

Firstly, I thank the authors for their considerable efforts to improve the manuscript. I appreciate this takes a great deal of time and can feel frustrating. However the manuscript has clearly been improved in my view.

The authors are correct to identify the following:

“The reviewer’s main concern is whether our results are mainly driven by TFMRA50 radar freeboard or derived altimetry parameters or by auxiliary measurements”

Indeed this is my only remaining concern; I am very satisfied with the authors responses to my other comments.

However I maintain that this concern must be addressed before publication, since the authors describe their product as a timeseries of radar freeboard. In its current form, this product will be interpreted by those both within and outside the radar altimetry community as a product that primarily reflects the difference in retracked heights between floes and leads (what people know as radar freeboard).

For instance the authors have now added the line: “This radar freeboard time series product based on CryoSat-2 estimations intends to provide a record of monthly sea ice changes over the last three decades and for climate studies”. This description clearly implies that “radar freeboard” is the main ingredient or at least the largest ingredient in the product.

If the authors describe their product as such, they simply cannot avoid examining the relationship between their corrected product and the actual radar freeboard (the difference in retracked height between floes and leads). If the corrected values are not clearly related, then their description is misleading in my opinion.

The authors have now nicely addressed this question for Envisat (Figure A2) and I thank them for this. I believe figure A2 offers great insight into the relative impacts of the different data sources on their final product during the Envisat period. The lower panel (included below) indicates to me that there is a positive but weak relationship ($r = 0.253$) between retracked height above interpolated sea level (the radar freeboard) and their corrected product. While this is low, I think it is definitely acceptable.

However I can’t see why they have not presented this relationship for ERS-2, which is the main subject of both their product and the concerns in my review. In my opinion the authors must submit this key piece of information for review. The analogous version of Figure A2 would illustrate it perfectly.

If there is no clear relationship in the lower panel for the ERS version of Figure A2 (shown below for Envisat), it would not be reasonable to present this as a “radar freeboard product”.

If however there is a clear relationship, then my concerns will have been unfounded. In this case, it would indeed be entirely reasonable to describe the product presented here as a “corrected radar freeboard product”.

If the editor can determine that the corresponding figure (inset right) for ERS2 has a similarly strong relationship (or stronger!), then I am satisfied for a manuscript **with that figure included** to be published without further review by me. In my view, no change in title would be necessary in this case.

If the relationship is not clear or significant, then the authors should reconsider framing this as a “proxy” product or similar as previously suggested, and I would like to review again. In the absence of a clear relationship between radar freeboard and “corrected radar freeboard” in the ERS-2 period, framing this product as a radar freeboard timeseries would be misleading.

I thank the authors for their time on this,
Robbie

