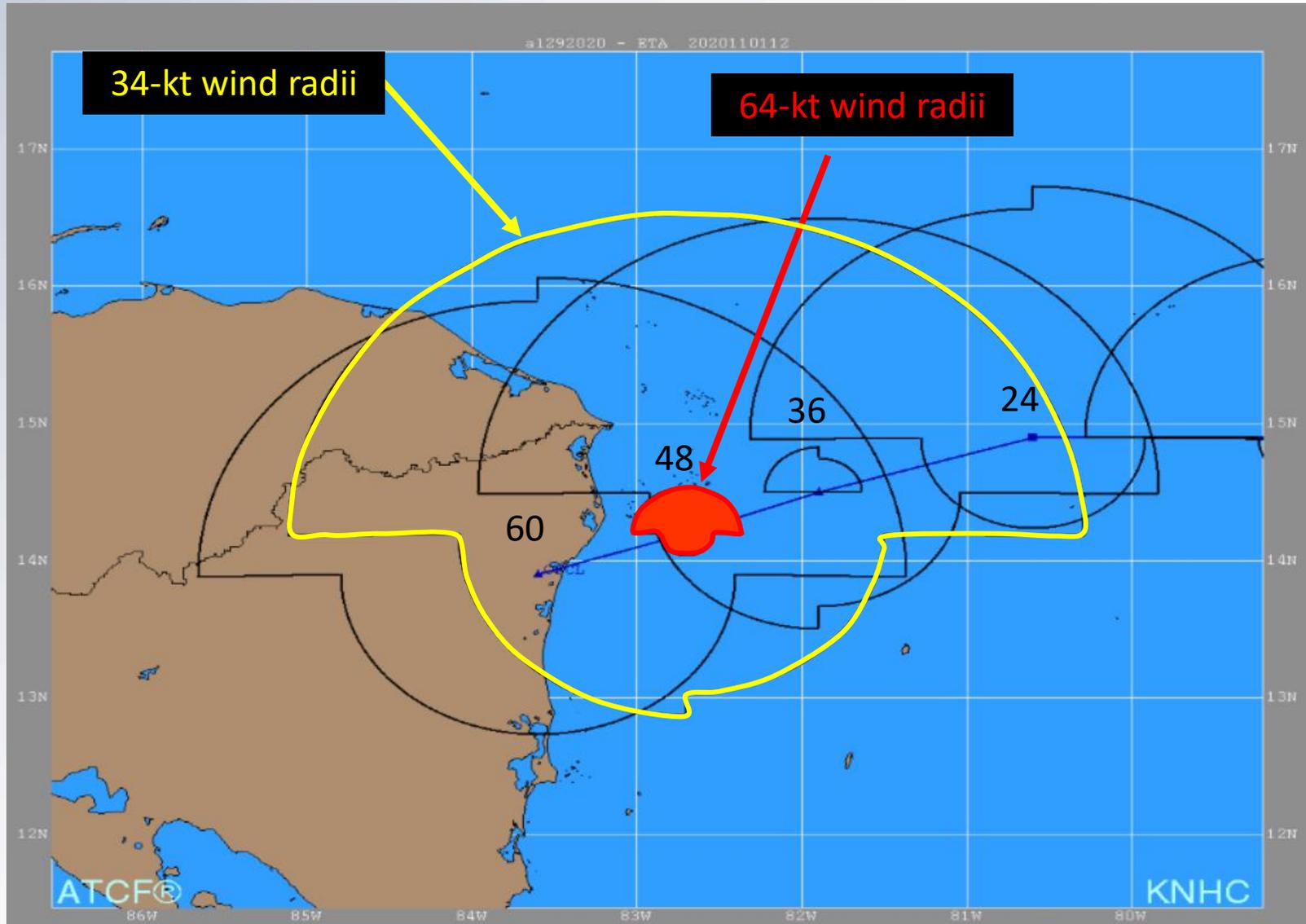
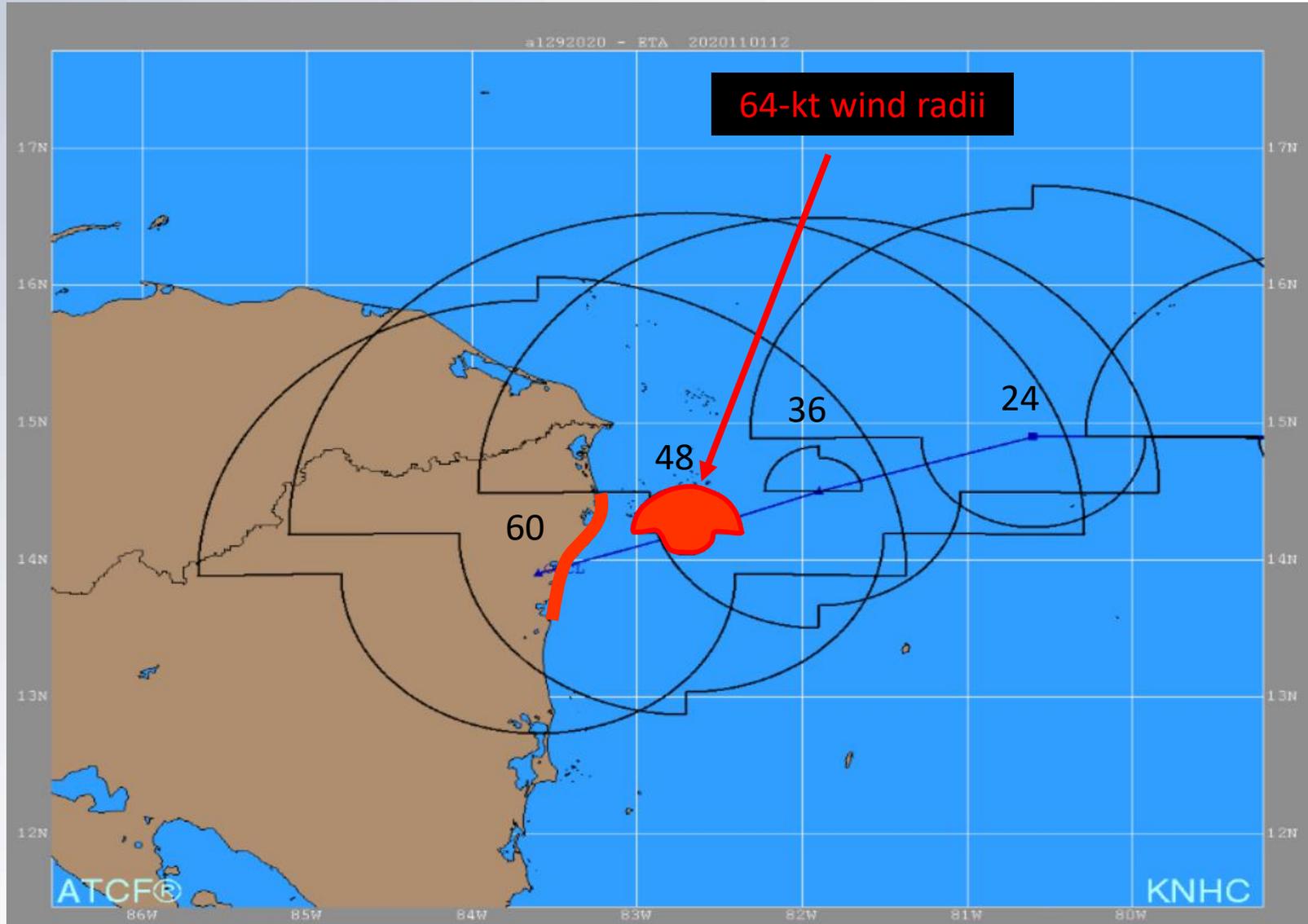


Where Would You Issue the Warning?



