ENSO Cycle: Recent Evolution, Current Status and Predictions

Update prepared by
Climate Prediction Center / NCEP
5 March 2012

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

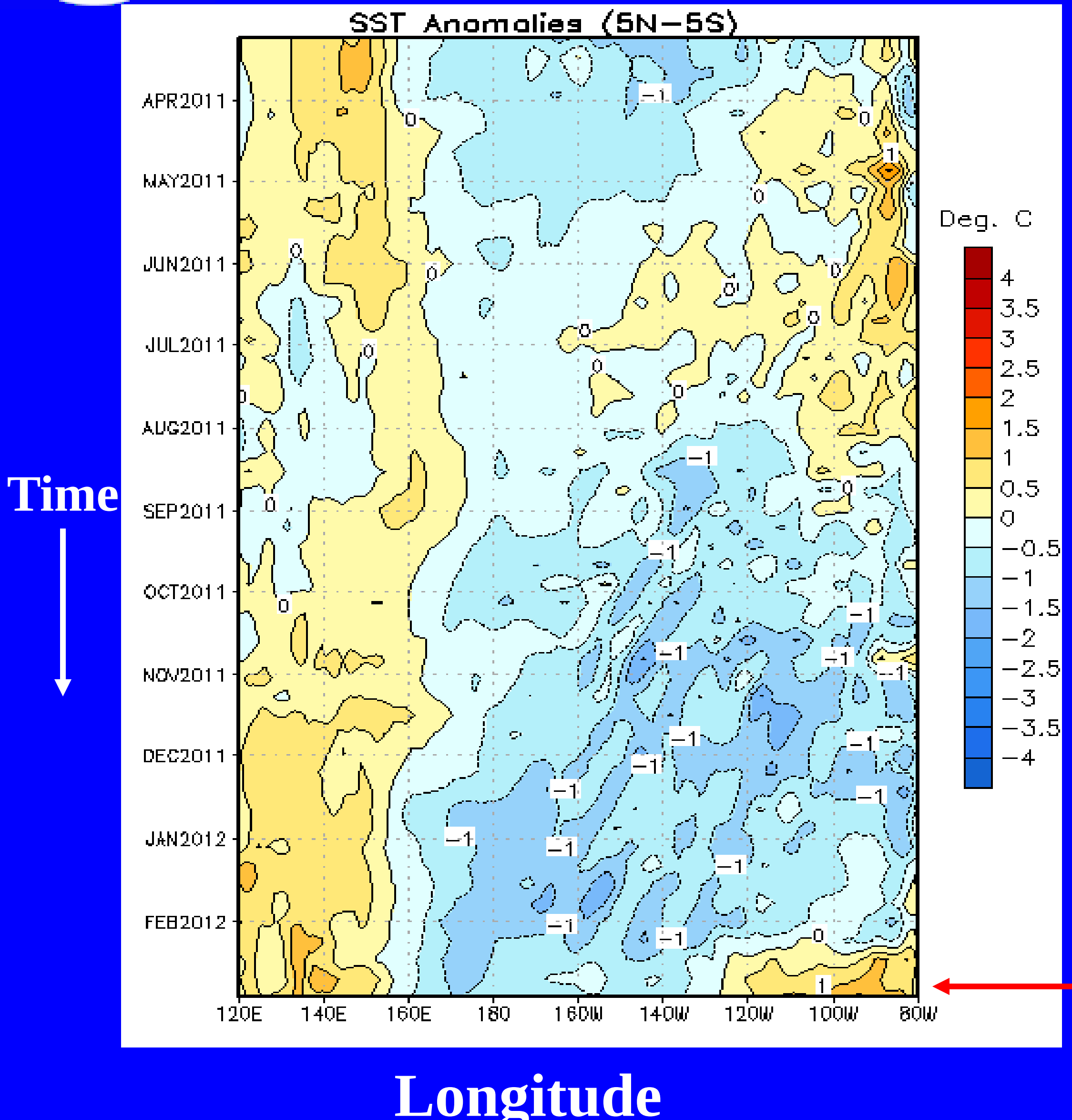
- La Niña has peaked across the equatorial Pacific.* Equatorial sea surface temperatures (SST) remain at least 0.5°C below average in the central Pacific, but have warmed considerably across the east-central and eastern Pacific Ocean in the last couple of weeks.

- Atmospheric circulation anomalies remain consistent with La Niña.

- La Niña is expected to transition to ENSO-neutral conditions during March-May 2012.*

* Note: These statements are updated once a month in association with the ENSO Diagnostics Discussion:
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory

Recent Evolution of Equatorial Pacific SST Departures (ºC)



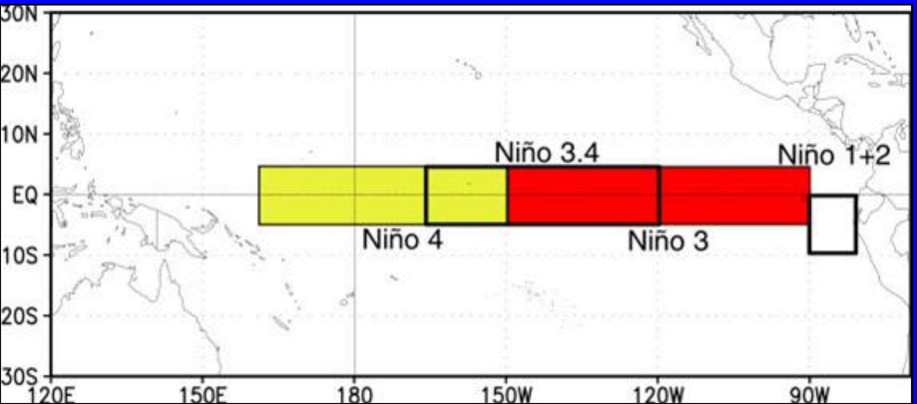
From September 2011- January 2012, below-average SSTs were evident across much of the equatorial Pacific Ocean.

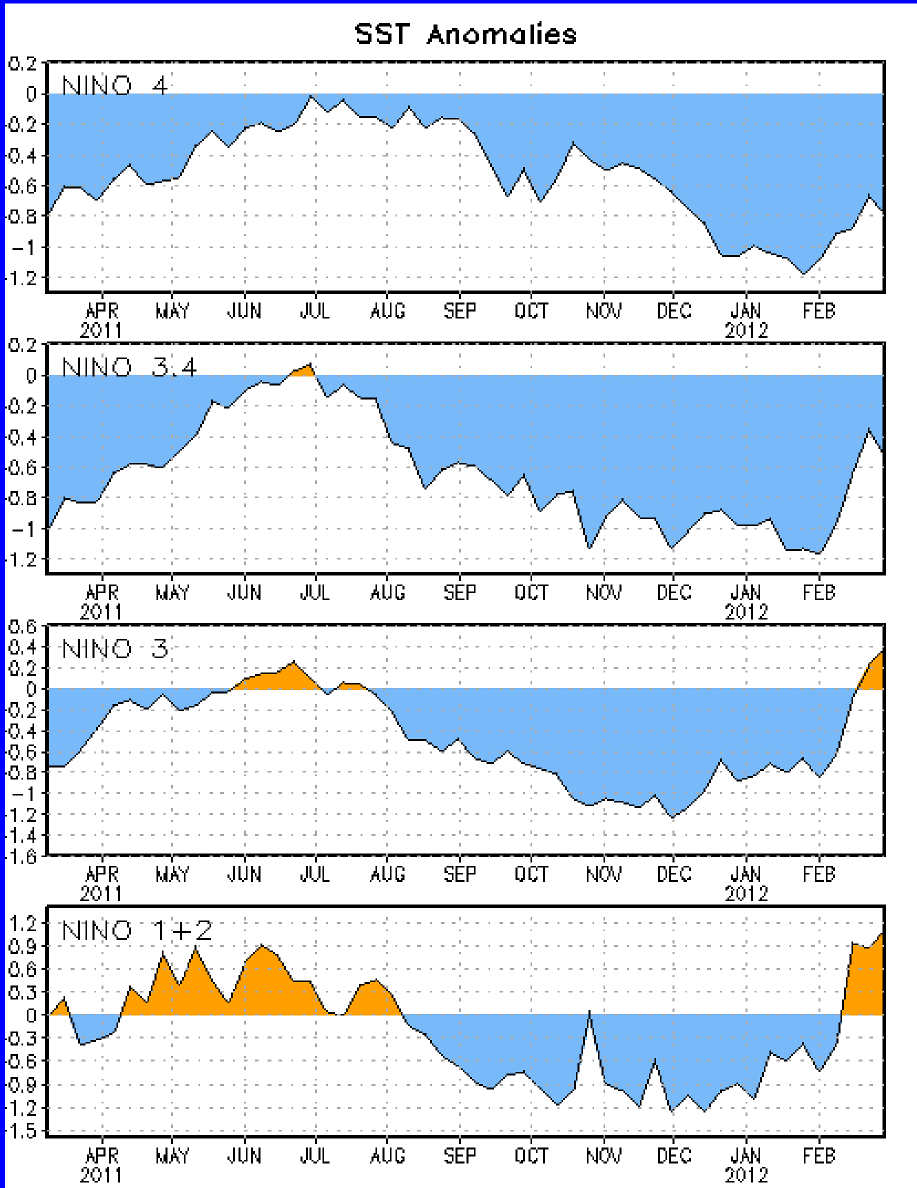
Recently, above-average SSTs have developed in the eastern Pacific.

Niño Region SST Departures (ºC) Recent Evolution

The latest weekly SST departures are:

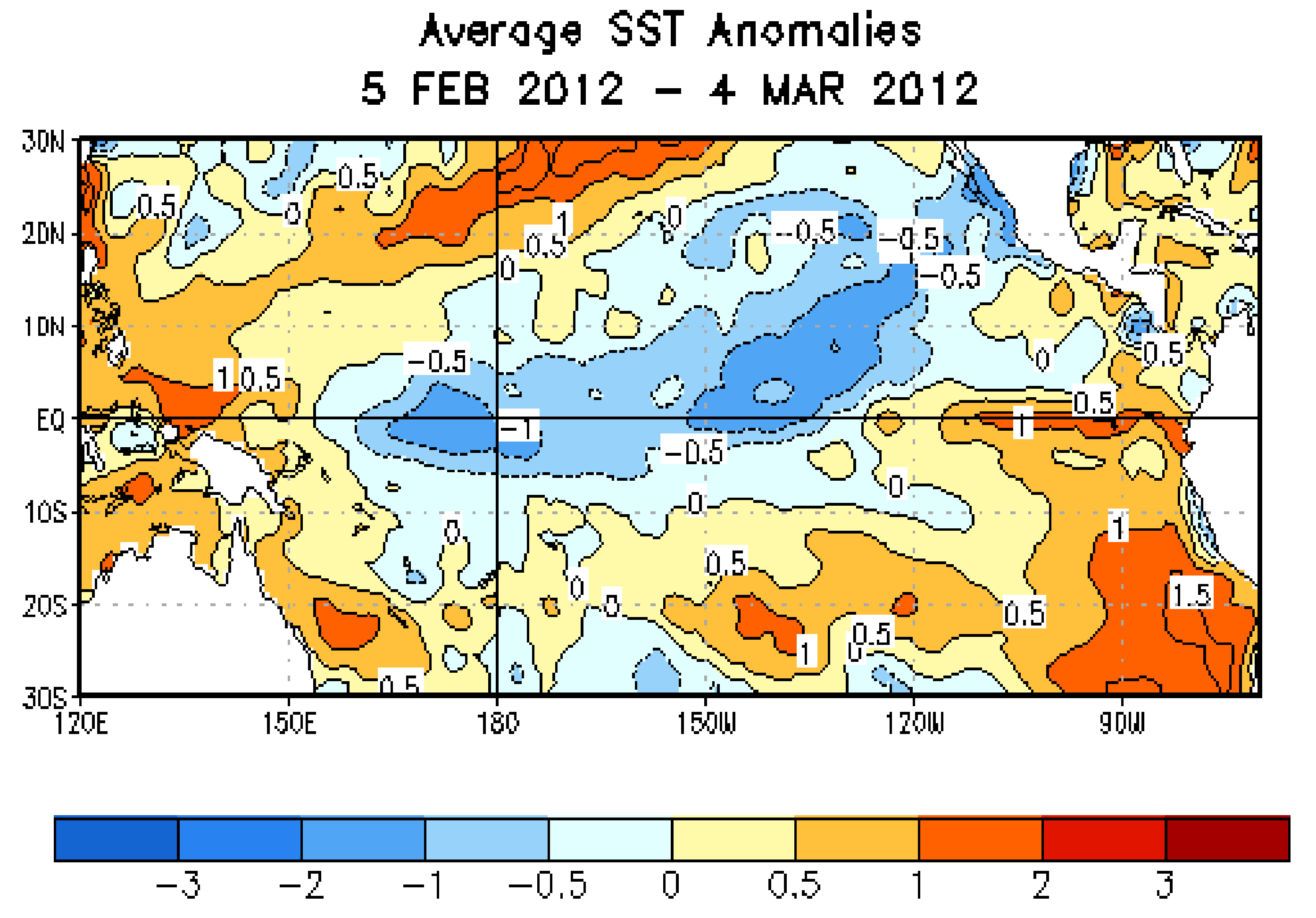
Niño 4	**-0.8ºC**
Niño 3.4	**-0.5ºC**
Niño 3	**0.4ºC**
Niño 1+2	**1.1ºC**



