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Update on National Hurricane Center Products and Services for 2018

Changes include:

1) **The NHC Public Advisory will now discuss forecast information beyond 48 hours.**

The NHC Public Advisory is a text product that contains a list of all current coastal watches and warnings and gives pertinent storm information, including general forecast and hazard (storm surge, wind, rainfall, tornadoes, surf) information. The forecast information contained within the advisory will now include information beyond 48 hours. Previously, these advisories were limited to a discussion of a tropical cyclone's track and intensity forecast through 48 hours. This change will allow public advisories to discuss the track and intensity forecast routinely through 72 hours, and allow the flexibility to discuss the forecast through 5 days when conditions warrant.

To accommodate this change, the Tropical Cyclone Public Advisory section header:

DISCUSSION AND 48-HOUR OUTLOOK
will be changed to:
DISCUSSION AND OUTLOOK

Public advisories for Atlantic tropical cyclones are normally issued every six hours at 5:00 AM EDT, 11:00 AM EDT, 5:00 PM EDT, and 11:00 PM EDT (or 4:00 AM EST, 10:00 AM EST, 4:00 PM EST, and 10:00 PM EST). Public advisories for Eastern Pacific tropical cyclones are normally issued every six hours at 2:00 AM PDT, 8:00 AM PDT, 2:00 PM PDT, and 8:00 PM PDT (or 1:00 AM PST, 7:00 AM PST, 1:00 PM PST, and 7:00 PM PST).

Intermediate public advisories are issued every 3 hours when coastal watches or warnings are in effect. Additionally, special public advisories may be issued at any time due to significant changes in warnings or in the cyclone. An example of the change can be found at: https://www.nhc.noaa.gov/tcp_example.php

2) The format of Weather Prediction Center (WPC) Public Advisories on inland tropical depressions will now mirror the format of NHC Public Advisories.

WPC Public Advisories provide users with meteorological information on decaying tropical or subtropical systems that have moved inland over the conterminous U.S. and have the potential

to produce heavy rainfall and flash flooding. WPC will issue Public Advisories on these inland systems when winds drop below tropical storm strength and the system is not forecast to regain tropical storm intensity or re-emerge over water. The format for WPC Public Advisories on these systems will now mirror the format of the NHC Public Advisories and will contain the same sections (Summary, Watches and Warnings, Discussion and Outlook, Hazards, and Next Advisory). WPC Public Advisories will also contain forecast positions for these systems. These advisories are issued every six hours at 5:00 AM EDT, 11:00 AM EDT, 5:00 PM EDT, and 11:00 PM EDT (or 4:00 AM EST, 10:00 AM EST, 4:00 PM EST, and 10:00 PM EST) under the same AWIPS and WMO headers as NHC Public Advisories. They are also available on the NHC website (www.hurricanes.gov). An example of a WPC Public Advisory can be found at: https://www.nhc.noaa.gov/productexamples/tcp_wpc_example.php

WPC will also issue Storm Summary products as needed during landfalling U.S. tropical cyclones. WPC Storm Summary products provide information on observed rainfall and peak wind gusts. The information contained in these storm summaries was previously contained in WPC Public Advisories, but these changes will now allow WPC to issue storm summaries with observed rain and wind information even when NHC is still issuing Public Advisories on the cyclone. An example of a WPC Storm Summary can be found at: https://www.nhc.noaa.gov/productexamples/TCSS_wpc_example.txt

3) NHC will begin issuing 48-hour hurricane-force (64-kt) wind radii forecasts.

NHC will begin issuing hurricane-force (64-knot) wind radii forecasts at the 48-hour forecast time. These wind radii will be provided in the Tropical Cyclone Forecast/Advisory Message (TCM). Previously, the NHC provided hurricane-force wind radii forecasts out to 36 hours. The NHC Forecast/Advisory will now include a forecast of tropical-storm-force (34-knot) and 58-mph (50-knot) wind radii out to 72 hours and hurricane-force (64-knot) wind radii out to 48 hours. These radii forecasts provide the forecast maximum extent of these winds in each quadrant of the storm. The addition of hurricane-force wind radii at 48 hours will improve the deterministic and probabilistic guidance for areas at risk from hurricane-force winds and can help forecasters facilitate the issuance of and determine the placement of a hurricane watch. An example of the NHC Tropical Cyclone Forecast/Advisory can be found at: https://www.nhc.noaa.gov/productexamples/tcm_example.php

