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Ziyue Guo and Jianping Tang
School of Atmospheric Sciences, Nanjing Unversity, Nanjing, Jiang Su province, China (jptang@nju.edu.cn)

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Ziyue Guo Jianping Tang
School of Atmospheric Sciences, Nanjing University, Nanjing, 210023,China

This study presents a 6-year (2009-2014) summer climate simulation using the Weather Research and Forecasting (WRF) model at convection-permitting (CP) resolution (4 km grid spacing). To investigate the effects of the microphysics parameterization (MP) schemes on precipitation characteristics, the three popular MP schemes such as Lin (single bulk MP), WSM5 (one-moment and mixed-phased MP), and Thompson (two-moment and mixed-phase MP) scheme are employed in this study. The model results are evaluated in comparison with the CMORPH and ERA-interim data. The CP model can well reproduce the summer precipitation amount and the associated large-scale atmospheric circulations, which are insensitive to the choice of MP schemes. The simulations with all the MP schemes are capable of capturing the precipitation timing but overestimating the precipitation amount, especially for the heavy rainfall, and this may be due to the systematic bias, and it can not be remarkably reduced by using different MP schemes. Moreover, all simulations can capture the major features of precipitation diurnal variation and their transition characteristics, but they significantly overestimate (underestimate) the precipitation frequency (intensity). The vertical profiles of solid hydrometeors, especially the snow and graupel particles, significantly affect the precipitation amount. Thompson scheme creates more snow particles (less graupel) than WSM5 (Lin) scheme, and produces the least precipitation amount that best matches the CMORPH.