IMPACT Examples

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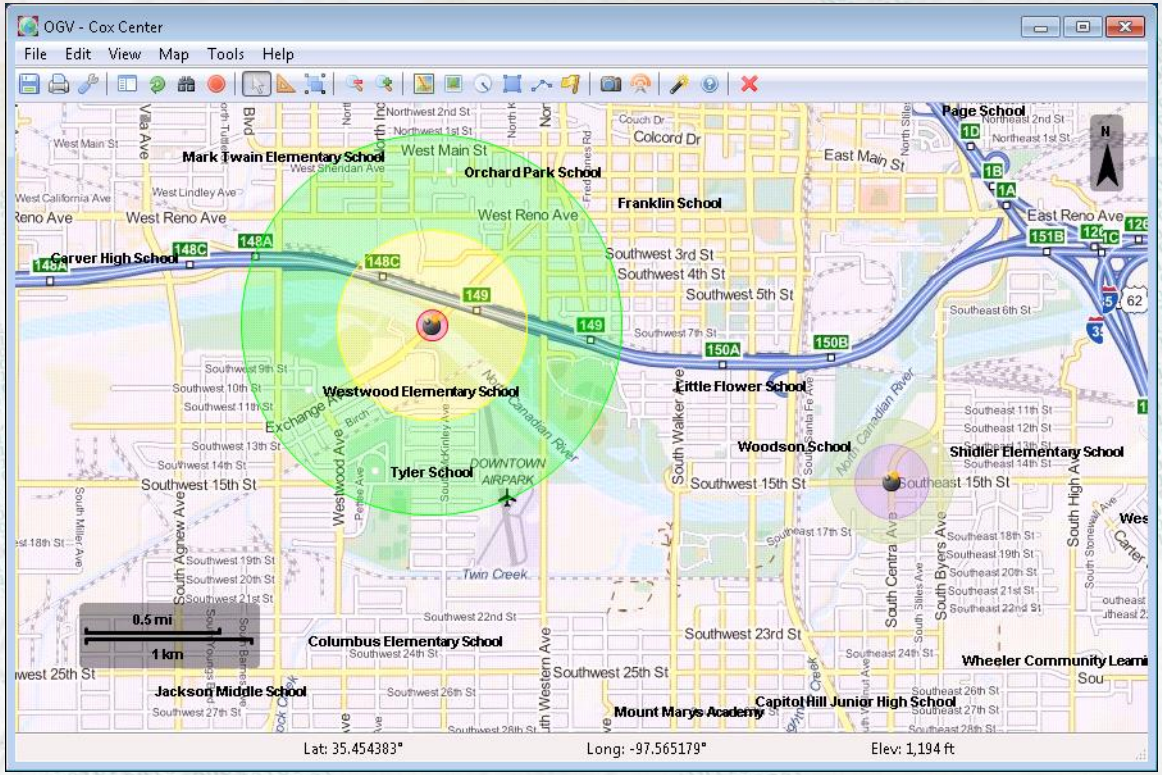
OAK RIDGE National Laboratory

IED Evacuation and Damage Rings

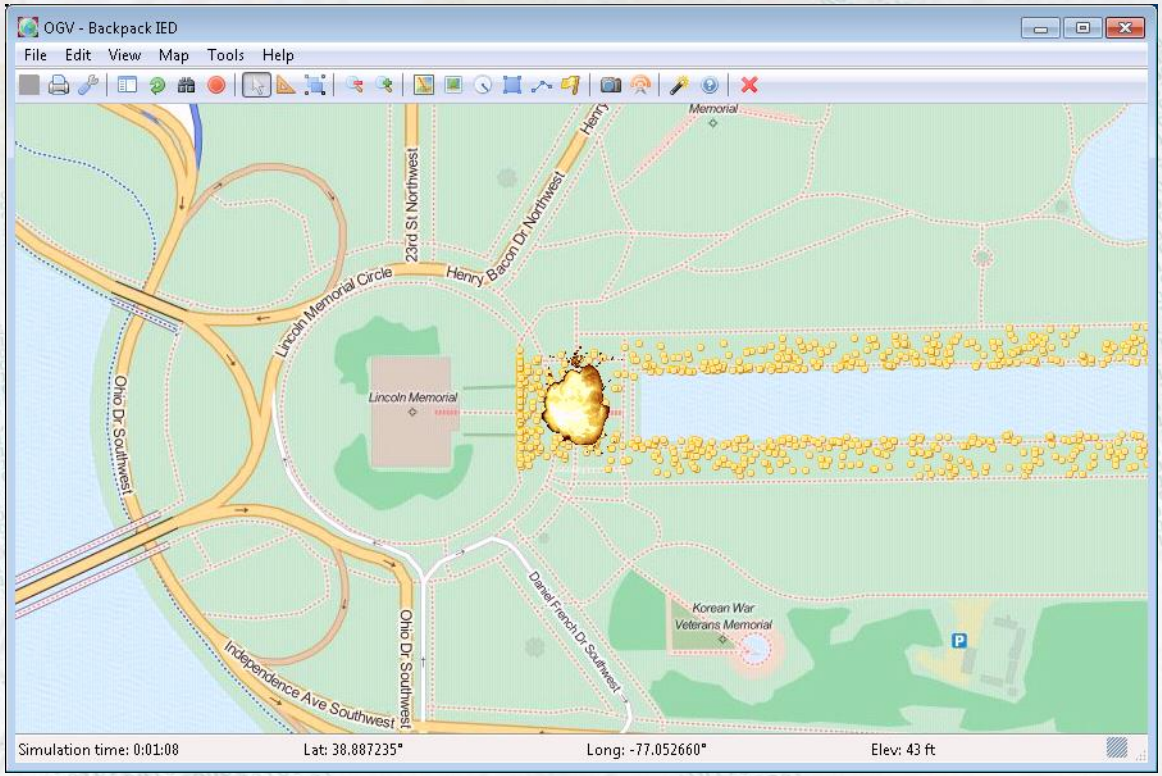
Geographic Information Science and Technology



- Both evacuation and damage rings may be placed on a map
- Evacuation distances come from DHS guidelines
- Damage rings come from open DoD model (6055.09-STD)
- Nearby infrastructure layers may be turned on
- Models assume free-field effects

Backpack IED Simulation

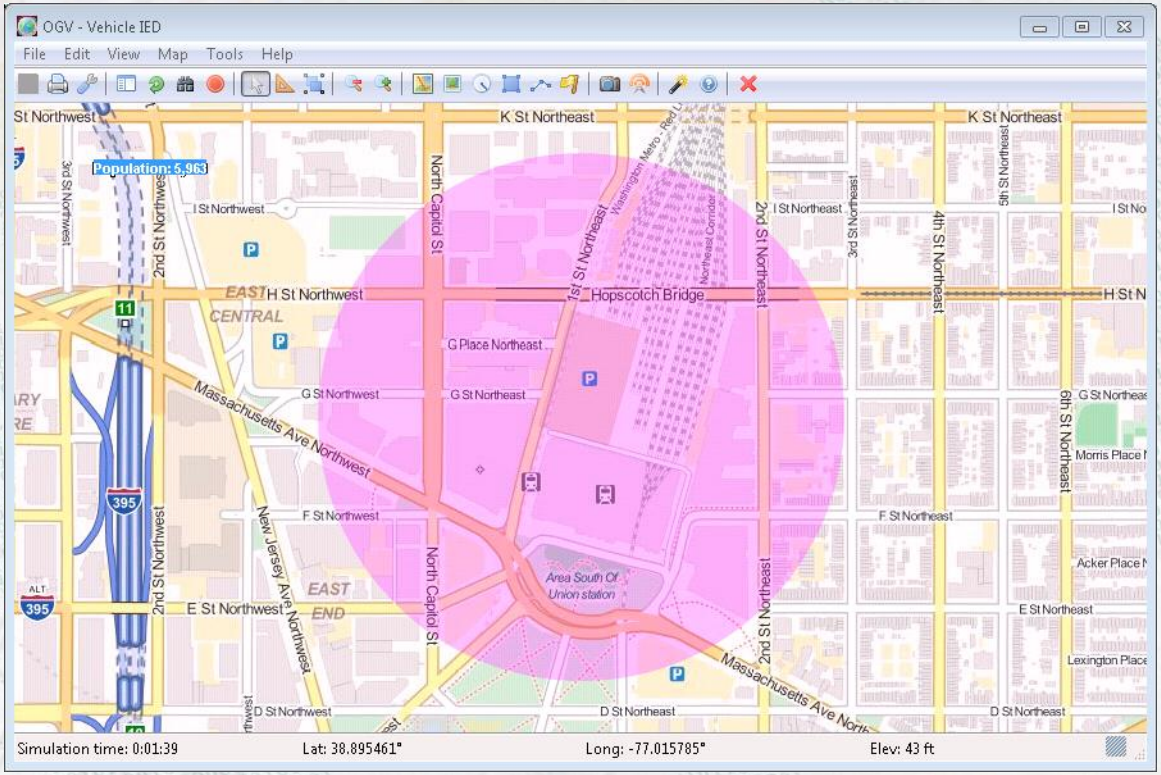
Geographic Information Science and Technology



