



# What the Models Do and What they Don't Do

*John Cangialosi*

National Hurricane Center  
National Oceanic and Atmospheric Administration  
U.S. Department of Commerce

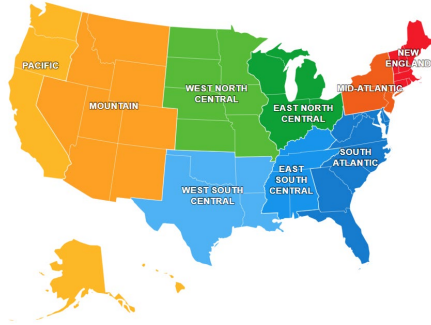
# What are the Weather Models?

## Global



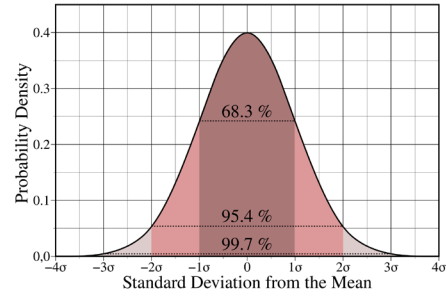
**GFS, ECMWF**  
Good for track,  
environment  
Not for intensity

## Regional



**HAFS, HWRF**  
Good for intensity  
Not as good for track

## Statistical



**SHIPS, LGEM**  
Good for  
environment/intensity  
Not used for track

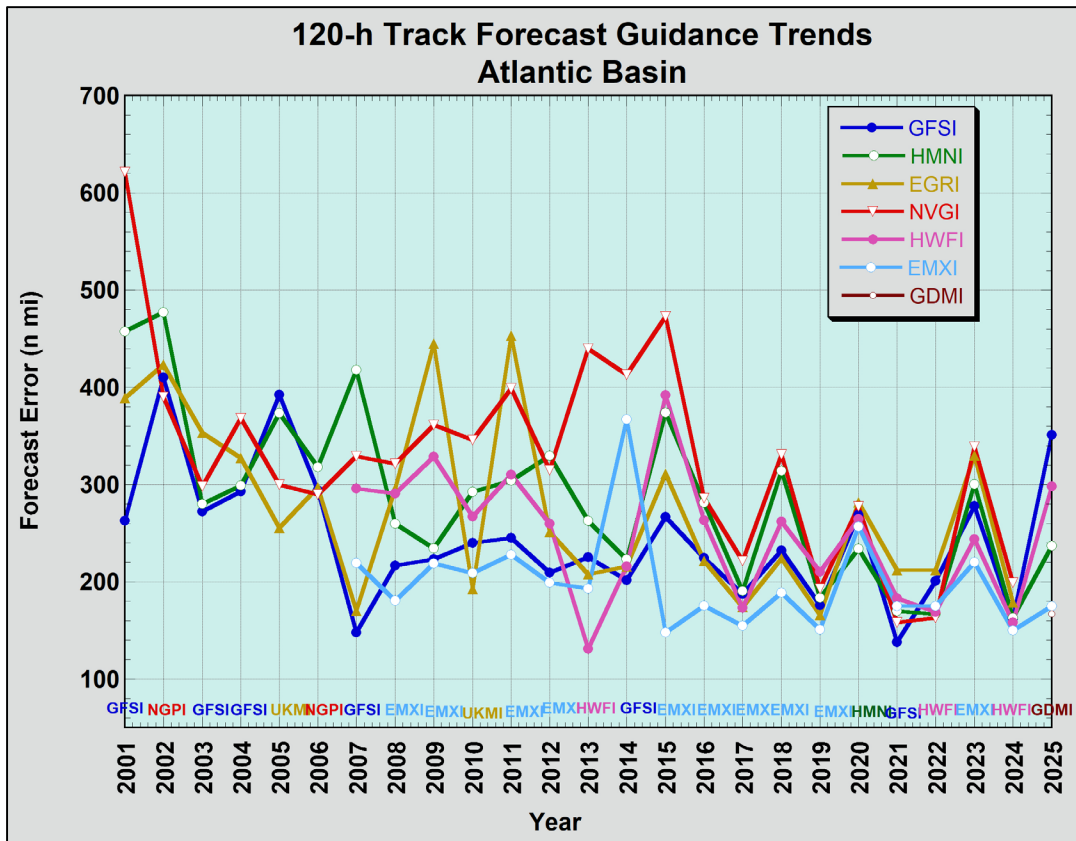
## AI



**GDM, ECAI**  
Good for track and  
intensity.  
Not good for analyzing  
environment

**Which model is the best one?  
Which one is going to win?**

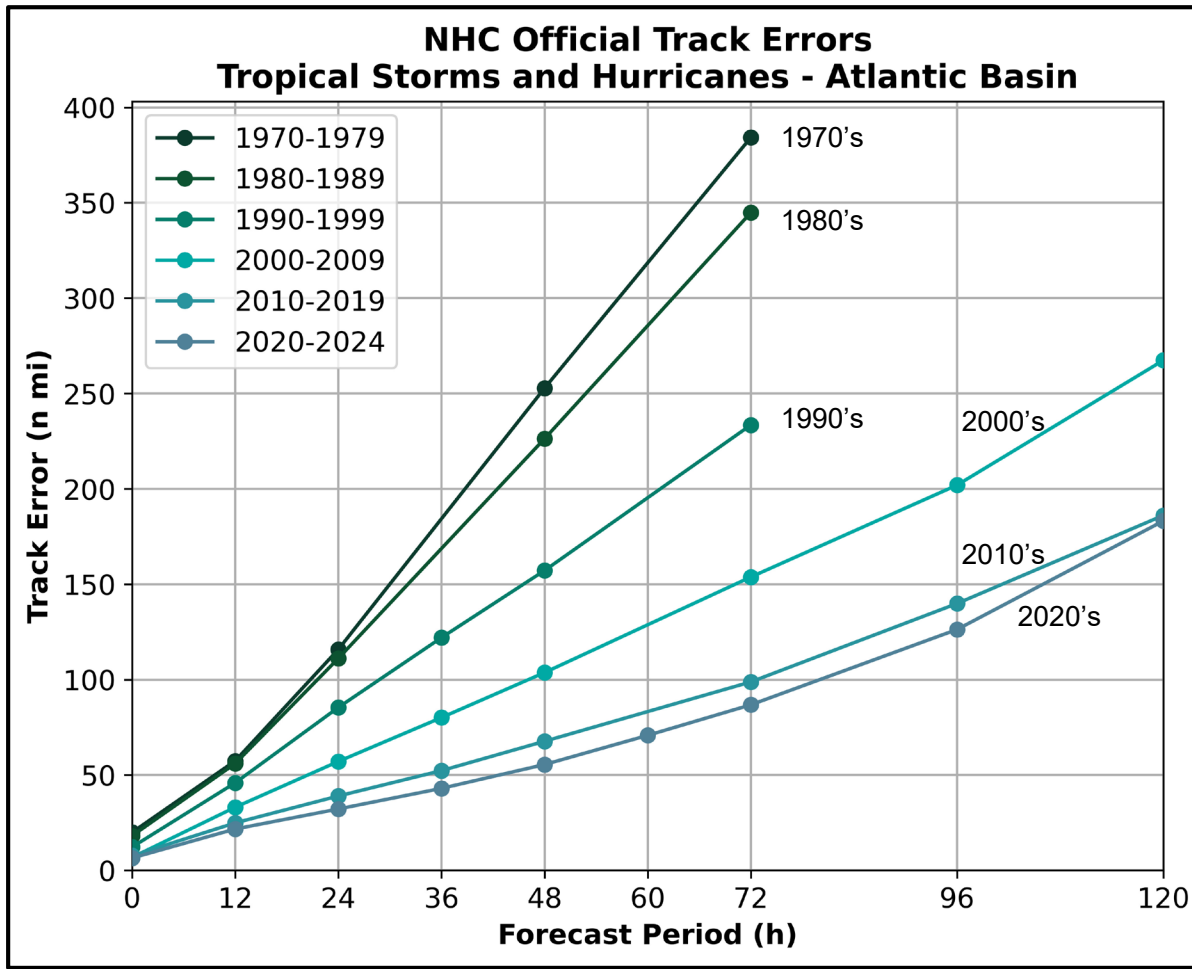
# 5-day Track Model (2001-25) – Atlantic Basin



