Reviewer 1

We warmly thank the reviewer for the comments and positive feedback. Please find below our point-by-point replies to the comments.

ESSD review criteria:

Is the article itself appropriate to support the publication of a data set? - Yes. The experimental procedure is clearly described and scientifically sound. A suggestion would be to plot time traces of the snow microstructure evolution (density, SSA, mean curvature, etc.) instead of or in addition to the 3D visualizations. This could serve as a 'preview' for further analysis and already yield some interesting results.

The present paper is a data paper that provides little or no data analysis, in agreement with the guidelines of the ESSD journal. However, we agree with the reviewer concerning the interest in investigating the temporal evolution of the snow microstructure geometrical properties. This raises results and comments that are out of the scope of the present paper. Data analysis will be presented in a separate paper, which is in preparation.

Is the data set significant – unique, useful, and complete? - Yes. The data set fits well within a history of time and spatially resolved microCT investigations of snow metamorphism and the resolution and detail will be useful for further investigations into these phenomena.

Is the data set itself of high quality? - Yes. The data set quality is adequate for the described effects of snow metamorphism. A few issues are discussed in the detailed comments below.

Is the data set publication, as submitted, of high quality? - Yes. A few remaining issues are discussed below.

Detailed comments:

Table 1: I think that the density for the snow sample 'DF' is incorrect. Looking at Fig. 4, 'DF' seems much less dense than, e.g., 'RGI'. Also, I would expect DF snow to have a density closer to 100 kg/m3. I processed the sample data 'DF_light_grad_10_3_seg.zarr' and found a density of approx. 80 kg/m3 and a specific surface area of approx. 58 m2/kg (as correctly reported in Table 1). The other samples are characterised correctly. Regarding the previous comment, it would be good to provide a script (along with the data set) that reproduces the numbers (density and SSA) in Table 1.

Yes, this was a mistake (typo, not a bug in the calculation code). Indeed, the correct density range for the DF samples is 84 - 91 kg/m3. We have corrected the values in the revised version of the manuscript. Regarding the computation of density and SSA on the 3D images, we used standard methods that are described in the references provided in the paper. As done by the reviewer, the values can be easily retrieved with this information.

'RG_dense_grad_100_3' is missing from the dataset.

Thank you for this comment. The missing file is now on the server sDrive (https://sdrive.cnrs.fr/s/HHJt56dj63sNTYg). Please note that the data are now also accessible on PANGAEA using the temporary key: https://www.pangaea.de/tok/49074e0ffa886fcd8fc18e21e45991ea867ce45e

l 122: correct to 'Schneebeli'

Corrected

l 143: Do you mean 'insulating' cap?
(https://dictionary.cambridge.org/dictionary/english/insulate)

Yes, we corrected the wording in the revised version.

l 257: What do you mean by '... and shorten its duration.'?

We meant that applying equi-temperature condition by setting the Peltier probes at the mean temperature for 5 to 10 minutes fastens the thermalization of the snow sample (which has just been moved out of the storage fridge at -85°C), compared to just letting the snow sample in the cold room and waiting for a "natural" thermalization. We agree that the formulation is not clear and was modified in the revised version to read "*To start an experiment, the snow sample was taken from the freezer and immediately placed in CellCold for temperature control. The temperatures imposed by the cell on the top and bottom of the sample were, for the first 5 to 10 minutes, an isothermal condition that corresponds to the mean temperature of the experiment. In doing so, we force the thermalization of the snow sample.*"

l 312: Gb (English) instead of Go (French).

Corrected

l 337: Why do you resort to using a grain size estimate, instead of using quantifiable parameters from your experiments (SSA, some sort of averaged grain size, or similar)?

As mentioned above, a physical description of grain size and shape is out of the scope of this paper. Here, we provided a qualitative description of the grain size and shape, as seen on the 3D images. We, however, agree that the sentence mentioned by the reviewer (l 337) is confusing and was removed.

Fig4/5: 'mm' (millimeter) on the colorbar should not be italic.

Corrected

Fig6-8: Add the colorbars for convenience.

Corrected

https://www.youtube.com/watch?v=wCCmKa7rk6o -- timestamp: 72h to 76h -- particles seem to be appearing. Can you comment on this? I did not go through all videos in detail, just noticed this by chance. Maybe recheck, if this is some sort of error.

We understand the reviewer's concern. However, we did not notice any error in the data set and its processing. We can only hypothesize that the occurring metamorphism led to grains' rearrangement, which resulted, for this time series, in a "sudden" movement of a grain from one time step to another. The same process happens for the DF sample in equi-temperature evolution (https://www.youtube.com/watch?v=tMXvGgdlP8E –timestamp: 108h to 112h). In addition, as videos only show a thin vertical section of the whole sample, of thickness 0.85 mm, a sudden grain movement results in a grain, or some part of it, suddenly appearing/disappearing out of sight, giving this strange behavior.