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Quantitative rainfall metrics for comparing volumetric rainfall retrievals to fine scale models

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Precipitation processes play a significant role in the energy balance of convective systems for example, through latent heating and evaporative cooling. Heavy precipitation "cores" can also be a proxy for vigorous convection and vertical motions. However, comparisons between rainfall rate retrievals from volumetric remote sensors with forecast rain fields from high-resolution numerical weather prediction simulations are complicated by differences in the location and timing of storm morphological features. This presentation will outline a series of metrics for diagnosing the spatial variability and statistical properties of precipitation maps produced both from models and retrievals. We include existing metrics such as Contoured by Frequency Altitude Diagrams (Yuter and Houze 1995) and Statistical Coverage Products (May and Lane 2009) and propose new metrics based on morphology, cell and feature based statistics. Work presented focuses on observations from the ARM Southern Great Plains radar network consisting of three agile X-Band radar systems with a very dense coverage pattern and a C Band system providing site wide coverage. By combining multiple sensors resolutions of 250m2 can be achieved, allowing improved characterization of fine-scale features. Analyses compare data collected during the Midlattitude Continental Convective Clouds Experiment (MC3E) with simulations of observed systems using the NASA Unified Weather Research and Forecasting model.

May, P. T., and T. P. Lane, 2009: A method for using weather radar data to test cloud resolving models. Meteorological Applications, 16, 425–425, doi:10.1002/met.150, 10.1002/met.150.
Yuter, S. E., and R. A. Houze, 1995: Three-Dimensional Kinematic and Microphysical Evolution of Florida Cumulonimbus. Part II: Frequency Distributions of Vertical Velocity, Reflectivity, and Differential Reflectivity. Mon. Wea. Rev., 123, 1941–1963, doi:10.1175/1520-0493(1995)123<1941:TDKAME>2.0.CO;2.