



## Climate Update Highlights August 5<sup>th</sup> 2008

- La Niña has transitioned to a neutral condition while the cold phase of the PDO is firmly in place. The cold phase of PDO favors La Nina type conditions over El Nino conditions on inter-annual to decadal time scales and has a direct association with south-central Florida dry season rainfall (i.e. rainfall is positively correlated with PDO index).
- The tropical Atlantic sea surface temperatures have warmed within the tropical Atlantic Main Development Region (MDR) during the past weeks. This increases the potential number and severity of hurricanes. However, of the 4 analog years (1951,1961,2000,2001) selected by CSU (Gray et al), none of them had a major hurricane hitting Florida.
- The sea surface temperature gradient from the tropical south Atlantic towards the tropical north Atlantic Ocean weakened. Therefore the AMM may have less influence on wind shear than originally suggested (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 weaker more westward centered Bermuda High, which acts to steer North Atlantic hurricanes toward the southern United States.

<http://garnet.acns.fsu.edu/~jelsner/PDF/Research/ElsnerLiuKocher2000.pdf>

➤ 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 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.

➤ July 15<sup>th</sup> 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.

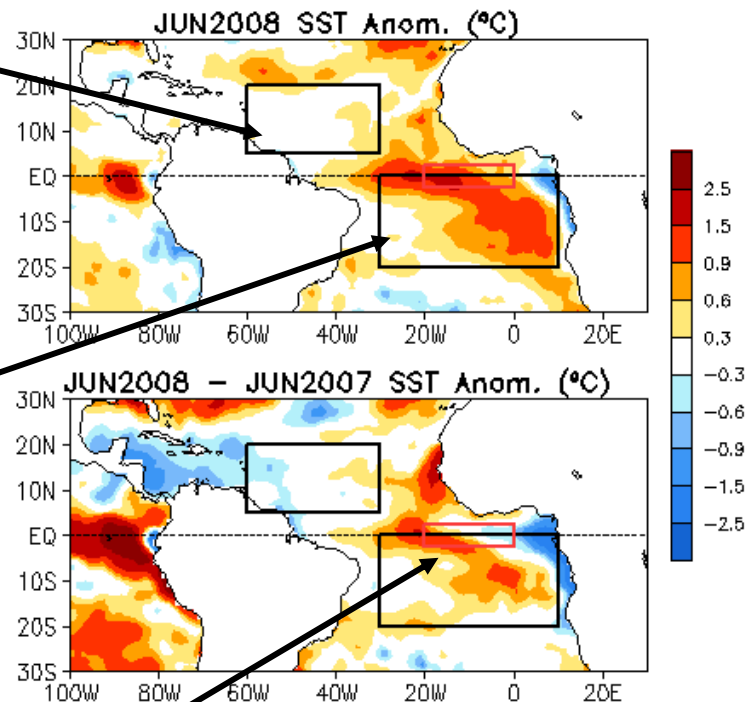
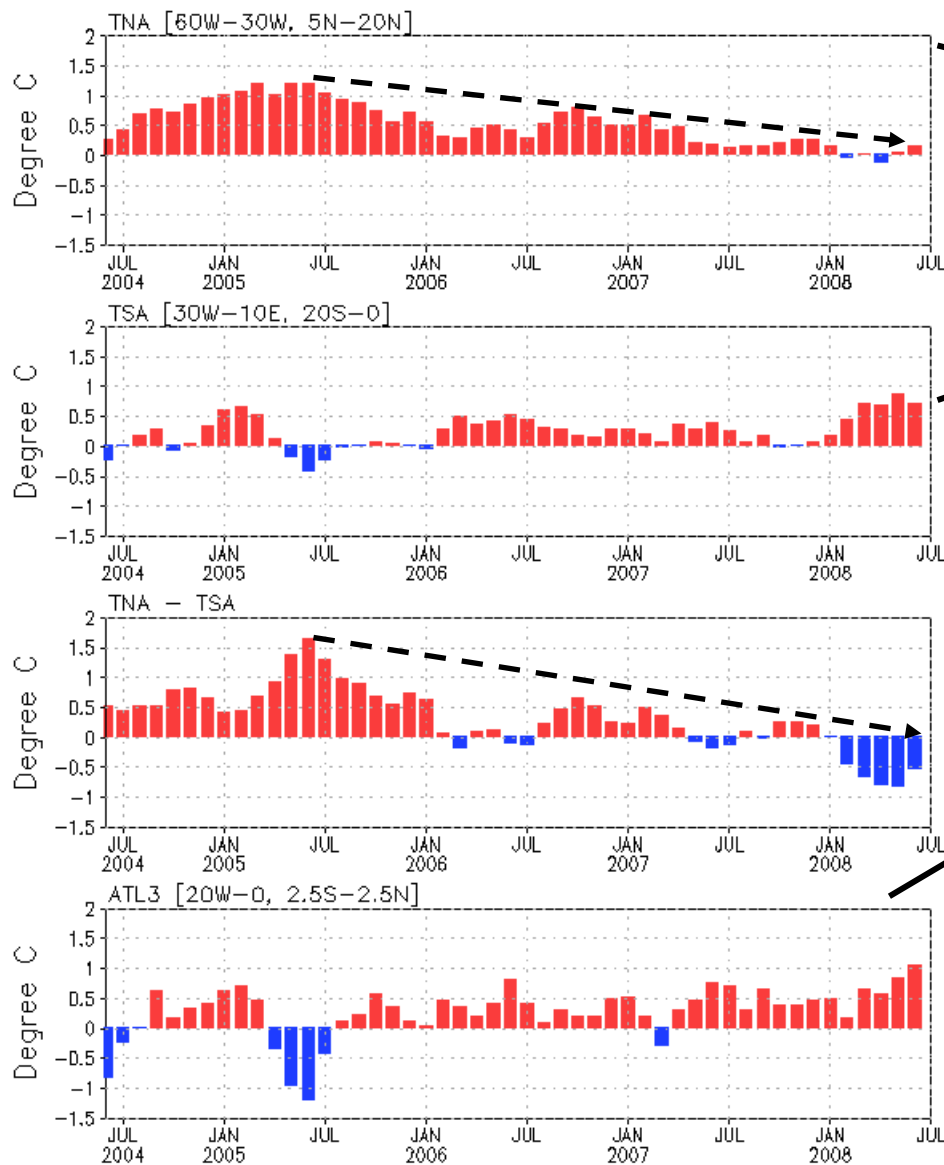


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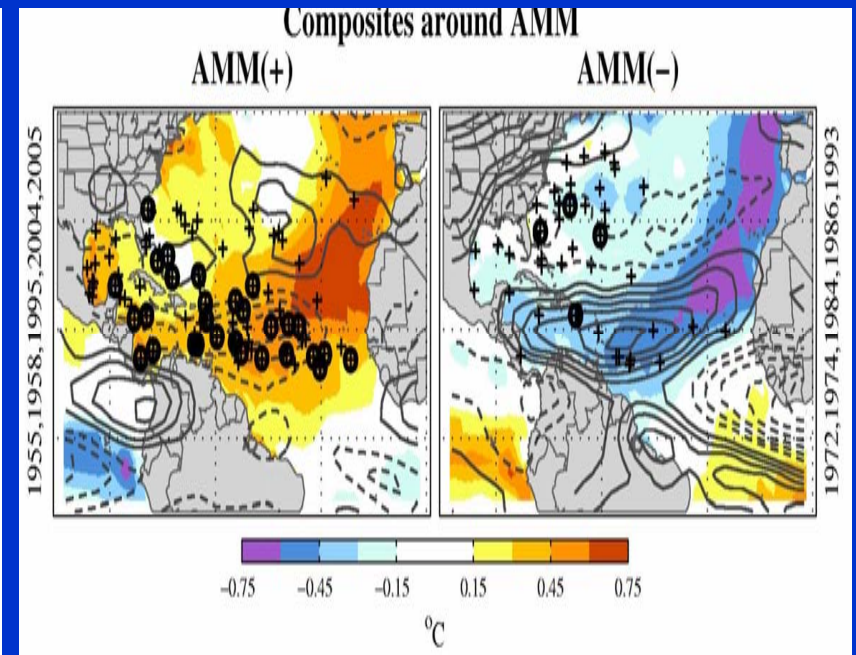
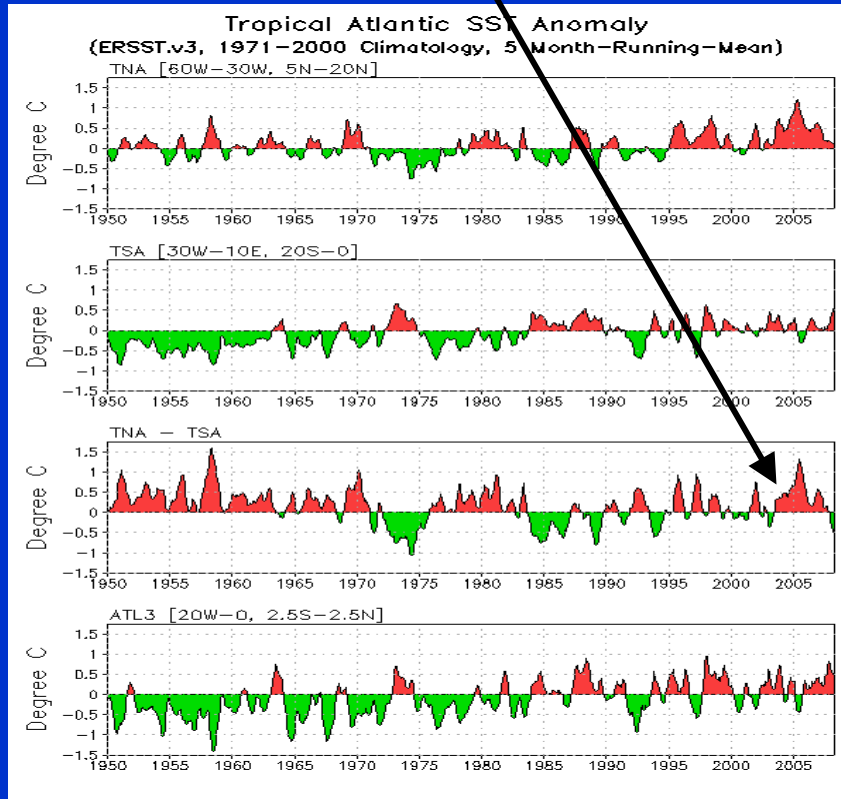
# Evolution of Tropical Atlantic SST Indices

