

Interactive comment on “Paleo-ice flow directions of the Northern Antarctic Peninsula ice sheet based upon a new synthesis of seabed imagery”

by C. Lavoie et al.

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Received and published: 25 November 2014

The paper is a major step forward in constraining the volume and shape of the Antarctic ice sheet at the LGM and is a welcome broad collaboration. Obviously, the volume of ice in the East and West Antarctic Ices sheets are larger, but the paper is an excellent way to go. It may help promote multibeam surveying of the rest of the Antarctic margin to produce similar improvements in LGM ice volume estimates.

There are several points of discussion that should be considered: Page 6 Lines 22-24. The authors assume that the flow lines and the lineations on hard substrates are LGM or older. It would be good for there to be some discussion given to potential changes

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in flow during deglaciation or inheritance of older features. E.g. Was deglaciation so rapid that the ice pattern of features most likely reflects LGM flows?

Figure 6: The figure shows NE flow along Bransfield Strait then major divergence of flow to the Powell Basin and between King George and Elephant Island yet still major palaeoflow lines continue NE well past Elephant Island. This looks strange to me. Given the bathymetry, would it not be more likely that there was a small ice dome on Elephant Island? To have definite flow direction as shown there must be some evidence from the sea floor though the area is off the NE corner of figures 1 and 5. It doesn't detract from the main part thrust of the paper but it would be good to tidy up this end of the region.

Presentation: The descriptions and arguments rely heavily on place names in the Antarctic Peninsula. Therefore, all place names need to be present on figures and large enough to be read easily. As someone who has never worked in the Peninsula, I regularly found myself lost in the geography, making it harder to evaluate details of the discussion.

The paper is quite well written but has some minor issues in places, particularly in clarity of expression. I list them below.

Page 9, Line 7: “more a more” needs rewording. What do you mean by flow indices? Do you mean flow indicators? Indices would suggest a derived numerical parameter of some sort. Indices is plural of index, not indicators. Page 9, Line 14: “an indistinct tributary confluence” I’m not really sure what this means, even after looking closely at the maps. Page 9, line 27: do you mean “offshore of”? Page 10, Line 2: What are marine flow indices? Do you mean flow indicators in which case you are saying flow of marine currents? Alternatively, do you mean ice flow indicators further offshore (delete “marine”). Page 10, line 6: What does “and inward the shipboard surveys” mean? Do you mean “adjacent to the areas surveyed by ship”? Page 10, Line 11: Do you mean “the evidence is for the establishment...”? Page 11, Line 1: Should not this be in past

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tense? Do you mean Crossed rather than crosses? "May only have" rather than "may only be" . . . ? Page 11, Line 23: What do you mean by "fans"? This the first a fan has been mentioned. What sort of fan? Alluvial, submarine????? Please explain. Page 12, line 7: "structure 100 km long" is correct, delete "of". Page 15, line 22: "flows into the northern outlet glaciers. . ." Page 15, line 24: "a topographic obstacle about 400 m high" . . . Don't need "of". Page 17, line 5: "conditions change. . . "

Interactive comment on The Cryosphere Discuss., 8, 5321, 2014.

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