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Interactive comment on “Introduction to the project DUNE, a DUst experiment in a low Nutrient, low chlorophyll Ecosystem” by C. Guieu et al.

Anonymous Referee #3

Received and published: 31 October 2013

The manuscript is an overview of the DUNE experiment results. It attempts to quantify the effect of extreme African dust atmospheric deposition events on the oligotrophic marine ecosystem of the West Mediterranean Sea through a series of mesocosm experiments. The mesocosm experiments set up and the methodology followed are presented. Then the observed changes, due to the atmospheric particles deposited on the sea surface, in chemical and biological parameters and in the material export below the sea surface are outlined. Because of the innovative and multidisciplinary character of the DUNE project, it is challenging to summarize its findings in an overview paper. The manuscript addresses relevant scientific questions within the scope of BG and therefore I recommend its publication after appropriate revisions.

Here below I provide only additional to the other reviewer's comments on the

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manuscript.

Introduction

The authors should give information about the importance of atmospheric deposition, in terms of inputs of new nutrients to the photic zone of the West Mediterranean Sea compared to the other sources.

Methodology

Although the manuscript is an introduction of a special issue with more information likely given in accompanying papers, enough information should be provided also in this paper to support the results presented.

a) The authors comment in the text (line14) that Figure 1 summarizes all the measurements that are possible; which of them were actually performed?

b) The authors wrote that addition of 10g dust m⁻² mimics realistic wet deposition; is the amount still realistic when deposited all at once? More information about temporal variability in wet and dry Saharan dust atmospheric deposition extreme events in the region is needed. Moreover the authors should explain the choice of a 7day time lag between the two evapocondensed dust deposition seedlings; is this related to the planktonic organisms' biological cycles and how?

Conclusions

a) The authors emphasize that POC downward oceanic fluxes are strongly enhanced after dust addition mainly due to the lithogenic carbon pump and to a lesser extent due to stimulated biological activity. A schematic representation of the amount and pathways of carbon loss and uptake resulted from the experiments could complete these results. For instance such information could be added in Fig. 1.

b) The authors end the manuscript by giving cursory information about the stoichiometric microbial food web model used to explain how planktonic food web reacts to dust

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deposition. No information is provided about the model set up. Are the parameters used in the model derived from the DUNE mesocosm experiments? Are the model results validated with in situ measurements? Quantitative results should be provided in order to support their conclusions. Overall it is unclear if the discussion in the last paragraph of the paper is based on purely modeling results or it is somehow related to the DUNE data interpretation by the model.

Interactive comment on Biogeosciences Discuss., 10, 12491, 2013.

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