

Interactive comment on “Past and future dynamics of the Brunt Ice Shelf from seabed bathymetry and ice shelf geometry” by Dominic A. Hodgson et al.

Anonymous Referee #2

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This work articulates the different possible scenarios of ice shelf stability that could follow the expected large calving event on the Brunt Ice Shelf. Authors consider the seafloor morphology of the region to infer likely configurations of ice streams in this area in the past and use this to qualitatively assess the possible future responses to calving.

The authors present a useful history of the calving, grounding and accelerations recorded during the observational period and use modeled bathymetry to infer earlier glacial configurations and predict former pinning points for the grounding line and past ice shelves. The connection between past configurations and possible future behavior is not strongly drawn, but several future scenarios are clearly articulated. The work does not distinguish between likelihoods of future scenarios but offers priorities

C1

for future work required to investigate this question.

Scientific questions: Line 61: I assume this bank is hard-rock cored. Was the sediment thickness from seismic surveys used in the gravity bathymetry model?

Line 133 to 157: The gravity inversion technique presented here is novel, and while it makes assumptions that will reduce the predicted accuracy of the inversion they are clearly-stated and well-understood. The resulting model appears to be fit-for-purpose in identifying potential former pathways and obstacles for ice flow – specific questions below.

Line 154: Not clear where 100 m figure comes from – can you offer a more detailed assessment of uncertainty?

Line 187: the conflict between gravity-predicted and altimetry-observed grounding lines in the region described casts some doubt on the absolute depth values from the gravity inversion. While I agree that the shape of the bed has probably been properly described from the gravity, it would be useful to see on the map what areas were constrained by ship and what weren't, and whether the magnetic data identify the ridge structures as geological structures or whether these reflect surface morphology only. Is there evidence from the acoustic mapping that the gravity features do have bathymetric expression?

Line 241: What is the evidence for ice shelves occupying the Brunt Basin following grounding line retreat? Is it just that they exist in the present or are you referring to geological records?

Technical corrections: Line 34: Be specific that it is the ice shelf front that is retreating.

Line 65: include reference to Figure 1 as well as 2c

Line 82: “has lead to further changes in velocity” or “preceded further changes in velocity”?

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Line 106: “includes” – to keep tenses straight

Line 182: Ice Stream (not Steam)

Line 106: be clear where radar data are available (cf line 167 “as there are no direct measurements of ice thickness”)

Line 194: the west face of the Bank looks steeper in the figure – is this a trick of shading?

Line 200: I would help to show ice velocity on one of the figures.

Line 227: May *be* the product of glacial planation

Line 272: There is no further increase in thickness that can be attributed to firn or marine ice, but does the thickness still increase?

Line 279: What flow line analysis are you referring to?

Line 336: “upstream” rather than “east” is more consistent

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2018-206>, 2018.