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Biogeosciences Discussions

Interactive comment on "Response of *Nodularia spumigena* to pCO_2 – Part 3: Turnover of phosphorus compounds" *by* J. Unger et al.

Anonymous Referee #2

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This paper reports the results of an experimental approach related to the effect of acidification on phosphorus dynamics by Nodularia spumigena. The author determined four DOP compounds including ATP, DNA, RNA and Lipid-P in culture experiments. These compounds are essential constituents of organic P in organisms and have been often studied in marine environments. As far as I know, this paper is the first report investigating simultaneously dynamics of these compounds in dissolved organic P fraction. The topic of potential effects of ocean acidification on nitrogen fixing plankton is timely. This manuscript adds incremental knowledge to our understanding of P dynamic, in particular dissolved organic P, in marine environments. While I find the results interesting I think the authors should make an effort to write the manuscript in a more comprehensive way. As it is now, the writing is not straightforward and the main points get diluted. There are numerous spots in the manuscript where I found myself stumbling

over awkward sentence structure or confusing wording.

This is a part of the investigations accompanying two papers of Wannicke et al. (2012) and Endres et al. (2012) on response of Nodularia to pCO2. However, in this paper the authors had made no effort to synthesize their findings with those in other papers. The author should be very careful with their discussion on the significant difference in observed pCO2 with the targeted values; the range of pCO2 was quite narrow (p. 14715, L1-L3). As the authors argued, they found no significant effect of variable pCO2 on dynamics of the DOP compounds (p. 14732, L26-L27). Although the authors founds the significant variation in total DOP concentration with pCO2 level, it is unclear if the DOP variation was directly due to potential change in metabolic functions of Nodularia with acidification. It could be that the variation of total DOP resulted from the difference in biomass observed between the low and high pCO2 cultures. Finally, since the authors used an "aged" seawater, refractory and biologically less-available DOP components which had withstood biological breakdown during the "aged" phase might dominate DOP at the start of the culture experiment. However, the results of this paper suggest that the ambient DOP in the sweater could be rapidly utilized with DIP-depletion. Do the authors have any idea why Nodularia could utilize such refractory DOP components?

Other detailed comments:

p. 14714, L7-L8: Add the information on sampling depth.

p. 14714, L8-L9: Add the information on condition of sample preservation.

p. 14716, L7-L9: Add reference for chlorophyll a extraction and determination procedures.

p.14720, L8-L10: Add reference for the conversion factors from nucleic acids to P concentration.

p.14722, L25: 4.69x10ˆ5$\pm$1.64 should be (4.69$\pm$1.64)x10ˆ5.

p.14723, L28: Fig. 4a should be Fig. 3b.

p.14723, L28: The authors did not measure DOP uptake.

p.14725, L2: Higher than what?

p.14726, 3.5 [33P]PO4 uptake and transformation: The authors showed the results of only proportion of [33P] distribution in each fraction. Did the authors confirm conservation of the total activity throughout the incubation?

p.14732, L9-L10: Add references for the turnover of DNA and other DOP.

p.14732, L13-L14: Is there literature to support authors' assumption.

Interactive comment on Biogeosciences Discuss., 9, 14709, 2012.