

## Response to Editor's comments

Section 3.1: Please make a correct use of acronyms: define when the expression is used the first time and use them where appropriate.

Response to Section 3.1: Thank you for your reminder. I have now stated these abbreviations in Section 3.1 of the revised manuscript and used them throughout the text.

L157-160: The discussion of spatial variability is still confusing:

-You still refer to “negative high spatial variability” in BAS, that does not make sense. What we see in the EOF plot is that, when PCs are positive, negative anomalies in BAS are accompanied by positive anomalies in WS.

-The Indian Ocean sector does not show much variability.

-Please indicate the latitudinal range of Prydz Bay, so we can locate it in the plots.

-The RS sector shows rather high variability but is not discussed.

Please rephrase to reflect what is displayed in the plot.

Response to Lines 157-160: I sincerely apologize for my oversight. I have now made further modifications and corrected expressions such as "negative high spatial variability." I have revised the expression regarding IO. A description of the extent of Prydz Bay has been added to the text. Additionally, a discussion on the high variability of the RS has been included, adding the following statement: “It is worth noting that the actual area of RS fast ice is few. However, due to the presence of the Ross Ice Shelf, the fast ice extends far offshore, resulting in high variability. Nevertheless, the high variability observed here for RS is of limited practical significance. Therefore, the high variability of RS will not be discussed further.”

L160-162:

-“During winter (Figure 2c), the western WS and BAS showed high spatial variability, while the middle of southern Atlantic sector (0°–30°W) and IO displayed reduced spatial variability”: please rephrase.

-The RS sector shows high variability also in winter but is not discussed.

Response to Lines 160-162: I especially appreciate your suggestions for revision. I have revised the phrasing of this paragraph in the revised version. Regarding the high variability in the RS, this has been addressed in the previous response.

L163-165:

-Please indicate the latitudinal range of the Antarctic Peninsula, so we can locate it in the plots.

-The RS sector shows high variability also in spring, that is not discussed.

Response to Lines 163-165: I have added a description of the extent of the Antarctic Peninsula in the revised manuscript. Regarding the high variability in the RS, this has been addressed in the previous response.

L165-167:

-Please indicate the latitudinal range of the Amundsen Sea and the Atlantic sector, so

we can locate them in the plots.

-“In summer (Figure 2g), the Amundsen Sea (...), BAS and IO showed reduced spatial variability. The WS and Atlantic sector (...) exhibited high spatial variability”: please rephrase.

-Prydz Bay does not seem to me showing remarkable anomalies.

-Here again, the RS sector shows high variability also in summer but is not discussed.

Response to Lines 165-167: Thank you for your suggestions. I have revised the manuscript according to your advice, adding the extent of the Atlantic sector, and referring to the Amundsen Sea, when appearing alone, as the western BAS.

L168-170: Please indicate whether correlations are statistically significant.

Response to Line 168: I have indicated in the revised manuscript that the correlations are statistically significant.

Figure 3: The discussion of second EOFs and associated PCs is rather confusing. Moreover, this second mode of variability is not further discussed in the manuscript, therefore I recommend removing the whole paragraph (L176-183) and Figure 3.

Response to Figure 3: I have carefully considered your suggestion and decided to delete the whole paragraph (Lines 176-183) and Figure 3.

L210: “... number and central pressure of extratropical-high-latitude cyclones ...”

Response to Line 210: Thank you for your suggestion. I have revised the phrasing accordingly.

### **Response to the Report from Anonymous Referee #1**

I sincerely apologize for previously overlooking this comment. I will now carefully consider the Report from Anonymous Referee #1 and respond to each point.

Line 71: Suggest referring to the location of Atka Bay as ‘in the far eastern part of the Weddell Sea’

Response to the suggestion regarding the description of location in Line 71: I have made revisions in the manuscript accordingly.

Line 77: Change ‘less’ to ‘fewer’

Response to the suggestion regarding word choice in Line 77: I have made revisions in the manuscript accordingly.

Lines 86-87: Reference required for Fraser (2022)

I apologize for the typo in my manuscript at Line 86. In fact, this refers to Fraser (2021) in the references.

Line 109: The acronym ‘EOF’ has already been defined (at lines 82).

Thank you for correcting my phrasing in Line 109. I have revised it in the manuscript.

Line 140: Perhaps show the variance explained by these modes to only ONE decimal place. Lots of numbers for each value here can distract to reader's attention and are not really required.

Thank you very much for the suggestion regarding variance explained in Table 1. I have revised it in the manuscript to show only one decimal place.