Climate Variability and Change in Florida

Tampa Bay Regional Planning Council

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"Facilitating the effective use of climate information and forecast in agriculture and natural resource management."

Florida State University
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The University of Georgia

UF UNIVERSITY of FLORIDA IFAS

Auburn University

UAHuntsville
The University of Alabama in Huntsville

UNIVERSITY OF Miami

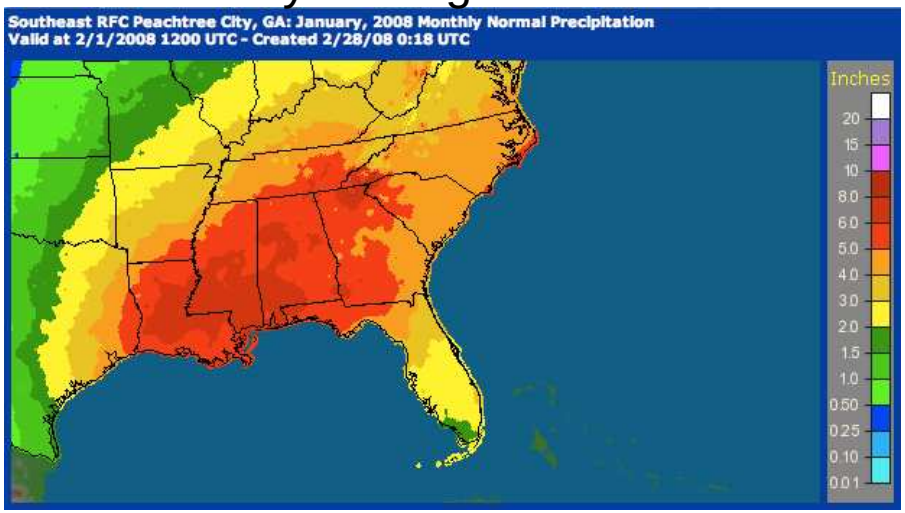
NC STATE UNIVERSITY

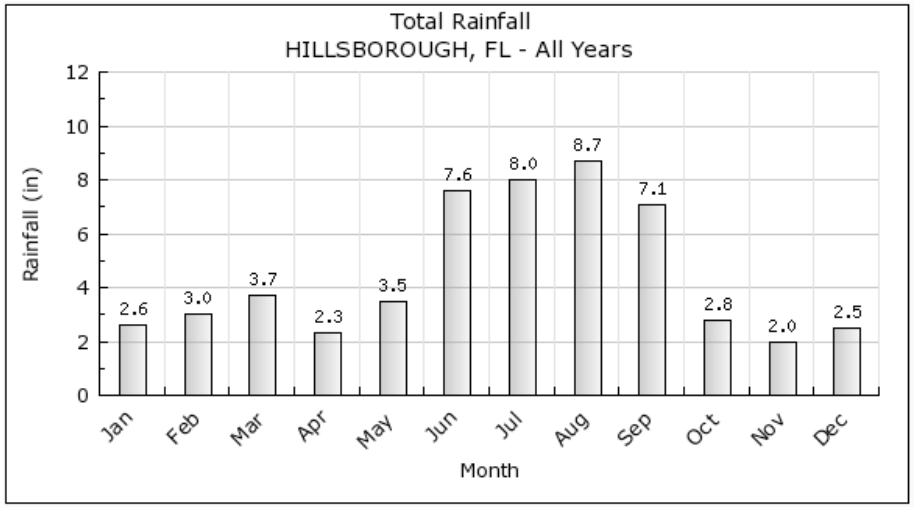
Climate Characteristics of the Southeast

- Much of the Southeast is classified as humid-subtropical, except extreme South Florida and the Keys. Other areas considered temperate.
- Subject to freezing temperatures in winter
- Hurricane-prone states
- Subject to severe weather
- Local and regional variations due to terrain, land cover, coastal influences, etc.

