

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1  
<https://doi.org/10.5194/nhess-2022-97-RC1>, 2022  
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## **Comment on nhess-2022-97**

Anonymous Referee #1

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Referee comment on "The impact of terrain model source and resolution on snow avalanche modeling" by Aubrey Miller et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-97-RC1>, 2022

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### 1) general comments

The manuscript investigates the influence of selected digital elevation models from different sources and resolutions on the modeling of a snow avalanche. Model runs and model output parameters are compared to a reference avalanche event. The manuscript could be improved by providing more information about the practical usability of the different model results and the transferability of findings.

### 2) specific comments

Abstract: Please note that digital elevation models are always a 2.5 D representation and not fully 3D.

Abstract: Please use the term "topographic LiDAR" throughout the whole paper.

Abstract: "performed well" - please add quantitative results in the abstract as well.

Line 189: Sections 1.4.2 climatic setting and 1.4.2 avalanche mitigation are not relevant for a study analyzing the effect of DEM resolution. Please delete or shorten.

Line 213: Please add a workflow diagram visualizing all processing and analysis steps providing a better overview for readers.

Line 219: What is the motivation to make use of the selected DEM sources? There are several other options, which would be also interesting for comparison e.g. why not making use of Pleiades tri-stereo, ASTER GDEM, etc. Please explain to the reader what DEMs are available for the specific site investigated and in New Zealand in general.

Line 237: Please add information about the resampling method and settings used instead of only naming the tool.

Line 251: Can you demonstrate the change in roughness without and with cleaning? How is this step reproducible or transferable to other sites?

Line 253: "other times of year": Does the phenological stage of vegetation have any influence on the surface representation? You may demonstrate the effect at overlapping areas.

Line 259: "without coordinate transformation" - Please specify. What coordinate system would be used in this case? How can you be sure that your point cloud model is oriented along with the horizontal and vertical axis correctly?

Table 1: Please specify acquisition dates for TLS scans.

Line 284: "interpolation" – please specify the interpolation strategy and settings used and document the influence on DEM quality.

Line 292: Please provide quantitative information on "required less hole-filling".

Line 306: Is the code of your developed script somewhere available for the scientific community?

Line 327: Please quantify "better represent the true terrain".

Line 331: Please explain and motivate your decision using two snow layers in the model. How did the weather station data look like so that you decided for a two layer setting?

Line 344: Please list all model parameters and input data sets used in different test runs, e.g. in a table as an appendix.

Line 360: Please add values for co-registration quality.

Line 376: You estimate a reference volume derived from TLS and PlanetScope. Can you add information on how safe this value is considering the resolution and uncertainty of input data sets and preprocessing steps? What deviation would you allow from this reference value interpreting a model result still as correct?

Line 378: What do we learn from the mass values for the tests performed in this study? Are they relevant?

Line 379: Please explain avalanche classification "size 5" in more detail.

Line 380: Please link avalanche properties mentioned here to the results in Table 2.

Fig. 5: Please add elevation profile lines in the two maps (subfigures upper and lower right).

Line 388: Here authors explain the special nature of the topographic situation of the site investigated. Are the results of the study transferable to other topographic situations? Can you please add information on the transferability and generalization of the findings in this study?

Line 429: Differences in simulations results are described in detail. Can you add information at which order of magnitude differences in simulation results become relevant i.e. model results become insufficient for hazard management applications?

Fig. 7: Please add elevation profiles of DEMs.

Line 487: Please specify. What is the order of magnitude for gully features to be relevant in avalanche modeling?

Line 506: Please rephrase this sentence to be more clear.

Fig. 10: Please add an overview map with marked areas of shown subfigures for readers, who are not familiar with the test site.

### **# technical corrections**

Line 35: cartesian coordinate system

Figure 3: Please use a different color for the fracture line for better visibility.

Fig. 9: Please add a blank between numbers and SI units.