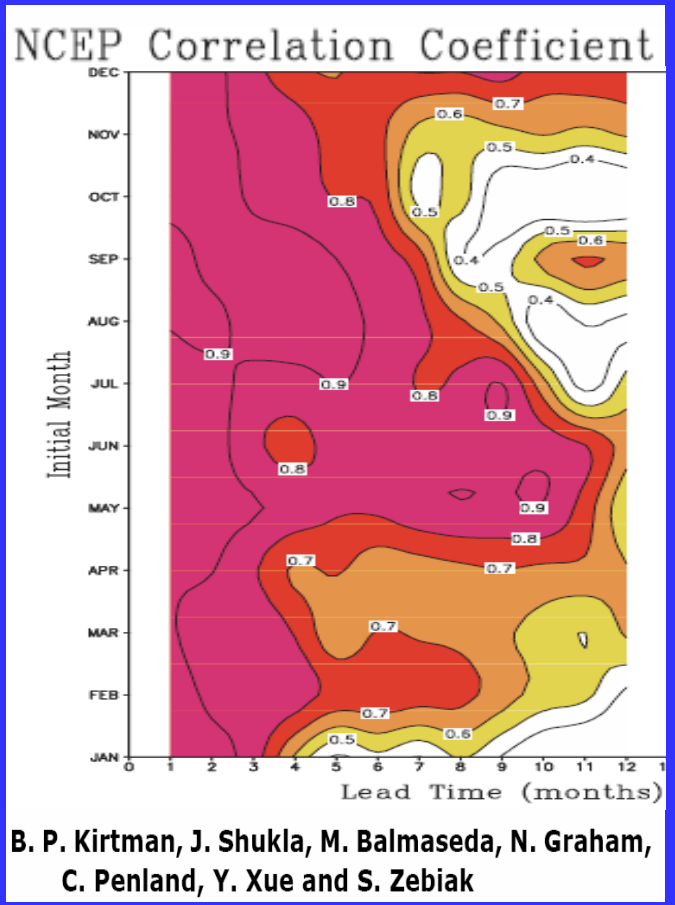
Weekly Climate Update March 31st 2009

- A large area of cooler than normal sea surface temperatures along the North American west coast (are associated with the cold phase of the Pacific Decadal Oscillation) continues to persist while La Nina conditions are expected to weaken in the tropical Pacific during the remainder of the spring. Weak La Nina conditions and the cold phase of PDO are indicative of an increase chance of below normal rainfall during the remainder of the dry season especially the month of April. May rainfall has been tending to be below normal during recent years [slide 35].
- The negative subsurface temperature anomalies along the central and eastern equatorial Pacific Ocean are a sign that La Nina conditions should persist through the remainder of the dry season. The latest IRI and CFS climate/ocean models simulate increased chances of drier than normal conditions for south Florida for the remainder of the dry season.
- The official climate outlook calls for an increased probability of below normal rainfall for the remainder of the dry season (April through June).
- The March Position Analysis in slide 13 - 17 illustrate projected water levels for Lake Okeechobee and the Water Conservation Areas.

Spring Barrier with ENSO Forecasts

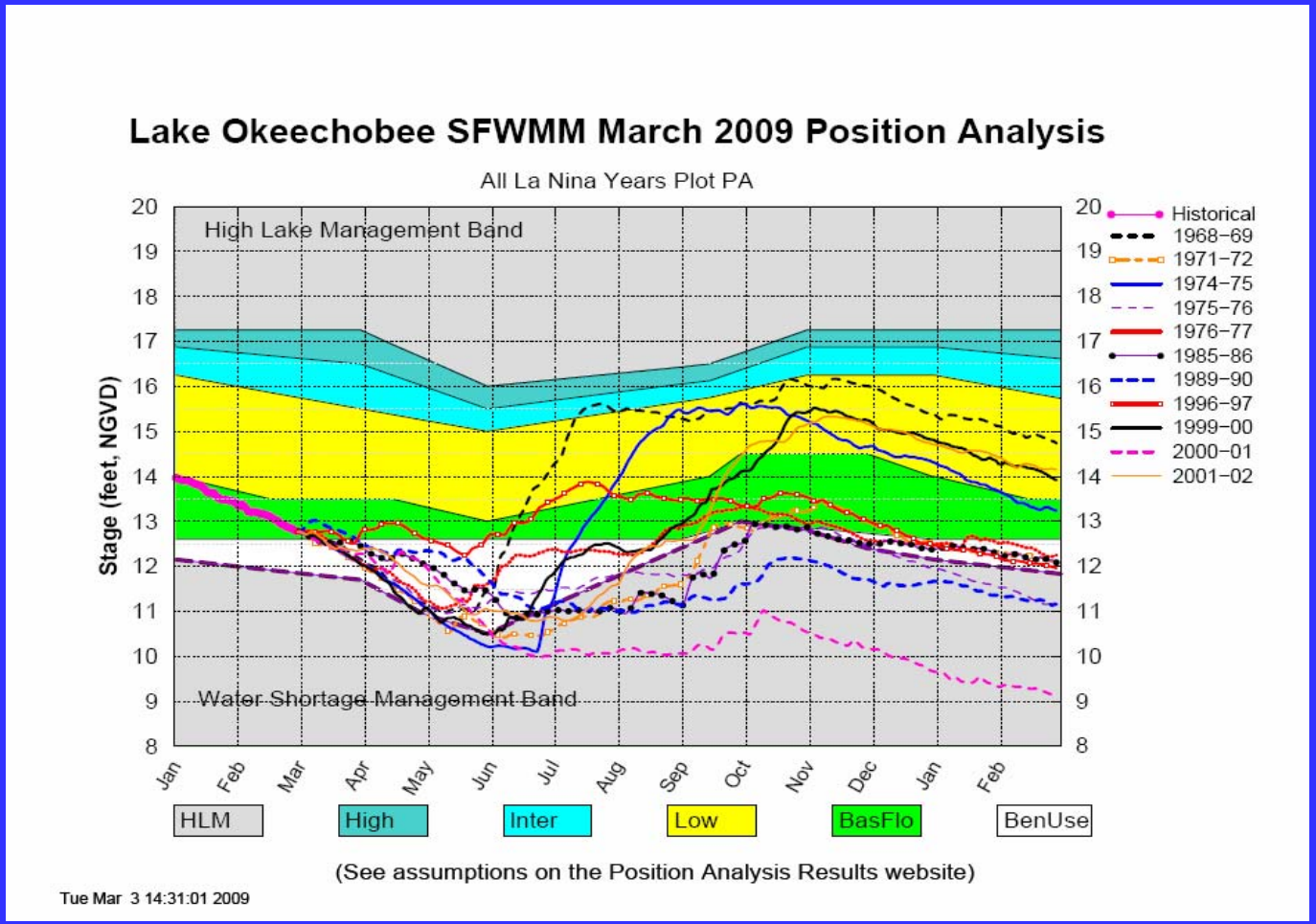
Forecasts skill as a function (month, lead time)

When predicting ENSO the challenge of the spring barrier has been well established over the years. Looking at the graphic, the y- axis indicates the month that the ENSO forecast is made and the x- axis is the lead time. It can be seen that skillful forecast with longer lead times occur starting in the month of May. In most cases when climate outlooks are made they are based on ENSO prediction initiated the previous month. So in the current case during the March Climate Outlook are based on ENSO predictions initiated on February 1st, while the latest April 1st are using March 1st Predictions. It can be seen in the graphic that skilled ENSO prediction skill for longer lead times doesn't increase until May. So expect that the ENSO predictions to improve as we approach summer with Climate outlook skills lagging one month. This is the advantage of the CFS Model as its forecasts are continually updated each day with the most data.



Preliminary March 1st Lake Okeechobee Position Analysis

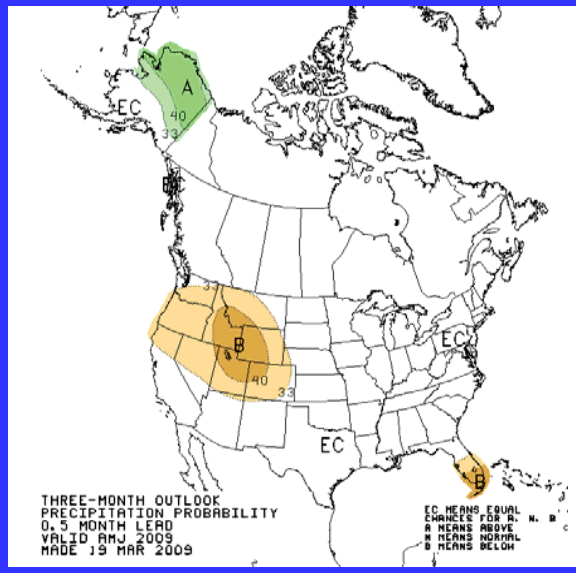
(La Nina Years)



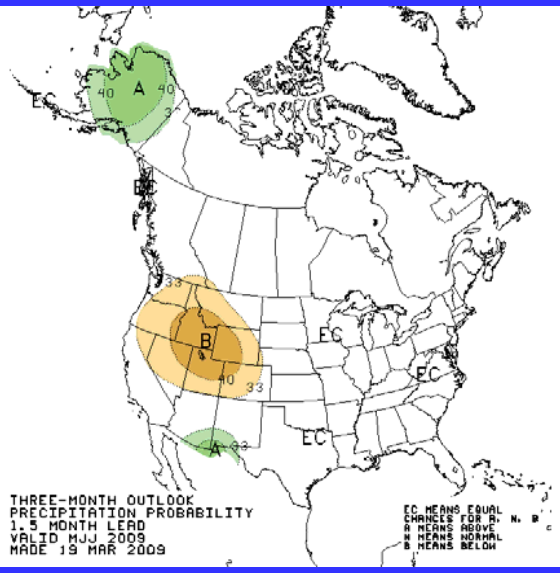
La Nina conditions are currently in place. This condition is associated with drier than normal dry season (November-April) rainfall.

Official CPC Seasonal Rainfall Outlook

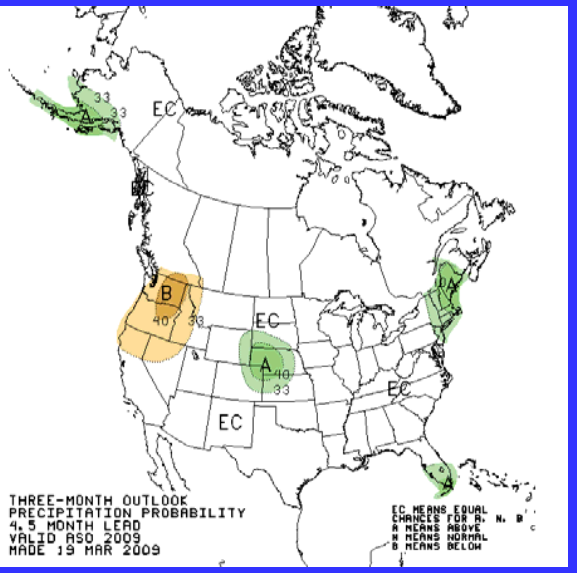
April-May-June



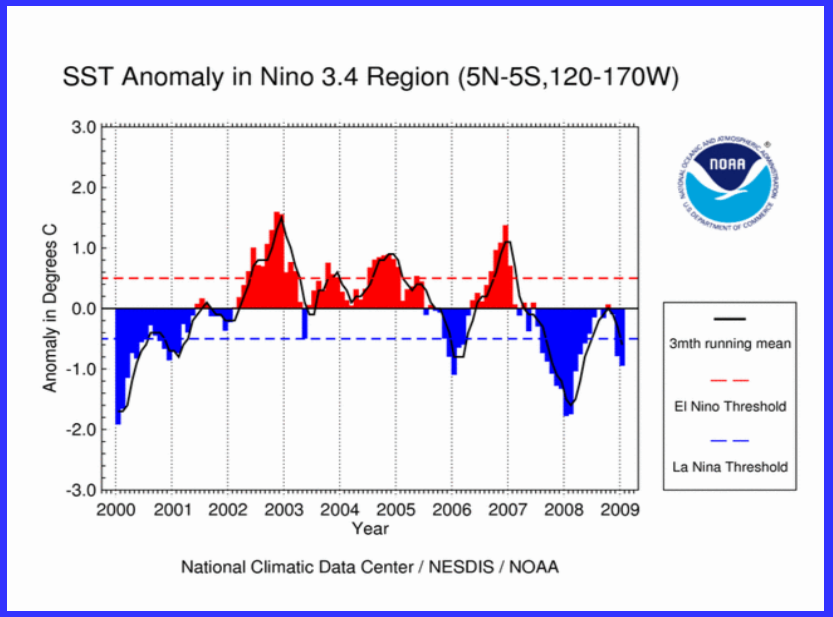
May-June-July



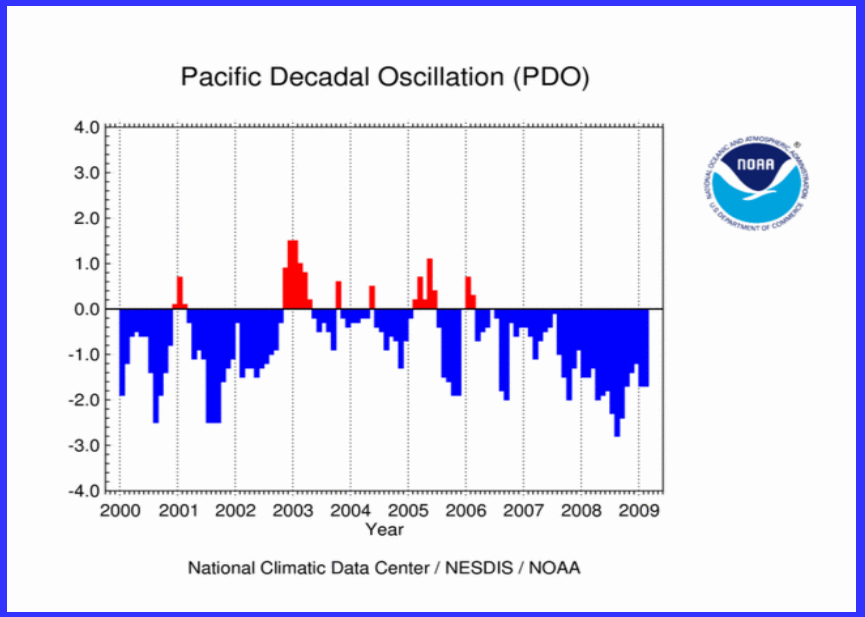
Aug.-Sept.-Oct.

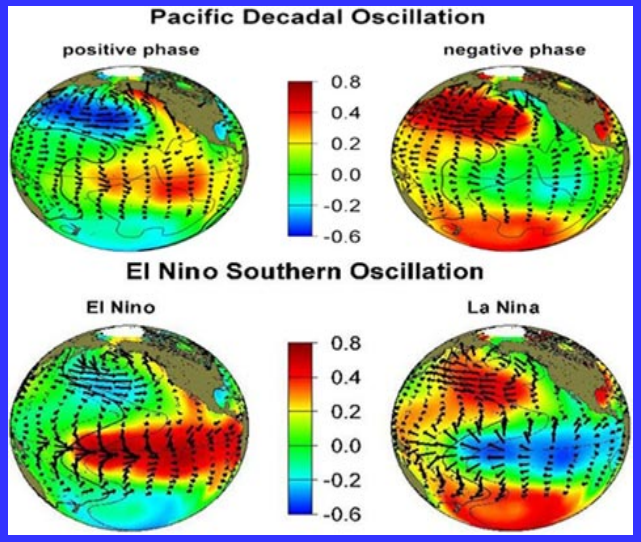


El Nino-Southern Oscillation



Pacific Decadal Oscillation





While the PDO and ENSO influence the same oceanic regions. The periods of oscillations are in different ranges. The ENSO period of oscillation ranges between 3 and 7 years while the PDO period of oscillation is closer to 10 years.

