

# **Monthly Bulletin** **Ministry of Agriculture** **Hydrometeorological Service**

## **February 2018**



*"To observe, archive and understand Guyana's weather and climate and provide meteorological, hydrological and oceanographic services in support of the Guyana needs and national and international obligations."*

# HYDROMETEOROLOGICAL BULLETIN

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## Highlights

- ❖ Guyana classified as *Moderately Dry* for January 2018
- ❖ Observed rainfall Significantly less than Historical Average – *Several stations recorded rainfall amounts more than 50% below average.*
- ❖ Warmer than average conditions dominated across much of the Earth's surface: Fifth highest January temperature recorded in 139 years.
- ❖ Wetter to pretty much like usual for period February – April, 2018. Chance for extremely wet condition higher than usual.
- ❖ ENSO-neutral conditions most likely.

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**Below:** Hydromet Service main office decorated for Republic Day celebration.



## Review of Synoptic Systems that influenced the Weather Conditions for January 2018

Guyana's observed weather conditions was not like a typical wet/rainy season. The Secondary rainy season which occurs from December throughout January and well into February saw a significant reduction in the observed January rainfall. For a greater percent of the month, drier and sunny

conditions was observed with few isolated days of heavy rainfall activities. This significant reduction in rainfall amount were as a result of a positive phase of the Madden Julian Oscillation (MJO)<sup>1</sup> which suppressed the convection.

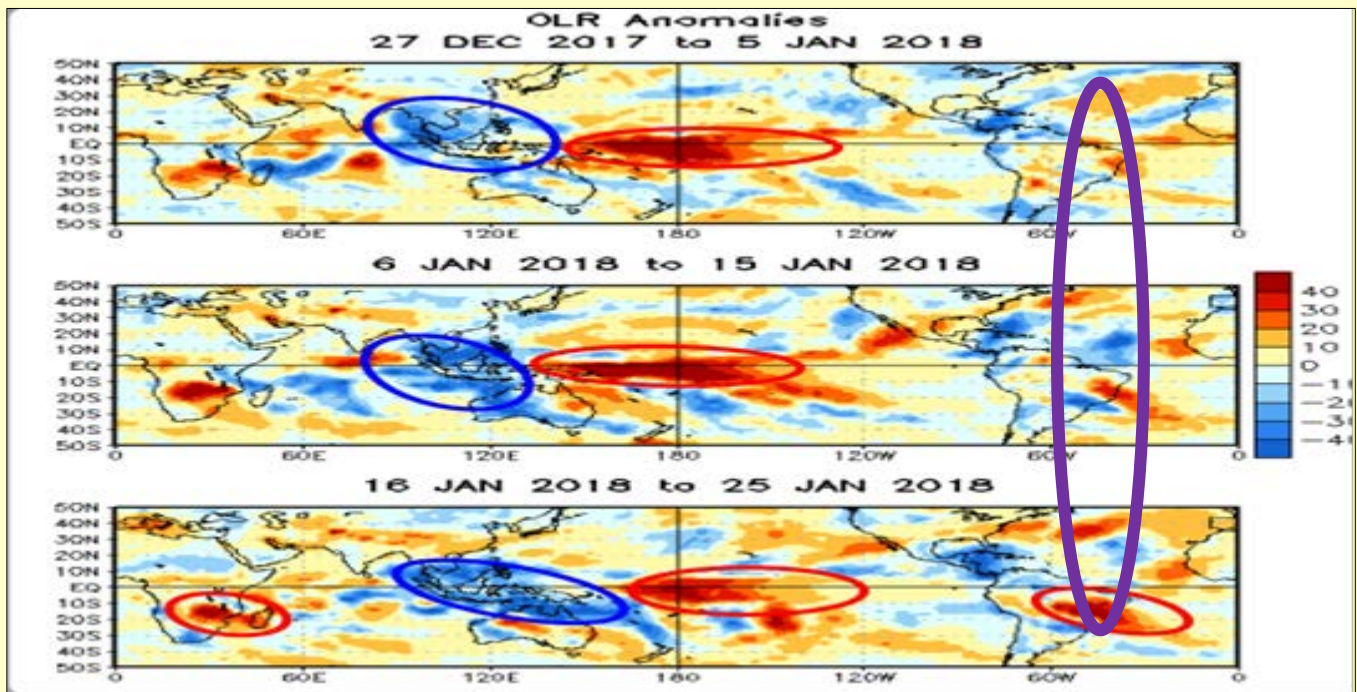


Figure 1 Surface chart (December 30, 2017 18:00 UTC) showing position of the ITCZ along Coastal Guyana

This, with added influence of the Saharan Air Layer (SAL) which produces strong wind shear and Strong Sub Tropical High Pressure system, whose pressure gradient remained tight allowing strong breeze in the lower levels. With the Saharan Dust combined with the strong pressure gradient, they inhibited any deep cloud development and precipitation. If any, showery activities were brief and swift. In the Upper

Levels, the orientation of the upper level trough was not positioned to favor convective buildups, the orientation favors mostly convergence which led to subsidence. Despite these controlling factors, there were oscillations of low to mid-level trough and moisture plumes embedded in the Trade winds which produced widespread showers and thundershowers.

<sup>1</sup> The Madden-Julian Oscillation (MJO) is the major fluctuation in tropical weather on weekly to monthly timescales. The MJO can be characterized as an eastward

moving 'pulse' of cloud and rainfall near the equator that typically recurs every 30 to 60 days



## Review of Seasonal Outlook provided in December 2017.

Below is a brief review of the Seasonal Outlook for Guyana which was provided by the Hydrometeorological Service earlier in December 2017.

**Precipitation:** Model output for January – March had suggests higher chances of above-normal rainfall across Guyana.

Guyana usually experiences 21 to 45 wet days during this period, the forecast had suggested 23 to 56 wet days, with at least 1 extreme wet spell.

There were concerns of potential flooding along coastal areas.

**Temperature:** Mean maximum and minimum temperatures across Guyana was expected to be slightly less than normal

**Drought:** Drought was not a concern for the outlook period. Rainfall received over the previous months along with the forecast above-normal rainfall during the outlook season would have been enough to recharge reservoirs, conservancies and aquifers to satisfactory levels.

