GIS Implementation for the National Weather Service and Other Regional Managers

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In Association with NEMAC

Outline

- GIS and Atmospheric Sciences
- ArcGIS Server Viewer
- Google Maps Viewers
  - Weather Stations Viewer
  - Webcams Viewer
- GIS Education
- Future of Integration

GIS and Atmospheric Sciences

- Still in early stages of integration
- Becoming increasing popular for meteorologists and climatologists
  - More user friendly GIS technologies and outputs
  - More data is becoming available in GIS ready formats for analysis

Benefits of Integration

- Better access and increased use of atmospheric data and products
  - Better organized
  - Useful for education
  - More informative product for the public
- Creates new areas for research
  - Apply atmospheric sciences to various other parameters

Projects

- Internship with NEMAC
- Helped create GIS 3 GIS viewer applications for the Greenville-Spartanburg (GSP) NWS office
- Goals:
  - Demonstrate the potential of GIS technologies for weather forecasting, weather event analysis, and climatological studies
  - Provide viewers to improve their forecasting and warnings

National Environmental Modeling & Analysis Center

National Weather Service

Renci Renaissance Computing Institute Catalyst for Innovation

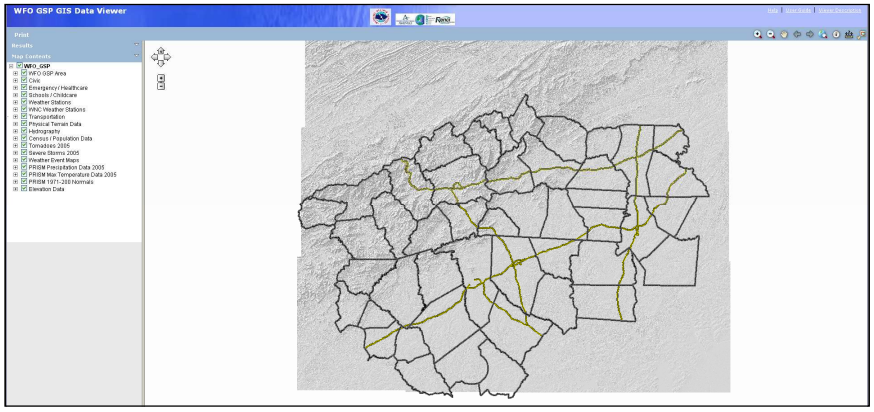
ArcGIS Server Viewer

- The Issue
  - Lots of significant spatial data in many different locations and in many different formats
- The Solution
  - Gather the data and store it
  - Create an ArcGIS Server Viewer to present the data

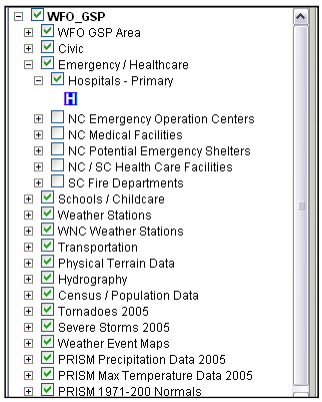
ArcGIS Server Process

- Obtained GIS data from various sources
- Processed for the GSP County Warning and Forecast Area (CWFA)
- Converted to ArcSDE to store in geodatabase
- Transferred to ArcGIS Server

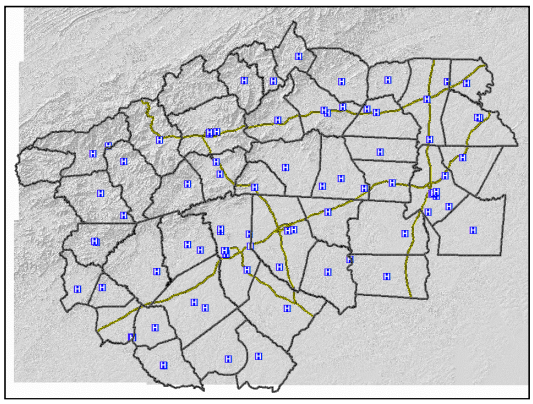
ArcGIS Server Page



ArcGIS Server Contents



Spatial Contents



Corresponding Map

ArcGIS Server Functionality

Benefits of ArcGIS Server Viewer to the NWS

- Allows easy access to a wealth of information
- Issue better severe weather advisories based on what features are in the predicted path
- Can communicate with people to verify weather conditions or warn of possible severe weather
- Basic applied research
- Host their own data products
- Data can be implemented into Advanced Weather Interactive Processing System (AWIPS)

