

## Climate Update Highlights July 15<sup>th</sup> 2008

➤ La Niña has nearly transitioned to a neutral condition. The cold phase of the PDO is firmly in place. The PDO cold phase favors La Nina type conditions over El Nino conditions on inter-annual scales and has a direct association with south central Florida dry season rainfall (i.e. rainfall is positively correlated with PDO index). ENSO neutral conditions are generally not much better than La Nina conditions when considering the probability of a hurricane strike to Florida. While La Nina phase has a greater number of hurricanes overall when compared to neutral or El Nino conditions, the path of hurricanes that form under neutral conditions have a greater likelihood of striking Florida than those that form during la Nina conditions. See the paper at the following link below for further details:

[ [http://www.coaps.fsu.edu/papers/regional\\_effects\\_hurricane\\_landfalls/#ABSTRACT](http://www.coaps.fsu.edu/papers/regional_effects_hurricane_landfalls/#ABSTRACT) ]

➤ The tropical Atlantic sea surface temperatures remain in the normal range within the tropical Atlantic Main Development Region (MDR). This should lower the potential for major hurricanes during this tropical season.

➤ The sea surface temperature gradient from the tropical south Atlantic towards the tropical north Atlantic Ocean continues to persist. When such a condition exists the tropical north Atlantic tends to have more wind shear which is also an unfavorable condition for tropical storm development (2007 Kossin, J. P. and D. J. Vimont; [http://www.aos.wisc.edu/~dvimont/Papers/Vimont\\_Kossin\\_2007.pdf](http://www.aos.wisc.edu/~dvimont/Papers/Vimont_Kossin_2007.pdf) )

(Continue from previous Slide)

The North Atlantic Oscillation (NAO) index has been trending downward and is currently negative. A weaker NAO is associated with a greater chance of hurricane landfalls along the Gulf Coast of the U.S. and Florida [Elsner and Bossak, 2004]. The NAO has specific effects upon the Bermuda High pressure system in the Atlantic Ocean. A negative (weak) NAO allows for a more westward centered Bermuda High, which acts to steer North Atlantic hurricanes toward the southern United States.

➤ Summary of current global ocean climate conditions can be found at the following link: [http://ioc3.unesco.org/oopc/state\\_of\\_the\\_ocean/all/](http://ioc3.unesco.org/oopc/state_of_the_ocean/all/)

➤ The CPC official climate outlook indicates an increased chance for above normal rainfall for the July-September and the August-October climate windows.

➤ The 2008 tropical season outlooks including the official National Hurricane Center outlook predict an increased probability of an above normal number of tropical storms during the upcoming hurricane season. This should not be surprising since 10 out of 13 years beginning in 1995 (the year the AMO returned to its warm phase) have had an above normal number of tropical storms. Most of these outlooks are based on La Nina conditions being in place during the peak of the hurricane season. This does not appear likely to be the case at this time. The possibility of weak El Nino condition developing before the peak of the hurricane season still exists.

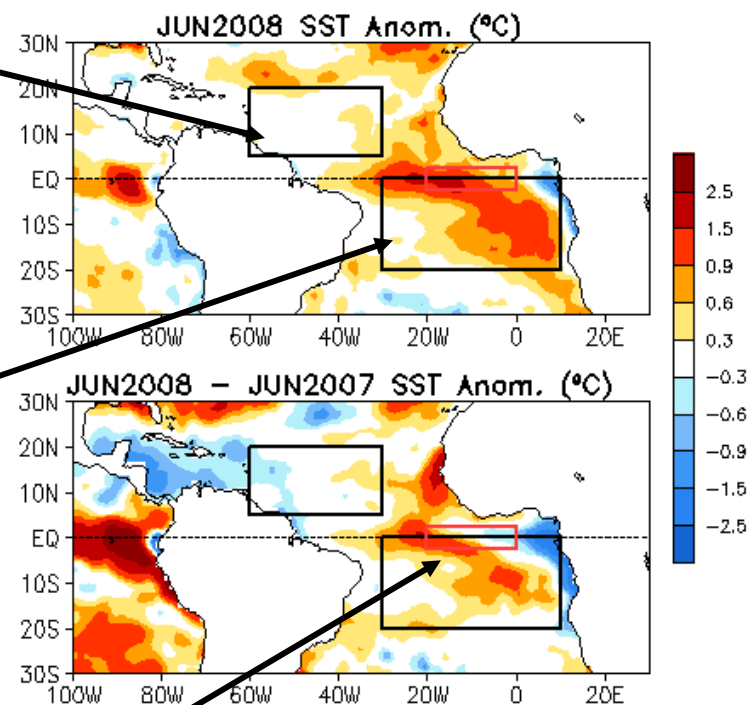
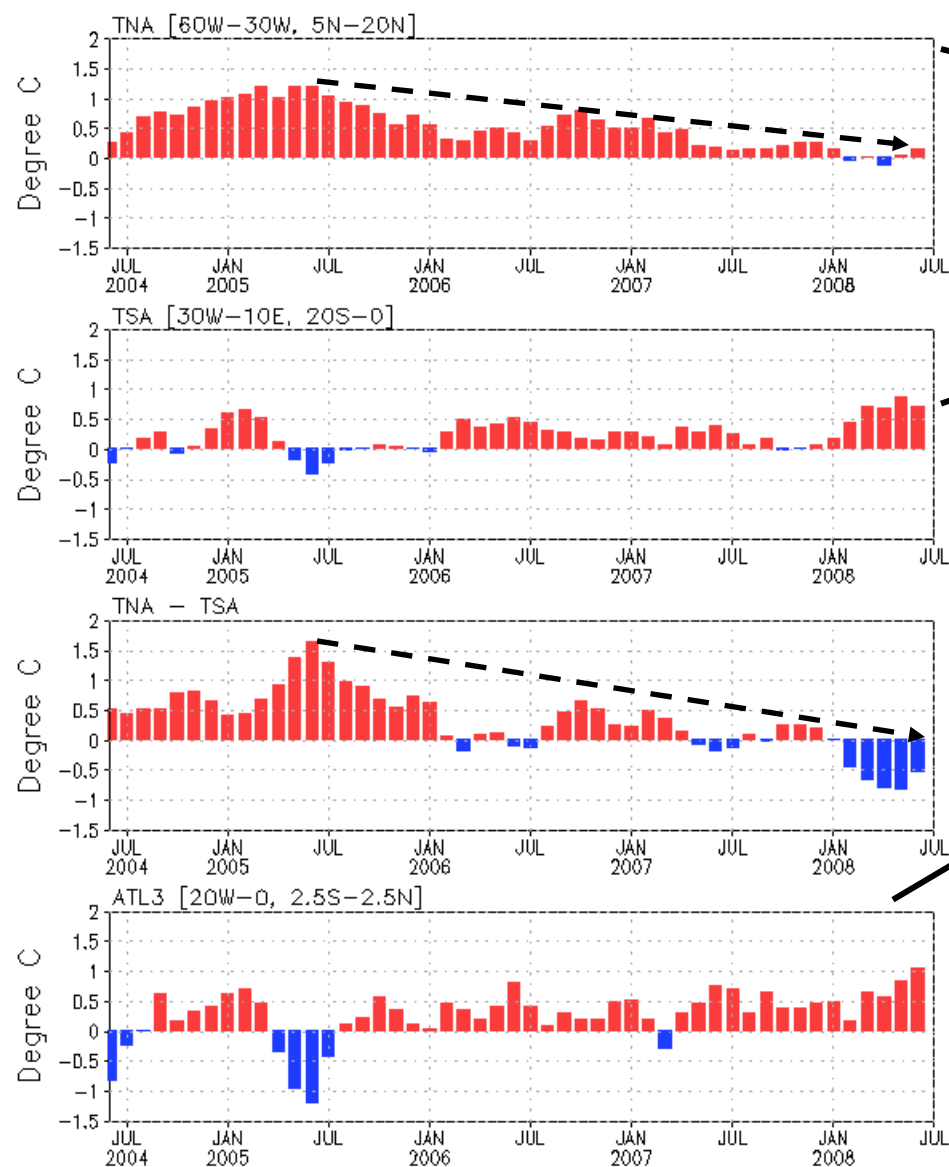
➤ July 1st Position Analysis indicates that unless rainfall continues to be above normal during the upcoming wet season that the Lake Okeechobee water level is likely to remain in the Water Shortage Management Zone during the 2008 wet season.

