

Interactive comment on “Chemical fate and settling of mineral dust in surface seawater after atmospheric deposition observed from dust seeding experiments in large mesocosms” by K. Desboeufs et al.

Anonymous Referee #1

Received and published: 13 April 2014

The paper describes the processes involved in the settling of atmospheric dust in mesocosm experiments. Sieved soils (< 20 μm) were supplied to the mesocosms in ultrapure water or seawater and the fate of the particles was assessed by suspended particle measurements in the water column and in the sediment traps at the bottom of the mesocosms. The paper is part of range of publications following mesocosm experiments off Corsica. The current manuscript heavily relies, and cites, data from the other mesocosm papers, and also adds some unpublished work. The mesocosm experiments off Corsica have yielded a great deal of nice work and manuscripts. They

C1027

are unique experiments which assess the impact of aerosols on biogeochemical processes. The current manuscript is hard to read. The use of scientific English is not strong, which makes it difficult to assess the science. The overall message(s) of the manuscript disappear(s) in a forest of words and convoluted paragraphs. In case this manuscript is resubmitted, it requires a thorough simplification. A very simple story needs to be conveyed. It also needs to be made clear that the current manuscript adds knowledge that is not already presented by others in the mesocosm team. It seems that the manuscript adds little new knowledge. Specific comments. Abstract: line 14. In the water column. Unclear: I think this means in a dissolved form. Abstract Line 27: is this a weight ratio? P 4911: I assume this is a process paper, not a database. P 4911: Line 6: what is a main nutrient. Overall sentence is vague. Line 6-7. This is awkwardly phrased. Is it an exclusive processes? Line 9: is the role of dust critical as it may have a dual function. I do not think this is correctly phrased. Line 11-13: this sentence is so convoluted that it has lost its meaning. Line 14-19. I assume that this not the topic for this paper. Why put this issue forward here? What is surface dryness? P 4912: line 6: why is this. Al can be used as a proxy for dust inputs independent of opal and CaCO_3 production and settling. The lithogenic flux is very low in most oceanic environments, but in the Mediterranean and off NW Africa it is a very significant part of the particle transport in the water column. Line 9: the question is whether the dust provides the ballast to the organic matter through its higher density, or organic matter facilitates dust sinking through facilitating agglomeration. Line 15: ‘trace metal clean’ I assume Line 19: stream? This should be currents I presume. Line 23: what is meant by: source to sink transfer of added dust? What is the particle sorting? Line 26: the elements chosen are confusing. Surely Fe is part of phytoplankton, and so is Mn, Mo, P etc. P 4913: Line 8: what is meant by ‘the accuracy of the strategy’? Line 19: a seeding does not happen (when researchers are adding dust), but are undertaken. Line 23: what is difference between Dune P, Q and R? P 4914: Line 1: The spray consisted of what? Line 8: what is diluted dust? Diluted with what? Line 16: . ‘We used for seeding the Ae fraction of soil as analog to Saharan aerosol particles (Desboeufs et al., 1999) in

C1028

order to obtain enough quantity of the same material.' This is very awkwardly phrased. Please rephrase P 4915: Line 23: a reference is needed to the protocol. Line 25: was the MQ water buffered to pH ca. 8 in order to minimise leaching of trace elements (MQ water has a pH of ca. 5.5 when not buffered) P 4916: Line 5: check for what? Line 9: what is SLRS? Line 13-14: sentence contains repeats Line 19: where the filters not acid washed prior to use? What was the filter blank level. P 4917: Line 2: What was the limit of detection? Table 1: explain all abbreviations used in table. Table 2: please use SI units (ppm is outdated) Page 4919: line 11: 'showing that the chemical composition of sinking particles collected in sediment traps did not evolve after the \sim 24 h during an experiment.' What does this mean. How does a composition evolve? Line 23: avoid the word evolution in this manuscript. Page 4920: Line 23: is it correct that there is more nitrate than N in the mesocosms (on a mole basis)? Line 29: this looks like is a circular argument. I understand from section 2.2. that you added the N to the dust during the processing, and obviously it will be become a source to the surface ocean then. Page 4921: Line 12-16. I really cannot follow the reasoning here. Line 21. A potential is not really sensitive?!

Interactive comment on Biogeosciences Discuss., 11, 4909, 2014.

C1029