NCAR

Earth Observing Laboratory

IHOP_2002 Results and Outstanding Issues

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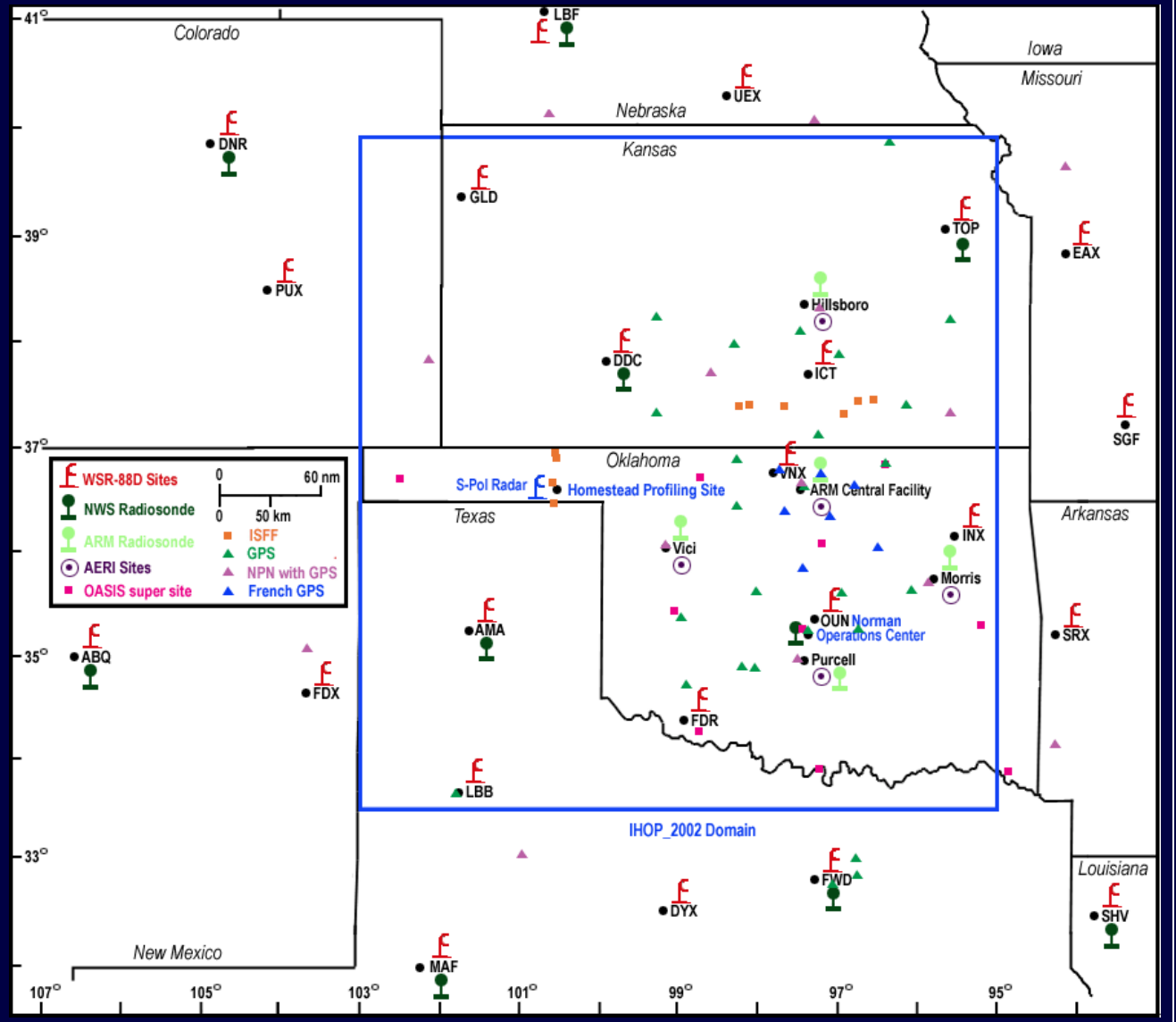
IHOP_2002

