USGS Measurements of Storm-Tide Impacts from Sandy--Time Series, Flood Marks, and Breach Dynamics

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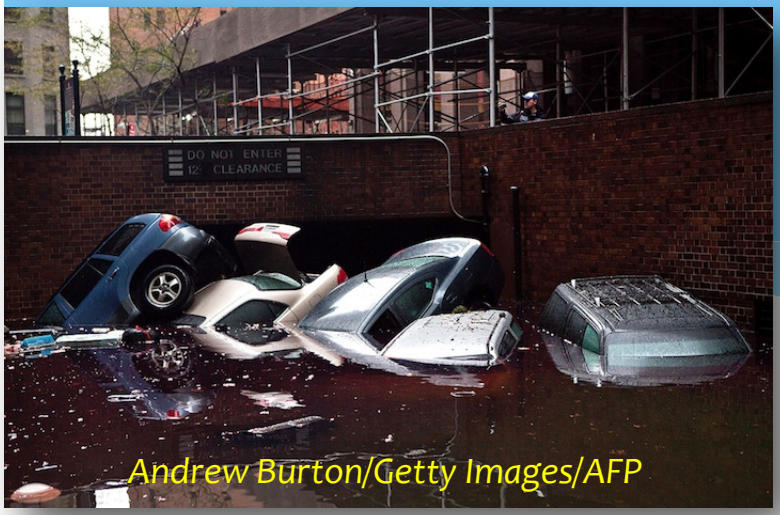
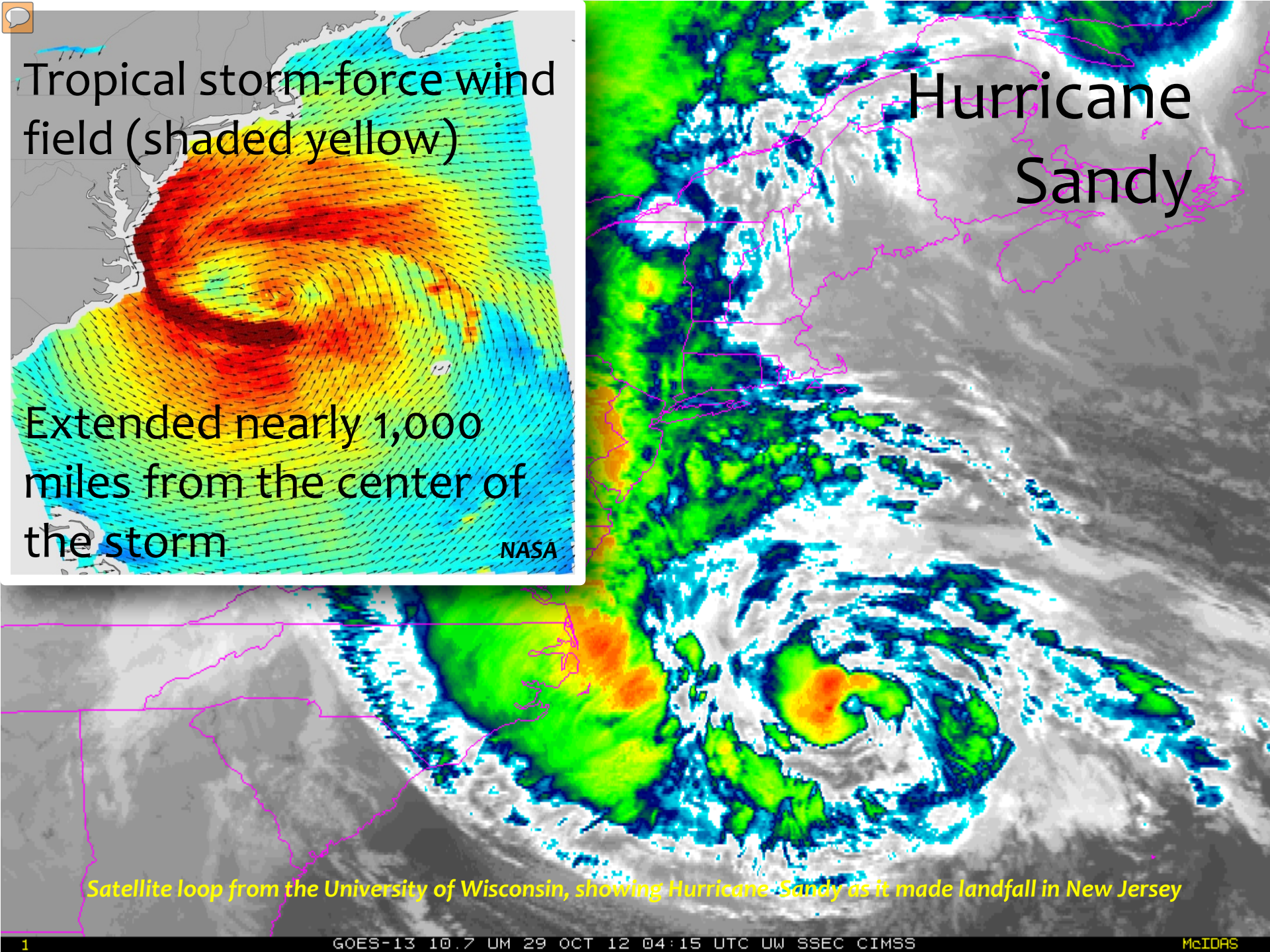
U. S. Geological Survey—U.S. Army Corps of Engineers

