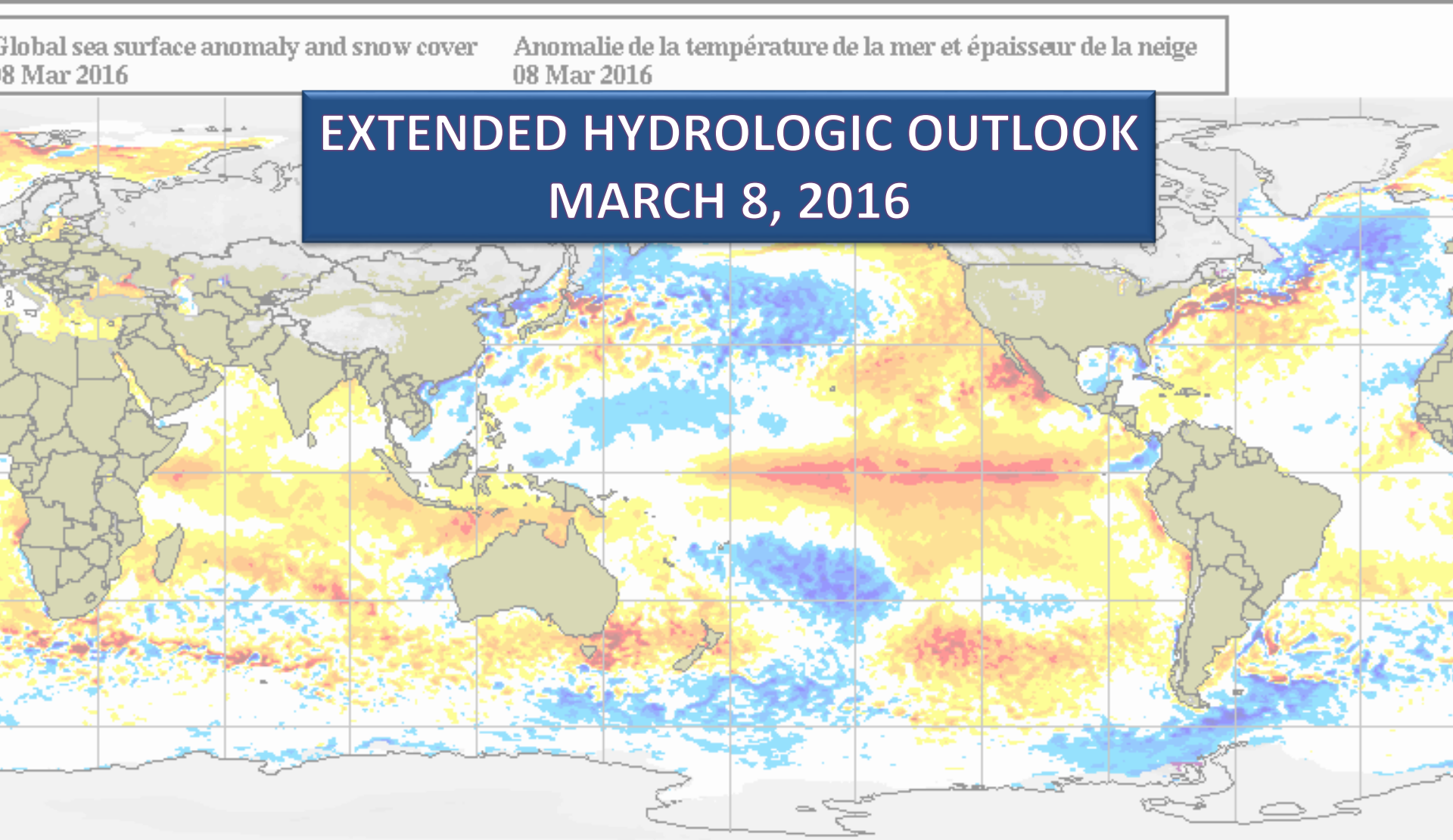
EXTENDED HYDROLOGIC OUTLOOK
MARCH 8, 2016



Summary

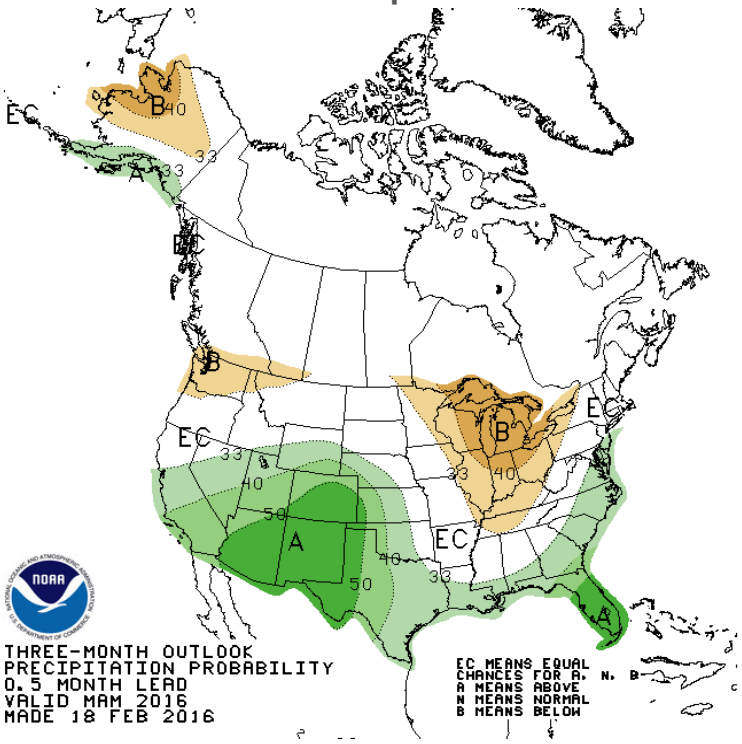
- The Climate Prediction Center (CPC) is forecasting above-normal rainfall for March through May.
- Strong El Niño conditions are present. March has historically been a wet month during El Niño. A transition to ENSO-neutral is likely during late spring or early summer.
- The strong positive phase of the Pacific Decadal Oscillation increases the potential for above normal rainfall in the winter and a greater number of El Niño events for multi-year periods.
- Watching Atlantic Multidecadal Oscillation (AMO) index for switch to negative (cold) phase, this has the potential to contribute to a drier-than-normal 2016 wet season.

