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Interactive Comment

Interactive comment on "The fate of new production from N₂ fixation" by M. R. Mulholland

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Comments on the paper "The fate of new production from N2 fixation" by M. R. Mulholland.

In this paper the fate of new production from N2 fixation is thoroughly reviewed. It summarizes the current knowledge of N2 and C fixation, nitrogen and carbon release and the trophic interactions with special emphasis on to the genus Trichodesmium, the most widely studied pelagic marine diazotroph. Each particular chapter is well-written and worthwhile reading. Global estimations of both N2 and C fixation are presented, not to forget other contributors like unicellular diazotrophs. Methodical problems in determining fixation rates are also touched. I like the manuscript and have only four minor comments. In Chapter 4 mechanisms of N release are given. The author proposes a new method to estimate the amount of release by comparing the C2H2 reduction

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method (which is a measure of gross N2 fixation) and the movement of 15N2 from the dissolved to the particulate pool (net N assimilation). This maybe appropriate assuming a theoretical conversion ratio of three. There are doubts about the generalisation of this ratio (see Mulholland et al. 2004, Capone 1988, 1993, Montoya et al. 1996, Postgate 1998). Secondly, on page 1059, lines 5-11, reasons for active release of DON are given. I would add the release of DON as a reaction on short term unbalanced energy as suggested by Lomas und Glibert 1999a and Lomas et al 2000. Due to high light levels there is an access of photosynthetic derived energy which can not be consumed during biosynthesis and has to be discharged as DON or NH4+ in order to prevent photo destruction. On page 1062, lines 7-10, causes of bundle formation in diazotrophic colonies are presented. I would add here that besides minimizing the exposure of nitrogenase to oxygen, the bundle formation is a behavioural strategy to minimize grazing. Furthermore, Wilshire and Lampert (1999) take a nutrient effect in account for bundle formation. The temporal differentiation of early bloom stages - active excretion vs. late bloom stages-lysis and decay are missing. They are indicated by work done in the Baltic Sea by Ohlendieck et al 2000. May be these aspects could be mentioned as well.

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