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Broadening of cloud droplet spectra through turbulent entrainment and eddy hopping GUSTAVO ABADE, Institute of Geophysics, Faculty of Physics, University of Warsaw, Poland, WOJCIECH GRABOWSKI, National Center for Atmospheric Research, Boulder, Colorado, HANNA PAWLOWSKA, Institute of Geophysics, Faculty of Physics, University of Warsaw, Poland — This work discusses the effect of cloud turbulence and turbulent entrainment on the evolution of the cloud droplet-size spectrum. We simulate an ensemble of idealized turbulent cloud parcels that are subject to entrainment events, modeled as a random Poisson process. Entrainment events, subsequent turbulent mixing inside the parcel, supersaturation fluctuations, and the resulting stochastic droplet growth by condensation are simulated using a Monte Carlo scheme. Quantities characterizing the turbulence intensity, entrainment rate and the mean fraction of environmental air entrained in an event are specified as external parameters. Cloud microphysics is described by applying Lagrangian particles, the so-called superdroplets. They are either unactivated cloud condensation nuclei (CCN) or cloud droplets that form from activated CCN. The model accounts for the transport of environmental CCN into the cloud by the entraining eddies at the cloud edge. Turbulent mixing of the entrained dry air with cloudy air is described using a linear model. We show that turbulence plays an important role in aiding entrained CCN to activate, providing a source of small cloud droplets and thus broadening the droplet size distribution. Further simulation results will be reported at the meeting.

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