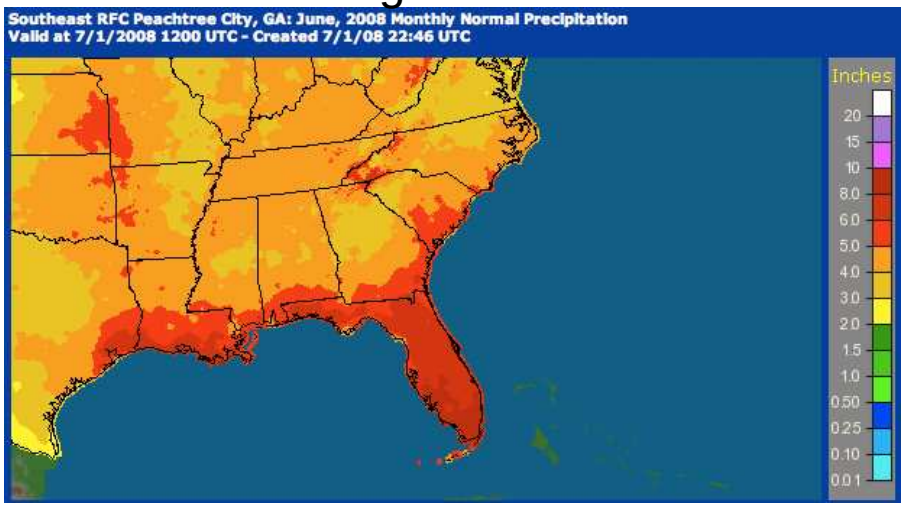
Seasonal Rainfall Patterns

January Average Rainfall



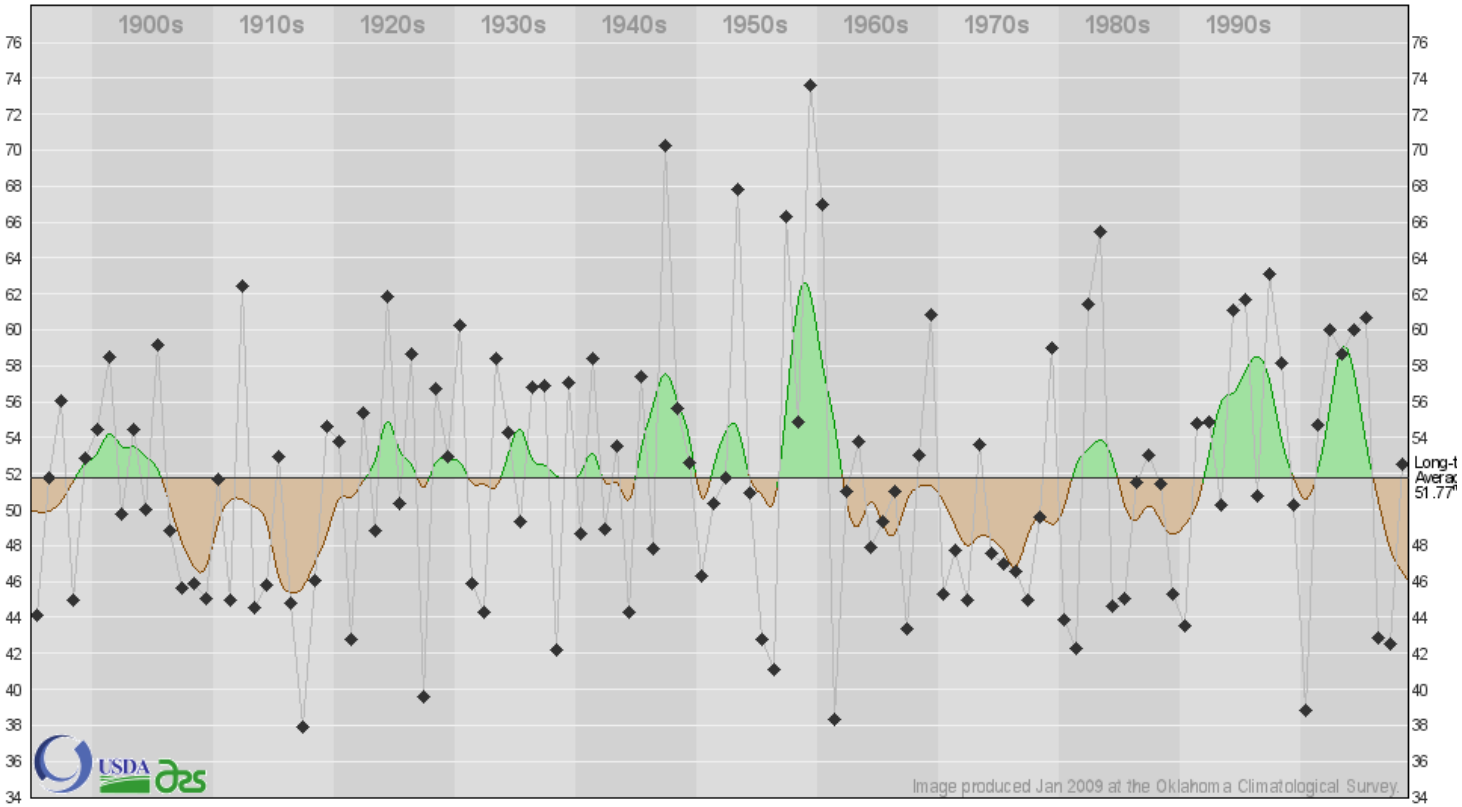


June Average Rainfall



Nearly 60% of annual rainfall in west-central Florida comes in the months of June through September.

