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The Cryosphere Discussions

Interactive comment on "Liquid-water content and water distribution of wet snow using electrical monitoring" *by* Pirmin Philipp Ebner et al.

Anonymous Referee #1

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The authors developed an experimental setup to investigate the liquid water and dielectric properties of snow and reported on the cold room experiment results using their experimental setup. In this manuscript, they classified the heating process of the snow into three phases: Dry snow, Wet snow, and Water percolation based on the characteristics of electric properties. They also showed the potential of micro-CT analyses for wet snow science. I think the manuscript is designed well and its scientific content is enough for publication in The Cryosphere. Before acceptance, several points, which are shown in comments, should be considered.

<Comments>

Abstract:

L33: Please add several concrete explanations how to help your result for the interpretation of the snow melt run-off of spring snow.

1. Introduction:

L76 and L 82: The authors used the sentences "water retention curve of snow from right(left) side", but it is hard to image what is right(left) side. Please add several detailed explanations for right(left) side.

L120: "surface-to-volume ratio" means "Specific surface area"?

2. Experimental setup

Although the sentence of micro-CT experiment was named "2.1 Topography experiments", the first sentence to show the measurement experiment of dielectric properties of snow during heating is not named. I recommend to name the fast sentence likely the sentence of micro-CT part.

L165: How to estimate the uncertainties of measurements? Please add more detail explanations.

3. Method

P8 L198 and L201: η should be heating efficiency, please clearly indicate what is η in the text.

4. Results

L 224-L226: The authors say that Table 1 shows that "The higher the snow density and the water content in snow was, the stronger the measured electrical properties were affected. But I can not agree to their argument because Table 1 does not show any information of water contents. To clear the evidence of their argument, please add the information of water content in Table 1 or add several explanations in the text how to get the information of water content from the information of the current version of Table 1.

L229-L230: Although text specifies the range of temperature from -1 to 0 °C, the temperature range in Fig. 3 is from -0.4 to 0 °C. The range description should be unified between text and figure.

L237-L237: Although the authors insist on that “After this maximum the current started to decrease with time”, I can not agree to their argument because the current graphs of 438 kg m-3 and 917 kg m-3 do not show such trends, namely they only seem to increase during the period in Fig. 3.

L238-L239: Although the authors insist on that “Both parameters decrease with time and increased afterwards again”, I can not agree to their argument because voltage and phase shift of 917 kg m-3 does not show such trends, namely they only seem to decrease during the period in Fig. 3.

L248-L252. Although the authors insist on that “The impedances of 38 kg m-3 and 917 kg m-3 reached minimum values after 80 min and 9 min respectively, I can not agree to their argument because the impedance graphs of 438 kg m-3 and 917 kg m-3 still seem to continue decreasing during the period in Fig. 4.

4 Discussion

The number of Discussion part should be 5.

L295-L297: Please add the description how to calculate the deviations.

L308-L309: It is difficult to understand the sentence that “at higher density the structural connections between ice crystals were less destructed by the pore volume”. Please add more detailed description.

L337: The range of mass water volume when water percolation started in Table 3 is from 4.1 to 7.5 %, therefore, the description in the text (5-8%) had better be 4 -8 %.

L545: URMS should be RRMS.

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