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Interactive comment on "Inter-comparison of snow depth over sea ice from multiple methods" *by* Lu Zhou et al.

Anonymous Referee #2

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This paper is reporting inter-comparison of various snow products from all different sources. The topic is timely and important – an overall good attempt. However, the manuscript suffers from a bad description of the results, especially Section 3. I recommend revising the whole section to point each argument to relevant evidence (figure or table) to support, also the supplementary materials should be there to support the main results, so suggest avoiding unnecessary explanation of the supplementary materials (that can be in the caption). In the beginning, I was quite excited to read the manuscript but quickly losing the interests due to the way the results being described. Section 3 can be much improved (I think it is Results and Discussions) if the authors restructure and rewrite them carefully. Too much unnecessary description in my view, and too little discussions. I really value the topic, but unfortunately, the manuscript itself is not up to

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Discussion paper

the standard.

Specific comments: Section 3 – Each sentence should be backed with Figures or Tables for the evidence. Many sentences are without pointing to specific figures. See some examples below.

Line 284: In particular, "NEOSIM...section" Should point the readers to figures or tables for your argument.

Line 293: "Deeper...-LG." "DESS shows..." Are you referring to Figure S1 or others? I recommend revising all sentences for this.

Line 301: "Modal and distribution..." do you need this? It is obvious from the figure.

Line 304: "Since the..." then what are the spatial coverage for other products in comparison?

Line 305: Are you referring Figure 3b or else?

Line 306: "PMW..." where do the readers to look at? "Mean snow depth...2.0 cm higher..." Is it spring or autumn? Please be specific and add figures.

Line 313: "We additionally...set used." The whole paragraph is describing a supplementary figure. What is the key point for this? I see a general tendency that the description of the results is heavily on supplementary materials. The supplementary materials are to support the main figures and tables but seems overpowering. For this paragraph, please think whether you need all detailed description of the figure, rather than using them to support the main results. I found this is the problem throughout the manuscript.

Line 324: "DESS exhibits...snow depths." Which figure or table for this?

Line 325: Are we still in Figure 4?

Line 325: winter time snow accumulation is largest in SnowModel-LG...Are you refer-

ring to Figure 4? I don't see it clearly.

Line 331: "the inter-annual variability of monthly averaged..is small among" I don't get this. Small among all snow products? Small compared to what? What do you mean? Also it is difficult to see which points are November or April in Figure 4.

Line 335: "DuST show a significant positive..." where is the evidence?

Line 337: "This features is also not..." where is the evidence?

Line 339: "We do not find..." Where can I see that? Figure 5 shows the trend from 1991 to 2015.

Line 353: "...directly fitted against OIB". What do you mean? You mean OIB data assimilated into those products?? "...show high correlations..." where is the number?

Line 357: "Figure 6..." Shouldn't this be first mentioned? Or Do you need this sentence? "The corresponding..." If you directly reference in the text, why do you need this?

Line 362: "Not surprisingly..." Why?

Line 380: What is the key message here? Higher R2 for coarse resolution but no significant difference for temperature resolution?

Line 387: "Given..." it seems the results are sensitive to the choice of OIB data, but to me it does show some consistency, e.g., SnowModel-LG R2 range from 0.27 to 0.47 yet PMW Bremen from 0.56 to 0.70. So, I don't know whether I should agree that it is impossible to conclude which ones perform better. Perhaps it is more related to how the particular products dependent to OIB data in their production?

Line 397: "PMW Bremen and..." no variability where I can see that? Figure 7? You mean no correlation? You have Figure 7 as one of the main figure but very little description for that. What is the point showing this?

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Line 400: I think it is far-fetched to compare each buoy with such products. I wonder why we see no correlation. Section 3.4: Personally, I like the results from this section, and found interesting among other results. The difficulty is that it is like comparing apple with an orange, but it does give us a general conclusion which is useful.

5. Discussion: I found this is confusing about the scope of this research. Need to make it clear whether you want to show the inter-comparison results or developing a new sampling strategy. The whole discussions are about sampling strategy not about inter-comparison results. This actually tells me whether this is a research article or just for a discussion.

6. Conclusions: It is too lengthy. Should be cut down to the key results and messages.