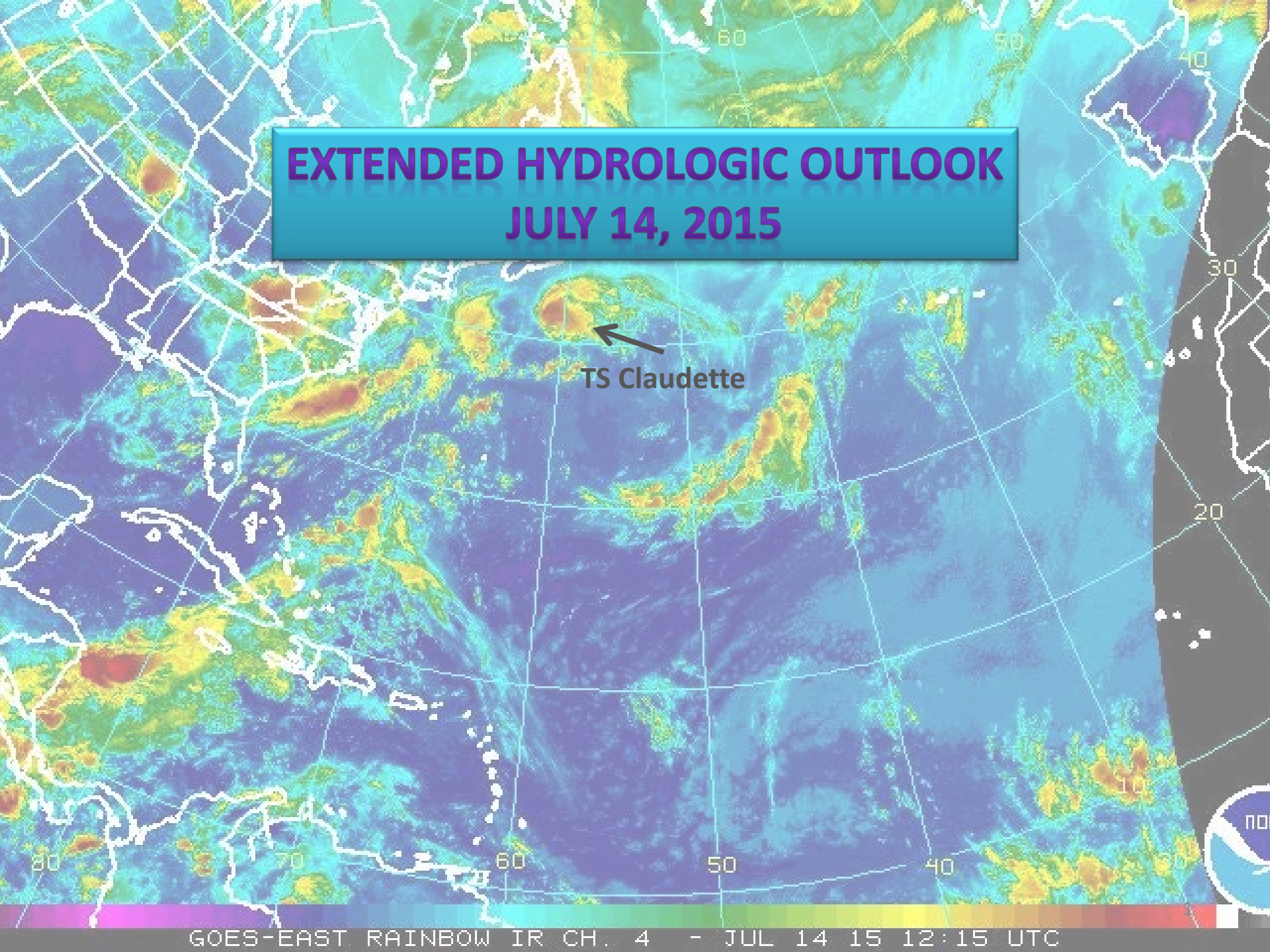

EXTENDED HYDROLOGIC OUTLOOK
JULY 14, 2015
TS Claudette
GOES-EAST RAINBOW IR CH. 4 - JUL 14 15 12:15 UTC

Summary

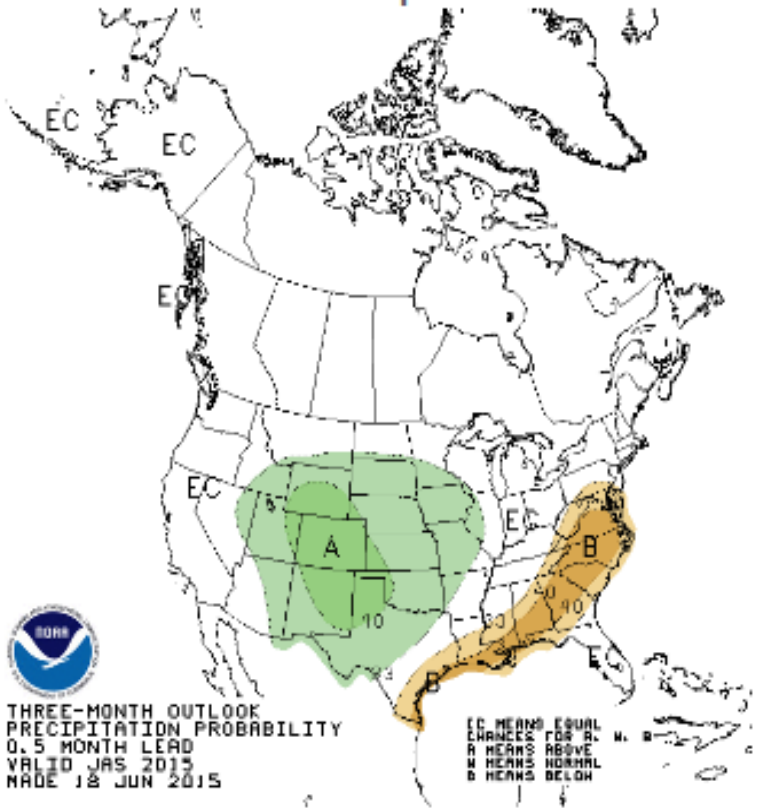
- The Climate Prediction Center (CPC) is forecasting equal chances of above-normal, normal and below-normal rainfall for July through September.
- El Niño conditions continue to strengthen. A moderate to strong El Niño is likely to persist into early 2016. The latter half of the wet season will tend towards normal rainfall probabilities. There are increased chances of above normal rainfall for the 2015-2016 dry season.
- The wet season should tend to have less tropical activity that will affect Florida due to the current El Niño continuing to strengthen during the spring and early summer and cooler sea surface temperatures in the tropical Atlantic main hurricane development region (MDR).
- The Atlantic Multidecadal Oscillation (AMO) is showing signs that it is entering the cold (negative) phase, which creates the potential for drier conditions in south Florida. AMO Cold also decreases the tropical activity in the Atlantic.
- The current switch from the negative phase to a 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.

