

Interactive comment on “Size resolved dust emission fluxes measured in Niger during 3 dust storms of the AMMA experiment” by M. Sow et al.

Anonymous Referee #2

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General comments

The paper addresses the important relationship of size-dependant dust flux and meteorological conditions. This is an important parameter for transport and derived models. Few measurements exist on this subject. In this case study, three cases of dust emission are investigated. From the meteorological conditions and optical particle measurements a size-dependant particle flux is calculated.

As the airborne size distribution is for sure depending on the soil grain size distribution, an analysis of this soil size distribution would have made up a valuable addition to this publication. Is data on this available? Also, additional measurements of soil conditions would add to interpretation.

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Specific comments

Page 5550, 24: The term PM_x should be avoided to prevent confusion, as commonly PM_x is defined for aerodynamic particle diameter. In this study, however, an optical equivalent diameter (for an unknown refractive index) is measured.

Page 5555, 5: Rajot et al. (2008) specify a 50 % transmission efficiency at 40 μm aerodynamic diameter. Assuming a particle density of 2.5 this corresponds to 25 μm Stokes diameter, which is closer to the optical equivalent diameter used in this study than the aerodynamic one. As a result, at the upper limit of the measurement range (20 μm) it is quite probable that the transmission efficiency will not be close to 100 %. In addition the Grimm OPC has counting efficiency other than unity depending on particles size and concentration (see Heim et al., 2008, J. Aerosol Sci. 39/12, 1019-1031). This should be taken into account when calculating mass fluxes/mass closure.

Page 5557, 12: For the upper range of "PM₂₀", particles do not follow the air movements perfectly.

Page 5558, 26: It is mentioned (more than once), that a closure of TEOM and OPC data was successfully performed. However, no data on the quality are presented.

Page 5561, 21: The interpretation of the differences in u^*T sounds plausible. However, 3 values for 2 different cases is not sensible statistics, especially as no hint on soil moisture for the cases is given.

Page 5564, 10: In addition to Fig. 7 it would be highly interesting to see mass fluxes as a function of particle size. From Fig. 7 it can be estimated that the mass maximum changes from 5 to 10 μm between the events. Also it would be interesting to see an example of the two measured size distributions (maybe for one case), from which these fluxes are derived.

Page 5566, 11: Is that really the only possible explanation? In the introduction it is mentioned that vegetation and soil moisture have effects on emission – so why not

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here? Is information on those parameters available?

Technical comments

Page 5556, 7: remove "." after Wieringa

Page 5563, 1: The dependency of dust emission on wind direct by Rajot et al. was already mentioned on page 5561, so omit here.

Page 5565, 11: "can be compared" – what does that mean? Are they equal or similar or deviating by a factor of x?

Page 5574, Fig. 2: Maybe decrease the size of the graph symbols. They black ones are nearly covered by the red ones.

Interactive comment on Atmos. Chem. Phys. Discuss., 9, 5549, 2009.