- 13 May-25 June 2002
- Four components
  - QPF
  - CI
  - ABL
  - Instrument



Some IHOP Tidbits

- >60 instruments (radars, soundings, sfc stns, lidars, profilers, sodars, GPS); 6 aircraft (dropsondes, DIALs)
- ~2500 additional soundings
- Dedicated GOES-11: 5 min rapid scan, 30-min soundings
- >$7.5M field phase
- 49 IOPs on 44 days
- >250 investigators and technical participants in the field
- >150 researchers using IHOP data
- 124 conference papers; 5 publications; at least 20 in press for MWR CI Special Issue

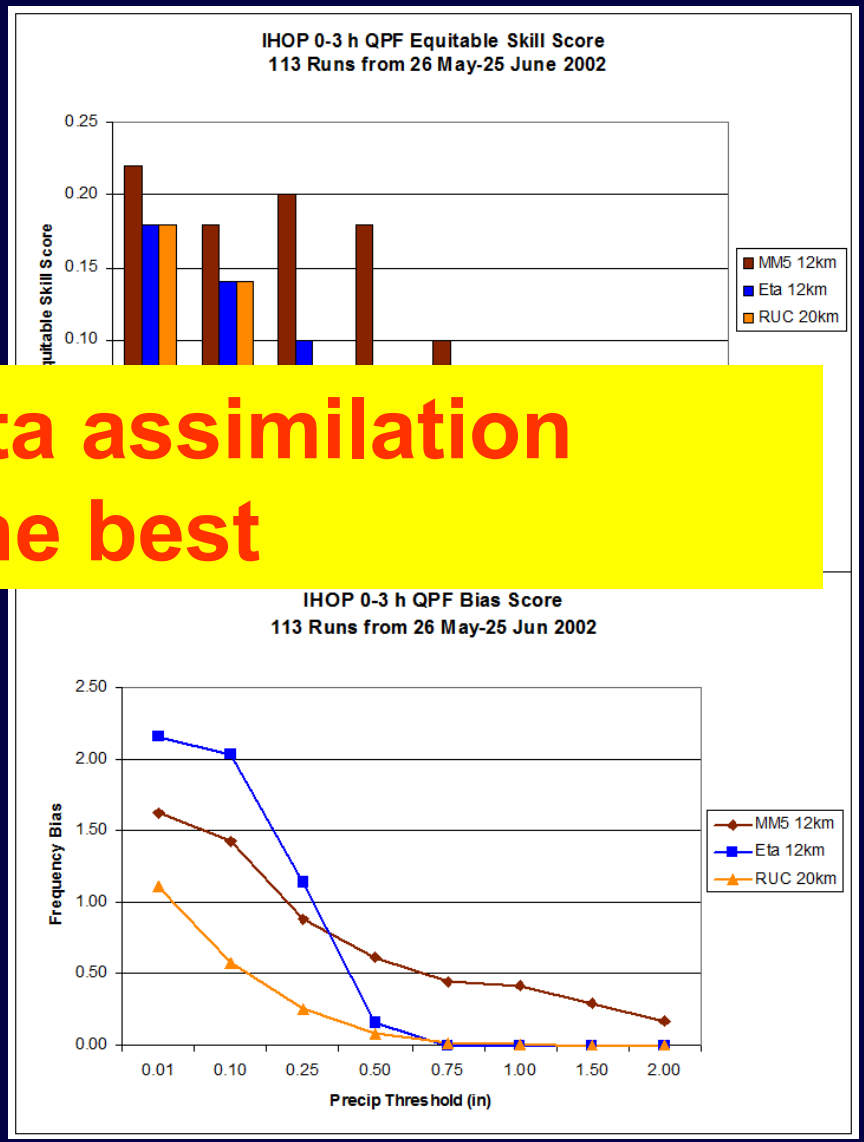
QPF

- 0-3 h QPF comparisons
- LAPS included assimilation of GOES sounder moisture fields, dropsonde and special

