The paper shows the variation of extinction in dependence on particle size, shape, and composition. It gives valuable insight into a spectral region where little information on optical properties of dust is available. The spectral shifts in the IR window for non-spherical particles are of particular interest. This shift seems to increase extinction due to the larger geometric diameter of the particles.

The usefulness of the results is limited as mixtures and coating have not been treated in this paper. The OPAC mixture of 10% hematite is almost never used by modelers. Modeling usually uses 2% hematite. The authors should address this issue in more detail with modeling results.

1. Title: Does "terrestrial atmosphere" mean "the Earth's atmosphere" or "the atmosphere observed at terrestrial wavelengths"? Please clarify.

2. The strict definition of "aerosol" includes the suspension medium, i.e., air. The authors certainly have in mind only the particulate component. I suggest that they specify the meaning of aerosols at the beginning of their text.

3. page 17220: The authors may want to comment a bit more on the choice of the OPAC dust model in their simulations. How realistic are the simulations in view of the finding during, e.g. SAMUM 2006?

4. Equation 2: Why do you denote r_g as effective radius? It should be the modal radius (which needs not be the same), shouldn't it? Or is this the case in a 1-modal distribution? For simplicity's sake there is only one mode.

5. page 17221: Haywood et al. (2009)? See you reference list.

6. page 17221: The authors refer to some SAMUM results and mention Kandler et al., Schladitz et al. Measurements by Schladitz et al. were restricted to comparably small particle radii (less than 5 micrometer). Please outline in more detail the fact that coarse mode particles of dust are considerably larger than 10-15 micrometer. See for example the results by Weinzierl et al. (TELLUS special issue on SAMUM 2006). In how far are these results in agreement with the description of VMD (As outlined by Reid et al. 2003b, 2008?

7. Page 17222, 17232, 17251: you refer to "Farmer". The reference is missing.

8. Eq. 3, page 17223: Does this mean that volume equivalence has been chosen? This is not entirely clear. The choice of size equivalence has a large impact on the optical properties of non-spherical properties! See reference: Otto et al. (2009)

9. page 17225: N=12 might be too small. The authors show comparisons to orientation angles of 1050. Please refer to the work by Worringen et al., AO, 2007. The authors show that 343 angles are required. But this depends on the modeled particles and their index of refraction.

10. page 17237: Please reconsider your rather generalizing comment that the optical properties at 870 nm are representative for the visible spectral region down to 500 nm, see for instance T. Mueller et al., Tellus Special issue on SAMUM, 2009 and D. Mueller et al., JGR 2010.

11. Eq. 8: I do not fully understand this equation. What is the wavelength summation?

12. page 17228, 17235: Reference Shettle and Fenn is missing in reference list.

13. page 17230: Reference Hudson et al. is missing in reference list.

14. page 17231: It is not clear which quantity is kept constant in the transition from number to volume concentration and in the variation of VMD. a) Vtot=const. (Mtot=const.) or b) Ntot=const. ...
This influences the behavior of MEE as a function of VMD (increasing or decreasing). In the case of Ntot=const., an increasing VMD leads to an increased number of large particles, which increases MEE, contrary to what is stated here. On the other hand, if Vtot=const., then a larger VMD reduces the number of large particles and consequently MEE. But what is essential with respect to field measurements? Is it not the number concentration that is measured? (Or is it not in the case of particle losses?) What would this imly for the a variation of VMD. Ntot should be constant, which is not what has been done here.

15. Section 5 (Discussion) is not really needed as a separate section. You can place the text into the previous section

16. References DeVoe and Redelsperger are not mentioned in the text

17. Table 1: References Drummond missing in list?

18. The authors may want to show a comparison of the mineral composition found during the different field campaigns listed in their paper (AMM; PRIDE, SAMUM, ASIAN DUST). It would help in evaluation the findings of their study.