

The Caribbean wet / hurricane season: wet, hot, and stormy

What are the drivers of the Caribbean wet / hurricane season?

- 1) Temperature of the Caribbean Sea and Tropical North Atlantic:** when they are warmer, more evaporation takes place. This adds moisture to the atmosphere, so clouds, showers and storms can easily form, while also making us feel hotter.
Predictable? Several months in advance.
- 2) Temperature of the eastern equatorial Pacific:** particularly warm (El Niño) or cool (La Niña) episodes influence the winds in the atmosphere so that storm activity as well as rainfall in the Caribbean is reduced or enhanced, respectively.
Predictable? Several months in advance.
- 3) Air pressure:** in the wet season, air pressure is relatively low, with the exception of July in the northern Caribbean. Air pressure bottoms out around the month of September, when a band of low pressure and heavy showers called the ITCZ often spurs heavy showers, tropical waves and even tropical cyclones. **Predictable?** Two weeks in advance.
- 4) Saharan dust:** dry air blowing in from the Sahara can carry dust. This dryness and dust stabilise the atmosphere and cool the North Atlantic Ocean, contributing to reduced rainfall and hurricane activity.
Predictable? Two weeks in advance.

How does heat affect our society?

Many people do not realize that heat is one of the most dangerous climate hazards.

Excessive heat affects

- **our health:** heat causes discomfort, illness and death;
- **our economy:** hot weather reduces labour productivity;
- **our energy needs:** access to cooling requires energy (e.g. A/C, fanning);
- **our food production:** poultry, crops and livestock suffer from excessive heat, reducing our food productivity.



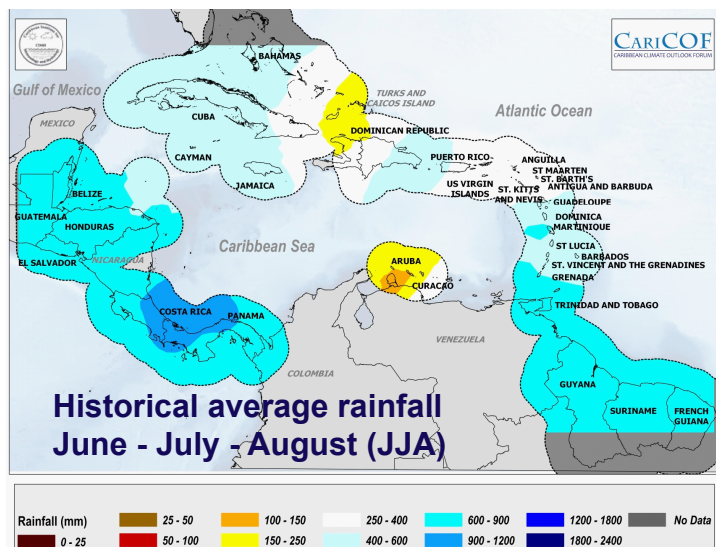
Building heat early warning systems

Climate and weather information enable early action in preparation for hot weather.

A forecast for a hot season gives time to train health professionals, community workers and emergency responders to recognise and treat heat-related symptoms. It also warns us to monitor weather forecasts more closely.

Then, when a **heat wave is forecast** in the coming days, awareness can be raised and guidance provided to the public, while hospitals and energy utilities can be alerted.

To **reduce vulnerability** to extreme heat, we need to understand who is most at risk and reduce their exposure to and help them cope with hot weather.



Our typical rainfall patterns between June and November

Belize & Caribbean Islands north of 16°N:

Jun - wet season. Usually frequent heavy showers.

Jul to Aug - wet season. Often includes a mid-summer dry spell.

Sep to Nov - wet season. Usually frequent heavy showers.

Caribbean Islands south of 16°N (except ABC Islands):

Jun to Aug - first half of wet season. Increasingly heavy showers.

Sep to Nov - wet season. Usually frequent heavy showers.

ABC Islands: Mostly dry until September. Alternation of wet spells and sunny days in October and November.

Guianas:

Jun to Jul - long wet season. Frequent heavy showers.

