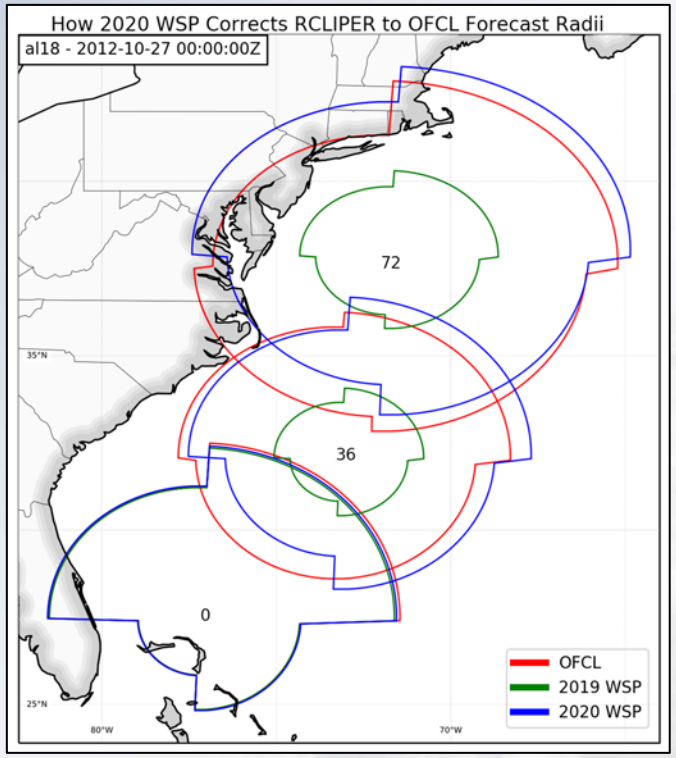
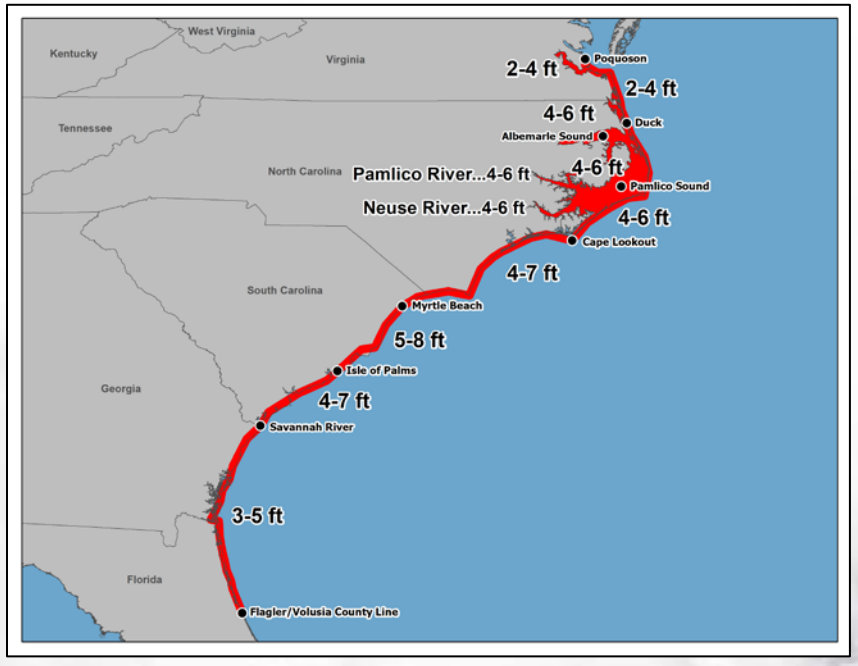
NHC Product Changes for 2020





Daniel Brown & Michael Brennan

National Hurricane Center

ICAO Seminar

17 June 2020

NHC Product Changes for 2020

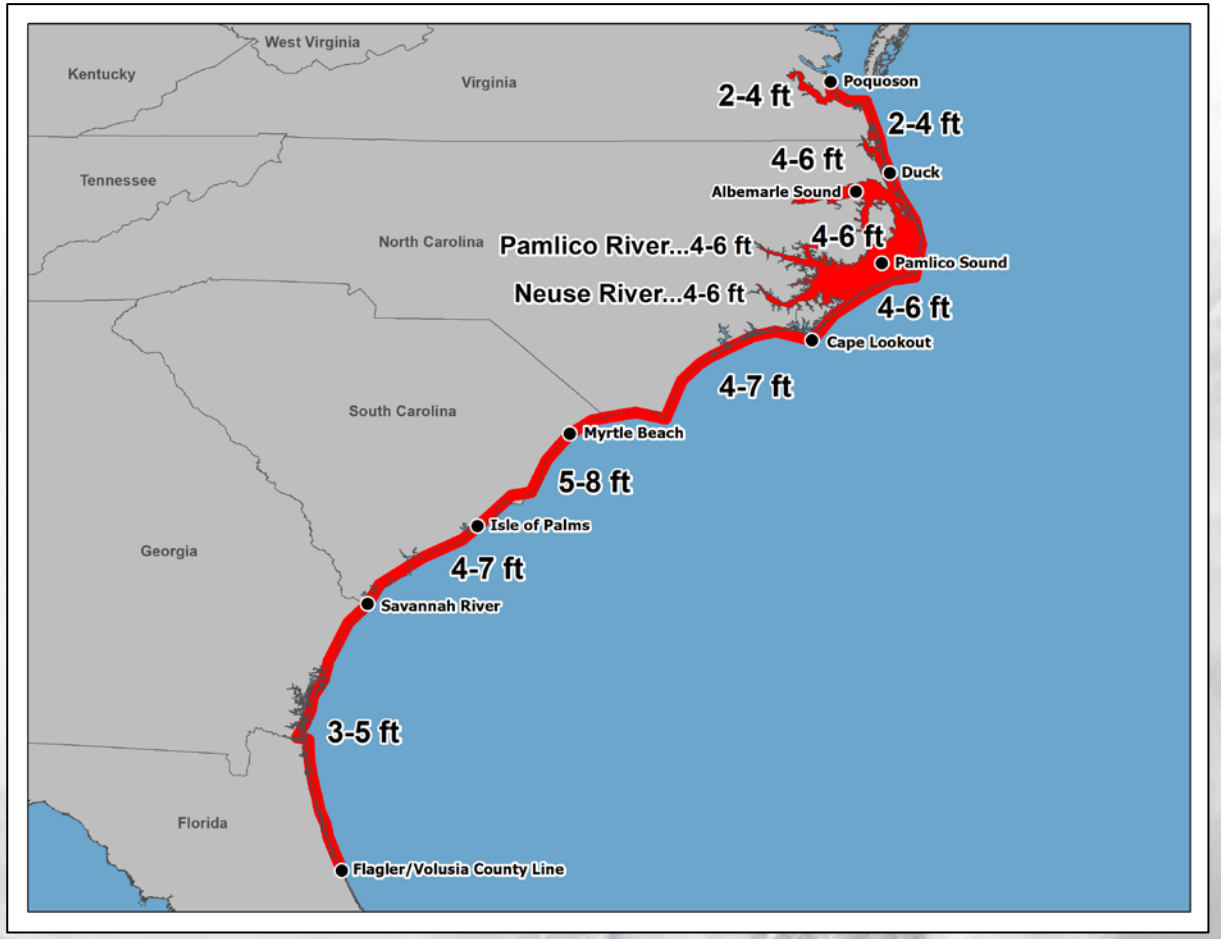
- Storm Surge Watch/Warning for Puerto Rico and U.S. Virgin Islands (became operational in 2019)
- Experimental peak storm surge forecast graphic
- New 60-h forecast information
- Same advisory issuance times, but additional local time zones for eastern Atlantic
- Wind Speed Probability model changes