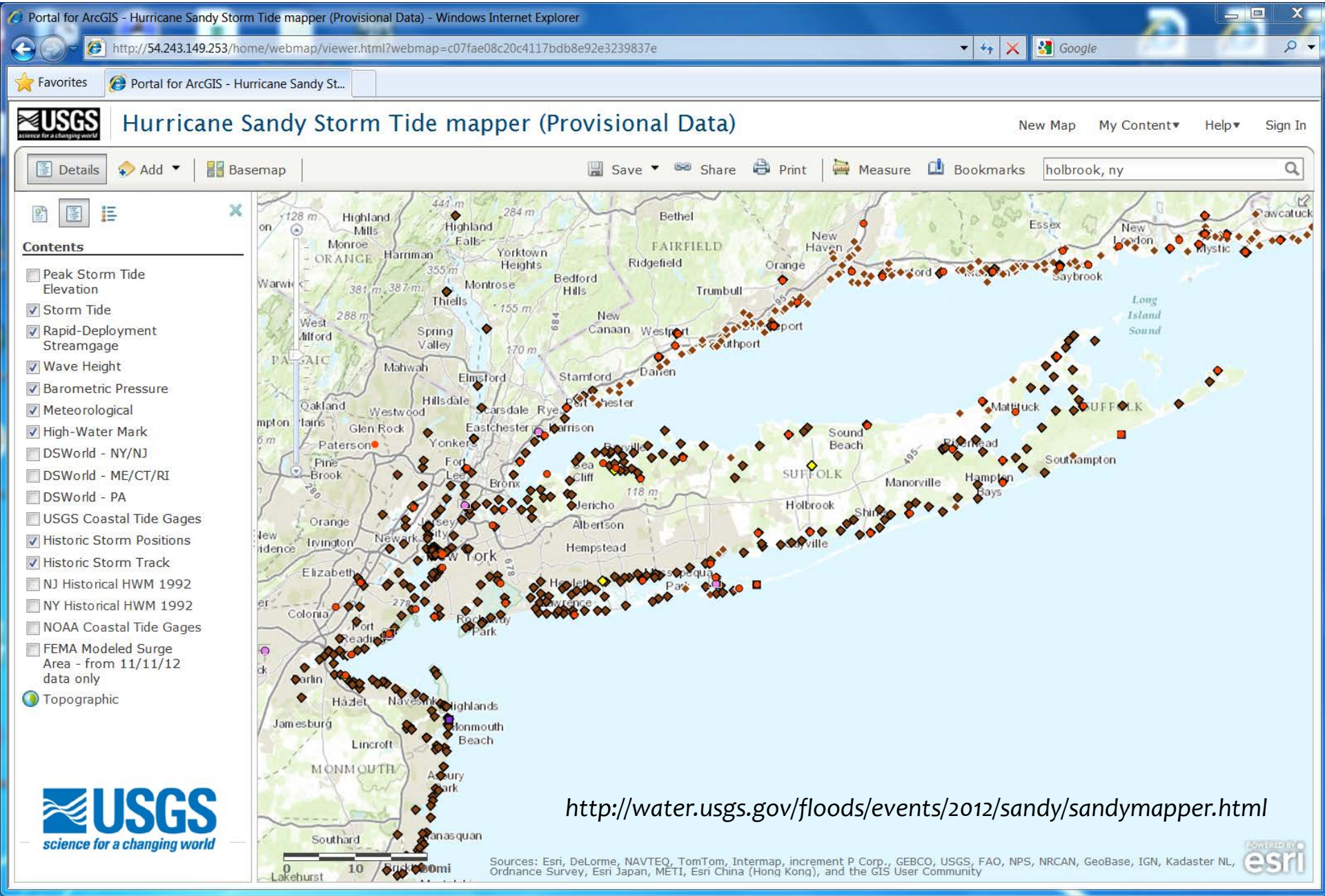
Joint Headquarters Meeting

January 23, 2013

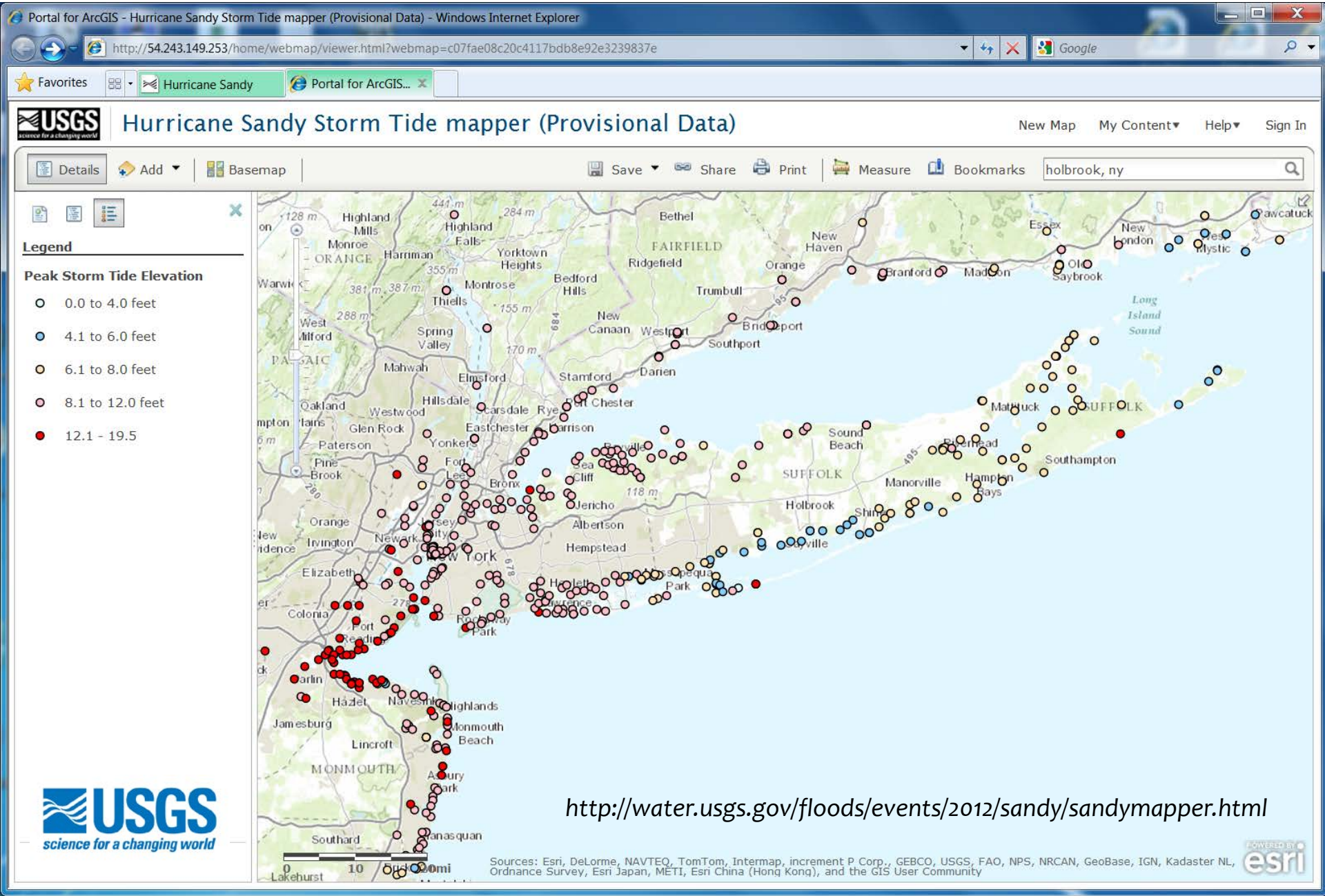



Tropical storm-force wind field (shaded yellow)
Extended nearly 1,000 miles from the center of the storm
NASA
Hurricane Sandy
