Geophysical Research Abstracts, Vol. 7, 10336, 2005
SRef-ID: 1607-7962/gra/EGU05-A-10336

Effects of aerosol concentration on a cloud field simulated by a cloud-resolving model with a double-moment bulk microphysics scheme and fully interactive radiation

V.T.J. Phillips (1) and L.J. Donner (2)

(1) Atmospheric and Oceanic Sciences (AOS) program, Princeton University, Princeton, USA;
(2) Geophysical Fluid Dynamics Laboratory (GFDL), NOAA/OAR, Princeton, USA

The impact of clouds on the radiation budget is sensitive to the size of cloud particles, in both the liquid and ice phases. A novel technique is presented for predicting the particle number for cloud-ice and cloud-water with an interactive aerosol component for ice nuclei and cloud condensation nuclei. For cloud-ice, primary ice nucleation, ice particle multiplication and homogeneous freezing of aerosols and droplets provide the source of ice-number. Primary and secondary droplet nucleation is also represented. A power-law activity spectrum is assumed for the aerosol.

Sensitivity tests with respect to the aerosol concentration of the environment are performed and the impact on radiative, dynamical and microphysical cloud statistics is documented.