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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Optical properties and mineralogical composition of different Saharan mineral dust samples: a laboratory study" *by* C. Linke et al.

C. Linke et al.

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Answer to the comments of Referee 3:

We acknowledge the comments and suggestions for an improvement of the paper.

Specific comments

P2902, line 21:
Our prior intention in the selection of the dust material was not to be representative for natural Saharan dust, but to compare dusts of obviously different mineralogical compositions and therefore likely different absorption properties. Also, we wondered whether there are differences in the absorption properties between the uncontaminated

sample (Cairo 2) and the likely contaminated sample (Cairo 3). In the end we found no significant differences in the optical properties of these two samples, which means that either city-induced pollution of the Cairo 3 sample is low or it has no significant influence on the dust optical properties.

P2903, line 8:
We added a figure (Figure 2) of the size distributions measured with an aerodynamic particle sizer (APS). Our dispersion procedure results in similar size distributions, for the different dust samples. It can be seen that the formation of fine particles from Cairo 2 sample was enhanced compared to the other samples, even though we applied the identical dispersion procedure. This might indeed reflect the high CaO content in that sample as mentioned by the referee.

P2903, line 11:
The referee likely thinks of EDX single particle analysis of the samples. We appreciate this comment and agree with her/him that this rather time consuming method should give a more detailed picture of the mixing state of the mineralogical components within the aerosol sample. However, this method was not available to us for the present investigations but will be on top of the wish list for future studies.

P2904, line 12:
We add a line “Loss of ignition’’ in table 3.

P2904, line 17:
We agree with the referee that the quantitative XRD procedure of Rietveld needs careful interpretation. Up to now we only have a quantitative assessment of the hematite phase for the Morocco dust sample and an estimation of the goethite phase for the Agadez dust. We are aware of the necessity of further refinement of investigations of complex composed mixtures like dust samples. In this respect we have to point to a possible size-dependent fractionation of the mineral components. Especially an enrichment of hematite in the fine aerosol fraction is possible, resulting in an underestimation

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of hematite in the minus 20 micron sieved samples compared to the size-cut chamber aerosols. Therefore, we added the following sentence to the end of section 4:
“However, due to a possible enrichment of hematite in the fine aerosol fraction the hematite concentration in the chamber aerosol could be significantly higher than the concentrations found in the XRD analysis of the granular samples.’’

P2906, line 23:
In further investigations we have to ensure, that we have enough material in the appropriate size range to apply also the extraction method of Lafon et al. (2004) in addition to the XRD analysis. As already mentioned, individual particle analysis by SEM/EDX will be applied in future investigations. This analysis will provide information about the mineralogical composition of the chamber aerosol, whose optical properties are measured.

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 2897, 2006.