

Your fun and easy guide to
creating your very own methodology for tornado tracking using NOAA radar imagery

Arc GIS

Tornado Tracking and Damage Path Assessment

FOR

NITWITS

and the Fiscally Challenged





A Reference for All of Us
by
One of Us!

Get the scoop on
one user's trials
and tribulations

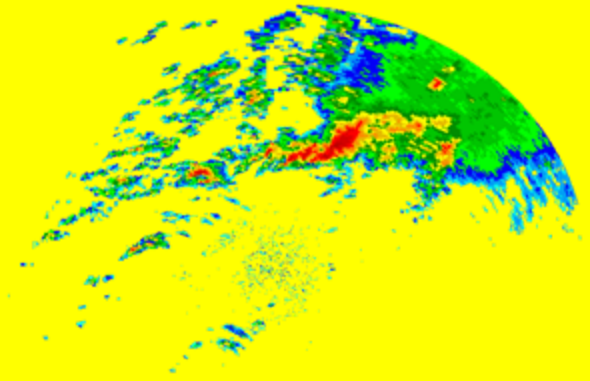
Allen Hoerle
GIS Analyst
Forsyth County Geographic Information Services
Cumming, Georgia 30040



What Brought This On?

-  The F3 tornado that devastated Americus, Ga., and their response utilizing GIS
-  An increased awareness/necessity of emergency preparedness within Forsyth County government
-  The tornado siren across the street from my old apartment that kept going off last spring
-  A desire to incorporate free imagery into our GIS program and developing a process using this imagery

Two Types of Radar Images



Base Reflectivity



Time 17:39

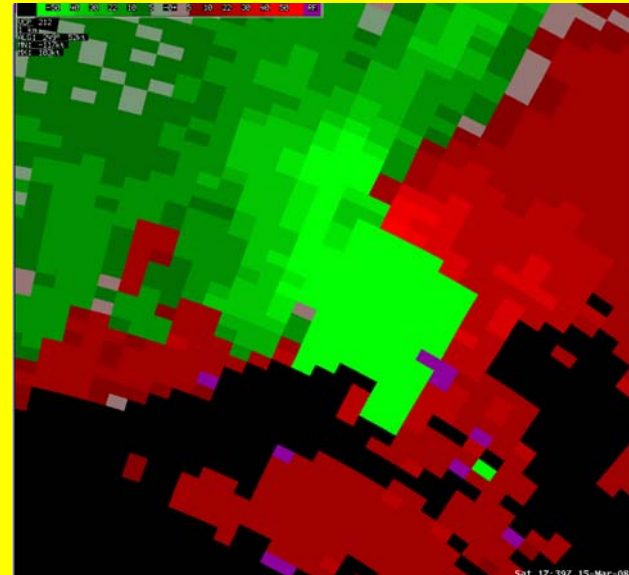


Both image types are available free of charge at www.NOAA.gov



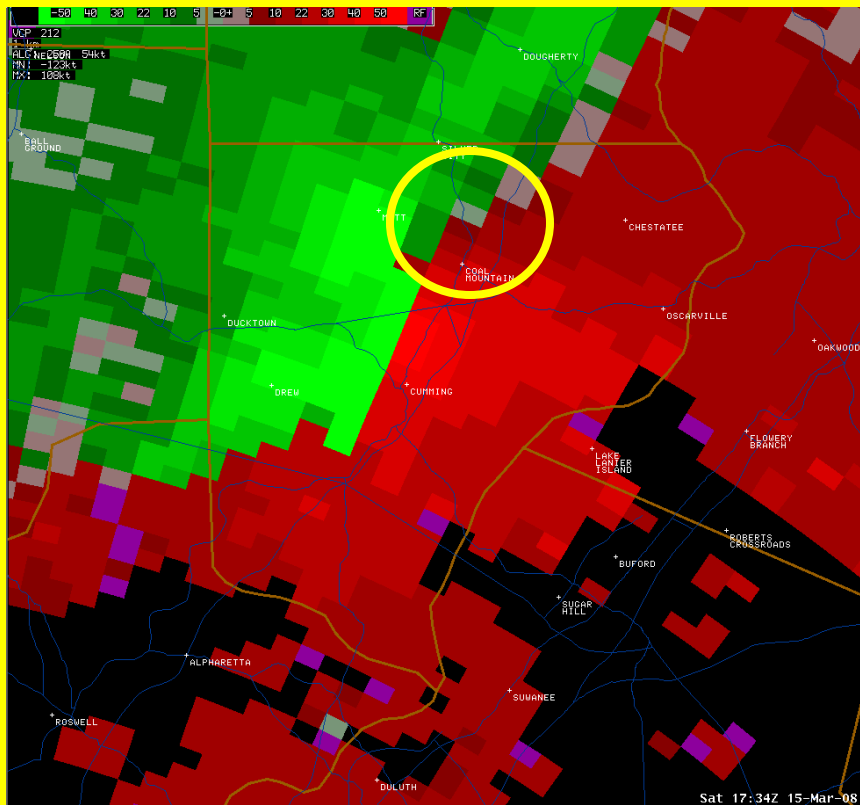
Base Velocity

Time 17:39



Sat 17:39Z 15-Mar-08

Velocity Imagery What It Is Telling Us



Region within the yellow circle would be a place of predicted tornado genesis



When one sees green pixels and red pixels lined up side by side, this indicates rotation within the thunderstorm

