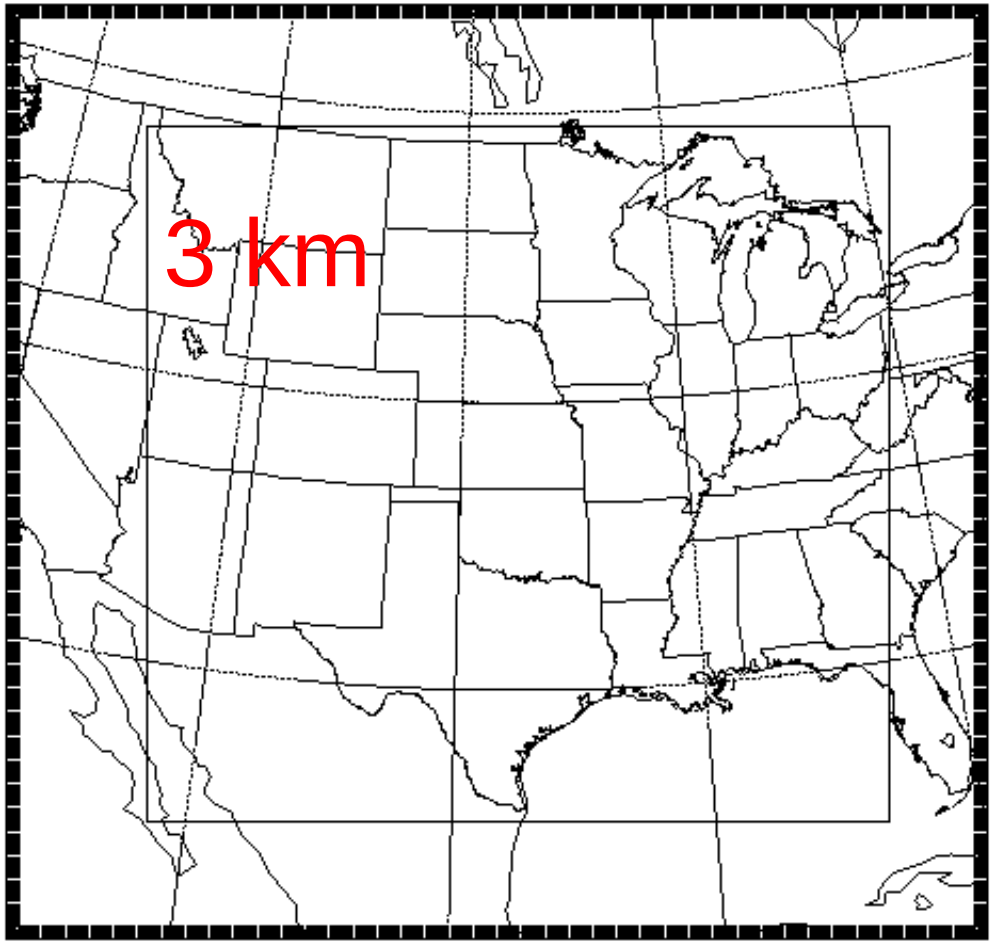
2009 Domain: 3 km (1 May - 30 June)



3 km domain:

….initialized at 00,12 UTC

….48 h

….MYJ PBL

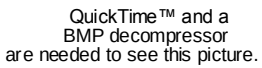
….Thompson Microphysics

…. RUC 13 km DFI analysis

…. GFS BC

2008: The use of WRF-3DVAR and 12 h of cycling at 9 km grid resolution produced spurious convection at times

07 May 2009 12 UTC



WRF-ARW Reflectivity

Composite Radar

Our Objectives:

….Establish predictive capabilities of high-resolution (1 - 4 km) models for convective weather from 0-48 h

…Clarify relative model sensitivities to physics and initial conditions

…Diagnose sources of forecast failure

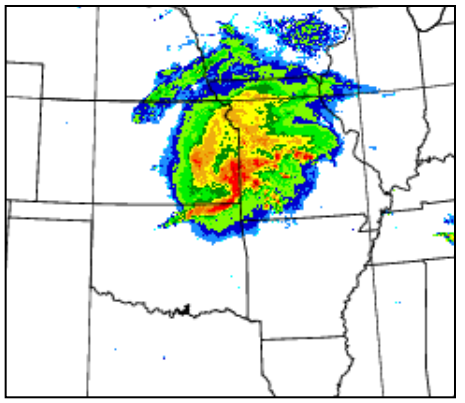
…Validate convective cell/system structure and evolution (e.g., reflectivity structure, cold pools, stratiform precipitation, rear-inflow jets,cell/system propagation)

…Validate statistical/climatological aspects of convective forecasts (precipitation cycles, diurnal cycle…

…Test improvements to ARW and techniques to improve upon cold starts (e.g., WRF-3DVAR Cycling, 2008; RUC DDFI, 2009)

