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Impact of uncertainties in parameterized cloud-microphysical processes on the simulated development of an idealized 2-D squall line

Sara Michelson (1), Jian-Wen Bao (1,2), Evelyn Grell (1,2)

(1) NOAA/ESRL/PSD, Boulder, Colorado, United States (Jian-Wen.Bao@noaa.gov), (2) CIRES, University of Colorado, Boulder, Colorado, United States

In this study, numerical model simulations of an idealized 2-D squall line are investigated using microphysics budget analysis. Four commonly-used microphysics schemes of various complexity are used in the simulations. Diagnoses of the source and sink terms of the hydrometeor budget equations reveal that the differences related to the assumptions of hydrometeor size-distributions between the schemes lead to the differences in the simulations due to the net effect of various microphysical processes on the interaction between latent heating/evaporative cooling and flow dynamics as the squall line develops. Results from this study also highlight the possibility that the advantage of double-moment formulations can be overshadowed by the uncertainties in the spectral definition of individual hydrometeor categories and spectrum-dependent microphysical processes.