



**ANNOUNCEMENTS**

A weak La Niña continues to exist, though it is highly likely that there would be a return to ENSO-neutral during January to March 2017. Rainfall for much of the region barring the northwest and west is likely to be above normal reducing concerns over water availability, but with greater chance of flooding and erosion, including landslides. There are concerns over short and long term drought in the west and northwest Caribbean.

**REGIONAL OVERVIEW ON WEATHER AND CLIMATE FOR NOVEMBER 2016**

The islands of the eastern Caribbean were normal to above normal regarding the month’s rainfall. Trinidad, Tobago, and Grenada were normal; Barbados very to extremely wet; St. Vincent exceptionally wet; St. Lucia moderate to exceptionally wet; and Dominica normal to moderately wet. Guyana was normal to exceptionally wet from north to south. Conditions in Jamaica were predominantly normal but with the western extreme ranging to extremely dry and the eastern extreme to slightly wet, but Belize ranged from very wet in the west to normal further east, north and south.

Most annual cropping takes place over a period of about three months. For the three month period, mixed conditions were experienced in the islands of the eastern Caribbean. Trinidad was moderately dry; Grenada slightly dry; Dominica normal; Barbados very to extremely wet; St. Vincent extremely wet; St. Lucia slight to exceptionally wet; and Antigua slightly wet. Exceptionally wet conditions dominated the interior of the Guianas, while coastal Guyana was predominantly normal, except for in the vicinity of Georgetown that was below normal. Jamaica ranged from normal in central areas to slightly dry in the east and west, but Belize ranged from slightly wet in the southwest to moderately dry in the northeast.

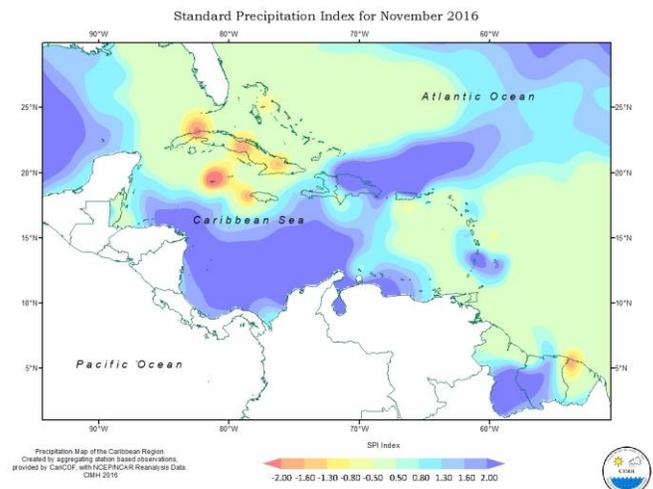


Figure 1. SPI for the Caribbean for November 2016. More information on the SPI can be viewed at <http://rcc.cimh.edu.bb/climate-monitoring/spi-monitor/>.

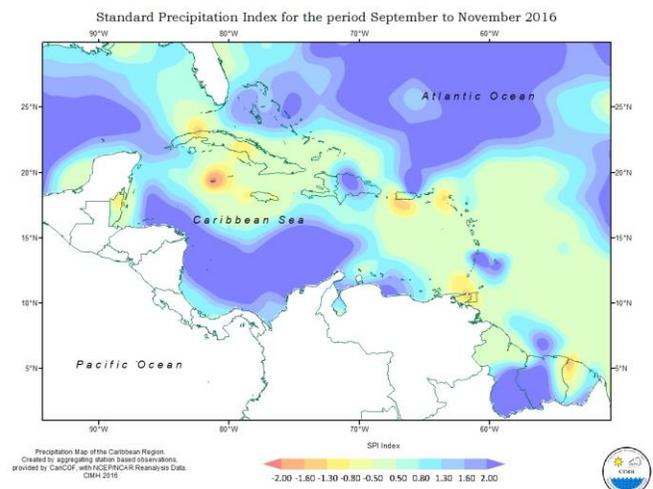


Figure 2. SPI for the Caribbean for September to November 2016. More information on the SPI can be viewed at <http://rcc.cimh.edu.bb/climate-monitoring/spi-monitor/>.