U. S. Seasonal Outlooks

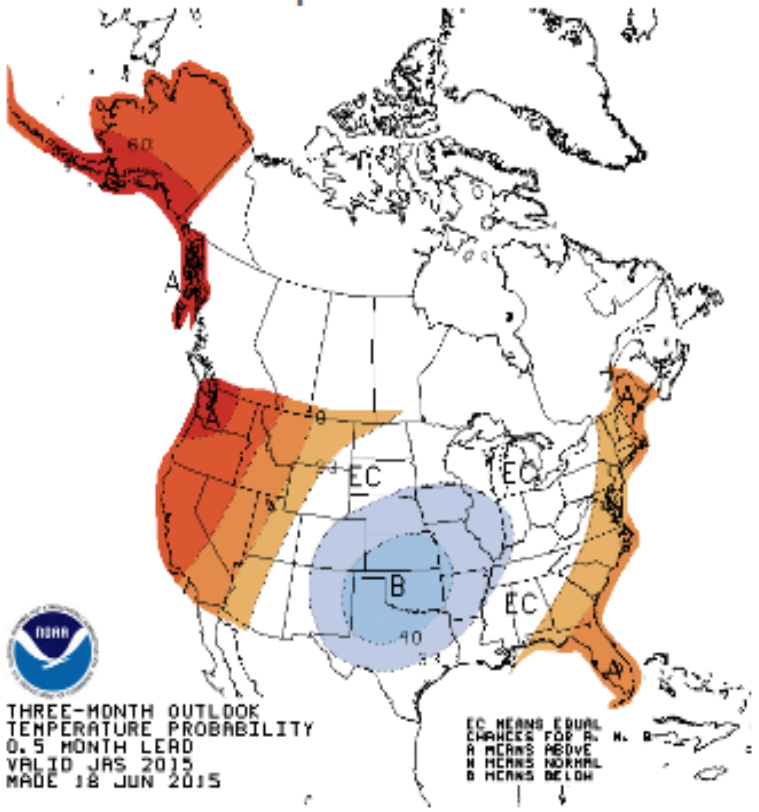
July - September 2015

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

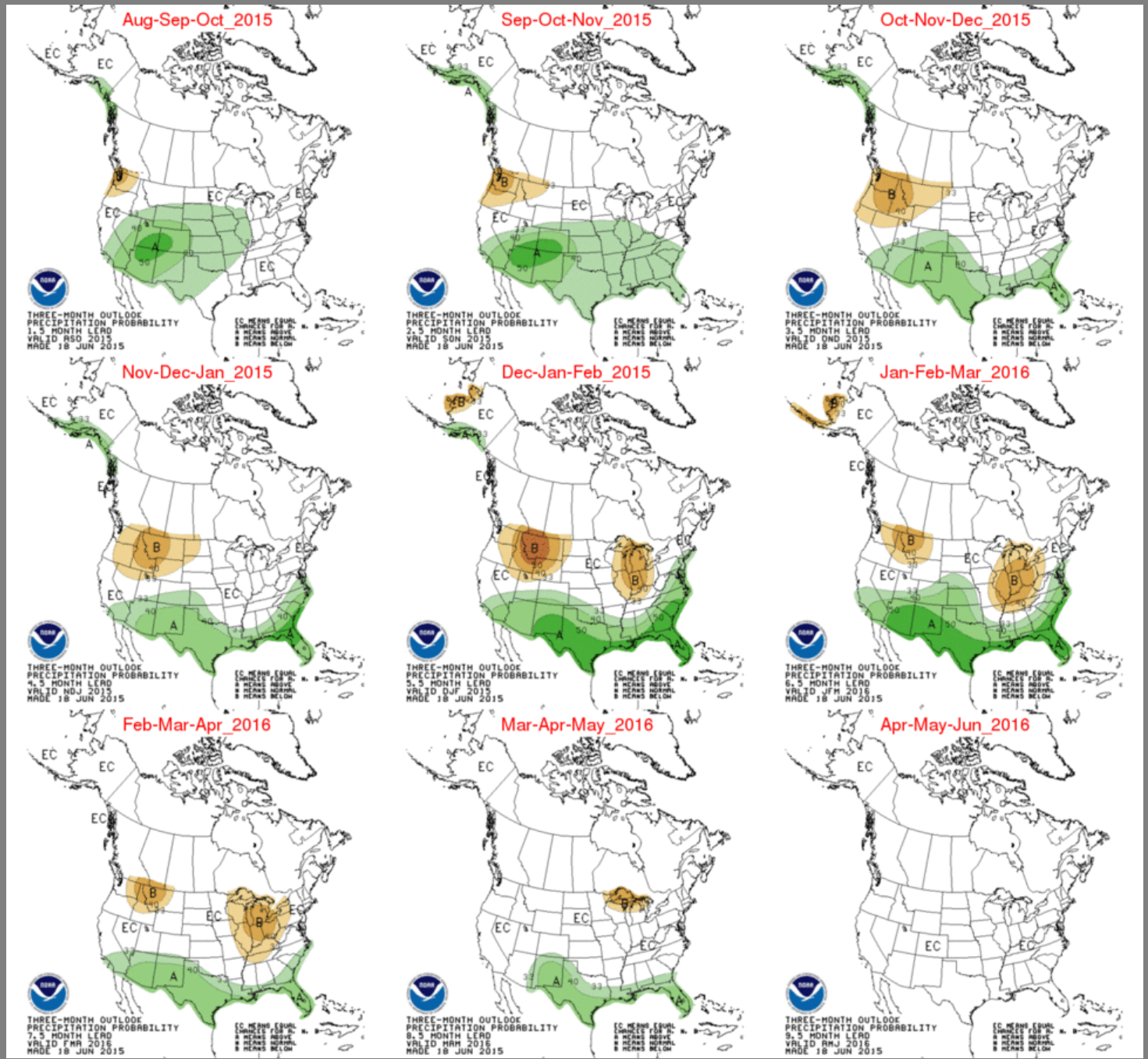
Precipitation



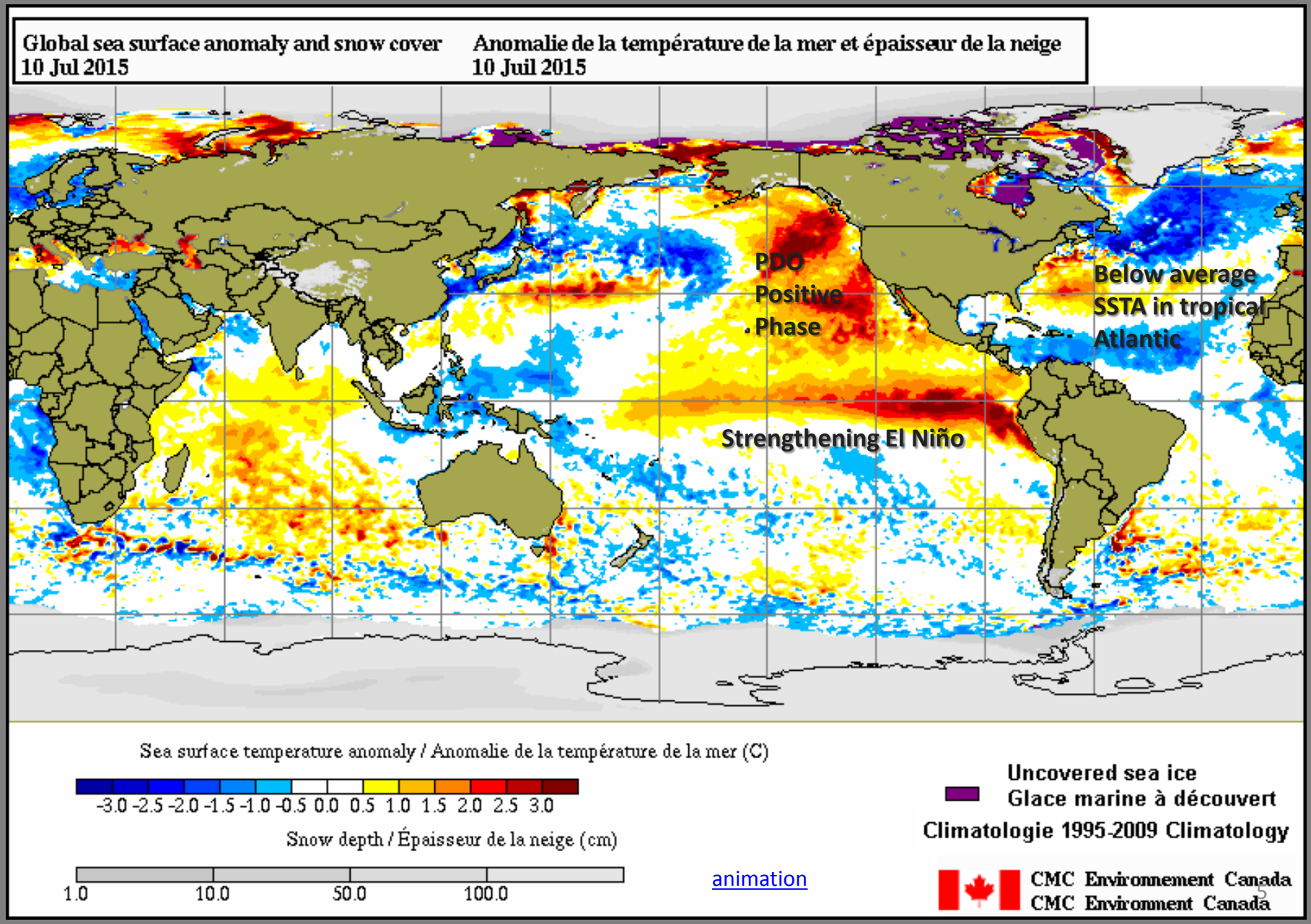
Temperature



U.S. Multi-Seasonal Outlook



Current Global Sea Surface Temperature Anomalies

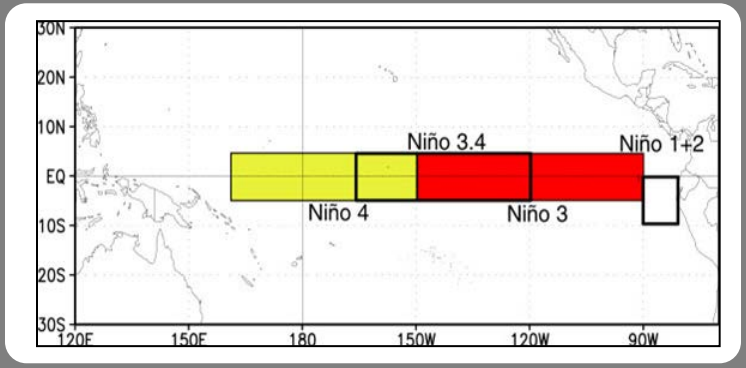


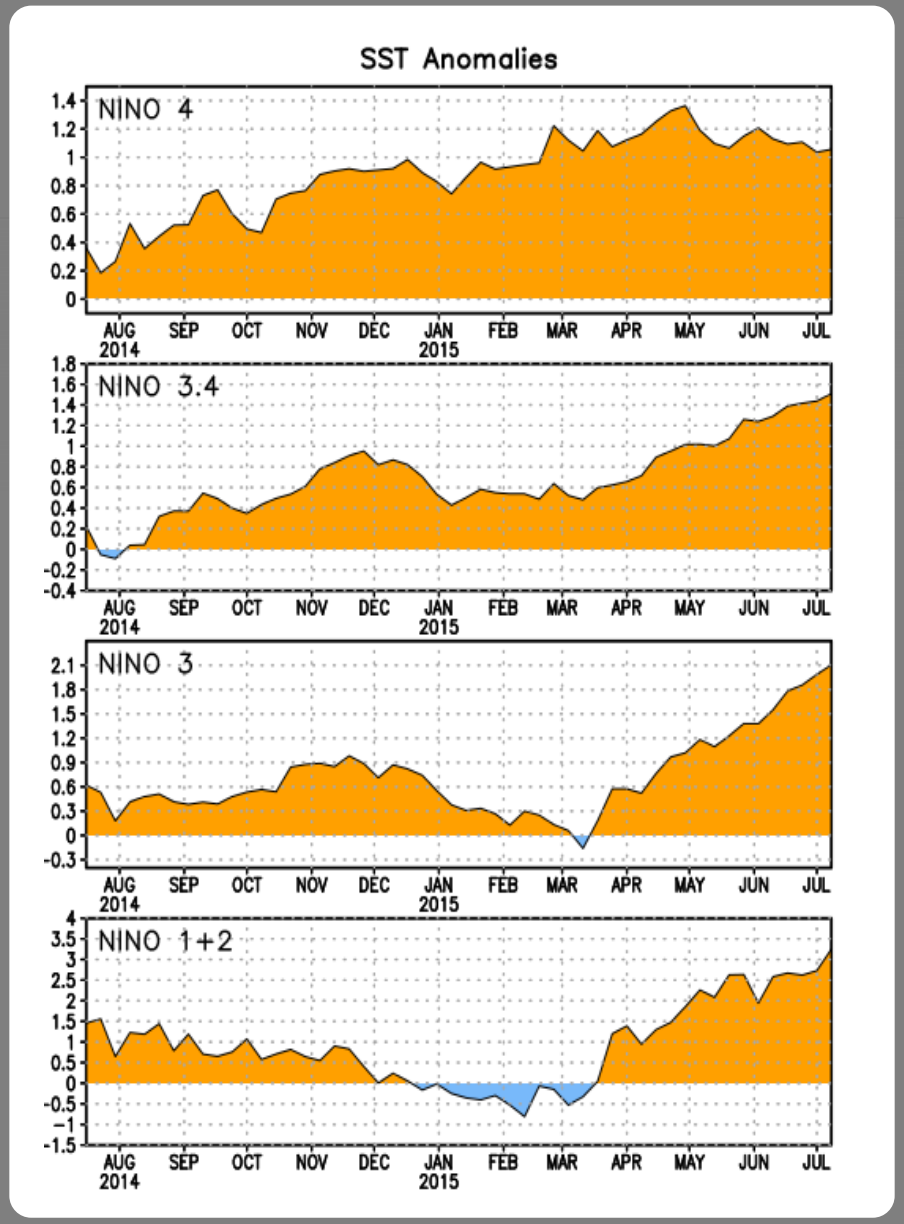
animation

Niño Region SST Departures (ºC) Recent Evolution

The latest weekly SST departures are:

Niño 4	**1.1ºC**
Niño 3.4	**1.5ºC**
Niño 3	**2.1ºC**
Niño 1+2	**3.3ºC**



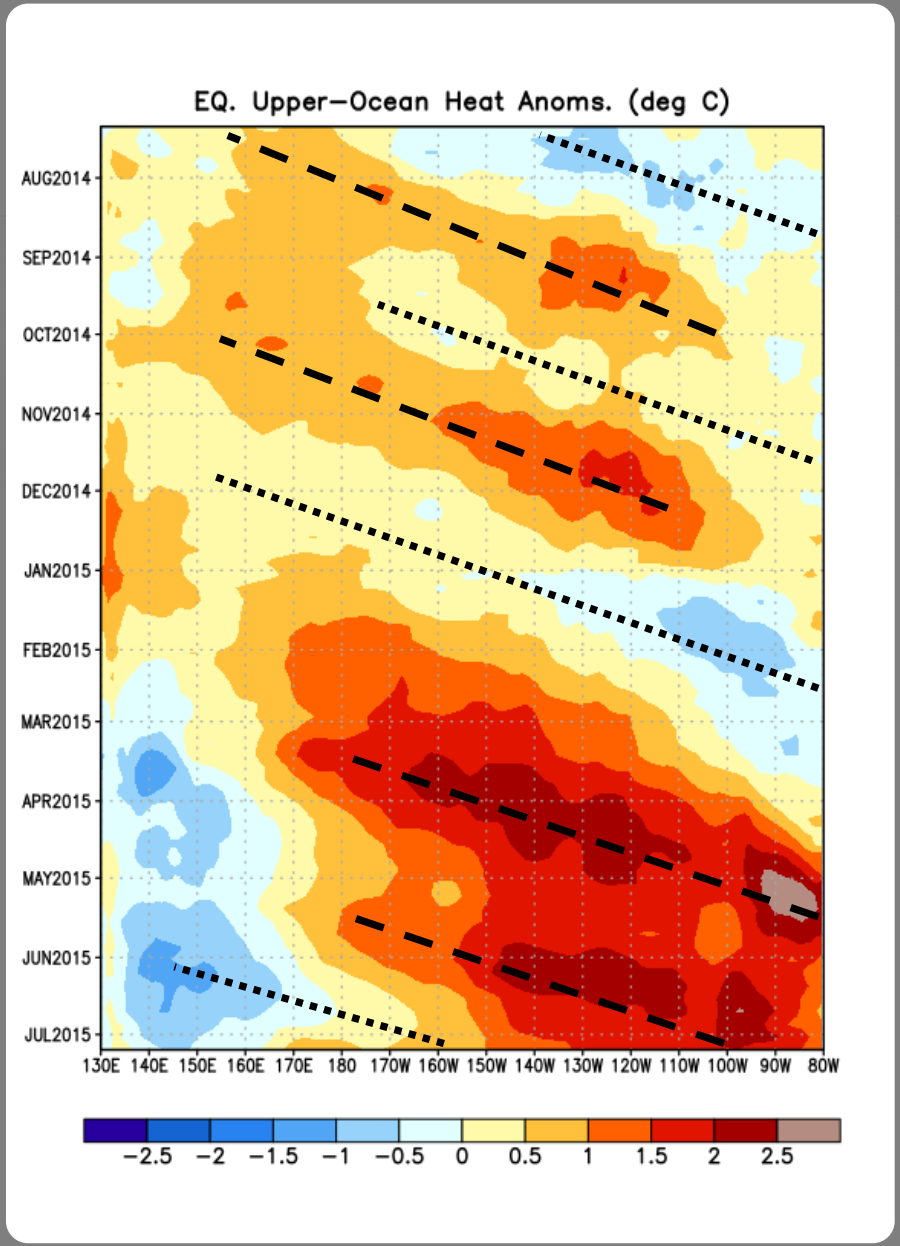


Weekly Heat Content Evolution in the Equatorial Pacific

During November - January, the upwelling phase of a Kelvin wave shifted eastward. This was followed by a significant downwelling Kelvin wave.

Since mid May, another downwelling phase of a Kelvin wave has shifted eastward.

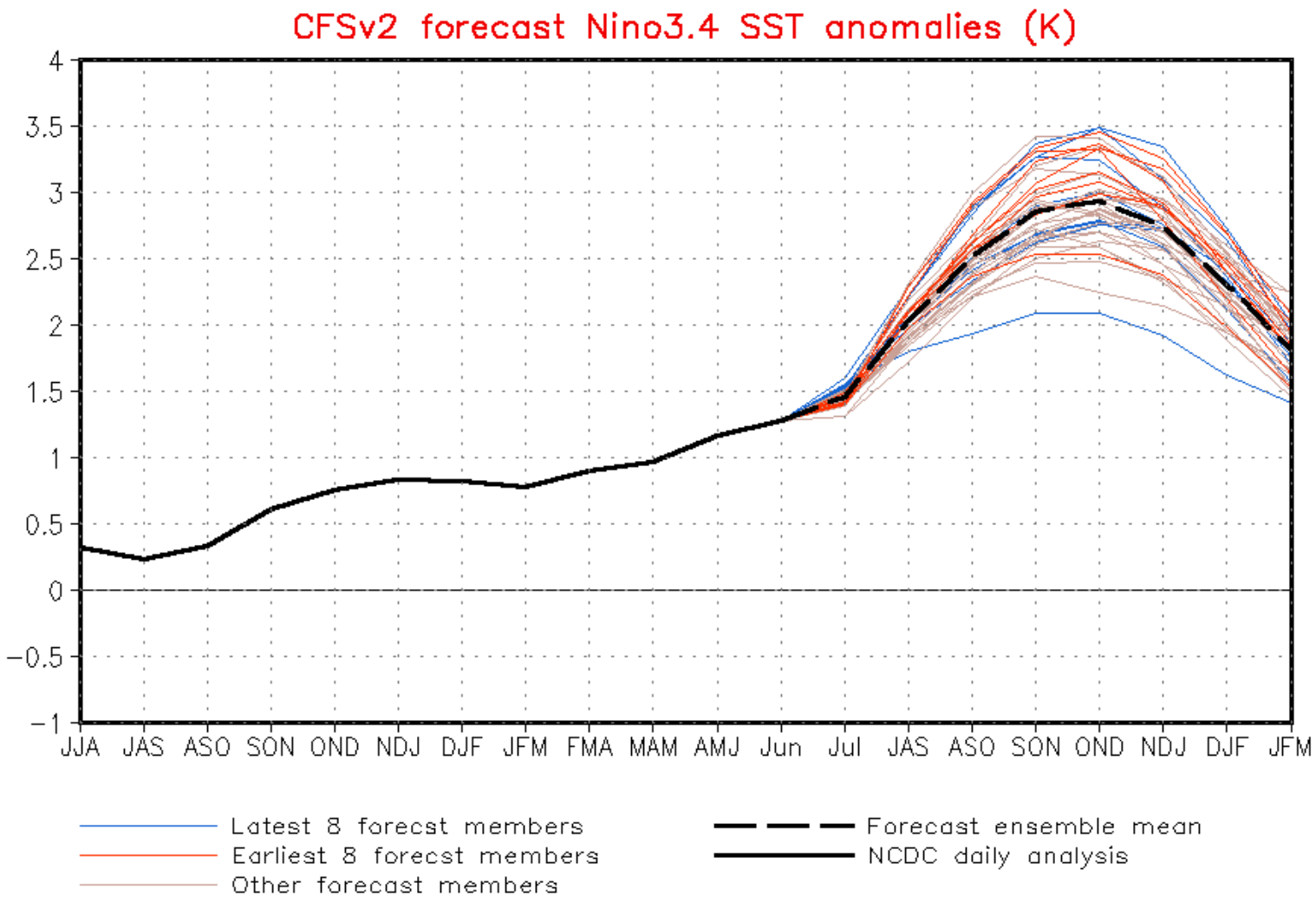
Since early June, an upwelling phase of a Kelvin wave has shifted eastward. In the eastern Pacific, above-average temperatures have persisted.



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

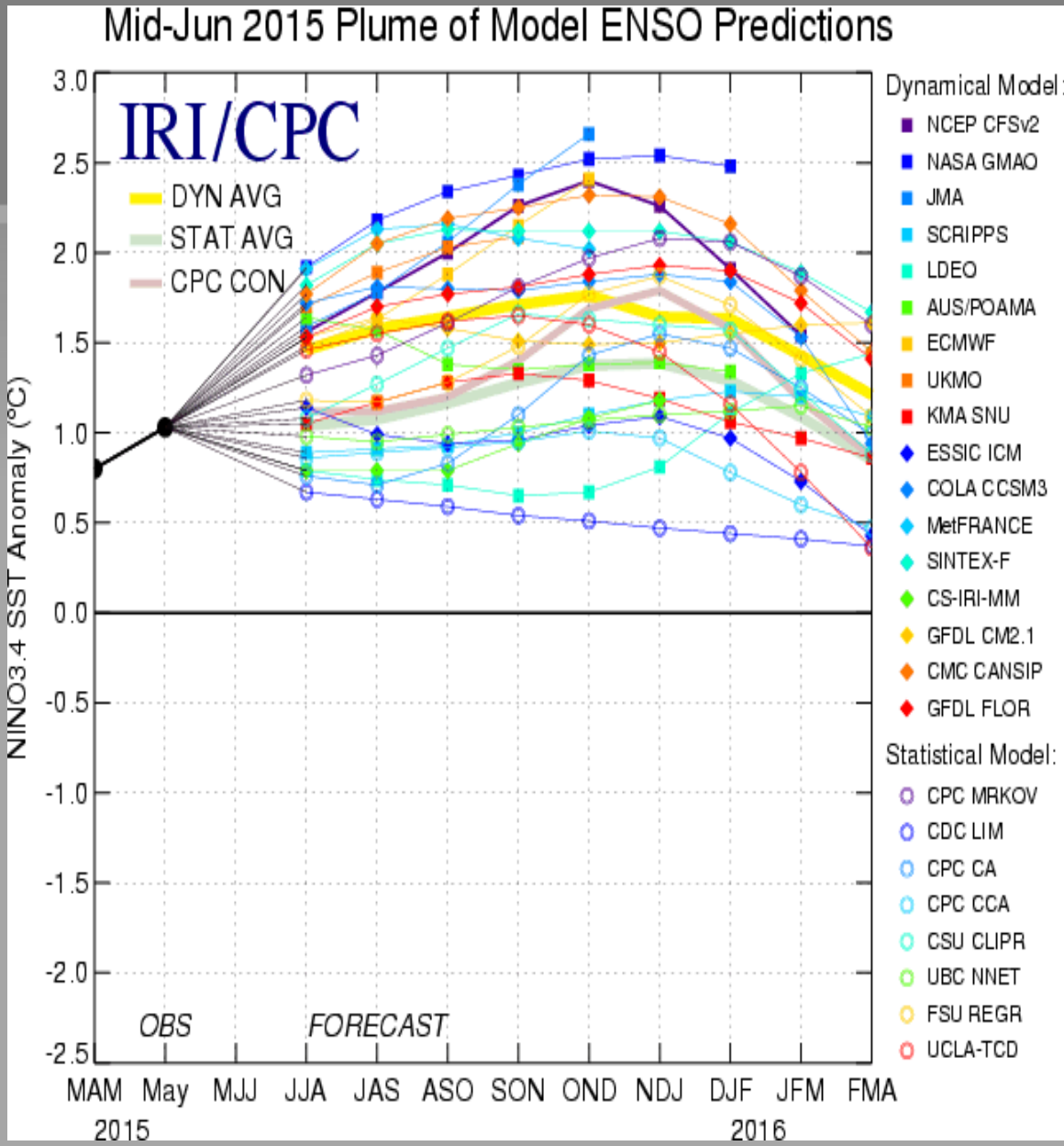
Last update: Fri Jul 10 2015
Initial conditions: 29Jun2015–8Jul2015



