



ANNOUNCEMENTS

During July, there was a major influence from dry Saharan air affecting convection and rainfall and tropical cyclone development. However the hurricane season continues to be forecasted to be above normal. Temperatures are likely to be normal to above normal across most of the Caribbean by up to 0.5 °C at least until October 2013. During the coming month, Saint Lucia will be issuing its first national Agrometeorological Bulletin to support its farmers.

REGIONAL OVERVIEW ON WEATHER AND CLIMATE FOR JULY 2013

During July, there was a major influence from dry Saharan air that kept much of the Caribbean rainfall below what was expected. Conditions in the southern portion of the eastern Caribbean were predominantly dry, while they were mixed in the remainder. Trinidad and Antigua were abnormally dry; Tobago severely dry; Grenada extremely dry; Barbados moderately dry; St Vincent exceptionally dry; St Lucia normal; and Dominica abnormally wet. Conditions in Guyana ranged from normal in the north to extremely wet in the east. Jamaica was normal in the west to moderately wet in the east. Belize ranged from moderately dry in the south and west to abnormally wet in the north.

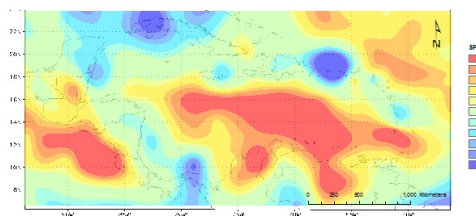


Figure 1. SPI for the Caribbean for July 2013. More information on the SPI can be viewed at <http://63.175.159.26/~cdpmn/spimonitor.html>.

Most annual cropping takes place over a period of about three months. In the three month period May

to July, apart from Grenada and Tobago that were abnormally dry, the eastern Caribbean and Guyana were normal to above normal. Trinidad was abnormally wet; Barbados, St. Vincent and St. Lucia normal; Dominica and Antigua moderately wet; and Guyana abnormal to moderately wet. Jamaica ranged from moderately dry in the west to abnormally wet in the east. Southern Belize was normal to abnormally dry while the north was abnormal to moderately wet. See Figure 2.

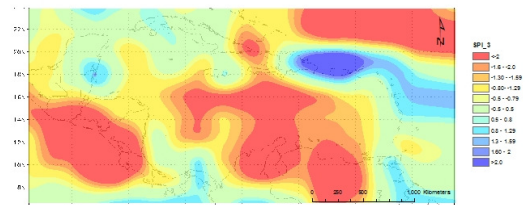


Figure 2. SPI for the Caribbean for May to July 2013. More information on the SPI can be viewed at <http://63.175.159.26/~cdpmn/spimonitor.html>

Temperatures in most of the region were above average, with relative humidities below average.

NATIONAL OVERVIEWS

Antigua

Fairly dry weather prevailed across the area during July. This is the first month with below normal rainfall since March. The projections was for this month to have above normal rainfall also; however,

the Saharan Air Layer seems to have been one of the main causes to inhibit rainfall, resulting in the below normal total. The island average for July was 61.2 mm; the lowest since 2008. For the month, at the airport, there were no heavy rainfall day, the first since 2003; meanwhile, the total of 10 wet days (≥ 1 mm) was near normal. The wettest day, July 13, only had 7.2 mm. During the passage of Tropical Storm Chantal, a water spout came ashore and caused hundreds of thousands of dollars in damage. The mean temperature of 27.7°C was well below normal and the second lowest since 2004. The mean daily maximum temperature was well below normal – the second lowest since 2004, while the minimum temperature was near normal.

The outlooks call for above normal rainfall and below normal temperature for August. Meanwhile, there is no clear signal for the seasonal outlook of rainfall and temperature (August to October). Based on the period 1995 – 2012, the probability of at least one named storm passing within 120 miles of Antigua during August is 32% as compared to the normal of 18% (1981 – 2010).

Barbados

The eastern tropical Atlantic was dominated by strong surface to low-level easterly winds and an abundance of Saharan dust and dry air, which inhibited the development of tropical waves. Nevertheless, two of these waves achieved tropical storm status (T.S.), namely Chantal and Dorian, which developed in the Atlantic Basin during the month.