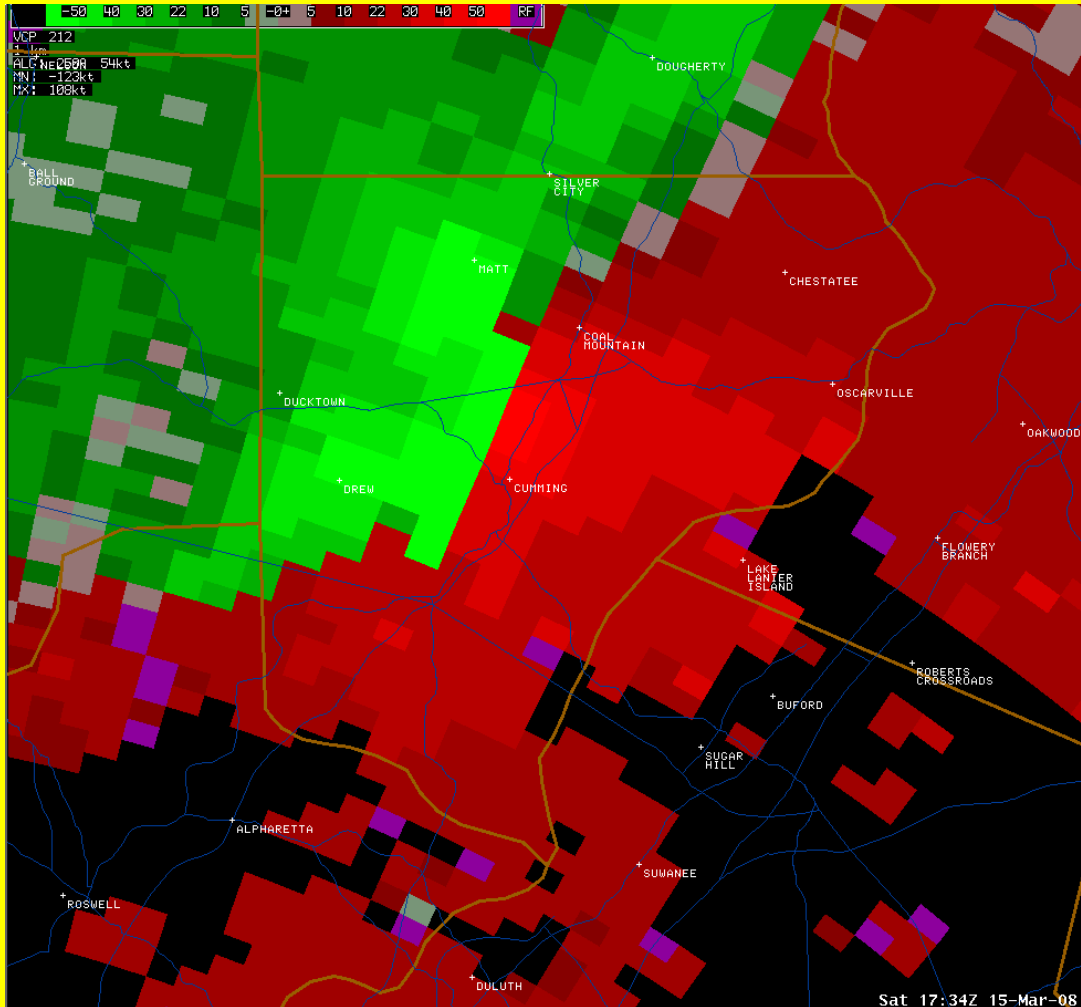


Green pixels depict inbound air flow and the red pixels depict outbound air flow, inward and outward is in reference to the radar capturing the images



When the inward and outward bound air flows add up to 40 or more knots, that is a good indicator of tornado genesis

What Are You Looking For




Rotation
within the
thunderstorm





When inflow and
outflow of air come
together or in close
proximity, indicator
of rotation within
the thunderstorm

