Radar Interpretation

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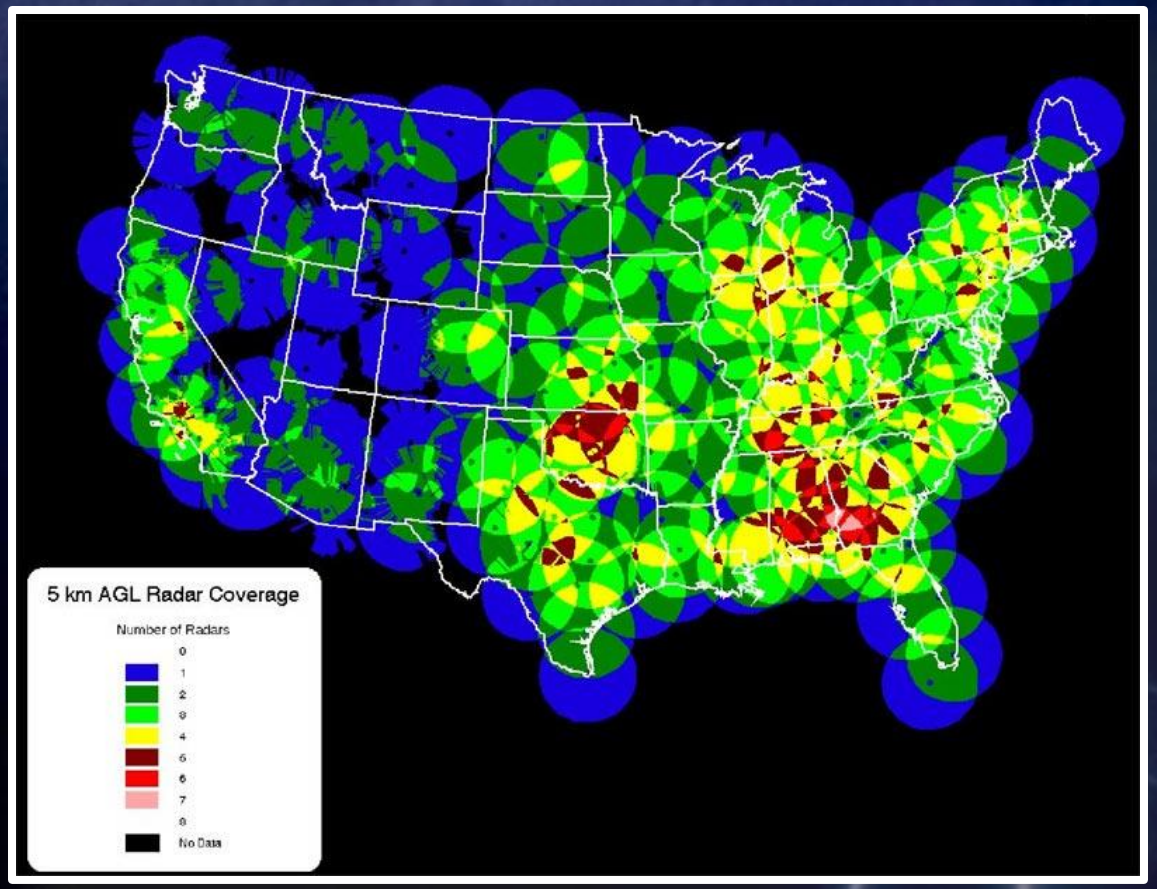
Overview

- NWS Doppler radar basics
- Radar Reflectivity Data
- Radar Velocity Data
- Winter Weather

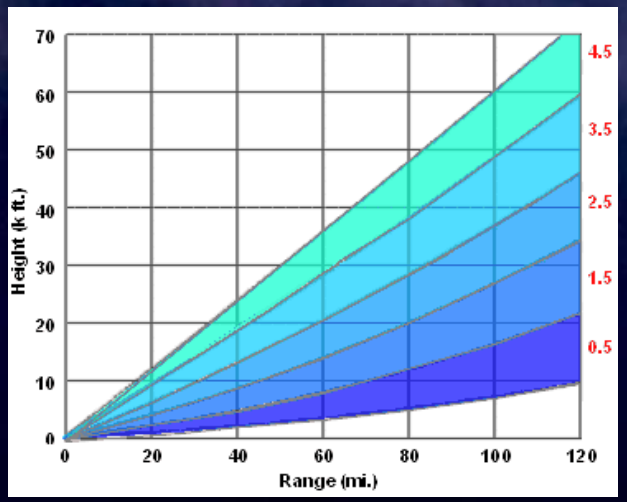
NWS Doppler Radar Network

- 155 radars across U.S., Guam, & Puerto Rico
- Primary local radar: Romeoville, IL
- Back-up radars:
  - Lincoln, IL
  - Milwaukee, WI
  - Davenport, IA
  - Syracuse, IN



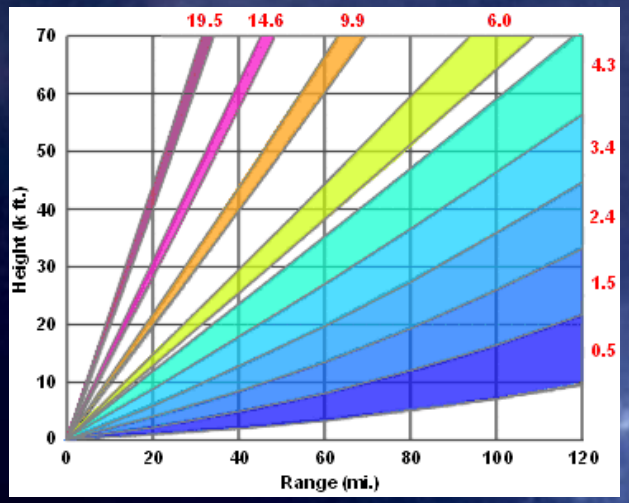
Radar Modes

Clear Air Mode



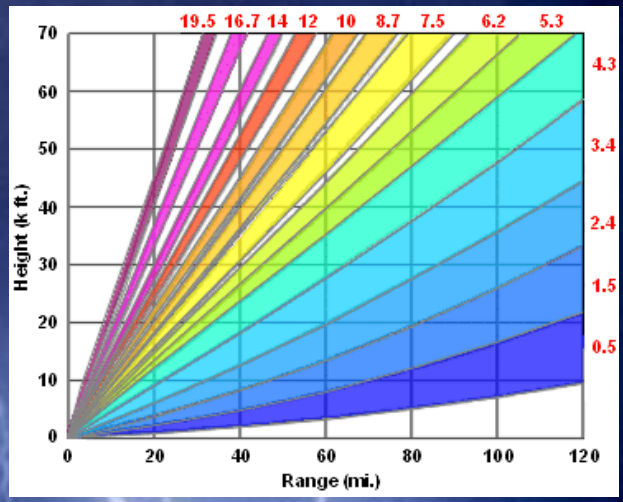
- Scans 5 different elevation heights
- Updates approx every 10 minutes

Precip Mode



- Scans 9 different elevation heights
- Updates approx every 5-6 minutes

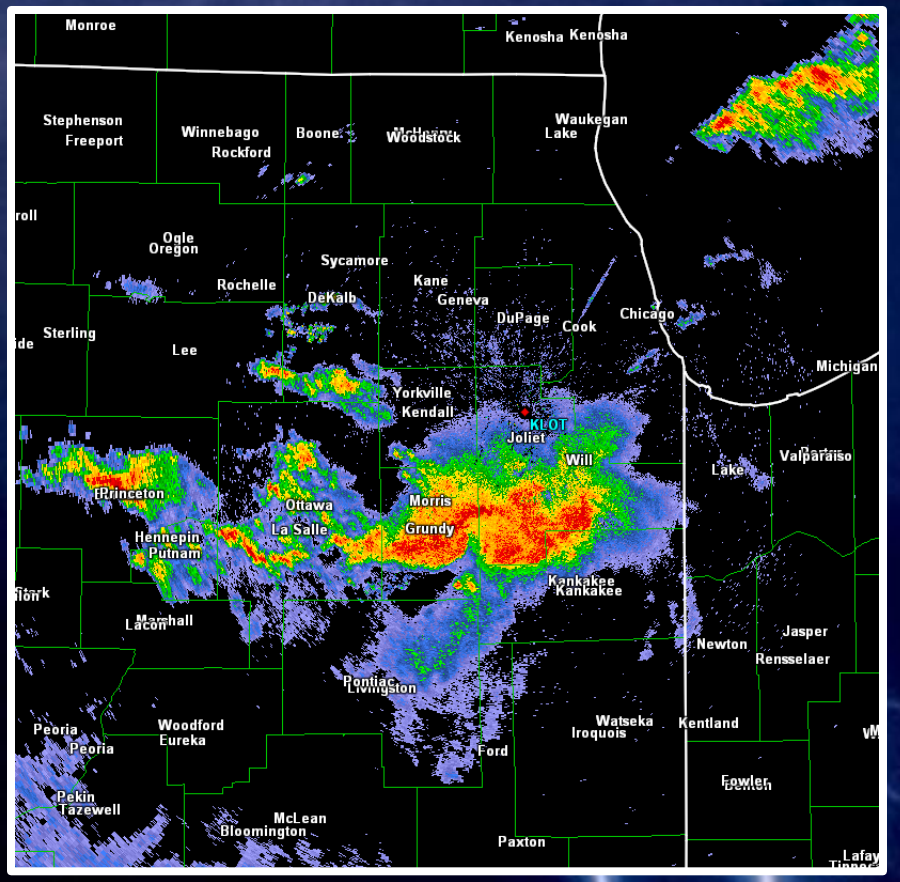
Storm Mode



- Scans 14 different elevation heights
- Updates approx every 4-5 minutes (more frequent low)

