Monthly Bulletin
Ministry of Agriculture
Hydrometeorological Service

October 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 September 2018
- Three quarters of the locations observed rainfall amounts greater than their historical averages – *a third of the locations recorded rainfall amounts more than doubling their historical averages*
- Little can be said at this time, BUT the chance for extremely wet or dry condition is very low.
- El Niño is favored to form in the next couple of months and continue through the Northern Hemisphere winter 2018-19 (70-75% chance).

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Below: Staff of the Hydromet Service battle the weather and terrains to conduct field assignment for the execution of maintenance and data collection works across the Weather Monitoring Network

Review of Synoptic Systems that influenced the Weather Conditions for September 2018

Climatologically, September month is usually the period of heightening of Guyana's Primary (main) Dry Season. Notwithstanding, due to the Country's geographical location, during this time of the year a wide range of meteorological systems can affect the local weather. These include, but are not limited to, the Inter-Tropical Convergence Zone (ITCZ), Low and Mid-Level Troughs and Tropical Waves /Easterly Waves (TW/EW), along with other Synoptic Systems. Additionally, the month falls within the period of the Atlantic Hurricane Season which may also contribute to the prevailing weather condition. Analysis of the rainfall data observed and recorded during September 2018 showed the usual spatial variation in the rainfall values.

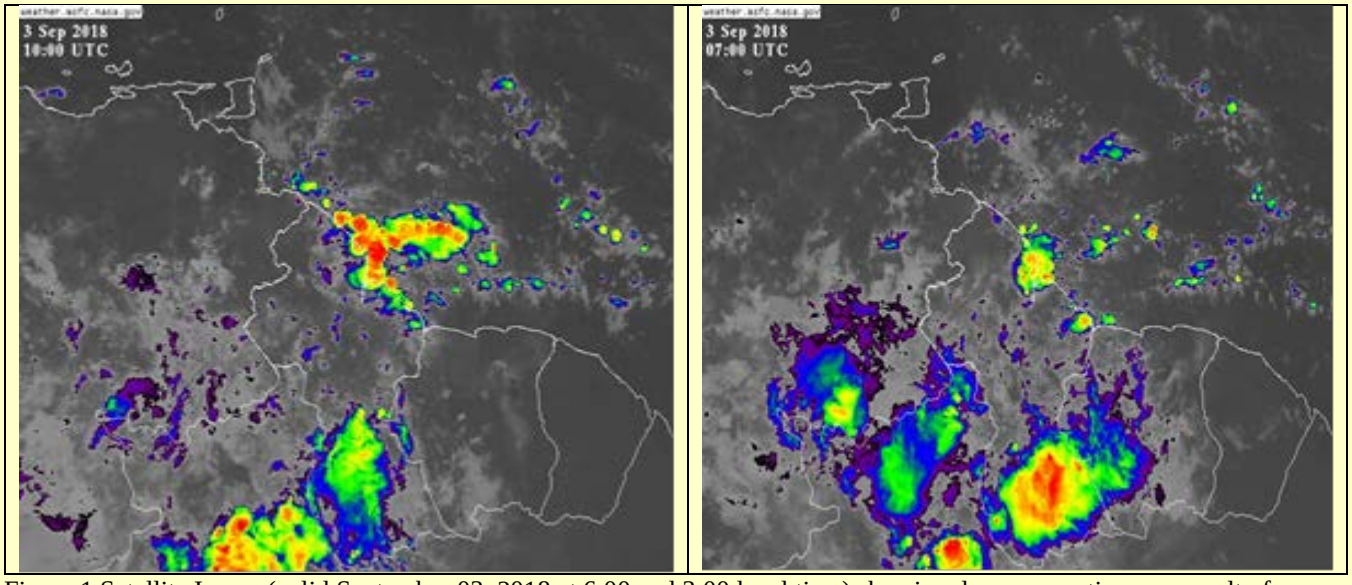


Figure 1 Satellite Image (valid September 03, 2018 at 6:00 and 3:00 local time) showing deep convection as a result of convergence.

For September 2018, Guyana's weather conditions observed was typical for season as of this time of year. As usual, there was a gradual reduction in rainfall amounts towards the end of the month as the dry season intensified.

For a greater part of the month, (beginning to mid – month), mostly cloudy conditions were observed during the daytime period with several days of moderate to heavy rainfall and periods of thundershowers. This condition was mostly a result of daytime diurnal heating interacting with frictional convergence along the Coastline. In addition, the ITCZ meandered along the Northern Coastline during this period, which also contributed to the condition.

As the month progressed, the ITCZ migrated further north, giving way to effects of the Sub tropical high pressure system, which dominated the forecast area with a strong low to mid-level ridge pattern. Ultimately there was a reduction in rainfall amounts due to suppressed convection. Additionally, the Saharan Air Layer (SAL) along with the Sub Tropical High Pressure system which maintained a tight pressure gradient allowing strong breeze in the lower levels inhibited any deep cloud development and precipitation.

Review of Seasonal Outlook provided in August 2018.

Below is a brief review of the Seasonal Outlook for Guyana which was provided by the Hydrometeorological Service earlier towards the end of August 2018.

Precipitation: Model output for September – November had suggested usual conditions for Region 4 while wetter conditions were expected for the lower Corentyne District. Drier than usual conditions were expected for other areas across the Country according to the probabilistic rainfall map provided in Figure 2(b) below.

Northern Guyana usually experiences 16 to 31 wet days (rainfall ≥ 1.0mm) during this period, the forecast had suggested the same numer of Wet Days for the season., with at least 2 extreme wet spell.

Temperature: Across Guyana, Cooler than usual daytime and night time temperatures was expected.

Drought: The forecast did not indicating any drought concerns for the SON season.
However, there were increasing concerns of drier than usual conditions through November

