ENSO Cycle: Recent Evolution, Current Status and Predictions

Update prepared by
Climate Prediction Center / NCEP
31 May 2011

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
- La Niña Composites

Summary

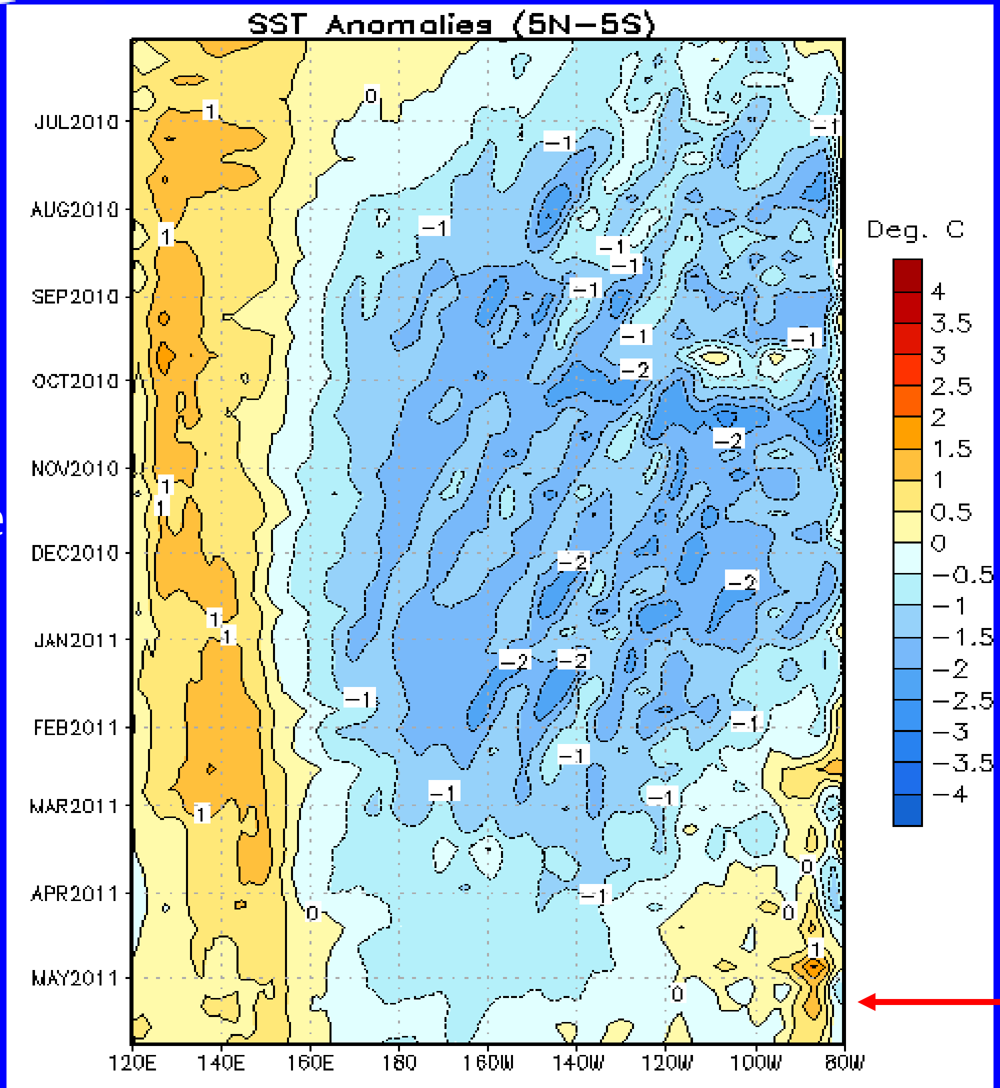
- A transition from La Niña conditions to ENSO-neutral conditions is underway across the equatorial Pacific.

- Negative sea surface temperature (SST) anomalies persist across the central equatorial Pacific Ocean, while SSTs are now above-average in the eastern equatorial Pacific Ocean.

- Atmospheric circulation anomalies associated with La Niña remain significant.

- ENSO-neutral conditions are expected to develop during May-June 2011 and continue through the Northern Hemisphere summer 2011.

Recent Evolution of Equatorial Pacific SST Departures (ºC)



Time

Longitude

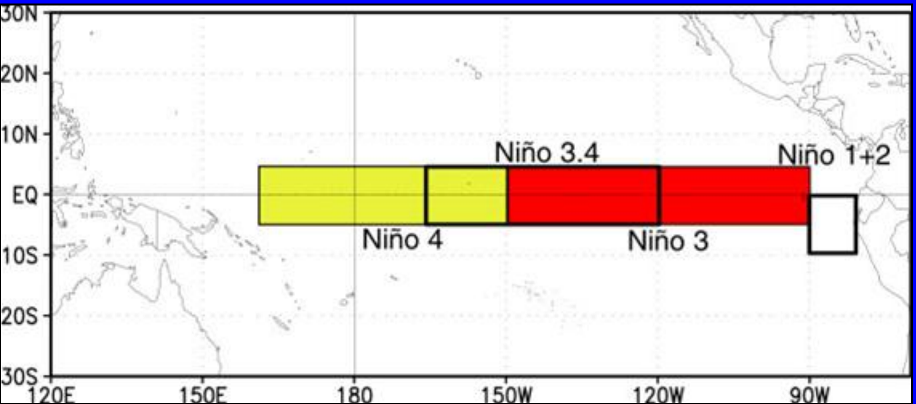
From May 2010- January 2011, negative SST anomalies expanded and persisted across much of the equatorial Pacific.

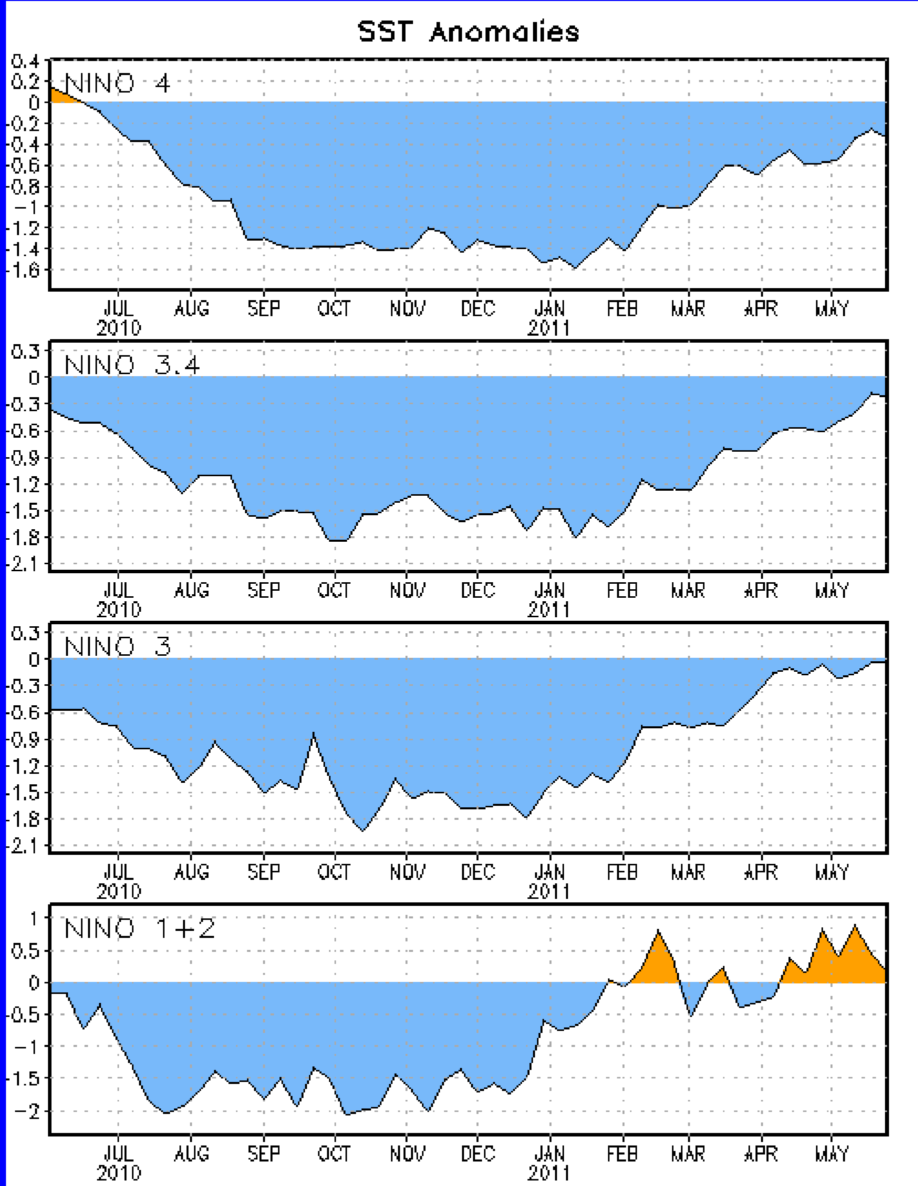
Since January 2011, negative anomalies have weakened in the central and eastern Pacific, and anomalies have become positive in the eastern Pacific.

Niño Region SST Departures (ºC) Recent Evolution

The latest weekly SST departures are:

