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

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GENERAL COMMENTS

The need to account accurately for the density of ice layers is evident from the introductory review of this paper. As no reliable method is available at present, the authors present a novel, simple, and promising method to measure the density of thin ice layers. They also took care to present a thorough error analysis, which is an asset. In addition, the paper reads nicely except for the section on 'effective porosity' that would benefit from some re-visiting by the authors. However, the method was so far applied to 4 ice layers only, two of which were artificial. It is thus questionable whether it can already be seen as a 'standard' and can be part of the special issue "Intercomparison

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of methods to characterise snow microstructure" without prior proper comparison with another method, as proposed by the authors themselves.

I recommend accepting the paper after the authors addressed the porosity issue and do some minor revisions as suggested below. Whether it is included in the special issue is left to the appreciation of the editor.

MINOR COMMENTS

p. 5983, line 12: why volume "range"?

p. 5984, line 16: "Consequently ..." I'm not sure this is the correct statement. You found your method to be accurate to 4 %. Whether this is "low enough" will depend on the application.

p. 5984, line 18: Field measurements: how were the samples taken and cleared from surrounding snow?

p. 5984, line 28: "To create the ..." unclear! Was the melt-freeze crust in the end part of the ice layer?

p. 5985, line 21: "thickness gradient" Could you indicate the range in numbers?

p. 5986, line 3: "Natural ice layers ..." Are the two distributions not significantly different? Of course, the statement would still rely on 2 ice layers each!

p. 5986, line 8: "physically reasonable" From Table 2, the mean of 915 kg m-3 does not seem less reasonable than from the artificial layer at North Bay!

p. 5987, line 1ff: "effective porosity" Is this the proper term? Why in cm3 (porosity has no dimension). Are you not rather decreasing the porosity by breaking the sample in pieces?

p. 5987, lines 5-10: Some repetition here!

Figure 6: "effect" Can we really speak of an 'effect' here?

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