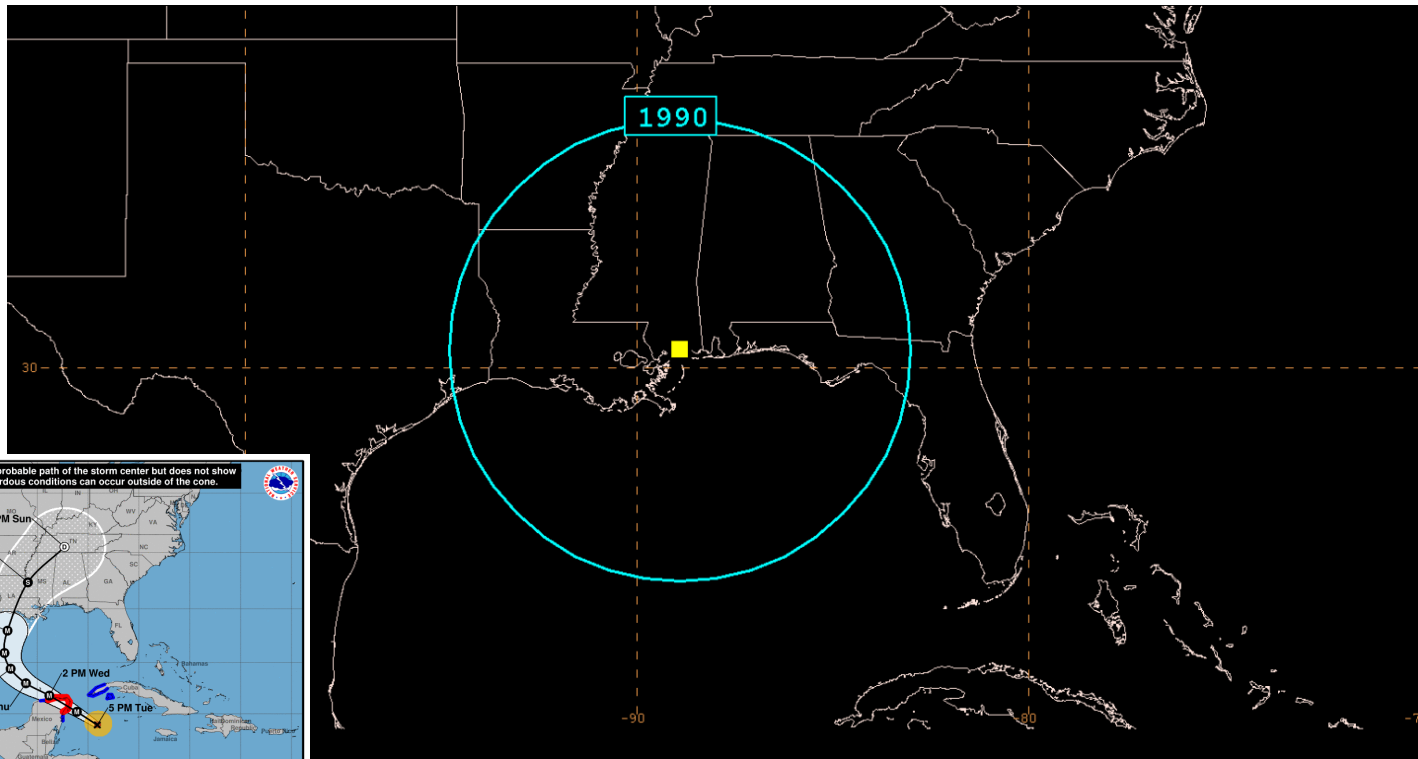
Due to model changes and other factors, the best performing model often varies from season to season

