



**ANNOUNCEMENTS**

Drought concerns in the vicinity of the northern islands of the eastern chain, have been alleviated to some extent, but concerns continue over the remainder of the eastern chain, particularly from Dominica southward to Grenada. Temperatures are likely to continue to be above normal across most of the Caribbean by up to 0.5 °C at least until until May/June 2013. The CAMI project is now financially completed but its output and activity continues.

**REGIONAL OVERVIEW ON WEATHER AND CLIMATE FOR MARCH 2013**

During March, there was a distinct difference between the normal to above normal north and the normal to below normal south in the eastern Caribbean and Guyana. Trinidad, St. Vincent, and St Lucia were normal; Tobago moderately dry; Grenada and Barbados extremely dry; Dominica abnormally dry; Antigua extremely wet; and Guyana normal in the west to moderately dry in the east. Jamaica was normal in the west and abnormally wet in the east. Conditions in Belize ranged from abnormally wet in the south to extremely dry in the north.

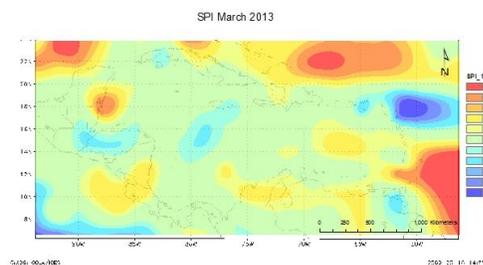


Figure 1. SPI for the Caribbean for March 2013. More information on the SPI can be viewed at <http://63.175.159.26/~cdpmn/spimonitor.html>.

Apart from Antigua that was abnormally wet, the calendar year thus far in the eastern Caribbean and Guyana has reflected a normal to below normal dry season. Trinidad, Tobago, Grenada, St. Vincent and St. Lucia were normal; Barbados severely dry;

Dominica extremely dry; and Guyana normal in the west to moderately dry in the east. Jamaica was normal but conditions in Belize ranged from abnormally wet in the south to abnormally dry in the north. See Figure 2.

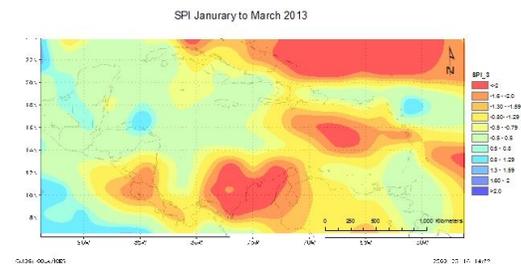


Figure 2. SPI for the Caribbean for January to March 2013. More information on the SPI can be viewed at <http://63.175.159.26/~cdpmn/spimonitor.html>

Concern about agricultural drought in the western Caribbean, continues mainly around Cuba and less so in the vicinity of Jamaica. Much of the concern in the northern eastern Caribbean islands was alleviated in late March with rains that resulted above normal monthly totals. This may well be the drought buster for the north, as conditions are expected to continue to improve into May. However central parts of the chain, from Dominica south to Grenada are not yet over their period of dryness, and the normal dry-season-like conditions are likely to continue for much, if not all, of April.

Temperatures for the month were generally normal to above normal in the region.

## NATIONAL OVERVIEWS

### Antigua

The heavy rainfall of 29<sup>th</sup> and 30<sup>th</sup> has brought the drought, which started last November, to a sudden and somewhat unexpected end. The island average for the month was 116.1 mm; the highest for March since 1992 and the seventh wettest on record (1928 – 2013). For March, at the airport, there were only four wet days ( $\geq 1$  mm), with this number being below normal. However, the three heavy rainfall days tied with 1984 and 1985 March for the second most such days for the month on record (1971 – 2013). The wettest day, March 29, had 41.3 mm; March 29 and 30 accounted for 68.2 mm at the airport; without these two days the drought would not have ended. Just about all the rainfall was caused by fronts.

The mean temperature of 25.3°C was below normal. Meanwhile, the mean daily maximum and minimum temperatures were below and above normal respectively.

The outlooks call for below normal rainfall and above normal temperature for April. However, above normal rainfall and temperature are projected for the period April to June (AMJ). Based on the outlooks, conditions look relatively favourable for agricultural activities. The ending of the drought along with the subsequent rainfall has farmers very upbeat; much field preparation is now underway.

