Biogeosciences Discuss.,
doi:10.5194/bg-2015-668-AC3, 2016

Biogeosciences Discussions
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Interactive comment on "Biogeochemical and biological impacts of diazotroph blooms in a Low Nutrient Low Chlorophyll ecosystem: synthesis from the VAHINE mesocosm experiment (New Caledonia)" *by* S. Bonnet et al.

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Received and published: 16 May 2016

Dear Reviewer,

First, we would like to thank you very much for your constructive comments. We made our best to take into consideration all comments and suggestions. Comments and questions are copied with our replies below.

Referee #3

The interdisciplinary VAHINE project has already generated a large number of data

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Discussion paper

rich papers, a dozen of which are cited in this paper. This current manuscript provides a summary (synthesis) of some of the major trends from this controlled mesocosm experiment. I have not gone back and read all the individual papers so I cannot really comment on the accuracy or inclusive nature of this summary; hence, I do not have an informed opinion of whether it is needed as a "stand alone" paper. I was surprised to learn that yet another paper (listed in the reference list as Bonnet et al., in preparation) termed "Introduction to the project VAHINE" is planned. It struck me as odd that no "introduction" had yet been published, given the many papers that have already appeared. Why not combine the introduction and the synthesis into a single paper? That would seem logical to this reader.

Actually the Introductory paper is already published in BG discussion (http://www.biogeosciences-discuss.net/bg-2015-615/) and has been recently accepted for final publication in BG after minor revisions. We agree that it was misleading as it appeared as 'in prep' in the present paper. This intro paper aims at describing the scientific objectives of the project as well as the implementation plan: the mesocosms description and deployment, the selection of the study site (New Caledonian lagoon) and the logistical and sampling strategy. The main hydrological and biogeochemical conditions of the study site before the mesocosms deployment and during the experiment itself are also described, and a general overview of the papers published in this special issue is presented. All papers from the special issue could then refer to this one to avoid repeating the detailed mesocosms strategy (which was quite complex) in their paper The present Synthesis paper aims at summarizing the major experimental and modelling results obtained during the project and described in the Special issue. We thus decided to divide this in 2 distinct papers

Specific Comments p. 2, line 11: "a stable water mass" – Was turbulence measured?

The turbulence has not been measured. We replaced the sentence by 'The sentence has been replaced by 'Triplicate large volume ($\sim$ 50 m3) mesocosms were deployed in the tropical South West Pacific coastal ocean (New Caledonia) to isolate a water-mass

with minimizing disturbance of ambient light and temperature conditions' in the revised version of the manuscript.. . ..

p. 3, line 5: ammonia is NH3, ammonium is NH4+

"Ammonia" has been replaced by "ammonium" in the new version of the manuscript.

p. 3, line 6: crops, not cultures?

"Cultures" has been replaced by "crops" in the new version of the manuscript.

p. 5, line 21: quantified, not qualified?

"Qualified" has been replaced by "quantified" in the new version of the manuscript.

p. 6, line 22: Eastern Tropical Pacific?

We change to "Eastern Tropical North Pacific" as mentioned in White et al. (2012) in the new version of the manuscript.

p. 8, line 17: 40 nM NO3- seems high to me. So does 0.1-0.15 ïAËŻ g Chl a l-1

The sentence has been replaced by 'The New Caledonian lagoon was chosen as it is a well-studied environment (Special issue Marine Pollution Bulletin 2010 (Grenz and LeBorgne, 2010)) submitted to high oceanic influence (Ouillon et al., 2010) and exhibiting typical LNLC conditions during the summer season (NO3- concentrations <0.04 μmol L-1 and chlorophyll a (Chl a) $\sim$0.10-0.15 μg L-1 (Fichez et al., 2010)'.

Fig. 3: Why not plot particulate P and DOP?

We chose to present in this figure mainly the plots related to the N dynamics as this is what is specifically discussed in the manuscript. Particulate P and DOP are both presented in the companion paper Berthelot et al. (2015) within the special issue.

Fig. 3: units on (h) PON export seem to be incorrect

Indeed, the units for PON export were wrong (should be μmol d-1 instead of μmol L-1).

The correction has been applied to the figure and its caption in the new version of the manuscript.

Interactive comment on Biogeosciences Discuss., doi:10.5194/bg-2015-668, 2016.