- User can create backpack IED simulations anywhere in the world
- Inputs include crowd size, explosive charge, and detonation time
- Outputs include likely fatalities and self-evacuation time for survivors
- Arrangement of physical barriers and gates for crowd control can be studied
- Can be used as the basis of a TTX for special events

Vehicle IED Simulation

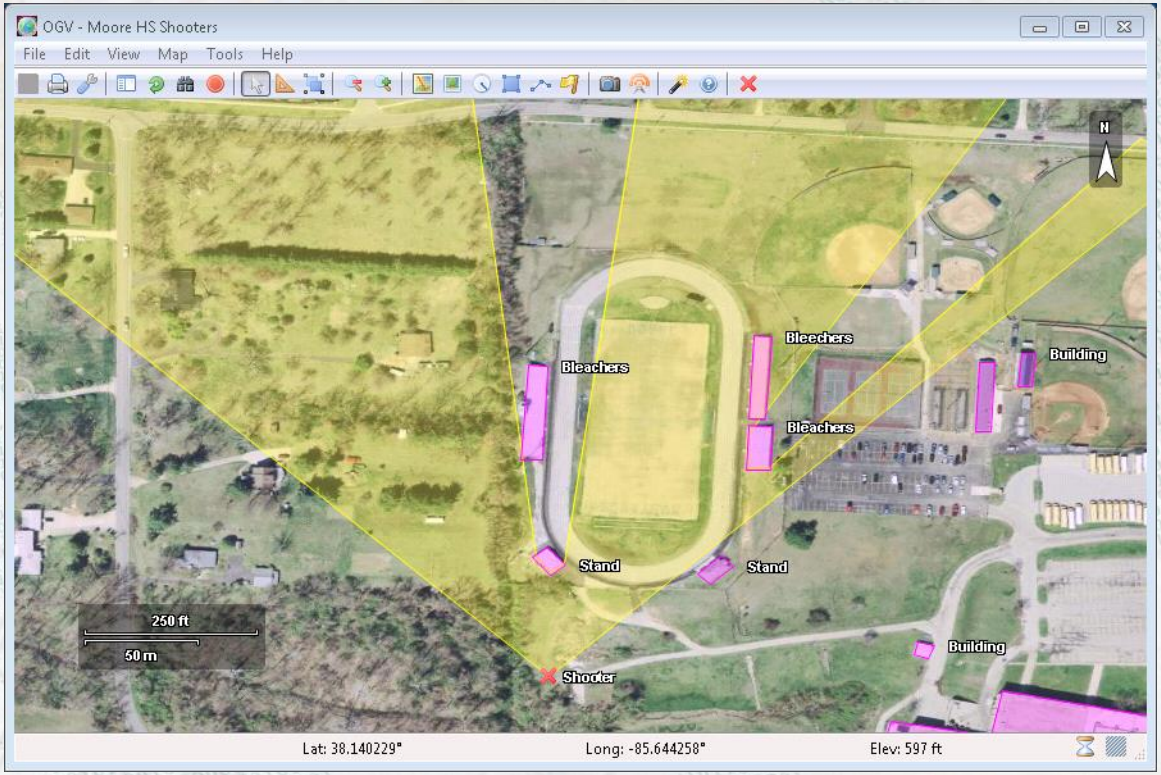
Geographic Information Science and Technology



- User can model a simple VBIED animation anywhere in the world
- Inputs include vehicle route and explosive size
- Expanding ring may represent shock wave or fallout
- Population shown as ring expands
- Could be used as a visual aid for a TTX

Active Shooter Line-of-Sight

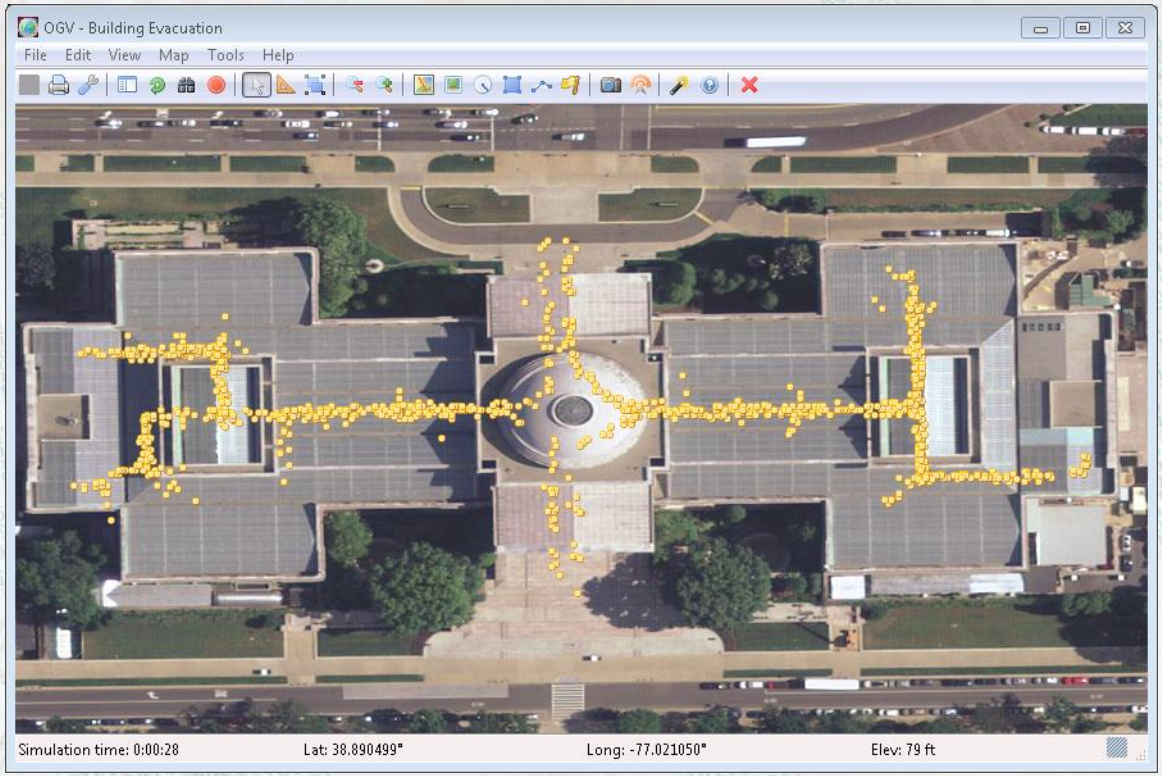
Geographic Information Science and Technology



- Shows what is in view for shooter or response team
- Takes into account terrain elevation and building heights
- Terrain elevation is built-in (DTED 0)
- User must outline buildings and assign heights
- Line-of-Sight wizard calculates view

Building Evacuation Simulation

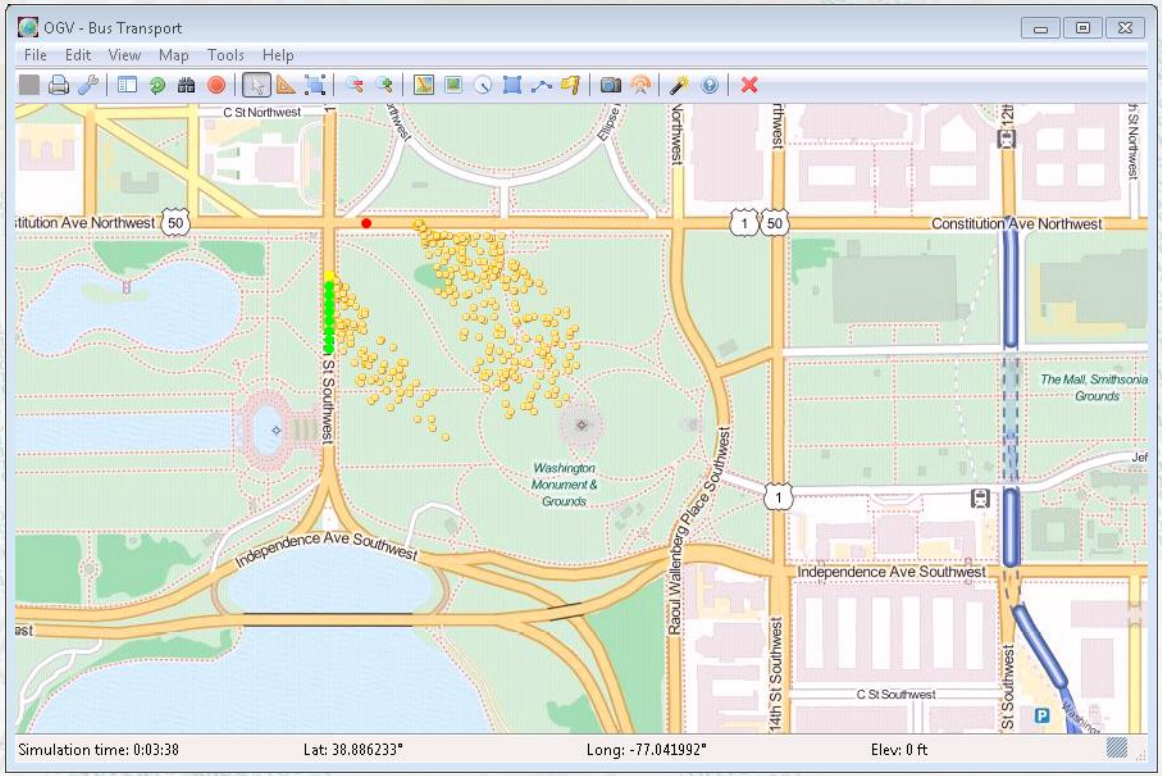
Geographic Information Science and Technology



