The 2016 Wet/Hurricane Season CariCOF Caribbean Climate Outlook

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Participating territories

Antigua & Barbuda, Aruba, Bahamas, Barbados, Belize, Cayman Islands, Cuba, Curaçao, Dominica, Dominican Republic, French Guiana, Grenada, Guadeloupe, Guyana, Haïti, Jamaica, Martinique, Puerto Rico, St. Barth's, St. Kitts & Nevis, St. Lucia, St. Maarten/St. Martin, St. Vincent & the Grenadines, Suriname, Trinidad & Tobago and the US Virgin Islands

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Key Messages

1. **2015-2016 drought: 2015 driest year on record in many places, with the drought persisting.** Drought impacts similar to major drought of 2009-2010.
2. **Why the drought?** A very strong El Niño, which is now fading out.
3. **Current outlook:**
   - progressive drought alleviation in coming months (wet season) for most.
   - Hurricane season normal to active this year.
   - Heat intense until October in many places, especially during dry spells.
4. **Be prepared for:** flash flood and land slides. This is because we expect La Niña to follow El Niño, bringing us more rainfall and storm activity.
5. **Next big drought?** Probably less than 10 years from now.

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What's the outlook?

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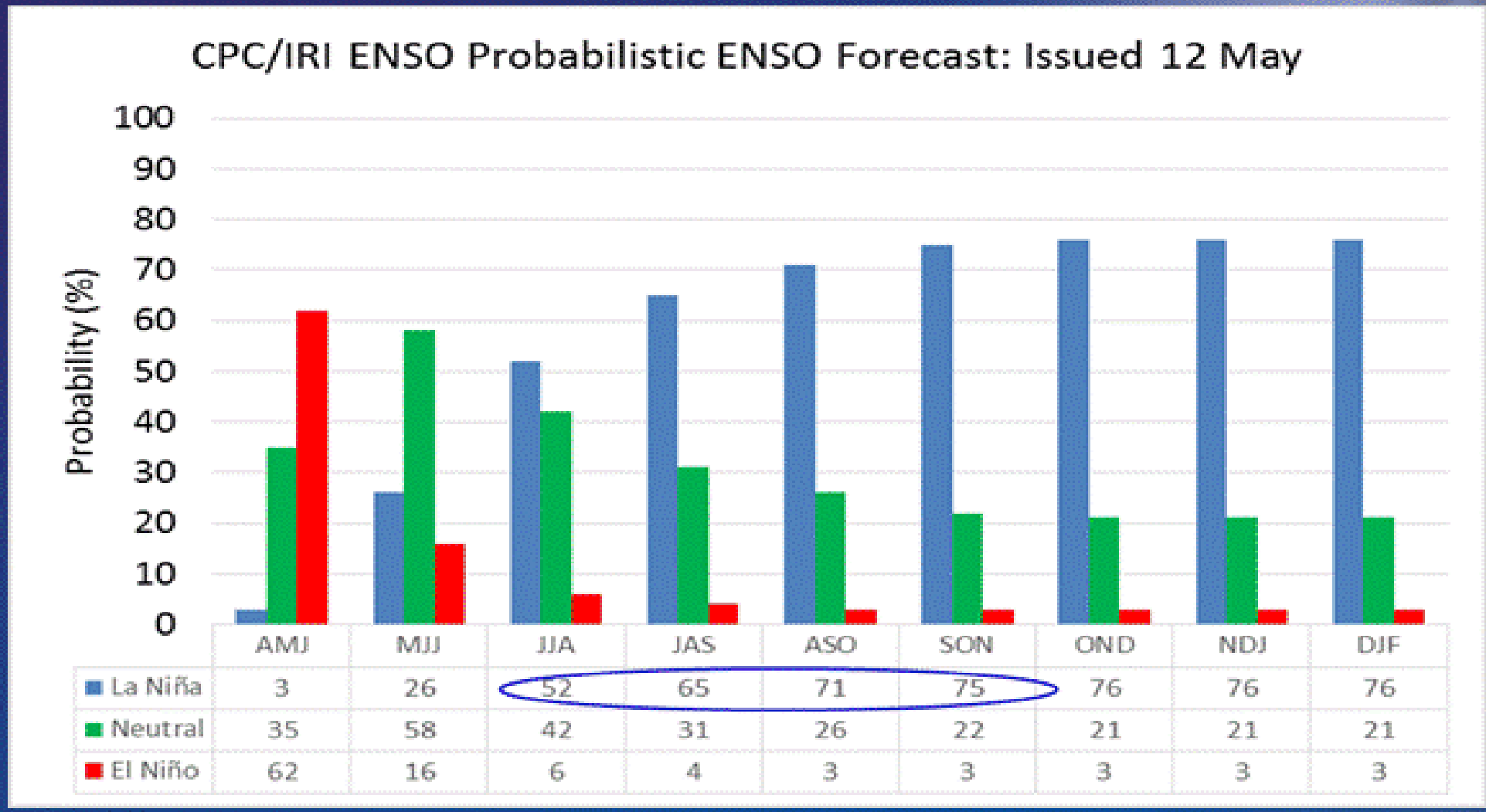
CPC/IRI ENSO Probability Forecast

