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Effects of cloud condensation nuclei concentration on the evolution of severe convective storms

Abstract

The impact of cloud condensation nuclei (CCN) on the development of severe convection has been researched by changing the initial CCN concentrations, but there are few studies how the enhancement or inhibition of CCN impact severe convection systems from the comprehensive perspective of cloud microphysics, thermodynamics, and dynamics.

In this study, it investigates the effects of varying initial CCN concentrations ahead of the severe convective storm with idealized three-dimensional storm simulations in WRF model. The simulations showed that it increased the rainfall and hailfall intensities. When CCN concentration increased with the time, it helps activated to increase the content of cloud droplets in the cloud, which enhanced accretion process of cloud droplets by raindrops and accretion process of cloud droplets by hails. On the other hand, the increase in CCN concentration ahead of the storm also creates a positive feedback mechanism to the thermodynamic and dynamic processes by the cloud microphysical processes, which promoted the development and maintenance of the storm.

Keyword

Microphysics process

Reference

Shu, W. X., et al. (2022). Effects of cloud condensation nuclei concentration on the evolution of severe convective storms. *Atmospheric Research*, **276:** 22.