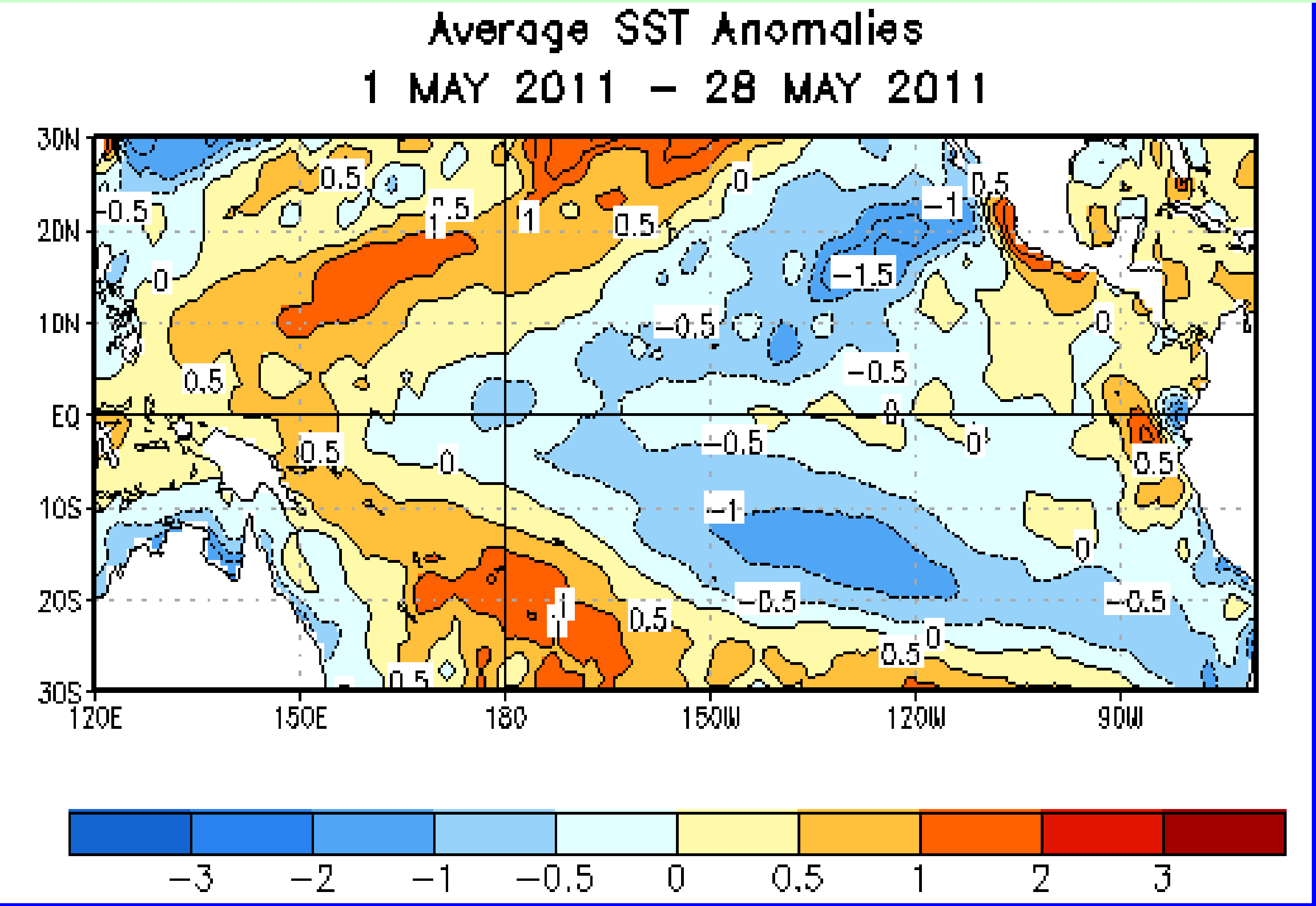
Niño 4	-0.3ºC
Niño 3.4	-0.2ºC
Niño 3	0.0ºC
Niño 1+2	0.2ºC



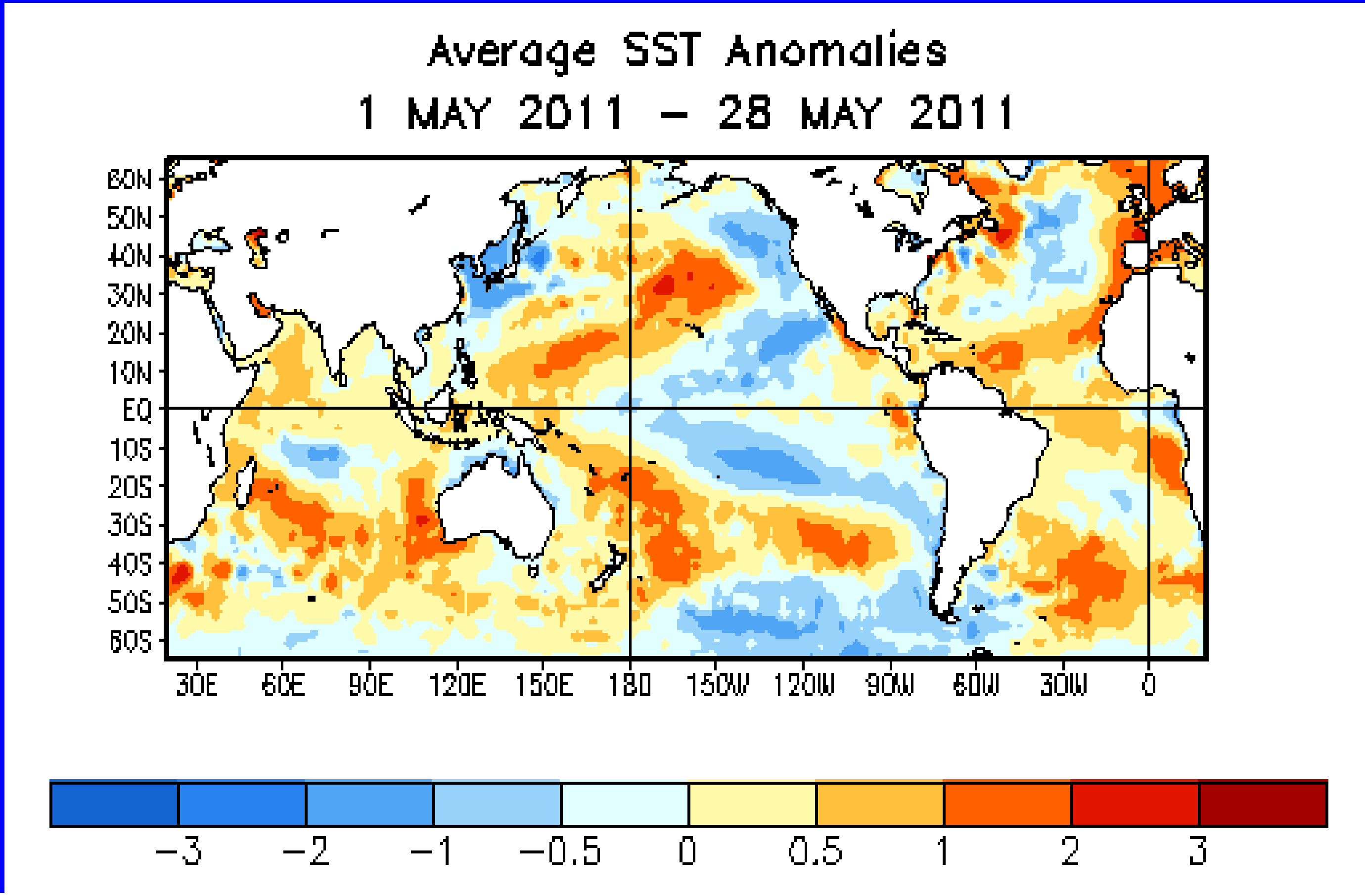


SST Departures (ºC) in the Tropical Pacific During the Last 4 Weeks

During the last 4-weeks, equatorial SSTs were 0.5°C below average near the International Date Line, while near-average to above-average temperatures have emerged across the east-central and eastern Pacific.

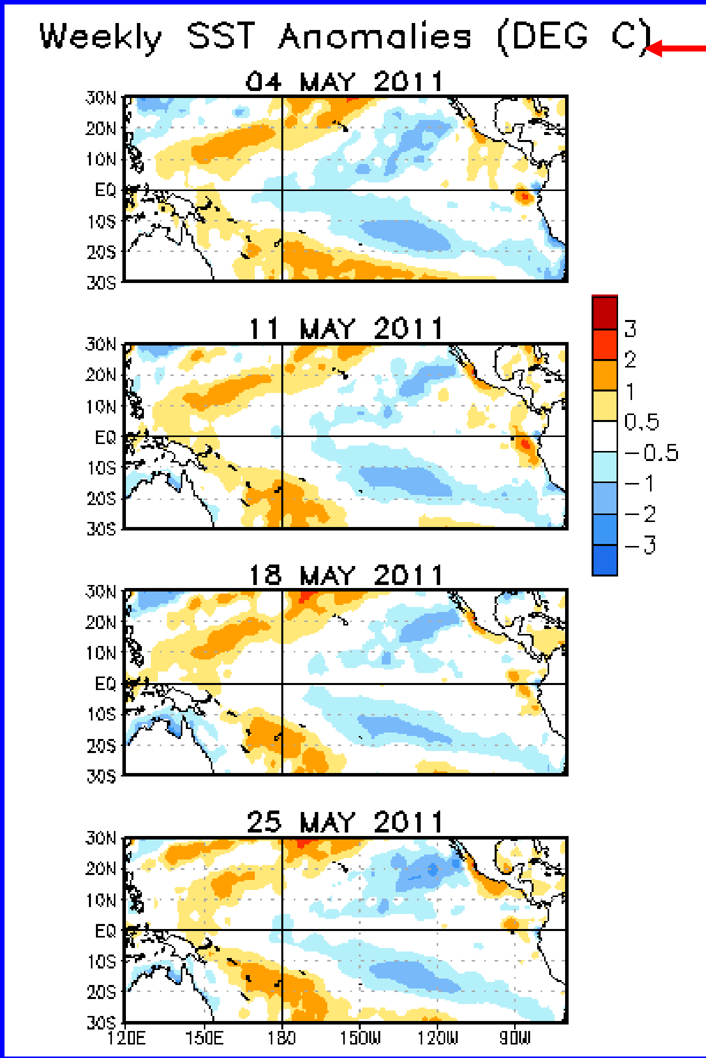


Global SST Departures (ºC)



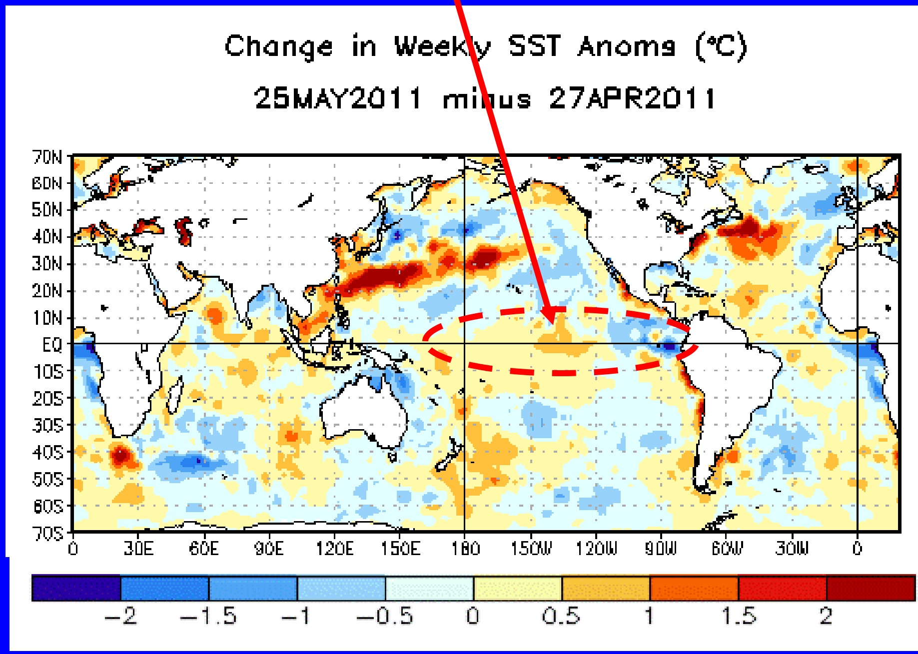
During the last four weeks, equatorial SSTs were above average across the Atlantic, the western/eastern Pacific Ocean, and western Indian Ocean. Meanwhile, equatorial SSTs were below average near the International Date Line. A horseshoe pattern of above-average SSTs extended from the Maritime Continent into the middle latitudes of the Pacific Ocean.

