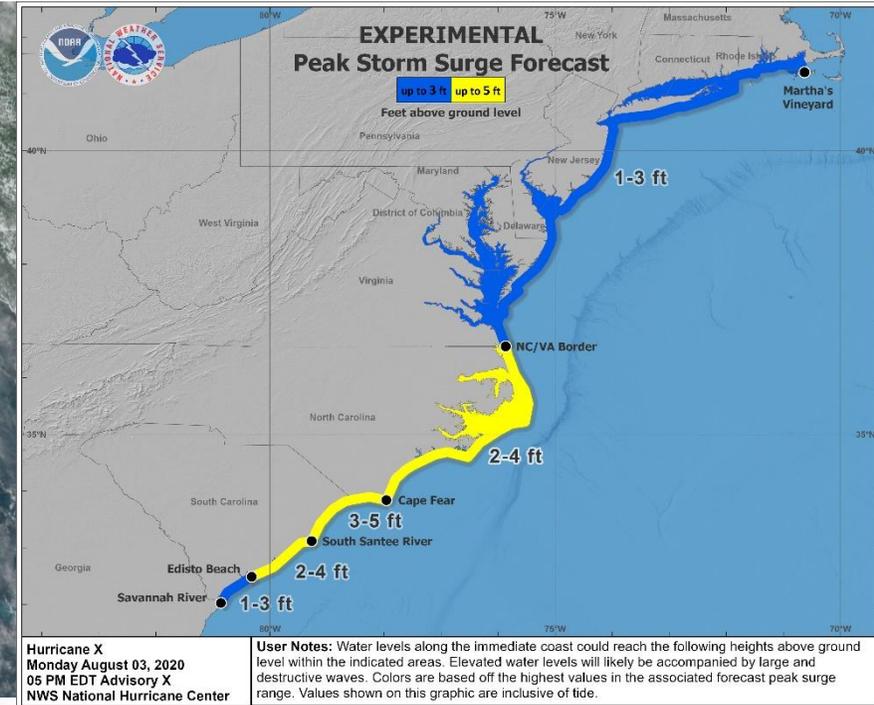
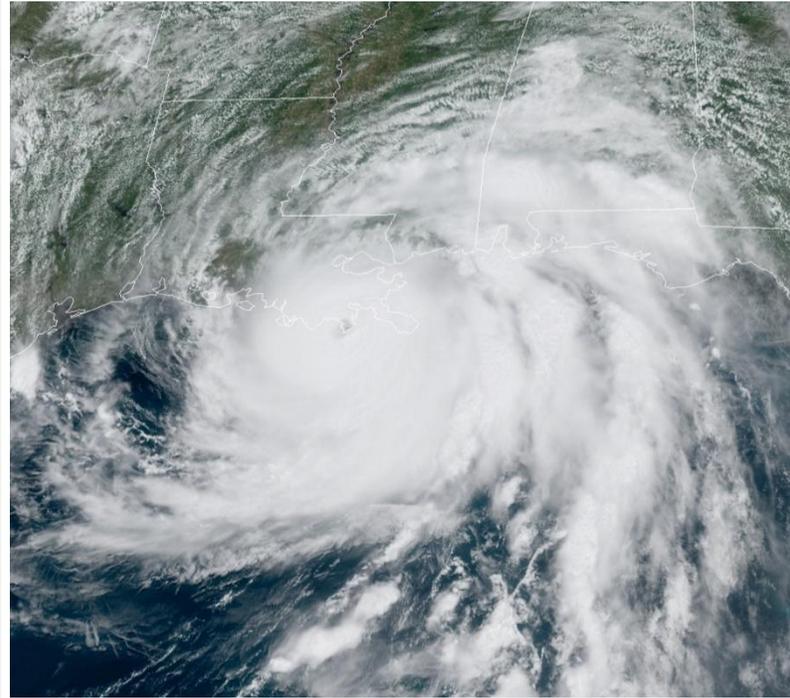
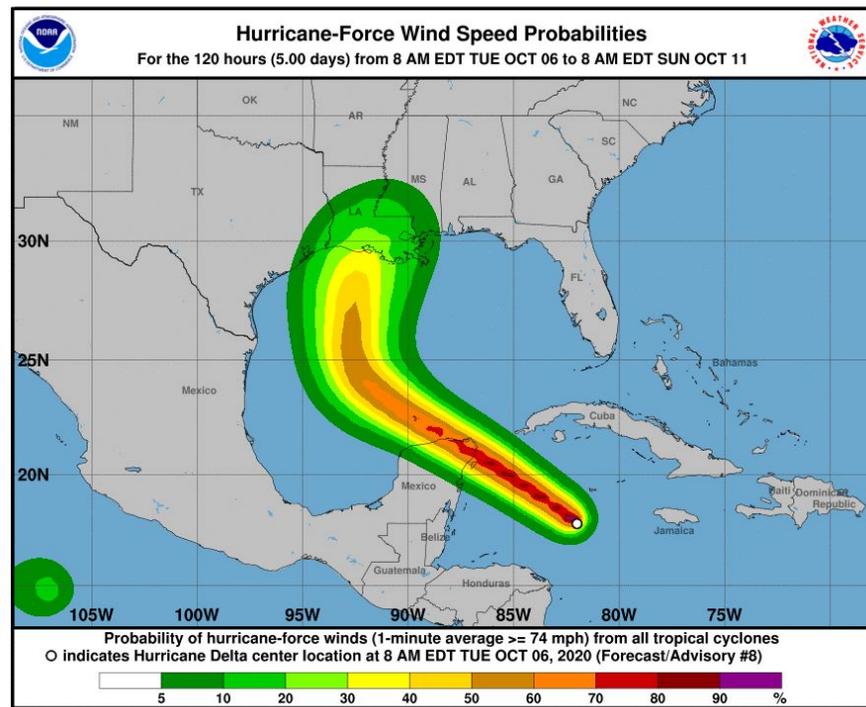


