

The Cryosphere Discuss., author comment AC1
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Reply on RC1

Jenny V. Turton et al.

Author comment on "The distribution and evolution of supraglacial lakes on 79°N Glacier (north-eastern Greenland) and interannual climatic controls" by Jenny V. Turton et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-45-AC1>, 2021

Dear Reviewer,

In this response, we outline the larger changes that we will make to the manuscript in response to your specific comments. Then, following a decision by the editor, we will then upload a revised manuscript and point-by-point response to all critiques.

Firstly, thank you for the positive feedback on the study and its contribution to the field. We appreciate your comments and questions. In general, we aim to improve the manuscript's structure for better understanding, especially in section 3.3, and improve the communication of the results by amending the figures. We summarise your main concerns and address your specific comments below:

Comment: Section 3.3: The structure should be consistent across the results, and I believe the paper would be better served by continuing to treat variables separately, highlighting the narrative of interannual change. This would further benefit the paper by making sure each year and variable receives equal treatment...

Response: We will edit the structure of this section as you suggest, to focus on each variable individually and give a similar weight to each. We will also remove any repetition and density of this section to aid reading and understanding. The second reviewer also suggested some structural changes which we will incorporate.

Comment: A key point of interannual comparison is the total area of lakes, but the way this is visualised in Figure 2 is hard to interpret. It would be easier to follow a line graph, which would be simple to add as a second axis of the Figure 2 panels. Additionally, it might be useful to present lake area data alongside the later data, so that the reader does not have to continually refer back to earlier figures/text on lake development... In turn, the authors may be able to simplify much of the denser text that is currently spent describing the temporal variations in these data.

Response: A number of figure changes were also suggested by Reviewer 2, so we will modify all figures in the manuscript to better represent the results, synthesise the data and aid in understanding. Specifically: Figure 1 will now include a larger map of Greenland with labels for NEGIS and the grounding line. Figure 2 will include the absolute lake area values (as a line plot) as well as percentage change, with some alteration to the colour bar. Figures 3 and 5 will be split into 4 panels to represent each year, and table data will

be included on figure 5. Figures 6 and 7 will be combined into one panelled figure. An additional figure is likely to be included to accompany a short discussion on the lake drainage characteristics- as mentioned by both reviewers.

Comment: Some discussion of individual lake behaviour needed alongside discussion of lake drainage.

Response: Both reviewers requested more information about lake drainage results. As the aim of this study was to link climate conditions with lake characteristics, and there is likely little relationship between climate indicators and drainage, we did not include this information initially. Furthermore, given the very cloudy conditions in northeast Greenland, it can often be difficult to quantify whether lakes have drained or are covered with clouds, especially when clouds persist for a number of days and lake drainage may have been missed. However, we will include some discussion of one or two lake drainage events in the form of case studies, so that we may infer the likely drainage mode in this region. Neckel et al. (2020) observed a lake drainage event in our study region and we will analyse this particular event, as we have observations to prove that the lake drained as opposed to being covered by clouds. Following this, we will assess a number of other lakes, to see whether individual lakes or a number of lakes drain in a similar fashion.

Comment: I am surprised by the relative lack of attention to the influence of teleconnections in the abstract, introduction, and conclusion (and perhaps, also, their lack of inclusion graphically)... some time spent introducing them and their context may be useful for those coming from other areas of the discipline.

Response: With just four years of data for comparison, it is difficult to draw strong conclusions to teleconnections, but we wanted to include them in the discussion due to the likely importance of such indices for record melting events over Greenland. We will consider how to best represent them graphically, and whether a broader discussion of teleconnections could be included. At the very least we will include them in the abstract and introduction, so that their discussion in section 4 does not come out of the blue, and to introduce them for others coming from a different field of research.

Comment: A number of additional references are provided, with guidance that a more thorough discussion of Greenland should accompany that of the Antarctic in section 4.

Response: We will ensure that more discussion of similar studies in other regions of Greenland are included and cite the suggested literature where necessary.

The minor comments and a more thorough description of the changes made will be provided in a point-by-point response to reviewers, once the editor has provided guidance on whether we are to upload a revised manuscript.

Once again, thank you for taking your time and providing your expert opinion on our research. We are hopeful that the editor invites us to provide a revised manuscript.

Best wishes,

Dr Jenny Turton, on behalf of all authors.