The 2016 Atlantic Hurricane Season concluded with the development of Tropical Depression #16 on the 21<sup>st</sup>, near 11.5N 79.4W or about 300 miles east of Blufields, Nicaragua. The system became Tropical Storm Otto later on the same day, making it the 15<sup>th</sup> named storm for the season. It lingered in the southern Caribbean Sea near the Costa Rica/Nicaragua coastline for another 24 hours before it strengthened to Category 1 hurricane status. Otto eventually moved over Central America and into the eastern Pacific after further strengthening to Category 2. Thus, the Season concluded with a total of fifteen named storms - seven hurricanes, three of them major.

A weak high pressure ridge was constantly further weakened by a series of eastward-moving frontal systems in the northern Atlantic, while a number of westward-moving surface troughs traversed the eastern Caribbean, influencing rainfall. Temperatures over many of the islands continue to be above average during November, while maximum temperatures over Guyana were below average.

## NATIONAL OVERVIEWS

### Barbados

A series of eastward-moving frontal systems in the northern Atlantic and a number of westward-moving surface troughs resulted in copious amounts of rainfall across Barbados and neighbouring territories as they induced the northward movement of the I.T.C.Z.

The November rainfall total this year far outstripped that of 2015 with a total of 457.5mm over 17 rain days (rainfall  $\geq$  1mm), compared with last year's total of 134mm. Between the 4<sup>th</sup> and 6<sup>th</sup>, 125.1mm were recorded and by the 17<sup>th</sup>, the total had reached 189.4mm, surpassing the long-term average of 171.4mm. Other very significant rainfall events occurred on the 23<sup>rd</sup> and 29<sup>th</sup>, which produced individual totals of 121.8 and 154mm respectively. The latter rainfall event resulted in the issuing of a Flood-Warning for Barbados. There was significant flooding and loss of property across the island

associated with this event. The final monthly rainfall totals ranged from 290mm at Union Hall, St. Philip to as high as 590.1mm at Springvale, St. Andrew. Meanwhile, Barbados' cumulative rainfall total at the end November at Charnocks reached 1314.1mm compared with the long-term (1981-2010) cumulative average (at the nearby G.A.I.A) of 1180.59mm.

There were only four days on which the daily maximum temperatures were less than the long-term average (1981 to 2010) of 30.2°C. On all other days, maximum temperatures ranged between 30.3°C and 32.3°C. On twelve of the latter mentioned days, temperatures were greater than or equal to 31.0°C. The highest maximum, 32.3°C occurred on the 4<sup>th</sup>, while the lowest minimum of 22.3°C was recorded on the 29<sup>th</sup>.

### Dominica

Above to normal rainfall was experienced across Dominica during the month.

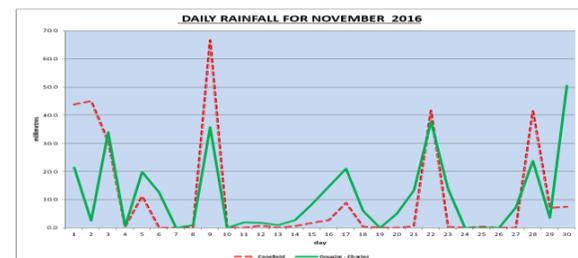


Figure 3 Daily rainfall at Canefield and Douglas-Charles Airports, Dominica during November 2016.

Above normal rainfall (61% above the 30year average) was recorded at Canefield. A total of 312mm was recorded over 12 rain days (3 days less than average). A trough system that affected the island on the 9<sup>th</sup> resulted in the highest 24-hour rainfall of 66.7mm. There were 3 significant dry spells during the 2<sup>nd</sup> to the 3<sup>rd</sup> week. The average air temperature was 27.8°C (about average). The highest maximum temperature recorded was 33.8°C on both the 6<sup>th</sup> and 11<sup>th</sup>. The lowest minimum temperature was 21.8°C on the 4<sup>th</sup>, 27<sup>th</sup>, 28<sup>th</sup> and 29<sup>th</sup>. The average wind direction was west south west at 7km/h. Weak unstable conditions on the 24<sup>th</sup> generated the month's highest gust of 44km/h.

