WEATHER RADAR DATA SERVICES AT NOAA'S NATIONAL CLIMATIC DATA CENTER

Twelfth Workshop on Meteorological Operational Systems
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Radar Networks Supported

Primary radar network data and products archived at NCDC:

- **Weather Surveillance Radar 1988 Doppler (WSR-88D)**
  - *** Common Name: Next Generation Radar (NEXRAD) (S-Band)**
  - *** 159 NEXRAD Sites (ConUS, Alaska, Hawaii, Puerto Rico, Guam, Korea)**
- **Depart of Transportation - Terminal Doppler Weather Radars (TDWR)**
  - *** 45 Sites (ConUS) Level III products, (C-band)**

Other Radar Network data and products available:

- **NOAA Regional & ConUS Radar-based Precipitation Mosaic (Multi-sensor product)**

- **RIDGE Mosaics (Radar Integrated Display with Geospatial Elements)**

Radar Networks Supported

- Environment Canada Radar Network 41 Sites (C-band)

- NOAA 3-D Reflectivity and QPE mosaic (1km resolution)

Potential future Radar networks data and products available:

- Collaborative Adaptive Sensing of the Atmosphere (CASA) Rada network (X-band)

- Phase Array Radar Networks (~2020)

Potential support for other global radar networks or programs

- GEWEX – Global Energy and Water Cycle Experiment

- OPERA - Operational Programme for the Exchange of weather Radar information, www.knmi.nl/opera

NCDC Radar Archives

- Entire NEXRAD Period of Record: 1991 – Present
- Archives hold over 1200 terabytes (1.2 petabyte)

Ingest

- Increases at 672 gigabytes/day (245.3tb per year)
- Projected increase to ~ 2.2 terabyte/day in ~ 2012 (Dual Pol)
- Potential increase ~ 10.9 terabyte/day ~ 2020 (Phase Array)

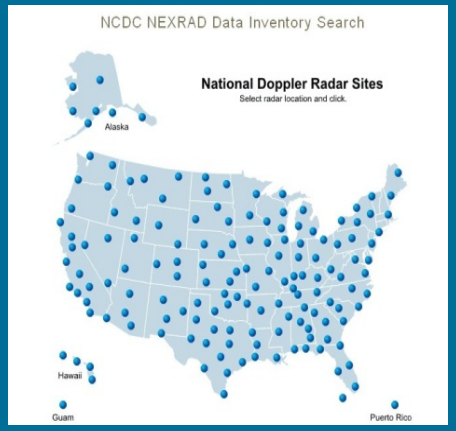
Dissemination statistics

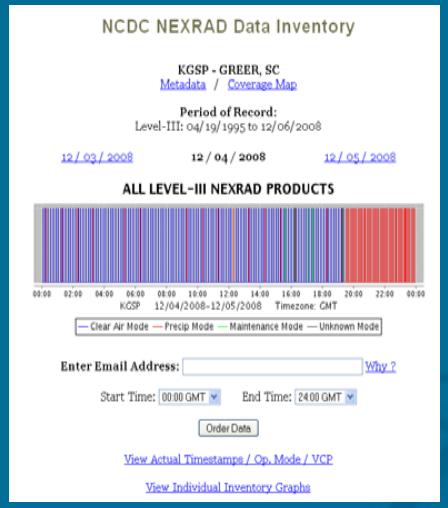
Access (September 2008-2009)

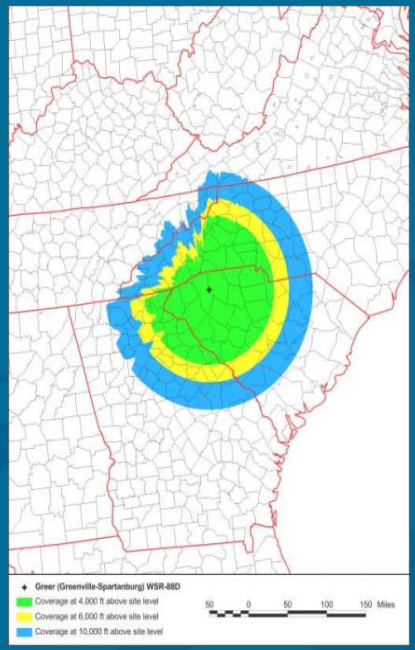
- **138 Gigabyte radar data accessed on average per day**
- **File count 150.2 million tar files retrieved (8hr or 1hr increment)**
- **50.4 terabytes accessed**
- **21 minute average retrieval latency (Last 6 months 18.7tb with 7.4 minute average access)**

Direct Web Access

Direct digital access to radar inventories, data, and visualization software are available at no cost via the NCDC radar resources web page http://www.ncdc.noaa.gov/oa/radar/radarresources







NEXRAD Inventory: Select Site and Product
http://www.ncdc.noaa.gov/nexradinv/

Data Access and Support Tools

- Data inventory online search tool

- Data visualization – Desktop application Weather and Climate Toolkit (http://www.ncdc.noaa.gov/oa/wct)
  - * Standards based using Unidata Common Data Model
  - * Batch Processing
  - * Tutorials
  - * API/Source code release

- Data mining

Weather & Climate Toolkit Overview

- Free, public domain source code
- Desktop and command-line application
- Simple visualization and data export
- Platform independent (Java-based)
- Leverages community tools and standards (NetCDF for Java, Common Data Model, etc…)
- Successor to Java NEXRAD Tools

Toolkit Access

Data:

- **Raw data files on disk or remote location (URL, THREDDS, OPeNDAP, etc…)**

Services:

- **Easy to use dialogs for remote services distributed over web services (REST, WMS, WFS, OPeNDAP, NetCDF Subset Service, etc…)**

*** Some of these services are under development**

Data

Currently:

- **NEXRAD (Level-II and Level-III), TDWR, Canadian Sigmet Radar**

GOES Satellite

Coming soon:

