

Response to editor – Public justification

October 2025

Dear Clare,

Thank you very much for your positive assessment and for accepting our manuscript pending minor revisions. We sincerely appreciate the constructive feedback provided throughout the review process and are pleased that the revised version meets the journal's standards.

We would also like to extend our sincere thanks to the reviewers for their thoughtful comments and the time they dedicated to evaluating our manuscript. Their input has been highly valuable in improving the clarity and quality of our work.

For your convenience, the requested changes have been incorporated into the manuscript and are highlighted in blue.

Kind regards,

Ida Lundtorp Olsen and Henriette Skourup

On behalf of all co-authors

Dear Authors,

After considering the revised manuscript and the reviewers' follow-up assessments, I am happy to accept the manuscript for publication pending the following changes:

1. Title: Both reviewers and I have repeatedly asked for changes to the title. The current wording does not reflect the scope and purpose of the dataset. The term "tailored" must be removed. Consider adding a term such as "repurposed" to clarify that the dataset draws on existing sources that were not originally collected for this purpose. Please propose a revised title that reflects these points.

We agree and have changed the term "tailored" to "repurposed".

2. Reviewer 2 has noted this concern about misleading dates before: "L39. It may be worth already here pointing towards that the data here is averaged, gridded, and in my opinion misleading dates added (e.g. the submarine data), and that readers will in the document find links to the original data that may better fit their needs, and point the reader to Table 2." Please include a brief statement in the text explaining that the data have been spatially gridded and temporally averaged, and that the original measurement dates and locations may differ from the processed values. Refer to Table

2. It is helpful to be explicit about what has changed from inputs to the final product, including both benefits and limitations. You might also consider adding flags to the dataset or a column in Table 2 indicating averaging/gridding and the original date ranges. This will assist users in interpreting the data and understanding how best to use it in their own work.

We agree with the reviewer's comment. To clarify this for the reader, we have added a specific explanation of the gridding procedures and their impact on the temporal and spatial coverage in the Introduction. All relevant information was already present in the manuscript; however, we have now improved clarity by explicitly referencing the corresponding tables and figures to better guide the reader.

“This signifies that the processed values may not directly reflect the original measurement dates or locations, particularly in cases where the input data are limited by incomplete metadata (see Table 4 for an overview). Table 2 provides a comprehensive list of the original data sources, including their full temporal coverage, while Table 7 details the gridding methodology applied to each dataset. Fig. 4 illustrates the specific date ranges associated with each dataset (temporally and spatially gridded) in the CCI SIT RRDP. Users requiring higher temporal or spatial resolution are encouraged to consult the original datasets directly, which are accessible via the links provided in Table 2.”

3. To maintain clarity, you could change "uncertainty budget" to "error estimates" or similar wording. (Reviewer 2 comment about L60: "What is an uncertainty budget?")

We have changed the “uncertainty budget” to “error estimates”.

4. Please update "N-ICE" to "N-ICE2015" to reflect the official name (abbreviation)

Thank you for your helpful comment. We have made the suggested changes throughout the manuscript.

5. In response to Reviewer 2's comment about ongoing datasets (e.g., ASSIST and the ULS data in the Fram Strait Arctic Outflow Observatory), please add a brief statement noting that several datasets are part of ongoing observational programmes. You might include a column in Table 2 indicating whether each dataset is ongoing or has concluded. ESSD supports live data, so you can make this explicit.

Thank you for this suggestion. We have added a column in Table 2 describing whether the datasets are “ongoing” or “concluded”. The text has been updated accordingly.

6. Please revise Figure 3 as suggested by Reviewer 2: "Figure 3 is difficult to read as the

dots and the diamonds looks very similar both in shape and size. Perhaps change the colour on one of the datasets for improved readability."

We agree and have revised Figure 3. We have made the SIMBA buoys diamonds now light grey and kept the others as is. We have updated the text accordingly.

7. Reviewer 2 asks why the ASSIST data are included. Please provide a clear statement that ASSIST data cannot be used for quantitative validation of satellite altimetry, but do offer valuable spatial context and qualitative information. This, together with the revised title, should clarify the role of ASSIST data.

We agree that the concern regarding the use of ASSIST data in the context of satellite altimetry comparisons needs to be addressed. To clarify our rationale, we have added the following text to the manuscript:

"The ASPeCt and ASSIST data are included in this compilation to examine whether they can be used for sea ice thickness and snow depth comparisons to satellite altimetry, given their spatial and temporal coverage. These datasets are among the most extensive observational records available in the SH and also provide summer sea ice thickness measurements in the NH (Fig. 5), which may help fill observational gaps if they prove useful for this purpose. While differences in measurement techniques and associated uncertainties exist, their inclusion offers spatial context and qualitative insights that may complement other sources and support broader interpretation of sea ice conditions."

We hope this addition clarifies the motivation for including these datasets and acknowledges the limitations highlighted in the conclusion.

Response to referee #1

October 2025

Ida Lundtorp Olsen and Henriette Skourup

I think the authors for responding in detail to my reviews and comments. I think you've done a good job increasing the clarity and potential utility of this dataset, nice work. I think the introduction is much clearer now too.

I will admit I am still a little on the fence regarding the median vs mean approach and how this relates to a satellite product validation (that will include outliers/skew). But at this stage I think you've presented what you think is best and future efforts can explore these concepts in more detail, so I encourage prompt publication!

