

A satellite image of a large hurricane system over the ocean. The hurricane has a well-defined eye and a dense, swirling cloud structure. To the left, a portion of a coastline is visible, showing land and some smaller islands. The text "2019 NHC Forecast Challenges" is overlaid in white at the top center.

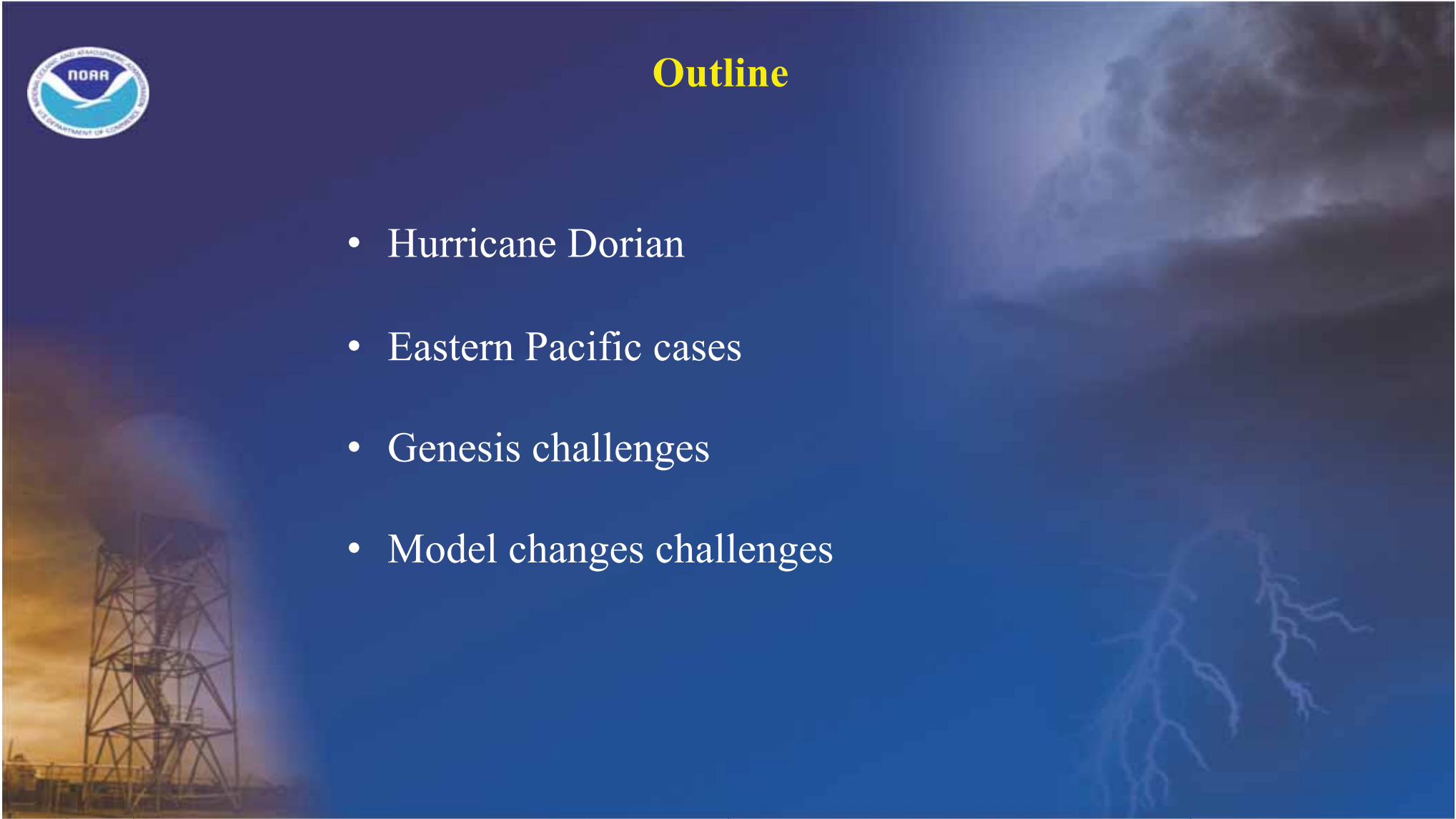
# 2019 NHC Forecast Challenges

Eric Blake  
NHC Hurricane Specialist  
HFIP Annual Meeting  
November 4, 2019



## Outline

- Hurricane Dorian
- Eastern Pacific cases
- Genesis challenges
- Model changes challenges

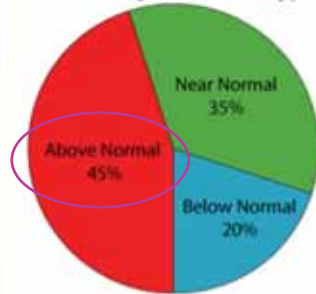




# NOAA's 2019 Atlantic Hurricane Season Outlooks

Updated Outlook Issued 8 August

Above-Normal Activity most likely  
Probability of Season Type



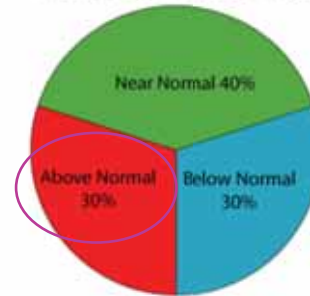
70% Probability For Each Range

August Update

Named Storms	10-17
Hurricanes	5-9
Major Hurricanes	2-4
ACE (% median)	85%-165%

Pre-Season Outlook Issued 23 May

Near-Normal Activity most likely  
Probability of Season Type



70% Probability For Each Range

May Outlook

Named Storms	9-15
Hurricanes	4-8
Major Hurricanes	2-4
ACE (% median)	65%-140%

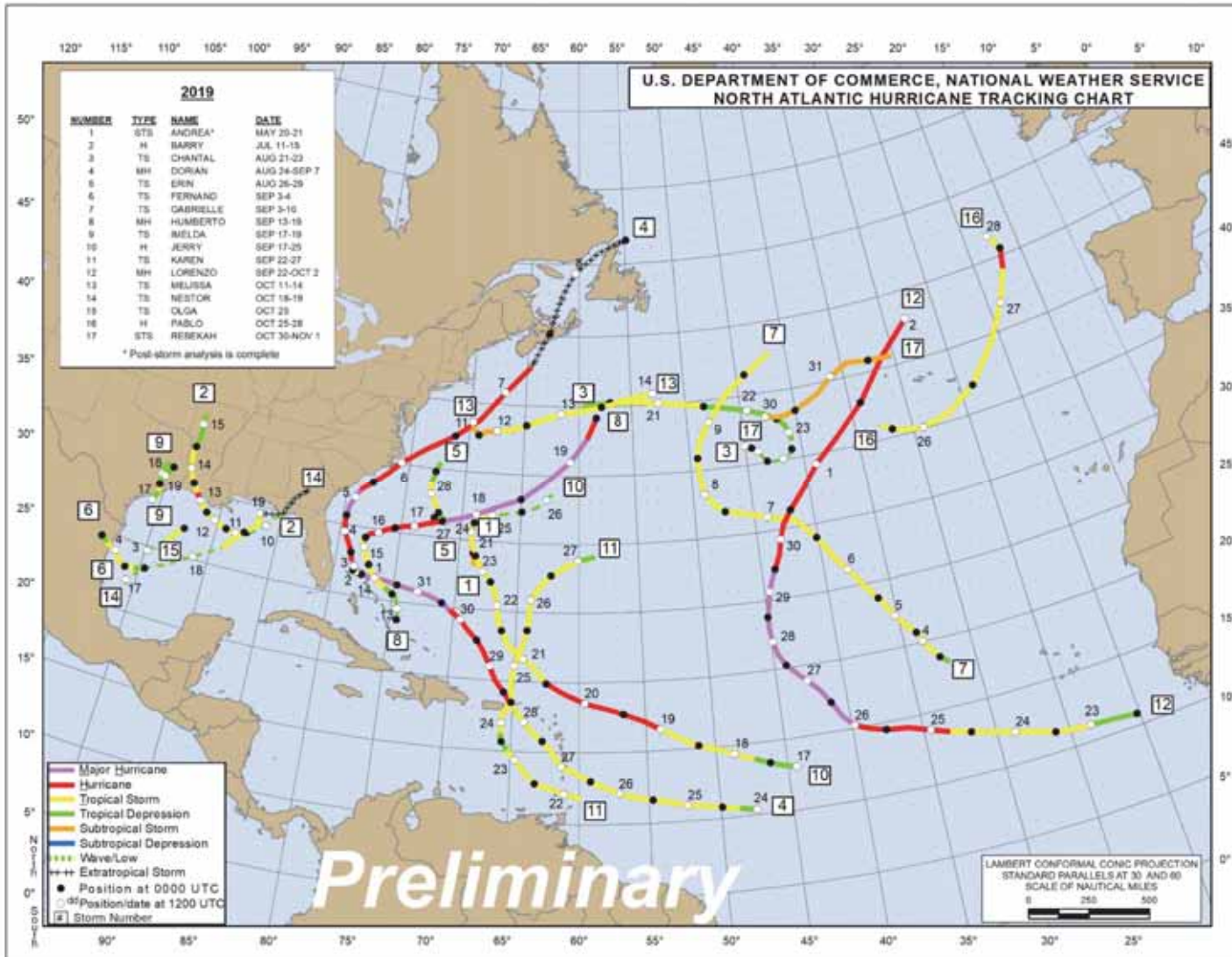
Actual:

