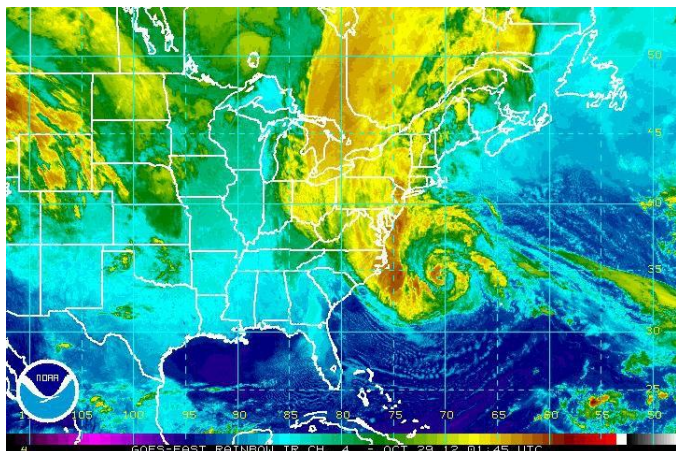


# Superstorm Sandy

## NOAA Response ... Before, During and After

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION • UNITED STATES DEPARTMENT OF COMMERCE



*"Such forecasting would not have been possible without improvements in hurricane forecasting and computer hardware. I can state without reservation this forecast would not have been accurately made a decade ago."*

*- Mike Smith, Senior Forecaster, AccuWeather Enterprise Solutions*

Before, during and after Sandy and other hurricanes, NOAA's agency-wide response includes a range of major assets, including geostationary and polar-orbiting weather satellites, ocean-observing and coastal water-level monitoring systems, a fleet of ships and aircraft, and potentially lifesaving information collected by NOAA scientists on land and water, in the air — and in the eye of the hurricane itself.

Beginning with the early forecasts, here's a record of how NOAA teams worked 24/7 to help ensure that our nation prepared for the worst of Hurricane Sandy, and examples of the efforts underway to help America recover:

### Embedding Meteorologists

NOAA National Weather Service meteorologists embedded with FEMA, National Security Staff, and at the Department of Homeland Security Operations Center went to work immediately and continuously. As the extent of the storm became clear, NOAA meteorologists were also assigned to regional and municipal emergency operations centers.

### Accurately Forecasting Rainfall/Snowfall Threats

Identifying and accurately and broadly communicating the threat of heavy snow was especially critical because the snow would be falling on trees still laden with leaves, creating the strong likelihood of major power outages. With heavy rainfall, too, the forecasts were accurate with regard to amounts, timing and location.

### Improving Hurricane Track and Intensity Forecasts

Beginning five days before landfall, the National Weather Service doubled the frequency of all upper-air soundings. Nearly 600 extra balloon launches prior to landfall improved the accuracy of atmospheric models critical to more precise hurricane track and intensity forecasts.

### Flying Into the Eye of the Storm

NOAA's Hurricane Hunters flew 10 missions over four days, or an estimated 80 flight hours. Pilots launched over 350 technological assets to measure ocean temperature and atmospheric conditions.

Four days in advance of actual landfall, the threats became clear. Strong winds. Record storm surge. Heavy rain. Paralyzing mountain snowfall.

NOAA meteorologists quickly and accurately issued warnings and engaged with emergency management, the media and the public. This outreach led to early, broad attention and significantly widened the effective lead time for storm preparation.

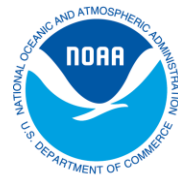
Of particular importance was the accurate track forecast centering on the South Jersey landfall, which was available to emergency personnel and the public a full four days before Sandy hit.

The forecast included a radical turn to the west a day before landfall, a highly unusual hurricane track. Just a decade ago, this model track may have been discounted, but improvements in numerical modeling gave NOAA forecasters the confidence to issue the forecast.