Satellite loop from the University of Wisconsin, showing Hurricane Sandy as it made landfall in New Jersey
1
GOES-13 10.7 UM 29 OCT 12 04:15 UTC UW SSEC CIMSS
McIDAS

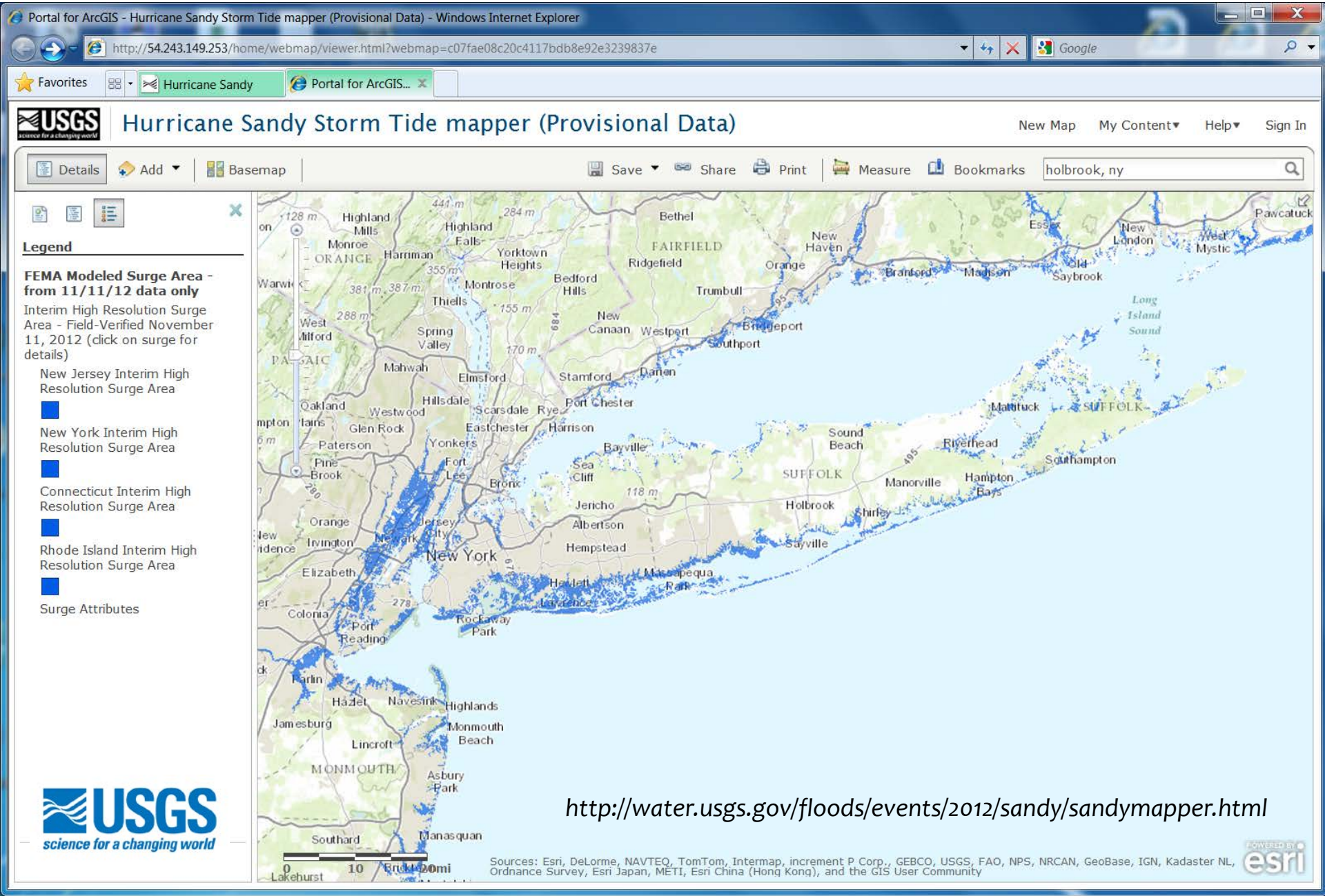
Temporary sensors (59) & high-water marks (>350)