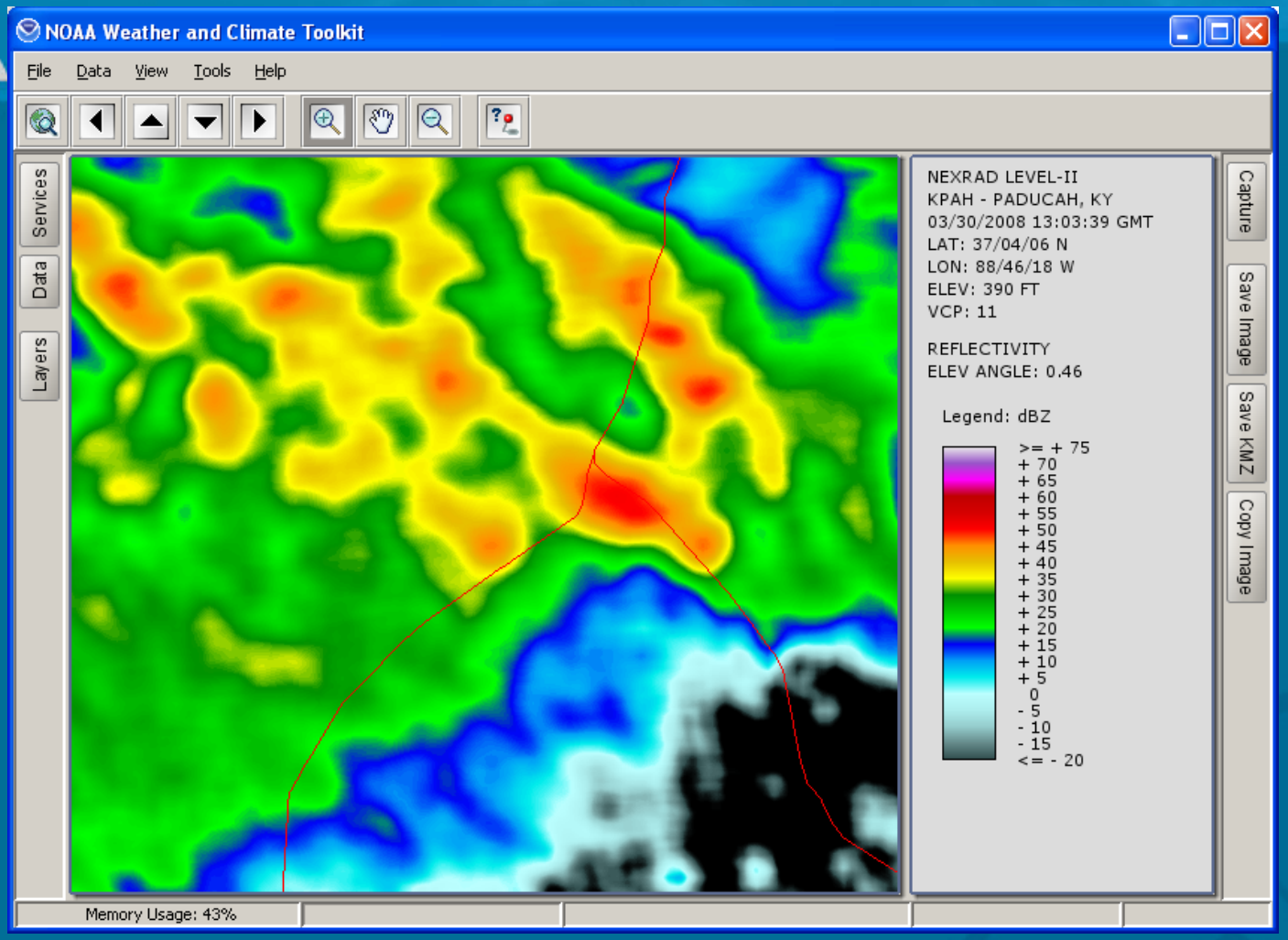
- **GRIB, GINI, Generic NetCDF:**
  - **Feature types of Grid, Swath, Radial, Time Series, Point, etc…**

Visualization

Simple 2-D maps

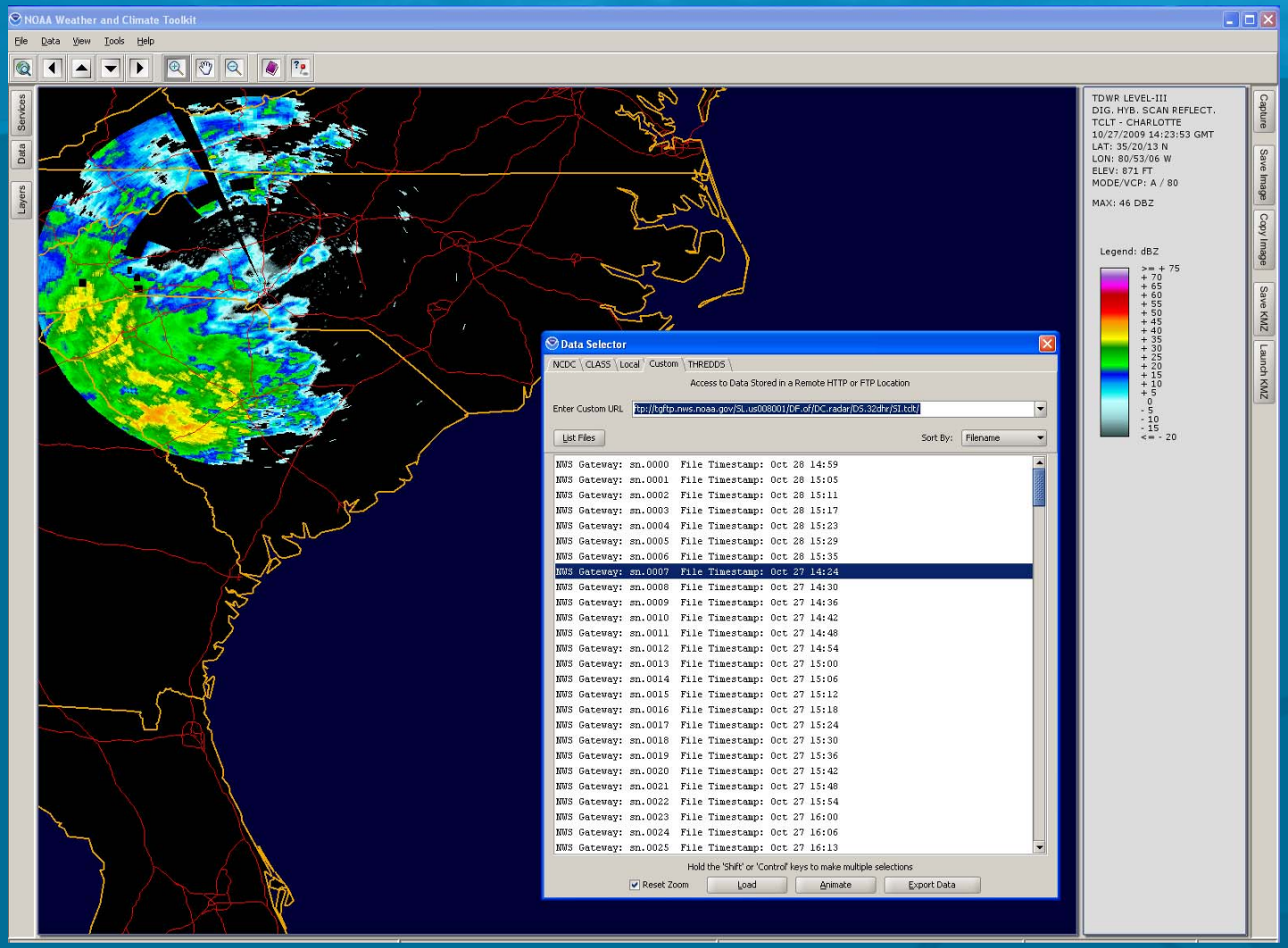
- **Basic overlays included (states, counties, etc…)**
- **Background images from any OGC WMS**
  - **Shaded Relief, Topo Maps, Landsat, ext…**
- **Save images and animations to Animated GIF, AVI, KMZ (Google Earth)**