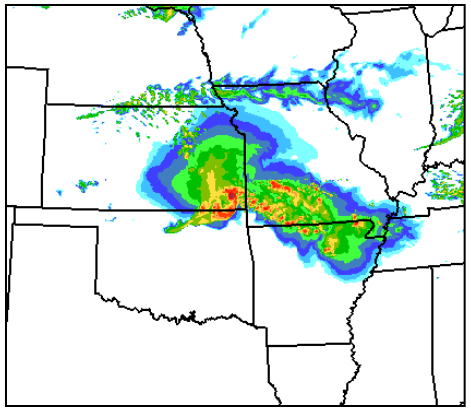
Thompson / MYJ

RADAR



24 h Forecasts
Valid 12 UTC
05/08/09

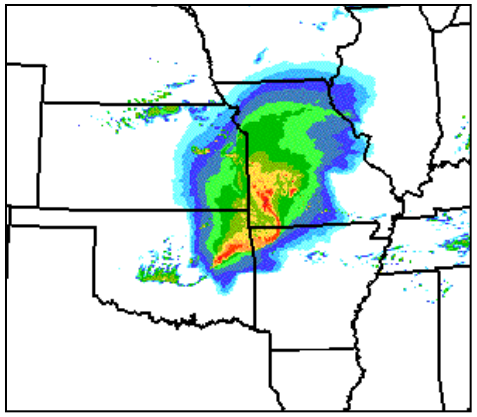
NAM

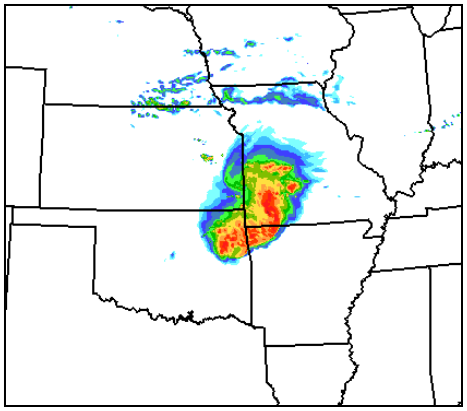


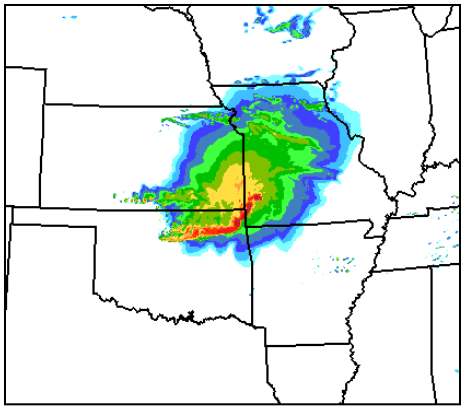
WSM6 / MYJ

Thompson / YSU

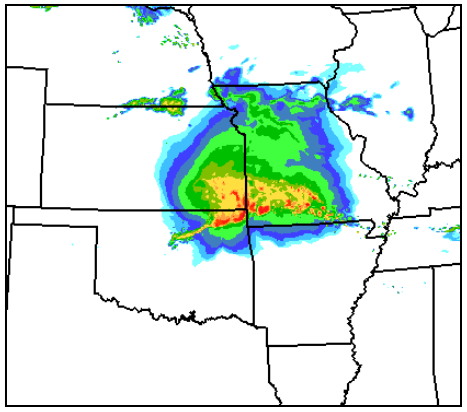
RUC-DFI

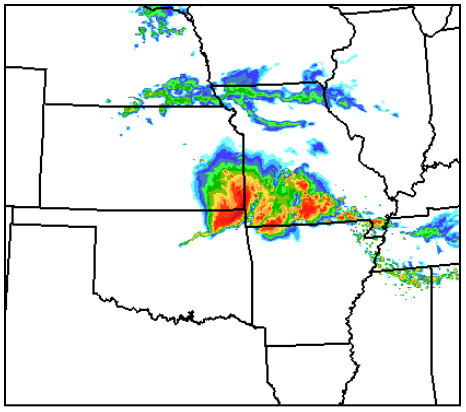


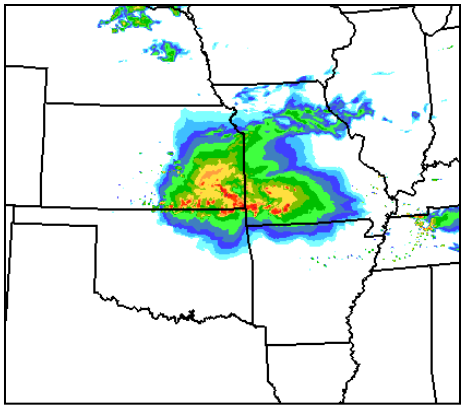




GFS

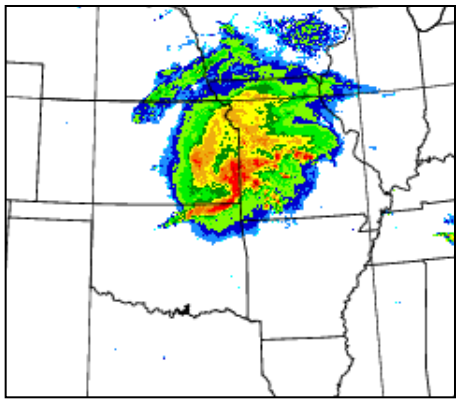






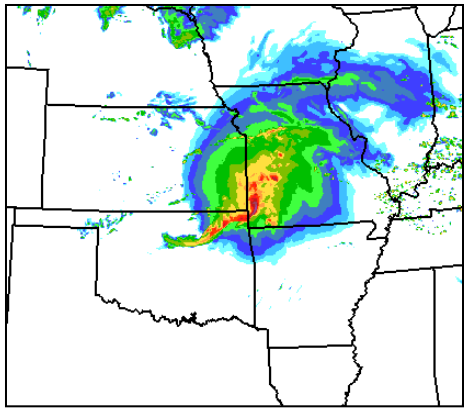
Thompson / MYJ

RADAR



12 h Forecasts
Valid 12 UTC
05/08/09

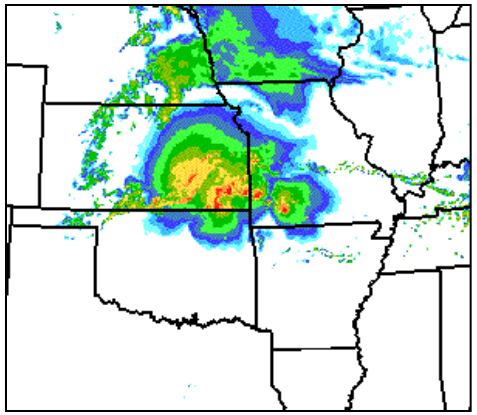
NAM

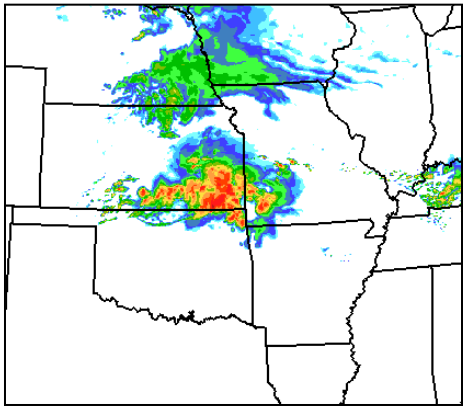


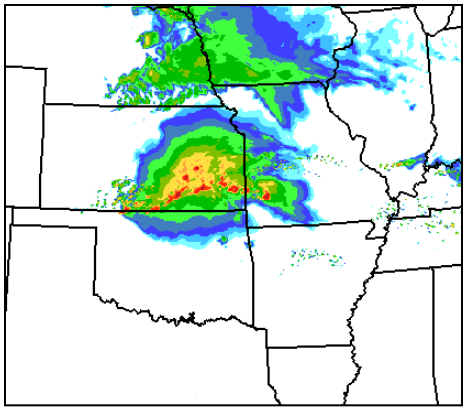
WSM6 / MYJ

Thompson / YSU

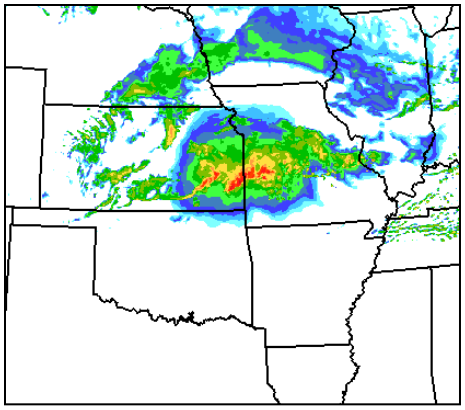
RUC-DFI

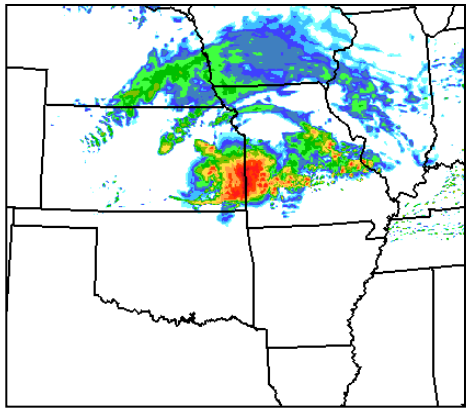


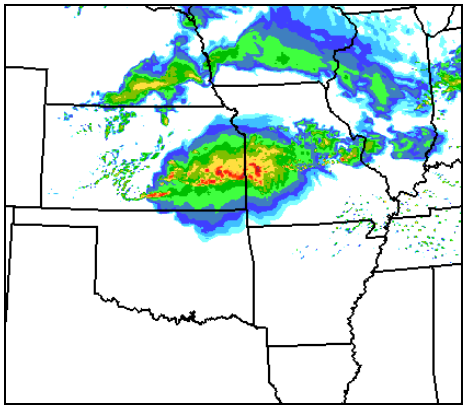




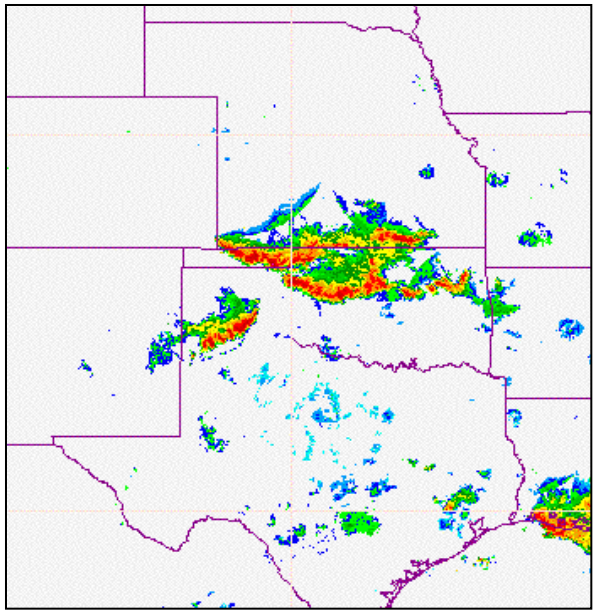
GFS







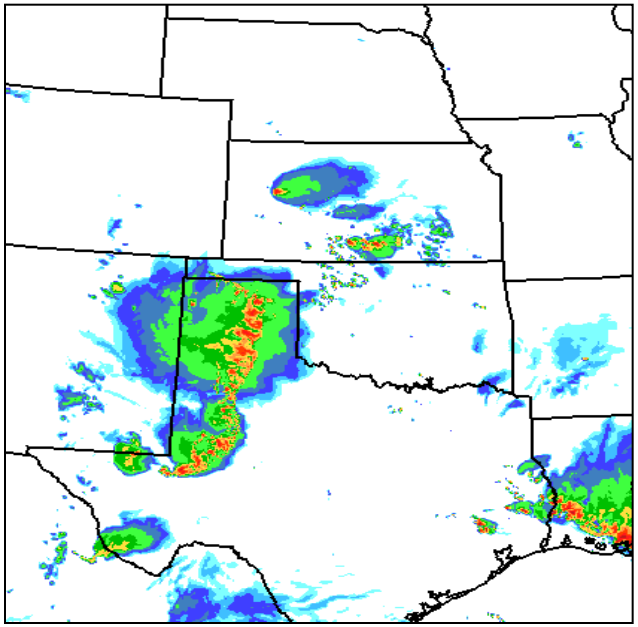
Forecast Failures….



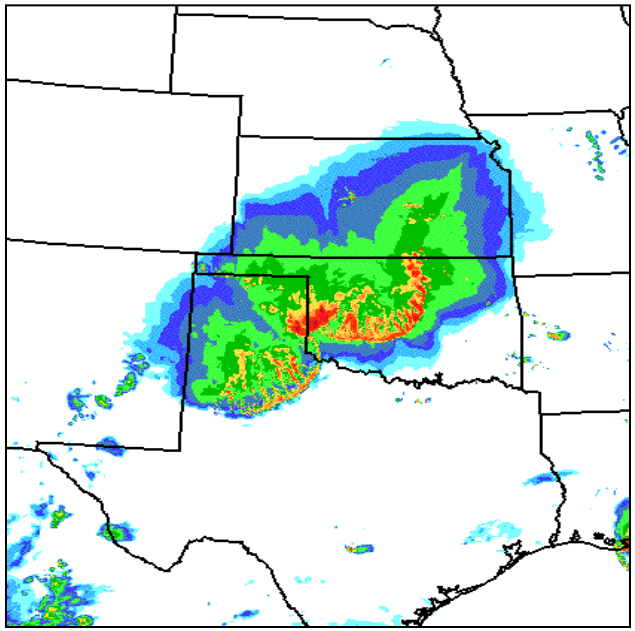
Composite Radar
03 UTC 06/20/07

15 h Forecasts:

