

## Update on National Hurricane Center Products and Services for 2017

New or recent changes to NOAA's National Hurricane Center (NHC) products include:

### 1) Storm Surge Watch/Warning becomes operational

Beginning with the 2017 hurricane season, the National Weather Service (NWS) will issue storm surge watches and warnings to highlight areas along the Gulf and Atlantic coasts of the continental United States that have a significant risk of life-threatening inundation from a tropical cyclone, subtropical cyclone, post-tropical cyclone, or a potential tropical cyclone. Storm surge is often the greatest threat to life and property from a tropical cyclone, and it doesn't always occur at the same times or locations as a storm's hazardous winds. In addition, while in most cases coastal residents can remain in their homes (or in a secure structure nearby) and be safe from a tropical cyclone's winds, evacuations are generally needed to keep people safe from storm surge. Having separate warnings for these two hazards will save lives by better identifying the specific tropical cyclone hazards communities face, and by enhancing public response to instructions from local officials.

The storm surge watch/warning areas are determined by a collaborative process between the NHC and local NWS Weather Forecast Offices (WFOs). The primary objective guidance will be P-Surge, an ensemble-based probabilistic system driven by the SLOSH model, the latest NHC official tropical cyclone forecast, and the typical historical errors associated with NHC forecasts. Forecaster confidence, continuity from advisory to advisory, and other subjective factors will also help determine the areas placed under a watch or warning. A graphic (e.g., Figure 1) depicting the watch and warning areas will be available on the NHC website ([www.hurricanes.gov](http://www.hurricanes.gov)) whenever these watches/warnings are in effect.

Below is an example of the graphic:



In addition to the graphic, the watch and warning areas will be included in Hurricane Local Statements issued by NWS Forecast Offices, and in the NHC Public Advisory.

The definitions for the new storm surge watch and warning are:

**Storm Surge Watch:** The *possibility* of life-threatening inundation from rising water moving inland from the shoreline somewhere within the specified area, generally within 48 hours, in association with an ongoing or potential tropical cyclone, a subtropical cyclone, or a post-tropical cyclone. The watch may be issued earlier when other conditions, such as the onset of tropical storm-force winds, are expected to limit the time available to take protective actions for surge (e.g., evacuations). The watch may also be issued for locations not expected to receive life-threatening inundation, but which could potentially be isolated by inundation in adjacent areas.

**Storm Surge Warning:** The *danger* of life-threatening inundation from rising water moving inland from the shoreline somewhere within the specified area, generally within 36 hours, in association with an ongoing or potential tropical cyclone, a subtropical cyclone, or a post-tropical cyclone. The warning may be issued earlier when other conditions, such as the onset of tropical storm-force winds, are expected to limit the time available to take protective actions for surge (e.g., evacuations). The warning may also be issued for locations not expected to receive life-threatening inundation, but which could potentially be isolated by inundation in adjacent areas.

The Potential Storm Surge Flooding Map, which became operational in 2016, will continue to be issued in 2017. This product provides quantitative information on the storm surge hazard associated with tropical cyclones, highlighting geographical areas where inundation from storm surge could occur and the height above ground that the water could reach. The map depicts inundation levels that have a 10-percent chance of being exceeded, which can be thought of as representing a reasonable worst-case scenario for any individual location. The first map will usually be issued at the same time as the initial hurricane or storm surge watch or warning, but can be issued at other times as appropriate, including for some tropical storm watches or warnings. The map is based on the latest forecast track and intensity for the tropical cyclone, and

takes in to account likely forecast errors. The map is subject to change every six hours in association with each new NHC full advisory package, and is generally available about 60 to 90 minutes following the advisory release.

Note that the NHC Public Advisory also contains quantitative estimates of inundation, but these will differ from the values shown the Potential Storm Surge Flooding Map. The NHC Public Advisory is not point-specific, but instead attempts to estimate the highest expected inundation that will occur anywhere within fairly long stretches of coastline, while the Potential Storm Surge Flooding Map describes a reasonable worst-case scenario for specific locations.

## **2) Issuance of Watches, Warnings, and Advisories for Potential Tropical Cyclones**

In 2017, NHC will have the option to issue advisories, watches, and warnings for disturbances that are not yet a tropical cyclone, but which pose the threat of bringing tropical storm or hurricane conditions to land areas within 48 hours. Under previous longstanding NWS policy, it has not been permitted to issue a hurricane or tropical storm watch or warning until after a tropical cyclone had formed. Advances in forecasting over the past decade or so, however, now allow the confident prediction of tropical cyclone impacts while these systems are still in the developmental stage. For these land-threatening “potential tropical cyclones”, NHC will now issue the full suite of text, graphical, and watch/warning products that previously has only been issued for ongoing tropical cyclones.