Visualization



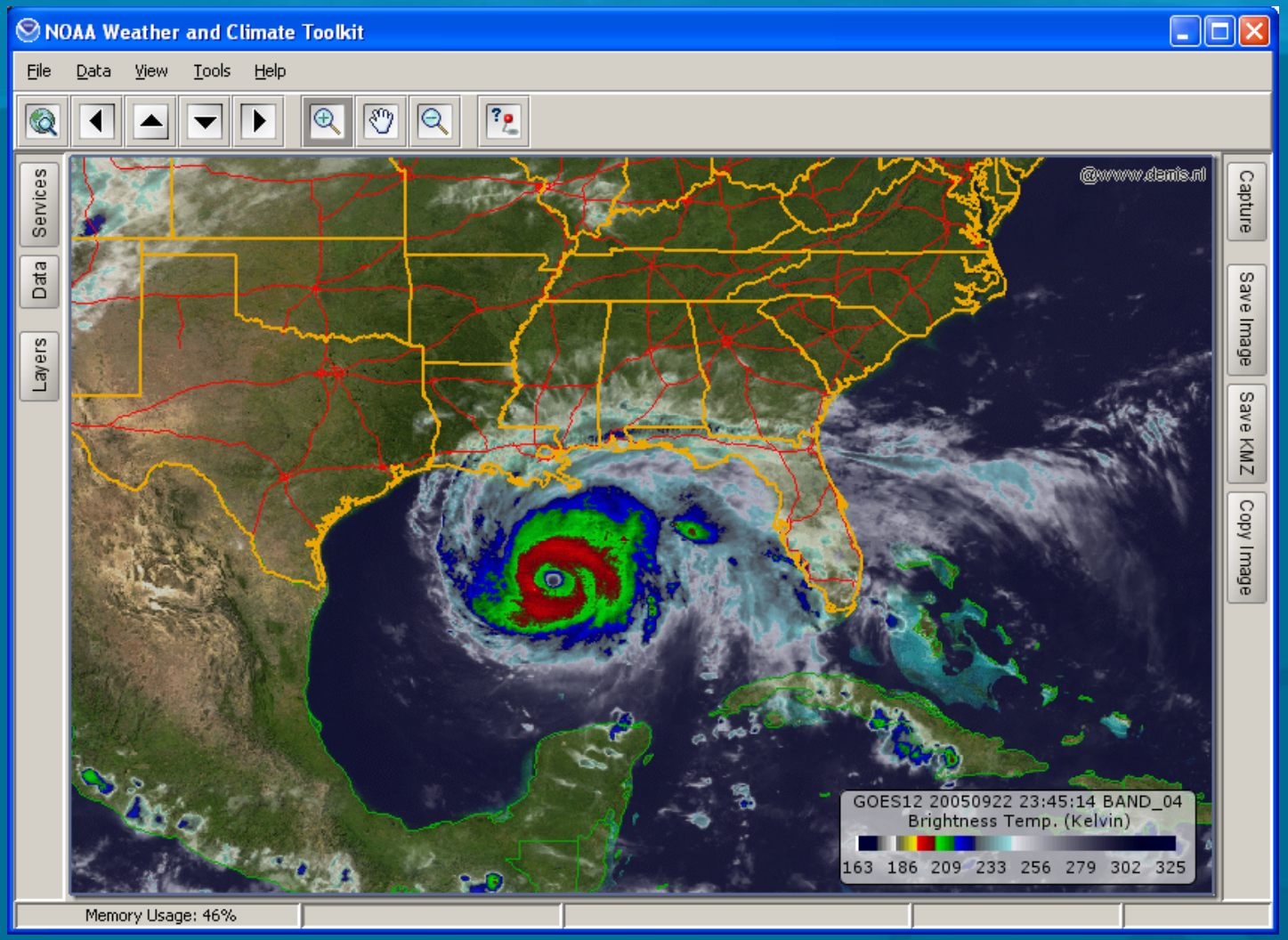
Smoothed NEXRAD Reflectivity Data

Visualization



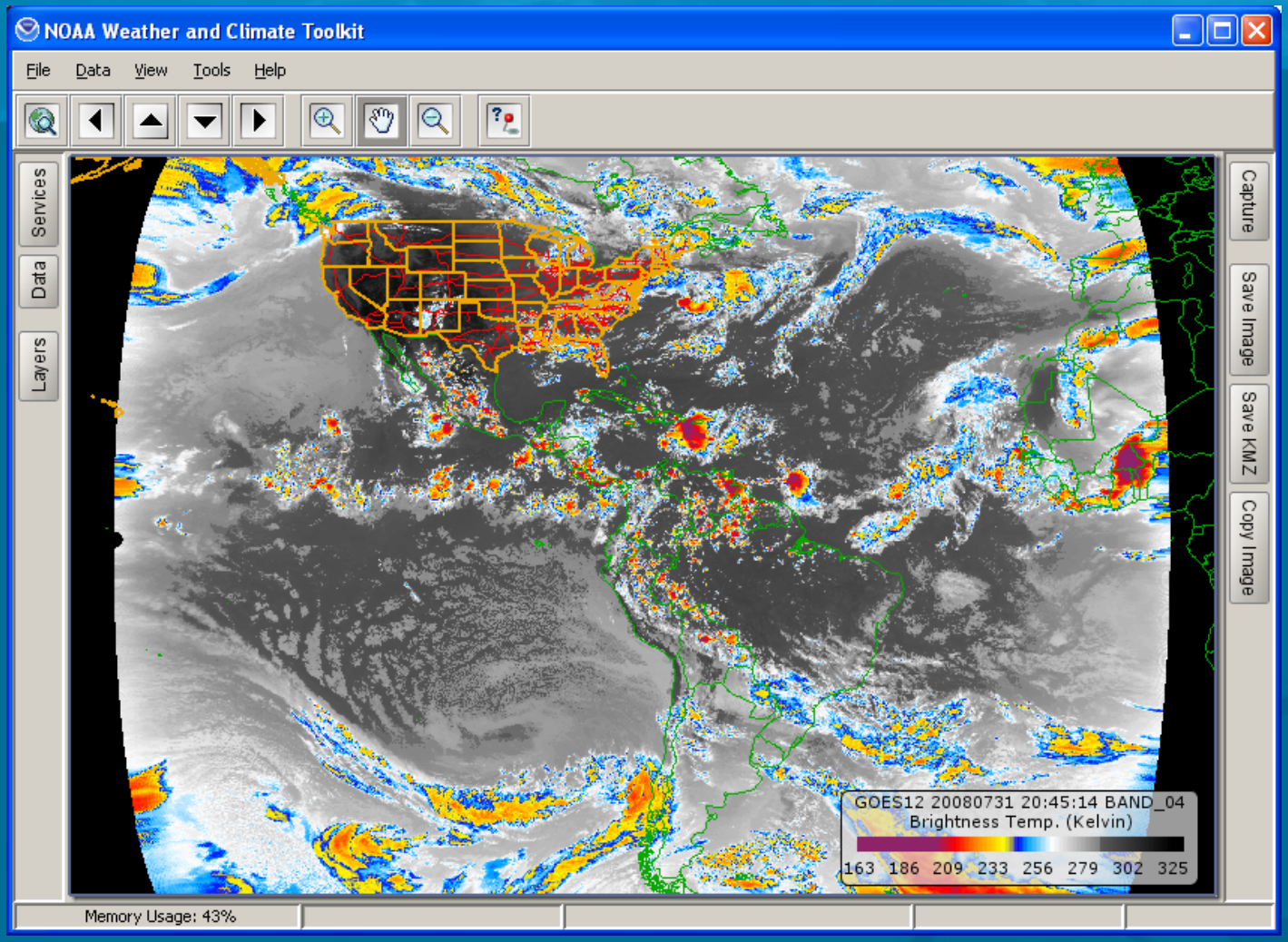
TDWR data displayed in toolkit using near real time data accessed from NWS server

