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# An Investigation of Microphysical Feedback on Flow Dynamics in a Heavy Rainfall Event

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The effects of diabatic forcing associated with parameterized microphysics processes on flow dynamics are explored through the use of model sensitivity experiments for the heavy rainfall event that occurred on 19-21 July 2016 in China. It is hypothesized that a significant amount of forecast error for the event is due to uncertainty in microphysically-induced diabatic forcing and its feedback on flow dynamics. Various experiments are performed to establish the sensitivity of detailed mesoscale distributions of precipitation in the 24- to 48-h forecast to differences in microphysics parameterization schemes and to the model's horizontal resolution. It is shown that the predicted light precipitation distribution and the maximum precipitation rate can be significantly altered by differences in microphysical feedback to flow dynamics through the choice of microphysical parameterization schemes as well as by the change in the model's horizontal resolution. The results from these experiments emphasize the difficulty of forecasting light and heavy precipitation equally well without the observational knowledge of hydrometeor size distributions and the use of a good representation of subgrid-scale cloud variability. They also strongly suggest that the predictability of detailed mesoscale distributions of precipitation in the cases like the one presented here may be limited to less than 2 days.