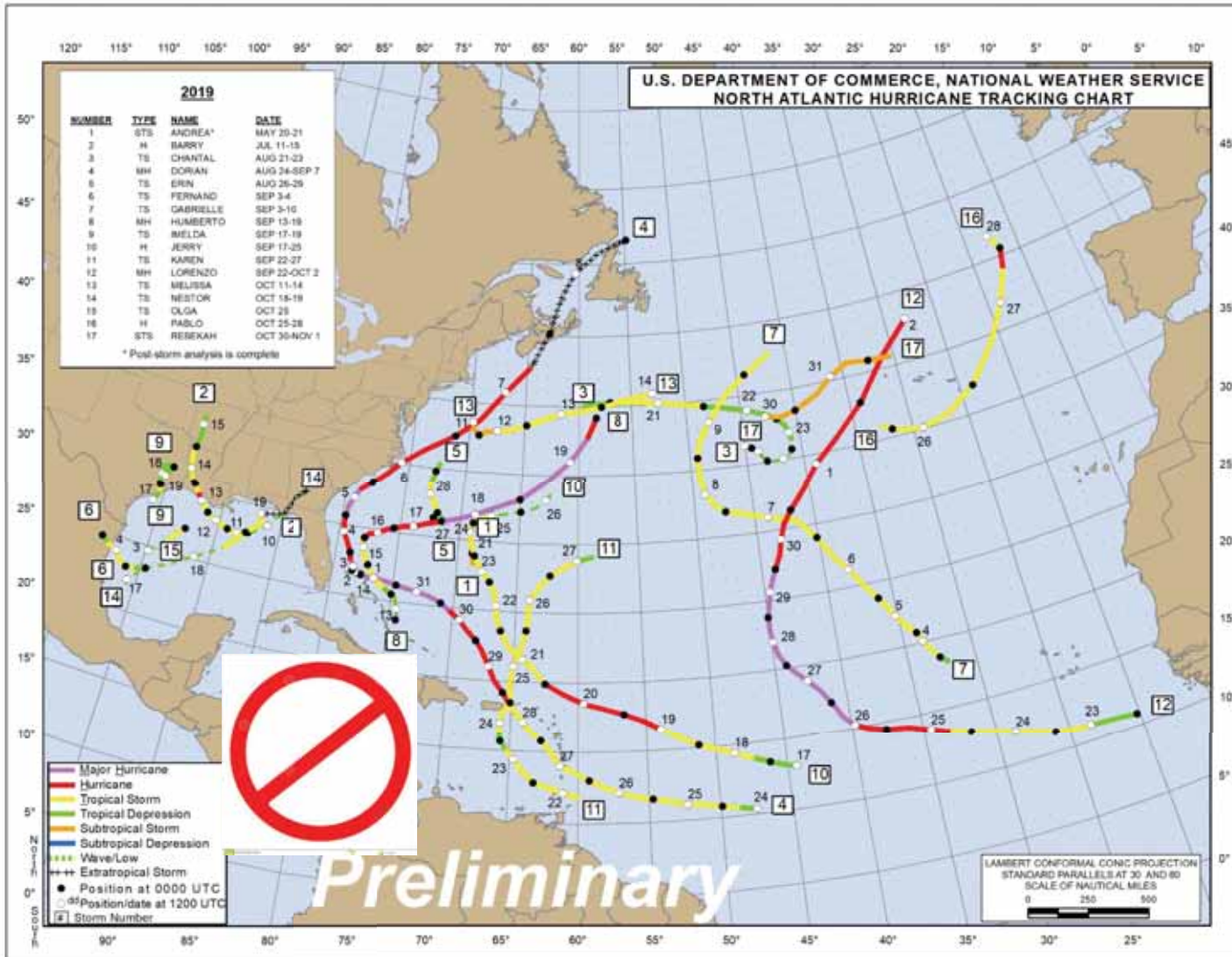
17

6

3

130





Lots of high-latitude activity, especially early/late season

Less than 12 h of total hurricane time in the Gulf of Mexico and Caribbean Sea combined

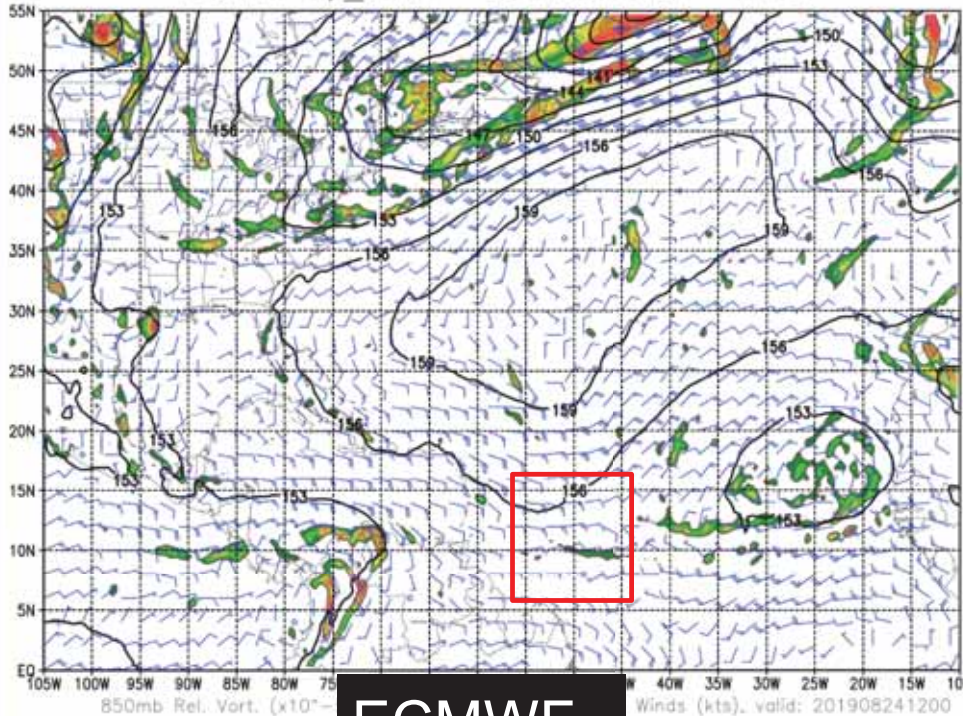
# Hurricane Dorian



# Dorian 5-day genesis models

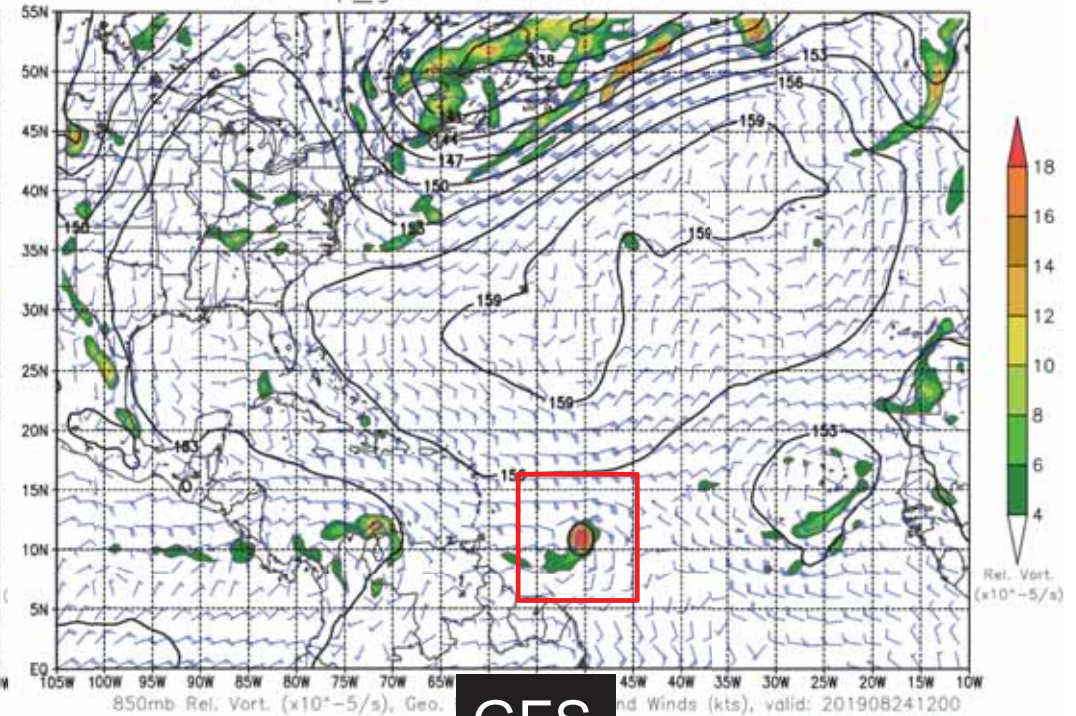
ECMWF had no clue while the GFS nailed it