The center of T.S Chantal passed just about 45 miles to the north of Barbados between 6:00 and 7:00 am on 9th. This system contributed some 47.3mm of rainfall to the final total of 61.8mm. T.S Dorian on the other hand, passed well to the north of the island chain on 28th and had little or no impact on rainfall levels in Barbados. As a result, the July rainfall total at Grantley Adams Airport was just 46% of the long-term (1981-2010) average. The total of 9 rain days (days with rainfall ≥ 1 mm) was also below the July average of 15 rain days. The cumulative total rainfall of 482.4 mm at the end of July (January to July) was also 10% shy of the cumulative average of 526.5mm.

During the first 10 days of the month maximum temperatures ranged between 30.1°C and 30.9°C. During the remainder of the month, these temperatures ranged between 31.0° and 31.4°C (the July long-term average is 30.7°C). The highest maximum recorded was 32.4°C on 23rd while the lowest minimum of 23.8°C was recorded on 3rd. The average day-time air temperature was 28.8° C while the average night-time air temperature was 26.7°C.

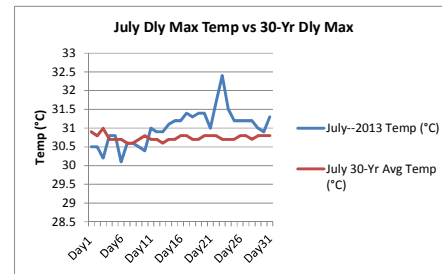


Figure 3. Temperature and rainfall at Grantley Adams, Barbados for July 2013.

Belize

The month started with cloudy skies and a few showers over southern coastal areas, but by the end of the day it was cloudy, as coastal showers headed inland. A few thunderstorms also developed inland before mid-morning of 1st. Weather conditions worsened the following day (2nd) as widespread showers and thunderstorms developed over southern coastal Belize before spreading to the rest of the country. The intense activity continued into 4th. The International Airport recorded 88.2mm followed by Middlesex with 79mm. During the 5th skies cleared up considerably and a gusty and stable southeasterly surface flow asserted dominance on the weather. The weather for the weekend (6th and 7th) turned out pleasant as the windy and dry southeasterly prevailed.

Showers and thunderstorms developed in the south late on the 8th and persisted into 9th morning. Later on 9th showers and thunderstorms developed over the Cayo district. A tropical wave reached the Yucatan Peninsula and Belize around midday on 9th. Intense showers and thunderstorms accompanied the wave's passage across the country early 10th morning, and skies being kept cloudy with showers

occurring over most parts of the country. Showers and thunderstorms, which developed in the south early 11th morning, spread northward along central and coastal areas later. Weather conditions improved for 12th as much of the country experienced hours of sunshine for the first time during the week. However, the fractured remains of Chantal approached Belize as a tropical wave on 13th resulting in another bout of showers and thunderstorms.

During the following week, generally good weather prevailed. A weak tropical wave, which approached the coast of Honduras and Nicaragua during 19th, started to produce coastal showers. The showers and thunderstorms increased during the evening along northern coastal Belize. Some showers also occurred over central Belize later in the night. Cloudy and rainy weather associated with the tropical wave prevailed during the following day. However, on 21st, weather conditions improved drastically as a drier southeasterly flow prevailed.

During the 22nd several showers occurred along the coast as the surface flow was a moist easterly. For the following days, weather conditions turned out generally good. In the south, however, showers continued to develop during the early morning. After 23rd the moisture content at low levels of the atmosphere waned steadily. Dry air encroaching westward from the Central Caribbean ensured generally warm and dry weather to the final weekend in July.