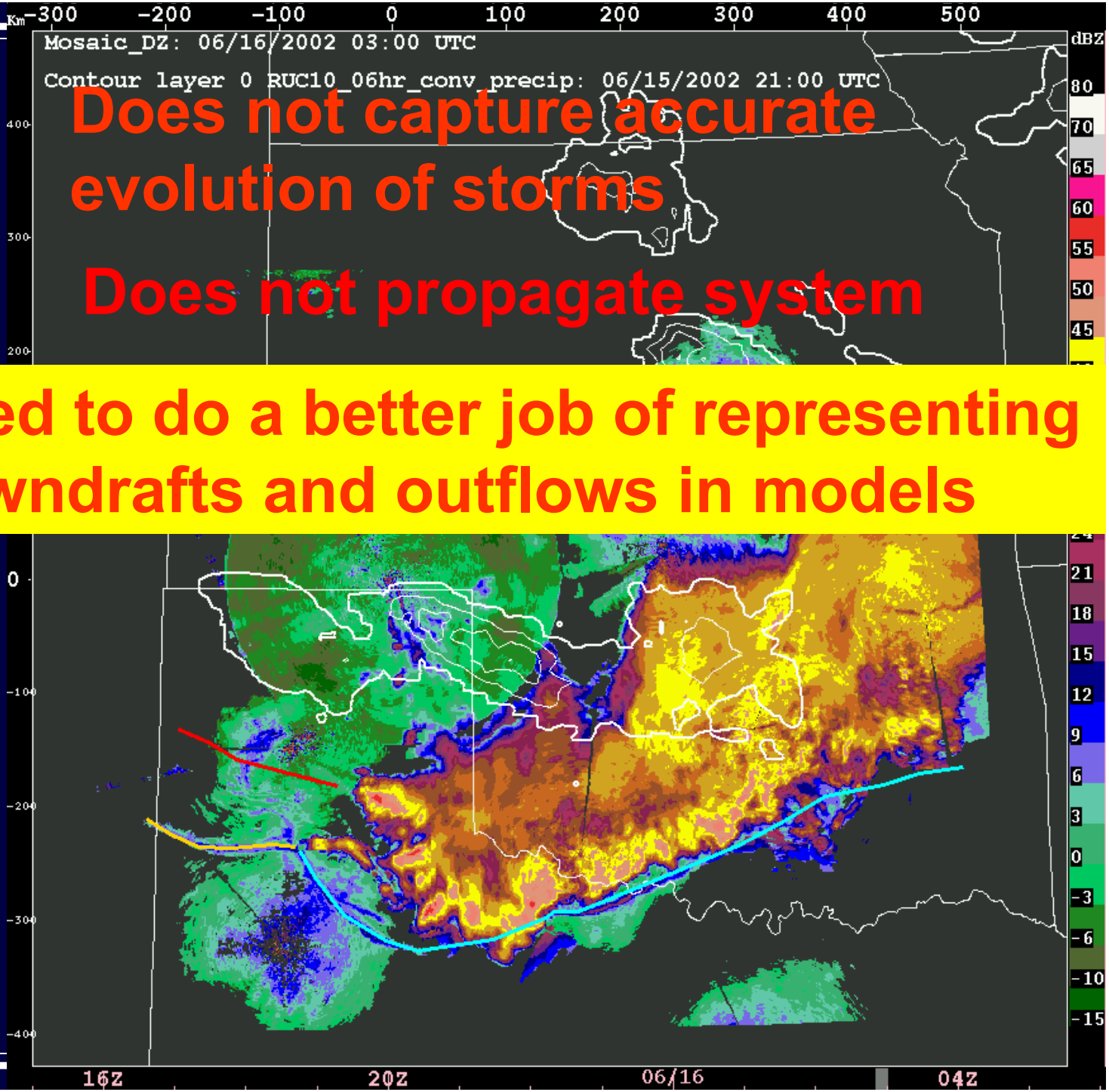
MM5 with LAPS data assimilation system performs the best

- LAPS/MM5I2 higher skill and lower bias, particularly for higher precip values
- Eta12 overpredicted light rain and underpredicted heavy rain

Courtesy Steve Koch (NOAA/FSL)



