The authors have made substantial changes to the original manuscript, and it now reads much better. In particular, the presentation of the results has improved, which now greatly facilitates the interpretation of the results. Nevertheless, I believe some changes are still required before the manuscript can be accepted for publication.

1. The presentation of the results obtained at the so-called operational sites can be improved. Specifically, I would suggest that the authors present the results shown in Figure 6 in a format similar to Figure 4. This would make the comparison of the experimental sites with the operational sites much more easy.

2. Although the discussion section has improved, it is rather long and somewhat unstructured. The authors could use sub-sections with headers to provide a better structure and rearrange the paragraphs accordingly. I would suggest to split the discussion into three sub-section, e.g. (i) limitations of the measurement setup (ii) observed changes to snowpack properties and (iii) significance/impact of changes.

3. The authors now provide a simple model to predict densification due to snow mobile usage based on the number of passes, snow depth and bulk density. This is a nice addition to the paper as it shows that changes in snowpack density could be modelled. However, in the current model, if the number of passes is 0, there can still be a change in density. Perhaps a model of the form:
$$\Delta\rho_{s\_bulk} = A \times passes\left(B \times d_s + C \times \rho_{s\_bulk} + D\right)$$
would be better suited, as the change in density would go to zero when there were no passes. Finally, the authors should mention the potential merits of a density change model in the context of land use management in the discussion section and their density change model should also be mentioned in the conclusions.

4. The authors should discuss the role of spatial variability in their results in a more quantitative manner. Indeed, the authors mention that they had two control transects at FEF (lines 126-127) and that the first measurements at FEF were performed prior to any snowmobile treatment (lines 138-140). Furthermore, the deeper snow treatments at REP only started on 1 February (lines 247-249). All these data can be used to assess the typical degree of spatial variability at the experimental sites in a more quantitative manner.

Detailed comments:

line 22: change ‘where there was less snow accumulation’ to ‘for thinner snow accumulations’
line 48: on **very** shallow snow. Also, move the reference Keddy et al in line 50 to the end of line 48
line 49: not clear how there can be an impact on the ‘underlying old snow’ if the snowpack is only 10 to 20 cm deep.
line 51: define what is meant by ‘deeper snow cover’.
line 60: not sure what is meant by ‘greater heat loss from the snowpack and underlying soil’. Does this mean that there is more cooling in the snowpack and soil? This wouldn’t make sense to me.
lines 68-69: I don’t see how ‘and billions of dollars are spent each year on snowmobiling’ is relevant here and suggest removing it
line 83: side of **the** pass … non-motorized **users**
line 125: Two control transects: these are not shown in Fig. 2b.
lines 154-155: remove this sentence
line 167: not sure what the ‘point of zero amplitude’ is
lines 172-173: remove ‘each stratified layer of’

line 179: rewrite as ‘It is due to’ does not make sense to me. Hardness is not due to something, it is a property related to something
line 184-186: Did you perform multiple measurements in thicker layers and average those values, or did you only perform one hardness measurement?
line 191: replace ‘tube’ with ‘rod’
line 192: replace ‘of known weight’ with ‘of defined weight’
line 197: here you mention ‘stratigraphic layers’. Are these the same as those identified in the manual snow profile? Usually, the layers identified in the ram profile do not correspond one-to-one to layers in the manual profile.
line 204: The statement ‘This determines the statistical significance between two datasets’ is inaccurate. The Mann-Whitney test is used to compare two distributions and determine if these are statistically different from each other without assuming normal distributions.
lines 224-225: rewrite to: … REP had slightly below average snow depth compared to the 15 year mean based on the Columbine SNOTEL data…
line 226: rewrite to: …9 April was at 93% if the historical …
line 229: rewrite to: …FEF was also below the 15 year …
line 237: mention that this refers to the first data point in Figure 4ii
line 283: (Table 1**c**)
line 296-297: remove sentence: ‘These results are also …’
line 307: move (Table 1) to end of sentence
line 317: fragmented facetted crystals is not an official crystal type mentioned in Fierz et al. (2009)
lines 322 to 324: rewrite to … and snow depth (Figure 6a), the amount of snow was comparable for the … sites, even though they were up to …
line 326: the statement ‘were similar’ cannot be concluded based on what is shown in Fig. 6. Suggest showing the results as in Fig. 4
lines 334-336: The line of reasoning does not make sense to me. Just because data do not fit the expected trend, does not mean they should be excluded. It is better to argument that you want to focus on dry snow conditions, and therefore exclude the data from later in the season.
lines 338-339: it is not clear to me what ‘ … were not cross-correlated’ means
lines 345-349: Show the results which end up with a NSCE value of 0.71 in Fig. 7. Also, since you do not control the amount of snowmobile use at these sites, you can use the model to estimate it. It makes perfect sense that it varies throughout the season, as many factors influence the amount of use, including weather and time of year (holidays).
lines 354-357: Mention density changes in % to facilitate the comparison with literature values for grooming.
line 361: change ‘densification’ to ‘density’
line 362: ‘compaction deformed fresh snow’ not sure what this means and on what observations this statement is based.
lines 378-379: Figure **3ai and 3aii**
line 382: ‘spatial variability between 40 to 200 kg/m3 for fresh snow’ I strongly doubt that such a variability would be observed in the experimental sites. Clearly, some quantification of the spatial variability observed at the experimental sites would be in place to provide some context.
lines 386-388: this sentence seems misplaced and should be moved to the paragraph in lines 409-415
line 387: based on Figure 4, the crystals at the end of the season were no rounded crystals, but rounded facets.
line 395: rewrite to: … property changes we observed could therefore also be …
line 411: …, it could impact weak layers that cause avalanches (Saly et al., 2016), **which are typically soft layers consisting of large facetted grains (e.g. Schweizer and Jamieson, 2003; van Herwijnen and Jamieson, 2007)**

line 415: ‘Do not try … ‘ rephrase this to say that the effects of snow mobile use on snow stability requires more investigation.
lines 428-430: also include Marty et al. (2017); Schmucki et al. (2015)
lines 432-440: move this paragraph to the start of the discussion

Fierz, C., Armstrong, R.L., Durand , Y., Etchevers, P., Greene, E., McClung, D.M., Nishimura, K., Satyawali, P.K. and Sokratov, S.A., 2009. The International Classification for Seasonal Snow on the Ground. HP-VII Technical Documents in Hydrology, 83. UNESCO-IHP, Paris, France, 90 pp.

Marty, C., Schlögl, S., Bavay, M. and Lehning, M., 2017. How much can we save? Impact of different emission scenarios on future snow cover in the Alps. The Cryosphere, 11(1): 517-529.

Schmucki, E., Marty, C., Fierz, C. and Lehning, M., 2015. Simulations of 21st century snow response to climate change in Switzerland from a set of RCMs. International Journal of Climatology, 35(11): 3262-3273.

Schweizer, J. and Jamieson, J.B., 2003. Snowpack properties for snow profile analysis. Cold Regions Science and Technology, 37(3): 233-241.

van Herwijnen, A. and Jamieson, J.B., 2007. Snowpack properties associated with fracture initiation and propagation resulting in skier-triggered dry snow slab avalanches. Cold Regions Science and Technology, 50(1-3): 13-22.