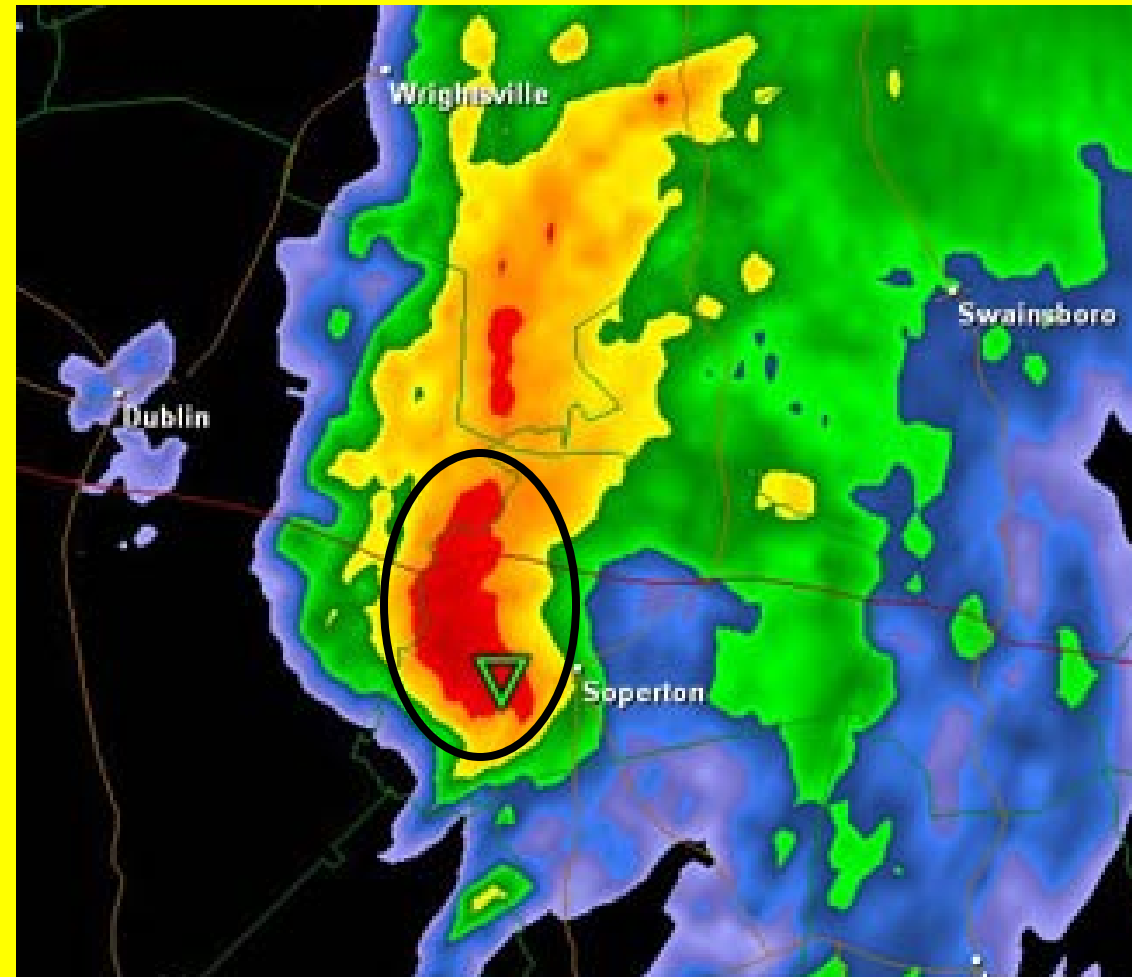
What Are You Looking For

Mini Bow

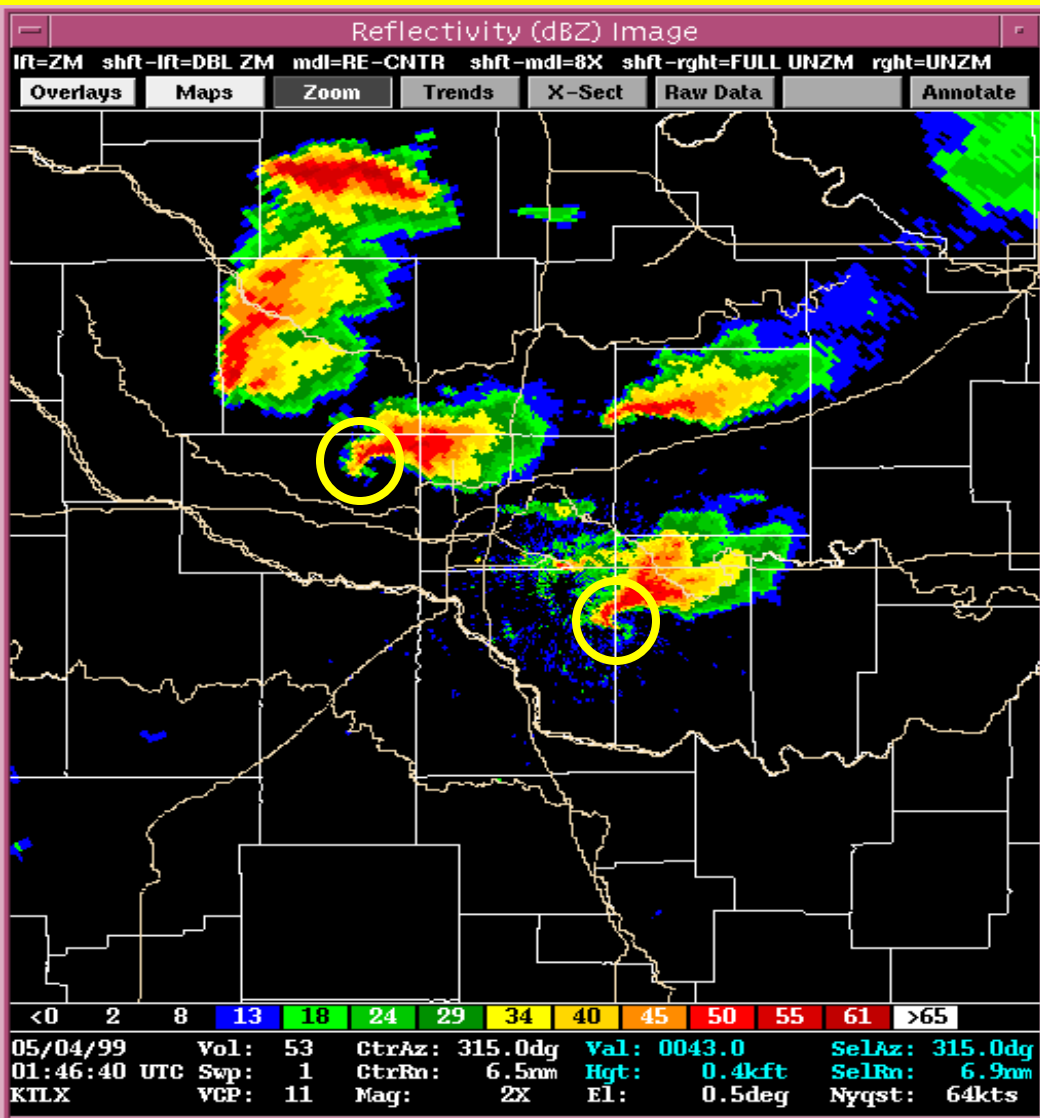
 This feature is depicted by the coma shaped region within the thunderstorm, look to the region within the black circle

 A feature often times associated with tornado producing thunderstorms occurring in the southeast


 Very difficult to identify in base reflectivity imagery





What Are You Looking For



Echo Hook or Hook