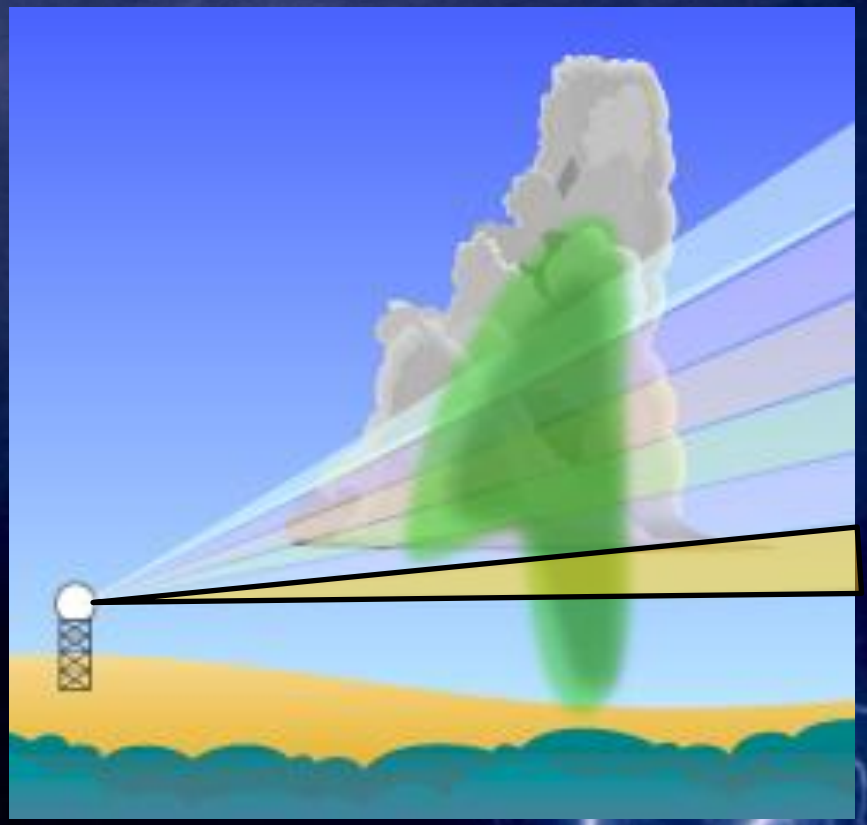
Reflectivity Data

- Probably most familiar radar product
- Measure of how much energy from radar beam is reflected back
- Wet hail, heavy rain, sleet, wet/melting snow flakes



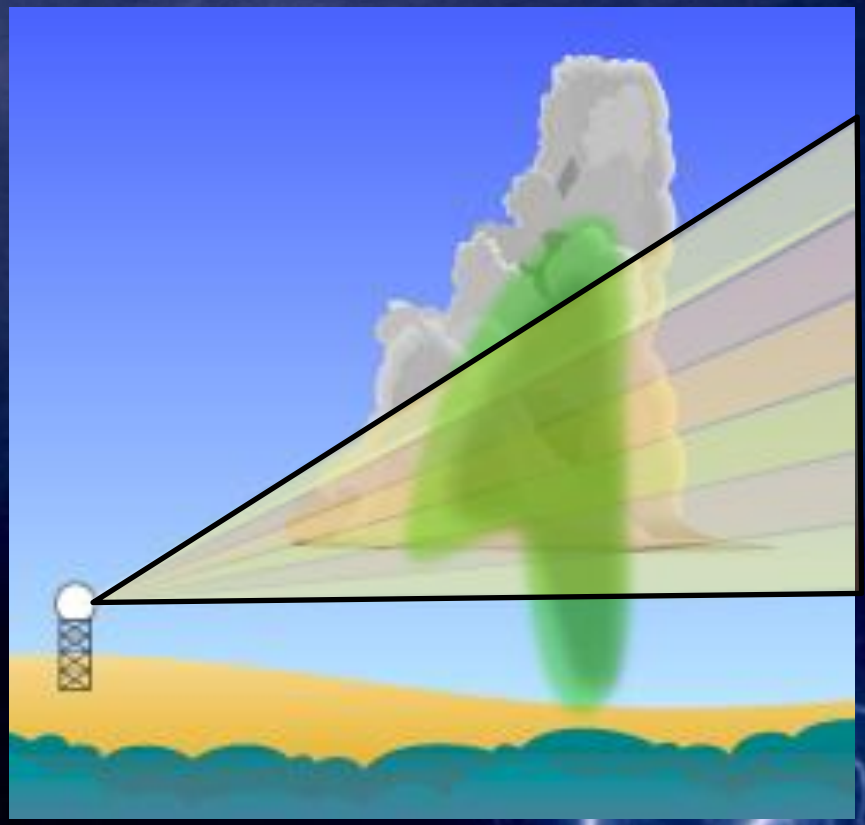
Base Reflectivity

- Shows reflectivity at single level (usually lowest)
- Best representation of what's happen at the ground (the base)



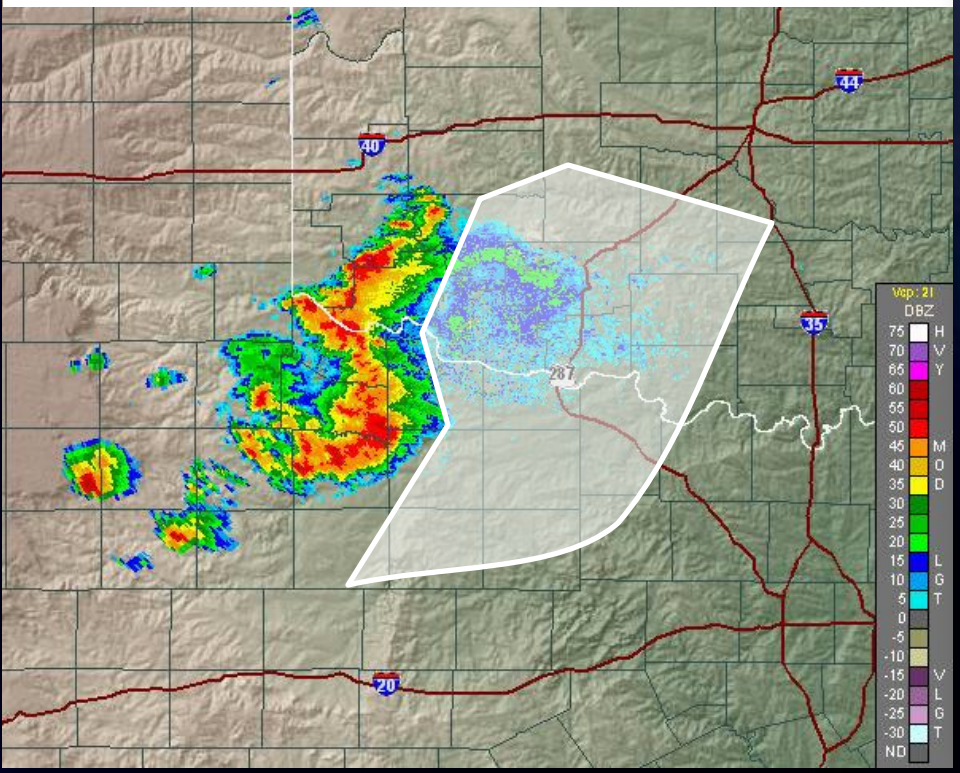
Composite Reflectivity

- Shows highest reflectivity value detected in column at a given point
- Shows precipitation aloft that's not reaching ground
- Not a good representation of what's falling to ground