Peak storm tides (astronomical tide + surge + waves)



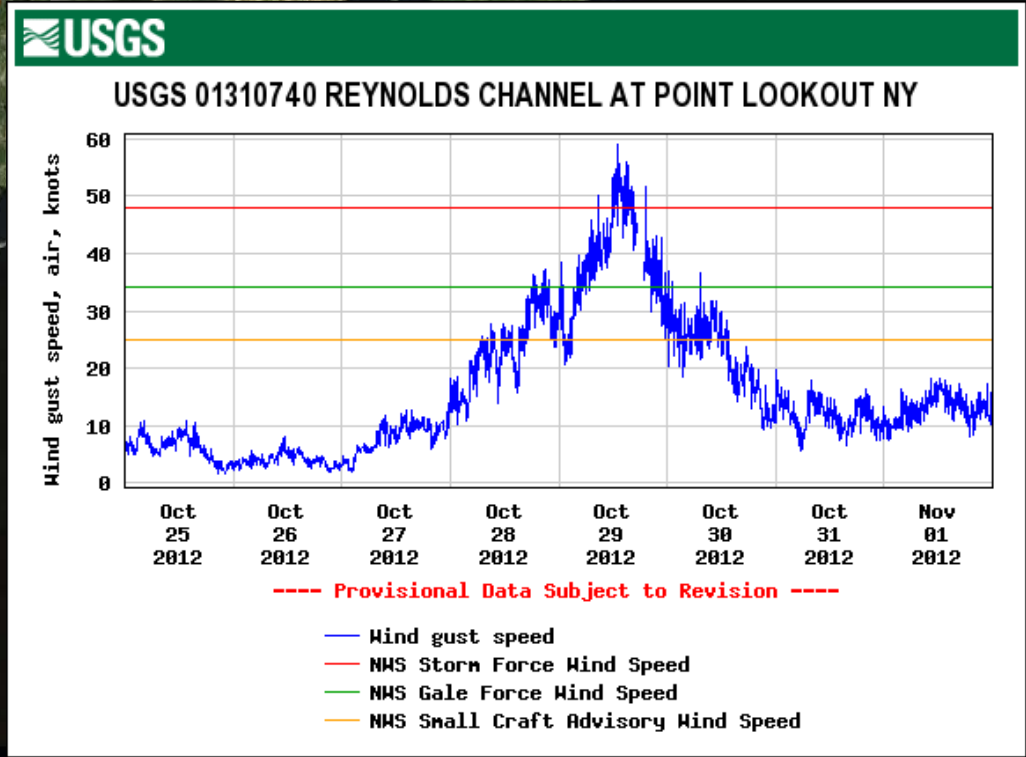
FEMA Modeled Surge Area—from 11/11/12 USGS data



Network of existing and temporarily reactivated coastal gages

* 17 tide gages, including 2 with weather stations
* Documented gale- to storm-force winds lasting 12 to 18 hours

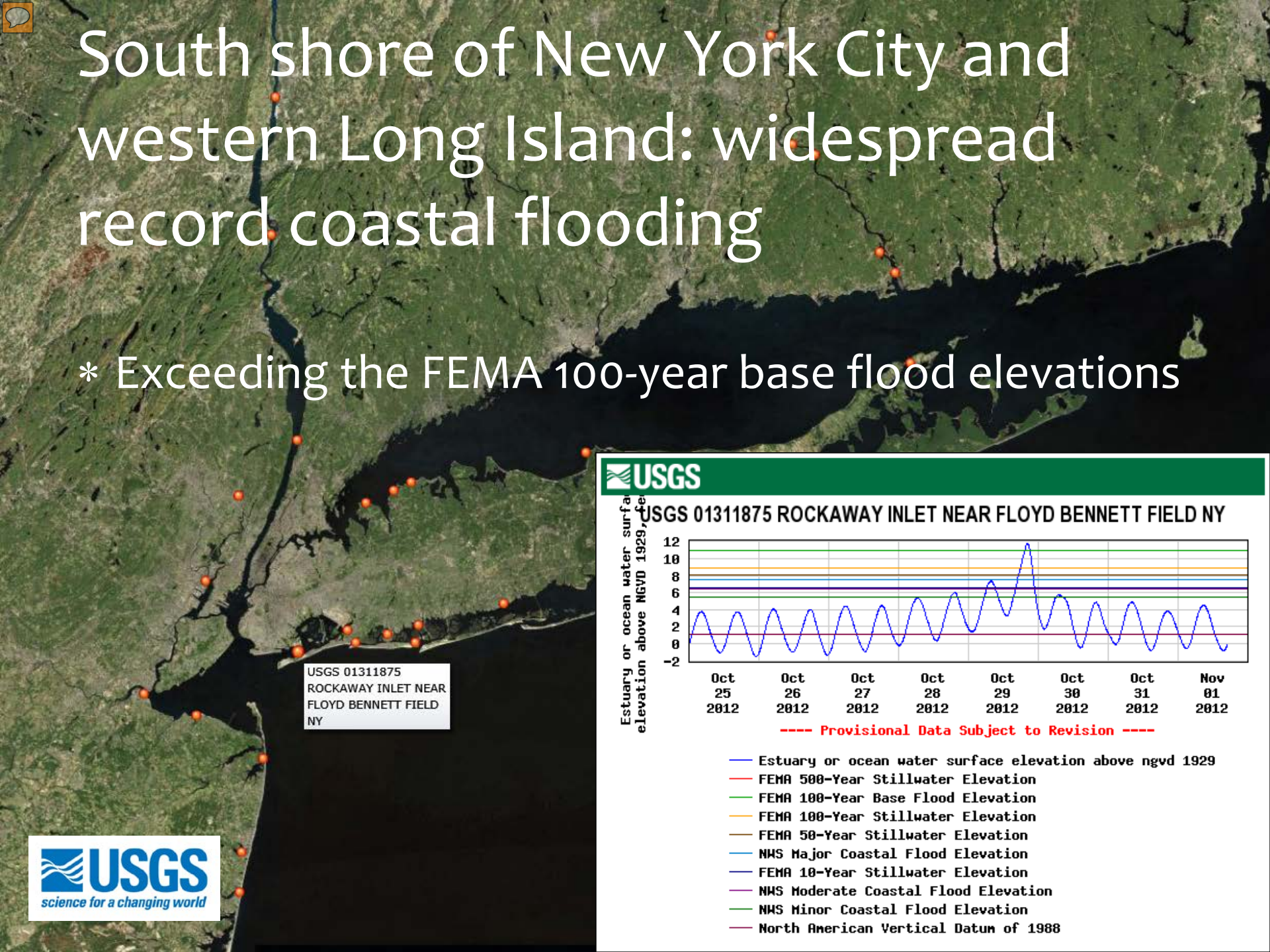
USGS 01310740
REYNOLDS CHANNEL AT
POINT LOOKOUT NY



