Summary
Metrics of tropical cloud system lifecycle are used to assess modeled microphysics.
- Storm size is sensitive to microphysics scheme
- ACRF profiles of storm graupel and snow content might provide key diagnostics

1. Tracking Mesoscale Convective Systems
Mesoscale convective systems (MCSs) are identified and tracked in the observations and simulations with the Boer and Ramanathan (1997) algorithm

MCS Definition (Laing and Fritsch, 1993):
- Core area > 50,000 km² with BT < 219 K; surrounding anvil with BT < 240 K
- Core area plus anvil area > 100,000 km²

Observations
- Track GOES-9 11 µm (Channel 4) brightness temperatures

Weather Research and Forecasting (WRF) Simulations
- WRF outgoing longwave radiation converted to equivalent top-of-atmosphere 11-µm brightness temperatures for tracking

2. WRF Simulations
One-week simulations: 25 to 31 December, 2003
Domains
- Inner: 4-km resolution, 22S-17N, 100E-162E
- Outer: 20-km resolution, 27S-27N, 89E-170E
Convection
- Inner: Explicit
- Outer: Kain Fritsch (new eta) each 6 mins

3. Diagnostic Statistics
Observed and simulated MCS lifecycle statistics.
- MCS size best simulated by the 6-class schemes
- Morrison 2-moment closely matches observed size
- Thompson closely matches MCS longevities

Average MCS profiles for the 6-class microphysics schemes.
- Graupel and snow profile concentrations might provide key diagnostics
- Cloud water and rain profiles are similar (not shown)
- Ice profiles different (not shown), but difficult to observe for MCSs

References

Contact Information
Andy Vogelmann, vogelmann@bnl.gov, 631-344-4421
NY Blue Climate Science: https://wiki.bnl.gov/bg_climate_science/index.php/Main_Page