- User can model a simple building evacuation anywhere in the world
- Inputs include crowd size and building details (one floor at a time)
- Output is time to evacuate
- Collision detection is built in
- User can vary the paths and exits to compare scenarios

Bus Transport Simulation

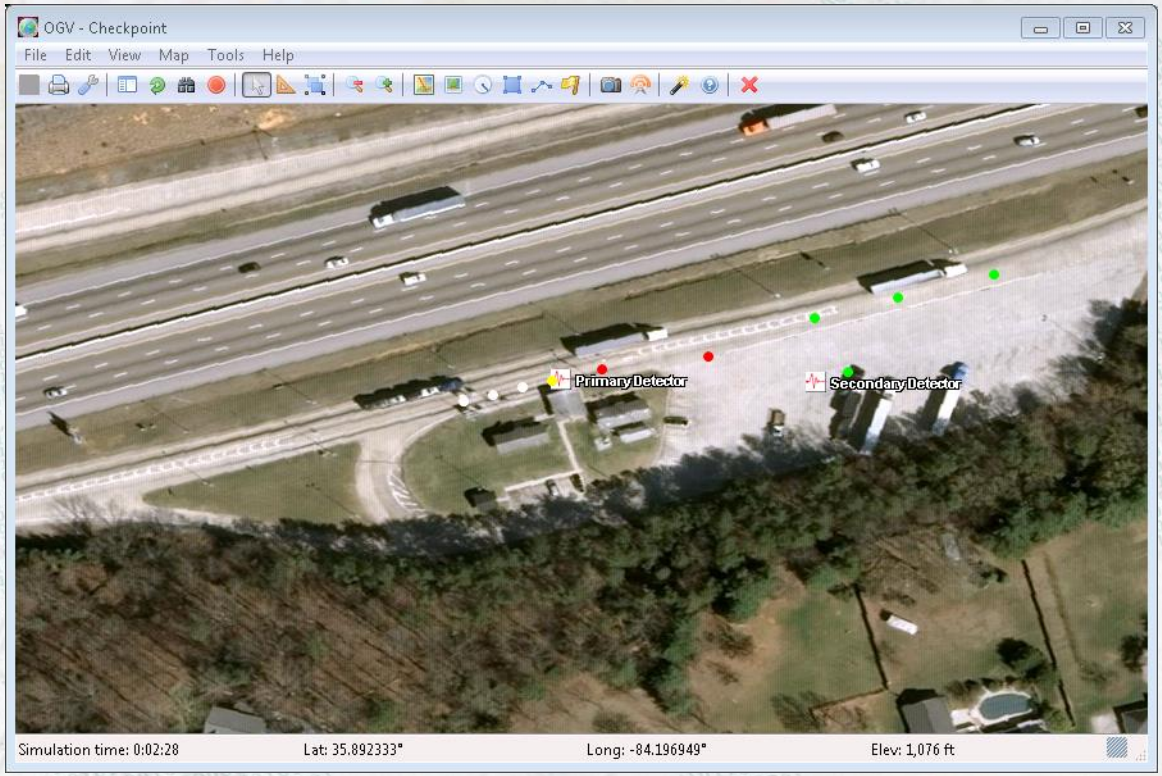
Geographic Information Science and Technology



- User can model a simple bus transport anywhere in the world
- Inputs include crowd size, number of buses, pick-up points, and routes
- Output is time to evacuate
- Collision detection is built in for people boarding buses
- Can be used for special event planning

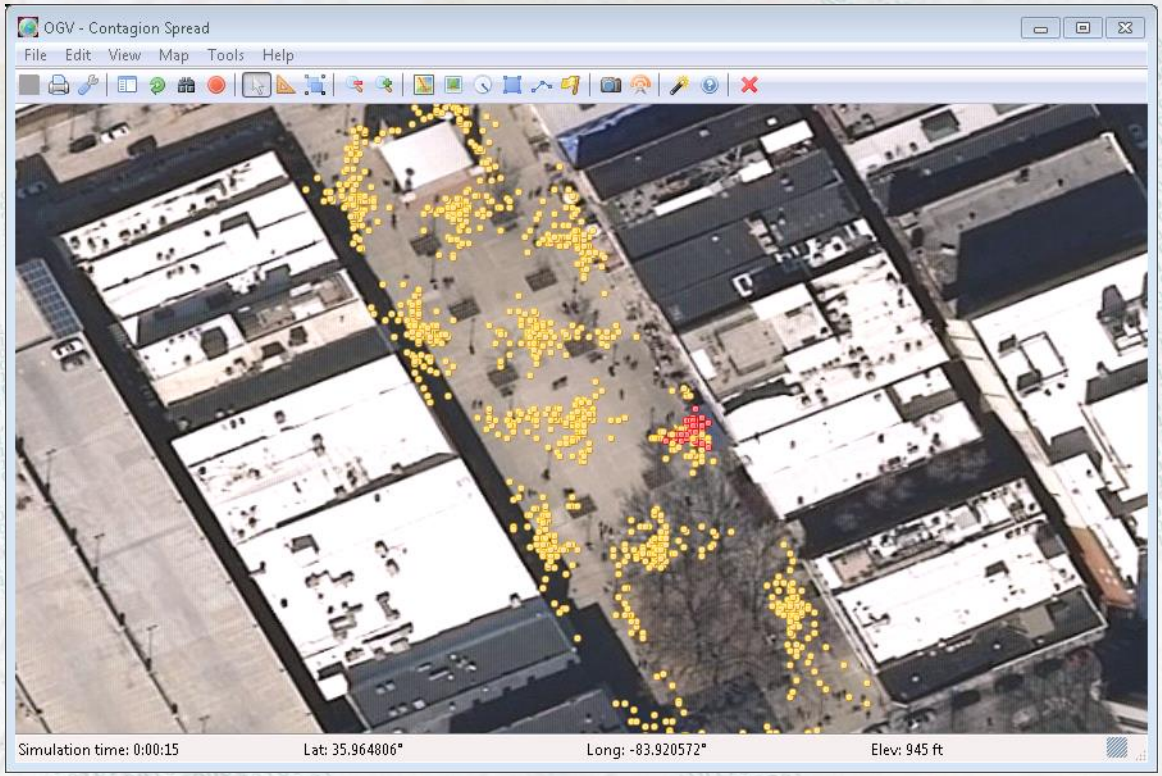
Checkpoint Simulation

Geographic Information Science and Technology



- User can model a simple checkpoint operation anywhere in the world
- Inputs include number of vehicles, routes, detector locations
- Outputs are time elapsed, visual display of traffic delays
- Collision detection is built in
- Could be modified for more complex operations or people instead of vehicles

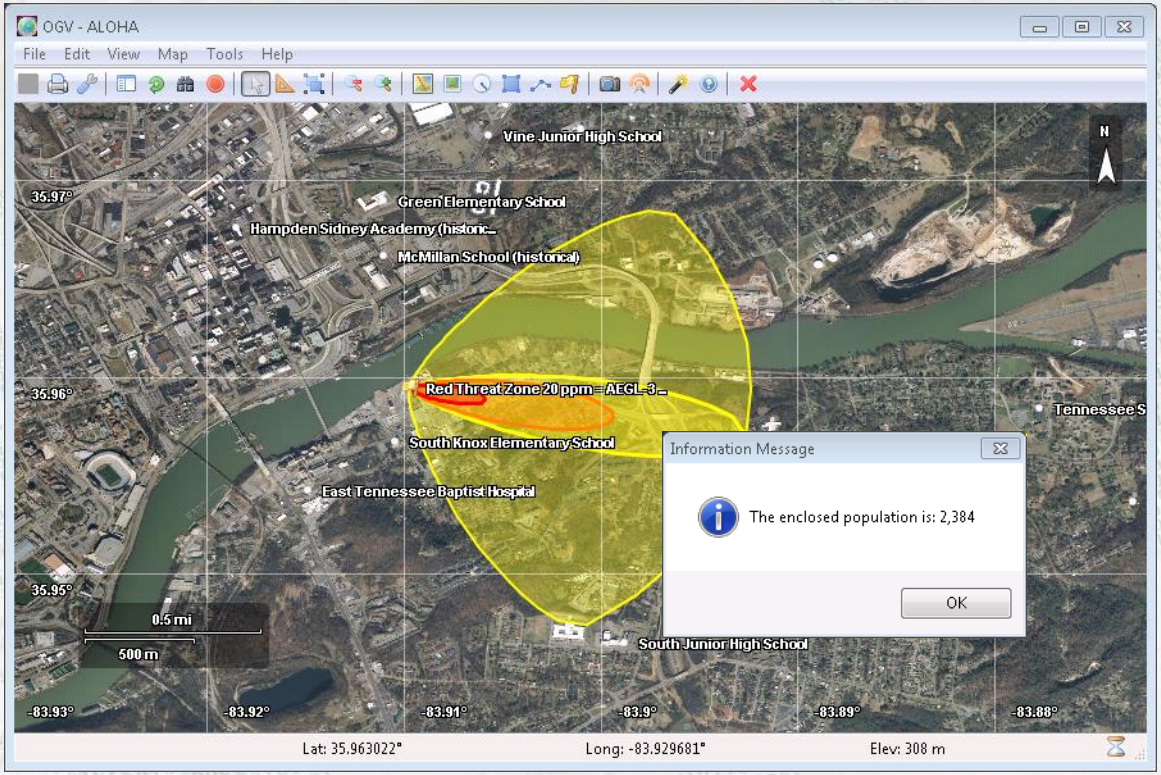
Contagion Spread Simulation



- User can model person-to-person contagion spread anywhere in the world
- Area may be indoors or outdoors
- Output is time for entire crowd to be exposed and contact statistics
- Cluster points can be introduced to simulate exhibit booths at a conference
- Currently being developed to investigate mass gatherings

