

Interactive comment on “Repeated ice streaming on the northwest Greenland shelf since the onset of the Middle Pleistocene Transition” by Andrew M. W. Newton et al.

Anonymous Referee #2

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It has been a pleasure to read this very well written manuscript. I am not a geophysicist, but I find the presentation of the geophysical data and the interpretations of the data to be very logical and understandable. The authors do a good job of outlining why this unusual record of multiple periods of ice streaming to the palaeo shelf edge is important and what its implications are.

I have only one complaint. Given how unusual it is to have preservation of aggradational topset strata and given the paucity of 3-D seismic data around Greenland (I presume it is not abundant), how do we know how extensive ice streams were elsewhere? In the abstract, but not in the conclusions, you state: ‘This suggests that the ice

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streams that occupied Melville Bugt during the Middle and Late Pleistocene were more active and extensive than elsewhere in Greenland.' I think it is less presumptive and likely more correct to state that these have not been observed elsewhere around Greenland. If other areas of the palaeo shelf had 3-D seismics and aggradational topset strata, then perhaps one would find that Melville Bugt is not the only area where ice advanced multiple times to the palaeo shelf edge. As you state, the record of past glacier ice extent is fragmentary. You have found a very informative fragment and even better, you can correlate your unusual preserved shelf strata to slope deposits (Knutz. Et al., 2019). I think it is more likely than not that many parts of the Greenland shelf had extensive ice at the same times as shown by the Melville Bugt record. Modeling might actually show what type of configuration of the ice sheet is likely and where/when more of these deposits might be found, guided by your observations. I think the conclusions are well written and would be a good model for revising the abstract.

The unusual preservation of topset beds is interesting. Why is there is accommodation space in Melville Bugt. You say it is because the ice streams are not occupying the whole trough and so not eroding previous sediments. Did I understand that correctly. Is Melville Bugt unusually wide compared to other troughs? It looks like it is wider than most. A couple of minor comments: P9 line 166...delete repeated ... and say multiple steaming events. 193...cannot not. Double negative or needs editing? 199 and another example Line 241 and other places in the manuscript. Unattended this. Try to add what 'this' is each time, just as you did in line 196, where you say 'this gradual shift'. It will make the writing even more clear.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2019-268>, 2019.

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