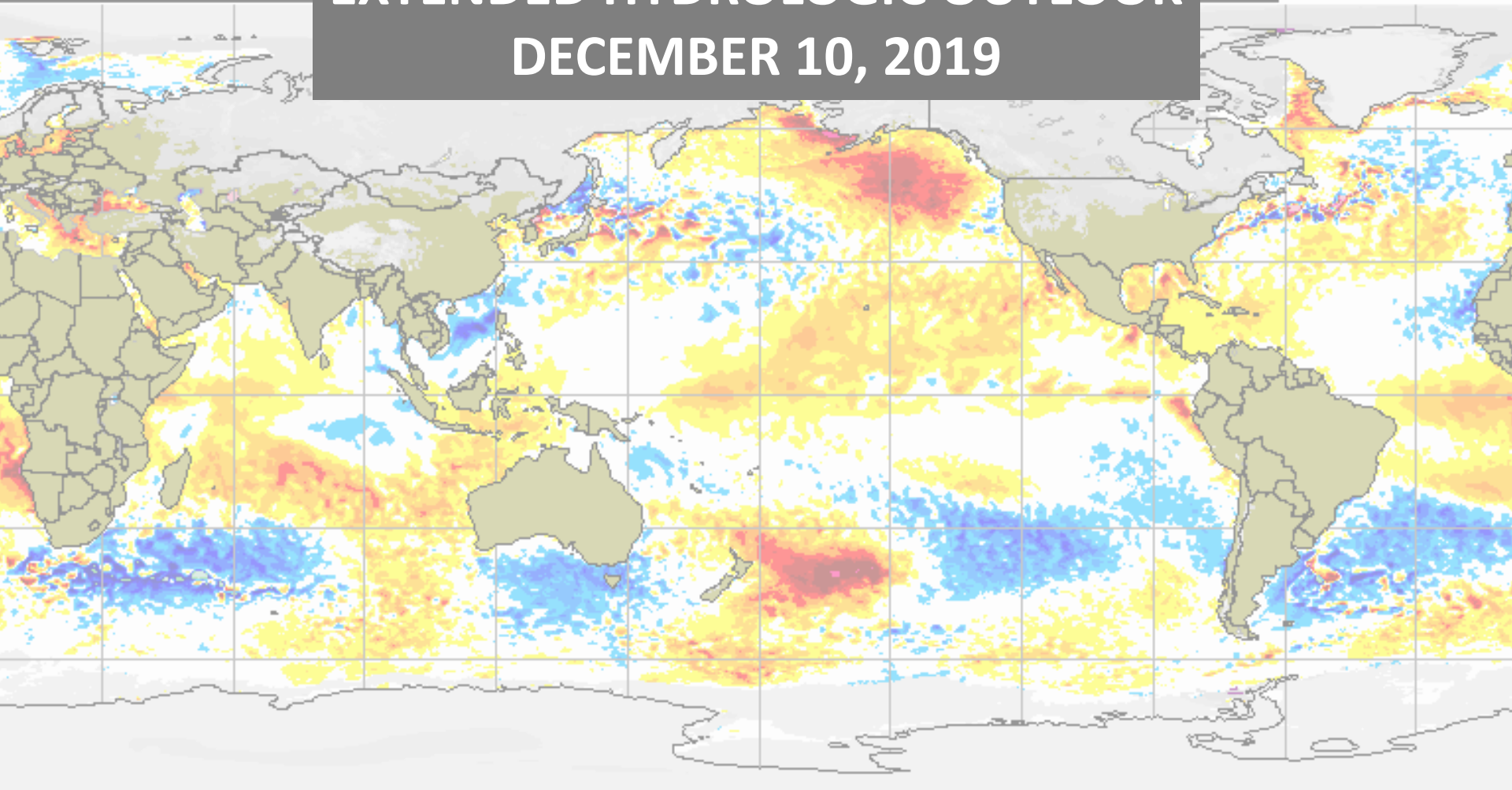


# EXTENDED HYDROLOGIC OUTLOOK

## DECEMBER 10, 2019



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



Snow depth / Épaisseur de la neige (cm)



Uncovered sea ice  
Glace marine à découvrir  
Climatologie 1995-2009 Climatologie



CMC Environnement Canada  
CMC Environment Canada

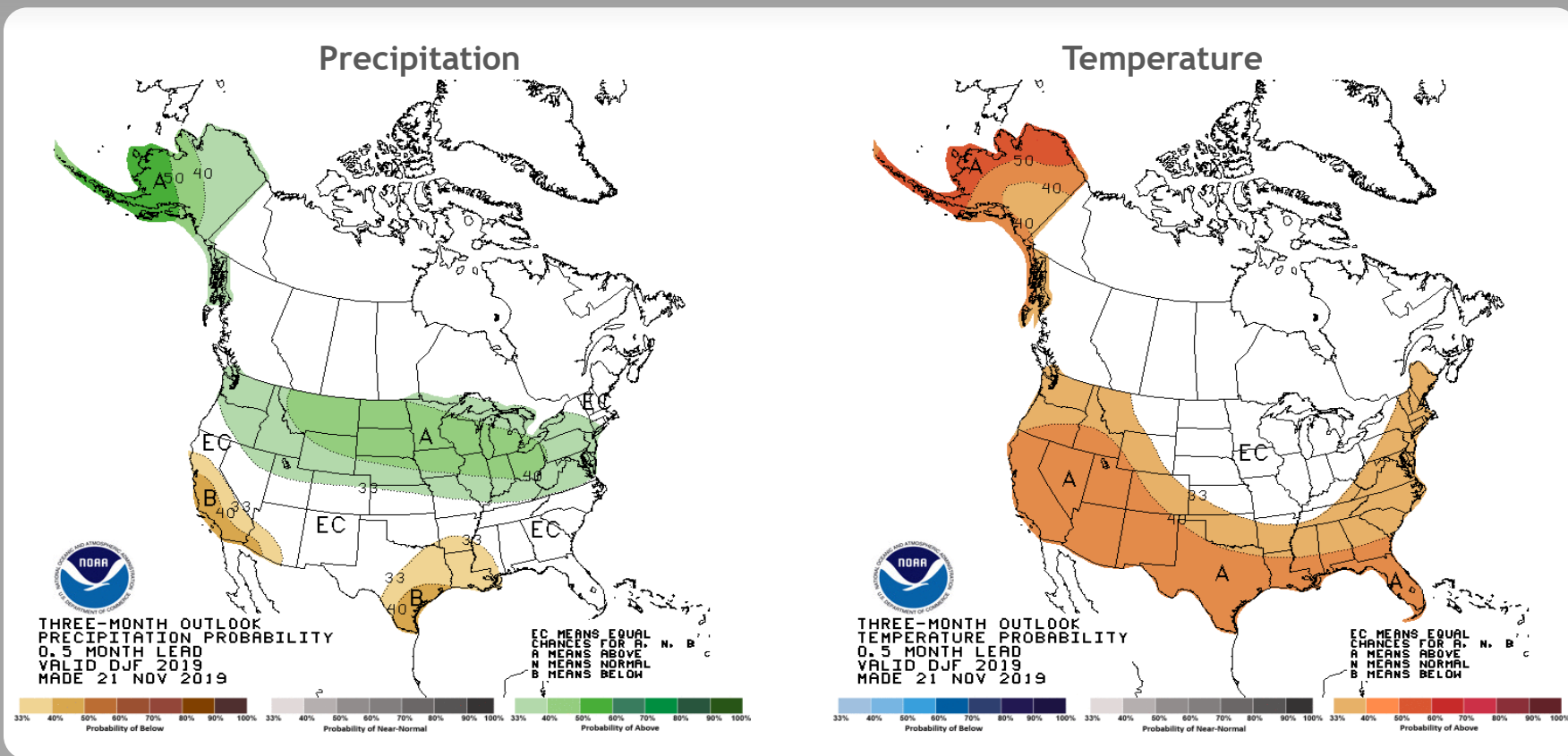
# Summary

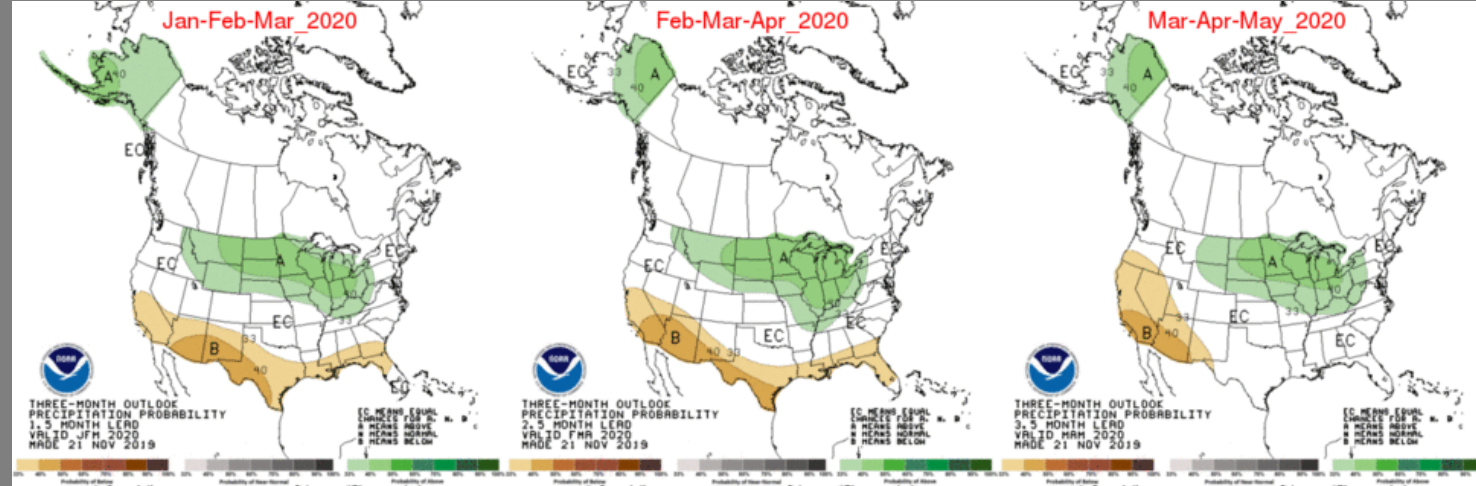
- The Climate Prediction Center (CPC) is forecasting equal chances of below normal, normal and above normal rainfall for December through February.
- ENSO-neutral conditions are present and are favored during the winter 2019-20 (~70% chance), continuing through spring 2020 (60-65% chance).
- El Niño increases the chances of a wetter-than-normal dry season and decreases the potential for tropical storm activity from the Main Development Region in the Atlantic Ocean.
- 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