### Barbados

During the early part of March, weak surface winds averaged just 22.2 km/hr across Barbados as the Bermuda/Azores High moved southwards to near 20°N while meandering between 40 and 50°W. During this period, a seventeen-day dry spell resulted in extremely dry conditions and several brush and cane fires across the island. Towards the latter half of March, the high pressure ridge re-strengthened and re-located to its more northward position and consequently Barbados experienced an increase in low-level winds which varied between 28 and 37 km/hr.

Prior to this year's event, the longest dry spell occurring in March (based on date from 1990) was that of 2001 when a 12-day dry spell at the beginning of the month was followed by another between the 16th and 30th of the same month. March, 2001 was also the driest (7.3mm over 3 rain days) based on records since 1942. The dry spell of March, 2013 was eventually disrupted by the passage of a number of trough features. The first of these brought measureable rainfall to some northern sections of the island between 12<sup>th</sup> and 14<sup>th</sup>. At the Airport, the first break came between 18<sup>th</sup> and 19<sup>th</sup> and resulted in 9.0mm of rainfall. The final monthly total of 14.1mm or 38 % of the average of 37.mm (1981-2010) occurred over a period of 3 rain days (rain-day= $\geq 1$ mm). This was well below long-term average number of eight rain-days. Golden Ridge in St. George observed 19.5mm of rainfall over six rain days.

Meanwhile, daily maximum temperatures ranged between 29.4° and 29.7°C during the first ten days of the seventeen- day dry spell, while for the remainder of March, the range was between 30.2° and 31.4°C. The 30-year average (1981-2010) daily maximum temperature is 29.7°C. The lowest minimum of 22.3°C occurred on the 19<sup>th</sup>.

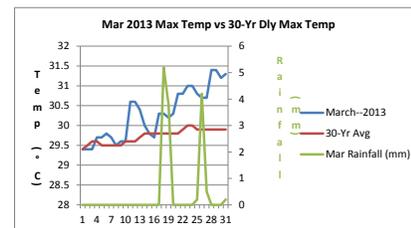


Figure 3. Temperature and rainfall at Grantley Adams for March 2013.

### April Forecast

Easterly trade winds of 28 to 37 km/hr, along with mostly shallow convection can be expected across Barbados during the first half of April. Thereafter, an increase in mid-level moisture in association with the passage of a number of trough features may contribute to wetter conditions from mid-April. However, the cumulative rainfall total at the end of April (at Grantley Adams) is likely to be below the long-term cumulative (for the year thus far) total of 209.6mm. Up to the end of March, 2013, the cumulative rainfall total was 119.3mm.

## Belize

A front crossed Belize on the 1<sup>st</sup> producing a strong northwesterly wind over the country. Cool and mostly dry weather prevailed on 3<sup>rd</sup> resulting in low temperatures at the International Airport of 13.9 °C, at Rio Bravo in the Orange Walk district of 10.0°C, and at Baldy Beacon in the Mountain Pine Ridge of 9.8 °C. The cool, dry weather continued into 7<sup>th</sup>.

Another cold front moved south across northern and central Belize during 8<sup>th</sup>, bringing several light showers over northern, central and coastal areas as a light northeasterly flow pushed moisture south. The weekend of 9<sup>th</sup> and 10<sup>th</sup> was sunny and generally dry weather.

On 11<sup>th</sup>, another front brought a few showers over western and northern Belize during the afternoon, with the most significant weather occurring the next day. Several showers over western Belize occurred during the evening and night. Behind the front, cool, dry northwesterly winds kept mainland Belize mostly dry and sunny until the 15<sup>th</sup>. On the 16<sup>th</sup> weather started out variably cloudy, but by midday cloudy skies over central and southern Belize produced some bouts of light to moderate showers.

For the next few days until 22<sup>nd</sup>, sunny weather prevailed. However, for several afternoons during this period, diurnal heating produced isolated thunderstorms over extreme western parts of the country. The weekend of 23-24<sup>th</sup> witnessed particularly high temperatures. The mercury climbed to 34.8°C on 24<sup>th</sup> at the International Airport. Chaa Creek in the Cayo district registered the highest temperature of 39.5°C, followed by Tower Hill in the Orange Walk district with 39°C. A pre frontal trough was close enough to induce afternoon thunderstorms on the southwest slopes of the Maya Mts. and near the Belize/Mexico border in northern Belize.