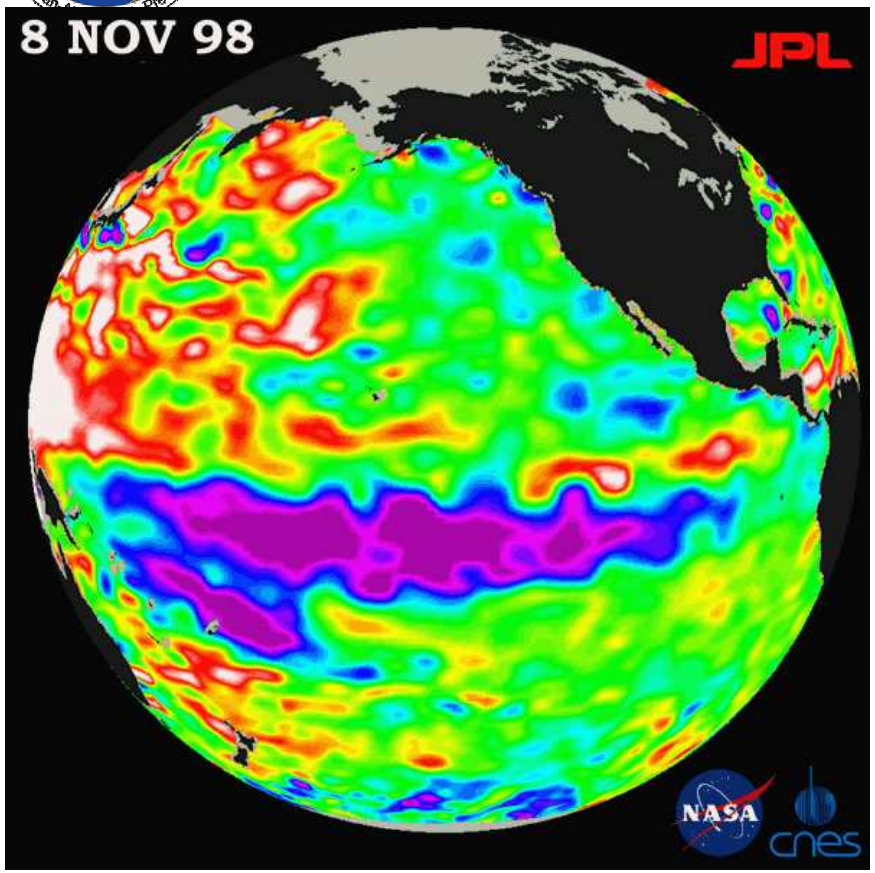
Central Florida Precipitation Trends



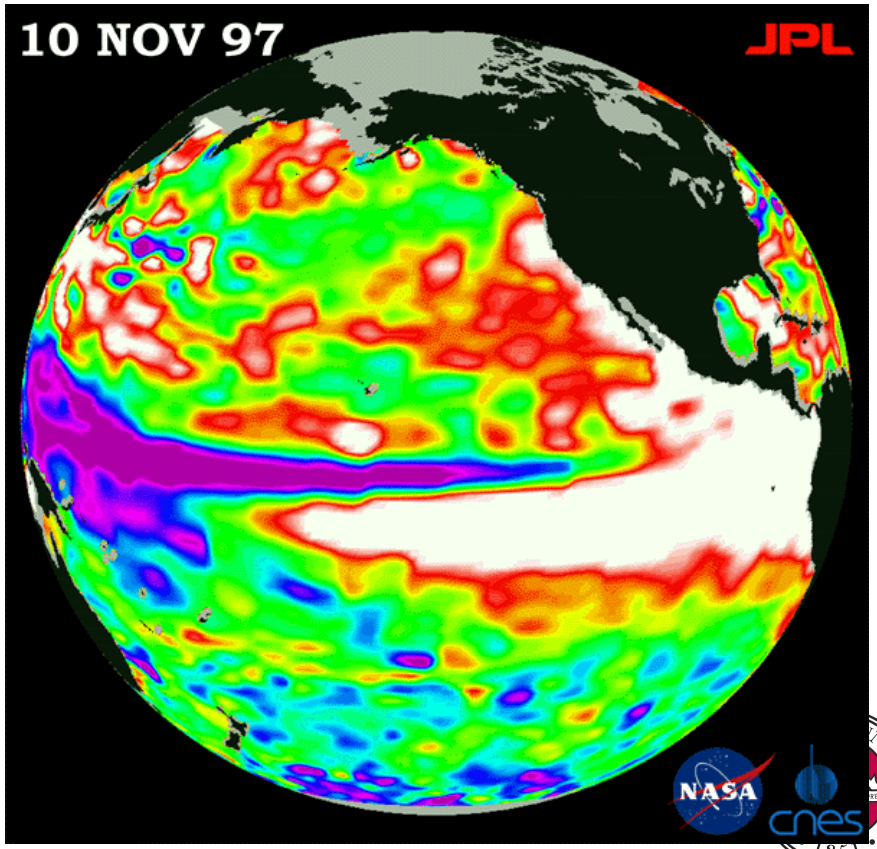
Annual Precipitation History with 5-year Tendencies
FL-CD4 (S. Central): 1895-2008

Wetter historical periods
Drier historical periods
Individual Annual precipitation value

The El Niño /La Niña Cycle

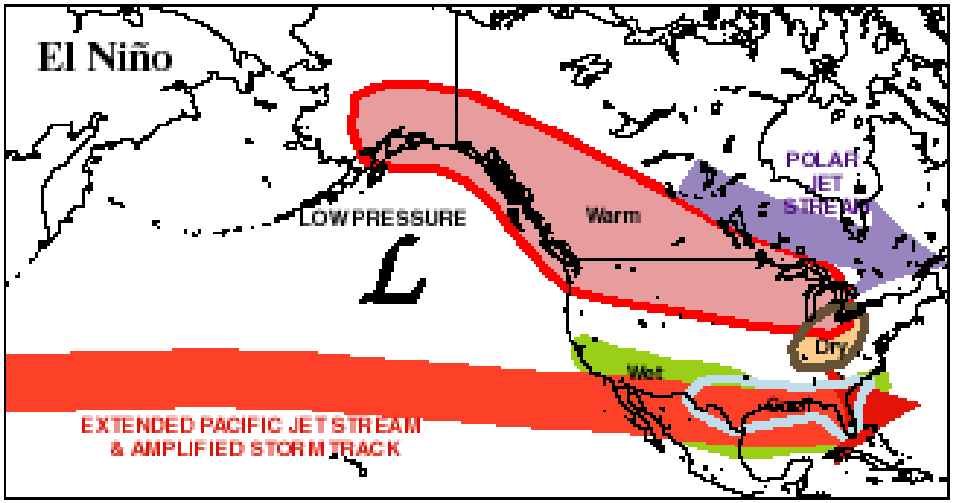


The El Niño /La Niña cycle is the predominant mode of year to year climate variability in the Southeast.

