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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.

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Thank you for your comments.

// In "2.3 Surface water identification" section, is there any reason red is selected over other portions of the visible spectrum (e.g. green, blue)?

MODIS's red band has higher spatial resolution (250 m) than that of the other visible bands (500 m). Also, reflectance in red is more sensitive to variations in depth than other parts of the visible spectrum. This has been clarified in the revised manuscript.

// In "2.4 Lake depth analyses" section, can you elaborate on how you obtained the value for g?

We calculate g from depth measurements taken in the field at the small lake near GULL. We compare the depth data to the July 3 image because the lake shore digitized from ETM+ imagery on that date is the same (within the resolution of the imagery) as the shoreline on July 28, collected by walking it with handheld GPS. We assume that the lakebed geometry does not change in this time period and that coincident shoreline positions (and also equal lake area) result in similar depths. There is an ETM+ image between July 3 and July 28, but the lake is significantly larger, and the depths at the locations where we measured would be greater. This has been clarified in the revised manuscript.

// "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. ∼7/1 events) while others appear a few days (∼3-4 days) prior to a surface speedup (i.e. in Fig. 6B, ∼6/20 drainage event, with jump in velocity anomaly ∼6/21)?

Speedups most likely occur immediately after drainage events; however, questions of timing and causality are difficult to address at this temporal resolution. Drainages occur in a matter of hours, but the record has a maximum temporal resolution of ∼1 day, which is coarsened by cloudy days and bad data (average data density over 10 years is ∼2.5 days between images). For example, the drainage event on 6/20 is detected using a cluster of images on 6/17 and on 6/24 (see black dots on top plot's horizontal axis), so that drainage could have actually occurred on 6/23, immediately prior to the speedup. This problem with lack of imagery reappears when trying to interpret speedups after ∼7/1.

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