Plume Model

Geographic Information Science and Technology



- Plume can be generated using built-in ALOHA program (NOAA)
- Can turn on other map layers to see what is affected
- Population can be estimated using built-in data set

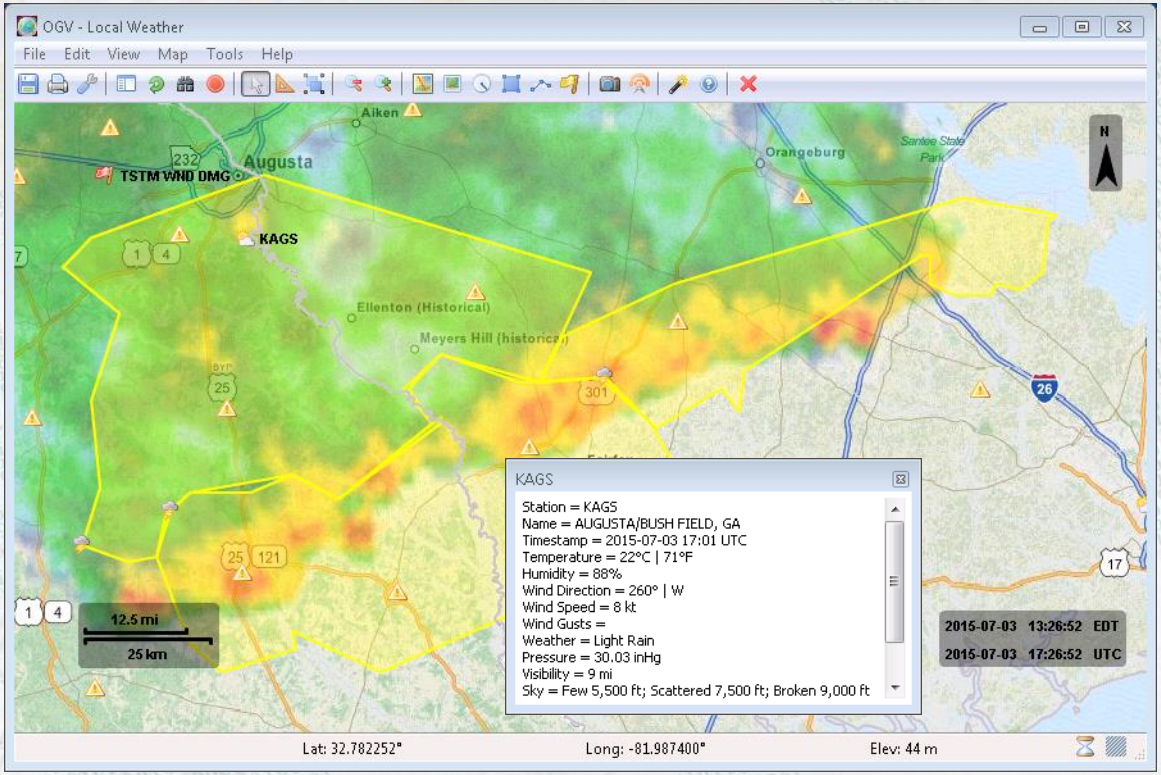
Natural Hazard Monitoring

Geographic Information Science and Technology

- Natural hazards from many sources can be consolidated on a single map
- User can control color and transparency of many features
- Double-clicking a map feature shows more information
- Population can be displayed for warning polygons
- Display can be recorded to make a movie for later playback

Local Weather Monitoring

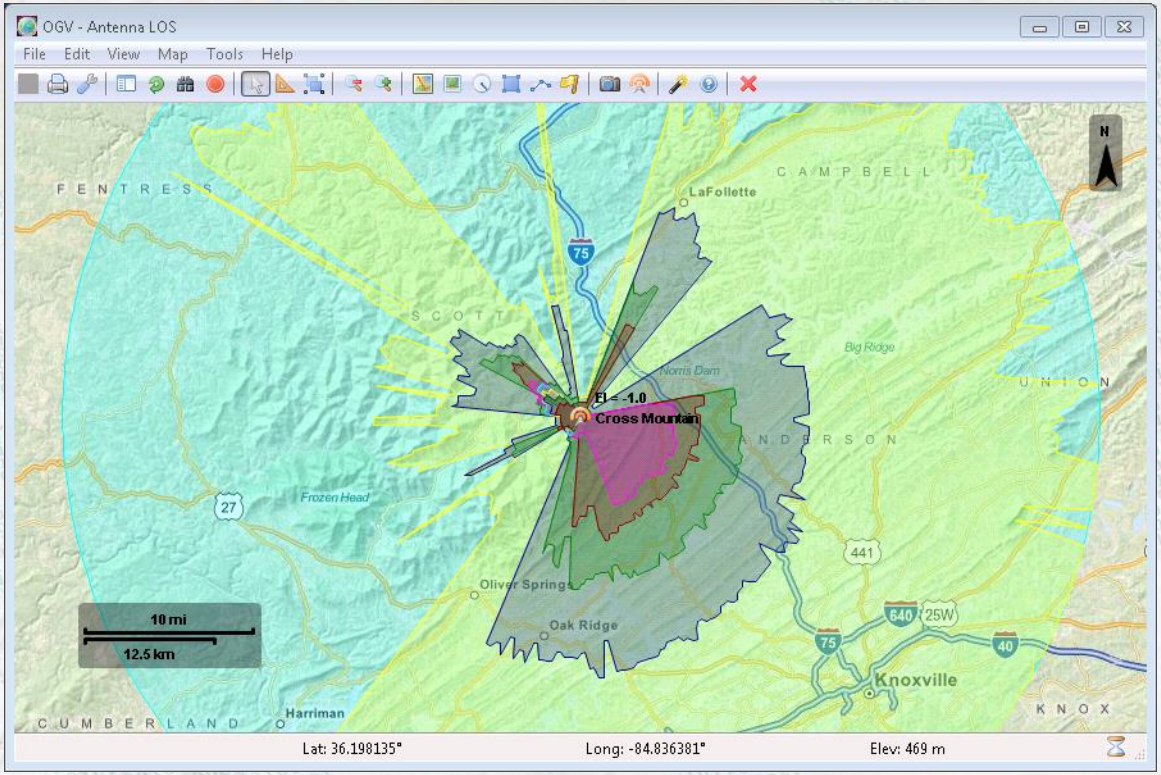
Geographic Information Science and Technology



- Local weather can be displayed in real-time
- User can control color and transparency of many features
- Double-clicking a map feature shows more information
- A geofence can be set up with email alerts for events inside an area like lightning
- Display can be recorded to make a movie for later playback

