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## ***Interactive comment on “Long-term atmospheric nutrient inputs to the Eastern Mediterranean: sources, solubility and comparison with riverine inputs” by M. Koçak et al.***

### **Anonymous Referee #2**

Received and published: 23 October 2010

In this paper, plenty of data was used to study the nutrient composition in aerosol and rainwater and their temporal variation, solubilities of nutrients in pure and sea water, and the comparison between atmospheric and riverine nutrient inputs for Northeastern Levantine Basin of the Eastern Mediterranean. Most of the results are reasonable and instructive, but there still some descriptions are confused, and there are so many clerical errors in the context. The manuscript may need moderate revision before final acceptance for publication. Some general comments and specific questions/remarks are given below:

General comments: 1. Based on my knowledge, there are lots of researches on the

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input of atmospheric deposition and related topics over Mediterranean Sea, including the studies of the authors. I recommend the author to elaborate on the scientific reasoning and rationale for the paper in introduction to inform the reader what questions are being asked, why this paper is necessary to answer these questions.

2. The estimation procedure of wet deposition is not clearly documented. Like the calculation of riverine discharge fluxes of nutrients, the estimations of wet deposition fluxes should be based on individual concentration of nutrients and precipitation in rainwater not directly by Eq.1, because the precipitation and nutrient concentration are quite different for individual event if you can find all the precipitation records. If you have not recorded all the precipitation events, you can use annual amount of precipitation as shown in your paper, but the  $C_w$  should be described as volume weighted ANNUAL mean concentration.

3. The authors may reduce some of the contents to make this paper simple and understand easily. The section of nutrient solubility might not be necessarily included.

4. Table 2 is not clear. Samples were collected from January 1999 to December 2007 for this study, but in this table the aerosol sampling period was Jan 1999–Dec 2009. In the first part of this table, the nutrients are  $\text{NO}_3$  and  $\text{NH}_4$ , the author may miss the name of nutrients.

5. In the description of sampling site, it is said the sampling site is not under direct influence of any industrial activities. What is the distance from large pollution sources? On page 5089 line 22-24, “whereas lowest values were observed at Finokalia (Markakie et al., 2003) since this site is categorized by natural background (distance from large pollution sources  $>50$  km)” is there any conflict with the sampling site description for this study? and in Table 2, there is no rainwater sample in Finokalia. Please check.

6. It is interesting to compare the nutrient concentrations in aerosol by different sampling filters. The results show considerable difference that  $\text{NO}_3$  and  $\text{NH}_4$  values by Whatman 41 were 42% and 50% higher than those by polycarbonate filters. The

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question is which results are reasonable?

7. It is said that the lower values of aerosol nutrients in winter can be attributed to efficient removal via frequent rain events(70% of the annual amount) on page 5091. Why the discharges of rivers show highest values during spring not winter on page 5097? What's the seasonal variation of precipitation in the research area?

8. It is suggested that the author should made a comparison between some published results of dry and wet nutrients fluxes and those in this study.

Specific questions/remarks

Page 5078 the units of Fw, Cw, P, Fr, Cdw, Qannual should be given just after the Eq.1 and Eq.3.

Page 5084 line 1 “The Mediterranean has one of the highest fluxes. . . . .” is not clear.

Page 5084 line 19 “atmospheric (dry and wet)” should be atmospheric deposition

Page 5085 line 8 “form” should be from.

Page 5085 line 14-15 “Samples and blanks (n=110) were kept cool at 4 \_C until analysis”. How long is the period from sampling to analysis?

Page 5085 line 21 what is “sampling coverage”

Page 5086 line 21 “Air masses back trajectories” should be Air mass back trajectories. There are still several similar clerical errors in the context.

Page 5086 line 24-26 “Daily back trajectories between January 1999 and December 2007 were evaluated for 3 days for three different heights above the starting point at ground level (1, 2 and 3km a.g.l.)” is not clear.

Page 5087 line 18 “The latest provided from General Directorate of State Hydraulic Works, Turkey.” is not clear.

Page 5089 line 18 “equivalent to be” should be equivalent to.

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**BGD**

7, C3463–C3466, 2010

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Page 5090 line 8-9 “Although particles are efficiently scavenged by wet deposition (26% of the annual amount, 39% of the total events, one rain event per 5 day)” What are “26% of the annual amount, 39% of the total events, one rain event per 5 day”? The meanings of these percentages are not clear. How can you get them? In this sentence, “wet deposition” was not used correctly.

Page 5090 line 18 “was observed” should be deleted.

Page 5091 line 9-10 “from the atmosphere via frequent rain events (70% of the annual amount, 55% of the total events, one rain event per 3 day)”. The meanings of these percentage numbers in bracket are not clear. How can you get them?

Page 5091 line 9-10 “For instance, rain samples associated with air masses from North Africa and which had a red “mineral dust” had pH values as high as 7 as a result of the dissolution of calcium carbonate originated from dust” is not clearly expressed.

Page 5092 line 5-8 “Rain events on 2 and 3 December showed drastic decreases in pH (3.4) and Sidiss since crust originated particles removed from atmosphere efficiently and resulted in a deficiency of neutralizing agents such as calcium carbonate” is not well written.

Page 5095 line 12 “36 (0.56, 0.70 and 3.48 nmolm<sup>-3</sup>) h” should be 36h (0.56, 0.70 and 3.48 nmolm<sup>-3</sup>).

Page 5096 line 13,16 “Vd’s” should be “Vd ”

Page 5109 Table 4 “DW” should be “SW”

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Interactive comment on Biogeosciences Discuss., 7, 5081, 2010.

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