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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Atmospheric acidification of mineral aerosols: a source of bioavailable phosphorus for the oceans" *by* A. Nenes et al.

Anonymous Referee #2

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General Comments: This paper was well written and contributes to the advancement of atmospheric chemistry in a meaningful way. The subject investigated, the role that mineral aerosols acidification as sources of bioavailable P for oceans, is important to understand from a nutrient cycling standpoint. Proper methods were used and the authors did a nice job of combing environmental measurements and lab experiments to provide strength to their argument. The conclusions drawn are supported by the data and provide ample areas for further research and the authors did a fantastic job framing the implications of their work. I feel that this paper is excellent or good in each of the three evaluation criteria of scientific significance, scientific quality, and presentation quality.

Specific Comments: I found it to be a bit odd that the methods were not included in the text, unless this is specific to the journal I would reorder the manuscript. In the abstract I suggest making the second sentence clearer that you're taking about oceans and that freshwaters are excluded from the statement "Deposition of atmosphereic aerosols provides the major external source of phosphorus to surface waters." Perhaps change to ". . . marine surface waters." Similar issue with the last section of conclusions and implications section. In numerous spots you mention iron hydroxide minerals. I was wondering if you should also add/discuss iron oxyhydroxide minerals as well? Lots of good discussion on the thermodynamics of the reactions, but little on the kinetics (e.g. page 6168 lines 24-26 and 6175 lines 22-23). I don't think this detracts much from the paper, but it could be an area of further investigation. On page 6169 lines 29-30, Its not clear to me why the P won't co-precipitate with the iron in the oxic surface water. Is it a pH issue or something else? The abbreviation of phosphorus as P is not consistent throughout, sometimes phosphorus is spelled out and other times abbreviated. I'd suggest spelling it out the first time then abbreviating it the rest. Similarly, LIP is sometimes referred to as leachable phosphorus and other times leachable inorganic phosphorus and sometimes abbreviated LIP. I'd suggest clarifying if it is leachable phosphorus OR leachable inorganic phosphorus and then defining it once and abbreviating it thorough the rest of the manuscript. I didn't notice any discussion about blanks, spikes, or matix spikes. I always think these add to the strengths of the data in a paper if they are included Fig 1 and Fig 2 I don't like that the symbols for course and fine are the opposite in each. I'd prefer if the course and fine had the same symbol in both the figures as it makes comparisons easier.

Technical Corrections: Page 6165 line 10. add 's' to the end of increase Page 6165 line 11. chance 'is' to 'were' Page 6166 lines 3-5. either combine as one sentence or cite the "7 to 100Page 6166 line 16. insert 'aerosols' after 'phosphate' and before 'is' Page 6167 line 11. my copy made it seem like there was no space between 'aerosol' and '(Seinfeld . . .' Page 6169 line 12. you use the abbreviation LIP but it has not been defined Page 6167 line 15. 'phosphorus' already defined as 'P' so just use abbreviation

Page 6172 line 17. you say LIP is leachable phosphorus, but you already have said that LIP is leachable inorganic phosphorus . . . which one is it? Page 6174 line 2. delete 'use' and after 'pre-calculated' add 'using' Page 6174 line 14. LIP is already defined Page 6176 lines 13 and 14. don't need to spell out phosphorus as you've already established it can be abbreviated as "p"; same issue with LIP Page 6177 line 12. a 's' to the end of 'method' Page 6177 line 14. add the material that the 15 ml tubes were made of Page 6178 line 9. should cite the molybdate method used Table 1 . You say leachable LIP, which is like saying leachable leachable inorganic phosphorus. Either deleate leachable and leave LIP or write out leachable inorganic phosphorus Fig. 2 (a). express ratio on y-axis as P:Ca rather than P/Ca. Should x axis label be umol m-3 rather than what you have listed ummol-3? Fig. 2 (b). y-axis says phosphate, but text under it says total dissolved P – is it P (phosphorus) or phosphate? Decide and switch one of the two so they match. Also in the text under Fig. 2 delete the comma after Ca5(PO4)3F as throughout the text you haven't used a comma after the second term in a list

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Interactive comment on Atmos. Chem. Phys. Discuss., 11, 6163, 2011.