The Cryosphere
Discussions

Open Access

EGU

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.

Anonymous Referee #2

Received and published: 4 October 2018

This paper presents a new tool, called IcePAC, to model the probabilities of various sea ice indicators for the Hudson Bay System based on historical satellite passive microwave sea ice concentration (SIC) data. The method involves extracting time series of the weekly average SIC and testing that the data are homogenous, stationary and independent. Trends are removed and a probability distribution is fit to the data. The model output can then be used to predict the probability of various sea ice indicators or events occurring in a given week of the year. Overall the method is sound and I think if the tool were made public, it would make a valuable contribution to the community.

I have a few minor comments and clarifications that should be addressed prior to pub-

lication. I also suggest that the authors carefully consider their use of references throughout the paper. I note some instances where a citation is needed or should be removed below. The paper should also be edited for English to clarify the language.

Minor Comments

I agree with the comments from Referee #1 that the use of "meltdown" throughout the text and figures should be changed to "melt".

L29-31: This sentence should be revised. "raise" should be "increase" or similar. Clarify if the Arctic has warmed or will warm by 2 degC. Apprehend is not the best word choice in this sentence. "...will tend to amplify" Are you suggesting the process of Arctic Amplification here? More background detail on the physical processes is needed to make this connection.

L49: The phrase "permit to analyze" implies that there are restrictions on how the data may be used. Probability analyses may not be readily available to users, but this does not mean that they could not be produced. I suggest revising this sentence.

L69: Cryogenic cycle isn't the right phrasing here. I suggest changing to seasonal sea ice cycle or similar.

L72-74: These are competing ideas. If complete freeze-up occurs in late December, why is the annual maximum extent in April? This needs to be clarified.

L82-83: Markus et al. (2009) is not a study of sea ice extent. It should not be cited here. Also, Cavalieri and Parkinson (2012) is an update of the data examined in Parkinson and Cavalieri (2002, 2008) and Parkinson et al. (1999). Citing just the 2012 paper is sufficient.

L88: What are some examples of the sea ice parameters described here?

L90: What recent research? There should be relevant citations to support this.

Figure 2: Adding some more description of the different panels in the figure caption

would be helpful since the later steps of the process have not yet been described in text.

Figure 5: "C%det" is not explicitly defined in text or the figure. Is this the same as SICdet? Define the notation in the figure caption or text.

L242: Expand the acronym for NSIDC the first time it is used. Also, the content of the webpage listed changes frequently. A specific link to the anomaly maps that were compared with the author's data needs to be provided.

Figure 6: I agree with Referee #1, I think a regular scatter plot would better show the spread in the probability curves for each site and take less time for readers to interpret.

L249: After what inquiry? Is this personal communication? With whom?

L257 and Figure 7: The MODIS data need to be properly cited.

L273-277: It is important to note that SIC thresholds to define sea ice retreat (advance) should be used only after the annual SIE maximum (minimum). For example, the first week that SIC is above 15% at a given pixel during a calendar year would likely be in week 1, not during autumn freeze-up. What time constraints were applied to the data to define the likely freeze-up or melting periods?

Technical Corrections

L20: "coherent" should be "coherence"

L54: Note that you are abbreviating Hudson Bay System as HBS at this point in the text.

L67: "researches have" should be "research has"

L69: "...HBS is primarily composed of..."

L75: Is the "Bay" Hudson Bay? The proper name should be specified.

L91: Typo: "int" should be "in"

L92: "Consist" should be "consists"

L95: Change to "... total of 20,738 pixels or sites within the HBS..." for clarity

L101: "an" should be "a"

L107: "had" should be "has"

L116-118: Rephrase this sentence

L142: "must be" should be "is"

L161: Change "and to be available" to "and be available"

L162-163,170: The a and b for parameters a and b should be highlighted in some way to make them distinct from the regular font.

L188-191: These sentences should be rephrased. Grammatically, they are hard to follow.

L210,215: Inconsistent use of week "#" and "number". I suggest referring to a particular week as "week 1". Also, add in a space between 1 and for in L210.

L248: Change "point" to "site"

L254: Delete highly

L274 and L275: Delete the second "to" in both lines

L290: Change "every" to "each"

L306: Delete "in front"

L343: "transposed to" is no the right phrasing to use here. "utilized in" would be better.