



**TCD** 4, C1040–C1042, 2010

> Interactive Comment

## Interactive comment on "Some fundamentals of handheld snow surface thermography" by C. Shea and B. Jamieson

## R. Hellstrom (Referee)

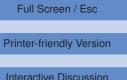
rhellstrom@bridgew.edu

Received and published: 4 November 2010

General Comments:

Shea and Jamieson present an overview of ground-based high resolution snow surface temperature measurement techniques. The paper presents the practical advantages to snow thermography, while elaborating on a few potential limitations. Novel applications include revealing processes of snow surface and substrate crystalization, grain growth, and structural changes such as warm crown fractures. This overview paper has merit for a broad spectrum of snow science, including avalanche forecasting, but also many others not mentioned by the authors.

Specific Comments:



**Discussion Paper** 



i. The authors should include other potential applications of snow surface thermography...think outside the avalanche community.

ii. The authors might also mention Tomography more prominently as a technique that would nicely complement thermography, such as in the "motivation" section. ie. Schneebeli

iii. It might strengthen the impact of this paper by briefly discussing the implications of thermography for validation of aircraft, balloon, or satellite based remote sensing of snow surface temperature?

iv. The paper is missing an aspect/process affecting snow surface morphology that may be detectable by thermography: wind pumping. ie. Colbeck, S. C. 1989. Air movement in snow due to windpumping. J. Glaciol., 35(120), 209-2 13. and for Greenland: Albert, M.R., McGilvary, W.R., 1992. Thermal effects due to air flow and vapor transport in dry snow. Journal of Glaciology38, 129.

v. This paper does promote interest in thermography applications in snowy environments and should be publishable after minor revisions that motivate broader appeal.

**Technical Corrections:** 

a. p. 1468: line 24, please rephrase, small-scale refers to a relatively large area, replace small-scale with sub-pixel scale or higher resolution or microscale.

b. p. 1470: line 2, to closer than..., replace closer with less than...

c. p. 1470: line 9, again the word choice of small-scale is misleading to those with background in geospatial analysis, please replace with high resolution or similar.

d. p. 1471: line 14, thermal imagers have significantly reduced (NOT lessened) in price, just a suggestion.

e. p. 1471: line 27, what is a pixel-type sensor...do you mean CCD-type sensor; a pixel is generally thought of as the smallest detectable square feature on an image.

**TCD** 4, C1040–C1042, 2010

> Interactive Comment

Full Screen / Esc

**Printer-friendly Version** 

Interactive Discussion

**Discussion Paper** 



Interactive comment on The Cryosphere Discuss., 4, 1467, 2010.

## TCD

4, C1040–C1042, 2010

Interactive Comment

Full Screen / Esc

Printer-friendly Version

Interactive Discussion

Discussion Paper

