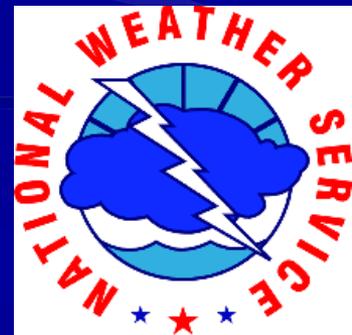


Models and Convection

ER sub-regional Aviation Workshop
WFO Cleveland

Robert LaPlante
22 April 2009



Outline

- Motivation for modeling convection
- Sample of modeling efforts at various national and local levels of NOAA that focus on convection

Motivation of Modeling Convection

- About half the flight delays in the summer are related to convection disrupting air routes and terminal operations
- Forecasting the exact timing, location, intensity, vertical extent and evolution of convection is still a challenge

Motivation of Modeling Convection

- Recent increases in computing capabilities has allowed for numerical modeling down to a scale of 2-5 km horizontal resolution
 - Convective parameterization is no longer necessary
 - Higher resolution permits explicit prediction of convection
 - Somewhat realistic depictions of convection can be achieved with hourly output

Various Convective Modeling efforts in NOAA

- Ensembling model data from individual model runs is being done at SPC during their annual spring experiment
- A few WFOs are beginning to ensemble a subset of model output from their local model runs

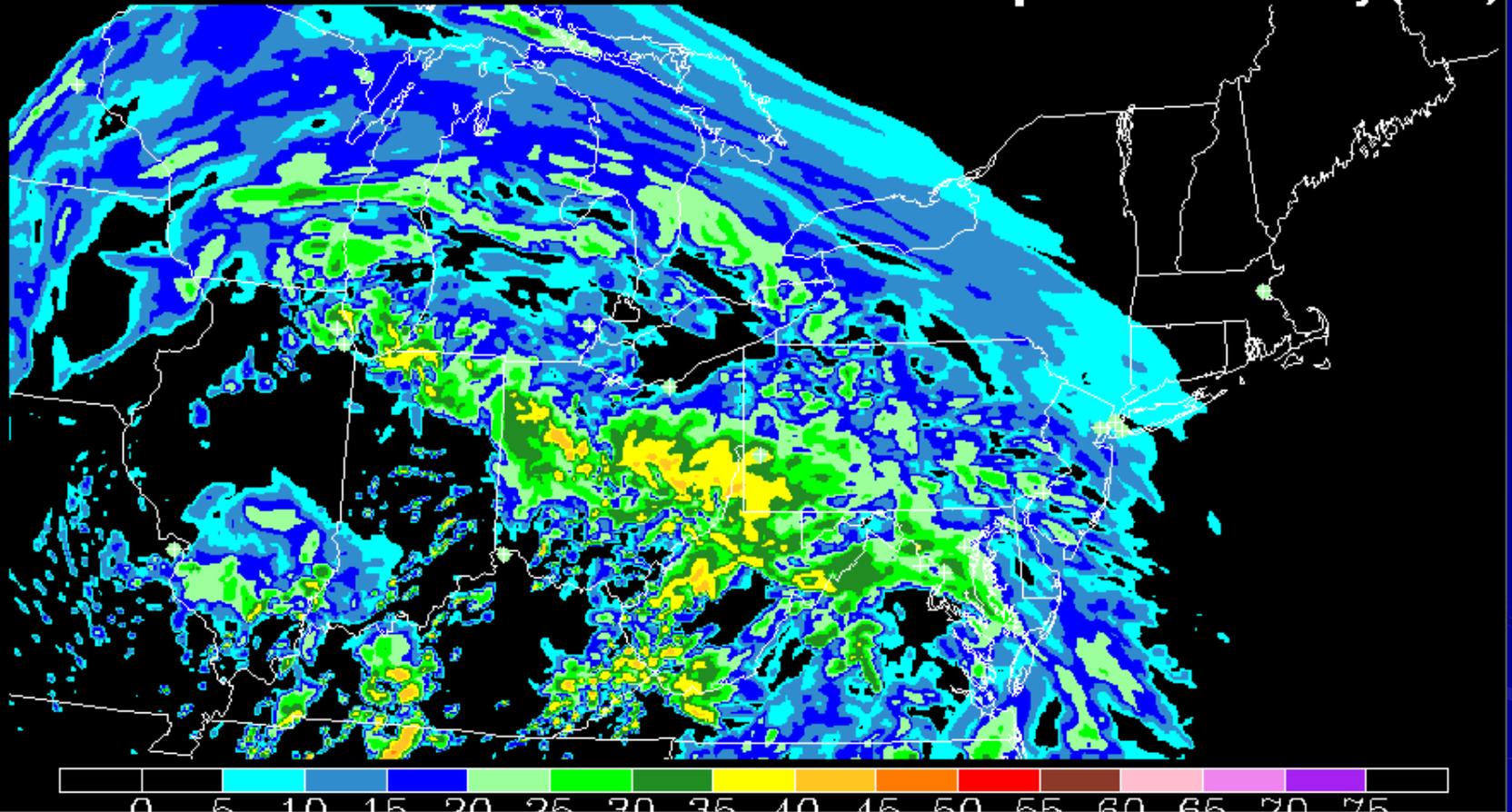
Various Convective Modeling efforts in NOAA

