

P77 Demonstrating the utility of the Mesoscale Model Evaluation Testbed (MMET) in a research environment



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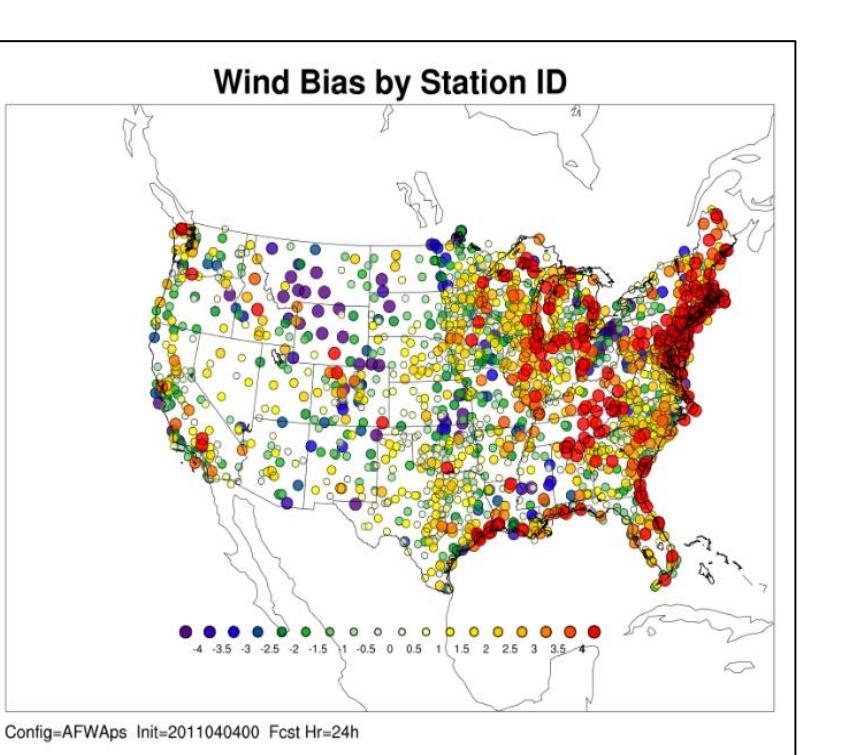
Motivation: The *Mesoscale Model Evaluation Testbed (MMET)* was established by the Developmental Testbed Center (DTC) to *assist the research community* in efficiently demonstrating the merits of a new technique by *providing datasets to utilize for testing* in a common framework in order to effectively *transition promising new advances into operations*.

MMET & DTC Baseline Testing

- MMET is hosted by the DTC, with data served through Repository for Archiving, Managing and Accessing Diverse DAta (RAMADDA)
- The DTC provides the user community with:
 - Model input* and *observational datasets* for testing
 - Baseline results* established by the DTC for select Operational Configurations (OCs), allowing for direct comparisons between new innovations and OCs
 - Scripts* to assist with post-processing, graphics generation, and model evaluation
 - For *further information* on the testing protocol, case descriptions, access to RAMADDA or to nominate additional cases of interest to be included in MMET, please visit: <http://www.dtcenter.org/eval/mmets>

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Example of baseline results:
4 Apr 2011 00 UTC
(Record breaking severe day)



Statistics generated by the
Model Evaluation Tools (MET)

MMET Cases	Meteorological Scenario
20090228	Mid-Atlantic <i>snow storm</i> where NAM model produced high QPF shifted too far north
20090311	<i>High dew point</i> predictions by NAM over the upper midwest and in areas of snow
20091007	<i>HiresW</i> runs <i>underperformed</i> compared to coarser NAM model
20091217	<i>Snowpocalypse '09</i> : NAM produced high QPF over mid-Atlantic, lack of cessation of precipitation associated with decreasing cloud top over eastern North Carolina
20100428-0504	Historic Tennessee <i>flooding</i> associated w/ an atmospheric river
20110404	Record breaking <i>severe</i> report day
20110518-26	Extended period of <i>severe weather</i> outbreak covering much of the midwest and into the eastern states later in the period
20111128	<i>Cutoff low</i> over SW US; NAM had difficulties throughout the winter of breaking down cutoff lows and progressing them eastward
20120203-05	<i>Snow storm</i> over Colorado, Nebraska, etc.; NAM predicted too little precipitation in the warm sector and too much snow north of front (persistent bias)