Monthly Tropical Atlantic SST Anomaly

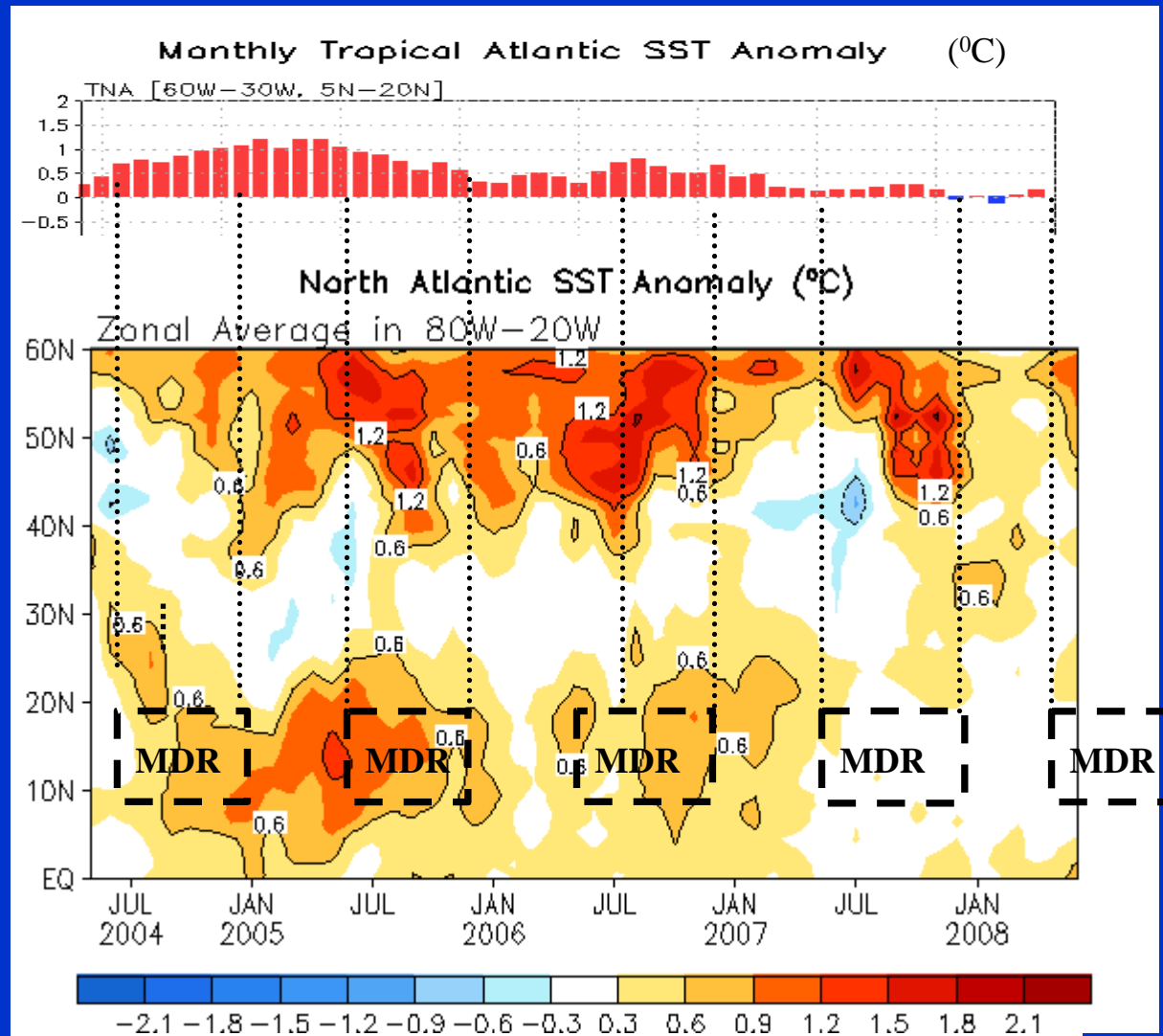


- TNA has been trending downward from about +1°C above-normal in summer 2005 to slightly below-normal in April, and then increased slightly over the past 2 months
- TSA has been above-normal since February
- Meridional SST Gradient Mode (TNA-TSA) remains negative, although the anomalies decreased in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

# Atlantic Meridional Mode (AMM)



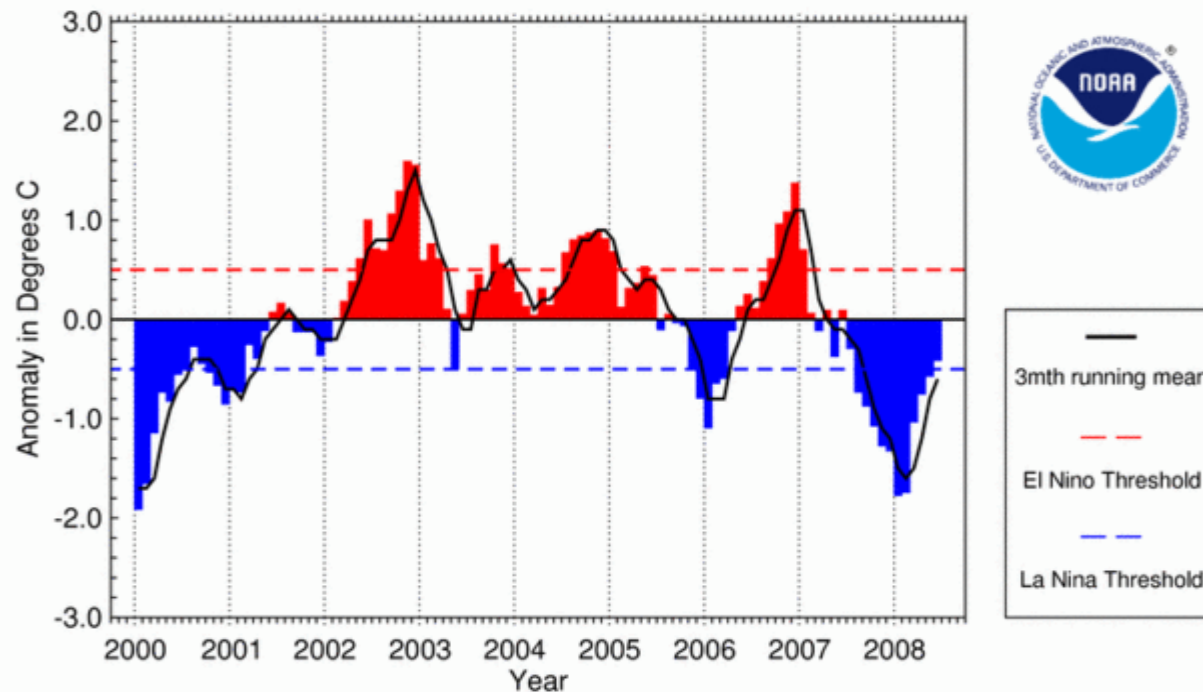
# Sea Surface Temperatures Anomalies in the Tropical Storm Main Development Region (MDR)





# 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 since 1981.  
ENSO is currently in neutral conditions.

[http://ioc3.unesco.org/oopc/state\\_of\\_the\\_ocean/sur/pac/nino3.4.php](http://ioc3.unesco.org/oopc/state_of_the_ocean/sur/pac/nino3.4.php)



# 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

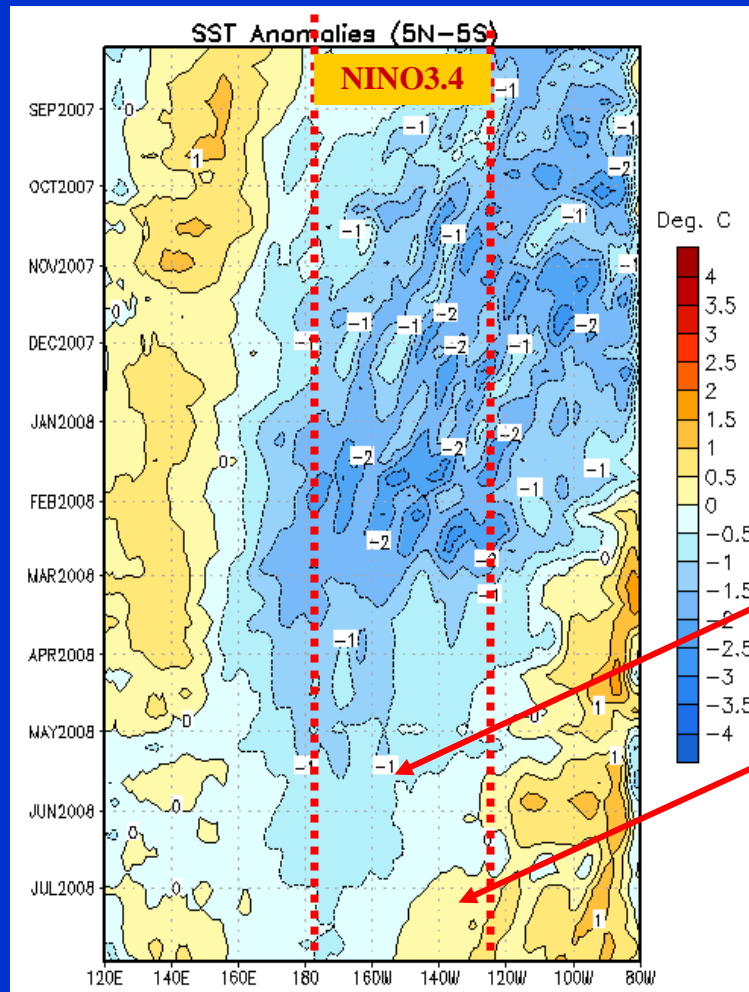
August  
2007

November  
2007

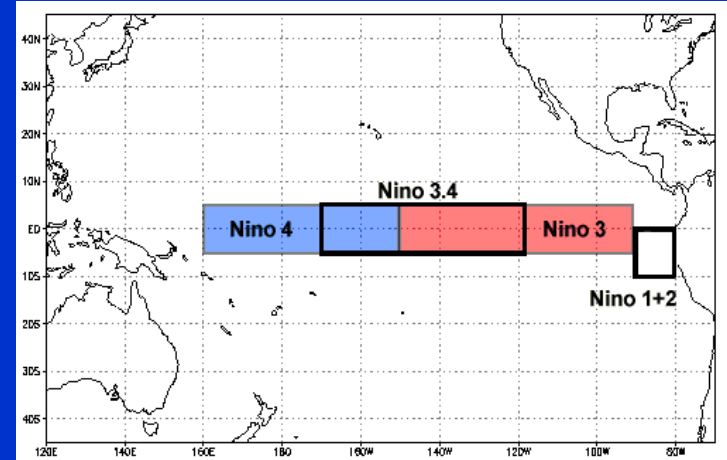
Time



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

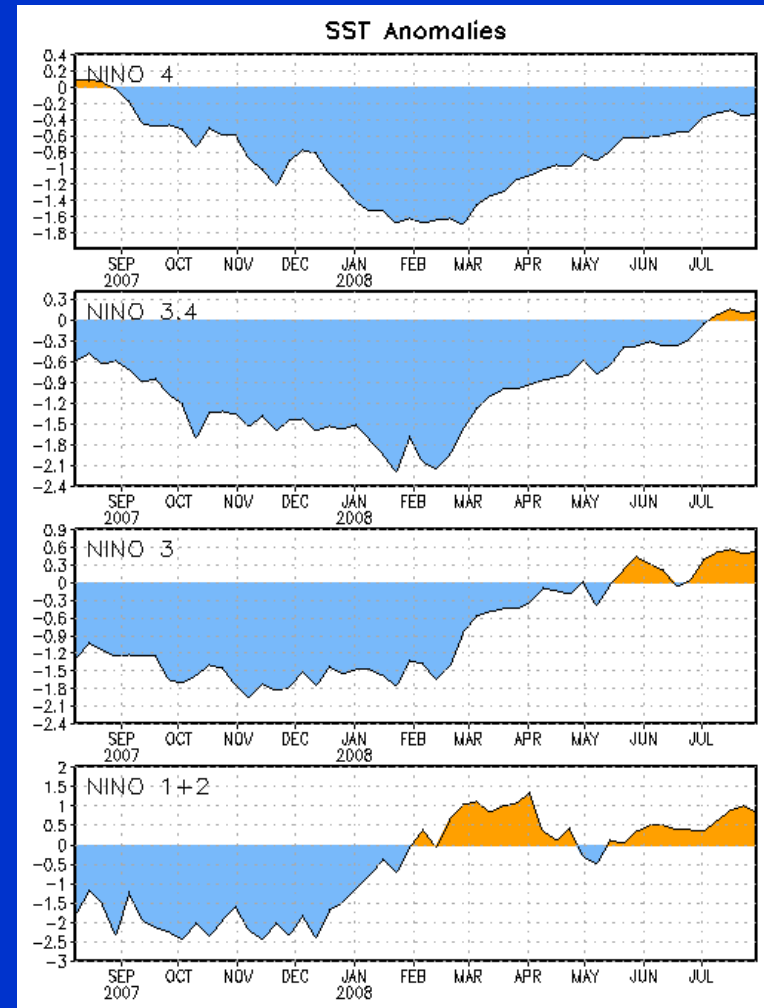
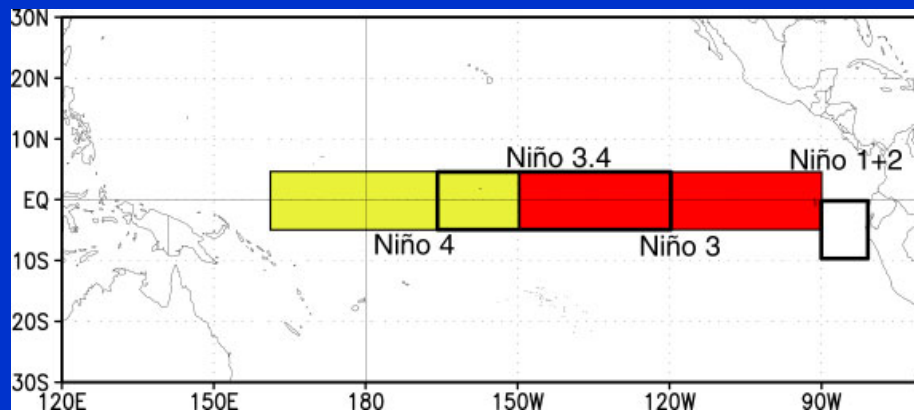
The latest weekly SST departures are:

**Niño 4**                      **-0.3°C**

**Niño 3.4**                    **0.2°C**

**Niño 3**                      **0.6°C**

**Niño 1+2**                   **0.9°C**



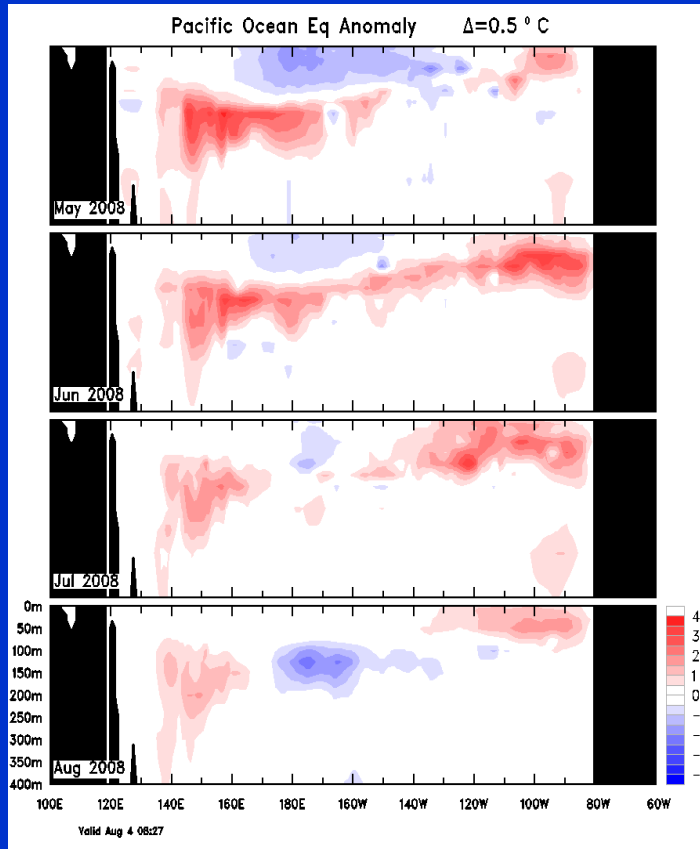
# Sub-Surface Temperature Departures (°C) in the Equatorial Pacific Ocean (July 28<sup>th</sup>, 2008) Bureau of Meteorology Research Centre

May

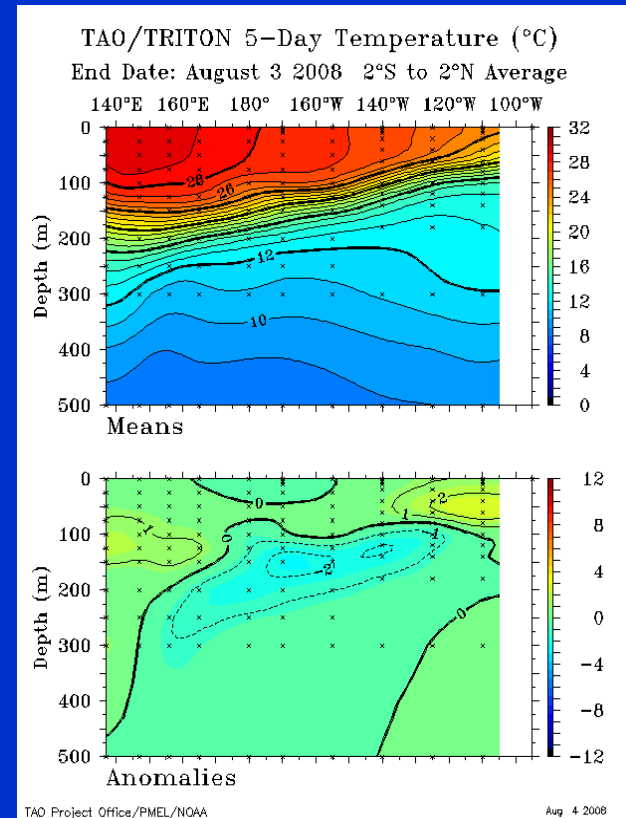
Jun

Jul

Aug



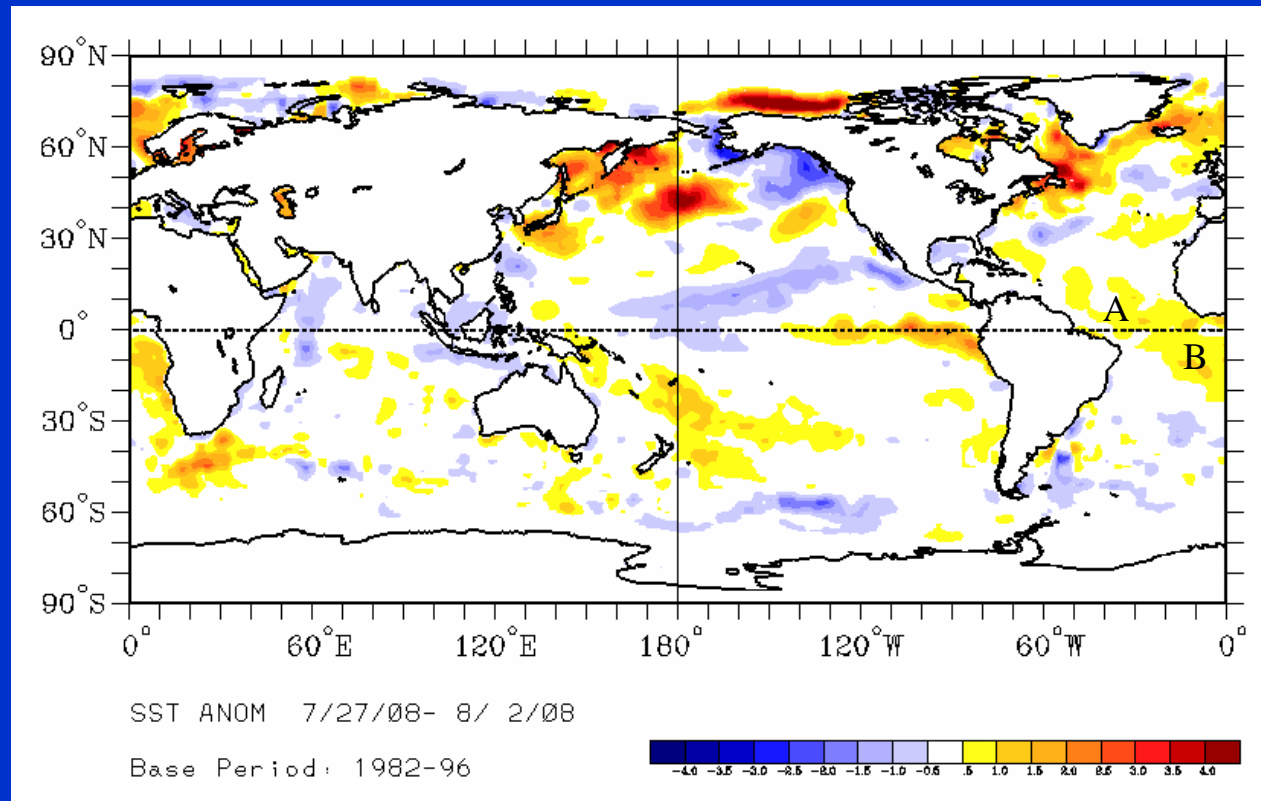
Longitude



At this time neutral conditions are in place. These conditions are likely to persist into next dry season. However, El Nino or La Nina conditions can be ruled out for the next dry season. A cool subsurface anomalies has recently appeared in the equatorial Pacific and needs to be monitored.

# Latest Weekly Sea Surface Temperature Anomaly

## National Climate Data Center



Most of the Caribbean and Gulf of Mexico have normal or below normal sea surface temperature. The Atlantic Main hurricane development region has experienced some warming in the past week.

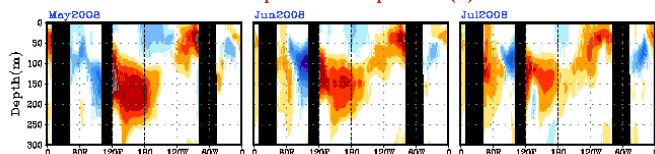
# Equatorial Pacific SST and Subsurface Temperature Anomaly Forecast

## NCEP Climate Forecast System Issued August 5<sup>th</sup> 2008

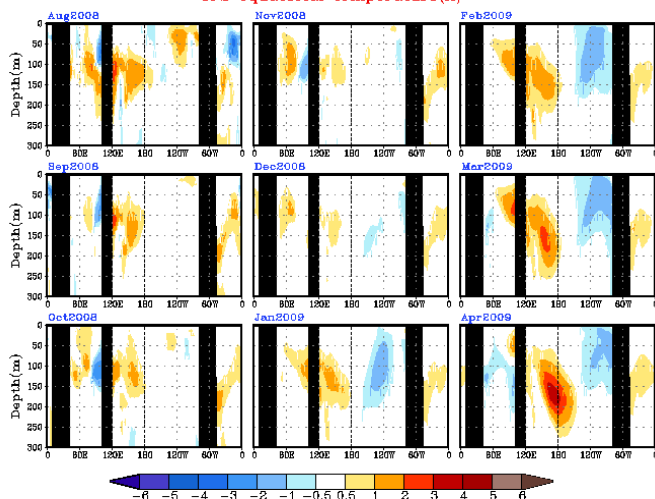


Last update: Tue Aug 5 2008  
Initial conditions: 25Jul2008-03Aug2008

GODAS equatorial temperature(K)



CFS equatorial temperature(K)



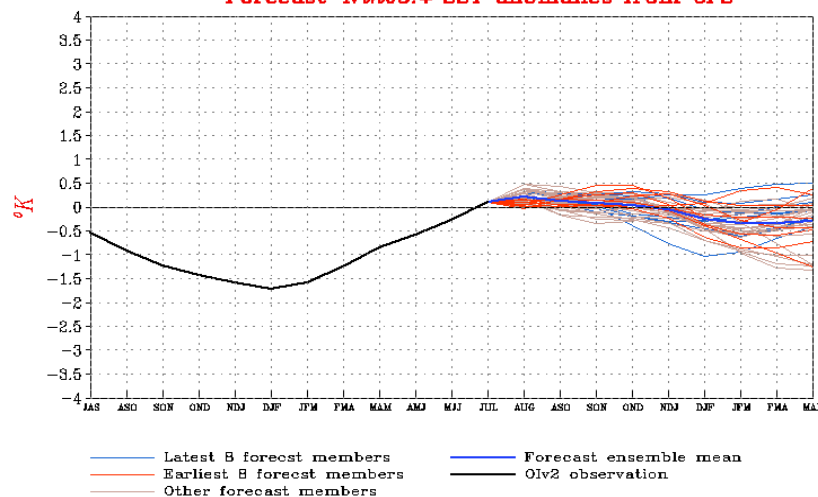
The CFS ensemble mean (heavy blue line) predicts La Niña most likely will be in neutral conditions for the remainder of the tropical season.