- High resolution modeling $\leq 5\text{km}$ is being conducted at:
 - GSD/FSL 3.0 km RUC/HRRR
 - SPC/NSSL 4.0 km WRF ARW
 - NCEP 4.0 WRF-NMM
 - Many WFOs use the Workstation WRF

GSD 3km RUC/HRRR

HRRR 04/13/2009 (15:00) 10 hr fcst

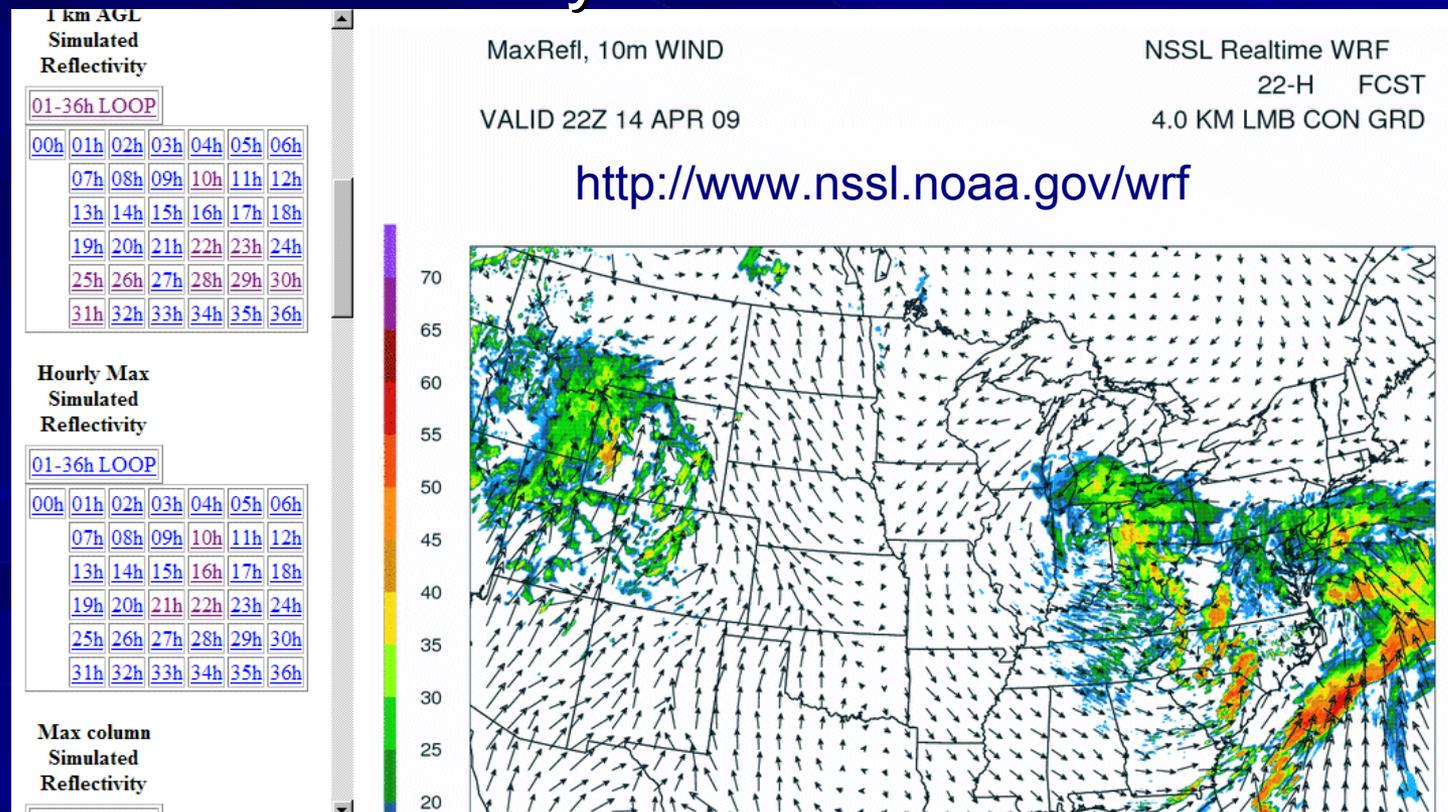
Valid 04/14/2009 01:00 UTC
Composite Reflectivity (dBZ)