Visualization



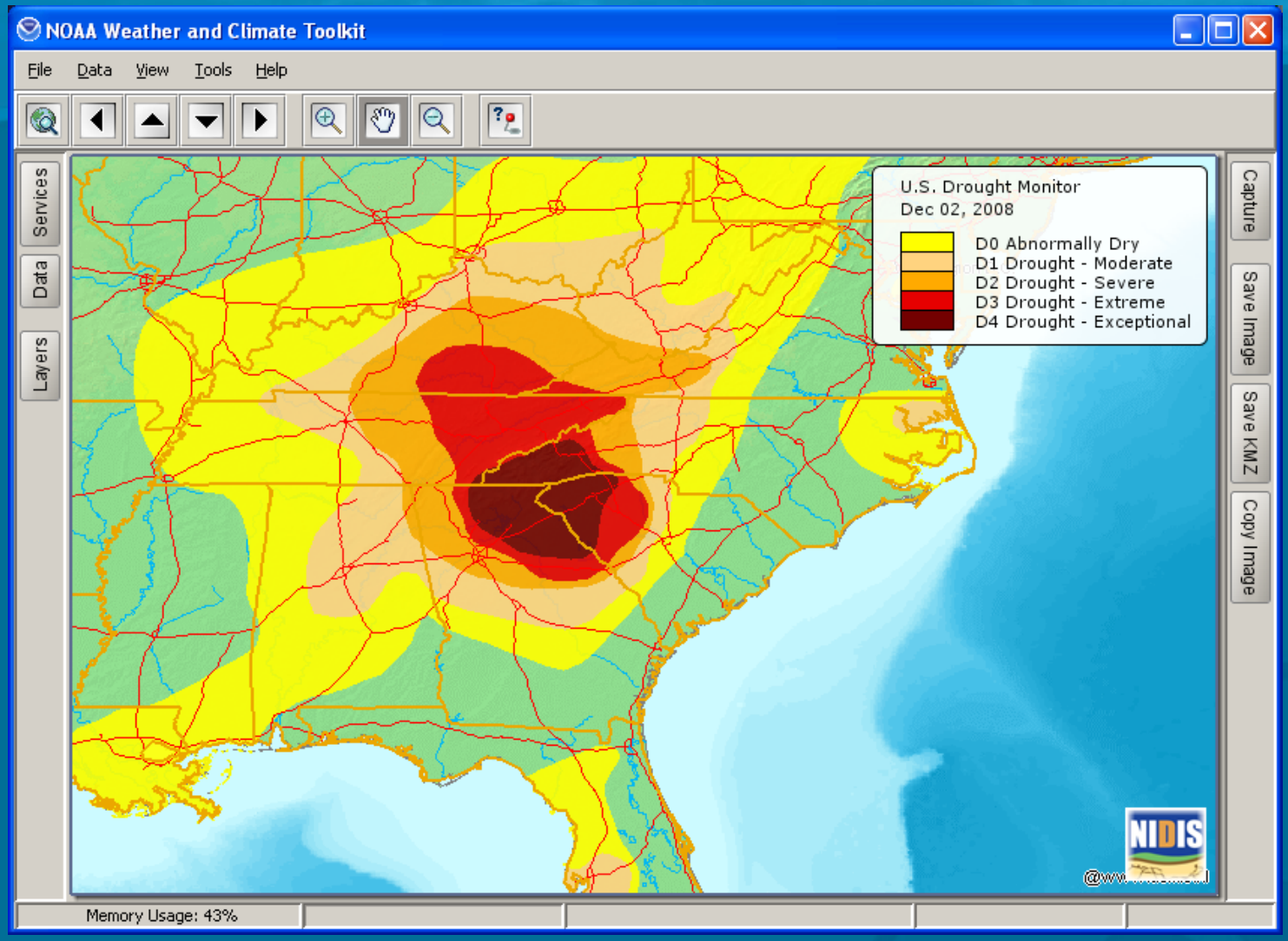
GOES Infrared with Blue Marble Web Map Service (WMS) background map

Visualization



GOES Full Disk Infrared

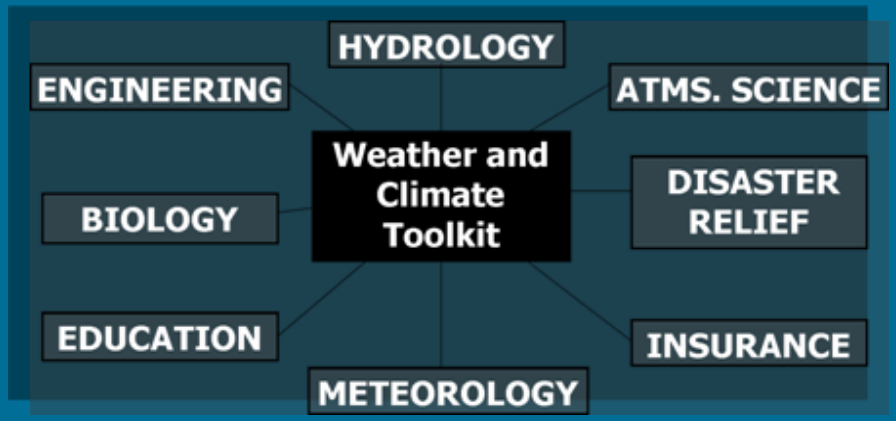
Visualization



U.S. Drought Monitor service from NIDIS/NDMC (National Drought Mitigation Center)

