Unique Weather Content and Geospatial Technology for Weather Sensitive Organizations

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Applications of Geospatial Technology at WDT

- **Situation Awareness**
  - Client services
  - Severe/hazardous weather impacts

- **Climatology Assessments (Long term records)**
  - Lightning Climatology
  - Hail Climatology

- **Historical Weather (Forensic) Assessments**
  - Hailstorm
  - Snow
  - Lightning Assessment
  - Wind Assessment
  - Rainfall Assessment (flood potential)
  - Tornado vs. Straight-line Winds

Applications of Geospatial Technology at WDT

- **Safety**
  - Mobile applications – iPhone, iPad, Android
  - Automated alerting

- **Custom Basemaps and Weather Sensor Location Analysis**
  - Terrain
  - Marine Boundaries and Shorelines
  - Rain gauge locations for optimum regional rainfall accumulation (gauge corrected radar precipitation estimation)

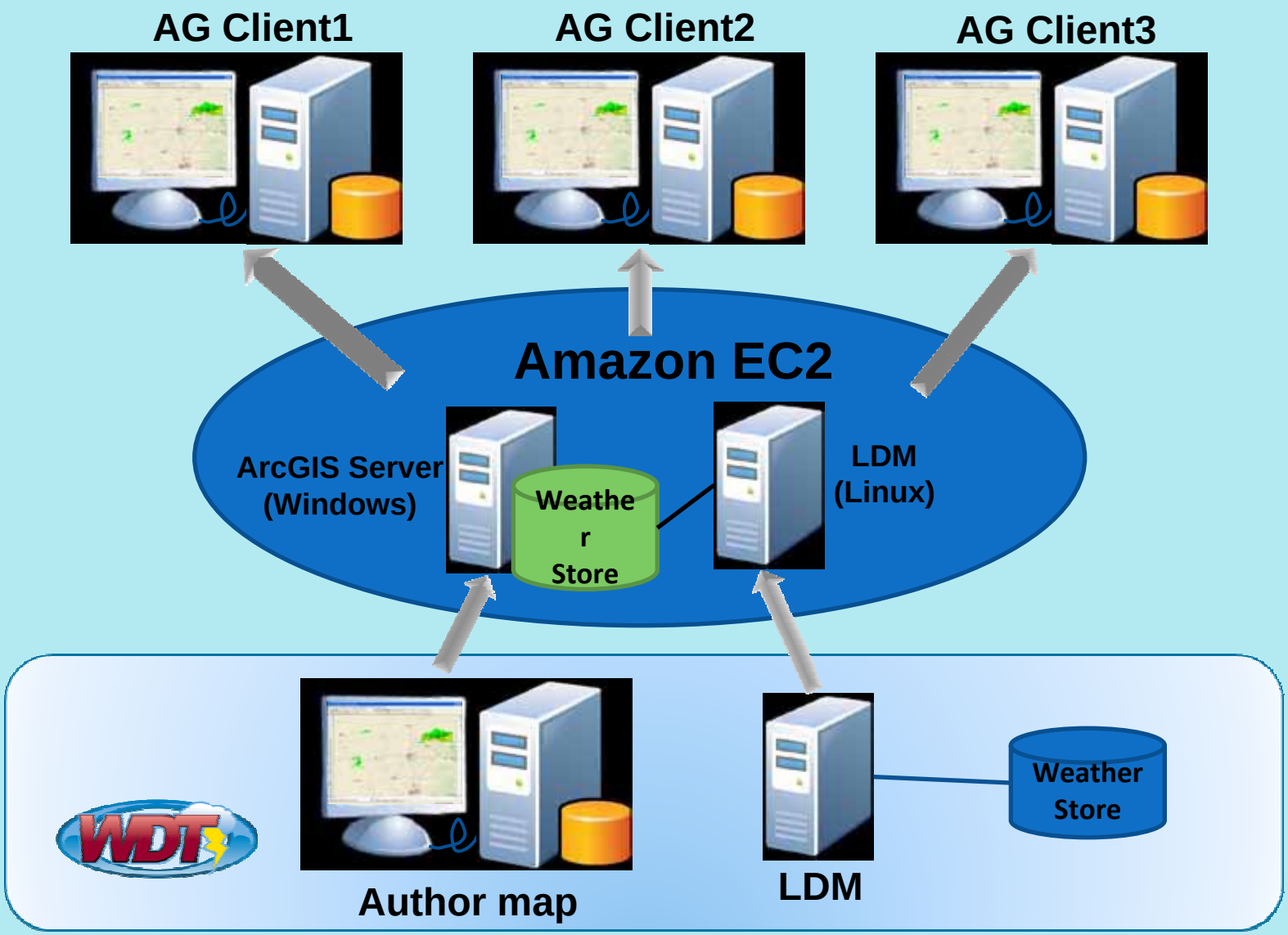
WDT Geospatial Weather Content

- NEXRAD radar - past, current and future (4 hour prediction)
- Rainfall accumulation, area coverage and intensity (average return interval)
- Lightning stroke locations
- Hurricane – Past/forecast track and intensity, error fan, wind radii
- NWS watches and warnings
- Thunderstorm rotation tracking - tornadoes
- Hailstorm track prediction and track (swath) diagnosis
- Hurricane wind damage assessment
- Global precipitation observations
- Surface Weather Observations
- And Much More!!!

Leveraged Technologies

- ArcGIS desktop 10.0
- ArcGIS Server 10.0
- Custom Web and Mobile Applications using Google Maps and Map Box
- PostgreSQL/PostGIS
- MySQL
- Local Data Manager (LDM) – Real-time data transfer/distribution

Real-time Data/Services Flow



WDT Hailswath Diagnosis Workflow

CONUS NEXRAD
134 Radars

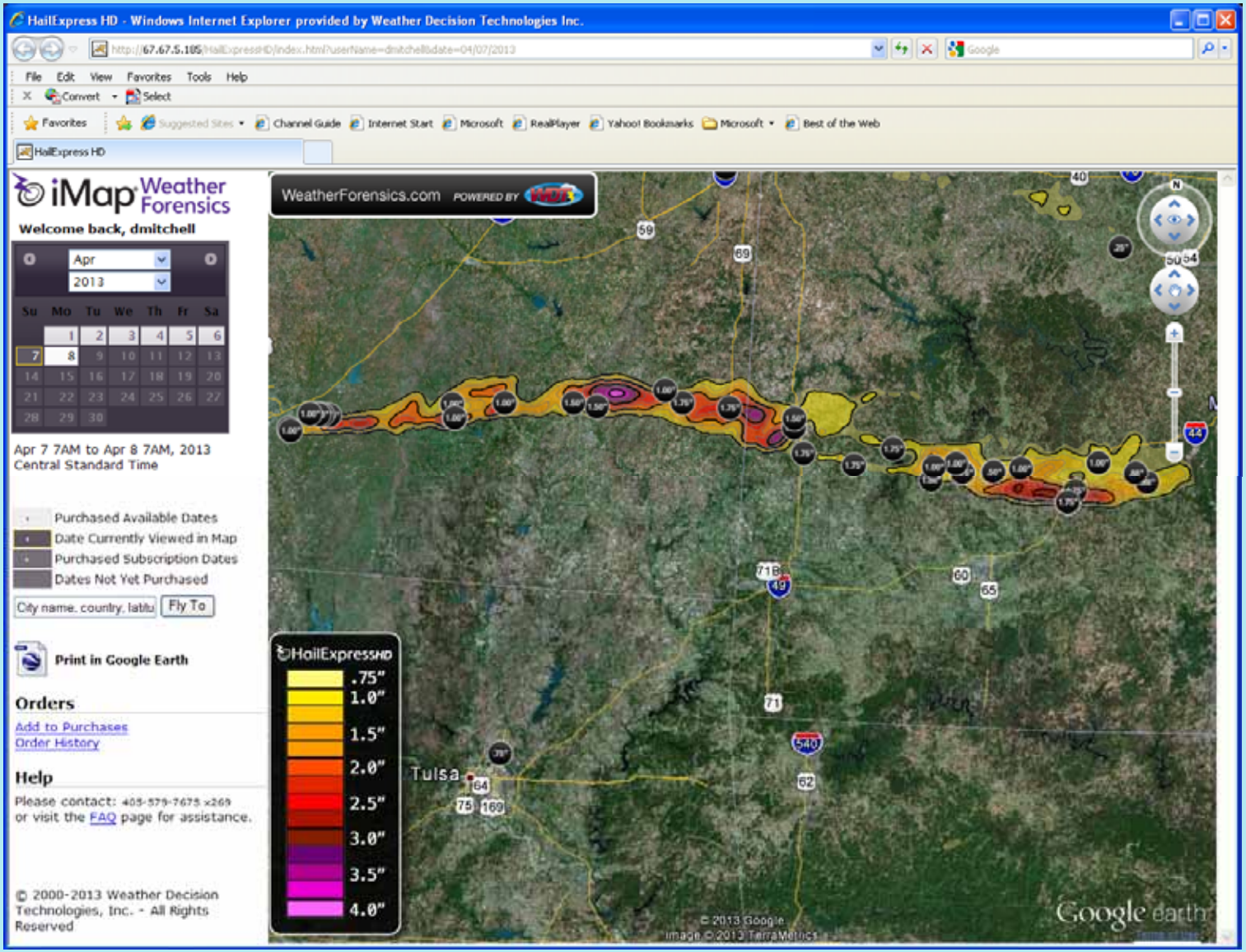
Advanced Radar and Storm Analysis System

- Decode Level II radar data
- Level II QC – Remove artifacts
- Create nationwide 3D radar mosaic
- Integrate temperature data (0C & -20C)
- Compute gridded hail size and hail probability
- Apply hail size and swath area bias adjustment techniques
- Contour final hail size grid