Verification of RUC 6hr fx for 03:00



Does not capture accurate evolution of storms

Does not propagate system

Need to do a better job of representing downdrafts and outflows in models

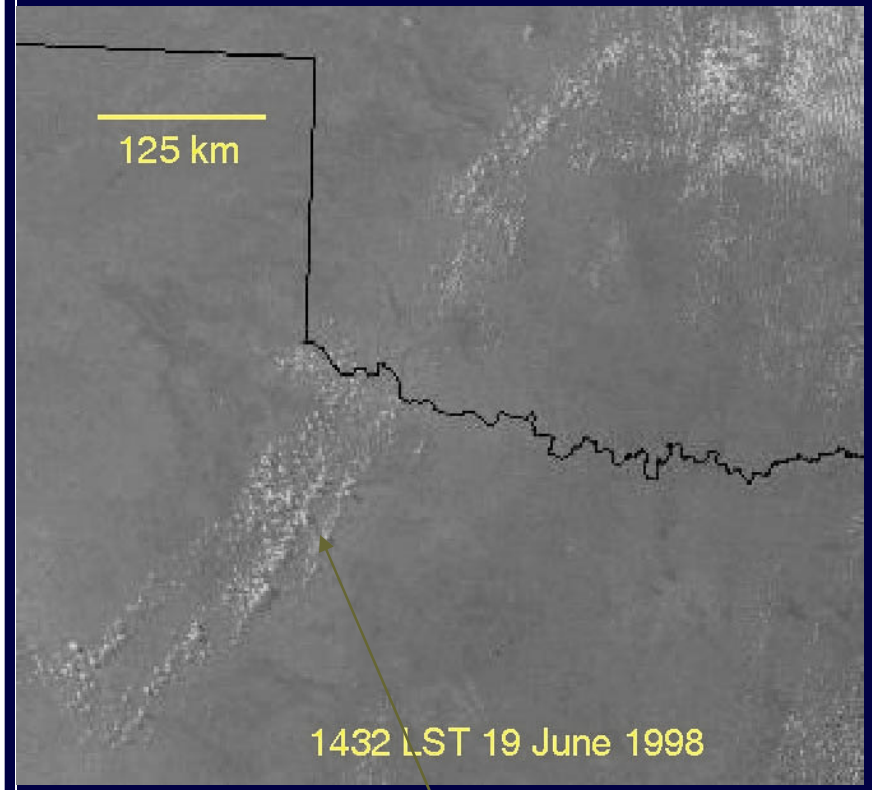
Wilson and Roberts (2005)

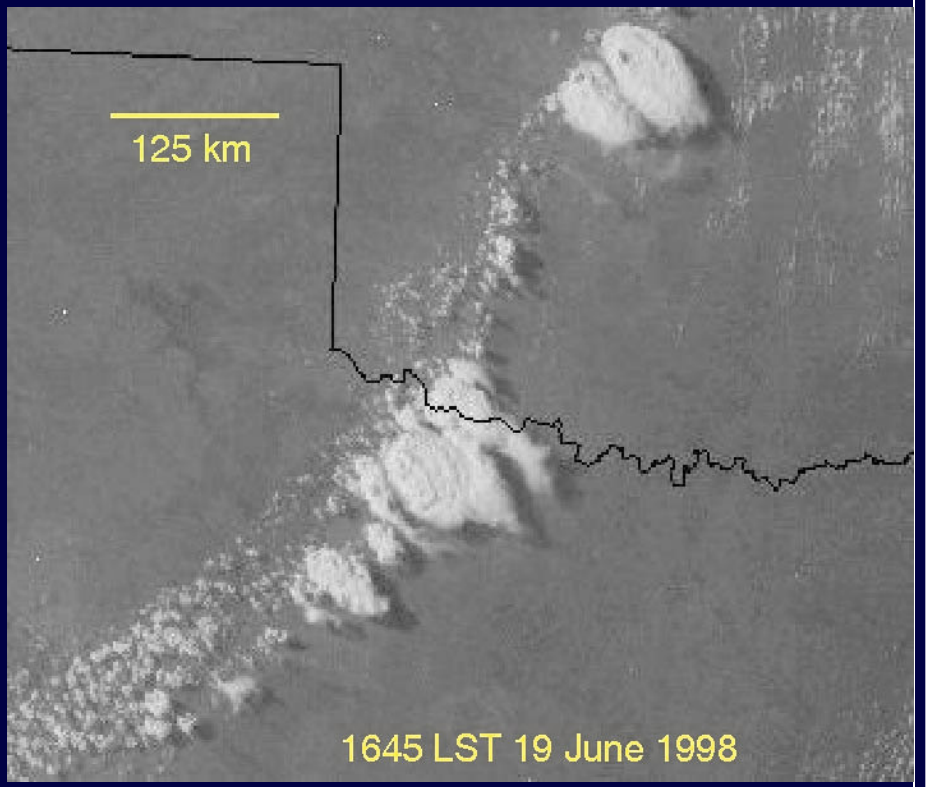
Ability of RUC 10 km Model to Initiate Precipitation

