Upcoming Changes to NHC Products, Services, and Warnings

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SECART Webinar
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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
Isaac 2012

Large, slow moving category 1 hurricane =
Extensive storm surge in portions of SE Louisiana
Sandy 2012
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
Recent Forecast Improvements

NHC Track Forecast Accuracy Improvements Continue

NHC Official Average Track Errors
Atlantic Basin Tropical Storms and Hurricanes

Track error (n mi) vs. Forecast period (h)

- 1970-79
- 1980-89
- 1990-99
- 2000-09
- 2010-13
NHC Atlantic Track Error Trends
Significant Reduction in Track Errors Since 1990

Error Reduction since 1990:

- 72 h: 67%
- 48 h: 65%
- 24 h: 58%
As the initial intensity of the storm increases, NHC track errors on average get smaller.
Little Progress with Intensity

Notable improvements in intensity forecasts over the past few years. Beginning of a trend?

24-48 h intensity forecasts likely to be off by one SSHS category, and off by two SSHS categories perhaps 5-10% of the time
2014 NHC Product Changes

• Potential Storm Surge Flooding Map

• New 5-day Graphical Tropical Weather Outlook

• Changes to the 48-hour Graphical Tropical Weather Outlook

• Elimination of the Maximum Intensity Probability Table

• Mixed case text in the Tropical Weather Outlook and Tropical Cyclone Discussion
Potential Storm Surge Flooding Map

- Highlights areas where inundation from storm surge could occur and 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 or in some cases, with a tropical storm watch

- Due to processing time, the map will not be available until about 45 to 60 minutes following the advisory release
Potential Storm Surge Flooding*
Through 2 AM Friday August 24th - Advisory X

- Blue: Up to 3 feet above ground
- Yellow: Greater than 3 feet above ground
- Orange: Greater than 6 feet above ground
- Red: Greater than 9 feet above ground

* Displayed flooding values indicate the water depth that has about a one-in-ten (10%) chance of being exceeded.
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Viewable in Google Map Interface
Storm Surge Decision Support Wedge

NHC Advisory/ NWS Local Statements
Probabilistic Storm Surge
*MEOWs

*MEOWs
*MOMs

Tier 1
Response
< 48 h of landfall

Tier 2
Readiness
48 h – 120 h of landfall

Tier 3
Planning/Mitigation
> 120 h of landfall
New Storm Surge Fact Sheets are Available for Outreach

Two public fact sheets are available, also one for emergency managers and for media professionals. Available at: www.nhc.noaa.gov/surge/resources.php
For the North Atlantic, Caribbean Sea, and the Gulf of Mexico…

A broad area of low pressure located a couple of hundred miles south-southwest of Jamaica is accompanied by showers and thunderstorms. This disturbance remains disorganized...and development, if any, should be slow to occur over the next couple of days while it moves slowly northwestward. Environmental conditions are expected to be marginally conducive for some development when the system moves over the northwestern Caribbean Sea and the southern Gulf of Mexico later this week. Locally heavy rainfall is possible over portions of Haiti and Jamaica today, and will likely spread across the Cayman Island and eastern Cuba on Tuesday.

* Formation chance through 48 hours...low...10 percent
* Formation chance through 5 days...medium...30 percent

A limited amount of disorganized cloudiness and showers are occurring in association with a broad area of low pressure centered about 600 miles east of the Leeward Islands. This low is expected to continue moving slowly westward, but environmental conditions appear hostile for development.

* Formation chance through 48 hours...low...10 percent
* Formation chance through 5 days...low...10 percent

Forecaster Brown
Graphical Tropical Weather Outlook: New Look Starting July 2014

Previous Graphical Outlook

Prototype of New 48 hour GTWO

Corresponding text provided as mouse-over on web

New 5-day GTWO
48-hour Graphical Tropical Weather Outlook

48-h Graphic no longer uses hatched areas to denoted location of disturbances. This is to avoid confusion over the meaning of hatched areas between the 2- and 5-day graphics.
Overview graphic shows entire basin, with single disturbance graphics to aid in display when overlapping areas

- Indicates formation potential during next 5 days
- Initial location of disturbance (X) indicated, if existing at issuance time
- Shading represents potential formation area
- Location of current storms are not shown

5-day Graphical Tropical Weather Outlook
Beginning July 2014
Tropical Cyclone Discussion

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.

