Geophysical Research Abstracts, Vol. 8, 08891, 2006
SRef-ID: 1607-7962/gra/EGU06-A-08891

Temporal evolution of aerosol properties in a transient climate simulation from 1860 – 2100

P. Stier and **J. Feichter**

Max Planck Institute for Meteorology, Hamburg, Germany

feichter@dkrz.de

The temporal evolution of aerosol properties is investigated through long-term transient climate experiments simulating the period 1860 - 2100. The atmospheric component of the climate model includes an aerosol module. In this module, the aerosol size distribution is represented by an ensemble of interacting internally and externally-mixed log-normal modes. Size, mixing-state, and composition are predicted, and sink processes and radiative properties for each mode are calculated consistently in dependence of size and composition. The current configuration distinguishes among the aerosol types: sulfate, black carbon, particulate organic matter, sea salt, and mineral dust. From 1860 until 2000 greenhouse gas concentrations and anthropogenic aerosol emissions are prescribed according to a historical inventory and from 2001 up to 2100 the SRES scenario A1b are applied (Toru Nozawa, pers. comm.). Aerosol and aerosol precursor emissions from natural sources as mineral dust, sea-salt and dimethylsulfide from the marine biosphere are calculated interactively based on the model's meteorology.

Climate relevant aerosol properties depend on a multitude of processes and interactions. Changing climate affects the source strength and distribution of natural emissions, the transport pathways, the hydrological cycle and subsequently wet removal and atmospheric residence time of aerosols. In addition, we show that changes in emissions affect the aging of insoluble primary particles when vapors condense on existing particles and enhance their solubility and atmospheric turn around.