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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Constraining the total aerosol indirect effect in the LMDZ and ECHAM4 GCMs using MODIS satellite data" *by* J. Quaas et al.

J. Quaas et al.

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We would like to thank the reviewer for her or his comments, which helped us to clarify our manuscript.

The rationale of this study is that the cloud droplet number concentration does not depend on the cloud water content or cloud geometry. We also assume here that the systematic difference in vertical velocity over oceans and continents do not result in systematically different relationships between CDNC and AODFM, while it certainly influences the variability. We agree that future studies need to include the influence of vertical velocity on CDNC as well. Since AODFM retrievals are not reliable over

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continents, the relationship could be established over oceans only, and this relationship is used to constrain the model.

Indeed, it is only possible to use the constraint from the satellite data for the model if the aerosol distributions are not too erroneous. However, since the scale for AODFM in Fig. 2 is logarithmic, it is sufficient if the order of magnitude is roughly correct, and it is not necessary that the distributions are matched exactly (though this certainly would be helpful). We argue that both our models are able to simulate AODFM to an acceptable accuracy. Since we have chosen the AODFM bins so that each one contains the same number of measurements,the position of the points along the AODFM axis in Fig. 2 indicates the histogram of AODFM in model and satellite retrievals. Roughly, the histograms are in agreement, while, as stated by the reviewer, ECHAM4(LMDZ) has a tendency towards smaller (larger) AODFM compared to MODIS.

Interactive comment on Atmos. Chem. Phys. Discuss., 5, 9669, 2005.