Lost in Translation

How can science better inform the public about natural hazards

迷失在翻译

如何更好地用科学为公众翻译自然灾害

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Stevens Institute of Technology, Hoboken, NJ

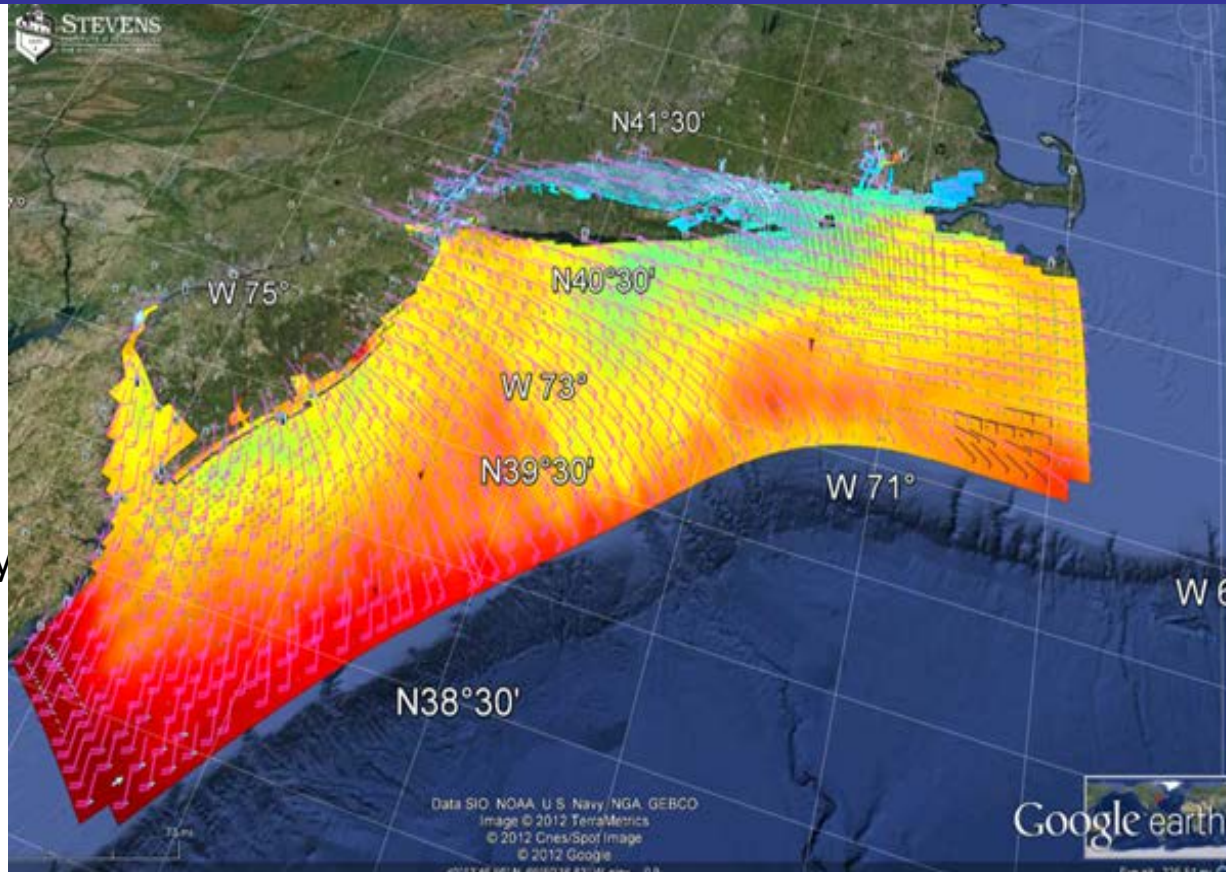

SHINYO SAVIO

New York Harbor Observing and Prediction System

Integrated system of observing sensors and forecast models

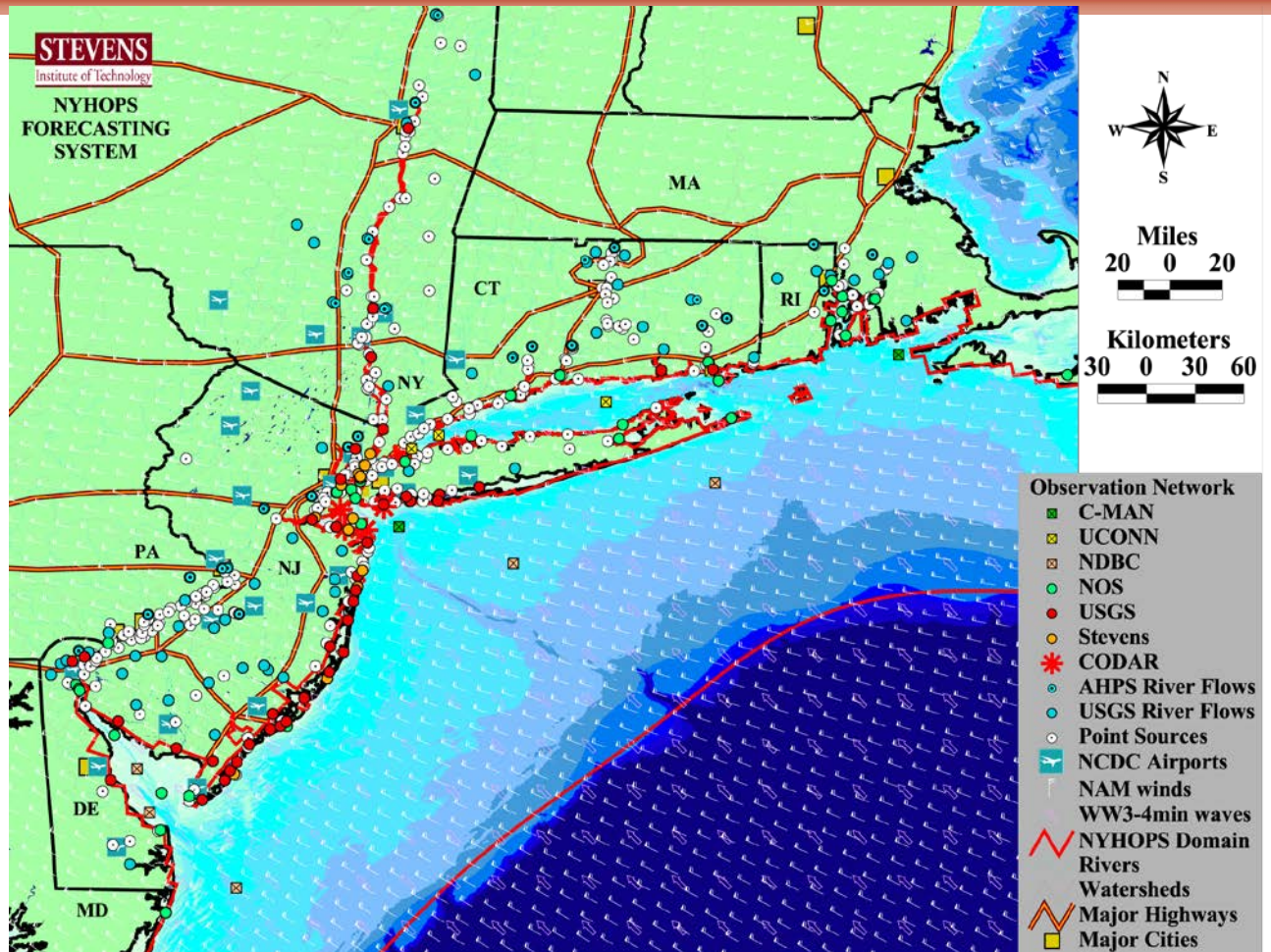
TO OBSERVE
TO PREDICT
