

USGS's Response to Hurricanes Florence and Michael

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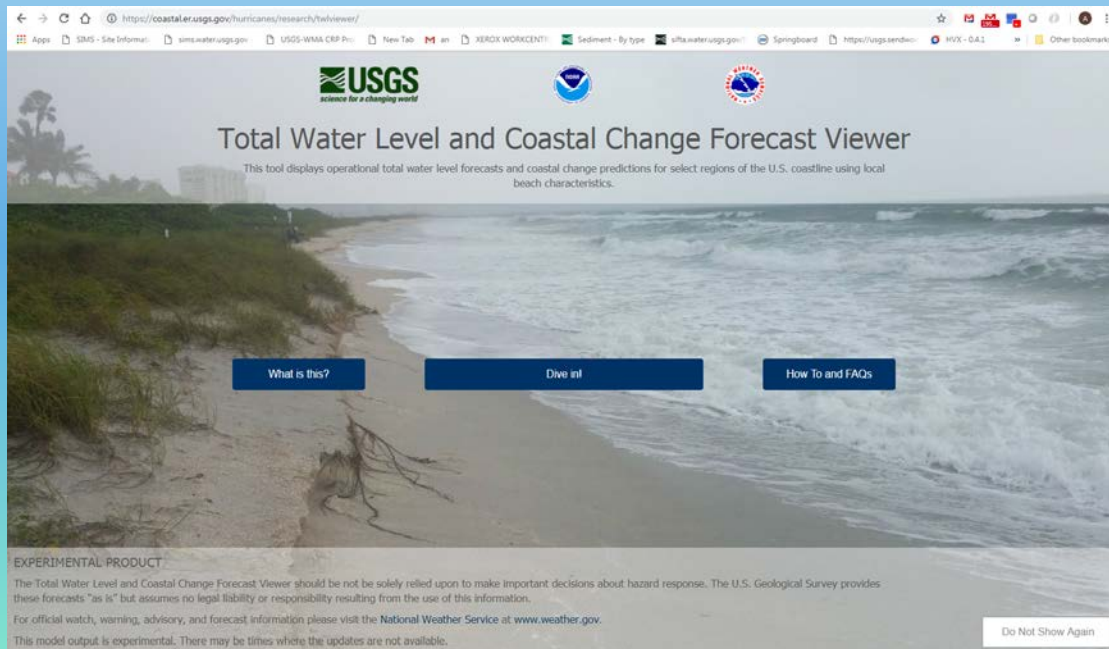
Several USGS online products available to assess water levels before, during, and after a hurricane

- USGS WaterWatch: <https://waterwatch.usgs.gov/>
- USGS Total Water Level and Coastal Change Forecast Viewer:
[https://coastal.er.usgs.gov/hurricanes/research/twlvie
wer/](https://coastal.er.usgs.gov/hurricanes/research/twlvie
wer/)
- USGS Coastal Change Hazards Portal:
<https://marine.usgs.gov/coastalchangehazardsportal/>
- USGS Flood Event Viewer:
<https://stn.wim.usgs.gov/fev/>
- USGS Event Support Map (hurricane specific)
- Water Footprint Data Visualization (hurricane specific)

USGS Total Water Level and Coastal Change Forecast Viewer:

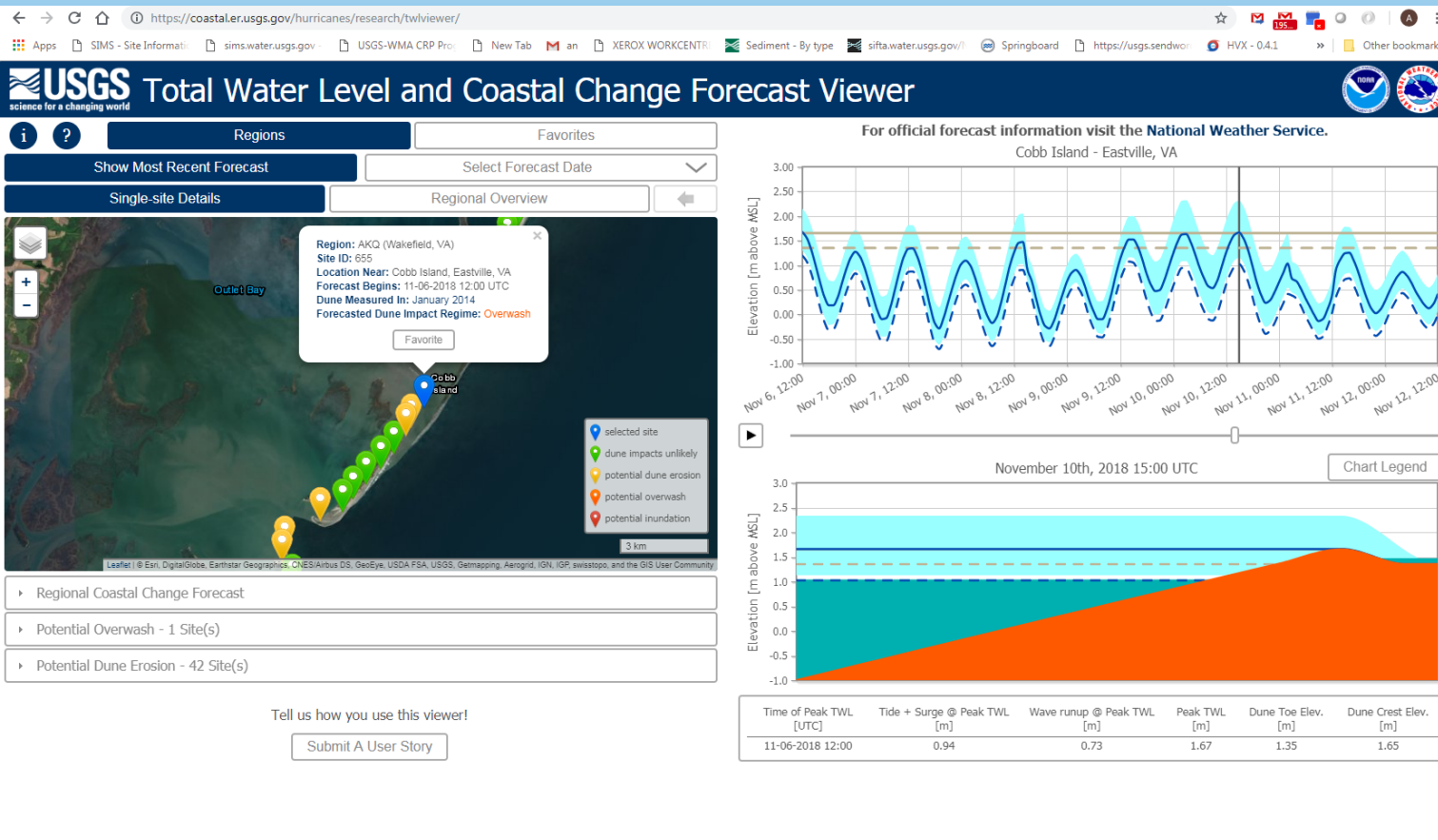
<https://coastal.er.usgs.gov/hurricanes/research/twlvviewer/>