Storm Surge Warning

- Expanded to Puerto Rico and USVI in 2019
- Storm Surge watch/warning will appear on graphic on NHC webpage
- No inundation graphic for PR/USVI in 2020

Experimental Peak Storm Surge Forecast Graphic

- Visual representation of peak storm surge forecast values from NHC Public Advisory (TCP) for U.S. East and Gulf coasts, PR, USVI
  - Same approach and interpretation as values in TCP
  - Areal threat (i.e. somewhere within specified area) not point or location specific
  - Includes/assumes peak storm surge occurs at high tide
  - Includes wave setup for areas with steep bathymetry (i.e., PR, USVI)
- Primarily for media and social media applications where point probabilities and/or high-resolution inundation mapping not easily displayed
- Experimental for 2020 – NHC interested in comments and feedback



New for 2020
60-h Forecast Information

Tropical Cyclone Forecast/Advisory

```
ZCZC MIATCMAT5 ALL
TTAA00 KNHC DDHHMM

HURRICANE DORIAN FORECAST/ADVISORY NUMBER  21
NWS NATIONAL HURRICANE CENTER MIAMI FL       AL052019
1500 UTC THU AUG 29 2019

FORECAST VALID 31/1200Z 26.3N  73.4W
MAX WIND 110 KT...GUSTS 135 KT.
64 KT... 20NE  10SE 10SW 10NW.
50 KT... 30NE  30SE 20SW 30NW.
34 KT... 80NE  60SE 40SW 60NW.

FORECAST VALID 01/0000Z 26.7N  75.2W
MAX WIND 110 KT...GUSTS 135 KT.
50 KT... 40NE  30SE 20SW 30NW.
34 KT... 80NE  70SE 40SW 70NW.

FORECAST VALID 01/1200Z 27.0N  76.9W
MAX WIND 115 KT...GUSTS 140 KT.
50 KT... 40NE  40SE 30SW 30NW.
34 KT... 90NE  80SE 50SW 80NW.
```

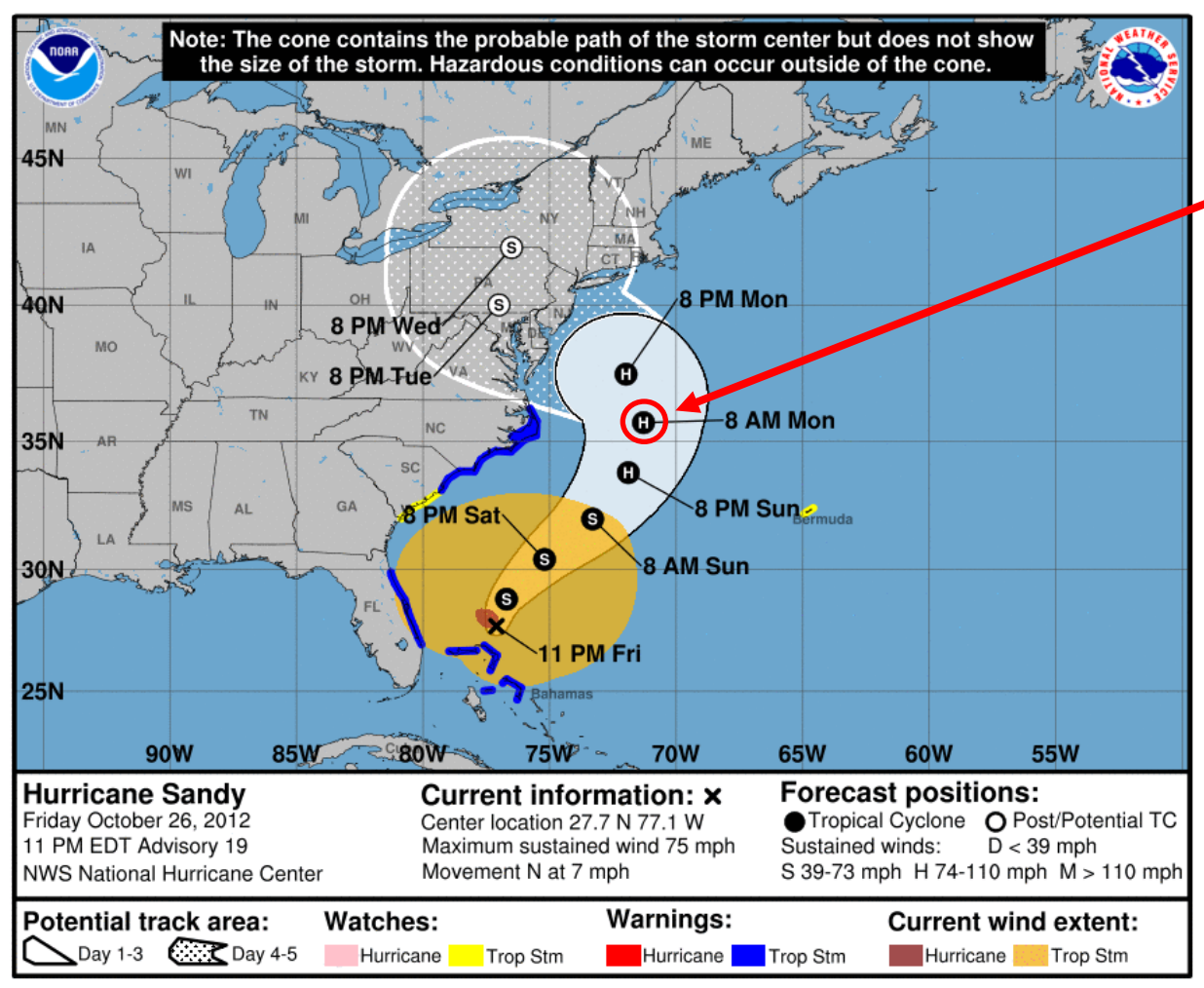
NHC will begin providing 60-h forecast information in 2020: position, intensity, and 34-kt and 50-kt wind radii