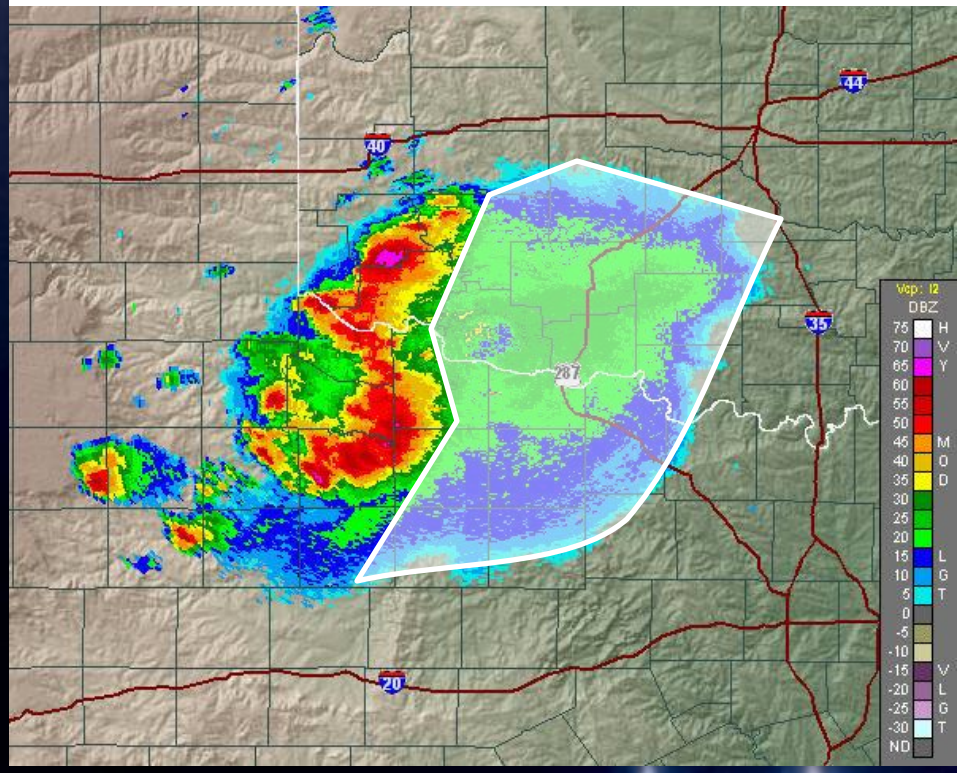


Base vs Composite

Base Reflectivity

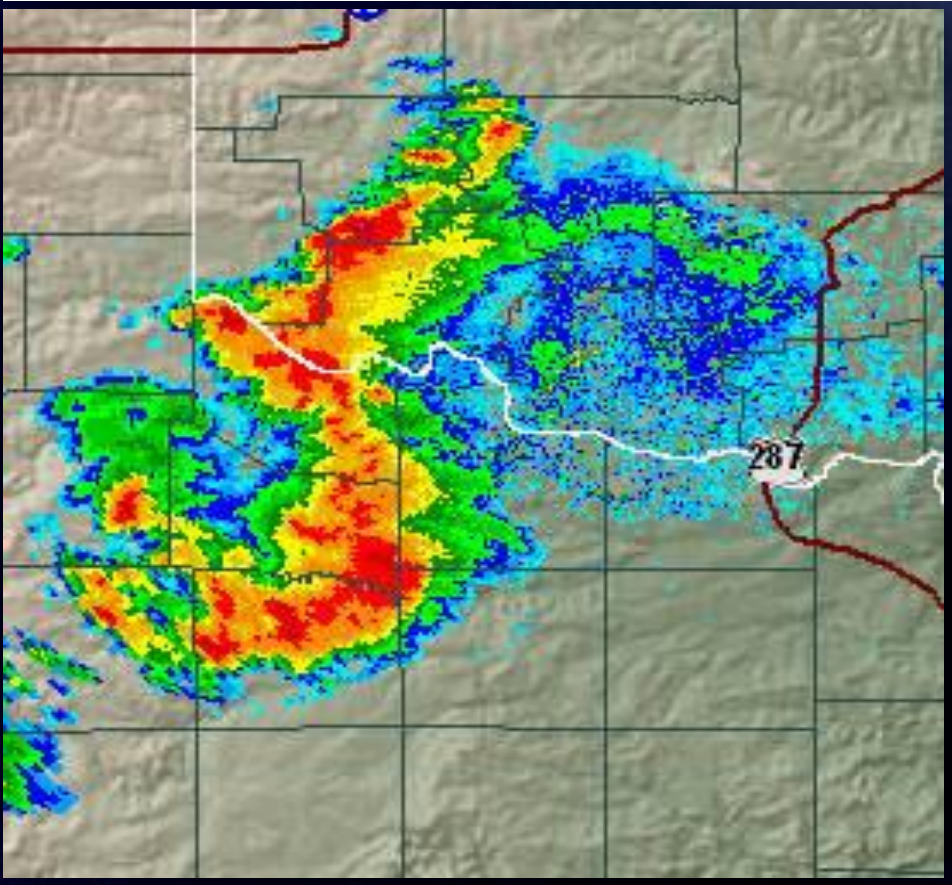


Composite Reflectivity

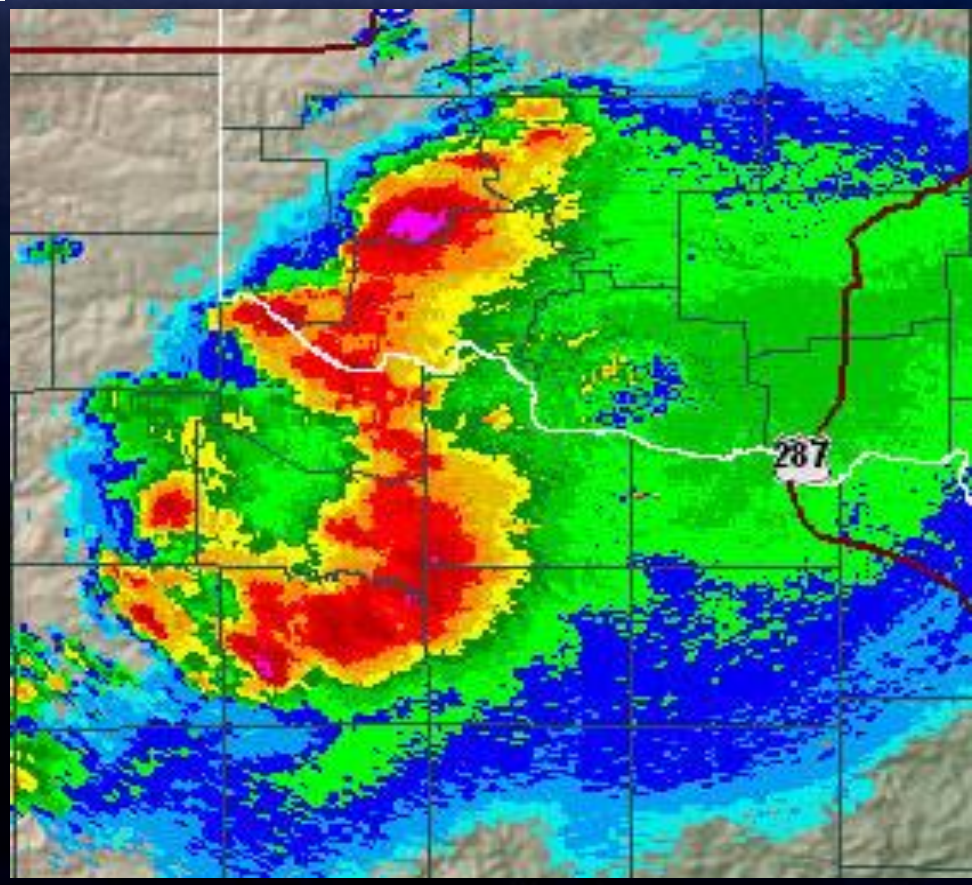


Base vs Composite

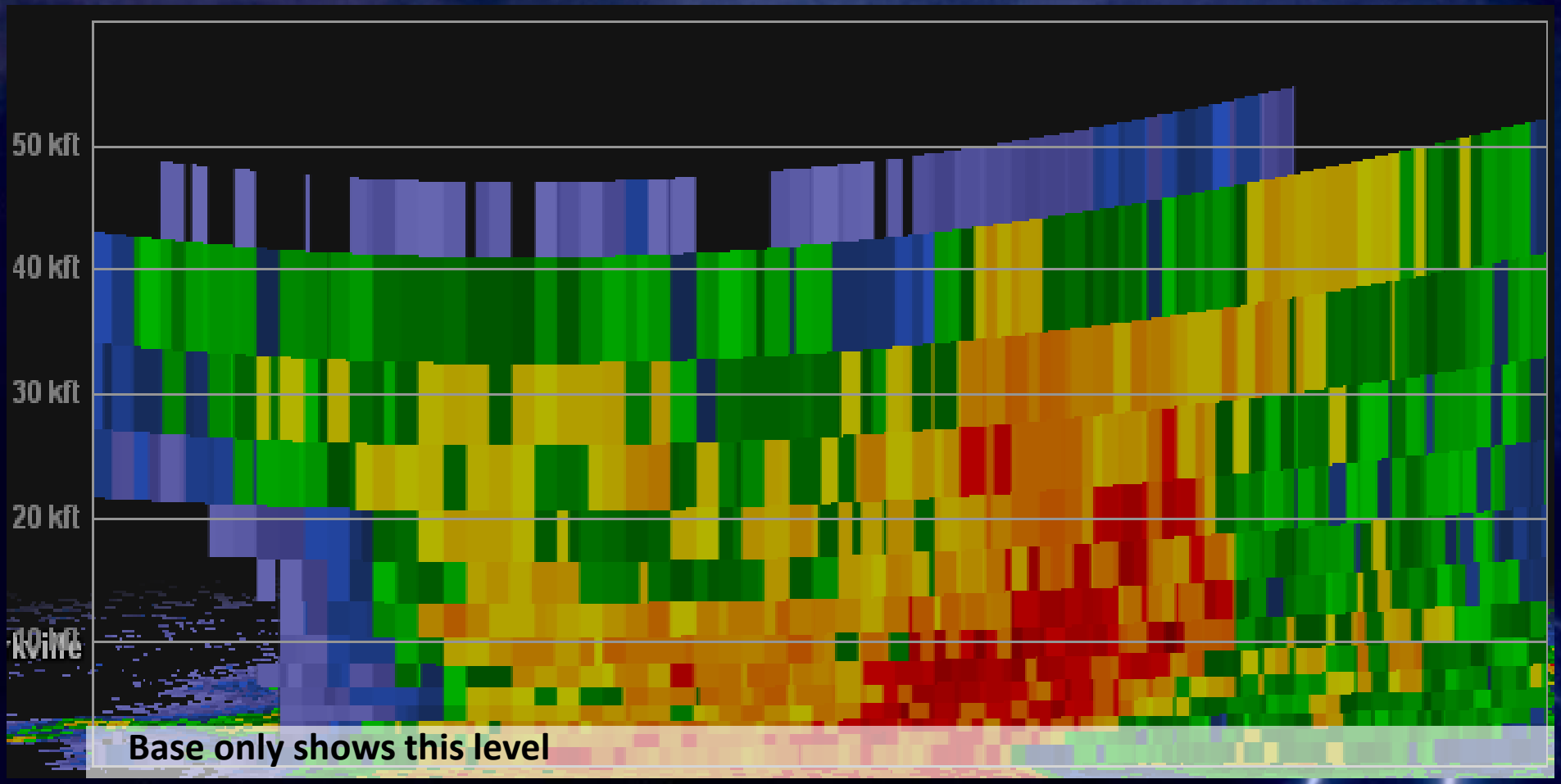
Base Reflectivity



Composite Reflectivity



Base vs Composite