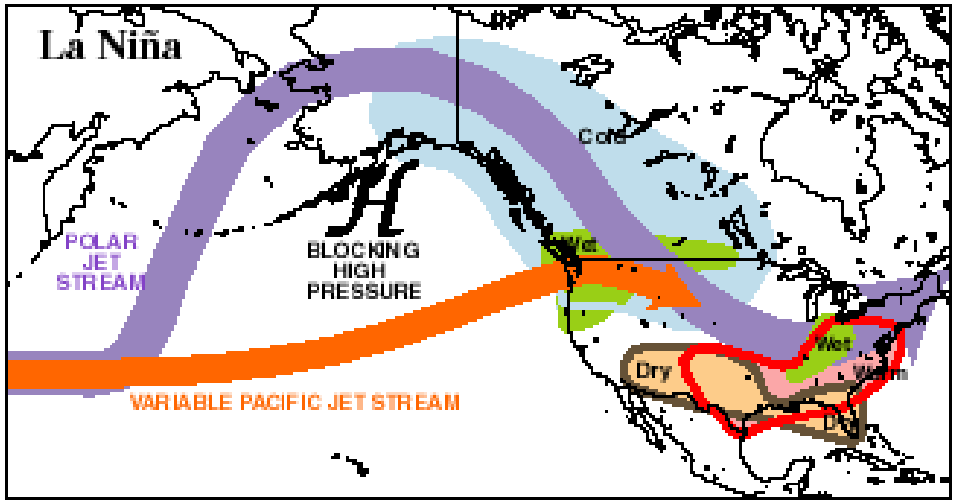


Winter Jet Stream Patterns

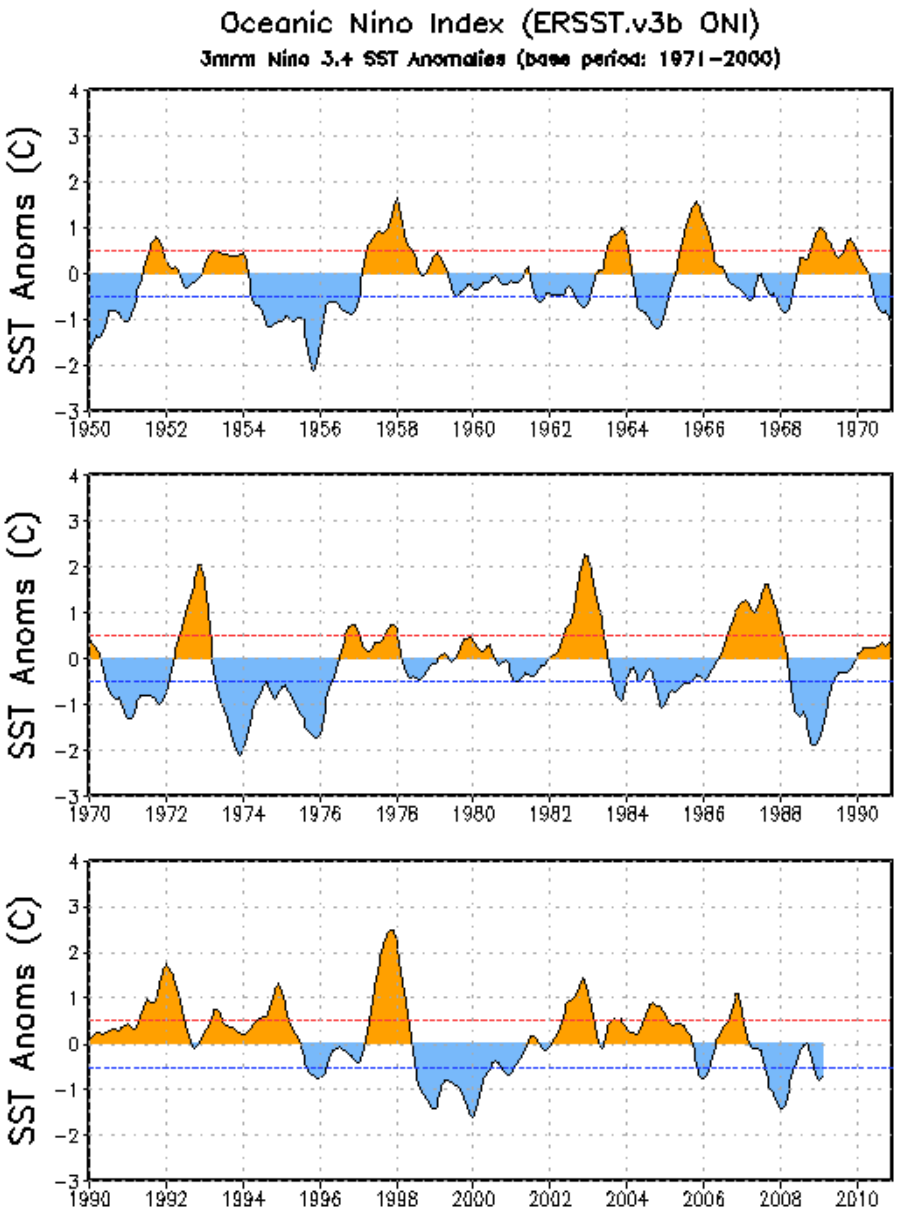
El Niño



La Niña

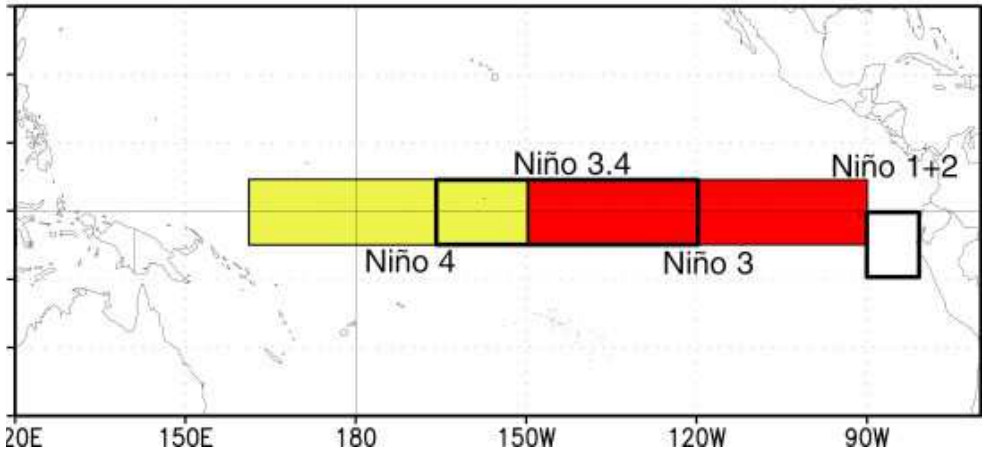


Tracking the El Niño /La Niña Cycle

