



Potential Tropical Cyclone Designation

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Training Session 20

Expectations vs. Reality

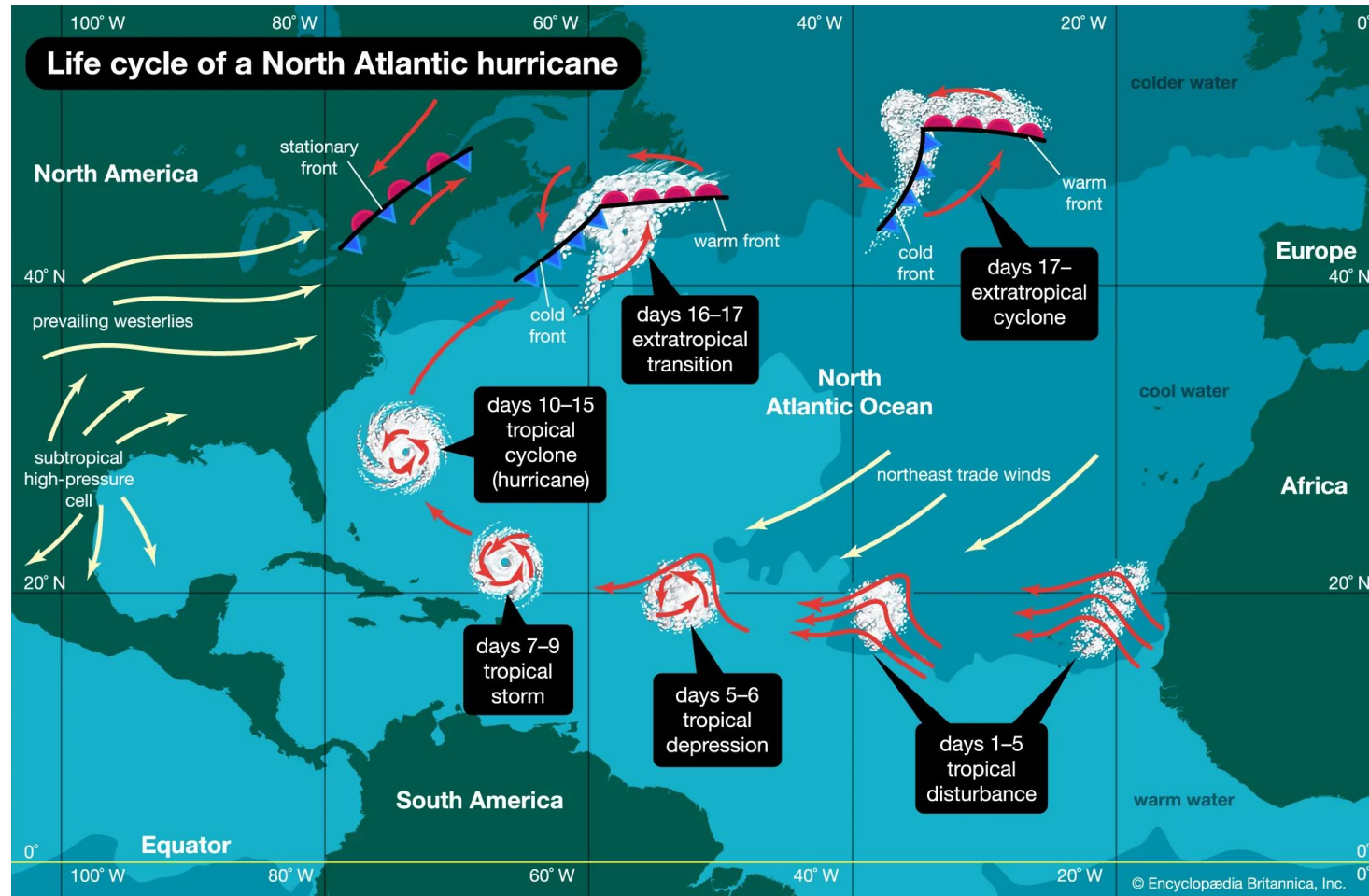


Image credit: Encyclopædia Britannica

Expectations vs. Reality



Image courtesy: Brian McNoldy, Univ. of Miami

Poll Question #1 (Placeholder)

How would you describe your knowledge of Potential Tropical Cyclones?

Extensive / I'm a pro!

Familiar / I understand the basics.

Limited / I don't really get it.

None / What are you talking about?

What is a potential tropical cyclone (PTC)?

Potential Tropical Cyclone

A disturbance that is not yet a tropical cyclone, but which poses the threat of bringing tropical storm or hurricane conditions to land areas within 72 hours.

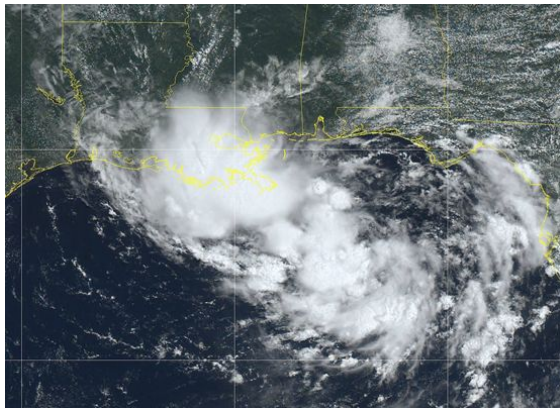
Tropical Cyclone

A warm-core, non-frontal synoptic-scale cyclone, originating over tropical or subtropical waters, *with organized deep convection and a closed surface wind circulation about a well-defined center.*

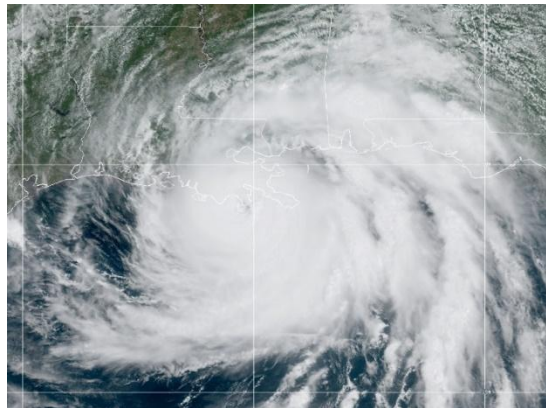
Post-tropical Cyclone

A cyclone that no longer possesses sufficient tropical characteristics to be considered a tropical cyclone (e.g., extratropical cyclones or remnant lows).