ECMWF op\_emx - 2019081912 - F120



**ECMWF**

NCEP op\_gfs - 2019081912 - F120

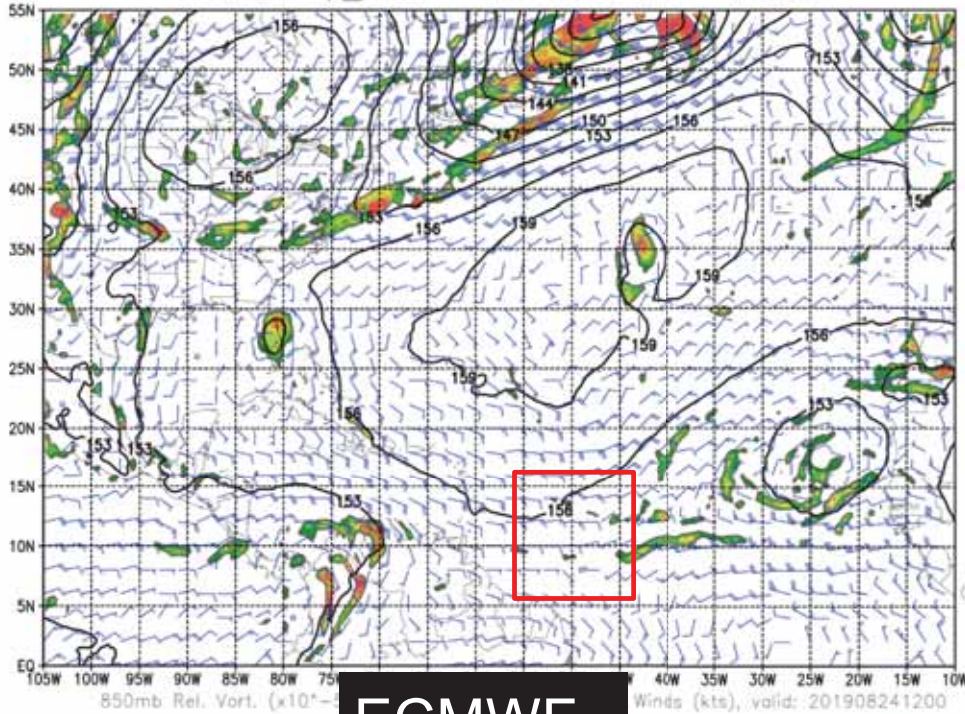


**GFS**

# Dorian 2-day genesis models

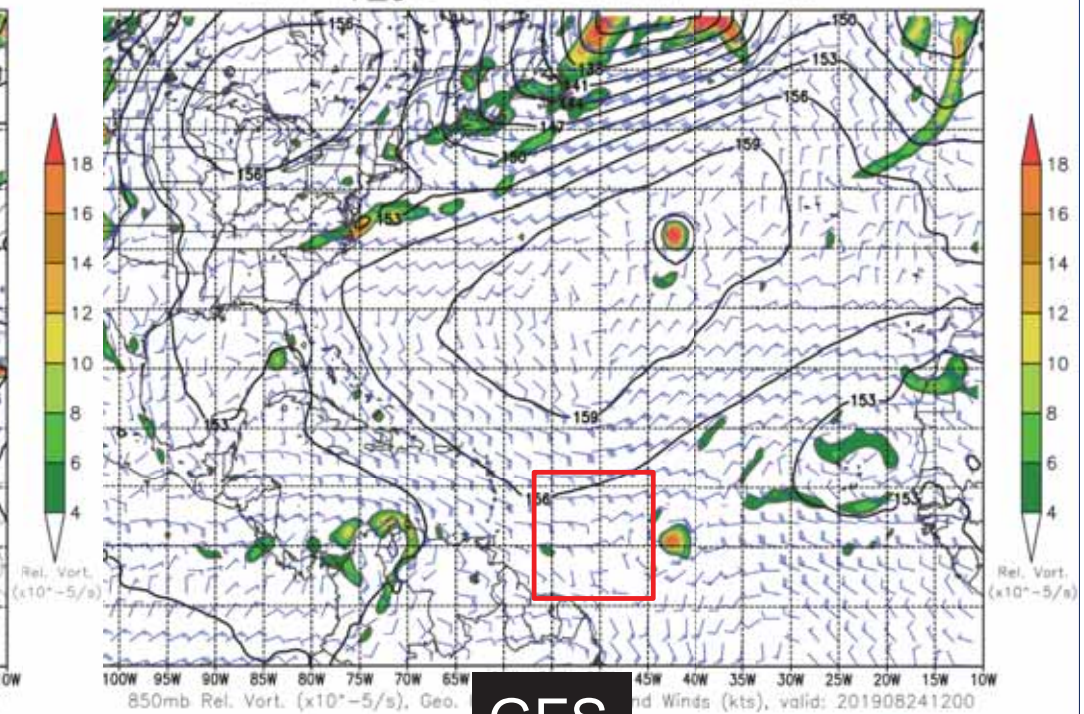
ECMWF still had no clue while the GFS weaker/too fast east

