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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Mapping the physico-chemical properties of mineral dust in western Africa: mineralogical composition" *by* P. Formenti et al.

Anonymous Referee #1

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The manuscript presents a synthesis of in-situ data of mineral dust properties collected during several field campaigns in West Africa. The objective is to sort out from these data the typical physico-chemical properties as signature of major dust sources. Such objective is addressing large uncertainties related to aerosol effects on climate. It is remarkable that their results help constrain more than one parameter. One is related to scattering and absorption of short and longwave radiations. There is no clear consensus on how much dust absorbs radiation, with radiative forcing varying from strongly negative to almost zero. The amount of absorption depends in great part to the amount of iron oxides, and the authors provide direct measurements for major sources. This

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Interactive Discussion
Discussion Paper

helps also solve another key uncertainty in biogeochemistry related to the amount of soluble iron deposited in the ocean for phytoplankton blooming.

Clearly, the present study greatly helps research on aerosol and climate research. The work is excellent, and it is unfortunate that the first 6 pages are poorly written. This goes beyond some grammatical or typo errors. Most sentences in the Introduction are unclear or make no sense. Hopefully, the authors were negligent and submitted a first draft, as I hope they will be able to improve the writing of this excellent paper.

In conclusion, I recommend publication of the manuscript after the authors improve their Introduction, and reply to my last minor comment about an apparent inconsistency. The first 6 pages will need to be edited to improve the English. In addition, I provide below some minor comments.

Minor comments: Abstract: First paragraph should be reformulated properly. Introduction: Gibberish. Reformulate entirely to be make a minimum of sense. Line 404: Should be Equation (2) Line 799: “In this purpose..”=>”For this purpose...” Line 885:”..than over transport zones” => and at some distance” Line 906-907: “Laurent et al., 2008)...Klaver et al., 2011).”=> “Laurent et al., 2008; Ginoux et al., 2012), and in attributing an origin to transported dust (e.g. Klaver et al., 2011).” Ginoux, P., J. M. Prospero, T. E. Gill, N. C. Hsu, and M. Zhao (2012), Global-scale attribution of anthropogenic and natural dust sources and their emission rates based on MODIS Deep Blue aerosol products, Rev. Geophys., 50, RG3005, doi:10.1029/2012RG000388.

Lines 908 to 915: Sentence too long. Unclear. Line 917: “from the natural mixing that occur in the atmosphere during transport.”=>”from atmospheric mixing occurring during transport.” Line 935: “the clay soil”=>”clay soil” Line 941: “...with the estimate of parameters which are relevant ...”=>”estimate of parameters relevant...” Line 942: “...on the ocean productivity”=>”on ocean productivity” Line 946:”...this overcomes...”=>”...higher than...” Line 947:”...has little correspondence with the model proposed by the OPAC database.”=>”... is quite different from the OPAC database.” Line 975: “differ-

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ences"=>"discrepancies" Line 976: "impacting the refinement of the"=>"impacting our" Lines 1009-1020: Need editing for proper English.

Tables: I would recommend adding a table containing typical values for each source regions of the real and imaginary parts of the refractive index at 370, 440, 500, 700, 9600 nm, as well as soluble Fe. This is the main objective of the paper.

Figure 9: The caption should be rewrite as "Normalized volume size distribution dV/dlog(EOD) at Banizoumbou during 3 days in summer (J1 red line, J2 green line, J3 blue line) and winter (black line),..." Change the colors accordingly, as they cannot be distinguished in the actual Figure.

Figure 11. "Figure 11.a represent the real part.." In my version Figure 11.a represents the imaginary part of the refractive index.

Figure 11. I don't understand why the imaginary part of the refractive index for Sahelian dust is smallest. This does not correspond to your analysis. You showed that Sahelian dust contains the highest iron content. You have either an error in your Figure or you will need to explain this inconsistency.

Interactive comment on Atmos. Chem. Phys. Discuss., 14, 10241, 2014.