We sincerely thank the reviewer for their positive feedback and thoughtful engagement throughout the review process. We are pleased to hear that the improvements made to the manuscript, particularly in terms of clarity and utility, have been well received.

Regarding the comment on the use of the median versus mean approach, we appreciate the reviewer's openness to our rationale and agree that future work may further explore this aspect in the context of satellite product validation. We are grateful for the reviewer's support for publication at this stage.

Kind regards,

Ida Lundtorp Olsen and Henriette Skourup

On behalf of all co-authors

Response to referee #2

October 2025

We would like to extend our sincere thanks to the reviewer for their thoughtful comments and the time they dedicated to evaluating our manuscript. Their input has been highly valuable in improving both the clarity and overall quality of the work.

For convenience, the requested changes have been incorporated into the manuscript and are highlighted in blue.

Kind regards,

Ida Lundtorp Olsen and Henriette Skourup

On behalf of all co-authors

Following reviewer 1 I also recommend updating the title of the work, in particular the part of "Tailored for Evaluation and Product Intercomparison of Satellite Altimetry" as the data was never collected with this in mind. And a reader may assume that the in-situ data was collected for this reason.

We agree and have changed the term "tailored" to "repurposed".

It's argued that if you remove data collected in the altimeter polar hole the dataset will be too small (L948-950). If this dataset is meant to provide a reference for altimeter data, it seems somewhat contradictory to first process the data for altimeter comparisons and then include data that will not be useful for this comparison.

comments about the exclusion of data from the polar hole, as these data may still be valuable for some users.

We appreciate the reviewer's thoughtful comment and understand the concern regarding the inclusion of data from the pole hole. However, we respectfully maintain our original approach, as the inclusion of these data is intended to support draping products covering the pole hole and as broader use cases beyond direct altimeter comparison. This point was considered during the editorial assessment, and no further revisions were requested. Accordingly, we have not made changes to the manuscript in response to this comment.

L24-28. As in-situ data can rarely match a satellite image in spatial and temporal extent and claiming that such data is scarce (as done here) could be considered misleading.

We appreciate the reviewer's perspective on this point. However, we respectfully maintain our original wording, as we believe it accurately reflects the context and limitations of the available in-situ data in relation to satellite observations. This aspect was discussed during the editorial assessment, and no further changes have been requested. We therefore have not made any modifications to the manuscript in response to this comment.

L39. It may be worth already here pointing towards that the data here is averaged, gridded, and in my opinion misleading dates added (e.g. the submarine data), and that readers will in the document find links to the original data that may better fit their needs, and point the reader to Table 2.

We agree with the reviewer's comment. To clarify this for the reader, we have added a specific explanation of the gridding procedures and their impact on the temporal and spatial coverage in the Introduction. All relevant information was already present in the manuscript; however, we have now improved clarity by explicitly referencing the corresponding tables and figures to better guide the reader.

“This signifies that the processed values may not directly reflect the original measurement dates or locations, particularly in cases where the input data are limited by incomplete metadata (see Table 4 for an overview). Table 2 provides a comprehensive list of the original data sources, including their full temporal coverage, while Table 7 details the gridding methodology applied to each dataset. Fig. 4 illustrates the specific date ranges associated with each dataset (temporally and spatially gridded) in the CCI SIT RRDP. Users requiring higher temporal or spatial resolution are encouraged to consult the original datasets directly, which are accessible via the links provided in Table 2.”

L60. What is an uncertainty budget?

We have changed the “uncertainty budget” to “error estimates”.

The official name (abbreviation) for N-ICE is N-ICE2015. Please update accordingly.

Thank you for your helpful comment. We have made the suggested changes throughout the manuscript.

Please indicate where the data is still being collected, such as, e.g. ASSIST and the ULS data in the Fram Strait Arctic Outflow Observatory, to ensure that readers search for and use the full dataset instead of this provided subsection.

Thank you for this suggestion. We have added a column in Table 2 describing whether the datasets are “ongoing” or “concluded”. The text has been updated accordingly.

Figure 3 is difficult to read as the dots and the diamonds looks very similar both in shape and size. Perhaps change the color on one of the datasets for improved readability.

We agree and have revised Figure 3. We have made the SIMBA buoys diamonds now light grey and kept the others as is. We have updated the text accordingly.

As stated in the conclusions: "Visual observations of sea ice thickness and snow depths from ship cruises cannot be used as reference measurements for satellite altimetry in the present form presented in the RRDP, as they are biased low in their distributions." Why are then the ASSIST data even included in this manuscript?

We agree that the concern regarding the use of ASSIST data in the context of satellite altimetry comparisons needs to be addressed. To clarify our rationale, we have added the following text to the manuscript:

"The ASPeCt and ASSIST data are included in this compilation to examine whether they can be used for sea ice thickness and snow depth comparisons to satellite altimetry, given their spatial and temporal coverage. These datasets are among the most extensive observational records available in the SH and also provide summer sea ice thickness measurements in the NH (Fig. 5), which may help fill observational gaps if they prove useful for this purpose. While differences in measurement techniques and associated uncertainties exist, their inclusion offers spatial context and qualitative insights that may complement other sources and support broader interpretation of sea ice conditions."

We hope this addition clarifies the motivation for including these datasets and acknowledges the limitations highlighted in the conclusion.