TO COMMUNICATE

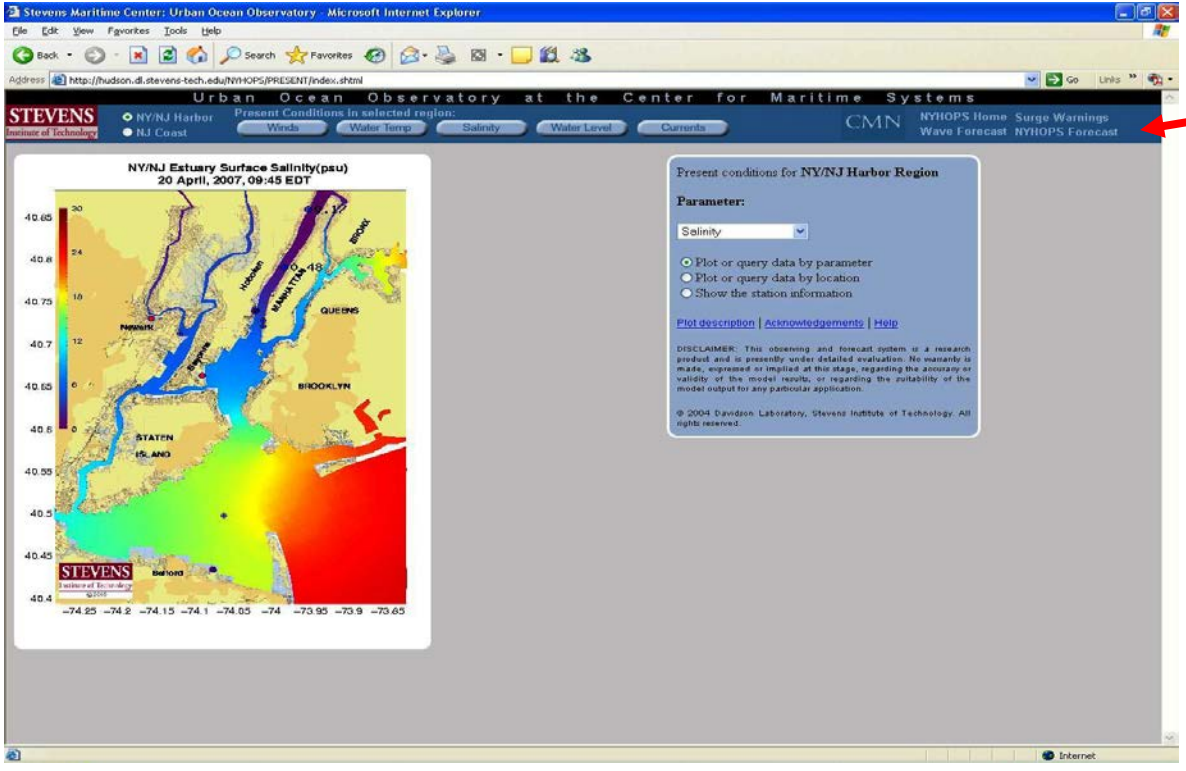
Weather, Currents , Water Level, Salinity Temperature, Waves



NYHOPS OMDR:

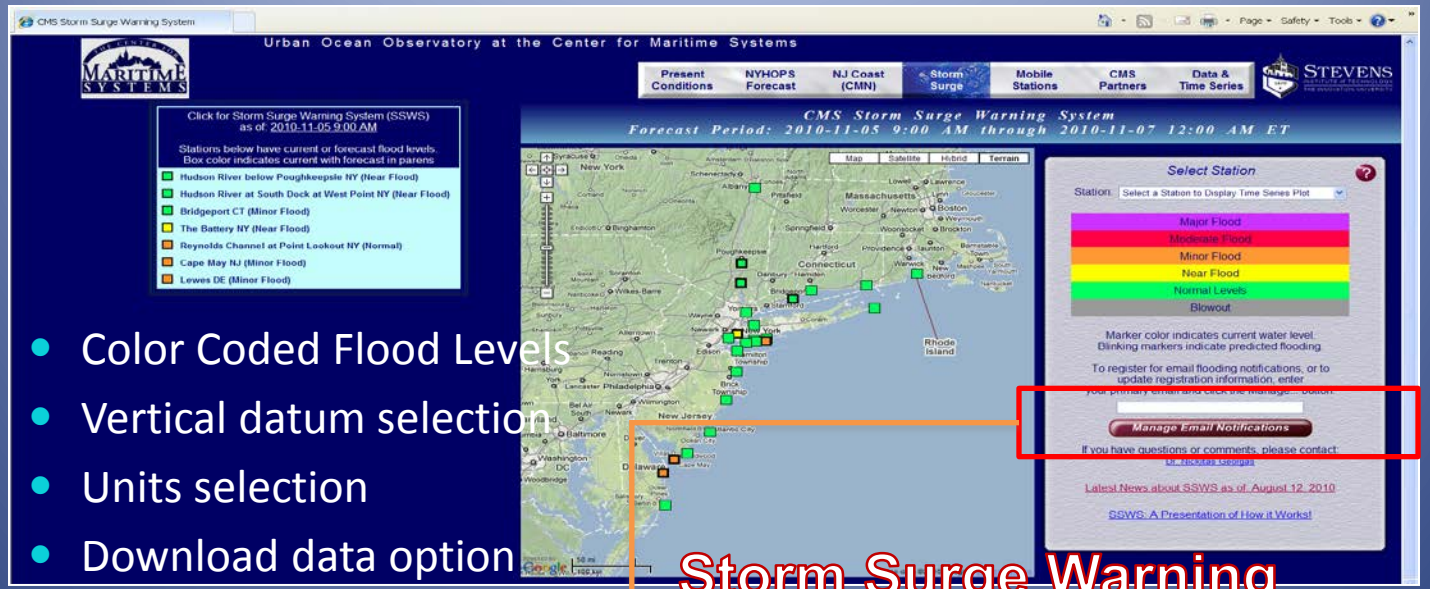
Real-Time Data



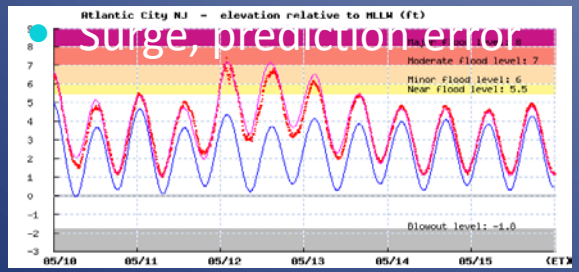


Forecasts out to 48 hours

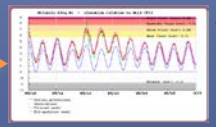
http://www.stevens.edu/maritimeforecast



- Color Coded Flood Levels
- Vertical datum selection
- Units selection
- Download data option

