

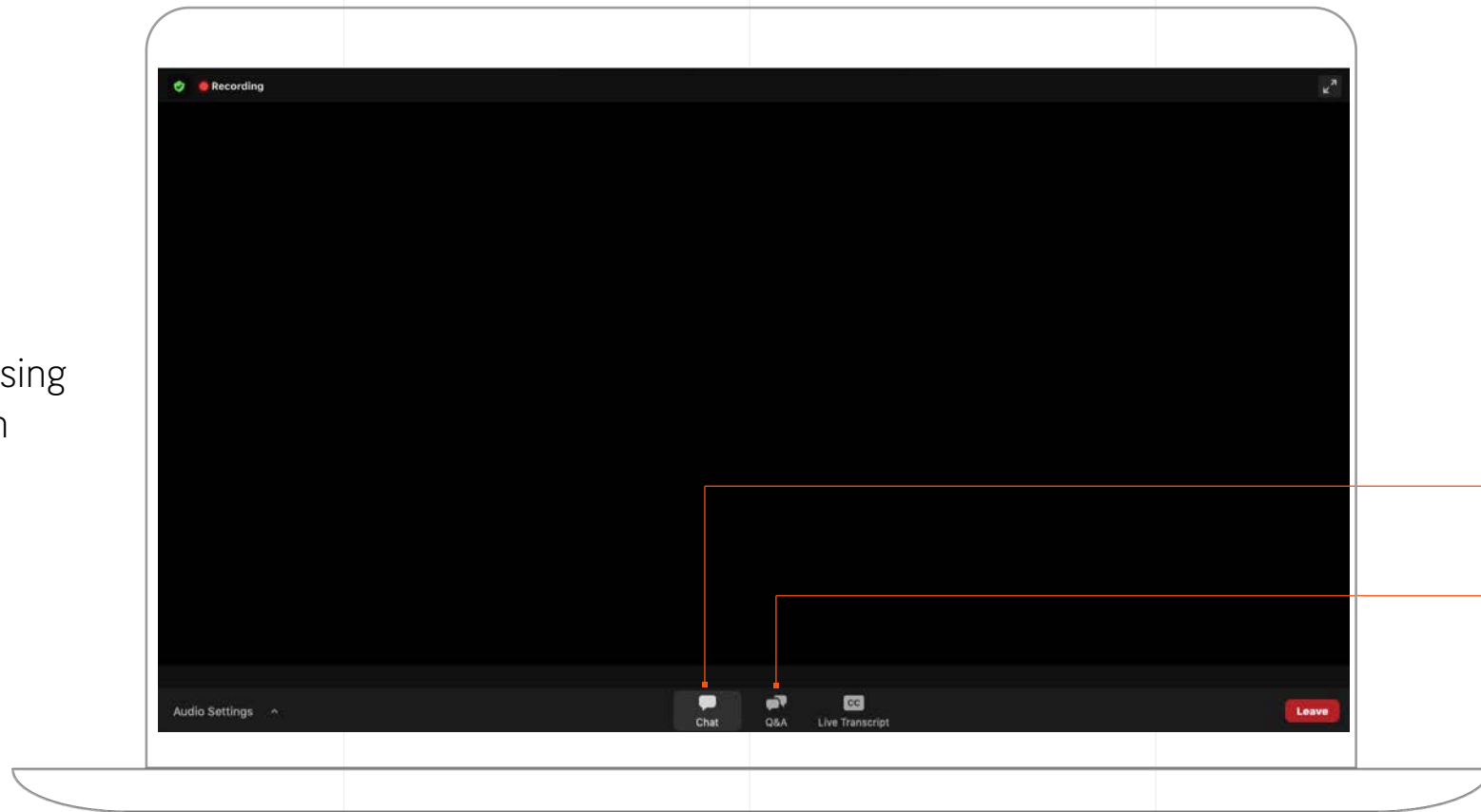
Hurricane Season Outlook

Dan Kottowski, Senior Meteorologist, Lead Hurricane Forecaster

Don Coash, Senior Account Executive, Meteorologist

How Zoom Webinars Work

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Q&A

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Dan Kottlowski

Lead Hurricane Forecaster,
Senior Meteorologist



Don Coash

Senior Account Executive,
Meteorologist

2021 Atlantic Basin Hurricane Season Outlook

Prepared by

Dan Kottowski, Senior Meteorologist and Lead Hurricane Forecaster

Definitions

- **ENSO:** El Niño Southern Oscillation or short-term climate fluctuation that is determined by warming or cooling of the Central Pacific waters.
- **El Niño:** A 12- to 18-month period during which anomalously warm sea-surface temperatures occur in the eastern half of the equatorial Pacific. Moderate or strong El Niño events occur irregularly, about once every three to seven years on average.
- **La Niña:** Opposite of El Niño with anomalously cold sea-surface temperatures occurring in the eastern half of the equatorial Pacific.
- **Vertical Wind Shear:** The difference in horizontal wind speed and direction between two vertical levels, usually between 5,000 feet and 40,000 feet.
- **AMO:** Atlantic Multi-decadal Oscillation: A 20- to 40-year cycle of above-normal or below-normal sea-surface temperatures in the Atlantic basin.
- **Analog Years:** Past years which have weather patterns similar to current and projected weather patterns. These are often used to estimate possible future trends and impacts during a hurricane season.
- **ACE: Accumulated Cyclone Energy:** A measure used to express the activity of individual tropical cyclones and entire tropical cyclone seasons. It uses an approximation of the wind energy used by a tropical system over its lifetime and is calculated every six hours.

Atlantic Hurricane Season outlook for 2021

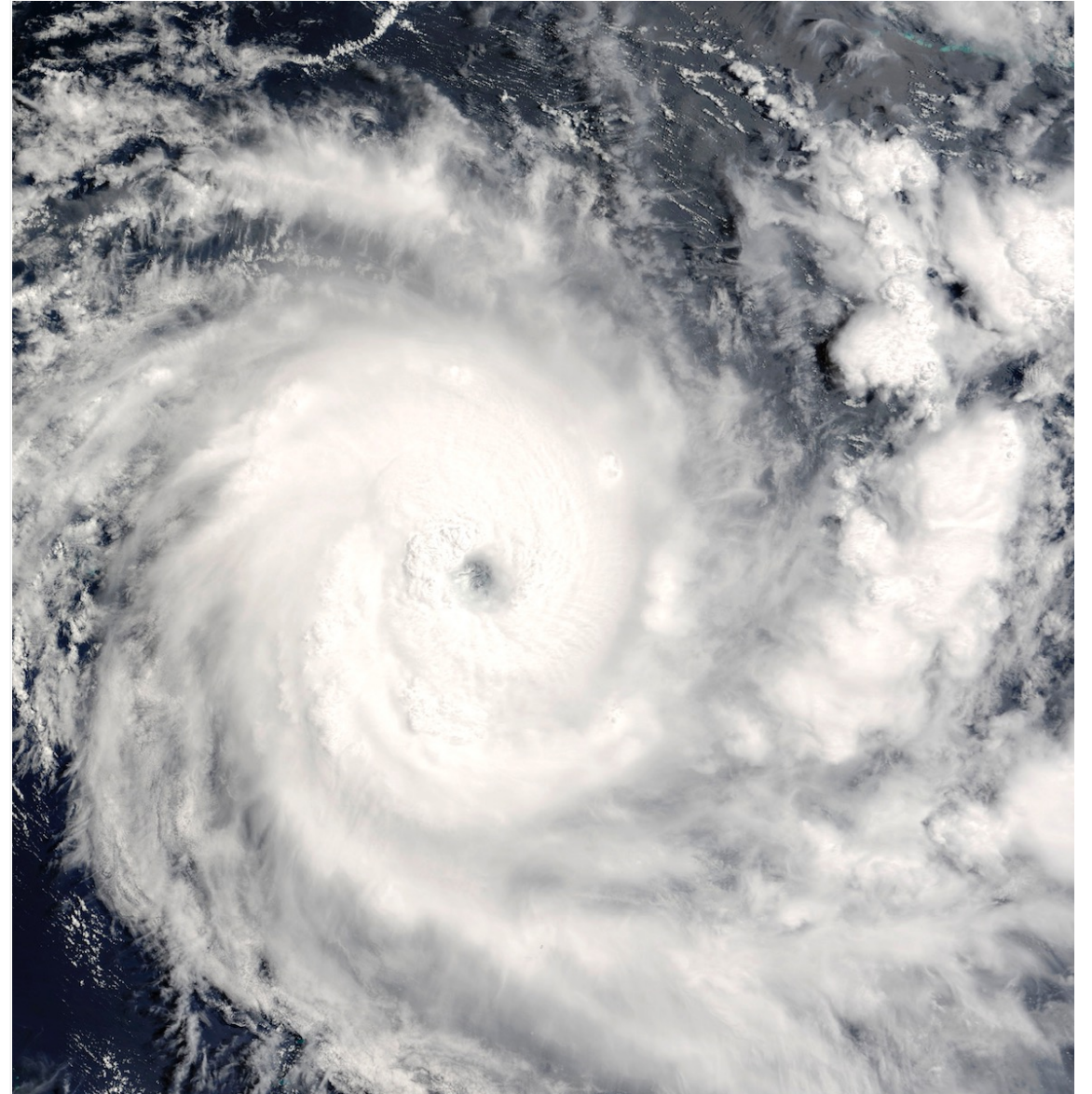
Issued March 25, 2021

	Named storms	Hurricanes	Major Hurricanes	ACE	Direct U.S. Impacts
2020	30	13	6	182	11
2021 forecast	16-20	7-10	3-5	120-160	3-5
Normal	14	7	3	123	3.5

2021 Atlantic Basin forecast

Key influential factor: ENSO

- Currently in weakening La Niña phase – forecast to transition to neutral phase
- Will ENSO remain neutral or transition back to La Niña during August, September and October?
- Impacts degree and frequency of vertical wind shear across the basin
- Models suggest ENSO will remain neutral through most active part of the season



