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The Cryosphere Discussions

Interactive comment on "Use of a thermal imager for snow pit temperatures" *by* C. Shea et al.

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General comments:

The authors present a new method for investigating small, micro-scale 2-dimensional temperatures and temperature gradients in a natural snowpack that could represent an important improvement over standard point temperature measurements. I only have a few, mostly technical, corrections, listed below.

Specific comments:

I do think that the manuscript, and future work on the micro-scale temperature investigation, could benefit greatly from an examination of snow micro geometry which does not involve disaggregating the snow crystals, such as micro tomography or stereology so that the pore specs geometry is left intact. The pore size is not necessarily the

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same size as the snow crystal, as has been assumed here. The macro photography presented here, while useful for proving the existence of faceted snow grains indicative of kinetic metamorphism and 2D extent does not give a good measure of the 3D geometry. I'm skeptical of the volumes estimated for faceted grains assuming a 1:50 width to height ratio. Perhaps some wording to the effect that this is just a gross estimate is in order.

Technical corrections:

Page 2524, line 11. There is a missing comma between "gradients" and "adjust"

Page 2525, lines 2-3, this sentence is mis-worded, it should say something like, "The transition between equilibrium and kinetic metamorphism is generally accepted by field practitioners to occur...". The way it reads now is incorrect.

Page 2528, line 19, the phrasing here is awkward, and difficult to understand. I think that the sentence means, "the largest magnitude difference at a single pixel within a thermal image to any of the pixel's eight nearest neighbors". I would suggest rewriting this sentence to be somehow clearer.

Page 2535, line 11, there is a bit of a non sequitur between the first sentence and the next two in this paragraph. It seems like this first sentence belongs in the next paragraph, and this paragraph should instead open with a sentence about the cause, or the importance to sampling size error, of the different sizes present in the natural snowpack.

Page 2537, several instances (lines 4,7,8,9,12) numbers are written out without hyphenating, for example, thirty-five, twenty-four

Page 2540, line 21, maybe add some wording about whether the 1:50 ratio is valid for hoar formations

Page 2541, line 19, this sentence either has some miswording or I don't understand what is being said. I don't know what the phrase "air the temperature" used twice,

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means.

Page 2542, line 3, maybe add wording about the assumption that the pore size is equal to the grain volume

Page 2544, line 1, macro scale is two words here, but one word previously in manuscript

Page 2545, line 10, define MFcr

Page 2546, line 25, perhaps should be written "values of similar magnitudes have been documented"

Page 2547, line 2, the word "to" should be deleted

Figure 3: perhaps adding a legend with the colors and times photographs were taken would make the figure easier to read

Figure 7: maybe add the length of the scale bar to the image as the ruler isn't that easy to read. This is a really interesting figure, it's a great result considering that it is a natural snowpack.

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