2018 U.S. Hurricane Season Preview

Eric Uhlhorn, Ph.D.

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Meet Dr. Uhlhorn

Dr. Eric Uhlhorn
Principal Scientist

That's me!

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Agenda

2017 Hurricane Season Recap

Factors Influencing Hurricane Activity

Seasonal Forecasts

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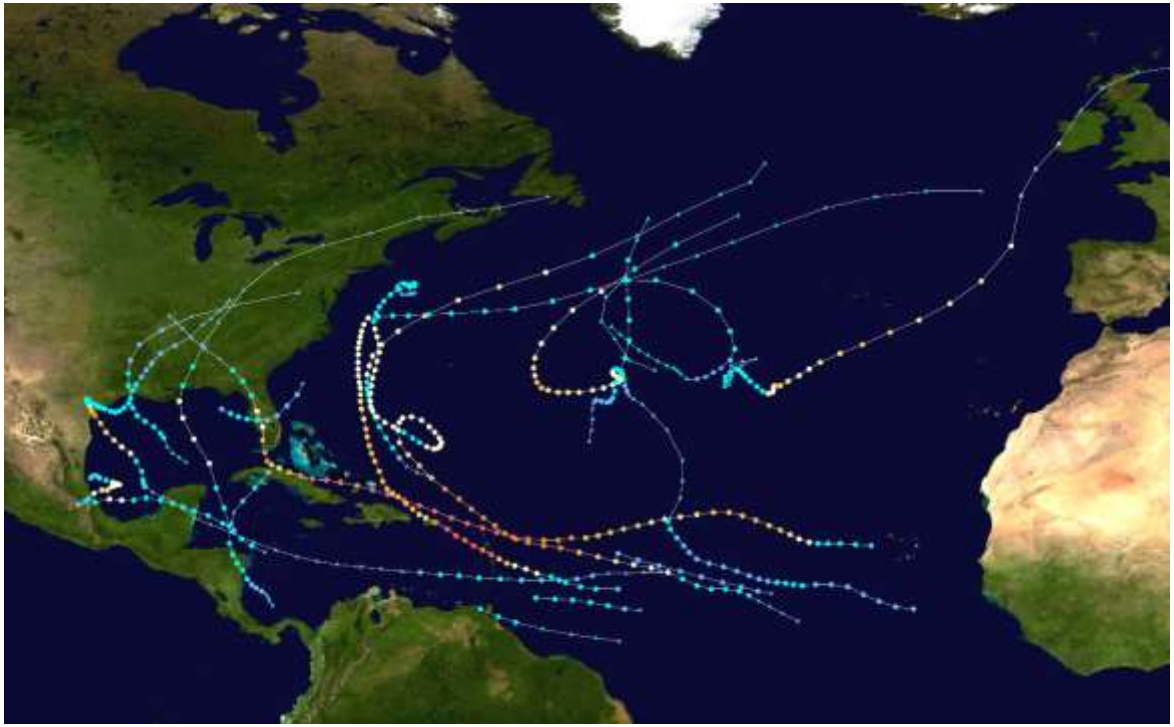
2017 Hurricane Season Recap

AIR Damage Survey, Hurricane Maria, Puerto Rico (2017)

2017 Hurricane Season Recap: Atlantic

	2017	Avg.
Named Storms	17	12
Hurricanes	10	6
Major Hurricanes	6	3
Landfalls	7	
Major Hurricane Landfalls	3	



Source: NHC/NOAA

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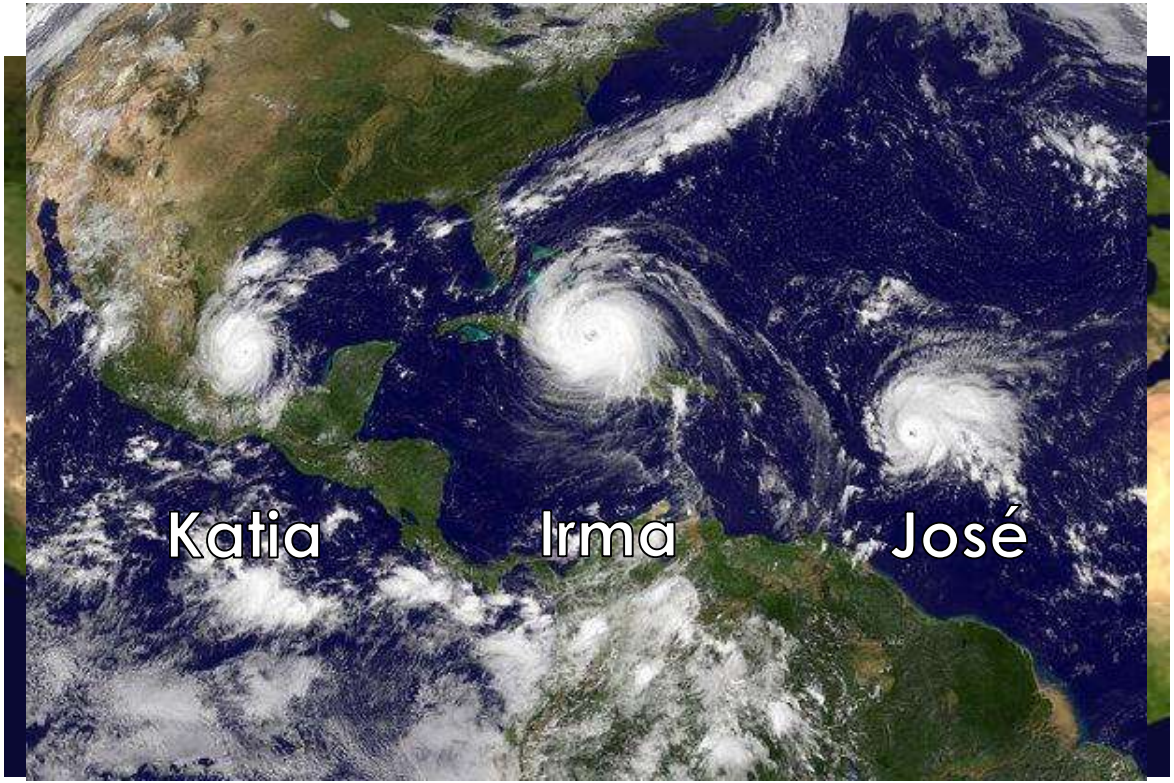
2017 Hurricane Season Recap: Atlantic

- 2 Cat 4 landfalls in 15 days
- 3 Cat 4 landfalls in U.S./Territories
- 10 hurricanes in a row
- 3 hurricanes at same time



