The Cryosphere Discuss.,
https://doi.org/10.5194/tc-2018-196-RC2, 2018

The Cryosphere Discussions
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Interactive comment on "A Race for Ice Discharge between Ice Streams on Glaciated Continental Shelves" *by* Etienne Brouard and Patrick Lajeunesse

Anonymous Referee #2

Received and published: 6 November 2018

The manuscript of Brouard and Lajeunesse introduces an interesting topic that certainly merits discussion. However, as already noted by the editor, the manuscript is written in a short format style and has not been adapted to the regular format that is usually used in TC. Submissions to short format / high impact journals is a game we all sometimes play but, just for one's own self-respect, it shouldn't be obvious to the readers which manuscripts were originally submitted to journals other than where they ended up published. 'Dumping' a manuscript to a more field-specific journal without any changes – 'here you have it, if XY don't want it' – is disrespectful to readers. In addition, it misses a chance to make the manuscript a better paper, in this case to explain properly what has been done and to discuss the work against all the relevant

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literature. I would therefore advise to redraft the text into a more rigorous manuscript format that would have the standard sections of methods, results, and discussion. The methods should explain what was done and why; at present they are just a brief list of the software used for the various steps of data manipulation.

In addition to a couple of minor points that I list further below, I have two comments on the interpretation of the geomorphology and the inferences made about the ice piracy both at the researched location and elsewhere. The authors state that 'the erosion and the morphology of the troughs of northeastern Baffin Shelf is a function of a competition for ice drainage basins' – while I agree with that statement, I consider their explanation, which infers a propagation of an instability wave upstream from the ice margin, as too simplistic. This is because the ice sheet is portrayed as a static feature through time while in reality its configuration was changing through time between very different states. Some ice configurations, such as an elongated ice field / ice cap / mountain ice sheet along the axis of Baffin Island favoured a denser ice drainage network draining small catchments via small ice streams, while the growth of the Foxe Dome and drainage of its ice across the high relief coast of Baffin Island likely favoured smaller number of larger ice streams. The analogue with the fluvial system is thus too simplistic. But I agree that once the Hecla & Griper Trough got eroded to its present depth, it prevented any ice being drained in the direction of the SF Trough. Ice streaming in the study area has been a subject of multiple studies (Briner et al., 2006, GSA B; De Angelis and Kleman, 2007, QSR; Briner et al., 2008, Geomorphology; Kessler et al., 2008, NG) and I find it unfortunate that none of these get any mention.

The authors state that 'ice piracy through the switching of ice streaming most probably occurred early during Pliocene-Pleistocene glaciations' in the case of the studied pair of cross-shelf troughs. By analogue, the authors infer that at other locations where similar trough configuration is observed, it might also be stemming from ice piracy. However, it's been shown that some parts of the continental shelf adjacent to high-relief coasts are composed largely of Quaternary sediments and have undergone a

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much more complex dynamics than ice piracy through a few tributary ice streams (e.g. Montelli et al., 2017, MPG). The authors should thus indicate more clearly how deep is the transition between the crystalline bedrock and the sedimentary strata on the shelf and what is the thickness of the unconsolidated Quaternary sediments to rule out a more complex evolution of the drainage network than portrayed in their study. This in turn applies also to their generalisation about other similar trough configurations where a caveat should be inserted that unless it's been proven that the layer of Quaternary deposits is shallow, the inferences based on geomorphology might be incomplete and the longer term evolution of the ice drainage network might be recorded in the sedimentary sequences of the continental shelf.

Minor points: Line 18-19 two levels of parentheses not needed. Line 79 grounding zone wedges have been mentioned in the text before but the abbreviation has not been introduced. Line 110 Scott Ice Stream – check the spelling Line 136 No need to capitalise 'World' Agree with Reviewer 1 about the spelling of 'fiord'

Figures:

TC figure content guidelines state: 'Labels of panels must be included with brackets around letters being lower case (e.g. (a), (b), etc.).' 'Coordinates need a degree sign and a space when naming the direction (e.g. 30° N, 25° E).' This has not been followed.

I would advise to place a black frame around the map figures, which would also subdivide the individual figure panels. The frame should be the same thickness as the coordinate ticks, ideally 0.5 pt.

Fig. 2 The grounding zone wedge is supposed to be marked in red in panel A but I cannot see that. The location of the seismic profile, drawn in Fig. 1, should be noted in the Fig. 2 caption.

Move the letter A in panel A of Figure 4 somewhere out of the inset location panel. I suggest drawing the schemes of piracy on the shown DEMs in Figure 4. That would

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help the reader to see the examples you note in the text. Okoa Bay not Okao Bay in Fig. 4C

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