**The best guidance in terms of accuracy and consistency is NHC**

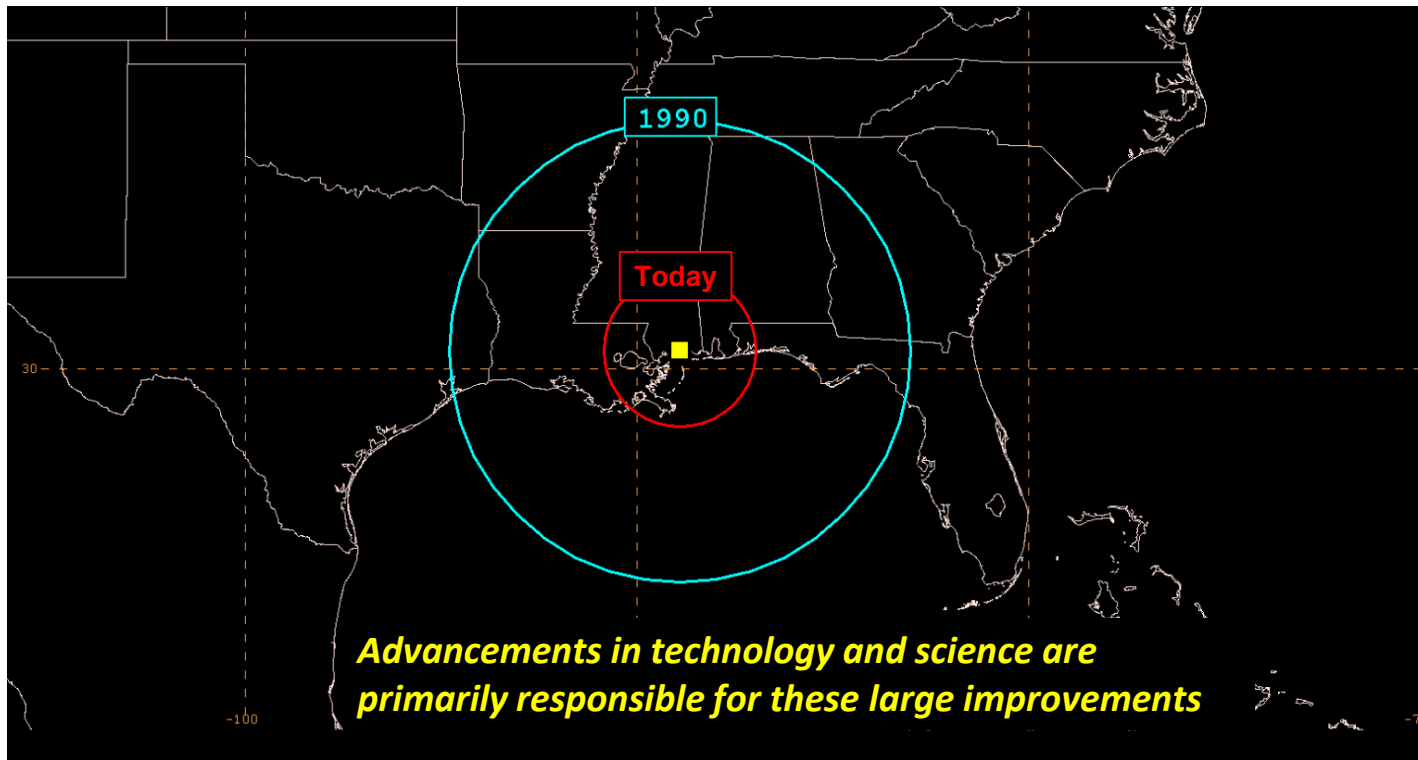
# Atlantic Track Error Trends



# 3-day NHC Average Track Error I

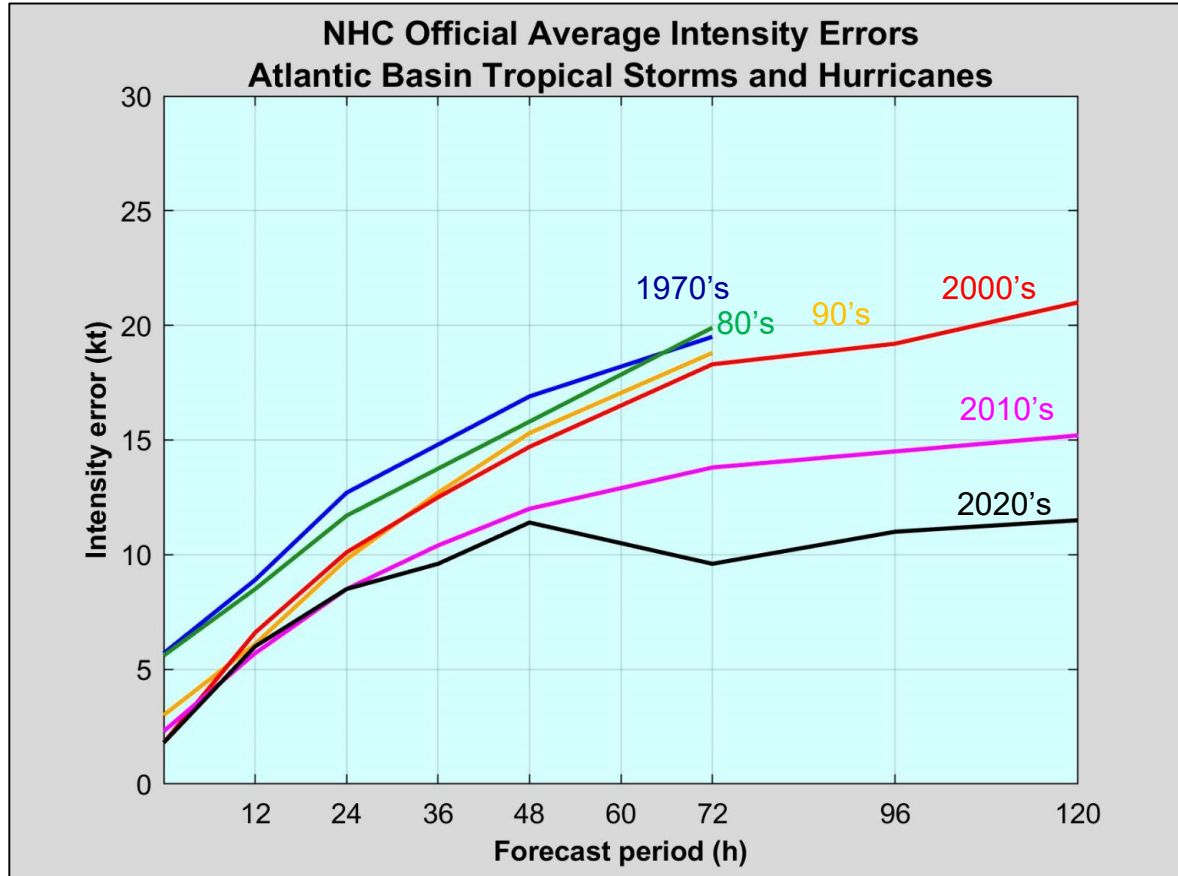


