



# **ENSO Cycle: Recent Evolution, Current Status and Predictions**

**Update prepared by  
Climate Prediction Center / NCEP  
28 November 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

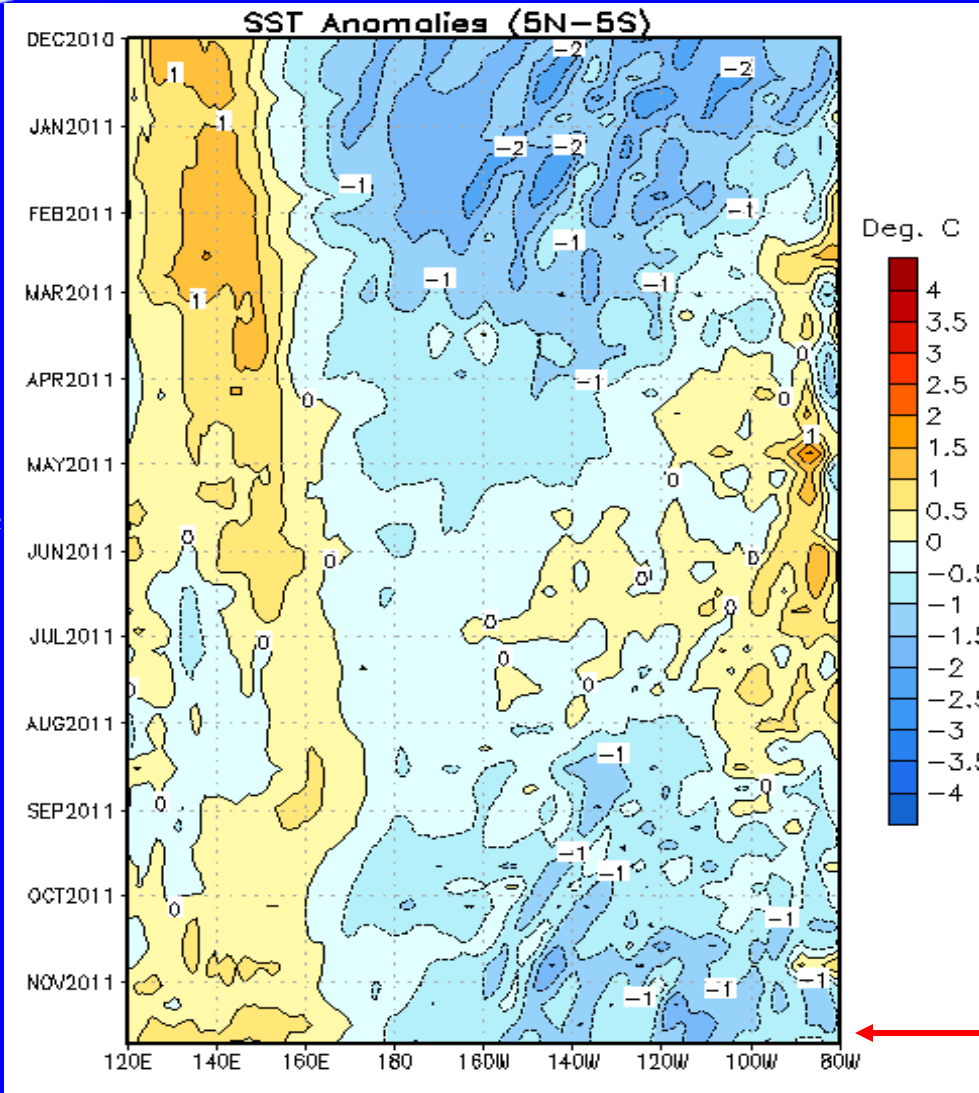
- **La Niña conditions are present across the equatorial Pacific.\***
- **Sea surface temperatures (SST) were at least 0.5°C below average across much of the central and eastern equatorial Pacific Ocean.**
- **Atmospheric circulation anomalies are consistent with La Niña.**
- **La Niña is expected to continue through the Northern Hemisphere winter 2011-12.\***

\* 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](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory)



# Recent Evolution of Equatorial Pacific SST Departures (°C)

Time



Longitude

Over the past month, below-average SSTs have persisted across much of the equatorial Pacific.



# Niño Region SST Departures (°C)

## Recent Evolution

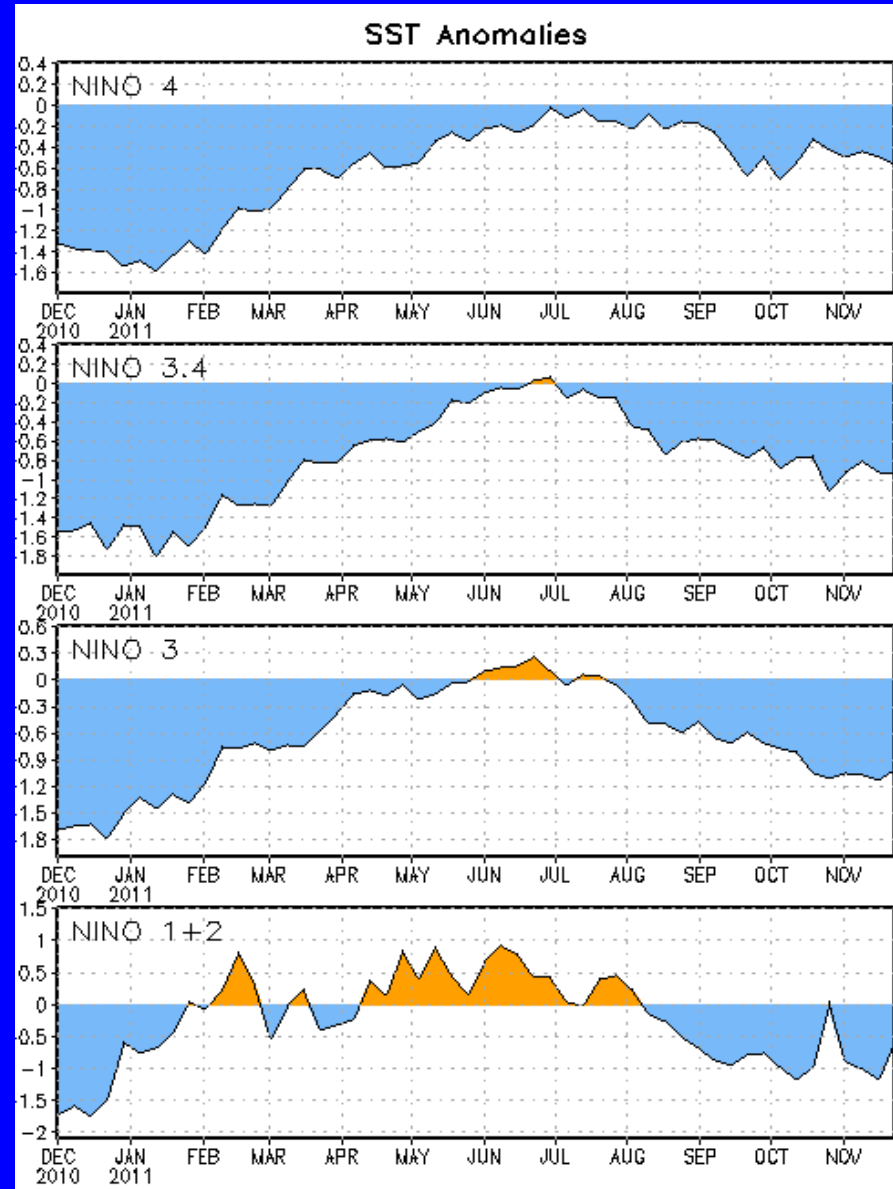
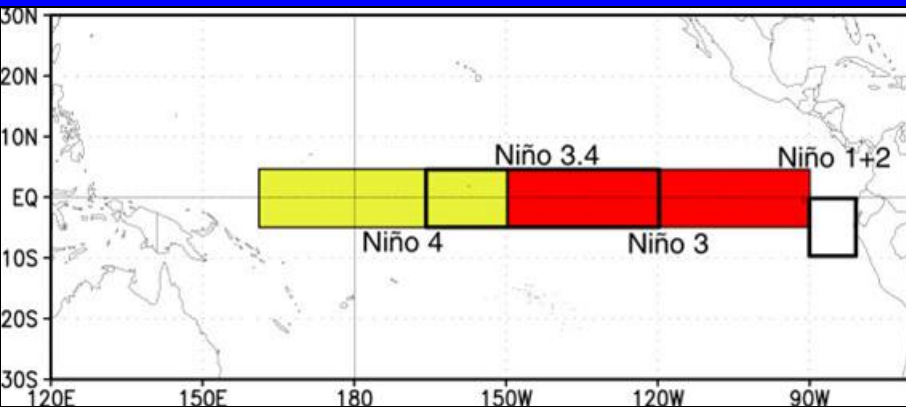
The latest weekly SST departures are:

**Niño 4**                    **-0.6°C**

**Niño 3.4**                **-0.9°C**

**Niño 3**                    **-1.0°C**

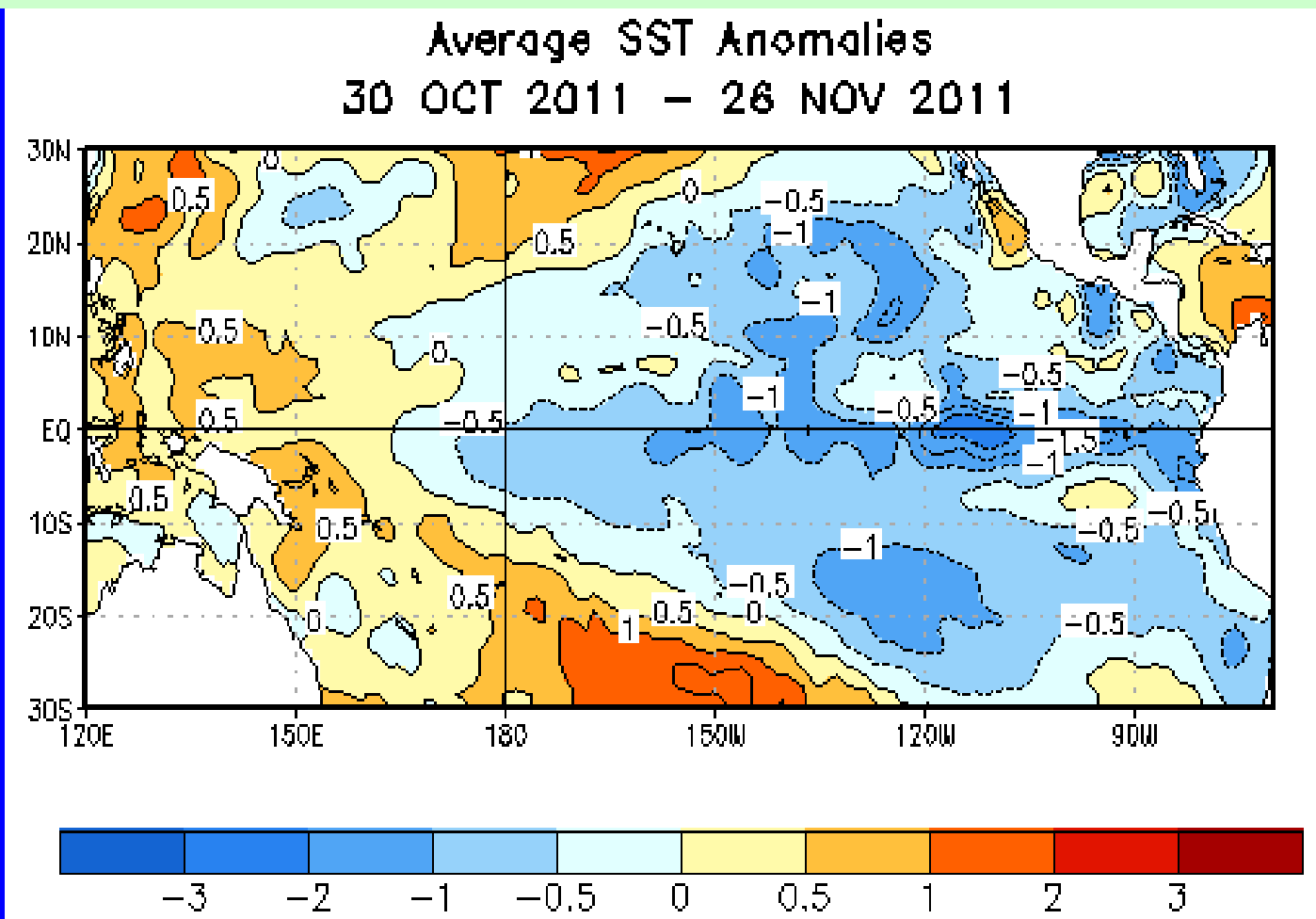
**Niño 1+2**                **-0.6°C**





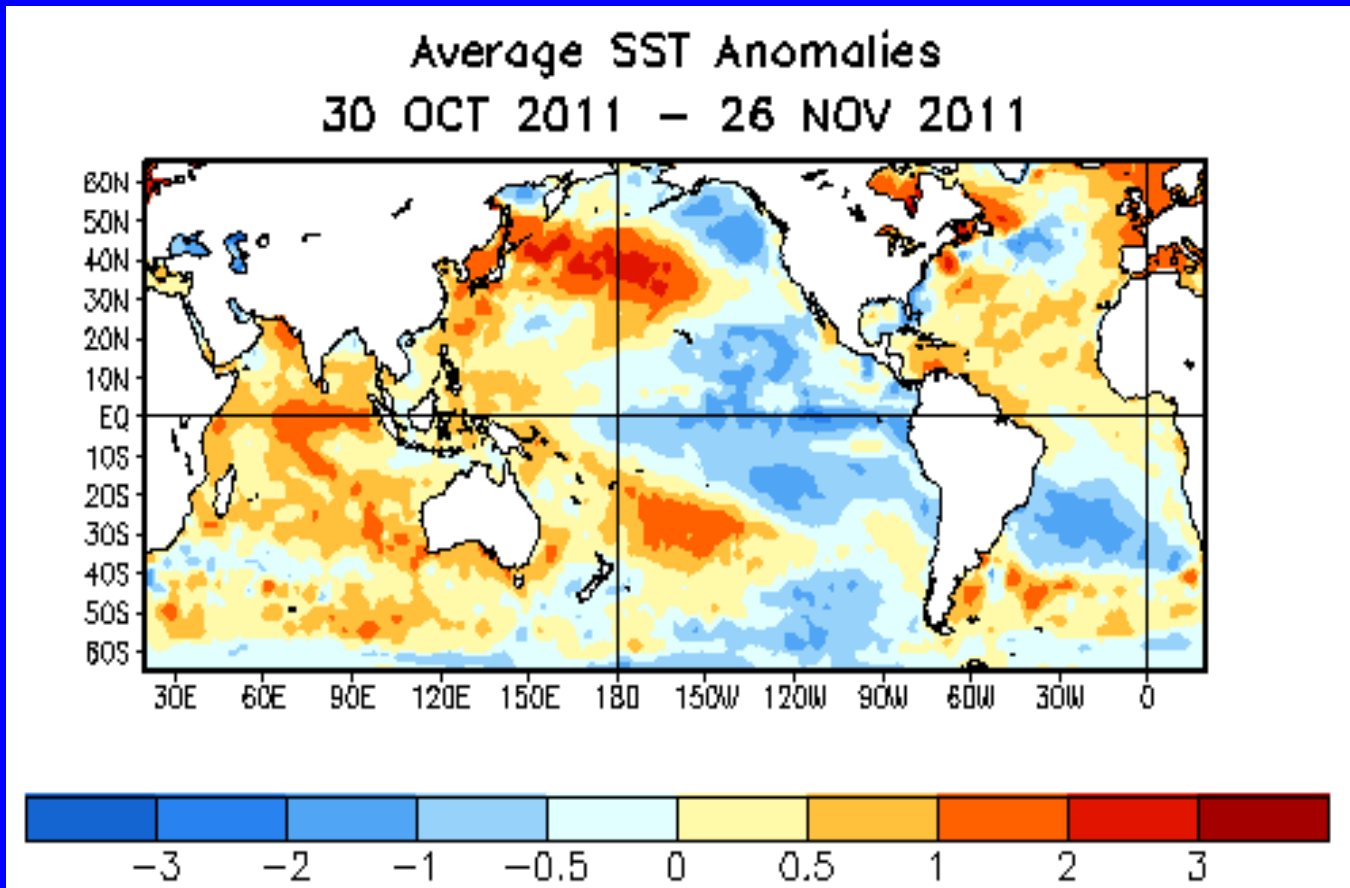
# SST Departures ( $^{\circ}\text{C}$ ) in the Tropical Pacific During the Last 4 Weeks

During the last 4-weeks, equatorial SSTs were more than  $0.5^{\circ}\text{C}$  below average east of  $170^{\circ}\text{E}$  and more than  $1^{\circ}\text{C}$  below average between  $160^{\circ}\text{W}$  and the South American coast.





# Global SST Departures (°C)

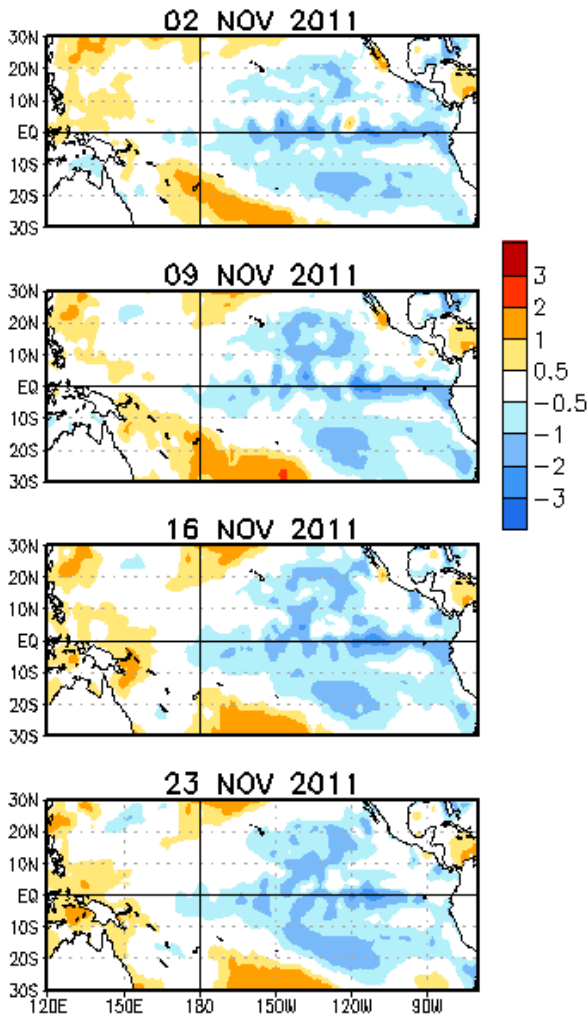


**During the last four weeks, equatorial SSTs were below average across much of the Pacific Ocean and above average across much of the Indian Ocean. A horseshoe pattern of above-average SSTs extended from the Maritime Continent into the middle latitudes of the Pacific Ocean.**



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

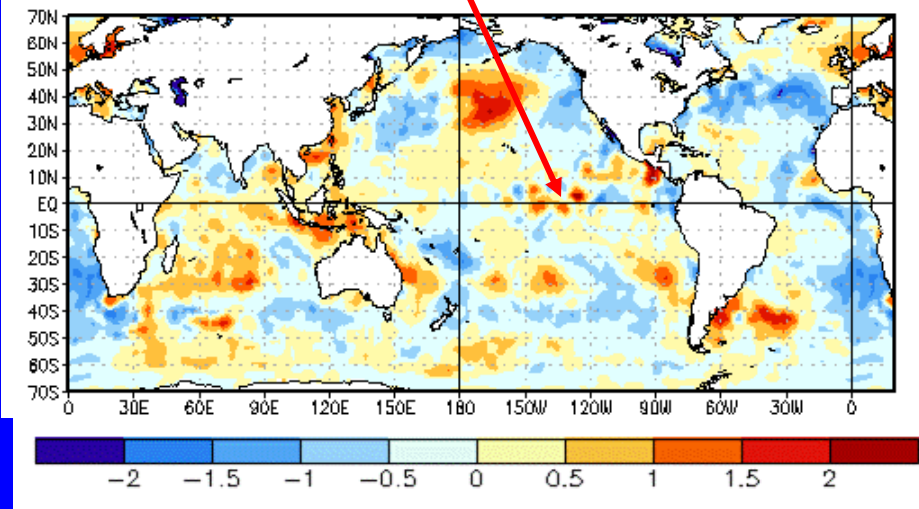
Weekly SST Anomalies (DEG C)



- During the last four weeks, equatorial SSTs were below average across most of the Pacific.

- During the last 30 days, local, rather than large-scale, changes in SST anomalies were observed across the eastern half of the equatorial Pacific.

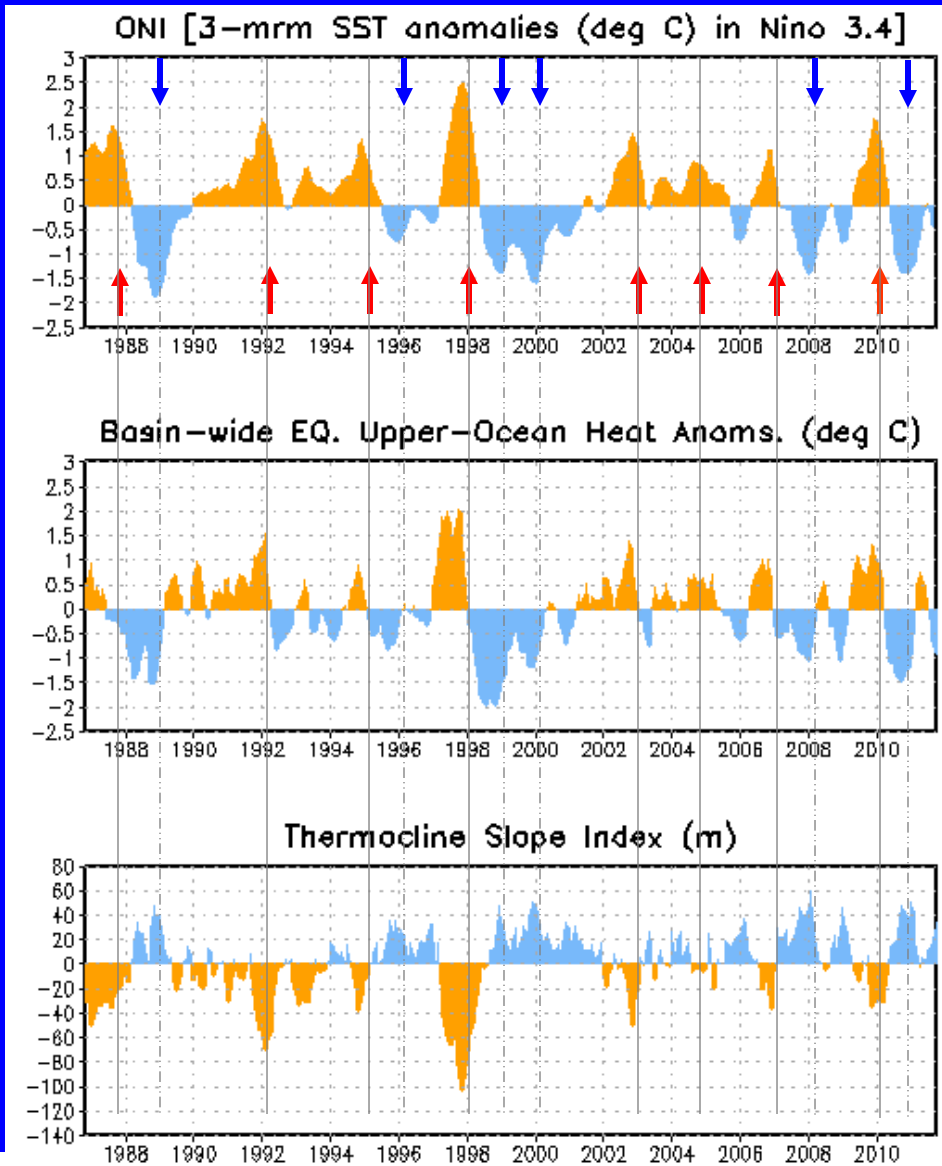
Change in Weekly SST Anoma (°C)  
23NOV2011 minus 26OCT2011





# Upper-Ocean Conditions in the Eq. Pacific

Cold Episodes ↓  
Warm Episodes ↑



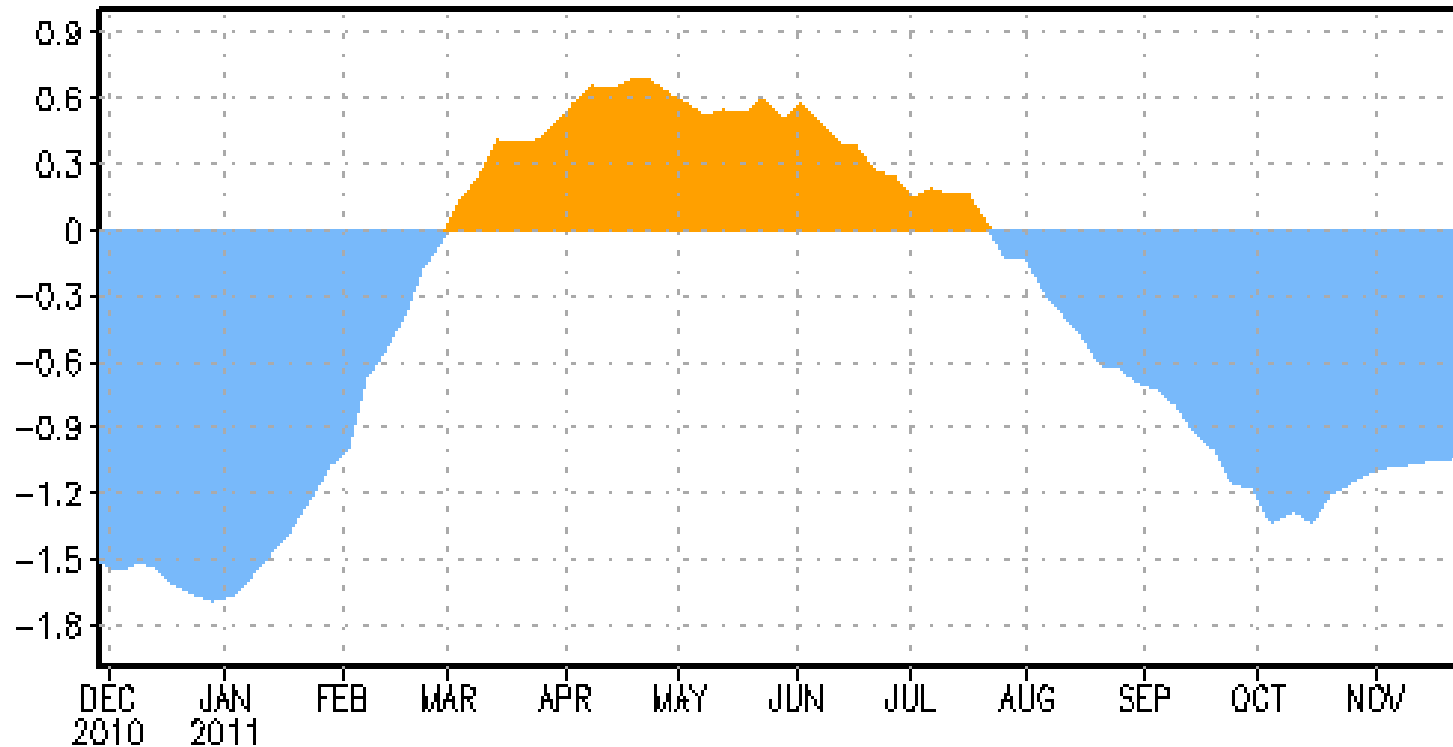
- The basin-wide equatorial upper ocean (0-300 m) heat content is **greatest** prior to and during the early stages of a Pacific **warm** (El Niño) episode (compare top 2 panels) and **least** prior to and during the early stages of a **cold** (La Niña) episode.
- The slope of the oceanic thermocline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

