

## ***Interactive comment on “Point release wet snow avalanches” by C. Vera Valero et al.***

### **Anonymous Referee #1**

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As is also pointed out in the Abstract of this manuscript, the wet snow avalanches are getting more important as the global warming is in progress. Based on this background, in this manuscript, the authors applied the avalanche model developed in Switzerland for the wet snow avalanches broke out in Chilean Andes. However, I do have got a feeling that it is nothing more than that. Thus I unfortunately came to the conclusion that this manuscript is not matured yet for the publication. Particularly, no new findings are specified in the discussion part. Although the RAMMS already has had established reputation, I am not sure the wet snow version of the model utilized in this simulation also has enough power to reproduce the wet snow avalanches in a high accuracy. I am wondering that all the specific processes related to the wet snow avalanches, such as the liquid water production, its effect on the fluidization of snow, further, the lubricant effect on the basal and turbulent frictions, are all taken into account precisely and verified satisfactory with the real avalanches. Are the equations of 6 and 7 in page 5

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accurate enough to describe the phenomena in nature? Even though it is the case, description of the model is too short and, thus, it is hard to recognize even the principle. Perhaps all the procedures are mentioned in the reference line by line, but more explanations are essential. Otherwise, all the reader will be frustrated. Actually, the model outputs the physical properties of the wet snow avalanches and its development along the path. Then, the temperatures, water production, avalanche flowing volume and the ratio to the initial ones are introduced in figures 7 to 9. However, mostly no data were obtained for the four exemplified avalanches to verify the simulation, except for the run-out distances and the roughly estimated volumes of debris. Thus, all the simulation outputs shown in figures 7 to 9 are merely illustrating a meaningless row of numbers. How do you determine the initial snow depth on the avalanche track? It looks far from uniform according to the figures in the manuscript strongly depending on the topography. As you see, the re-distribution of snow by the wind will be the key issue. Needless to say, initial snow depth distribution gives the strong effect not only on the basal friction but on the erosion mass. I wonder the authors introduced ARPS as well as SNOWPACK models, and utilized to estimate the initial snow depth distribution. If it is not included in the initial condition, the following calculation sounds meaningless. As you see, snow properties, such as dry or wet, are far from satisfactory. Further, although this article sets on the focus on the point release avalanches, consequently, no specific differences were found among four avalanches and the point release does not give distinctive effect on the avalanche dynamics. So I am not sure the title of this manuscript is suitable or it still has room for improvement. Well, to say the least, the approach introduced here may be useful for the practitioners. However, the descriptions of the avalanche releasing mechanism, that is much more direct and necessary information for them, is not involved in this manuscript. That sounds very inconsistent. Since the SNOWPACK model is utilized in this approach, authors must be able to issue the warning from this aspect as well. Thus, I have an impression that this manuscript will be fairly well if it is submitted as something like a short note. However, if the authors are willing to submit the article as a scientific paper, the quality needs to be improved

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much more to make it worthy of. In particular, discussion part should be expanded further.

Although the following inquiries can be trivial more or less, they also need to be addressed.

Line 167: Is there a specific reason why 2m grid size was set in the simulation in spite the 1m resolution of DEM was available?

Line 145: In this model only the wet snow were eroded and not the dry ones. Although it looks quite rough assumption, is this reasonable and verified with the four avalanches here or previously?

Table 2: It looks like the simulation parameters shown in Table 2 seem to be set arbitrarily not physically, such as Cohesion C. Please describe the reason how each values were chosen.

Further, I am a bit anxious whether the depth-averaged shallow water equation model is able to describe the avalanche motion precisely on the steep clip as is shown in the figures.

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