IRI/CPC Pacific Niño 3.4 SST Model Outlook

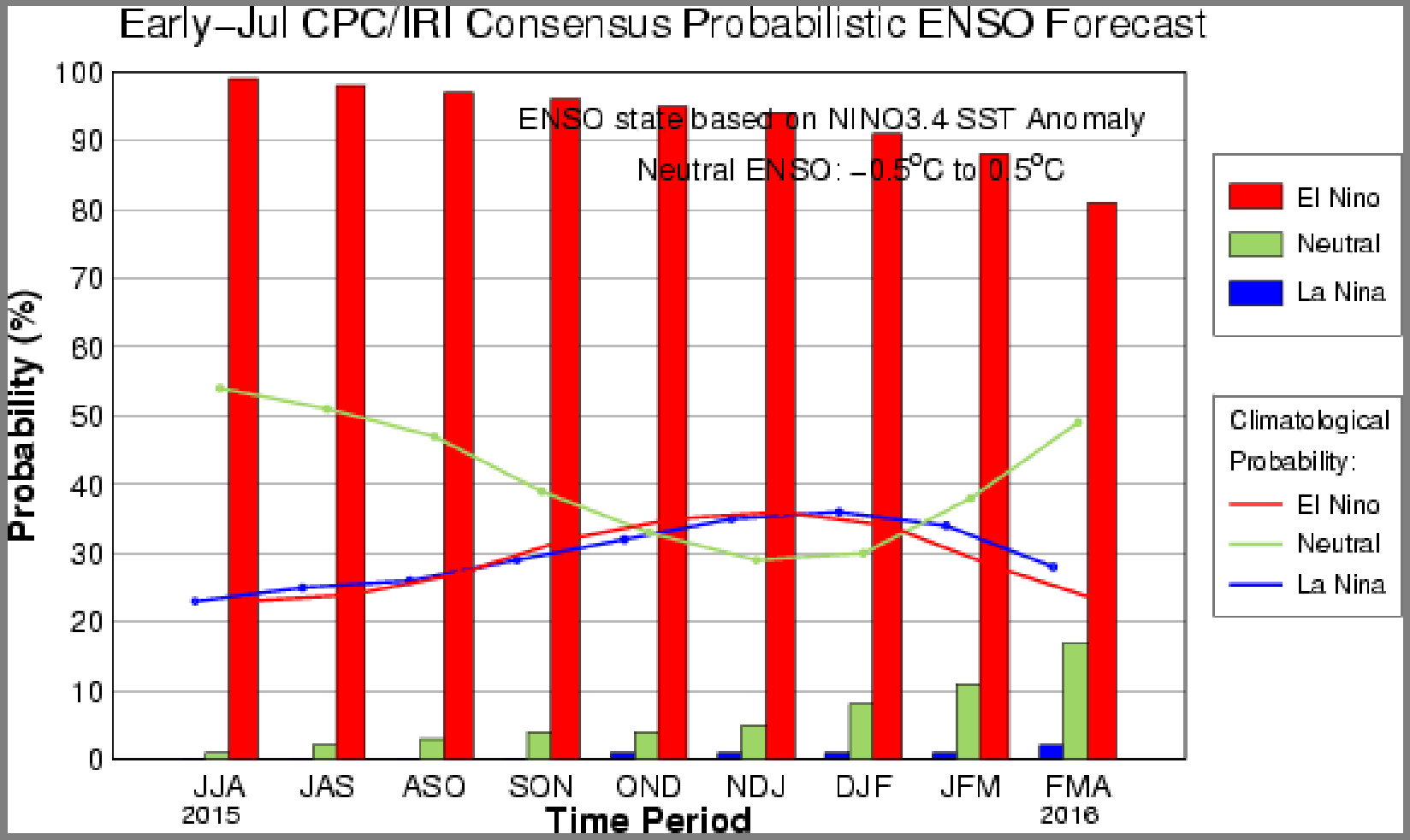
Almost all of the models indicate Niño 3.4 SST anomalies will remain greater than or equal to +0.5C through the end of 2015.

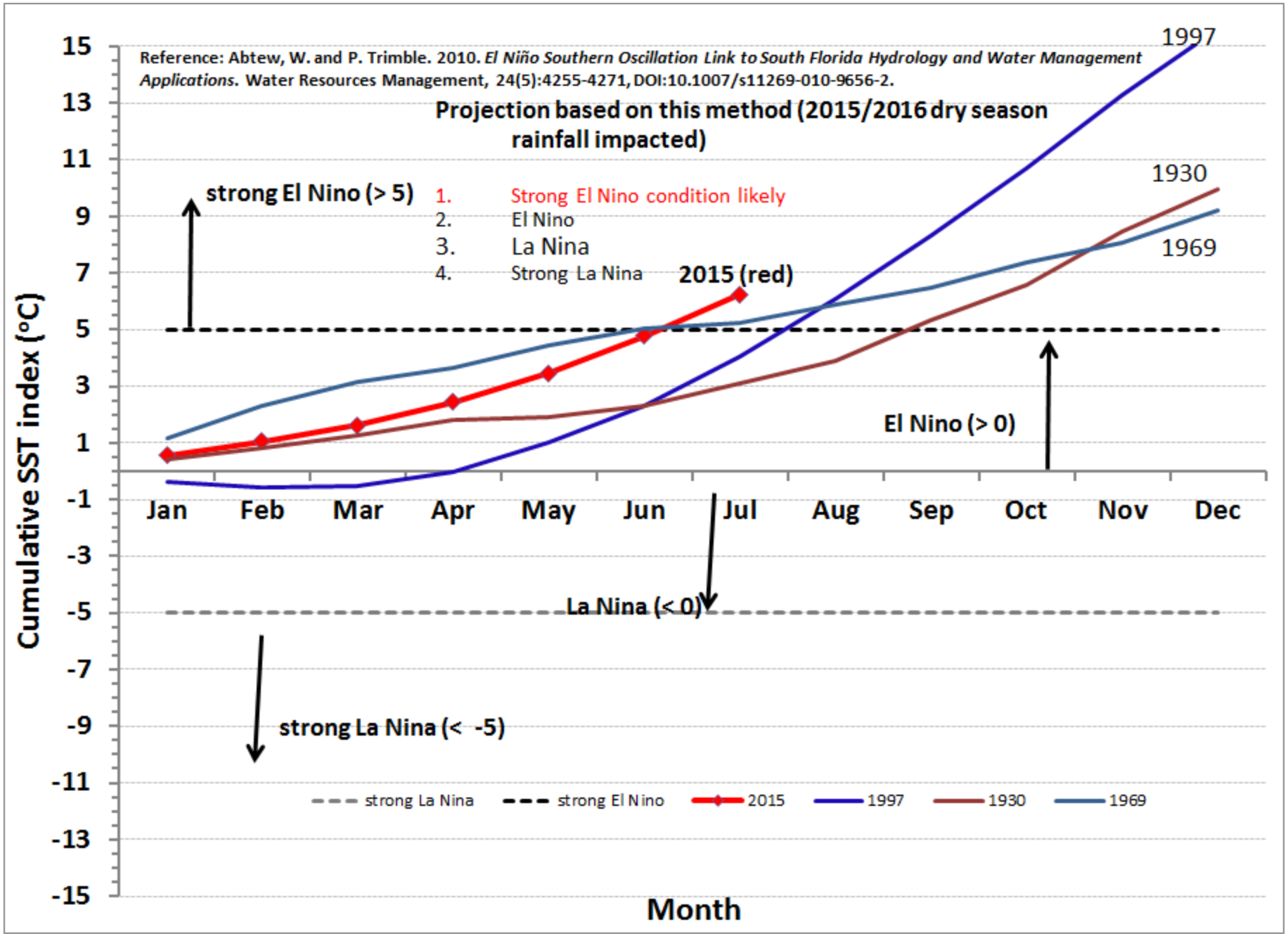
The dynamical model average and CPC CON suggest that Niño 3.4 will exceed +1.5C (a "strong" El Niño) later on this year.



CPC/IRI Probabilistic ENSO Outlook
Updated: 9 July 2015

The chance of El Niño is approximately 80-98% through 2015.




Reference: Abtew, W. and P. Trimble. 2010. El Niño Southern Oscillation Link to South Florida Hydrology and Water Management Applications. Water Resources Management, 24(5):4255-4271, DOI:10.1007/s11269-010-9656-2.
Projection based on this method (2015/2016 dry season rainfall impacted)
strong El Nino (> 5)
1. Strong El Nino condition likely
2. El Nino
3. La Nina
4. Strong La Nina
2015 (red)
1997
1930
1969
El Nino (> 0)
La Nina (< 0)
strong La Nina (< -5)
Cumulative SST index (°C)
15
13
11
9
7
5
3
1
-1
-3
-5
-7
-9
-11
-13
-15
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Month
strong La Nina
strong El Nino
2015
1997
1930
1969

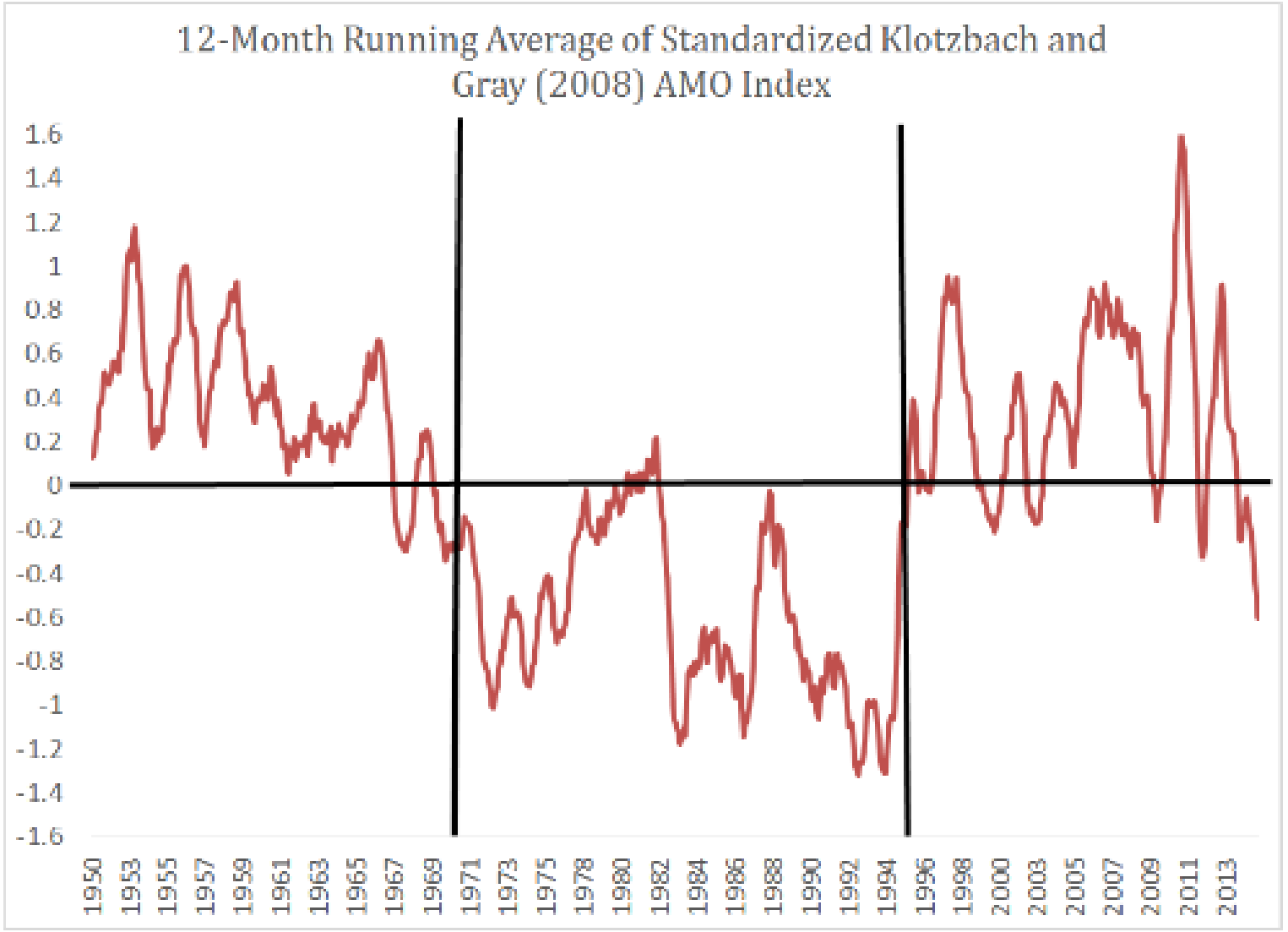
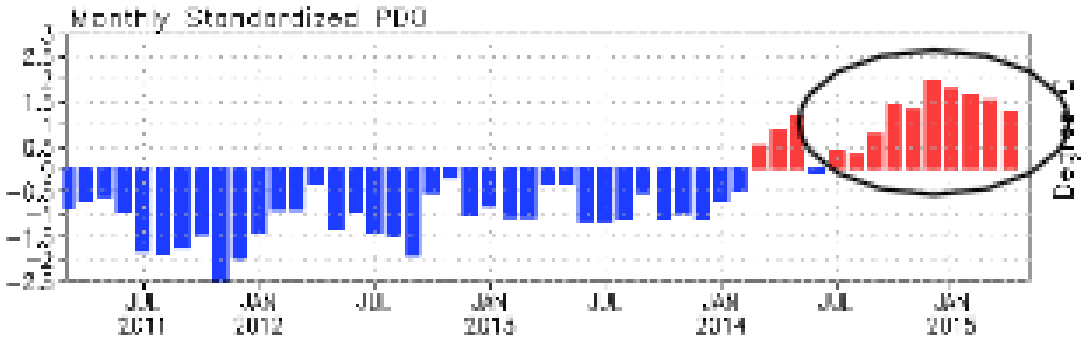
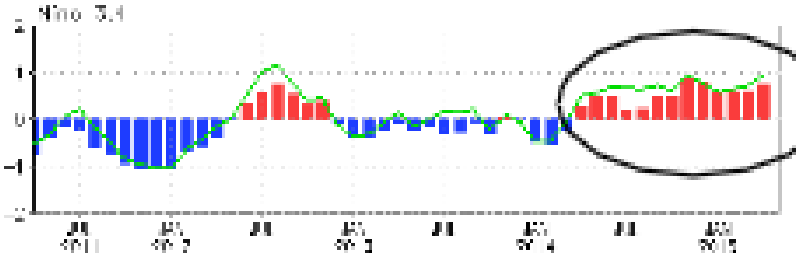
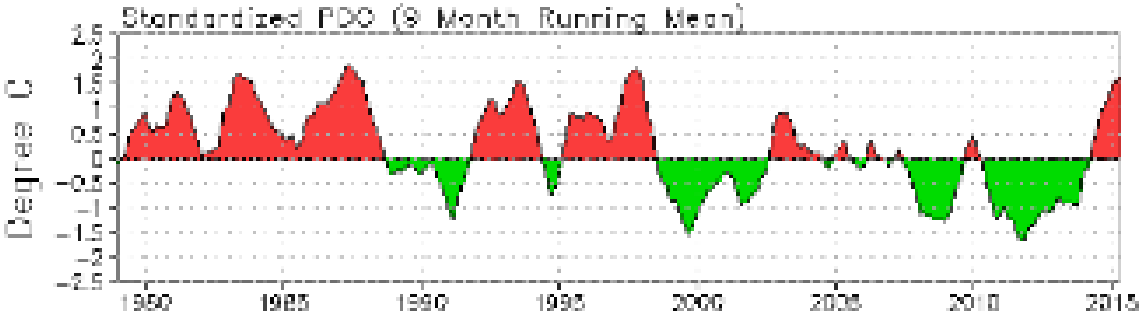


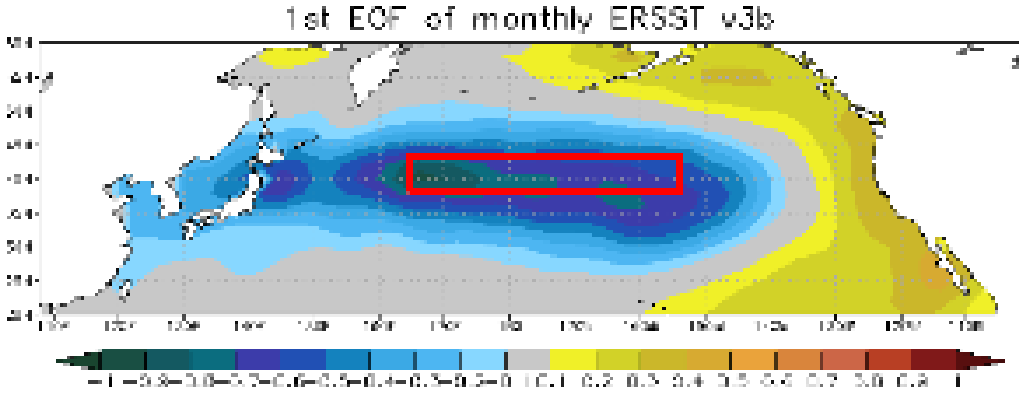
Figure 17: 12-month running average values of our standardized index of the AMO/THC. Current 12-month running average values are at their lowest since 1994.