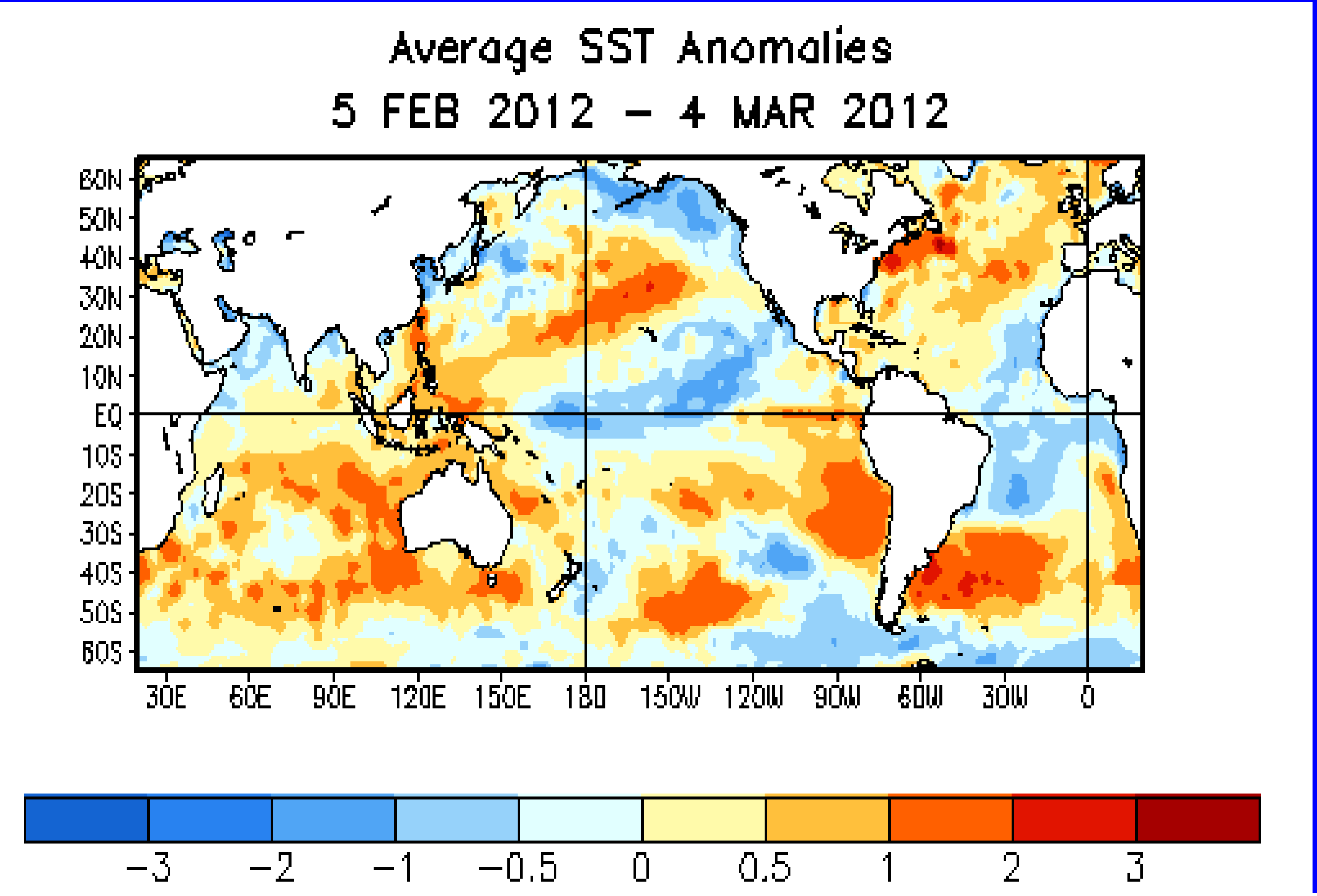


SST Departures (ºC) in the Tropical Pacific During the Last 4 Weeks

During the last 4-weeks, equatorial SSTs were more than 0.5°C below average between 160°E and 130°W, and more than 1°C below average in small areas of the central Pacific. SSTs were above average in the eastern Pacific.

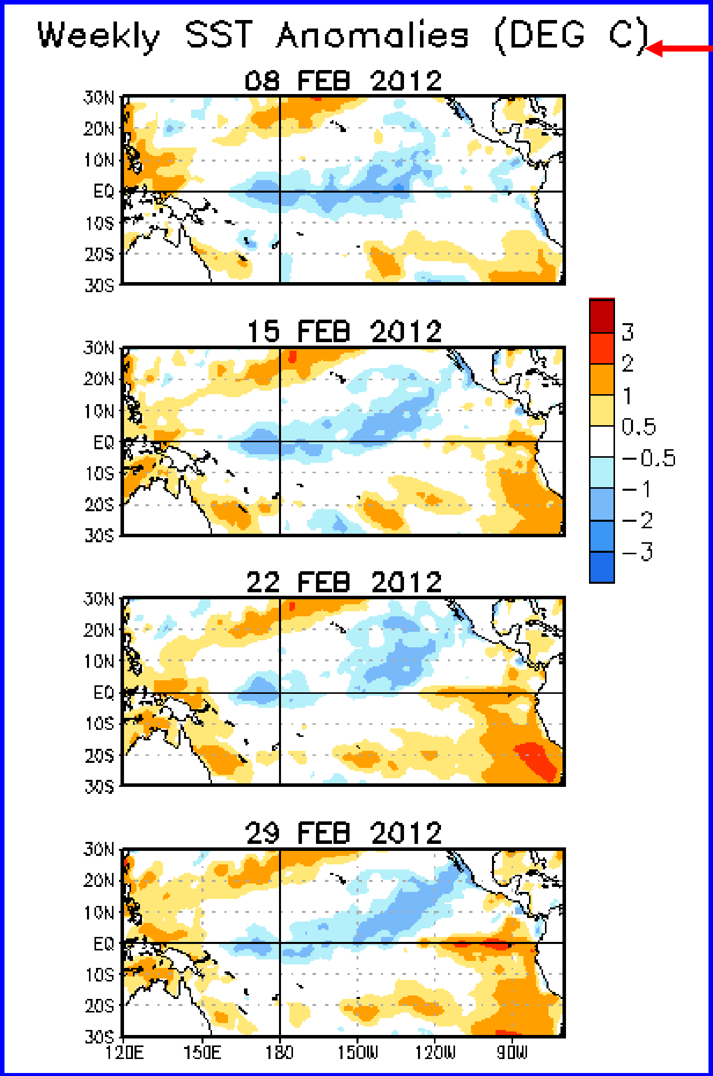


Global SST Departures (ºC)



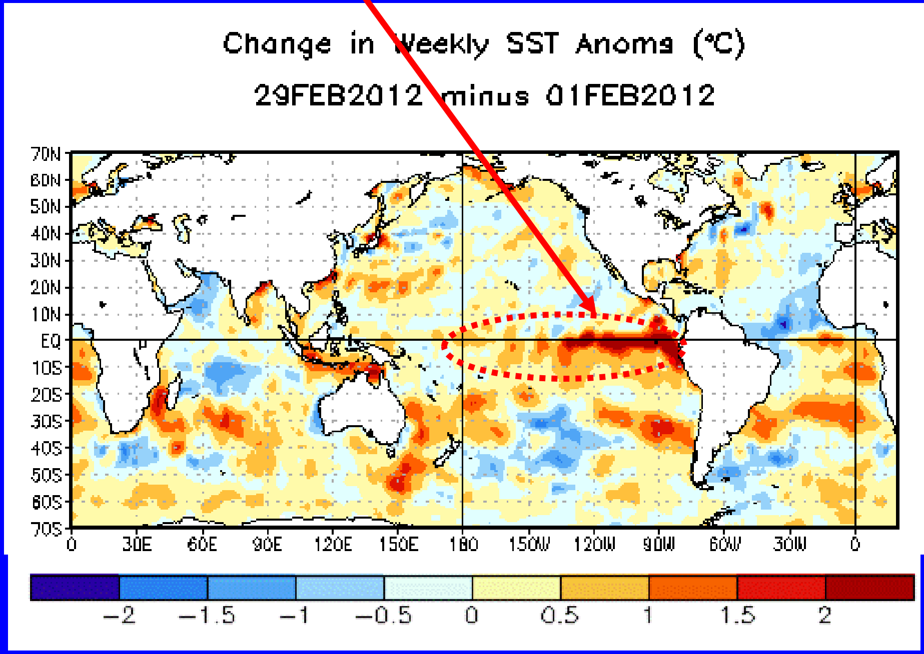
During the last four weeks, equatorial SSTs were below average across the Atlantic and central Pacific Oceans and above average in the eastern Pacific. A horseshoe pattern of above-average SSTs extended from the Maritime Continent into the middle latitudes of the Pacific Ocean.

Weekly SST Departures (ºC) for the Last Four Weeks

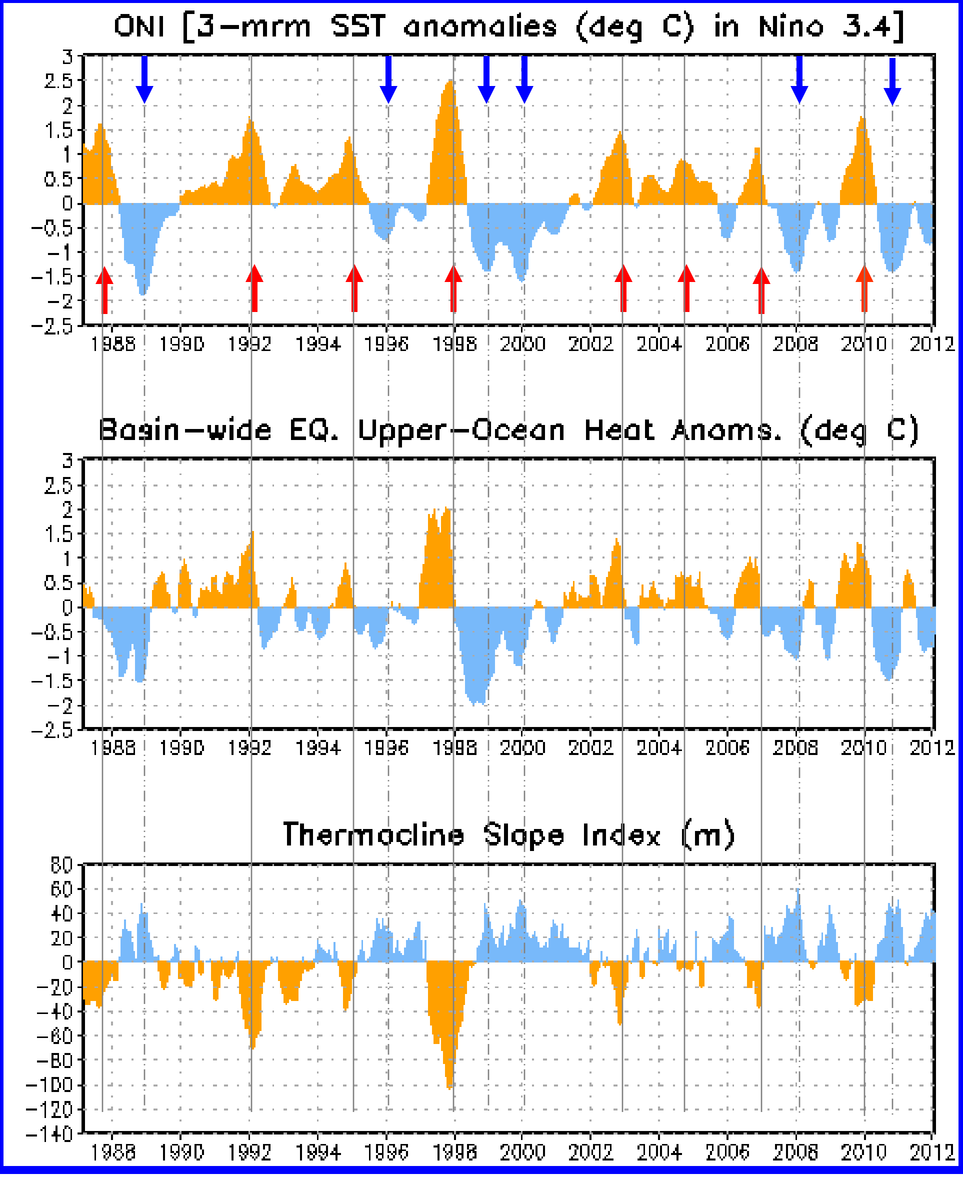


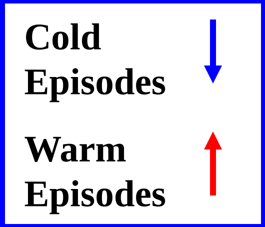
- During the last four weeks, below-average SSTs have weakened considerably across the Pacific Ocean and have become above-average in the eastern Pacific.

- During the last 30 days, strong positive changes were observed east of the Date Line.



