Biogeosciences
Discussions

Interactive comment on "Interaction between elevated CO_2 and phytoplankton-derived organic matter under solar radiation on bacterial metabolism from coastal waters" *by* Antonio Fuentes-Lema et al.

Anonymous Referee #1

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Review of Fuentes-Lema et al titled Interaction between elevated CO2 and phytoplankton derived organic matter under solar radiation on bacterial metabolism from coastal waters

The paper presents data from an experiment performed in two stages. First, natural water was bubbled in present day and future CO2 conditions, and this water was using in the second stage of the experiment were a mix of this water, 1.2 μm filtered water with bacteria and 0.2 μm filtered water (without bacteria).

The first stage of the experiment produced non-acidified organic matter (NO) and acidified organic matter (AO). The second phase used the NO and AO treatments and exposed them to the same CO2 conditions used in the first phase termed low carbon (LC) and high carbon (HC). All combinations were used, i.e. there were four treatments LC_NO, LC_AC, HC_NO and HC_AO, each with three replicates.

It took me some time to figure out what actually had been done in the experimental set-up, but Fig 2 is very good in outlining this. It is an interesting set up with the two stages which were used to see what the potential carry over effects of water grown under different CO2 concentration may have on the bacterial production.

One possible bias is that the water produced in the first phase of the experiment was frozen until the start of the second phase of the experiment. Freezing the water might affect the DOM pool. This was the same for all treatments so I do not see this as a major flaw, but you could consider taking this aspect up in the discussion.

For the statistical test, why not use a two way ANOVA, you have two factors NO/AO and LC/HC? Also for the BR, BP I would suggest to do a regression of the development, e.g. on the cumulative respiration/production, then the whole time series could be taken into account. This way you could compare the cumulative results to the single point results.

I would also like to see a deeper analysis of what happens with the physiological variables over time. You found a higher respiration initially in the HC treatment, but this shifted towards highest respiration in the LC_NO at the end. Why is that and what are the different processes that could be involved? Similar with BP, it increases initially in all treatments, but in the end there is a clear difference between treatments. I know you take up some aspects e.g. the effect of pH on enzymatic activity, but there could be other aspects e.g. intracellular pH regulation, and the literature points to different directions.

Overall the manuscript is well written and easy to follow. The figures are of sufficient

quality and I have no problem supporting the publication after taking my suggestions above into consideration.

Minor comments:

Please add the actual p value throughout the results chapter where statistical tests were conducted, also where there is no statistical difference, i.e. $p < 0.05$ is not acceptable; the limit should be at $p < 0.001$ or $p < 0.0001$, so less than 0.1% or 0.01% probability for a type II error.

In line 475 you write: On one hand (should be: on the one hand), and it is only in line 490 as a start of a new paragraph where you have the follow up: on the other hand . . . Please rephrase, these two points should come right after each other if you want to keep them in the 'one the one hand', 'on the other hand' form

y-axis in Figs 5 and 9 has ',' as decimal separator

Please add the axis title, for example Respiration to Fig 5c with units in parenthesis. It makes it much easier to see what data is presented.