Review of: Opposing changes in subpolar ocean heat content due to meridional heat advection driven by the Southern Ocean wind anomaly

The authors examined regional changes in Ocean Heat Content (OHC) over two periods, pre-1993 and post-2001. They discovered a notable difference in the patterns between the Atlantic-Indian region and the Pacific region. The Atlantic-Indian region exhibited warming due to increased meridional heat advection induced by poleward westerly winds, while the Pacific region experienced significant cooling driven by equatorward advection caused by stronger winds. The role of the Subantarctic Front (SAF) in influencing heat advection is particularly interesting in explaining part of these findings.

The paper is well-structured and presents significant findings. Although the authors attempt to interpret the results in light of existing research, this area could be enhanced. The results have potential for publication, but the interpretation and discussion sections need substantial revision to meet the expected standards. I recommend accepting the paper, provided it undergoes major revisions.

My main concern is that the choice of the periods analyzed isn't clearly explained, raising questions about how this might affect the results. The first period has fewer data points, so it's crucial to carefully interpret those findings. While the paper's "Data and Methods" section introduces several oceanographic datasets, it doesn't clearly specify which dataset is used in each analysis within the results section. The figure legends require particular attention to accurately describe each panel. The "Summary and Discussion" section is comprehensive, but it should include more references to earlier studies, which are absent in the current manuscript version. I also suggest a thorough review of the manuscript to refine the writing and improve clarity.

Specific points:

Title:
- I recommended either removing the word "Opposing" from the title or adding the word "Regional." This adjustment can help to clarify the title and make it more accurate or specific in terms of its scope.
Abstract:
- Lines 11 – 13: "Our study reveals that the heat exchange between Antarctic and subtropical oceans driven by wind, which plays an important role in modulating changes in regional ocean heat content (OHC) through meridional heat advections." Should be rephrase.

- Lines 13 -14 "In this study, we used the observed objective analysis and reanalysis datasets to explore the changes in subpolar ocean heat content and analyze attributions to the remarkable regional discrepancy": I suggest that you mention that you're analyzing the heat content by region, and then describe the significant discrepancies in the following sentence.

Introduction:

- Lines 62 – 70: Need references.

- Line 78: "Importantly, the pattern of subpolar OHC changes exhibits a remarkable discrepancy, but the fundamental factors influencing this discrepancy are unclear.": You should describe the 'discrepancy'.

Data and Methodology:
- Why did you choose to use all these oceanographic datasets? Throughout the manuscript, it is unclear which datasets your analyses are based on (with the exception of the first two figures).
- Why are you using these two specific periods (pre-1993 and 2001-2019)? The trends appear consistent throughout the entire timeframe. How reliable is the data from the first period? There is much more data available for the second period. What impact does this discrepancy have on your analysis? I believe these points should be clarified in the methodology section and discussed in your final section.

Results:

-Line 196: It is significant for all datasets?

- Table 1: The table is not clear, should be re-organize and better explain in the legend. Your top line indicates that both columns 1 and 2 is about OHC and I understand that is just for the first one. I suggested clear state that the first column is OHC of Upper 2000m, AAIW and UCDW, and second column is SAF shift position and MHA.

- Line 230: I only see a change of 0.2ºC. Perhaps you should adjust the figure axes to increase the range or visibility of the data.

- Line 231 – 238: Please specify which region you're referring to. It seems like you're discussing the Pacific Sector, but this isn't explicitly stated. Also, are the changes you're observing statistically significant? This should be made clear.

- line 372 – 372: How does this relate to the subtropical gyre below?

- lines 374: I would change 'one and a half times larger' to 50%.

- line 378: In the text, you should explain what RCC stands for.

- line 389: 'Instead of saying "What's more," I suggest using "Additionally."

- lines 390 – 392: It is a confuse statement.

- lines 391-398: You should better demonstrate the influence of the Amundsen Sea Low (ASL), or provide references that support your statement.

- The "Summary and Discussion" section aligns with the results, but there's a lack of comparison with previous studies.

Figures:
- All figure legends need improvement. In some cases, there are panels without a legend at all.

Figure 1:
- Why is there only one significance area for all datasets? It would be more appropriate to have a separate significance area for each dataset.
- Why the colorbar of the panel 'c' is different from 'a' and 'b':
- Enlarge figures a, b, and c so that the label "MOAA GPV" fits within the continent boundaries.
- In panel 'd', please specify in the legend what the colors represent and the meaning of the correlation index.

Figure 2:
- It's difficult to understand what's happening with salinity in panels 'c' and 'd'. I suggest adding two separate panels to isolate the temperature and salinity analyses. You could also include contours indicating where the trend is significant for each parameter.

 Figure 4:
- The legend for panel 'a' needs more detailed explanation, similar to how you did it in panel 'b'.

Figure 6:
- Instead of calling panel 'a' a time series, consider naming it "anomalies and differences." Additionally, panel 'b' lacks a legend; please add one.

Figure 8"
- The legend for panel 'd' is missing.

Figure 9:
- There's a slash ('/') in the color bar title that shouldn't be there. Consider removing it.