- This tool displays operational total water level forecasts and coastal change predictions for select regions of the U.S. coastline using local beach characteristics.
- Model output is experimental. For official watch, warning, advisory, and forecast information, please visit the National Weather Service at www.weather.gov



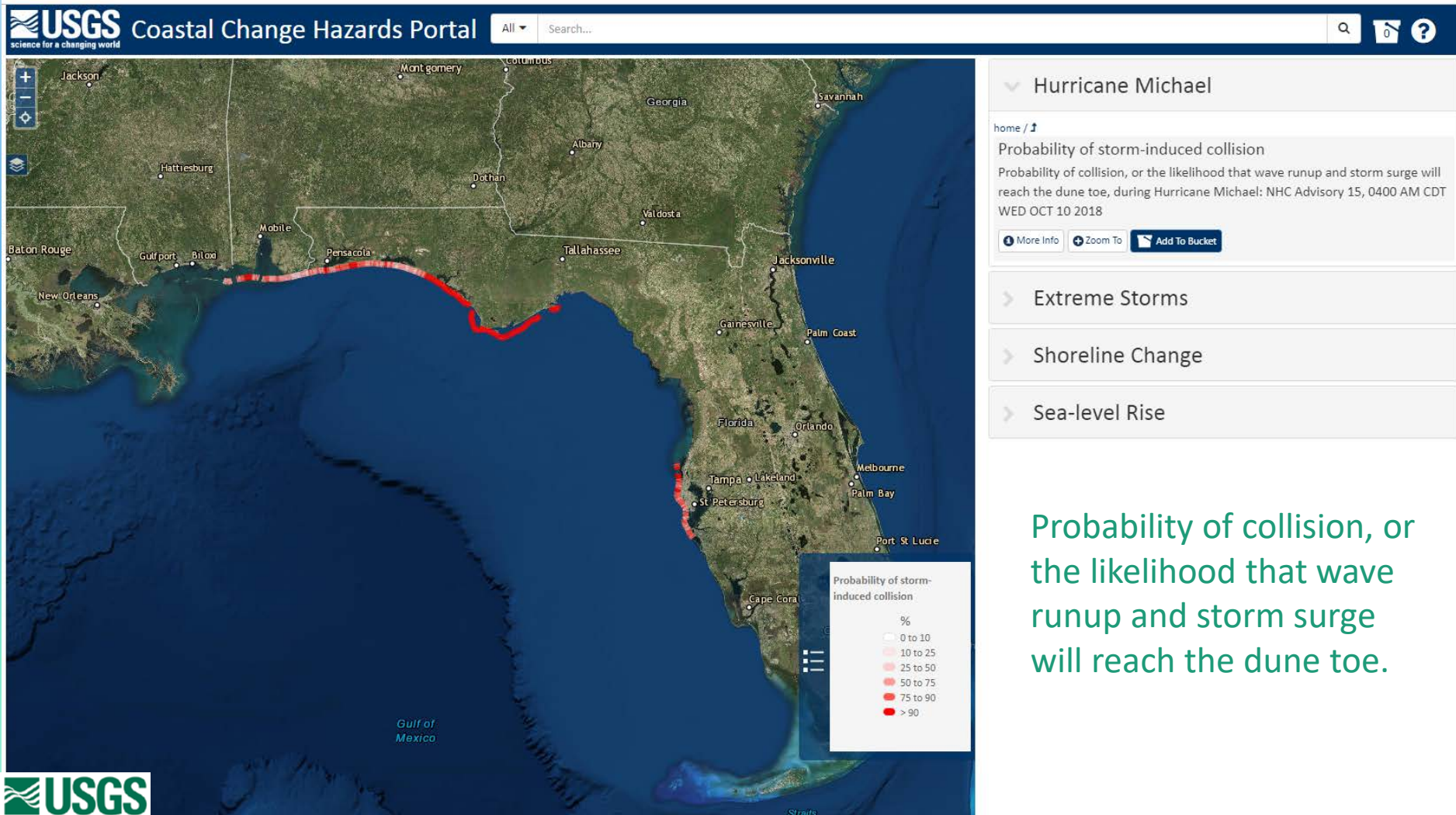
USGS Total Water Level and Coastal Change Forecast Viewer:

<https://coastal.er.usgs.gov/hurricanes/research/twlvviewer/>



Coastal Change Hazards Portal

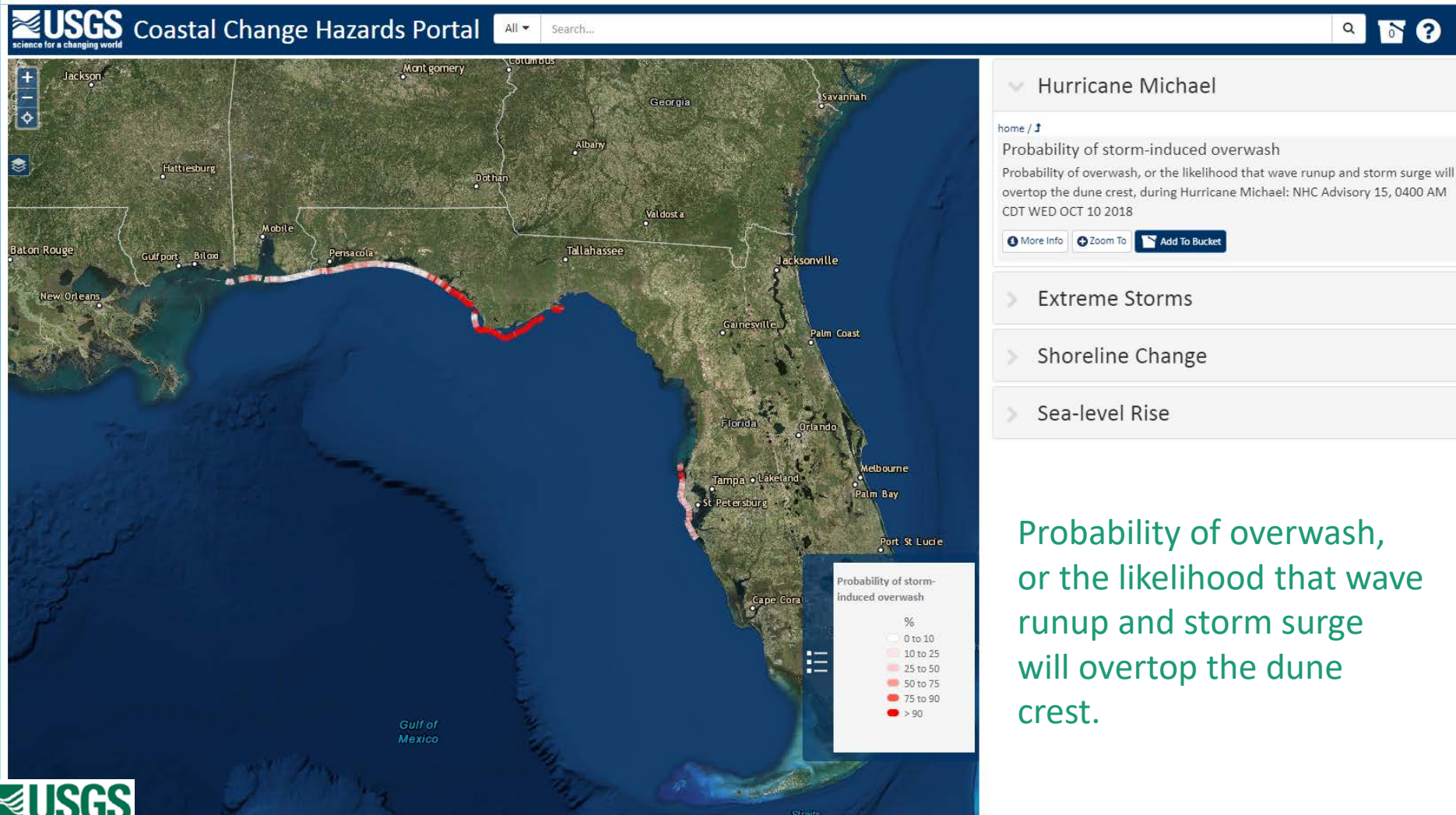
Probability of storm-induced collision



Probability of collision, or the likelihood that wave runup and storm surge will reach the dune toe.

Coastal Change Hazards Portal

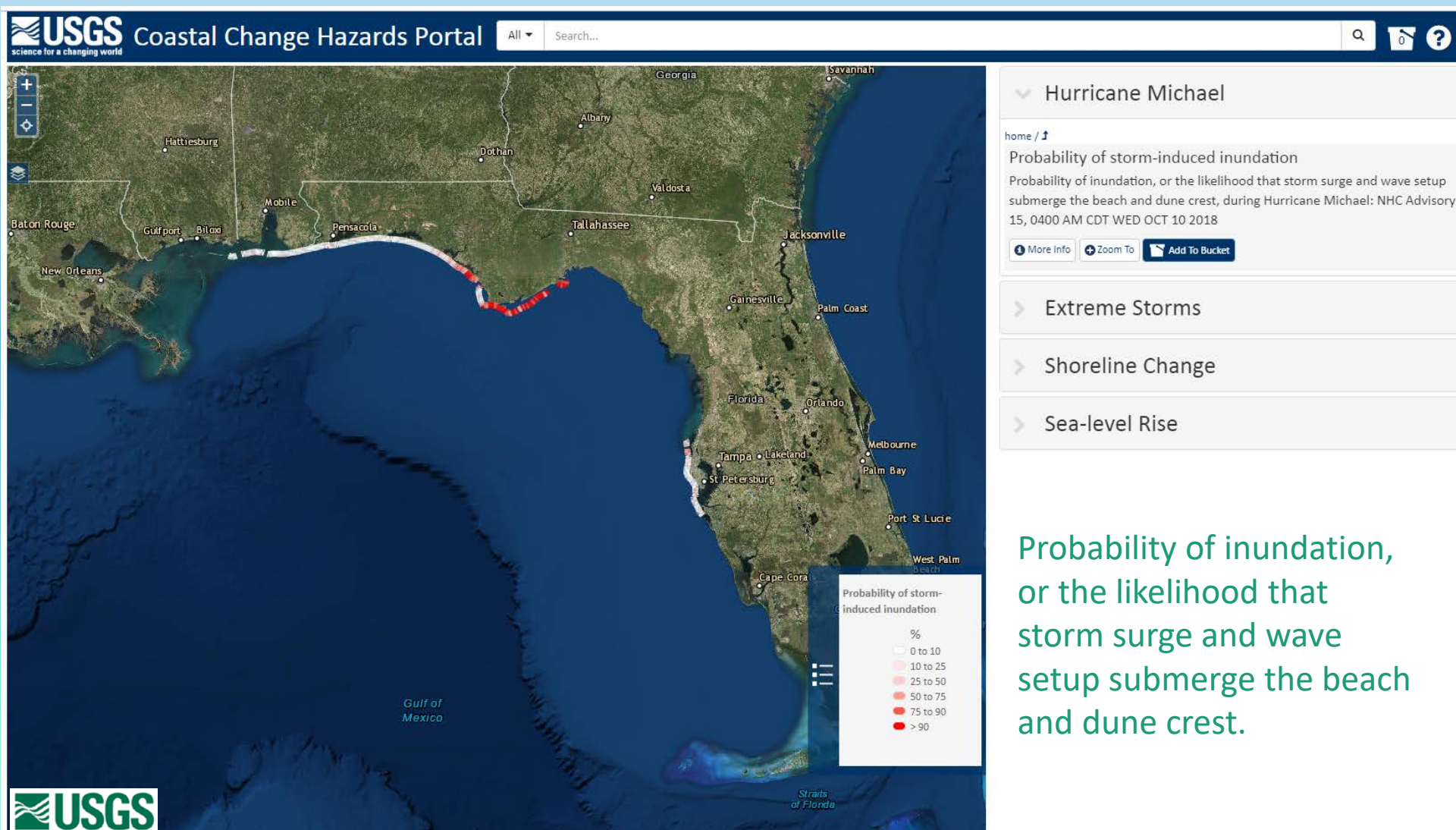
Probability of storm-induced collision



Probability of overwash, or the likelihood that wave runup and storm surge will overtop the dune crest.