Data Export

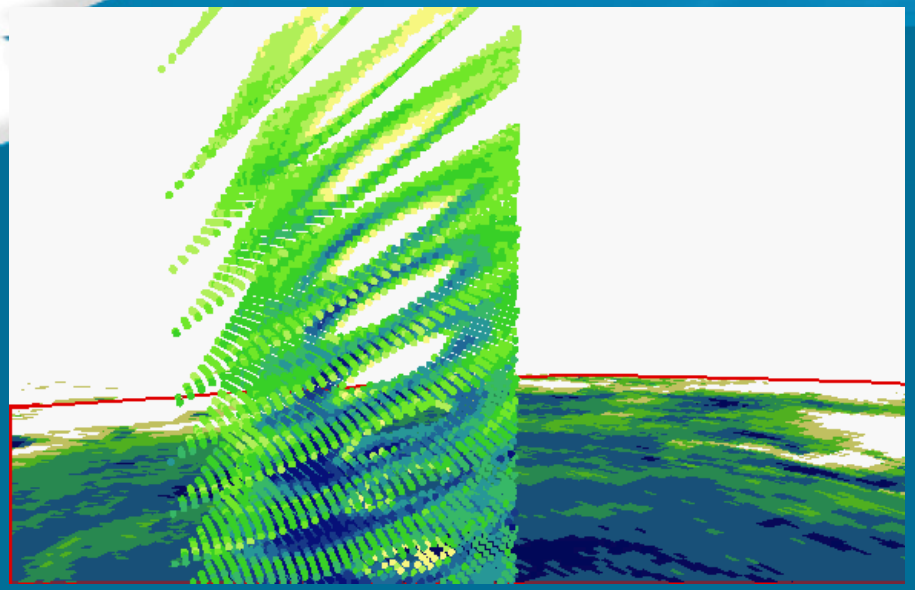
"Bridge" between raw Weather and Climate data and multiple scientific user communities

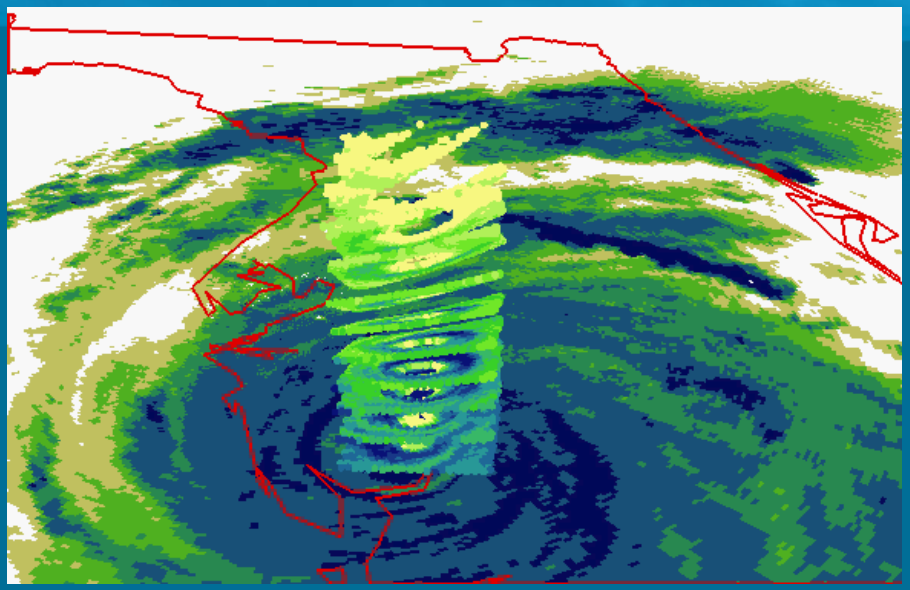


Export Data to:

Shapefile, Well-Known Text, Arc/Info ASCII GRID, Gridded and Raw NetCDF, GeoTIFF and KMZ (Google Earth)

