The Philosophy of Climate Services

By:

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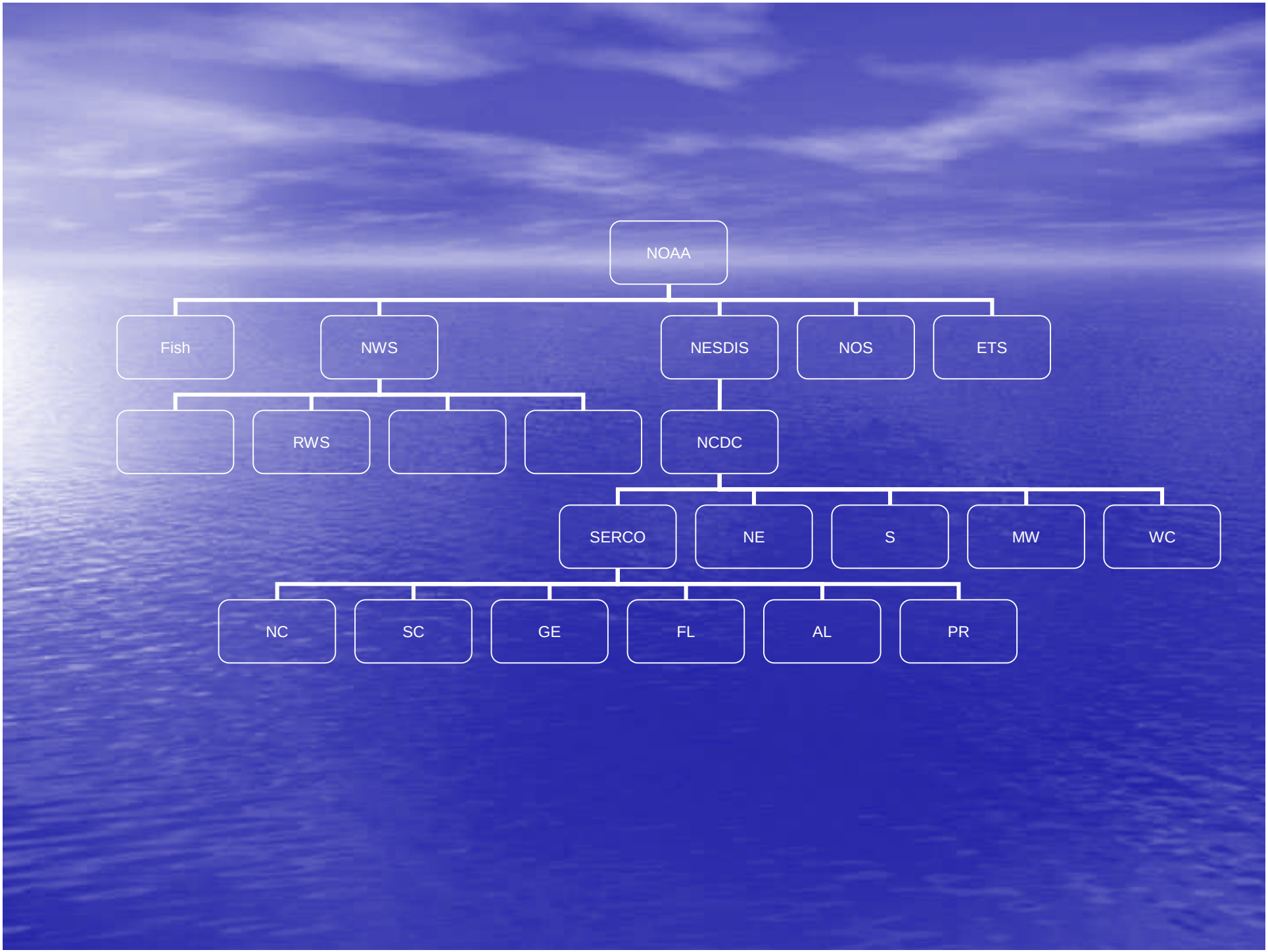
NOAA
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What are Climate Services?

Climate Services is delivery of knowledge of past and future climate variability to users.

What is NOT Climate Services?

A. A website with old weather data
B. Terciles for forecasting climate
C. Above or below catagorization of future climate
D. Any categorical forecast
E. Always using Gaussian PDF's

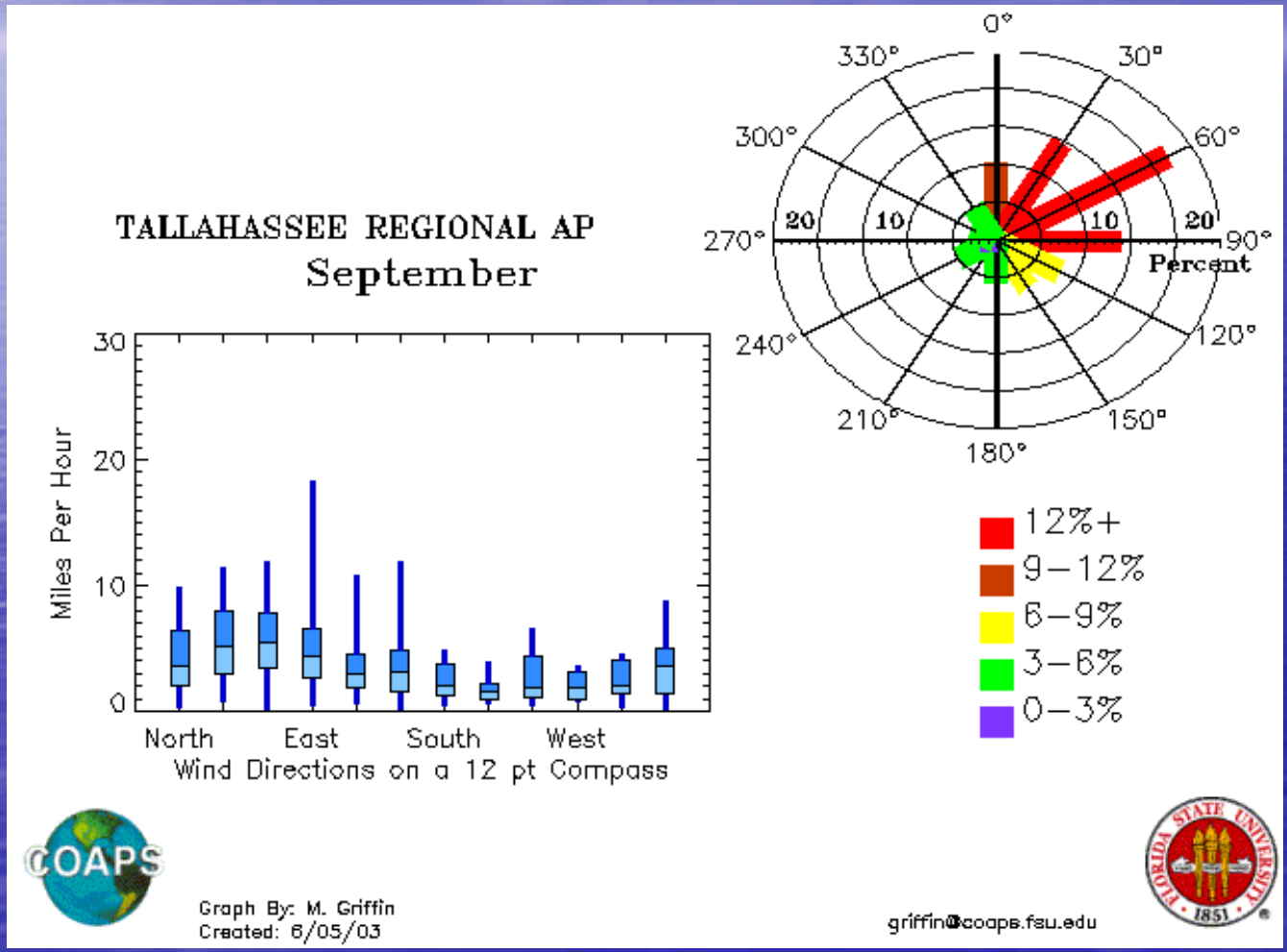
What are standard variables?

The standard "weather variables" are:

1) Temperature - Hourly, daily, maximum and minimum, monthly, annual
2) Atmospheric Pressure
3) Rainfall - Hourly, daily, monthly, etc., rainfall rates
4) Humidity - Specific humidity, relative humidity, wet-bulb temperature, etc.
5) Winds - Wind speed and direction, wind components

Most clients need derived information. EXAMPLES:

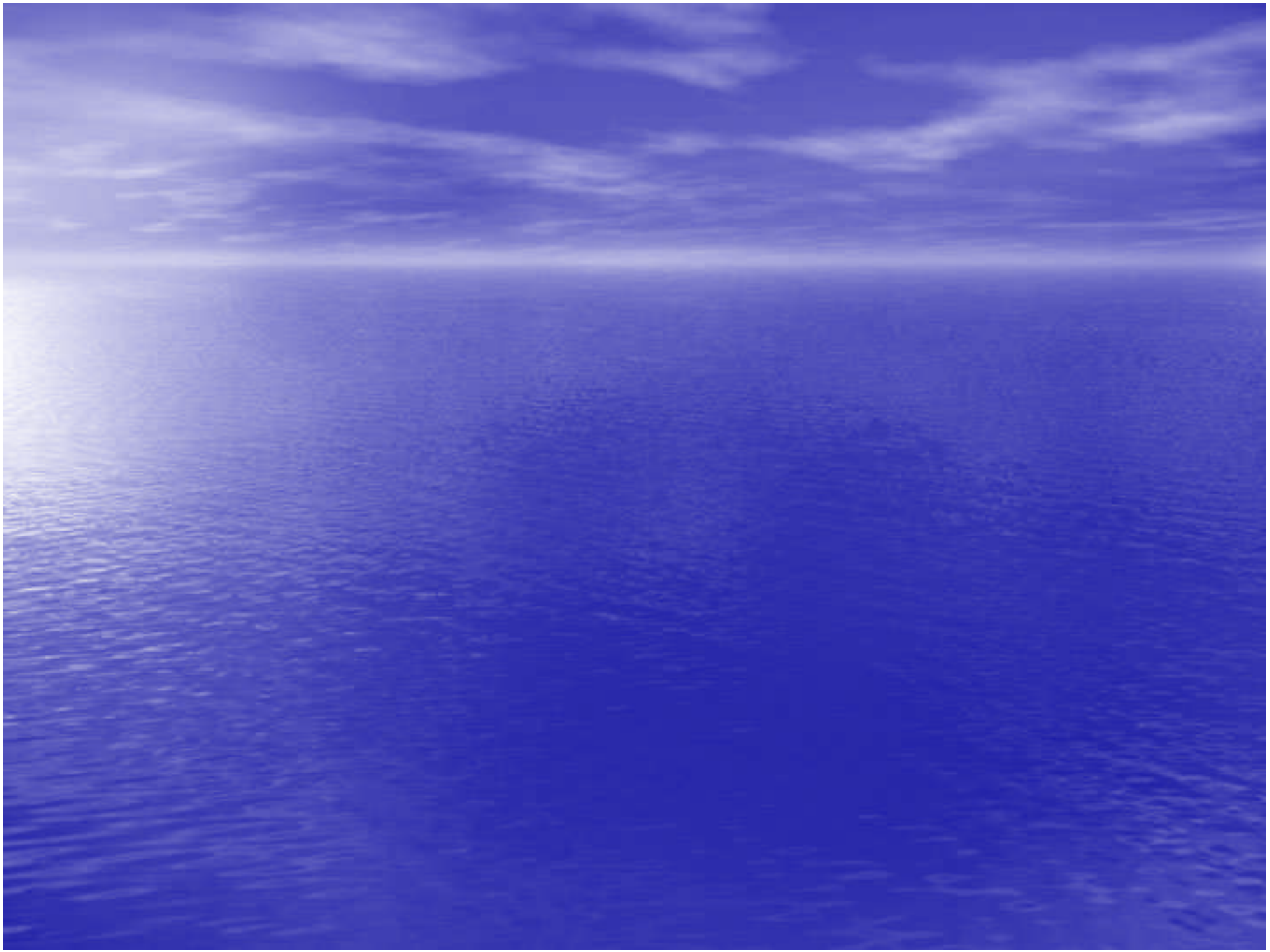
Wind Climatology



Impact Freezes of the last century

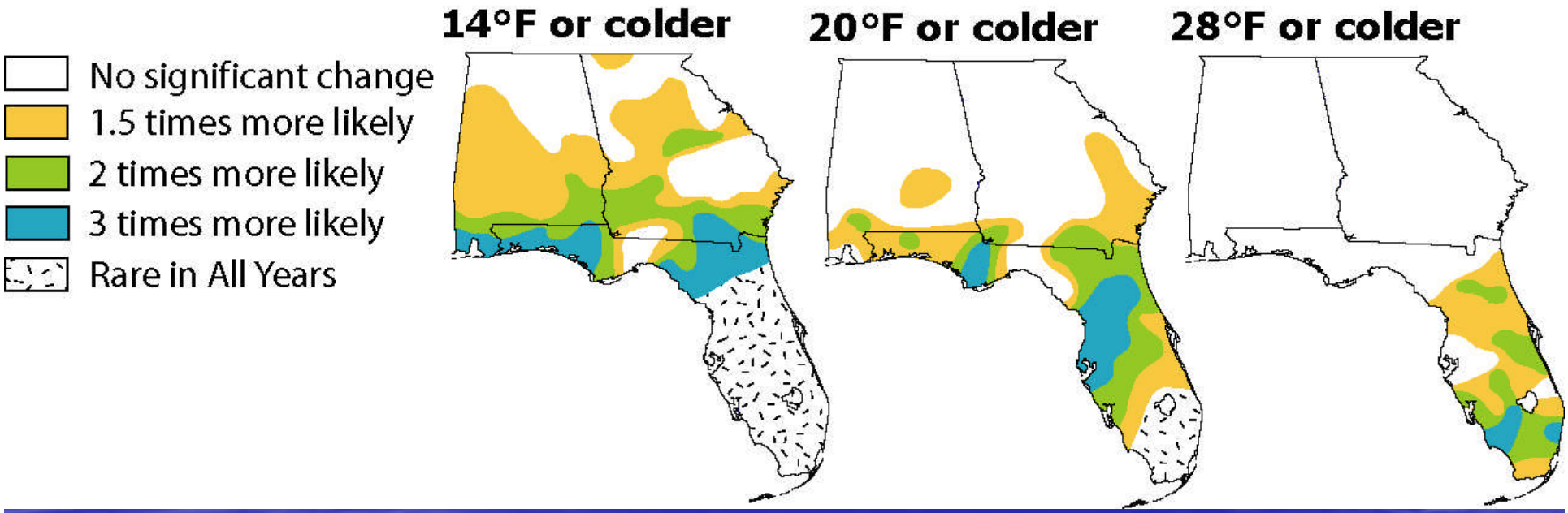
Freeze Date	ENSO State
*Dec 1894	Neutral
Feb 1899	Neutral
Dec 1934	Neutral
Jan 1940	Neutral
*Dec 1961	Neutral
Jan 1981	Neutral
*Dec 1983	Neutral
Jan 1985	Neutral
*Dec 1989	Neutral
Jan 1997	Neutral

