

Interactive comment on “An experimental study on the effects of nutrient enrichment on organic carbon storage in western Pacific oligotrophic gyre” by J. Liu et al.

Anonymous Referee #2

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The objective of the present study was to investigate the effect of inorganic nutrients and different organic carbon sources on the degradation of the resident DOC pool. The authors tested this idea in 20-L mesocosm experiments through the addition of inorganic nutrients, glucose, and the SPE-extracted fraction of a diatom exudate to 3 μm -filtered seawater collected at 75m in the western Pacific Ocean. The authors followed basic microbial parameters and concentrations of inorganic nutrients and dissolved organic carbon (DOC) over about 1 week. The major finding of the present study is that the combined addition of glucose+N+P had the most pronounced effect on microbial activity and DOC consumption. The addition of N+P, and of SPE-extracted DOM also yielded higher rates than in the control treatment, while rates in the glucose-amended

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treatment were not different from the control treatment. The authors conclude from their study that inorganic nutrient limitation can profoundly affect DOC dynamics, and thus potential storage of DOC in the deep ocean. This finding and conclusion is not new. A large body of literature exists on this issue, in many oceanic regimes. The overall conclusion drawn by the authors that “nutrient repletion has negative effects on carbon preservation which is meaningful for coastal water management” is quite far-fetched. This link does not really make sense. Also, in the conclusion, the authors argue that their experiment has shown a “reduction of carbon storage”, which I do not agree with. Even if the DOC was not consumed in the time frame of their experiment, it could be degraded under changing environmental conditions, or at longer time scales before being stored in the strict sense. Finally, the title of the MS is not appropriate. Specific comments: p. 2975 : Line 13-15 : The authors state that the production of RDOC is well understood. I do not agree with this statement, as a very limited number of studies exist on this topic.

p. 2976, line 9-13 : The first sentence describes the inorganic nutrient concentration, while the follow-up sentence is about DOC : What is the connection between them ?

p. 2977, line 7-9 : Why was the algal exudate concentrated on a SPe cartridge and not added as a whole to the mesocosms ?

Table 1 : It appears this Table provides the added concentrations to the mesocosms? It would be important to provide also the final concentrations of DOC and inorganic nutrients to appreciate the amount of the respective nutrients added. Why are all the concentrations only provided approximatively?

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