 Simply a hook that forms at the back of an advancing thunderstorm, look to the regions within the yellow circles

 A feature common to tornado producing thunderstorms in "Tornado Alley" and the Midwest

 Not always easy to recognize in the base reflective imagery

Quick Science Lesson



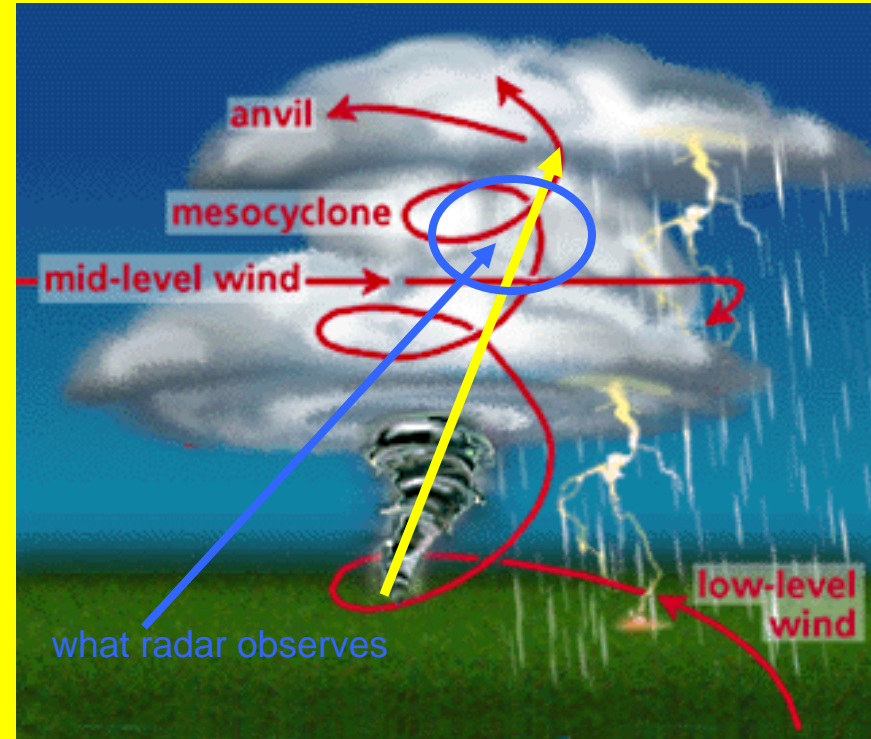
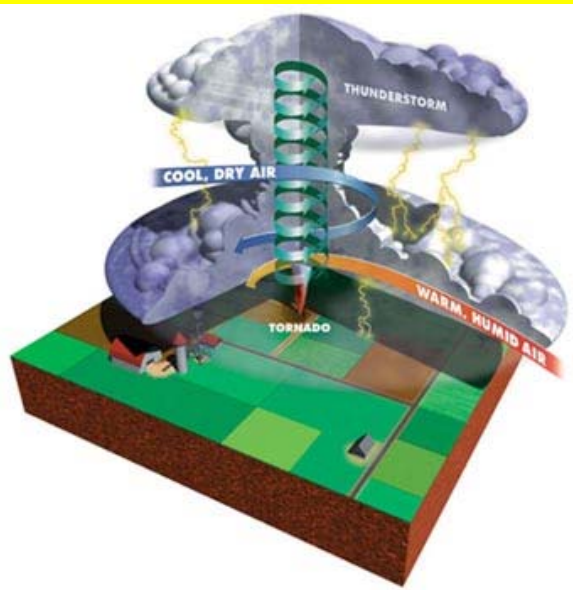
The funnel or rope of a tornado is only a small part of the tornado and the portion we observe