Yet another front crossed Belize early on the morning of 26<sup>th</sup>. Gusty northerly to northwesterly winds accompanied the front's passage. By the afternoon and evening of 27<sup>th</sup>, an invasion of layered clouds obscured most parts of the country. After this, pleasant weather existed until the end of the month.

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

| Station              | Liber tad   | Zoo         | PGIA        | Belmopan    | Central Farm | Savannah    |
|----------------------|-------------|-------------|-------------|-------------|--------------|-------------|
| Elevation (m)        | 12          | 30          | 5           | 90          | 90           | 13          |
| <b>Rainfall (mm)</b> | <b>4.5</b>  | <b>1.2</b>  | <b>3.7</b>  | <b>56.3</b> | <b>32.6</b>  | <b>15.2</b> |
| Mean.                | 31          | 43          | 52          | 47          | 51           | 57          |
| Max                  | 3.5         | 1.2         | 2.3         | 45.4        | 27.8         | 12.2        |
| Rain days            | 2           | 1           | 1           | 5           | 2            | 2           |
| <b>Temp (°C)</b>     |             |             |             |             |              |             |
| Mean Min.            | <b>18.7</b> | <b>18.7</b> | <b>21.1</b> | <b>19.0</b> | <b>18.8</b>  | <b>20.3</b> |
| Mean                 | 19.2        | 19.2        | 22.0        | 18.8        | 18.8         | 21.6        |
| Lowest Min.          | 10.8        | 13.0        | 13.8        | 12.2        | 10.7         | 11.8        |
| Mean Max.            | <b>30.5</b> | <b>30.9</b> | <b>28.6</b> | <b>30.6</b> | <b>30.8</b>  | <b>31.0</b> |
| Mean                 | 31.5        | 31.2        | 29.7        | 31.3        | 31.6         | 30.7        |
| Highest Max.         | 36.7        | 38.0        | 34.8        | 37.4        | 38.6         | 36.0        |

## Dominica

18.9mm or about 39% of the normal March rainfall was recorded at Canefield. There were a total of 27 dry days which is above the mean. An 18 day dry spell was recorded during the beginning of the month resulting in a 27 day dry spell that began in February. An 8 day dry spell towards the end of March was broken on the 31st when the maximum monthly rainfall total of 10.9mm was recorded. An average air temperature of 27.4°C was recorded for the month, which is 0.5° above the monthly mean. The maximum temperature recorded was 32.6°C on the 27th while the minimum temperature was 19.1°C recorded on the 4th.

During the month, 74.8mm of rainfall was recorded at Melville Hall which is about 66% of the mean. The maximum rainfall amount was 15.2mm recorded on the 22<sup>nd</sup>. There were 16 dry days which is normal for March. A similar pattern as Canefield followed, with a 6 day dry spell occurring at the beginning of the month resulting in a 13 day dry spell that began in February. A 5 day spell was recorded during the second dekad. The average air temperature was 26.6°C which is 0.2° above the monthly mean. The highest daily temperature was 30.4°C recorded on the 30th and the lowest was 17.6°C recorded on the 14th. Total sunshine hours recorded was above the monthly average.

## Grenada

Strong subsidence and stable conditions produced sunny weather throughout the month. There was a generally steep pressure gradient across the eastern

Caribbean from the Central Atlantic/Bermuda Azores High pressure system to the relatively low pressure over South America. This resulted in continuous moderate to strong trade winds across the islands.

The subsidence and dry air aloft resulted in only 3.6mm of rainfall recorded at Maurice Bishop International Airport, making it one of the driest Marchs on record. The first ten (10) days of the month produced only 0.2mm, while the highest in 24 hours was 1.1mm on the 21st. There were twenty (20) dry days.

The steady trades kept the island relatively cool and with almost cloudless skies help to maintain an even diurnal range. The average maximum temperature for the month was a moderate 30.3°C. The minimum was a comfortable 24.4°C. The extremes temperatures were maximum 32.5°C on the 13th and minimum of 22.8°C recorded on the 19th.

Due to the Atlantic high pressure system and several cold fronts a combination of high wind waves and sea swells were of great concern to the general public during the month. The meteorological office was forced to issue marine advisories from the 9th to 15th and on the 26th. The northern and western coastlines were severely impacted by the heavy surf; which adversely affected the fishing industry. Fishermen were kept at bay due to the less than cooperative seas. The month's catch was significantly reduced.

