

Response to Reviewer2:

Weak relationship between remotely detected crevasses and inferred ice rheological parameters on Antarctic ice shelves; C., Gerli, S., Rosier, H., Gudmundsson, S., Sun

Anonymous Referee #2, 18 Jan 2024

General comments:

One key point: In the history of looking at “damage” (specifically, reflections and noise in radar data caused by crevassed zones at the edges of ice streams) in ice shelves, the shoe started out on the other foot: Signs of damage that were buried under un-damaged firn (specifically at Kamb Ice Stream, then called ice-stream C), and their extensions out on the Ross Ice Shelf were of great significance in telling the story of past change in the flow conditions. In this case, the change was the “shut down” of an ice stream (which has less press value in today’s world, but which needs to be studied, especially if there is ever going to be hope that ice-stream flow at Thwaites or Pine Island Glacier will self-limit). It might be worth touching on this point in the introduction. I believe that the original literature on it (from the late 1970’s and early 1980’s) is easy to find.

We will add a short paragraph in the Introduction.

Generally speaking: the word on the “street” (I got this from an editor’s meeting of a related glaciological journal) is that use of acronyms can be an impediment to getting papers to be cited. In some ways, I think this is intuitively obvious; but apparently it is also a result of doing careful quantitative analysis with specific metrics for measuring acronyms and citations. This paper does not have a lot of acronyms, however, I still wonder if the paper would be easier to read (and thus more likely to be cited) if acronyms were minimized. The ones that I had to struggle with were: CNN, NeRD (that one appears to be a kind of subtle joke, which I like, as the word NeRD in English refers to a “smart” but slightly “dull” person), MOA, ROC, FPR, TPR, AUC, OPTPT, ... This is an online journal, hence there is no cost in paper to write out the words in full. I think that the authors should consider this. The authors might additionally find it works more simply to assign actual variables to elements that are now a kind of hybrid acronym, for example: AUC-mean2009. These long, strung out variable names that incorporate an acronym make the reading of the paper a bit harder. With harder reading, there is then the possibility of fewer citations.

While we acknowledge the reviewer's suggestion to expand certain acronyms, we have, however, opted to retain the current format. This decision is driven by the frequent repetition of these acronyms throughout the text and their substantial length when written in full—consider NeRD (NormalisEd Radon transform Damage detection), for instance. We trust that readers will still be able to comprehend the text and interpret the results effectively.

I notice that the analysis makes a distinction between 2019 and 2020 velocities in the AUC for Pine Island Ice Shelf (and different years for different regions). What specifically (as a reminder) is changing? Is it the detected crevassing fields or is it the velocity field?

For Pine Island Ice Shelf, we use the method developed by Izeboud et al. in 2023, which classifies crevasses adopting a composite satellite imagery — here, we use the one from December to February of 2019-2020. To ensure optimal alignment with the crevasse map corresponding to this specific timeframe, we employ two distinct velocity datasets from the years 2019 and 2020 and perform two ROC analyses.

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Specific comments:

Abstract: “Wealth of research”? I’m not sure it adds precision to use the term wealth as a qualifier. Maybe another word would be more appropriate. “Wealth” appears as the first word in the discussion as well.

Response: We will change it to “An abundance of studies” for the discussion.

A minor point: I see that variables that appear in the text are italicized (as they should be), however, this italicization needs to be checked. For example, x- and y- around line 115. Ditto for the R that appears near there. A good double check just for this would be useful.

Response: Thanks, we will check it.

L-curve method (here the L should not be italicized, as I think that the “L” denotes a shape more than a variable). Also, I’ve never heard of this method before, so I wonder if the reference to it should appear right away. Also, I would find it helpful to possibly say in a few sentences how a user would “walk through” a problem following the L-curve method.

Response: We will move the reference earlier in text, and will add additional text to make it easier to understand.

Something to check: numbers in the text sometimes appear in scientific notation (where there is a “times ten to the power of something”) and sometimes in digital computer notation or floating point notation, e.g., 1.3e-4... Journal style should be checked. I suppose it would be a bit pedantic to say so, since nobody even thinks about this any more: but it would be cool if every now and then people would report whether they are doing single or double precision computations (I don’t suppose there are single precision computations any more, but what the heck, I might as well bring it up).

Response: Many thanks, it will be checked

Figure 4: I note that the vertical axes have a notation that is “ $\#10^n$ ”. Is this standard notation (I usually see “x” replace the “#”)? Also, would it be better to have the scale (ten to the power of) in the axis label rather than perched on top of the axis frame?

Response: It will be corrected

This one is not an essential comment, and is motivated by the fact that Chris Borstad, one of the pioneers of damage mechanics in glaciology passed away in November of 2023. I see that Copernicus no longer provides an “acknowledgment” section in its articles where a dedication (if the authors were to want to make one) would normally appear. Instead, I see that Copernicus prefers to replace the general acknowledgement section with specific (and seemingly less noble) sections like “Funding”. This comment is not a criticism, just something that came to my mind (and heart).

Response: If the Journal allows it, we are happy to make a dedication, in the funding section. Thanks for your kind suggestion.