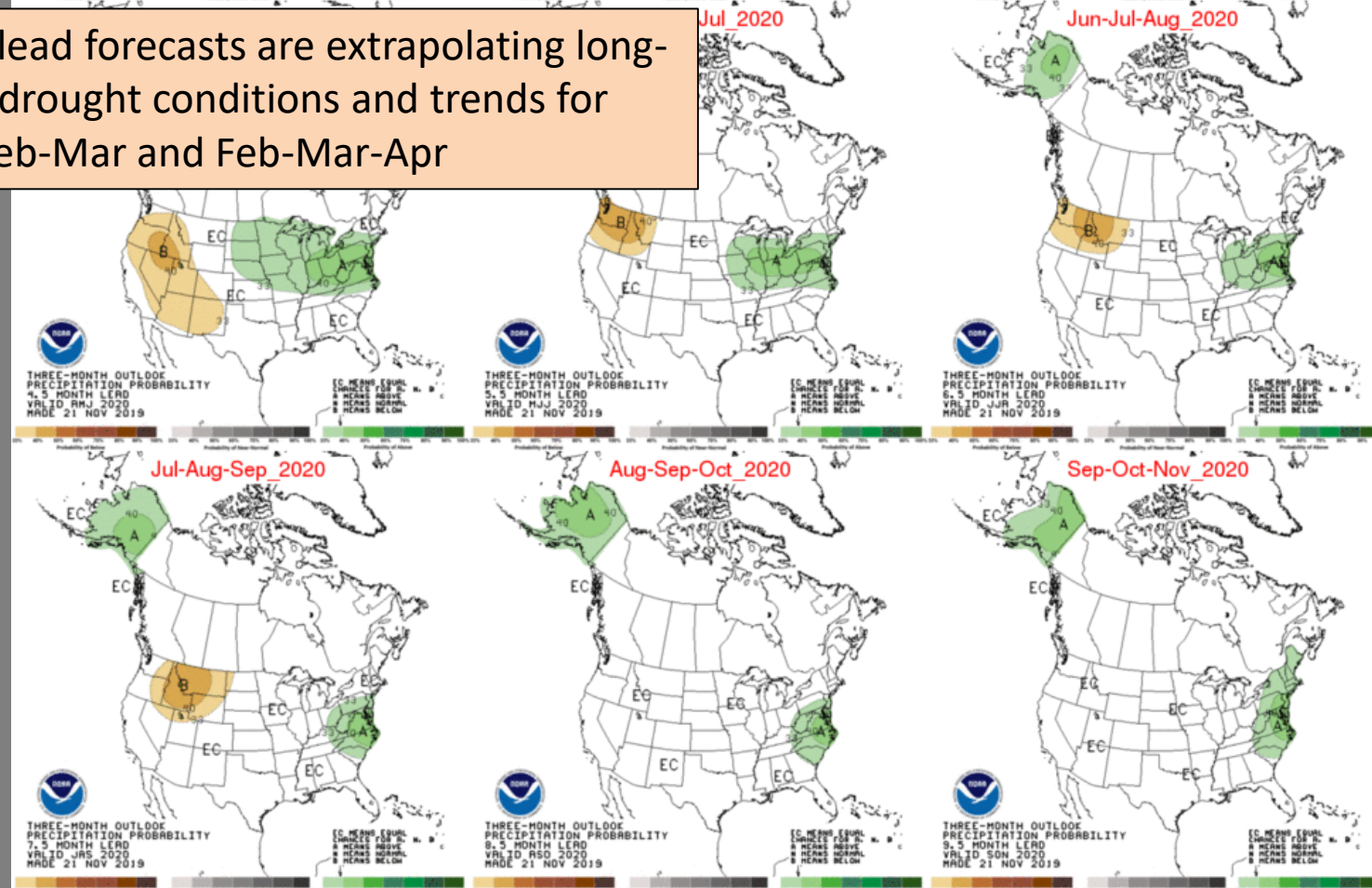
December 2019 - February 2020

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





Long lead forecasts are extrapolating long-term drought conditions and trends for Jan-Feb-Mar and Feb-Mar-Apr



# 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)

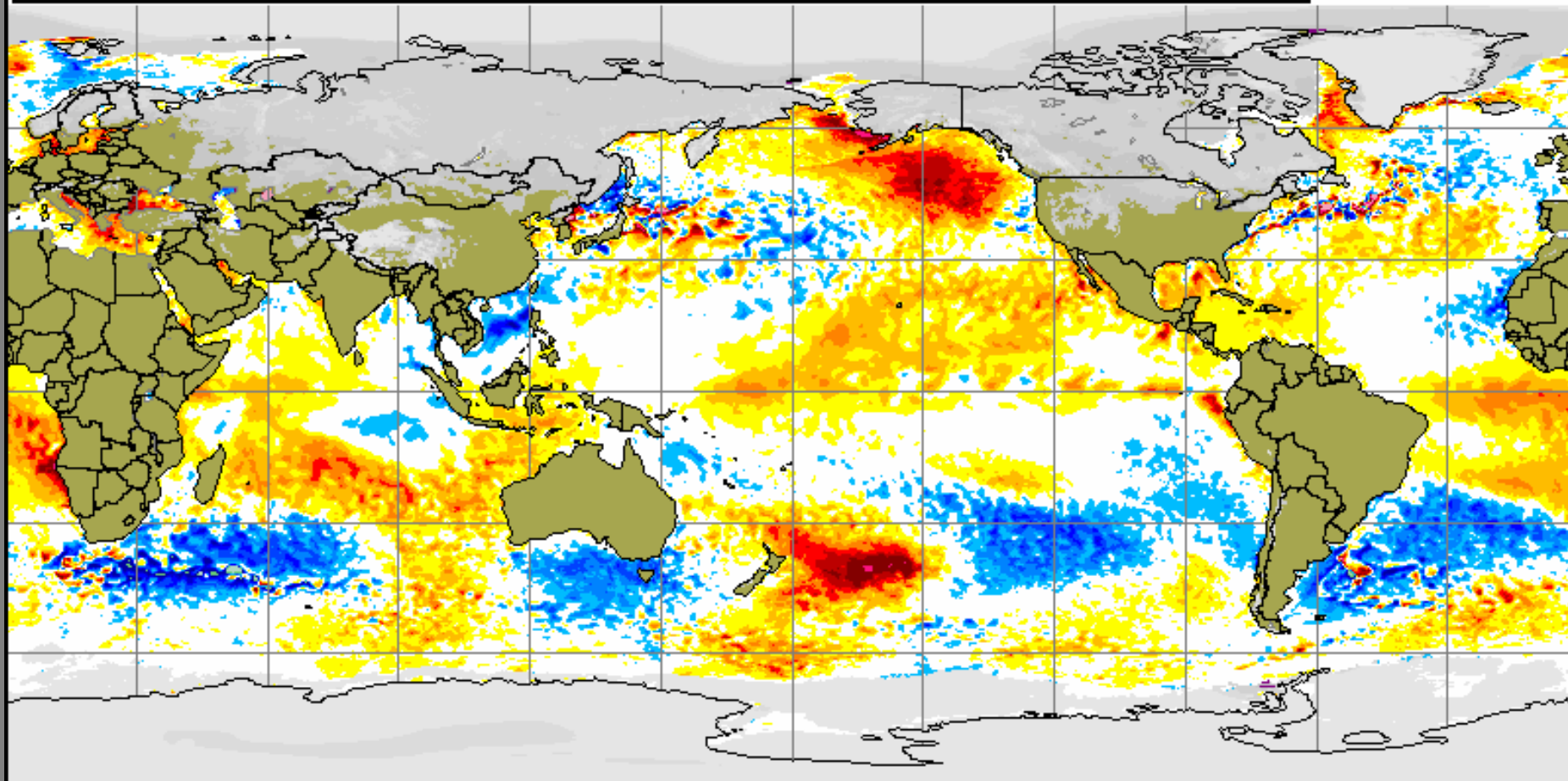
Increases variations of south Florida dry season rainfall



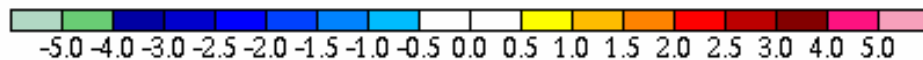
# Current Global Sea Surface Temperature Anomalies