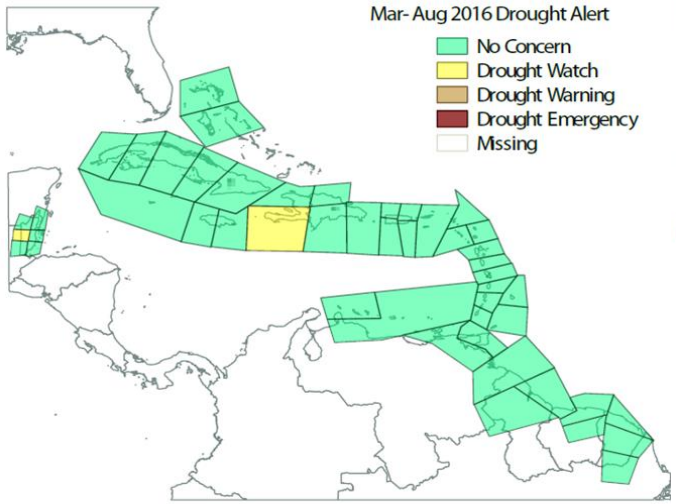


	AMJ	MJJ	JJA	JAS	ASO	SON	OND	NDJ	DJF
La Niña	3	26	52	65	71	75	76	76	76
Neutral	35	58	42	31	26	22	21	21	21
El Niño	62	16	6	4	3	3	3	3	3

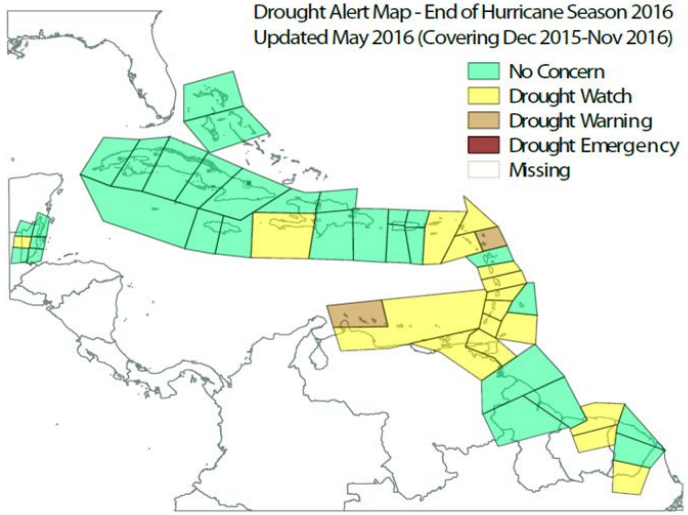
Caption: Seasonal forecast probabilities for El Niño (Red bars), ENSO-Neutral (Green bars) , and La Niña (Blue bars). Actual probabilities are indicated below the plot.