Initiation Mechanism	Number of Events	Spatial Offset <250 km	Spatial Offset <50 km, no time offset
Elevated Frontal	10	80%	0%
Fronts	18	61%	22%
Elevated (isolated)	43	40%	7%
Other Boundaries	19	37%	26%
Gust Fronts	12	17%	8%
ALL	102	44%	13%

Wilson and Roberts (2005)

19 June 2002 GOES Visible Imagery





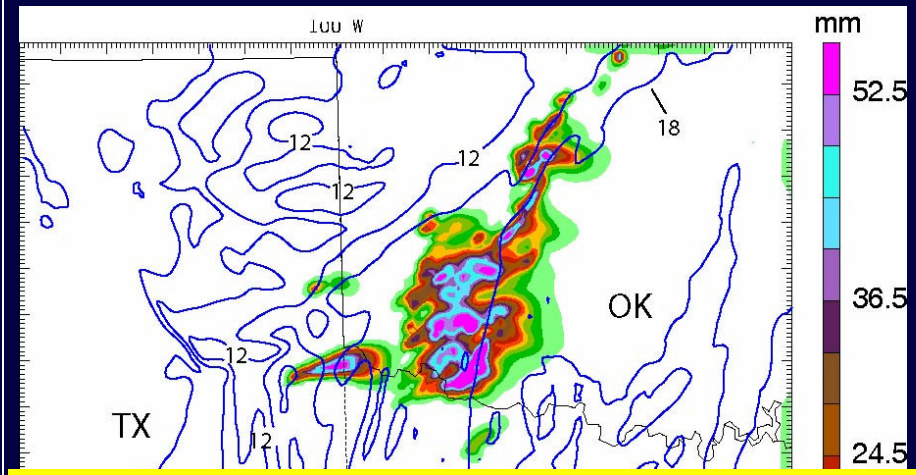
Horizontal convective rolls (HCRs)

Trier et al. (2004)

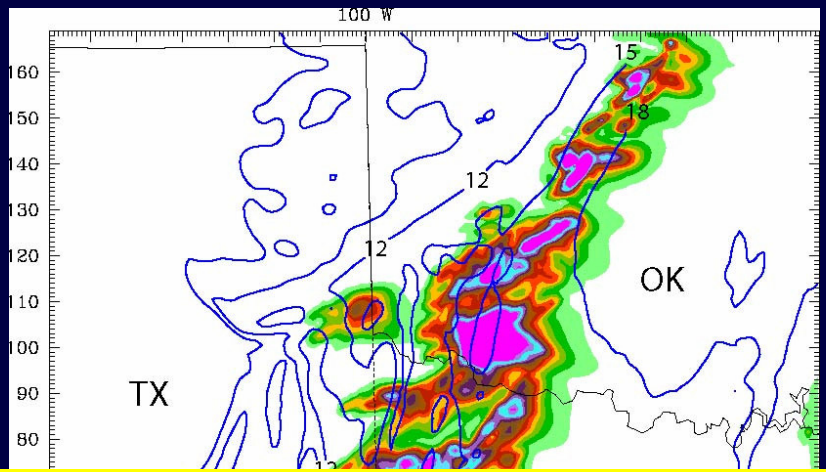
19 June 2002
Soil Moisture Experiment: 3-h rainfall

Trier et al. (2004)