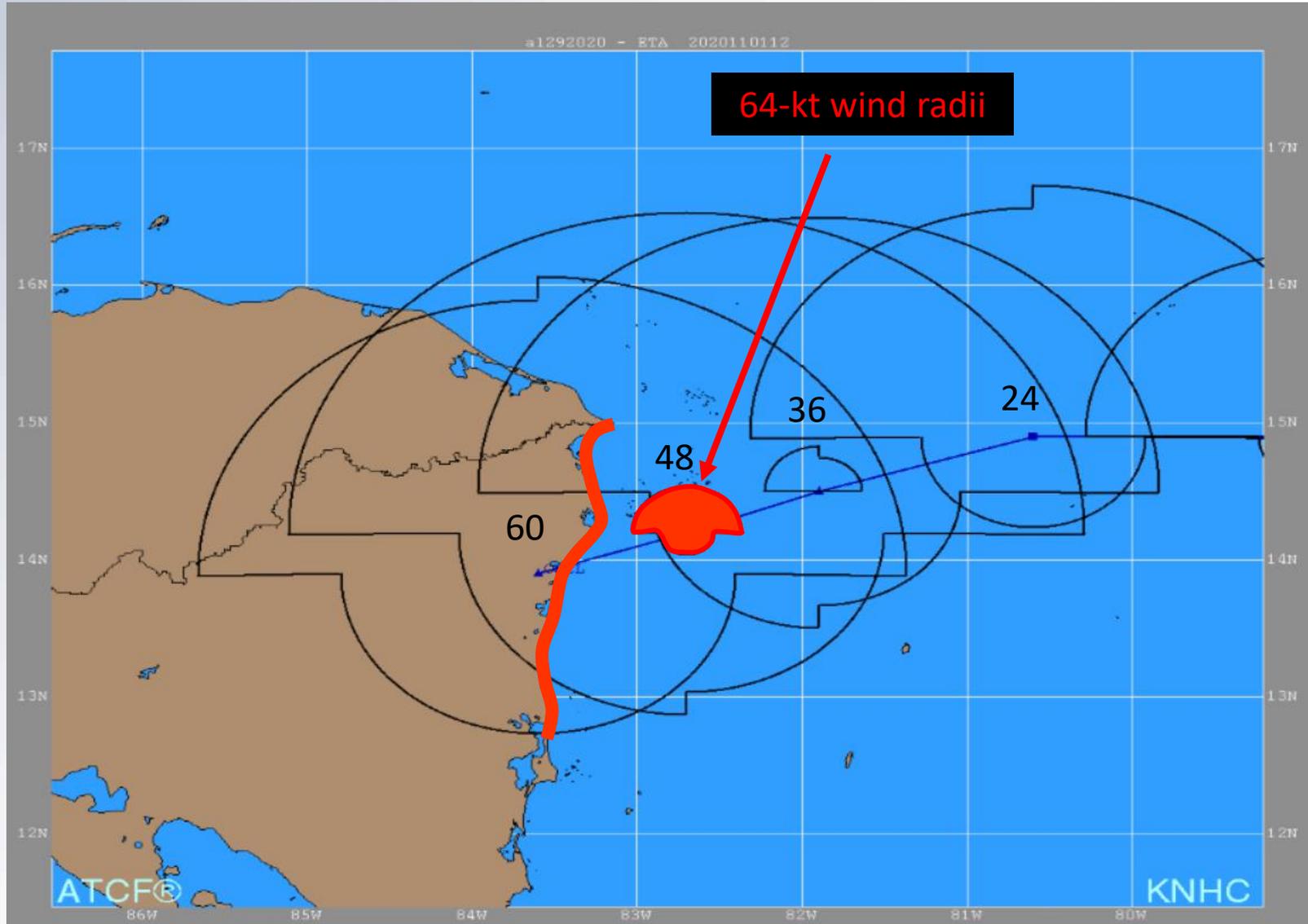
- Hurricane forecast to reach the coast of Nicaragua in 48-60 h
- 34-kt winds arrive on the coast in about 36 h
- Where would you issue a Hurricane Warning?

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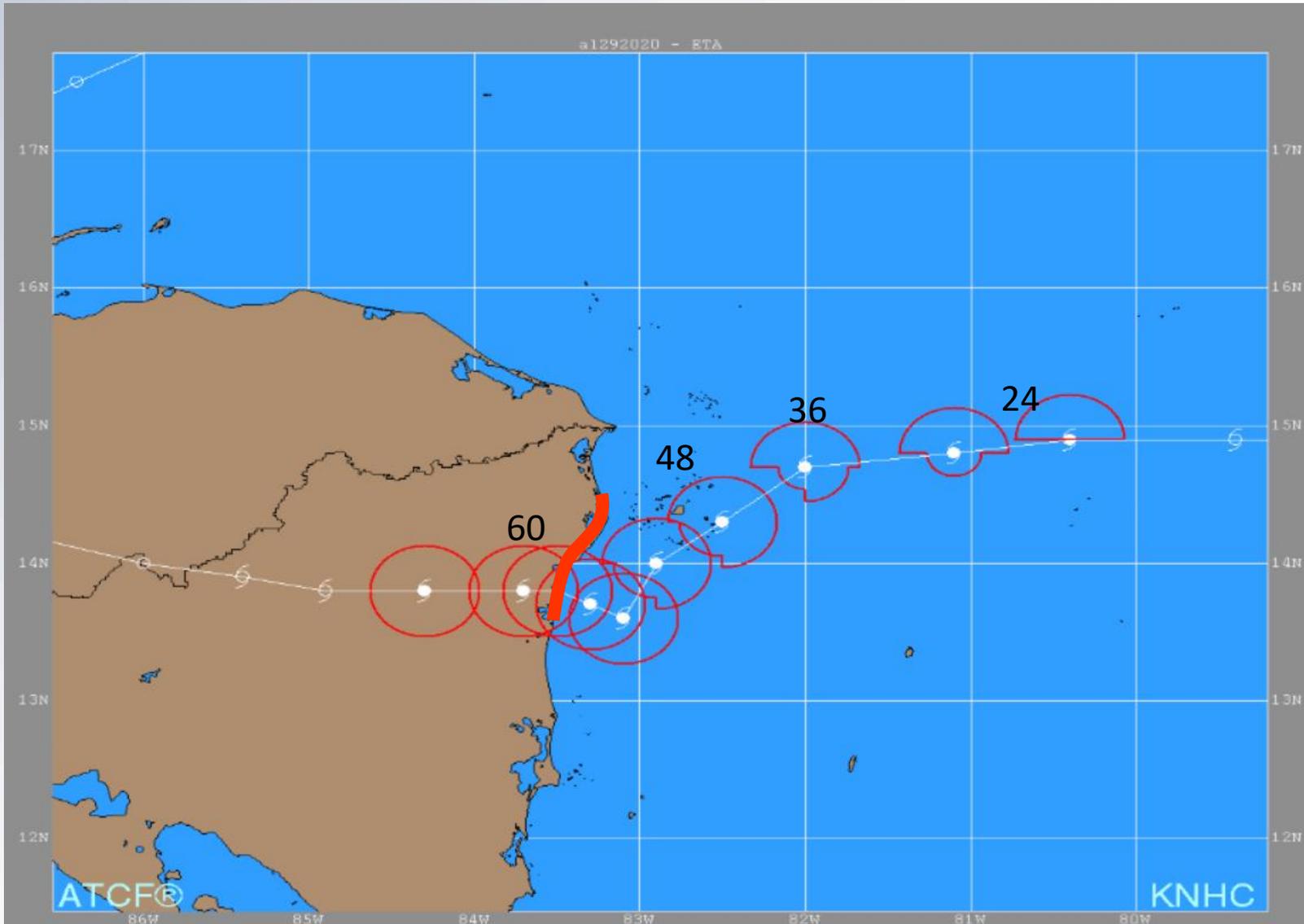
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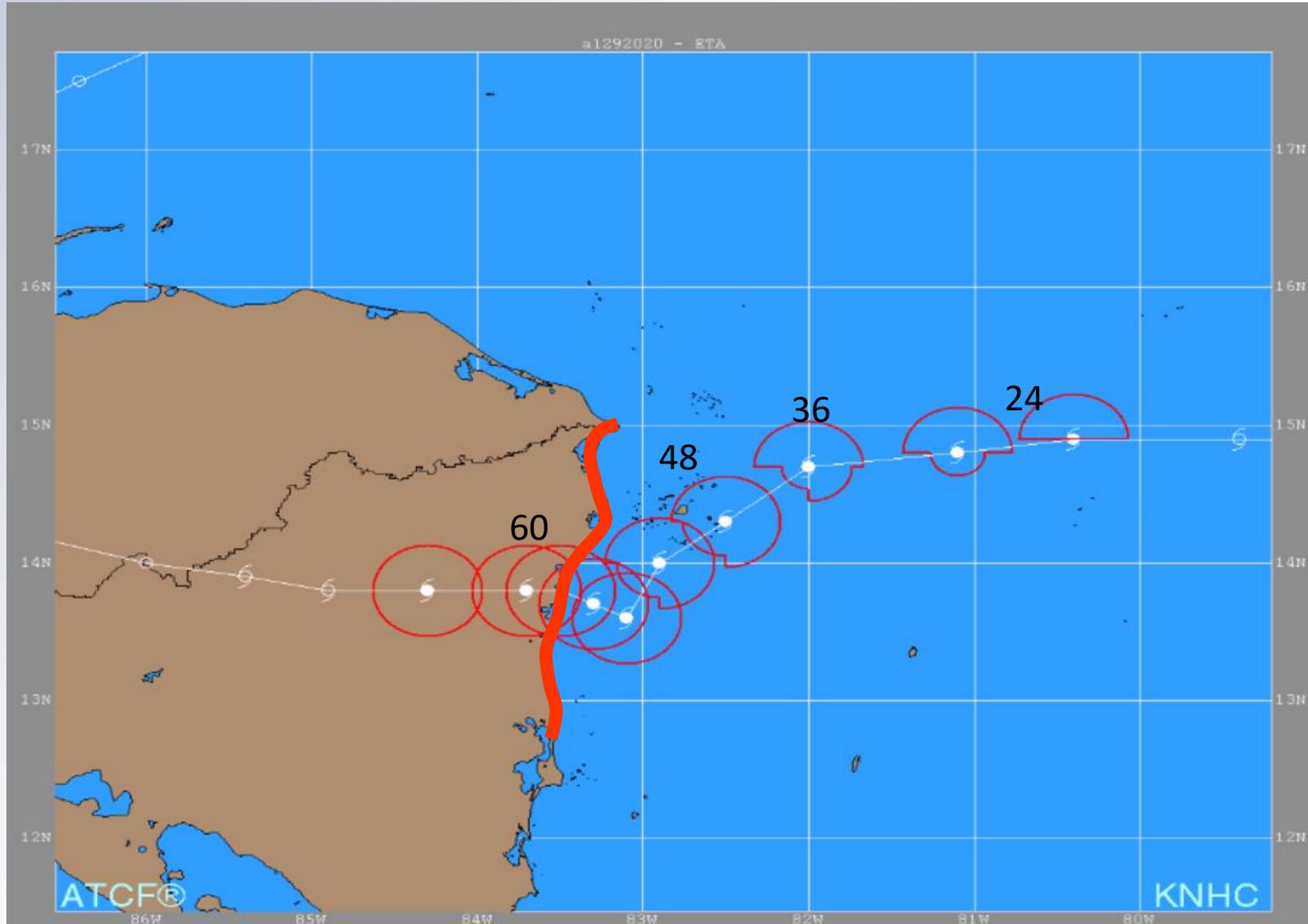
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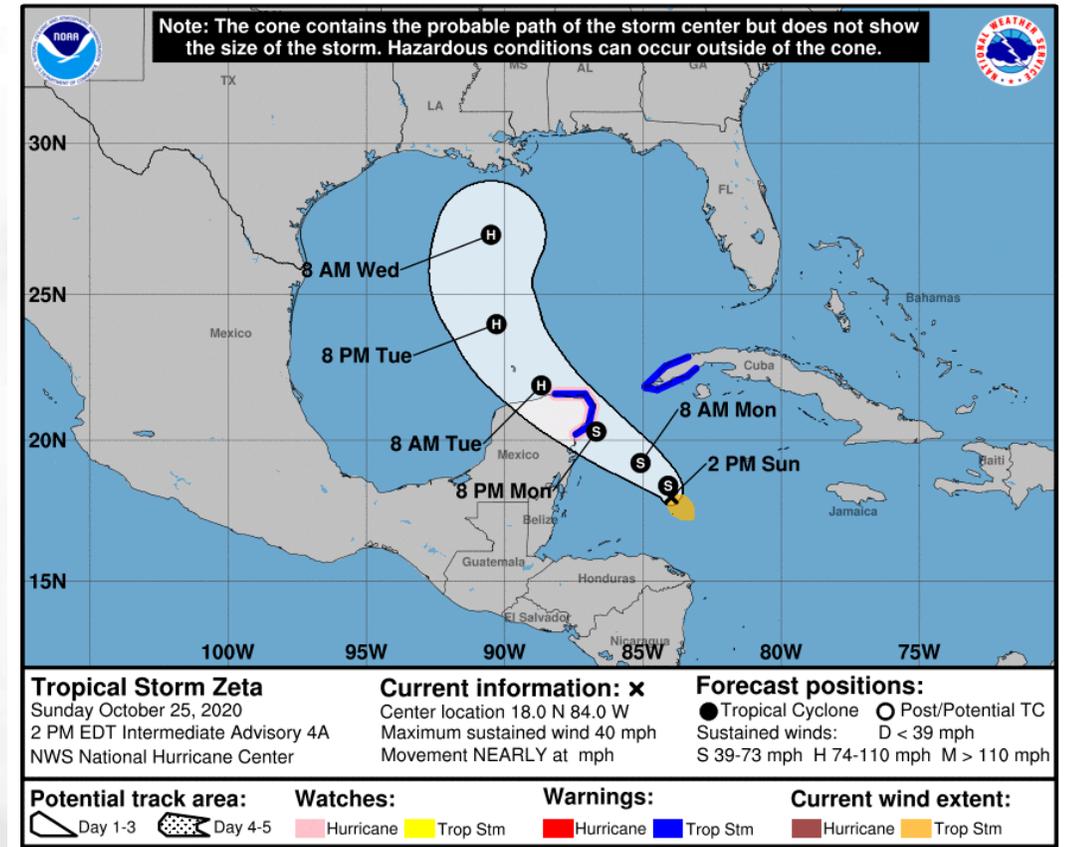
Watch/Warning Philosophy