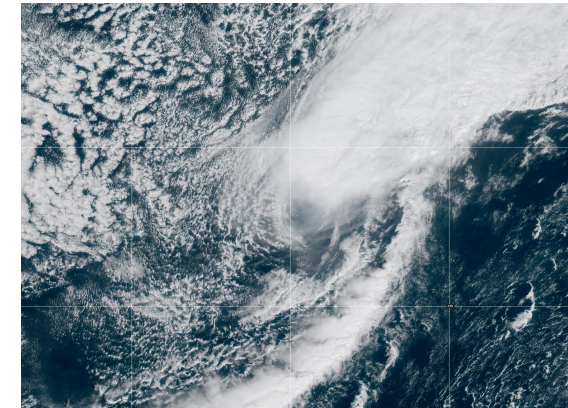
Potential Tropical Cyclone



Tropical Cyclone

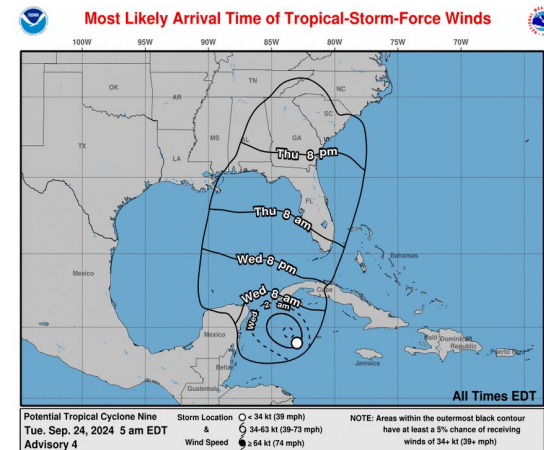
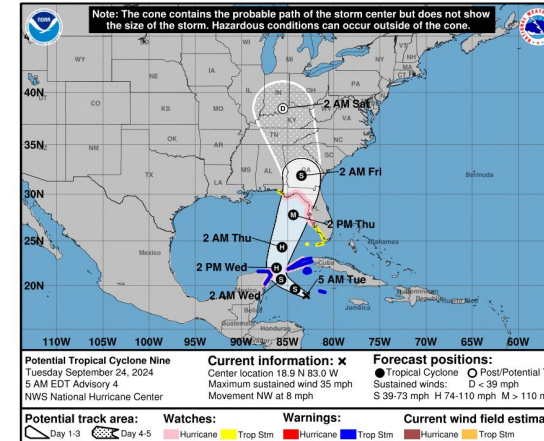


Post-tropical Cyclone



Potential Tropical Cyclone Advisories

- NHC text and graphical products issued at regular advisory times before a tropical cyclone has actually formed
- Can be issued **up to 72 h** before the anticipated arrival of storm surge or tropical-storm-force winds on land
- Enable NHC to issue Tropical Storm, Hurricane, and Storm Surge Watches and Warnings for developing systems

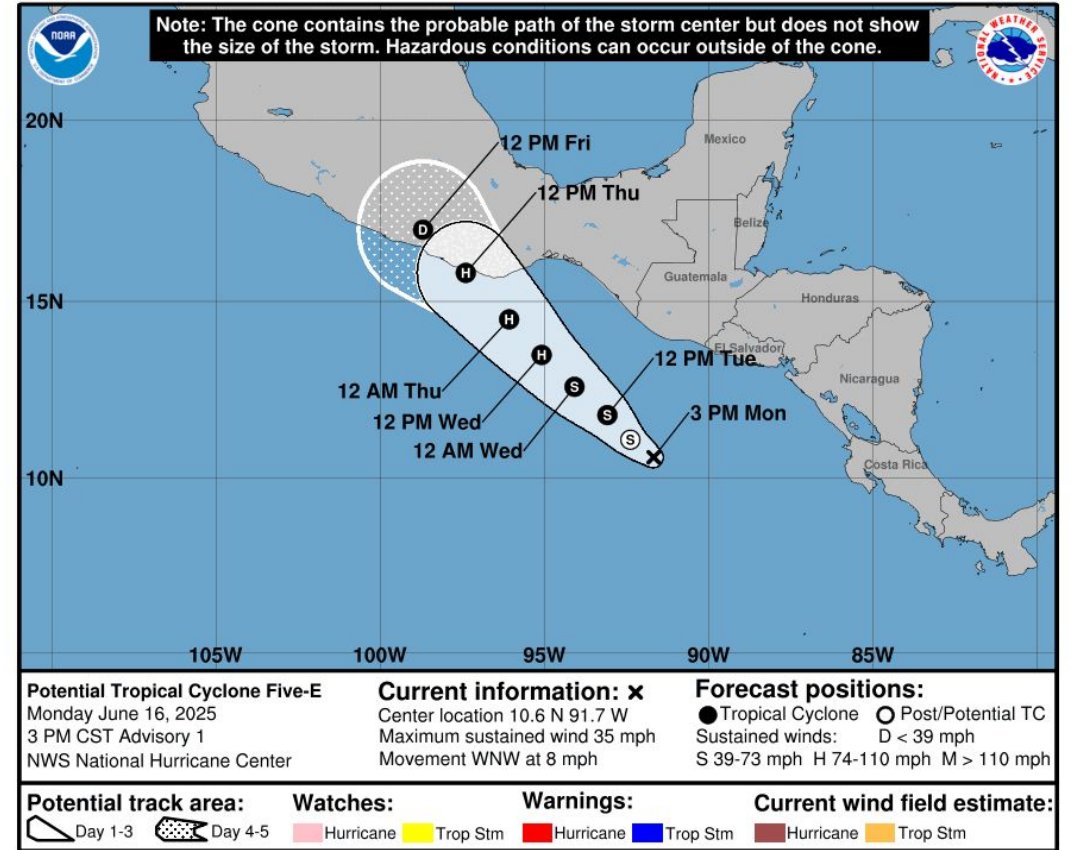
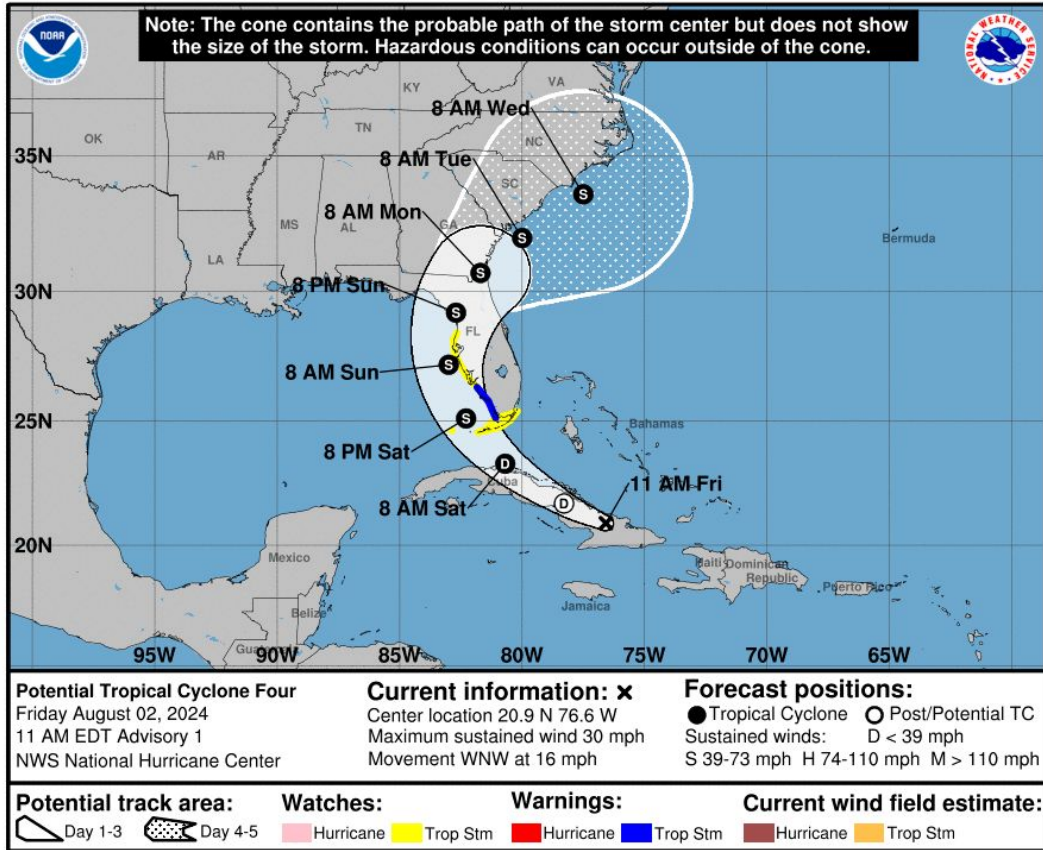