NAM Initialization

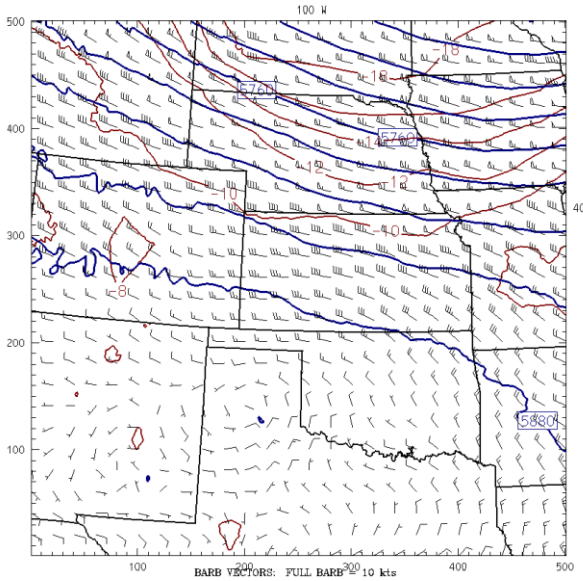


GFS Initialization

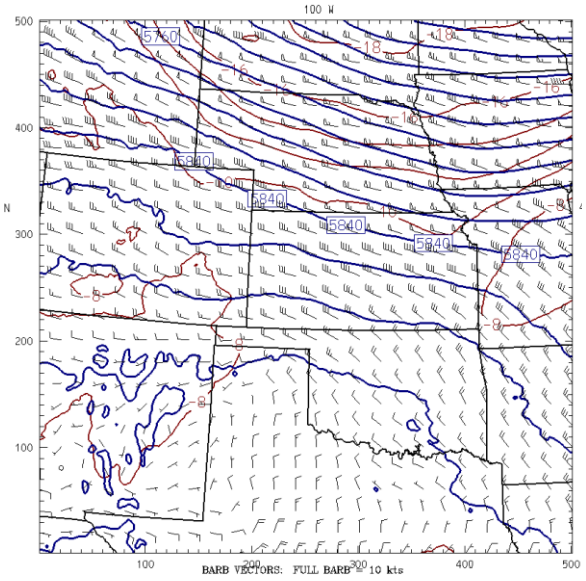


12 UTC 06/19/07

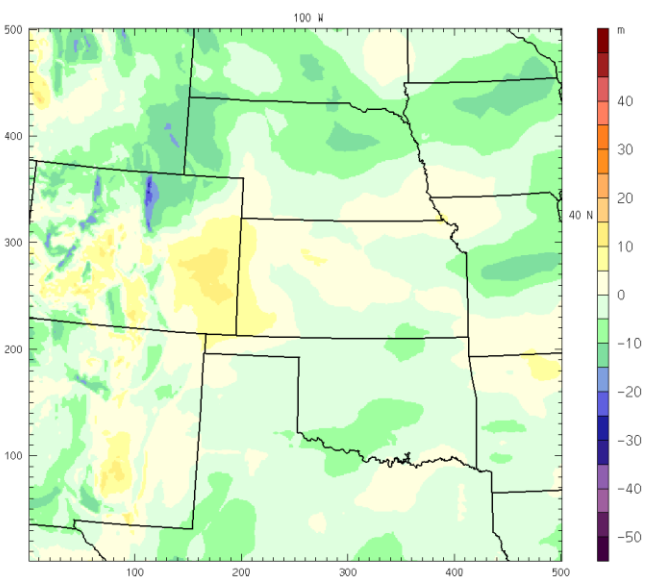
GFS 500 mb



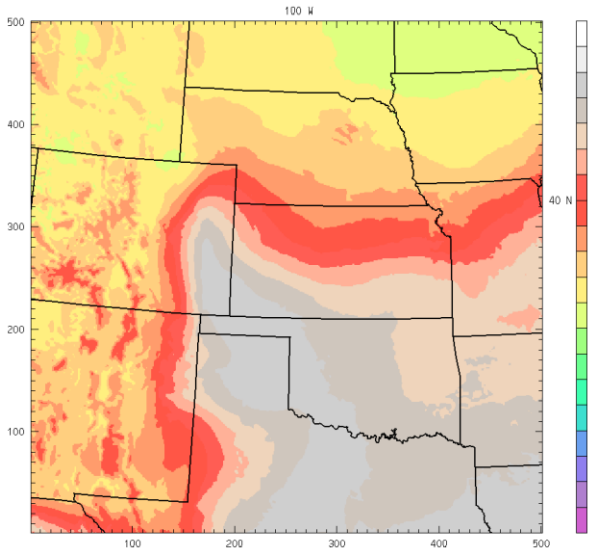
NAM 500 mb



GFS-NAM 500 h



GFS Sfc ThetaE



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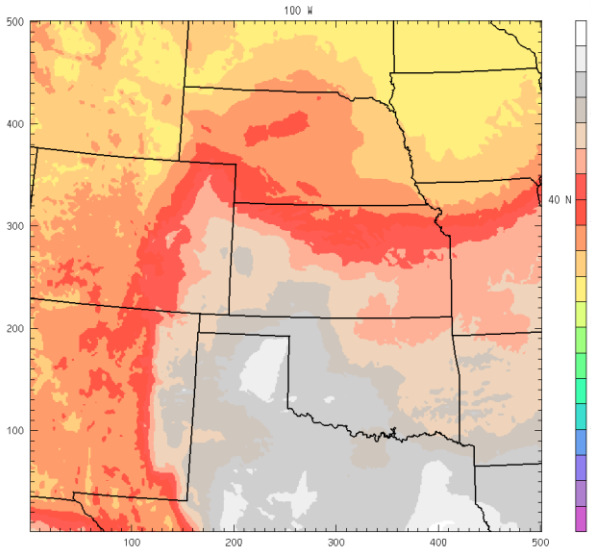

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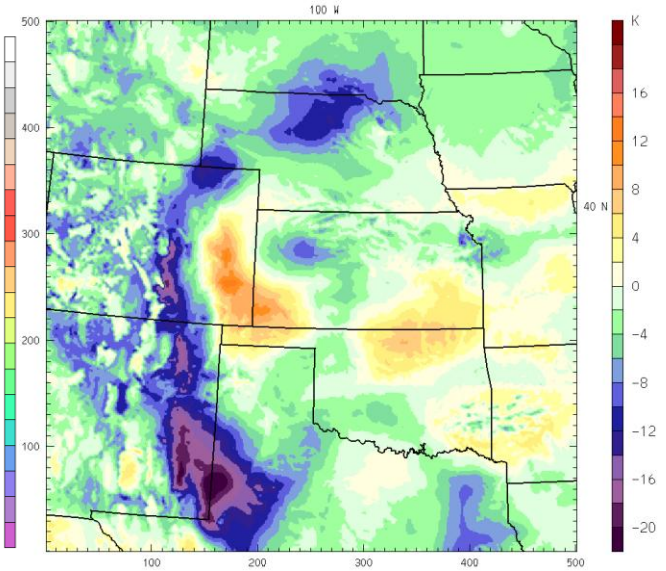
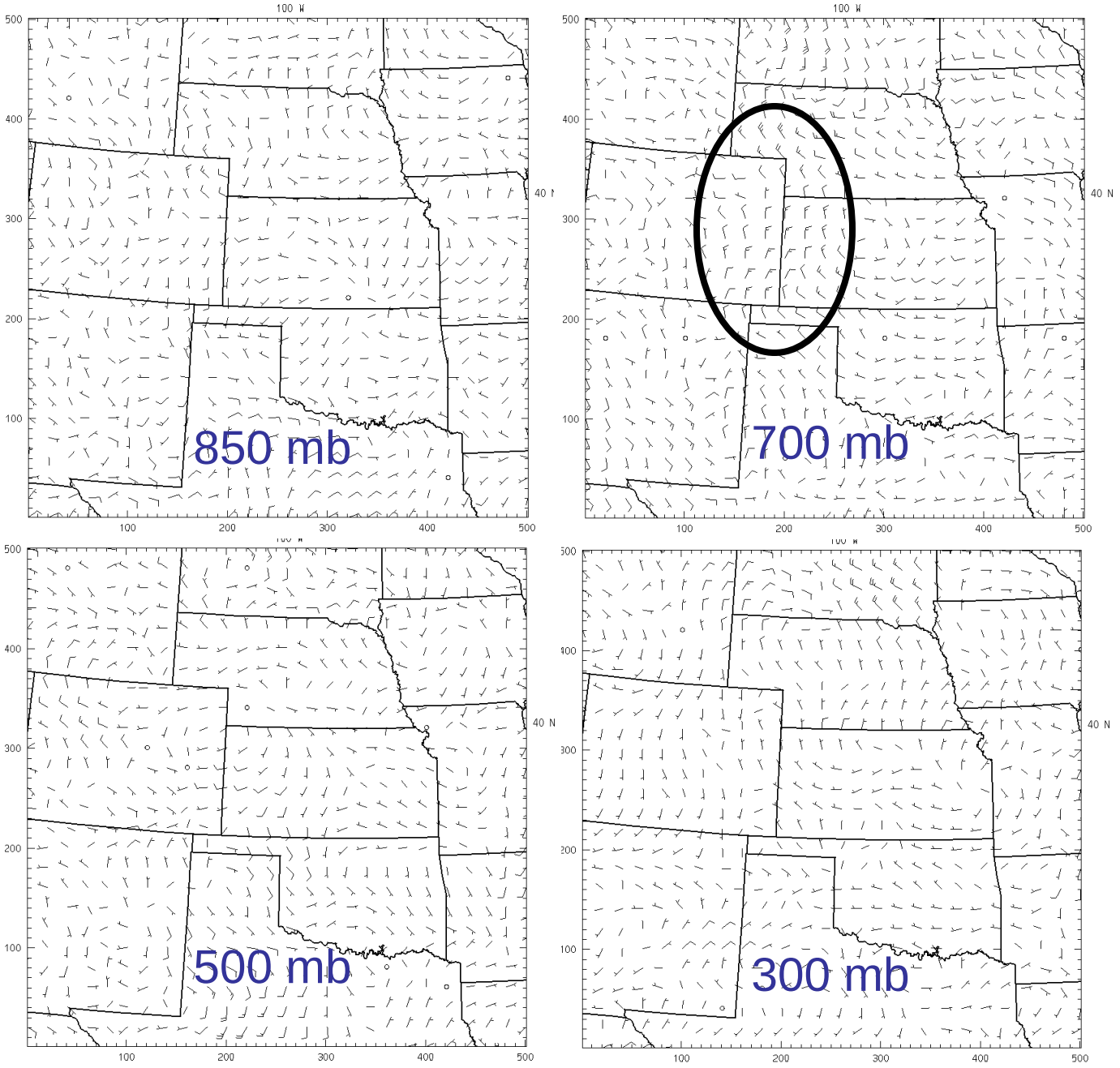
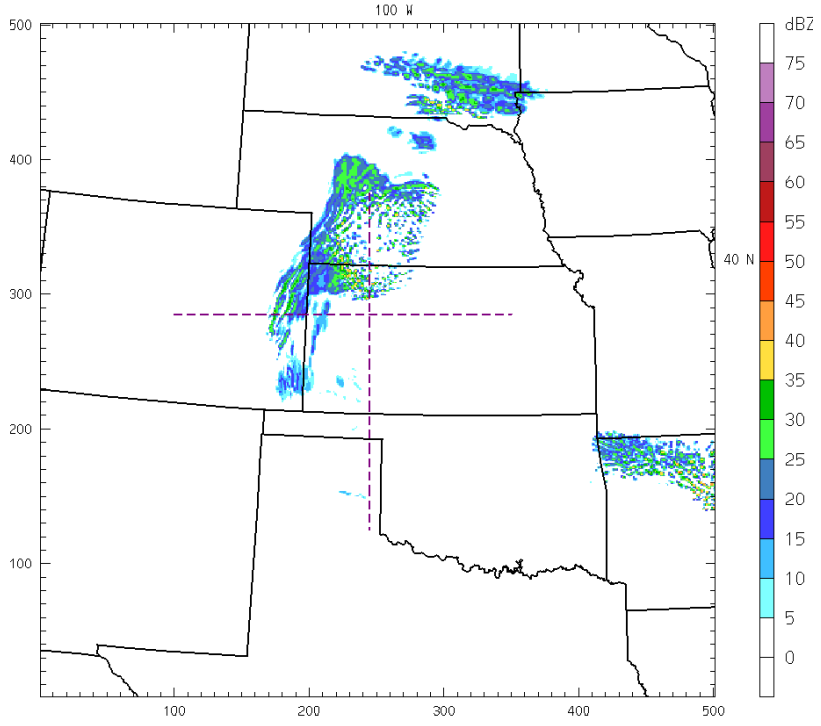
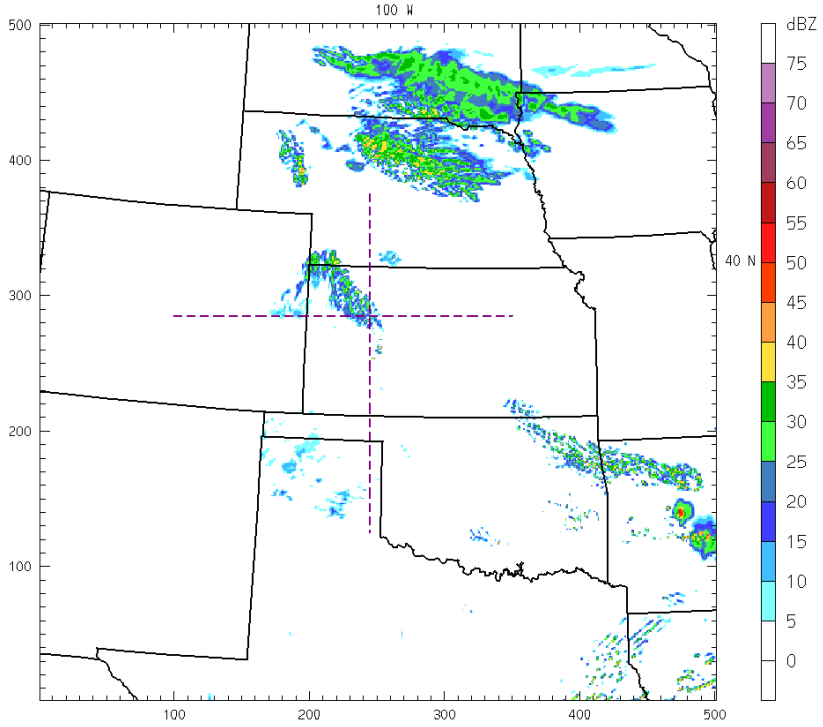