Weekly SST Departures (ºC) for the Last Four Weeks



- During the last four weeks, negative SST anomalies have weakened across the central Pacific.

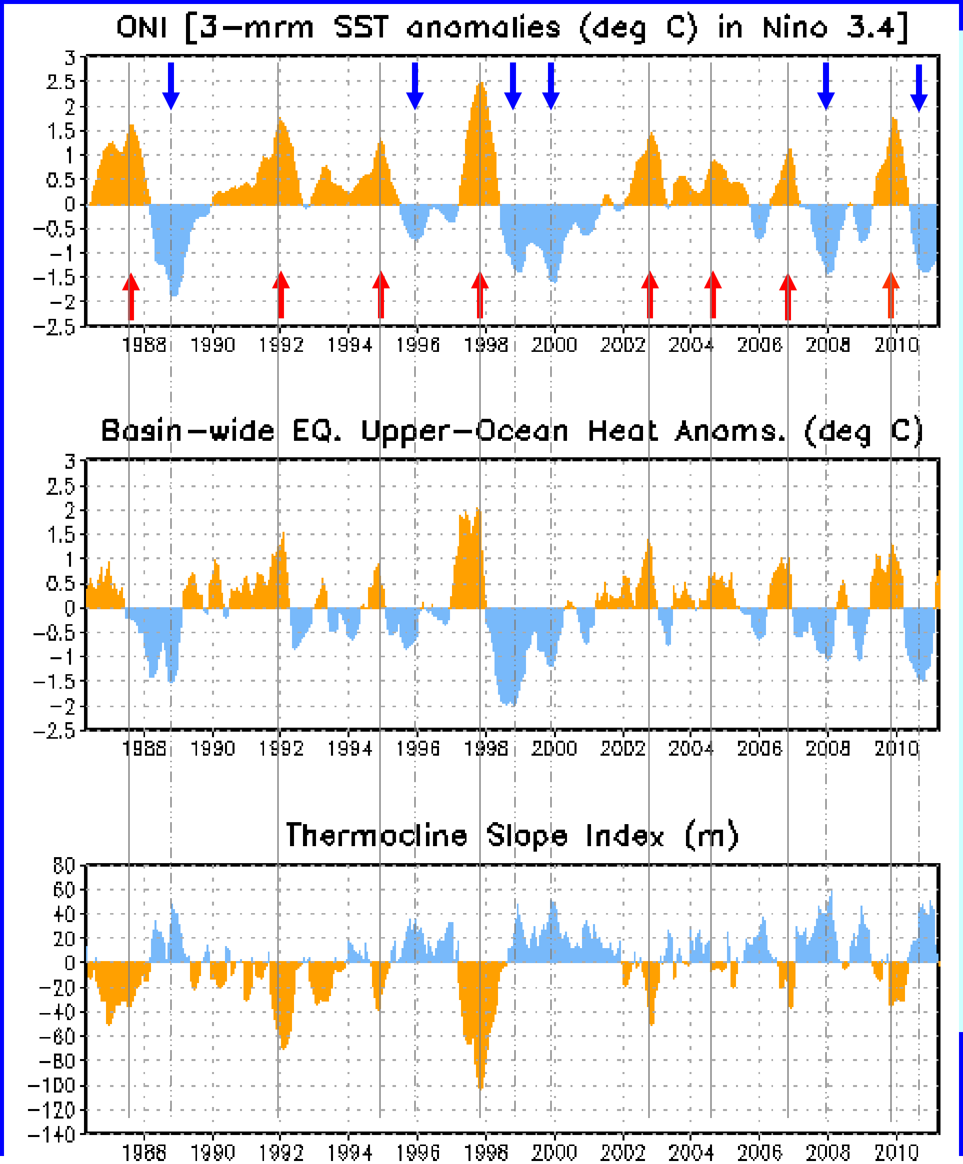
- During the last 30 days, positive changes in the SST anomalies were evident in the central and east-central Pacific, along with an area of negative changes in the eastern Pacific.



Upper-Ocean Conditions in the Eq. Pacific

Cold Episodes

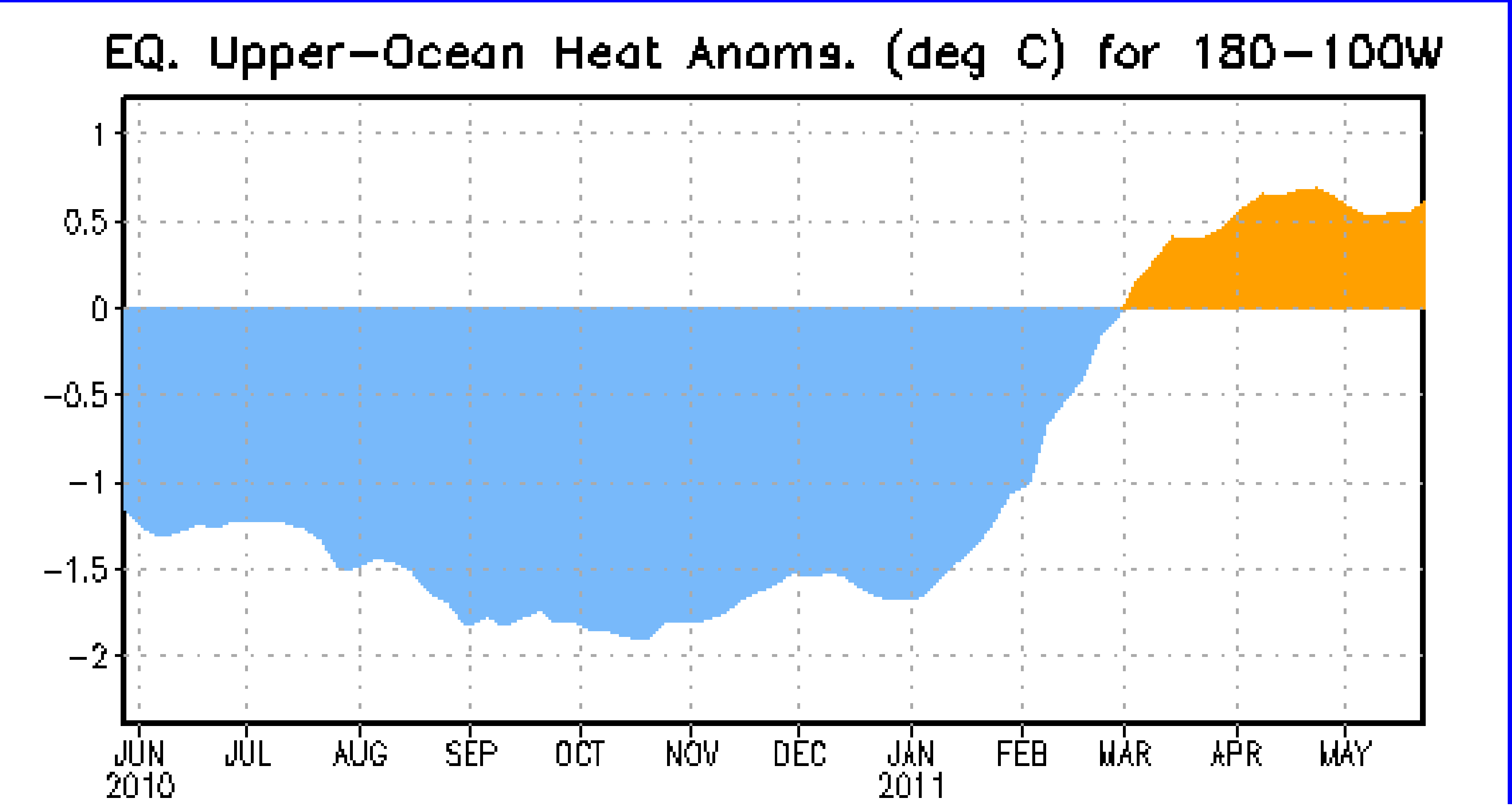
Warm Episodes



- 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 a decreasing thermocline slope index reflect a transition from La Niña to ENSO-neutral conditions

The monthly thermocline slope index represents the difference in anomalous depth of the 20°C isotherm between the western Pacific (160°E-150°W) and the eastern Pacific (90°-140°W).

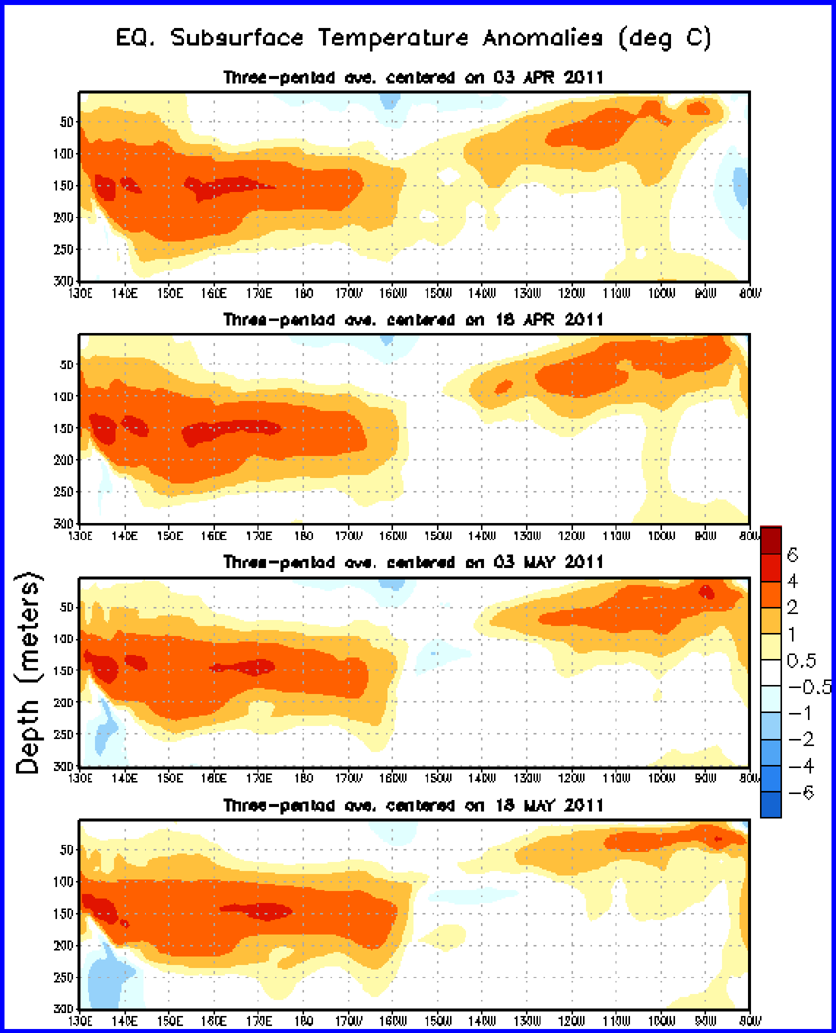
Weekly Central & Eastern Pacific Upper-Ocean (0-300 m) Average Temperature Anomalies



The negative anomalies since June 2010 are consistent with La Niña. In January 2011 negative anomalies began to decrease in magnitude, with positive anomalies evident since March 2011.