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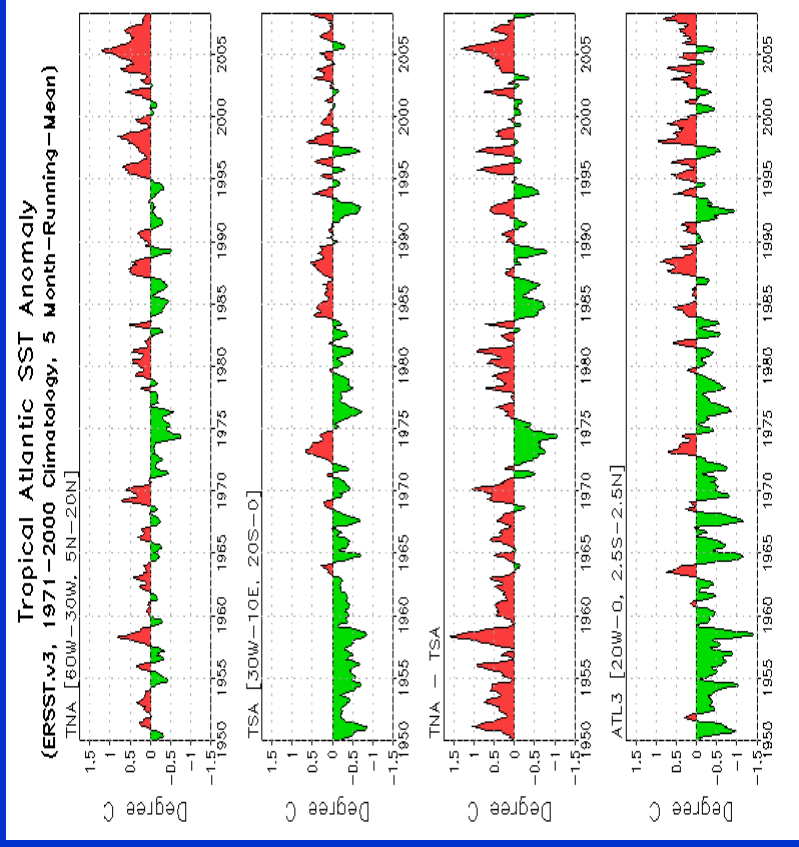
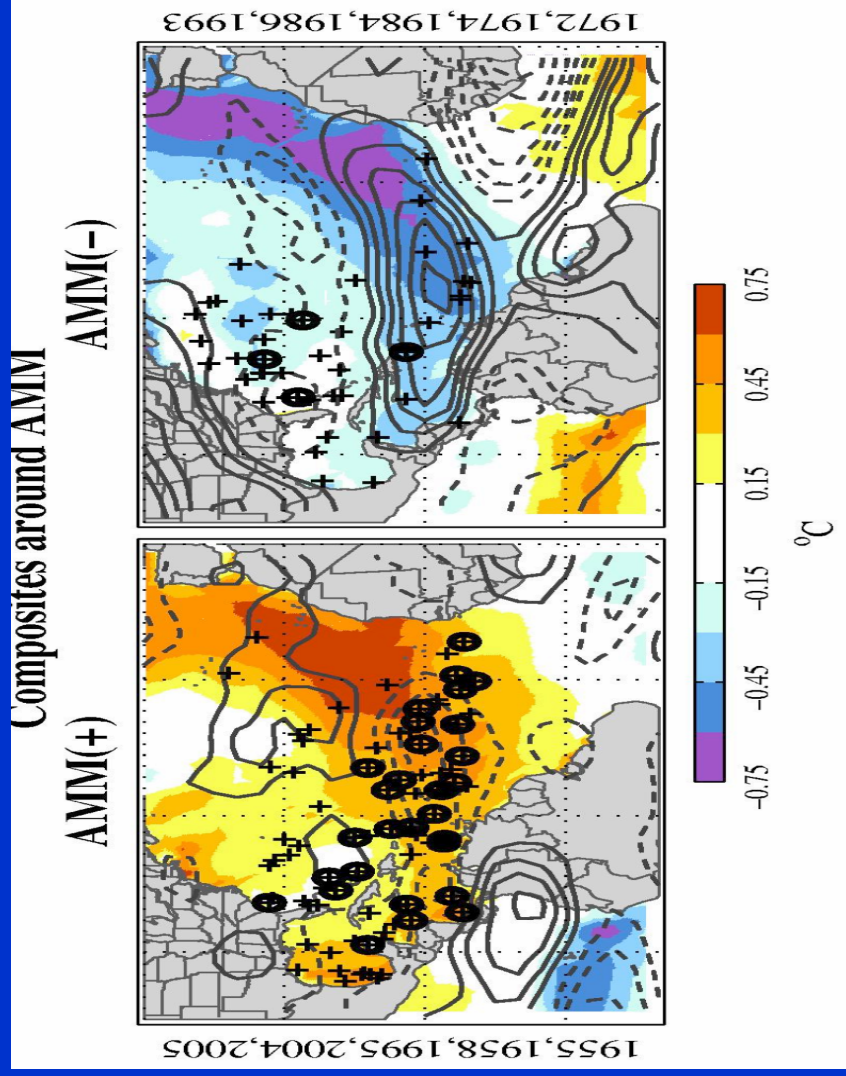
# Evolution of Tropical Atlantic SST Indices

Monthly Tropical Atlantic SST Anomaly

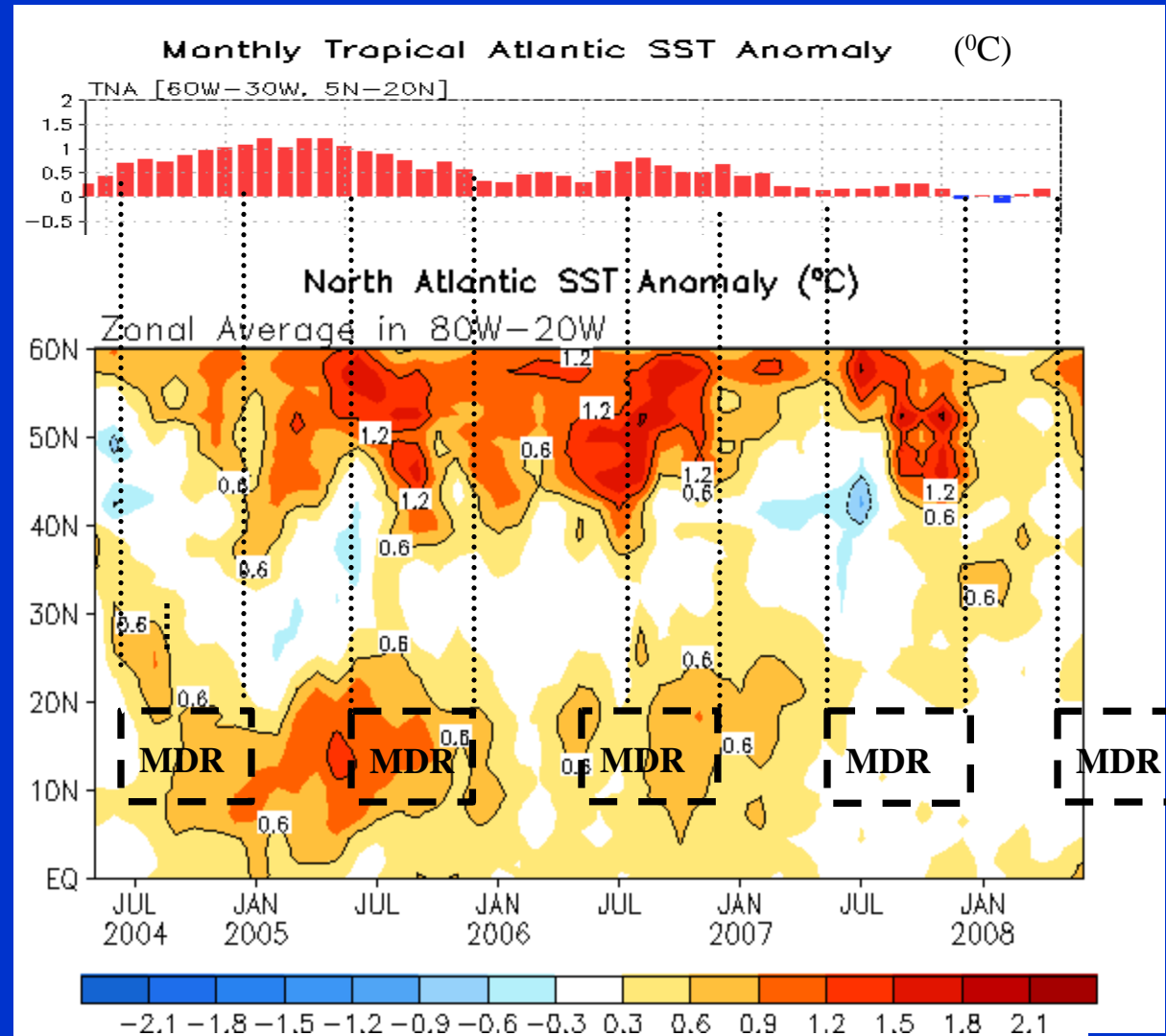


- TNA has been trending downward from about +1°C above-normal in summer 2005 to slightly below-normal in April, and then increased slightly over the past 2 months
- TSA has been above-normal since February
- Meridional SST Gradient Mode (TNA-TSA) remains negative, although the anomalies decreased in magnitude..
- ATL3 increased steadily over the past 3 months, and reached 1.1°C in June

# Atlantic Meridional Mode (AMM)



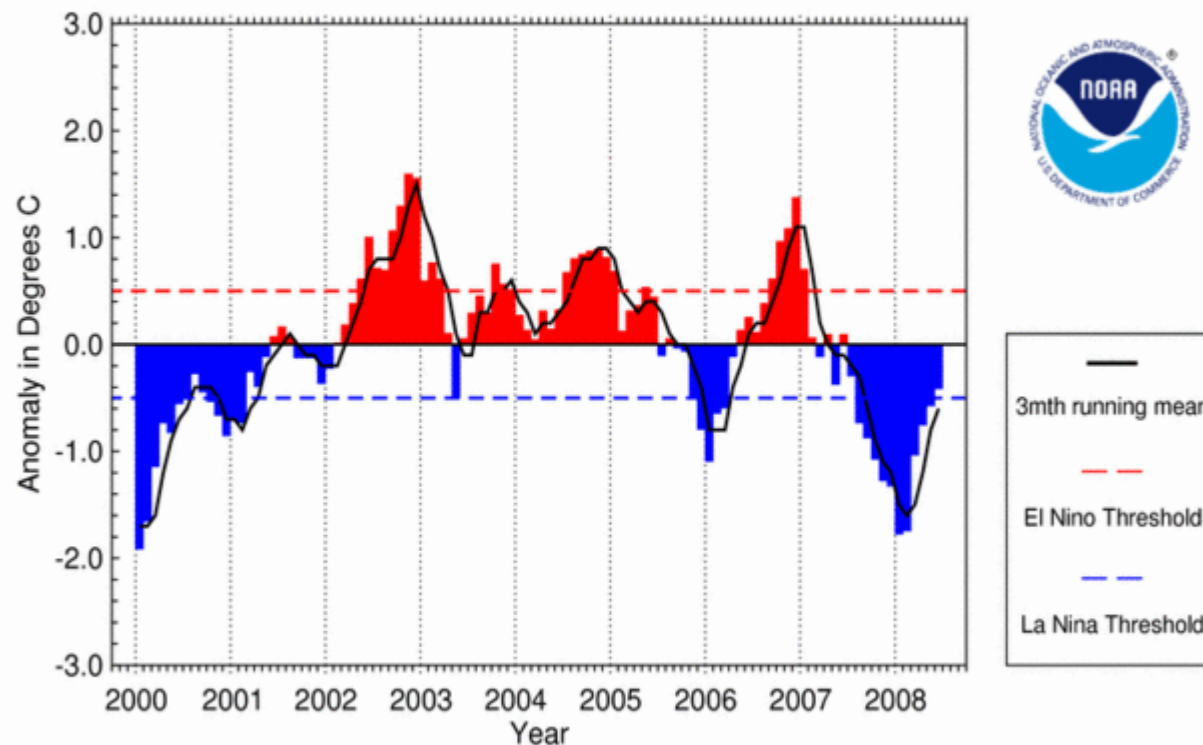
## Sea Surface Temperatures Anomalies in the Tropical Storm Main Development Region (MDR)





# El Nino-Southern Oscillation Index

SST Anomaly in Nino 3.4 Region (5N-5S,120-170W)



