



Disaster Impacts on Urban Coastal Communities Can Be Complex and Unpredictable

The effects of natural and man-made disasters on urban coastal communities can be unpredictable and catastrophic. Predicting disasters is compounded by the complex nature of urban landscapes, which involve highly populated areas, various environmental conditions such as wind and ocean currents, and a concentration of critical infrastructure (e.g., port terminals, airports, train stations, bridges, tunnels) that are essential to the economy.

Data Sources and Models Provide Real-Time Situational Awareness

Magello is a customizable, Web-based tool that integrates oceanic and atmospheric forecasting, plume modeling, and real-time information updates that can help decision-makers and emergency responders prepare for, respond to, and recover from events. The tool overlays multiple datasets, model outputs, and information sources in a single, user-friendly interface.

Developed by the Center for Maritime, Island, and Remote and Extreme Environment Security (MIREES) at Stevens Institute of Technology, a Department of Homeland Security (DHS) Science and Technology (S&T) Center of Excellence, Magello provides enhanced situational awareness for emergency response and allows decision-makers to rapidly access vital information necessary to make quick, informed decisions. For example, accessing and overlaying real-time wind, ocean current, and sea surface temperature data in a single interface could provide critical information needed to assist the U.S. Coast Guard in tracking and cleaning up an oil spill or running search and rescue operations.

Magello Successes

- Conceived and developed by a team of students at the 2011 Summer Research Institute at Stevens Institute of Technology
- Selected as a top ten finalist in the 2012 National Security Innovation Competition

Features of Magello

- Easy-to-read, Web interface on a user-friendly Google Earth™ platform
- Ultra-high resolution (~100 meter resolution), high-fidelity oceanic and atmospheric forecasts
- Plume forecasting of spills or contaminants in the rivers, ocean, and air



3D modeling of water temperatures shown with AIS

- Ability to include custom layers and annotations
- Simultaneous viewing of a variety of user-specified data sets, including atmospheric and oceanic data (e.g., air and water temperatures, currents, wind, sea state) and AIS vessel information
- Accessible by computer and smartphones

Test and Evaluation

Students in the 2014 Summer Research Institute demonstrated Magello to the New York City Office of Emergency Management and to the U.S. Coast Guard Sector New York Incident Command Team. End-user feedback resulted in new datasets and layers to include regional population counts, air quality readings, shoreline sensitivity indexes and other civil infrastructure maps (e.g., sewer overflow, hospital locations, and breakwaters and piers).

Next Steps

Magello is undergoing further development with support from the U.S. Coast Guard Research and Development Center. Additional field tests and meetings with end-users are being conducted.