Antenna Placement Studies

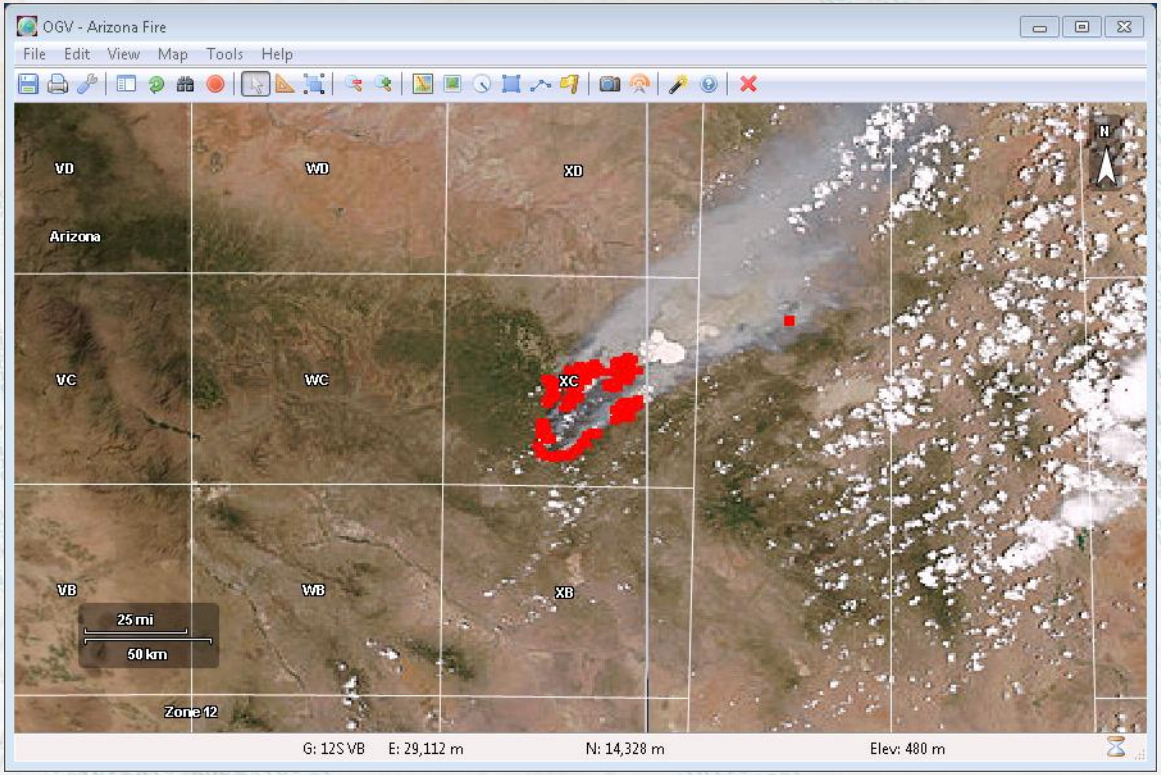
Geographic Information Science and Technology



- **Wizard can be used to characterize antenna patterns**
- **Useful for picking sites for relay stations**
- **Uses built-in terrain elevation data set**

GIS Data Exchange

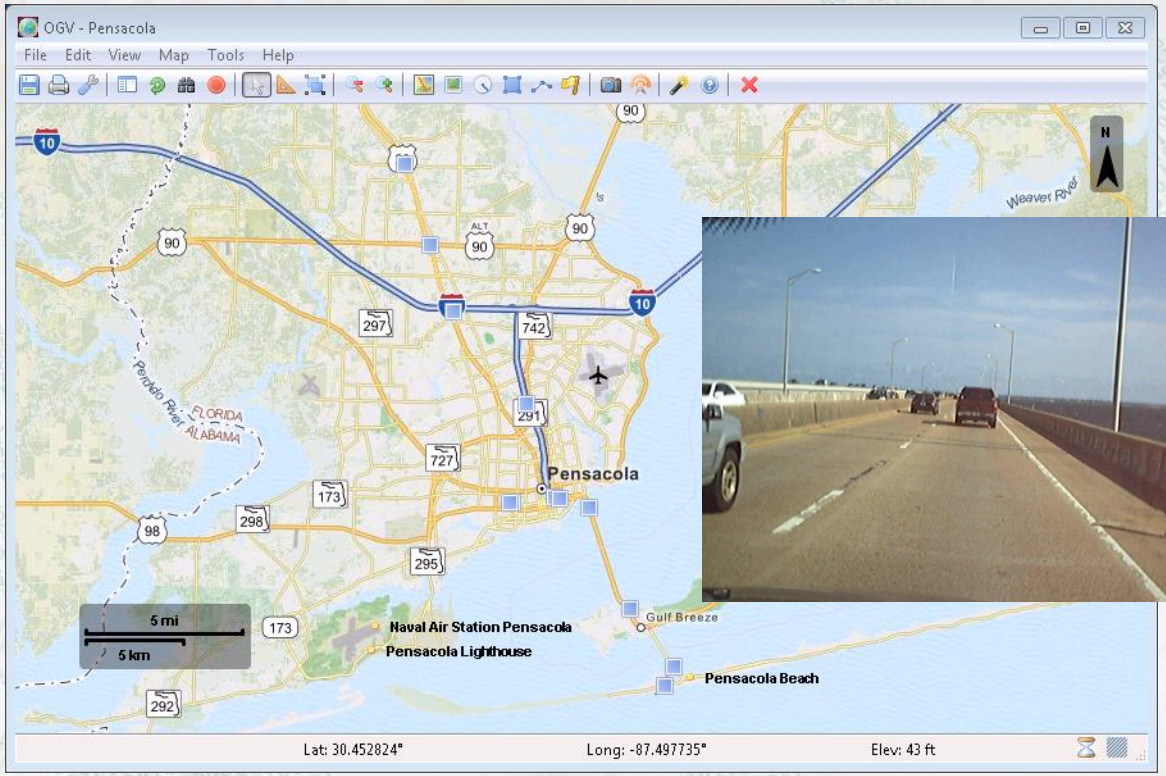
Geographic Information Science and Technology



- Maps can import/export data with other GIS programs
- Supports several grids including US National Grid and user-defined
- Uses a publish/subscribe method to share data in real-time
- Can monitor social media based on location and boundary

GPS and Webcam Support

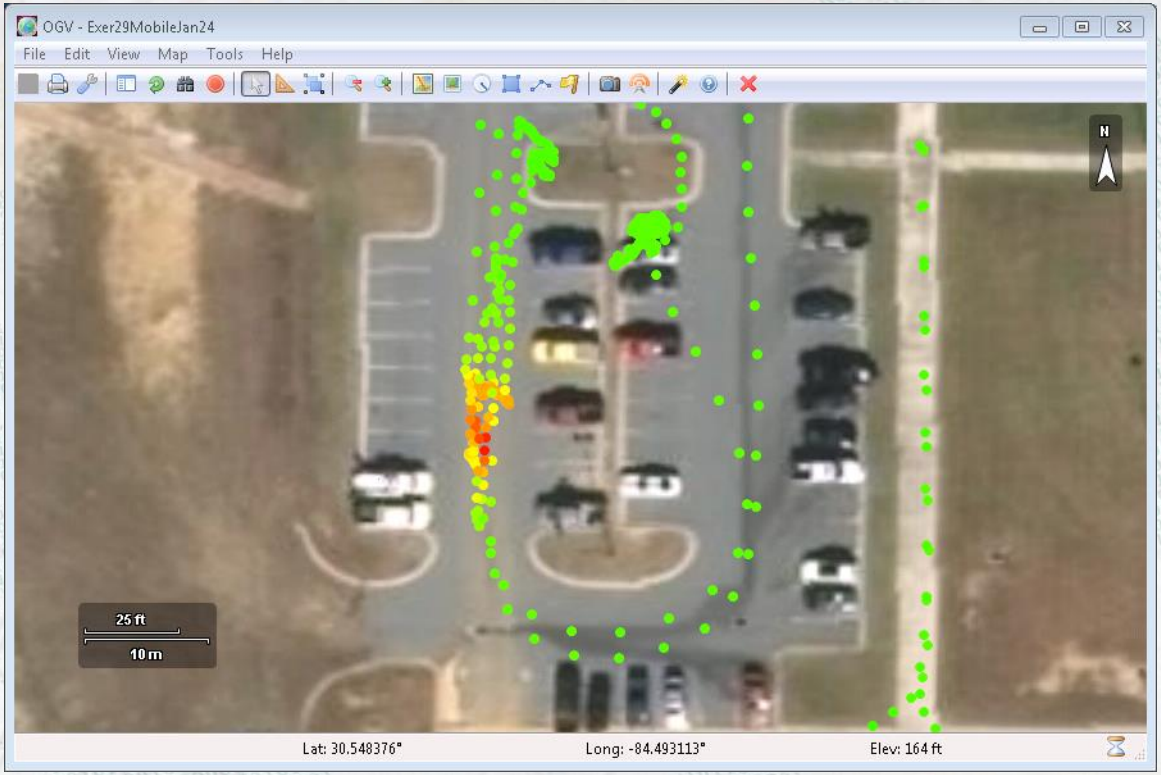
Geographic Information Science and Technology



- GPS position can be shared in real-time with publish/subscribe
- Webcam can be programmed to automatically take photos
- Geo-tagged photos can be shared in real-time with publish/subscribe
- Could be used for windshield damage assessment after a storm

