State of Missouri

Homeland Security and Emergency Management GIS

Recent and Ongoing Activities

January 2007 Ice Storm

In mid-January 2007, ice storms crippled a swath of Missouri between Springfield and St. Louis. In response to these storms, the State Emergency Operations Center (SEOC) was activated. This activation represented a significant move forward in the use of GIS in emergency management and response.

A multi-agency team of GIS personnel assisted SEOC operations, marking the first such operation for the larger state GIS community. Personnel from Missouri Departments of Conservation, Health and Senior Services, Transportation, State Emergency Management Agency and Cole County produced maps and geospatial data for various aspects of the response. The team assisted SEOC operations for approximately 7 days before standing down.

The following types of maps were produced during the course of GIS operations:

- Disaster Declaration
- Generator Locations
- Power Outages
- Shelters
- Fatalities

May 2007 Flood

Continuous rains, saturated ground conditions brought flooding close to 1993 and 1995 levels in early May. From the initial activation on May 7, through the bulk of 24-hour SEOC operations, GIS provided important information to responders and decision makers.

Personnel from Missouri Departments of Conservation and Transportation produced on-site maps and geospatial data for various aspects of the response. Missouri Department of Health and Senior Services used GIS to identify special needs populations located in the flood zones. The Department of Natural Resources assisted with data updates for critical facilities.

The University of Missouri - Geographic Resources Center provided GeoPDFs of the Missouri River floodplain showing aerial imagery with the 100-year and 1993 flood extents. These maps provided emergency management with an approximation of what areas could be flooded.

GeoPDFs are smart PDFs that provides some basic GIS functionality such as coordinates, measurements, query and attribute recall, as well as layer control. In an advanced form, GeoPDFs can also allow GIS-usable markups.

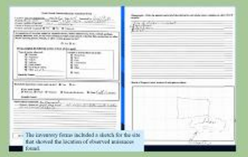
The following types of maps were produced during flood response:

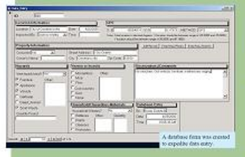
- Road Closures
- Public Drinking Water Facilities
- Hazardous Materials Locations
- Levee Breaks
- River Flood Stages
- Preliminary Damage Assessment Counties
- Special Needs Population Locations

2006 Caruthersville Tornado Cleanup

In 2006, a tornado struck the town of Caruthersville, Missouri. A Department of Health and Senior Services GIS team deployed soon after to assist with mapping public nuisance locations resulting from tornado damage. The city requested this assistance to facilitate debris removal in areas hardest hit by the tornadoes.

Few street signs or house numbers remained in the damaged areas, which made GIS and GPS vital for this event. Geospatial Technology was used for route creation, data collection, quality control, and event coordination. In all, 174 properties were inventoried. A database that linked collected data, photographs, maps, and scanned field reports was created and submitted to the mayor of Caruthersville to allow local efforts to continue after the response teams were gone. All participants involved were pleased with the increased speed of the recovery efforts that GIS and GPS was able to supply.





Nuclear Facility Safety

State GIS personnel continue to support State efforts to safeguard Missouri's citizens in the event of a nuclear incident at the Callaway Nuclear Facility outside of Fulton, and the Cooper Nuclear Facility near Brownsville, Nebraska.

GIS provided situational awareness for numerous exercises throughout 2006 and 2007, including a graded exercise for the Callaway facility, overseen by the Federal Emergency Management Agency and the Nuclear Regulatory Commission. Department of Health and Senior Services also provided GIS support to the Radiological Response Field Teams. Should an incident occur at the plant, GIS will continue its situational awareness role by generating these products, among others:

- Affected wind sectors
- Evacuation areas
- Generalized plume direction
- Agricultural Embargo areas
- Other incidents/closures
- Radiological readings

Callaway (MO) Facility

Cooper (NE) Facility

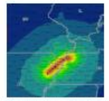
June 2007 New Madrid Earthquake Exercise

In June 2007, Missouri held its first statewide earthquake drill. This exercise encompassed six operational periods, simulated over three actual days.

The GIS workstation was stationed in the SEMA Control Room, above the work floor, and used one of the main 3 large-scale projectors for viewing on the work floor. The former Missouri Emergency Response Geographic Information System (MERGIS) dataset (containing crucial shapefiles like telecommunications, bridges, fuel tanks, roads, schools, etc.) was already loaded on the GIS workstation and ready for decision support of the work floor.

When the earthquake occurred during the drill, damage estimation maps were brought onscreen from the USGS website, which had earthquake impact shapefiles for Missouri. Later in the drill, map requests displayed counties without power, water, and communications based on information provided by the drill coordinators. Before the drill concluded, GIS also displayed the locations of downed bridges, closed roads, and possible search and rescue zones.

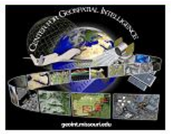
Casualty Estimates (HAZUS)



Peak Ground Acceleration (HAZUS)

Current Programs and Projects

Center for Geospatial Intelligence



The Center for Geospatial Intelligence (CGI) is an interdisciplinary center at the University of Missouri - Columbia (UMC) that involves faculty and researchers in Electrical Engineering, Computer Engineering, Computer Science, Geography, Civil & Environmental Engineering, and Geological Sciences. The center was formally established in February 2004 and is designated and supported as a "Signature Program" by the UMC College of Engineering.

