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Biogeosciences Discussions

Interactive comment on "Availability of phosphate for phytoplankton and bacteria and of labile organic carbon for bacteria at different pCO_2 levels in a mesocosm study" *by* T. Tanaka et al.

T. Tanaka et al.

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[Referee comment] It would benefit this paper to add a line or two on SRP, HPLC etc., even if these are/or will soon be published elsewhere.

[Author response] As suggested, we added methodological description of SRP, DOC, POC, HPLC, and bacterial counting: See Materials and methods, 2.2 and 2.3 in the revised ms.

[Referee comment] I also believe that some reconstruction of certain passages and sentences would improve the readability of this paper (see below) as well as breaking the results and discussion sections into their own separate entities.

[Author response] As suggested, we have improved the sentences and the structure of the results and discussion section in the revised ms. However, we decided not to break the results and discussion section into two.

[Referee comment] Materials and methods 2.1

[Author response] We added the sampling frequency and sampling time in the revised ms. Diel patterns of certain parameters might be influenced by increasing pCO2. But we did not follow diel patters in this study. Our results should be regarded as the responses that integrated such events.

[Referee comment] What were your hypothesized results to the different treatments?

[Author response] Because of little information of effect of increasing pCO2 on (semi)natural marine ecosystems, we summarized the previous studies on effect of increasing pCO2 rather than made hypotheses to be tested: See the introduction section.

[Referee comment] The reason for sampling out of one each of the treatments instead of all nine mesocosms can be stated here rather than in the results and discussion section.

[Author response] We moved this description in Materials and method section 2.1 in the revised ms.

[Referee comment] 2.4. calculations. … why did the P-biomass have to be derived from cell counts and chlorophyll data since there were direct measurements of size fractionated particulate P throughout these experiments (e.g. Fig. 1)?

[Author response] The chemically measured particulate P includes not only osmotrophs but also phagotrophs and detritus.

[Referee comment] Results and discussion, P3947, ln 29. Was the grouping of phytoplankton taxa from HPLC diagnostic pigments during the 5 phases identified by P

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turnover times the same as if analyzed by any other parameter?

[Author response] No, we described dominant phytoplankton groups for each phase of phosphate turnover time. We improved the text in the results and discussion section: By using the five phases defined by the dynamics of phosphate turnover time, the succession of dominant phytoplankton groups based on HPLC pigment analysis (Schulz, et al., 2007) can be summarized as follows (Table 1) and in a new table (Table 1 in the revised ms): Phytoplankton groups are based on HPLC pigment analysis. Dominant groups are shown for each phase of phosphate turnover time.

[Referee comment] Abstract, ln 4. 750 μatm should be 700 μatm.

[Author response] We corrected.

[Referee comment] Introduction, p3938, ln 26. increasing the dissolved CO2 concentration

[Author response] We corrected.

[Referee comment] p3939, ln 3. Change until the year 2100 to by the year 2100.

[Author response] We corrected.

[Referee comment] p3939, ln10. Suggest enhance both photosynthetic carbon and release of and split sentence in two.

[Author response] We corrected.

[Referee comment] p3940, ln3. Change not necessarily easy to be examined especially for to not necessarily readily examined. The sentence following is also somewhat heavy and could be rewritten to improve reading.

[Author response] We improved.

[Referee comment] Ln10. Suggest changing can be useful to examine to can be useful for examining.

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[Author response] As suggested, we changed.

[Referee comment] Ln12. Suggest changing the objective is to examine how for bacteria changes at different pCO2 levels to for bacteria, is affected by different pCO2 levels.

[Author response] We improved.

[Referee comment] Results and discussion, p2946, ln4. I suggest to change from accompanied by an increase in the >10 μm fraction to driven by an increase in the >10 μm fraction.

[Author response] We changed.

[Referee comment] P3947, ln7. nmol-P L-1 should be nmol-P L-1 h-1.

[Author response] We corrected.

[Referee comment] P3948, ln24. Suggest to change from P deficiency supply for phytoplankton and bacteria community. to P deficiency…supply for the phytoplankton and bacterial communities.

[Author response] We improved.

[Referee comment] P3951, ln9 and 19. Change from between to among.

[Author response] We changed.

[Referee comment] P3951, ln19. Suggest to change from …the availability of glucose and of phosphate availability was o the availability of glucose and phosphate was.

[Author response] We changed.

[Referee comment] Figures 1 and 2.

[Author response] As suggested, we applied different colors to both figures.

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[Referee comment] There looks like there is a nice anti correlation between P turnover time and APA. Could SPR data also be included here?

[Author response] We included results of correlation analysis between APA and SRP and between APA and phosphate turnover time in the revised ms: A significant correlation was found between APA and phosphate turnover time ($r=-0.689$, $P<0.01$, $n=15$), but not between APA and SRP ($r=0.414$, $P>0.1$, $n=15$).

[Note by the authors] We re-arranged the author list according to the revision of our manuscript.

We thank Referee #4 for helpful comments.

References Schulz, K. G., Riebesell, U., Bellerby, R. G. J., Biswas, H., Meyerhöfer, M., Müller, M. N., Egge, J. K., Nejstgaard, J. C., Neill, C., Wohlers, J., and Zöllner, E.: Build-up and decline of organic matter during PeECE III, Biogeosciences Discussion, 4, 4539-4570, 2007.

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