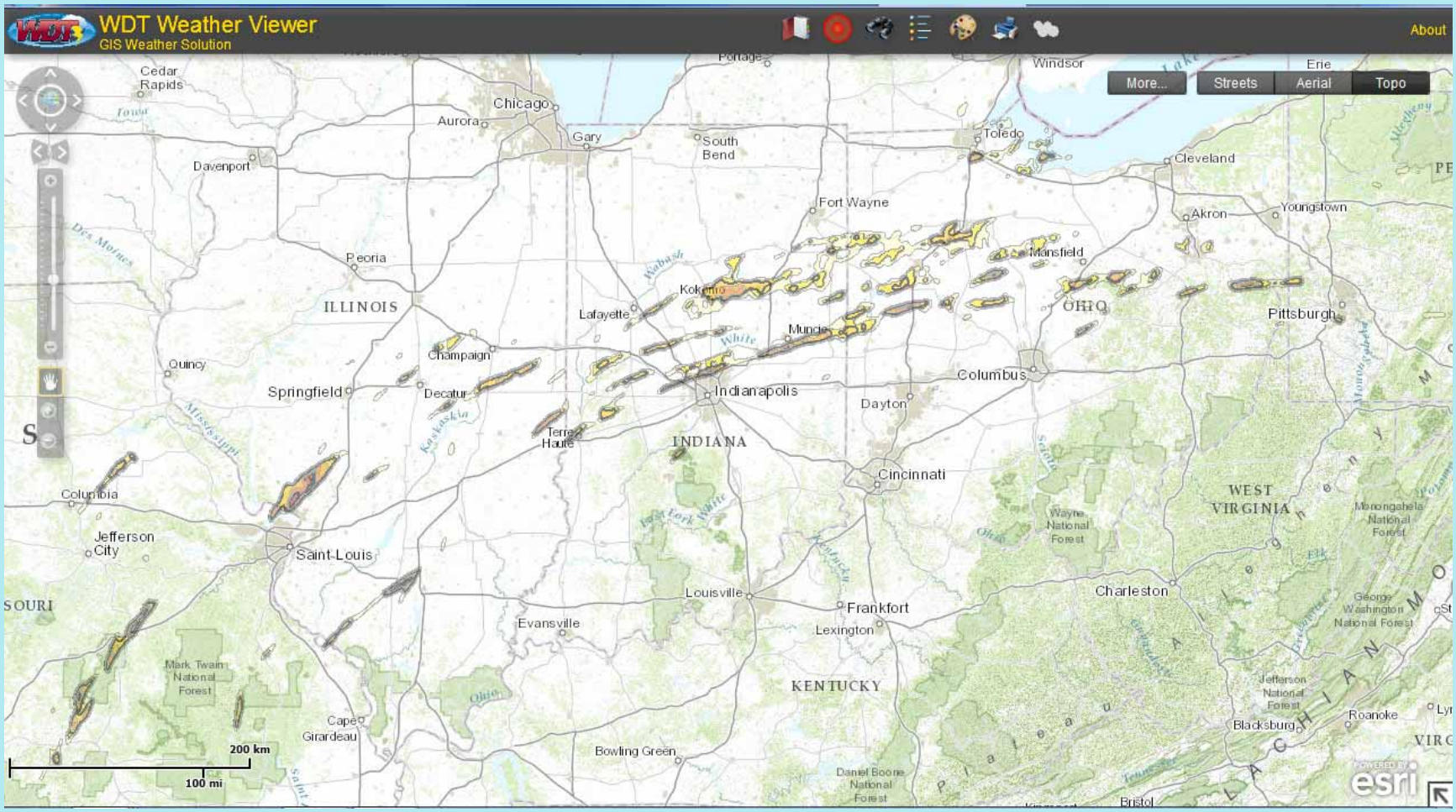
Data store

Display

WDT Hailswath Visualization



WDT Hailswath Example: April 10, 2013



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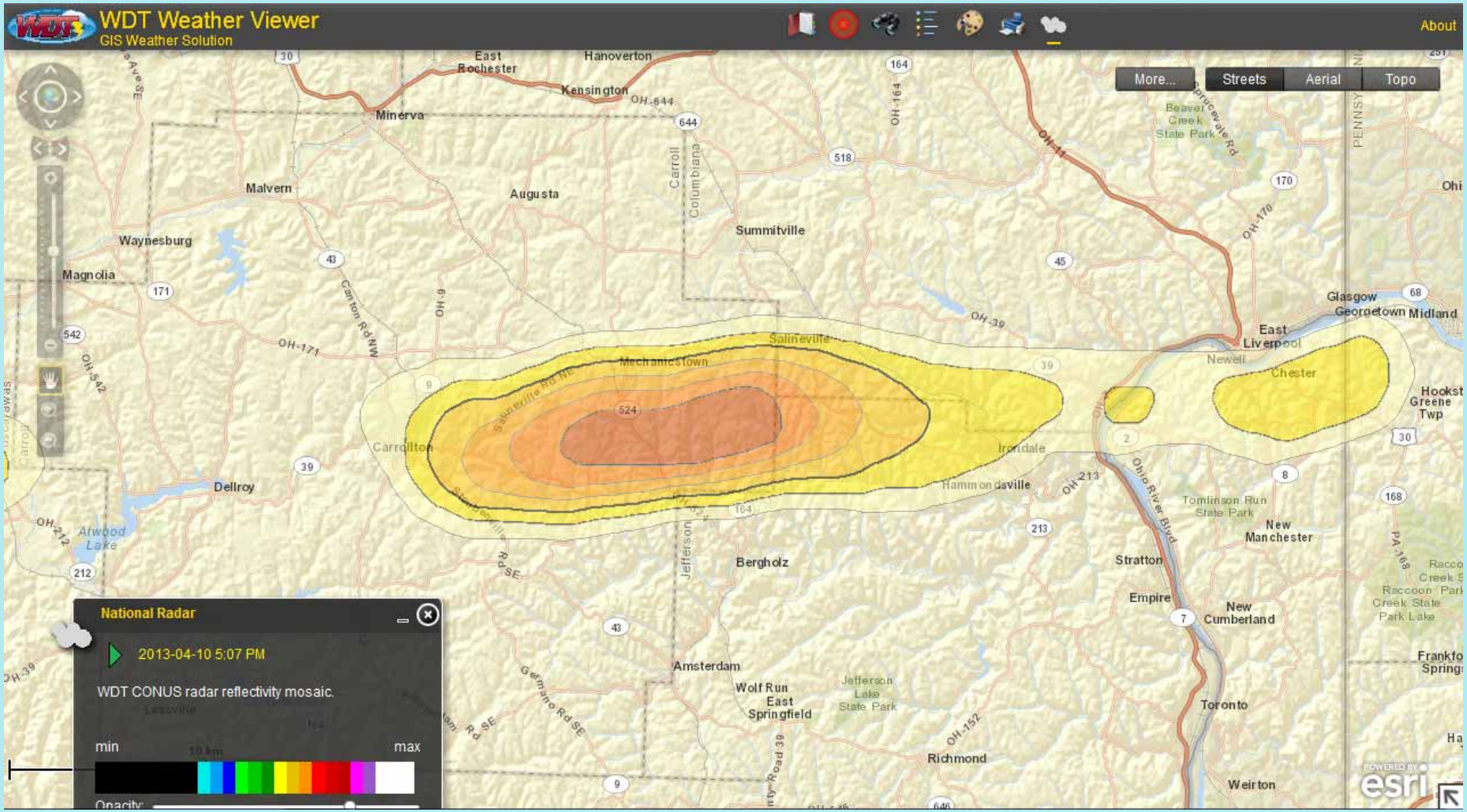

