The Cryosphere Discuss.,
https://doi.org/10.5194/tc-2019-250-RC1, 2019

The Cryosphere Discussions

Interactive comment on "CryoSat Ice Baseline-D Validation and Evolutions" *by* Marco Meloni et al.

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Received and published: 28 December 2019

Review for The Cryosphere Discussions, https://doi.org/10.5194/tc-2019-250

CryoSat Ice Baseline-D Validation 1 and Evolutions Meloni et al., 2019

This study provides a comprehensive evaluation of the CryoSat-2 'Ice' processing chain at Baseline D, including measurements over land ice, sea ice and inland water. Several areas of strong improvement are noted between the Ice processing schemes at Baselines C and D. The conclusions of the study are useful for the large scientific community using Level 1B and 2 observations from the CryoSat-2 Ice processor, particularly those using ESA's official derived land ice and sea ice data products.

The paper is well put together and offers detailed assessment of the validity of Ice measurements at Baseline D. However, I would suggest to the authors to include more

information on the specific changes/evolutions that have been implemented between the Baseline C and D processing chains. I have provided a set of minor comments and recommendations but have no significant concerns with the author's methods or results. My review is focused on the sea ice validation, since that is my area of expertise, although I have made a few minor comments elsewhere.

Please don't hesitate to get in contact if you have questions regarding these comments. Kind regards, Jack Landy

General comments:

1. It is important for tracking the history of each baseline to describe here what issues led to poor quality L2 data in baseline C (e.g. Section 3.3.2) and then what specific modifications were made to the retracking algorithms or processing chains that have led to vast improvements at baseline d.

Minor comments/edits: Line 40-41. Reword to explain why the 12 km is relevant. L48-49. Are the exact same set of auxiliary measurements used for this ice draft analysis at baselines C and D? Fig 1. Please include product acronyms in the captions. Section 1. It would be useful here to include some introduction to the observations produced in the L2 data product. What specific measurements are provided by the ice processor at L2 for land ice, sea ice and lakes? L 140-141. How can the SARIn mode be used to reduce uncertainty? L 143. Need to explain what is meant by 'bad phase difference calibration'. L150-153. What are these parameters for and how Cn they be used by the community? L159. OK to refer to another study, but you need to at least include a definition here of this correction. L170. What is specific about the SARIn mode retracking? Specific in comparison to SAR mode? L172-173. Define retracking before this discussion. You also need to include details of this retracker and how it is implemented. L176. 'Records' is quite ambiguous. Returns? L214-215. This was an issue with baseline c data, or just an issue with the selected TDS for baseline d? L238-239. Clarify whether the angular correction is implemented by the data provider

for baseline d L1B products? Can you explain in a little detail here the source of the angular error and its spatiotemporal dependence? L247. What are these retrackers? What are their differences? It would be extremely useful generally for the altimetry ice community if the authors could provide a table here with details of all the retrackers implemented for each surface type and sensing mode. L249. Citations? L250. Updated surface mask derived from what? By whom? Fig 3. Include an inset map of the location. L327-328. Explain why. L349-350. Add explanation on the latest ESA baseline d retracking algorithm and processing chain. Does it follow one of the other group's processing chains? Are the retracking solutions from other group's algorithms available in the baseline d L2 ice processor data product? L375-376. Clarify. L385.The hyperlink doesn't seem to work. L394. Is this correct? I expect this rms measure is a convolution of the noise with valid signal at the sub grid-cell level. A better estimate for the noise distribution would be obtained from along-track rms of height observations over smooth level ice. Fig 8. Very difficult to see the difference map. Can you enlarge the points and ensure the color scale is cantered so that white = zero. Almost impossible to visualize the positive anomalies here. L404. You need to explain in detail the processing changes that have led to such extreme improvements here. Fig 9a and b. Please include the best-fit line so the reader can see the deviation from 1:1. How were the OIB freeboard observations processed? Are they an official NSIDC product? How are the CS2 observations converted to draft from freeboard? Most importantly what assumptions were made about the snow load? L422-42. This paragraph seems more appropriate for the introduction. L438-439. By what degree can it be reduced? I would also expect it to reduce systematic uncertainty associated with biases in the SSH retrieval. L471-472. Most of these citations do not correspond with the AWI data product. L479-480. So is the ESA retracking algorithm used to derive freeboard, then the remaining processing uses the AWI chain? Or is the full processing from AWI but using different data baselines? L489. Is the phase used to produce an ONC in this processing chain? L504-508. This passage requires explaining in more detail. L536. Identical? Fig 12. It is very difficult to observe any differences between these classifi-

cations if indeed there are any. If there are, can you use extra panels to highlight the differences? L562-563. Explain. L564-565. Why is one meter considered to be good? Do you mean the lake mean height from a single track? L575. Why was such a large offset present at baseline c?! Fig 13. Is this a stacked bar chart? If not, move the BD bars next to each BC bar. L590. The lower noise level is not really confirmed here, as I explained in the comment above this would require a different approach to ascertain. L599. Which statistic? Mean bias, rmse..?

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