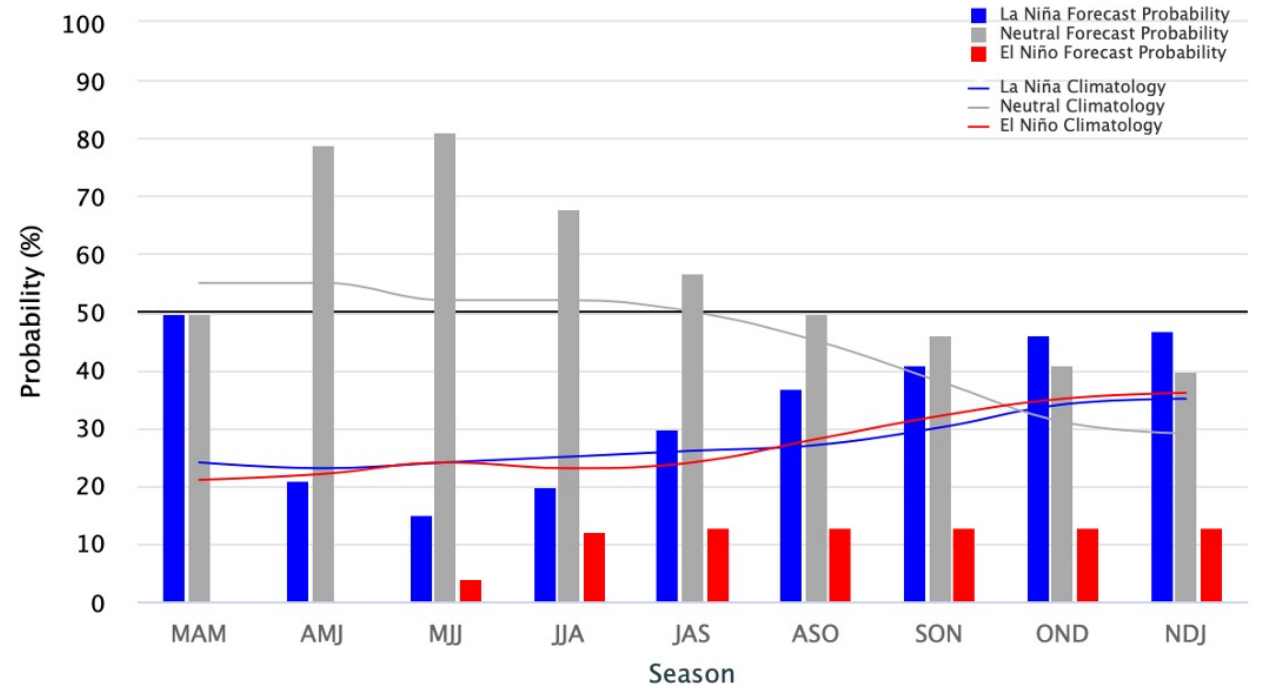
Neutral Phase of ENSO

- 50% chance of neutral ENSO conditions
- 37% chance for La Niña ENSO conditions during August, September and October

La Niña phase of ENSO should transition to a neutral phase during the next three months.

Early-April 2021 CPC/IRI Official Probabilistic ENSO Forecasts

ENSO state based on NINO3.4 SST Anomaly
Neutral ENSO: -0.5 °C to 0.5 °C

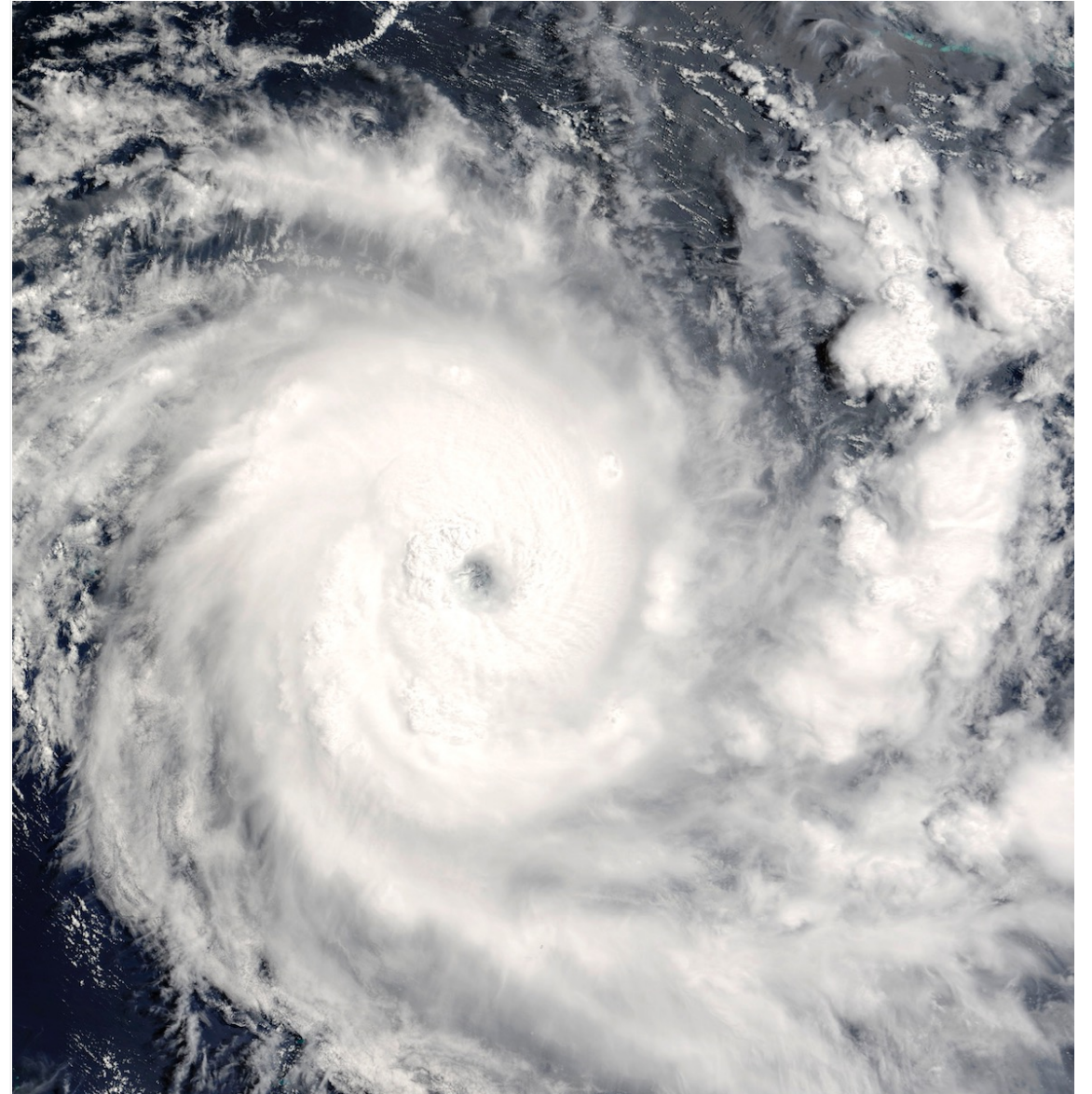


Courtesy of IRI

2021 Atlantic Basin forecast

Key influential factor: Wind Shear

- Neutral ENSO favors near normal to below normal episodes of vertical wind shear
- Stronger shear with latitude

