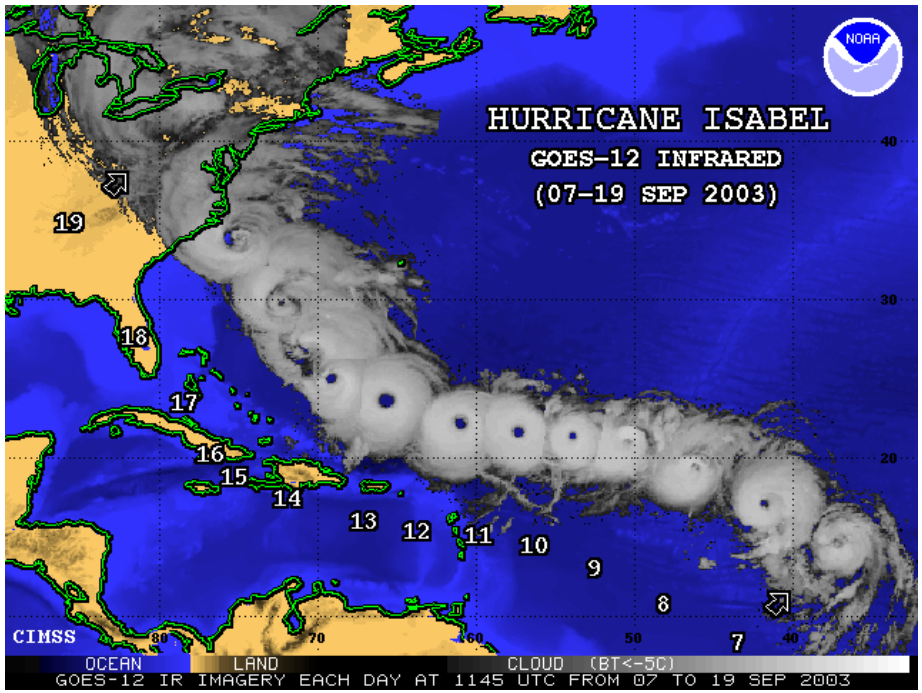
GIS at the Maryland State Emergency Operations Center:
Lessons Learned during Hurricane Isabel



Matt Felton
Associate Director, Center for GIS
Towson University

Background

- The Center for Geographic Information Sciences (CGIS) volunteered its assistance to the Maryland Emergency Management Agency (MEMA) at the State Emergency Operations Center (SEOC) during Hurricane Isabel (September 2003)
- Prepared a “Lessons Learned” white paper documenting our experiences during the Isabel emergency
  - A description of our pre-Isabel activities, activities at the SEOC, and post-Isabel activities
  - Recommendations organized in several sections …
    - Data
    - Hardware and software
    - People
    - Procedures
  - Atlas of maps prepared during the Isabel emergency

Pre-Isabel Emergency

- Maryland State Geographic Information Committee (MSGIC) had dedicated its efforts towards GIS for homeland security and emergency management (Spring 2003)
  - Provided input to MEMA regarding a Geospatial Strategic Plan
  - Created a “Short Term Implementation Strategy for Geospatial Preparedness in Maryland”
  - Recommended the establishment that MEMA establish a volunteer network of GIS professionals to support GIS efforts for emergency management

- Towson University Center for GIS has a long history of providing GIS support to MEMA
  - Dates back to 1998 – Towson digitized Hurricane Storm Surge Inundation maps
  - Letter to MEMA Director on May 15, 2003 pledging volunteer GIS support in the event of an emergency
  - On Saturday, September 13, 2003, MEMA invited CGIS to the State Emergency Operations Center (SEOC)

Planning for Isabel

- Monday, September 15, 2003
  - CGIS staff met to discuss data requirements, staff resources, supplies, and equipment
  - Contacted MSGIC for additional input
- Tuesday, September 16, 2003
  - Assessing the SEOC
    - CGIS was asked to participate in a pre-activation meeting at the SEOC
    - Discovered that there was only one computer available for GIS
    - Older version of GIS software (ArcView 3.x)
    - Determined that an additional computer (and a laptop) would be needed
  - Preparing our resources
    - Moved Towson's Emergency Management Mapping Application (EMMA) to a production server
    - Loaded data onto a portable hard drive (250 GB)
    - Printed maps for each county showing roads, place names, 100-year flood plains, storm surge inundation areas, high-hazard dam flood areas

SEOC Activation

- 24/7 GIS support began at 6:00pm on Wednesday, September 17, 2003
- Two-member teams worked 12-hour shifts
  - Each had substantial ArcGIS / ArcView experience
  - Team leader was established for each shift
  - 1 hour of overlap for transition
- MEMA Director introduced the CGIS team
  - Pledged MEMA's commitment to integrate GIS into the emergency response process
  - Offered CGIS staff as a resource to SEOC staff for mapping needs

Staffing the SEOC

- Continuous support
  - 6:00pm on Wednesday, September 17 through 6:00pm on Saturday, September 20
  - 10:00am to 5:00pm on Sunday, September 21
  - 391 staff hours
- Tasks
  - Identification of facilities at risk
    - Nursing homes, detention centers, residences
  - Real time information display via EMMA
    - Weather, stream flow, storm surge
  - Creation of custom maps
    - Power outages, storm surge prediction, evacuation routes