The center leverages significant ongoing R&D activities at UMC in the areas of satellite and airborne remote sensing, advanced geospatial data processing, automated feature extraction and target recognition, large dataset visualization, computer vision, intelligent databases, and information retrieval. In addition, faculty from Geologic Engineering and Mining Engineering at the University of Missouri - Rolla (UMR) provide added expertise in the detection and characterization of underground structures along with UMC faculty in Civil & Environmental Engineering and Geological Sciences.

By leveraging these multi-disciplinary research skills, the center conducts leading-edge research focused on geospatial intelligence needs critical for national security, homeland defense, and military combat support.

http://geoint.missouri.edu

Project Homeland

The National Geospatial-Intelligence Agency's Project Homeland Missouri Pilot is to facilitate the collection, analysis, and dissemination of emergency management geospatial information from State and local governments and make it readily available to Federal Agencies across the Government.

The Missouri Pilot system will integrate GIS and event data, such as data pertaining to emergency events, from local, State and federal emergency management agencies, to provide the State and federal government with a situational awareness common operational picture (COP) that supports emergencies as well as routine operations. The system is anticipated to provide the capability to:

- Provide the architecture to provision standards-compliant web mapping and geo-processing services in support of an emergency management Services Oriented Architecture (SOA).
- Provide map and geo-processing services that enhance the State's existing situational awareness tool (MERIS) and corresponding GIS architecture.
- Provide the capability to visualize the locations of State assets and infrastructure in relationship to other State data and emergency management activities. Integrate data and knowledge that has been collected from disparate sources and methods and converted into consistent, accurate, and useful geospatially referenced information.
- Access and visualize data from State, regional, local and federal systems provided via the Missouri portal (MSDIS), a system that harvests, and indexes geospatial data and services for efficient consumption by geospatial applications.

Geographic Health Emergency Response Mapping

Geographic Health Emergency Response Mapping (GHERM) was developed to support health emergency response through the use of spatial visualization and analysis at the Missouri Department of Health and Senior Services. This program provides Geospatial support during a health emergency, but also used for planning, prevention, and recover.

A team of GIS professionals has been trained to provide support in an Emergency Operations Center, the Department's Decision Support Room (DSR), or their Mobile Command Center during an emergency event. The team's primary function is to input incoming information and quickly transform it into an easily visualized format. Information is added to the system as the situation changes and customized maps can be created.

This program also provides GIS software and training to Local Public Health Agencies (LPHA). These agencies are also provided GPS (Global Positioning System) units for field data collection. Many LPHAs have used GIS/GPS to assist in creating emergency response plans and to help develop emergency exercises. LPHAs are also using the GHERM dataset for projects such as environmental hazard inventory, West Nile virus tracking, and on-site inspections.

GHERM incorporates GIS into many other aspects of emergency response. For example, an Internet mapping site has been established for the State Health laboratory that allows staff to track the distribution of emergency medical packets via the Internet. It is also used to visualize distribution of illness and symptoms of possible illness across Missouri.

Missouri Emergency Resource Information System

Provide the State with a platform that can be used to meet the needs today, and in the future, for all jurisdictions to be able to participate in planning, managing, maintaining and executing response and recovery operations with common operating systems that provide near real-time situational awareness and synchronization of actions relating to emergencies and disasters. (MERIS Website)

The Missouri Emergency Resource Information System (MERIS) is a combined incident command system that will be deployed across the state, providing a common operational picture to all levels of response.

GIS is a vital component of MERIS, as the ability to locate incidents, response resources and facilities is pervasive throughout the system. As such, MERIS users will be able to create basic maps within the system, without the need for a designated GIS specialist. This capability will be provided to all users through a secure, shared database of GIS.

While MERIS does not eliminate the need for dedicated GIS support, it does provide responders the ability to do some mapping themselves, allowing for quicker assessments.

http://www.dps.mo.gov/HomelandSecurity/MERIS/MERIS.htm

Homeland Security Infrastructure Program

The Homeland Security Infrastructure Program (HSIP) is a coordinated effort to locate and inventory critical infrastructure and provide that information to the emergency response/homeland security community. Spearheaded by the National Geospatial-Intelligence Agency (NGA), HSIP seeks to provide responders with highly accurate facility information and locations by working with state and local jurisdiction.

Missouri is currently working with HSIP to improve information about schools, law enforcement agencies, evacuation routes, critical health care locations and other locations. The result will be improved ability to locate and identify facilities affected by an incident, directly or in a support role.

Currently, contractors for NGA are collecting and validating data. As a return for state and local entities, the contractors provide the validated data back at no cost.

Homeland Security GIS Subcommittee

The Homeland Security Subcommittee of the Missouri GIS Advisory Committee serves as a resource for many of the GIS programs within the state's homeland security and emergency management sectors. Comprised of federal, state, local, academic and private sector personnel, the subcommittee develops or assists with grant funding, data and software architecture and development, training, and general program guidance.

The subcommittee also functions as the GIS subcommittee and advocate for the Governor's Homeland Security Advisory Council.

More information regarding the subcommittee (including meeting information, contacts and other resources) can be found at its website:

http://www.mgisac.org/HomelandSecurity

Mid-America GIS Consortium Conference 2008

Poster by:
Jason Eberwein - Intermediate GIS Specialist
Missouri Department of Transportation
Jefferson City, MO
Jason.Eberwein@modot.mo.gov
573-526 5860

Contributions by:
Tim Robichaud - Missouri Geographic Information Officer
Debbie Brinkerd - Missouri Department of Health and Senior Services' State Emergency Management Agency
Colin Darrell - Missouri Department of Economic Development