Key Messages for Potential Tropical Cyclone Nine
Advisory 4: 5:00 AM EDT Tue Sep 24, 2024

- The disturbance is forecast to intensify and be near hurricane strength when it reaches the far northwestern Caribbean Sea early Wednesday. Tropical storm conditions are expected over portions of western Cuba and the northeastern coast of the Yucatan Peninsula with hurricane conditions possible.
- The system is expected to intensify into a major hurricane before it approaches the northeastern Gulf Coast on Thursday, and the potential for life-threatening storm surge and damaging hurricane-force winds along the coast of the Florida Panhandle and the Florida west gulf coast is increasing. Hurricane and Storm Surge Watches have been issued, and residents should ensure they have their hurricane plan in place, and also follow advice given by local officials.
- Potential Tropical Cyclone Nine will bring heavy rain to portions of the western Caribbean, which will cause considerable flooding and mudslides across western Cuba. Heavy rainfall will likely result in locally considerable flash and urban flooding across portions of Florida, with isolated flash and urban flooding possible across the Southeast, Southern Appalachians, and the Tennessee Valley Wednesday through Friday. Minor to isolated moderate river flooding will be possible.

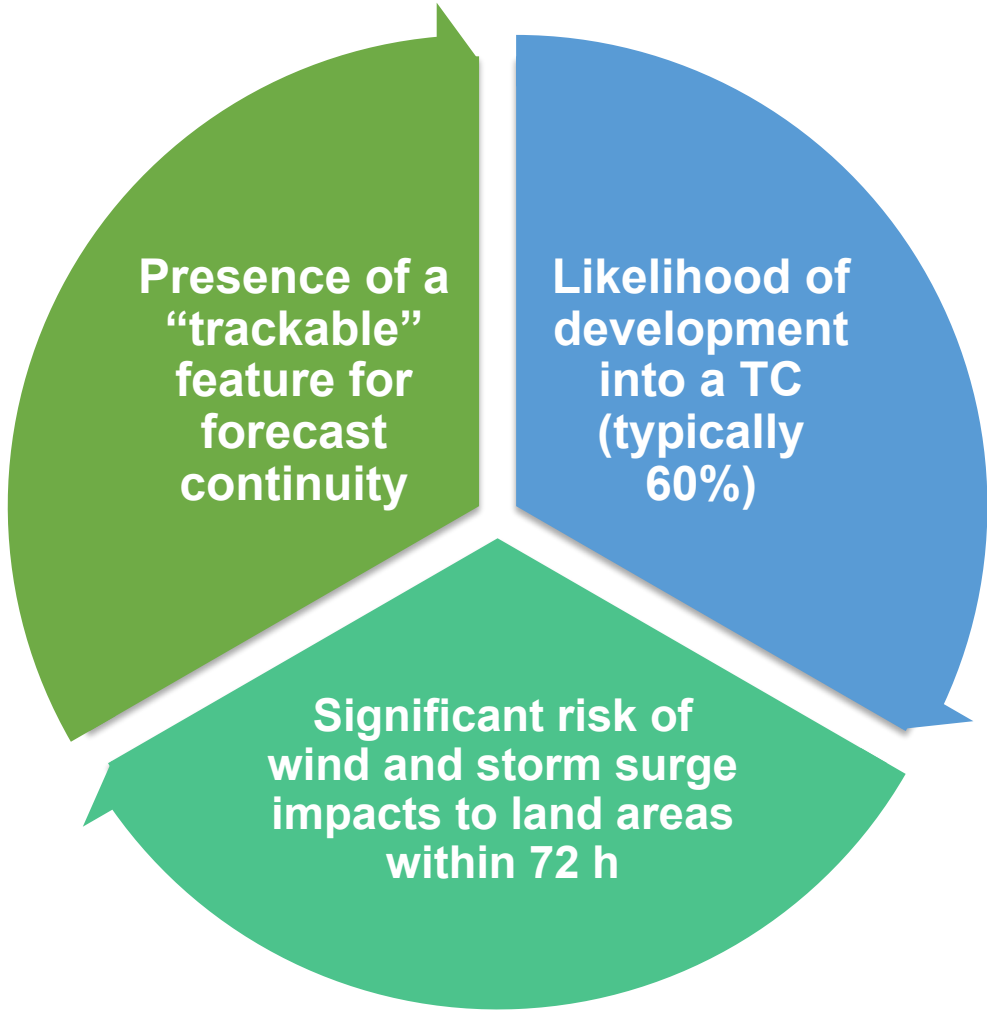
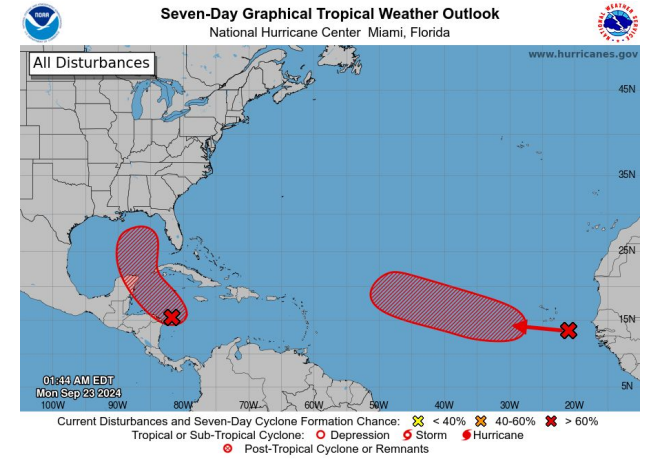
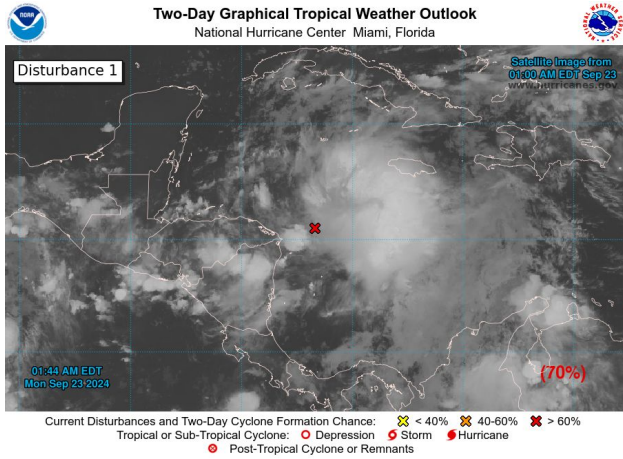
For more information go to hurricanes.gov

Potential Tropical Cyclone Advisories





PTC advisories can now be issued regardless of the immediate need for land-based watches or warnings.

