



ANNOUNCEMENTS

An above normal wet and hurricane season is expected for 2013. The degree of certainty is greater in the countries of the Greater Antilles. Temperatures are likely to be above normal across most of the Caribbean by up to 0.5 °C at least until September 2013, but this can be dampened by above normal rainfall. Effort have begun toward the validation of CAMI weather and climate related pests and diseases models. This began via an on-line training session for meteorologists (initially) on the software.

REGIONAL OVERVIEW ON WEATHER AND CLIMATE FOR JUNE 2013

A very dominant Bermuda/ Azores high pressure system generated mostly windy conditions throughout June as a number of weak, but relatively frequent tropical waves traversed the southern side of the ridge entering the region. The waves were often quickly followed by dense layers of Saharan Dust.

Conditions in the eastern Caribbean were predominantly normal to above normal. Trinidad, St. Lucia and Dominica were moderately wet; Tobago, Grenada, Barbados, St. Vincent, and Guyana normal; and Antigua abnormally wet. Jamaica ranged from moderately dry in the west to normal in the east, while Belize ranged from normal in the south to moderately wet in the north.

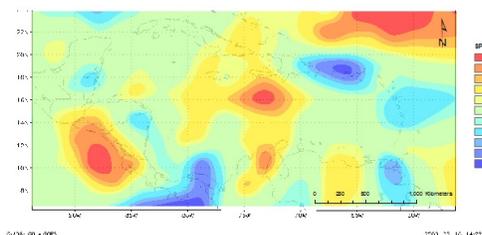


Figure 1. SPI for the Caribbean for June 2013. More information on the SPI can be viewed at <http://63.175.159.26/~cdpmn/spimonitor.html>.

The eastern Caribbean and Guyana were normal to above normal for the three month period. Trinidad, St. Lucia and Antigua were very wet; Tobago, Grenada and St. Vincent moderately dry; Barbados extremely wet; Dominica exceptionally wet; and Guyana ranging from moderately wet in the northwest to normal in the east. Jamaica, was predominantly normal. Belize was normal in the south and abnormally wet in the north. See Figure 2.

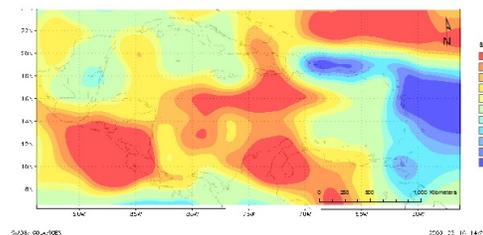


Figure 2. SPI for the Caribbean for April to June 2013. More information on the SPI can be viewed at <http://63.175.159.26/~cdpmn/spimonitor.html>

Temperatures in most of the region were normal to below normal, particularly near showers. Further south in the vicinity of Trinidad and Tobago and Guyana temperatures were slightly above normal.

NATIONAL OVERVIEWS

Antigua

Wet weather continues to prevail across the area. This is now the fourth month running with above

normal rainfall. The island average for June was 84.58 mm; this was the highest since 2010 for the given month (1928 – 2013). For the month, at the airport, there were 9 wet days (≥ 1 mm) and 2 heavy rainfall days, which were near normal. The wettest day, June 18, had 26.0 mm – 35% of the total for the month at the airport. Tropical waves were responsible for nearly all the rainfall for June. The mean temperature of 27.4°C was well below normal for the third month running. Meanwhile, the mean daily maximum temperature was well below normal – the lowest since 1986 – the fifth lowest on record. The minimum temperature was near normal.

The outlooks call for above normal rainfall and below normal temperature for July. Further, above normal rainfall and below normal temperature are projected for the period July to September (JAS). Based on the outlooks, conditions look relatively favourable for agricultural activities for the coming season; however, measures should be put in place to mitigate the impacts of potentially flooding rainfall. Based on the period 1995 – 2012, the probability of at least one named storm passing within 120 miles of Antigua during July is 5% as compared to normal of 3% (1981 – 2010).