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

Station	Liber tad	Zoo	PGIA	Belmopan	Central Farm	Savannah
Elevation (m)	12	30	5	90	90	13
Rainfall (mm)	284	194	292	198	110	256
Mean.	150	200	221	274	223	324
Max	112	58.8	89.1	41.7	44.7	47.2
Rain days	13	15	16	16	11	18
Temp (°C)						
Mean Min.	23.9	23.5	25.4	23.3	23.3	24.4
Mean	23.3	23.1	24.7	22.4	22.4	24.3
Lowest Min.	20.8	22.0	21.6	17.0	21.5	22.0
Mean Max.	33.8	31.9	30.9	32.1	32.8	31.9
Mean	32.9	32.7	31.2	31.8	32.0	31.1
Highest Max.	36.2	33.2	32.4	34.3	36.0	32.8

Dominica

The center of T.S. Chantal, the first storm for the season to affect the island, passed some 70 miles to the south on the 9th. Chantal along with tropical waves generated most of the rainfall amounts. Additionally, unstable conditions on the 7th generated the month's highest rainfall total at both the Melville Hall and Canefield Airports.

The rainfall total at Canefield was near normal this month. A total of 244.0mm was recorded and this is just 3% below its average. The highest daily total of 42.4mm was recorded on the 7th. Seventeen (17) wet days were recorded, which is below the average. There was no significant dry spell. The average air temperature was 28.5°C and this is 0.4°C below average. The highest temperature recorded was 34.1°C on the 30th. This is the 3rd highest recorded since 1988. The lowest temperature recorded was 22.5° on the 28th. Wind directions were from the south-south-east at an average speed of 9km/hr. Tropical storm Chantal produced the month's highest wind gust of 80km/hr on the 9th.

Rainfall total at Melville Hall was above average. A total of 262.8mm was recorded and this is 11% above its average. The highest daily total of 62.3mm was recorded on the 7th. There were 20 wet days, which is 2 days below average. There was no significant dry spell. The average air temperature was 28.6°C which is about average for July. The highest temperature recorded was 32.0°C on the 30th and the lowest recorded was 22.8° on the 9th. The winds was from the east-south-east at an average of 15km/hr. Again, tropical storm Chantal produced the month's highest wind gust of 76km/hr on the 9th.

Grenada

During the first week and a half of July, the Bermuda/Azores High was strong, supplying the Eastern Caribbean with fresh to strong trade winds. Such trades helped to keep conditions generally fair.

A mid-level anticyclone that caused subsidence along with the Saharan Air layer reduced rainfall. As a result, the rainfall for the month as recorded at the Meteorological Office at the Maurice Bishop International Airport, was a mere 48mm making it the driest July on record. There were sixteen (16) days either of insignificant or no rainfall, including a

five day period from the 10th to 14th with only a trace recorded.

The highest temperature recorded was 31.6°C while the lowest was experienced on the 2nd with 23.2°C. Of interest is that there were four nights when the minimum temperature was above 26°C – very warm nights.

Of the two tropical cyclones that formed during the month, Chantal posed no threat to Grenada and its dependencies as it crossed the islands of the Eastern Caribbean and the second, Dorian was also of no threat to Grenada or its dependencies.

Marine advisories were twice issued by the local Met. Office. First on the 8th and 9th for the passage of T.S. Chantal and on the 19th & 20th as a tight pressure gradient developed over the Atlantic and Caribbean producing brisk winds, which in turn resulted in abnormal surfs.

The low rainfall affected the quality and quantity of crops such as watermelon and pumpkins while the corn crop is having a disastrous season. There was also a significant reduction in the quantity of mangoes and wax apples but this might be more a seasonal variation than climatic.

The fisheries sector held its own with regular turnover of stock. One retailer had to sell Tuna, Kingfish and other species at very low prices in order to get rid of old stock. There was an abundance of “small jacks” (*Secrurmenonophpamus*) at all major fishing centers.

Guyana

Based on rainfall data collected from the ten (10) Administrative Regions, Guyana had an average of 280.4mm of rainfall with an average of 17 rainfall days. July averages 269.4mm with 18 rainfall days, suggesting that rainfall was slightly above average. Kaietuer in Region 8 recorded the highest rainfall with 646.0mm. The highest one day rainfall total was recorded at Capoey Lake in Region 2 with a total of 120.1mm on 13th. A total of twenty six rainfall stations across Guyana recorded rainfall above their averages, while fourteen rainfall stations recorded below.

