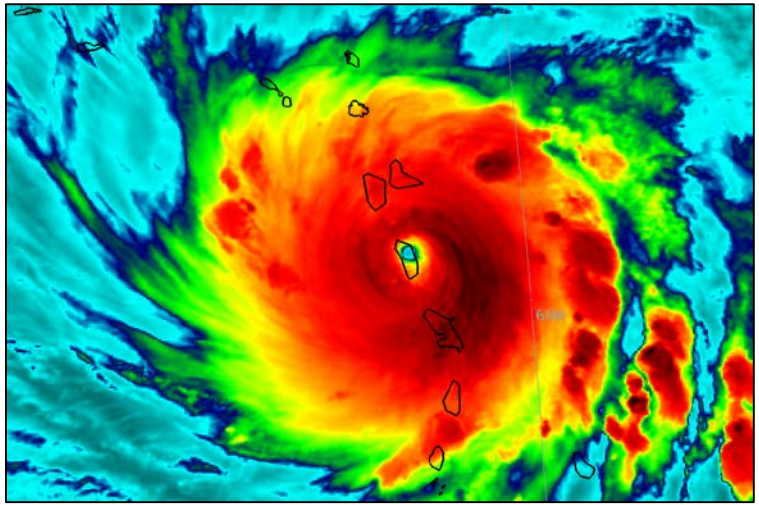
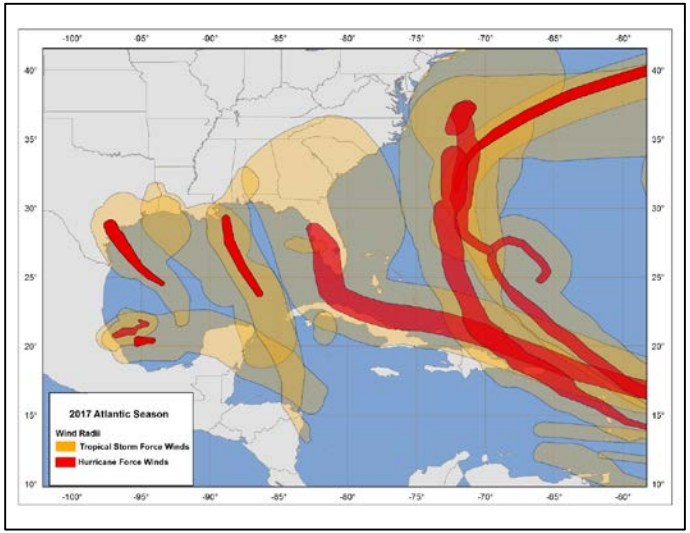
Ideas for New NHC Tropical Cyclone Products and Services in the Next 3-10 Years



