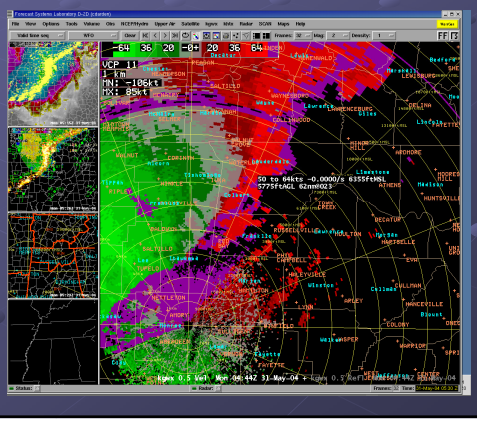
May 30th-31st Severe Weather Review

Radar Sampling Issues

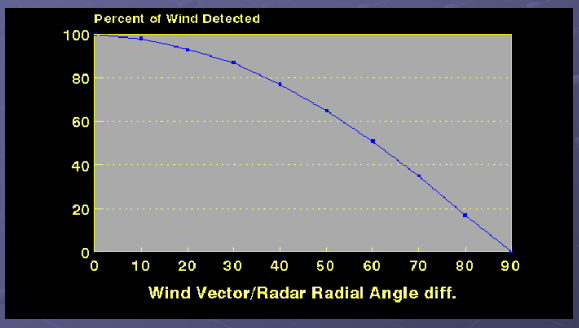


Velocity Sampling Issues

- Unless a wind vector (at a given point) is parallel to the radar radial, only a portion of the true component of the wind velocity is being sampled
- This likely led to undersampling (and underestimation) of wind velocities across NW AL (from KGWX) on May 30th, 2004
- Radar operators should be aware of these sampling issues and monitor other radars (NQA, OHX, HTX) as needed.
- Also, 8bit data was not available from KGWX (which would have provided more specific velocity information)

Sampling Impacts
Radial Velocities

Actual vs Detected wind speed



If winds blow down the radial, you see it all. If winds blow *across* the radial (perpendicular), you see none of it.

Velocity Considerations

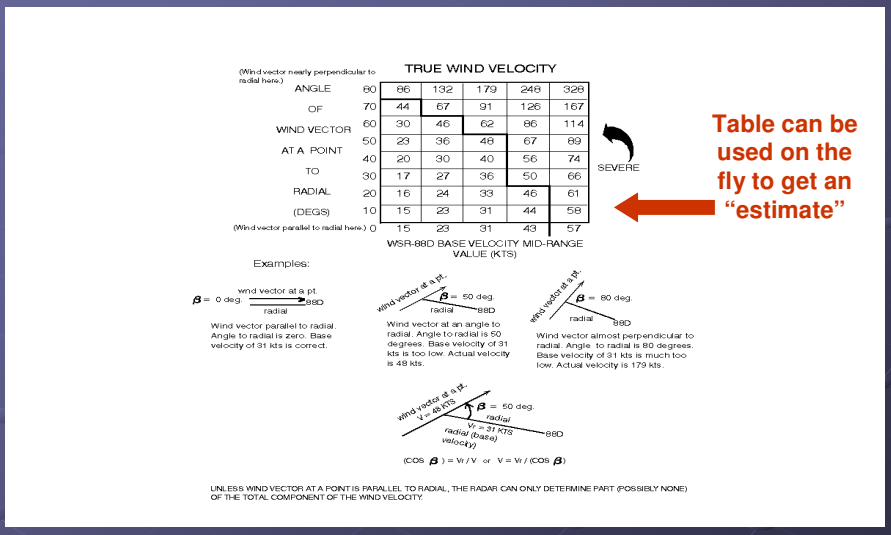
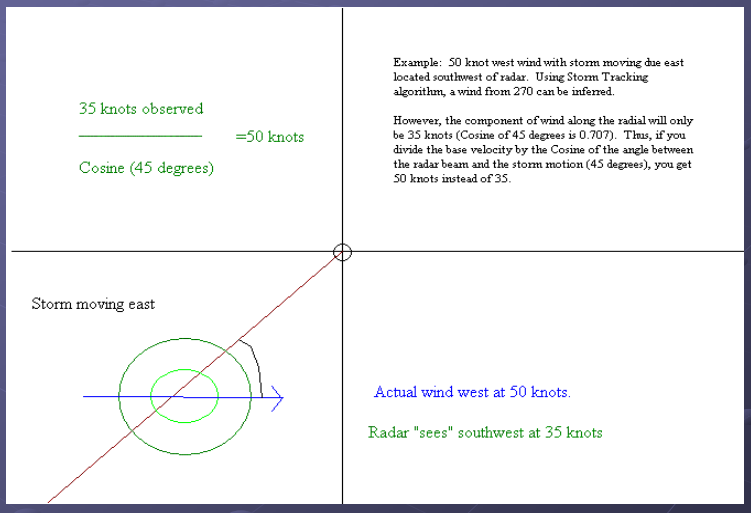