Coastal Change Hazards Portal

Probability of storm-induced inundation



Probability of inundation, or the likelihood that storm surge and wave setup submerge the beach and dune crest.

USGS storm response

- Deploy storm-tide and wave sensors to collect storm tide water-level and wave data
- Deploy Rapid Deployment Gages (RDGs) designed to temporarily measure and transmit real-time stream stage/storm-tide water-level data in an emergency situation. The speed with which these gages can be installed allows the USGS to ...
 - Augment the gage networks during coastal and riverine flooding
 - Provide situational awareness and support to emergency managers
 - Replace streamgages when equipment is damaged
- Flag and survey high water marks (HWMs) to fill data gaps and develop flood inundation maps
- Repair damaged streamgages and collecting high flow measurements
- Data can be retrieved from the USGS Flood Event Viewer: <https://stn.wim.usgs.gov/fev/>

Storm-tide sensor



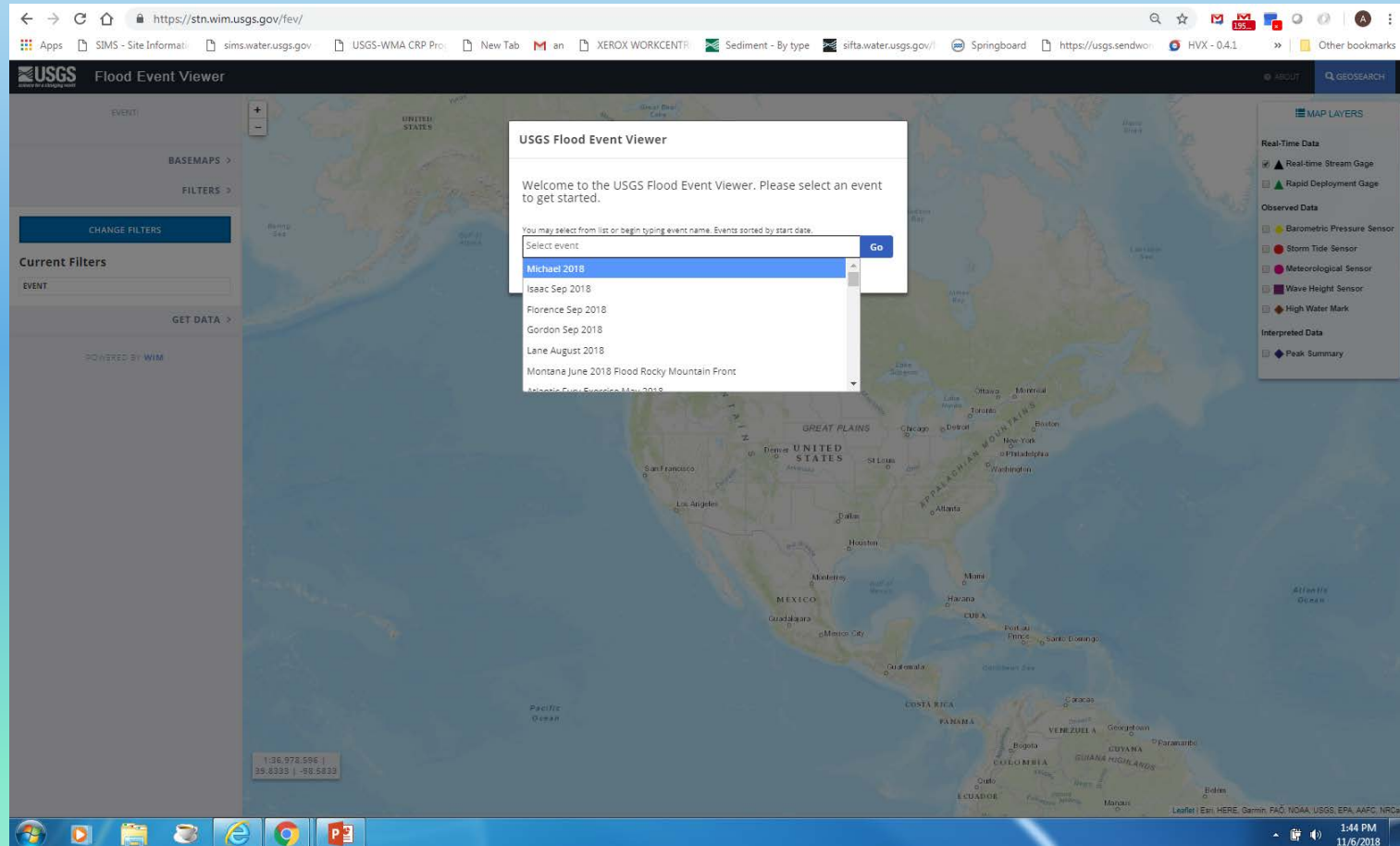
Rapid Deployment Gage



Highwater Marks

USGS Flood Event Viewer:

<https://stn.wim.usgs.gov/fev/>



Storm Tide Sensor Before & After @ Mexico Beach



https://www.washingtonpost.com/national/hurricane-michael-is-looking-even-more-violent-on-closer-scrutiny/2018/11/11/313bce34-d85a-11e8-a10f-b51546b10756_story.html?utm_term=.7a40a2a0b3c7

