Referee comments 1 (RC1)

Once again, we would like to thank Nathaniel for his feedback as well as the kind words emphasizing the improved quality of the manuscript and its importance to the wider community. Below we copy Nathaniel's comments in red and write our responses in blue

Technical Corrections
ABSTRACT
Line 12 – Put a comma after dynamics.
Corrected

INTRODUCTION and STUDY SITE
Line 61 – I've always felt it's better to write any number less than 10 as a word, rather than in numerical format. So in this case, "2 to 3 years" would become "two to three years". I know many other journals ask for this style in particular (unsure about the Cryosphere) but in my opinion it looks better.
Agree. Corrected to 'two to three years'.

Fig 1 Caption – "Close up of the study site" rather than "zoom in".

Corrected

Also watch your dates, here and elsewhere – it's either e.g. 23/8/2021 or 23-8-2021.
Corrected. All dates in the manuscript are now formatted as xx-xx-xxxx.

METHODS
Line 106 – remove the comma after mission II.
Corrected

Line 108 – "resulted in decreased image quality", not lowered.

Corrected

Line 109 – Try"…majority of the acquired images were captured from an oblique viewing angle..." instead.

Corrected

Line 110 – "…computationally challenging to process…"

Corrected

Line 111 –"…varying perspective and illumination conditions."

Corrected

Line 149 – "…however, this varied depending…as well as to avoid areas with apparent morphological changes".

Corrected

Line 171 – again you've written "1 day", rather than "one day" – I'd go with the latter and make sure you're consistent throughout.

Completely agree. Corrected throughout the entire manuscript.
RESULTS
Line 228 – put a space between your two values of drainage threshold and the two "m".
Corrected

Line 229 – remove "from".
Corrected

Referee comments 2 (RC2)

We thank reviewer #2 for their constructive feedback on our manuscript and appreciate their kind words stating the great structure of the paper and the importance of such long-term observational studies. Below we copy the referee comments in red *and write our responses in* blue

General comments:
Within the text, there are many long sentences which can be difficult to interpret- I suggest trying to shorten sentences/remove extra words to improve clarity. The overall manuscript and structure are well organized.

Thank you for the comments. We are glad that you find the manuscript well organized with a great structure. We are aware of the many long sentences within the manuscript. We have shortened many of these by either splitting them or removing excess words.

I don't believe the authors discussed the presence or absence of ice within the ice-dammed lake. If ice is present, I suggest looking at Jenson et al. (2022) for how ice presence can influence lake discharge/volume and may produce discharge values different than would be expected.
We do not discuss this, as we do not observe any notable ice cover on the surface of the lake during the 14 GLOFs included in this study. We have added a sentence on the absence of ice in the discussion of manuscript (section 5.1). The sentence reads:
"We observe no notable presence of ice on the lake surface during any of the 14 GLOFs. This is important as ice may limit the lake's water storage capacity and influence the drainage timing and volume (Jenson et al. 2021)."

Specific comments:

L11-12: Difficult to follow. Perhaps "…are frequent in Greenland and can influence local ice dynamics, cause geomorphological changes, and pose flooding hazards." – I'm not sure what you mean by "bedrock displacement"?
Bedrock displacement means an elastic bedrock uplift following a drainage event. We changed the wording to bedrock motion.
Sentence changed to: "*Glacial lake outburst floods (GLOFs) or 'jökulhlaups' from ice-dammed lakes are frequent in Greenland and can influence local ice dynamics and bedrock motion, cause geomorphological changes, as well as pose flooding hazards"*

L13-15: Too many parts to this sentence—difficult to follow. Break into multiple sentences. Do this elsewhere in the abstract as well.
Corrected. The sentence now reads: *"Multidecadal time series of lake drainage dates, volumes, and flood outlets are extremely rare. However, they are essential for determining the scale and frequency of future GLOFs, identifying drainage mechanisms, and for mitigating downstream flood effects."*

We have edited/shortened multiple sentences in the abstract and in the manuscript in general.

L20: perhaps use "~" instead of c.? more commonly used- here and throughout manuscript

Corrected here and throughout the manuscript.

L22: for consistency, say "drainage dates ranging from late May to mid-September and drainage volumes ranging between…"

Corrected

L61: remove "and up"

Corrected

L63: remove "reoccurring" – annual implies that it is reoccurring

Corrected

L64: remove "different" – variety implies they are different

Corrected

Figure 1: I believe the star should be "stream gauge"? The hydrograph is what is recorded, not the actual instrument that is in place
Yes, you are right. We have changed the name to gauging station.