National Hurricane Center

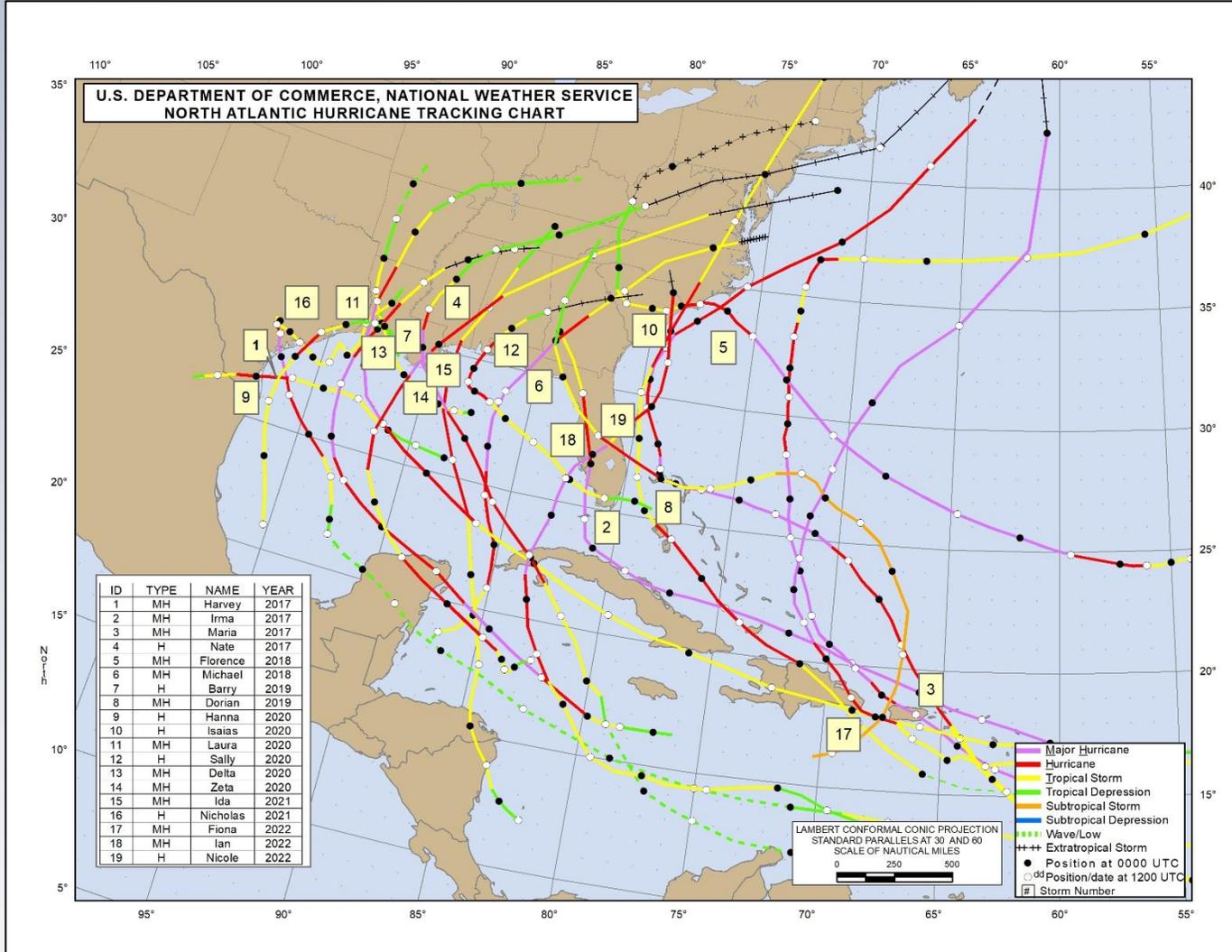
Tropical Cyclone Products and Services



Dr. Michael J. Brennan
Acting Deputy Director, National Hurricane Center
Insurance Webinar Series
26 January 2023

It Has Been BUSY

U.S. Landfalling Hurricanes 2017-2022



18 U.S. Hurricane Landfalls (8 major) since 2017

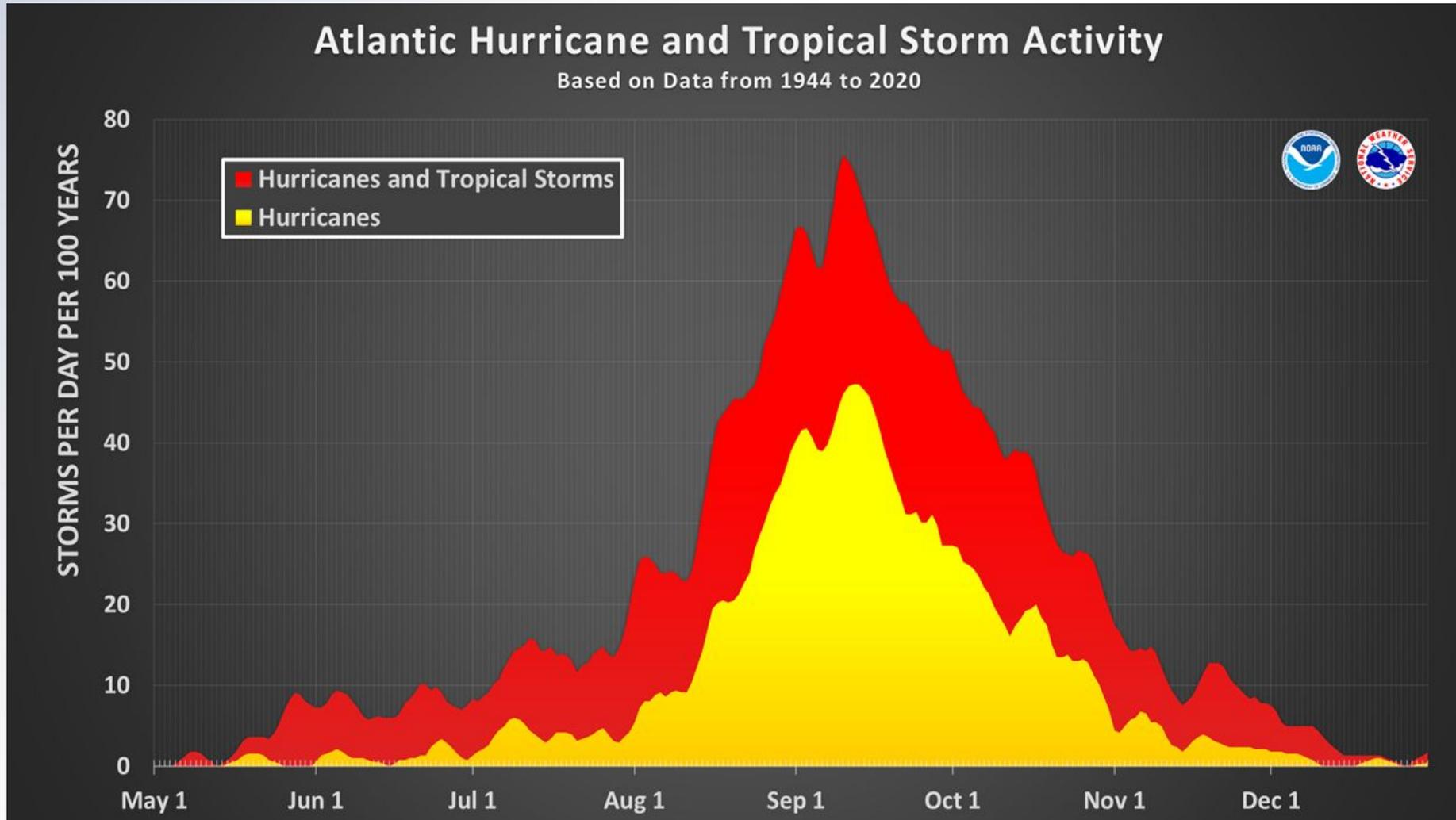
More U.S. landfalling Category 4 and 5 hurricanes (6) since 2017 than from 1963–2016

Tropical cyclones have caused nearly **700 fatalities** and more than **\$553B** in damage in the U.S. since 2017