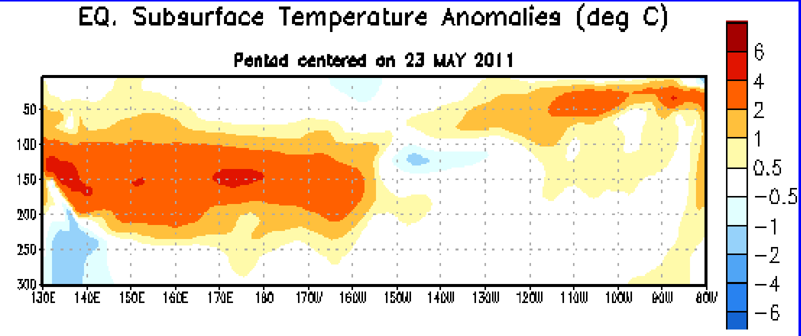
Sub-Surface Temperature Departures (ºC) in the Equatorial Pacific

Time



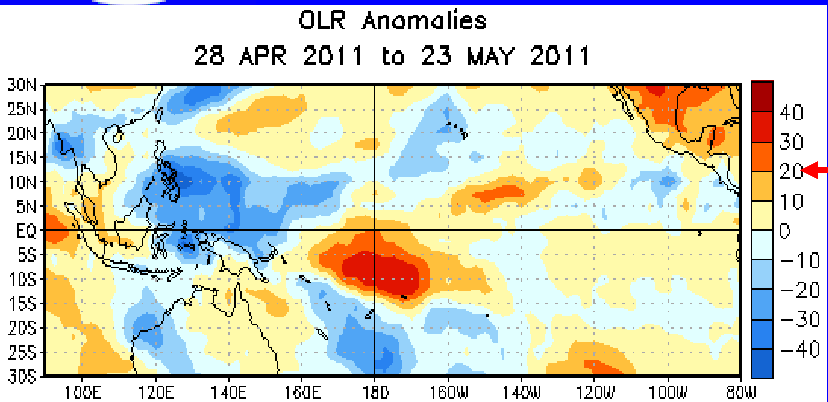
Longitude

- Since early April 2011, positive subsurface temperature anomalies (100-300m) have been observed across the Pacific Ocean.
- In the recent period, only small changes in the anomaly pattern are evident.

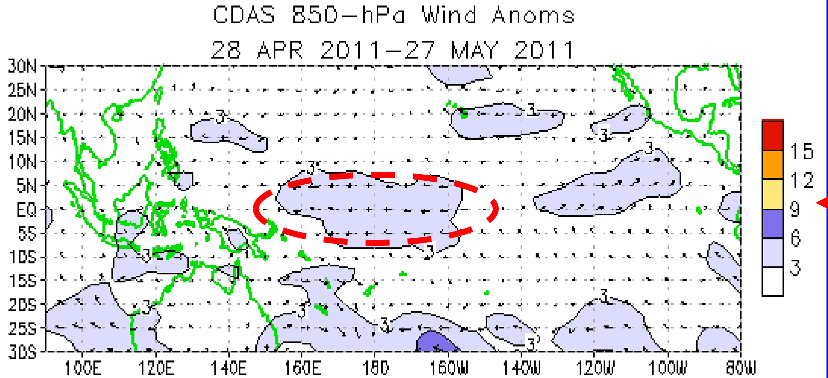


Most recent pentad analysis

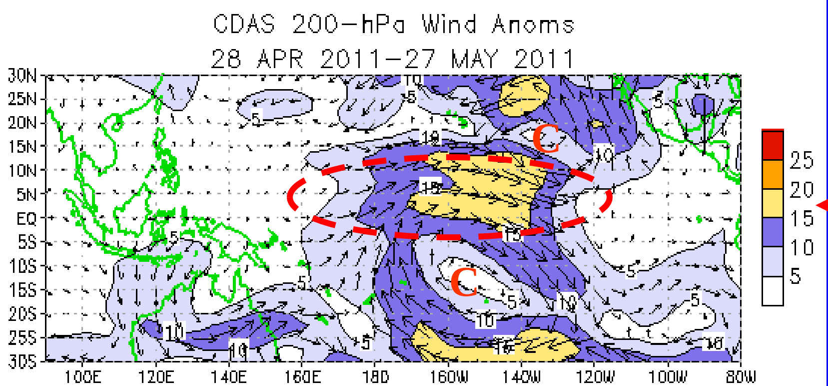
Tropical OLR and Wind Anomalies During the Last 30 Days



Negative OLR anomalies (enhanced convection and precipitation, blue shading) were located over the Philippines and Indonesia. Positive OLR anomalies (suppressed convection and precipitation, red shading) were located near the Date Line, with strongest amplitudes south of the equator.



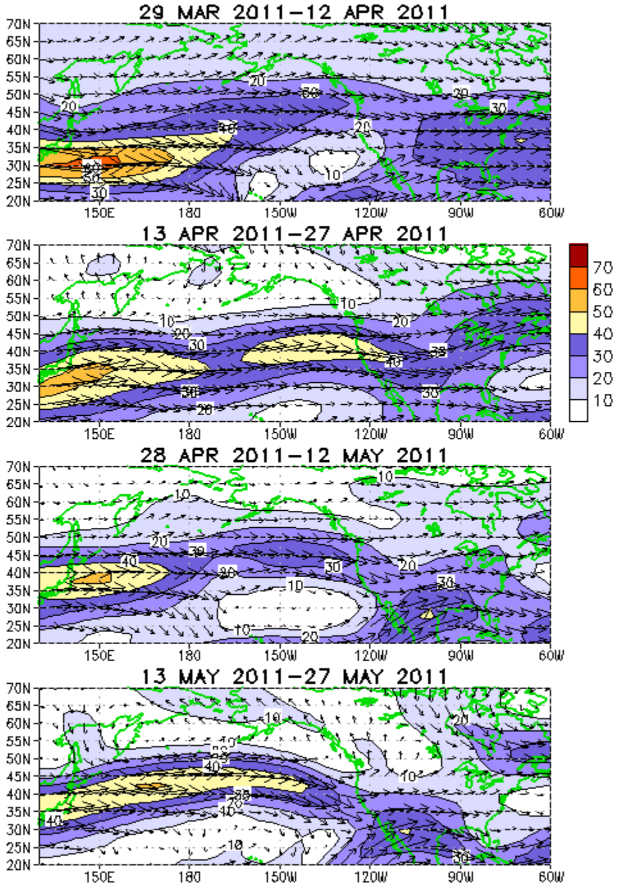
Weak low-level (850-hPa) easterly anomalies were observed over the central equatorial Pacific.



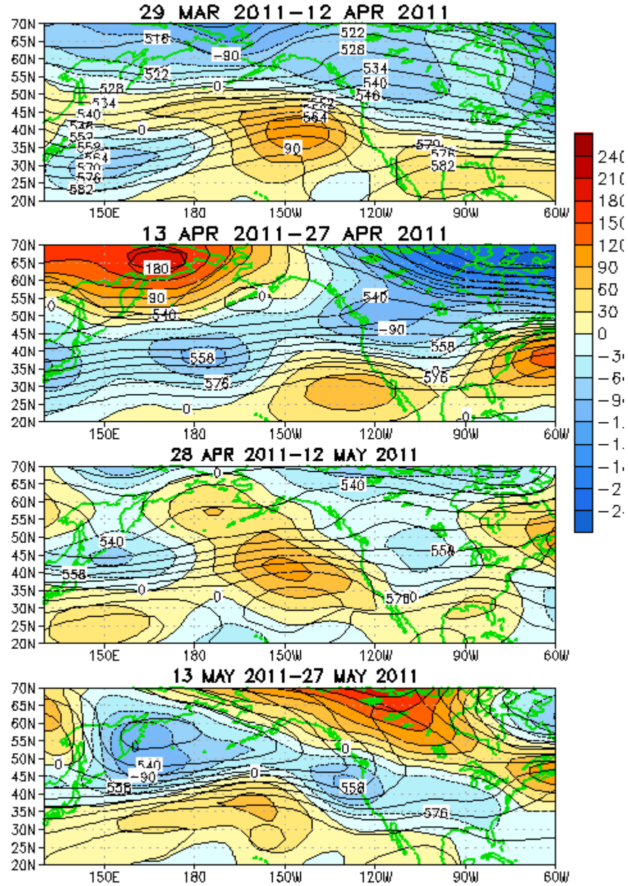
Upper-level (200-hPa) westerly anomalies were observed over much of the central and east-central equatorial Pacific. Anomalous cyclonic circulation centers are evident in the subtropics of both hemispheres, which is consistent with La Niña conditions.

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

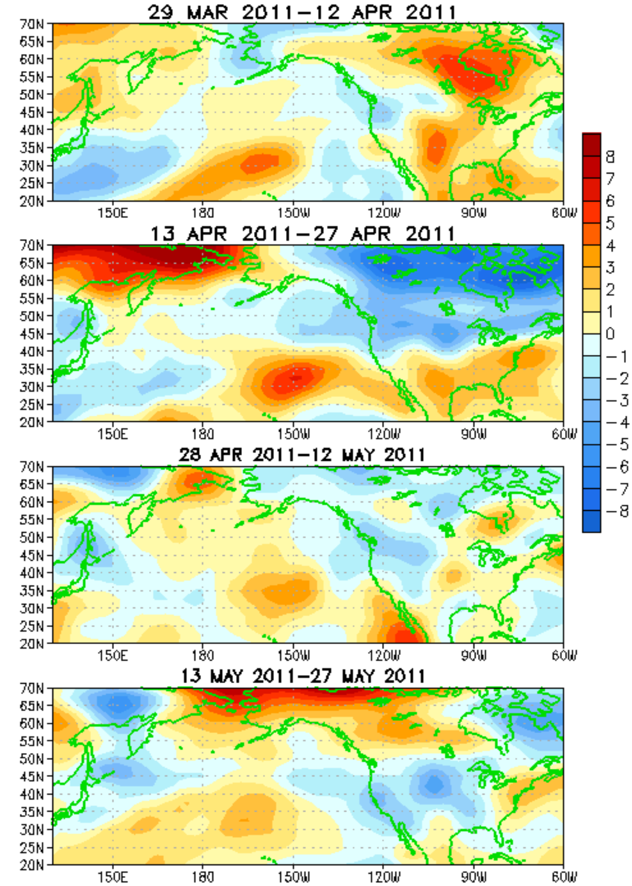
200-hPa Wind



500-hPa Height & Anoms.