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### Ensuring Real-time Water-level Observations

In real-time, NOAA monitored and disseminated observations of water levels and maintained a "Storm Quicklook" synopsis of locations most affected by severe storm surge, helping coastal authorities prepare for and respond to coastal flooding.

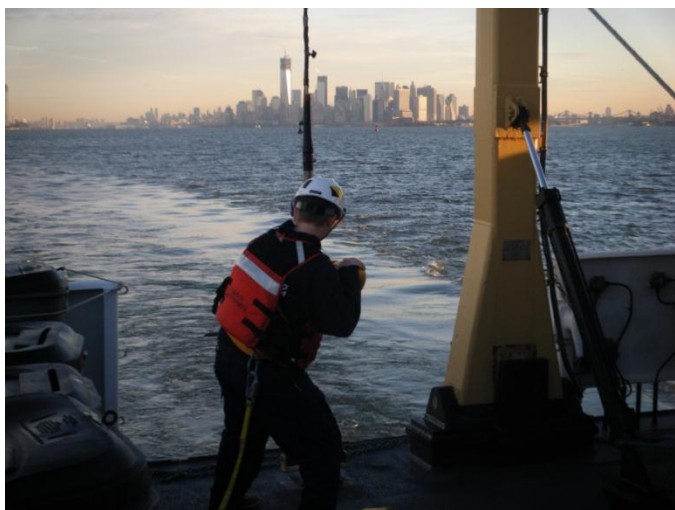
### Confirming Storm Surge

The entire East Coast needed to know with as much precision as possible what to expect from storm surge, and NOAA's Centers for Operational Oceanographic Products and Services provided essential data. Realistic models captured previously unavailable storm parameters. Maritime traffic resumed more quickly because NOAA embedded regional navigation managers within command centers.



### Staying on the Front Lines

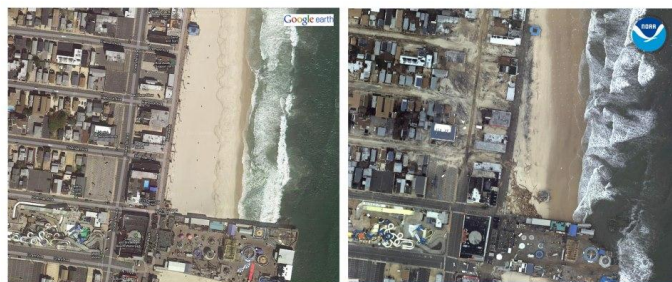
Seafloor sonar surveys completed by NOAA ships and small boats helped reopen Baltimore and the Virginia ports, quickly restarting commerce and allowing Navy ships to return to port. Similarly, New York and New Jersey ports were reopened so that emergency fuel and other crucial supplies could reach some of the hardest-hit areas.



*"NOAA's detailed subsurface surveys were absolutely key to opening the port."*

*- CDR Linda Sturgis, Port Recovery Officer, USCG Sector New York.*

Hours after the storm, NOAA planes and scientists conducted aerial surveys of the affected coastlines, and published the photos online immediately, allowing emergency managers and residents to examine the damage even before ground inspections were permitted. These surveys are also vital to FEMA assessment teams and other on-the-ground responders and those managing oil spill clean-up and damage assessment. Over 3,000 miles of coastline have been surveyed, and over 10,000 images processed to document coastal damage and impacts to navigation.



*A "before" and "after" aerial photo of Seaside Heights, NJ boardwalk area. On lower right, you can see the roller coaster out at sea.*

NOAA's Office of Response and Restoration is on-the-scene working with state and federal co-trustee agencies to lead a preliminary assessment of natural resource impacts from the numerous oil spills caused by Sandy. The U.S. Coast Guard and others are using NOAA's Environmental Response Management Application as the common operational application for pollution response.

*"Thank you for all the efforts NOAA has provided. On behalf of the entire emergency response geospatial community, we are extremely grateful for everything you continue to do to advance/support this mission."*

*- Chris Vaughan, Geospatial Information Officer, FEMA*