

Interactive comment on “An enhancement to sea ice motion and age products” by Mark A. Tschudi et al.

Anonymous Referee #3

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Review of

An enhancement to sea ice motion and age products

by

Tschudi, M., et al.

Summary: This contribution attempts to illustrate the enhancements - to be understood mainly as extension - of two sea-ice products issued by the National Snow and Ice Data Center (NSIDC), namely the NSIDC sea-ice motion data set and the NSIDC sea-ice age data set. The latter is based on the former. The manuscript advertizes the data sets, informs a bit about the history of these two data sets and describes briefly changes made to the processing which potentially led to an enhancement in quality of

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both products.

My overall impression is that this paper is not suitable for publication and should be rejected.

It lacks essential information about the retrieval procedure, and the retrieval uncertainties. It further lacks results of an evaluation. It presents trends which seem artificial. It is incomplete in terms of geographical coverage. It contains errors. There are many open technical questions which are not answered in the manuscript and also not in the respective documentation of the data set(s) on the NSIDC web pages.

This paper is written as if it extends a reference benchmark paper where all the required missing details could be found. But this is not the case. Such a benchmark paper does not yet exist for the sea-ice motion product. As the authors stress, the sea-ice motion data set is unique, it has a unique length, and it allows unique applications. And therefore it requires a unique extensive high-quality paper first, in which the reader and the data users can learn about all details and limitations associated with the data set and its generation and evaluation.

General Concerns: GC1: No systematic evaluation of the products has been undertaken - neither for version 3 nor for version 4 of the sea-ice motion product. Also the associated newest sea-ice age data set is not evaluated. In your case, it is not sufficient to just compare version 3 and version 4 of the product because a systematic, detailed evaluation of version 3 products is missing in the scientific literature. There is hence no benchmark against which this new version 4 can be quantitatively referenced. Section 2.2 does not provide new results. There is no indication of a useful sea-ice motion retrieval uncertainty provided along with the product, like is done for sea-ice concentration and thickness data sets. The authors do not present results of an evaluation neither of the newly derived components of the sea-ice motion entering the gridded product nor of the gridded product.

GC2: The reader and data set user is informed about user statistics, the importance

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of the two data sets, some selected bits of the history of the retrievals, and a relatively unspecific description of the changes made to the methods which leaves many open questions. This is, however, potentially not what a reader of this paper and user of this data set would have expected for the following reason: There is no specific paper in which the various retrieval processes, their uncertainties, the caveats of the different spatio-temporal resolution of the input data sets, a detailed description of the merging (optimal interpolation) approach and its uncertainties have been published so that the full package of detailed, high-quality information is visible at a glance. The retrieval, the input data, the pre-processing steps all these are not transparently described. In other words: A benchmark reference paper containing all bits and pieces is missing so far. And in this context this paper about an "enhancement" seems of doubtful value.

GC3: The introduction is a nice compilation of recent work dedicated to changes in Arctic sea-ice area / extent, multiyear ice fraction and thickness and in Antarctic sea-ice area and extent. But: during the past two decades or so various other approaches for sea-ice motion retrieval have been developed and the respective data sets are also in use. This paper lacks a review of this work. The retrieval method is not put into context of the current research landscape in this field. This applies to new algorithm developments (both method and input satellite data) as well as evaluation studies. What I, in this context, understand the least, is that despite evidence exists in the literature from various groups using predecessors of the ice motion data set (mainly version 2 and 3), that the inter-sensor inconsistencies cause artificial trends computed from the ice motion product and render parts of the product not useful, you do not comment about this.

GC4: I also miss an evaluation of the ice-age data set and/or more quantitative statements about its reliability and potential uncertainty. I do not rate a comparison to the previous version of the data set as providing enough evidence for a proven enhancement. Such a comparison provides only qualitative information about the potential sign of the enhancement. Any quantitative information which would go beyond the compar-

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ison to the previous version is lacking.

There is a list of specific comments which I can provide on request if need be.

Interactive comment on The Cryosphere Discuss., <https://doi.org/10.5194/tc-2019-40>, 2019.

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