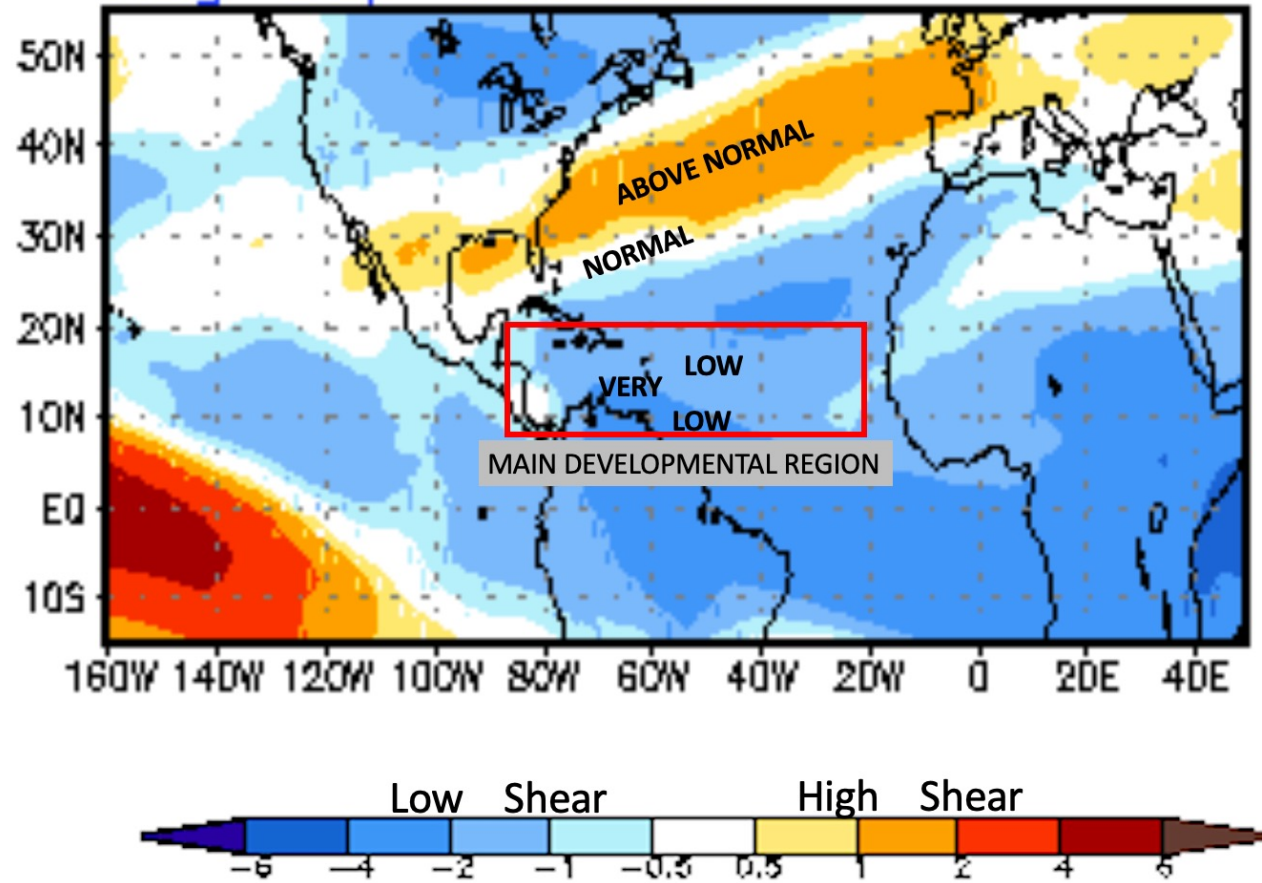


Vertical Wind Shear

August, September, October

Issued May 3, 2021

Aug-Sep-Oct 2021

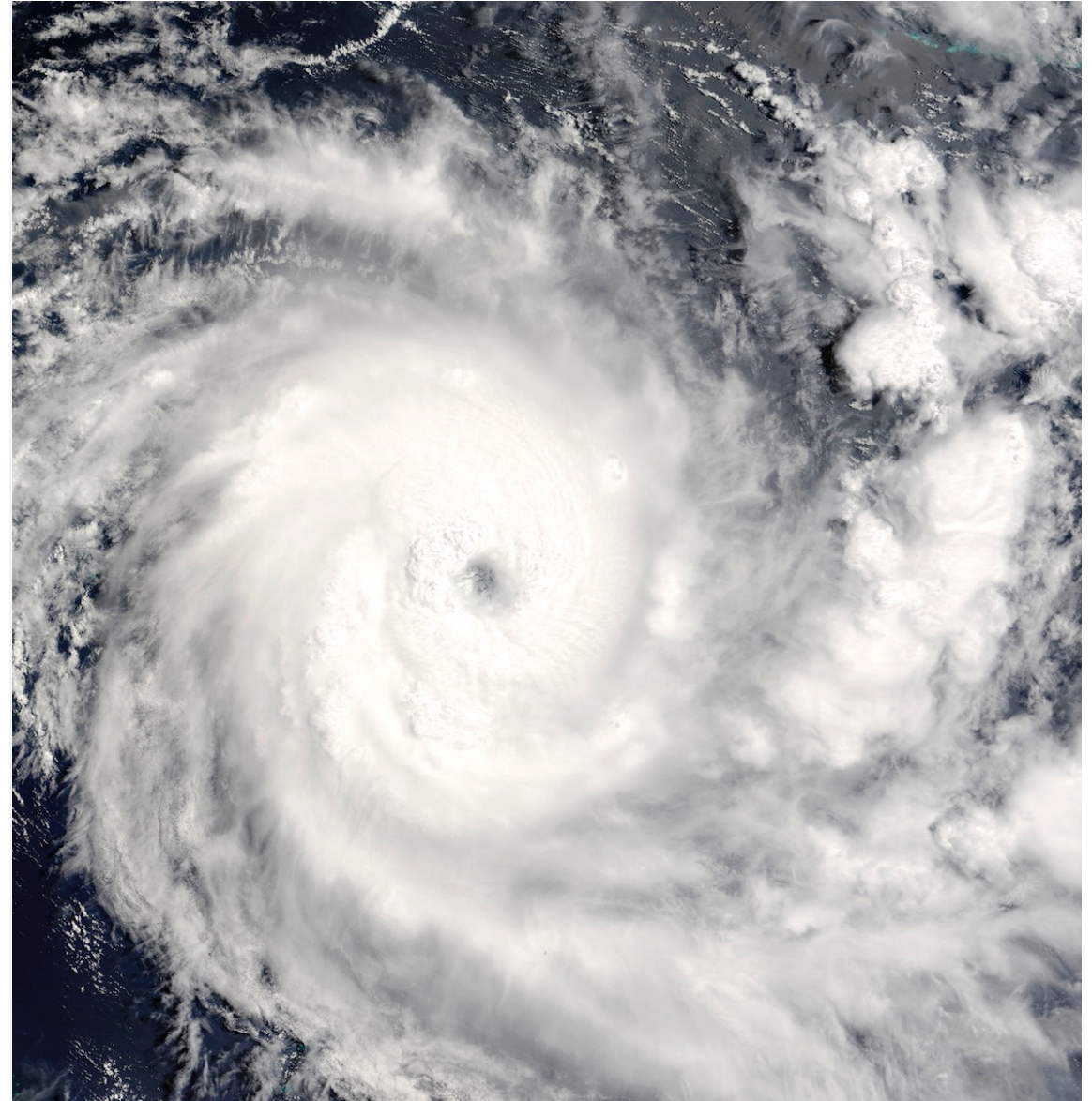


Courtesy of CPC

2021 Atlantic Basin forecast

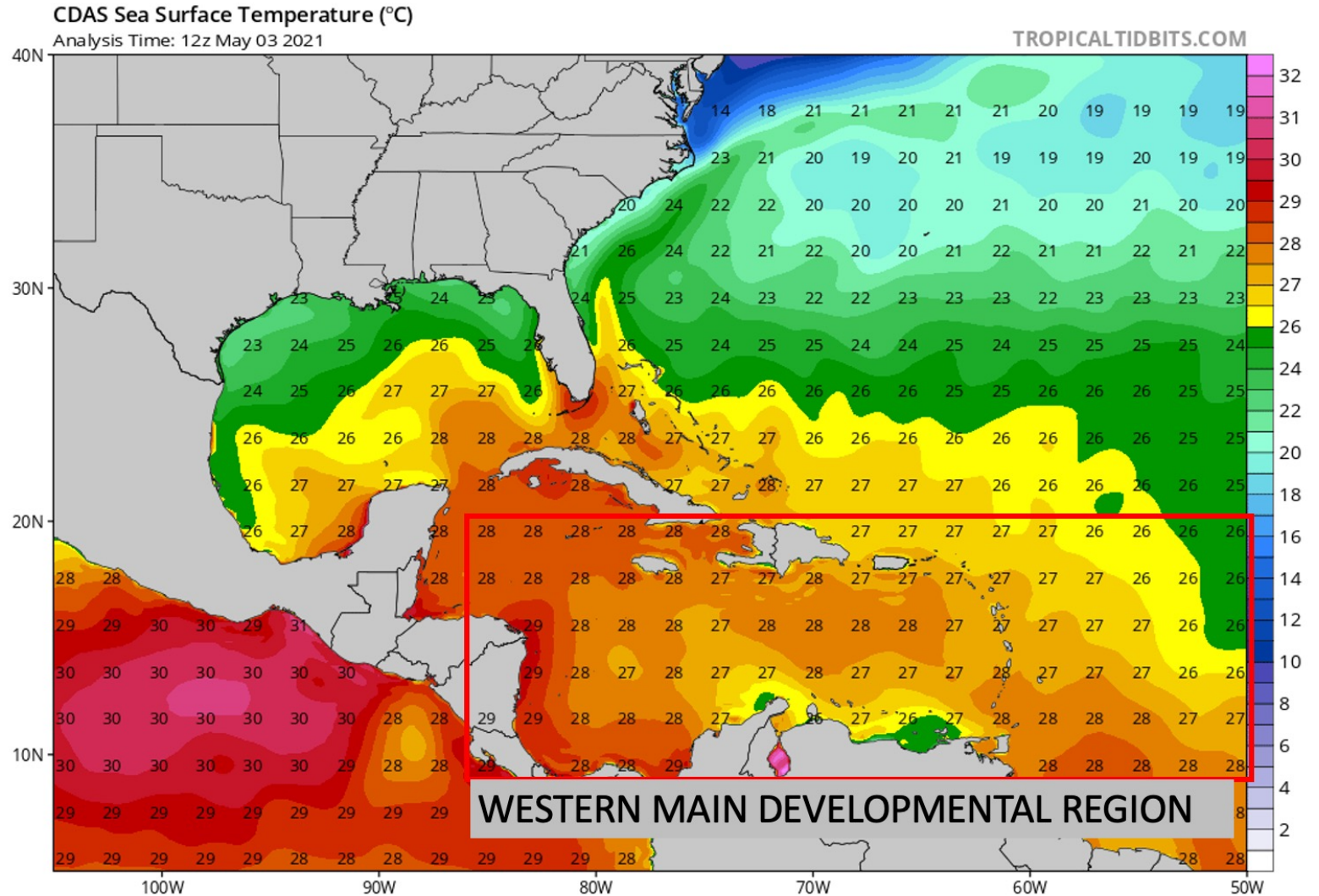
Key influential factor: Sea-Surface Temperatures (SST)

- Warm water could support preseason or early season development
 - N. & C. Gulf of Mexico: above normal
 - Tropical Atlantic: warmer than normal
 - Caribbean: near normal
- Could support above-normal tropical development, even during preseason and early season