Source: NOAA/NASA GOES Project

2017 Hurricane Season Recap: Eastern/Central Pacific

	2017	Avg.
Named Storms	18	15
Hurricanes	9	8
Major Hurricanes	4	3
Landfalls	1	
Major Hurricane Landfalls	0	

Source: NHC/NOAA

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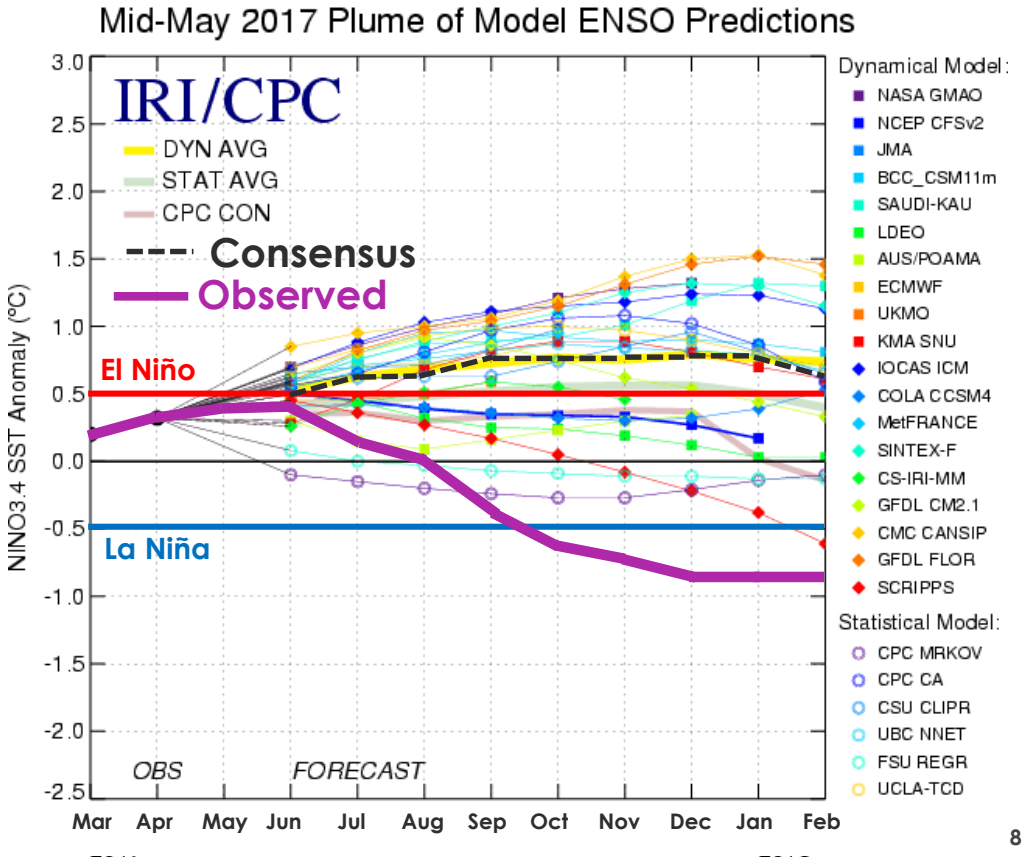
2017 ENSO Predictions vs. Results



Learn more about the 2017 hurricane season by visiting our On-Demand Webinars page

2017 AIR Hurricane Season Preview: Watch now

The Impact of Hurricanes Harvey and Irma on the U.S. Mainland: Watch now

Looking Back at an Active 2017 Hurricane Season: Watch now

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Factors Influencing Seasonal Hurricane Activity

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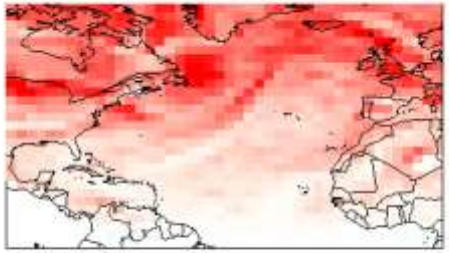
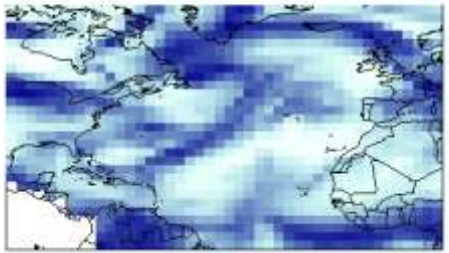
Environmental Factors Impact Genesis Probability

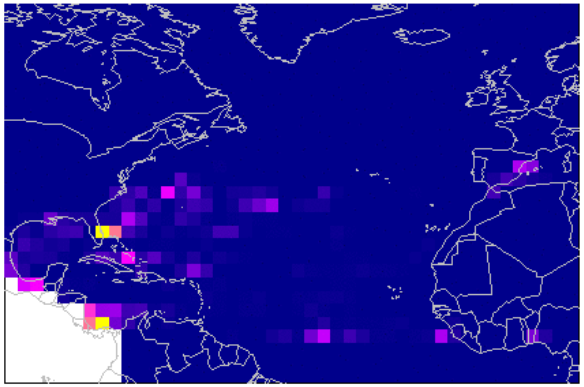
Vorticity



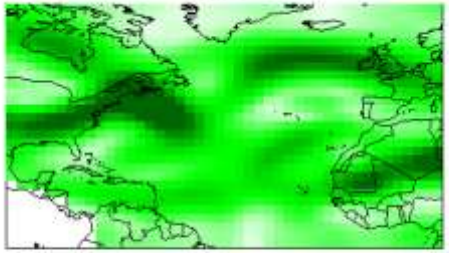
Humidity



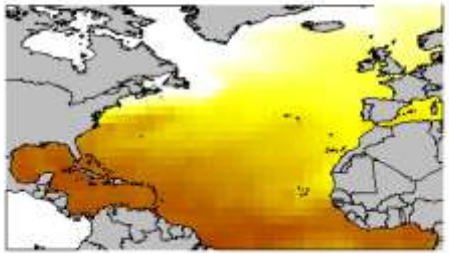
Genesis Probability



Shear



Sea Surface Temp.



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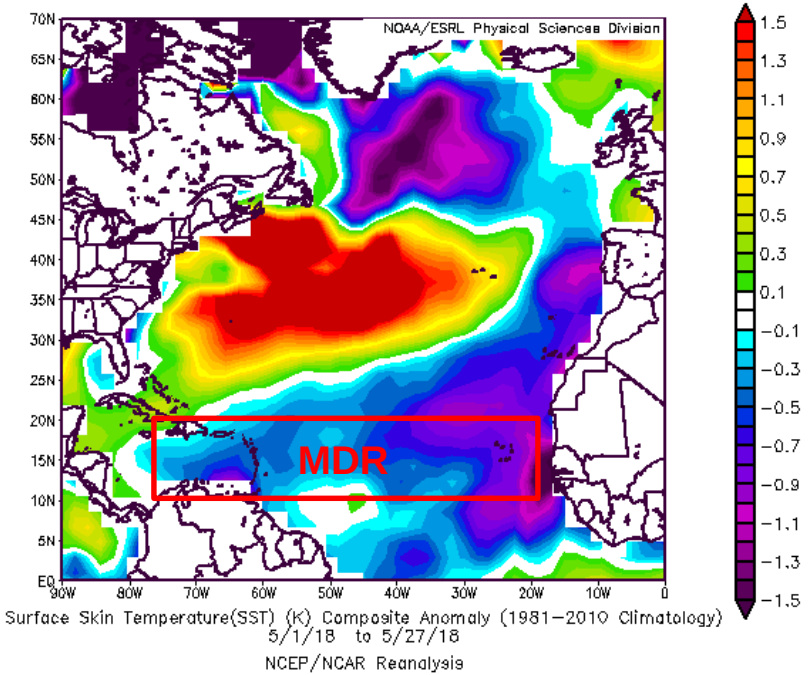
Atlantic Basin Sea Surface Temperature (SST) Far Below Average in Main Development Region (MDR)