Sensor Data Display

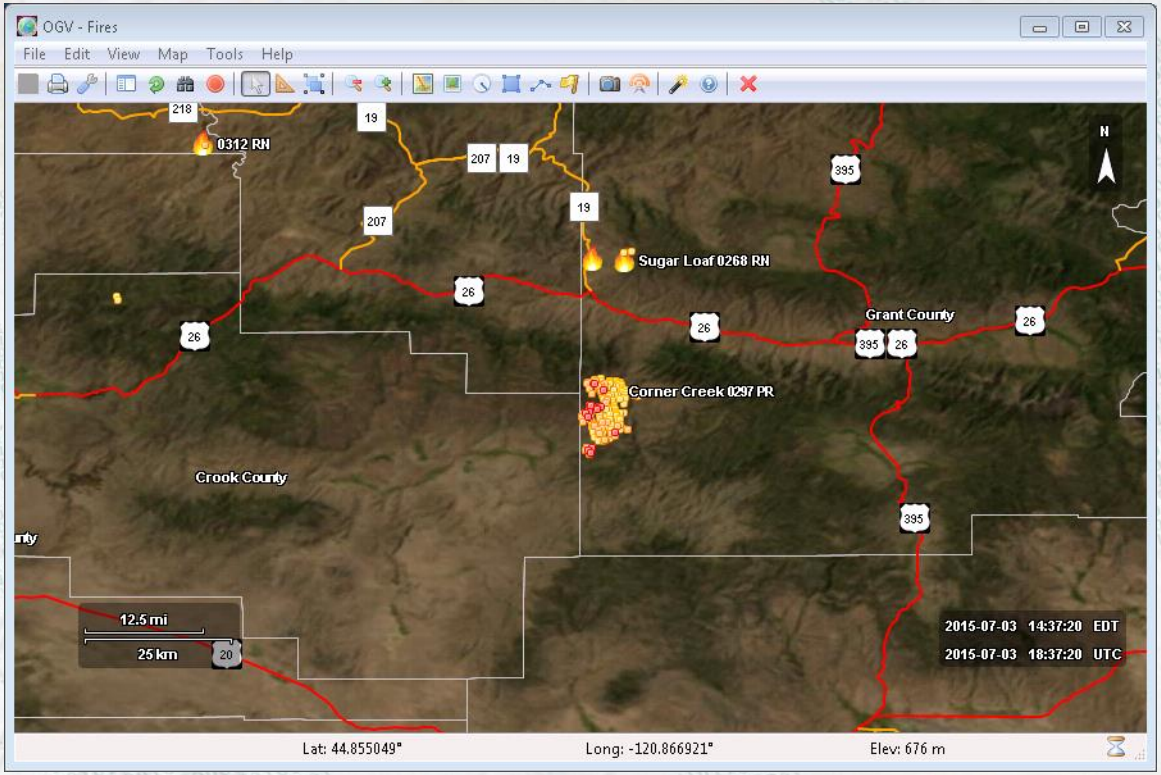
Geographic Information Science and Technology



- GPS position can be combined with sensors attached to laptop
- Useful for detecting signal sources
- Color coding makes it easy to find strongest signal

Wildfire Monitoring

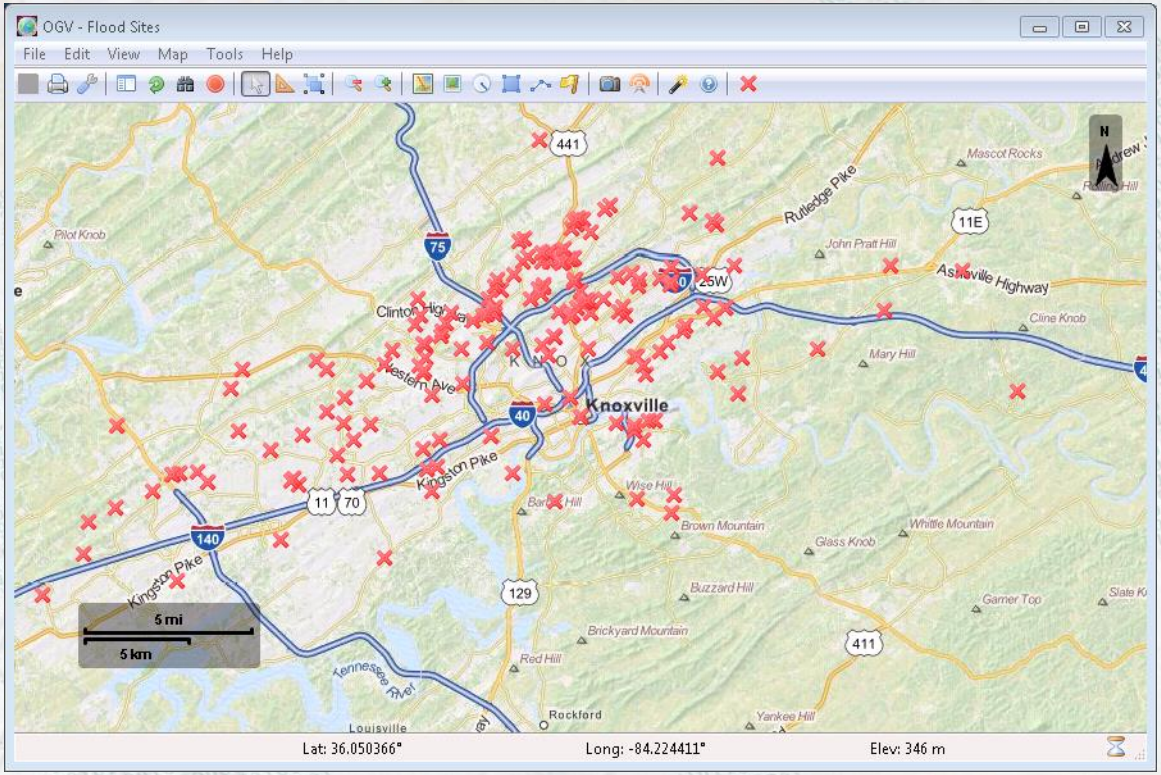
Geographic Information Science and Technology



- **Wildfire satellite feeds can be monitored**
- **Transportation routes and infrastructure threatened can be assessed**
- **Color coding allows direction of spread to be estimated**

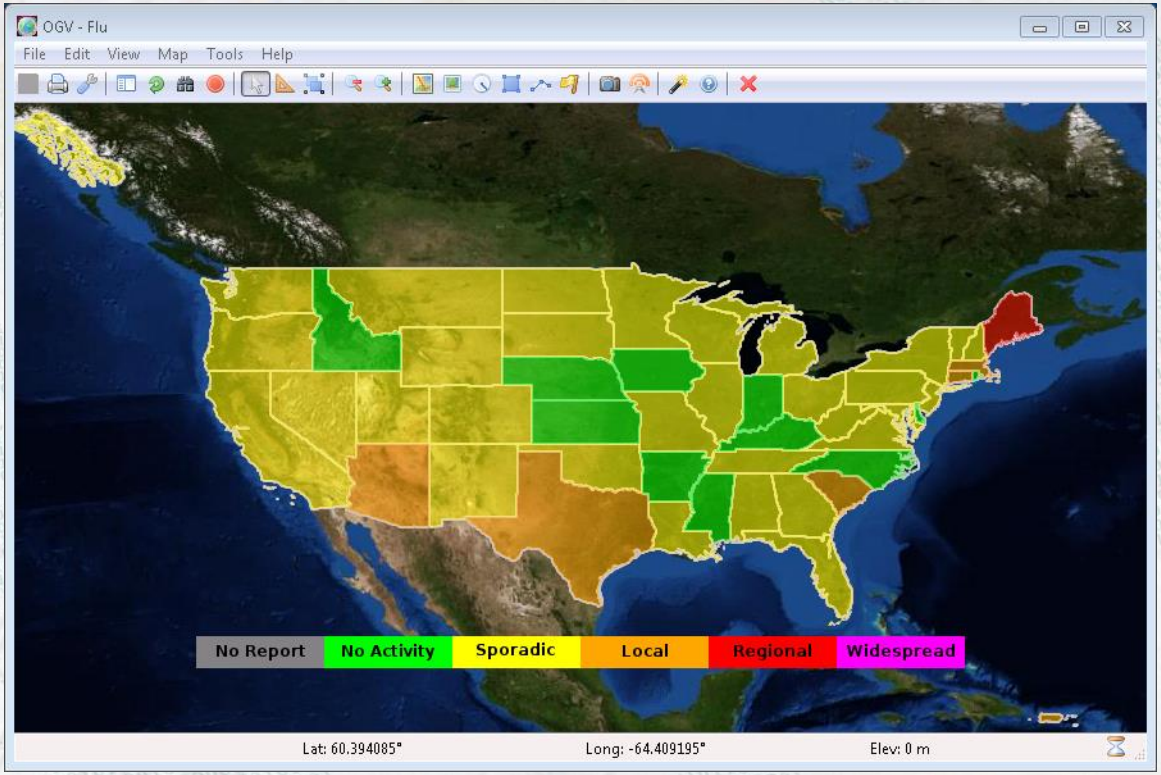
Importing Spreadsheet Data

Geographic Information Science and Technology



- **Spreadsheet data can be imported and automatically geocoded for display**
- **If timestamp is included, animation is possible**
- **Animation frames can be saved and made into a movie**