Pacific Decadal Oscillation









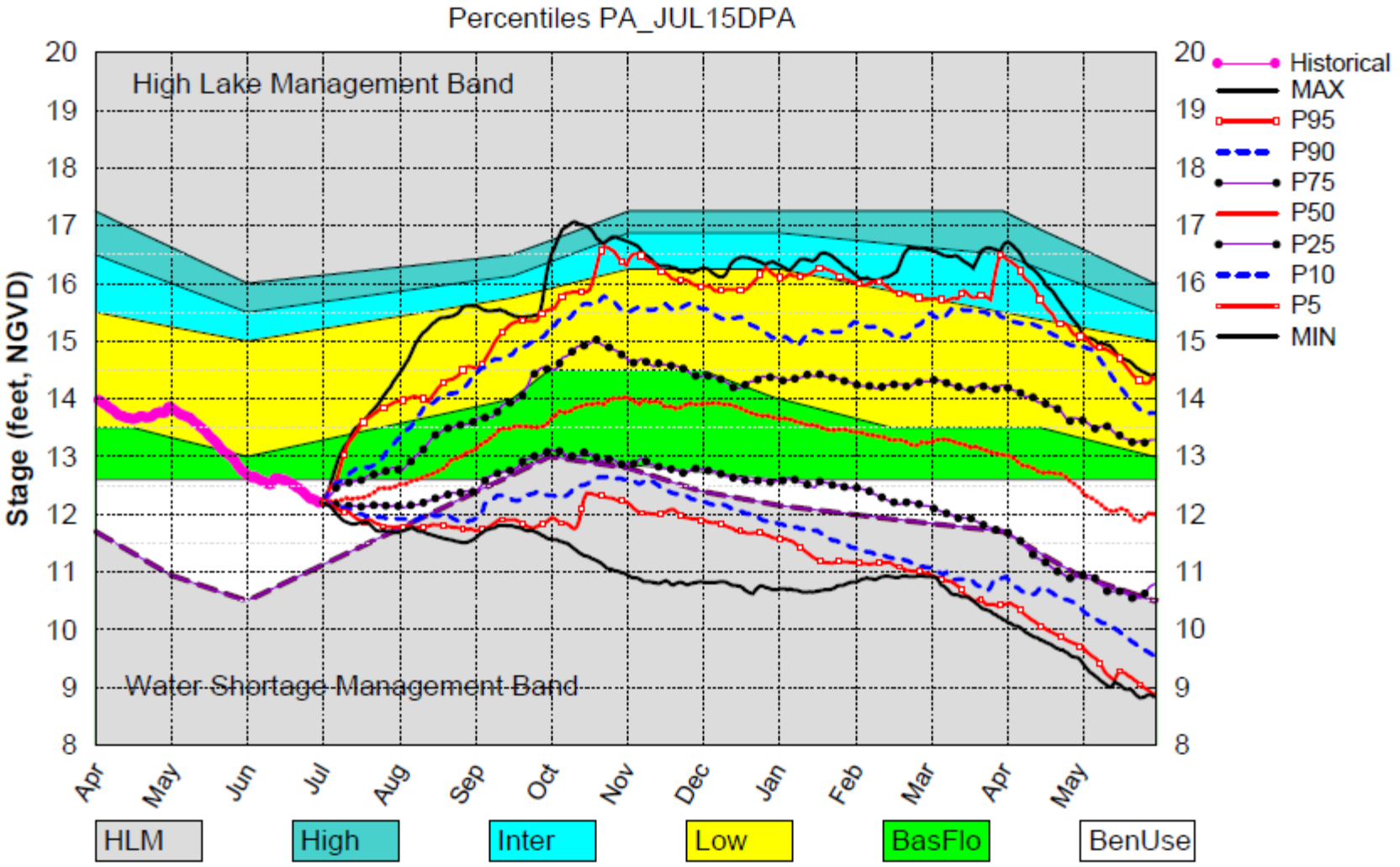
- The positive phase of PDO index has persisted 10 months since Jul 2014 with PDO index =1.3 in Apr 2015.

- Statistically, ENSO leads PDO by 3-4 months, may through atmospheric bridge.

- Pacific Decadal Oscillation is defined as the 1st EOF of monthly ERSST v3b in the North Pacific for the period 1900-1993. PDO index is the standardized projection of the monthly SST anomalies onto the 1st EOF pattern.

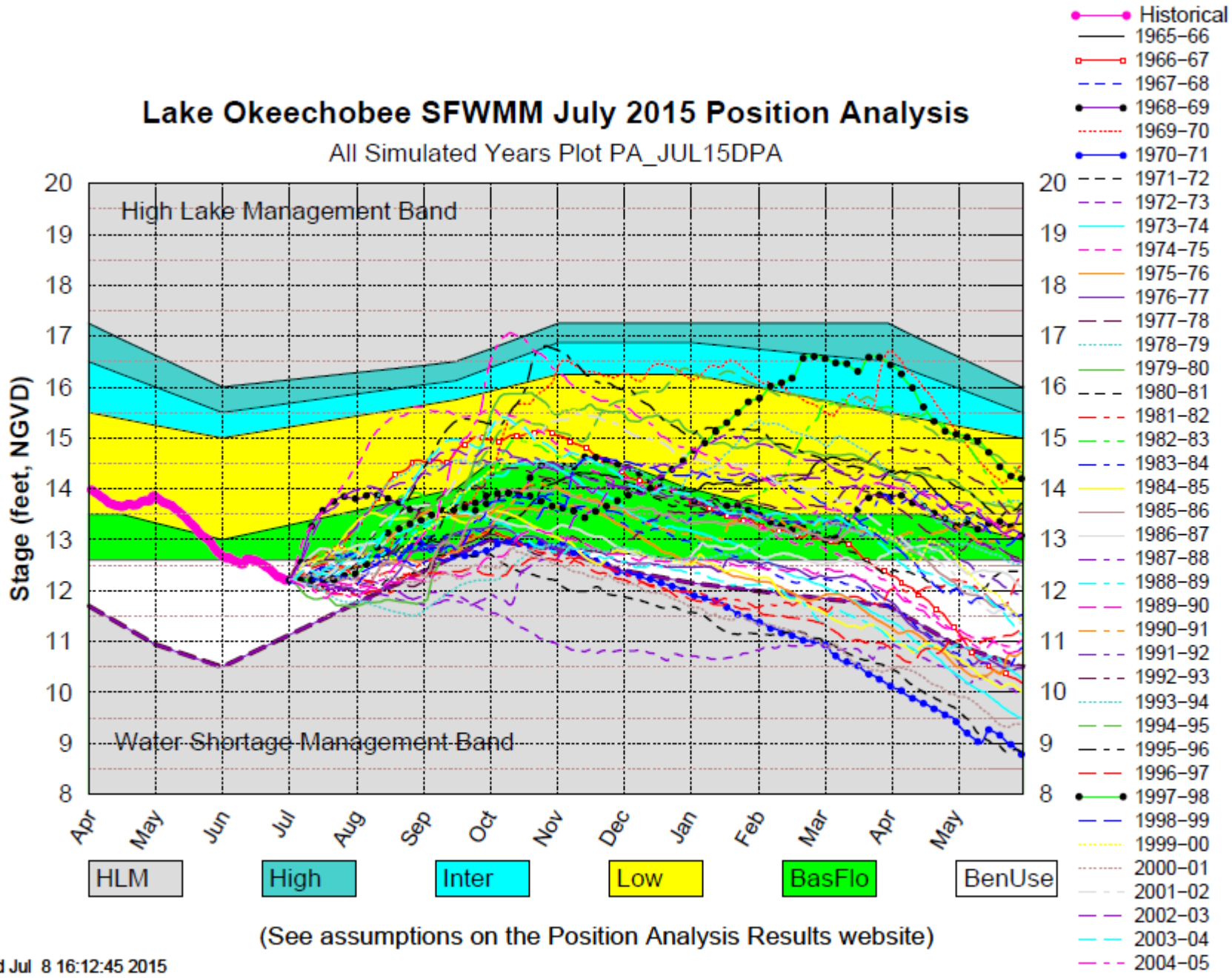
- The PDO index differs slightly from that of JISAO, which uses a blend of UKMET and OIv1 and OIv2 SST.

Lake Okeechobee SFWMM July 2015 Position Analysis



(See assumptions on the Position Analysis Results website)

Wed Jul 8 16:10:20 2015



(See assumptions on the Position Analysis Results website)

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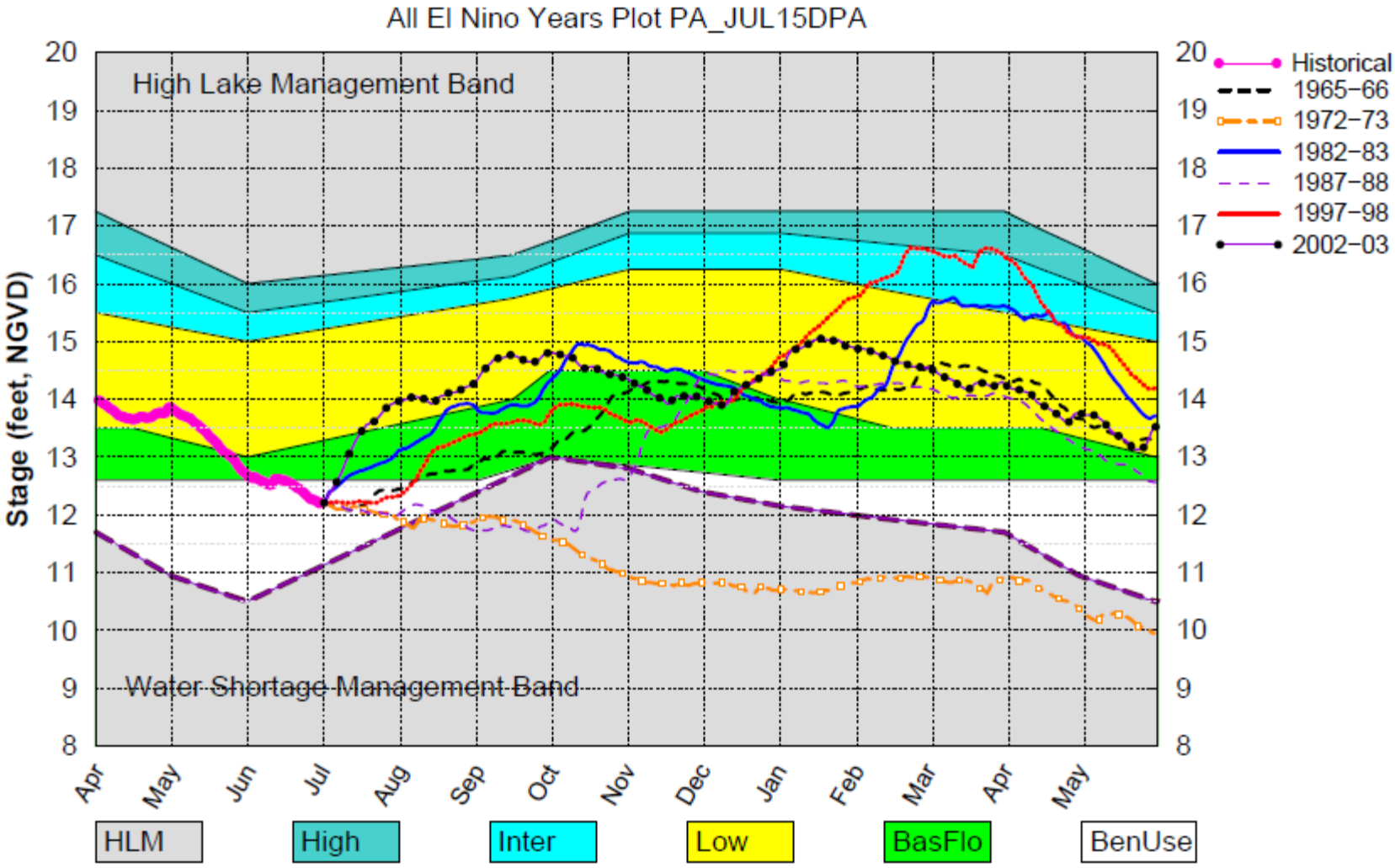
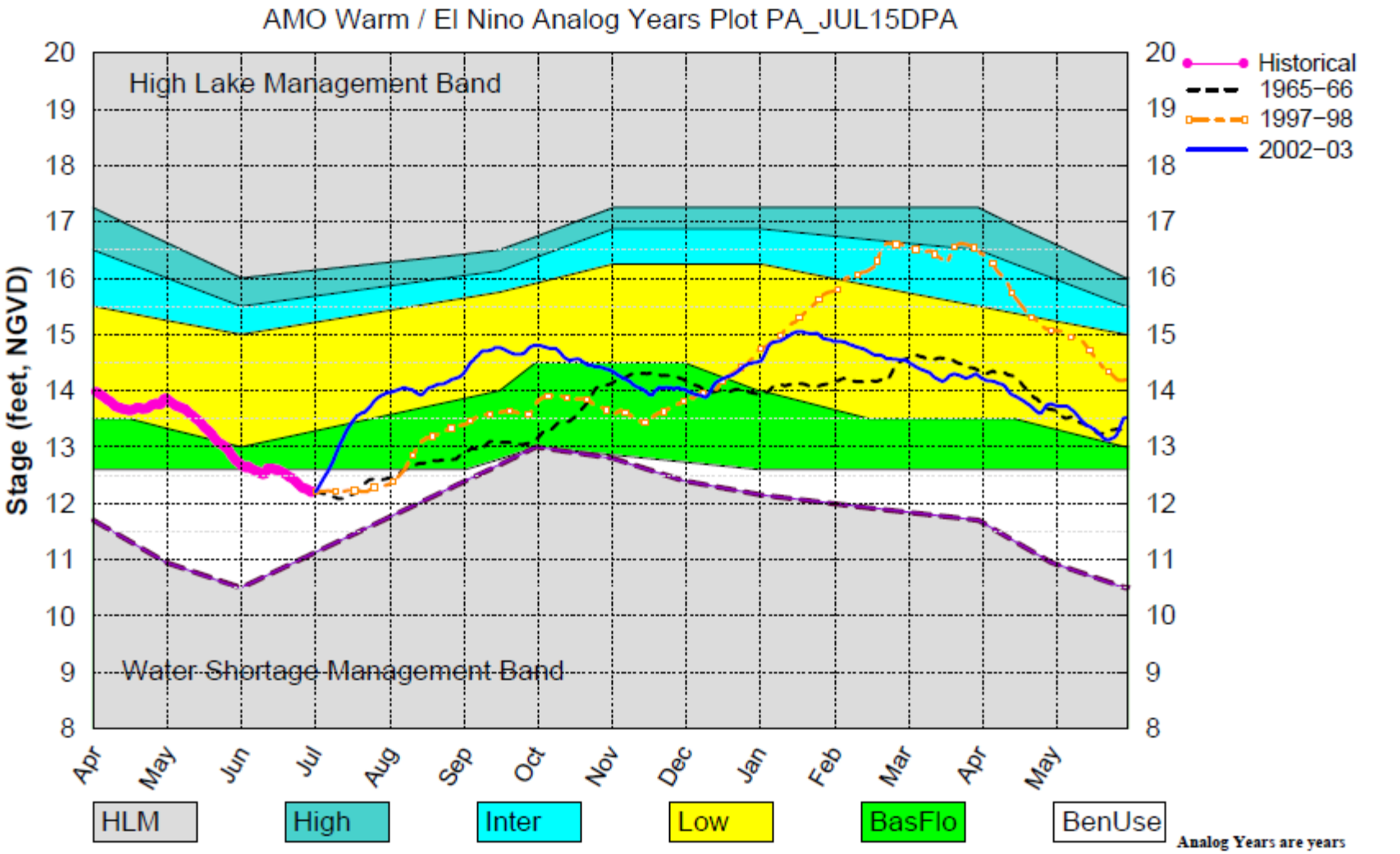
Lake Okeechobee SFWMM July 2015 Position Analysis



(See assumptions on the Position Analysis Results website)

Wed Jul 8 16:10:47 2015

Lake Okeechobee SFWMM July 2015 Position Analysis



(See assumptions on the Position Analysis Results website)

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

Wed Jul 8 16:10:51 2015

Early Tropical Season Outlook

ENSO Impacts on U.S. regional Hurricane Activity

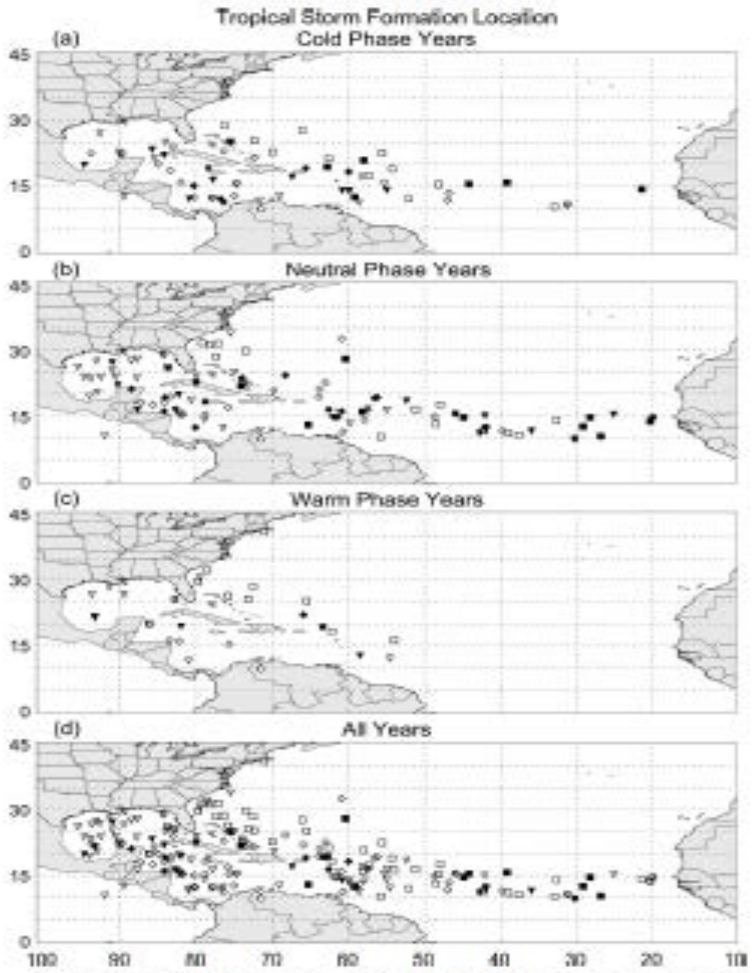


FIG. 5. Location at which hurricanes making landfall in the United States are first designated as a tropical storm (or stronger) within the HURDAT for ENSO (a) cold, (b) neutral, and (c) warm phases and (d) all years combined. Landfall location is separated into East Coast (square), Florida (diamond), and Gulf Coast (inverted triangle). Open symbols are hurricanes that made landfall as a category-1 or -2 storm, and closed symbols are hurricanes that made landfall as a category-3, -4, or -5 storm. Note that storms may move across land as a tropical storm and make landfall in a different region as a hurricane.

