Interactive comment on "A meteorological and blowing snow dataset (2000–2016) from a high-altitude alpine site (Col du Lac Blanc, France, 2720 m a.s.l.)" *by* Gilbert Guyomarc'h et al.

Anonymous Referee #1

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General comments:

This paper presents a meteorological database of blowing snow events for the Col du Lac Blanc study site a high-altitude experimental site located in Grandes Rousses range (French Alps). In-situ observations are obtained in four different automatic weather stations located within the study site. Additionally meteorological information is completed with SAFRAN model reanalysis. It is also described the methodology for obtaining blowing snow events and the data obtained with this methods are included in the database. The dataset described in this article has a great potential for many applications for studying snow dynamics on mountain areas. For this reason the manuscript

should be published. Nevertheless there are some issues that must be addressed before its final publication.

Major points:

1.- I encourage to include a new section explaining and describing Blowing snow data and the methods used (this is, change section 2.3 to section 3), since this probably is the most novel part of the paper. This section must clearly state from which AWS are the data. Sometimes it is difficult to follow this. Moreover Table 3 must be divided. You first present results obtained in section 2.3.2 with the particles thresholds. Afterwards you present a new "Table 4" with results shown in the two last rows of Table 3 since you are using there same method to compare the occurrence of drifting snow. This will help to understand the table faster for potential readers. I also miss some discussion about the fact that in Figure 4, when less data are available (percentage of valid data derived from SPC) more quantity of snow is detected and a higher percentage of time detected particles.

2.- I have missed some information about the climatic characteristics of the study site. As authors say, the experimental site has been operationally used since 1988. I think it is really interesting to provide an overview of the climatology observed in this site. For instance it could be included the mean annual and winter temperature, number of days with snow presence in the automatic weather station with the longest dataset, total annual precipitation. . .

3.- If possible, I encourage manuscript authors to include in the database observations obtained during the whole study period and not only during winter period. This can be really interesting since can provide an evaluation of observations/model deviations on an annual time basis. Moreover I think that observations of the last two snow seasons 2016-2017 and 2017-2018 are quite valuable, so I encourage manuscript authors to, upload this information during the review process.

4.- The is mostly focused on data obtained with different environmental sensors. This

way along the manuscript the model and the company (including a reference to their data) of sensors must be specified.

Specific comments:

Line 15: Precise that "Grandes Rouses" is located in French Alps.

Line 20: Precise the period in which the Snow Particle Counter acquired observations (2010-2016).

Line 28: Remove Gaillardet et al., 2018 reference. It is not appropriate to include a reference of an article submitted, even more if it is included in the abstract.

Line 43: Maybe rephrase as: "...have joined their efforts to investigate the effect of wind transport on snowpack evolution."

Line 44: "A high-altitude experimental site WAS set up..."

Line 45: By inspection of Figure 2. I guess that the study area covers an altitudinal range of about 200-300m. Please include maximum and minimum elevations in the text.

Line 53-55: Change appropriately in regard to the major comment of including a new section for describing blowing snow data.

Line 60: Describe the locations of Grandes Rouses within the Alps and include the altitudinal range of the study site.

Line 73: In table 1 and line 61, you provide the location of the automatic weather station on longitude, latitude; could you please also provide these coordinates on same coordinate system of the DEM available in the database?

Line 130: Which is the "manual quality check" process? You remove outliers?

Line138: Which young sensor? There are several products of this company.

Line 142: There is a final "." missed.

Line 147: Include the company of PT100 wires.

Line 149: You have already said that height changes during the course of the winter. Additionally you don't provide the snow free-height of these sensors. Remove this sentence.

Line 152: Please, include model and company of the ultra-sound snow height sensor. I also suggest giving a small explanation about how these sensors work.

Line 155: The surface area of the ultra-sound sensor observation may variate depending on snow height. Please clarify and quantify maximum and minimum surface area values.

Line 157: Include the company of SHM30 sensor.

Line 164: In the abstract you said that you provided SAFRAN reanalysis and here it is said that you provide SAFRAN analysis. Please clarify.