Table can be used on the fly to get an "estimate"

Laminated copies are located in the Severe Weather Tools Binder

Velocity Considerations



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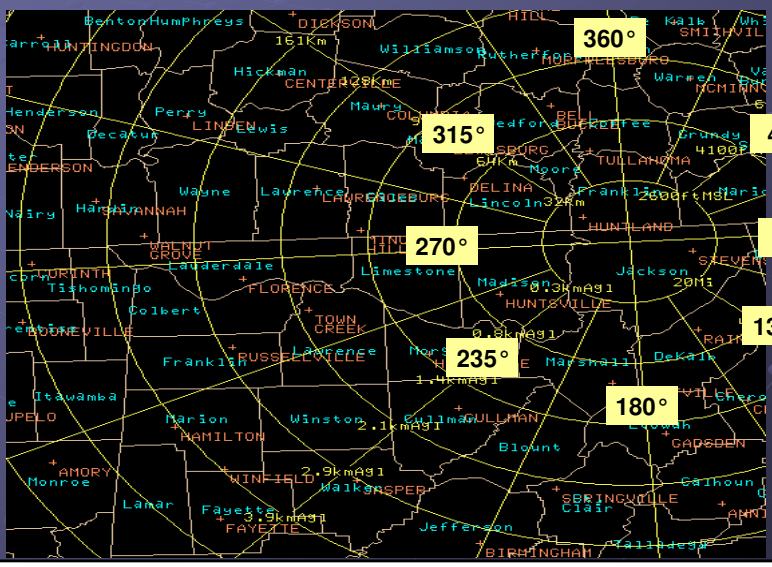
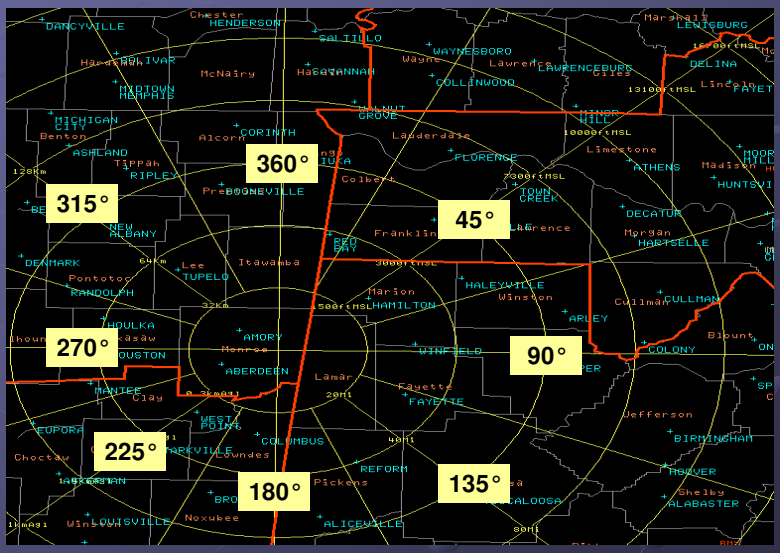
KHTX Radar Radials

