

Interactive comment on “Dinitrogen fixation and dissolved organic nitrogen fueled primary production and particulate export during the VAHINE mesocosms experiment (New Caledonia lagoon)” by H. Berthelot et al.

Anonymous Referee #2

Received and published: 7 April 2015

General comments

“Dinitrogen fixation and dissolved organic nitrogen fueled primary production and particulate export during the VAHINE mesocosms experiment (New Caledonia lagoon)” uses a mesocosms approach to assess the potential impact of diazotrophy on the export of organic matter in a low nitrate low chlorophyll system. This design is perfect for working in a closed environment, which resembles natural conditions better than microcosms, and allows to better constraint the different input and output fluxes. The study shows that the degree of export of N in this kind of low nitrate low chlorophyll systems,

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when stimulated with phosphorous amendments, is dependent on the composition of the N₂ fixing community.

It is a well structure paper with complies with the scope of the journal and will to the existing knowledge pool of the constraints and implication of diazotrophy. However, the reviewer recommends a revision of the syntax, especially in the discussion, where the continuous use of the passive voice, the repetition of concepts in consecutive senteces, and sometimes the overuse of connecting particles, hinders its reading, and devalues its scientific significance. For this reason, with a few exceptions, no technical comments will be added after page 4289.

Specific comments

P4278, L13: do the authors mean phosphorous instead of phosphate? DIP is a commonly used abbreviation for dissolved inorganic phosphorous. Phosphate is in fact a form of this DIP, so this abbreviation seems redundant. If authors mean DIP in its original meaning please change phosphate by phosphorous. Otherwise, consider using PO₄ instead. And apply these changes to the whole text.

P4278, L15: again, it is confusing that P is used for phosphate, as it is the name of the element. Please use PO₄ or something similar instead.

P4280, L13: please do not use unexplained abbreviations in section headers, write the complete term and add the acronym in parentheses, especially when it is not the commonly used one as DIP for dissolved inorganic phosphate. This helps the reader to skip through the sections without coming back to look for the meaning of the acronym. Do the same in the next headers whenever necessary.

P4280, L17: Please could the authors explain why adding an excess of KH₂PO₄ stops PO₄ assimilation? Is it an effect of dilution of the tracer?

P4286, L9: please explain what the authors mean with “increased faster”. It is slightly ambiguous, it suggests a sharp change that it not so obvious looking at the graph.

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P4286, L19: the reviewer wonders if the authors consider that this figure is essential? Does it add to the information in the text? As most of the information of this figure is given or could be given in the text, is it essential to keep this fig2 and the next fig 7?

P4288, L25-23: this sentence is unnecessary, the information is in the figure caption and the e ratio was defined in the previous sencece, simply add (Fig. 7) to the previous sentence, please. And again, is it essential to use this graph, given that more of its information is in the text?

P4290, L8: units of nitrate in nM, however, measurements were made in μM , as explained in the methods section (P4285) and in the results section (P4285). The authors should try to be consistent with units through the text.

P4290, L10: Jickells et al (2005) does not apply here. Pathways of atmospheric nitrogen deposition are not only limited to dust, like Fe, which is exactly the scope of this study.

P4291, L21 to P4292, L10: the argumentation of this part is difficult to follow. It is very difficult to grasp the different arguments supporting that the DON pool produced or maintained in the previous part of the experiment (P1) is now supporting part of the production of PON in addition to N₂ fixation, and thus supporting the export of organic matter. Relating the effect of a lateral transport of DON to a close system seems difficult to fit in order to explain this argument.

P4292, L24-27: This sentence is incomplete or has some extra particles, probably it should say “at LEAST 20

P4294, L15: why do the authors relate a canonical Redfield ratio (6.6) with a cite of Fukuda et al (1998)?

Technical corrections

P4275, L15: please correct “v fixation”.

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P4276, L12: the term “alighted” is referred to fire, may the authours mean “lit up” instead?

P4277, L23: please change “If heterotrophic although. . .” by “Although heterotrophic bacteria. . .”

P4278, L6: please add “export, AND (2) to trace. . .”

P4280, L7: please add “organic” to “dissolved matter” to be consistent with other sections.

P4281, L11-14: please re write the sentence “Incubation bottles. . .for 24h”. It is a bit too long and wordy sentence, difficult to understand.

P4281, L14: delete of in “After of incubation”. It should say, “after incubation”

P4283, L14: correct “. . .DON and DOP, respectively”.

P4283, L17: add “were found to be A negligibile source OF particulate. . .”

P4284, L10-13: please re write this sentece, it is slightly wordy and takes some readings to get through it.

P4284, L18: correct, “according TO the propagation of errors”.

P4284, L24: please consider changing “similarly inside the mesocosms and in surrounding waters”. The sentece looks incomplete, awkward, as it needs a verb.

P4285, L8-10: another wordy sentence, too long, please try to re write.

P4285, L15: try to keep consistency between figures and the mention in the text, change Fig. 1a. Use upper case for A in the text or change the A in the figure to a lower case. The same for the rest of figure mentions through the text.

P4285, L23: add (PP) after primary production.

P4285, L25: 7.3 nM d-1. This is an awkward way of expressing a rate, it might be

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confusing for many readers. It is commonly accepted to write all the units in rates, please change rates in the text to a format like $\text{nmol L}^{-1} \text{d}^{-1}$ (as it was used in P4282, L5).

P4288, L8: correct, “DON dynamicS”.

P4288, L10-12: wordy, please re write the sentence, “decreased of” in this context is confusing.

P4288, L17: delete at, “during P1 averaging at. . .”

P4288, L18: comma before respectively. This happens through the text in several occasions, please, correct all of them.

P4288, L19: change to “M1 were higher than THOSE in. . .”

P4288, L23: re write “much more stochastic”, too informal and vague.

P4289, L1: “. . . integrated over P1 WERE. . .” (rates. . . were).

P4289, L1: “. . . all the mesocosms, AND DID not significantly differ from”

P4289, L3: “the resulting change ON the. . .”

P4289, L7-8: “. . .but deviated negatively from 0. . . FROM day 19 TO day 23”

P4289, L8: “Thus, even though. . .” Please re write this, too wordy.

P4289, L9: delete of in “the TNcalc pool decreased of. . .”

P4291, L5: change “trough” by “through”. This is repeated through the discussion, please check all the misspellings and correct them.

P4294, L19-22: please, re write this sentence, wordy, difficult to understand. Add a cite to the first argument (diazotrophs over-fix C).

Figures. Please do not use unexplained acronyms and abbreviations in figures captions, do write the whole term before adding the acronym, e.g. DDAs, PP.. Figures

should be self-contained, so anyone looking at them without reading the text can understand them. Consider joining both boxplots in one figure.

Interactive comment on Biogeosciences Discuss., 12, 4273, 2015.

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