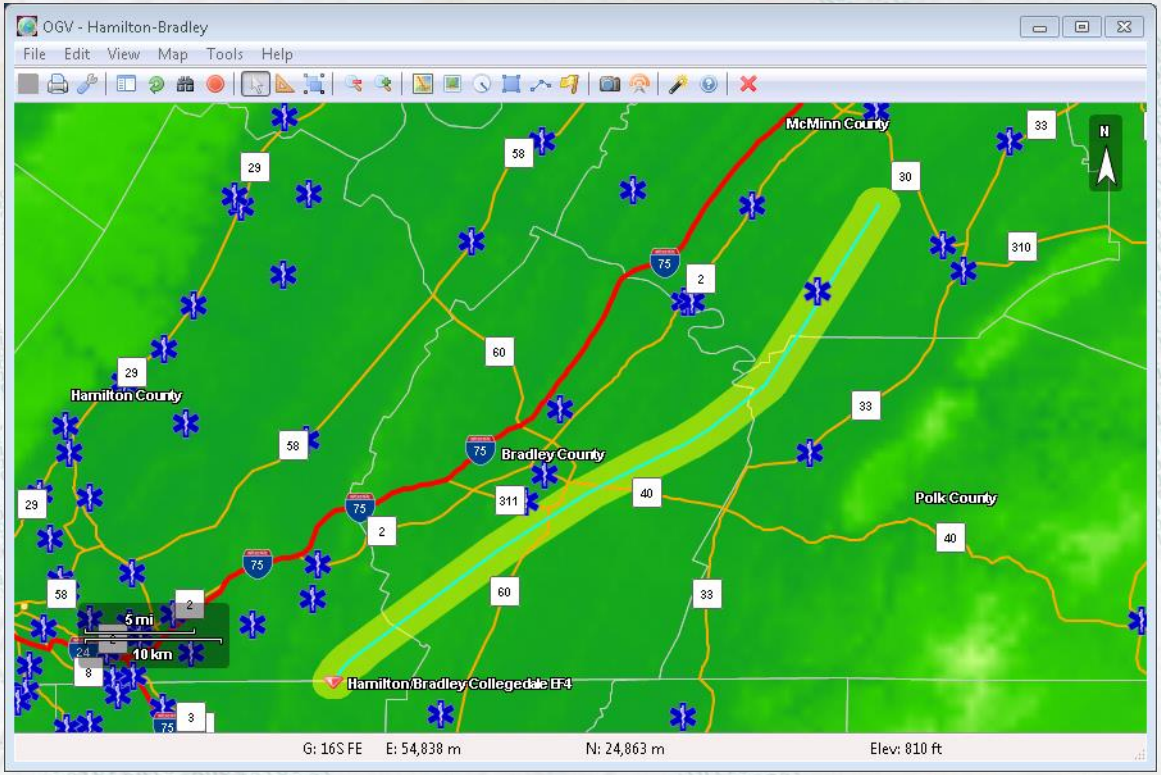
Creating Color-coded Maps



- Maps can be color-coded for use in reports
- Raw images as well as framed versions are supported
- Legends can show which layers are turned on
- Maps can be exported for other IMPACT users

Showing Buffers

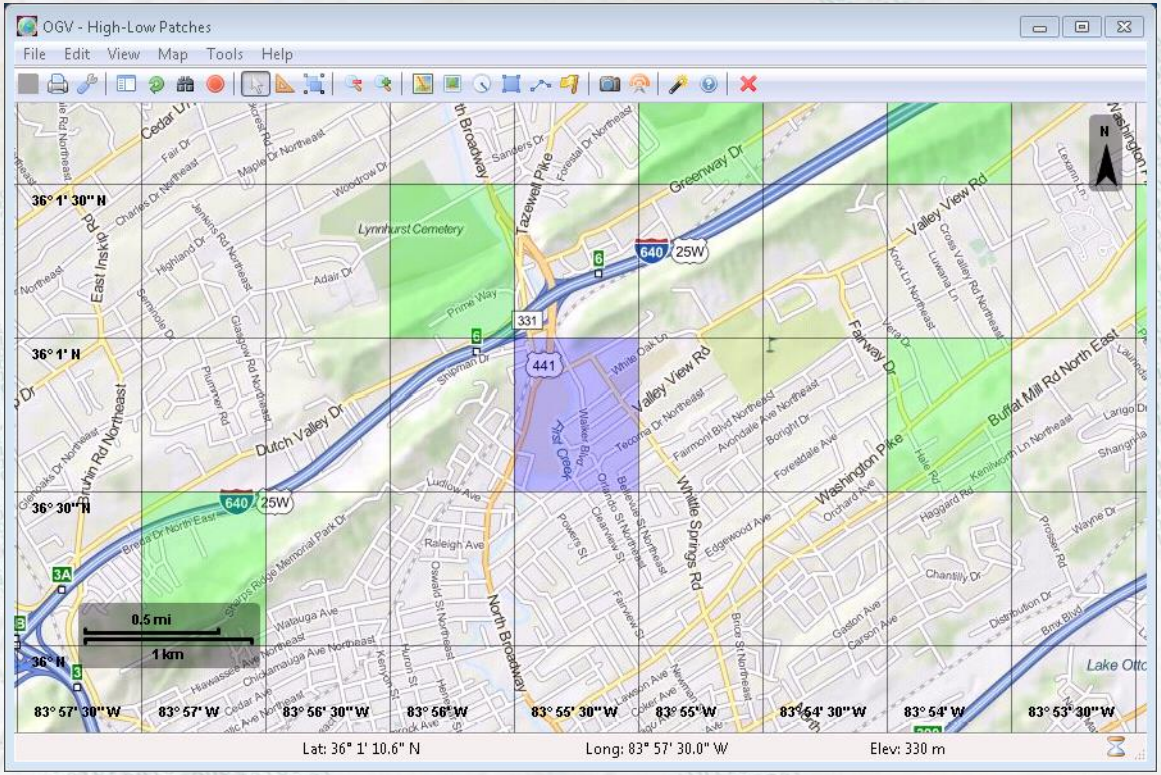
Geographic Information Science and Technology



- Buffers can be auto-generated around map features
- Example shows a tornado track from 2011 near Chattanooga, TN
- Nearby medical facilities are plotted
- Responders could plot track in real-time with copies of IMPACT in vehicles
- Can function without a network connection

Terrain Studies

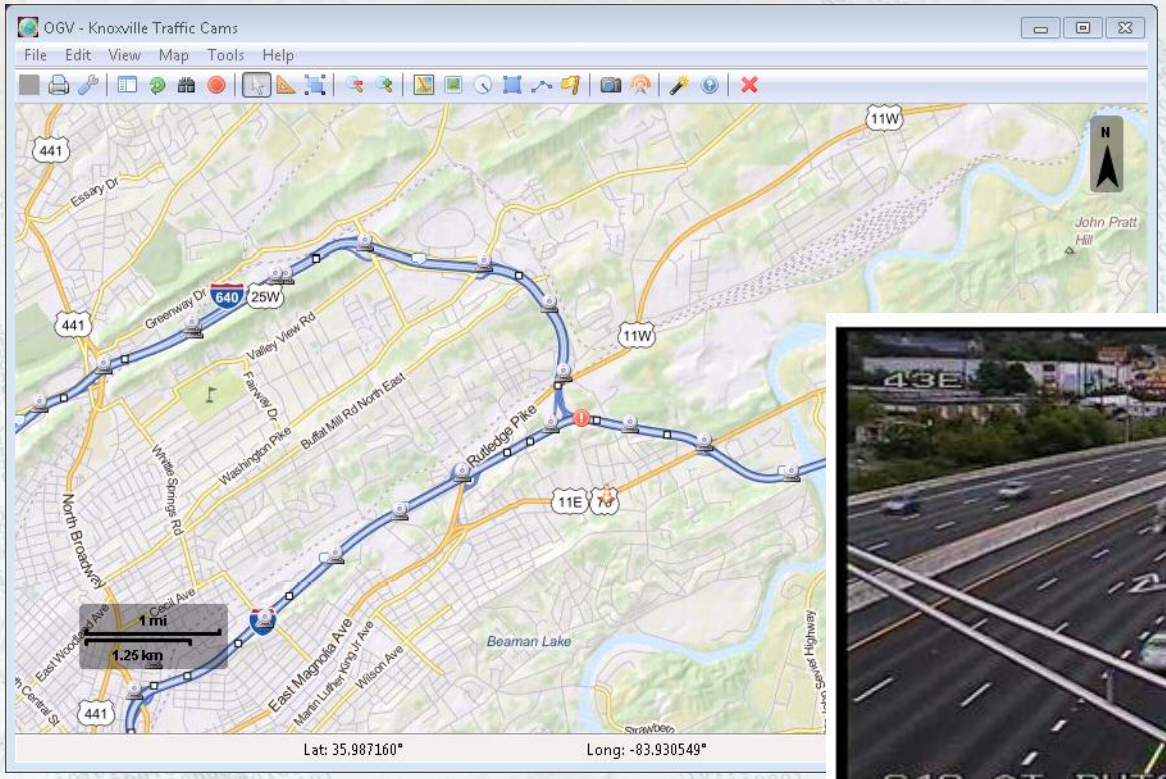
Geographic Information Science and Technology



- High (green) and low (blue) areas can be found using wizard
- Useful for flood planning or communications placement
- Based on DTED 0 terrain elevation data set (30 sec resolution, about 1 km)