Upper-Ocean Conditions in the Eq. Pacific

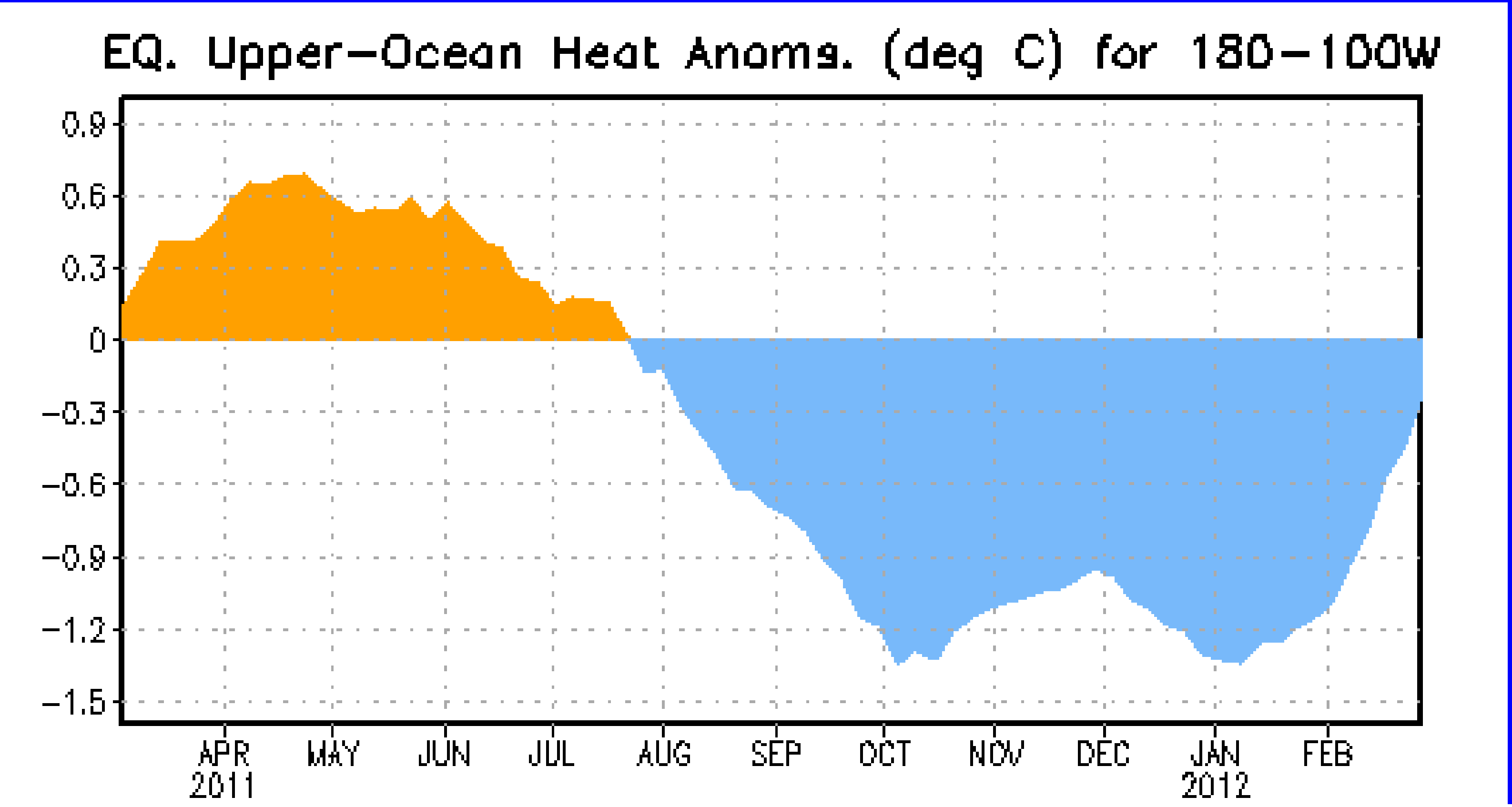




- The basin-wide equatorial upper ocean (0-300 m) heat content is greatest prior to and during the early stages of a Pacific warm (El Niño) episode (compare top 2 panels) and least prior to and during the early stages of a cold (La Niña) episode.
- The slope of the oceanic thermocline is least (greatest)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

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).

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

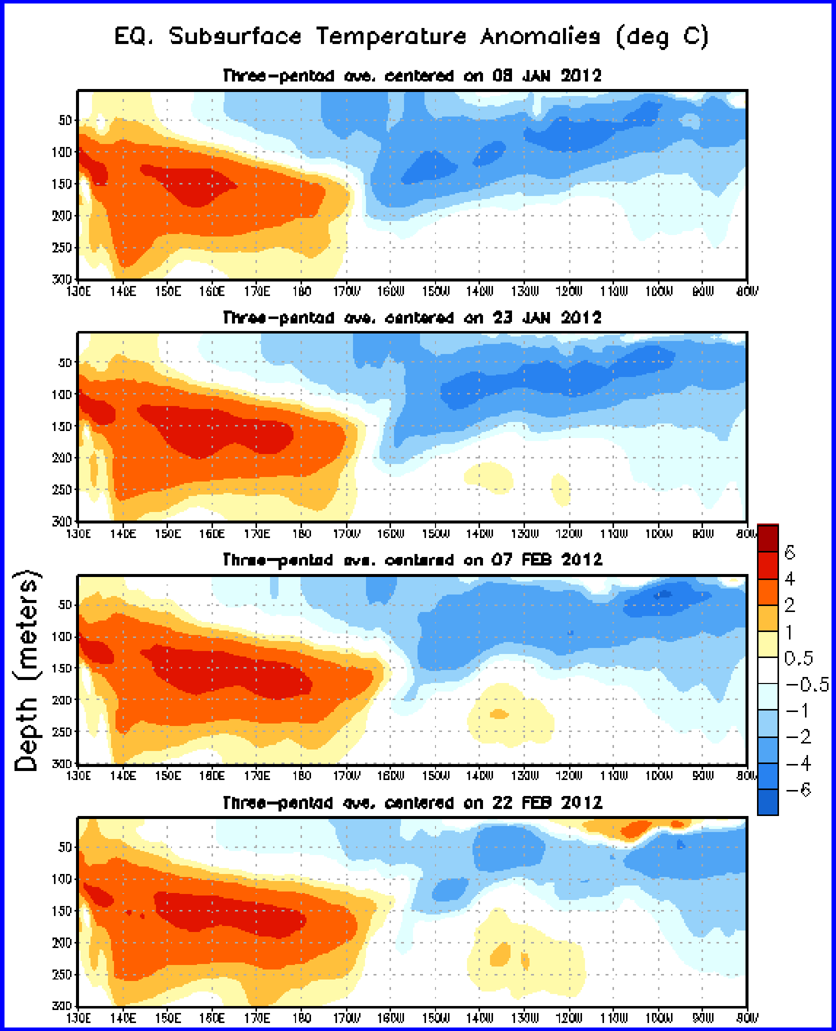


Positive subsurface anomalies were evident from March-July 2011. Negative anomalies developed in late July 2011 and strengthened through early October 2011. After weakening slightly during late October and November 2011, negative anomalies strengthened in December 2011. Since January 2012, the negative anomalies have weakened considerably.

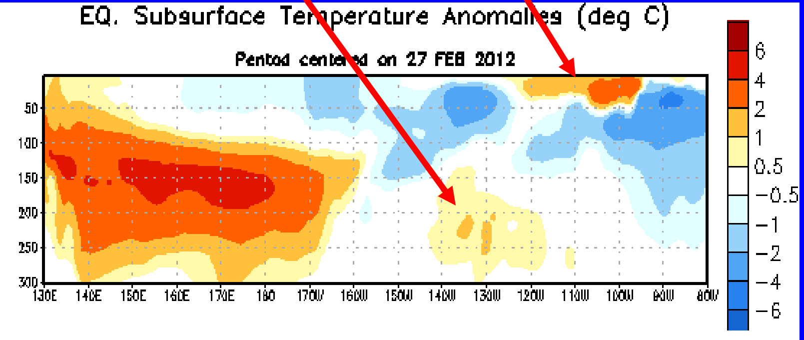
Sub-Surface Temperature Departures (ºC) in the Equatorial Pacific

- During the last two months, negative subsurface temperature anomalies weakened across the Pacific.
- During the recent period, strong near-surface warming is evident in the eastern equatorial Pacific. Also, anomalous warmth is evident between 150-300m depth in the east-central Pacific.

Time

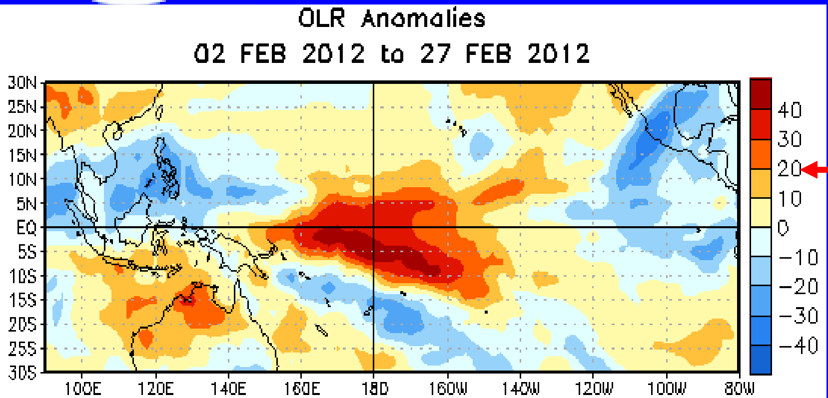


Longitude

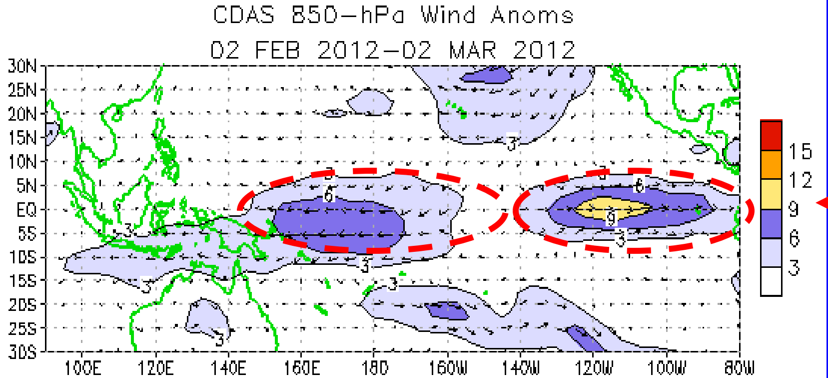


Most recent pentad analysis

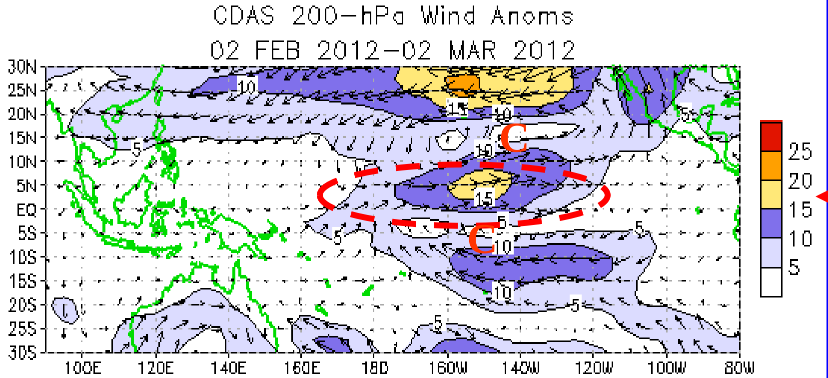
Tropical OLR and Wind Anomalies During the Last 30 Days



Negative OLR anomalies (enhanced convection and precipitation, blue shading) were observed over Malaysia, the Philippines, and to the southeast of Papua New Guinea. Positive OLR anomalies (suppressed convection and precipitation, red shading) were located over the central tropical Pacific.



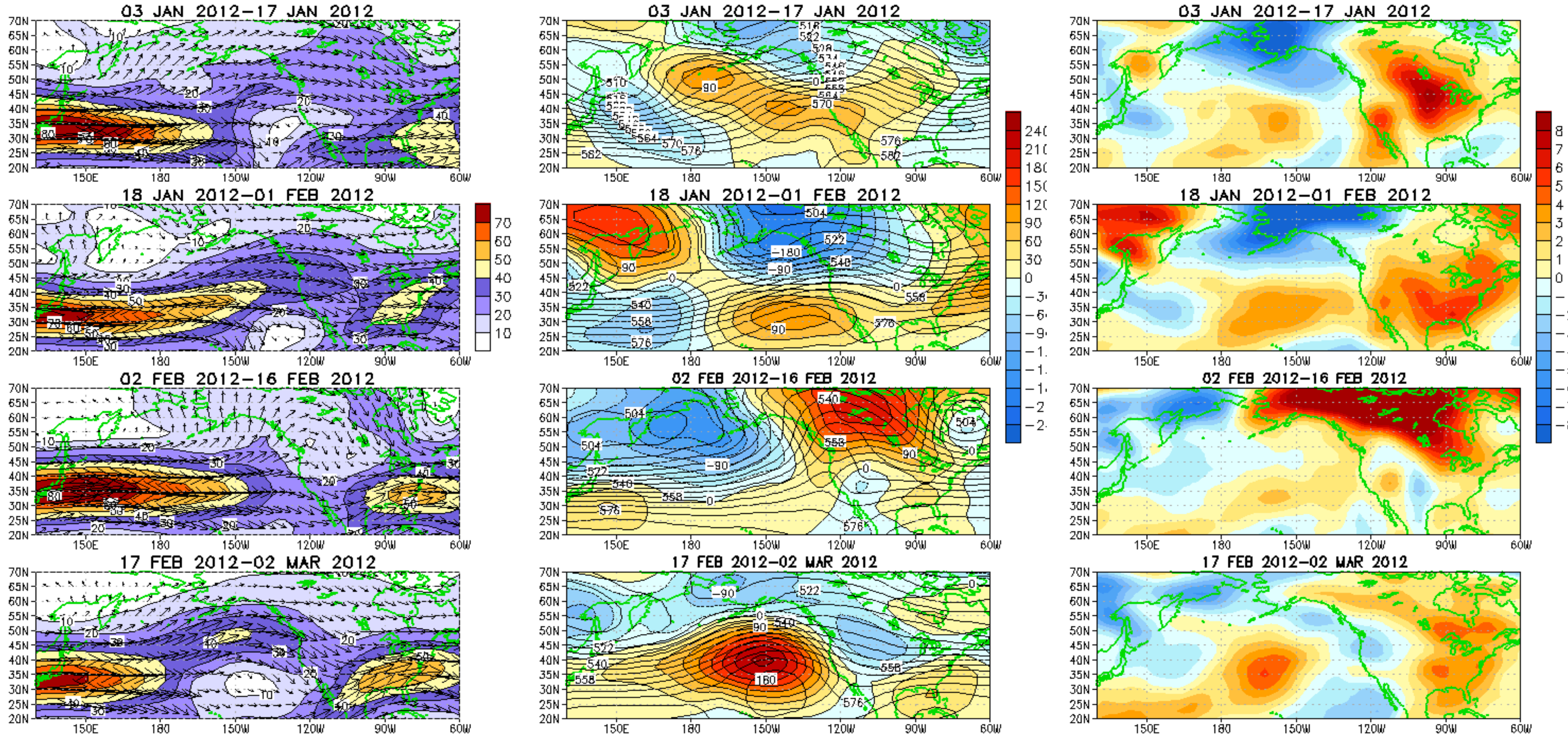
Low-level (850-hPa) easterly anomalies were observed over the central and western tropical Pacific, while westerly anomalies were located over the eastern Pacific.