Journal of Climate

ENSO's Impact on Regional U.S. Hurricane Activity

SHAWN R. SMITH, JUSTIN BROLLEY, JAMES J. O'BRIEN, AND CARISSA A. TARTAGLIONE

Center for Ocean–Atmospheric Prediction Studies, The Florida State University, Tallahassee, Florida

(Manuscript received 5 December 2005, in final form 19 June 2006)

ABSTRACT

Regional variations in North Atlantic hurricane landfall frequency along the U.S. coastline are examined in relation to the phase of El Niño–Southern Oscillation (ENSO). ENSO warm (cold) phases are known to reduce (increase) hurricane activity in the North Atlantic basin as a whole. Using best-track data from the U.S. National Hurricane Center, regional analysis reveals that ENSO cold-phase landfall frequencies are only slightly larger than neutral-phase landfall frequencies along the Florida and Gulf coasts. However, for the East Coast, from Georgia to Maine, a significant decrease in landfall frequency occurs during the neutral ENSO phase as compared to the cold phase. Along the East Coast, two or more major (category 3 or above) hurricanes never made landfall in the observational record (1900–2004) during a single hurricane season classified as an ENSO neutral or warm phase.

Total Number of Hurricanes
El Niño is listed here as "Warm"

Total Number of Major Hurricanes
El Niño is listed here as "Warm"

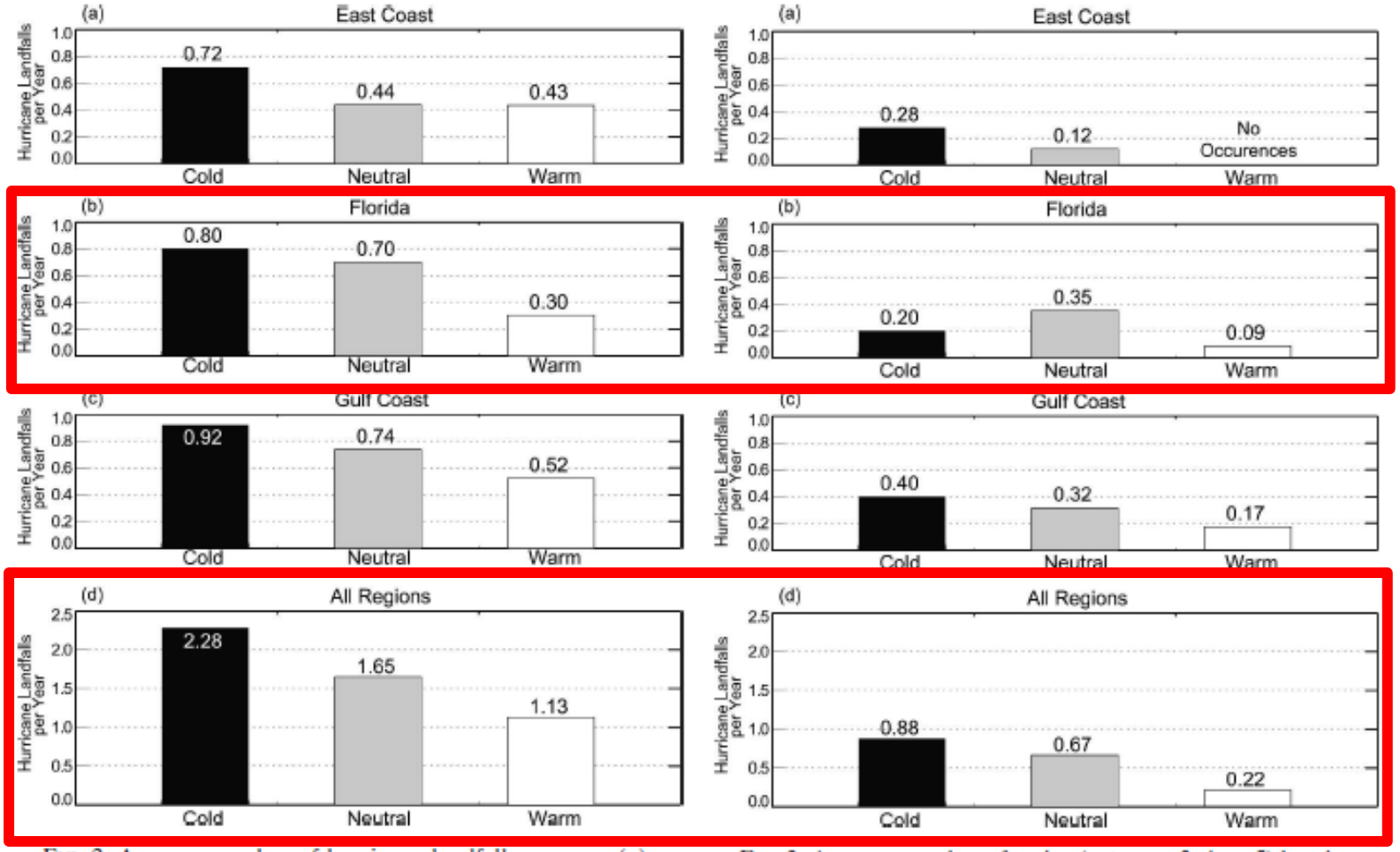
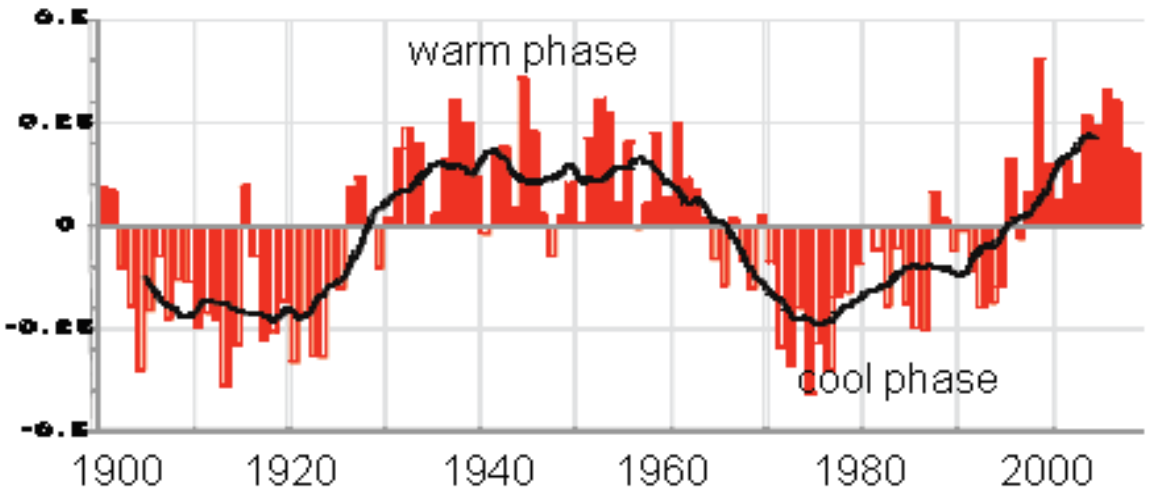


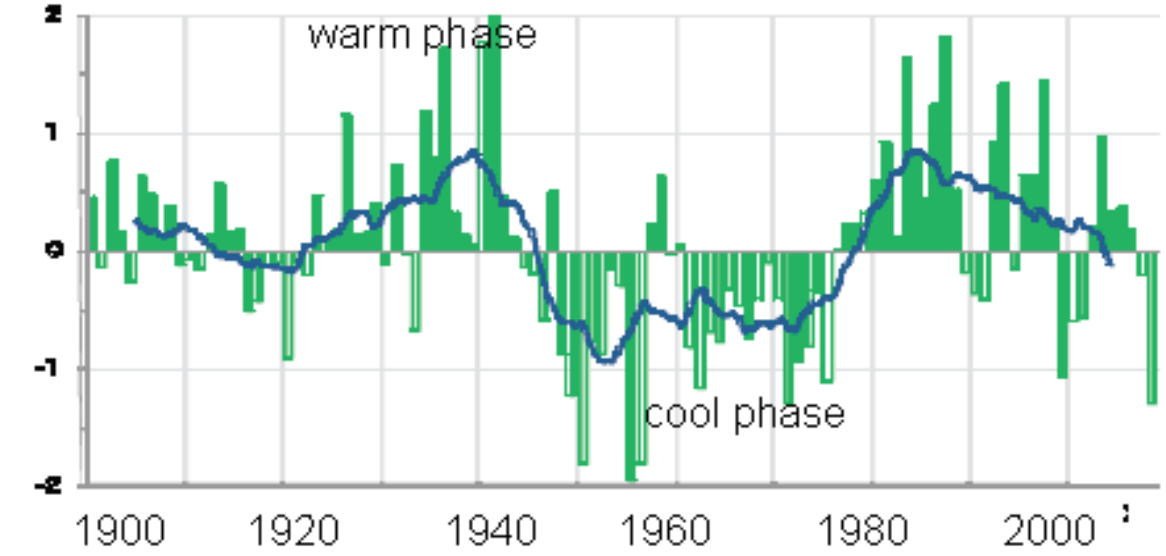
FIG. 2. Average number of hurricane landfalls per year (a) on the East Coast (except Florida), (b) in Florida, (c) along the Gulf Coast (except Florida), and (d) along the entire U.S. coastline from 1900 to 2004 during years classified as cold, neutral, or warm ENSO phases. As an example of how to interpret these averages, approximately one (0.92) landfall occurs per ENSO cold phase vs one landfall for every two ENSO warm phases (0.52) along the Gulf Coast.

FIG. 3. Average number of major (category 3, 4, or 5) hurricane landfalls per year (a) on the East Coast (except Florida), (b) in Florida, (c) along the Gulf Coast (except Florida), and (d) along the entire U.S. coastline from 1900 to 2004 during years classified as cold, neutral, or warm ENSO phases. Within the 1900–2004 period, there were no occurrences of major hurricane landfalls along the East Coast during ENSO warm phases.

Backup Slides

Time series of multidecadal climate regimes





Atlantic Multidecadal Oscillation (AMO)

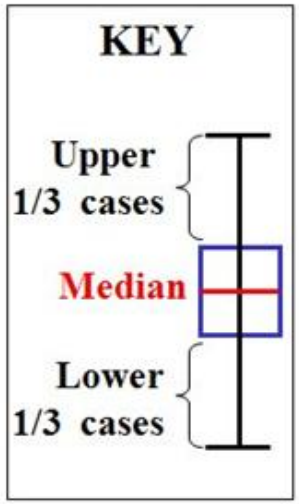
In warm phase since 1995

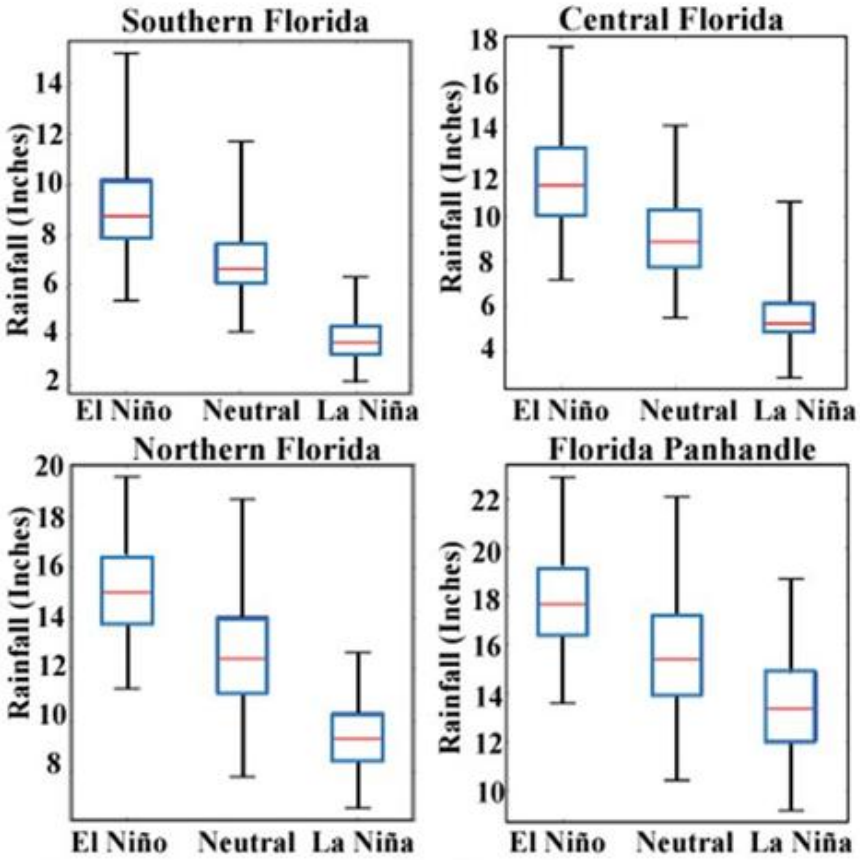
Pacific Decadal Oscillation (PDO)

Just entering cool phase

Figure Courtesy: M. Jelinek

Florida Winter Rainfall (Inches)





Throughout Florida, El Niño, Neutral, and La Niña wintertime rainfall differ dramatically

Atlantic Multidecadal Warm and Cold Phases

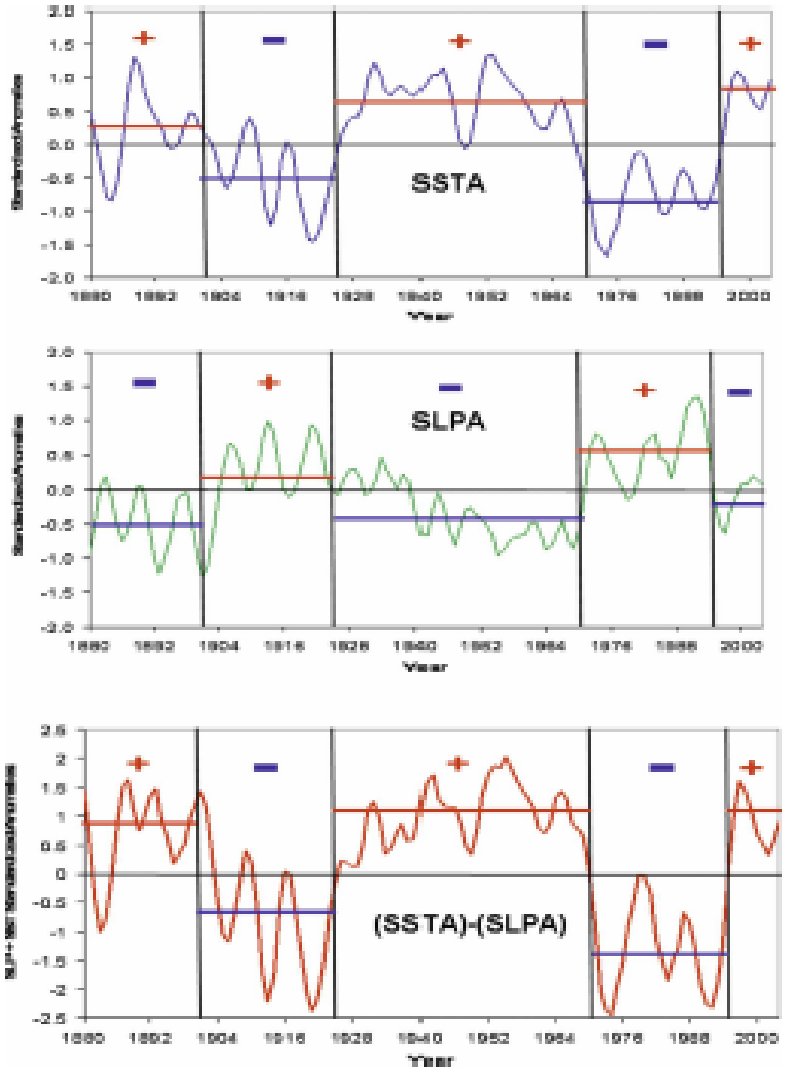
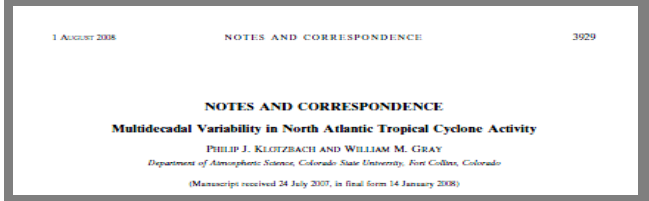


FIG. 1. Standardized values of (top) North Atlantic SSTA for the area from 50°–60°N and from 50°–10°W, (middle) North Atlantic SLPA for the area from 0°–30°N and from 70°–10°W, and (bottom) the combination of these two parameters (SSTA − SLPA) taken to be the strength of the AMO from 1880 to 2004. Horizontal lines indicate average values for the multidecadal period, while (+) and (−) symbols indicate that positive or negative values of the particular index predominated during that period. A 1–2–3–2–1 filter has been applied to the data.

