

Interactive comment on “Centuries of intense surface melt on Larsen C Ice Shelf” by Suzanne Bevan et al.

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The paper presents flowline and firn data density model data to interpret five 90m boreholes on Larsen C ice shelf. The study is timely, well written and clearly structured. I think the paper should be published following minor revisions.

There is a lot of reference to recently published papers and even a reproduction of a figure from a study published this year. I have not read these works but the author's state that Ashmore et al., 2017 concluded that spatial melt has been ongoing for decades to centuries. Perhaps the authors could make it clear what is new about this study (ice flow modelling? dating melt events?), demonstrating that this study builds on existing research but contains novel insights.

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Discussion paper



One area that could be improved is relating the ages of these melt events to the wider climate of the region. You mention instrumental evidence for warming beginning in the 1950s, but there is ice core evidence from the central and southern Antarctic Peninsula that this is part of a longer 20th century trend (eg Bruce Plateau and Gomez ice cores). In addition, the Ferrigno ice core revealed warming trends during the mid 18th and 19th centuries that would support your findings for melt events during those periods.

Relating to this, there is growing evidence that SMB on the AP has been changing dramatically during the 20th century. Admittedly the majority of the ice core records are from the western side of the Peninsula, but the snow accumulation records here are strongly influenced by changes in westerly wind strength (eg SAM), which is driving changes in foehn winds and impacting melt on Larsen C. My query therefore is has the snow accumulation on the eastern side of the AP remained stable during the past 300 years? And if not, how would that influence the flowline models and age estimates? Could this explain some of the discrepancies you mention (page 8)?

Technical corrections: Abstract – “experience”, change to “experiencing” “..the boreholes sample ice that...” consider rewording? Page2, In 26 – duplication “in which” Page3, In 18 – “additional”, unnecessary wording Page 4, - title capitalisation “Flowline model” Page 5, version of RACMO? 2.3? Perhaps define eg “...the Regional Atmospheric Climate Model (RACMO2.3).” Page 5, In 29 the estimates of 870 and 588 years are from this study? Page 19 delete “along”

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