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Interactive comment on “Near-surface air temperature and snow skin temperature comparison from CREST-SAFE station data with MODIS land surface temperature data” by C. L. Pérez Díaz et al.

Anonymous Referee #2

Received and published: 31 August 2015

General comments:

The paper ‘near-surface air temperature and snow skin temperature comparisons from CREST-SAVE station data with MODIS land surface temperature data’ submitted by C.L. Perez-Diaz et al. is generally well written. However, the structure of the paper and how the content is presented is confusing. The paper investigates the relationship between satellite-retrieved temperature and air temperature / skin temperature over snow, but its main message and findings remain unclear. The limited representative-

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ness of the in-situ measurements and the consequences this has for the findings is not sufficiently discussed or accounted for, even though this is of utmost importance for correctly interpreting the results (see attached screenshot of a wider area around Caribou station). The data, instruments and methods also need to be described in more detail. Given the relatively small data set, the conclusions drawn about the relationship between skin temperature, cloudiness, wind speed and air temperature (figs 6 and 7) appear to be speculative. A major revision and resubmission of the paper is recommended.

Specific comments:

The 'Abstract' reads more like a part of the introduction and should be rewritten.

Page 7667 Lines 9-11: it is stated that in-situ measurements often cannot provide measurements that are representative for wide areas. However, a broad range of medium to coarse spatial resolution LST products have been successfully validated using temperature-based validation, e.g. MODIS, ASTER, AATSR, and SEVIRI. Please refer to the corresponding literature and try to specify the conditions for sufficiently representative in-situ measurements w.r.t. your location / application.

Page 7668 line 3: need line 4: consider rewording 'for proper scrutiny' line 5: ... researchers often use near surface air temperature over snow as proxy, ... lines 6-7: please reformulate. Line 12: ... (Zhou et al. 2013). In contrast, only few researchers... lines 14-17: difficult to read and understand: please reformulate this sentence. Line 27: introduce LT ('local 'time' ?)

Page 7669 lines 4-15: please give the source of the data and acknowledge and reference the data providers. Also provide the name of the LST retrieval algorithm, briefly state its qualities and state the expected accuracy, in particular w.r.t. your application (land cover types). Line 17: please name and refer to the experimenters who performed the CREST-SAFE measurements. Lines 19-20: what is the relevance of the microwave observations in the context of the paper?

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Page 7670 line 4: please provide more details about the Apogee radiometer (instrument type, spectral range, FOV, mounting height, cover type within observed surface area). Line 7: do you mean 'accuracy of 0.2C' or is this the 'digitisation interval' of the instrument (compare with achievable accuracy of the instrument)? Line 21: ... behaviour, the hourly values (Sect. 4.3.) indicate otherwise. Line 23: ... The time series shows that ... line 24: ... was the colder ... line 25: ... ruled out that the ...

page 7671 line 1: ... temperature was colder ... line 2: ..., but this is not observed in the daily averages. Line 6: ... is negligible, so that the radiative cooling of the ground, which results in lower ... line 7: ... between air minus ...

Page 7672 Lines 13-24: is air temperature also closer to satellite-retrieved LST if the land is covered by snow? The referenced articles appear to relate to snow-free surfaces only. Line 21-22: LST is the radiative temperature of the land cover. Therefore, the statement that 'the temperature of the vegetation canopy is usually closer to air temperature than to the land surface temperature, ...' does not make any sense, since over completely forested areas LST is derived exclusively over vegetation and, hence is also close to air temperature. The larger differences observed in this studies stem from the fact that the in-situ LST is not representative for the satellite LST.

Page 7673 Lines 5 and 12: ...clear-sky...(rather than non-clouded)

Page 7675 Line 29: ... drawn by repeating this study ...

Figure 3: in my opinion the scatter observed in figure 3 may be due to cloud-contamination with a broad range of cloud heights, i.e. different cloud temperatures. Furthermore, LST is usually only retrieved for clear-sky situations. The authors should explain the effect of cloudiness on the measurements, which should mainly be observed for average air temperatures (as long as LST are limited to clear-sky situations).

Figures 4 and 5: the two figures appear to mainly demonstrate the lack of representativeness of the in-situ LST. Please comment.

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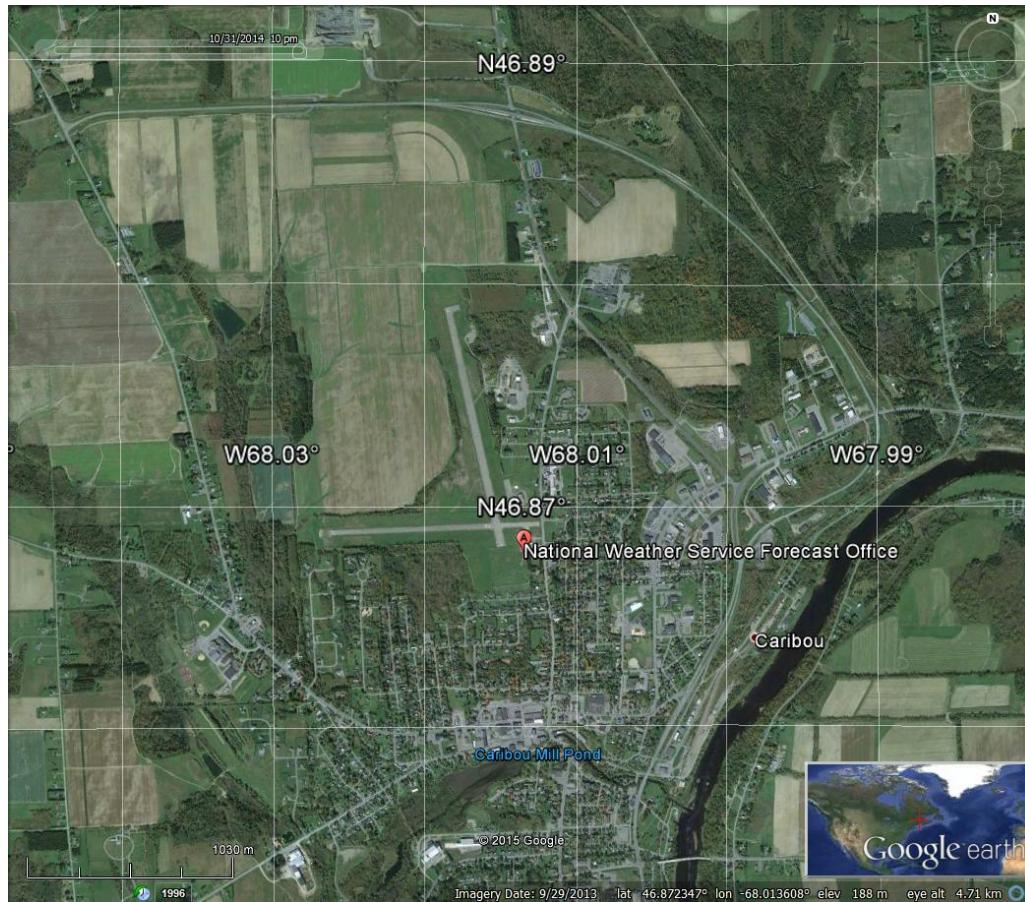
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Fig. 1.

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