Tropical Cyclone Discussion Table

```
FORECAST POSITIONS AND MAX WINDS

INIT  29/1500Z 21.4N  67.2W  75 KT  85 MPH
 12H  30/0000Z 22.9N  68.1W  85 KT 100 MPH
 24H  30/1200Z 24.5N  69.6W 100 KT 115 MPH
 36H  31/0000Z 25.6N  71.4W 105 KT 120 MPH
 48H  31/1200Z 26.3N  73.4W 110 KT 125 MPH
 60H  01/0000Z 26.7N  75.2W 110 KT 125 MPH
 72H  01/1200Z 27.0N  76.9W 115 KT 130 MPH
 96H  02/1200Z 27.5N  79.8W 115 KT 130 MPH
120H  03/1200Z 28.1N  81.5W  65 KT  75 MPH...INLAND
```

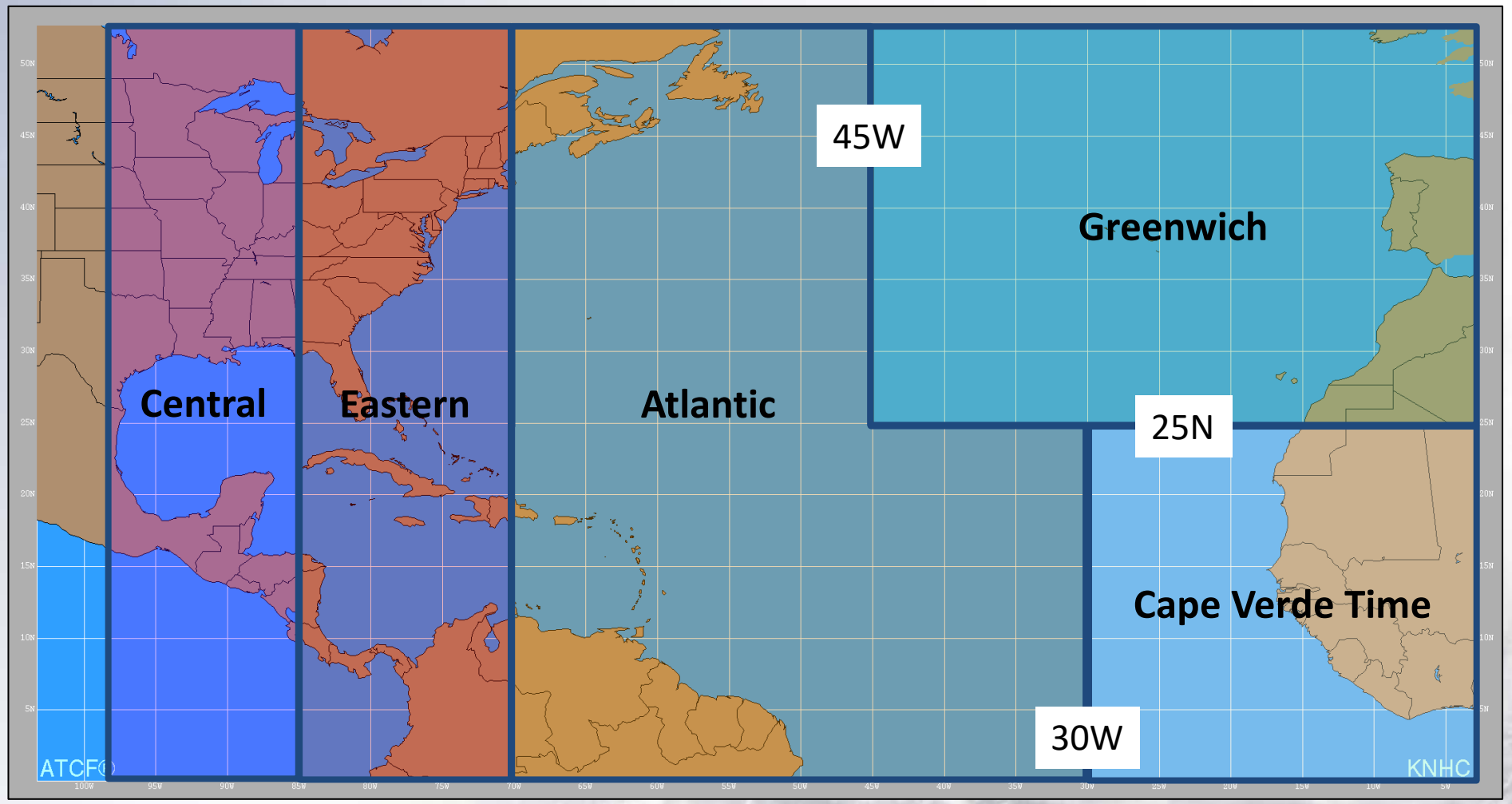
New for 2020
60-h Forecast Information



60-h Forecast Information on Cone Graphic

60-h forecast information also used as input for PSurge and for TC wind speed probabilities

