General comments

The authors present new point seismic data collected beneath the Larsen C Ice Shelf in West Antarctica. These new data are used to produce a bathymetric grid of the seabed beneath the ice shelf and some of the main implications of features revealed in this new grid are discussed. This data set is crucial to improving modelling efforts in an important and rapidly changing region, however I find the paper to be very light on important details and I have some concerns about the bathymetric grid that is presented. These major issues are listed below and are followed by more minor technical corrections.

Specific comments

- The paper is very light on details and this is a particular weakness in terms of the error estimates and gridding as detailed below, but also throughout the paper in general. For example, I think a section discussing the problems with other estimates of sub-shelf cavity and the difficulties in obtaining these measurements is worthwhile. Section 5 is very brief and could greatly benefit from more careful analysis and discussion, particularly in the context of future ice-shelf stability. Furthermore I think there should be more care to emphasise the weaknesses of the grid and the interpretation that follows from it in areas where only one or two data points are available. Finally, many parts of the paper are completely missing references.

- Section 3.3 seems to rely entirely on analysis made in previous studies and makes no attempt that I can see to constrain uncertainties using the newly collected data. How are the picking errors estimated? The assumption of a linear variation in ice temperature from 100m below the surface to the base of the ice shelf is almost certainly flawed when you consider a typical ice shelf temperature profile. Why is a comparison not made between ice thicknesses obtained through surface and seismic measurements, surely this is easily done and worthwhile since in some cases the former is used rather than the latter. How is the GPS error determined?

- My main concern is with the bathymetric grid itself. The paper in its current form presents this grid, rather than individual point measurements, as the main result. Section 4 that describes the gridding does not go into sufficient detail. What grounded-ice-depth measurements are added into the grid, those from Bedmap2? So the gridded grounding line position is consistent with that dataset? The authors state that the ice draft in Bedmap2 is better constrained, do they mean the draft as calculated from floatation in regions far away from their own measurements? If so the last sentence is wrong since these thickness values in Bedmap2 are not measurements and therefore not 'known'.
  I find the choice of natural neighbour interpolation very puzzling and I think this choice will dramatically affect the resulting grid. I don't think the authors' justification is sufficient, but if there is a very good reason for this choice I would like a discussion and appropriate references. Many deep bathymetric points near the grounding line end up as bullseyes in the grid whereas they are almost certainly located in the troughs of paleo-ice-streams.
  Deepening the seabed to ensure an open cavity in some cases is clearly a necessary evil but how extensively is this done? If this is going to be used by ice sheet modellers then I would strongly suggest a much greater minimum thickness than 10m, since even small transient dhdt values during the start of a simulation will cause the ice shelf to ground and completely change ice flow in the region. An uncertainty estimate would be useful but presumably would be difficult to produce without using a more advanced gridding algorithm (which I strongly feel should be done, or at least a comparison made to justify the choice made here). Also given that many of these data are already published elsewhere and lead to the generation of a previous grid, I think a direct comparison is

essential to be able to ascertain which features are genuinely new discoveries resulting from the data presented here.

Overall, more detailed discussion is needed. I realise a perfect grid is impossible with limited data, but I do not feel that sufficient care has been taken with grid generation and I think the resulting discussion skips over these issues, particularly given that it is presented as the main result of the paper.

Technical corrections

Throughout the paper: Hyphenation rules inconsistently applied

p. 1 l. 21: Capitalise West (also in title)

p. 1 l. 28-30 Repeat of earlier parts of the abstract

p.2 l. 3: Missing references for buttressing e.g. Rott 2002, Furst 2016, Reese 2018

p.2 l. 14: Missing references for Antarctic Peninsula warming

p. 2l. 26: accurately predict

p. 3 l. 9: here and elsewhere should be bathymetric when used as adjective and bathymetry when a noun

p. 3 l. 16 Ensure that units are in-line with numbers

p. 5 l. 1: How were picking errors determined, was a repeat of each pick done?

p. 5 l. 22: What is the vertical GPS accuracy based on, why were some surface elevation measurements not available?

p.5 l. 26: Based on all of the above uncertainty sources, we arrive at a cumulative overall uncertainty…

p. 6 ;. 12: Surely another crucial aspect of the bathymetry around this ice rise is whether slight thickening could lead to extensive re-grounding.

p. 6 l. 16-17: I don't see this path of Jason trough north of Bawden Ice Rise since the bathymetry there is shallower than the route south.

p.6 l. 17-19: This is based on one data point and the gridding here has just created a presumably unrealistic bullseye around that point. Presumably the reality is that there is a trough here leading towards the grounding line that is missed in the grid and this should be discussed.

p. 6 l. 21: References needed.

Fig. 3: Given that this is the main figure of the paper I think it needs a lot more work. Firstly the resolution is far too low for publication. The background MODIS imagery is either completely missing or not discernible. Please highlight the grounding line by making it a bolder contour. What do the black arrows indicate? Add label for Mobiloil inlet and Cole Peninsula which are discussed in the discussion text.