# 3-day NHC Average Track Error II

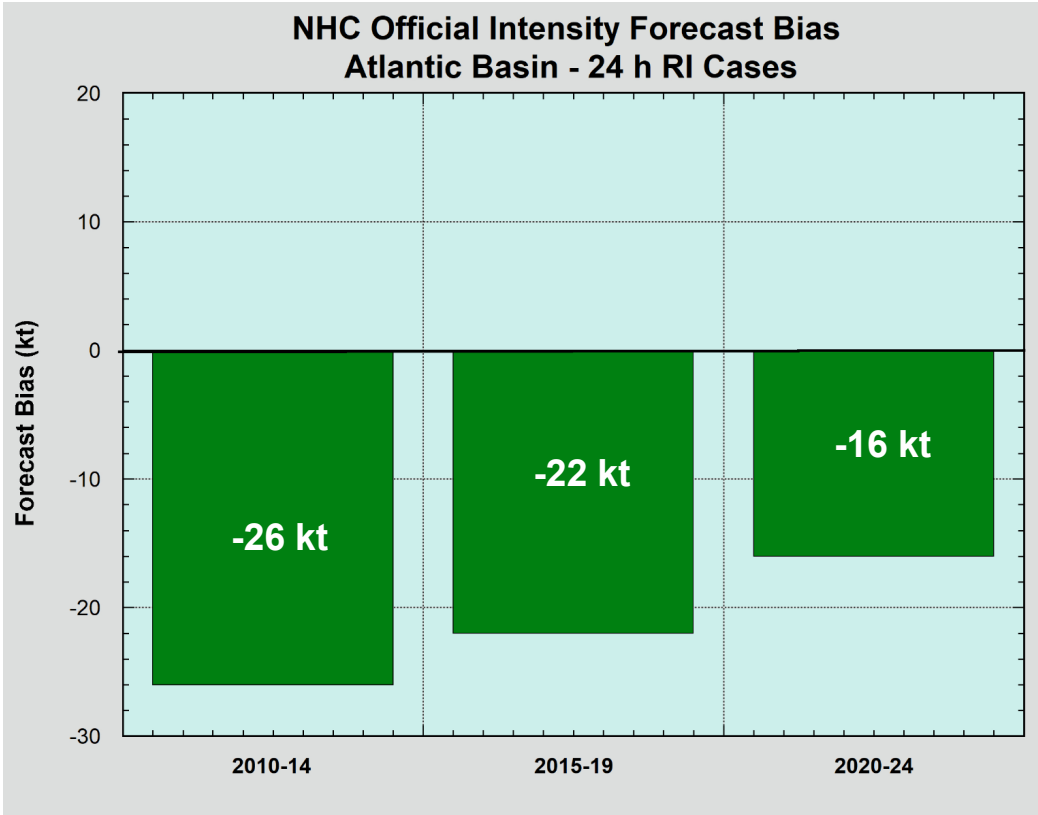


**NHC track errors are about 70% smaller today!**

# Atlantic Intensity Error Trends

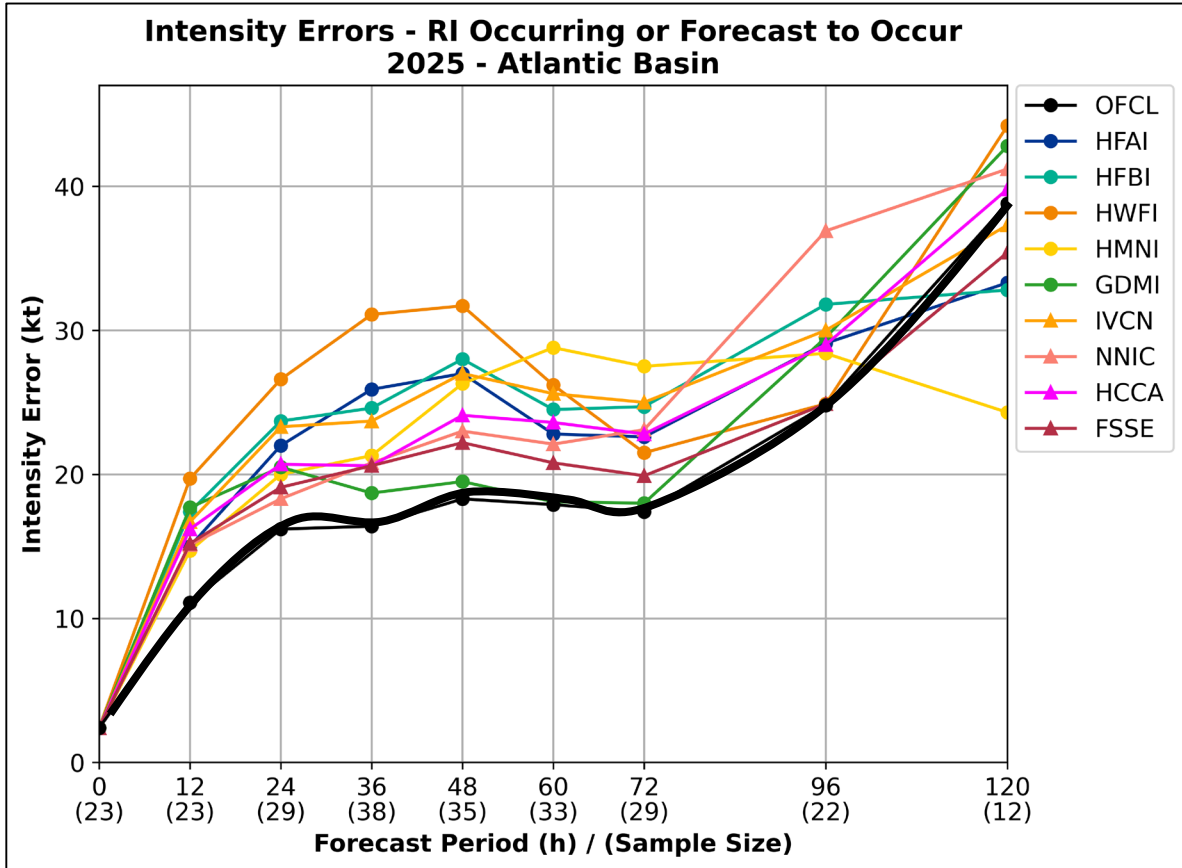