MM5 initialized with Eta soil fields



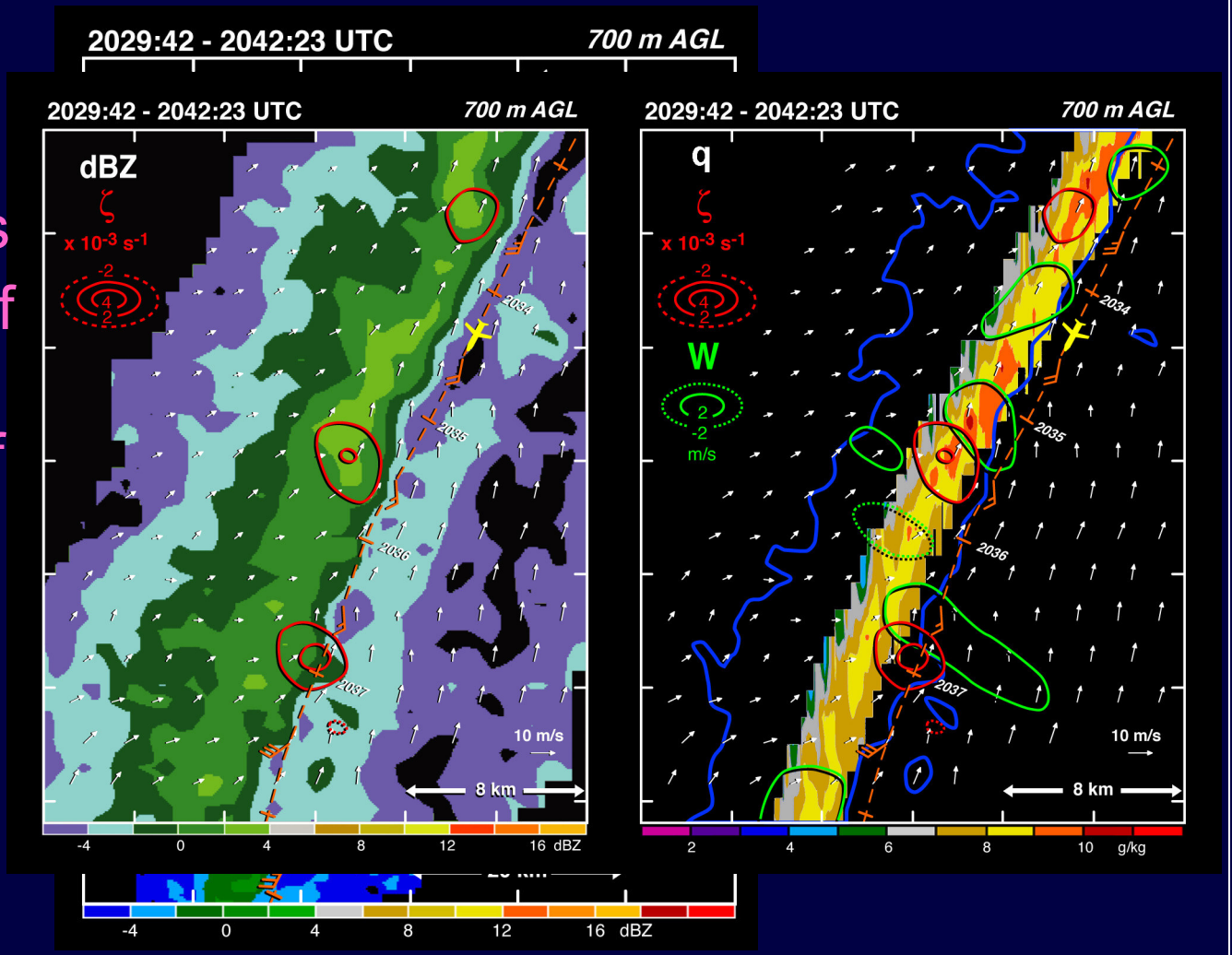
MM5 initialized with HRLDAS 4-km soil fields



- Eta soil fields accurately produced dryline but put CI too far east with reduced rainfall
- Initialization of HRLDAS small-scale soil moisture gradients important for accurate simulation of CI and QPF