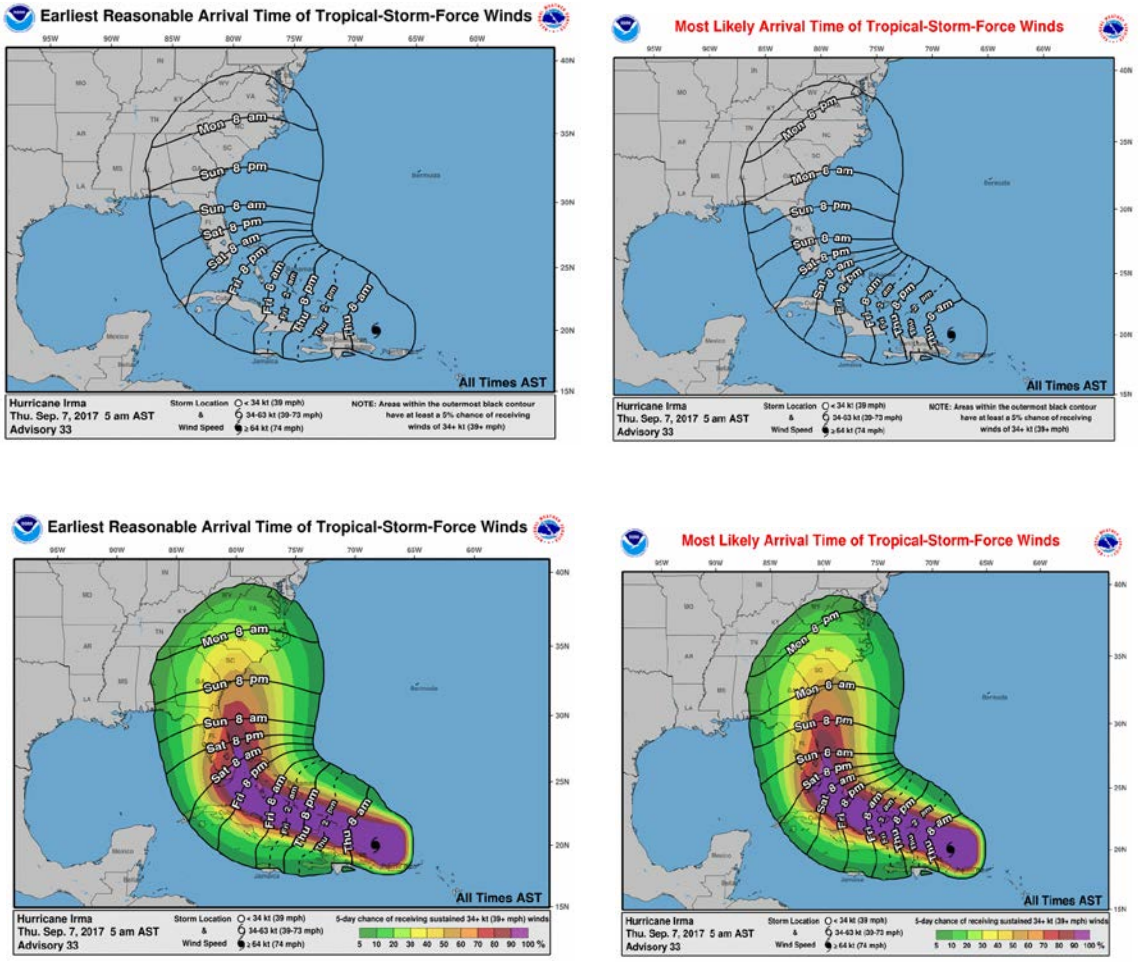
4) The NHC Arrival Time of Tropical-Storm-Force Winds graphics will become operational in 2018.

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 began issuing experimental Time of Arrival of Tropical-Storm-Force Winds graphics in 2017. These graphics will become operational in 2018. The graphics are 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 graphic 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 tropical-storm-force wind speed probabilities with the timing information, providing a single combined depiction of the likelihood of tropical-storm-force winds at individual locations, along with their possible or likely arrival times. Examples of these graphics are shown below.