After the Storm…

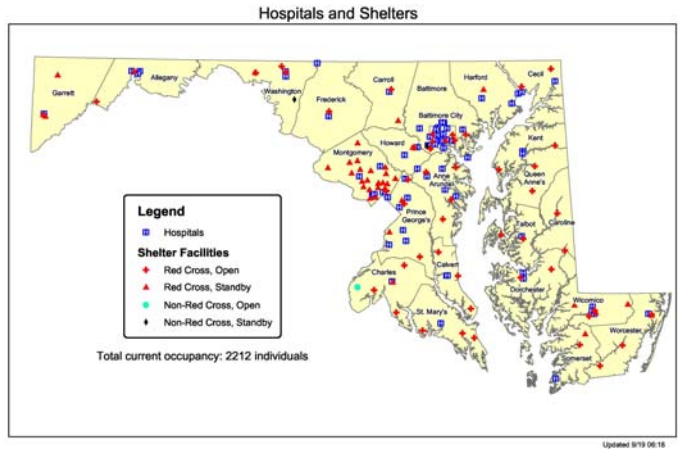
- SEOC staff began to learn the potential of GIS technology
- CGIS staff better understood the needs of the emergency management community
- GIS lessons learned
  - Data access
  - Data layers
  - Hardware and software
  - Network resources
  - Procedures
  - People

Lessons Learned: Data Access

- Data organization is critical
  - Hierarchy of folders
  - Consistent file naming conventions (data and map documents)
- Determine what is reusable
  - Predefined symbolization using ArcGIS layer files (.lyr)
  - Map templates (.mxt)
- Standard maps
  - Critical facilities
  - Transportation infrastructure
  - Evacuation routes
  - Shelters

Lessons Learned: Data Layers

- Need for a statewide “points of interest” layer
  - Positionally accurate
  - Attribute rich
- Subscription to real-time data feeds
  - Weather
- Identification of vulnerable populations
  - Over age 65, non-english speaking, urban populations dependant on public transportation
- GPS devices to collect hazard location, resource tracking

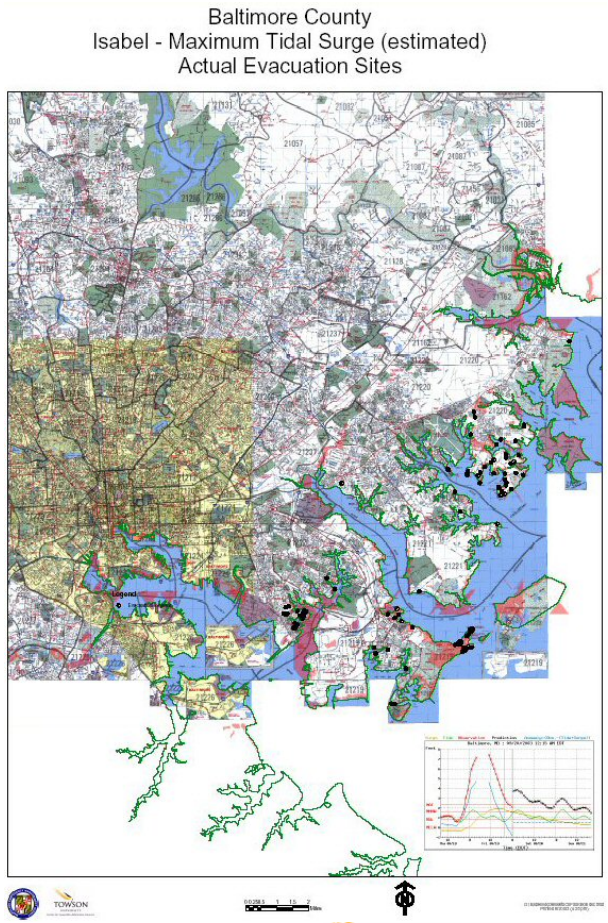


Lessons Learned: Hardware and Software

- PCs / workstations
  - Fast processors, large RAM, abundant storage, large (flat) screen
  - 2 computers for analysts, 1 for SEOC display
- Plotter
  - Fast, adequate memory
  - Extra ink and paper
  - Connectivity to GIS workstations
- Physical space
  - Plan for one person at each computer
  - Workspace for large maps

Lessons Learned: Network Resources

- Mechanism for securely sharing data externally
  - FEMA, counties, other agencies
- SEOC intranet for sharing completed maps
  - Avoid duplicate requests
  - Build upon existing efforts
  - Trigger new ideas
- Ability to push maps to MEMA's Web site
  - Standard maps (evacuation routes, points of interest)
  - Hazard specific maps (availability of shelters, power outage status, evacuation status)
  - E-government (accessing relevant information via the Internet)



