Original Comments (Specific to the Critique)

In general, this is a well-written manuscript and most of my comments are relatively minor. I would like to see in places some additional detail around the discussion of lake depth retrieval methods (see specific comments).

Lastly, The Cryosphere's data policy states that "Authors are required to provide a statement on how their underlying research data can be accessed. This must be placed as the section "Data availability" at the end of the manuscript." Although the authors state at the end of the manuscript that the Matlab code will be converted and shared publicly, I would like to see this section added including statements of how Landsat, Sentinel and Planet imagery can be accessed.

In addition to the minor comments, we will be releasing the matlab code for Watta within github. In response to both this critique and the other reviewer, we have expanded upon the section relating to lake/ice layers detected by Watta and imagery over both Lake Julian and Lake Ayse. As requested, we have also expanded the discussion about the assumptions made about the surface winds and lake bottom structure.

Partially in response to this critique, we have detailed specific imagery IDs and ICESat-2 track boundaries attached to each scene/depth estimate. This should allow others to easily replicate the dataset in the future, which is unique because of its coincidence with the Operation IceBridge mission. In particular, this dataset will now be used within a classroom by another colleague who works with surface melt estimates. Additionally, all references have been added/checked/removed according to the reviewer's suggestions. Data Availability now includes links for Watta code, Planet imagery, Sentinel-2, Landsat as well as ICESat-2 ATL03.

Specific comments:
Line 17: Specify Landsat 8 OLI, as you are specifying Sentinel-2.
Altered

Line 38: 'a common feature on large parts of the ice sheets' – this should be ice sheet (singular) as the paragraph has only discussed Greenland so far.
Altered

Line 40: ' (…) of both ice sheets'. So far, Antarctica has not been mentioned in the text. Perhaps add an additional 1-2 sentences in the previous paragraph introducing meltwater production and Antarctic-wide surface meltwater and supraglacial lakes.
Added sentence about Antarctic ice shelf hydrology

Line 43: Suggest rewording to: 'The complex links between (…) can potentially be deduced (…)'.
Done

Line 45: Specify here that feature types are 'supraglacial'.
Done

Line 46-7: I think detail could be added here outlining both the physically-based and empirically-based methods, together with a slight clarification of the wording, as the physically-based approach has been applied to other optical imagery such as Aster (Sneed and Hamilton, 2007), Landsat (Banwell et al., 2014) and Sentinel. It should also be added to the text that the physically-based method assumes a minimal impact of wind-driven surface waves, low slopes of lake bottoms and a homogeneous lake-bottom albedo on lake depths, which may be particularly important in Greenland (Sneed and Hamilton, 2011). I believe the empirically-based method was first applied to WorldView2 by Legleigter et al. (2014), so I suggest citing this work too (see below for full reference).
We have added the details requested and the associated reference, although we note that the earliest reference to the empirical method is Box and Ski (2007)

Line 49: Can you include a specific lake depth limit here? I believe Pope et al. (2016) found that the maximum lake depth that could be derived from the empirical depth retrieval method using in-situ estimates was 5 m.
Added.

Line 55: Specify resolution here (e.g. ≤ 3 m, daily) to demonstrate improvements over Sentinel-2.
Added

Line 61: Could you specify by how much the physically-based estimates tended to underestimate lake depth?
Altered "tended to underestimate lake depth" to "tended to underestimate lake depth by over 2m"

Line 65: Specify native resolution (0.7 m).
Done

Line 68-70: This sentence is slightly hard to follow – adding 'from' before 'multiple imagery sources' may improve the clarity?
Done

Line 72: It is not clear to me what the representative sections are that are referred to in this sentence – is this part needed?