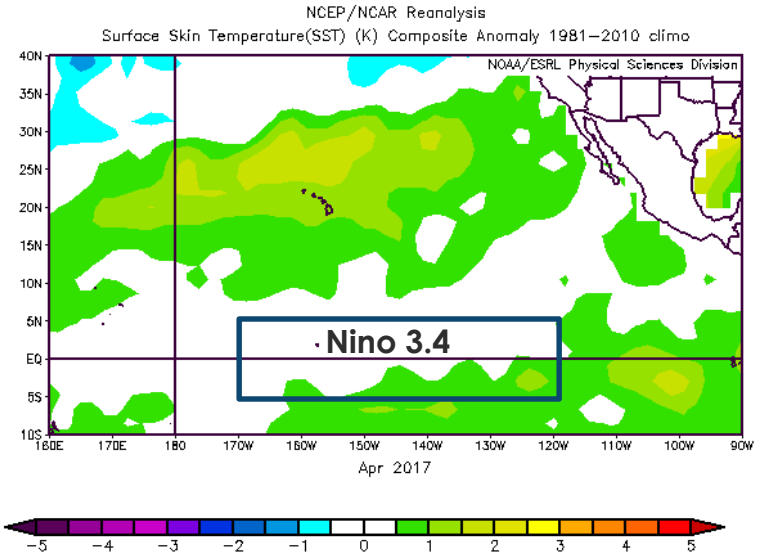
North Atlantic SST Anomaly

May 2018



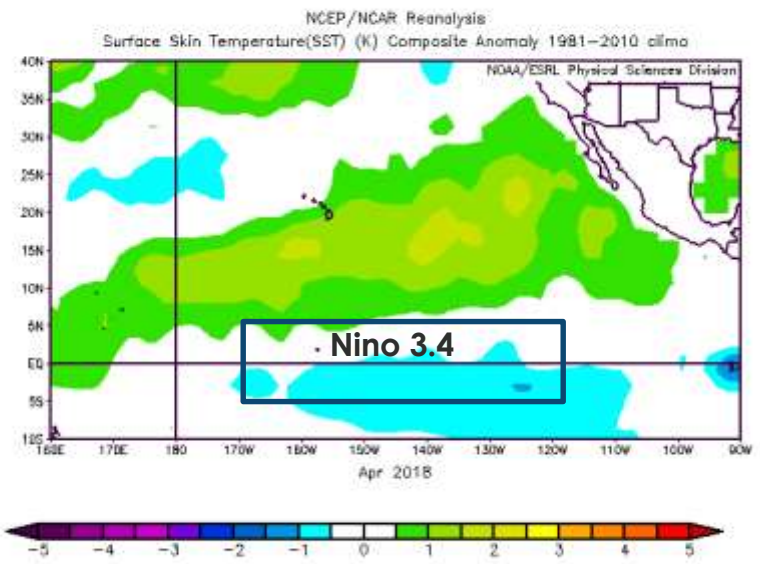
El Niño/Southern Oscillation (ENSO)