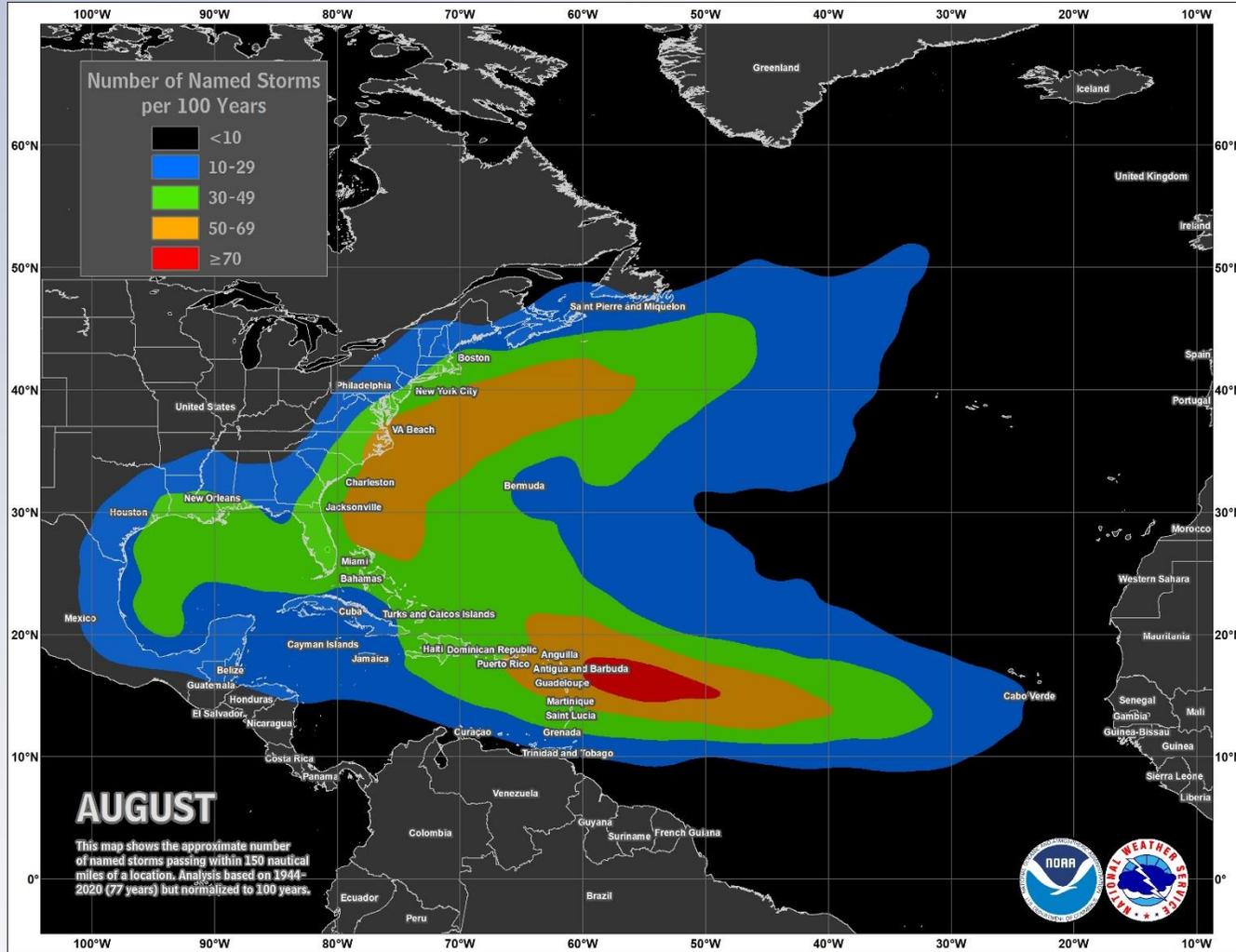
Long-Term Risk Information

Climatological Seasonal Activity – When



hurricanes.gov/climo/

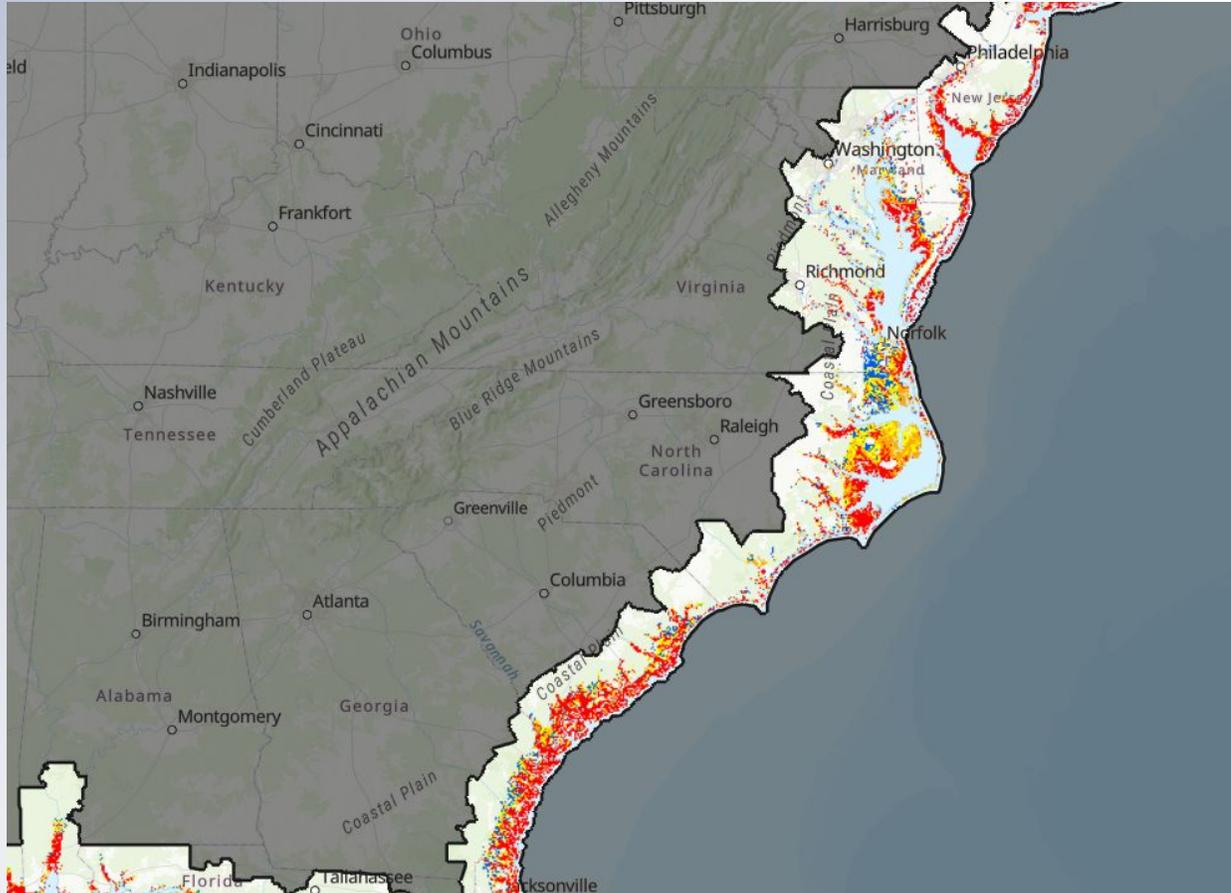
Tropical Cyclone Frequency Maps – Where



Maps of tropical cyclone and hurricane frequency by month available at

hurricanes.gov/climo/

Storm Surge Risk Maps – What

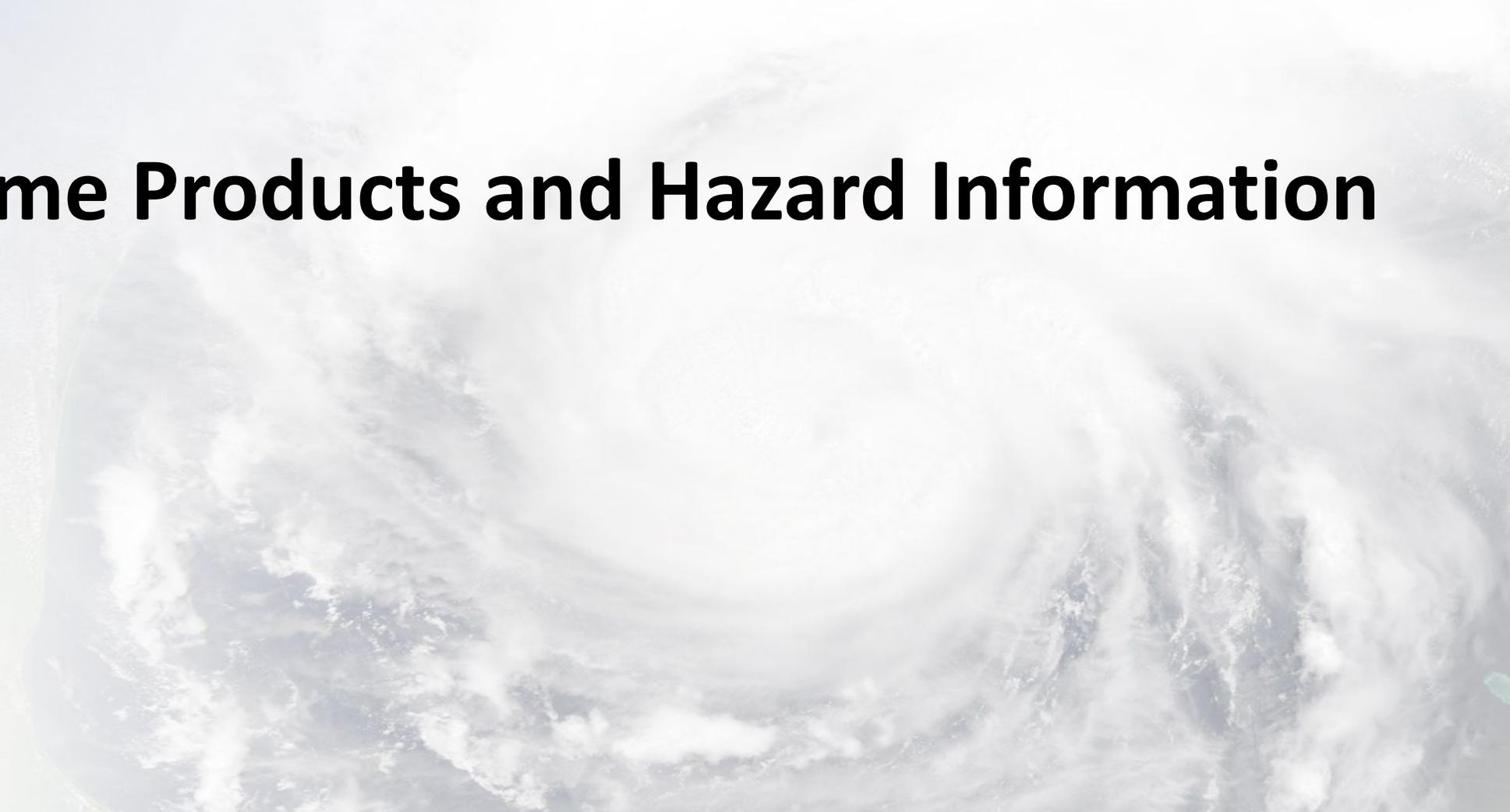


Category 4 Storm Surge Risk Map

- National Maximum of Maximums (MOM) for categories 1 through 5
- Available for U.S. East and Gulf Coasts, Puerto Rico, U.S. Virgin Islands, Southern California, Hawaii, Yucatan Peninsula, Belize, Honduras, Haiti, and the Dominican Republic
- Available in GIS compatible formats at <https://hurricanes.gov/nationalsurge/>



Real-Time Products and Hazard Information



Tropical Weather Outlook – Next 7 Days

- Discusses chances of tropical cyclone formation during the next **7 days*** Probabilities of formation during the first 48 hours and the entire 7-day period are provided
- **Includes reference to invest area if appropriate***
- Issued at 2 AM, 8 AM, 2 PM, 8 PM EDT daily from 15 May-30 November
- Special outlooks issued as needed

***(new for 2023)**

Tropical Weather Outlook
NWS National Hurricane Center Miami FL