* High Impact



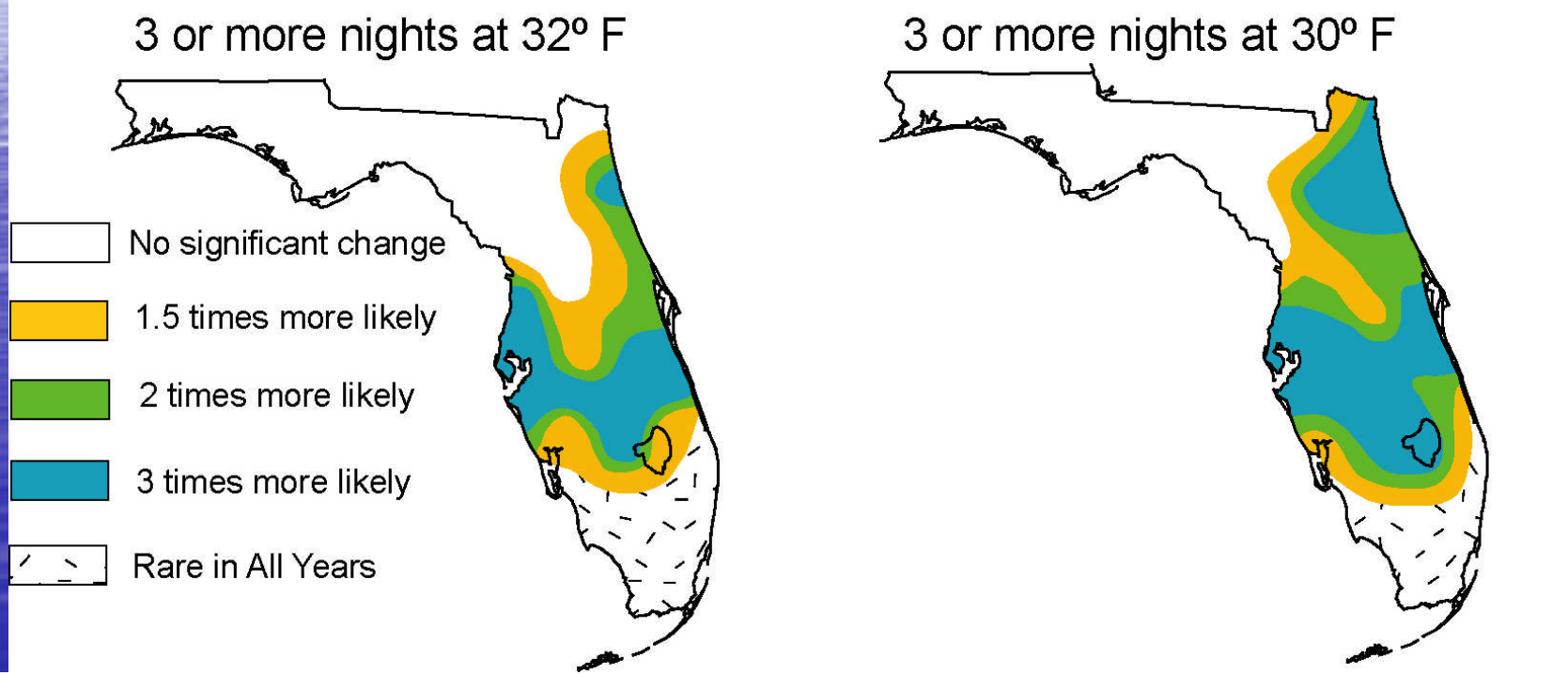
ENSO and Florida Freeze Probabilites

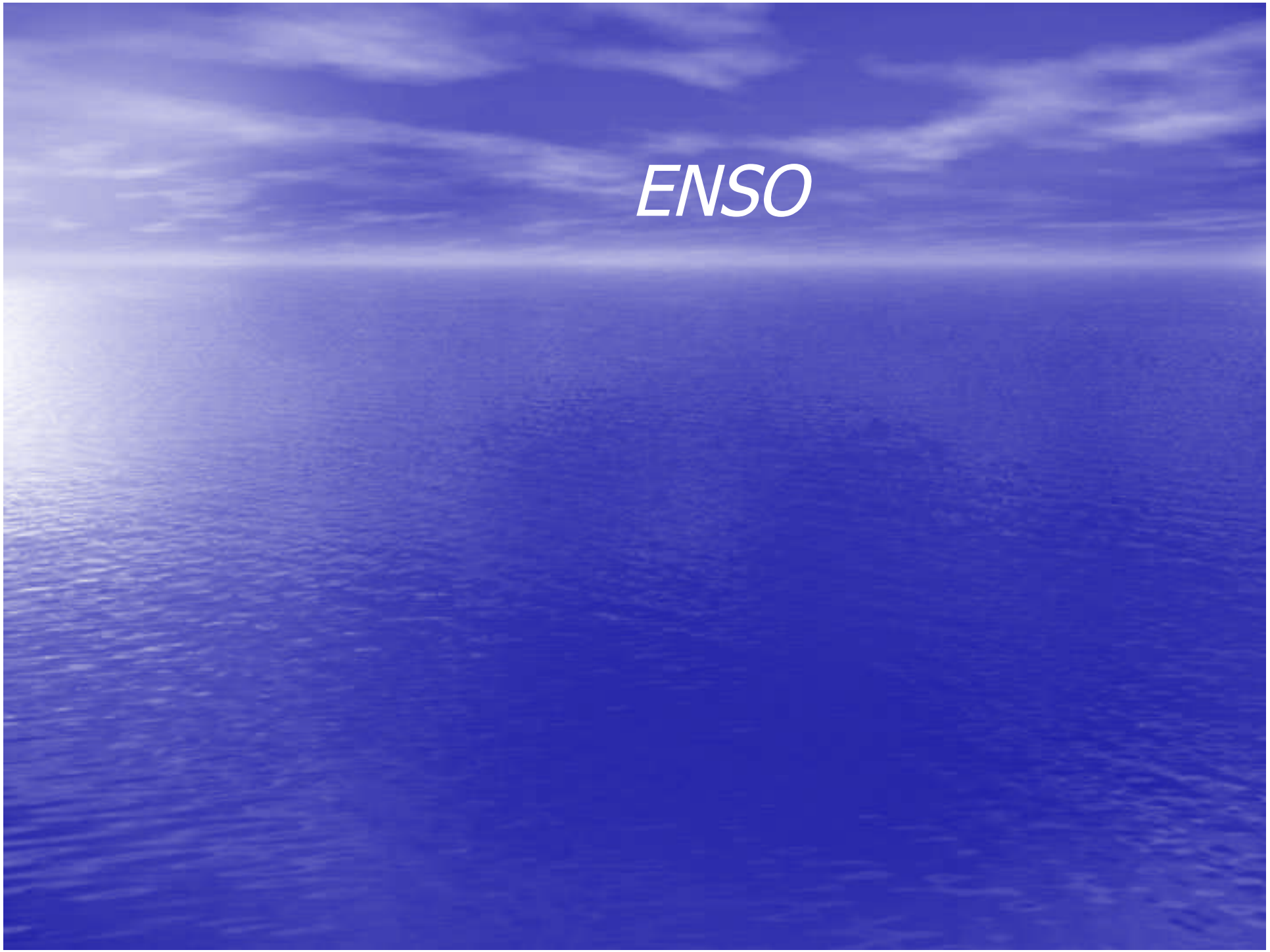
Increased Risk for this Winter (2003/2004) versus El Niño or La Niña Winter



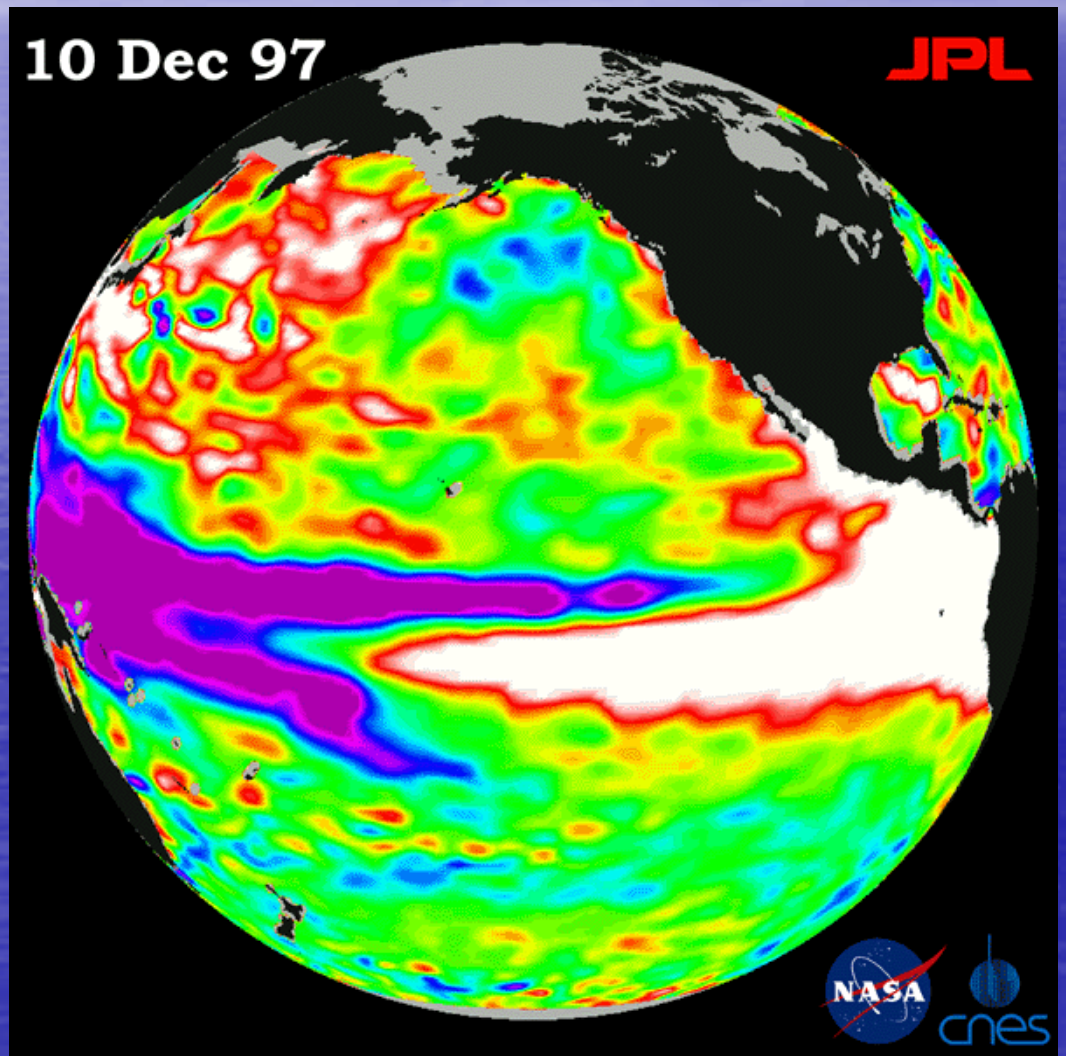
Extended Freeze Events

Increased Risk of Extended Freeze Event (This Winter versus El Niño or La Niña)

