

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

### **Anonymous Referee #2**

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Review of “An enhancement to sea ice motion and age products” by Mark A. Tschudi et al. TC-2019-40

General comments: 1) 7-10: Stale opening sentences in the abstract. Reads boring, repeats phrases.

2) Abstract: Suggest to provide more "scientific" results/summary. And drop the first few sentences.

3) The ms is a bit plain and could be lifted by addition of further investigation of the ice-motion and ice-age data sets and discussion of the results.

Specific comments:

C1

1/12-13: Pls specify/give example on how they "are not substantially different between the versions."

1/18: "recent years" or "recent decades"?

1/26: Suggest to rephrase "it is more difficult to draw solid quantitative".

2/26: Correct "will expand greatly with the launch of the NASA ICESat-2 in September 2018" as all this is happened (i.e., it is not longer in the past).

2/27: Could mention Op IceBridge in this paragraph.

3/8-9: Redundant?

3/12-14: Shorten.

3/17: Change "ice motion" to "sea ice motion".

3/25-26: Provide info on typical repeat frequency of "Two geolocated, spatially-coincident, temporally-consecutive satellite images".

4/18: How is the oversampling rate of "4" motivated?

4/34: This statement is not correct as is: "AVHRR was discontinued after 2000." Please qualify or remove.

5/3: How is the threshold of "0.4" motivated?

5/8-15: It is not clear how exactly previous versions dealt with input PM data. Can you separate into composite versus swath or similar?

5/19-24: The assumption that sea ice moves at 0.01 of the wind speed (for the Arctic) needs to be reviewed, especially in an environment of highly variable and increasing wind speeds. → Underestimate of the ice speed. I.e., Rampal et al. [2009], Positive trend in the mean speed and deformation rate of Arctic sea ice, 1979–2007, J. Geophys. Res., 114, C05013, doi:10.1029/2008JC005066.

C2

5/29: Replace "data" in "These buoys monitor meteorological and oceanographic data", i.e., to read "conditions" or "states".

5/33: Mention explicitly that there are too few sea-ice buoys in the Southern Ocean.

8/23ff: It is not clear how the few PM (or combined) motion vectors are treated to derive a broad map of sea-ice motion (on EASE grid)? It appears as if severe extrapolation is taking place.

8/24: There are several experiments with decent buoy arrays available for some parts of the Antarctic sea-ice zone. Why not use some of those to at least assess the skill of the product... and to possibly explore the suitability of Antarctic ice-buoy data to provide information into the ice-motion product discussed here.

9/2: The netCDF file should include an additional mask (0/1) where one can mask all gridded ice motion that is "too far" from an actual observation, where the value of "too far" needs to be discussed.

9/32: How is the limit of "16 years" for the maximum ice age set? Physical motivation?

10/19: There is not quantitative measure of how V4 ice age as improved relative to V3: "there is less "speckling"".

10/21ff: In discussing the relative "ageing" of Arctic ice from V3 to V4 there are no physical details provided as to what process would be the main driver of this change.

11/1ff: The discussion of trends and variability in ice motion & age between V3 and V4 should be more quantitative. – Also, regional contributions should be explored.

12/7: Correct "Fennoscandian peninsula." to "Fennoscandian Peninsula." (upper case)

Fig.7: There seems to be a cyclical signal in the ice-speed difference between V3 and V4. Decadal or perhaps 11 - 12 years. Can different PM sensors be the reason for this? Or the speed magnitude??

C3

Fig.9: The version difference in ice age for 4yr+ is not well explained.

Fig.10 & 11 are not well explained/discussed.

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C4