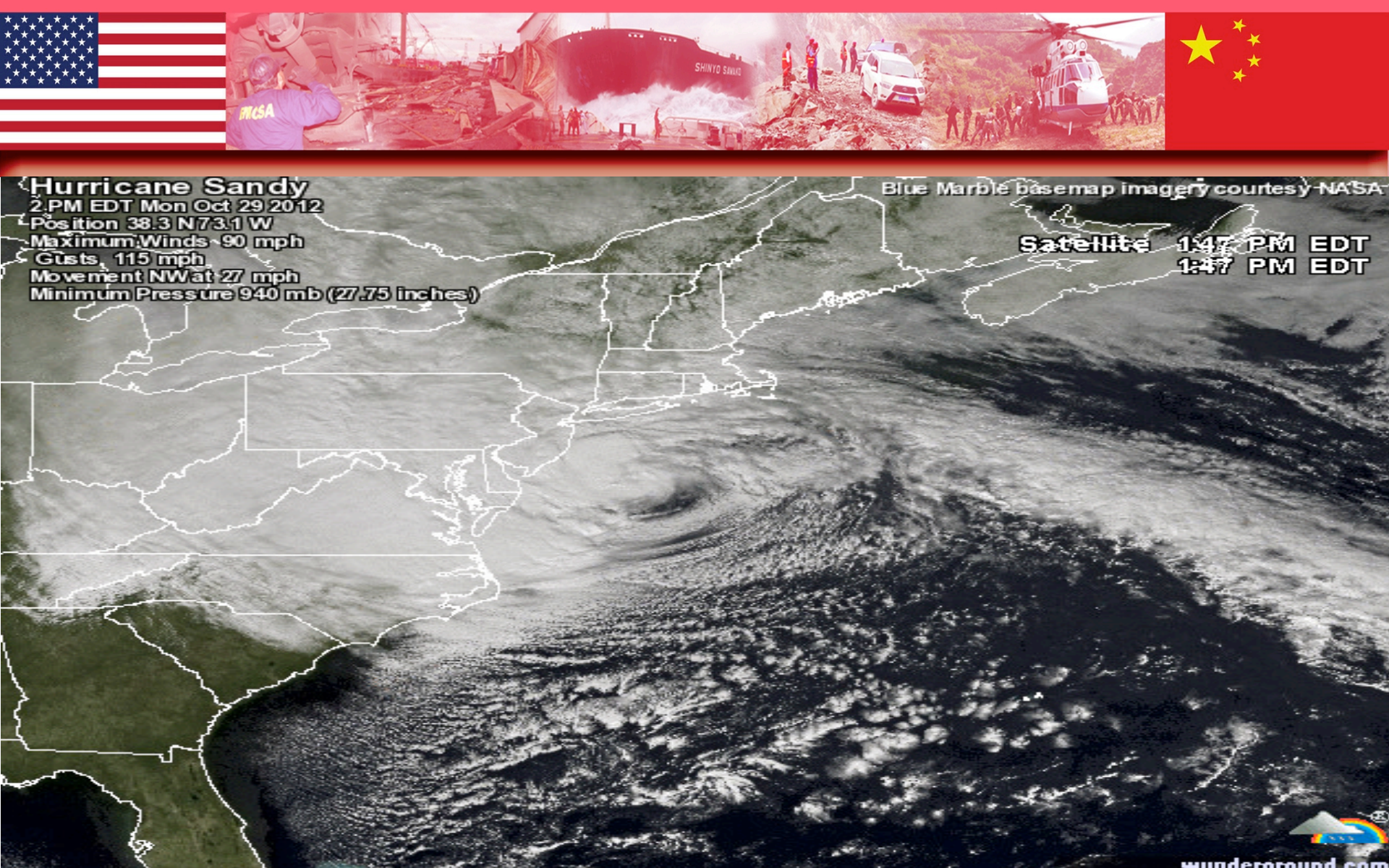


Storm Surge Warning System



Event → Phonebook → Warning

http://www.stevens.edu/maritimeforecast


Hurricane Sandy
2 PM EDT Mon Oct 29 2012
Position 38.3 N73.1 W
Maximum Winds 90 mph
Gusts 115 mph
Movement NW at 27 mph
Minimum Pressure 940 mb (27.75 inches)
Blue Marble basemap imagery courtesy NASA
Satellite 1:47 PM EDT
1:47 PM EDT
wunderground.com


