

What's New and What's Next at the National Hurricane Center

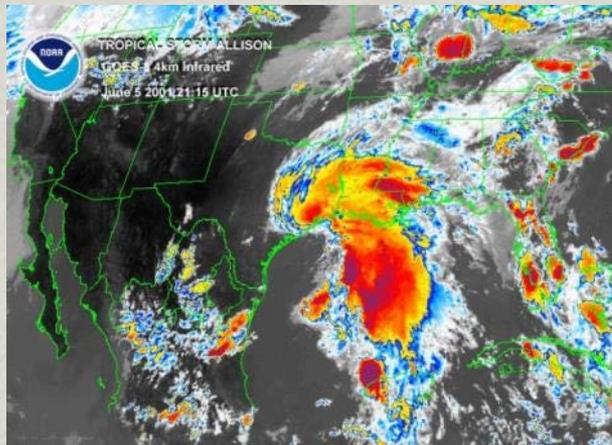
James Franklin
Chief, Hurricane Specialist Unit
National Hurricane Center

Massachusetts Emergency Management Agency
Preparedness Conference
May 2015

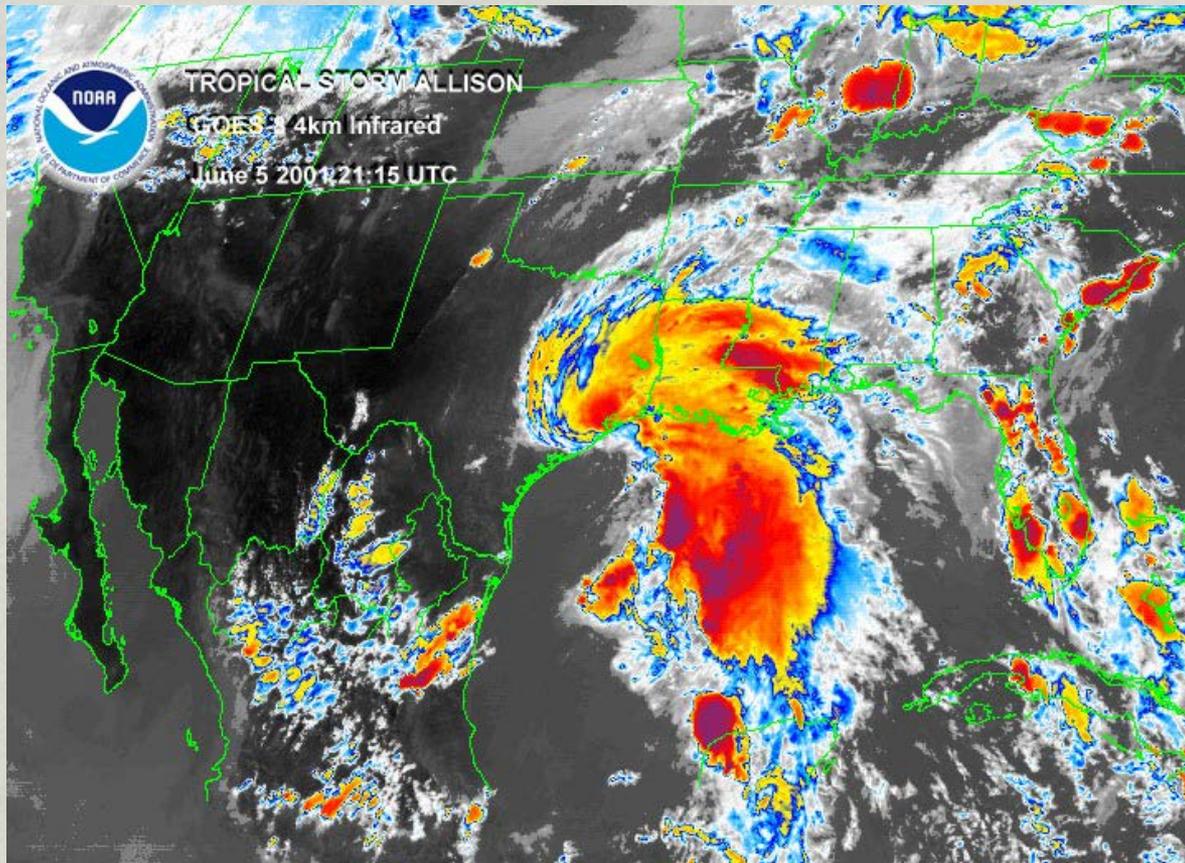


Lessons from recent tropical cyclones

Emphasize hazards, not categories

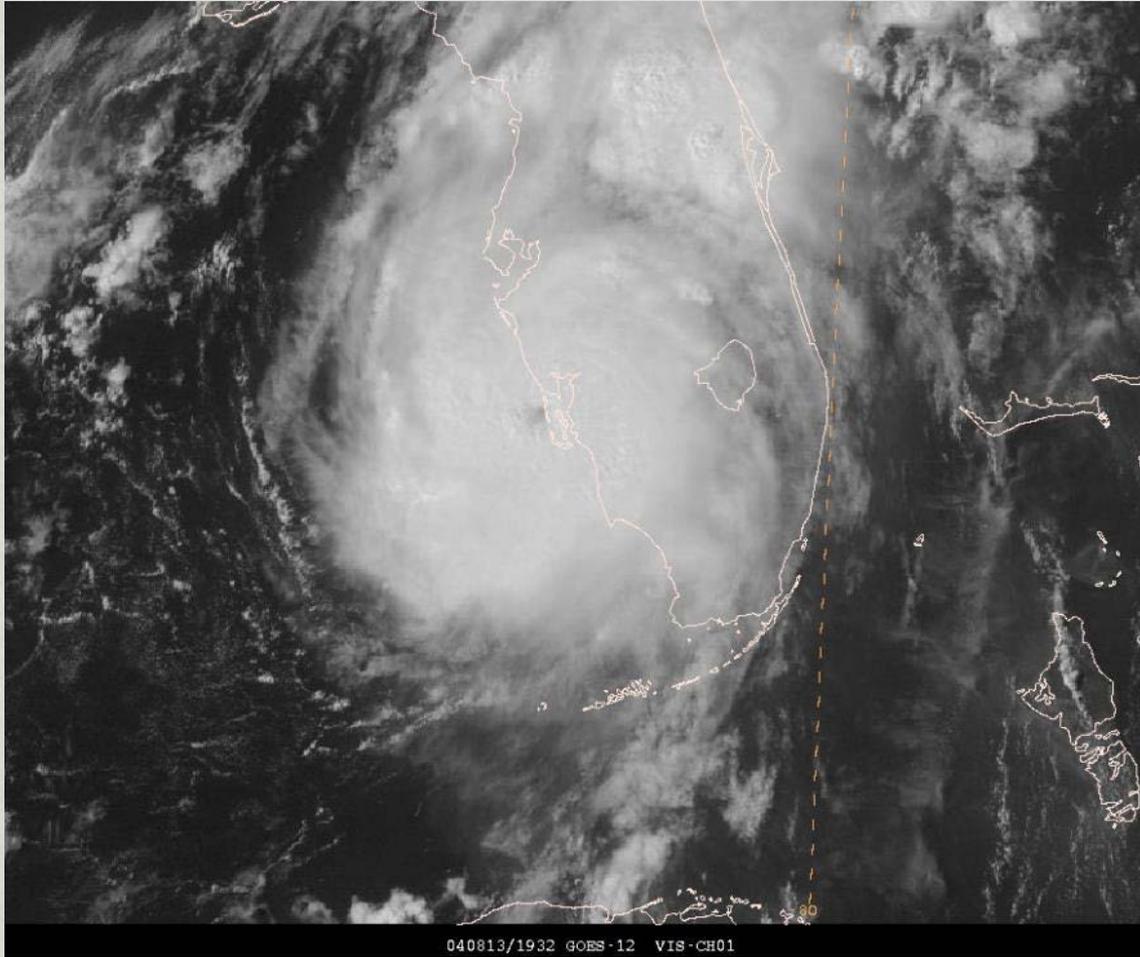


Allison 2001



Minimal tropical storm, but slow moving =
copious amounts of rain

Charley 2004



Compact category 4 hurricane =
Incredible wind damage, but little surge

Katrina 2005



Weakened from a C5 to a C2 at landfall, but expands, enhancing surge



Isaac 2012



Large, slow moving category 1 hurricane results in extensive storm surge in portions of SE Louisiana

Sandy 2012



Not even a tropical cyclone at landfall but very large with wide array of hazards.