July was warmer than average, with maximum temperature for the month being 30.6°C when compared to the average of 29.5°C. Lethem (Region 9) recorded the highest average monthly Maximum temperature of 31.5°C; Lethem on the 1st reported the highest one day maximum temperature with 33.0°C.

Jamaica

Throughout the month the island was impacted by a combination of surface troughs, tropical waves and high pressure ridges. The troughs and tropical waves which affected the island resulted in increased levels of rainfall activity across sections of the island. Sangster International airport (Sangster) in the northwest recorded 70% of its 30 year monthly mean while Norman Manley International airport (Norman Manley) in the southeast received 179% above its 30 year mean rainfall. During the month, Sangster recorded 36.3 mm of rainfall, while Norman Manley recorded 83.6 mm. There were five rainfall days reported for Sangster, while Norman Manley had four rainfall days during the month.

Sangster Airport recorded 34.3°C (24th), while 35.3°C (10th) was reported for Norman Manley Airport, which exceeds the 20 year mean on record for that station.

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

Monthly Averages	Norman Manley	Sangster
Extreme Maximum Temperature	35.3 °C (34.7 °C)	34.3 °C (34.6 °C)
Lowest Minimum Temperature	20.6 °C (23.8 °C)	23.4 °C (22.4 °C)
Rainfall Total	83.6 mm (30.0)	36.3 mm (52.0)
Rainfall days (≥1mm)	4 days (5.4)	5 days (12.1)

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

St Lucia

Saint Lucia recorded below average rainfall for July this year. Both Hewanorra and George Charles recorded rainfall figures below the long term means of 151.8 mm and 196.7 mm respectively. Hewanorra recorded 14 rainy days while George Charles recorded 16. The centre of T.S. Chantal passed Saint

Lucia on the morning of July 9, and although Saint Lucia was placed under a tropical storm warning, the impact of the system on the island’s agricultural industry was minimal.

The seasonal precipitation outlook for the August to October period indicate likelihood for rainfall to be in the normal to above normal categories or to range from 514 mm to 1179 mm in Vieux-Fort and from 613 mm to 1195 mm in Castries. Most of the rains are produced by migratory tropical systems (tropical waves, tropical cyclones, etc.) and upper level weather systems.

Saint Lucia will be issuing its first monthly national Agrometeorological bulletin this month and it is expected that subsequent bulletins will be issued during the first week of each month.

Table 3 July 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)
4	90	14	28.3	78	130.6
Max Temp (°C)	Min Temp (°C)	Daily Sunshine (Hrs)	Daily Evap (mm)	Soil 20 (°C)	
30.9	25.9	10.0	8.0	29.4	

Table 4 July 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)
4	90	08	28.4	77	142.4
Max Temp (°C)	Min Temp (°C)	Daily Sunshine (Hrs)	Daily Evap (mm)	Soil 20 (°C)	
30.7	24.9				

St Vincent and the Grenadines

On 9th July, tropical storm Chantal passed North of St. Vincent and the Grenadines (SVG), bringing pockets of light to moderate showers with rumblings of thunder on a few occasions. Tropical waves and trough systems also moved in and out of our area, generating unstable conditions across the islands.

Winds gusted to near 61.1 km/hr at the E.T. Joshua Airport on the 18th July. Occasionally, Saharan dust haze reduced visibility across the islands. Sea-swells

were moderate to occasionally rough in open waters, with above normal sea swells agitated by strong breezes, resulting in high-surf and small-craft advisories and warnings being issued.

Total rainfall for July 2013, at E.T. Joshua Airport-Arnos Vale was 93.8 mm; 136 mm less than the average for July (using 1981-2010 at the E.T. Joshua Airport). Rain-days (16) were 5 days below average; with the highest daily rainfall (20.0 mm) being recorded on the 9th. There were five consecutive days with rainfall <1mm (22nd to 26th). Rainfall distribution showed the first dekad (ten-day period) had ~52%, the second dekad 22%, and the third dekad 26% of total rainfall for the month.

