

Dear Dr. Hauri and co-authors,

Thank you for the submission of your revised manuscript. Both referees are satisfied with the changes you made following their comments on a previous version of your manuscript. It is now almost ready for publication. One issue is still indicated by referee #1. Please respond to that.

Dear Editor Hoppema,

Thank you again for your time and effort to push our publication across the finish line. We addressed your comments as well as the comment by referee #1 below.

I have some final, mostly technical comments which are listed below:

- Please change the numbering of the figures so that the figures are presented in the text in order of appearance.

We apologize for this oversight and corrected the numbers according to the order of appearance.

- In some figures chlorophyll and dissolved oxygen data are shown. Please add info about how they were measured and possibly some info on the precision.

Details about the oxygen sensor can be found L208-215 (newly edited track-change document) with added text: "oxygen with a precision of 0.1 μM and an absolute accuracy of $\pm 2 \mu\text{M}$ after multipoint calibration."

L. 218-219 mention how chlorophyll was measured, with "Wetlabs Ecopuck measuring chlorophyll fluorescence at 695 nm". Figures 9 and 11 both say "raw chlorophyll fluorescence". Since we did not do any processing or QC of the ecopuck data, we believe this is sufficient for the work presented here.

L55 „Over 100 years,“ sounds strange to me. I am not sure whether the average reader will understand what is meant. What about: Considering a 100 years period, ... (or something similar)

Corrected to: Over the coming 100 years,...

L77 Maybe: ... are commonly collected ... (add: commonly)?

Done

L132 Please do not use the abbreviation POM for polyoxymethylene because in marine research POM is the current abbreviation of: particulate organic matter.

Corrected throughout.

L191-192 Please use date format like: 4-7 May 2022 (many places in the paper)

Done

L191 Here Fig 5 is presented but Figure 4 was not shown before

Done

L218 Here Fig 7 is presented but Figures 5 and 6 were not shown before
[Figure 5 and 6 referenced L191-192](#)

L262 please write: 25.00 +/- 0.01 °C

Done

L280 please add one or two words on what errors.m actually is
[Added “errors.m \(Orr et al., 2018\) that propagates input uncertainties plus the errors in the constants”](#)

L335-338 I would suggest revising this sentence as it is quite hard to read in one go

Done

L351 Double parenthesis should be deleted

Done

L513-530 I think this text would fit better in the section Concluding Thoughts.

[We would like to keep the text where it is as we think that the current flow works well and we don't want to make the concluding thoughts any longer.](#)

L670 Three times Christian, J.R.

Corrected

L670 Dickson, A.G. (one G too many)

Corrected

L610-945: I noticed that several of the references' links lead to the site “zotero.org” instead of the corresponding publication sites (despite the doi text being fully correct in the list). I kindly suggest the authors to check for this thoroughly before final publication.

Done

Thanks and best wishes

Mario Hoppema

Reviewer 1#

The revised manuscript by Hauri et al. addresses the concerns raised by both reviewers well. The technical details added more clarity, and more clear data presentation helped grasp the scope of the work. I've noticed that the Author's tracked changes version includes somewhat different text than that indicated in the Author's response document. It seems like the co-authors did not

finalize

their comments in the main text at the time when the Author's response document was submitted. Specifically, L363-367 and L835-841 have added/modified text. I hope these are changes are intended(?).

Yes, these changes were intended with the goal of easier reading. We thank you for the careful review.

In response to my comment about Eq.1:

*L359: Check Equation 1, must be $\% \text{ diff} = (\text{delta}/p\text{CO}_2 \text{ disc}) * 100\%$*

the authors wrote:

*Thank you for catching this! The denominator should be divided by two so it should read: $\% \text{ diff} = (\text{delta}/(p\text{CO}_2\text{HydroC} - p\text{CO}_2 \text{ disc})/2) * 100\%$ The values are within $\sim 0.1\%$ using the equation you recommend.*

I agree that the difference in results between the two equations (suggested and revised) is small in this case. However, there is a fundamental difference between the two equations. The revised equation $\% \text{ diff} = (\text{delta}/(p\text{CO}_2\text{HydroC} - p\text{CO}_2 \text{ disc})/2) * 100\%$ represents the difference between two values that are equally correct or incorrect. In the case of the sensor data ($p\text{CO}_2 \text{ HydroC}$) of unknown quality, the $p\text{CO}_2 \text{ disc}$ acts as a reference against which the error is assessed. Therefore, I suggested earlier that Equation $\% \text{ diff} = (\text{delta}/p\text{CO}_2 \text{ disc}) * 100\%$ should perhaps be used to calculate the percent difference (or percent error). % difference in Tables 1-3 would also have positive/negative values then.

Thank you for the follow up. We've changed Equation 1 following your recommendation, and have updated the values in Tables 1-3, as well as throughout the text.