Recent SST

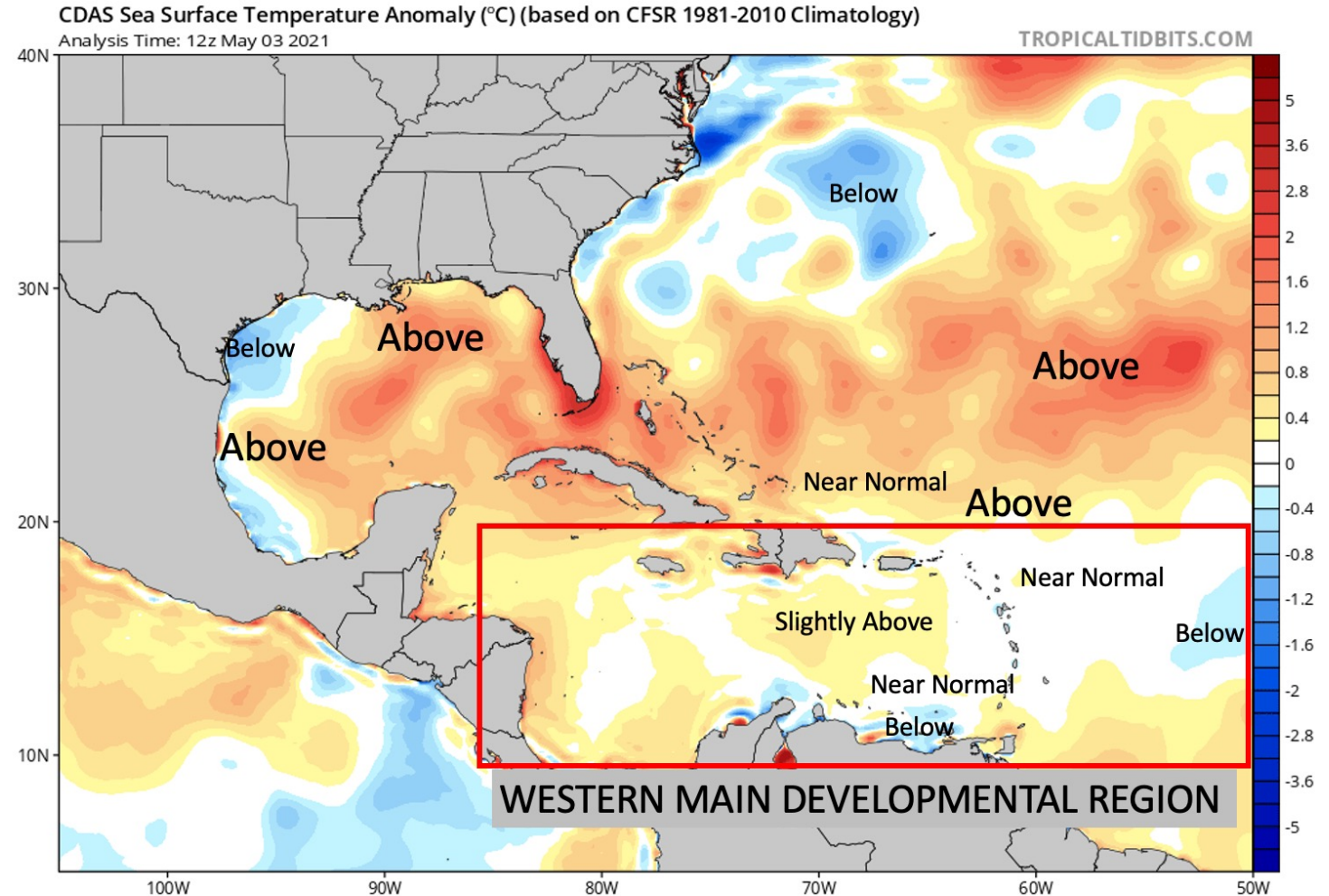
Temperatures above 26°C are most favorable for tropical development



Courtesy of TropicalTidbits

Sea-Surface Temperatures

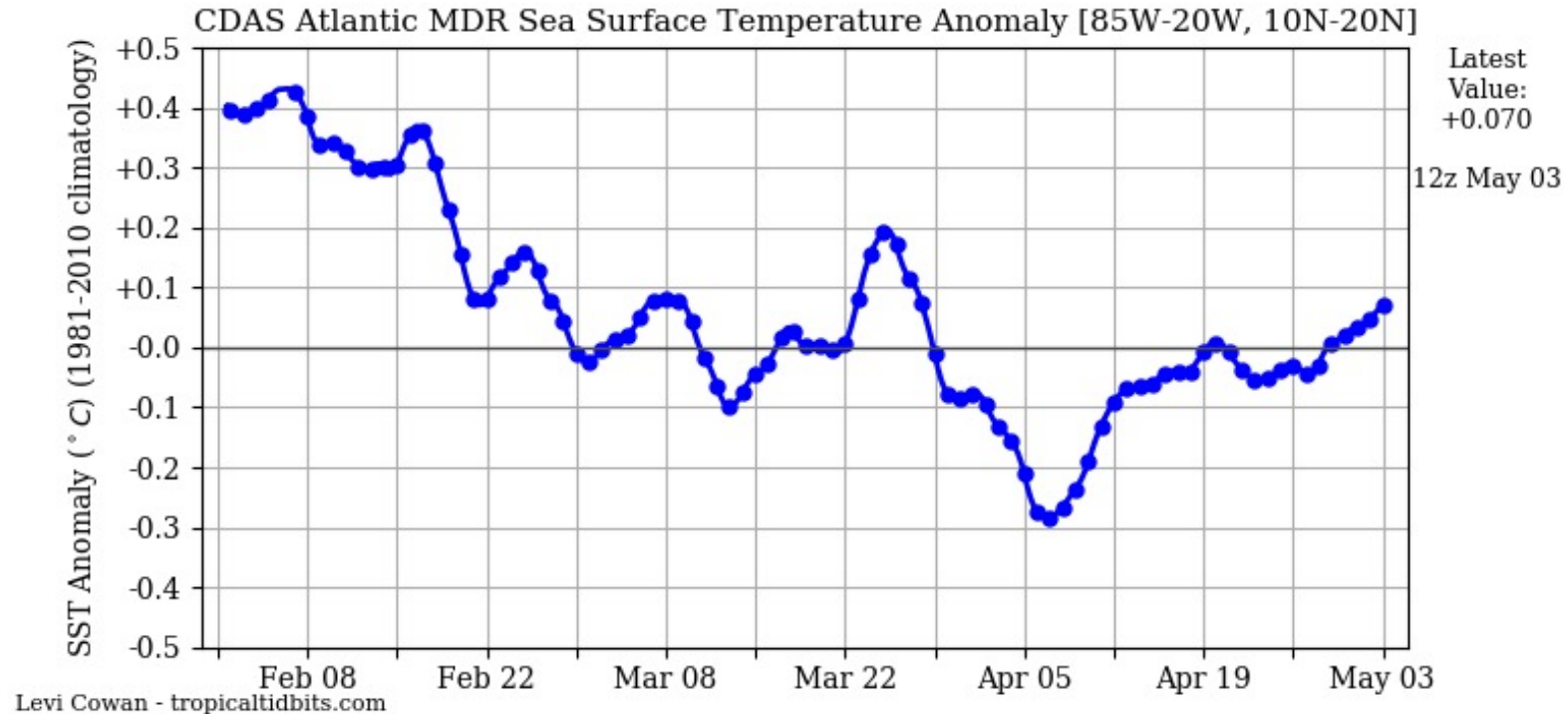
- Near normal in main developmental region
- Warmer than normal over most of the rest of the Atlantic basin



Courtesy of TropicalTidbits

Main development region SST anomaly

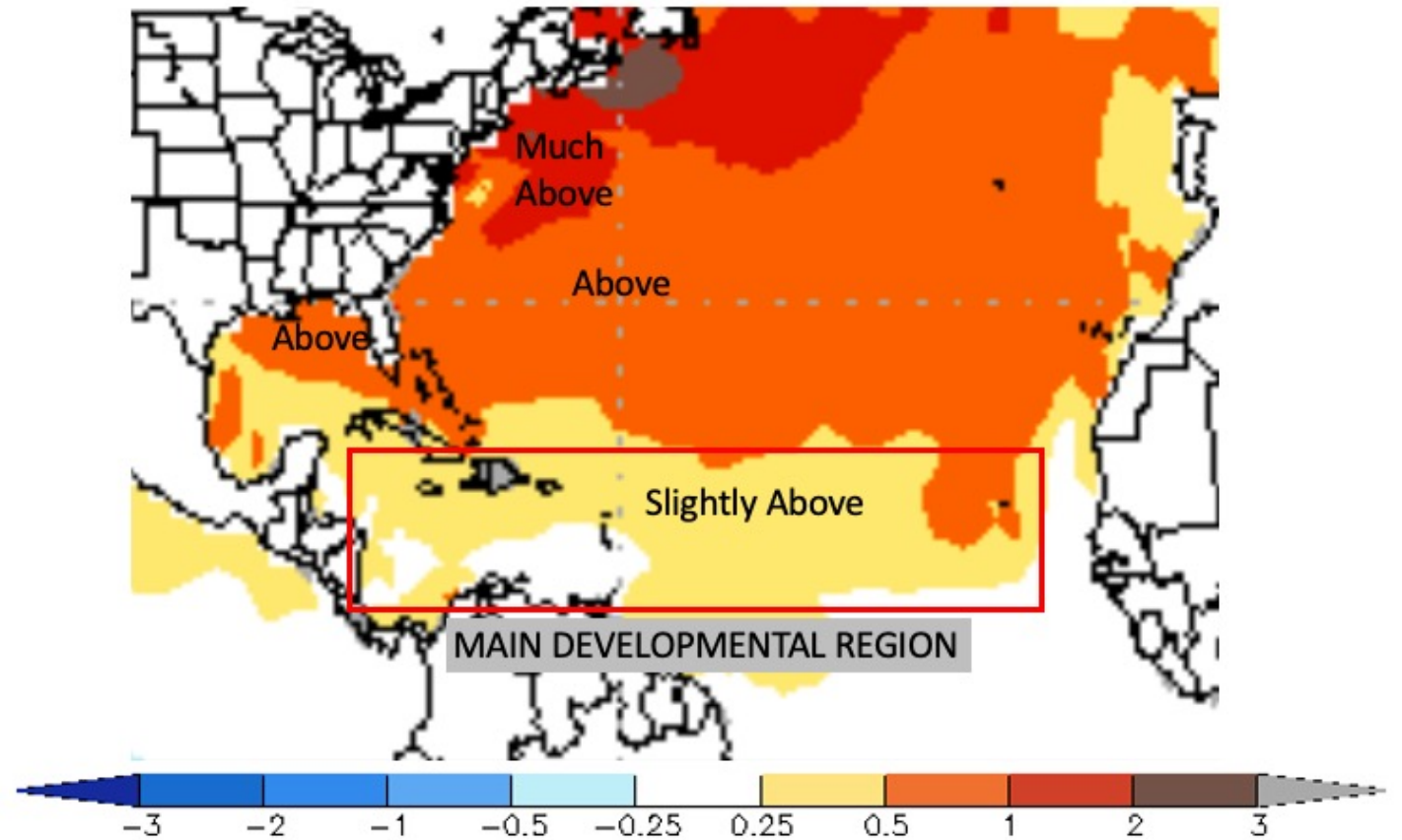
- Main development region of Atlantic basin averaging near to slightly below normal since late February
- Very typical of early spring