12 UTC GFS-NAM Wind Differences



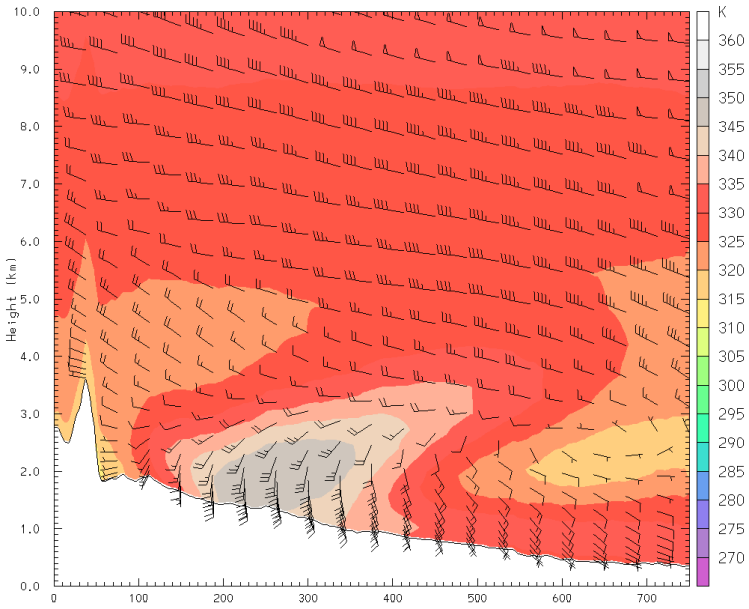
15 UTC 06/19/07



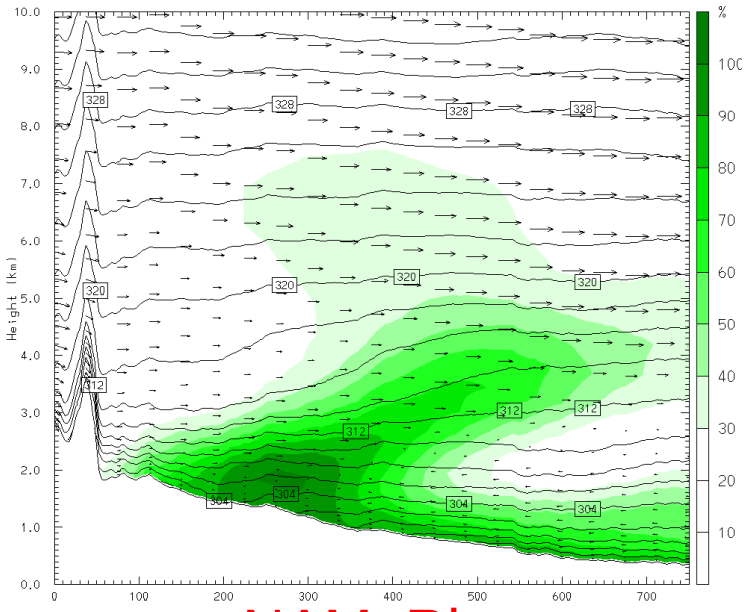


07/19/07 Theta-E E-W (12 UTC init) 12 UTC (0 h)

GFS ThetaE



GFS Rh



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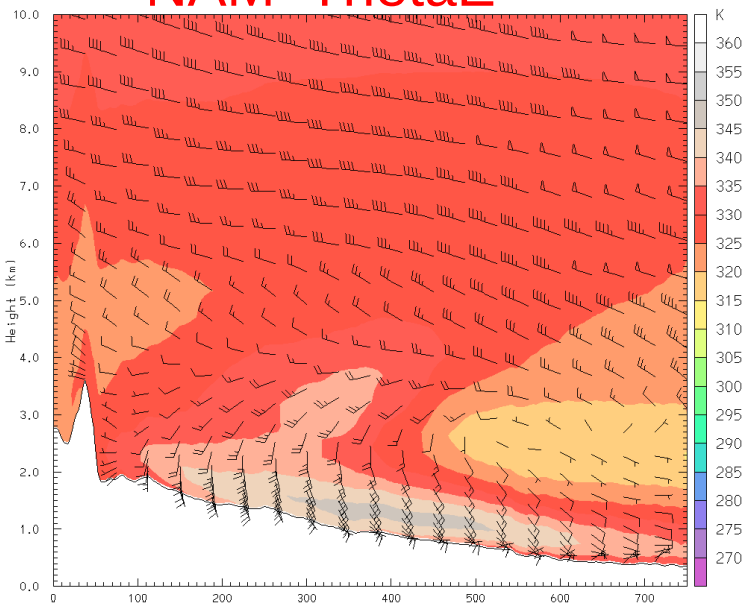