5) Annual update to the track forecast error cone

The size of the tropical cyclone track forecast error cone for the Atlantic basin will be smaller this year, but a little larger at the longer forecast times in the East Pacific. 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 (2013–2017) fall within the circle. The circle radii defining the cones in 2018 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	26	25
24	43	39
36	56	50
48	74	66
72	103	94
96	151	125
120	198	162

6) New reconnaissance vortex message format

In June of 2018, NHC will change the reconnaissance Vortex Data Message format. This product is transmitted from NOAA and Air Force hurricane hunter aircraft and issued under AWIPS headers MIAREPNT2, MIAREPPN2, and WMO headers URNT12 URPN12 for both KNHC and KWBC site IDs. The format changes below will enhance the utility of the Vortex Message by including important parameters previously not provided, or provided only optionally in the comment section, and by improving the organization of the message.
The primary changes and rationales are listed below, along with examples of the current and proposed message format:

1. The current format (see example) has a formal entry only for inbound wind maxima, with any outbound wind maxima appearing in the comment section. In the proposed format, Items L through O comprise a new outbound wind maxima section to simplify data decoding and to ensure that no data are missed. The new outbound wind maxima
section appears in a similar format to the inbound maxima data (Items H through K).

2. The latitude and longitude will be listed in decimal degrees instead of degrees and minutes to better accommodate NHC and other users' needs.

3. The proposed message includes a new tropical cyclone center data block section (Items C through G). The surface wind reported by dropsonde at the system’s center is now given in Item E. Center/eye shape and size characteristic lines are moved up to Items F and G from Items L and M.

4. The current message lacks most wind observation times; the proposed format appends the observation times to the bearing and range location Items.

5. To better collect similar data together, the inbound maximum surface and flight-level wind block (Items D through G in the current format) is shifted downward to Items H through K.

Current format example:

```
URNT12 KNHC 241133
VORTEX DATA MESSAGE   AL162016
A. 24/11:12:50Z
B. 10 deg 58 min N
  082 deg 46 min W
C. 700 mb 2927 m
D. 90 kt
E. 144 deg 5 nm
F. 253 deg 78 kt
G. 158 deg 8 nm
H. 977 mb
I. 10 C / 3042 m
J. 18 C / 3045 m
K. NA / NA
L. CLOSED
M. C20
N. 12345 / 7
O. 0.02 / 1 nm
P. AF301 0616A OTTO                OB 13
MAX OUTBOUND AND MAX FL WIND 108 KT 349 / 14 NM 11:17:00Z
CNTR DROPSONDE SFC WIND 210 / 11 KT
```

An explanation of the current format can be found at:
http://www.ofcm.gov/publications/nhop/FCM-P12-2016Change1.pdf
(see Figure 5-3, page 5-6).

New format:

```
URNT12 KNHC 241133
VORTEX DATA MESSAGE   AL162016
A. 24/11:12:50Z
B. 10.97 deg N 082.77 deg W
C. 700 mb 2927 m
D. 977 mb
E. 210 deg 11 kt
F. CLOSED
G. C20
H. 90 kt
I. 144 deg 5 nm 11:07:00Z
J. 253 deg 78 kt
K. 158 deg 8 nm 11:07:30Z
L. 95 kt
M. 314 deg 5 nm 11:17:00Z
N. 033 deg 108 kt
O. 349 deg 14 nm 11:17:30Z
P. 10 C / 3042 m
Q. 18 C / 3045 m
R. NA / NA
```

```
S. 12345 / 7
T. 0.02 / 1 nm
U. AF301 0616A OTTO OB 13
MAX FL WIND 108 KT 349 / 14 NM 11:17:00Z
```

The individual items in the new format are defined as follows:

```
A. Date and time of fix
B. Latitude and longitude of vortex center fix
C. Minimum height at standard atmospheric level
D. Minimum sea-level pressure from dropsonde or extrapolation
E. Dropsonde center wind speed and direction
F. Eye character
G. Eye shape/orientation/diameter
H. Estimate of maximum inbound surface wind observed
I. Bearing, range and time of wind observed in Item H
J. Maximum inbound flight-level wind
K. Bearing, range and time of wind observed in item J
L. Estimate of maximum outbound surface wind observed
M. Bearing, range and time of wind observed in item L
N. Maximum outbound flight-level wind
O. Bearing, range and time of wind observed in item N
P. Maximum flight-level temp/pressure altitude outside eye
Q. Maximum flight-level temp/pressure altitude inside eye
R. Dewpoint temperature/sea surface temperature inside eye
S. Fix determined by (codes for observation type)
T. Navigation fix accuracy/meteorological accuracy
U. Aircraft id, mission number, cyclone name, and observation
number

End remarks include maximum flight-level wind, bearing, range
and time during mission
```

