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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Simulating aerosol microphysics with the ECHAM/MADE GCM – Part I: Model description and comparison with observations" *by* A. Lauer et al.

Anonymous Referee #2

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General Comments

The paper presents the new model system ECHAM4/MADE which is used to simulate the life cycle of particulate matter and a number of gaseous precursors on the global scale. To show the applicability of the model system a number of comparisons with observations are presented. It is quite clear that it is very difficult to compare results of a climate model with point measurements during specific time periods. The authors try to overcome this problem by time and area averaging of the measurements. The results show a better agreement for polluted continental areas than for the upper tro-

posphere and areas in the southern hemisphere where larger differences are found. The paper should be published in ACP after some modifications which are discussed in the following:

The main focus of the paper is a detailed description of the new model system and a comparison of the simulated data and different measurements. One of the conclusions is that the growth of nucleated particles currently used in the model has to be improved. Although the authors include for example ammonium and nitrate into the model system they neglected for different reasons the formation of secondary organic aerosols. But especially in more rural regions those components are important components in the aerosols and influence consequently diameter and number. This should be discussed by the authors. The combination of a climate model with an aerosol model which describes not only aerosol mass but also the aerosol dynamics is very interesting for different reasons. The authors are applying two aerosol models within their study. In addition they have chosen a procedure that makes sure that the meteorological conditions are identical for both aerosol modules. This allows a documentation of the progress which was achieved by the more detailed aerosol model MADE. This was not done by the authors but should be done in the revised version of the paper. For example the authors could add the results of the FL96 model to the scatter to the diagrams where the mass concentrations simulated with MADE and the observations are presented. Concerning the comparison of mass concentration there is no comparison shown for ammonium. This should be also discussed.

The Specific Comments

The abstract can be shortened. It should concentrate on the performed work and the main outcome. At the moment it reads like a summary.

Page 7983: Please check the reference of the IMPROVE data.

Figure 6: Should be enlarged.

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Interactive comment on Atmos. Chem. Phys. Discuss., 5, 7965, 2005.