

Petlicki et al review

Petlicki and others present data from a 2019 airborne ground penetrating radar survey of the San Quintín glacier, Patagonia. The authors do a nice job of summarizing the data and explaining how the glacier has changed over the past ~20 years, mostly from satellite imagery and several previous studies. While the 2019 airborne survey was rather spatially limited, the authors use remote sensing to broaden their results. The authors present a brief discussion on the future of this piedmont glacier, although the Discussion section could be improved by increasing the number statistical and quantified variables. Many of the calculated variables and figures are difficult to understand and do not enhance the paper as much as they should.

Overall, the paper is scientifically sound but suffers immensely from grammatical and language issues. Much of this manuscript is difficult to review due to incomprehensible run-on sentences and grammatical errors. I recommend major revisions and a rewrite of the Discussion/Conclusion sections that focus on how this study will improve the understanding of the San Quintín glacier and how it compares with other studies in the region. The manuscript is not necessarily novel in technique or scope, but it should at least contribute to the greater understanding of the northern Patagonia icefield if written better.

Other comments:

Abstract:

There's room for more quantification of results and major findings. This abstract is quite short and could use a few additional sentences to invite the reader to continue learning from the rest of the paper.

L1: It's always nice to use the term "anthropogenic climate change," instead of "climate warming," to remind readers (especially in the US) that this problem is manmade.

L2: Sometimes it's "San Quintín" and sometimes it's "San Quintín Glacier." Pick one and be consistent.

L3-4: How "new" is the proglacial lake?

L4: Word "new" is repeated from previous sentence. Consider "We present results from a 2019 airborne GPR survey..."

L4-7: Long run-on sentence. Consider splitting into two.

L6: Can you quantify "shortly" or at least give some estimate of how long it will survive?

Introduction:

L21-L4 (Page2) very long run-on sentence that could be simplified and split into two.

P2 L8: Both Fig. 1 and Figure 1 are used, be consistent.

P2 L12: How large is the net negative surface mass balance?

P2 L18: Quantify "extremely wet and temperate maritime climate."

P2 L21: Explain who Steffen (1900) is and give their full name.

P2 L28-33: Long confusing sentence.

P3: Define SAR interferometry.

Data and Methods:

Need to define GEEDiT, FAU RETREAT, NASA MEaSURES, ITS_LIVE, etc.

Please address the accuracy of the DEMs (you state 2 m resolution, but how accurate) and ice flow velocities.

P5 L3: I'm not sure if there's a typo in "was set at 3 kHz of the pulse repetition frequency," or what "of" means in this case.

P5 L8: How constant is "electromagnetic wave velocity propagation in ice of $0.168 \text{ m} \cdot \text{ns}^{-1}$?" I know the speed should change through different ice densities and depending on how saturated the ice is with lagoon water.

P5 L12: Likewise, please address how constant the airwave speed is. Does this vary with air density, temperature, etc.? Provide a citation. Please address how accurate you are using a constant velocity for both ice and air, and how these numbers compare with overall accuracy of your methods.

P5 L27: How do you know how thick the ice is before conducting the BRP analysis? This seems somewhat circular.

P8 L9: Unclear what "much ice supports the ice column before it reaches flotation" is trying to say.

P11 L2: The relationship might be "clear," but it is quite complex. Some additional annotations on the figure might help?

Results

P8 L18: Retreated over 3 km since when? 1993? And until 2020? This sentence is unclear.

P10 L6: Say that the radio echo sounding is from GPR, otherwise it's unclear what is being talked about.

P10 L10: "It" refers to the glacier bed? Be specific.

P10 L12: State which GPR profile is the longitudinal.

P10 L11-15: Which is the BRPr and which is the IRP? Need to say which is black and which is red.

P11 L9: Here the authors use "up-glacier," while previously it's been "upstream." Be consistent.

P11 L11-12: How consistent? Give some sort of comparison. What advantage does the RETREAT FAU give you having multiple measurements per year?

P12 L3-4: Give a citation for assuming a parabolic profile of the lake.

P12 L11: Please explain the 2011/2014 survey, is this from both years or an average of the two?

P13 L8: Quantify "was very small."

P13 L10: Please quantify this assumption. How much does the ice elevation rate change over 2000-2019 in your data? I agree that this looks somewhat reasonable visually, but quantify it to make sure.

P14 L2: Define "near future" and provide numbers for when each section will disintegrate.

P14 L5-12: Where are the measurements and model values coming from? Where on the glacier are these thicknesses? The reader needs to know how to compare these values.

P14 L8: Quantify correlation coefficients "are very low" and bias "is very high."

Discussion

First several paragraphs seem like "introduction" material instead of discussion

Almost none of the text in this section is appropriate for "discussion," since the results are barely discussed. Please comment on the results presented earlier and why they are important, how they compare with previous studies, and the major implications of this research.

P17 L1: How far "up glacier" is the "final valley gate?"

Conclusion:

This is the first time that you state where the grounding line and possible pinning points are, which should have been discussed earlier.

This conclusion does not recap what is done in the paper, nor does it highlight major findings or future work. The conclusion needs to wrap up the paper nicely and reiterate the purpose of this study.

Figure 1: Reichert and Exploradores glaciers names are a bit hard to read. Contours (presumably in m) should be stated in figure caption. Would be nice to have scale on inset to see how large the lake is.

Figure 3: Amazing figure. The reader is really only interested in the entire extent of the figure for panel a (and even this panel could be zoomed in), otherwise panels b and c should be zoomed in on the current glacier extent. This figure is just so amazing and there's lots of wasted white/lake/land space.

Figure 4: Need to state what the blue and red lines signify, and/or label the air, ice, water/bed. The red line in the bottom figures is hard to distinguish from the red dots. Which is the BRPr and which is the IRP? Need to say which is black and which is red.

Figure 5: Not sure if relative water height needs () as units for panel a. I'd consider moving "BRPr (dB)" and "w ()" into the label for the colorbar instead of the figure legend. The dot above the Z in the x-labels is not centered. I'd recommend replacing "Z" with "elevation" in the second plot.

Figure 6: Ice flow velocity label should be vertical and next to the colorbar. No need to label "year" for either plot.

Figure 7: Great figure. I'd recommend zooming in to 5-11 km for panels b-e, since there is no data for the left half of these figures. I understand wanting to line them up with panel a, but it's difficult to interpret when all the data is squished together in the right half of these figures.

Figure 9: Should be previously published estimates "from." The 1200 value on the x-axis is cropped out.

Data availability: Very straightforward and easy to use data. Nicely done.

Appendix A:

P19 L1: Imagine is repeated.

P19 L7: Define RPC.