Potential Tropical Cyclone Considerations



Potential Tropical Cyclone Benefits

- Ensures consistent messaging and avoids switching warning types
- Allows for longer lead times when confidence is high for a significant risk of wind & storm surge impacts
- Focuses on what matters to you – the hazards and potential impacts



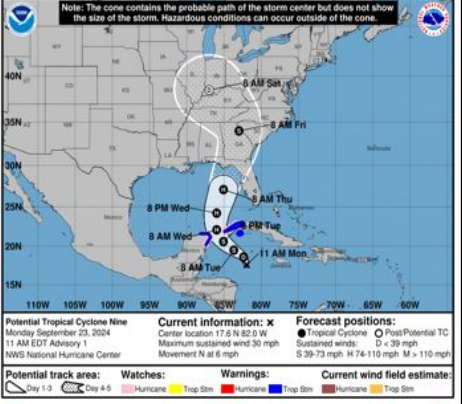
Key Messages for Potential Tropical Cyclone Nine

Advisory 1: 11:00 AM EDT Mon Sep 23, 2024

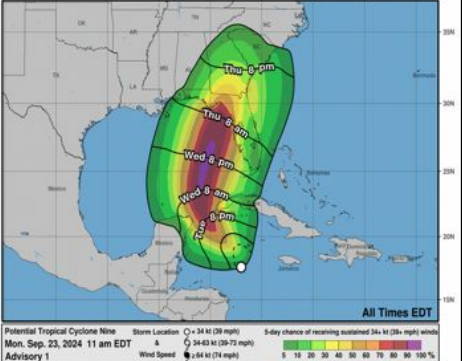
1. The disturbance is forecast to strengthen and be near hurricane strength when it reaches the far northwestern Caribbean Sea Tuesday night. Tropical storm conditions are expected over portions of western Cuba and the northeastern coast of the Yucatan Peninsula with hurricane conditions possible.

2. The system is expected to intensify while it moves northward over the eastern Gulf of Mexico, and it could be a major hurricane when it reaches the northeastern Gulf Coast on Thursday. There is an increasing risk of life-threatening storm surge and damaging hurricane-force winds along portions of the northern and northeastern Gulf Coast, including the Florida Panhandle and portions of the Florida west coast. Although it is too soon to specify the exact location and magnitude of impacts, residents in these areas should monitor the latest forecast updates and ensure that they have their hurricane plan in place.

3. Potential Tropical Cyclone Nine will bring heavy rain to portions of the western Caribbean which may lead to flooding and possible mudslides in western Cuba.



Most Likely Arrival Time of Tropical-Storm-Force Winds



For more information go to hurricanes.gov

Poll Question #2 (Placeholder)

How often do Atlantic PTCs go on to become tropical cyclones?

50%

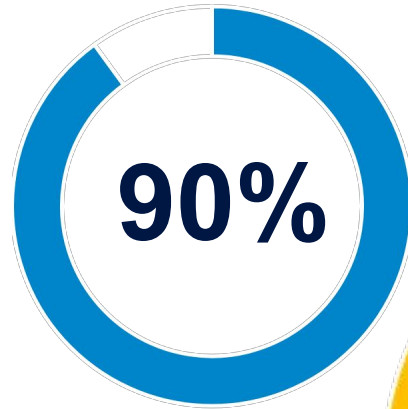
75%

90%

100%

Potential Tropical Cyclone Quick Facts

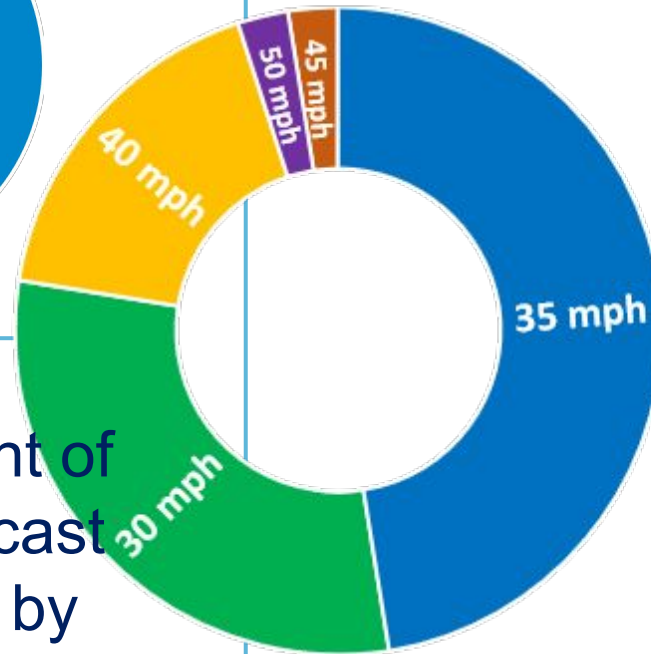
How often do Atlantic PTCs become tropical cyclones?



20 hours

Average amount of advanced forecast time provided by PTC advisories

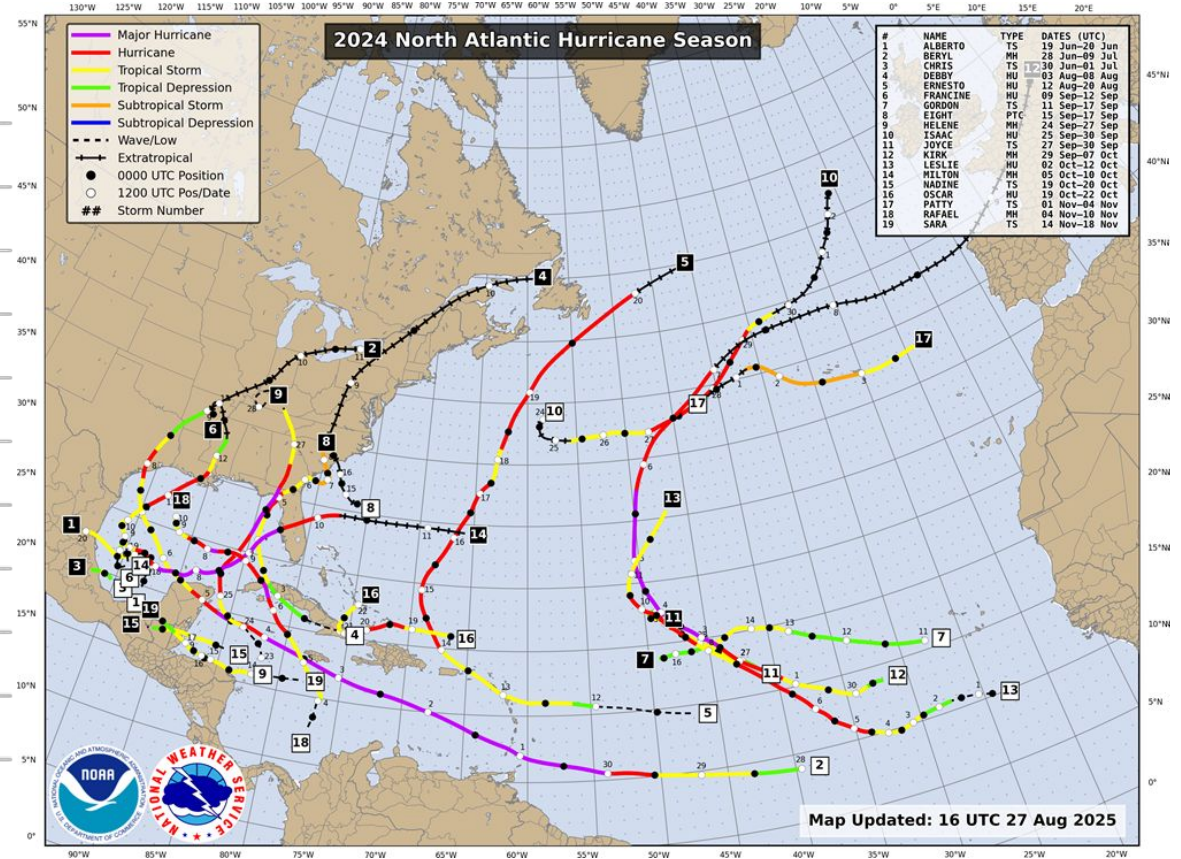
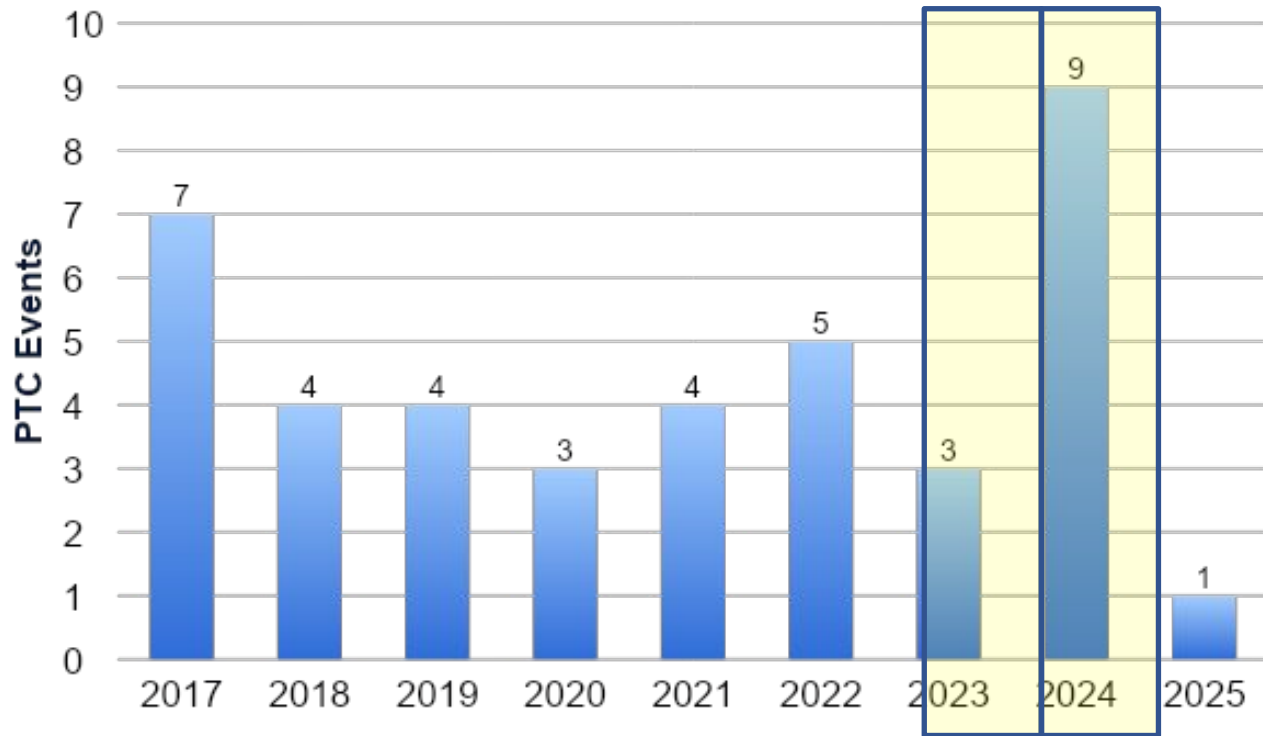
What is the initial intensity of PTCs?
(2017-2025; 40 Atlantic cases)



