EULAG simulation of shallow cumulus clouds with two-moment warm-rain scheme and prescribed entrainment-mixing scenarios

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We will present results of three-dimensional simulations of shallow cumulus convection using EULAG with two-moment bulk warm-rain microphysics scheme combined with a simple approach to model entire range of subgrid-scale mixing scenarios, from homogeneous to extremely inhomogeneous (Morrison and Grabowski, J. Atmos. Sci. 2007, 2839-2861; 2008, 792-812). A series of simulations was performed using the nonprecipitating (BOMEX) as well as precipitating (RICO) cases and assuming various idealized aerosol characteristics (PRISTINE versus POLLUTED) as well as various mixing scenarios. The focus is on the impact of the entrainment-mixing processes on microphysical properties of clouds, the effective radius in particular. A possibility of in-cloud droplet activation (e.g., due to increasing updraft strength or entrainment) is also investigated. For the RICO case, the impact of entrainment/mixing on rain processes is explored. The results of these investigations will be summarized at the meeting.