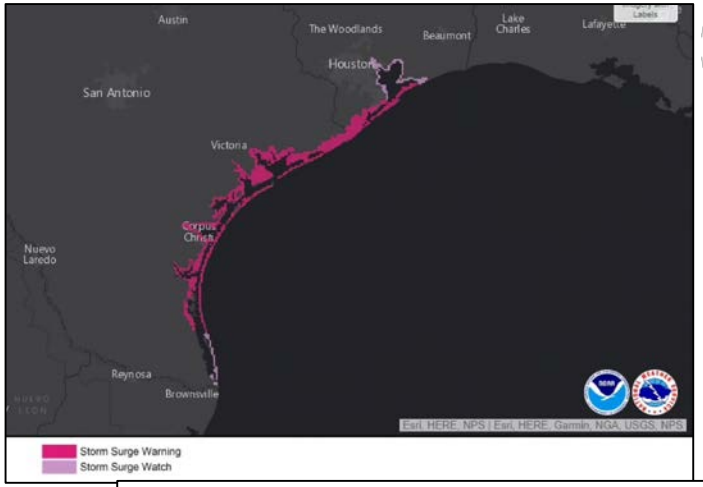


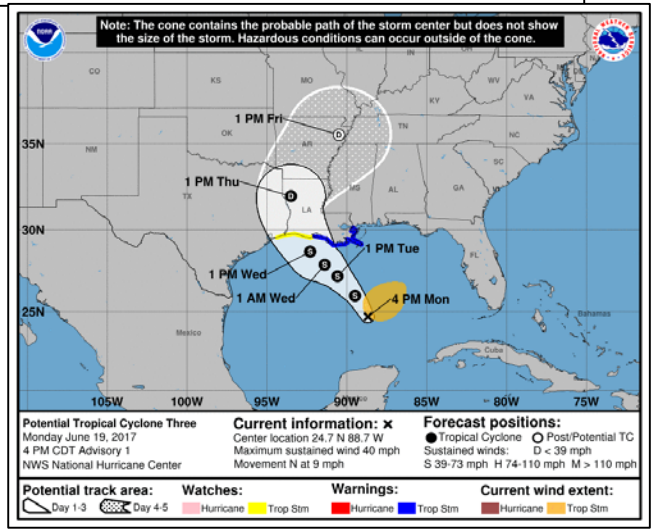
Mike Brennan and NHC Staff

NOAA SECRT Webinar
8 May 2018

Background

- For the past several years, NHC's focus has been on implementation of the Storm Surge Watch/Warning, as well as the addition of Post-Tropical and Potential Tropical Cyclone advisories
- What should be the next advances in NHC's tropical cyclone products and services over the next 3 to 10 years?
- We began by collecting ideas from Hurricane Specialist Unite and then from the rest of the NHC staff
- We'll be sharing those ideas today and asking for additional feedback and comments



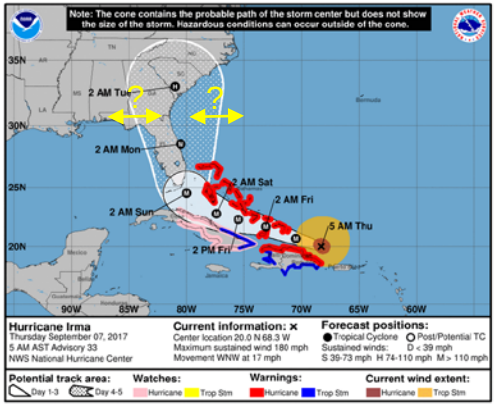


Potential External Product and Service Enhancements

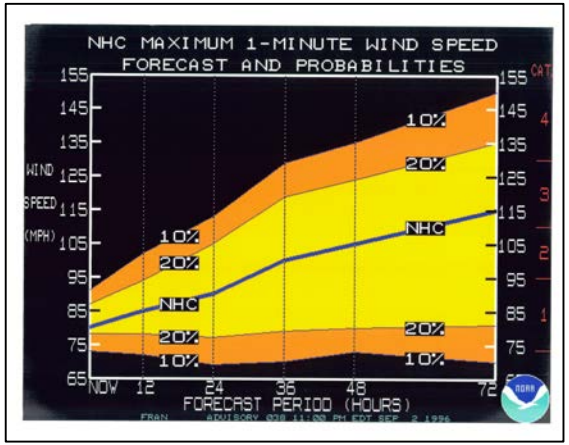
- Three main categories:
  1. Forecasts/Warnings
  2. Graphics
  3. Communication
- Beyond making more accurate forecasts
- Separate list of new/improved techniques for the hurricane forecasters

Potential Product Enhancements
Forecasts/Warnings

- Dynamic track uncertainty cone based on model spread and synoptic situation instead of climatological errors
- Replace cone graphic with a more hazard-based product