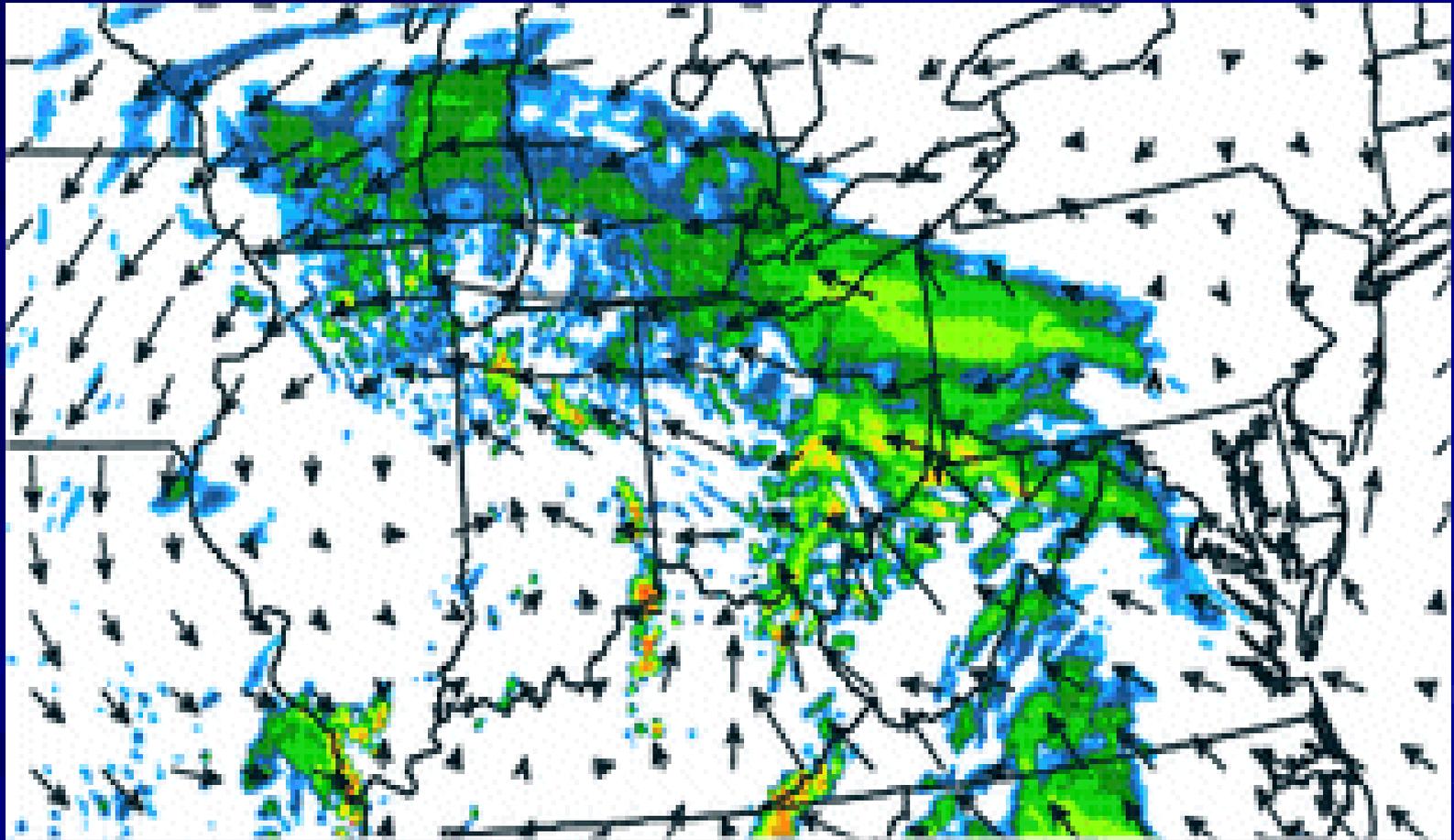
High resolution modeling $\leq 5\text{km}$