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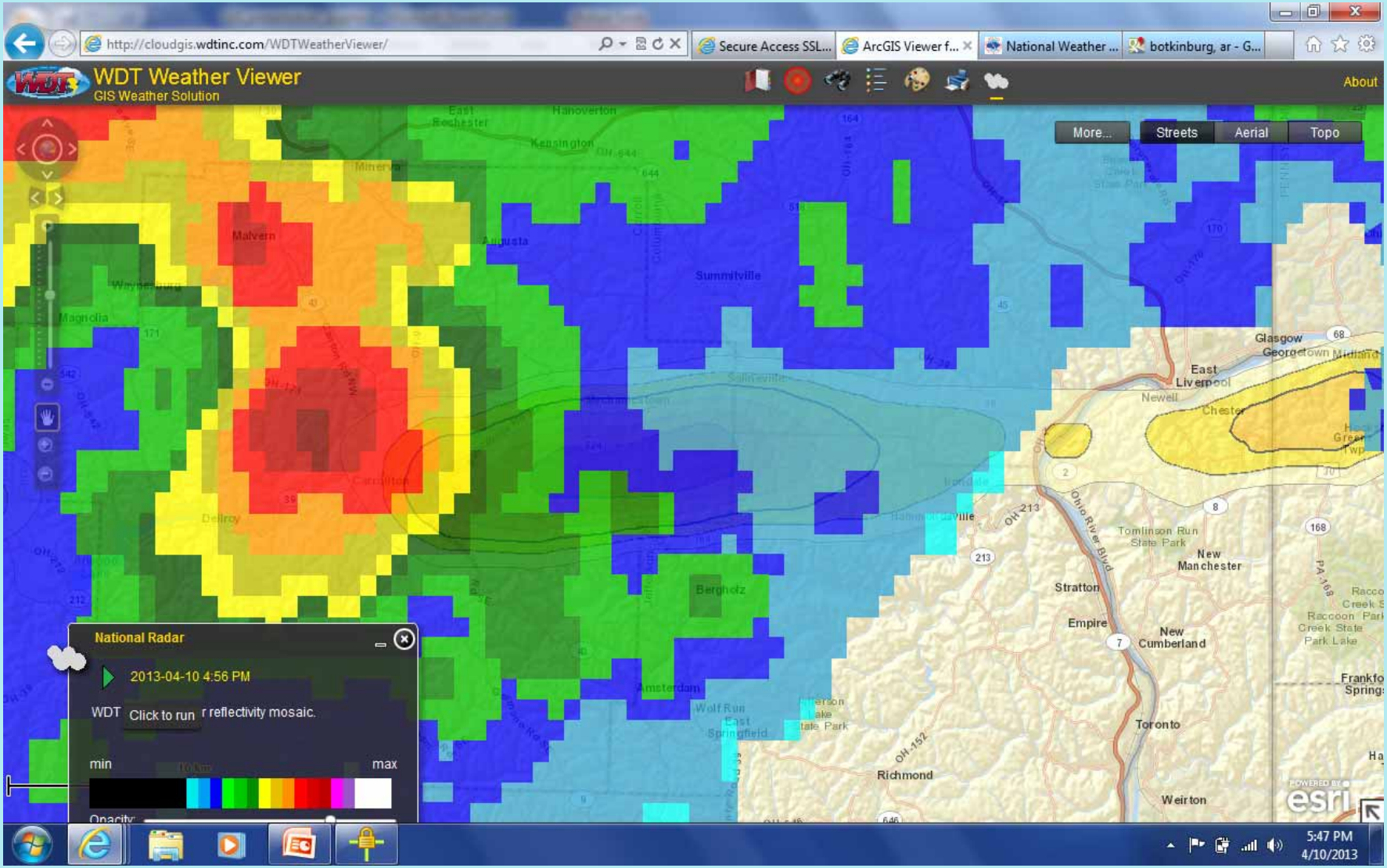
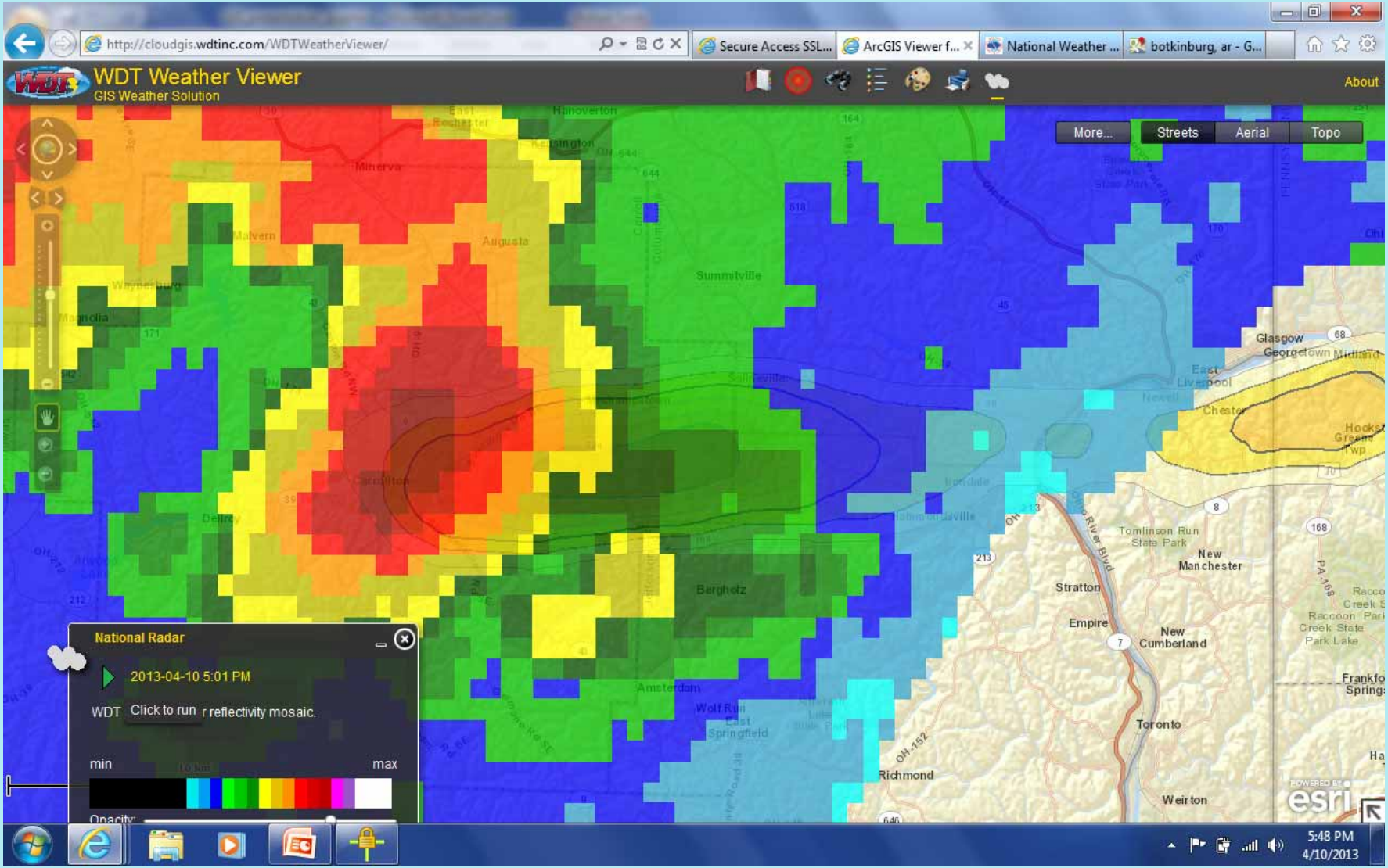


WDT Hailswath Example: April 10, 2013



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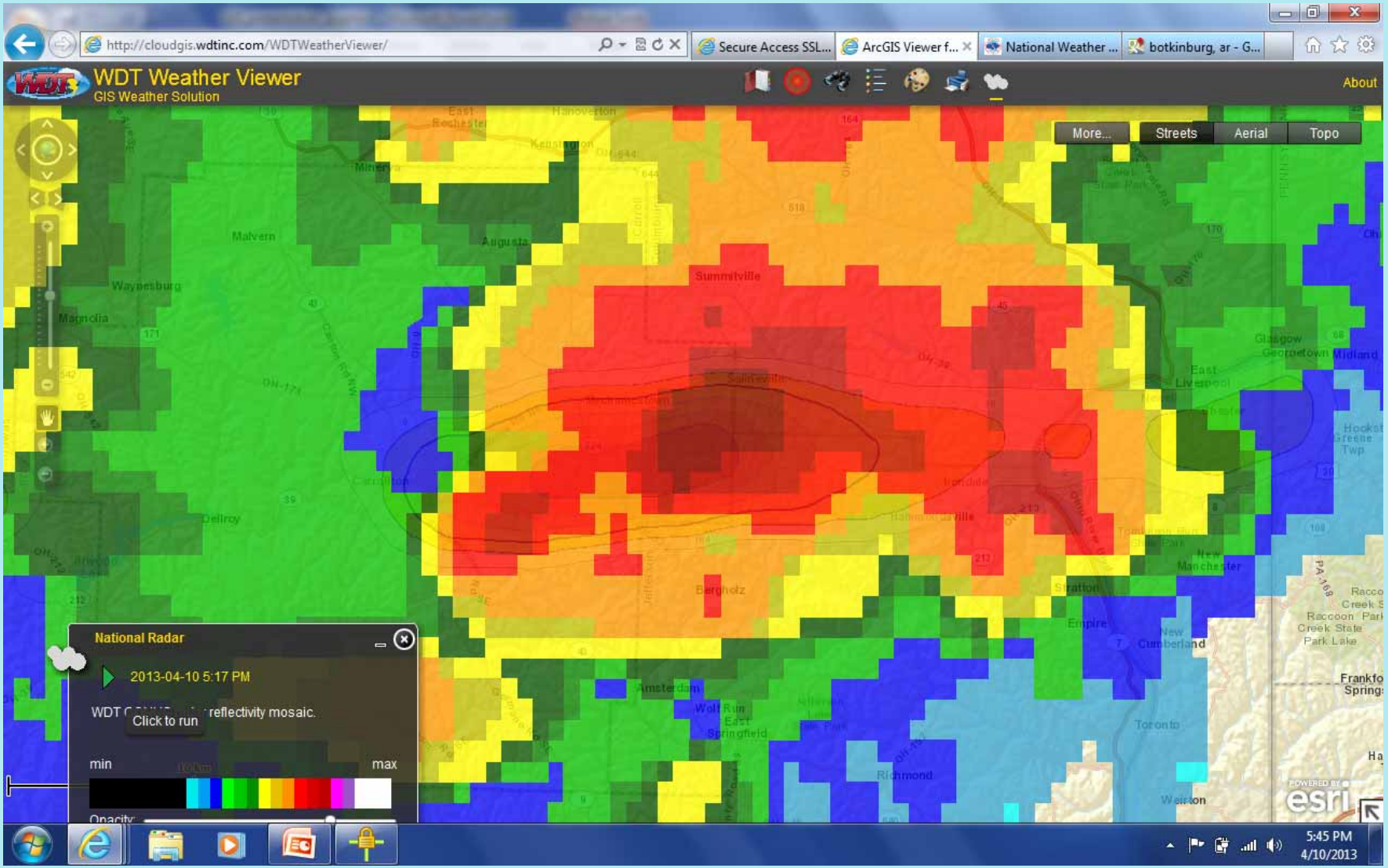
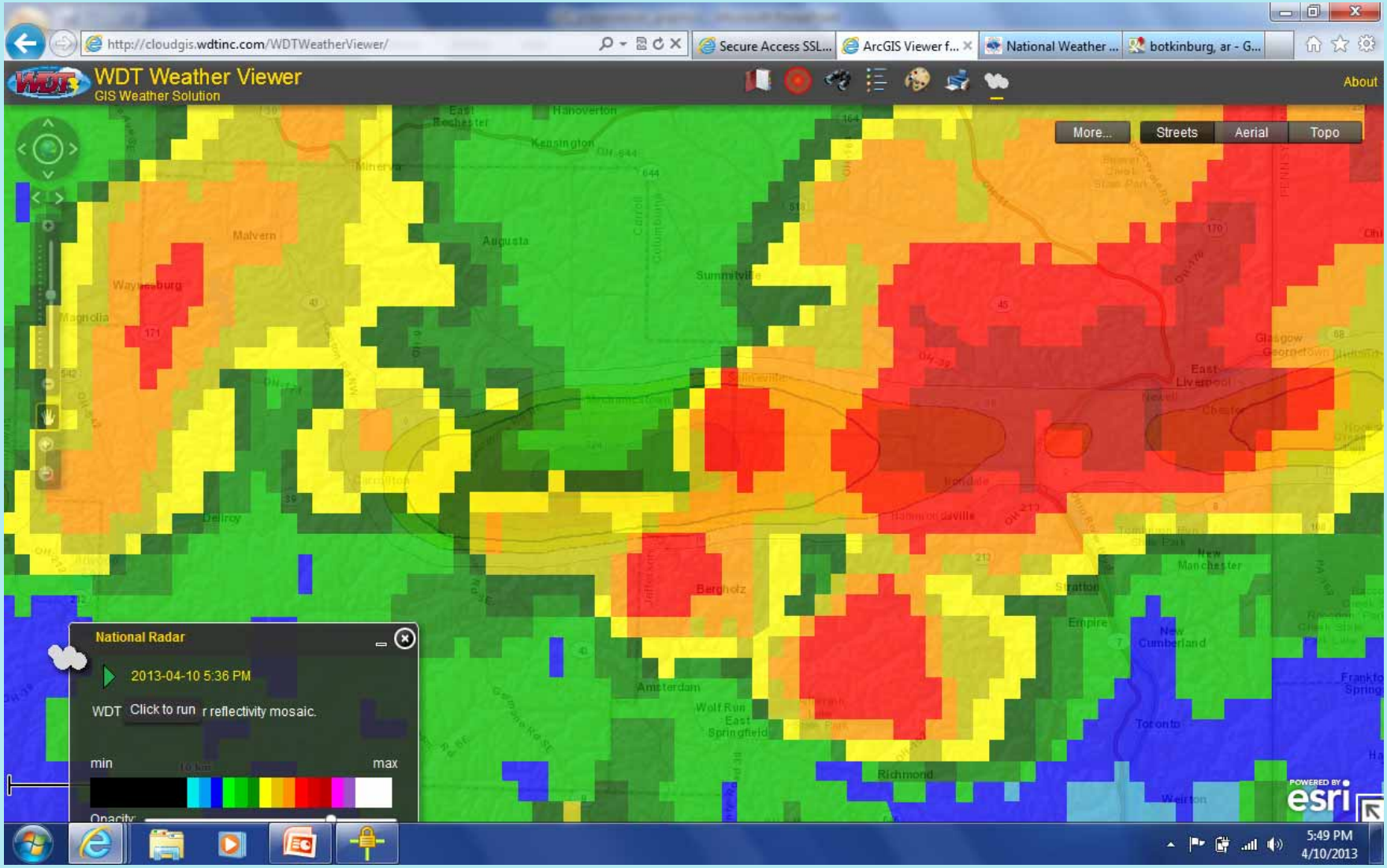