Reminder of Recent Changes to NHC Products and Services:

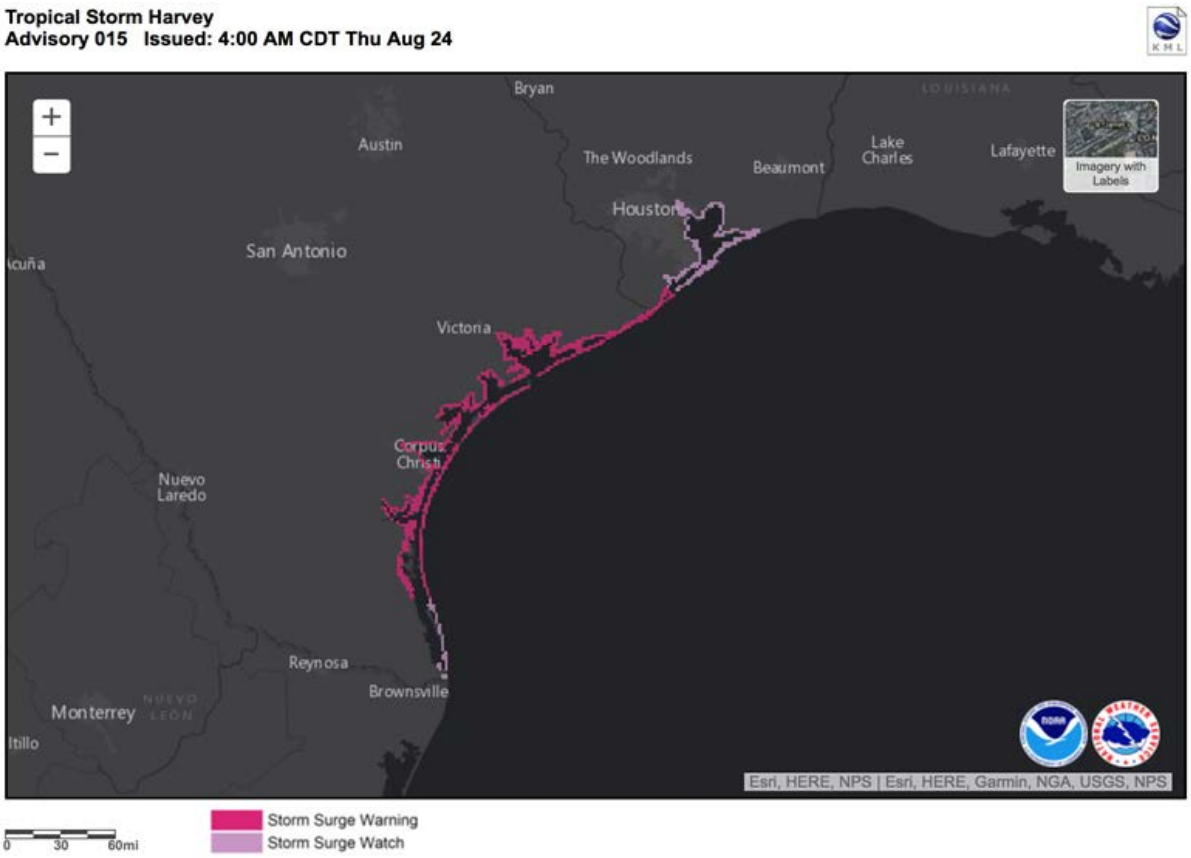
1) Storm Surge Watch/Warning became operational for the Atlantic and Gulf coasts of the United States in 2017.

The National Weather Service (NWS) began issuing storm surge watches and warnings in 2017 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. The first Storm Surge Watch and Warning was issued prior to Harvey's landfall along the Texas coast in August 2017.

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. Issuing separate warnings for wind and storm surge will save lives by better identifying the specific tropical cyclone hazards that 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 depicting the watch and warning areas will be available on the NHC website (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 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 2018. 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 NHC forecast track and intensity for the tropical cyclone, and takes into account typical 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 tropical storm and hurricane watches and warnings before formation via Potential Tropical Cyclone Advisories.