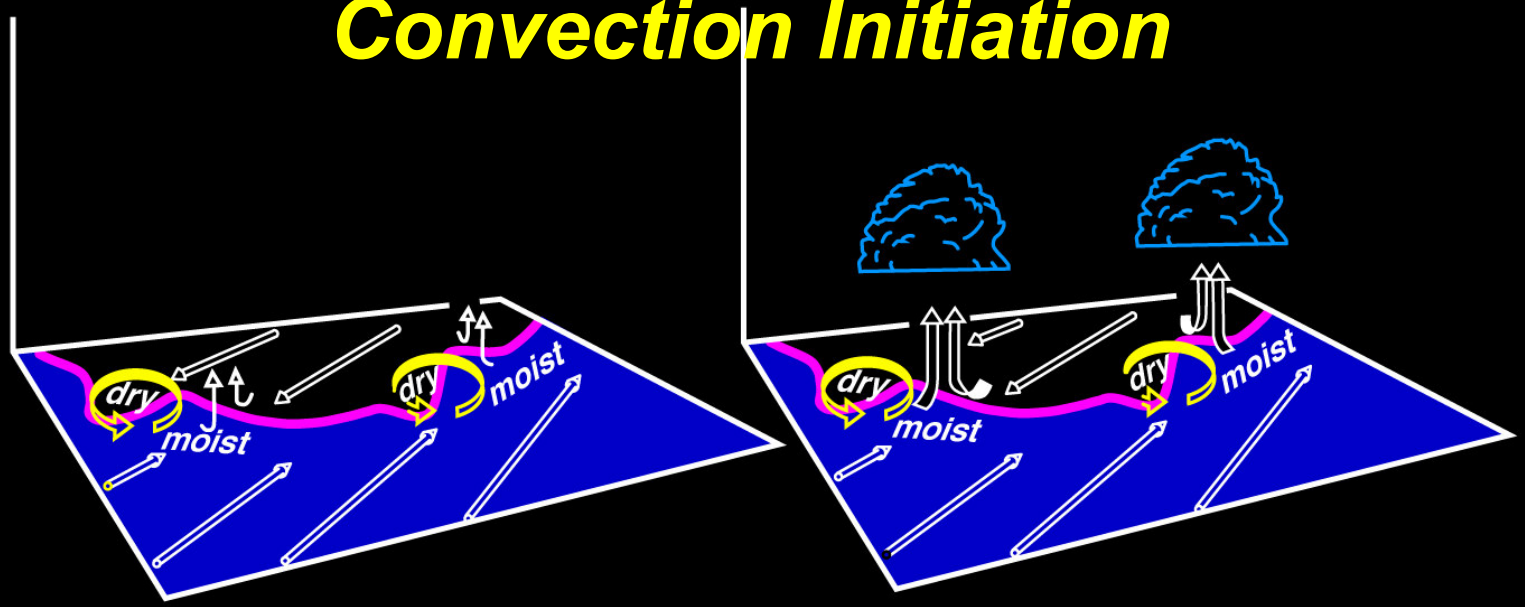
Convection Initiation

- Dryline with perturbations
- Misocyclones
- Moist north of misos
- W_{max} north of misos
- DIAL DA promising results (Wulfmeyer et al. 2005)

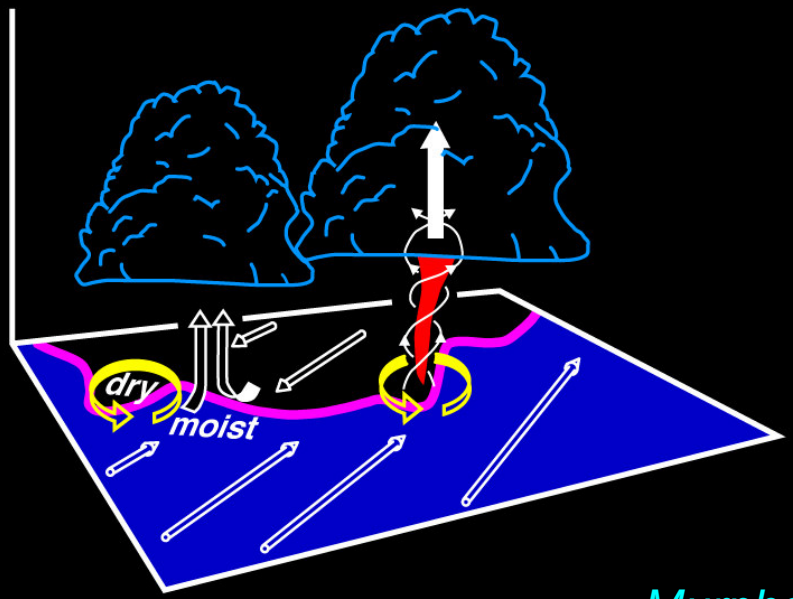


Murphey et al. (2005)

