

Answers to Reviewer 1

We thank the reviewer for useful comments which we tried to address fully in the following.

My main request is that the authors consider whether it would be possible/useful to present some of the information in tables in a more graphical form preferably in the paper but also possible in supplementary material. For example, the parameters for log-normal modes established in recent campaigns are presented in a table – it would be easier to compare these if they were drawn up into a figure. Similarly I would like to see an example comparing the various definitions of diameter for a typical dust particle (aerodynamic, optical etc). This would make the paper much more useful for non-experts in these measurement techniques. The information on mineralogy in section 3.1.1 is quite overwhelming – again would it be possible to devise a pictorial representation of this information. I recognise that the tables are needed for those who wish to use the values in other studies, but there would be considerable merit in both approaches.

We agree with the referee in saying that the information can be overwhelming. We would like to keep the tables, which might be useful to modellers. However we added two additional figures:

(1) Figure 3 showing the range of variability of illite/kaolinite (I/K) and chlorite/kaolinite (C/K) ratios for African and Asian mineral dust and source sediments.

(2) Figure 4 showing the log-normal mode parameters presented in Table 3.

On the contrary, we believe that presenting the conversion rules between aerodynamic/optical/geometric diameter is beyond the scope of this paper. We referred to the books by Baron and Willeke (2005) and Hinds (2000) for a reader interested in finding those conversion rules.

P 33189 line 22 “extends” to extends
This has now been corrected

P31191 For the uninitiated, what are “platy” particles?

Platy has been changed to flat. A definition of flat particles (i.e., particles whose thickness is smaller than the width and length, such as spheroids) has been added to the text.

P31193 line 27 – there seem to be some words missing from this sentence
I am afraid we could not find any missing word here.

P31197 is a reference to McConnell et al appropriate here in terms of discussion of impact of cut-off on optical properties?

I am afraid I cannot find the McConnell et al. reference at page 31197. Nonetheless, McConnell et al. (2008; 2010) discussed and quantified the impact of the inlet cut-off on the calculation of the optical properties. Their experimental approach consisted in comparing the calculated optical properties for a case study during the DODO campaign when the aircraft flew in a dust plume close soon after emission and therefore during which the coarse fraction was in significant amount. The reference to this case study is appropriate as an example of the dust coarse mode on the optical properties based on real data.

P31201 line 23. It would perhaps be useful to say why much attention has been focussed on iron.

The importance of iron in determining the optical properties and the availability of dust as oceanic nutrient has been put into evidence in the introduction (pages 31191 and 31192). Nonetheless a sentence has been added to page 31201. This reads now “Because of its role in determining the effect of mineral dust on the radiative budget and the marine ecosystem productivity, many recent compositional studies of mineral dust have focussed on the characterisation of iron.”

P 31211 line 9. I'm not sure that it is true that dust is transported above the marine boundary layer from western Africa during winter. I believe that flights during the DODO campaign found dust in the marine boundary layer on occasion. Certainly the statement is true for the summer season.

The reviewer is right. There is a seasonal cycle in dust transport over and from the African continent which additional low-level transport in winter-time, as shown by Chiapello et al., (1995). The measurements by Chiapello et al. (1999) at the Sal Island, on the short-transport range of mineral dust towards the Atlantic

Ocean, indicate that sea salt represents, on average, less than 10% of the transported dust mass. Sea salt is mostly confined below 500 m, above sea level, and depends on wind speed.
The initial statement has therefore being changed.

P31211. You refer to the lack of observations of internal mixtures of soot and dust. I believe that external mixtures are observed (e.g. in biomass burning regions such as the Sahel) and some references to these observations would be appropriate.

Only few publications show the presence of some internal mixtures of soot and mineral dust in connection with intensive burning processes and high sample loadings (Parungo et al., 1992; 1994; Hand et al., 2010). For other situations, there is no report on internal mixtures of soot and mineral dust, while external mixtures of dust and organic carbon may be more frequent (Falkovich et al., 2004; Kandler et al., 2009; Leaitch et al., 2009; Deboudt et al., 2010; Matsuki et al., 2010). The presence of microorganisms on dust particles has been confirmed at various sites for Asian dust (Iwasaka et al., 2009), which is not surprising for surface soil particles. The impacts of these internal mixtures are unknown.

P31214. The authors should consider whether discussion of potential charging of dust particles is suitable for this publication.

We do not consider the discussion of potential charging as suitable. Charging – as optical properties, or solubility – is a property which derives from the physico-chemical properties which are the object of discussion of this paper.

P31219 line 15 “In particular, we recommend...(1)...”

This has now been corrected

P31219 line 23 “... should be sought”....

This has now been corrected.