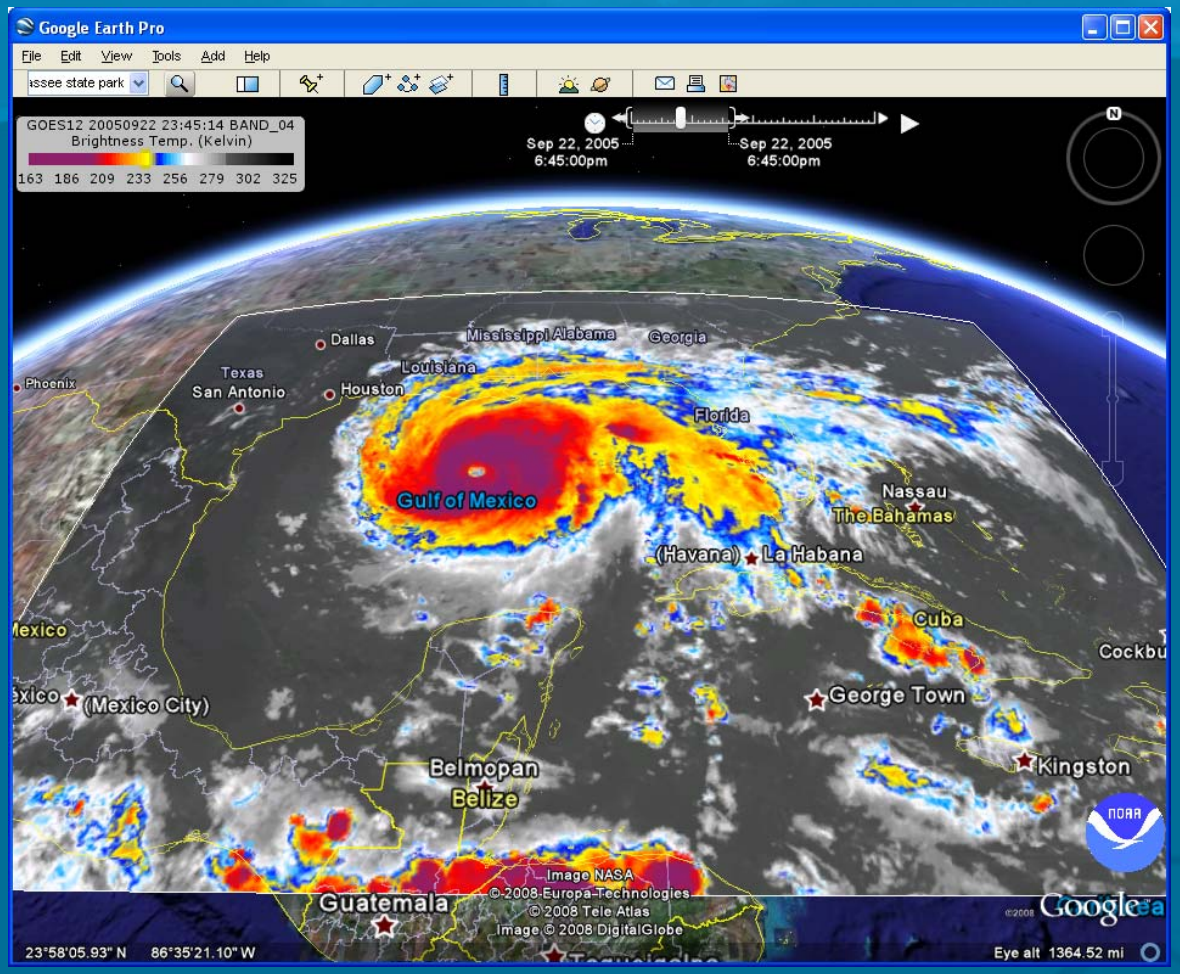
Applications





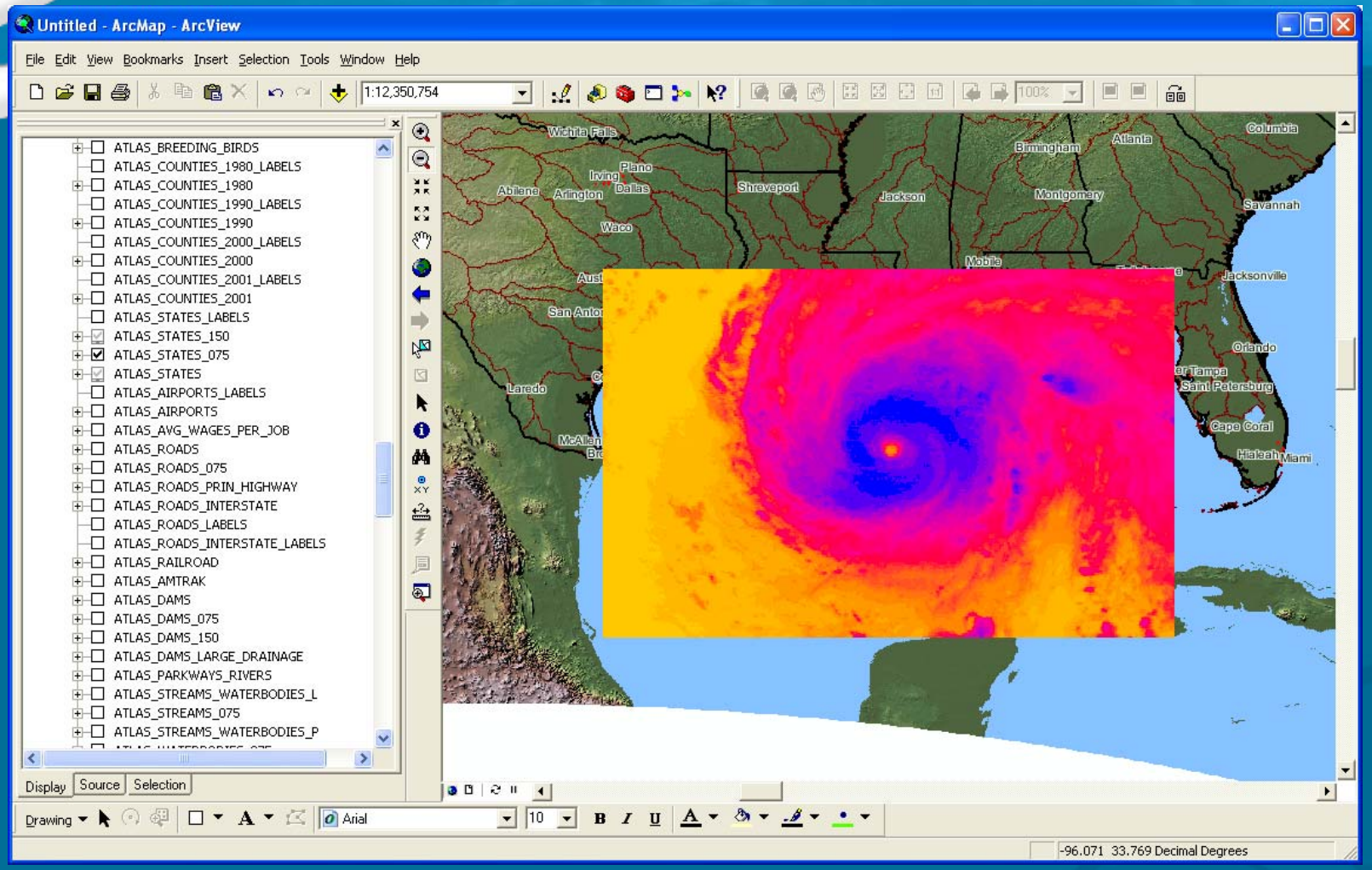
Level-II Reflectivity data from Hurricane Charley in ESRI ArcScene. Data exported to a point Shapefile with an exaggerated height attribute

Applications



GOES Satellite Imagery from Hurricane Rita landfall in Google Earth

Applications

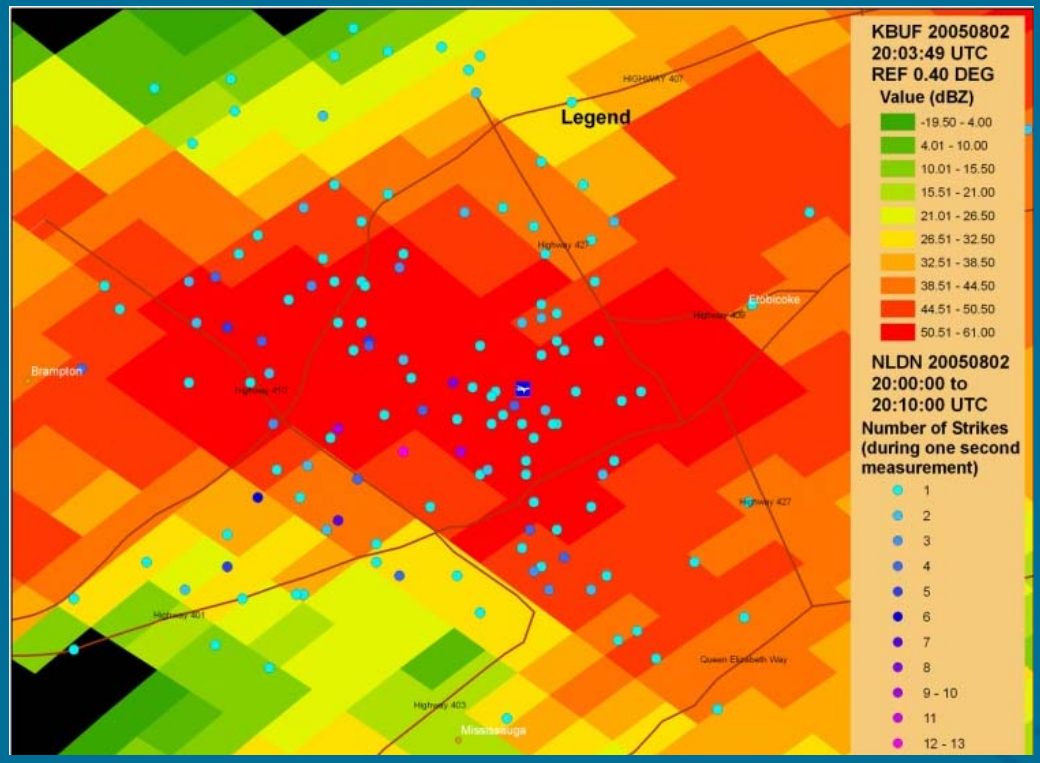


GOES Satellite Imagery from Hurricane Rita landfall, exported as ASCII GRID, in ArcGIS