Upper-level (200-hPa) westerly anomalies were observed over the eastern half of the tropical Pacific. Cyclonic circulation anomalies were present in the subtropics of both hemispheres

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)**

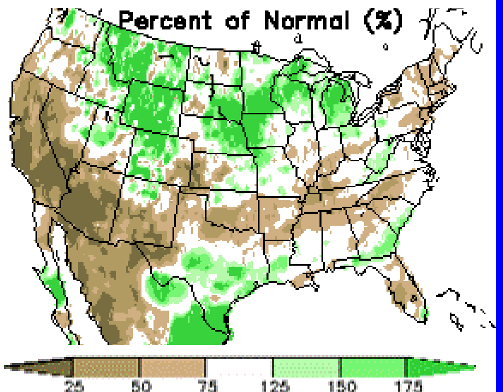


During January through February, an anomalous ridge persisted over the eastern North Pacific and above-average heights extended across much of the contiguous U.S. Associated with this ridging, above-average temperatures were evident across much of North America, except for Alaska. In early February, the pattern shifted so that southerly flow over Alaska contributed to a period of above-average temperatures.

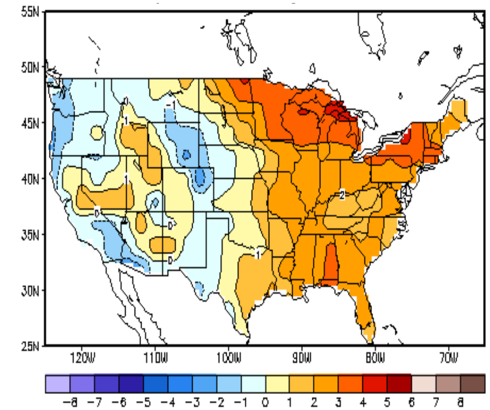
U.S. Temperature and Precipitation Departures During the Last 30 and 90 Days

Last 30 Days

30-day (ending 4 Mar 2012) % of average precipitation

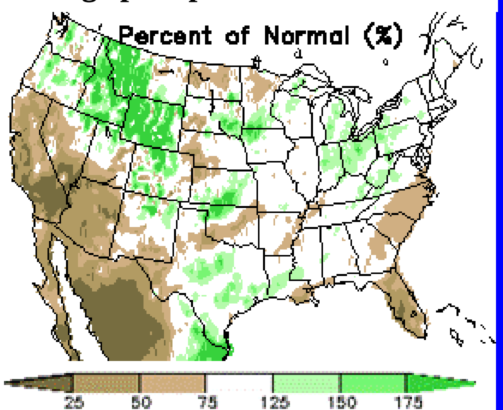


30-day (ending 3 Mar 2012) temperature departures (degree C)

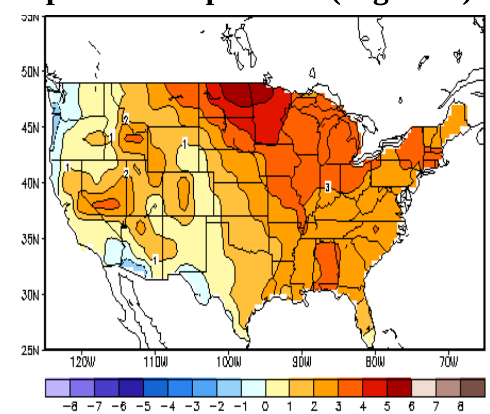


Last 90 Days

90-day (ending 4 Mar 2012) % of average precipitation



90-day (ending 3 Mar 2012) temperature departures (degree C)

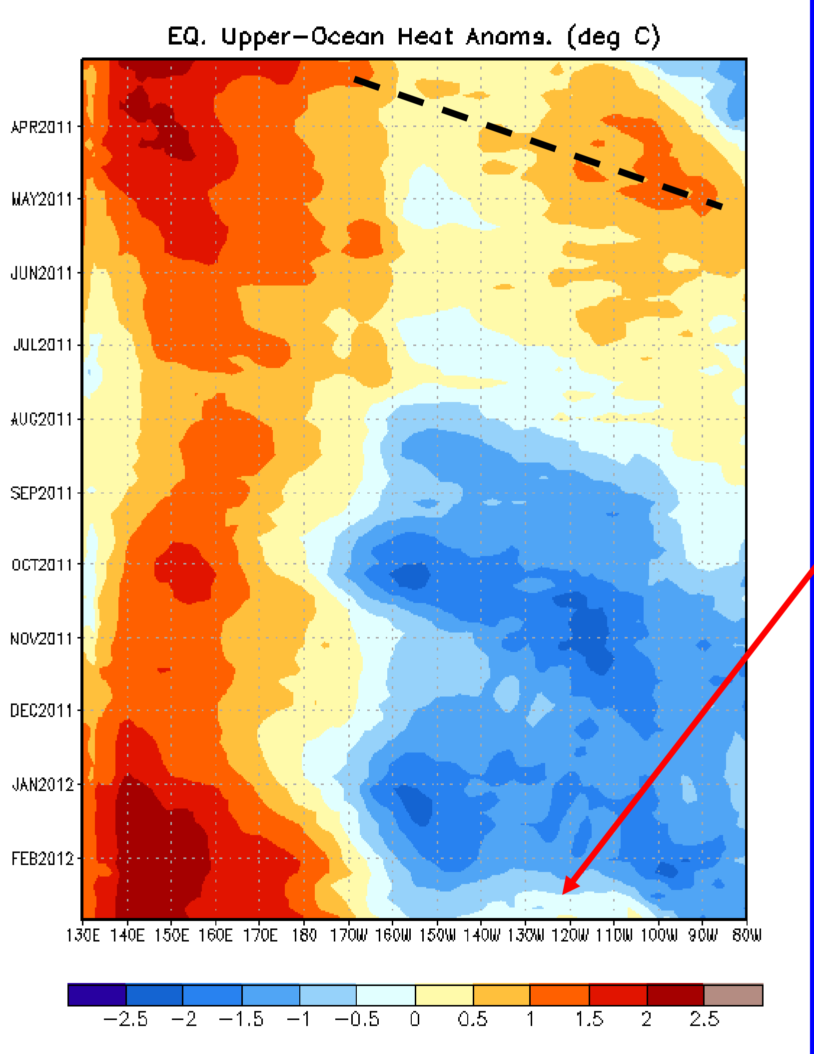


Intraseasonal Variability

- 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.

Weekly Heat Content Evolution in the Equatorial Pacific



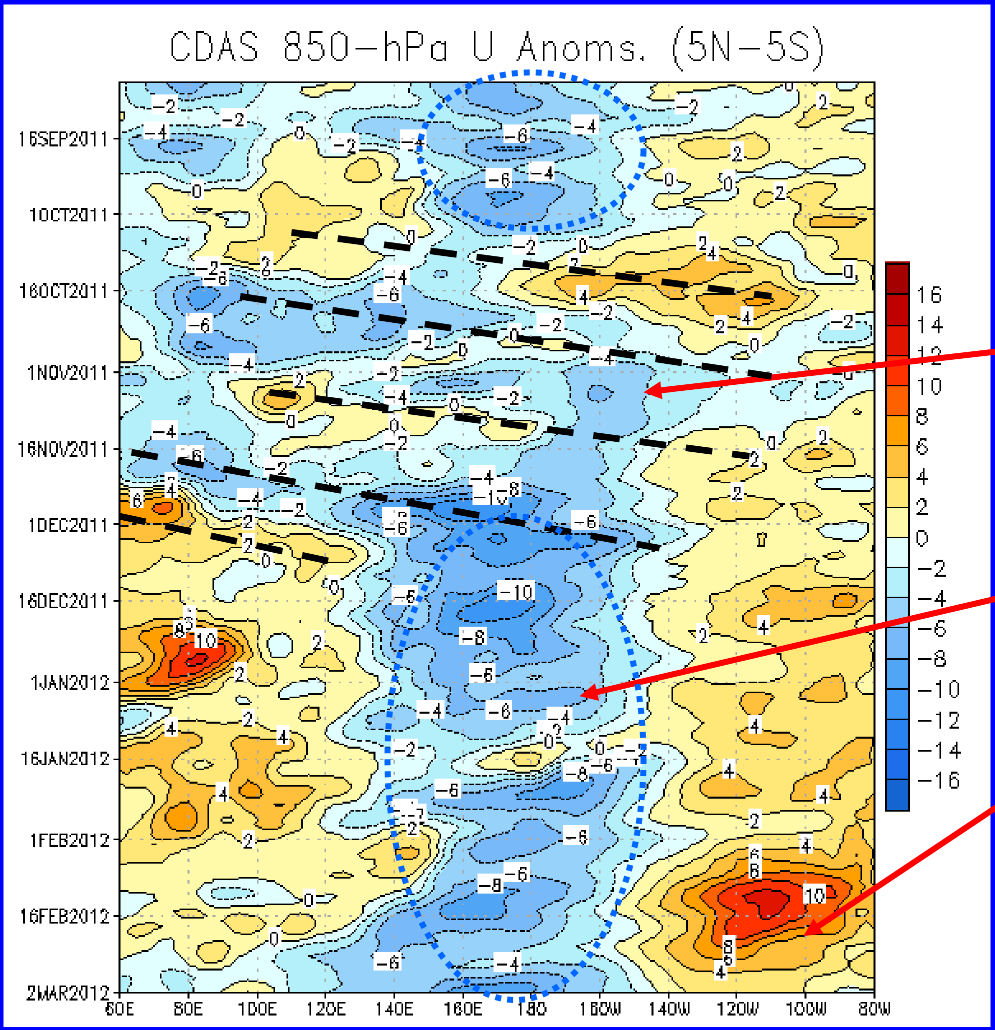
Time

Longitude

- From February-June 2011, the heat content was above-average, especially across the western Pacific.
- Since January 2012, negative heat content anomalies have weakened across the equatorial 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).

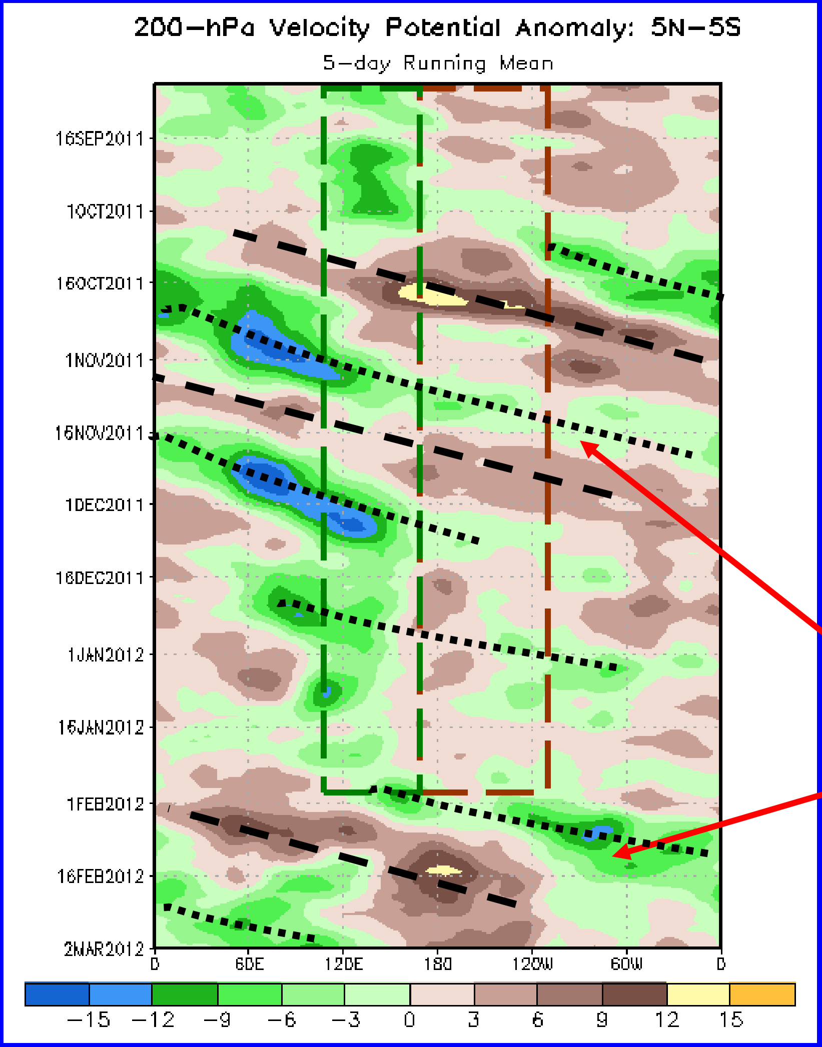
Easterly wind anomalies (blue shading).

During October- mid December 2011, the MJO contributed to an eastward shift of the low-level wind anomalies.

Since the beginning of December 2011, low-level easterly wind anomalies persisted over the western and central equatorial Pacific.

During February 2012, strong westerly anomalies were present over the eastern Pacific.