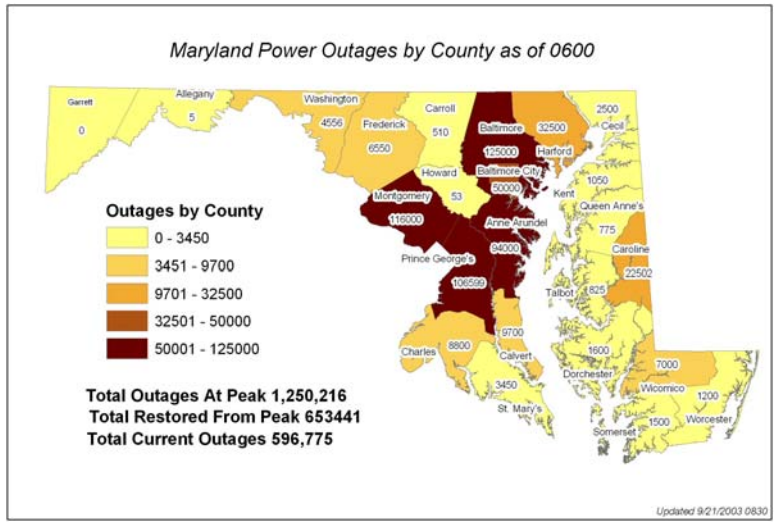
Lessons Learned: Procedures

- "Shrink wrapped" GIS tasks
  - Review of current action plans by GIS staff
  - Integrate standard mapping and spatial analysis as part of the emergency action plan
  - Standard maps for Situation Reports
- Get the right map to the right person
  - Make sure that maps generated don't get buried
- Establish a map request "triage" system
  - Map request form (who, when, deadline, description)
  - Which maps are most important?
  - How long will it take to fulfill a request?

Lessons Learned: People

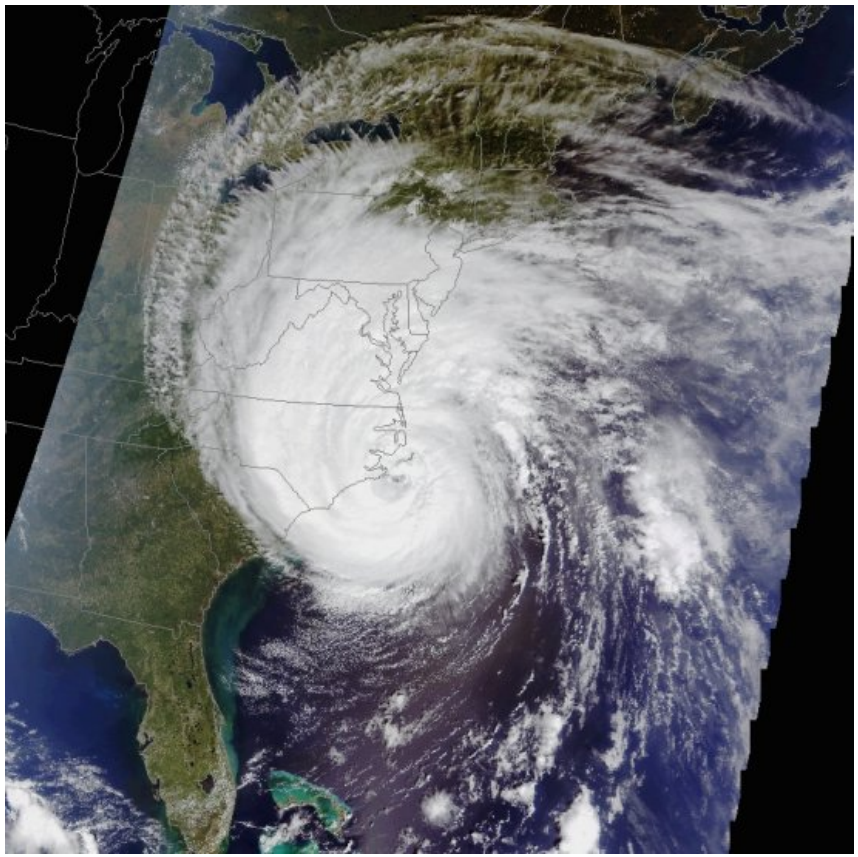
- Raise awareness of GIS potential
  - More than just mapping, can generate “what – where” reports
  - 1-day course to demonstrate use of GIS
- Availability of GIS tools for decision makers
  - Basic functionality
  - Quick, predefined map views
  - Access to advanced functionality
- Identification of map / data needs for State agency representatives

Surprises



- At the statewide level, very general maps were needed
- SEOC didn't appear to require large scale digital orthophotography or detailed elevation data
- Barely scratched the surface of GIS potential
- GIS workstation was woefully inadequate
- Printing capability was not planned
- While Maryland has a large amount of digital geospatial data available to support homeland security/emergency management activities, the data needs to be made more readily available and interoperable if it is to be used in the event of an emergency

Questions?



NASA's Terra satellite image (true-color composite) taken at 11:50 AM EDT on September 18, 2003 just as heart of Isabel was making landfall.

"Geographic Information Systems and Emergency Management: Lessons Learned During Hurricane Isabel"
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Available for download from
http://cgis.towson.edu/about/resources.asp

Matt Felton
Associate Director, Technical Services
Center for GIS
Towson University

mfelton@towson.edu
(410) 704-5292