Review Comments for "Deep Learning Based Automatic Grounding Line Delineation in DInSAR Interferograms"

Thank you for addressing my comments in the first round of revision. While I appreciate the improvements made, I believe this paper still needs further clarification and improvement before I can recommend this manuscript for publication in The Cryosphere. The current version has some ambiguity regarding the main conclusions about which features are most effective for the neural network in mapping grounding lines. Additionally, the results sections provide limited insights into the new grounding line information generated by your proposed method, making it challenging to fully understand its utility.

General Comments

The narrative needs improvements to better highlight key conclusions about feature selection and network performance. It is unclear which features and network configuration are recommended for actually mapping the grounding line from DInSAR.

The results need to expand on how the new grounding line data derived from your method adds value or compares to existing datasets.

Specific Comments:

Line 6: Consider rephrasing to "delineating the grounding line from DInSAR interferograms" instead of "delineating DInSAR interferograms."

Line 9: You mention assessing the contribution of non-interferometric features. However, the conclusions from this assessment are unclear. What are the most important features identified, and which network configuration performs best? The Results sections (4.1 and 4.2) need clearer writing to highlight these conclusions.

Line 11: Can you explain why the mean distance has such a high uncertainty?

Line 15: The statement "while there is little doubt in the amount..." is not entirely accurate. Different satellite-based mass balance measurements produce different values for mass change. What is consistent is the trend. See https://www.nature.com/articles/s41586-018-0179-y

Line 26: Short-term grounding line migration isn't a challenge for mapping using satellite images, as satellite images represent snapshots.

Line 30: If tide-induced grounding line variability is irrelevant to this paper, consider removing it from the introduction.

Line 34: Can surface slope measurements from tiltmeters actually identify Point F? I think it's break in slope?

Line 46: The sentence "The above-stated methods and others... detailed in Friedl et al., 2020" could be better integrated into the paragraph for conciseness.

Lines 59–66: The details on Parizzi (2020) seem excessive for this context especially its method is not super relevant to your approach. Please revise the description to maintain focus on your study.

Line 74: please provide details about your earlier works (Ramanath Tarekere, 2022 and 2023). Explain what you have done in your initial works, how the methods differ in this study and why further improvements to Mohajerani (2021) are necessary.

Line 83: Include details on where the AIS_cci GLL product can be accessed?

Line 117: Why only incorporate northing and easting components? Please justify this decision.

Line 162: The example in Figure 5 does not clearly illustrate the use of the median filter for postprocessing in eliminating spurious branches'. Consider using a more illustrative example.

Line 175: What is meant by "most ROIs"? Please specify.

Line 177: Figure 6h fits the description, but so do Figures 6g, 6i, and 6j. Clarify this point.

Line 239: Could you provide evidence to support the statements here?

Line 240: Instead of saying, "Later in the section, we elaborate...," consider integrating this explanation directly into the paragraph. This will make the section flow better.

Line 248: Have you considered discussing Network 3 here as well?

Line 250: using a break in slope as a proxy for Point F can be problematic, especially for fast-flowing glaciers. If DInSAR data is unreliable in these regions, the break-in-slope method is likely to have similar limitations. Additionally, on Line 257, you suggest that users verify the stability of the ROI to avoid errors when adding the DEM. This seems to contradict your earlier statement about the benefits of using the break in slope in fast-flowing areas for detecting the grounding line when DInSAR interferograms are unavailable.

Sections 4.1 & 4.2:

- In Section 4.1, I was curious why not train a network that combines both the rectangular representations and the polar representations? Additionally, I noticed in Table 3 that networks 3–9 were all generated using the real and imaginary components. Could you clarify why phase and pseudo-coherence weren't used instead?
- You've talked about the contributions of interferometric and non-interferometric components in mapping the grounding line. However, one critical piece of information is missing: which network do you recommend using? This isn't clear in these sections but is only briefly mentioned in the conclusion.

Line 266: You mention using Network 1, which focuses on rectangular features. However, according to Table 3, Network 3 has the best performance. Could you explain why Network 3 wasn't used instead?

Lines 273-275: Could you provide evidence to support this? Should we refer to Figure 9 here?

Lines 280-286: Did you apply this method to the entire Antarctic Ice Sheet? If so, how does your new grounding line (GL) data compare to other publicly available GL products? Expanding this section with such comparisons would be very helpful.

Figures:

Please review all the figures to ensure they are easy to read and visually clear for the readers.

Figure 1: Could you add a geolocation map to Fig. 1b? This would help provide more context for the figure.

Figure 2: It might be clearer to separate the features into two columns: one for interferometric features and another for non-interferometric features. The current color choices and line widths make it challenging to easily distinguish between these categories. Additionally, consider labeling the interferometric and non-interferometric features directly in the figure to improve clarity.

Figure 4: Is this network architecture identical to the one in Xie and Tu (2015)? If not, could you clarify whether it is based on that work?

Figure 5: The subtitles above the figure panels are quite small and hard to read when the paper is printed on A4 paper. It would be helpful to increase the font size. The same issue applies to Figure 6.

Figure 7: The shapes of the inset polygons in columns 1 and 3 don’t match the shapes of the zoomed-in maps in columns 2 and 4. The insets are rectangular, while the zoomed-in maps are square. Please adjust this for consistency. Additionally, adding titles or annotations directly within the figures to distinguish between different networks would make it more straightforward for readers. Referring to "columns 1 & 3" or "columns 2 & 4" in the text can be unclear.

Figures 8 & 9: These figures have the same issue as Figure 7 regarding inset shapes and labeling. Please consider making similar adjustments.

Figure 10: There is an error in the subplot labels for (a) and (c). Crary Ice Rise should be labeled as (a), not (c).