JOURNAL OF CLIMATE



1 AUGUST 2008 NOTES AND CORRESPONDENCE 3929

NOTES AND CORRESPONDENCE

Multidecadal Variability in North Atlantic Tropical Cyclone Activity

PHILIP J. KLOTZBACH AND WILLIAM M. GRAY

Department of Atmospheric Science, Colorado State University, Fort Collins, Colorado

(Manuscript received 24 July 2007, in final form 14 January 2008)

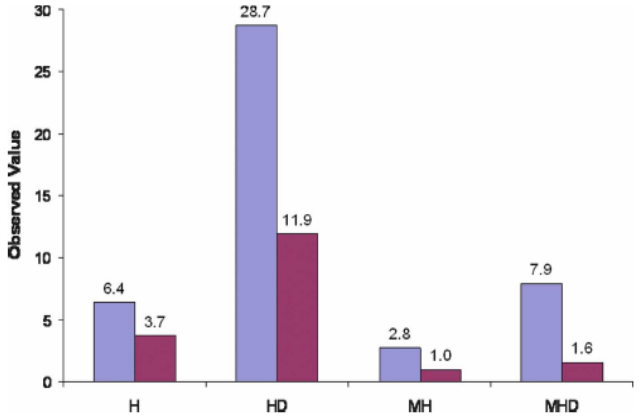
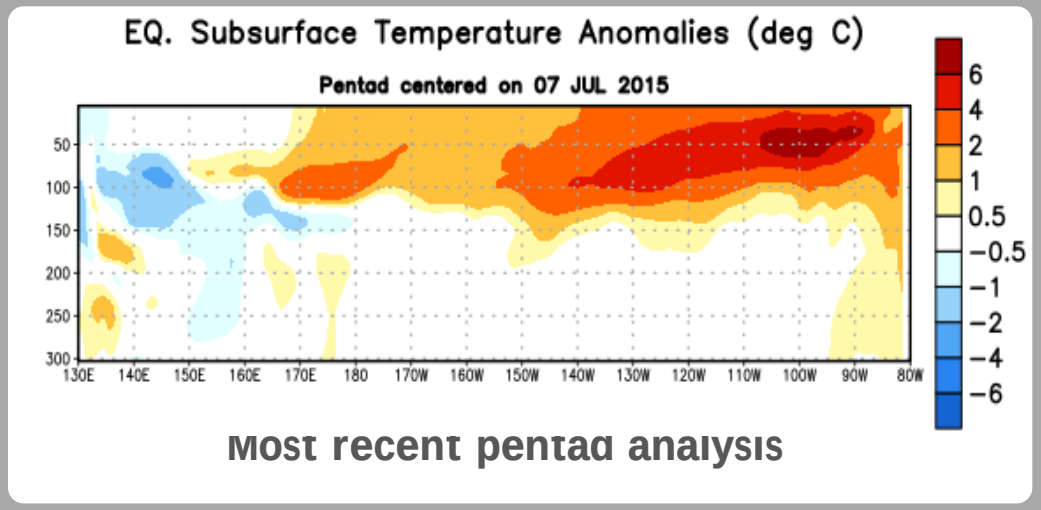


FIG. 2. Annually averaged Atlantic basin H, HD, MH, and MHD for the top 20 AMO years (blue bar) and the bottom 20 AMO years (red bar).

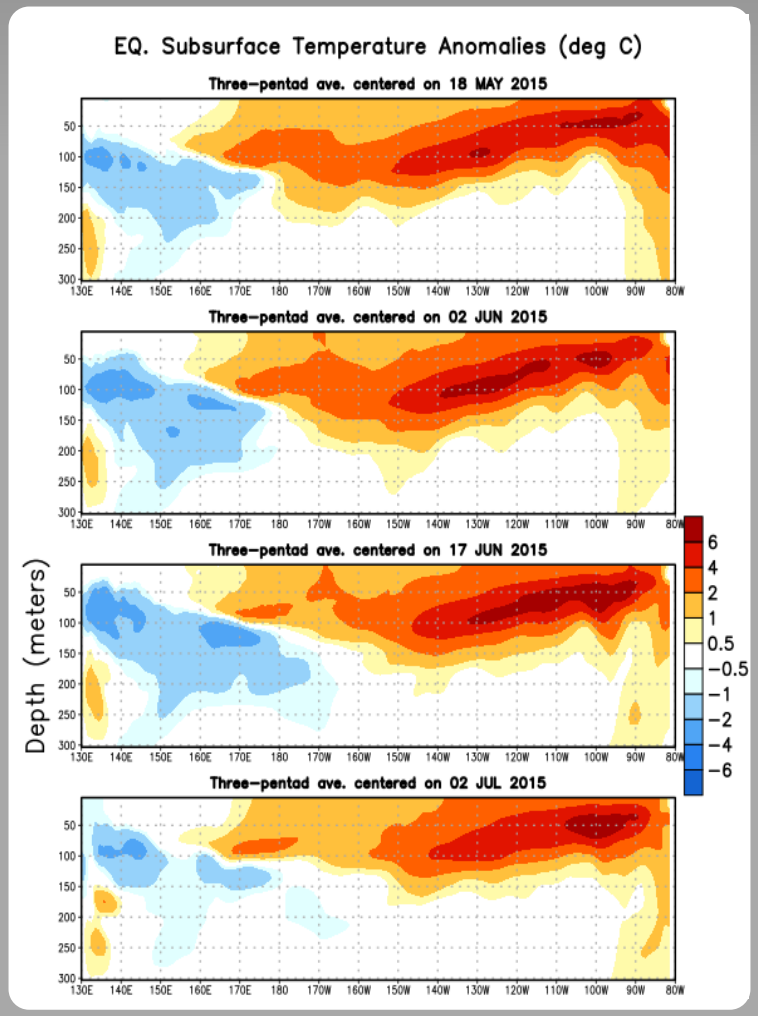
Sub-Surface Temperature Departures in the Equatorial Pacific

During the last two months, positive subsurface temperature anomalies were observed across most of the equatorial Pacific

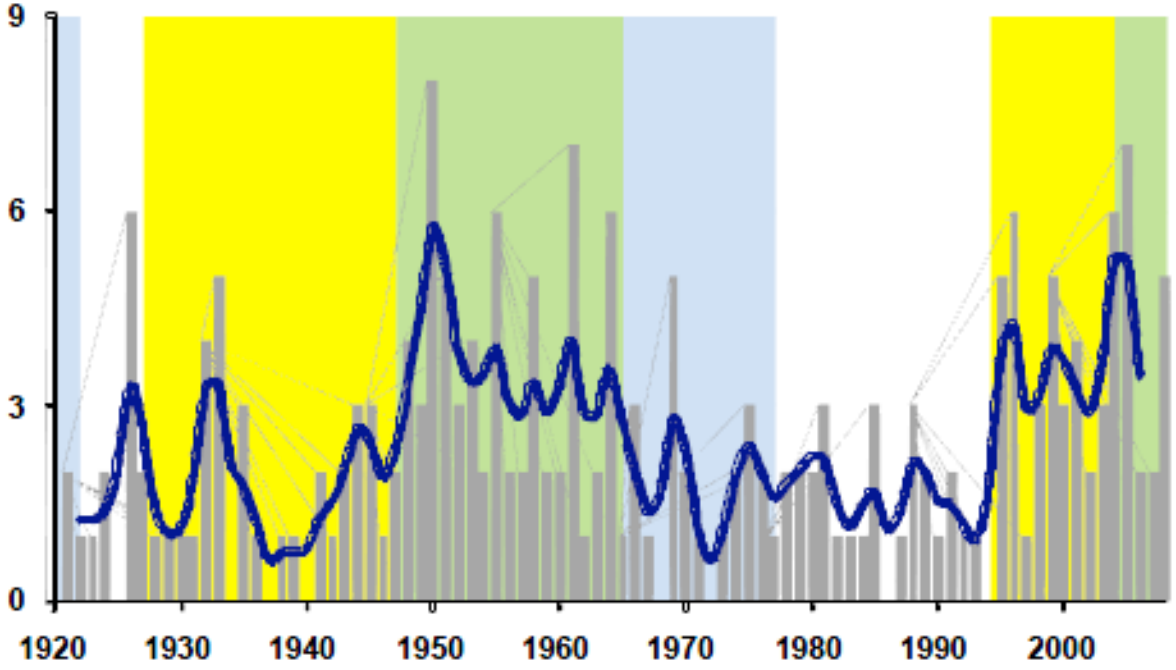


Most recent pentad analysis

Negative anomalies at depth have weakened in the western Pacific.



