ENSO Cycle: Recent Evolution, Current Status and Predictions

Update prepared by
Climate Prediction Center / NCEP
8 March 2010

Outline

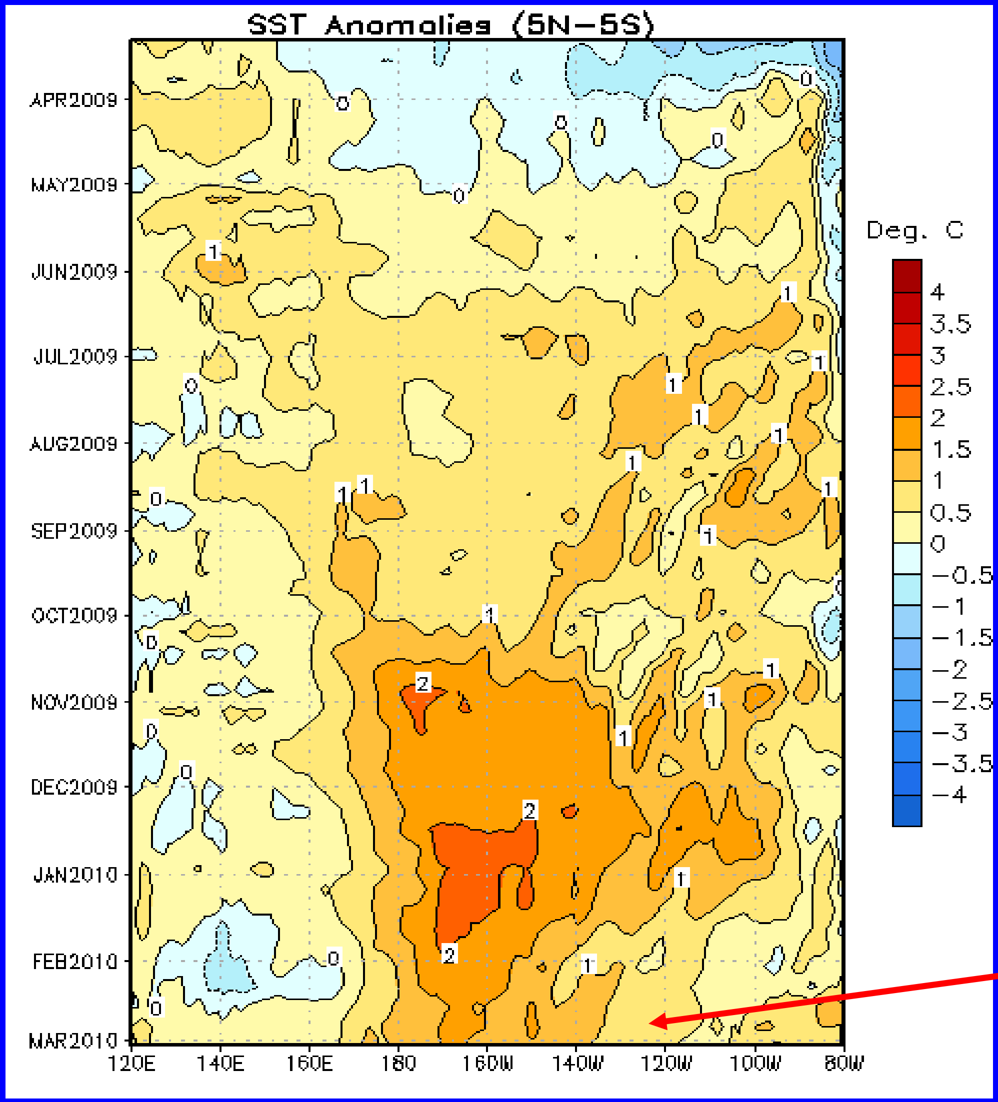
- Overview
- Recent Evolution and Current Conditions
- Oceanic Niño Index (ONI) – "Revised December 2008"
- Pacific SST Outlook
- U.S. Seasonal Precipitation and Temperature Outlooks
- Summary
- El Niño Composites

Summary

- El Niño is present across the equatorial Pacific Ocean.
- Sea surface temperatures (SST) are more than 1.0ºC above-average across much of the central and eastern equatorial Pacific.
- Based on current observations and dynamical model forecasts, El Niño is expected to continue at least through the Northern Hemisphere spring 2010.

Recent Evolution of Equatorial Pacific SST Departures (ºC)

Time



Longitude

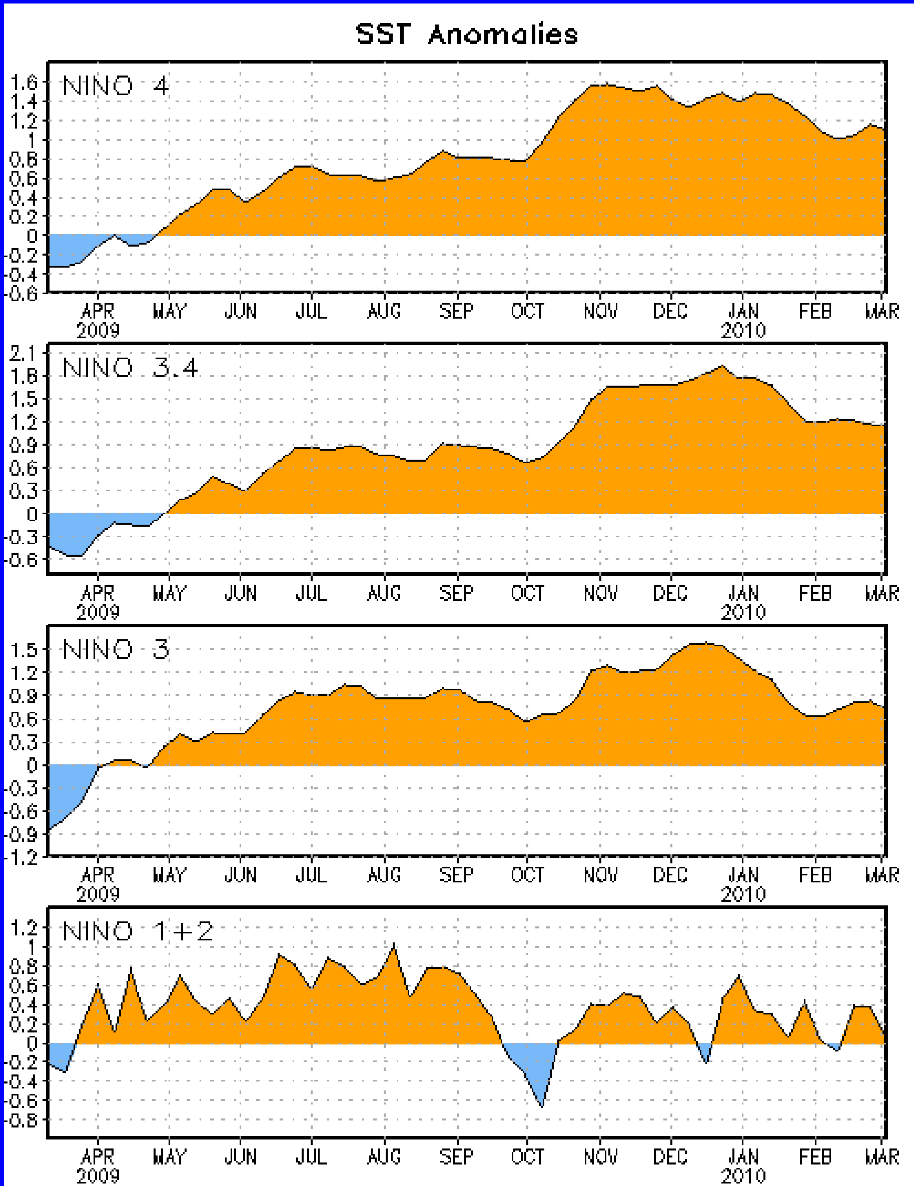
Since the beginning of June 2009, SST anomalies have been at least +0.5°C across most of the equatorial Pacific.

During December 2009, positive SST anomalies increased across much of the equatorial Pacific.

From late December 2009 to mid-February 2010, positive SST anomalies decreased across portions of the central and east-central Pacific.

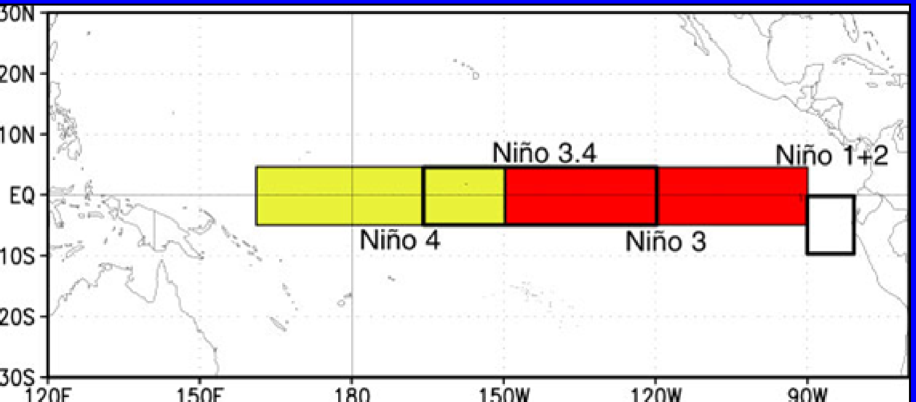
Recently, positive SST anomalies are nearly unchanged.

Niño Region SST Departures (ºC) Recent Evolution



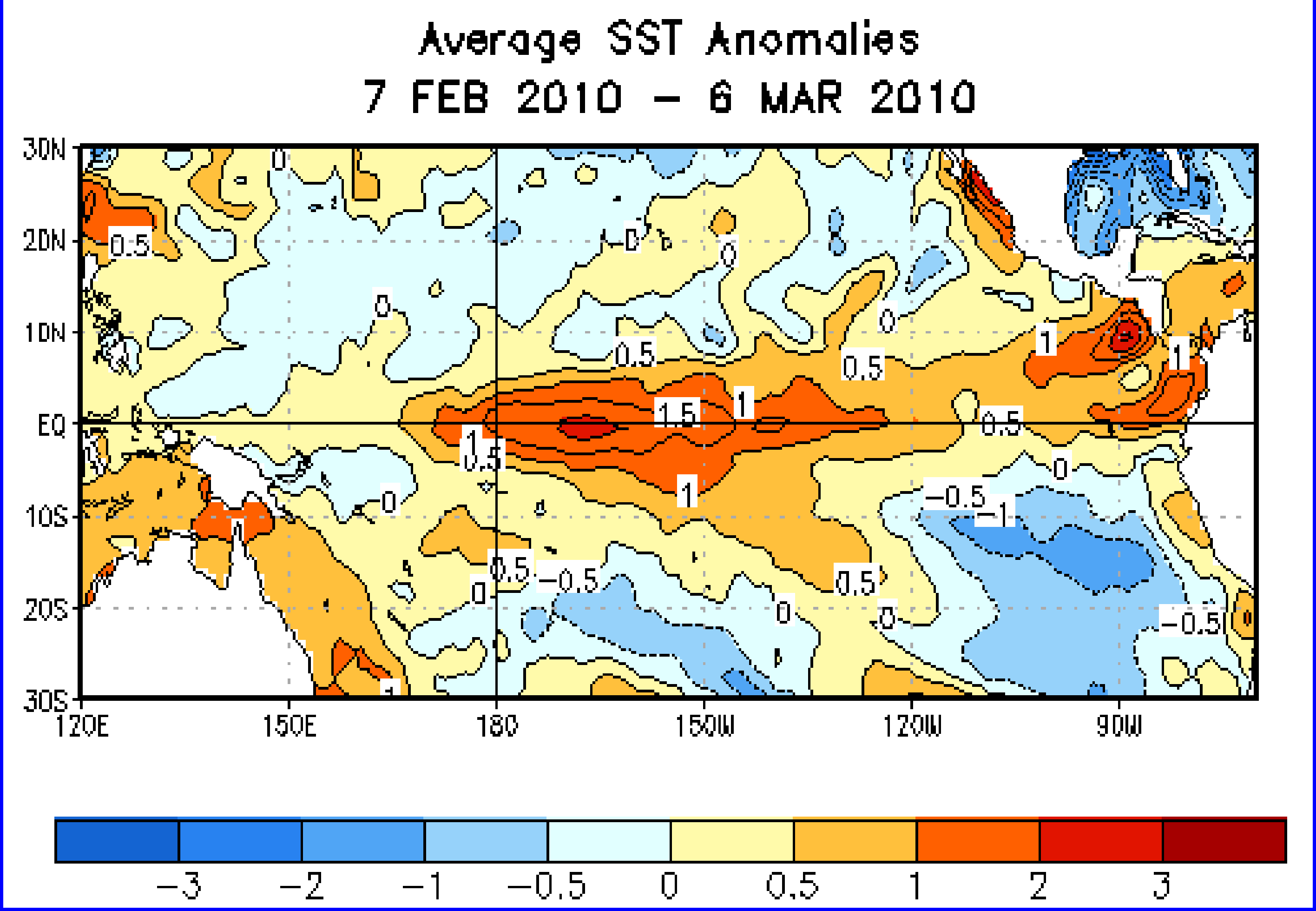
The latest weekly SST departures are:

Niño 4	1.1ºC
Niño 3.4	1.1ºC
Niño 3	0.7ºC
Niño 1+2	0.1ºC

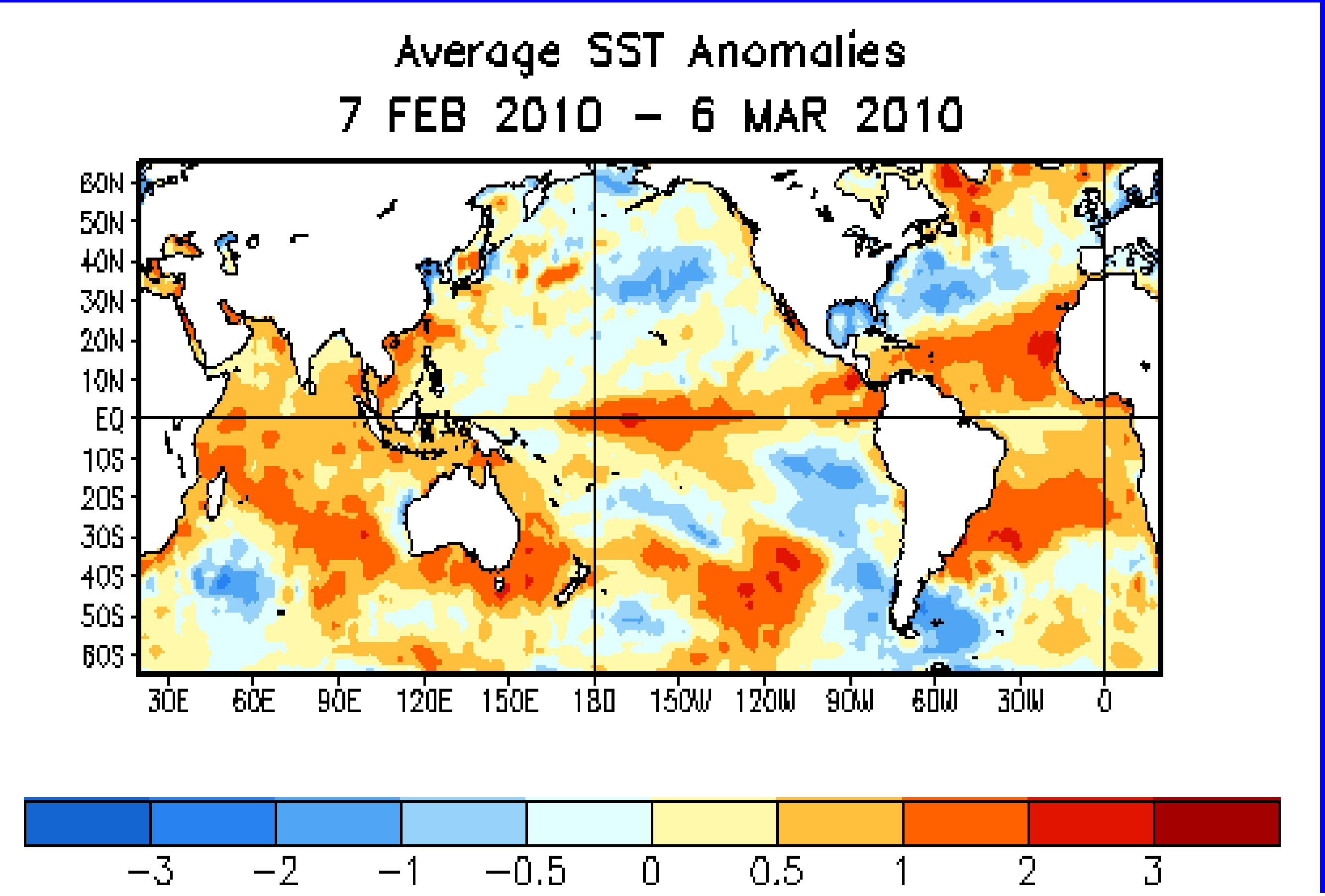


SST Departures (ºC) in the Tropical Pacific During the Last 4 Weeks

During the last 4-weeks, equatorial SSTs were more than 1.0°C above average between 170°E and 125°W and near the western S. American coast.