NWS/NCEP

Last update: Tue Aug 5 2008  
Initial conditions: 25Jul2008-03Aug2008

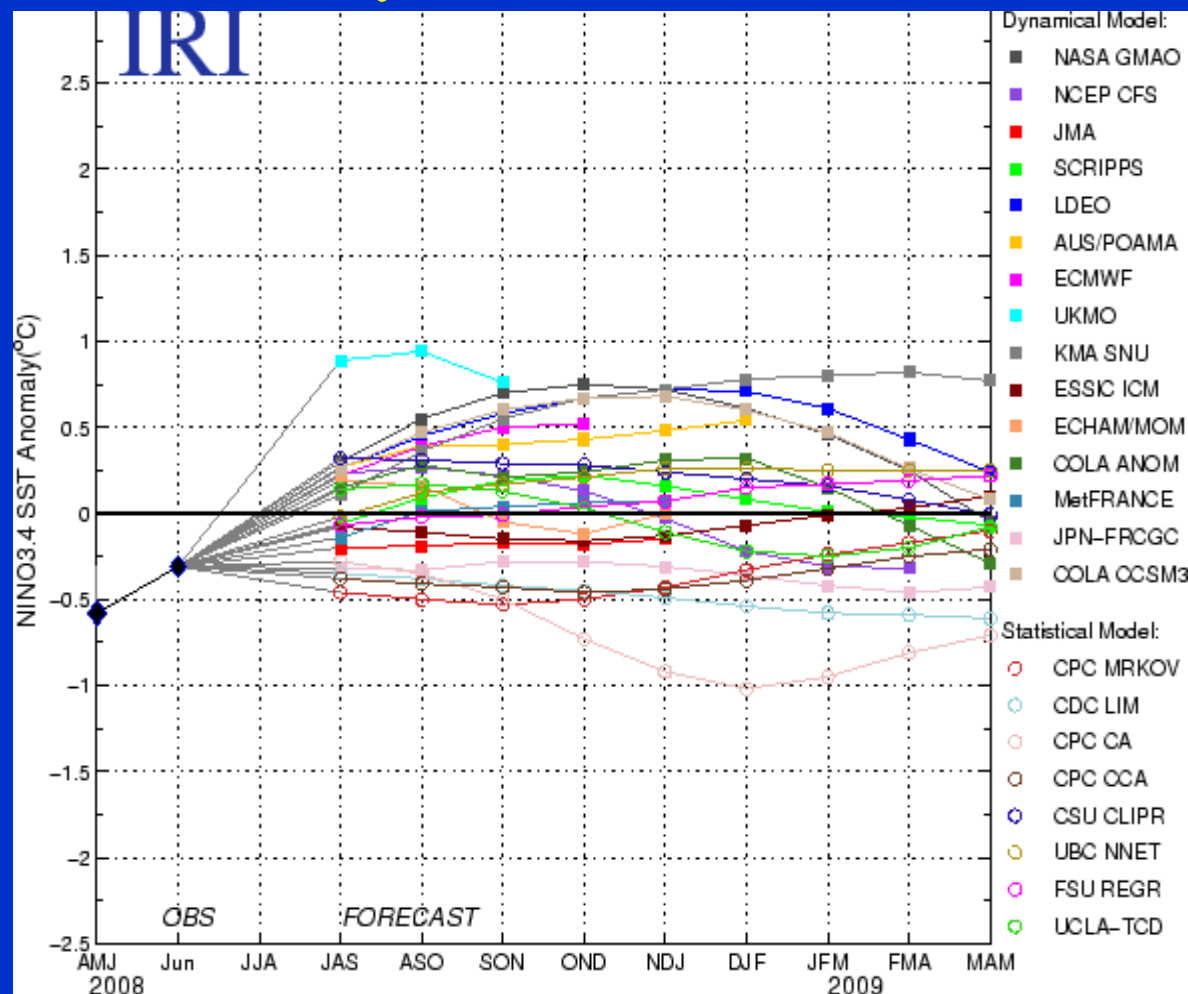
Forecast *Niño3.4* SST anomalies from CFS



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

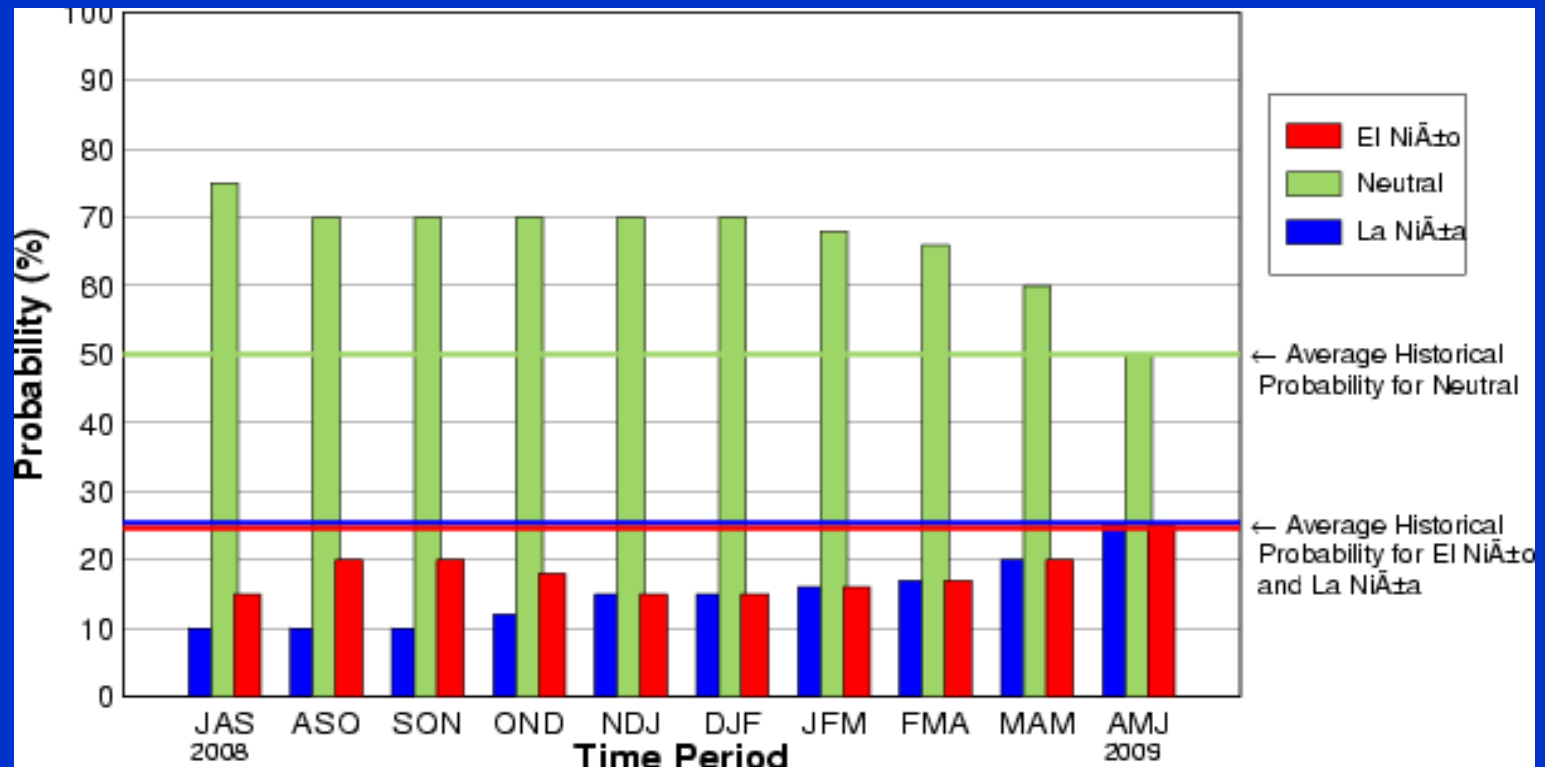
The CFS ENSO ensemble forecast has had a significant upward shift during recent weeks.

# Summary of ENSO Model Forecasts



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

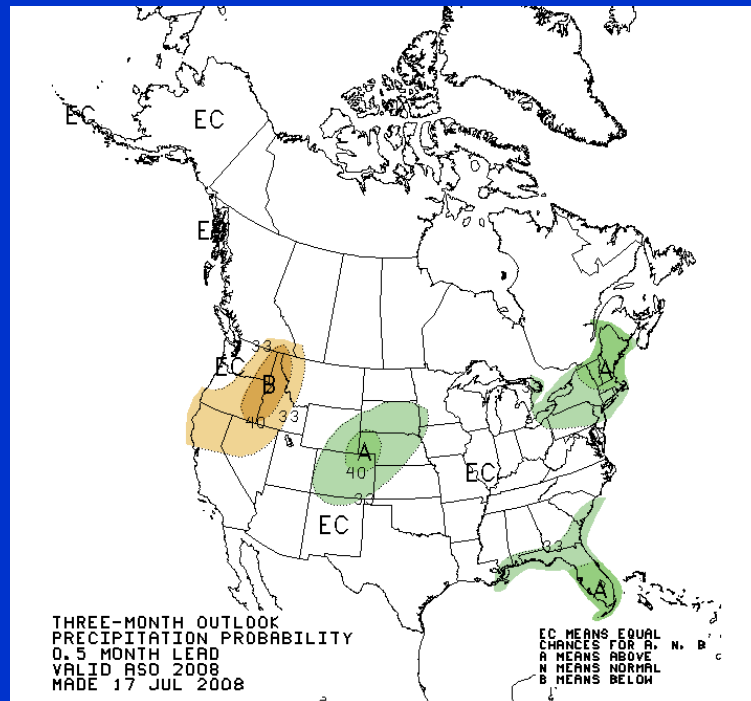
## IRI Probabilistic ENSO Forecasts for the NINO 3.4 Region