925-hPa Temp. Anoms. (°C)

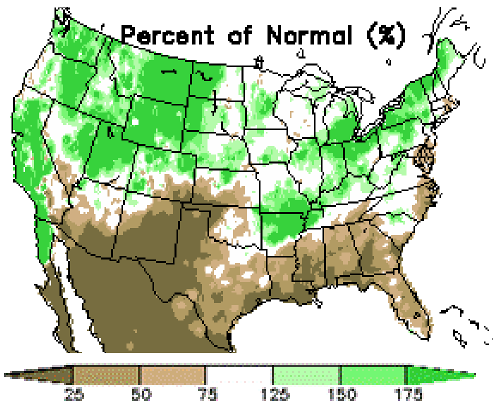


During late March through May, 500-hPa heights were below-average near western N. America and/or over the northern U.S./Canada, which contributed to the prevalence of below-average temperatures over the Pacific Northwest and the northern tier of states. Meanwhile, during most of the period, ridging and above-average temperatures have prevailed over the southeastern United States.

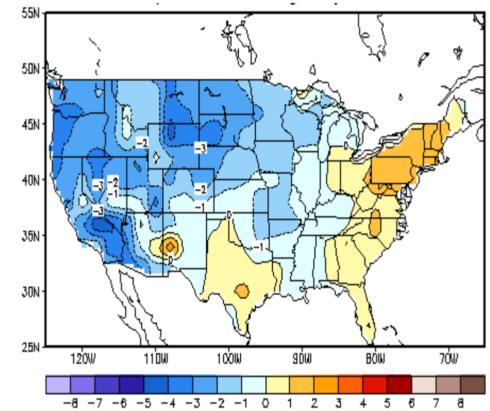
U.S. Temperature and Precipitation Departures During the Last 30 and 90 Days

Last 30 Days

30-day (ending 30 May 2011) % of average precipitation

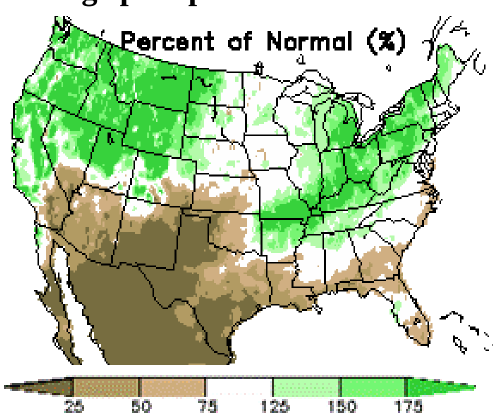


30-day (ending 29 May 2011) temperature departures (degree C)

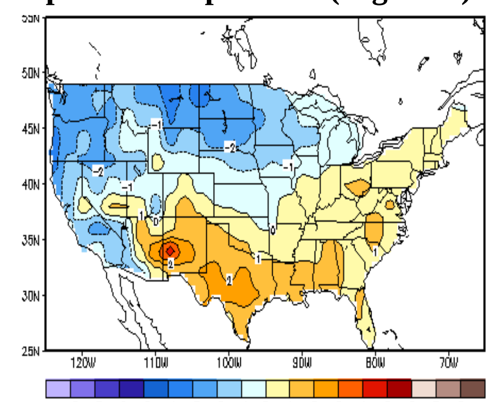


Last 90 Days

90-day (ending 30 May 2011) % of average precipitation



90-day (ending 29 May 2011) temperature departures (degree C)

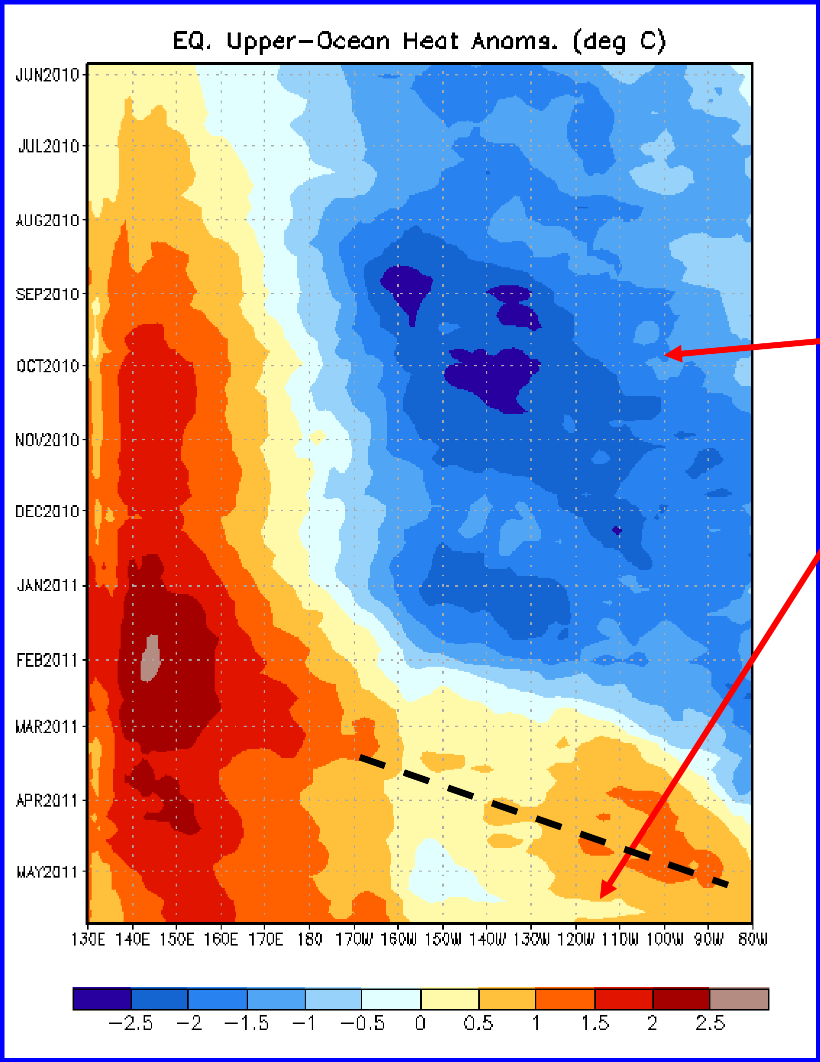


Intraseasonal Variability

- **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

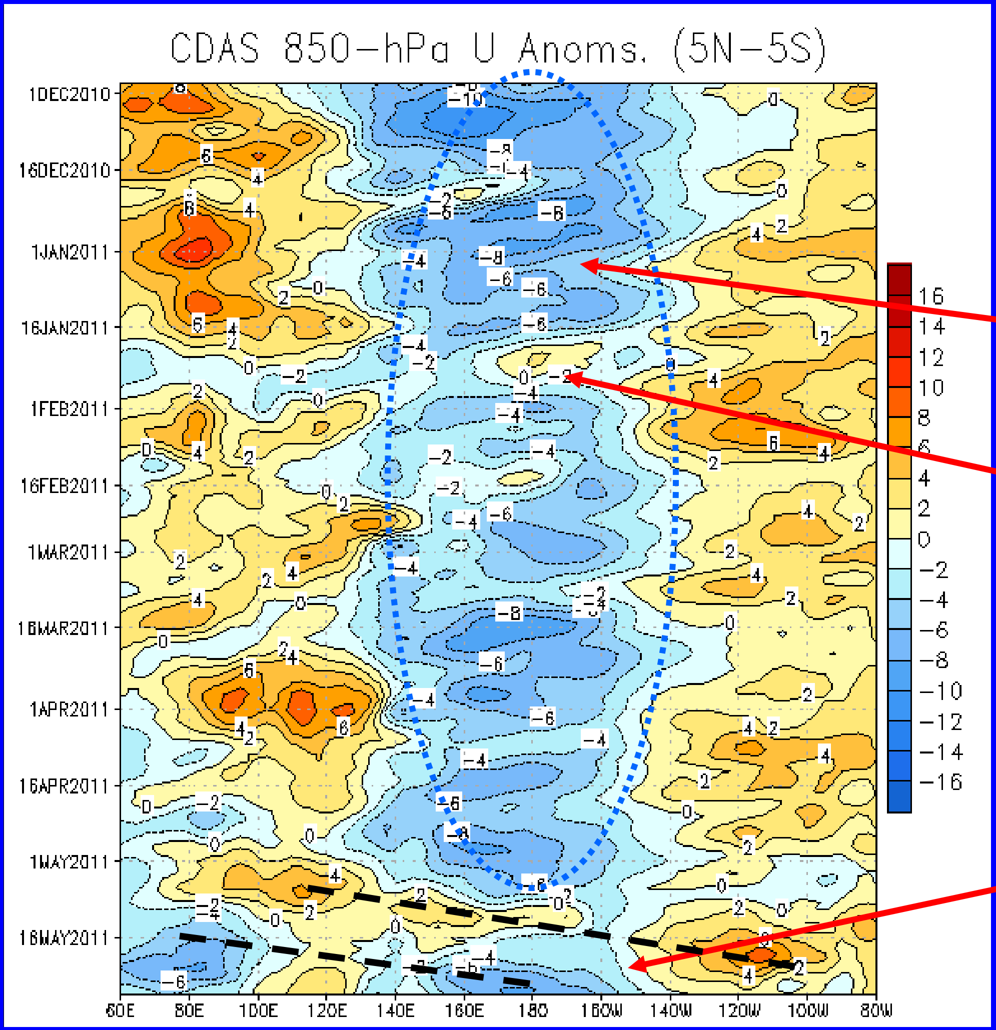
Longitude

- **From May 2010- January 2011, negative heat content anomalies extended across the equatorial Pacific in association with La Niña.**
- **During February-April 2011, positive heat content anomalies have been above-average, especially across the western and eastern Pacific.**

- **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).