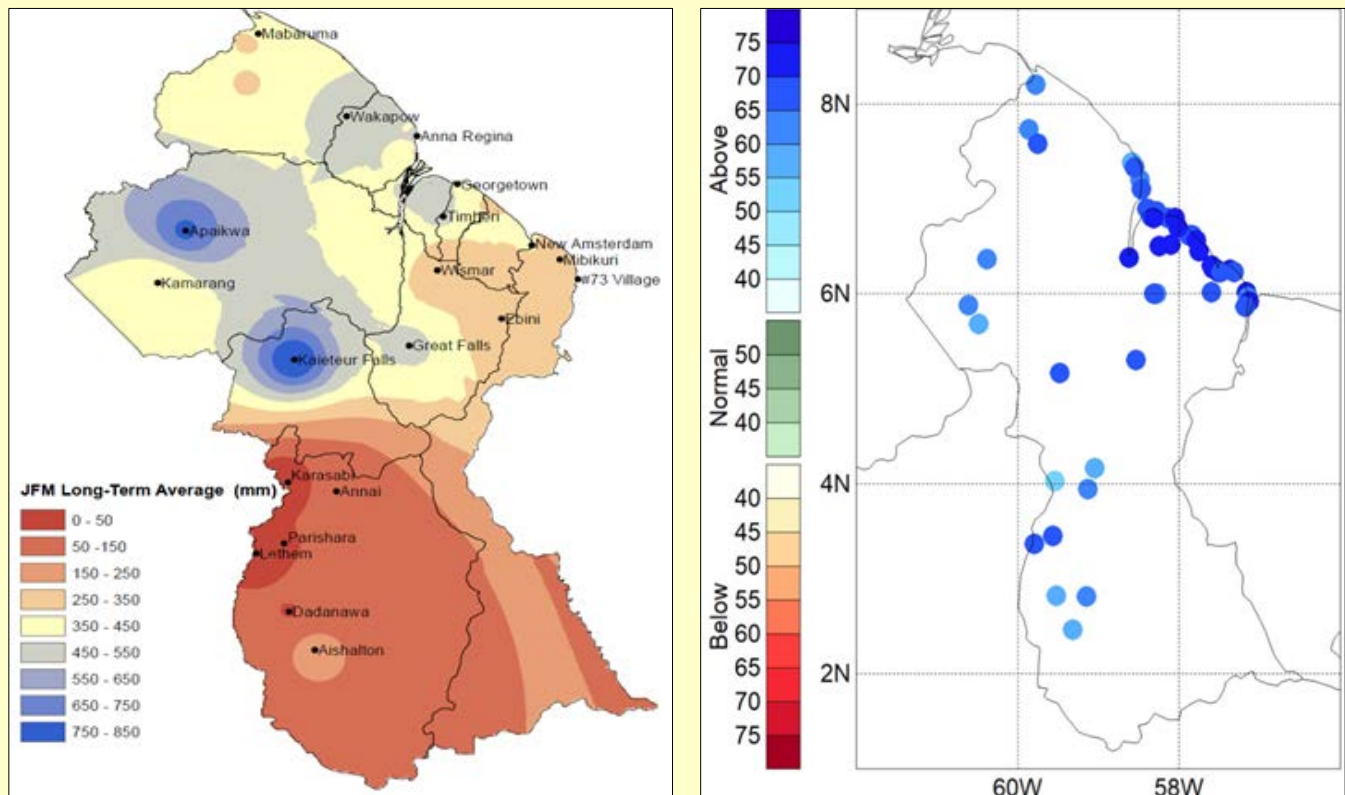


Figure 2 Maps of Guyana showing (a) Climatological Normal and (b) probabilistic seasonal forecast<sup>2</sup> (chances of occurrence) across Guyana for period January – March 2018.

<sup>2</sup>The forecast and projection above was prepared taking into account the usual Climatological trends along with current dynamical models and Climate Prediction Tools (CPT)

# January 2018 Rainfall Analysis

Guyana was classified as *Moderately Dry* (MD) for the month of January 2018, with a nationwide average rainfall of 94.3 mm distributed over 10 rain

days A detailed comparison of the January 2018 rainfall with the historical average for selected stations can be seen in Figure 3 below.

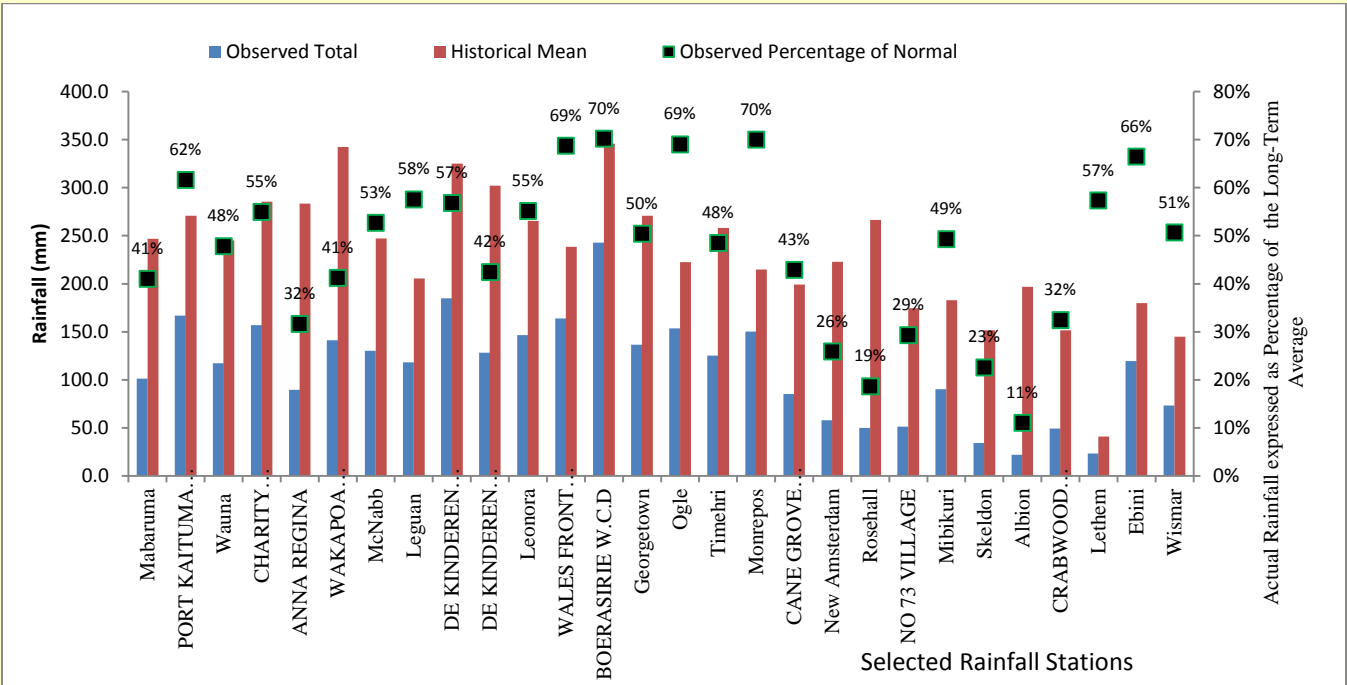


Figure 3 Comparison of the accumulated observed Rainfall for January 2018 expressed as a percentage of the Historical mean

According to the records collected and processed by the Hydromet Service, most locations recorded rainfall amounts significantly less than their historical averages. Albion in Region 6 recorded the highest deviation from its historical average at an observed total rainfall of only 21.8 mm for the month – an observed rainfall amount that was merely 11% of the historical average for the location. Region 3 and 4 at Boerasirie and Monrepos tied with the closest recorded rainfall amount relative to their historical average (70% of the Historical average) at an observed total rainfall of 242.8 mm and 150.3 mm respectively. Details of the temporal distribution of daily rainfall for several locations are shown in Figure 4 to the left.

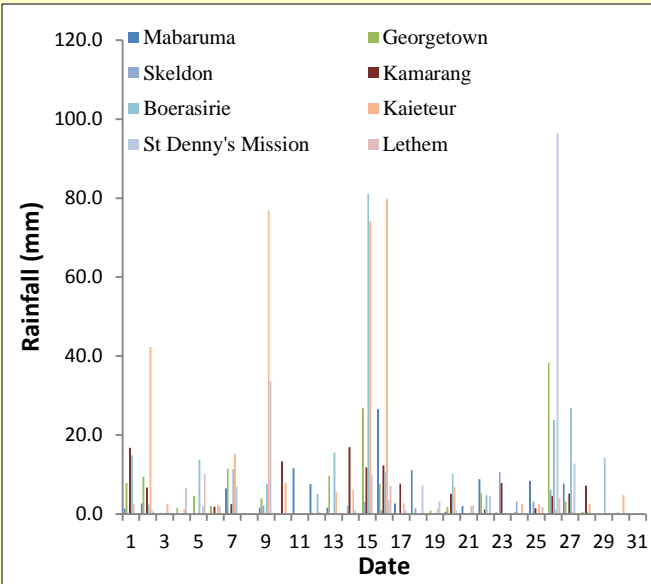


Figure 4 Temporal distribution of daily rainfall for January 2018 for selected stations throughout Guyana

Further analysis of the rainfall amount in Figure 3 above was done and the results presented in Figure 19 below as a histogram. The horizontal axis shows January 2018 accumulated rainfall expressed as a Percentage difference of the long-term average, with -ve values indicating rainfall amounts below the historical averages, while +ve values represent rainfall amounts greater than the historical average.

Most notable observations made are that all rainfall stations recorded rainfall amounts significantly less than their Historical average. Additionally, the histogram shows that approximately half of the locations across Guyana had a rainfall deficit in excess of 50%, that is, more than half of the stations recorded rainfall amounts less than 50% of the historical average.