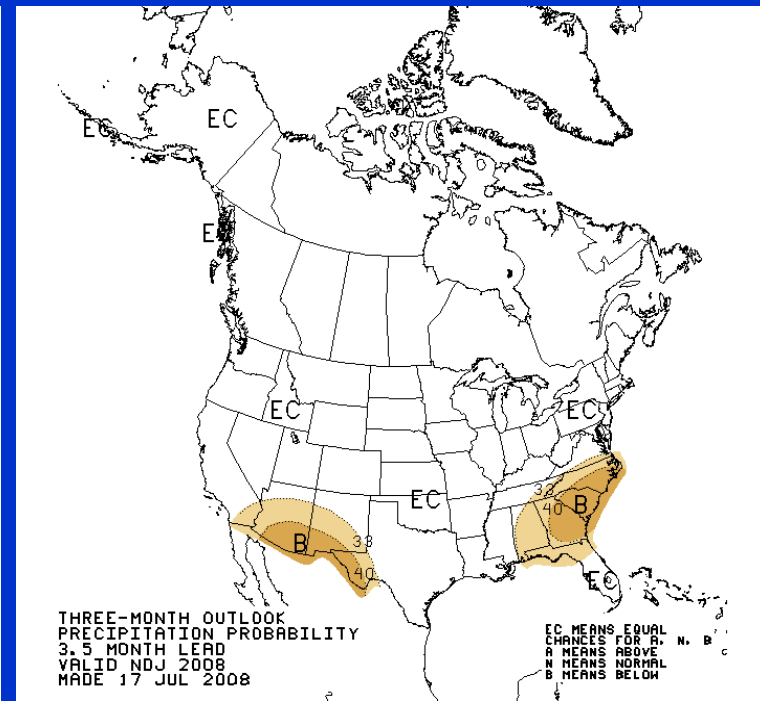


# CPC Seasonal Rainfall Outlook

## August- October

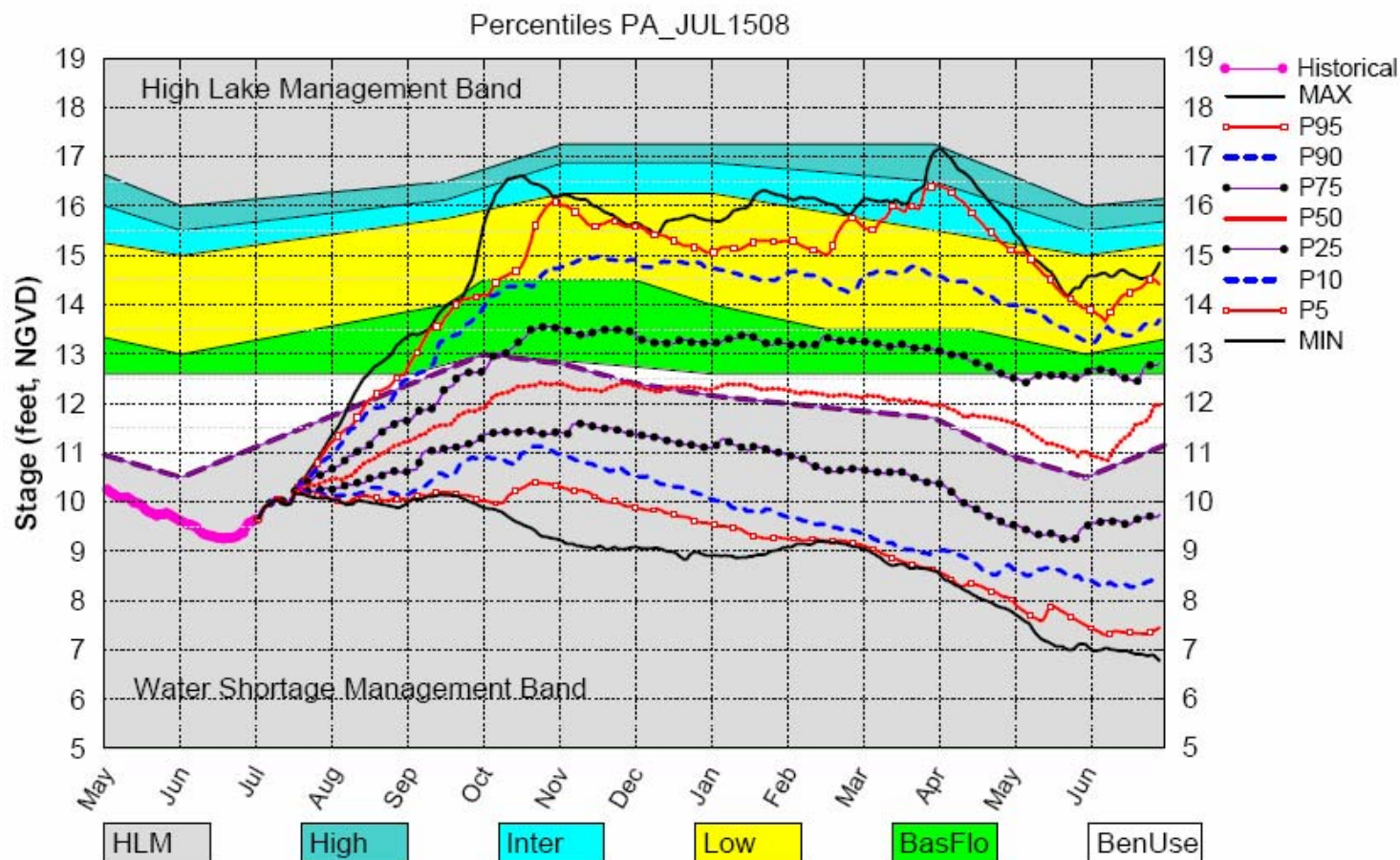


## November-January



# July 15<sup>th</sup> Position Analysis

## Lake Okeechobee SFWMM July 2008 Position Analysis

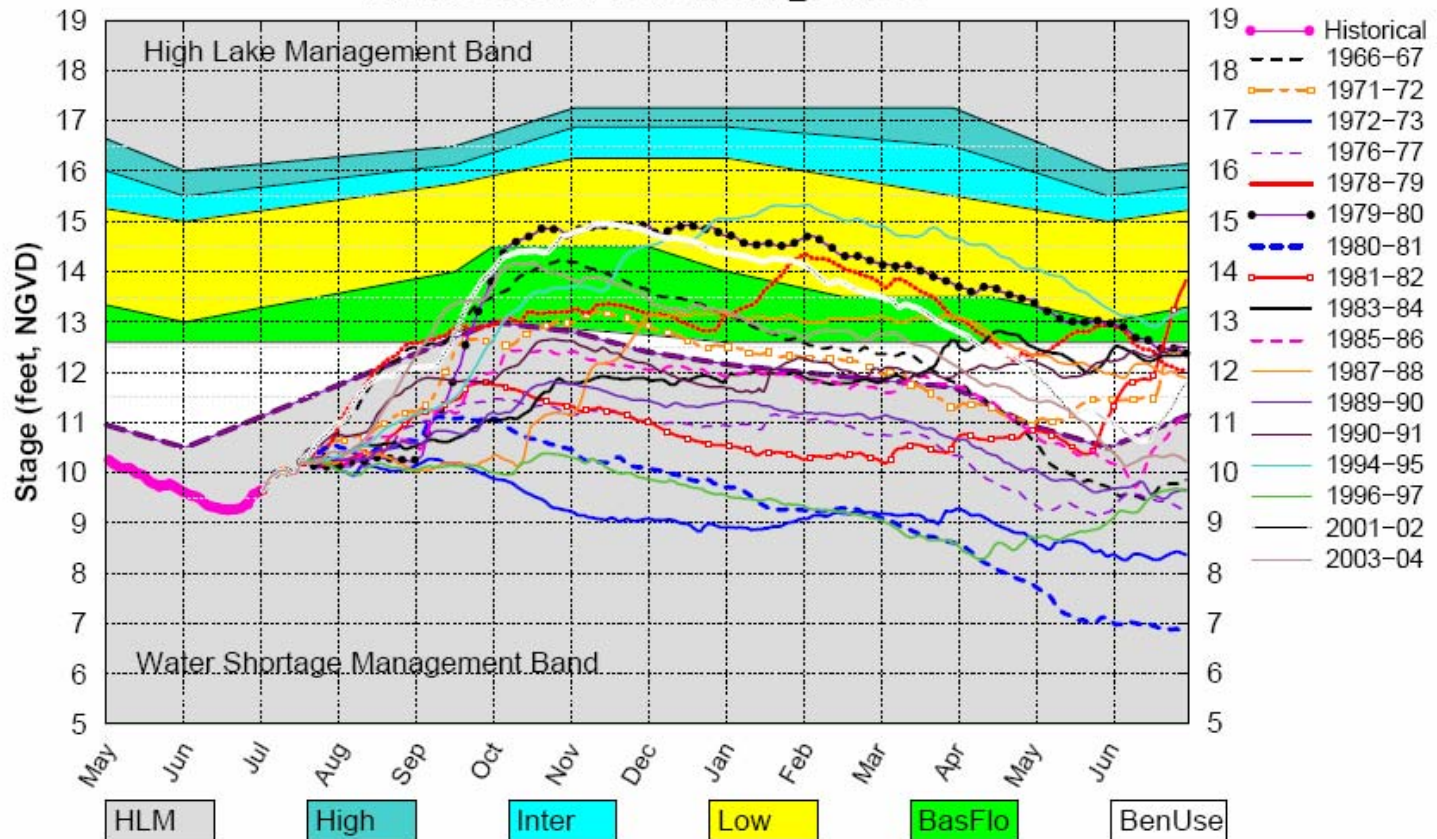


(See assumptions on the Position Analysis Results website)

# July 15<sup>th</sup> all ENSO neutral years Position Analysis

## Lake Okeechobee SFWMM July 2008 Position Analysis

All ENSO Neutral Years Plot PA\_JUL1508



(See assumptions on the Position Analysis Results website)