East Pacific SST Anomaly



April 2017

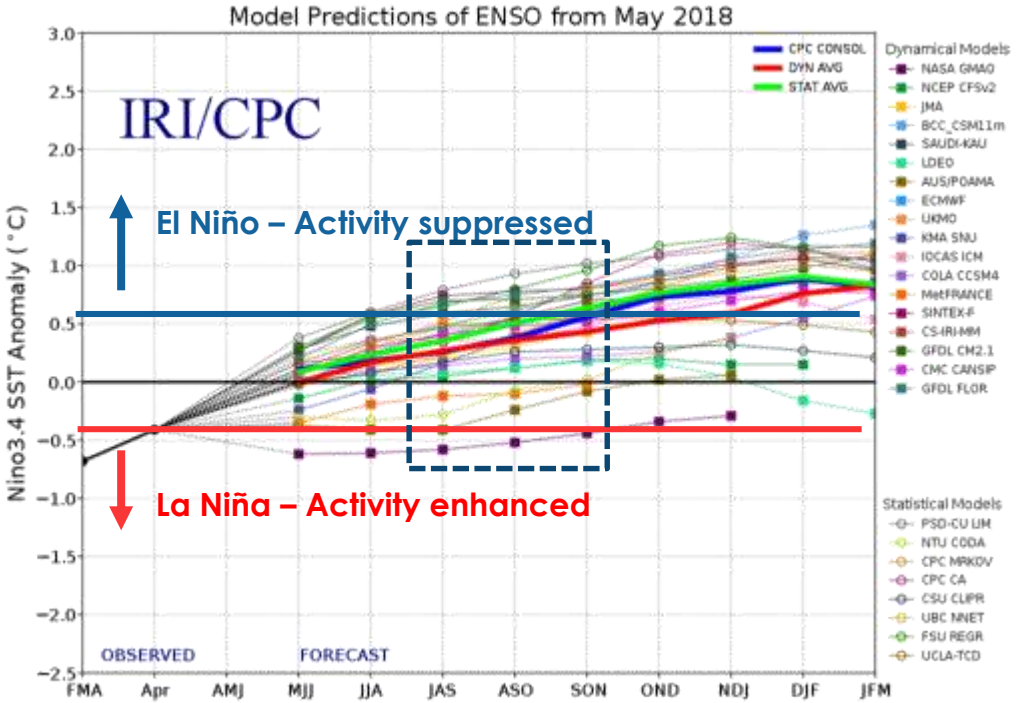
Nino 3.4 SST Anomaly: +0.32



April 2018

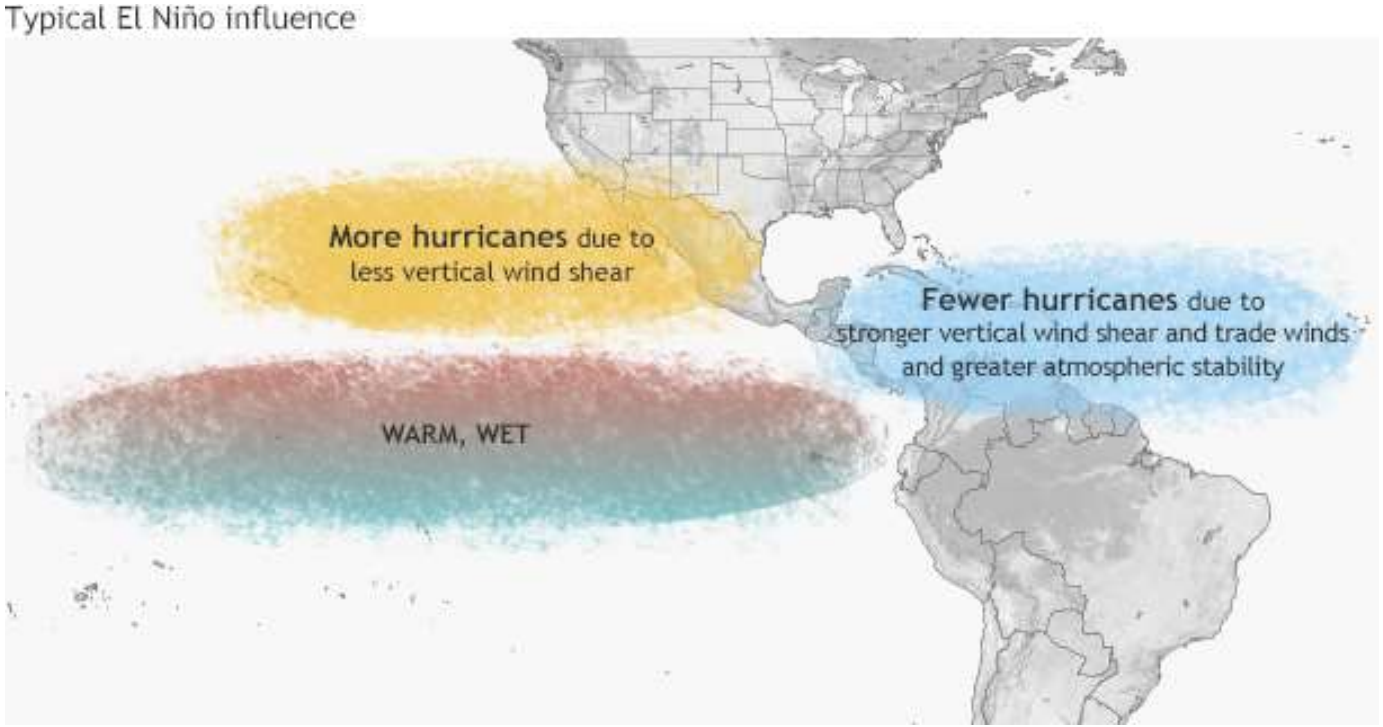
Nino 3.4 SST Anomaly: -0.45

ENSO Forecasts Trending Toward El Niño



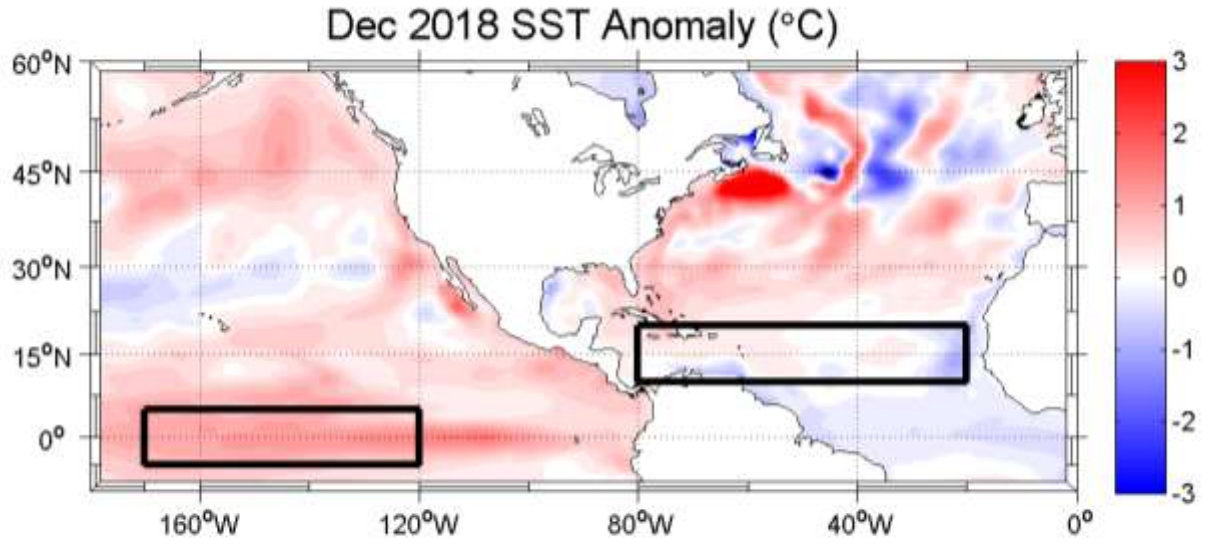
Source: iri.columbia.edu

El Niño Teleconnection to the Atlantic



Source: climate.gov

Global SST Forecasts Predict Warming in Pacific and Atlantic, Resulting in Average Conditions



Source: cpc.ncep.noaa.gov

Secondary Factors

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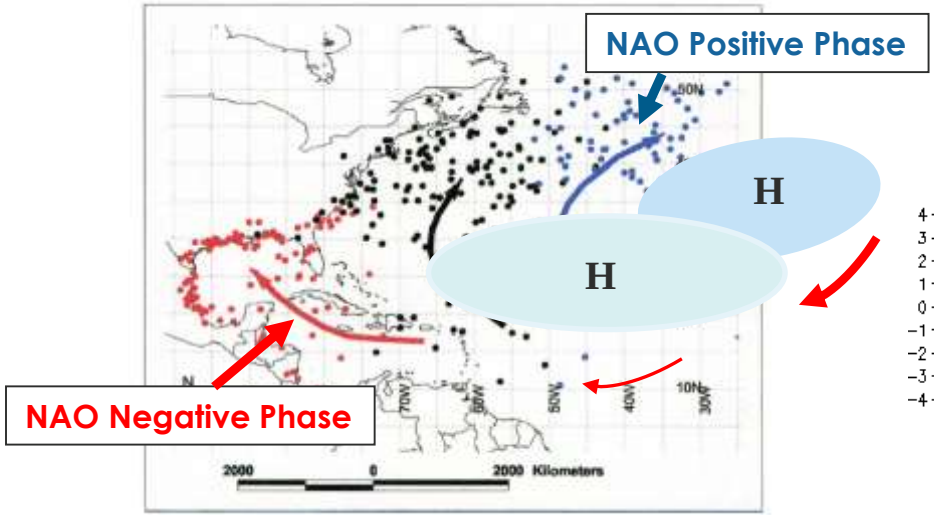
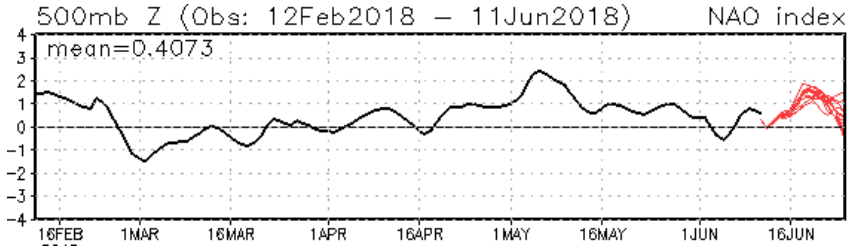
North Atlantic Oscillation (NAO) Can Influence Landfalls



