

Interactive comment on “Distribution and seasonal evolution of supraglacial lakes on Shackleton Ice Shelf, East Antarctica” by Jennifer F. Arthur et al.

Anonymous Referee #2

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Using optical satellite imagery, analysed alongside modeled temperature and surface melt data, this paper presents a detailed study of surface lake evolution over the last two decades on the Shackleton Ice Shelf, East Antarctica. The authors observe extensive ponding in the region, and from their analysis find that katabatic winds and an albedo feedback play a key role in the formation of lakes, and the timing of variations in extent and volume.

The method used to analyse changes in lake characteristics is scientifically sound, and the analysis of this data alongside climatic factors is of a high quality and interesting. The paper is also clear in stating its limitations. This detailed and comprehensive ana-

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ysis of lake evolution, both through and between seasons, at a particular region, will be valuable to the scientific community as we strive to improve our understanding of surface hydrology in the Antarctic and elsewhere. A detailed temporal study of this nature is particularly welcome. The results and discussion will especially be of value to those studying the nature of lake evolution and the factors associated with that evolution, including modelers.

I do think the clarity of the paper in sections needs to be improved before final publication. In particular, I think there are instances where lack of consistency and specificity of language can hinder clear understanding. I attach an annotated PDF with all my comments and suggestions. Briefly, some key issues and suggestions are:

-Section 3.3 needs substantial change in terms of structure and the use of terms. See the PDF.

-I think the references to ‘englacial’ drainage, and what is meant by that, need to be made clearer. See the PDF.

- The information in the paragraph from L45 to L56 seems as though it should be in the study site section. Currently ‘study site’ seems spread out over two sections in a way that disrupts the flow.

- It would be interesting if the authors, in their discussion, assessed the modeled findings of Banwell and MacAyeal (2015) about lakes deepening inter-annually on ice shelves. I only suggest that they briefly assess Banwell/MacAyeal’s finding against this paper’s analysis.

-I think figure 4 needs work to be more useful to readers. I find that the attempt to include data from every year in the long study period makes it almost impossible to tell which color corresponds to which year. I leave it to the authors to decide how best to overcome this – perhaps they need to be selective about which data from this series is most important to demonstrate the findings and move some to a supplementary figure.

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I appreciate this is a difficult challenge. I also have a small suggestion for figure 1 and a tiny cosmetic suggestion for figure 10. All suggestions are included in the same pdf.

Thank you very much to the authors for an interesting read and for contributing this valuable research.

Please also note the supplement to this comment:

<https://www.the-cryosphere-discuss.net/tc-2020-101/tc-2020-101-RC2-supplement.pdf>

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-101>, 2020.