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Diagnosis of Differences in Hydrometeor Production between Multiple Parameterizations of Microphysics Using a Single-Column Model

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This presentation is about a comparison study of four bulk microphysics schemes using the single-column version of the Weather Research and Forecasting (WRF) model in a tropical convection testing case. The schemes compared, ranging from a single-moment simple 3-category scheme to a more complex double-moment 6-category scheme, produce different average vertical hydrometeor distributions, as well as different accumulated precipitation. Diagnosis of differences in the source and sink terms of all the hydrometeor budget equations reveals that the major differences in the production of hydrometeors of these schemes are more in the spectral definition of individual hydrometeor categories and spectral-dependent microphysical processes such as accretion growth and sedimentation, than the differences between the single- and double-moment formulations. Differences in the assumed pathways to the production of frozen hydrometeors also significantly contribute to the differences in the hydrometeor and latent heat distributions output from these schemes. The comparison results presented serve as a reference for other WRF users to compare with their microphysics schemes and facilitate future microphysics parameterization development and improvement.