WDT Hailswath Example: April 10, 2013



WDT Rotation (Tornado) Diagnosis Workflow

CONUS NEXRAD
134 Radars

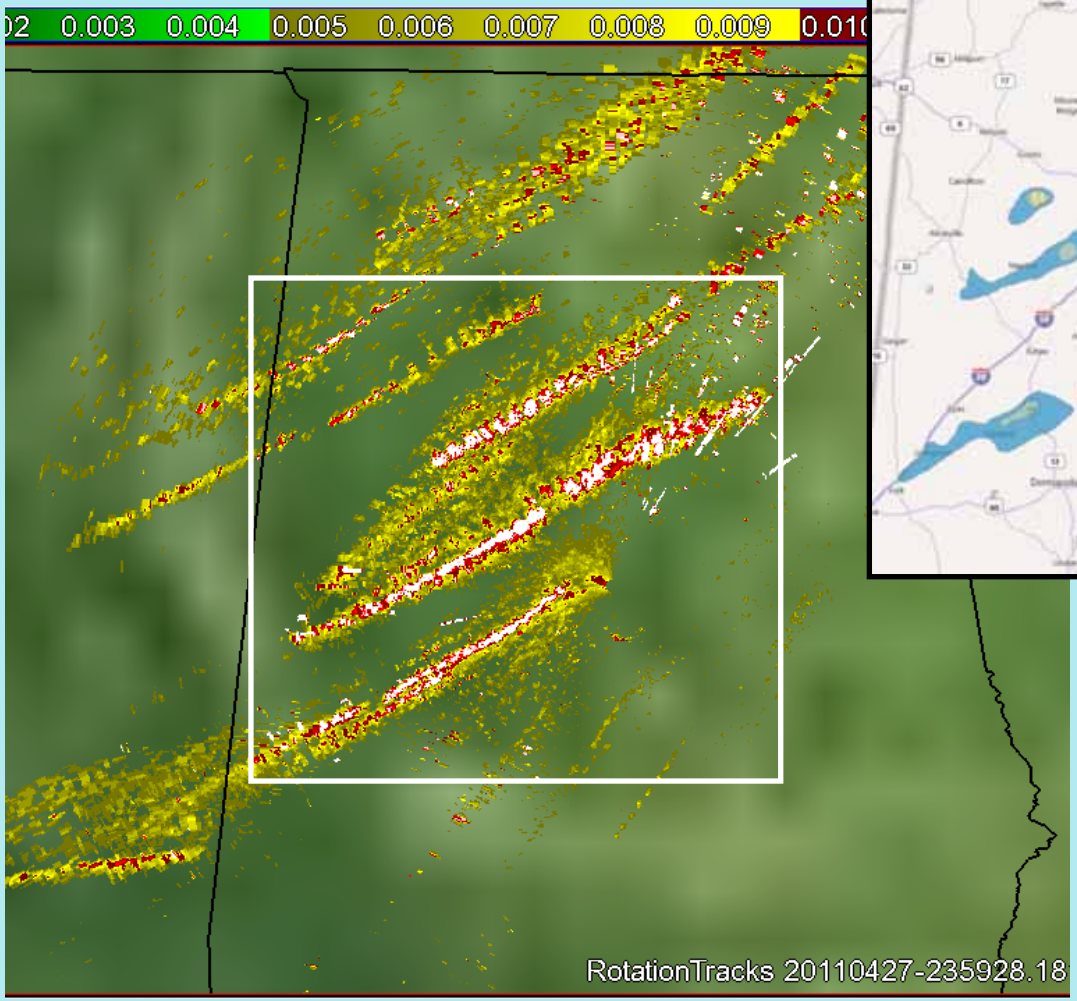
Advanced Radar and Storm Analysis System

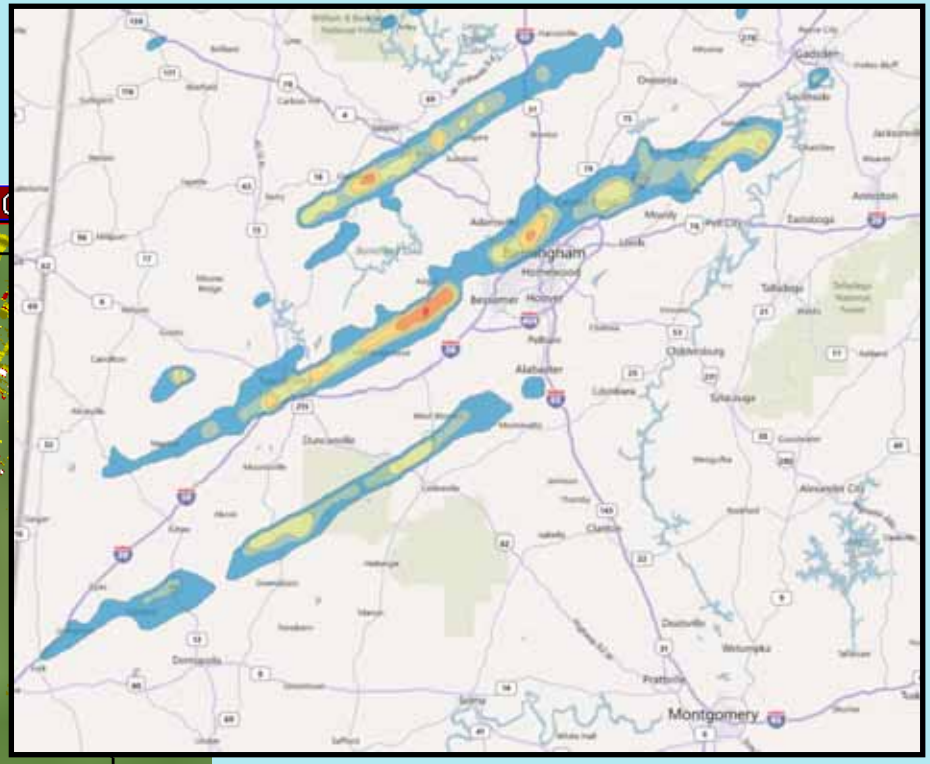
- Decode Level II radar data
- Compute/identify rotation (azimuthal shear)
- Merge single-radar rotation into CONUS shear mosaic
- "Accumulate" rotation over time
- Apply QC/QA: Remove noise and spurious data.

