

First of all, we would like to thank you for all your constructive comments (shown in black), which greatly helped us improve the manuscript. Below, we provide our detailed point-by-point responses (in blue). We have revised the manuscript accordingly.

Reviewer #1

Thank you for the careful and thorough revision of the manuscript. I appreciate the substantial effort that has gone into addressing the previous comments. The additions regarding uncertainty, the clarification of the robustness metric, and the generally more cautious interpretation of the results have significantly improved the manuscript.

In its current form, the paper reads clearly and is much better aligned with the level of evidence provided. I do not have further substantive comments.

I would, however, like to point out one important issue that should be corrected before publication. The manuscript states that GOBAI-O<sub>2</sub> Version 4.4 was used. Based on the data archive (Index of /data/oceans/archive/arc0207/0259304/4.4/data/0-data), it appears that the analysis may in fact be based on Version 2.2 (it's the version of the .nc file that matters, not of the release). This distinction is critical and should be clarified explicitly. Versions prior to 2.3 rely on a different methodological framework, and the differences between pre-2.3 and later versions can lead to substantial changes in inferred oxygen trends. In some regions, these differences are large enough to affect even the sign of the trend (for example, in the Bay of Bengal, or in the Cape Verde region). Given that the conclusions of the manuscript depend on relatively subtle spatial patterns in oxygen trends, it is essential that the exact dataset version is correctly identified and reported.

I therefore strongly recommend verifying the dataset version used in the analysis and correcting the manuscript accordingly. If Version 2.2 was indeed used, it would also be appropriate to briefly comment on the implications of using a pre-2.3 product, given the change in methods for GOBAI-O<sub>2</sub>.

Aside from this important clarification, I am satisfied with the revisions and have no further comments.

We appreciate the reviewer's careful and constructive comments, which have helped improve the manuscript.

Following this comment, we clarified the data description in the revised manuscript and explicitly refer to the product as "GOBAI-O<sub>2</sub>-v2.2" where appropriate. In addition, we added a discussion in Section 4 regarding the potential sensitivity of oxygen trend estimates to differences among GOBAI-O<sub>2</sub> product versions, as follows:

“Different versions of the GOBAI-O<sub>2</sub> product may yield different oxygen trend estimates because of methodological differences among releases. Therefore, some of the regional patterns discussed in this study may be sensitive to the specific GOBAI-O<sub>2</sub> version used in the analysis. Future comparisons across multiple GOBAI-O<sub>2</sub> versions and observational products would help further assess the robustness of the results.”

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Reviewr #2

Figures 3d and 3h: The caption states the contour interval for thin lines is 0.2, but in the figure, it appears to be 0.5. Please correct this discrepancy.

We changed from “0.2” to “0.5”. Thank you for the careful checking.

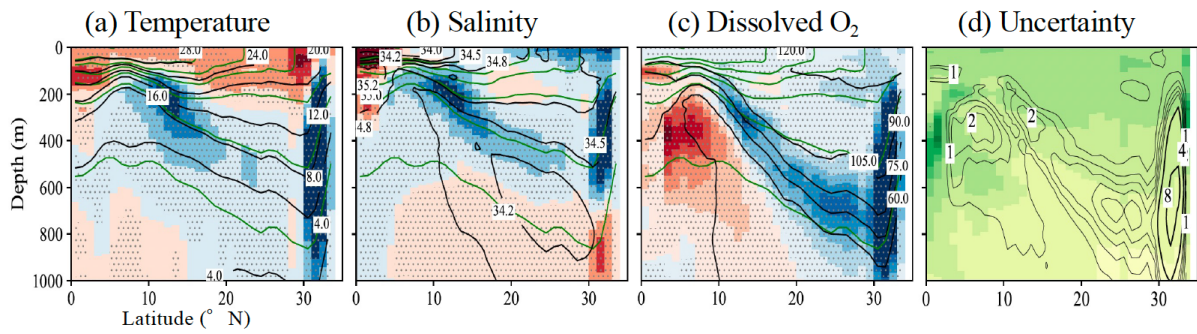
Figures 3 and 4: The unit of uncertainty is umol/kg in Figure 3, but umol/kg/yr in Figure 4. Is one of them incorrect? Please check them again.

You are right. We changed the unit in Figure 4 from “umol/kg/yr” to “umol/kg”. Thank you for the careful checking.

Figures 3 and 4: The latitudinal range for the 137E section is 0 - ~30N in Figure 3, but ~10S - ~55N in Figure 4. It would be better to use the same range for consistency and easier comparison.

We have revised Figures 3 and 4 to use the same latitudinal range in the revised manuscript, in response to the reviewers' comments. Thank you for the careful checking.