Applications

Integrated radar, lightning and hail data animation

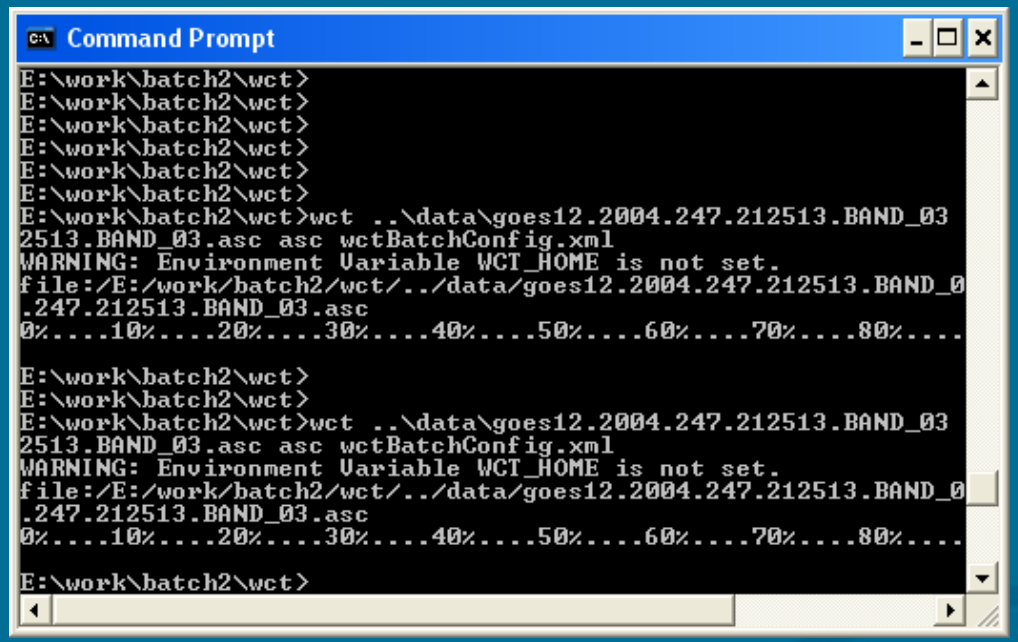
View Movie



Toronto A.P. August 2, 2005 data exported to SHP file and displayed in ESRI GIS software

Applications

```
<?xml version="1.0"?>
<wctExportBatchOptions version="2">
   <!--
      Logging options: These can be 'SEVERE', 'WARNING', 'INFO',
   -->
   <logging> WARNING</logging>



      <!--  ================================================
      <!--  Grid Section - decoding and filtering options
      <!--  ================================================
   <grid>
      <gridFilter>
         <!--
            Geographic Extent Filter units of decimal degrees
         -->
         <minLat> NONE</minLat>
         <maxLat> NONE</maxLat>
         <minLon> NONE</minLon>
```



Command-line batch processing of data export

Applications

Public domain / open source API

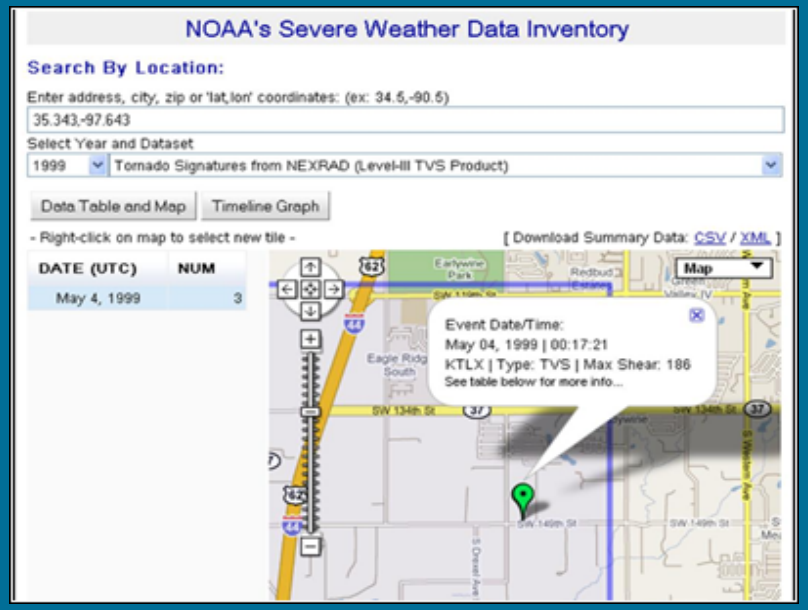
```
String source =
    "E:\\work\\goes\\katrina\\goes12.2005.241.144513.BAND_04";


GoesRemappedRaster goes = new GoesRemappedRaster();
goes.setHeight(500);
goes.setWidth(500);

Rectangle2D.Double bounds =
    new Rectangle2D.Double(-102.0, 17.0, 24.0, 24.0);

goes.process(source, bounds);

System.out.println("WRITING ASCII Grid");
WCTRasterExport rasterExport = new WCTRasterExport();
rasterExport.saveAsciiGrid(new File(source+".asc"), goes);
```

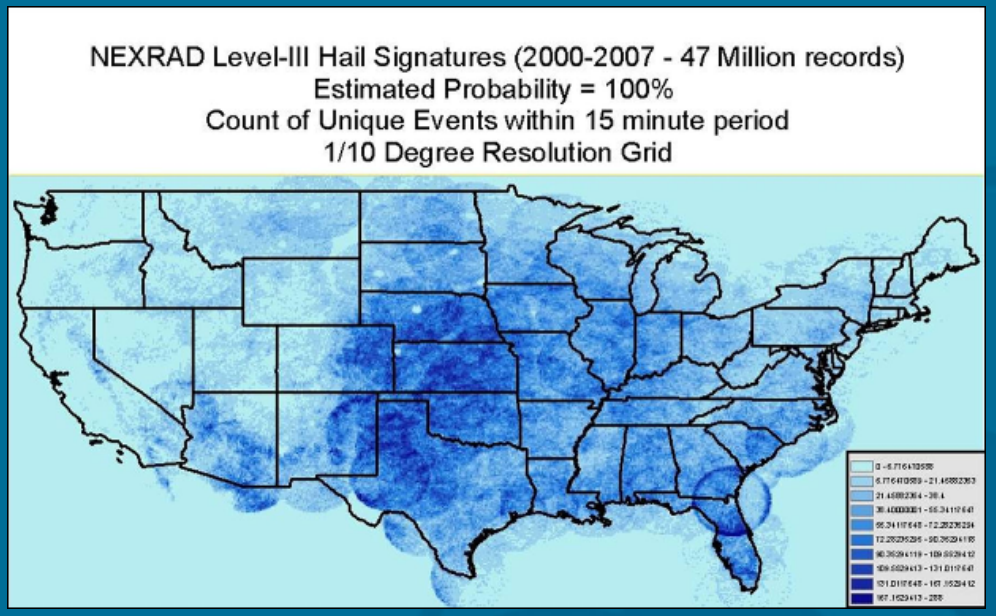
Geospatial DB of severe weather records

- NEXRAD Level-III point features describing general storm structure, hail, mesocyclone and tornado signatures