- Watches and warnings are tools used to *convey risk* – telling users what they should be *prepared for* in terms of hazards
- Proper issuance of tropical storm and hurricane watches and warnings must account for uncertainty in the forecast and be issued with enough lead time for preparations to occur before the onset of hazards
- Considerations include:
 - Maintaining continuity, expectations of future changes to the forecast, assessment of forecast uncertainty, vulnerability of the area, time of day/day of week, and other non-meteorological factors



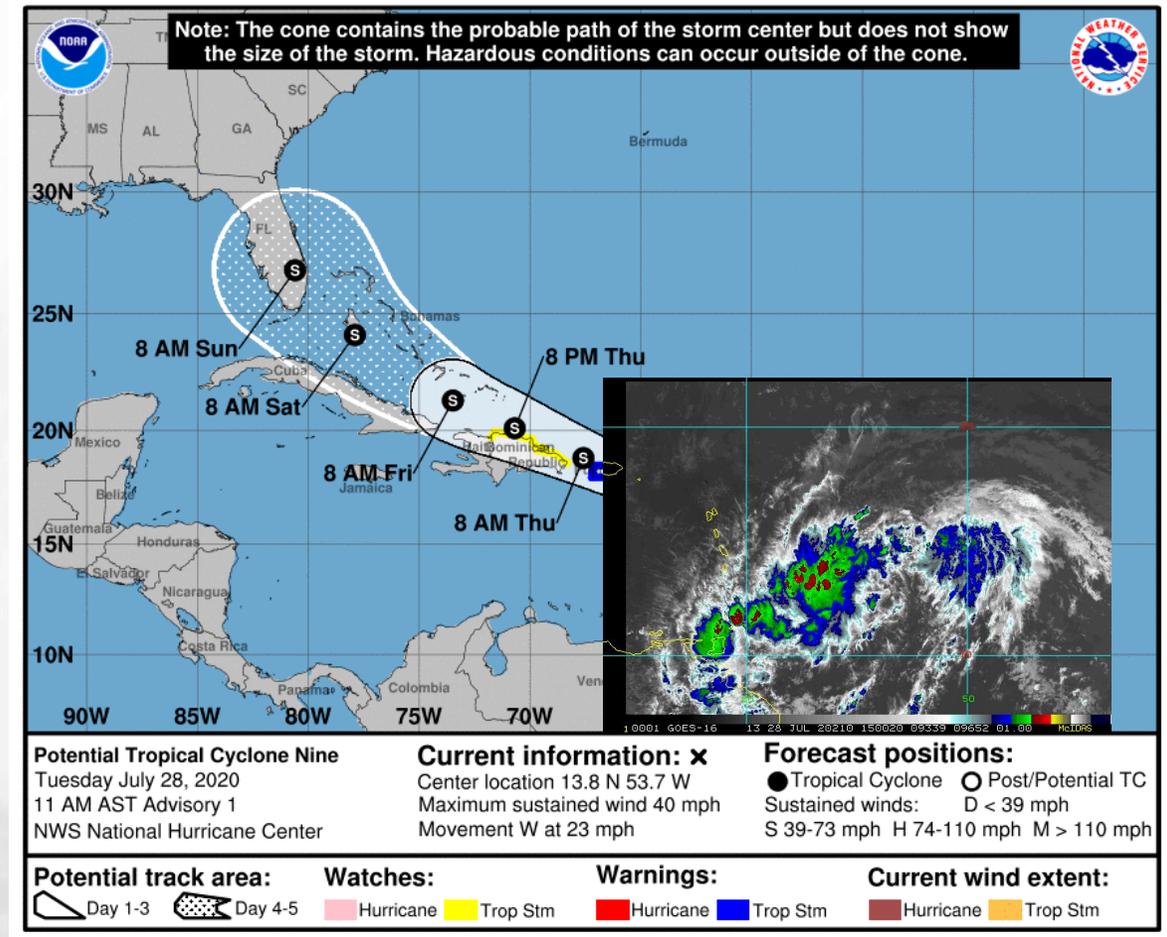
Watch/Warning Philosophy

- Watches and warnings can (and often should) exist for areas where those wind speeds are not explicitly forecast to account for uncertainty
- A watch can be maintained within the warning time frame to account for uncertainty and the possibility of conditions occurring
 - Example: A Hurricane Watch and Tropical Storm Warning are in effect for the same area where tropical storm conditions are expected and hurricane conditions are possible
- A Hurricane Watch can be used to message the threat of near-hurricane winds even when 64-kt winds are not explicitly forecast



