NOAA Research Matters

May 2011

HURRICANES

With more than 50 percent of our Nation's population living in coastal communities, hurricanes pose substantial risk to people who live, work, and vacation there. Every year land-falling hurricanes cost the U.S. an average of $10 billion, and every ten years economic losses double. NOAA has improved forecasts dramatically, making today's 5-day forecast as good as the 3-day forecast 15 years ago. Through NOAA's 10-year ***Hurricane Forecast Improvement Project****, NOAA is working to more accurately predict hurricane intensity, while further improving track forecasting. NOAA Research serves our partners in the emergency management communities at national, regional, and local levels.*

Observations

Unmanned flight into Hurricane Earl

Modeling

Rapid Intensity Index developed

Stronger Homes

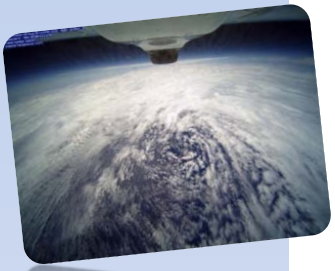
Sea Grant funds project to construct hurricane-resilient housing

Coastal Inundation

10-day forecasts of streamflow generated prior to Tropical Storm Ida

More…

Outstanding Accomplishments in Research



High resolution image taken from Global Hawk mission into Hurricane Earl (Credit: NOAA)

Unmanned Aircraft Makes Successful Flight into Hurricane Earl

Hurricane Earl marked the first flight of an unmanned aircraft system (UAS), NASA's Global Hawk, above a fully developed tropical cyclone. Researchers from OAR's Atlantic Oceanographic and Meteorological Laboratory (AOML) and NASA collected data and images of Earl at 60,000 feet. UASs are an important experimental observational technology because they can reach areas too dangerous or too difficult for humans to access.

Hurricane Hunters Capture Earl's Rapid Intensification

NOAA P-3s and G-IV aircraft collected inner-core and environmental data during flights into Hurricane Earl, forming a historic dataset that captured the rapid intensification of Earl from a 50 knot tropical storm to a 125 knot Category 4 hurricane over 36 hours. Capturing intensification was a major goal of this year's Intensity Forecast Experiment field campaign. Improving intensification forecasts is a goal of the Hurricane Forecast Improvement Program.

WP-3D Orion "hurricane hunter" aircraft and Gulfstream-IV hurricane surveillance jet. (Credit: NOAA)

NOAA Improves Forecasts of Rapid Intensification of Hurricanes

A revised rapid intensification index (RII), a statistically-based forecast method that provides real-time estimates of the probability of tropical cyclone rapid intensification, demonstrated skill at forecasting rapid intensification for storms from the 2006-2009 seasons. The study, conducted by OAR's Atlantic Oceanographic and Meteorological Laboratory and the National Environmental Satellite, Data, and Information Service (NESDIS) Regional and Mesoscale Meteorology Team, appeared in *Weather Forecasting*.

Read more about NOAA's Hurricane Research:

researchmatters.noaa.gov/news/Pages/Hurricanes2011.aspx

Tropical Storm Ida gives CI-FLOW Research Opportunity

Tropical Storm Ida gave the CI-FLOW (Coastal and Inland Flood Observation and Warning Project) team an opportunity to demonstrate, in real-time, the capability to use NOAA's National Severe Storms Laboratory's (NSSL) real-time gridded quantitative precipitation estimates in the CI-FLOW river models in tropical storm conditions. CI-FLOW is an interdisciplinary, multi-institutional team working to combine existing monitoring technology and new techniques to forecast and warn of coastal storm effects such as heavy rainfall, storm surge, and the resultant river conditions in coastal North Carolina.

The newly developed CI-FLOW computing environment collected hourly multi-sensor quantitative precipitation estimates from the NSSL Q2 system and gridded quantitative precipitation forecast products from NOAA's National Weather Service (NWS). The data was fed into two CI-FLOW models to generate 10-day forecasts of streamflow from multiple points in the Tar-Pamlico and Neuse River basins. CI-FLOW also tested NOAA's nowCOAST CI-FLOW visualization capabilities to explore how data can be displayed for stakeholders, a responsibility of NOAA Sea Grant and the NWS offices.

A decade after Hurricanes Floyd and Dennis wreaked havoc on eastern North Carolina, NOAA continues to improve flood prediction in estuaries and coastal areas of the state. *Credit: FEMA News Photo*

The Collective WISDOM on Hurricanes

Hurricane forecasters could potentially improve advanced lead time for the track a hurricane will take with additional data on winds over parts of the open ocean. In 2009, the WISDOM (Weather In-Situ Deployment Optimization Method) Program launched over 90 balloons to probe the winds that influence the path of a hurricane. The largest launch successfully targeted Hurricane Ida, and the initial Observing System Simulation Experiments and real-time analysis showed an impact of 2-3 knots on the wind field analysis in preliminary studies. WISDOM is a joint effort between NOAA, the Department of Homeland Security, the U.S. Air Force, and academic and international partners including the Northern Gulf Institute, University of Miami, Texas A&M, and Howard University.

NOAA's Hurricane Forecast Improvement Project (HFIP)

NOAA 's HFIP is implementing a national, interagency 10-year plan to improve our one to five day tropical cyclone forecasts, with an emphasis on rapid intensity change. The goal of HFIP is to improve the accuracy and reliability of hurricane forecasts and warnings and to increase the confidence in those forecasts to enhance mitigation and preparedness decisions by emergency management officials at all levels of government and by individuals.

Scientists Making Homes Stronger Against Storms

Catastrophic losses due to hurricanes are one of the largest risks faced by Gulf of Mexico coastal communities. Because residential structures are a predominant casualty of hurricanes, the Gulf of Mexico Sea Grant College Programs are funding a project led by scientists from Florida International University and Louisiana State University to improve home construction techniques so homes can withstand Category 4 hurricane conditions. Researchers constructed a unique, full-scale testing facility capable of producing winds of up to 140 miles per hour, called the Wall of Wind (WoW). Also, they are designing a connection system that will distribute the wind force along a continuous path using connections between the roof, walls, and foundation to allow the structure to better withstand hurricane conditions. After small-scale tests to determine the most suitable connection design, they will test the system in the WoW. If the connection system performs well, the application of this system to existing residential structures could be a significant step toward increasing the resilience of coastal communities.

Wall of Wind (WOW), Credit: *International Hurricane Research Center, Florida International University*