

## ***Interactive comment on “Contribution and pathways of diazotroph derived nitrogen to zooplankton during the VAHINE mesocosm experiment in the oligotrophic New Caledonia lagoon” by B. P. V. Hunt et al.***

**Anonymous Referee #1**

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Review of the manuscript Biogeosciences Discuss., bg-2015-614

Contribution and pathways of diazotroph derived nitrogen to zooplankton during the VAHINE mesocosm experiment in the oligotrophic New Caledonia lagoon

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The manuscript by Hunt et al. is part of a series of manuscripts linked to the VAHINE mesocosm, dealing in this case with the transfer of nitrogen derived from N<sub>2</sub> fixation to zooplankton over a 23 day period. I greatly appreciate the effort of this large scale

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mesocosm experiment and its scientific objectives. I also greatly welcome the integration of gut measurements to identify diazotrophs ingested.

This manuscript is in general very well prepared and written. Moreover, experimental procedure and concept are thoroughly planned.

I only have some minor specific suggestions:

Abstract and Introduction

As I understood, the scope of the manuscript and experiment is to provide a time series and temporal variability in N<sub>2</sub> fixation rates. This should be mentioned already in the abstract.

What does the abbreviation VAHINE stand for? Please add!

1. Page 3, line 24: Strange wording, please re-write e.g. the identification of the predominating pathway still in question.

2. Please add a list of accompanied manuscripts which deal with the VAHINE mesocosm experiment and their individual scope (I understand that there were a couple more).

Material and Methods

3. Page 5. I would restructure the first paragraph and make separate subheadings for Mesocosm description and Zooplankton sampling and processing

4. Page 6, line 24. Add counting error of enumeration.

5. Page 8, lines 23 ff. I doubt that the authors really determined direct grazing using the 15N set-up as it is presented. The microbial loop was likely still present in the incubation and recycling via bacteria attached to substrates and bacteriovorous nano- and microzooplankton might have occurred. Also see comment 13. Direct grazing nevertheless was truly identified via gut content analysis.

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6. Was zooplankton put in non-labeled food after incubations so that they could purge their guts of non-digested N<sub>2</sub> food? If not the measured N might overestimate nitrogen incorporation.
7. How many zooplankton species were pooled for the mass spectrometer analysis?
8. Also please provide a scheme for experiments and incubation that had been carried out.
9. Page 10, line 19. Why did you use a theoretical value for diazotrophs of -2‰ not the one measured during the VAHNE experiment?

#### Results and Discussion

10. Page 11, line 13 ff. It may be helpful to add a supplemental graph with phytoplankton data.
11. Page 15, line 4. Please change grazing to e.g. incorporation, as you did not determine direct grazing using the <sup>15</sup>N tracer. See also comment number 5 (the authors also stated on page 19, line 4 "that secondary pathways were also important").
12. Figure 3. Why not show the actual nMDS plot, instead of showing nMDS dimensions versus time.
13. Figure 6. Please add label and numbers to the x- axis for *Trichodesmium*.

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