User Case #1: 28 Apr – 4 May 2010 Flooding in TN

Submitted by Pedro Jimenez & Jimy Dudhia

Case Details

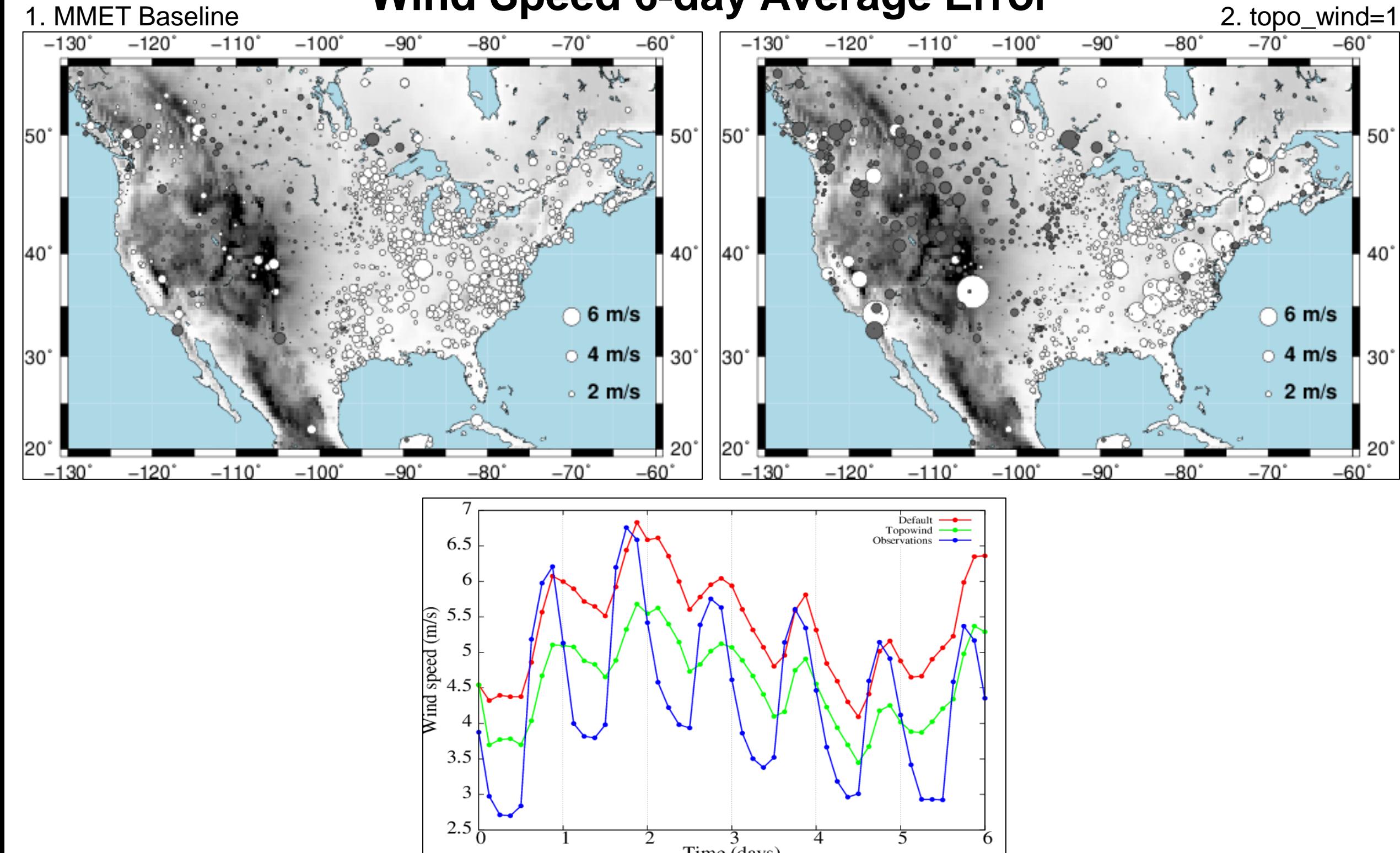
Forecasts: All simulations: 15-km grid length

1. WRF v3.4 ARW baseline configuration namelist from DTC (MMET Baseline Configuration)
2. WRF v3.4 ARW namelist w/ *topo_wind=1* activated

Model Initialization: Utilized IC/BC files from DTC

Verification: Utilized observation files provided by DTC

Wind Speed 6-day Average Error



Case Summary

- Overall 6-day domain average with *topo_wind=1* smaller than default
- Reduces diurnal mean bias but does not capture full diurnal amplitude
- Future work:** reduce the effect of *topo_wind=1* in daytime convective planetary boundary layer

