Louisiana EPSCoR
EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH VOL.9 NO.10 AUGUST 2013

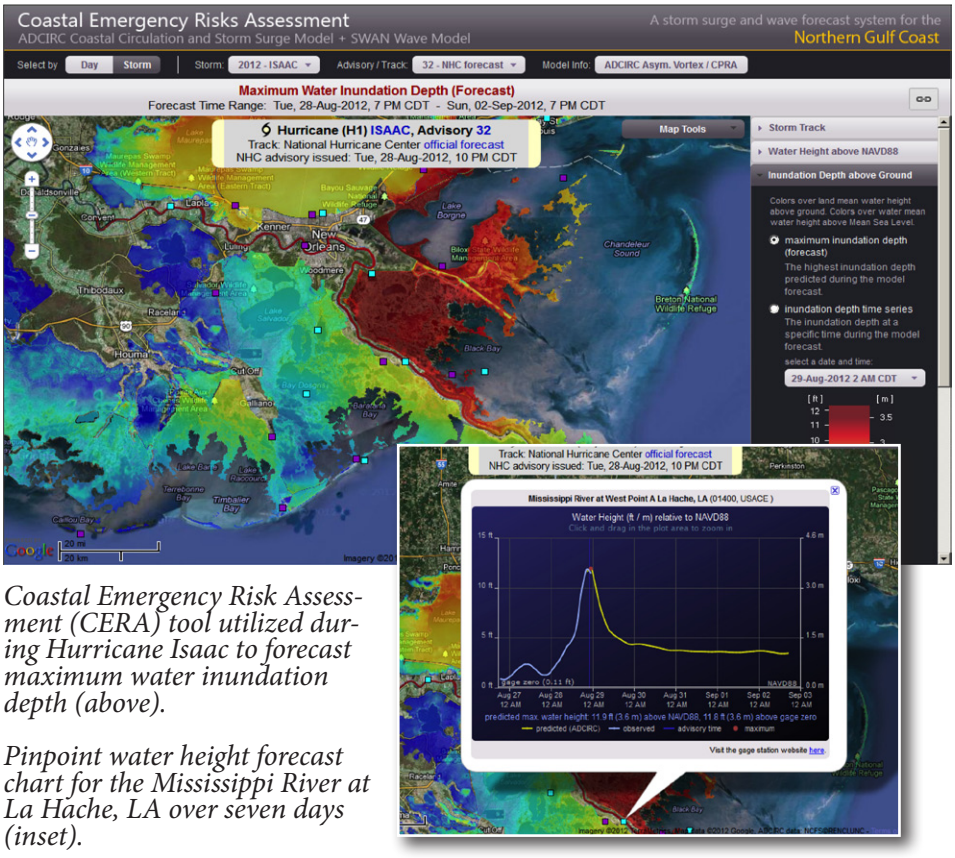
EPSCoR collaborates to visualize unforeseen hazards

The Gulf Coast region is inherently vulnerable to natural and human disaster. While rich with resources and history, this complex natural and built environment is a living laboratory for researchers in Louisiana, Mississippi and Alabama.

Eleven universities from Alabama, Louisiana, and Mississippi are leveraging their unique partnerships, proximity, and significant prior investments in cyberinfrastructure to advance science and engineering of coastal hazards across the region.

Under the auspices of NSF EPSCoR, the Northern Gulf Coastal Hazards Collaboratory (NGCHC) was established in 2010 to advance research, enrich training, and inspire collaboration through innovative cyberinfrastructure with a particular focus on geosciences and engineering from the watershed to the coast.

With NSF funding of $6 million, the collaboratory is developing a framework and implementing strategies for organizing resources in the region in a manner that transcends boundaries among state lines and enables rapid sharing of available data resources and simulation tools.



Coastal Emergency Risk Assessment (CERA) tool utilized during Hurricane Isaac to forecast maximum water inundation depth (above).

Pinpoint water height forecast chart for the Mississippi River at La Hache, LA over seven days (inset).

Gulf simulation experiments require a variety of large data sets that establish a digital description of landscape elevations and how the landscape interacts with environmental conditions of extreme events such as wind, waves, river flow, and storm surge. The coastal landscape is very complicated due to the built infrastructure such as levees, dams, bridges, and canals that require very large data sets to predict the way floods occur during extreme events.

The NGCHC has developed computer software tools that grab large data sets from a variety of monitor-

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"Extreme weather from river floods to hurricanes are some of the most costly coastal hazards due to damage to critical coastal infrastructure in navigation, fisheries and energy production. These events also complicate damages associated with oil spills and other chemical releases in the coastal zone. The Northern Gulf Coastal Hazards Collaboratory is a joint research project among eleven universities in that three-state region to develop state of the art coastal modeling tools to help reduce risks by improving forecasts of potential flooding during such catastrophic events."

- Dr. Robert Twilley, Principal Investigator
Louisiana State University

ing stations, to be used in computer models that simulate extreme events across these digital landscapes. These tools allow researchers across the three states to couple models, locate appropriate data and computational resources, create necessary workflows associated with different simulation demands, and provide visualization tools for analysis of results.

The observational and data storage systems located at university, government and private industry in the Northern Gulf Coast were made accessible through a variety of software tools to implement a system that captures the flow of water from the watershed to the coast. In addition, a portal was developed to maintain software tools and to assist in applying consistent standards and protocols across the modeling platforms and data acquisition tools.

The Coastal Emergency Risks Assessment (CERA) project is providing operational real-time storm surge flooding visualization services for coastal emergency events.

CERA was deployed during severe Hurricanes Rita, Gustav, Ike, and Isaac in the Gulf of Mexico and Hurricane Irene and Superstorm Sandy. It was also used as an effective real-time tool during the BP Oil Spill in 2010.

The CERA visualization technology has been successfully used by emergency managers and federal agencies and is being incorporated into a larger collaboration with the National Oceanic and Atmospheric Administration. Based on feedback from emergency managers, new features have been added, including real-time rainfall observations, rainfall estimated by radar, and FEMA flooding zones.

CERA is part of an interconnected 'system of systems' in conjunction with SIMULOCEAN, a web-based deployment and visualization framework for coastal modeling, and SULIS, community ecosystem models and tools.

The integration of this trio of systems is a major accomplishment of the NGCHC and provides a modeling framework whereby scientists and engineers from across the institutions of the central Gulf can participate in discovery on critical issues of coastal hazards.

Tightly integrated with the research are several educational tools for K-12 teachers developed to advance training and enhance public understanding of storm surge, using Google Earth, computer modeling, and visualization. An interactive storm surge exploration tool allows users to visualize the effects on water levels depending on the location and intensity of a hurricane.

Collaborating Organizations:

Dauphin Island Sea Lab
Jackson State University
Louisiana Board of Regents
Louisiana State University
Mississippi State University
Water Institute of the Gulf
University of Alabama
University of Alabama at Huntsville
University of Louisiana at Lafayette
University of Mississippi
University of New Orleans
University of South Alabama
University of Southern Mississippi

Explore:

http://ngchc.org
http://stormsurge.disl.org
https://external.lite3d.com/ngchc

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