Global sea surface anomaly and snow cover  
10 Dec 2019

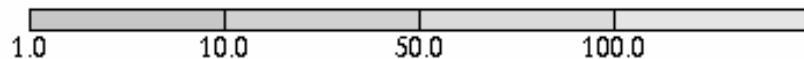
Anomalie de la température de la mer et épaisseur de la neige  
10 Dec 2019



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



Snow depth / Épaisseur de la neige (cm)



Uncovered sea ice

Glace marine à découvert

Climatologie 1995-2009 Climatologie

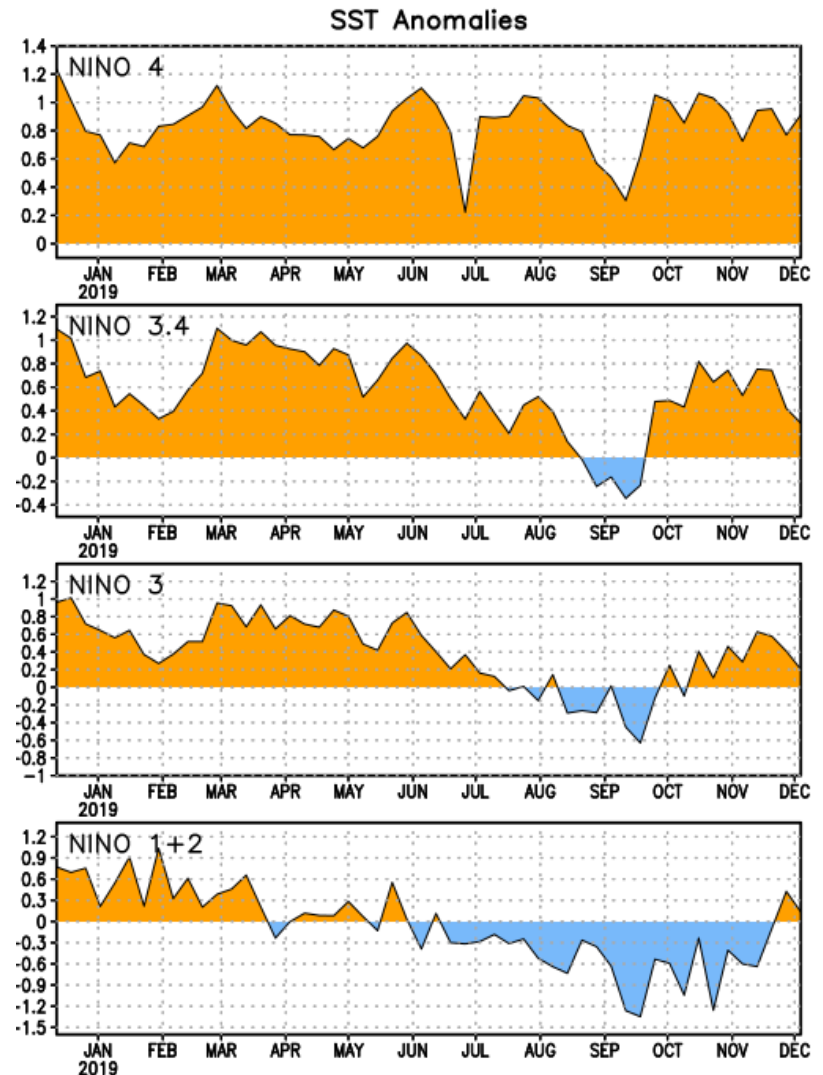
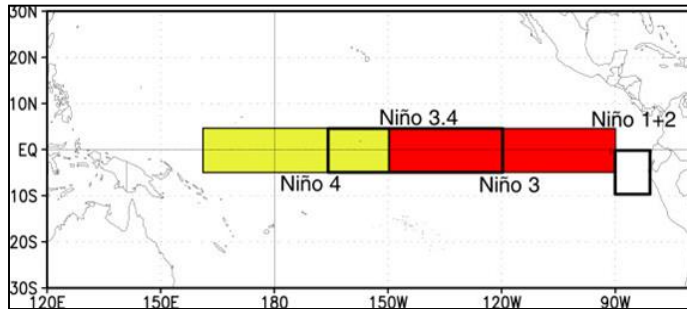