EQ. Upper-Ocean Heat Anoms. (deg C) for 180-100W



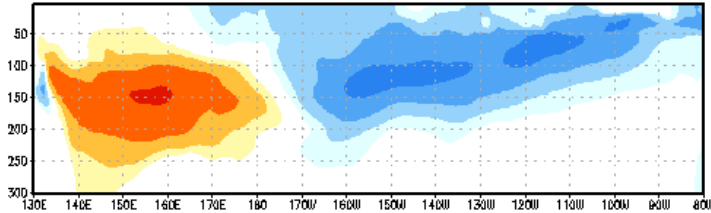
**In January 2011 the negative anomalies began to decrease in magnitude, with positive anomalies evident from March-July 2011. Temperature anomalies became negative in late July 2011 and have weakened slightly since mid-October 2011.**



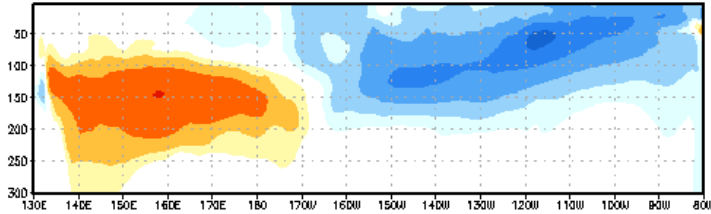
# Sub-Surface Temperature Departures (°C) in the Equatorial Pacific

EQ. Subsurface Temperature Anomalies (deg C)

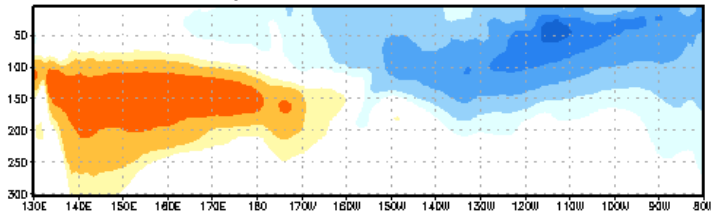
Three-pentad ave. centered on 05 OCT 2011



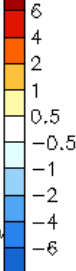
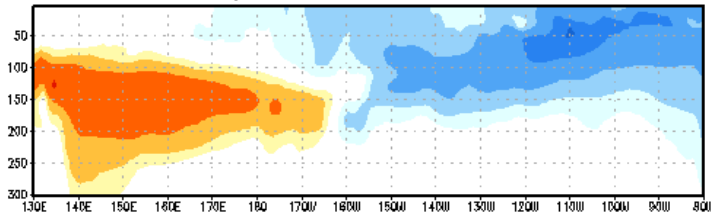
Three-pentad ave. centered on 20 OCT 2011



Three-pentad ave. centered on 04 NOV 2011



Three-pentad ave. centered on 19 NOV 2011



Time



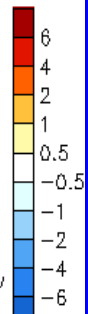
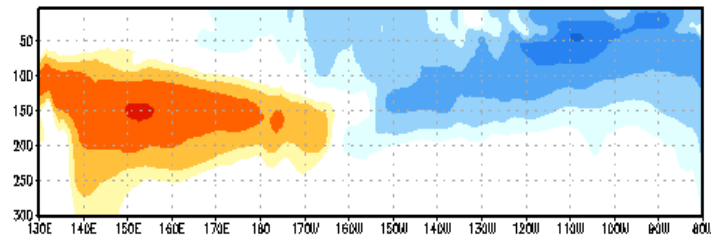
Longitude

- During the last six weeks, positive subsurface temperature anomalies (100-300m) in the western Pacific have shifted slightly eastward, while negative anomalies have been present in the eastern half of the Pacific.

- In the recent period, the positive anomalies have persisted in the western half of the Pacific, while the negative anomalies persisted in the eastern Pacific.

EQ. Subsurface Temperature Anomalies (deg C)

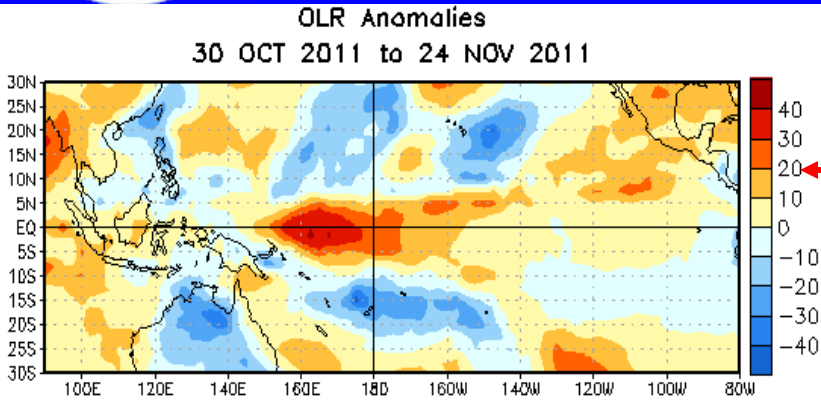
Pentad centered on 24 NOV 2011



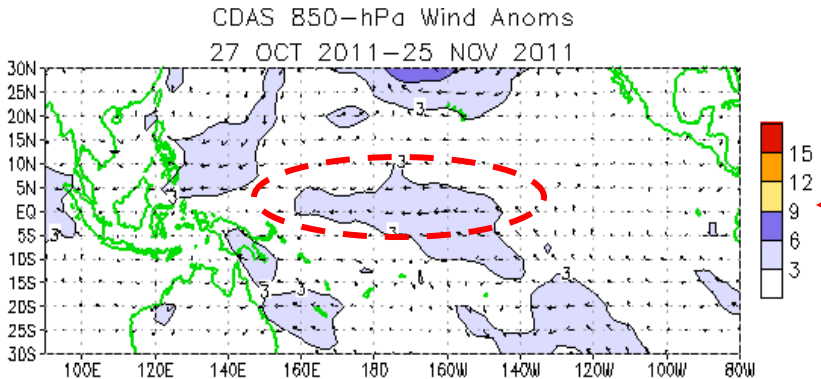
Most recent pentad analysis



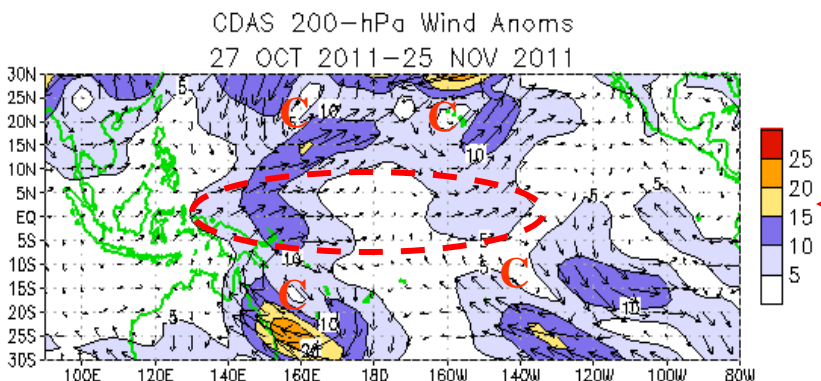
# Tropical OLR and Wind Anomalies During the Last 30 Days



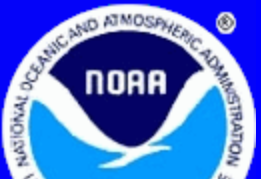
Negative OLR anomalies (enhanced convection and precipitation, blue shading) were observed over Australia and portions of Indonesia. Positive OLR anomalies (suppressed convection and precipitation, red shading) were located over the western and central tropical Pacific.



Low-level (850-hPa) easterly anomalies were observed over the central tropical Pacific.



Upper-level (200-hPa) westerly anomalies were observed over much of the tropical Pacific. Anomalous cyclonic circulation centers were present in the subtropics of both hemispheres

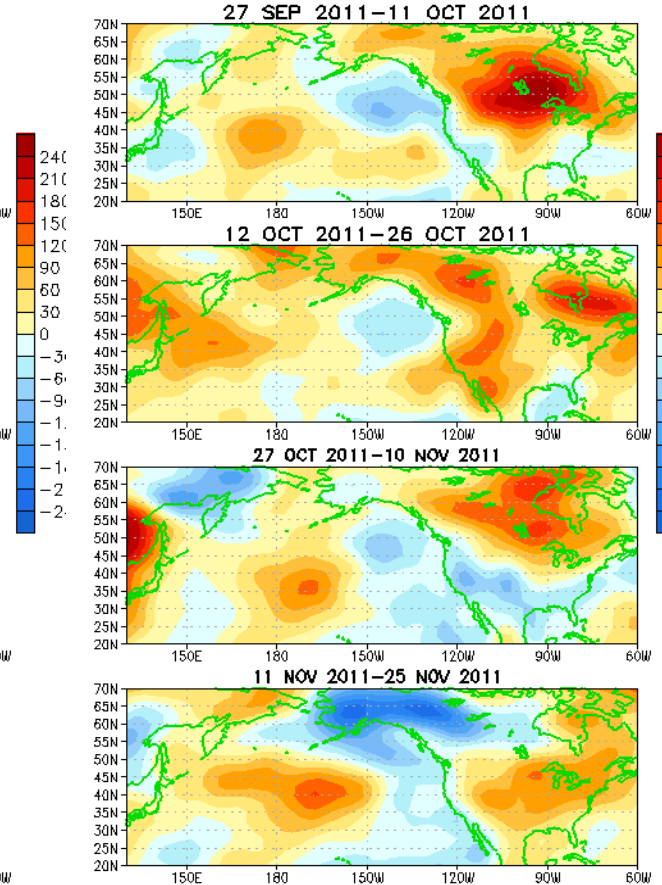
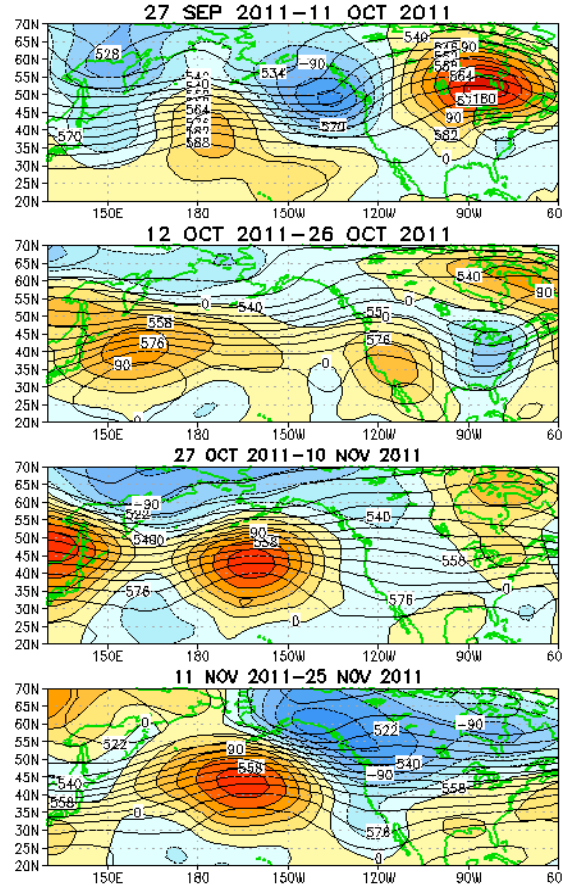
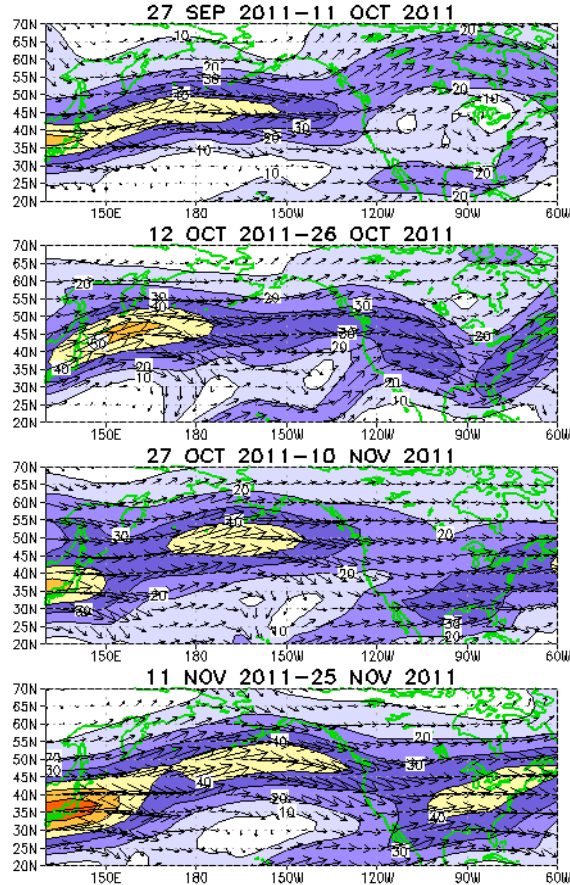