23% of PTC disturbances are already producing TS-force winds.

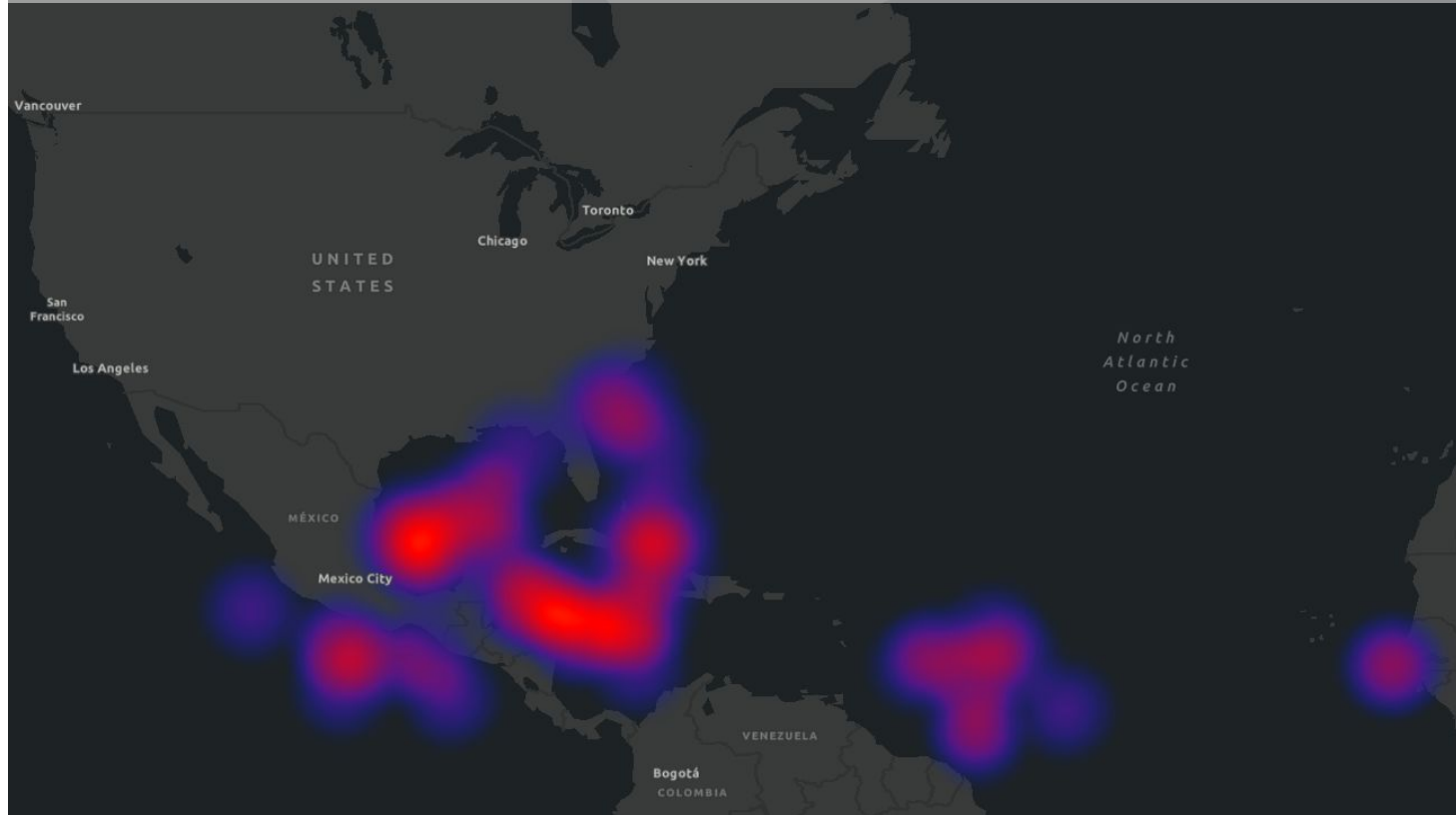
Potential Tropical Cyclone Quick Facts

How many Atlantic systems are started with PTC advisories?