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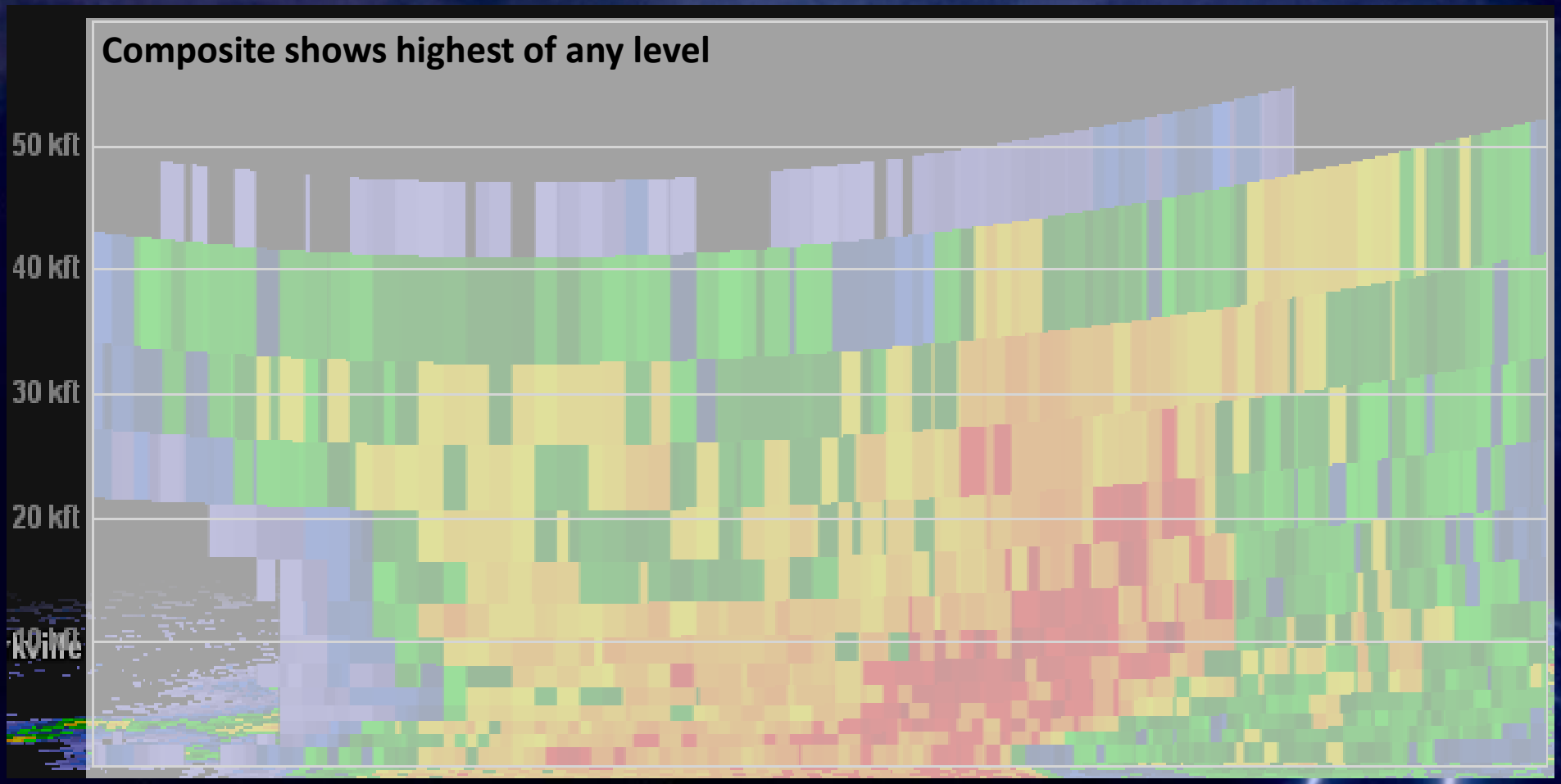
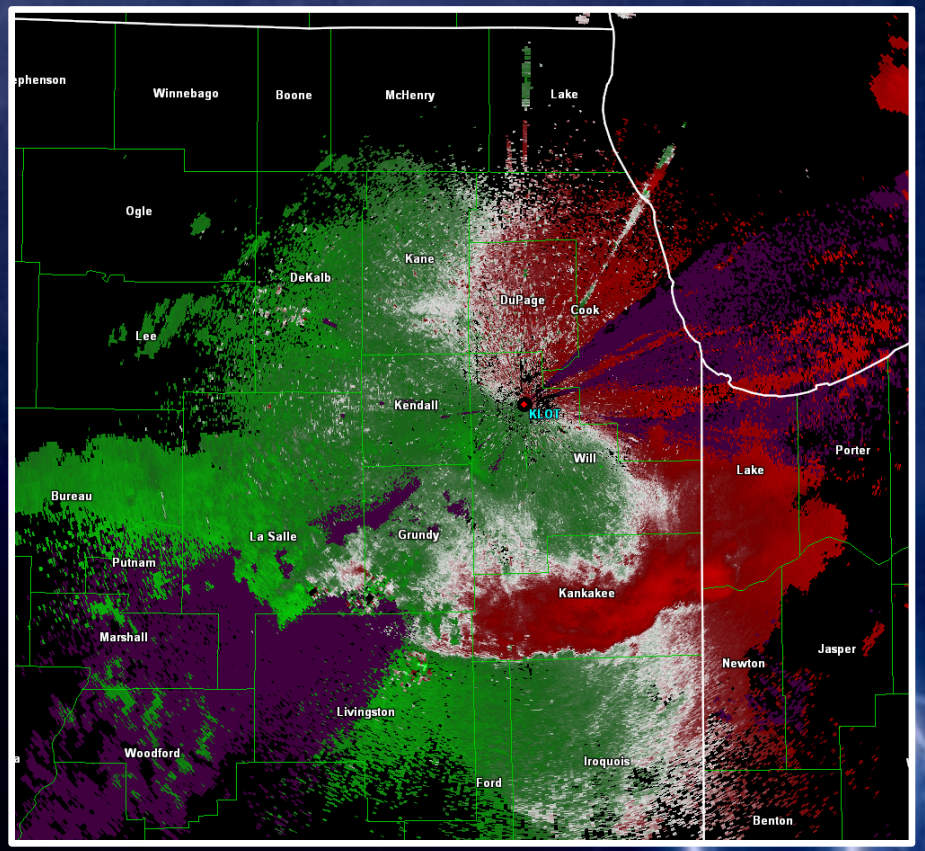


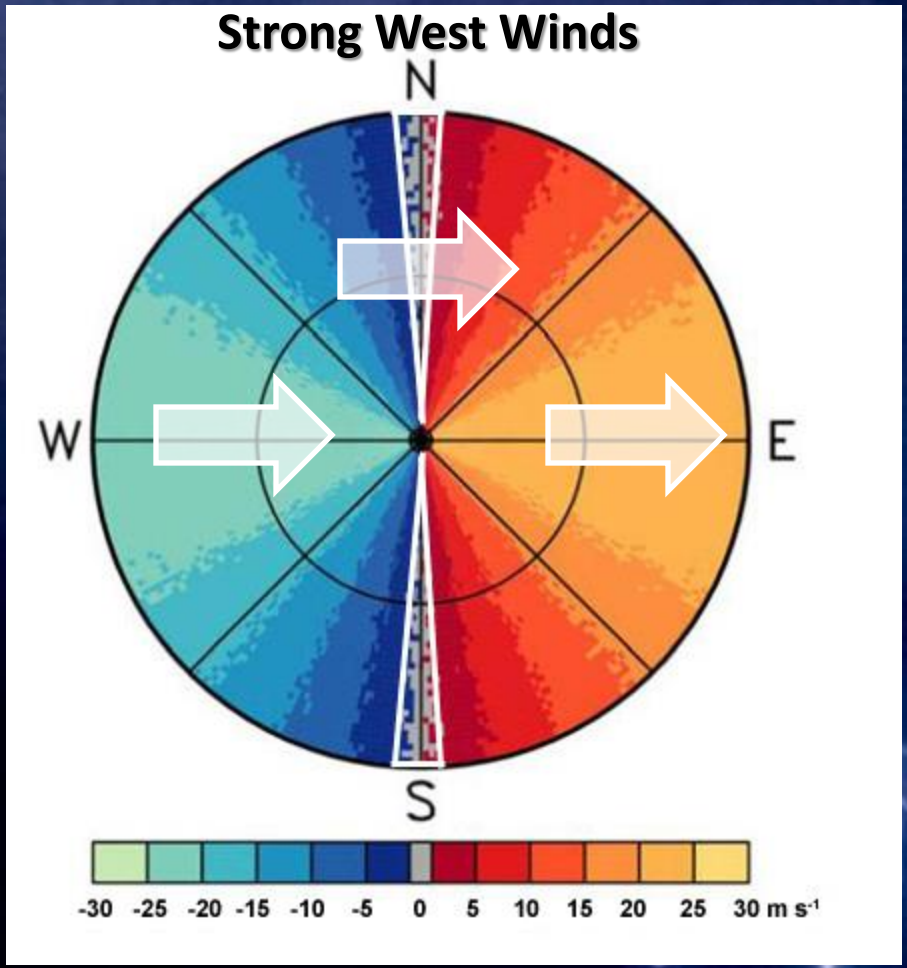
Velocity Data

- Doppler radar can detect how fast motion toward or from radar
- Great at detecting rotation, t-storm winds moving to/away from radar