200 AM EDT Fri Sep 2 2022

For the North Atlantic...Caribbean Sea and the Gulf of Mexico:

Active Systems:

The National Hurricane Center is issuing advisories on Tropical Storm Danielle, located about 925 miles west of the Azores.

East of the Leeward Islands (**AL91**):

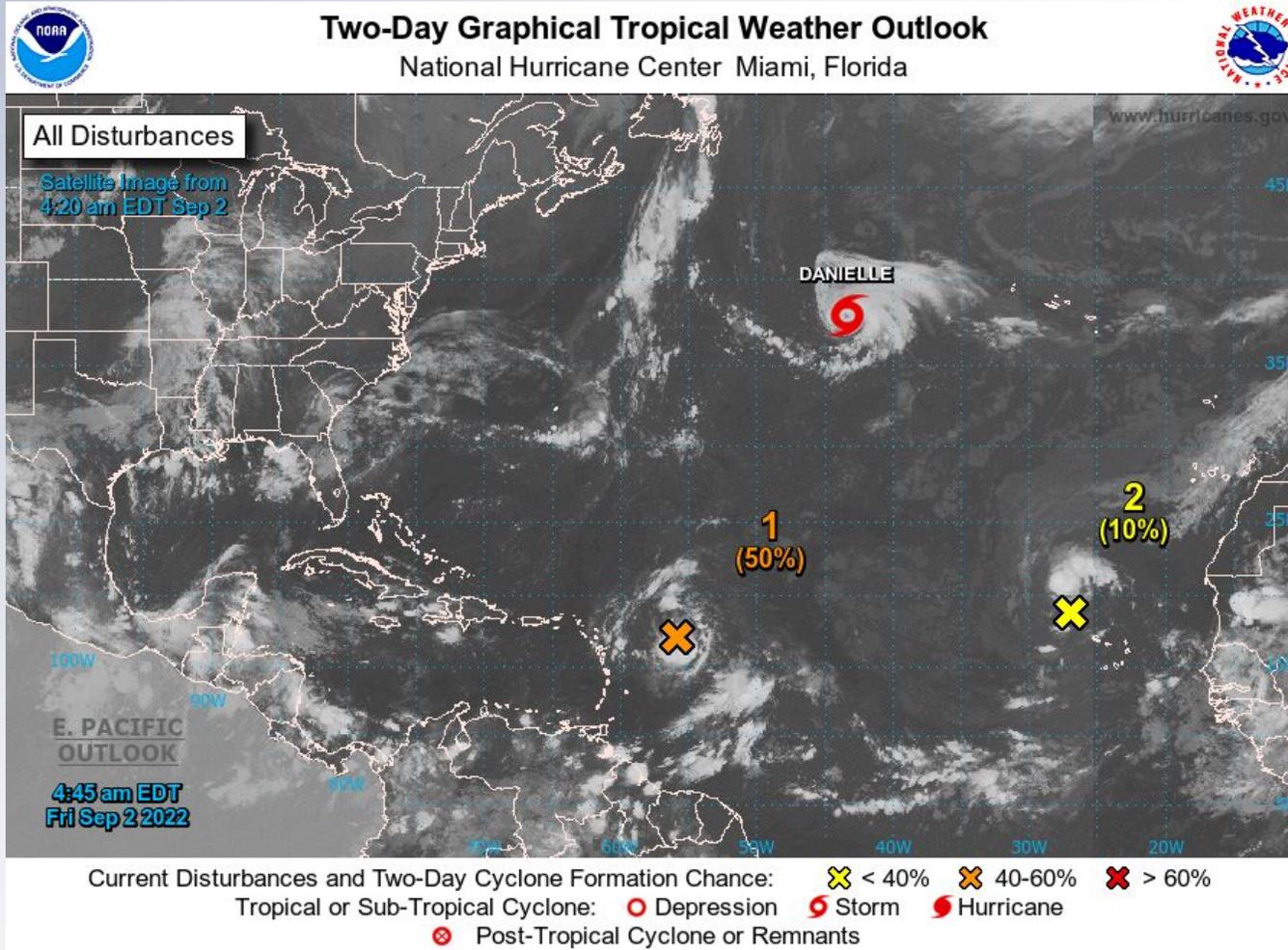
Satellite imagery indicates there has been little change in the organization of the area of low pressure located several hundred miles east of the Leeward Islands during the past several hours. Although environmental conditions remain only marginally conducive, any additional development of the system over the next few days would lead to the formation of a tropical depression. The disturbance is expected to move slowly west-northwestward, toward the adjacent waters of the northern Leeward Islands. Regardless of development, locally heavy rains may occur over portions of the Leeward Islands during the next couple of days, and interests in that area should monitor the progress of the system. An Air Force Reserve Hurricane Hunter aircraft is scheduled to investigate the system this afternoon, if necessary. Additional information on this system can be found in High Seas Forecasts issued by the National Weather Service.