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



Time

Longitude

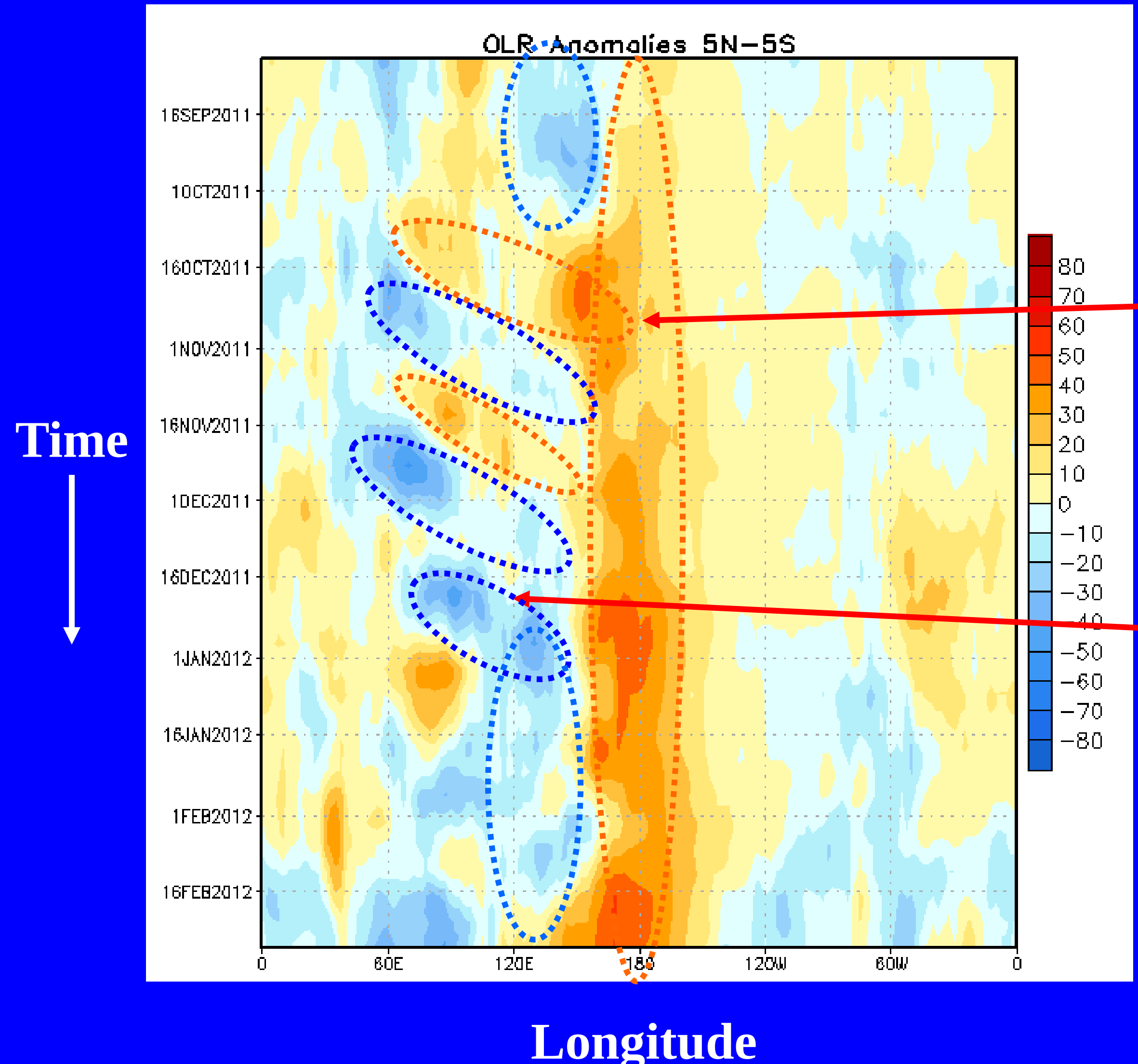
Positive anomalies (brown shading) indicate unfavorable conditions for precipitation.

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

From May 2010 - January 2012, a persistent pattern of upper-level convergence anomalies (brown) was evident over the central Pacific, while anomalous upper-level divergence (green) generally prevailed over the Maritime Continent.

The MJO was active during October through December 2011, and became active again during February 2012.

Outgoing Longwave Radiation (OLR) Anomalies



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.

From October – December 2011, variability in OLR anomalies (focused mostly over the Indian Ocean and Maritime Continent) was associated 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.

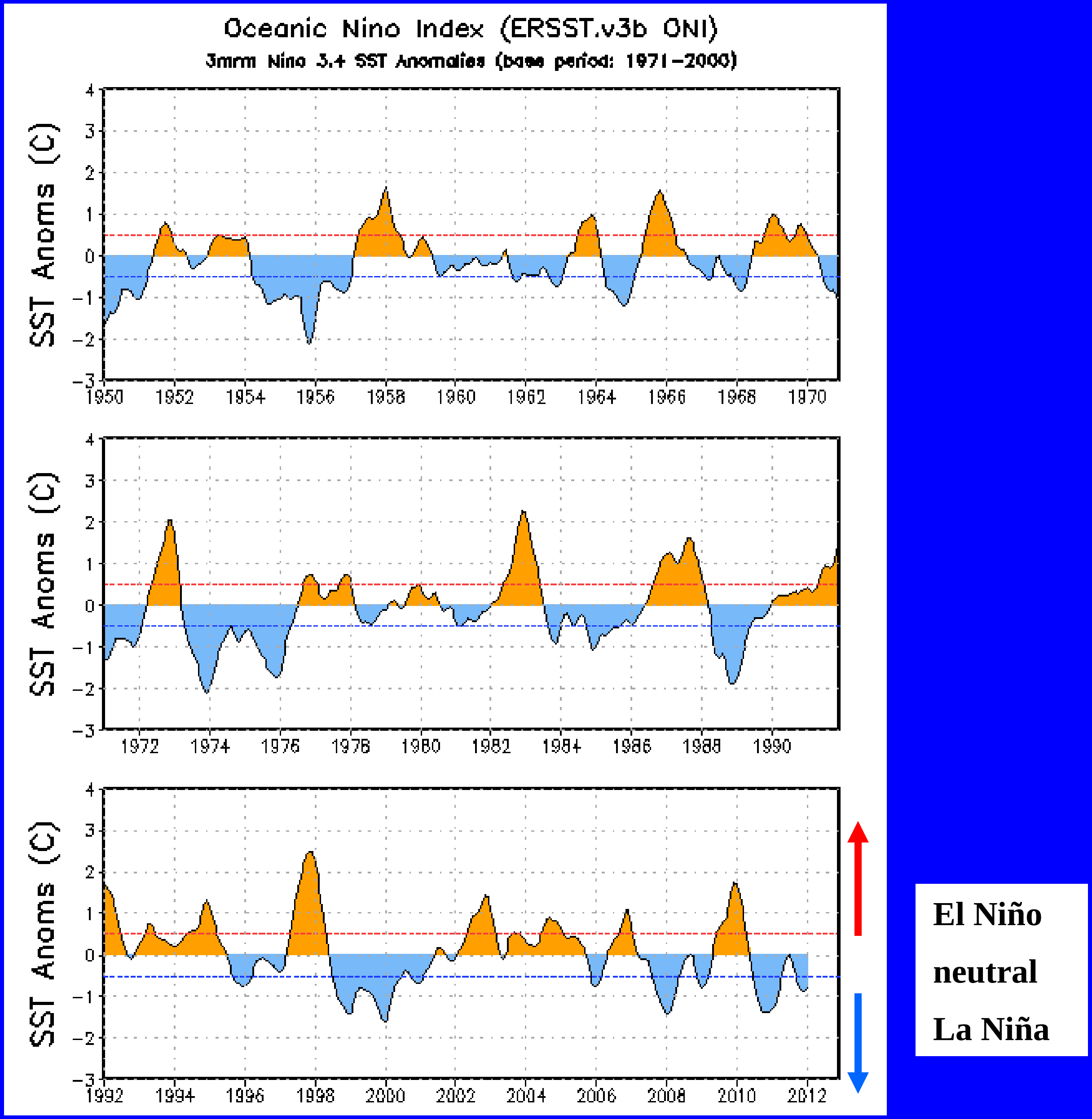
<u>La Niña:</u> characterized by a *negative* ONI less than or equal to −0.5°C.

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 (December 2011 – February 2012) is -0.8ºC.



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
JJA 2010 – MAM 2011	-1.4

Historical Pacific warm (red) and cold (blue) episodes based on a threshold of +/- 0.5 ^{o}C 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

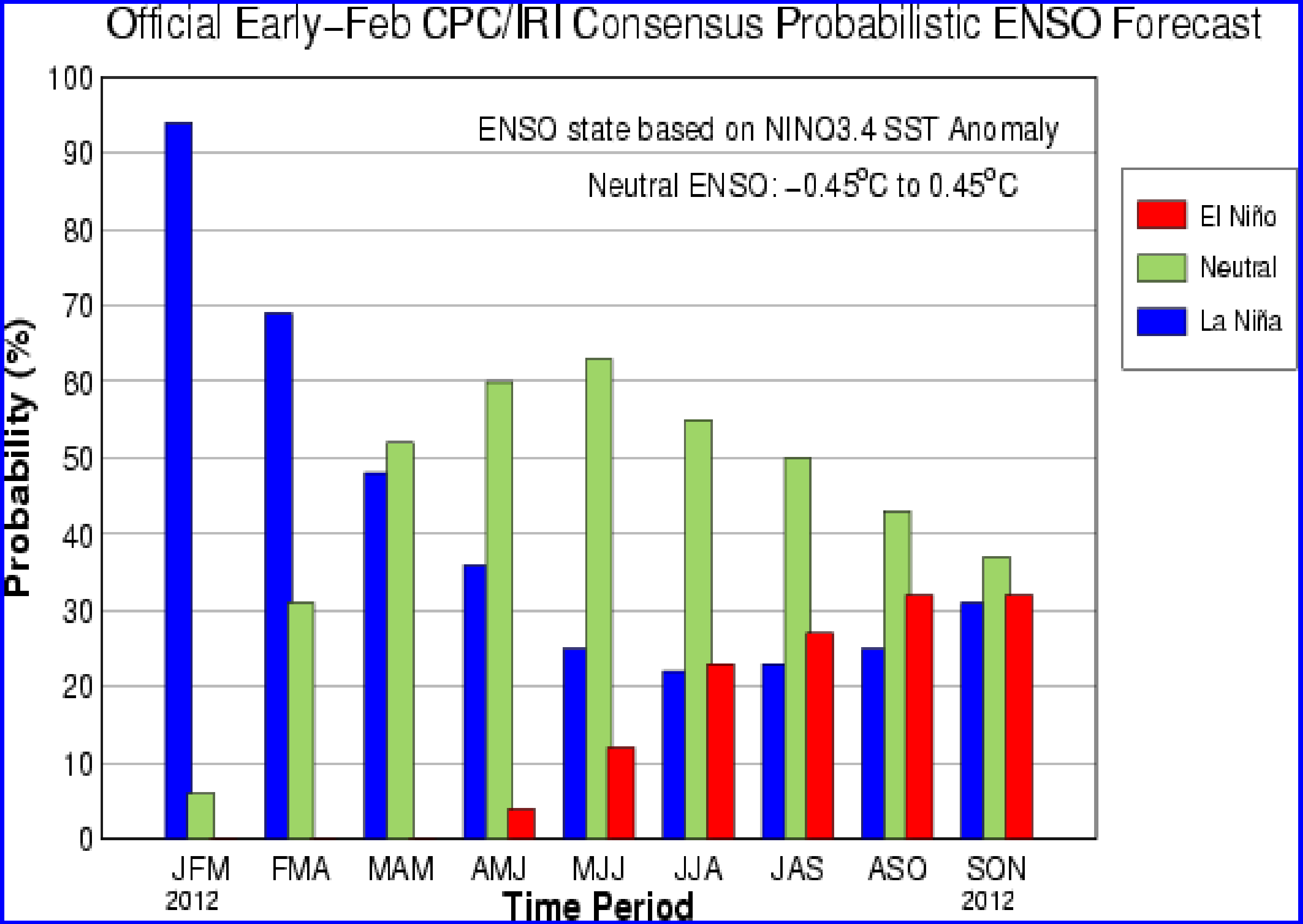
Historical Pacific warm (red) and cold (blue) episodes based on a threshold of +/- 0.5 °C for the Oceanic Nino Index (ONI) [3 month running mean of ERSST.v3b SST anomalies in the Nino 3.4 region (5N-5S, 120-170W)], calculated with respect to the 1971-2000 base period. For historical purposes El Niño 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**	**-0.6**	-0.2	0.0	0.0	-0.2	-0.4	**-0.7**	**-0.8**	**-0.9**
2012	**-0.8**											
2013												
2014												
2015												
2016												
2017												
2018												
2019												
2020												
2021												
2022												
2023												
2024												
2025												
2026												
2027												

Official Probabilistic ENSO Outlook

(updated 9 Feb 2012)

La Niña is expected to transition to ENSO-neutral conditions during March-May 2012.



Pacific Niño 3.4 SST Outlook

• The majority of models predict the return of ENSO-neutral (Niño-3.4 SST anomalies between -0.5°C and +0.5°C) during the Northern Hemisphere spring (March-April-May) and continuing through the summer.