Continuing into the clouds is the mesocyclone which extends all the way up to the anvil



The funnel and the mesocyclone tilt in the direction the thunderstorm is traveling

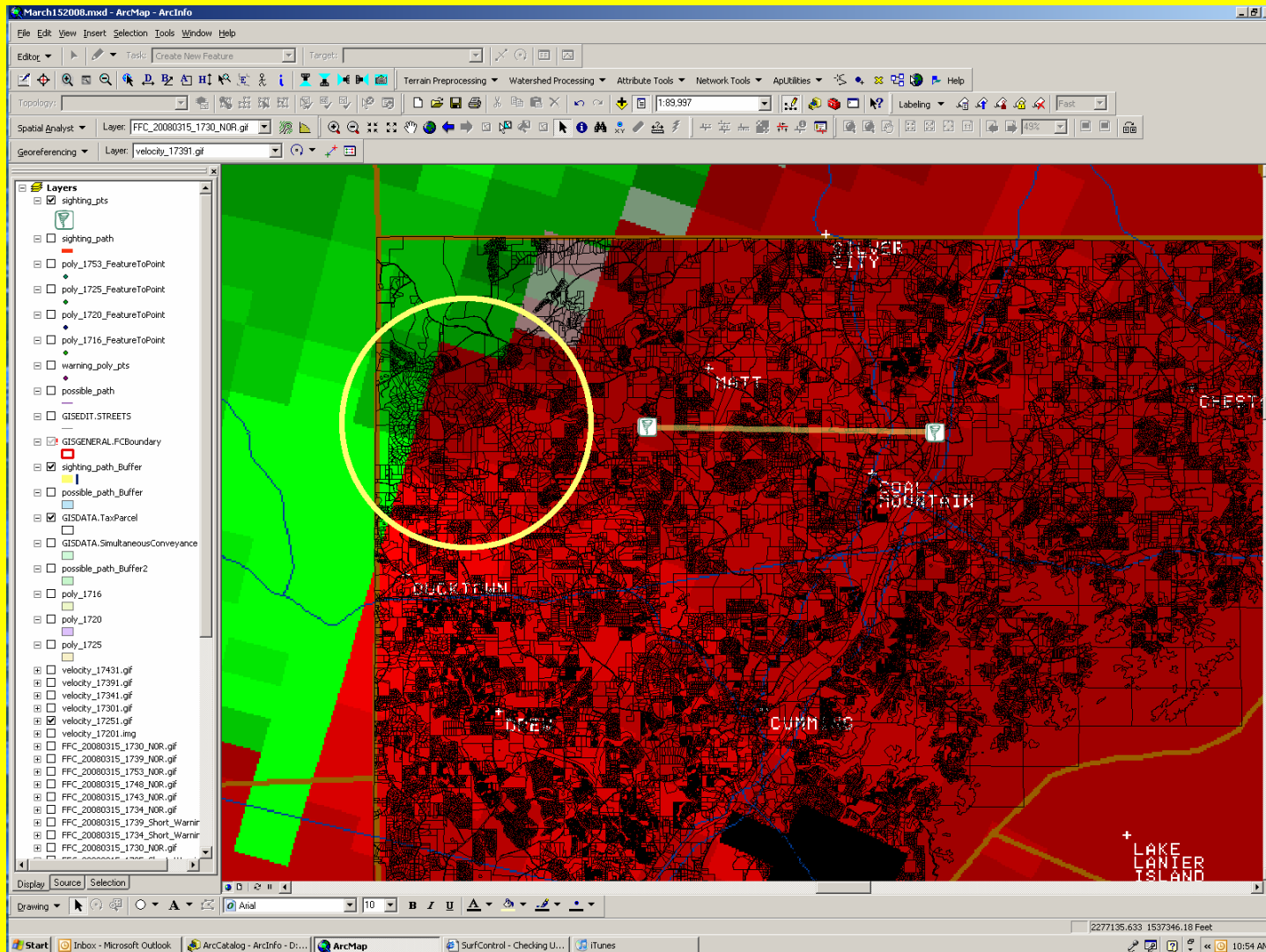


Due to the curvature of the earth and the distance the tornado is away from the radar, the base velocity image will be of the mesocyclone and not the actual funnel of the tornado



