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# NEW DEVELOPMENTS IN THE MOMENT-BASED REPRESENTATION OF ATMOSPHERIC AEROSOLS

R. McGraw, D. L. Wright, and S. E. Schwartz
Atmospheric Sciences Division
Brookhaven National Laboratory
Upton, NY 11973-5000

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## ABSTRACT

The Method of Moments (MOM) provides an accurate and efficient representation of aerosol evolution and microphysical properties suitable for incorporation in chemical transport models. The MOM does not provide the particle size distribution (PSD), but it tells you (almost) everything else you want to know about the aerosol through the moments of the PSD. Recent development of the quadrature method of moments (QMOM) has enabled closure of the moment evolution equations under general conditions for nucleation, particle growth through condensation and coagulation, and activation in clouds. Furthermore, the quadrature points obtained by the QMOM enable accurate estimation of aerosol physical and optical properties directly from the moments. This method is becoming sufficiently mature that it can be used in regional-scale simulations. Here we (1) compare the QMOM with benchmark discrete and analytic particle population balance models, (2) summarize application of the QMOM in a regional scale chemical transport model and compare with observations [*Yu et al*., 2002], and, (3) present new extensions of the QMOM to the simulation of internally-mixed and generally-mixed, multivariate, aerosol populations. Regional-scale comparisons with observations for sulfate are favorable, with the model capturing much of the synoptic-scale and diurnal variability of the observations. Improvements are needed in representing other key aerosol species.

## REFERENCE

S. Yu, P. S. Kasibhatla, D. L. Wright, S. E. Schwartz, R. McGraw, and A. Deng. Simulation of Microphysical Properties of Sulfate Aerosols in the Eastern United States: Model description, evaluation and regional analysis. J. Geophys. Res., in preparation (2002).

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