- Intensity forecast cone and/or landfall intensity probability information

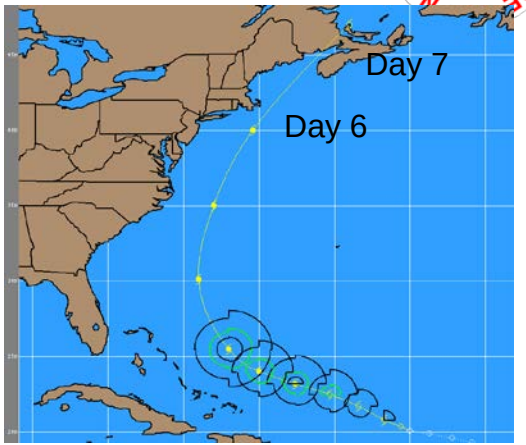


WIND SPEED FORECAST FOR FRAN
EXPRESSED AS PROBABILITY
FROM NHC ADVISORY 038
11:00 PM EDT SEP 2 1996

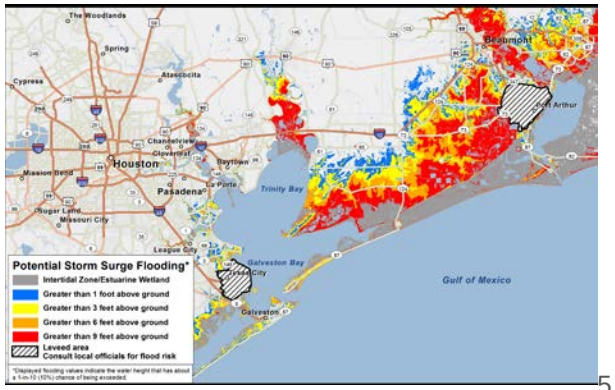
TIME HOURS	WIND SPEED INTERVAL IN MPH							
	DISSIPATED	TROPICAL DEPRESSION <39	TROPICAL STORM 39-73	HURRICANE >=74	HURRICANE CAT.1 74-95	HURRICANE CAT.2 96-110	HURRICANE CAT.3 111-130	HURRICANE CAT.4-5 >=131
12	<1%	<1%	8%	92%	70%	19%	3%	<1%
24	<1%	<1%	20%	80%	52%	20%	7%	1%
36	<1%	<1%	9%	90%	40%	28%	16%	6%
48	<1%	<1%	11%	90%	41%	21%	18%	11%
72	<1%	<1%	10%	90%	27%	15%	24%	24%

Potential Product Enhancements
Forecasts/Warnings

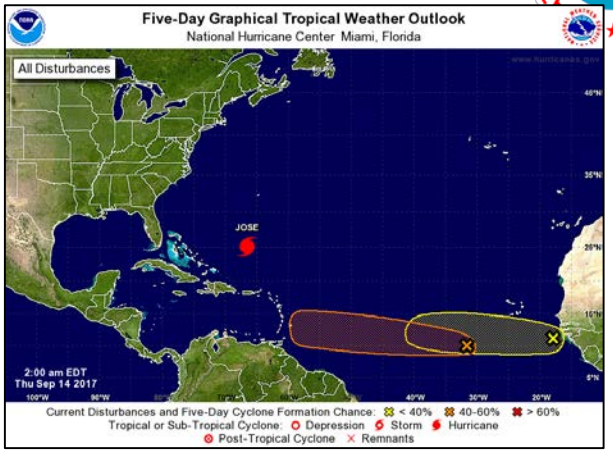
- Day 6-7 track and intensity forecasts
- Intermediate tropical cyclone forecast points beyond 48 h



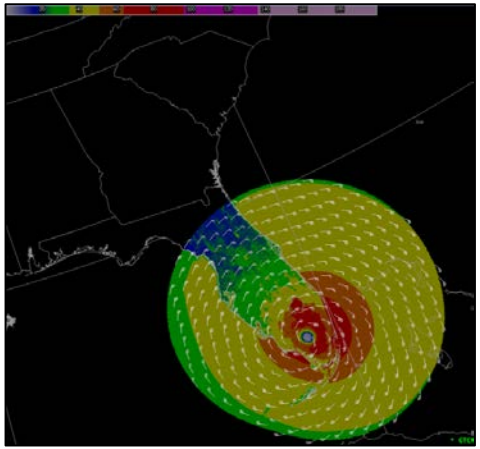
- Extend real-time storm surge guidance availability to 72 h prior to landfall
  - More actionable time period for many evacuation decisions and other preparedness actions