Live Traffic Cams

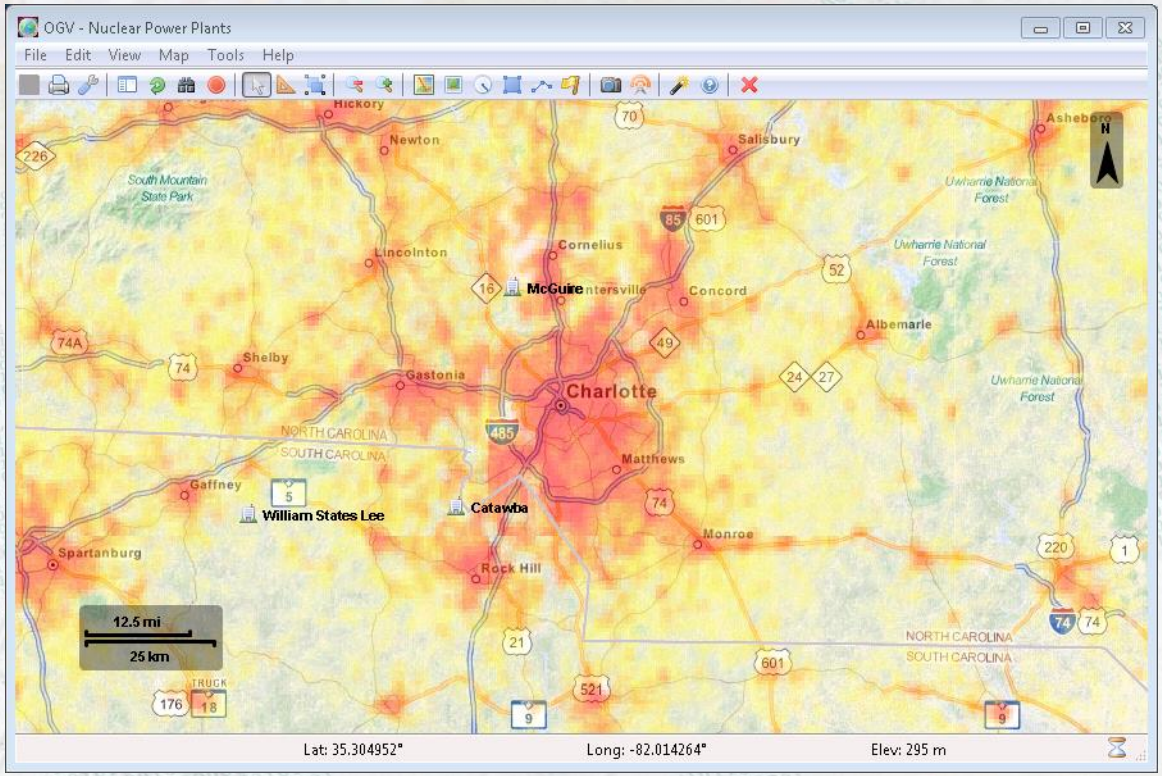
Geographic Information Science and Technology



- **Live traffic cams may be viewed if sources are available**
- **Useful for response route planning**
- **User can add local feeds**

Shelter Placement Planning

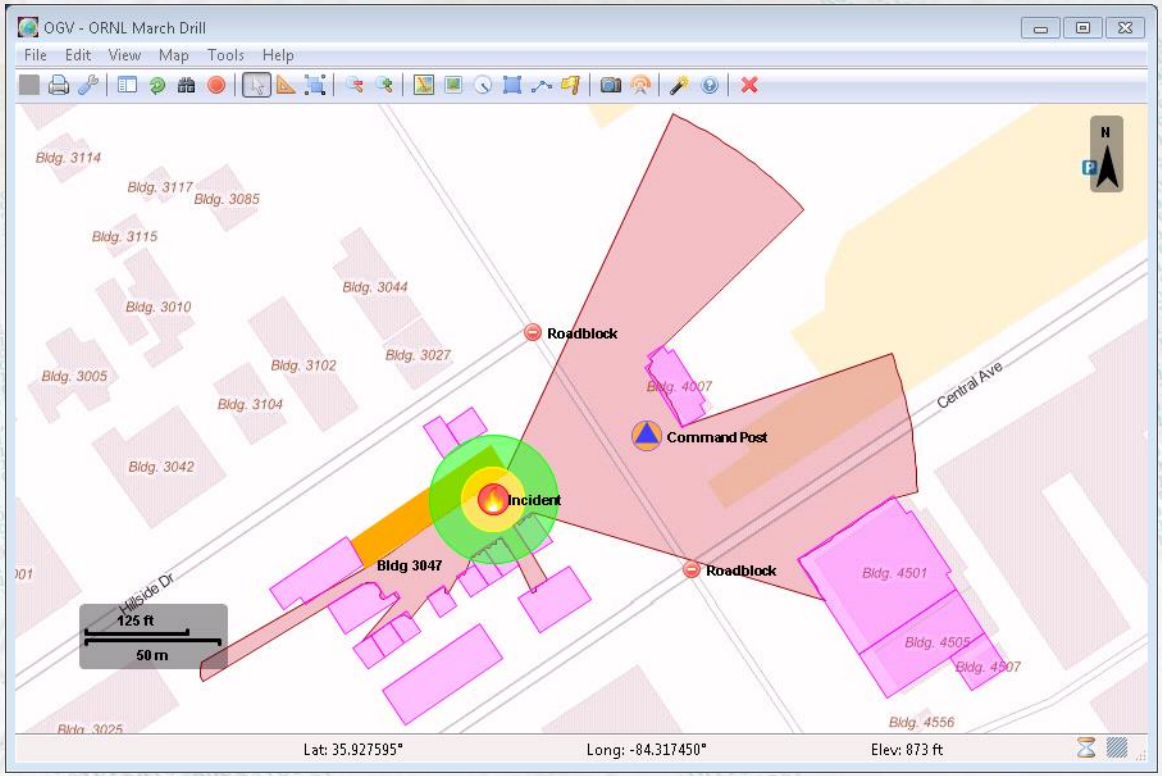
Geographic Information Science and Technology



- Critical sites may be plotted with population tiles as a heat map
- Useful for shelter placement planning
- Regions (polygons) or zones (circles) can be used for population counts

Incident Response and Training

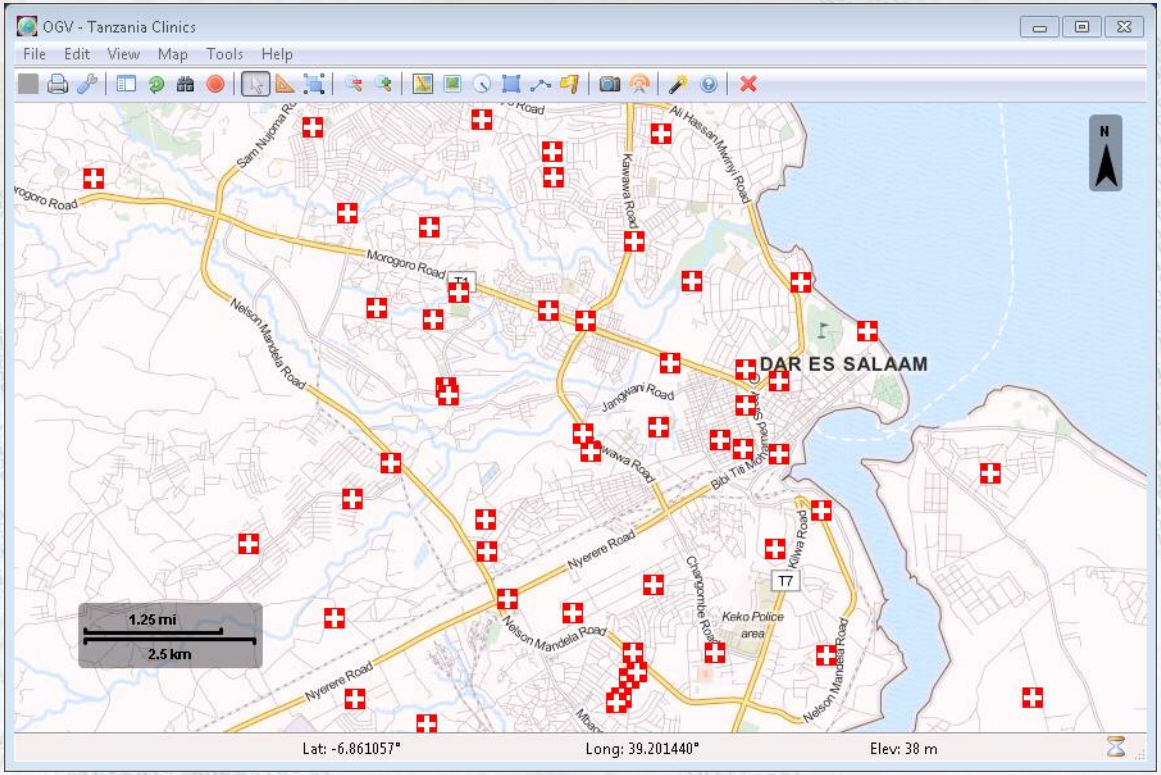
Geographic Information Science and Technology



- **Incident response items can be mapped and shared in real-time**
- **Mock incidents can be used for training**

Worldwide Use

Geographic Information Science and Technology



- Many data sets are available for areas worldwide
- Global imagery and some weather feeds are currently unavailable
- Street tiles come from OpenStreetMap via MapQuest and may be refreshed on demand
- User may add own data directly or as map layers in a database