* Formation chance through 48 hours...medium...50 percent.

* Formation chance through **7 days**...high...70 percent.

Graphical Tropical Weather Outlook

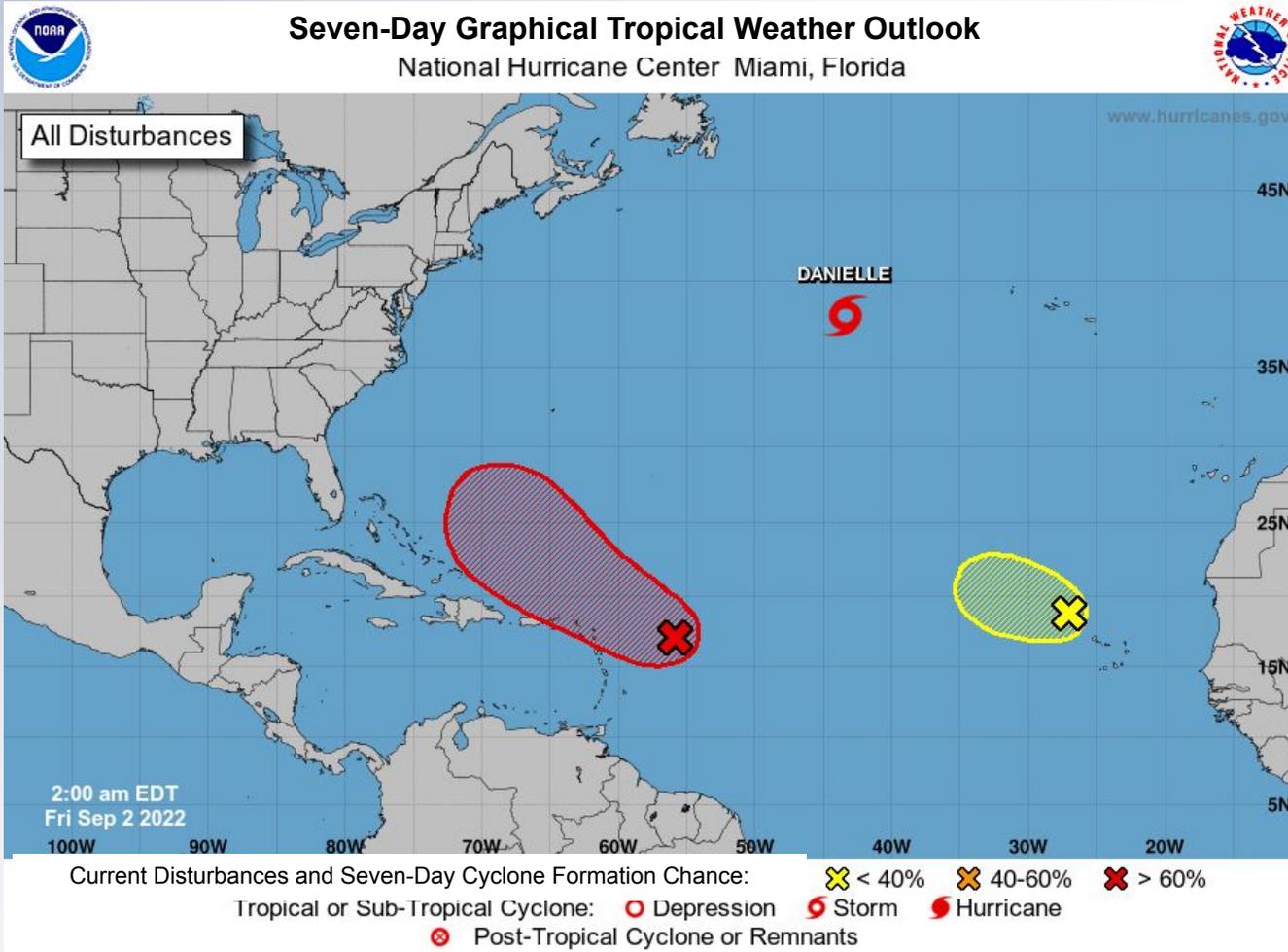
2-Day Formation Chance



- Identifies current location of disturbances discussed in the TWO
- Shows formation chance during the next 48 hours
 - Categorical (Low, Medium, and High)
 - Probabilities to nearest 10%
- Shows current location of active systems that NHC is writing advisories on

Graphical Tropical Weather Outlook

7-Day Formation Chance

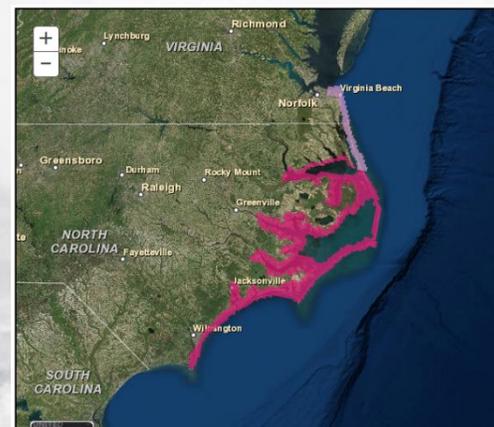
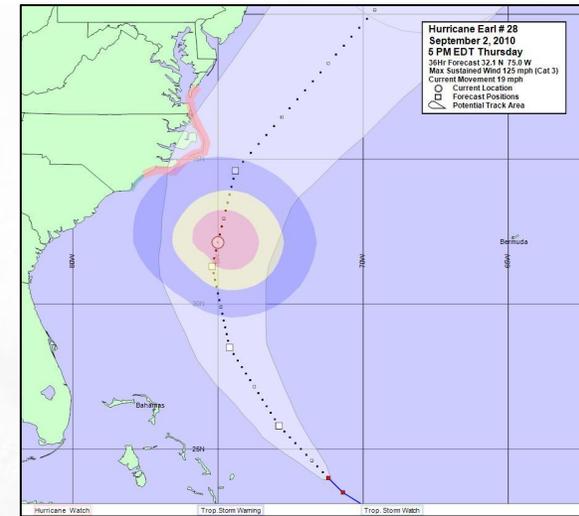


- Shows formation potential during the next 7 days
- Initial location of disturbance indicated (X) if it exists
- Shading represents potential formation area (not shown for Potential Tropical Cyclones)
- Shows the location of active tropical cyclones

NHC Advisory Packages

Issued every 6 hours

- 5-day track and intensity forecast
- Forecast of storm size out through 72 hours (hurricane-force winds through 48 hours)
- Watches and warnings
- Hazard information
 - Storm surge
 - Rainfall
 - Wind probabilities and timing
 - Tornadoes (U.S.)
- Forecast Discussion
 - Forecaster reasoning and confidence
 - Key Messages