U. S. Seasonal Outlooks

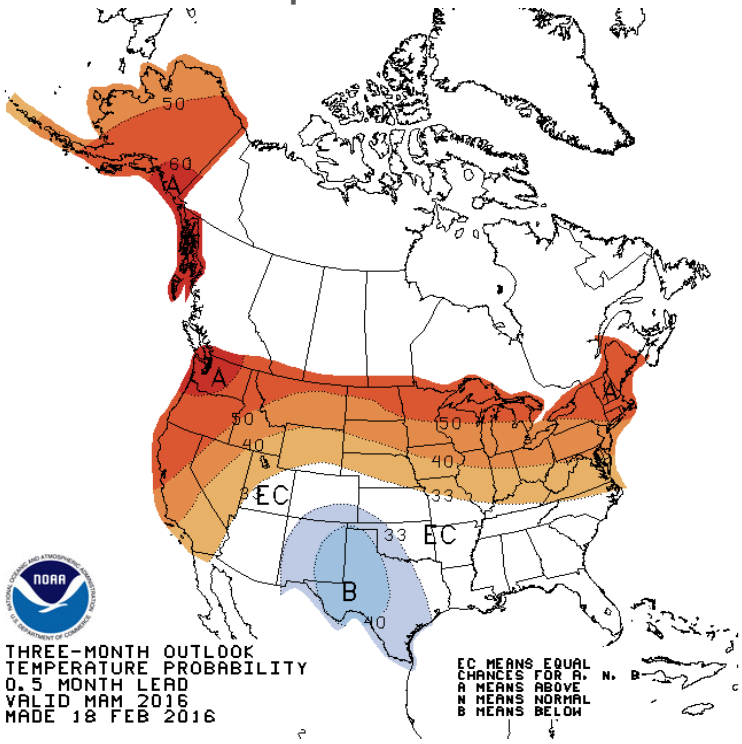
March - May 2016

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

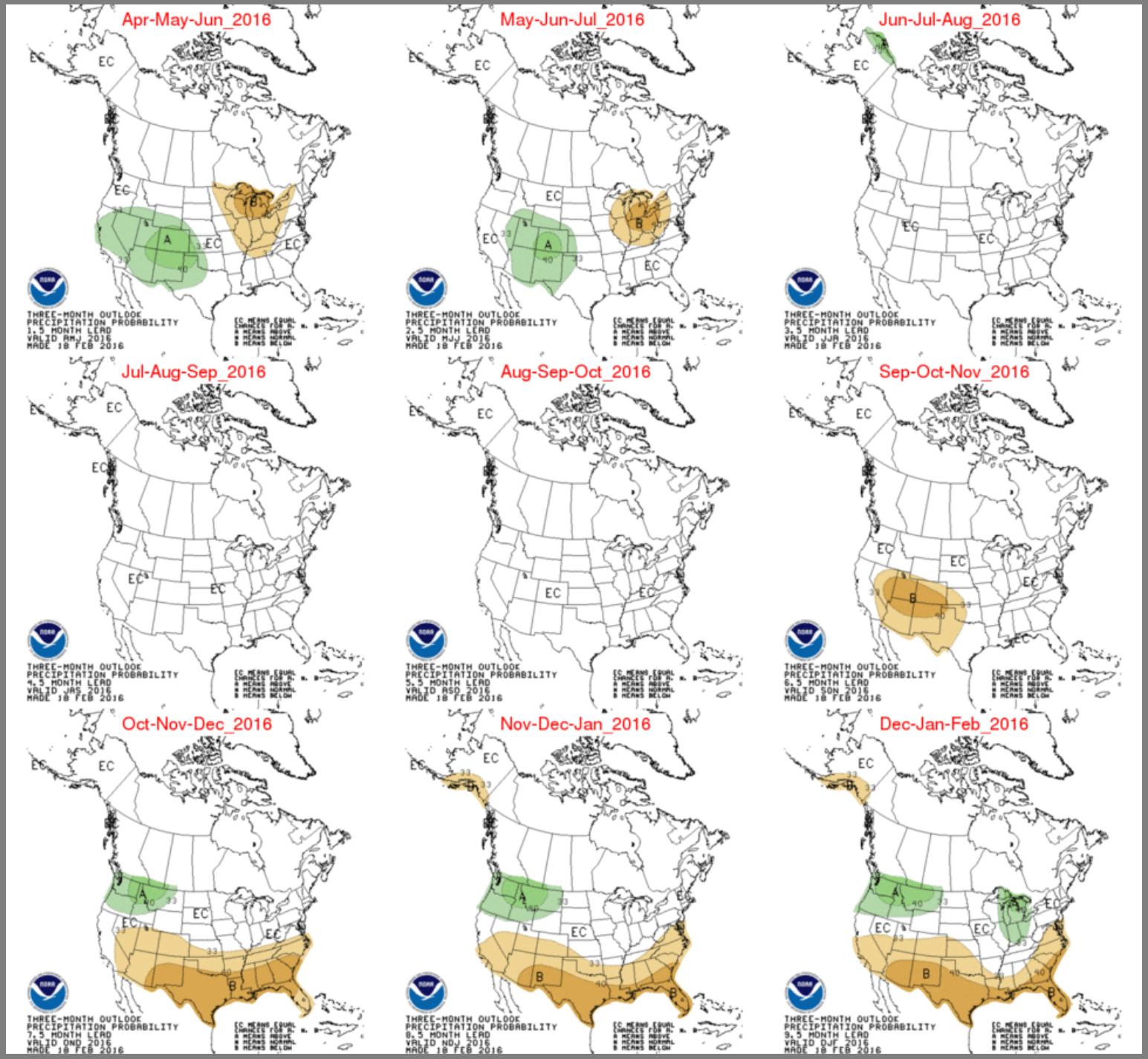
Precipitation



Temperature

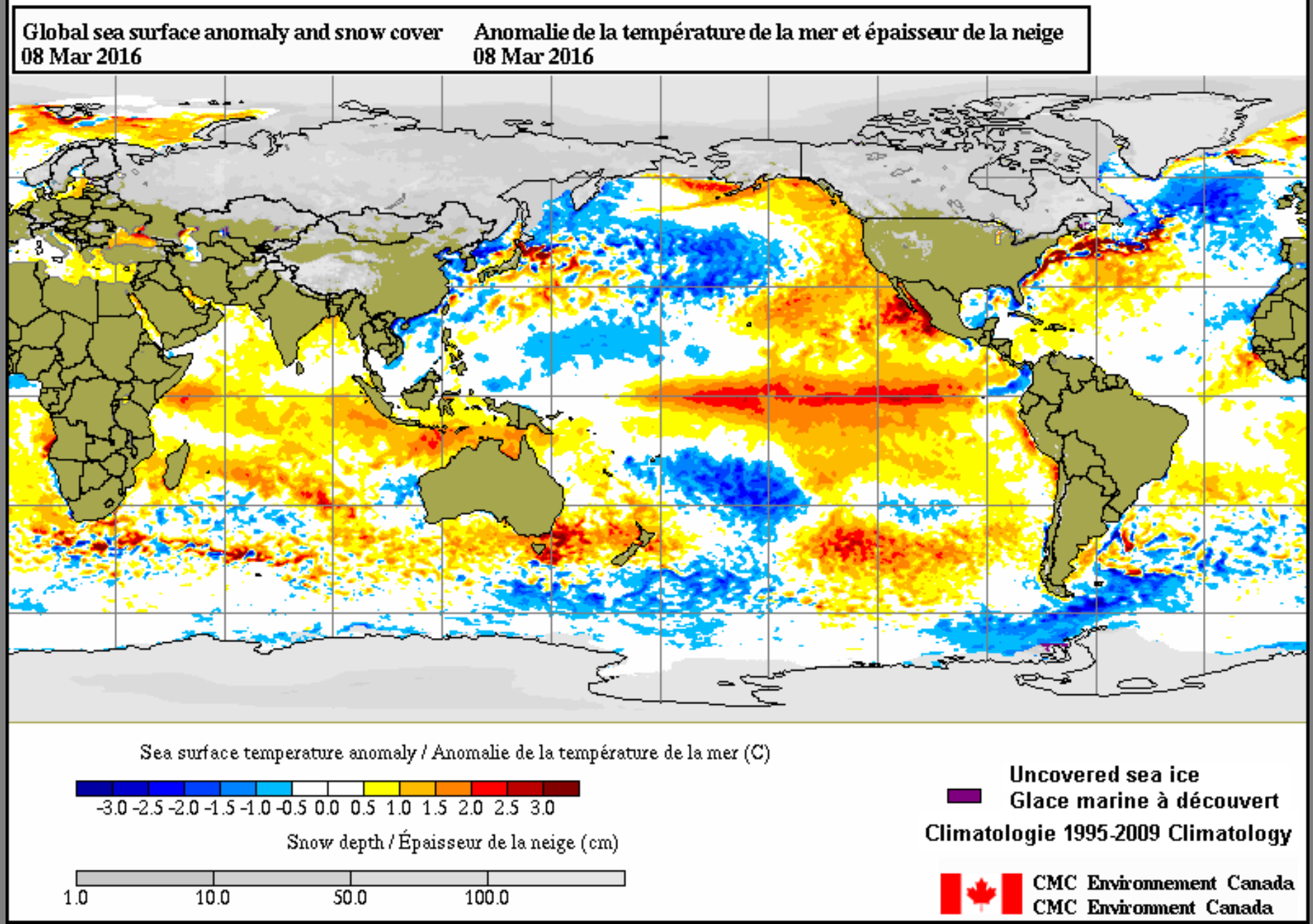


Prepared by: Climate Prediction Center / NCEP



Prepared by: Climate Prediction Center / NCEP

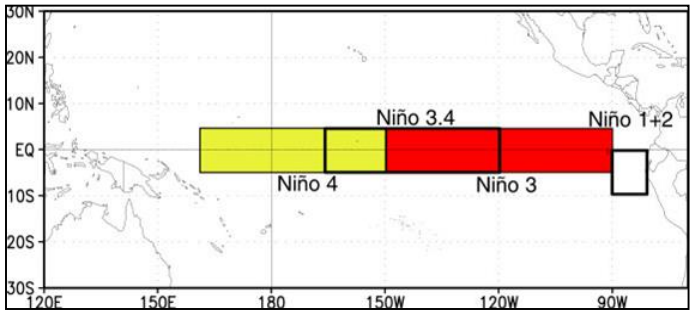
Current Global Sea Surface Temperature Anomalies