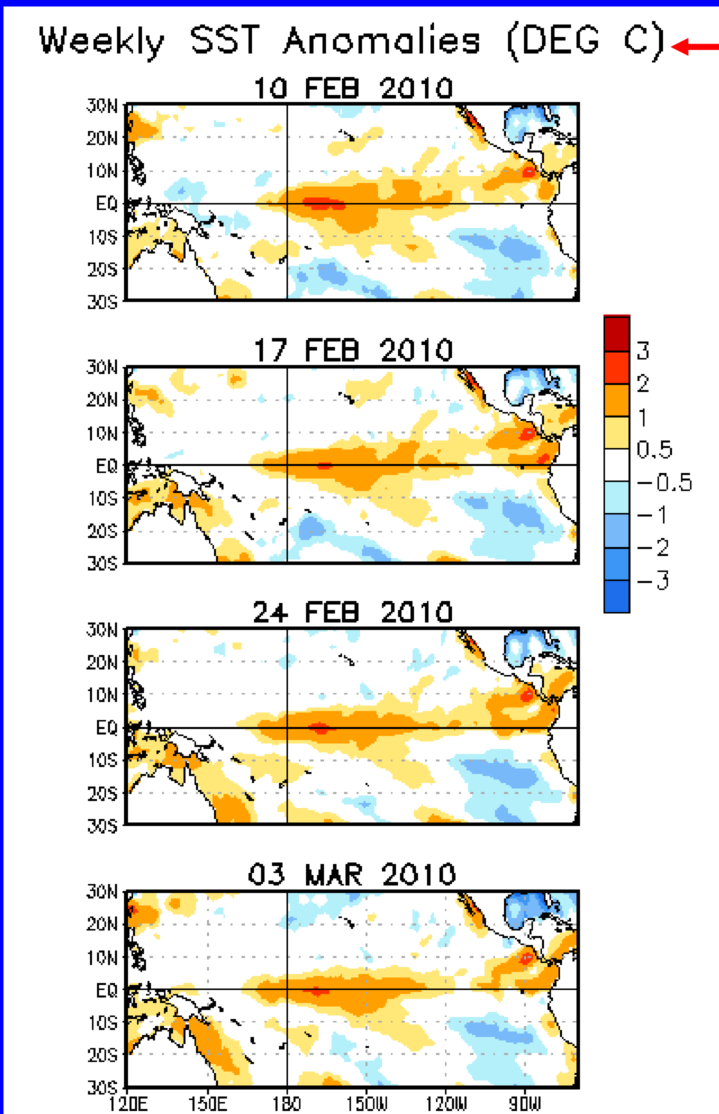


Global SST Departures (ºC)



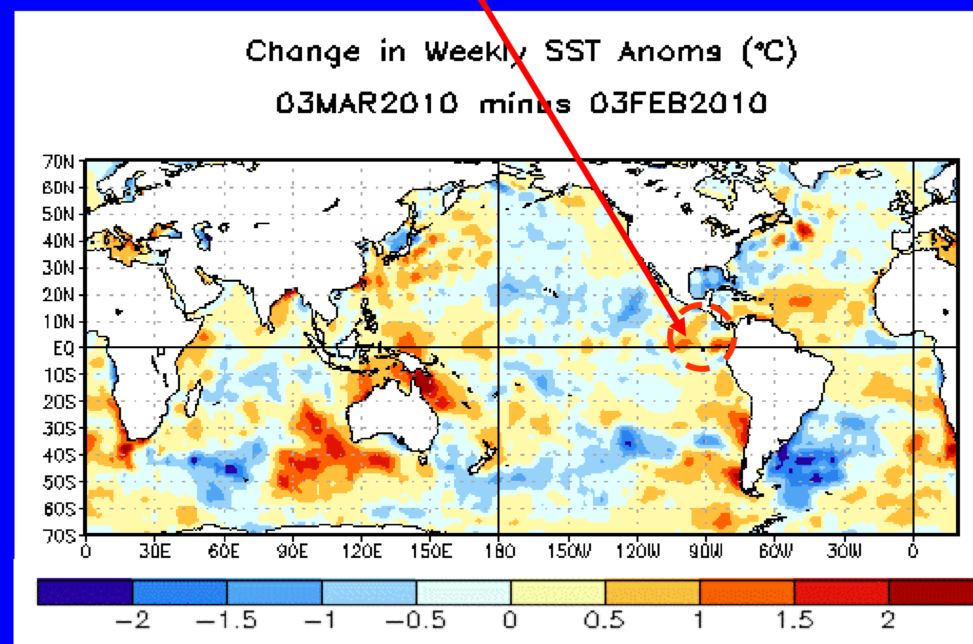
During the last four weeks, equatorial SSTs were above-average across the central and eastern Pacific, Indian, and Atlantic Oceans.

Weekly SST Departures (ºC) for the Last Four Weeks

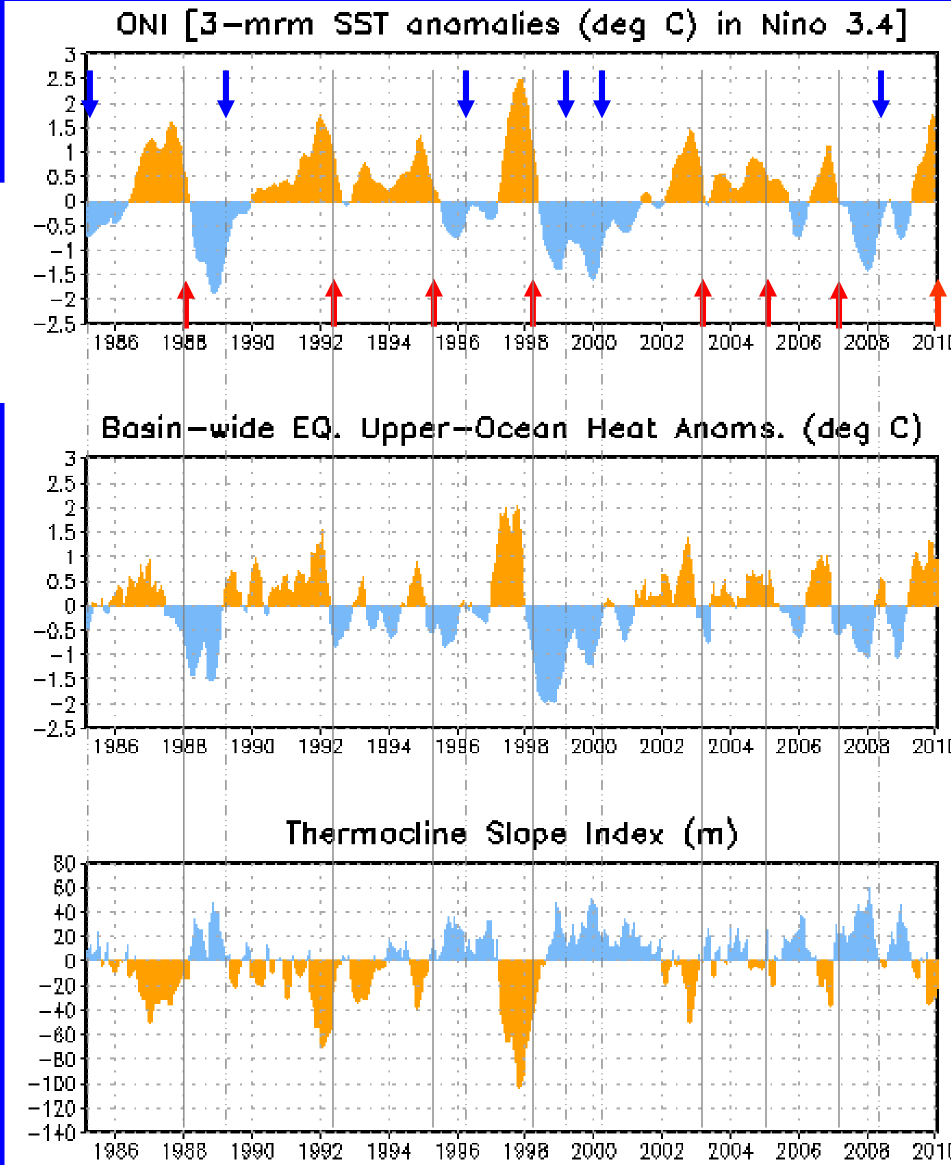


- During the last four weeks, positive SST anomalies have extended from 170°E eastward to the South American coast.

- During the last 30 days, equatorial SST anomalies are nearly unchanged across much of the Pacific, except for an increase in the extreme eastern Pacific.



Upper-Ocean Conditions in the Eq. Pacific

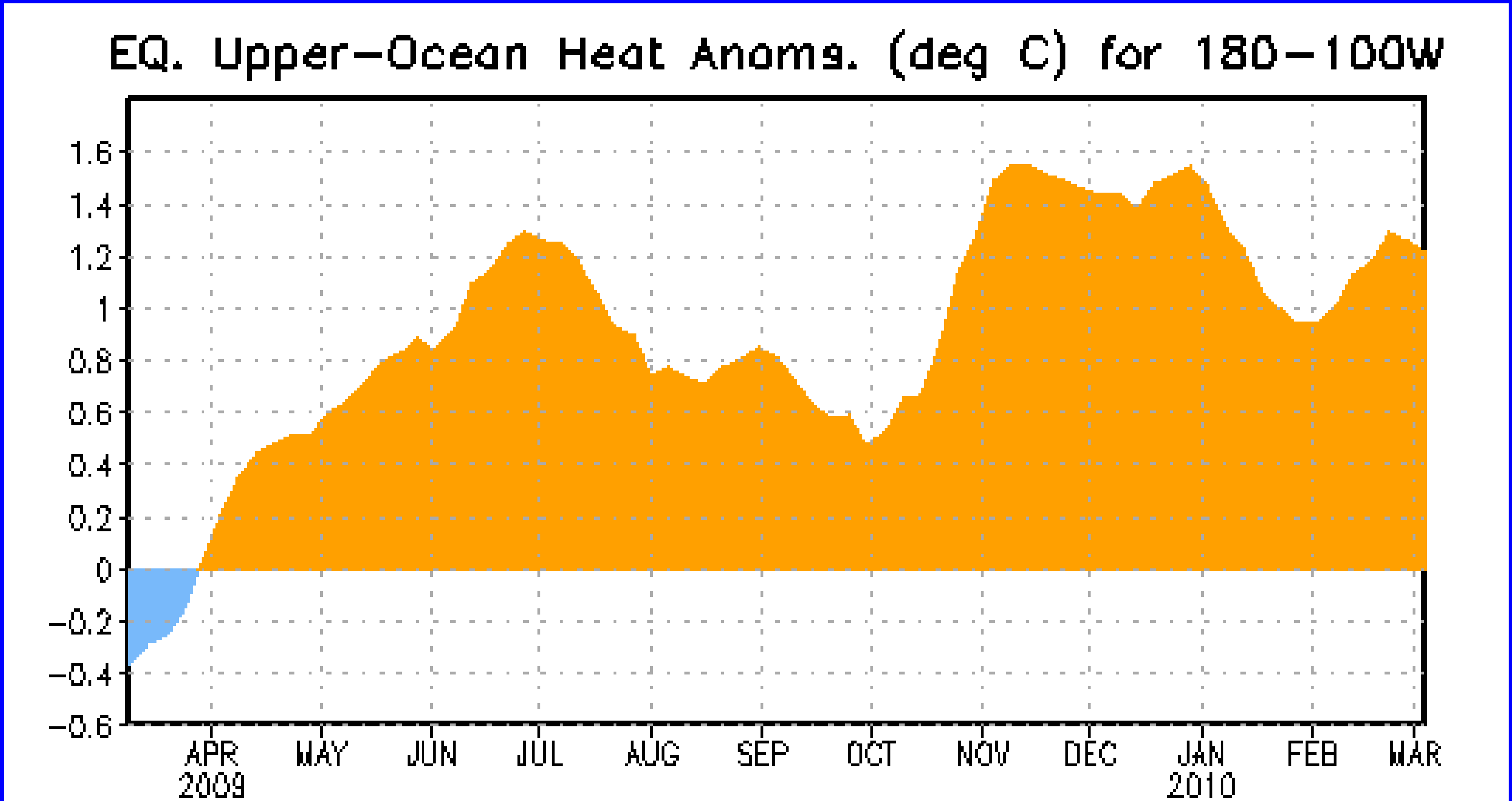


Cold Episodes ↓
Warm Episodes ↑

- The basin-wide equatorial upper ocean (0-300 m) heat content is greatest prior to and during the early stages of a Pacific warm (El Niño) episode (compare top 2 panels) and least prior to and during the early stages of a cold (La Niña) episode.
- The slope of the oceanic thermocline is least (greatest) during warm (cold) episodes.
- Recent values of the upper-ocean heat anomalies (positive) and the thermocline slope index (negative) reflect El Niño.

