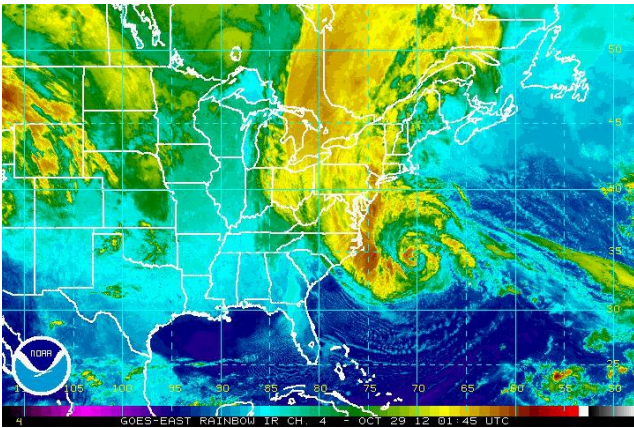


# Sandy

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



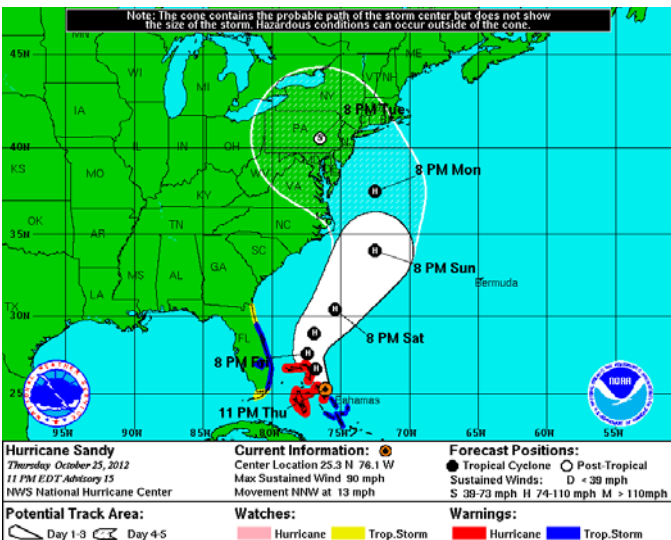
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Four days in advance of actual landfall, the threats became clear. Strong winds. Record storm surge. Heavy rain. Paralyzing mountain snowfall.

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 might have been discounted, but improvements in numerical modeling gave NOAA forecasters the confidence to issue the forecast.

*"Knowing what to expect from Superstorm Sandy helped CDC deliver the right messages for each stage of the event. NOAA provided valuable information to support important, timely health messages to those affected by the storm."*

**Christopher J. Portier, PhD, Director, CDC National Center for Environmental Health/Agency for Toxic Substances and Disease Registry**

Before, during and after Sandy and other hurricanes, NOAA's agency-wide response includes a range of major assets: 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, NOAA teams worked 24/7 to help ensure that our nation prepared for the worst of Sandy. NOAA is now working 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 also assigned meteorologists to regional and municipal emergency operations centers.

### 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.

### Improving Hurricane Track and Intensity Forecasts

Beginning five days before landfall, the National Weather Service doubled the frequency of all upper-air measurements. Nearly 600 extra balloon launches prior to landfall added valuable observations to the NOAA weather models used by forecasters to predict hurricane track and intensity.

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### Accurately Forecasting Rainfall/Snowfall Threats

Identifying and then accurately and broadly communicating the threat of heavy snow were especially critical because the snow would be falling on trees still laden with leaves, creating the likelihood of major power outages. Forecasts regarding the amount, timing and location of heavy rainfall also were on target.

### 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.

### Communicating Health Hazards

NOAA National Weather Service briefings for CDC and U.S. Department of Health and Human Services staff began before Sandy made landfall. Following the storm, New York, New Jersey and Pennsylvania Weather Forecast Offices disseminated CDC health information, significantly elevating awareness of serious threats such as carbon monoxide poisoning, harmful mold exposure, and hypothermia. NOAA Weather Radio, NOAA social media, and the press helped keep critical, potentially life-saving information out front.

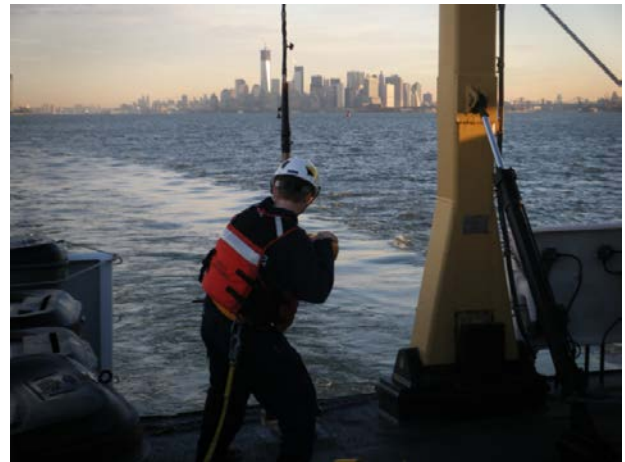


### Staying on the Front Lines

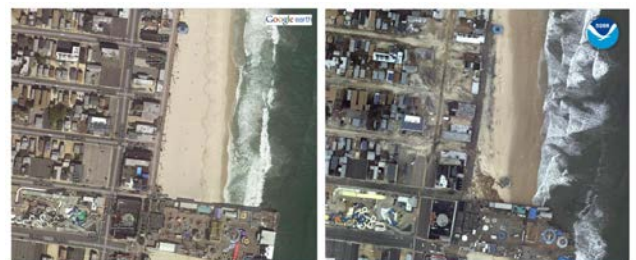
Seafloor sonar surveys completed by NOAA ships and small boats helped reopen Baltimore and Virginia ports, quickly restarting commerce and allowing Navy ships to return to port. New York and New Jersey ports were reopened, enabling emergency supplies to reach some of the hardest-hit areas. Maritime traffic resumed more quickly because NOAA embedded regional navigation managers within command centers.

*"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 immediately published the photos online, 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.*

*"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 and support this mission."*

*Chris Vaughan, Geospatial Information Officer, FEMA*

The NOAA Office of Response and Restoration continues working with state and federal co-trustee agencies to assess 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.