

Interactive comment on “Satellite Passive Microwave Sea-Ice Concentration Data Set Intercomparison for Arctic Summer Conditions” by Stefan Kern et al.

Stefan Kern et al.

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Response to the review of anonymous reviewer #1: tc-2020-35-RC1 of the manuscript tc-2020-35:

Satellite Passive Microwave Sea-Ice Concentration Data Set Intercomparison for Arctic Summer Conditions by Kern et al.

The manuscript is interesting and useful for the sea ice research. It is very useful to make this kind of comparisons. Comparisons to MODIS SIC give an idea of the weaknesses of the existing algorithms and also gives tools to correct or improve the

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current algorithms, especially in the summer conditions with the highest uncertainties. The suggested bias correction looks like a promising approach to get more accurate SIC or ISF estimates. Also the potential explanations for the algorithm behaviour in summer conditions are interesting and useful information and give good information for further research and algorithm development.

» We thank the reviewer for the positive impression given about the manuscript and are grateful to the comments helping to finalize the manuscript for publication.

I only have a few minor comments: 1) The algorithms have been divided into four groups. I think the division has been in more detail reasoned in the previous TC paper of the authors. However, I would miss a short description/reasoning also here pointing out what are the actual differences between the algorithm groups and what are the similarities (and differences) within groups. I think this can be seen as a clustering analysis i.e. looking for an optimal set of clusters simultaneously minimizing within-cluster distance and maximizing between cluster difference for a set of (selected) features.

» We thank the reviewer for this comment. We added a short reasoning of the assignment of algorithms to groups in Section 2.1.

2) There are formulas of the parameters discussed given. Even though they are mostly quite simple, formulas would make the presentation even more clear, e.g. $SIA = n_{\text{integral}} \text{ SIC } dA$ or something similar, now they have (only) been described in words.

» We thank the reviewers and provided formulas were appropriate.

3) Some abbreviations are not explained, at least PR and GR should be explained as they appear for the first time (even though they are clear for the most readers). Still check all of these. Possibly even (general) formulas for PR and GR could be given? Also open OSI SAF and SICCI.

» Thank you. We checked the entire manuscript with respect to abbreviations not yet explained and added the respective explanation when introducing the abbreviations.

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We also provided formulas for PR and GR.

4) Consider of replacing "<" and ">" in the text by "less than" and "greater/more than"

» We changed the manuscript according to this suggestion.

5) P2 L59: "...early in the melt season or on land-fast sea ice..." When this may occur over land-fast ice? Also during early melt season?

» Thank you. We replaced "or on land-fast sea ice" by "and on particularly level such as land-fast sea ice".

6) P3 L125: "... with the size of the field-of-view of..." Could this be e.g. diameter (I think the unit of the size should be km²)?

» We replaced "size" by "diameter"; thank you.

7) P7 L1149-150: "last accessed October 12, 2016". This is almost 4 years ago, update this.

» This data set hasn't changed since then. Still we updated the access date to a more recent date.

8) P5 L187-189: "...excluded all the samples..." "...larger than 1". The ratio $\text{mean(MPF)}/\text{std(MPF)}$ is the signal to noise ratio, if You exlude the values with high SNR then You only include the uncertain data? Or did You mean the coefficient of variation $\text{std(MPF)}/\text{mean(MPF)}$ instead?

» We thank the reviewer for the careful review. In fact, we exclude all samples where the ratio $\text{mean(MPF)}/\text{std(MPF)}$ is SMALLER than 1. We changed the text accordingly such that it reads "smaller" instead of "larger" in Line 188.

9) Conversion to Cartesian coordinates is mentioned. But is there a certain projection You are using. What are the units in the coordinate system (e.g. meters in which projection)? This is not very clear to me based on the manuscript.

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» Thank you. We replaced “For this step the coordinates of both data sets, i.e. the PMW products and the MODIS products, are converted into Cartesian coordinates . . .” by “For this step, we converted the latitude and longitude coordinates of both data sets, i.e. the PMW products and the MODIS products, into metric coordinates using the WGS84 ellipsoid . . .”

10) You use the term Day of the Year, it is also often referred as the Julian day. I do not know which one is better in scientific articles, I have seen both practices.

» Well, in fact we kept day of the year (DOY) then. We believe that day of the year is actually less abstract than “Julian Day”.

11) P13 L534: "values held in Table 3...". Probably "values given in Tables 3 and 4" or "values held by tables 3 and 4" would sound better?

» We opted for “values given in Tables 3 and 4” in the new manuscript.

12) P15 L613: "accord" -> "accordance"?

» Changed accordingly.

13) P17 L697: "The influence different surface properties exert on the" -> "The influence exerted by different surface properties...?"

» Changed as suggested.

14) Possibly You could also mention the bias correction approach of section 4.4. also in the final conclusion section (5.5.).

» We thank the reviewer for this suggestion. We discussed this issue and now mention the possibility of a bias correction towards a PMW netISF as an added value of our results in the conclusions. At the same time, we mention that a bias-correction towards true SIC is not recommended because such a result would be ambiguous, because we cannot distinguish between water on top of ice and between ice floes and because a correction towards the PMW netISF is physically more meaningful. We also added a

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comment that further research on melt-pond fraction data sets is required.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2020-35>, 2020.

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