# Rapid Intensification Prediction - Trends



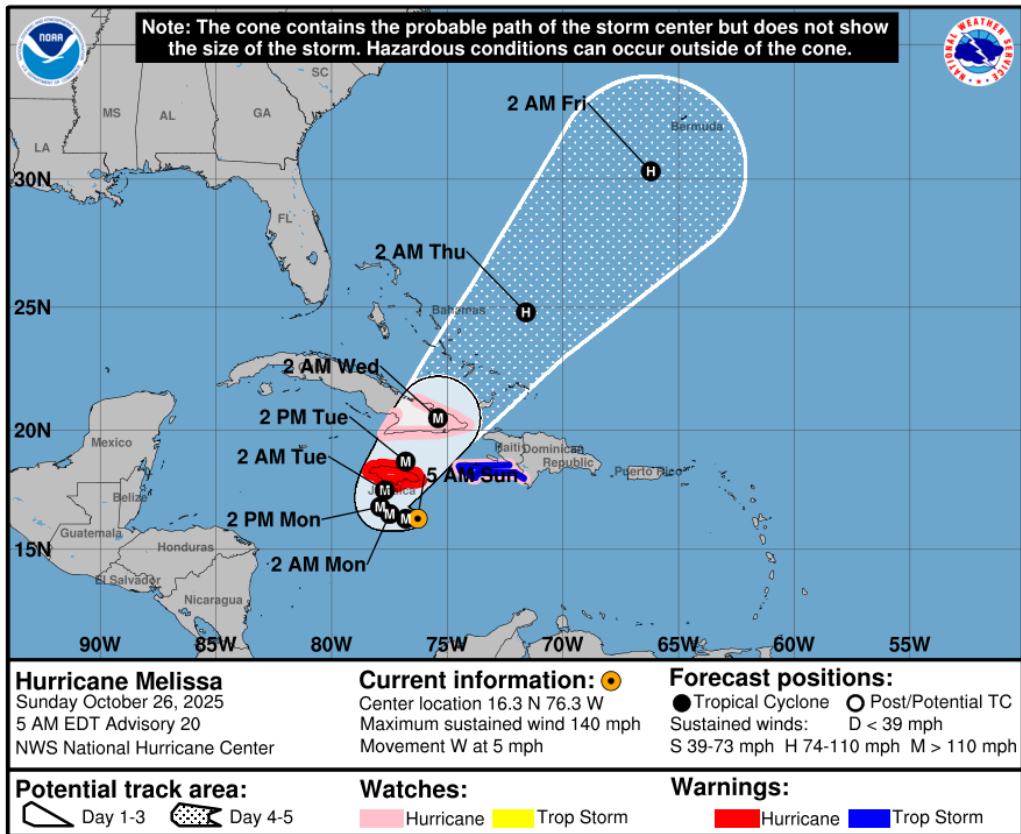
Trends are looking good at better predicting rapid intensification

# Rapid Intensification Cases – Atlantic Basin (2025)



NHC beat just about all of the models for the most challenging cases.

