CAMI MONTHLYBULLETIN
Caribbean Agro-Meteorological Initiative
Enhancing Farming through Weather and Climate Information

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ANNOUNCEMENTS

A weak La Niña continues to exist, though it is highly likely that there would be a return to ENSO-neutral by February 2017. Concerns over drought continue to exist in the western Caribbean, along with drought concerns over the northern and southern part of the eastern chain. By the end of May, the impacts on agriculture in these parts could be significant. It is recommended that these regions continue to monitor the situation regarding water availability for their agricultural activities.

REGIONAL OVERVIEW ON WEATHER AND CLIMATE FOR DECEMBER 2016

Mixed conditions were experienced in the islands of the eastern Caribbean during the month. Trinidad was normal to slightly wet; Tobago slight to moderately wet; Grenada moderate to very wet; Barbados, St. Vincent and Antigua slightly wet; St. Lucia wet; and Dominica from slightly dry in the north to exceptionally wet in the south. Conditions in Guyana ranged from normal to extremely wet. Conditions in Jamaica ranged from slightly wet in the south to moderately dry in the east and west; but in Belize, from normal in the northwest to exceptionally wet in the southeast.

Most annual cropping takes place over a period of about three months. For the period October to December, mixed conditions were experienced in the eastern Caribbean. Conditions in Trinidad ranged from moderately dry in the southwest to moderately wet in the northeast; Tobago, Grenada and Antigua normal; Barbados very wet; St. Vincent extreme to exceptionally wet; St. Lucia slight to exceptionally wet; and Dominica from normal to very wet. Rainfall in Guyana ranged from normal in the north to exceptionally wet in the south. Jamaica was predominantly normal except for the extreme south that was slight to moderately wet, and the extreme west that was slight to moderately dry. Conditions in

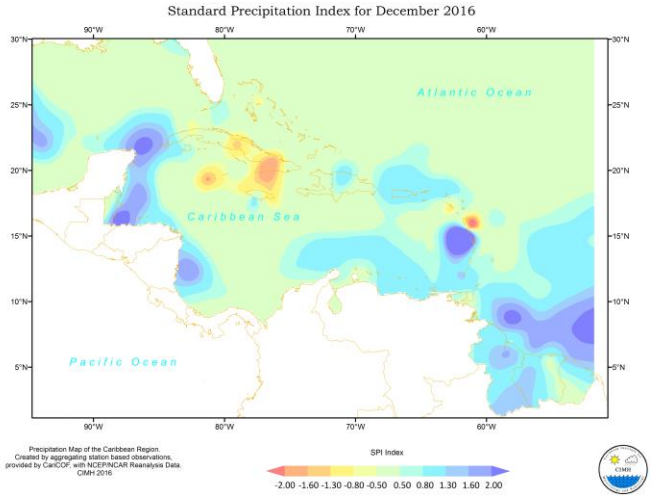

Figure 1. SPI for the Caribbean for December 2016. More information on the SPI can be viewed at http://rcc.cimh.edu.bb/climate-monitoring/spi-monitor/.

Belize ranged from moderately wet in the south to moderately dry in the north.

The Bermuda/Azores high pressure system strengthened significantly during the second half of December to a high of 1041mb on the 18th and 23rd, generating brisk north-easterly trade-winds. Meanwhile, a number of surface and mid to upper level troughs traversed the region. These resulted in frequent showers over the eastern Caribbean.

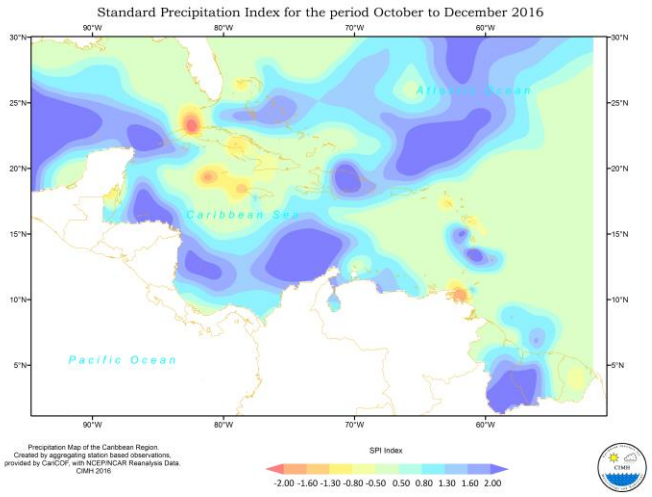

Figure 2. SPI for the Caribbean for October to December 2016. More information on the SPI can be viewed at http://rcc.cimh.edu.bb/climate-monitoring/spi-monitor/.

