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An intercomparison and evaluation of CCN and size distribution among AeroCom global aerosol models of a range of complexity

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Since 2003, the open international AeroCom initiative has provided a platform for the evaluation and intercomparison of global aerosol models. In the first phase of AEROCOM, comparing models to new satellite observations and the AERONET global sun photometer network improved climate model simulated aerosol optical properties and helped reduce the uncertainty range for aerosol direct forcings in the IPCC 4th Assessment Report (AR4).

Most aerosol schemes in AR4 climate models were single-moment mass-based schemes, with a prescribed size distribution used to provide cloud condensation nuclei (CCN) concentrations which drive aerosol indirect forcings. Many climate models are now adding aerosol schemes which include aerosol microphysics to simulate size distribution and CCN explicitly, resolving new particle formation and growth via coagulation, condensation and cloud processing. A major activity in the current 2nd phase of AeroCom is the intercomparison of this new generation of global aerosol microphysics models.

The recent set of AEROCOM phase II experiments included specific "all-aerosol-tracer" diagnostics to allow the particle size distribution and CCN concentrations to be intercompared consistently across aerosol schemes of varying complexity (mass-based, two-moment-modal, two-moment-sectional).

In this presentation, we show results from an intercomparison of CCN and particle size distributions among the 16 models who submitted the all-aerosol-tracer data, with evaluation against a wide range of benchmark global observational datasets.