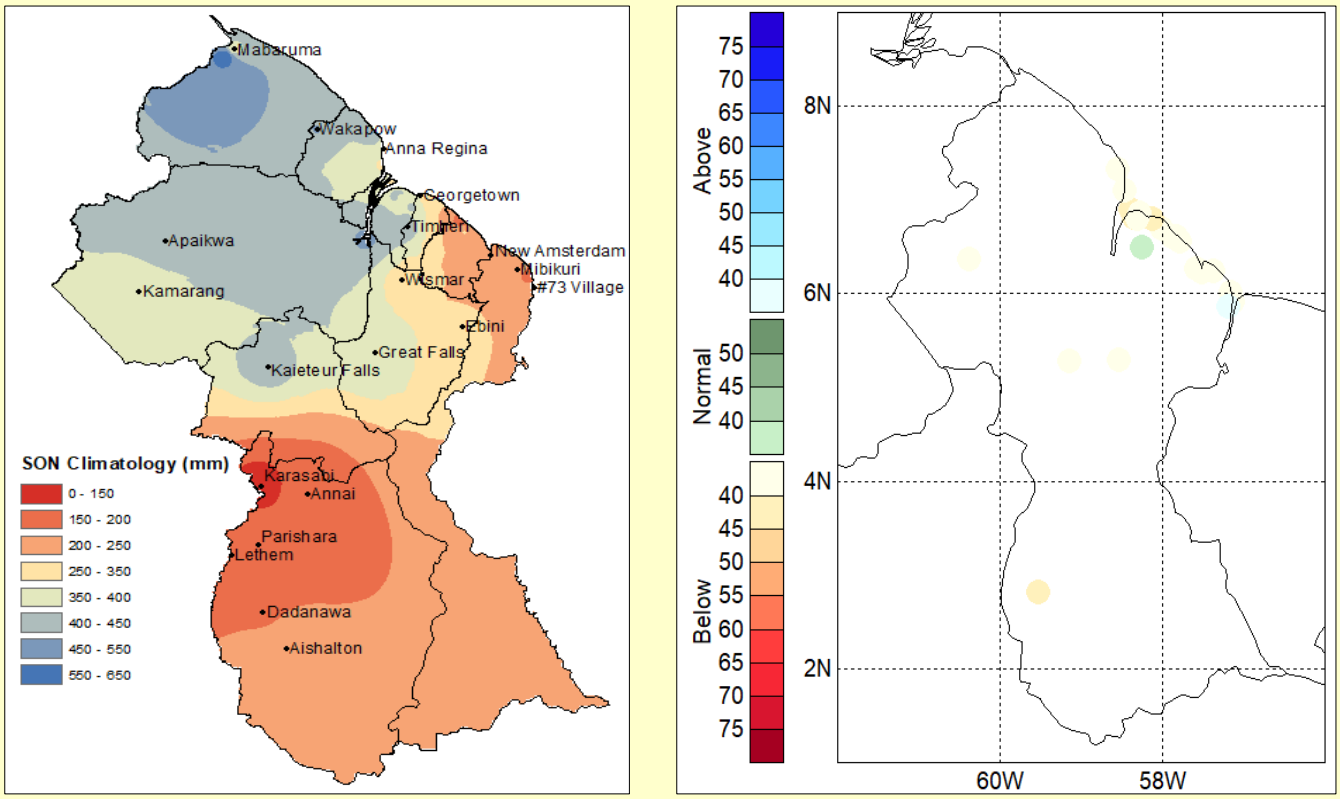


Figure 2 Maps of Guyana showing (a) Climatological Normal and (b) probabilistic seasonal forecast[1] (chances of occurrence) across Guyana for period September – November 2018.

[1]The forecast and projection above was prepared taking into account the usual Climatological trends along with current dynamical models and Climate Prediction Tools (CPT)

September 2018 Rainfall Analysis

On average, Guyana was classified as *Moderately Dry* (MD) for the month of September 2018, with a nationwide average rainfall of 149.1 mm distributed over 11 rain days A detailed comparison of the September 2018 rainfall with the historical average for selected stations can be seen in Figure 3 below.

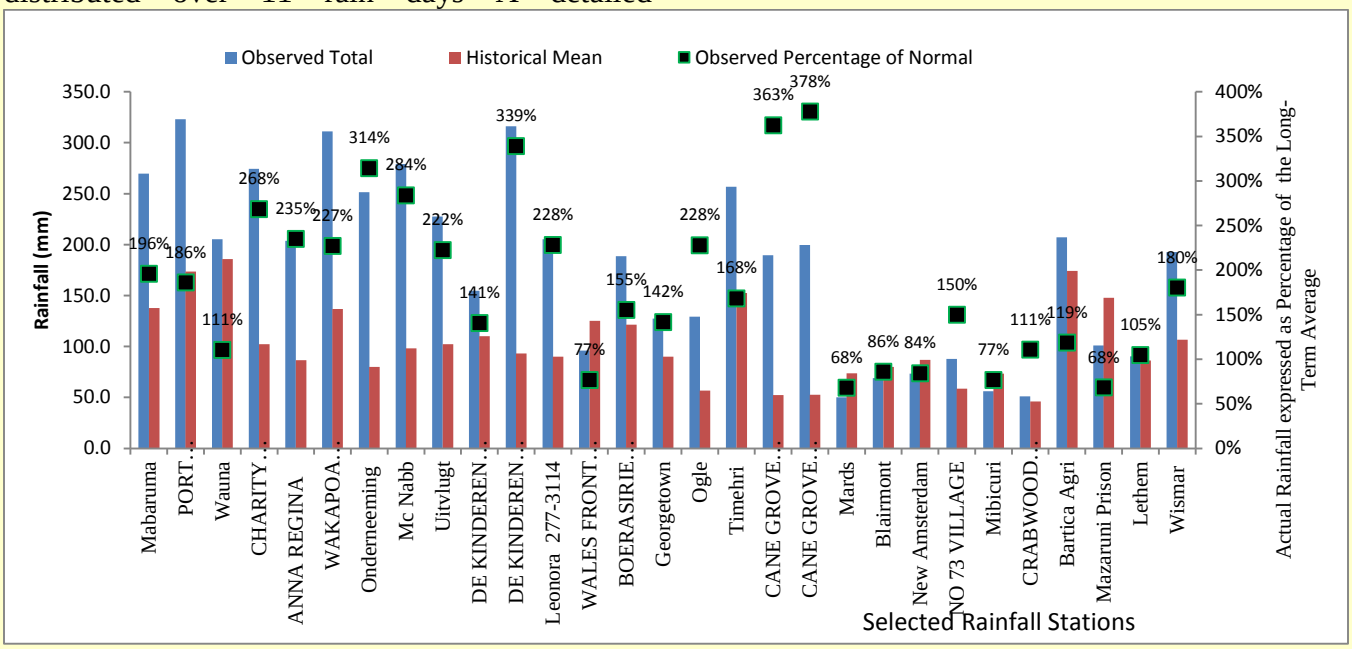


Figure 3 Comparison of the accumulated observed Rainfall for September 2018 expressed as a percentage of the Historical mean

According to the records collected and processed by the Hydromet Service, more than three quarters of the locations recorded rainfall amounts significantly above their historical averages. For stations with long term data available, Region 4 at Cane Grove recorded the largest deviation from its historical average – rainfall amounts more than trippling (378% of the usual amount) the historical average at an observed accumulated rainfall total of 52.8 mm for the month, notwithstanding this location did not record the maximum rainfall countrywide. In addition, several other locations also recorded rainfall amounts considerably more than the usual for the month. Region 3 at De Kinderen recorded the second highest deviation in the observed rainfall when compared to the historical average, with an observed amount that is 339% of the historical average at 316.1 mm. On the other hand, Region 7 at Mazaruni experienced the highest deficit (68%) in the observed rainfall when compared to its historical average at merely 101.1 mm for the month

Details of the temporal distribution of daily rainfall for several locations are shown in Figure 4 below.

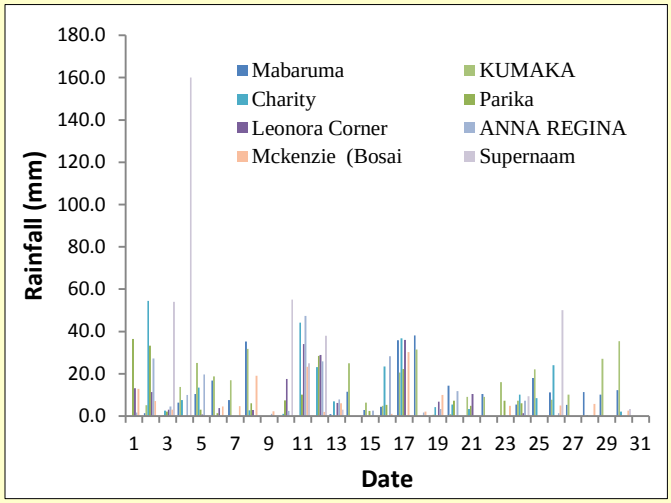


Figure 4 Temporal distribution of daily rainfall for August 2018 for selected stations throughout Guyana

Further analysis of the rainfall amount in Figure 3 above was done and the results presented in Figure 5 below as a histogram. The horizontal axis shows September 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 observation made is that in excess of three quarters of the location with available historical records recorded rainfall amounts greater than their long term averages. In addition, the histogram shows that a third of the locations across Guyana recorded rainfall amounts more than doubling their long term averages while the largest deficit in observed rainfall when compared to the historical average did not exceed 30%.

