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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "Forest damage and snow avalanche flow regime" *by* T. Feistl et al.

Anonymous Referee #2

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OVERALL COMMENT:

The manuscript analyses avalanche impact on trees assuming different flow regimes: powder, intermittent dry and wet. The authors calculate the bending stress for the different flow regimes with different approaches, starting from variables derived by the avalanche simulation program RAMMS – extended version. If this bending stress is larger than the bending strength of the trees, taken from literature, they are destroyed and the avalanche slow down. If not, the avalanche can loose mass due to the detrainment function that the same first author described in a previous paper.

It is an interesting work that study the interaction avalanche flows / trees in a quantitative way, though most of the avalanche parameters were modelled and not measured. The authors state themselves that more field investigations are needed to better understand the process. Some more discussion on the uncertainty of the results would

be appreciate from the readers.

The manuscript is acceptable for publication after minor/major revisions.

LINE-BY_LINE COMMENTS:

Abstract: in the abstract it is not completely clear what are your results and what is from literature. . . For ex. lines 6-8 is a result from your study? Then at line 8 there is a "We demonstrate. . ." and after a while again "We find (1) . . .". I would separate better what are your results concerning the different flow regimes that you list at lines 5-6.

p. 536, lines 22-23: forest destruction is known to be able to provide very important and precise information concerning avalanche frequency; in relation to the spatial extent of avalanche impact pressure the knowledge is not at the same level.. Actually this manuscript could help in this issue. I would specify this difference in knowledge.

p. 536, lines 24-26: I would specify that you are speaking of the protective role of forest along the avalanche track and not in the release areas. . .. The topics are completely different, therefore a specification is needed.

p. 538, lines 14-16: This means that from field work you have already recognised the typical flow regime for the recorded avalanches? Which method did you use to define on field the different flow regimes? It was always so clear? I think it is an interesting information for the readers. . . why not putting, if you have them, 4 different pictures to show the 4 different flow regimes? If not, at least, say (in the methodological section) how you got this information, as it is crucial for the definition of the equation to be used for the bending stress computation. Another point here: as the result of the bending stress comes from simulated variables or parameters, it would be nice to have an idea of the uncertainty in the results. It is not necessary a sensitivity analysis, but an idea of the uncertainty in the result would be well accepted. This would belong to the discussion section.

p. 543, line 22: What is hi? The height at which the granule i hit the tree?

Section 3.4. This section is very different from the two previous ones. Can't you tell more about the damages? And it is strange that the title this section is Powder snow avalanches in Germany, but then in Fig. 8 you report the flowing core.... Can't you do the same as you did for Section 3.3 (a powder avalanche)? If you do not have the same good data of the previous study case, simply tell it.... or highlight better which useful information you can gain from these additional case studies (as you already call them at page538, lines 19-21). The fact that the run-out distances were overestimated if not taking forest into account is an ancillary result for the main aim of the manuscript (forest damage).

Pag. 555, line 11: where did you test on real data the formula for the intermittent regime? Maybe, it would be nice to have a table (in the result section 3.1) where you list the simulated avalanches with the different flow regimes... the reader would have in a glance an idea on the cases where you tested the different formulas to calculate the bending stress for the different flow regimes. Only at lines 7-16 it appears that no test on real cases were done..... of course it is a difficult task but, as you suggest this type of flow regime, it is necessary to be clear about what can be or cannot be done and what you could do in this paper.

Fig. 6: I understood well that the pressure shown here is the one calculated from Vera et al. (2015)? It is not the result of equation 22 or 23?

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