Near-average rainfall (98% of the 30-year normal) was recorded at the Douglas-Charles Airport. A total

of 341.2mm was recorded over 23 rain days (near average). A trough system also produced the month's highest 24-hour total of 50.6mm during the evening of the 30<sup>th</sup>. The average air temperature was 27.3°C (near-average). The highest maximum temperature recorded was 31.5°C on the 1<sup>st</sup> and 10<sup>th</sup>. The lowest minimum was 20.5°C on the 4<sup>th</sup>. The average wind direction was south-south east at 9km/h. A trough system traversing the region on the 15<sup>th</sup> produced the month's highest gust of 50km/h.

Trough systems during the month impacted negatively on the farming community. Heavy rainfall events resulted in damages to farm access roads, and farms with exposed soils faced loss of top soil. Applied fertilizers and other pest controlling measures lost their potency. However, conditions were favourable for other farm practices such as land preparation and transplanting. The main crops harvested for the period were dasheen, yam, citrus, passion fruit, avocado, banana and plantain. Vegetable production was relatively low. Pest problems proliferated during the month. The Black Sigatoka Disease had a slight increase in infestation levels in the Musa species. Small ruminants had abundance of green foliage for the period. Many producers treated their animals for worms and ticks.

**Grenada**

Below average rainfall was recorded at Point Salines (Maurice Bishop Airport) for the fourth consecutive month. A total of 135.9mm of rainfall was recorded for the month, which is 83.27% of the thirty (30) year average. The highest 24 hour rainfall, 31.6mm, resulted from a trough on the 18<sup>th</sup>. There were 8 days with a trace of rainfall and only five 5 with 0.0mm.

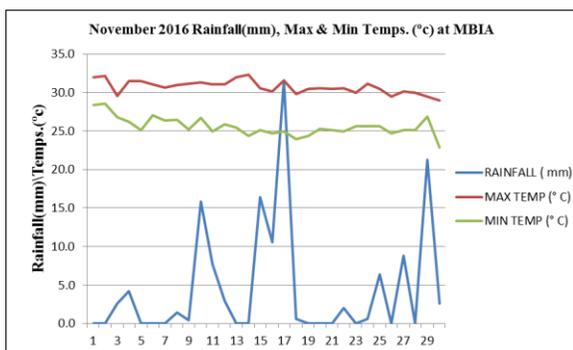


Figure 4 November 2016 daily rainfall, as well as daily maximum and minimum temperature at Maurice Bishop International Airport.

The highest maximum temperature recorded was 32.3°C on the 14<sup>th</sup>, higher than the 30 year average of 31.9°C. It is also the 2<sup>nd</sup> highest maximum temperature recorded for 2016 so far and the 6<sup>th</sup> highest over a 31 year period. The lowest minimum temperature recorded was 22.9°C on the 30<sup>th</sup>, which is higher than the thirty (30) year average of 22.6°C.

Small craft and marine advisories were issued on the 3<sup>rd</sup>, 5<sup>th</sup>, 15<sup>th</sup>, 25<sup>th</sup> and 28<sup>th</sup>-30<sup>th</sup> of the month. On the 2<sup>nd</sup> of the month a deep layer trough system to the west of the Lesser Antilles produced flooding and landslide in the northeast sector of the island. On the 29<sup>th</sup> a surface trough produced minor flooding in the northern sector of the island resulting in significant loss of crops for farmers in that area. Other farmers produced exceeding numbers of ripe bananas, citrus, breadnut and cucumbers. There was a shortage of plantains, yams, lettuce and okras for the month. The monthly fish catch included black- and yellow-fin tuna, blue marlin and snapper.

**Guyana**

For November, Guyana had a monthly country average rainfall of 104.1mm over an average of 7 rain days. The highest monthly rainfall total of 314.1mm was recorded over 16 rain days at Mathews Ridge station in Region 1; while the lowest monthly rainfall total of 20mm over 2 rain days was recorded at No 73 village in Region 6. The highest 24-hour total was recorded at Wash Clothes in Region 5 with 141.5mm on the 18<sup>th</sup>. Most of the stations recorded below normal rainfall conditions, but stations in Regions 7 and 10 recorded totals above their averages.