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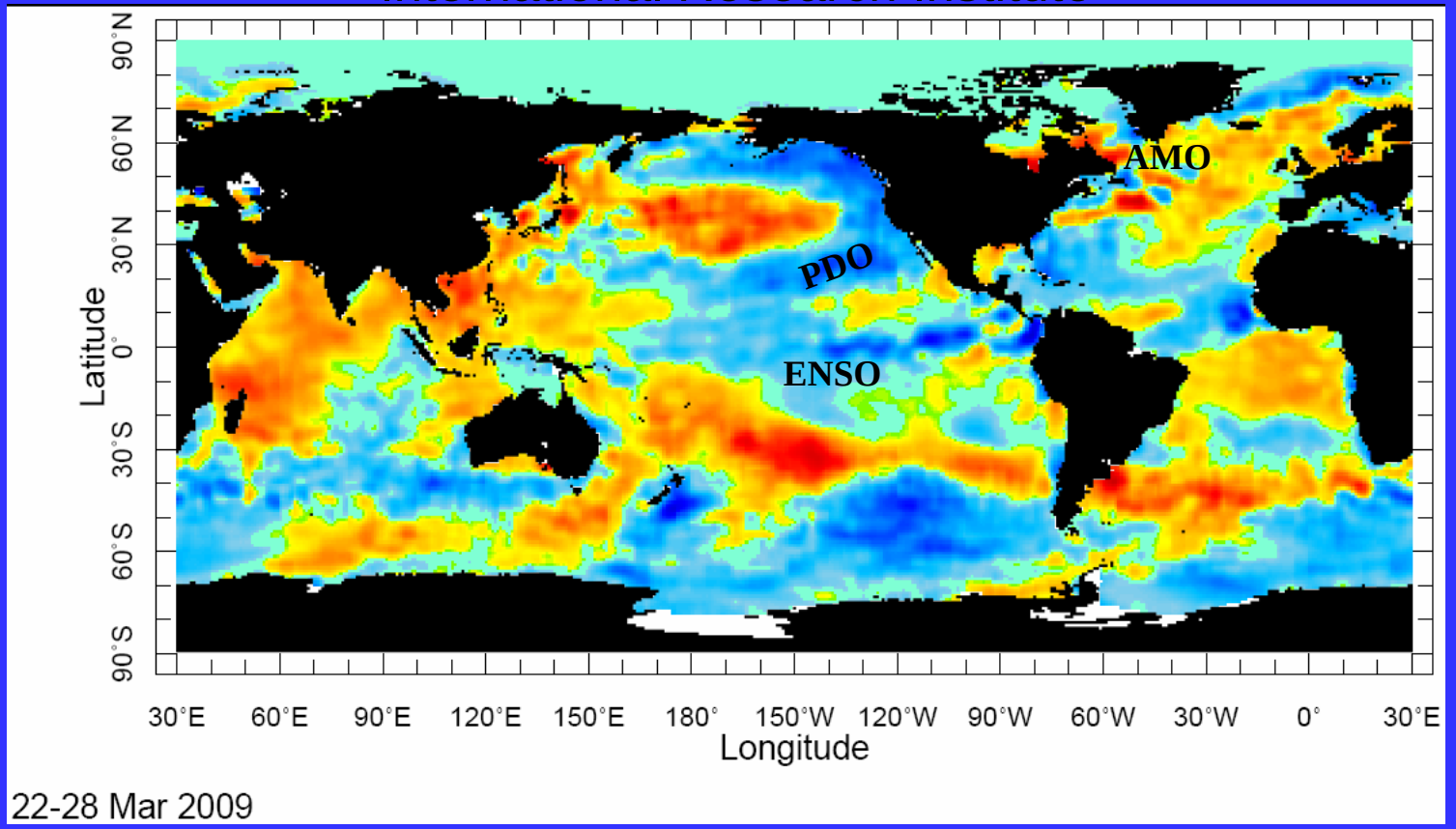
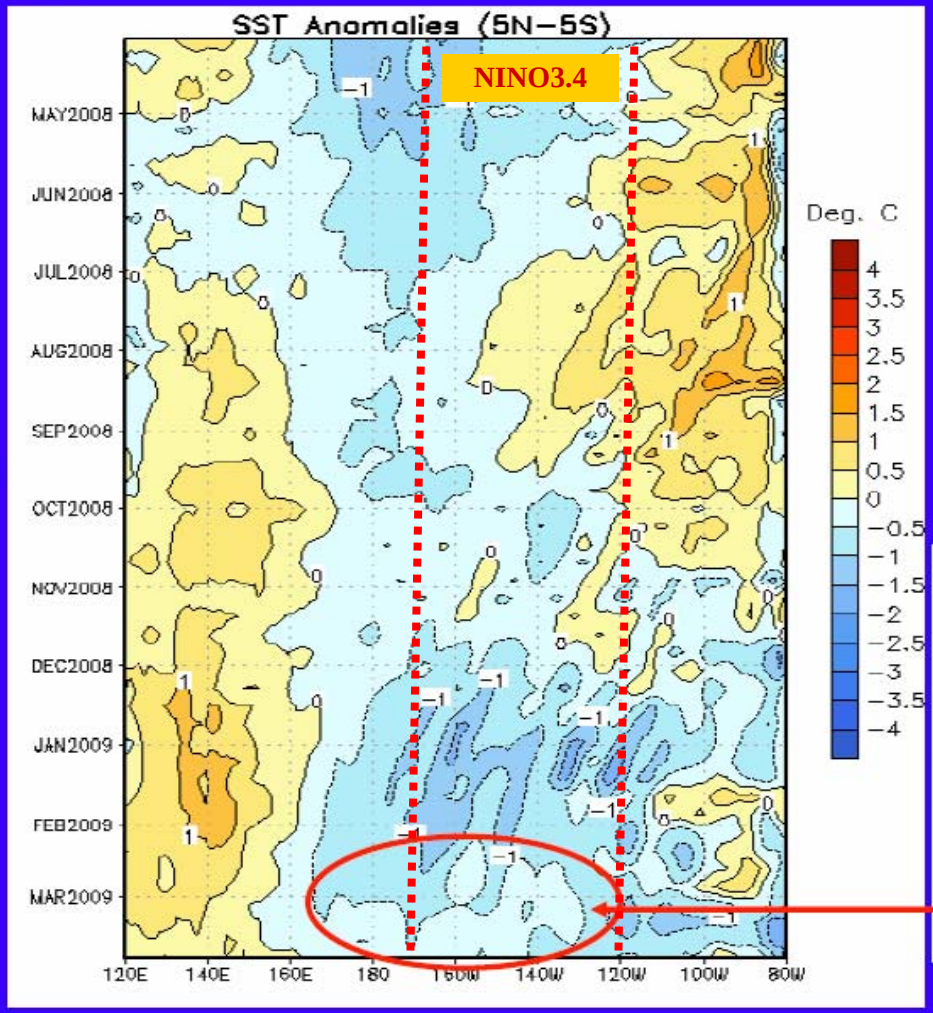
Latest Weekly Sea Surface Temperature Anomaly

International Research Institute



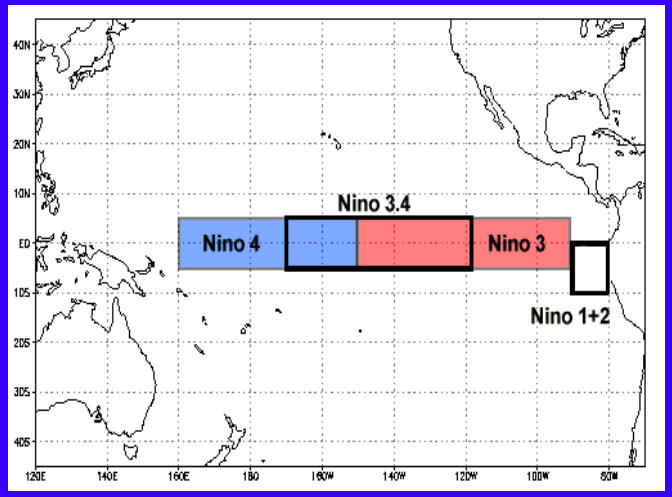
Large area of cooler than normal sea surface temperatures in the equatorial Pacific extending northward to higher latitudes along the west coast of North America are a result of a La Nina condition in the tropical Pacific and the cold phase of the Pacific Decadal Oscillation.

Recent Evolution of Equatorial Pacific SST Departures (°C)



Time

Longitude



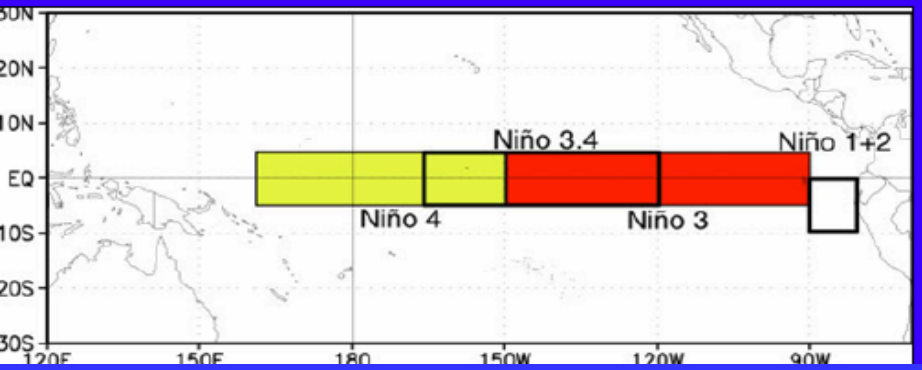
Since October 2008, negative sea surface temperature (SST) anomalies in the central and east-central equatorial Pacific Ocean have been in place.

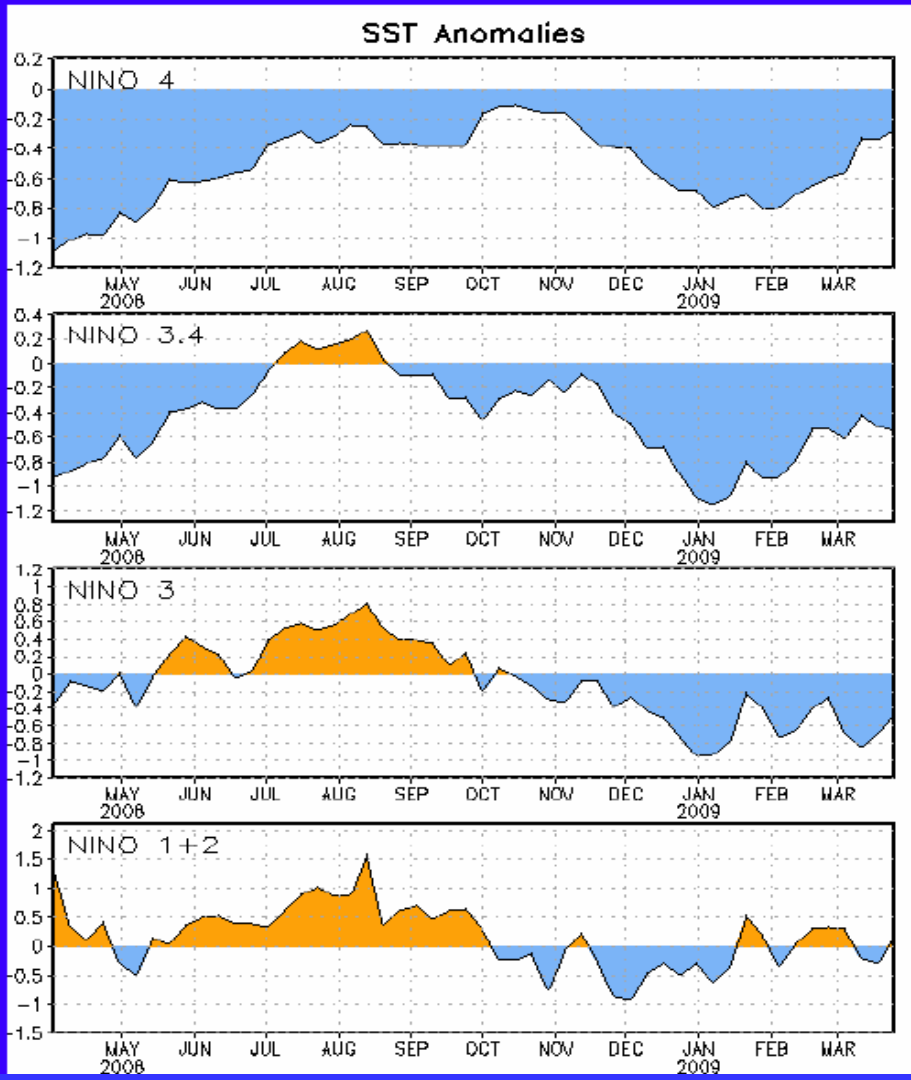
Since February 2009, negative SST anomalies have weakened in the central and east-central Pacific.

Niño Region SST Departures (ºC)
Recent Evolution

The latest weekly SST departures are:

Niño 4	**-0.3ºC**
Niño 3.4	**-0.5ºC**
Niño 3	**-0.5ºC**
Niño 1+2	**0.2ºC**





Equatorial Pacific Subsurface Temperature Anomalies

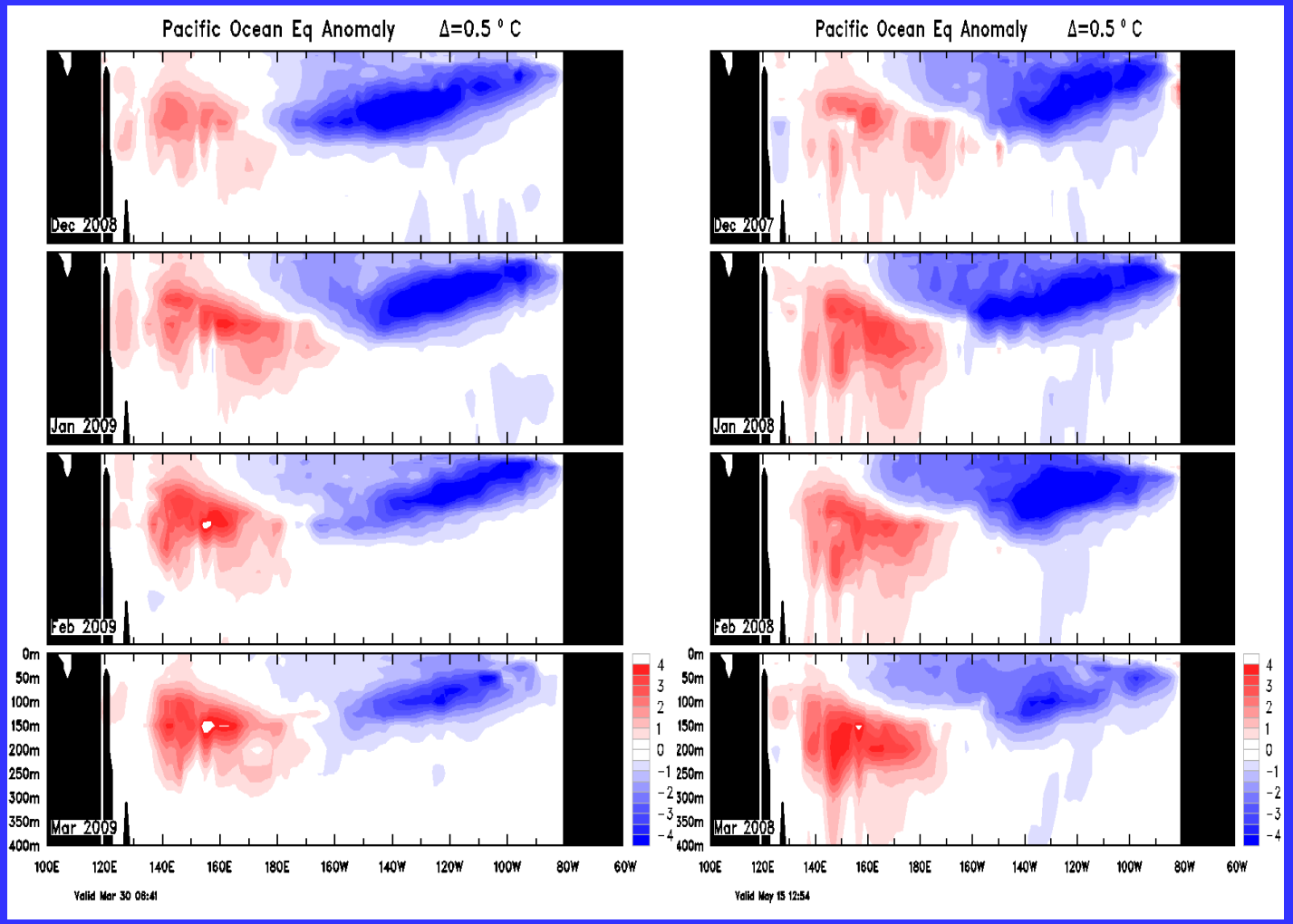
Current 2008

December

January

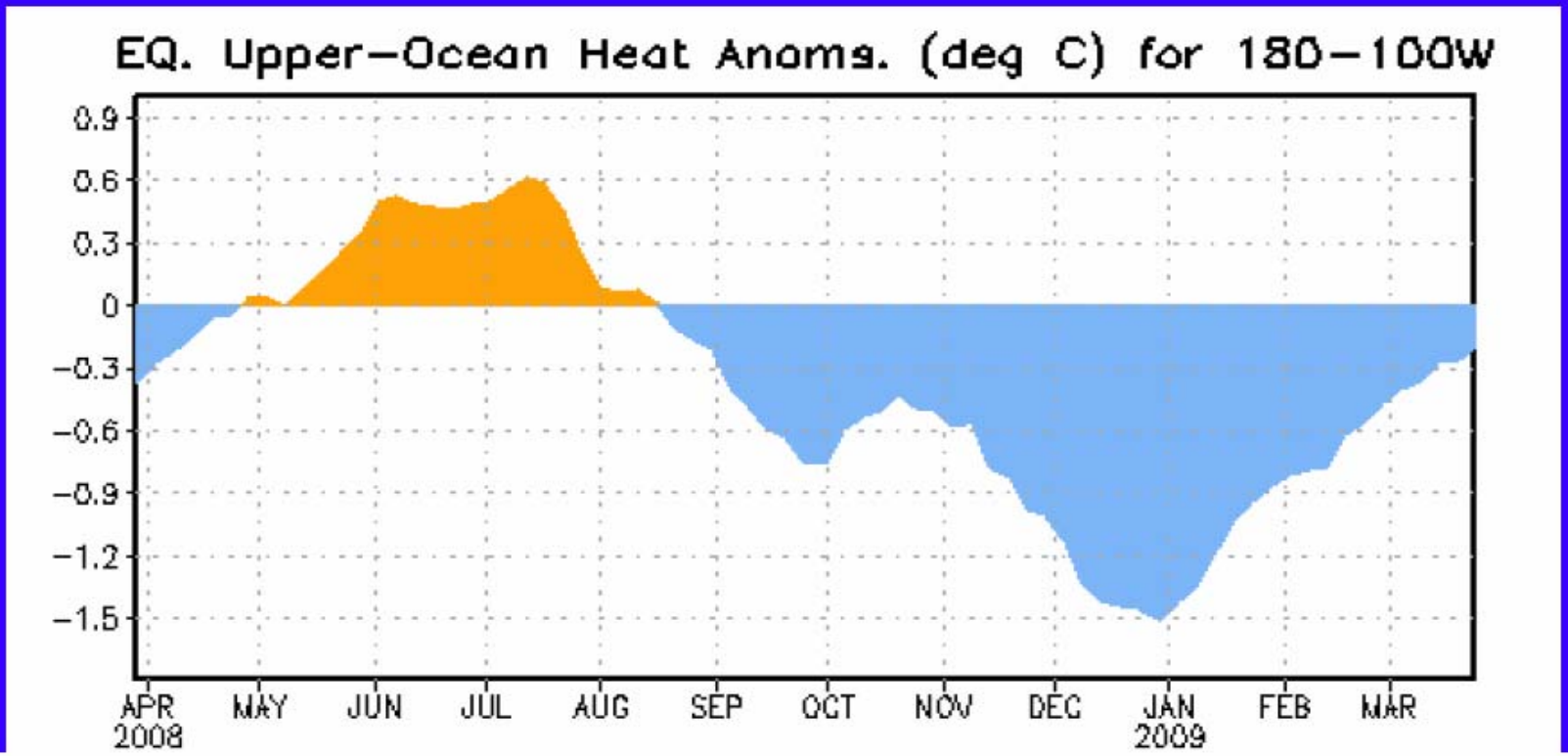
February

March



Subsurface temperatures are similar with slightly smaller anomalies than last year

Central & Eastern Pacific Upper-Ocean (0-300 m) Weekly Heat Content Anomalies

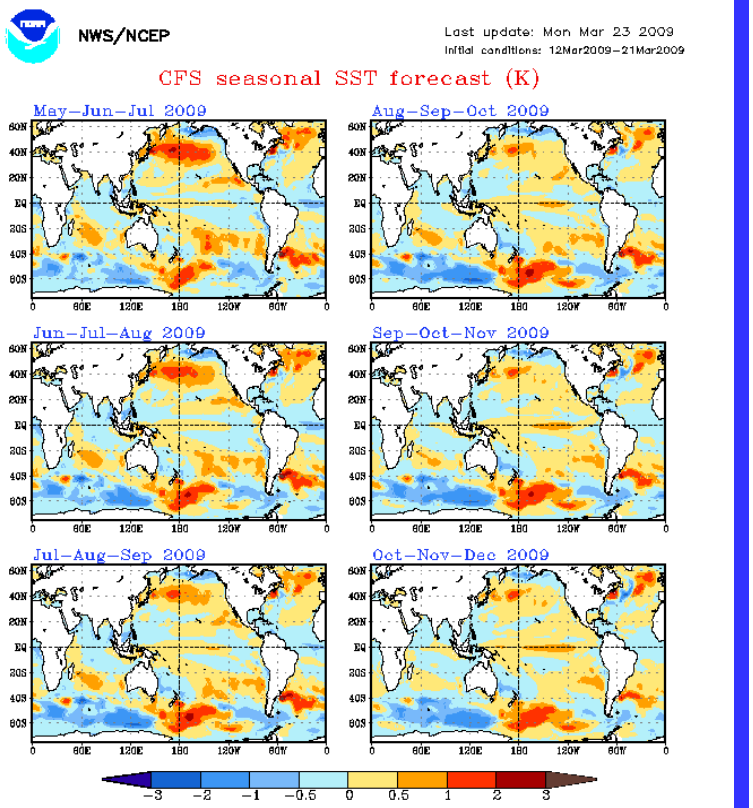


The upper ocean heat content was below-average across the eastern half of the equatorial Pacific Ocean between January and April 2008 and again since mid-August 2008. The negative heat content anomalies have weakened since late December 2008.

