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RECENT ADVANCES IN AEROSOL MODELING AT BROOKHAVEN

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Atmospheric aerosols influence the shortwave radiation budget by scattering and absorption of radiation (direct effect) and by modification of cloud properties, affecting their reflectance and persistence (indirect effect). Because of the importance of these phenomena as secular forcing agents of climate it is considered necessary to represent these phenomena in climate models, specifically in atmospheric general circulation models. Confident model representation of these phenomena requires extensive evaluation. Our approach has been to drive our model by meteorological data derived from observation in order to take into account the high variability and dynamic range in aerosol loading that is due to meteorological variability. Comparisons with observations by this approach are typically within a factor of two for 24-hour sulfate. Our model for sulfate has recently been incorporated into the NCAR (National Center for Atmospheric Research) CCM3 (Community Climate Model Version 3) to evaluate direct and indirect forcing. The indirect forcing is highly sensitive to the parametrization of cloud droplet number as a function of sulfate loading. It is recognized that future work will require representation of aerosol microphysics in order to improve accuracy of representing aerosol properties other than mass of specific compounds. The approach we are taking is to represent microphysics not by the size distribution but by the moments of this distribution. This approach is economical and attractive for inclusion in large-scale models. Integral aerosol properties can be accurately represented by this approach. Recently we have incorporated the moment method in our subhemispheric scale model, and initial results will be presented.

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