ECMWF op\_emx - 2019082212 - F048



**ECMWF**

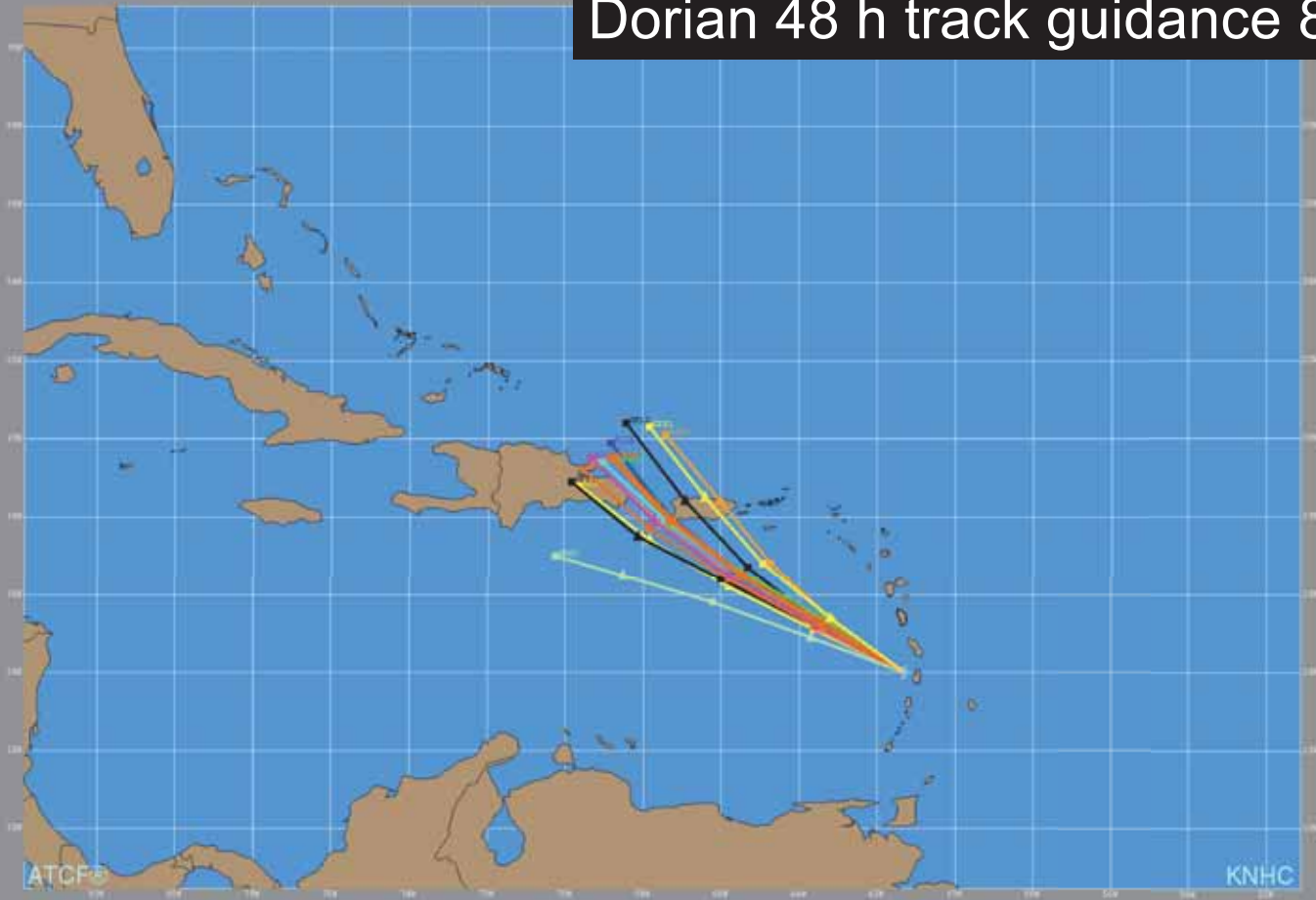
NCEP op\_gfs - 2019082212 - F048



**GFS**



# Dorian 48 h track guidance 8/27/12z



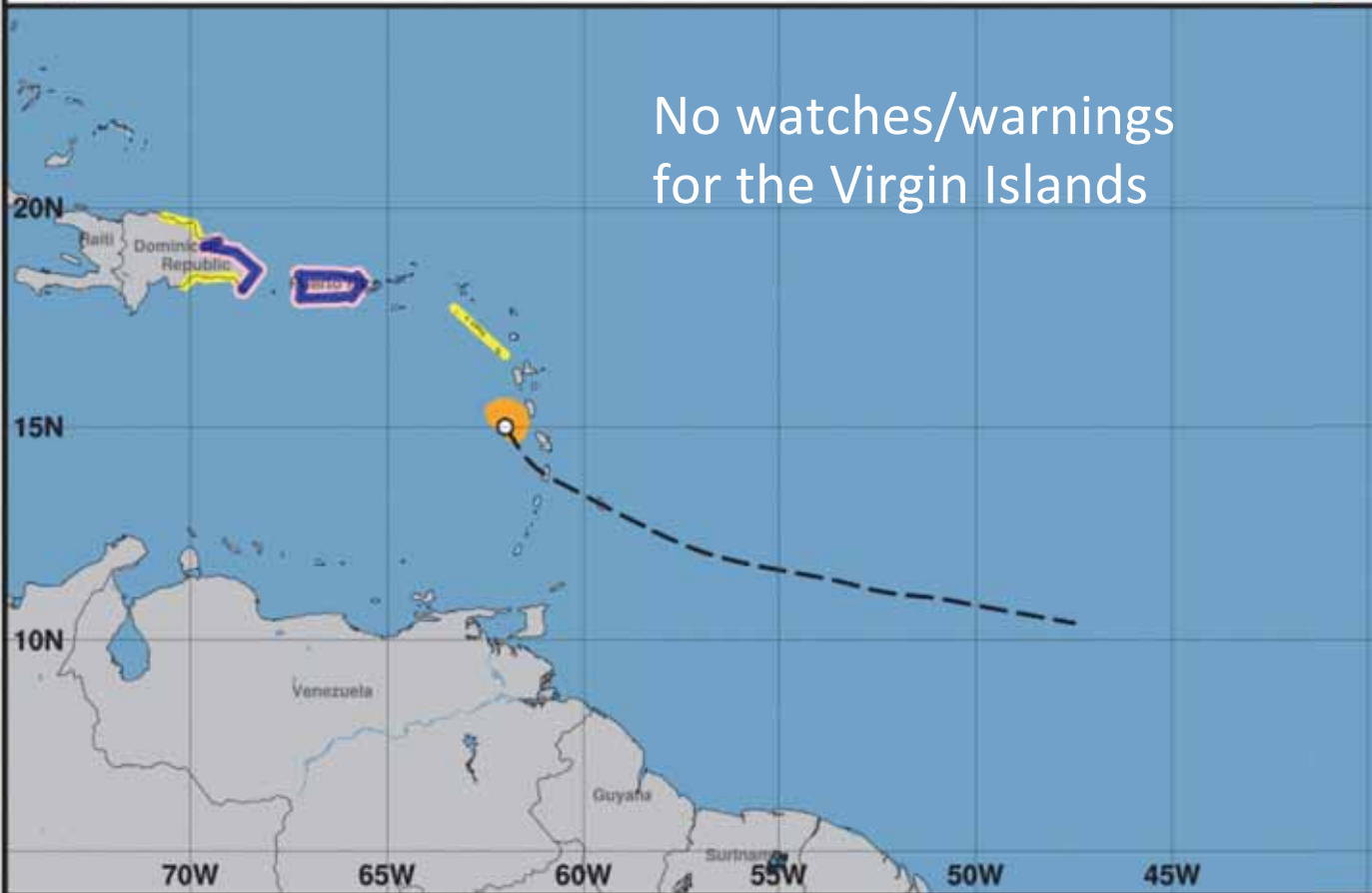


# Surface Wind Field of Tropical Storm Dorian

Sustained Winds as of 200 PM AST Tue Aug 27, 2019    Advisory Number 13A

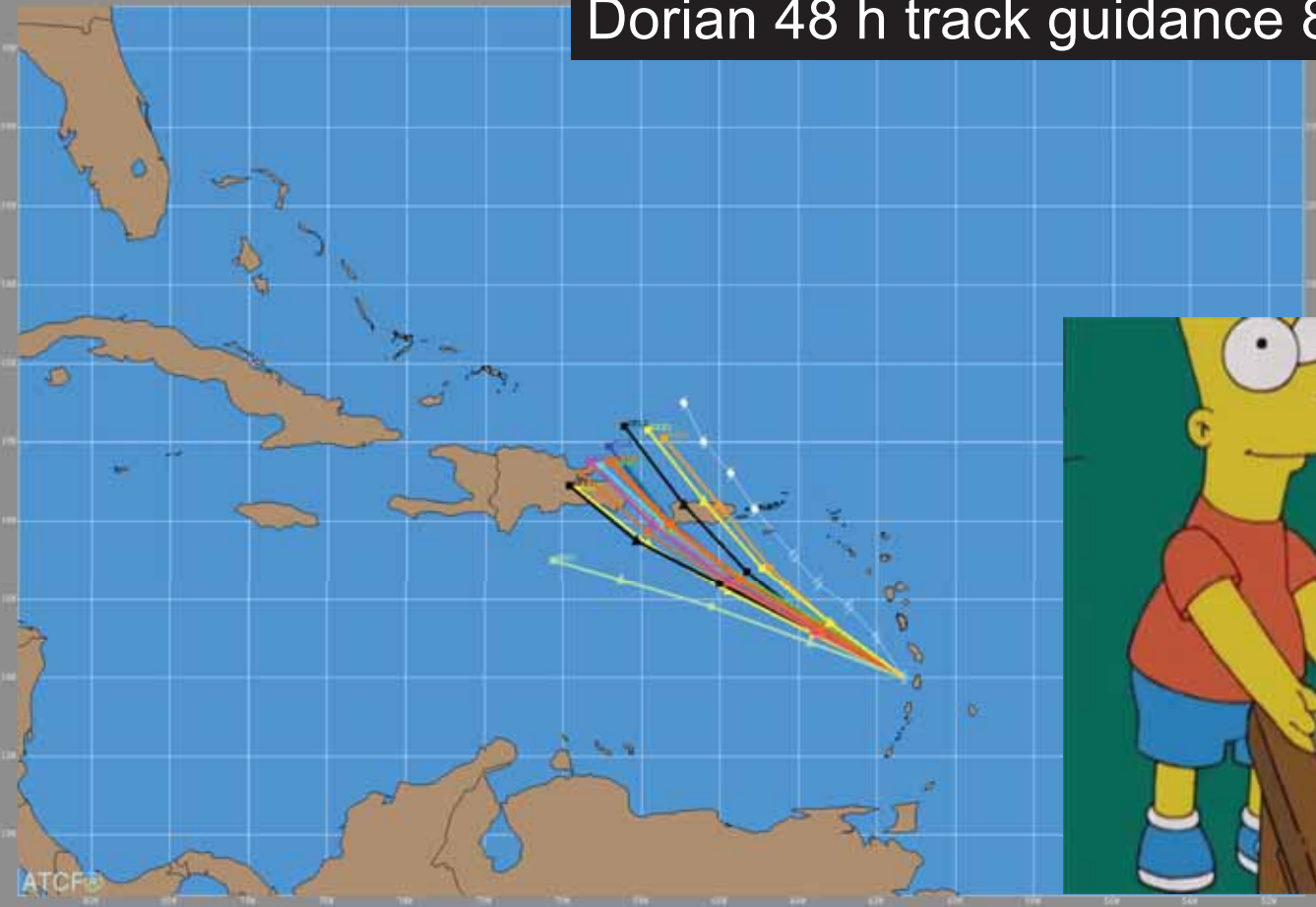


No watches/warnings  
for the Virgin Islands



Watches:	Warnings:	Sustained Winds:	Position:
Hurricane Watch	Hurricane Warning	Hurricane Force	Center as of 200 PM AST
Tropical Storm Watch	Tropical Storm Warning	Tropical Storm Force	Past Track

