

## ***Interactive comment on “Performance of snow density measurement systems in snow stratigraphies” by Jiansheng Hao et al.***

**Anonymous Referee #2**

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The authors carried out the comparison of snow density observations between gravimetric and dielectric permittivity measuring systems under dry and wet snow conditions. Then, they analyzed these data with considering characteristic of snow layer stratigraphies. Based on these analyses results, they discussed the causes of dependency of measurement error on its snow layer stratigraphy. Finally, they recommend which measurement system is better for snow density measurements.

First of all, it is clear to see that a lot of hard work has been put into the study. Measurement data have enough number statistically, therefore, I do not doubt their statistical analyses results.

However, the overall investigation is not novel from the scientific viewpoints and conclusion addressed by this paper is a little bit weak under the present version for publication

For improvement of the manuscript, I point out the following major comments and specific comments:

<Major comments>

1. The logic to compare different two methods is ambiguous. When we discuss the relative accuracy between different methods, we firstly need to determine the standard reference method, then compare the measured data of different methods with measured data of the standard reference method, but the authors do not do it. For clearing the logic, the standard reference method should be defined in the manuscript.
2. The organization of the manuscript leaves plenty of room for improvement because similar descriptions appear at several paragraphs and some unimportant information were included. For the level of publication, reconsider the organization to show the scientific significance of the work efficiently.

<Specific comments>

<2.3. Field experiment design>

L206: Were the values of water contents (0-0.45%) true? Air temperature was so low (-7.6 degree Celsius) that snow could not be wet. Including this part, the authors should consider significant figures obtained from the equipment through the manuscript.

Table 1: In the Fig. 3, there is not a MF layer. If the authors obtained the MF layer from the same snow pits shown in Fig. 3, please show it in the figure.

<Results>

L296-297: Wet snow density of the box-cutter group should be lower than that of the Snow Fork.

<Discussion>

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L371: Although the authors insisted that “the degree of compressive deformation and shear failure varied greatly with each measurement for DF”, Fig. 5 does not show such trend. Please indicate which figure shows this result.

L406-410: The explanation of Snow Fork is not suitable in Discussion part. They should be moved to the Method part.

L431-433: I can not understand their logic. Please add more detail explanation to support their arguments.

L442-444: L452-455: Their arguments are not convincing because there is no evidence that the densities of Snow Fork measurement are correct. As mentioned in Major comment, the authors must clear which measurement method is standard and then compare each other if they want to discuss the superiority or inferiority.

L466-467: In the Table 4, weight of box-cutter is much heavier than Snow Fork although they claimed that weight of box-cutter is lighter than Snow Fork.

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<https://doi.org/10.5194/gi-2020-14>, 2020.

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