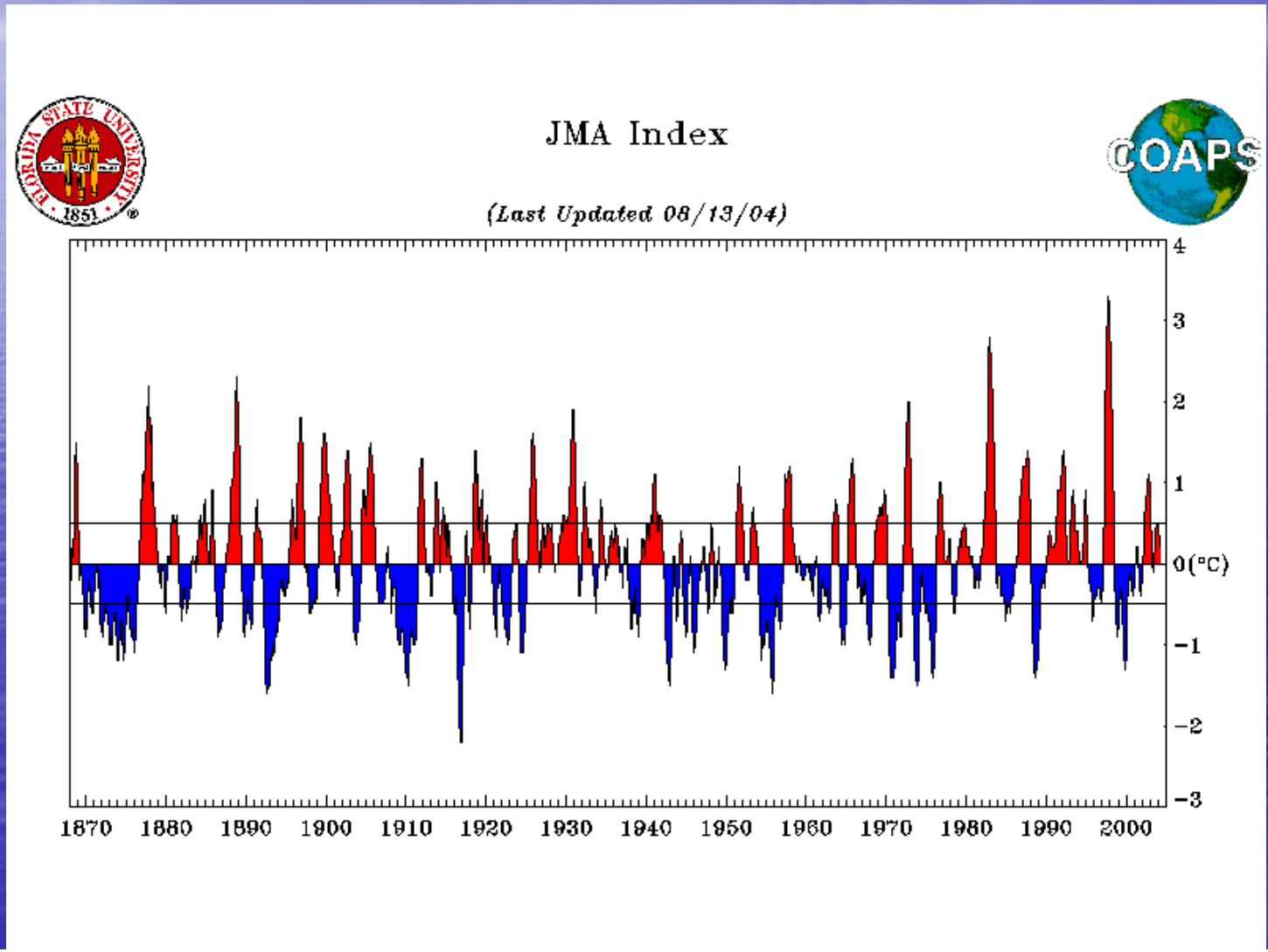



ENSO

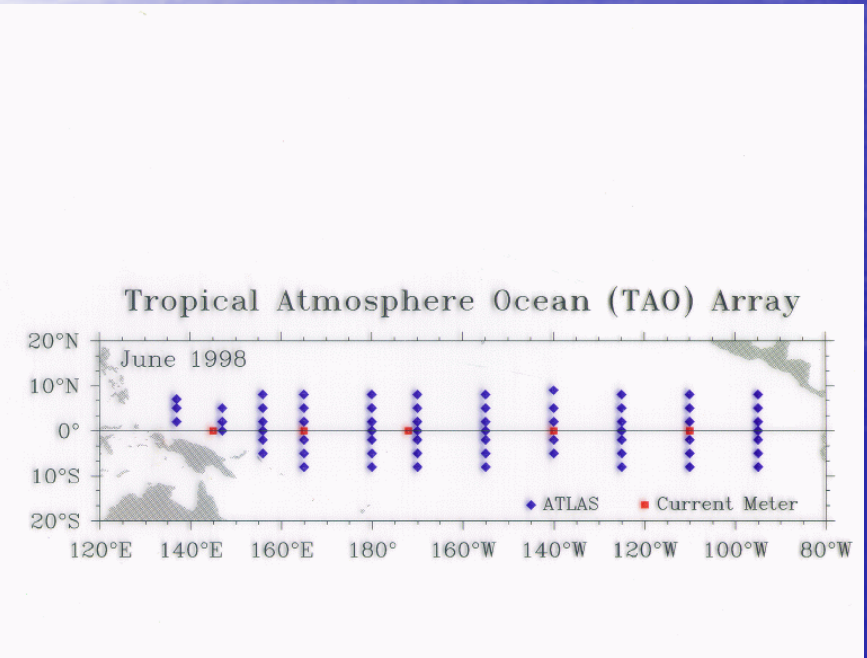
World Map

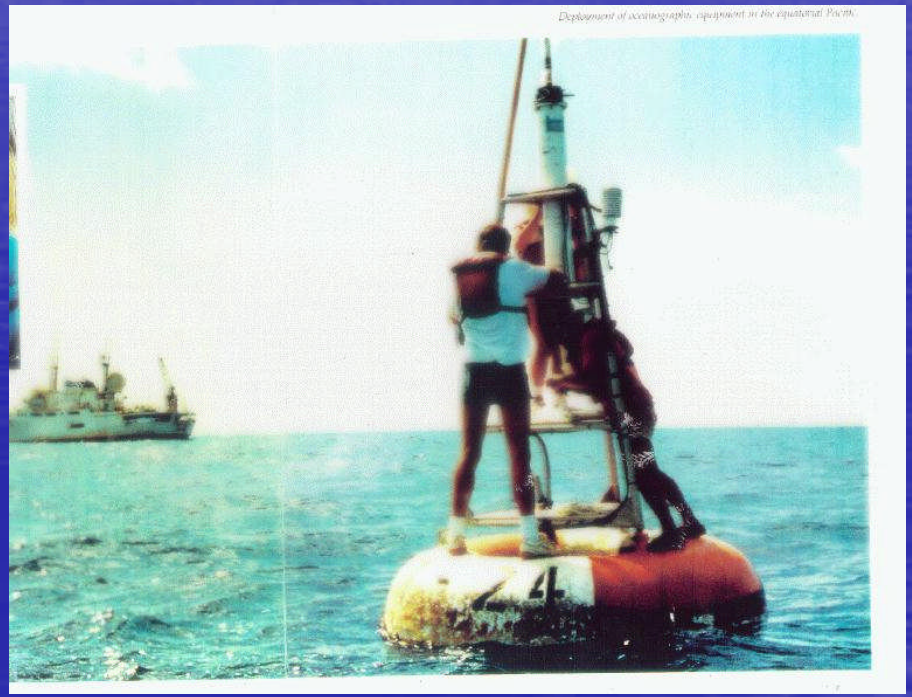


Changes in the ENSO Cycle



Monitoring the Pacific Ocean

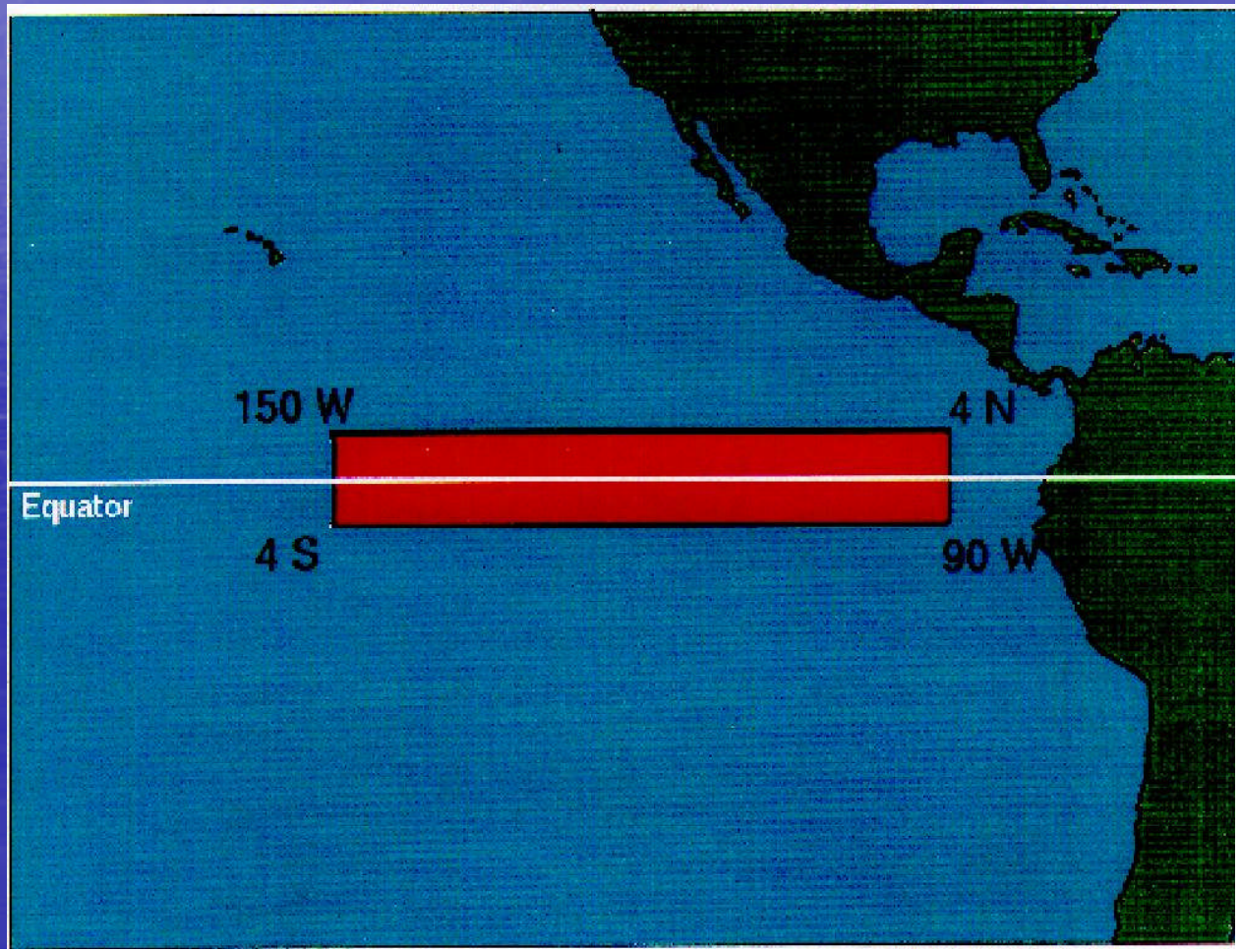




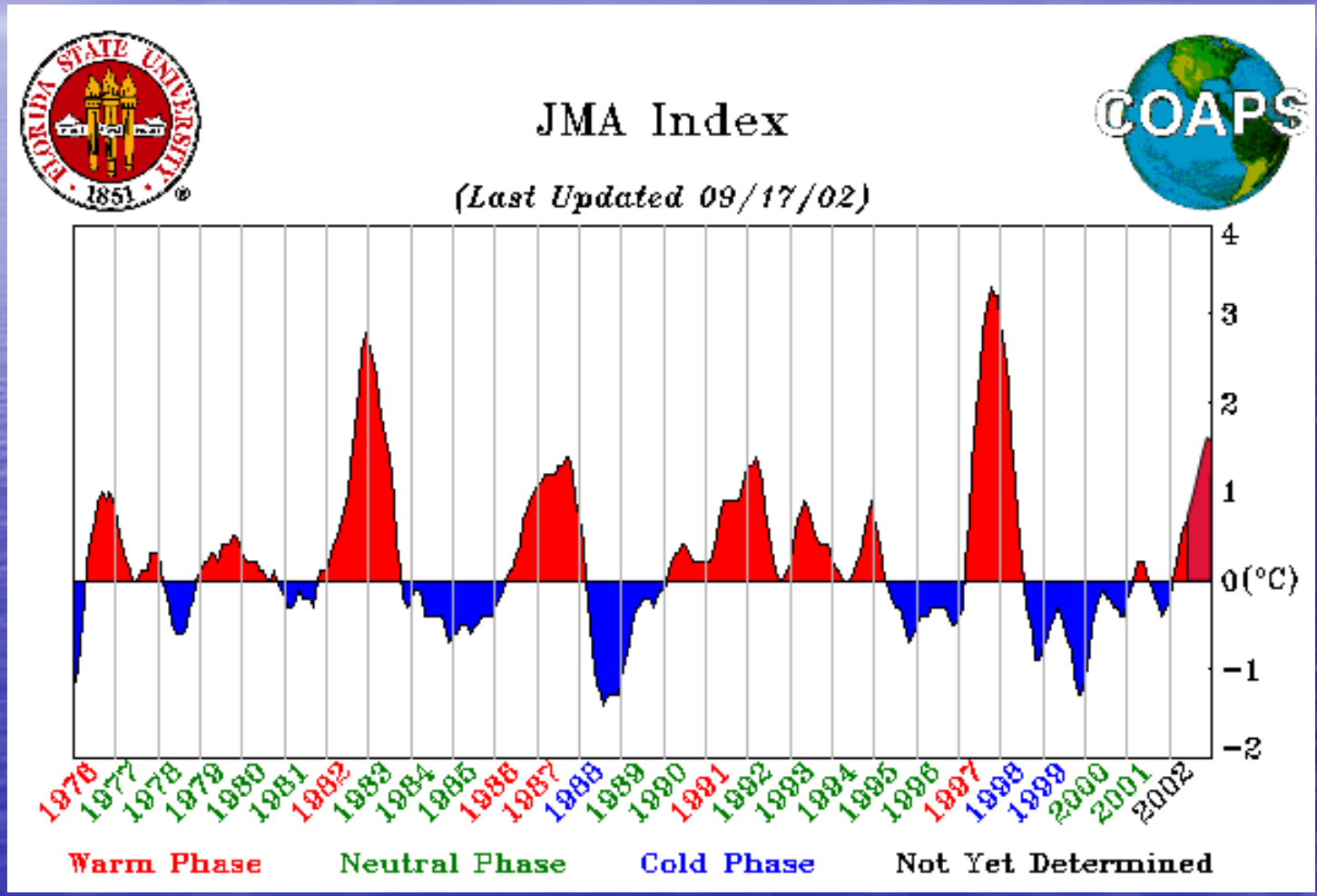
Japan Meteorological Agency (JMA) ENSO Index

SST Anomalies averaged over the red shaded portion of the equatorial Pacific Ocean

Smoothed with a five-month running average to reduce noise



Tracking ENSO with the JMA Index



ENSO Impacts in Florida

EL Niño

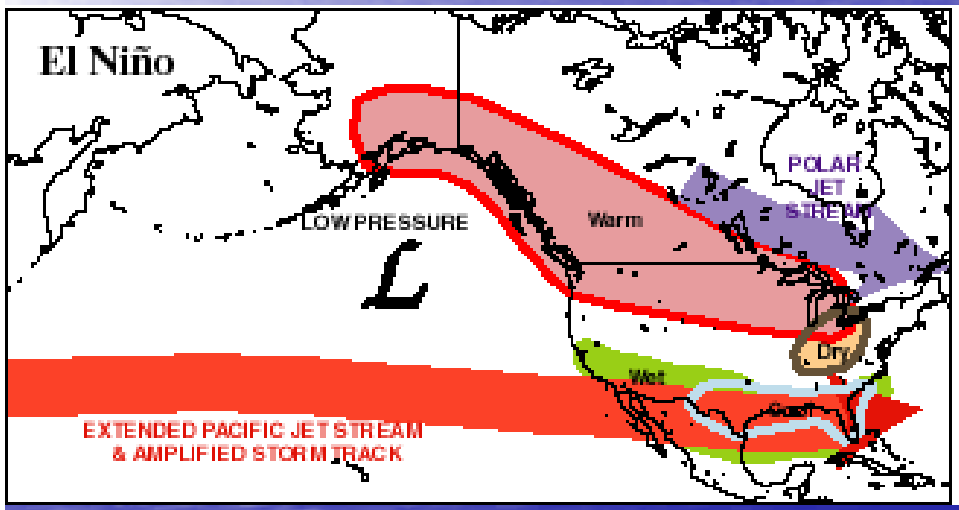
- Very wet winter and spring
- Greatly reduces Atlantic hurricanes
- decreases tornadoes in the tornado alley

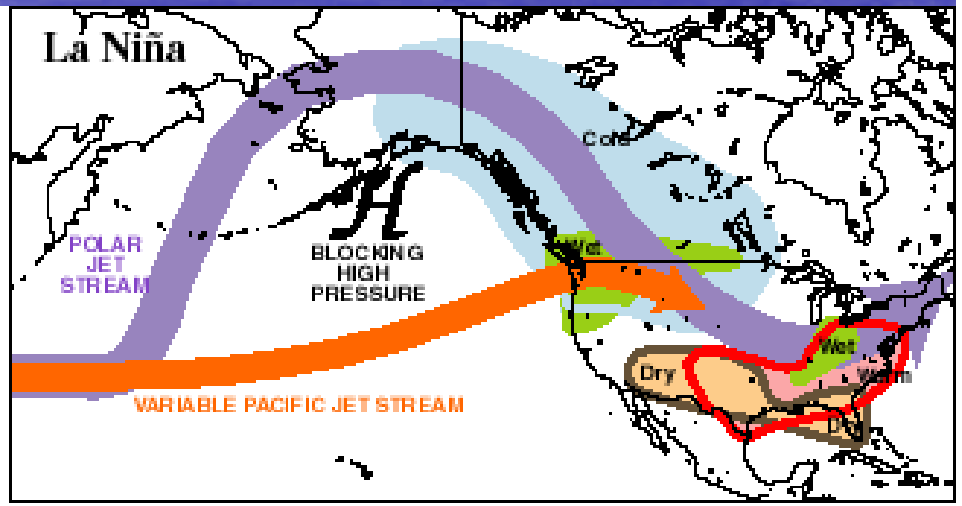
La Niña

- Dry Fall, Winter, and Spring
- Greatly increases Atlantic hurricanes
- Increases tornadoes in the deep south
- Greatly increases wildfire activity

Neutral ENSO phase increases the risk of severe freezes by 3:1 odds.