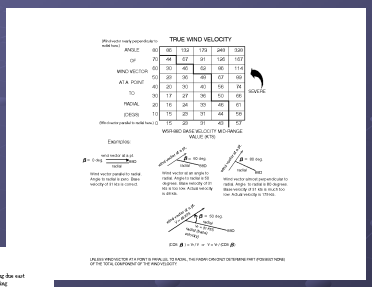


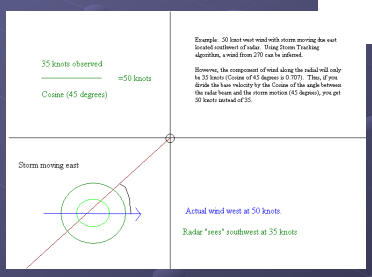
KGWX Radar Radials



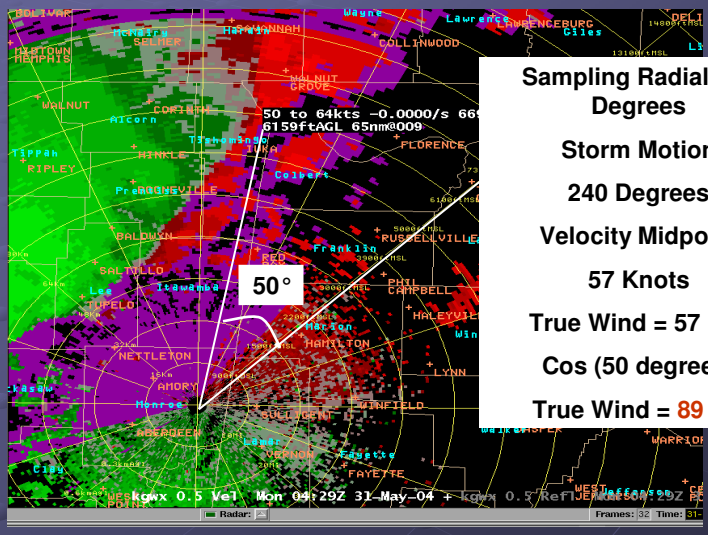
Utilizing these Tools

- Now let's take a look at the velocity data from May 30th and see how we might utilize these tools





Velocity Considerations



Sampling Radial 190 Degrees

Storm Motion

240 Degrees

Velocity Midpoint

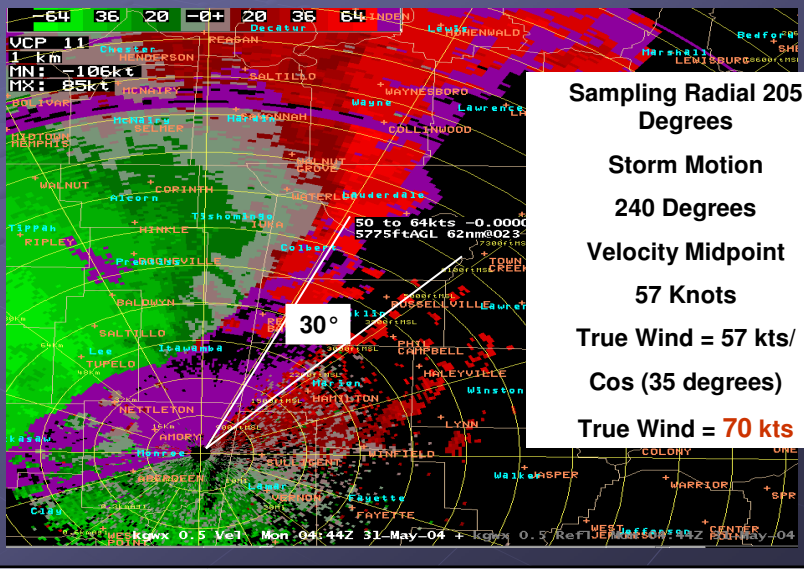
57 Knots

True Wind = 57 kts/

Cos (50 degrees)

True Wind = 89 kts

Velocity Considerations



Sampling Radial 205 Degrees

Storm Motion

240 Degrees

Velocity Midpoint

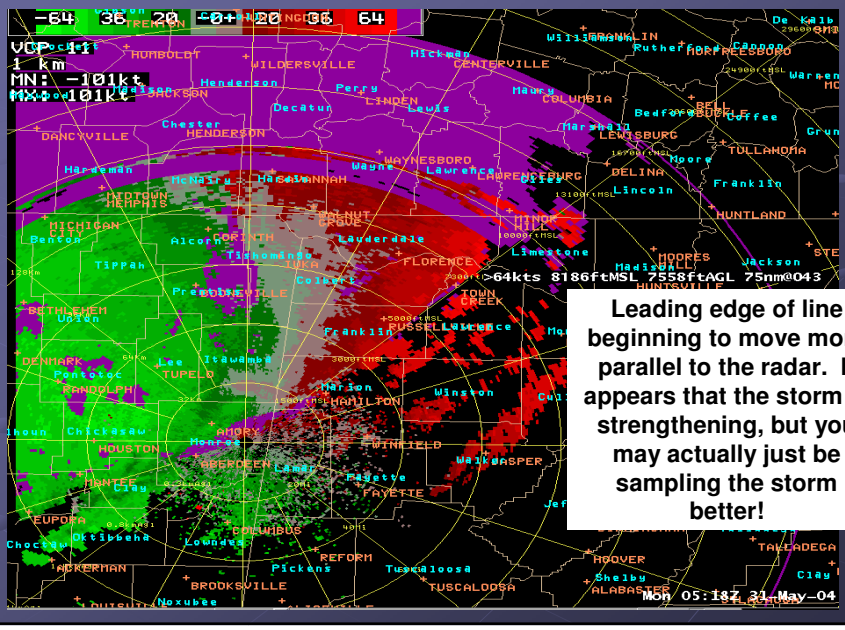
57 Knots

True Wind = 57 kts/

Cos (35 degrees)