SHINYO SAVAGE

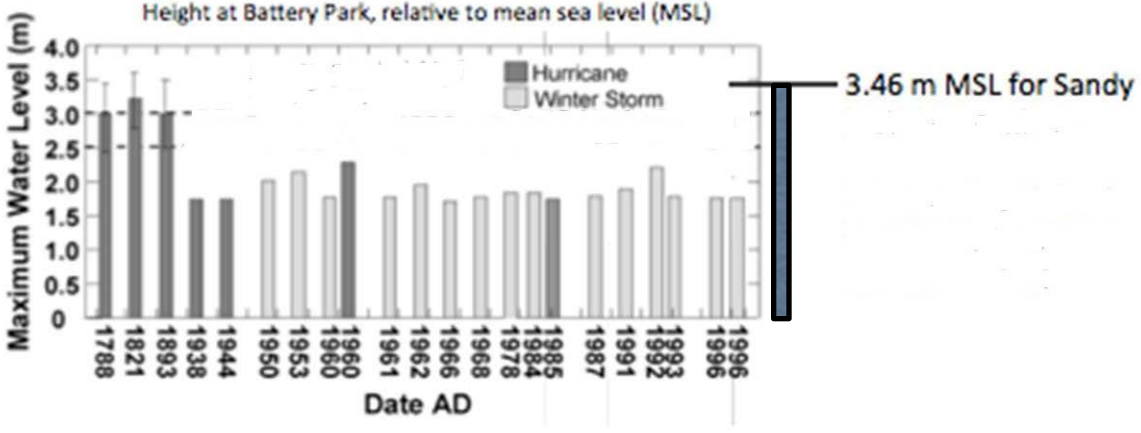

SHINYO SAVIOR


C34

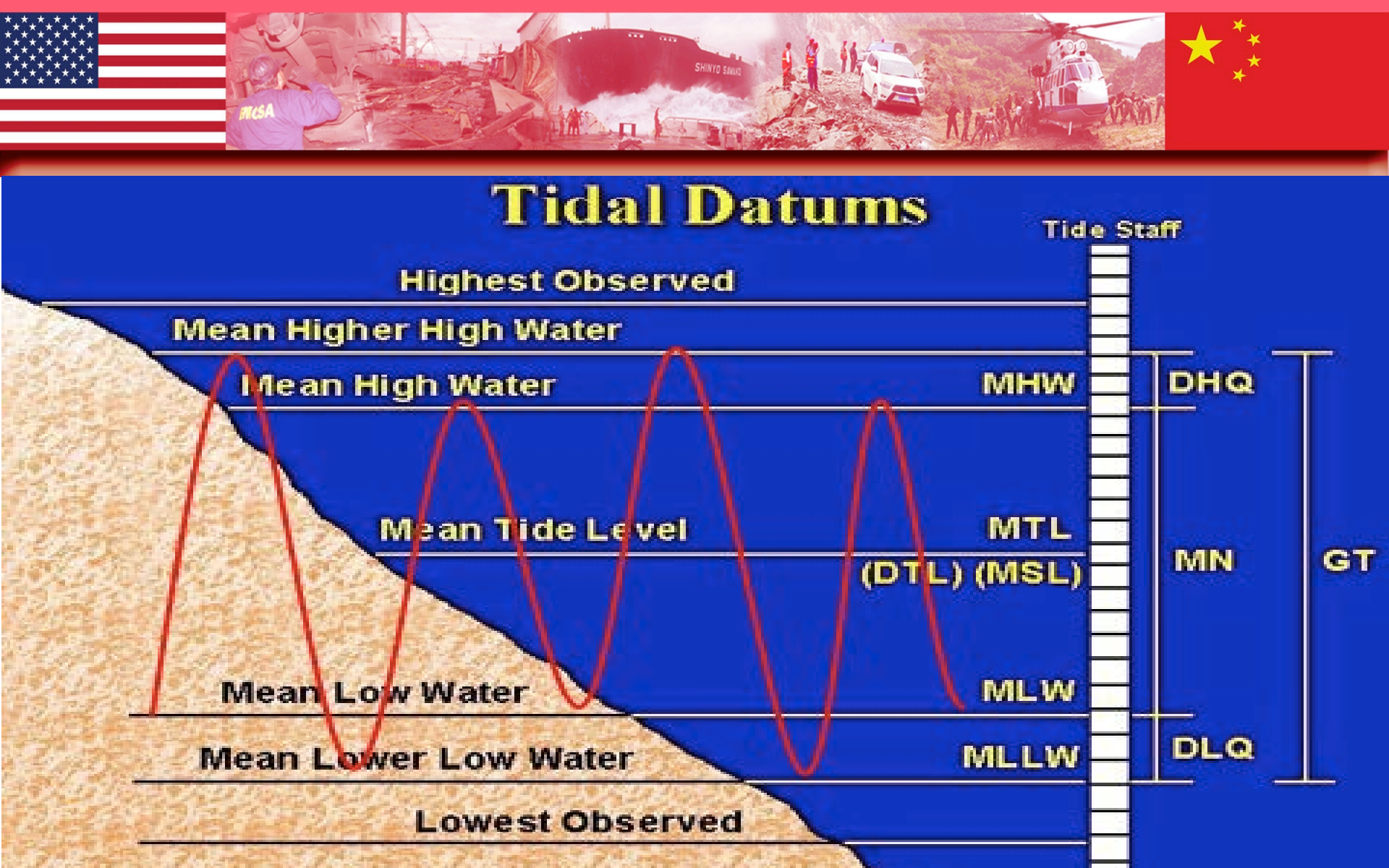

SHINYO SAVIOR

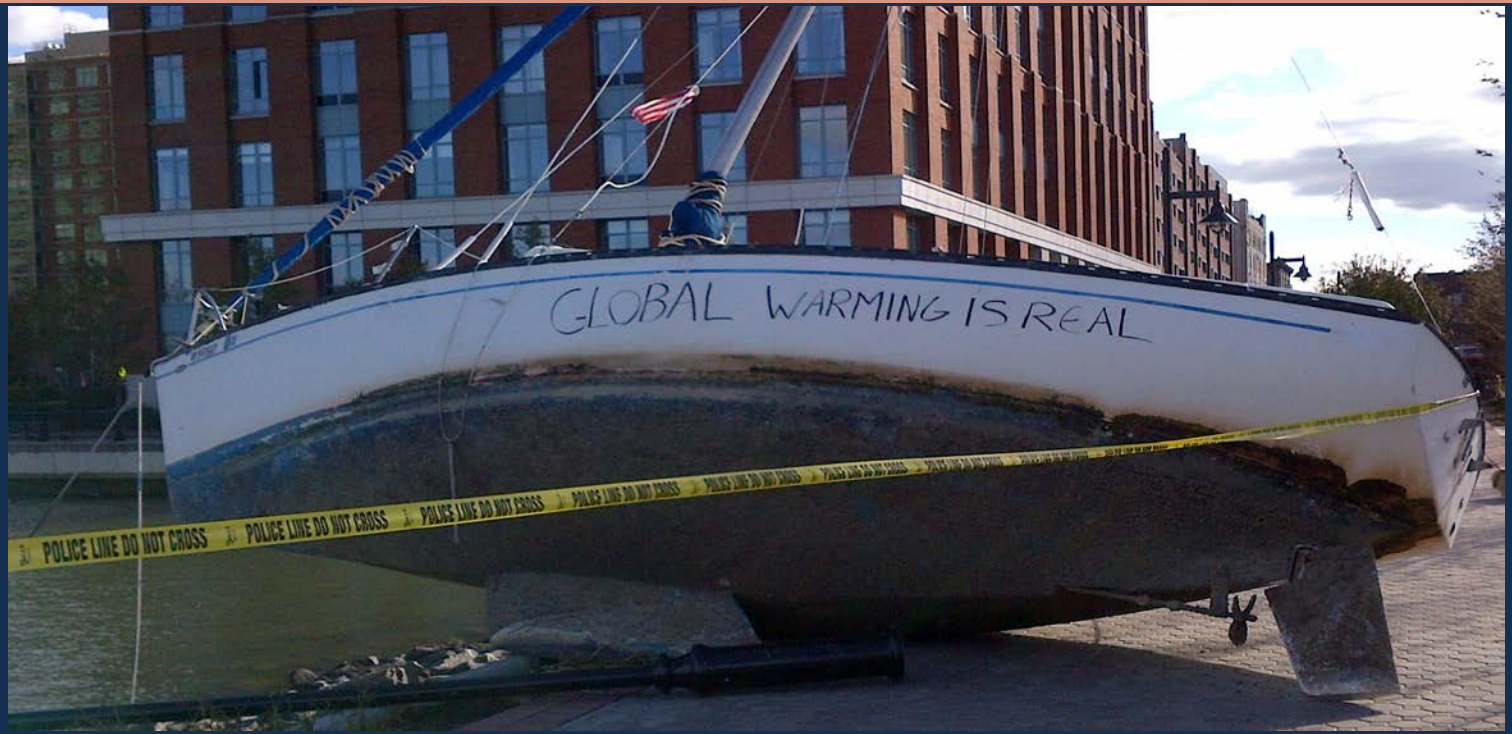
Storm Surge Height at Lower Manhattan

Adapted from: Scileppi and Donnelly, *Geochemistry, Geophysics, Geosystems*, 2007



- Prior hurricanes:
  - The city is believed to have been **directly hit** by hurricanes in 1788, 1821 and 1893
  - 1821 was worst in NYC's history – 4 m surge, "a wall of water" rising in less than one hour (peaked at low tide), total water level of ~3.25 m


Tidal Datums
Tide Staff
Highest Observed
Mean Higher High Water
Mean High Water
MHW
DHQ
Mean Tide Level
MTL
(DTL) (MSL)
MN
GT
Mean Low Water
MLW
Mean Lower Low Water
MLLW
DLQ
Lowest Observed



Hoboken, October 31, 2012

Data Retrieval

http://tidesandcurrents.noaa.gov/data_menu.shtml?stn=8518750%20The%20Battery,%20NY&type=Tide+Data

Google

NOAA TIDES & CURRENTS

Search

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- Station Home Page
- Station Information
- Tide / Water Level Data
- Tide Predictions
- Current Data
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- PORTS
- Operational Forecast System
- Bench Mark Sheets
- Datums
- Harmonic Constituents
- Sea Level Trends
- Measurement Specifications