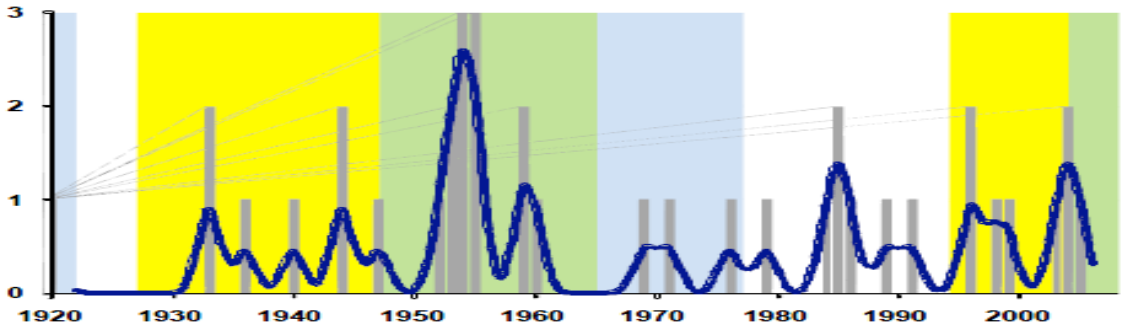
NATL Major Hurricanes



Strong increase in warm AMO, cool PDO

Figure Courtesy: M. Jelinek

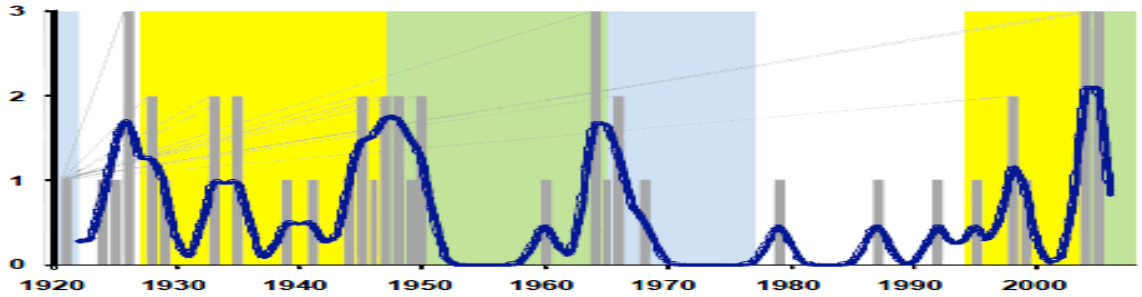
ATL coast landfalling hurricanes



More landfalls in warm AMO, cool PDO

Figure Courtesy: M. Jelinek

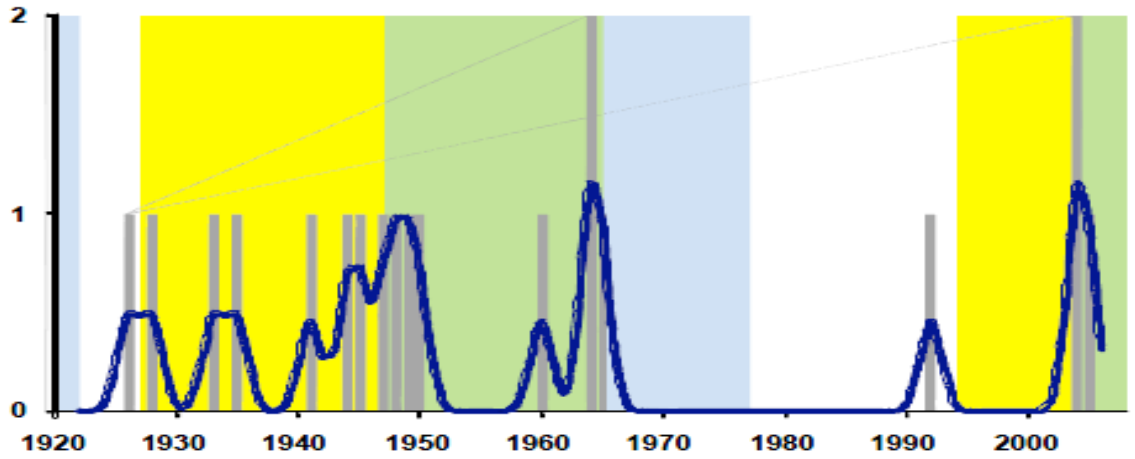
FL Landfalling Hurricanes



More landfalls in warm AMO

Figure Courtesy: M. Jelinek

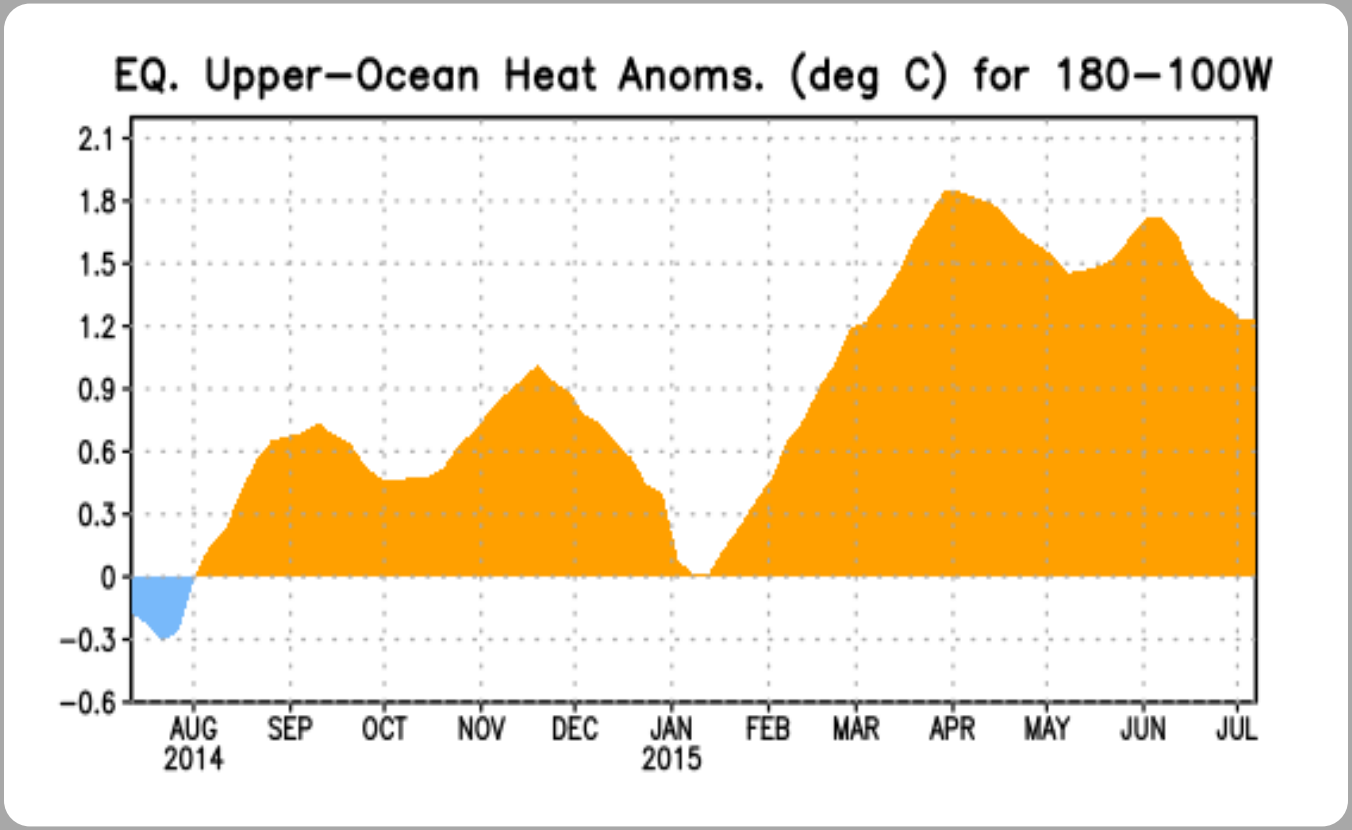
FL Landfalling Major Hurricanes

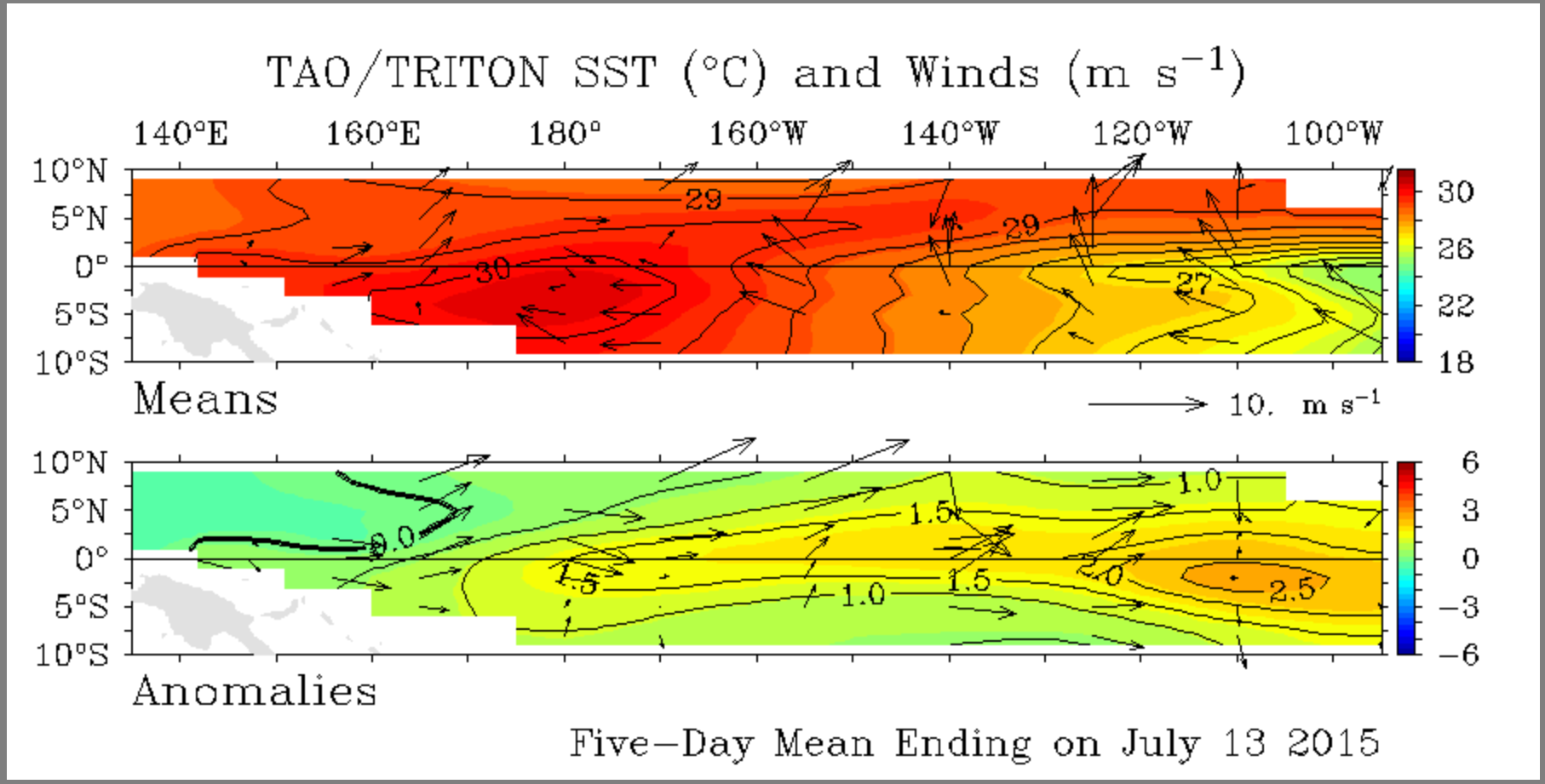


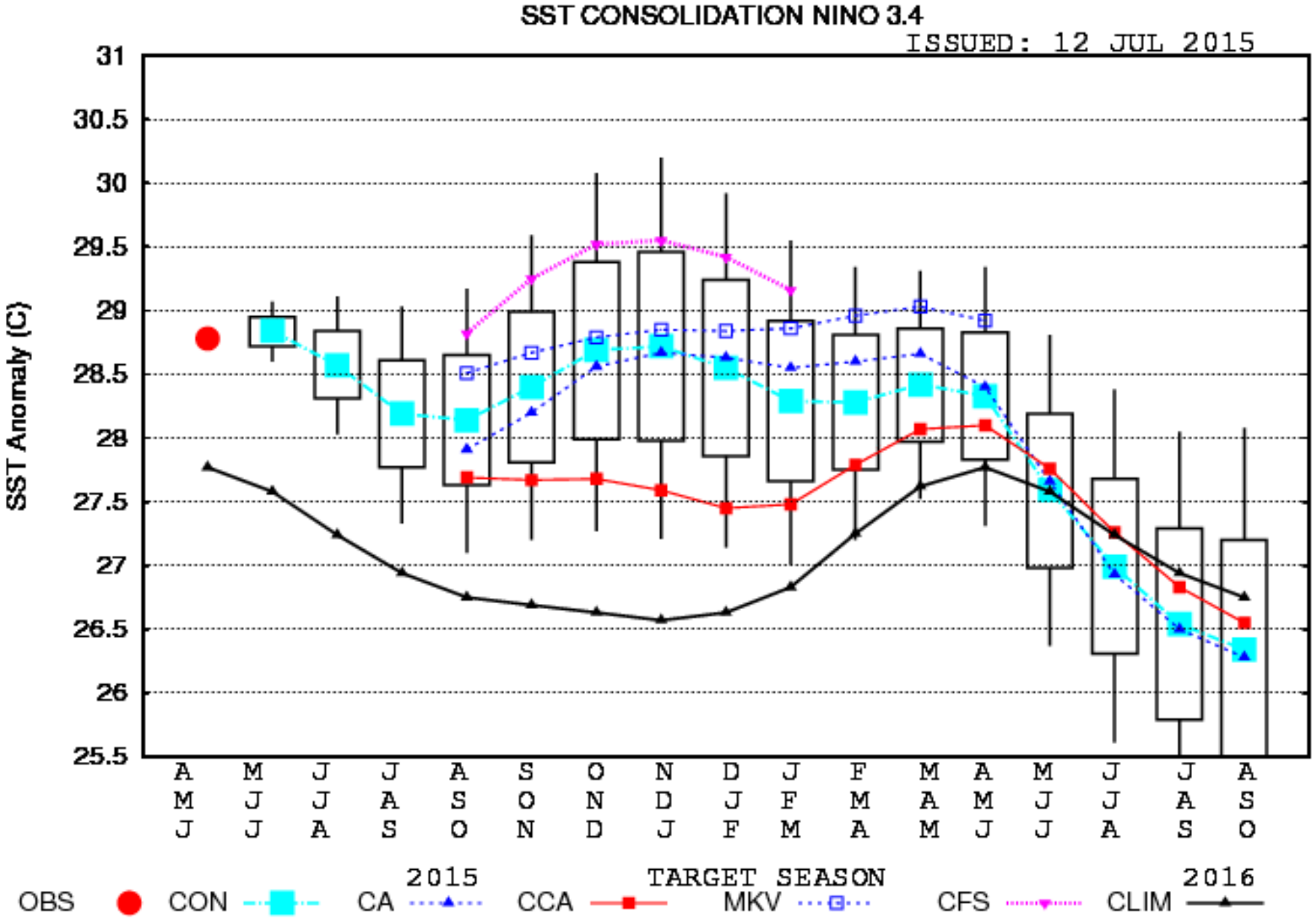
More major landfalls in warm AMO

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

Subsurface temperature anomalies increased from mid-October to mid-November 2014 before decreasing to near zero in early January 2015. Temperature anomalies grew from January to March, decreased during April, and increased during May. During June, anomalies decreased.




TAO/TRITON SST (°C) and Winds (m s^{-1})
140°E
160°E
180°
160°W
140°W
120°W
100°W
10°N
5°N
0°
5°S
10°S
29
30
29
27
30
26
22
18
Means
10. m s^{-1}
0.0
1.5
1.5
1.0
1.5
2.0
1.0
2.5
6
3
0
−3
−6
Anomalies
Five−Day Mean Ending on July 13 2015


SST CONSOLIDATION NINO 3.4
ISSUED: 12 JUL 2015
SST Anomaly (C)
31
30.5
30
29.5
29
28.5
28
27.5
27
26.5
26
25.5
A M J
M J J
J J A
J A S
A S O
S O N
O N D
N D J
D J F
J F M
F M A
M A M
A M J
M J J
J J A
J A S
A S O
2015
TARGET SEASON
2016
OBS
CON
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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.

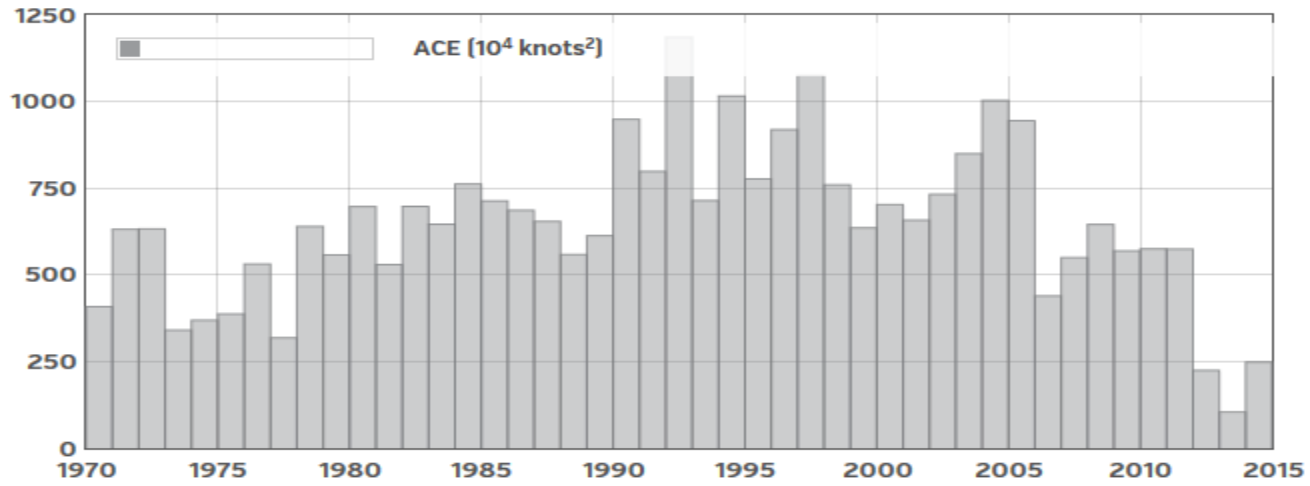
The ONI is one measure of the El Niño-Southern Oscillation, and other indices can confirm whether features consistent with a coupled ocean-atmosphere phenomenon accompanied these periods. The complete table going back to DJF 1950 can be found here.

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2003	0.9	0.6	0.4	0.0	-0.2	-0.1	0.1	0.2	0.3	0.4	0.4	0.4
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	0.0	0.0	0.0	0.2	0.4	0.6	0.6
2015	0.5	0.4	0.5	0.7	0.9							

Accumulated Cyclone Energy (ACE)

Atlantic | East Pacific | West Pacific | Indian Ocean | Southern Hemisphere | **Global**

Updated: February 13, 2015



Accumulated Cyclone Energy (ACE)