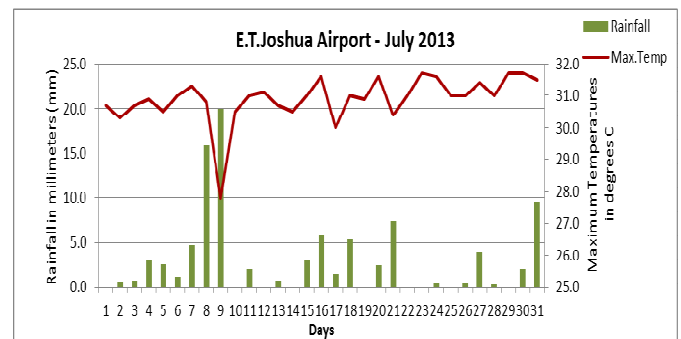


Figure 4 Maximum temperature and rainfall for E. T. Joshua, St. Vincent and the Grenadines.

The average maximum temperature was 30.9°C, and the average minimum temperature was 25.6°C. The extreme maximum temperature recorded was 0.2 °C higher than the 30 year average of 31.5 °C, while the extreme minimum temperature was the 1.1 higher than the 30 year average of 23.0°C. The mean relative humidity was 0.8% lower than the 30 year average of 78.3%.

Trinidad and Tobago

With the onset of the wet season occurring in late May, Trinidad and Tobago returned to a dry state during the month of July resulting in an abundance of sunshine. At the Piarco climatological reference station in Trinidad, 131.0 mm of rainfall or 49% of the average (1961-1990) was recorded, making it the 3rd driest July on record since 1946. The ANR Robinson Airport climatological reference station in Tobago experienced even drier conditions with only 52.3 mm of rainfall or 30.9% of the average (1971-2000). July 2013 was the driest on record since 1968. During the month, the Piarco Station experienced 17

Dry-days (a day with less than 1 mm rainfall), and 14 Rain-days (a day with 1.0 mm or more rainfall). Five (5) of the Rain-days were considered as Wet-days (a day with 10.0 mm or more rainfall) with the wettest day (26.3 mm) occurring on 26th. At the ANR Robinson Airport station, there were 24 Dry-days and 7 Rain-days with the sole Wet-day (July 2nd) being the wettest day (25.4mm) of the month.

Corresponding with the dry conditions was warmer than normal temperatures. At Piarco for instance, the mean temperature for the month was 27.8°C or 1.6°C warmer than expected. This was accompanied by a mean maximum temperature of 32.4 °C (1.6 °C above average), while the mean minimum temperature observed was 24.0°C (1.0°C warmer than average). Similar conditions occurred at ANR Robinson, with a mean temperature of 27.6°C (0.6°C warmer than average), mean maximum temperature of 31.6°C (1.4 °C above average) and mean minimum temperature of 24.3°C (0.5°C warmer than average) were reported. In total, Piarco reported 274.3 hours of sunshine for the month compared with the normal (1961-1990) of 205.9 hours; while ANR reported 293.9 hours compared with the long term average (1971-1990) of 236.4 hours. In the presence of these drier conditions, relative humidity (RH) during the month attained a maximum and minimum of 93 and 58 % respectively at Piarco; whereas, at ANR it was 86 and 61% respectively. The foregoing conditions would have reduced soil moisture content, increase soil temperatures and caused varying levels of dryness resulting in related stress on crops, pastures and livestock. The outlook for August is for near normal rainfall for both islands.

REGIONAL OVERVIEW ON SEASONAL CLIMATE FORECAST

August to October 2013

Rainfall during August to October shows a tendency to above normal across most of the Antilles. It is further suggested that preparations be made for normal to above normal across the Caribbean for this period.