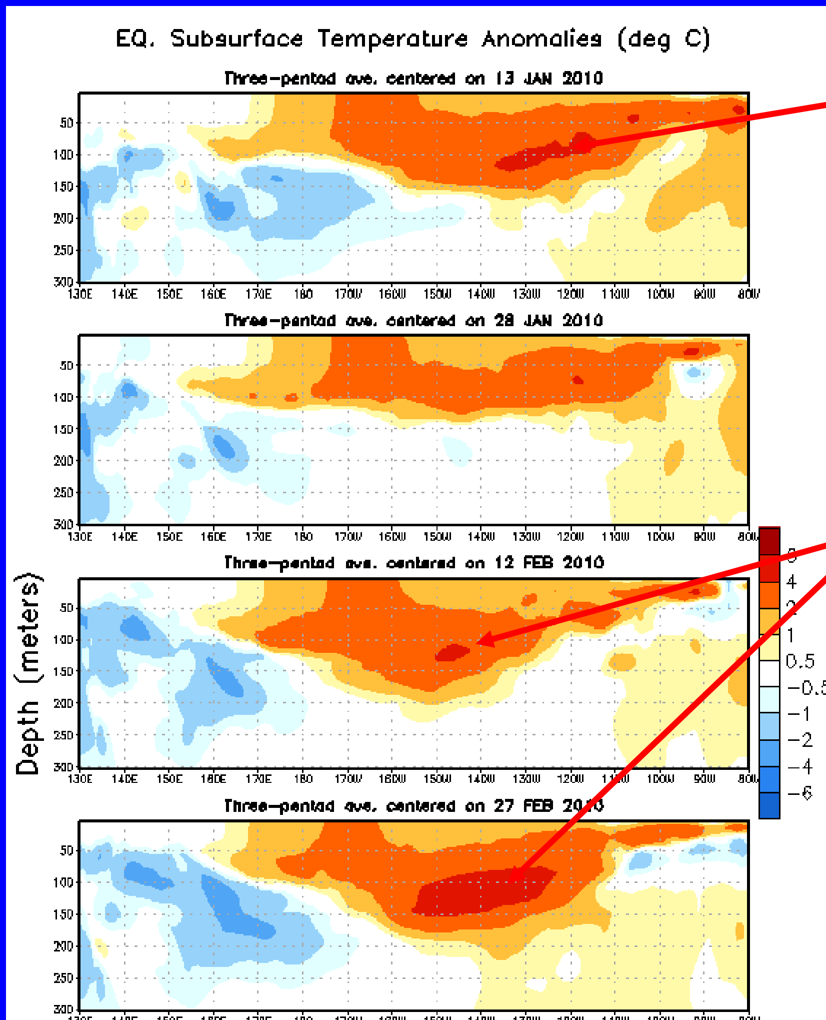
The monthly thermocline slope index represents the difference in anomalous depth of the 20ºC isotherm between the western Pacific (160ºE-150ºW) and the eastern Pacific (90º-140ºW).

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



Since April 2009, the upper-ocean heat content has been above average across the eastern half of the equatorial Pacific Ocean. Sharp increases in heat content during June and October coincide with the development and subsequent strengthening of El Niño, respectively. Recently, heat content anomalies have increased again in association with an oceanic Kelvin wave.

Sub-Surface Temperature Departures (°C) in the Equatorial Pacific

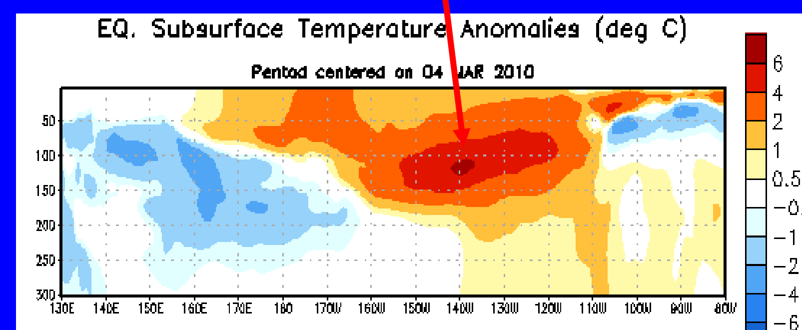


Time

Longitude

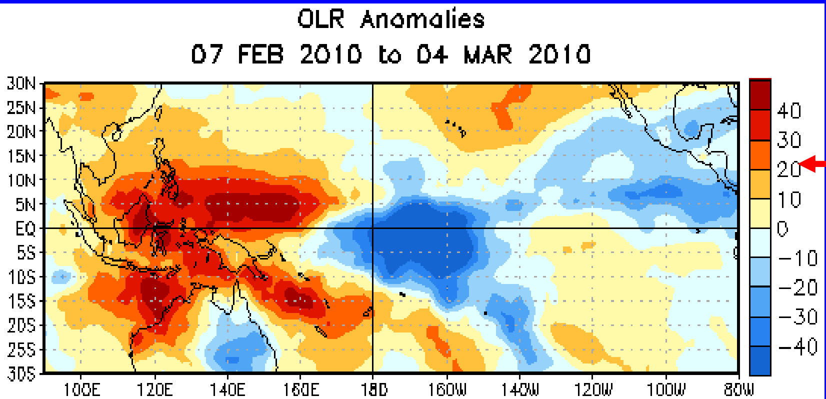
- In mid January 2010, positive subsurface temperature anomalies increased in the eastern equatorial Pacific in association with the downwelling phase of an oceanic Kelvin wave.

- Since mid-February 2010, the downwelling phase of another oceanic Kelvin wave has increased temperatures in the east-central equatorial Pacific Ocean.

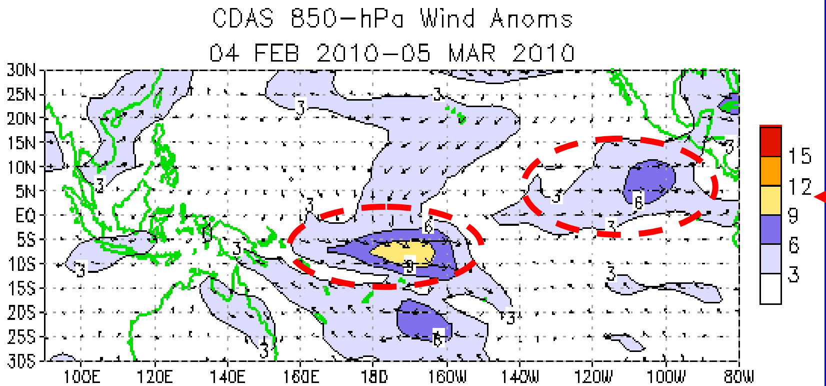


Most recent pentad analysis

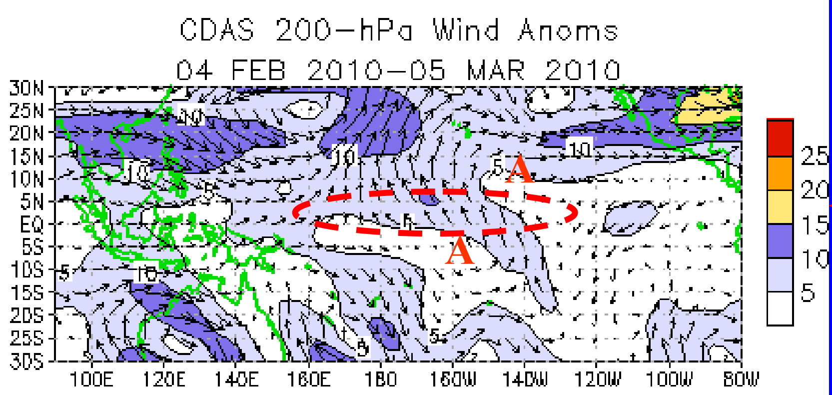
Tropical OLR and Wind Anomalies During the Last 30 Days



Large negative OLR anomalies (enhanced convection and precipitation, blue shading) were located over much of the central and eastern equatorial Pacific Ocean. Positive OLR anomalies (suppressed convection and precipitation, red shading) were located over most of the Maritime Continent, northwestern Australia, and the Philippines.



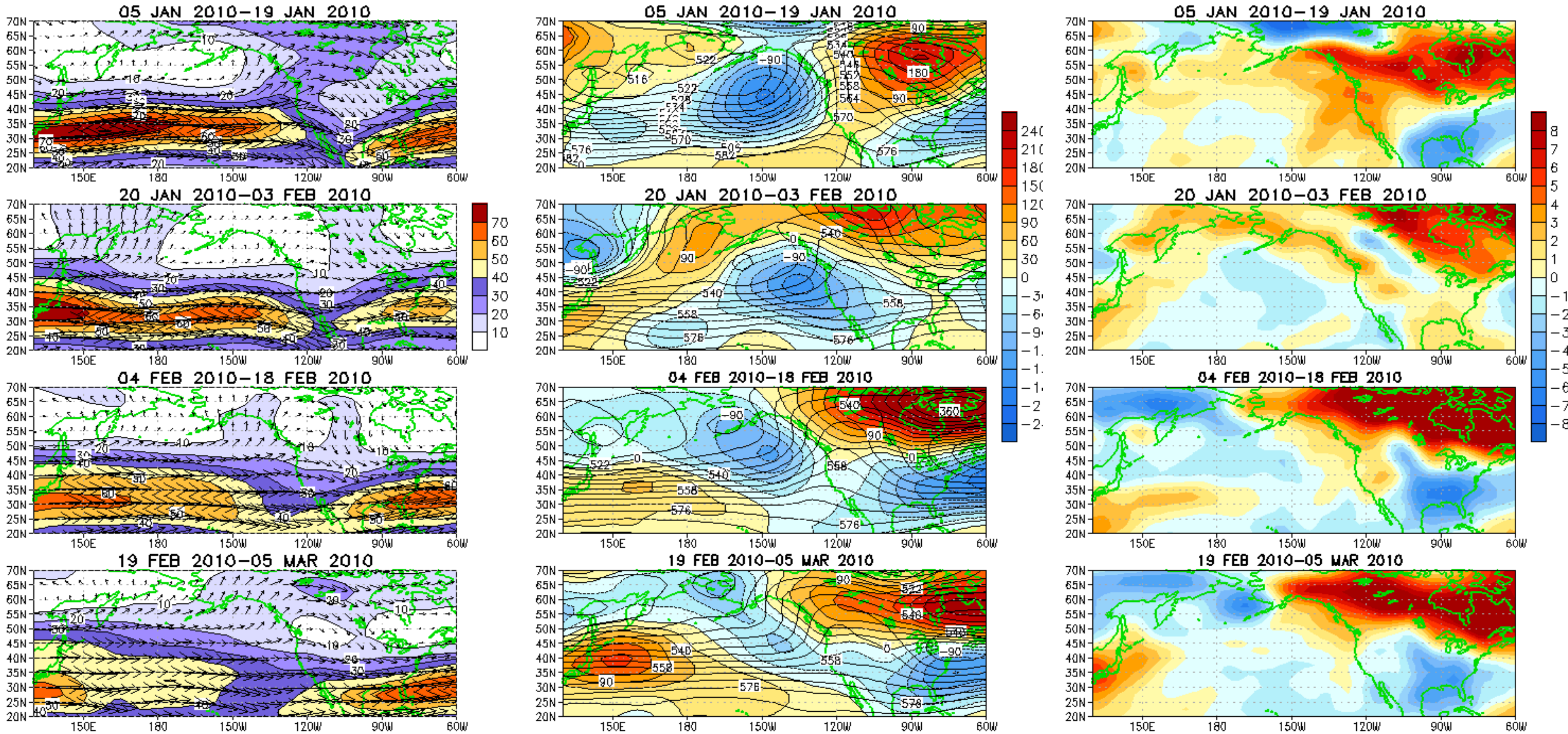
Low-level (850-hPa) westerly anomalies were observed over the central Pacific, south of the equator. Another area of westerly anomalies was evident in the eastern Pacific, centered north of the equator.



Anomalous upper-level (200-hPa) cross equatorial flow was observed across the equatorial Pacific. An anticyclonic couplet was evident in the subtropics of both hemispheres, which is consistent with El Niño.

Atmospheric Circulation over the North Pacific & North America During the Last 60 Days

200-hPa Wind | 500-hPa Height & Anoms. | 925-hPa Temp. Anoms. (°C)

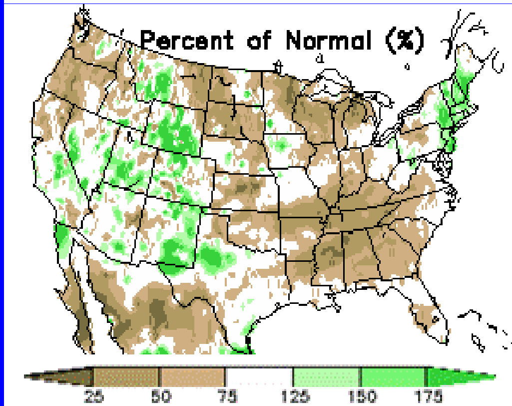


During January-February, strong mid-latitude westerlies (East Asian and Atlantic jets) were accompanied by troughs over the North Pacific and the eastern U.S. The anomalous troughs were associated with below-average temperatures over much of the central and eastern United States. At higher latitudes, strong ridging was associated with above-average temperatures across most of Canada.

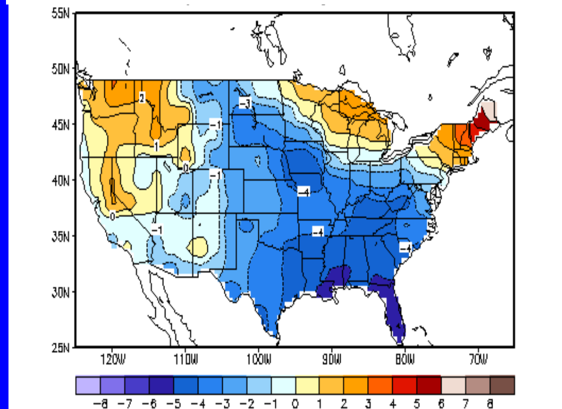
U.S. Temperature and Precipitation Departures During the Last 30 and 90 Days

Last 30 Days

30-day (ending 7 Mar 2010) % of average precipitation

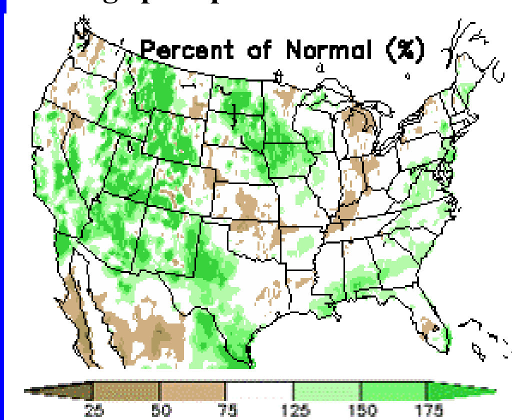


30-day (ending 6 Mar 2010) temperature departures (degree C)

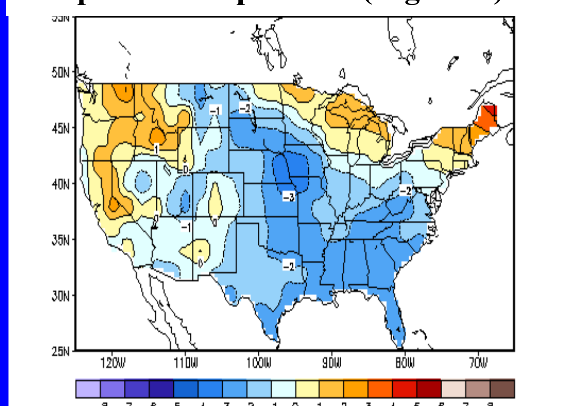


Last 90 Days

90-day (ending 7 Mar 2010) % of average precipitation



90-day (ending 6 Mar 2010) temperature departures (degree C)

