Comments by C. Fierz

General comments

The authors present an important addition to the dataset described by Morin et al. in 2012. Not only is the hourly 2012 data set prolonged to 2017, but they also compiled all data available at Col de Porte in a daily dataset starting in 1960. The data are conveniently described and presented clearly and concisely without loosing on clarity, except for soil temperatures (see Section 3.4 in annotated manuscript). The estimation of uncertainties of the various measurements is an important asset of the paper as these are rarely given for other data sets. In conclusion, the paper is a welcomed contribution to long term, well described data sets for snow studies. Thus I recommend to accept the paper provided the authors address the points raised above and below as well as in the annotated version of their manuscript.

The authors are very grateful to Charles Fierz for his careful and useful review of the manuscript. A point by point response to each comment is provided in blue below. Changes in the manuscript are enlightened in **bold**.

Additional changes in the manuscript :
The dataset of snow vertical profiles has been extended to March 2018 (April 2015 in the first version of the manuscript) and these profiles are now provided in caaml v6 format (caaml v5 in the first version).

Specific comments

Regarding uncertainties on the water equivalent of snow cover (SWE), I have two questions:

1) Would it not be more interesting to compare the bulk density of the snow cover given by SWE/HS (where HS is snow depth) rather than SWE itself ? Indeed, I assume that the spatial variability of SWE is mostly given by the spatial variability of HS while measurement errors of the snow mass may dominate the uncertainty on bulk density. I am aware that the cosmic-ray sensor does not fully fit this approach, but I assume from Figure 2 that snow depth is quite well known at its location.

Yes, we agree that this would be interesting, especially regarding discussion on the spatial variability of the bulk density and its density such as in Sturm et al., 2010. Unfortunately, no snow depth sensor is located close enough to the reference SWE sensor (location 16 in Fig. 2). We are planning, in a near future, to add a snow depth sensor at this location. The snowpits data, which combine both SWE and HS measurements can be used to investigate the spatial variability of bulk density. Since the reference SWE sensor is not combined with snow depth measurement we believe that it is more relevant in that case to stick to the estimation of SWE variability and uncertainties.

Sturm, M., B. Taras, G.E. Liston, C. Derksen, T. Jonas, and J. Lea, 2010: Estimating Snow Water Equivalent Using Snow Depth Data and Climate Classes. *J. Hydrometeor., 11, 1380–1394,* https://doi.org/10.1175/2010JHM1202.1

2) If comparing SWE, I would prefer to see the differences expressed as a percentage of SWEref. But at least the mean maximum SWE should be indicated.

Translating Fig. 9 in percent of SWE ref would result in the following figure :
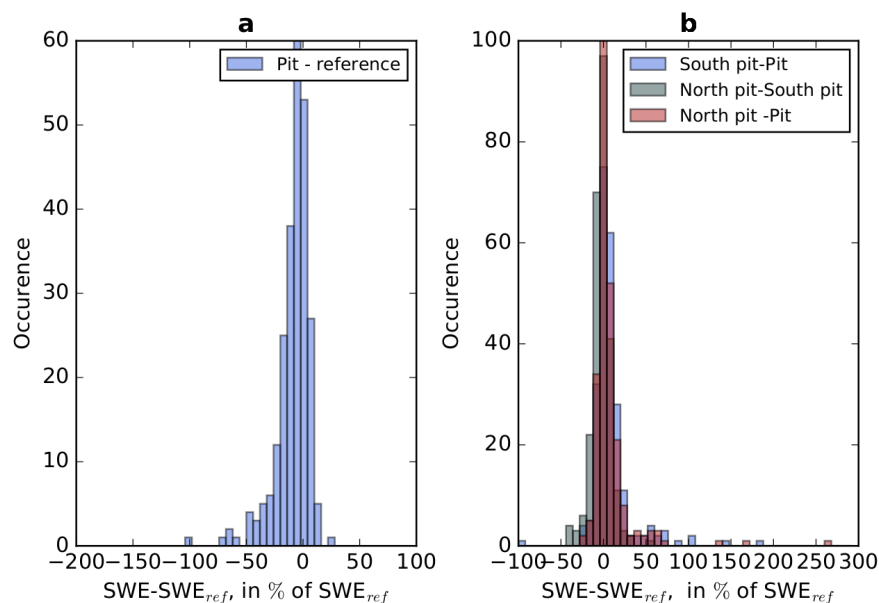
We believe that the representation with the absolute values give less emphasis on the outliers and thus we prefer to keep the analysis in absolute values in the revised manuscript. However, as suggested we added in the text the mean value of peak SWE and added the percentage in mean peak SWE in the description of the figure.