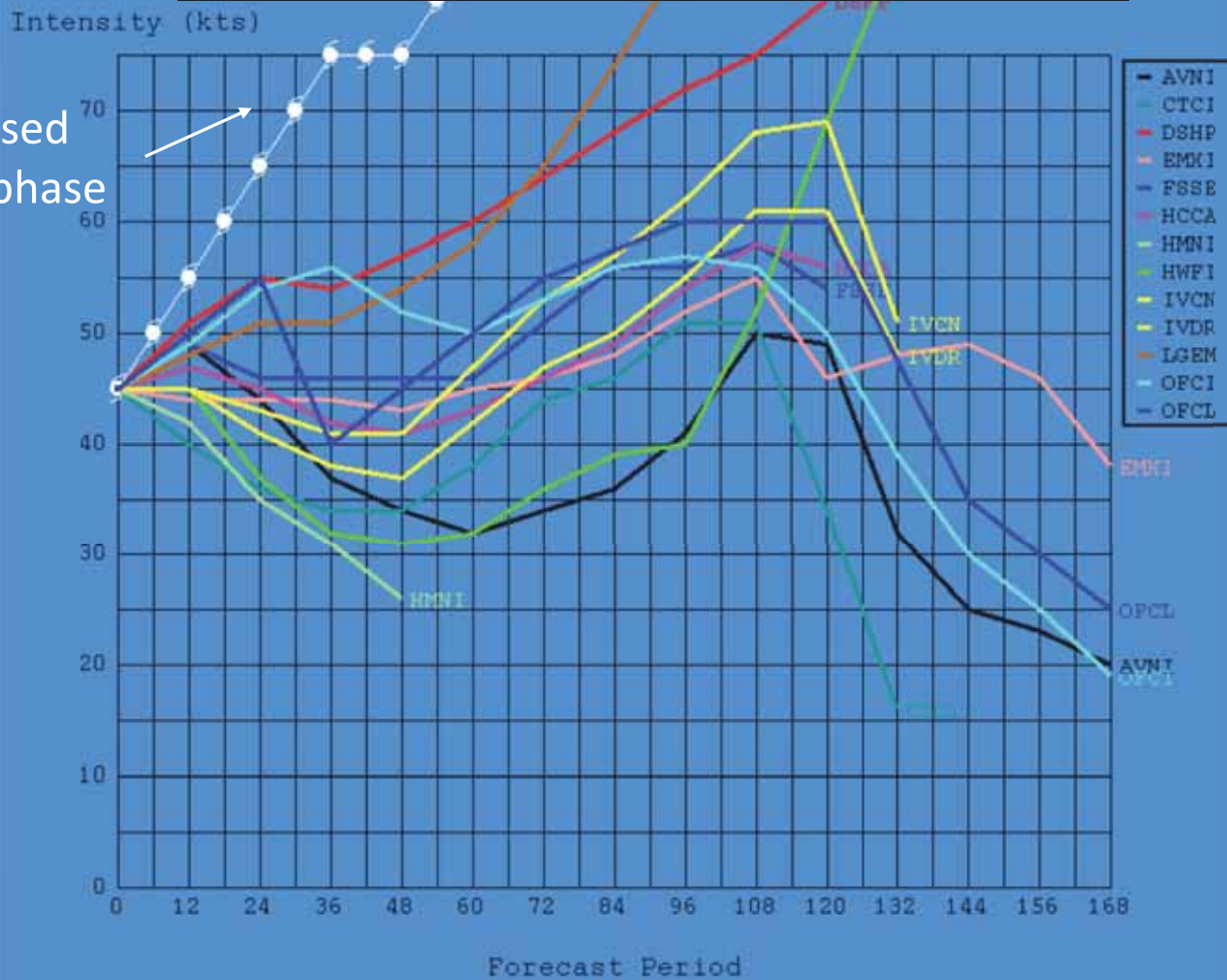
## Dorian 48 h track guidance 8/27/12z



The storm reformed to the northeast and immediately went outside of all predicted guidance.

# Dorian intensity guidance 8/27/18z

Totally missed hurricane phase





# Surface Wind Field of Tropical Storm Dorian

Sustained Winds as of 1100 AM AST Wed Aug 28, 2019    Advisory Number 17



## Hurricane Warnings for the Virgin Islands



### Watches:

- Hurricane Watch
- Tropical Storm Watch

### Warnings:

- Hurricane Warning
- Tropical Storm Warning

### Sustained Winds:

- Hurricane Force
- Tropical Storm Force

### Position:

- Center as of 1100 AM AST
- Past Track

Cockburn Town

TURKS AND  
CAICOS

Prince

DOMINICAN  
REPUBLIC

111 mph wind gust in St. Thomas!

