

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)

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	0 10	.0 50	.0 100	0.0

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 <u>equal</u> <u>chances of below normal, normal and above normal rainfall</u> <u>for November through January.</u>
- ENSO-neutral conditions are present and are favored during the fall 2019 (~85% chance), continuing through spring 2020 (55-60% chance).
- El Niño increases the chances of a <u>wetter-than-normal dry</u> 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 November-January 2019

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





# **Teleconnections to South Florida**

Climate anomalies being related to each other at large distances: <u>El Niño Southern Oscillation (ENSO)</u>

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**



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# Niño Region SST Departures (°C) Recent Evolution

# The latest weekly SST departures are:

Niño 4	0.7°C
Niño 3.4	0.5°C
Niño 3	0.3°C
Niño 1+2	-0.6°C





## Weekly Heat Content Evolution in the Equatorial Pacific

In November 2018 and in January-March 2019, positive subsurface temperature anomalies increased, partly due to downwelling Kelvin waves.

During April-May 2019, an upwelling Kelvin wave contributed to a reduction of positive subsurface temperature anomalies and the emergence of negative anomalies around 110°-90°W.

Since mid-September, a downwelling Kelvin wave has increased subsurface temperature anomalies in the east-central Pacific, while the far eastern Pacific remains below-average.

> 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.







#### **Multivariate ENSO Index Version 2**



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







# IRI/CPC Pacific Niño 3.4 SST Model Outlook

A majority of models favor ENSOneutral through Northern Hemisphere spring 2020.



Figure provided by the International Research Institute (IRI) for Climate and Society (updated 19 October 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 +/- 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 <u>here</u>.

Year	DJF	JFM	FMA	MAM	AMJ	MJJ	ACC	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			

## **CPC/IRI Probabilistic ENSO Outlook**

Updated: 10 October 2019

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







# **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-November-2019)
  - 41 1-year simulations of system response to historical rainfall conditions
  - Statistical summaries used to display projections

#### Lake Okeechobee SFWMM Nov 2019 Position Analysis



(See assumptions on the Position Analysis Results website)



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(See assumptions on the Position Analysis Results website)