**Review of the manuscript No. egusphere-2023-1892 '*Evaluation of debris-flow building damage forecasts*' submitted to *NHESS*.**

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Recommendation: ACCEPT

Focus of the paper is on reliable forecasts of building damage due to debris flows.

Relevance: The presented study is the original primary research within the scope of the journal. In this study, the authors evaluated the performance of building damage forecasts for the 9 January 2018 Montecito post-fire debris-flow runout event, in which over 500 buildings were damaged.

Abstract is well written and clearly describes the undertaken study.

Structure: The article is well organized with structured sections.

Introduction presents a background, defines research goals and provides a clear statement of research problem. It presents the purpose of the research investigation which is supported by the pertinent literature. Literature is well referenced and relevant.

Research questions and goal are identified: Application of debris-flow runout models to generate forecasts requires combining hazard intensity predictions with fragility functions that link hazard intensity with building damage.

Motivation is explained: reliable forecasts of building damage due to debris flows may provide situational awareness and guide land and emergency management decisions.

Methods: Methods described with sufficient information: The authors constructed forecasts using either peak debris-flow depth or volume flux as the hazard intensity measure and applied each approach using three debris-flow runout models (RAMMS, FLO-2D, and D-Claw).

Results are reported: The authors generated forecasts which were based on combining multiple simulations that sampled a range of debris-flow volume and mobility, reflecting typical sources and magnitude of pre-event uncertainty.

Discussion interpreted the major outcomes of this study: The authors found that only forecasts made with volume flux and the D-Claw model could correctly forecast the observed number of damaged buildings and spatial patterns of building damage. The authors also found found that both depth and velocity are needed to forecast building damage, comparing debris flow models against spatially distributed observations of building damage is a more stringent test for model fidelity than comparison against the extent of debris-flow runout.

Conclusion The authors concluded that the event size strongly influences the number of damaged buildings and the spatial pattern of debris-flow depth and velocity. Conclusions are well stated, linked to original research question, limited to supporting results and summarized the study with interpretation of facts.

Recommendations for future work: The authors noted that future research on the link between precipitation and the volume of sediment mobilized may have the greatest effect on reducing uncertainty in building damage forecasts.

Actuality, novelty and importance of the research: the authors indicated that forecasts made at the building level reliably reflect the spatial pattern of damage, but do not support interpretation at the individual building level.

Academic contribution: The paper increases the knowledge in predictive forecasting of building damage to debris flow. Thus, The authors remarked that the best forecast only predicted 50% of the observed damaged buildings correctly and had coherent spatial patterns of incorrectly forecast building damage (i.e., false positives and false negatives).

Figures Figures are of acceptable quality, easy to read, relevant and suitable.

Recommendation: This manuscript can be ACCEPTED based on the detailed report above.

With kind regards,

- Reviewer.

24.01.2024.