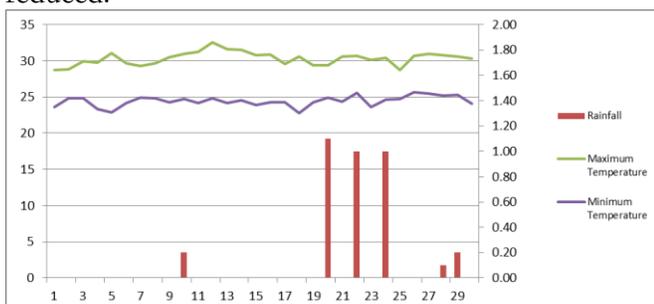


Figure 4 Daily maximum and minimum temperature, and rainfall (bars) for March at Maurice Bishop Airport, Grenada.

Carrots, cabbages, lettuce as well as sapodillas were among the crops that were able to weather the conditions and thrive. The citrus crop, on the other hand, diminished quite noticeably both in quantity and quality. Water-melon made quite a strong appearance.

## Guyana

Guyana had an average of 37.1mm of rainfall with an average of 7 rainfall days over the 42 stations for March, 2013. The average for March is 108.3mm with 11 rainfall days. The rainfall values recorded for March implied that Guyana was well below its average. St Denny Mission in Region 2 recorded the highest total with 110.2mm. The highest one day rainfall total was recorded at Capoey, also in Region 2, with a total of 32.7mm on 24<sup>th</sup>. Region 10 recorded the highest average of the ten Regions, with 58.2mm over 10 raindays. Unlike one rainfall station that was above its average, a total of forty one rainfall stations across Guyana recorded rainfall values below average.

March was warmer than normal, with average Maximum temperature of 31.9°C when compared to the 30.3°C. Lethem (Region 9) recorded the highest average monthly Maximum temperature of 33.3°C; and highest one day maximum temperature of 36.0°C on 28<sup>th</sup>.

## Outlook

For the upcoming months in Guyana, normal rainfall conditions will prevail as the primary rainfall seasons begins in May-June.

## Jamaica

Throughout the month of March the island was impacted mainly by high pressure ridges, surface troughs, and the occasional cold front. This resulted in an increase in the levels of rainfall measured across most areas. Both Sangster International airport (Sangster) in the northwest and Norman Manley International airport (Norman Manley) in the southeast received near their monthly average rainfall. During the month, Sangster recorded 41.6 mm of rainfall, while Norman Manley recorded 30.6 mm. There were five rainfall days reported for Sangster, while Norman Manley had three rainfall days during the month. Sangster recorded approximately 78% of the 1971-2000 mean while Norman Manley recorded 28% above the 1971-2000 mean.

The highest maximum temperature recorded for Sangster Airport was 32.5°C (23<sup>rd</sup>) while 32.6°C (28<sup>th</sup>) was reported for Norman Manley Airport.

**Table 2 Climatological Statistics for Manley and Sangster Airports for March 2013**

| Monthly Averages            | Norman Manley               | Sangster                    |
|-----------------------------|-----------------------------|-----------------------------|
| Extreme Maximum Temperature | 32.6 °C<br><i>(32.7 °C)</i> | 32.5 °C<br><i>(32.5 °C)</i> |
| Lowest Minimum Temperature  | 20.5 °C<br><i>(21.1 °C)</i> | 20.9 °C<br><i>(20.1 °C)</i> |
| Rainfall Total              | 30.6 mm<br><i>(24)</i>      | 41.6 mm<br><i>(53)</i>      |
| Rainfall days (≥1mm)        | 3 days<br><i>(4.5)</i>      | 5 days<br><i>(10.5)</i>     |

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

**St Lucia**

Both Hewanorra (33.0 mm) and George Charles (62.6 mm) Meteorological Stations recorded below average rainfall for March this year (58 % and 85% of the long term mean respectively). There was a 17 day dry spell with no measurable rainfall at both stations at the beginning of the month. At Hewanorra there was only 1 day with rainfall greater than or equal to 10 mm while at George Charles there were 2. The mean maximum and minimum temperatures at Hewanorra were 30.3 and 24.6 °C; and at George Charles were 28.9 and 23.1 °C, respectively.

