

## ***Interactive comment on “High-resolution mapping of circum-Antarctic landfast sea ice distribution, 2000–2018” by Alexander D. Fraser et al.***

### **Anonymous Referee #2**

Received and published: 6 July 2020

To the Authors,

This is an interesting and relevant study that advances a new dataset as well as preliminary analysis on Antarctic landfast ice conditions from 2000-2018. The topic is appropriate for this journal, and is timely given increasing interest in sea ice change and its consequences. The study also fills an essential knowledge gap in landfast ice studies, which tend to focus on Arctic and Subarctic environments, by introducing a pan-Antarctic dataset to serve as the basis for future research on a relatively understudied continent. I recommend this work be published after some minor revisions which are listed below. I first provide general feedback, followed by line-by-line revision requests. Feedback generally concerns editing with the writing and clarification on data properties. I understand the methodology to be a modification on already-established

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approaches advanced in previous publications and accept this as valid.

General notes:

I think the spatiotemporal dimensions of the landfast ice datasets you create (1km, 15-day interval) could be better justified. It's entirely reasonable to cite the data product and repeat interval of the satellite as reasons for these dimensions. However, because the purpose of this publication is to present a novel dataset for others to use, it would be a good idea to include some discussion of the advantages/disadvantages of these spatiotemporal dimensions. I understand you are intending to apply this dataset in an analysis for future publication. I would advise you either discuss how these dimensions apply to your intended use of the dataset, or how you envision others using your dataset. In your results section, for example, you observed an 8.3% increase in fast ice extent compared to Fraser et al.'s (2012) study, which you attributed to the switch from a 20 to 15-day stationary criterion used to identify fast ice. How do these differences in outcomes due to changes in temporal window affect what this data might be used for?

Line-by-line revision requests:

Line 67: Perhaps provide some examples of these scientific and operational uses?

Line 81: The use of parenthesis to clarify the imagery dating back to the year 2000 seems out of place. It would help the flow of the introductory sentence to this section to find a way to integrate this into the sentence without the use of parenthesis.

Line 96: I'm unsure of why "(coastline)" and "(change in)" were inserted into this sentence. Please edit the sentence to make their purpose clear.

Line 98: The wording of this sentence is a little redundant. You can change it to "Temporal compositing was carried out to create cloud-free..." or "Temporal compositing is required to create cloud-free...". Since this is the methods section, the reader will already assume this is what you've done, so I would recommend the latter. It is also in keeping with the present tense used in the writing.

Line 106: Because the authors are the same for the two studies cited, you can change the in-parenthesis citation to Fraser et al. (2009, 2010).

Line 107: If you are referring to both cited Fraser et al. studies, say “The earlier works”, if you are referring to only one of the cited studies, specify which one.

Line 110: Per my comment on line 107, if Fraser et al. 2010 is the work being referenced, make mention of it earlier. Perhaps move this parenthesis citation to the end of the previous sentence that starts with “The earlier work”.

Line 111: Overall the writing in this manuscript is well done. However there is the tendency to use parenthesis when they are not necessary. The clarification that cloud cover is a challenge for optical remote sensing in polar regions can either be integrated into the sentence, or stand as its own sentence. I would recommend the latter, as this would allow for the inclusion of study citations where optical remote sensing was challenging in polar environments.

Line 118: Please integrate parenthesis into sentence, or create new sentence.

Line 123: Please integrate parenthesis into sentence.

Line 126: Please change to “thin clouds” or “thin cloud cover”.

Line 168: Figure 1 is really well done, and does a good job complimenting the written description of the data collection process.

Line 182: Parenthesis integrate or remove

Line 187: Parenthesis integrate or remove

Lines 192 - 205: I am personally a supporter of numbered lists in publications, especially methods sections, as they are a great help for the audience. However I would recommend some consistency in how these numbered lists are used. From lines 192 - 205 there are two numbered lists, the first list is independent from the text in a line-by-line format. The second list is integrated in the text. I advise you pick a method of

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numbering and stick with it. If you choose to integrate both lists into the text, I suggest you separate them into different paragraphs so the readers do not get them confused.

Line 215: Add a space between the final word and the parenthesis containing the citation.

Line 220-223: This sentence needs work. I would advise either choosing between “ground-breaking” and “new” to avoid redundancy. Remove the parenthesis (across East Antarctica) and integrate into text. Rearrange to improve the flow. For example: “We restrict our presentation of results to the illustration of key attributes in this new pan-Antarctic fast ice dataset, and evaluate its improvements over earlier datasets created for East Antarctica (Fraser et al. 2012).”

Line 223-224: Remove parenthesis and integrate into text, or delete it. In this case I would advise the latter because the audience already knows you are talking about the dataset you created. Also, the comma separation breaks the flow of the sentence. Try something like: “More in-depth analysis of spatial-temporal patterns and drivers of fast ice distribution is outside the scope of this journal, but is underway for future studies (Fraser et al., in prep.)”

Line 227: I would remove “important new” adjectives in this sentence when you are referring to the data. The importance has already been demonstrated in the intro and discussion sections, and the purpose of the article is to introduce a novel dataset, so the audience already knows it is new.

Line 230: Please integrate the parenthesis text into the sentence.

Line 233: Please integrate the parenthesis text into the sentence

Line 236: Please integrate the parenthesis text into the sentence

Line 259-260: Can you specify any ongoing or anticipated study topics of the Antarctic coastal environment this dataset is expected to help? It’s okay if there aren’t any that can be specified at the present time, but it would be interesting to include if there are.

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Line 260: As I make clear in my summary of this manuscript above, I have no doubt this dataset is a very important contribution to Antarctic fast ice research, and will be heavily cited for years to come. However there is a certain promotional tone in this manuscript that seems out of place in a scientific article. In line 260, “major high-level” is used to emphasize the importance of IPCC reports. However, readers of ESSD will already know the importance and weight of IPCC reports, and will not need these adjectives. Unless “major” and “high-level” are established terms used to organize IPCC reports by importance, I would advise leaving them out. Throughout the manuscript you qualify mentions of your data with terms such as “new” and “ground-breaking”. While this dataset is indeed new and ground-breaking, it would be better to reserve these terms for sentences when the actual importance of the data is directly addressed, rather than somewhat indiscriminately throughout the manuscript. I understand the purpose of this paper is to make the availability and utility of this new dataset known to the scientific community. I would argue, on your behalf, that the importance of the dataset you created is already evident in your paper, and the scientific community will readily understand this without the need for promotional adjectives.

Lines 263-267: Previously you used numbers when listing steps taken to accomplish a goal. I suggest using numbers here instead of letters, to maintain consistency in the paper.

Line 269: In this paper you use the terms “spatial-temporal patterns” and “spatio-temporal patterns”. Both are valid terms, but for the sake of consistency I would pick one and use throughout.

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