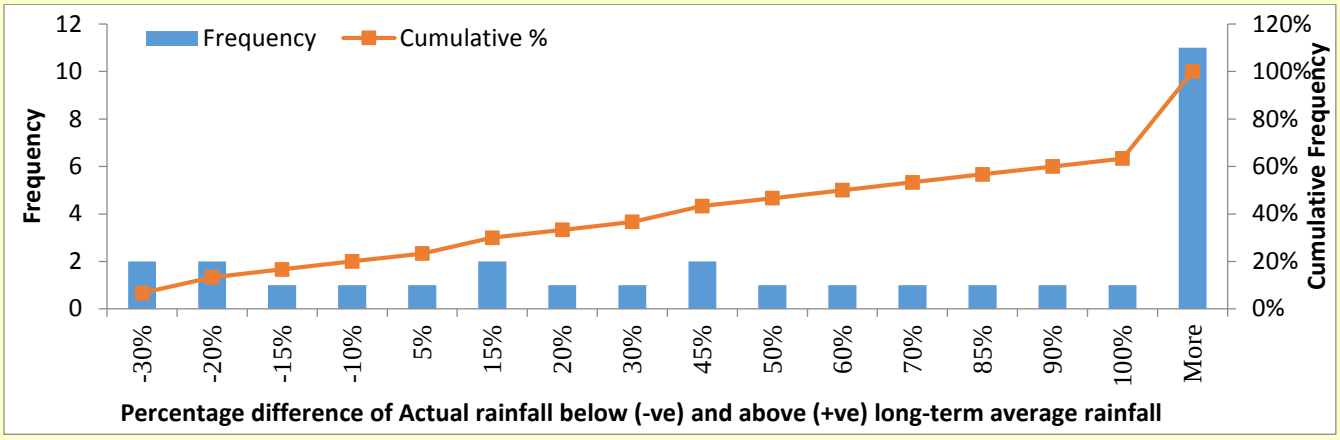
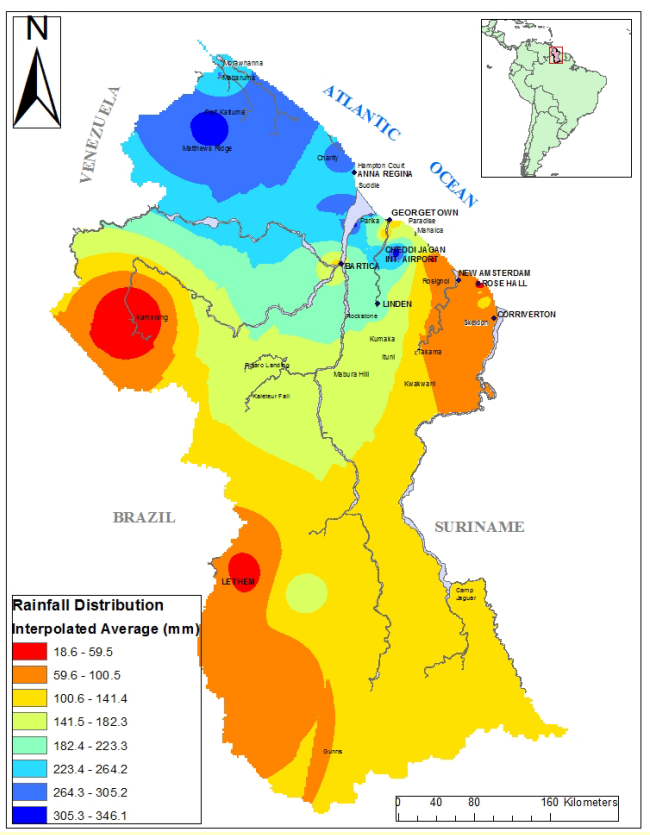


Figure 5 Histogram of September 2018 rainfall as percentage difference of Long term average rainfall

Figure 6 shows a spatial representation of the rainfall distribution across Guyana. Region 2 at Supernaam recorded the highest accummulated rainfall for September 2018 at 397.6 mm over a meager 9 rain days. In general, western Coastal Guyana (Region 1 to 3) recorded higher amounts of rainfall – see Figure 6 to the left.

It is not surprising that the highest one – day rainfall amount of 160.0 mm was recorded in Region 2 at Supernaam on September 4, 2018 (see Figure 4 above). Table 1 below shows classification of rainfall by administrative regions across Guyana.



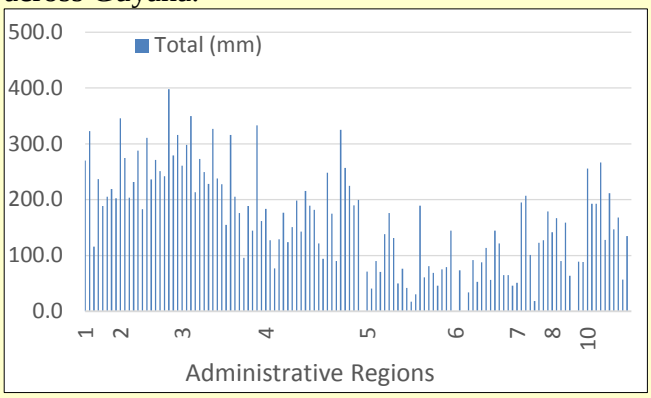


Figure 6 (a)Map and (b) Graph showing Spatial Interpolation (IDW) and distribution of rainfall amounts acrosss Guyana.

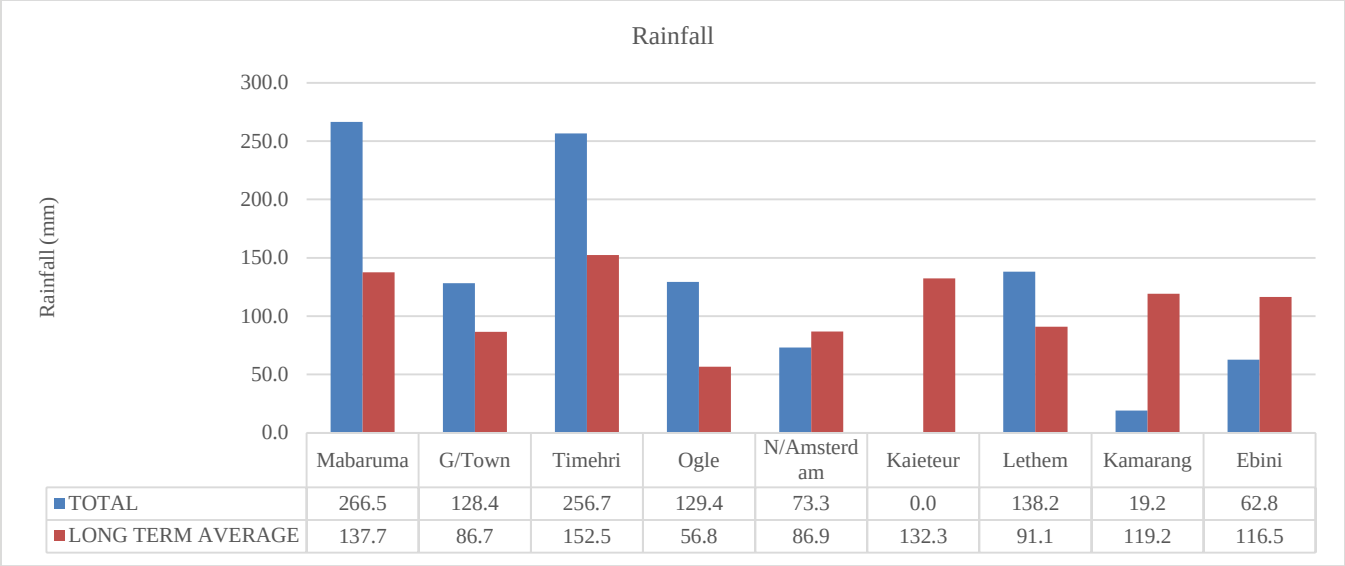
Table 1 Classification of Regional rainfall throughout Guyana for September 2018.

