The Effect of Microphysics Parameterization on Environment and Convections

Jin-De Huang and Chien-Ming Wu

Department of Atmospheric Sciences, Nation Taiwan University, Taipei, Taiwan

This study investigates the effects of condensation on precipitation spectrum in a strongly forced environment using a vector vorticity cloud-resolving model (VVM). Two experiments are performed under strong large-scale forcing with two microphysics parameterizations, predicted particle properties scheme (P3) and Lin scheme (Lin). The results show that even though the domain-averaged precipitation is similar in two experiments, P3 exhibits stronger extreme precipitation in the spectrum. Compared to Lin, convective core clouds tend to produce more intense precipitation in P3. The isentropic analysis shows that P3 environment profiles of equivalent potential temperature is more unstable than Lin; besides, stronger updraft and higher saturation deficit occur in the convections in P3. The cause of such differences is possibly related to the difference in the condensation processes between two schemes. The further experiment (modified Lin) is carried out to identify the impact of the condensation processes through adjusting the criteria of the condensation from 100% to 110% in Lin scheme. Modified Lin and P3 share corresponding differences in comparison with Lin: more intense precipitation, more unstable environment, stronger updraft, and higher saturation deficit in both P3 and modified Lin. According to those results, it can be concluded that the environment, the convections, and the extreme precipitation are considerably influenced by the criteria of the condensation processes.

Key words: Convections, Environment, Microphysics Parameterization

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