# Average Uncertainty



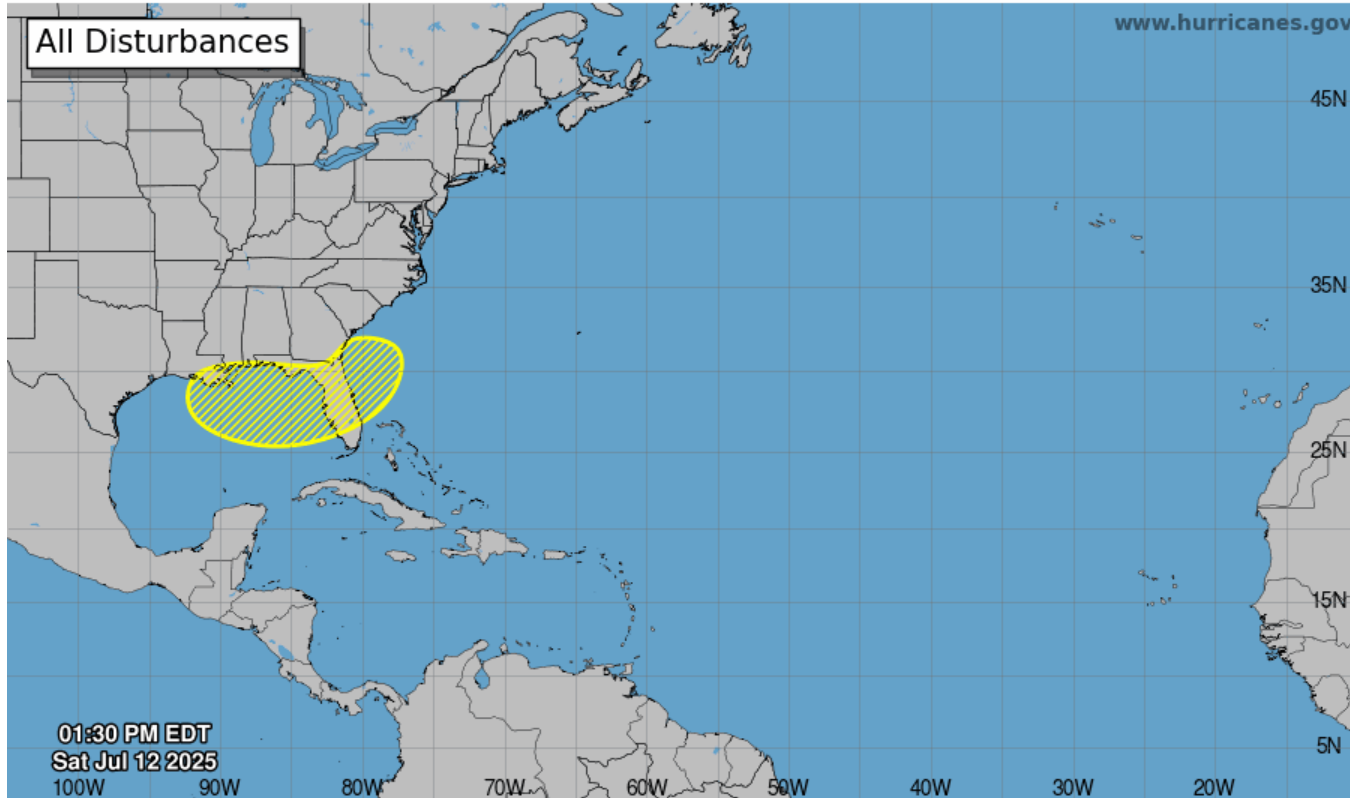
- **Track** – Average forecast is typically off by 30-40 miles per day
- **Intensity** – typically off by up to one Saffir-Simpson category