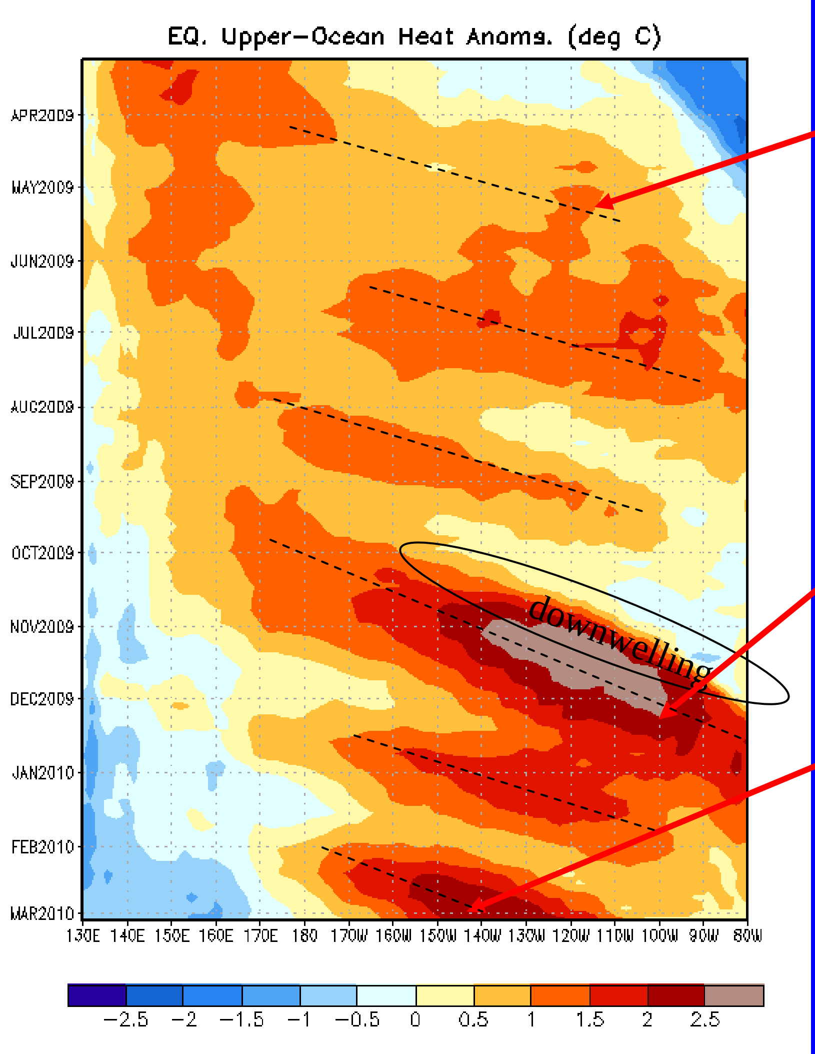


Intraseasonal Variability

- Intraseasonal variability in the atmosphere (wind and pressure), which is often related to the Madden-Julian Oscillation (MJO), can significantly impact surface and subsurface conditions across the Pacific Ocean.

- Related to this activity
  - significant weakening of the low-level easterly winds usually initiates an eastward-propagating oceanic Kelvin wave.
  - Several Kelvin waves have occurred during the last year (see next slide).

Weekly Heat Content Evolution in the Equatorial Pacific



Time

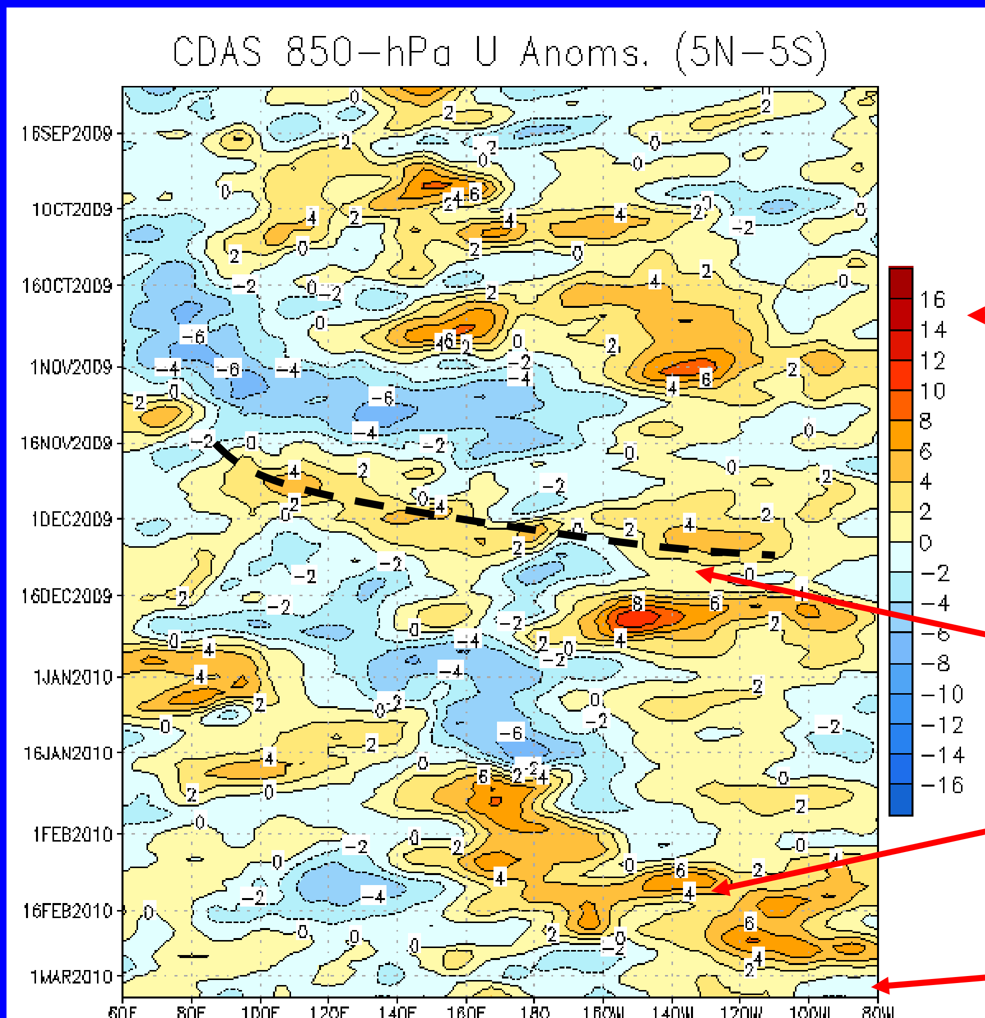
Longitude

- In April 2009, the combined effects of an oceanic Kelvin wave and weaker-than-average easterly trade winds contributed to an increase in the upper-ocean heat content anomalies across the Pacific Ocean.
- Since April 2009, heat content anomalies have remained above-average, but there has been considerable month-to-month variability due to Kelvin wave activity.
- From November- January 2009, two oceanic Kelvin waves contributed to the change in heat content across the eastern half of the Pacific.
- Since early February 2009, the heat content has increased across the east-central Pacific in association with the downwelling phase of another Kelvin wave.

•Oceanic Kelvin waves have alternating warm and cold phases. The warm phase is indicated by dashed lines. Down-welling and warming occur in the leading portion of a Kelvin wave, and up-welling and cooling occur in the trailing portion.

Low-level (850-hPa) Zonal (east-west) Wind Anomalies (m s^{-1})

Time



Longitude

Westerly wind anomalies (orange/red shading).

Easterly wind anomalies (blue shading).

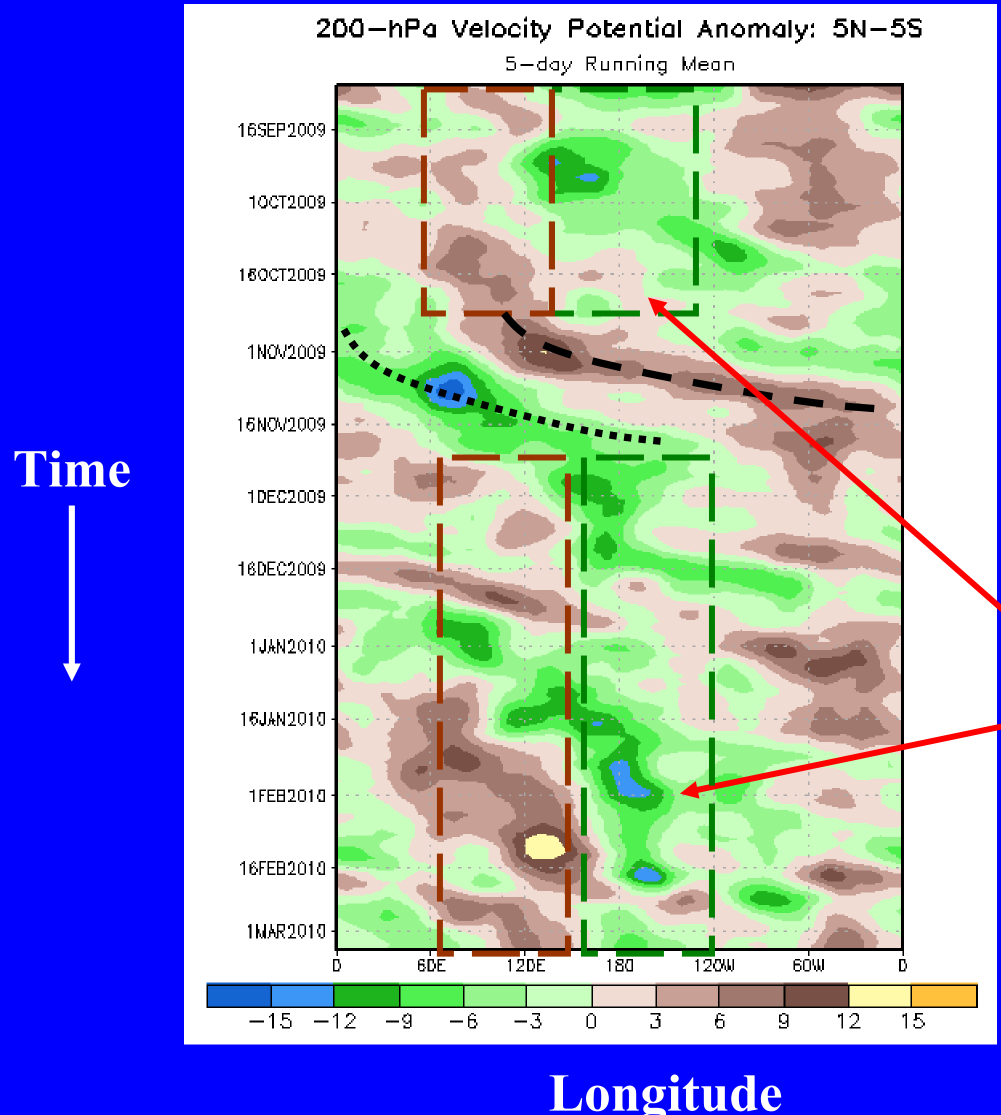
Since May 2009, westerly wind anomalies have covered large portions of the equatorial Pacific, except near the Date Line.

During November 2009, the MJO became active, which contributed to anomalous easterlies shifting eastward from the Indian Ocean to the central and eastern Pacific.

During February 2010, anomalous low-level westerly winds strengthened across the eastern half of the Pacific.

Recently, anomalous westerlies have subsided across much of the Pacific.

200-hPa Velocity Potential Anomalies (5ºN-5ºS)



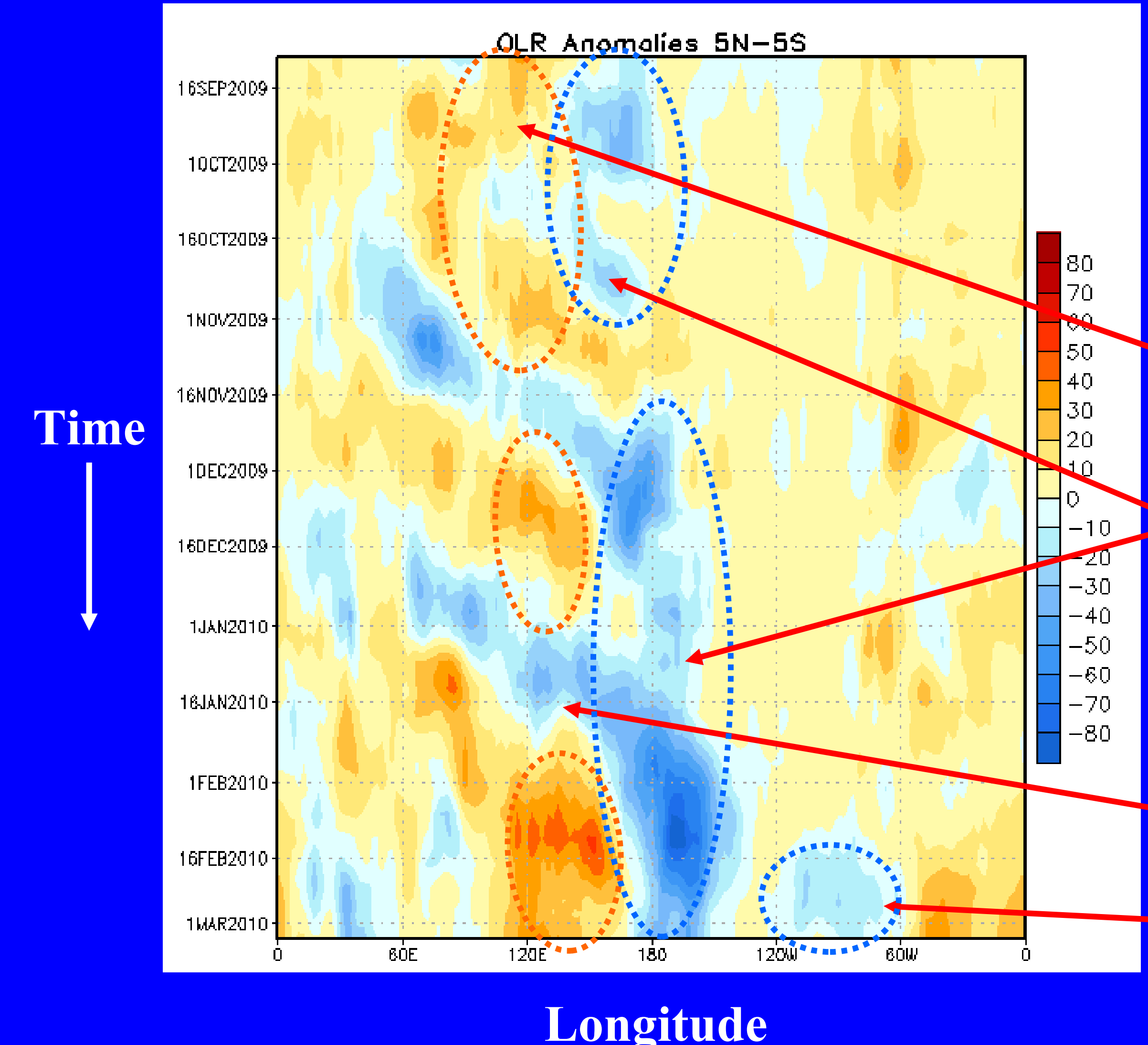
Positive anomalies (brown shading) indicate unfavorable conditions for precipitation.

Negative anomalies (green shading) indicate favorable conditions for precipitation.

During November, MJO activity was prevalent, but diminished during the first half of December.