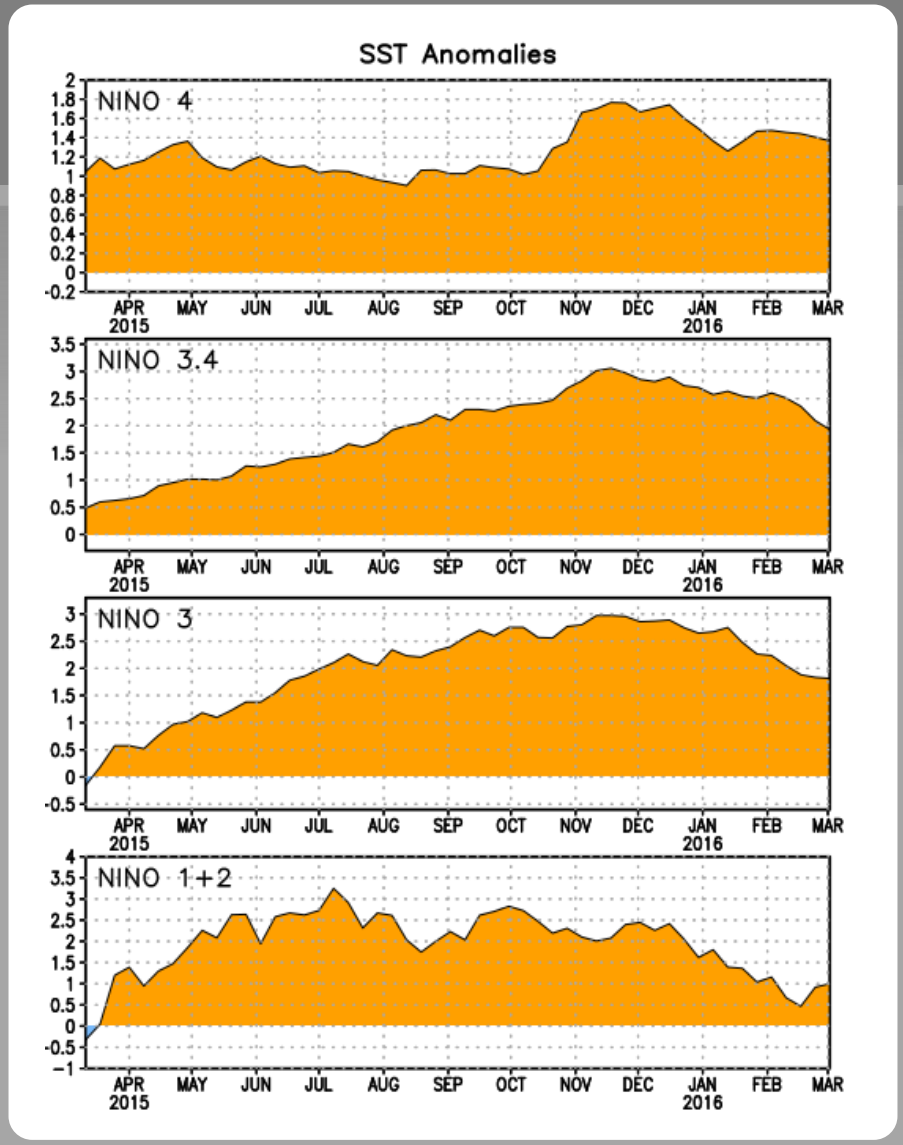


Niño Region SST Departures (ºC) Recent Evolution

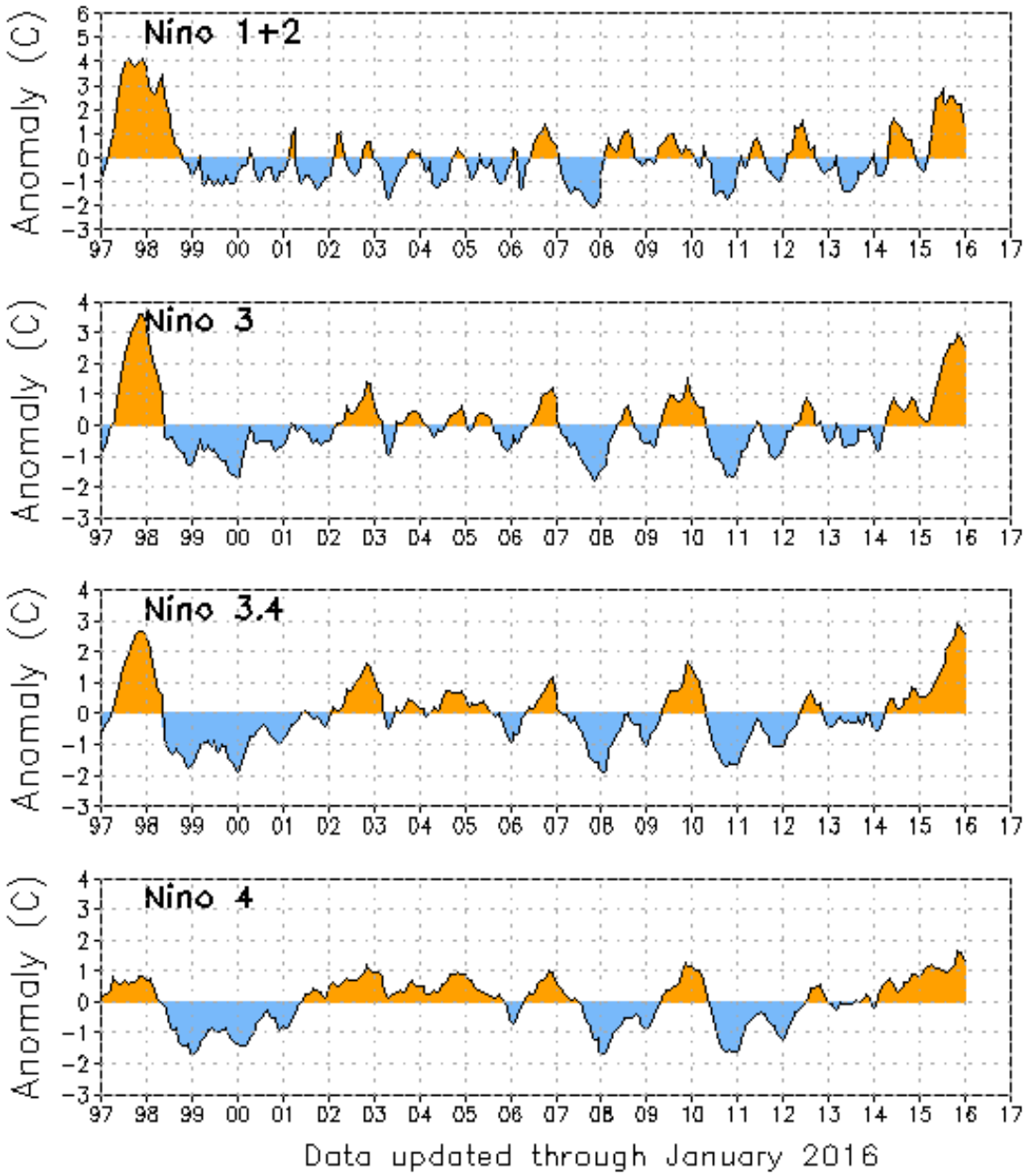
The latest weekly SST departures are:

Niño 4	1.4ºC
Niño 3.4	1.9ºC
Niño 3	1.8ºC
Niño 1+2	1.0ºC





Prepared by: Climate Prediction Center / NCEP

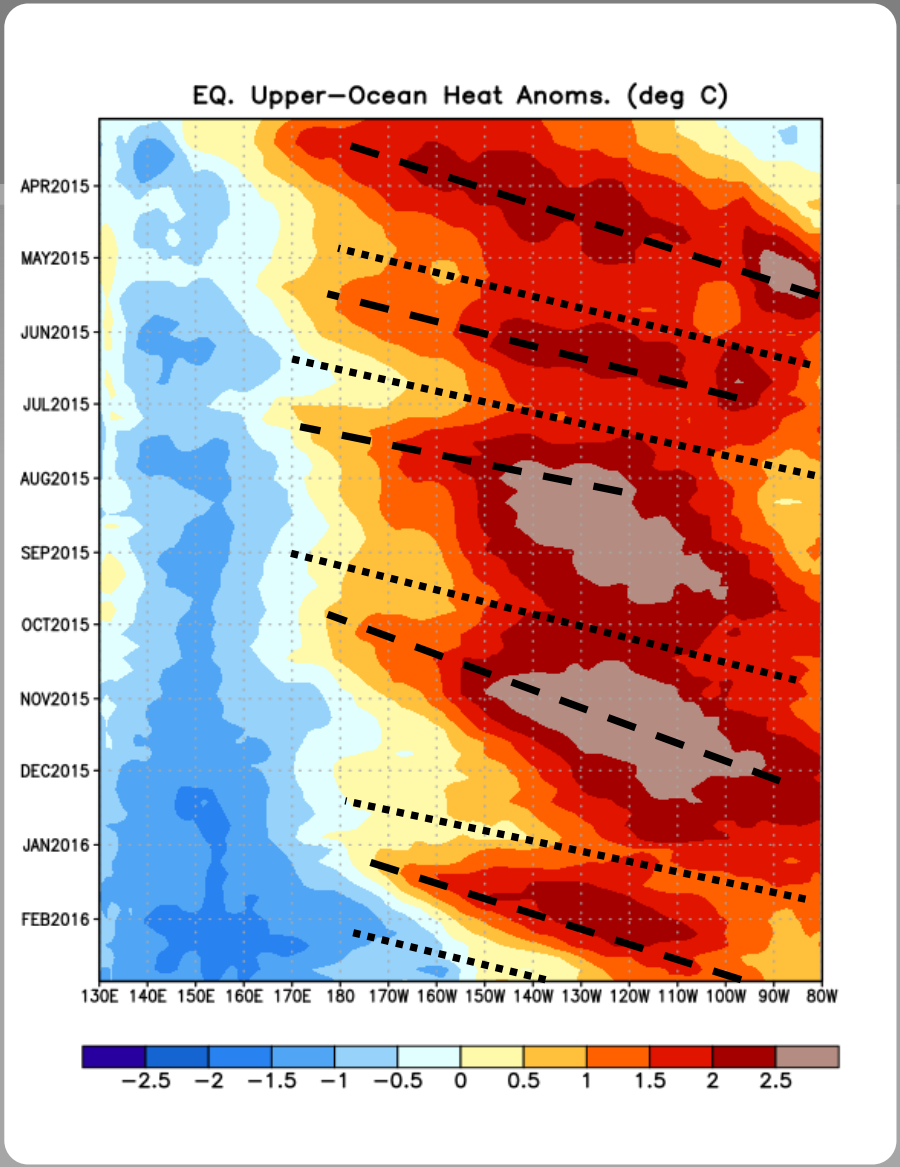

Nino 1+2
Nino 3
Nino 3.4
Nino 4
Anomaly (C)
97 98 99 00 01 02 03 04 05 06 07 08 09 10 11 12 13 14 15 16 17
Data updated through January 2016

Weekly Heat Content Evolution in the Equatorial Pacific

Downwelling phases of a Kelvin wave were observed in March-April, mid-May to late June, July-August, and October to November.

During August and September, positive subsurface temperature anomalies slowly shifted eastward.

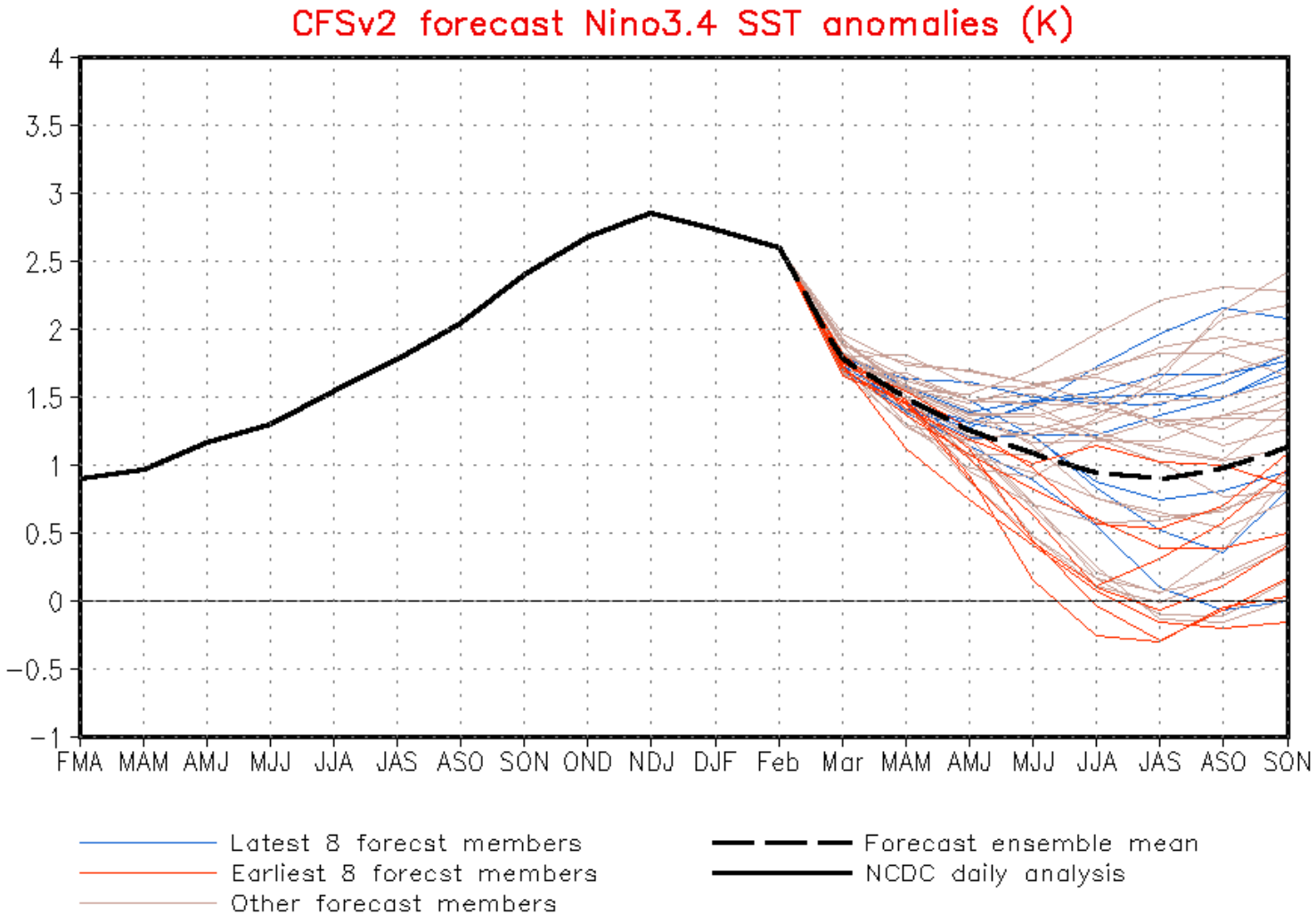
More recently, the downwelling phase of a Kelvin wave has shifted eastward into the eastern Pacific, while an upwelling phase is apparent in the east-central Pacific.



