Response to Referee #1 “Review of: A simple model for daily basin-wide thermodynamic sea ice thickness growth retrieval”

By Anheuser, et al.

Author responses in red.

1 Synopsis

Congratulations again to the authors for another round of good responses. I should apologize for the substantially delayed review on my end. I’m pleased to say I’m very satisfied with the responses and revised manuscript. I think the paper now represents a rigorous and interesting contribution to the literature on sea ice thickness - in particular I think it has a strong element of literature review, and it is pleasantly surprising how well the product does given its relatively low complexity and number of data inputs.

I have a couple of remaining comments. If the editor is satisfied that the authors have suitably responded to these, then I am happy for the manuscript to be accepted without further review.

2 Comments

Fig. 2: The label on the colorbar should be padded away from the tick labels to improve readability. This looks like a python plot - if so, this can be done with the labelpad keyword.

This change has been made.

Fig 3: This is a good figure, but needs a bit of cleaning up. I don’t think the colorbar label needs ‘[-]’ in it. Furthermore, a line break would help improve readability for the right-hand panel’s y-axis label, and the subplots could do with being moved apart a bit (fig.subplots adjust(wspace)). You have lots of horizontal space to do this, so it should be straightforward. You also need (a) & (b) annotations to match the caption. Finally, the text annotations in both panels need proper right-hand-justifying, if you’re using python you can do this with the ha keyword passed to ax.annotate().

The same points from Fig. 3 also apply to Fig. 6 & 8. Colorbars could also do with a tick-label at 0.

These updates have been made to Figs. 3, 6, and 8.

L458: ‘instantaneous’

This spelling has been updated.

L501: That’s a nice point about not being dependent on atmospheric reanalysis, consider putting this in your abstract.

Good suggestion, we have added this to the abstract:

The advantages of the SLICE retrieval method include daily basin-wide coverage, lack of atmospheric reanalysis product input requirement, and a potential for use beginning in 1987.

Response to Referee #2 “Review of: A simple model for daily basin-wide thermodynamic sea ice thickness growth retrieval”

By Anheuser, et al.

Author responses in red.

I appreciate the authors' efforts to respond to my questions and comments. Most of the responses are successful, thus I think this manuscript has improved to be published in the Cryosphere.

However, I found some errors in the revised manuscript (inconsistency between the authors' response and the revised manuscript). Those are:

1) Abstract: I cannot find the passage "basin-wide SLICE has equal linear correlation ... Operation IceBridge, respectively.", which authors wrote in the authors' response. I suppose that they changed the word "equally" to "nearly"? Please confirm...

The next revision will include the following as the last line of the abstract:

Despite its simplifications and assumptions relative to models like the Pan-Arctic Ice–Ocean Modeling and Assimilation System (PIOMAS), basin-wide SLICE performs nearly as well as PIOMAS when compared against CryoSat-2 and Operation IceBridge using a linear correlation between collocated points.

2) Figure 2: Inconsistency between the response and figure in the revised manuscript. The authors said they show snow-ice interface temperatures on November 1, 2013 (also in the text). However, the caption in the manuscript is about January 1, 2013.

We have updated the manuscript text to state the figure shows January 1, 2013 snow—ice interface temperatures, which is indeed to data being show. We discussed a few other captions and numbers within the text that were not updated from previous revisions:

L9: mean correlation of 0.90 was replaced by 0.89 and mean bias of 0.08 m was replaced by 0.06 m

Fig. 3 caption: “Both exhibit a linear correlation of 0.71” was replaced by “Linear correlations are 0.70 and 0.71, respectively”.

Fig. 4 caption: mean correlation of 0.90 was replaced by 0.89 and mean bias of 0.08 m was replaced by 0.06 m

L358-L360: mean (standard deviation) correlation of 0.90 (0.19) was replaced by 0.89 (0.21) and mean bias of 0.08 m was replaced by 0.06 m

Fig. 6 caption: “SLICE has the highest linear correlation though all three are virtually equal” replaced with “All three have similar linear correlations”.

L413: mean correlation of 0.90 was replaced by 0.89 and mean bias of 0.08 m was replaced by 0.06 m

Fig. 8 caption: “SLICE has as lower bias at 0.03 m than PIOMAS at 0.10 m and linear correlation values are equal” replaced with “SLICE and PIOMAS have nearly equal mean bias and linear correlation values.”

L484: mean correlation of 0.90 was replaced by 0.89 and mean bias of 0.08 m was replaced by 0.06 m

3) I found that the word "improved" in L395 of the previous version of the manuscript is replaced with "similar". However, the authors responded that they replace it with the word "lower". Please verify... Is this response to figure 8?

We've changed this word to "lower".

These must be corrected or confirmed before publication.