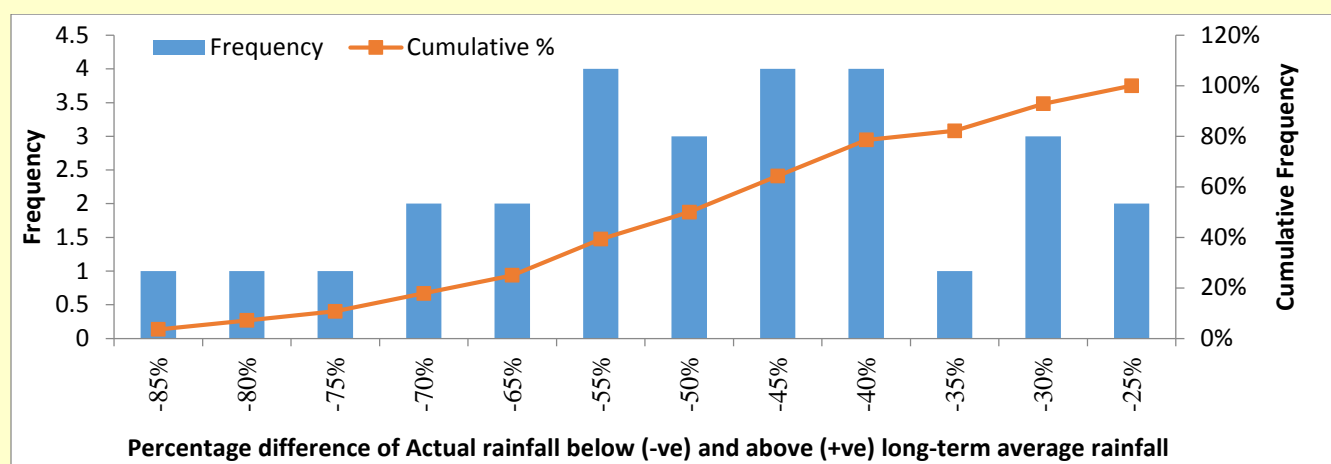


Figure 5 Histogram of January 2018 rainfall as percentage difference of Long term average rainfall

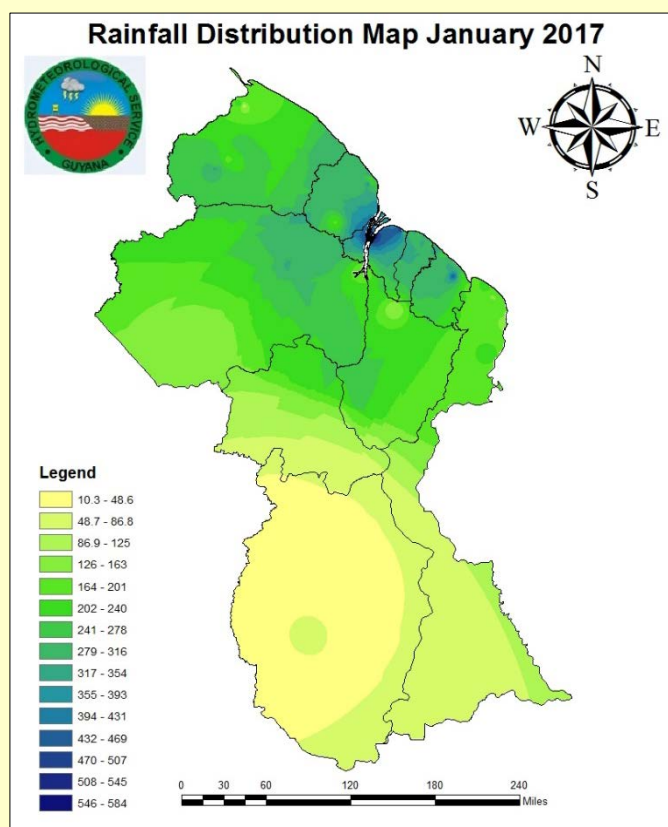


Figure 6 shows a spatial representation of the rainfall distribution across Guyana. Region 8 at Kaieteur recoded the highest accumulated rainfall for January 2018 at 344.9 mm over 21 rain days, while Region 2 at St. Dennys Mission recorded the highest one – day amount for the month at 96.4 mm on January 26, 2018 (see Figure 18 above). Table 1 below shows classification of rainfall by administrative regions across Guyana.

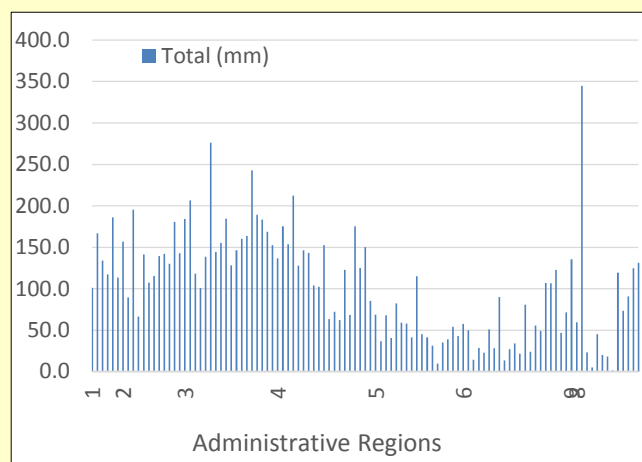


Figure 6 (a)Map and (b) Graph showing Spatial Interpolation (IDW) and distribution of rainfall amounts acrosss Guyana.

Table 1 Classification of Regional rainfall throughout Guyana for January 2018.

<i>Region</i>	<b>Average Rainfall (mm)</b>	<b>Average Rain days</b>	<b>Classification</b>	<b>Station with the highest total</b>
1	161.9	18 days	Moderately Wet (MW)	Wauna White Water recorded 226.1 mm of rainfall with rain 17 days.
2	310.3	15 days	Very Wet (VW)	Supernaam Forestry recorded 426.1 mm of rainfall with 9 rain days.
3	404	18 days	Exceedingly Wet (EeW)	Boerasirie recorded 463.9 mm of rainfall with 19 rain days.
4	302.8	17 days	Very Wet (VW)	Sam Atta Point recorded 332.5 mm of rainfall with 21 rain days.
5	262.4	14 days	Wet (W)	Wash clothes recorded 314.3 mm of rainfall with 14 rain days.
6	179.9	11 days	Moderately Wet (MW)	Canje forestry recorded 233.7 mm of rainfall with 13 rain days.
7	148.0	16 days	Moderately Dry (MD)	Bartica forestry recorded 184.2 mm of rainfall with 18 rain days.
8	225.2	16 days	Wet (W)	Kaieteur recorded 225.2 mm of rainfall with 16 rain days.
9	31.5	5 days	Dry (D)	Karadarnaua recorded 87.8 mm rainfall with 8 rain days.
10	161.2	11 days	Moderately Wet (MW)	Wisburg recorded 217.1 mm of rainfall with 3 rain days.

## Climatological Summary for January 2018

Table 2 Summary of Observed data and Historical averages for Synoptic stations across Guyan during January 2018

<b>STATION</b>	<b>RAINFALL (mm)</b>		<b>MAX. TEMP (°C)</b>		<b>MIN. TEMP (°C)</b>		<b>SUNSHINE HOURS</b>	
	<b>TOTAL</b>	<b>LONG TERM AVERAGE</b>	<b>MEAN</b>	<b>LONG TERM AVERAGE</b>	<b>MEAN</b>	<b>LONG TERM AVERAGE</b>	<b>MEAN</b>	<b>LONG TERM AVERAGE</b>
<i>MABARUMA</i>	101.4	183.0	30.2	*	21.9	*	*	*
<i>GEORGETOWN</i>	136.6	239.7	29.6	29.2	23.6	23.8	7.7	6.4
<i>TIMEHRI</i>	125.2	239.9	31.1	*	19.2	*	7.3	*
<i>OGLE</i>	153.7	194.6	29.4	*	23.5	*	8	*
<i>N/AMSTERDAM</i>	57.8	180.6	30.8	30.2	23.6	22.8	8.4	5.7
<i>KAIETEUR</i>	344.9	*	*	*	20.3	*	6.5	*
<i>LETHEM</i>	23.4	17.2	32.5	32.7	22.5	17.7	8.3	7.4
<i>KAMARANG</i>	122.7	*	28.8	*	19.5	*	5.30	*
<i>EBINI</i>	119.5	152.6	31.6	31.1	21.6	21.9	7.1	*