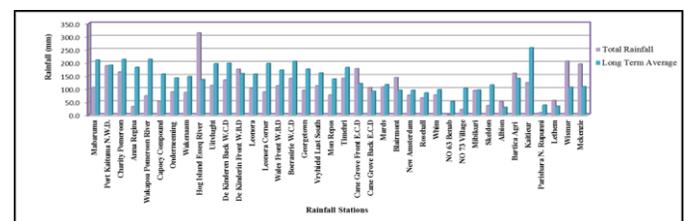


Figure 5 Rainfall totals for November 2016 compared with November averages at select stations in Guyana.

For the month of November, the highest mean temperature was recorded at Lethem in Region 9 with 34.6°C on the 6<sup>th</sup>. Lethem also recorded the highest mean maximum temperature of 36.5°C. The highest mean minimum temperature was recorded at Georgetown in Region 4 with 25.3°C, while Ogle,

also in Region 4, recorded the highest minimum temperature of 26.8°C on the 18<sup>th</sup>.

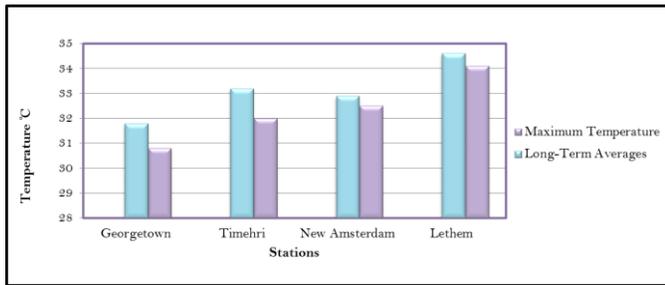


Figure 6 Maximum temperature for November 2016 compared with November averages at select stations in Guyana.

### Jamaica

The Norman Manley Airport in the southeast recorded a total of 95.6mm, which was above the average for the station. Sangster in the northwest recorded a rainfall total of 44.9mm. There were 6 rainfall days reported for both Sangster and Manley Airports. The highest maximum temperature recorded for Norman Manley Airport was 33.2°C (10<sup>th</sup>), while Sangster Airport reported 32.5°C (10<sup>th</sup>).

Table 1 Rainfall Statistics for Manley and Sangster Airports, Jamaica, for November 2016.

Monthly Averages	Norman Manley	Sangster
Extreme Maximum Temperature	33.2 °C <b>(33.9 °C)</b>	32.5 °C <b>(32.8°C)</b>
Lowest Minimum Temperature	22.1 °C <b>(22.3 °C)</b>	22.9 °C <b>(22.0 °C)</b>
Rainfall Total	95.6 mm <b>(85 mm)</b>	44.9 mm <b>(102 mm)</b>
Rainfall days (≥1mm)	6 days <b>(5.7)</b>	6 days <b>(15.1)</b>

Values in red indicate the 1992-2011 (20-year) averages. Values in orange represent 1971-2000 (30-year) mean.

### St. Lucia

November was an extremely wet month for Saint Lucia and this was the second wettest November over the last 40 years at Hewanorra Airport. The monthly rainfall total at Hewanorra was 445.1mm, which is more than twice the average for this location. At GFL Charles the monthly rainfall total was 119.0mm more than the average, with a total of 346.5 mm. There were 18 rainy days with 1 dry spell at Hewanorra and at GFL Charles there were 19 rainy days with 1 dry spell as well.

December is the transition month into the dry season with the mean monthly rainfall total at Hewanorra and GFL Charles being 106.4mm and 138.2mm respectively. The precipitation at this time of year is mainly due to isolated moisture surges embedded in the easterly trades and on some occasions, shear lines from decaying cold fronts. The seasonal precipitation outlook for December, January & February suggests that rainfall totals are likely to be above normal, ranging from 271mm to 400mm at Hewanorra and 362mm to 781mm at GFL Charles.

Table 2 November 2016 monthly averages at Hewanorra Airport, St. Lucia.