User Case #2: 17 Dec 2009 "Snowpocalypse"

Submitted by Gary Lackmann

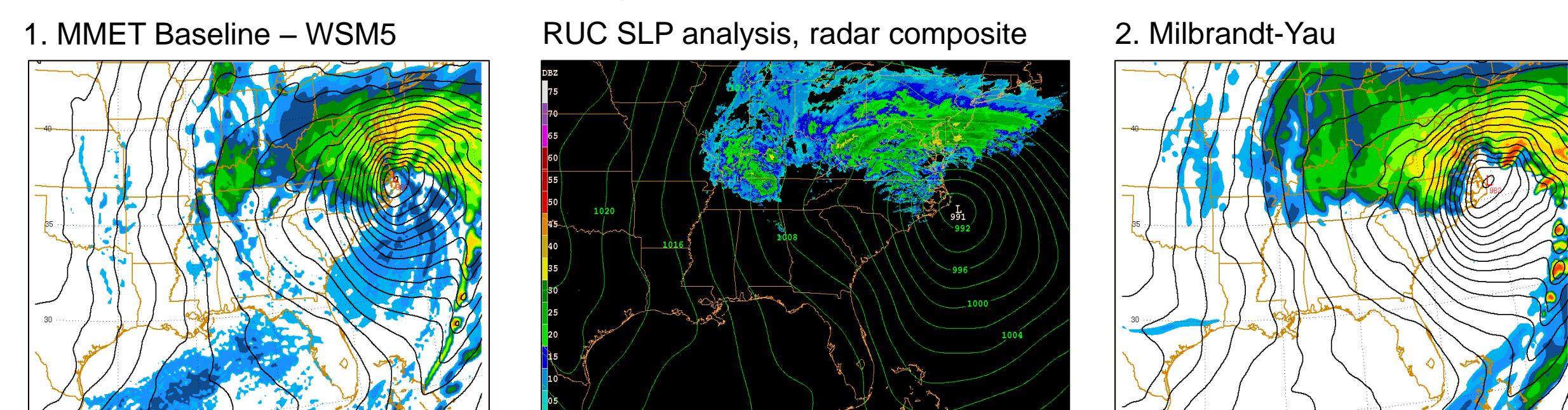
Case Details

Forecasts: All simulations: 15-km grid length

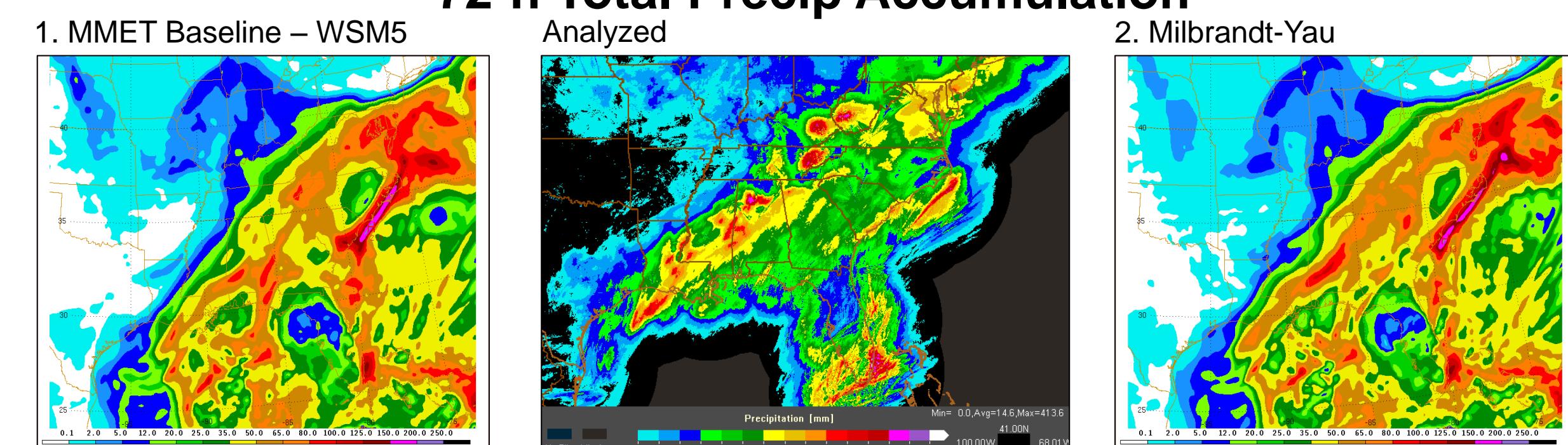
1. WRF v3.4 ARW baseline configuration namelist from DTC (MMET Baseline Configuration w/ *WSM5* microphysics)
2. WRF v3.4 ARW namelist w/ *Milbrandt-Yau* microphysics