San Juan

PUERTO  
RICO

US  
ISLANDS

GUILLA

Leeward  
Islands

ST. JOHN  
ST. PETER  
ST. PAUL  
ST. GEORGE  
ST. MARK  
ST. VINCENT  
ST. LUCIA

All Saints

ANTIGUA AND  
BARBUDA

MONTSERRAT

GUADELOUPE

DOMINICA

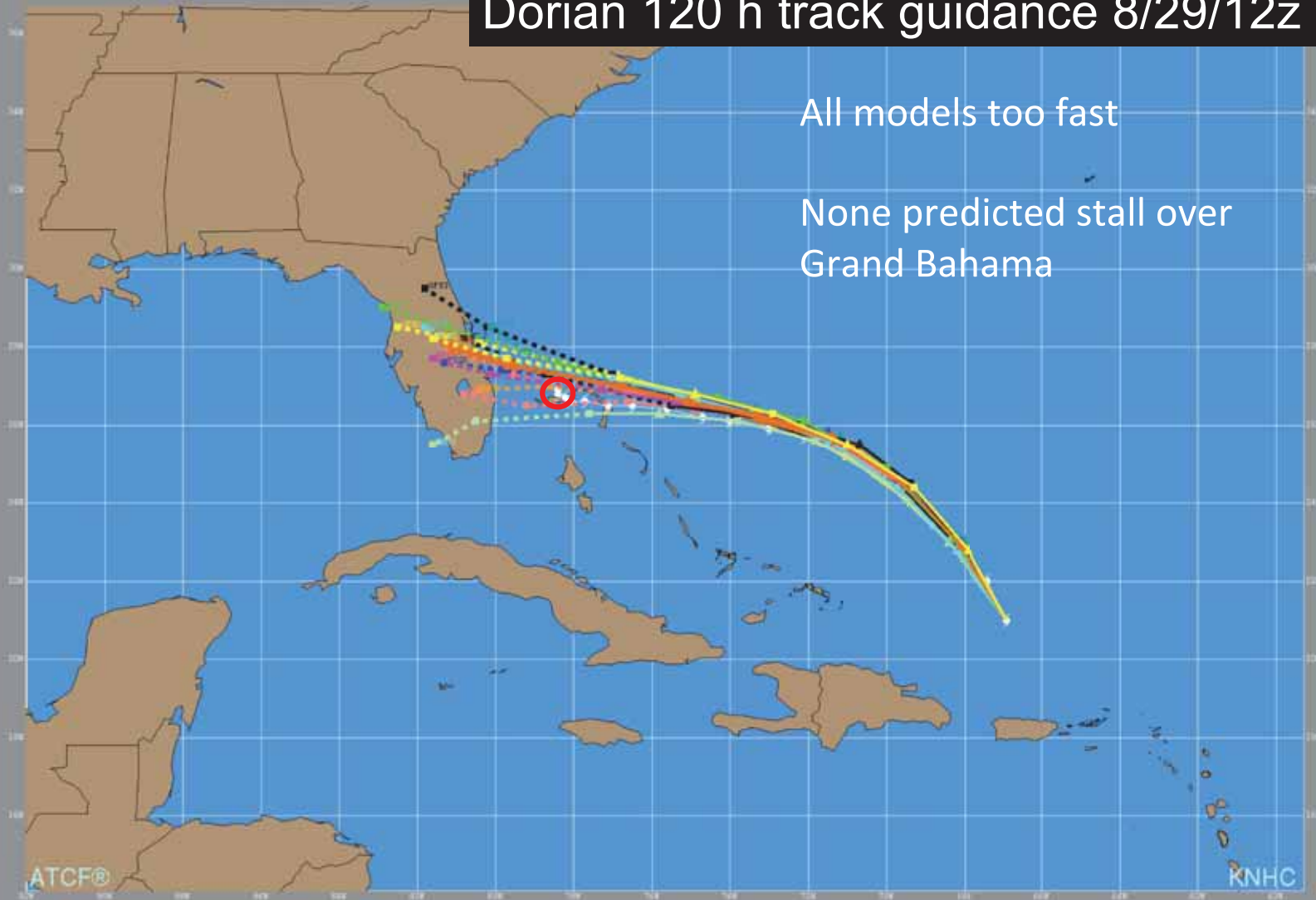




## Dorian 120 h track guidance 8/29/12z

All models too fast

None predicted stall over Grand Bahama

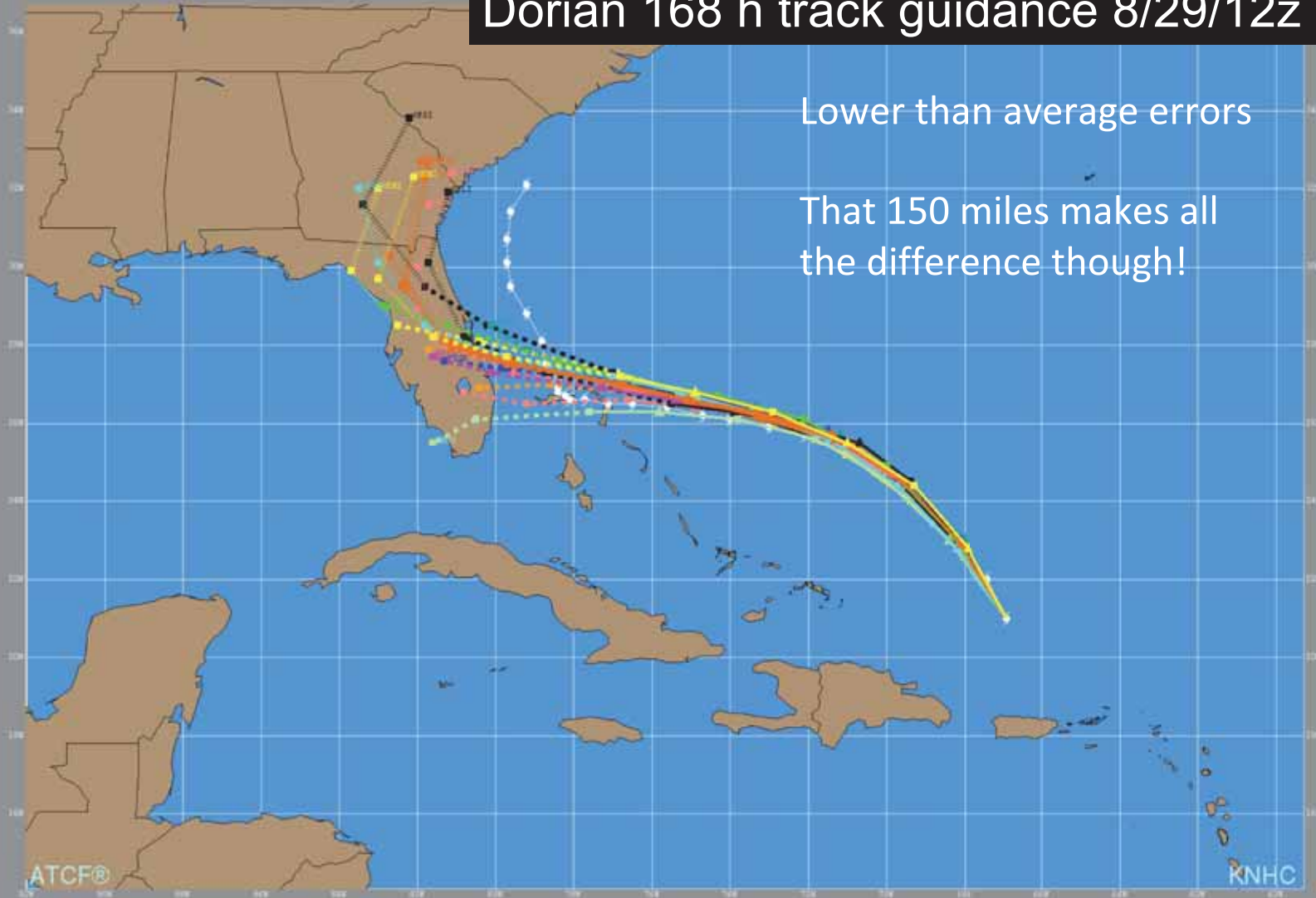




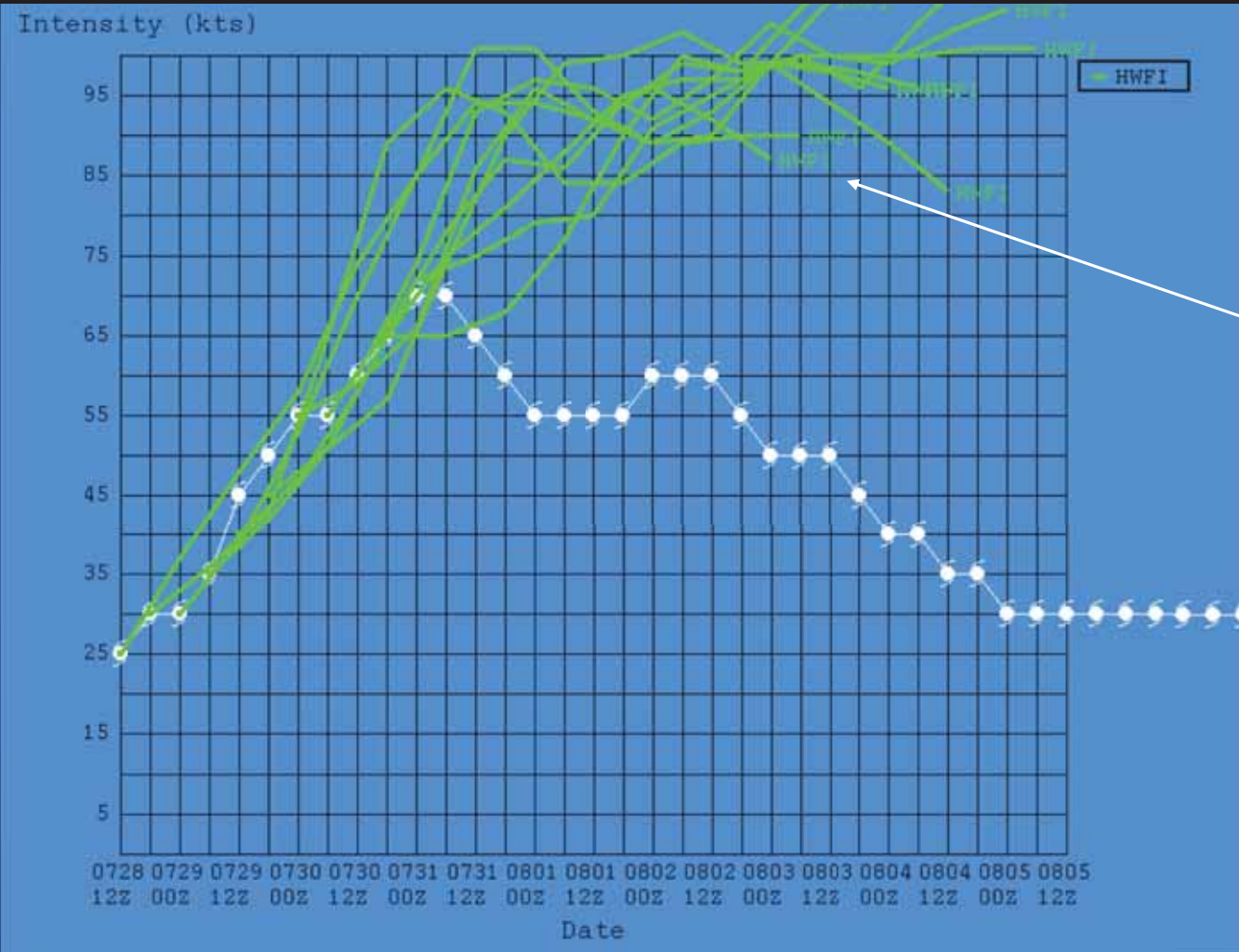
## Dorian 168 h track guidance 8/29/12z

Lower than average errors

That 150 miles makes all the difference though!



