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***Interactive comment on “Marine ecosystem
community carbon and nutrient uptake
stoichiometry under varying ocean acidification
during the PeECE III experiment” by
R. G. J. Bellerby et al.***

Anonymous Referee #2

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This paper presents the dynamic of inorganic carbon and nutrient uptake stoichiometry during the PeECE III experiment.

The results complement nicely the other papers of the special issue.

However, the message conveyed in the paper is not very clear for me, especially the effect of acidification on

calcification by *E. huxleyi* and may be either further discussed or tuned down.

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Major comments :

The part 4.4 reads "Calcification was insensitive to CO₂ level in this study". This is a strong message indeed. In contrast some part of the manuscript suggests that potential decrease of calcification has not been caught owing to the low biomass of *E. huxleyi*. So what is the message that this manuscript aims to convey ? Furthermore, I would like to point out that the biomass of *E. huxleyi* was not so low during this experiment: 6 $\mu\text{g/L}$ Chla during PeECE III experiment to be compared to 11 $\mu\text{g/L}$ during PeECE I experiment (Engel et al., 2005). This should be also compared to the biomass of natural bloom (0.3 - 3.80 $\mu\text{g L}^{-1}$ Chla) in the North sea (Head et al., 1998) or (0.8 -1.1 $\mu\text{g L}^{-1}$ Chla) in the Gulf of Biscay (Lampert et al., 2002). So I am not sure in what extent this sentence "subtle inter-treatment differences ... would magnify to be significant within a plankton bloom dominated by *E. huxleyi*"; is relevant. The idea that the survey of Total Alkalinity might be not sensitive enough to capture some difference in calcification for Chla abundance lower than 6 $\mu\text{g/L}$ makes sense to me, but I am not sure about what is the feeling of the authors. If the authors think that it is not possible from the results to assess if the acidification impacts calcification or not, then the sentence "Calcification was insensitive to CO₂ level in this study"; must be tuned down. If the authors think that the experiment showed that calcification was insensitive to acidification, that is a quite interesting outcome. But then, the authors should discuss in more details why during PeECE I experiment calcification was affected by the increase of CO₂ (Delille et al., 2005) while no effect was observed during PeECE III experiment. As pointed out in the manuscript, the effect of acidification on calcification of *E. huxleyi* is still a matter of debate (Riebesell et al., 2000; Zondervan et al., 2001; Langer et al., 2006) and this experiment can potentially bring some significant information.

In contrast, some parts of the discussion (especially part 4.4) are a bit evasive and are not directly related to the results from the experiment. They might be shortened, even removed.

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Technical comments

Abstract: "Inorganic carbon and nutrient biogeochemical responses". The authors should precise what this response is referring to.

"Temporal inorganic carbon dioxide system variations" could be rewritten

References

Delille, B., Harlay, J., Zondervan, I., Jacquet, S., Chou, L., Wollast, R., Bellerby, R.G.J., Frankignoulle, M., Borges,

A.V., Riebesell, U., Gattuso, J.-P., 2005. Response of primary production and calcification to changes of pCO₂ during

experimental blooms of the coccolithophorid *Emiliana huxleyi*. *Global Biogeochemical Cycles* 19(GB2023),

doi:10.1029/2004GB002318. Engel, A., Zondervan, I., Aerts, K., Beaufort, I., Benthien, A., Chou, L., Delille, B., Gattuso, J.P., Harlay, J.,

Heemann, C., Hoffmann, L., Jacquet, S., Nejstgaard, J., Pizay, M.D., Rochelle-Newall, E., Schneider, U., Terbrueggen,

A., Riebesell, U., 2005. Testing the direct effect of CO₂ concentration on a bloom of the coccolithophorid *Emiliana*

huxleyi in mesocosm experiments. *Limnology and Oceanography* 50(2), 493-507. Head, R.N., Crawford, D.W., Egge, J.K., Harris, R.P., Kristiansen, S., Lesley, D.J., Marañón, E., Pond, D., Purdie,

D.A., 1998. The hydrography and biology of a bloom of the coccolithophorid *Emiliana huxleyi* in the North Sea. *Journal of*

Sea Research 39, 255-266. Lampert, L., Quéguiner, B., Labasque, T., Pichon, A., Lebreton, N., 2002. Spatial variability of phytoplankton

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composition and biomass on the eastern continental shelf of the Bay of Biscay (north-east Atlantic Ocean). Evidence for

a bloom of *Emiliana huxleyi* (Prymnesiophyceae) in spring 1998. Continental Shelf Research In Press, Uncorrected Proof. Langer, G., Geisen, M., Kläs, J., Riebesell, U., Thoms, S., Young, J.R., 2006. Species-specific responses of calcifying

algae to changing seawater carbonate chemistry. Geophysical Research Letters 7(9), Q09006, doi:10.1029/2005GC001227. Riebesell, U., Zondervan, I., Rost, B., Tortell, P.D., Zeebe, R., Morel, F.M.M., 2000. Reduced calcification of marine

plankton in response to increased atmospheric CO₂. Nature 407, 364-367. Zondervan, I., Zeebe, R.E., Rost, B., Riebesell, U., 2001. Decreasing marine biogenic calcification: A negative feedback

on rising atmospheric pCO₂. Global Biogeochemical Cycles 15(2), 507-516.

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4, S2605–S2608, 2008

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