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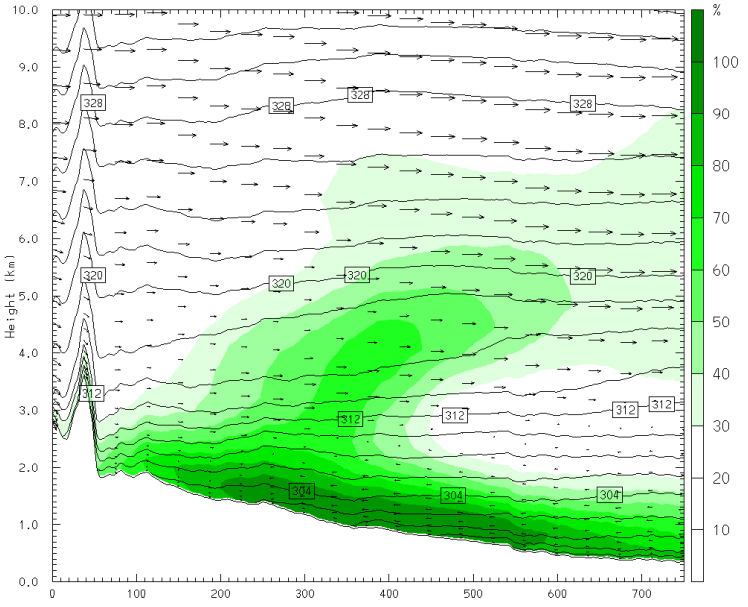
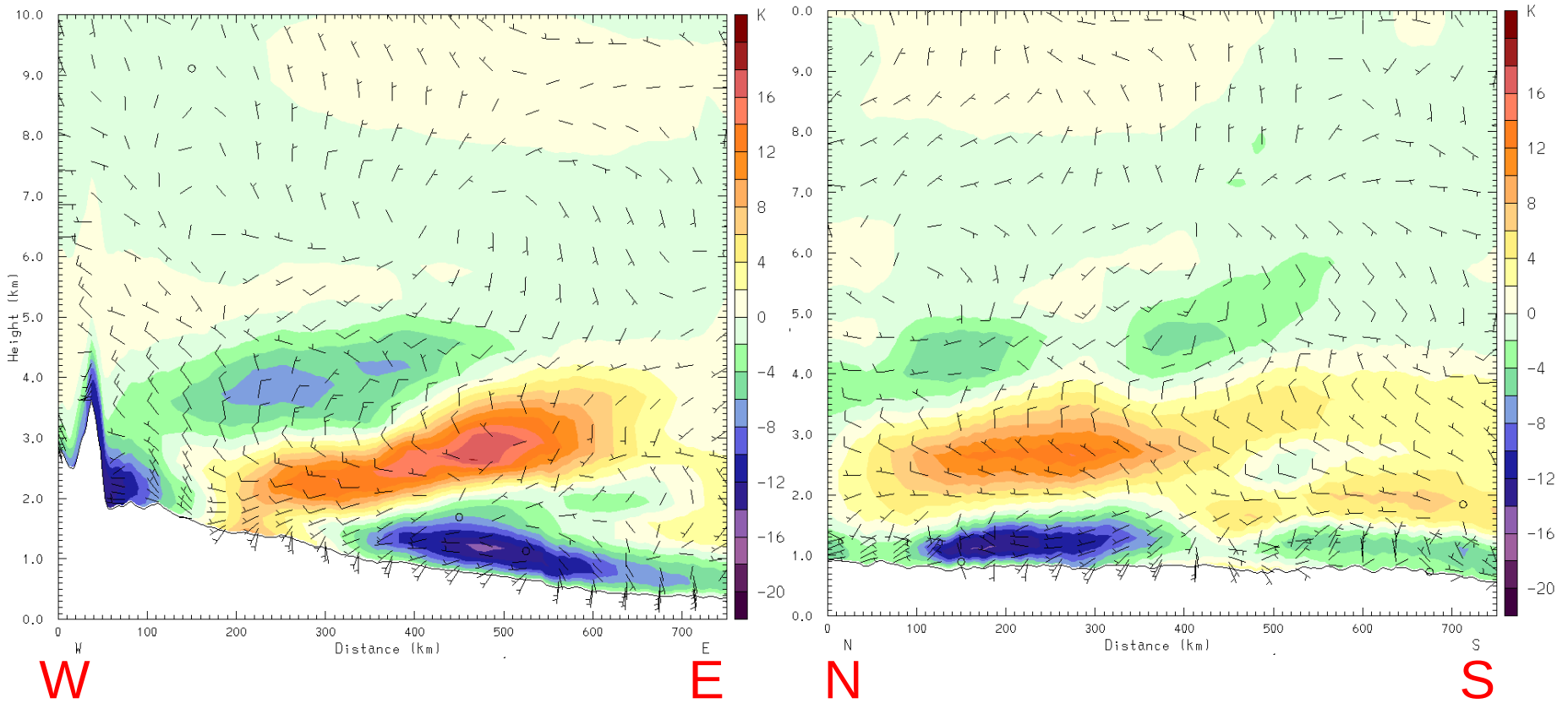
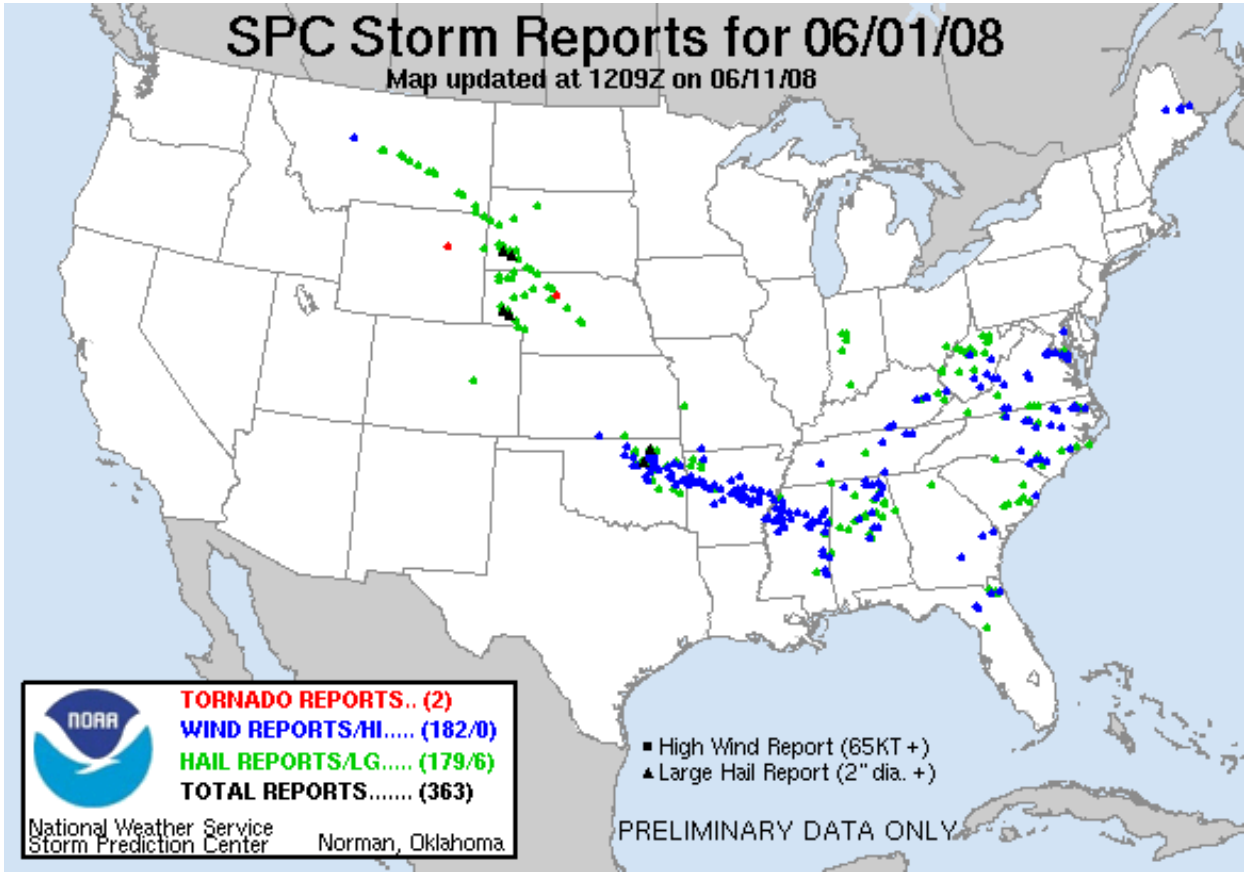


12 UTC 06/19/07

GFS-NAM Theta-E DIFF

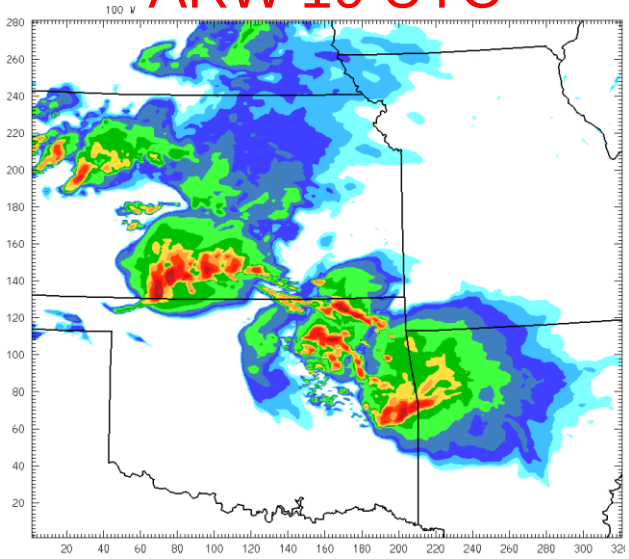


Validate explicit convective phenomena….