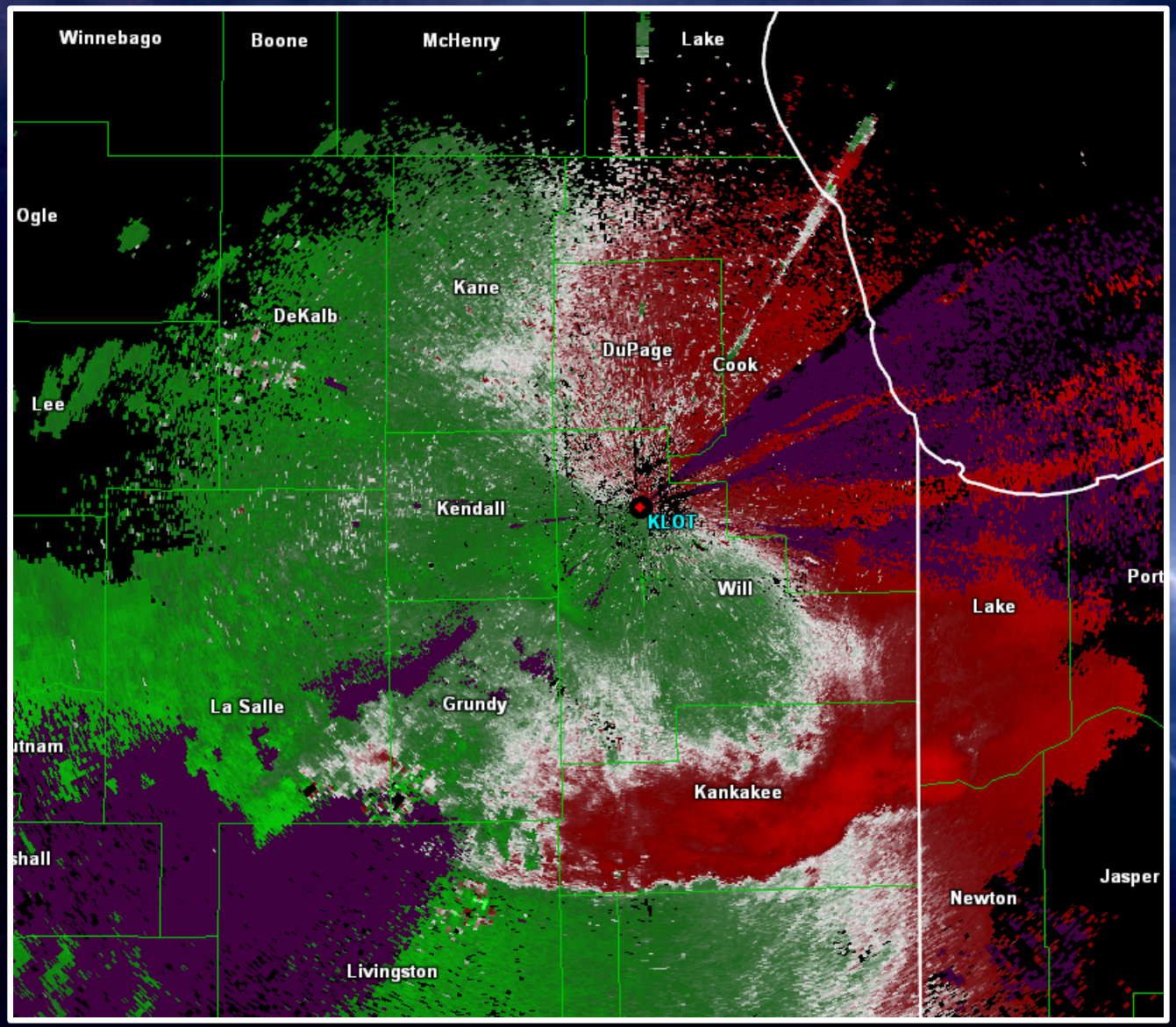


Velocity Data

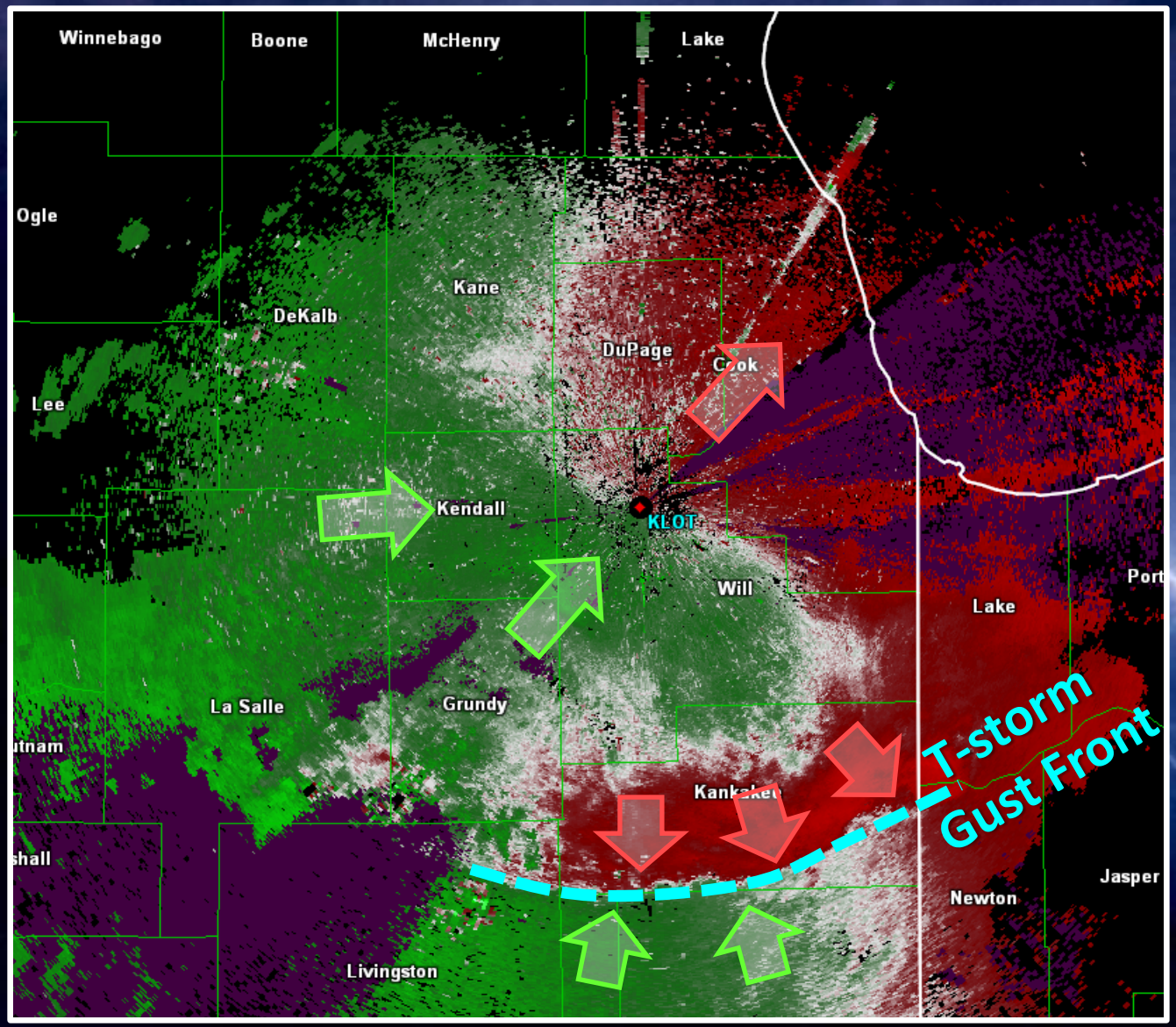
- Green/blue is motion in toward the radar
- Red/Orange is motion away from the radar
- Gray/white no motion toward or away from radar
- Purple is range folding (no data)