Data store

Display

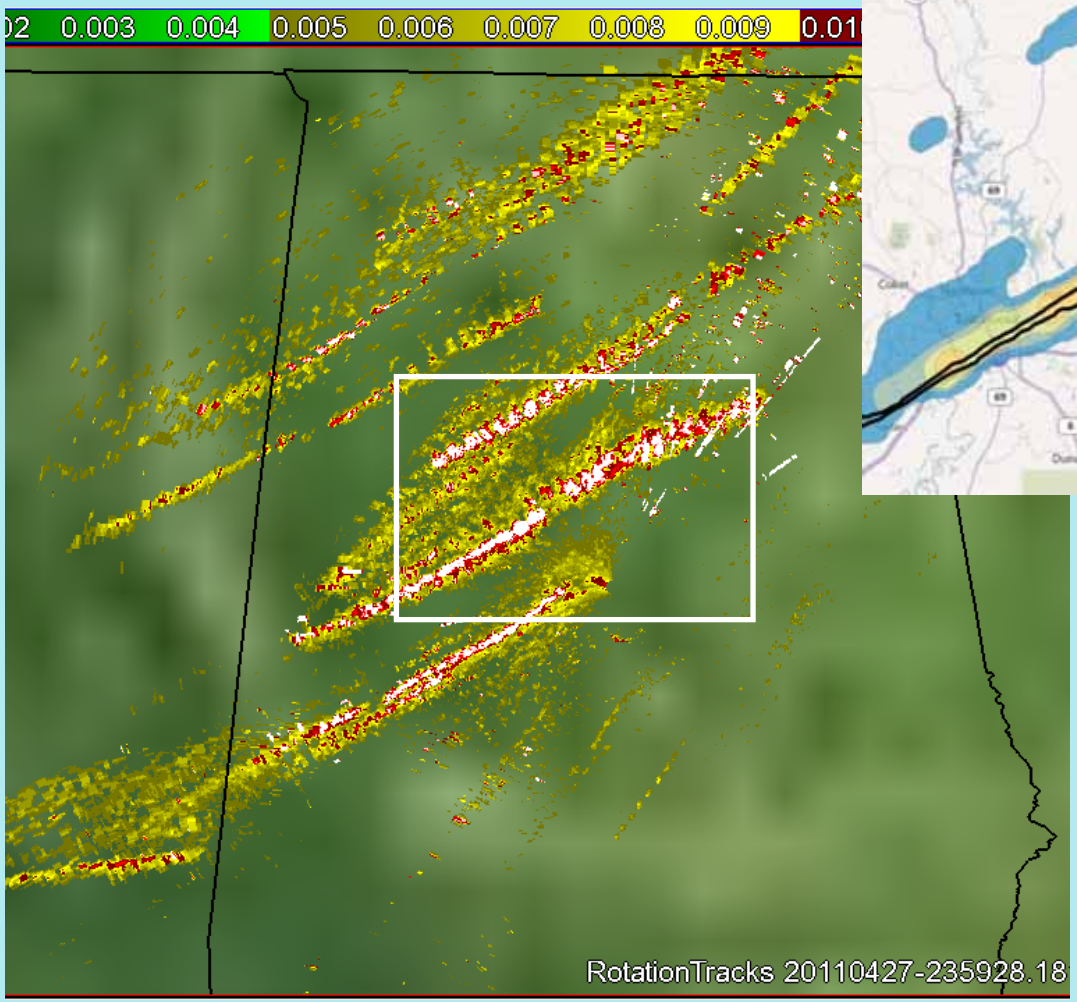
Before QC/QA

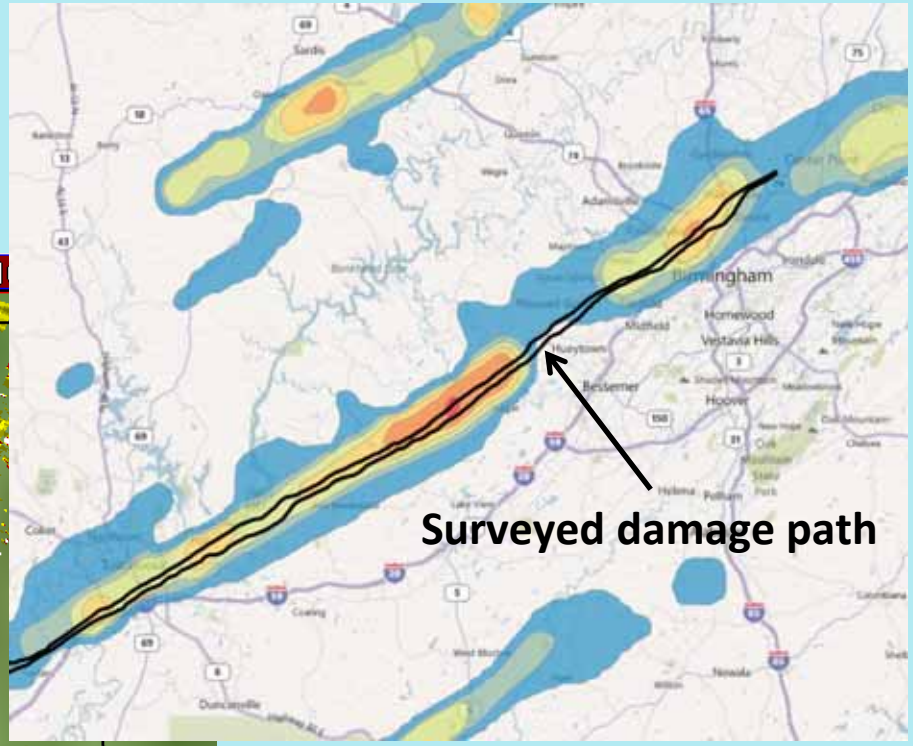




After QC/QA

Before QC/QA





After QC/QA

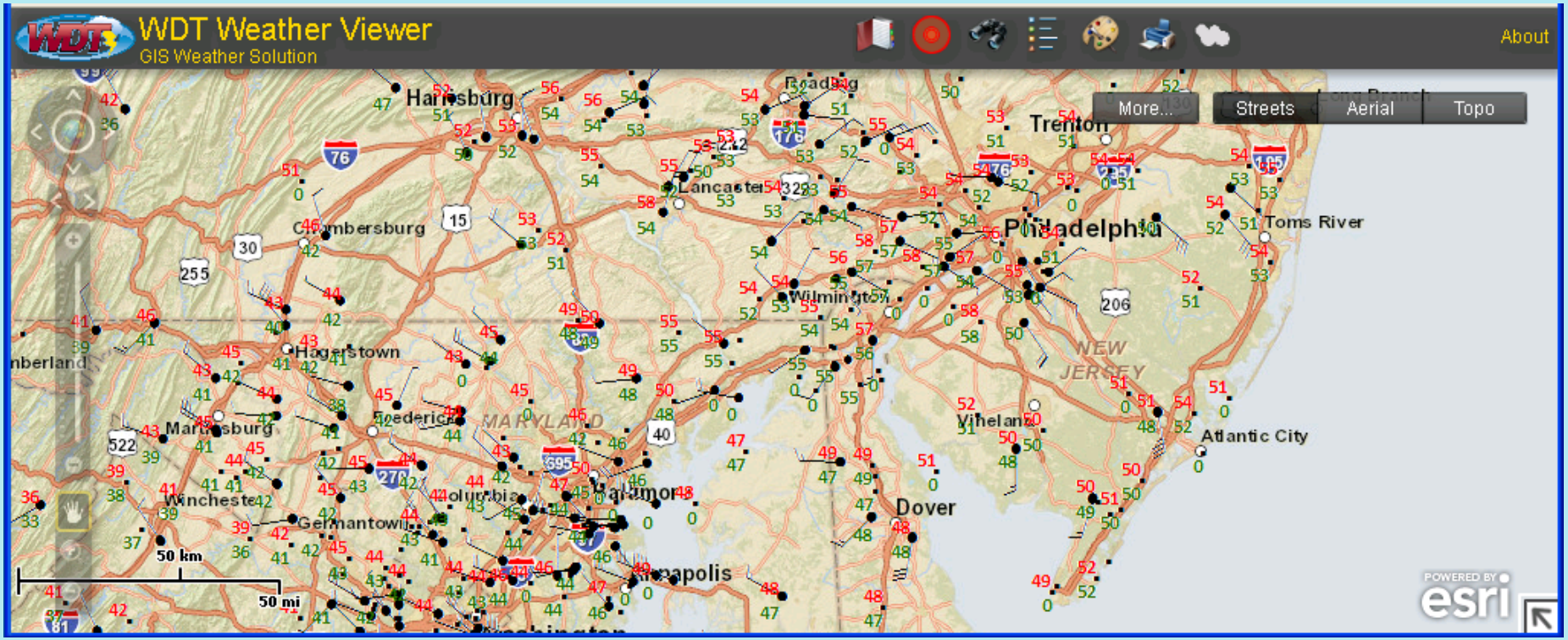
Geospatial Weather: Situation Awareness

Web Viewer

ArcMap

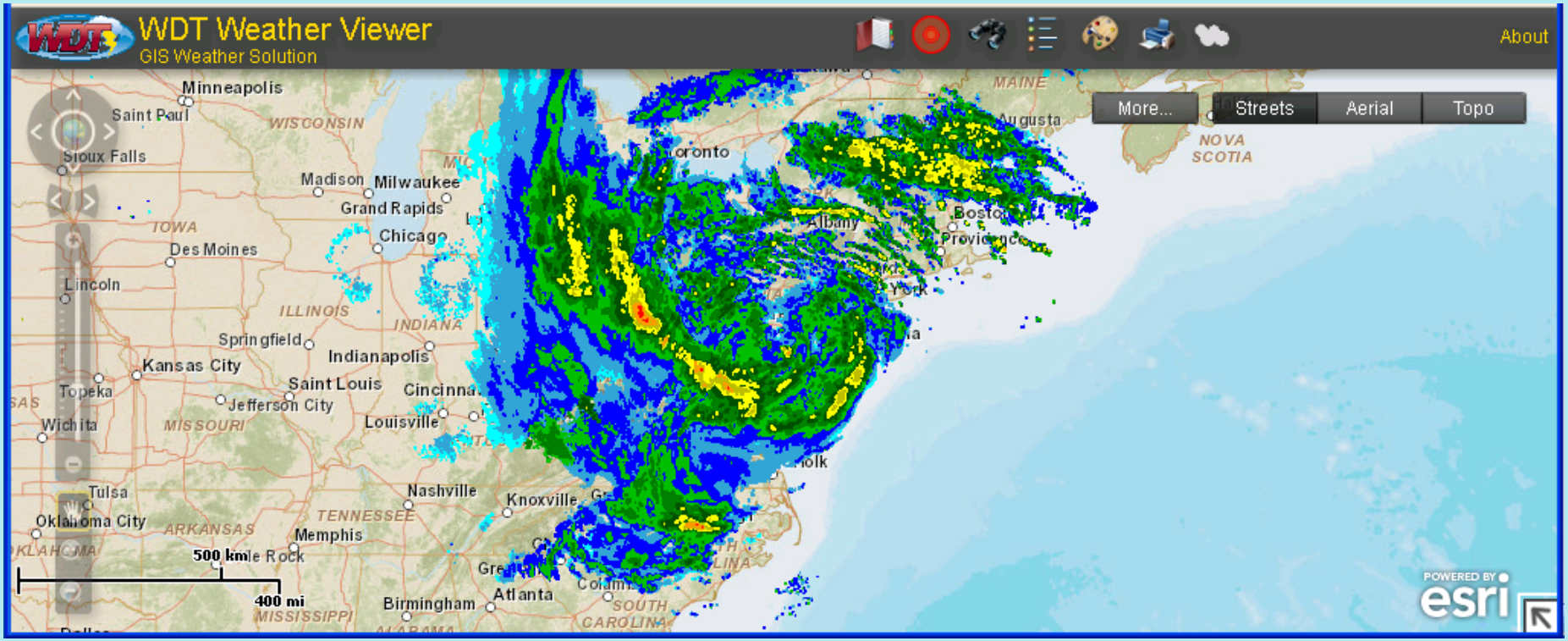
Geospatial Weather: Situation Awareness

Surface weather observations: Hurricane Sandy



Geospatial Weather: Situation Awareness

Radar reflectivity: Hurricane Sandy




WDT Weather Viewer
GIS Weather Solution
About
Map Contents
Streets
Aerial
Topo
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MEXICO
Gulf of Mexico
Seattle
Portland
Spokane
Boise
Salt Lake City
Denver
Cheyenne
Bismarck
Minneapolis
Saint Paul
Chicago
Detroit
Cleveland
Toronto
Ottawa
Montreal
Sudbury
Rochester
Buffalo
Albany
Boston
Hartford
New York
Philadelphia
Trenton