During July-October 2009 and since December 2009, the anomalous velocity potential pattern has generally featured upper-level divergence over the west-central Pacific (green) and upper-level convergence (brown) over the eastern Indian Ocean and Maritime Continent.

Outgoing Longwave Radiation (OLR) Anomalies



Drier-than-average conditions (orange/red shading)

Wetter-than-average conditions (blue shading)

Since mid-May 2009, convection has remained mostly suppressed over the eastern Indian Ocean and Maritime Continent.

The pattern of OLR anomalies since late August 2009, generally featured suppressed convection around 120ºE and enhanced convection near the Date Line. This pattern is consistent with El Niño.

Periodic MJO activity has also been evident in the eastward shift of OLR anomalies.

Since mid-February, negative OLR anomalies have become evident in the eastern Pacific.

Oceanic Niño Index (ONI)

- The ONI is based on SST departures from average in the Niño 3.4 region, and is a principal measure for monitoring, assessing, and predicting ENSO.
- Defined as the three-month running-mean SST departures in the Niño 3.4 region. Departures are based on a set of improved homogeneous historical SST analyses (Extended Reconstructed SST – ERSST.v3b). The SST reconstruction methodology is described in Smith et al., 2008, *J. Climate*, vol. 21, 2283-2296.)
- Used to place current events into a historical perspective
- NOAA's operational definitions of El Niño and La Niña are keyed to the ONI index.

NOAA Operational Definitions for El Niño and La Niña

El Niño: characterized by a ***positive*** ONI greater than or equal to +0.5°C.

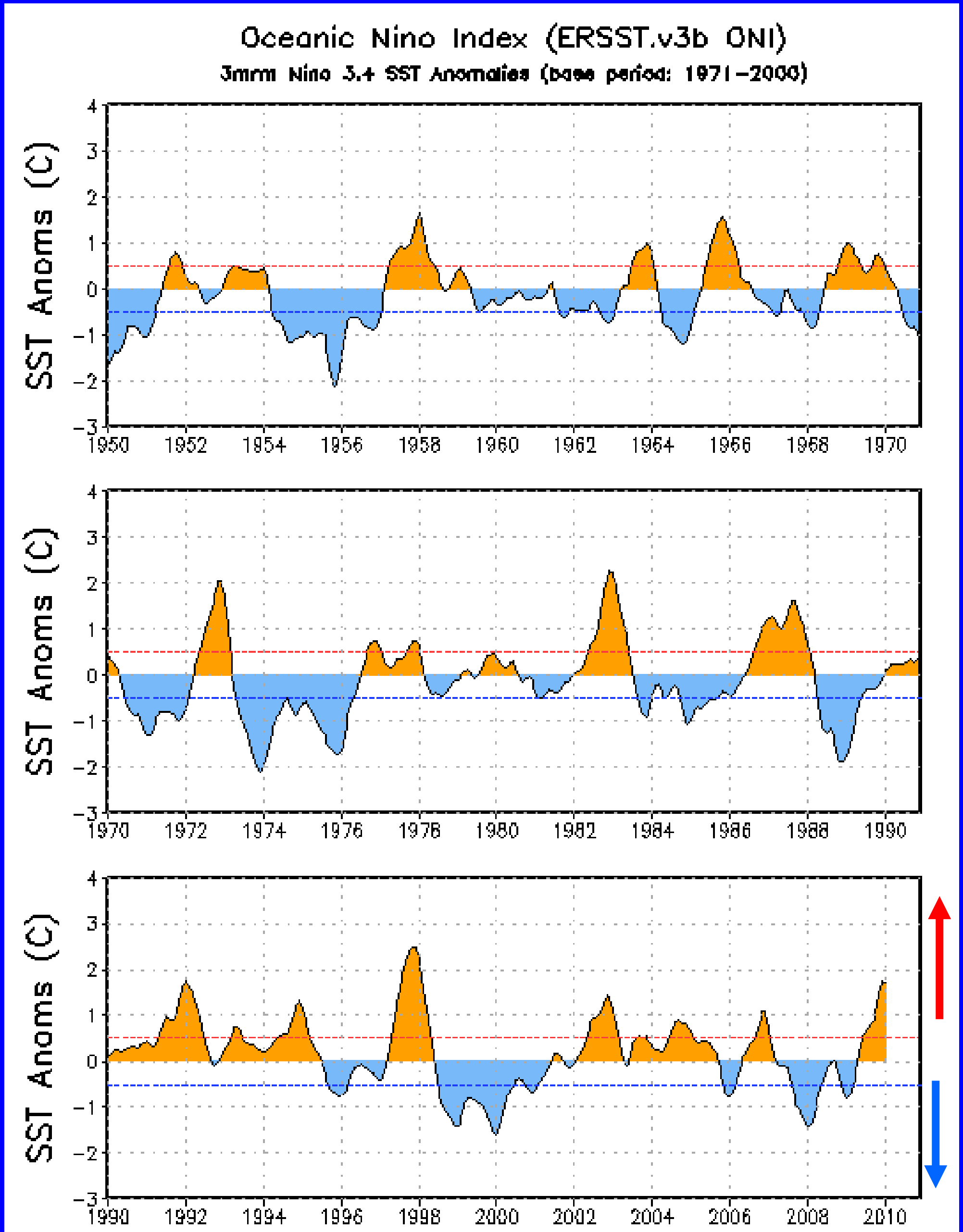
La Niña: characterized by a ***negative*** ONI less than or equal to -0.5°C.

By historical standards, to be classified as a full-fledged El Niño or La Niña episode, these thresholds must be exceeded for a period of at least 5 consecutive overlapping 3-month seasons.

CPC considers El Niño or La Niña conditions to occur when the monthly Niño3.4 SST departures meet or exceed +/- 0.5°C along with consistent atmospheric features. These anomalies must also be forecasted to persist for 3 consecutive months.

ONI (ºC): Evolution since 1950

The most recent ONI value (December 2009 – February 2010) is +1.7ºC.



El Niño

neutral

La Niña

Historical El Niño and La Niña Episodes
Based on the ONI computed using ERSST.v3b

NOTE:

After updating the ocean analysis to ERSST.v3b, a new La Niña episode was classified (ASO 1962- DJF 1962/63) and two previous La Niña episodes were combined into one single episode (AMJ 1973- MAM 1976).

El Niño	Highest ONI Value
JAS 1951 - NDJ 1951/52	0.8
MAM 1957 – MJJ 1958	1.7
JJA 1963 – DJF 1963/64	1.0
MJJ 1965 – MAM 1966	1.6
OND 1968 – MJJ 1969	1.0
ASO 1969 – DJF 1969/70	0.8
AMJ 1972 – FMA 1973	2.1
ASO 1976 – JFM 1977	0.8
ASO 1977 - DJF 1977/78	0.8
AMJ 1982 – MJJ 1983	2.3
JAS 1986 – JFM 1988	1.6
AMJ 1991 – JJA 1992	1.8
AMJ 1994 – FMA 1995	1.3
AMJ 1997 – AMJ 1998	2.5
AMJ 2002 – FMA 2003	1.5
MJJ 2004 – JFM 2005	0.9
JAS 2006 - DJF 2006/07	1.1

La Nina	Lowest ONI Value
ASO 1949 – FMA 1951	-1.7
MAM 1954 – DJF 1956/57	-2.1
ASO 1962 – DJF 1962/63	-0.8
MAM 1964 – DJF 1964/65	-1.1
NDJ 1967/68 – MAM 1968	-0.9
JJA 1970 – DJF 1971/72	-1.3
AMJ 1973 – MAM 1976	-2.0
SON 1984 – ASO 1985	-1.0
AMJ 1988 – AMJ 1989	-1.9
ASO 1995 – FMA 1996	-0.7
JJA 1998 – MJJ 2000	-1.6
SON 2000 – JFM 2001	-0.7
ASO 2007 – AMJ 2008	-1.4

Historical Pacific warm (red) and cold (blue) episodes based on a threshold of +/- 0.5 ºC for the Oceanic Nino Index (ONI) [3 month running mean of ERSST.v3b SST anomalies in the Nino 3.4 region (5N-5S, 120-170W)], calculated with respect to the 1971-2000 base period. For historical purposes El Niño and La Niña episodes are defined when the threshold is met for a minimum of 5 consecutive over-lapping seasons.

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
1950	**-1.7**	**-1.5**	**-1.3**	**-1.4**	**-1.3**	**-1.1**	**-0.8**	**-0.8**	**-0.8**	**-0.9**	**-0.9**	**-1.0**
1951	**-1.0**	**-0.9**	**-0.6**	-0.3	-0.2	0.2	0.4	**0.7**	**0.7**	**0.8**	**0.7**	**0.6**
1952	0.3	0.1	0.1	0.2	0.1	-0.1	-0.3	-0.3	-0.2	-0.2	-0.1	0.0
1953	0.2	0.4	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4
1954	0.5	0.3	-0.1	**-0.5**	**-0.7**	**-0.7**	**-0.8**	**-1.0**	**-1.2**	**-1.1**	**-1.1**	**-1.1**
1955	**-1.0**	**-0.9**	**-0.9**	**-1.0**	**-1.0**	**-1.0**	**-1.0**	**-1.0**	**-1.4**	**-1.8**	**-2.0**	**-1.9**
1956	**-1.3**	**-0.9**	**-0.7**	**-0.6**	**-0.6**	**-0.6**	**-0.7**	**-0.8**	**-0.8**	**-0.9**	**-0.9**	**-0.8**
1957	**-0.5**	-0.1	0.3	**0.6**	**0.7**	**0.9**	**0.9**	**0.9**	**0.9**	**1.0**	**1.2**	**1.5**
1958	**1.7**	**1.5**	**1.2**	**0.8**	**0.6**	**0.5**	0.3	0.1	0.0	0.0	0.2	0.4
1959	0.4	0.5	0.4	0.2	0.0	-0.2	-0.4	-0.5	-0.4	-0.3	-0.2	-0.2
1960	-0.3	-0.3	-0.3	-0.2	-0.2	-0.2	-0.1	0.0	-0.1	-0.2	-0.2	-0.2
1961	-0.2	-0.2	-0.2	-0.1	0.1	0.2	0.0	-0.3	-0.6	-0.6	-0.5	-0.4
1962	-0.4	-0.4	-0.4	-0.5	-0.4	-0.4	-0.3	-0.3	**-0.5**	**-0.6**	**-0.7**	**-0.7**
1963	**-0.6**	-0.3	0.0	0.1	0.1	0.3	**0.6**	**0.8**	**0.9**	**0.9**	**1.0**	**1.0**
1964	**0.8**	0.4	-0.1	**-0.5**	**-0.8**	**-0.8**	**-0.9**	**-1.0**	**-1.1**	**-1.2**	**-1.2**	**-1.0**
1965	**-0.8**	-0.4	-0.2	0.0	0.3	**0.6**	**1.0**	**1.2**	**1.4**	**1.5**	**1.6**	**1.5**
1966	**1.2**	**1.0**	**0.8**	**0.5**	0.2	0.2	0.2	0.0	-0.2	-0.2	-0.3	-0.3
1967	-0.4	-0.4	-0.6	-0.5	-0.3	0.0	0.0	-0.2	-0.4	-0.5	-0.4	**-0.5**
1968	**-0.7**	**-0.9**	**-0.8**	**-0.7**	-0.3	0.0	0.3	0.4	0.3	0.4	**0.7**	**0.9**
1969	**1.0**	**1.0**	**0.9**	**0.7**	**0.6**	**0.5**	0.4	0.4	**0.6**	**0.7**	**0.8**	**0.7**
1970	**0.5**	0.3	0.2	0.1	0.0	-0.3	**-0.6**	**-0.8**	**-0.9**	**-0.8**	**-0.9**	**-1.1**
1971	**-1.3**	**-1.3**	**-1.1**	**-0.9**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.8**	**-0.9**	**-1.0**	**-0.9**
1972	**-0.7**	-0.4	0.0	0.2	**0.5**	**0.8**	**1.0**	**1.3**	**1.5**	**1.8**	**2.0**	**2.1**
1973	**1.8**	**1.2**	**0.5**	-0.1	**-0.6**	**-0.9**	**-1.1**	**-1.3**	**-1.4**	**-1.7**	**-2.0**	**-2.1**
1974	**-1.9**	**-1.7**	**-1.3**	**-1.1**	**-0.9**	**-0.8**	**-0.6**	**-0.5**	**-0.5**	**-0.7**	**-0.9**	**-0.7**
1975	**-0.6**	**-0.6**	**-0.7**	**-0.8**	**-0.9**	**-1.1**	**-1.2**	**-1.3**	**-1.5**	**-1.6**	**-1.7**	**-1.7**

Historical Pacific warm (red) and cold (blue) episodes based on a threshold of +/- 0.5 ºC for the Oceanic Nino Index (ONI) [3 month running mean of ERSST.v3b SST anomalies in the Nino 3.4 region (5N-5S, 120-170W)], calculated with respect to the 1971-2000 base period. For historical purposes El Niño and La Niña episodes are defined when the threshold is met for a minimum of 5 consecutive over-lapping seasons.

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
1976	**-1.6**	**-1.2**	**-0.8**	**-0.6**	**-0.5**	-0.2	0.1	0.3	**0.5**	**0.7**	**0.8**	**0.7**
1977	**0.6**	**0.5**	0.2	0.2	0.2	0.4	0.4	0.4	**0.5**	**0.6**	**0.7**	**0.7**
1978	**0.7**	0.4	0.0	-0.3	-0.4	-0.4	-0.4	-0.4	-0.4	-0.3	-0.2	-0.1
1979	-0.1	0.0	0.1	0.1	0.1	-0.1	0.0	0.1	0.3	0.4	0.5	0.5
1980	0.5	0.3	0.2	0.2	0.3	0.3	0.2	0.0	-0.1	-0.1	0.0	-0.1
1981	-0.3	-0.5	-0.5	-0.4	-0.3	-0.3	-0.4	-0.4	-0.3	-0.2	-0.1	-0.1
1982	0.0	0.1	0.1	0.3	**0.6**	**0.7**	**0.7**	**1.0**	**1.5**	**1.9**	**2.2**	**2.3**
1983	**2.3**	**2.0**	**1.5**	**1.2**	**1.0**	**0.6**	0.2	-0.2	-0.6	-0.8	-0.9	-0.7
1984	-0.4	-0.2	-0.2	-0.3	-0.5	-0.4	-0.3	-0.2	-0.3	**-0.6**	**-0.9**	**-1.1**
1985	**-0.9**	**-0.8**	**-0.7**	**-0.7**	**-0.7**	**-0.6**	**-0.5**	**-0.5**	**-0.5**	-0.4	-0.3	-0.4
1986	-0.5	-0.4	-0.2	-0.2	-0.1	0.0	0.3	**0.5**	**0.7**	**0.9**	**1.1**	**1.2**
1987	**1.2**	**1.3**	**1.2**	**1.1**	**1.0**	**1.2**	**1.4**	**1.6**	**1.6**	**1.5**	**1.3**	**1.1**
1988	**0.7**	**0.5**	0.1	-0.2	**-0.7**	**-1.2**	**-1.3**	**-1.2**	**-1.3**	**-1.6**	**-1.9**	**-1.9**
1989	**-1.7**	**-1.5**	**-1.1**	**-0.8**	**-0.6**	-0.4	-0.3	-0.3	-0.3	-0.3	-0.2	-0.1
1990	0.1	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.4
1991	0.4	0.3	0.3	0.4	**0.6**	**0.8**	**1.0**	**0.9**	**0.9**	**1.0**	**1.4**	**1.6**
1992	**1.8**	**1.6**	**1.5**	**1.4**	**1.2**	**0.8**	**0.5**	0.2	0.0	-0.1	0.0	0.2
1993	0.3	0.4	0.6	0.7	0.8	0.7	0.4	0.4	0.4	0.4	0.3	0.2
1994	0.2	0.2	0.3	0.4	**0.5**	**0.5**	**0.6**	**0.6**	**0.7**	**0.9**	**1.2**	**1.3**
1995	**1.2**	**0.9**	**0.7**	0.4	0.3	0.2	0.0	-0.2	**-0.5**	**-0.6**	**-0.7**	**-0.7**
1996	**-0.7**	**-0.7**	**-0.5**	-0.3	-0.1	-0.1	0.0	-0.1	-0.1	-0.2	-0.3	-0.4
1997	-0.4	-0.3	0.0	0.4	**0.8**	**1.3**	**1.7**	**2.0**	**2.2**	**2.4**	**2.5**	**2.5**
1998	**2.3**	**1.9**	**1.5**	**1.0**	**0.5**	0.0	**-0.5**	**-0.8**	**-1.0**	**-1.1**	**-1.3**	**-1.4**
1999	**-1.4**	**-1.2**	**-0.9**	**-0.8**	**-0.8**	**-0.8**	**-0.9**	**-0.9**	**-1.0**	**-1.1**	**-1.3**	**-1.6**
2000	**-1.6**	**-1.4**	**-1.0**	**-0.8**	**-0.6**	**-0.5**	-0.4	-0.4	-0.4	**-0.5**	**-0.6**	**-0.7**
2001	**-0.6**	**-0.5**	-0.4	-0.2	-0.1	0.1	0.2	0.2	0.1	0.0	-0.1	-0.1