Recent NHC Priorities

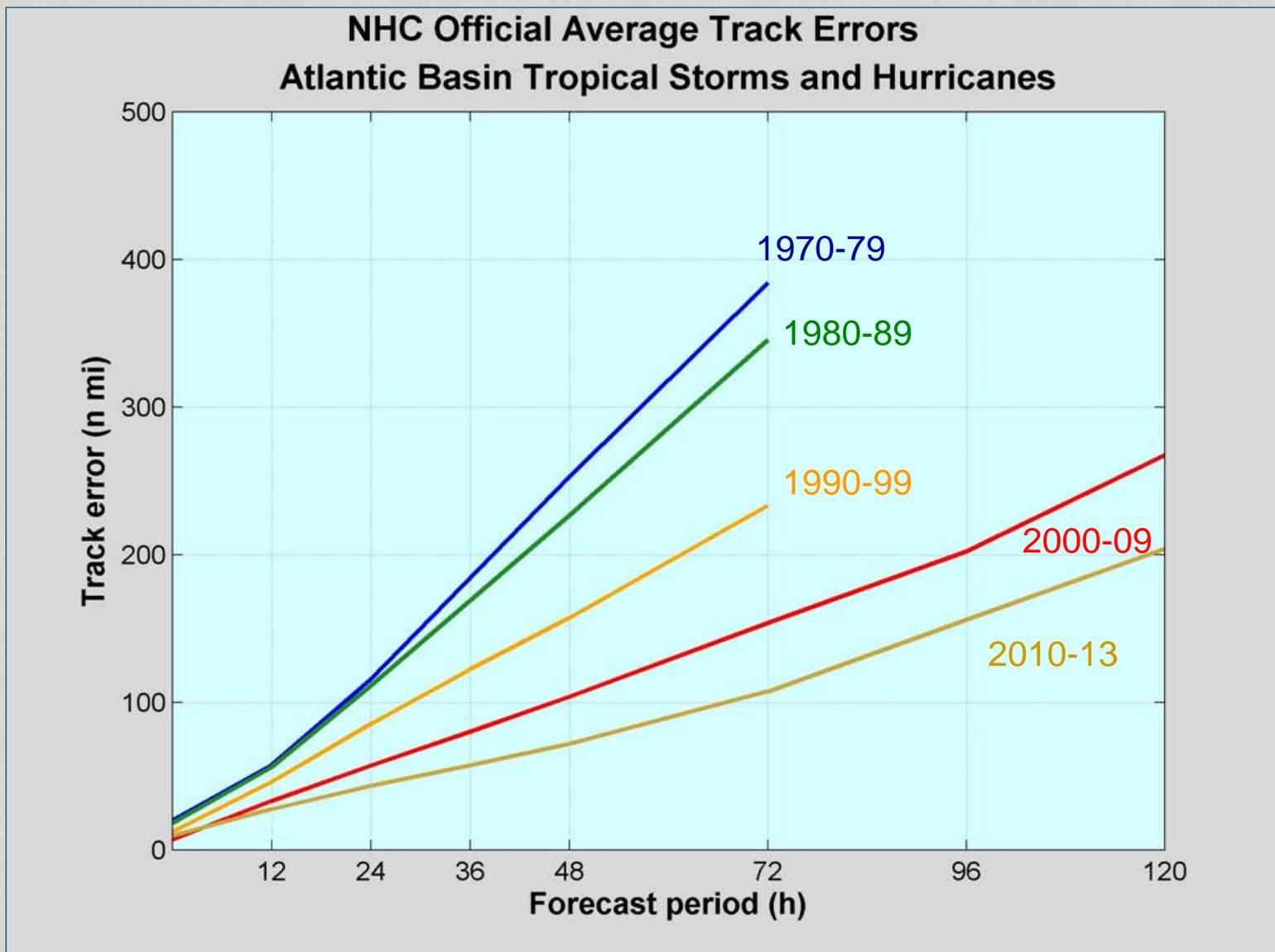
- **Focus has been on gearing products toward improving customers' understanding of hurricane hazards.**
 - Storm Surge Potential Flooding Map
 - Storm Surge Warning
- **Focus on improving customers' ability to assess risk.**
 - Probabilistic Products
- **Enhancing communications through social media.**





Recent Forecast Improvements

NHC Track Forecast Accuracy Improvements Continue

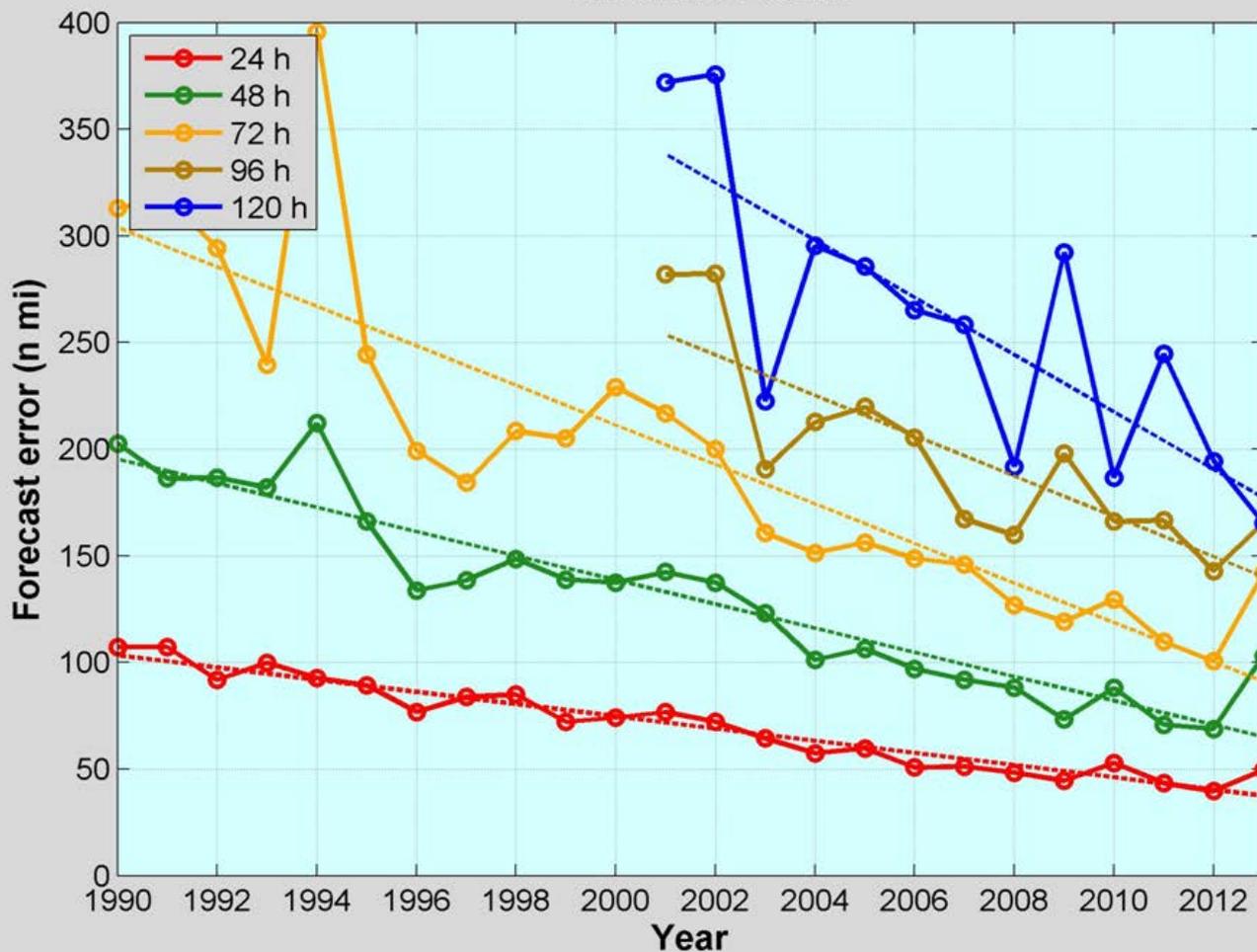




NHC Atlantic Track Error Trends



NHC Official Track Error Trend
Atlantic Basin



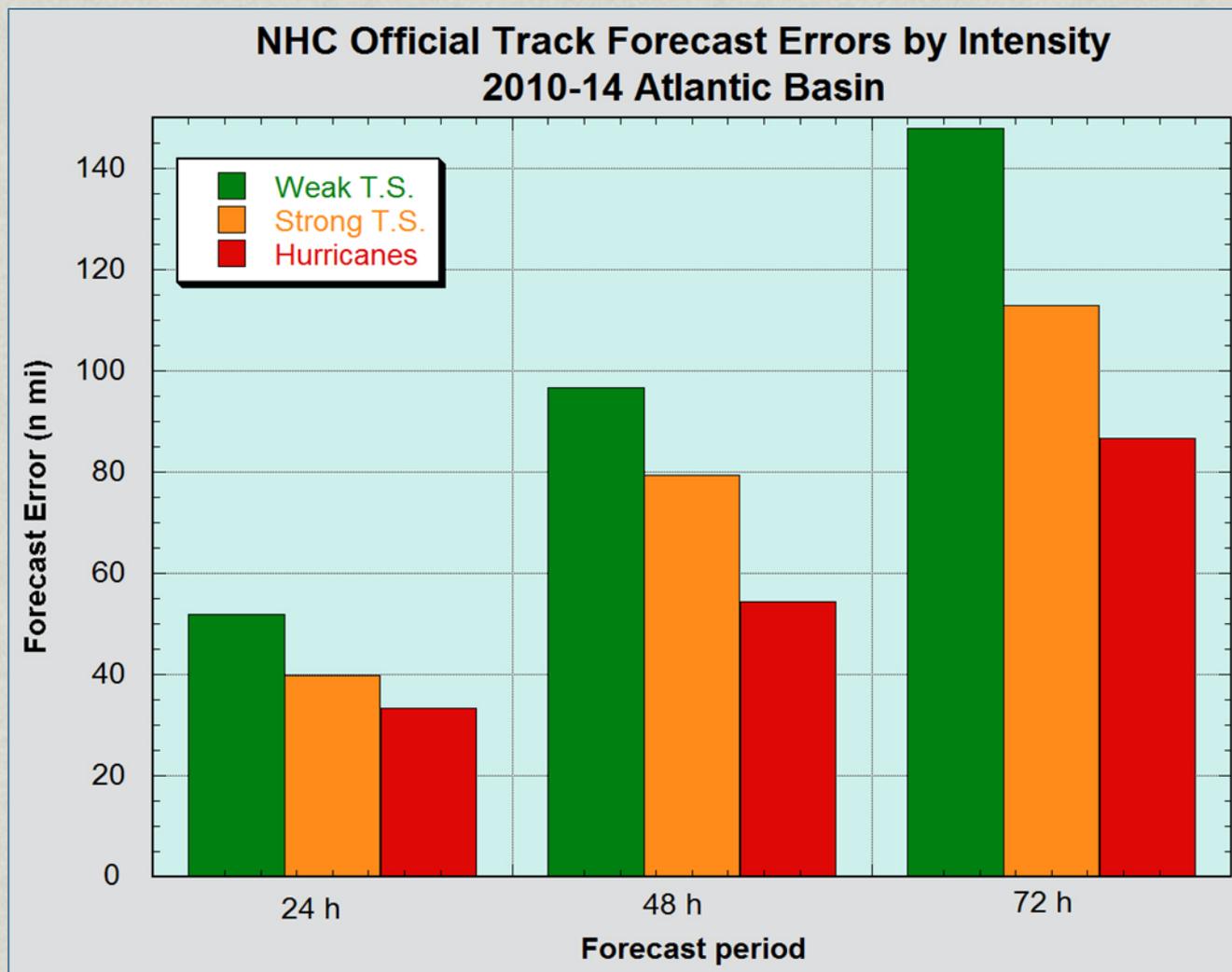
Error Reduction since 1990:

72 h: 67%

48 h: 65%

24 h: 58%

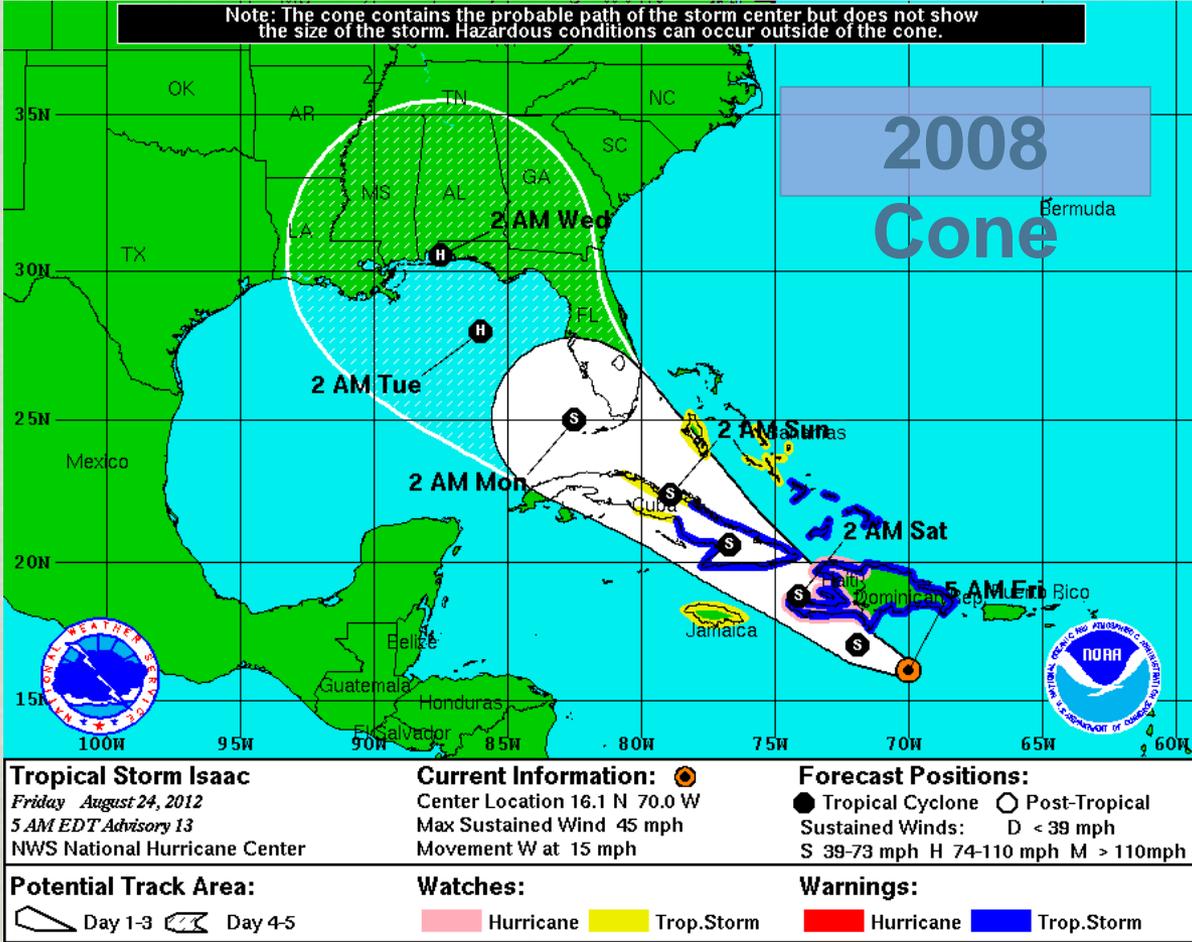
Track Errors by Initial Intensity



As the initial intensity of the storm increases, NHC track errors on average get smaller.



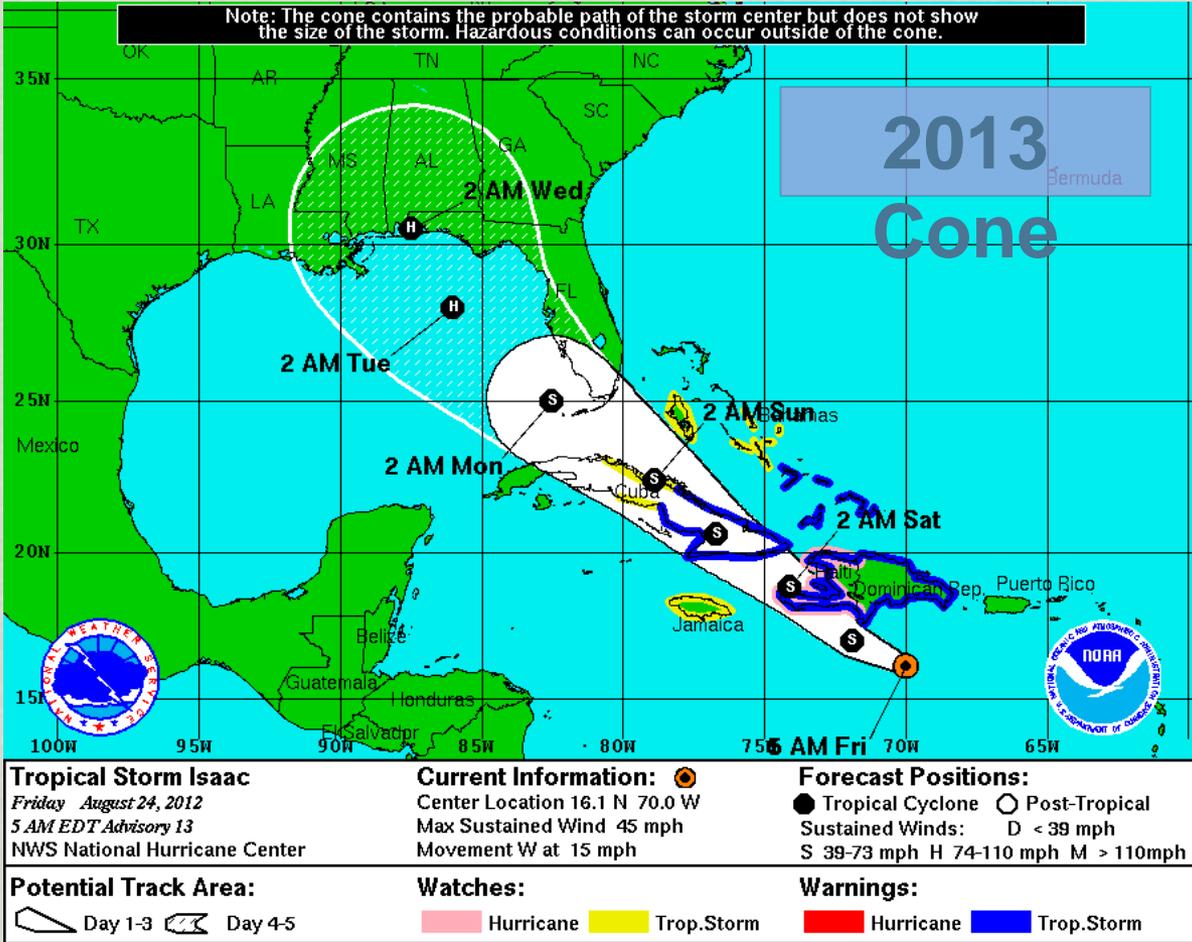
Improvements in Track Forecasts Have Resulted in Smaller Cones