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.

NWS/NCEP/CPC

Last update: Tue Mar 8 2016
Initial conditions: 26Feb2016–6Mar2016



IRI/CPC Pacific Niño 3.4 SST Model Outlook

Positive Niño 3.4 SST anomalies are predicted to weaken through 2016.

Most models suggest a transition to ENSO-neutral by May-June-July (MJJ) 2016 with the possibility of La Niña conditions during the fall.

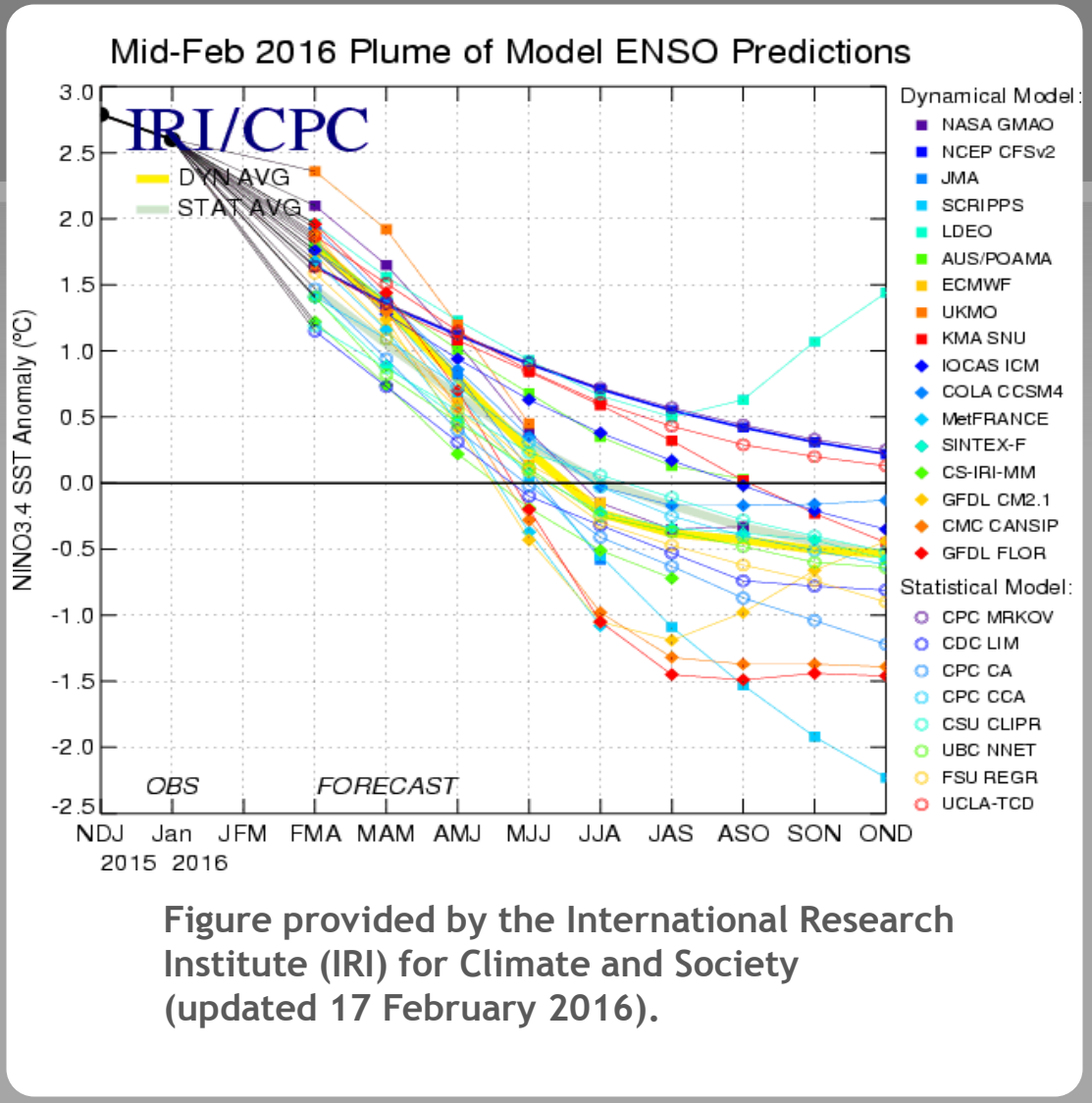


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 17 February 2016).

Historical El Niño and La Niña Episodes Based on the ONI computed using ERSST.v4

Recent Pacific warm (red) and cold (blue) periods based on a threshold of +/- 0.5 °C for the Oceanic Nino Index (ONI) [3 month running mean of ERSST.v4 SST anomalies in the Nino 3.4 region (5N-5S, 120-170W)]. For historical purposes, periods of below and above normal SSTs are colored in blue and red when the threshold is met for a minimum of 5 consecutive over-lapping seasons.

The ONI is one measure of the El Niño-Southern Oscillation, and other indices can confirm whether features consistent with a coupled ocean-atmosphere phenomenon accompanied these periods. The complete table going back to DJF 1950 can be found here.

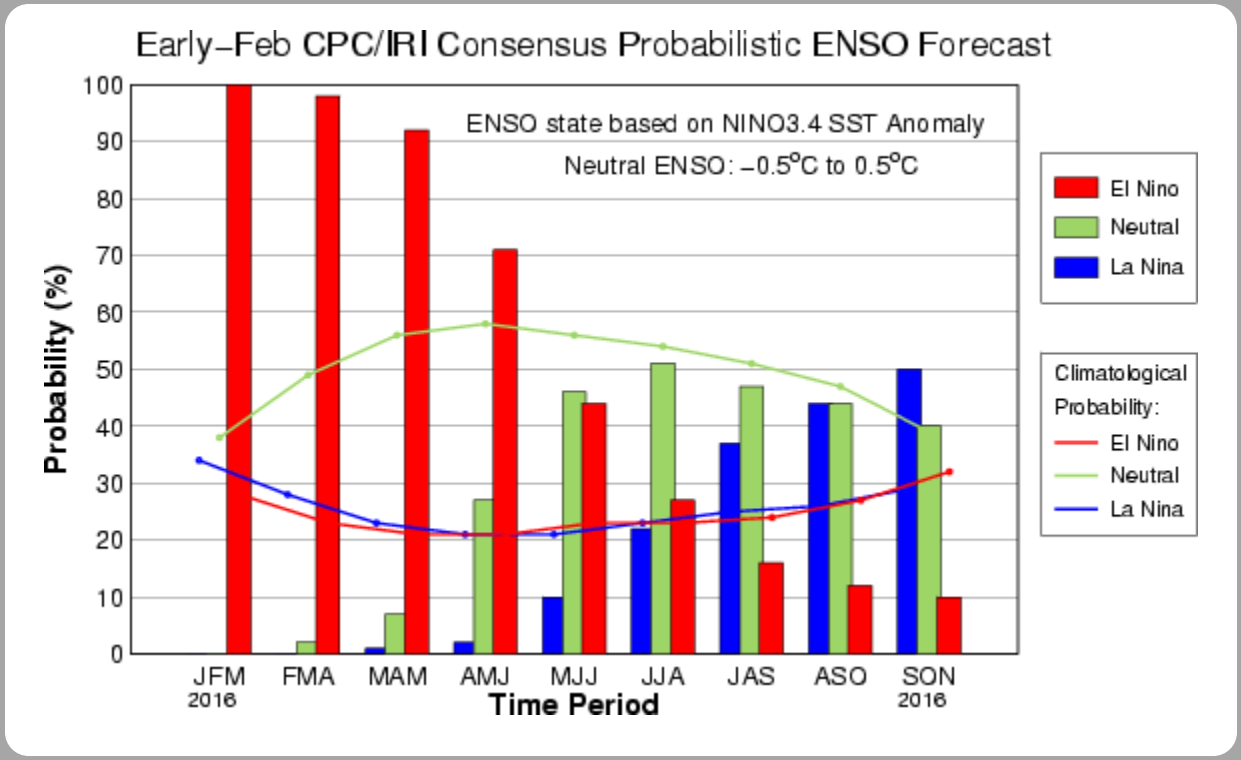
Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2004	0.3	0.2	0.1	0.1	0.2	0.3	0.5	0.7	0.7	0.7	0.7	0.7
2005	0.6	0.6	0.5	0.5	0.4	0.2	0.1	0.0	0.0	-0.1	-0.4	-0.7
2006	-0.7	-0.6	-0.4	-0.2	0.0	0.1	0.2	0.3	0.5	0.8	0.9	1.0
2007	0.7	0.3	0.0	-0.1	-0.2	-0.2	-0.3	-0.6	-0.8	-1.1	-1.2	-1.3
2008	-1.4	-1.3	-1.1	-0.9	-0.7	-0.5	-0.3	-0.2	-0.2	-0.3	-0.5	-0.7
2009	-0.8	-0.7	-0.4	-0.1	0.2	0.4	0.5	0.6	0.7	1.0	1.2	1.3
2010	1.3	1.1	0.8	0.5	0.0	-0.4	-0.8	-1.1	-1.3	-1.4	-1.3	-1.4
2011	-1.3	-1.1	-0.8	-0.6	-0.3	-0.2	-0.3	-0.5	-0.7	-0.9	-0.9	-0.8
2012	-0.7	-0.6	-0.5	-0.4	-0.3	-0.1	0.1	0.3	0.4	0.4	0.2	-0.2
2013	-0.4	-0.5	-0.3	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.2	-0.3
2014	-0.5	-0.6	-0.4	-0.2	0.0	0.2	0.4	0.4	0.4	0.4	0.6	0.6
2015	0.5	0.4	0.5	0.7	0.9	1.0	1.2	1.5	1.8	2.1	2.2	2.3
2016	2.2											