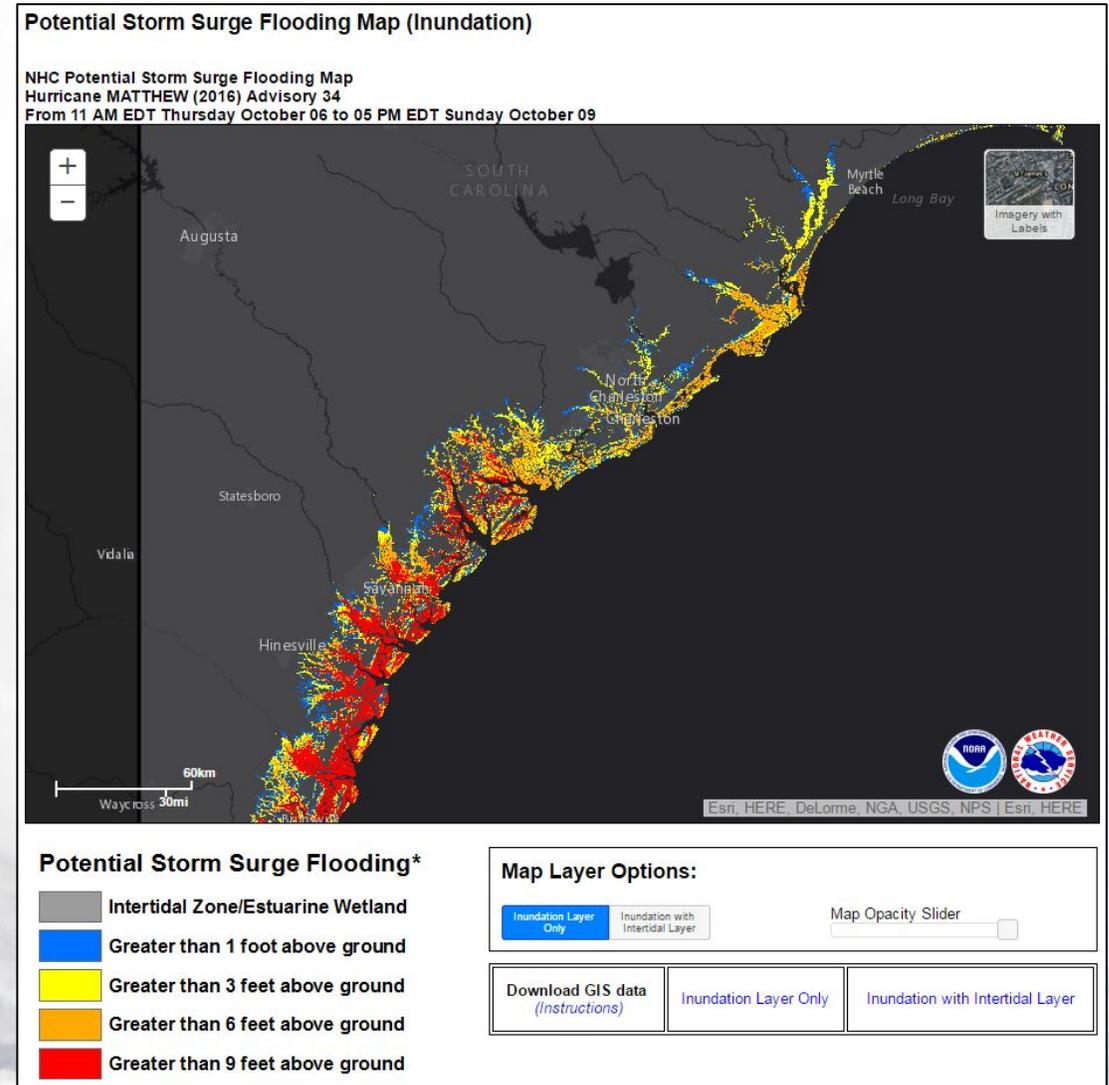
Key Messages for Hurricane Irma
Advisory 13: 11:00 AM AST Sat Sep 02, 2017

1. Irma is expected to be a major hurricane when it moves closer to the Lesser Antilles early next week, producing rough surf and rip currents. Irma could also cause dangerous wind, storm surge, and rainfall impacts on some islands, although it is too soon to specify where and when those hazards could occur. Residents in the Lesser Antilles should monitor the progress of Irma through the weekend and listen to any advice given by local officials.
2. It is much too early to determine what direct impacts Irma will have on the Bahamas and the continental United States. Regardless, everyone in hurricane-prone areas should ensure that they have their hurricane plan in place, as we are now near the peak of the season.

For more information go to hurricanes.gov

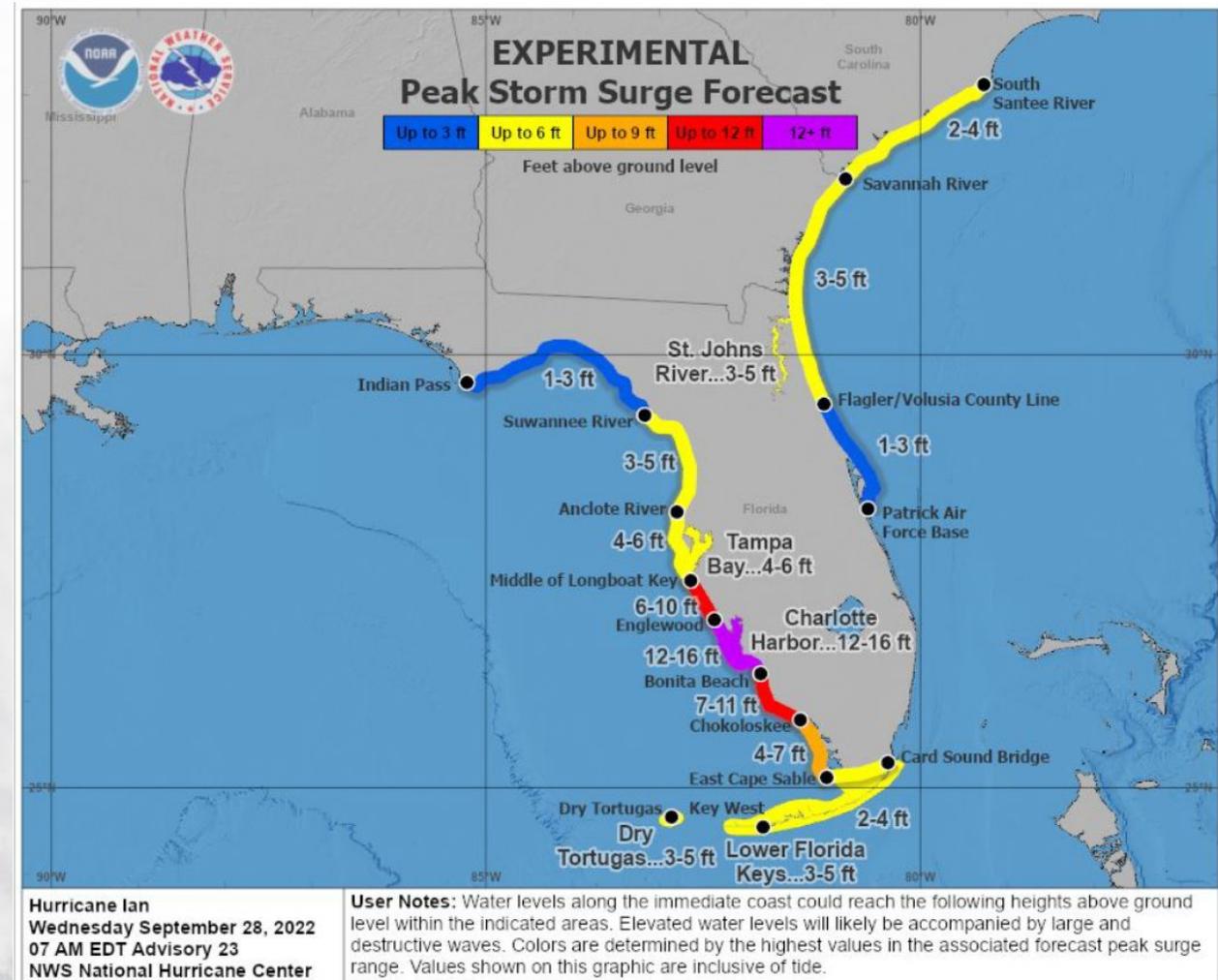
Potential Storm Surge Flooding Map

- Quantitative risk assessment for decision makers
- Shows height above ground that the water could reach
 - Depicts the reasonable worst-case scenario at any individual location
 - Shows inundation levels that have a 10% chance of being exceeded
- Issued at the same time as initial Storm Surge Watch
- Available 60-90 minutes after advisory release