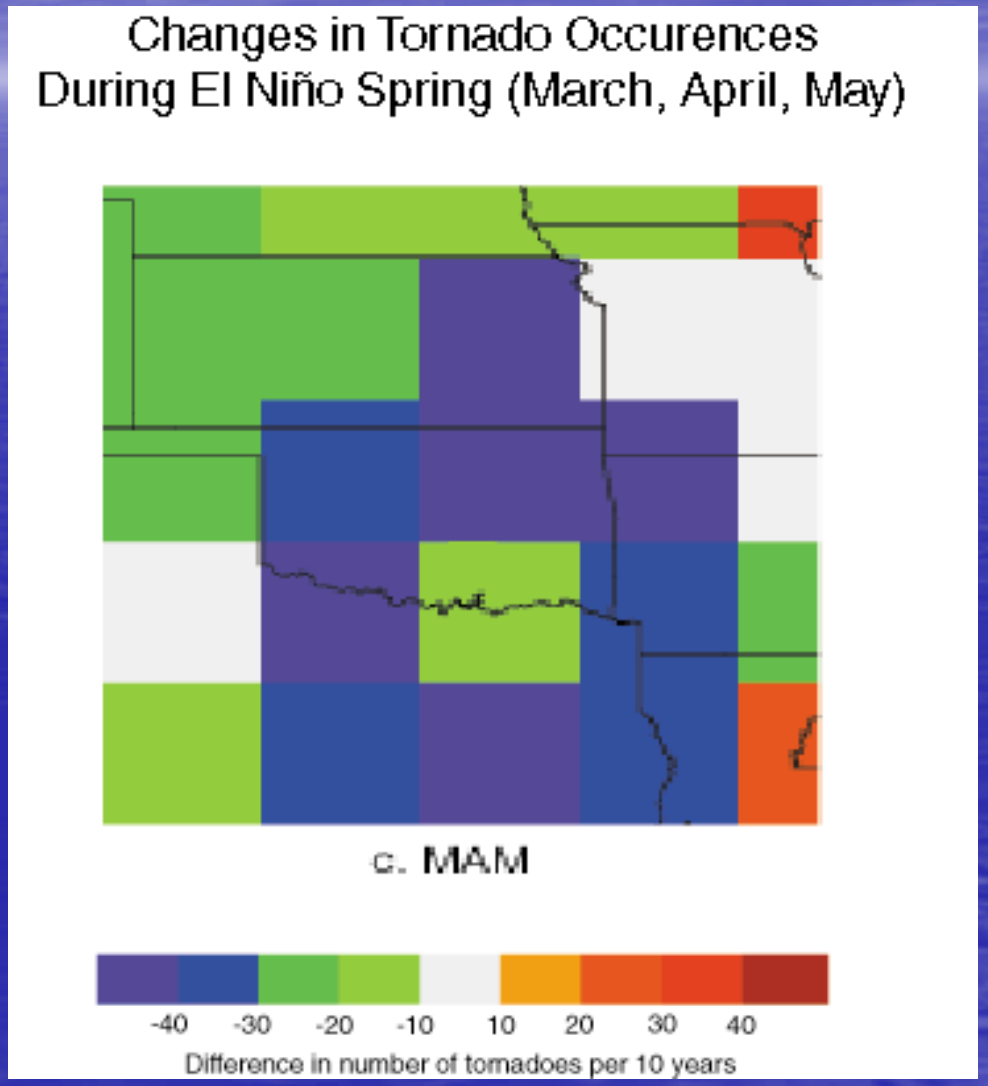
Winter Jet Stream Patterns during El Niño and La Niña





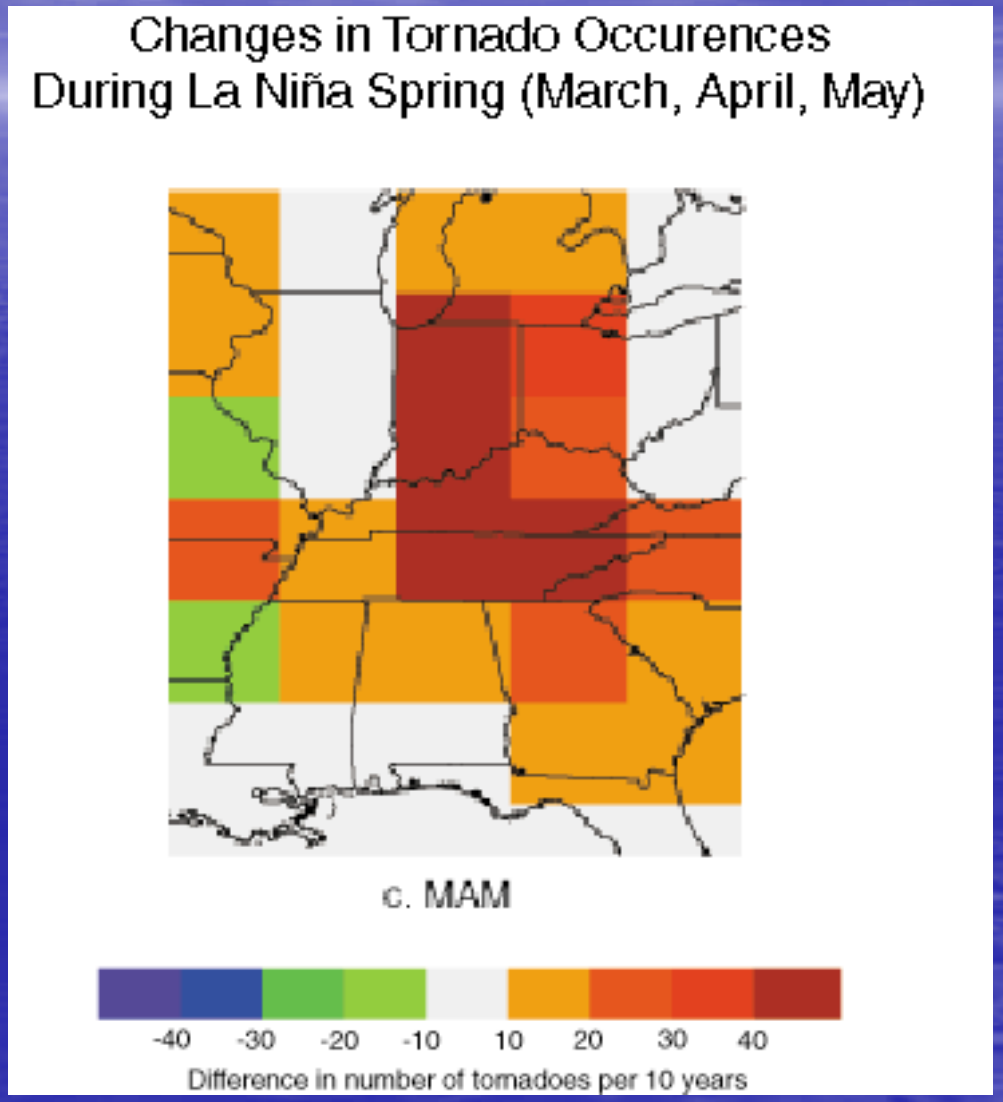
ENSO and Tornadoes

El Niño decreases the number of tornadoes in Tornado Alley

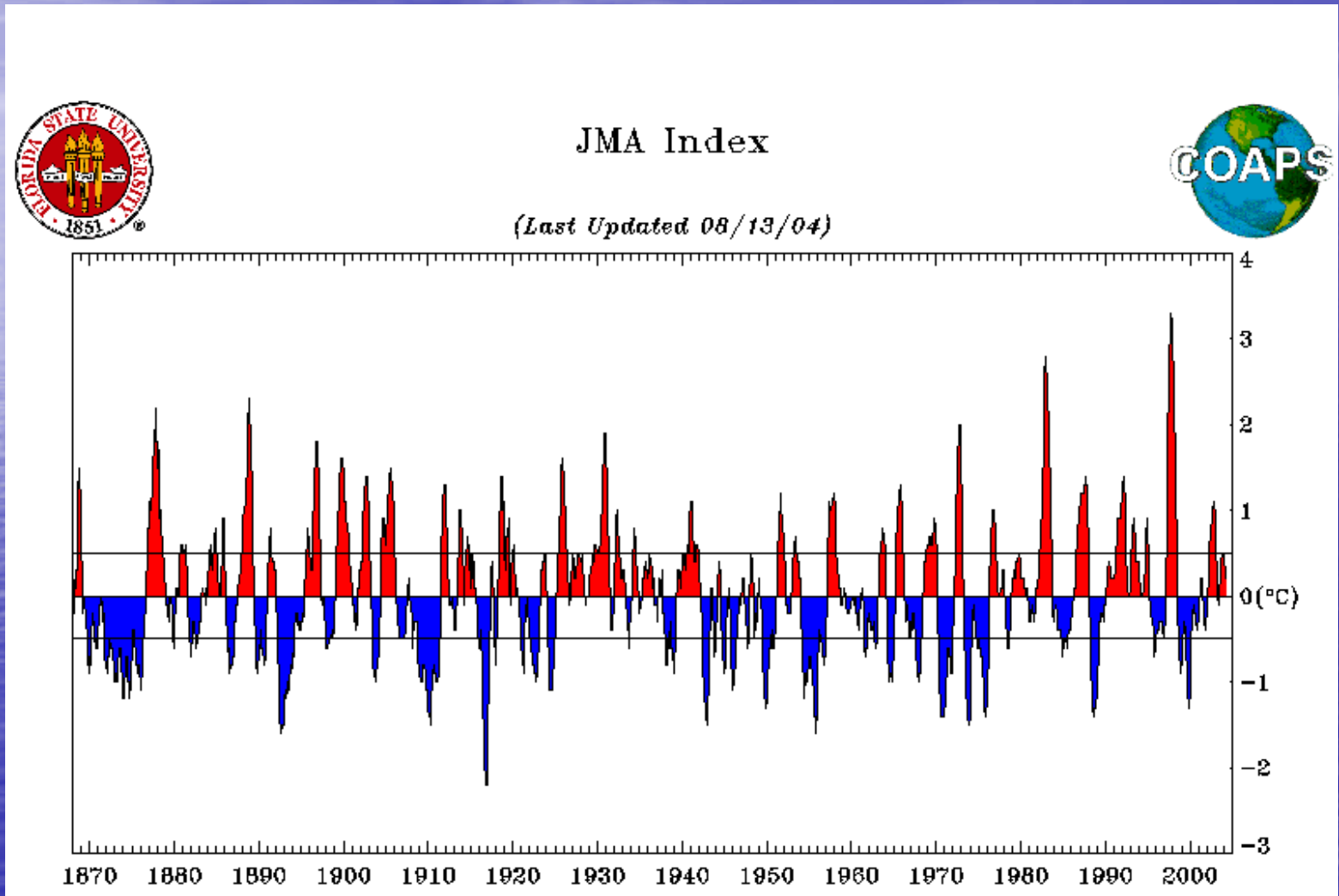


ENSO and Tornadoes

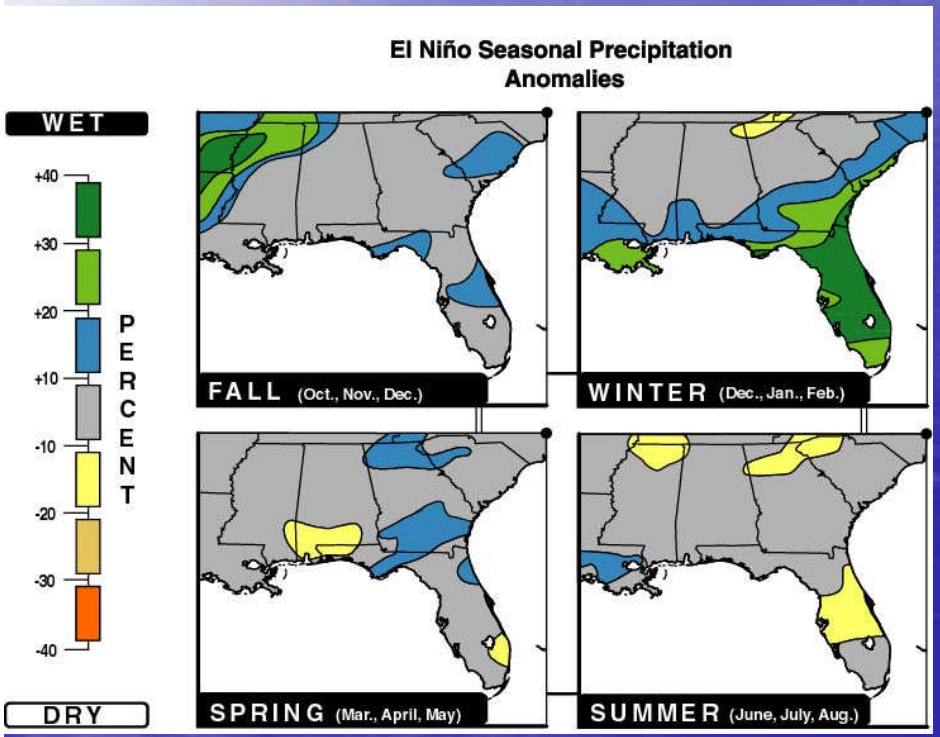
La Niña increases the number of tornadoes in the Southeast U.S.