Potential Product Enhancements
Forecasts/Warnings



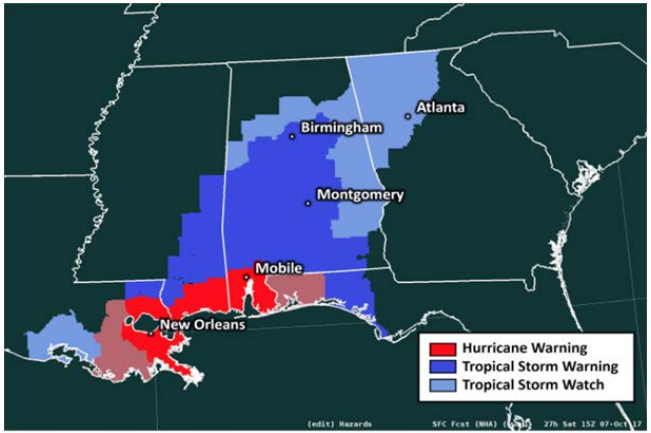
- 7-day genesis forecasts
  - Perhaps initially only make 6-7 day forecasts for tropical storms
- Surface wind analysis and forecast (grids?) from Hurricane Specialist Unit
- New product or extension of an existing product that provides a bulk measure of forecast uncertainty
  - Could start with track, but later be extended to include intensity and maybe wind structure



Potential Product Enhancements

Graphics

- Show all Tropical Storm/Hurricane/Storm Surge watches/warnings for the NHC website and briefings

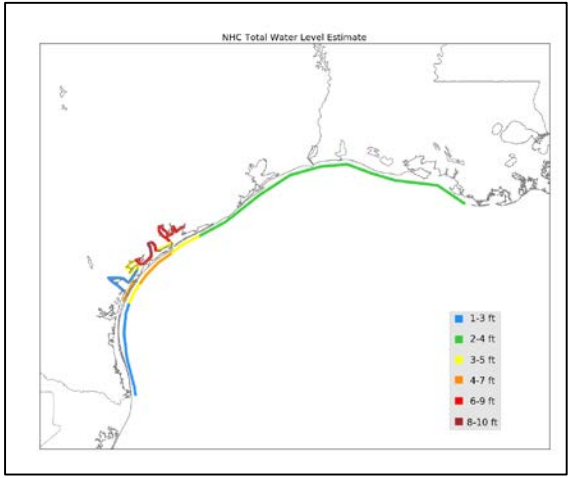


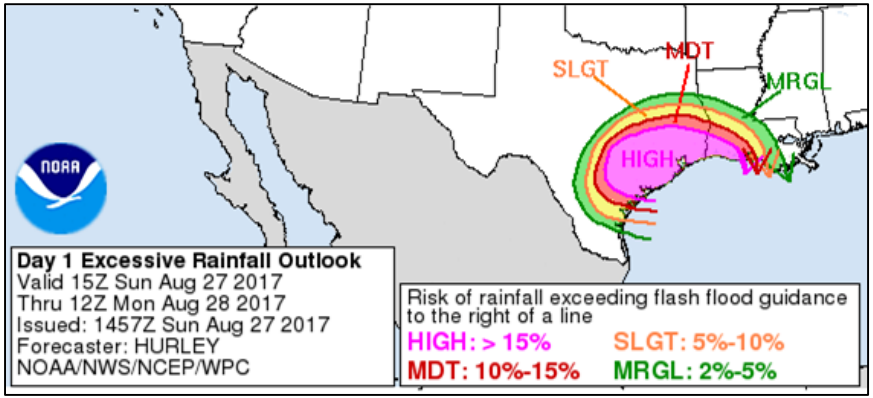
- Graphical representation of all hurricanes hazards, including rip current threat

