EXTENDED HYDROLOGIC OUTLOOK
JULY 9, 2019

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

Uncovered sea ice
Glace marine à découvert
Climatologie 1995-2009 Climatology

CMC Environment Canada
Summary

• The Climate Prediction Center (CPC) is forecasting equal chances of above normal, normal and below normal rainfall for July through September.

• El Niño is predicted to persist through the summer 2019 (66% chance), with lower odds of continuing through the fall and winter (50-55% 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) index for switch to negative (cold) phase, this has the potential to contribute to drier-than-normal wet seasons.
U. S. Seasonal Outlooks
July-September 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:

**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

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

-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

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
Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

- Niño 4: 0.9°C
- Niño 3.4: 0.6°C
- Niño 3: 0.2°C
- Niño 1+2: -0.3°C
In early August, October, November 2018 and in January-March 2019, positive subsurface temperature anomalies increased, partly due to downwelling Kelvin waves.

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

From mid-May through June, a downwelling Kelvin wave resulted in the increase of positive subsurface anomalies across the east-central 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 upwelling and cooling occur in the trailing portion.
Warm Water Volume (5°N–5°S, 120°E–80°W) and NINO 3.4 SST Anomaly
MEI.v2 Evolution of Current ENSO Event in Historical Context

Year -1 | DJ | MA | JJ | SO | DJ | MA | JJ | SO | DJ | MA | JJ | SO | DJ | Year 2

Time

-3.0
-2.0
-1.0
0.0
1.0
2.0
3.0

MEI.v2

1983
1987
1992
1998
2016

2019
CFSv2 forecast Nino3.4 SST anomalies (K) (PDF corrected)

Latest 8 forecast members
Earliest 8 forecast members
Other forecast members
Forecast ensemble mean
NCDC daily analysis

The majority of models predict a weak El Niño to continue into the Northern Hemisphere winter 2019-20.
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 Niño Index (ONI) [3 month running mean of ERSST.v5 SST anomalies in the Niño 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 Southern Oscillation phenomenon accompanied these periods. The complete table going back to DJF 1950 can be found here.

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<thead>
<tr>
<th>Year</th>
<th>DJF</th>
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<th>FMA</th>
<th>MAM</th>
<th>AMJ</th>
<th>MJJ</th>
<th>JJA</th>
<th>JAS</th>
<th>ASO</th>
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<td>0.1</td>
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</table>
El Niño is favored to continue with chances nearing 50% in Northern Hemisphere fall and winter.
El Niño & La Niña Events (1950-2018), and Lake Okeechobee Watershed Rainfall & Net Inflow

Oceanic Niño Index (ONI)
Seasonal ERSSTv5 (centered base periods) Niño 3.4 Region (5°N-5°S; 170°-120°W)

Lake Okeechobee Watershed Rainfall and Net Inflow (Nov-Apr)

Source: Cal Neidrauer (SFWMD)
2019 Tropical Outlook
2019 Atlantic Hurricane Season Outlook

- Named storms: 9-15
- Hurricanes: 4-8
- Major hurricanes: 2-4

Season probability:
- 30% Above-normal
- 30% Near-normal
- 40% Below-normal season

Be prepared: Visit hurricanes.gov and follow @NWS and @NHC_Atlantic on Twitter.
### ATLANTIC BASIN SEASONAL HURRICANE FORECAST FOR 2019*

<table>
<thead>
<tr>
<th>Forecast Parameter and 1981-2010 Average (in parentheses)</th>
<th>Issue Date 4 April 2019</th>
<th>Issue Date 4 June 2019</th>
<th>Issue Date 9 July 2019</th>
<th>Observed Activity Through June 2019</th>
<th>9 July Forecast for Remainder of 2019</th>
</tr>
</thead>
<tbody>
<tr>
<td>Named Storms (NS) (12.1)</td>
<td>13</td>
<td>14</td>
<td>14</td>
<td>1</td>
<td>13</td>
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<td>Named Storm Days (NSD) (59.4)</td>
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<td>55</td>
<td>55</td>
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<td>Hurricane Days (HD) (24.2)</td>
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<td>Major Hurricane Days (MHD) (6.2)</td>
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<td>Accumulated Cyclone Energy (ACE) (106)</td>
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<td>100</td>
<td>100</td>
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<td>Net Tropical Cyclone Activity (NTC) (116%)</td>
<td>90</td>
<td>105</td>
<td>105</td>
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</tbody>
</table>

*Seasonal forecast numbers in the first three forecast columns in the above table include tropical cyclones that formed prior to the date of the forecast release (e.g., Andrea in May).

We estimate that 2019 will have an additional 6 hurricanes (average is 6.4), 13 named storms (average is 12.1), 54.25 named storm days (average is 59.4), 20 hurricane days (average is 24.2), 2 major (Category 3-4-5) hurricanes (average is 2.7) and 5 major hurricane days (average is 6.2). The probability of U.S. major hurricane landfall is estimated to be about 105 percent of the long-period average. We expect Atlantic basin Accumulated Cyclone Energy (ACE) and Net Tropical Cyclone (NTC) activity for the remainder of the season to be approximately 95 percent of their long-term average values.
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\textsuperscript{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\textsuperscript{st} 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-July-2019)
  ▪ 41 1-year simulations of system response to historical rainfall conditions
  ▪ Statistical summaries used to display projections
Lake Okeechobee SFWMM July 2019 Position Analysis

Percentiles PA_DPA

High Lake Management Band

Water Shortage Management Band

Stage (feet, NGVD)

Apr May Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr May

HLM High Inter Low BasFlo BenUse

(See assumptions on the Position Analysis Results website)
Lake Okeechobee SFWMM July 2019 Position Analysis

All El Nino Years Plot PA_DPA

High Lake Management Band

Water Shortage Management Band

Stage (feet, NGVD)

Mon Jul 8 23:12:30 2019

(See assumptions on the Position Analysis Results website)