Prepared by: Climate Prediction Center / IRI

CPC/IRI Probabilistic ENSO Outlook

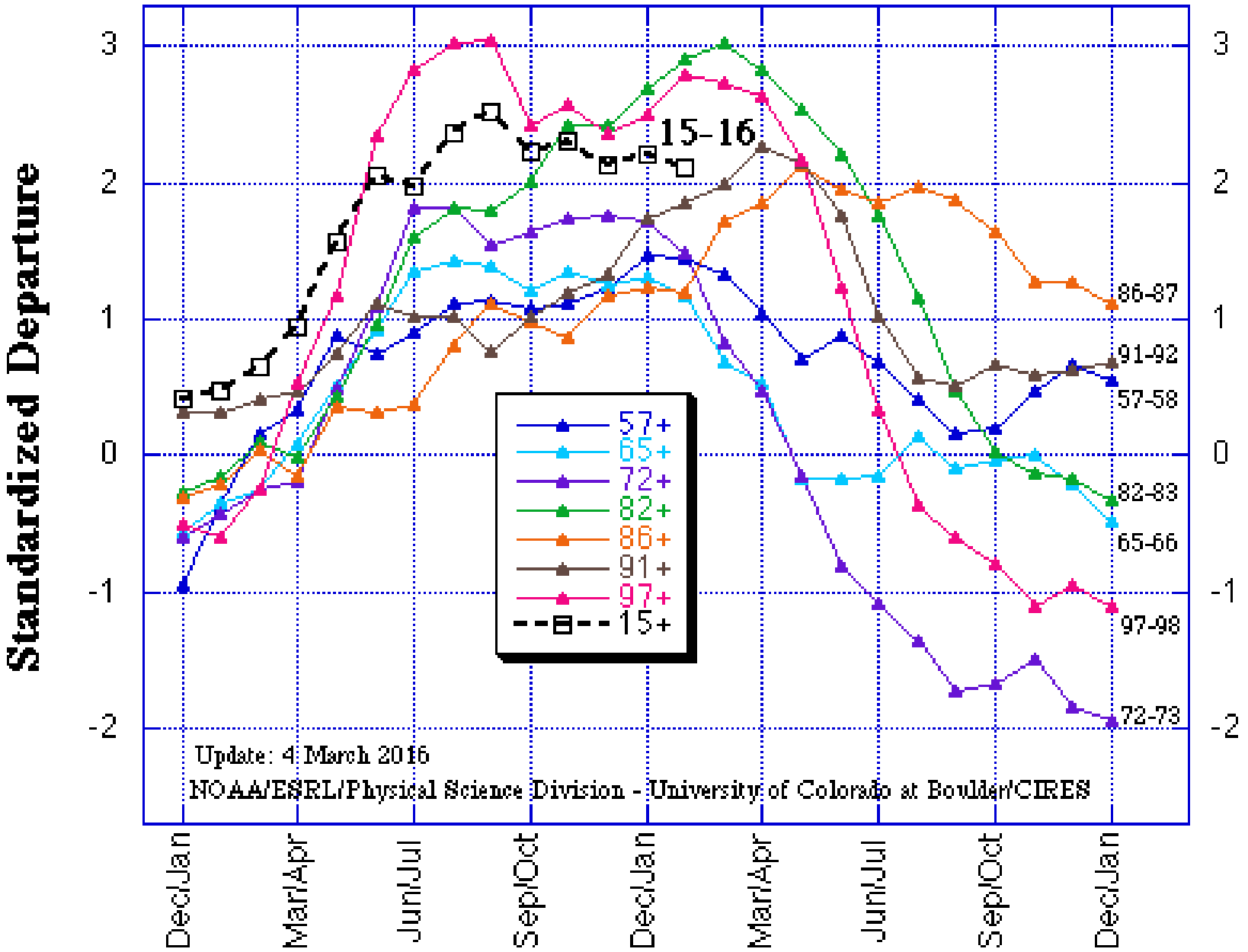
Updated: 11 February 2016

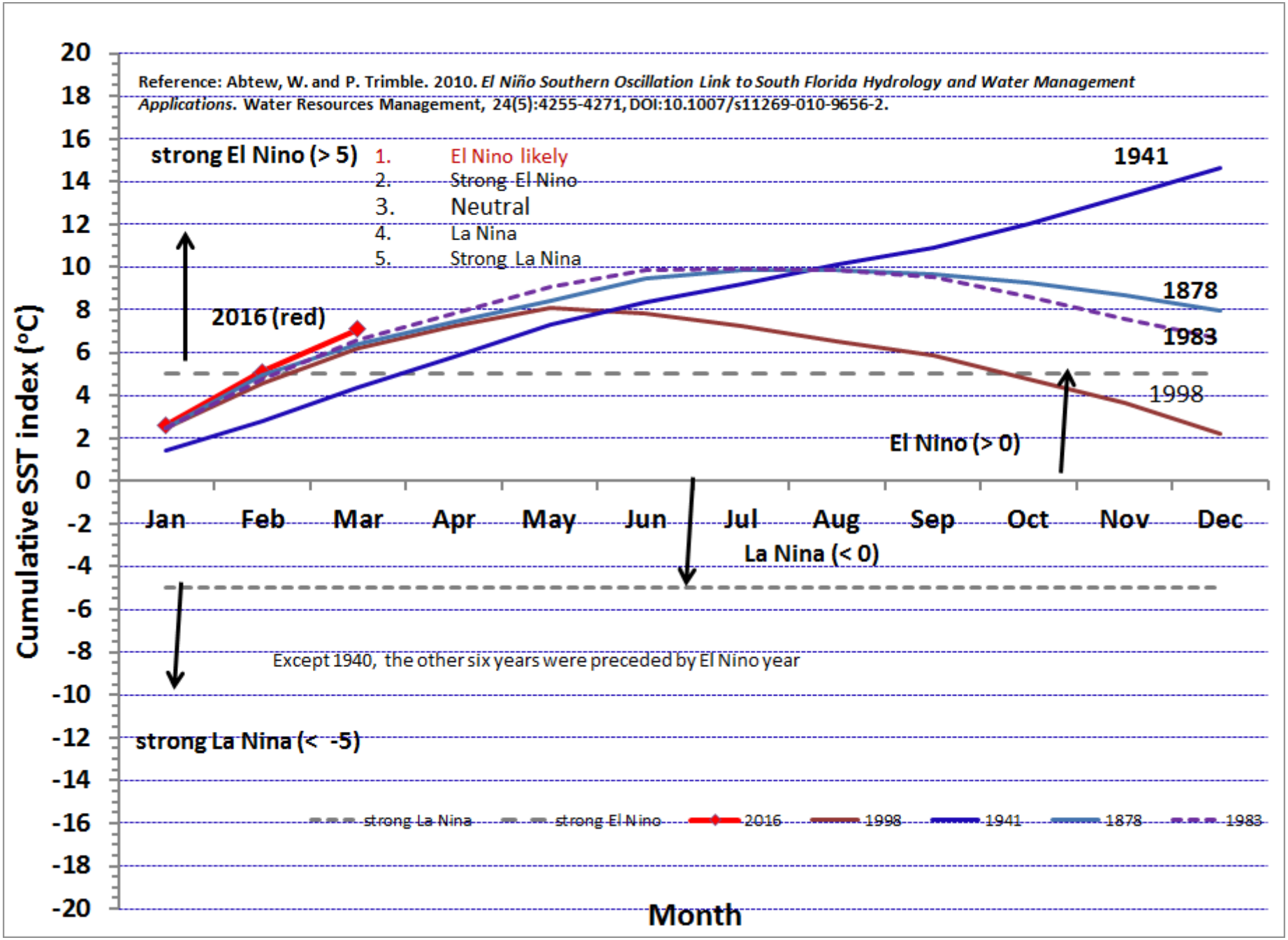
The chance of El Niño gradually decreases into the spring and ENSO-neutral is favored by May-June-July (MJJ) 2016. The chance of La Niña increases to 50% in September-October-November (SON) 2016.



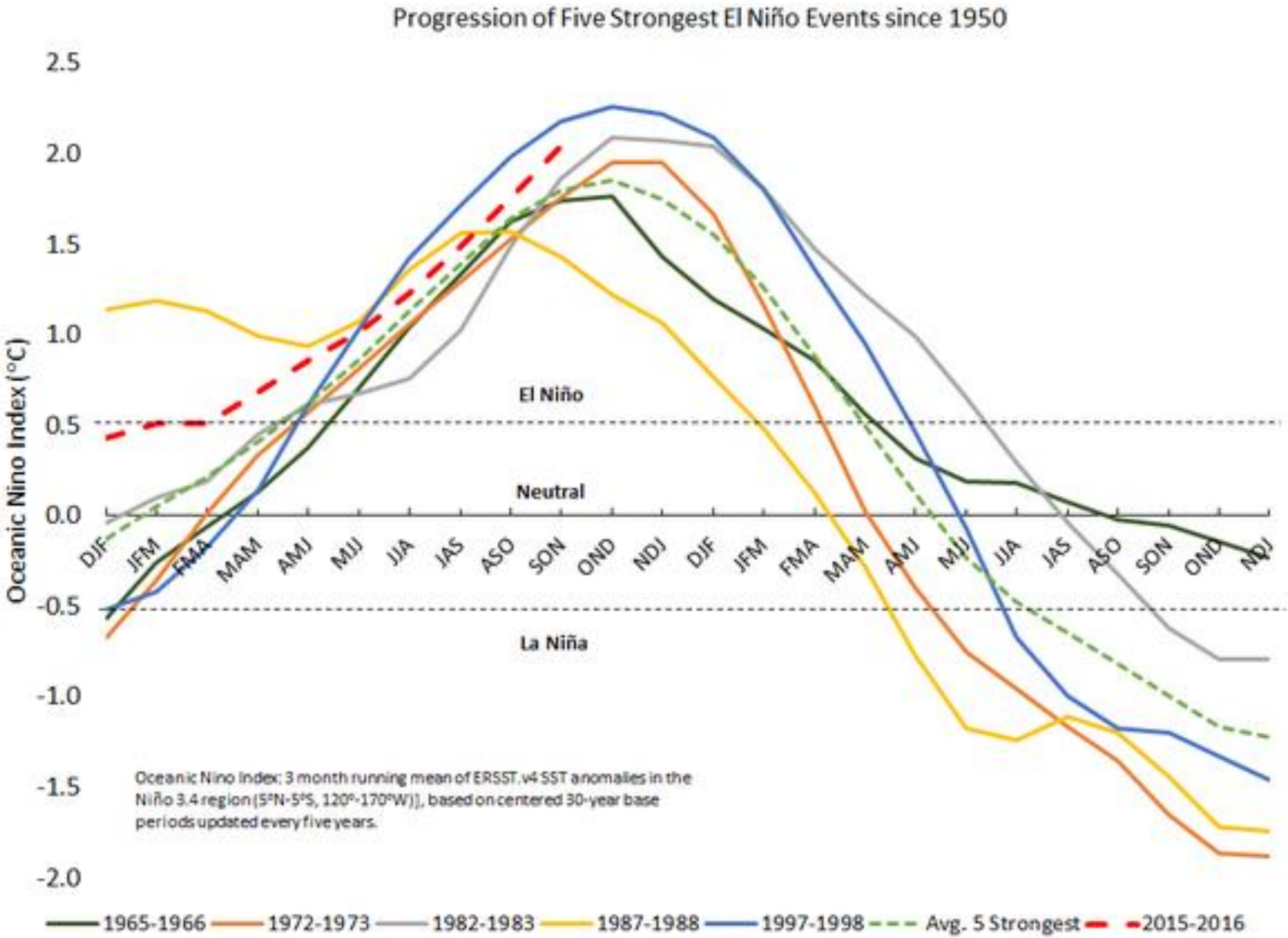
Prepared by: Climate Prediction Center / IRI