Because of the tilt of the funnel and mesocyclone, the actual funnel will be to the south and west of where the image locates the mesocyclone

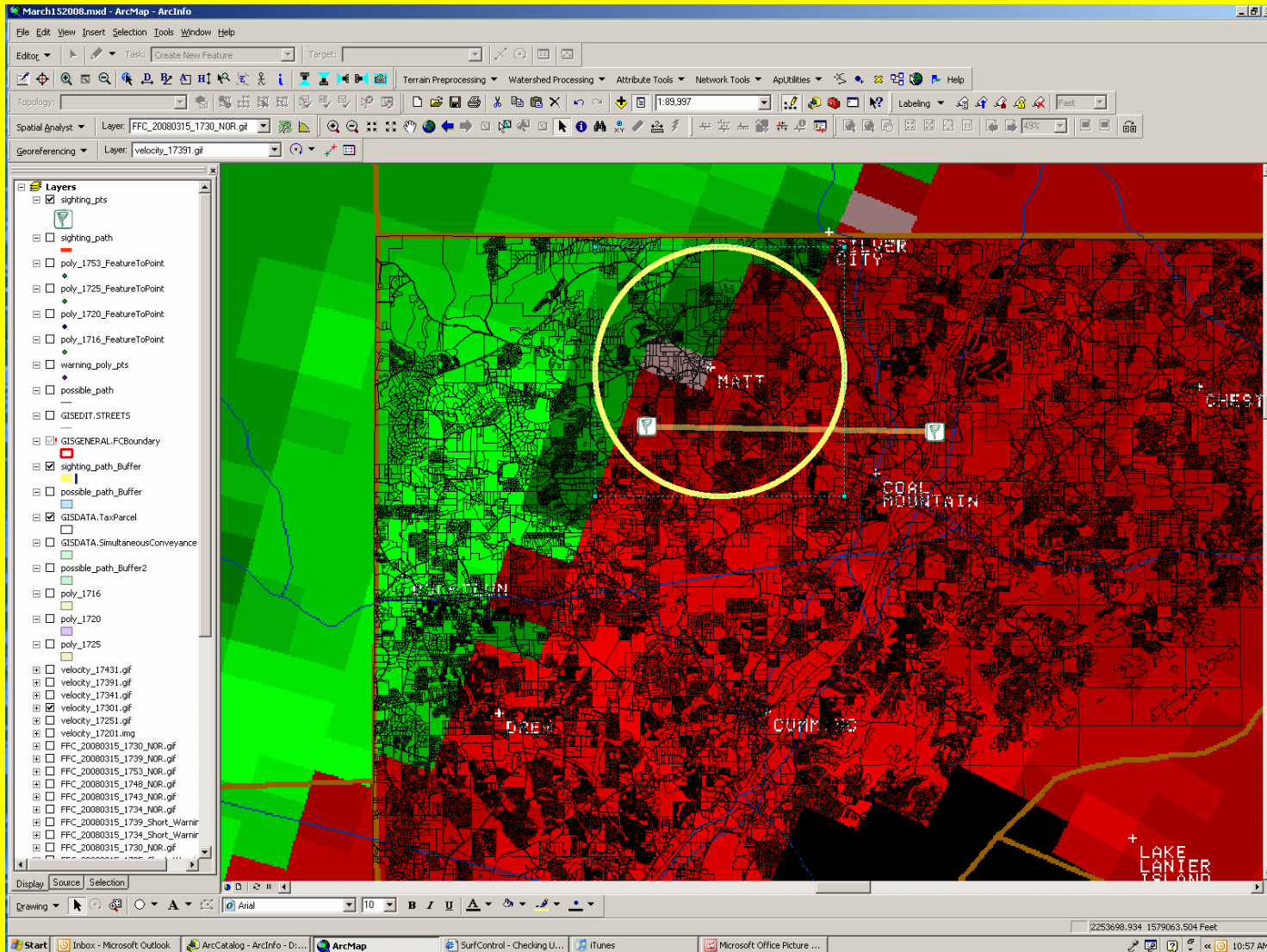
Putting the Science and the Imagery Together Within ArcMap