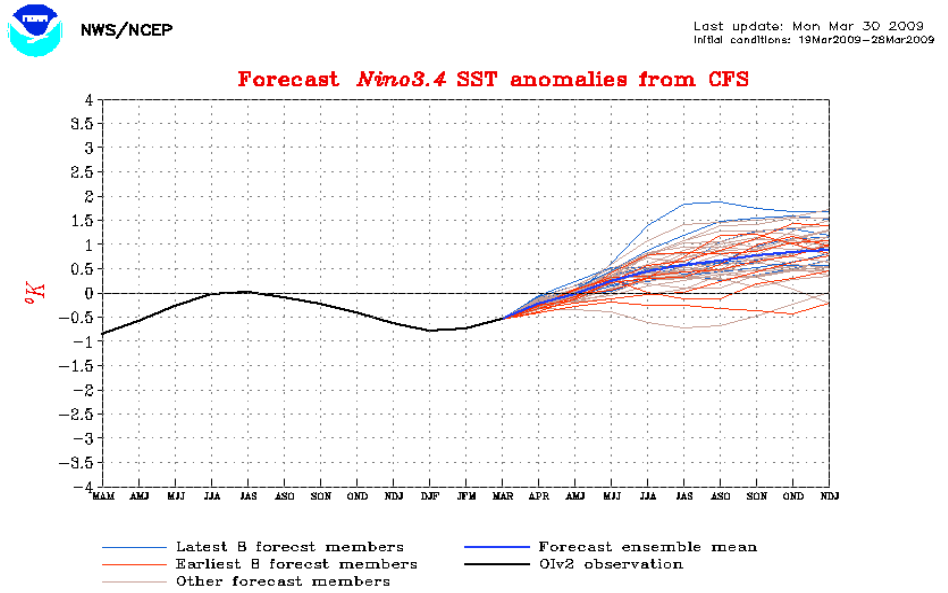
Predicted Sea Surface Temperature Anomalies

Issued March 23rd

Global

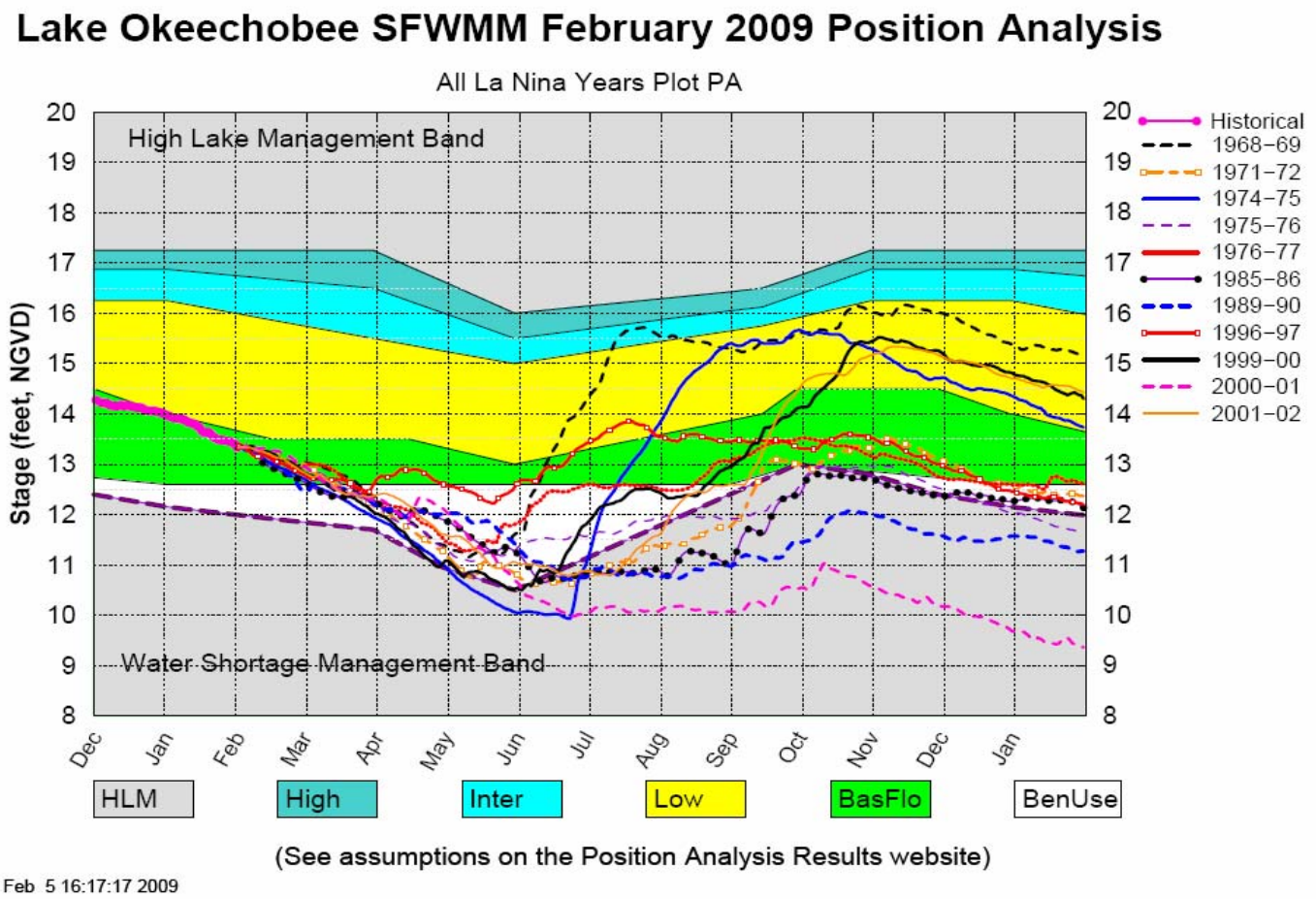


NINO 3.4 Ensemble

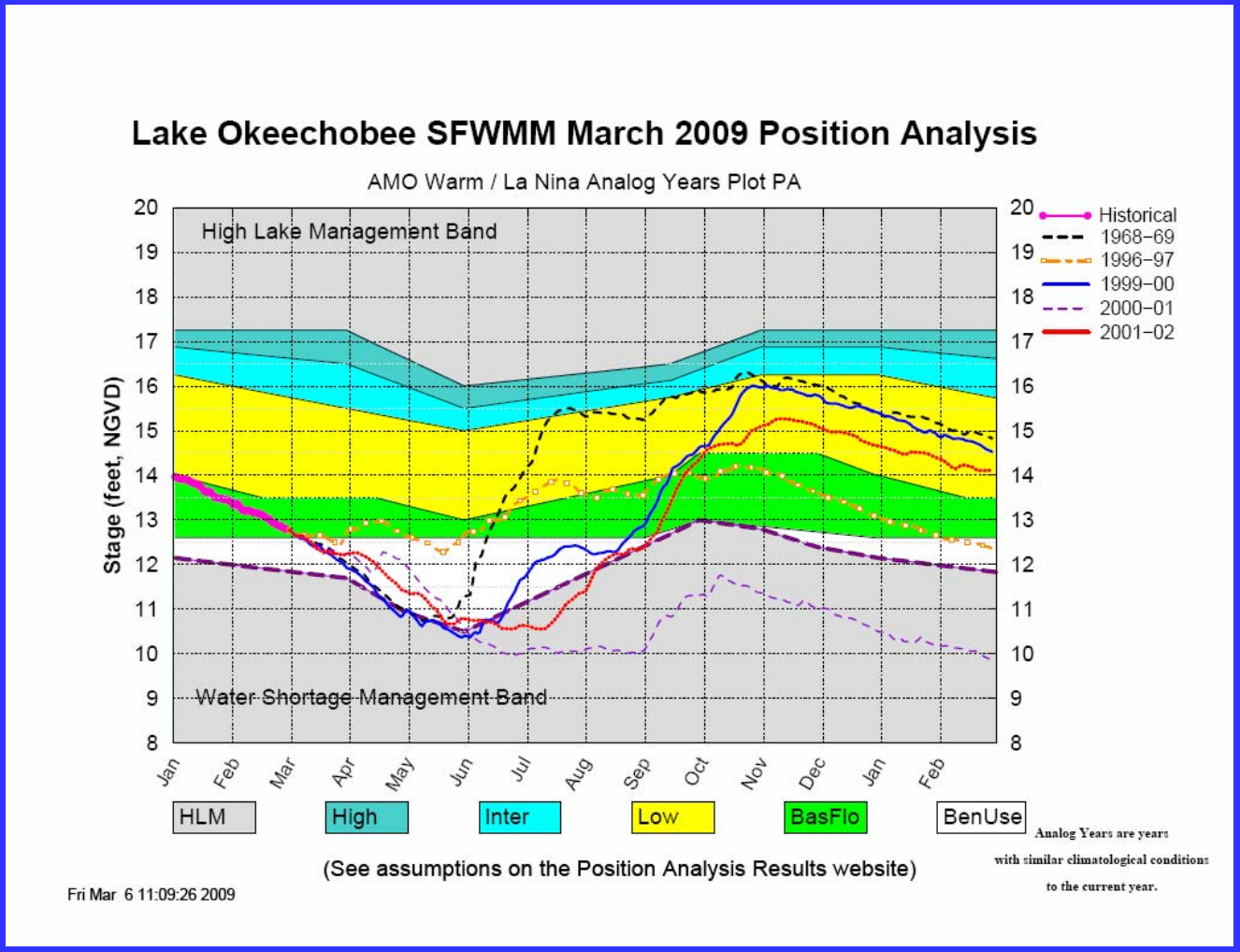


The CFS ensemble mean (heavy blue line) indicates La Niña conditions into Spring 2009

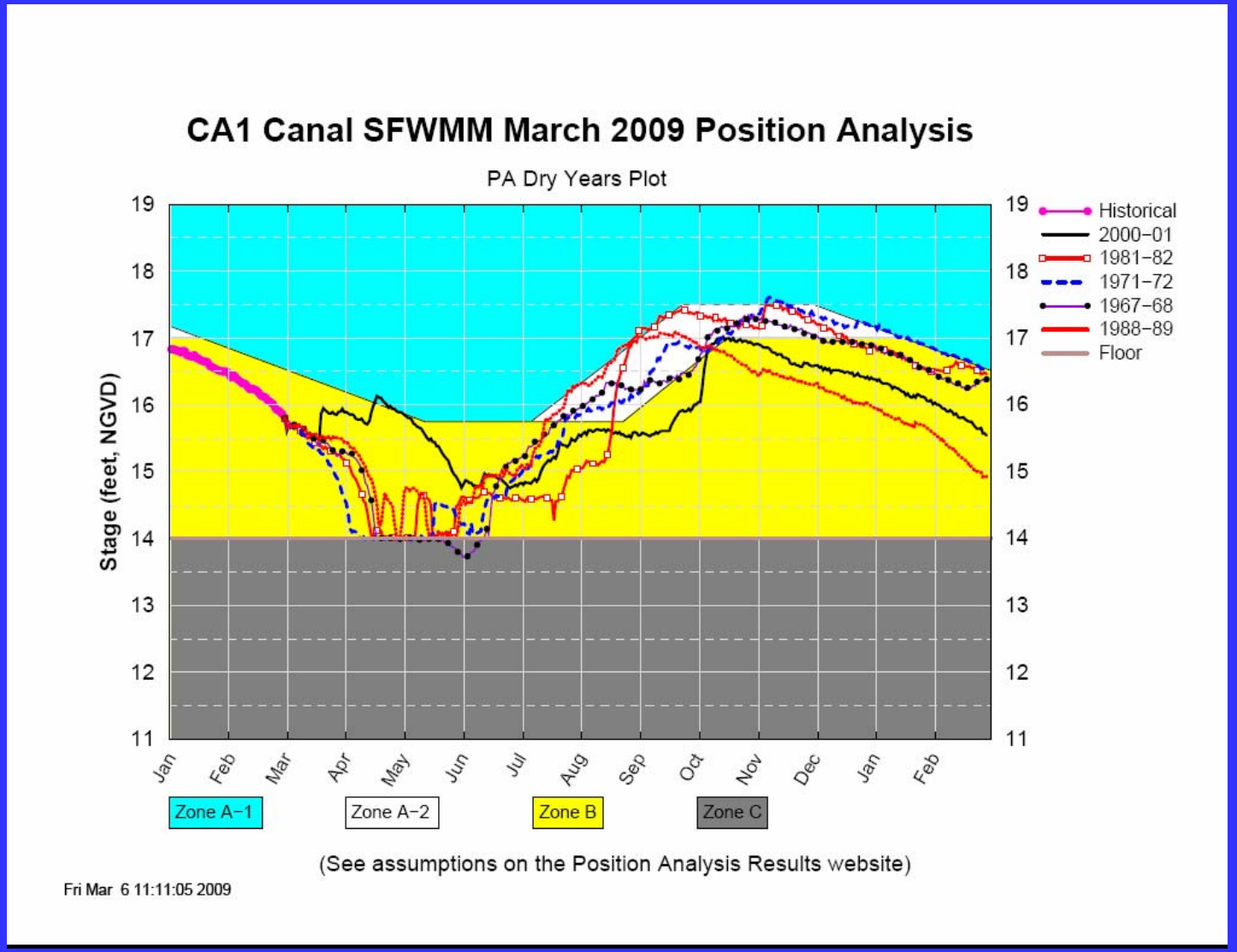
March Position Analysis for La Nina Years



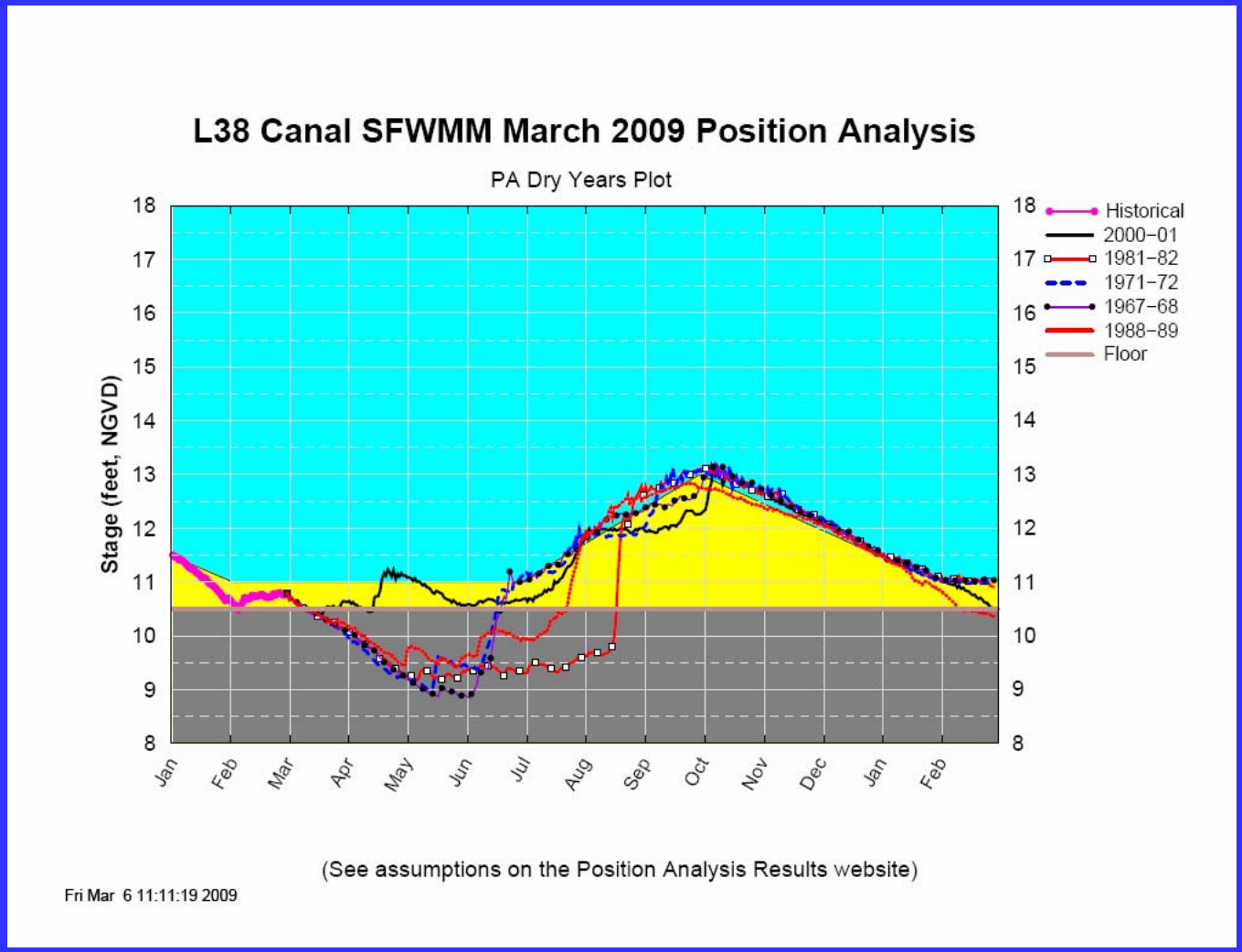
March Position Analysis La Nina /AMO Warm sub sampling



