

Comments to the Author:

1. The authors have addressed the reviewer comments, but have not fully addressed the editor's recommendations on presentation. Therefore, I will make detailed recommendations for changes in presentation to make the manuscript consistent with TC style and standards.

Supplemental material should only be used in very specific circumstances. It cannot be used to illustrate new points. It is intended for items that cannot fit in the main text because of format or size, but should be avoided in other cases. In most cases, the SM figures illustrate new points. In these cases, they **MUST** be in the main text. In those few cases where the supplement points are already made in the main paper with text and figures (see below with respect to Figure 5, S3 and S4), I still recommend placing in the main text, as there is no reason for a simple figure to be in SM. In this case, an appendix might be reasonable, though I do not see that as necessary here.

These changes will make the paper more readable. The authors should either put all SM figures in the main text, or if not needed to support any points, leave them out altogether.

Authors. Thank you so much for your suggestions. As per the suggestion, we have placed all the figures in the main text to make the manuscript consistent with the journal policy. Now, there is no supplementary figures and texts in the revised manuscript.

2. Figure S1 – Figures should not normally be in the introduction. This presents results similar to what has been previously published (at least with respect to sea ice, to some degree with the ARGO data). If these results are adequately published elsewhere, I recommend it just be cited with no figure if you are citing it in the Introduction. If these are new results, these **SHOULD NOT** be in the supplemental material, nor in the introduction and should be presented in the Results section with a figure in the main text. This was not commented on by the referees, so I will leave this up to the authors, but I suggest this would be more useful if you just looked at the Weddell Sea rather than the whole Antarctic, and then this could be included in the results.

Authors. As per the suggestion, we have removed the Figure S1 in the introduction section and cited Parkinson (2019) for discussing recent sea-ice changes. Figures S1 is moved in the main text (Figure 9) to show the likelihood of Antarctica polynya occurrence with a background of anomalous upper ocean warming and sea-ice loss, similar to the events that occurred in the Antarctic sea-ice from 2016 to 2019.

3. Figure S2 – These data are useful to understand how close the data are to the study area, and the quality of the relationship with NPP. As this is used to choose the model, it should be in the main text.

Authors. Included in the main text as Figure 3.

4. Figure S3, S4, and Figure 5: These figures all support the same point. Notably, S4 and 5 show the same data, with Fig 5 just showing detail. I'd combine into a single figure, but it is fine if you want to keep them separate. But as they are presenting evidence for the new point that there is upwelling locally at the MR, they should both be in the main text. Figure S3 isn't consistent in timing with Figure 5, and since the former is a model and latter data, I wonder if S3 is needed to

make your point and should just be excluded. If you retain it, I think it should be discussed a bit more in the main text to explain these differences (and thus, the figure needs to be in the main text).

Authors. As per the suggestion, we have removed Figure S3. And, we merged Figure S4 and Figure 5 which are included in the main text as Figure 6.

5. Figure S6 – again, this is introducing a new point, thus according to journal policy, should be in the main text.

Authors. Included in the main text as Figure 7.

6. Figure S7 – same reasoning as for S6.

Authors. Included in the main text as Figure 8.

7. Figure S8 – This figure is pertinent to show the timing of the polynya, so should be in the main text. I'd suggest that since this provides a clear visual of the evolution of the physical setting driving your observations, that this would be most useful as a figure 1 to provide the reader an introduction to the setting.

Authors. Now, this figure is included in the main text to show the reappearance of polynya in 2018. The evolution of polynya in 2017 and its physical setting is shown in Figures 3a-c and 1a.

8. Non-public comments to the Author:

I have sought clarification on journal style with respect to supplemental material. In this case, your SM figures do not meet the standard for use in this case. Therefore, I am making the decision that all figures and text should be in the main paper before it can be published.

There remain widespread non-standard phrasing throughout the paper. I would again urge the authors to take a careful look through and edit to avoid misunderstandings and delays when the paper goes through copy-editing. I have not taken the time myself to provide suggestions in order to expedite the process.

Authors. Sir, thank you so much for your suggestions. We have moved all the supplementary figures and texts into the main text as per the journals policy. We have tried to improve for the English phrasing so as to convey the intended meaning.