The Battery, NY - Data Disclaimer

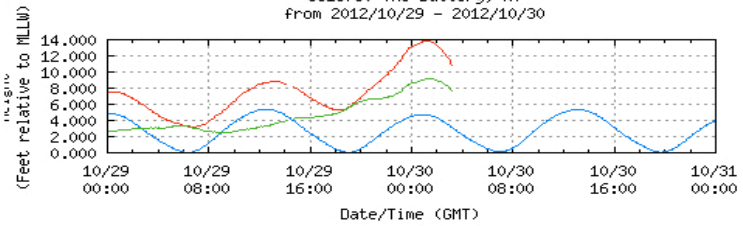
Station ID: 8518750

The Battery, NY: Data Inventory

Page Help

Tide Data

NOAA/NOS/CO-OPS
Preliminary Water Level (B1:2) vs. Predicted Plot
8518750 The Battery, NY
from 2012/10/29 - 2012/10/30



Predicted Tide — Observed WL — (Obs-Pred)

Retrieve data from 20121028 through 20121029

Retrieve data from 20121030 through 20121031

Nearby Stations

Verrazano-Narrows
Bayonne Bridge Air
Bergen Point West
Kings Point, NY
Sandy Hook, NJ
Bridgeport, CT
Newbold, PA
Burlington, Delawa
New Haven, CT
Tacony-Palmyra Bri
Philadelphia, PA
Atlantic City, NJ
Marcus Hook, PA

Click here for larger plot

☐ Check to plot backup data (if available)

Begin Date: Oct 29 2012

End Date: Oct 30 2012

Datum: MLLW

Data Units: ◉ Feet ○ Meters

Time Zone: ○ Local (LST/LDT) ◉ GMT ○ LST

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Storm Surge Warning System

http://hudson.dl.stevens-tech.edu/SSWS/d/index.shtml?station=N017

Google

Urban Ocean Observatory at the Center for Maritime Systems

THE CENTER FOR MARITIME SYSTEMS

STEVENS INSTITUTE of TECHNOLOGY THE INNOVATION UNIVERSITY

Present Conditions | NYHOPS Forecast | NJ Coast (CMN) | Storm Surge | Mobile Stations | CMS Partners | Data & Time Series

