Comments from the reviewer are given in black.

Author responses are given in red, and **proposed amendments or additions to the revised manuscript in bold red.**

RC2: 'Comment on tc-2022-265', Kasia Warburton

This article addresses the mapping of tidal grounding-line migration from ICESat-2 repeat-track laser altimetry, highlighting the large regions of transiently grounded ice in an ice plain of the Ronne Ice Shelf. The authors raise excellent points about the need for consistency in grounding line products given the scale of tidal grounding-line migration compared to long term retreat rates. They also identify several different patterns of migration, termed "linear", "asymmetric", "threshold", and "hysteresis" - although I agree fully with the authors that given the potential for hysteresis, this categorisation could be highly affected by the gaps in sampling and will be improved by increasing repeats by ICESat-2 (perhaps this point should be made a little louder).

Many thanks for the review and positive comments on this work. **We will emphasise this final point in the revised manuscript.**

This is a well-written and significant paper, and the summary and outlook section in particular provides concrete recommendations that will enhance our understanding of grounding-line processes. I have only two minor comments which the authors might like to consider in their final version:

The authors argue convincingly that the choice of lowest-sampled profile provides the best measurement of grounding-line migration. The mean profile is described as introducing observation bias, but the issue appears to be primarily the same issue as with the neutral tidal profile, that the point F cannot be accurately identified when the elevation anomaly is negative. This point could be made more clearly, perhaps with a note about why this limitation exists (e.g. a naive question might be what happens if the highest-sampled profile is taken as reference instead).

Thank you for this comment, we appreciate that this point requires some further clarification in the revised manuscript, and has been addressed in detail in the response to Reviewer 3. The mean profile (when calculated from more than two cycles, i.e. the 'traditional' method), still has the issue with being skewed further inland if there is significant tidal migration at high tide, which makes the interpretation of Point F more ambiguous. This is the key additional issue compared to the Neutral tide method.

Indeed, Point F cannot be located where the elevation anomaly is negative in either case. To address your final question, Figure R1 illustrates the results of using the highest sampled tide profile as the reference (compared to the lowest sampled tide). If we locate Point F at the point at which elevation anomalies start to deviate from 0, then for all of the cycles we would incorrectly locate Point F at approx. -80.99°S.

Following these comments, further clarification will be made in the revised manuscript.

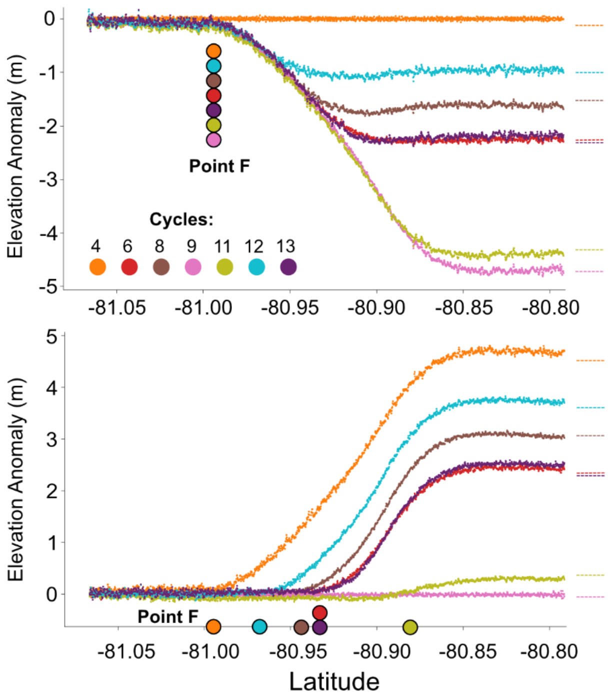

***Figure R1** – Comparison of elevation anomalies for RGT 559 GT3L, using the highest-sampled-tide (cycle 4; upper panel) and lowest-sampled-tide (cycle 9) as the reference profile for calculating anomalies. Coloured circles show the derived Point F in each case. Dashed horizontal coloured lines indicate the modelled tide heights per cycle.*

In l.263 the authors describe that they "then manually adjusted any choice of peak where it was still visibly incorrect". From both a reproducibility and automation point of view, this method should be made more explicit.

We will add additional explanation of this process in the revised manuscript, as suggested. Ultimately, it is difficult to create an automated processing chain that can deal with all circumstances, particularly in grounding zones (including increased noise and the impact of crevassing and undulating topography, etc.). This could be addressed by filtering out more tracks with poorer fits, however this would lead to a loss of useful data. Therefore, in this study (working in a relatively small area) it was decided to manually check the results and adjust the choice of peak accordingly.

This was done by inspecting the 2nd derivative of the low pass filter for each cycle against the elevation anomalies (as in Figure 3b-g) and checking that the peak in the 2nd derivative selected to locate Point F was in fact that closest to the point at which the elevation anomalies first deviate from zero. The automated method selected the 'correct' peak in the majority of cases, however by visually checking the results, we could adjust the choice of peak where necessary in order to ensure consistent location of Point F between cycles and tracks.

Making the code available (currently tbc) should also be a priority.

The code will be made available on GitHub at the time of publication.

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