

Dear Referee 2,

thank you for reviewing our article. Your constructive comments will help to improve our manuscript significantly. Below you find the point-by-point replies to your comments.

*Specific comments:*

*Pag. 2948, line 24: what do you mean with artificial defense structures? Usually it is enough to call them defense structures... or you use artificial to more stress the difference between human-made defence structures and natural ones as forests? I think it is clear enough without artificial, and actually I would delete natural before forests.*

>> See reply to referee 1. We will replace 'artificial' by 'technical' and delete 'natural'.

*Pag. 2951, line 2: glide-snow avalanche prevention*

>> We will include 'glide-snow' before 'avalanche prevention'.

*Pag. 2951, line 10-11: concerning the precision of the delineation of the release areas: were the photos georeferenced? were you able to really identify the stauhwall of the release areas? See also comment to page 2953, lines 8-10.*

>> The pictures were not georeferenced, however the accuracy was high. An uncertainty exists and we will highlight this fact in the text. Though, when collecting our field data we often found the release areas which we relocated via GPS to correspond to areas with homogeneous vegetation and terrain. This is an indication that the mapping according to photos was precise within meters. The stauhwall could not always been identified but we assume for each glide-snow avalanche with the terrain characteristics mentioned in section 2.2. a stauhwall to exist.

*Pag. 2952, line 13-15: This is already an interesting result! It is good that you mentioned it again in the conclusion (page 2961, lines 17-20).*

>> Thank you for this comment. We agree that compression of vegetation by snow is a main factor for glide-snow avalanche formation.

*Pag. 2952, line 21: which other environmental variables? Just add something:*

*'...environmental variables, such as for ex. ...'*

>> We will include 'such as snow depth' here.

*Pag 2953, title of section 2.2: I do not understand well the word "segregation"... isn't this a simple choice selection, of data to be used for the model? They are sinonimous, but segregation remind me more a physical process...*

>> We agree, that 'segregation' may sound awkward, we will change the phrase to 'selection'.

*Pag 2953, lines 8-10: again then it is important the precision of the localization of the*

*release areas from photos to GIS... see comment before. Just add a sentence to highlight that some uncertainty exists, if the identification of the release area was done not with georeferenced photos.*

>> See comment before: we will add a sentence mentioning the uncertainty of the mapping in the first paragraph of section 2.

*Pag. 2955, line 14: it seems to me that the definition of  $l_g$  and  $l_m$  is the same... which is the difference between  $l_m$  (length of the sliding zone, defined at pag. 2954, lines 1-2 and Fig. 7) and  $l_g$  (length between the crown and the sauchwall, defined here) ? Infact later you write : "These comparisons should also hold for the mechanical model" ... why this distinction? It is only that one ( $l_m$ ) is for the model and the other ( $l_g$ ) is for field data?*

>> Yes, we made this distinction between  $l_g$  and  $l_m$  to distinguish between measured slab lengths  $l_g$  and modeled slab length  $l_m$ . We will include a sentence before equation (6) to clarify the difference. We will replace 'observed' by 'measured'.

*Pag. 2955, line 13: here I understand that  $l_g$  comes from field measurement, while  $l_s$  ?*

>>  $l_s$  is assumed to be twice as long as the snow depth (see pag.2958, line 26).

*Pag. 2956, lines 14-15: ok to union the two classes, but only if no other analysis are done concerning the lenght of the gliding zone, as this parameter is different between the two classes: 42m for short grass and 28 m for shrubs.*

>> We unified the two classes according to the characteristic vegetation height. In Table 1. you see a considerable difference between long and short grass, whereas short grass and low dwarf shrubs had comparable vegetation heights, especially below the snow cover. The big difference between the slab length of 'short grass' and 'low dwarf shrubs' is not that distinct if you consider the distribution. Slab length varied for short grass for example from 6 to 104 m and only 6 events were documented.

*Pag. 2956, line 16 and Table 1: you write that  $h_v$  is 15 cm for strong lignified shrubs, but in Table 1 is written 0.5 in autumn and 0.15 in winter: : I guess there is a typing error, as probably the strong lignified shrubs do not change their height too much from autumn to winter. At line 19 I would therefore write "... short grass and low dwarf shrubs, while for strong lignified shrubs remain in the range 10-20 cm." Check this!*

>> See comment to Referee 1. We will list the vegetation height for each vegetation type in line 16. In fact the lignified shrubs change their height from appr. half a meter to 10-20 centimeter from summer to winter. And probably even more for bigger snow depths. That is why we will keep line 19 as it is.

*Pag 2956, line 24: "...We note that, in autumn, only 5 cm separates..."*

>> We will include 'in autumn' here.

*Pag 2956-2957: actually in winter the difference between the classes is smaller for the first classes (all  $h_v$  around 0.01-0.04 m), but higher btween the first three classes and the last one ( $h_v = 0.15$  m).*

>> That is true. But the difference in friction between long grass, which is compacted to less than 1 cm and is lying flat, to short grass and shrubs is probably high.

*Pag. 2957, lines 3-15: this part describes results that are sometimes well shown in one of the three mentioned tables but sometimes are hidden and cannot be found in the tables. It is not straightforward the combination of the info written in the text with the data shown in the Tables... Maybe it is just enough to move the reference to Table 3 later, at lines 16-17 (or even move this sentence later, as it is probably functional to what it comes later in section 3.3: : :) (see two comments below).*

>> We agree with your remark. The combination of the vegetation and terrain categories is confusing in this paragraph. We will remove the link to Table 3 in line 8 and the sentence of line 16/17. We think it is not necessary here. On page 2959, line 13-15 the description of the three categories is sufficient.

*Pag 2957, line 18: here for Fig. 8 do you consider only avalanche release areas with stauchwall or all? Before in the section you used all data, I guess the same here... probably in Fig. 8 the points are less only because some of them overlap. If instead the choice of using only data with clear stauchwall was done, please write it. Just put the number of data in the caption of Fig. 8?*

>> We only use data of cases with stauchwall here. We will clarify this in the caption of Fig. 8.

*Pag 2957, lines 18-27: again here you do not address the new classes made by vegetation+terrain, but the original ones... it is confusing (see two comments above).*

>> It should be clearer now that we removed lines 16/17. Additionally we added a sentence in section 3.3 to clarify, that from now on we only use data of events with stauchwall.

*Pag. 2963, lines 3-7: I think this is not necessary, it is a repetition: you started the conclusion saying the importance of surface roughness... Either you add there somethin written here or you just delete this last sentence.*

>> We will remove the last paragraph as you suggested.

*Figures and Tables: Fig. 4: put letters in the different photos to have a better correspondence to the caption. Fig 10: I would use more different colours between the three categories of data.*

>> We will follow your suggestions for Fig. 4 and Fig. 10. (see reply to Referee 1).