

Interactive comment on “Characterization of Canadian High Arctic glacier surface albedo from MODIS C6 data, 2001–2016” by Colleen A. Mortimer and Martin Sharp

Anonymous Referee #1

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General Comments:

In this paper, the albedo and surface temperature of the glaciers in the Queen Elizabeth Islands (QEI) are investigated using MODIS data products for 2001 – 2016. Over the study period BSA is shown to decrease significantly in the month of July, while LST increases during the summer months (JJA). This is a valuable paper and it is well written (though a bit long) and technically sound. My comments below are almost all optional.

I believe that the authors have not fully taken advantage of this opportunity to explore the relationship between albedo and LST. Though they point out that albedo and LST

C1

are negatively correlated for the QEI, they do not discuss that relationship as cause-and-effect in either the Abstract or the Conclusion. The relationship between albedo and LST is discussed in Section 4.2 but I would have liked that discussion to have been better integrated throughout the paper. Since there was quite a bit of information about LST in the paper, the authors might want to consider including LST in the title of the manuscript.

The authors say that only the month of July shows the statistically-significant albedo decrease over the study period. Thus they should consider stating that the July albedo is decreasing over the study period instead of saying mean summer (JJA) albedo is decreasing.

If the paper can be made more concise it would be easier to follow.

Specific comments:

Title: consider removing "C6" from the title since it's not that different from C5 for the albedo and LST, and many people, before reading the paper, have no idea what C6 is. You have appropriately mentioned the fact that you've used C6 in the paper as needed. Also consider including LST in the title, especially if you decide to enhance the discussion about cause-and-effect between LST and albedo for the QEI.

Figure 1 caption – do you mean “Top-left inset” and “Bottom-right inset”? Figures 2, 3, 5, 6, 7 & 9 – it should be mentioned in the caption that white (Figs 2 & 3) is not ice and brown is not ice (Figs 5, 6, 7 & 9). Figure 8 – lower panel; I am confused about the point that you are trying to get across in this graph; please clarify

Line 14 – note that the range of years says 2008 – 2012 on line 486 60 – MODIS has already been defined on lines 53 & 54 76 & 78 – Lutch should be spelled Lucht 99 – perhaps the word “detectors” should be used instead of “instruments”?? 120 – 124 – this discussion of MOD10A1 should be deleted; it is not relevant to this paper, and MOD10A1 is never mentioned again in the paper; it really isn't good validation for

C2

MCD43 151 – This is misleading because, in Hall et al. (2008a), the pixels when the temperature was >2 deg C were removed since it's impossible to have temperatures greater than zero and still be ice. Hall et al. (2008a) did not remove pixels with errors >2 deg C that were below zero, if I am recalling correctly. 155 – it should be stated that MOD11A2 Collection 6 data were downloaded 235 – I would say “opposite from” instead of “opposite to” 319 – I think Sections 3.3 and 4.1 could be shortened and made to be more concise 601 – should read IEEE instead of IEE

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2017-160>, 2017.