Courtesy of TropicalTidbits

SST Anomaly Forecast

- August, September and October
- Issued April 1
- Most active part of the Atlantic hurricane season
- Suggests above-normal SST values across most of the Atlantic basin



Courtesy of CPC

2021 Atlantic Basin forecast

African Easterly Jet will be a key feature to monitor during the next few months

- Expected to support normal to above-normal numbers of tropical waves moving off the coast of Africa this season
- Development of a strong jet will bring frequent episodes of dry air and dust during spring into early August
- Might initially hinder and limit early season development, similar to last year.
- Probably won't overall impact the number of storms that form during the entire season



Hurricane development factors: last season vs. this season

	2020	Influence	2021	Influence
Wind shear 1.5 km - 12 km	Low	+	Low	+
Sea-surface temperature	Above	+	Above	+
Surface pressure	Low	+	Low	+
E. wind flow in lower 1.5 km	Normal	+	Normal	+
High-level winds above 15km	East then West	+	West	+
Degree of low to mid-level moisture	Above	+	Above	+

+ = Positive Influence - = Negative Influence 0 = No Influence

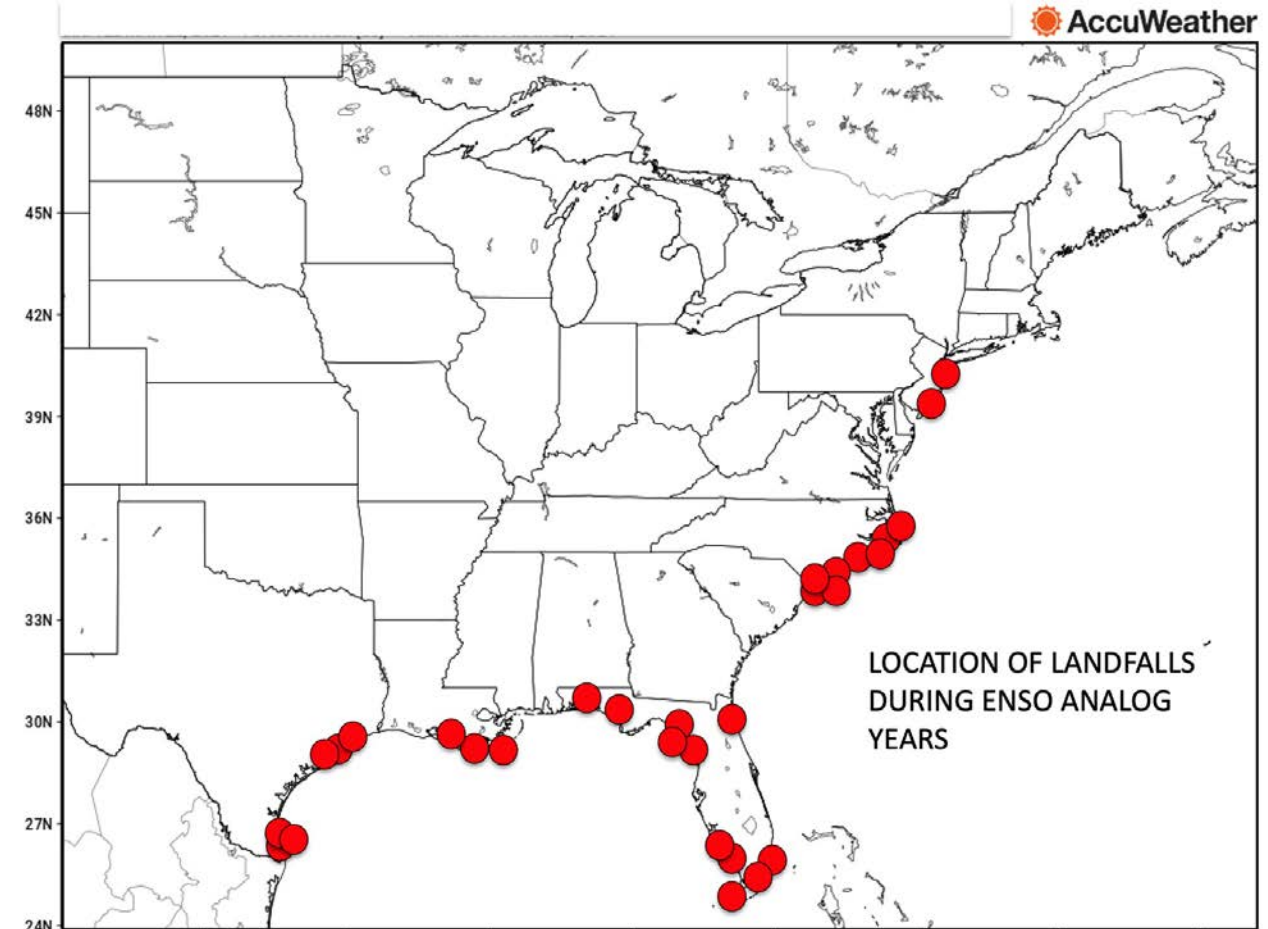
ENSO-based analog years for Hurricane Season

Year	Tropical Storms	Hurricanes	Major Hurricanes	ACE	Landfalls	U.S. Impacts
1996	13	9	6	166	4	3 NC, NW FL
1999	12	8	5	177	5	S TX, 2 NC, SW FL, S & SE FL
2000	15	8	3	119	2	NW FL, FL PH
2001	15	9	4	110	3	SE TX, FL PH, SW FL
2008	16	8	5	146	6	S TX, 2 SE TX, FL, C LA, SC/NC
2011	19	7	4	126	3	S TX, NC-NJ, C LA
2012	19	10	2	133	4	NE FL, NW FL, SE LA, NJ/NY
Average	16	8	4	140	4	

Landfall locations of chosen ENSO-based analog years

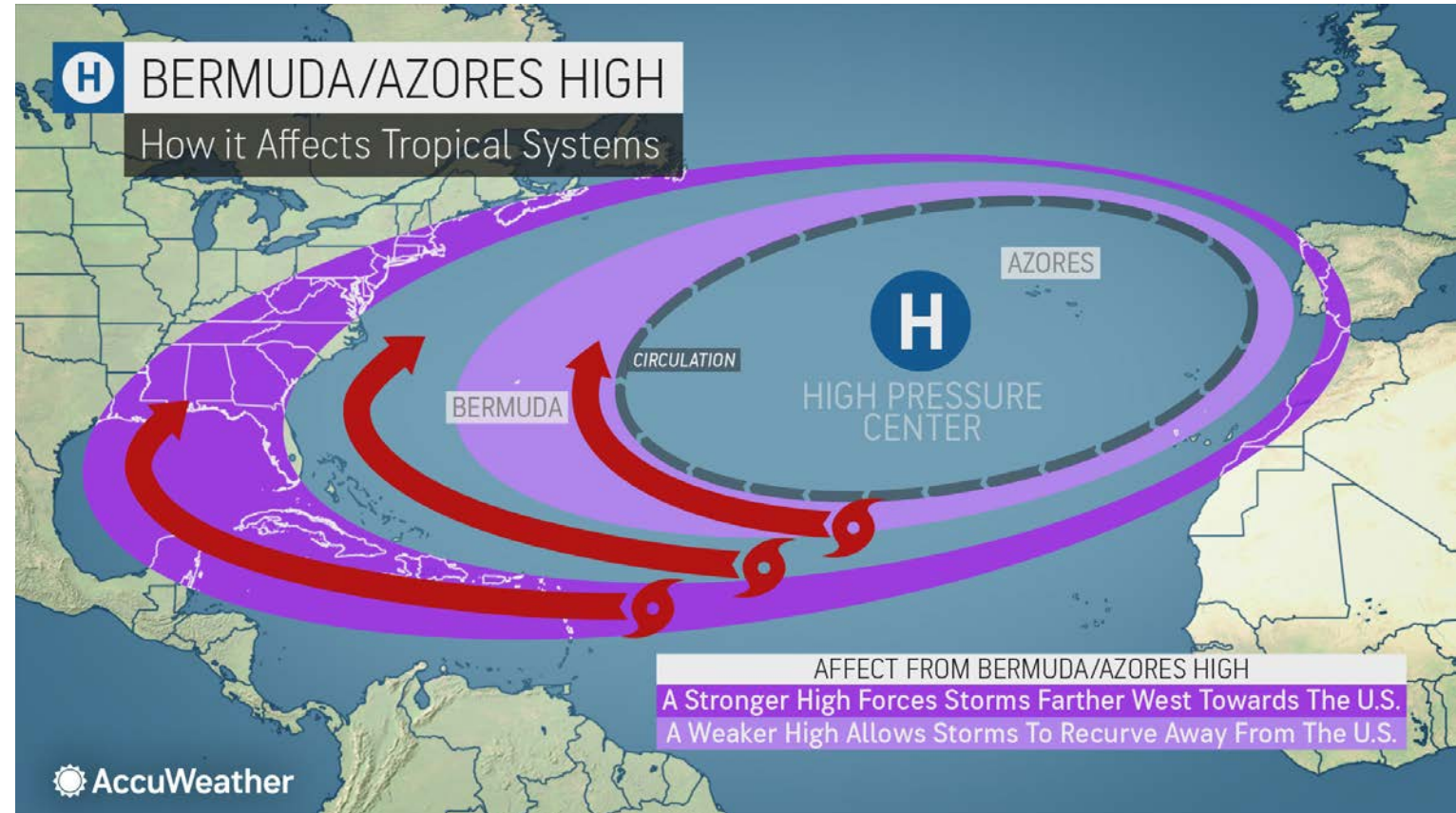
- Where have tropical cyclones made landfall during analog years?
- Solely based on the current and future trend of ENSO
- Greatest potential for direct impacts will be:
 - Western and northern Gulf of Mexico
 - Florida
 - North Carolina coast

If current and projected ENSO patterns match up with these years, this could be an active year for Texas, Florida and North Carolina. Notice the two hits on New Jersey.