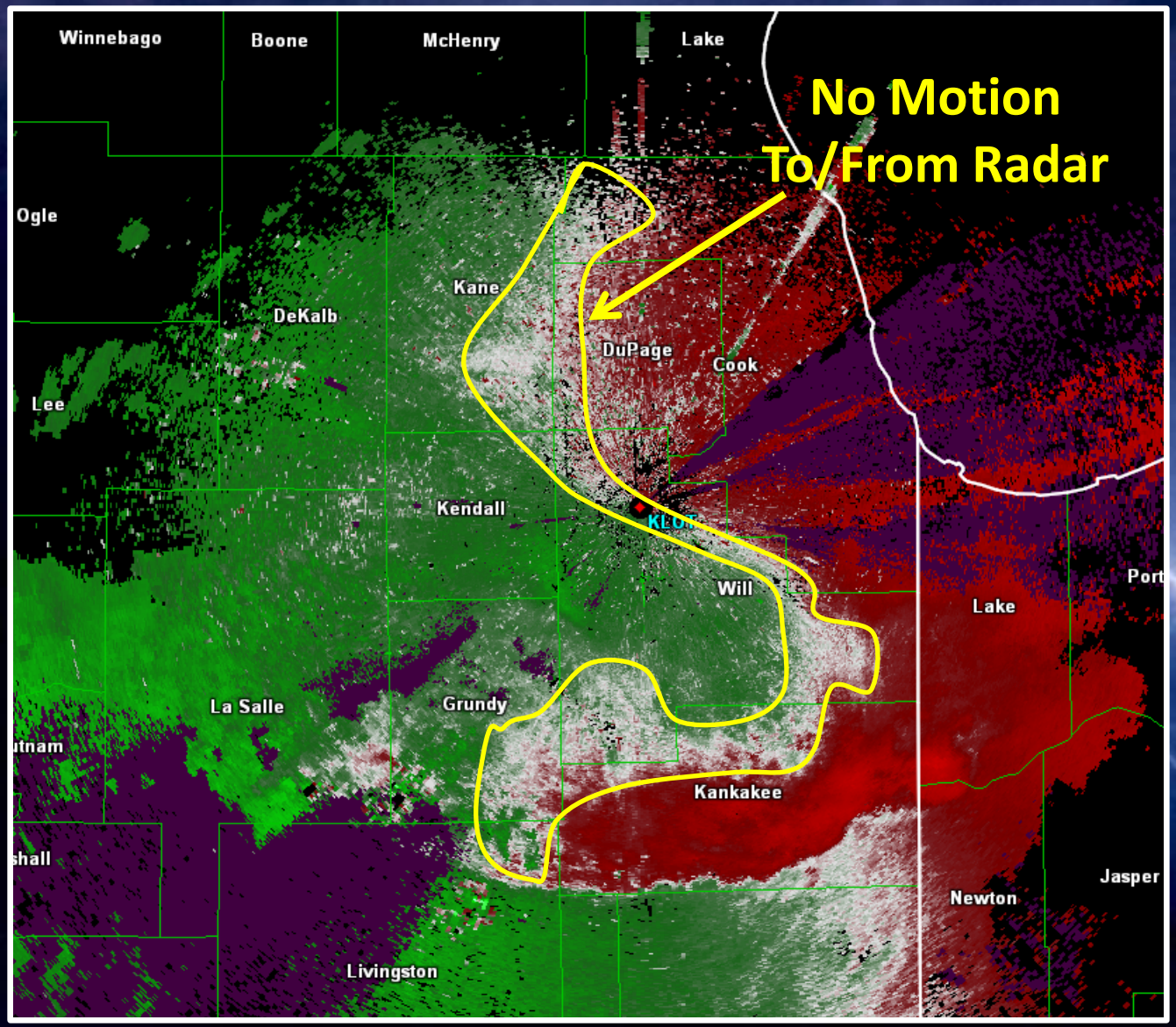
Velocity Data



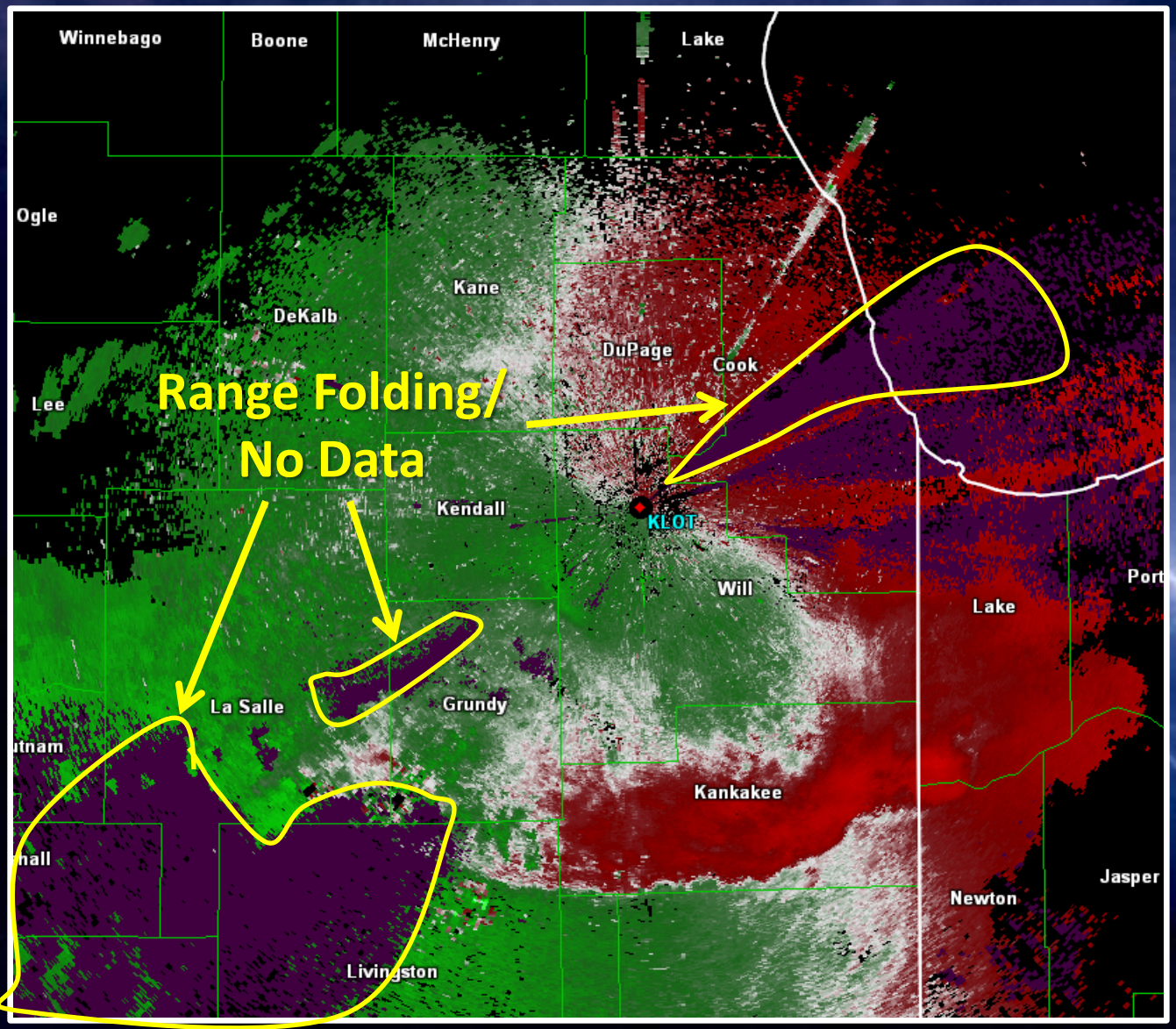
Velocity Data



Velocity Data



Velocity Data

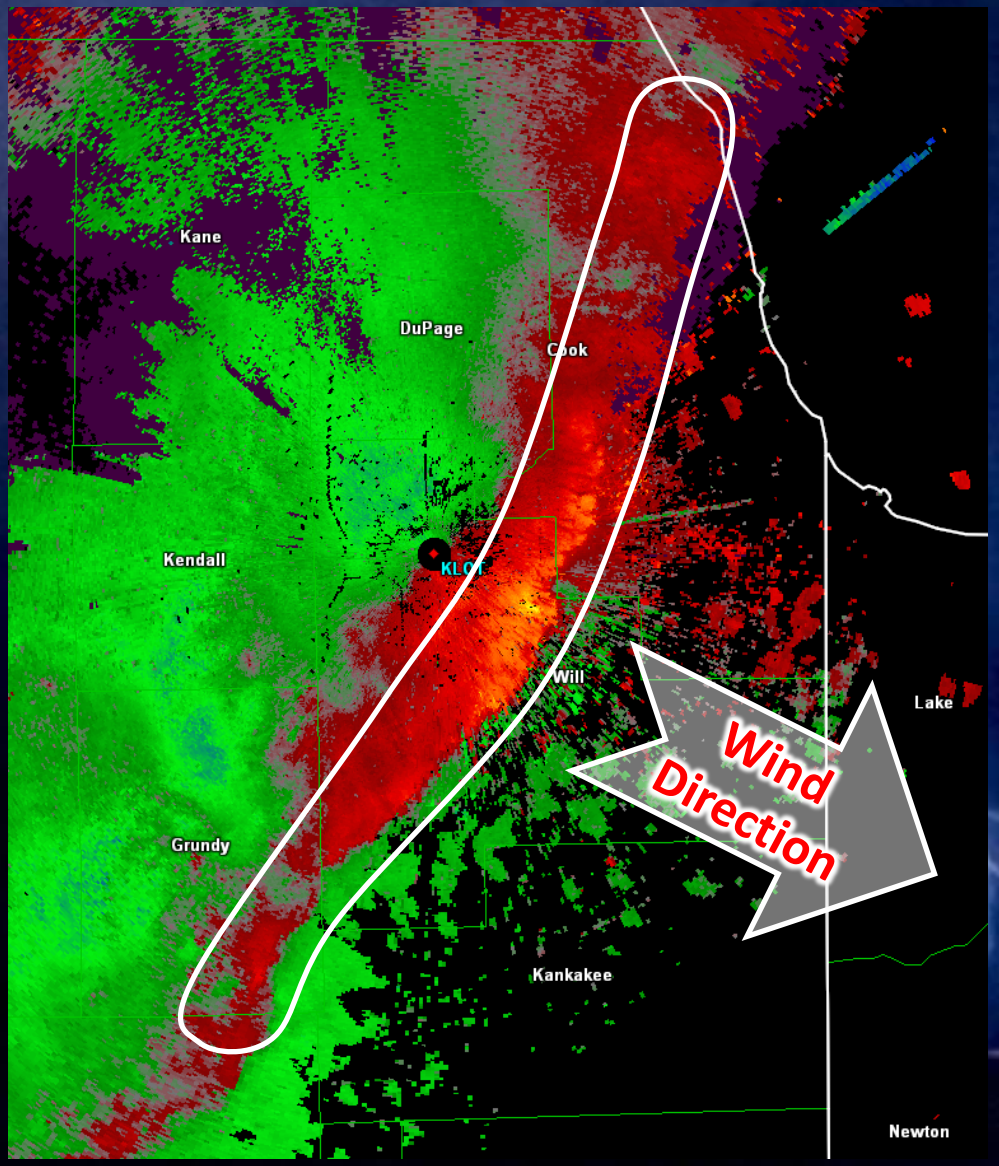


Velocity Data

- Good tool for identifying potentially damaging straight line winds, but there are limitations
  - Harder to see strong winds on velocity data when viewing angle is bad
  - Radar beam detects velocities above surface, doesn't always translate to surface

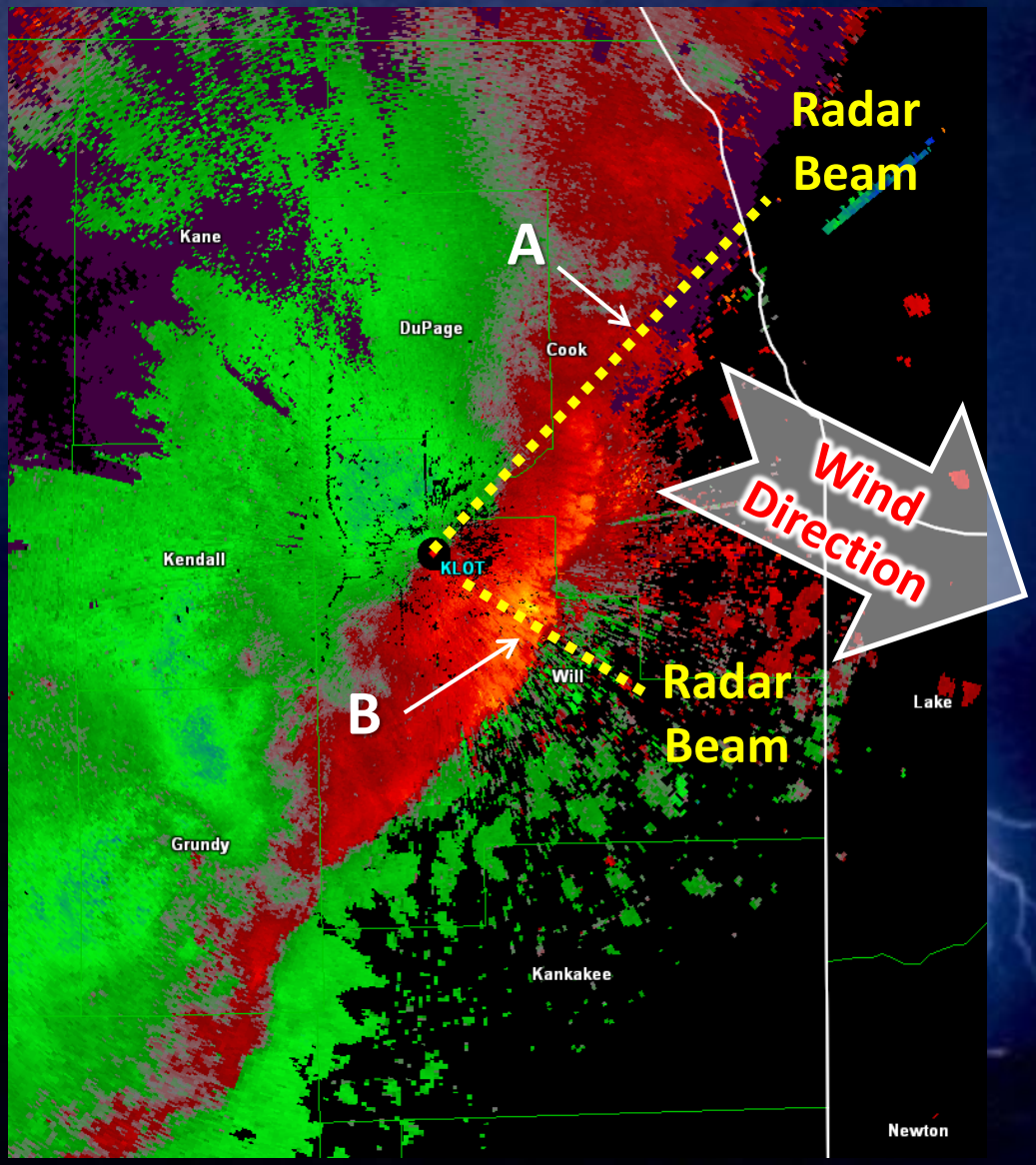
Viewing Angle

- Likely very strong winds from WNW all along line (area circled in white)
- Radar shows strong outbound velocity where viewing angle is good
- Radar can't see stronger winds where angle isn't as good

