We are thankful for the thoughtful and constructive comments by Dr. Hong-Hai Zhang. We added corrections/additions to the manuscript (in blue font). Our point-by-point responses are as follows:

R1: Page 4 Lines 107: The author mentioned in the manuscript that because of a technical problem with the calibration of the CO analyzer, data was corrected by the correction factor. It is not clear for me that the correction factor is for atmospheric samples or for all samples?

Reply: We apologize for any confusion caused. We acknowledged that the issue stems from a malfunction in the calibration system. There seemed to be errors with the calibration algorithm: The CO analyzer did not report any error during the warm-up progress including self-test after power-on, indicating that the detector, carrier gas pressure, and lamp were working normally. We repeated calibrations over time, using the same standard gases, to ensure that the detector consistently responds to the point calibration. The results were consistent and reproducible. However, the values obtained from the analyzer during the calibration were only about one-third of those given for the standard gases. Further, we compared the average atmospheric CO mole fraction for the same month (May 2021) from atmospheric monitoring stations in Mace Head and Teixeira. A correction factor f (3.12) was determined. This was the fundamental reason for using the correction factor f for the CO analyzer measurements. Fieldwork and incubation samples were all corrected by the factor. The corrected data can be viewed in Table 1 or in the supplement.

R2: Page 9 Lines 263-264: as mentioned in the previous paragraphs 'with the assumption of a steady state, the sum of the CO sources and sinks is equal to zero'. It should not be mentioned here again in the form of a conclusion. It is recommended to modify or delete.

Reply: We will delete 'with the assumption of a steady state, the sum of the CO sources and sinks are equal to zero'.

R3: For the microbial CO consumption experiment, should the influence of dark (thermodynamic) production on CO be considered?

Reply: We think the estimates of dark (thermodynamic) production in the Ria Formosa Lagoon (in Table 2) were several orders of magnitude below, which was negligible compared to microbial CO consumption.

R4: should the sampling density be increased, especially between 0 and 24 hours? And the author mentioned that CO net production rate for Olhão aquaculture effluent is extremely low, microbial CO consumption was counteracting the CO photochemical production almost completely. Would the author consider using some testing methods to analyze the consumption of microorganisms to confirm the experimental results?

Reply: Thank you for pointing to this issue. The suggested experiments would indeed be beneficial to confirm the conclusion of our study. However, they were not part of the study presented here.

R5: The conclusion should not contain too many references.

Reply: We think that citing three references in the Conclusion section is not a case of 'overciting'. Moreover, the cited references are all necessary to justify our conclusions.

R6: Minor comments for the figures:
The quality of the figure should be improved (Fig. 2).
Fig. 5(a), the color for the right vertical axis for CO saturation ratio is oversaturated, I suggest changing to another color.
The legend of Figure 8 is not very clear.

Reply: We have made all suggested modifications in the figures in the revised manuscript.
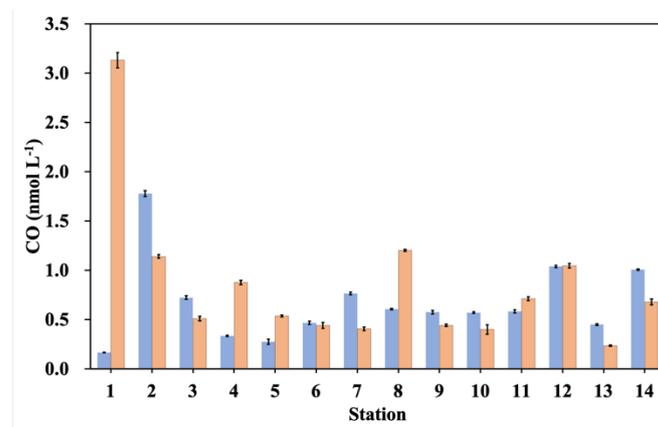

Figure 2: Mean CO surface concentrations (± standard error estimate) at Stations 1¬14 measured on 25 May 2021 (blue bars) and on 26 May 2021 (orange bars).
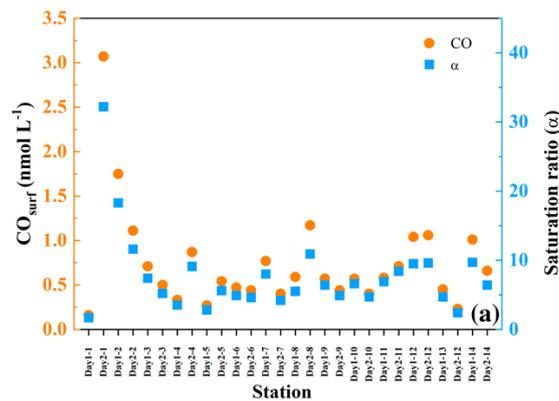

Figure 5: (a) Concentrations of dissolved CO (CO_{surf}; filled orange dots) and CO saturation ratios (α; filled light blue squares) at all stations in the Ria Formosa Lagoon on 25 May (Day1) and 26 May 2021 (Day2).
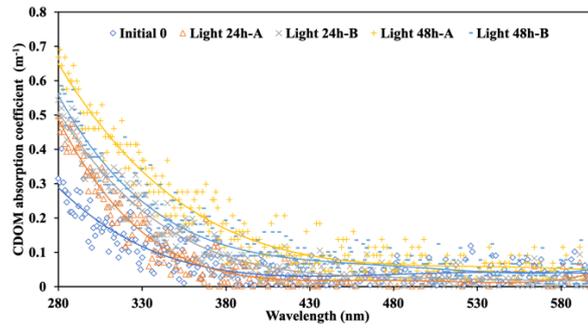
Figure 8: The CDOM absorption spectra for different groups (Initial 0, Light-24h-A, Light-24h-B, Light-48h-A, Light-48h-B) of the aquaculture photo-incubations (The curves corresponding to different groups are their fitted curves with the same color).