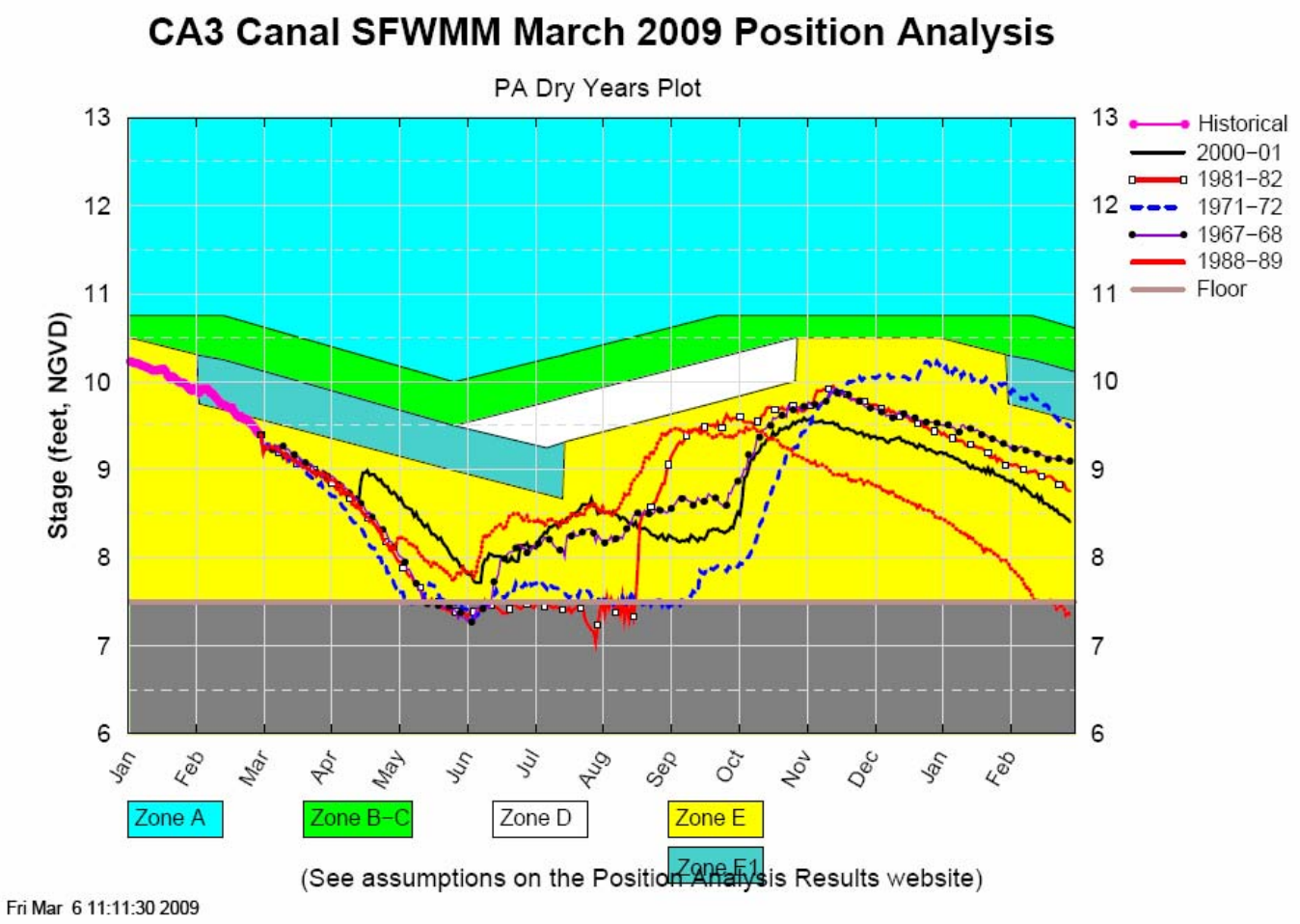
March Position Analysis for Dry Years



March Position Analysis for Dry Years

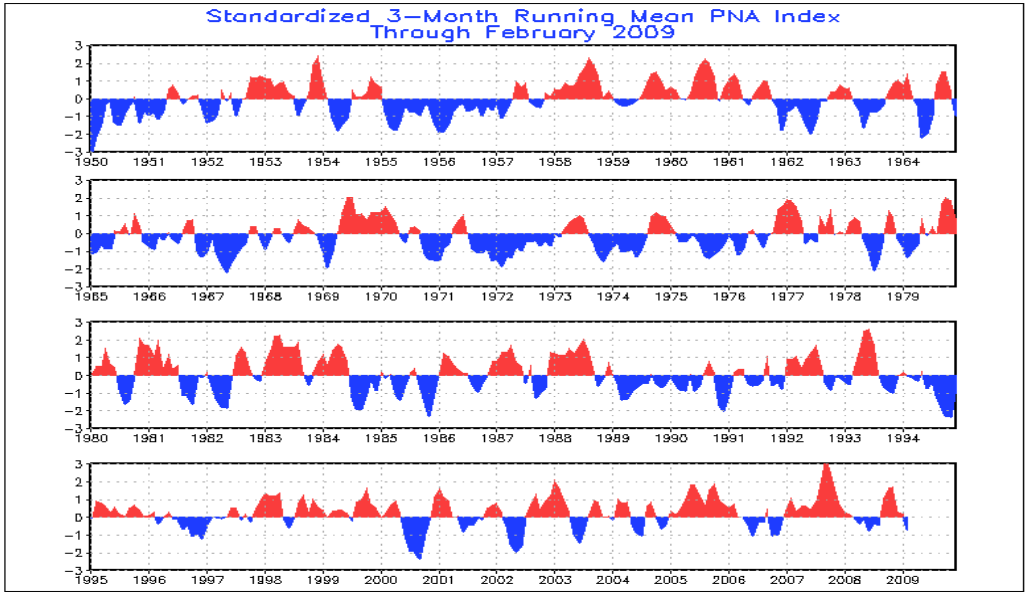


March Position for La Nina/AMO Warm Years



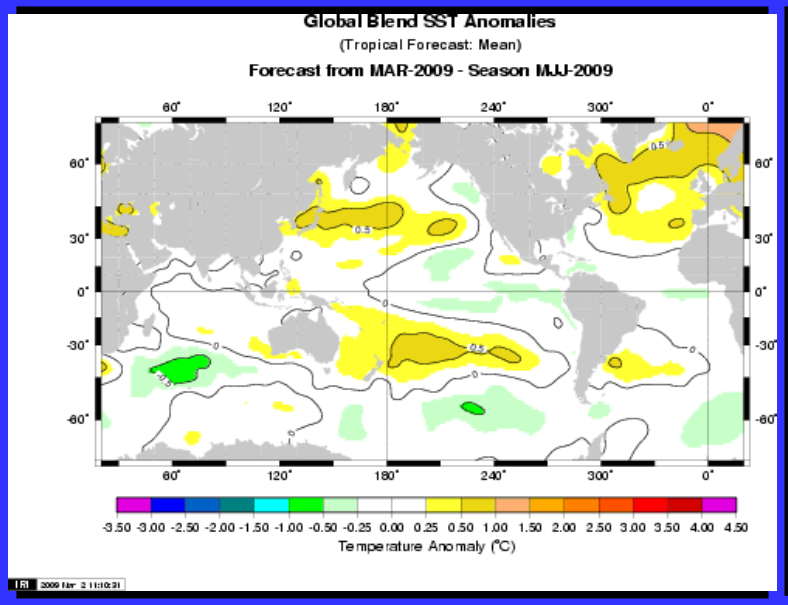
Backup Slides
with additional support material