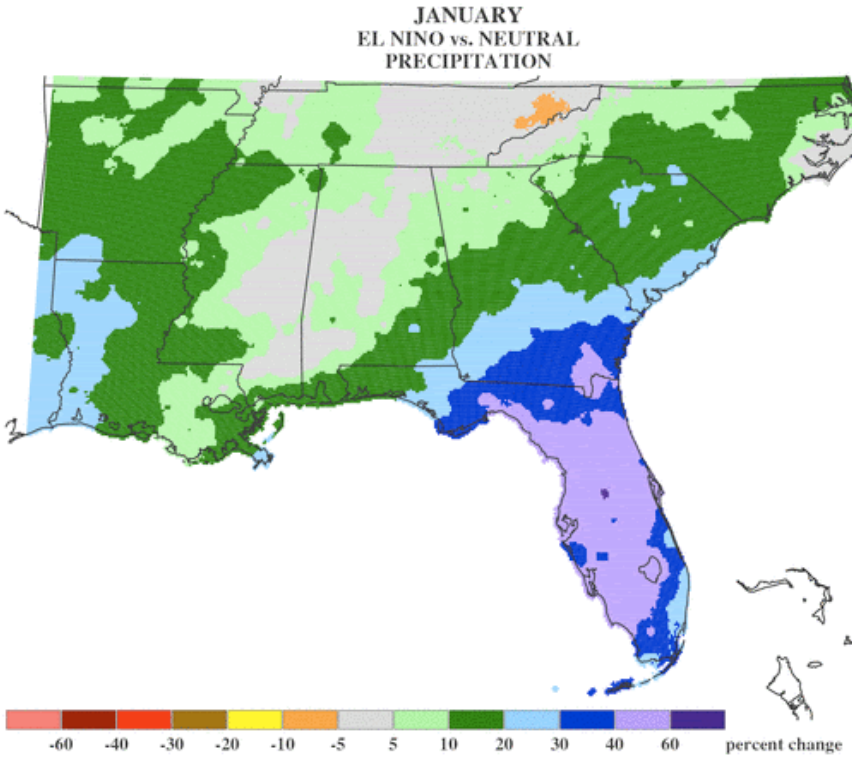


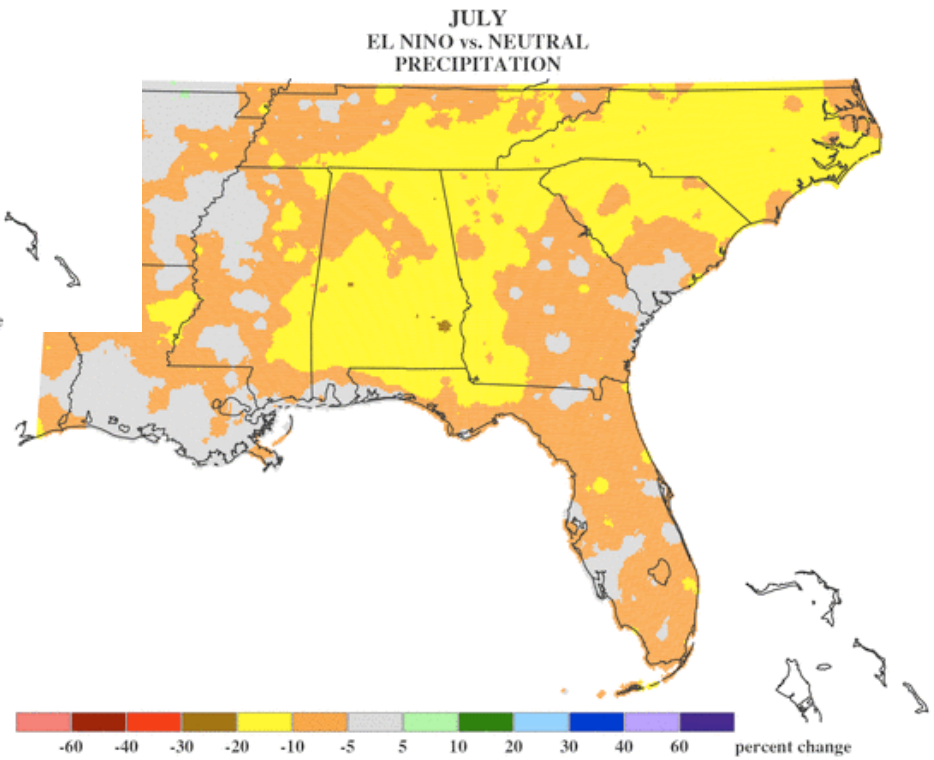
- Sea surface temperature anomalies averaged over the Nino 3.4 portion of the equatorial Pacific Ocean

- Smoothed with a three-month running average to reduce noise