**No Change in Storm Size =
More Impacts Outside Cone**



Improvements in Track Forecasts Have Resulted in Smaller Cones

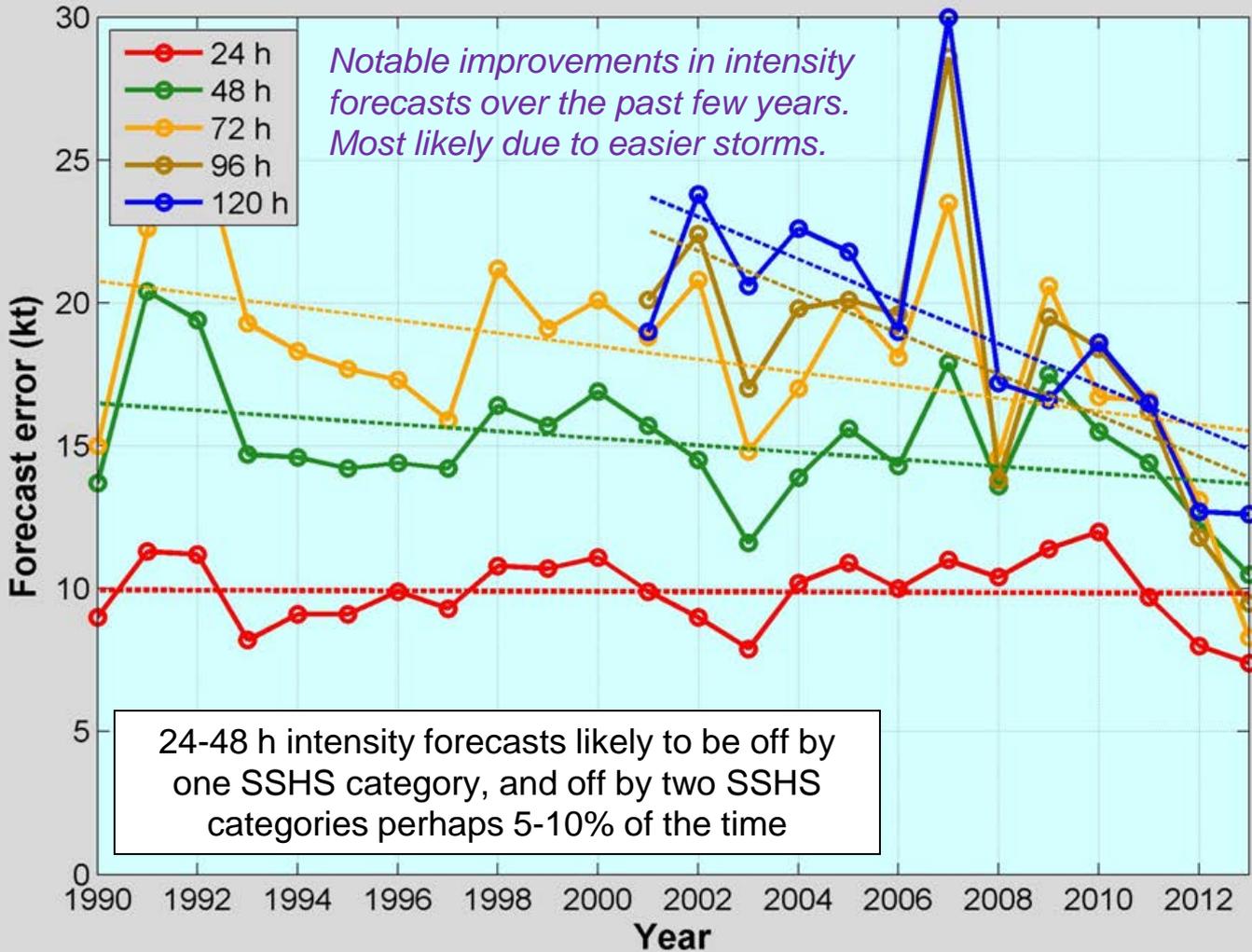


**No Change in Storm Size =
More Impacts Outside Cone**



Little Progress with Intensity

NHC Official Intensity Error Trend Atlantic Basin

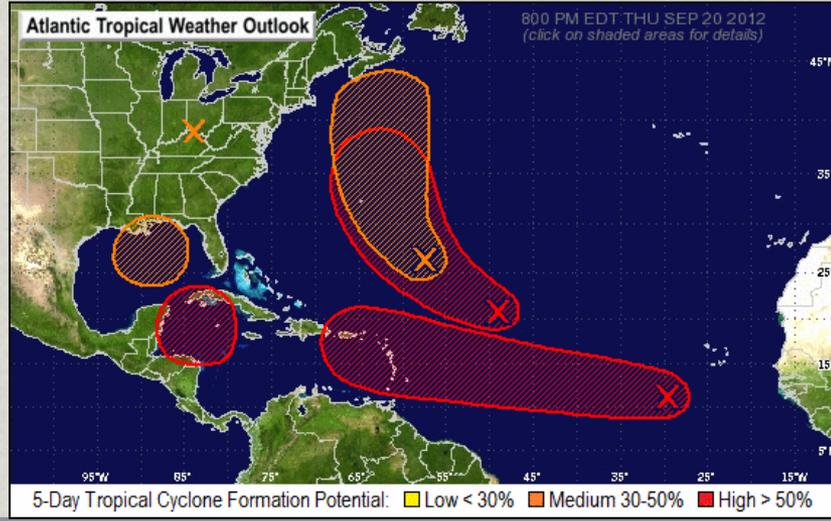
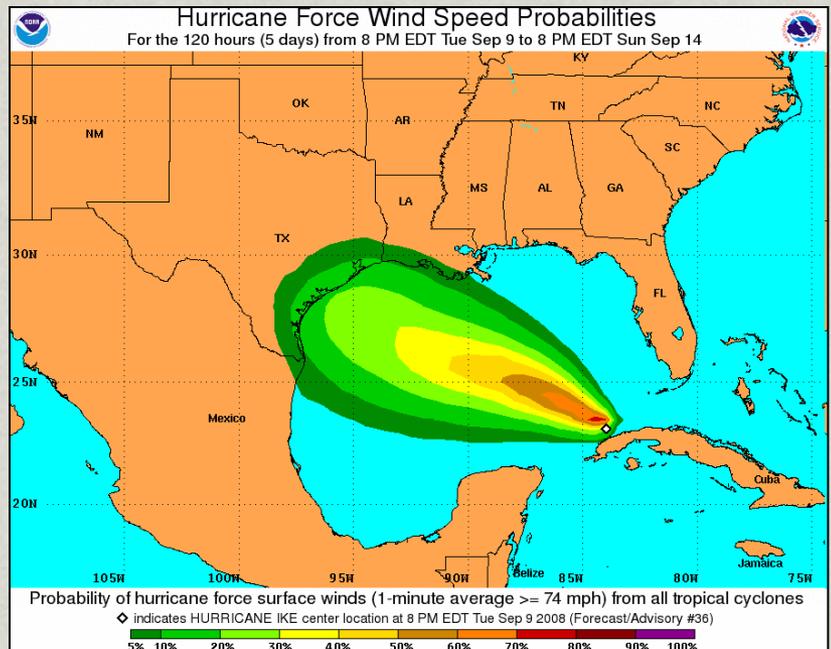




Recent NHC Product Improvements

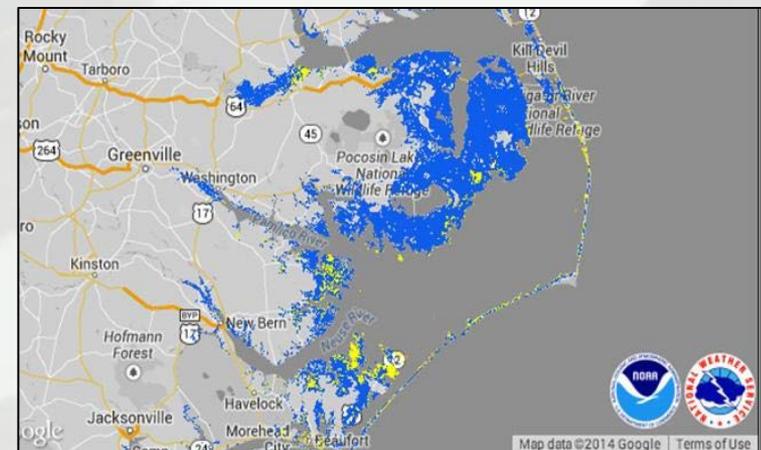
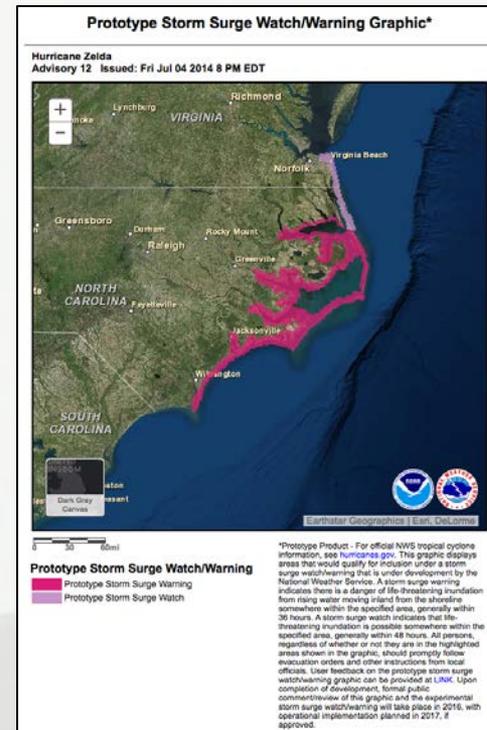


- Addition of probabilistic products
 - Wind Speed Probabilities (2005)
 - Storm Surge Probabilities (2007)
- Graphical Tropical Weather Outlook introduced in 2007, color-coded probabilities added in 2008.
- Tropical Storm and Hurricane Watch and Warning lead times increased in 2010.
- Time covered by the NHC Tropical Weather Outlook increased from 48 hours to 5-days in 2013, new 5-day graphic in 2014.



2015 NHC Product Changes

- **New Prototype Storm Surge Watch/Warning Graphic**
- **Experimental Potential Storm Surge Flooding Map (introduced in 2014)**
- **New categorical bins for the NHC Graphical Tropical Weather Outlook**
- **Uniform 3-hourly advisory cycle whenever watches or warnings in effect (no 2-hourly advisories)**
- **Additional NHC products in mixed-case text**