Barbados

Tropical waves moved across the eastern Caribbean resulting in a generally even distribution of rainfall during the month. Thus, in spite of the windy and dusty conditions which prevailed, a total of 77.7mm of rainfall or 75% of the long-term average of 103mm (1981-2010) was recorded at the Grantley Adams Airport over a period of 14 rain days (days with rainfall ≥ 1 mm). Rain days were three more than the long-term average for June of 11 rain days. The cumulative rainfall total (January to June) at the end of June reached 420.6mm which was above the 30-year cumulative average of 391.6mm. Over at Golden Ridge, the June rainfall total reached 105.0mm over a period of 18 rain days.

Daily maximum temperatures at the Airport were generally cooler than the long-term averages as shown in the graph below. The highest maximum temperature recorded was 30.8°C on 14th and the lowest minimum was 23.0°C recorded on 30th. The average day-time air temperature was 28.4°C while average night-time air temperature was 26.5°C.

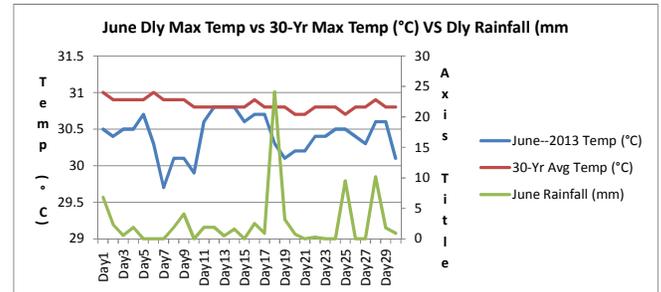


Figure 3. Temperature and rainfall at Grantley Adams, Barbados for June 2013.

Belize

Weather over central and northwest Belize during the weekend of 1st & 2nd was rainy due to the presence of the remnants of Tropical Storm (TS) Barbara. The weather continued to be cloudy and rainy during the first full week, initially due to a trough that eventually became TS Andrea, then later due to another surface trough with showers primarily over northern and western Belize.

Weather was fair until the morning of 11th when rainfall occurred over southern Belize in the early morning. Another bout of early morning showers and isolated thunderstorms occurred over southern Belize the following day, then over northern Belize later in the day. Generally good weather prevailed on 14th and 15th.

On 16th a wave, in combination with an upper level trough, caused cloudy weather with several outbreaks of showers and thunderstorms along the coast and over southern, central and coastal portions of the country. Early morning of 17th, high winds and isolated thunderstorms accompanied showers. The International Airport recorded wind gusts to 74.1km/hr. That same morning the National Hurricane Center began issuing bulletins on Tropical Depression #2. The centre of the depression crossed Belize during the afternoon, but did not strengthen. Incessant rainfall continued across much of the country during the following day with the National Emergency and Management Organization gathering reports of flooding in the Stann Creek district. Rainfall amounts from 17th an 18th morning ranged between 141-172mm in the Stann Creek district as well as portions of southwest Belize. Rainfall decreased somewhat over the next two days, but

showery outbreaks continued within an unstable environment. Surface winds remained very gusty and warranted the issuing of a small craft warning for coastal waters. River levels rose in the north of the country for the Rio Hondo and New Rivers. However, at the Macal River in the west, river levels remained below normal. The Mopan River was above normal. The Belize River at Double Run was approaching its banks. During 21st, the showers occurred mainly inland, but late that night, a mass of showers and thunderstorms invaded southern and coastal Belize from the Gulf of Honduras. The showers affected much of the Toledo district and portions of the Stann Creek district. By midday, skies cleared up for much of the country.

During 24th an upper level trough with showers and thunderstorms eventually crossed southern and coastal Belize. Weather conditions the next morning started out cloudy with several showers and thunderstorms over central and coastal Belize. The showers dissipated during the afternoon, but by late evening showers and thunderstorms developed over central and inland Belize before gradually dissipating. Apart from early morning showers over southern Belize for several mornings, the weather for the country continued mainly well to the end of the month.