NATIONAL OVERVIEWS

Barbados

Relatively light winds ranging between 15 and 20 km/h, moved across Barbados and the eastern Caribbean during the first half, but strengthened to between 25 and 45 km/h during the latter half of the month.

There were four significant rainfall events. The first three occurred between the 7th and 8th, the 13th and 15th and 18th and 19th of the month, producing 30.8mm, 21.3mm and 12.9mm respectively at the Charnocks/Airport station. The fourth and most significant rainfall event occurred on 22nd December when some central sections of the island observed rainfall amounts ranging between 50 and100mm. This resulted in some flash-flooding across the island with most of the showers occurring between 9:00 a.m and 4:00 p.m. At Charnocks/Airport, 21.4mm was recorded during the 24-hour period between 21st and 22nd. The final December rainfall total at Charnocks/Airport was 108.3mm from 15 rainy days (rainy day≥ 1.0mm) while rainfall totals reported by some of the other stations across the island varied between 100mm and 165mm. The 2016 Charnocks/Airport rainfall accumulation of 1422.3mm was the 15th highest rainfall total recorded since 1942.

Dominica

Rainfall for December across Dominica ranged from below average along parts of the eastern coast to above average along the central and western areas.

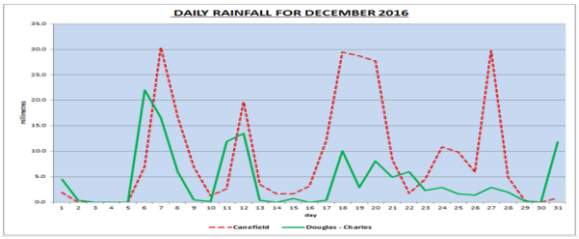

Figure 3 Daily rainfall at Canefield and Douglas-Charles Airports, Dominica during December 2016.

The second wettest December in over 30yrs was recorded at Canefield (December 2013, was the wettest). A total of 270.9mm was recorded, which is in excess of 2.7 times that of the 30yr average. A trough system produced overnight shower and thunderstorm activities on the 7th into the 8th resulting in the month's highest 24-hour total of 30.4mm on the 7th. There were 24 wet days (8 days above average). A 4-day dry spell was recorded at the start of the month. The average air temperature was 27.3°C (near-average). Record breaking maximum temperature of 33.0°C was recorded on both the 2nd and 3rd. The lowest temperature recorded was 20.8°C on the 31st. A strong high pressure system from mid-month resulted in gusty winds with the highest gust of 52km/h recorded on the 18th and 27th .The average wind direction was east south east at 7km/h.

Below average rainfall was recorded at the Douglas-Charles Airport. A total of 134.1mm (61% below the 30yr average) was recorded. The Atlantic High Pressure System generated the month's highest daily total of 22.0mm on the 6th. There were 18 wet days (average). There was a 4-day dry spell during the start of the month and a 5-day dry spell during mid-month. The average air temperature was 27.2°C (near average). The highest temperature was 30.7°C recorded on the 24th and the lowest 20.5°C recorded on the 31st. The highest gust of 65km/h was recorded on the 17th and 18th. The average wind direction was east south east at 19km/h.

Wet conditions experienced during the month impacted negatively on vegetable production. Farmers who tried to establish their vegetable crops experienced severe losses as most seedlings were not

able to withstand the conditions. Root crops, especially dasheen; citrus, sorrel, plantain and banana crops were the main harvest for the period. Livestock farmers reported an increase in internal parasite, worms and ticks. De-worming practices and tick control measures were enforced during the month. The weather conditions experienced were conducive for pests and diseases proliferation.

Grenada

Rainfall for the month totaled 187.2mm making this December the 4th wettest on record. This total was significantly above both the long term and 30yr averages of 105mm & 103.8mm, respectively. The highest 24-hr rainfall occurred on the 21st when 102.9mm was recorded. There were 5 days of insignificant or no rainfall. Other significant rainy days were on the 23rd when 18.6mm was collected, and on the 9th when there was 9mm. Flood and/or landslides warnings were issued on the 6th, 7th, 22nd, 23rd & 27th as soil moisture levels became a grave concern.