# Beware of Social Media Traps



# Seven-Day Graphical Tropical Weather Outlook

National Hurricane Center Miami, Florida

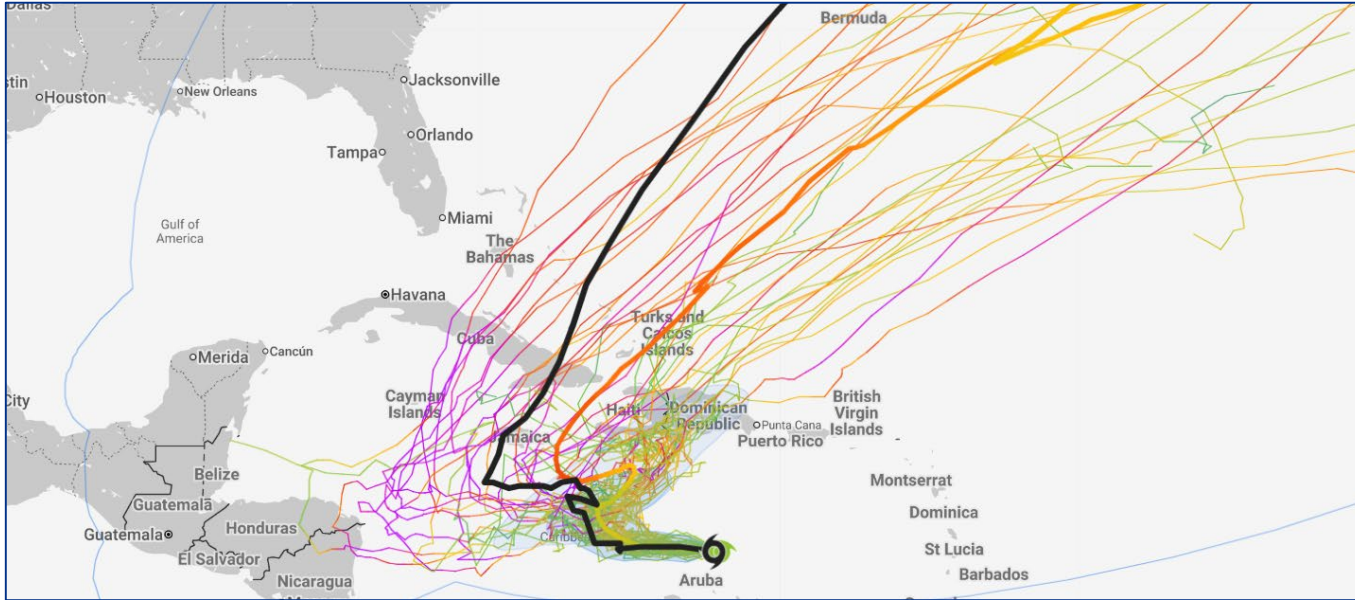


Current Disturbances and Seven-Day Cyclone Formation Chance: < 40% 40-60% > 60%  
Tropical or Sub-Tropical Cyclone: Depression Storm Hurricane  
 Post-Tropical Cyclone or Remnants

Department of Commerce | National Oceanic and Atmospheric Administration | weather.gov

**Throughout this period, NHC and NWS primarily focused on the rainfall threat and low to medium chance of a tropical depression forming, but some social media sources messaged something different...**

# AI Has All the Answers



Google Deep Mind Forecast (Melissa)

1 - Does this answer your questions?

2 - Is this enough information to make decisions from?



