

### **General comment:**

I see that the authors have put in a lot of effort to address my concerns and that the manuscript has improved a lot. However, there are still some minor issues that should be addressed before publication.

### **Specific comments:**

- My concern about the time periods mentioned has not been satisfactorily addressed. While the authors have added two new sections where they describe time-periods, their mentioning of time-periods is rather imprecise. What exactly does it mean when the authors refer to preindustrial conditions in their model? Are they then considering the last 10-years of their spin-up runs or the first 10-years afterwards or does this include just one model year? Further, there are still several pictures and references to concentrations where no time-periods are mentioned. Do all concentrations and pictures throughout the manuscript refer to the same model-years? If so, then please mention this. Still, it is beneficial to repeat the mentioning of the considered time-frame – this makes it easier to follow the manuscript. Also, the sentence “The gridded data-products from GLODAP and the World Ocean Atlas are derived from samples taken during the previous few decades” is rather vague. Both data-products mention a precise time-frame. So does, furthermore, Lee et al, 2001 and probably also other references. While this seems to be of little interest for the authors, there are probably other scientists who want to compare their results, where the specific time frame and the underlying conditions might be of interest.

### **Technical comments (referring to the revised manuscript):**

- p. 8, lines 250-255: While the equation for variable  $K_{eff}$  appears now earlier in the text, the whole explanation for  $K_{eff}$  is now missing. Please insert it again!
- Table 2: Please refer to the depth of the export flux (75m, see Table 4).
- p. 4, line 111: please mention that this is the mean concentration from the GLODAP dataset.
- p. 4, line 114: please do not refer to the mean concentration here, but rather on page 4, line 132 and add which regression this mean concentration is associated with.
- p. 5, line 133: please do not refer to the mean concentration here, but rather on page 5, line 139.
- p. 5, line 111: please mention that this mean concentration is achieved utilising the GLODAP dataset and your reference choices for  $TA^f$  and  $TA^o$ .
- p. 19: The re-organisation of sentences and paragraphs makes this page now very difficult to read. I would suggest to re-arrange the sentences on this page again, so that everything about correlations, bias and RMSE is in one connected paragraph and not spread all over the page.
- p. 19, line 651: this is not “corresponding to the high correlation”. Correlations are a measure of gradients/trends and RMSE are a measure of mean deviation, hence both

measures do not correspond to each other but are independent. Please delete this part of the sentence. I am not sure why the RMSE is in percentage, as it is scale-dependent and usually expressed as an absolute unit.