National Climatic Data Center / NESDIS / NOAA

2007-2008 La Nina compared with other ENSO events during the past few years

<http://www.ncdc.noaa.gov/img/climate/research/teleconnect/el-n-5-pg.gif>

# Recent Evolution of Equatorial Pacific SST Departures (° C)

## Climate Prediction Center

### El Nino-Southern Oscillation Weekly Update

Nino 3.4 continue to trend towards neutral

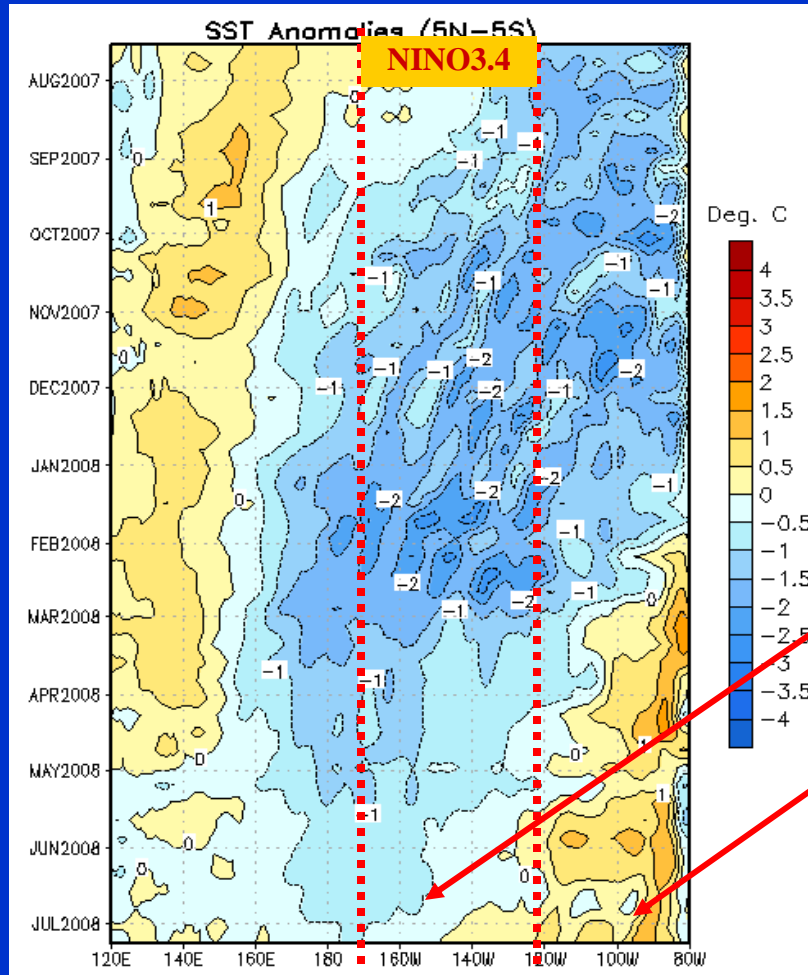
August  
2007

November  
2007

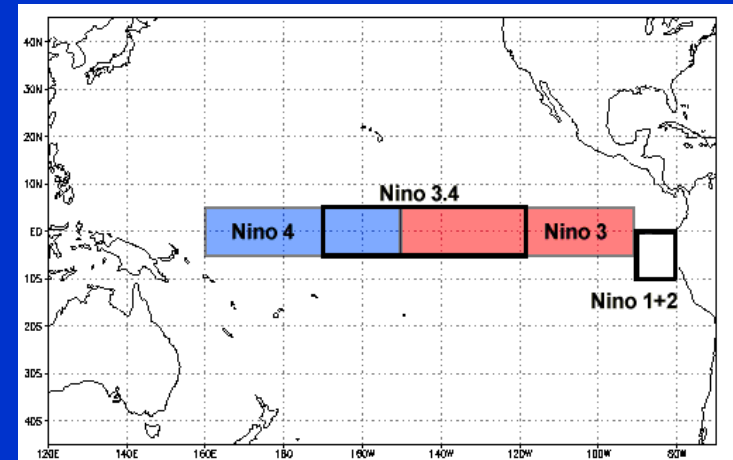
Time



June  
2008



Longitude



Since February 2008, negative sea surface temperature anomalies have weakened over the central and east-central equatorial Pacific Ocean.

Positive anomalies continue to shift westward in the eastern equatorial Pacific Ocean.



# Niño Region SST Departures (° C) Recent Evolution

## Climate Prediction Center

### El Nino-Southern Oscillation Weekly Update

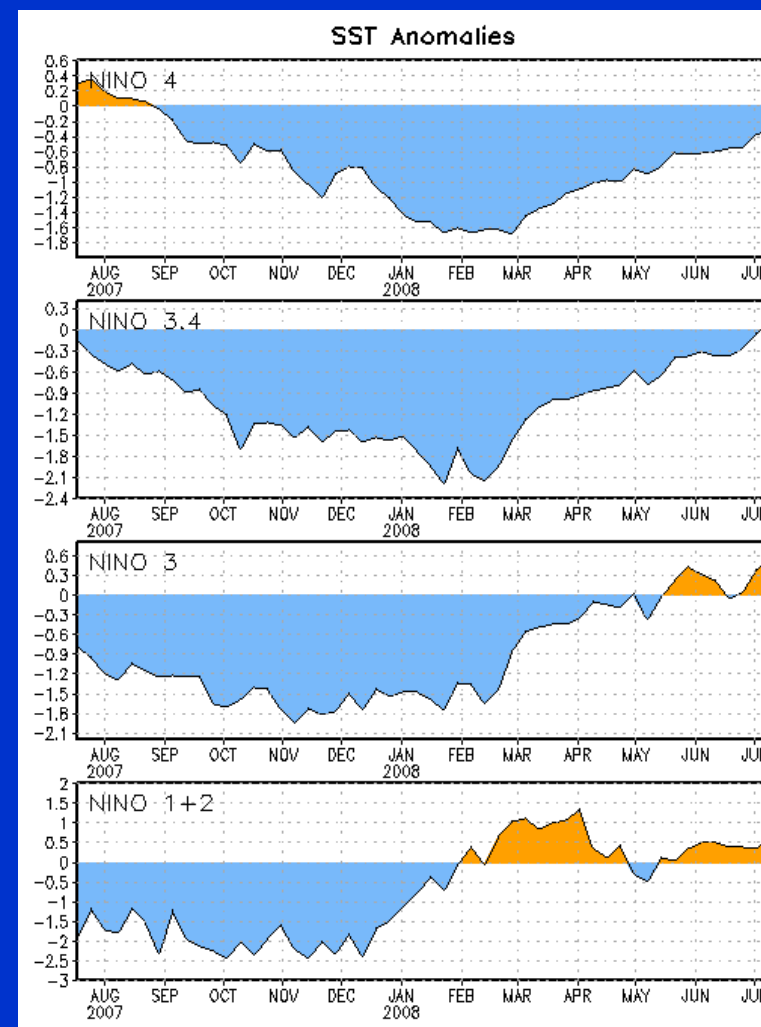
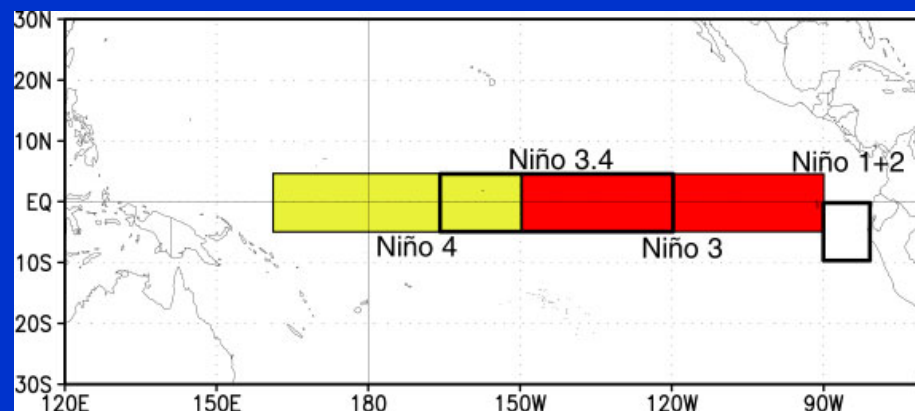
The latest weekly SST departures are:

Niño 4 -0.3°C

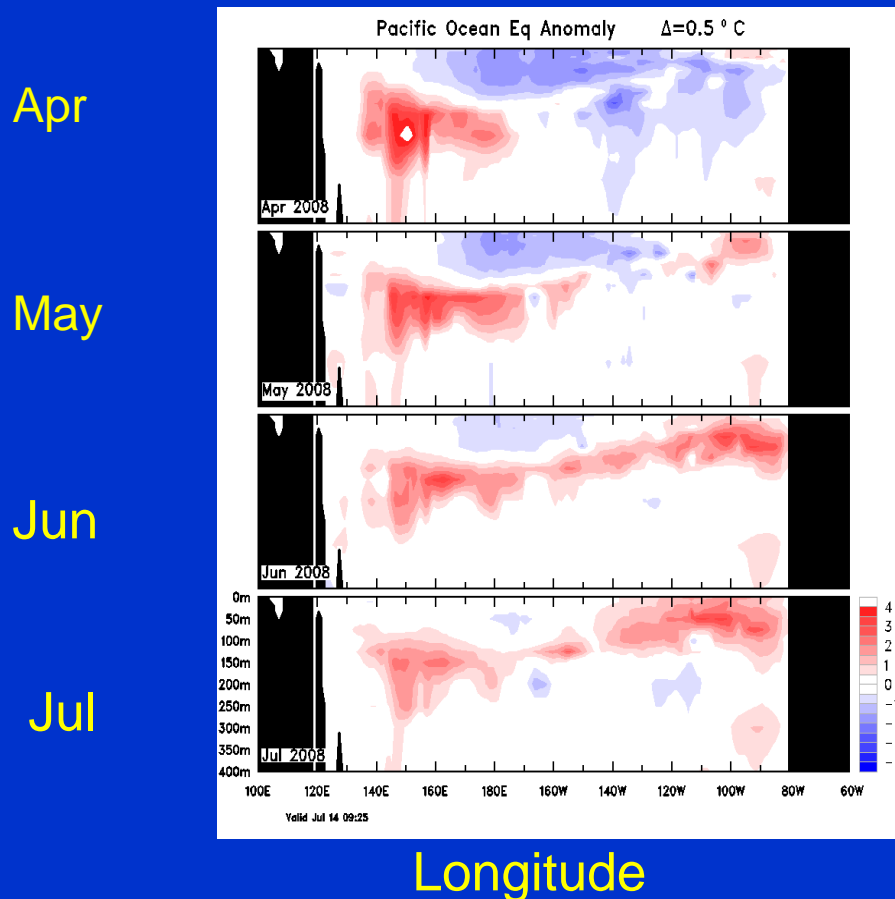
Niño 3.4 0.1°C

Niño 3 0.5°C

Niño 1+2 0.6°C



# Sub-Surface Temperature Departures (°C) in the Equatorial Pacific Ocean (July 1st, 2008) Bureau of Meteorology Research Centre



