The Cryosphere
Discussions

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Interactive comment on "Satellite-based sea ice thickness changes in the Laptev Sea from 2002 to 2017: Comparison to mooring observations" *by* Hans Jakob Belter et al.

Anonymous Referee #2

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In the manuscript the authors inter compare satellite-based sea ice thickness retried from ENVISAT and Cryosat2 data with the sea ice thickness retrieved from ADCP and ULS measurements in the Laptev Sea. The comparison give a new insights into the satellite-based sea ice thickness data and is of interest for sea ice community.

General comments:

1. The 'Data and method' section lacks important details. The data section only briefly introduces different data sets. It is not clear how many measurements were compared and how the mean Laptev Sea sea ice thickness from gridded data was calculated. Section 4.1. and 4.2 describing data limitations can be moved to the 'Data and meth-

ods' to provide the reader with valuable information before introducing the results.

2. The discussion can be elaborated. - The Anabar, Khatana and Lena stations a located in the area of polynya formation. Are polynya events taken into account in SAT and VAL data? Do the polynya events affect your comparison between SAT and VAL monthly mean? - One of the main finding shows that SAT data represents modal sea ice thickness rather than mean. What is a possible explanation? - The SAT-VAL difference depend on sea ice thickness. It there a seasonal change in this difference? I suggest that a scatter plot with seasonal cycle might be informative. - Section 4.4 introduces new data, method and results. Would it make more sense to restructure it and add a subsection to methods and results? Why other data from ADCP and ULS is not shown? Does it confirm you findings?

Specific comments:

Line 160: 'The ESA CCI-2 SIT CDR shows an overall thinning of sea ice in the Laptev Sea between 2002 and 2017.' The sentence about is too strong. The error of the overall trend is as large as trend. Also the significance of the trend is quite low. The black line rather shows that there is no changes in sea ice thickness.

Lines 161-162: How is the Laptev Sea defined? Please show the region used for SIT anomaly calculation in Figure 1.

Line 210: 'ENVISATorbit data shows a higher average RMSD, stronger average underestimation of VAL sea ice draft and much lower average correlation with VAL sea ice drafts compared to the gridded ENVISAT data' Is there an explanation? Why does the orbit data which supposed to be closer to the VAL measurement shows worse statistical characteristics?

Lines 282-283: 'The seasonal biases between ENVISAT and CS2 need to be considered for the temporal development of the Laptev Sea SAT-VAL differences between the two periods'. Please elaborate. Are those biases considered in this study?

Lines 343-348: It is worth mentioning that ULS provide sea ice draft measurements after the onset of melt. However it is not a real finding that there is sea ice in the Laptev Sea in June-July. Please consider reformulating.

Line 359: 'The presented satellite products represent similar sea ice drafts differently.' I am not sure the meaning is clear. Do you mean identical sea ice draft or sea ice draft of similar thickness, e.g. within presented bins?

Technical comments:

Page 1 line 24: sea ice system –> sea ice state?

Page 2 Line 43: a space after '(ULS)' is missing

Line 132: a space after 'ENVISAT' is missing

Figure 2: It seems that colors of he legend in the upper left corner are mixed up. The negative trend should be the ENVISAT one.

Figure 7: The scale on the sea ice draft axis is missing

Interactive comment on The Cryosphere Discuss., https://doi.org/10.5194/tc-2019-307, 2020.