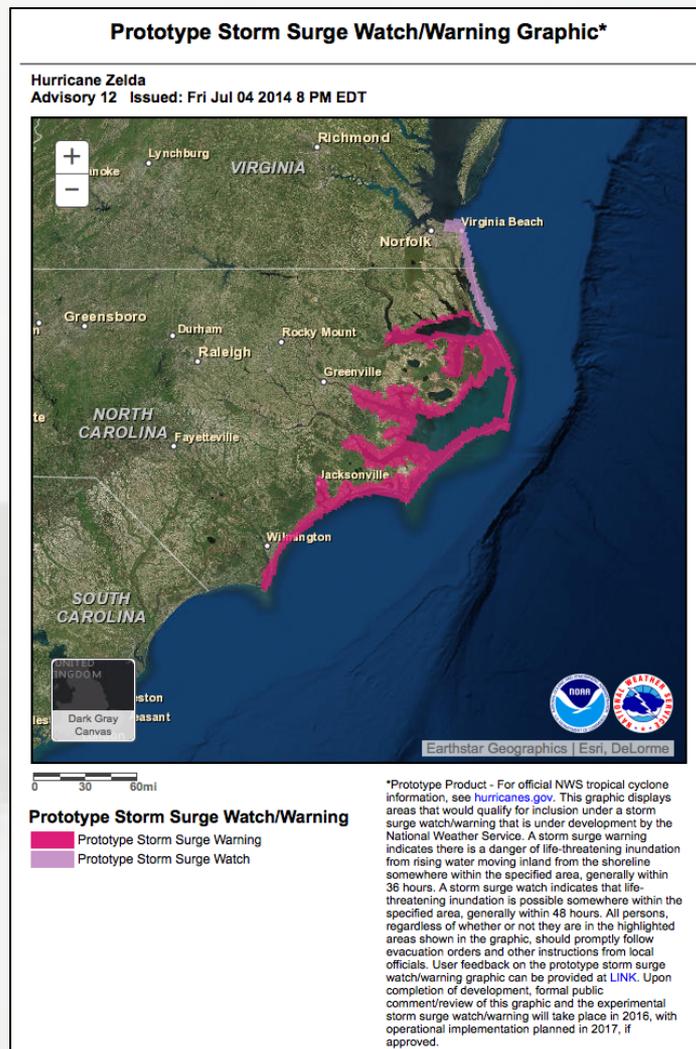




Prototype Storm Surge Watch/Warning Graphic

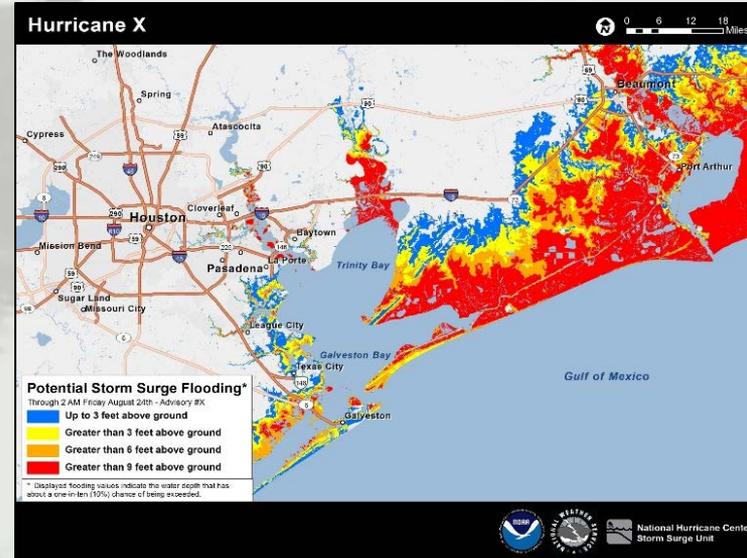
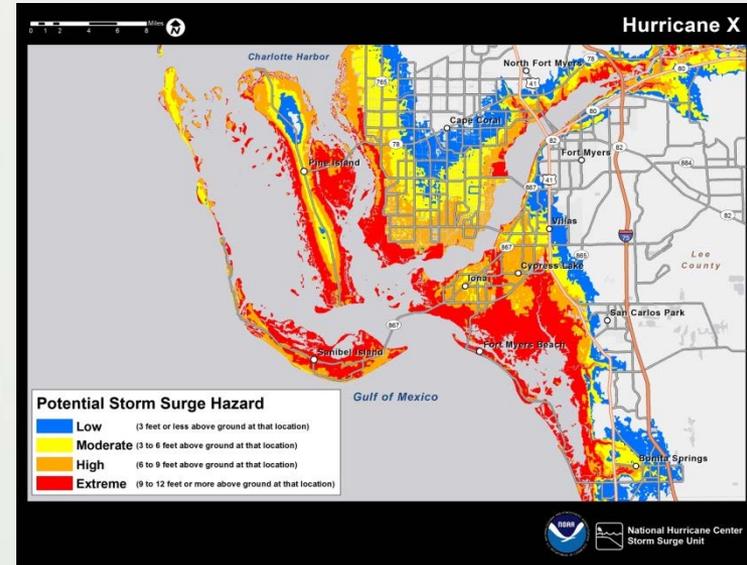


- Intended for general public to enhance the response to instructions from local officials.
- Highlights areas that have a significant risk of life-threatening inundation by storm surge.
- Introduces the concept of a storm surge watch/warning.
- Issued 48 hours before the arrival of life-threatening surge (or other hazards that would impede evacuation).
- Issued in collaboration with local NWS Offices.



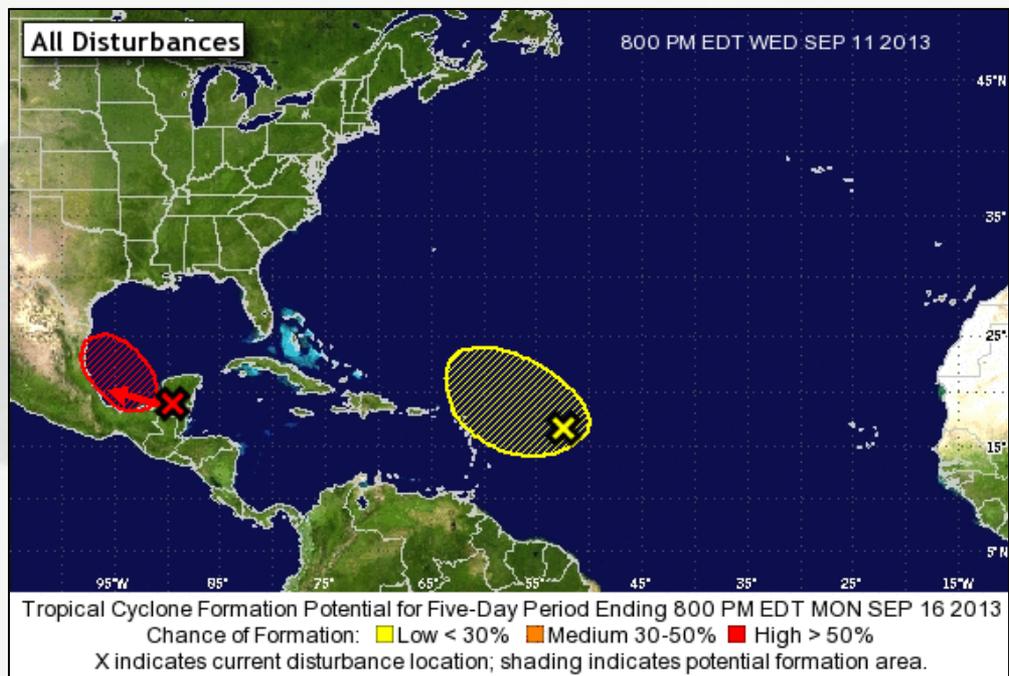
Potential Storm Surge Flooding Map

- Provides a quantitative risk assessment for decision makers.
- Shows height above ground that the water could reach.
- Depicts the reasonable worst-case scenario for any individual location
- Shows inundation levels that have a 10% chance of being exceeded
- First map issued at the same time as the initial hurricane watch, prototype surge warning graphic, or in some cases with a tropical storm watch.





Graphical Tropical Weather Outlook: *Updated Ranges for Categorical Bins*



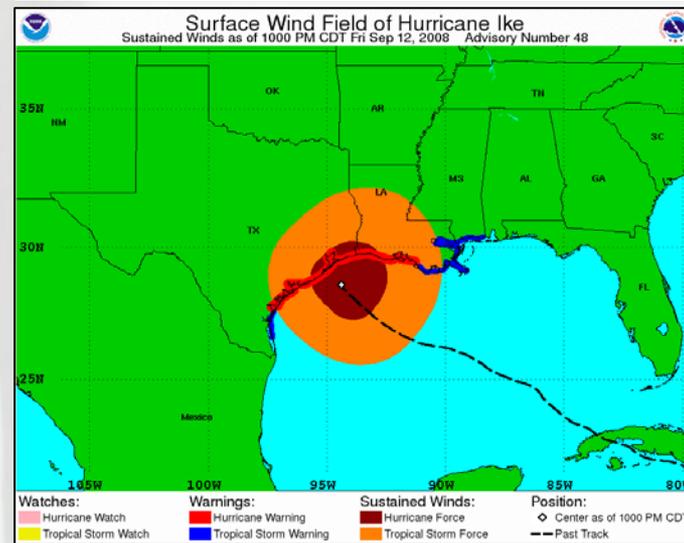
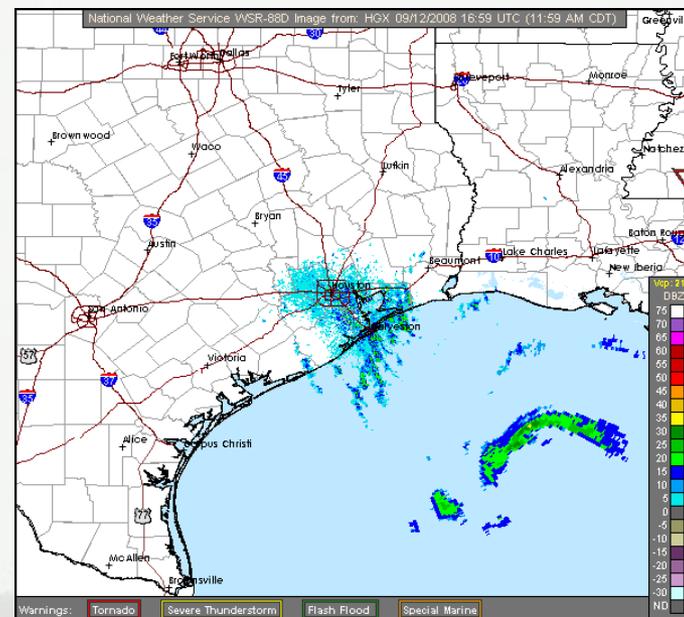
Categories	2014	2015
Low	0-20%	0-30%
Medium	30-50%	40-60%
High	60-100%	70-100%



Uniform 3-hourly Public Advisory Cycle



- NHC will maintain a 3-hourly Public Advisory (TCP) cycle whenever coastal watches or warning are in effect
- Previously, advisories were issued every 2 hours whenever watches/warning were in effect and coastal radars provided reliable center positions
- Hourly Tropical Cyclone Updates will be issued between TCPs to provide continuous flow of information when the center can be reliably tracked by radar.