Source: Elsner, 2003

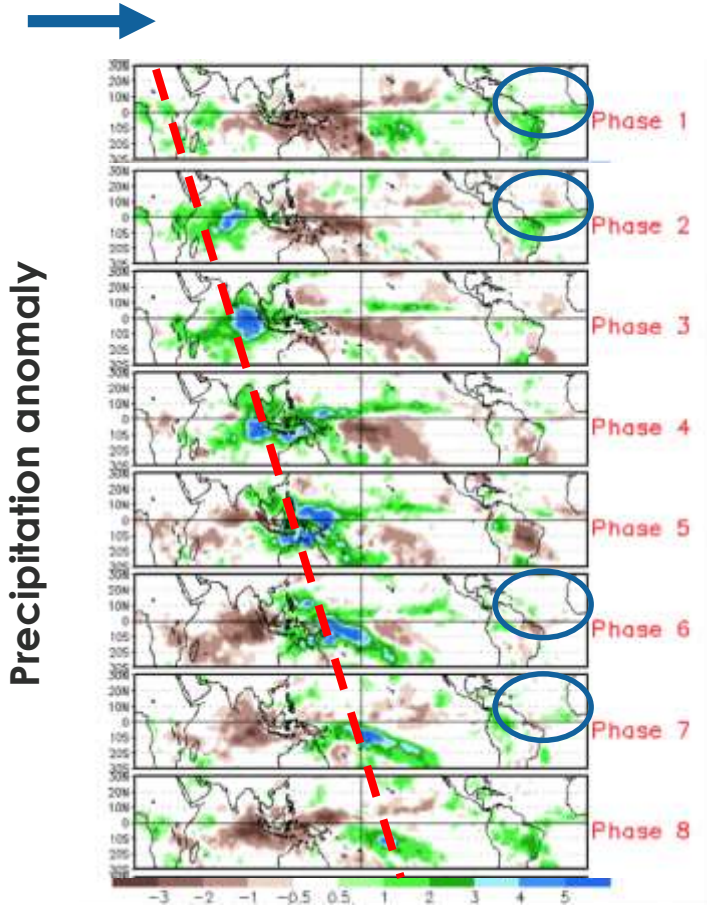


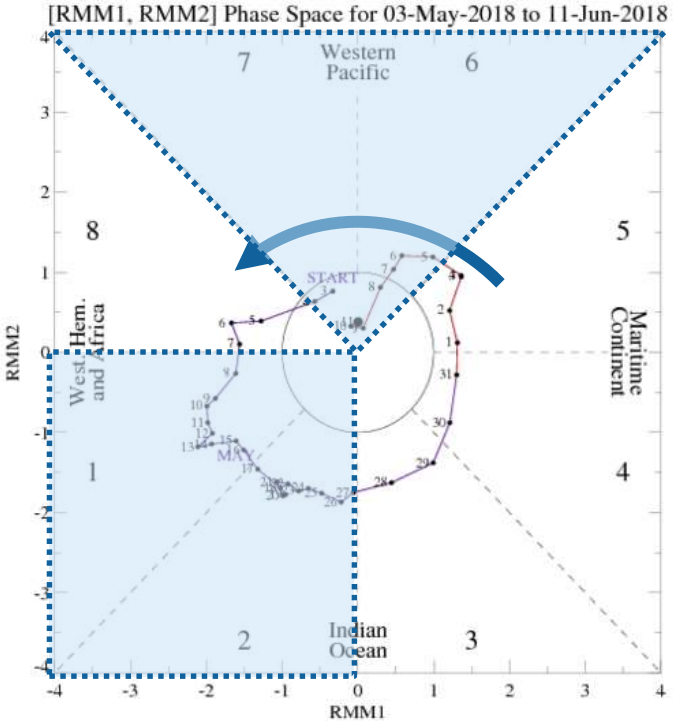
Source: cpc.ncep.noaa.gov

NAO Phase Impacts:

- Storm tracks
- Storm propagation speeds
- Atlantic SST
- Landfall locations

Madden-Julian Oscillation (MJO) Supports Brief Periods of Enhanced Activity



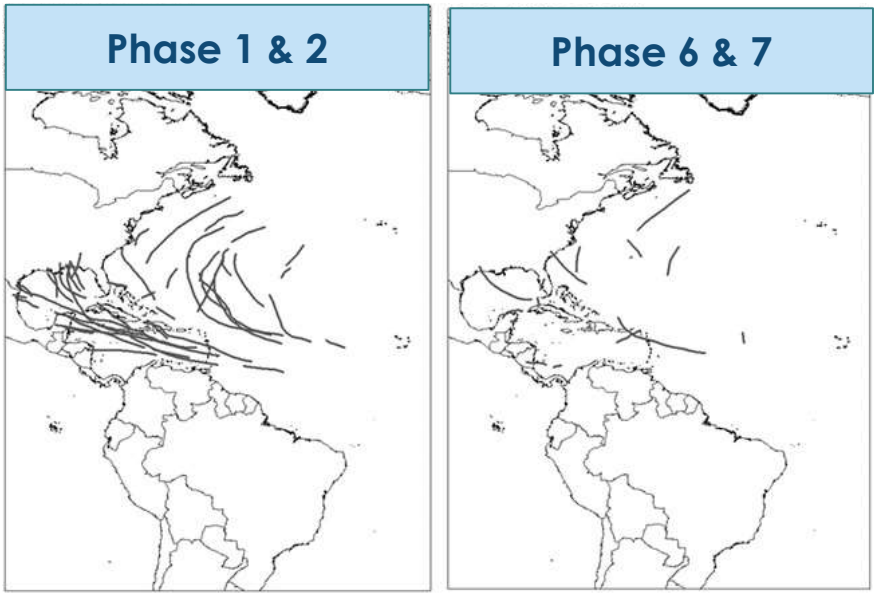


Source: Wheeler, M. C., and H. H. Hendon, 2004

The MJO and Atlantic Hurricanes

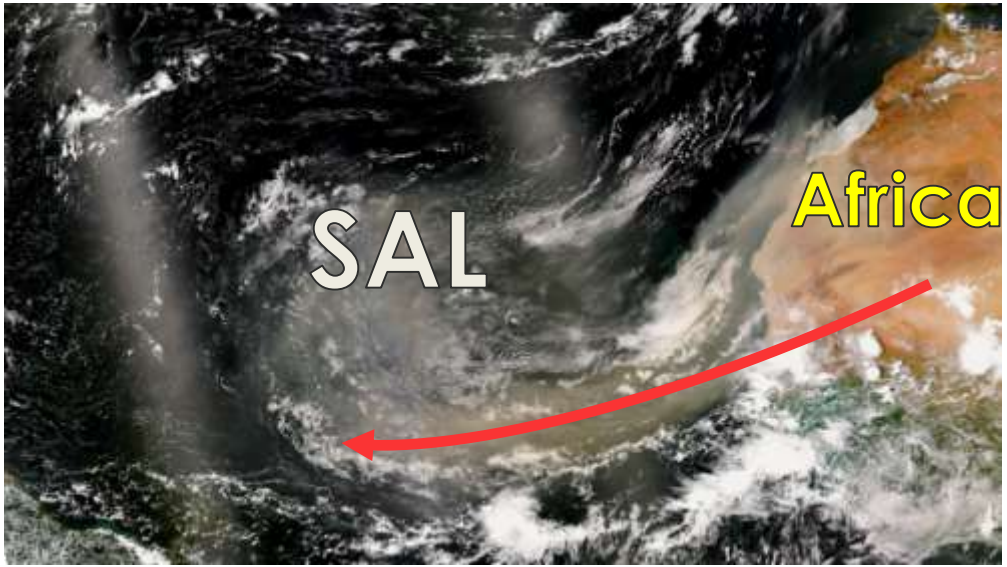
- Phases 1 and 2 support increased activity
- Phases 6 and 7 support suppressed activity

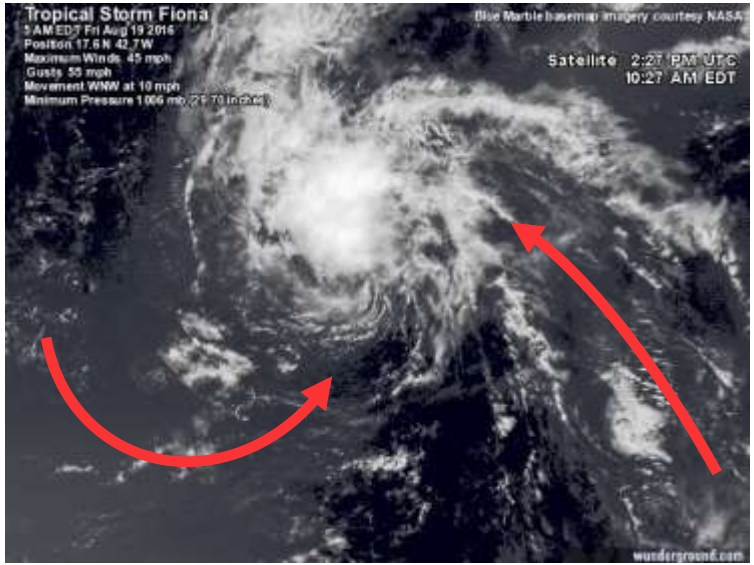
Major Hurricane Tracks 1974-2007



Source: Klotzbach (2010), Journal of Climate

Saharan Air Layer (SAL) Can Weaken Hurricanes





Source: noaa.gov

Volcanic Ash Can Impact Climate

- The largest volcanic explosions (>60,000 ft.) can eject ash into the stratosphere
- Suspended particles scatter solar radiation, causing temporary global cooling