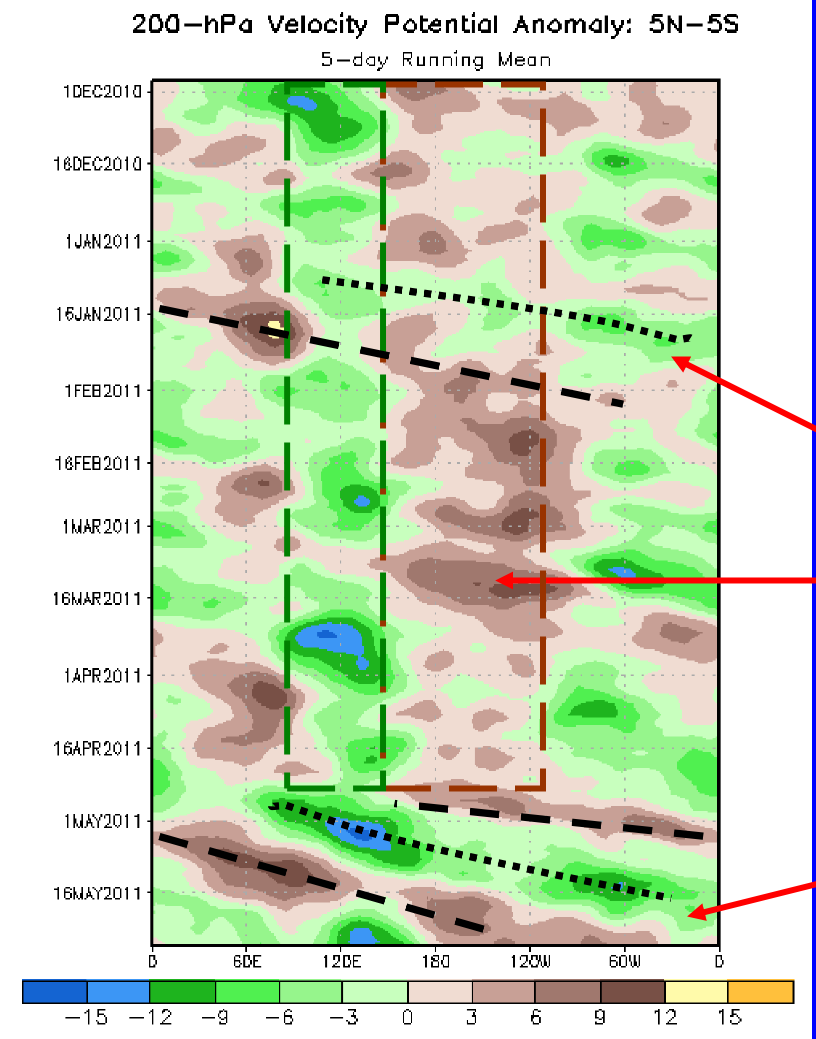
Easterly wind anomalies (blue shading).

Since March 2010, low-level easterly wind anomalies have persisted over the western and central equatorial Pacific.

In late January 2011, weakening of the easterly wind anomalies (light blue) and weak westerly wind anomalies (yellow) occurred in conjunction with Madden Julian Oscillation (MJO) activity.

Recently, the MJO has contributed to increased variability across the western and central Pacific Ocean.

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



Time

Longitude

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

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

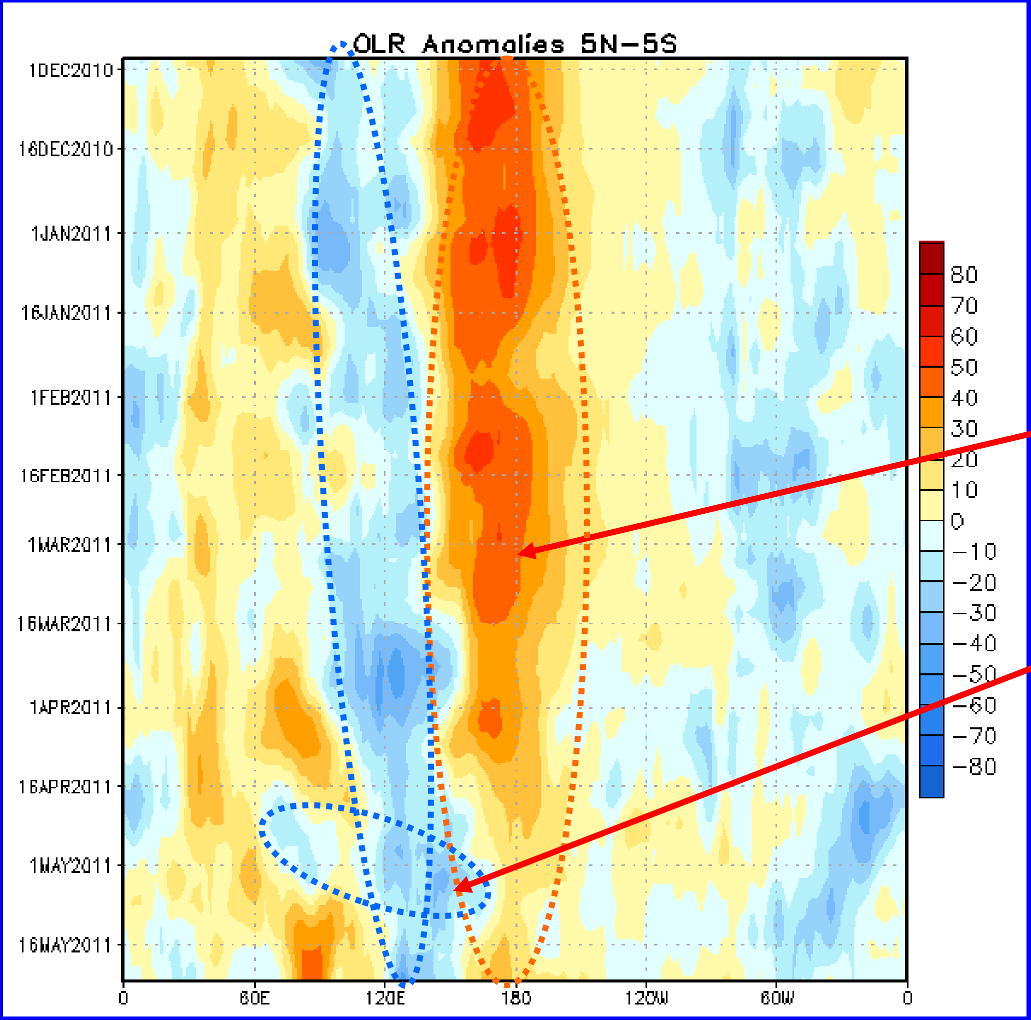
During January 2011, MJO activity influenced the pattern of velocity potential anomalies.

From May 2010- April 2011, persistent upper-level convergence anomalies (brown) have were evident over the central Pacific, while anomalous upper-level divergence (green) has generally prevailed over the Maritime Continent.

Recently, the eastward shift of the velocity potential anomalies reflects the MJO.

Outgoing Longwave Radiation (OLR) Anomalies

Time



Longitude

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

Wetter-than-average conditions (blue shading)

Since April 2010, negative OLR anomalies have been observed near the Maritime Continent and positive OLR anomalies have prevailed over the western and central Pacific.

The recent eastward shift of negative OLR anomalies from the Indian Ocean to the western Pacific is consistent with the MJO.

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

<u>El Niño:</u> characterized by a *positive* ONI greater than or equal to +0.5 C.

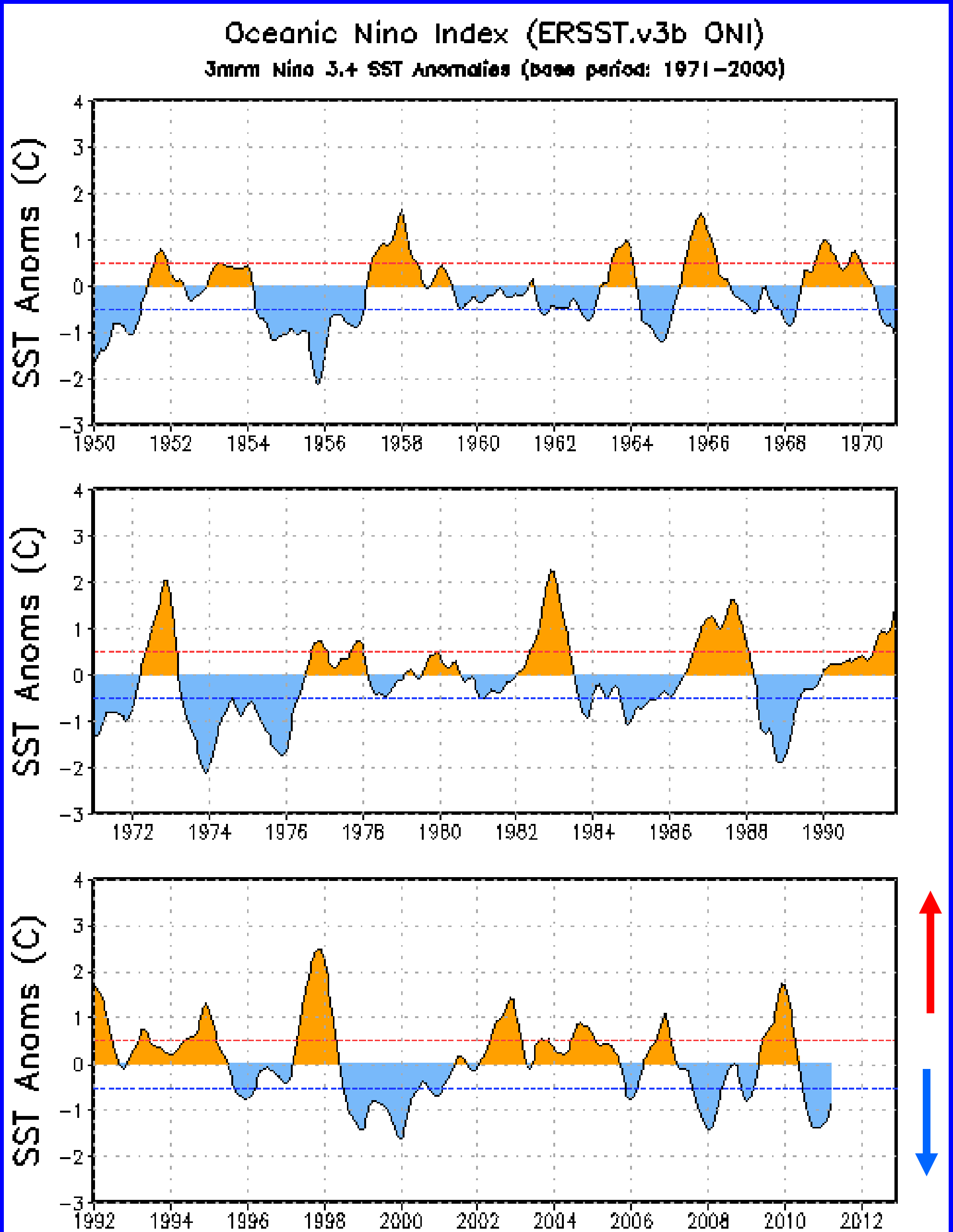
<u>La Niña:</u> characterized by a *negative* ONI less than or equal to -0.5 C.

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

CPC considers El Niño or La Niña <u>conditions</u> to occur when the monthly Niño3.4 OISST 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 (February – April 2011) is -0.9ºC.



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
MJJ 2009 – MAM 2010	1.8

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**	**1.5**	**1.2**	**0.8**	0.3	-0.2	**-0.6**	**-1.0**	**-1.3**	**-1.4**	**-1.4**	**-1.4**
2011	**-1.3**	**-1.2**	**-0.9**									
2012												
2013												
2014												
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												
2026												
2027												

Pacific Niño 3.4 SST Outlook

- Almost all of the ENSO models predict a return to ENSO-neutral conditions by May-June-July 2011 (Niño-3.4 SST anomalies between -0.5 C and +0.5 C).
- Just over half of the individual models and all three multi-model forecasts indicate ENSO-neutral conditions will continue through the rest of 2011.