Aug - transition to dry season. Heavy showers become less frequent.

Sep to mid-Nov - dry season. Heavy showers at times.

Second half of Nov - start of secondary wet season in coastal areas. Heavy showers become frequent. Dry season in the south.

Wet in Jamaica, Dom. Rep., coastal Guianas, but dry to very dry in most other places; April uncomfortably hot at times in dry areas

+ impacts

Raised public awareness on drought; drought relief seen in N C'bean

- impacts

Where drought prevailed: water shortages; reduced crop production & livestock; rising food insecurity in Haïti; increased fire incidence

Observations

- ♦ **RAINFALL:** *April:* very dry in St. Vincent; very wet in Guyana. *March:* very dry in S Guyana; very wet in Dominica and Martinique. *February:* very dry in Antigua, Grenada, St. Lucia, St. Vincent.
- ♦ **TEMPERATURES:** *April, March, February:* above-normal across most parts of the Caribbean.

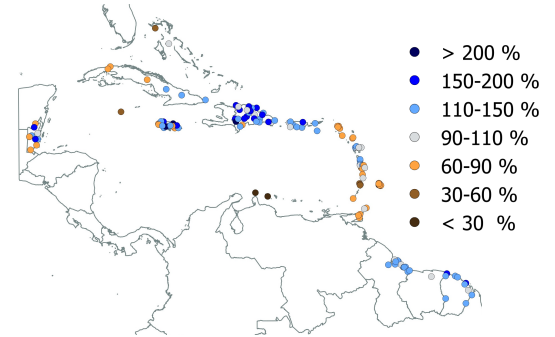
Notable climate records

- ♦ **WET - FMA:** record wet in 1 location in Jamaica.
- ♦ **HOT - FMA:** 2 & 3 territories with locations recording highest min. & mean temps., respectively (notably Jamaica).

Notable Impacts

- ♦ Prevailing short- and long-term drought across the Caribbean, with:
 - hunger and food insecurity in Haïti;
 - upsurge in fires & failed 2016 sugar cane harvest & water rationing in Barbados;
 - cocoa production in Grenada affected, NaDMA raising drought awareness in April;
 - Taiwan helps bring drought relief to water consumers in St. Kitts & Nevis.

FMA Observed rainfall



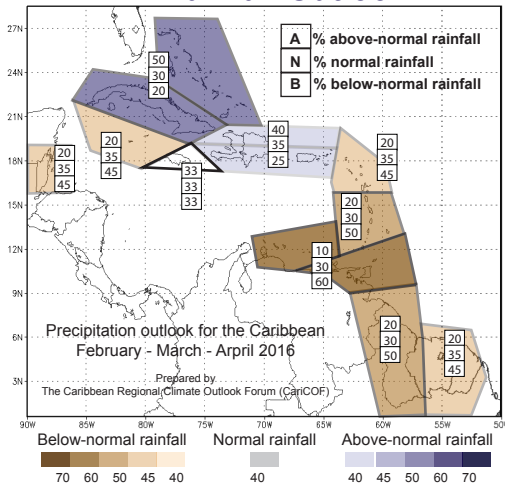
Worsening living conditions in Haïti after 3-year drought



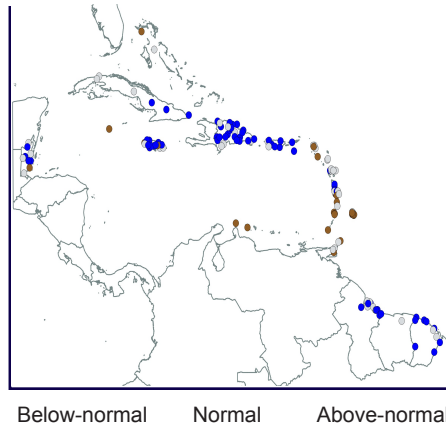
Credit: LatinAmerican Post

How well did we predict?

FMA Rainfall Outlook



FMA Observed Rainfall



We successfully forecast which islands would be dry and which islands would be wet for FMA in most cases.

We were not successful for Belize & the Guianas.