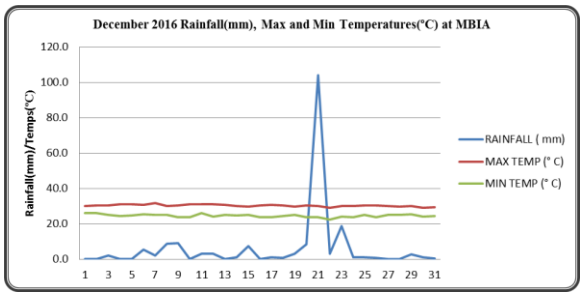

Figure 4 December 2016 daily rainfall, as well as daily maximum and minimum temperature at Maurice Bishop International Airport.

The temperature on the other hand was fairly constant. The mean maximum temperature was 30.3°C, which is near the long term and 30yr average of 30.1°C. The warmest day was the 7th, when the temperature soared to 31.6°C. Night times were a little warmer than usual, with a mean of 24.6°C, which is almost one degree above both the long term and 30yr term mean of 23.8°C. The coolest night was the 22nd when the temperature fell to 22.4°C.

Passing cold fronts produced higher than normal swells which reached the Grenadian coastline. The winds generated by the High pressure System agitated the sea surface producing large waves. The Met Office issued marine advisories from the 8th through to the 31st and a high wind warning on the 18th.

With the above average rainfall, farmers reaped good harvests in pumpkins, citrus and sorrel. Watermelon production diminished drastically, while avocado has disappeared. Breadfruit is slowly making its presence felt, while there is still no sign of pigeon peas. Due to unfavorable sea conditions, fisherman catch decreased. As to be expected, mainly the bigger species were caught, e.g. barracuda, marlin, ocean gar and king fish.

St. Lucia

Saint Lucia experienced above average rainfall during the month of December. The monthly rainfall total at Hewanorra was 137.5mm, and at GFL Charles 192.5mm, 53.5mm above the average. There were 18 rainy days at Hewanorra Airport with 2 dry spells. The longer one lasted 5 days and occurred at the end of the month. At GFL Charles there were 25 rainy days with no dry spells.

Table 1 December 2016 monthly averages at Hewanorra Airport, St. Lucia.

Cloud Cover (oktas)	Wind Dir (o from N)	Wind Speed (kt)	Air Temp. (°C)	Rainfall Mean (mm)	Rainfall Total (mm)
5	80	17	27.5	137.5	107.1
RH (%)	Max Temp (°C)	Min Temp (°C)	Daily Sunshine (Hrs)	Daily Evap (mm)	Soil 20 (°C)
76	30.0	25.1	8.7	6.6	25.3

Table 2 December 2016 monthly averages at George Charles Airport, St. Lucia.

Cloud Cover (oktas)	Wind Dir (o from N)	Wind Speed (kt)	Air Temp. (°C)	Rainfall Mean (mm)	Rainfall Total (mm)
5	90	9	27.4	192.5	139.3
RH (%)	Max Temp (°C)	Min Temp (°C)	Daily Sunshine (Hrs)	Daily Evap (mm)	Soil 20 (°C)
76	29.5	24.1			

January is a month where the monthly precipitation totals begin to decrease as the dry season progresses. The mean monthly rainfall total at Hewanorra and GFL Charles is 79.4 mm and 110.5 mm respectively. The seasonal precipitation outlook for January, February and March (JFM) indicate that rainfall is most likely to be above normal, ranging from 212m

to 409m at Hewanorra and 282mm to 640mm at GFL Charles.

The island experienced above average minimum temperatures during the month and near-average maximum temperatures.

There is no concern with regard to drought. However, farmers should monitor their water resources as the dry season continues and be prepared to take the necessary measures in the event of an odd dry spell during that period.

St. Vincent

St. Vincent and the Grenadines experienced cloudy to occasionally cloudy skies with showers on most days. At E. T. Joshua Airport, 220.1mm was recorded with 20 rain days and 11 dry days. On the 16th, a high surf and small craft warning was issued. The highest wind gust recorded at the E.T. Joshua Airport – Arnos Vale was near 55km/h on the 22nd. Sea swells were moderate to rough in open waters.