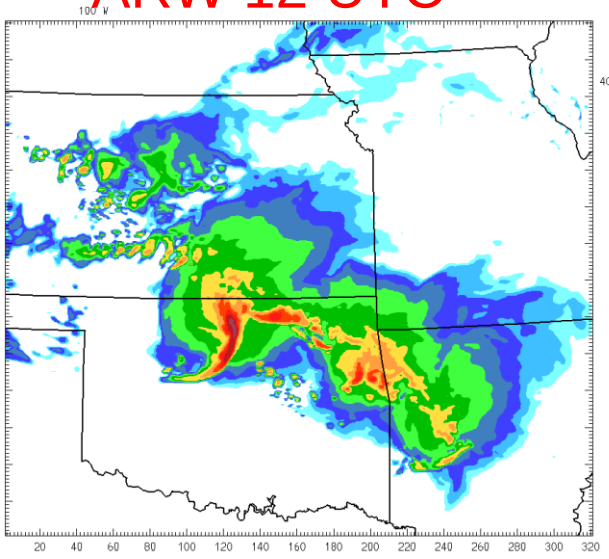


01 June 2008

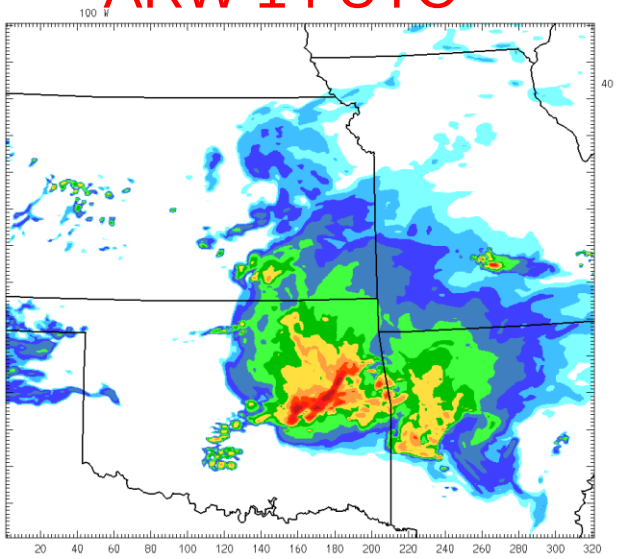
ARW 10 UTC



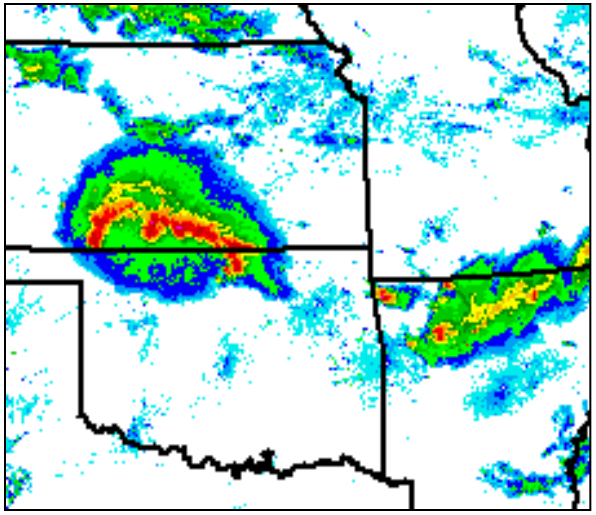
ARW 12 UTC



ARW 14 UTC



OBS 12 UTC



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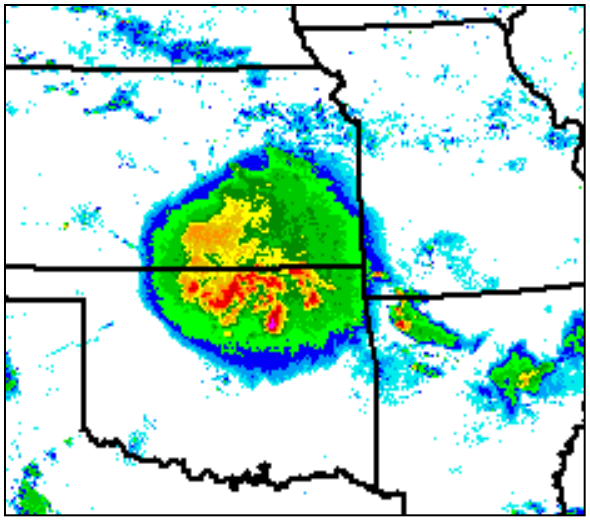

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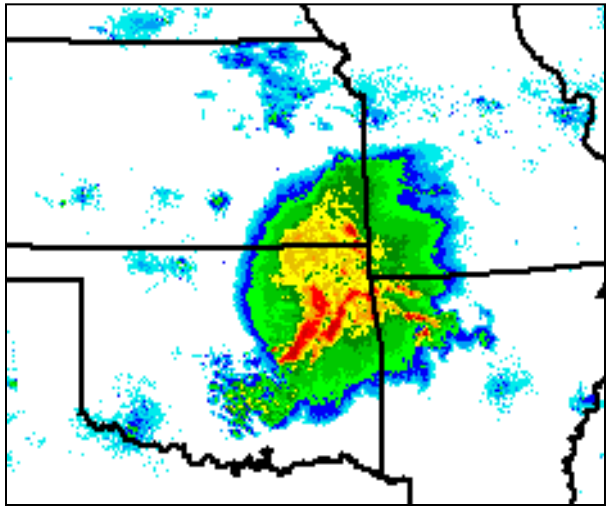

01 June 2008 WRF-ARW 12 UTC (12h)

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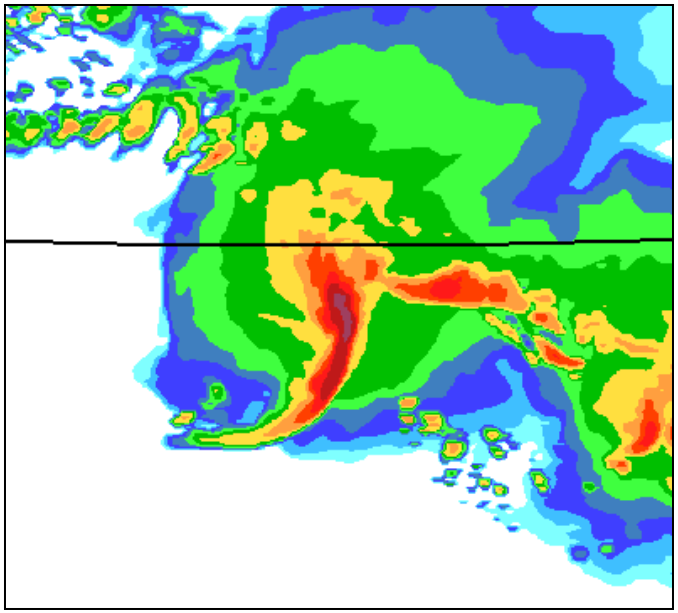
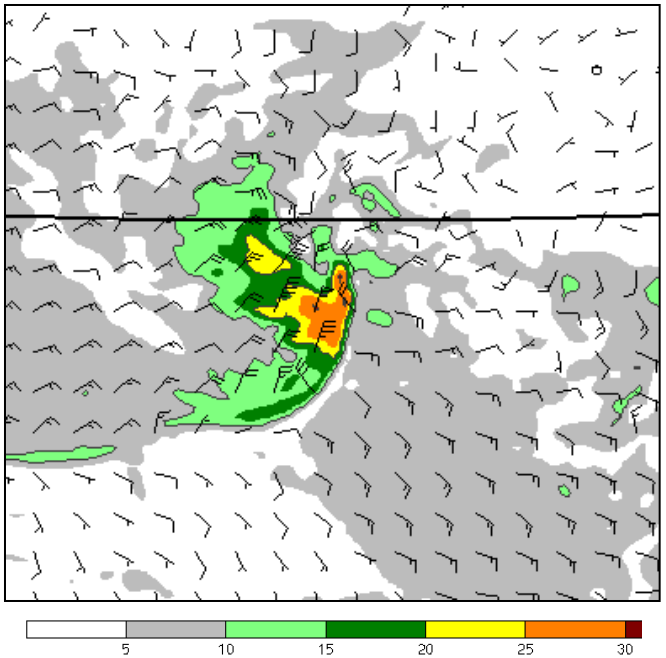
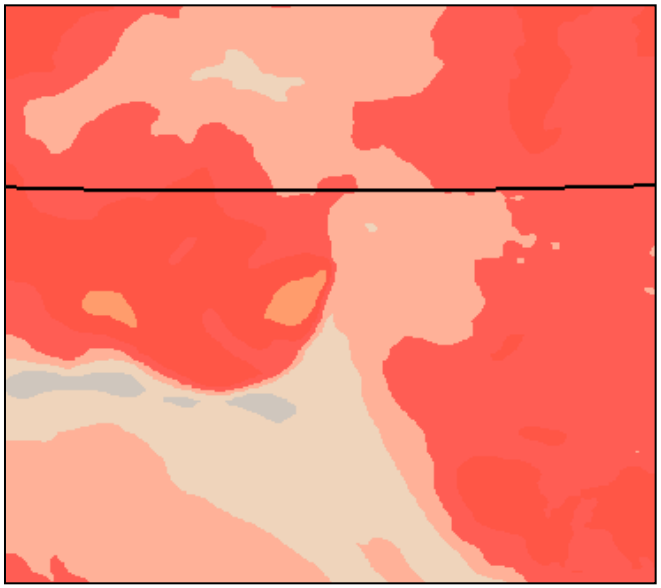
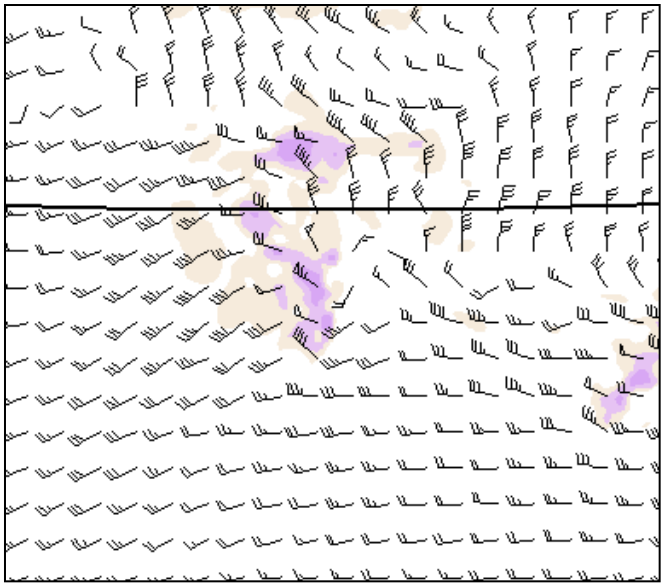