Fri Jul 18 12:44:03 2008

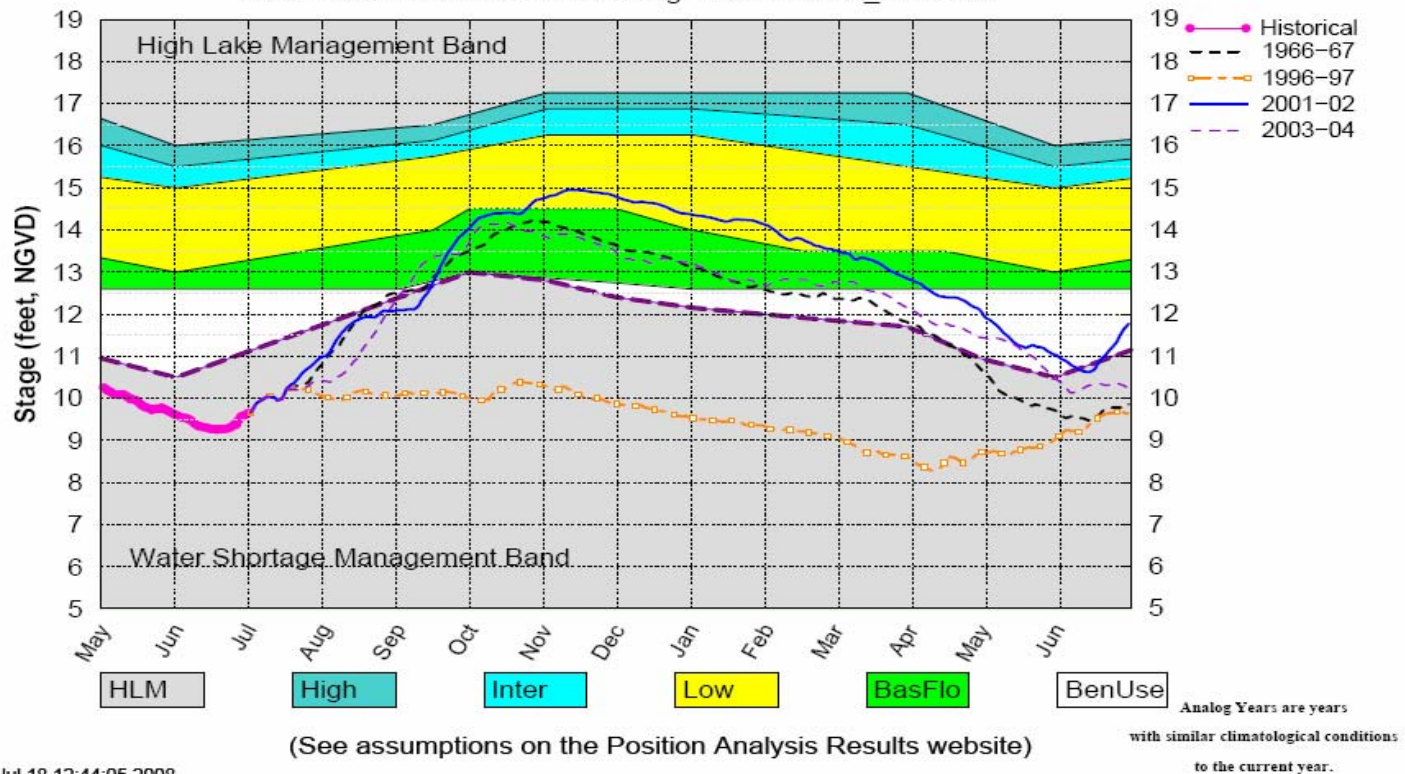


# July 15<sup>th</sup> Position Analysis

## ENSO Neutral/AMO Warm sub sampling

### Lake Okeechobee SFWMM July 2008 Position Analysis

AMO Warm / ENSO Neutral Analog Years Plot PA\_JUL1508

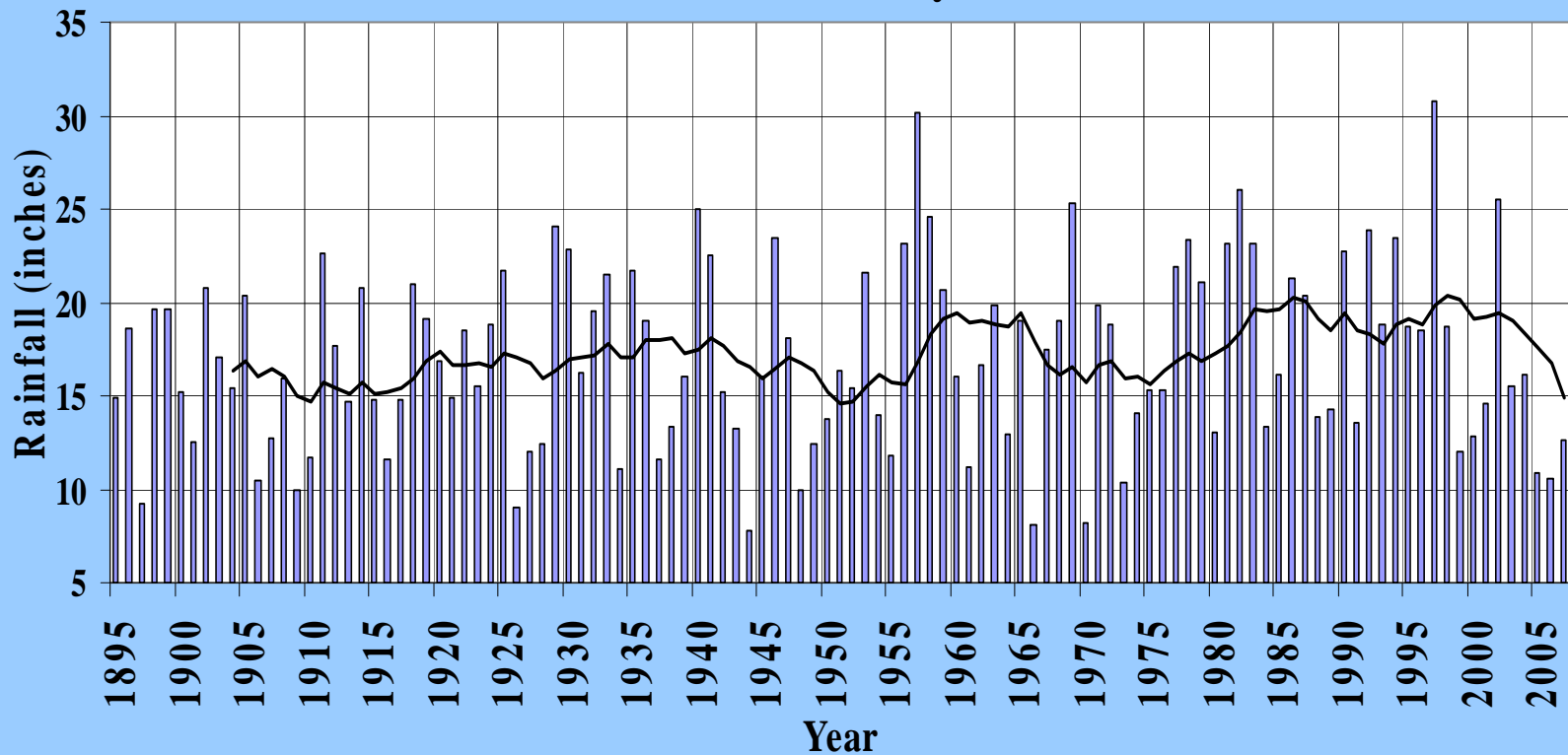


Fri Jul 18 12:44:05 2008

# Backup Slides with additional support material

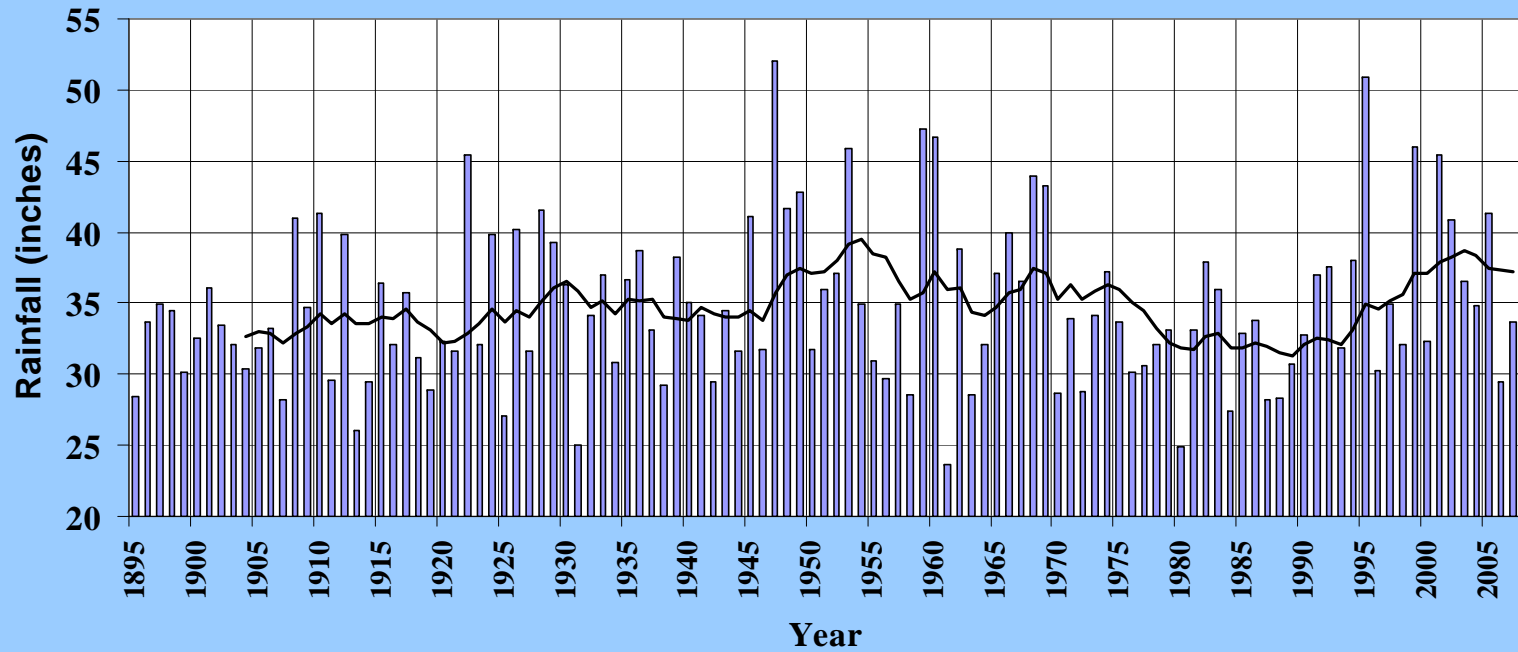
## SFWMD Dry Season Rainfall

### November - May

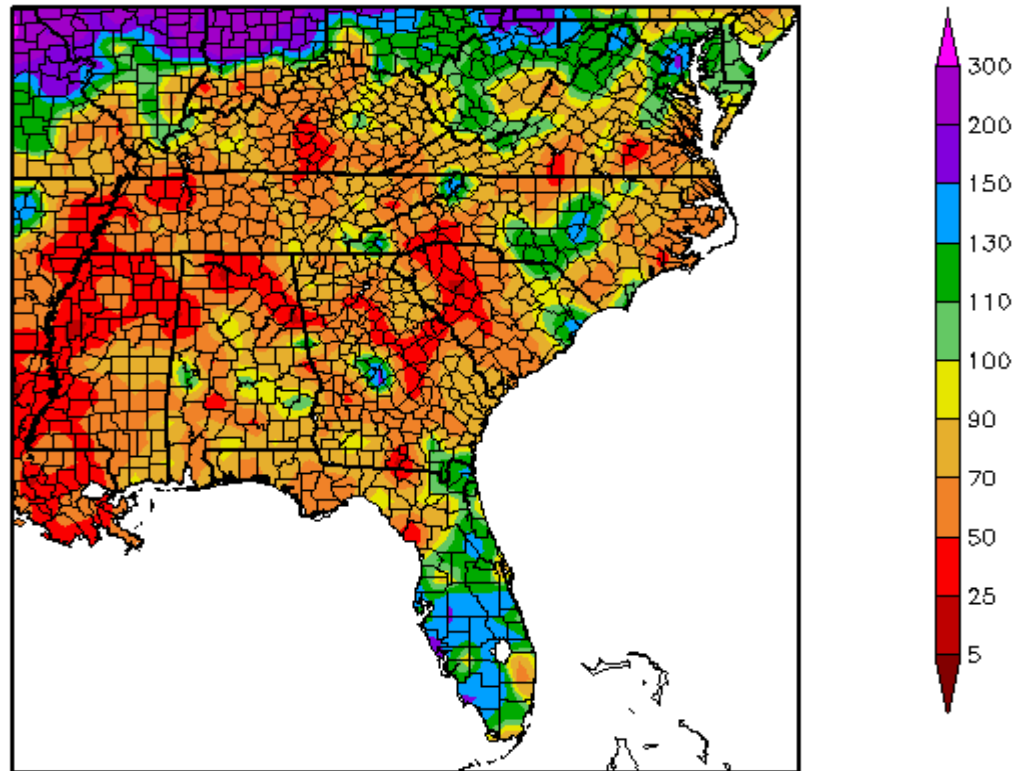




## SFWMD Wet Season Rainfall June-October



Percent of Normal Precipitation (%)  
5/30/2008 – 7/28/2008



Generated 7/29/2008 at HPRCC using provisional data.