Table 1 Rainfall and Temperature Summary for June 2013 for stations in Belize

Station	Liber tad	Zoo	PGIA	Belmopan	Central Farm	Savannah
Elevation (m)	12	30	5	90	90	13
Rainfall (mm)	150	156	369	246	275.3	306
Mean.	222	274	243	289	186	307
Max	45.2	34.2	161.8	105.1	66.4	117
Rain days	13	11	13	12	16	16
Temp (°C)						
Mean Min.	23.9	24.2	25.6	24.0	23.5	24.6
Mean	23.7	23.4	25.0	23.0	22.9	24.6
Lowest Min.	20.6	23.0	22.7	21.9	21.2	22.0
Mean Max.	34.1	32.7	31.2	32.1	32.6	32.4
Mean	33.1	32.6	31.5	32.5	33.0	32.6
Highest Max.	36.5	34.5	33.2	34.9	35.0	34.7

Dominica

The Canefield Airport has seen yet another wet month. Rainfall total of 314.7mm was collected and

this total is 97% above its average. That's the second highest on record from 1982. The highest daily total of 70.6mm was recorded on the 29th. A record breaking of 25 wet days were recorded which is 9 days above normal. There was no significant dry spell. The average air temperature of 28.3°C is 0.8°C below normal. The maximum temperature recorded was 32.5°C on the 24th and 27th with the minimum of 22.0°C being recorded on the 8th. The wind dominated an east south easterly (120°) direction with an average speed of 9km/h. The highest wind gust recorded was 61km/h on the 16th.

Rainfall recorded at Melville Hall was amazingly exactly on average. A total of 191.0mm was collected. The highest daily total was 36.1mm and was recorded on the 3rd. There were 21 wet days which is just 3 days above normal. There was no significant dry spell. The average air temperature was 28.1°C which is 0.4°C below the mean. The maximum temperature recorded was 31.0°C on the 28th and the minimum of 23.3°C was recorded on the 8th. The dominant winds were from the east south east at an average speed of 15km/h. The highest wind gust for the month was 72km/h and was recorded on the 13th.

During the month, vegetable establishment were affected by the heavy rainfall. There were rotting of mature crops such as cabbages and the washing away of seedlings. There was an increase incidence of pest and disease problems in open field vegetables and greenhouse production which caused a decline in production. Tomato was the crop that was mostly affected by the most devastating of diseases, Bacterial Blight. This situation is being addressed by research activity and staff training and development. A humidity chamber is being constructed for grafting tomato seedlings and plants. The Greenhouse survey to determine the main cause of abandonment is concluding. There was an increase incidence of the Black Sigatoka Disease. Weeds/grass species were a major problem as the weather favoured their growth. Livestock that forage have an abundance of grass for feeding. There was a decline in the symptoms of the Dasheen Mosaic Virus. The major crop establishment that took place for the month was root crops.

Grenada

The two highest rainfall days of the month, the 28th and the 25th produced 22.6mm and 14.7mm respectively. These were as a result of the passage of tropical waves. There were two other days, the 15th and 29th which saw over 10mm of rainfall. Conversely there were eight (8) rain-free days. The month's total was 120.6mm.

The diurnal temperature range was fairly constant with an average maximum of 29.0°C. The highest recorded maximum occurred on the 28th of 31.1°C (which was the only max. temperature over 31°C for the month). The lowest minimum temperature, 22.5°C, was recorded on the 26th.

Strong trades crossed our region during the month. The Meteorological Office. was forced to issue Marine Advisories on two occasions, from the 12th to 16th and on the 30th as above normal surfs affected our coastlines.

With the conditions experienced, quite a number of crops flourished. Most noticeably were mangoes and chenips. Watermelons, avocados & damsels together with sweet potatoes and leafy vegetables all continue to have good numbers.

In the fishing industry long liners continued with their good fortune. The stock for the local market was over abundant forcing local agents to cut prices by more than 50%.