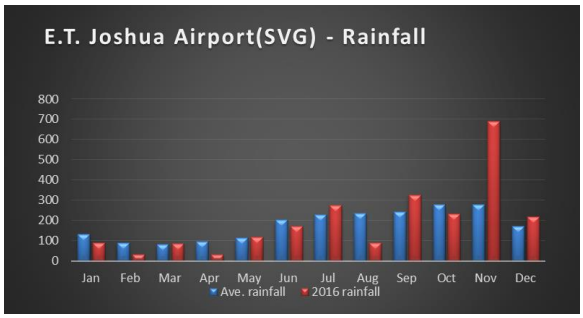

Figure 5 Average monthly rainfall compared with the January to December 2016 rainfall totals at E. T. Joshua Airport, St. Vincent and the Grenadines

On average, E. T. Joshua receives 173.0mm of rainfall in December. For December 2016, 220.1mm were recorded. There were 20 rain days; with the highest 24-hour rainfall (30.9mm) recorded on the 8th. There were 11 dry days (rainfall < 1mm). The first dekad (ten-day period) received 35% of the month's rainfall, the second 40.1%, and the third 24.9%.

The average maximum temperature was 29.9°C, and the average minimum temperature 24.4°C. The extreme maximum temperature recorded was 31.3°C, 0.4°C higher than the 30-year average. The extreme minimum was 22.5, 1.2°C higher than the 30-year average. The mean relative humidity was 76%.

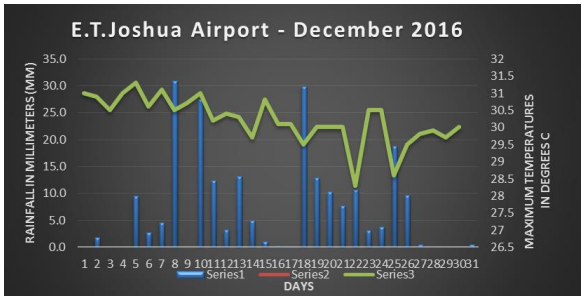

Figure 6 Daily rainfall and minimum temperature for December 2016 at E. T, Joshua St. Vincent.

REGIONAL OVERVIEW ON SEASONAL CLIMATE FORECASTS

A borderline to 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 February 2017, with a return to neutral conditions. La Niña increases chances of wetter than usual conditions, increases flash flooding and landslide potential in the eastern Caribbean and dryer conditions in the west and northwest. However since borderline to weak, La Niña's influence is expected to be limited.

Sea Surface Temperatures (SSTs) are up to 0.5 above-average within the Caribbean Sea and the Tropical North Atlantic east of the islands, but approaching average. Above average SSTs can result in rainfall increases across the Caribbean, but such affect will diminish approaching the April to June 2017 period when SSTs are expected to be about average.

January to June 2017

The islands of the eastern Caribbean and the Guianas are likely to be normal to above normal, with the chances of above normal rainfall increasing from south to north during January to March. On the other hand, the northwest Caribbean, i.e. in the vicinity of Cuba and The Bahamas, will more likely to be normal to below normal. There is great uncertainty in the remainder of the Caribbean.

As the La Niña fades and SSTs approach normal, there is uncertainty over much of the region for the period April to June, particularly over the Guianas, the southern portion of the eastern Caribbean, and

in the vicinity of Hispaniola and Puerto Rico. The remainder of the region is expected to experience normal to above normal rainfall, with the greatest confidence for above normal rainfall over the Cayman Islands and The Bahamas.

