

Interactive comment on “Quantitative Risk Assessment of Vehicles Hit by Landslides: A Case Study” by Meng Lu et al.

Anonymous Referee #2

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This manuscript presents a case study on quantifying the risk of landslides hitting vehicles.

It is my opinion that the manuscript is not at the standard of this journal. There are a number of issues associated with this manuscript:

- It is mentioned that few attempts have been made to suggest a rigorous assessment framework of vehicles hit by landslides. This is not true. Besides the work you have already referenced, there has been much work done on this regard, including:

Macciotta, R. et al., 2019. Quantitative risk assessment of rock slope instabilities that threaten a highway near Canmore, Alberta, Canada: managing risk calculation uncertainty in practice. *Canadian Geotechnical Journal*, 37(2), pp.1–17.

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Bunce CM, Cruden DM, Morgenstern NR (1997) Assessment of the hazard from rock fall on a highway. *Can Geotech J* 34:344–356

Macciotta, R. et al., 2017. Rock fall hazard control along a section of railway based on quantified risk. *Georisk*, 11(3), pp.272–284.

Corominas, J. et al., 2013. Recommendations for the quantitative analysis of landslide risk. *Bulletin of Engineering Geology and the Environment*, 9(3), pp.1095–55.

Bunce CM (2008) Risk estimation for railways exposed to landslides. Dissertation, University of Alberta

Macciotta, R. et al., 2016. Quantitative risk assessment of slope hazards along a section of railway in the Canadian Cordillera – a methodology considering the uncertainty in the results. *Landslides*, 13(1), pp.115–127.

to name a few.

- In this regard, the content of the manuscript is not novel and it does not provide a framework for quantitative risk to vehicles from landslides. The manuscript needs to be re-framed. It is a case study, what can be learned from this case study?

- The paper focuses on rainfall induced landslides, therefore it can not claim to provide a formal framework that can be generally applied to vehicles impacted by landslides.

- Travel distance. The authors justify the application of empirical methods based on convenience. This is not scientific. Should take advantage of the work referenced after this statement to validate this. Were these landslides of a similar type? under similar moisture conditions?

- The methodology does not appear to be comprehensive regarding potential scenarios. It is common that a quantitative analysis of vehicles endangered by landslides include the scenario where the moving vehicle is impacted by a falling landslide, a moving vehicle impacts a blocked section of road, and a static vehicle (traffic jams or

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vehicles stop because of precursory landslide activity to a larger event) is impacted by falling material or debris.

- The manuscript mentions a quantitative risk assessment. Only calculations of probability of a landslide impacting vehicles are presented. No risk calculations are presented in the manuscript. No assessment through evaluation against acceptance criteria is presented.

- Major revisions would be required, including proper calculation of risk, assessment against adopted criteria, clear statement and discussion of assumptions and simplifications, development of other vehicle-landslide impact scenarios, justification and discussion regarding the criteria adopted and the need for mitigation.

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