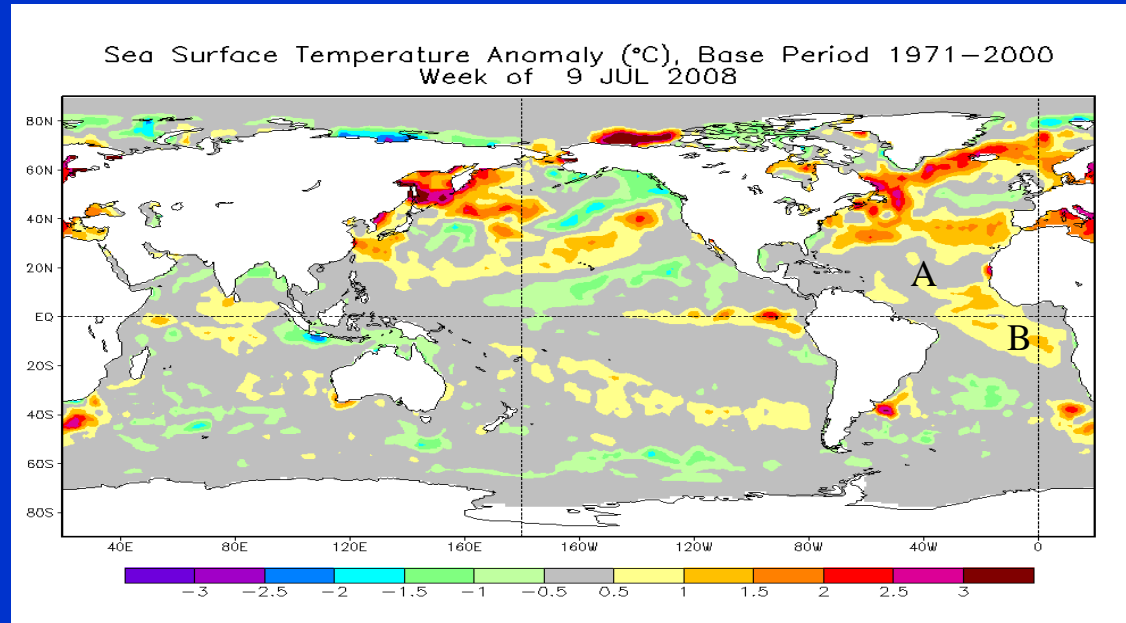
- During April through July 2008, the negative sub-surface equatorial temperature anomalies dissipated, while positive anomalies shifted westward at depths.

- July shows only small areas of negative temperature anomalies. In the central Pacific at greater than 100 m depth positive anomalies exist.

At this time it appears most likely that neutral conditions will develop during the next few months with these conditions persisting into next dry season. However, El Nino or La Nina conditions can be ruled out for the next dry season.

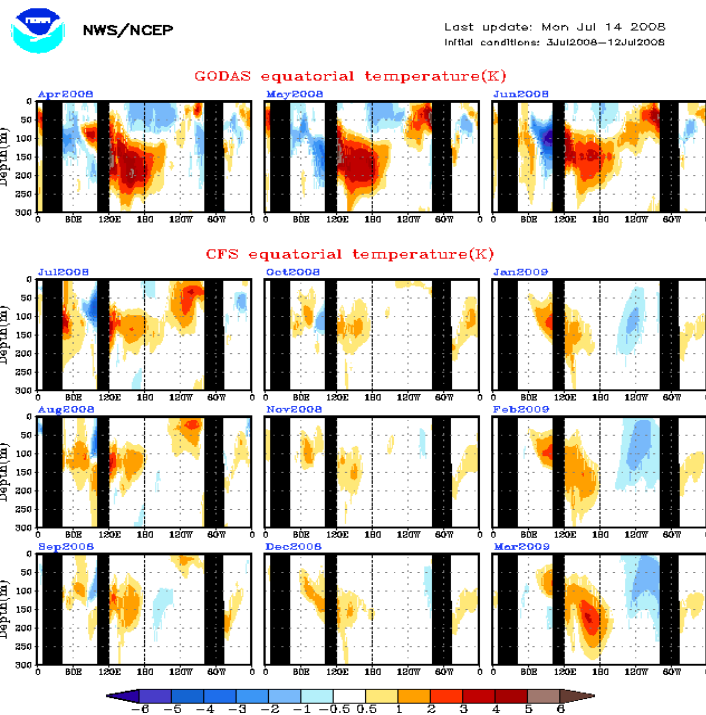
# Latest Weekly Sea Surface Temperature Anomaly

## National Climate Data Center

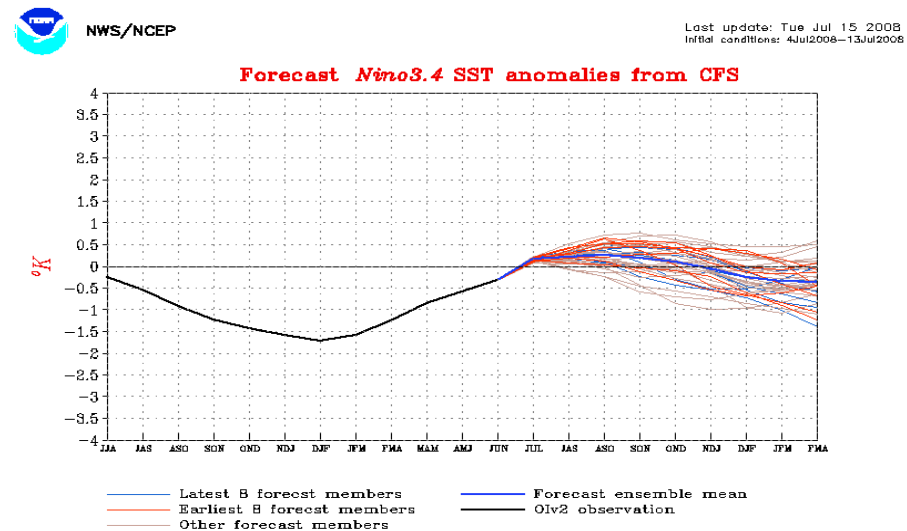


- A. Most of the Caribbean and western Atlantic main hurricane development region has SSTA in the normal range.
- B. The Meridional Mode (A-B) in the tropical Atlantic is currently negative. This Index is calculated by subtracting the south tropical Atlantic sea surface temperatures from the north tropical Atlantic sea surface temperatures. In the negative phase there tends to be stronger shear while in the positive phase conditions are more favorable for hurricane development,

# Equatorial Pacific SST and Subsurface Temperature Anomaly Forecast NCEP Climate Forecast System Issued July 15<sup>th</sup> 2008



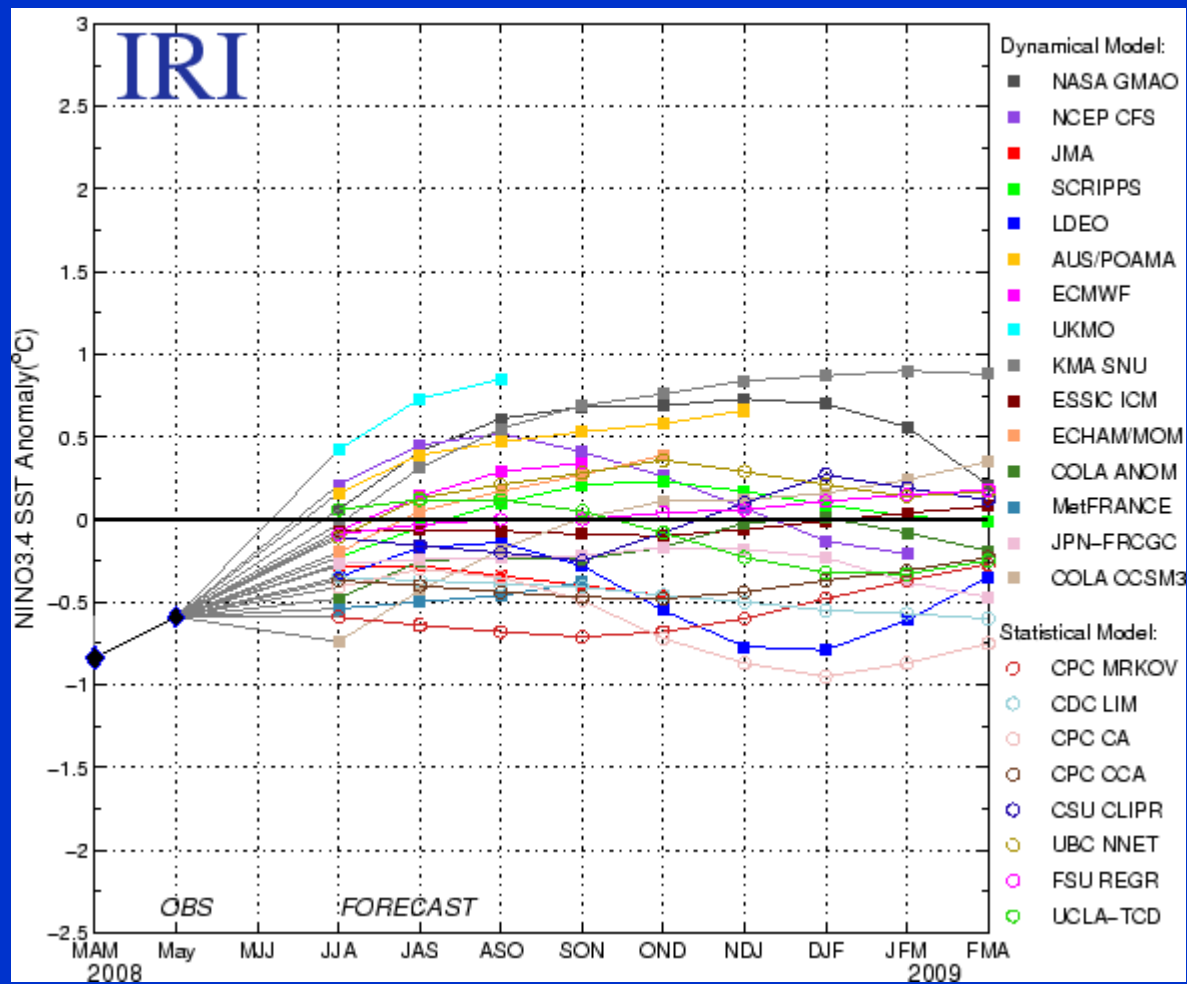
The CFS ensemble mean (heavy blue line) predicts La Niña most likely will be in neutral conditions for



Regions illustrated above are the Indian, Pacific, and Atlantic tropical oceans subsurface temperature anomalies.