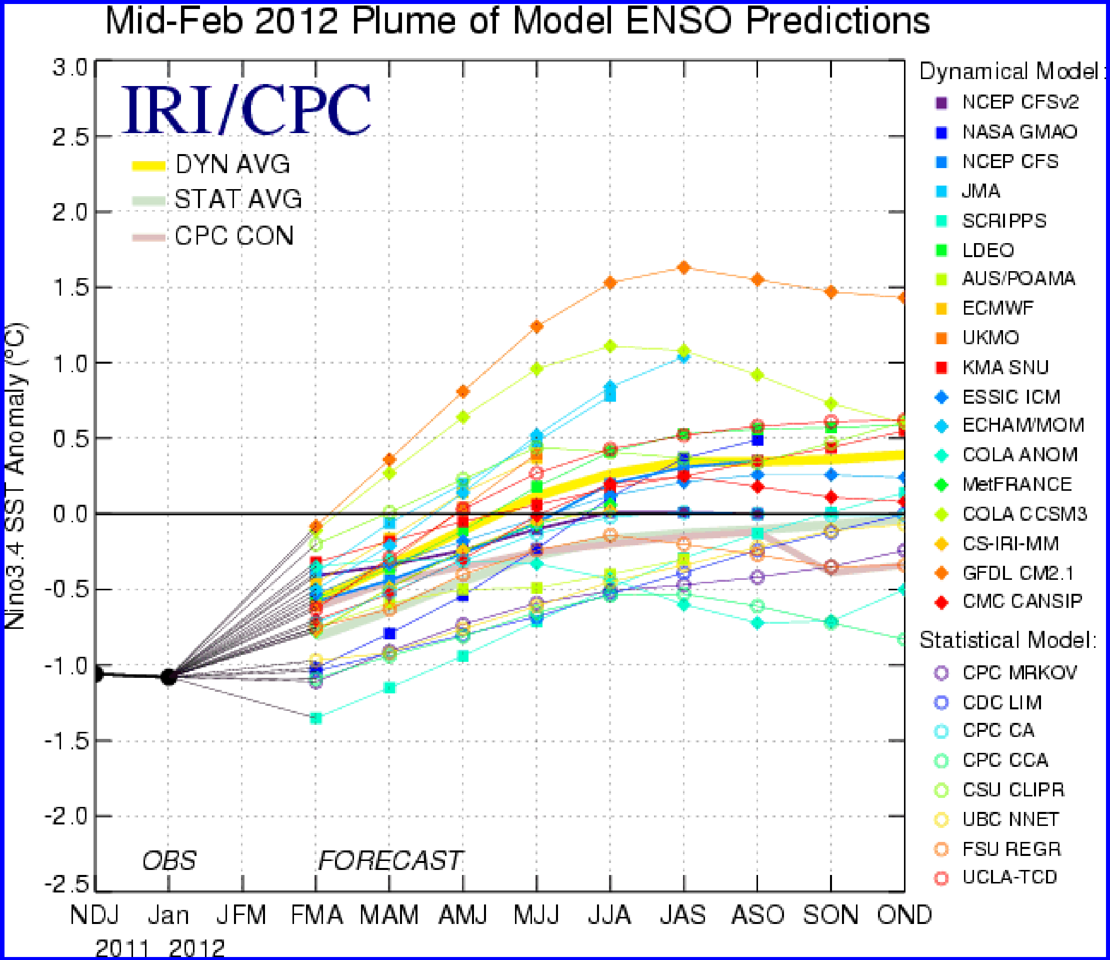
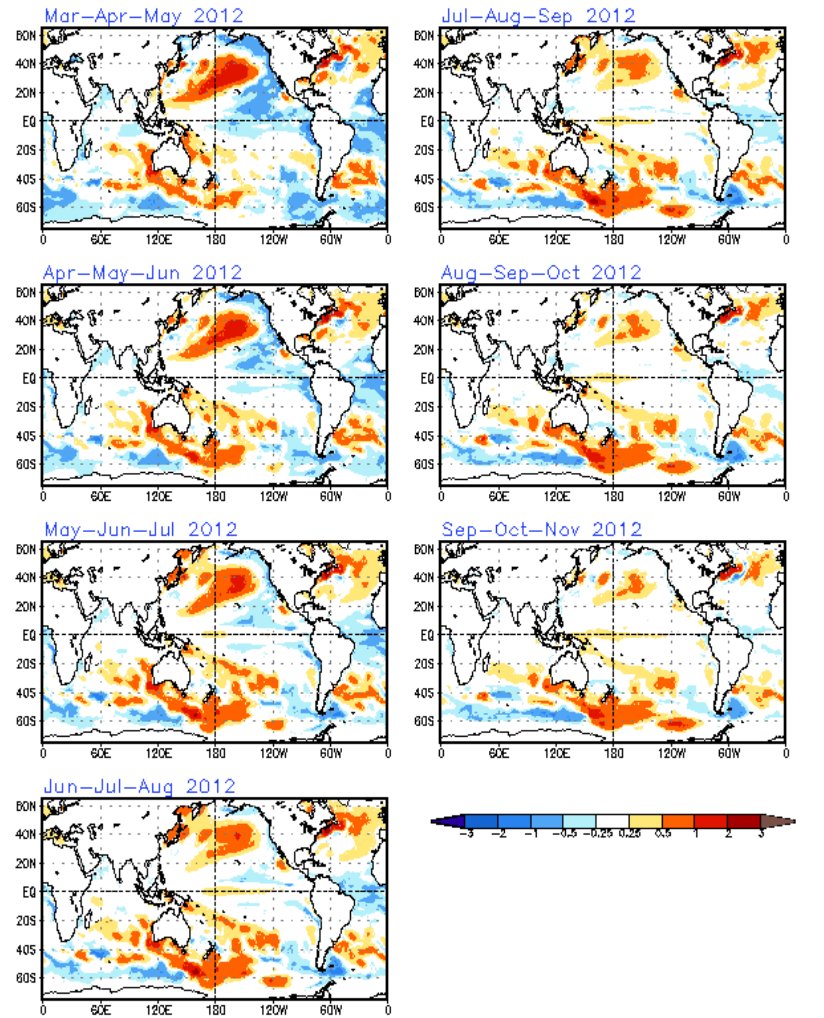
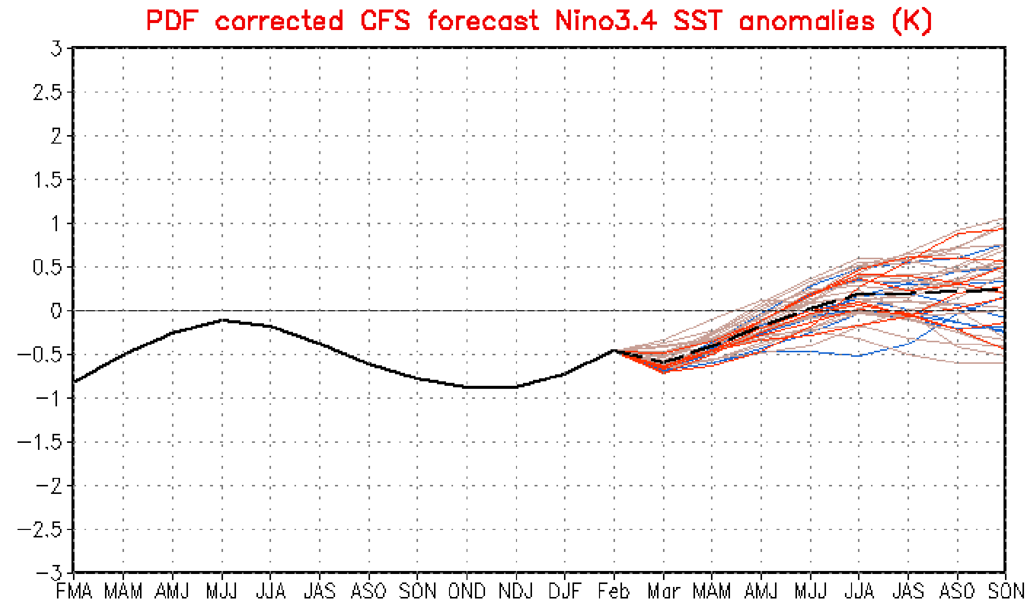


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 14 February 2012).

SST Outlook: NCEP CFS.v1 Forecast Issued 5 March 2012

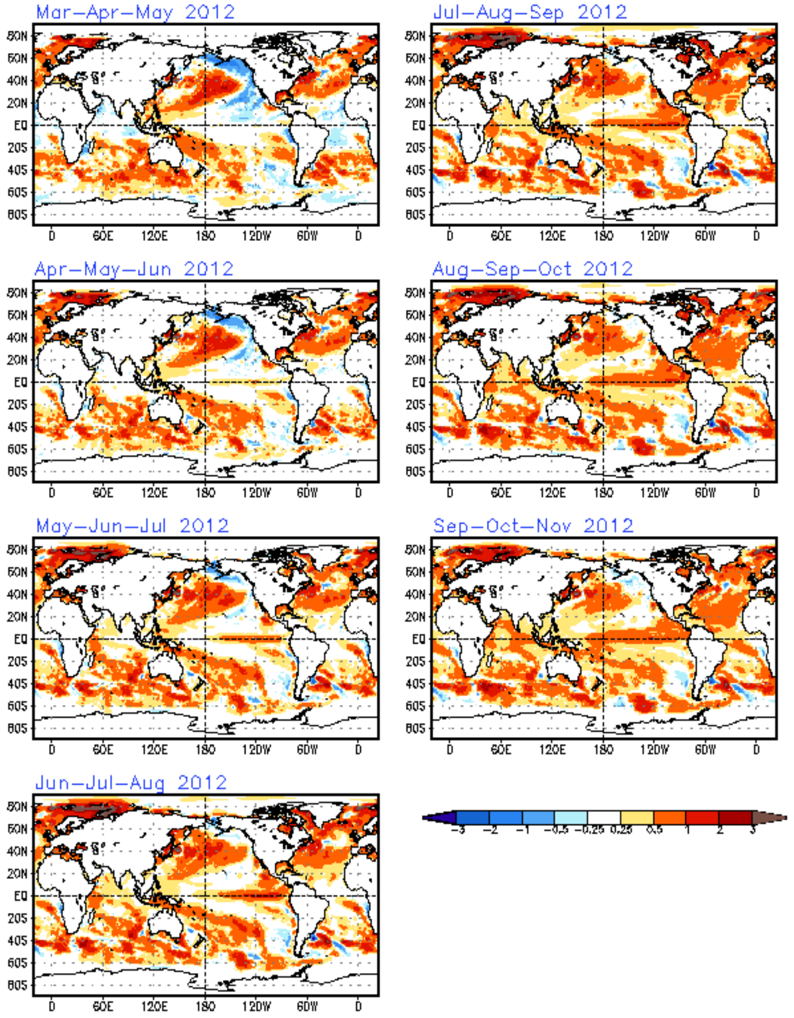


The CFS.v1 ensemble mean (black dashed line) predicts ENSO-neutral conditions beginning in March-May 2012.



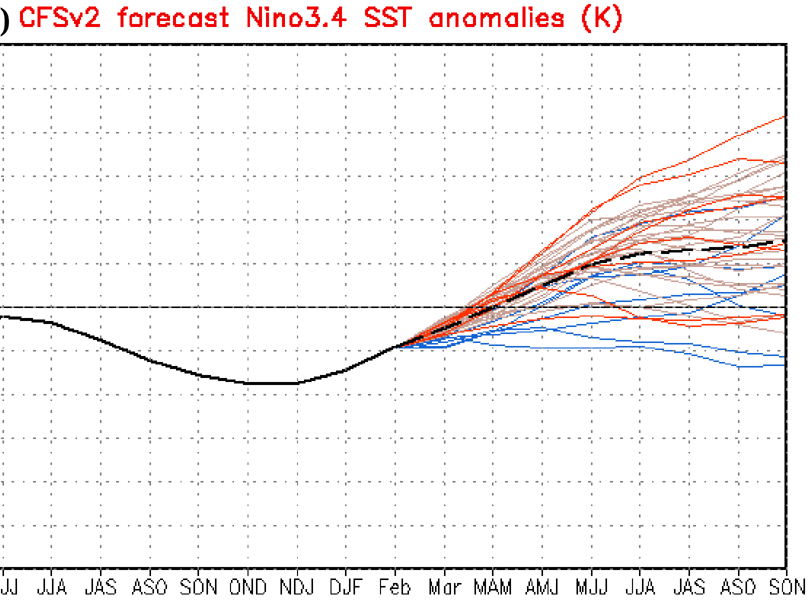
Please note that CFS.v1 will be discontinued in June 2012.

SST Outlook: NCEP CFS.v2 Forecast Issued 5 March 2012



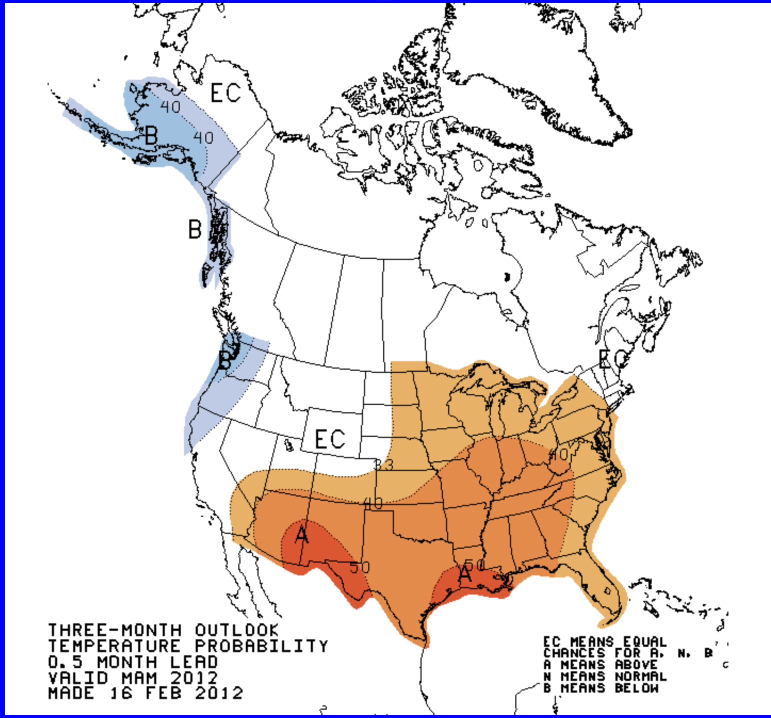
The CFS.v2 ensemble mean (black dashed line) predicts ENSO-neutral conditions beginning in March 2012.

