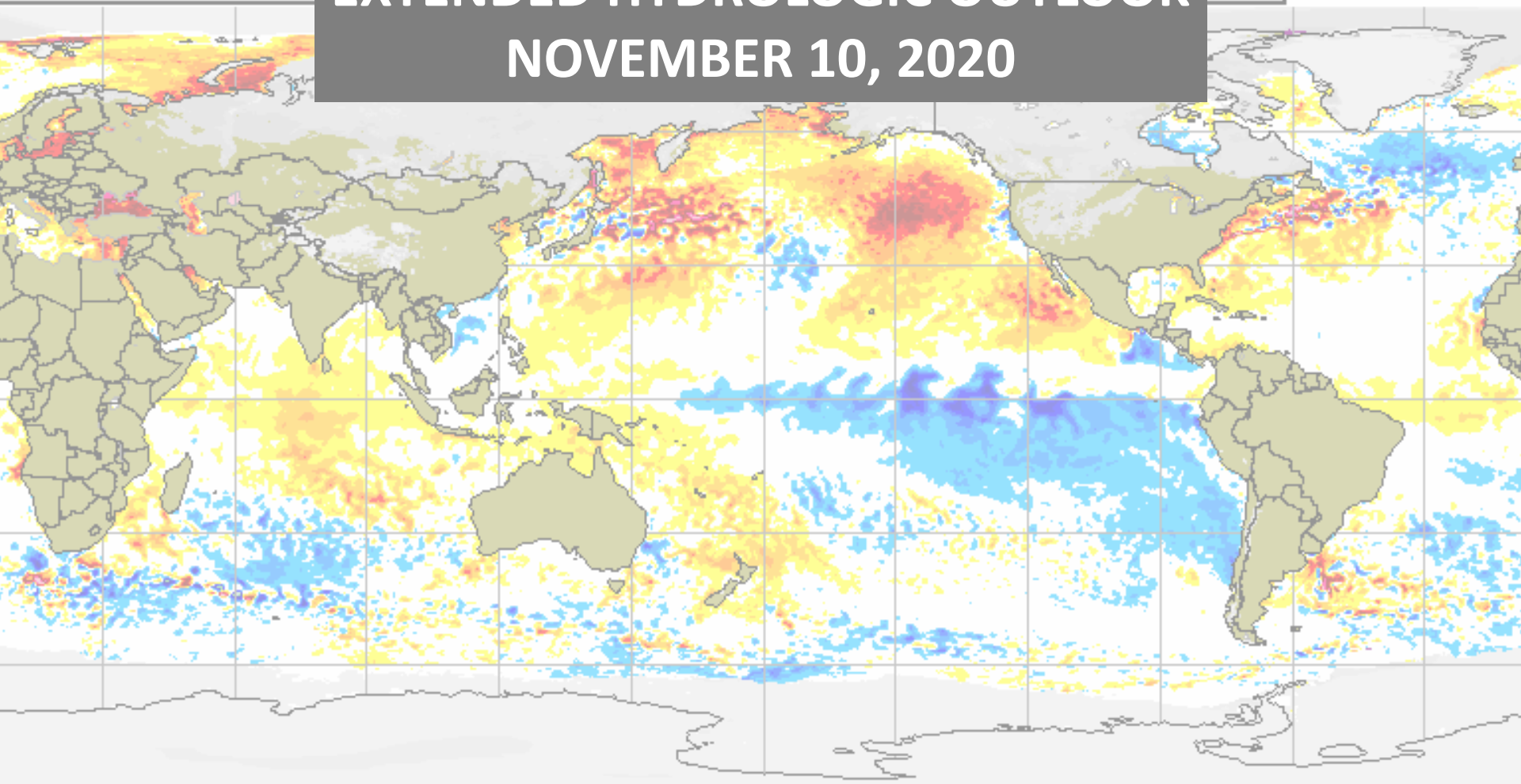
# EXTENDED HYDROLOGIC OUTLOOK
# NOVEMBER 10, 2020




Sea surface temperature anomaly / Anomalie de la température de la mer (C)

-5.0 -4.0 -3.0 -2.5 -2.0 -1.5 -1.0 -0.5 0.0 0.5 1.0 1.5 2.0 2.5 3.0 4.0 5.0

Snow depth / Épaisseur de la neige (cm)

1.0 10.0 50.0 100.0

Uncovered sea ice
Glace marine à découvert

Climatologie 1995-2009 Climatology

CMC Environnement Canada
CMC Environment Canada

# Summary

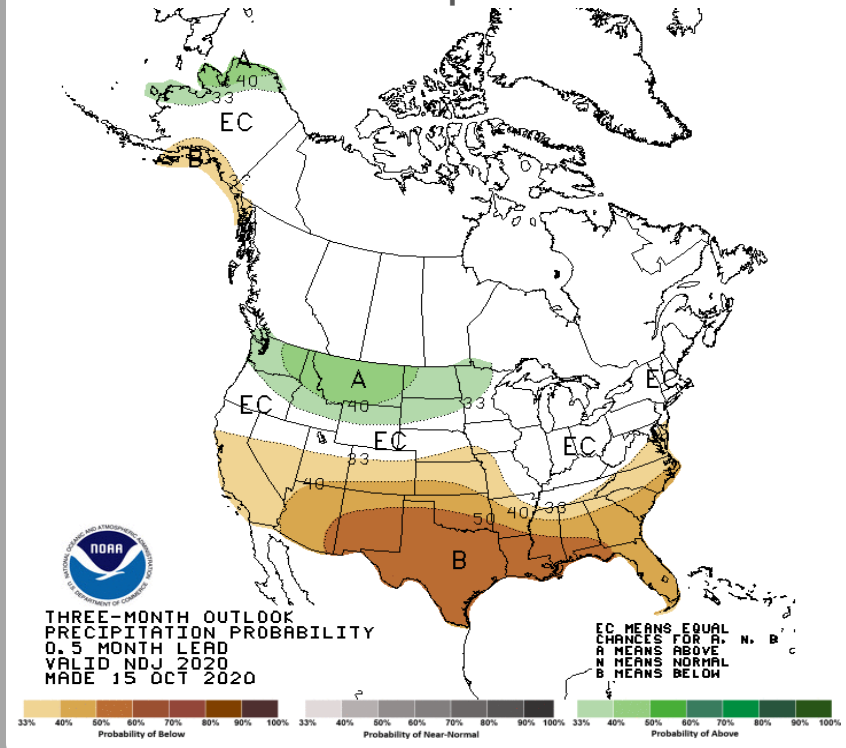
- The Climate Prediction Center (CPC) is forecasting below normal rainfall from November through January.
- La Niña is likely to continue through winter 2020-21 (~85% chance) and into spring 2021 (~60% chance during February-April).
- El Niño increases the chances of a wetter-than-normal dry season and decreased tropical activity, La Niña increases the chances of a drier-than-normal dry season and increased tropical activity (both have most influence November through March).
- Monitoring Atlantic Multidecadal Oscillation (AMO) which is currently in the warm phase:
  - Average annual inflow to Lake Okeechobee is nearly 50% greater during the warm phase compared to the cold phase