SFC wind

Theta-e



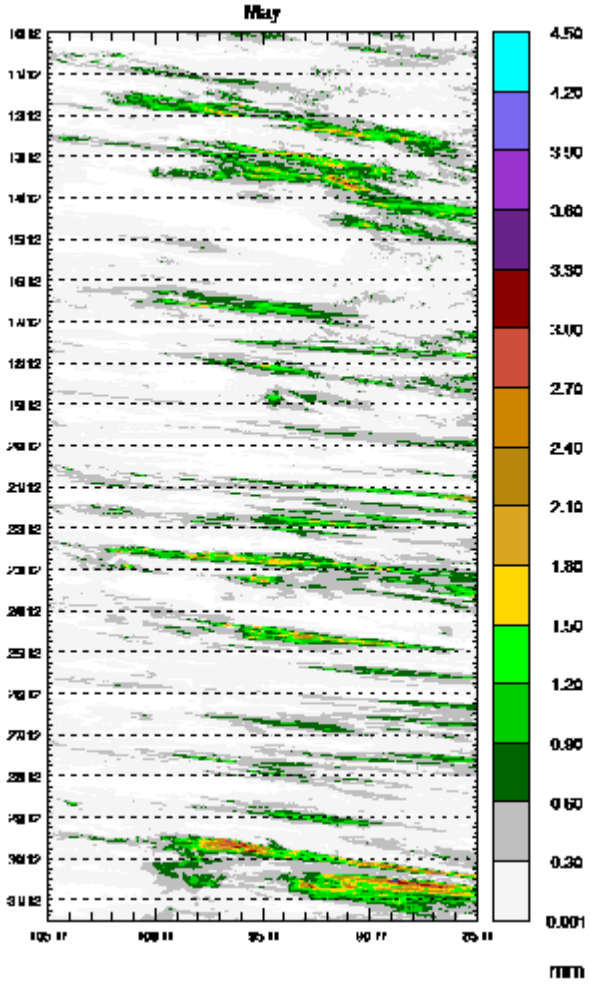


700 mb

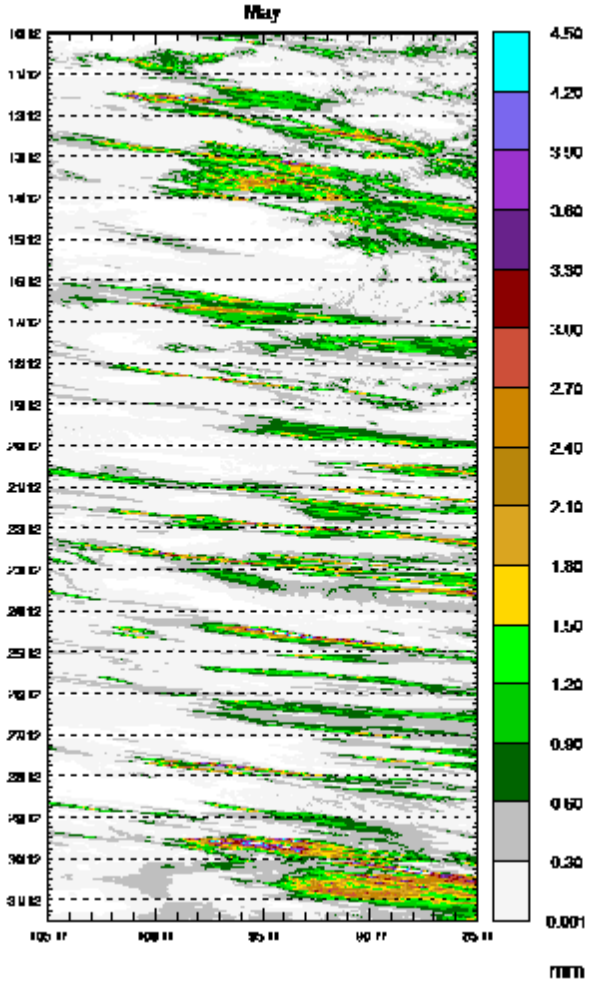
Climatological / statistical properties ….

