

## ***Interactive comment on “Atmospheric deposition of organic matter at a remote site in the Central Mediterranean Sea: implications for marine ecosystem” by Yuri Galletti et al.***

### **Anonymous Referee #2**

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This paper presents a sound dataset concerning the dry and wet deposition fluxes of dissolved organic matter sampled for 2 years and a half at the island of Lampedusa (Italy). This site, in the central Mediterranean, is appropriately taken to represent the interaction atmosphere-sea surface in a remote marine environment. It is a well written paper which addresses a topic of interest: the role of DOM (and its components DON and DOP) deposition in the western Mediterranean. It explores the role of the frequent Saharan intrusions, a very interesting point since few studies have dealt with the interactions between organic carbon and Saharan dust. Finally, it specifically addresses the role of this atmospheric deposition for marine productivity. The quantification of N and P atmospheric deposition to the Mediterranean has been previously addressed in

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many papers, the most relevant of them are adequately cited by the authors. However, I'd like to bring to the authors attention the work of Izquierdo et al. 2012 in Atmospheric Environment. Atmospheric phosphorus deposition in a near-coastal rural site in the NE Iberian Peninsula and its role in marine productivity, since it will provide more data for comparison, discussion and understanding of the role of African sources in marine biogeochemistry, and the relative contribution of dry and wet deposition. The layout of the paper and data treatment are OK, and I have only a few suggestions, which I list below. Introduction Lines 34-35. Industrial pollution can also be originated from North Africa as has been shown in the work of Rodríguez et al (2011). Transport of desert dust mixed with North African industrial pollutants in the subtropical Saharan Air Layer. Atmospheric Chemistry and Physics 11, 6663–6685. I think it is worth considering.

Line 40. The work of Izquierdo et al 2012 could be included in this list of references, since it deals with how P dep influences the marine biogeochemical cycle in the western Med Sea.

Line 45. This sentence should be revised as it is not true that atmospheric deposition affects radiative forcing and human health. Aerosols in the atmosphere do, but not deposition.

#### Material and methods

I recommend to make some reorganization of the text, since some paragraphs in this section in fact correspond better to the Introduction. E.g. the paragraph dealing with the explanation of the Mediterranean seawater DOM stoichiometry compared to the world oceans (lines 70-75) should be moved to the Introduction. Same thing with the paragraph justifying the appropriateness of Lampedusa as representing an unpolluted site in the central Med.

Line 78. Revise the notation of units of mean dust deposition Line 95. polycarbonate, not in capital letter Paragraph 104-108. Please list in this text the ions and metals analyzed Line 105 and 136. blank levels, instead of blanks level Lines 135-140. This

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has been already exposed in lines 104-108. Line 144. I see that the particulates retained in the filters (after wet and dry deposition filtration) was analysed. But the procedure of digestion and analysis is not reported. Same thing for particulates from the PM10 samples (line157). This should be described in the M&M.

Results Line 202. Here there is an error, since the upper limit of TDP is  $5 \cdot 10 \text{ exp-3}$  (as deduced from Table 2). Line 244. Error in unit:  $8.8 \text{ ug m-3}$

Discussion In this section I'd like a more in deep discussion of dry versus wet deposition and its relation to meteorology.

High DOC deposition was recorded in Lmp25 (May 2016) and also in Lmp1 (end of March 2015) and Lmp 4 (May2015) coinciding with Saharan dust but low DOC was found in Saharan events during autumn and winter. In view of this clear seasonal differentiation, one could hypothesize that there is a role of pollen attached to desert particles in these spring events (end March-May) and this pollen would contribute DOC. This process would not occur in the other seasons (winter and autumn of no pollen production). This is a possible explanation that needs further attention. However, there are some reports in the literature of joint pollen and dust transport: for example, Van Campo and Quet (1982) identified pollen types transported from North Africa to south France together with mineral desert dust, Franzen et al. 1994 documented the arrival of pollen from the Mediterranean to Fennoscandia during a dust event. Pollen originating in Morocco was detected South Spain (Cabezudo et al. 1997) and various pollen types (Cannabis, Cupressus, Pinus, Platanus and Sambucus) were observed in Cordoba (South Spain) exclusively during dust African events (Cariñanos et al. 2004).

Figures In fig 2, 3 and 4, include a legend to indicate the color of wet and dry deposition.

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