

# ***Interactive comment on “Heterotrophic bacterial production and metabolic balance during the VAHINE mesocosm experiment in the New Caledonia lagoon” by F. Van Wambeke et al.***

## **Anonymous Referee #3**

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### General comments

The present study is focused in evaluate the importance of N<sub>2</sub> fixation as agent that controls the new primary production and the relationship with the heterotrophic bacteria. To enhance the N<sub>2</sub> fixation authors carried out a mesocosms experiment including two periods, and in the second period they fertilize the system with DIP (dissolved inorganic phosphorous) for stimulating N<sub>2</sub> fixation. Authors arrived to the conclusion that most of the fate of diazotroph derived nitrogen reached the bacterial community through indirect processes as phytoplankton mortality (grazing, lyses. . . ).

The study is well designed but everybody knows that experiments are far from reality

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although are needed for understanding how communities behave when are submitted to driving changes. However, what it bothers me is the high variability among these three replicates. M3 presented higher values than the other two mesocosms for chl a and PP, while for APA showed lower values. There is any evident reason for this lack of replication? Of course part of this variability disappeared when averages are taken into account and results are clear and conclusive.

Authors, please, clarify whether the results derived from this experiment, are explaining the importance of N<sub>2</sub> fixation in the South Pacific. In other words what is the advance of the knowledge in this topic after applying this study?

Specific comments

Abstract

Perhaps authors should start the abstract with a more explicative sentence instead of this statement, because it is not clear the reasoning of the text. In line 2 an “is “ is lacking before “designed” Line 4: picoplanktonic instead of picoplanctonic. Line 24: ... processes, like mortality, lysis and grazing are from phytoplankton?

Introduction

Page 19865 Are you sure that waters of the New Caledonian lagoon are really representative that what happen in the surface waters of SW Pacific?

Results Authors said that very little stratification is observed in the mesocosms, and in the lagoon?

Page 19874 Authors said: APA in the lagoon waters exhibited the strongest increase between day 10 and 11 and stayed at this higher level until day 23. Question: it this means that the community is highly P limited?

Discussion

Page 19876, line 20, delete first “much” Page 19879, line 20, is Alonso-Saez

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Figure Figure 4b is difficult to follow the lagoon waters

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Interactive comment on Biogeosciences Discuss., 12, 19861, 2015.

**BGD**

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