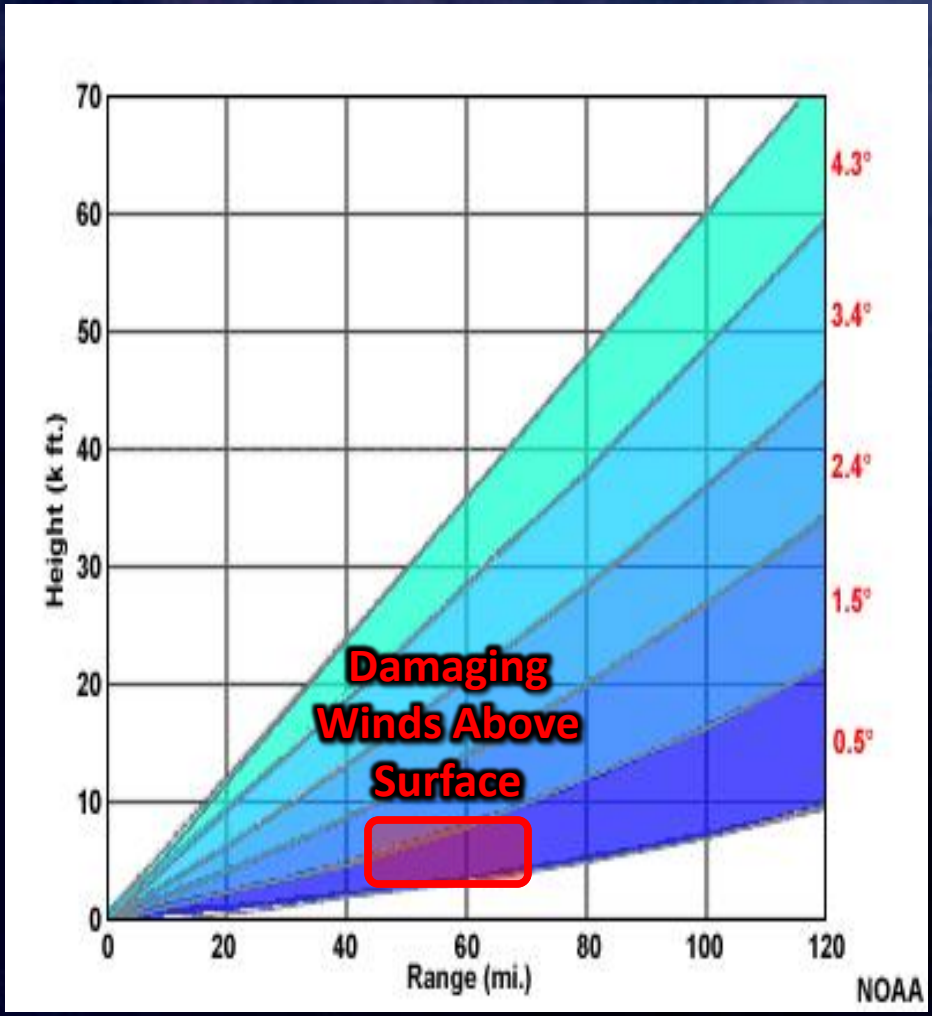


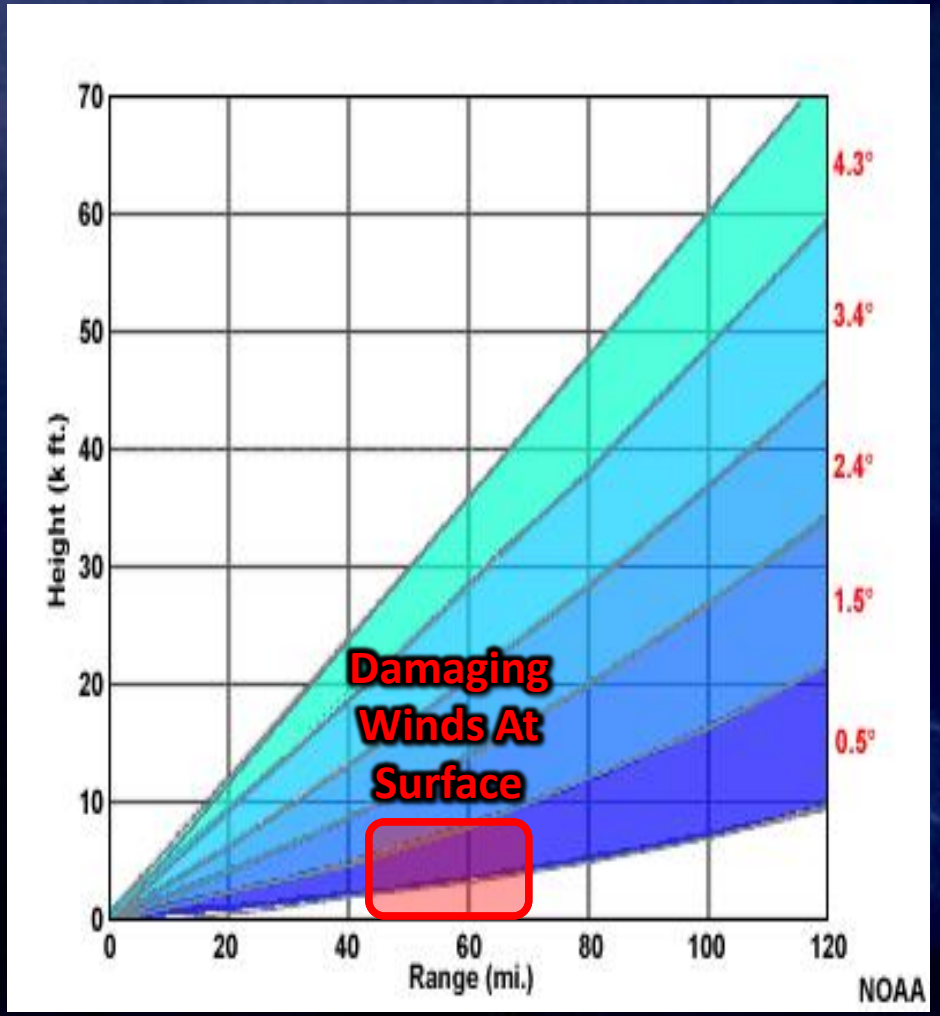
Viewing Angle

- Only a small portion of the winds over point "A" are blowing away from radar
- Nearly all wind is along the beam over point "B" so strong winds show up nicely



Beam Height


Height (k ft.)
70
60
50
40
30
20
10
0
0
20
40
60
80
100
120
Range (mi.)
4.3°
3.4°
2.4°
1.5°
0.5°
Damaging
Winds Above
Surface
NOAA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0.5°
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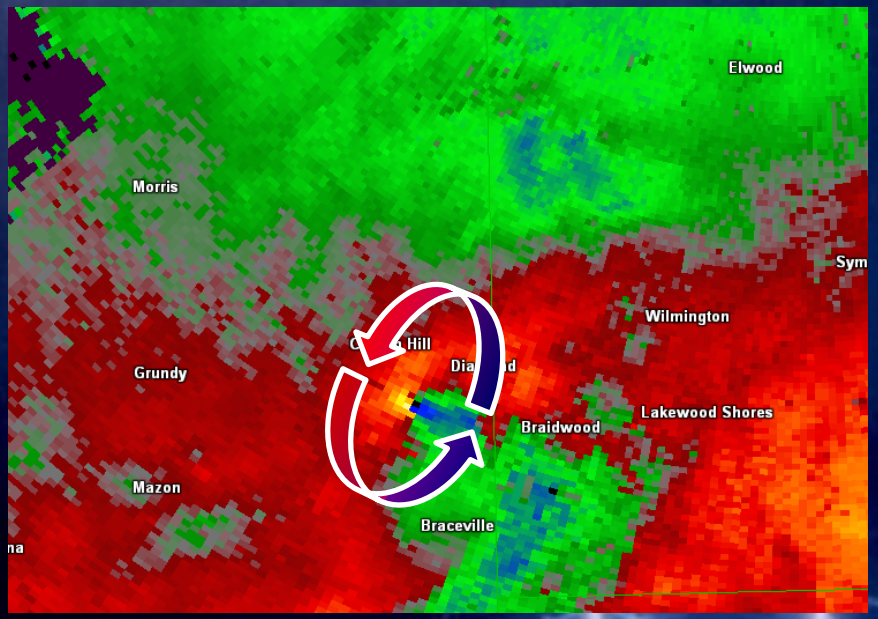
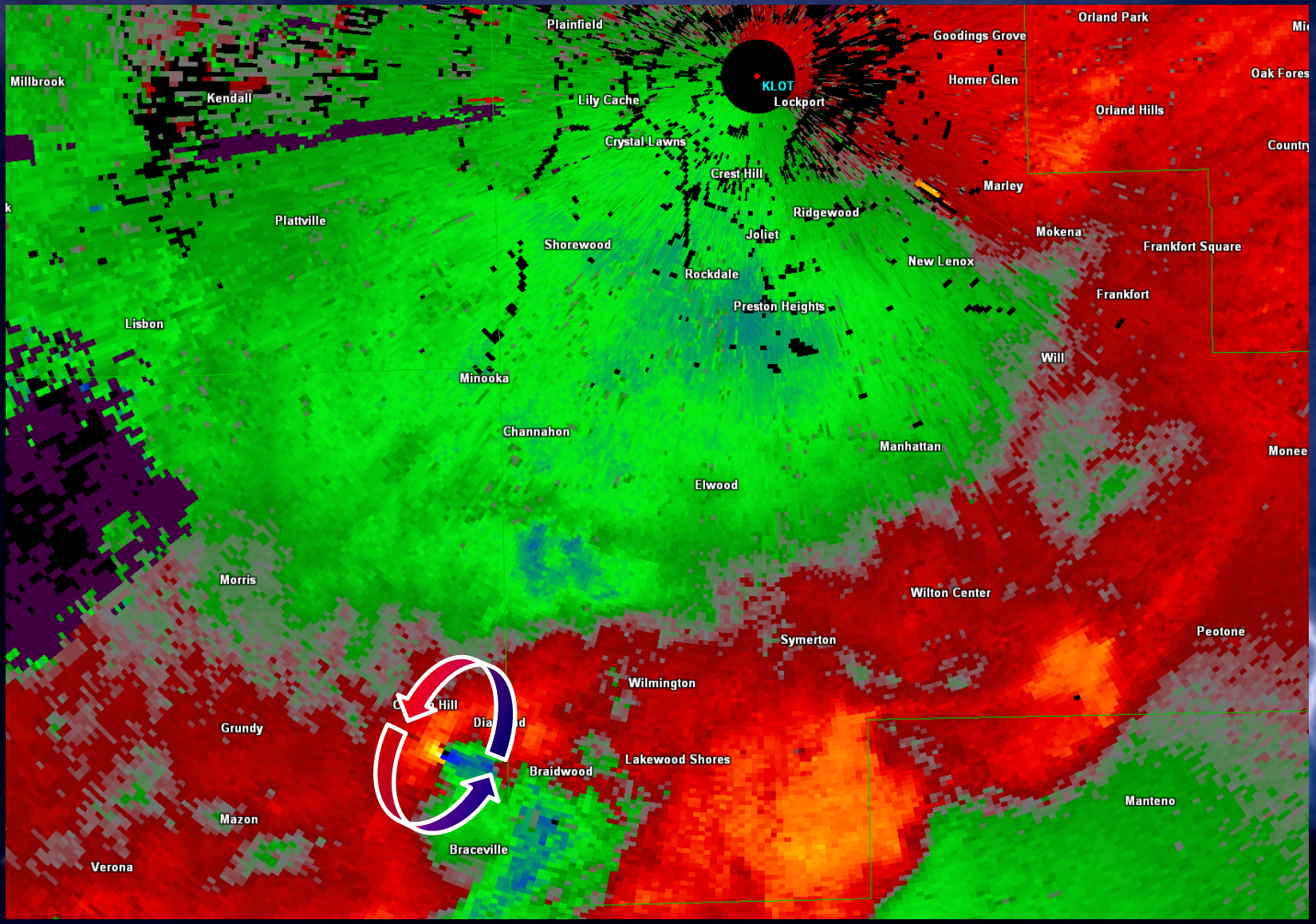
NOAA

Tornadic Rotation

- Tornadoes have winds in all directions
- Unlike straight line winds, viewing angle not problem



