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Comment on nhess-2021-352

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Referee comment on "Variable hydrograph inputs for a numerical debris-flow runout model" by Andrew Mitchell et al., Nat. Hazards Earth Syst. Sci. Discuss., https://doi.org/10.5194/nhess-2021-352-RC2, 2022

The paper by Mitchell et al. investigates how the variability of input hydrographs affects the outcome of debris-flow modeling. Results show a large variation in simulated flow depths and velocities, also reflecting in the variability of the affected areas. This study represents a significant advance in debris-flow research and opens the door to applications in the field of risk management. Using field observations and monitoring data can improve our capability to model the potential variability of debris-flow impact. The paper already is in good shape and I recommend publication after minor revisions. Here follow my remarks and suggestions, best regards.

Lines 35-46: well said.

Lines 47-54: again, well said. Maybe, you can also mention one additional point related to rainfall distribution. The actual area contributing to debris-flow initiation is often considerably smaller than the whole basin (e.g., Berti et al., 2020; Coviello et al., 2021).

Line 82: the word “model” is repeated, please check the wording.

Section 2 Methodology: few sentences summarizing the different steps would be useful to understand the work flow from the beginning.

Line 90: “we used a model based on… Lagrangian model that…”, please check the

wording.

Lines 182-184: why did you select a value c = 0.2 to define the upper peak-discharge limit of this second test?

Figure 6: the figure is ok but the five lines above it already contains the key message. Does the reader need a colored 3D plot presenting the variation of Froude number to understand the story? In my opinion, this figure can be moved to the appendix or supplement.

Line 391: "the red outline on the impact…" the line is yellow, am I right? In the caption, please refer to panels using (a), (b), etc.

Lines 408-415: everything is fine, maybe I would just add one sentence to clarify if your results are consistent with other studies investigating the impact of topography and flow-resistance parameters on the modeled discharge.

Lines 416-427: good discussion. I am wondering if a figure with a concept illustration of a simplified channel summarizing the two cases (in two panels?) could be useful: case (1) if channel slope > f value, then the downstream estimate peak discharge can be used as it is; case (2) if channel slope < f value, then higher inflow peak discharge is probably needed.

Section 5: here, you move to British Columbia, Canada, and test the methodology described in the previous sections on two debris-flow fans (Currie D and Neff Creek). This is ok but I would suggest adding a couple of introductory sentences to this section just to avoid that it sounds somehow disconnected from the previous ones.

Data availability: given the Copernicus data policy, consider making hydrograph data available through an official repository.

References

Berti, M., Bernard, M., Simoni, A. and Gregoretti, C.: Physical interpretation of rainfall

thresholds for runoff-generated debris flows, J. Geophys. Res. Earth Surf., 1–25, doi:10.1029/2019JF005513, 2020.

Coviello, V., Theule, J. I., Crema, S., Arattano, M., Comiti, F., Cavalli, M., Lucia, A., Macconi, P. and Marchi, L.: Combining Instrumental Monitoring and High-Resolution Topography for Estimating Sediment Yield in a Debris-Flow Catchment, Environ. Eng. Geosci., 27(1), 95–111, doi:10.2113/EEG-D-20-00025, 2021.