L68: "6th of September"
Corrected

L69-70: This sentence is a bit confusing. Please clarify. Is it the ice margin drainage route and outlet drainage route?

The sentence is simplified and now read: "*Two UAV missions were undertaken to produce DEMs and orthophotos of the drained lake basin topography as well as the flood drainage route*"

L106: remove the comma after "Mission II"
Corrected

L125: did you mosaic them together? Or separately?
We combined the DEMs into one mosaic. The sentence now reads "*Following co-registration, we combined the Mission I and Mission II DEM into a mosaic."*

L139: Was there any ice present in the lake? That could produce real differences in elevation of the lake surface. See Jenson et al. (2022)
No ice was observed at that time. We changed the sentence to include this. The sentence now read: "*We validated the estimated water level by comparing it to 33 ICESat2 data points from 19th September 2021 measured at the ice-free lake interior.*"

L149-50: "…spacing of 20 m, however, they vary depending on the visibility of the waterline and by avoiding areas with apparent morphological changes."
The sentence is changed and now reads: "*…spacing of 20 m, however, this varied depending on the visibility of the waterline as well as to avoid areas with apparent morphological changes.*"

L150: what do you mean "it only has"? Could remove "only" for clarity

The DEM covering the Western part of the lake is constructed from a combination of 0.1 x 0.1 m UAV-derived elevation pixels and 2 x 2 m Arctic DEM pixels (resampled to 0.1 x 0.1 m) (see figure 1). Thus, "it only contains" is used to emphasize that the DEM covering the Eastern part of the lake is constructed solely from 0.1 x 0.1 m UAV-derived elevation pixels.

L166: "based on"
The sentence is split into two and now reads: "*For each year, we manually adjusted the lake area to match with the position of the ice margin, as observed in the respective satellite image. Finally, we recalculated the volume change of the adjusted lake area based on the estimated pre- and post-drainage level*"

L183: "Water discharge was then obtained"
Corrected

L184: Are these from manual discharge measurements? Or how did you take these measurements?
The discharge measurements are not manual but are measured using 1) a propeller at low water level, 2) a float at high/higher water level and 3) ADCP measurements. This is all described in the referenced study by van As et al, 2017. We added an additional reference to this study following our mentioning of the discharge measurements.

L189-92: Did you apply a lapse rate? It appears that the weather station is ~200 m above the lake. Or clearly state if you determine this is not necessary
Thank you for the comment. We have not applied any lapse rate to the temperature data as it would not change the overall conclusion. We are studying the relative change in temperature prior to the lake drainage. Applying a lapse rate would simply shift the temperature profile and not change the observed changes in temperature.

L229: remove "through"
We kept "through" and removed "from". The sentence now reads: "*The high resolution of the orthomosaic and DEM produced through UAV Mission I have enabled us to observe….*"

L264: "respectively (Table 2). However, …"
Corrected

L270-71: I suggest removing "which show variations in timing and magnitude"
Corrected

L308: What do you mean by "weaken the ice dam"? In what ways?
The quantities of drainage water released during the 'large' GLOFs widen the englacial drainage tunnel and cause additional damage to the damming glacier. We hypothesize that these damages and the enlargement of the englacial tunnel leads to an incomplete sealing of the englacial drainage system. We have rewritten the sentences to make this clearer. The sentence now reads: *"We hypothesize that the large GLOFs potentially weaken the ice dam leading to an incomplete sealing of the englacial tunnel. This allows the following event(s) to occur at much lower water level."*

Figure 5: It is difficult to follow the labels all the way to the plots on the right – it would be helpful to either add y-axis labels to all plots, or perhaps add a line at 0 degrees so it is easier for the reader to quickly see whether the temperatures are above or below 0 C.
Thank you for the suggestion. The initial figure actually had y-axis labels for all plots, but we removed those in order to make the plot bigger. We have now added a thin grey line (a thicker line took too much focus from the MAT-lines) at 0 C to make it easier for the reader.

L351: could say "which is 63% lower than the 37.7…"
Corrected

L352: "explained by the observed thinning" – suggestion for clearer text

Corrected

L353-54: can remove "suddenly" and "sudden"

Corrected

L357: "low drainage volumes"

Corrected