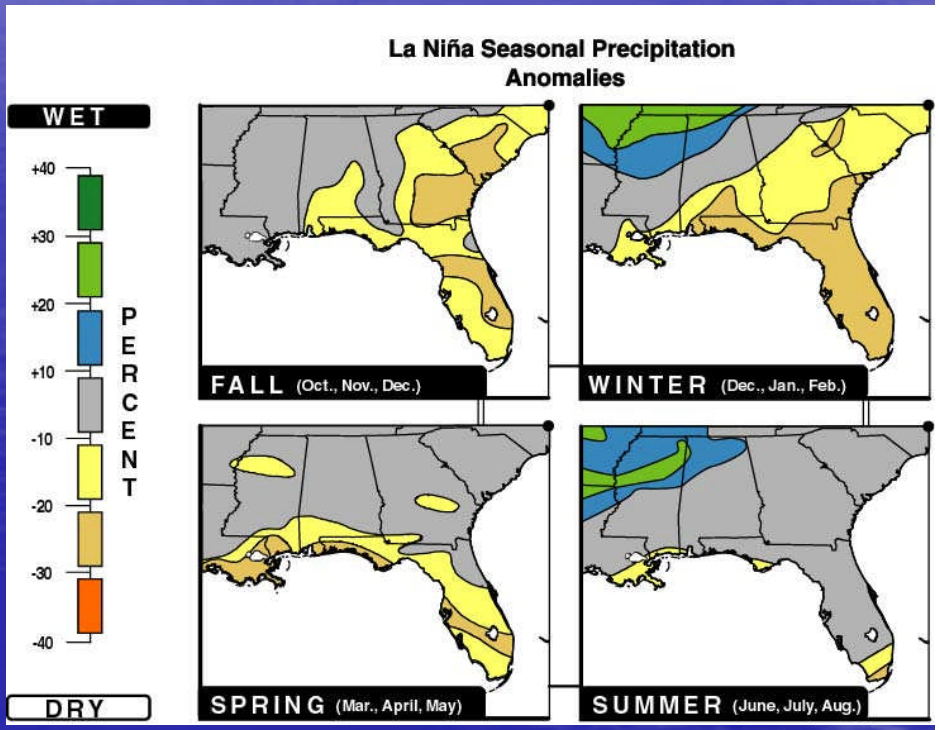


Climate Change and ENSO

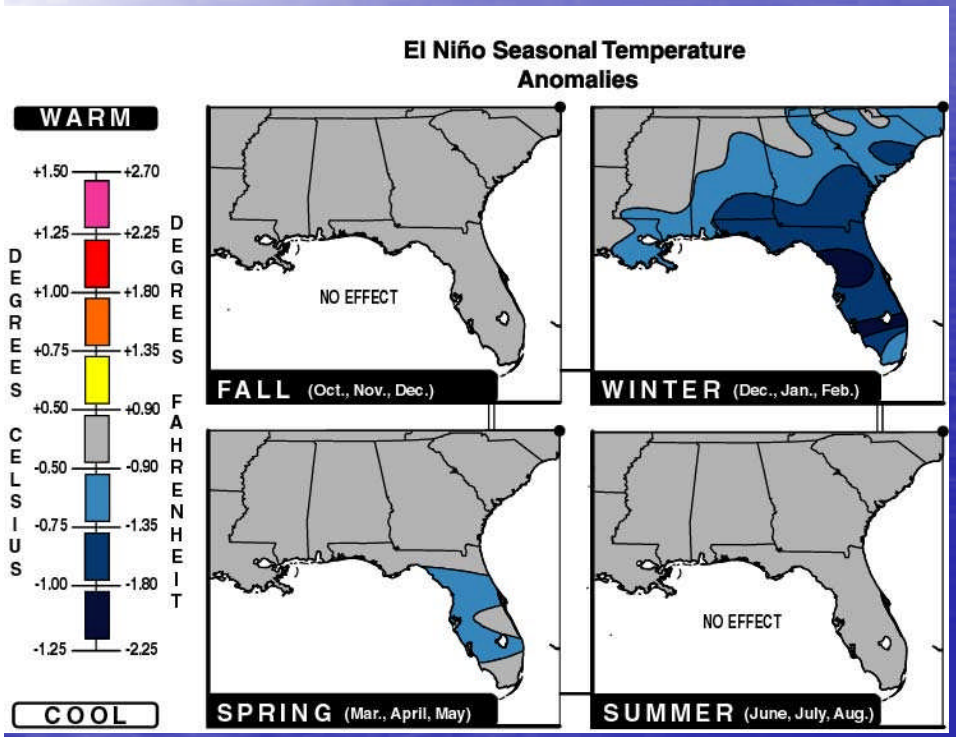


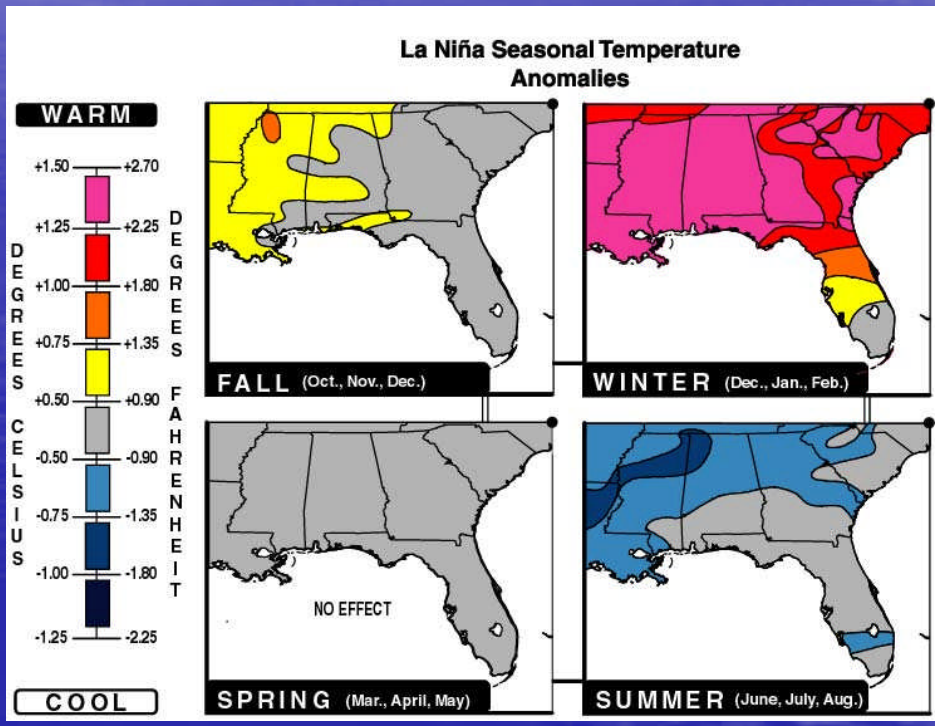
ENSO Effects on Precipitation





ENSO Effects on Temperature

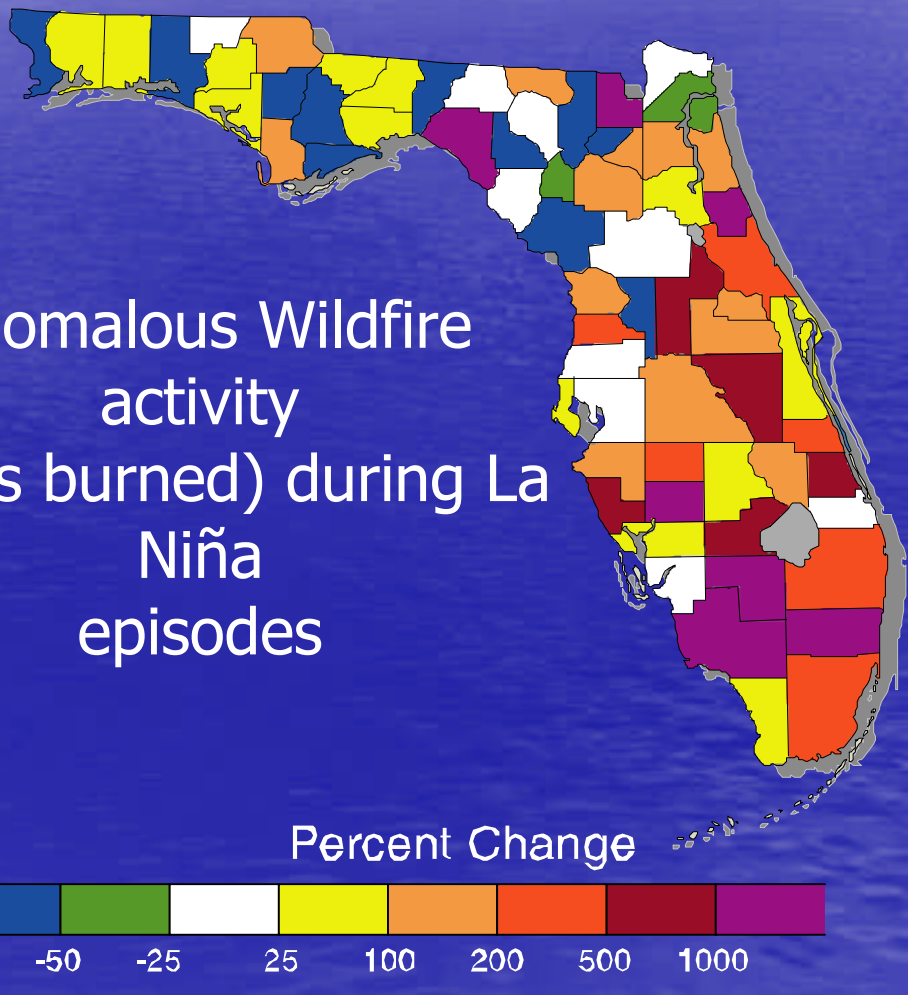




La Niña and Wildfires

- La Niña brings drier than normal conditions (30%-40%) and warmer temperatures from November through April.
- Wildfire activity is increased throughout the wildfire season.
- The increased activity can be expected during nearly all La Niña episodes.

April

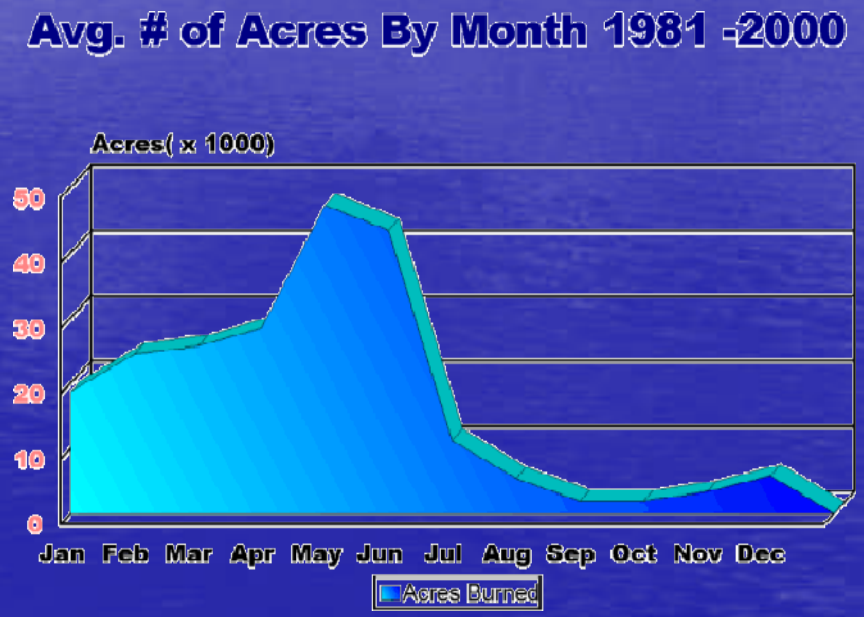


Anomalous Wildfire activity (acres burned) during La Niña episodes


Mallory Swamp Fire
during the last La Niña
This Mallory Swamp fire covers two counties and has burned over 60,000 acres in what some people say was the largest fire Florida has ever seen. The smoke plume extends several hundred miles into the eastern Gulf of Mexico.
clouds
clouds
Major Florida Wildfire
NOAA-15 AVHRR HRPT (1km)
Multi-spectral False Color Image
May 24, 2001 @ 1259 UTC

Typical Wildfire Season in Florida and the Southeast

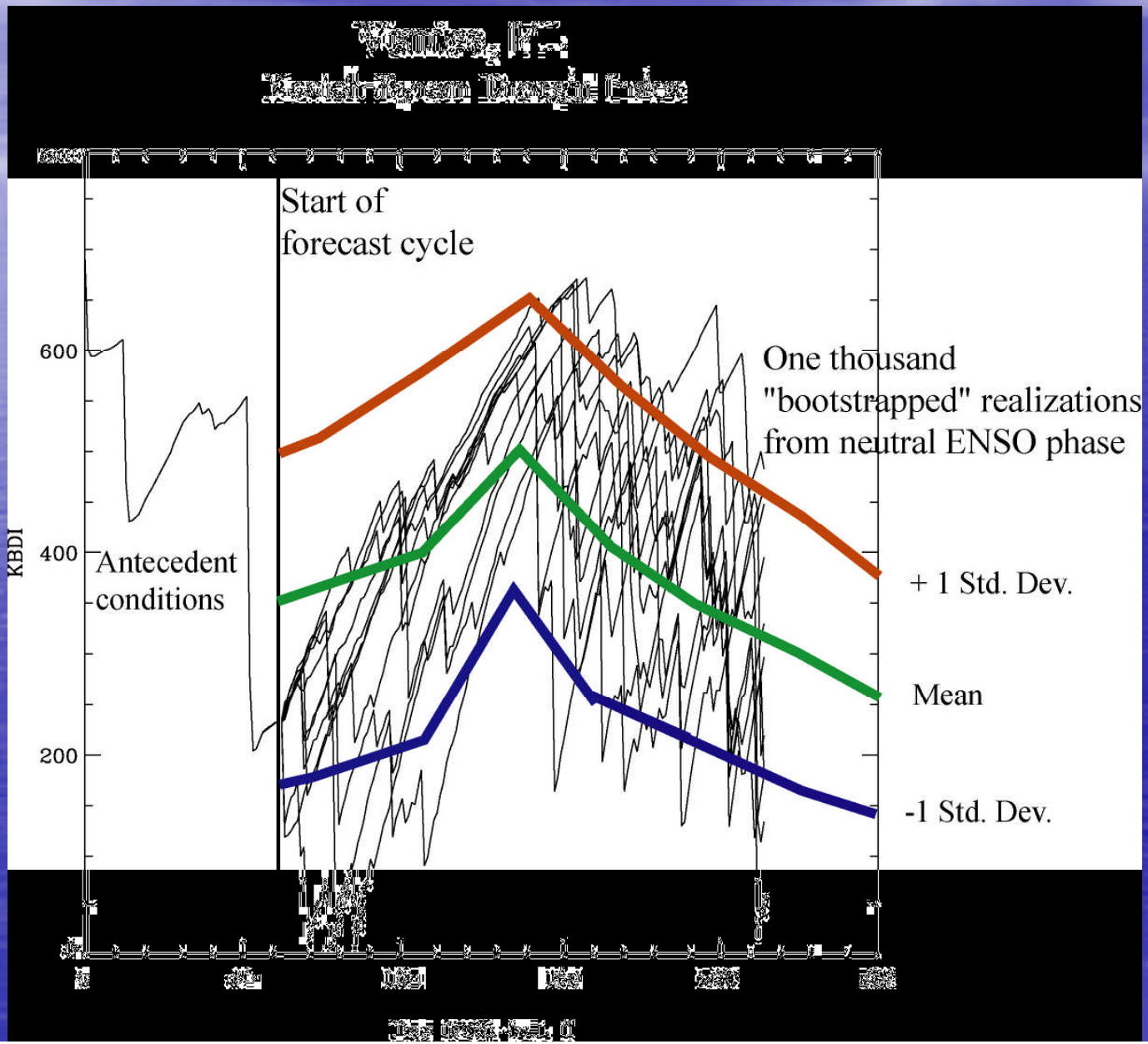
- The peninsula experiences an extended dry season from Oct. through April.
- Unlike the Western U.S., Florida's wildfire season peaks in the spring/early summer.
- Winter wildfires are usually cause by human activities.
- Late spring and early summer fires are predominantly caused by lightning and can occur in remote/inaccessible locations.