Potential Tropical Cyclone Locations

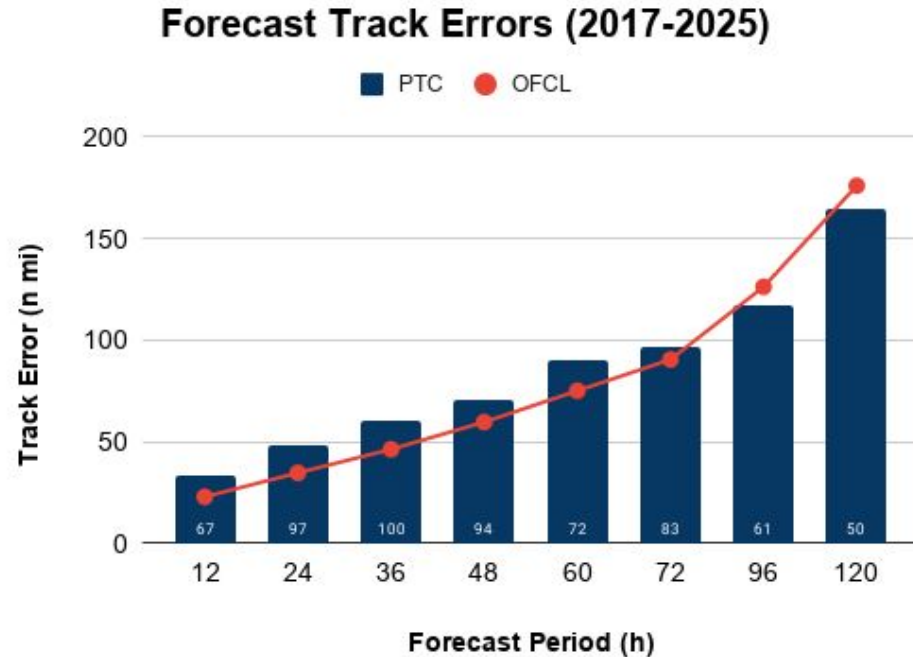
Heat Map of Initial PTC Advisory Locations (2017-2025)



Where are PTC advisories more likely to be started?

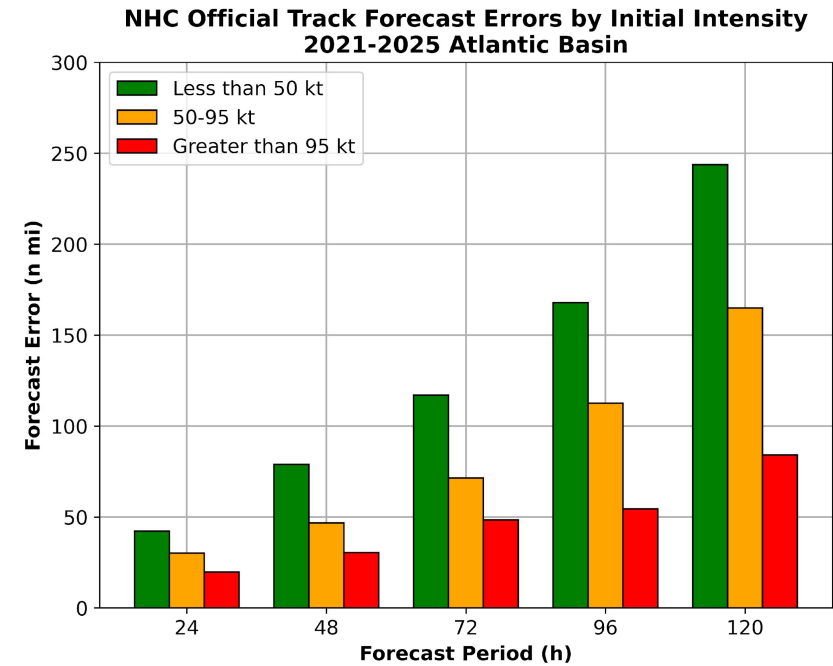
- Western Caribbean
- Southwestern Gulf
- Offshore of the SE U.S.
- Central Atlantic

How good are PTC track forecasts?



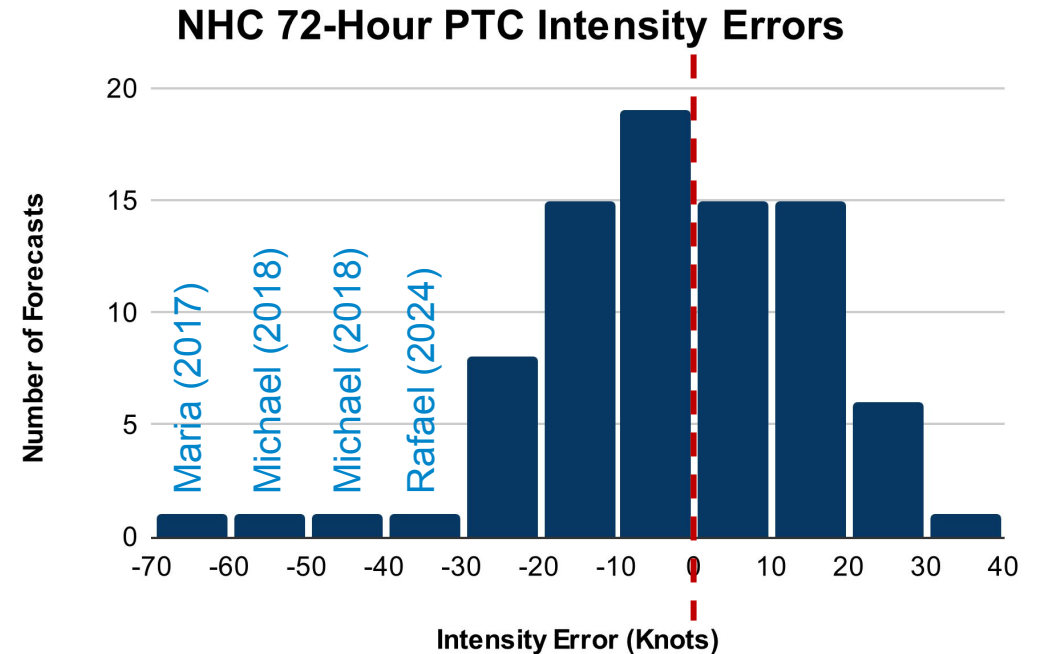
Average PTC track errors are larger than our overall OFCL track errors from 12–72 h.

- Why? PTCs are poorly organized and lack a well-defined center
- Center re-formations often occur



Overall, we see larger track errors for weaker systems (< 50 kt, green) than for major hurricanes (> 95 kt, red).

How good are PTC intensity forecasts?



Average PTC intensity errors are smaller than OFCL intensity errors from 12–48 h, but larger than OFCL from 72–120 h.