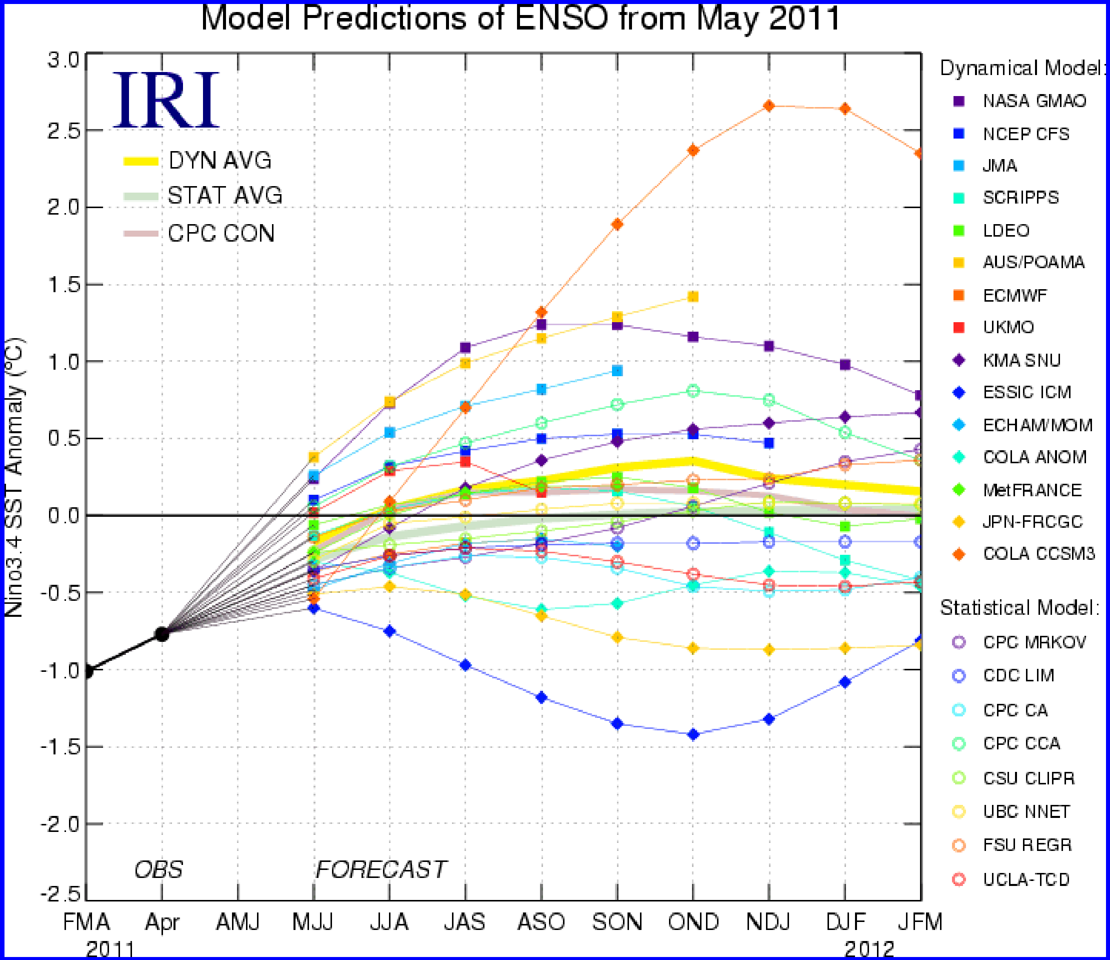
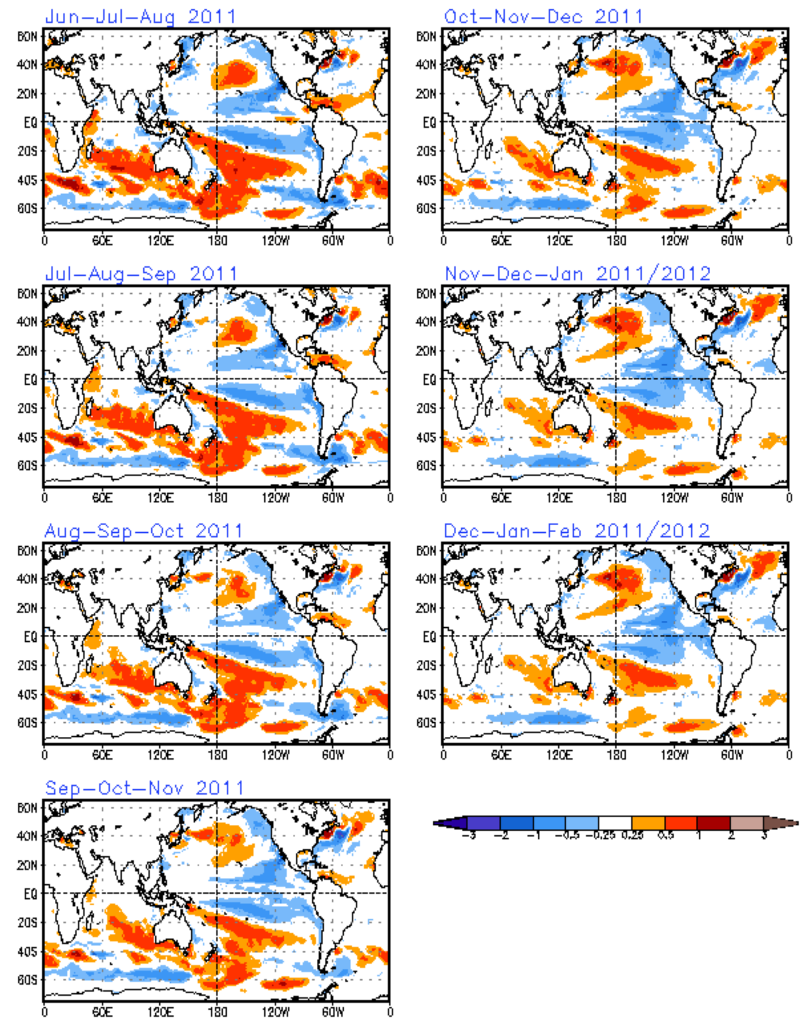
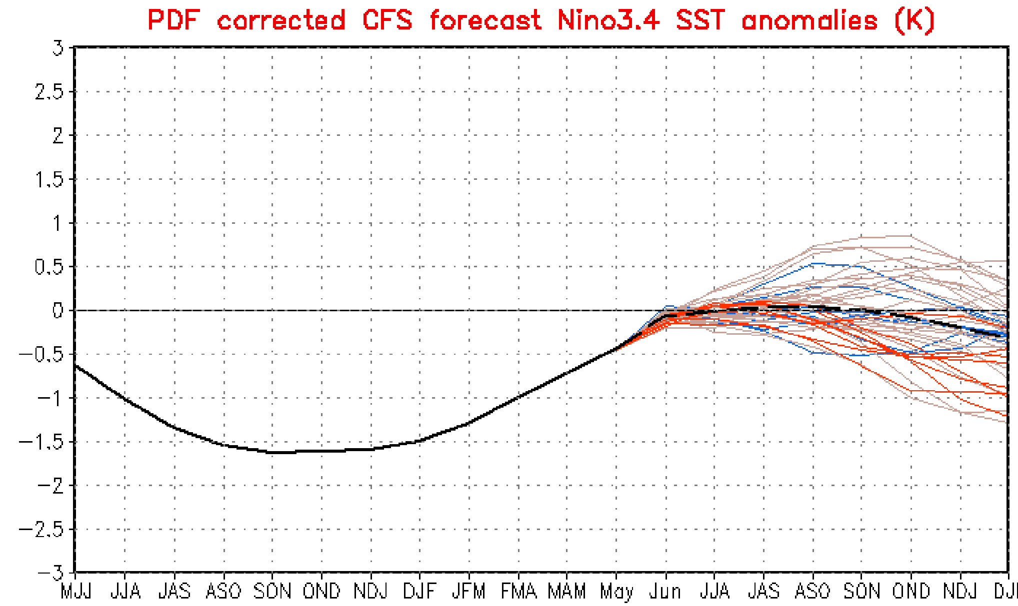


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 17 May 2011).

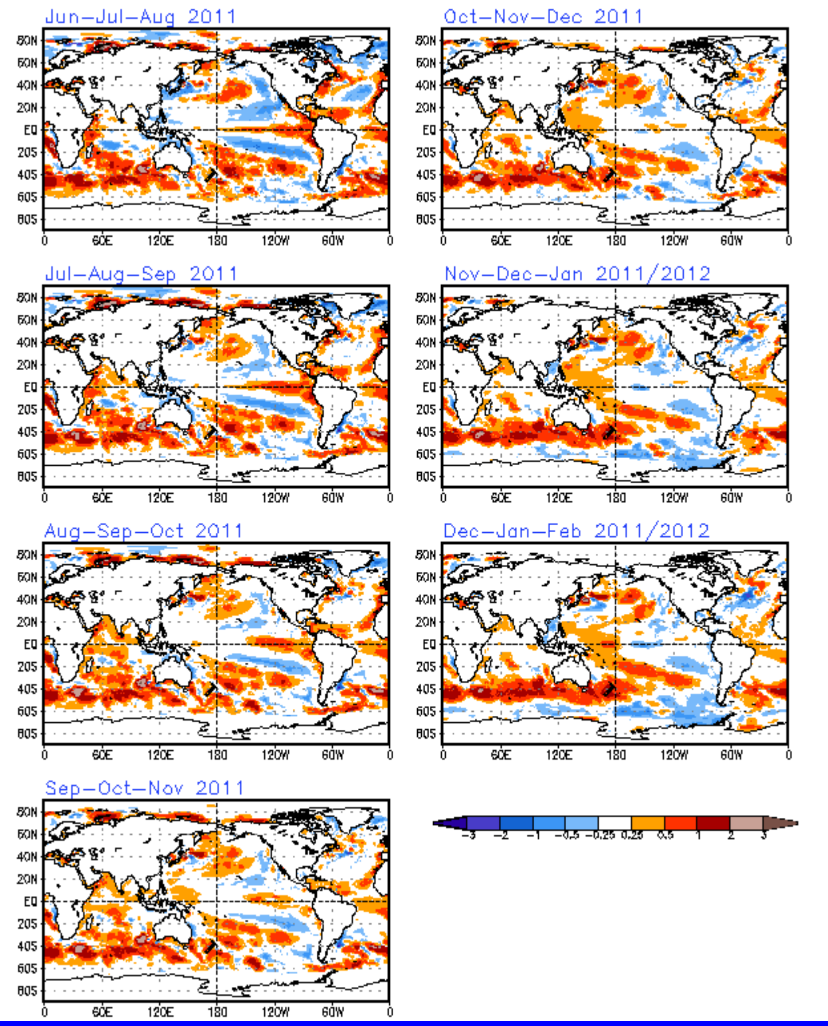
SST Outlook: NCEP CFS.v1 Forecast Issued 30 May 2011