Region	Average Rainfall (mm)	Average Rain days	Classification	Station with the highest total
1	234.1	18	Wet (W)	Kumaka recorded 345.6 mm in 20 rain days
2	262.7	15	Wet (W)	Supernaam Forestry recorded 397.6 mm in 9 rain days
3	237.3	15	Wet (MW)	Wakenaam recorded349.8 mm in 12 rain days
4	173.3	11	Moderately Wet (MW)	Beehive recorded 248.1 mm in 15 rain days
5	84.8	8	Dry (D)	Railway Line Mahaicony recorded 175.9 mm in 7 rain days
6	76.6	6	Dry (D)	Johanna South recorded 144.4 mm in 6 rain days
7	136.6	13	Dry (D)	Imbaimadai recorded 141.9 mm in 13 rain days
8	166.8	13	Moderately Wet (MW)	Mahadia recorded 166.8 mm in 13 rain days
9	124.5	8	Moderately Dry (MD)	Karaudarnaua recorded 225.9 mm in 10 rain days
10	165.8	13	Moderately Wet (MW)	47 Miles Mabura Road

Climatological Summary for September 2018

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

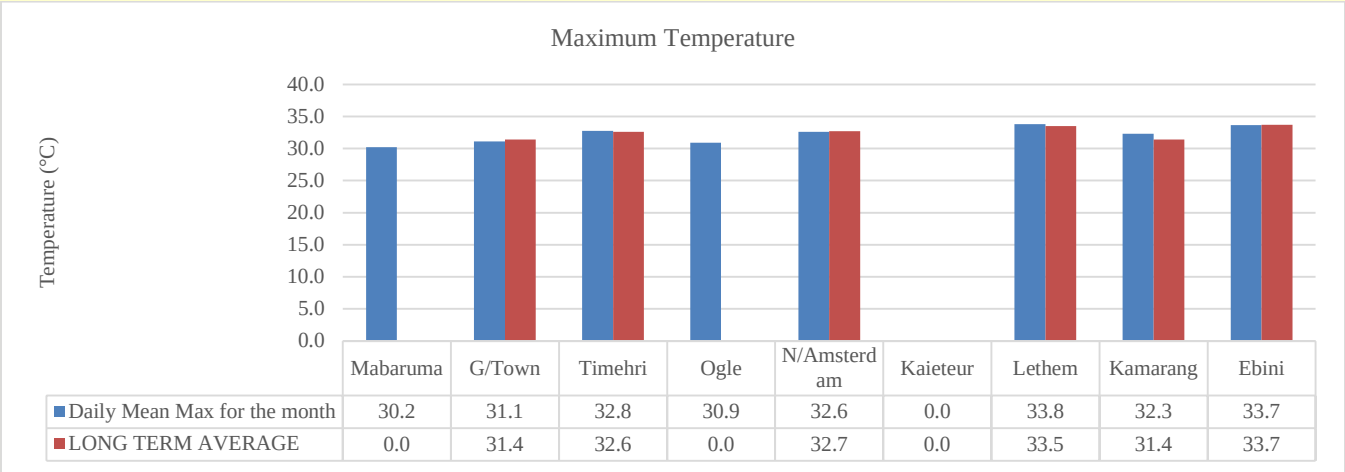
STATION	RAINFALL (mm)		MAX. TEMP (˚C)		MIN. TEMP (˚C)		SUNSHINE HOURS	
	TOTAL	LONG TERM AVERAGE	MEAN	LONG TERM AVERAGE	MEAN	LONG TERM AVERAGE	MEAN	LONG TERM AVERAGE
Mabaruma	266.5	137.7	30.2	*	18.5	*	6.5	*
G/Town	128.4	86.7	31.1	31.4	24.6	24.5	7.3	7.8
Timehri	256.7	152.5	32.8	32.6	22.4	22.4	6.7	7.0
Ogle	129.4	56.8	30.9	*	24.6	*	7.8	*
N/Amsterdam	73.3	86.9	32.6	32.7	24.3	23.5	6.9	7.8
Kaieteur	*	132.3	*	*	*	20.3	*	7.4
Lethem	138.2	91.1	33.8	33.5	22.8	24.4	8.2	7.6
Kamarang	19.2	119.2	32.3	31.4	20.6	20.0	8.1	*
Ebini	62.8	116.5	33.7	33.7	23.6	22.5	7.7	*



	Mabaruma	G/Town	Timehri	Ogle	N/Amsterdam	Kaieteur	Lethem	Kamarang	Ebini
TOTAL	266.5	128.4	256.7	129.4	73.3	0.0	138.2	19.2	62.8
LONG TERM AVERAGE	137.7	86.7	152.5	56.8	86.9	132.3	91.1	119.2	116.5

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

Figure 7 shows a comparison of September 2018 actual accumulated rainfall with the historical average for the Synoptic weather stations across Guyana. Five of the eight synoptic stations across Guyana recorded rainfall amounts significantly above their historical averages. During September 2018, Region 1 at Mabaruma recorded rainfall amount nearly twice the historical average, however, in keeping with the usual trend, it is expected that this sypnoptic station record rainfall amounts amoung the highest values. On the other hand, Region 7 at Kamarang recorded the least rainfall amounts amoung the synotptic stations, however, according to the data available, this is usually expected for Region 4 at Ogle.