New for 2020
Local Time Zones in NHC Products

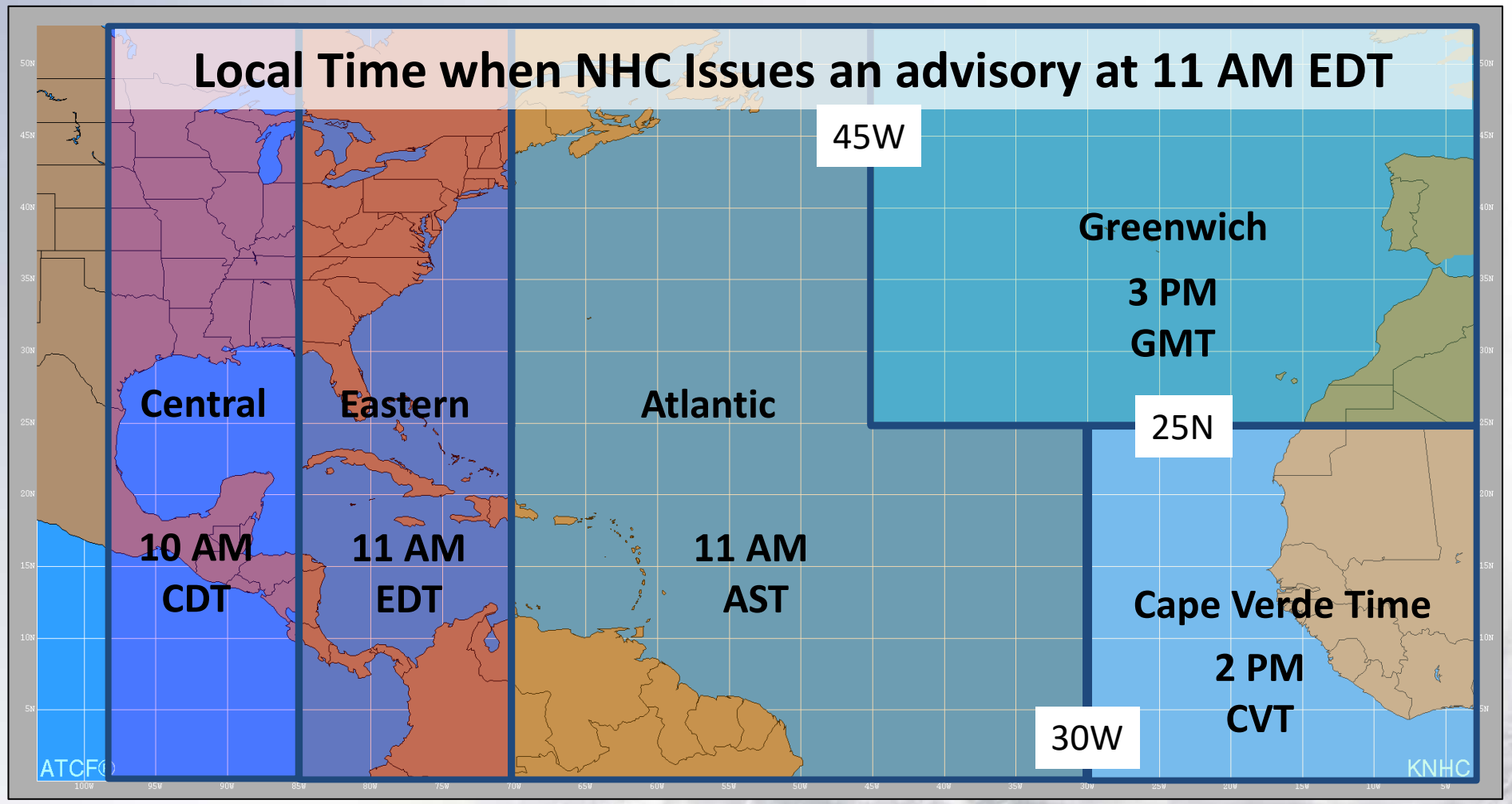


Products Using Local Time

- Public Advisory
- Discussion
- Update
- Time of Arrival Graphics

Still 5 AM, 11 AM, 5 PM, 11 PM Eastern Daylight Time!

New for 2020
Local Time Zones in NHC Products



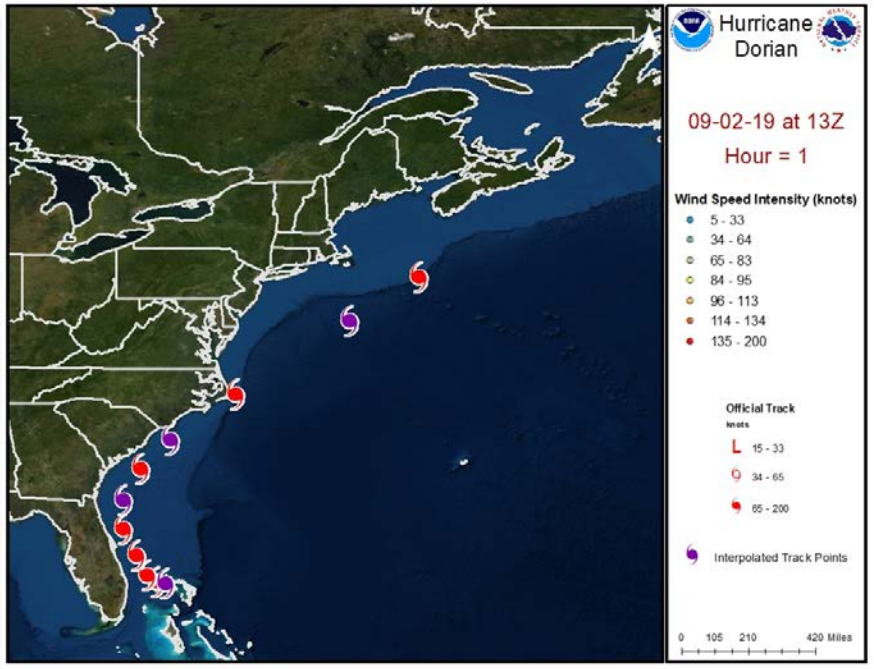
Products Using Local Time

- Public Advisory
- Discussion
- Update
- Time of Arrival Graphics

Still 5 AM, 11 AM, 5 PM, 11 PM Eastern Daylight Time!

