The Cryosphere Discuss.,
https://doi.org/10.5194/tc-2020-309-RC2, 2020

The Cryosphere Discussions
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EGU

Interactive comment on "32-year record-high surface melt in 2019/2020 on north George VI Ice Shelf, Antarctic Peninsula" *by* Alison F. Banwell et al.

Anonymous Referee #2

Received and published: 25 November 2020

This is an engaging study investigating the 2019/2020 austral melt season on the north George VI Ice Shelf, Antarctic Peninsula. The authors combine different datasets such as satellite microwave radiometer/scatterometer data, optical satellite imagery and local meteorological station data. The authors highlighted exceptional melt and surface ponding conditions in 2019/2020, and they concluded that warm temperatures were likely triggered by warm northwesterly and northeasterly low-speed winds, rather than Foehn winds.

The paper is well written, and the results are supported by the data and methods. The study has the potential to become a fully relevant article to concept of The Cryosphere

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Discussion paper

and my criticisms are with regards presentation rather than science.

Specific comments:

Lines 31-32: Could you please specify the rate of mass loss?

Lines 53-54: Is there any projected estimation of contribution of the AP ice shelf melting to the global sea level rise? If yes, that information would be useful.

Lines 56-58: I would add a link of official WMO status on this evaluation:

https://public.wmo.int/en/media/news/new-record-antarctic-continent-reported

In addition, to my knowledge, WMO is evaluation the value of 18.4°C., not the 20.75°C. There has been no official effort/information to evaluate the value of 20.75°C. Furthermore, this value was not recorded at the official Marambio station. I recommend the authors to make sure that whether this temperature is being evaluated or not. If not, I recommend them to remove the statement in lines 58-60.

Lines 60-63: Could you please quantify melt amount in this part too? Because, you are comparing GVIIS with the other AP ice shelves. Some numerical values would help the reader to see the differences.

Lines 87-94: What makes the northern GVIIS more vulnerable to high surface summer melt rates? I would expect to consider rates of basal melting, nonetheless, you state that rates of basal melting are greatest at the southern end of the GVIIS. Therefore, a clarification might be needed to have a better idea on different physical processes at the northern and southern ends.

Lines 123, 208-212: Is there any elevation difference between the AWS station and ice shelf?

Line 213: What does it mean exactly “using 12-hour data” for the 1999-2020 period? I understand that you use only one time step as a daily mean temperature for the 1979-1999 period. If yes, what is the exact hour of the observation (morning, late afternoon)?

For the second period, did you pick up the same hour with the 1999-2020 period or did you take a temporal mean of 12-hour data?

Line 223: Could you please specify why there exist lower mean speeds over north GVIIS?

Lines 238-239: In your analysis, I understand that Larsen C shows a record high melt year in 1992-1993, not in 2019-2020 on the contrary to the findings of Bevan et al. Is that related just with the different datasets? Can you please specify potential uncertainties of each product?

Lines 326-334: Why not to compare the longest warm periods with the volume changes? For instance, are the longest periods coincide with the largest volume change?

Lines 335-339: I think the authors should also discuss the potential role of the warm air advection given the low foehn conditions. I suspect that regional sensible heat transport seems to be one of the main contributors of the 2019/2020 melt season, particularly for the first two weeks of February.

Lines 349-359: Can you specify where the calculated 9 hour of foehn is located in this time series (Fig. 6)?

Lines 431-438: I am a bit disconnected here. So, I understand that rather than local conditions (i.e., Foehn winds) one should expect to see regional- and/or large-scale warm advection. In this case, I would expect to see similar warming rates over the GVIIS and Larsen C. However, in Fig. 2c there are notable warming differences between these two regions. Do the authors have any idea for these differences?

Figures:

Fig. 1 and Fig. 2: Could you please use a larger font size for the lat/lon coordinates?

Overall suggestion: As you use different datasets with different spatial and temporal

resolutions, I would add a table for the information given in data and methods (e.g., name of the product, resolution, temporal coverage etc.). This makes it easier for reader to follow the result.

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