

Interactive comment on “Ocean acidification of a coastal Antarctic marine microbial community reveals a critical threshold for CO₂ tolerance in phytoplankton productivity” by Stacy Deppeler et al.

Anonymous Referee #1

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General comments: In this work, Deppeler et al. installed six minicosm to study how ocean acidification will affect coastal microbial communities, including photoautotrophs and heterotrophs. This kind of field work is rather difficult to conduct, because it requires large amount of resources, participation of different groups and limited by meteorological condition and logistical support. They stated that there existed a tipping point for CO₂ effects, ocean acidification with CO₂>1140 uatm would decrease primary production of phytoplankton, while no consistent effects on bacteria. This is an interesting finding, however, the data analysis is inadequate, especially for the threshold,

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the author should present a fig, the x-axis is pCO₂, and y-axis could be GPP, FV/FM or other parameters, to clearly show there is a tipping point. Overall, this manuscript is well structured, while there are some flaws need to be fixed. Specific comments: Introduction: This section is well written, reflected the background of this study Method: I recommend the author to present a picture of whole scene of the minicosm, that will be much easier for the reader to follow the method. P4 Line24, the seawater was transferred from another location by helicopter, my impression is that the community structure might be different with the local seawater where the experiment done. The major concern is that seawater in minicosm might contact with local seawater during the manipulation, is the contamination even for all minicosms? Because you don't have replication for each CO₂, even the contamination happened differently for minicosm, while the statistics cannot tell you. P4 Line 33 Why you use blue filter? Are the transmission spectra available? P6 Line 17, Why ammonium was not measured? It is actually an important nutrient for phytoplankton. P9 Line 5, Are AZ and EZ directly dissolved in milliQ water? I remember these two reagents are quite difficult to dissolve in pure water. Here is just a reminder. P10 Line 7, I understand that it is impossible to run 6 CO₂ with replicates, however, I think the author should do more job on statistics instead of simple comparison with ANOVA. They could try to do some curve fitting, e.g. exponential rising for POC, PON, Chla, decay of nutrients etc, to extract some valuable numbers for comparison. Results: This section is well written Discussion: This section is somewhat redundant, the author talked too much about CCM. CCMs are quite complicated and involved by many proteins, enzymes, and ion channels. The present data is obtained only using two CA inhibitors, so to what extent these data can reflect the activity of CCM? Moreover, you only measured chlorophyll fluorescence, which is direct measurement of light reaction, however, CA only participates in CO₂ acquisition for dark reaction, so the measured parameters further limit the interpretation of data for CCM. I suggest the author to compress CCM related paragraph. P14 Line 22 "photosynthetic . . . process", this is a very short sentence, please rephrased.

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