Google Maps Projects

- Created MashUps for the weather stations and webcams viewers
  - MashUp – a web application that combines data from various sources into a single viewer
- Created using Google Maps Application Programming Interface (API)
  - Lets you embed Google Maps in your own web pages with JavaScript
  - Created database in Microsoft Access that is linked to the Google Maps

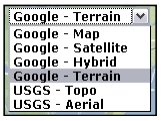
Google Maps MashUps

- The Issue
  - Weather stations and webcams maintained by many different agencies and hosted on a multiple websites
  - Usually have no spatial, physical, or technical attributes
- The Solution
  - MashUp utilizing the Google API with Google Maps for the map background (spatial context)
  - Completely free to build, browser-based application

MashUps Functionality

Zoom to County

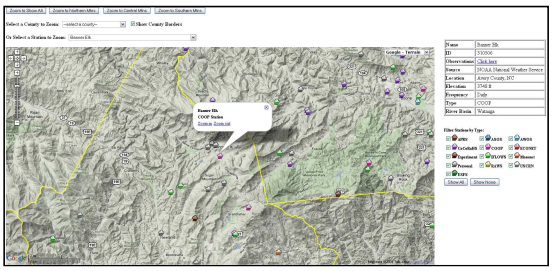
Select by Station



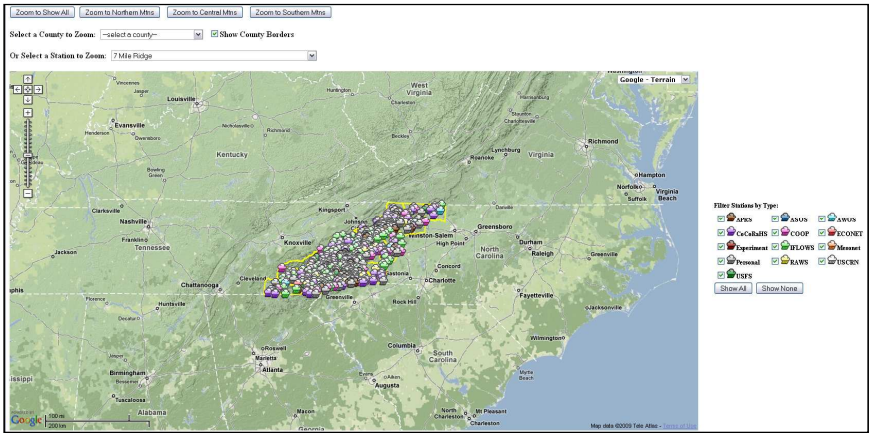
Select Terrain View

Google Maps Weather Stations Viewer

- Combined weather stations data from a variety of online locations to create a comprehensive list of weather stations in Western North Carolina
  - Each station have a list of attributes to go with it
  - Can select based on type of station and location

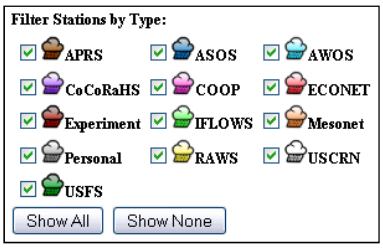


Weather Stations Viewer Page



Selecting by Station Type

- Can select which stations are visible
- Different stations can serve different purposes
  - Different measurements
  - Level of quality control
  - Temporal and spatial resolution



Filter by Station Type

Weather Stations Viewer Attributes

Selected Station

Name	Celo 2 S
ID	311624
Observations	Click here
Source	NOAA National Weather Service
Location	Yancey County, NC
Elevation	2680 ft
Frequency	Daily
Type	COOP
River Basin	French Broad

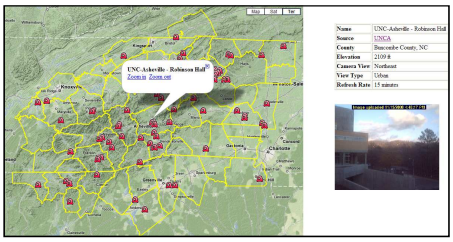
Station Attributes

Benefits of Google Maps Weather Stations Viewer

- Easy access to a variety of stations types
  - Quick sorting by type
- Local variations can be observed
- Forecast verification
- Provide information about where future stations should be built
- Data can be used to create more accurate event maps