■ SPC/NSSL 4 KM WRF-ARW core web based output

– Run once a day at 00 UTC out to 36 hours



NSSL WRF ARW 4km Comp Reflectivity



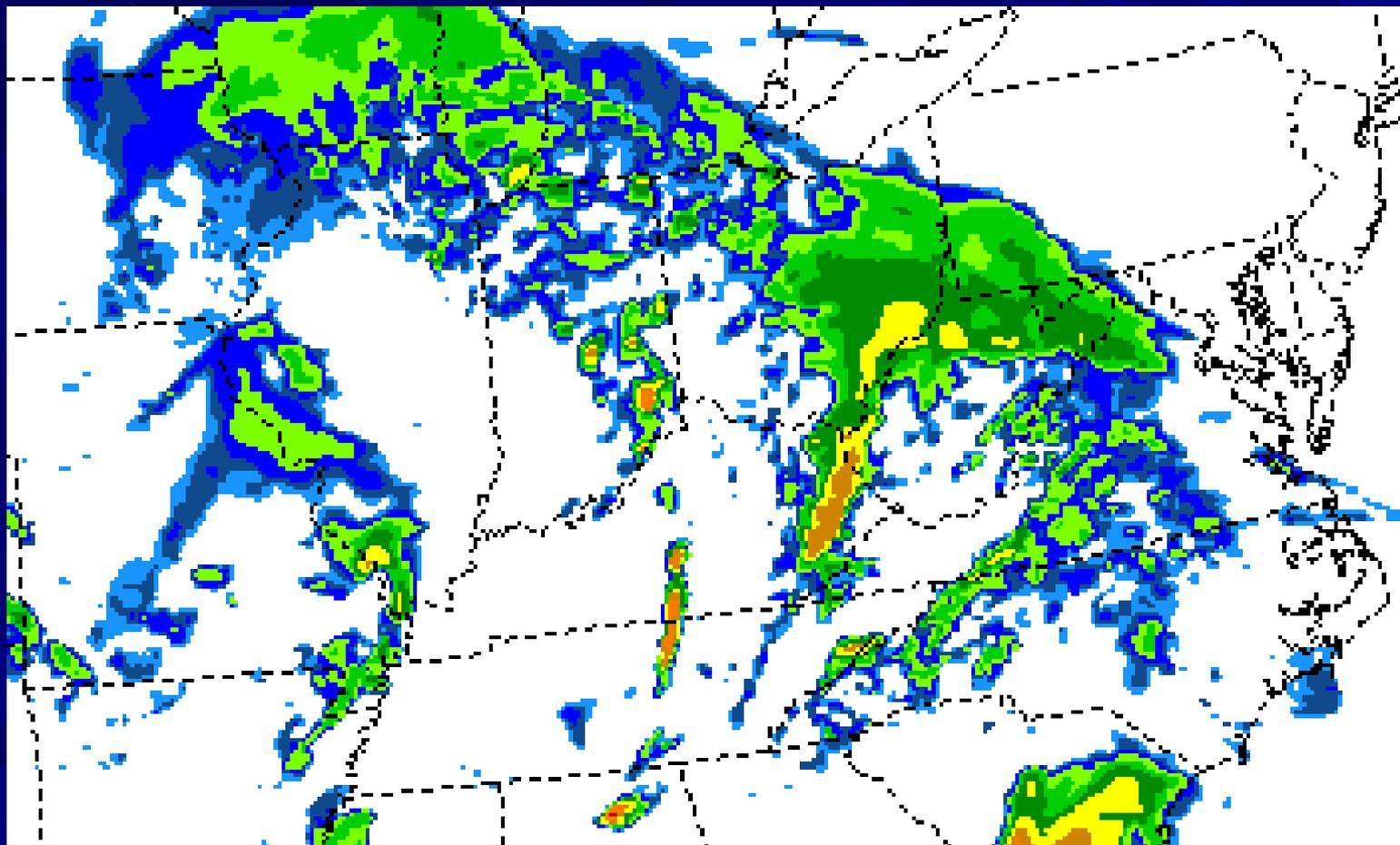
High resolution modeling $\leq 5\text{km}$

- NCEP High resolution window (HRW) 4km WRF-NMM and WRF-ARW cores
- Web based output for now but may reach AWIPS

<http://www.emc.ncep.noaa.gov/mmb/mpyle/cent4km/conus/00/>

- Eastern U.S. domains run at 00 and 12 UTC out to 36 hours
- HRW runs are frequently (50% of July & Aug) cancelled during the hurricane season