- NWS Severe Thunderstorm, Tornado, Flash Flood, Preliminary Local Storm Reports and Special Marine warnings

- Google-maps based web page or REST URL-based web service
  - Data download in CSV, XML, Shapefile and KMZ



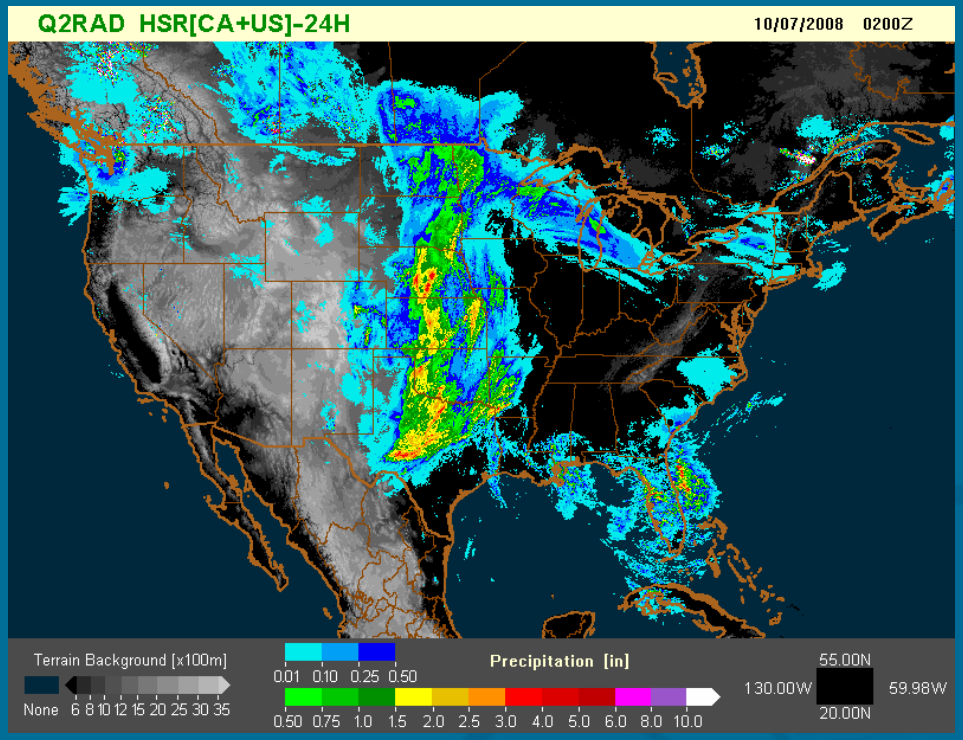


http://www.ncdc.noaa.gov/swdi

Next Generation QPE (Q2)

Precipitation re-analysis using Q2

- NCDC is collaborating with NSSL to produce precipitation re-analysis products using Q2
- Q2 is a high resolution precipitation product with 1km spatial resolution & 5 minute temporal resolution
- Goal is to derive Climatology by running Q2 algorithms against 10 years of NEXRAD base data
- Methodology may provide large improvement over current Stage IV products



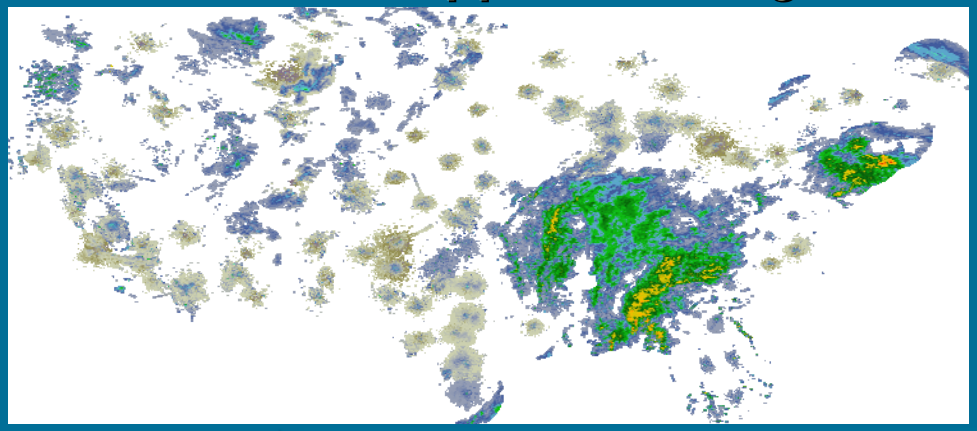
RIDGE Mosaics

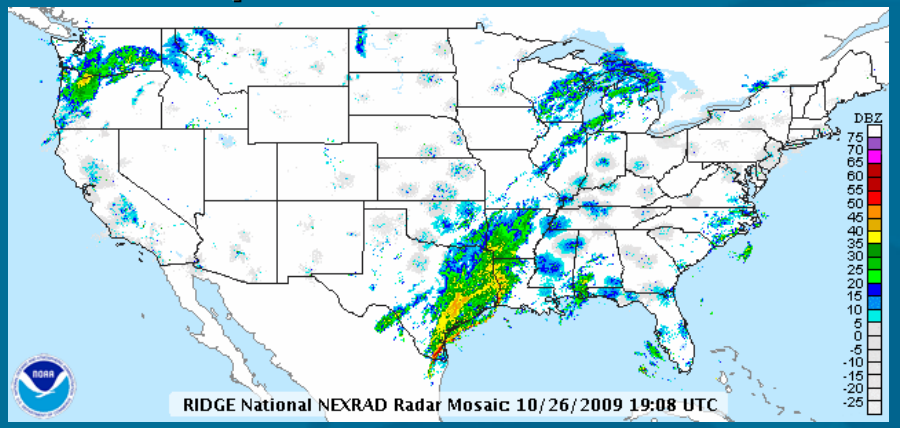
- The NWS RIDGE mosaics are available on-line & cover latest hour
http://www.srh.noaa.gov/ridge/Conus/

- Data older than one hour is available from NCDC
http://www.ncdc.noaa.gov/oa/radar/radardata.html

- The radar images can be animated and layered with geospatial elements http://www1.ncdc.noaa.gov/pub/data/nexrad/ridge

- OGC WMS support for Ridge2 under development





Contacts

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