Overview of the WSP Model

- 1,000 member TC ensemble based on NHC official forecast
- Track, intensity perturbations from 5-year NHC/CPHC error distributions
- Wind radii perturbations from radii-CLIPER model
- 34, 50 and 64 kt wind speed probabilities and time of arrival products derived from the 1,000 ensemble members



Tracks and intensities of
1000 ensemble members
Hurricane Dorian 12 UTC 9/2/2019

2020 WSP Model Upgrades

1. Track, intensity error distributions updated

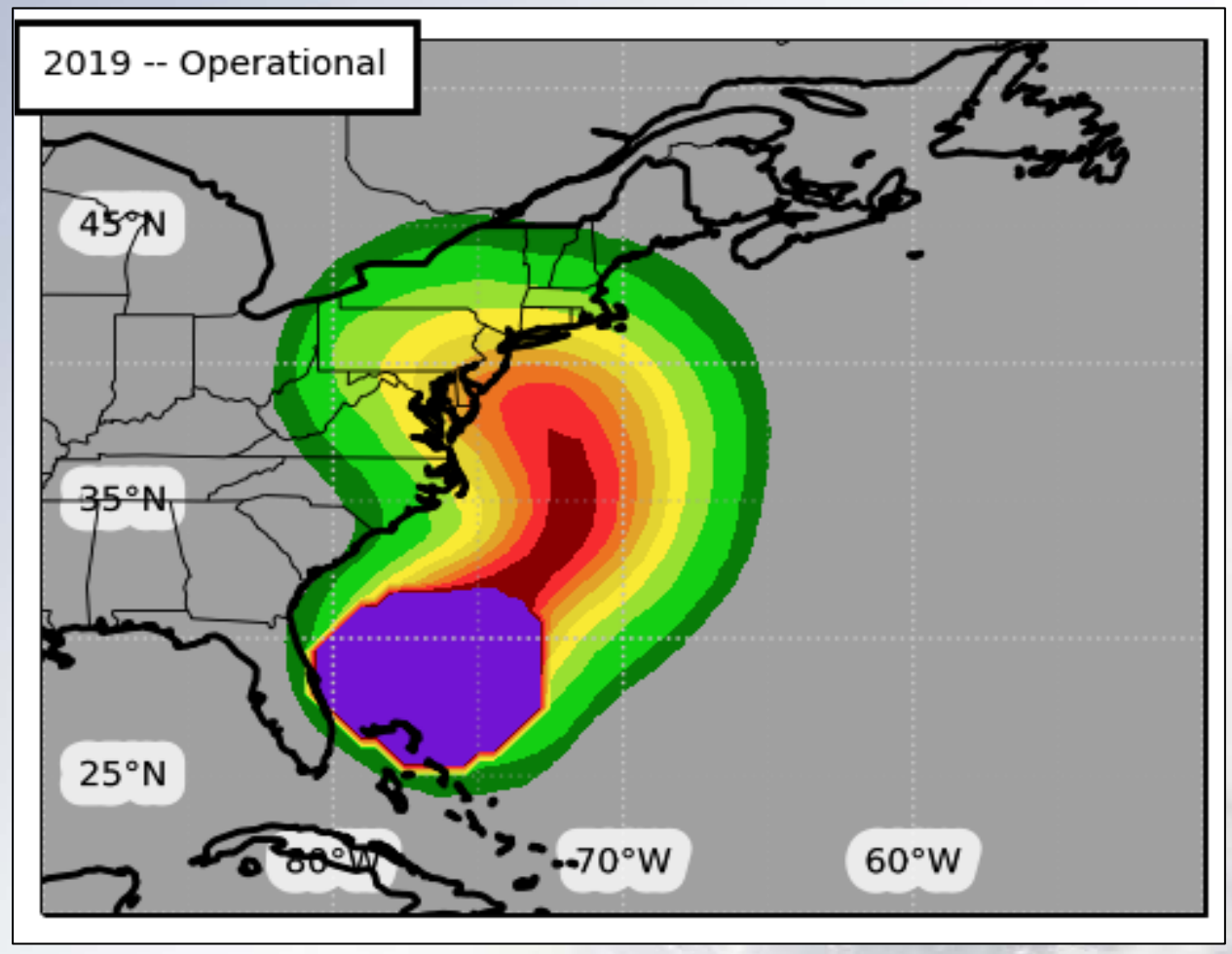
   2014-2018 replaced with 2015-2019

2. Ensemble mean wind radii bias corrected to match NHC forecast radii
3. Land mask updated and global version created
4. Text product adjusted to improve consistency for locations very close to the coast

