Author Response to Referee #1 (RC1) and Community Comment (CC1)

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Assessing Buried Landslide Rupture Surfaces Using Genetic Algorithms and Dynamic Flow Modeling

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We thank referees for their constructive and encouraging comments, which improved the terminological consistency, physical grounding, and demonstrated robustness of the manuscript.

Referee comments are shown in italics, followed by our response and the corresponding manuscript changes. Bracketed items ([ ]) mark values or locations to be finalized in the revised manuscript.

Part B: Response to Community Comment

CC1.1 Computational details (hardware and timing)

> *[...] it would be useful to provide some additional details about the computation times for different numerical simulations and mention the GPU card and other hardware specs of the PC employed for simulations.*

Many thanks for this constructive suggestion! The following information will be added in the revised MS:

All simulations were run on a single PC with an NVIDIA GeForce RTX 2080 Ti (11 GB GDDR6), an Intel Core i7-8700 CPU, and 64 GB RAM. Each run integrates the erosion-deposition model of Wong et al. (2024) until the moving mass has settled; a single simulation required about 23.5 min for the Provincial Highway No. 7 event (620 × 584 cells, 1 m mesh, 180 s simulated) and about 87.1 min for the 2009 Hsiaolin event (271 × 330 cells, 10 m mesh, 1412 s simulated).

CC1.2 Sensitivity to the basal friction angle (±3°)

> *[...] if the angle of basal friction was varied by +-3 degrees, would the numerical results be noticeably different in terms of run-out distances and deposition coverage accuracy? I think that a brief analysis on these sources of uncertainty could enhance the impact of the work.*

Additional analysis of varying δ_b by ±3° (namely, 32°, 35°, 38°) are performed for candidate rupture surfaces of Scenarios 2 and 3 for the Provincial Highway No. 7 event (Table R1, Figure R1). With respect to 35°, these additional two metrics constrain δ_b from opposite sides. At 32° the deposition coverage has already declined to its poorest values (0.71 and 0.76), so lowering δb further is unwarranted. At 38° the coverage gain is marginal (below one percentage point) but the run-out is underestimated by 13%. The adopted δ_b = 35° reproduces the measured run-out of 269 m for Scenario 3 to within 0.2%, and therefore provides the best balance among flow path, deposition depth, and run-out distance. These information will be added into the revised MS.

Table R1. Sensitivity of the Provincial Highway No. 7 simulation to the basal friction angle (±3°). Observed run-out = 269.19 m, from the pre- and post-event DEM difference and the post-event UAV survey.

Scenario	δ_b (deg)	Deposition RMS (m)	Deposition coverage (%)	Run-out (m)	Deviation from 269 m
2	32°	9.56	70.53	330.23	+22.7%
	35°	8.63	78.78	291.23	+8.2%
	38°	8.07	84.51	245.07	−8.9%
3	32°	9.52	76.11	311.11	+15.7%
	35°	8.62	84.28	268.67	−0.1%
	38°	8.10	85.07	234.11	−12.97%

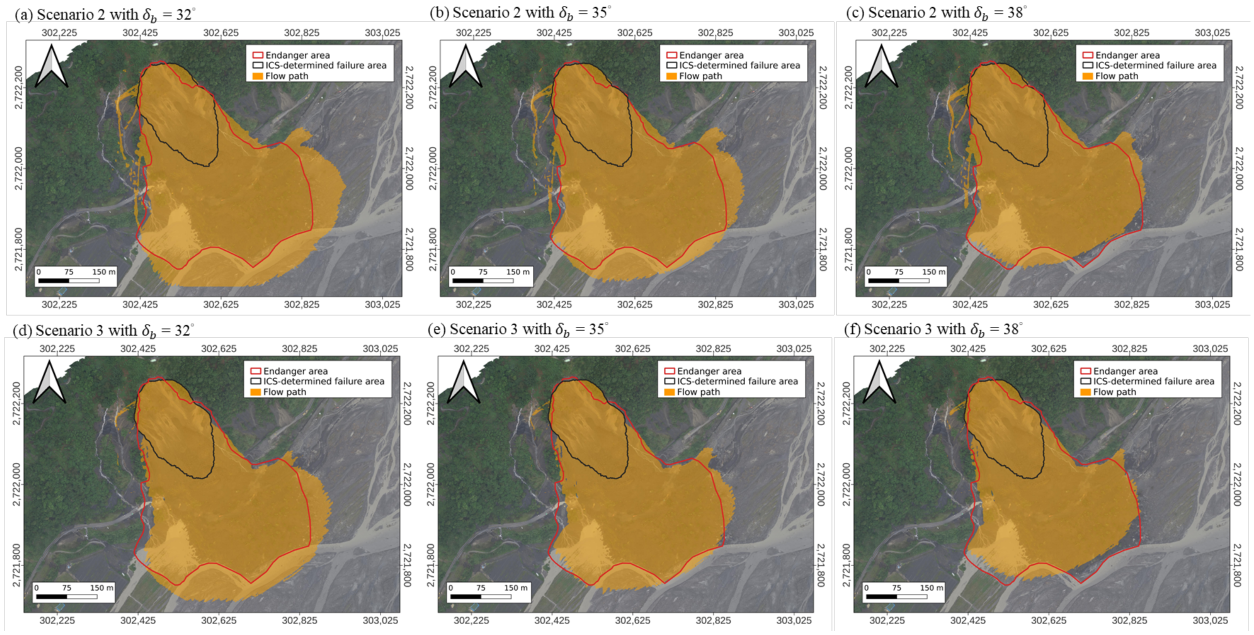

Figure R1. Simulated flow-path extent (orange) for both candidate rupture surfaces of the Provincial Highway No. 7 event: (a-c) Scenario 2 and (d-f) Scenario 3, each at δ_b = 32°, 35° and 38°. The red outline marks the observed endangered area and the black outline the ICS-determined failure area. The run-out contracts as δ_b increases, and at δ_b = 35° the Scenario 3 flow path (panel e) most closely matches the observed extent, consistent with Table R1.