Yellow circle is where one would look for a tornado on the ground

Actual damage path is depicted

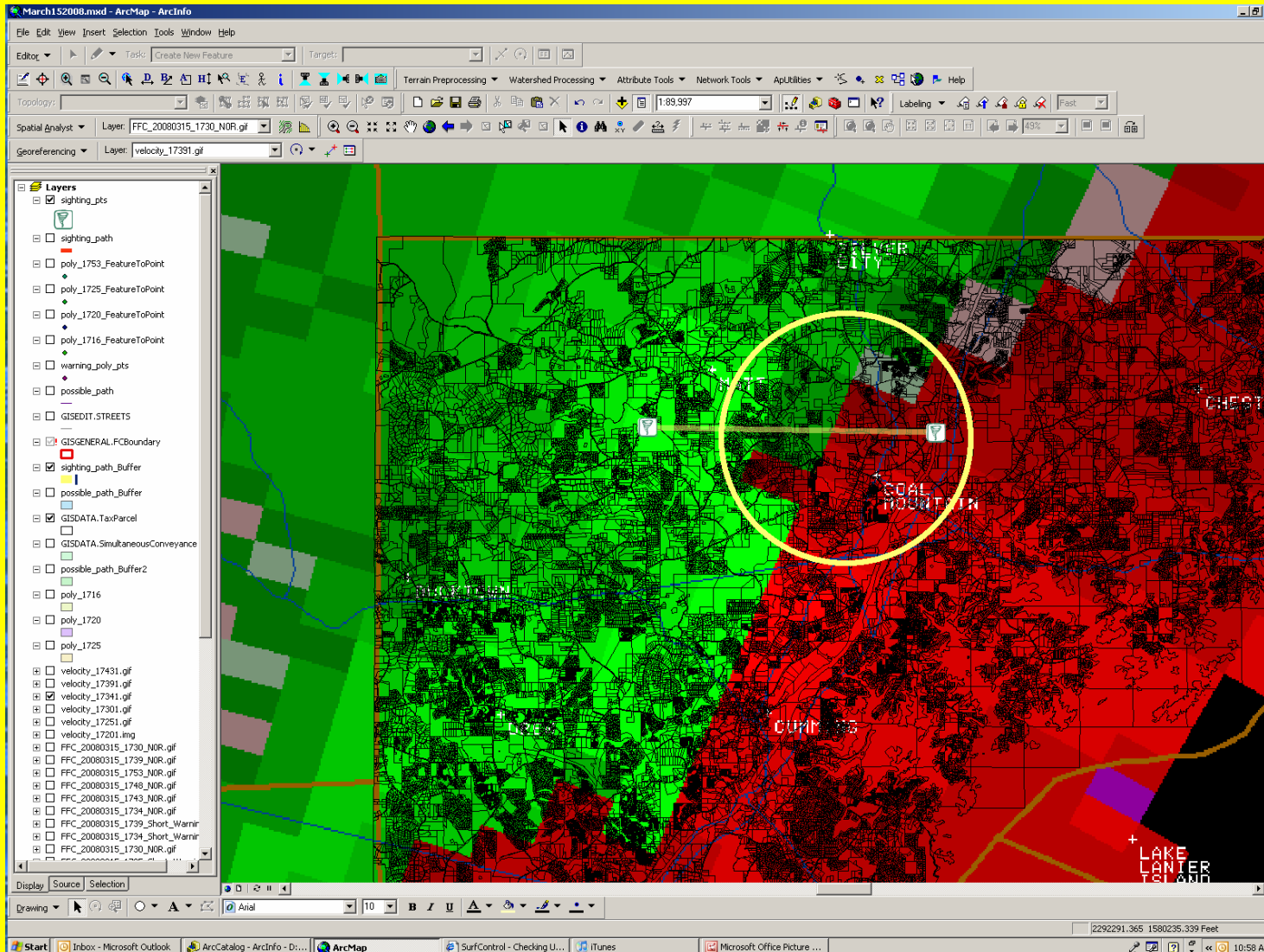
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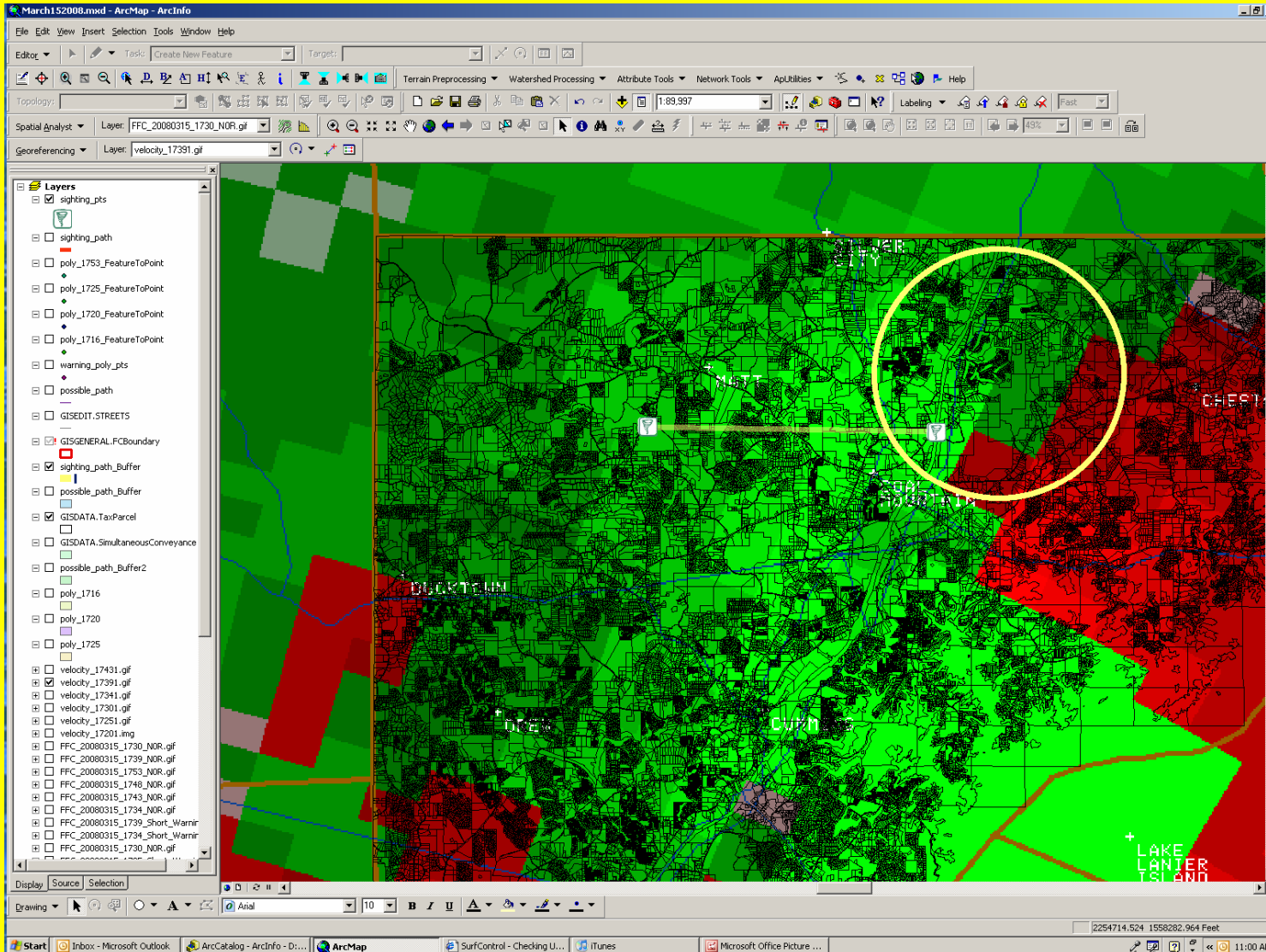
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Now I Have a Damage Path and your Attention, What Next?