Timeline for Advisories

Watches/Warning in Effect and Center Tracked by Radar

- **5 am – Advisory**
 - **6 am – Tropical Cyclone Update**
 - **7 am – Tropical Cyclone Update**
 - **8 am – Intermediate Advisory**
 - **9 am – Tropical Cyclone Update**
 - **10 am – Tropical Cyclone Update**
- **11 am – Advisory**

Time in EDT



Mixed-Case Text

Public Advisories and Tropical Cyclone Update in 2015

- **NHC began issuing Tropical Cyclone Discussion and Tropical Weather Outlook in mixed-case text in 2014.**
- **We plan to issue the Public Advisory, Tropical Cyclone Update, and Monthly Tropical Weather Summary in mixed case in 2015.**

Tropical Storm Sandy Discussion Number 2

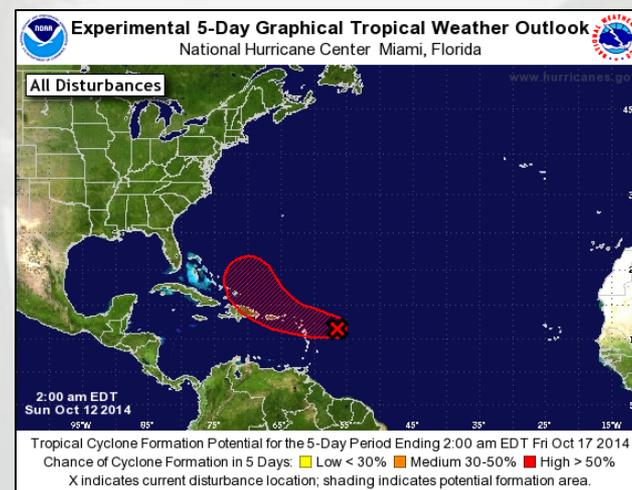
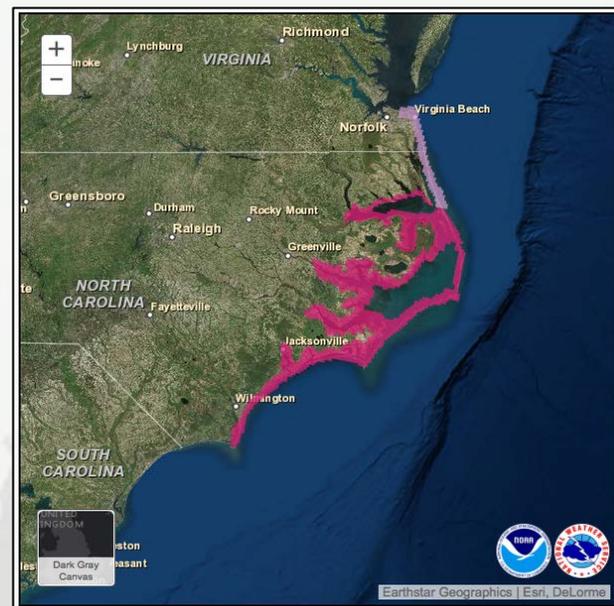
**NWS National Hurricane Center Miami FL AL182012
500 PM EDT Mon Oct 22 2012**

The Air Force Hurricane Hunters found a band of surface winds near 35 kt over the southeastern quadrant of the cyclone, so the system is being named at this time. The environment should be characterized by weak shear, and the storm will be over warm waters for the next couple of days so additional strengthening is likely. The official intensity forecast is similar to the previous forecast and close to the model consensus. This could be conservative, however, as the Rapid Intensification Index shows a significant possibility of rapid strengthening during the next day or so.

Aircraft observations show that the central region of the storm is characterized by a fairly flat pressure field, but the center appears to be located somewhat to the south of the previous estimates. However, little overall motion appears to have taken place this afternoon. Global models predict that the mid-tropospheric ridge to the north of Sandy will gradually weaken within the next day or so, which should also the tropical cyclone to begin moving north to northeastward soon. The official track forecast is somewhat to the west of the model consensus but not as far west as the latest ECMWF forecast. This is only a little to the west of the previous official forecast track.

Potential Future NHC Product Enhancements

- **Storm Surge Watch/Warning (2016)**
 - Public dissemination expected to begin in 2016
- Extension of tropical cyclone forecasts to 7 days
- Watches and Warnings before tropical cyclone formation
 - 3-day track and intensity forecasts for disturbances that require watches/warnings