Forecasting Potential Wildfire Activity

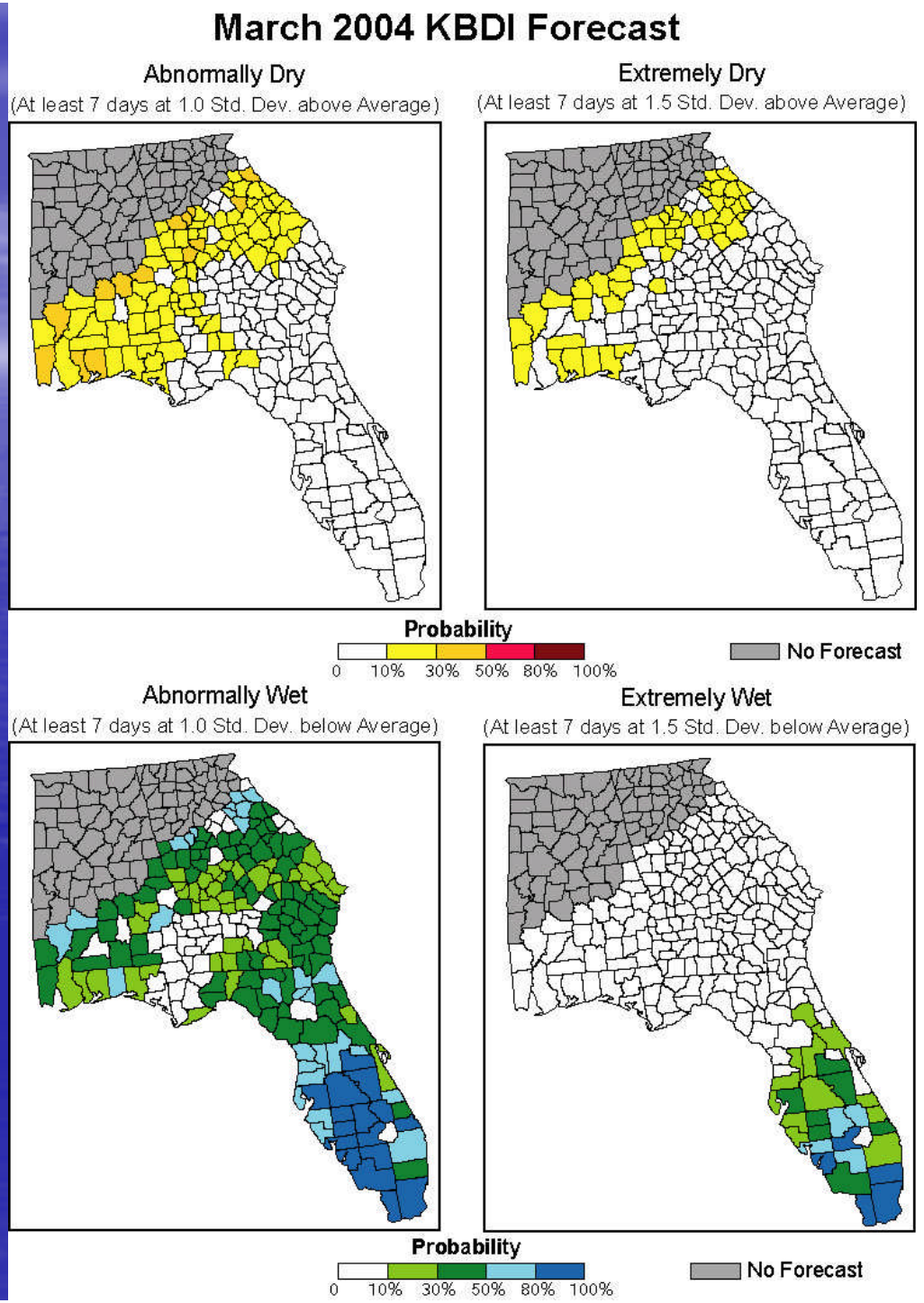
- Forecast based on the Keetch-Byram Drought Index (KBDI).
- Historical weather observations from the NWS Coop network provides coverage at nearly county level.
- Forecast is presented in probabilistic terms.
- "Bootstrapping" used to generate probability distributions for each station.

KBDI Forecast Method



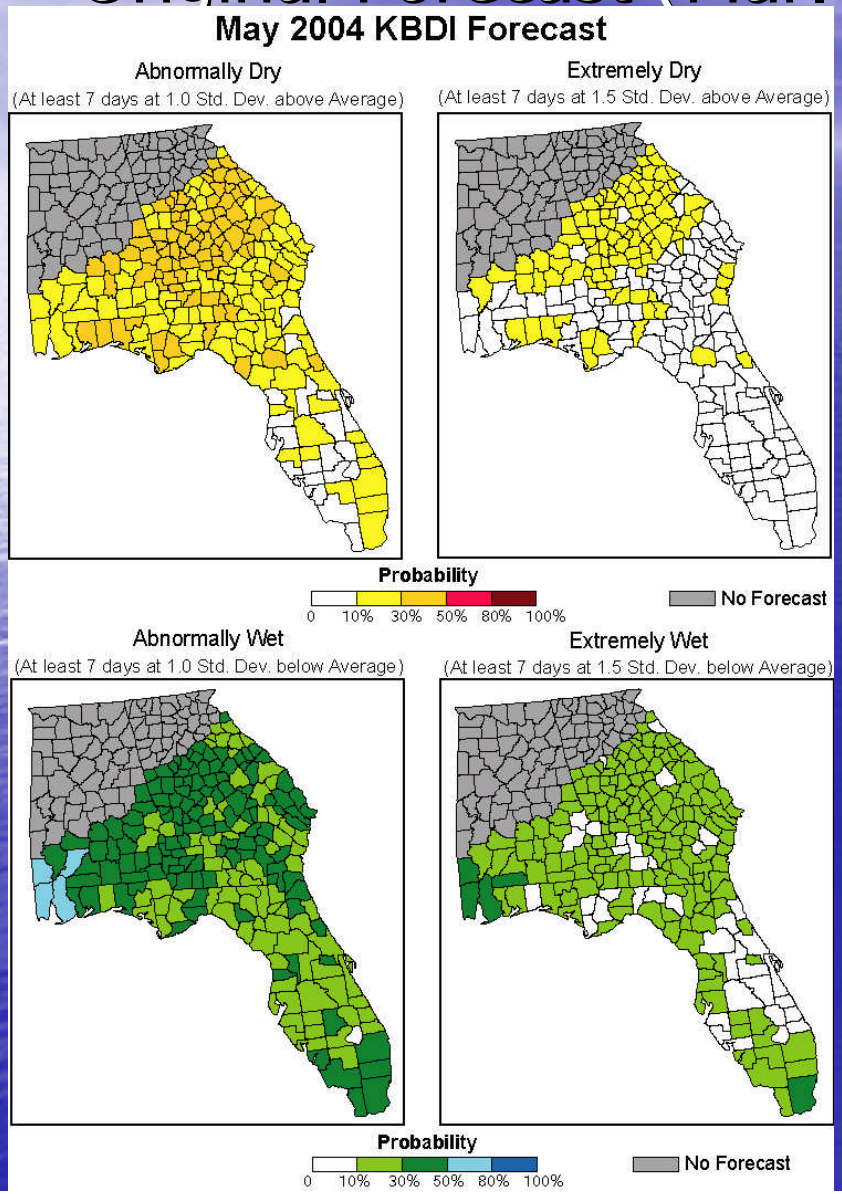
Wildfire Threat forecast

- The end product is a monthly, *county-by-county* forecast of the KBDI.
- Graphic shows the probability of *at least 7 days* in the month being above or below critical thresholds.
- Thresholds were determined with input from forestry and wildfire experts.
- Forecast was based on the Neutral ENSO phase.



May KBDI Forecast

Original Forecast (Mar. 1)



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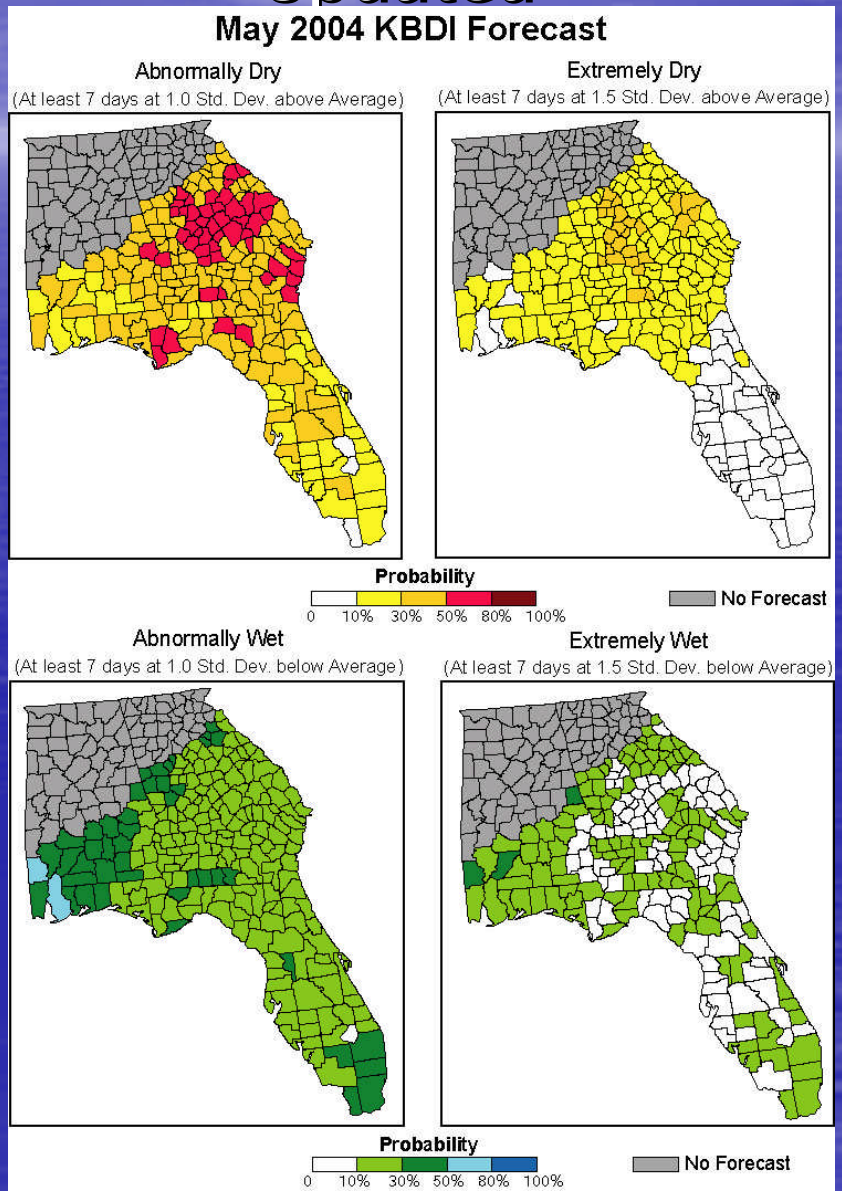
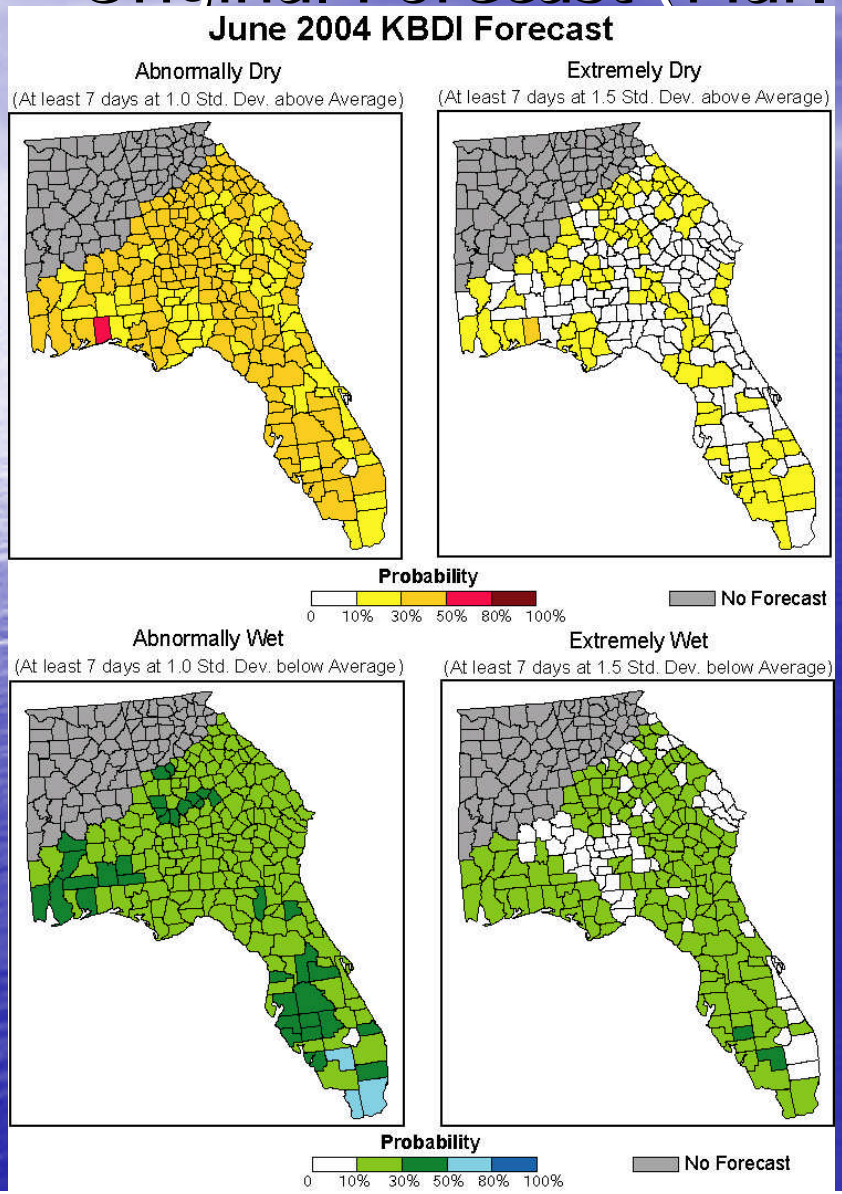