El Niño Effects on Precipitation





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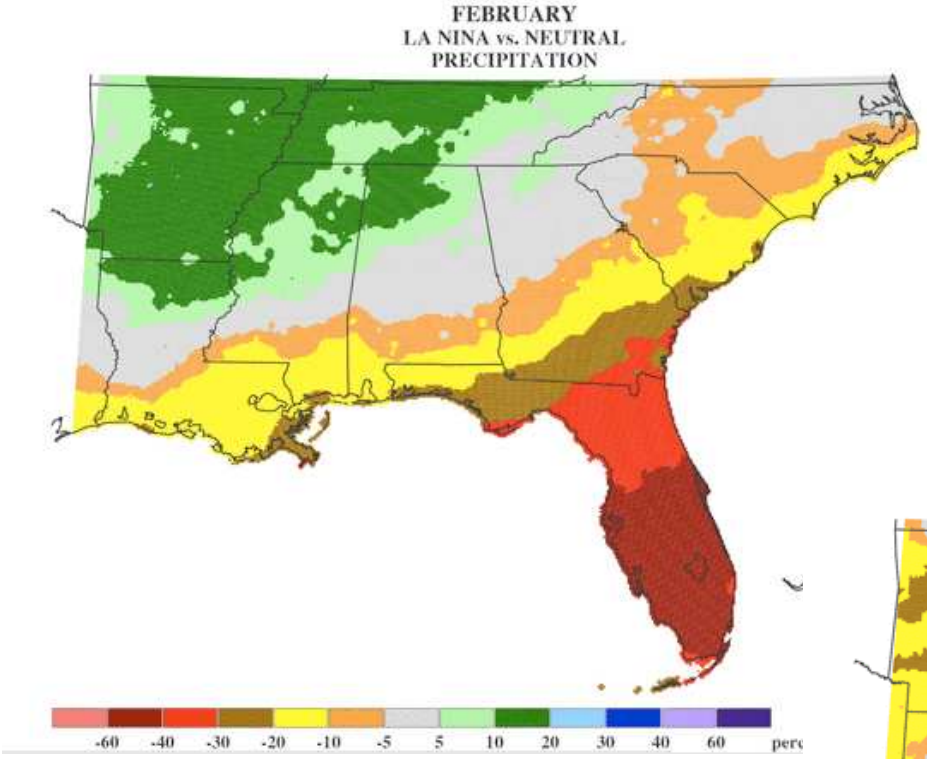
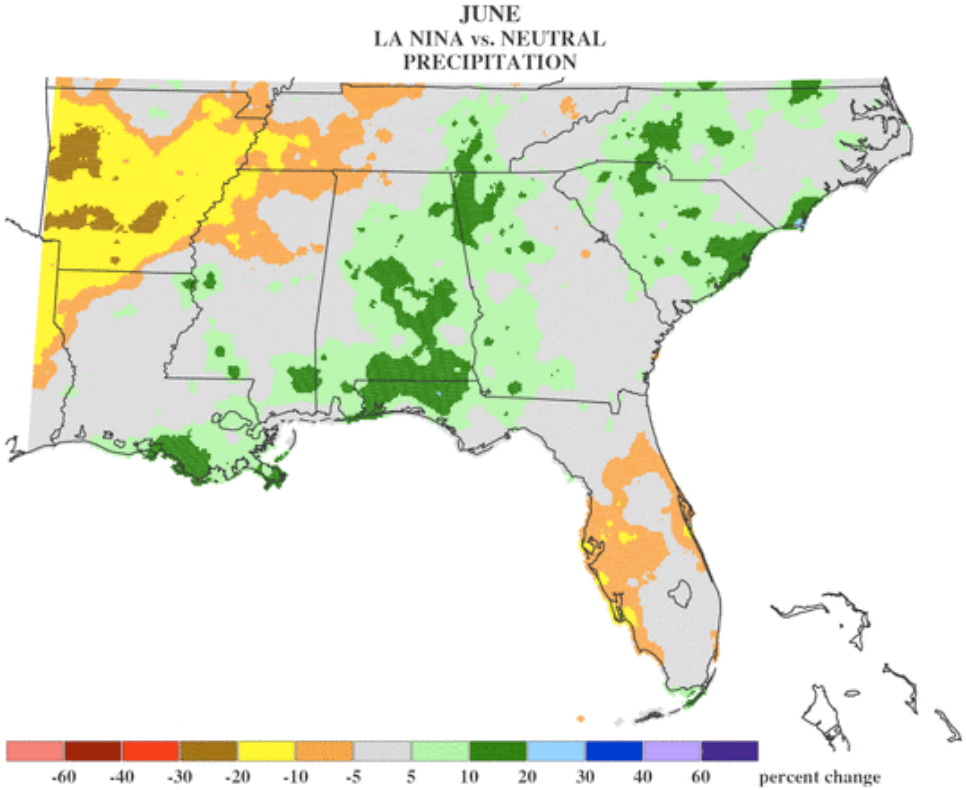
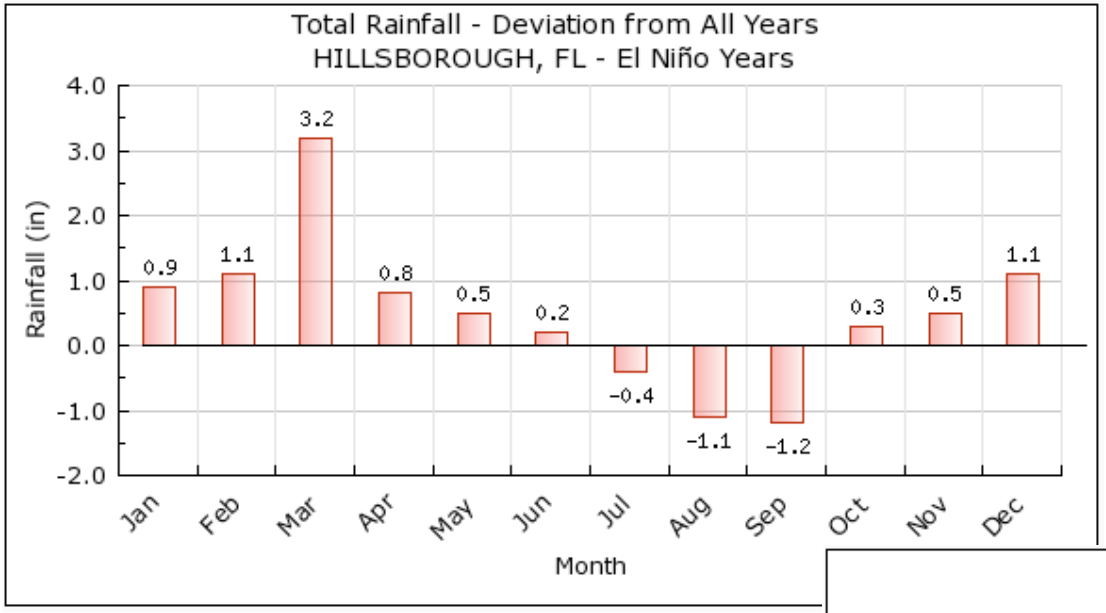