Cloud Cover (oktas)	Wind Dir (° from N)	Wind Speed (kt)	Air Temp. (°C)	Rainfall Mean (mm)	Rainfall Total (mm)
6	110	11	27.6	185.3	
RH (%)	Max Temp (°C)	Min Temp (°C)	Daily Sunshine (Hrs)	Daily Evap (mm)	Soil 20 (°C)
81	30.6	25.4	6.4	5.6	27.2

Table 3 November 2016 monthly averages at George Charles Airport, St. Lucia.

Cloud Cover (oktas)	Wind Dir (° from N)	Wind Speed (kt)	Air Temp. (°C)	Rainfall Mean (mm)	Rainfall Total (mm)
6	100	6	27.8	227.5	346.5
RH (%)	Max Temp (°C)	Min Temp (°C)	Daily Sunshine (Hrs)	Daily Evap (mm)	Soil 20 (°C)
82	30.2	24.4			

The island experienced above average maximum and minimum temperatures during the month of November and this is likely to continue for the December 2016 to February 2017 season.

There is no concern with regard to drought. However, due to the above normal precipitation over past months, the soil moisture content could be relatively high. Farmers should continue to take the necessary measures to reduce the chances of flooding since above normal precipitation is forecasted for the December 2016 to February 2017 season in Saint Lucia.

**REGIONAL OVERVIEW ON SEASONAL CLIMATE FORECASTS**

A borderline, weak **La Niña** continues, with sea-surface temperatures (SSTs) around 0.5°C below average in the equatorial E. Pacific (NINO3.4). All the models indicate a fading La Niña, by the December 2016 to February 2017 period, with a return to neutral conditions between March and May most likely. La Niña increases chances of wetter than usual conditions in much of the region during December 2016 to February 2017. It increases flash flooding and landslide potential until the end of the year, but cools the dry season and dampens the intensity of its dryness.

**Sea Surface Temperatures (SST)** are up to 0.5 to 1.0°C above-average within the Caribbean Sea and the Tropical North Atlantic east of the islands. Above average SSTs can result in rainfall increases across the Caribbean.

**December 2016 to May 2017**

Contrasting rainfall conditions between the western and northwestern Caribbean and the remainder of the region are forecasted for the period December 2016 to February 2017. The majority of the Caribbean is highly likely to experience normal to above normal rainfall; and the western and northwestern areas below normal. There is greater uncertainty in the vicinity of the Cayman Islands.

There is far greater uncertainty in the region for the March to May 2017 period, particularly in the Windward and Leeward Islands, Puerto Rico and Hispaniola. However, normal to above normal rainfall is likely in the west and northwest, as well as French Guiana and the majority of Suriname; while the southern portion of the eastern Caribbean, including the ABC islands and Guyana, are likely to experience normal to below normal rainfall for the same period.