Harrisburg
Washington
Annapolis
Dover
Richmond
Norfolk
Pittsburgh
Columbus
Indianapolis
Springfield
Kansas City
Wichita
Lincoln
Des Moines
Saint Louis
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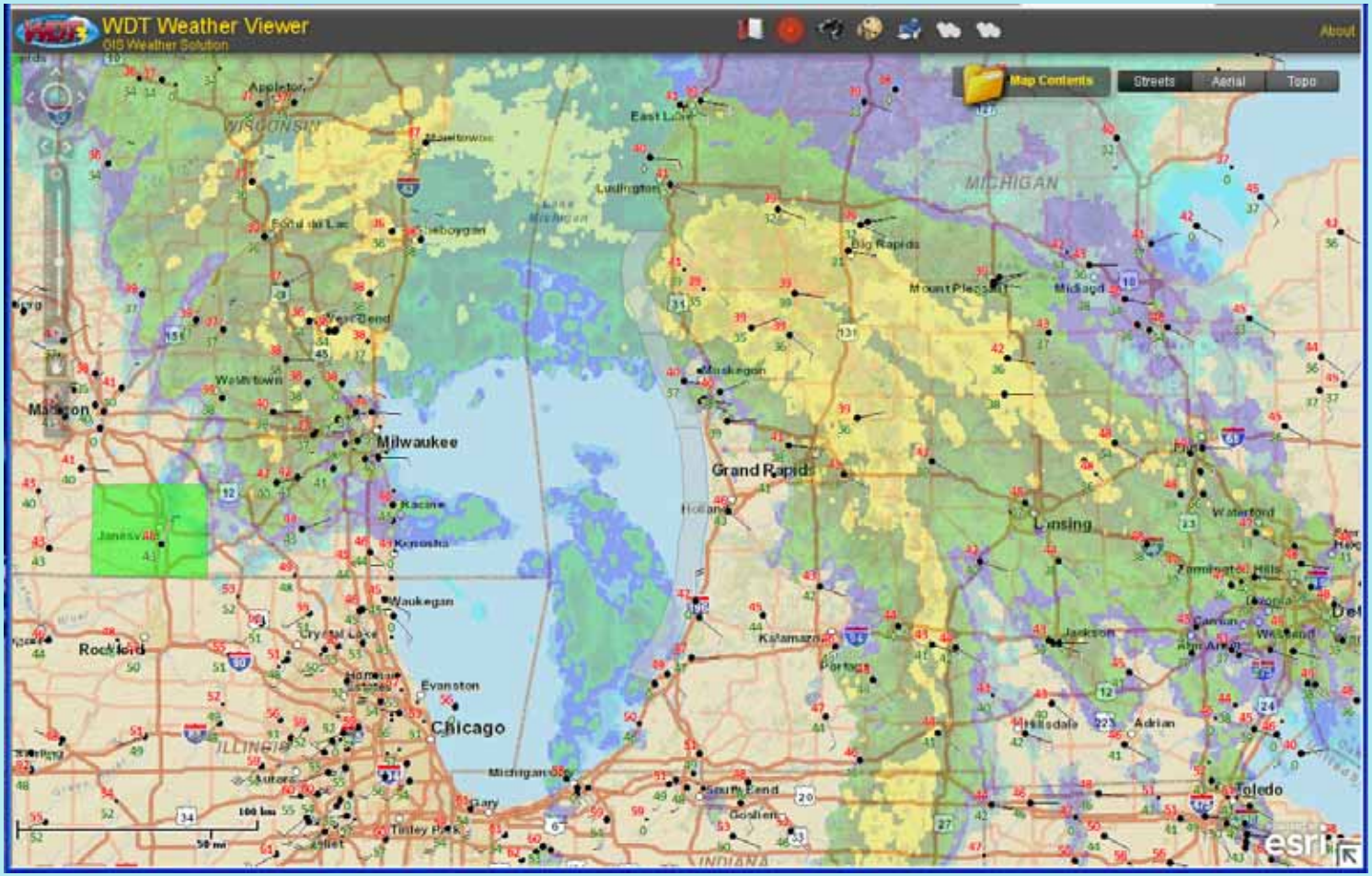
Chihuahua
Hermosillo
Tucson
Monterrey
Brownsville
Culiacan
Durango
Tijuana
Fresno
Los Angeles
San Diego
Phoenix
Helena
Bismarck
500 km
500 mi
esri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Tinley Park
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South Bend
Goshen
Hillsdale
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Portage
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Farmington Hills
Ann Arbor
Wayland
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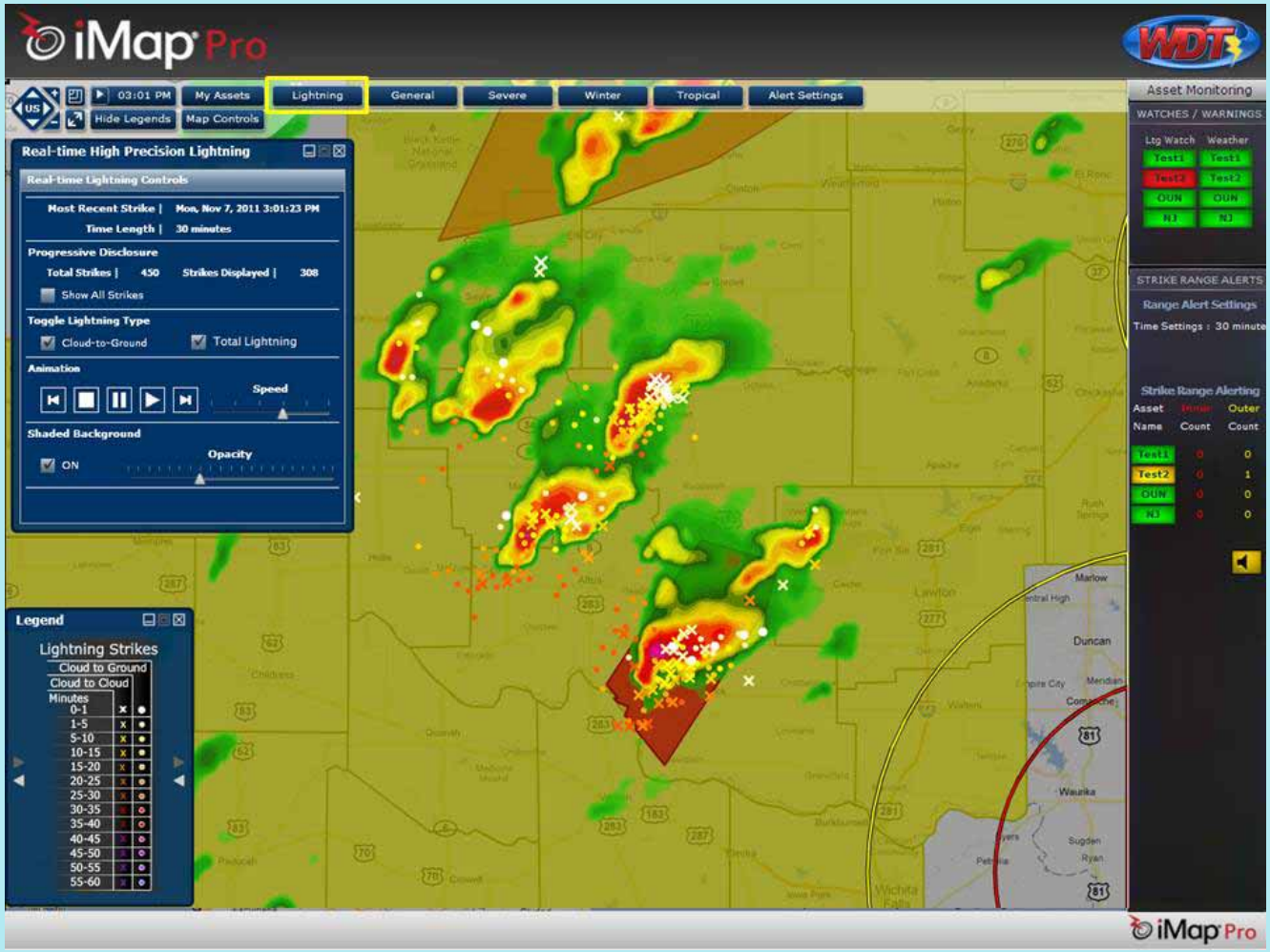
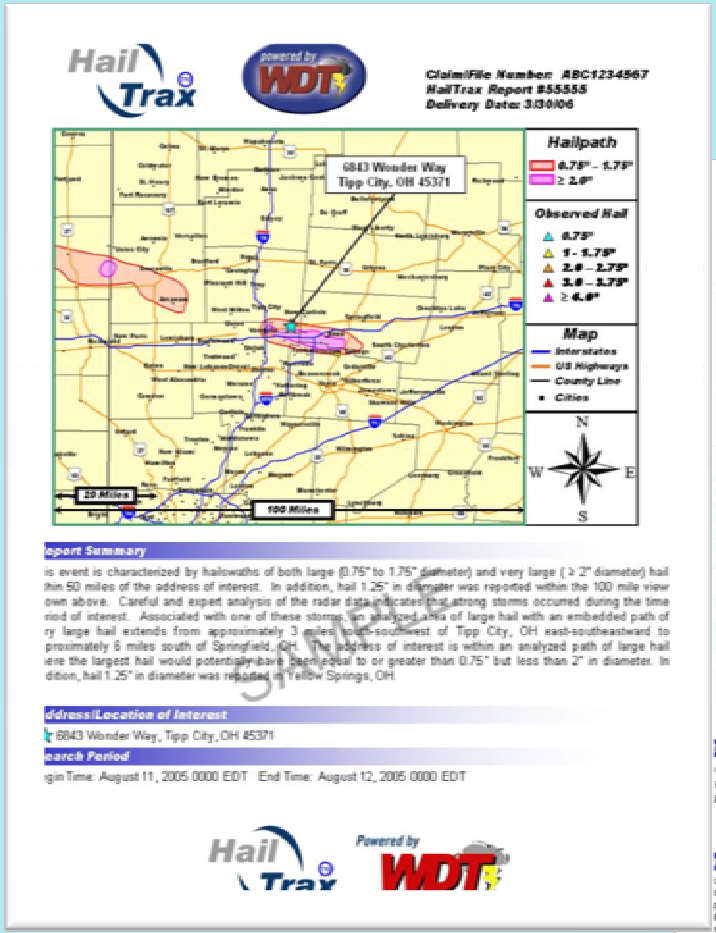
Geospatial Weather: Situation Awareness