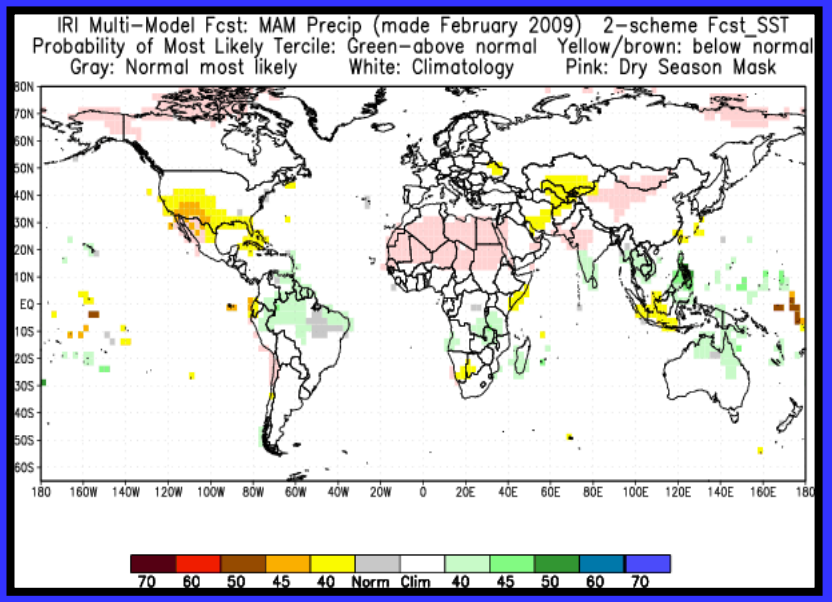
Pacific – North American Index



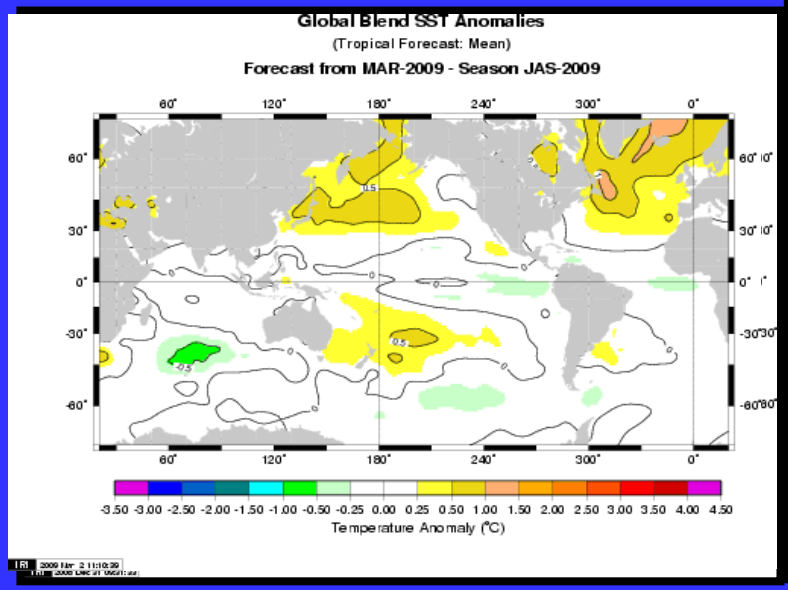
IRI Multi-Model Forecasts 2009

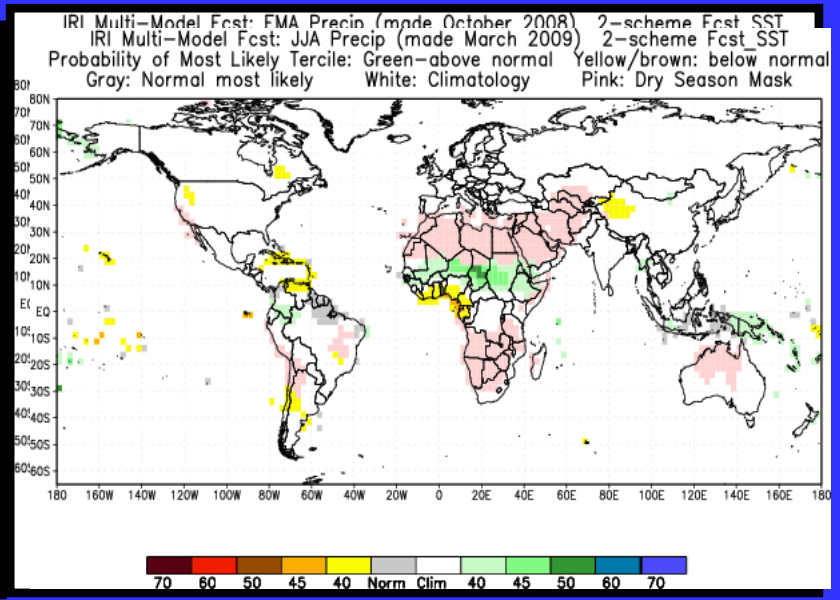
AMJ





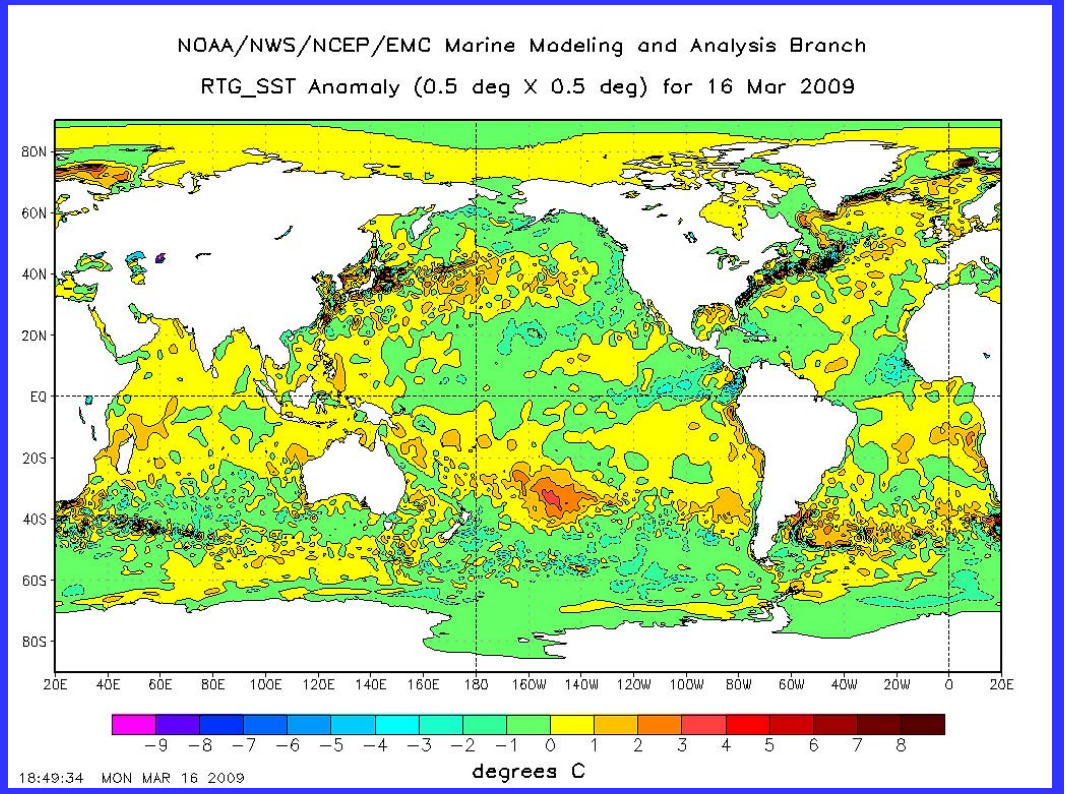
JAS

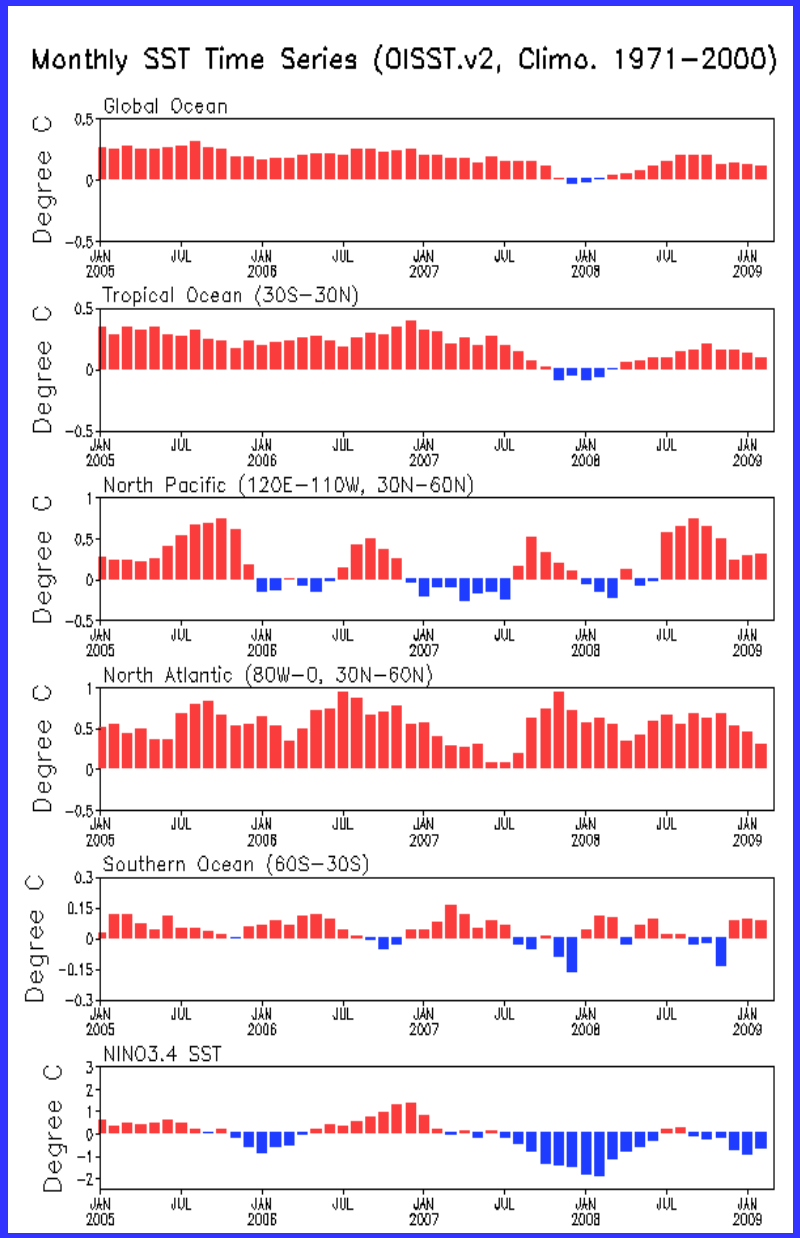




Summary of Global Sea Surface Temperature Anomalies by Regions

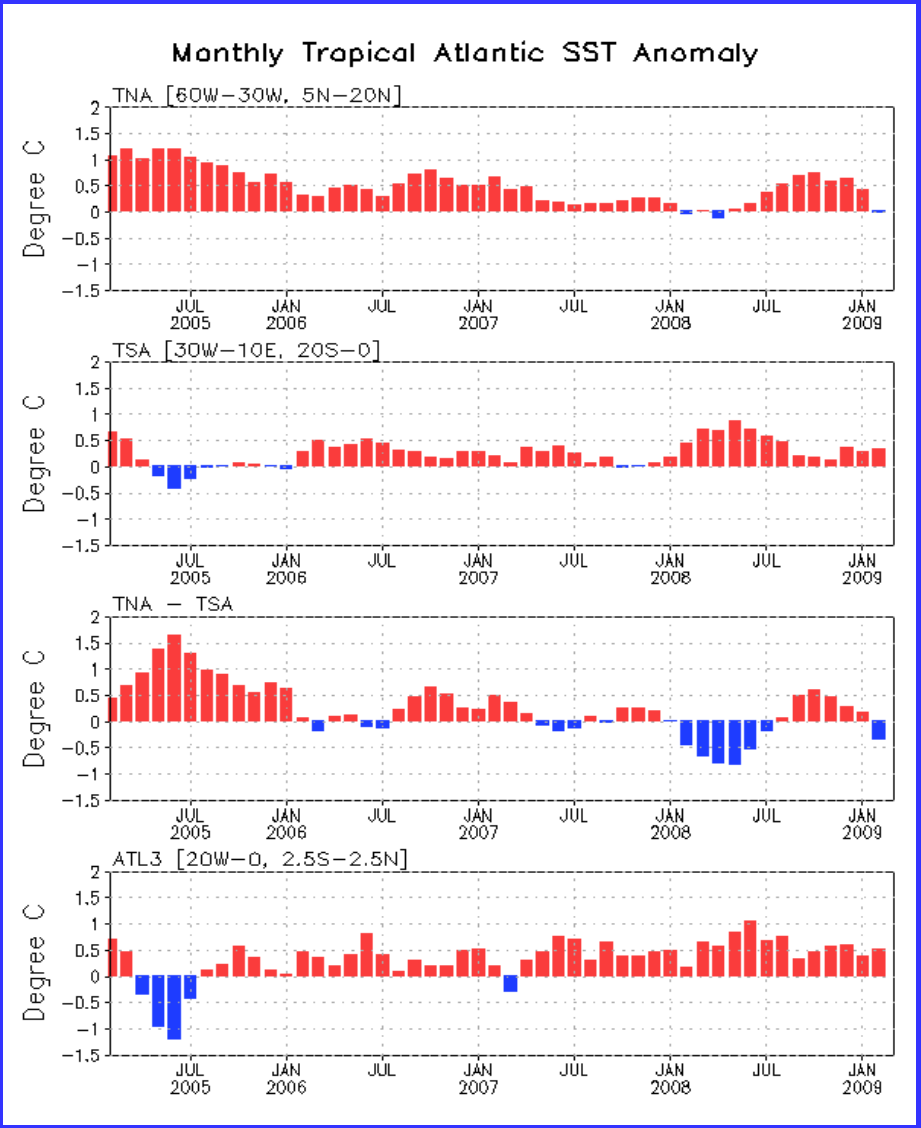
- La Nina conditions
- Tropical North Atlantic cooler than normal



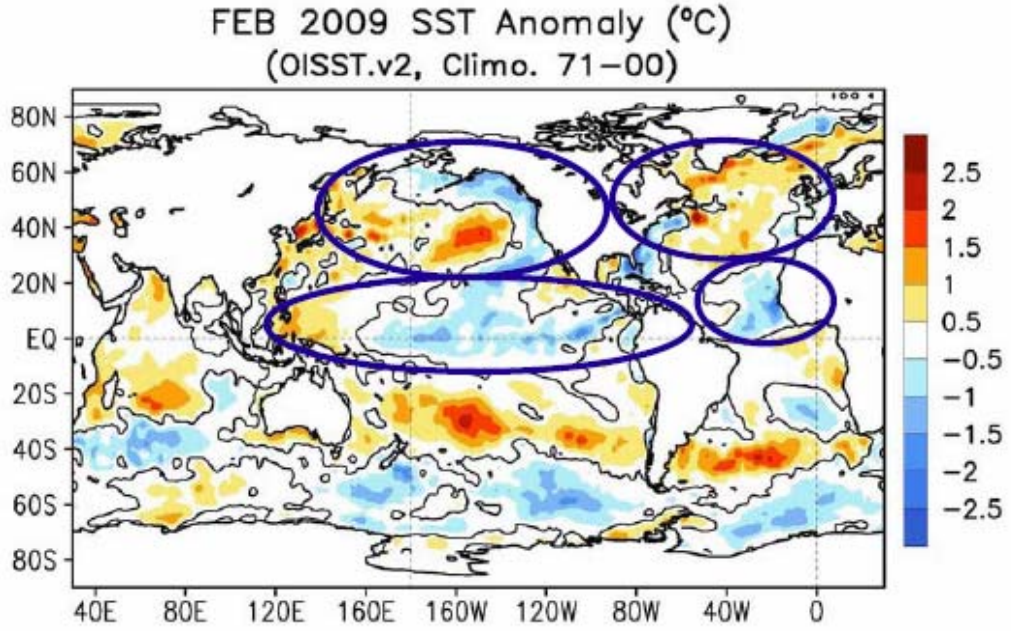


Weekly update: http://ioc3.unesco.org/oopc/state_of_the_ocean/all/

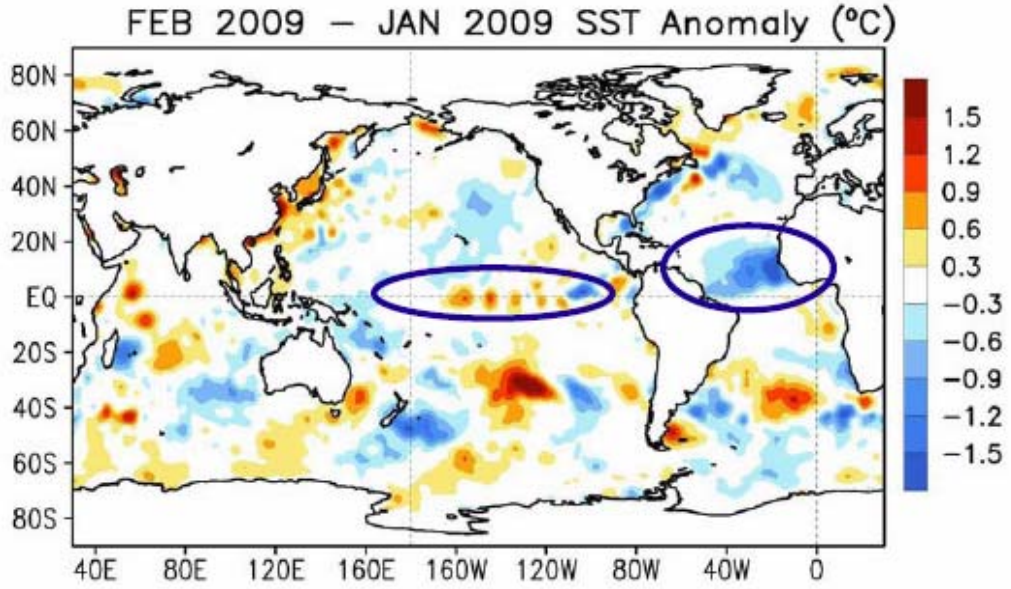
Status of the Tropical Atlantic SSTA



Global SST Anomaly (°C) and Anomaly Tendency



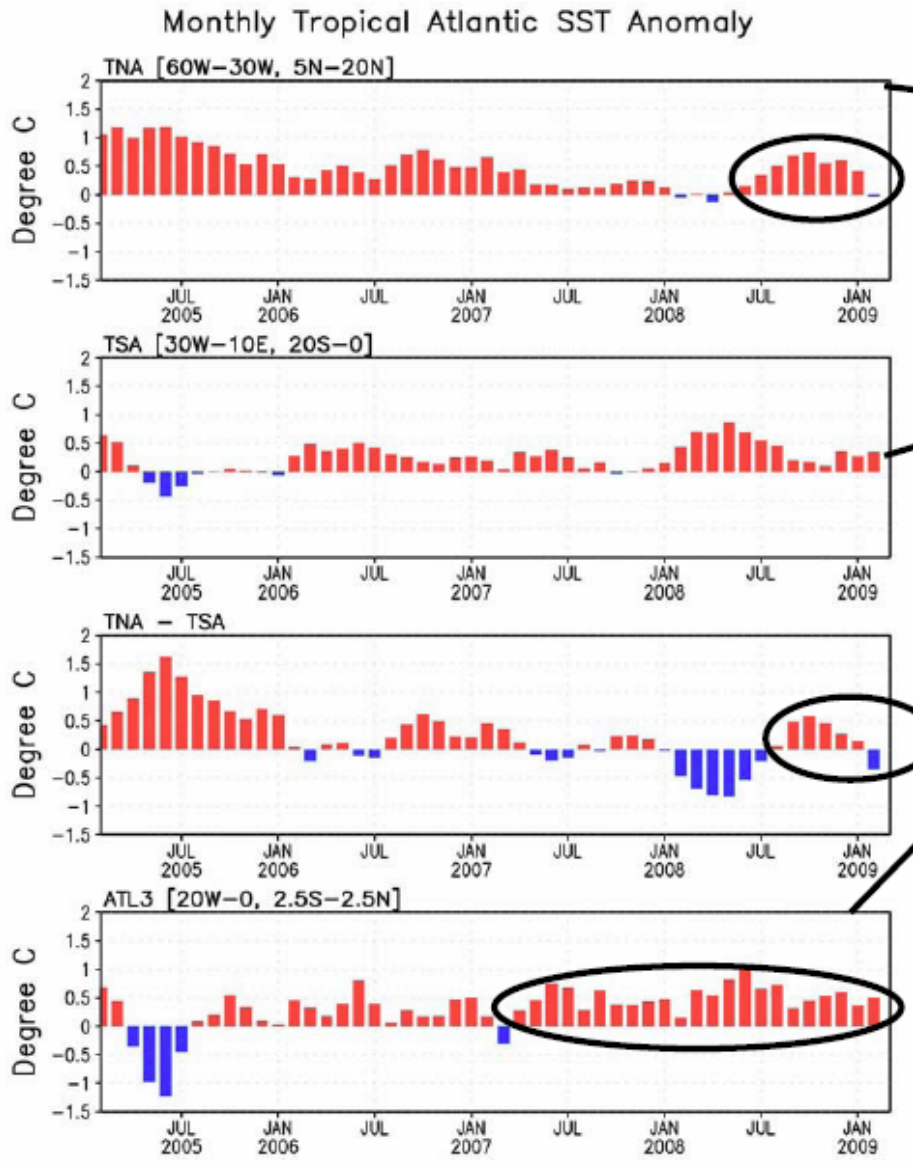
- Negative PDO-like SST pattern in North Pacific.
- La Niña Conditions in the tropical Pacific.
- Positive SSTA in the North Atlantic.
- Negative SSTA in the northeastern tropical Atlantic

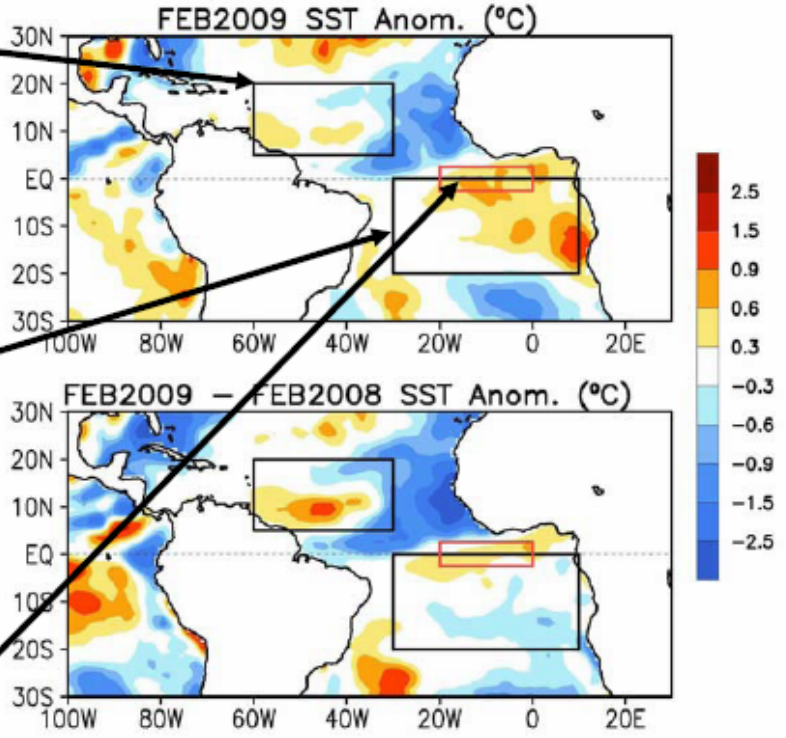


- Positive SSTA tendency in the central-eastern tropical Pacific: La Niña weakened.
- Negative SSTA tendency in the northeastern tropical Atlantic.

Fig. G1. Sea surface temperature anomalies (top) and anomaly tendency (bottom). Data are derived from the NCEP OI SST analysis, and anomalies are departures from the 1971-2000 base period means.

Evolution of Tropical Atlantic SST Indices



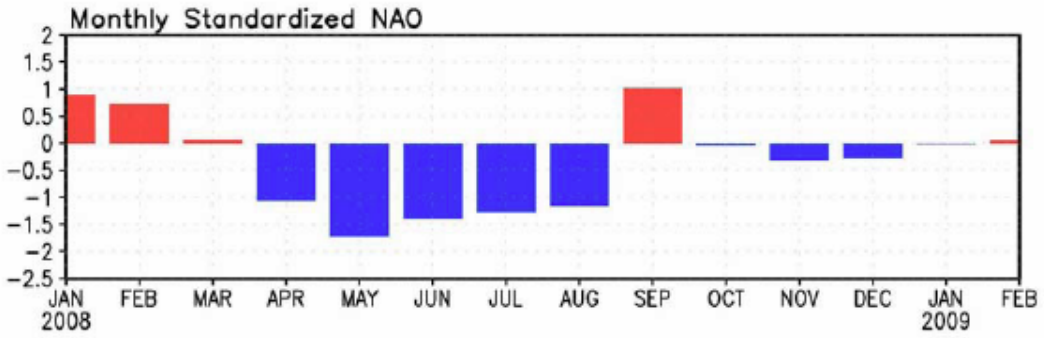


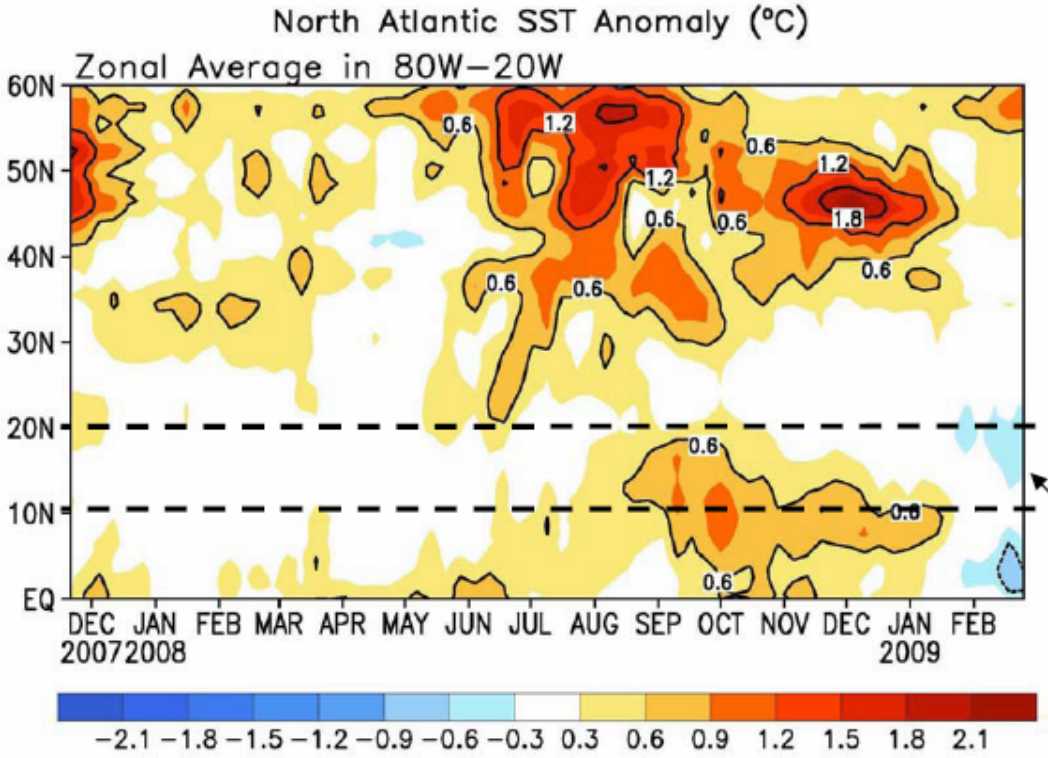
- Tropical North Atlantic cooled down substantially and returned to normal-conditions, while tropical South Atlantic remained above-normal.

