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Global climate model simulations of aerosol indirect effects on convective clouds

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The microphysical parameterization used for stratiform clouds in the ECHAM5 climate model has been extended to convective clouds. The performance of the newly implemented parameterization in simulating mid-latitude continental summertime convective cloud systems is evaluated at the ARM SGP site in Oklahoma using the single column version of ECHAM5. Significant improvements are shown in the simulations of outgoing longwave radiation and net incoming solar radiation at the top of the atmosphere revealing the feasibility of the new parameterization. Sensitivity studies show that a tenfold increase in cloud droplet number concentration significantly increases the simulated liquid water content. More interestingly, this increase in the cloud droplet number concentration leads to an increase in the total amount of precipitation in two of the three intensive observing periods. First results of global simulations with the new scheme in terms of the indirect effects of aerosols on the radiation budget and the hydrological cycle will be presented at the EGU conference.