The Cryosphere Discuss.,
https://doi.org/10.5194/tc-2018-178-AC1, 2018
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The Cryosphere Discussions
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Interactive comment on "IcePAC – a Probabilistic Tool to Study Sea Ice Spatiotemporal Dynamic: Application to the Hudson Bay area, Northeastern Canada" *by* Charles Gignac et al.

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Received and published: 4 December 2018

ICEPAC – A PROBABILISTIC TOOL TO STUDY SEA ICE SPATIOTEMPORAL DYNAMIC: APPLICATION TO THE HUDSON BAY

Reviewer #1, We thank you very much for your valuable and helpful comments on our work. We made all suggested modifications to our manuscript. CG

A modified version of the manuscript in found as supplementary file.

R = Reviewer comments A = Author response and B = Manuscript modifications

GENERAL COMMENTS

Printer-friendly version

Discussion paper

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R: In the introduction, I feel like the authors do not fully understand the area of interest. The ice conditions in the Foxe Basin/Hudson Bay areas are very different from the ones found in the Hudson Strait. Studying some products available like the ones on the CIS website would be useful to better understand the ice conditions in the AOI.

A: Details about the different ice regimes in the HBS were added to section “2. The Hudson Bay System”. Also, an additional site (Hall Beach) was added to the analysis to outline the specific difference in sea ice concentration behaviors between Foxe Basin and the rest of the HBS.

B: New content about sea ice, trends and polynyas in the HBS were added from line 97 to 114.

R: I feel like the authors need to tone down the language when saying that this is a completely new approach. There are many studies that have used very similar approaches in the past in other AOIs. A more thorough literature review might be needed. The method and the validation of the data and results are thorough here and this is not always clear in other studies. This is a strength, in my opinion, of this study

A: As you rightfully suggest, other studies have brought a probabilistic perspective on the behavior of sea ice concentrations. However, to our knowledge, all the studies we have identified as “probability modeling” approaches of sea ice concentrations were based on a “classical” probability calculation. They were using the common approach to probability calculation, consisting of measuring the number of occurrences of a specific situation (for example 40% SIC or more) over the total number of observations. Therefore, none were basing their probability estimates on the “underlying distributions” as we do. This is why we were stating that our approach was an innovation.

B: We have modified our sentence in lines 61 to 63 in order to make sure that readers are aware that other “probabilistic” products are available, though based on a different approach.

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R: I understand that the different ice products are scattered everywhere on the web and there are many (probably too much to cite them all). I would be careful to say that no similar products exists. Many products exist, not necessarily in the same format and many are not necessarily accessible to the public but the outputs can be seen in different products of National Ice Services (Canadian, US, Finnish, Danish, etc.). If IcePAC is planned to be accessible to the public, I would underline it since it will be of great use to many. I would tone down the language on this topic as well.

A: We have made sure to underline the fact that the IcePAC approach was based on the frequency analysis method at a weekly pace. We have outlined that other sea ice products, based on the "classical" approach (as described in the previous remarks) were already providing probabilistic information on sea ice. Nevertheless, most of the probabilistic products available provide information on the "sea ice presence" probability, not the concentration. Introduction was reformulated to ensure that readers understood that national ice services and others were also providing probabilistic information on sea ice. As you suggested, the fact that IcePAC data are available on a web interface was added to the conclusion.

MINOR COMMENTS All suggested corrections in the PDF file were applied to the manuscript.

Please also note the supplement to this comment:
https://www.the-cryosphere-discuss.net/tc-2018-178/tc-2018-178-AC1-supplement.pdf

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Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2018-178, 2018.

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