

Interactive comment on “Four decades of surface elevation change of the Antarctic Ice Sheet from multi-mission satellite altimetry” by Ludwig Schröder et al.

A. Shepherd

a.shepherd@leeds.ac.uk

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I am a fan of all things altimetry, but this paper falls a long way short of the standard that publications on this topic need to meet today.

1. Title. The title is misleading; a minority (25%) of the data set spans 4 decades. It should be modified to explain this or address the majority data set
2. Error budget. The authors use the variance of single cycle crossover differences as a measure of error, and conclude that the reduced variance offered by their preferred retracker indicates a de-facto improvement in error. This is misleading, as their

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conclusion is entirely related to their choice of error metric and is therefore subjective. To conclude an improvement the authors should evaluate each retracker against independent observations of greater and known precision.

3. Methods. The authors discuss that a variety of approaches have been used to derive continental scale elevation change measurements, leading to apparently large differences in solutions, and yet they present only one solution. The reader is unable to assess whether the presented solution is optimal. The authors should show how the choice of power correction, firn correction, retracker, elevation change solver, spatial and temporal sampling, spatial and temporal interpolation, and mission cross calibration, influence the final product.
4. Validation. Great efforts have been made by others to acquire independent elevation change measurements in Antarctica, for example NASA Icebrige. The authors should make use of these measurements to evaluate their satellite product, and their estimated error budget, in support of their claims that it offers improved accuracy and is optimal.
5. Comparison to GRACE and ERA. I don't understand why the authors have compared altimeter volume changes to mass changes and precipitation anomalies derived from GRACE and from ERA Interim. These are not equivalent, and so a side-by-side comparison has no meaning. There is potential value in contrasting these measurements, if they are each worked up to a common unit such as mass, but that requires more work.

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