overview of our grant-related questions
NSSL/OU: Stensrud, Coniglio, Doswell
Purdue: Trapp, Baldwin

- How does the upscale feedback relate to the mode of convection, and to other characteristics, such as the numbers and relative sizes of the convective cells?
- How does the environmental warming/cooling due to convection vary surrounding the convective region? Are there differences upstream and downstream of the core convective region? What produces these differences?

- Are the simulations with convection-permitting models able to produce warming/cooling over the same vertical depths as indicated by observations? How well does the model simulation reproduce the moisture structures nearby deep convection?
- Is this warming/cooling influenced by atmospheric stability or the details of the microphysical or radiation processes?
- How well is the model simulation able to predict the response of the wind field?
- Is the model response to deep convection produced over an appropriately sized region, or is the model response limited to very near the convection or over too large a region?
- Is the rapid decrease in the skill of convective forecasts influenced by the accuracy of model environmental forecasts in regions just outside of active deep convection?

Work sections

- Quantification of observed upscale feedbacks from deep convection
- Model simulations of upscale feedbacks from deep convection
- Predictability of convectively disturbed atmosphere

upscale feedbacks from recent tornadic storms

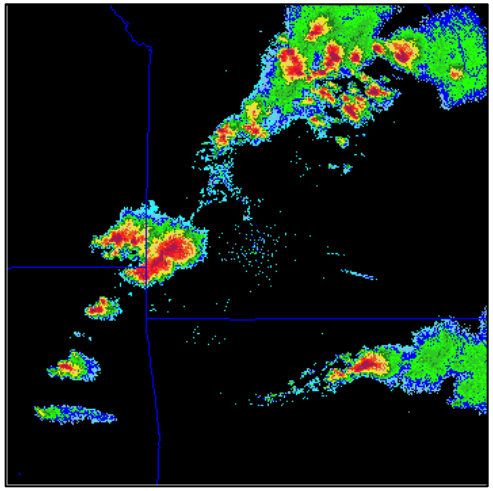
based on SLS presentation by Joe Woznicki & Jeff Trapp

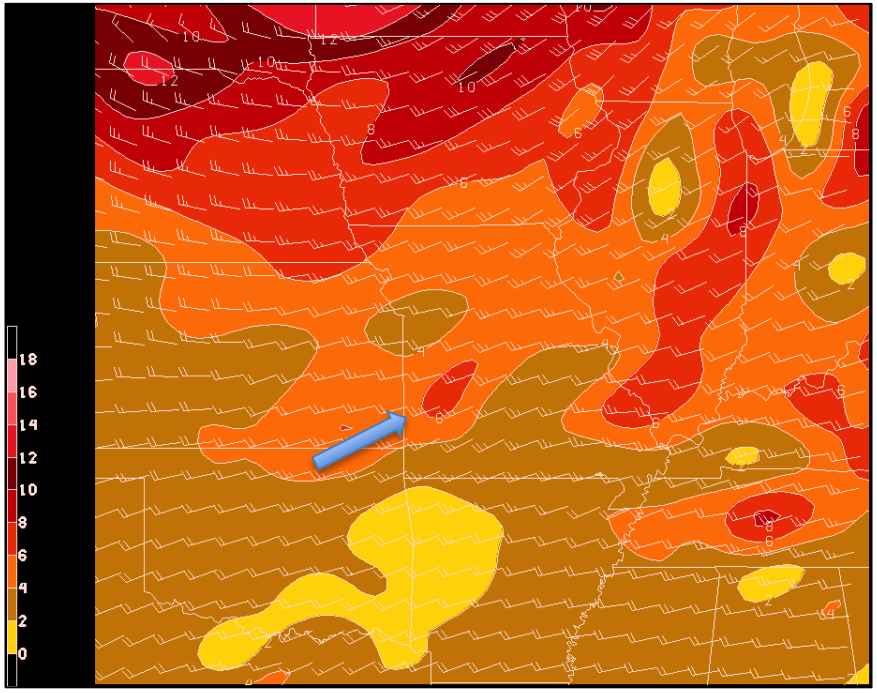
Cases

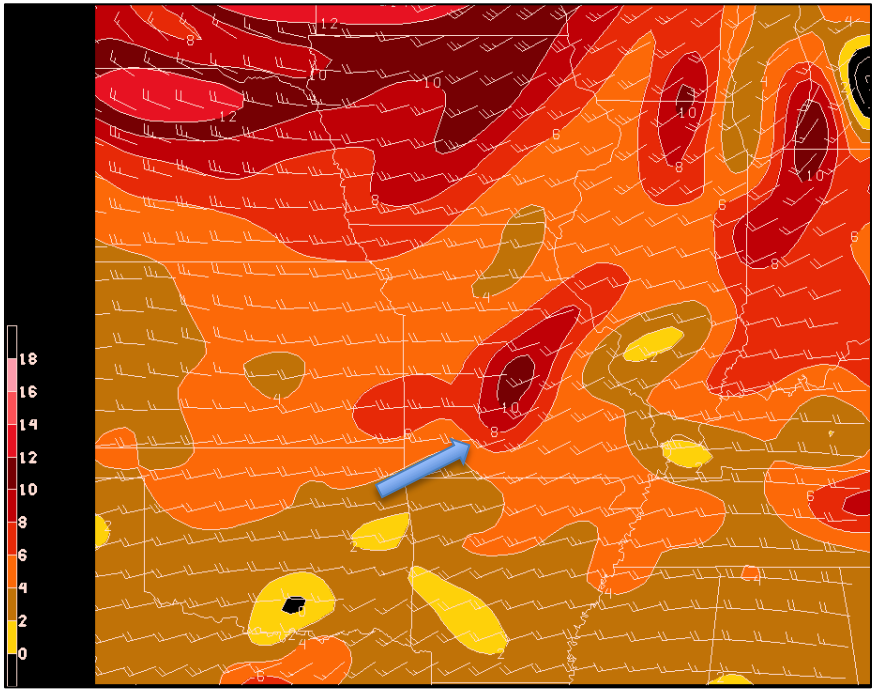
- Joplin, MO 22 May 2011 (tornadic supercell – merged into QLCS)
- Alabama, 27 April 2011 (numerous tornadic supercells)
- Indiana, 16 June 2010 (tornadic LEWP)