- Why? Disturbances are initially weaker
- Long-range forecasts tend to be more conservative due to higher uncertainty

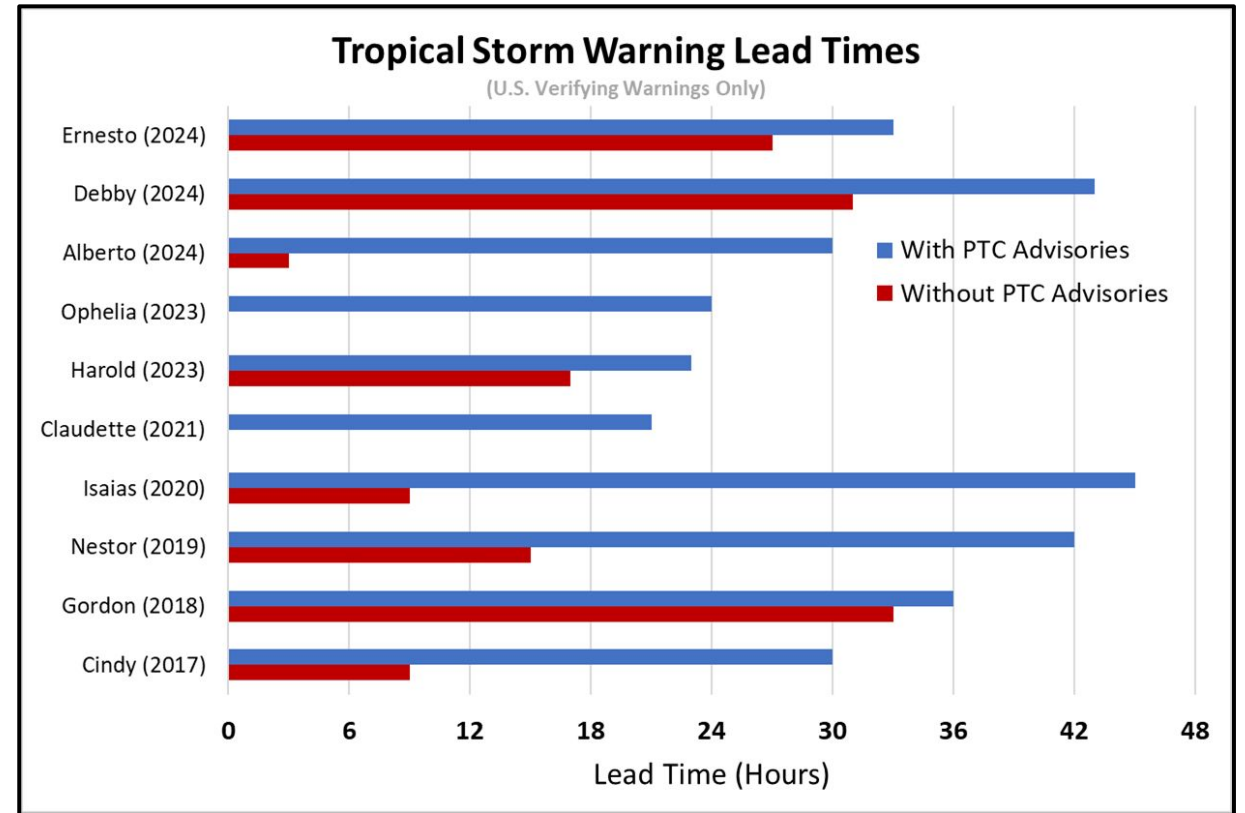
At Days 3–5 (72–120 h), PTC intensity forecasts tend to have a low bias with a few extreme outliers.

PTC Warning Lead Times

How much extra lead time* has been provided with PTC advisories?

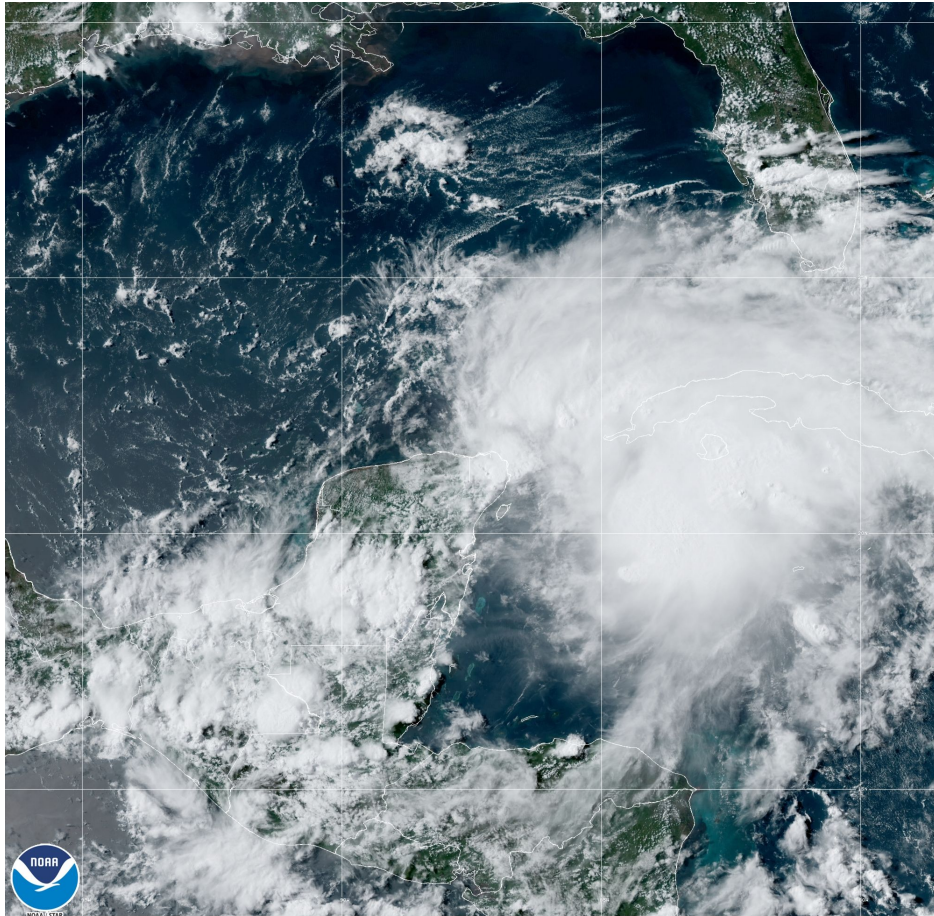
**Lead Time = Time between warning issuance and when sustained tropical-storm-force winds began on land*

- Verified TS Warnings that were issued with PTC advisories provided on average an extra **18 h** of lead time.