137° E line



165° E line

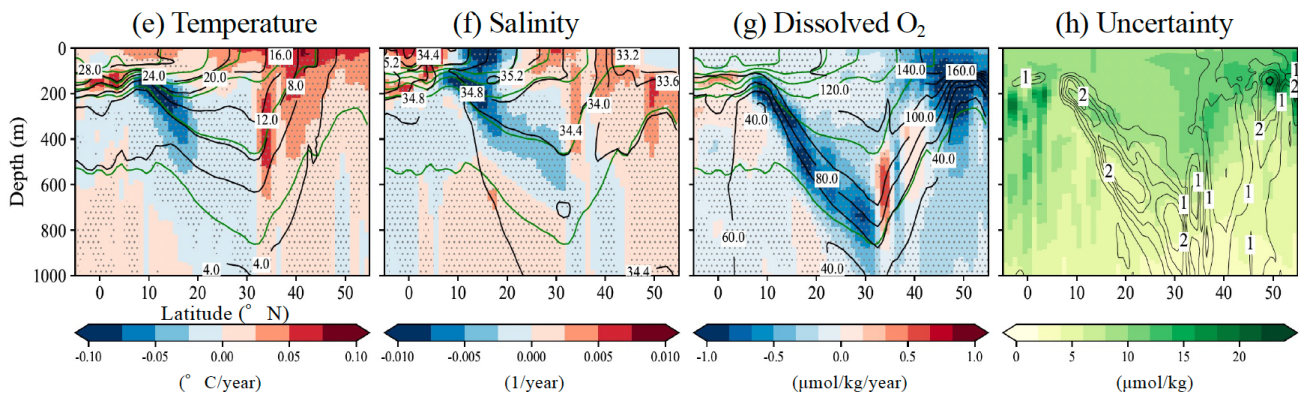
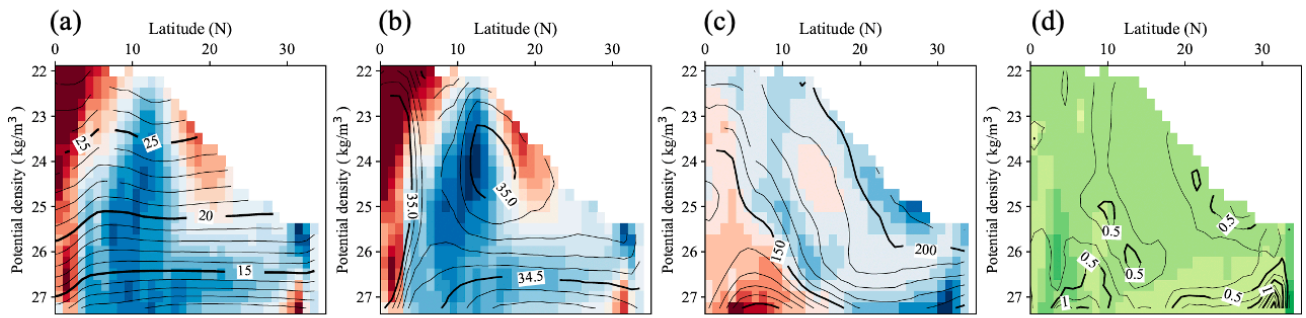
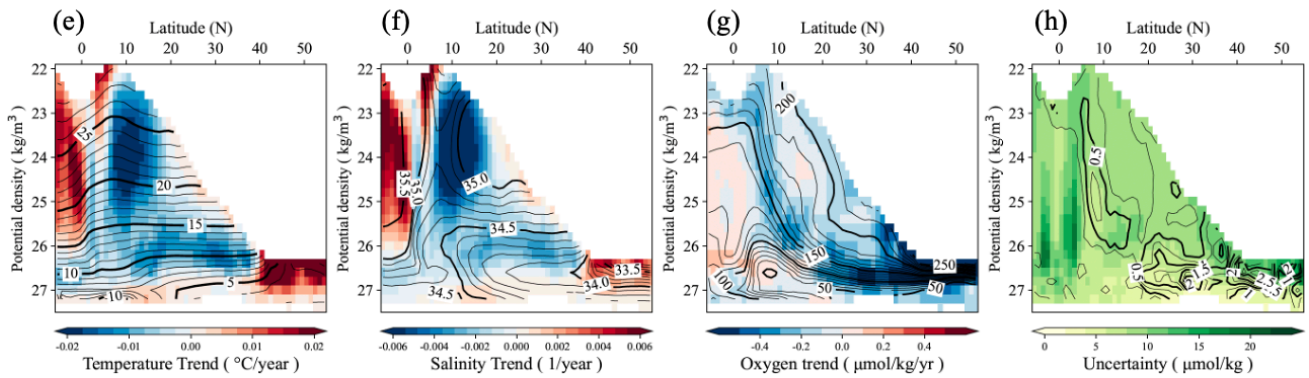


Figure 3 in the revised manuscript: Vertical sections showing linear trends in potential temperature ( a, e ), salinity ( b, f ), and dissolved  $O_2$  ( c, g ) along the 137°E and 165°E meridians, respectively. Black contour lines indicate the mean potential temperature ( a, f ), salinity ( b, g ), and dissolved oxygen ( c, h ) over the period 2004–2023, while green contour lines represent the mean potential density. Labels for the potential density are shown only in the robustness sections. Hatched areas indicate statistically significant trends at the 95% confidence level based on a Student’s t-test with effective degrees of freedom accounting for temporal autocorrelation. Trend significance was evaluated using a t-test with effective degrees of freedom accounting for lag-1 autocorrelation. Corresponding vertical sections of the mean uncertainty with the contours of the Robustness ( R ) in panels ( d, h ). The contour intervals for thin and thick contours in ( d, h ) are 0.5 and 4.0, respectively.

## 137° E Line



## 165° E Line



**Figure 4** in the revised manuscript: Linear trends in ( a, e ) potential temperature, ( b, f ) salinity, ( c, g ), and dissolved  $\text{O}_2$  on each isopycnal surface at intervals of  $0.1\sigma_\theta$ , calculated at every  $1.0$  deg of latitude in  $137^\circ\text{E}$  and  $165^\circ\text{E}$  lines, respectively. Contour lines represent the mean values during the target observation periods, plotted at intervals of  $0.1\sigma_\theta$  for each  $1$  degree of latitude. Panels ( d, h ) show the corresponding vertical sections of mean uncertainty, along with contours of robustness (R). The contour intervals for thin and thick contours in (d, h) are  $0.25$  and  $0.5$ , respectively.