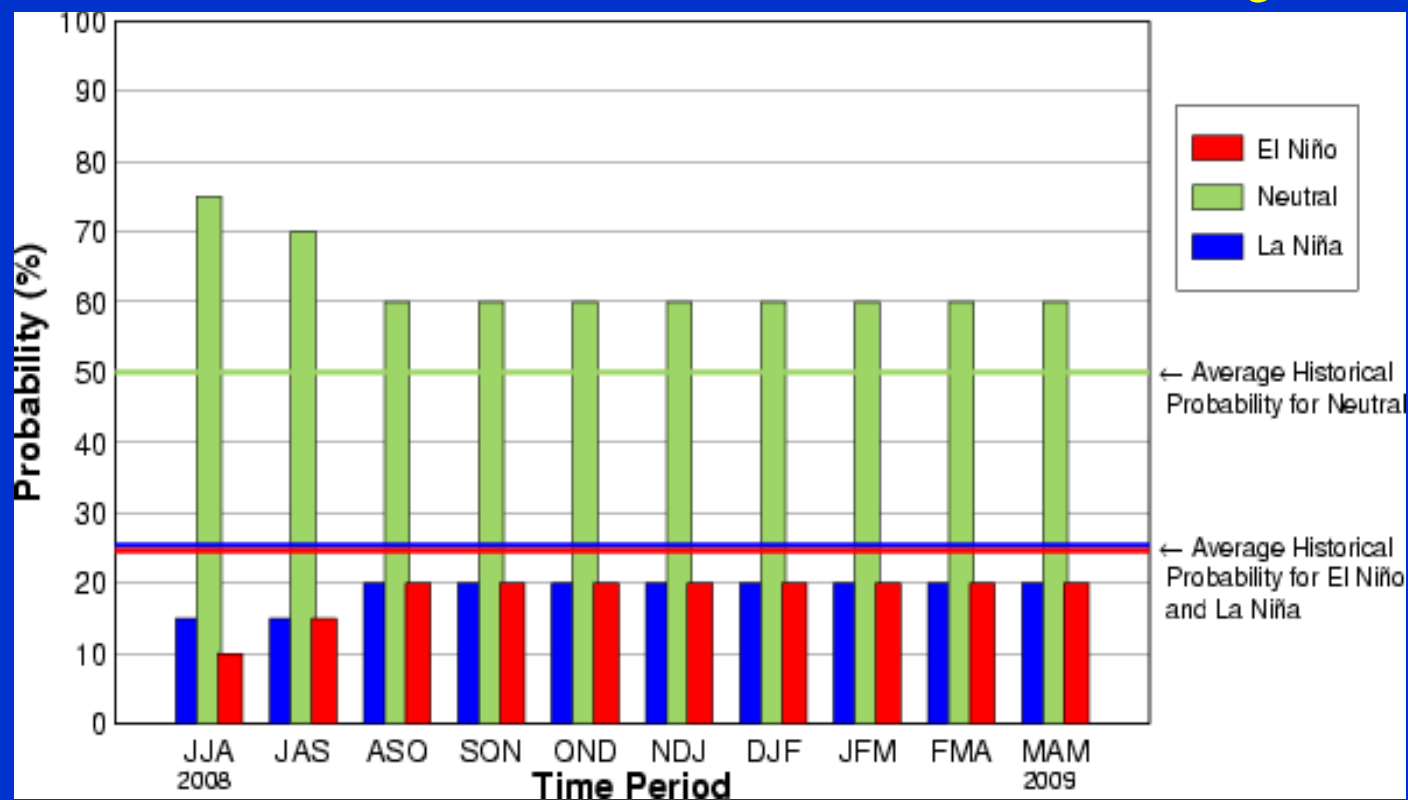
The CFS ENSO ensemble forecast has had a significant upward shift during recent weeks.

# Summary of ENSO Model Forecasts



The IRI ENSO model summary supports the cfs prediction that ENSO most likely to remain in the neutral phase.

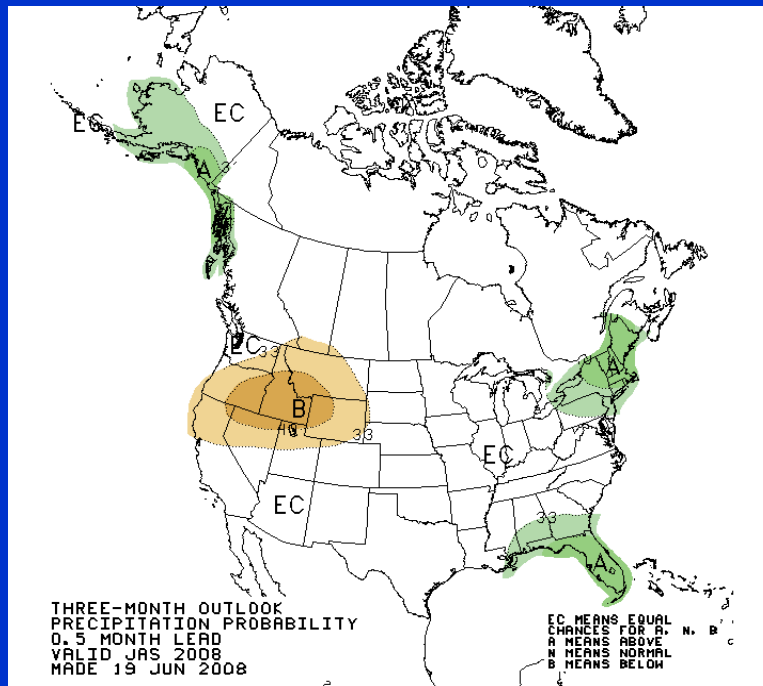
## IRI Probabilistic ENSO Forecasts for the NINO 3.4 Region