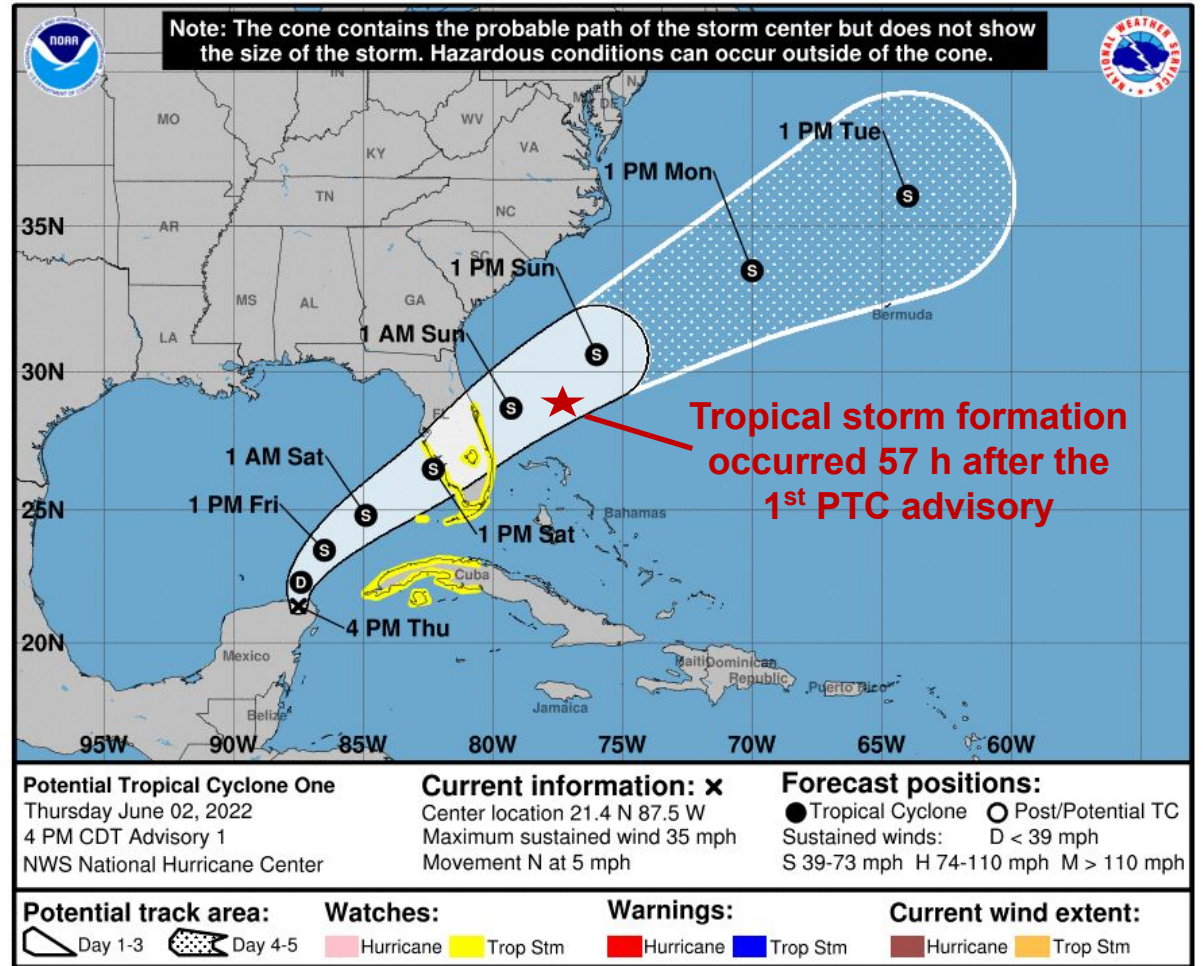


Post-analysis lead times from NHC Tropical Cyclone Reports

Potential Tropical Cyclone One (2022)



02 Jun 2022 21:00Z NOAA/NESDIS/STAR GOES-East ABI GEOCOLOR



Potential Tropical Cyclone One (2022)

PTC One dropped nearly a foot of rain over South Florida, widespread flooding continues



Potential Tropical Cyclone Nine (2024)

- Initially, Tropical Storm Warnings & Hurricane Watches were issued for portions of Mexico and Cuba.
- Storm Surge, Hurricane & Tropical Storm Watches were later issued for Florida during the PTC phase.
- This was the first time that we predicted a PTC disturbance to strengthen into a major hurricane.

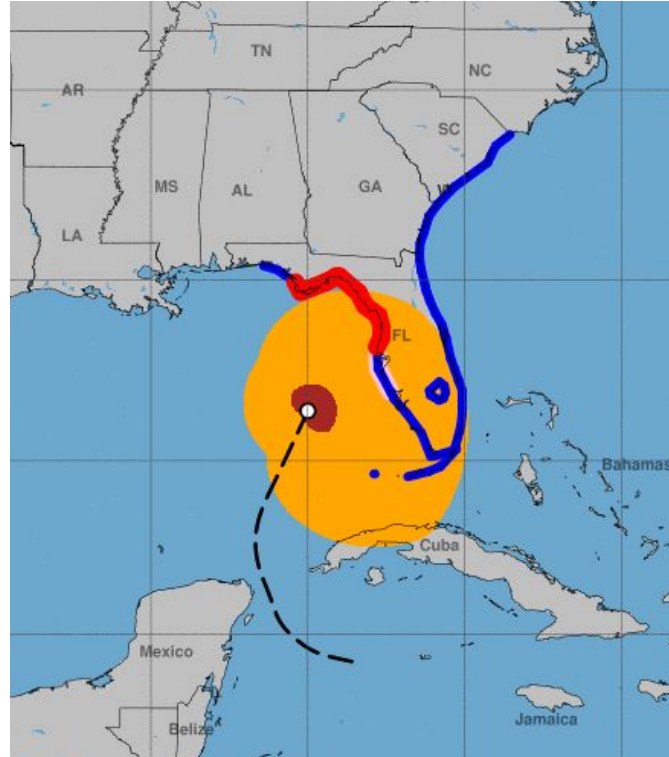


Hurricane Helene (2024)



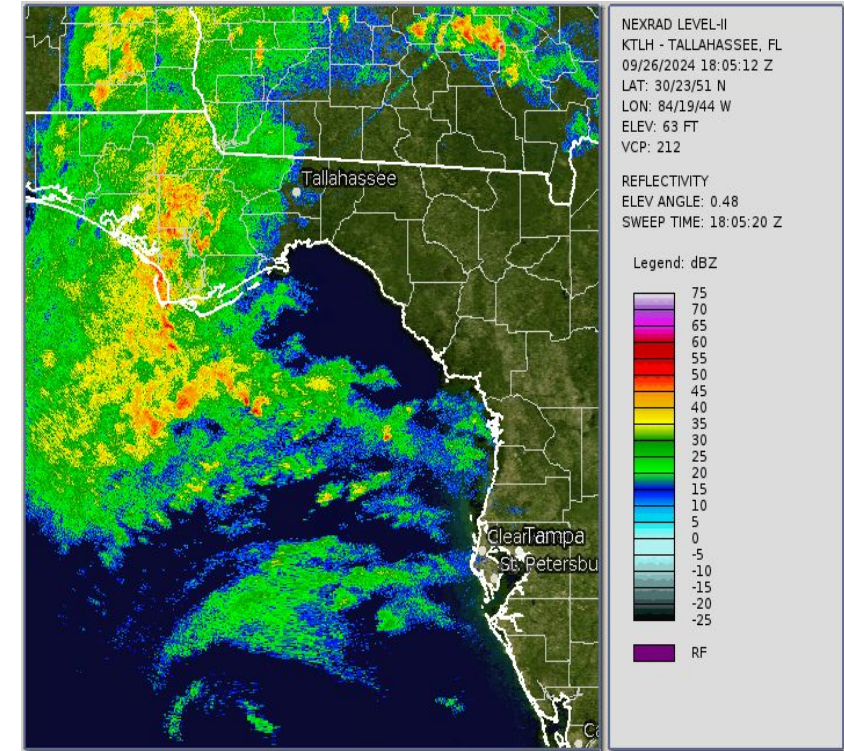
25 Sep 2024 15:00Z - NOAA/NESDIS/STAR GOES-East - GEOCOLOR Composite - HU Helene

Helene strengthened into a hurricane just 48 h after the first PTC advisory.



Helene grew in size and rapidly intensified offshore of Tampa Bay.

Image courtesy: Brian McNoldy, Univ. of Miami



Helene made landfall as a major hurricane in the Florida Big Bend region.

Hurricane Helene (2024)

Dekle Beach, Florida

Photo credit: Paul Ratje, The New York Times



Near the landfall location, the [Hurricane Watch](#) provided 57 h of lead time before TS conditions began.

St. Petersburg, Florida

Photo credit: Max Chesnes, Tampa Bay Times



Near Tampa Bay, the [Storm Surge Watch](#) provided 60 h of lead time and prompted evacuations along the west coast of Florida.

Summary

PTC advisories are used to address the challenges posed by developing TCs near land.

Can provide forecast products up to 72 h before wind or storm surge impacts are anticipated on land

Increase watch and warning lead times to facilitate preparedness actions and decisions

Ensure consistent hazard messaging regardless of whether a system has formed yet

Questions?

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