# U. S. Seasonal Outlooks

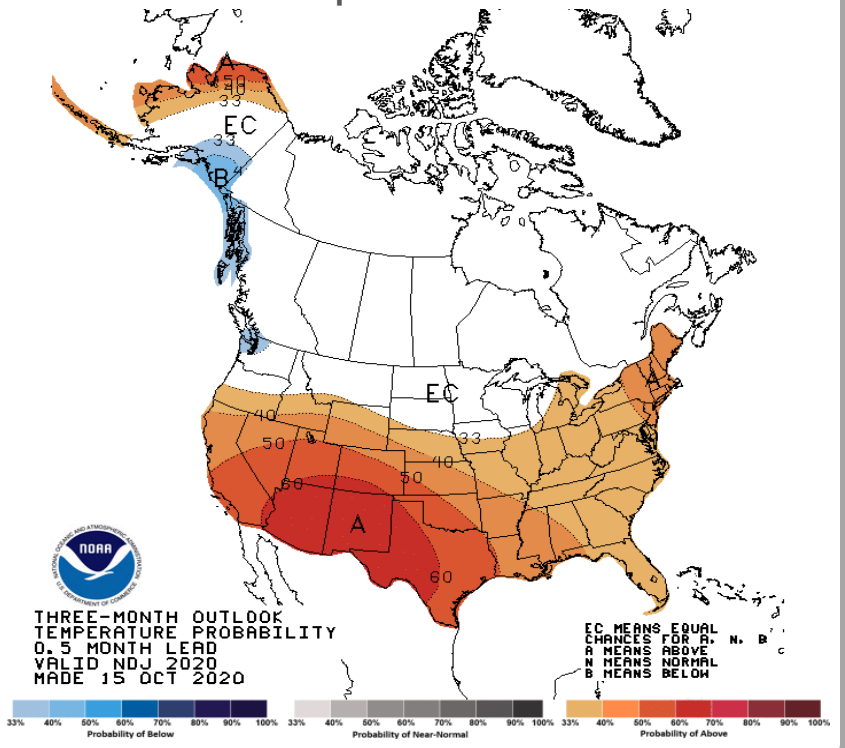
## November 2020-January 2021

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

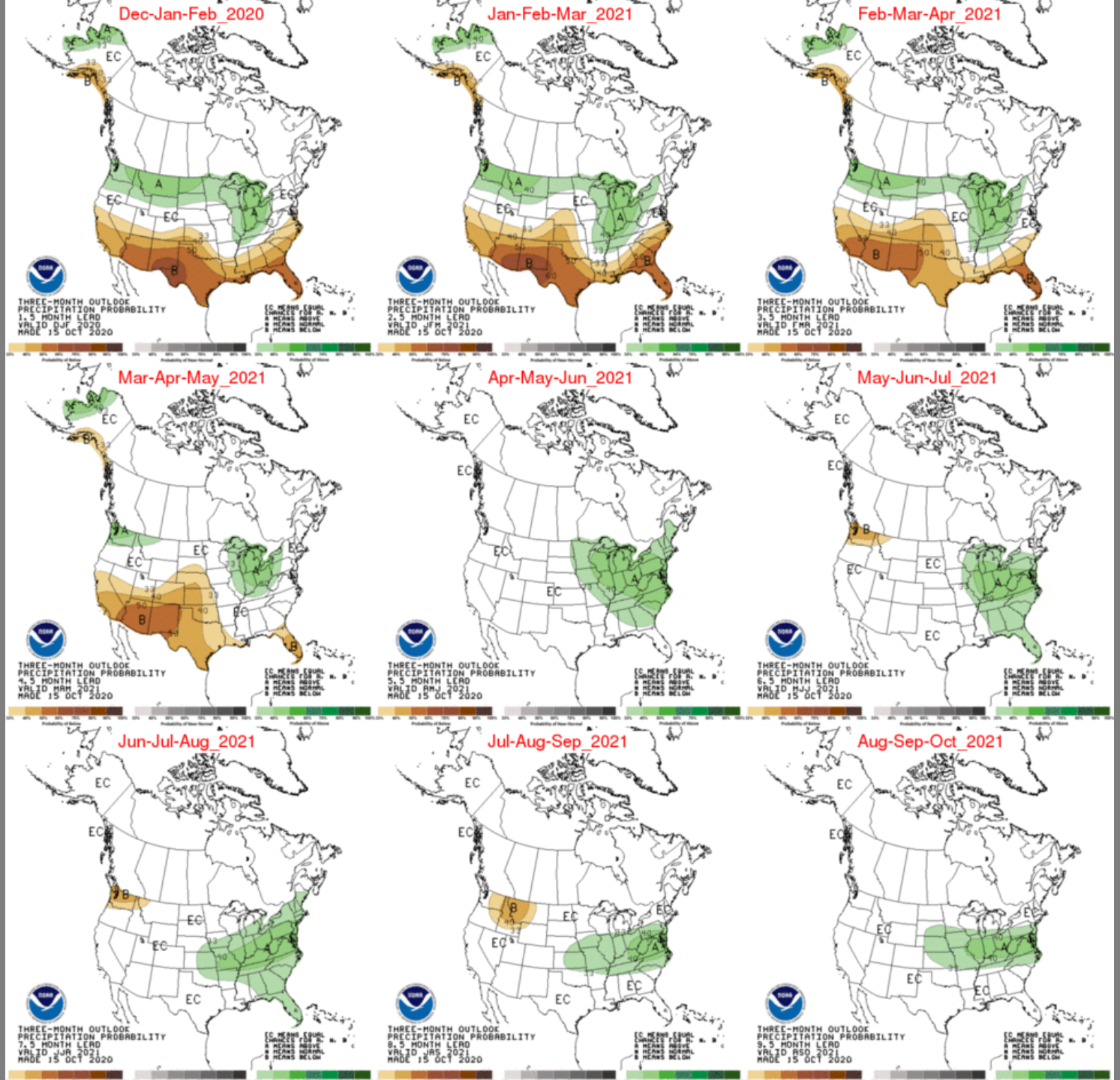
### Precipitation




### Temperature




Prepared by: Climate Prediction Center/NCEP




Prepared by: Climate Prediction Center/NCEP

# Teleconnections to South Florida

**Climate anomalies being related to each other at large distances:**

**El Niño Southern Oscillation (ENSO)**

- **South Florida dry season (November through May) rainfall is positively correlated with El Niño which has a frequency that ranges between 3 to 7 years while rainfall is negatively correlated with La Niña November through March with a potential increase in tropical rainfall during La Niña**

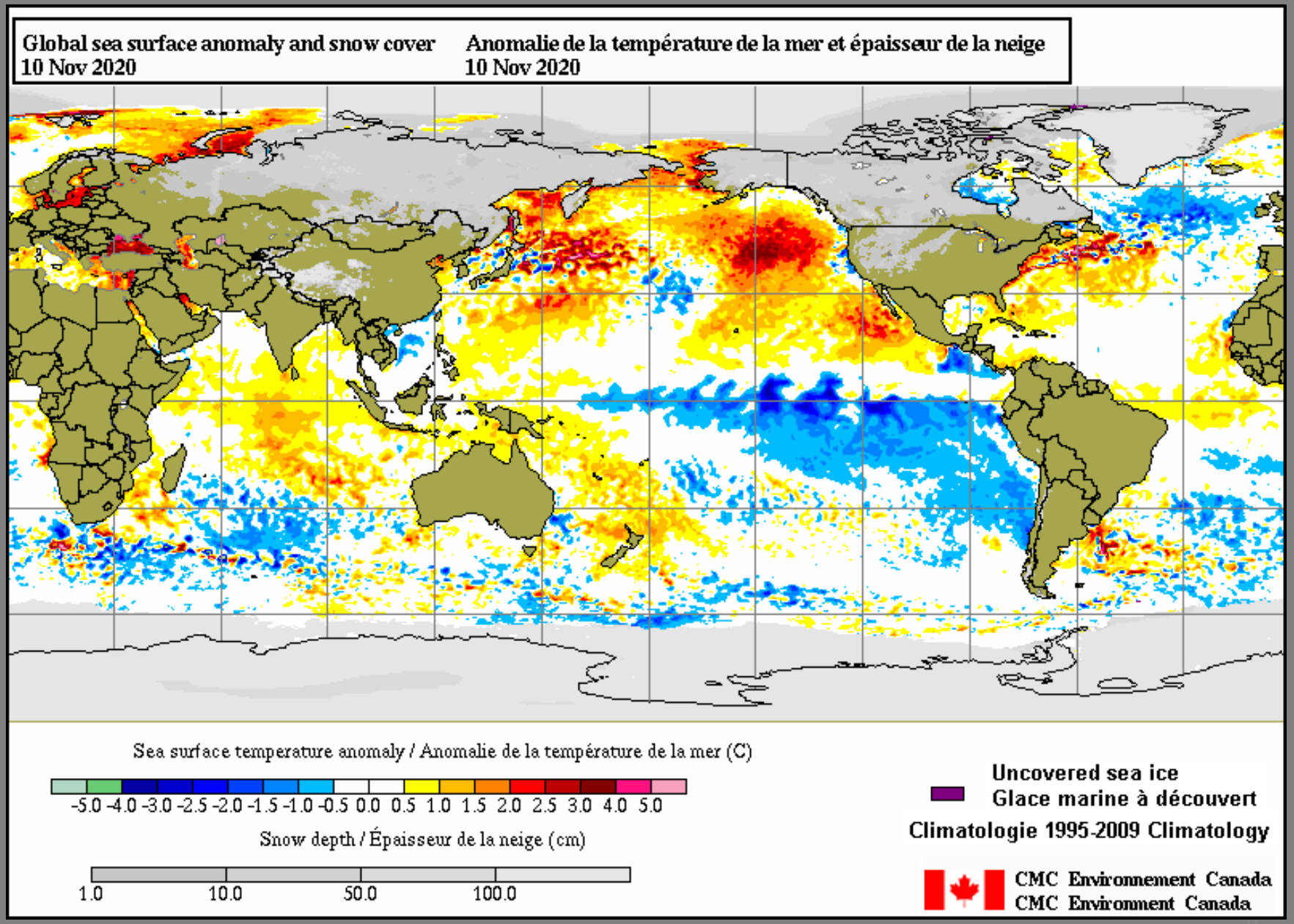
**Atlantic Multidecadal Oscillation (AMO)**

- **Average annual inflow to Lake Okeechobee is nearly 50% greater during the warm phase compared to the cold phase of the AMO, easterly flow toward south Florida affected by phase**

**Pacific Decadal Oscillation (PDO)**

- **Increases variations of south Florida dry season rainfall**

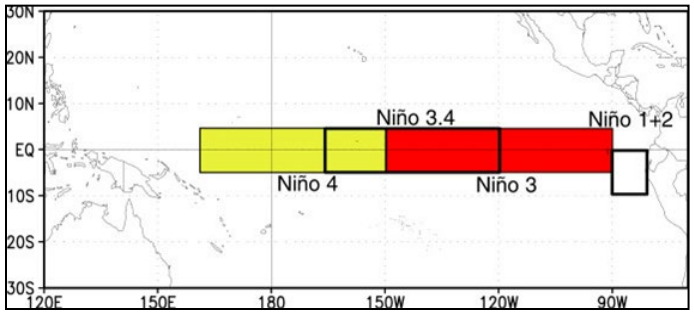
# Current Global Sea Surface Temperature Anomalies

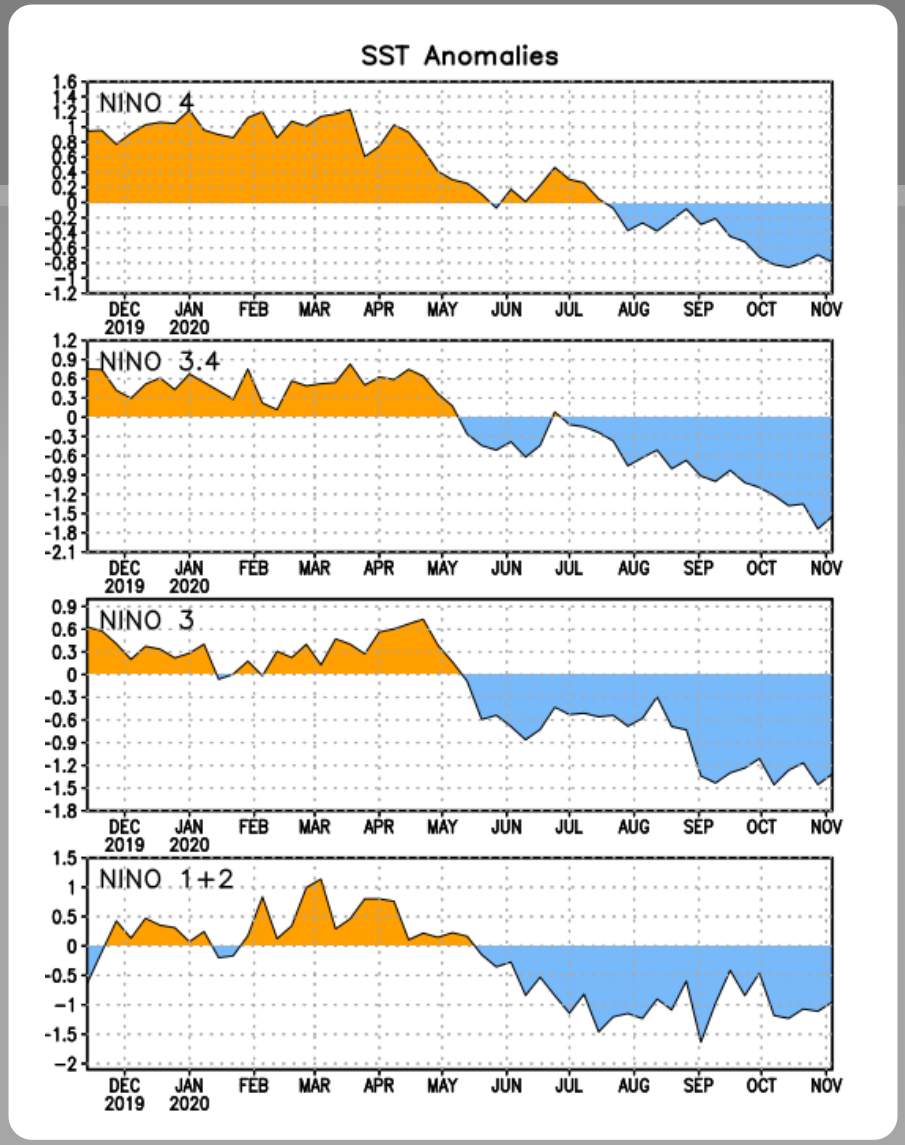


# Niño Region SST Departures (ºC) Recent Evolution

The latest weekly SST departures are:

| | |
|---|---|
| Niño 4 | -0.8ºC |
| Niño 3.4 | -1.5ºC |
| Niño 3 | -1.3ºC |
| Niño 1+2 | -1.0ºC |