Bermuda-Azores high pressure area guides tropical features

- Strength, orientation and central position of the area determines where storms and hurricanes track
- Tends to weaken during summer
- Warmer water and more opportunity for storms to re-curve toward the United States



ENSO: Comparing 2020 to 2021

ENSO in 2020

- Weak El Niño transitioned into a neutral pattern in spring
- Weak then strong La Niña developed during the mid and late summer
- Supported favorable conditions for tropical development

Expected ENSO in 2021

- Current weakening La Niña pattern transition into a neutral pattern the next couple of months
- Either remain neutral or transition back to a La Niña pattern later in the summer or fall
- Shear values expected to average near to below normal in the main developmental region during August, September and October. **This should favor storm development**

Sea-Surface Temperature: Comparing 2020 to 2021

Sea-Surface Temperatures in 2020

- SST values above normal

Expected Sea-Surface Temperatures in 2021

- Current SST values — above normal over most of the tropical Atlantic Ocean and the Gulf of Mexico
- Projected SST values expected to be above normal during most active time of the year
- Regions of deep, warm water across the basin, especially in the NW Caribbean and Gulf of Mexico — will support rapid intensification

In Summary

- Another season featuring above-normal numbers of tropical storms and hurricanes
- More than 20 named storms if ENSO transitions back into a La Niña pattern
- Analog years suggest a good chance for three to five direct impacts on the United States
- Chance for a high-impact storm to affect the U.S. mainland, Puerto Rico and the Virgin Islands is once again higher than normal
- **All people and interests near and along all coastal areas of the U.S. need to have a hurricane plan**
- **The Covid-19 pandemic should continue to be an additional component to your hurricane plan**

As the 2021 season progresses

We will provide an update to this forecast:

- Before June 1
- On or around August 1
- On or around September 1

An aerial satellite-style view of Earth's tropical regions, showing several large-scale cyclonic cloud formations (hurricanes or typhoons) with distinct eyes and spiral patterns. The background is a dark, textured view of the planet's surface and atmosphere, with vertical lines suggesting a grid or data overlay.

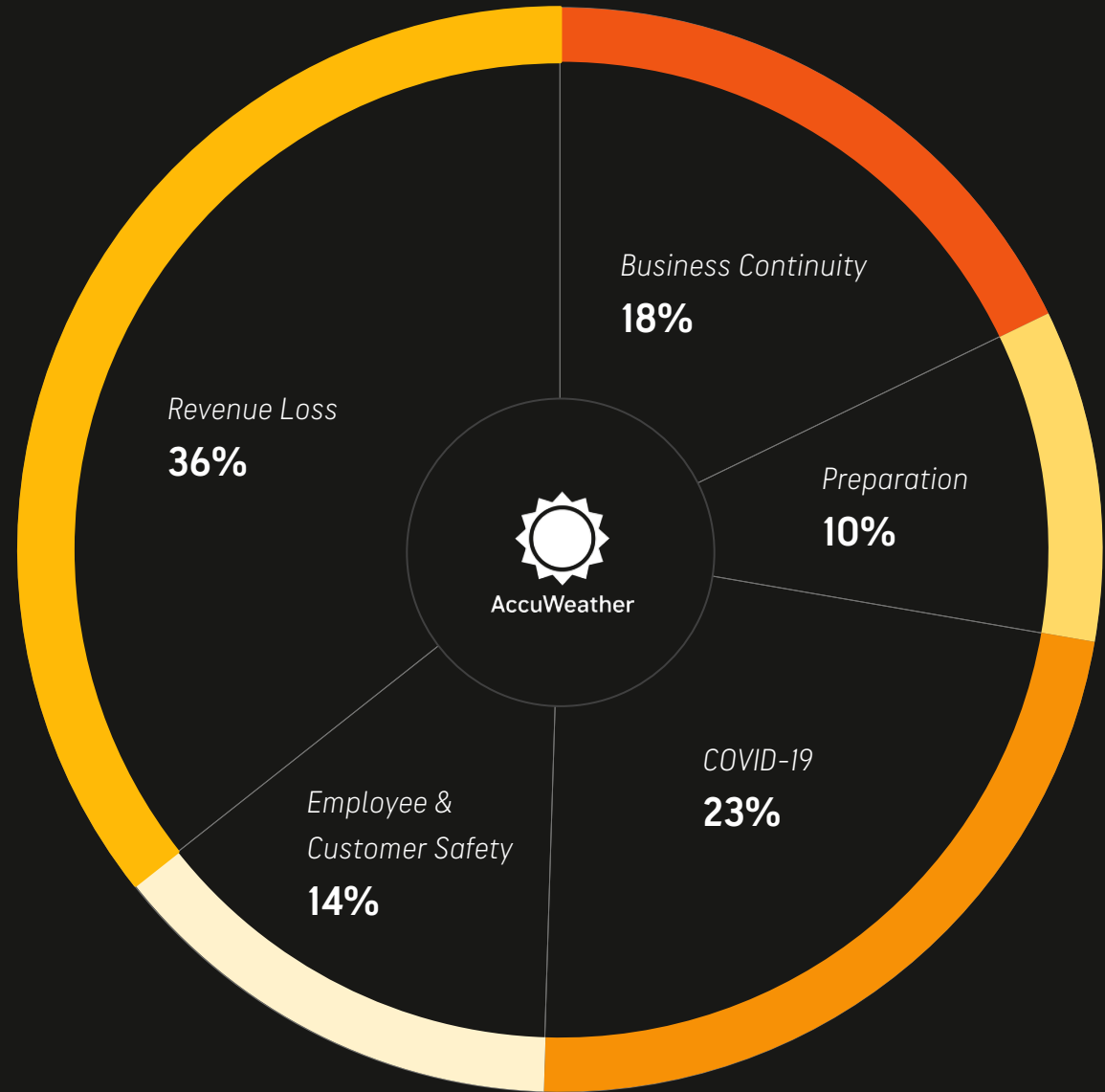
Tropical expertise,
products & services

Be prepared for Hurricane Season

- Team of expert meteorologists monitoring your specific assets
- Easy to use tools that help you understand potential weather impacts
- Actionable weather information before you know you need it

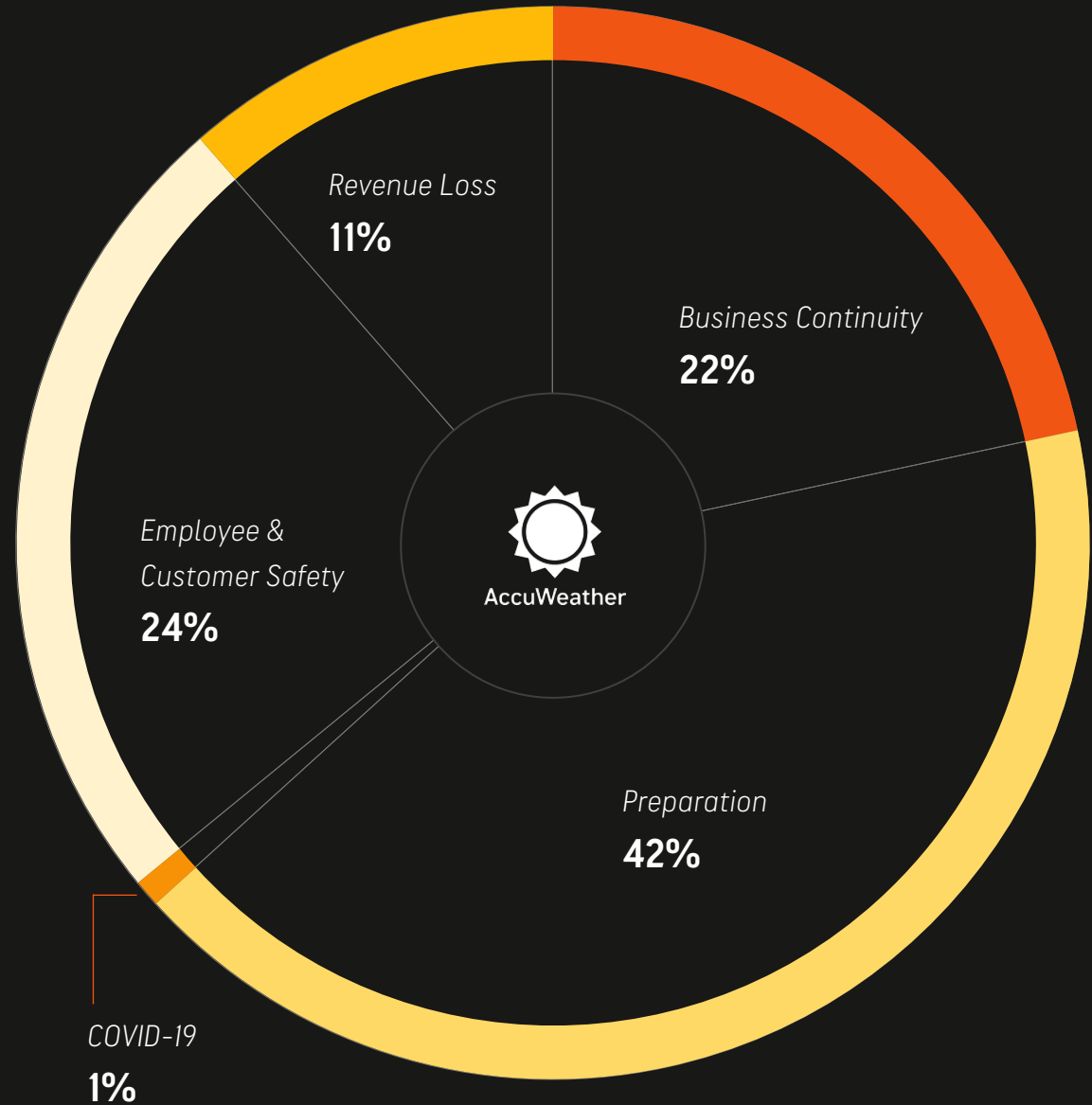
Question

2020: What's your biggest concern during hurricane season?



