

Additional Improvements:

Beyond addressing the reviewers' concerns, we will also:

- Add uncertainty quantification for all model predictions
- Include a more detailed comparison with existing typhoon-landslide studies
- Expand the discussion on practical applications for emergency management
- Provide supplementary materials with detailed methodology and additional results
- Add recommendations for future research directions and model improvements

We believe these revisions will significantly strengthen the manuscript and address all

identified concerns. We are committed to producing a high-quality publication that makes a valuable contribution to landslide hazard assessment in typhoon-prone regions. We look forward to submitting our revised manuscript and appreciate the opportunity to improve our work based on this valuable feedback.