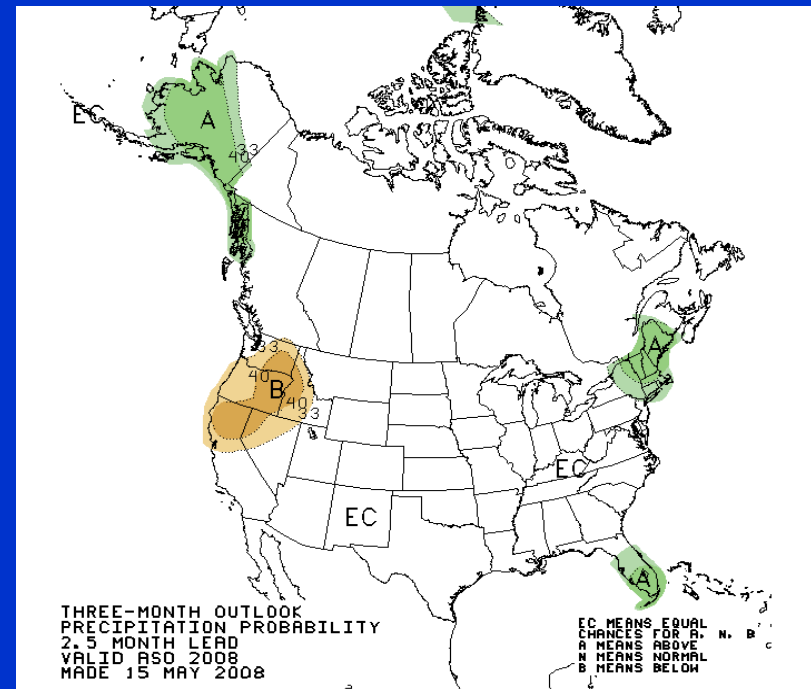


# CPC Seasonal Rainfall Outlook

July-September

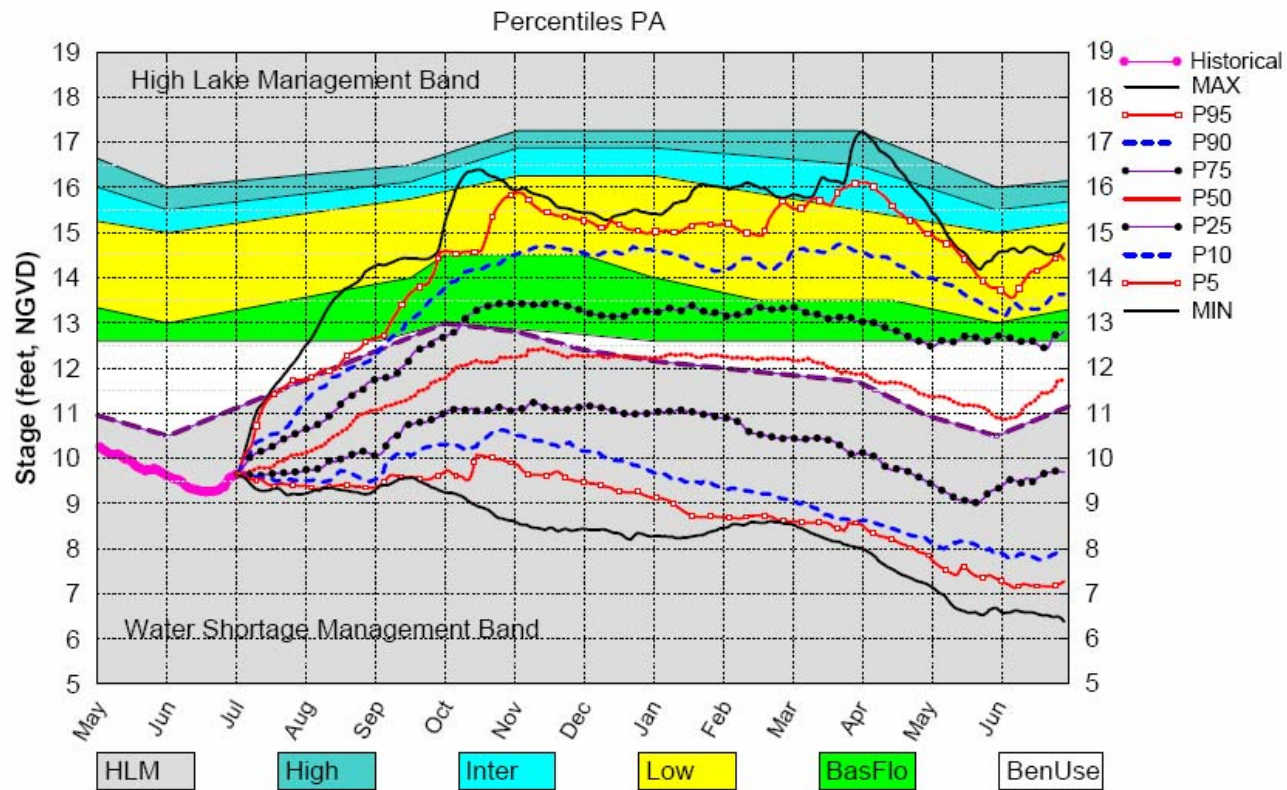


August-October



# July 1<sup>st</sup> Position Analysis

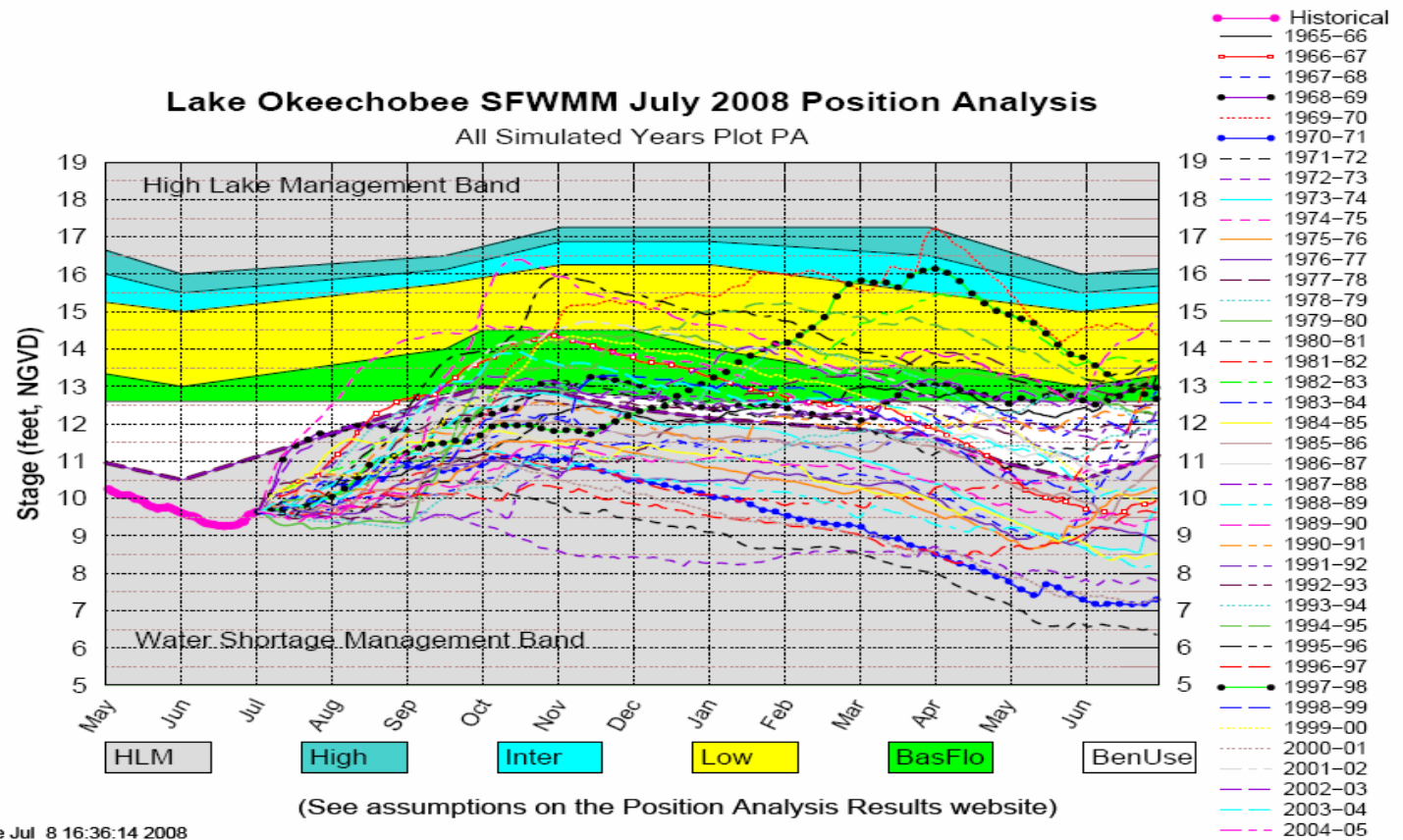
## Lake Okeechobee SFWMM July 2008 Position Analysis



(See assumptions on the Position Analysis Results website)

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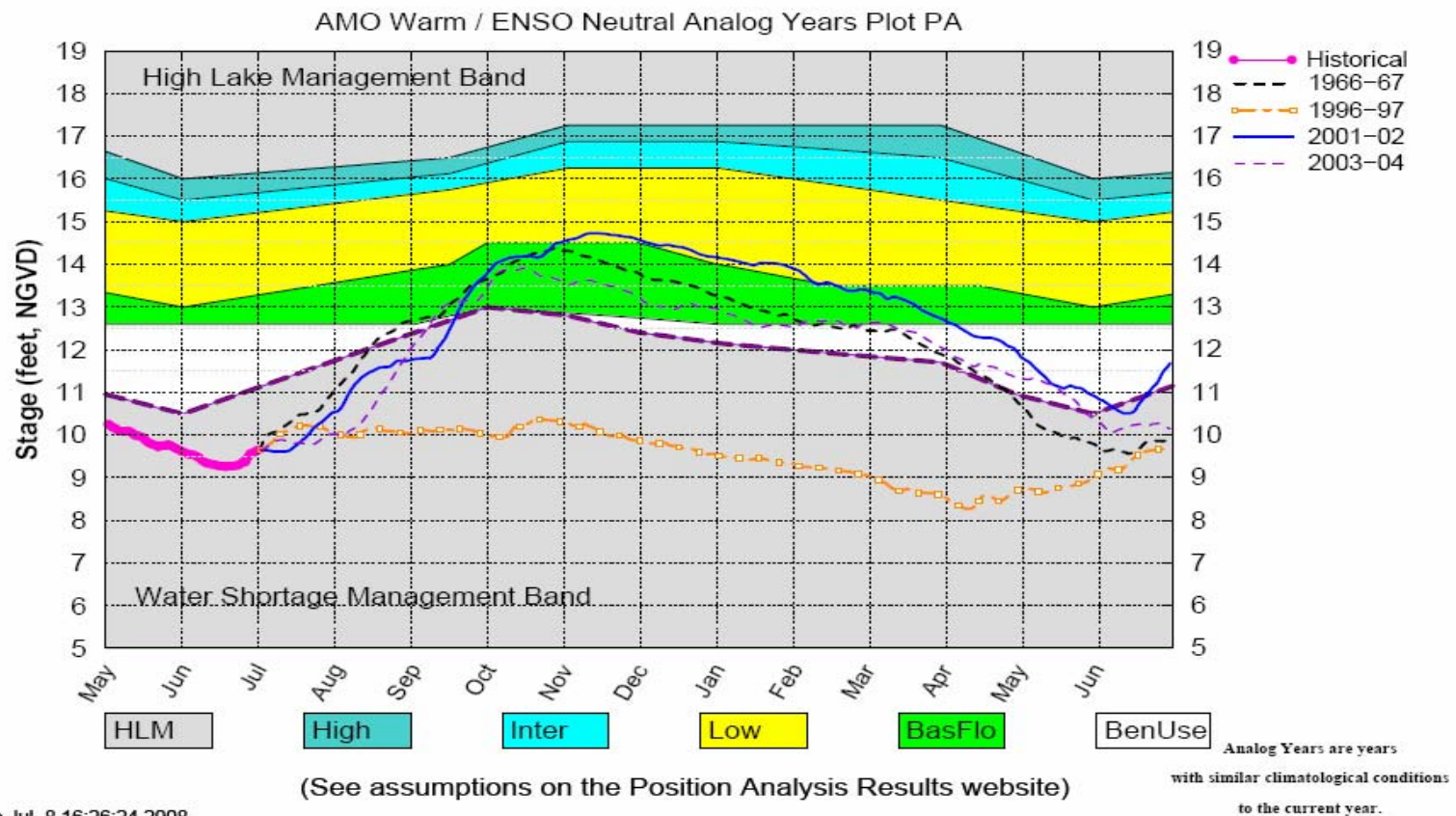
# July 1st all years Position Analysis



# July 1st Position Analysis

## ENSO Neutral/AMO Warm sub sampling

### Lake Okeechobee SFWMM July 2008 Position Analysis

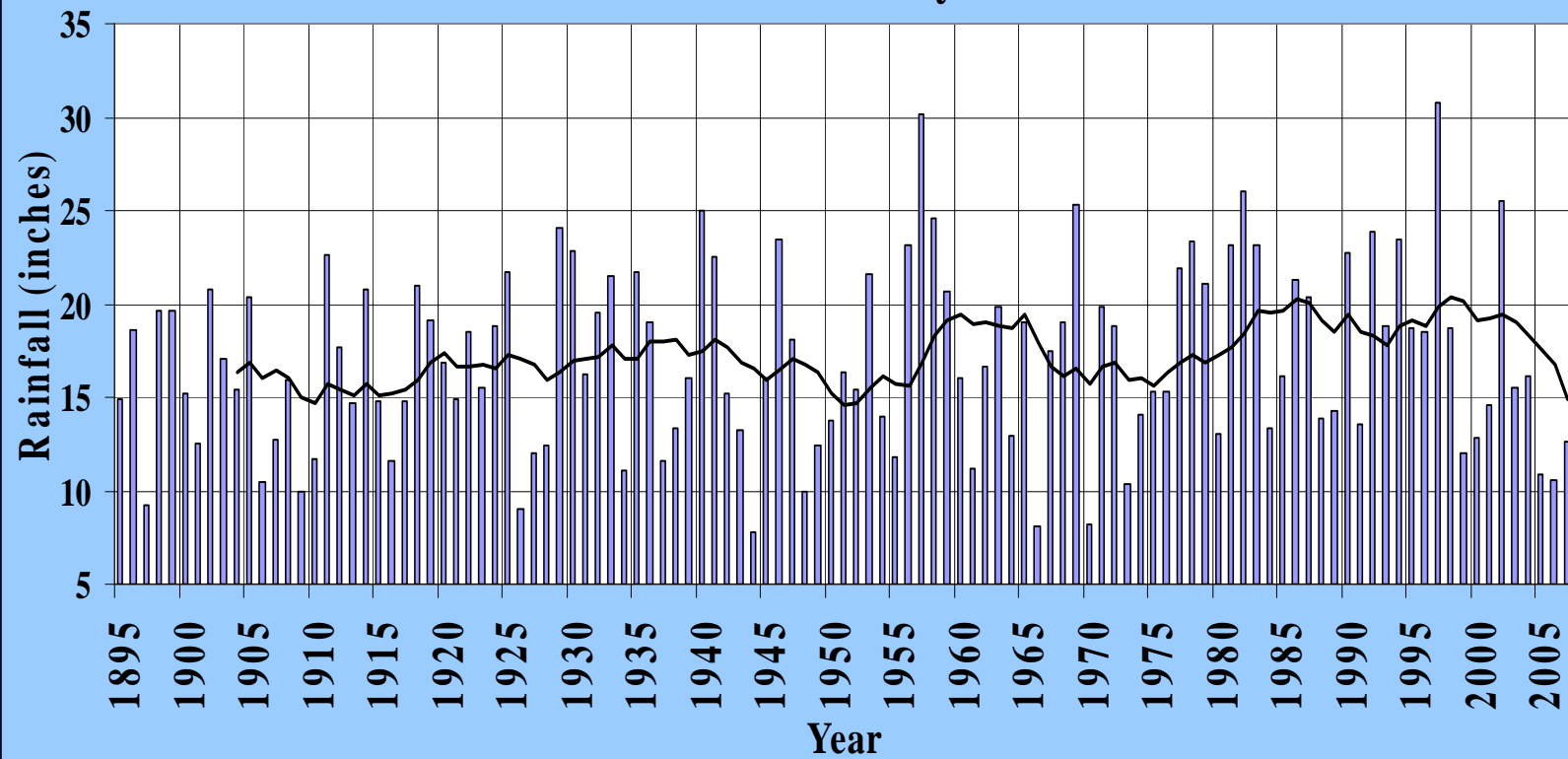


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# Backup Slides with additional support material