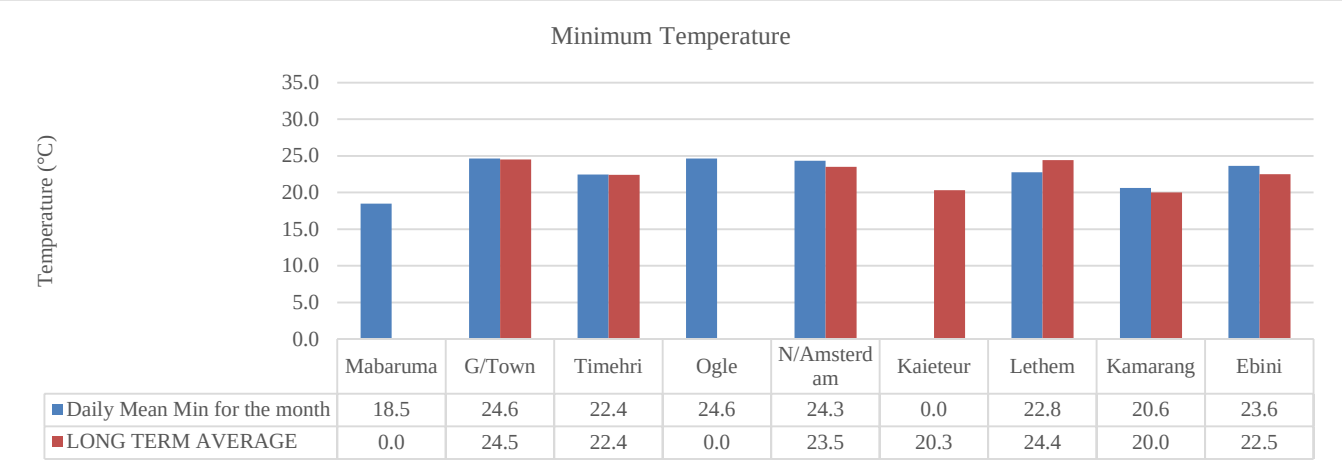


	Mabaruma	G/Town	Timehri	Ogle	N/Amsterdam	Kaieteur	Lethem	Kamarang	Ebini
Daily Mean Max for the month	30.2	31.1	32.8	30.9	32.6	0.0	33.8	32.3	33.7
LONG TERM AVERAGE	0.0	31.4	32.6	0.0	32.7	0.0	33.5	31.4	33.7

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

As with the previous few months, during September 2018 all Synoptic stations recorded maximum and minimum temperatures consistent with their long-term averages (correlation factor of more than 0.9) – with only very slight variation. Region 9 at Lethem recorded the highest monthly mean temperature of 33.8 ° C for the month – exceeding the historical average by 0.3 °C, with

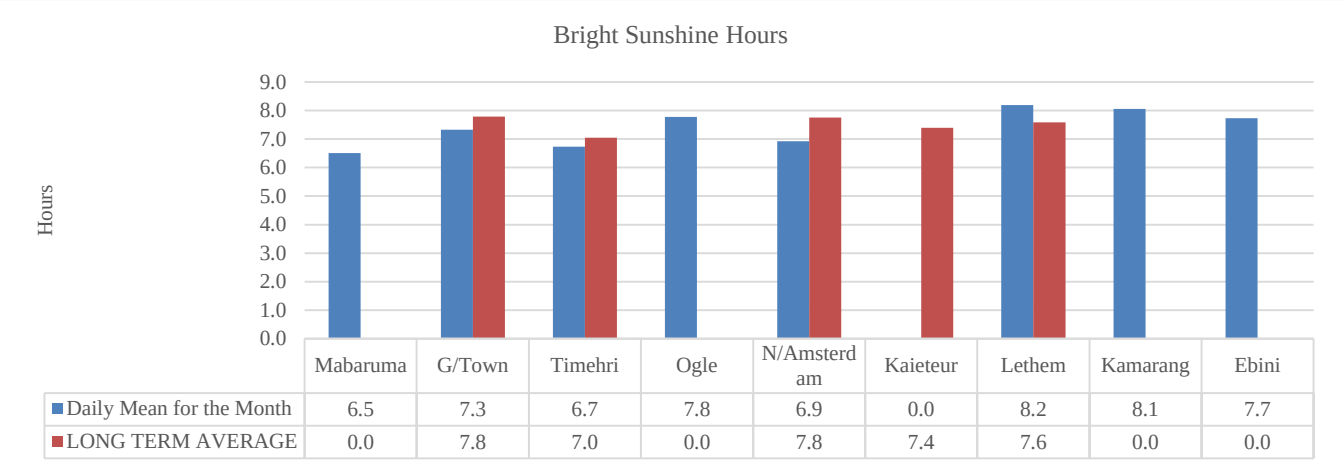
Region 10 at Ebini trailing by a meagre tenth of a degree. In addition, Region 9 at Lethem recorded the highest one-day Max Temperature of 36.2 °C on September 28, 2018. On the other hand as it relates to the Minimum temperatures(long term averages shown in Figure 12), Region 1 at Mabaruma recorded the lowest minimum temperature of 18.5 °C, in addition, Region 9 at Lethem recorded the lowest one – day minimum temperature of 16.5 °C on September 12, 2018.



	Mabaruma	G/Town	Timehri	Ogle	N/Amsterdam	Kaieteur	Lethem	Kamarang	Ebini
Daily Mean Min for the month	18.5	24.6	22.4	24.6	24.3	0.0	22.8	20.6	23.6
LONG TERM AVERAGE	0.0	24.5	22.4	0.0	23.5	20.3	24.4	20.0	22.5

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

According to the available data, all station (with available historical records) recorded mean daily bright sunshine hours consistenet with their long term averages, with most being slightly below avearge. Region 9 at Lethem, recorded the highest mean daily Bright Sunshine Hours of 8.2 hours/day for September 2018, which would justify the highest mean maximum temperature for the month. Other areas also recorded significant amout of Sunshine, including Kamarang and Ebini with 8.1 and 7.7 hours/day respectively. Region 4 at Ogle recorded the maximum one – day Bright Sunshine hour of 11.3 hours on September 7, 2018.



	Mabaruma	G/Town	Timehri	Ogle	N/Amsterdam	Kaieteur	Lethem	Kamarang	Ebini
Daily Mean for the Month	6.5	7.3	6.7	7.8	6.9	0.0	8.2	8.1	7.7
LONG TERM AVERAGE	0.0	7.8	7.0	0.0	7.8	7.4	7.6	0.0	0.0

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

Climatological Outlook for the next few Weeks

CariCOF Precipitation and Temperature Outlook for October to December 2018

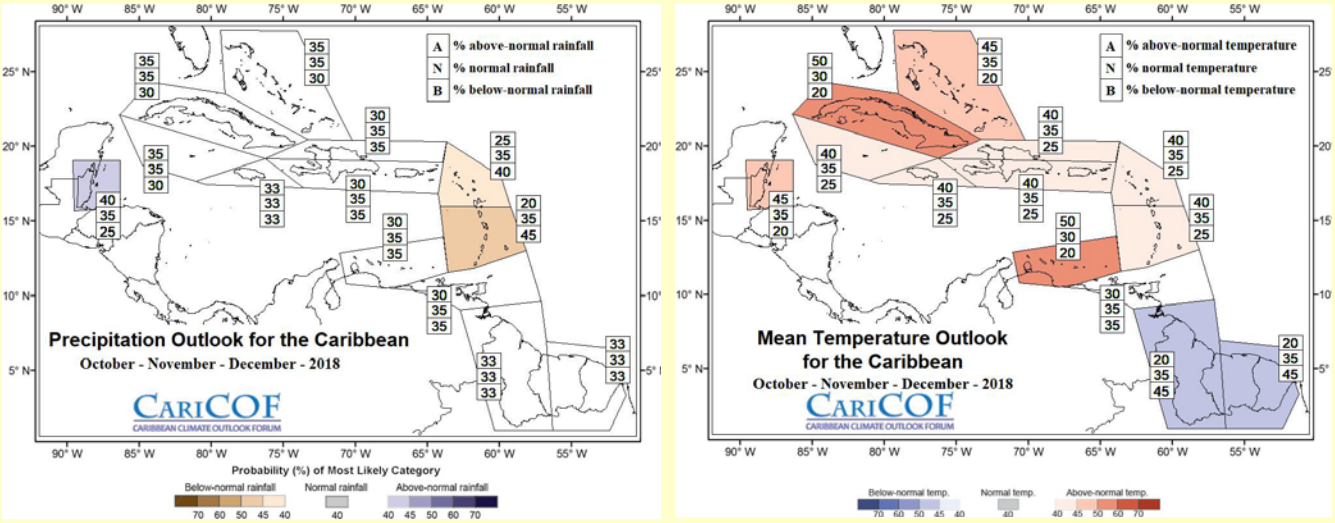


Figure 11 CariCOF (a) Precipitation and (b) Temperature outlook for the Caribbean for the period valid October – December, 2018 showing equal chances for *Above Normal, Normal and Below Normal* rainfall and 80 % chance for Above Normal to Normal Temperature across Guyana