Storm Tide Sensor

Storm Tide Sensor Data

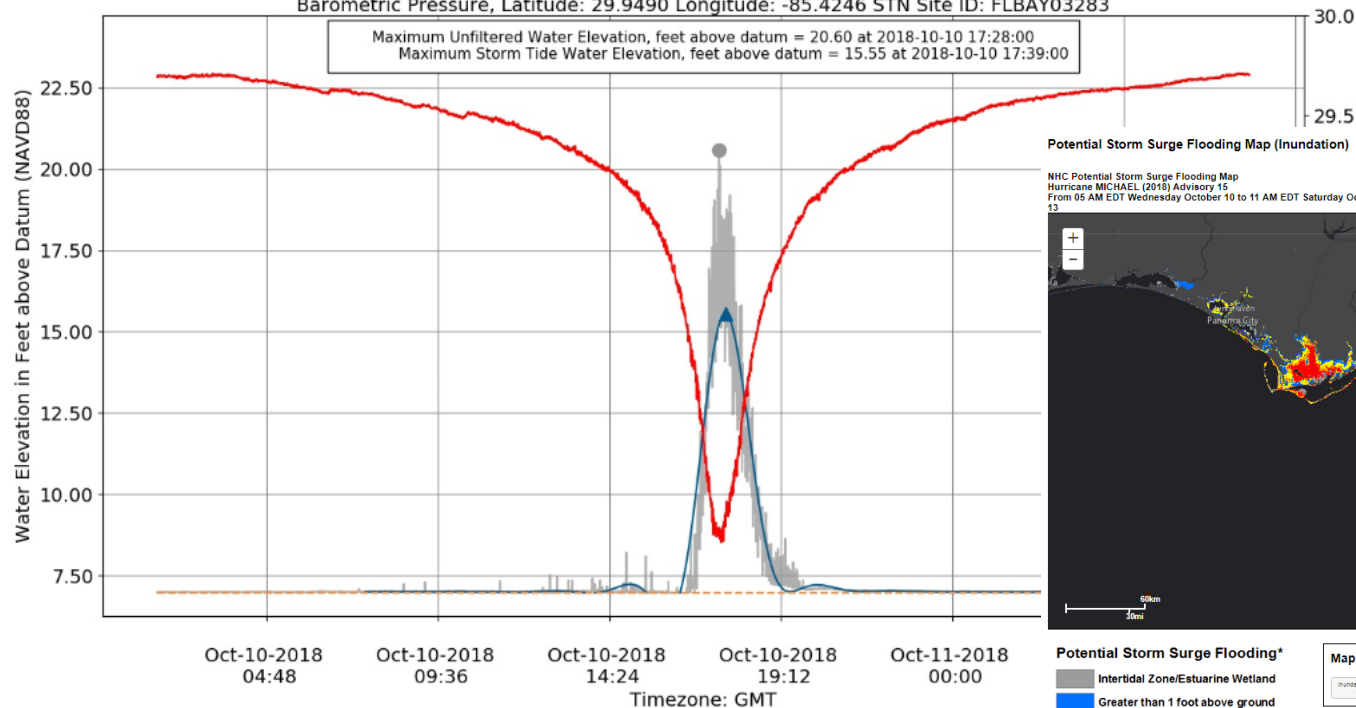


EXPLANATION

- Unfiltered Water Elevation
- Storm Tide (Lowpass Filtered) Water Elevation
- - - Minimum Recordable Water Elevation
- Barometric Pressure
- Maximum Unfiltered Water Elevation
- ▲ Maximum Storm Tide Water Elevation

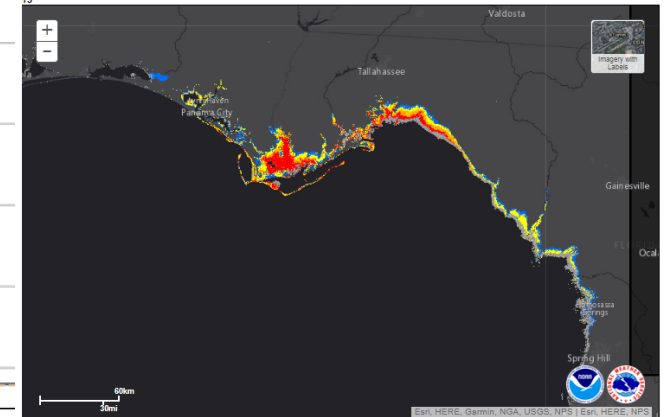
Storm Tide Water Elevation, Latitude: 29.9490 Longitude: -85.4246 STN Site ID: FLBAY03283

Barometric Pressure, Latitude: 29.9490 Longitude: -85.4246 STN Site ID: FLBAY03283



Potential Storm Surge Flooding Map (Inundation)

NHC Potential Storm Surge Flooding Map
Hurricane MICHAEL (2018) Advisory 15
From 05 AM EDT Wednesday October 10 to 11 AM EDT Saturday October 13



Potential Storm Surge Flooding*

- Intertidal Zone/Estuarine Wetland
- Greater than 1 foot above ground
- Greater than 3 feet above ground
- Greater than 6 feet above ground
- Greater than 9 feet above ground
- Leveed area
- Consult local officials for flood risk

Map Layer Options:

- Inundation Layer Only ☒ Inundation with Intertidal Layer ☐ Map Opacity Slider
- Download GIS data [\(Instructions\)](#)

*Displayed flooding values indicate the water height that has about a 1-in-10 (10%) chance of being exceeded.

High Water Marks

USGS Flood Event Viewer

EVENT: Michael 2018
8 Oct 2018

BASEMAPS >

- STREETS
- SATELLITE
- TOPO
- TERRAIN
- GRAY
- NATGEO

FILTERS >

CHANGE FILTERS

Current Filters

EVENT Michael 2018

GET DATA >

POWERED BY WIM

1:4.513 | 17
29.9496 | -85.4322




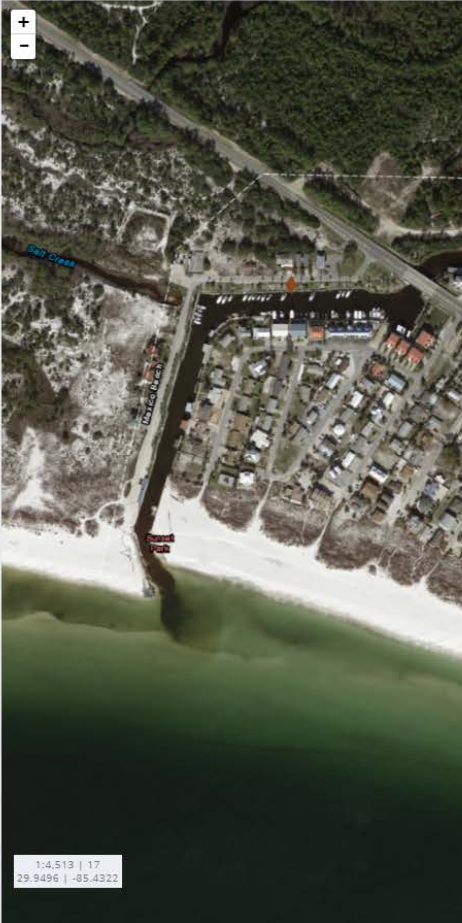
HIGH WATER MARK | MICHAEL 2018

STN Site No.:	FLBAY27709
HWM Label:	hwm-2
Elevation(R):	undefined
Datum:	
Height Above Ground:	5.6
Approval status:	Provisional
Type:	Seed line
Marker:	Marker
Quality:	Good: +/- 0.10 ft
Waterbody:	Gulf of Mexico
County:	Bay County
State:	FL
Latitude, Longitude (DD):	29.9511, -85.4236
Description:	OFFICE BUILDING. SEED LINE ON GLASS IN LOBBY. TRACED LINE TO EXTERIOR WALL. NEAR PALM TREE MARKED WITH BLACK MARKER. STAKE STRAPPED TO SECOND FLOOR RAILING. TRACED MARKED LINE IS 5.54FT ABOVE LAND SURFACE