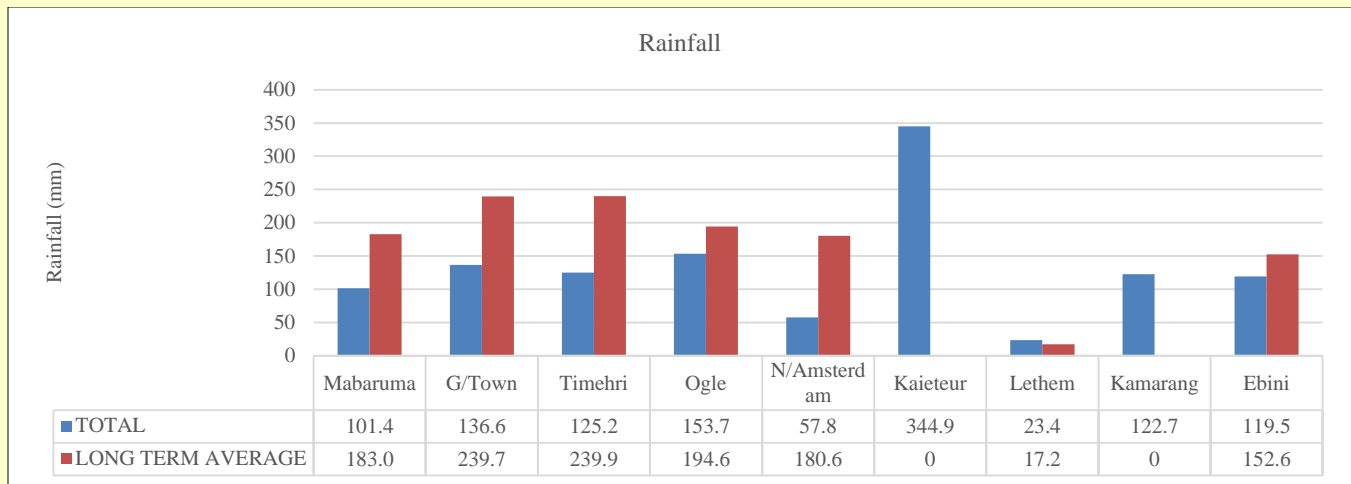


Figure 7 Comparison of January observed rainfall with its historical average for Synoptic Weather Stations across Guyana.

Figure 7 shows a comparison of January 2018 actual accumulated rainfall with the historical average for the Synoptic weather stations across

Guyana. With the exception of Region 9 at Lethem, all other synoptic stations across Guyana recorded rainfall totals above their long-term averages.

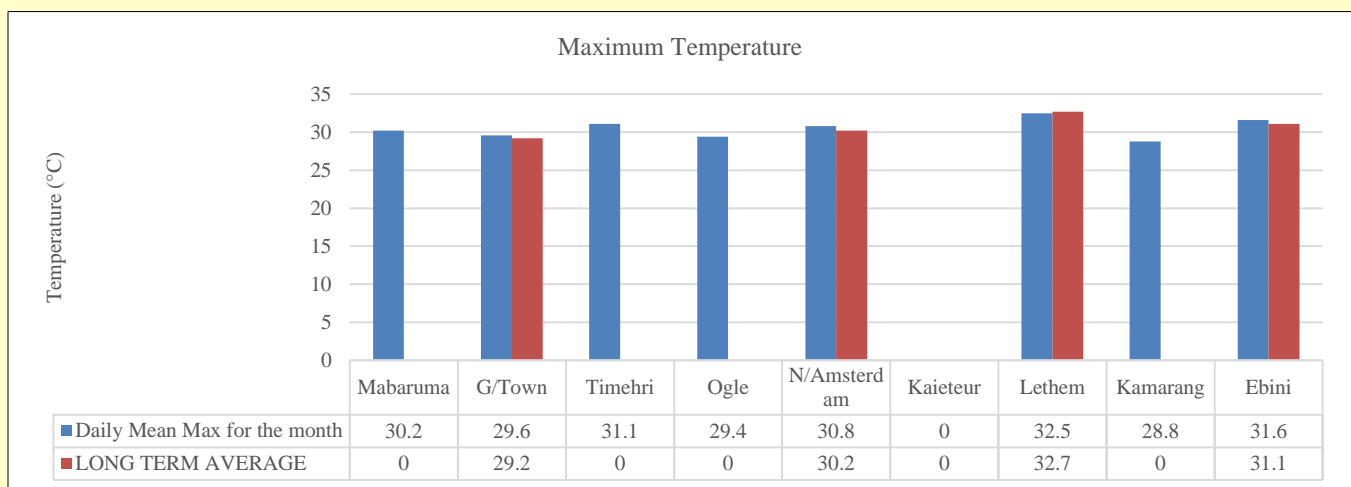


Figure 8 Comparison of January 2018 actual mean monthly Maximum Temperature with mean monthly historical average for January for Synoptic Weather Stations across Guyana

As with the previous few months, during January 2018 all Synoptic stations recorded maximum and minimum temperatures consistent with their long-term averages – with only minor variation. Nevertheless, according to the data available, with the exception of Region 9 at Lethem, all other station with available historical averages recorded mean maximum temperatures slightly above their long term averages. For the minimum

temperatures, only Region 9 at Lethem recorded mean minimum temperature with significant variation from its long term average. The highest mean maximum temperature of 32.5 °C was recorded at this location, additionally, this station also recorded the highest one-day Max Temperature of 34.2°C on January 10, 2016. On the other hand, Region 4 at Timehri recorded the lowest minimum temperature of 19.2°C.



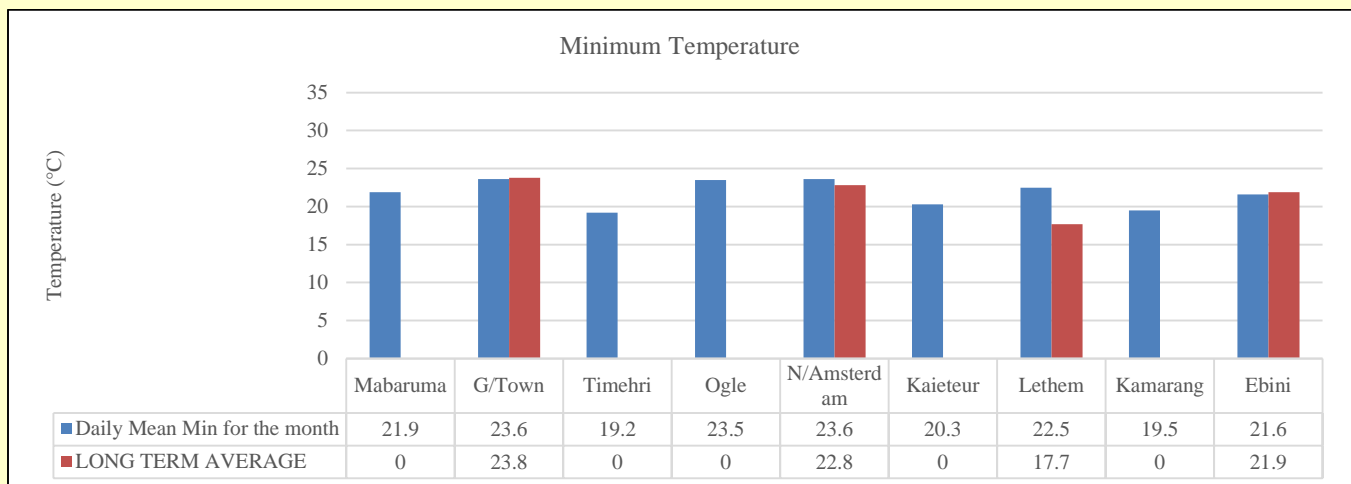


Figure 9 Comparison of January 2018 actual mean monthly Minimum Temperature with mean monthly historical average for January for Synoptic Weather Stations across Guyana

According to the available data, all station (with available historical records) recorded mean daily bright sunshine hours above their long term averages. Region 6 at New Amsterdam recorded the highest mean daily Bright Sunshine Hours of 8.4 hours/day for January 2018 while Region 9 at Lethem being second highest, trailing by only 0.3 hours/day. It is worthwhile to note that the

observed mean daily value for New Amsterdam exceeded the historical average by almost 50%. In addition, according to the graph in Figure 10, this location usually records the lowest Bright Sunshine hours. Region 9 at Lethem recorded the maximum one – day Bright Sunshine hour of 11.2 hours on January 13, 2018.