EL NIÑO FADING. LA NIÑA EVOLVING?

June to November 2016

Recent observations:

Weakening El Niño; sea-surface temperatures (SSTs) less than 1°C above avg. in the equatorial E. Pacific (NINO3.4).

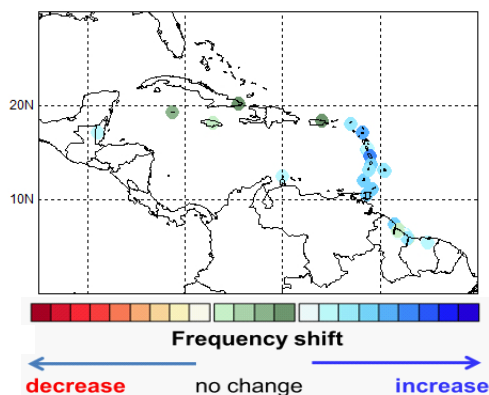
Global Model guidance:

All the models indicate a fading El Niño, with >50% chance of La Niña conditions by JJA increasing to 75% for September-October-November (SON).

Expected impacts on rainfall, drought and temperatures:

- 1) La Niña increases chances of wetter than usual conditions in much of the region during SON, alleviating long-term drought, but increasing flash flood, long-term flooding and landslide potential.
- 3) In addition, we are confident that there will be higher feel-like temperatures than usual throughout the wet season.

JJA 2016 3-day Extreme Wet Spells Frequency Shift



What usually happens from June to August?

- Roughly 35 to 75 days are wet at most places.
- Roughly 3 to 6 wet spells occur, of which 1 to 3 are very wet.
- Also, there tends to be up to 1 extreme wet spell.

Wet days and wet spells outlook up to August

What are wet days and wet spells?

- Wet days: days with at least 1mm rainfall.
- Wet spells: the number of 7-day spells (within a 3 month period) during which rainfall ranks among the wettest twenty percent of the entire historical record.
- Extreme wet spells: the number of 3-day spells (within a 3 month period) during which rainfall ranks among the wettest 1% of the entire record.

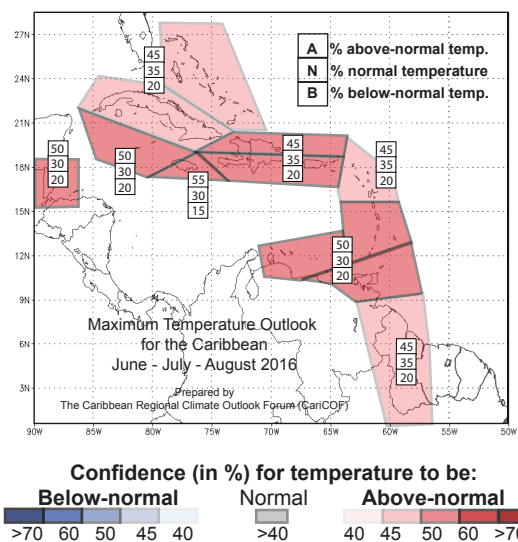
What is the rainfall forecast?

JJA rainfall is likely to be above- to normal in many parts of the Antilles, as well as the western half of the Guianas, but below- to normal in Belize. Fewer wet days and wet spells than normal are forecast, except for the Guianas where more wet spells are forecast (*low to medium confidence*). By contrast, there is an increased chance of extreme wet spells in the Lesser Antilles (*medium to high confidence*).

Implications?

- Increasing surface wetness; increasing disruption of outdoor activities... however, perhaps less often than usual.
- Recharging of large water reservoirs.
- Development of flash flood potential.

