Comment on essd-2022-66
Anonymous Referee #3

The authors present a dataset of upper ocean temperature and salinity from drifting buoys that were deployed as part of the MOSAiC Distributed Network. The dataset represents valuable observations from the central Arctic Ocean over a 10-month period, including the scarcely observed Arctic winter. Observational methods, data processing steps and the resulting dataset(s) are described in detail, and some preliminary analyses of the data to investigate the signature of an eddy in the distributed network are shown.

The manuscript is in general well written with mostly clear and useful figures. Some revisions could help to improve readability and avoid confusion in an otherwise highly relevant publication.

Main concerns:

- There is a bit of repetition between the Methods and the Results section, esp. with 4.1. This is maybe not surprising given the nature of a data paper, but could still be avoided, and the manuscript could be more streamlined.
- The introduction is quite lengthy about mesoscale and submesoscale features, but then there is nothing more these throughout the methods and the results section. First in the discussion, you pick up the topic again by describing the passage of an eddy. To show that the dataset is useful to investigate (sub)mesoscale features, which you explicitly present as an aim of the design of the DN and this manuscript, a bit more...
analysis in this direction would be useful. For example, more detail on the drift trajectories of the buoys relative to each other beyond just the map in Figure 3 (and the short sentence on Lines 267-269) could easily provided, such as a timeseries of the relative distance of the buoys to each other or of the maximum diameter of the area covered by the buoys. That would link nicely to the discussion around the size of the eddy and could indeed demonstrate that this buoy network can capture (sub)mesoscale features.

- Be more precise with the variable names – I have to assume that you talk about in situ temperature and practical salinity but cannot know for sure, so please make this clear at the start of the manuscript.
- Many of the figures are not colour-blind (or greyscale friendly) – consider modifying them.

Other comments:

Line 21: “much greater than” – can you be more precise? E.g. give order of magnitude or similar?

Line 21&22: “the vertical velocity” and “the horizontal velocity” – sounds odd (like there is only one fixed vertical velocity and one horizontal velocity); suggest to change to “vertical velocities are ... weaker than horizontal velocities“.

Line 41: “submesoscale processes are responsible for ... restratification” – suggest to change to “contribute to”. Du Plessis et al. (2019) still state that the main driver for springtime restratification is surface heating.

Line 66: Is “synopticity” really a word? (Or rather, a word in this context?) Suggest to rephrase.

Line 84: Which feedback? Sounds like there is only one...

Line 93: Do you mean upstream IN or OF the Transpolar Drift?

Line 101: Same issue: upstream in or of the TPD?
Line 109-110: “the ice relative drift across the liquid ocean” – weird formulation. Rephrase?

Line 117: “ensued” – is this the right word? Or should it rather be something like “took place” or “were done”? I assume there was a degree of planning involved in the location of the DN.

Line 135-138: This part is confusing. So the CTDs are measuring every 2 minutes regardless of what the buoy is doing. Then there’s an extra measurement when the buoy is polling – so “its measurement interval” means the buoy’s measurement interval? And the data the buoy sends back via iridium – that’s only those extra measurements or all of them?

Following on from that, on line 142 you write “All data” – is that now the data from the measurements polled by the buoy or indeed “all” data??

Please rework this part to clarify.

Line 145 and throughout: when you write “temperature”, is that in situ temperature? Please clarify in the text.

Line 147: “the other variables” – I assume that’s conductivity, (in situ?) temperature and pressure?

Line 147 (and throughout the manuscript) provide version numbers of software and toolboxes used.

Line 169: Protection from what? Towels don’t strike me as the best protector from
freezing in -15deg C.

Line 171: What do you mean by “hydrohole”?

Line 179: The CTD data from recovered instruments then also provide higher accuracy pressure data?

Line 186: Replace “using” with “indicated by” or something similar (you didn’t “use” the flag to modify the data).

Line 190: How did you fill the gaps in the GPS record after removing outliers?

Line 191: What was the consequence of applying the threshold? A different flag? Or removing data points?

Line 192: How did you determine “plausibility”?

Line 220: What do you mean by “sim”?

Line 223: How big was the drop in conductivity?

Line 229: Capital O in the buoy name.

Line 240: Add “practical” to salinity.

Line 243: Is the closing bracket in the right place? Bit confusing at the moment.

Line 253-254: It would be useful to include this information in one of the tables, e.g. Table 1. If you explicitly state here all buoy numbers of the ones you can provide a merged product from, then also provide the numbers of the ones with buoy data only.
Line 255: I guess the measured temperature is in situ temperature? And the derived salinity practical salinity (and not absolute salinity)?

Figure 2: Nice schematic! You could mark which of the steps were not included in the processing for buoy-only datasets.

Table 2: In situ temperature?

Figure 5d: axis labels in the salinity panel are missing. If they are not included because of the icing issues, why show the data at all?

Presentation of the timeseries starting Line 274: Refer to the respective figures/panels.

Line 276: delete “a”

Line 276-277: Isn’t 2.5 weeks a pretty long time for ice in the conductivity cell to disappear? Was the water at freezing point at 50 m depth throughout this period?

Line 286: So all but the 50 m sensor?

Line 318-319: Is a drop in pressure not equivalent to instruments rising? “… causing the surface buoy to drop” => shouldn’t that then lead to an increase in pressure? I can’t follow your argument here.

Line 323-324: How long did this issue last? The entire record?

Line 329: Replace “in” by “the”.


Line 374: What is the stated accuracy?
Figure 7: I’m confused by the shading in panels c and d – please provide a clearer description in the caption.

Line 472: Publish the code together with the dataset or place it on e.g. github or similar sites.

Figure A1 is not referred to in the text.