According to the Outlook provided by CariCOF for the period October – December 2018 in Figure **11** (a) above; Little can be said at this time, BUT the chance for extremely wet or dry condition is very low, nevertheless, this is the period of transition into the secondary rainy season, hence there is still a resonable chance for high intensity rainfall events.

According to the Temperature Outlook in Figure **11** (b) above, expect cooler than to pretty much like usual for this period with a confidence of 80%. Since the chance for cool condition is a bit higher than usual for the season, extreme heat is not a concern at this time.

CariCOF Wet Days and Wet Spells Outlook for October – December 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 October – December, 2018

October to December 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	13-25	12-23	1.3-3.2	1.1-3.2	0.2-2.3	0.1-2.1	0-1.3	0-0.3
Guyana (Albion)	18-40	14-38	0.8-4.5	0.6-4.3	0-2.3	0-1.9	0-1.4	0-0.6
Guyana (Blairmont)	20-41	18-38	1-3.9	0.8-3.6	0.4-2.1	0.1-1.9	0-1	0-1.1
Guyana (Enmore)	17-49	15-42	0.9-4.3	0.9-4	0.4-2.9	0.2-2.4	0-1.9	0-1.4
Guyana (Georgetown)	28-46	28-46	1.1-4.5	1.1-4	0.4-2.8	0.3-2.3	0-1.8	0-1.7
Guyana (New Amsterdam)	23-40	19-38	1.1-3.9	0.8-3.7	0.4-2.2	0.2-2.1	0-1	0-1.3
Guyana (Skeldon)	26-38	22-39	1.3-3.5	1.2-3.4	0.4-1.8	0.4-1.8	0-1.3	0-0.8
Guyana (Timehri)	40-51	35-49	1.7-4.1	1.6-3.8	0.4-2.3	0.5-2.2	0-1	0-0.8
Guyana_Wales	30-48	31-49	1.7-4.4	1.3-4	0.4-2.6	0.5-2.4	0-1	0-1.1

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

Wet Days: Ususally, during October – November – December, 20 to 40 of the 92 days are Wet Days along Coastal Guyana – shown in Table 3 above. For October – December 2018, the forecast indicates indicate a slight reduction 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 October to December. For October – December 2018, the forescast indicates that there will be slight decrease in the usual number of Wet and Very Wet spells – low confidence (see Table 3 for usual and forecast occurrences).

IRI-ENSO Forecast

***Synopsis*: El Niño is favored to form in the next couple of months and continue through the Northern Hemisphere winter 2018-19 (70-75% chance).**

During September 2018, ENSO-neutral continued, but with increasingly more widespread regions of above-average sea surface temperatures (SSTs) across the equatorial Pacific Ocean. Over the last month, all four Niño index values increased, with the latest weekly values in each region near +0.7°C. Positive subsurface temperature anomalies (averaged across 180°-100°W) also increased during the last month, due to the expansion and strengthening of above-average temperatures at depth across the equatorial Pacific. Convection was increasingly suppressed over Indonesia and around the Date Line. Low-level westerly wind anomalies were evident over the western and east-central Pacific, with some of the strongest anomalies occurring over the eastern Pacific during the past week. Upper-level wind anomalies were easterly over the east-central Pacific. Overall, the oceanic and atmospheric conditions reflected ENSO-neutral, but with recent trends indicative of a developing El Niño..