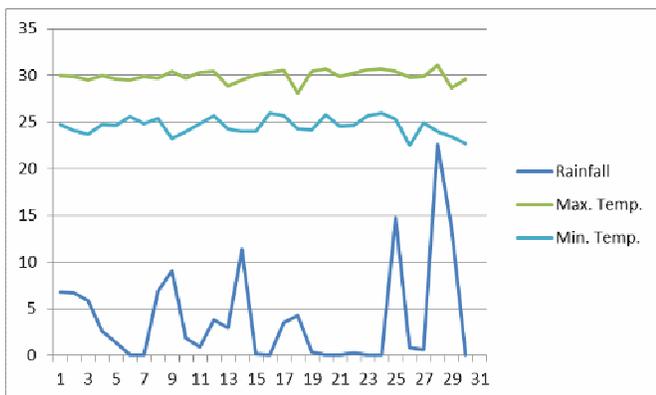


Figure 4 Daily maximum and minimum temperature, and rainfall for June at Maurice Bishop Airport, Grenada.

Guyana

Based on the rainfall data collected from the ten (10) administrative Regions, Guyana had an average of

273.4mm of rainfall with an average of 16 rainfall days. The average rainfall for June is 321.3mm with 20 rainfall days. Rainfall values recorded for June implied that Guyana was partially below its normal Climatological average. St Denny Mission in Region 2 recorded the highest monthly rainfall with 679.8mm. The highest one day rainfall total was also recorded at St.Denny Mission with 225.0mm on the 10th. A total of twelve rainfall stations across Guyana recorded rainfall values above their averages, while thirty one rainfall stations recorded below average.

June was warmer than normal, average Maximum temperature for the Month was 31.2°C when compared to the average of 29.8°C. Lethem (in Region 9) recorded the highest average monthly Maximum temperature of 32.4°C, and on the 23rd reported the highest one day maximum temperature of 34.0°C.

Jamaica

Although the island observed no major rainfall events during the month, a significant increase in the number of tropical waves that affected the island's weather was observed during the month.

Sangster International airport (Sangster) in the northwest recorded about 41% of its monthly average while Norman Manley International airport (Norman Manley) in the southeast received 29 % of its 30 year mean rainfall.

During the month, Sangster recorded 41.7 mm of rainfall, while Norman Manley recorded 18.8 mm. There were four rainfall days reported for Sangster and Norman Manley respectively during the month.

Table 2 Climatological Statistics for Manley and Sangster Airports for June 2013

Monthly Averages	Norman Manley	Sangster
Extreme Maximum Temperature	34.5 °C (34.3 °C)	35.5 °C (34.4 °C)
Lowest Minimum Temperature	23.3 °C (23.5 °C)	22.8 °C (22.5 °C)
Rainfall Total	18.8 mm (65.0)	41.7 mm (102.0)
Rainfall days (≥1mm)	4 days (5.6)	4 days (13.2)

Values in red indicate the 1992-2010(19-year) averages.

The highest maximum temperature recorded for Sangster Airport was 35.5°C (6th), while 34.5°C (18th) was reported for Norman Manley Airport.

St Lucia

Rainfall in Saint Lucia for June exceeded the long term mean. Both Hewanorra and George Charles recorded rainfall figures well above the long term means with 118.5 mm and 154.5 mm respectively. Hewanorra recorded 20 rainy days while George Charles recorded 24.

July is usually a month of high rainfall and humidity in Saint Lucia with mean rainfall amounts of 152.3 mm at Hewanorra and 197.9 mm at George Charles. Heavy rainfall events associated with the passage of tropical waves and cyclones across the island are common in July. The seasonal precipitation outlook for the July, August and September period indicate the likelihood for rainfall to be in the above normal category or to range from 536 mm to 1025 mm in Vieux-Fort and from 711 mm to 939 mm in Castries. Farmers should ensure adequate drainage and proper field sanitation practices to avoid outbreaks of pests and diseases associated with excess soil moisture and high humidity. They should also liaise with the national Services to decide on the best times for the application of pesticides and fertilizer.