Storm Surge Warning System

Plot Series or Download Data

Station: The Battery NY

Stations are listed from North to South

Start Date: 2012-10-28 Set Start

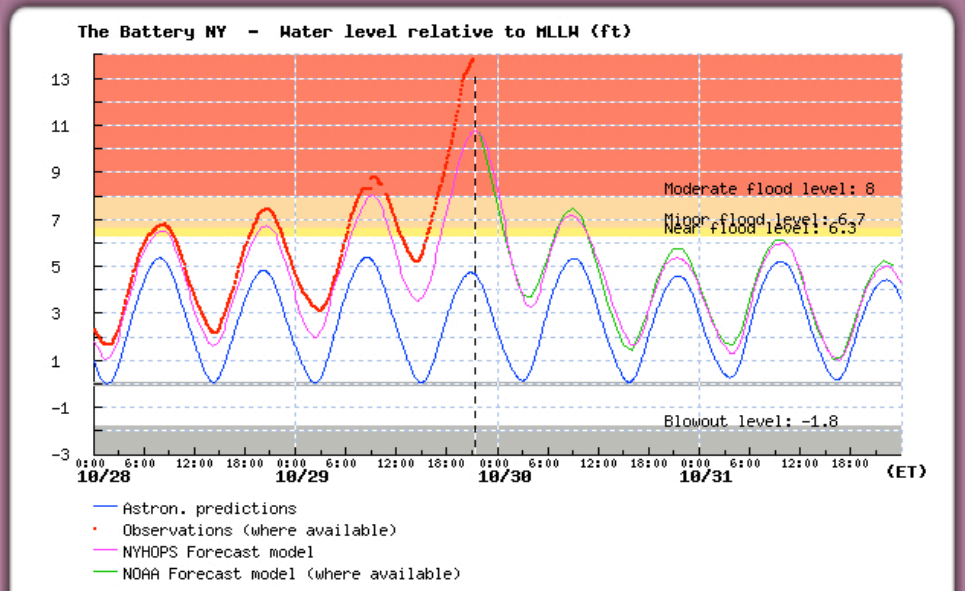
End Date: 2012-10-31 Set End

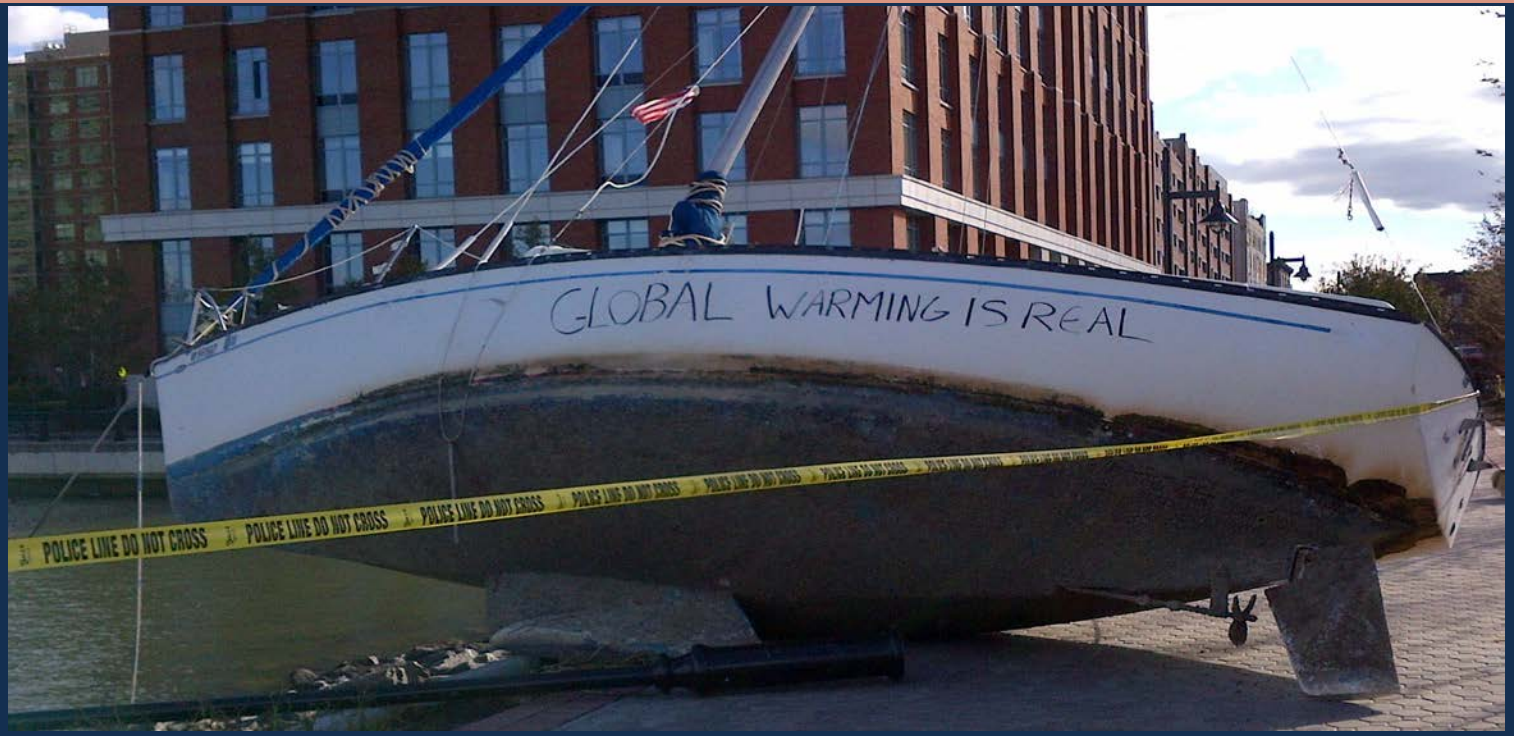
Datum: MLLW

Units: English

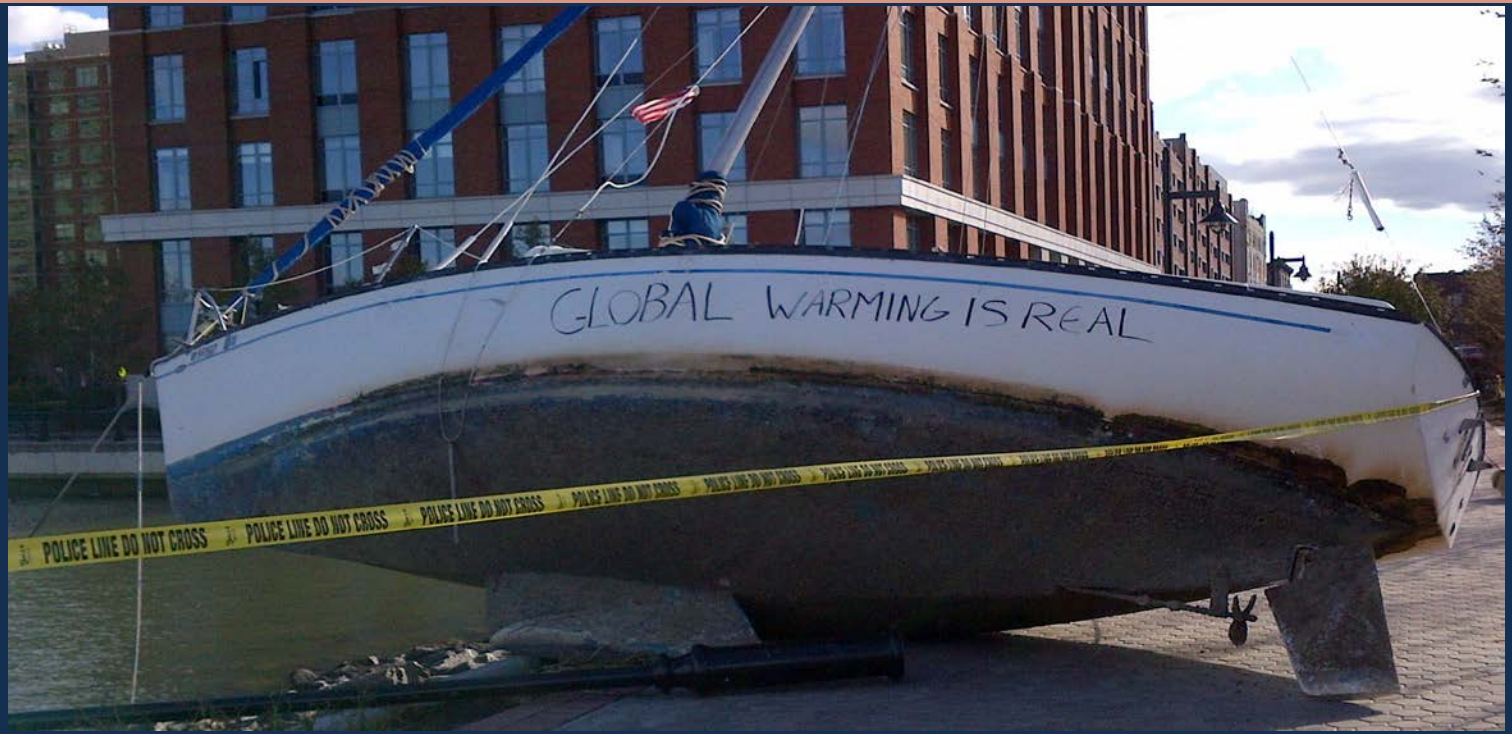
Time Zone: Eastern Local

Extended Download | Plot



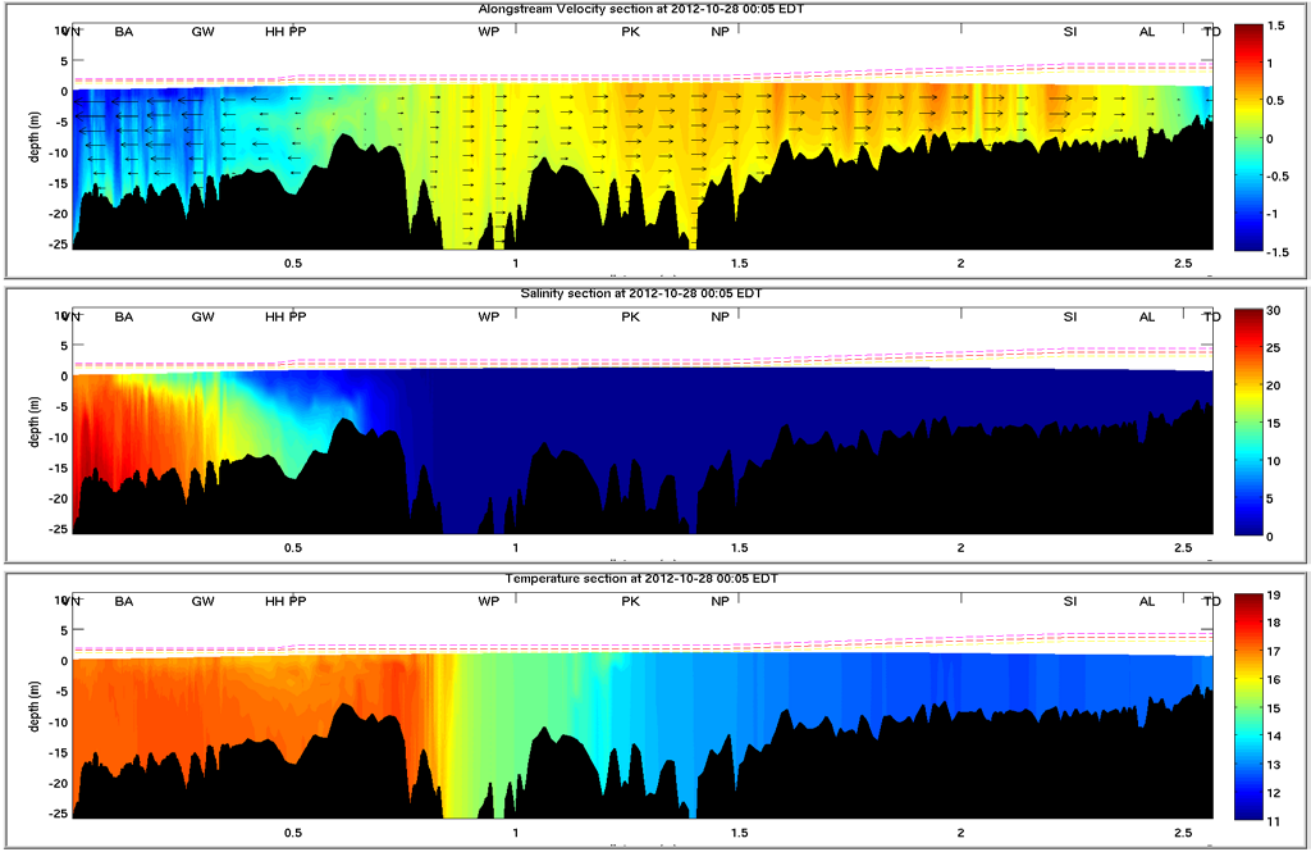


The owner didn't know – and didn't care – whether the storm surge was going to be 