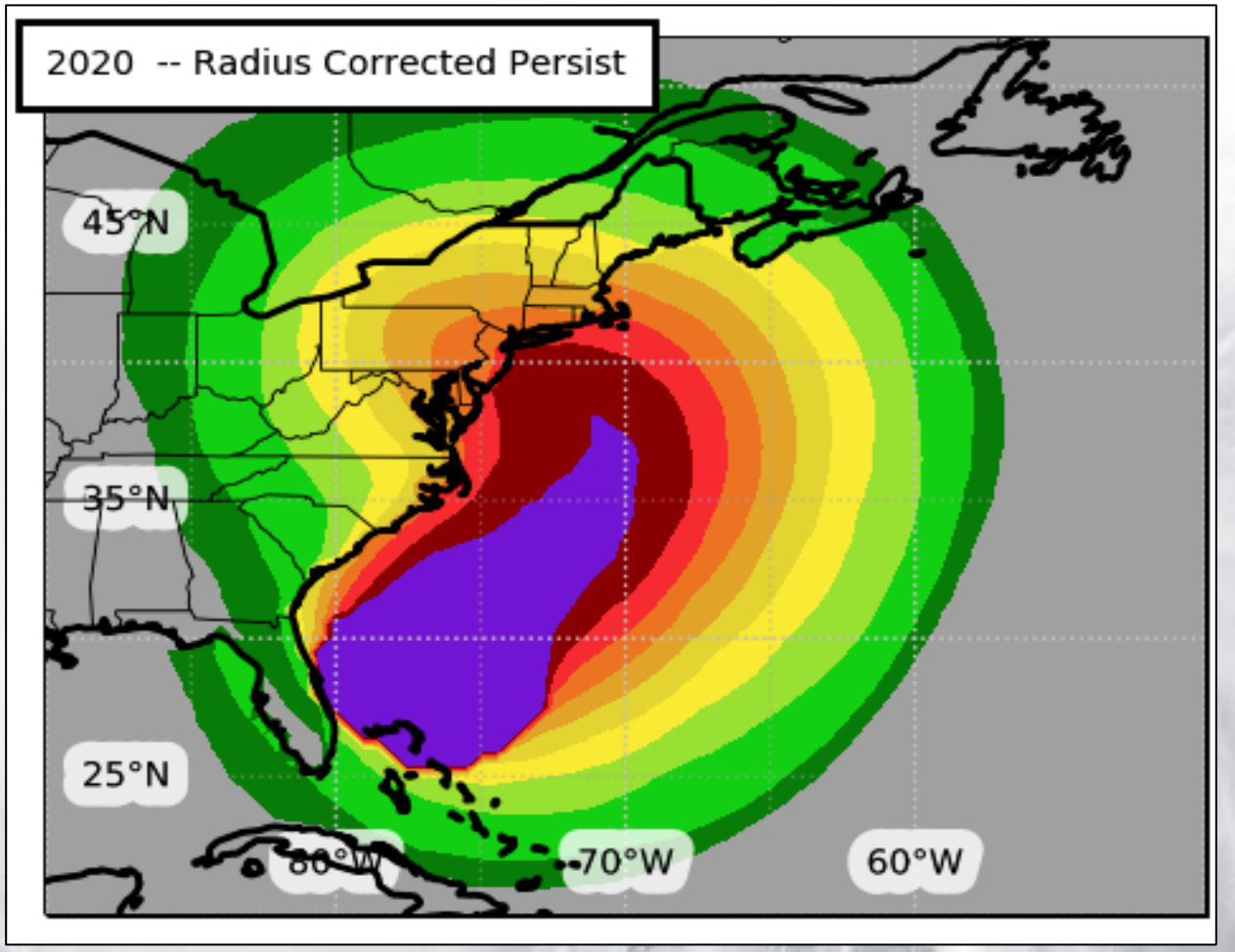
Inclusion of NHC Forecast Radii

- Previous Method: Wind radii for 1,000 ensemble member from radii-CLIPER model and its error distributions
  - Start with initial (t=0) NHC radii (persistence)
  - Climo radii function of intensity, latitude, motion
  - Size parameter perturbed
  - Different for each ensemble member
  - Weight of persistence decreases exponentially
  - Persistence component mostly gone by 36 h
- New Method: Bias correct radii so the mean radii from the 1,000 ensemble members matches NHC forecast radii
  - Radii anomaly maintained after 72 h