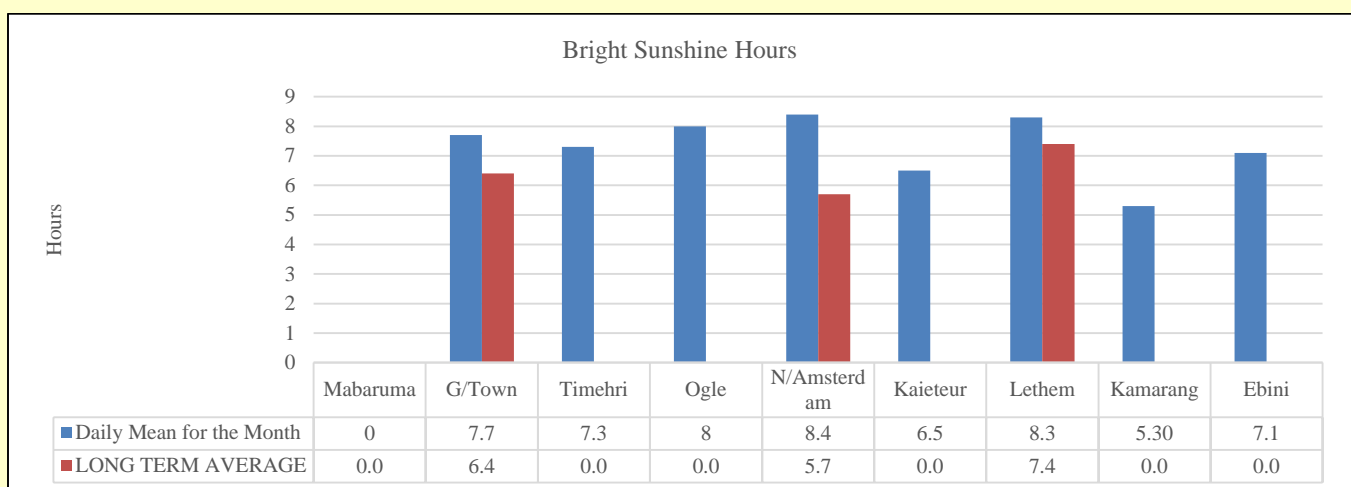


Figure 10 Comparison of January 2018 actual daily mean Bright Sunshine Hours with historical average for January for Synoptic Weather Stations across Guyana

## Global Analysis

The January 2018 temperature across global land and ocean surfaces was 0.71°C (1.28°F) above the 20th century average of 12.0°C (53.6°F). January 2018 marks the 42nd consecutive January (since 1977) and the 397th consecutive month (since January 1985) with temperatures at least nominally above the 20th century average. This was the fifth highest temperature for January in the 1880–2018

record (see Figure 11(b) below). The last four years (2015–2018) rank among the five highest Januaries on record. The global land and ocean temperature during January has increased at an average rate of +0.07°C (+0.13°F) per decade since 1880; however, the average rate of increase is twice as great since 1975

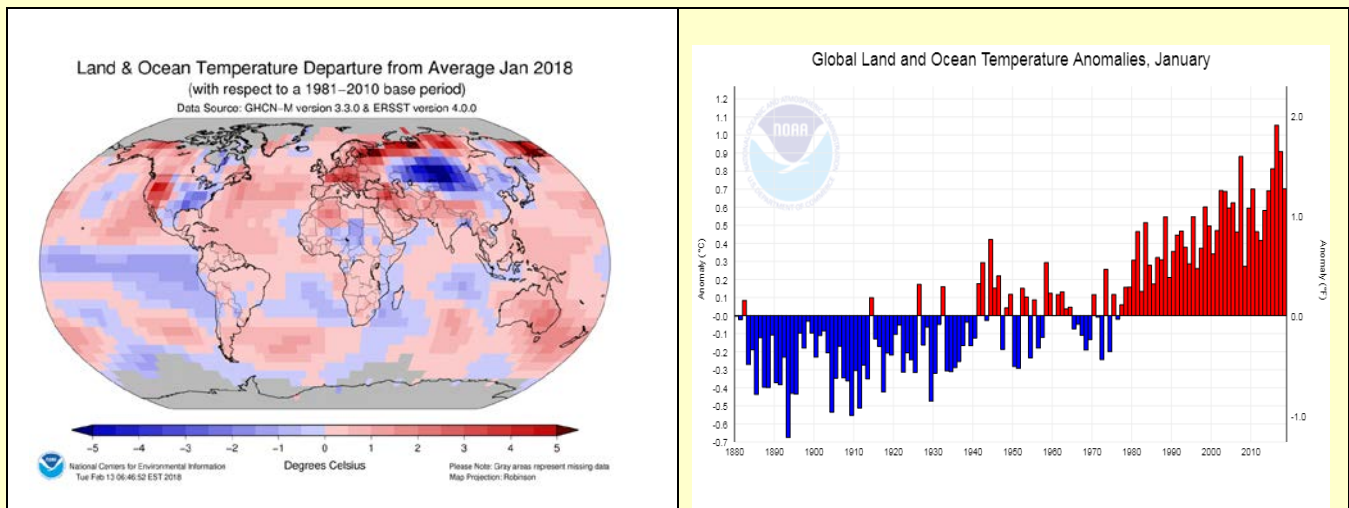


Figure 11(a) Global departure of January 2018 Land and Ocean Temperatures from the Historical averages taken for period 1981 - 2010. Compliments of NOAA<sup>3</sup>. (b) Global Land and Ocean Temperature Anomalies for the month of January from 1880 to 2017<sup>4</sup>

The January 2018 global land surface temperature departure from average of +1.11°C (+2.00°F) was the lowest since 2013 and the eighth highest January land global temperature on record. South America had its lowest temperature departure since 2011.

Across the oceans, warmer-than-average conditions dominated across much of the world's oceans during January 2018, with record warmth observed across parts of the north Atlantic Ocean (off the coast of Portugal), and the central and

southwestern Pacific Ocean. Near- to cooler-than-average conditions was present across parts of the northern and southern Pacific, as well as the tropical Pacific from the International Dateline to the west coast of South America.

Averaged as a whole, the global ocean surface temperature for January 2018 was 0.56°C (1.01°F) above the 20th century average of 15.8°C (60.5°F). This value tied with 1998 as the fifth highest global ocean temperature for January in the 139-year record.

