

Response to the review tc-2019-120-RC1 by anonymous reviewer #1
of Reviewing Satellite Passive Microwave Sea-Ice Concentration Data Set Intercomparison:
Closed Ice and Ship-Based Observations by Kern et al.

General comments: This paper aims to establish a reference by comparing 10 different sea-ice concentration data sets and derived products without ranking them. This is a novel effort and highly worthwhile since many different algorithms are employed to derive sea-ice concentration from an array of space-borne passive microwave sensors resulting in slightly different geophysical values and therefore different individual strengths and weaknesses.

The study is well researched and sufficiently justified, the methodology scientifically sound and the discussion thorough and comprehensive. The paper is presented in clear language, even though the referencing of ten products, which are sometimes grouped (and not always in the same groups), does not make it an easy read as such. I am satisfied the paper will be of high impact meets the expected standard for publication in *The Cryosphere* and am happy to recommend acceptance with only a few and minor editorial changes (outlined below).

We are grateful to the reviewer for the positive perception of our manuscript and for the many helpful technical corrections that helped to enhance its readability. As the reviewer will recognize when reading the revised version of the manuscript, we needed to shorten it considerably taking into account the concerns of the other two reviewers and the editor.

We note that we revised the grouping of the algorithms, introduced this much earlier and annotated the groups where appropriate to figures and tables.

Technical corrections:

I. 15: [. . .] retrieve SIC [. . .] : remove 'the';

Changed as suggested.

I. 43: [. . .] covered *by* sea ice [. . .] ;

Changed as suggested.

I. 90ff: reference is made to a second paper of a series (of which this paper under review is the first), which will focus on Arctic summer sea-ice conditions. I'd be hoping that a similar effort may be applied to Antarctic summer conditions;

This part has been reformulated to avoid confusion (summer conditions ARE actually treated in this paper as well) and to make clear that the second paper will mainly contain an inter-comparison to MODIS melt pond data and hence will focus on the Arctic.

I.105 [. . .] After Table 2 [. . .] : this is awkward language. Following Table 2???

Changed as suggested.

I. 133 too many commas before and after 'Version X';

Commas were removed.

I. 142 replace 'It roots on [. . .]' with 'It originates from' or 'It stems from';

Has actually been changed to "*is based on*".

I. 167-176 please rephrase the paragraph; plots don't reveal and don't take information from a figure. Plots and figures show/display data that show or reveal . . . ;

We re-formulated the paragraph where necessary.

I. 273 [. . .] an impression of [. . .] not 'about';

We remove the histograms from the paper and hence also the sentences describing these.

I. 313 and I. 355 [. . .] 1980s and 1990s [. . .] not 'nineteeneighty-ties';

Changed as suggested.

I. 331 and I. 339 don't refer to place names (that is 'proper names') in bulk: Greenland Sea and Barents Sea à`A`T as well as Pechora Sea and Barents Sea;

Changed as suggested.

I. 335 and I. 338 and I. 372 the reading would benefit from stating 'differences exceeding -10%' . . . I think I understand what is meant by writing 'differences of < -10%' but it appears confusing à`A`T see I. 376 for a clearer phrase;

These have all been replaced by a clearer phrase.

I. 385 Weddell Sea and Ross Sea;

Changed as suggested.

I. 393 remove 'a' : [. . .] caused by too aggressive [. . .] ;

Changed because sentence has been removed.

I. 434 and I. 438 is 'the last but one bin' actually 'the second last bin' !?!

Bins are denoted by their actual range now.

I. 453 The figure does not confirm. A figure shows data that confirm. . . ;

We changed the wording accordingly where appropriate.

I. 485 replace 'remark' with 'note';

We replace "*remark*" with "*note*" in two places in the manuscript.

I. 494ff. see 'last but one bin' comment earlier;

Bins are denoted by their actual range now.

I. 508-509 This behaviour [. . .] echoes [. . .];

Has been replaced with “*agrees with*”.

I. 546 and I. 549 it is either the track of one ship (the ship’s track) or the tracks of many ships (the ships’ tracks);

Changed accordingly.

I. 553 [. . .] we can not rule out [. . .] instead of ‘exclude’;

Changed as suggested.

I. 578 and I. 579 refer to ‘1’ as the ‘identity line’ – makes it easier to read;

We changed all instances of “1” or “1-to-1 fit line” to “*identity line*”.

I. 590ff ‘in’ time ‘for’ a region . . . not ‘for winter’ etc. ;

Changed “*for*” to “*in*” where appropriate for winter and summer.

I. 602ff Figure15 shows results of binning . . . in red symbols . . . etc. ;

This paragraph has been re-written.