(not PDF corrected)

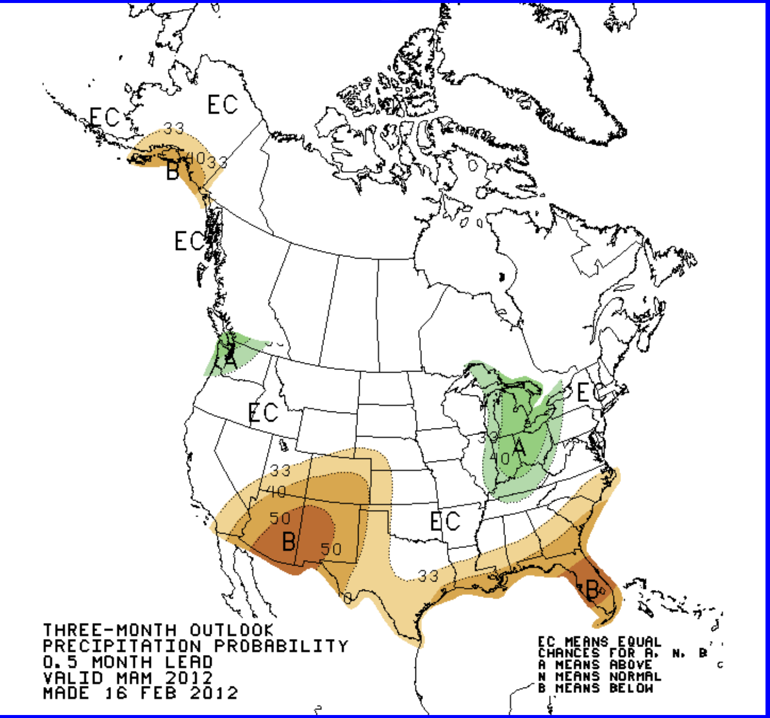


U. S. Seasonal Outlooks
March – May 2012

Temperature



Precipitation



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

Summary

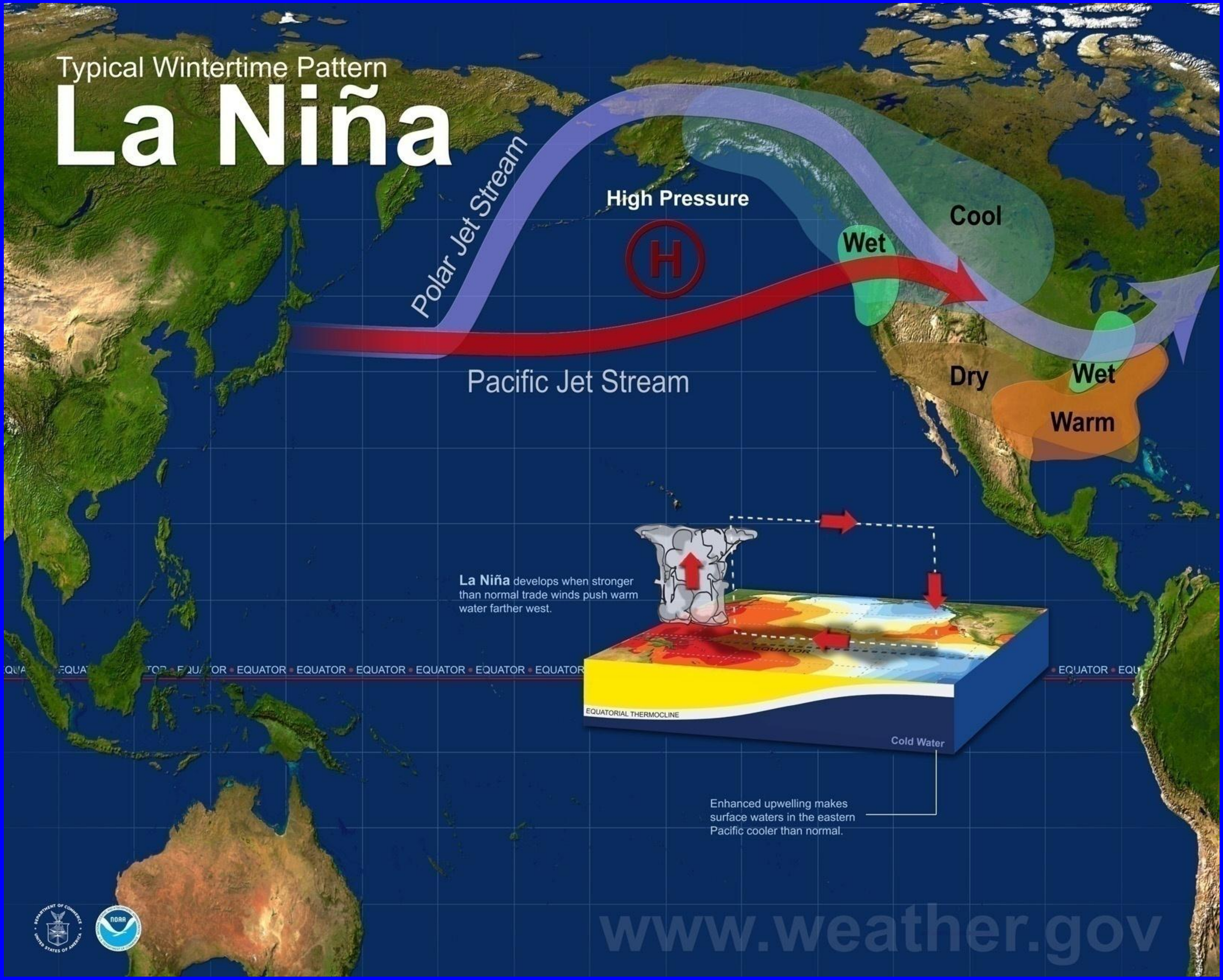
- La Niña has peaked across the equatorial Pacific.* Equatorial sea surface temperatures (SST) remain at least 0.5°C below average in the central Pacific, but have warmed considerably across the east-central and eastern Pacific Ocean in the last couple of weeks.

- Atmospheric circulation anomalies remain consistent with La Niña.

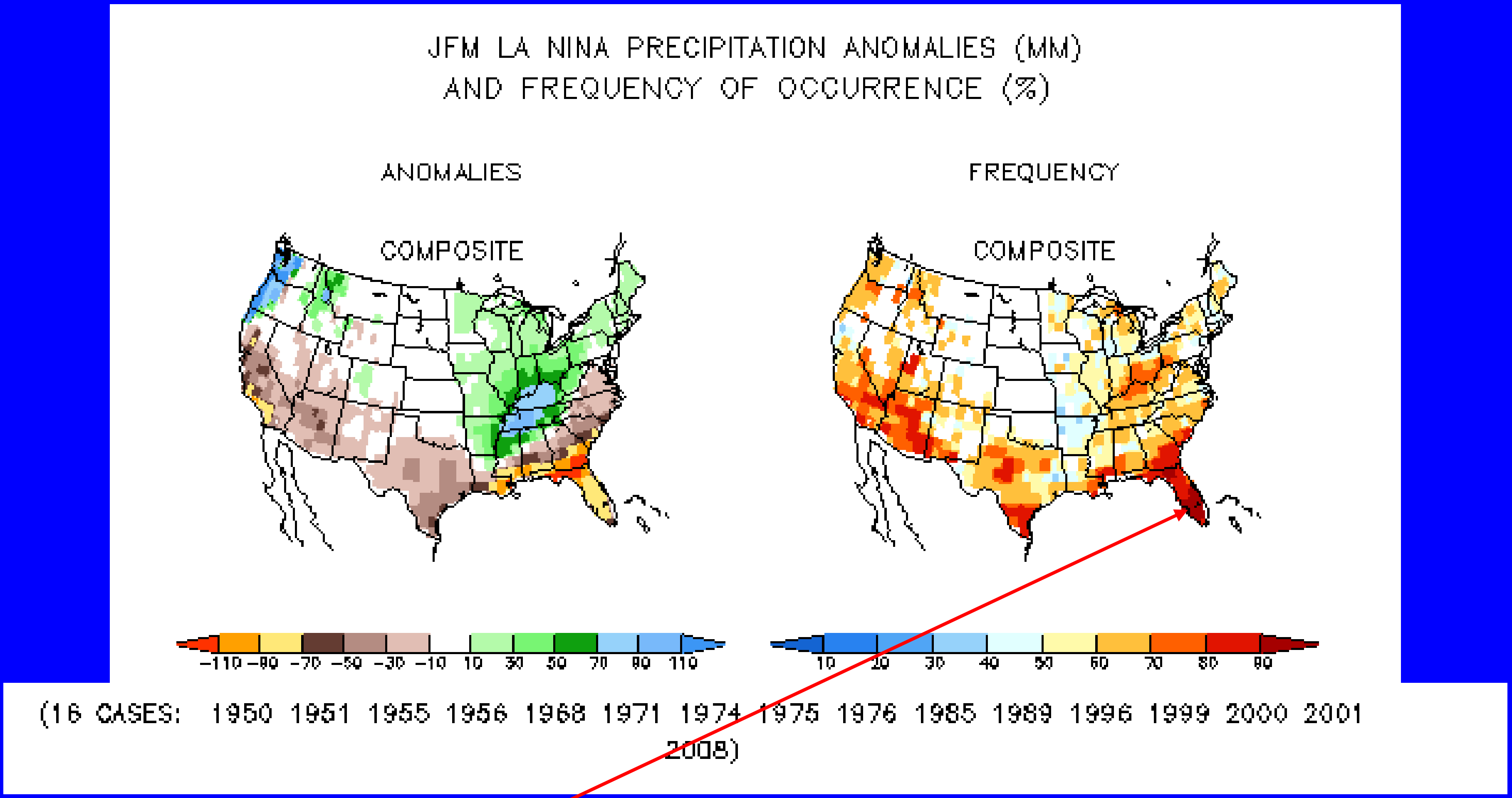
- La Niña is expected to transition to ENSO-neutral conditions during March-May 2012.*

* Note: These statements are updated once a month in association with the ENSO Diagnostics Discussion:
http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory

Typical US Temperature, Precipitation and Jet Stream Patterns during La Niña Winters

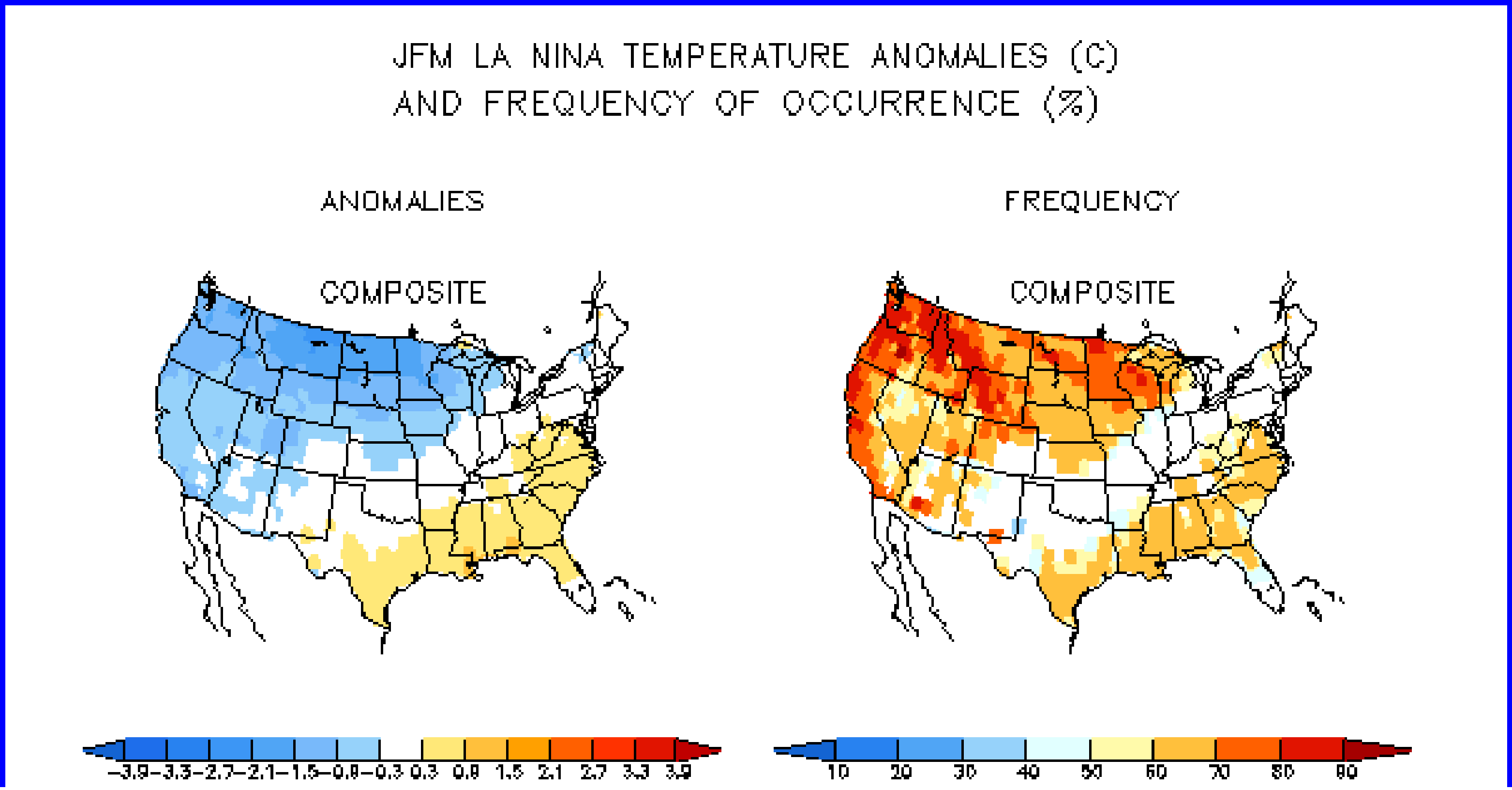


U.S. Precipitation Departures (mm) and Frequency of Occurrence (%) for La Niña during Jan.-Mar.



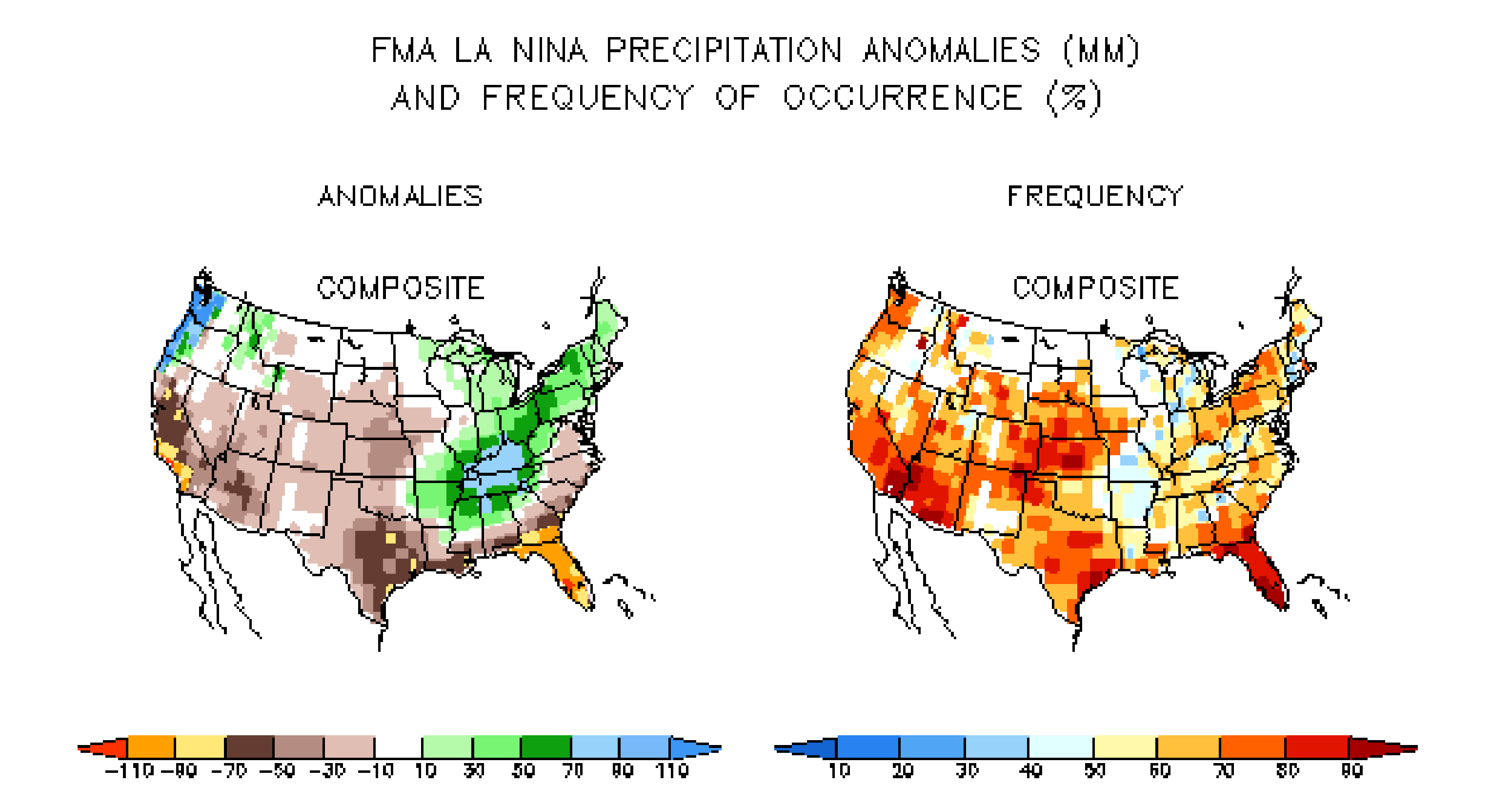
FREQUENCY (right panel) indicates the percentage of La Niña years that the indicated departure (left panel) occurred. For example, below-average seasonal precipitation over Florida occurred in 70%-90+% of the La Niña years.

