

Interactive comment on “Plankton community response to Saharan dust fertilization in subtropical waters off the Canary Islands” by G. Franchy et al.

Anonymous Referee #2

Received and published: 12 December 2013

Journal: BG MS No.: bg-2013-485

Title: Plankton community response to Saharan dust fertilization in subtropical waters off the Canary Islands Authors: G. Franchy et al.

General comments The paper deals with the effects of atmospheric Saharian dust inputs on the planktonic community dynamics in the subtropical Atlantic waters. The results are part of a weekly sampling effort carried out in 4 stations off the Canary Islands, between February and June 2010. This ms presents data on the planktonic community growing in the mixed layer of 4 stations along a transect, including phytoplankton, picophytoplankton, nanoflagellates, microplankton and zooplankton. In situ

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simulated primary production was also estimated at one station. Total suspended matter from atmosphere was also quantified, together with its content in some metals.

The sampling effort is relevant but I am not convinced by the conclusions raised by this study and by its scientific contribution for the oceanographic community.

In a general way, I am not sure that the effects of dust deposition on plankton community might be investigated at 20 meters depth, which can be too deep to see a direct effect of dust deposition on biological dynamics of the surface layer. Also, data of nutrient concentrations are lacking. The authors discussed them a little bit in the discussion section (with the reference of Benavides et al., 2013) but I think that there is a need to present them in this paper. Indeed, the objective of this study is the role of fertilization on plankton community.

Specific comments - I suggest the authors to homogenize the presentation of the data set: * Fig 2: Temperature is described from Dec 2009 to June 2010, while all the other figs present data from Feb. 2010 to June 2010. Data before Feb. 2010 are not useful, since they covered only the first 10 meters depth layer being recorded by a buoy. * I suggest to homogenize the treatment of the data, estimating the mean in the same way for all the parameters, i.e., stations 2 to 4, instead of stations 1- 4 for some and 2-4 for others. - I also suggest to present hydrological data along the transect, to show the spatial distribution of the hydrological properties of the water masses. - Fig. 3: same comment than for Fig. 2: I don't understand the reason why the authors present the data from November 2009 to July 2010. I suggest to present data only for the Feb. - June 2010 period. - The Fig. 3 is interesting, showing the different dust inputs during the sampling period. However, this study only presents the impact of one of these (the greatest input observed in March). I think it is a pity that the authors did not investigate/present the effects of the different inputs on the plankton community. However, the other inputs are not very clear to me. I am not sure that the TSM peaks are significant. - Did the authors analyse the heterotroph prokaryotic community (included into the flow cytometry data set)? I think that it can be useful

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to integrate this compartment to the present work (there are different papers on the bacterial responses to dust input in the surface waters). - Also, I suggest to report the metal data concentration on the TSM concentration since it appears from the Fig. 3 a huge heterogeneity in the metal content (and so, type?) of dust. - The Fig. 5 is not clear, too much lines are present on the plots. I also suggest to present the sum of picophytoplankton biomass (APE+Syn+Pro)

- P 17280, lines 13-17. I am sceptical on the reason why fluorescence and Chl.a concentration were not correlated during the May-June sampling period. I don't think so that the reason was the fluorometer (it should be a great problem in this case!), but much more a problem of environmental forcing on chl. a fluorescence, such as light. Indeed, greater light in surface, lower the chl a fluorescence as a photophysiological response of algae. Also in May-June, diatom biomass was different from the previous period and was very low, so, maybe, with different cell size and photophysiological properties.

- P 17278, line 28: I suggest adding "from the deeper layer" after ". . .of nutrients in the mixed layer" - P 17283: lines 8-10: I am wondering about the following affirmation: "the absence of intense mixing". It appears to me that the mixing might be high in the first 30 meters layer (from the plot 2a). I think that the low biomass value might be due to this feature, or to the low nutrient concentrations? It should be interesting to discuss on the picoplankton biomass contribution to the total phytoplankton biomass.

- P 17284: lines 8: I suggest ratio instead of "relationship"

- The plots on the figs 6 and 7 do not convince me. I suggest to present the temporal evolution of the parameters from 2/3 weeks before to 2/3 weeks after the dust event. Indeed, we can hypothesize that some components react quickly and other do react slowly.

- P 17285, Lines 6-10: The statement reported here is not clear to me.

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- P 17286: - Evolution of nutrient concentrations is strongly lacking in the ms. - Great part of the discussion on nutrient dynamics is speculative (e.g., nitrogen, silicate)

- Fig. 9: I suggest presenting cell concentration data, instead of biomass concentration.

- P 17287: discussion on the discrepancy between PP and biomass responses. I am not convinced by this part of the discussion. The authors did not provide any strong hypothesis on this feature. Hypotheses regarding biomass losses, such as grazing or sinking must be discussed.

- P 17288: The relation between dust input and increase of the presence of *Chaetoceros* sp. is rather speculative. Thus, it is almost clear that in correspondence to this period, a deepening of mixing layer occurred (Fig. 2a), that might induce changes in the phytoplankton community at 20 meters depth, with an increase in diatoms and a lowering of picophytoplankton.

- The references are not really updated. Some recent papers dealt with the effect of dust deposition on the surface layer ecosystem of the Med. Sea.

Summary section: - “In summary, our results showed that the Canary Islands waters were continuously affected by the Saharan dust deposition during the period studied.”

This affirmation does not really fit with the data presented.

- “Dust fertilization was evident by the high atmospheric iron, and nitrate and phosphate concentrations found in the mixed layer. “ These data are not presented in the ms. - Therefore, after the heavy dust event observed in March, the smaller but numerous dust events in April, May and June would potentially reinforced the fertilization effect of the atmospheric deposition. The biological data presented in this ms does not support this hypothesis.

- “Finally, the response of the planktonic community consisted, on one hand, in the enhancement of primary producers, mostly diatoms, and mesozooplanktonic organisms, as it has been observed before.” This response appears to me a seasonally driven

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response, since diatom biomass increased for a long time (until the end of May).

- “On the other hand, picophytoplankton seemed to be negatively affected, but if this effect was directly caused by dust or indirectly by grazing losses remains unknown. This unequal effect upon autotrophs, favoring diatoms instead the small autotrophs, could also enhanced the biological pump due to a higher carbon export flux resulted from diatom sedimentation.” This assumption is too speculative respect to the data presented in the ms.

Interactive comment on Biogeosciences Discuss., 10, 17275, 2013.

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