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News

- Press Releases
- Event Announcements
- CCT Weekly
- Grants and Funding
- Student News
- Archived News

LSU Researchers Create Web Interface to Support Storm Surge Forecasting System

LSU teams at the Center for Computation & Technology, or CCT, and the School of the Coast & Environment have developed a sophisticated, interactive, and dynamic Web interface titled Coastal Emergency Risks Assessment, or CERA, providing operational advisory services related to impending hurricane events and other coastal hazards.

CERA is a component of the Advanced Surge Guidance System, or ASGS. Based on the Advanced Circulation and Storm Surge model, or ADCIRC, coupled with the SWAN Wave model, the ASGS is a sophisticated software package that combines software programming, numerical analysis, coastal engineering, high performance computing, and a dynamic Web interface to generate storm surge guidance for approaching hurricanes in near real-time.

ADCIRC is a system of computer programs for solving time dependent, free surface circulation and transport problems in two and three dimensions. These programs utilize the finite element method in space allowing the use of highly flexible, unstructured grids.

SWAN is the most widely used computer model to compute irregular waves in coastal environments, based on deep water wave conditions, wind, bottom topography, currents, and tides for both deep and shallow water.

The ADCIRC/SWAN Model allows simultaneous storm surge runs and generates results using national high performance cyberinfrastructure resources like the National Science Foundation funded TeraGrid and FutureGrid.

CERA, which is based on Google Maps, uses an automated post processing workflow to provide a suite of maps and storm related information. The CERA Web application provides an easy-to-use interactive Web interface which allows emergency managers to quickly evaluate critical situations. Official hurricane advisories as issued by the National Hurricane Center are automatically picked up every six hours. Information and maps are available within 30 minutes after the completion of the ADCIRC/SWAN run.

The capacity and timeliness of such high performance computing resources ensure the ability of the ASGS teams to meet very tight and critical deadlines for updating emergency response groups regarding impending storm surge during a real-time tropical/hurricane event.

CERA works closely with various local, state and federal emergency response teams. During Hurricane Irene in 2011 that impacted the East Coast from North Carolina to Vermont, ASGS and the CERA Website received tremendous attention from federal and state agencies and residents of those impacted states.

"During the last days before landfall of Hurricane Irene, there were more than 3,000 visits to the Website each day," said Carola Kaiser, analyst at the CCT and key developer of the CERA Web interface at the CCT.

The ParalleX group at the CCT supports this effort by providing computing and visualization technologies for near real time ADCIRC data processing and Web presentation.

To view CERA, visit: http://nc-cera.renci.org. For more information on this or other research being done at the CCT, visit: http://www.cct.lsu.edu/home.

Official hurricane advisories as issued by the National Hurricane Center are automatically picked up every six hours.

The Advanced Surge Guidance System, or ASGS, is a coastal modeling research & development effort providing operational advisory services related to impending hurricane events. Based on the Advanced Circulation and Storm Surge model, or ADCIRC, coupled with the SWAN Wave model, the ASGS is a sophisticated software package that combines software programming, numerical analysis, coastal engineering, high performance computing, and a dynamic web interface to generate storm surge guidance for approaching hurricanes.

The ASGS is a multi-state storm surge guidance effort including regional teams from Louisiana State University, the University of Louisiana at Lafayette, and the University of North Carolina at Chapel Hill.

Next year the ASGS effort will be extended to Mississippi and Alabama, in addition to south Louisiana.

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