Lines 164-176: I see quite interesting to include SAFRAN model outputs. If I am right, this is not a 2D model. Please explain how you obtain the data for Col du Lac Blanc.

Line 173: You say SAFRAN is considered as the reference precipitation in Col du Lac Blanc; however this is a model and could have errors. Please discuss this issue and provide an estimation of potential bias of this model (even if it is for a different study area) in the Alps.

Line 195-204: These sentences are difficult to follow, please rephrase. For instance when you say: "Positive values of the difference...." I think you are describing the method you refer before as "This indirect method..." but this is not clear.

Line 203: How did you complete the analysis for the period 2000-2004 without the webcam? Maybe you could explain that the results obtained for the period 2004-2016 were evaluated with a visual inspection of webcam images.

Line 204: Change "recorded" by "included".

Line 225: Why 917 kg m-3 density value?

Line 228: Here you use the acronym SPC and not anymore SPC-S7s as you did before. Please be consistent along the manuscript when you refer to this device.

Line 240: Include A, z and m values you used to estimate mean horizontal flux and its vertical interpolation. Line 220 and 238: include a reference for mathematic equations (1, 2…).

Line 251: I guess this is the power law you introduce in line 238. Use a number to refer this expression.

Line 263 to 264: When you present "kg" of snow, specify that you are showing snow mass transport variable.

Line 266: "…to keep in mind that SPC, which detects each particle, is able to…"

Line 267: This is discussed in next section in several paragraphs…

Line 278: You already showed the 50% if time and the 6245 kg of mass on previous section. This is redundant. You can remove it here.

Line 291: I guess these conclusions came from table 3 since Figure 4 does not show the empirical method. Remove Figure 4 reference.

Line 299: I find quite surprising that the occurrence of wind-induced snow transport is closer to 30% of the time. Has been shown this value before? Where?

Line 301: You mean the empirical method with SPC data? Please clarify.

Line 316: Include mean snow depth value during the 2010-2016 time period.

Section 4, data availability: The database must include a metadata file for each AWS that includes all variables of each file, their units and the location of the station. Moreover I think it is not necessary to include the doi of each single station, for SAFRAN reanalysis and for the DEM all these links can be easily found following

the link: http://doi.osug.fr/public/CRYOBSCLIM_CLB/CRYOBSCLIM.CLB.all.html Concerning the DEM, it must be provided DEM on a single file and not in 14 separate files. The research group knows in detail the study site characteristics and any incoherence coming from alignment errors of the separate files can easily be detected, what it is not the case for potential users of the DEM. If necessary the spatial resolution of the DEM can be reduced to 0.5 m or 1 m grid cell size. X, Y and Z units and column names must be included in xyz files. Also a metadata diles of the DEM must be included.

Figures and tables:

Figure 1: Please include in c) panel the "Dôme des Petites Rouses" triangle and the point that marks "Col du lac Blanc" from b) map. I also encourage manuscript authors to draw dashed lines on c) map showing the area covered in picture of Figure 2. This would really help to potential readers to understand the characteristics of the study site.

Figure 5: I guess that the different circles of wind roses show the frequency of the different events. Please clarify. Maybe it is more interesting to provide the wind rose for AWS Col (same of (b) wind rose) since you are showing the fluxes obtained in this station.

Table 2: Please group first column when same station is described. It will be easier to understand the table.

Table 3: For the second column of the table, put "Threshold" in the first cell and not for each single cell. Units of the different variables are not appropriately included; in some cases the occurrence of drifting snow presents the % in others not. Similarly Kg of snow mass transport are not provided. Please be consistent along the table. Moreover there is a mistake and the 2p/cm2/min threshold is a 20p/cm2/min threshold as introduced in line 248. In the last row of table 3: You say that it is shown the "Total quantity of snow transported" however I think it is the occurrence of drifting snow. Moreover I see a bit confusing that you show in this row the results obtained with the method presented in section 2.3.1 with the SPC data without introducing this before.

Supplementary material: Line 20: Remove one "of" right before 500*500.