CMC Environnement Canada  
CMC Environnement Canada

# Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

Niño 4	0.9°C
Niño 3.4	0.3°C
Niño 3	0.2°C
Niño 1+2	0.1°C

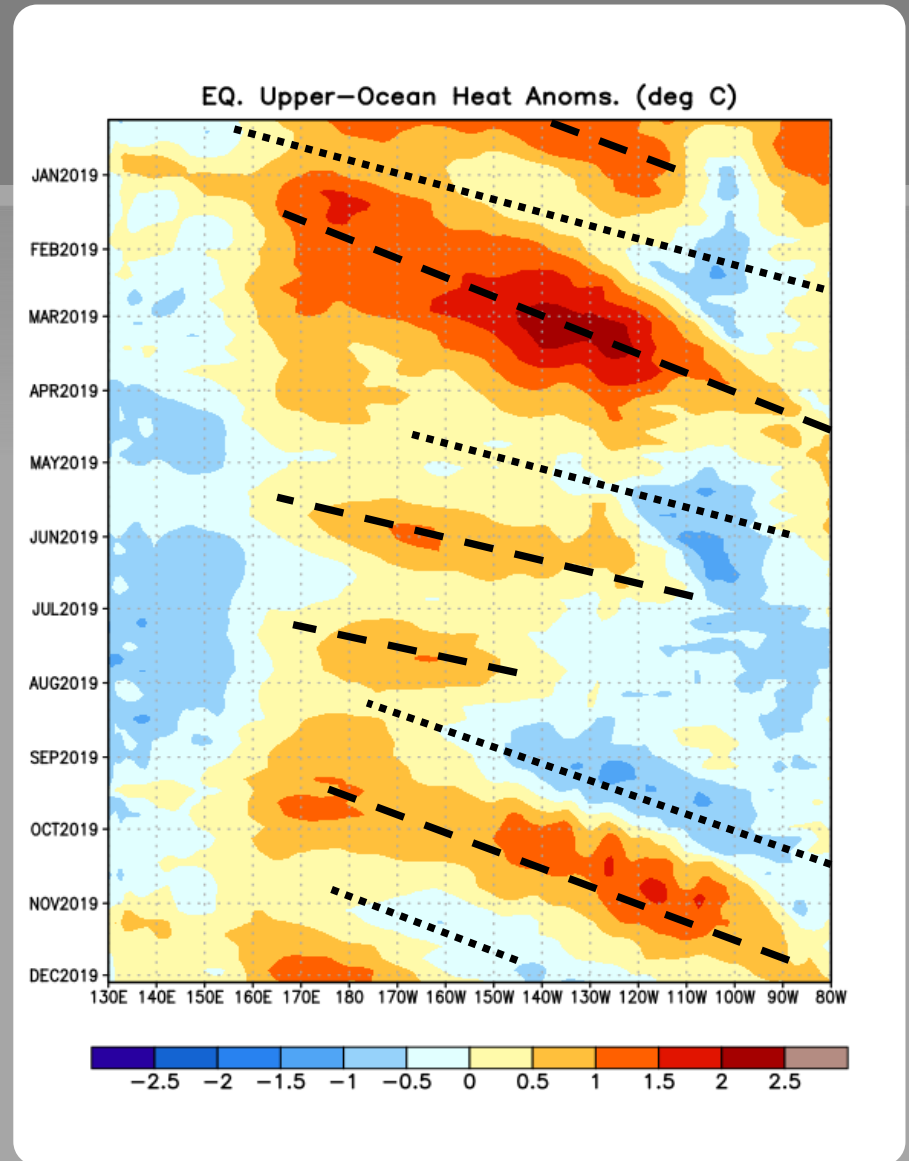


# Weekly Heat Content Evolution in the Equatorial Pacific

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

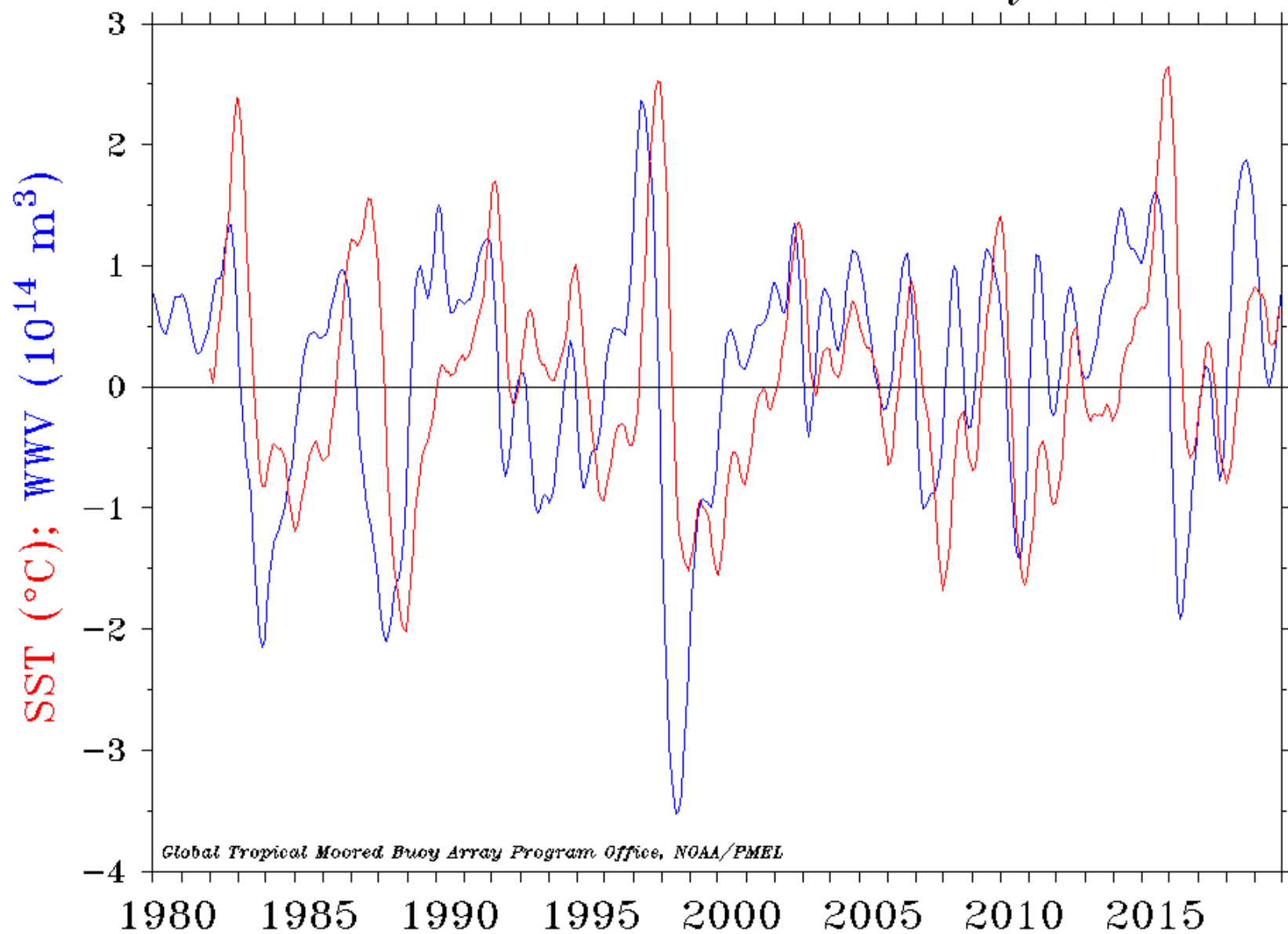
Recently, a downwelling Kelvin wave and anomalous warming (dashed line) reached the west coast of South America, while an upwelling Kelvin wave and anomalous cooling (dotted line) moved into the east-central equatorial Pacific.

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

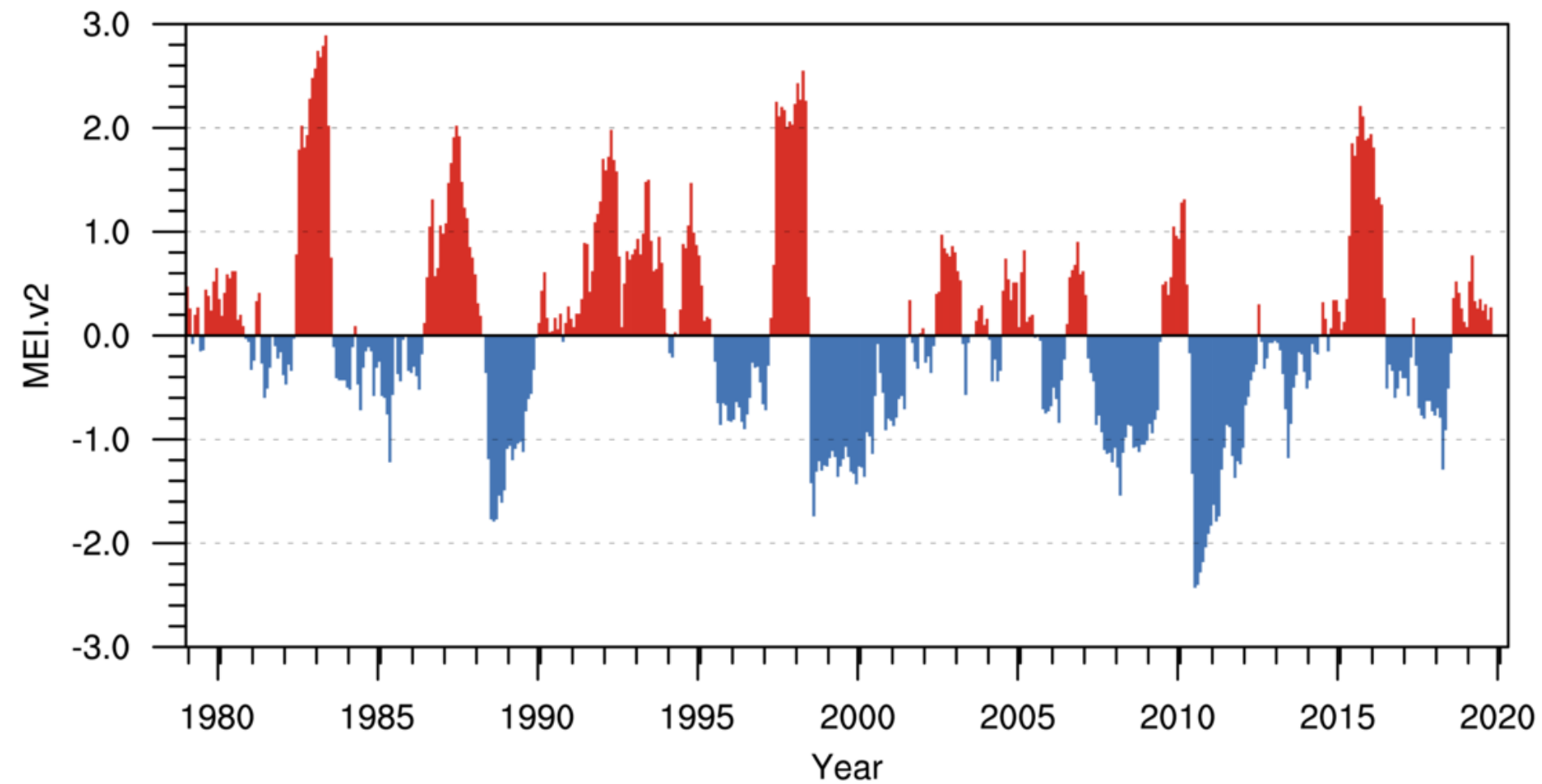




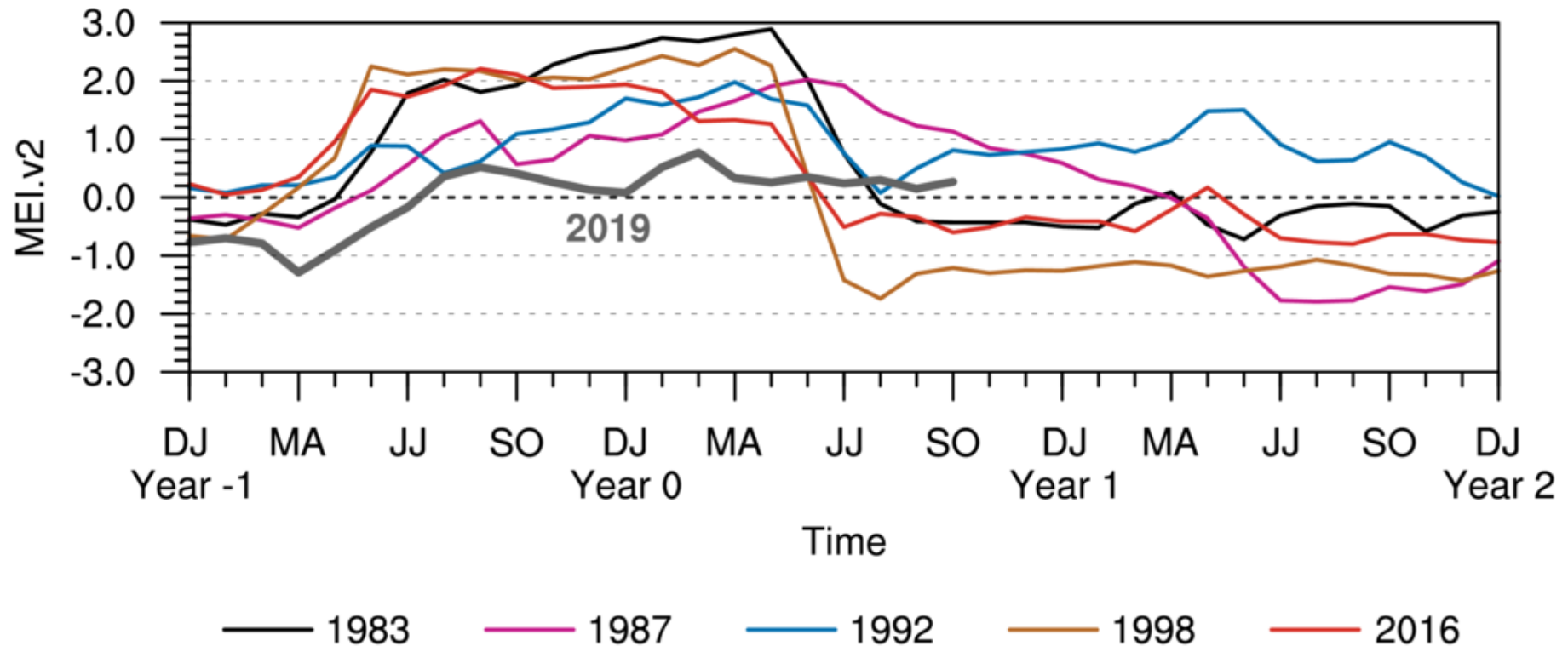
# Warm Water Volume (5°N–5°S, 120°E–80°W) and NINO 3.4 SST Anomaly