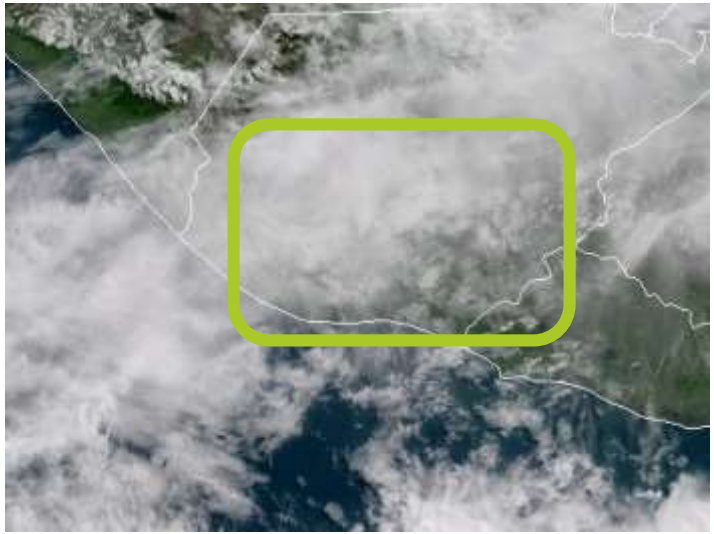
Kilauea, Hawaii (2018)

20,000 ft.

Sullivan, C. (2016), Fewer tropical cyclones form after volcanic eruptions, EOS, 97.

Volcán de Fuego, Guatemala (2018)

50,000 ft.



Animation courtesy CSU/CIRA/RAMMB

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Seasonal Forecasts

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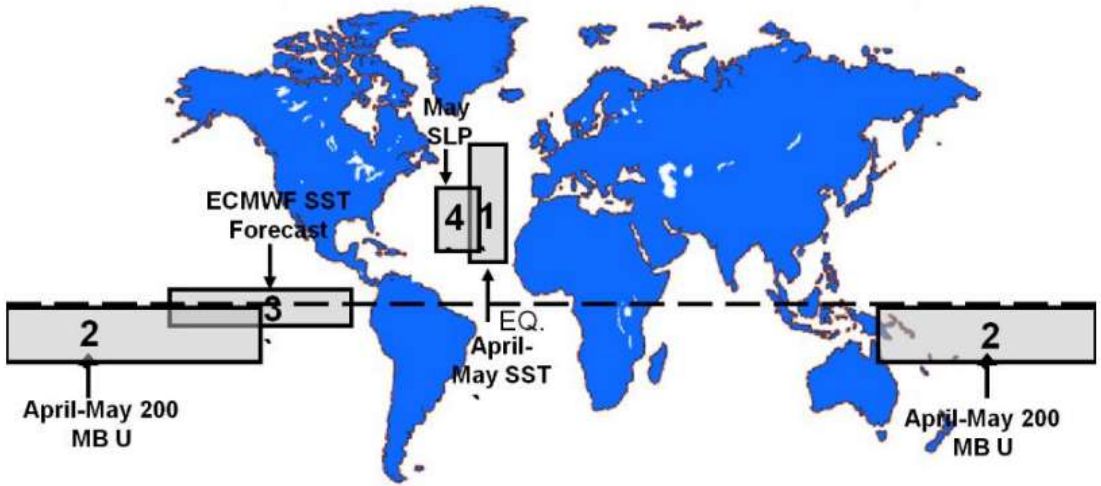
Summary of June Predictors of Seasonal Activity

Colorado State University

This forecast is based on an extended-range early June statistical prediction scheme developed using 29 years of historical data.

- Observed SSTs in E. Atlantic (+)
- Upper-level zonal winds (+)
- European Centre for Medium Range Weather Forecasts (ECMWF) SST forecast in E. Pacific (-)
- Sea level pressure (-)



Source: tropical.colostate.edu

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Summary of June Predictors of Seasonal Activity

Colorado State University

- Observed SSTs in E. Atlantic below normal (-) **BELOW**
- Upper-level zonal winds (+) **ABOVE**
- ECMWF SST forecast in E. Pacific (+) **BELOW**
- May Atlantic sea level pressure (+) **BELOW**

CSU forecast: **Average** level of activity in the Atlantic Basin

Source: tropical.colostate.edu

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U.S. Landfall Probabilities

Colorado State University

- Total season activity's link to landfall is poor
- Currently active area of research

CSU forecast: **Near-average** probability of landfalling tropical cyclones throughout the Atlantic Basin

Source: tropical.colostate.edu

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NOAA 2018 Hurricane Season Outlook

Near- or Above-Normal
(80% probability)

Eastern Pacific	
Named Storms	14-20
Hurricanes	7-12
Major Hurricanes	3-7
ACE	80-160% median

Near- or Above-Normal
(75% probability)

Atlantic	
Named Storms	10-16
Hurricanes	5-9
Major Hurricanes	1-4
ACE	65-145% median

Seasonal Forecasts

http://www.bsc.es/seasonalhurricanepredictions

Colorado State University

COASTAL CAROLINA UNIVERSITY

WEATHERBELL

University of Missouri

SEOUL NATIONAL UNIVERSITY

FAN

Tropical Storm Risk.com

The Weather Company An IBM Business

NC STATE UNIVERSITY

AnuMS

WEATHER DESK

INSMET Instituto de Meteorologia

AccuWeather

WEATHERTIGER Now you know.

PennState

StormGeo

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Seasonal Forecasts

- Season total numbers of:
  - Named storms
  - Hurricanes
  - Major hurricanes (Saffir-Simpson Category 3 and higher)
  - Accumulated Cyclone Energy (ACE)

$$\mathrm{ACE} = 10^{-4} \sum_{Season} V_{max}^2$$

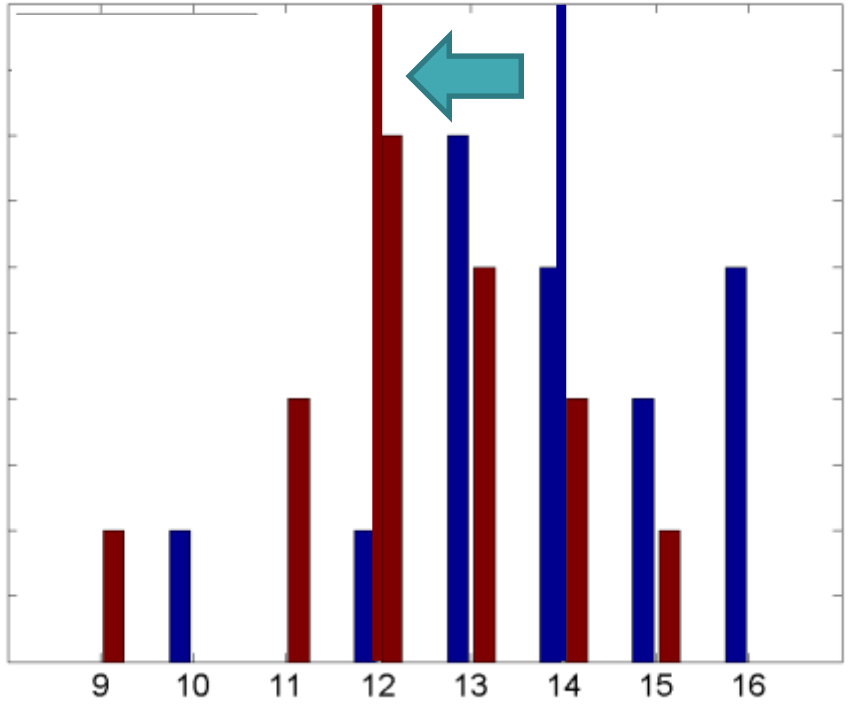
- Often with ranges of uncertainty
- Forecasts updated throughout the year