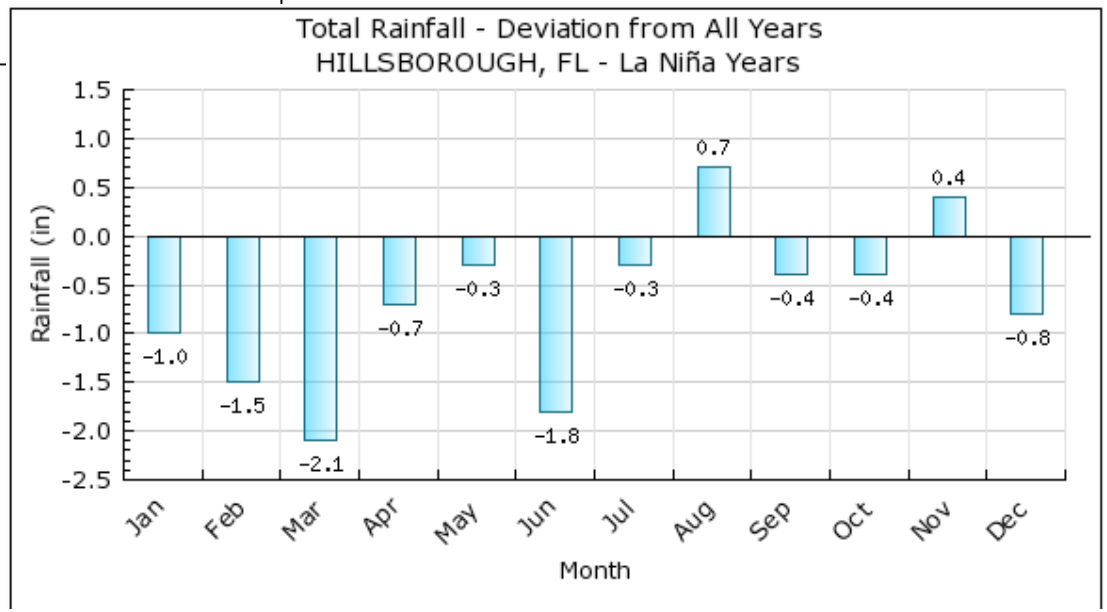


Local Impacts of El Niño /La Niña

El Niño

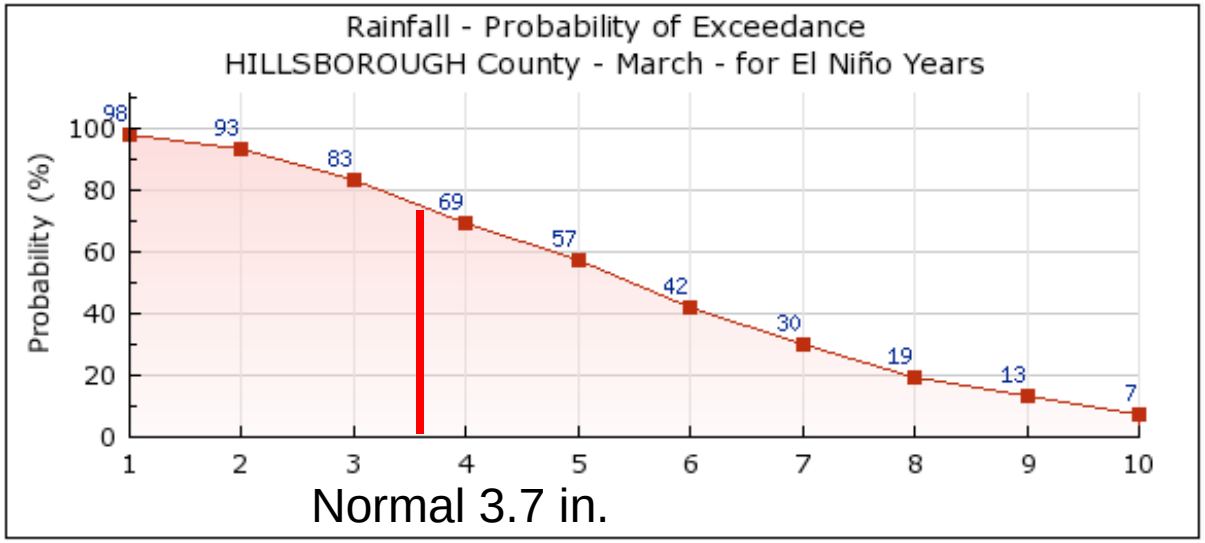


La Niña

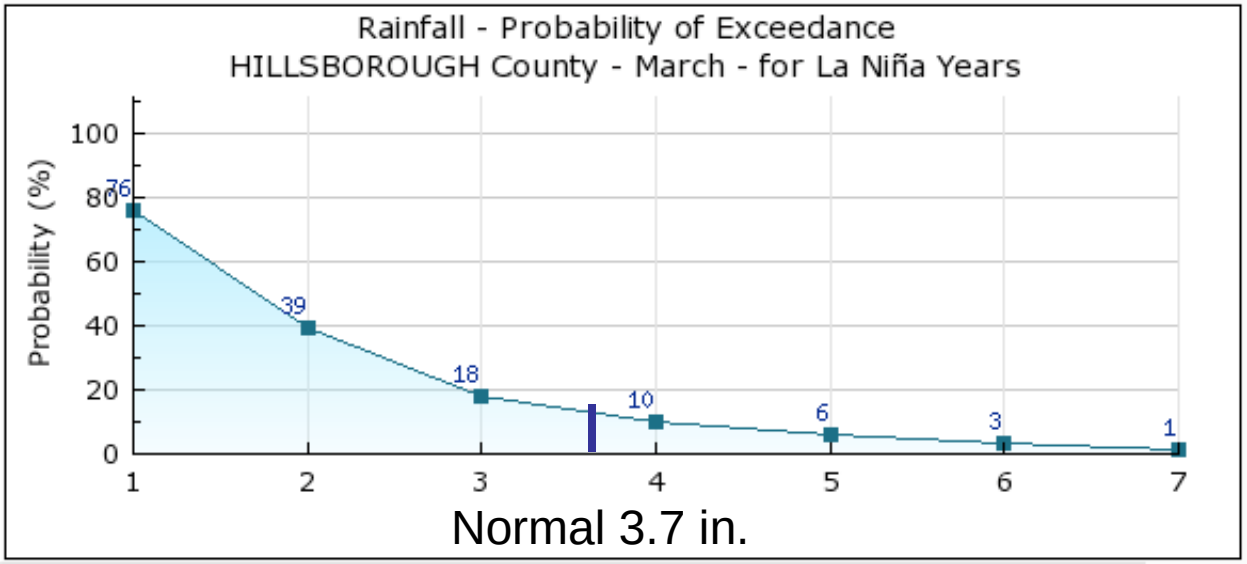


Probabilistic Nature of Forecasts

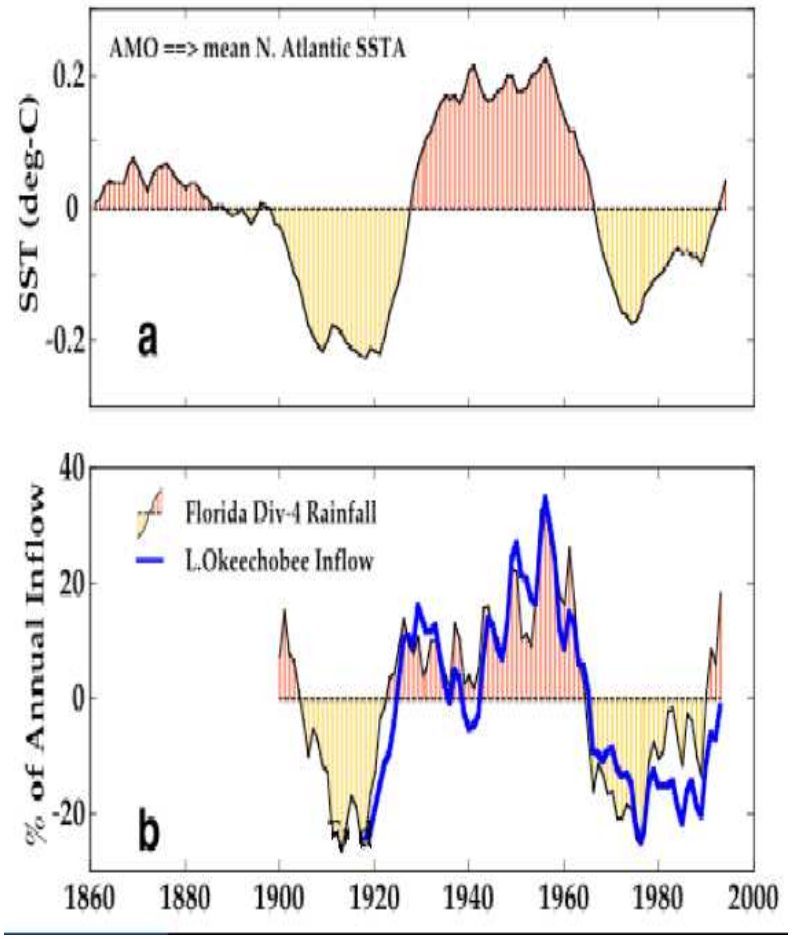
March - El Niño



March - La Niña



Atlantic Multidecadal Oscillation



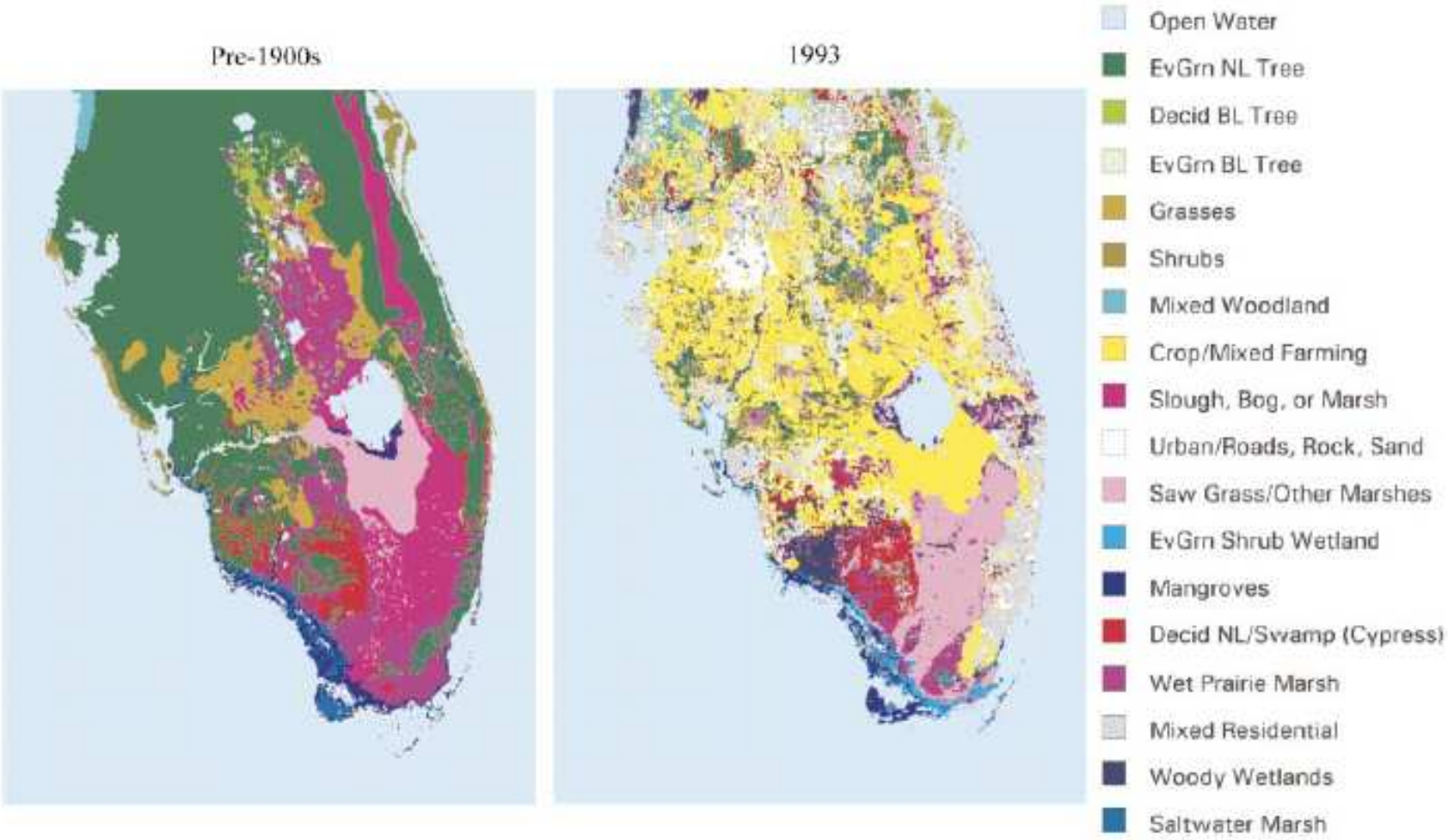
Enfield, et. al. 2001

The Atlantic multidecadal oscillation (AMO) describes variations in sea surface temperatures north of the equator.

It is tied to changes in the thermohaline circulation or conveyor belt.

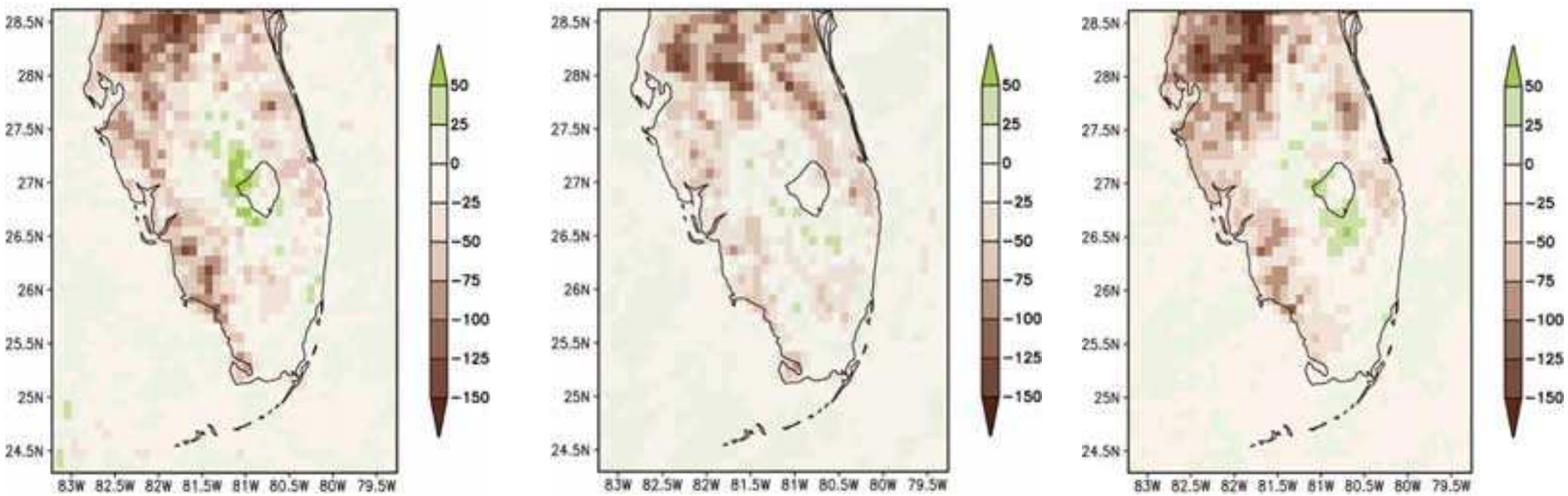
Land Use Change

Land cover maps of Florida from the pre-1900's and from 1993.



Impacts of Land Use Changes

Modeled differences in convective summer (July – Aug.) rainfall using pre-1900 and 1993 land cover.



1973 1989 1994

Marshall, Pielke, et. al. 2004

Preparing for the Future

- No discernable trend in rainfall (or temperature) over the last century in central Florida.
- Year-to-year variability in precipitation provides the biggest challenge for water resource managers.
- The El Niño/La Niña cycle gives us some seasonal predictability, especially in the dry season.
- Land use changes may be an important factor in local precipitation changes.
- Adequately preparing for known variations is the first step towards adapting to other climate changes.