Review of manuscript «Determining the drivers for snow gliding» (Fromm et al. )

General comments:

The manuscript aims at determining the drivers for snow gliding under the effect of changing soil moisture conditions (also in relation development vs. decline of snowpack) and vegetation characteristics. The authors found that soil moisture at the soil surface (1st Part of winter) and soil moisture 1.5 cm below the soil (2nd part of winter) were the most important variables. They found also important vegetation effects. The presented work fills thus important research gaps and has the potential to be a valuable contribution to the state of research on snow gliding processes. I see however several points which should be improved before publishing in NHSS, most importantly:

1. The story of the manuscript should be focused more towards answering the three research questions and towards the main conclusions (which are not yet so clear for me). Two of the three research questions are dealing with vegetation effects on snow gliding. So, this topic should be introduced and discussed better in the light of previous work and implications for land-use management.
2. Some methodological aspects should be clarified (see also specific comments). Generally , the methods used in this work have been conducted carefully, but they partly fail at disentangling potentially confounding variables. Surprisingly significant results (e.g. effects of lichens and mosses on snow gliding) should thus be better checked for interactions with other variables or at least carefully discussed before publishing.
3. The form and presentation of the manuscript could be improved in different ways (see also specific comments). Some parts of the text is not yet nicely structured in topical paragraphs. Some sections could be shortened without a loss of relevant information towards the main conclusions. Some captions to figures and tables are not 100% clear. The English language would deserve an additional check.

Specific comments:

For a reviewer it would be helpful to have continuous line numbers in order to refer in the review to a specific text.

Page 1, l. 16. Abstract: was it really the lower phytomass of mosses that had a negative influence on snow gliding or was it not just the lower canopy height of these sites, which was related to phytomass of mosses?

P1, l. 17-18. Did a higher phytomass of dwarf shrubs really reduce snow gliding? According to table 2 I see that exp (B) for this variable is very close to 1 for the 1st period and not given for the 2nd period.

P1, l. 24. The 3rd sentence « Höller summarized the findings.. » is in this from not necessary for the introduction of the research questions. Please just add the reference where it fits and contributes to the state of research.

P2, l. 11-16 – The paragraph on the role of vegetation is important for the understanding of the manuscript (2 of 3 research questions are dealing with vegetation effects). The paragraph would deserve thus some more attention in the introduction. In the current form the topic is just introduced by the statement that not much is known about vegetation effects (ignoring thus various publications on snow-glide vegetation effects) before the topic is again abruptly changed to LWC in the same paragraph.

P2, l 20-25, research questions: the two first research questions make sense, but the 2nd research question is not really introduced in the preceding introduction. The 3rd question is also relevant, but is in my eyes not really answered here. The manuscript provides some information on the association between snow gliding with different plant types (eg. mosses or lichens), but I can't find information about the effect of different land-use types (e.g. pasture, abandoned land).

Section 2.1: the test-site section is quite long and partly redundant with Fig. 1. Please avoid where possible paragraphs with only 1 sentence (in the whole manuscript). I would also reduce the number of listed plant species (because most readers of NHSS are probably not be familiar with them) and focus on the most characteristic and for snow gliding most relevant dwarf shrub and grass species (or vegetation types). It is not clear from the description of the study area if we have 2 or 3 treatments (is abandoned and unusable the same treatment or not). And are slope angles and other topographical variables the same for the different categories?

Section 2.2.1 : The description of the design of the distribution of the glide shoes is rather vague. How many glide shoes were distributed in pastures vs abandoned land and which other criteria were used to distribute them?

Section 2.2.2 : Some of the very technical information in this section could potentially be shortened without substantial loss of information.

p.4. line 21. Please replace « after Braun-Blanquet » with « according to Braun-Blanquet »

p5, line 12-14. I'm a bit confused by the statement that about 0.5% of the data entries contain snow-gliding and the data set was reduced to have an equal number of snow gliding vs. no snow gliding. I agree that the numbers of 0 and 1 in a logistic model should be similar or at least in the same range, so the approach seems ok for me. But this would means that c. 90% of the data entries without gliding have been thrown away. Could you provide here numbers of data entries with and without snow gliding and the criteria used for this categorization.

p. 6, line 8ff. Was slope angle not a relevant variable or was the variation in slope angle so small? I would have expected also a boxplot with snow-gliding vs. slope angle.

p. 6, line 26, replace "very significant" by "highly significant"

p. 6, line 29-30 (and elsewhere): please avoid where possible method description in the result section

p. 7, line. 13-15. It is not necessary to repeat the objective of the study here. The objective should be clear from the introduction.

p. 7, line 18-19. It is for me a bit surprising that the phytomass of mosses has an influence on snow gliding. While I'm not surprised that you received a significant relationship, I expect mainly a confounding effect between phytomass of mosses and other variables which may have a more direct effect on snow gliding (also indicated on p. 8, line 10, relationship with canopy height). Such potentially confounding relationships are not easy to disentangle with multivariate logistic models alone. I would suggest to check additionally for such relationships or at least to discuss such a result (which is also repeated in the abstract) and potential confounding effects with other variables

p8, l8: snow gliding or snow sliding?

P8, l. 9 ff. similar case like

Table 1: do the abandoned areas include "unusuable land"? And was there actually a difference in snow gliding for the different land-use types? Do the results of this study confirm earlier studies (e.g. by Leitinger, Tasser et al. ?)

Table 3: the content of the contingency table is interesting but should be better explained in the table caption. The model for period 1 was obviously better than for period 2, which can be interpreted quite well with differences in relevant variables for both periods

Fig. 3: The description of the figure could be clearer. In the first graph on the left, the y-axis is water content, but there is also a boxplot on soil moisture in the same graph. And what do the A, B, AA, BB mean?