Took out the word “representative”

Line 75: Can you cite any work here to support that this was an unusually intense melt season, e.g. Tedesco and Fettweis (2020)? I would also specify 2019 here too, just to clarify to the reader.
Added reference

Line 78: I think this is the first place CAMBOT is used as an acronym, so include the full name (Continuous Airborne Mapping By Optical Translator).
Added

Line 85 (Figure 1): Please make the scale bar in the top left panel bigger, and add lat-lon labels to the main panel. Perhaps also add ‘(A)’ to the Lake Ayse label to make clearer how the Skysat image relates to the main panel. In the Figure caption, specify that RGT = repeat ground track. Finally, a small comment but maybe call SkySat boxes ‘grey’ rather than white in the caption so that it is clear when looking at the main panel
Altered accordingly, although graticule added in bottom left panel as either text or a graticule in the main panel made the panel difficult to understand. Additionally, latitude/longitude of all lakes has been added to Supplemental Table 1

Line 100: Specify ICESat-2 confidence levels (i.e. low, medium, high) in brackets.
Done

Line 116: Are there any studies you can cite here to demonstrate the PlanetScope radiometry issues? Possibly Saunier (2020)?
Added.
The improvements to radiometry were being discussed and then implemented at Planet when the work was being conducted, thus I have added the reference but avoided adding more details.

Line 121: What is the vertical accuracy of the GIMP-2 DEM? Also, include the GIMP-2 dataset citation here (Howat et al.).
Have added citation to Howat et al., 2014 and a phrase describing the vertical accuracy (as caompared to ICESat) as between ±1m over most ice surfaces and ±30m in regions with high relief.

Line 143: Specify how lake boundaries are delineated? Discussion of NDWI does not come until Section 3.2, consider moving some of this into the Methods section.
We elected to reference section 3.2, where the image processing is discussed in greater detail (including how lake boundaries are delineated).

Line 195: I wonder if you have considered what the effect is of wind-driven scattering on lake surface roughness and on the surface photon return?
This is absolutely an issue that can drive surface roughness and, I think, an interesting direction for research, but this is beyond the scope of this study.

Line 218: Specify that NDWIice uses the blue and red bands.
Added

Line 220: Is ‘limitations’ a better word here, rather than ‘limits’?
Agreed.

Line 246: I think Banwell et al. (2019) calculate a lake-bottom ablation rate of 20.3 mm day-1 on McMurdo Ice Shelf. Perhaps worth adding in?

We think this may be unnecessary as this is on an ice shelf with rather different dynamics than the lakes studied here. A thorough study of lake ablation would, I think be outside the scope here (and the authors' expertise).

Line 315: Be explicit in the Figure 5 caption that G = green and R = red in panels c-j.
Added text accordingly.

Line 330: In Fig. 6 caption, write abbreviations in full again for clarity (
Agreed. Text added accordingly.

Line 345: 'Liquid water (…) remains constant at around 3%' – over what period? Looking at Figure S4, the surface water extent appears to increase?
Actually, interestingly, that's not the case (which was surprising, hence the inclusion in the text). It is simply distributed differently, as detailed in the next sentence. We have, however, specified the time period as requested for completeness.

Line 346: Can you refer to a figure/results here to support this statement?
This now directly reffers to Supplemental Fig. S4. The support to this statement is exactly what the reviewer has observed contrasted with the actual calculation of NDWI values over the ice sheet, namely that there is more surface water over recognizable (larger) features later in the season.

Line 355: Could you add lake outlines to Panel b of Figure 7?
Unfortunately, doing so obfuscated some of the contrast in the elevation detail.

Lines 360-62: Refer to Fig. 8(j-l) end of first sentence, and (m-o) in the next sentence.
Added

Line 383: Refer to Fig. 8m-n at the end of this sentence.
Added

Line 390: Looking at the SkySat image in Figure 9b, incised streams are also visible to the right of the image; could Lake Julian not also have drained through these?
It's a possibility (and will include language accordingly), but the timing of the new incised stream and the sudden rapid drainage suggests that this was the most likely cause.

Line 401: Should this refer to Fig. 10c here, not 10b?
That's correct. Altered accordingly.