Prepared by: Climate Prediction Center/NCEP

# Weekly Heat Content Evolution in the Equatorial Pacific

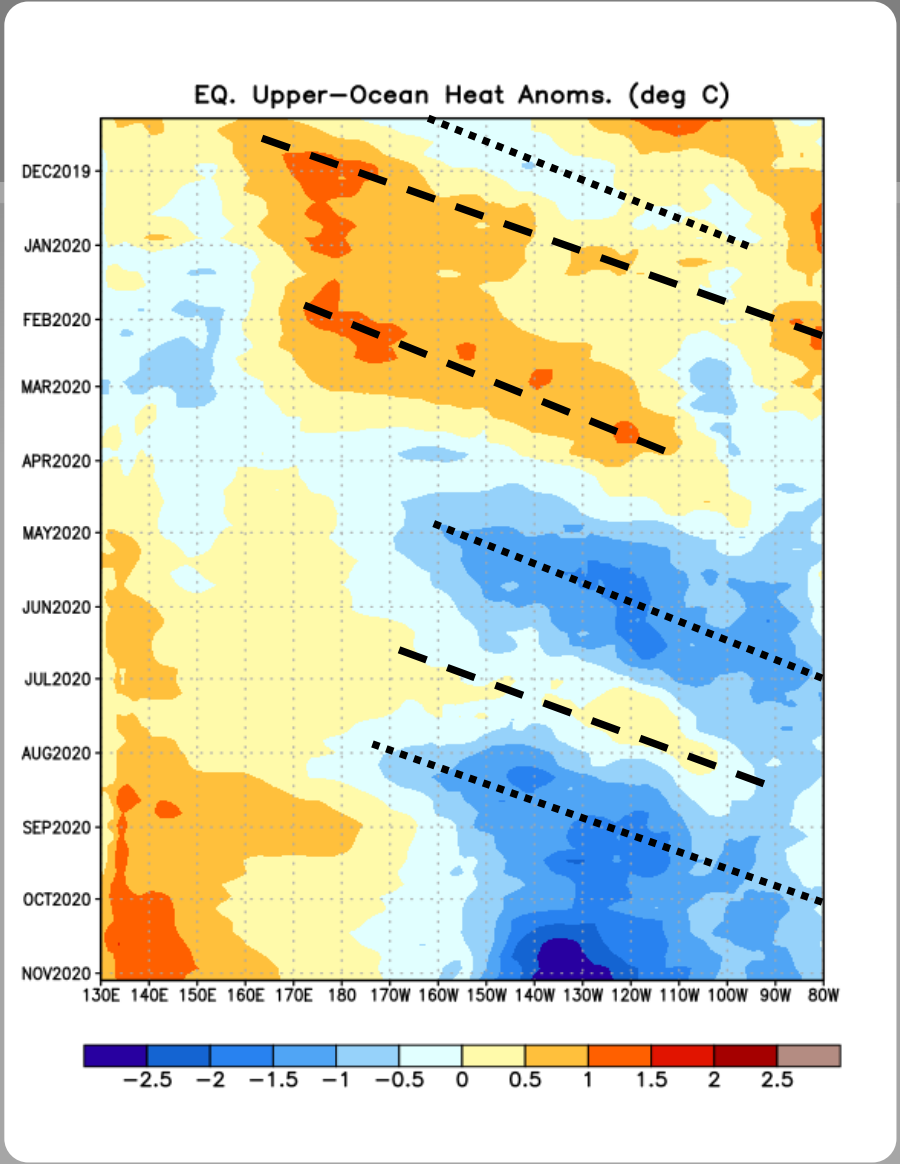
Significant equatorial oceanic Kelvin wave activity (dashed and dotted lines) has been present throughout the period shown.

From December 2019 to February 2020, downwelling Kelvin waves (dashed line) resulted in above-average subsurface temperatures across the central and east-central equatorial Pacific.

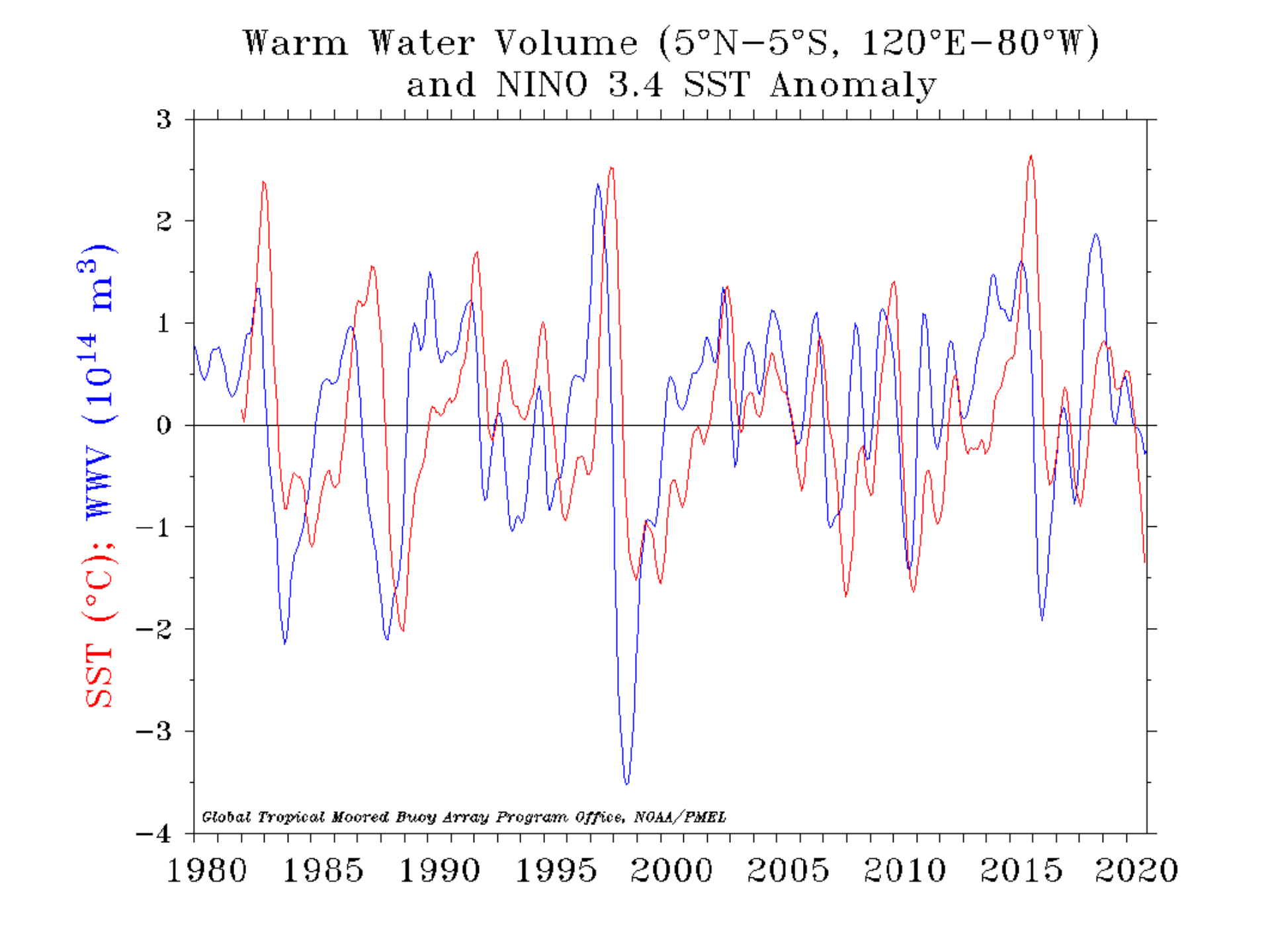
During April-June and August-September 2020, negative subsurface temperature anomalies were associated with upwelling Kelvin waves.