Model Initialization: 12 UTC 17 Dec, utilized IC/BC files from DTC

48-h WRF Forecast



72-h Total Precip Accumulation



Case Summary

- Both forecasts captured main features
 - Axis of precipitation over coastal Carolinas and VA
 - Precipitation minimum over FL
- Significant over-prediction over NC, SC, and VA and issues with cessation of precipitation
- Future work:** perform verification of simulations with MET

User Case #3: 1 – 3 May 2010 Flooding in TN

Submitted by Kelly Mahoney

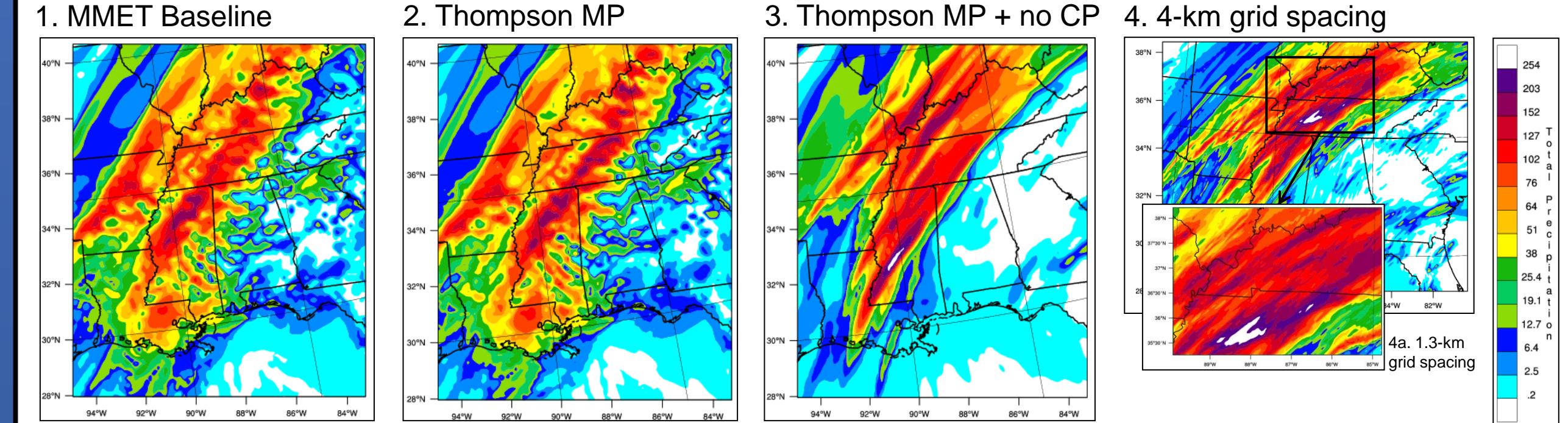
Case Details

Forecasts: Simulations #1-3: 15-km grid length; Simulation #4: 4-km grid length/1.3-km inner nest

1. WRF v3.5 ARW baseline configuration namelist from DTC (MMET Baseline Configuration w/ *WSM5*)
2. WRF v3.5 ARW namelist w/ *Thompson* microphysics
3. WRF v3.5 ARW namelist w/ *Thompson MP* and *no CP scheme*
4. WRF v3.5 ARW namelist w/ *#3* physics and *4-km/1.3-km grid length*

Model Initialization: Utilized IC/BC files from DTC for simulations #1–3, NAM 00 UTC 20100501 forecast from DTC to produce IC/BCs for #4

48-h Total Precip Accumulation



Case Summary

- Strong synoptic-scale dynamical forcing; all simulations generate precipitation maxima > 150 mm in 48-h period
- Significant over-forecast of precip found in LA and TN in all runs; timing error vs. location error? Need longer simulation to test.
- KF CP scheme generates NW-SE-oriented precip banding not seen in explicit convection (no CP) runs
- Increased horizontal resolution increases precipitation maxima
- Relative to less strongly-forced cases (e.g., Atlanta, GA Sept 2009 flooding) sensitivity to model resolution, physics is reduced
- Future work:** perform verification of simulations with MET; couple forecast output files to WRF-Hydro and compare to observed streamflow; compare to sensitivity tests altering model topography and upstream moisture.