Example 1: Large Storm – Sandy 2012



Old WSP Model 34-kt WSP



New WSP Model 34-kt WSP

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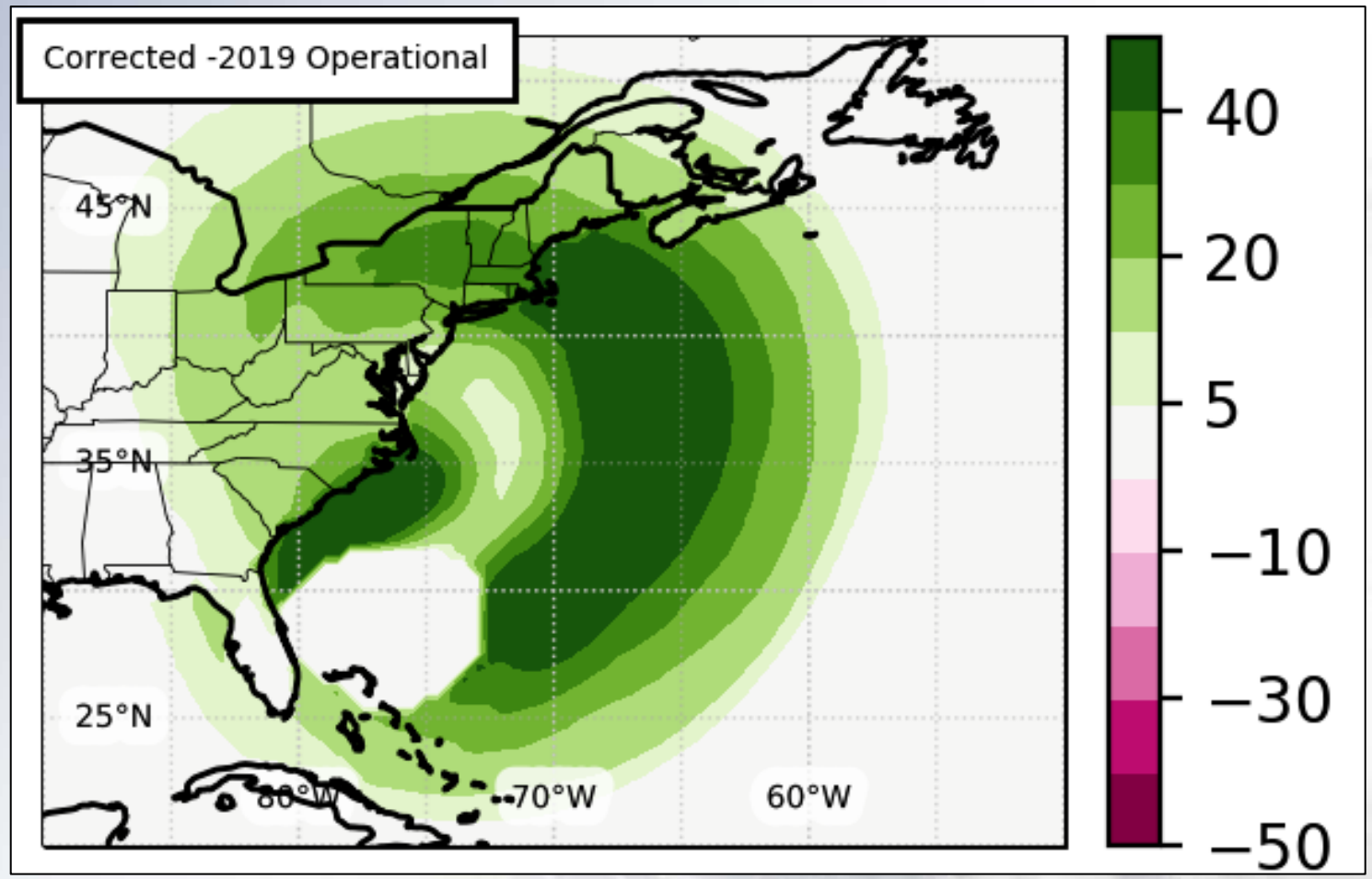
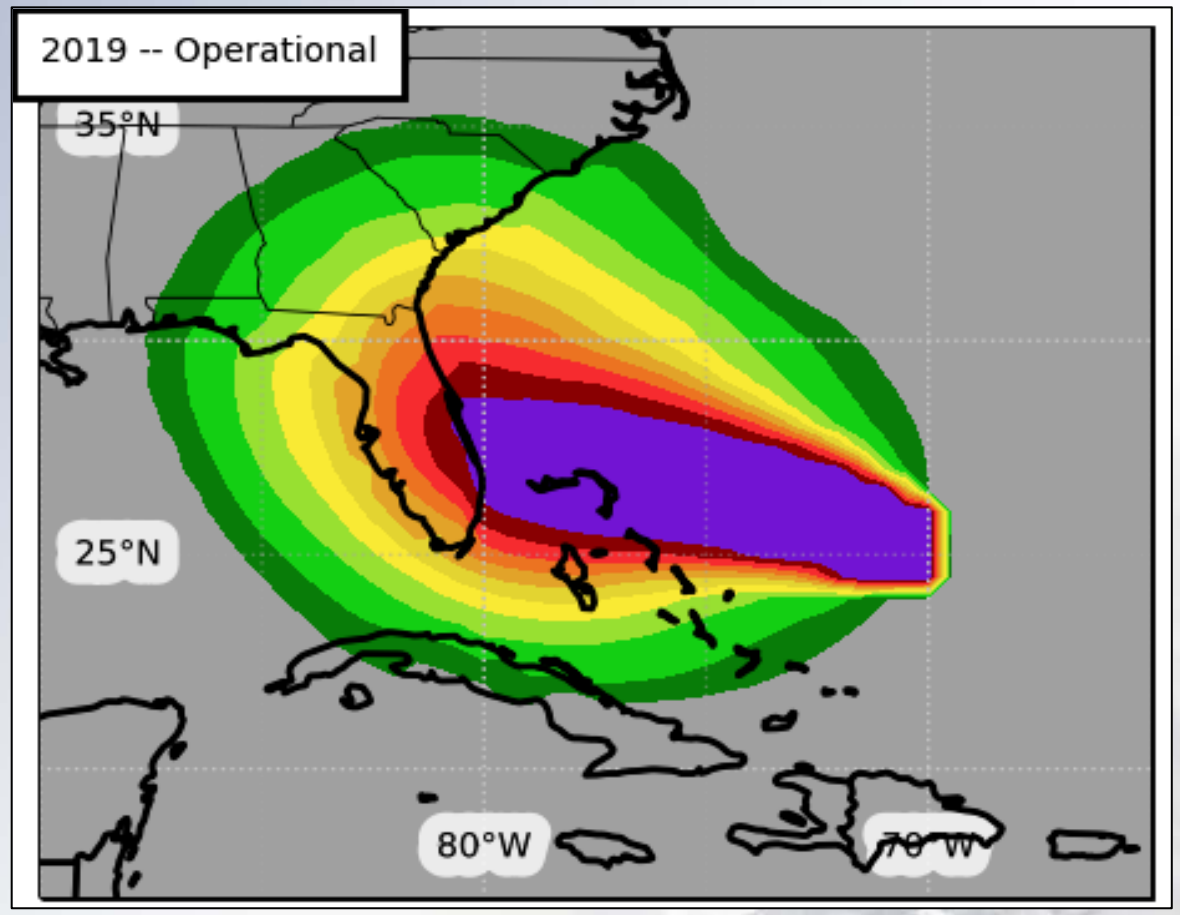


