

Reply to Editor's comments:

"Before it can be accepted for publication, I kindly ask that you address the remaining comments, which are provided in the annotated PDF of the manuscript.

Regarding the supplementary material, please ensure that all figure captions listed at the beginning of the file match those accompanying the figures, and that all supplementary figures are properly listed at the start of the document."

Dear Editor,

Thanks a lot for your specific and constructive suggestions for improving our manuscript. We have addressed all the comments in the annotated PDF of the manuscript accordingly.

1、 We have added a comma before "and" in expressions such as "IAP, WOA18, WOA23, and GOBAI".

2、 We have corrected the format of some citations such as "Cheng et al., 2024" and "Ito et al. (2025)".

3、 We have resolved the issues about abbreviations as suggested, especially in the Introduction section and in Table 1.

4、 We have checked and confirmed that some specific expressions are consistent throughout the manuscript such as "BGC-Argo" and "Apr.".

5、 We have modified the format of the citations of figures and tables as suggested.

6、 We have modified the unit in expressions such as "from  $-1 \mu\text{mol kg}^{-1}$  to  $0.8 \mu\text{mol kg}^{-1}$ " instead of " $-1-0.8 \mu\text{mol kg}^{-1}$ ", and " $0.3-2 \%$ " instead of " $0.3 \%-2 \%$ ".

7、 For the comment for Lines 173-176, we added an estimate of the interpolation error for the global mean  $\text{O}_2$  (less than 0.01% for the global mean  $\text{O}_2$ ), which is calculated by comparing the global mean  $\text{O}_2$  of the original SJTU dataset and the interpolated  $1^\circ \times 1^\circ$  data.

8、 We have reordered the figures in the supplementary material (moving Fig. S12 to Fig. S4) and changed the referencing in the main text accordingly.

9、 We have corrected some grammar problems and addressed all the other comments in the annotated PDF of the manuscript.

Thank you again for your dedication in providing so many specific and constructive

suggestions. They have truly helped improve the quality of the manuscript from the very original version until now, which reassured me that our manuscript is in good hands and encouraged me to constantly improve my research work.

Sincerely,

Juan Du on behalf of all the co-authors