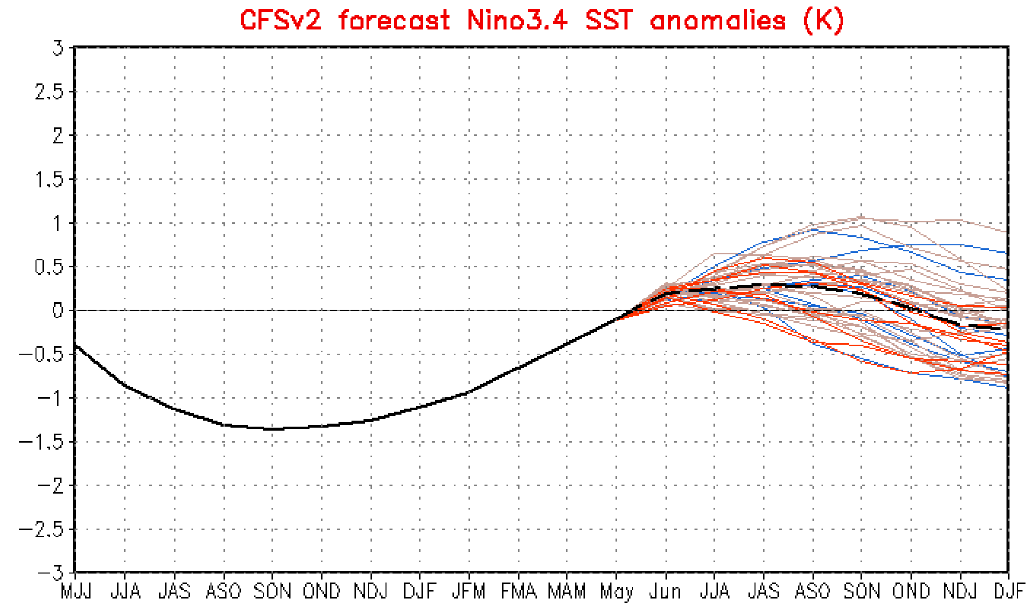
The CFS.v1 ensemble mean (black dashed line) predicts ENSO-neutral conditions to continue through 2011.



SST Outlook: NCEP CFS.v2 Forecast Issued 31 May 2011



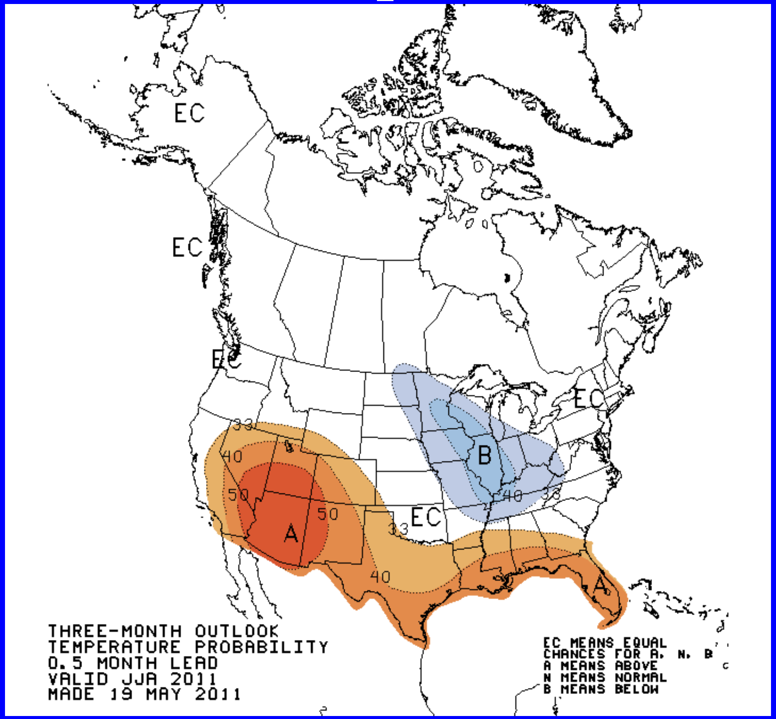
The CFS.v2 ensemble mean (black dashed line) predicts ENSO-neutral conditions to continue through 2011.



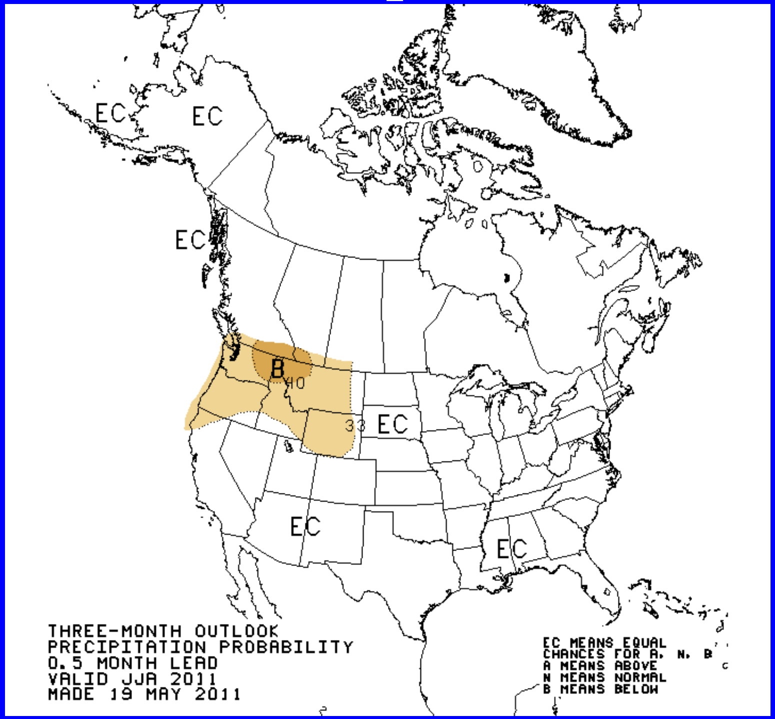
CFS.v2 is now operational. More information on version 2 is available at http://cfs.ncep.noaa.gov/cfsv2/docs.html

U. S. Seasonal Outlooks
June – August 2011

Temperature



Precipitation

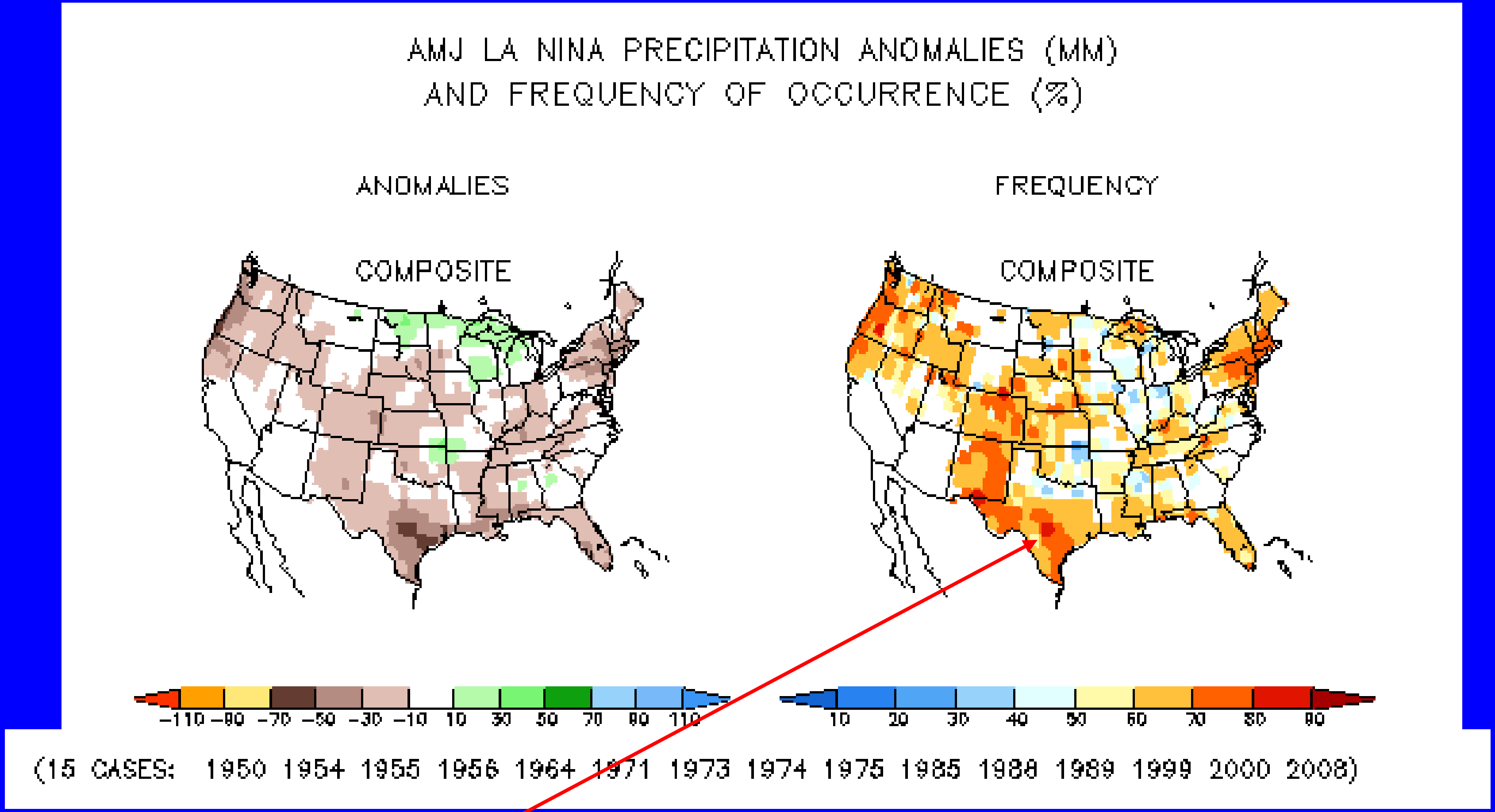


The seasonal outlooks combine the effects of long-term trends, soil moisture, and, when appropriate, the ENSO cycle.

Summary

- A transition from La Niña conditions to ENSO-neutral conditions is underway across the equatorial Pacific.
- Negative sea surface temperature (SST) anomalies persist across the central equatorial Pacific Ocean, while SSTs are now above-average in the eastern equatorial Pacific Ocean.
- Atmospheric circulation anomalies associated with La Niña remain significant.
- ENSO-neutral conditions are expected to develop during May-June 2011 and continue through the Northern Hemisphere summer 2011.

U.S. Precipitation Departures (mm) and Frequency of Occurrence (%) for La Niña during Apr.-June



FREQUENCY (right panel) indicates the percentage of La Niña years that the indicated departure (left panel) occurred. For example, below-average seasonal precipitation over southern Texas occurred in 60%-80+% of the La Niña years.

U.S. Temperature Departures (C) and Frequency of Occurrence (%) for La Niña during Apr. -June