# Atmospheric Circulation over the North Pacific & North America During the Last 60 Days

## 200-hPa Wind

## 500-hPa Height & Anoms.

## 925-hPa Temp. Anoms. (°C)



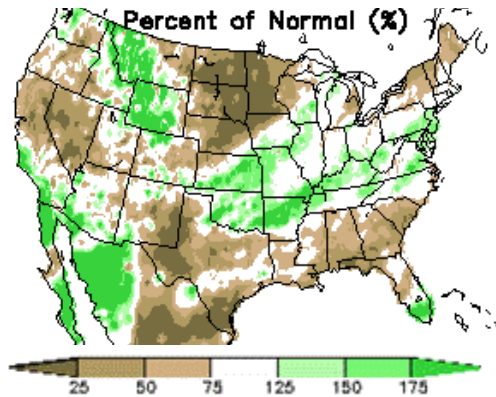
During late September through November, 500-hPa heights were predominantly above-average over the central North Pacific with downstream troughing evident over the eastern Pacific and western North America. The anomalous trough has contributed to near to below-average temperatures along the West Coast during most of the period.



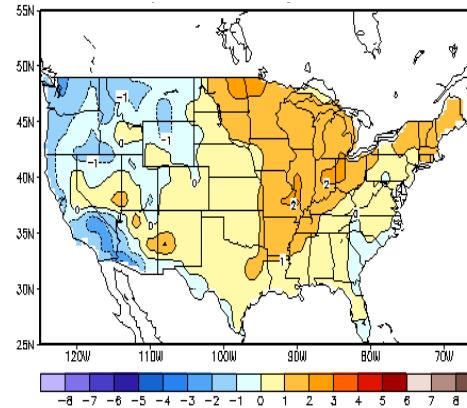
# U.S. Temperature and Precipitation Departures During the Last 30 and 90 Days

## Last 30 Days

30-day (ending 27 Nov 2011) % of average precipitation

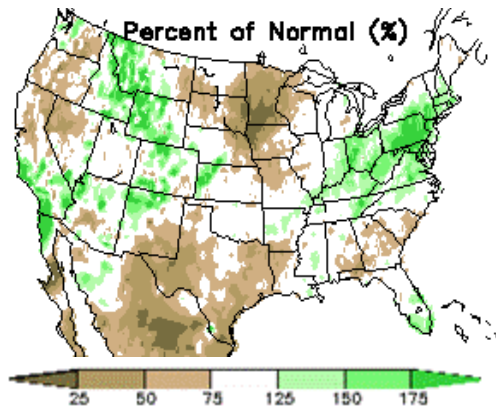


30-day (ending 26 Nov 2011)  
temperature departures (degree C)

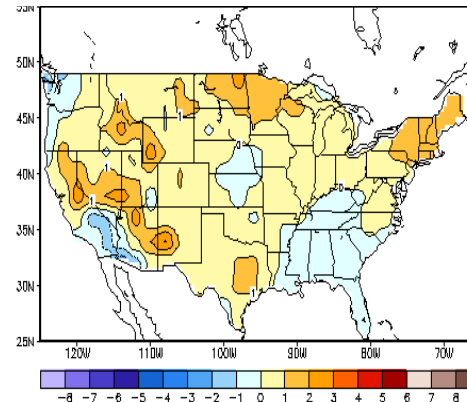


## Last 90 Days

90-day (ending 27 Nov 2011) % of average precipitation



90-day (ending 26 Nov 2011)  
temperature departures (degree C)



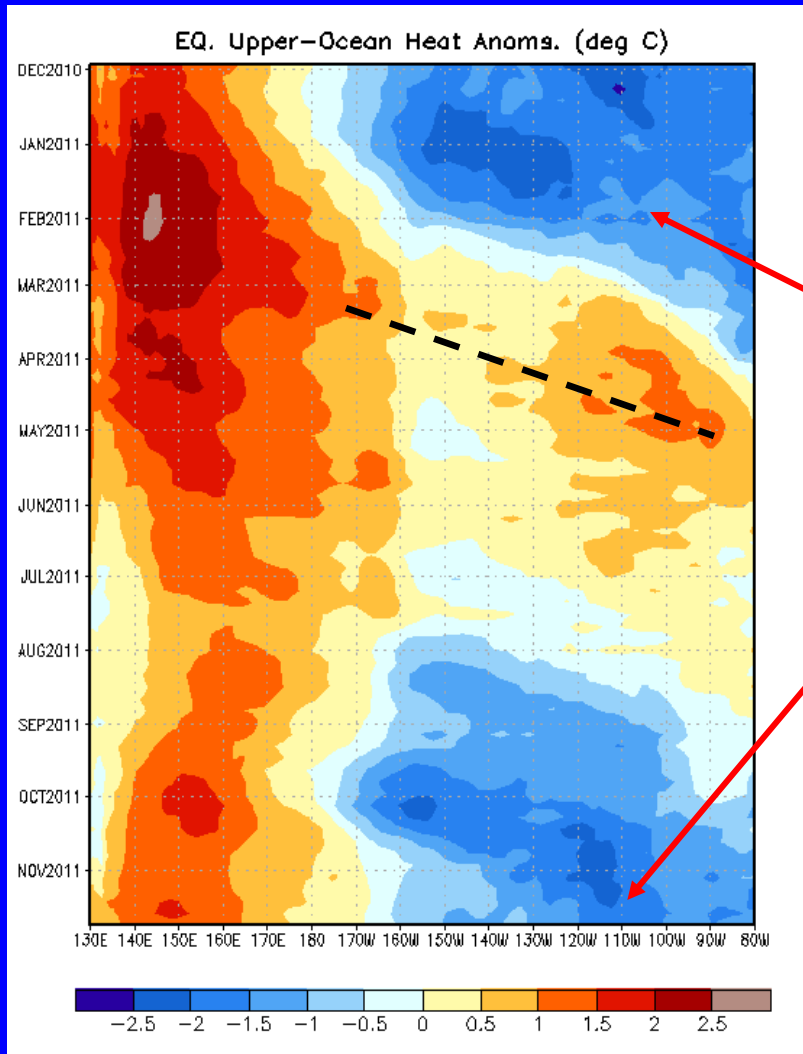


# Intraseasonal Variability

- **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.**



# Weekly Heat Content Evolution in the Equatorial Pacific



- From May 2010- January 2011, negative heat content anomalies extended across the equatorial Pacific in association with La Niña.

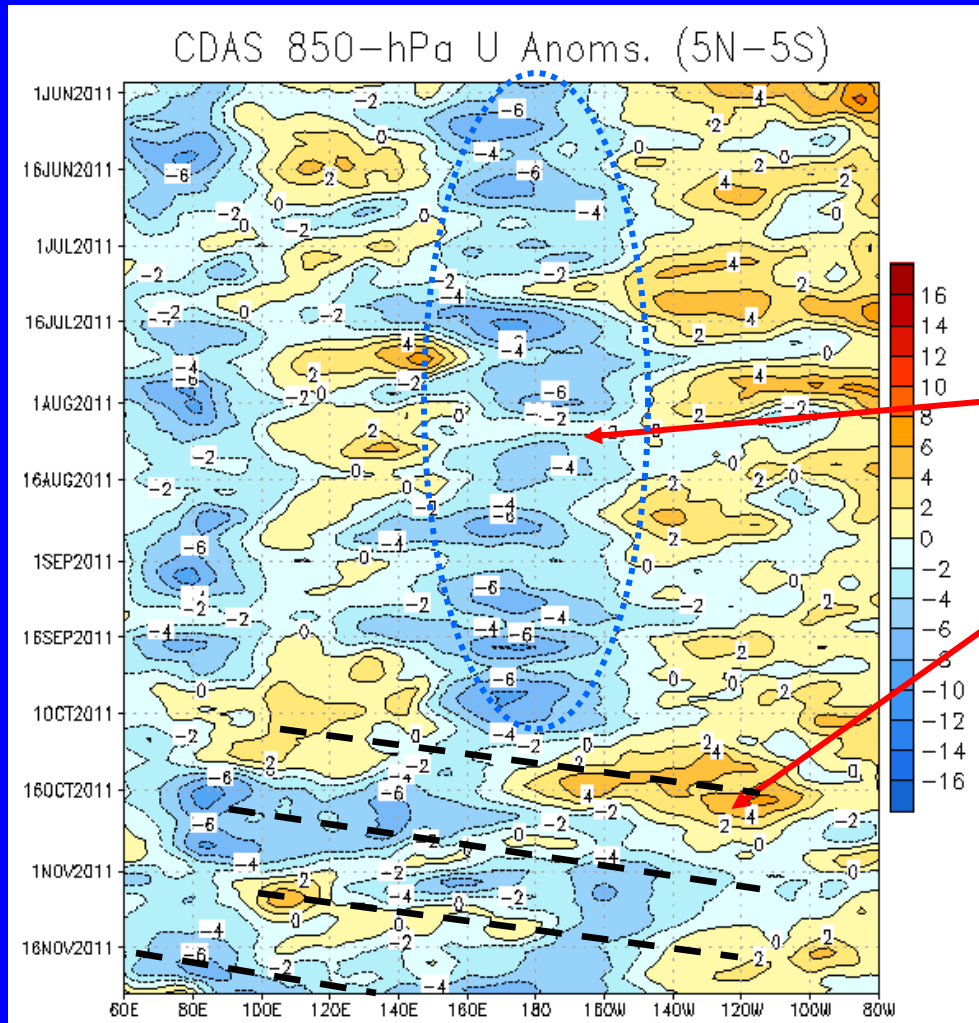
- From February-June 2011, the heat content was above-average, especially across the western Pacific.

- Since late July 2011, negative heat content anomalies have persisted in the eastern half of 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 ( $\text{m s}^{-1}$ )



**Westerly wind anomalies  
(orange/red shading).**

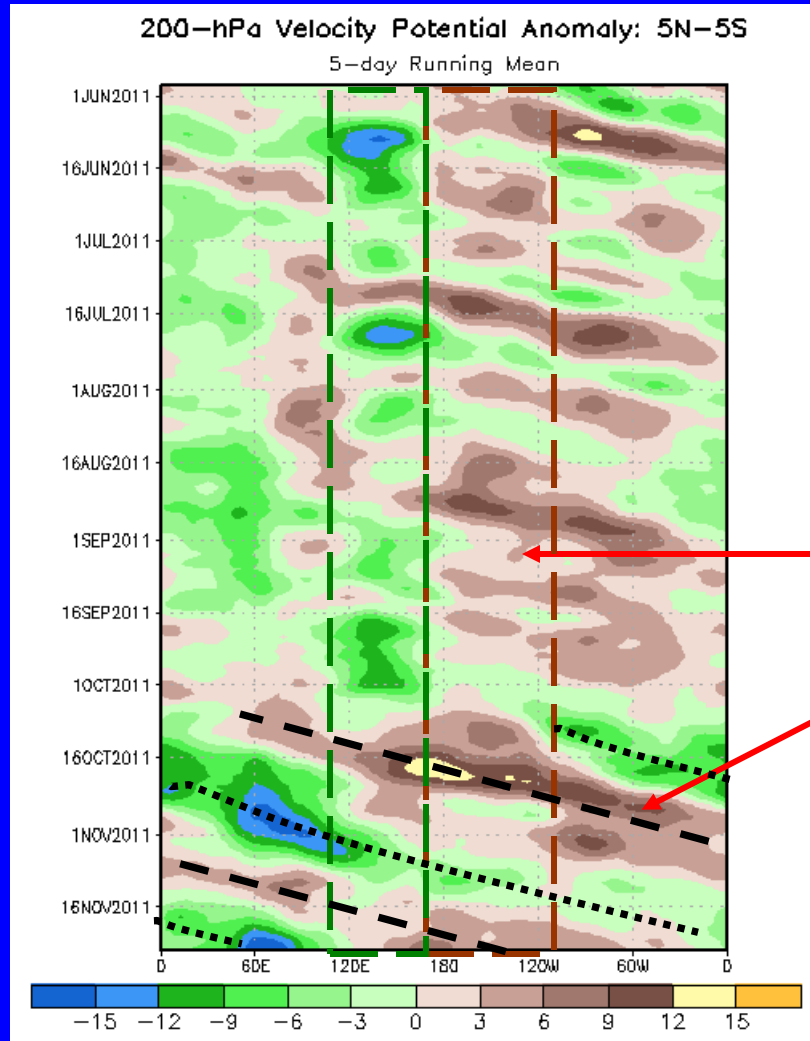
**Easterly wind anomalies (blue  
shading).**