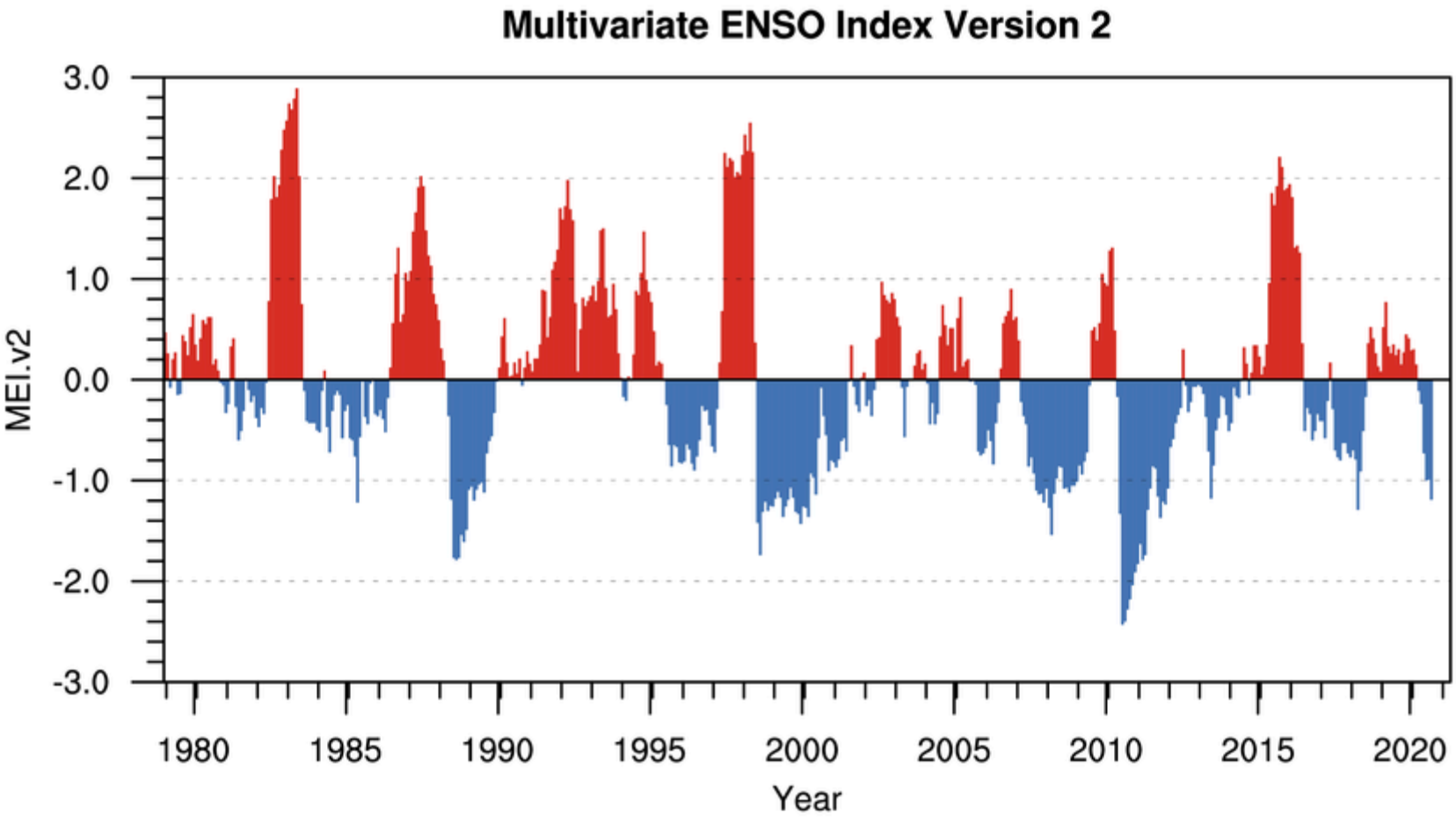
Since August 2020, negative anomalies have persisted in the eastern half of the Pacific Ocean.

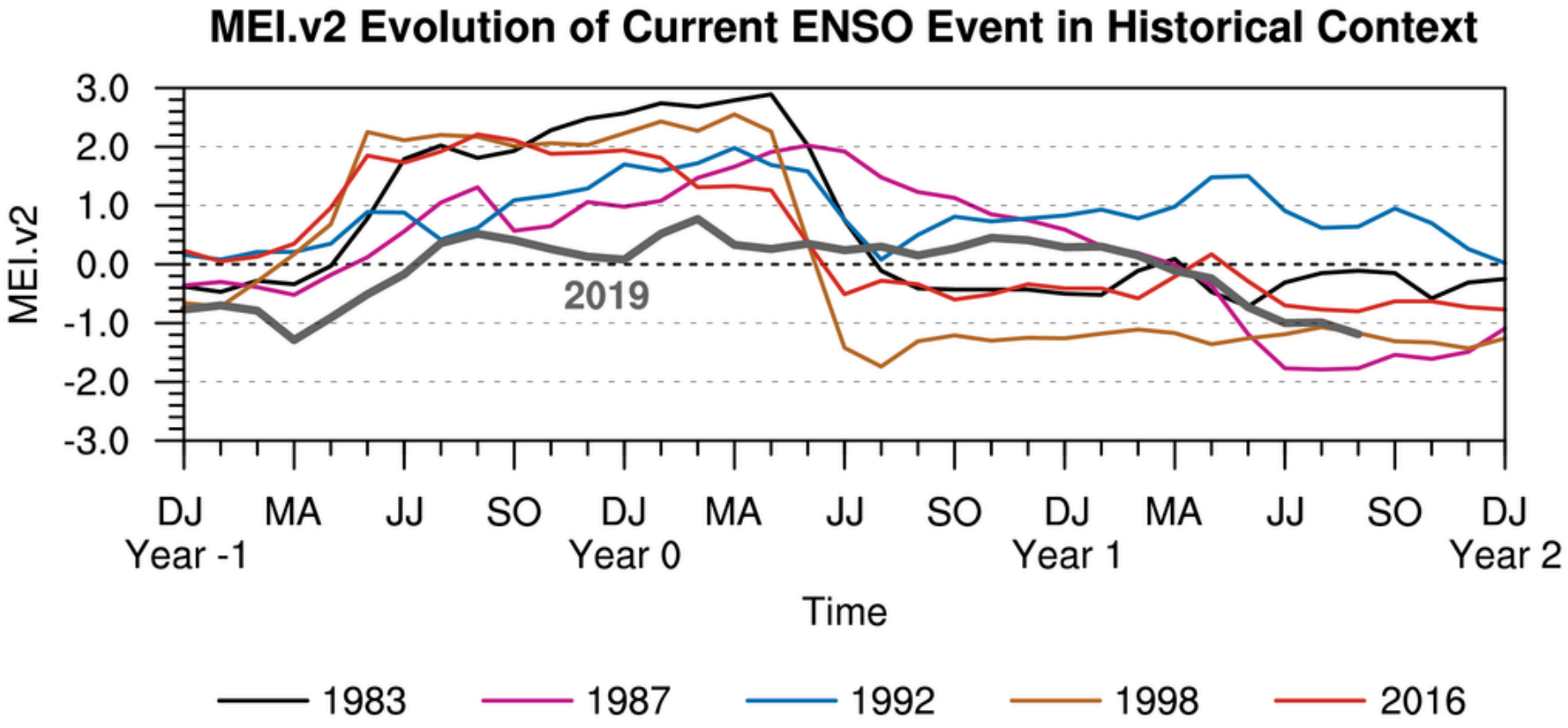
Equatorial oceanic Kelvin waves have alternating warm and cold phases. The warm phase is indicated by dashed lines. Down-welling and warming occur in the leading portion of a Kelvin wave, and up-welling and cooling occur in the trailing portion.



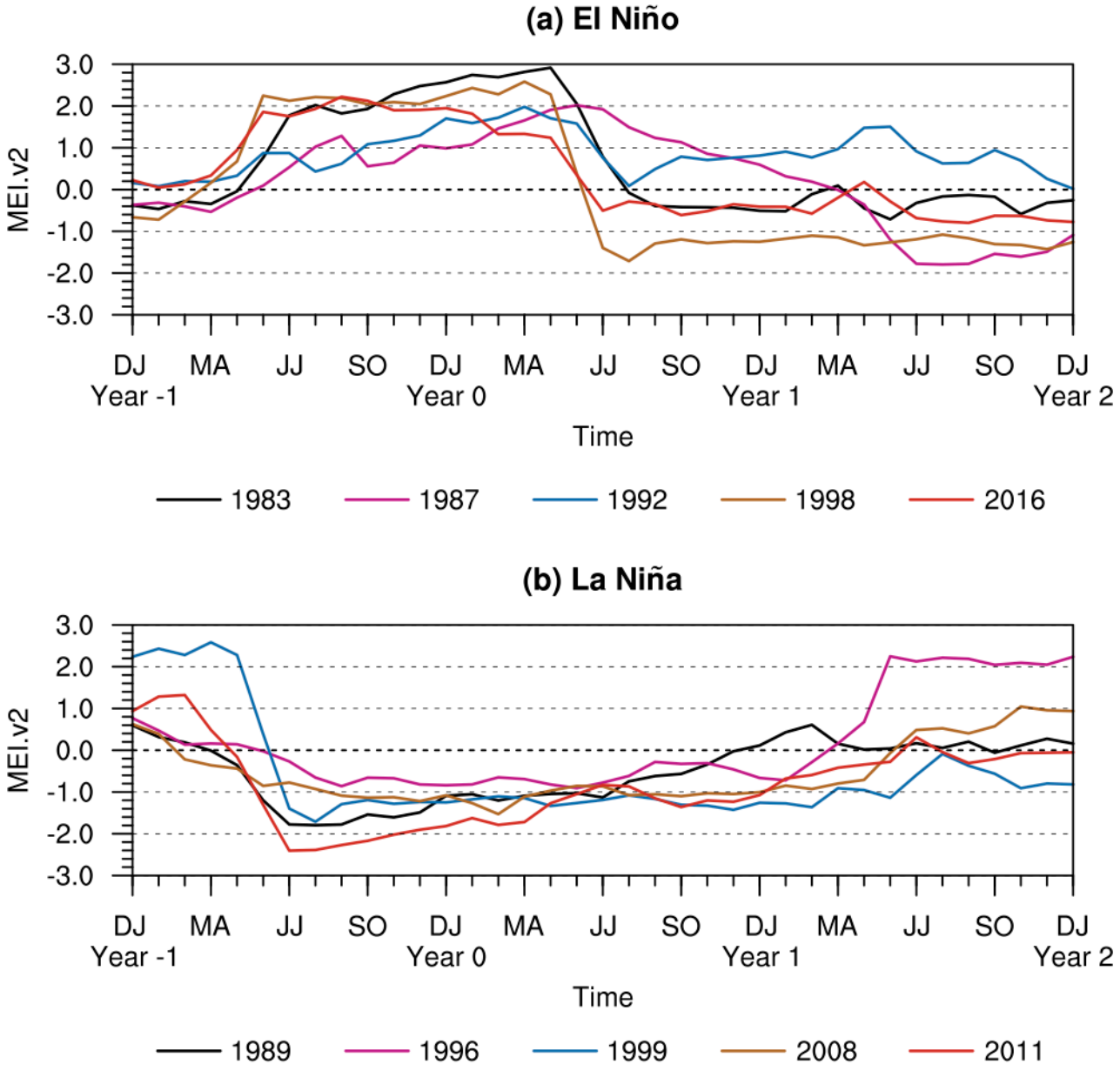

Prepared by: Climate Prediction Center/NCEP


Warm Water Volume (5°N–5°S, 120°E–80°W)
and NINO 3.4 SST Anomaly
SST (°C); WWV ($10^{14}$ $m^3$)
3
2
1
0
−1
−2
−3
−4
1980
1985
1990
1995
2000
2005
2010
2015
2020
Global Tropical Moored Buoy Array Program Office, NOAA/PMEL


Multivariate ENSO Index Version 2
MEI.v2
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
1980
1985
1990
1995
2000
2005
2010
2015
2020
Year