Table 3 June 2013 monthly averages at Hewanorra Airport

AVERAGE MONTHLY DATA FOR HEWANORRA					
Cloud Cover (oktas)	Wind Dir (o from N)	Wind Speed (kt)	Air Temp. (°C)	RH (%)	Rainfall (mm)
6	90	16	28.0	79	181.7
Max Temp (°C)	Min Temp (°C)	Daily Sunshine (Hrs)	Daily Evap (mm)	Soil 20 (°C)	
30.4	25.4	7.5	7.3	28.9	

Table 4 June 2013 monthly averages at George Charles Airport

AVERAGE MONTHLY DATA FOR HEWANORRA					
Cloud Cover (oktas)	Wind Dir (o from N)	Wind Speed (kt)	Air Temp. (°C)	RH (%)	Rainfall (mm)
6	100	09	28.0	78	197.9
Max Temp (°C)	Min Temp (°C)	Daily Sunshine (Hrs)	Daily Evap (mm)	Soil 20 (°C)	
30.2	24.7				

St Vincent and the Grenadines

Tropical waves moved in and out of our area as expected at this time of year. On one such occasion, 25th, St. Vincent and the Grenadines (SVG) experienced moderate to heavy showers and thunderstorm activity. Lightning strikes in St. Andrew’s mountain area damaged equipment for three radio stations.

Hazy conditions fluctuated in intensity reducing visibility as Sahara dust layers moved across the islands. Sea-swells were light to moderate in open waters, with above normal sea swells agitated by strong breezes

Total rainfall for June 2013, at E.T. Joshua Airport-Arnos Vale was 228.7 mm; 26.1 mm above the average for June (using 1981-2010). Rain-days (18) were just one day below average; with the highest daily rainfall (47.4 mm) being recorded on the 25th. There were three days with rainfall totals more than 25. There were five consecutive days with rainfall <1mm (19th to 23rd).

As far as distribution is concerned, the first dekad (ten-day period) had ~22%, the second dekad had 31%, and the third dekad had 47% of the month’s total rainfall



Figure 5 Maximum temperature and rainfall for E. T. Joshua, St. Vincent and the Grenadines.

The average maximum temperature was 30.4°C, and the average minimum temperature was 25.1°C. The extreme maximum temperature recorded was 0.2 lower than the 30 year average (31.5 °C), while the extreme minimum temperature was the 0.5 higher than the 30 year average of 23.1°C.

The mean relative humidity was 1.9% lower than the 30 year average 77.4%.

Trinidad and Tobago

The month was generally wet for Trinidad with rainfall occurrences deemed mostly moderate but frequent, since only six (6) days with immeasurable rainfall were reported at the Piarco. At Crown Point in Tobago on the other hand, the month was mixed, with as much as twelve (12) dry days with immeasurable rainfall. The total rainfall recorded at Piarco for the month was 245.5 mm or near-average rainfall relative to 1971-2000 average (246.0 mm). This consisted of 9 wet days (days when the 24 hour rainfall exceeded 10.0 mm) and 4 extremely wet days (days when the 24 hour rainfall exceeded 25.0 mm) with the wettest day (46.7 mm) occurring on 2nd. At Crown Point, the total rainfall for the month was 134.2 mm (86% relative to the 1971-2000 average-156.8 mm). Of this total, there were six (6) wet days and one (1) extremely wet day which was also the wettest day (27.4 mm) and occurred on 3rd.

Even though Trinidad was mostly wet, the mean daily (27.5°C), mean maximum (32.0°C) and mean minimum (24.5°C) temperatures were above the average expected by 1.1°C, 1.4°C and 1.2 °C respectively. Under drier conditions in Tobago, temperatures were generally par with mean daily (26.9°C), mean maximum (30.7°C) and mean minimum (24.1°C) temperatures being 0.4°C less than, 0.1°C more than and 0.1 °C less than average respectively. Across both islands, average daily relative humidity (RH) were below the expected range. Daily mean RH of 80% (74%), mean maximum RH of 94% (88%) and mean minimum RH of 60% (67) compared to expected averages of 84% (79%) , 96% (91%) and 65%(68%) respectively were recorded at Piarco (Crown Point).

These conditions generally favoured agriculture activities as evapo-transpiration rates would have been relatively low, more so for Trinidad than Tobago, and would have reduced the need for irrigation. The rainfall pattern in Trinidad in particular, would have enhanced soil moisture content and to some degree reduce soil temperatures. On the other hand, these warm and wet conditions would have favoured agriculture pest proliferation and therefore increased the need for spraying. The outlook for July to September calls for a continuation of warmer than normal temperatures

and near normal to above normal rainfall for Trinidad and Tobago.