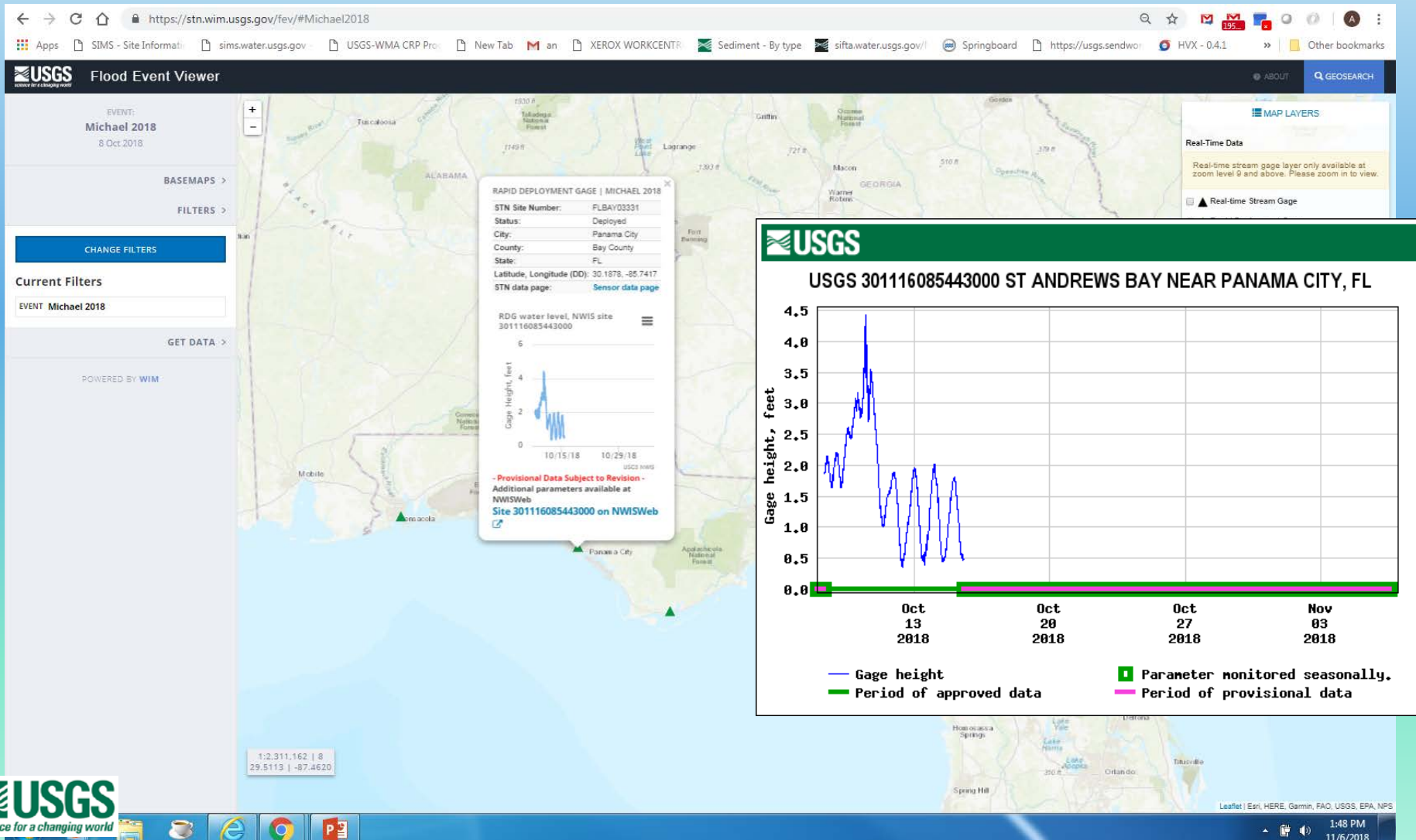
Full data link: [HWM data page](#)