Potential Tropical Cyclones

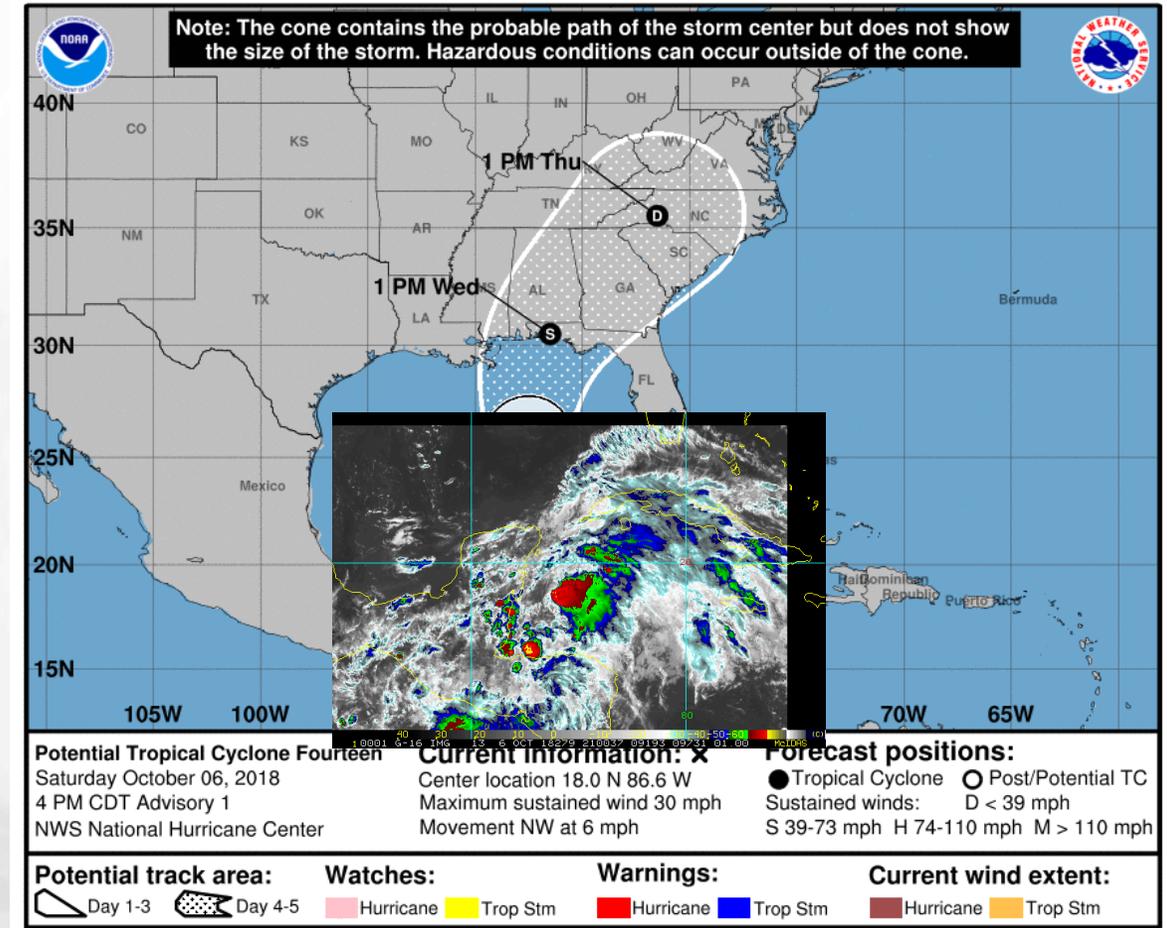
- Allows NHC to provide the same level of service for systems that are not yet tropical cyclones but could bring tropical storm conditions to land areas within 48 h
- Accompanied by the standard suite of NHC advisory products
- Initiating advisories on a PTC depends on
 - Likelihood of TS force winds occurring
 - Likelihood of system becoming a TC
 - A somewhat trackable “center” feature to maintain continuity from one advisory package to the next
- The need for PTC advisories can be coordinated between NHC and affected countries in advance
- Don't hesitate to reach out to NHC if you have questions or want to coordinate!



Initial advisory on PTC 9 (later Isaias) on 28 July 2020, about 30 h before it became a TS

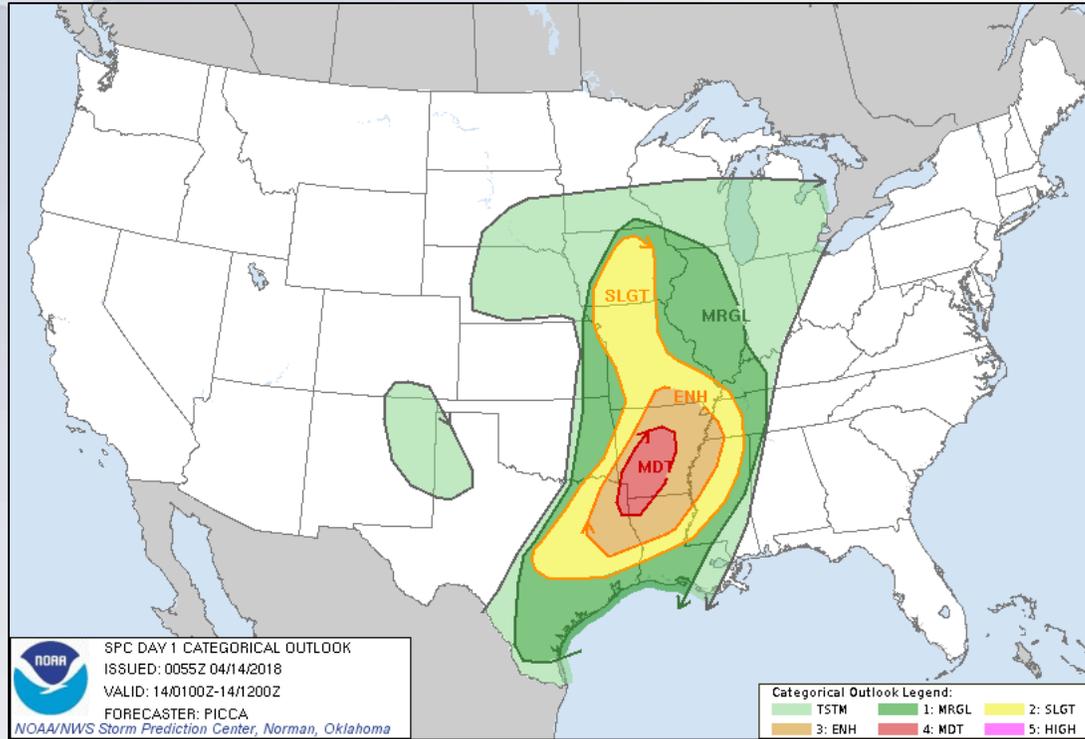
Potential Tropical Cyclones

- Forecast uncertainty can be higher than usual for PTCs given their (lack of) structure, poor model initialization, and center (re)formation
 - Watch/warning areas may need to be larger to account for this uncertainty
- NHC can defer to local met service's opinion on need for PTC advisories for marginal cases
 - Can wait until warning time frame to see if confidence increases
- Unexpected development still occasionally occurs near land, forcing us to go immediately to advisories and warnings on short notice