USGS
science for a changing world

South shore of New York City and western Long Island: widespread record coastal flooding

* Exceeding the FEMA 100-year base flood elevations



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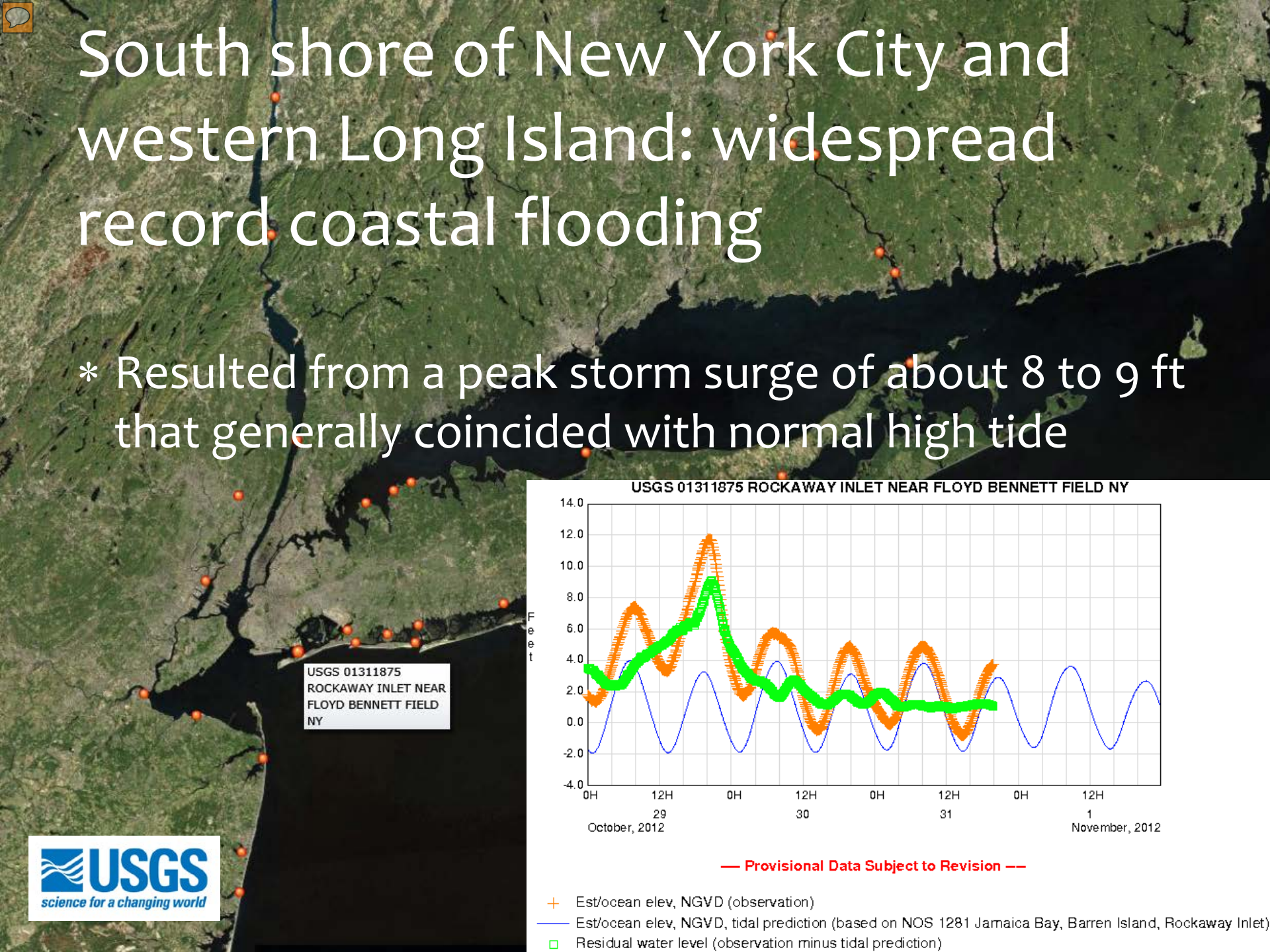
South shore of New York City and western Long Island: widespread record coastal flooding

* Resulted from a peak storm surge of about 8 to 9 ft that generally coincided with normal high tide



