Review of

A Climate Data Record of Sea Ice Age Using Lagrangian Advection of a Triangular Mesh

by Korosov, A, et al.

Summary:

The manuscript presents a new sea ice age data set based on a combination of PMW sea ice concentrations and sea ice drift products. This is an extension/substantial improvement of the earlier work where Eulerian approach to sea ice drift and fractional coverage of ice of different ages is now substituted by a Lagrangian sea ice advection scheme. The presented results on fractional ice ages for 1991-2024 are compared with other existing products from NSIDC and C3S. In general, this is a very exciting data product undoubtedly useful for a number of scientific and management applications.

The are a few comments that should be addressed for the manuscript to be published

Major to moderate comments.

1) Section 3.4 Mapping between the advected meshes

Eq. 5 and 6 suggest a fraction conservation during changes in the areal content (changes proportional to areal change). This can be the case during divergence, but during convergence and hence ice ridging this may not work. This scheme explicitly assumes the ridging intensity to be the same for different age classes. This is in general not the same as younger/thinner ice types have a higher chance for ridging during convergence.

The authors are entirely correct in their statement in Lines 185-186 that there is no straightforward way to account for this based on observations alone. It is not unlikely however that the discrepancies with other products can partly be a result of this equal scaling of fractions of different ages. This is a statement worth making in the text.

2) Uncertainty calculations.

Section 3.8 begins with presentation of "The uncertainty of the produced sea ice age variable". Please clarify what is "sea ice age variable" . Is it something related with Eq.(11) ? If this is the case, then (if I don't misunderstand something), Eq.12 does not seem to be correct - it is not just a sum of uncertainties scaled by the respective ages. Uncertainty of the weighted average can be calculated by the error propagation formula (can be found elsewhere).

Need to mention that this section is quite difficult to read/comprehend. Can the authors consider adding another figure similar to Figure 2 where the entire sequence of uncertainty calculation/aggregation is presented? As far as I see the authors assume the uncertainties for concentrations/fractions for different age classes to be independent?

The uncertainties, the way they are presented in the data (%) and in e.g. Figure 8, are these absolute values (i.e. ice concentrations) or % of these fractions/concentrations? What is the "total uncertainty" – sum of uncertainties for all ice fractions? Please clarify.

The authors apply caping to advected concentrations. Did the authors consider applying the same procedure (caping/or better say conditioning) to the uncertainties? The total uncertainty looks higher than the observed SIC uncertainty.

Minor comments

1) According to WMO nomenclature, see 2.6.1 in

   https://cryo.met.no/sites/cryo/files/IceService_docs/WMO_259-2015_multilingual.pdf

   FYI ice that survived the summer minimum is called "residual ice" and it "officially" turns into SYI only on the 1 January of the coming winter. I understand that it makes it much easier for understanding if the indexing is changed in the way the authors did, but good to mention, at least, that you bypass the established classification a bit.

2) Figure 2: please add colorbars to the panels to improve the visualization. Consider also adding notation like "step 1", "step 2" (or just subplot numbers) in the figure and in the corresponding text in Lines 113->
3) Figure 15: please clarify what the numbers on the colorbars denote.