**Between March 2010-September 2011,  
low-level easterly wind anomalies have  
persisted over the western and central  
equatorial Pacific.**

**In October- November 2011, the MJO  
contributed to an eastward shift of the  
low-level wind anomalies.**



# 200-hPa Velocity Potential Anomalies (5°N-5°S)



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

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

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

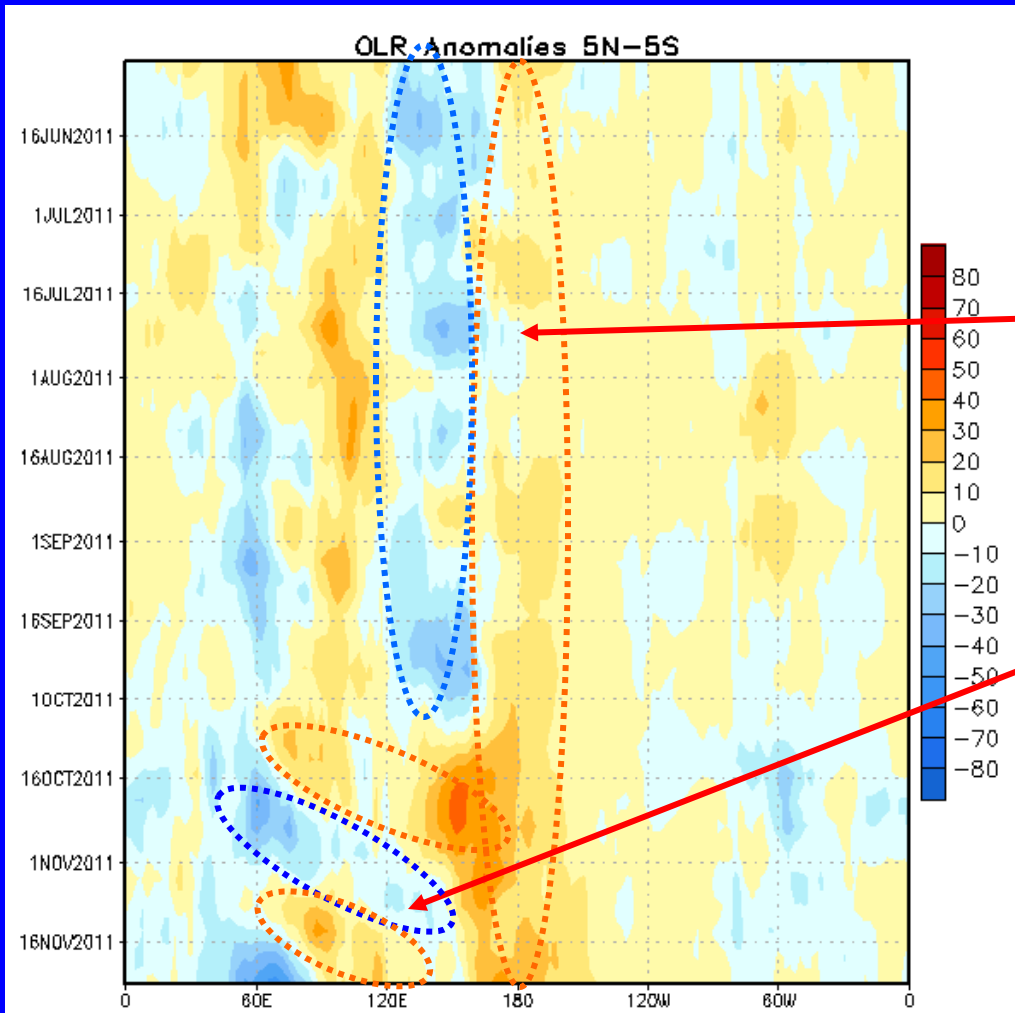
Since October 2011, the MJO has been active.

Longitude



# 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.

Recently, the variability in OLR anomalies (evident over the Indian Ocean and near the Maritime Continent and western Pacific) has been 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

El Niño: characterized by a *positive* ONI greater than or equal to  $+0.5^{\circ}\text{C}$ .

La Niña: characterized by a *negative* ONI less than or equal to  $-0.5^{\circ}\text{C}$ .

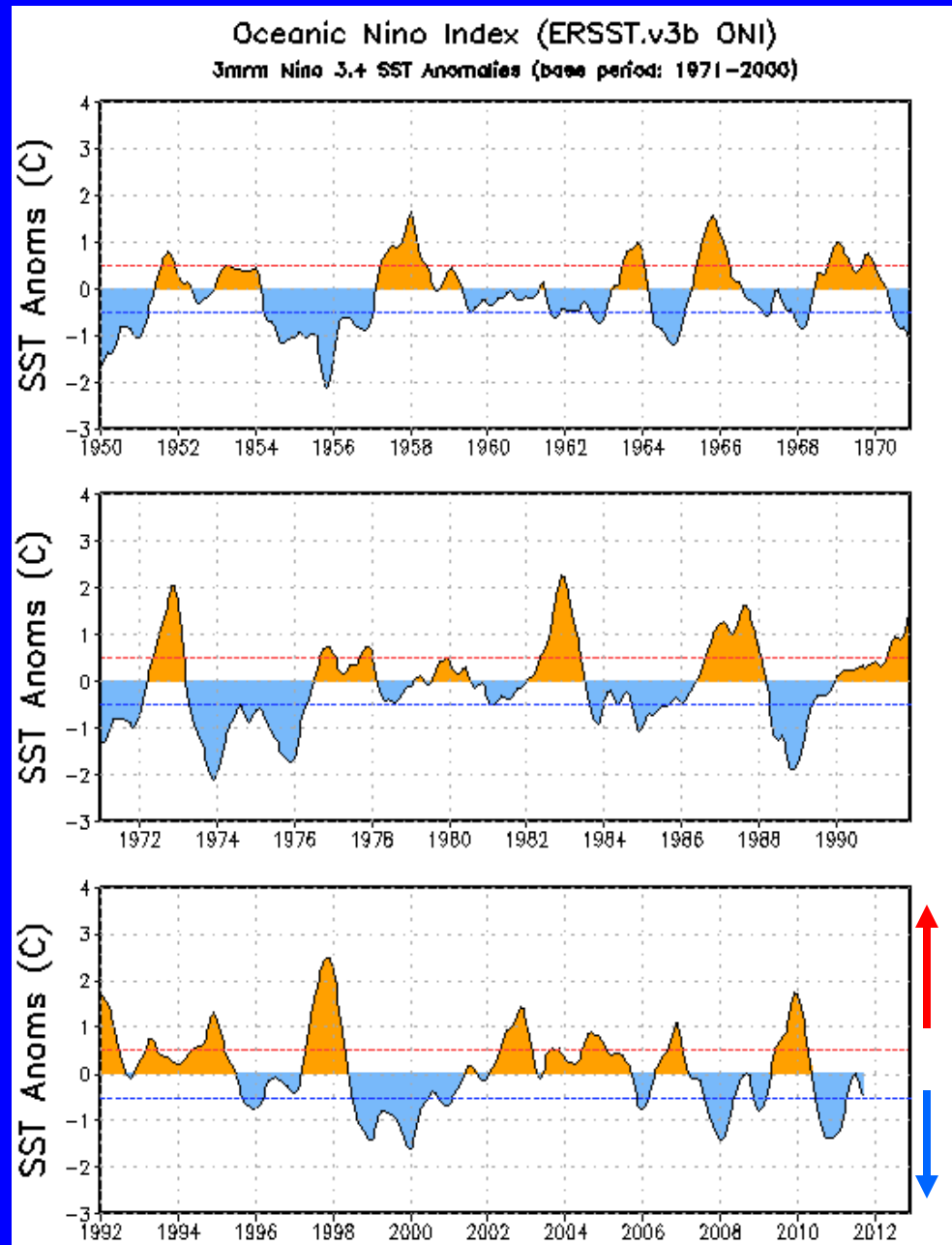
By historical standards, to be classified as a full-fledged El Niño or La Niña episode, these thresholds must be exceeded for a period of at least 5 consecutive overlapping 3-month seasons.

*CPC considers El Niño or La Niña conditions to occur when the monthly Niño3.4 OISST departures meet or exceed  $\pm 0.5^{\circ}\text{C}$  along with consistent atmospheric features. These anomalies must also be forecasted to persist for 3 consecutive months.*



# ONI (°C): Evolution since 1950

The most recent ONI value (August – October 2011) is  $-0.4^{\circ}\text{C}$ .





# Historical El Niño and La Niña Episodes

## Based on the ONI computed using ERSST.v3b

Highest		Lowest	
<u>El Niño</u>	<u>ONI Value</u>	<u>La Nina</u>	<u>ONI Value</u>
JAS 1951 - NDJ 1951/52	0.8	ASO 1949 – FMA 1951	-1.7
MAM 1957 – MJJ 1958	1.7	MAM 1954 – DJF 1956/57	-2.1
JJA 1963 – DJF 1963/64	1.0	ASO 1962 – DJF 1962/63	-0.8
MJJ 1965 – MAM 1966	1.6	MAM 1964 – DJF 1964/65	-1.1
OND 1968 – MJJ 1969	1.0	NDJ 1967/68 – MAM 1968	-0.9
ASO 1969 – DJF 1969/70	0.8	JJA 1970 – DJF 1971/72	-1.3
AMJ 1972 – FMA 1973	2.1	AMJ 1973 – MAM 1976	-2.0
ASO 1976 – JFM 1977	0.8	SON 1984 – ASO 1985	-1.0
ASO 1977 - DJF 1977/78	0.8	AMJ 1988 – AMJ 1989	-1.9
AMJ 1982 – MJJ 1983	2.3	ASO 1995 – FMA 1996	-0.7
JAS 1986 – JFM 1988	1.6	JJA 1998 – MJJ 2000	-1.6
AMJ 1991 – JJA 1992	1.8	SON 2000 – JFM 2001	-0.7
AMJ 1994 – FMA 1995	1.3	ASO 2007 – AMJ 2008	-1.4
AMJ 1997 – AMJ 1998	2.5	JJA 2010 – MAM 2011	-1.4
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		

**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).



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
1950	<b>-1.7</b>	<b>-1.5</b>	<b>-1.3</b>	<b>-1.4</b>	<b>-1.3</b>	<b>-1.1</b>	<b>-0.8</b>	<b>-0.8</b>	<b>-0.8</b>	<b>-0.9</b>	<b>-0.9</b>	<b>-1.0</b>
1951	<b>-1.0</b>	<b>-0.9</b>	<b>-0.6</b>	-0.3	-0.2	0.2	0.4	<b>0.7</b>	<b>0.7</b>	<b>0.8</b>	<b>0.7</b>	<b>0.6</b>
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	<b>-0.5</b>	<b>-0.7</b>	<b>-0.7</b>	<b>-0.8</b>	<b>-1.0</b>	<b>-1.2</b>	<b>-1.1</b>	<b>-1.1</b>	<b>-1.1</b>
1955	<b>-1.0</b>	<b>-0.9</b>	<b>-0.9</b>	<b>-1.0</b>	<b>-1.0</b>	<b>-1.0</b>	<b>-1.0</b>	<b>-1.0</b>	<b>-1.4</b>	<b>-1.8</b>	<b>-2.0</b>	<b>-1.9</b>
1956	<b>-1.3</b>	<b>-0.9</b>	<b>-0.7</b>	<b>-0.6</b>	<b>-0.6</b>	<b>-0.6</b>	<b>-0.7</b>	<b>-0.8</b>	<b>-0.8</b>	<b>-0.9</b>	<b>-0.9</b>	<b>-0.8</b>
1957	<b>-0.5</b>	-0.1	0.3	<b>0.6</b>	<b>0.7</b>	<b>0.9</b>	<b>0.9</b>	<b>0.9</b>	<b>0.9</b>	<b>1.0</b>	<b>1.2</b>	<b>1.5</b>
1958	<b>1.7</b>	<b>1.5</b>	<b>1.2</b>	<b>0.8</b>	<b>0.6</b>	<b>0.5</b>	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	<b>-0.5</b>	<b>-0.6</b>	<b>-0.7</b>	<b>-0.7</b>
1963	<b>-0.6</b>	-0.3	0.0	0.1	0.1	0.3	<b>0.6</b>	<b>0.8</b>	<b>0.9</b>	<b>0.9</b>	<b>1.0</b>	<b>1.0</b>
1964	<b>0.8</b>	0.4	-0.1	<b>-0.5</b>	<b>-0.8</b>	<b>-0.8</b>	<b>-0.9</b>	<b>-1.0</b>	<b>-1.1</b>	<b>-1.2</b>	<b>-1.2</b>	<b>-1.0</b>
1965	<b>-0.8</b>	-0.4	-0.2	0.0	0.3	<b>0.6</b>	<b>1.0</b>	<b>1.2</b>	<b>1.4</b>	<b>1.5</b>	<b>1.6</b>	<b>1.5</b>
1966	<b>1.2</b>	<b>1.0</b>	<b>0.8</b>	<b>0.5</b>	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	<b>-0.5</b>
1968	<b>-0.7</b>	<b>-0.9</b>	<b>-0.8</b>	<b>-0.7</b>	-0.3	0.0	0.3	0.4	0.3	0.4	<b>0.7</b>	<b>0.9</b>
1969	<b>1.0</b>	<b>1.0</b>	<b>0.9</b>	<b>0.7</b>	<b>0.6</b>	<b>0.5</b>	0.4	0.4	<b>0.6</b>	<b>0.7</b>	<b>0.8</b>	<b>0.7</b>
1970	<b>0.5</b>	0.3	0.2	0.1	0.0	-0.3	<b>-0.6</b>	<b>-0.8</b>	<b>-0.9</b>	<b>-0.8</b>	<b>-0.9</b>	<b>-1.1</b>
1971	<b>-1.3</b>	<b>-1.3</b>	<b>-1.1</b>	<b>-0.9</b>	<b>-0.8</b>	<b>-0.8</b>	<b>-0.8</b>	<b>-0.8</b>	<b>-0.8</b>	<b>-0.9</b>	<b>-1.0</b>	<b>-0.9</b>
1972	<b>-0.7</b>	-0.4	0.0	0.2	<b>0.5</b>	<b>0.8</b>	<b>1.0</b>	<b>1.3</b>	<b>1.5</b>	<b>1.8</b>	<b>2.0</b>	<b>2.1</b>
1973	<b>1.8</b>	<b>1.2</b>	<b>0.5</b>	-0.1	<b>-0.6</b>	<b>-0.9</b>	<b>-1.1</b>	<b>-1.3</b>	<b>-1.4</b>	<b>-1.7</b>	<b>-2.0</b>	<b>-2.1</b>
1974	<b>-1.9</b>	<b>-1.7</b>	<b>-1.3</b>	<b>-1.1</b>	<b>-0.9</b>	<b>-0.8</b>	<b>-0.6</b>	<b>-0.5</b>	<b>-0.5</b>	<b>-0.7</b>	<b>-0.9</b>	<b>-0.7</b>
1975	<b>-0.6</b>	<b>-0.6</b>	<b>-0.7</b>	<b>-0.8</b>	<b>-0.9</b>	<b>-1.1</b>	<b>-1.2</b>	<b>-1.3</b>	<b>-1.5</b>	<b>-1.6</b>	<b>-1.7</b>	<b>-1.7</b>