Number of Named Storms

Climatological Average

March-April Average

May-June Average

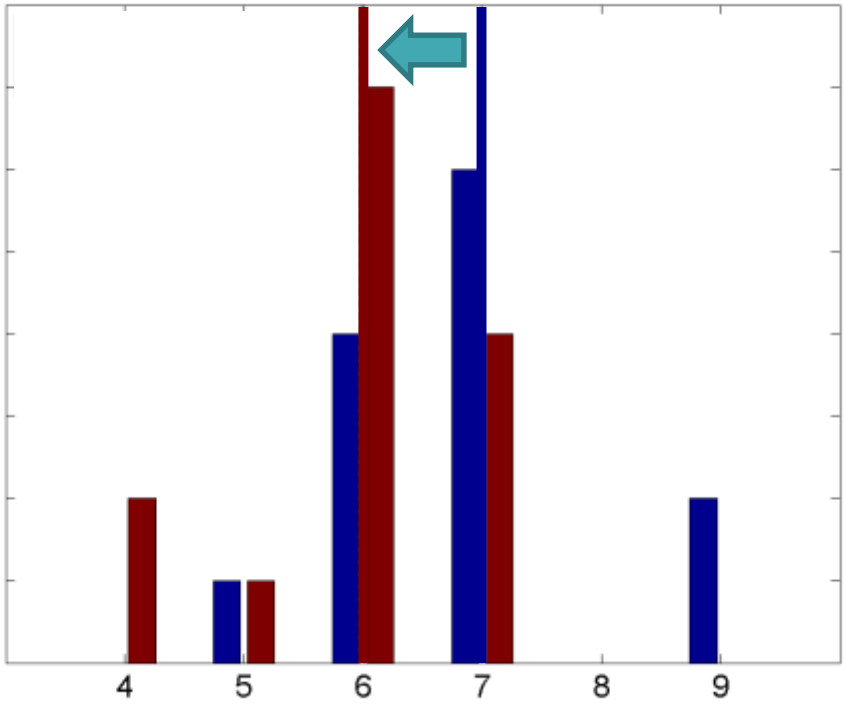


Number of Hurricanes

Climatological Average

March-April Average

May-June Average

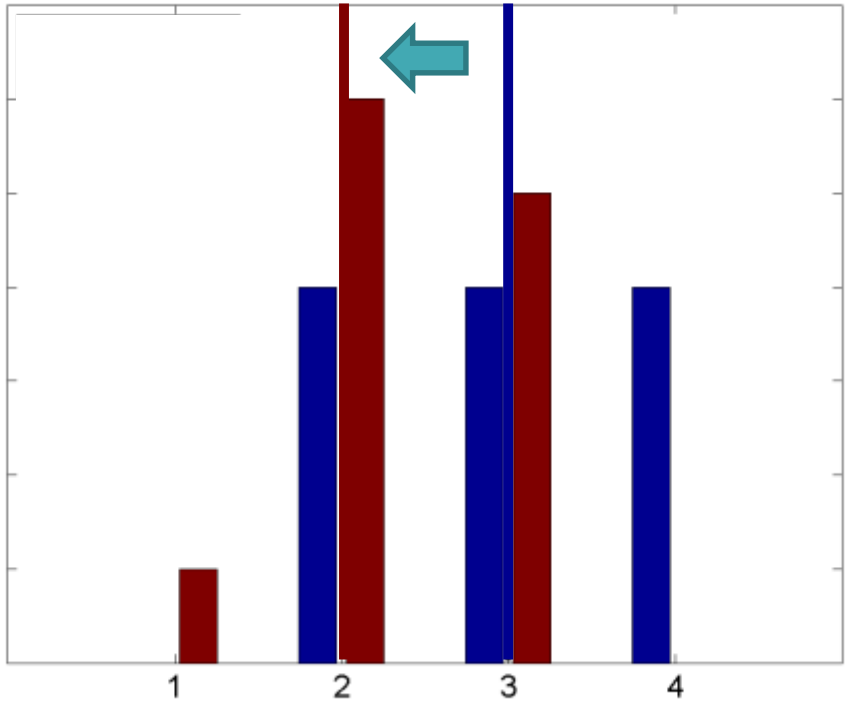


Number of Major Hurricanes

Climatological Average

March-April Average

May-June Average

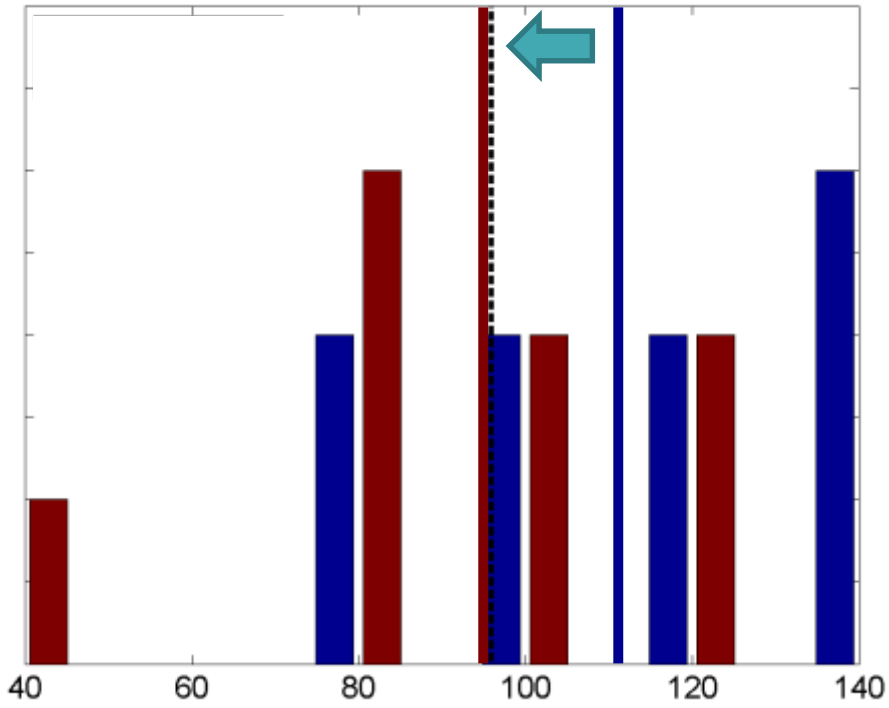


Accumulated Cyclone Energy (ACE)

Climatological Average

March-April Average

May-June Average



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2012 Atlantic Storm Names

Alberto	Helene	Oscar
Beryl	Isaac	Patty
Chris	Joyce	Rafael
Debby	Kirk	Sandy
Ernesto	Leslie	Tony
Florence	Michael	Valerie
Gordon	Nadine	William

2018 Atlantic Storm Names

~~Alberto~~	Helene	Oscar
Beryl	Isaac	Patty
Chris	Joyce	Rafael
Debby	Kirk	Sara
Ernesto	Leslie	Tony
Florence	Michael	Valerie
Gordon	Nadine	William

