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# Development of a global-regional nested atmospheric aerosol model with detailed microphysical processes

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In this study, a global-regional nested atmospheric aerosol model was developed to simulate aerosol microphysics. The model includes an advanced particle microphysics module with nucleation, condensation, and coagulation processes being represented in detail. The model calculates not only the condensation of sulfuric acid, nitrate, ammonium but also the condensation of low-volatility organic vapors and equilibrium partitioning of semi-volatile organics. Internal mixing is assumed for secondary particles while other particles, like BC, POC, dust and sea salt are assumed to be composed of a seeding core and coating species. Aerosols of different types are externally mixed with each other. Both the primary emitted particles and associated coating species are tracked in the model. Secondary particles are represented by 40 sectional bins with dry diameters ranging from 0.0012 $\mu$m to 12 $\mu$m and thus new particle formation processes are explicitly resolved. The model has good performance in simulating particle size distribution in typical atmospheric environment and number concentration in global and regional scales.