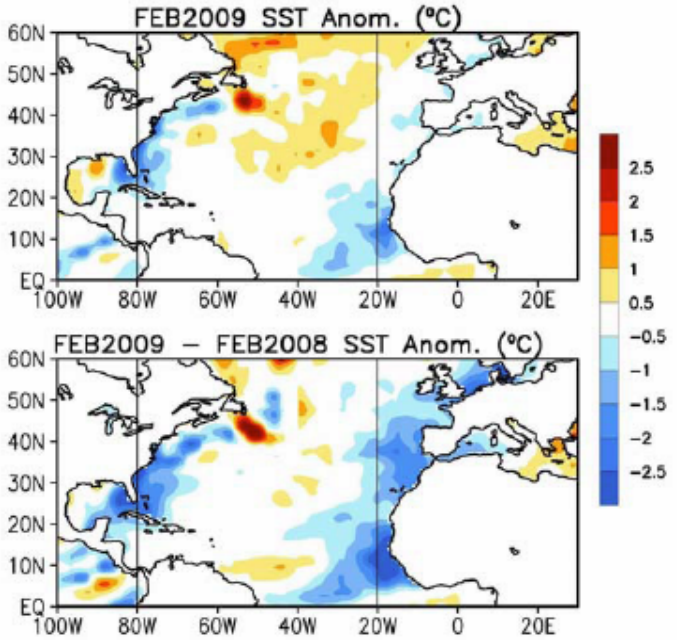
- Meridional Gradient Mode (TNA-TSA) became negative in February 09.

Fig. A1a. Tropical Atlantic Variability region indices, calculated as the area-averaged monthly mean sea surface temperature anomalies (°C) for the TNA [60°W-30°W, 5°N-20°N], TSA [30°W-10°E, 20°S-0] and ATL3 [20°W-0, 2.5°S-2.5°N] regions, and Meridional Gradient Index, defined as differences between TNA and TSA. Data are derived from the NCEP OI SST analysis, and anomalies are departures from the 1971-2000 base period means.

NAO and SST Anomaly in North Atlantic

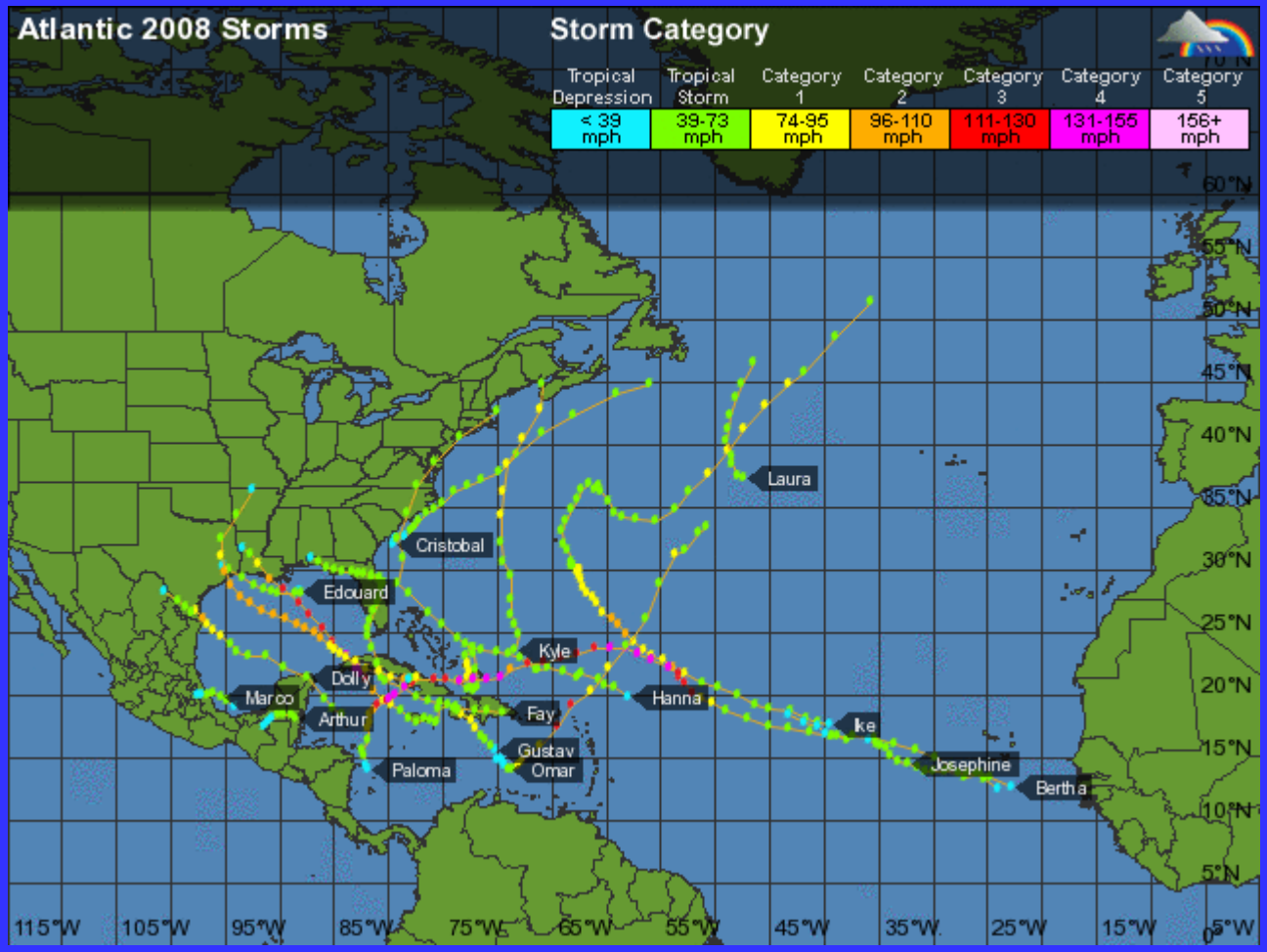




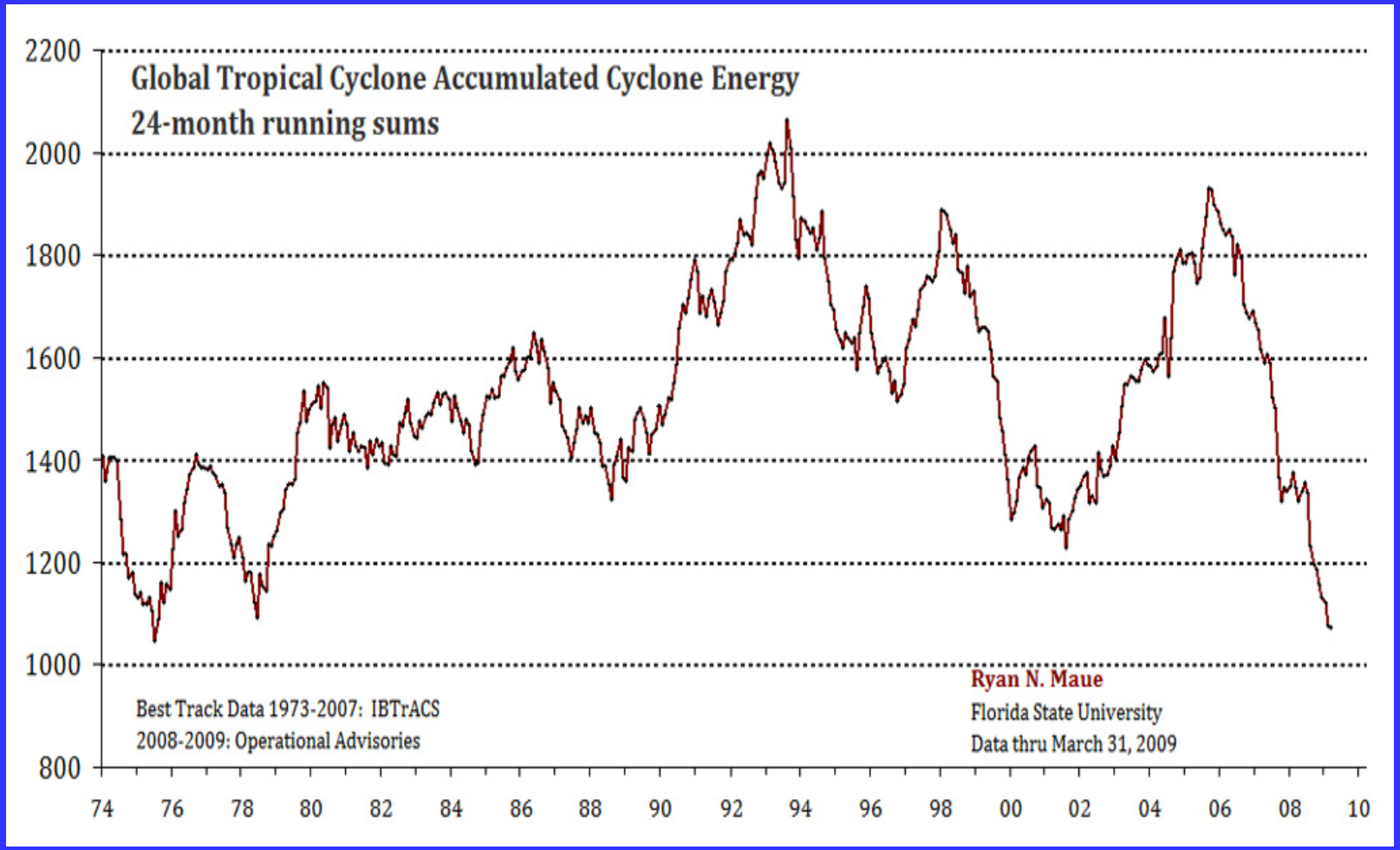


- High-latitude North Atlantic SSTA are closely related to NAO index – negative (positive) NAO leads to SST warming (cooling).
- NAO was near-normal in February 09.
- SSTA in the Hurricane Main Development Region were weakly below-normal in February 09.

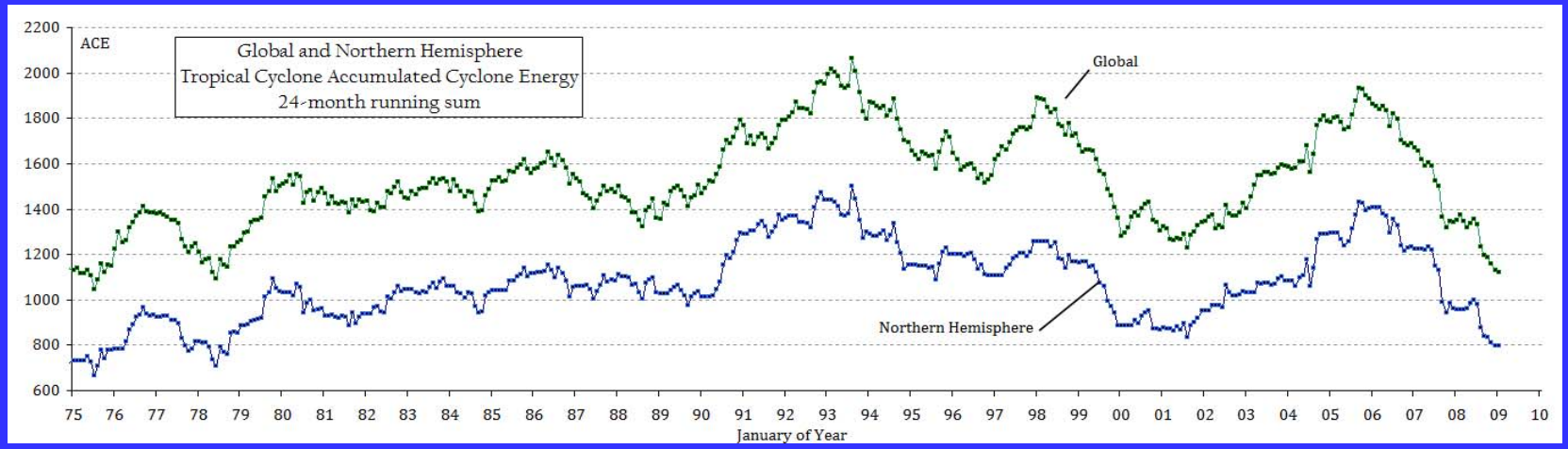
Fig. NA2. Monthly standardized NAO index (top) derived from monthly standardized 500-mb height anomalies obtained from the NCEP CDAS in 20°N-90°N (http://www.cpc.ncep.noaa.gov). Time-Latitude section of SST anomalies averaged between 80°W and 20°W (bottom). SST are derived from the NCEP OI SST analysis, and anomalies are departures from the 1971-2000 base period means.


Atlantic 2008 Storms
Storm Category
Tropical Depression
< 39 mph
Tropical Storm
39-73 mph
Category 1
74-95 mph
Category 2
96-110 mph
Category 3
111-130 mph
Category 4
131-155 mph
Category 5
156+ mph
Laura
Cristobal
Edouard
Kyle
Dolly
Marco
Arthur
Fay
Hanna
Ike
Gustav
Omar
Paloma
Josephine
Bertha
60°N
55°N
50°N
45°N
40°N
35°N
30°N
25°N
20°N
15°N
10°N
5°N
115°W
105°W
95°W
85°W
75°W
65°W
55°W
45°W
35°W
25°W
15°W
5°W

Global Tropical Cyclone Accumulated Cyclone Energy



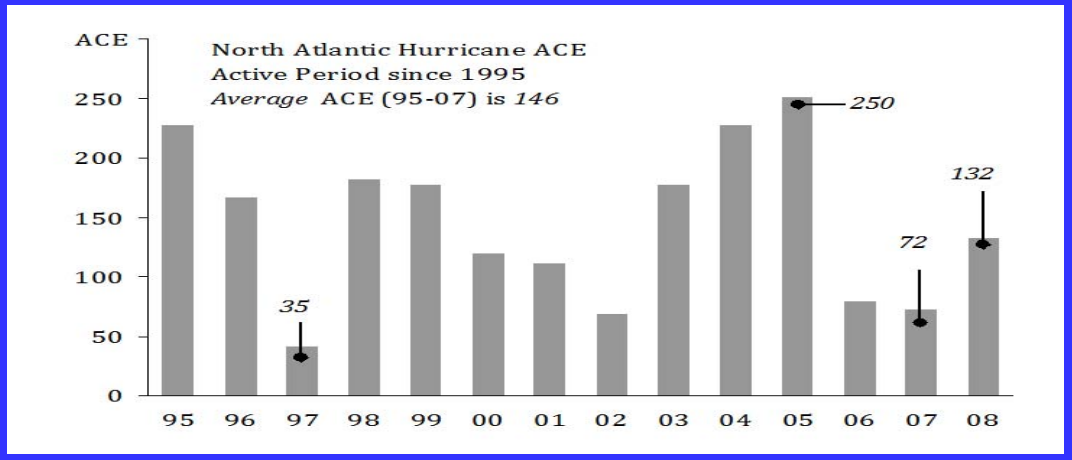
Global and Northern Hemisphere Accumulated Cyclone Energy (ACE) -- 24 month running sum

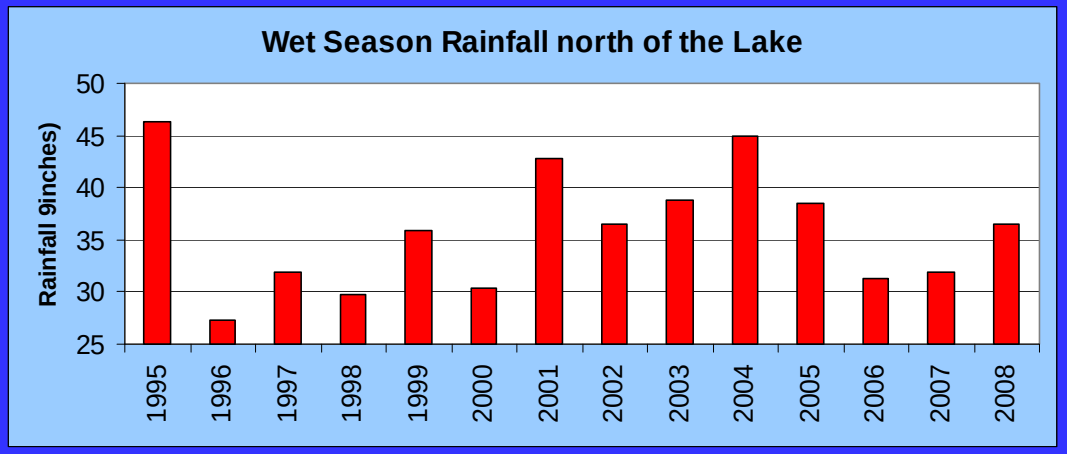


Analysis shown in the figure depicts tropical cyclone energy continuously summed over 24-month periods from 1975 through 31, January 2009. The top green time series shows the evolution of global Accumulated Cyclone Energy or ACE. Global ACE is at historical lows, and the lowest in 30-years. The Earth is experiencing a prolonged period of severely depressed cyclone activity. The Northern Hemisphere is responsible for 70% of global tropical cyclone ACE *on average* since 1975. Thus, it is no surprise that Northern Hemisphere Tropical Cyclone activity is also at 30-year lows.

