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A numerical study of background cloud condensation nuclei's effects on microphysics of the typhoon Morakot

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Aerosols effects acting as cloud condensation nuclei (CCN) on the precipitation of the landfall typhoon Morakot (the eighth typhoon in 2009) was investigated by using Weather Research and Forecasting Model (WRF), two numerical experiments were carried out: one with the background concentration of CCN set to 2000 cm-3 and the other with 300 cm-3. The results indicate that, a large number of aerosols can enter peripheral rain-band to condensate vapor into drops and release latent heat which invigorates convection. One the other hand aerosols reduce drops size and delay precipitation. Lots of drops can rise above the freezing level and change their phases and then increase the content of ice material. It is shown that aerosols increase precipitation of peripheral rain by changing the conditions of solid water, liquid water and convection.