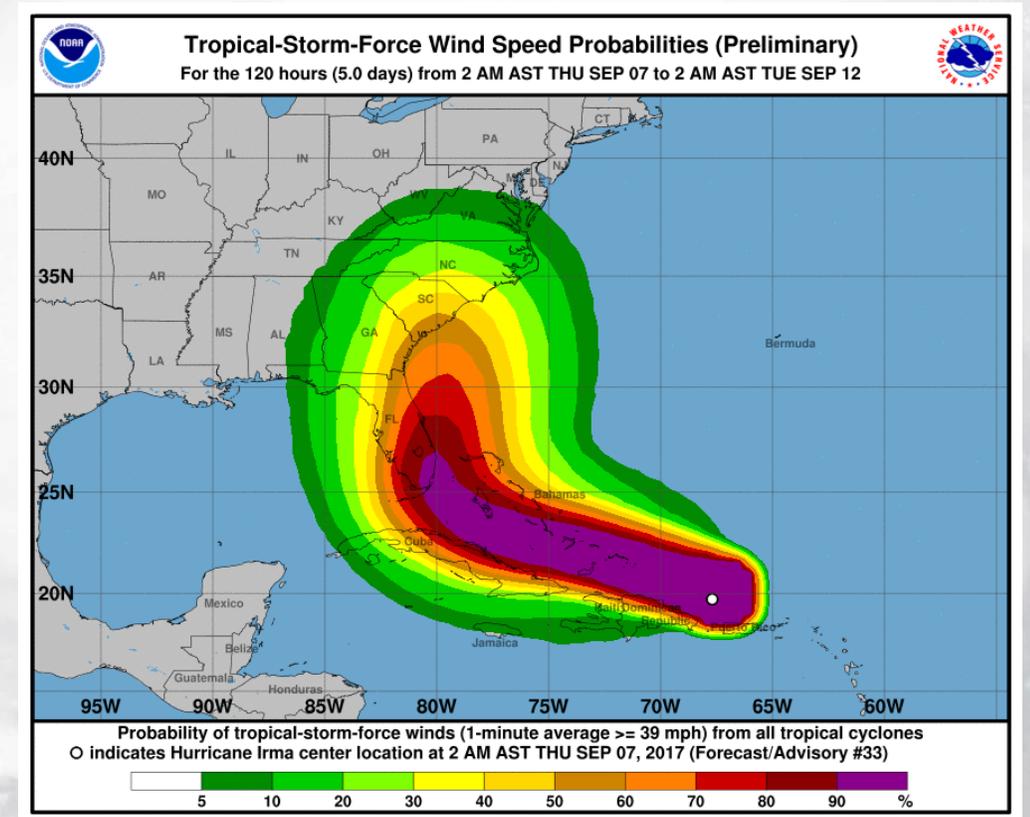
Initial advisory on PTC 14 (later Michael) on 6 October 2018, about 12 h before it became a TD

Similarities to Severe Weather Program



SPC Convective Outlook provides information on potential for severe weather. Categorical and probabilistic information available.

NHC wind and storm surge probabilities provide risk of wind and surge at individual locations.



Similarities to Severe Weather Program

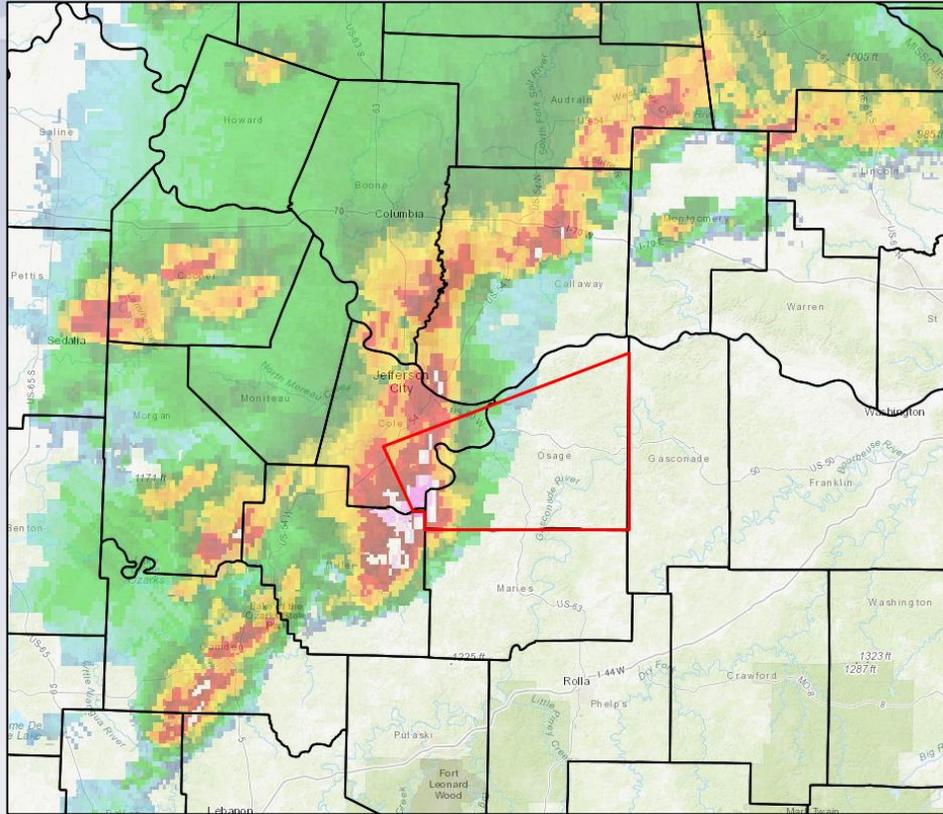


A Tornado Watch then identifies the area within which conditions are favorable for the development of severe thunderstorms and tornadoes (i.e., the area in which severe weather is *possible*).

A Hurricane Watch means that hurricane force winds are *possible* somewhere within the watch area within 48 hours.

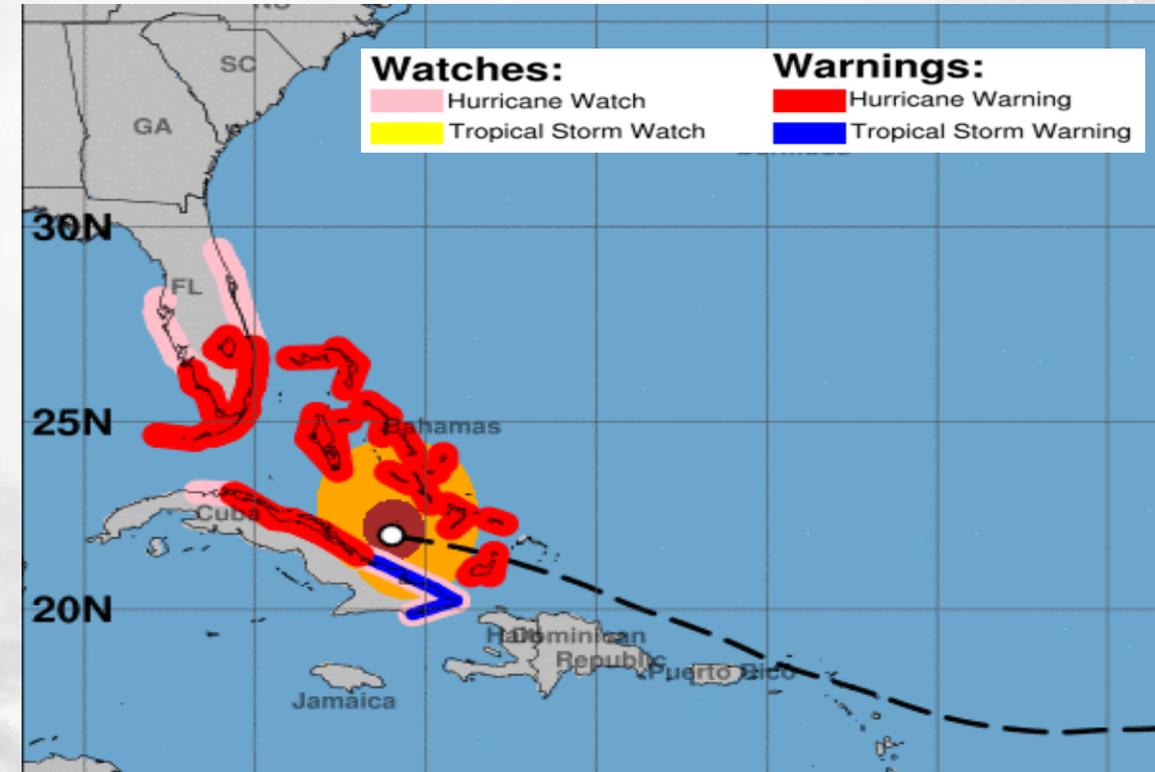


Similarities to Severe Weather Program



A Tornado Warning identifies the area within which a tornado is occurring or is *expected* to occur somewhere within the polygon. The warning expresses a danger to life and property.

A Hurricane Warning means that hurricane force winds are *expected* somewhere within the warning area within 36 hours.