## Multivariate ENSO Index Version 2

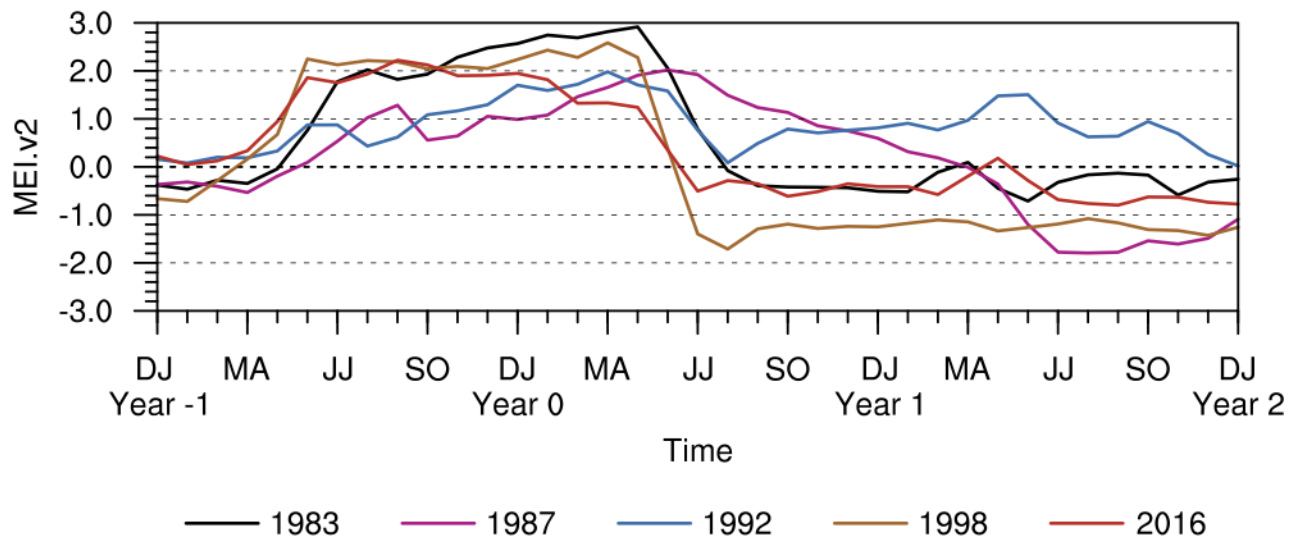


## MEI.v2 Evolution of Current ENSO Event in Historical Context

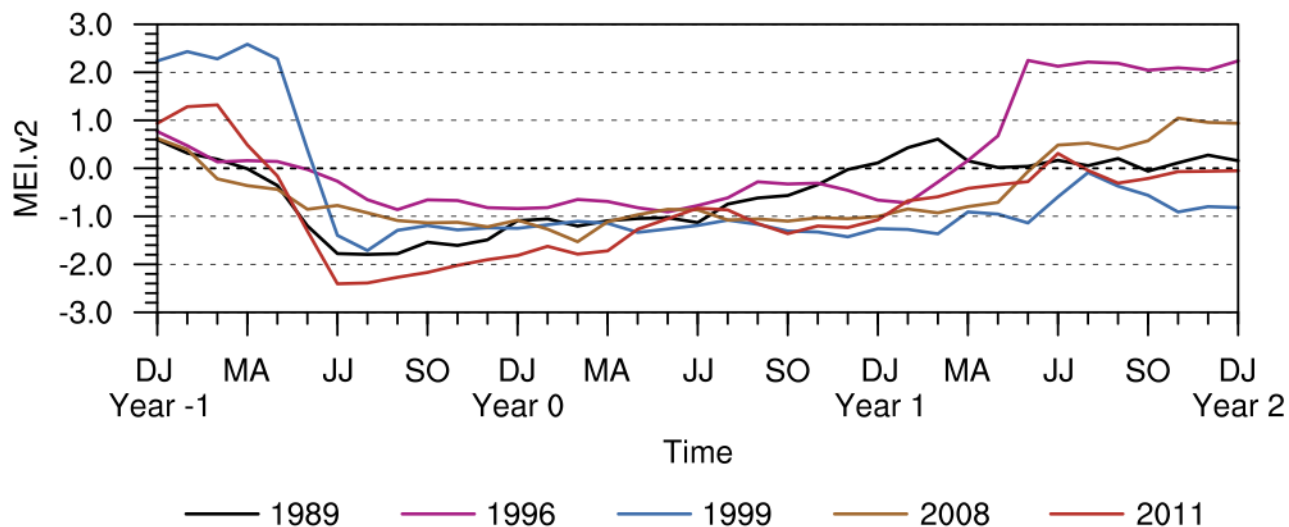


## MEI.v2 Evolution of Historical ENSO Events

(a) El Niño

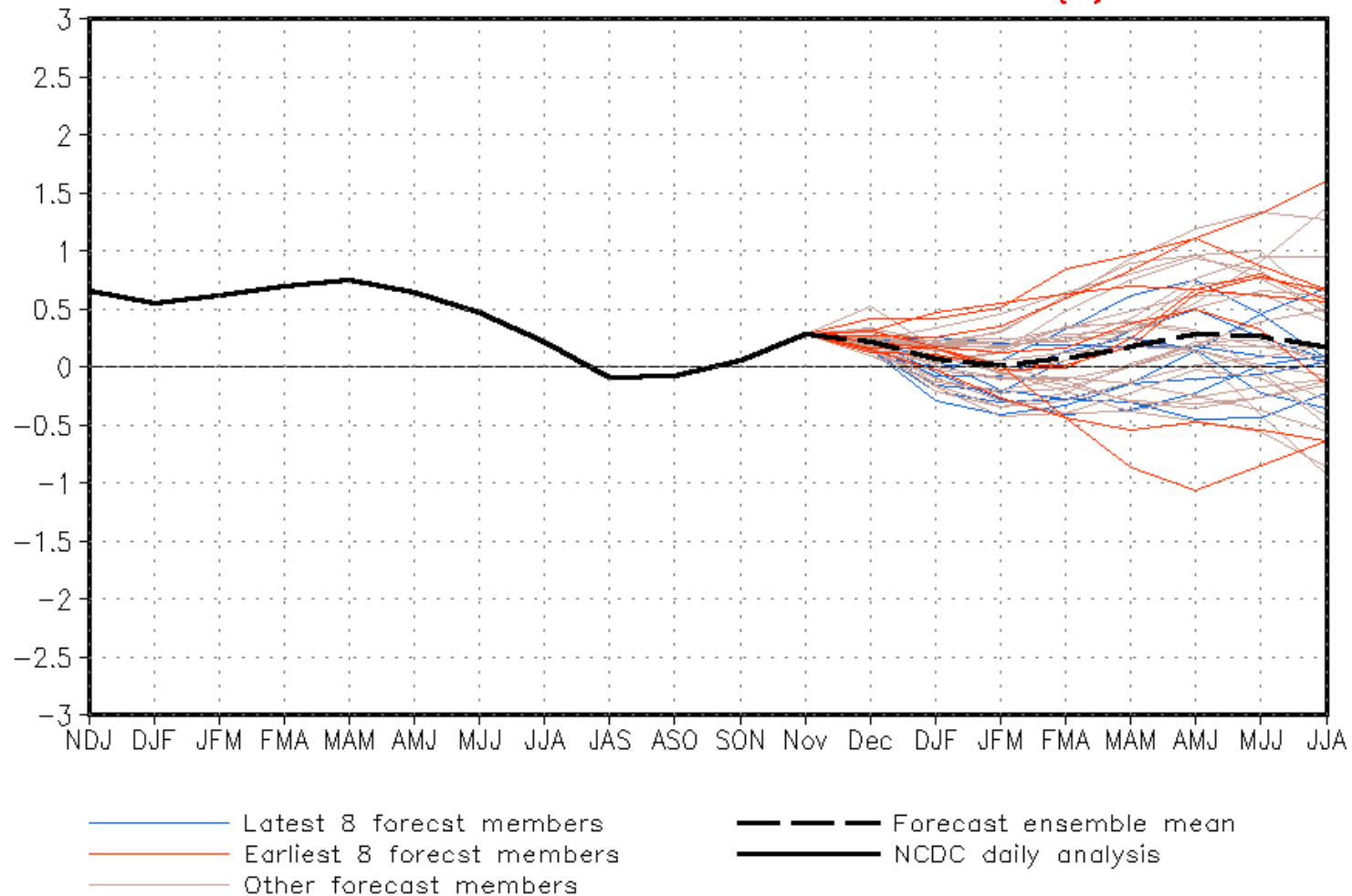


(b) La Niña





## CFSv2 forecast Nino3.4 SST anomalies (K)



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



# IRI/CPC Pacific Niño

## 3.4 SST Model Outlook

A majority of models favor ENSO-neutral through Northern Hemisphere summer 2020.