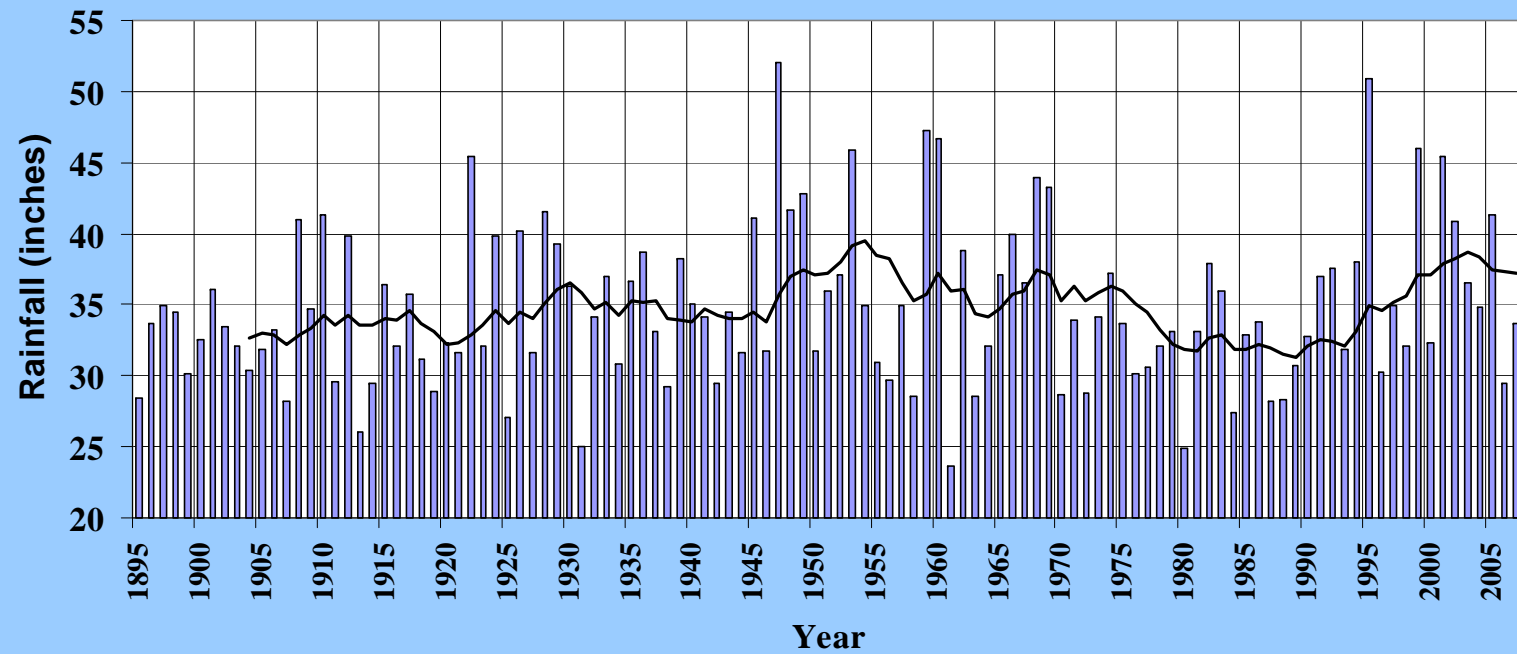
## SFWMD Dry Season Rainfall

November - May





## SFWMD Wet Season Rainfall June-October

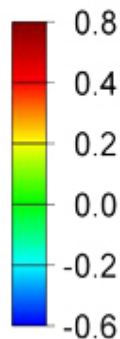
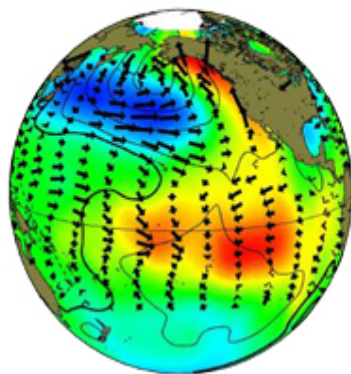


PDO cold phase equals less El Nino more La Nina and drier  
dry seasons

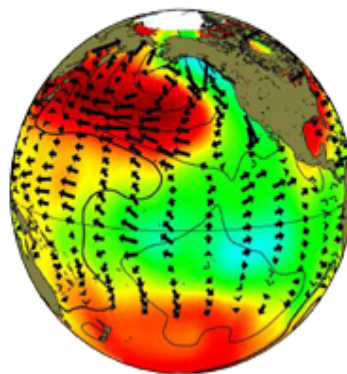
[http://www.americanthinker.com/blog/2008/04/nasa\\_confirm  
s\\_natural\\_climate.html](http://www.americanthinker.com/blog/2008/04/nasa_confirm_s_natural_climate.html)

### Pacific Decadal Oscillation

positive phase

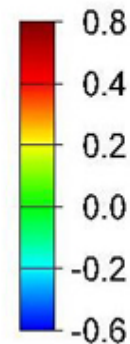
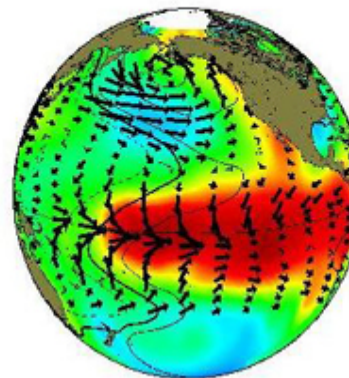


negative phase

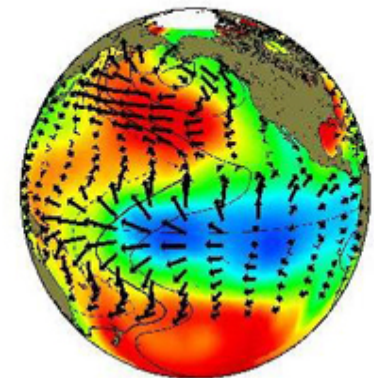


### El Nino Southern Oscillation

El Nino

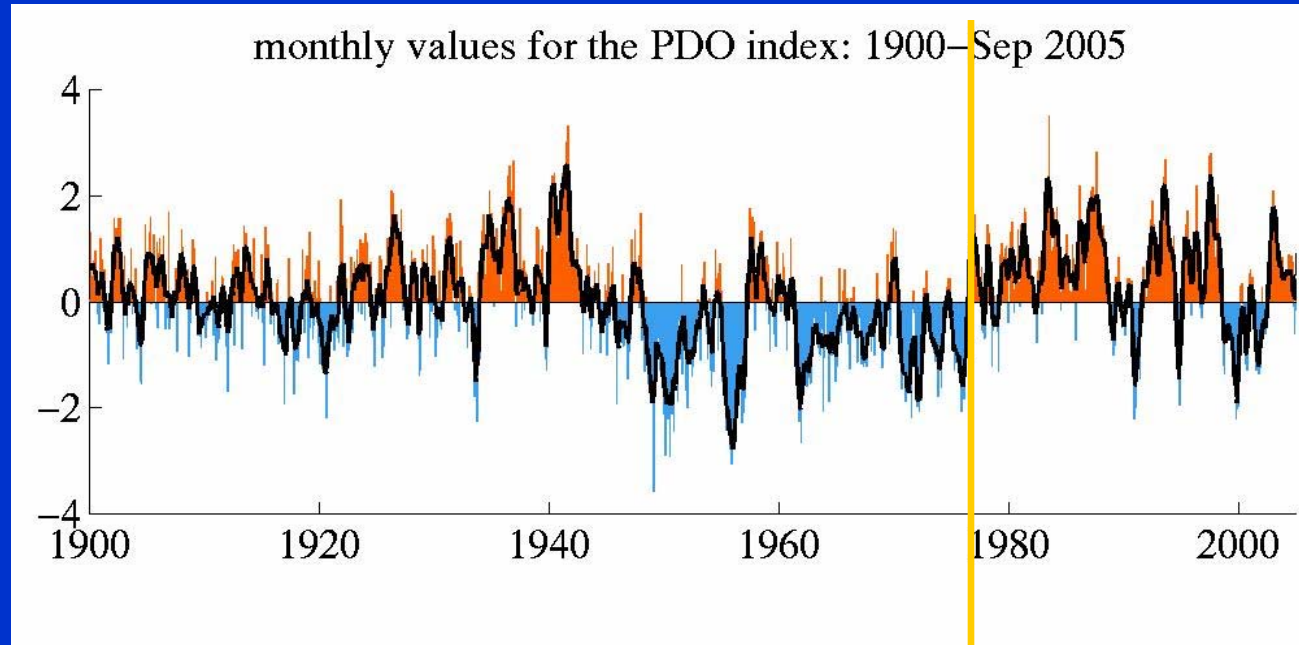


La Nina



Currently  
transitioning  
to cold phase of  
PDO

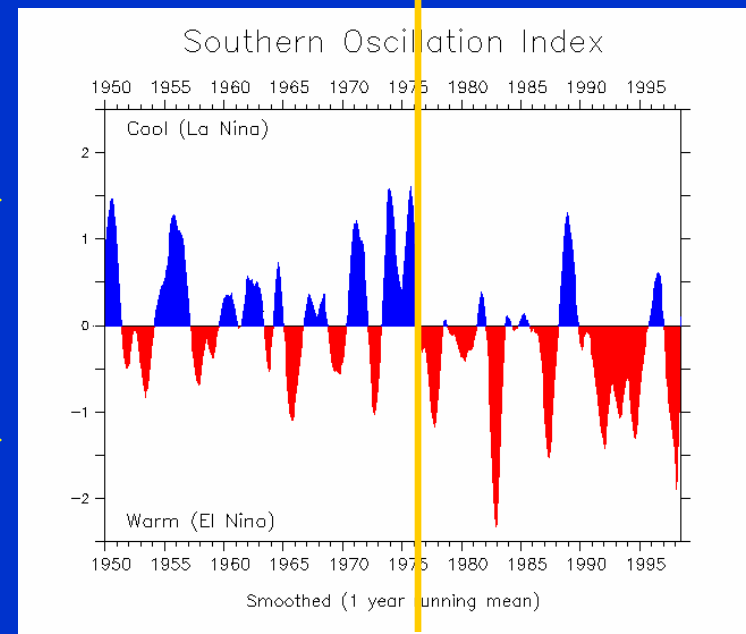
## PDO



## ENSO

La Nina predominates when  
PDO is in negative phase →

El Nino predominates when  
PDO is in positive phase →



# AO (or NAO) – North Atlantic

- Larson et al. (2006, J. Climate)
  - The AO (and/or NAO) has a strong influence on the intraseasonal and interannual variability of NA TC activity.

