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Discussions

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Interactive comment on "Strong stimulation of N$_2$ fixation in oligotrophic Mediterranean Sea: results from dust addition in large in situ mesocosms" *by* C. Ridame et al.

Anonymous Referee #2

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GENERAL COMMENTS The factors that control the distribution and magnitude of nitrogen fixation (iron supply through dust deposition among them) is a currently discussed issue in oceanography. Ridame et al. shows the effects of simulated wet and dry dust depositions on nitrogen fixation and its relevance in the supply of N for primary production on Mediterranean low nutrient low chlorophyll waters. The experimental approach used large mesocosms to establish the effects through the web chain from bacteria to zooplankton in enclosed and controlled systems, which allowed extending the period of sampling further in time, and also adding more variables, in order to improve the amount of data retrieved, in comparison to microcosms experiments or field surveys. Thus, this manuscript provides interesting information, and represents a

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substantial contribution to the scientific community, presenting consistent conclusions about the control of nitrogen fixation by dust deposition in this area. The manuscript is generally structured with clarity and the logical flow is correct, but the use of English needs revision, as pointed by Referee #1. Besides some parts are slightly confusing and could be smothered, in particular, points 3.2, 3.3 and 3.4 of the results section. After a few changes, it will be suitable for publication in BG.

SPECIFIC COMMENTS p10586 – section 2.1. The reviewer understands that the experimental design is completely described in another paper but more details on the dimensions (width, diameter, depth...) and characteristics of the mesocosms are required, also a brief description of the methods of estimation of primary production and new production. Because this manuscript will be read on its own, a brief description of the mesocosms design and the primary production methods will help to fully understand the relations with nitrogen fixation. p10588 – section 2.2.What was the limit of detection of nitrogen fixation? Is it possible to estimate it according to Montoya et al. (1996). And, if possible, a extended explanation on the methodology will be helpful: number of replicates per depth, type of incubation (refrigerated, simulation of light?)... The underestimation of nitrogen fixation due to the addition of 15N2 as a bubble is a key issue, which needs to be discussed further. It is not extremely important for the comparison of changes between control-meso as dust-meso in nitrogen fixation. As long as the difference of diazotroph species between replicates and treatments is not large, the underestimation should be of the same order and the % of change remains valid. But it may be relevant when estimating the fraction of N supply for primary production using absolute values of nitrogen fixation. Besides, a couple of key papers are missed in the citation: Mohr et al. (2010), PLoS ONE, which could be addressed to apply corrections to the estimated dissolution of the bubble of 15N2 during DUNE experiments; and Grosskopf et al. (2012), Nature, which showed that the underestimation in communities dominated by UCYN in the Atlantic was up to 7-fold in certain regions, suggesting that the % of N to primary production, estimated during DUNE, may be higher that currently estimated. Due to this, p10596 - section 4.2, needs also

revision and a slightly cautious interpretation because of possible underestimation. p 10597 – line 25. Please also cite Mulholland et al. (2001) J. Phycol. Results.

TECHNICAL COMMENTS p10586 – line 23. It is a mere suggestion, but it is helpful to explain abbreviations again the first time it appears in a new section. It allows readers understand what we are telling them, without going back to look for the meaning of the abbreviation. So, the reviewer would recommend the same for the results and discussion. p 10593 – line 3. Please, explain the meaning of UCYN (unicellular cyanobacteria) before introducing the abbreviation, not specialists could find it confusing. I will not add any other technical comment, as most of the issues I detected are mentioned in the thorough revision of Referee #1.

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