

## ***Interactive comment on “The impact of Saharan dust on the particulate export in the water column of the North Western Mediterranean Sea” by E. Ternon et al.***

**Anonymous Referee #2**

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Review of Ternon et al.: “The impact of Saharan dust on the particulate export in the water column of the North western Mediterranean Sea” *Biogeosciences Discuss.*, 6, 10737–10773, 2009

General comment: The present paper, tries to relate the measurements of eolian deposition and flows of particles in marine environment. This issue is one of the major topics within the field of particle fluxes and has great impact on other issues such as the functioning of pelagic ecosystems, wind-fertilization of these ecosystems and the biological pump activity, among others.

Specifically the work relates the flows of particles collected in the station DYFAMED, at

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200 m of depth, among the years 2003 and 2007, and the flows of atmospheric particles collected from the north (Cap Ferrat) as well as for the south in different stations (Orstriconi, Ile de Rousse and Ponte Leccia in the island of Corsica) of the station DYFAMED. The aim of the article focuses on the relationship between atmospheric fluxes of lithogenic material and the export of organic matter from the surface layers of the water column.

The article is very interesting and well written. I think it is suitable for publication in BG, but first would have to make some minor corrections.

Specific comments: Title: The title, while attractive does not reflect the entire paper. This only mentions the contributions of atmospheric origin, while in the manuscript are mentioned both wind and river inputs.

Methods: 2.1. Atmospheric sampling The sampling of atmospheric particles is too short compared to the marine particles. Most physical characteristics of the stations and particle collectors are only mentioned in Table 1.

2.2.1 and 2.2.3 These two points are confused. These sections deal with chemical analysis to determine the composition of marine particles. I would suggest entering the text of paragraph 2.2.2 within the text of paragraph 2.2.3, since later in the text refers to the results obtained in Section 2.2.3.

Results and Discussion: Paragraphs Results and Discussion, I personally think that would be better to separate them. Make a one paragraph of complete and comprehensive results, and then lets make a much clearer discussion on the objectives of the article. Paragraphs 3.1, 3.2 and 3.3.1, it is mainly a description of results, while paragraphs 3.3.2 and 3.4 are clearly of discussion of the subject of the article.

3.1 Atmospheric flux Since most of the deposition events are wet. It would be interesting to mark in the Figure 2 the dry deposition events. Have you seen any difference in the type of particle (mass flow, composition, size...) and the ecosystem response

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between the two types of events?

Figure 2. Change one of the scales of graph. Marine particle fluxes are very difficult to observe by being behind atmospheric flows. Figure 2. Units of fluxes  $\text{mg}\cdot\text{m}^{-2}\cdot\text{d}^{-1}$ ? Figure 3. Change the figure caption. The mean mass flows of atmospheric deposition are not climatology.

3.2 Hydrological and biological . . . It would be interesting to put some figure of T and / or S in the two periods identified (stratified and unstratified) during the period studied (2003-2007). Especially interesting would be to put the graphs of the periods referred to subsequently be in the text, for example in February 2004, July 2004, June 2006... P10745, line 13: "According to pigment. . . ." This phrase, I guess it refers to the graph 4.i, can you explain more deeply? Figure 4a? At the figure caption of Figure 4, we have the figures 4.i, the 4.ii, and 4.iii Figure 4. Change the figure caption. This is not climatology.

3.3 Marine flux 3.3.1 Marine total mass flux p10745, line 20: 1228??!! Vs figure 2. Fig. 4b or 4.ii? p10746, line 21: Fig. 4b or 4.ii? p10746, line 25: ". . . maximum of the total mass flux occurs before the peak of the bloom." This observation is important, the authors show the presence of a peak in the mass flow and the flow of organic matter (p10748, line 11) before the spring bloom. This observation, important for understanding ecosystem functioning and dynamics of the biological pump, need a greater and long discussion, which greatly improved the article. This remark, which as the authors say, has been described previously by other authors (Miquel et al. 1994) and by others elsewhere (Zúñiga et al. 2007). Although the latter author, relates that maximum contributions to fertilization by wind. Personally, watching the figures, 2, 4 and 5, I consider that these maximum mass flow and organic matter, may be due to processes of un-stratification of the water column and the subsequent inflow of nutrients. Are the processes that control these peaks are simply physical and biogeochemical? To elucidate these processes, it would be interesting to know the relationship between mass flows and flows of components (OM and especially Opal), ie the nature and evolution-

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ary state of the OM. Are phytoplankton communities, not detected by satellite images?

3.4.1 Winter high marine lithogenic events See Fabres et al. (2002) for a similar study

3.4.2 and 3.4.3 The cases of Saharan dust events. In these cases, to know certain characteristics of the aeolian material (size, composition,...), give many more possibilities for discussion and relation to other processes.

3.5 Lithogenic particles and organic carbon export Paragraph 3.5, is a mixture of discussion and conclusion. Many of the topics covered have already been discussed above. Certain information and data may be included in the preceding paragraphs, this would reduce the Section 3.5 and give more substance to the above. p10755, line 3: Remove recently, these papers are nothing new in this field. p10755, line 16: To see Honjo (1996) for a conceptual model of succession of different peaks in the mass flows and OM. And, Boyd and Trull (2007), for a nice discussion of new processes and new mechanisms of export of OM. p10756, line 18: 0.8 is the 40% of 2.

Boyd, P. W. and T. W. Trull (2007). Understanding the export of biogenic particles in oceanic waters: Is there a consensus? *Prog. Oceanogr.* 72: 276–312.

Honjo, S. (1996). Fluxes of particles to the interior of the open oceans. In: Ittekkot, V., Schafer, P., Honjo, S., Depetris, P. (Eds.), *Particle Flux in the Ocean*, SCOPE Vol. 57. Wiley, New York, pp. 91-154 & 372

4. Conclusions p10757, line 20 to 25: Is this paragraph necessary? Rewrite specifying the subject of the article and possible future lines of work.

Figures: Figure 1. To Add the rivers mentioned in the paper and the ocean circulation in the study area. Figure 2. Mentioned above Figure 3. Mentioned above Figure 4. Mentioned above

References: Add the following references:

Zuniga et al. (2008): COMPOSITIONAL AND TEMPORAL EVOLUTION OF PAR-

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TICLE FLUXES IN THE OPEN ALGEROBALEARIC BASIN (WESTERN MEDITERRANEAN). J. of Marine Systems 70, pp 196-214 At certain points of the article is better than the aforementioned Zuniga et al. (2007).

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