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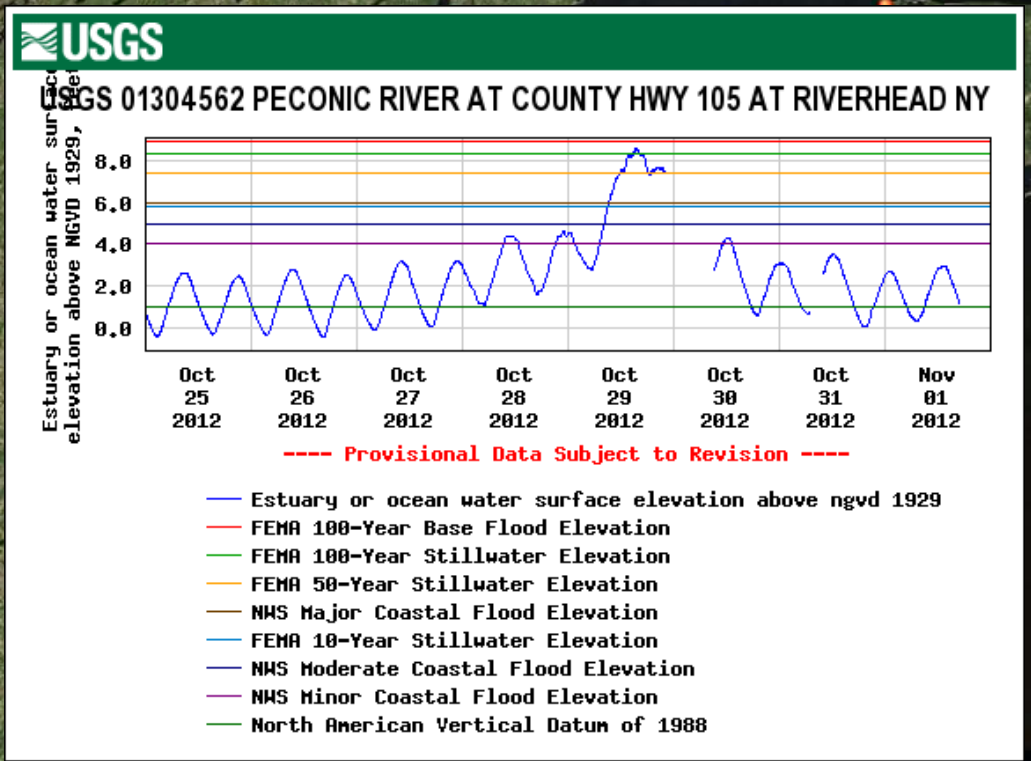
South shore & Peconic Estuary of eastern Long Island: localized record coastal flooding

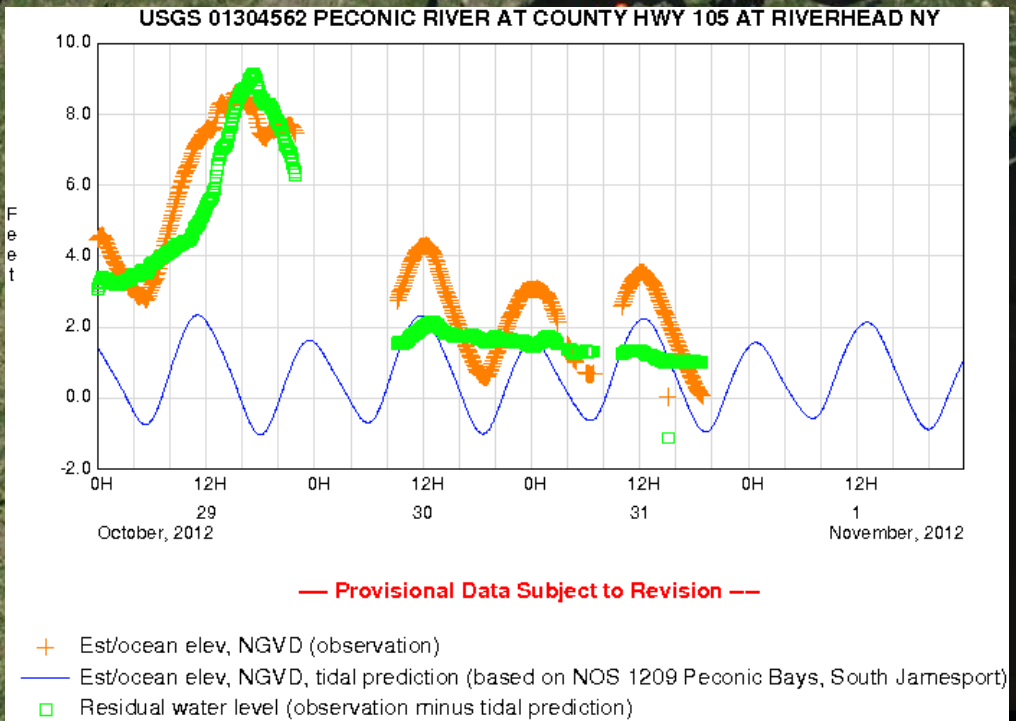
* Exceeding the FEMA 100-year stillwater elevations

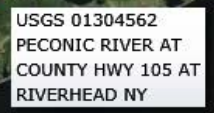


USGS 01304562
PECONIC RIVER AT
COUNTY HWY 105 AT
RIVERHEAD NY

South shore & Peconic Estuary of eastern Long Island: localized record coastal flooding

* From a surge of about 6 to 8 ft at normal high tide, although a peak surge of about 7 to 9 ft occurred near normal low tide in the Peconic Estuary