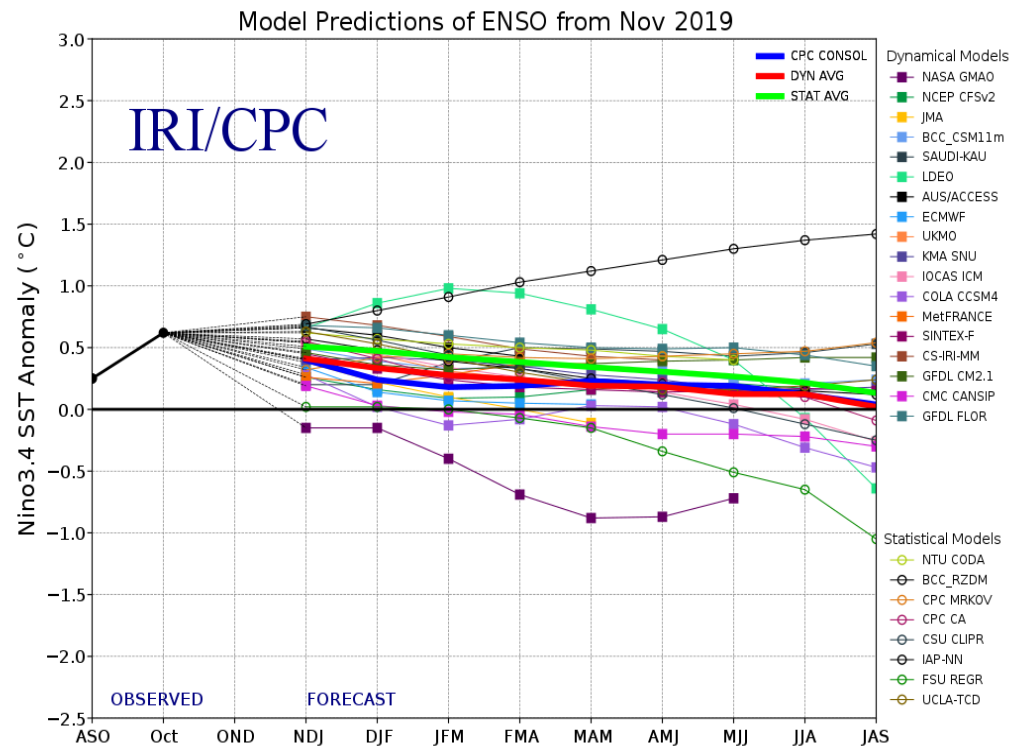


Figure provided by the International Research Institute (IRI) for Climate and Society (updated 19 November 2019).

# 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  $\pm 0.5$  °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.

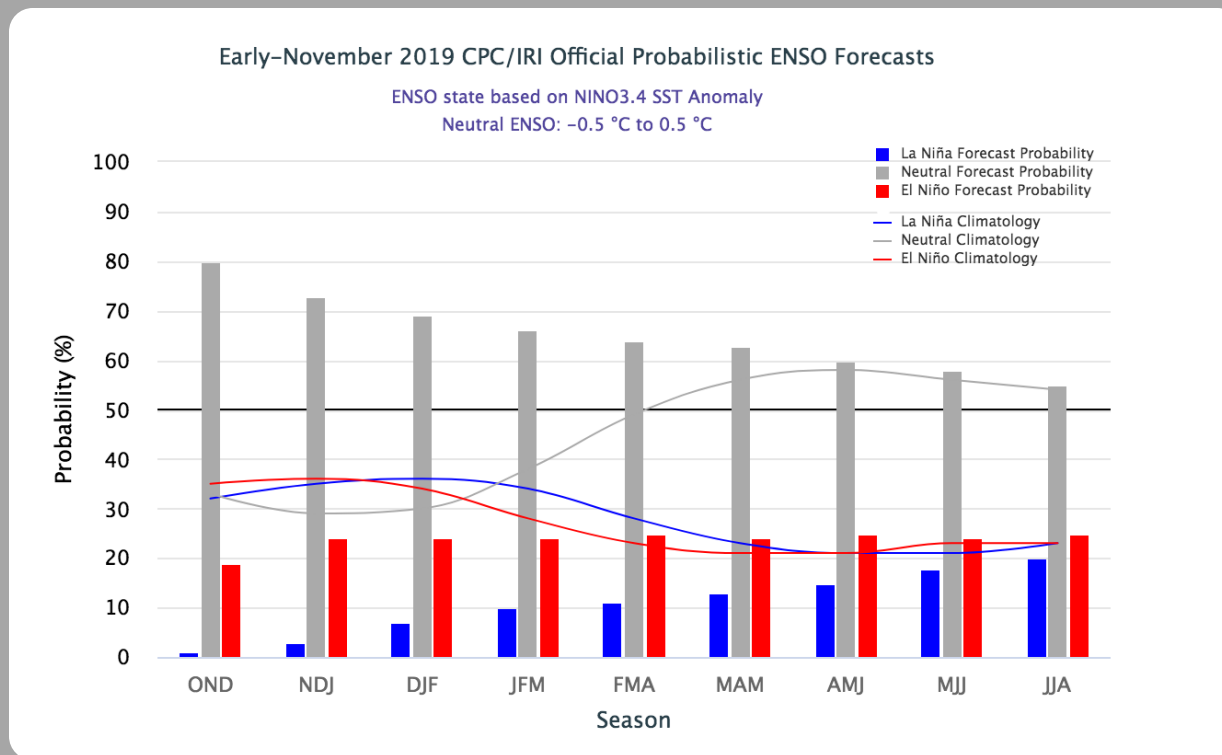
The ONI is one measure of the El Niño-Southern Oscillation, and other indices can confirm whether features consistent with a coupled ocean-atmosphere phenomenon accompanied these periods. The complete table going back to DJF 1950 can be found [here](#).

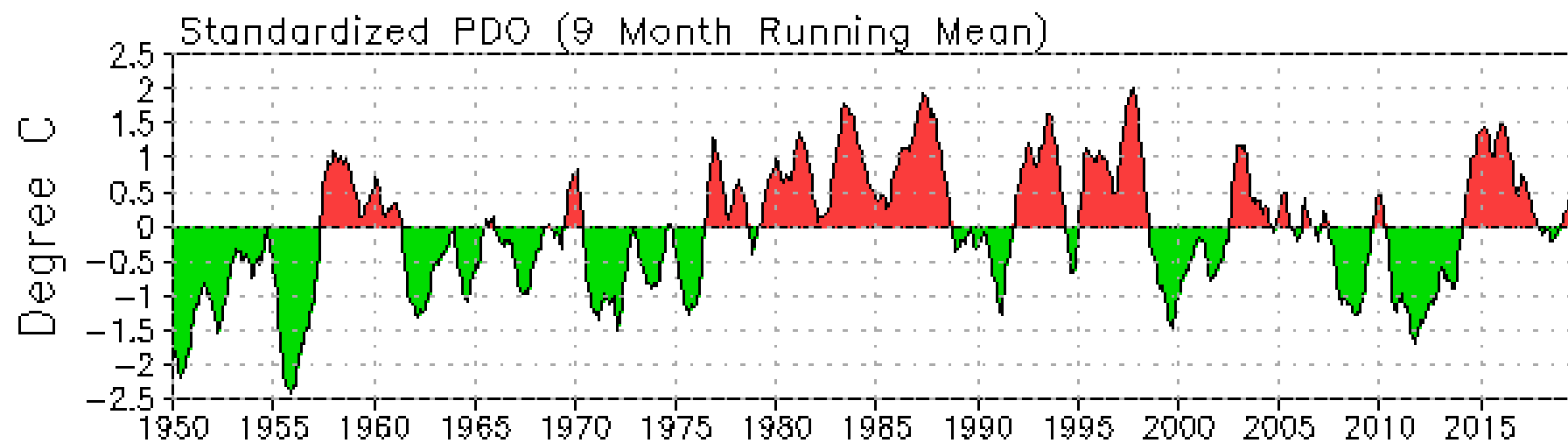
Year	DJF	JFM	FMA	MAM	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ
2007	0.7	0.3	0.0	-0.2	-0.3	-0.4	-0.5	-0.8	-1.1	-1.4	-1.5	-1.6
2008	-1.6	-1.4	-1.2	-0.9	-0.8	-0.5	-0.4	-0.3	-0.3	-0.4	-0.6	-0.7
2009	-0.8	-0.7	-0.5	-0.2	0.1	0.4	0.5	0.5	0.7	1.0	1.3	1.6
2010	1.5	1.3	0.9	0.4	-0.1	-0.6	-1.0	-1.4	-1.6	-1.7	-1.7	-1.6
2011	-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		