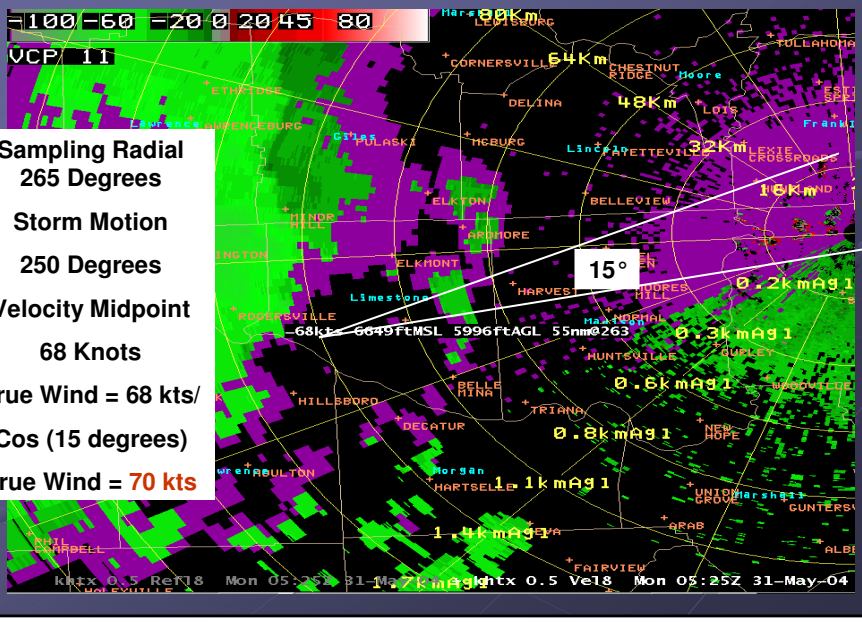
True Wind = 70 kts

Velocity Considerations



Leading edge of line beginning to move more parallel to the radar. It appears that the storm is strengthening, but you may actually just be sampling the storm better!

Velocity Considerations



Sampling Radial
265 Degrees

Storm Motion

250 Degrees

Velocity Midpoint

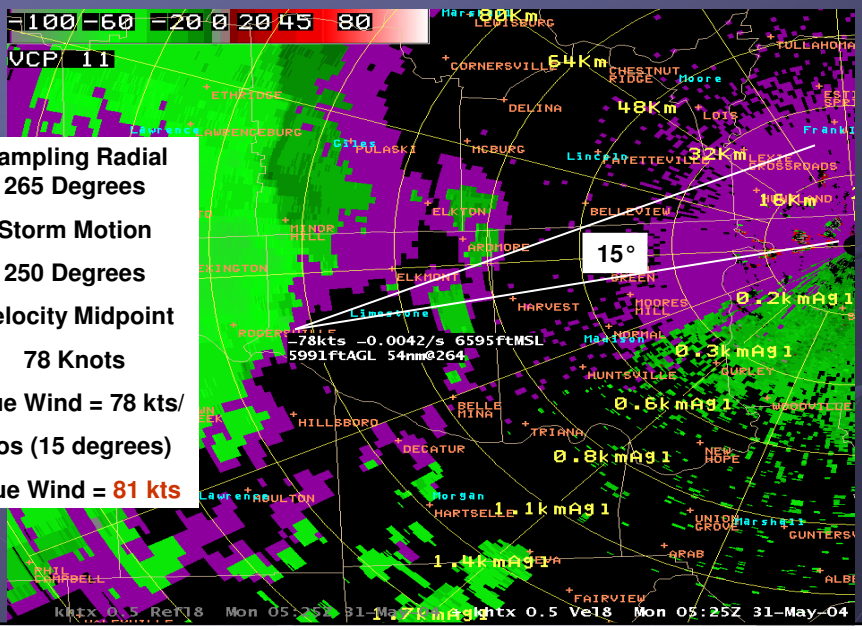
68 Knots

True Wind = 68 kts/

Cos (15 degrees)