1:4.513 | 17
29.9496 | -85.4322

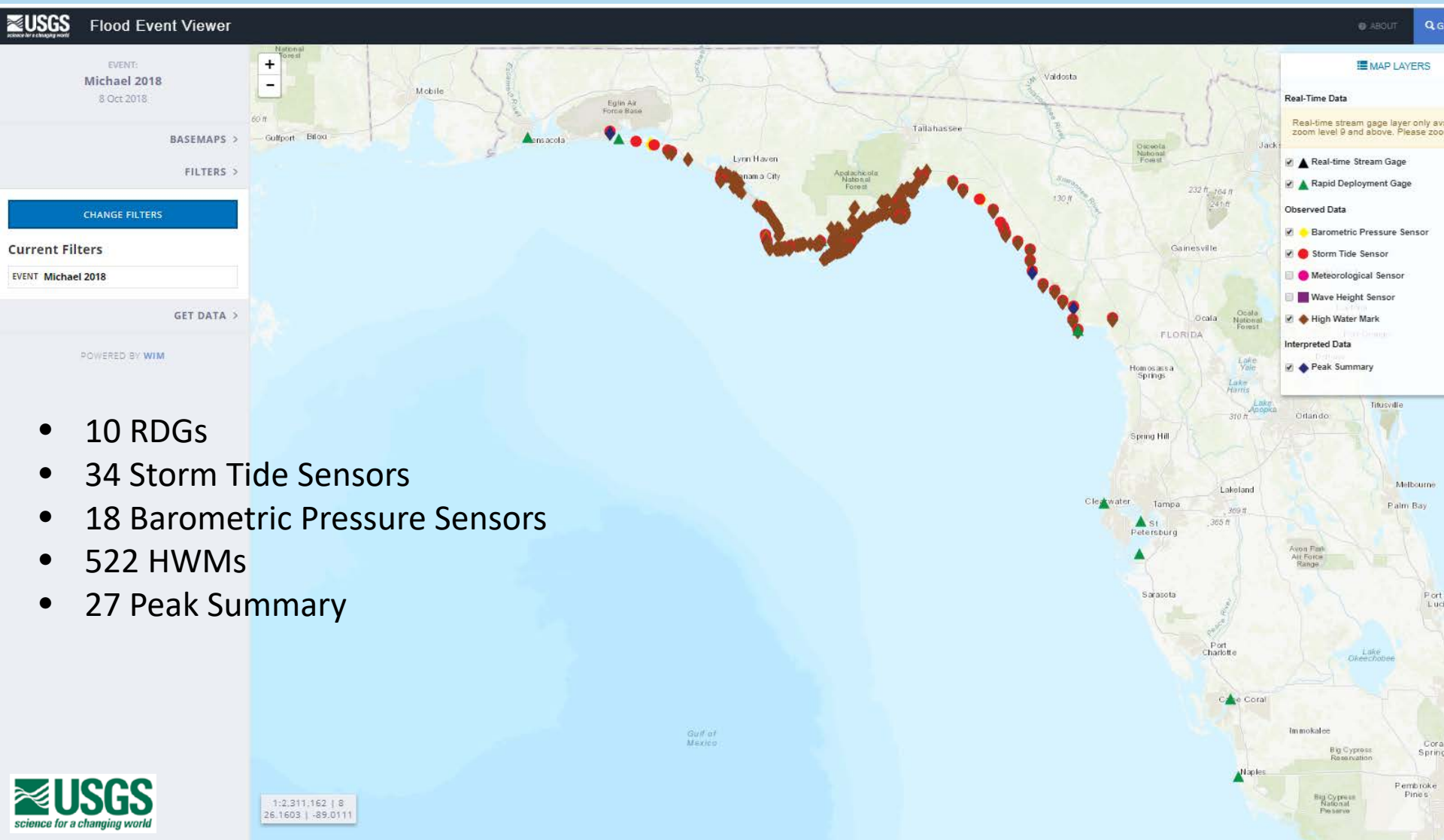
USGS science for a changing world



Real-time streamgages – temporary (RDGs)

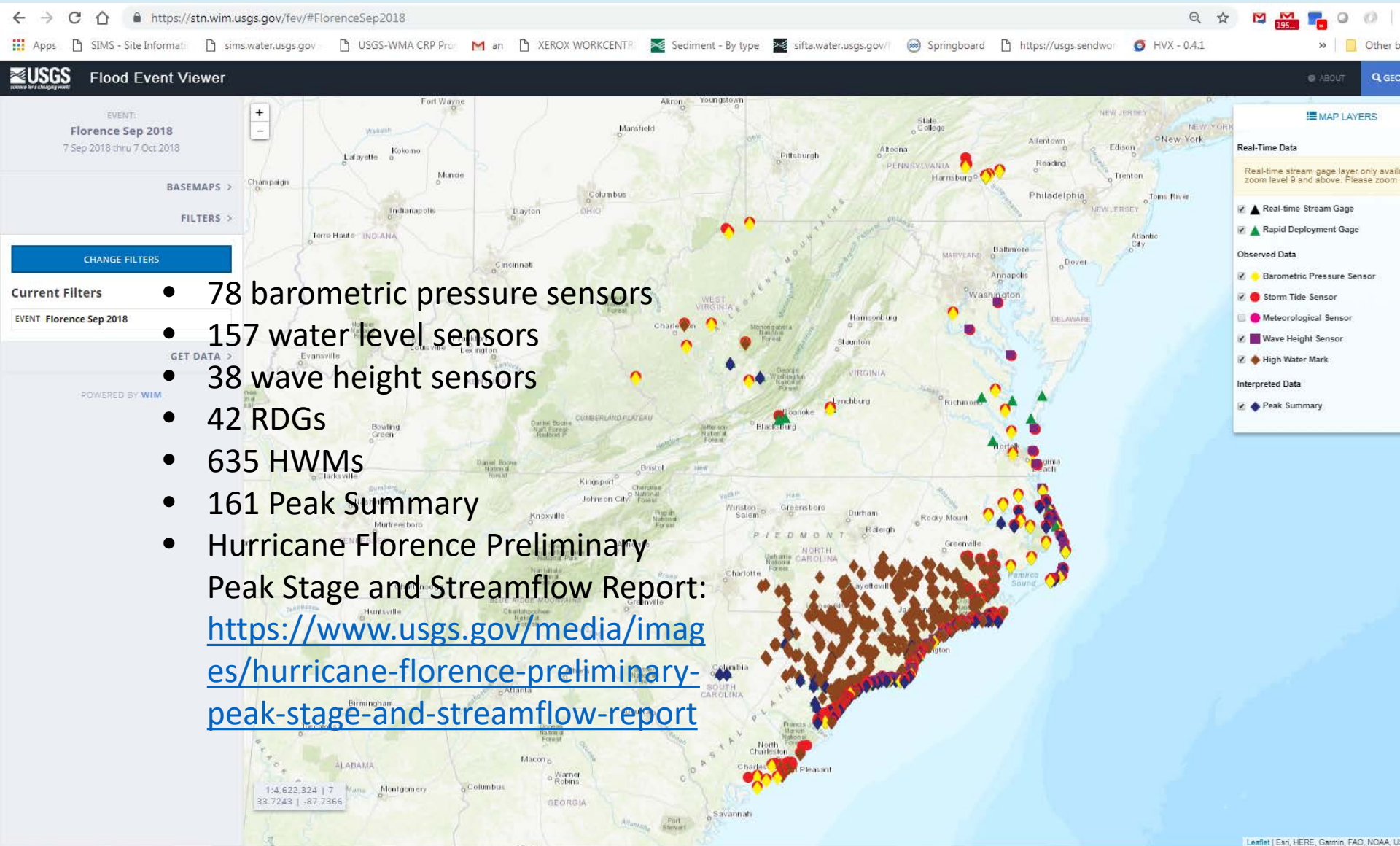


Hurricane Michael



- 10 RDGs
- 34 Storm Tide Sensors
- 18 Barometric Pressure Sensors
- 522 HWMs
- 27 Peak Summary

