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Ocean Science
Discussions

Interactive comment on "Evaluation of Arctic Ocean surface salinities from SMOS and two CMEMS reanalyses against in-situ data sets" *by* Jiping Xie et al.

Anonymous Referee #1

Received and published: 12 February 2019

The paper shows an intercomparison among 6 arctic salinity products (2 based on SMOS acquisitions, 2 climatologies and 2 reanalysis products). All products are also compared with in-situ data CORA 5.1. In addition to the intercomparison by itself, the aim of the paper is to evaluate the best SMOS product to be assimilated by TOPAZ4 reanalysis product.

General Comments

The paper needs a general improvement of the writing. In some cases the concepts are no clear and English should be improved.

Other general comment refers to the version of the BEC SMOS product included in the

comparison. The version of the SMOS BEC product is only clearly defined at the end of the conclusions(lines 543-546). This should be explained in section 2. According to the expressed in conclusions, the version of the BEC SMOS product used in this paper is version 1.0. This version is not accessible now because it has been superseded by version 2.0. Why authors have not included v2.0 instead v1.0 in this study?

This reviewer knows the effort that implies to redo this validation using the new BEC product, but taking into account that v1.0 is not available, the inclusion of this product in the study is not interesting and v2.0 should be used. It is not necessary to proceed with all the period of the current v2.0, only the studied period (2011-2013) will be enough. Please, use v2.0 of 2011-2013 period instead v1.0. Change "BEC product" section accordingly.

Specific Comments

Lines 142-145: The BEC Arctic product 1.0 is not created as is described here. Systematic bias of the retrieved salinity data is corrected computing the so-called SMOS-climatology (the most probable value for a given lat-lon, incidence angle and across swath distance) and substituting this one by a reference. The used reference is the annual WOA13 (the same reference for all maps) and not Argo float extrapolated at 7.5 km. The second correction (the temporal bias correction) was computed for version 1.0 of the Arctic product in the same way as in the global one: assuming that the quantity of salt is constant in the surface. This coarse approach has been refined in version 2.0 (the current one) using Argo to compute the mean value of salinity for each Arctic map.

Line 147: The anomaly is referenced to WOA13 (not WOA09)

Section 3: Many comparisons are made involving different regions and products. A table similar to table 1 but for intercomparisons would help to the reader.

Line 466: Beware both SMOS products do not use different BT filtering flags. The main difference between both is that they are applying a completely different salinity retrieval

method.

Lines 5-9: Suppress “respectively”. This long sentence probably sounds better as “Recently, two independent gridded SSS products have been derived from ....mission: the developed by the Barcelona... and the one developed by Ocean....” Here a mention about the regional or global character of both products will help to the reader to know about the general characteristics of each product (one can expect that a product specifically developed for Arctic will provide better results)

Line 42: “northern North Atlantic”. Authors are referring to the north of the North Sea (a relative small region) or the authors are referring to the thermohaline circulation between Arctic Ocean and North Atlantic? (probably is this second option but “northern North Atlantic” sounds strange to me)

Lines 47-50. This sentence is difficult to read. “a significant change in the global warming scenario” should be “ or a significant”? Probably no, but I do not clearly understand what is the meaning of this sentence.

Line 112: There exist, at least, two different versions of WOA13 (1.0 and 2.0) with significant differences between them in the Arctic data. Please, indicate the one used used in this study.

Line 130: “non geophysical sources” should be better than “unphysical contaminations”

Line 131: ice-sea contamination should be mentioned because is an important source of biases in the Arctic.

Line 193: Acronyms EnKF (Ensemble Kalman Filter) and DEnKF have not been defined in the text

Line 268: “Marches” should be “matches”?

Lines 281-282: Have in mind that comparison of BEC product and WOA is not recommended because BEC product incorporates as reference WOA13.

Lines 285-286: For this reviewer is not clear what do you mean with “over the sea-ice conver” and “under the sea-ice cover”... Under sea-ice cover means “below the ice”? Probably the meanin is related with latitudes not covered by ice?

Line 294: This sentence refers to figure 6? This figure is only referred in conclusions (line 487)

Line 413: The mentioned four observations, are outliers?

Line 536: In my opinion this is not a validation. Is a comparison.

Line 61. Typo: MIRIAS should be MIRAS

Technical corrections (Typos)

Line 122: Typo: “in in Section” ("in" written twice)

Line 133: Typo: “march-up” should be “match-up”?

Line 149: Correct address is http://bec.icm.csic.es

Line 166: Typo: should be EASE instead of EASA

Line 281: Typo: then should be than. The correct ending for the sentence should be “than the provided by BEC product”

Line 317:Word SMOS is used twice.

Line 552: The correct URL is bec.icm.csic.es

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