"Figure \ref{fig:swe} and Table \ref{tab:swe} compare the SWE automatic measurements at \hyperref[fig:scheme]{location 16} with the manual measurements from the main snow pit field (panel a) and the three locations for manual SWE measurements (panel b). The statistics are calculated over the 2001-2017 period. It must be underlined that the automatic SWE sensor is calibrated using the manual measurements at snow pit fields south and north. **The average of the annual maximum value of SWE$_{\rm{ref}}$ during this period is 389 $\pm$ 104 kg~m^{-2} .** Figure \ref{fig:swe} and Table \ref{tab:swe} show that the mean difference between the automatic and manual measurements in the main snow pit field reaches -17 kg\,m^{-2} with RMSD of almost 25 kg\,m^{-2}. The comparison between the three locations of manual measurements displays RMSD reaching 25 kg\,m^{-2}, **i.e. 8.6 $\%$ of average peak SWE values.** This value is consistent with the spatial variability of snow depth and can probably be used as an estimate of the uncertainty associated with the SWE dataset both due to measurement errors and spatial variability. "

Regarding Fig., Tab., etc, I would suggest to use the same style throughout the paper. Myself I would tend to use Figure, Table, Section, etc.

According to ESSD website (https://www.earth-system-science-data.net/for_authors/manuscript_preparation.html),

"The abbreviation "Fig." should be used when it appears in running text and should be followed by a number unless it comes at the beginning of a sentence, e.g.: "The results are depicted in Fig. 5. Figure 9 reveals that...".”
"Please note that the word "Table" is never abbreviated and should be capitalized when followed by a number (e.g. Table 4).”
"Equations: They should be referred to by the abbreviation "Eq." and the respective number in parentheses, e.g. "Eq. (14)". However, when the reference comes at the beginning of a sentence, the unabbreviated word "Equation" should be used, e.g.: "Equation (14) is very important for the results; however, Eq. (15) makes it clear that..."”
"The abbreviation "Sect." should be used when it appears in running text and should be followed by a number unless it comes at the beginning of a sentence.”

These guidelines have been taken into accounted in the new version of the manuscript (also pointed out by R. Essery). We also note that the Copernicus Editorial team will prepare the manuscript for final publication and enforce style issues that may have escaped our attention.

The reader often needs to navigate back to Figure 2 (and other Tables). I hope this can be made easier by linking any Location N to Figure 2 as well as referrals to tables to their respective Entries. That way the multiple repetition of '(Figure 2)' could be avoided in the text. Anyway, whatever you decide, make it consistent throughout the paper (currently not the case).

Tables references were already linked to their respective entries.
We have now linked every location to Figure 2 in .pdf.
This was also added in the legend of Figure 2 that now reads :
"...The correspondence between numbering and sensors is indicated in Tables \ref{tab:driving}, \ref{tab:eval} and \ref{tab:quot}. **For the sake of clarity, when a location is cited in the text, the reference to Fig. \ref{fig:scheme} is omitted and the location is directly linked to the figure or the corresponding table.** ...”

Moreover, I hope the final layout will also help with that respect. Currently, some Figures and Tables seem badly misplaced.

This formatting issue will be dealt with during the final editing process, upon acceptance of the manuscript, in connection with the publishing staff. The current locations of figures and tables have been also checked and updated (see also response to comment from referee #2).

Please also note the supplement to this comment: https://www.earth-syst-sci-data-discuss.net/essd-2018-84/essd-2018-84-RC3-supplement.pdf

Each comment and annotation in the supplement have been taken into account (please see the track-changes version of the manuscript submitted along with the revised version of the manuscript).

Regarding the comment of the HTN diff, the 80 cm difference values was a mistake in the dataset. Thanks for spotting it ! It has been corrected and Fig. 8 and the dataset has been updated consequently.