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An AeroCom initial assessment – optical properties in aerosol component modules of global models

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Abstract. The AeroCom exercise diagnoses multi-component aerosol modules in global modeling. In an initial assessment simulated global distributions for mass and mid-visible aerosol optical thickness (aot) were compared among 20 different modules. Model diversity was also explored in the context of previous comparisons. For the component combined aot general agreement has improved for the annual global mean. At 0.11 to 0.14, simulated aot values are at the lower end of global averages suggested by remote sensing from ground (AERONET ca. 0.135) and space (satellite composite ca. 0.15). More detailed comparisons, however, reveal that larger differences in regional distribution and significant differences in compositional mixture remain. Of particular concern are large model diversities for contributions by dust and carbonaceous aerosol, because they lead to significant uncertainty in aerosol absorption (aab). Since aot and aab, both, influence the aerosol impact on the radiative energy-balance, the aerosol (direct) forcing uncertainty in modeling is larger than differences in aot might suggest. New diagnostic approaches are proposed

to trace model differences in terms of aerosol processing and transport: These include the prescription of common input (e.g. amount, size and injection of aerosol component emissions) and the use of observational capabilities from ground (e.g. measurements networks) or space (e.g. correlations between aerosol and clouds).

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