9.5 feet, or the water level was going to be 14 feet MLLW. What he/she wanted to know was where was the water going to be relative to the dry land surrounding the boat?



船主不知道－也不想知道－是否风暴潮会达9.5英尺，或水位会至平均较低低潮位之上14英尺 。他/她只想知道，以船附近的干地作参考，水会涨到哪里？

NYHOPS - Sandy - HRE: Verrazano Narrows to Troy

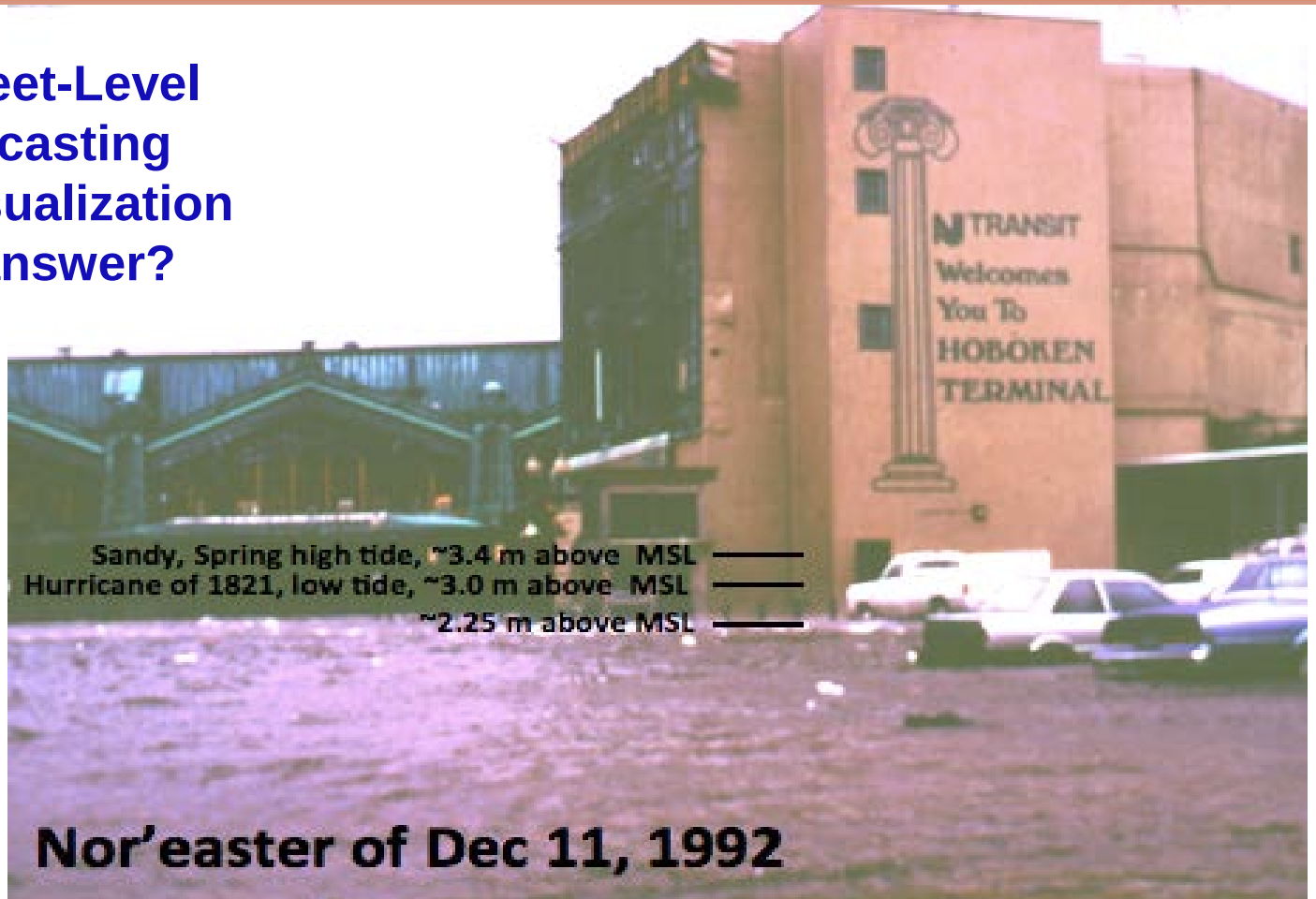



SHINYO SAVAGE

Nor'easter of Dec 11, 1992


NJ TRANSIT
Welcomes
You To
HOBOKEN
TERMINAL
Hurricane of 1821, low tide, ~3.0 m above MSL
~2.25 m above MSL
Nor'easter of Dec 11, 1992