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
1976	<b>-1.6</b>	<b>-1.2</b>	<b>-0.8</b>	<b>-0.6</b>	<b>-0.5</b>	-0.2	0.1	0.3	<b>0.5</b>	<b>0.7</b>	<b>0.8</b>	<b>0.7</b>
1977	<b>0.6</b>	<b>0.5</b>	0.2	0.2	0.2	0.4	0.4	0.4	<b>0.5</b>	<b>0.6</b>	<b>0.7</b>	<b>0.7</b>
1978	<b>0.7</b>	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	<b>0.6</b>	<b>0.7</b>	<b>0.7</b>	<b>1.0</b>	<b>1.5</b>	<b>1.9</b>	<b>2.2</b>	<b>2.3</b>
1983	<b>2.3</b>	<b>2.0</b>	<b>1.5</b>	<b>1.2</b>	<b>1.0</b>	<b>0.6</b>	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	<b>-0.6</b>	<b>-0.9</b>	<b>-1.1</b>
1985	<b>-0.9</b>	<b>-0.8</b>	<b>-0.7</b>	<b>-0.7</b>	<b>-0.7</b>	<b>-0.6</b>	<b>-0.5</b>	<b>-0.5</b>	<b>-0.5</b>	-0.4	-0.3	-0.4
1986	-0.5	-0.4	-0.2	-0.2	-0.1	0.0	0.3	<b>0.5</b>	<b>0.7</b>	<b>0.9</b>	<b>1.1</b>	<b>1.2</b>
1987	<b>1.2</b>	<b>1.3</b>	<b>1.2</b>	<b>1.1</b>	<b>1.0</b>	<b>1.2</b>	<b>1.4</b>	<b>1.6</b>	<b>1.6</b>	<b>1.5</b>	<b>1.3</b>	<b>1.1</b>
1988	<b>0.7</b>	<b>0.5</b>	0.1	-0.2	<b>-0.7</b>	<b>-1.2</b>	<b>-1.3</b>	<b>-1.2</b>	<b>-1.3</b>	<b>-1.6</b>	<b>-1.9</b>	<b>-1.9</b>
1989	<b>-1.7</b>	<b>-1.5</b>	<b>-1.1</b>	<b>-0.8</b>	<b>-0.6</b>	-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	<b>0.6</b>	<b>0.8</b>	<b>1.0</b>	<b>0.9</b>	<b>0.9</b>	<b>1.0</b>	<b>1.4</b>	<b>1.6</b>
1992	<b>1.8</b>	<b>1.6</b>	<b>1.5</b>	<b>1.4</b>	<b>1.2</b>	<b>0.8</b>	<b>0.5</b>	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	<b>0.5</b>	<b>0.5</b>	<b>0.6</b>	<b>0.6</b>	<b>0.7</b>	<b>0.9</b>	<b>1.2</b>	<b>1.3</b>
1995	<b>1.2</b>	<b>0.9</b>	<b>0.7</b>	0.4	0.3	0.2	0.0	-0.2	<b>-0.5</b>	<b>-0.6</b>	<b>-0.7</b>	<b>-0.7</b>
1996	<b>-0.7</b>	<b>-0.7</b>	<b>-0.5</b>	-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	<b>0.8</b>	<b>1.3</b>	<b>1.7</b>	<b>2.0</b>	<b>2.2</b>	<b>2.4</b>	<b>2.5</b>	<b>2.5</b>
1998	<b>2.3</b>	<b>1.9</b>	<b>1.5</b>	<b>1.0</b>	<b>0.5</b>	0.0	<b>-0.5</b>	<b>-0.8</b>	<b>-1.0</b>	<b>-1.1</b>	<b>-1.3</b>	<b>-1.4</b>
1999	<b>-1.4</b>	<b>-1.2</b>	<b>-0.9</b>	<b>-0.8</b>	<b>-0.8</b>	<b>-0.8</b>	<b>-0.9</b>	<b>-0.9</b>	<b>-1.0</b>	<b>-1.1</b>	<b>-1.3</b>	<b>-1.6</b>
2000	<b>-1.6</b>	<b>-1.4</b>	<b>-1.0</b>	<b>-0.8</b>	<b>-0.6</b>	<b>-0.5</b>	-0.4	-0.4	-0.4	<b>-0.5</b>	<b>-0.6</b>	<b>-0.7</b>
2001	<b>-0.6</b>	<b>-0.5</b>	-0.4	-0.2	-0.1	0.1	0.2	0.2	0.1	0.0	-0.1	-0.1





# Pacific Niño 3.4 SST Outlook

- The majority of ENSO models predict the continuation of La Niña at least through the Northern Hemisphere winter (Niño-3.4 SST anomalies less than  $-0.5^{\circ}\text{C}$ ).

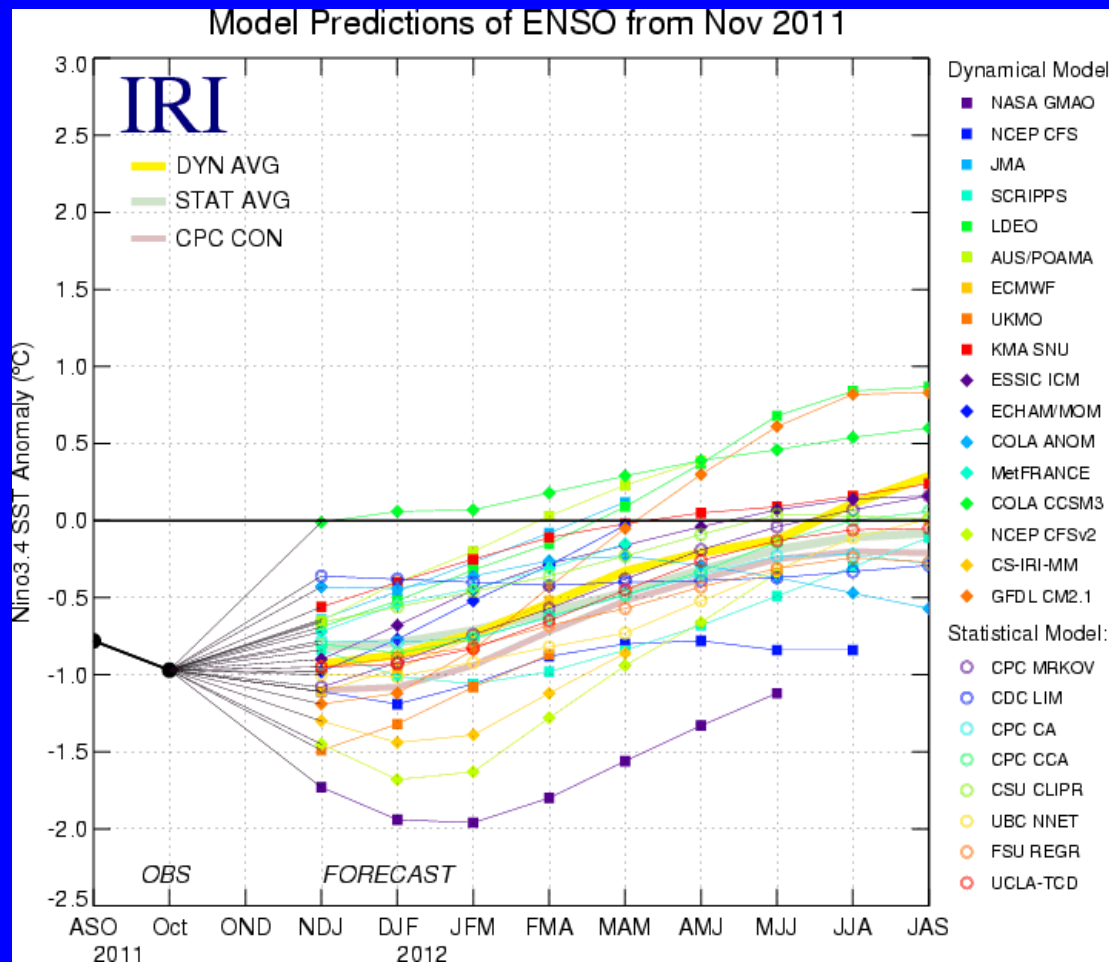
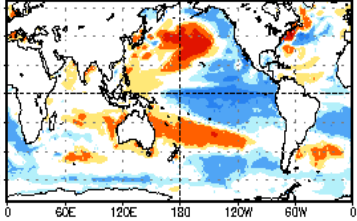


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 15 November 2011).

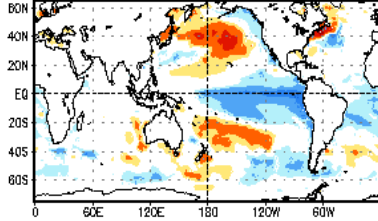


# SST Outlook: NCEP CFS.v1 Forecast Issued 27 November 2011

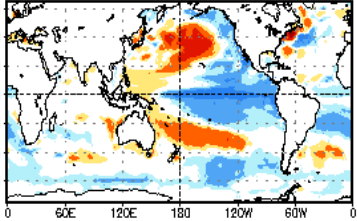
Dec-Jan-Feb 2011/2012



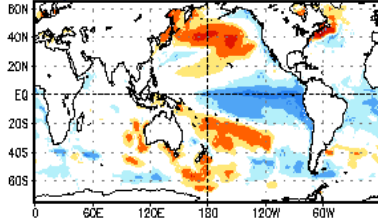
Apr-May-Jun 2012



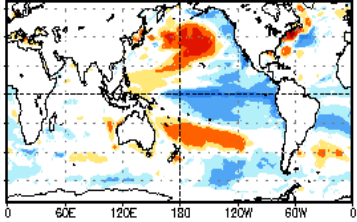
Jan-Feb-Mar 2012



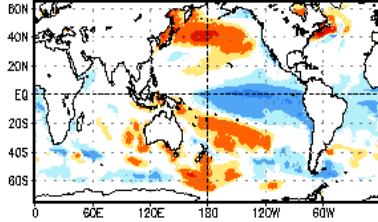
May-Jun-Jul 2012



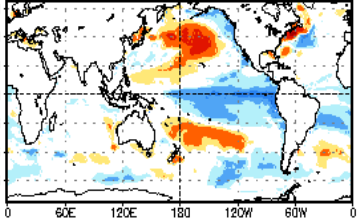
Feb-Mar-Apr 2012



Jun-Jul-Aug 2012

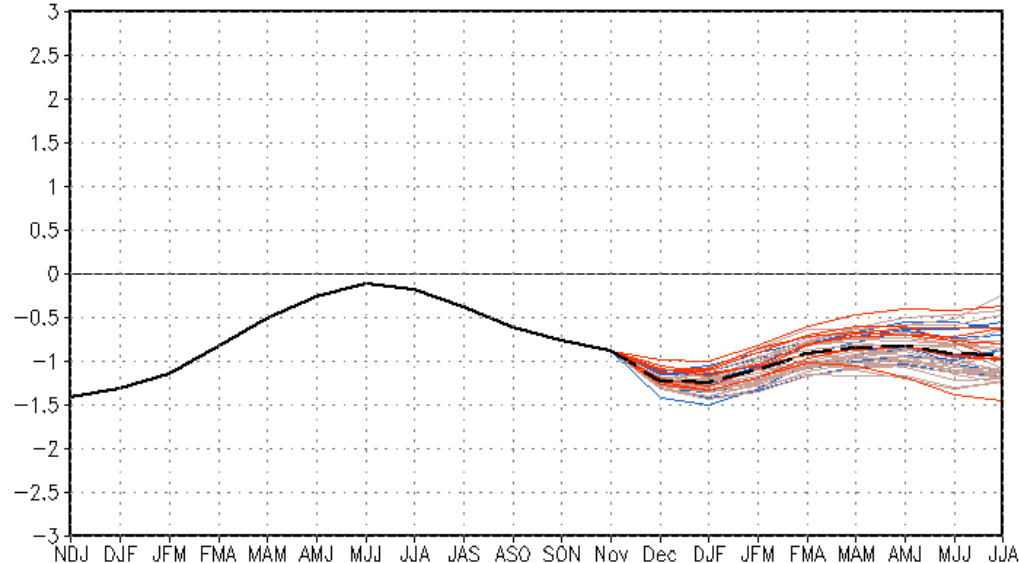


Mar-Apr-May 2012



The CFS.v1 ensemble mean (black dashed line) predicts La Niña conditions to strengthen and continue through the Northern Hemisphere spring 2012.

