Geophysical Research Abstracts, Vol. 7, 03464, 2005
SRef-ID: 1607-7962/gra/EGU05-A-03464

Global simulation of multi-component aerosol transport in the GFDL-GCM

M. S. Reddy, P. Ginoux, V. Ramaswamy
Geophysical Fluid Dynamics Laboratory/NOAA, Princeton, USA

We present estimates of aerosol distributions and optical depths (AOD) for major atmospheric aerosol species including sulfate, black carbon (BC), organic carbon (OC), mineral dust, and sea salt (SS) computed in the Geophysical Fluid Dynamics Laboratory General Circulation Model (GFDL-GCM). The GFDL-GCM includes all major anthropogenic and natural sources for the above aerosol species. The seasonal variability in open biomass burning emissions are inferred from satellite measured fire counts. The size resolved sea-salt and dust emissions are parameterized online as a function of surface windspeeds. The natural sources of OC are included assuming a constant fraction of monoterpene conversion to OC. The extinction and absorption AOD are calculated accounting for hygroscopic growth and change in refractive indices, for organic carbon, sulfate, and sea salt. The model performance is validated by comparing predicted extinction and absorption AODs with sun photometer AERONET measurements at different parts of the globe. The model reproduces the seasonal variations at most of the sites, especially at places where biomass-burning aerosols dominate. The model estimates of AODs at 550 nm compare well with satellite retrieval products from MODIS over ocean and land. The contributions of different aerosol species to total AOD will be presented. The effect of aerosol radiative feedbacks on the model meteorology on atmospheric cycles of different aerosol species will be discussed in the paper.