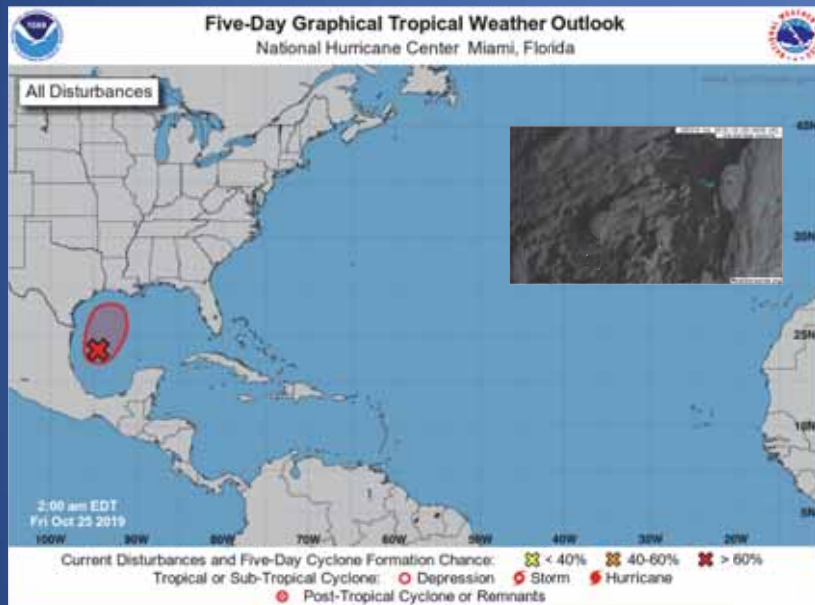
# Flossie HWRF intensity guidance 7/28/12z-7/30/18z



# Narda 48 h track guidance 9/29/06z



# Difficult year for genesis!

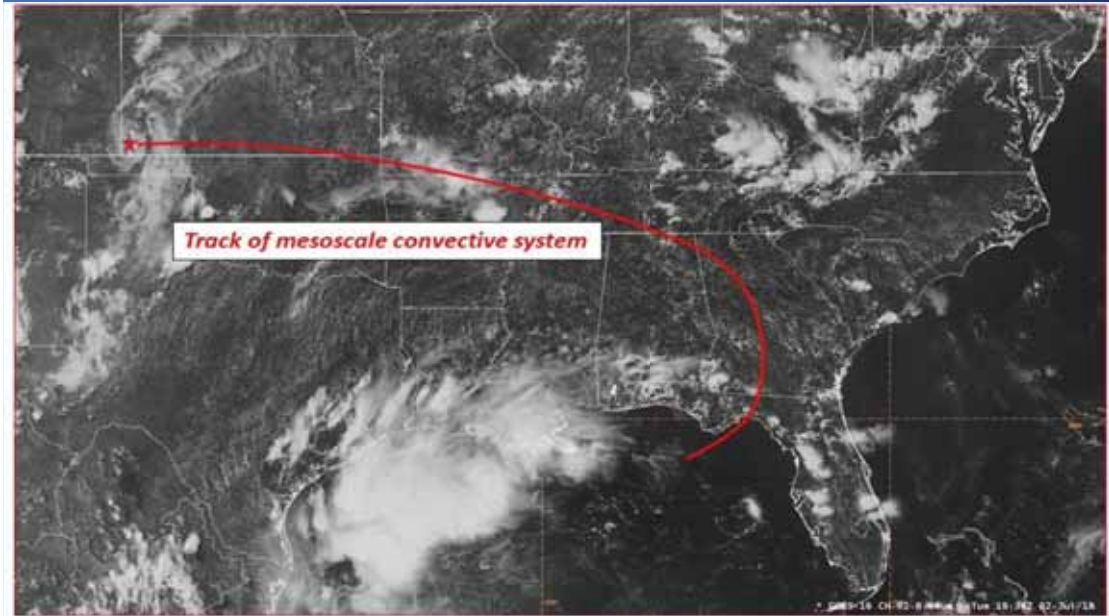
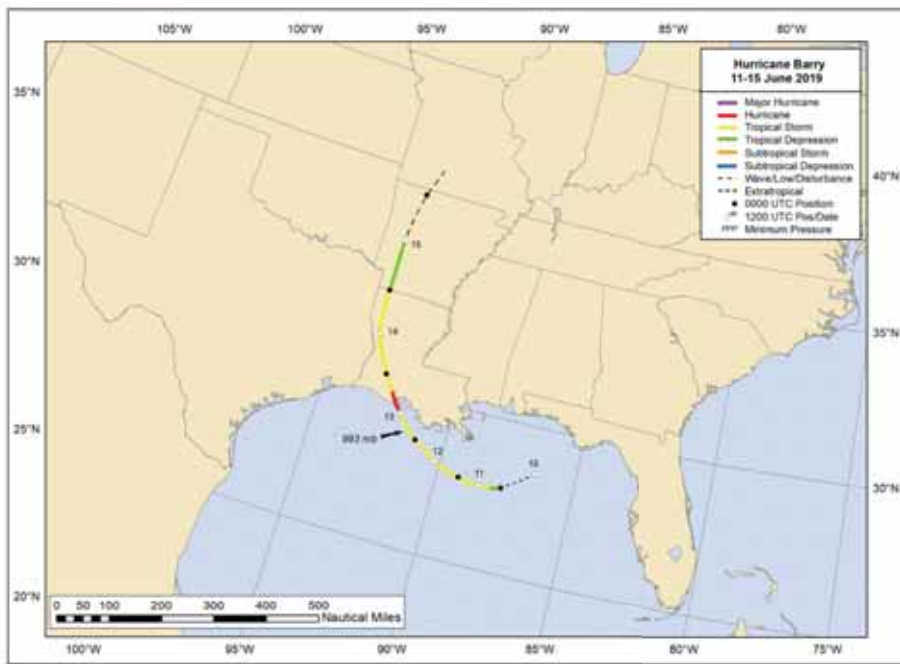