- By plotting the center of the circles in the previous slides with a point feature class it just a matter of connecting the dots with a line feature class to establish a preliminary damage path
- Once the damage path is ascertained then with buffering the dimensions of the swath can be input
- With the dimensions of the damage path a clip or simple selection could be performed to isolate impacted parcels
- Then the parcels could be queried with tax assessor data to determine initial amounts of damage in dollars
- With road data, aerial images and network analyst best and safest routes could be established for first responders
- Using your imagination the “sky is limit” (pun intended) to what could be accomplished

Where We Would Like To Go Next

- RSS feed for the images to our server at the EOC so when the tornado is happening we are receiving up to date images for real time processing
- Further integration with existing geoprocessing tools and other extensions to provide even more pertinent and real time information to first responders

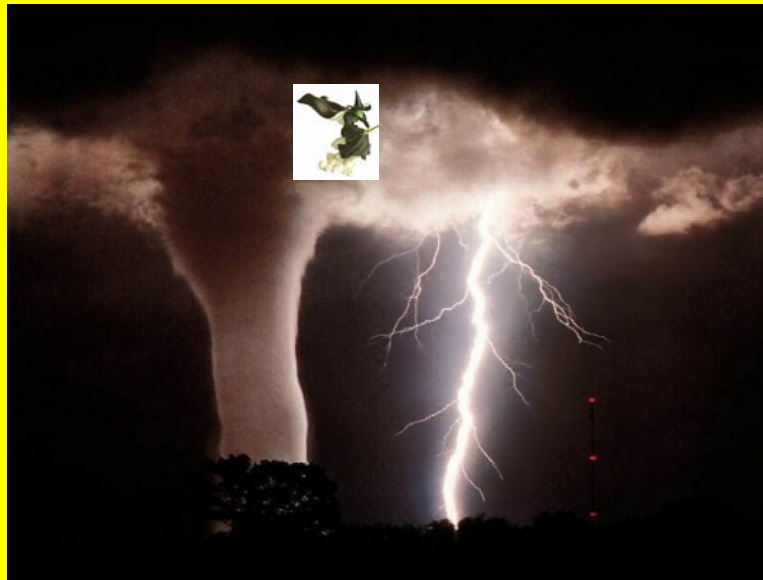
FOLKS TO THANK BACK IN Kansas

(after all we are not in Kansas any more)



Mr. Lans Rothfusz

&



Mr. Steven Nelson



From the Peachtree City, Georgia office of the National
Weather Service