June KBDI Forecast

Original Forecast (Mar. 1)



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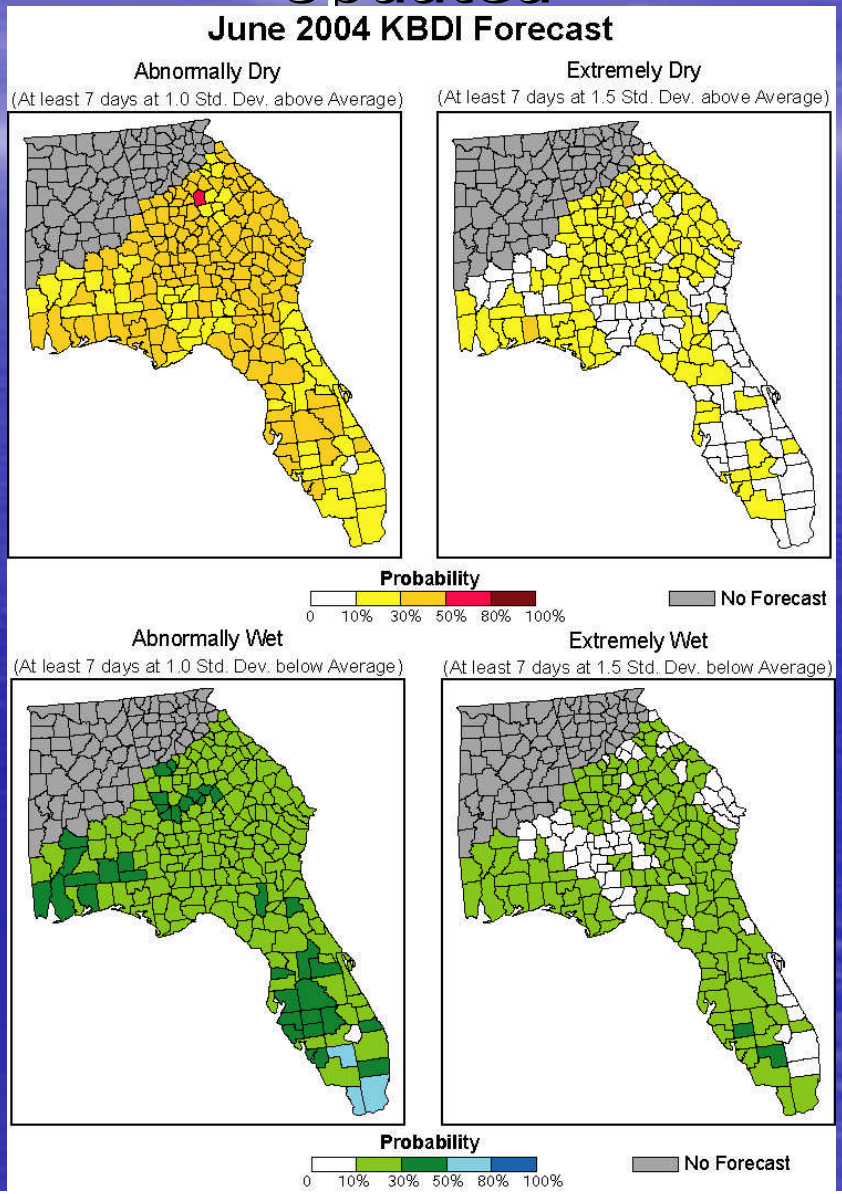


esults: KBDI Probabilities - acksonville

- La Nina
  - Drought probabilities are moderate during winter and low during summer.
- Neutral
  - Probability is between La Nina and El Nino Probabilities.
- El Nino
  - Probabilities are very low during winter but increase to near 30 percent in July.
- Chart provides probability of KBDI exceeding one standard deviation above the climatological mean.

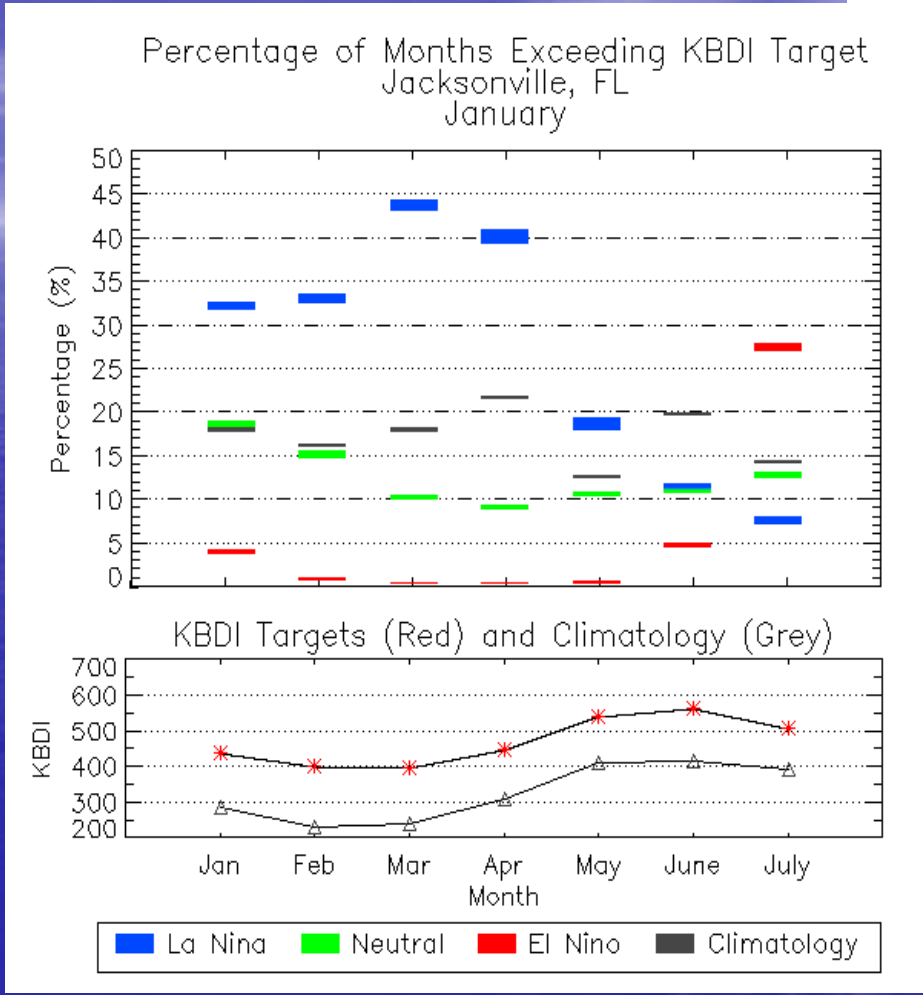
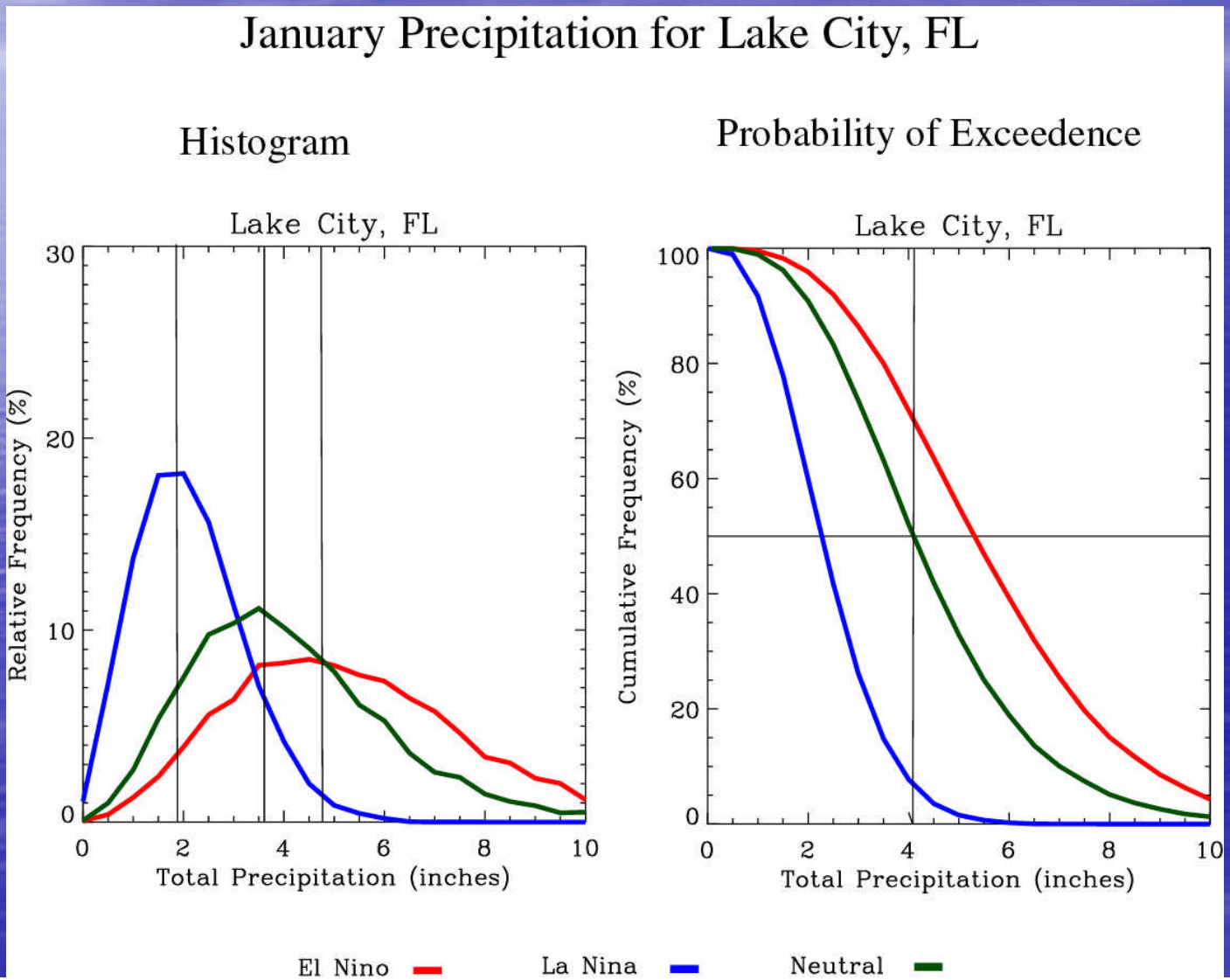


Figure 1: Jacksonville's composite forecast probabilities of KBDI exceeding target as given in plot below forecast. The thickness of the bars is the 95% confidence interval for a range of probabilities.

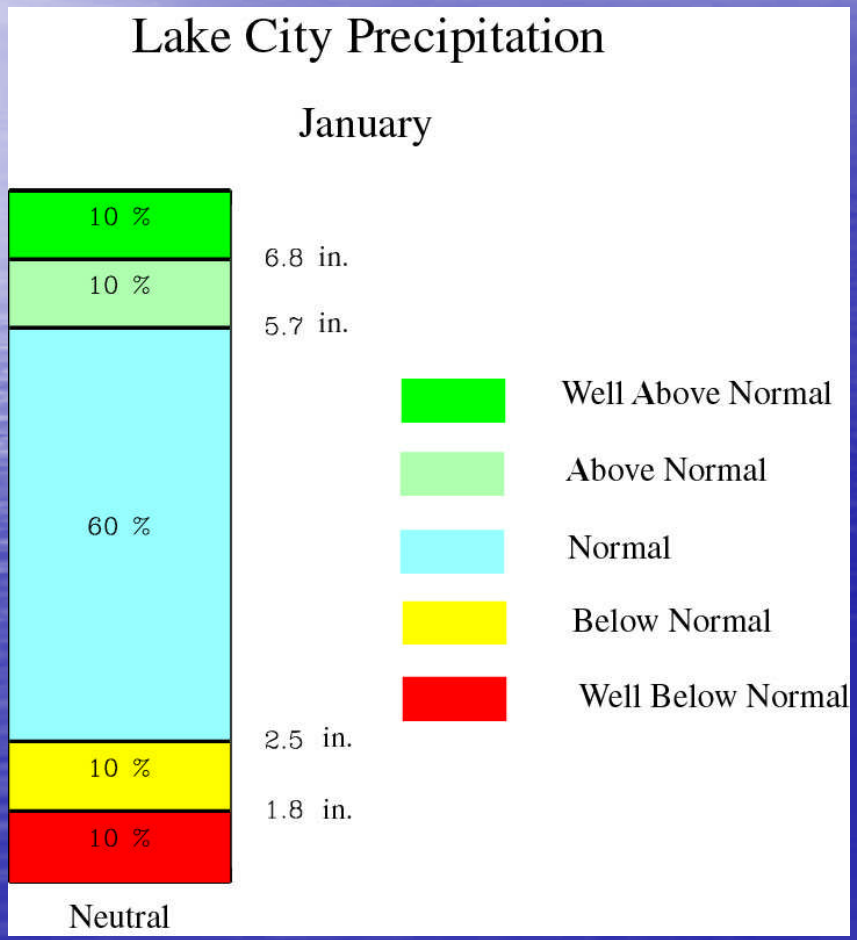
More uses for climate forecasts that just wildfire