The seasonal precipitation outlook for the April, May and June period indicate the likelihood for rainfall to be above normal over St. Lucia. However, farmers should continue their water conservation practices since the dry season is expected to last until the end of May.

**Table 3 March 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                   | 27.1            | 73           | 33.0          |
| Max Temp (°C)                      | Min Temp (°C)       | Daily Sunshine (Hrs) | Daily Evap (mm) | Soil 20 (°C) |               |
| 30.3                               | 24.6                | 9.7                  | 9.0             | 28.5         |               |

**St Vincent and the Grenadines**

The rainfall recorded at the E.T. Joshua Airport for March 2013 was 71.9 mm. At the E.T Joshua Airport, there were 9 rain days, and a dry spell of 16 consecutive days, and 22 dry days in total for the month.

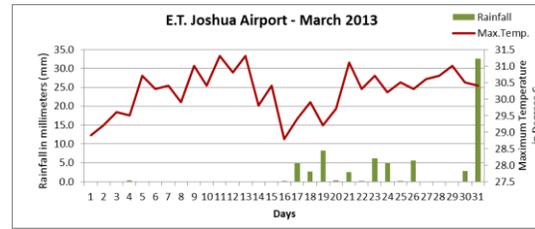


Figure 5 The maximum temperature and rainfall for March, 2013 at E.T. Joshua Airport.

**Trinidad and Tobago**

March is climatologically the driest month of the year. Rainfall totals during the month of March 2013 was above normal for Trinidad and below normal for Tobago. Rainfall recorded at the Observing station in Piarco International Airport, Trinidad was 46.5 mm, 28% above the long-term average (1971 to 2000). In one day, 27th March 2013, rainfall recorded at the observing station in Trinidad was 37.6 mm, which was 3% above the long term average. Rainfall for the month at the A.N.R. International Airport, Crown Point, Tobago was 9.5 mm, 77% below the long-term average.

There were two dry spell periods in Trinidad and Tobago. In Trinidad, first dry spell period lasted 13 days, while in Tobago, dry spell lasted 10 days. The second dry spell period lasted 8 for both islands.

Temperatures were higher for Trinidad when compared to Tobago. Maximum temperatures for the month ranged from 29.2°C to 34.3°C for Trinidad and 28.8°C to 32.4°C for Tobago. Minimum temperatures ranged from 21.7°C to 25.6°C for Trinidad and from 21.8°C to 25.1°C for Tobago.

There were no reports of damages to the Agricultural community.

**REGIONAL OVERVIEW ON SEASONAL CLIMATE FORECAST**

Rainfall in the Caribbean during April to June shows a tendency to normal or above normal from Belize, Jamaica and Hispaniola east and southward down to Trinidad and Tobago, with increased odds of above normal over the Leeward Islands. By contrast, the northern-most portions of the Caribbean around The Bahamas and Cuba, is more likely to be normal

to below normal. Much of the above normal outlook in the eastern portion of the region can be attributed to a negative North Atlantic Oscillation rather than ENSO conditions. Rainfall outlook over Guyana is uncertain.

Note that, although the Leeward, and to some extent the Windward, Islands may experience above normal rainfall taken over the entire period, it is likely that April rainfall will generally turn out to be around normal, with the rainfall increasing above normal during May and June.

