The Cryosphere Discuss.,
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The Cryosphere Discussions

Interactive comment on "Ice velocity of Jakobshavn Isbræ, Petermann Glacier, Nioghalvfjerdsfjorden and Zachariæ Isstrøm, 2015–2017, from Sentinel 1-a/b SAR imagery" *by* Adriano Lemos et al.

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This paper uses new, high-resolution satellite imagery to assess velocity variations on four large Greenlandic outlet glaciers. Overall, it is very well written, clear and topical. It makes a useful contribution to the field and presents interesting results. It also nicely illustrates the usefulness of these datasets. It is concise, but addresses the questions it sets out to answer. I have a few minor comments below, which are noting places where things could be clarified or expressed more clearly. Overall, however, I think it is a really good paper in its present form. Nice to see such a well-put together and

concise paper.

Line by line comments Page 1 L13: Indicate temporal resolution in brackets. L19: Give date. L30: Sentence is a bit hard to follow. Consider splitting. L34: Specify the time period as 'last years' will date with the paper. L37: There are other references that are relevant here, e.g. Jensen et al., 2016, Carr et al., 2017 (J Glac). There are a couple of places in the intro where only one or two refs are given, but there are clearly more. Please add a selection of relevant ones and add 'e.g.' to indicate awareness of the others you don't list. Also need a couple of references for the statement about glacier specific and climatic controls.

Page 2 L1: Good justification for the study. L3: ...ice sheet dynamics AND ice discharge, and for assessing.... L14: Why these glaciers. I'd add a sentence of two. This is sort of given in the next sentence, but it feels like it needs a clear justification at this point. L33: Seems odd to switch to area change here, after discussing retreat. I know this paper does look at area change, so I'd work on improving the flow of the argument here.

Page 3 L21: Is this the maximum data range? Worth stating for clarity. L26: Might be useful to have graph showing image availability for each glaciers over time. E.g. you could have a bar graph, with number of images on the Y axis, then time on the x Axis, at monthly intervals. You'd then have a different coloured bar for each of the four glaciers. I'm suggesting this so that the reader can get a better handle on how these 187 velocity maps are distributed over the glaciers and over time. L40: Why was this value used?

Page 4 L2: Why was this spacing used? Was it because of the GIMP resolution? L14: Please state what these higher errors were in a separate sentence. L43: What period were these means taken over? Or do you mean the maximum value of the means across the whole glacier? Generally this is done well, but make sure you give the time period / spatial extent of your averages, as it's sometimes hard to follow which average

/period you are discussing. L44: Do you mean velocity MAXIMA (not magnitude)?

Page 5 On this page, there are several points were it would be useful to refer back to the relevant figures, e.g. L2, L24, L26. Please update throughout, as it helps guide the reader quickly to the relevant figures. L2: I'm not clear what '46 km extension' refers to. Please revise this description so it's clear. L7: I find this hard to follow. Please re-phrase. L12: ...scale variability, which continues..... L14: Helpful to repeat the time period these values relate to. L34: starts IN early 2015.

Page 6 L10: Please state whether or not this relationship is statistically significant, then have the explanation of why it is not significant (i.e. lack of data). L27: I think it would help to add a summary sentence or two. I'd definitely add one to sum up the key message of this paragraph (i.e. your data agree pretty well), and maybe add another, more general summary sentence to reflect on the usefulness of the data for this purpose. At the moment, it feels like the paper ends abruptly, even if you do say this in the conclusion. L31: Be specific about what you mean by 'important', I.e. high flow, large discharge. L32: I'd just give the date, as 'the present day' dates.

Figures Figure 1 & 3: The labels on these maps need to be much bigger, especially the locations of the extracted velocities. I find it really difficult to see these, but they're important for the context of the paper. I also think the three Greenland overviews are too small and don't work. Instead, please add one Greenland overview, with the sites marked, but which is a reasonable size. It's a shame to have nice figures like these when the reader can't read them properly. Figure 2: As with the other figures, this needs to be bigger, especially the text, as I can barely read it, especially the axes labels. Figure 3: The grounding line needs to be much more obvious, as do the lines for the termini. I really struggle to see them. Same for figure 1 Particularly for A), it would be useful to have a land mask to orientate people. Figure 4: make the line stronger ad markers larger. Add the p-value and R2 for this regression. Figure 5: The text is much easier to read on this, but some of the points are hard to see, e.g. the green dots in A. I know it's difficult given the data density, but think how you can back

the points easier to see throughout this figure (e.g. through increasing size or changing the colours). Figure 6: Add p-values for the regression lines. Figure 7: Might be clearer with slightly large points

Overall, the figures are really good and illustrate the points well, but you have to make sure they are readable, otherwise all of the hard work is wasted!

In summary, this is a really nice, concise paper, and I really enjoyed reading it. Thanks!

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