Potential tropical cyclones will share the naming conventions currently in place for tropical and subtropical depressions, with depressions and potential tropical cyclones being numbered from a single list (e.g., “One”, “Two”, “Three”, ..., “Twenty-Three”, etc.). The assigned number will always match the total number of systems (tropical cyclones, subtropical cyclones, or potential tropical cyclones) that have occurred within that basin during the season. For example, if three systems requiring advisories have already formed within a basin in a given year, the next land-threatening disturbance would be designated “Potential Tropical Cyclone Four”. If a potential tropical cyclone becomes a tropical depression, its numerical designation remains the same (i.e., Potential Tropical Cyclone Four becomes Tropical Depression Four).

Potential tropical cyclone advisory packages (i.e., the Public Advisory, Forecast/Advisory, Discussion, Wind Speed Probability Product, etc., along with all the standard tropical cyclone graphics) will be issued at the standard advisory times of 5 AM, 11 AM, 5 PM, and 11 PM EDT. Three-hourly Intermediate public advisories will be issued for potential tropical cyclones at 2 AM, 8 AM, 2 PM, and 8 PM EDT when watches or warnings are in effect. The product suite will include a five-day track and intensity forecast just as is done for ongoing tropical cyclones. In addition, the Potential Storm Surge Flooding Map and Storm Surge Watch/Warning graphic would be issued for these systems when appropriate.

Advisory packages on potential tropical cyclones will be issued until watches or warnings are discontinued or until the threat of tropical-storm-force winds for land area sufficiently diminishes, at which point advisories would be discontinued. However, if it seems likely that new watches or warnings would be necessary within a short period of time (say 6-12 hours), then advisories could continue for a short time in the interest of service continuity. Once a system becomes a tropical cyclone, the normal rules for discontinuing advisories will apply. Potential tropical cyclone advisories will not be issued for systems that pose a threat only to marine areas.

Because NHC will be issuing its normal graphical products depicting the five-day forecast track and uncertainty cone for potential tropical cyclones, to avoid potential confusion the Graphical Tropical Weather Outlook will no longer display a formation area for these systems.

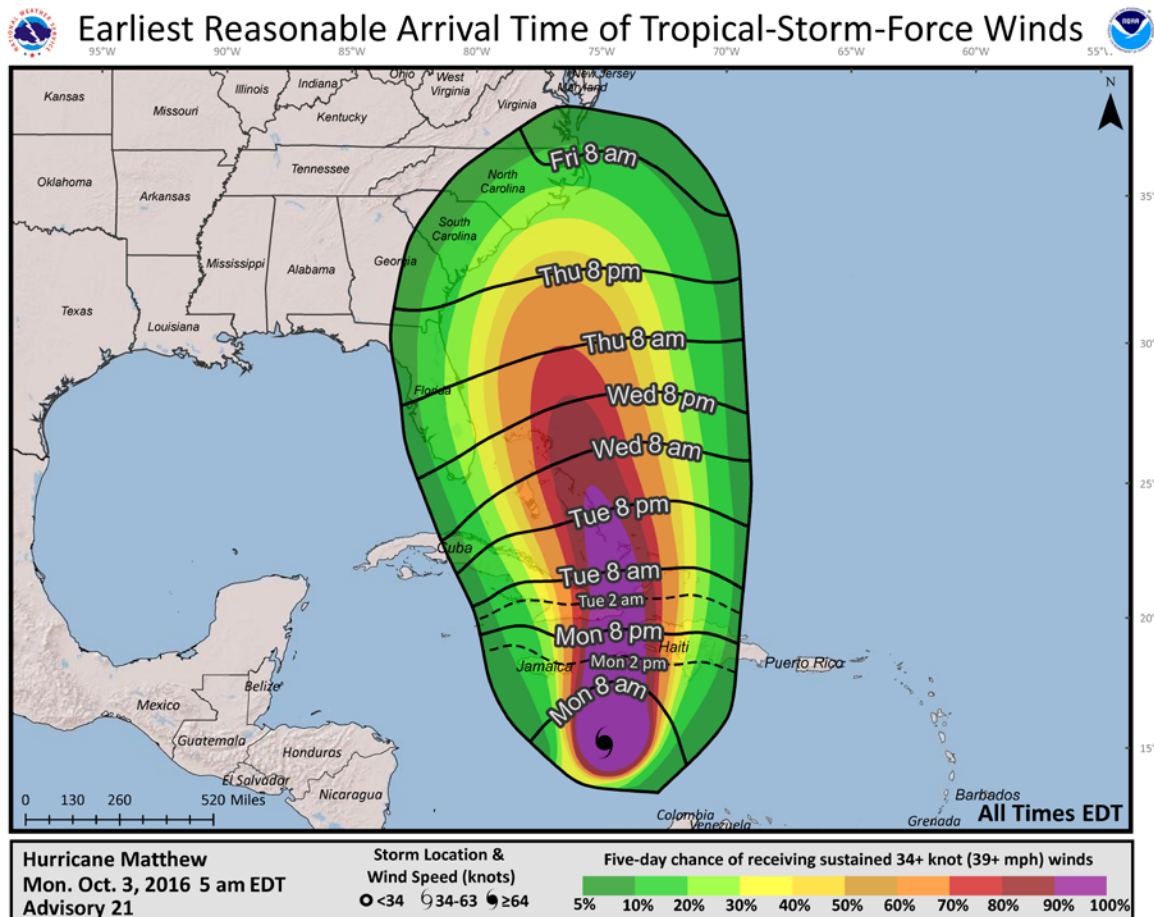
Examples of Potential Tropical Cyclone Advisory products can be found at [http://www.nhc.noaa.gov/potentialtc\\_tcp\\_example.php](http://www.nhc.noaa.gov/potentialtc_tcp_example.php)

