

Authors' Response to Reviews of

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

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RC: *Reviewers' Comment*, AR: Authors' Response, Manuscript Text

We are grateful to the reviewers and the editor for a comprehensive review of our manuscript and detailed comments!

1. Comments from the anonymous referee and the editor

RC: *1. The reviewer notes that while the revised uncertainty description and formulas are much clearer and the error propagation approach is correct and well explained, Equation 12 could benefit from additional clarification. The indices may be confusing for some readers. Please revise this equation or add explanatory text to ensure the notation is unambiguous.*

AR: The notation of the processing step was changed according to the previous notation in Eqs. 7 and 8, and a supporting comment is added.

$$\sigma_n^2 = k_n \sigma_{n-1}^2 \quad \sigma_{n+1}^2 = k_{n+1} \sigma_n^2$$

RC: *2. The new text explains the Lagrangian scheme limitations. However, the reviewer suggests adding one short paragraph that clearly states the main limitations for users (e.g coastal areas, early-1990s drift quality and strong deformation zones).*

AR: The following paragraph was added to **Conclusions**

Among the limitations of the LM-SIAge dataset, we can name the following. First, although MYI concentration has been available since 15 September 1991, the full set of ice age fractions is available only after the spin-up period, starting from 15 September 1995. Second, the different convergence (and melting) rates of ice of various ages are not accounted for due to the absence of systematic observations for constraining these rates. Assumption of similar convergence (melt) rate for older and younger ice may lead to overestimation of the loss of older ice. And finally, the unrealistic presence of MYI near the coast in the Kara and Laptev Seas results from enhanced sea ice concentrations near the coast in the upstream SIC products due to the "land spillover" effect.

RC: *3. Please add a brief mention that buoy coverage in the 1990s is limited, and therefore validation in this earlier period is less robust than after 2002. This will help users appropriately interpret the validation results across the full temporal range.*

AR: The following text is added to the sub-section **2.5 Ice drifting buoy trajectories**

As noted in (Lavergne and Down, 2023), the overall coverage of the Arctic Ocean with buoys throughout the 3 decades is good, with fewer observations in the peripheral Arctic seas. However, the number of buoys before 2002 is somewhat smaller, making validation in this earlier period less robust.

RC: *4. Finally, there is a typo in your caption for Figure 15 - it should read "(c)", not "(b)" after "NSIDC Age"*

AR: The typo is corrected.