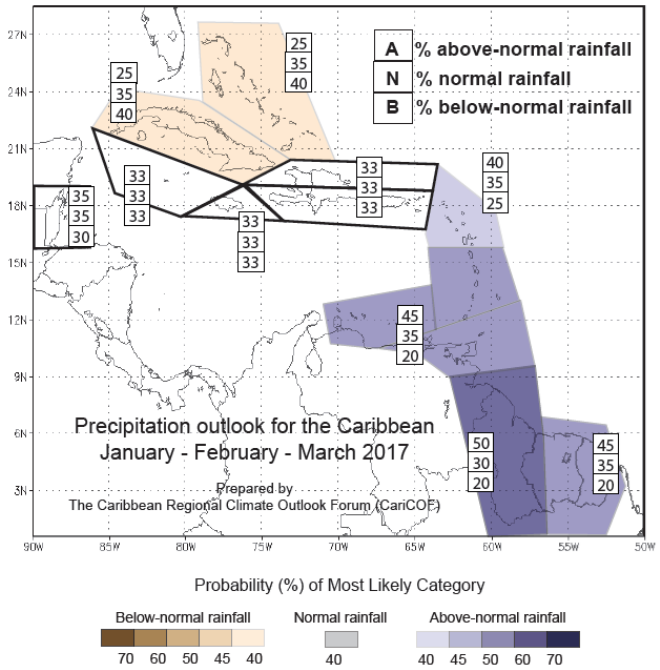

Figure 7 The January to March 2017 rainfall forecast

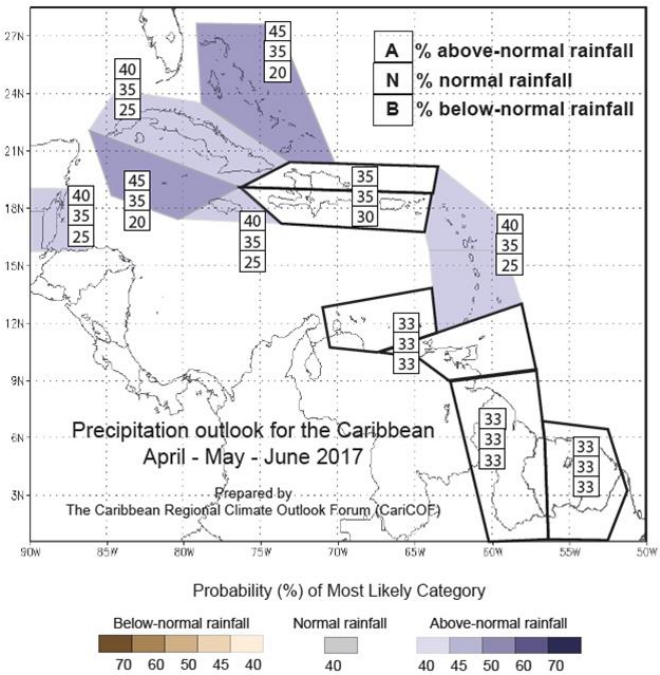

Figure 8 The April to June 2017 rainfall forecast

Recent past and emerging conditions will likely translate to concerns in the Cayman Islands (where there were record dry conditions in 2016, that are likely to intensify during the 2017 dry season), as well as Cuba, Belize, Jamaica, French Guiana, and the southern and northern islands of the eastern Caribbean chain.

Minimum temperatures (an indication of night time temperatures) are expected to be normal to above normal during January to June. However, there is greater uncertainty of what will happen with the maximum temperatures (an indication of day time temperatures) during January to March. On the other hand, for the April to June period, a decreasing likelihood for above normal temperature is emerging in the eastern Caribbean, particularly over the Leeward Islands.

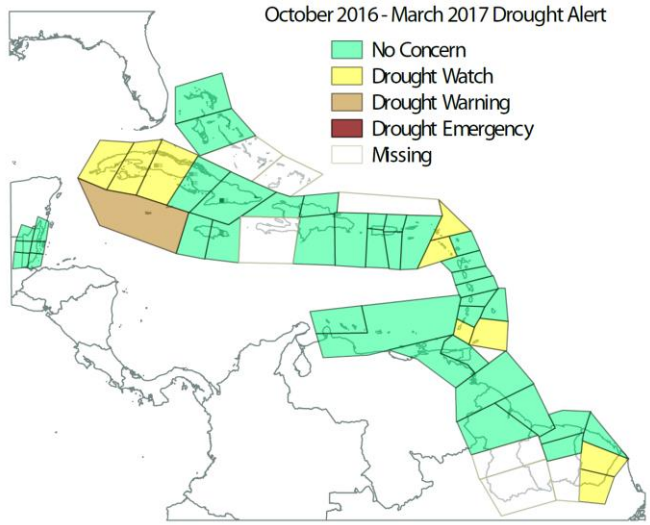

Figure 9 Drought Alert map (based on the SPI) for the end of March 2017, based on actual and forecasted rainfall for the period October 2016 to March 2017.

Forecast Implications for Agriculture

Most of the region, east of Cuba, received above average rainfall for November and December, with reports of flooding and landslides in some countries. Such activity is likely to diminish in the region as the heart of the dry season approaches. This is likely to translate to low available water for agriculture in the western Caribbean especially (particularly in parts of Cuba and Jamaica), that can impact significantly. Record-dry Cayman Islands would likely continue to experience significant rainfed agricultural declines, worsening into May. Conditions should also be monitored in the northern and southern islands of the eastern Caribbean chain, particularly where rainfed agriculture is practiced, or where irrigation

agriculture is satisfied from small water sources. By May, larger sources, including from groundwater could also be limited, particularly in the southern islands of the eastern Caribbean, and west central Cuba.

Concerns over high (particularly day time temperatures) are likely to be diminished between March to June in the eastern Caribbean, implying that possibility of heat stress in livestock, poultry and plants is lower than in recent times.

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