Longitudinal 1 hr Precip. May 10-31, 2004

Stage IV

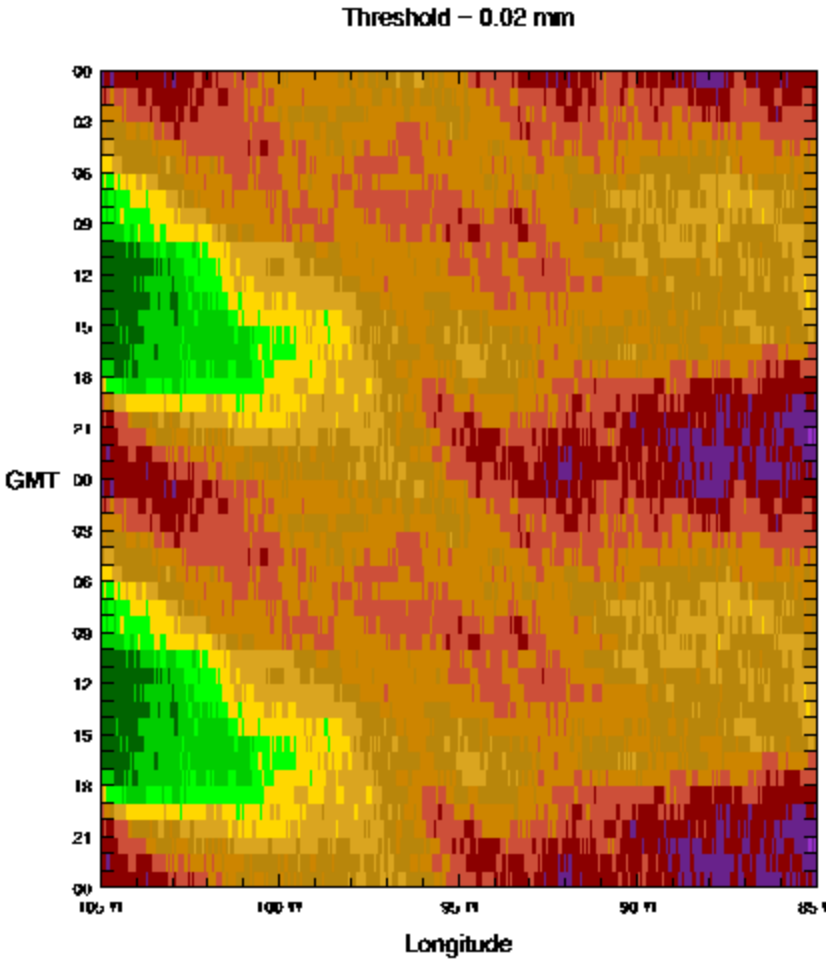


WRF

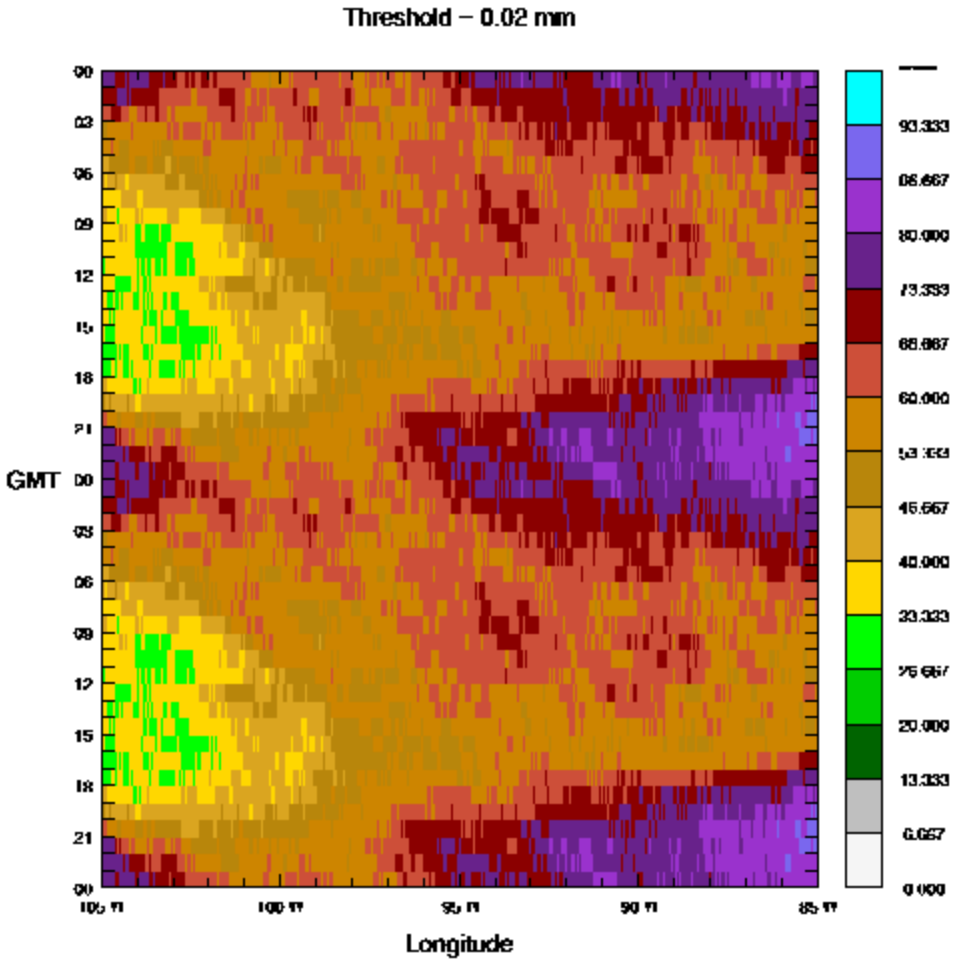


Diurnal Average Frequency: May 10-July 31 2004

Stage IV

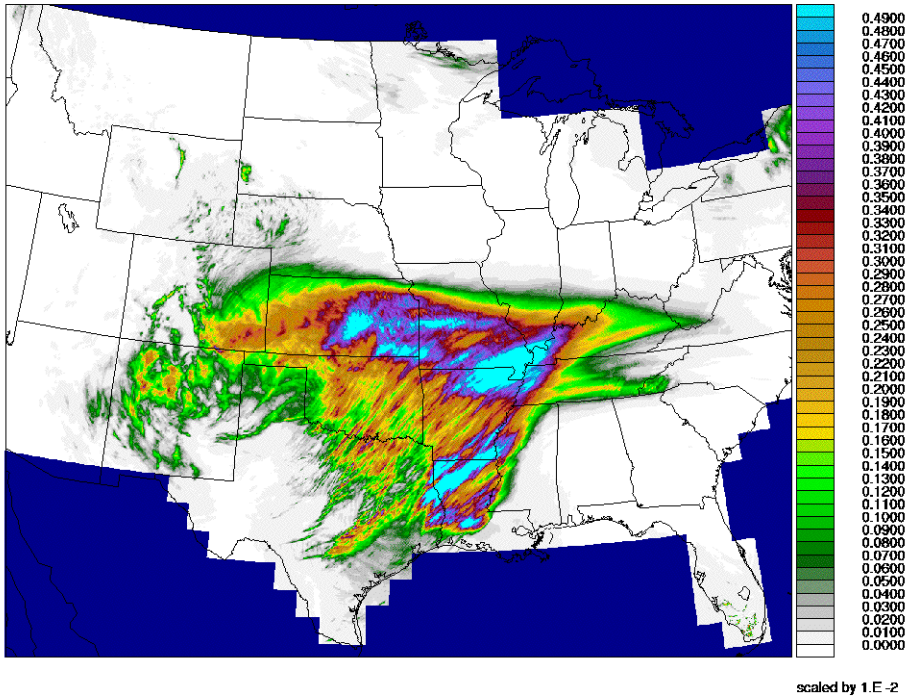


4 km WRF

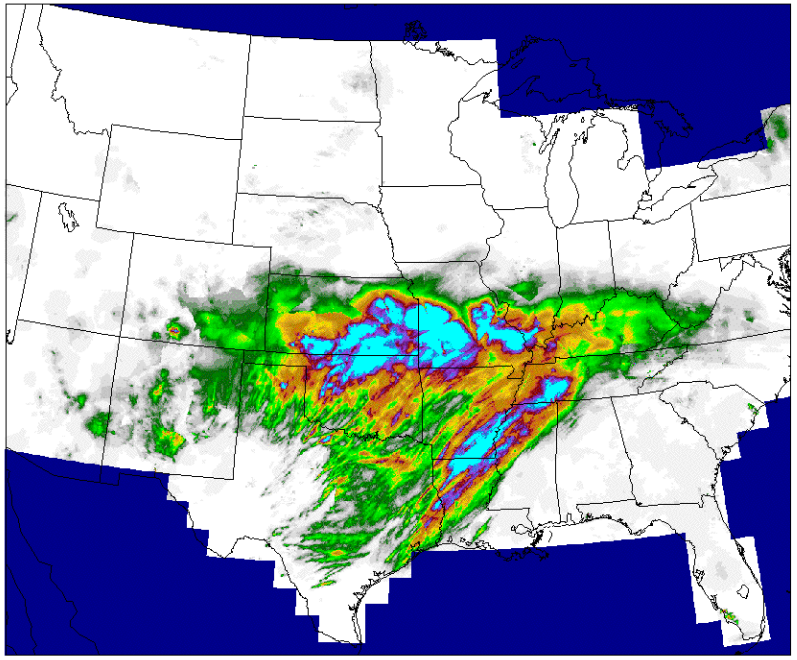


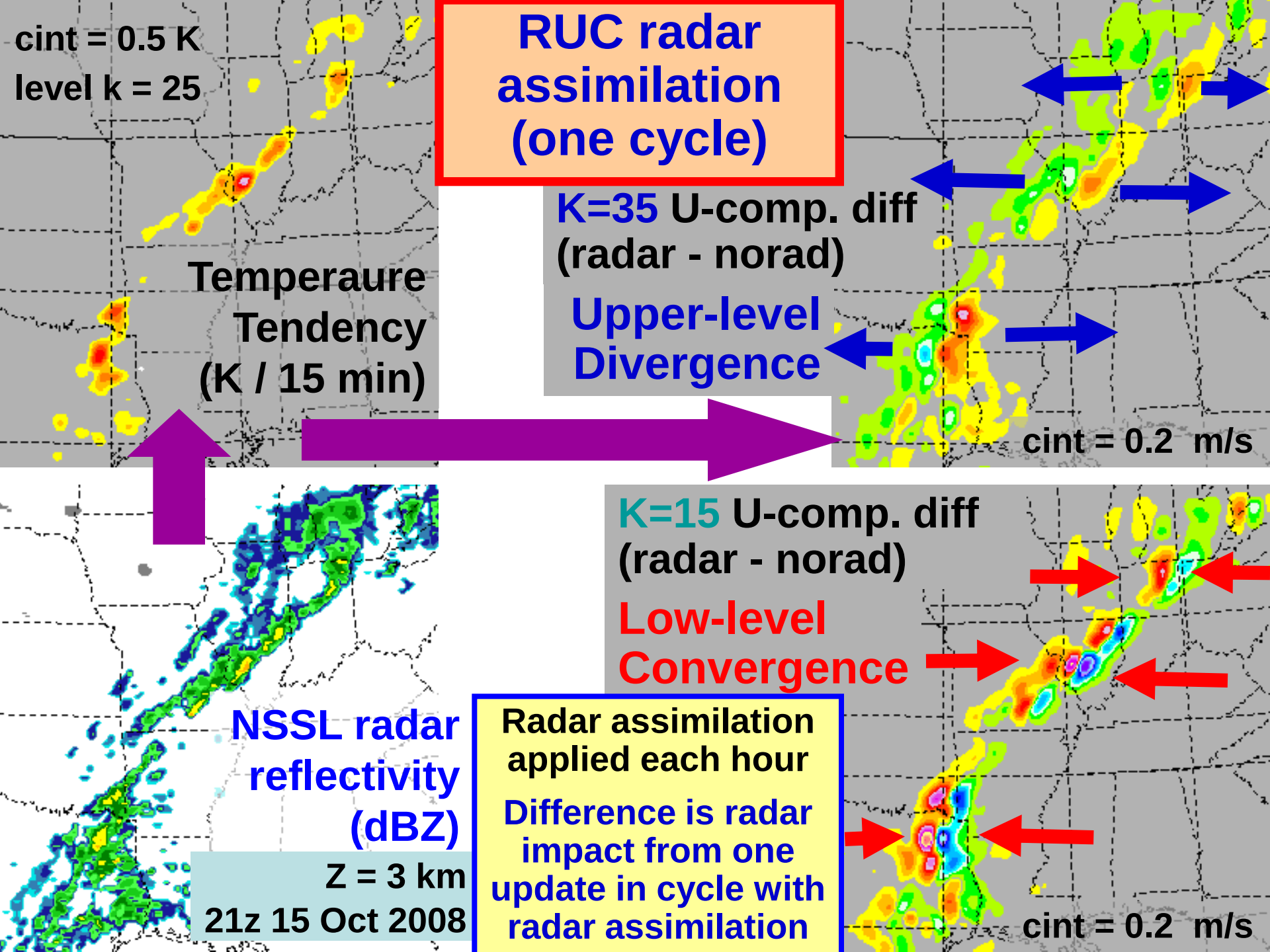
24 h Precipitation (mm): 12 UTC 04/14/07

3 km ARW

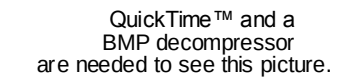


ST4 Analysis



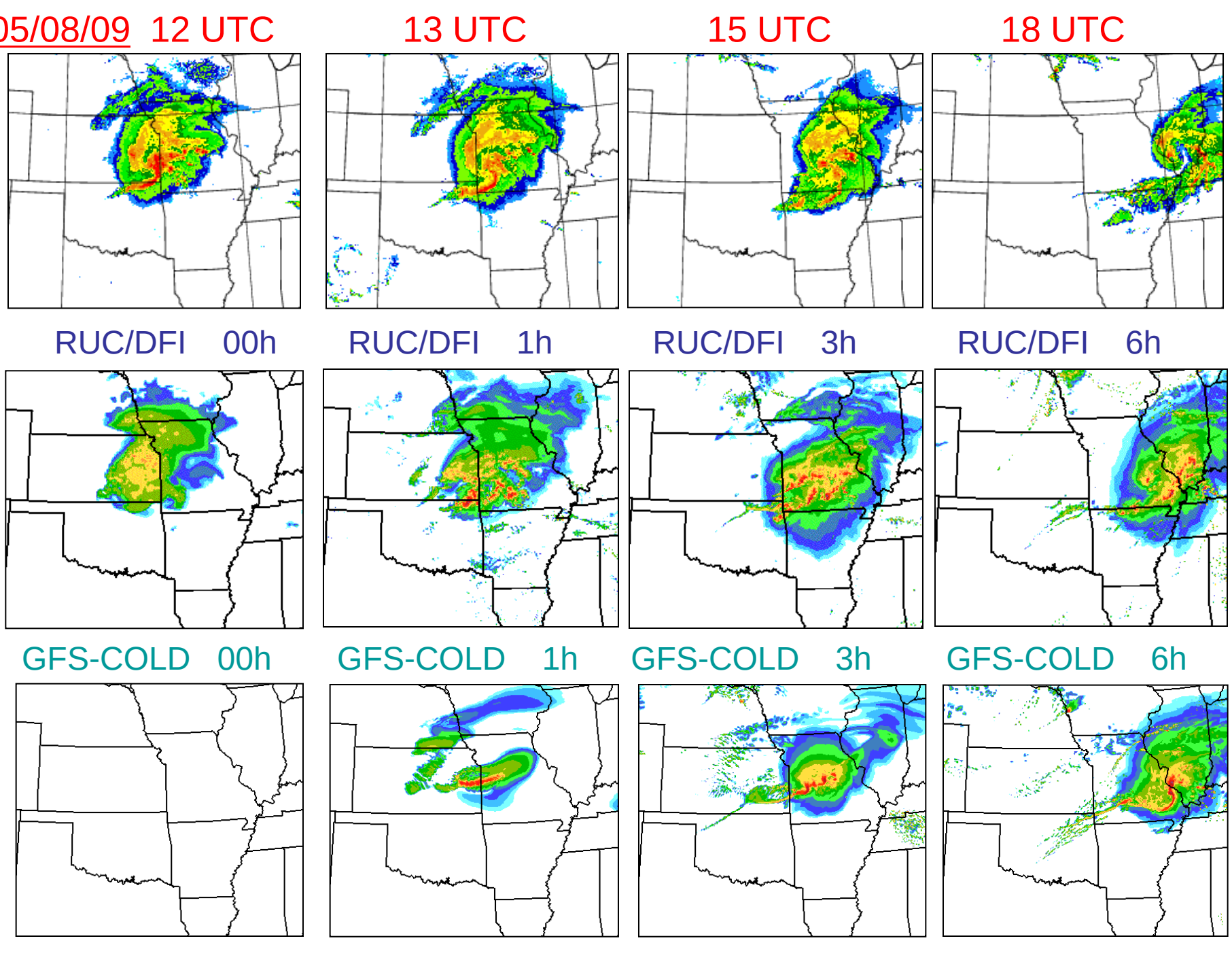

cint = 0.5 K
level k = 25
RUC radar assimilation (one cycle)
K=35 U-comp. diff (radar - norad)
Upper-level Divergence
Temperaure Tendency (K / 15 min)
cint = 0.2 m/s
K=15 U-comp. diff (radar - norad)
Low-level Convergence
NSSL radar reflectivity (dBZ)
Z = 3 km
21z 15 Oct 2008
Radar assimilation applied each hour
Difference is radar impact from one update in cycle with radar assimilation
cint = 0.2 m/s

08 May 2009 12 UTC



WRF-ARW Reflectivity

Composite Radar


05/08/09 12 UTC
13 UTC
15 UTC
18 UTC
RUC/DFI 00h
RUC/DFI 1h
RUC/DFI 3h
RUC/DFI 6h
GFS-COLD 00h
GFS-COLD 1h
GFS-COLD 3h
GFS-COLD 6h

Plans for 2010 ???

…3 km ARW forecasts to 48 h at 00 UTC and 12 UTC using RUC DDFI…

…Initialize using mesoscale analysis produced via EnKF ???

…Continue validation/verification efforts