NOAA Regional Climate Centers

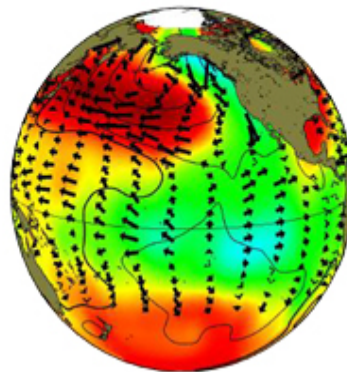
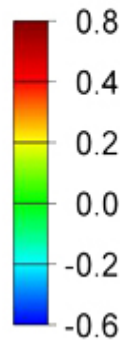
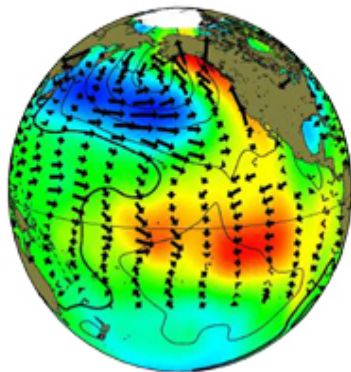
PDO cold phase equals less El Nino more La Nina and drier  
dry seasons

[http://www.americanthinker.com/blog/2008/04/nasa\\_confirms\\_natural\\_climate.html](http://www.americanthinker.com/blog/2008/04/nasa_confirms_natural_climate.html)

### Pacific Decadal Oscillation

positive phase

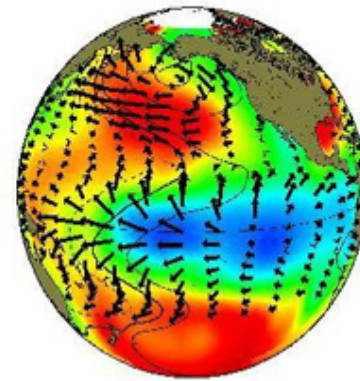
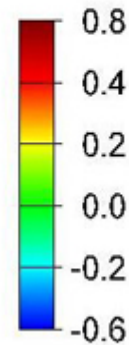
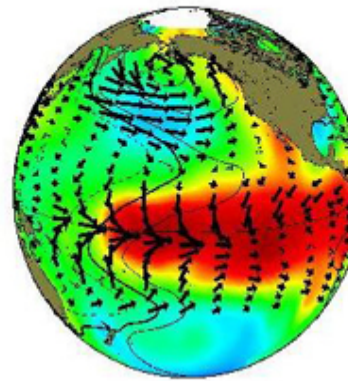
negative phase



### El Nino Southern Oscillation

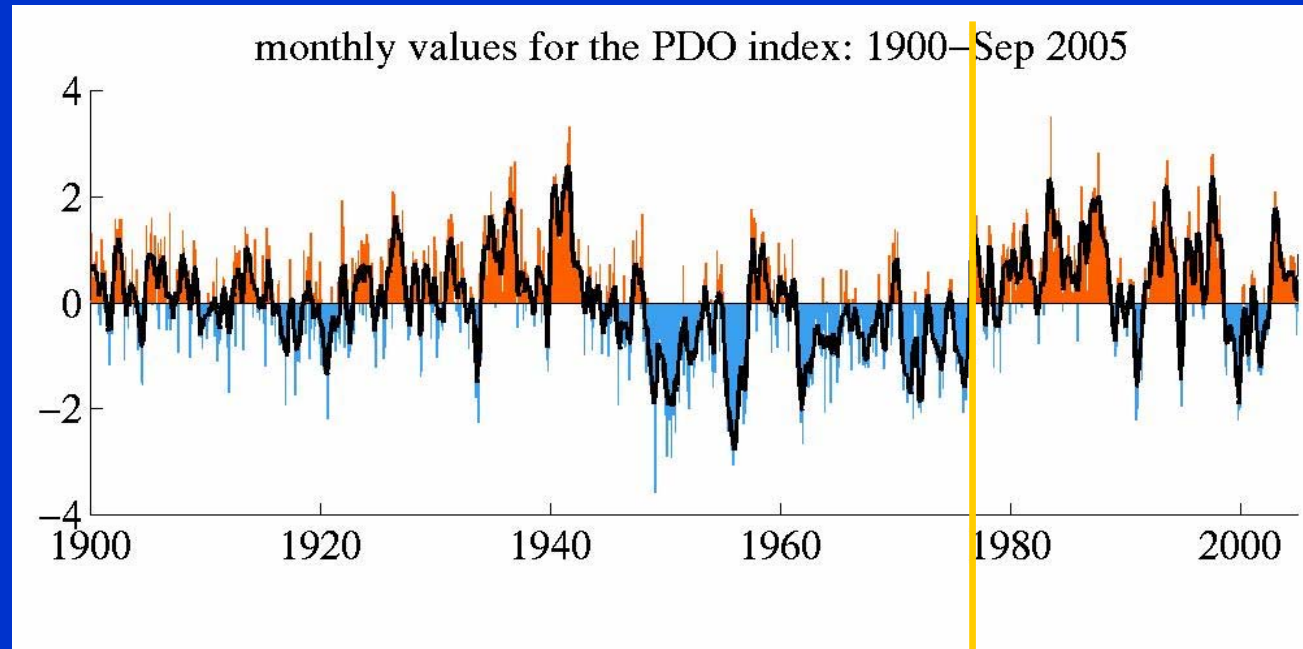
El Nino

La Nina



Currently  
transitioning  
to cold phase of  
PDO

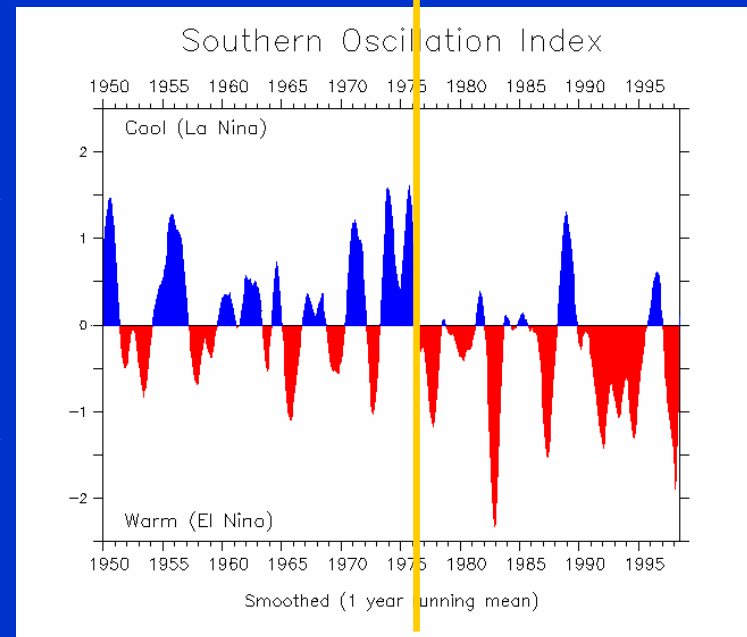
## PDO



## 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.

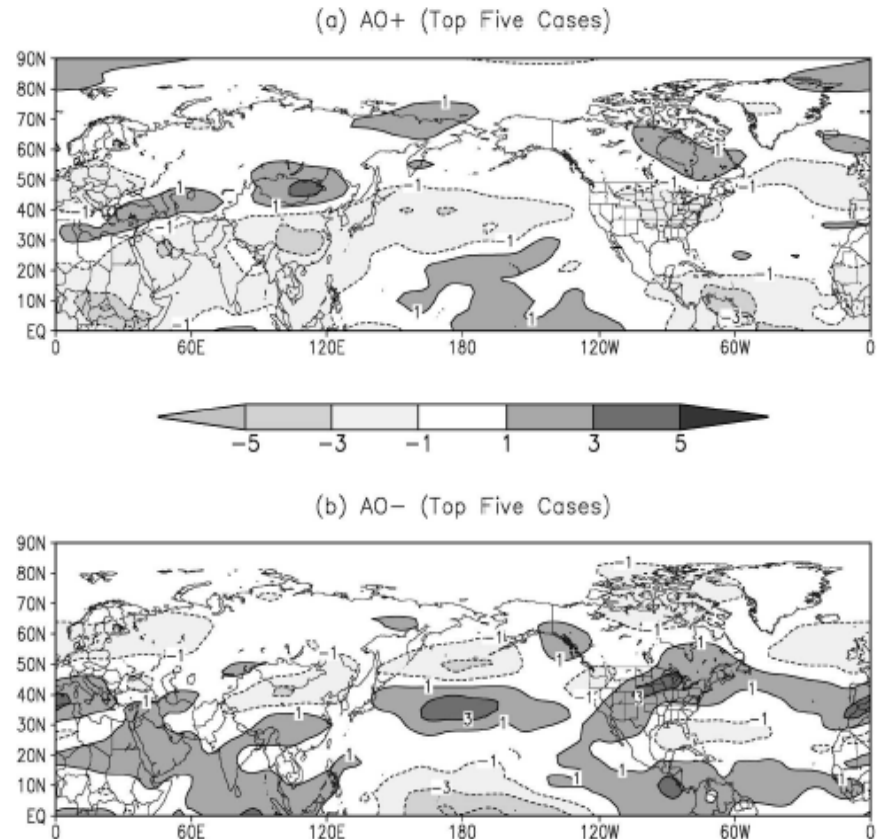
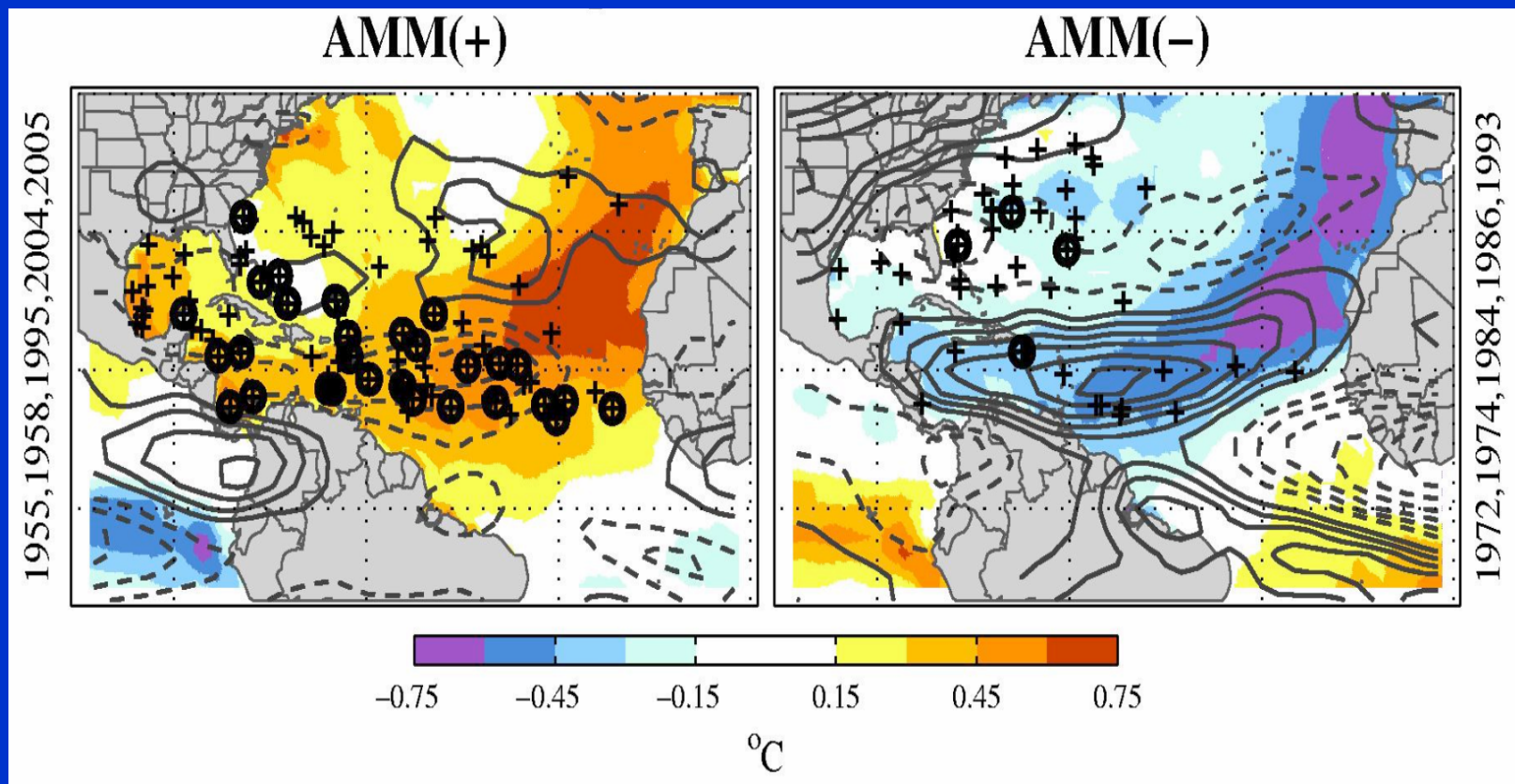


FIG. 11. As in Fig. 10 but for seasonal-mean zonal wind shear anomalies ( $\text{m s}^{-1}$ ); (difference in mean zonal wind anomalies between 200 and 850 hPa).