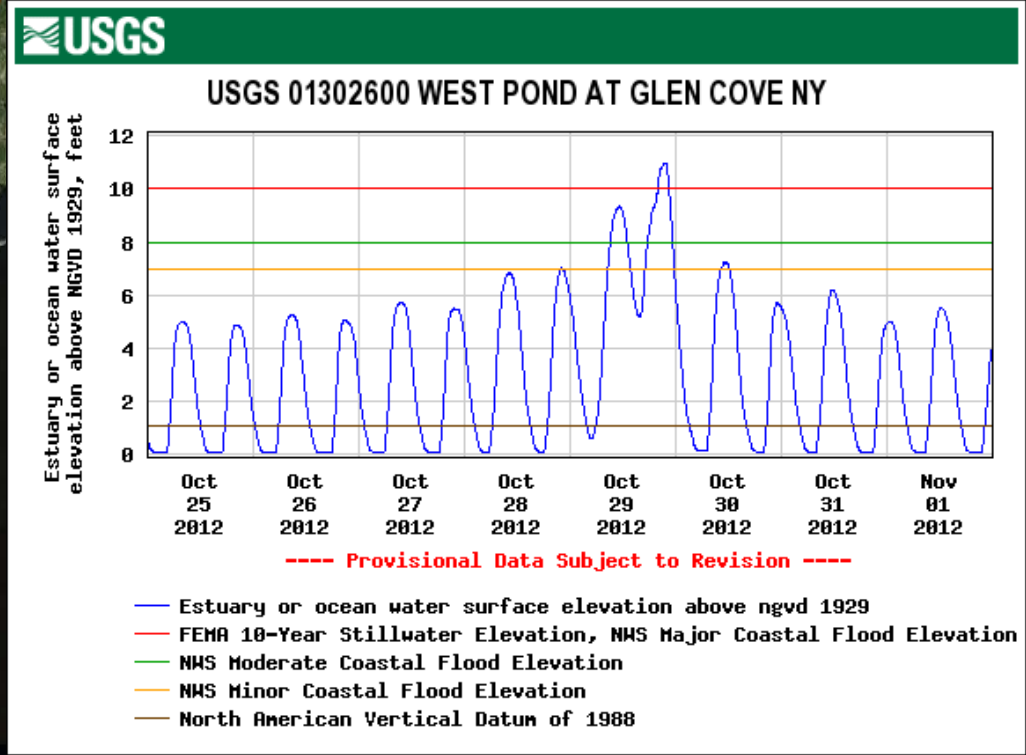




North shore of western Long Island: major coastal flooding

* Exceeding the FEMA 10-year stillwater elevation

USGS 01302600 WEST POND AT GLEN COVE NY



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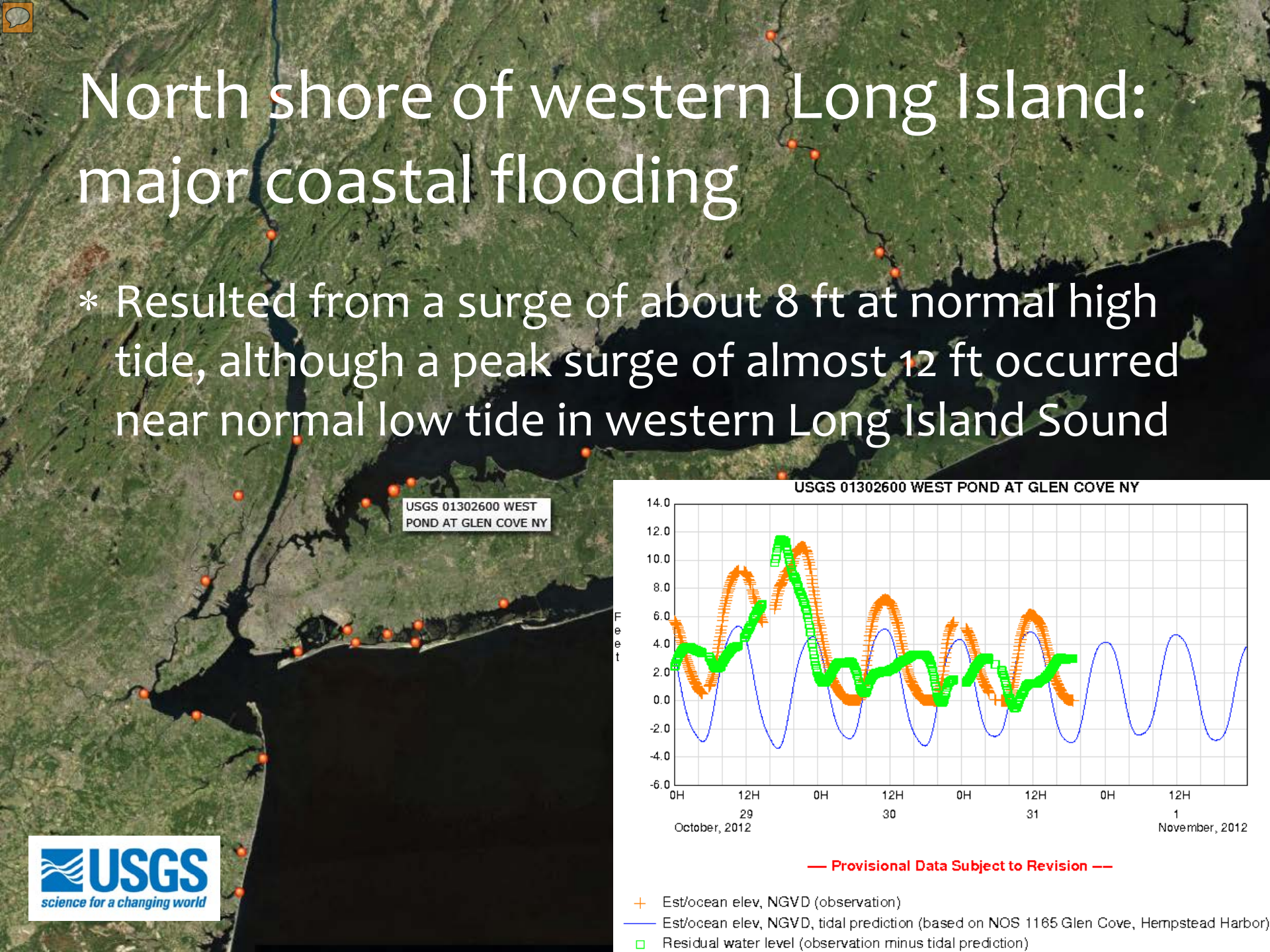
North shore of western Long Island: major coastal flooding