NCEP WRF ARW 4km Comp Reflectivity



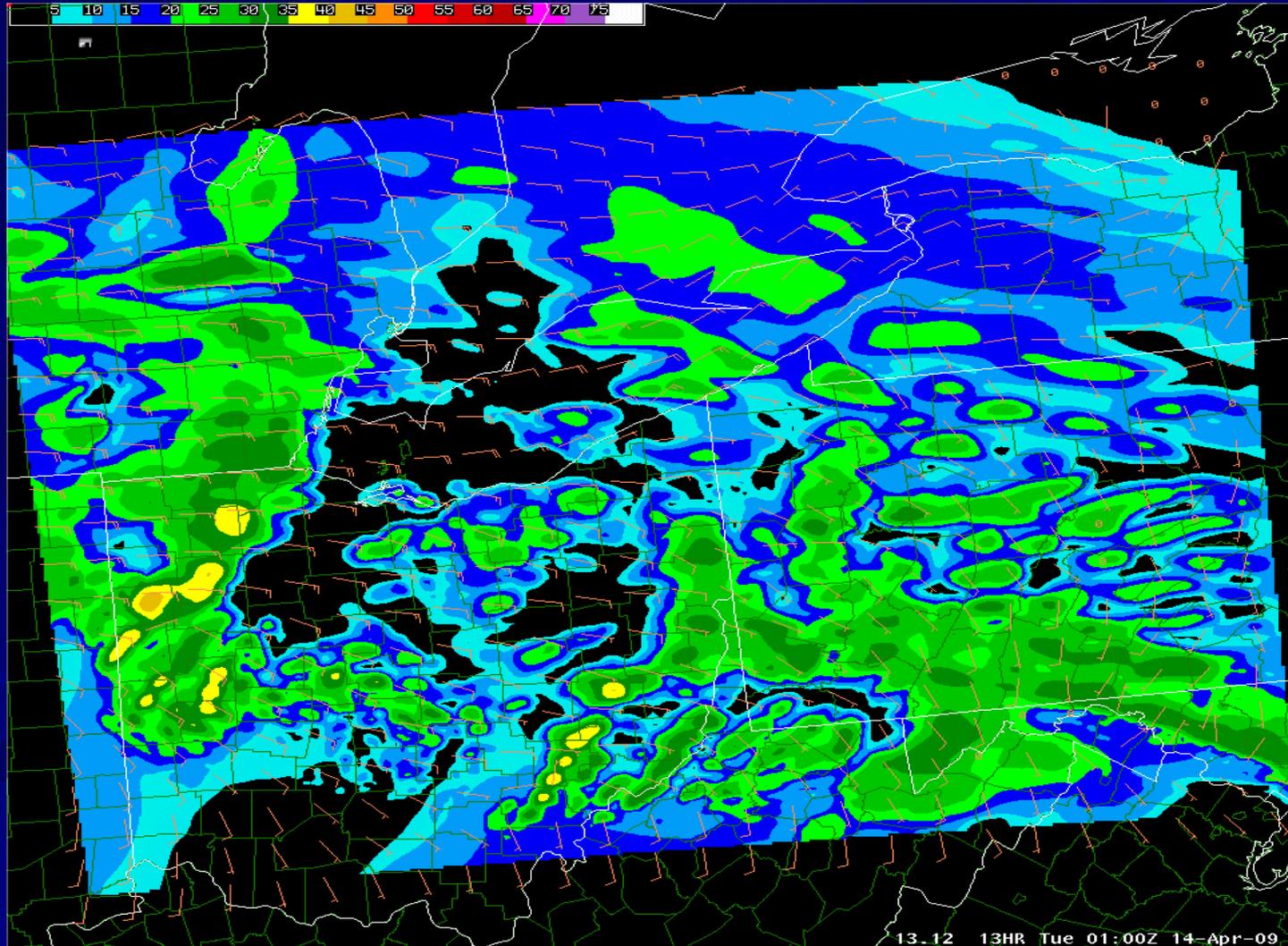
High resolution WFO modeling $\leq 5\text{km}$

- Local modeling provides forecasters with a tool to simulate phenomena not well-captured with coarser synoptic model such as lake effect snow, lake breezes, small-scale orographically forced circulations, & warm season convection
- Local modeling enhances situational awareness
- Local modeling allows one to conduct NWP studies