Pablo



Imelda

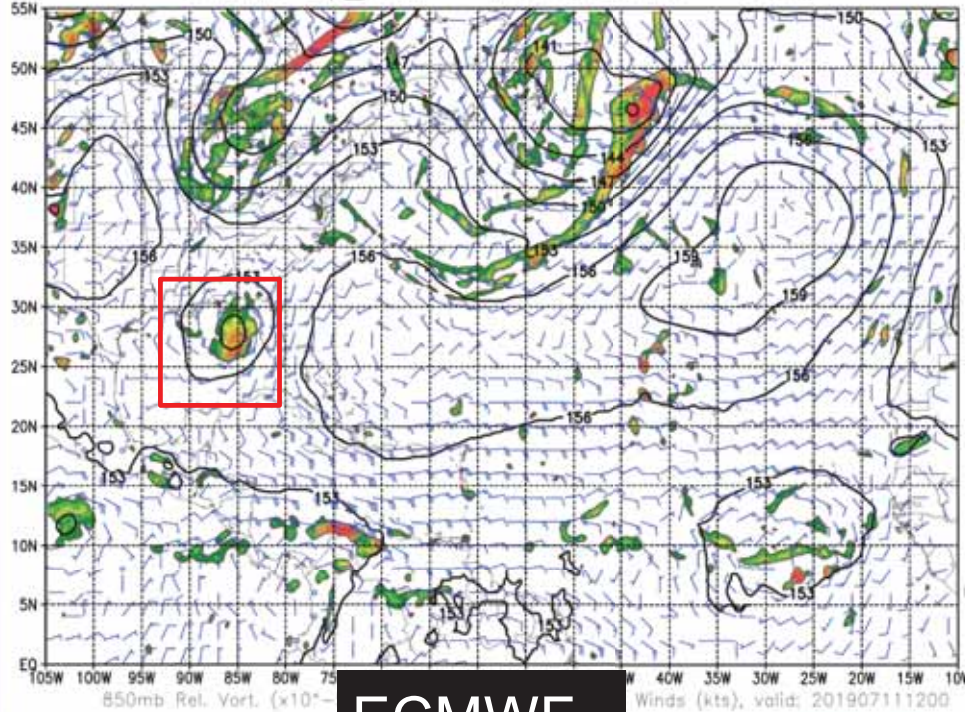
# Hurricane Barry



# Barry 5-day genesis models

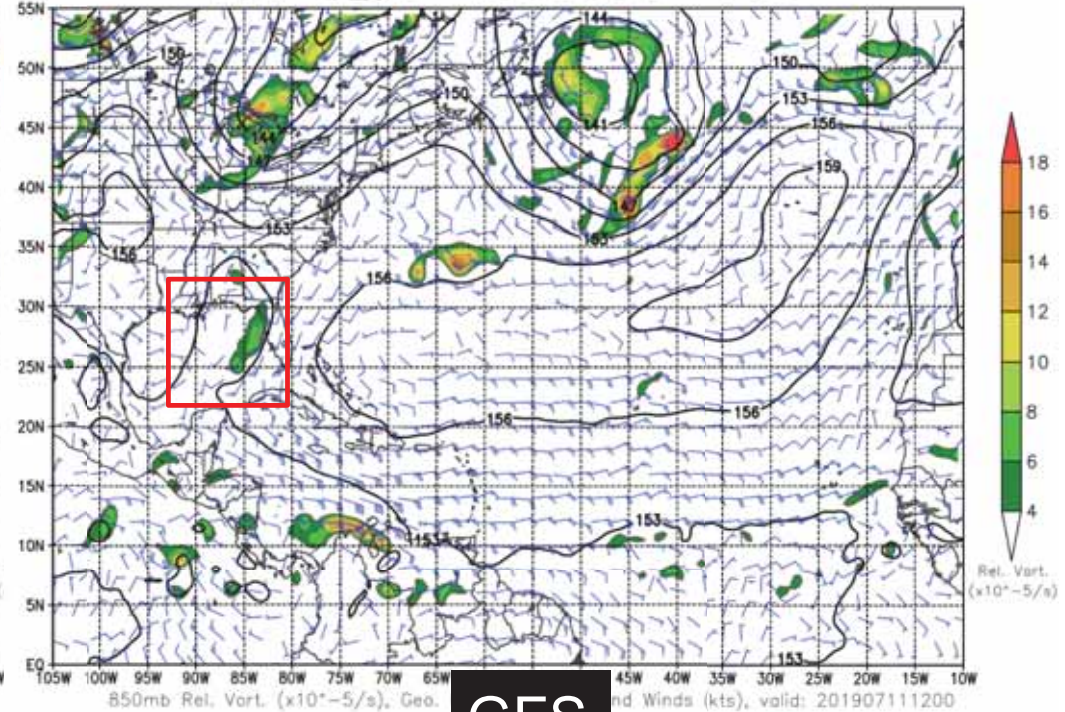
ECMWF provided much better guidance while GFS just had a trough

ECMWF op\_emx - 2019070612 - F120



**ECMWF**

NCEP op\_gfs - 2019070612 - F120

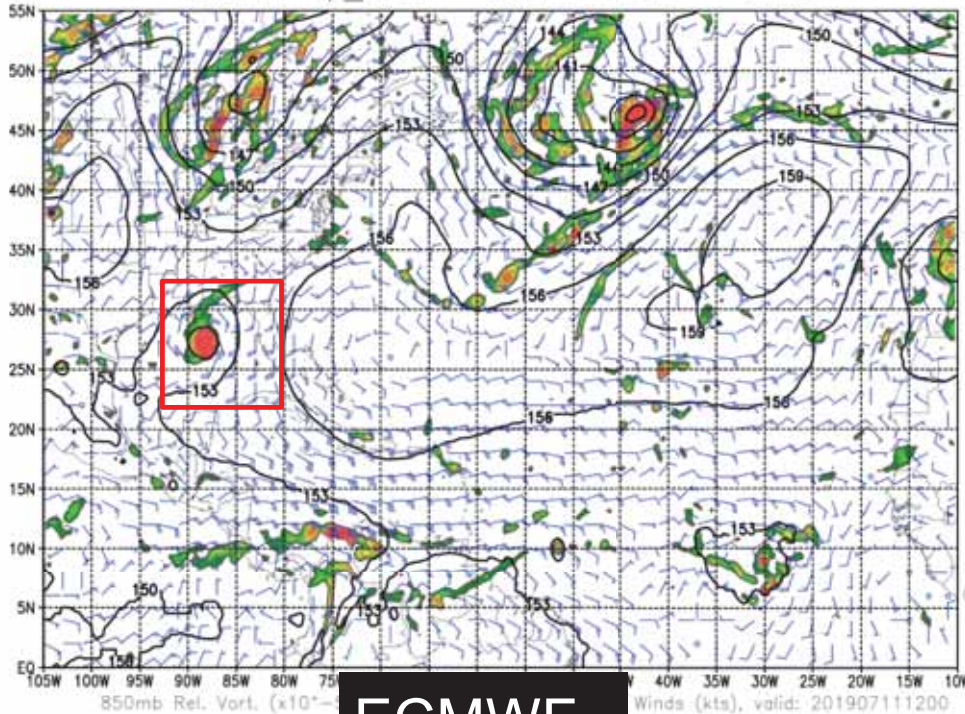


**GFS**

# Barry 3-day genesis models

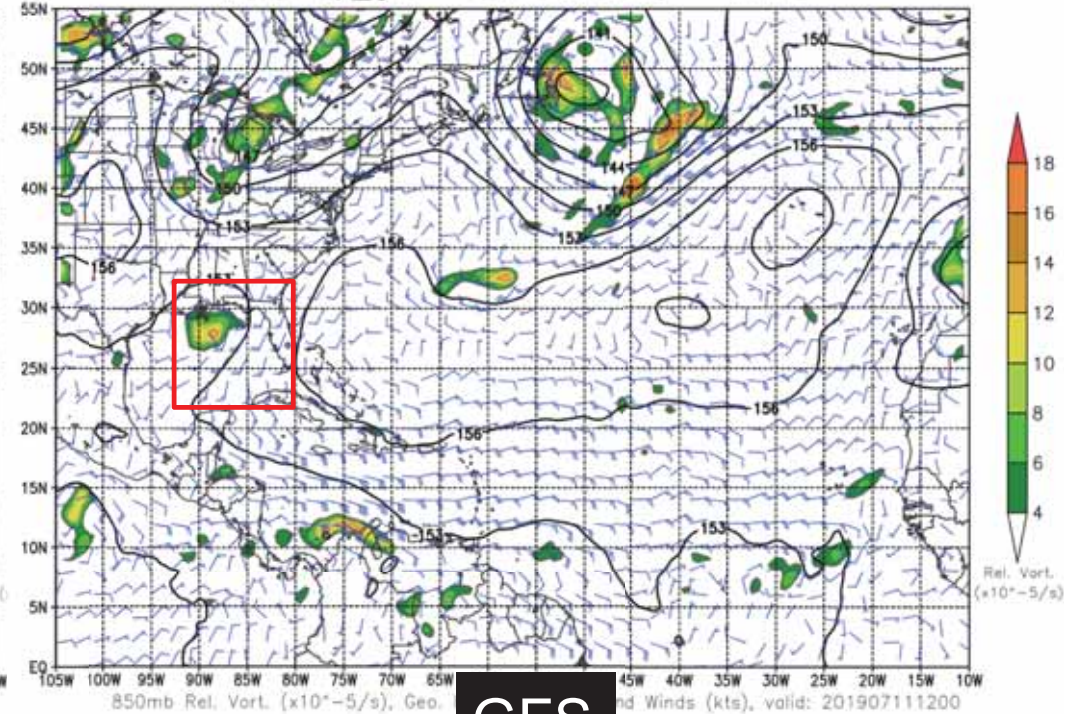
ECMWF locked onto Barry while GFS shows a weak low

ECMWF op\_emx - 2019070812 - F072



**ECMWF**

NCEP op\_gfs - 2019070812 - F072



**GFS**

## FV3 GFS and HWRF

- In 2019, HWRF track skill was much lower compared to GFS than in 2018 from 12-96 h
- Skill of both models relative to CLIPER degraded in 2019, but HWRF degraded more (10-20%)

### HWRF Track Skill Relative to GFS

FH	2019	2018
12	-13.7%	-5.8%
24	-13.4%	-4.7%
36	-10.3%	-2.9%
48	-12.1%	-2.0%
72	-23.8%	-2.1%
96	-26.7%	-12.1%
120	-14.2%	-15.3%



# TVCA Consensus vs. ECMWF/UKMET Blend

- Comparing TCVA Atlantic track consensus (GFS, HWRF, ECMWF, UKMET, COAMPS-TC) to ECMWF/UKMET blend
- NCEP-driven models made positive contributions in 2018, but were mostly negative in 2019
- Note that half of ECMWF and UKMET forecasts are 12 h old vs. 6 h

## Track Skill of ECMWF/UKMET Blend compared to TVCA

Forecast Hour	2019	2018
12	-2.1%	-14.6%
24	3.3%	-22.0%
36	5.6%	-27.9%
48	9.6%	-28.8%
72	14.3%	-22.6%
96	11.9%	-15.0%
120	-1.1%	-15.9%

Questions/Comments?