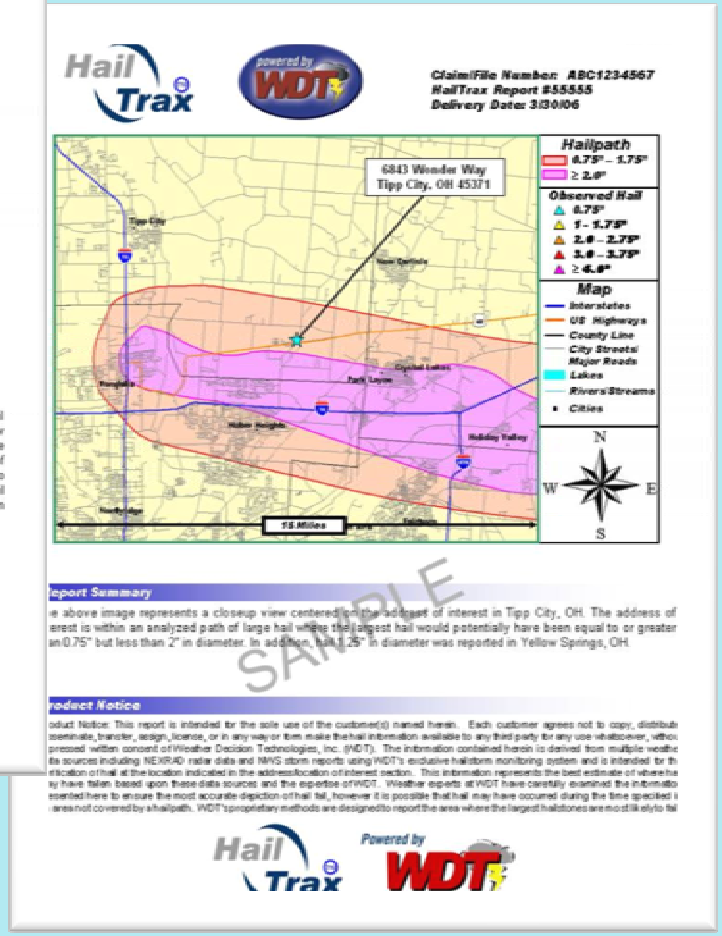


Geospatial Weather: Historical Assessment

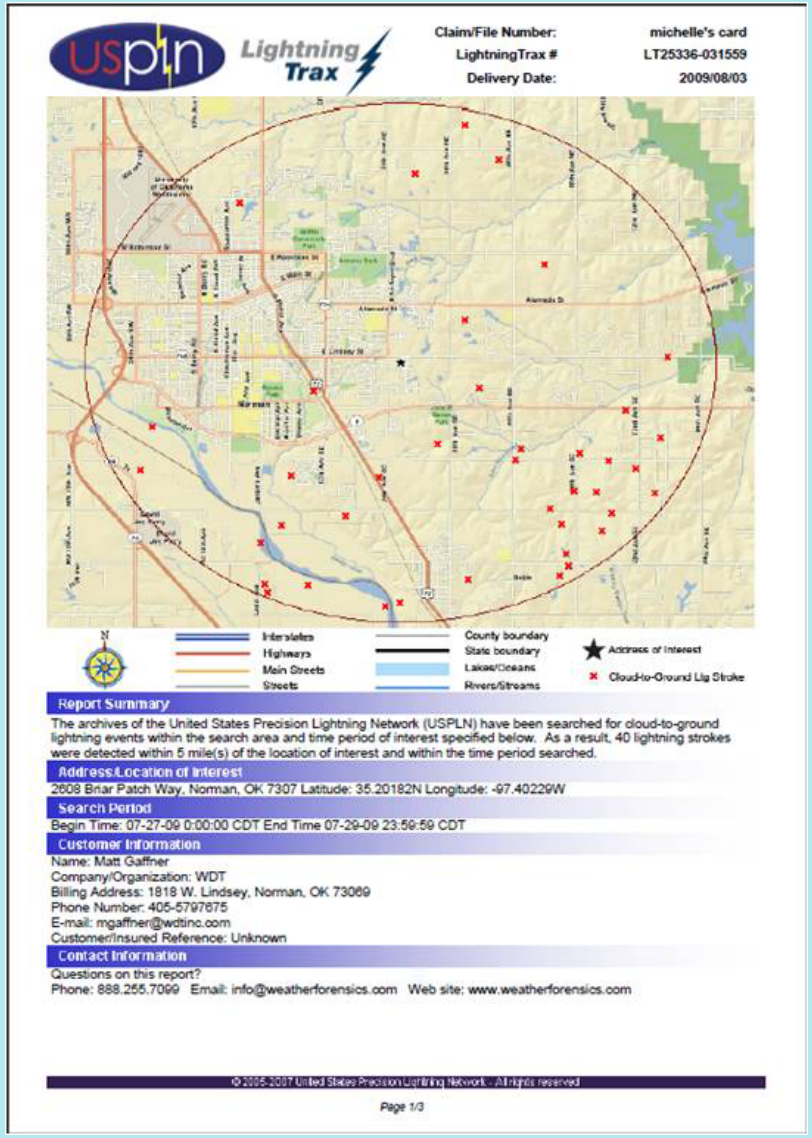


Hailstorm Assessment

...integration of radar, hail reports using ESRI ArcGIS Desktop...



Geospatial Weather: Historical Assessment



USpln Lightning Trax

Claim/File Number: michelle's card
LightningTrax # LT25336-031559
Delivery Date: 2009/08/03

Interstates
Highways
Main Streets
Streets
County boundary
State boundary
Lakes/Oceans
Rivers/Streams
Address of Interest
Cloud-to-Ground Lig Stroke

Report Summary

The archives of the United States Precision Lightning Network (USPLN) have been searched for cloud-to-ground lightning events within the search area and time period of interest specified below. As a result, 40 lightning strokes were detected within 5 mile(s) of the location of interest and within the time period searched.

Address/Location of Interest

2608 Briar Patch Way, Norman, OK 7307 Latitude: 35.20182N Longitude: -97.40229W

Search Period

Begin Time: 07-27-09 0:00:00 CDT End Time 07-29-09 23:59:59 CDT

Customer Information

Name: Matt Gaffner
Company/Organization: WDT
Billing Address: 1818 W. Lindsey, Norman, OK 73069
Phone Number: 405-5797675
E-mail: mgaffner@wdtinc.com
Customer/Insured Reference: Unknown

Contact Information

Questions on this report?
Phone: 888.255.7099 Email: info@weatherforensics.com Web site: www.weatherforensics.com