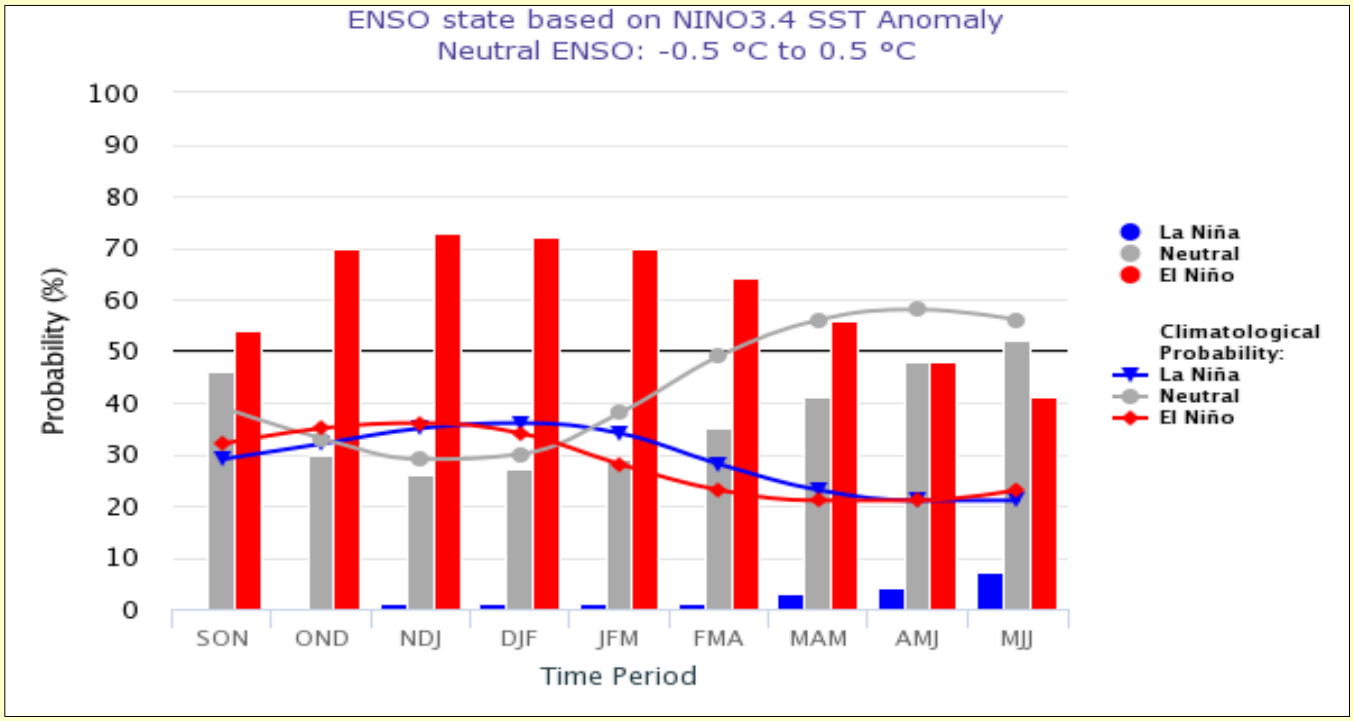


Figure 12 October 2018 CPC/IRI Official Probabilistic ENSO Forecast

Recent and Current Conditions

In mid-October 2018, the recent weekly NINO3.4 SST anomalies showed weak El Niño conditions, but the September SST anomaly was 0.34 C, indicating ENSO-neutral conditions, and for Jul-Sep it was 0.31 C, also neutral. 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 0.6, indicating weak El Niño conditions. Some key atmospheric variables, such as the lower and upper level zonal wind anomalies, have recently suggested El Niño conditions, but the outgoing longwave radiation pattern (convection) continues to indicate neutral conditions over recent weeks. The Southern Oscillation Index has recently been variable, averaging borderline El Niño levels. The subsurface temperature anomalies across the eastern equatorial Pacific remain moderately above-average, and have recently increased further. These warmed waters at depth have been impacting the surface, resulting in above-average temperatures, and also presaging likely further warming of the SST in the coming weeks. Given the current and recent SST anomalies, the subsurface profile and the conditions of most key atmospheric variables, a likely warming trend and suggests that the Oct-Dec SST anomalies will be at weak El Niño levels, lasting into the winter seasons.

Expected Conditions

The official diagnosis and outlook produced jointly by CPC and IRI issued by the NOAA/Climate Prediction Center ENSO Diagnostic Discussion suggested a 70-75% chance for El Niño development during fall season, continuing through winter 2018-19. An El Niño watch remains active. As of mid-October, about 85-92% of the models predict El Niño conditions from the initial Oct-Dec 2018 season through Feb-Apr 2019, with about 8-15% showing neutral conditions for this same range of seasons. Following the Feb-Apr season, probabilities for neutral begin rising, reaching nearly 25% by the final season of Jun-Aug. Meanwhile, probabilities for El Niño begin dropping, reaching about 75% by Jun-Aug. No model predicts La Niña for any season from Oct-Dec through Jun-Aug. – see Table 4 below for probability of occurrence.

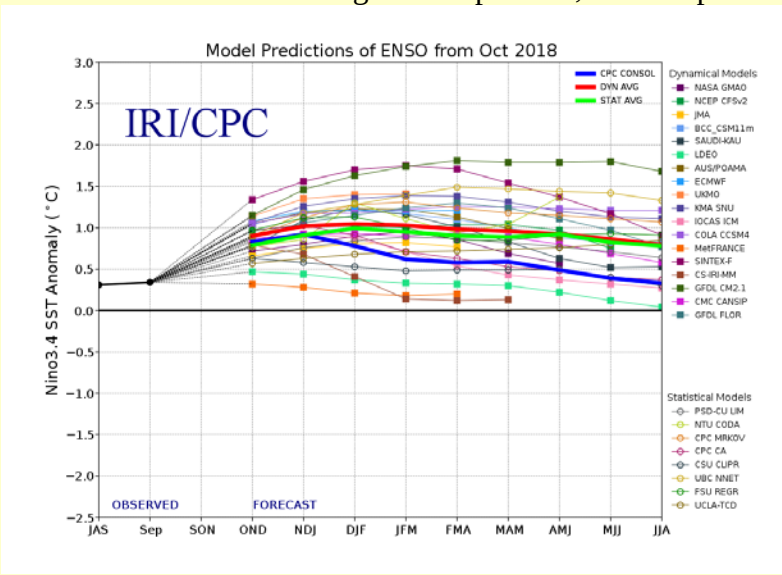


Figure 13 October 2018 Plume of Model ENSO Predictions

Table 4 Showing IRI/CPC Early – October Official Forecast probabilities for La Niña, neutral, and El Niño conditions for each 3-month season.

Season	La Niña	Neutral	El Niño
SON 2018	0%	46%	54%
OND 2018	0%	30%	70%
NDJ 2018	1%	26%	73%
DJF 2018	1%	27%	72%
JFM 2018	1%	29%	70%
FMA 2018	1%	35%	64%
MAM 2019	3%	41%	56%
AMJ 2019	4%	48%	48%
MJJ 2019	7%	52%	41%

In summary, the probabilities derived from the models on the IRI/CPC plume describe, on average, a strong tilt of the odds toward El Niño conditions from Oct-Dec through Jun-Aug 2019, peaking at 85-90% from Nov-Jan through Mar-May. Probabilities for La Niña are close to zero through Apr-Jun.

Annex I
Glossary of Terms

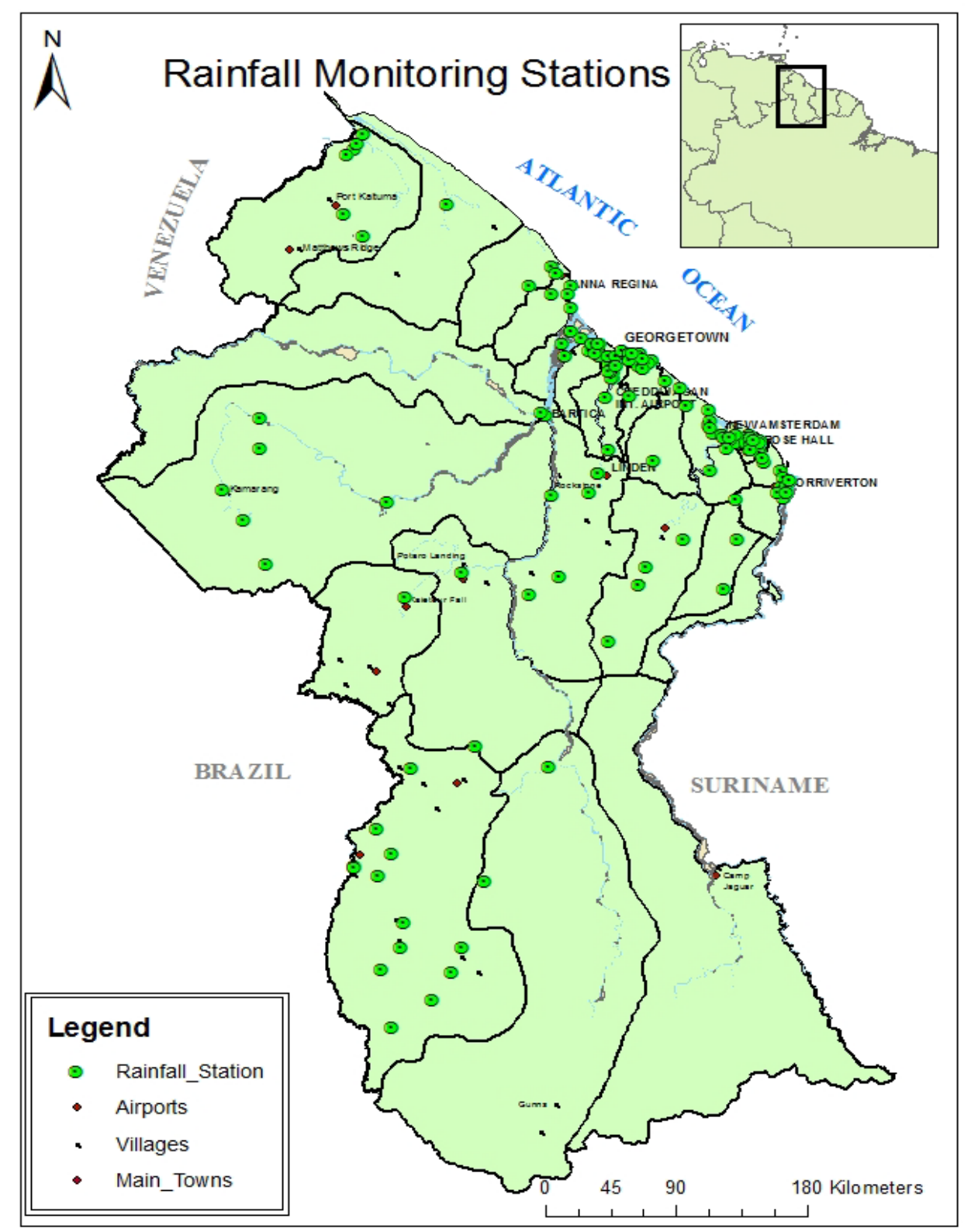
- **CariCOF** - Caribbean Climate Outlook Forum
- **CPC** – Climate Prediction Center
- **ENSO** - *El Niño–Southern Oscillation* is an irregularly periodical variation in winds and sea surface temperatures over the tropical eastern Pacific Ocean, affecting much of the tropics and subtropics.
- **Fall Season (Northern Hemisphere) –** Period from March to May
- **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**
- S**econdary 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
- **Spring Season (Northern Hemisphere) –** Period from March to May
- **SST** - Sea Surface Temperature

