

## ***Interactive comment on “Determining the drivers for snow gliding” by Reinhard Fromm et al.***

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We thank the reviewer for the comments and we address the various concerns below. In this answer we mainly consider questions and remarks from the general comments and major specific comments. Full answers to minor specific comments (mainly wording and rephrasing as well as improving figures and tables) will be included in the revised version of the manuscript. Reviewer comments are highlighted (R), with our response below (A) in each case.

R: [General comments to the authors:]

R:[My main concern is related to the choice of the data used for the analyses and the possible consequences of this choice on the results. You state that “In about 0.5 % of the data entries snow gliding was recorded. The data set was reduced by randomly selecting data entries without displacements. This satisfies that equal amount of 0 and

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1 for snow gliding which are used for the multiple logistic regression.” (pag. 5, lines 12-14). As in the period of “no gliding” the other parameters (used as independent variables) were very variable (Fig. 2), I think that the results of your analyses might be very different if another random subsample of “no gliding” data was chosen. I think you should try to address this fact, discussing the uncertainty related to the results. Did you try with different subsets? ]

A: We agree that randomly selecting sub-samples may cause variations of the coefficients  $\exp(\beta)$ . The magnitude of these variations will be determined by choosing several sets of randomly selected data records for the analysis (i.e. statistical bootstrapping). This will demonstrate the quality of the fit. Table 2 will be extended with the range of the values of  $\exp(\beta)$ . We did some tests with several random samples in advance and based on these results we expect small variations with the main correlations/results staying the same. However, the interpretation of variables with  $\exp(\beta)$  close to 1 will be revised based on the new results.

R: [You should also indicate the number of data in your dataset: 0.5% corresponds to  $N = ?$ ]

A:  $N = 5259$ . We will add this information in the revised version of the manuscript.

R: [Something unclear is also what is the “snow glide rate” that you used as dependent variable? It seems that it takes the value 1 or 0 if there was or not displacement. If this is the case, I would not call it glide rate which includes something related to time (30 min, hourly, daily ?). ]

A: Displacements of glide shoes originate electrical pulses which are recorded. A pulse is produced by a rotary switch when the glide shoe moves 2.6 mm. All remaining data (temperature, moisture etc.) are registered in intervals of 10 minutes. Therefore, the snow displacement is calculated for these 10 minute intervals (in millimeter per 10 minutes) for each glide shoe. We will improve the wording in the revised version of the manuscript to avoid confusion.

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R: [Specific comments:]

R suggests restructuring some parts in the sections 'methods' and 'results' as well as minor changes of the wording in the 'introduction' section.

A: We will follow these suggestions in order to improve the manuscript. We will clearly distinguish what belongs to which section (methods, results and discussion). A new subsection will collect all information concerning topography and vegetation. The subsection 'time series' will be removed. We will take care to ensure that there are no new terms in the discussion section.

R: [Still in section 2.2.3 you write "The stagnation depth was below 0.5 m, except in one case, indicating a smooth location of that glide shoe." (pag. 4, line 32). Apart from this statement, concerning the roughness of the site, you show in Table 1 values for "vegetation roughness" in the pasture and abandoned areas. . . how did you determine these values? Is this parameter related to stagnation depth? Please describe this or refer to literature.]

A: We have realized that terminology is not distinct regarding the different measures of roughness (vegetation versus ground). We will clarify this issue and improve wording to avoid confusion.

R: [In section 3.2 (pag. 6, line 9) you give values for the overall mean glide distance which I cannot find in Fig. 2. What are the values 185.9 and 361.8 mm? In Fig. 2 the black lines should represent the same values at the end of the period, right? Do I miss something? Please, check and explain well this. . . I would also write somewhere what a "click" in the measuring device for glide distance corresponds to. In Leitinger et al. (2008), which you refer to in section 2.2.1, it seems that it corresponds to 2.6 mm. Is this right?]

A: Due to graphical representation, Figure 2 is currently not showing all the data used in the statistics as some data loggers have stopped logging due to a full memory. We

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will clarify this issue and update Fig. 2 (mean, max, min snow gliding distance) to be in accordance with the data used in statistics. You are right about the distance for one "click" in the measuring device, it corresponds to 2.6 mm. We will add this information as already indicated in the general comments.

R: [At pag. 8 the discussion on snow gliding and vegetation properties is very interesting, but it is strange that some p values appear here for the first time without being presented before. . . did you do some correlation analyses? Why don't you present all the results of the correlation analyses in the results section and then discuss them here?]

A: Thank you for this comment and the positive evaluation of our discussion on snow gliding and vegetation. We apologize for the confusion. In the revised version of the manuscript we will ensure that all results are presented in the appropriate section and nothing new will be presented in the discussion section.

A: Thank you for your valuable comments, which will significantly improve our manuscript. We are looking forward to present you a revised version of our manuscript.

Please also note the supplement to this comment:

<https://www.nat-hazards-earth-syst-sci-discuss.net/nhess-2018-3/nhess-2018-3-AC1-supplement.pdf>

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