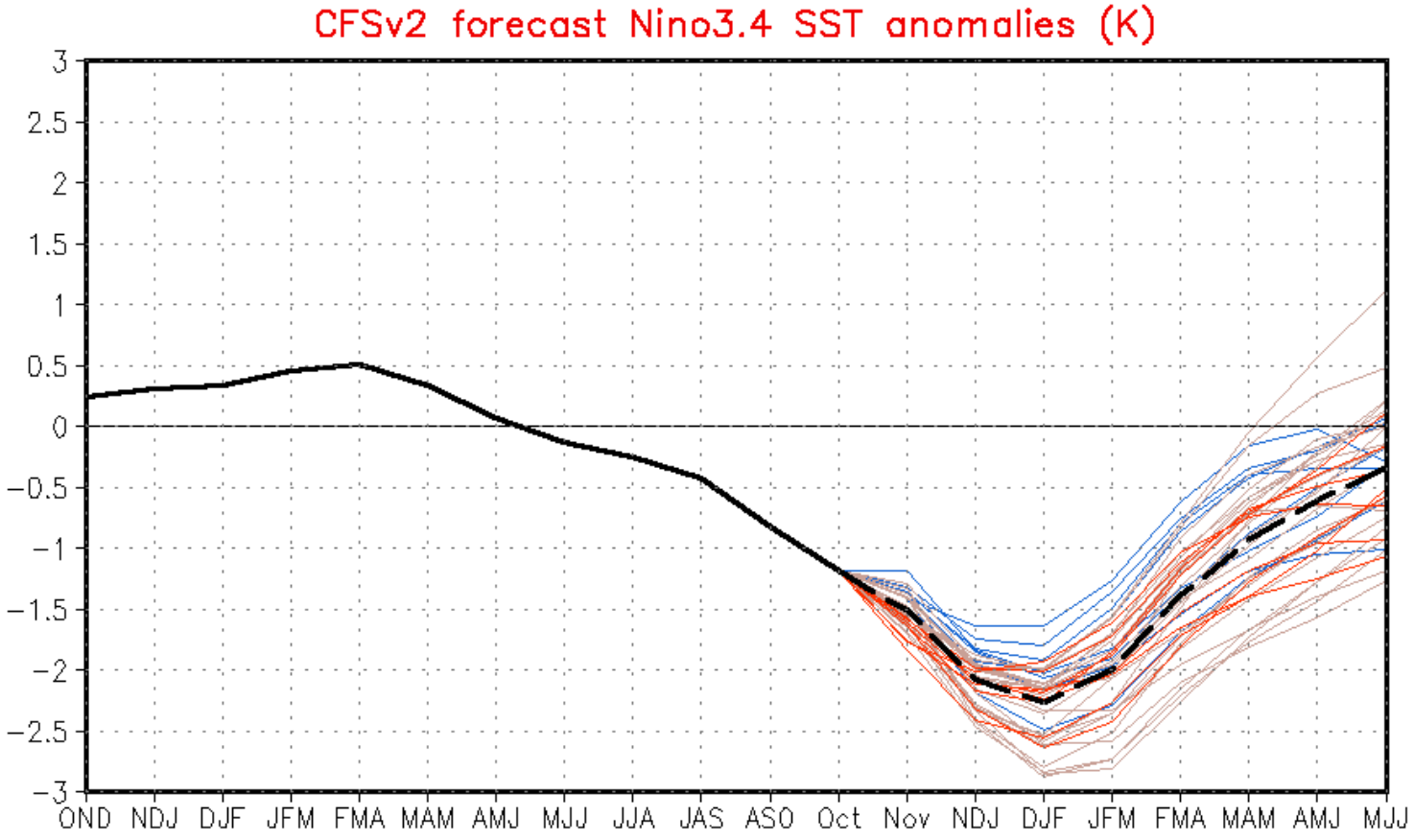

MEI.v2 Evolution of Current ENSO Event in Historical Context
MEI.v2
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
2019
DJ
MA
JJ
SO
DJ
MA
JJ
SO
DJ
MA
JJ
SO
DJ
Year -1
Year 0
Year 1
Year 2
Time
1983
1987
1992
1998
2016

# MEI.v2 Evolution of Historical ENSO Events



NWS/NCEP/CPC

Last update: Tue Nov 10 2020
Initial conditions: 10Oct2020-19Oct2020




(Model bias correct base period: 1999-2010; Climatology base period: 1982-2010)

# IRI/CPC Pacific Niño 3.4 SST Model Outlook

The model averages predict La Niña to continue into the Northern Hemisphere spring 2021.

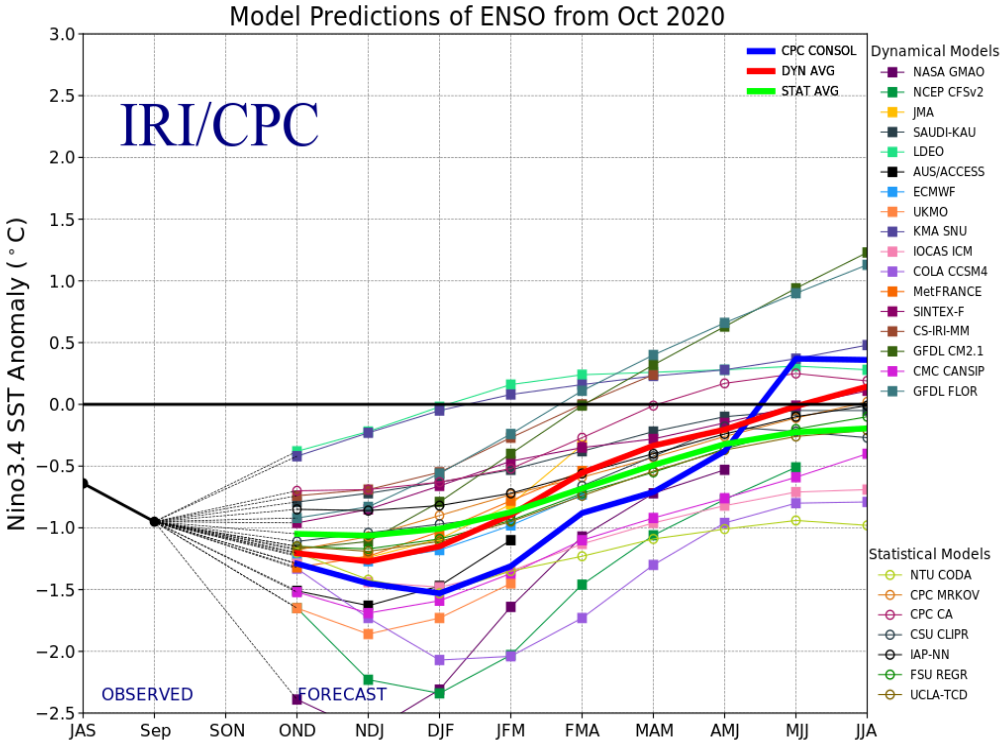



Figure provided by the International Research Institute (IRI) for Climate and Society (updated 19 October 2020).

Prepared by: Climate Prediction Center/NCEP

# Historical El Niño and La Niña Episodes Based on the ONI computed using ERSST.v5

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.v5 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.

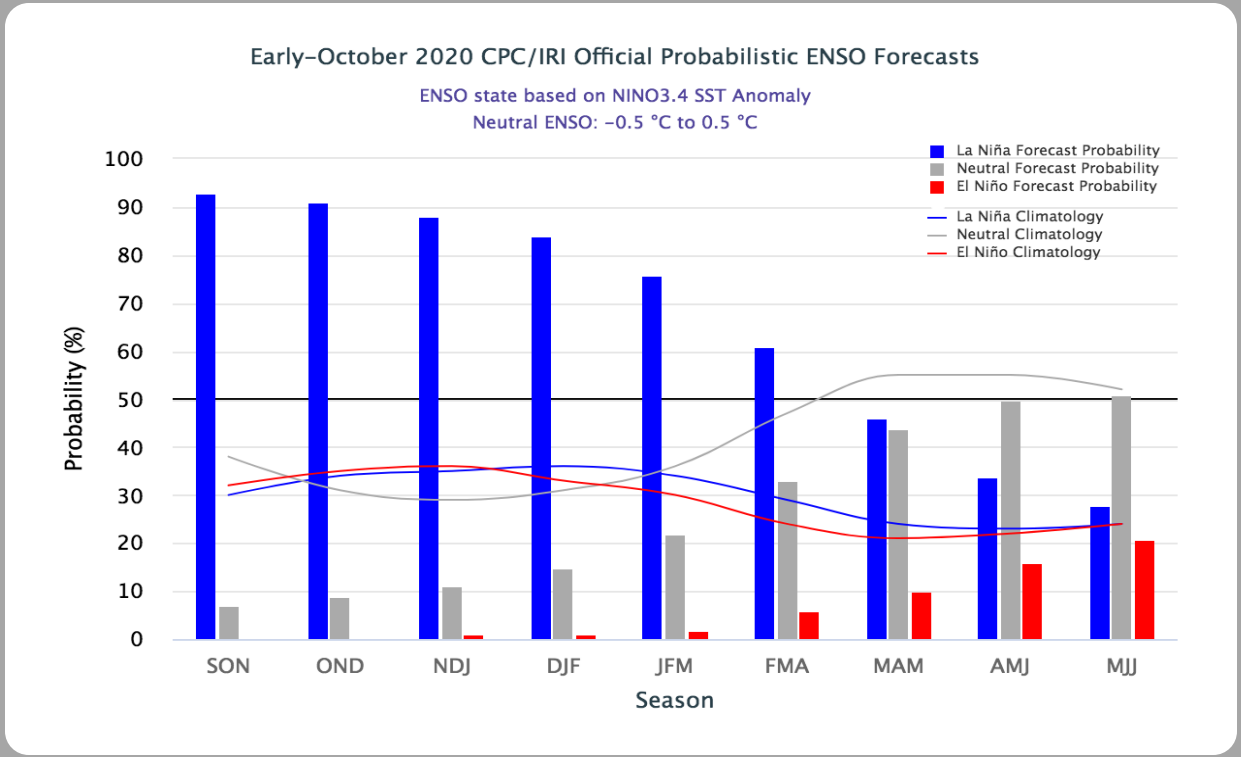
| Year | DJF | JFM | FMA | MAM | AMJ | MJJ | JJA | JAS | ASO | SON | OND | NDJ |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2008 | -1.6 | -1.4 | -1.2 | -0.9 | -0.8 | -0.5 | -0.4 | -0.3 | -0.3 | -0.4 | -0.6 | -0.7 |
| 2009 | -0.8 | -0.7 | -0.5 | -0.2 | 0.1 | 0.4 | 0.5 | 0.5 | 0.7 | 1.0 | 1.3 | 1.6 |
| 2010 | 1.5 | 1.3 | 0.9 | 0.4 | -0.1 | -0.6 | -1.0 | -1.4 | -1.6 | -1.7 | -1.7 | -1.6 |
| 2011 | -1.4 | -1.1 | -0.8 | -0.6 | -0.5 | -0.4 | -0.5 | -0.7 | -0.9 | -1.1 | -1.1 | -1.0 |
| 2012 | -0.8 | -0.6 | -0.5 | -0.4 | -0.2 | 0.1 | 0.3 | 0.3 | 0.3 | 0.2 | 0.0 | -0.2 |
| 2013 | -0.4 | -0.3 | -0.2 | -0.2 | -0.3 | -0.3 | -0.4 | -0.4 | -0.3 | -0.2 | -0.2 | -0.3 |
| 2014 | -0.4 | -0.4 | -0.2 | 0.1 | 0.3 | 0.2 | 0.1 | 0.0 | 0.2 | 0.4 | 0.6 | 0.7 |
| 2015 | 0.6 | 0.6 | 0.6 | 0.8 | 1.0 | 1.2 | 1.5 | 1.8 | 2.1 | 2.4 | 2.5 | 2.6 |
| 2016 | 2.5 | 2.2 | 1.7 | 1.0 | 0.5 | 0.0 | -0.3 | -0.6 | -0.7 | -0.7 | -0.7 | -0.6 |
| 2017 | -0.3 | -0.1 | 0.1 | 0.3 | 0.4 | 0.4 | 0.2 | -0.1 | -0.4 | -0.7 | -0.9 | -1.0 |
| 2018 | -0.9 | -0.8 | -0.6 | -0.4 | -0.1 | 0.1 | 0.1 | 0.2 | 0.4 | 0.7 | 0.9 | 0.8 |
| 2019 | 0.8 | 0.8 | 0.8 | 0.8 | 0.6 | 0.5 | 0.3 | 0.1 | 0.1 | 0.3 | 0.5 | 0.5 |
| 2020 | 0.5 | 0.6 | 0.5 | 0.3 | 0.0 | -0.2 | -0.4 | -0.6 | -0.9 | | | |