REGIONAL OVERVIEW ON SEASONAL CLIMATE FORECAST

Rainfall during July-August-September shows a tendency (45% probability) to above normal across all of the Antilles north of 15°N. This inference can be made with relatively high confidence, given a convergence of most models to showing such trend. Other areas where normal to above normal rainfall is the predominant trend (in decreasing order of confidence) are the Guianas, the southern Antilles and Belize. By comparison, models are diverging with respect to expected rainfall in the Bahamas, but a narrow majority favour normal to below normal.

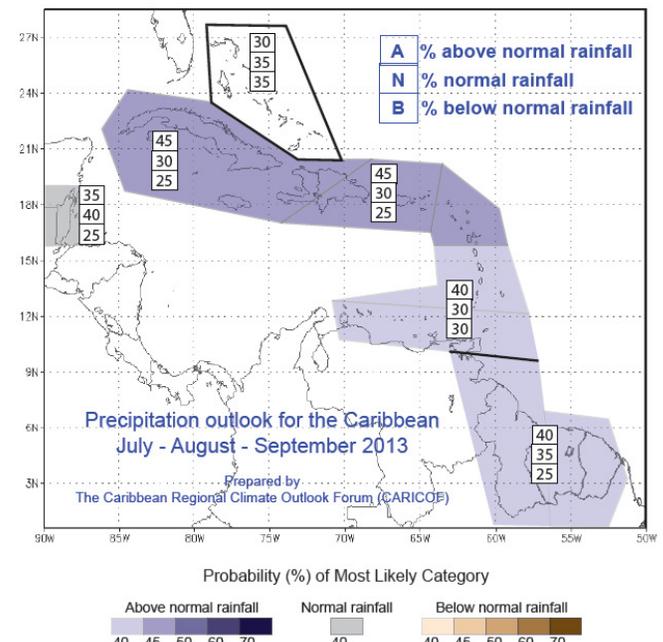


Figure 6 The July to September 2013 Rainfall Forecast

As the Antilles and Belize are in the wet season which coincides with the hurricane season, rainfall is mostly convective in origin, i.e. falling from storm clouds, whether or not inbedded in tropical cyclones. Two factors contribute to an above normal rainfall outlook for the Antilles:

1. Well above average North Atlantic tropical sea surface temperatures (SSTs), providing more heat and moisture - the primary fuel source for storms and cyclones. The anomaly is expected to decrease

towards the end of the period (with September rainfall more likely normal).

2. Trade winds over the Atlantic Ocean are expected to be weaker than average. This allows storms to grow taller and more potent due to reduced vertical wind shear

Currently, the tropical North Atlantic and Caribbean Sea show SSTs of about 0.5-1°C above average. Such conditions are expected to last into August. Consequently, more evaporation than usual may be expected, promoting rainfall across the Antilles. However at odds with global models, the expected normal to wet conditions in the Antilles may keep air temperatures relatively mild rather than hot.

ENSO Conditions

Eastern Pacific equatorial SST anomalies have recently hovered just below average (i.e. deviation of 0°C to -0.5°C). A majority of models maintains fairly small anomalies (i.e. close to 0°C) in the coming months. Little impact is expected on Caribbean temperatures and rainfall from ENSO.

NAO and Atlantic Subtropical High conditions. Though there are indications that NAO returns to a negative phase, this prediction is not very confident. Nevertheless, a weaker and/or more northerly Subtropical (Bermuda/Azores) High should reduce trade wind speed. This will help sustain above average Atlantic SSTs and reduce vertical shearing of storms, thus enhancing the probability of strong disturbances and tropical cyclones as well as rain.

Six month outlook

As in any long-lead forecast, there is considerable uncertainty as to the development of rainfall activity beyond September. In fact, present analyses suggest that there is just about equal chance of rainfall in either category (above, below or normal) for the period October to December. We will see if the outlook becomes clearer by the next bulletin.

In conclusion, air temperatures are very likely to become or remain above normal for most of the Caribbean during this six month period. Above normal temperatures may well be dampened by above normal rainfall.

Prepared by

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