Multivariate ENSO Index (MEI) for the seven strongest El Niño events sicne 1950 vs. 2015-16

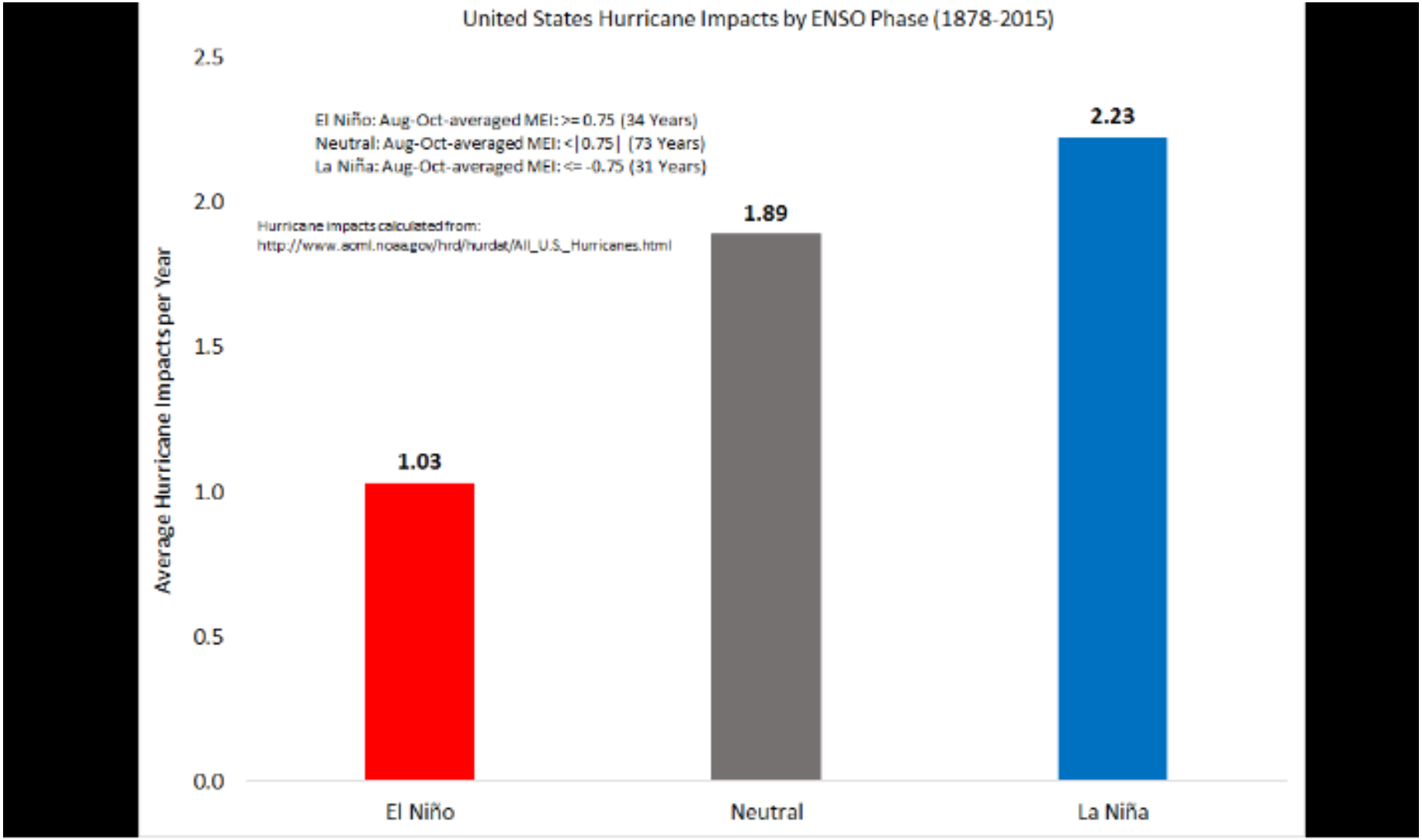




Source: Wossenu Abtew (SFWMD)



Source: Phil Klotzbach (CSU)

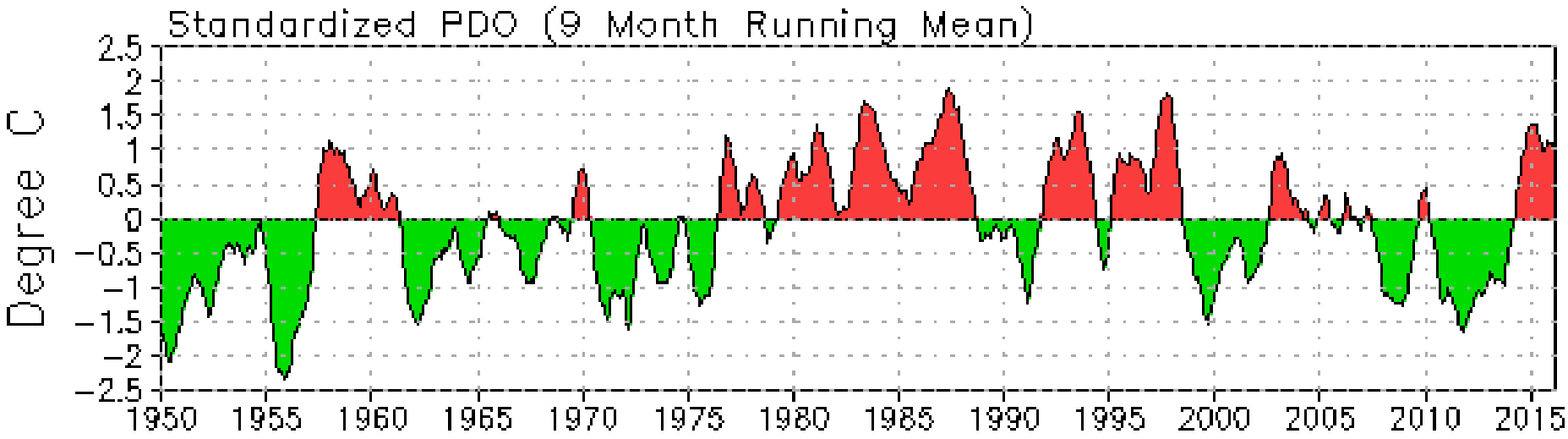


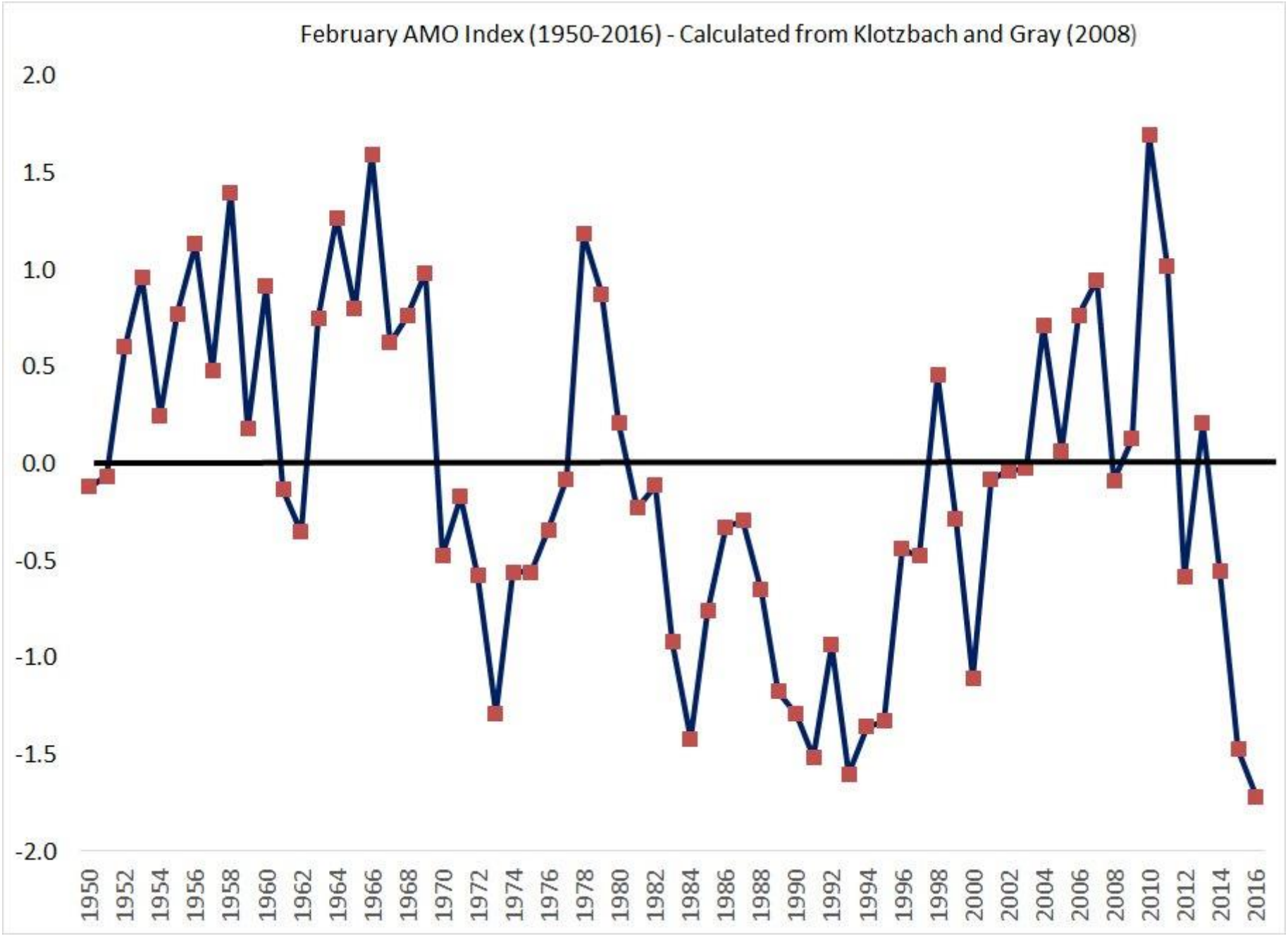
Philip Klotzbach @philklotzbach · 18 Dec 2015