# CPC/IRI Probabilistic ENSO Outlook

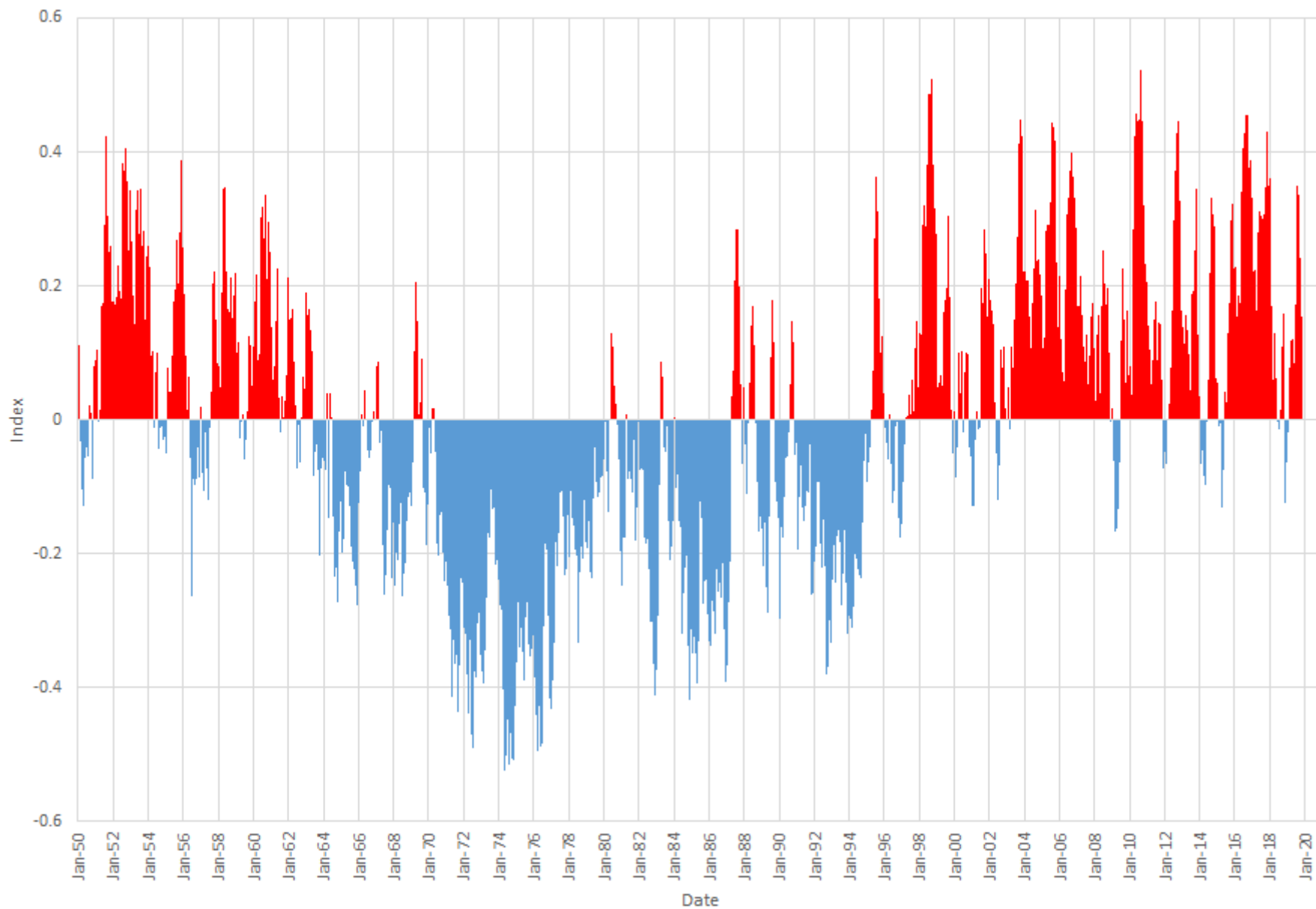
Updated: 14 November 2019

ENSO-neutral is most likely to continue through the Northern Hemisphere summer 2020.





Index of the North Atlantic Temperatures from Kaplan Extended SST V2

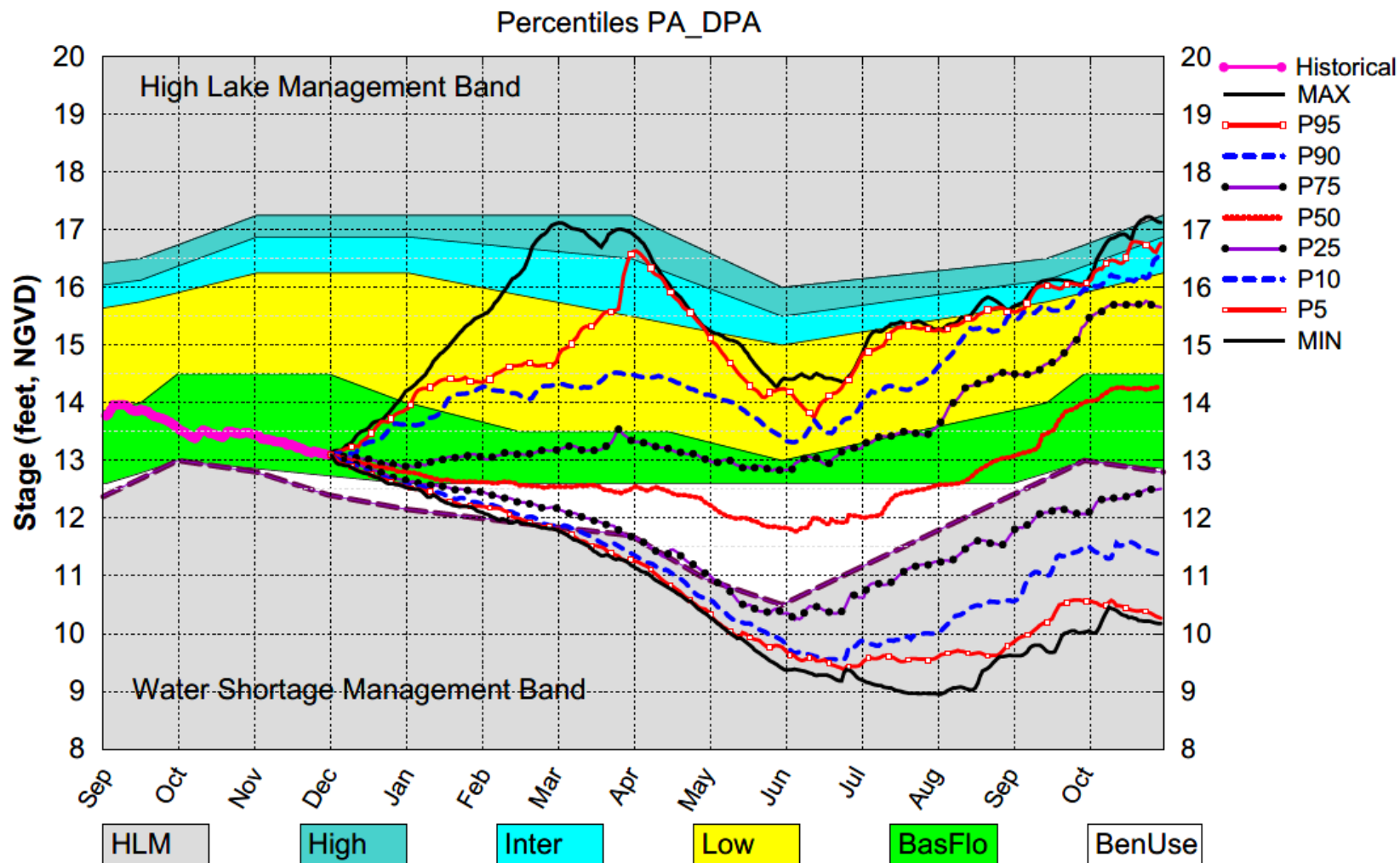




# Dynamic Position Analysis

- 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<sup>st</sup> of the previous month and conditions the simulation using real time data during the previous month to achieve real time stage on the 1<sup>st</sup> 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-December-2019)
  - 41 1-year simulations of system response to historical rainfall conditions
  - Statistical summaries used to display projections

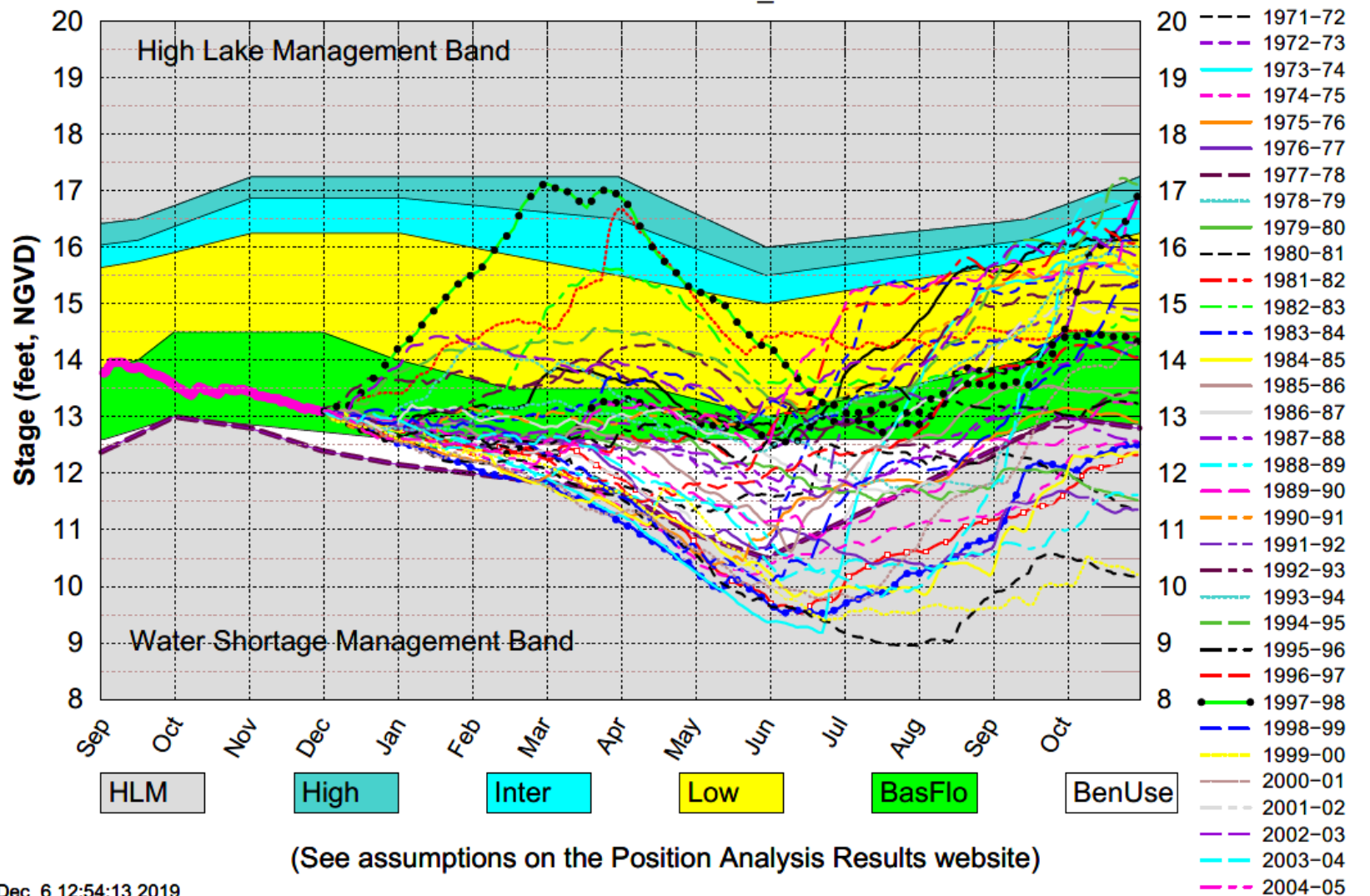
# Lake Okeechobee SFWMM Dec 2019 Position Analysis