*“During La Niña (El Niño) conditions, atmospheric circulation appears more (less) conducive to TC activity in the main developing region [MDR] during AO-positive (negative) conditions than during AO negative (positive) ones.”*
  - An enhanced (decreased) TC activity during the positive (negative) phase of the AO. During the positive phase of the AO,
    - The subtropical ridge in the NA is enhanced.
    - The westerly wind shear weakens over the MDR.
    - The tropical easterly jet intensifies over Africa.
  - provide favorable conditions for TC development.

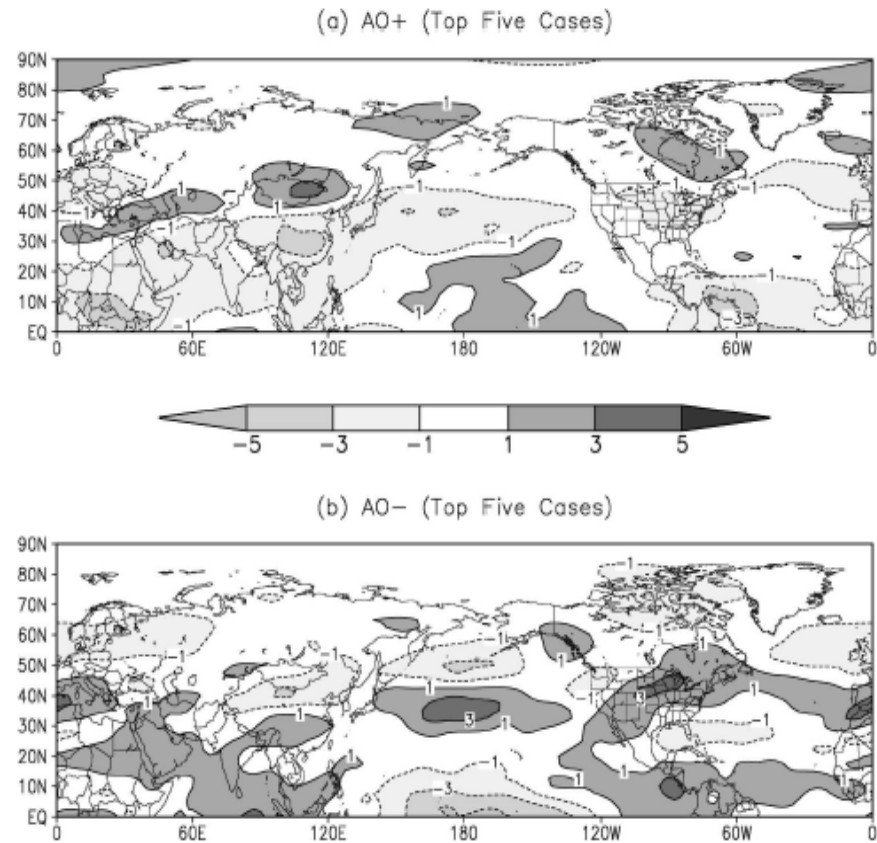
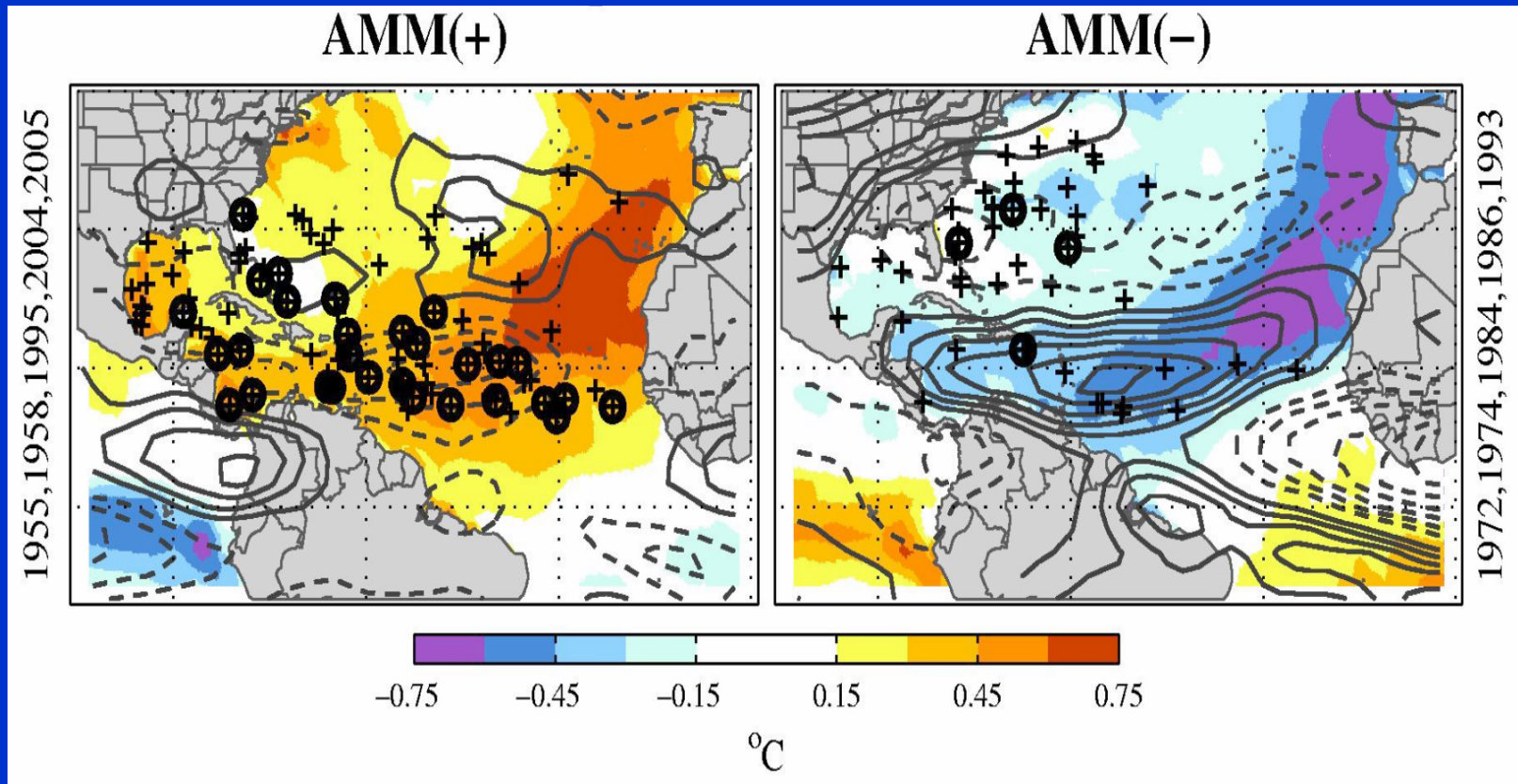


FIG. 11. As in Fig. 10 but for seasonal-mean zonal wind shear anomalies ( $\text{m s}^{-1}$ ); (difference in mean zonal wind anomalies between 200 and 850 hPa).

## Composites associated strongest AMM (+) and AMM (-)



Tropical cyclo-genesis points for the five strongest and five weakest AMM years, superimposed on composites of SST (shaded) and shear (contours) anomalies. Crosses show the genesis points for all storms that reached tropical storm strength. Storms that reached “major hurricane” strength (maximum sustained surface wind speed  $> 49 \text{ m s}^{-1}$ ) also have a circle around their genesis point. Solid (dashed) shear contours denote positive (negative) values. The contour interval is  $0.25 \text{ m s}^{-1}$  and the zero-contour has been omitted. Shear was calculated every 6 h as the amplitude of the vector difference between the layer-mean winds in the 300–150 hPa and 925–700 hPa layers, and means were formed around the hurricane season from monthly means.



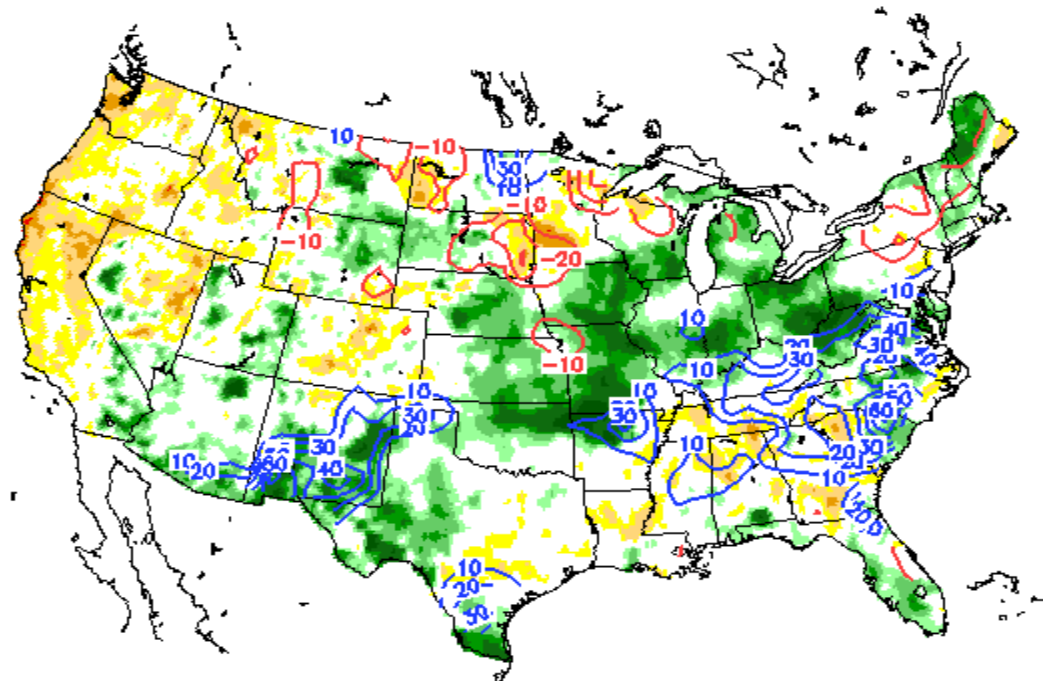
# Moisture Percentile for July 19<sup>th</sup> , 2008

## Land Surface Hydrology Research Group

### Princeton University

<http://hydrology.princeton.edu/~luo/research/FORECAST/current.php>

Total Column Soil Moisture Percentiles on 20080710  
(wrt samples within a 49-day window in 1951–2004)



Contours show the changes in quantiles in the last 7 days.