Historical Pacific warm (red) and cold (blue) episodes based on a threshold of +/- 0.5 ºC for the Oceanic Nino Index (ONI) [3 month running mean of ERSST.v3b SST anomalies in the Nino 3.4 region (5N-5S, 120-170W)], calculated with respect to the 1971-2000 base period. For historical purposes El Niño and La Niña episodes are defined when the threshold is met for a minimum of 5 consecutive over-lapping seasons.

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2002	-0.1	0.1	0.2	0.4	**0.7**	**0.8**	**0.9**	**1.0**	**1.1**	**1.3**	**1.5**	**1.4**
2003	**1.2**	**0.9**	**0.5**	0.1	-0.1	0.1	0.4	0.5	0.6	0.5	0.6	0.4
2004	0.4	0.3	0.2	0.2	0.3	**0.5**	**0.7**	**0.8**	**0.9**	**0.8**	**0.8**	**0.8**
2005	**0.7**	**0.5**	0.4	0.4	0.4	0.4	0.4	0.3	0.2	-0.1	-0.4	-0.7
2006	-0.7	-0.6	-0.4	-0.1	0.1	0.2	0.3	**0.5**	**0.6**	**0.9**	**1.1**	**1.1**
2007	**0.8**	0.4	0.1	-0.1	-0.1	-0.1	-0.1	-0.4	**-0.7**	**-1.0**	**-1.1**	**-1.3**
2008	**-1.4**	**-1.4**	**-1.1**	**-0.8**	**-0.6**	-0.4	-0.1	0.0	0.0	0.0	-0.3	-0.6
2009	-0.8	-0.7	-0.5	-0.1	0.2	**0.6**	**0.7**	**0.8**	**0.9**	**1.2**	**1.5**	**1.8**
2010	**1.7**											
2011												
2012												
2013												
2014												
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												
2026												
2027												

Pacific Niño 3.4 SST Outlook

- A majority of the models indicate that the Niño-3.4 temperature departures will gradually decrease at least into the summer.
- The models are split with the majority indicating ENSO-neutral conditions by May-July 2010 and persisting into the Fall. Several models also suggest the potential of continued El Niño conditions or the development of La Niña conditions during the Fall.

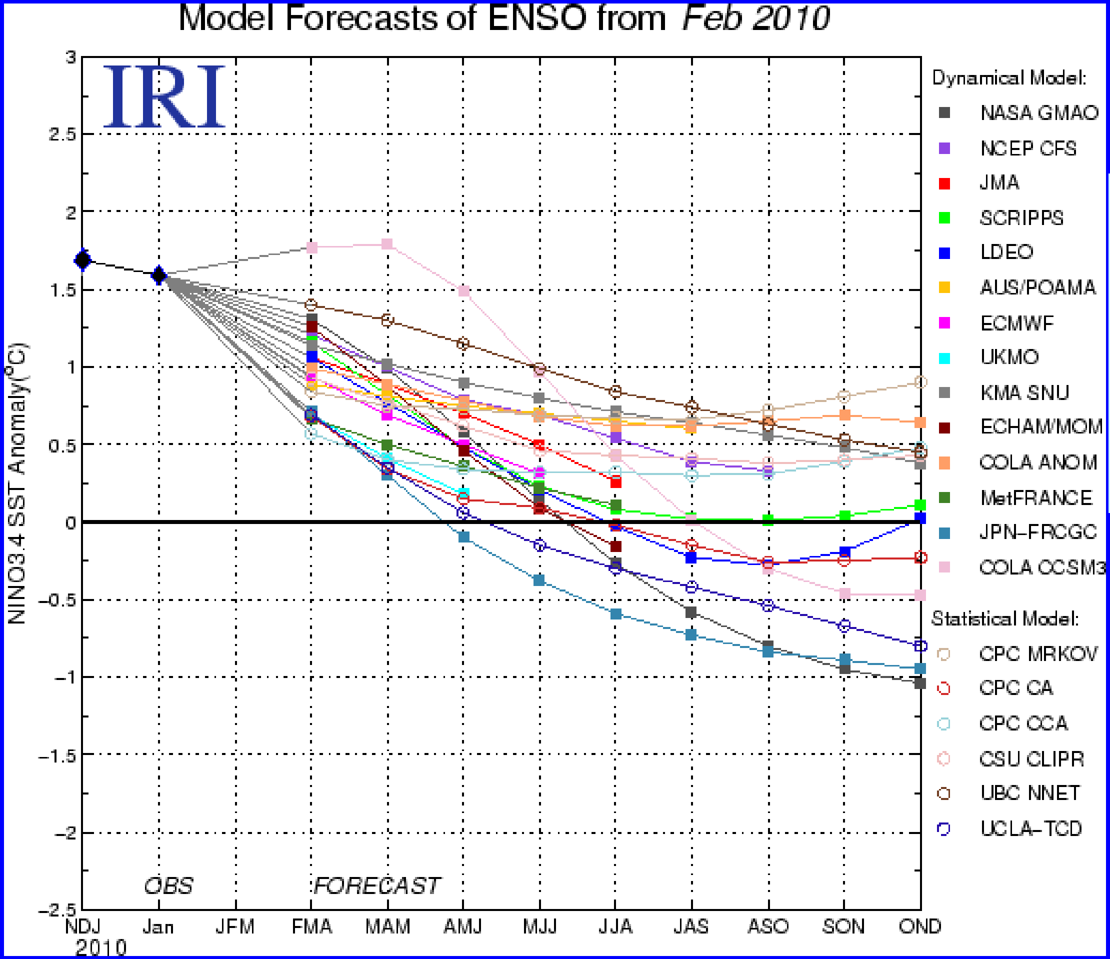
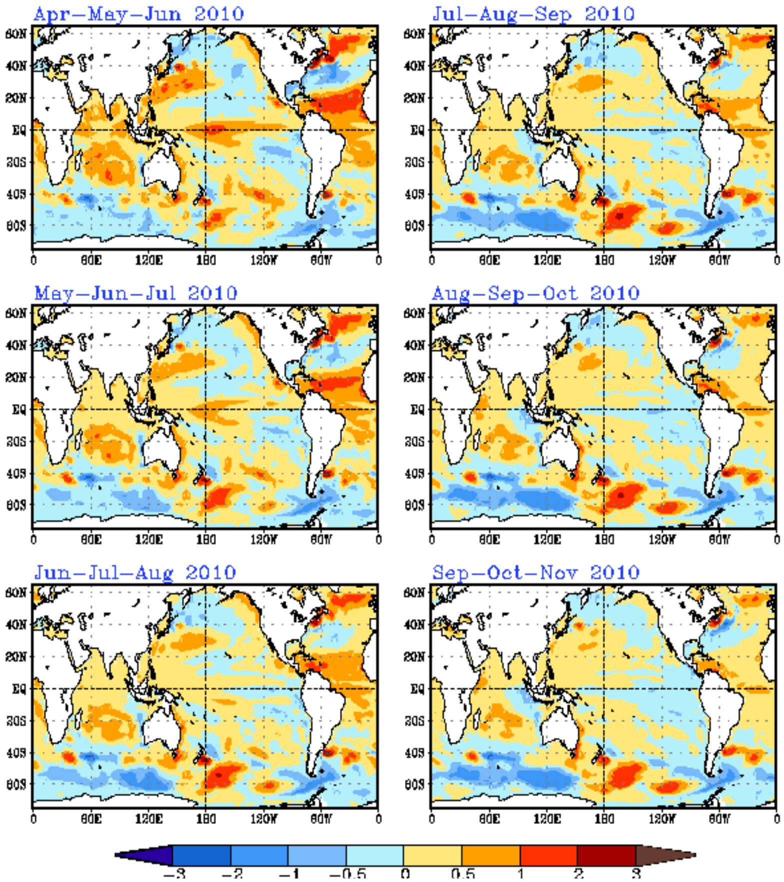
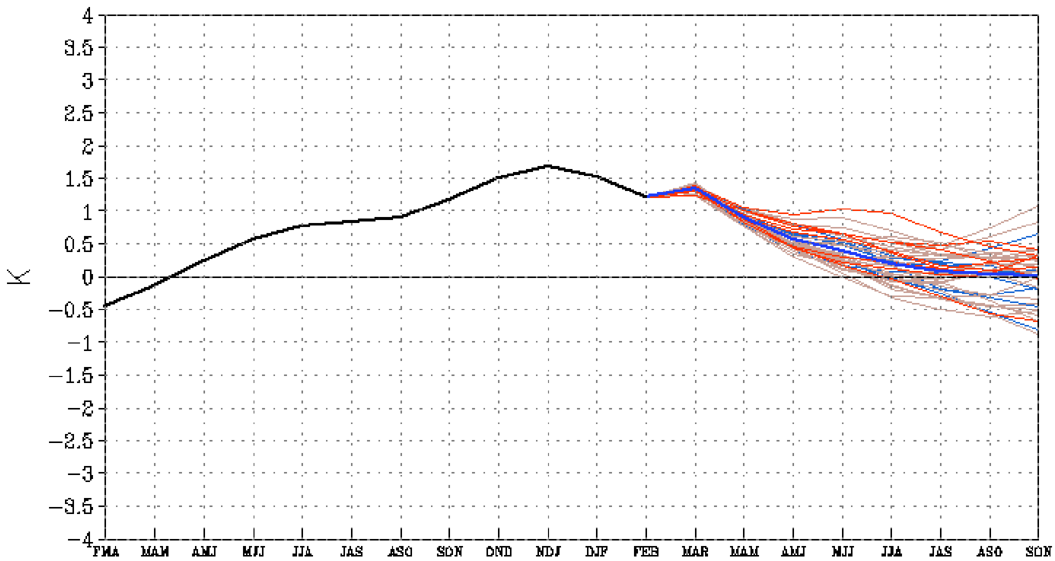


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 16 Feb 2010).

SST Outlook: NCEP CFS Forecast Issued 7 March 2010



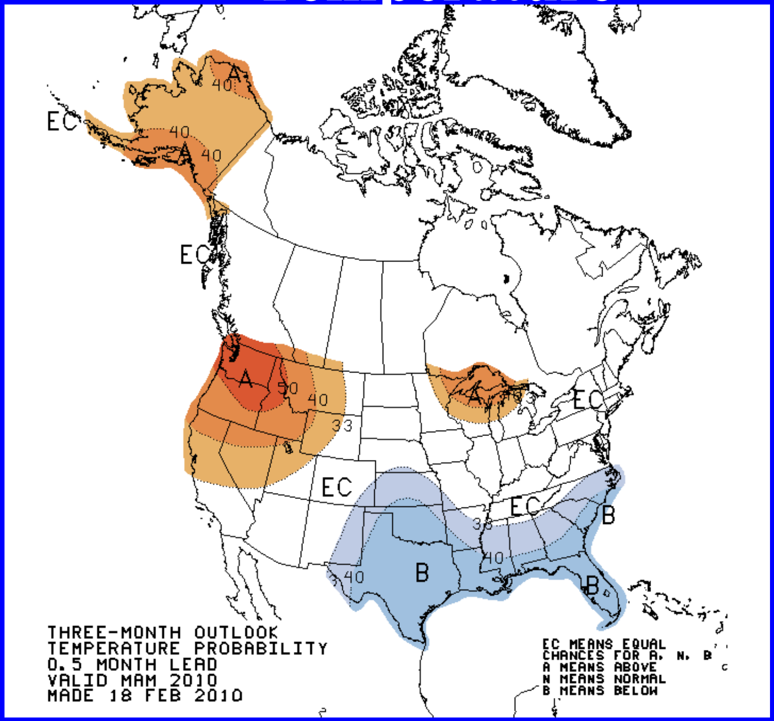
The CFS ensemble mean (heavy blue line) predicts El Niño will last through the Northern Hemisphere spring 2010.



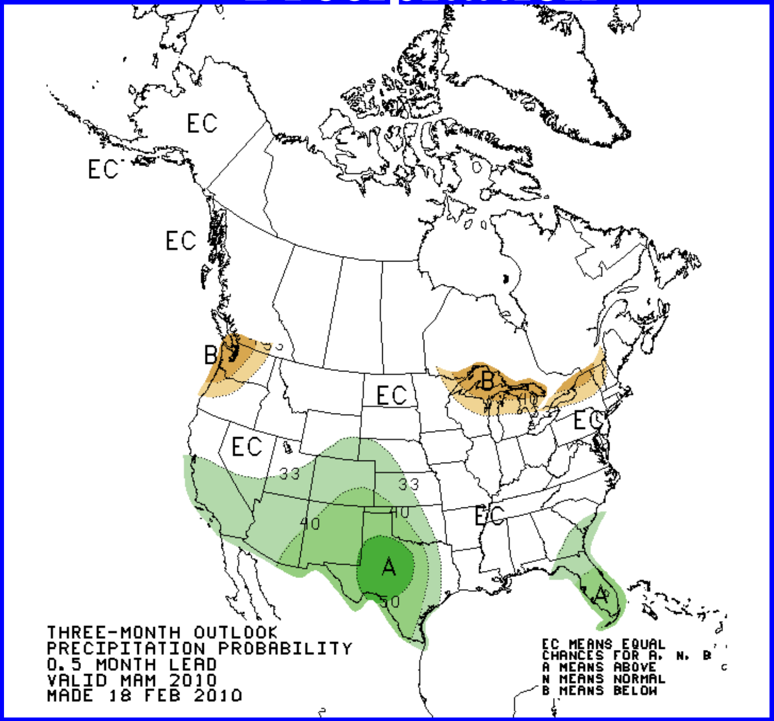
Please note the anomalies displayed above are not PDF corrected (they are biased corrected).