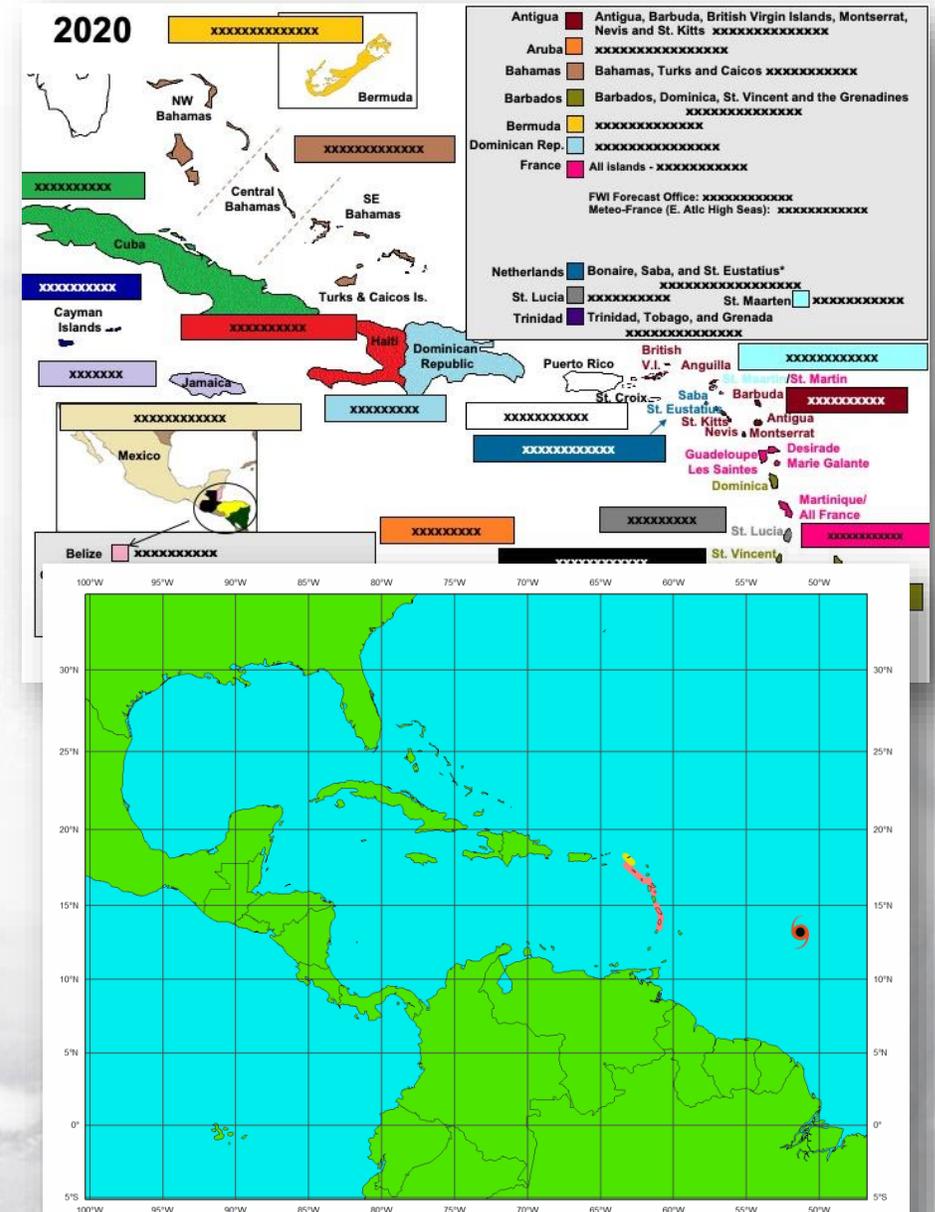
Coordination of Watches and Warnings

- Each country responsible for issuing watches/warning for their respective country or jurisdiction
- NHC will recommend the placement of tropical storm and hurricane watches/warnings
- Watches issued 48 h prior to the anticipated arrival of tropical-storm-force winds
- Warnings issued 36 h prior to the arrival of tropical-storm-force winds



Coordination of Watches and Warnings

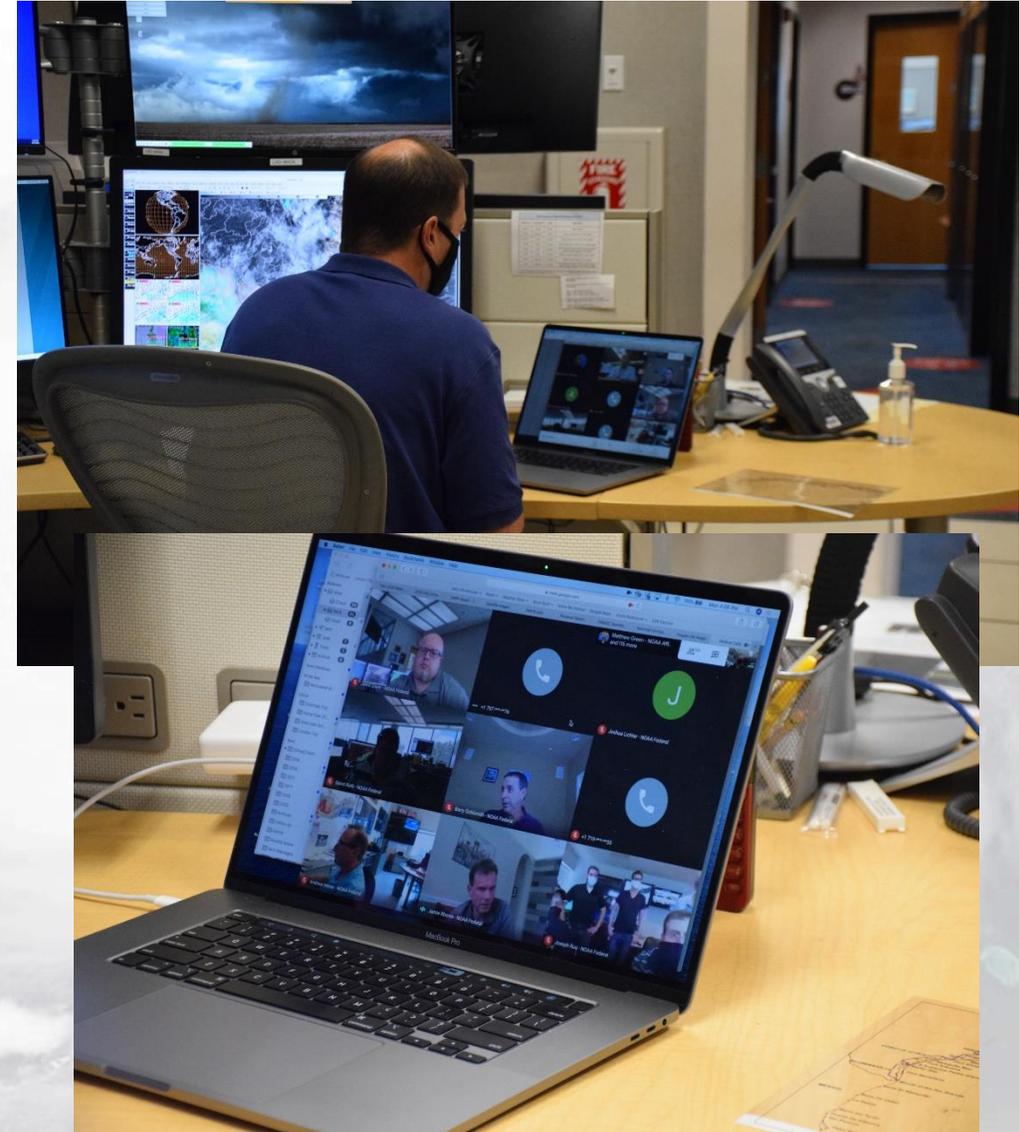
- Coordination occurs with each country's meteorological office
- Coordination can be complex when many countries are involved, especially neighboring countries or jurisdictions
- NHC always has at least two forecasters on duty during watch and warning situations
- Coordination can occur by phone or email