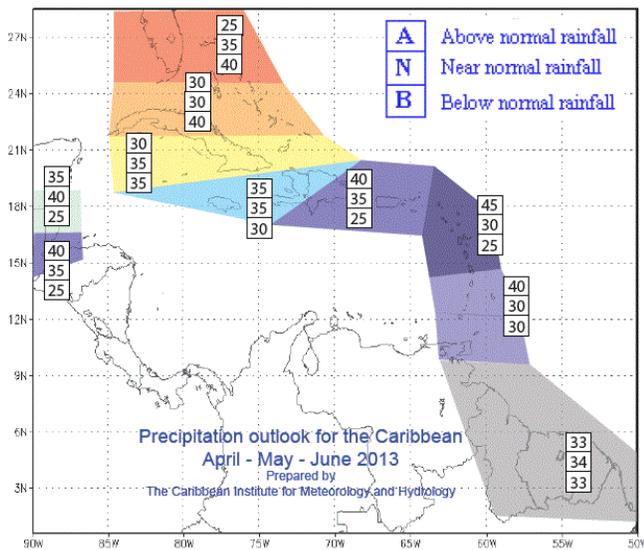


Figure 6 The April to June 2013 Rainfall Forecast

Currently, the tropical North Atlantic shows SSTs that are mostly average or slightly above (up to 0.5°C above average). Such conditions are expected to last well into Apr-May-June period, with an area of above normal SSTs centred over and further east of the Lesser Antilles. Consequently, slightly more evaporation than usual may be expected, promoting rainfall across the Lesser Antilles. Air temperatures are likely to be above normal over the entire Caribbean. This is especially so over the Guianas, while towards the northwest, chances of above normal air temperatures decrease, though remaining higher than the probability of below normal air temperatures.

**ENSO Conditions**

Most models tend to project the SST anomalies in the Pacific close to 0°C in the coming months. There is however, little predictability and high variability in the evolution of ENSO during April to June

between different models, thus further making predictability of rainfall and temperatures in the Caribbean low. That a quick reversal and a possible evolution to either El Niño or La Niña conditions may still evolve, is leaving us with considerable uncertainty beyond this April to June period. Moreover, the current cool eastern equatorial Pacific SSTs have not reflected in atmospheric circulation consistent with La Niña. In conclusion, if the current neutral-cold ENSO conditions prevail, as forecasted by most models, we do not expect a large effect on Caribbean rainfall in this season, if any.

**NAO conditions**

Background: The North Atlantic Oscillation (NAO) is basically a flip flop in the relative strength of the Bermuda/Azores High and the Icelandic Low pressure system over the North Atlantic and acts on time scales of typically a couple of years to a decade. NAO is in its positive phase when the Bermuda/Azores high is stronger and larger than usual, while negative if the High is smaller and weaker than usual. A positive NAO typically tends to decrease rainfall in the eastern Caribbean. By contrast, the northwestern-most areas of the Caribbean (such as the Bahamas), would typically experience more rainfall as stronger than usual ocean currents would bring in more warm waters from the south, enhancing evaporation and precipitation there. A typical negative NAO phase would result in the opposite pattern.

Current situation: This year, ENSO has thus far not been the dominating signal explaining an observed deficit of seasonal rainfall in the dry season. Rather, the NAO, another driver of seasonal rainfall variability in the Caribbean, has been the dominating driver, and is likely to continue to do so over the coming months. In recent months, NAO has been in a strongly negative phase, which renders the Bermuda High pressure system smaller and weaker at this time than in most other years. However, this year’s negative NAO is particular in that the High has been pushed far south to be centred closer to the Caribbean than usual. The net effect appears to have been higher than normal pressure over many kilometers in the atmosphere. The associated subsidence (or sinking and drying of air within the High) suppressed moisture and thus the formation

of heavy rain showers during the past few months even more so than in a typical dry season.

April-June: The recently observed persistent atmospheric conditions have started to shift over and around the North Atlantic as we move to the end of the dry and start of the wet season. From April to June, the High is expected to move northward and loosen its firm grip on weather in the Caribbean. While this evolution happens each year around the same time, the smaller and weaker than usual High may prevent fewer disturbances from penetrating at full force into the Caribbean. By consequence, we could see above normal rainfall, especially over the Leeward Islands – the area in the Caribbean usually located closest to the action centre of the High. By contrast, rainfall in the Bahamas in May and June might be somewhat suppressed by the negative NAO.

#### **Six month outlook**

As in any six month forecast, there is considerable uncertainty as to the development of rainfall activity in the region. Moreover, as the Caribbean enters the

latter part of the dry and, subsequently the early wet season, climate conditions driving rainfall across the Caribbean on seasonal to half-year basis are showing very weak signal. With anticipated neutral ENSO conditions in the Pacific, below average SSTs over the western tropical South Atlantic, but slightly above average SSTs being forecasted in the Caribbean, it is (at best) somewhat likely that rainfall in the south-eastern Caribbean may generally be normal, whereas eastern portions may experience normal to above normal rainfall. There is little confidence in the forecast for the early wet season (June to August).

Finally, in terms of air temperatures, a highly probable pattern of warmer than average Caribbean region emerges from climate models for the next 6 months. The northwestern part may be subject to air temperatures close to average at first, with a probable trend to normal to above normal between May and August.

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