U. S. Seasonal Outlooks
March – May 2010

Temperature



Precipitation

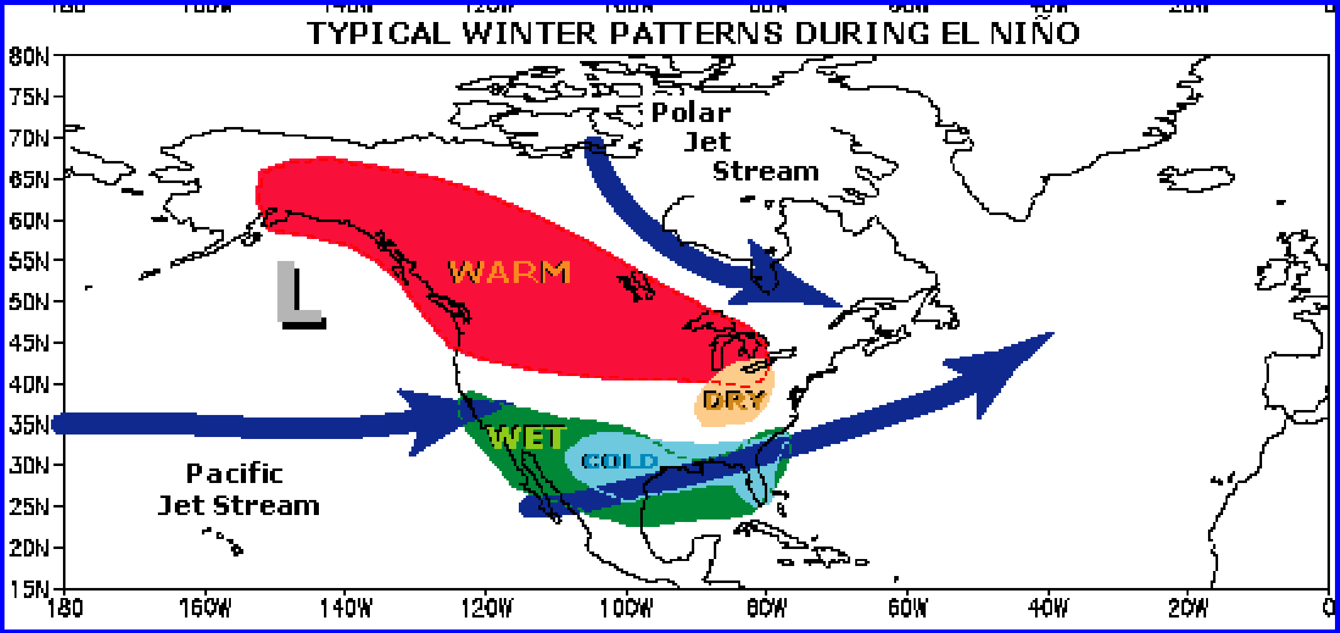


The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, the ENSO cycle.

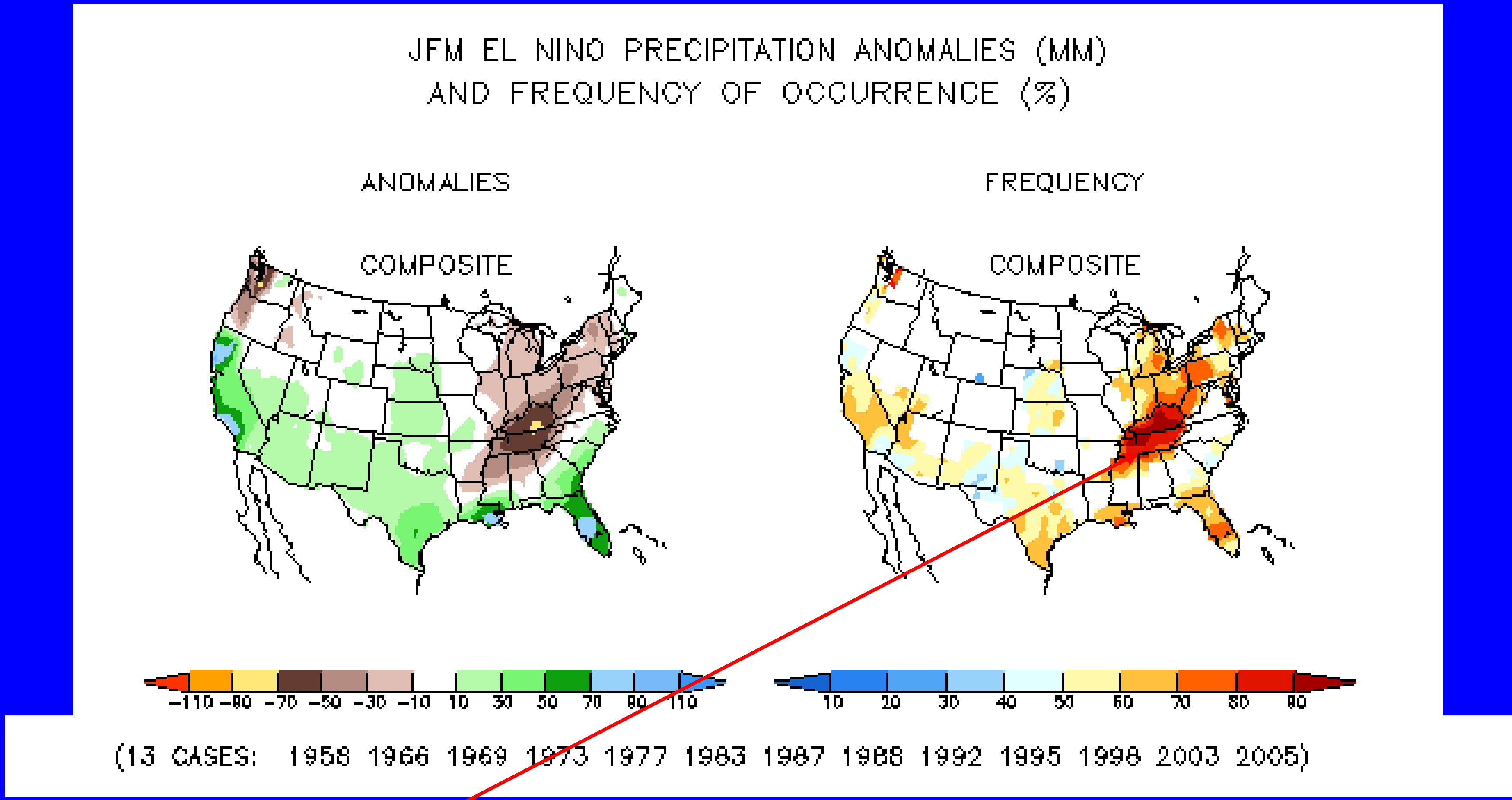
Summary

- El Niño is present across the equatorial Pacific Ocean.
- Sea surface temperatures (SST) are more than 1.0ºC above-average across much of the central and eastern equatorial Pacific.
- Based on current observations and dynamical model forecasts, El Niño is expected to continue at least through the Northern Hemisphere spring 2010.

Typical US Temperature, Precipitation and Jet Stream Patterns during El Niño Winters

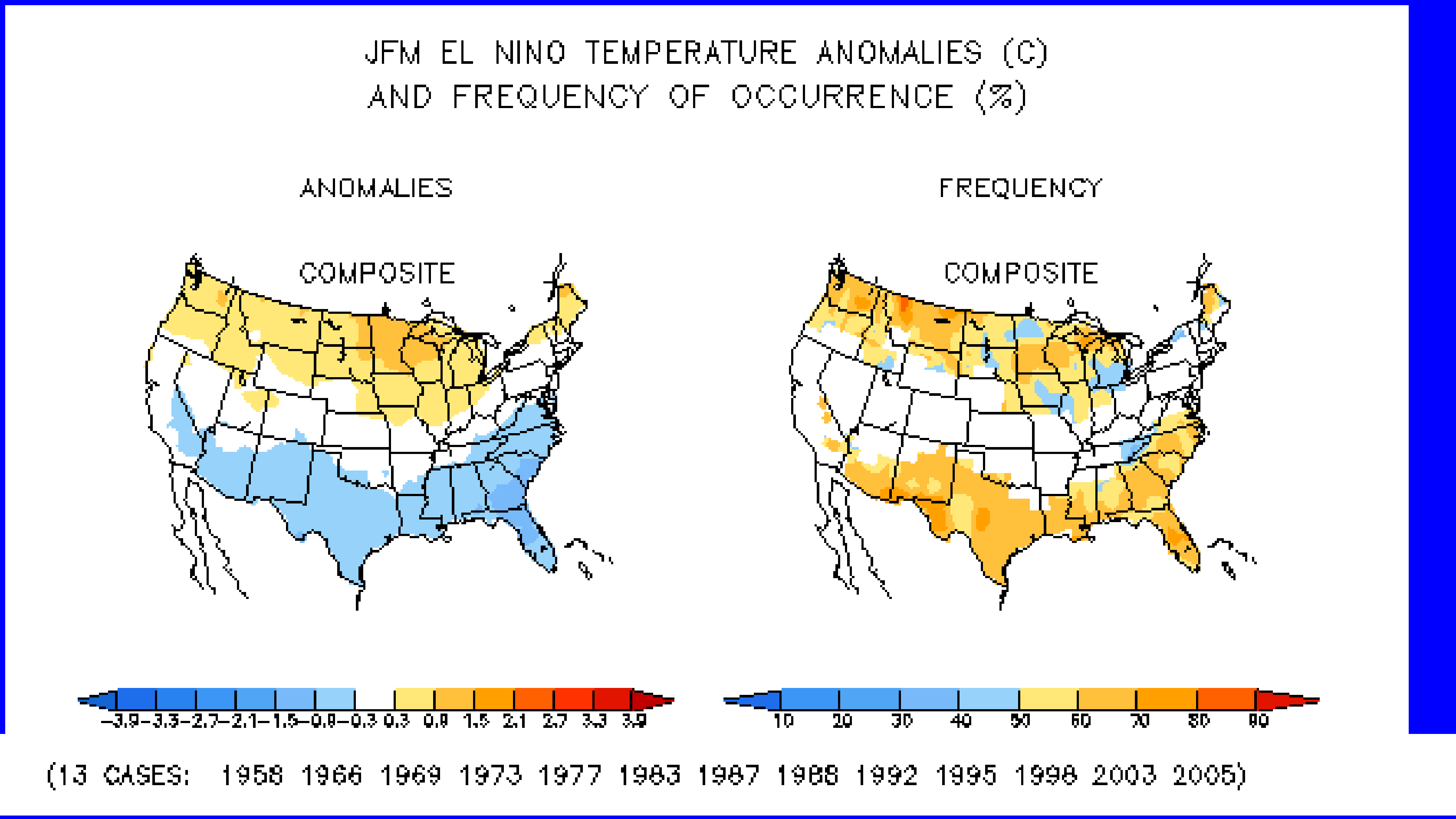


U.S. Precipitation Departures (mm) and Frequency of Occurrence (%) for El Niño during Jan.-Mar.

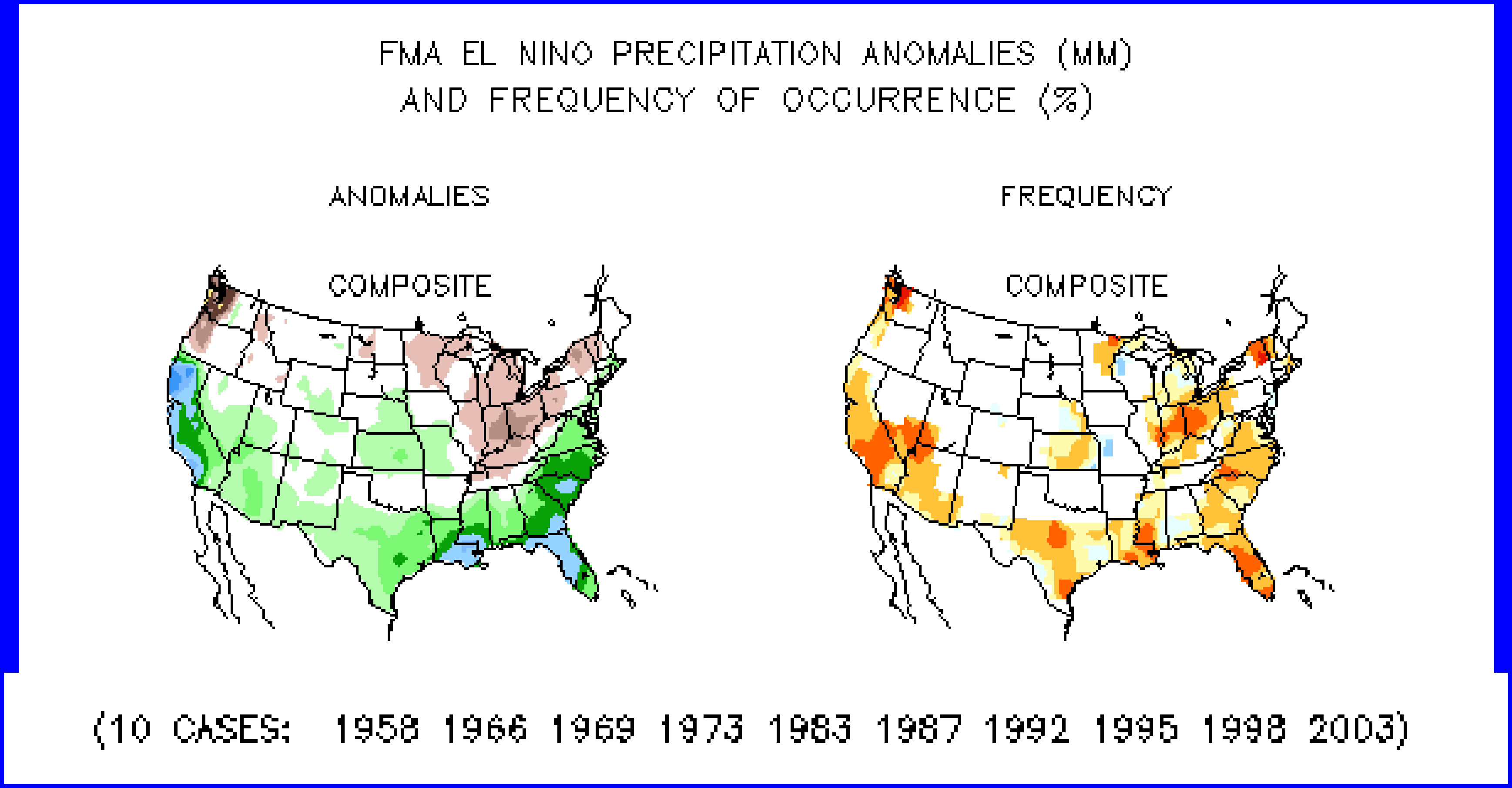


FREQUENCY (right panel) indicates the percentage of El Niño years that the indicated departure (left panel) occurred. For example, below-average seasonal precipitation over Tennessee occurred in 80%-90% of the El Niño years.