In 2017, NHC introduced the capability 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. This option was invoked for 7 disturbances in the Atlantic basin in 2017, with 6 of those eventually becoming tropical storms or hurricanes. The first use of this capability for the United States occurred before the formation of Tropical Storm Cindy in the Gulf of Mexico, which resulted in nearly a day of additional lead time for watches and warnings before the system became a tropical cyclone

For these land-threatening “potential tropical cyclones”, NHC has the option to issue the full suite of text, graphical, and watch/warning products that previously had only been issued for ongoing tropical cyclones. Potential tropical cyclones 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 matches 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., 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 for land areas. The product suite includes 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 areas 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, advisories could continue 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.

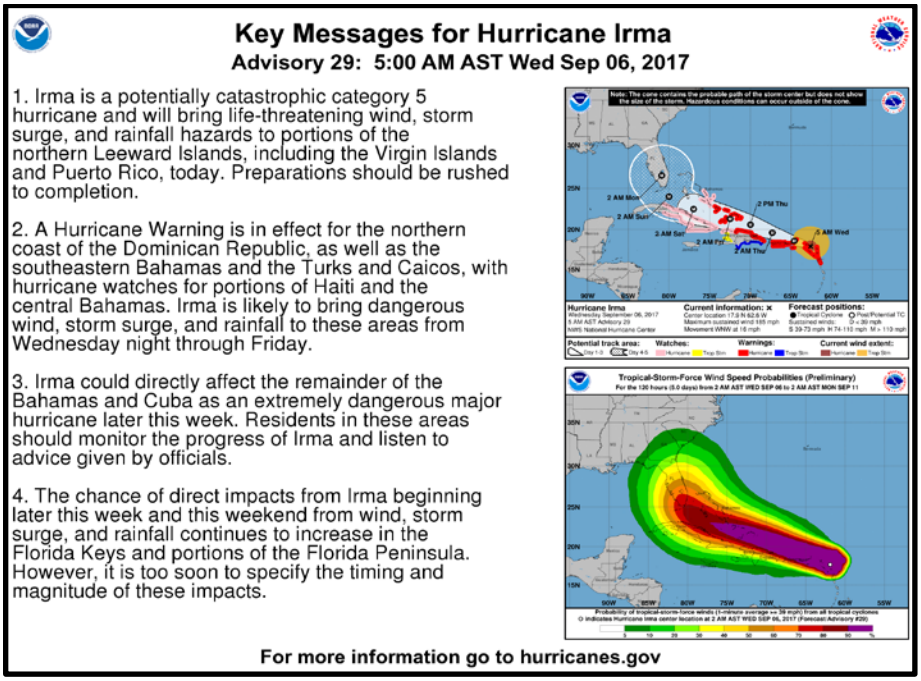
Examples of Potential Tropical Cyclone Advisory products can be found at
http://www.nhc.noaa.gov/potentialtc_tcp_example.php

3) The NHC Key Message Graphic will be available on the NHC website with other tropical cyclone graphical products.

The National Hurricane Center includes Key Messages in its Tropical Cyclone Discussion text product to highlight essential points about tropical cyclone hazards and forecast uncertainty for tropical cyclones posing a significant threat to land. When Key Messages are available, the NHC also provides a graphic that includes the text of the Key Messages and relevant tropical cyclone graphics, which can include the cone graphic, the 34-kt cumulative wind speed probability graphic, or a rainfall forecast graphic provided by the Weather Prediction Center.

This graphic has previously been available in the Top News section of the NHC website and shared via NHC social media accounts (Twitter and/or Facebook). Beginning in 2018, when available, this graphic will be provided with the other graphical products in the active tropical cyclone information section of the NHC website. These graphics will also continue to be shared via the NHC social media account.

Below is an example of a Key Messages Graphic from Hurricane Irma at 5 AM AST on 6 September 2017:



4) The extent of hurricane- and tropical-storm force winds were added to the cone graphic in 2017.

In 2017, NHC added the current extent of hurricane- and tropical-storm-force winds to the cone graphic, in order to help illustrate that hazardous conditions can occur well outside of the track forecast cone. In addition, a set of radio buttons 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

Other items of interest for 2018:

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
Eastern North Pacific: 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. 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.

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.

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.

9) 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

Contact: NHC Public Affairs: nhc.public.affairs@noaa.gov

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