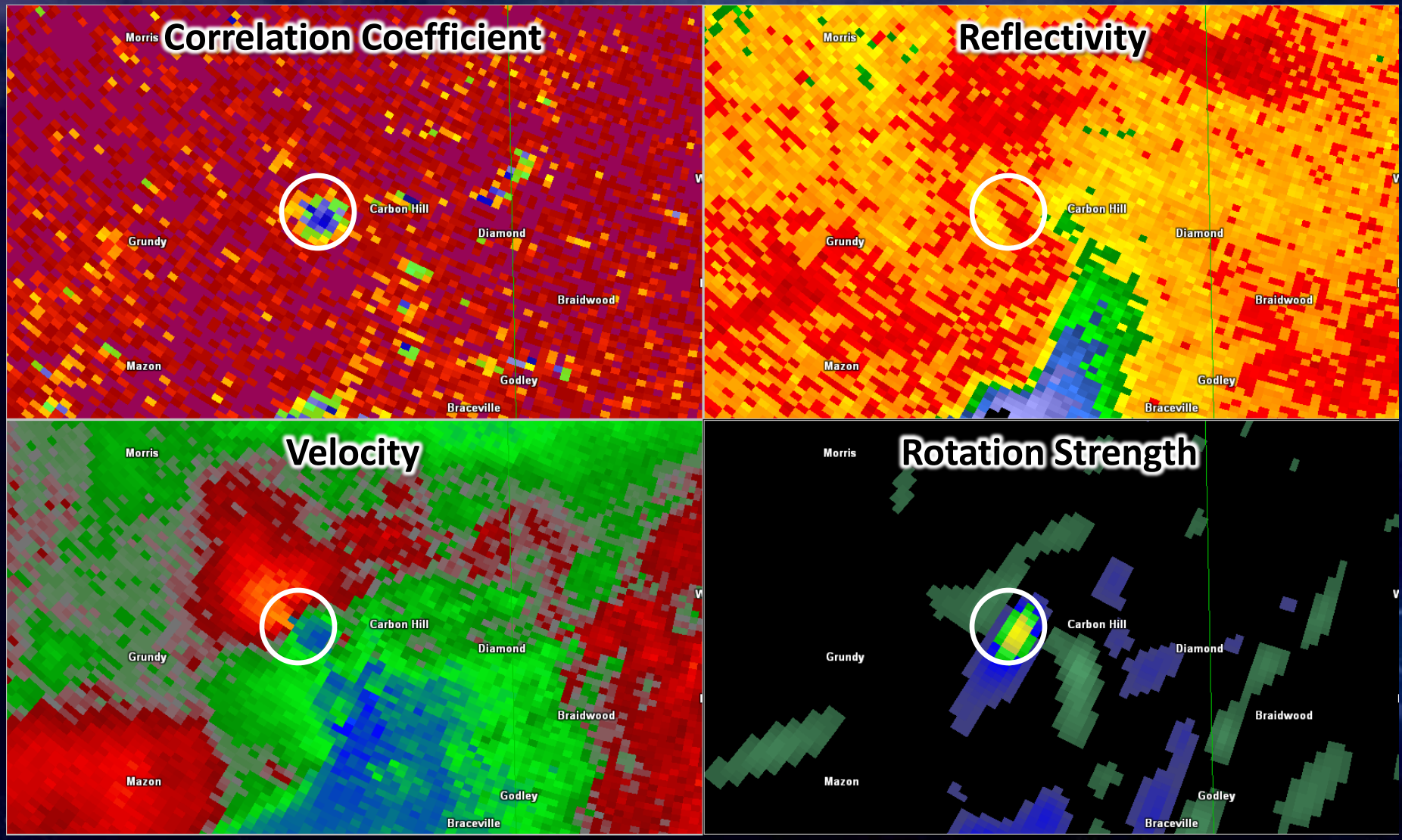
Tornadic Rotation



Tornado Debris Signature

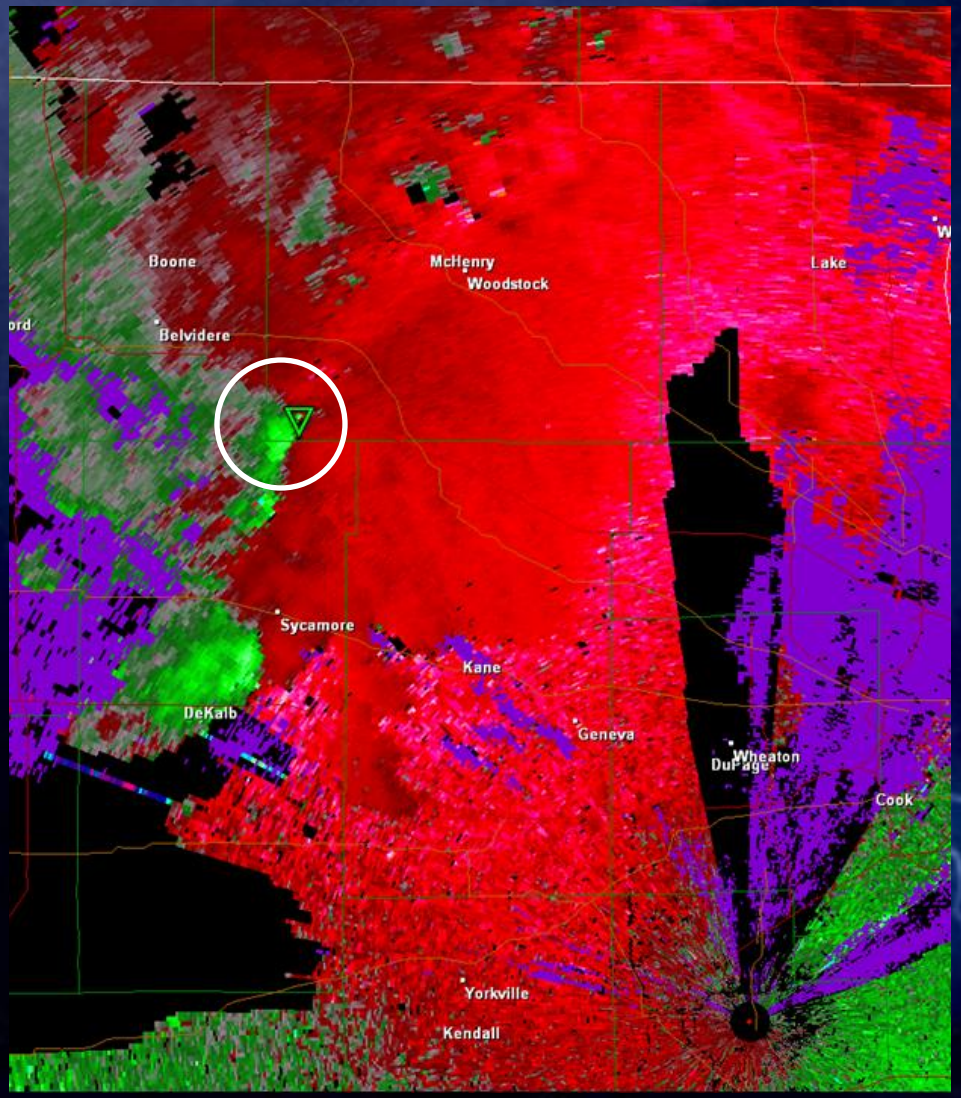
- NWS Doppler radars got dual pol upgrade recently, allowing new capabilities
- Can now see variability in size of objects being detected
- Tornado debris shows up very well, meteorologist can now almost instantly confirm significant tornadoes via radar

Tornado Debris Signature



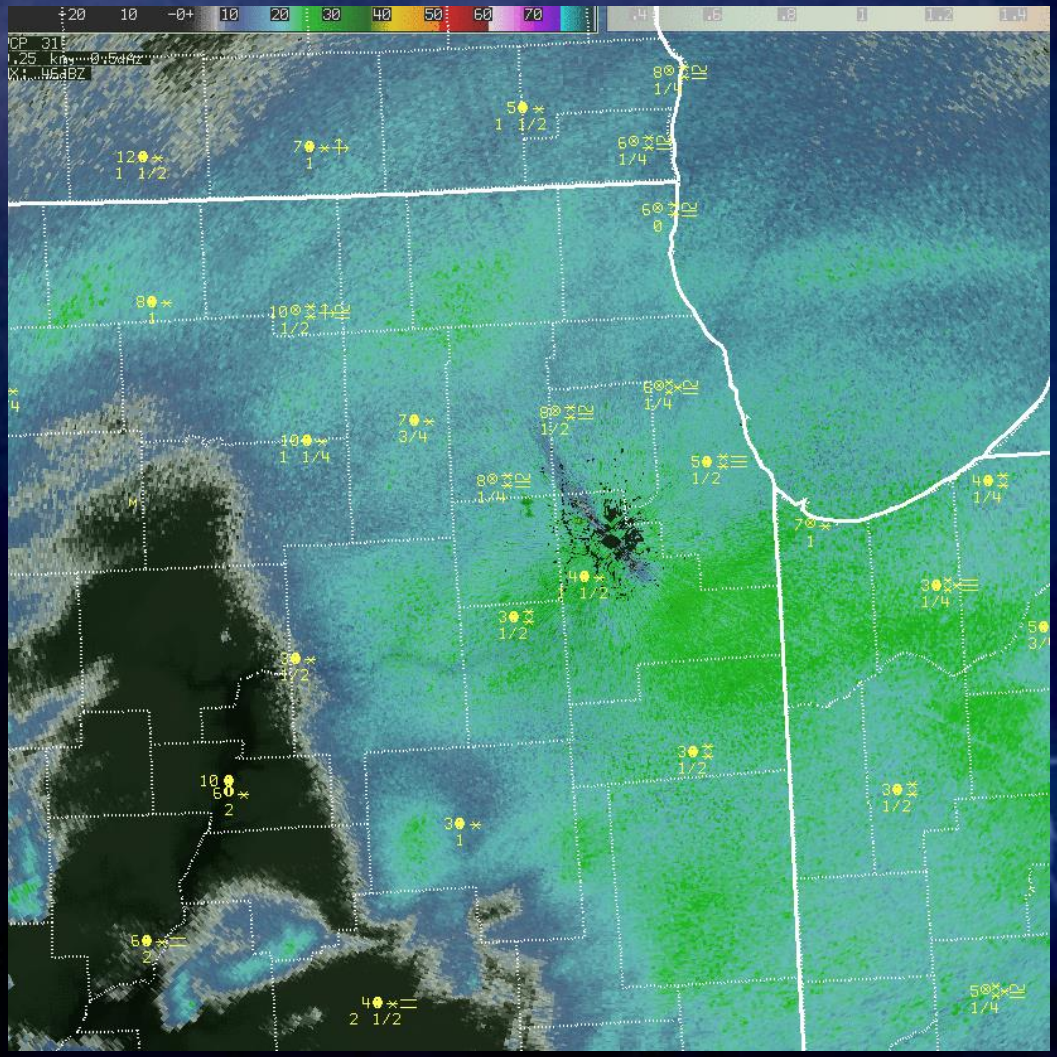
Tornado Vortex Signature (TVS)

- Automated algorithm identifying areas of large velocity diffs
- Useful tool for situational awareness, has a high fall false alarm rate
- Need full understanding of meteorological environment to access validity of TVS



Snow

- Snow is less reflective than rain, hail, sleet
- Less reflective means lower values on radar
- Very light snow & flurries hard to detect



Where Can I Get Radar Data?

- http://weather.gov/chicago
- RadarScope (Android & iOs)
- http://grlevelx.com


Questions??