(See assumptions on the Position Analysis Results website)

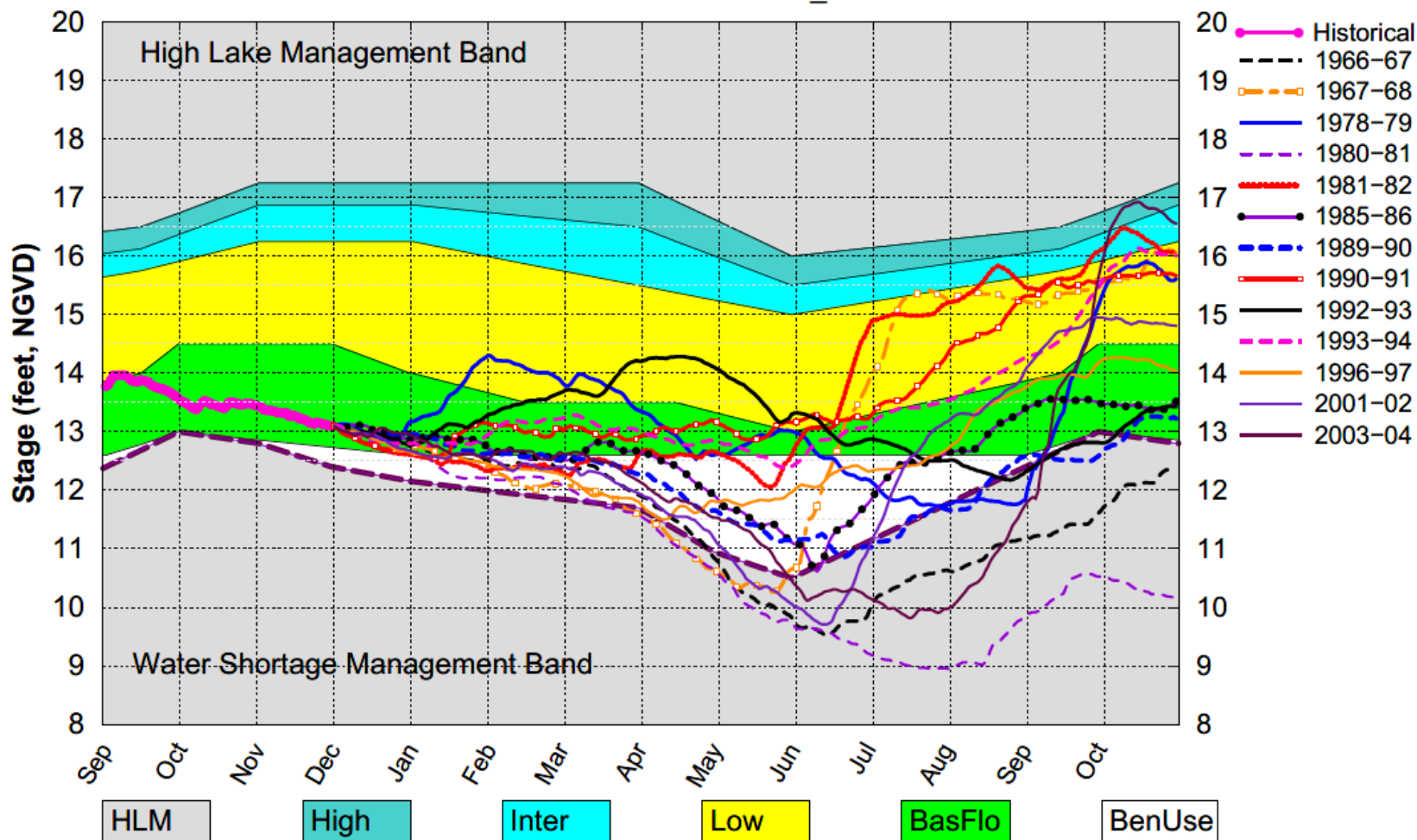
# Lake Okeechobee SFWMM Dec 2019 Position Analysis

All Simulated Years Plot PA\_DPA



# Lake Okeechobee SFWMM Dec 2019 Position Analysis

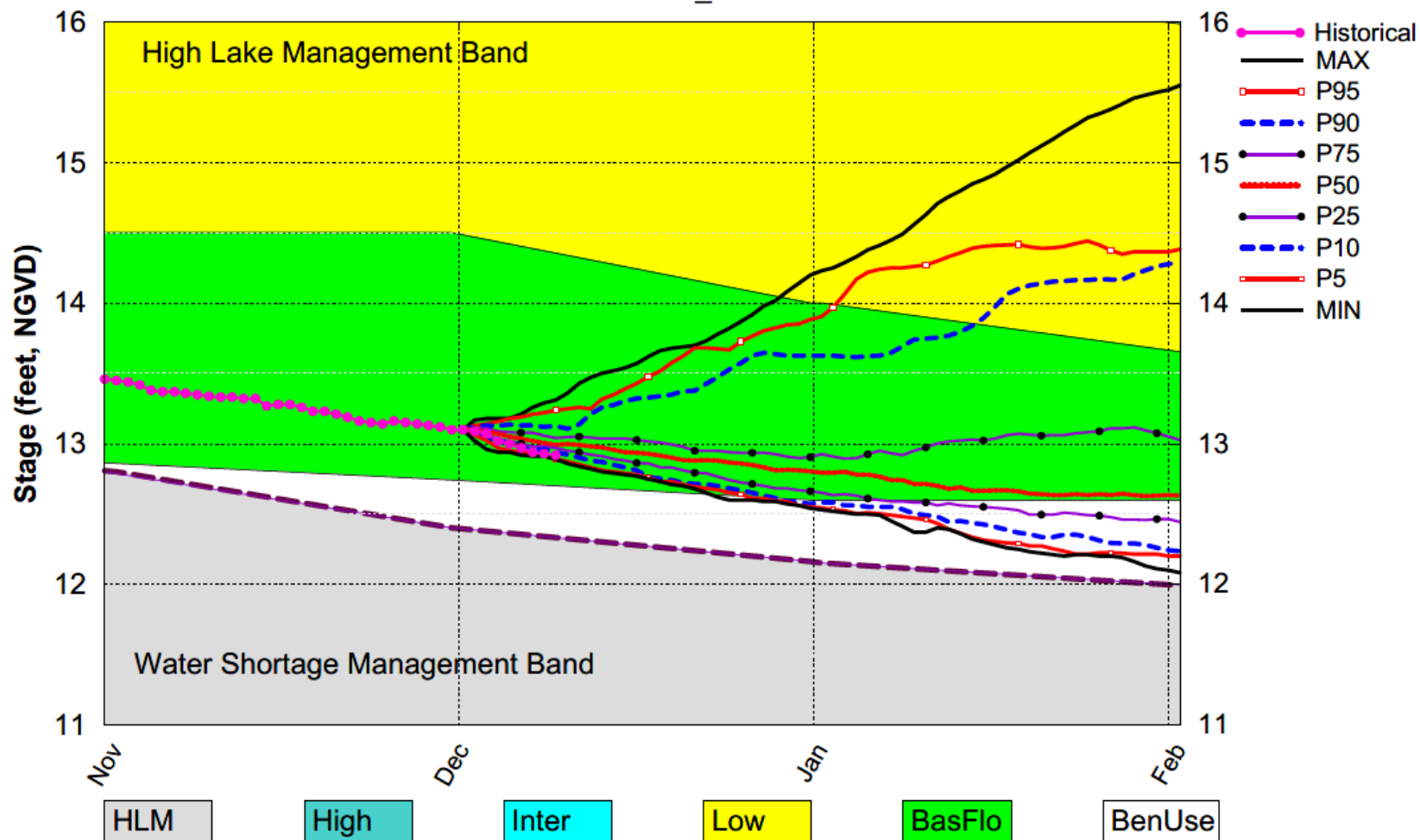
All ENSO Neutral Years Plot PA\_DPA



(See assumptions on the Position Analysis Results website)

# Lake Okeechobee SFWMM Dec 2019 Position Analysis

Percentiles PA\_DPA



(See assumptions on the Position Analysis Results website)