Line 419: It isn't clear to me how this suggests the presence of an ice layer in the same place following drainage in the previous season? Is there evidence of this in satellite imagery?
In this case, the floating ice layer shown in the May 14th image is, itself, the evidence that this is the point of drainage (i.e. that it formed and then settled in this location following drainage). This interpretation was corroborated as plausible by several experts on Greenland surface hydrology (including Lauren Andrews, acknowledged here). This is obviously not clear to the reader though so we have altered text to add "that an ice layer had formed at the same place **and settled in this location** following drainage" to make this explicit.

Line 425: I suggest slightly rewording the first part for clarity: '(a) Sentinel-2 image acquired on May 14th 2019, with ICESat-2 RGT 727 (occurring on May 15th 425, 2019 and August 14th, 2019) overlapping in green (…). (b) Lake depth derived from Watta (Panel c) and Sentinel imagery (Panel a).' Please also add full stops to make it easier for the reader to separate descriptions of (a), (b), (c), (d) and (e).
Added. This figure has also been altered slightly to more clearly depict the points on imagery.

Line 433: Refer to Fig. 11d here, and Fig. 11e-i in the next sentence.
This doesn't match with the figure, but have added specific references.

Line 436: I agree that the stream is clearly incised on September 24th but think it might be difficult to conclude the same from the April 20th Skysat image.
This is due to the resolution of the image. We have altered the figure to include an inset panel to focus on the incision point on April 20th.

Line 440: I think it would be helpful here to cite some work showing how surface relief preconditions the spatial distributions of lakes and surface dradinage, e.g. Ignéczi et al. (2018).
Have added a sentence with the suggested reference

Line 447: Specify again that the intense melt season was in 2019.
Added.

Line 450: Specify Landsat geolocational accuracy (5 m).
Added

Line 460: I suggest citing some other recent studies that have quantified the seasonal evolution of surface meltwater in Antarctica: Dell et al. (2020), Moussavi et al. (2020).
Moussavi et al., 2020 is mentioned several times earlier in the paper, but we have mentioned Dell et al., 2020 specifically pointing out the feature-tracking capabilities

Line 469: See general comment above about data availability.
Addressed

Technical/minor corrections: ALL ADDRESSED except as noted
Line 12: 'bathymmetric' spelling error (same on Line 57 and 60).
Line 16: Italicise 'in situ' (and please check throughout).
Line 23: Add comma after '(both publicly-available and commercial)'.
Line 30: This should be Slater et al. (2018) (please also check similar instances throughout – especially in places where the reference is unclear e.g. Pope, 2016 or Pope et al., 2016). Some references are also missing from the reference list (e.g. Fair et al., 2020) – please check.
Line 35: Consider rewording to 'led to unprecedented summer mass loss'.
This does not flow with the clause "in the past 50 years" unfortunately

Line 51: Change 'LandSat' to 'Landsat 7 and 8'.
Line 62: I suggest moving '(supraglacial lake depth)' to Line 57 i.e. 'empirical (supraglacial lake depth) bathymetric methods'.
Line 65: Typo, 'wen' should be 'when'
Line 112: No need to hyphenate 'high spatial'
Line 119: Replace 'is' with 'are' ('frequently captured multiple times').
Line 120: Specify 'spectral' response curves and write near infrared (NIR) in full here.
Line 135: Comma should be full-stop.
Line 137: Change 'is' to 'are'.
Line 176: Remove duplicate word 'outliers'.
Line 205: New sentence after 'lake edges'.
This is a new sentence
Line 215: 'in order to exclude regions with moving surface water, which evolves rapidly and can be mistaken for fixed topography'.
Line 218: Remove double comma.
Line 242: Keep to past tense for consistency.
Line 292: Typo ('there were').
Line 435: Missing word ('a' substantial quantity of liquid water).
Line 438: 'connects' to an efficient drainage system.