JJA Max. Temperature Outlook



JJA Minimum (Min.) Temperature

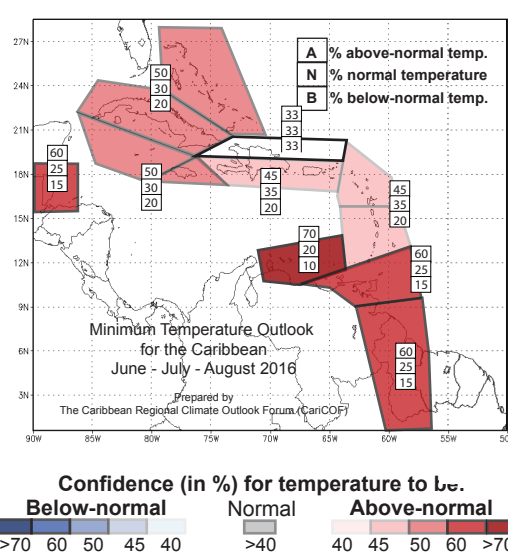
JJA minimum temperatures above- to normal across the region.

In detail: ABC Islands: confidence 90%. Belize, W Guianas, Trinidad & Tobago,: confid. 85%. Bahamas, Cayman, Cuba, Turks & Caicos: confid. 80%. Barbados, S Hispaniola, Leewards, US C'bean Terr., Windwards: confid. 80%. N Hispaniola equal chances.

IMPLICATIONS:

- **Night time temperatures become uncomfortable earlier on in the year than we are used to.**
- **Favourable conditions for mosquito breeding.**
- **Increased cooling needs.**

JJA Min. Temperature Outlook



JJA Maximum (Max.) Temperature

JJA maximum temperatures above- to normal across the region, as we are moving into a period that is increasingly warm and humid.

In detail: Jamaica: confidence 85%. ABC Islands, Barbados, Belize, Cayman, Winwards, Trinidad & Tobago, US C'bean: confidence 80%. Bahamas, Cuba, Leewards, W Guianas, Turks & Caicos: confid. 80%.

IMPLICATIONS: Increased cooling needs. Heat waves increasingly likely throughout the period.

Climate outlooks - background

The Caribbean Climate Outlooks are prepared by the Caribbean Regional Climate Outlook Forum (CariCOF). The Caribbean Institute for Meteorology and Hydrology, in its role as WMO Regional Climate Centre in demonstration phase, coordinates the CariCOF process. Contributors to the Outlooks are the Meteorological Services from the region. For more information on how the outlooks are produced, please visit rcc.cimh.edu.bb

The Precipitation and Temperature Outlooks are issued in the form of a map, which shows regions where the forecast rainfall or temperatures have the same probabilities to be:

- Above-normal (A) - within the wettest/hottest third of the historical record
- Near-normal (N) - within the middle third of the historical record
- Below-normal (B) - within the driest/colest third of the historical record

DISCLAIMER

The information contained herein is provided with the understanding that The Caribbean Climate Outlook Forum makes no warranties, either expressed or implied, concerning the accuracy, completeness, reliability, or suitability of the Outlook. The information may be used freely by the public with appropriate acknowledgement of its source, but shall not be modified in content and then presented as original material.

Consensus Rainfall Outlook

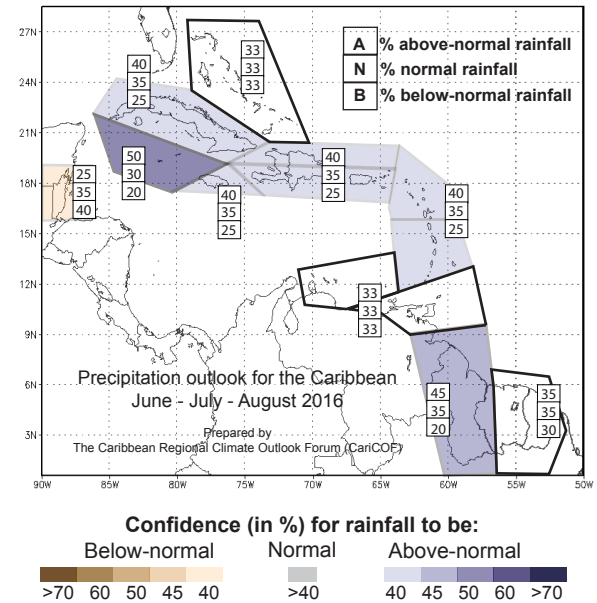
JJA

JJA rainfall in the Caribbean is likely to be above- to normal in the Greater Antilles, the Leewards, the Windwards, Barbados and the western Guianas.

