Interactive comment on "Detecting high spatial variability of ice-shelf basal mass balance (Roi Baudouin ice shelf, Antarctica)" *by* Sophie Berger et al.

R. Gladstone

rupertgladstone1972@gmail.com

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Informal comments from Rupert Gladstone

Interesting work!

Fig 4, really interesting to see the detail here. Please add a label other than 60 so we don't have to count contours! You might want to add a subplot here showing actual thickness if you have it, or maybe hydrostatic thickness if you don't as the basal expression of this feature is presumably much deeper than the surface expression.

Fig5, again additional contour label in a and b would be good. Please describe arrows in the caption.

Fig 7, it is hard to see the channel location here. Would elevation contours help here? Or something to clarify the location of the channel, which gets a bit lost especially in c,d. In fig 7c I am guessing that the red region is on the channel side and the blue region is the middle of the channel, but some visual clarification of this would be useful.

Given that channels appear to melt preferentially at the side, why do they not just keep getting wider? Is this balanced by lateral convergence of the ice flow? You mention lateral convergence in the context of data processing, but perhaps this should also be mentioned in your discussion of melting in sub-shelf channels. Could you view it as a competition between the ice dynamics trying to close these channels through lateral convergence and the ocean dynamics trying to open them through preferential melting at the side walls? Are there circumstances under which one would win over the other or are there feedbacks that prevent either from winning? Perhaps preferential side wall melting would steepen the side walls causing an increase in lateral convergence?

Did you think of using statistical techniques to investigate the relationship between LBMB and potentially relevant parameters such as spatial gradient of the ice shelf lower surface, absolute depth of the lower surface, distance from grounding line? This would shed some light on the relevance of currently used basal melt parameterisations (which are mostly linear functions of depth) in marine ice sheet modelling. Perhaps this would be a separate study, but really someone should be doing this urgently, and you have a good data set for it here! I feel sure that one could empirically justify a melt parameterisation as a function of both slope and depth more easily than just depth.