<sup>3</sup> <http://www.ncdc.noaa.gov/sotc/service/global/map-blended-mntp/201802.gif>

<sup>4</sup> [http://www.ncdc.noaa.gov/cag/time-series/global/globe/land\\_ocean/1/1/1880-2018](http://www.ncdc.noaa.gov/cag/time-series/global/globe/land_ocean/1/1/1880-2018)

## Climatological Outlook for the next few Weeks

### CariCOF Precipitation and Temperature Outlook for February to April 2018

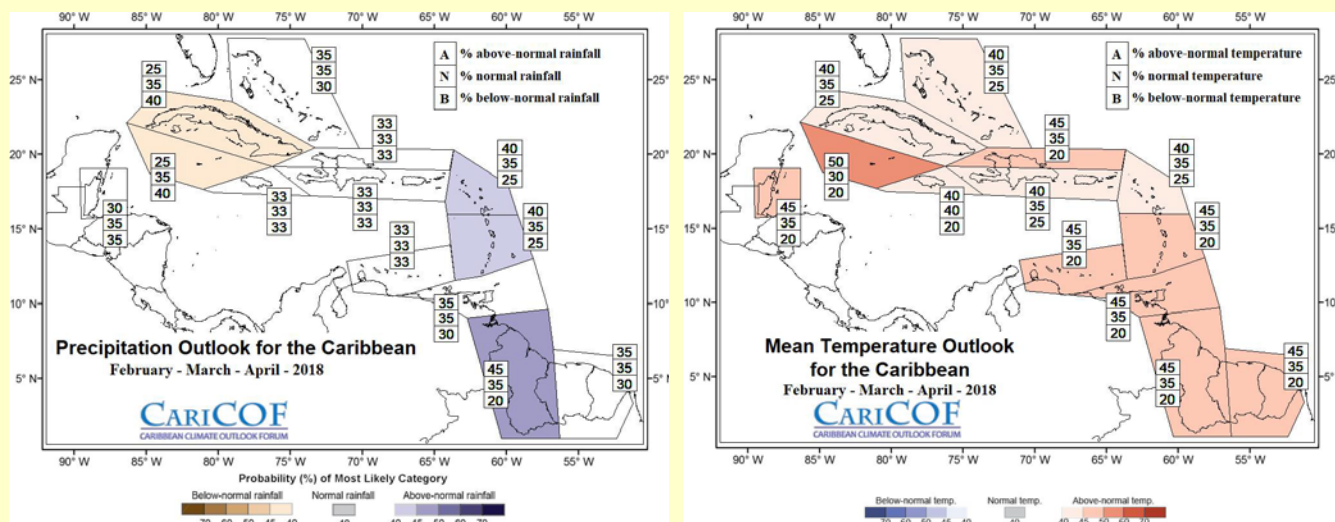


Figure 12 CariCOF (a) Precipitation and (b) Temperature outlook for the Caribbean for the period valid February – April, 2018 showing 80% confidence for *Above Normal to Normal* rainfall and Temperature for Guyana

According to the Outlook provided by CariCOF for the period February – April 2018 in Figure 12(a) above, Guyana can expect wetter to pretty much like usual for this period with a confidence of 80%. Since this is the transitioning phase from wet to dry season, the chance for extremely wet conditions are higher than usual.

Additionally, according to the Temperature Outlook in Figure 12(b) above, warmer than to pretty much like usual can be expected for this period with a confidence level of 80%. There is a reasonable chance of extreme warm conditions which can cause minor discomfort at times.

### CariCOF Wet Days and Wet Spells Outlook for February – April 2018

Table 3 Climatological Normals and Forecasted Number of *Wet Days* and various categories of *Wet Spells* for selected locations across Guyana for the period February to April, 2018

February - April 2018	No. of wet days		No. of 7-day wet spells (20% wettest)		No. of 7-day very wet spells (10% wettest)		No. of 3-day extremely wet spells (1% wettest)	
	Climatology	Forecast	Climatology	Forecast	Climatology	Forecast	Climatology	Forecast
Guyana_73	14-26	16-31	1.1-4.2	1.6-5	0.4-2.4	0.5-2.8	0-1.1	0-0.3
Guyana (Albion)	23-37	23-43	0.8-3.4	1.1-3.9	0-1.7	0.3-2.3	0-1	0-0.9
Guyana (Blairmont)	23-44	25-51	0.9-3.3	1.1-4.3	0.3-1.7	0.4-2.4	0-1	0-0.4
Guyana (Enmore)	24-38	26-44	1.1-3	1.1-3.6	0.4-2.2	0.5-2.4	0-1.1	0-1
Guyana (Georgetown)	23-42	26-50	0.4-3.4	1-4	0-2.1	0.3-2.4	0-0.9	0-0.5
Guyana (New Amsterdam)	24-41	26-51	0.9-3.3	1.1-4.4	0.4-2	0.5-2.5	0-1	0-0.8
Guyana (Skeldon)	21-41	26-49	1.1-3.9	1.5-5	0.3-2.6	0.5-2.7	0-1	0-0.3
Guyana (Timehri)	23-45	28-56	0.4-3	0.9-4.3	0-1.7	0.3-2.1	0-1	0-1

brown is a decrease in frequency, dark blue an increase, grey none are expected

**Wet Days:** Usually, during February – March – April, 22 to 39 of the 90 days are Wet Days along Coastal Guyana – shown in Table 3 above. For February – March 2018, rainfall is likely to be above to normal for Guyana, as a result, the forecast indicates a slight increase in the amount of Wet Days across coastal Guyana.

**7 – Days Wet Spells:** Usually, Coastal Guyana experiences up to 4 ‘Seven – Days’ Wet Spell, with up to 2 of them being Very Wet for the period February – April. For February to April 2018, the forecast indicates a higher than usual number of Wet and Very Wet spells – high confidence (see Table 3 for usual and forecast occurrences).

## IRI-ENSO Forecast

**Synopsis:** A transition from La Niña to ENSO-neutral is most likely during the Northern Hemisphere spring (~55% chance of ENSO-neutral during the March-May season).

During January 2018, La Niña was evident in the pattern of below-average sea surface temperatures (SSTs) across the central and eastern equatorial Pacific Ocean. The latest weekly index values were close to -1.0°C in the Niño-1+2, Niño-3, and Niño-3.4 regions, while the western-most Niño-4 region was -0.5°C. While negative anomalies were maintained near the surface, the sub-surface temperatures in the eastern Pacific Ocean returned to near average during the last month. This was due to the eastward propagation of above-average temperatures in association with a downwelling

equatorial oceanic Kelvin wave, which undercut the below-average temperatures near the surface. The atmospheric conditions over the tropical Pacific Ocean also reflected La Niña, with suppressed convection near and east of the International Date Line and enhanced convection around Indonesia. Also, the low-level trade winds remained stronger than average over the western and central Pacific, while upper-level winds were anomalously westerly. Overall, the ocean and atmosphere system remained consistent with La Niña..