Enhancing Real-Time Coordination in RA-IV

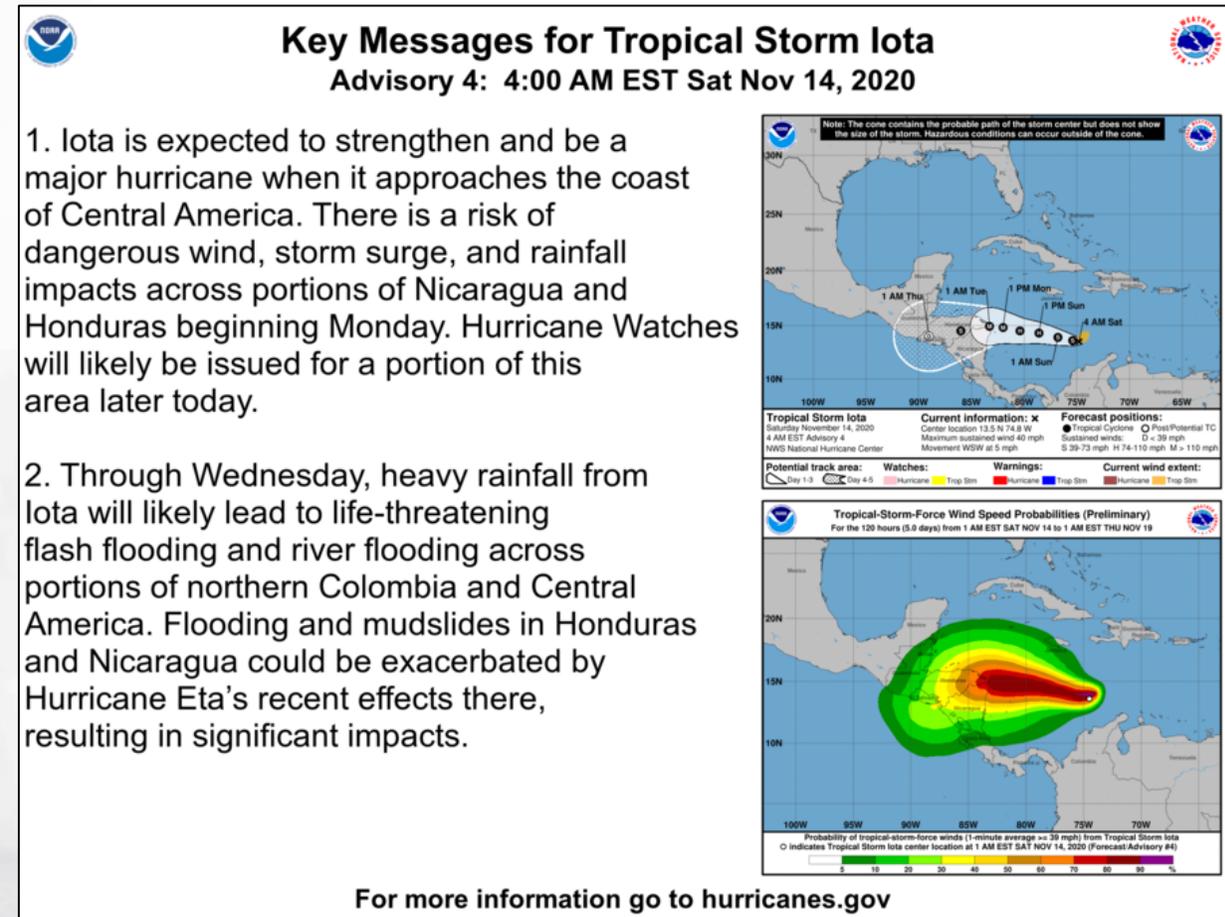
Test Video Conferencing in 2021 – Stay Tuned!

- NHC transitioned to the use of video conferencing to coordinate forecasts & warnings within the U.S. NWS
- Enabled face-to-face coordination and data/screen sharing
- Allows nation-to-nation coordination by increased understanding of Watch/Warning decisions of neighboring countries
 - Calls will be decisional – goal is to reduce need for multiple calls and have more efficient collaboration
- Will try to test with a subset of member states in 2021 – Stay Tuned!



Key Messages

- “Key” takeaways from each NHC forecast package focused on evolving risk of hazards, not on storm “details”
- Included in the Tropical Cyclone Discussion and on graphic for dissemination via social media
 - Spanish language graphic available on hurricanes.gov
- Geared toward public, emergency managers, and media for consistent messaging of threat/impacts



Pre-Genesis Messaging

- Strongly worded TWOs issued before Harvey's genesis mentioned:
 - Storm Surge
 - Tropical storm or hurricane-force winds
 - Very heavy rainfall across portion of central and eastern Texas
- 1 AM CDT Wednesday, August 23 TWO mentioned that tropical storm or hurricane watches could be required for a portion of TX and LA coasts later that day

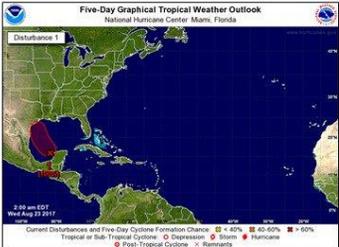
Tropical Weather Outlook
NWS National Hurricane Center Miami FL
200 PM EDT Tue Aug 22 2017

Interests in northeastern Mexico and along the Texas coast should monitor the progress of this system, as **it could produce storm surge and tropical storm or hurricane force winds along portions of the Texas coast, and very heavy rainfall across portions of central and eastern Texas from Friday through the weekend.** Please refer to products from your local National Weather Service office for more information on this system.

 **Key Messages regarding Remnants of Harvey** 
August 23, 2017 – 1 a.m. CDT

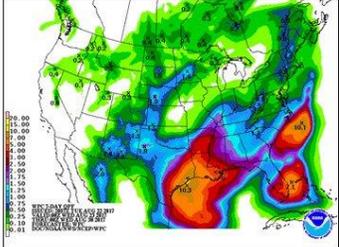
Five-Day Graphical Tropical Weather Outlook
National Hurricane Center Miami, Florida

Disturbance 1



2:00 am EDT
Wed Aug 23 2017

Current Disturbances and Five-Day Cyclone Formation Chance:  



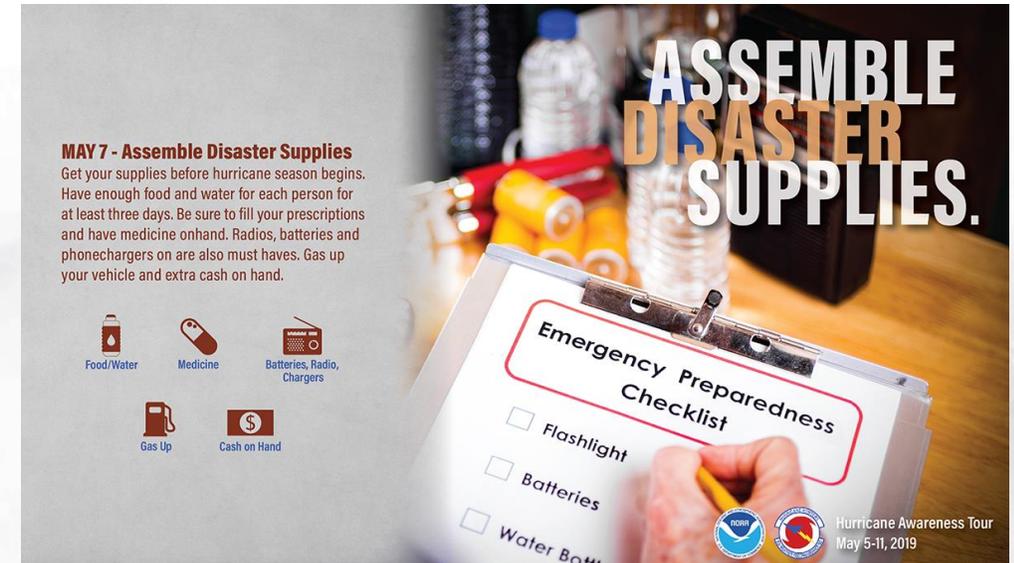
7-day rainfall forecast from WPC through 7 PM CDT August 29

1. The remnants of Harvey are very likely to regenerate into a tropical cyclone over the southwestern Gulf of Mexico today or tonight, move northwestward, and possibly make landfall along the Texas coast by late Friday.
2. This system could produce storm surge flooding along portions of the Texas coast and flooding rainfall across portions of southern and eastern Texas and western Louisiana. Tropical storm or even hurricane force winds are also possible along portions of the Texas coast, although it is too early to determine which areas could see these direct impacts.
3. Tropical Storm or Hurricane Watches could be required later today for portions of the coast of northeastern Mexico, Texas, and southwestern Louisiana. People in these areas should monitor the progress of this system and follow any instructions provided by their local officials.

NOAA National Hurricane Center: www.hurricanes.gov

Messaging Threats Many Days Away

- Mention ***potential for impacts***, but no specific information on timing, magnitude and location of impacts
- Encourage interests to ***monitor*** the storm and ensure they have a ***hurricane plan*** in place
- As event approaches and confidence increases, messaging becomes more specific and focused



ASSEMBLE DISASTER SUPPLIES.

MAY 7 - Assemble Disaster Supplies
Get your supplies before hurricane season begins. Have enough food and water for each person for at least three days. Be sure to fill your prescriptions and have medicine on hand. Radios, batteries and phonechargers on are also must haves. Gas up your vehicle and extra cash on hand.

Food/Water Medicine Batteries, Radio, Chargers
Gas Up Cash on Hand

Emergency Preparedness Checklist

- Flashlight
- Batteries
- Water Bott

Hurricane Awareness Tour
May 5-11, 2019



DEVELOP AN EVACUATION PLAN.

MAY 6 - Develop an Evacuation Plan
Find out today if you live in a hurricane evacuation zone. Plan where you'll go and how you would get there. Leave immediately if ordered to evacuate and be sure to plan for your pets.