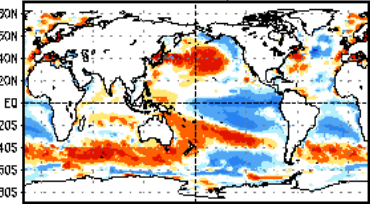
PDF corrected CFS forecast Nino3.4 SST anomalies (K)



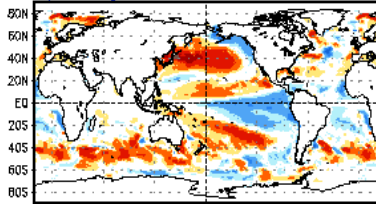


# SST Outlook: NCEP CFS.v2 Forecast Issued 28 November 2011

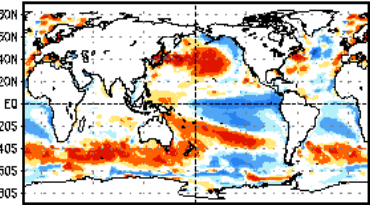
Dec-Jan-Feb 2011/2012



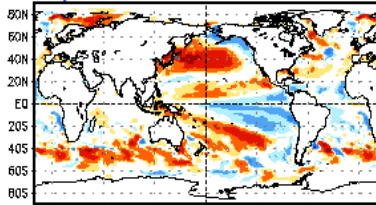
Apr-May-Jun 2012



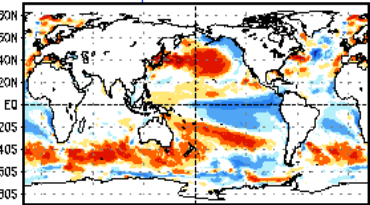
Jan-Feb-Mar 2012



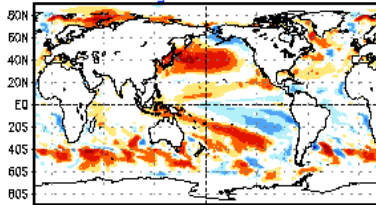
May-Jun-Jul 2012



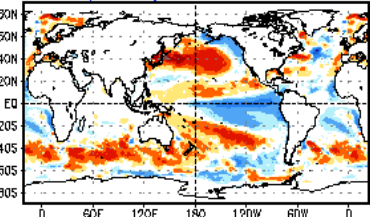
Feb-Mar-Apr 2012



Jun-Jul-Aug 2012

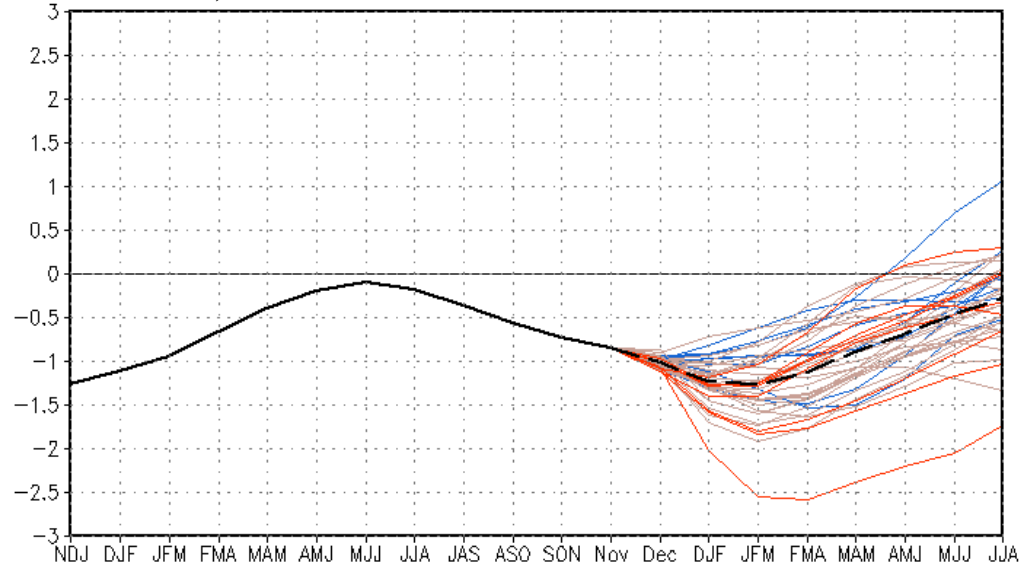


Mar-Apr-May 2012



The CFS.v2 ensemble mean (black dashed line) predicts La Niña conditions to strengthen and continue through the Northern Hemisphere spring 2012.

(not PDF corrected) CFSv2 forecast Nino3.4 SST anomalies (K)



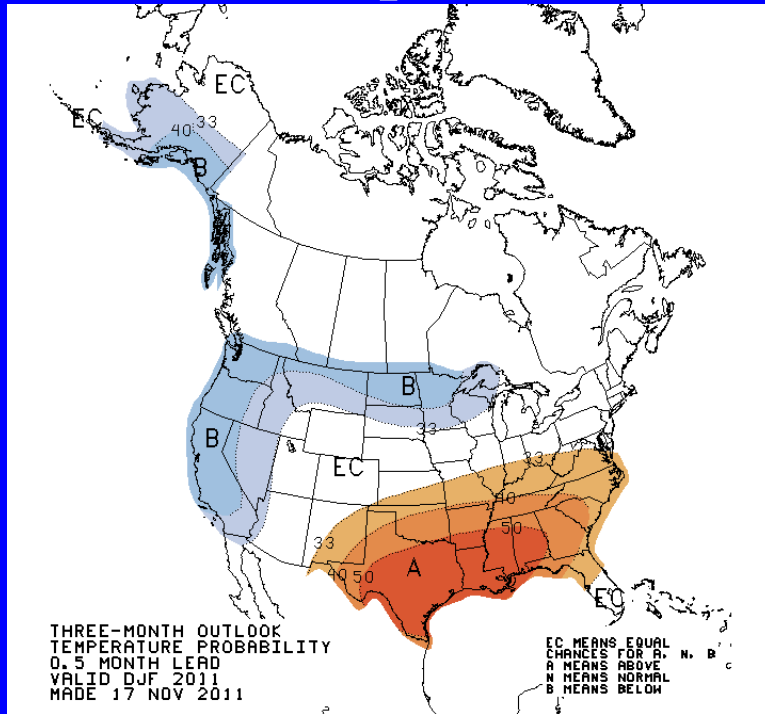
CFS.v2 is now operational. More information on version 2 is available at  
<http://cfs.ncep.noaa.gov/cfsv2/docs.html>



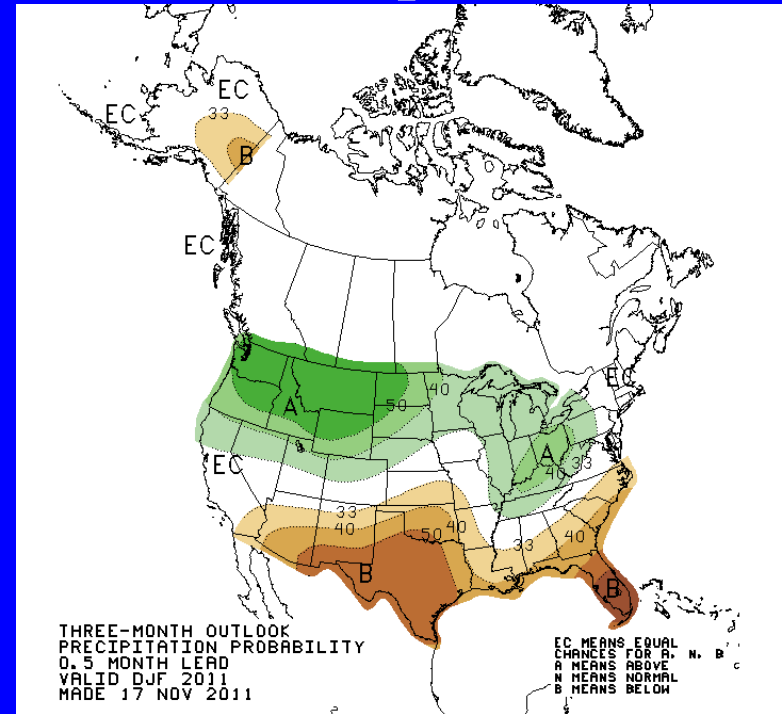
# U. S. Seasonal Outlooks

## December 2011 – February 2012

### Temperature



### Precipitation



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



# Summary

- **La Niña conditions are present across the equatorial Pacific.\***
- **Sea surface temperatures (SST) were at least 0.5°C below average across much of the central and eastern equatorial Pacific Ocean.**
- **Atmospheric circulation anomalies are consistent with La Niña.**
- **La Niña is expected to continue through the Northern Hemisphere winter 2011-12.\***

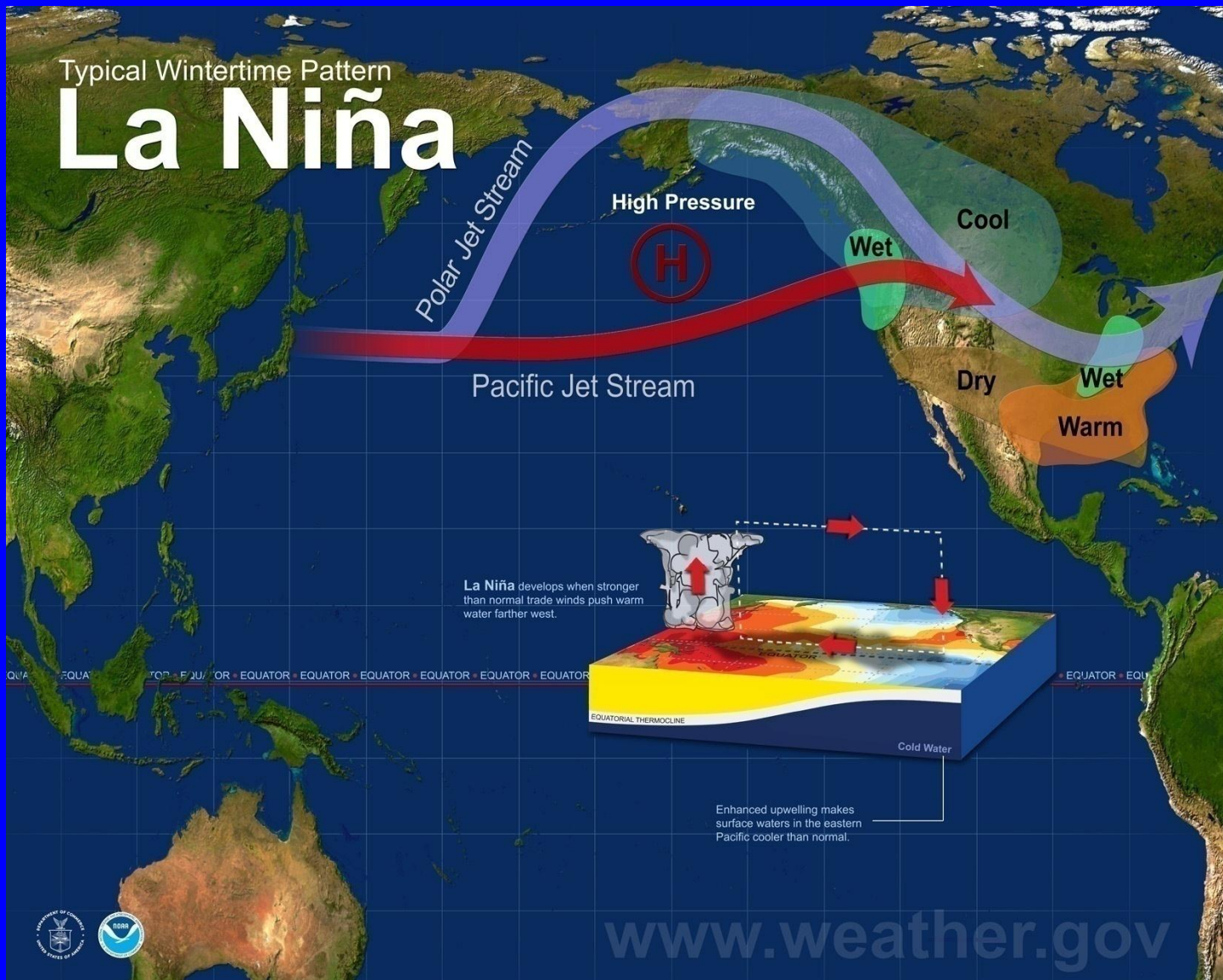
\* Note: These statements are updated once a month in association with the ENSO Diagnostics Discussion:  
[http://www.cpc.ncep.noaa.gov/products/analysis\\_monitoring/enso\\_advisory](http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory)



