

The Cryosphere Discuss., referee comment RC2  
<https://doi.org/10.5194/tc-2021-80-RC2>, 2021  
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## Comment on tc-2021-80

Anonymous Referee #2

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Referee comment on "MOSAiC drift expedition from October 2019 to July 2020: sea ice conditions from space and comparison with previous years" by Thomas Krumpen et al., The Cryosphere Discuss., <https://doi.org/10.5194/tc-2021-80-RC2>, 2021

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### Summary

This paper provides an overview of the sea ice and atmospheric conditions along the Polarstern drift track during the first phase of MOSAiC. An impressive number of satellite data products are used to achieve this. While the manuscript isn't the most exciting from a scientific perspective, I appreciate that it wasn't intended to be. It will act as great reference material for anyone interested in working with MOSAiC data and I would be very pleased to see it published. However, I have some comments to be addressed first.

### General Comment

The manuscript contains a huge amount of information, and I strongly feel that readers would benefit from having the highlights presented in a more accessible way. I suggest including a synopsis/summary table, which includes:

- Satellite datasets evaluated
- Spatial and temporal resolution of each dataset (raw, and when averaged for this analysis)
- Statement of which datasets were analyzed close to the CO, i.e. not just within the 50 and 100 km radius, and what "close" means (as it varies for each dataset)
- Key results (as summarized in the conclusions)

Point 3 above would also address the general inconsistency in the paper around what "close" means with respect to the CO

### Specific Comments

Title: The title would be more descriptive if it were "The MOSAiC Drift \*\*first phase\*\*..."

P1L26: Climatological mean over what period?

P1L32: "...divergence\*\*/convergence\*\*..." i.e. be explicit that convergence is included in

their definition of divergence. I don't feel it's widely assumed that divergence, when negative, can be used interchangeably with convergence.

P1L33-34: You state that 5 km is "close" the CO and that 50 km represents the "wider surroundings", but then that 50 km is "near" to the CO. Maybe just state the distances, to avoid ambiguity on what is close/near and what is not.

P2L46: Could you comment on whether the chosen floe was representative of the pack ice in general, or was an anomalously large floe selected? That strikes me as a big floe, especially for the Laptev Sea, and that's an important factor when considering differences in e.g. ice drift compared with previous years.

P2L56: The wording here is confusing. It would make more sense just to say "... were able to follow the ice floe back to its place of origin".

Section 2: Throughout this section I would have liked references to the relevant figures for each paragraph (e.g. sea-ice tracking, sea-ice concentration etc.) I'd also suggest changing the order of your figures so they better fit the flow of the text and make it easier for the reader to familiarize themselves with the datasets before moving to the discussion.

P3L106: "...drift of the CO \*\*and other buoys\*\*..."

P3L199: How was the 6.25 km dataset averaged to get conditions close to the CO?

P4L130: Have you validated that the multi-parameter approach is more accurate, or is this statement just based on what's expected? Please specify.

P4L157-158: On average how many CS2SMOS SIT observations were averaged? It must be quite a small number.

P5L169-170: Do you mean that snow depth can only be retrieved for MYI, or that it's only MYI that has these limitations?

P5L178: State what "MOY" and "MOD29" stand for

P5L184-185: Do you only use daily lead data up to April because this dataset isn't available after melt onset? Please specify.

P5L186: Is 10 km the MODIS resolution, or the distance you chose from the CO? If not the resolution, please state the resolution.

P5L196: Why was the ship outside the satellite coverage?

P6L228: Maybe I'm missing something but winds at the N. Pole don't look westward to me. It would be great to make the blue arrows in Figure 4 much clearer, to see the drift during the respective month.

P7L277-280: I disagree with the way the ice concentration analysis is presented here, for 2 reasons. 1) From October to July the concentrations don't necessarily "agree well". It's true that the MOSAiC concentrations don't deviate significantly from the long-term mean, but the patterns aren't the same, and during MOSAiC the concentration is consistently higher. 2) The lower concentrations in March are around the same time as the warm air intrusions. So, the drop in concentration is an artefact in the data rather than a "true" drop in concentration. You do go on to mention this below, but it should be included here to avoid any confusion that you're talking about "true" concentration.

P8L305: Are the daily values calculated using a monthly moving average? If not, how do you achieve daily coverage from CS2 data?

P10L385: What do you mean by "conditionally"?

Section 3.7: When not explicitly discussing positive divergence, I suggest changing "divergence" to "divergence\*\*/convergence\*\*". I don't feel it's widely assumed that divergence, when negative, can be used interchangeably with convergence.

### **Technical Comments**

P1L30: "month" -> "months"

P2L78: "...CO prior \*\*to\*\* departure..."

P3L104: "number" -> "assess/gauge/quantify"

P4L152: Remove the duplicate "sea" before "sea-ice"

P7L264: "westerly" -> "eastward"

P7L276: "...radii, \*\*we\*\* will limit..."