Question

Today: What's your biggest concern during hurricane season?



Long range U.S. tropical

- Forecast update generated daily for the Atlantic Basin, Gulf of Mexico and Eastern Pacific out to 10 days
- Visualizes current tropical activity and potential areas of concern during hurricane season
- Realize the value of being the first to know when tropical weather threats exist

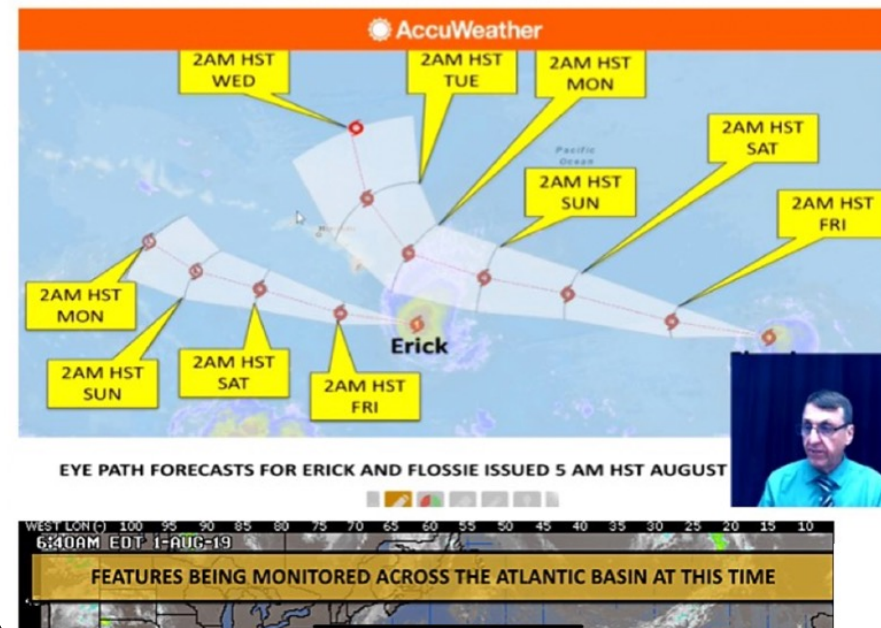
TROPICAL WEATHER

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Thursday, August 01, 2019 11:34

Atlantic might become active by early next week; East and Central Pacific remain active

Written by AccuWeather Senior Meteorologist and Lead Hurricane Forecaster Dan Kottowski

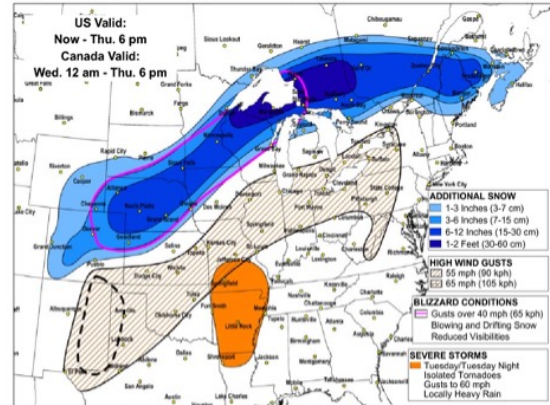


Storm Potential Notices 5-10 days ahead

Major Winter Storm to Disrupt Holiday Travel



Day: 11/26/2019 Time: 4:30 am CT Forecaster: Masse



HEAVY SNOW AND HIGH WIND TO DISRUPT HOLIDAY TRAVEL FROM PLAINS TO ATLANTIC CANADA!

IMPACTS AND TIMING:

The main adjustment made to this update was reducing the snowfall in the Rockies to account for amounts which have already occurred, and adding a region of severe storms to the Mississippi Valley. A winter storm will continue to develop over the Central Plains this morning, causing heavy snow to fall across the region. This storm will strengthen and continue to move northeastward today. By this evening, snow will move into more of the Central to Northern Plains and Upper Midwest. Snow will begin Wednesday morning across portions of Northern and Central Ontario, and much of southern Quebec, drifting into New Brunswick, and interior portions of New England Wednesday evening into Thursday morning. The heaviest additional snowfall of 12-24 inches (30-60 cm) will fall from rates up to 2"/hr (5 cm/hr) across far northern Wisconsin and the Upper Peninsula of Michigan through far western Quebec. A large swath of 6-12 inches (15-30 cm) is expected to impact portions of the Central Rockies and the Central Plains, as well as across portions of the Upper Midwest, Central to Northern Ontario, southern Quebec, western New Brunswick, and northern Maine. Snow will come to an end across the Rockies by this evening, the Central and Northern Plains through Wednesday afternoon, the Upper Midwest and Great Lakes by Wednesday night, and across New England and eastern Canada by Thursday night.

Severe storms will develop across southern Missouri, Arkansas and northern Louisiana this evening. Expect isolated tornadoes, wind gusts to 80 mph (100 kph) and locally heavy rain with this activity. Severe storms will drift eastward into the early tonight before diminishing. High wind will also occur across areas from the Central Plains this afternoon, across the Middle Mississippi Valley into the Great Lakes on Wednesday, with gusts up to 65 mph (90 kph) expected. Portions of eastern New Mexico and western portions of the Texas Panhandle will see gusts up to 65 mph (105 kph) occur today. Areas within the heaviest snowfall across the Central Plains through the Midwest will see wind gusts in excess of 40 mph (65 kph). This will lead to blizzard conditions with blowing and drifting snowfall along with reduced visibilities. Heavy snow and high wind will combine with increased amounts of traffic due to the holidays, leading to major disruptions across the hardest-hit areas. Travel delays, road and major interstate closures, and power outages are expected across areas impacted by heavy snow, severe storms, and high wind.

An update to this Storm Potential Notice (SPN) will be sent this afternoon.

Major winter storm

Hurricane Irma Impact Timing



Day: 9/5/2017 Time: 10 pm CT Forecaster: Putnam / Lavin



IMPACTS AND TIMING:

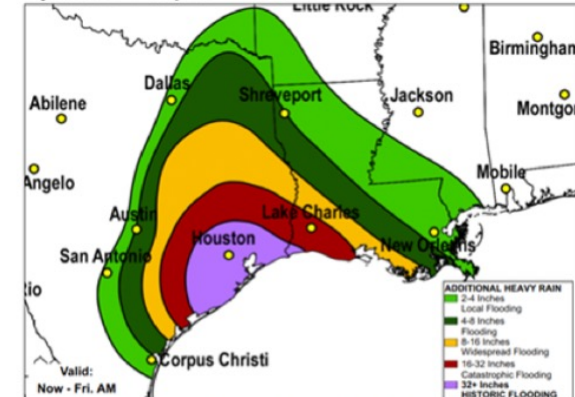
Hurricane Irma will continue its path toward the U.S. through the work week, and approach the mainland during the second half of the weekend. While it is too soon to predict an exact landfall, major impacts are expected for a large portion of the Southeast this Sunday (9/10) through Tuesday (9/12). With inconsistent forecast trends beyond Sunday, there remains a large area in the Southeast with a low potential of seeing major impacts. Within that region, a moderate potential of seeing major impacts exists for portions of the Carolinas through Florida. However, current forecasts predict the most likely area, and therefore high potential of major impacts, to be areas of southeastern Georgia through much of the Florida Peninsula, where hurricane force winds, flooding rain, and storm surge will all be concerns. While a shift in forecast track to the east or west may occur as the week continues, this represents our current and most confident prediction.

Hurricane Irma

Harvey Continues to Bring Historic Flooding to Gulf Coast!



Day: 08/27/2017 Time: 3 pm CT Forecaster: Glenn



HARVEY WILL BRING UNPRECEDENTED FLOODING TO TEXAS AND SOUTHWESTERN LOUISIANA INTO THIS WEEK!

IMPACTS AND TIMING:

This update reflects additional rainfall totals expected to occur through the end of this week across eastern Texas and Louisiana, as Tropical Storm Harvey continues to plague the region. Although rainfall amounts of 15-25 inches have already fallen across southwestern Texas, including the Houston area, additional amounts above 32 inches will lead to further long-term, devastating flooding. With this update, the eastern extent of the rainfall totals has been reduced, and the highest rainfall bands have been moved northeastward. Additional totals of 16-32 inches have been expanded to include areas as far north as College Station, TX and into Lake Charles, LA. Additional totals of 32 inches are also expected from southwest of Houston towards Beaumont, TX. Rates will exceed 4"/hr in the heaviest, most persistent bands.