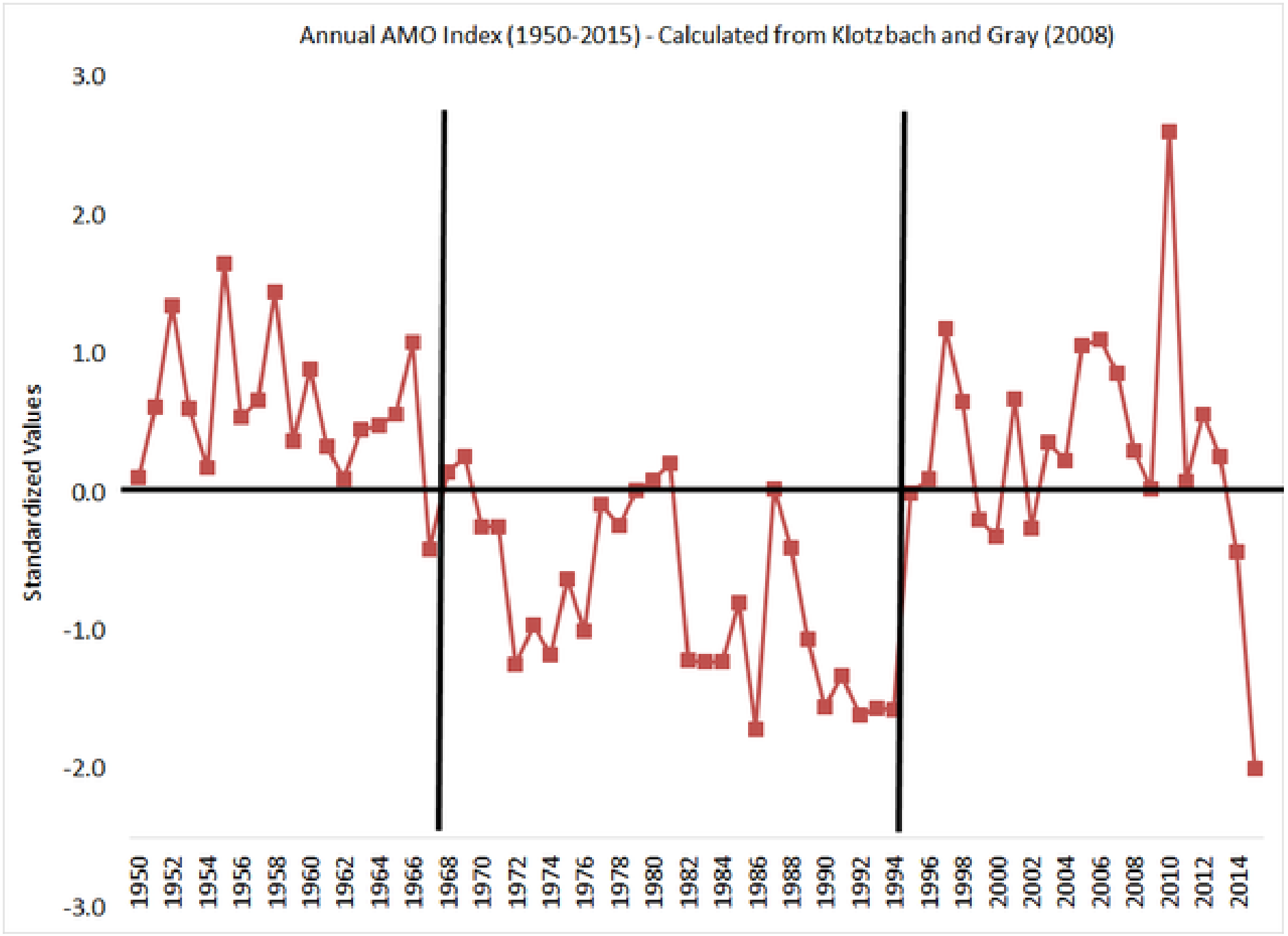
Over twice as many hurricanes impact the United States in La Nina years vs. El Nino years. #ElNino

28 16

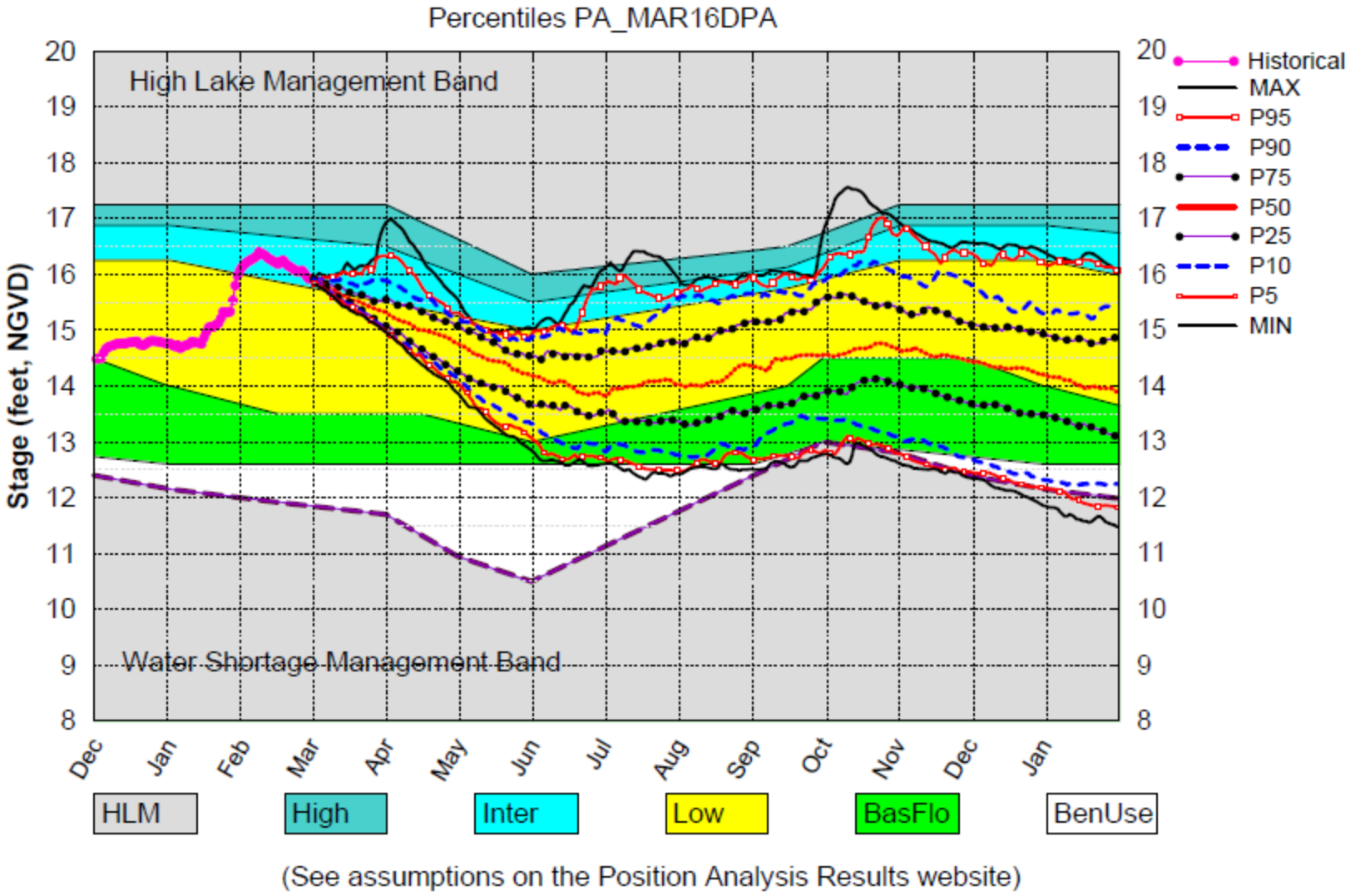
Source: Phil Klotzbach (CSU)


Standardized PDO (9 Month Running Mean)
Degree C
2.5
2
1.5
1
0.5
0
−0.5
−1
−1.5
−2
−2.5
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015


February AMO Index (1950-2016) - Calculated from Klotzbach and Gray (2008)
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016


Annual AMO Index (1950-2015) - Calculated from Klotzbach and Gray (2008)
Standardized Values
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
1950
1952
1954
1956
1958
1960
1962
1964
1966
1968
1970
1972
1974
1976
1978
1980
1982
1984
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014