True Wind = 70 kts

Velocity Considerations



Sampling Radial
265 Degrees

Storm Motion

250 Degrees

Velocity Midpoint

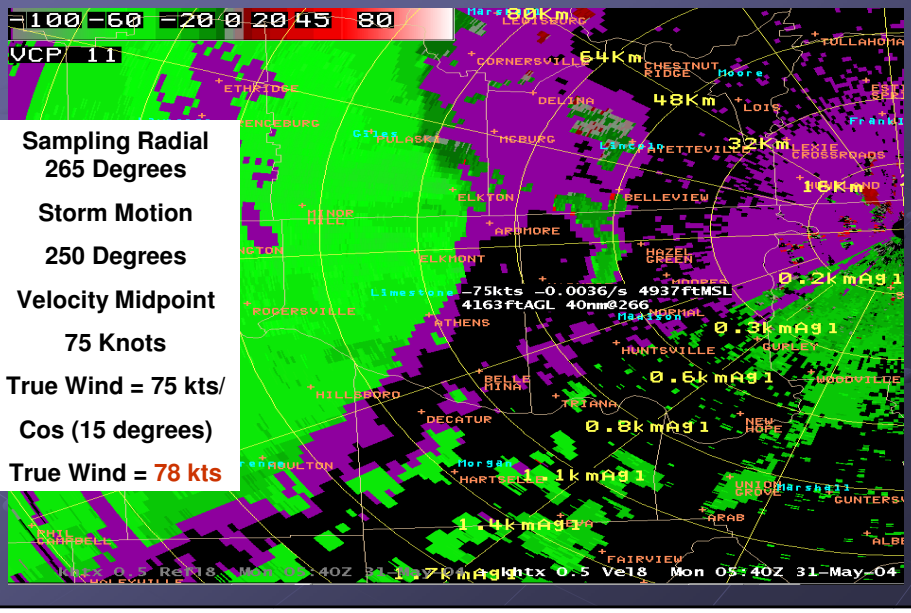
78 Knots

True Wind = 78 kts/

Cos (15 degrees)

True Wind = 81 kts

Velocity Considerations



Sampling Radial
265 Degrees

Storm Motion

250 Degrees

Velocity Midpoint

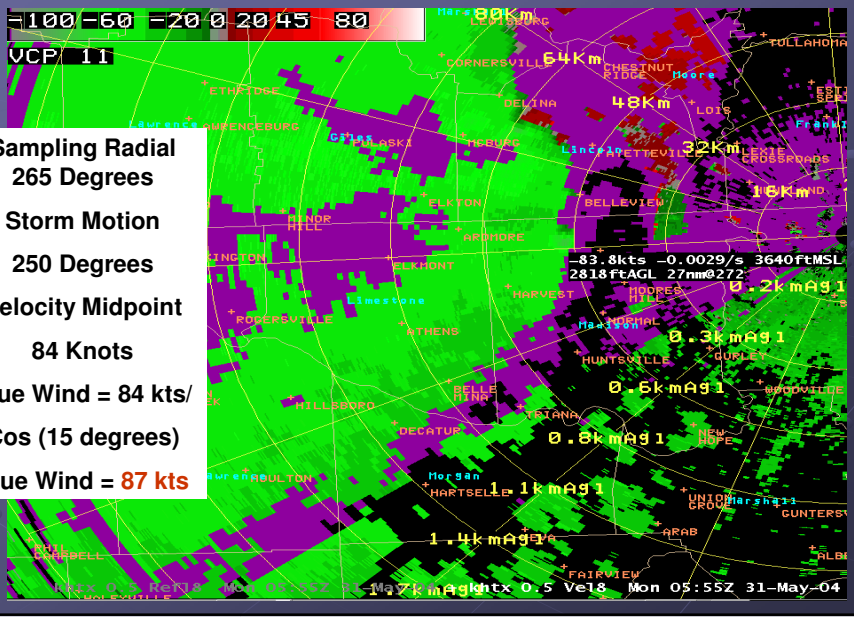
75 Knots

True Wind = 75 kts/

Cos (15 degrees)

True Wind = 78 kts

Velocity Considerations



Sampling Radial
265 Degrees

Storm Motion

250 Degrees

Velocity Midpoint

84 Knots

True Wind = 84 kts/

Cos (15 degrees)

True Wind = 87 kts

Damage Pictures (Lauderdale and Limestone Counties)

Summary

- Velocity calculations using the “cosine” equation indicated winds near 90 knots across northwest AL at 0430z. This was nearly 30 knots greater than KGWX estimates
- Storms moving perpendicular (or with a large component of its movement perpendicular) to the radar radial will have its velocity poorly sampled.

Summary

- As storms pushed eastward, velocity estimated improved.
- 8bit velocity estimates from KHTX provided much greater detailed, and **should be used when available**
- This *might* be a reason that we’ve seen a few missed events across northwest AL
- Velocity data from local TV media radar *may* provide added value to our warning decision making operations.