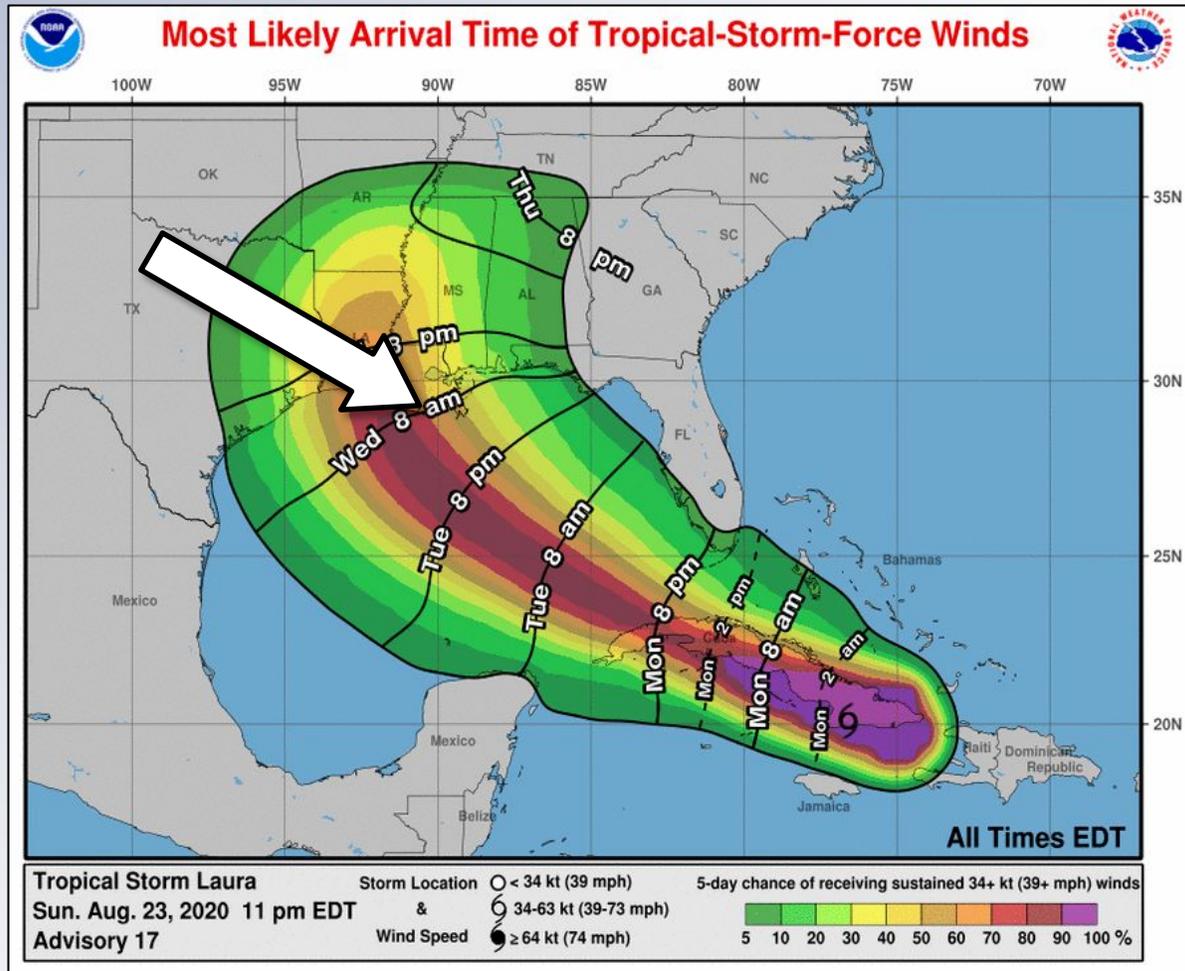


Peak Storm Surge Forecast Graphic – Operational in 2023

- Visual representation of peak storm surge inundation expected to occur *somewhere* within the indicated area
 - High-level look at expected storm surge inundation
 - Introduced when a Storm Surge watch or warning is in effect
 - May differ from the Potential Storm Surge Flooding Map since that product depicts location-specific reasonable worst case scenarios



Time of Arrival of 34-kt Winds



Earliest Reasonable and Most Likely graphics provide range of potential TS-force wind arrival times, accounting for typical forecast track, intensity, and size uncertainties

• Earliest Reasonable

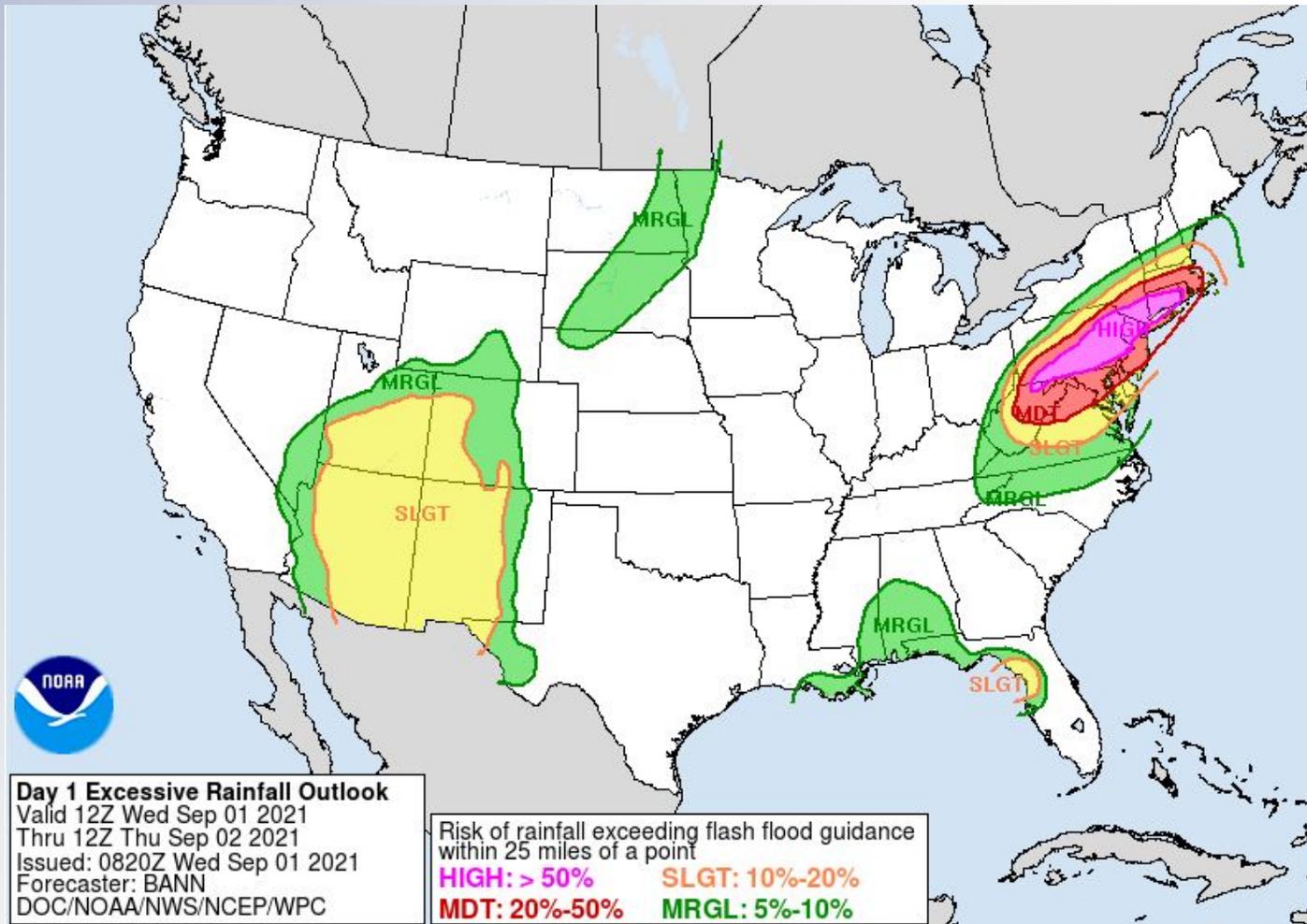
- 10% chance of onset
- Most conservative timing
- **Tuesday 8 PM EDT**

• Most Likely

- 50% chance of onset
- Equally likely before as after
- **Wednesday 8 AM EDT**

Range of wind arrival: 12 h
Tuesday 8 PM-Wednesday 8 AM

WPC Excessive Rainfall Outlook



Generally answers the question:

Where is the greatest risk of rainfall-induced flash flooding?