* Resulted from a surge of about 8 ft at normal high tide, although a peak surge of almost 12 ft occurred near normal low tide in western Long Island Sound



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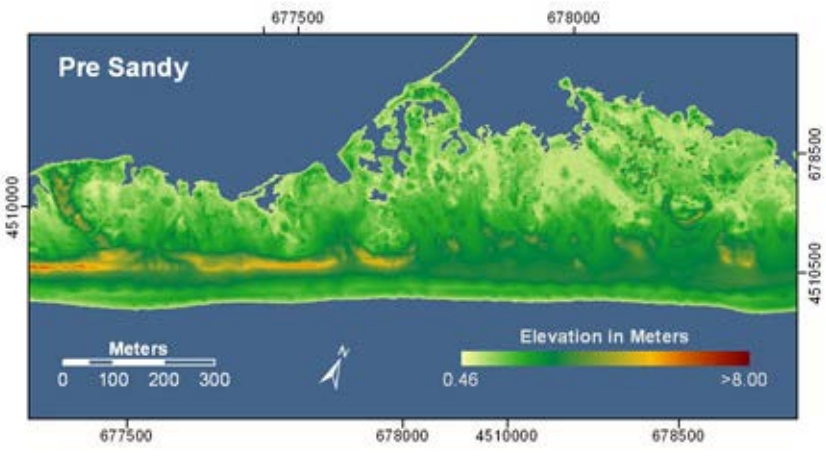
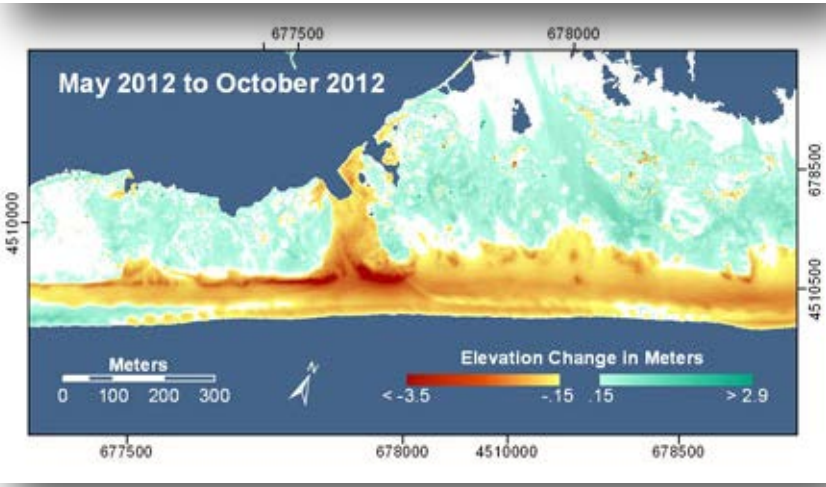
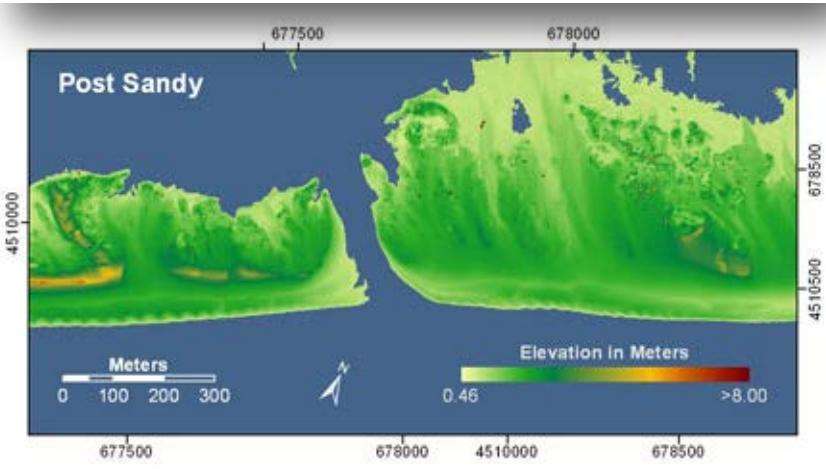
Fire Island National Seashore
May 21, 2009

Barrier-island breach
created by Hurricane Sandy
November 5, 2012
USGS


Pre Sandy
677500
678000
4510000
678500
Meters
0 100 200 300
Elevation in Meters
0.46
>8.00


May 2012 to October 2012
677500
678000
4510000
678500
Meters
0 100 200 300
Elevation Change in Meters
< -3.5
-.15 .15
> 2.9


Post Sandy
677500
678000
4510000
678500
Meters
0 100 200 300
Elevation in Meters
0.46
>8.00

November 6, 2012

1,060 cfs at 1410 EST

1,180 cfs at 1420 EST

1,160 cfs at EST 1428

1,250 cfs at 1446 EST

1,340 cfs at 1455 EST

1,330 cfs at 1500 EST

Legend

Velocity (ft/s)

- 0.50 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- 3.01 - 3.50
- 3.51 - 4.00

N

0 15 30 60 90 120 Meters

USGS science for a changing world

http://ny.water.usgs.gov/projects/hurr_sandy_2012/index2.html

November 20, 2012

1,420 cfs at 1542 EST

1,460 cfs at EST 1554

1,570 cfs at 1604 EST

1,560 cfs at 1613 EST

1,820 cfs at 1623 EST

Legend

Velocity (ft/s)

- 0.10 - 1.00
- 1.01 - 1.50
- 1.51 - 2.00
- 2.01 - 2.50
- 2.51 - 3.00
- 3.01 - 3.50
- 3.51 - 4.50

N

0 15 30 60 90 120 Meters

USGS science for a changing world

http://ny.water.usgs.gov/projects/hurr_sandy_2012/index3.html

For more information, contact:

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http://ny.water.usgs.gov/