Geophysical Research Abstracts, Vol. 8, 06555, 2006
SRef-ID: 1607-7962/gra/EGU06-A-06555

Integrating microphysical and radiative responses of a tri-component aerosol system into GCMs

S. Ghosh, M.H. Smith and S. Dobbie

School of Earth and Environment, University of Leeds, Leeds LS2 9JT, UK
(sat@env.leeds.ac.uk / Phone: +44-113-3437531)

The simultaneous activation and growth of multiple aerosol species including biomass smoke, along with the more common sulphate aerosol and sea-salt particles, is a complicated process. In this study, we have used a detailed microphysical chemical parcel model to relate the cloud droplet number concentration $N_D$to varying masses of individual aerosol components, and used this information in radiative transfer calculations. Methods are outlined for a realistic incorporation of the estimated value of N_d into standard general circulation models (GCMs).

We find that the TOA (top of the atmosphere) upward flux and the flux absorbed at the surface are strongly modulated by the variations in the different components. Although, in cases of low biomass and sea salt loadings, the fluxes respond in a predictable manner to variations in sulphate mass, much more complex behaviour becomes apparent when biomass and sea salt loadings are elevated (but still within observed limits). In such cases, the reflectance is observed to undulate with increasing aerosol levels, a response not captured by existing aerosol-cloud activation schemes.