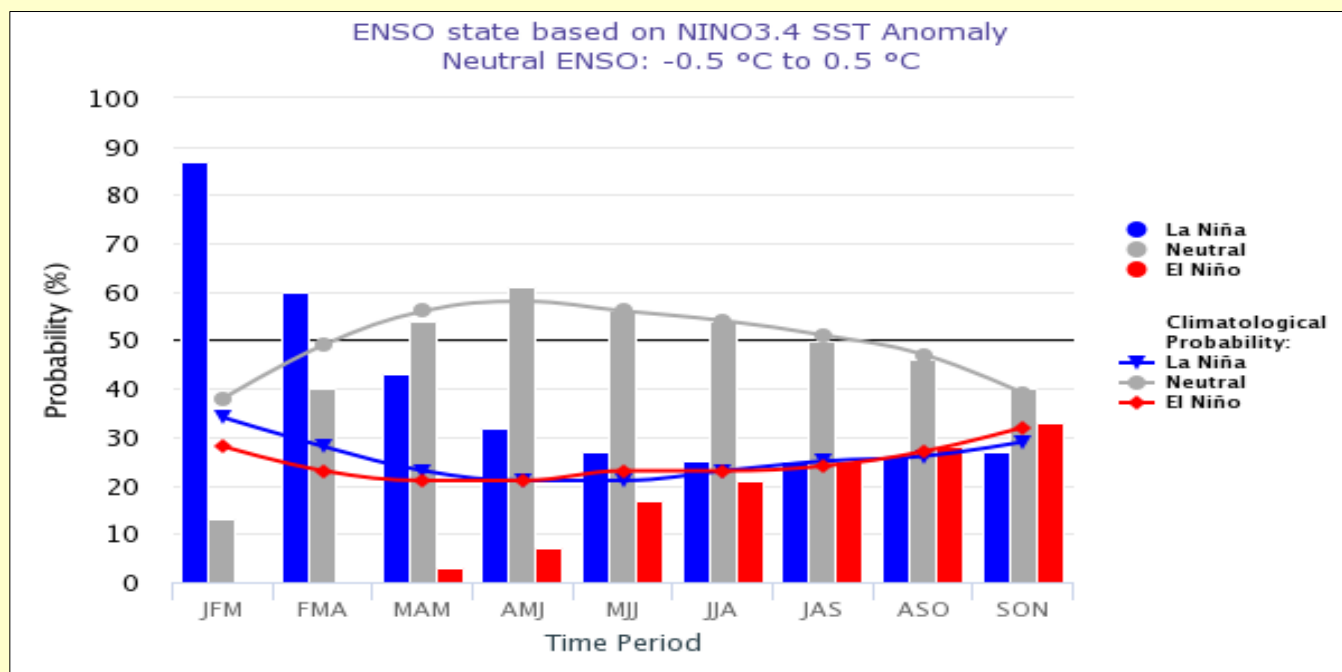


Figure 13 February 2018 CPC/IRI Official Probabilistic ENSO Forecast

## Recent and Current Conditions

In mid-February 2018, the NINO3.4 SST anomaly was in the upper portion of the weak La Niña range. For January the SST anomaly was -0.75 C, indicating weak La Niña, and for November-January it was -0.79 C, also in that range. According to the IRI and NOAA/Climate Prediction Center, the condition for El Niño requires that the SST anomaly in the Nino3.4 region (5S-5N; 170W-120W) exceed 0.5 C. Similarly, for La Niña, the anomaly must be -0.5 C or less. The climatological probabilities for La Niña, neutral, and El Niño conditions vary seasonally, and are shown in a table in Annex IV for each 3-month season. The most recent weekly anomaly in the Nino3.4 region was -0.9, showing weak La Niña but not far from the borderline of moderate La Niña. The pertinent atmospheric

variables, including the lower level zonal wind anomalies, the Southern Oscillation Index and the anomalies of outgoing longwave radiation (convection), have been showing patterns suggestive of La Niña, although the Southern Oscillation has been weak and variable and the enhanced trade winds in the western Pacific have ceased. Subsurface temperature anomalies across the eastern equatorial Pacific, while recently weakening significantly, are also still mildly negative and not inconsistent with a La Niña nearing the end of its duration. Given the current and recent SST anomalies, the subsurface profile and the La Niña patterns in most key atmospheric variables, it appears we are in the later stage of a weak (but nearly moderate) La Niña.

## Expected Conditions

The official diagnosis and outlook produced jointly by CPC and IRI issued by the NOAA/Climate Prediction Center ENSO Diagnostic Discussion stated that La Niña is likely to transition to ENSO-neutral during spring. As of mid-February, about

60% of the dynamical or statistical models predicts La Niña conditions for the initial Feb-Apr 2018 season, dropping to only around 25% for Mar-May and Apr-Jun – see Table 4 below for probability of occurrence.

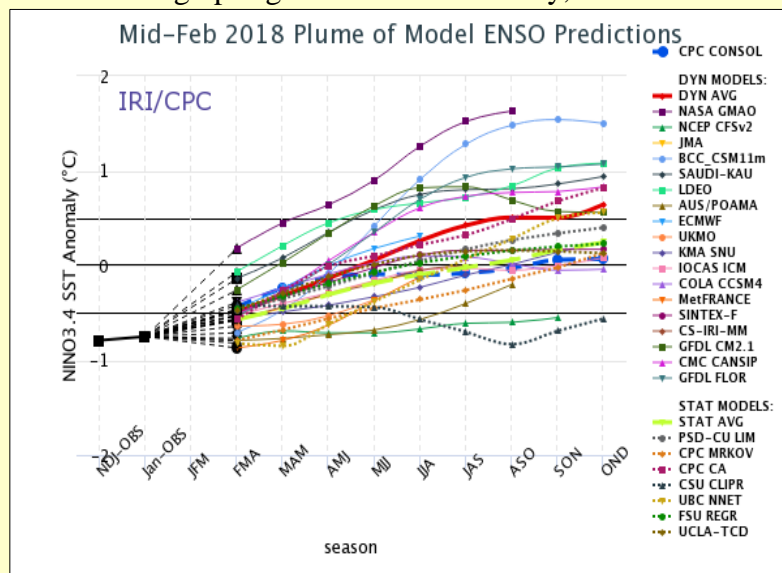


Figure 14 February 2018 Plume of Model ENSO Predictions

In summary, the probabilities derived from the models on the IRI/CPC plume on average suggests a slight preference for weak La Niña conditions for Feb-Apr 2018, followed by the period from Mar-

Table 4 Showing IRI/CPC Mid – February model Based Forecast probabilities for La Niña, neutral, and El Niño conditions for each 3-month season.

Season	La Niña	Neutral	El Niño
FMA 2018	52%	48%	0%
MAM2018	31%	69%	0%
AMJ 2018	17%	81%	2%
MJJ 2018	16%	68%	16%
JJA 2018	15%	56%	29%
JAS 2018	14%	49%	37%
ASO 2018	15%	42%	43%
SON 2018	18%	37%	45%
OND 2018	18%	33%	49%

May through Jun-Aug with neutral having more than a 50% chance. Chances for El Niño are small through May-Jul 2018, rising to near 35% for Jul-Sep and nearly 50% by the final period of Oct-Dec.