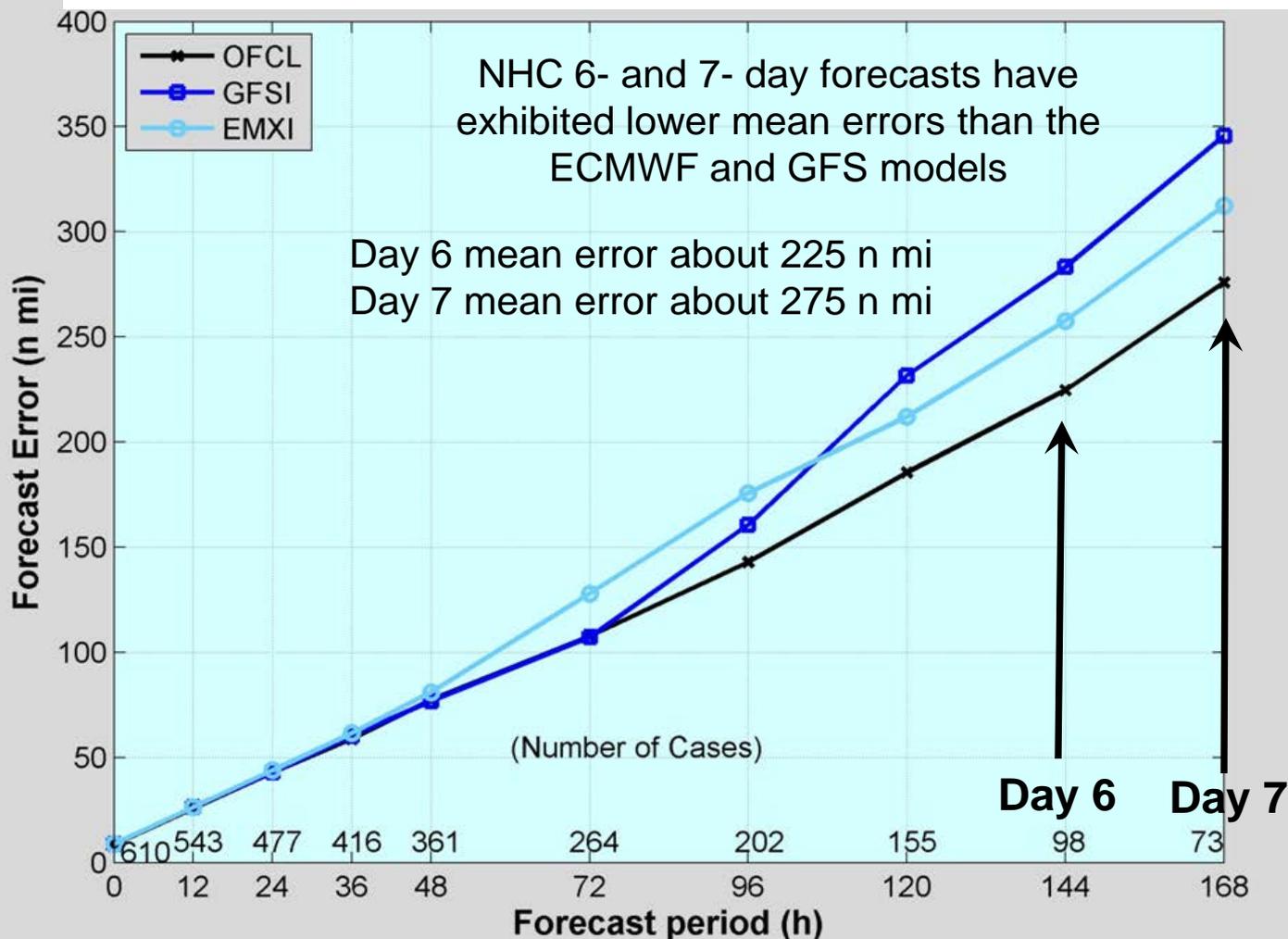




Preliminary Verification of NHC 6- and 7-day Track Forecasts

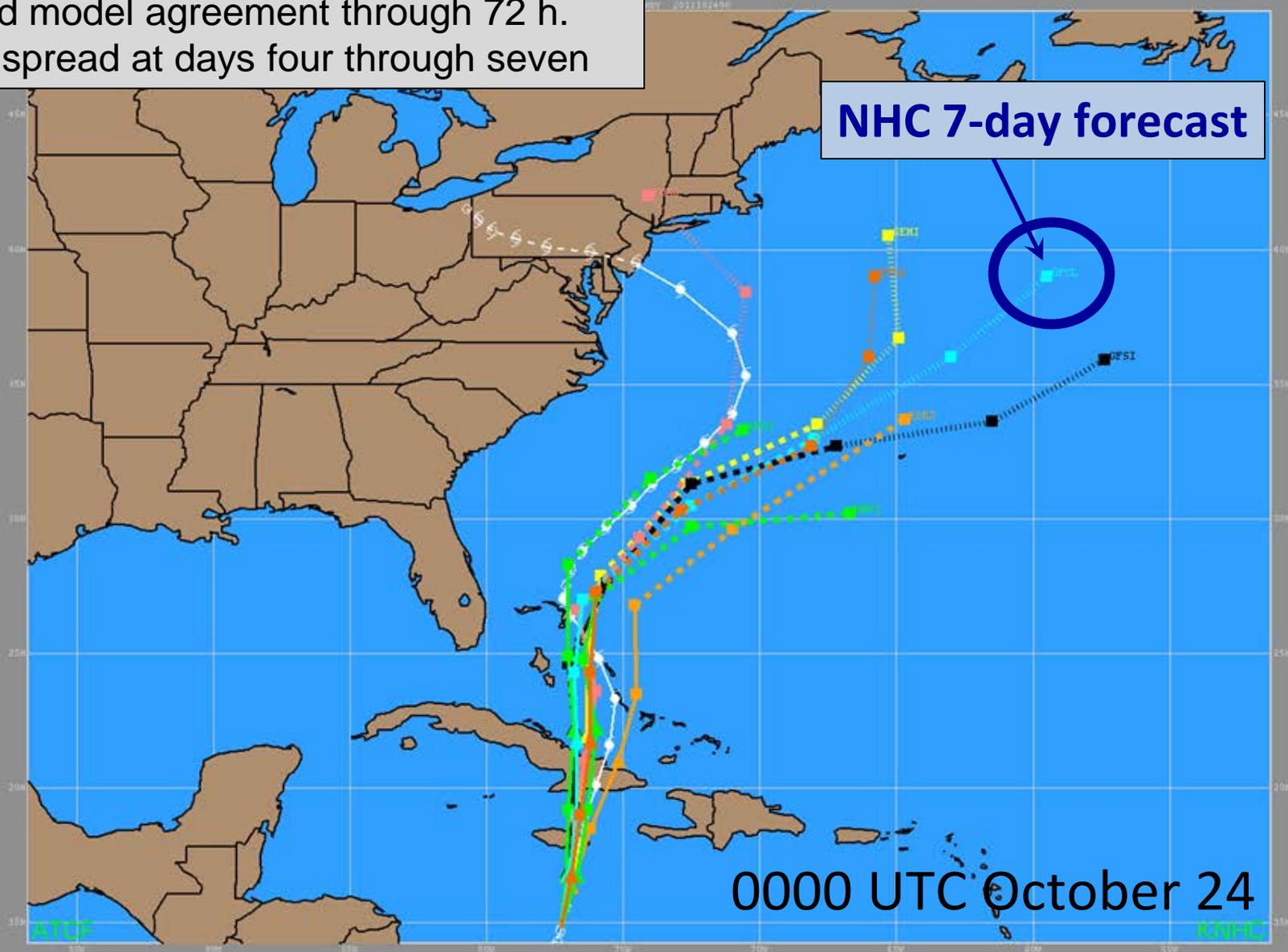


Track Forecast Errors - Atlantic Basin 2012-13



Sandy Track Guidance

Good model agreement through 72 h.
More spread at days four through seven



NHC 7-day forecast

0000 UTC October 24

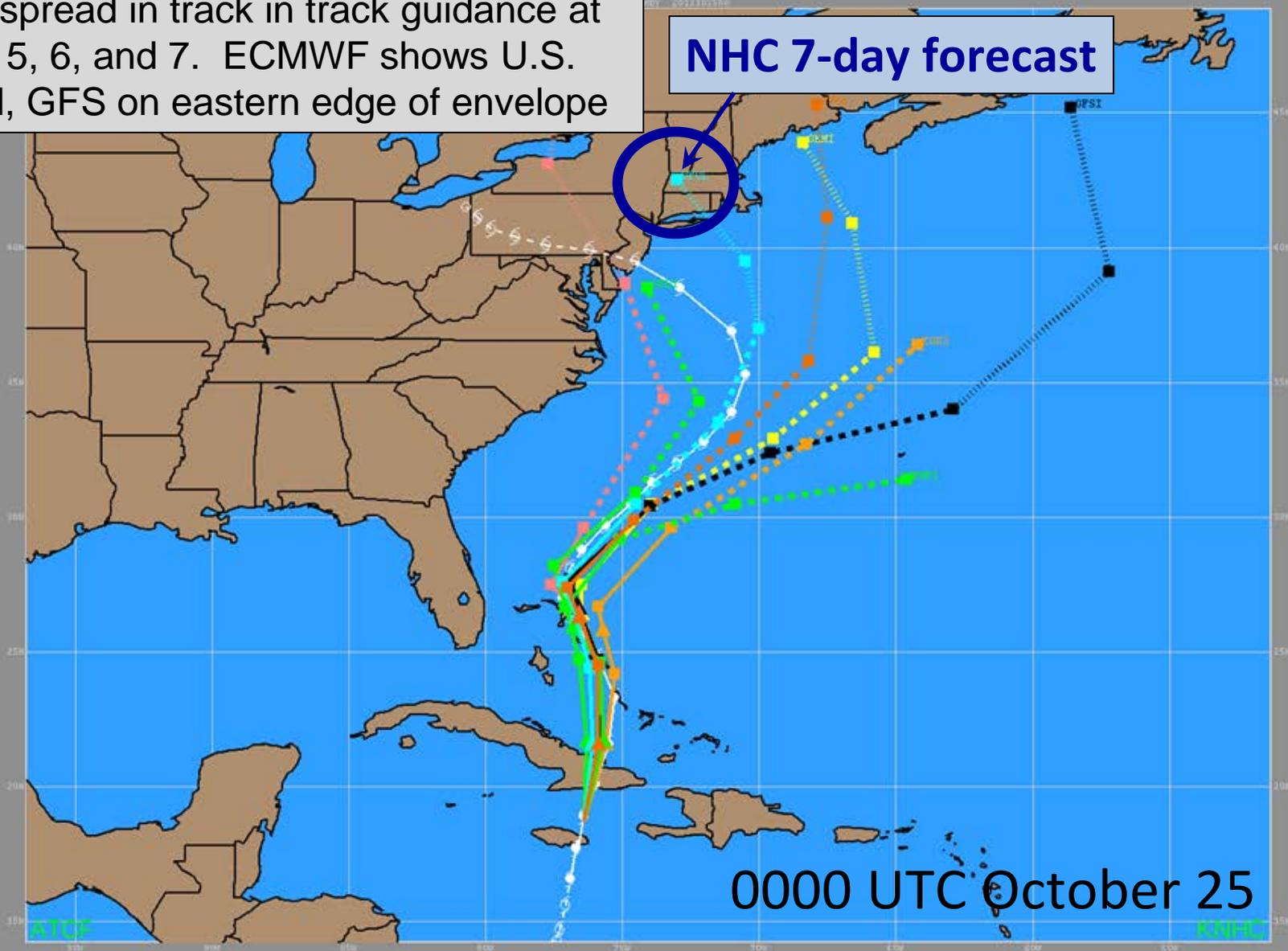
RTCF

KEM

Sandy Track Guidance

Large spread in track in track guidance at days 5, 6, and 7. ECMWF shows U.S. landfall, GFS on eastern edge of envelope