Find out if you live in an evacuation zone Plan your route out
Follow evacuation orders Plan for your pets

HURRICANE EVACUATION ROUTE

Hurricane Awareness Tour
May 5-11, 2019

Messaging Threats Five or More Days Away

- Key Messages can be introduced during this phase
- Emphasis on preparedness and broad areas that could be impacted
- Storm surge, rainfall, and wind impacts mentioned - too early for details



Key Messages for Hurricane Irma

Advisory 10: 5:00 PM AST Fri Sep 01, 2017

1. Irma is expected to be a major hurricane when it approaches the Lesser Antilles early next week, producing rough surf and rip currents. Irma could also cause dangerous wind, storm surge, and rainfall impacts on some islands, although it is too soon to specify where and when those hazards could occur. Residents in the Lesser Antilles should monitor the progress of Irma through the weekend and listen to any advice given by local officials.

2. It is much too early to determine what direct impacts Irma will have on the continental United States. Regardless, everyone in hurricane-prone areas should ensure that they have their hurricane plan in place, as we are now near the peak of the season.



Note: The cone contains the probable path of the storm center but does not show the size of the storm. Hazardous conditions can occur outside of the cone.

Category	Center location	Maximum sustained wind
Hurricane Irma	18.8°N 58.1°W	120 mph

Forecast positions:
● Tropical Cyclone ○ Post-Potential TC
Sustained winds: D < 39 mph
S 39-73 mph H 74-110 mph M > 110 mph

Potential track area: Day 1-3 (solid line), Day 4-5 (dashed line)
Watches: Hurricane (red), Trop Stm (yellow)
Warnings: Hurricane (red), Trop Stm (blue)
Current wind extent: Hurricane (red), Trop Stm (yellow)



For the 120 hours (5.00 days) from 2 PM AST FRI SEP 01 to 2 PM AST WED SEP 06

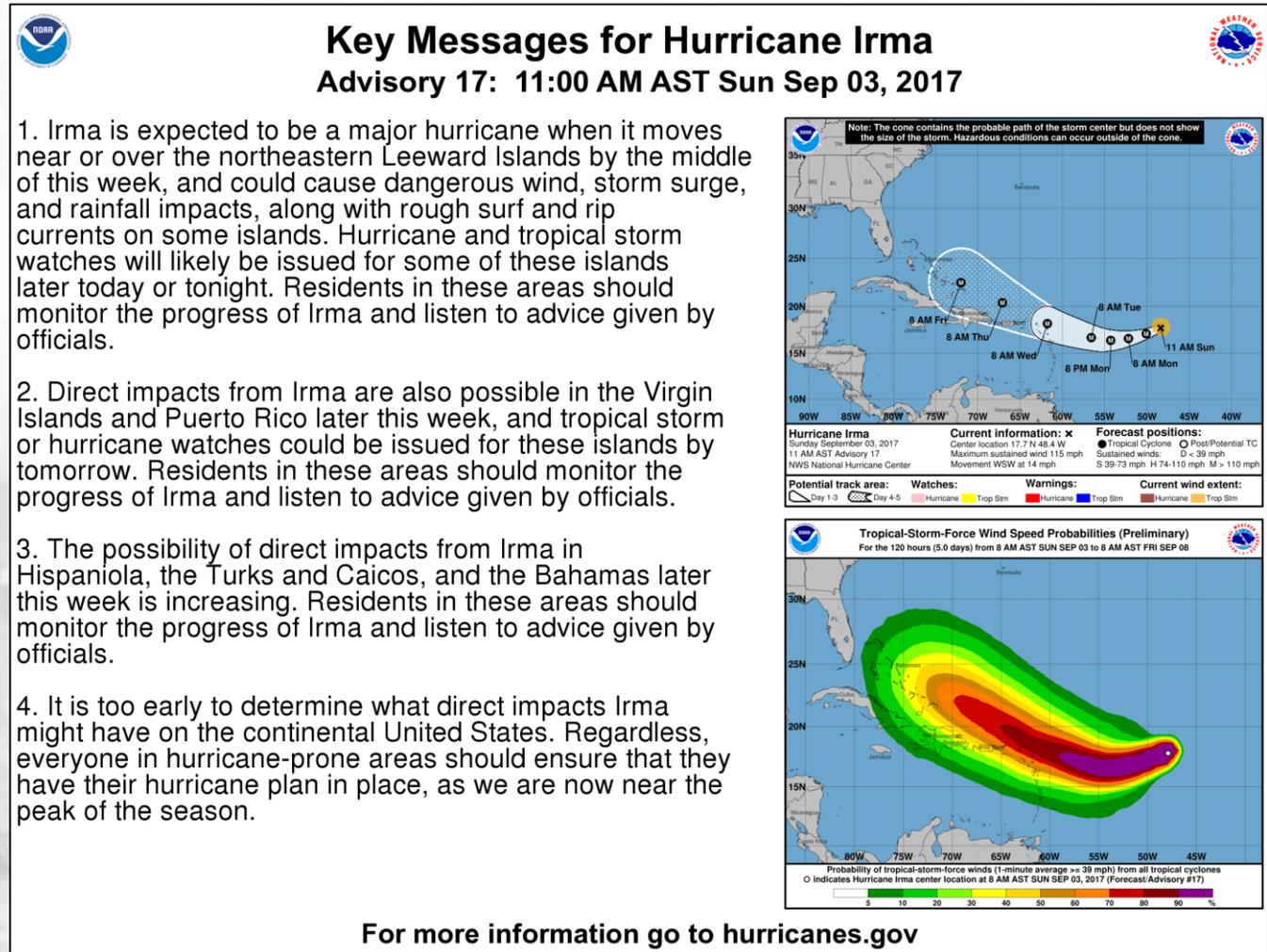
Probability of tropical-storm-force winds (1-minute average >= 39 mph) from all tropical cyclones
○ Indicates Hurricane Irma center location at 2 PM AST FRI SEP 01, 2017 (Forecast Advisory #10)

5 10 20 30 40 50 60 70 80 90 %

For more information go to hurricanes.gov

Messaging Threats Three to Five Days Out

- Messaging begins to focus on area where impacts could occur
- Risk of impacts continues to increase, but uncertainty still too large to get specific about timing and magnitude
- Life-threatening wording can be included at this stage, if confidence allows
- Preparedness actions typically underway



Messaging Threats in the Watch/Warning Phase

- Important to keep messaging *focused on hazards not track or intensity*
- Concentrate messaging on individual hazards, with more detail provided at this stage



Key Messages for Hurricane Eta

Advisory 8: 10:00 AM EST Mon Nov 02, 2020



1. Eta is forecast to strengthen to a major hurricane very soon, and additional strengthening is likely before it reaches the northeastern coast of Nicaragua on Tuesday. Catastrophic wind damage is expected where Eta's eyewall moves onshore, and preparations should be rushed to completion within the Hurricane Warning area.

2. Through Friday evening, heavy rainfall from Eta will likely lead to catastrophic, life-threatening flash flooding and river flooding across portions of Central America, along with landslides in areas of higher terrain. Flash and river flooding is also possible across Jamaica, southeast Mexico, El Salvador, southern Haiti, and the Cayman Islands.

3. A potentially catastrophic and life-threatening storm surge, along with battering waves, is expected along portions of the northeastern coast of Nicaragua near and to the north of where the center makes landfall. Water levels could reach as high as 12 to 18 feet above normal tide levels in some parts of the hurricane warning area. Preparations to protect life and property should be rushed to completion.



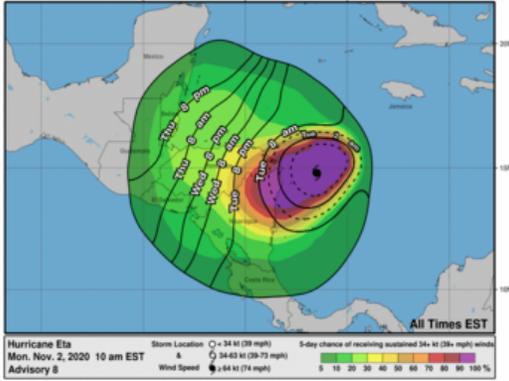
Hurricane Eta
Monday November 02, 2020
10 AM EST Advisory 8
NWS National Hurricane Center

Current information: x
Center location 14.8 N 81.5 W
Maximum sustained wind 110 mph
Movement W at 9 mph

Forecast positions:
● Tropical Cyclone ○ Post-Potential TC
Sustained winds: D < 39 mph
S 39-73 mph H 74-110 mph M > 110 mph

Potential track area: Watches: Day 1-3 Day 4-5
Warnings: Hurricane Trop Strm
Current wind extent: Hurricane Trop Strm

Most Likely Arrival Time of Tropical-Storm-Force Winds



Hurricane Eta
Mon. Nov. 2, 2020 10 am EST
Advisory 8

Storm Location: ○ < 34 kt (39 mph)
● 34-43 kt (39-73 mph)
▲ 44-64 kt (74 mph)

5-day chance of reaching sustained 34-kt (39-mph) winds
Wind Speed 0 10 20 30 40 50 60 70 80 90 100 %

All Times EST

For more information go to hurricanes.gov



Questions/Discussion?