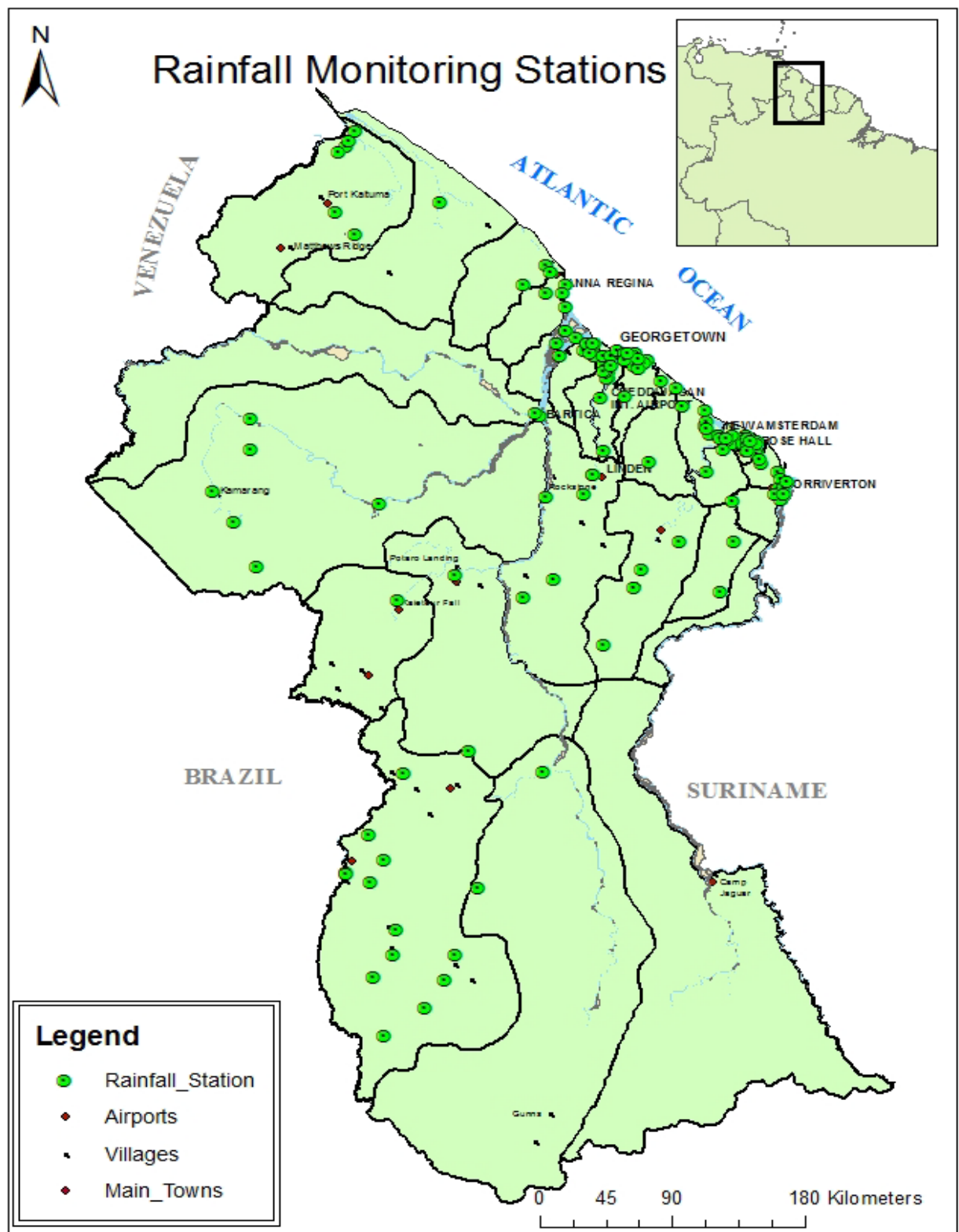


## Annex I

### Glossary of Terms

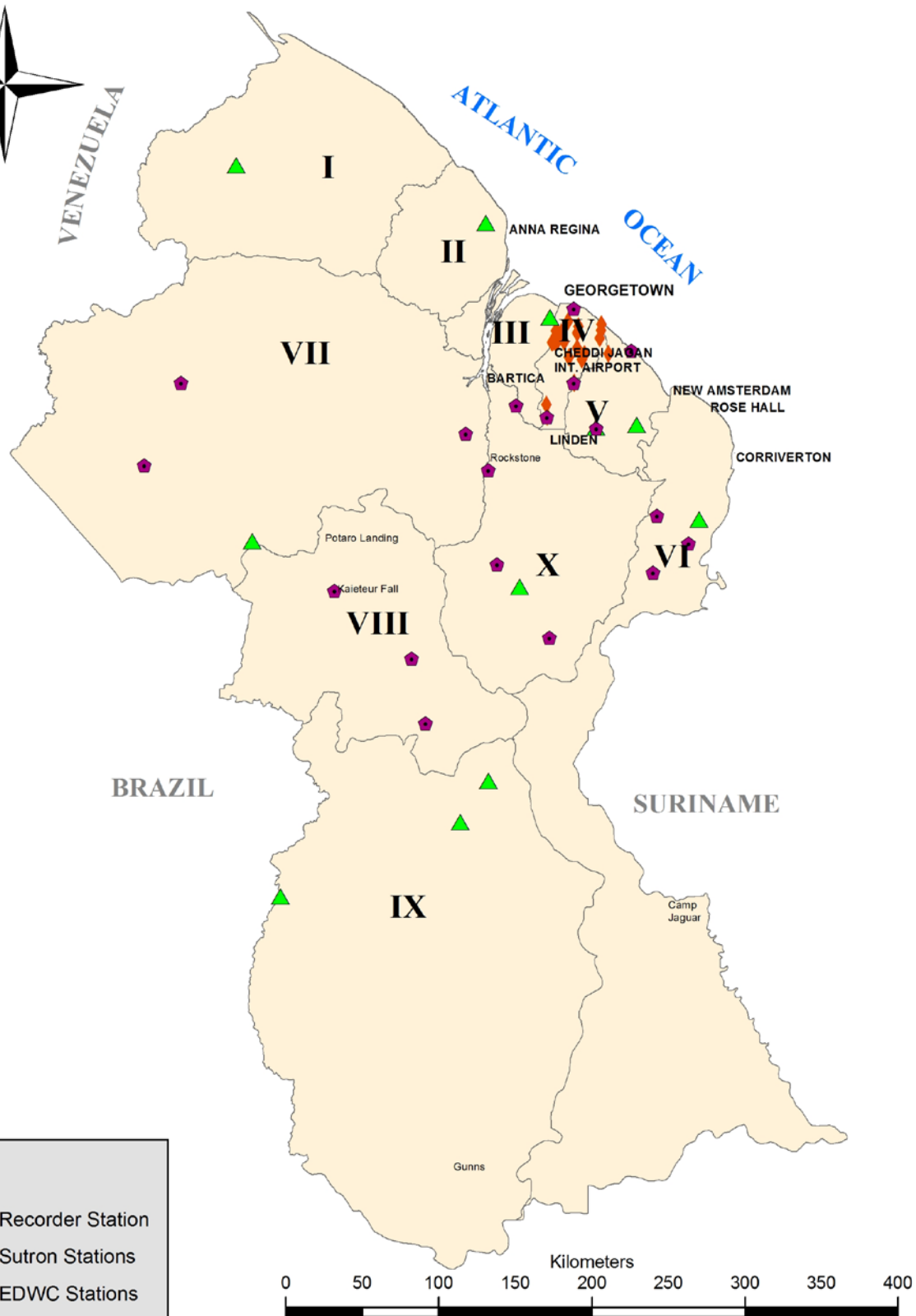
- **CariCOF** - Caribbean Climate Outlook Forum
- **CPC** – Climate Prediction Center
- **ENSO** - *El Niño–Southern Oscillation* is an irregularly periodical variation in winds and sea surface temperatures over the tropical eastern Pacific Ocean, affecting much of the tropics and subtropics.
- **Historical Mean** - Arithmetical mean computed using all the available Historical data from time of commencement of data collection.
- **IRI** – International Research Institute
- **ITCZ** - *The Inter Tropical Convergence Zone* is a belt of low pressure which circles the Earth generally near the equator where the trade winds of the Northern and Southern Hemispheres come together.
- **Long Term Average** - Same as Historical Mean
- **NOAA** - National Oceanic and Atmospheric Administration
- **Normal** - An Arithmetical mean taken over a Thirty (30) years period defined by WMO - currently 1981-2010.
- **OLR** – Outgoing Longwave Radiation.
- **Primary Dry Season** - The Major Dry Season in Guyana Occurring during the period August to mid-November
- **Primary Wet Season** - A period of heavy rainfall in Guyana occurring during the period Mid-April to Mid-July as a result of the northward movement of the ITCZ
- **Secondary Dry Season**
- **Secondary Wet Season** - A rainfall season in Guyana occurring during the period mid-November to January as a result of the Southward movement of the ITCZ
- **SST** - Sea Surface Temperature
- **WMO** - World Meteorological Organization

## Annex II





## *Administrative Distribution of Hydrological Stations*



**Annex III****Classification of Precipitation Values**

DESCRIPTION	ABBREVIATION	RAINDAYS	RAINFALL (mm)
Very Dry	VD	0-10 11-20	0-59.9 11-29.9
Dry	D	1-10 11-20 21-31	60-119.9 30-89.9 21-59.9
Moderately Dry	MD	1-10 11-20 21-31	120-179.9 90-149.9 60-119.9
Moderately Wet	MW	1-10 11-20 21-31	180-239.9 150-209.9 120-179.9
Wet	W	1-10 11-20 21-31	240-329.9 210-269.9 180-239.9
Very Wet	VW	1-10 11-20 21-31	330-449.9 270-389.9 240-329.9
Exceedingly Wet	EeW	1-10 11-20 21-31	450-569.9 390-509.9 330-449.9
Excessively Wet	EsW	1-10 11-20 21-31	>570 510-629.9 450-569.9
Extremely Wet	EtW	11-20 21-31	>630 >570

Table Showing variation in seasonal climatological probabilities for La Niña, neutral, and El Niño conditions for each 3-month season

SEASON	LA NIÑA	NEUTRAL	EL NIÑO
<b>DJF</b>	36%	30%	34%
<b>JFM</b>	34%	38%	28%
<b>FMA</b>	28%	49%	23%
<b>MAM</b>	23%	56%	21%
<b>AMJ</b>	21%	58%	21%
<b>MJJ</b>	21%	56%	23%
<b>JJA</b>	23%	54%	23%
<b>JAS</b>	25%	51%	24%
<b>ASO</b>	26%	47%	27%
<b>SON</b>	29%	39%	32%
<b>OND</b>	32%	33%	35%
<b>NDJ</b>	35%	29%	36%



## Sources

- <http://carogen.cimh.edu.bb/index.php/component/countrydata/countrydata?dataset=rainfall>
- [http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso\\_tab=enso-cpc\\_update](http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-cpc_update)
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