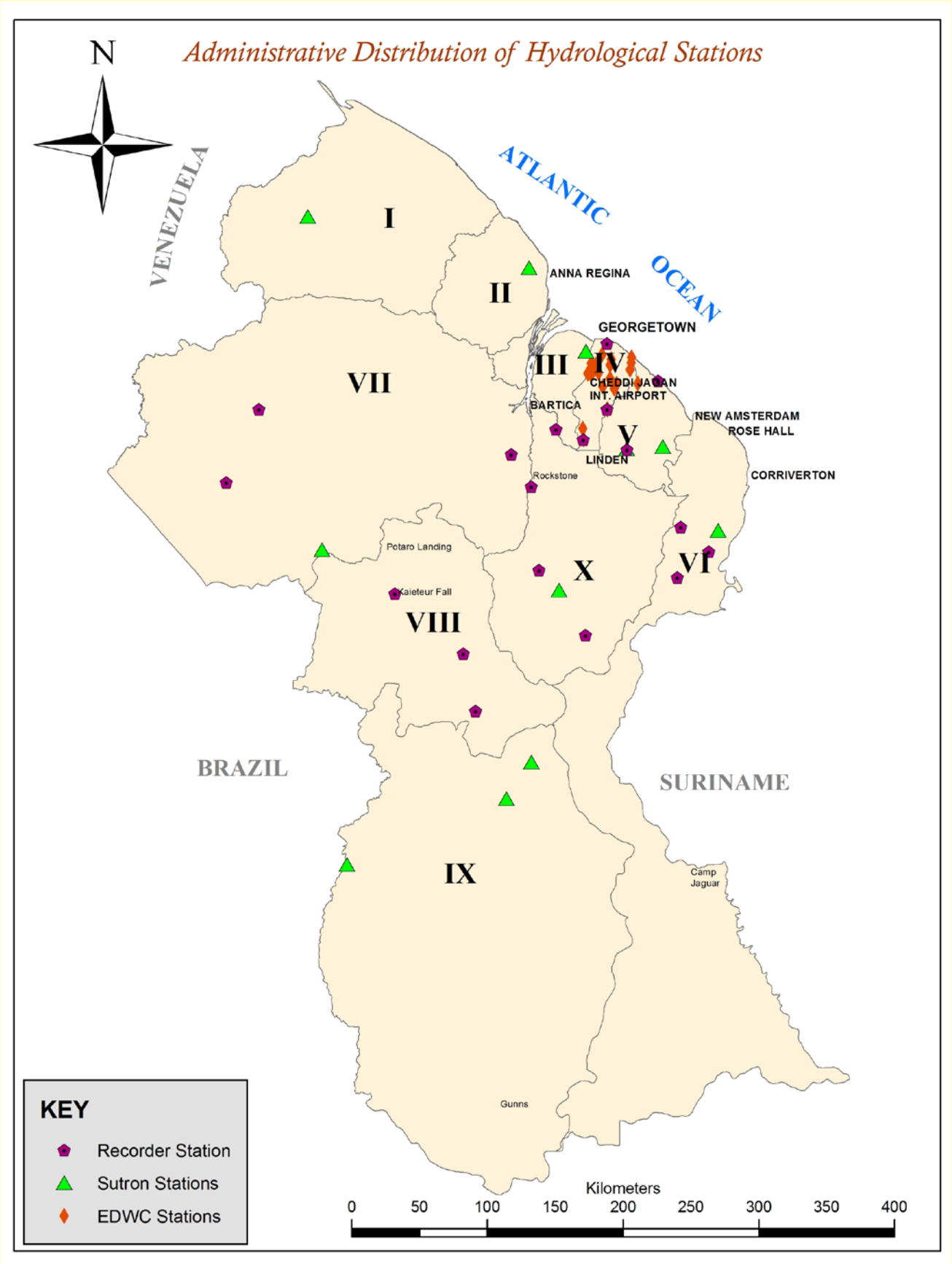
- **Summer Season (Northern Hemisphere)** – Perion from June to August

  Winter Season (Northern Hemisphere) – Period from December to February

- **WMO** - World Meteorological Organization

Annex II


N
Rainfall Monitoring Stations
VENEZUELA
ATLANTIC
OCEAN
Port Kaituma
ANNA REGINA
GEORGETOWN
NEW AMSTERDAM
LINDEN
ORRIVERTON
Kamarang
Potaro Landing
BRAZIL
SURINAME
Camp Jaguar
Legend
Rainfall_Station
Airports
Villages
Main_Towns
0 45 90 180 Kilometers


N
Administrative Distribution of Hydrological Stations
VENEZUELA
ATLANTIC
OCEAN
I
II
III
IV
V
VI
VII
VIII
IX
X
ANNA REGINA
GEORGETOWN
CHEDDI JAGAN
INT. AIRPORT
BARTICA
NEW AMSTERDAM
ROSE HALL
LINDEN
CORRIVERTON
Rockstone
Potaro Landing
Kaieteur Fall
Camp
Jaguar
Gunns
BRAZIL
SURINAME
KEY
Recorder Station
Sutron Stations
EDWC Stations
Kilometers
0
50
100
150
200
250
300
350
400

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
DJF	36%	30%	34%
JFM	34%	38%	28%
FMA	28%	49%	23%
MAM	23%	56%	21%
AMJ	21%	58%	21%
MJJ	21%	56%	23%
JJA	23%	54%	23%
JAS	25%	51%	24%
ASO	26%	47%	27%
SON	29%	39%	32%
OND	32%	33%	35%
NDJ	35%	29%	36%

Sources

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- http://iri.columbia.edu/our-expertise/climate/forecasts/enso/current/?enso_tab=enso-cpc_update
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- http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.html
- http://www.ncdc.noaa.gov/sotc/global/201808
- http://iri.columbia.edu/wp-content/uploads/2018/08/figure1.gif

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