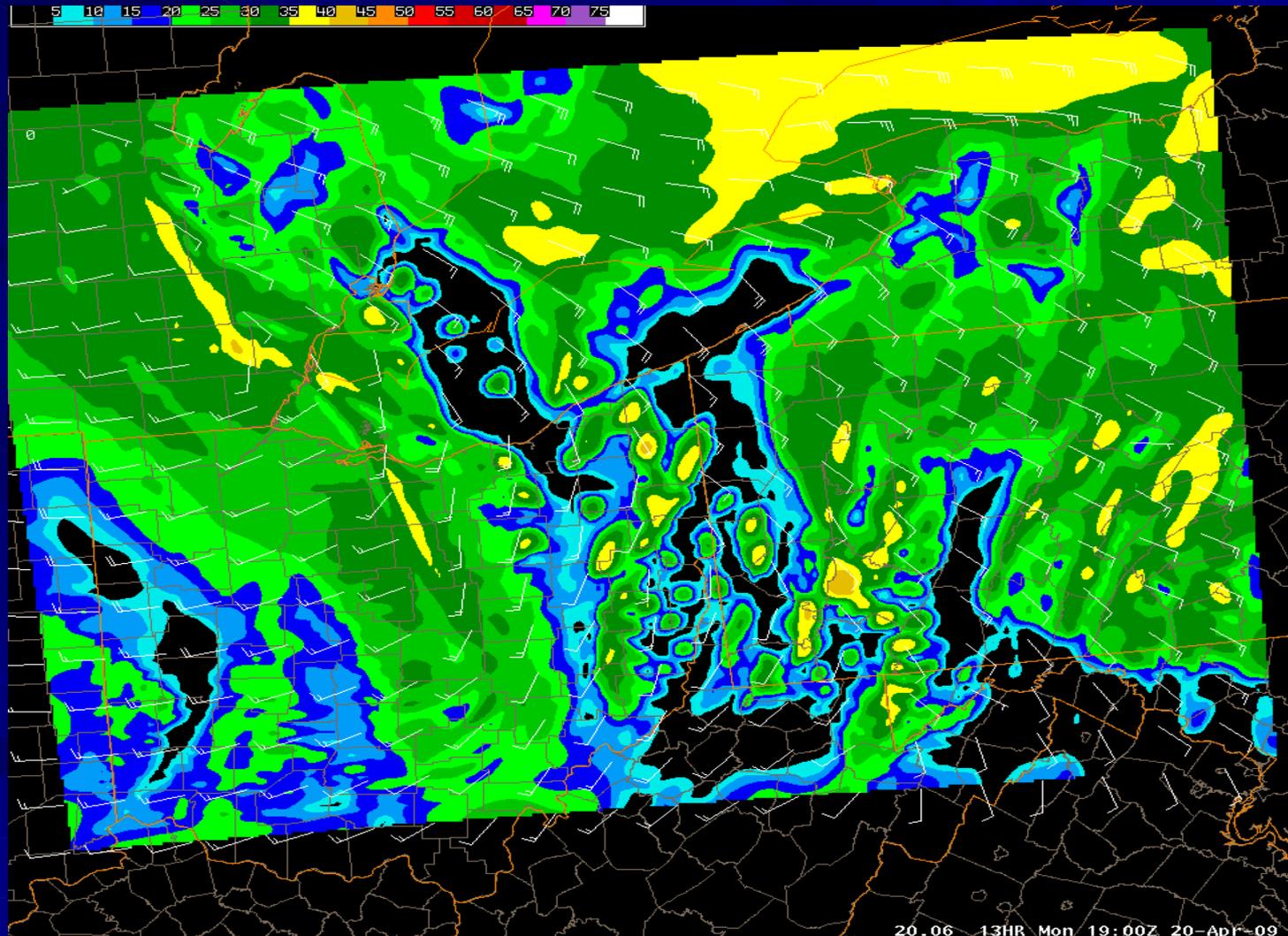
High resolution WFO modeling $\leq 5\text{km}$

- Local modeling has the flexibility of specifying the model, model physics core, microphysics scheme, resolution, domain, projection length, & cycle to simulate a particular phenomenon
- Model output can be ingested into AWIPS/GFE or sent to the web
- Bufr files can be created for use in BUFKIT at any location in the domain

WFO CLE 4km WRF ARW Comp Reflectivity



WFO CLE 4km WRF ARW Comp Reflectivity



Modeling Convection

- Accuracy of the local model is dependent on the following:
 - Skill of the model providing the initial and boundary conditions to the local model
 - Whether the forcing for the event is locally induced (terrain or land/lake interface) or a transient feature (short wave)
 - Appropriate configuration of the local model

Questions

Robert.laplante@noaa.gov