Convection Initiation



- Updraft+miso= dust devil or non-supercell tornado



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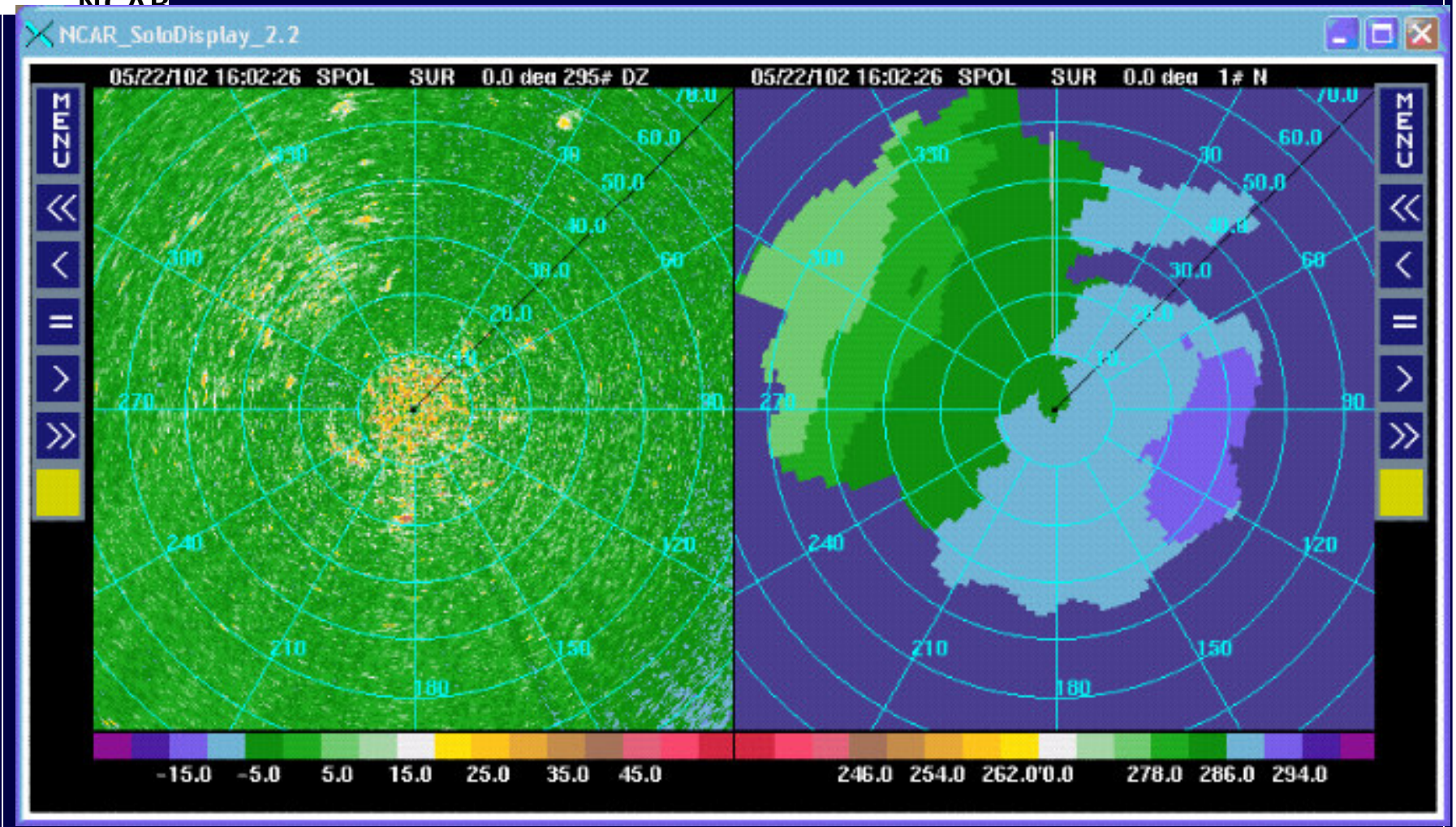

Hot, dry

Cool, moist

REFLECTIVITY

REFRACTIVITY

Weckwerth et al. (2005)

IHOP Summary Relevant to COPS

- Very small portion of IHOP research
- Exciting research results and work in progress
- Models have difficulty creating outflow boundaries (particle size and precipitation phase are important)
- Elevated convection occurs 50% - difficult to capture in forecast models
- Small-scale soil moisture input important for CI accuracy
- Data assimilation (both operational and research) showing promising results
- Radar refractivity has great potential