



Caribbean-Florida Water Science Center

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DATA CENTER

Real-time data

- ◆ Streamflow
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Historical data

- ◆ Streamflow
- ◆ Groundwater
- ◆ Water quality
- ◆ Annual Data Reports
- ◆ Water Use

WaterWatch

- ◆ Duration Plots
- ◆ Floods/High flows
- ◆ DroughtWatch

Groundwater

- ◆ Active Water Level Network
- ◆ Below Normal Groundwater Levels
- ◆ Climate Response Network
- ◆ Long-Term Groundwater Data Network

Monitoring Websites

- ◆ USGS WaterAlert
- ◆ Water-level Conditions in South Florida
- ◆ South Florida Coastal Stations
- ◆ Everglades Depth Estimation Network (EDEN)

USGS Cooperative Water Program

USGS IN YOUR STATE

Florida Hurricane Information

Introduction

Preventing flood hazards, such as hurricane-induced tidal surge, from becoming human disasters requires an understanding of the relative risks floods pose to specific communities and knowledge of the processes by which flood waters rise, converge, and abate. Historically, hurricane-induced tidal surge has been documented through measurement of high-water marks left on structures or vegetation. These remnant signals are not always reliable or accurate, however, and do not provide quantitative information about the timing of flooding, the sequencing of multiple paths by which storm-surge waters arrive, or the magnitude of waves.

To gain better knowledge about the effects of hurricanes, the U.S. Geological Survey Caribbean-Florida Water Science Center (USGS-CFWSC), in cooperation with municipal, State, and Federal agencies, uses two monitoring approaches to measure the timing, magnitude, and duration of hurricane tidal surge. The first approach uses the existing fixed network of gages that provide "real-time" data on water levels, and the second uses tidal-surge sensors that are temporarily-deployed in advance of hurricanes.

Real-Time Monitoring Network



Barometric-pressure sensor deployed at WS_19 Imperial River.

The USGS maintains a network of 95 real-time gaging stations along the Florida coast. Seventy-seven of those sites are located along the Gulf Coast and 18 along the Atlantic. These stations record data at 15-minute intervals that are available on the web at fl.water.usgs.gov, and include measurements of water level, velocity, specific conductance, salinity, temperature, turbidity, pH, chlorophyll, blue green algae and dissolved oxygen. The real-time network monitors a large range of hydrologic conditions, from droughts to floods, and provides the data on the web for a broad base of stakeholders. In the event of a hurricane, the real-time network allows individuals to monitor the storm-surge data in near real time (maximum 1-hour delay). Depending on the elevation of the gage-house structure, real-time gages may be at risk of being inundated by flood waters during extreme storm surges.

Temporary Deployment of Hurricane Storm Surge Sensors

To augment the real-time gaging network, a temporary network of more than 80 hurricane storm-surge sensors can be deployed prior to a hurricane that record data at 30-second intervals. As part of this monitoring approach, water-level and barometric-pressure sensors are deployed to areas of projected hurricane landfall. The addition

USGS Response to Hurricanes

CFWSC had been responding to the rains and flooding being forecast by ensuring that USGS real-time gages are operational and providing critical information on river stage and rainfall to the public, National Weather Service, and emergency management officials. In addition, USGS will deploy staff to make streamflow measurements at streamgages across the state to verify and update the river stage and streamflow discharge ratings. These ratings are critical for determining the volume of water that passes a streamgaging station at any given river stage and are used in issuing flood warnings, mapping floodplains, monitoring water-quality and environmental conditions, and managing water resources

- ◆ [Hurricane Michael](#) - October 2018
- ◆ [Tropical storm Isaac](#) - September 2018
- ◆ [Hurricane Maria](#) - Sep 2017
- ◆ [Hurricane Irma](#) - Sep 2017
- ◆ [Hurricane Matthew](#) - Oct 2016

Hurricane Matthew - USGS Recovers Storm Tide Sensors

USGS Installs Storm-Tide Sensors along Atlantic Coast prior to Hurricane Matthew's Arrival
October 2016

0:00 / 2:05

Transcript: [See more](#) Credits: [See more](#)

Hurricane Links

- ◆ USGS Science: [Before, During and After the Storm](#)
- ◆ USGS [Coastal Change Hazards Program](#)
- ◆ USGS [Storm-tide Documentation Program](#)
- ◆ [Florida Division of Emergency Management SERT \(State Emergency Response Team\)](#) - Hurricane Preparedness
- ◆ [Florida DOT hurricane information](#)
- ◆ [SERT Evacuation Route and Zone Maps](#): Hurricane evacuation planning tools
- ◆ [Interactive Tide Table](#)
- ◆ National Weather Service [National Hurricane Center](#)
- ◆ National Weather Service [Rip Current Information](#)

Hurricane Publications

USGS Water Science Centers are located in each state.



