The Cryosphere Discuss.,
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The Cryosphere Discussions

Interactive comment on "2020 Larsen C Ice Shelf surface melt is a 40-year record high" *by* Suzanne Bevan et al.

Anonymous Referee #2

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Review of Bevan et al 2020 'Larsen C Ice Shelf surface melt is a 40-year record high.' Cryosphere Discussions, tc-2020-130.

This paper examines the record melt season duration on Larsen C Ice Shelf during 2019/2020 by placing it in the context of a 40-year time-series based on combined passive and active microwave remote sensing. The paper then searches for synoptic-scale atmospheric drivers of this exceptional melt event. They conclude that teleconnections between southern high-latitude and the tropics were able to transport heat toward the Antarctic Peninsula and end the trend of decreasing melt since 1999. The authors are to be congratulated for a concise and useful paper which provides a new (and freely available to all) long-term melt time-series for Larsen C, and new insights into synoptic scale drivers of melt. The topic is suitable for publication in The Cryosphere and

the quality of the paper is high. I have only a few short comments for revision before acceptance, provided below.

Comments (by line number):

- 15: The introduction is extremely brief and context, timeliness and wider importance is lacking. You should mention by way of context here that inland ice acceleration and discharge is expected in the event of a collapse of Larsen C, although the glaciers are not thought to be highly buttressed and therefore the sea-level response is likely to be modest (Furst et al., 2016 doi:10.1038/nclimate2912; Schannwell et al., 2018 doi: 10.5194/tc-12-2307-2018).

- 54: if you're going to state that the threshold determination is 'carefully considered', it may be worth detailing that consideration, rather than just stating it's what has been done previously.

- 57: these acquisition times differ from those of QSCAT, can you discuss discrepancies in melt detection between QSCAT image acquisition and ASCAT during their crossover period?

- 99: Odd to draw comparison on first line of results with data presented by another paper. Readers may look to your figure 6 here, erroneously. This sentence describes results that are not shown in this paper. 101: how intense? How much greater?

- 142: would you not expect an ENSO teleconnection to be important to western Antarctic Peninsula temperatures, as per previously published work? This doesn't seem to be mentioned here (main focus is on the IOD), but it ought to be discussed to be able to relate this paper to findings in previous literature.

- 164: but station measurements are not shown in Figure 5... Is this referenceable, or could you plot them in an additional Appendix figure (on inset within a figure)?

- 170-171: this is speculative rather than proven, I think. If proven, please provide a reference, if not then amend text to 'may also reduce'.

- 192: Perhaps a final summary statement on the importance of large-scale atmospheric influences on ice shelves for stability, environmental change, sea-level rise implications?

- Figure 1: Does the SAR backscatter image need a colour scale?

- Figure 2: For ease of viewing could you instead differentiate the colour scales in Figure 4 to grey, blue, red (instead of dark grey, light grey, blue)? And is there a reason why the January bar is dark grey? Is this related or not to the 2019/2020 (dark grey, also) curve?

- Figure A2: Given averaging periods were 'shifted slightly to maximize signals', what effect would you see from different averaging periods?

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