Source: FSU

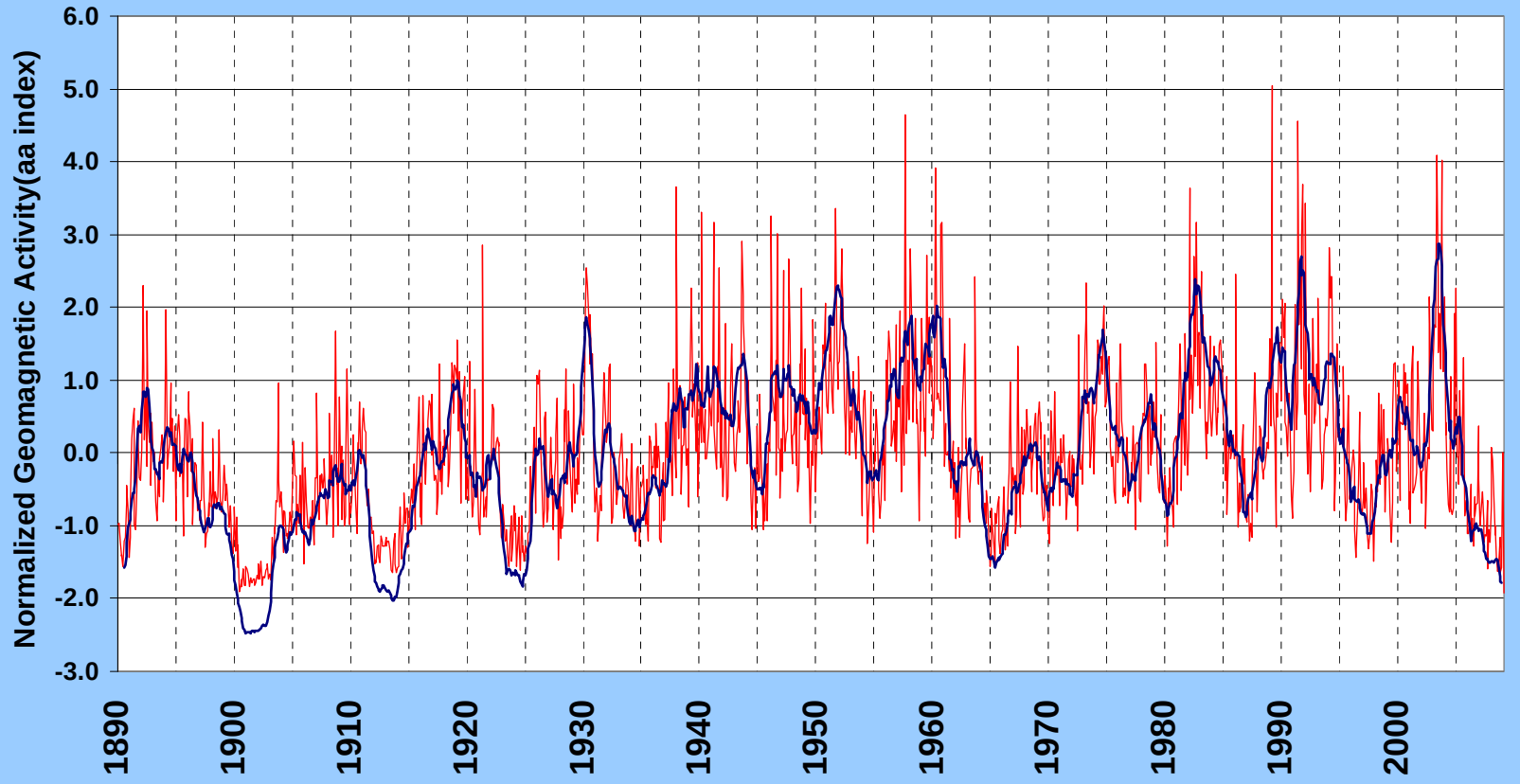
North Atlantic Accumulated Cyclone Energy





Solar Activity

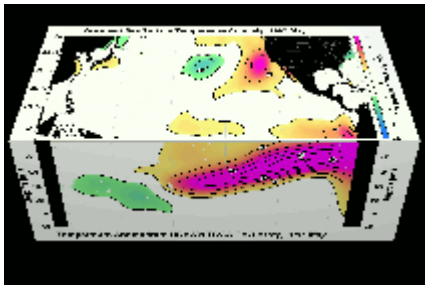
(NASA geomagnetic aa index adjusted prior to 1957)



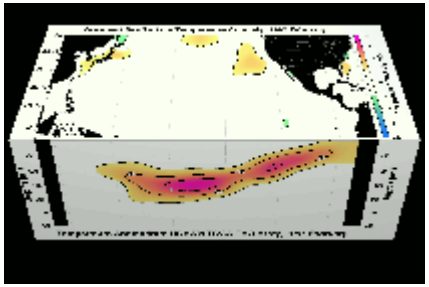
From historical record it can be seen that many of the SFWMD drier periods tend to occur more often during periods of lower solar activity. Examples of such periods are the mid- 1940s, mid-1950s , early to mid- 1960s and early 1980s. Solar activity since the end of 2005 has been very low.

Scripps Institution of Oceanography Climate Prediction Center

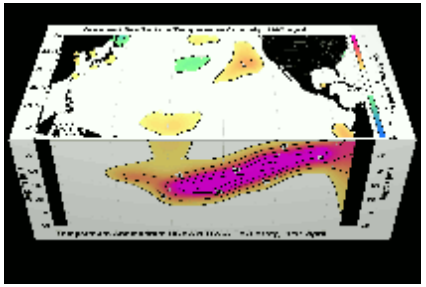
January 1997



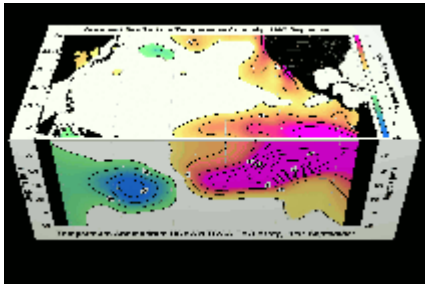
February 1997



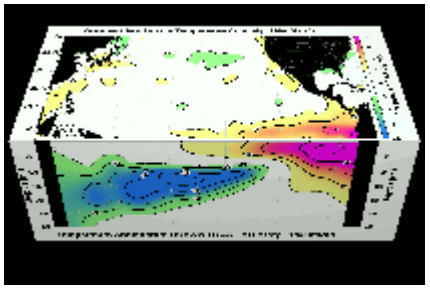
April 1997



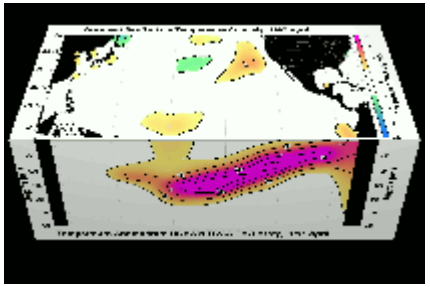
May 1997



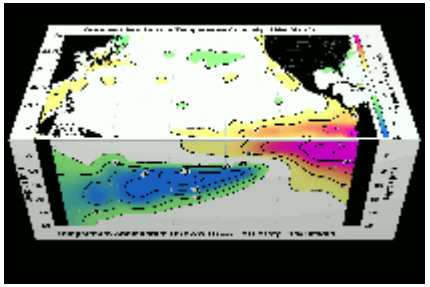
September 1997



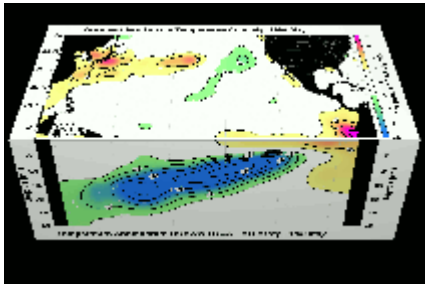
January 1998



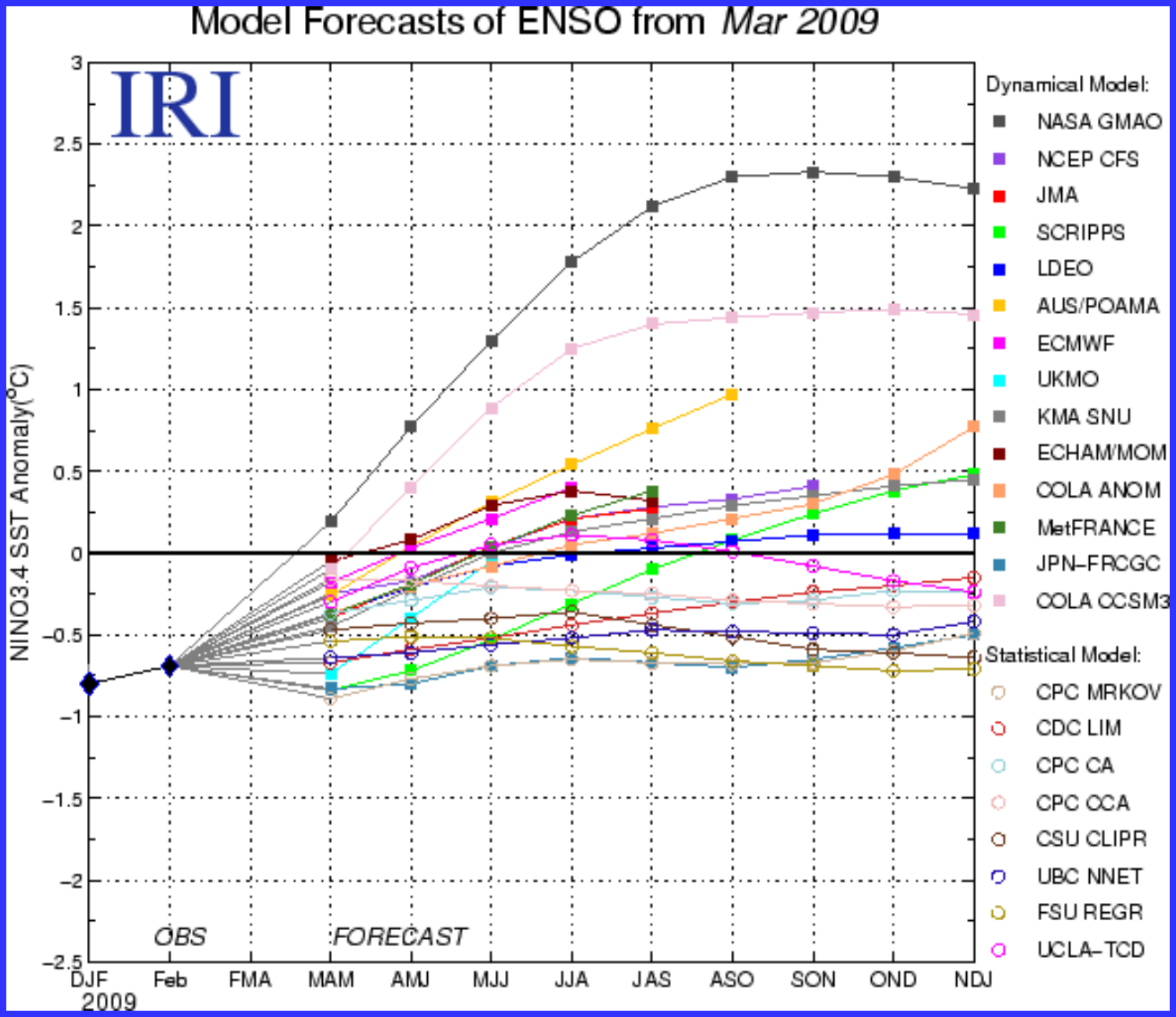
March 1998

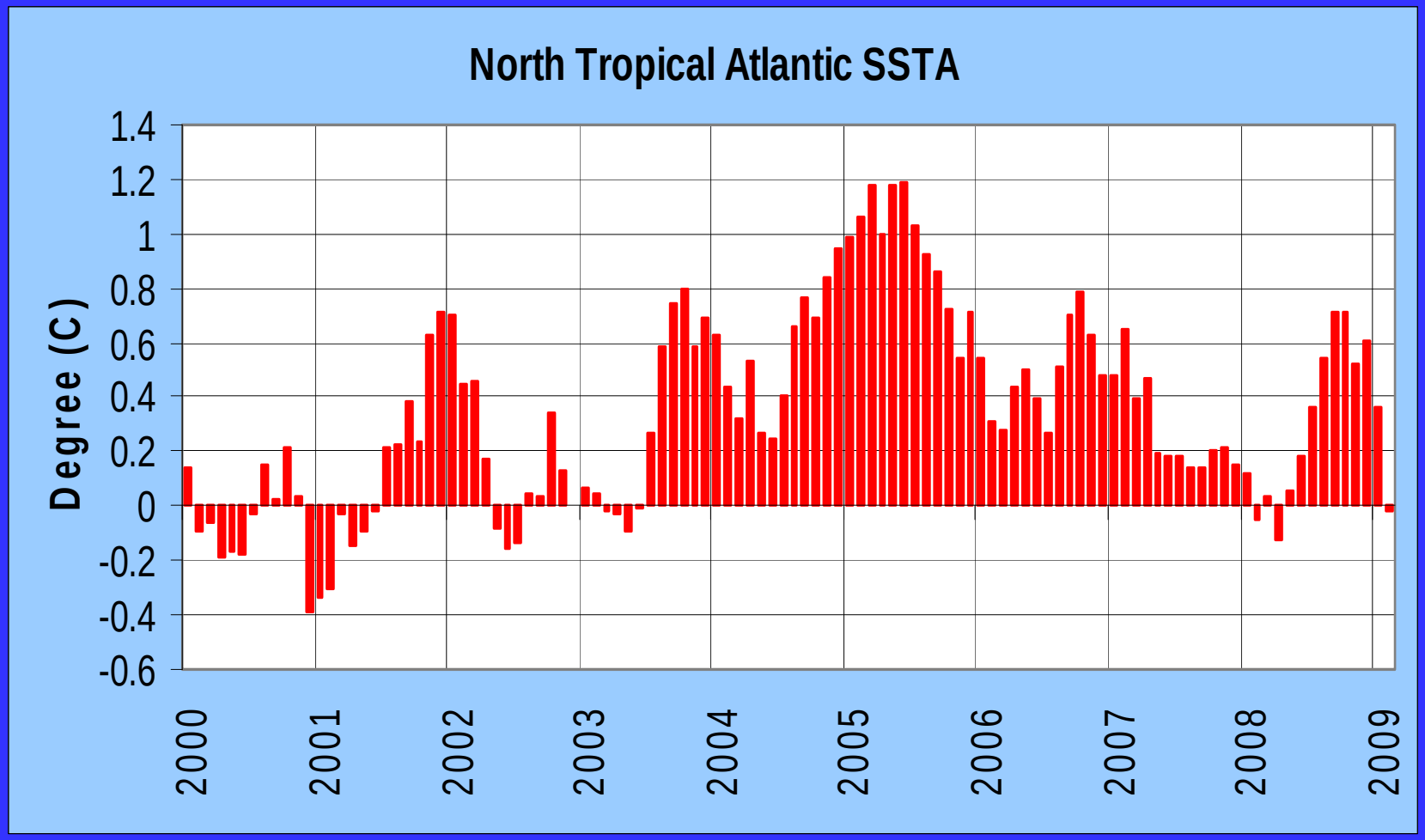


May 1998

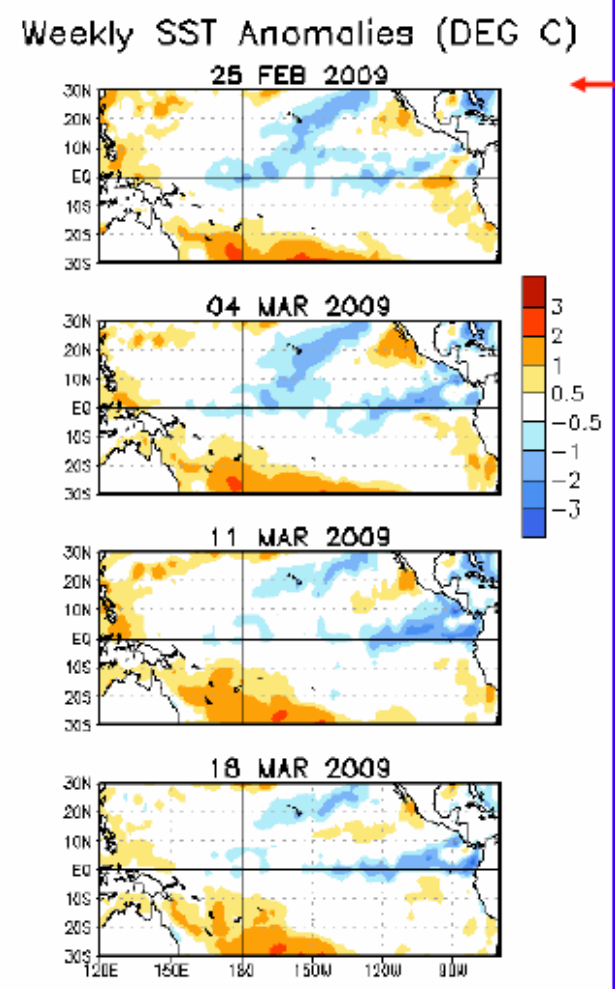


➢http://meteora.ucsd.edu/~pierce/elnino/en97/en97.html

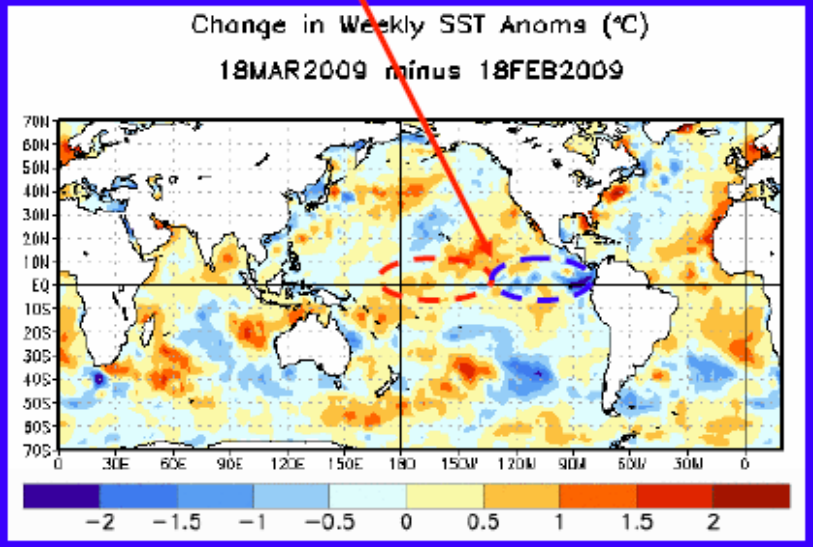

Model Forecasts of ENSO from Mar 2009
IRI
NINO3.4 SST Anomaly(°C)
3
2.5
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
−2.5
DJF
2009
Feb
FMA
MAM
AMJ
MJJ
JJA
JAS
ASO
SON
OND
NDJ
OBS
FORECAST
Dynamical Model:
NASA GMAO
NCEP CFS
JMA
SCRIPPS
LDEO
AUS/POAMA
ECMWF
UKMO
KMA SNU
ECHAM/MOM
COLA ANOM
MetFRANCE
JPN–FRCGC
COLA CCSM3
Statistical Model:
CPC MRKOV
CDC LIM
CPC CA
CPC OCA
CSU CLIPR
UBC NNET
FSU REGR
UCLA–TCD