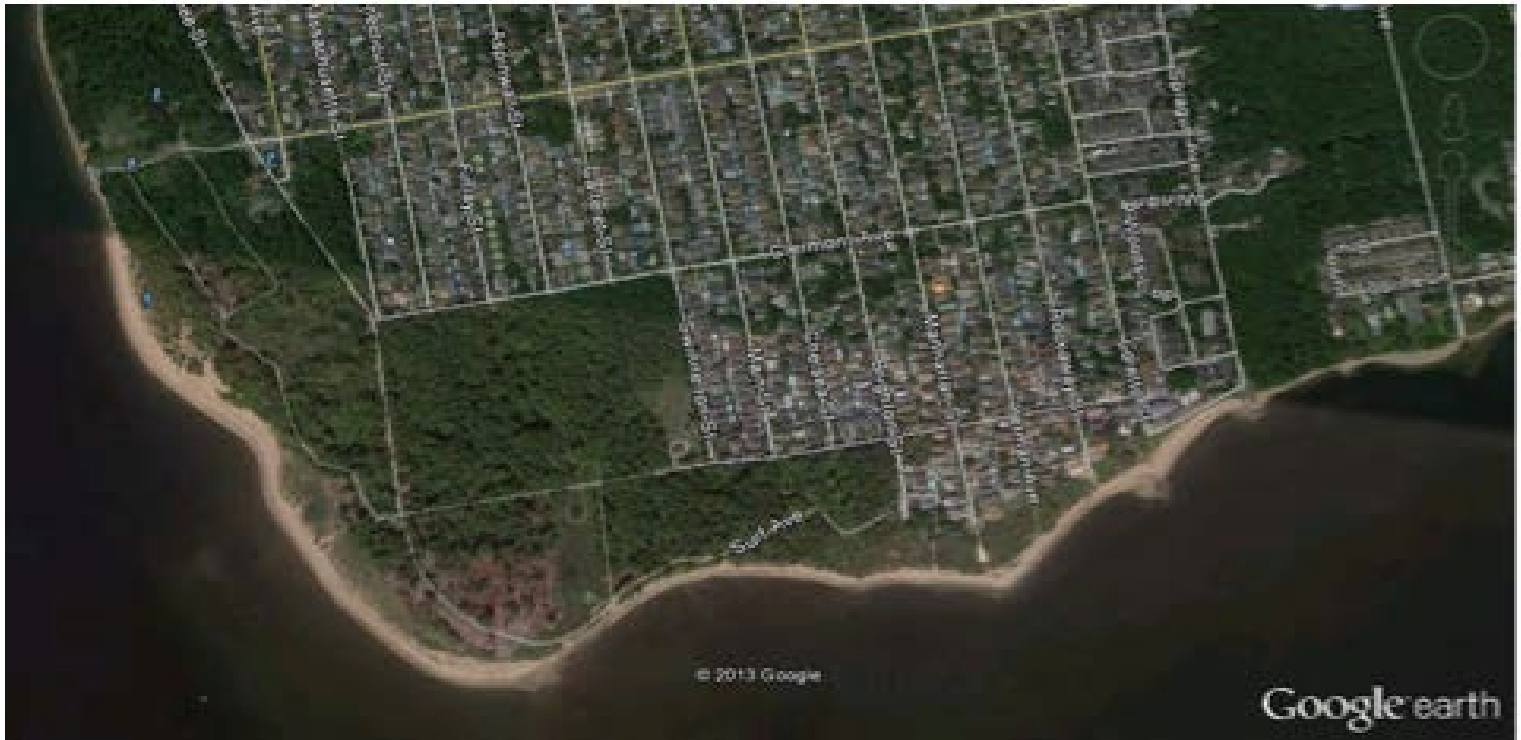
Is Street-Level Forecasting and Visualization the answer?



Translating Flood Hazards on Google Earth

- Using high-resolution topographic elevation maps as a layer in Google Earth, forecasted flood depths can be mapped in:
  - 1. Horizontal extent on contour maps
  - 2. In depth on Google Street View images
- Consistent datum is important
  - Here we use the North American Vertical Datum of 1988 (NAVD 88)

Google Earth Image of South Tottenville



Manhattan St. looking South from Google Earth Street View

Forecasted Flood Depth

Why This Matters
这为什么重要

The Earth at Night

晚间地球

Population Density

人口密度

The Bigger Picture

In the year 2000:

- 20% of the world's population lived within 30 km (walking distance) of the coast
- 40% lived within 100 km (1 hour drive)
- 50 % (3.1 billion people) lived within 200 km of the coast
- 11 of the world's 15 largest cities are located in the coastal zone.
- Global sea level rise and land subsidence are causing coastal sea level rise of approximately 1 foot per 100 years along the US Atlantic and Gulf coasts
- "Humanity is the first species to become a geophysical force." (E.O. Wilson)

更大的图景

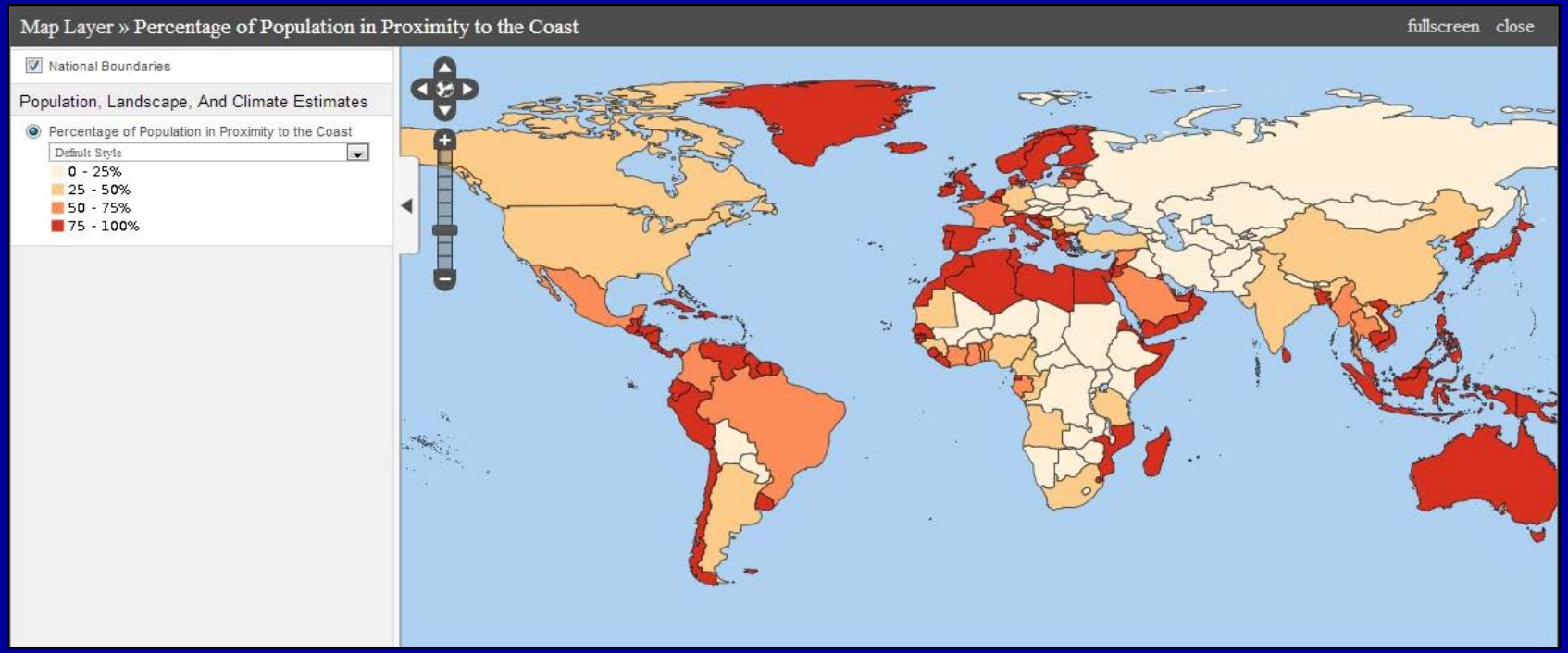
在2000年:

- 20%世界人口住在距海岸线30公里以内(步行距离)
- 40%住在距离100公里以内(一小时车程)
- 50%(31亿人)住在距离200公里以内

- 世界上最大的15个城市有11个在海岸区

- 全球海平面上升和地面沉降正使美国东部和南部的海岸水位以约每百年一英尺的速率上升

- “人类成为第一个能影响地球物理的物种” (E.O. Wilson)



% population living within 200 km of coast (2010)

What's Next?
下一步?

We – the scientific community – need to work together on an international scale to address two primary needs:

1. Develop guiding principles, supporting data, and design guidelines for Resilient Coastal Urban Communities.

2. Develop more effective ways to Translate scientific information, and Risk and Vulnerability into terms that the public can understand and act on. This will lead to Public Policy informed by new knowledge & better understanding. 公共政策基于更新的知识和对科学更好的理解

Thank you!

谢谢！