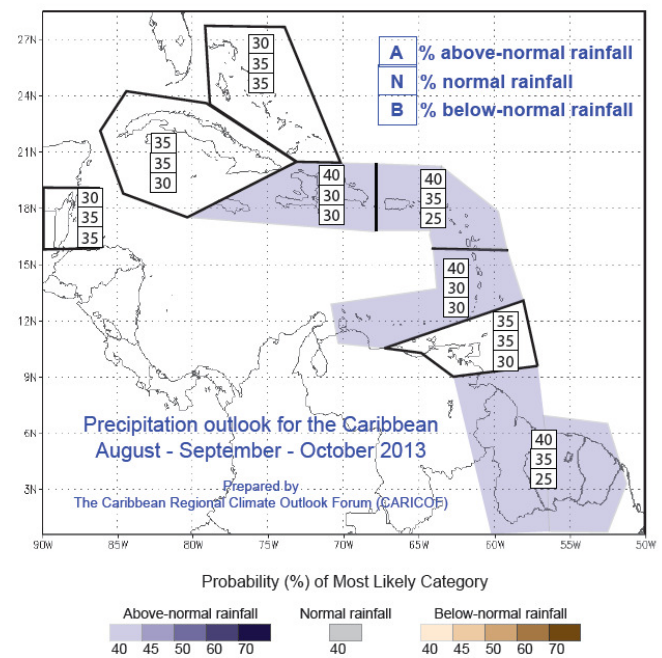


Figure 5 The August to October 2013 Rainfall Forecast

Two factors contribute to an above normal rainfall outlook for the Antilles:

1. Above average North Atlantic tropical sea surface temperatures (SSTs – 0.5 to 1.0 °C warmer), providing more heat and moisture - the primary fuel source for storms and cyclones. This should certainly last until the end of August.
2. Trade winds over the Atlantic Ocean are stronger than average, but expected to weaken during August. Weaker than average trade winds allow storms to grow taller and more potent due to reduced vertical wind shear

Temperatures are expected to be normal to above normal for this period.

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.

November 2013 to January 2014

As in any long-lead forecast, there is considerable uncertainty as to the development of rainfall activity beyond October. Currently, for the period November 2013 to January 2014, climate signal exist only for the southern Caribbean (from St. Lucia

southward to Grenada of normal to below normal rainfall), Trinidad and Tobago normal to above normal rainfall, Guyana with a higher than normal chance for above normal, and Belize with higher than normal chance for below normal.

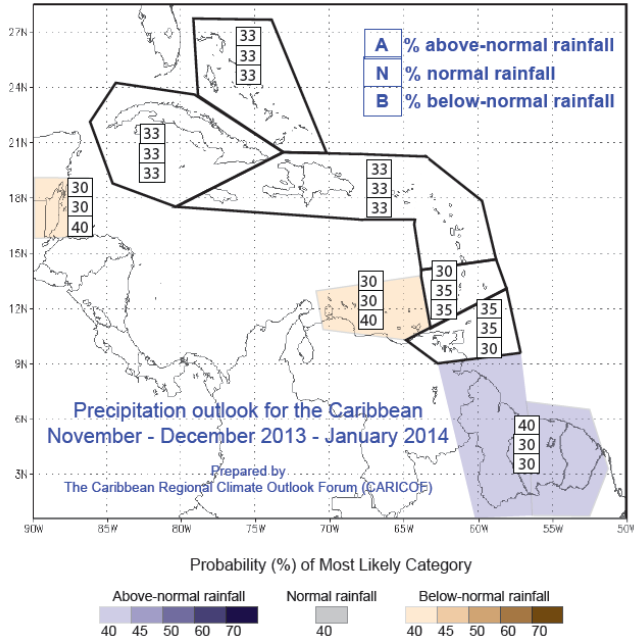


Figure 6 The November 2013 to January 2014 Rainfall Forecast

Air temperatures are very likely to be normal to above normal for most of the Caribbean, except for in the furthest northwest portion around Cuba and The Bahamas during the period November to January 2014.

Prepared by

Caribbean Institute for Meteorology and Hydrology (CIMH) and the National Meteorological Services of Antigua and Barbuda, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, St Lucia, St Vincent and the Grenadines and Trinidad and Tobago

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