

Satellite-based sea ice thickness changes in the Laptev Sea from 2002 to 2017: Comparison to mooring observations

Hans Jakob Belter, Thomas Krumpfen, Stefan Hendricks, Jens Hoelemann, Markus Janout, Robert Ricker, and Christian Haas

<https://doi.org/10.5194/tc-2019-307>

25 May 2020

The authors have presented detailed, proper answers to all my comments to the first version of the paper, and made corresponding changes and additions to the paper. I think that the paper has improved considerably, and its overall structure is now good. Below I have some minor comments for your consideration for further possible paper improvements.

2) In Introduction Section you could review what is current understanding on the accuracy/quality of the CCI-2 SIT CDR: it seems this has been investigated at least by Kern et al. 2018. Are there any other studies, especially in peer-reviewed journals? You could also review similar other studies: comparisons between RA SIT records and sonar draft data. What is the typical relationship(s) between sonar and RA drafts over MYI?

No changes in the 'Introduction' but a short additional review of previous results and a comparison between MY and FYI results in the 'Conclusion'.

This is good addition, but you could also shortly review studies conducted (if exist) with other RA SIT records, e.g. by UCL and NASA,

3) A short section describing typical sea ice conditions and typical progress of sea ice season in the Laptev Sea would be good addition to the paper. How much there can be MYI in the Laptev Sea? Can there be large areas of grounded landfast ice for which the used freeboard to SIT conversion is not valid, and thus, could have an effect on your results?

We added a short paragraph to introduce the general conditions of the Laptev Sea ice cover to the 'Introduction' (LINES 52-57).

“with water depths between 15 and 200 m very shallow” somewhat odd sentence; “and it is very shallow with water depths between 15 and 200 m”?

6) In Section 2 you could have a sub-Section which describes how different datasets are processed to match each other. Now this information is scattered in sub-Sections describing the datasets. Also include a Table which summarizes datasets: spatial and temporal resolutions, accuracies, etc.

Summary paragraph for satellite data processing following the introduction of the satellite data sets LINES 161-171).

This is very good addition. It could be under its own sub-section; now it is after “2.2.3 Merged CryoSat-2/SMOS data”

9) Section 3.3.2 Merged CS2SMOS sea ice draft contains also a summary of all results; this should be in its own sub-Section.

We added a free line after the Section 3.3.2. to show that the summary below is the summary for the entire 'Results' chapter rather than the 3.3.2. Section.

-Changes: Addition of extra line after LINE 272.

I guess you can do it like this, but maybe you could check with the editor if this is in line with the TC paper style.

11) Tables 1-3 show averages of statistical parameters from different mooring locations. I am not sure this is meaningful, what an average correlation coefficient really tells us here? I think better would be here to combine all datasets together and then calculate RMSD, mean difference and r.

We hope you agree that we clearly state that the averages of the correlation coefficients are nothing more than averages over all stations and do not provide information about how good the general agreement between VAL and the respective satellite data is. No additional changes have been made here.

Yes, I can agree on your solution.

It would be interesting to see what is the typical variation of the sonar draft during a day, week and month. A figure about a time series of sea ice draft from some ADCP location would be nice.

An example of the variation on a monthly scale is given in Fig. 7 (the Taymyr case study) and we are happy to provide the high frequency (1 Hz) sea ice draft time series (also for the Taymyr case) below (Fig. 1).

I think you could add this figure under Section 2.1.1 with short description in the text. It shows nicely much there is draft variation in the raw data vs. the daily mean. You could also add weekly and monthly averages to this figure. This would nicely show the ULS draft variation in different temporal scales.

Are there any peer-reviewed journal papers that could be put as reference to CCI-2 SIT CDR in Section 2.2.1? A figure about monthly gridded SIT over the Laptev Sea would be interesting see; also what is typical SIT spatial variation over the Laptev Sea in this monthly product? How many pixels there are over the Laptev Sea?

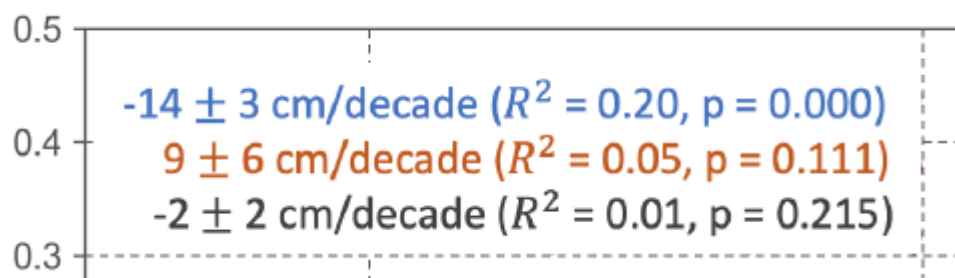
No changes to the text required.

I still think an example figure in Section 2.2.1 about monthly gridded CS2 SIT over the Laptev Sea would be interesting.

Comment correlations shown in Figure 2 in Section 3.1.

We are not sure what correlations you are referring to here. We are not showing any correlations in Fig. 2 and therefore do not mention any in the text.

There are correlations in Figure 2:



line 170: “Since all five data sets are based on radar altimetry data satellite sea ice draft data is only available from October through April.”

Short explanation with references for why the temporal restriction (dry snow period). Later in lines 369-370 there is an explanation related to this.

The paragraph in lines 248-252 is somewhat separate from the topic of Section 3.2.1. This could be moved as introductory (with some intro also to 3.2.1) to beginning of Section 3.2.