Prepared by: Climate Prediction Center/IRI

# CPC/IRI Probabilistic ENSO Outlook

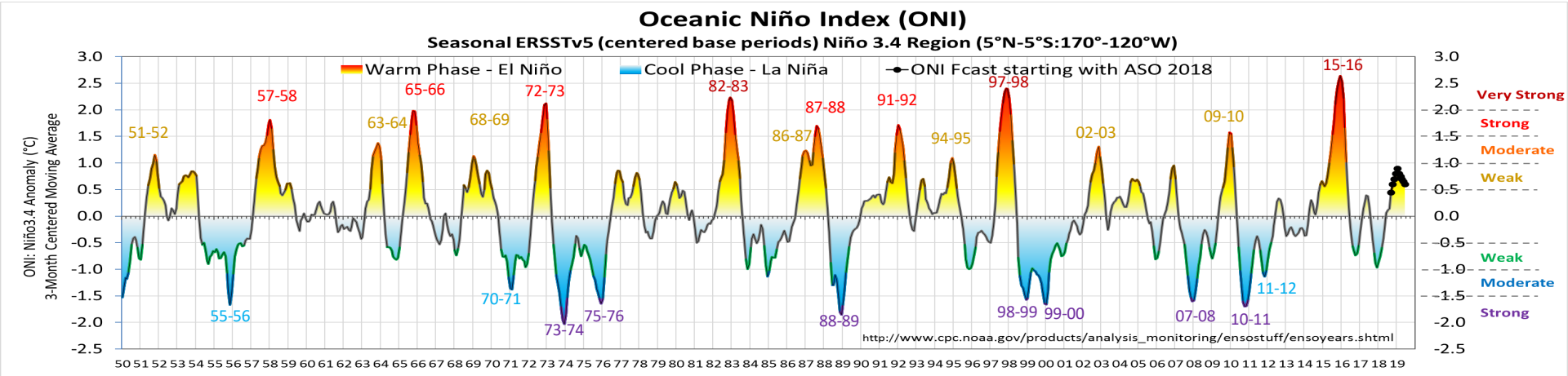
## Updated: 8 October 2020

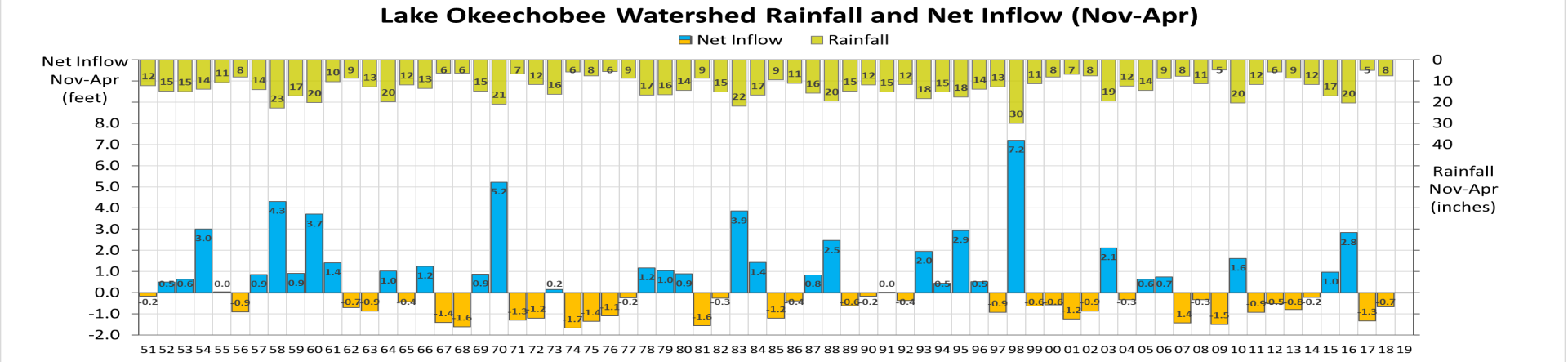
**La Niña is likely (> 80% chance) from September-November 2020 to December-February 2020-21, with a ~60% chance of continuing through February-April 2021.**



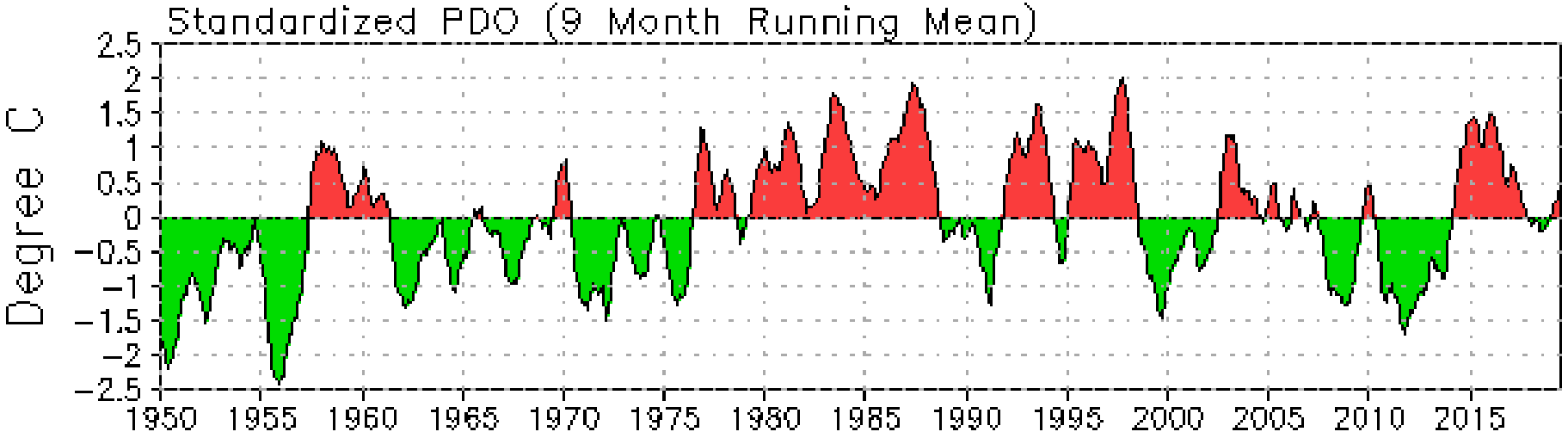

Prepared by: Climate Prediction Center/IRI

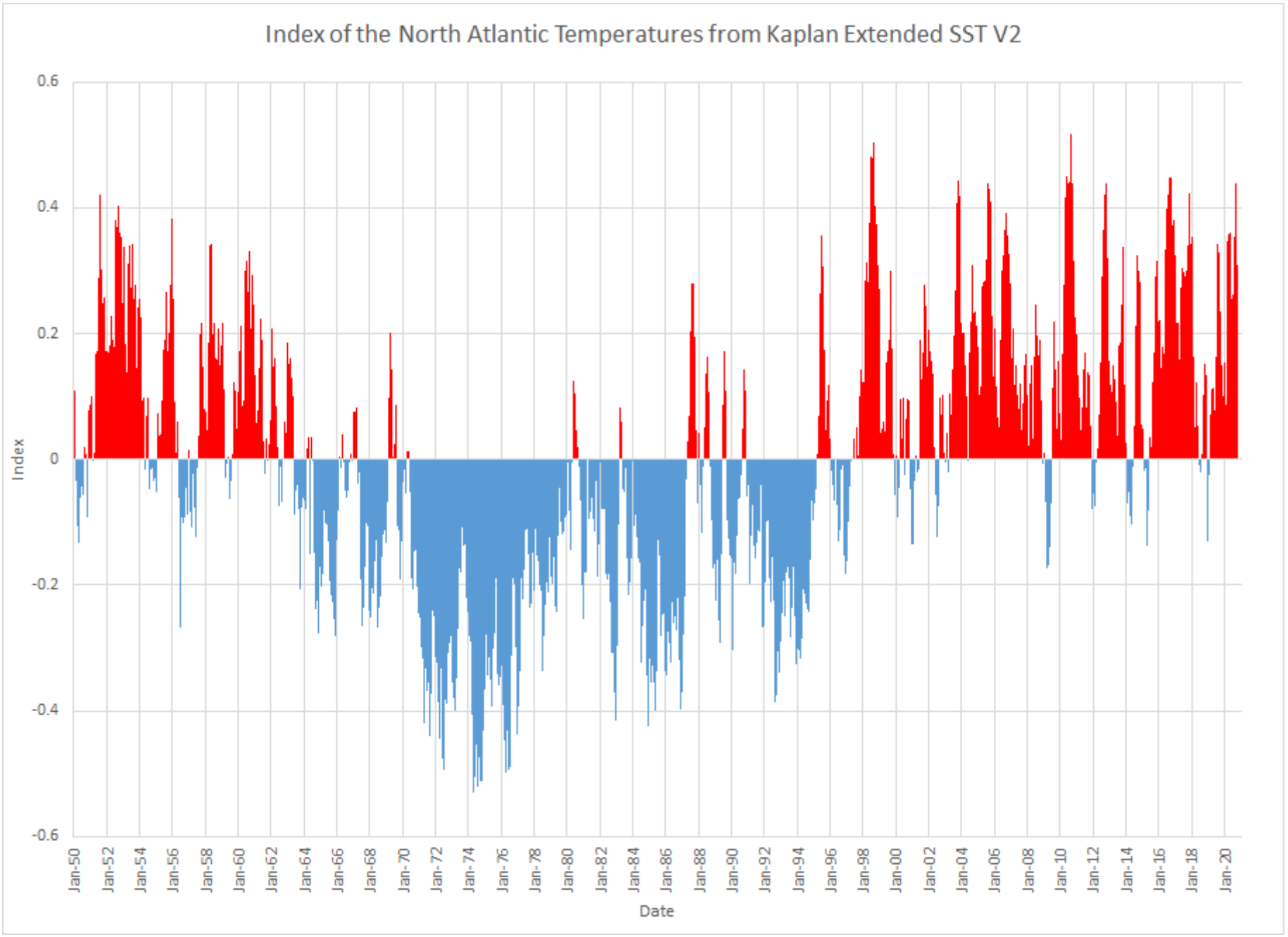
# El Niño & La Niña Events (1950-2018), and Lake Okeechobee Watershed Rainfall & Net Inflow




