

Interactive comment on “A ten-year record of supraglacial lake evolution and rapid drainage in West Greenland using an automated processing algorithm for multispectral imagery” by B. F. Morriss et al.

Anonymous Referee #2

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In this paper, novelty is found in the automation of detecting supraglacial lakes in West Greenland using ETM+ and MODIS imagery. After lake detection, the filling and drainage of lakes during years 2002–2011 were analyzed to detect relationships by elevation, with surface air temperature, and speedups in surface velocity. While the study is limited to West Greenland alone, specifically Sermeq Avangnardleq, it broadly explores different facets of the supraglacial lake phenomenon.

Providing a rationale over certain portions of the methodology will improve understanding and clarity for the reader. In “2.3 Surface water identification” section, is there any

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reason red is selected over other portions of the visible spectrum (e.g. green, blue)? In “2.4 Lake depth analyses” section, can you elaborate on how you obtained the value for g ? Also, for the calibration of g , is the 3 July 2011 ETM+ image the closest in DOY to the field measured depth on 28 July 2011? With a 16 day revisit period, there would be another ETM+ image on 19 July 2011.

In “3.4 Rapid lake drainage-induced ice flow” section and Figure 6, is it possible to explain why some lake drainages are concurrent with surface speedups (i.e. $\sim 7/1$ events) while others appear a few days (~ 3 – 4 days) prior to a surface speedup (i.e. in Fig. 6B, $\sim 6/20$ drainage event, with jump in velocity anomaly $\sim 6/21$)?

To help with the flow of the paper, in the “2.2 Imagery” section, please provide a phrase or sentence on the rationale in selecting the red and near-infrared wavelengths to detect supraglacial lakes. It would also be helpful if the “2.2 Imagery” section mentioned the ETM+ and MODIS imagery were “calibrated radiances,” as stated in the following section, “2.3 Surface water identification.”

A list of technical corrections is below. Groupings are by page number, followed by a listing of line number(s). Comments follow each line number listed.

3544 8: define “large” 11,12: define “low and middle elevations”

3545 28: delete “aim to” 29: replace “including” with “based on”, “through” or “from”

3546 2–3: “We automatically...cloud cover.” Is this line necessary? Seems a little repetitive with lines 10–14 (on same page).

3547 8: “areas of 0.125km^2 or larger”. If spatial resolution is 250m, then isn’t smallest resolved area $250\text{m} \times 250\text{m} = 62500\text{m}^2 = 0.0625\text{km}^2$ [you have 0.125km^2 .]? Maybe I’m missing something.

3548 24: elaborate on “by inspection.” Is this visual inspection of imagery?

3551 18: delete “complete”

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3552 20: quantify “many” 24: quantify “several”

3554 19: I believe “2009” is a typo, based on Figure 5. I’m guessing the year referred to is 2010 instead, based on context and Fig 5.

3555 19: change “it” to “the system” 23: define “low, mid, and high elevation zones” 23: replace “a few days and over a month” with “a few days to over a month”

3560 Figure 1: Add description of air temperatures from Swiss Camp (pink marker). Otherwise, remove the pink marker.

3564 Figure 5D: The Cumulative PDD at Swiss Camp is discontinuous, ending in ~85-90 PDD in late July. Is there a reason for this? Was there a data gap?

3565 Figure 6: Add the year (2011) of data to the caption.

Interactive comment on The Cryosphere Discuss., 7, 3543, 2013.