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

Typical Wintertime Pattern

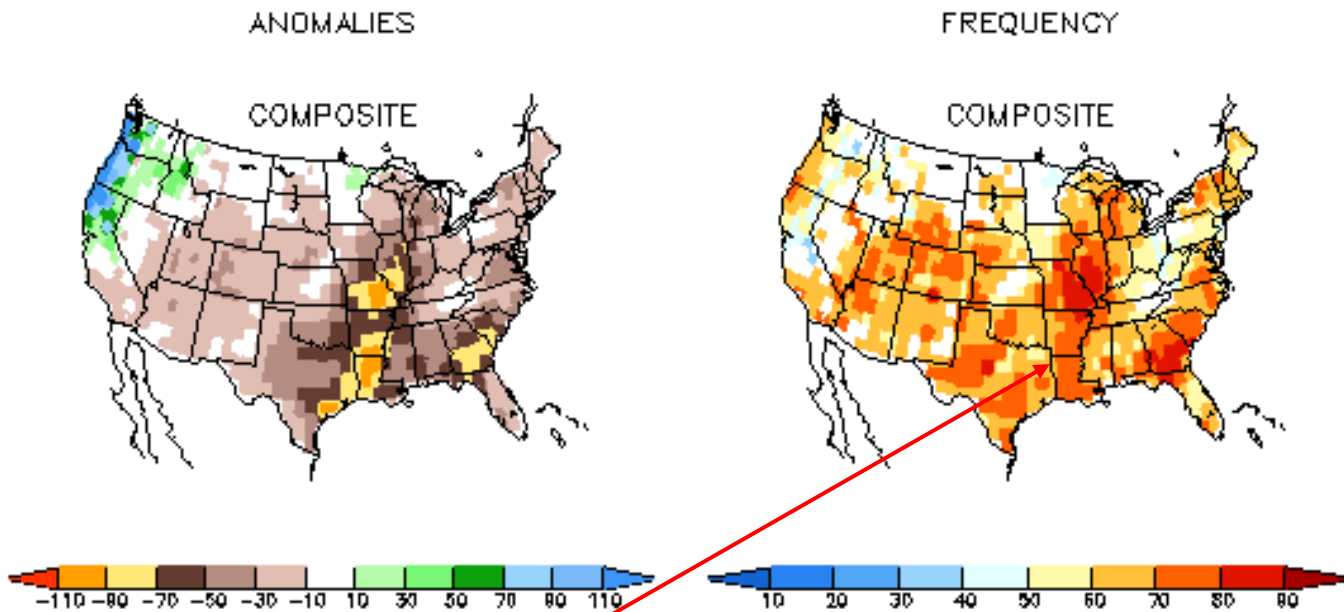
## La Niña





# U.S. Precipitation Departures (mm) and Frequency of Occurrence (%) for La Niña during Oct.-Dec.

OND LA NINA PRECIPITATION ANOMALIES (MM)  
AND FREQUENCY OF OCCURRENCE (%)



(19 CASES: 1950 1954 1955 1956 1962 1964 1970 1971 1973 1974 1975 1984 1988 1995 1998  
1999 2000 2007 2010)

**FREQUENCY** (right panel) indicates the percentage of La Niña years that the indicated departure (left panel) occurred. For example, below-average seasonal precipitation over the Mississippi Valley occurred in 70%-80% of the La Niña years.



# U.S. Temperature Departures (°C) and Frequency of Occurrence (%) for La Niña during Oct.-Dec.

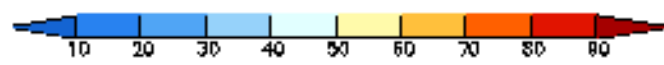
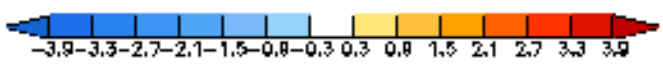
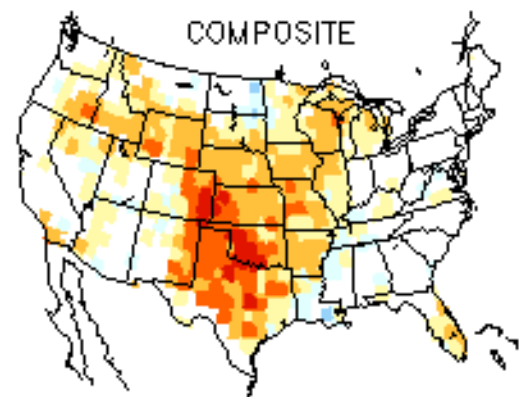
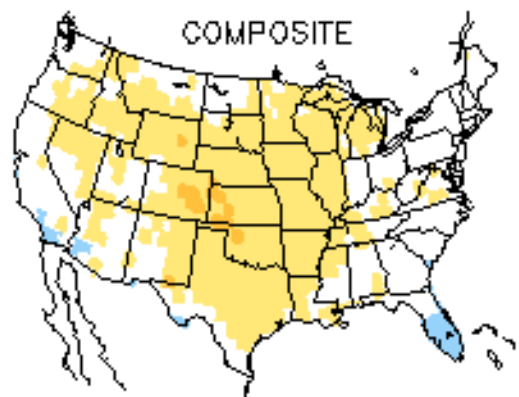
OND LA NINA TEMPERATURE ANOMALIES (C)  
AND FREQUENCY OF OCCURRENCE (%)

ANOMALIES

FREQUENCY

COMPOSITE

COMPOSITE



(19 CASES: 1950 1954 1955 1956 1962 1964 1970 1971 1973 1974 1975 1984 1988 1995 1998  
1999 2000 2007 2010)



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

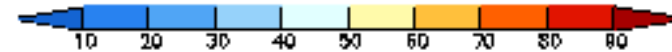
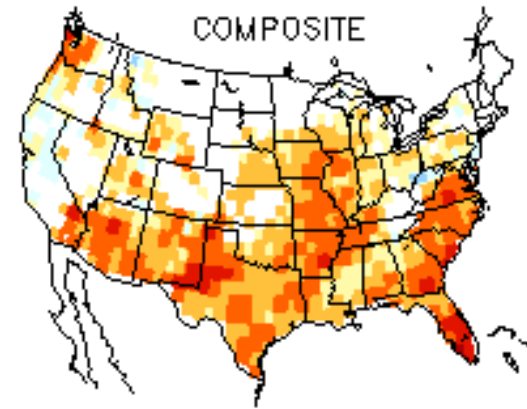
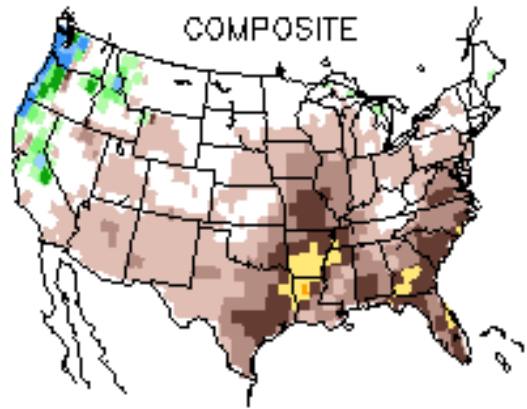
NDJ LA NINA PRECIPITATION ANOMALIES (MM)  
AND FREQUENCY OF OCCURRENCE (%)

ANOMALIES

FREQUENCY

COMPOSITE

COMPOSITE



(19 CASES: 1950 1954 1955 1956 1962 1964 1967 1970 1971 1973 1974 1975 1984 1988 1995  
1998 1999 2000 2007)



# U.S. Temperature Departures ( $^{\circ}\text{C}$ ) and Frequency of Occurrence (%) for La Niña during Nov.-Jan.

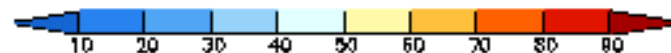
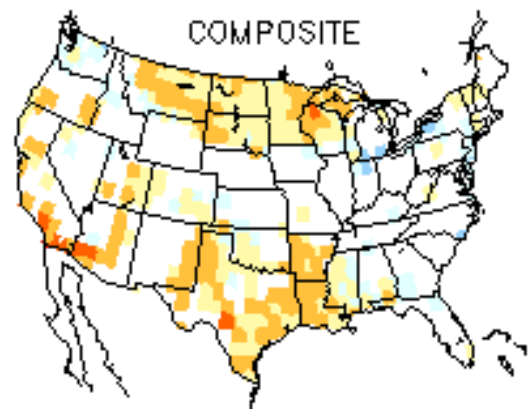
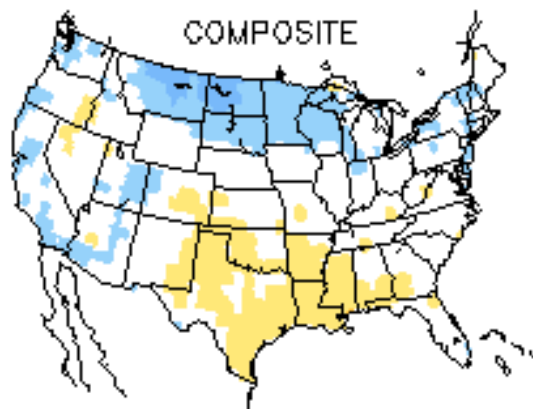
NDJ LA NINA TEMPERATURE ANOMALIES ( $^{\circ}\text{C}$ )  
AND FREQUENCY OF OCCURRENCE (%)

ANOMALIES

FREQUENCY

COMPOSITE

COMPOSITE



(19 CASES: 1950 1954 1955 1956 1962 1964 1967 1970 1971 1973 1974 1975 1984 1988 1995  
1998 1999 2000 2007)



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

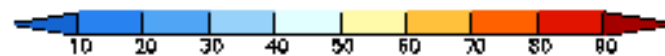
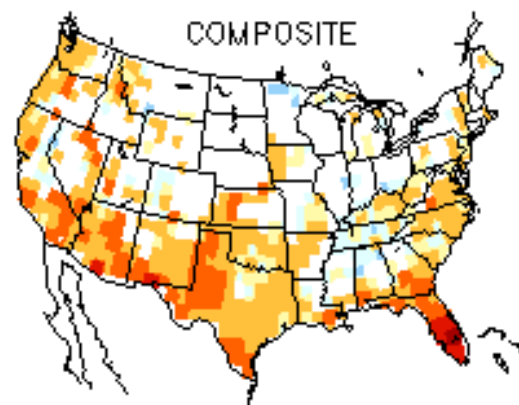
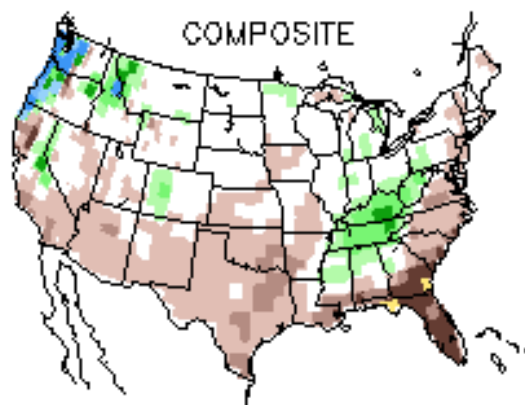
DJF LA NINA PRECIPITATION ANOMALIES (MM)  
AND FREQUENCY OF OCCURRENCE (%)

ANOMALIES

FREQUENCY

COMPOSITE

COMPOSITE



(20 CASES: 1950 1951 1955 1956 1957 1963 1965 1968 1971 1972 1974 1975 1976 1985 1989  
1998 1999 2000 2001 2008)



# U.S. Temperature Departures ( $^{\circ}\text{C}$ ) and Frequency of Occurrence (%) for La Niña during Dec.-Feb.

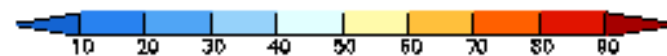
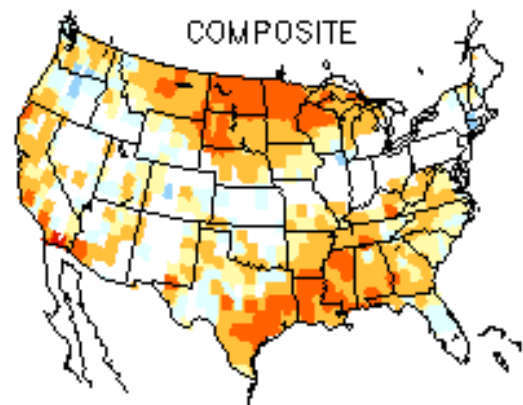
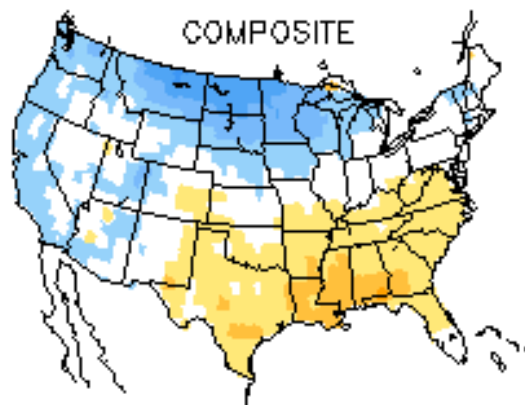
DJF LA NINA TEMPERATURE ANOMALIES ( $^{\circ}\text{C}$ )  
AND FREQUENCY OF OCCURRENCE (%)

ANOMALIES

FREQUENCY

COMPOSITE

COMPOSITE



(20 CASES: 1950 1951 1955 1956 1957 1963 1965 1968 1971 1972 1974 1975 1976 1985 1989  
1998 1999 2000 2001 2006)