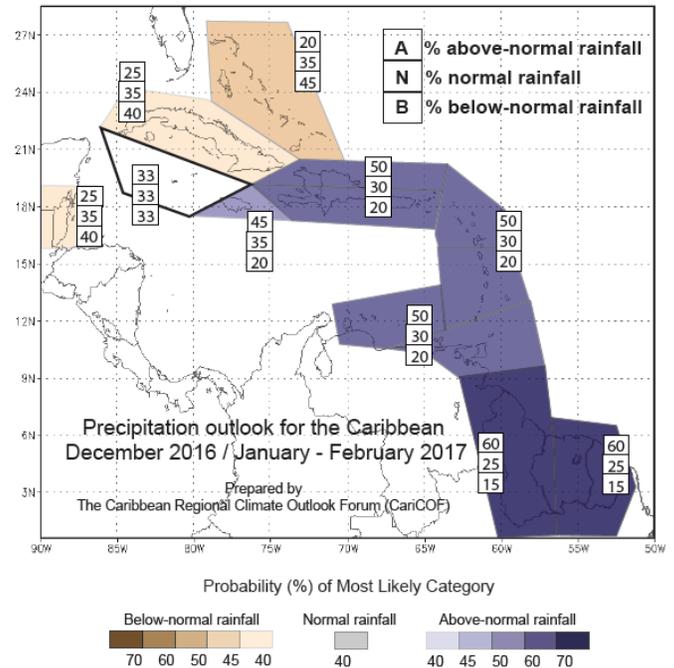


Figure 7 The December 2016 to February 2017 rainfall forecast

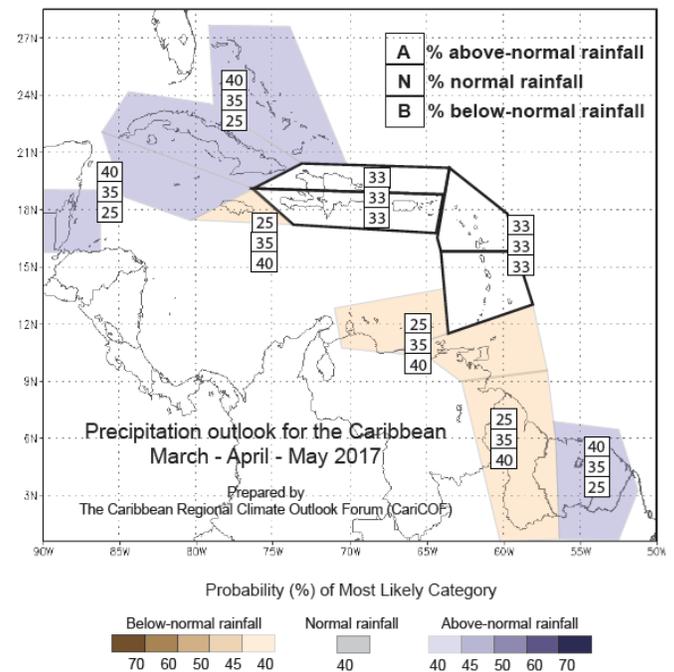


Figure 8 The March to May 2017 rainfall forecast

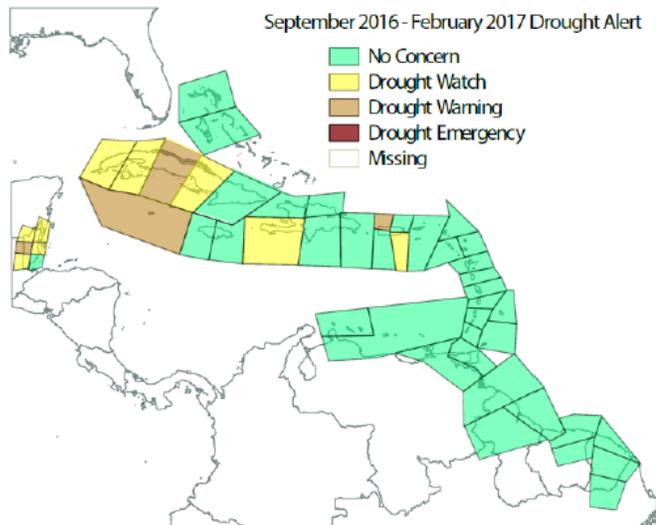


Figure 9 Drought Alert map (based on the SPI) for the end of February 2017, based on actual and forecasted rainfall for the period September 2016 to February 2017.

about successfully cropping in parts of the Leeward Islands, if rains do not continue to make up for previous deficits.

Concerns over high temperature is likely to be well diminished by the March to May period in much of the Caribbean, implying that possibility of heat stress in livestock, poultry and plants is lower than recent times.

### Forecast Implications for Agriculture

The islands east of Cuba experienced normal to above normal rainfall during November, introducing greater concerns regarding flooding and erosion, including landslides (without there necessarily being more flood events than normal), but certainly removing drought concerns in the eastern Caribbean islands and the Guianas until February. This trend is very likely to continue during December to February 2017, sustaining these concerns, particularly during December, and continuing the need for field drainage in these areas until end of December at least. On the other hand, short and long term droughts are evolving in the west and northwest, with water availability for rainfed and irrigated agriculture being threatened.

With greater uncertainty in rainfall in the eastern Caribbean during March to May 2017, it is important to note that this period represents the second half of the dry season, and so areas already in drought (like western and northwestern areas) would likely accumulate significant long term drought impacts, with less water available for irrigation. By the end of May 2017, there may be some growing concerns

Prepared by

Caribbean Institute for Meteorology and Hydrology (CIMH) and the National Meteorological Services of  
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