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Subtropical Storm Alberto

- 4th consecutive year with a storm forming in the Atlantic before the official beginning of the season

2018 Pacific Storm Names

~~Aletta~~	Ileana	Rosa
~~Bud~~	John	Sergio
Carlotta	Kristy	Tara
Daniel	Lane	Vincente
Emilia	Miriam	Willa
Fabio	Norman	Xavier
Gilma	Olivia	Yolanda
Hector	Paul	Zeke

Pacific Hurricanes Aletta and Bud

- Both Category 4 major hurricanes
- Bud expected to make landfall on the Southern Baja Peninsula tomorrow as a TS

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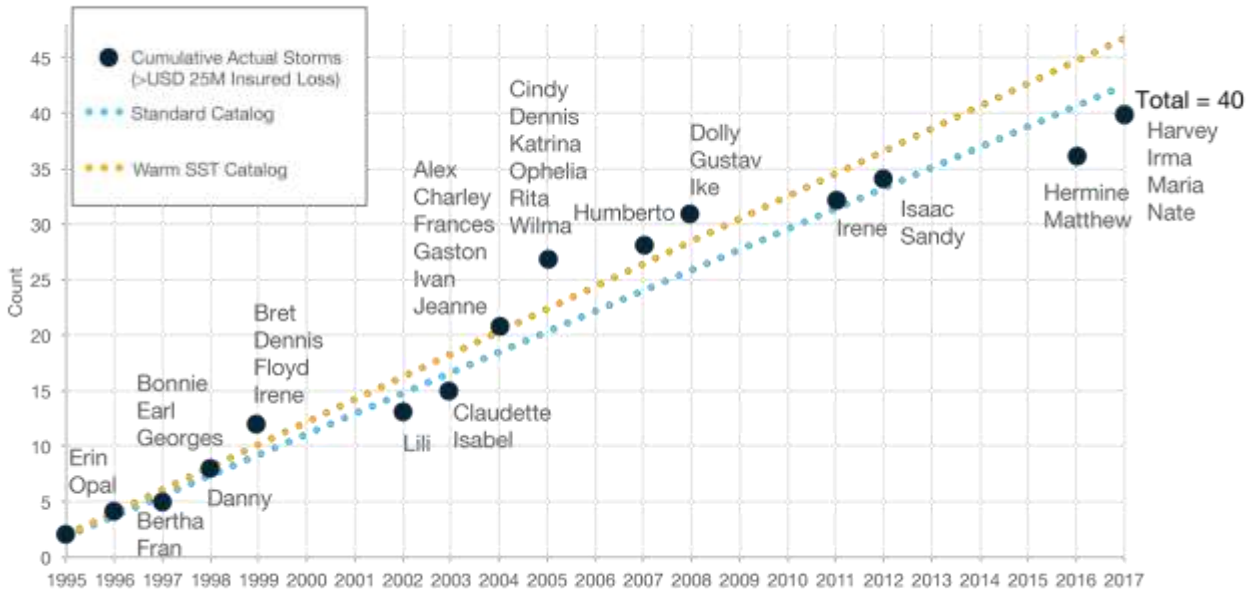
Forecasts Trending Downward

- Cooler Atlantic sea surface temperatures remaining during the season
- Increased probability of a neutral ENSO due to a weak El Niño
- August updates will reveal more

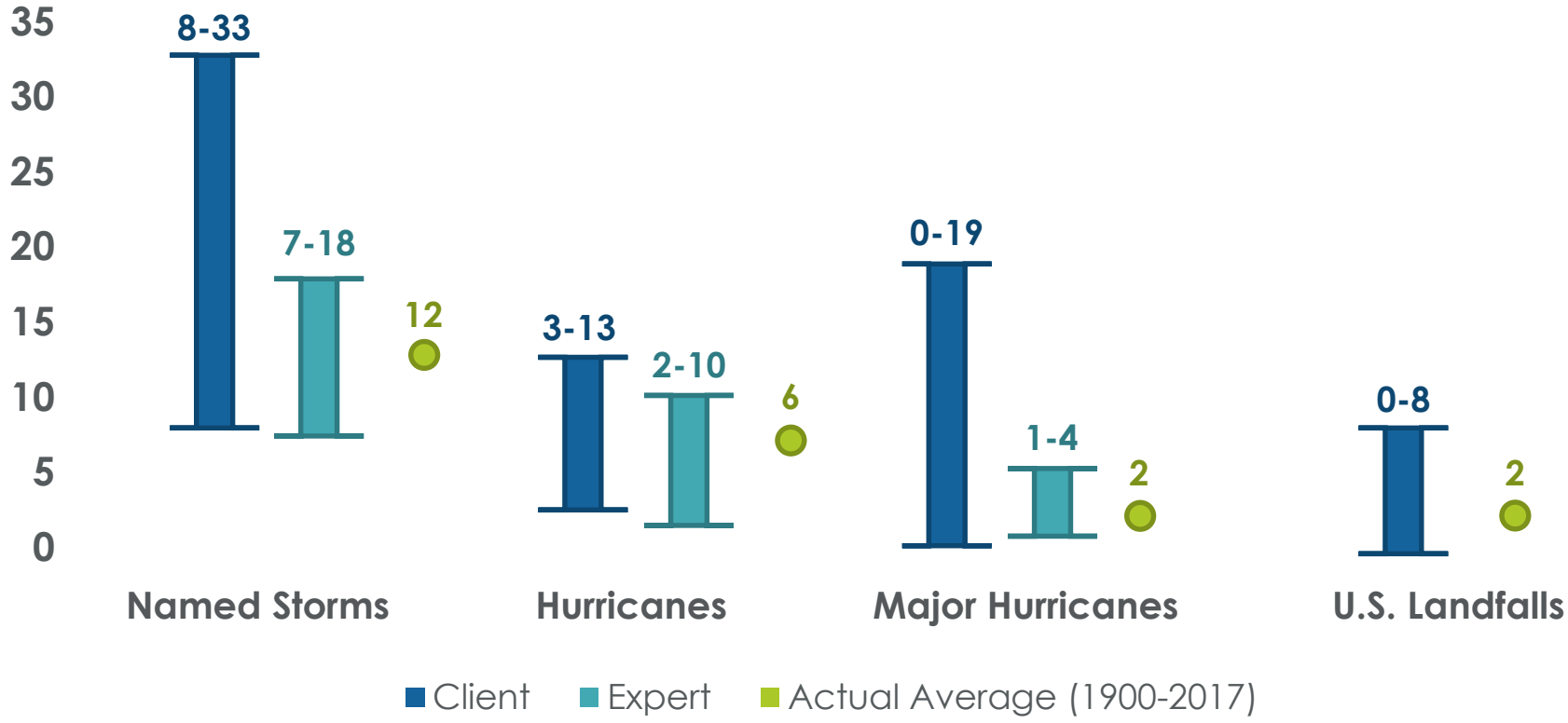
Recent Hurricane Activity Aligns with Long-Term Averages

- Even with scientific advancements and more data available than ever, hurricane forecasts are unreliable—*think about 2017's ENSO forecast bust!*
- Models help us understand and prepare for the long term



AIR Hurricane Contest

AIR Hurricane Contest



Thank You!

A recording of today's webinar and the slide deck will be distributed shortly.

Thank you for submitting your questions online—they helped to shape today's content!

If your question isn't covered during Q&A, please reach out to your account rep or airconference@air-worldwide.com

Image source: Lannis Waters / The Palm Beach Post