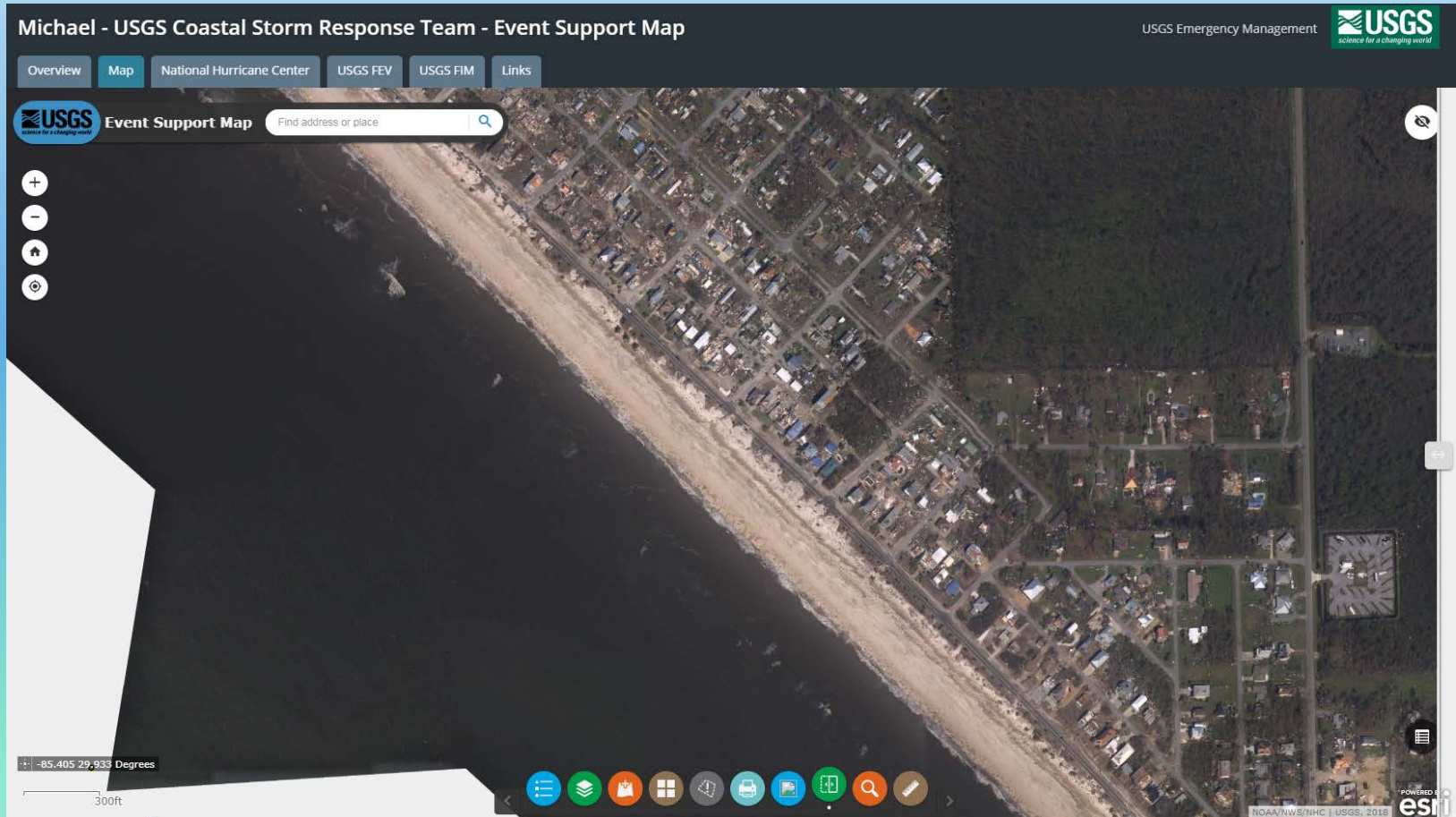
Hurricane Florence



<http://www.msn.com/en-us/weather/topstories/hurricane-florence-set-at-least-28-flood-records-according-to-new-usgs-report/ar-BBPFVL8?li=BBnb7Kz&ocid=iehp>

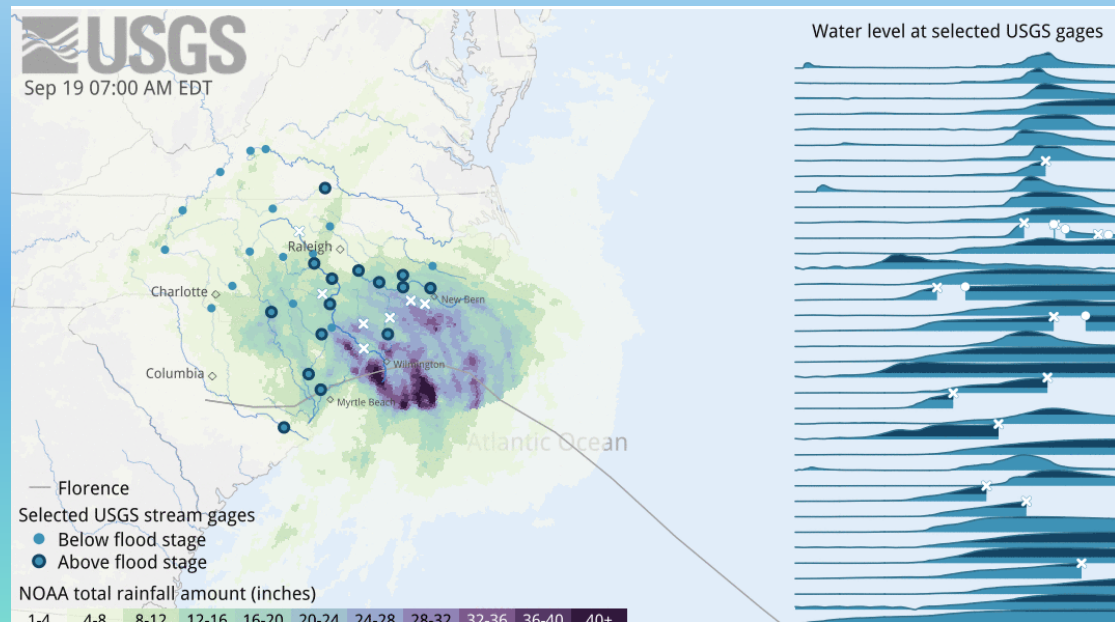
USGS Event Support Map:

A multi-layered map that includes forecasts, storm tracks, topographic maps, and more in one place. Hurricane Specific site.



Water Footprint Data Visualization

Watch Florence move through the Carolinas in this data visualization and see USGS streamgage measurements spike as the storm's extreme rainfall leads to intense flooding. USGS streamgages provide critical information during storms to flood forecasters and emergency managers as they make decisions that contributes to protecting lives and property. Understanding river levels and locations of flooding can make a huge difference in these dangerous storms. The water footprint visualization shows patterns of precipitation and river discharge of 18 USGS streamgages greatly impacted by Florence.



<https://www.usgs.gov/media/images/hurricane-florence-water-footprint-data-visualization>

USGS Pre-defined Sites for Storm Tide Sensor Deployment



- Pre-identified sites
- Faster sensor deployment
- Some have pre-installed/pre-surveyed brackets

Questions?