U.S. Temperature Departures (°C) and Frequency of Occurrence (%) for La Niña during Jan.-Mar.



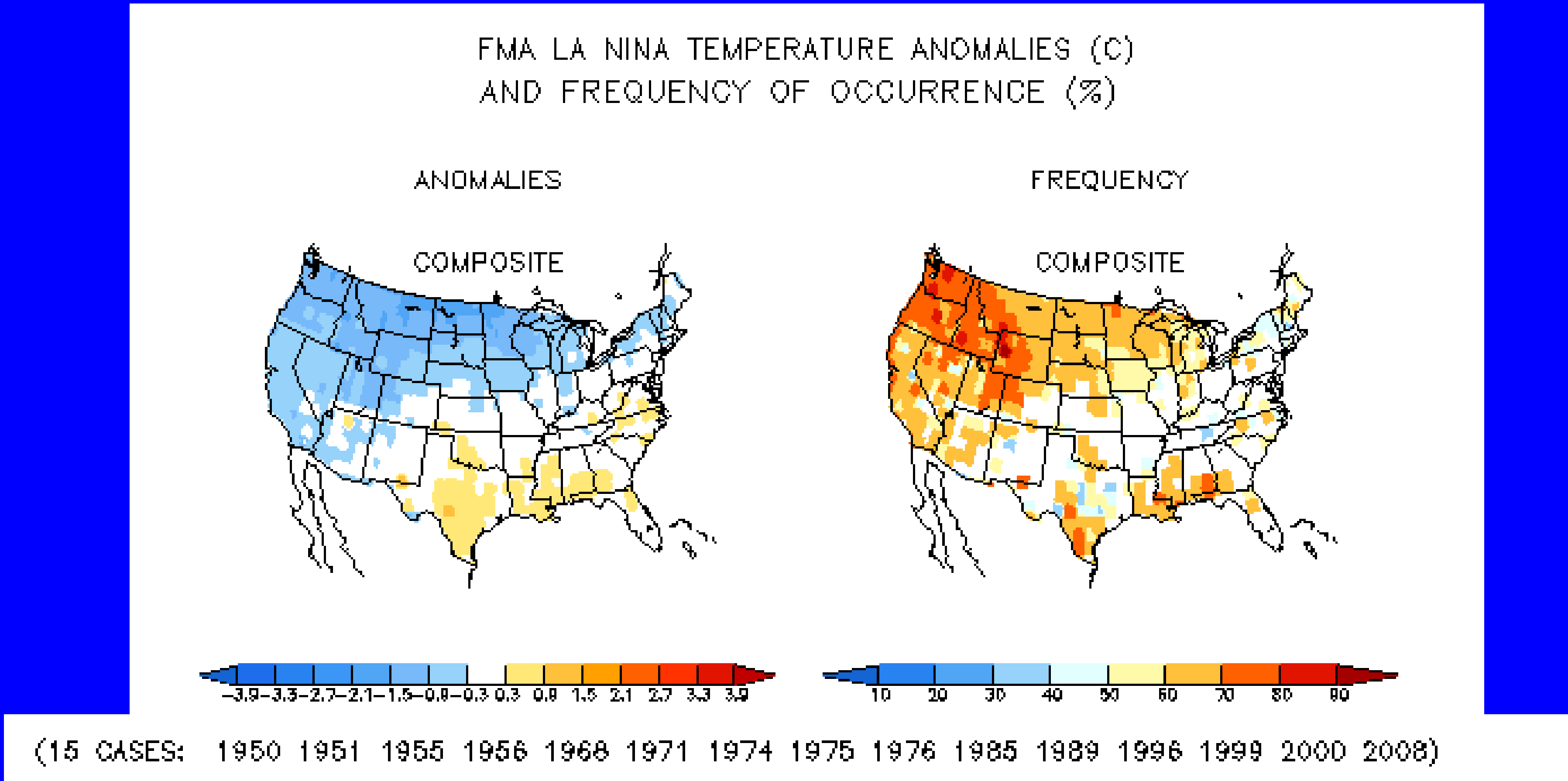
(16 CASES: 1950 1951 1955 1956 1968 1971 1974 1975 1976 1985 1989 1996 1999 2000 2001 2008)

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

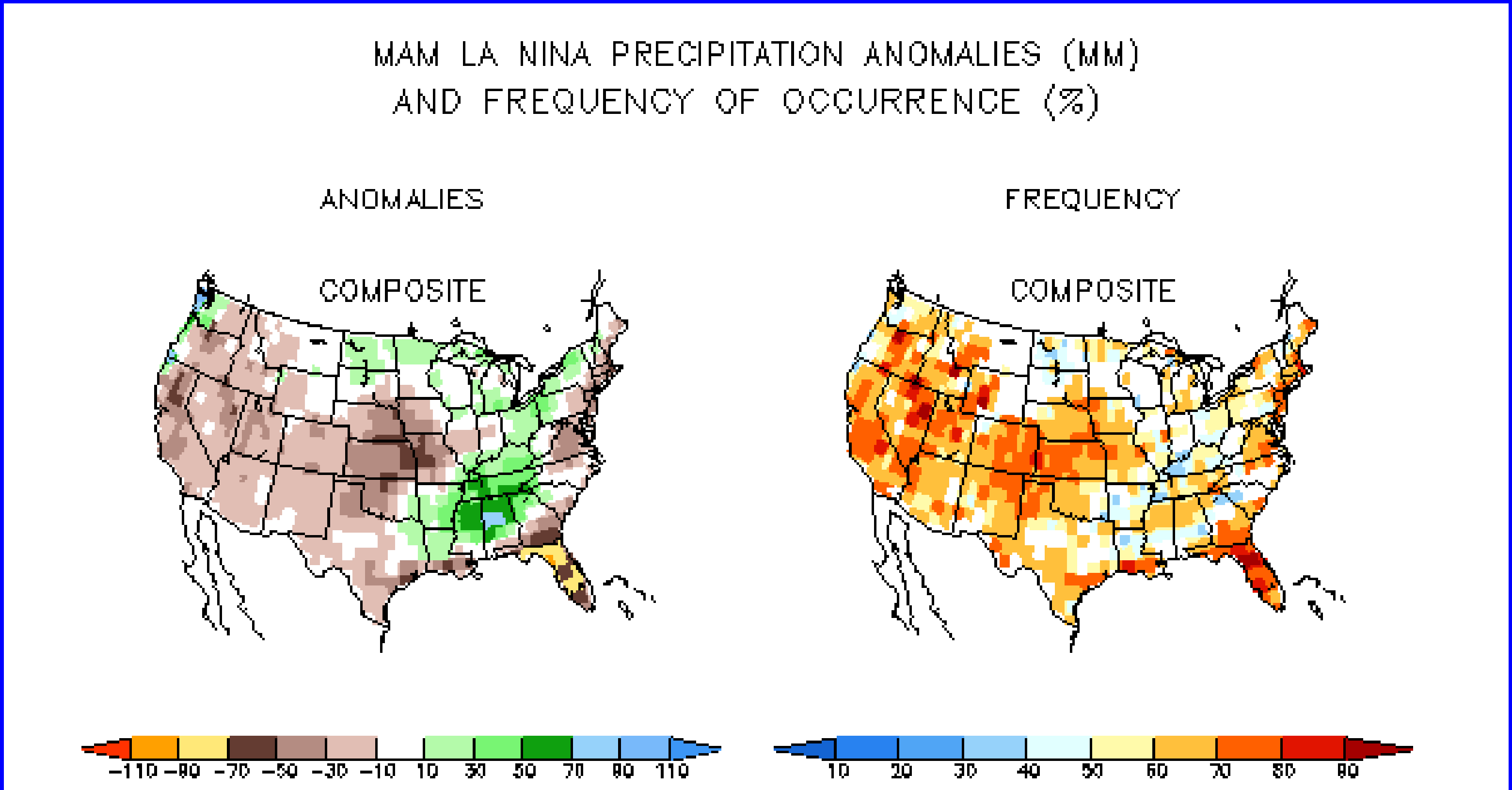


(15 CASES: 1950 1951 1955 1956 1968 1971 1974 1975 1976 1985 1989 1996 1999 2000 2008)

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

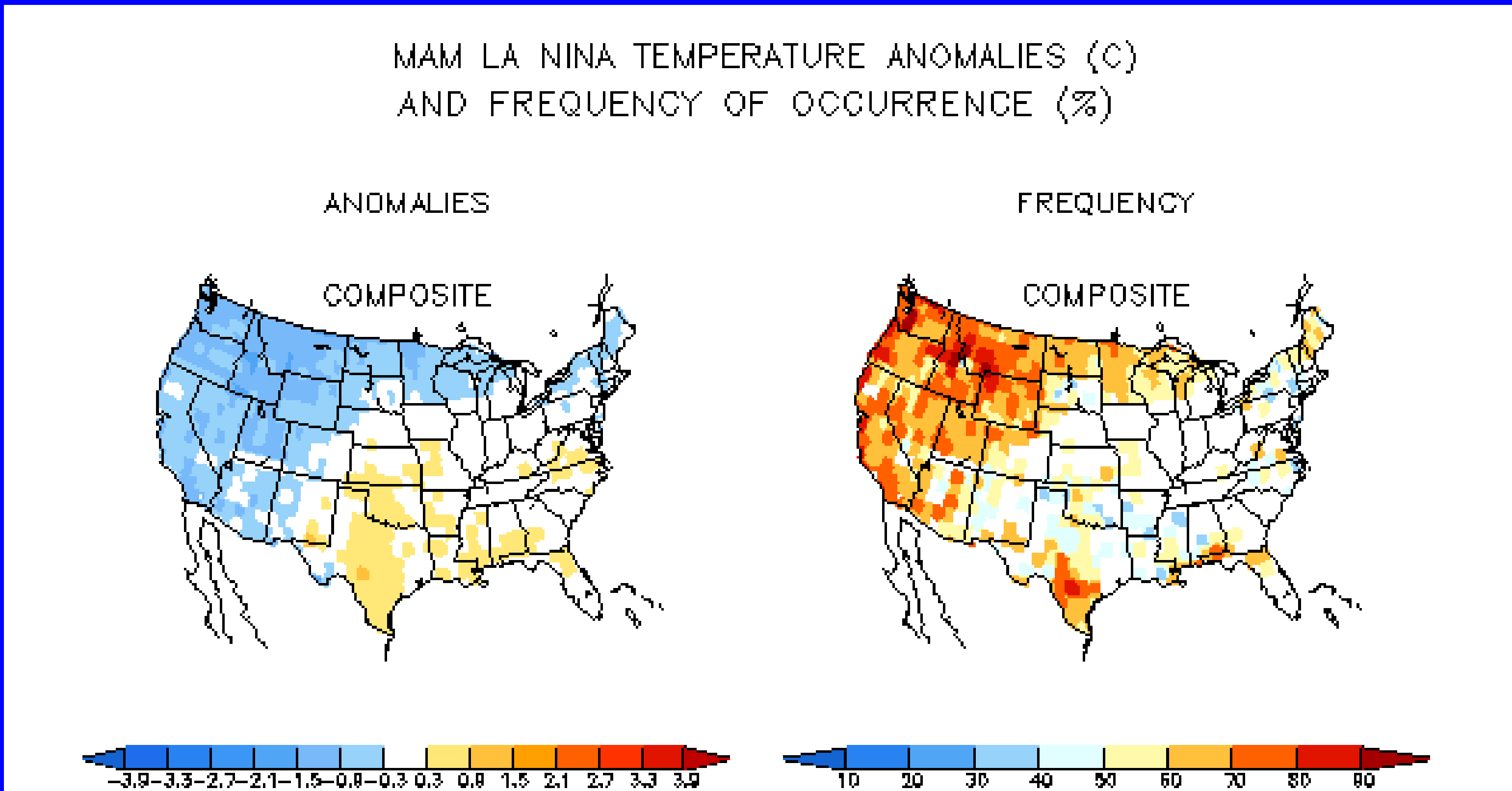


U.S. Precipitation Departures (mm) and Frequency of Occurrence (%) for La Niña during Mar.-May



(15 CASES: 1950 1954 1955 1956 1964 1968 1971 1974 1975 1976 1985 1989 1999 2000 2008)

U.S. Temperature Departures (°C) and Frequency of Occurrence (%) for La Niña during Mar.-May



(15 CASES: 1950 1954 1955 1956 1964 1968 1971 1974 1975 1976 1985 1989 1999 2000 2008)