Abstract Submitted
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Cloud-turbulence interactions: Insights from moist Rayleigh-Benard convection experiments[1] PRASANTH PRABHAKARAN, ABU SAYEED MD SHAWON, GREGORY KINNEY, SUBIN THOMAS, WILL CANTRELL, RAYMOND SHAW, Michigan Technological University — Clouds are ubiquitous in nature and play an important role in atmospheric circulation and global climate change. One of the key processes in the evolution of a cloud is the interaction between aerosol particles and cloud droplets, called the aerosol-indirect effect. Aerosol particles become cloud droplets when the ambient relative humidity (saturation ratio) exceeds a critical value. In the traditional formulation of this problem, only average saturation ratios are considered. Using experiments and theory, we study the effects of turbulent fluctuations in the formation and growth of cloud droplets. The experiments were conducted in a turbulent Rayleigh-Bénard convection chamber. Cloudy conditions are created through a continuous injection of aerosols. A steady state is obtained when a dynamic equilibrium is established between droplet formation through activation of aerosols and droplet removal through sedimentation. Our measurements and the theoretical model show a clear transition from a regime in which the mean saturation ratio dominates to one in which the turbulent fluctuations determine cloud properties.

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