Water-level sensor deployed at WS_26A Marco Island Bayside.

of these sensors creates a concentrated network of storm-surge monitors that provide more spatially-dense information on hurricane tidal surge. For example, temporary deployment of sensors in the projected hurricane path can be placed to monitor the escalation and attenuation of the hurricane storm surge along coastal rivers and across barrier islands, low-lying areas, and wetlands. After the passing of a storm the locations of the temporarily-deployed sensors must be surveyed to a known elevation. The USGS has successfully deployed temporary tidal surge-networks for Hurricanes Rita (2005), Wilma (2005), Gustav (2008), Ike (2008), Irene (2011),

and Tropical Storm Ernesto (2006).

Summary

The use of existing fixed network stations along with temporarily-deployed water-level and barometric pressure sensors provides a cost-effective hurricane storm-surge monitoring network for Florida. The combined networks effectively leverage resources of over 10 cooperative funding agencies in Florida to monitor hurricane storm surge. The data are a valuable resource for emergency preparedness agencies to better protect public safety, for engineers to improve structural design of coastal infrastructures, and for oceanographers to evaluate and improve hurricane storm-surge computer models.

- ◆ 2013 CIRC 1390: [Meeting the science needs of the Nation in the wake of Hurricane Sandy—A U.S. Geological Survey science plan for support of restoration and recovery](#) ; Buxton, H.T., Andersen, M.E., Focazio, M.J., Haines, J.W., Hainly, R.A., Hippe, D.J., and Sugarbaker, L.J.
- ◆ 2010 OFR 2010-1142: [Floods in Florida due to Tropical Storm Fay, August 15 through September 26, 2008](#) ; Verdi, Richard J.; Holt, Sandra L.
- ◆ 2007 DS 294: [Monitoring the Storm Tide of Hurricane Wilma in Southwestern Florida, October 2005](#) ; Soderqvist, Lars E.; Byrne, Michael J.
- ◆ 2005 FS 2005-3028: [Floods in southwest-central Florida from hurricane Frances, September 2004](#) ; Kane, Richard L
- ◆ 2005 OFR 2005-1277: [Hydrologic effects of the 2004 hurricane season in northwest Florida](#) ; Verdi, Richard Jay
- ◆ 1998 WRIR 98-4231: [Hurricane Georges: Headwater Flooding, Storm Surge, Beach Erosion, and Habitat Destruction on the Central Gulf Coast](#) ;urnipseed, D. Phil, Giese, Gerald L., Pearman, J. Leroy, Farris, Gaye S., Krohn, M. Dennis, and Sallenger, Asbury H., Jr.
- ◆ 1994 OFR 94-116: [Storm-tide elevations produced by Hurricane Andrew along the southern Florida coasts, August 24, 1992](#) ;Murray, Mitchell H.
- ◆ 1980 HA 640: [Hurricane Frederic tidal floods of September 12-13, 1979, along the Gulf Coast, Gulf Breeze-Fort Barrancas quadrangles, Florida](#) ; Franklin, Marvin A.; Scott, John C.
- ◆ 1980 HA 639: [Hurricane Frederic tidal floods of September 12-13, 1979, along the Gulf Coast, West Pensacola quadrangle, Florida](#) ; Franklin, Marvin A.; Bohman, Larry R.
- ◆ 1980 HA 638: [Hurricane Frederic tidal floods of September 12-13, 1979, along the Gulf Coast, Perdido Bay quadrangle, Florida](#) ; Scott, John C.; Franklin, Marvin A.

Flood Information

- ◆ The [100-year flood](#)
- ◆ [Flood fact sheet](#) (2 Mb PDF)
- ◆ [Flood FAQs](#)
- ◆ [Large Floods in the United States](#)
- ◆ [How much water flows during a storm?](#)

Flood Links

- ◆ [Current NWS/NOAA Warnings](#)
- ◆ National Weather Service [Flood Guidance](#)
- ◆ [NWS Recent Precipitation](#)
- ◆ NOAA's [Flood Safety](#) site

USGS Home Water Climate Change Core Science Ecosystems Energy and Minerals Env. Health Hazards

[U.S. Department of the Interior](#) | [U.S. Geological Survey](#)

URL: <https://fl.water.usgs.gov/flood/hurricane/index.html>

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Page Last Modified: Wednesday, 10-Oct-2018 09:36:06 EDT