

Interactive comment on “On retrieving sea ice freeboard from ICESat laser altimeter” by K. Khvorostovsky and P. Rampal

Anonymous Referee #2

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The paper presents a study to evaluate the two NASA methods (TP and LLE) for retrieving total freeboard and explore the similarities and differences for both, and provide an improvement for the TP method to produce a better freeboard than either TP or LLE. The paper is overall read well, although can be improved since many places lost me completely and I have to stop reading. After a few days, I need to reread it again. This is one reason actually took me so long to read it through. I feel the paper has merit for publication, but the presentation can be improved. Clarifications are needed for the followings. (1) in the abstract, you said “LLE give significantly lower estimate over thick multi-year ice and larger estimates over thin first year ice as compared with the TP”. However, from figure 9, it seems in all cases, the freeboard from LLE (Goddard) already higher than from TP (Tiepoints). Please explain. (2) in the abstract, line 20-24, you seem say the LLE and TP methods give similar freeboard estimates (that’s why

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you said the ice thickness difference might be due to different other parameters used). However, from the comment (1) above, it is clear that freeboard from LLE and TP are not the similar. Please explain this statement or rewrite it.

Page 2, Line 24, references for using the LLE method, there is important reference missed and suggest to add in here. Xie, H., A. Tekeli, S. Ackley, D. Yi, and J. Zwally, 2013. Sea ice thickness estimations from ICESat Altimetry over the Bellingshausen and Amundsen Seas, 2003-2009, Journal of Geophysical Research, doi: 10.1002/jgrc.20179

Page 3, line 1, “JPL estimates” to “JPL estimates of ice thickness”

P4-L20, lowest 1

P5-L2, is very confusing, should remove the 25.

P6-L7, “ice” should be “ocean water”?

P6-L10-19, it seems part of the method and should be move to the method. If you can make a kind of work flow chart, it would be even better.

Section 3.5 summary should be combined into the conclusion section

P14-line 7-8, “we obtain similar. . .”, however, figure 9 shows that they are not similar, although the patterns are similar.

Some table and figure captions include a lot of information but a kind of strange way as compared with normal captions of figures and tables. I hope they can make changes and improve them. so readers can easily understand the table or figure. In their current format, I have difficult to read them. for example, Table 1, Figure 2 ((d) is not mentioned in the caption and no unit for any of them)

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