

Major Comments

- *I particularly liked the well-referenced introduction, clearly outlining our current understanding of the system both in terms of physical and biogeochemical oceanography. Between lines 49 and 64, the authors present various published hypotheses on the drivers behind the nutrient variability. I feel like this is exactly what the current study can help elucidate. However, I don't think you make it that clear in the conclusion which of the previous hypotheses better fits with what your data showed, or if there is a different new finding. I just think a stronger ending without leaving so many open questions would benefit the paper.*

Thank you for your encouraging remarks. The hypotheses presented in the introduction will be revisited in the discussion to contextualize the nutrient variability. While we may not be able to attribute variability to one driver, with our planned additional analyses, we will make efforts to clarify our findings and provide a more robust conclusion

Particular Comments

- *In lines 68-71, you are presenting results from the current study in the Introduction section. It's good to mention what you will be doing without revealing the findings.*

We have considered the reviewers comments. We have revised the final paragraph of the introduction to now provide a synthesis of the major conclusions reached in this study.

- *Figure 1 could benefit from an inset zoomed-out map to show where exactly on the Australian coast the study area is located. I think you have space for this in the bottom-left corner.*

We will make several enhancements to Figure 1, including adding a subplot with surface currents and the location of the study area on the Australian coastline, providing additional context for readers unfamiliar with the region.

- *Figure 1 legend – the triangles are yellow, no?*

Fixed.

- *Section 2.2 You already have a section called “Methods” – I don't think you can have another subsection with the same name*

We have changed the subheading to “Analysis”.

- *Line 110 – You give the citation for MLD calculation. Can you be more specific and explicitly state in the text what this means (e.g. density difference from surface)?*

We used the Holte and Talley (2009) algorithm to calculate the mixed layer depth (MLD). This method uses an algorithm to determine the MLD from a suite of possible MLDs based on various methods (density and temperature difference from the surface, and temperature and density gradient criteria). The threshold value of temperature and density for both the difference and gradient methods are 0.2°C and 0.03 kg m⁻³, and 0.005°C dbar⁻¹ and 0.0005 kg m⁻³ dbar⁻¹, respectively. We will add further information on the application of the Holte and Talley (2009) algorithm to determine the MLD in the revised manuscript.

- *Figure 2 – Is this the full 10 years of data? Maybe make this clear to the reader? Also, for example, at 154.8, I see two lines in the CTD plot (green and yellow), but I only see green dots in the plot above. Does this mean no samples were collected from the CTD on one occasion? Please clarify. Furthermore, you need units on your axis labels.*

We will update the figure and caption to improve the clarity. Figure 2 includes the complete 10 years of data. The hydrochemical plot appears sparser because bottle samples were not collected at all CTD casts. We will revise the figure caption and methods section appropriately. Additionally, the Figure 2 axis labels have been updated to include the appropriate units.

- *Line 118 and Figure 3 – How come? Is the EAC mostly (a majority of the total time; or a majority of the time samples) in the inshore mode making the average being so close to the inshore plot?*

Yes, the reviewer is correct: the inshore mode, where the EAC flows over the continental slope, is the climatological mean position of the EAC. In our dataset, the inshore mode occurs for 57% of samples. We have provided further information regarding the inshore mode alignment with the climatological mean EAC position in the manuscript.

- *Figure 4 – I find myself confused about what the stippling means. In this caption you say it indicates statistically significant departures from the average, but in the methods section you say that stippling shows areas of statistical significance.*

We will edit the two descriptions for consistency.

- *Figure 5 could benefit from three labels that show what is shown on each horizontal row: autumn, winter, spring. Figure 5 caption should say “light grey lines”.*

Each subplot has been updated to include the corresponding season in its description.

Additionally, the caption has been revised to specify “black dotted lines” to match changes to the figure.

- *Line 178: “there are a few significant changes”*

Fixed.

- *Figure 8: I think you need to explain to the reader what a violin plot is and think about if it’s really useful to show the data in this way. Even in the text, you only very briefly mention this figure but you don’t interpret it almost at all. Is there a significance of the flat base of some violins in subfigures b and c being higher than 0?*

Thank you for your insightful comments. After careful consideration, we have modified the text to provide a comprehensive interpretation of what is shown by this figure. In addition, we decided to replace the violin plots with boxplots, which provide a clearer representation of the data and more appropriately match the interpretations in the text.

- *Line 204: “Interesting impact” is too subjective.*

We have edited to remove subjectivity.

- *Line 205 and line 211: don’t these two statements contradict each other? Are the water properties changed or not between the different modes?*

While the overall ranges of water properties remain unchanged when geographical data is excluded, clear differences emerge when geographical data and depth are included in the analysis. We have revised the text for clarity to better convey this distinction.

- *Line 207: “with of cooler”? something missing?*

Fixed.

- *Lines 229 and further: while I appreciate putting your results in the context of other studies, I feel like you are drifting too far from your results and instead it turns into a literature review. Please base your discussion more on your findings.*

We will relocate the discussion on WBCs to the introduction. The discussion will now retain only a few relevant remarks that are directly compared to our findings, ensuring a more focused analysis.

- *Line 247: That is exactly what you should find out through a study like this one, no?*

The intent was to highlight that many questions remain unanswered. The text will be altered for clarity.

- *Line 256: data are needed*

This section will be removed.

- *Final remarks: You have 10 years of data to work with. While probably not long enough to find statistically significant biogeochemical trends, should you not mention if you have seen any trends at all? Maybe a timeline plot, or a Hovmöller where you have longitude and time on your axes at a chosen depth?*

We would have very much liked to investigate long-term trends in nutrients in the region, and this project started with that idea in mind. Unfortunately, the data do not permit robust investigation of trends. Although we have 10 years of data, the sampling frequency is quite sparse, occurring approximately every 18 months. This results in effectively only seven sampling periods, which are collected at different times of the year and are subject to large seasonal and interannual variability.