Source: Cal Neidrauer (SFWMD)


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


Index of the North Atlantic Temperatures from Kaplan Extended SST V2
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
Index
Jan-50
Jan-52
Jan-54
Jan-56
Jan-58
Jan-60
Jan-62
Jan-64
Jan-66
Jan-68
Jan-70
Jan-72
Jan-74
Jan-76
Jan-78
Jan-80
Jan-82
Jan-84
Jan-86
Jan-88
Jan-90
Jan-92
Jan-94
Jan-96
Jan-98
Jan-00
Jan-02
Jan-04
Jan-06
Jan-08
Jan-10
Jan-12
Jan-14
Jan-16
Jan-18
Jan-20
Date

# 2020 Tropical Summary

# Atlantic Hurricane Activity Through November 9

| Forecast Parameter | 2020 Observed | 1981-2010 Average Thru 11/9 | 2020 % of 1981-2010 Average | 2020 Full Season Rank Since 1966 (Satellite Era) |
|---|---|---|---|---|
| Named Storms (NS) | 29 | 11.4 | 254% | 1 |
| Named Storm Days (NSD) | 105.25 | 55.7 | 189% | 3 |
| Hurricanes (H) | 12 | 6.1 | 197% | T-2 |
| Hurricane Days (HD) | 32 | 23.2 | 138% | 15 |
| Major Hurricanes (MH) | 5 | 2.6 | 192% | T-4 |
| Major Hurricane Days (MHD) | 7.5 | 6.1 | 123% | 15 |
| Accumulated Cyclone Energy (ACE) | 159 | 101 | 157% | 11 |

1981-2010 average is current NOAA 30-year climate base period. This 30-year base period will change to 1991-2020 next year.

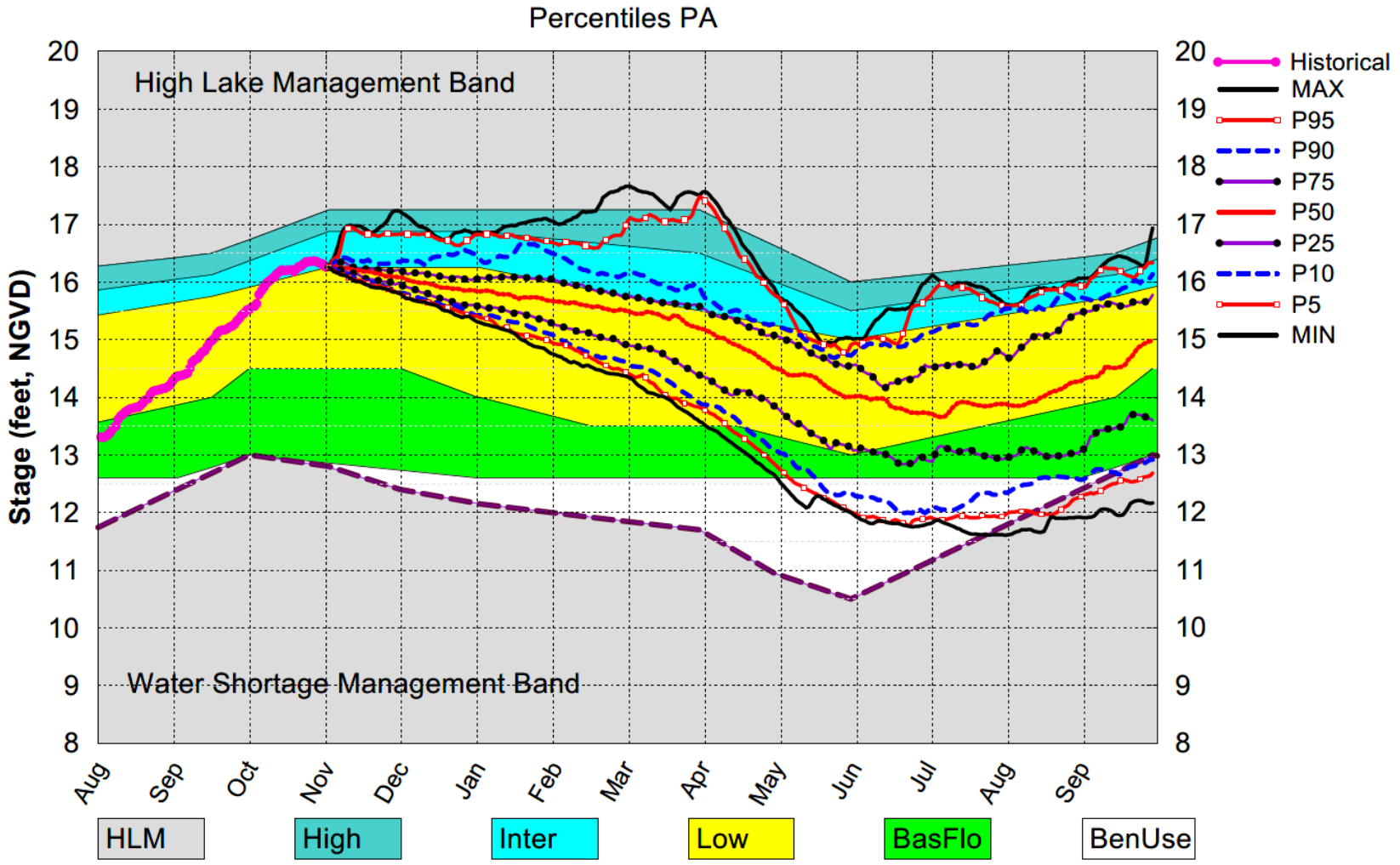
T – Denotes tie with other years

Source: Colorado State University (Tropical Meteorology Project)

# Dynamic Position Analysis

- Based on historical climatic conditions spanning the period 1965-2005
- Each year the model resets the initial stages for Lake Okeechobee (LOK) and the Water Conservation Areas (WCAs) to value on the 1$^{st}$ of the previous month and conditions the simulation using real time data during the previous month to achieve real time stage on the 1$^{st}$ or 15$^{th}$ of the current month for both Lake Okeechobee and the Water Conservation Areas
- Dynamic Position Analysis
  - Each 1-year simulation starts with current hydrologic conditions (e.g., 1-November-2020)
  - 41 1-year simulations of system response to historical rainfall conditions
  - Statistical summaries used to display projections