Hurricane Harvey

Tropical

Layers

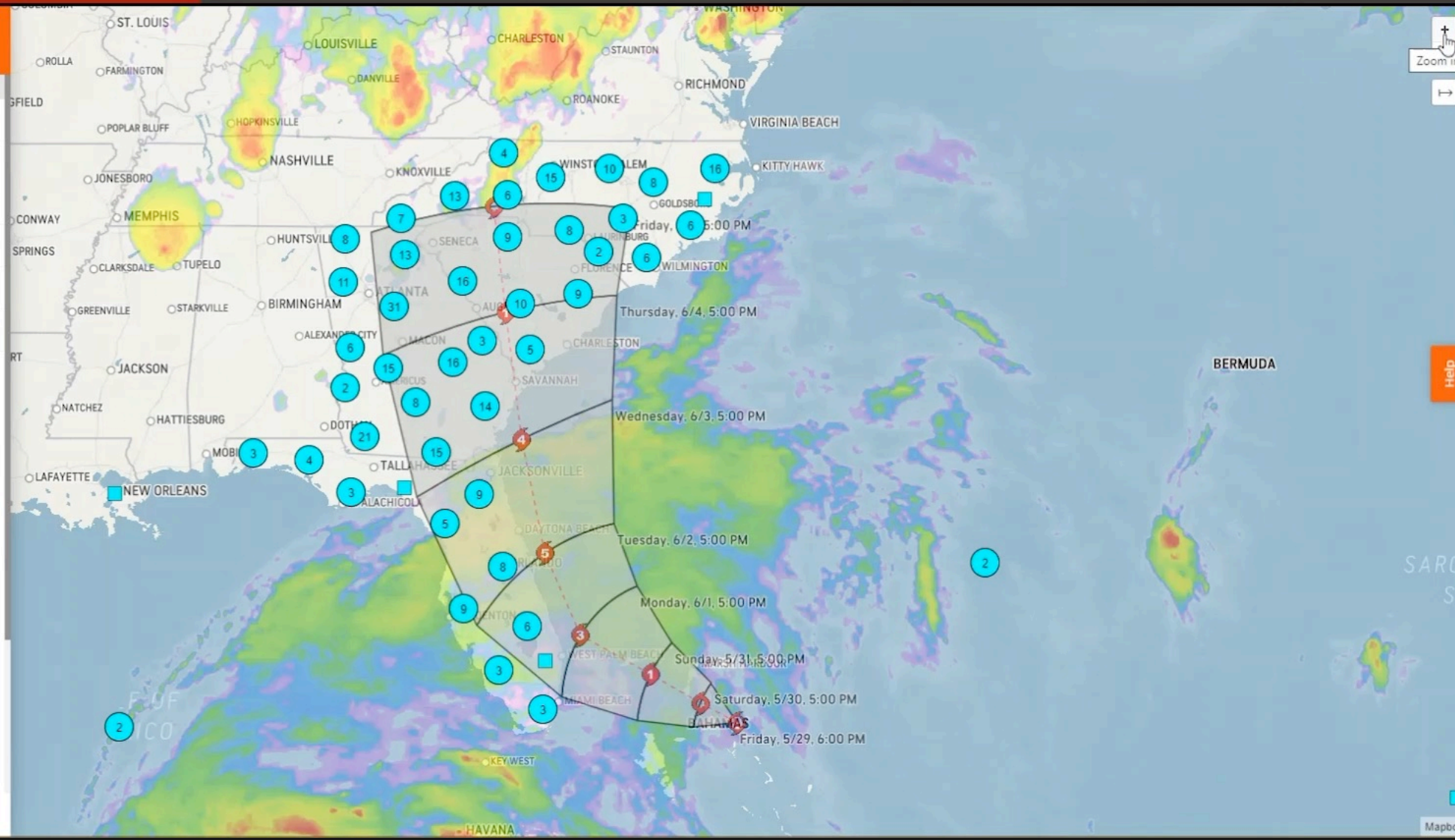
- SkyGuard Warnings
- Null Notifications
- Public Warning Notifications
- Storm Report Notifications
- SkyGuard Warning Locations
- Locations
- Tropical Impact Forecast

Description

- Current Position
- Forecast Points
- Time Lines
- Forecast Track
- Hurricane Wind Radii
- Tropical Storm Wind Radii
- Window of Movement
- Watches and Warnings
- Storm Surge
- Rainfall Potential
- Risk Assessment
- Hurricane Wind Probability
- Max Sustained Winds
- Max Wind Gusts

Opacity

60



Features

Table lists all locations

Downloadable CSV to manipulate the data yourself in Excel or combine into your own analytics platform.

Groups together all information from the table feature.

Quickly reference custom asset data you can upload in relation to weather impacts.

The screenshot shows an Excel spreadsheet titled 'AssetReport_DemoTable.csv'. The table contains 37 rows of data, each representing an asset location. The columns are: Name, State, Group, Rainfall Min, Rainfall Max, Wind Gust Min, Wind Gust Max, Earliest Tropical Force Wind, Earliest Hurricane Force Wind, Latest Tropical Force Wind, and Latest Hurricane Force Wind. The data includes various locations such as North Spyglass Hill, West Larkbere Arcade, South Cumnor Rise, etc., with their respective states, groups, and weather impact dates and times.

Name	State	Group	Rainfall Min	Rainfall Max	Wind Gust Min	Wind Gust Max	Earliest Tropical Force Wind	Earliest Hurricane Force Wind	Latest Tropical Force Wind	Latest Hurricane Force Wind
1 North Spyglass Hill	MS	Store	8	16	40	60	11/10/2019 10:00 PM +0000		11/11/2019 07:00 PM +0000	
3 West Larkbere Arcade	MS	Store	8	16	40	60	11/10/2019 02:00 PM +0000		11/11/2019 07:00 AM +0000	
4 South Cumnor Rise	LA	Store	8	16	80	100	11/09/2019 11:00 PM +0000	11/10/2019 05:00 AM +0000	11/10/2019 09:00 PM +0000	11/10/2019 12:00 PM +0000
5 Craftsman Turnpike	LA	Store	8	16	60	80	11/09/2019 07:00 PM +0000	11/10/2019 02:00 AM +0000	11/10/2019 06:00 PM +0000	11/10/2019 06:00 AM +0000
6 Northwest Pajaro Grove	LA	Store	8	16	40	60	11/11/2019 02:00 AM +0000		11/11/2019 04:00 PM +0000	
7 Handel Drive West	LA	Store	8	16	60	80	11/10/2019 05:00 AM +0000		11/11/2019 03:00 AM +0000	
8 Blythswood Mews	LA	Store	8	16	60	80	11/10/2019 09:00 AM +0000		11/11/2019 07:00 AM +0000	
9 Haug Cove	MS	Data Center	8	16	40	60	11/11/2019 12:00 AM +0000		11/11/2019 11:00 AM +0000	
10 East Tribunal Walk	LA	Data Center	8	16	60	80	11/10/2019 03:00 AM +0000		11/11/2019 12:00 AM +0000	
11 South Yamato Knoll	LA	Data Center	8	16	80	100	11/09/2019 04:00 AM +0000		11/10/2019 08:00 AM +0000	
12 Rotcher Heights	LA	Data Center	8	16	80	100	11/09/2019 09:00 AM +0000	11/09/2019 02:00 PM +0000	11/10/2019 10:00 AM +0000	11/10/2019 03:00 AM +0000
13 South Hobbayne Byway	LA	Data Center	8	16	80	100	11/09/2019 11:00 PM +0000		11/10/2019 11:00 PM +0000	
14 South Centre Park	LA	Data Center	8	16	60	80	11/09/2019 02:00 PM +0000		11/10/2019 07:00 AM +0000	
15 Tennent Street West	LA	Data Center	8	16	60	80	11/09/2019 12:00 AM +0000		11/09/2019 11:00 PM +0000	
16 West Rumbullion Terrace	LA	Data Center	8	16	60	80	11/10/2019 12:00 PM +0000		11/11/2019 01:00 AM +0000	
17 Northwest Tobasco Ridge	LA	Distribution Center	8	16	60	80	11/09/2019 03:00 PM +0000		11/09/2019 11:00 PM +0000	
18 Northwest Esdale Mews	LA	Distribution Center	8	16	80	100	11/09/2019 10:00 AM +0000		11/10/2019 12:00 PM +0000	
19 Deansgate Mount	LA	Distribution Center	8	16	60	80	11/10/2019 05:00 AM +0000		11/11/2019 02:00 AM +0000	
20 Turnley Manor Northeast	LA	Distribution Center	8	16	80	100	11/09/2019 07:00 PM +0000	11/10/2019 01:00 AM +0000	11/10/2019 06:00 PM +0000	11/10/2019 09:00 AM +0000
21 West Treichel Manor	LA	Distribution Center	8	16	80	100	11/09/2019 04:00 PM +0000		11/10/2019 04:00 PM +0000	
22 South Model Farm	LA	Distribution Center	8	16	40	60	11/10/2019 06:00 AM +0000		11/10/2019 10:00 AM +0000	
23 Wilsons Creek West	LA	Distribution Center	8	16	40	60	11/09/2019 10:00 PM +0000		11/10/2019 03:00 AM +0000	
24 West Alvaston Pike	LA	Distribution Center	8	16	60	80	11/10/2019 03:00 AM +0000		11/10/2019 06:00 PM +0000	
25 North Gray Birch Spur	LA	Call Center	8	16	60	80	11/09/2019 09:00 AM +0000	11/09/2019 04:00 PM +0000	11/10/2019 10:00 AM +0000	11/10/2019 12:00 AM +0000
26 Viewing Grove	LA	Call Center	8	16	60	80	11/10/2019 06:00 AM +0000		11/11/2019 03:00 AM +0000	
27 North Coppins Route	LA	Call Center	8	16	60	80	11/10/2019 01:00 PM +0000		11/11/2019 10:00 AM +0000	
28 Hermon Rise	FL	Call Center	8	16	40	60	11/10/2019 05:00 PM +0000		11/11/2019 02:00 PM +0000	
29 Ibstone Row	FL	Store	4	8	40	60	11/11/2019 10:00 AM +0000		11/11/2019 04:00 PM +0000	
30 Hegeman Causeway	FL	Store	4	8	40	60	11/11/2019 06:00 PM +0000		11/11/2019 11:00 PM +0000	
31 East Shalesbrook Street	FL	Data Center	4	8	40	60	11/11/2019 07:00 AM +0000		11/11/2019 04:00 PM +0000	
32 North Eagle Chase Arcade	FL	Data Center	4	8	40	60	11/11/2019 09:00 PM +0000		11/12/2019 01:00 AM +0000	
33 Unity Pointe Arch Southeast	FL	Data Center	4	8	40	60	11/11/2019 10:00 PM +0000		11/12/2019 01:00 AM +0000	
34 Whittemore Terrace	FL	Call Center	4	8	40	60	11/11/2019 11:00 AM +0000		11/11/2019 11:00 PM +0000	
35 East Distribution Lane	FL	Store	2	4			11/12/2019 02:00 AM +0000		11/12/2019 03:00 AM +0000	
36 West Keegans Boulevard	FL	Call Center	2	4			11/12/2019 12:00 AM +0000		11/12/2019 06:00 AM +0000	

Table features all locations and if/how they will be impacted by a specific hazard.

Easy to read reports consist of start and stop times for tropical storm and hurricane-force winds, custom weather criteria for your asset locations, and business-focused discussions, including economic impact, all created by expert meteorologists.



Consultative services available 24/7

Beyond precision forecasts and SkyGuard warnings, our expert meteorologists are available for 1:1 consultations, ensuring the right decision is made when weather threatens.



Q&A