General Comments:

This study presents a new gridded bathymetry of the ice-shelf cavity beneath Larsen C Ice Shelf, complied from new and existing seismic data sets and some existing drill-site measurements. The article is concise and well written covering all relevant aspects of data processing. This data set presents a significant improvement on previously available cavity bathymetry. As identified by the authors, this data set will be of use in improving predictive models of the future evolution of the potentially vulnerable Larsen C Ice Shelf. All data sets are present at the links given.

My only major comment is easily remedied and of a technical nature: The labelling of the data sets used is somewhat confusing. It isn't clear to me how the new data described in Section 3.1 is related to Figure 1 and Table 1, I have gone back and forth between them a few times and tried to cross-check, but I am still not entirely sure. My suggestions would be:

1. Adjust the labelling of Figure 1, so it is clear and consistent with Table 1. Add to the legend in Figure 1 to indicate which data sets (e.g. BAS reflection, MIDAS, RACE etc…) are indicated by the different coloured points. For example, I am not clear if the yellow points are referring to just the dedicated bathymetry measurements described at the start of Section 3.1, or also some of the other supplementary data sets (some of which are reflection and some refraction experiments)?
2. Add references in the text of Section 3.1 to Figure 1
3. Add references in the text of Section 3.1 to the different survey names/campaigns given in Table 1 - I have made some suggestions in the specific comments as to where I think this would be useful.
4. Add a row to Table 1 to give the reference to the paper/doi where data can be found.

Minor/Specific Comments:

Pg1, L21 – State that "new water column thickness measurements" are from seismic data.

Pg2, L10 – step or steep increase?

Pg2, L21 – Additional references:
Goldberg, D. N., Gourmelen, N., Kimura, S., Millan, R., & Snow, K. (2019). How Accurately Should We Model Ice Shelf Melt Rates? Geophys. Res. Lett., 46 (1), 189{199. doi: 10.1029/2018GL080383

Pattyn, F., Favier, L., Sun, S., & Durand, G. (2017). Progress in Numerical Modeling of Antarctic Ice-Sheet Dynamics. Current Climate Change Reports, 3 (3), 174{184. doi: 10.1007/s40641-017-0069-7

Pg2, L31 – Rephrase sentence starting "The geometry of LCIS…". I had to read it twice as it sounds like the specific locations were measured by inverting gravity data, rather than the gravity inversions being used to help choose targets for the specific measurements.

Pg3, L5 – Reference to Figure 1 (blue dots)

Pg3, L6 – Add Reference to Nicholls et al., 2012 when boreholes are mentioned.

Pg3, L11 – Consider changing title to "New Data Acquisition for clarity.

Pg3, L12 – Reference to Figure 1 (yellow dots?) – see general comments.

Pg3, L14 – Does digging the plate in "improve source consistency" or coupling? It sounds odd to use "consistency" here, as you have described two different methods of placing the source.

Pg4, L15 – Explain the 30 m offset is between the source and the first geophone. Consider moving this a few sentences later, where you introduce the source, rather than here where you are talking about receivers.

Pg3, L18 – "using a geophone trigger adjacent to the hammer plate" add "to start the recording" or something similar.

"A stack on 10 hammer blow were also…" – I'm not quite clear on what this means? Were 10 of the 20 hammer blows stacked to evaluate reflection strength, or were an additional 10 blows made and stacked on site for evaluation? A little re-phasing needed here, as the sentence seems a bit lost.

Pg3, L22 – See general comments above, I am not clear on where the "supplementary surveys" are on Figure 1.

Pg3, L30 – "constrain arrivals" – I think "identify" would be a better word to use here, as you state that travel times were measured on the raw gathers so semblance and AGC wasn't actually used to constrain them?

Pg4, L1 – Nice idea to use the multiples in these cases!

Pg4, L10 – Are these the "BAS refraction sites" in Figure 1 or all refraction measurements? If so, reference here. As above, some confusions with which data set is which.

Pg4, L26 – Add reference to Table 2, after "At site PRHB4"

Pg5, L29 – "We interpolated all available" change to "We gridded all available" or "We interpolated between all available"

Pg6, L6 – Errors on the gridded product is potentially much larger that the errors quoted in Section 3.3 - a comment to that effect here would be good.

Figure 1: As mentioned above. I am confused with the labelling of survey data here, compared to the text in Section 3.1 and Table 1: Are blue points those from Brisbourne et al., 2014? Are the yellow points a combination of MIDAS, SOLIS and RACE and new

reflection surveys? What are the red points, just BAS refraction or ALL refraction surveys? Please clarify.

Figure 2: Add labels (e.g. P1, M1, P2, M2) next to diagrams on right hand side to signify which are multiples and which primaries – something similar to Brisbourne et al., (2014). It might not be clear to those without a seismic background what they are are looking at.

Table 1: Add column for reference to paper where data is presented, where relevant.