Homeland Security

Science and Technology

Enhancing Situational Awareness in the Maritime Domain: Magello

A DHS Science and Technology Center of Excellence Solution

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.

Atmospheric and Oceanic Data Sources Provide Situational Awareness and Decision Support

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.

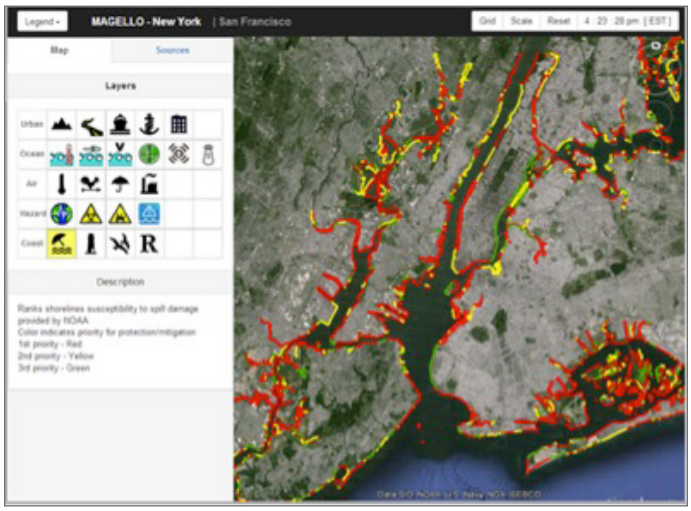
Developed by the Maritime Security Center (MSC) at Stevens Institute of Technology, a Department of Homeland Security (DHS) Science and Technology (S&T) Center of Excellence, Magello provides enhanced situational awareness for emergency response and allows decision-makers to rapidly access vital information 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.

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
- Modeling and forecasting of spills or contaminants in the rivers, ocean, and air
- Ability to include custom layers and annotations



Magello displays shoreline sensitivity areas for the New York Harbor. The highlighted areas rank shorelines susceptibility to spill damage.

- 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

Feedback from the Coast Guard District 7, inspired students in the 2015 Summer Research Institute to incorporate new environmental and maritime infrastructure data sets for the Caribbean Region. These data sets can be used to provide Maritime Domain Awareness in the event of an oil spill or other maritime incidents that would impact the United States or its Caribbean partners.

Previous student efforts and end-user feedback have resulted in additional 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, public access piers).

Next Steps

Magello, while still in a beta version, is part of MSC's growing portfolio of tools and technologies to enhance the situational awareness and decision support capabilities of maritime security practitioners and emergency responders. Magello is undergoing further improvements to address stakeholder interests and needs including those of the U.S. Coast Guard Research and Development Center. Additional field tests and meetings with end-users are being conducted.

*To learn more about Magello, contact the DHS S&T Office of University Programs at **universityprograms@hq.dhs.gov.***