

Interactive comment on “Improved measurement of ice layer density in seasonal snowpacks” by T. Watts et al.

Anonymous Referee #1

Received and published: 25 December 2015

The authors reported on the measurement results of natural and artificial ice layer densities in the snowpack using a new field measurement technique. They also discussed the errors resulting from their technique in detail. Thus, their results should be more certain than the previous studies. Because the number of observations is too small, the work does not present completely innovative results, but rather presents an incremental advance in a technique to measure accurate density of ice layer in the snowpack. From this viewpoint, this paper is worth publishing in TC. However, I think there are several points to clear before publication. Below I give suggestions on improvements for better understanding the arguments in the manuscript.

L94-96: How was the mean squared error in the measurement of the ice sample volume calculated? Please add more detail explanation.

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L147: How was the random error in the density measurements calculated? Please add more detail explanation.

L157 & Table 3: The explanation of Table 3 is insufficient. What is n in the Table 3? If n indicates the measurement number, what does “ $n < 0.1$ ” mean? Please add more detail explanation.

L181 & Fig. 4: Is the simulation results of 800 kg m^{-3} in Fig. 4 true? The areas replaced by bubbles in the figure seem to be much larger than those supposed from its density. The simulation results should depend on the initial pure ice density, which does not have any bubbles. Thus, please add the explanation of the initial pure ice density in the simulation.

L202: Do you think the dependence of pure ice density on temperature is enough strong to affect the density difference between artificial and natural ice layer? As shown in Table 1, the density difference between the 0°C and -40°C is less than 7 kg m^{-3} . Please add the detail explanation if you have any idea to support your hypothesis.

Interactive comment on The Cryosphere Discuss., 9, 5979, 2015.

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