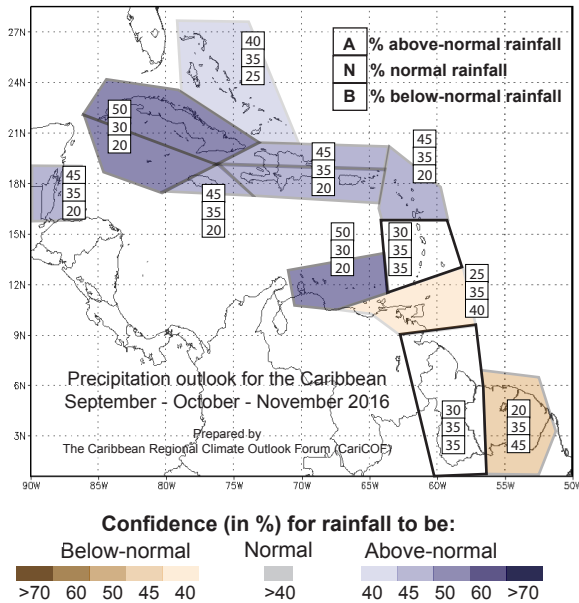
Rainfall predictability in other areas is low for the Jun. to Aug. 2016 period.

In detail: **Cayman Is.:** below- to normal, confidence 80%. **W Guianas:** above- to normal, confid. 80%. **Barbados, Cuba, W Guianas, Hispaniola, Jamaica, Leewards, Windwards, U.S. Terr.:** above- to normal, confid. 75%. **Belize:** below to normal; confid. 75%. **Elsewhere:** equal chances of below-, above- or normal.

JJA Rainfall Outlook



SON Rainfall Outlook



Consensus Rainfall Outlook

SON

SON rainfall in the Caribbean is likely to be above- to normal in Belize, Bahamas, Turks & Caicos, Greater Antilles, Leewards and ABC Islands; below- to normal in eastern Guianas and Trinidad & Tobago. Rainfall currently has low predictability in Barbados and Windwards, as well as, western Guianas .

In detail: **ABC Is., Cuba, Cayman Is.:** above - to normal, confidence 80%. **Belize, Hispaniola, Jamaica, Leewards, U.S. Terr.** above- to normal, confid. 80%. **E Guianas:** below-or normal; confid. 80%. **Bahamas, Turks & Caicos:** above- to normal; confid. 75%. **Trinidad & Tobago:** below- or normal, confid. 75%. **Barbados, W Guianas, Windwards:** below- or normal, confid. 75%.

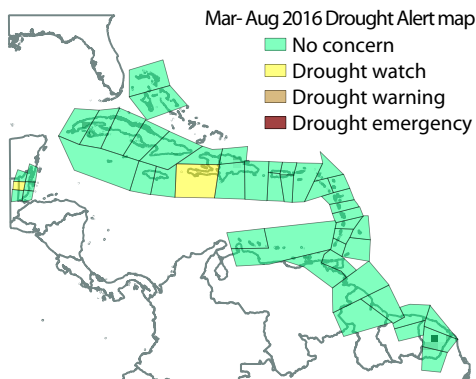
THE CLIMATE OUTLOOK IN SHORT

A normal to wetter than usual wet season for much of the islands, though with more dry spells; a wetter or normal wet season in the Guianas, followed by a normal or drier dry season there. Hot until October.

+ impacts : increased soil moisture and recharging water reservoirs.

- impacts : flash flood potential developing; heat stress; conducive to mosquito breeding.

Drought alert levels by the end of August



MONITOR DROUGHT & CONSERVE WATER

Drought conditions up to November

Drought situation:
(as of May 1)

Nearly all island nations of the Lesser Antilles are in long term drought. Short-term drought may develop in central-west Belize and S Haiti.

Short-term outlook:

Generally no drought concern by the end of August.

Long-term concern:

Recovery of long-term drought is expected during the wet season, with the probable exception of the ABC Islands and Antigua.