Potential Product Enhancements

Graphics

- Display storm surge forecast inundation values included in the public advisory
- Improve communication of inland flood threat through new graphics or probabilistic products from Weather Prediction Center
  - Storm-centered excessive rainfall outlook graphic will be on NHC website in 2018





Potential Product Enhancements

Communication

- Reformatting the Tropical Cyclone Forecast/Advisory (TCM) product to a matrix or data table and removing the watch/warning information
  - Some reformatting will probably be necessary when additional forecast points are added (60-h and/or day 6/7)
  - Easier to add new parameters (e.g., probabilistic information)
  - Need a larger discussion of what tropical cyclone information the marine user community needs in the Tropical Cyclone Forecast/Advisory or perhaps another product for marine users

TROPICAL STORM ISAAC FORECAST/ADVISORY NUMBER 21
NWS NATIONAL HURRICANE CENTER MIAMI FL AL092012
0900 UTC SUN AUG 26 2012

SUMMARY OF 0900 UTC...INFORMATION

HURRICANE CENTER LOCATED NEAR...23.1N 79.0W
POSITION ACCURATE WITHIN 25 NM
PRESENT MOVEMENT...NW OR 305 DEGREES AT 16 KT
MAXIMUM SUSTAINED WINDS...55 KT WITH GUSTS TO 65 KT
MINIMUM CENTRAL PRESSURE...995 MB

FORECAST INFORMATION

VT	000	012	024	036	048	060	072	096	120	144	168
DT	0826	0826	0827	0827	0828	0828	0829	0830	0831	0901	0902
TM	0900	1800	0600	1800	0600	1800	0600	0600	0600	0600	0600
STAT	TS	TS	HU	HU	HU	HU	HU	TS	TD	LO	9999
LAT	23.1	24.2	25.5	26.9	28.1	29.1	30.2	32.0	34.0	38.0	9999
LON	79.0	80.8	83.1	84.9	86.5	87.3	88.0	88.5	88.5	88.5	9999
DIR	305	300	300	310	310	320	330	345	360	360	9999
SPD	16	14	12	11	9	8	6	5	5	9	9999
WIND	55	60	65	70	80	85	90	40	25	25	9999
GUST	65	75	80	85	100	105	110	50	3	35	9999
34NE	180	180	180	180	180	180	150	9999	9999	9999	9999
34SE	180	180	180	150	150	150	150	9999	9999	9999	9999
34SW	0	0	60	80	90	100	110	9999	9999	9999	9999
34NW	180	180	180	160	160	140	110	9999	9999	9999	9999
50NE	60	60	60	60	70	80	80	9999	9999	9999	9999
50SE	0	30	60	60	60	70	70	9999	9999	9999	9999
50SW	0	0	30	40	50	50	60	9999	9999	9999	9999
50NW	0	0	40	50	60	60	60	9999	9999	9999	9999
64NE	9999	9999	20	30	30	9999	9999	9999	9999	9999	9999
64SE	9999	9999	10	20	20	9999	9999	9999	9999	9999	9999
64SW	9999	9999	0	10	20	9999	9999	9999	9999	9999	9999
64NW	9999	9999	10	20	20	9999	9999	9999	9999	9999	9999
12NE	250	9999	9999	9999	9999	9999	9999	9999	9999	9999	9999
12SE	250	9999	9999	9999	9999	9999	9999	9999	9999	9999	9999
12SW	45	9999	9999	9999	9999	9999	9999	9999	9999	9999	9999
12NW	180	9999	9999	9999	9999	9999	9999	9999	9999	9999	9999
OTHR									I	I	I