Lake Okeechobee SFWMM Mar 2016 Dynamic Position Analysis

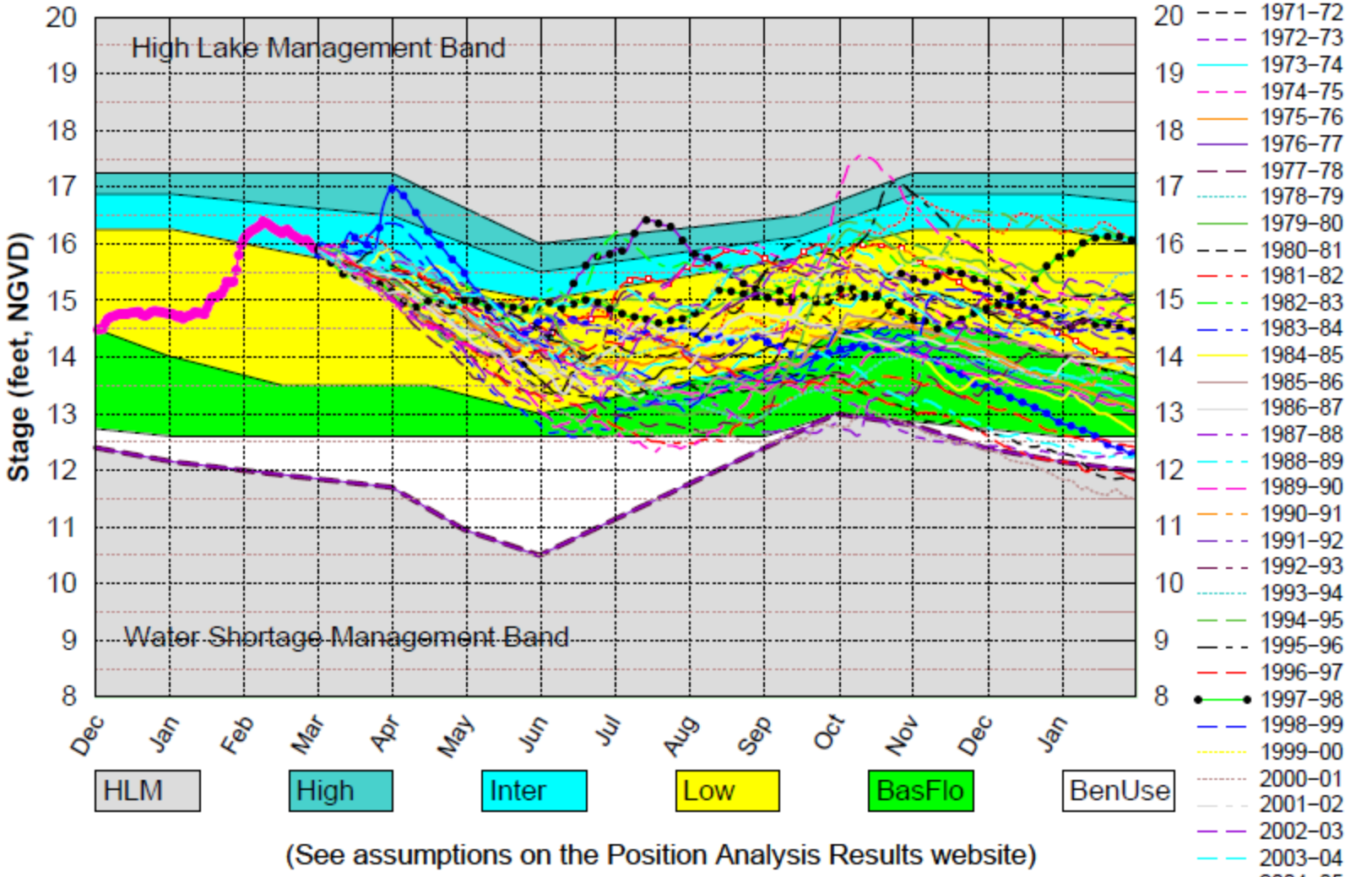


(See assumptions on the Position Analysis Results website)

Mon Mar 7 12:58:27 2016

Lake Okeechobee SFWMM Mar 2016 Dynamic Position Analysis

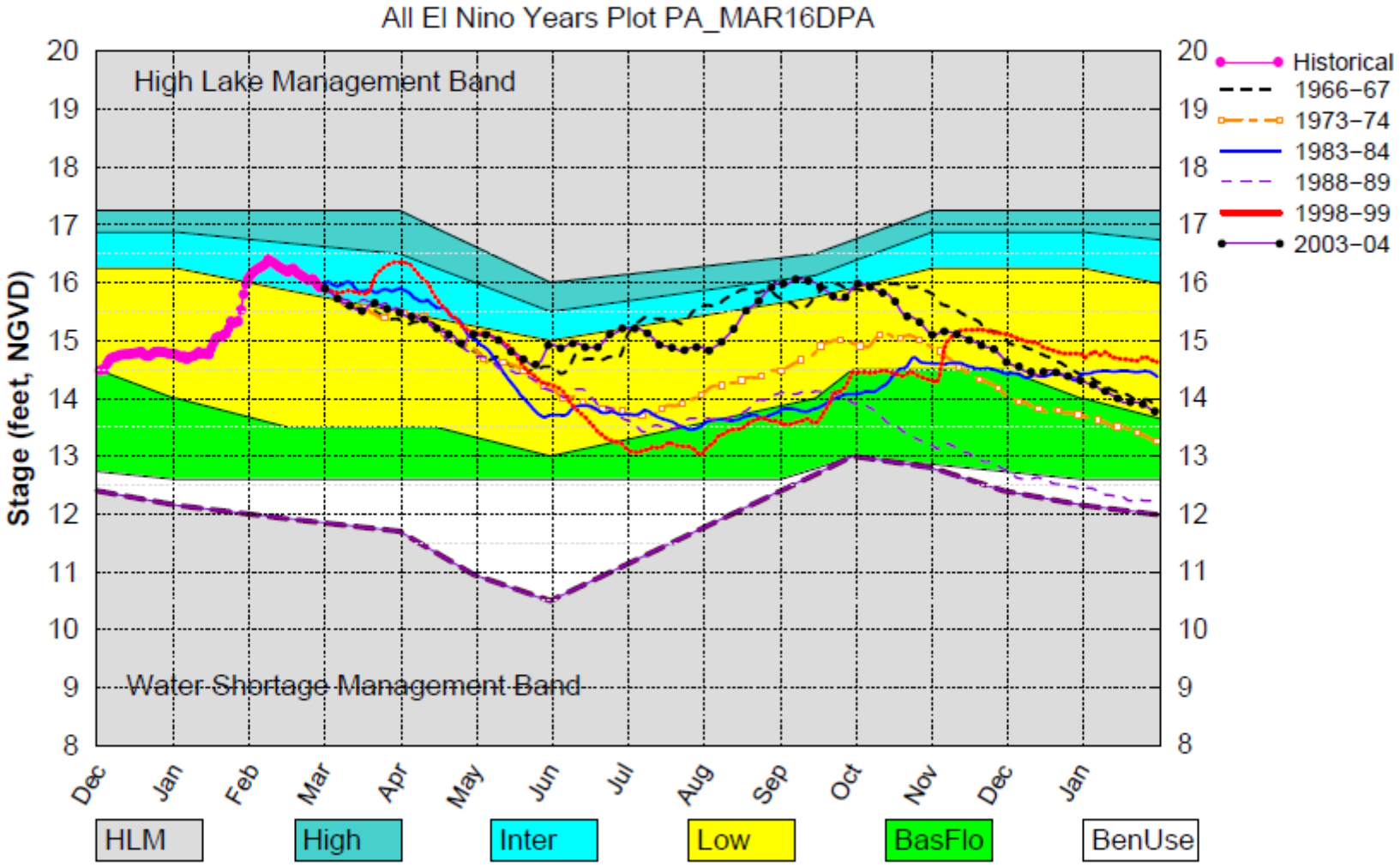
All Simulated Years Plot PA_MAR16DPA



(See assumptions on the Position Analysis Results website)

Mon Mar 7 13:01:18 2016

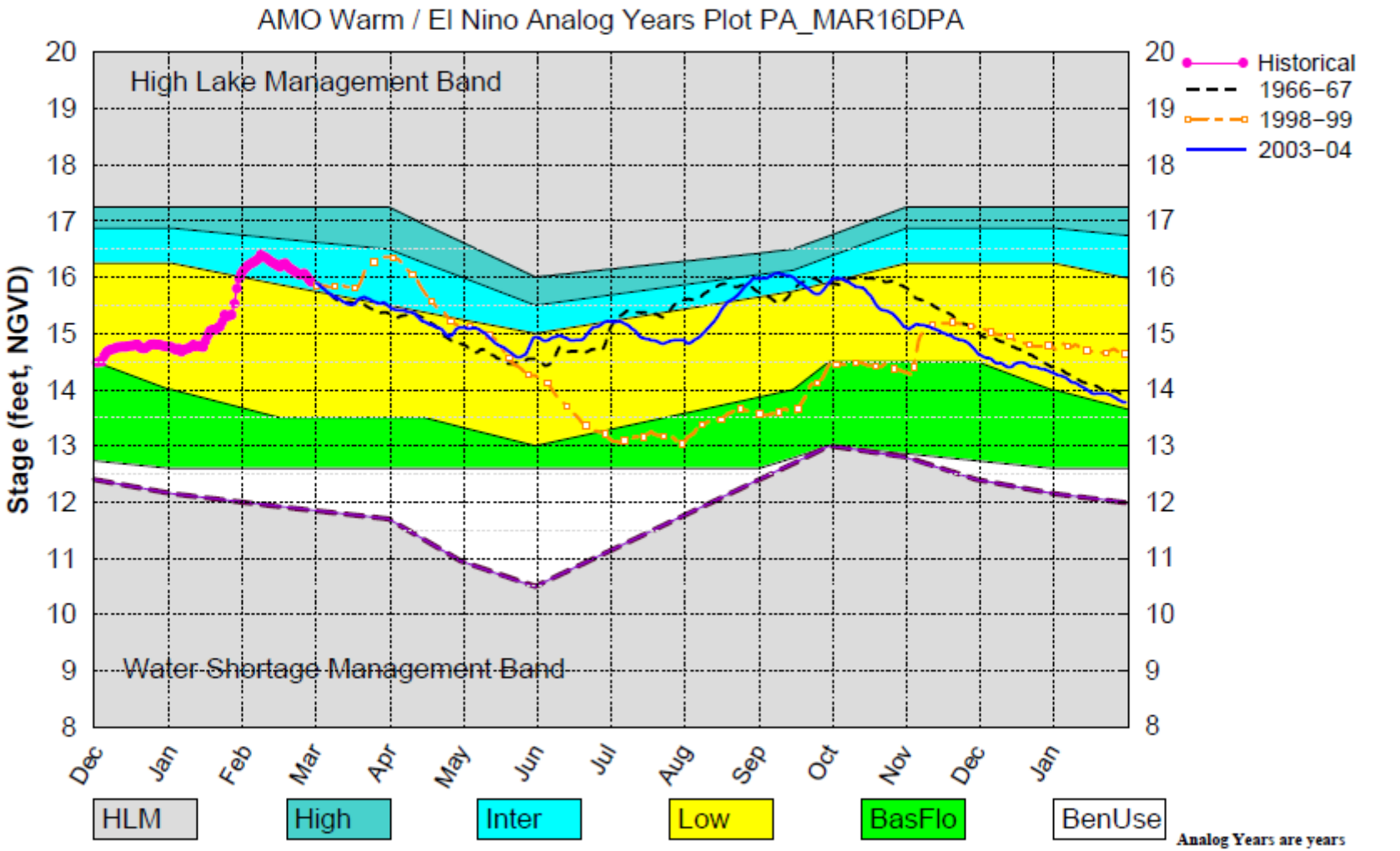
Lake Okeechobee SFWMM Mar 2016 Dynamic Position Analysis



(See assumptions on the Position Analysis Results website)

Mon Mar 7 12:58:57 2016

Lake Okeechobee SFWMM Mar 2016 Dynamic Position Analysis



(See assumptions on the Position Analysis Results website)

Analog Years are years with similar climatological conditions to the current year.

Mon Mar 7 12:59:02 2016