Basic methodology

- geolocation of storms, assessment of mode, using WSR-88D level II data
- assessment of upscaling effects using initialization fields from 20-km RUC
  - benefits from diabatic digital filter initialization
  - PV computed (using GEMPAK) on 500- and 700-hPa levels



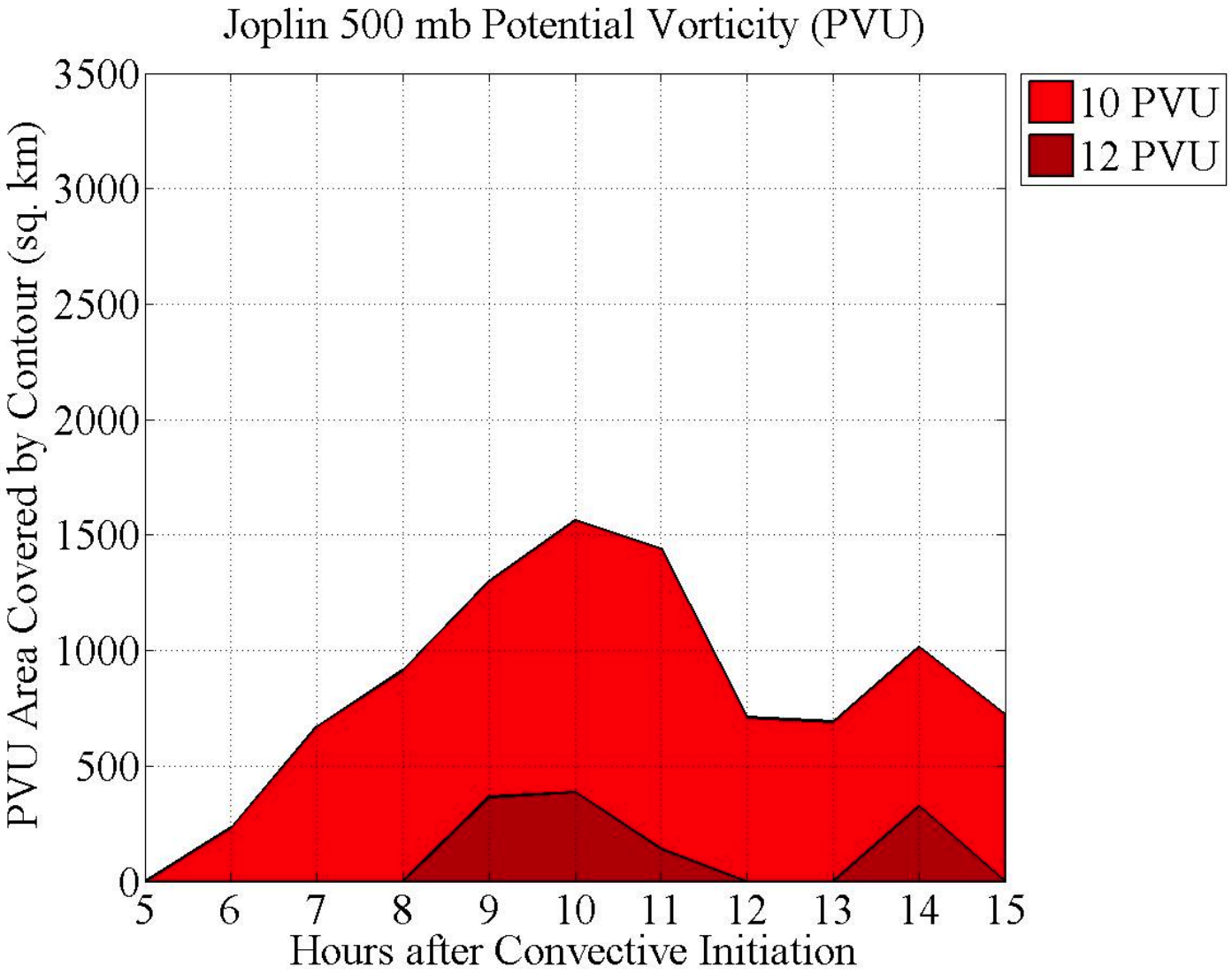




5/22 23 UTC 500 hPa PV (PVU)

5/22 01 UTC 500 hPa PV (PVU)

discrete integration of area within PVU contours



Quantification of observed upscale feedbacks from deep convection

- CAPE, shear/SRH – will provide initial information about the magnitude of environmental modification by the deep convection of each event.
- 3D structure of upscale effect – time-space correction/application of triangle method (or equivalent)

- relate all to quantitative characteristics of convective storms
  - e.g., use Baldwin's algorithm to quantify size and other attributes