# Lake Okeechobee SFWMM Nov 2020 Position Analysis

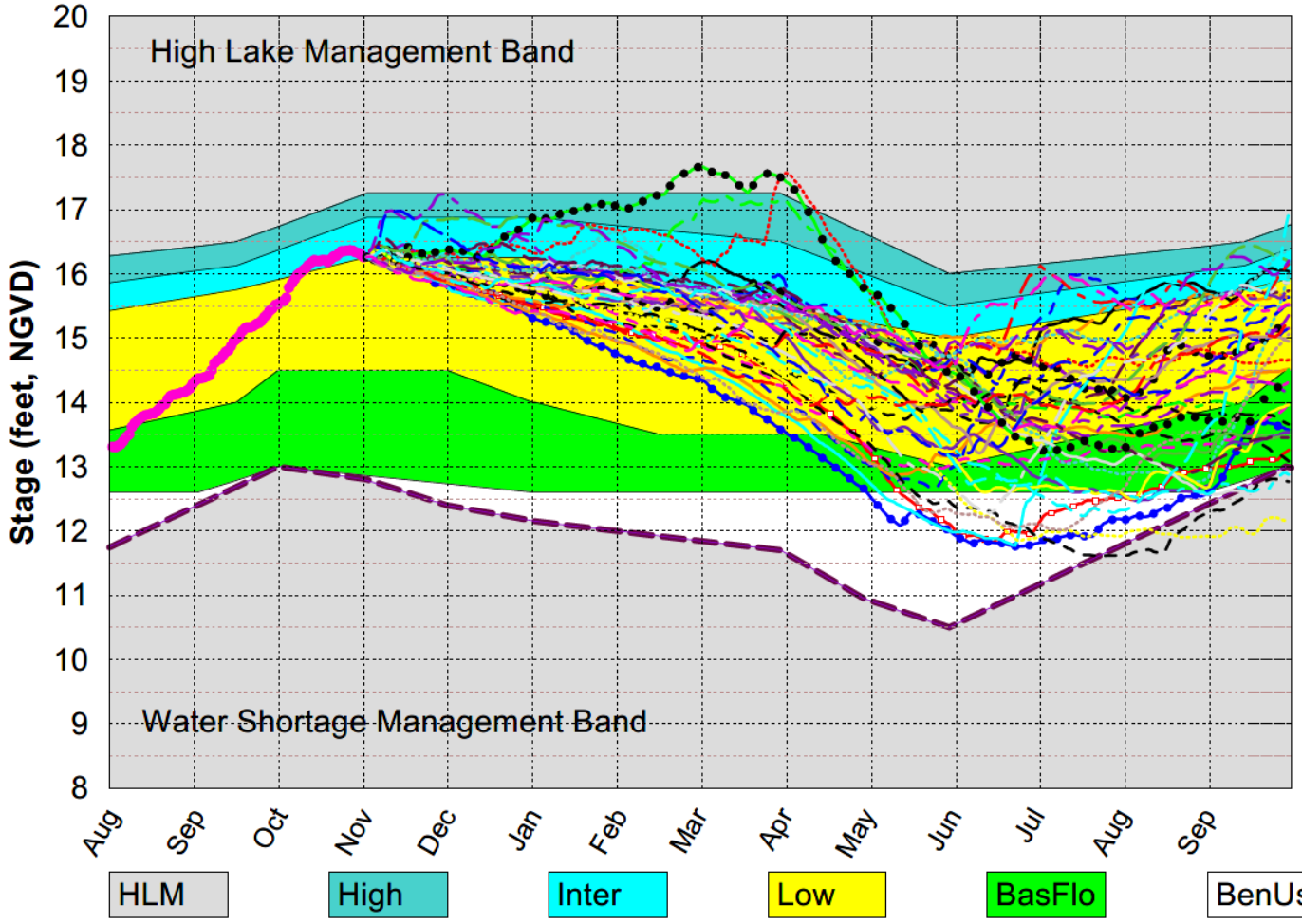


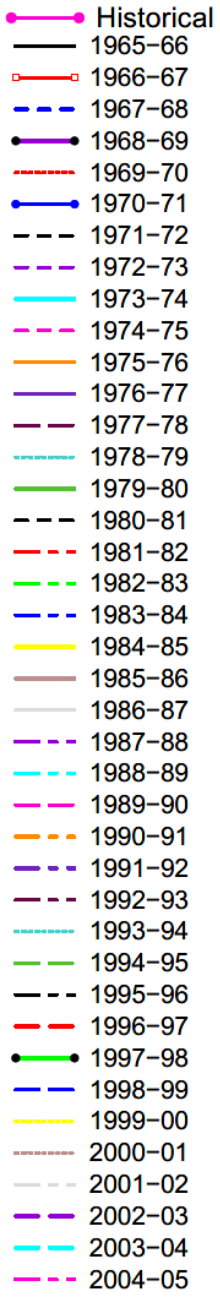

(See assumptions on the Position Analysis Results website)

Fri Nov 6 12:25:47 2020

# Lake Okeechobee SFWMM Nov 2020 Position Analysis

All Simulated Years Plot PA

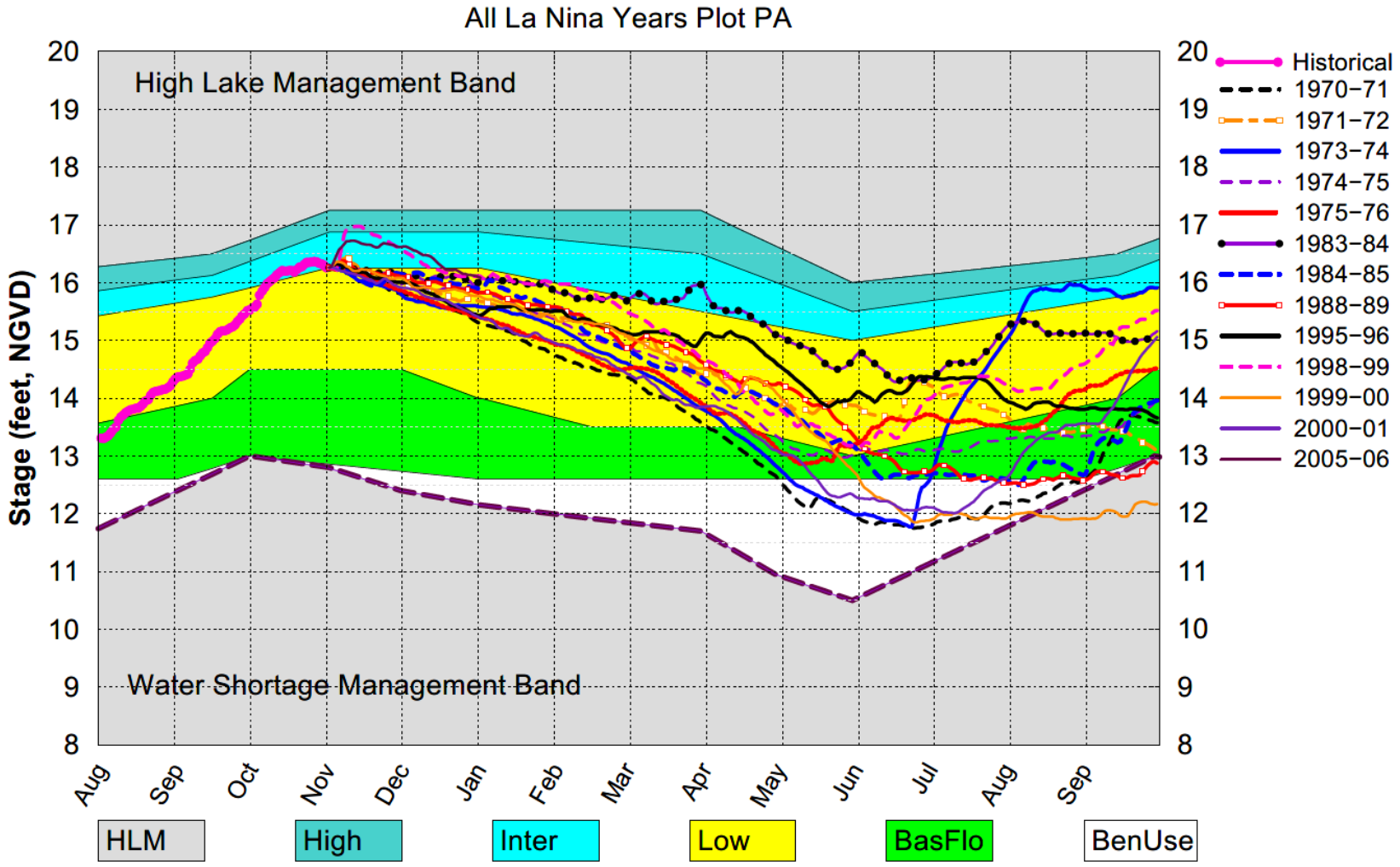



(See assumptions on the Position Analysis Results website)

Fri Nov 6 12:29:05 2020

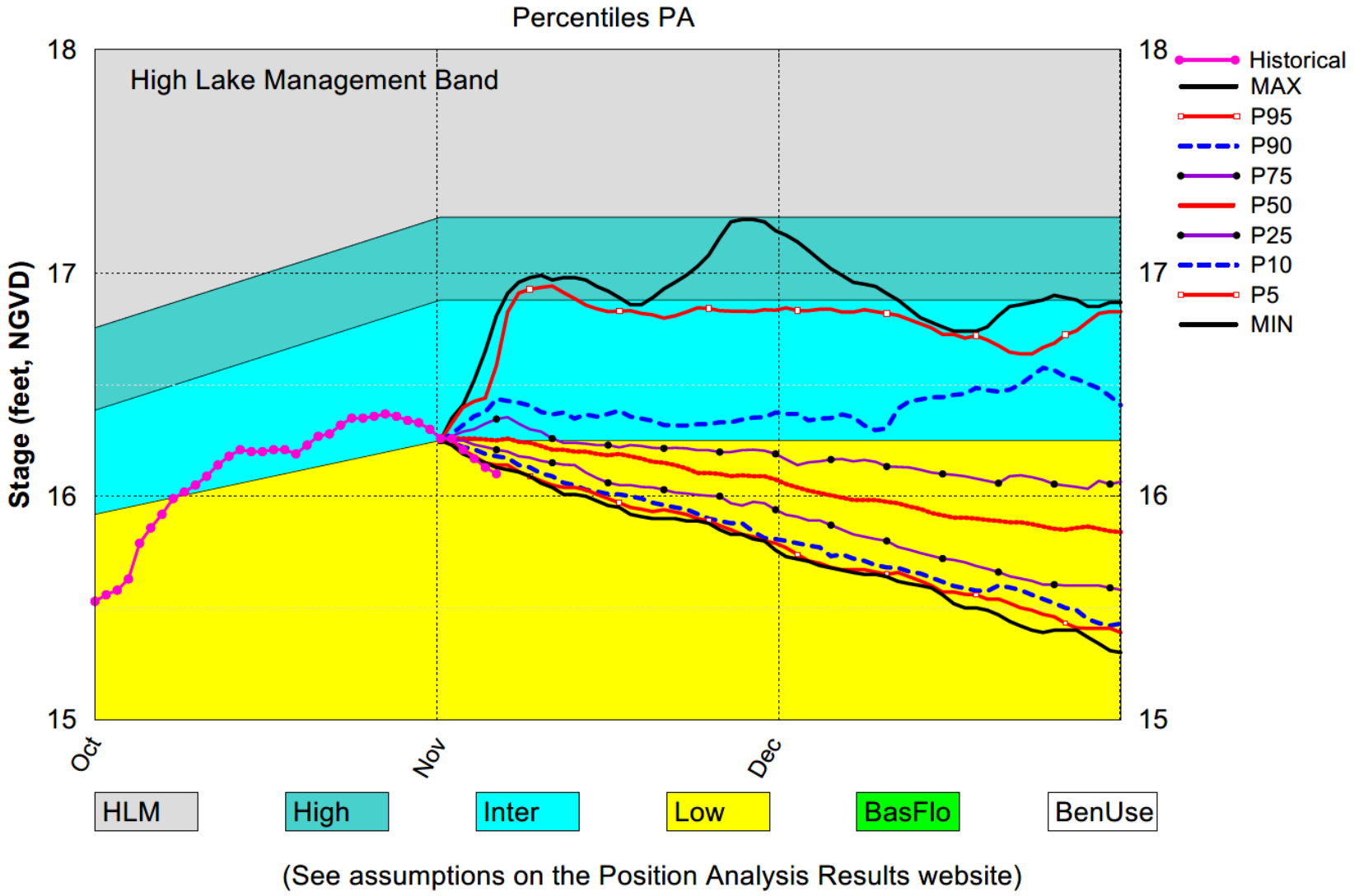
# Lake Okeechobee SFWMM Nov 2020 Position Analysis




(See assumptions on the Position Analysis Results website)

Fri Nov 6 12:26:30 2020

# Lake Okeechobee SFWMM Nov 2020 Position Analysis




(See assumptions on the Position Analysis Results website)

Fri Nov 6 14:24:48 2020