Atlantic | East Pacific | West Pacific | Indian Ocean | Southern Hemisphere

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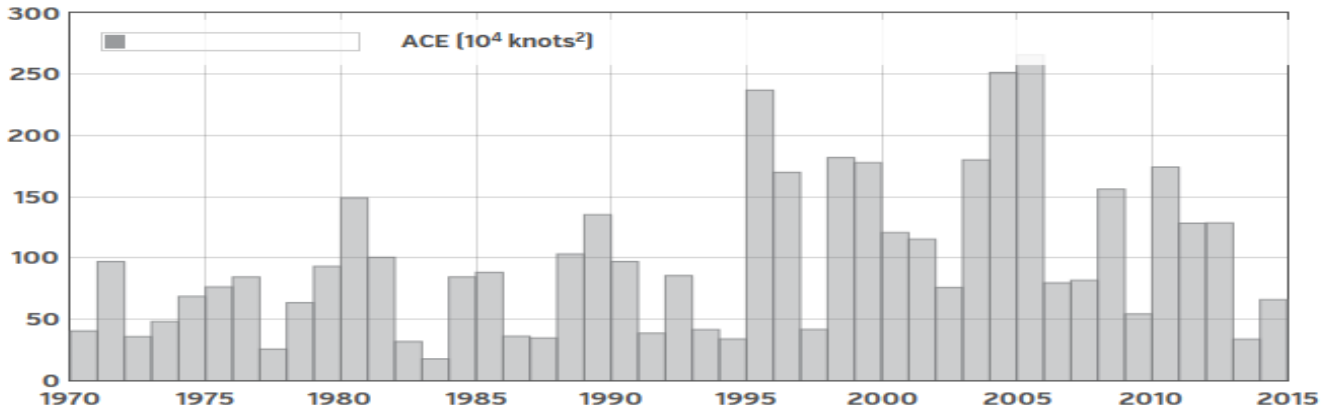
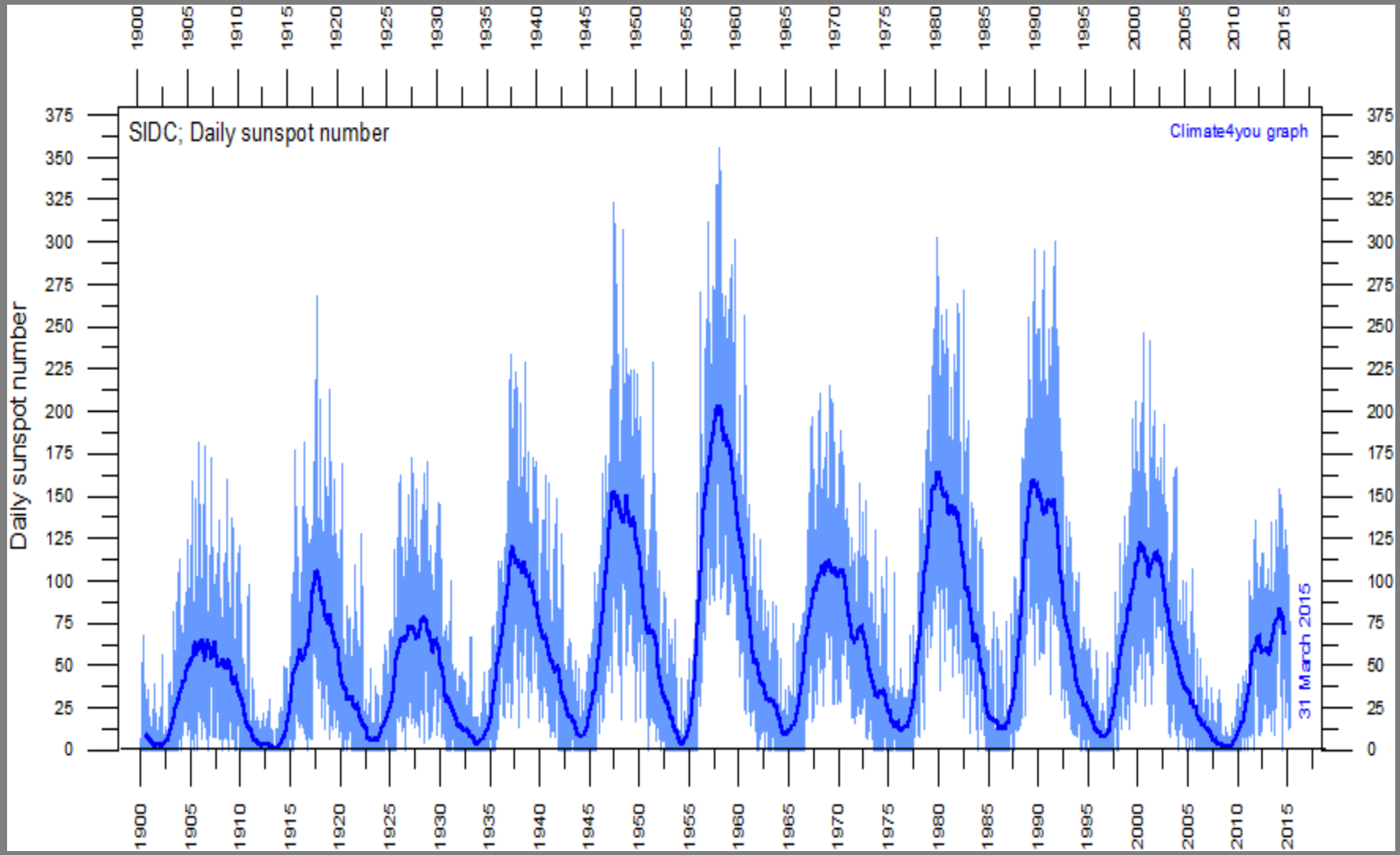
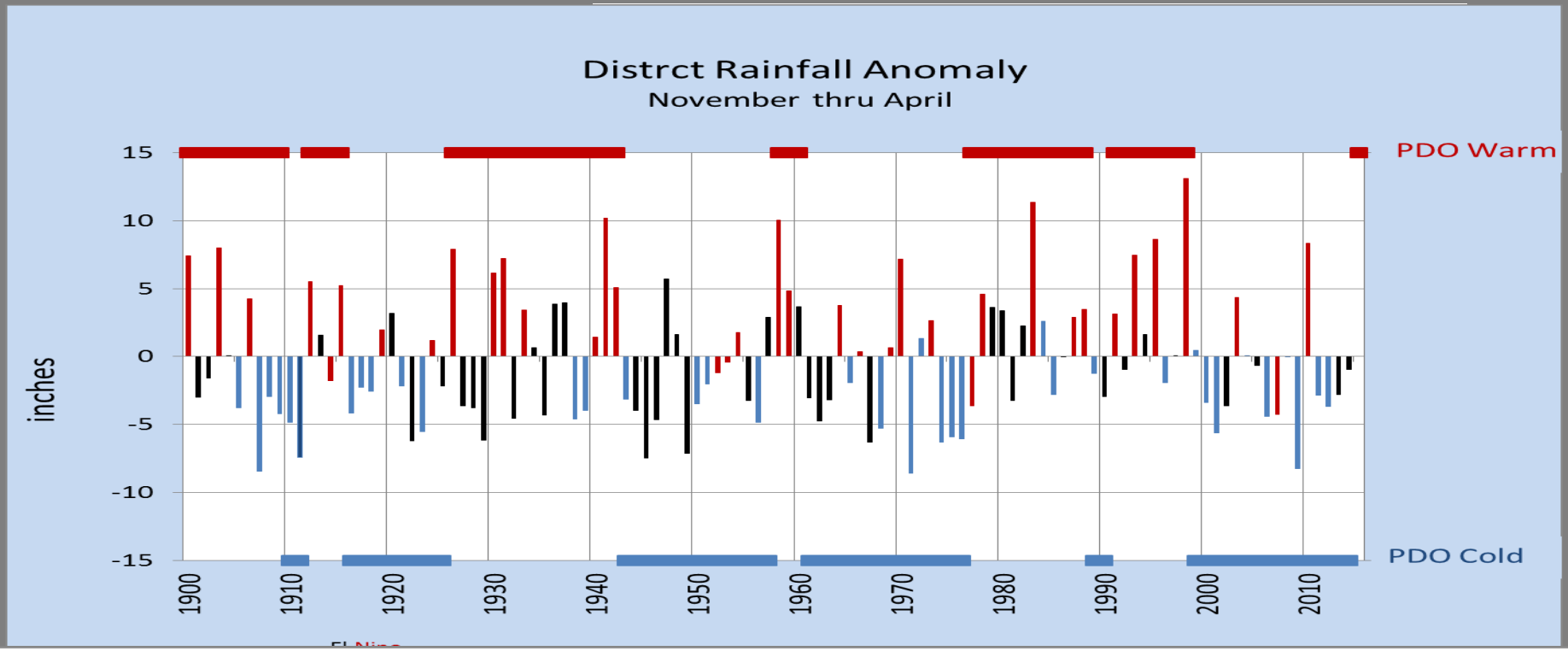


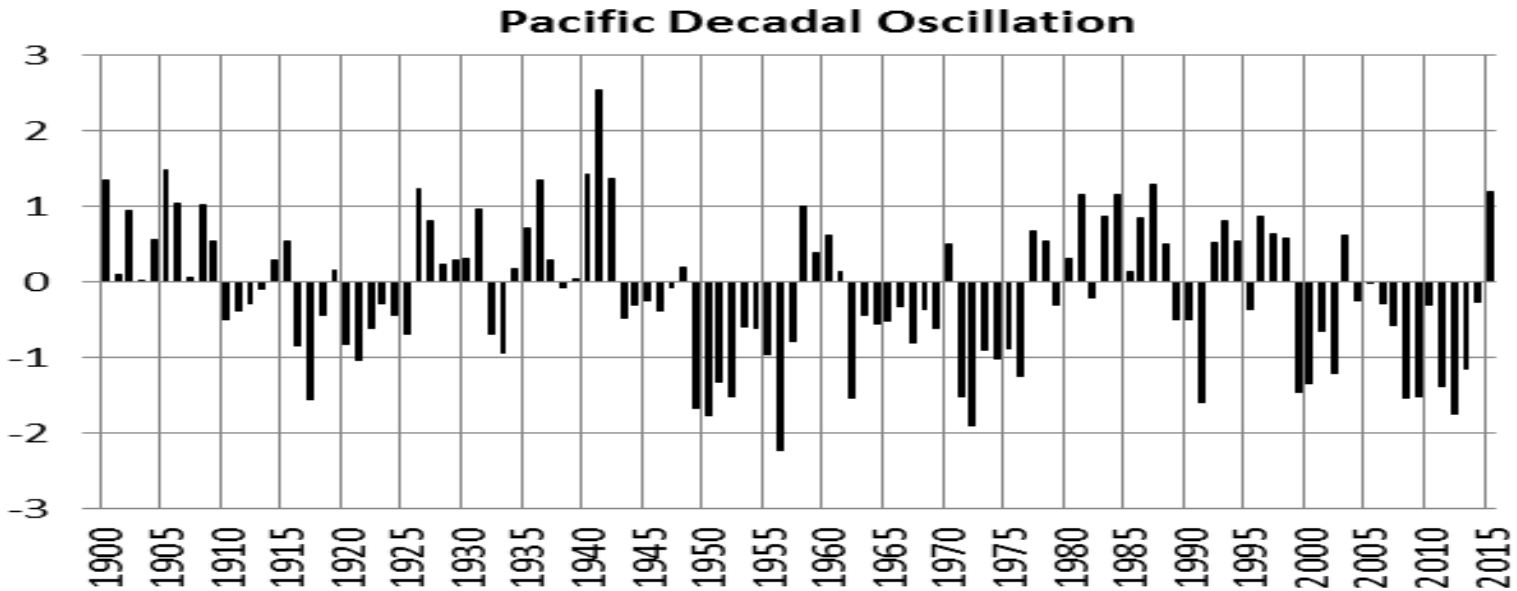
Average year: 110

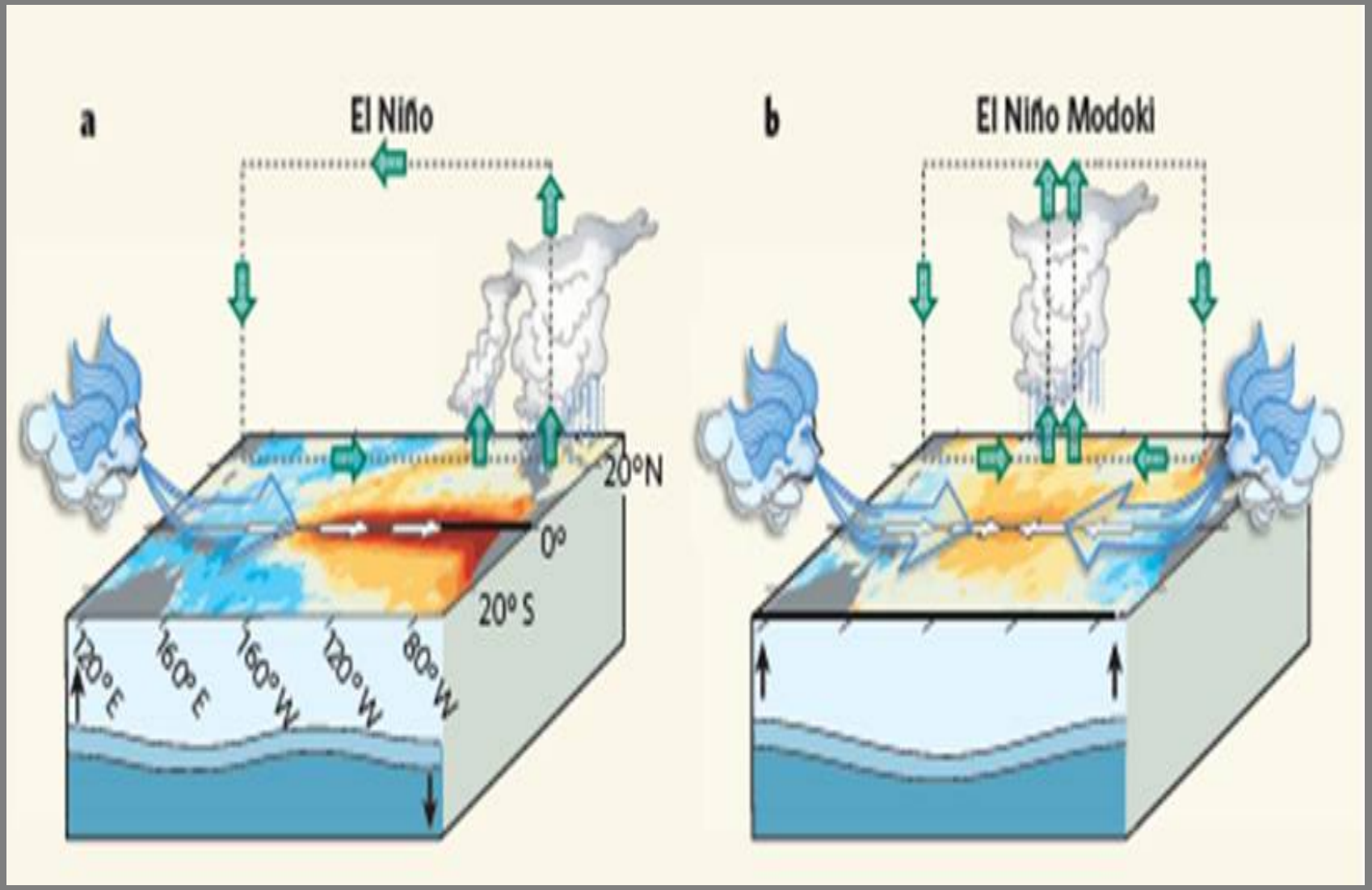
2015 year-to-date: 0

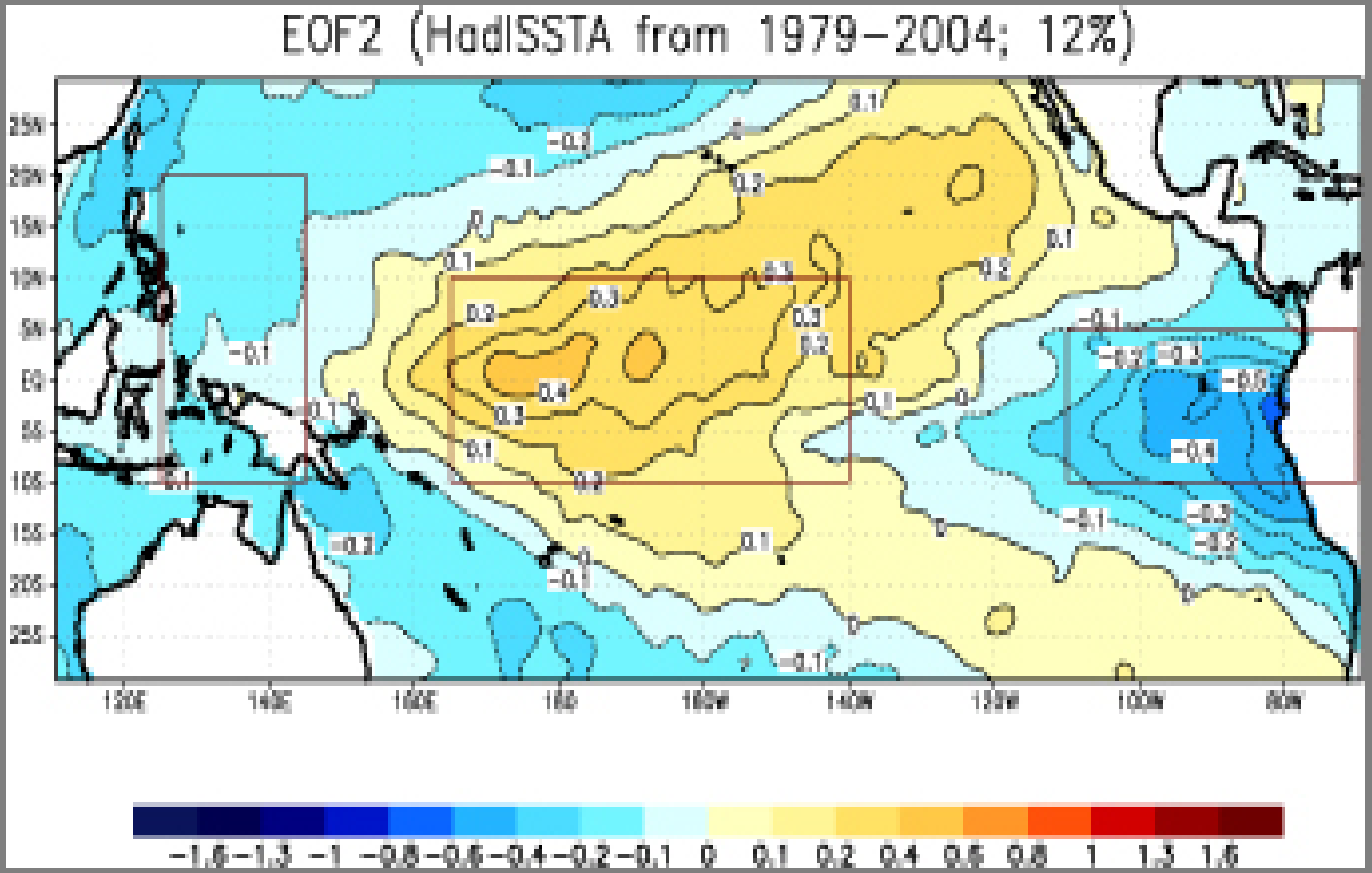
Sunspot Number




Distrct Rainfall Anomaly
November thru April
inches
15
10
5
0
-5
-10
-15
1900
1910
1920
1930
1940
1950
1960
1970
1980
1990
2000
2010
PDO Warm
PDO Cold


Pacific Decadal Oscillation
3
2
1
0
-1
-2
-3
1900
1905
1910
1915
1920
1925
1930
1935
1940
1945
1950
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
2010
2015


a
El Niño
20°N
0°
20° S
120° E
160° E
160° W
120° W
80° W
b
El Niño Modoki


EOF2 (HadISSTA from 1979–2004; 12%)
25N
20N
15N
10N
5N
EQ
5S
10S
15S
20S
25S
150E
140E
160E
180
160W
140W
120W
100W
80W
-1.6 -1.3 -1 -0.8 -0.6 -0.4 -0.2 -0.1 0 0.1 0.2 0.4 0.6 0.8 1 1.3 1.6