The Cryosphere Discussions

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Comment on tc-2020-368

Anonymous Referee #3

Referee comment on "Brief Communication: Initializing RAMMS with High Resolution LiDAR Data for Avalanche Simulations" by James Dillon and Kevin Hammonds, The Cryosphere Discuss., https://doi.org/10.5194/tc-2020-368-RC3, 2021

This contribution tackles an in general very interesting topic for a broad modelling community within cryospheric sciences: How does model input data influence model results? This question is worth investigating. The authors are interested in taking this question a step further by trying to imply that critical model input and the analysis of it has operational value. I think this is also an interesting problem that has impacts worth publishing. Unfortunately, there are major shortcomings in this paper of technical nature that need to be addressed:

- The LiDAR data does not fully cover the entire extent of the simulated avalanches: I think this critically limits your discussion and conclusion of the data since you have to introduce assumptions about the coulomb friction values by arbitrarily increasing them to achieve runouts that are visible to you. Any sort of interpretation falls short thereafter and must be seen in the light of this short coming. This makes me wonder if you succeed at all in teasing out the differences in your model runs using different snow / ground surfaces as input. Therefore, I am also unsure if you can address the operational value of your proposed method.

Asking for major revision on the technical part is likely not possible for you to achieve since you would have to acquire a new LiDAR dataset. So, I am unsure how you could address this issue in a sensible way, and I am interested in your response.

- I am not familiar with how RAMMS handles erosion into the snow when the simulated avalanche is in motion. However, in reality I would except the sliding surface to change

constantly which is likely not resolved in RAMMS for good reasons and from my practical experience, RAMMS models avalanches runout (at least for large events) quit well. As a result I am unsure about your discussion on the dynamics of the simulated avalanches and their interaction with terrain and vegetation.

In general, the paper is well written and contains a good overview and introduction to the problem at hand and the field of avalanche modelling. I am not an English native speaker, so I am not commenting on language and writing style.

However, I believe that the presentation of the LiDAR data and the simulation data (eg. Fig 1,2,3) could be sharpened up by adding more topographic context, a scale bar, a larger better visible and distinguishable color bar (without rainbow colors).

I would also appreciate more details on the LiDAR scans in terms of georeferencing, co-registration, spatial resolution, which LiDAR scanner, which frequency, software etc.