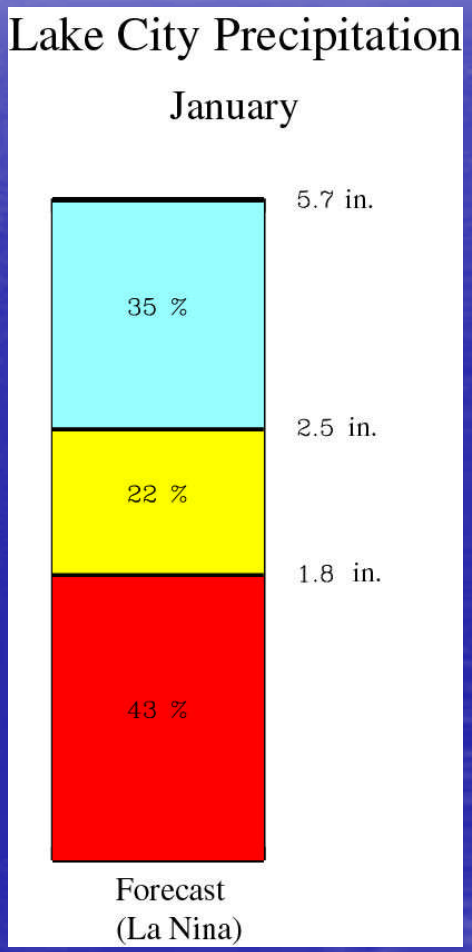
- Harvesting - cannot harvest in low areas during El Nino winters.
- Planting - Survival rate low during La Nina
- Managed Forests - Herbicides, pesticides, prescribed burns

Probabilistic Climate Forecasts



New Method of Forecasting





ENSO Agricultural Case Studies

1. Orange Solids Quality - Growers must replace rain during La Niña.
2. Strawberry Growers Switch Varieties - Too much sunshine during La Niña.
3. Potato Farmers Crown Fields - Provide increased drainage during wet El Niño winters.
4. Ranching/Cattle - Do not plant winter forage (rye, etc.) during La Niña

Summary

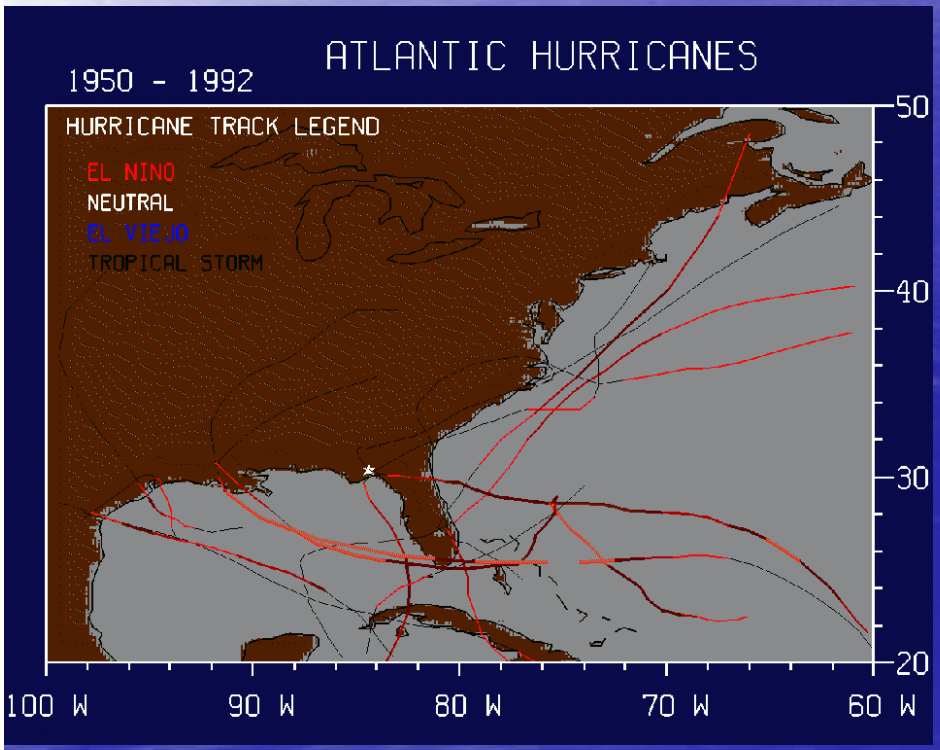
The delivery of climate services has to care about the client and provide useful information, including the explaination of the climate Variability.

Climate Services is the delivery of knowledge of past and future climate variability to users.

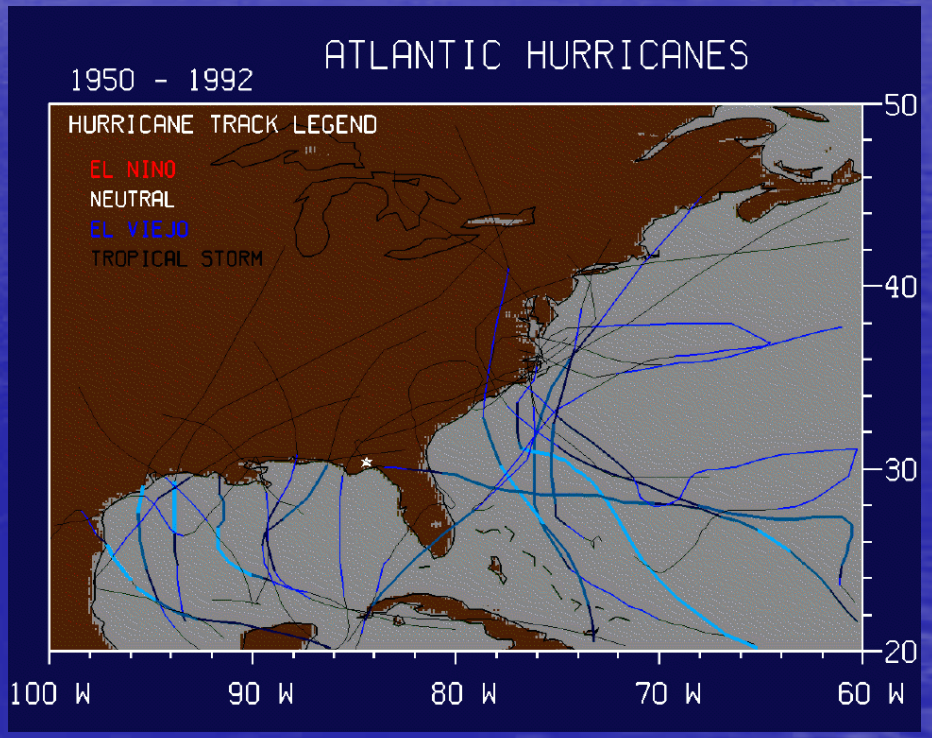
- Jim O'Brien 9 March 2004

El Niño/La Niña and Hurricanes

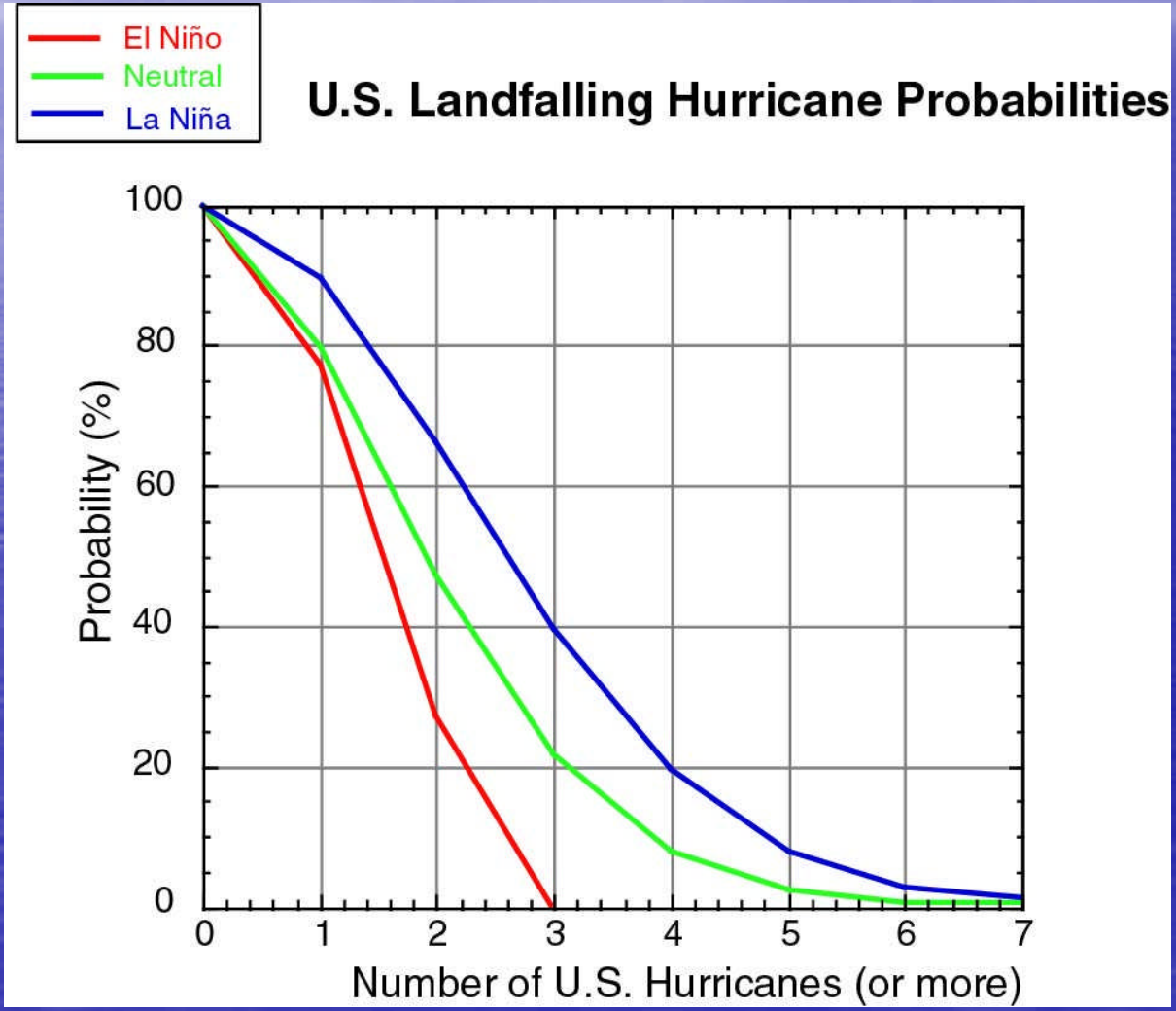
El Niño



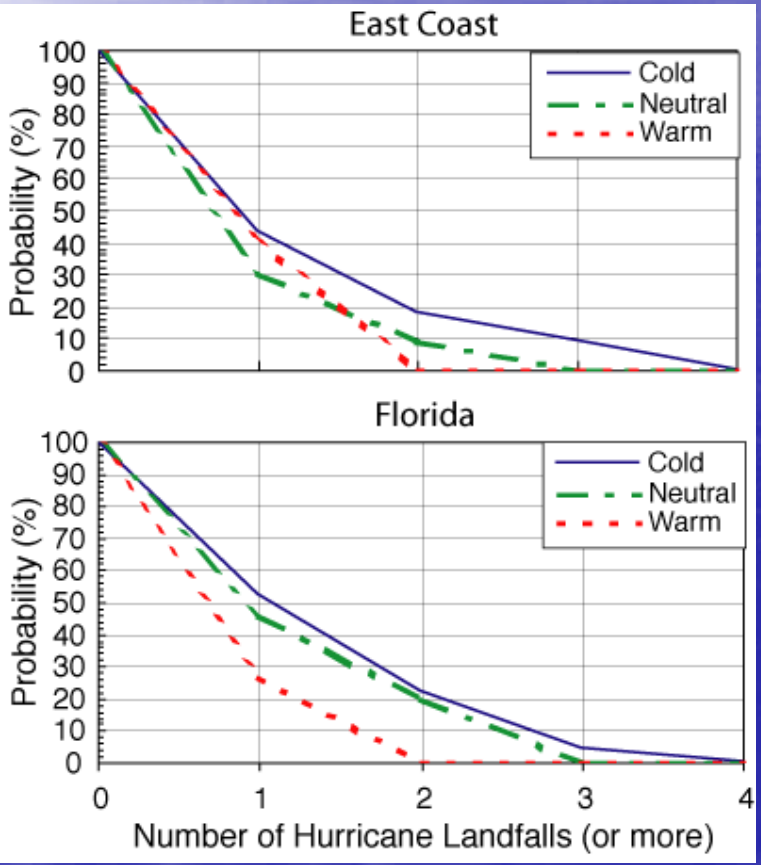
La Niña

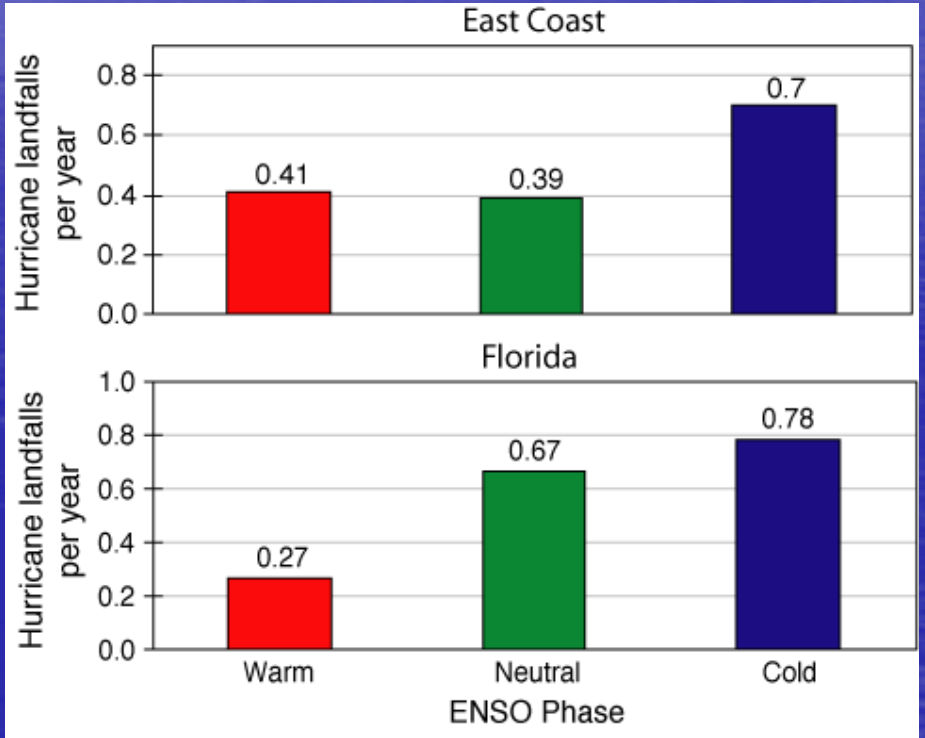


Probability of Hurricane Landfall: U.S. Coast



Probability of Hurricane Landfall: East Coast vs. Florida





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COAPS: www.coaps.fsu.edu

Florida Climate Center:
www.coaps.fsu.edu/climate_center

Florida Automated Weather Network:
fawn.ifas.ufl.edu

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