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Biogeosciences Discussions

Interactive comment on "Longitudinal variability of the biogeochemical role of Mediterranean aerosols in the Mediterranean Sea" *by* E. Ternon et al.

Anonymous Referee #1

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General comments on the manuscript

I feel this represents a missed opportunity. The manuscript represents an interesting experiment but key measurements appear not to have been made. In particular the authors have no determined the amount of bioavailable phosphate and nitrate & ammonium which was leached from the aerosol samples into the microcosms. This is the critical driving parameter for their experiments. At one point they estimate a value from literature values but this is a very poor substitute for the actual values.

They have calculated a value for anthropogenic P based on P/Al for natural unpolluted crustal rocks. However this value is far from fixed. We have data which shows a very

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large range of values for P/Al for rocks in the Saharan dust source region. As such it is not possible therefore to calculate enrichment factors in this simplistic manner.

Finally I am unhappy about the relationship of this manuscript to other manuscripts in the series. There are a series of manuscripts from the BOUM cruise which are referred to as in preparation. These often contain crucial information related to this manuscript and vice versa. It would be much better to submit these all to a single dedicated volume so that all could be considered together.

Specific comments:

Aerosol sampling:

Insufficient detail is given of how the aerosols were actually sampled. If samples still exist then the authors could potentially still measure Leachable inorganic P and inorganic N and thus solve my major problem with this manuscript.

Seawater sampling:

It is great pity that micrograzers were not also measured in this study.

Aerosol addition experiments:

The authors state that 'It is noteworthy that due to on-board schedule pressure, aerosol filters used were not necessarily geographically representative of the area where the seawater was sampled.' The author's state there is no problem in doing this. That of course depends on what is the limiting factors when the aerosols are added.

The next paragraph suggests that they have somehow modified the Saharan dust to make it mimic aerosol transport but they do not explain exactly what they have done.

How was the dust introduced to the microcosms? Was it just added with the filter or was it shaken from the filter. Depending on the answer was their a measure of exactly how much dust was added?

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Acid digestion of aerosol filters

What acid was used? More details are needed here so we can understand this manuscript.

Aerosol metal analysis

Can we see the actual precision and accuracy results? It would be very unusual but not impossible to have reference recoveries of 100.0% for all crucial elements.

Aerosol phosphorus analysis:

What P species is being measured? I can guess it is inorganic P assuming that 1 M HCl is used but that is certainly not Murphy and Riley 1962. It is also rather odd to dilute the samples by 1/10 prior to using a LWCC flow cell to make the measurement. Why not measure undiluted and a normal detection system?

Section 2.3.5

What is meant by 'after at least 10 minutes' ? and less than how long?

Section 3.2

Did the authors carry out any N fixation blanks? Do they have any idea what is their detection limits for N fixation?

Section 3.3.1

Did they measure chlorophyll changes in this microcosms? I assume the primary productivity was gross primary production.

Discussion:

Section 4.1

The first section depends on their being a stable and unchanging value for 'crustal' P/Al which applies to all Saharan dust samples. Sadly that is not true. We have data

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from 10 locations across the Saharan with P/Al ratios which average 0.0134 +/-0.013 (1s). You cannot simply take one value of 0.07 as the background level and assume anything in excess of that is pollution.

Section 4.2

The authors correctly calculate a potential nutrient requirement (section 4.2.1) but then never measured the leachable N or P on any samples. They make some general estimate form the literature which can easily be wrong by a factor of 50% or more. Since this was crucial to their experimental design why was it not measured?

Section 4.2.3

We need to know the speciation of N in the aerosol input to know whether it contains chemical species which might suppress N fixation or not.

In explaining their results, the potential importance of micrograzers is not mentioned.

Section 4.3

What is a typical midsummer rain? How far east do such rains occur?

What is anthropogenic carbonaceous species?

Interactive comment on Biogeosciences Discuss., 7, 8087, 2010.