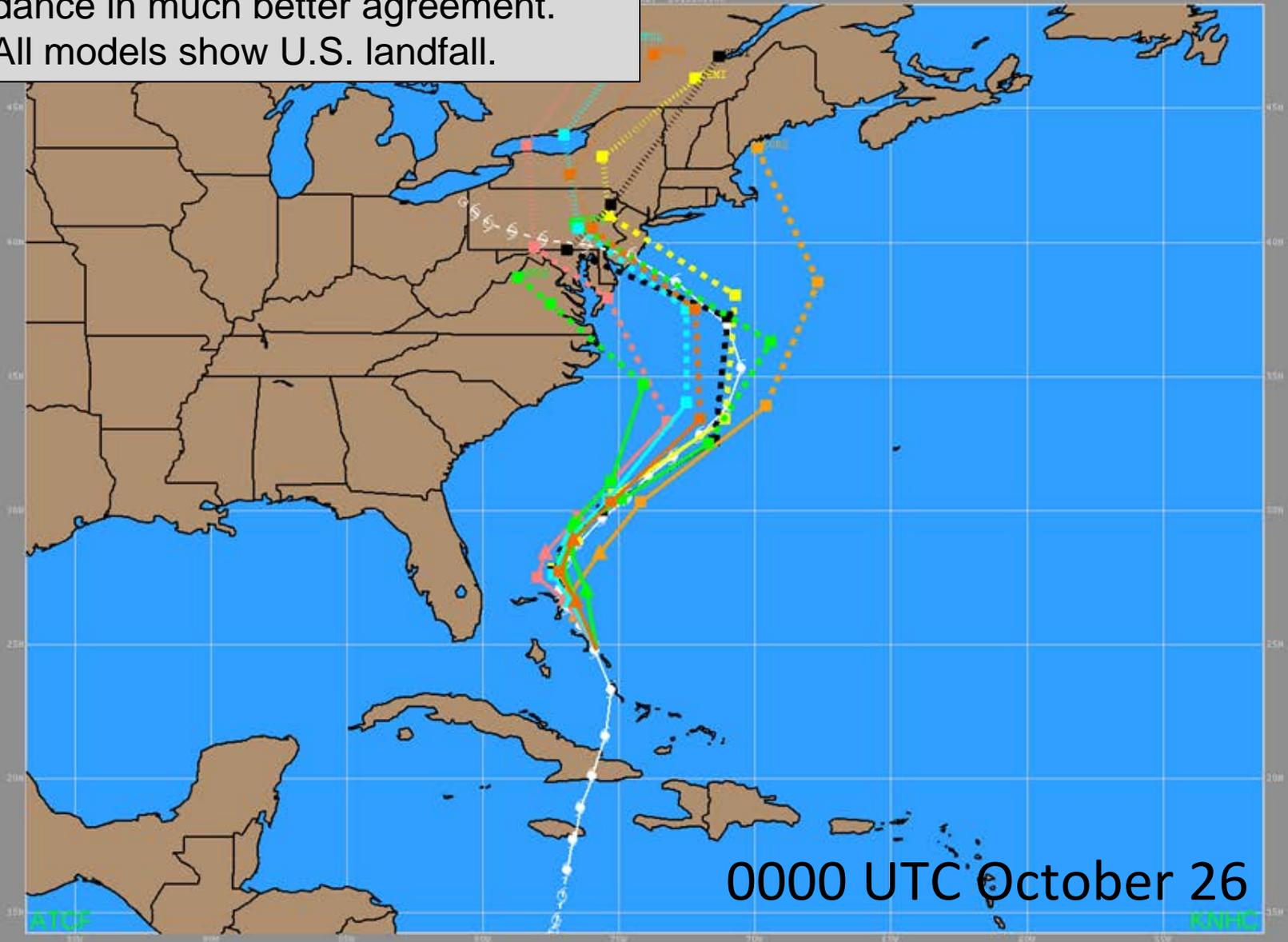
NHC 7-day forecast



0000 UTC October 25

Sandy Track Guidance

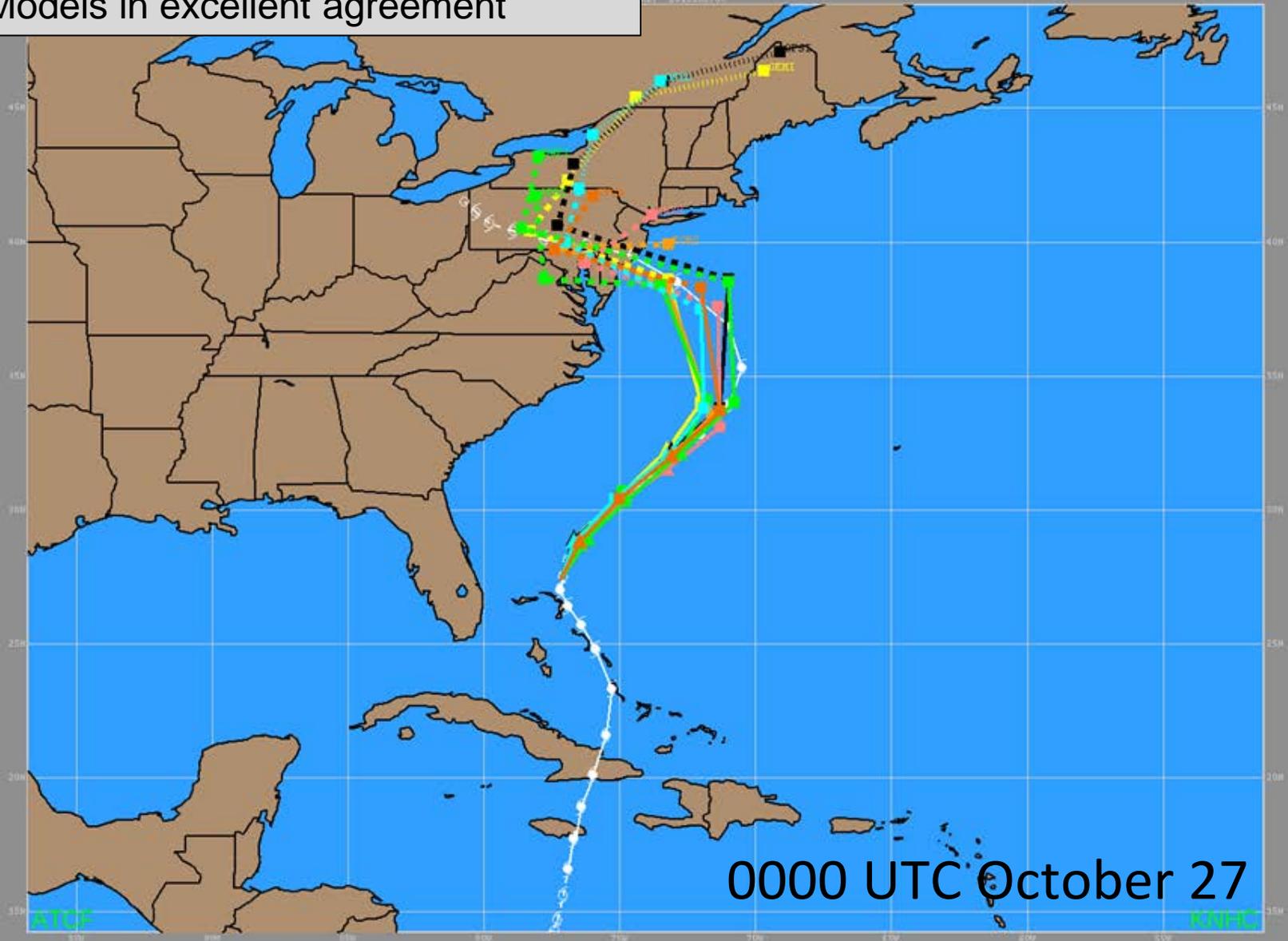
Guidance in much better agreement.
All models show U.S. landfall.



0000 UTC October 26

Sandy Track Guidance

Models in excellent agreement



0000 UTC October 27



NWS Team Developing Procedures and Tools to Allow Warning Before Formation



- **NHC would issue a 3-day track and intensity forecast for disturbances that have a significant change of formation and expected to produce tropical-storm-force winds overland.**
- **Typical suite of advisory products would be issued: Public and Forecast advisories, Discussion, Wind Speed Probabilities, and graphics.**
- **Naming convention of disturbances and technical details need to disseminate warnings in development.**





Key 2015 NHC Outreach Activities



- NHC active on Facebook & Twitter
- NHC “Inside the Eye” Blog
- Updates to National Hurricane Preparedness Week videos are planned
- East coast Hurricane Awareness Tour will take place May 3-8. U.S. stops include Atlantic City, Norfolk, Myrtle Beach, St. Augustine, Marathon.
- National Hurricane Preparedness Week – May 24-30





New Storm Surge Tutorial

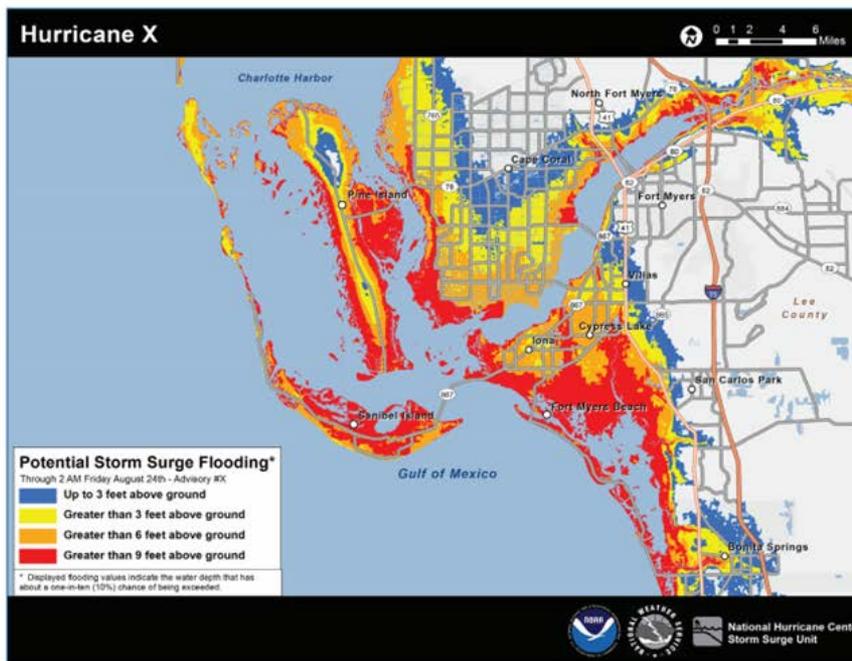


www.hurricanes.gov/surge/resources.php

Storm Surge Fact Sheets

*When a storm is threatening your area,
always follow the instructions of local officials*

1. Storm surge is often the greatest threat to life and property from a hurricane. It poses a significant threat for drowning. A mere **six inches** of fast-moving flood water can knock over an adult. It takes only **two feet** of rushing water to carry away most vehicles—including pickups and SUVs.
2. Storm surge can cause water levels to rise quickly and flood large areas—sometimes in just minutes, and you could be left with no time to take action if you haven't already evacuated as instructed.
3. Storm surge values do not correspond well to the hurricane wind categories (of the Saffir-Simpson Hurricane Wind Scale) that range from 1 to 5. These categories are based only on winds and do **not** account for storm surge.
4. Tropical storms, category 1 or 2 hurricanes, major (category 3 to 5) hurricanes, and post-tropical cyclones can **all** cause life-threatening storm surge.
5. Storm surge can also occur with non-tropical storms like Nor'easters and other winter storms.
6. Many U.S. Gulf and East Coast areas are vulnerable to storm surge, including areas up to several miles inland from the coastline. **Find out today, well before a hurricane ever approaches, if you live in a storm surge evacuation zone.**
7. Storm surge can occur before, during, or after the center of a storm passes through an area. Storm surge can sometimes cut off evacuation routes, so do not delay leaving if an evacuation is ordered for your area.



If a tropical storm or hurricane is threatening your community, go to www.nhc.noaa.gov to see a map like this, which will show potential storm surge flooding for your area

8. During the peak of a storm surge event, it is unlikely that emergency responders will be able to reach you if you are in danger.
9. Even if your community is not directly affected by storm surge, it could experience other hazards from the storm and face dangerous conditions such as **impassable roads, water and sewage problems, and power outages**. If power remains on, downed electrical wires can pose an **electrocution risk**.
10. Weather conditions and the forecast can change. Local officials could issue evacuation or other instructions for many reasons. **Always follow the instructions of local officials.**

Two public fact sheets are available, one for emergency managers and one for media professionals. Available at: www.nhc.noaa.gov/surge/resources.php

NHC Hurricane Specialists