OTHR- I=POSITION OVER LAND

Potential Product Enhancements

Communication

- Compiling post-storm data that currently go into Tropical Cyclone Report tables into a GIS database that could become part of the permanent archive from the storm, and that users could download

- Audio/Video Tropical Cyclone Discussions (“TCD”) and/or briefings

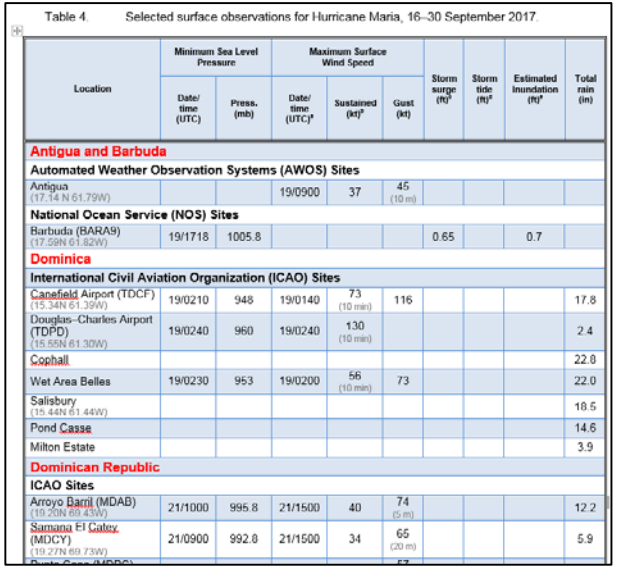


Table 4. Selected surface observations for Hurricane Maria, 16–30 September 2017

Location	Minimum Sea Level Pressure		Maximum Surface Wind Speed			Storm surge (ft)[b]	Storm tide (ft)[c]	Estimated Inundation (ft)[d]	Total rain (in)
	Date/ time (UTC)	Press. (mb)	Date/ time (UTC)[a]	Sustained (kt)[a]	Gust (kt)				
Antigua and Barbuda									
Automated Weather Observation Systems (AWOS) Sites									
Antigua (17.14 N 61.79W)			19/0900	37	45 (10 m)				
National Ocean Service (NOS) Sites									
Barbuda (BARA9) (17.59N 61.82W)	19/1718	1005.8				0.65		0.7	
Dominica									
International Civil Aviation Organization (ICAO) Sites									
Canefield Airport (TDCF) (15.34N 61.39W)	19/0210	948	19/0140	73 (10 min)	116				17.8
Douglas–Charles Airport (TDPD) (15.55N 61.30W)	19/0240	960	19/0240	130 (10 min)					2.4
Cophall									22.0
Wet Area Belles	19/0230	953	19/0200	56 (10 min)	73				22.0
Salisbury (15.44N 61.44W)									18.5
Pond Casse									14.6
Milton Estate									3.9
Dominican Republic									
ICAO Sites									
Arroyo Barril (MDAB) (19.20N 69.43W)	21/1000	995.8	21/1500	40	74 (5 m)				12.2
Samana El Catey (MDCY) (19.27N 69.73W)	21/0900	992.8	21/1500	34	65 (20 m)				5.9

Externally Contributed Ideas/Feedback

- Issue Potential Tropical Cyclone (PTC) advisories prior to the watch timeframe

- Information on time of departure of tropical storm winds
  - Concern about giving public false sense of safety if other hazards still ongoing

(Boy Meets Whirlwind)

- EMs interested in 6-7 day forecasts as a planning tool even if large uncertainty

What's Next?

- What are highest priorities given limited resources?
- Collected feedback and additional ideas in meetings with customers and partners during the past few months
- Prioritize items, determine resources needed, and develop timelines
  - How does this work in current NWS governance structure?
- Interact with users to determine details
- Involve social science for any changes or additions to public products (could be folded into new HFIP effort to examine entire NWS TC product suite)