### 3) Experimental Time of Arrival of Tropical-Storm-Force Winds Graphic

The arrival of sustained tropical-storm-force winds is a critical planning threshold for coastal communities, as many preparedness activities become difficult or dangerous once winds reach tropical storm force. Frequently, this timing is estimated using the deterministic NHC track, intensity, and wind-field (size) forecasts, but such an approach doesn't account for forecast uncertainty, and communities can be caught off guard if a storm speeds up or grows in size beyond what was forecast. To provide guidance on when users should consider having their preparations completed before a storm, NHC will begin issuing in 2017 experimental Time of Arrival of Tropical-Storm-Force Winds graphics. These graphics will be driven by the same Monte Carlo wind speed probability model that is currently used to determine the risk of tropical-storm- and hurricane-force winds at individual locations – a model in which 1000 plausible scenarios are constructed using the official NHC tropical cyclone forecast and its historical errors.

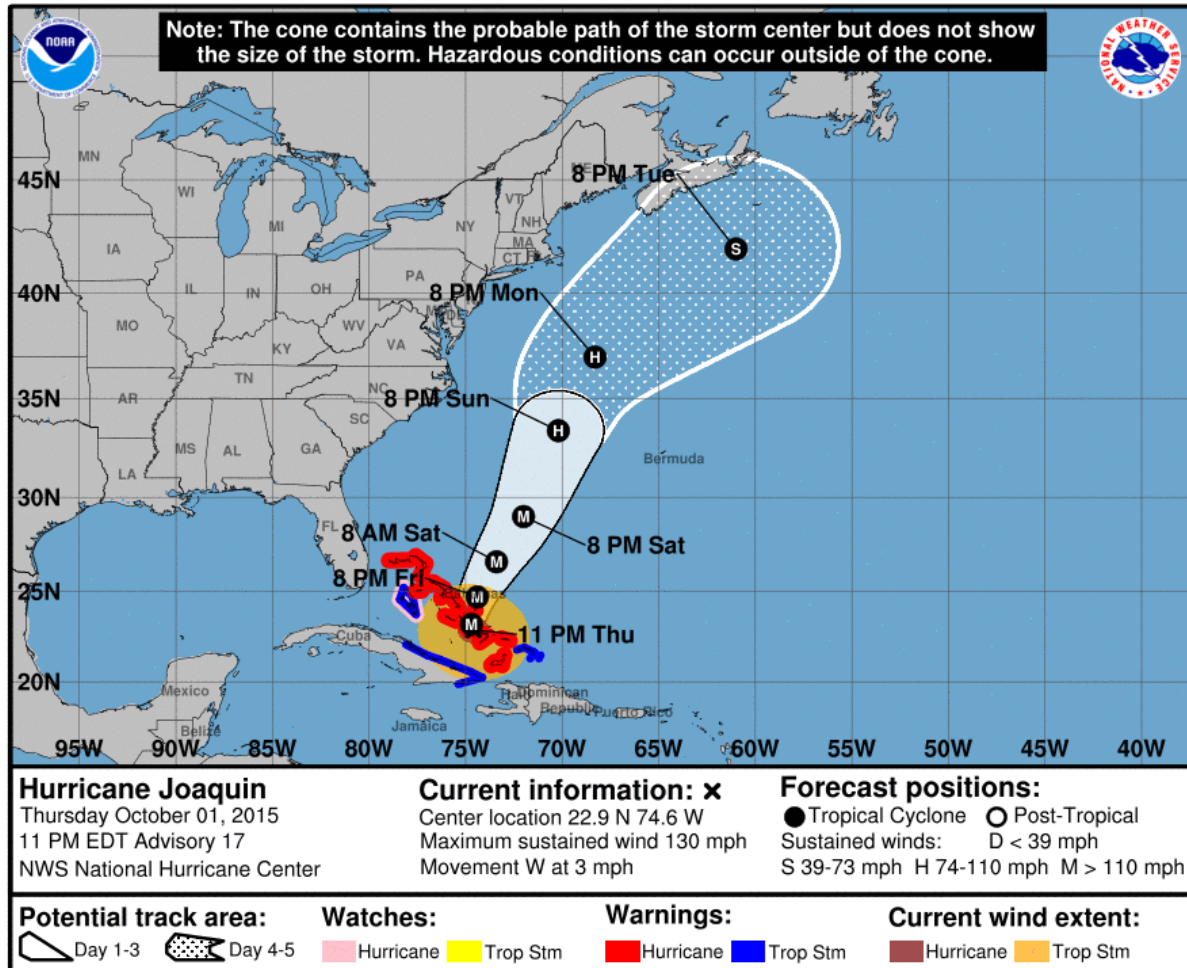
The primary graphic displays the “earliest reasonable” arrival time, identifying the time window that users at individual locations can safely assume will be free from tropical-storm-force winds. Specifically, this is the time that has no more than a 1-in-10 (10%) chance of seeing the onset of sustained tropical-storm-force winds – the period during which preparations should ideally be completed for those with a low tolerance for risk. A second graphic will show the “most likely” arrival time – that is, the time before or after which the onset of tropical-storm-force winds is equally likely. This would be more appropriate for users who are willing to risk not having completed their preparations before the storm arrives.