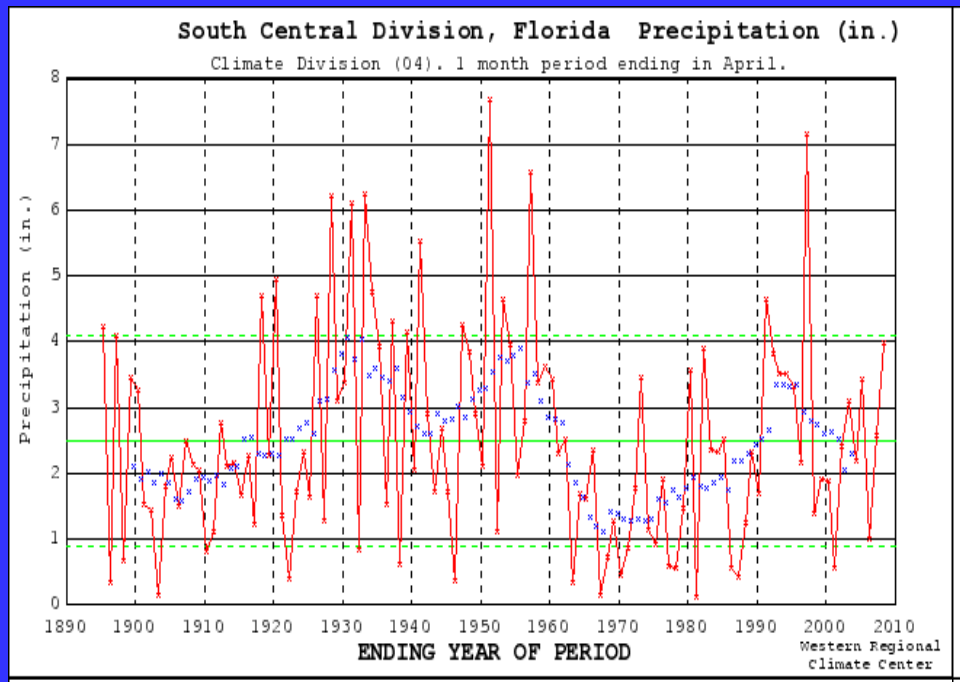

North Tropical Atlantic SSTA
Degree (C)
1.4
1.2
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009

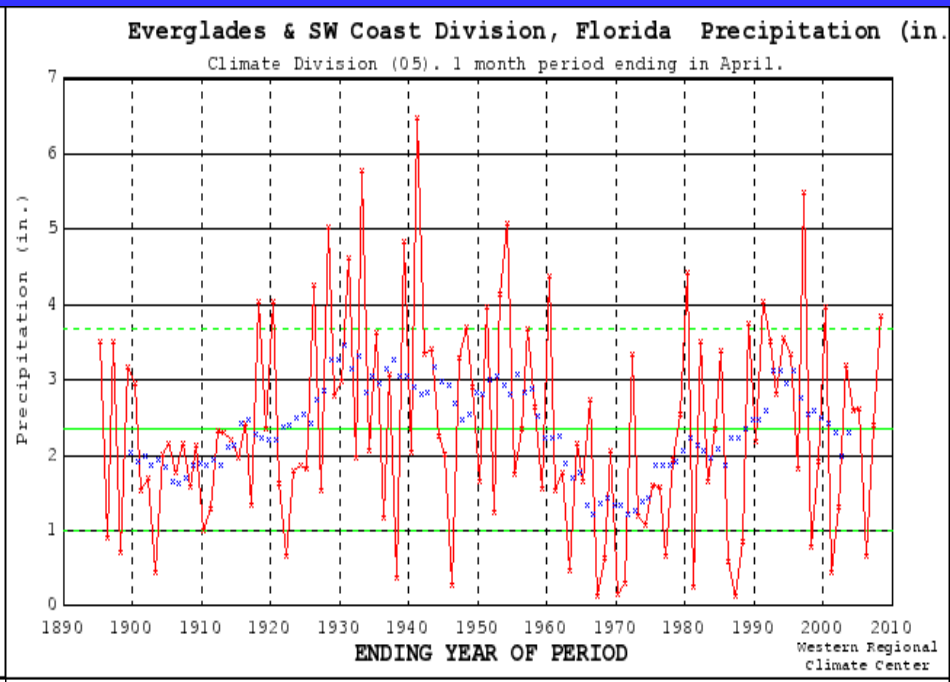
Weekly SST Departures (°C) for the Last Four Weeks

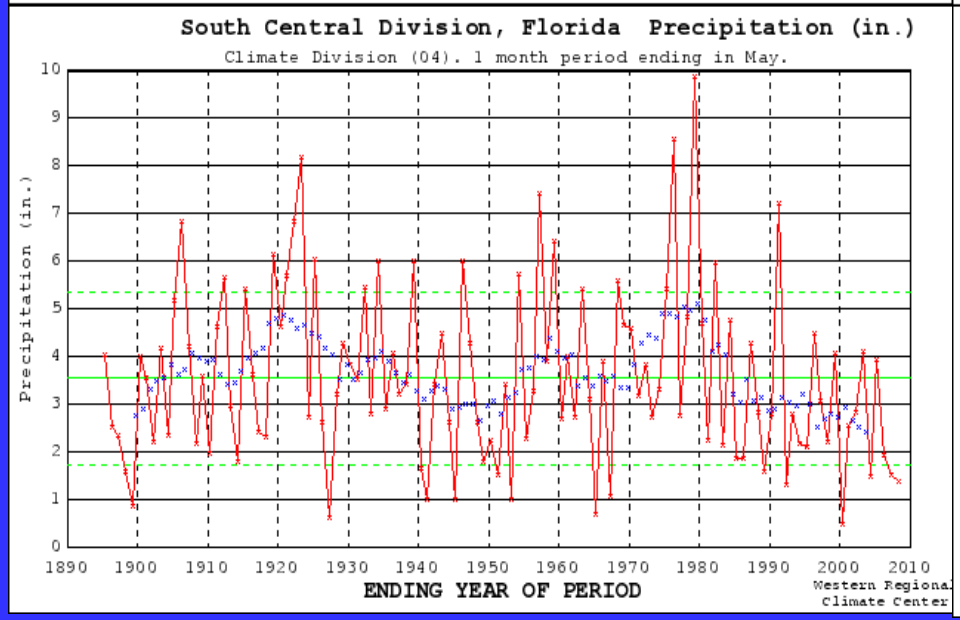


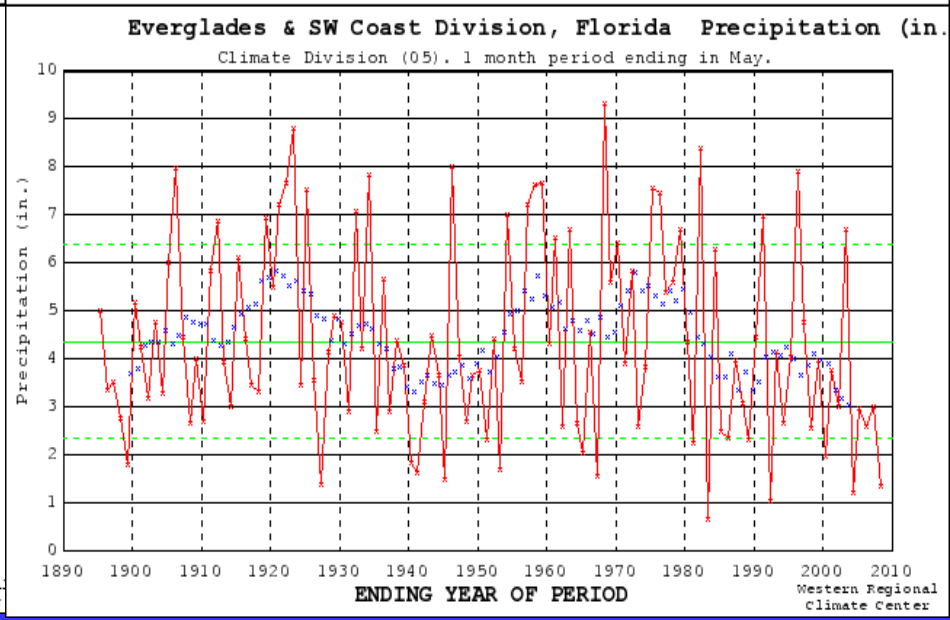
- During the last four weeks negative SST anomalies have weakened in the central equatorial Pacific Ocean and have strengthened in the eastern equatorial Pacific Ocean.
- The change in SST anomalies was mainly positive in the central equatorial Pacific Ocean and negative in the eastern equatorial Pacific Ocean.

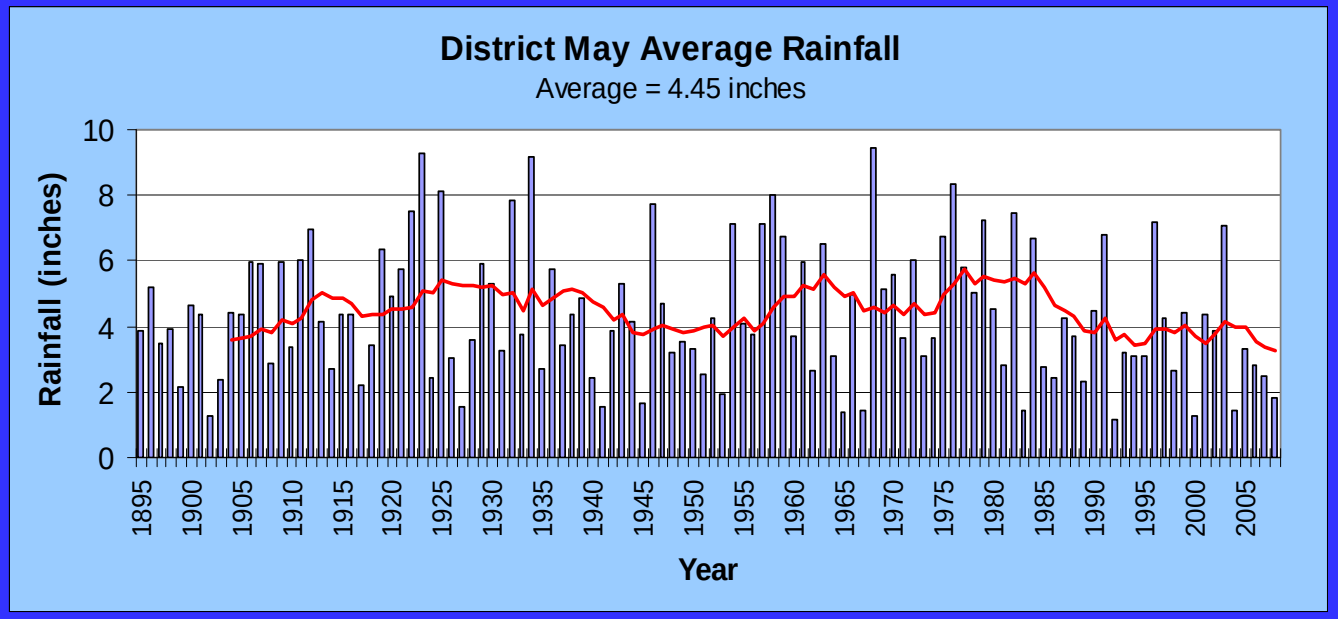


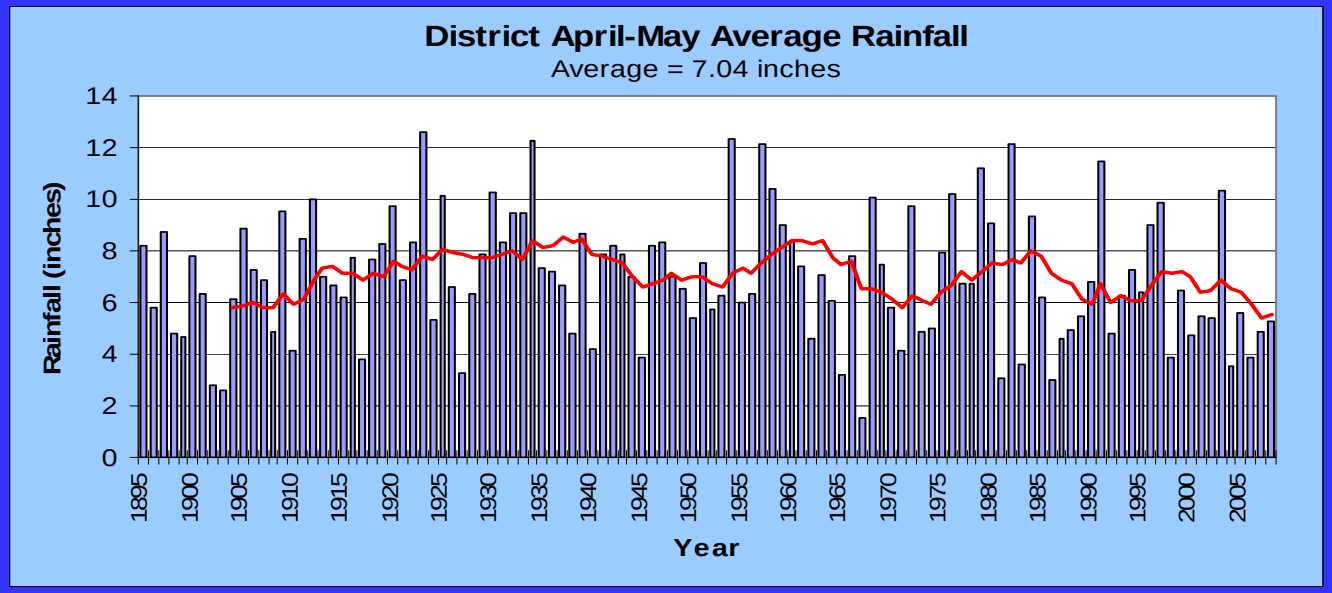

South Central Division, Florida Precipitation (in.)
Climate Division (04). 1 month period ending in April.
Precipitation (in.)
ENDING YEAR OF PERIOD
Western Regional Climate Center

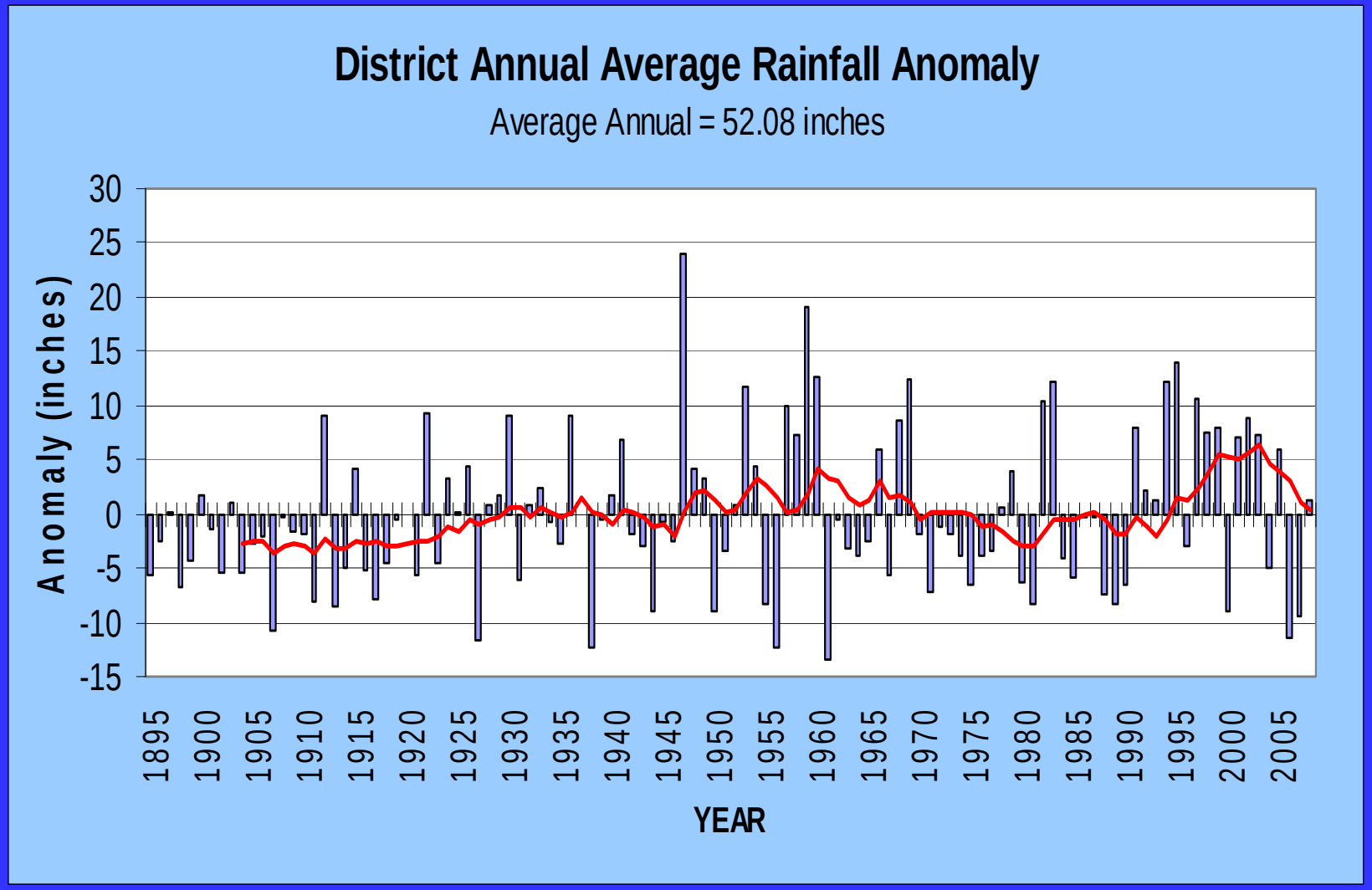

Everglades & SW Coast Division, Florida Precipitation (in.
Climate Division (05). 1 month period ending in April.
Precipitation (in.)
ENDING YEAR OF PERIOD
Western Regional Climate Center


South Central Division, Florida Precipitation (in.)
Climate Division (04). 1 month period ending in May.
Precipitation (in.)
ENDING YEAR OF PERIOD
Western Regional Climate Center


Everglades & SW Coast Division, Florida Precipitation (in.
Climate Division (05). 1 month period ending in May.
Precipitation (in.)
ENDING YEAR OF PERIOD
Western Regional Climate Center


District May Average Rainfall
Average = 4.45 inches
Rainfall (inches)
0
2
4
6
8
10
1895
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
Year


District April-May Average Rainfall
Average = 7.04 inches
Rainfall (inches)
0
2
4
6
8
10
12
14
1895
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
Year


District Annual Average Rainfall Anomaly
Average Annual = 52.08 inches
Anomaly (inches)
30
25
20
15
10
5
0
-5
-10
-15
1895
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
YEAR