(cont.)
Potential Future NHC Product Enhancements

- Storm Surge Warning (2015)
- Extension of tropical cyclone forecasts to 7 days
- Tropical Storm and/or Hurricane Watches and Warnings before tropical cyclone formation
Prototype of Storm Surge Warning

Hurricane Irene, Advisory #22
Storm Surge Warning PROTOTYPE

27 August 2011
2 PM EDT
Category 2

National Hurricane Center
Storm Surge Unit

NOAA
NWS/NHC Storm Surge Warning
Six and Seven Day Forecasts

- NHC began producing in-house 6 and 7 day forecasts in 2012

- In-house experiment expected to continue in 2014

- Likely need a couple more seasons to fully evaluate the accuracy of the forecasts

2012-13 preliminary results indicate the 6- and 7-day forecasts are about as good as the NHC 4- and 5-day forecasters were a decade ago when they were publically introduced.
Preliminary Verification
NHC 6- and 7-day Track Forecasts

NHC 6- and 7-day forecasts have exhibited lower mean errors than the ECMWF and GFS models.

Day 6 mean error about 225 n mi
Day 7 mean error about 275 n mi

Track Forecast Errors - Atlantic Basin 2012-13

(Number of Cases)

Forecast period (h)

Forecast Error (n mi)
Sandy Track Guidance

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

NHC 7-day forecast

0000 UTC October 24
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
Guidance in much better agreement. All models show U.S. landfall.
Sandy Track Guidance

Models in excellent agreement

0000 UTC October 27
Tropical Storm & Hurricane Watches & Warnings Before Formation?

- Tropical cyclones occasionally form, strengthen, and affect land within the 36- to 48-hour watch/warning lead time.

Coastal Watches/Warnings Associated with Tropical Disturbance as of 800 am EDT Friday August 27, 2004

Location of disturbance denoted by the “X”. Enclosed area represents potential formation area.
TROPICAL WEATHER OUTLOOK
NWS TPC/NATIONAL HURRICANE CENTER MIAMI FL
530 PM EDT FRI SEP 7 2007

FOR THE NORTH ATLANTIC...CARIBBEAN SEA AND THE GULF OF MEXICO...

SATellite imagery indicates that shower activity associated with the low pressure area between Bermuda and the southeastern coast of the United States is gradually becoming better organized. However...an air force reserve hurricane hunter aircraft currently investigating the system has not yet found a well-defined circulation. Upper-level winds are becoming more favorable for development...and a tropical or subtropical cyclone could form at any time as the system moves west-northwest at about 10 mph. Interests along the southeastern and mid-Atlantic coast of the U. S. should closely monitor the progress of this system...and tropical storm watches could be issued this evening.

Elsewhere...tropical cyclone formation is not expected during the next 48 hours.

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...TROPICAL STORM WATCHES COULD BE ISSUED THIS EVENING.
NWS Team Obtaining Customer Feedback and Developing a Path Forward

- Tropical Storm and Hurricane Watches & Warnings for tropical disturbances would increase public awareness and response.

- NHC and NWS exploring ways these watches and warning could be issued and communicated (new graphics and products)
Seasonal Forecast Message
“It Only Takes One”

2014 Atlantic Hurricane Outlook

Named Storms: 8 - 13
Hurricanes: 3 - 6
Major Hurricanes: 1 - 2

Outlook Probability
- Near Normal: 40%
- Below Normal: 50%
- Above Normal: 10%

Be prepared: Visit hurricanes.gov and follow @NWS and @NHC_Atlantic on Twitter

Says nothing about where storms will form or impact
Little U.S. impacts, significant damage and loss of life in Mexico
Twelve hurricanes, but no U.S. landfalls
Only 4 hurricanes, but Category 5 Andrew hit South Florida.
Only 4 named storms, but Category 3 Alicia hit the Houston area
8 named storms, 4 hurricanes - Bob impacted New England as a category 2 hurricane
NHC Social Media

NHC Blog “Inside the Eye” expected to be introduced very soon.
The 2014 NHC Outreach and Education Season

Two NWS Effective Hurricane Messaging Courses

FEMA (L-0311) Courses at the National and Florida Governor’s Hurricane Conferences

World Meteorological Course for International Meteorologists

FEMA (L-0320) Emergency Manager Course - New Jersey

Three FEMA (L-0324) Emergency Manager Courses

FEMA (L-0311) Courses at the National and Florida Governor’s Hurricane Conferences
Other Key Outreach Activities

- Hurricane Awareness Tour - one week, alternating each year between U.S. Gulf (2014) and East Coasts (2015?)
- Caribbean Hurricane Awareness Tour
- National Hurricane Preparedness Week (late May)
- National Hurricane Conference
- State conferences
Thank You for Your Time

Questions and Comments:
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