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Biogeosciences Discussions

Interactive comment on "High bacterial organic carbon uptake in the Eastern Tropical South Pacific oxygen minimum zone" *by* Marie Maßmig et al.

Anonymous Referee #2

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This is a useful study investigating the complicated microbial dynamics within oxygen minimum zones with many different biogeochemical and physical measurements made. The authors focus on calculating bacterial production predominantly associated with carbon cycling, but then also use other studies to consider the input of nitrogen cycling and anoxic processes. The manuscript is very well written, generally clear and detailed. I have a few suggestions to revise the text and figures to make some of the points clearer and to hopefully clarify some uncertainties. One point that was not mentionned was that the bacteria were collected from suboxic concentrations but rates measured in oxic conditions I assume? How might the fact the microbes are being oxidised affect your results? It is difficult to work in OMZs and many of the studies cited

would have done a similar thing but i think this should be discussed. Also the authors seemed to switch between top/bottom hypoxic and upper/lower oxycline, which i took to mean the same thing. If not this should be clarified.

Specific points: Line 16 - Change to 'from the upper AND lower oxyclines', using 'or' makes it seem negative and I had to read it a few times to understand you were saying production was high.

Line 73 - I noticed the transects had data from both cruises. They are quite close together temporally, but even so some discussion on how the data is aggregated and if temporal affects are accounted for is needed. Did you look at the data separately per cruise too? Which data/transects are used in the figures? What is the seasonality like in the region?

Line 139 - citation for first use of BOD and write in full first time used in main text

Line 145 - what temperature dependance? Is a conversion used? Cite

Line 198 - Perhaps place oxygen concentration in Fig. 2 with the other 'standard' oceanographic measurements, as it is a key plot for this paper. I would also add on horizontal layers onto the transect images, i.e. by using black lines to show oxycline/omz/hypoxic/oxic layers.

Also, what was lowest oxygen concentration, was it 5 umol/L so only suboxic or even lower to maybe anoxic as set by your definitions in the introduction? The study refers to 'suboxic' throughout which makes me think outside of the OMZ, but actually this is the OMZ. Being clear about this early on in the results would help.

Line 199 - Does this mean OMZ is 100-500 m depth, be explicit

Line 206 - 'except for most coastal stations' - what happened at these stations?

Line 235 - full statistical results in parentheses is great to see and the correct way to present results, however with so many tests and parts of the text in parentheses it stops

the flow when reading. Can you shorten the statistical results in some way? Or add a table to the supplementary material?

Line 242 - normalisation completely changes the pattern of production with depth and oxygen, reverses it compared to un-normalised data. It would be good to show this and discuss further, perhaps using scatter plots too.

Line 243 - Units of 'amol per cell per day' are incredibly low as one may expect from a 'per cell' measurement, but is this comparable with results from other studies?

Line 284 - Is this finding because experiments were run in oxic conditions, as were some of the studies you cited too. But should consider the affects of exposing microbes from OMZ to oxygen.

Line 375 - where did the data of amount of reduced nitrogen come from, was it Kalvelage? I found this section, whilst interesting, a little hard to follow which numbers were from this study and which from others. For instance, why use BGE from Del Giorgio 1998 when you calculated it in this study?

Line 388 - Do you mean distributed evenly vertically or horizontally, or both?

Line 399 - I agree with final sentence of paper but not mentioned anywhere how can improve understanding or quantification processes, so on its own this final sentence is a bit weak for such a thorough study.

Figures: Fig. 2 and Fig.3 - show horizontal oxygen regions as suggested above. Also, reduce extrapolation with ODV, large gap $\sim$ 100 km where no station/data between coastal and offshelf. Which interpolation did you use in ODV? The stations are running from the coast which is more east than offshore according to figure 1, so perhaps flip horizontally to reflect the east to west/coast to offshore nature of the spatial distribution. Having longitude instead of distance from coast (or both preferably) may be more useful, and make clear the inset is top 100 m.

Fig 4 - labels of oxygen regimes different to text where instead oxyclines often referred

to, is that the same as top and bottom hypoxic? Continuity throughout would be helpful.

Fig. 5. Add a title for each panel so do not need to refer to legend as much.

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