Google Maps Webcams Viewer

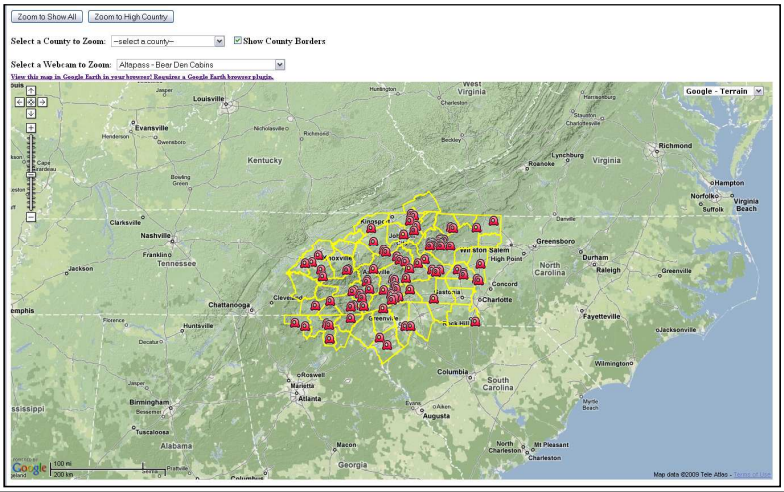
- Same basic methodology as the weather stations viewer
  - Sometime tedious matching with Google Earth to find spatial information
  - Each cam has a list of attributes to go with it
  - Majority of cams have in viewer image of current conditions



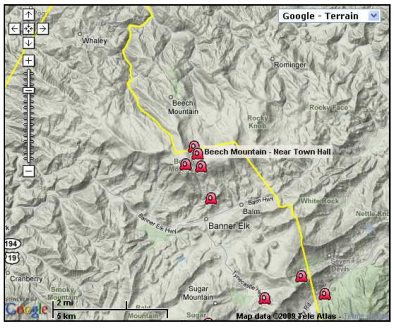
For the Greater Southern Appalachian Region

Webcams Viewer Page

www.weatherwebcams.org



Webcams Viewer Attributes



Selected Station

Name	Beech Mountain - Near Town Hall
Source	High Country Webcams
County	Avery County, NC
Elevation	5100 ft
Camera View	North
View Type	Transportation
Refresh Rate	3-4 seconds

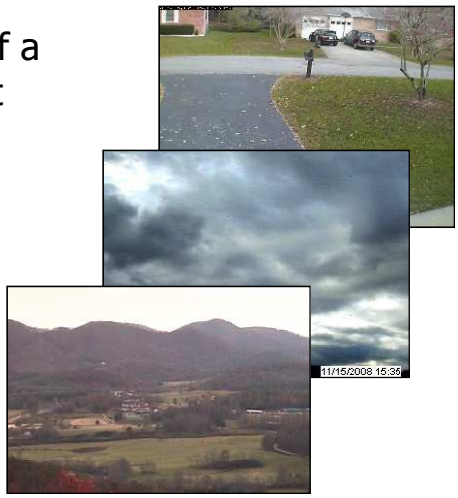
Webcam Attributes

Live Image

Webcams Viewer - Google Earth View

Benefits of Google Maps Webcams Viewer

- Live observation of a variety of different landscapes
- Local variations in weather events
- Severe weather conditions

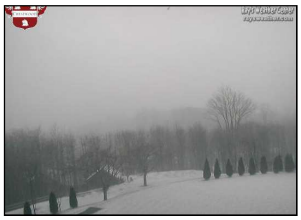


Conditions Comparison from Snow Event on 11/18/08

Avery County, NC - Before

Avery County, NC - After

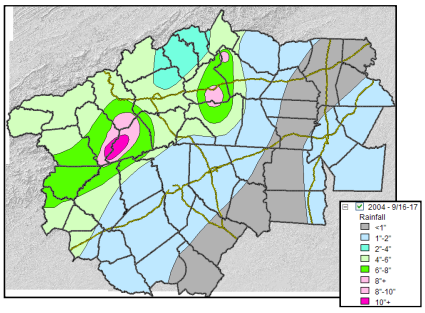
Watauga County, NC – Before



Watauga County, NC – After

GIS Education

- Created manuals for producing event maps in ArcMap for GSP NWS office
  - Using ArcMap saves time and allows attributes to be saved with the maps for user interactivity



Ivan Remnants

The Future of GIS Integration

- Demonstration of integration capabilities
  - Lead by example
- Education on using various GIS technologies
  - Workshops and training courses
- Increased information exchange
  - More communication and collaboration between developers and researchers
- Better integration of time varying data
- More GIS compatibility for atmospheric data formats

Acknowledgements

- Thanks to NEMAC and RENCI
  - Project Leader - Greg Dobson
  - Coding – Todd Pierce

- Thank you for your time!
- Questions?