I. 604 This step is motivated by the notion outlined in [. . .];

This paragraph has been re-written.

I. 609 add a note to ‘the black ones’ – I presume it’s un-binned data!?

This paragraph has been re-written.

I. 613 For the Antarctic, [. . .];

Changed as suggested where appropriate.

I. 624 Like for the Arctic [. . .];

Changed as suggested where appropriate.

I. 627 [. . .] distribute symmetrically [. . .];

Text has been reformulated. Comment does not apply anymore.

I. 633 and I. 634 refer to ‘1’ as ‘the identity line’ ;

See above.

I. 647 Inter-seasonal [. . .] for the Antarctic (I think?!?) ;

No, "*Arctic*" is correct here.

I. 682 [. . .] are also shown in our Fig. [. . .] ;

Text has been reformulated. Comment does not apply anymore.

I. 693 [. . .] by a particular algorithm [. . .] ;

Text has been reformulated. Comment does not apply anymore.

I. 711 For the Antarctic, [. . .] ;

See above.

I. 712 [. . .] In September [. . .] ;

Changed as suggested where appropriate.

I. 721 In September [. . .] ;

Changed as suggested where appropriate.

I. 727 Data presented in Figure 6 through to Figure 11, [. . .] ;

Changed to "*For the results shown in ...*"

I. 733 Fig. 1 and Fig. 2 illustrated [. . .] ;

Changed as suggested.

I. 734f [. . .] Potential users should [. . .] ;

Changed as suggested.

I. 739 [. . .] Here, we are interested in both the temporal [. . .] ;

Changed as suggested.

I. 796 [. . .] both Arctic and Antarctica in [. . .] ;

Text has been reformulated. Comment does not apply anymore.

I. 800ff and I. 816 and I. 745 'for' a region (see above) ;

Changed as suggested where appropriate.

I. 855 [. . .] intermediate [. . .] (no hyphen) ;

Changed as suggested.

I. 891 introduce acronym 'GCOS';

Changed as suggested.

I. 913 [. . .] by too aggressive [. . .] ;

Changed as suggested.

I. 925 [. . .] as long as one [. . .] ;

Changed as suggested.

I. 928 [. . .] worth to start reconsidering this threshold [. . .] ;

Changed as suggested.

I. 1078 [. . .] obtained with NT1. NT2 is [. . .] ;

Changed as suggested.

References:

I did not find any reference to Heygster et al (2019) but it's listed in the references;

This is not true. We think the reviewer has mistaken the Lavergne et al. (2019) entry in the references list.

I did not find any reference to Meier et al (2017) but it's listed in the references;

Reference has been added to the text where appropriate.

I. 1273 wrong DOI, should be [. . .]L081565

Changed as suggested.

Figures:

I. 1369 Fig. 3 [. . .] In each panel, the modal [. . .]

Changed as suggested.

Figure 6: clearer labelling of the panels would assist the reader: 'a) SIA winter', 'b) SIA summer', 'c) SIE winter' and 'd) SIE summer';

We labeled the panels as suggested.

I. 1385 [. .] for the Arctic winter (March 2003- [. .] ;

Changed to *“for the Arctic in winter (March) 2003-2011”*

Figure 8 ^{AT} see comment for Figure 6;

We labeled the panels as suggested. Note that this Figure has become Figure 7.

I. 1391 [. .] for the Antarctic winter (September 2002- [. .] ;

Changed to *“for the Antarctic in winter (September) 2002-2011”*

I. 1394 [. .] Same as Fig. 9, but for Antarctic summer (January 2003- [. .] ;

Changed to *“for the Antarctic in summer (January) 2003-2011”*

Figure 11 would benefit from a clearer structure of the panels. While all the information is provided, it is difficult to find. Clearly label the columns ‘SIC’, ‘SIA’ and ‘SIE’, first row ‘Arctic winter’, second row ‘Arctic summer’ third row ‘Antarctic winter’ and fourth row ‘Antarctic summer’

In the revised manuscript we split Figure 11 in two figures, one for the Arctic (or NH) = Figure 9, the other for the Antarctic (or SH) = Figure 12. We labeled columns as suggested and labeled rows with NH winter, NH summer, SH winter, and SH summer.

Figures of Appendix G: the labels and individual panels of the figures are too small to legible. I believe panels a) to l) are January to December but the marks of rows and columns and the actual values are illegible in print.

We re-ordered the 12 panels per Figure, increased them in size and labeled at the top left whether this is NH or SH and SIC, SIA, or SIE. Note that we changed the order, first showing NH in G1 through G3 and then SH in G4 through G6 in accordance with Section 3 where we first discuss the Arctic (Fig. 9) and then the Antarctic (Fig. 12).