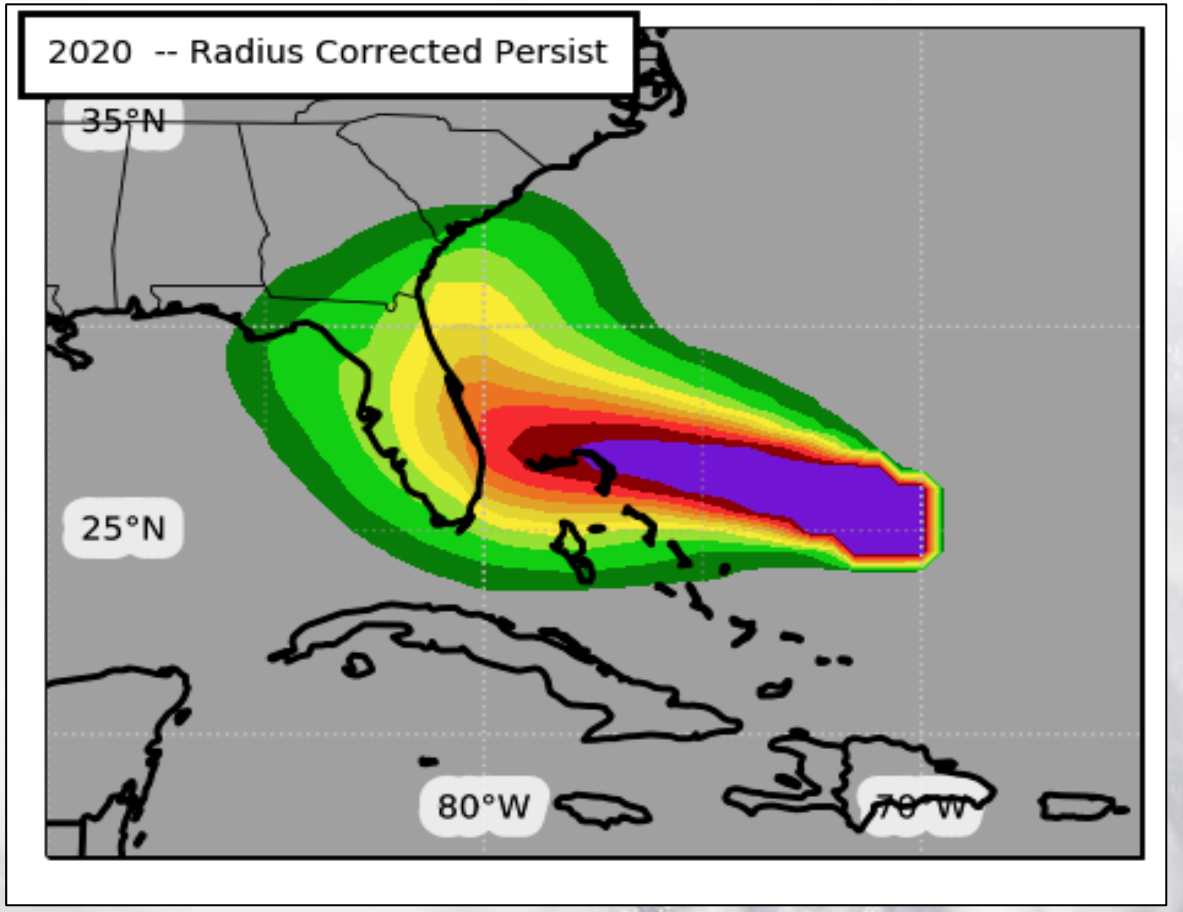
34-kt WSP Difference (new–old)

34-kt point probabilities increased by > 20% away from Sandy's core to reflect the large wind field

Example 2: Small Storm – Dorian 2019



Old WSP Model 34-kt WSP



New WSP Model 34-kt WSP

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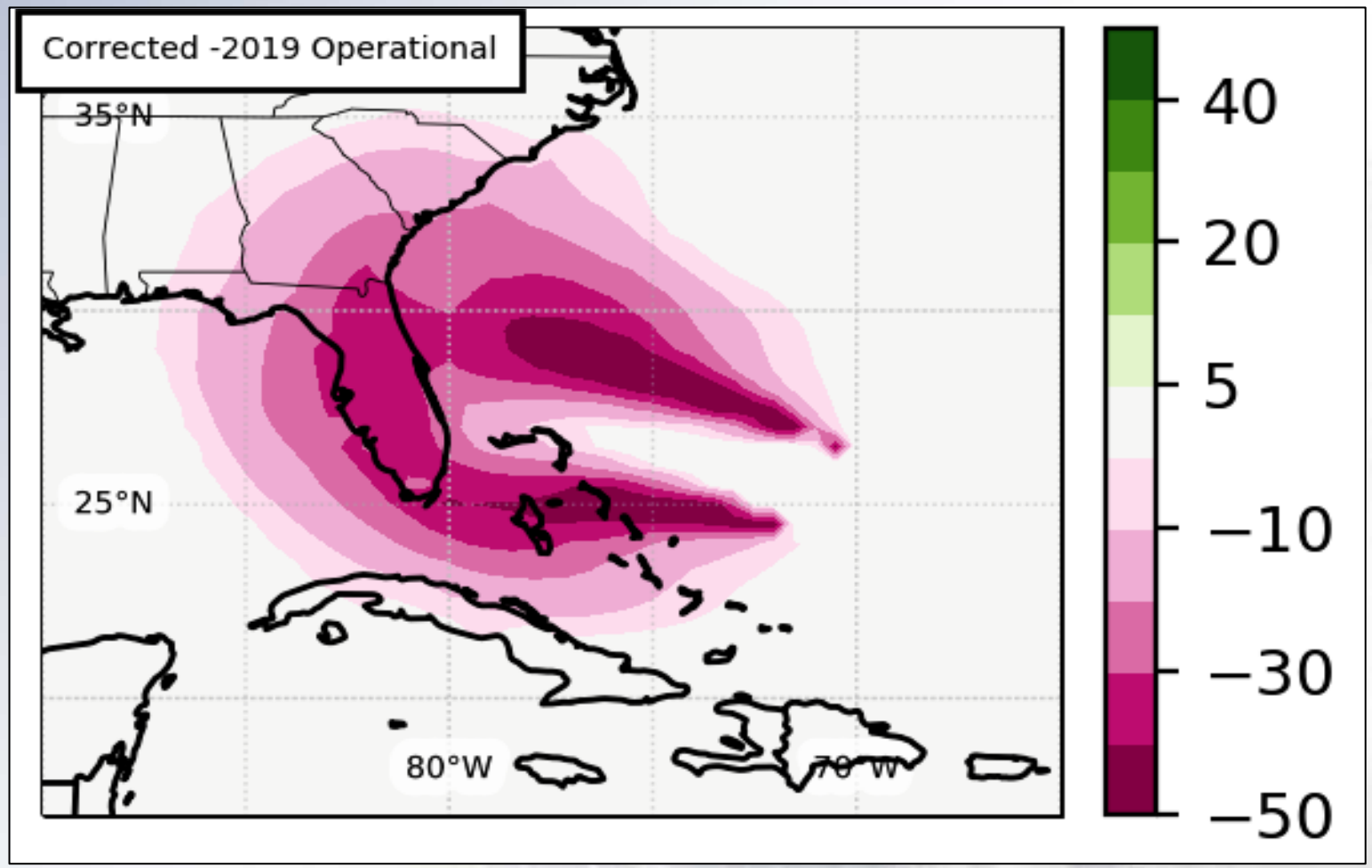

34-kt WSP Difference (new–old)

34-kt point probabilities at locations in Florida reduced by 20-30%

Questions/Comments

Michael.J.Brennan@noaa.gov