# 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.



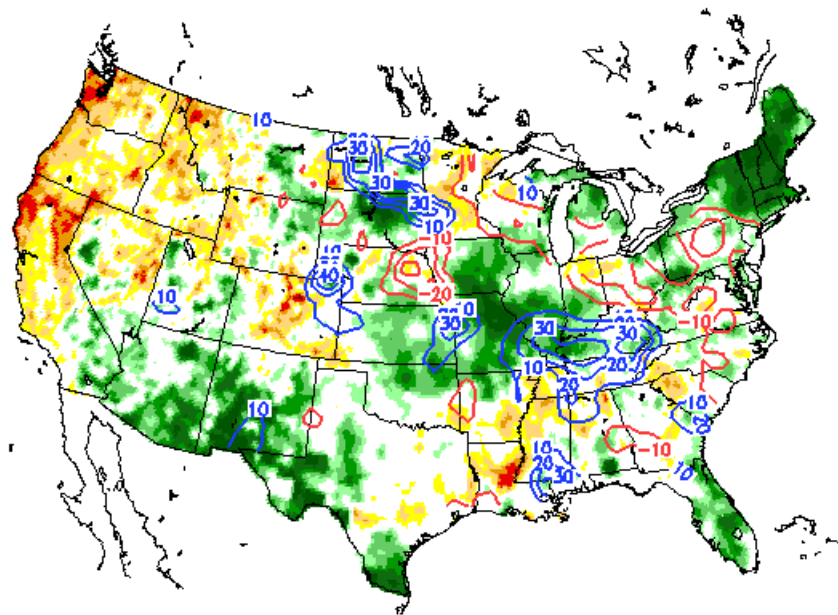
# Moisture Percentile for July 24<sup>th</sup> , 2008

## Land Surface Hydrology Research Group

### Princeton University

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

Total Column Soil Moisture Percentiles on 20080731  
(wrt samples within a 49-day window in 1951-2004)



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

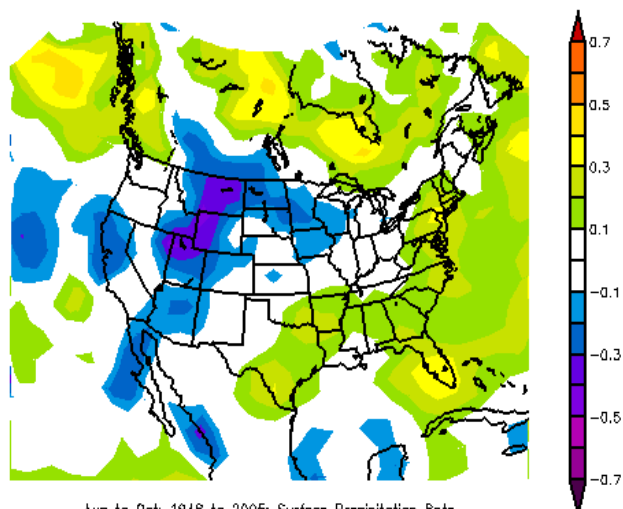


## (Discussion Related to previous Slide)

The drought analysis is based on comparing the current soil moisture against the 54-yr retrospective climatology. The climatology is developed separately for each grid cell ( $> 55,000$  cells in the USA) in the form of a pdf. The original drought analysis (Sheffield et al. 2004) fitted beta distributions to the soil moisture data. In this update a empirical distributions based directly on the data is applied. The plots shows the percentile of current soil moisture with respect to the 54-yr climatology defined as all values in a 49-day sampling window centered at 2008/07/24

## Correlation between RF and Atlantic Meridional Mode and Atlantic Multidecadal Oscillation

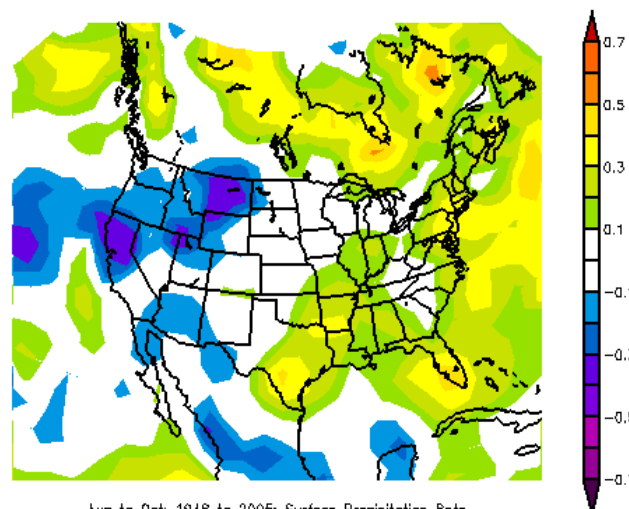
AMM



Aug to Oct: 1948 to 2005: Surface Precipitation Rate  
Seasonal Correlation w/ Aug to Oct AMM  
NCEP/NCAR Reanalysis

NOAA/ESRL Physical Sciences Division

AMO



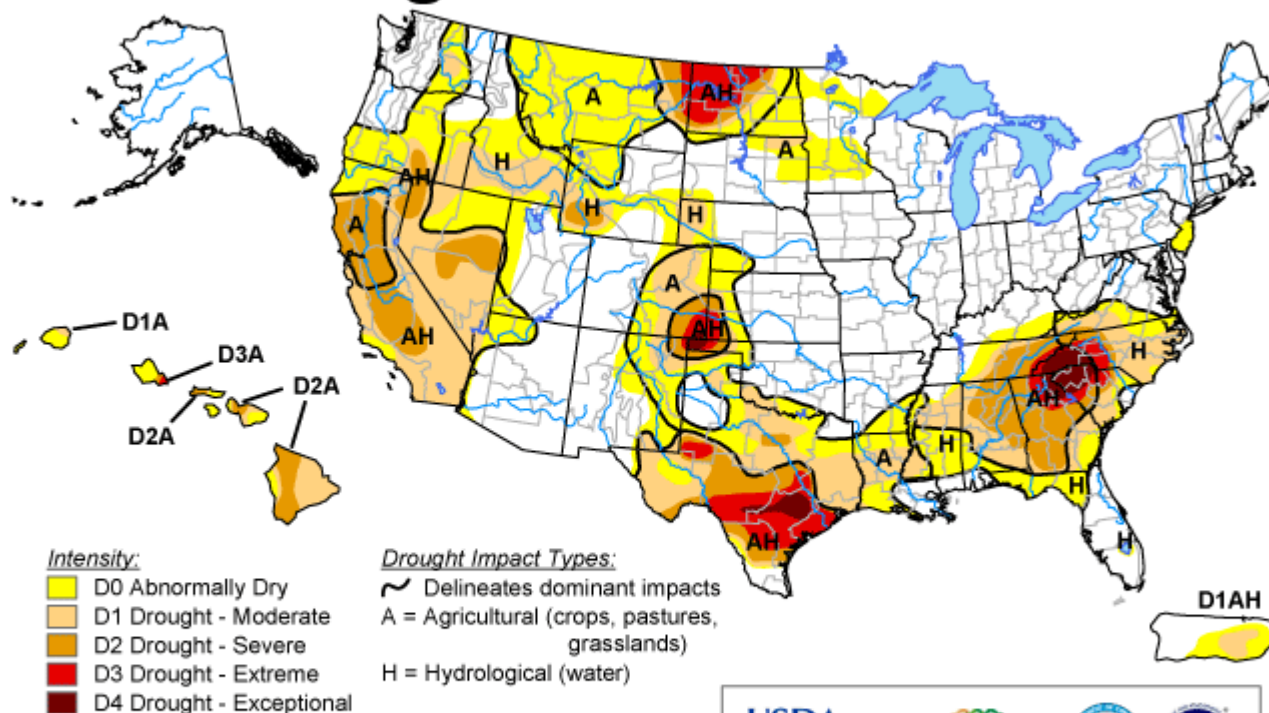
Aug to Oct: 1948 to 2005: Surface Precipitation Rate  
Seasonal Correlation w/ Aug to Oct AMO  
NCEP/NCAR Reanalysis

NOAA/ESRL Physical Sciences Division

# U.S. Drought Monitor

July 29, 2008

Valid 8 a.m. EDT



The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

<http://drought.unl.edu/dm>



Released Thursday, July 31, 2008

Authors: Brian Fuchs, NDMC/Laura Edwards, WRCC

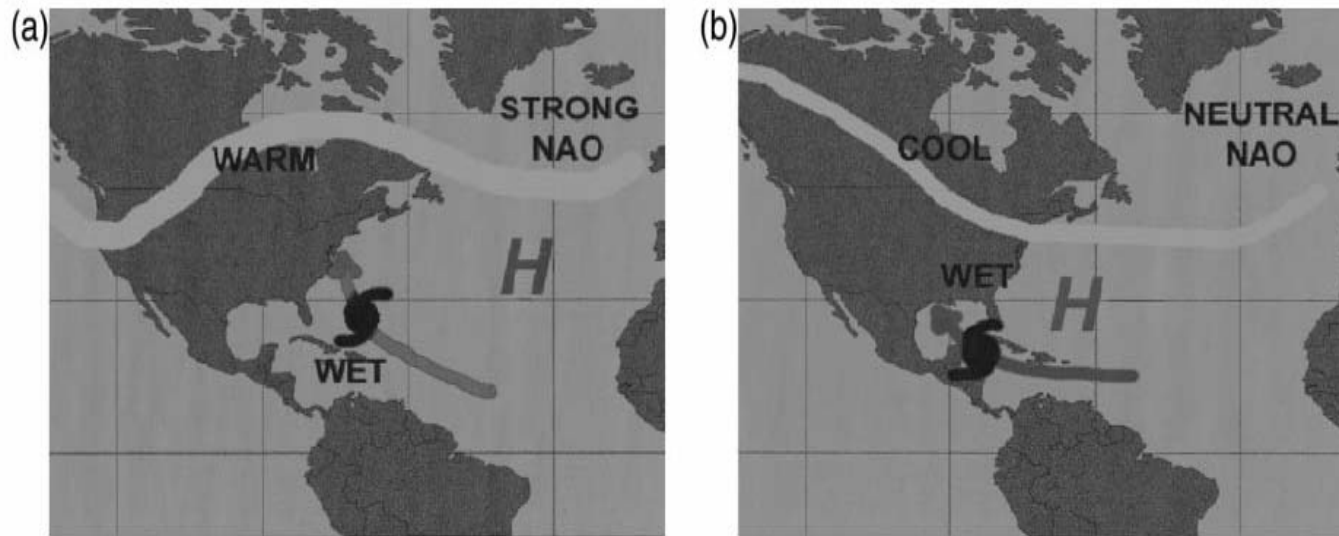


FIG. 3. A sketch of the inferred mean Jul midlatitude jet stream and subtropical high for conditions of (a) strong and (b) neutral NAO. A southwestward shift of the Bermuda high by 3000 yr BP likely brought less precipitation to the northeast Caribbean and more catastrophic hurricanes to the Gulf Coast. Adapted from Liu (1999).

# July 2008 Atlantic Sea Level Pressure and Anomaly