Users will also be able to overlay the standard wind speed probabilities, providing a single combined depiction of the likelihood of tropical-storm-force winds at individual locations, along with their possible or likely arrival times. An example of these graphics is shown below.



#### 4) Update to tropical cyclone advisory graphical products

The NHC has updated the look of its tropical cyclone advisory graphics. The suite now has a consistent look across the various graphics, with cleaner fonts and softer colors. One significant enhancement is the addition of the current extent of hurricane- and tropical-storm-force winds to the cone graphic, which will help illustrate that hazardous conditions can occur well outside of the track forecast cone. In addition, a set of radio buttons will allow users to toggle on and off various elements of the cone graphic. Examples of the NHC tropical cyclone graphics can be found at: <http://www.nhc.noaa.gov/aboutnhcgraphics.shtml>



#### 5) Annual update to the track forecast error cone

The size of the tropical cyclone track forecast error cone for both the Atlantic basin and the eastern Pacific basin will be smaller this year. The cone represents the probable track of the center of a tropical cyclone, and is formed by enclosing the area swept out by a set of imaginary circles placed along the forecast track (at 12, 24, 36 hours, etc.). The size of each circle is set so that two-thirds of historical official forecast errors over the previous five years (2012-2016) fall within the circle. The circle radii defining the cones in 2017 for the Atlantic and eastern North Pacific basins are given in the table below:

Forecast Period (hours)	Circle radius Atlantic Basin (nautical miles)	Circle radius Eastern North Pacific Basin (nautical miles)
3	16	16
12	29	25
24	45	40
36	63	51
48	78	66
72	107	93
96	159	116
120	211	151

## 5) Changes to the National TCV

The format and content of the Atlantic basin National TCV, which provides Valid Time Event Code (VTEC) data for tropical cyclone watches and warnings, will change in 2017. In prior years, this National Hurricane Center product only contained information on coastal tropical cyclone wind watches and warnings. Beginning this year, the National TCV will also contain information on inland tropical cyclone wind watches and warnings, as well as on the new storm surge watches and warnings. It is, essentially, a compilation of all the land-based tropical cyclone watch/warning VTEC information provided in the applicable WFO TCV products. Because the new National TCV compiles information from many WFOs, it will generally be issued 10-15 minutes later than in previous years. In some cases, such as for Special Advisories, the issuance of the National TCV could lag the rest of the NHC advisory products by up to 45 minutes.