The ERO is:

A situational awareness and planning tool

The ERO is ***NOT***:

A forecast of flash flooding at a specific location



WEATHER PREDICTION CENTER
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

GIS Products

<https://hurricanes.gov/gis>



**NATIONAL HURRICANE CENTER and
CENTRAL PACIFIC HURRICANE CENTER**
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION



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NHC Data in GIS Formats

[Satellite](#) | [Radar](#) | [Aircraft Recon](#) | [GIS Data](#) | [Analysis Tools](#)

Data & Products

Please note these GIS datasets are provided as a convenience to users. Support for these data may not always be available or timely in nature. For issues directly related to the datasets below, please [contact us](#).

	As of Wed, 20 May 2020 13:14:08 UTC			
	Atlantic	Eastern Pacific	Central Pacific	Archive
Advisory Forecast Track, Cone of Uncertainty, and Watches/Warnings[†] <i>Sample Shapefiles: Irma Example Sample KMZ: Cone Track Warnings</i>	No current data	No current data	No current data	Year ▾
Advisory Wind Field and Forecast Wind Radii[†] <i>Sample Shapefiles: Irma Example Sample KMZ: Initial Radii Forecast Radii</i>	No current data	No current data	No current data	Year ▾
Preliminary Best Track[†] <i>Note: Final Best Tracks available here Sample Shapefiles: Irma Example Sample KMZ: Past Track Wind Swath</i>	No current data	No current data	No current data	Year ▾

Tropical Cyclone Reports

- Tropical Cyclone Reports provide a summary for every Atlantic, eastern Pacific, and central Pacific storm
- Available on hurricanes.gov weeks to months after each storm
- Final track, intensity and size info
- Damage and casualty figures
- Forecast verification



**NATIONAL HURRICANE CENTER
TROPICAL CYCLONE REPORT**

**HURRICANE IDA
(AL092021)**

26 August–1 September 2021

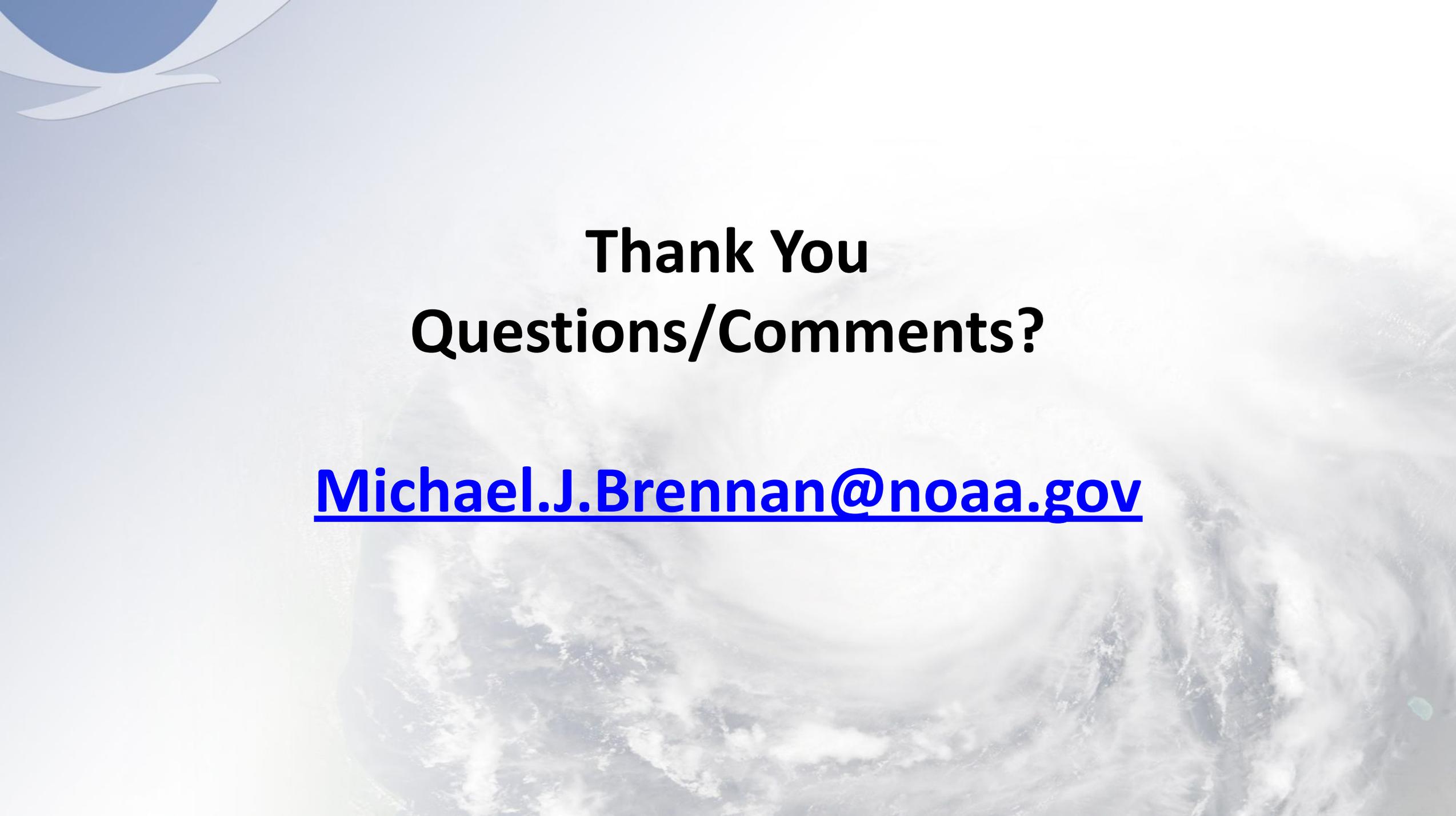
John L. Beven II, Andrew Hagen, and Robbie Berg
National Hurricane Center
4 April 2022



29 Aug 2021 14:00Z NOAA/NESDIS/STAR GOES-East ABI DayLandCloud

GOES-16 DAY CLOUD CONVECTION IMAGE OF IDA A FEW HOURS BEFORE LANDFALL AT PORT FOURCHON, LOUISIANA, AT 1400 UTC 29 AUGUST 2021. IMAGE COURTESY OF NOAA/NESDIS/STAR.

Ida was a category 4 hurricane (on the Saffir-Simpson Hurricane Wind Scale) that caused catastrophic damage when it made landfall in southeastern Louisiana. It also made landfall in western Cuba as a category 1 hurricane. Ida later became an extratropical low that caused heavy rain and deadly flooding in the northeastern United States.



Thank You
Questions/Comments?

Michael.J.Brennan@noaa.gov