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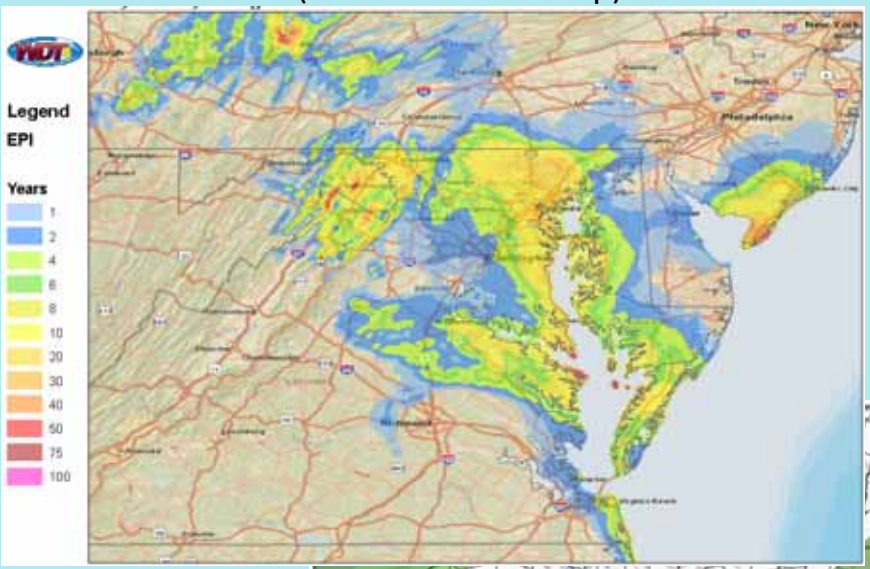
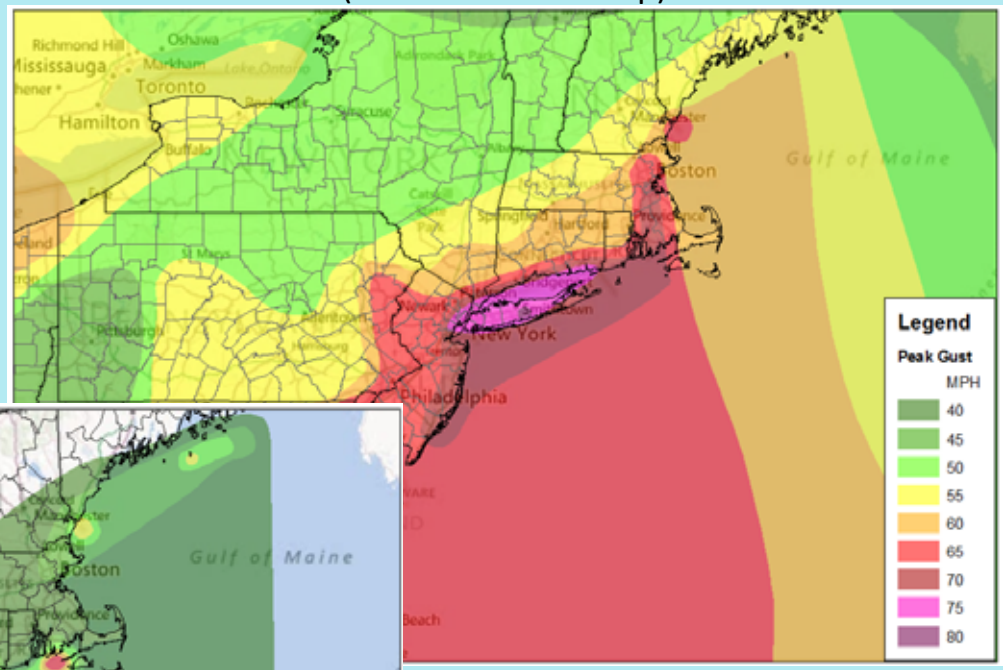
Lightning Strike Location Assessment

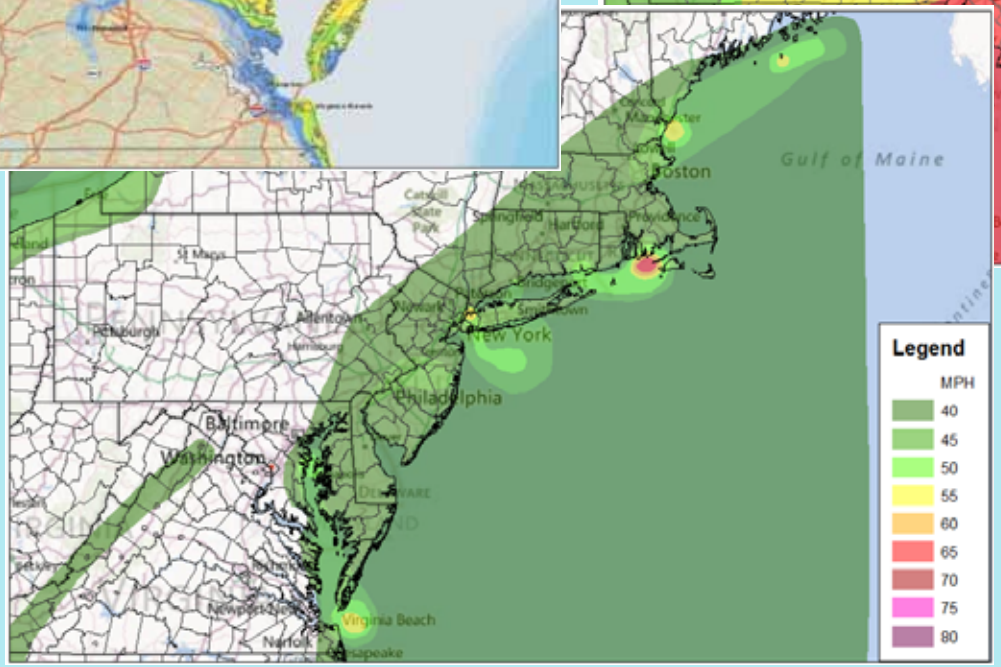
Geospatial Weather: Historical Assessment

Extreme Precipitation Index: Hurricane Sandy
(ESRI ArcGIS desktop)



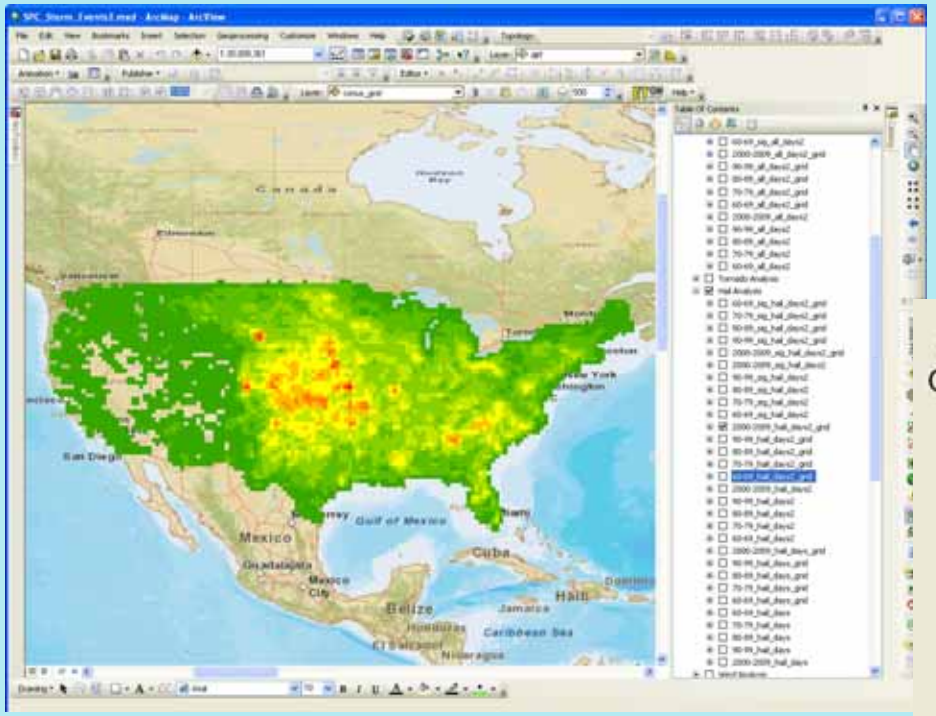
Peak Winds: Hurricane Sandy
(ESRI ArcGIS desktop)



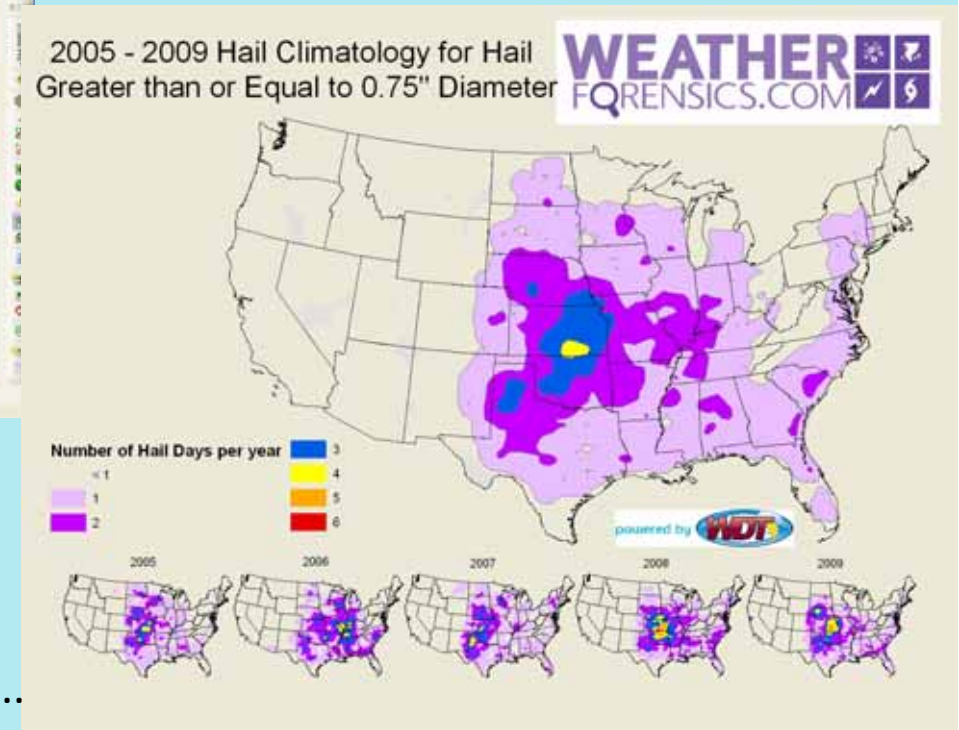


Sustained Winds: Hurricane Sandy
(ESRI ArcGIS desktop)

Geospatial Weather: Historical Assessment



Hail Climatology Assessment (decadal)
...NWS hail reports
using ESRI ArcGIS desktop
with spatial analyst...



Hail Climatology Assessment
..."long-term" hail analysis using
ESRI ArcGIS desktop with spatial analysis...

Geospatial Weather: Mobile Applications

- Polygon-based alerts, combined with “follow me” location-based services (LBS). Leverages device’s GPS capability.
- Interactive mapping with live radar, watches/warnings and satellite.
- Alerts (NWS Watches/Warnings) for your current location and for saved locations.
- Phone “wakes up” automatically, beeps and speaks to you.


"That's all Folks!"
Cartoon Songs From
MERRIE MELODIES & LOONEY TUNES

Questions??