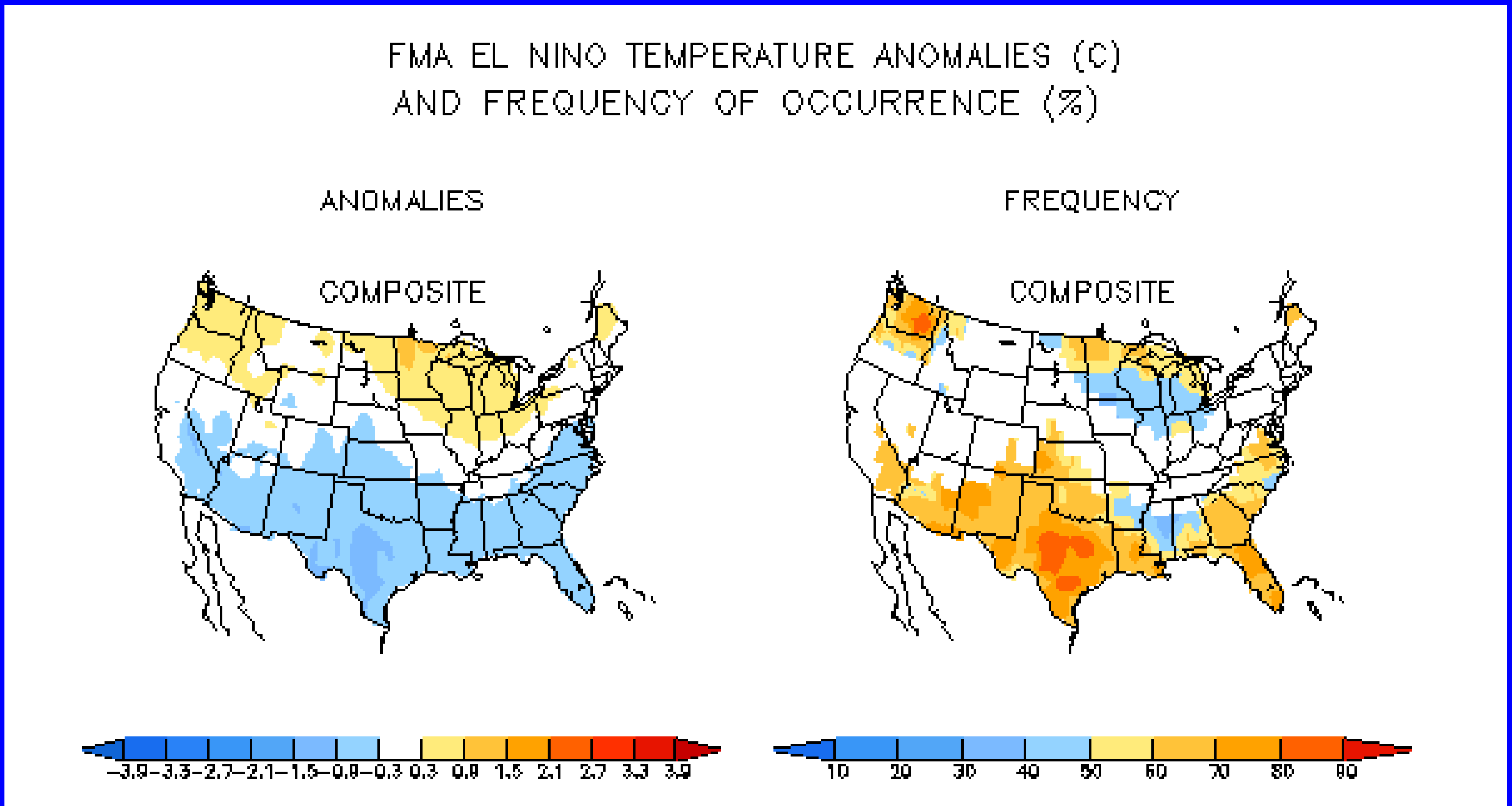
U.S. Temp. Departures (°C) and Frequency of Occurrence (%) for El Niño during Jan.-Mar.



U.S. Precipitation Departures (mm) and Frequency of Occurrence (%) for El Niño during Feb.-Apr.

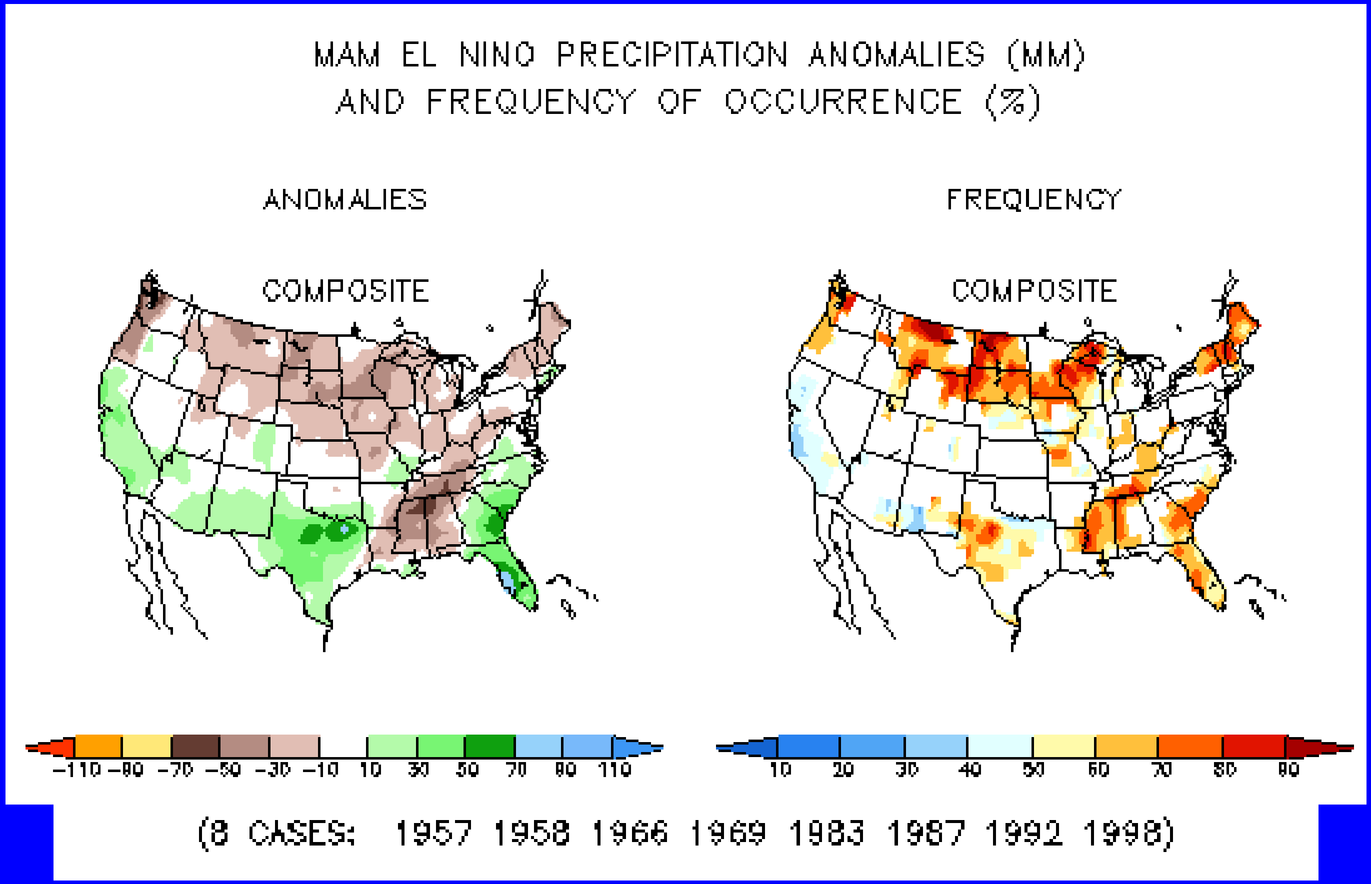


U.S. Temp. Departures (°C) and Frequency of Occurrence (%) for El Niño during Feb.-Apr.

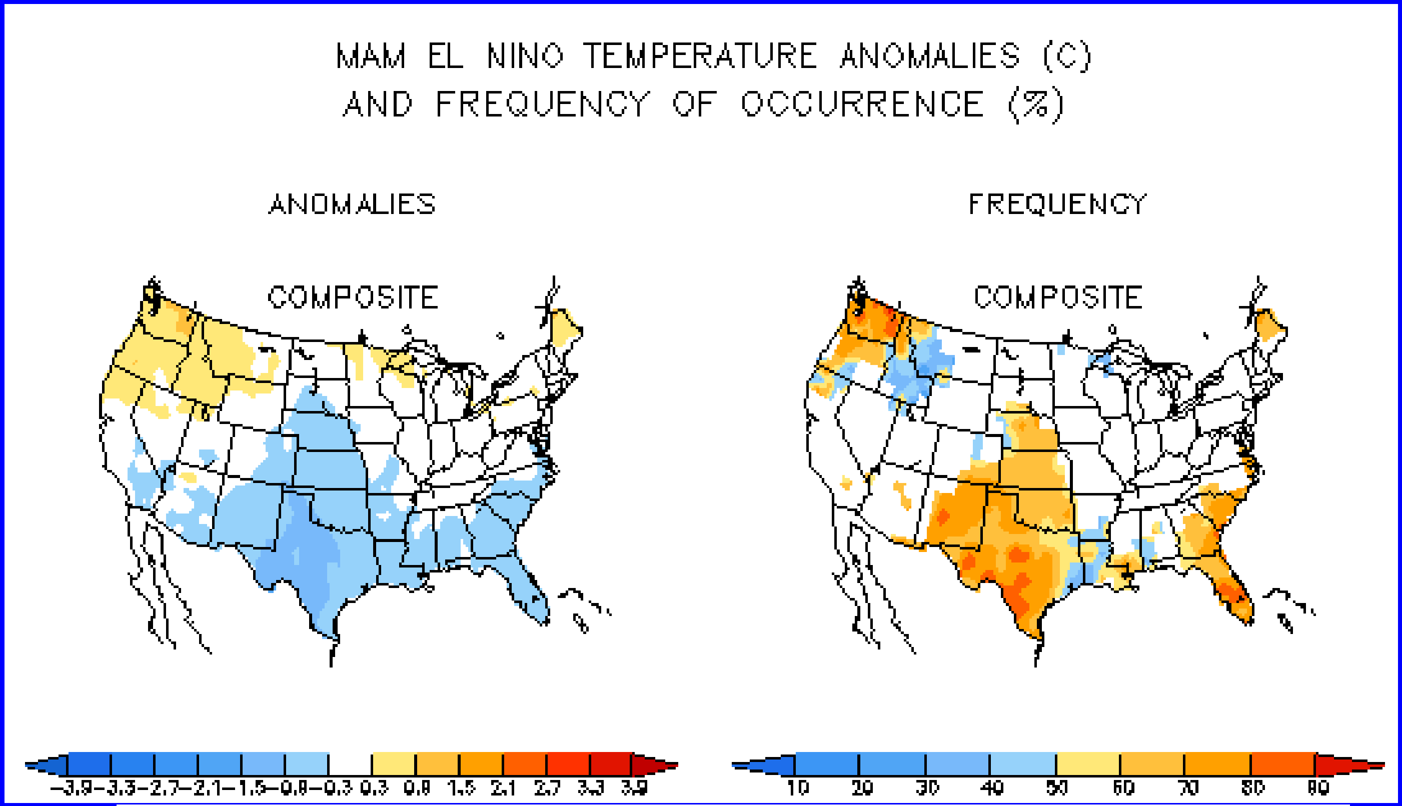


(10 CASES: 1958 1966 1969 1973 1983 1987 1992 1995 1998 2003)

U.S. Precipitation Departures (mm) and Frequency of Occurrence (%) for El Niño during Mar.-May

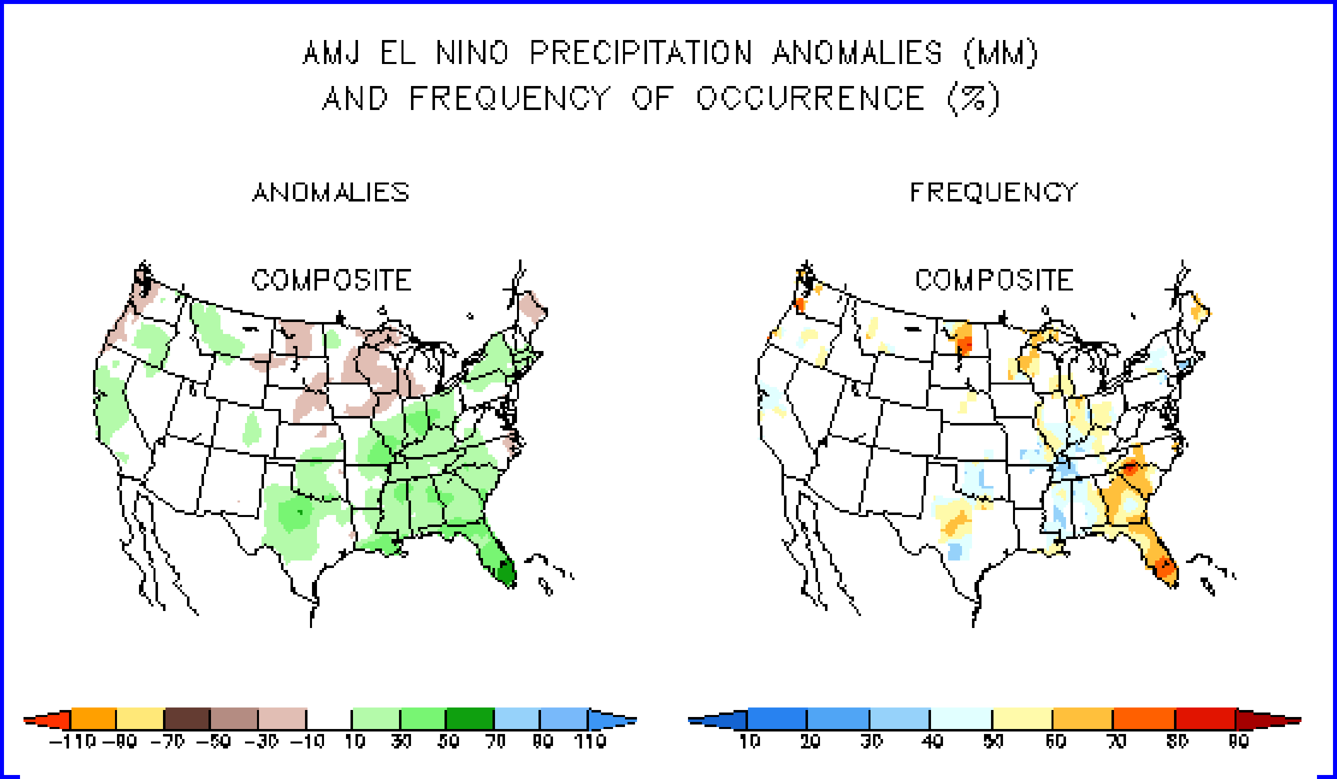


U.S. Temp. Departures (°C) and Frequency of Occurrence (%) for El Niño during Mar.-May



(8 CASES: 1957 1958 1966 1969 1983 1987 1992 1998)

U.S. Precipitation Departures (mm) and Frequency of Occurrence (%) for El Niño during Apr.-Jun.



(13 CASES: 1957 1958 1969 1972 1982 1983 1987 1991 1992 1994 1997 1998 2002)

U.S. Temp. Departures (°C) and Frequency of Occurrence (%) for El Niño during Apr.-Jun.