In the new National TCV, the representation of watches/warnings is provided only in terms of zones; it will no longer include information on coastal breakpoints. As a result, the National TCV can only convey an *approximate* description of the watch/warning areas. The precise lateral extent of tropical cyclone wind watches and warnings along the coastline will continue to be specified by breakpoints in the Tropical Cyclone Public Advisory. The precise extent of storm surge watches/warnings will be specified in gridded form through the National Digital Forecast Database. Additional information on the new National TCV format can be found here: <http://www.nhc.noaa.gov/experimental/tcv/>

The National TCV issued by NHC for the eastern Pacific basin will not change; it will continue to list coastal tropical cyclone wind watches/warnings (by breakpoints and by zones) for southern California. It will not include inland watches/warnings issued by WFOs.

## 6) Other items of interest for 2017:

1) Pronunciation guides for storm names including the phonetic pronunciations of all Atlantic and eastern North Pacific storm names can be found on the NHC website at:

Atlantic: [http://www.nhc.noaa.gov/pdf/aboutnames\\_pronounce\\_atlc.pdf](http://www.nhc.noaa.gov/pdf/aboutnames_pronounce_atlc.pdf)

Eastern North Pacific: [http://www.nhc.noaa.gov/pdf/aboutnames\\_pronounce\\_epac.pdf](http://www.nhc.noaa.gov/pdf/aboutnames_pronounce_epac.pdf)

2) The National Hurricane Center has a Facebook page. The “NOAA NWS National Hurricane Center” page provides updates about the NHC outreach and education campaign and other items that might be of interest to the public throughout the year. During the hurricane season, the site contains a daily tropical weather update for both the Atlantic and eastern North Pacific basins, as well as alerts regarding any tropical cyclone activity as needed. The NHC Facebook page is found at: <http://www.facebook.com/NWSNHC>

3) The National Hurricane Center is on Twitter – and has five twitter accounts:

Interactive Outreach (**@NWSNHC**) - The broadest in scope of NHC's Twitter accounts, **@NWSNHC** is our primary mechanism for engaging the public and our partners in two-way conversations. Tweets will be composed by NHC managers, the Warning and Coordination Meteorologist, the Public Affairs Officer, and other non-operational staff. This account will cover general topics such as education and outreach, NWS products and policies concerning tropical cyclones, significant events, or just fun facts – from across all of the branches that comprise NHC. Whenever possible, we'll try to respond to your questions and comments.

There are two operational Twitter feeds, one for the Atlantic basin - **@NHC\_Atlantic** (which includes the Gulf of Mexico and Caribbean Sea) and one for the eastern North Pacific basin - **@NHC\_Pacific**. Automated tweets are sent via these accounts whenever NHC issues:

- A public advisory regarding a tropical cyclone (TCP)
- A tropical cyclone update (TCU)

Each tweet contains a link to access the corresponding product on the NHC website. These two operational accounts will also be used to supplement and augment the formal tropical cyclone product suite, with occasional notices on such topics as reconnaissance aircraft status, announcements on NHC's intention to initiate advisories on a new tropical cyclone, highlights of key messages during active cyclones, etc. These accounts will not, however, be able to engage in two-way conversations with users.

The NHC storm surge group can be followed on Twitter at **@NHC\_Surge**

This account enhances storm surge forecasts by providing real-time reports and observations during an event (resources permitting). The feed will enhance preparedness and outreach efforts throughout the year, and provide news and announcements on updates to the SLOSH modeling system and storm surge decision support tools.

The Tropical Analysis and Forecast Branch (TAFB) is on Twitter at **@NHC\_TAFB**

TAFB, an operational arm of the NHC, is responsible for issuing more than 100 marine products daily covering millions of square miles of the Atlantic and eastern Pacific Ocean. This account highlights significant weather events over the marine area as well as its outreach programs.

4) An audio podcast will be available when the media pool is activated.

The audio podcast RSS/XML feed for top-of-the-hour briefings will be operational when the media pool is activated: <http://www.nhc.noaa.gov/audio>. The media pool is typically activated when a hurricane watch is issued for any portion of the U.S. contiguous coastline.

**7) On the Web:**

National Hurricane Center: <http://www.hurricanes.gov>

Graphical Tropical Weather Outlook: <http://www.nhc.noaa.gov/aboutnhcgraphics.shtml#GTWO>

Saffir Simpson Hurricane Wind Scale: <http://www.nhc.noaa.gov/aboutsshws.php>

Definition of NHC Track Forecast Cone: <http://www.nhc.noaa.gov/aboutcone.shtml>

National Hurricane Preparedness Week: <http://www.weather.gov/wrn/hurricane-preparedness>

National Hurricane Center Facebook page: <http://www.facebook.com/NWSNHC>

National Hurricane Center Twitter page: <http://www.nhc.noaa.gov/twitter.shtml>

**8) Contact:** NHC Public Affairs: [nhc.public.affairs@noaa.gov](mailto:nhc.public.affairs@noaa.gov)

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