Drought will gradually be alleviated

short to mid-term drought



long-term drought



Drought alert & action levels

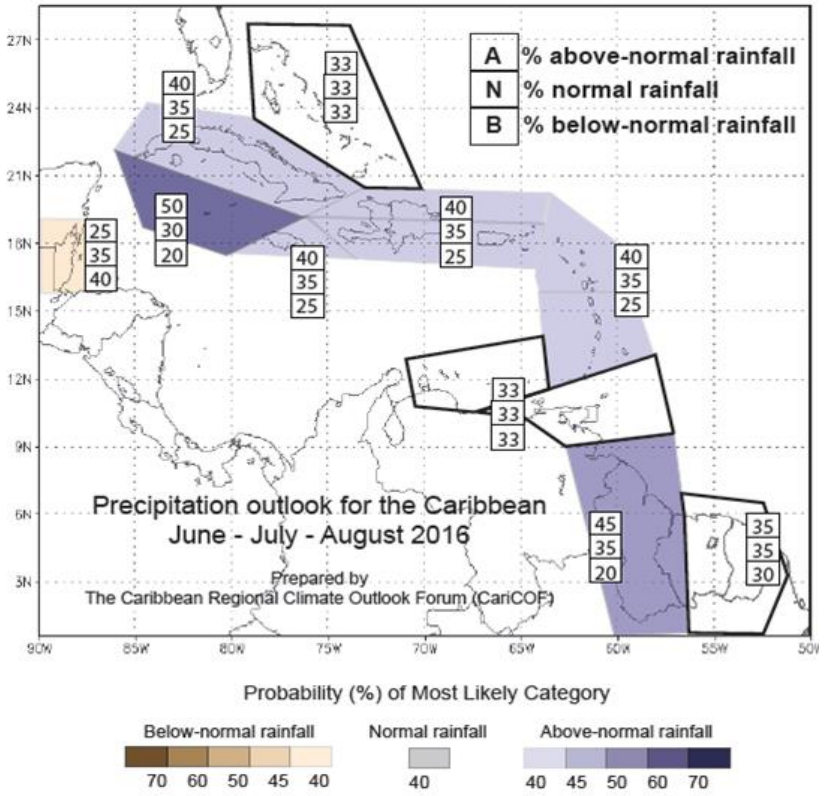
ALERT LEVEL	MEANING	ACTION LEVEL
NO CONCERN	No drought concern	✓ **monitor resources** ✓ update and ratify management plans ✓ public awareness campaigns ✓ upgrade infrastructure
DROUGHT WATCH	Drought possible	✓ **keep updated** ✓ protect resources and conserve water ✓ implement management plans ✓ response training ✓ monitor and repair infrastructure
DROUGHT WARNING	Drought evolving	✓ **protect resources** ✓ conserve and recycle water ✓ implement management plans ✓ release public service announcements ✓ last minute infrastructural repairs and upgrades ✓ report impacts
DROUGHT EMERGENCY	Drought of immediate concern	✓ **release public service announcements** ✓ implement management and response plans ✓ enforce water restrictions and recycling ✓ enforce resource protection ✓ repair infrastructure ✓ report impacts

IMPLICATIONS:

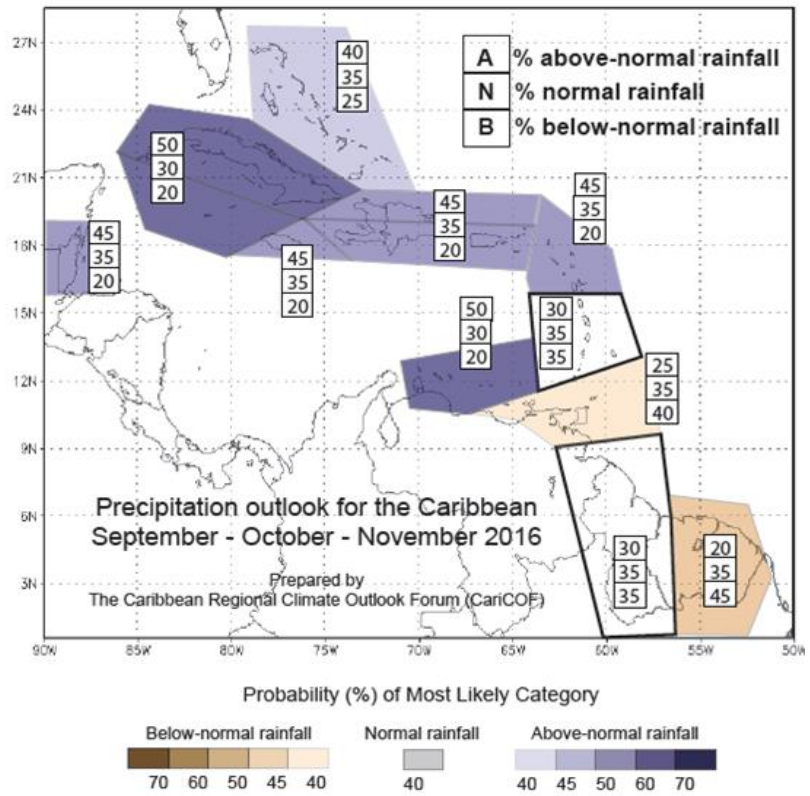
- Surface and soil wetness and river flow to increase.
- Large water reservoirs recharging (except the ABC Islands and Antigua).

How wet or dry will the next three to six months be?

June – July – August 2016



September – Oct. – Nov. 2016



Drier ← Usual → Wetter | Usual → Wett

FORECAST:

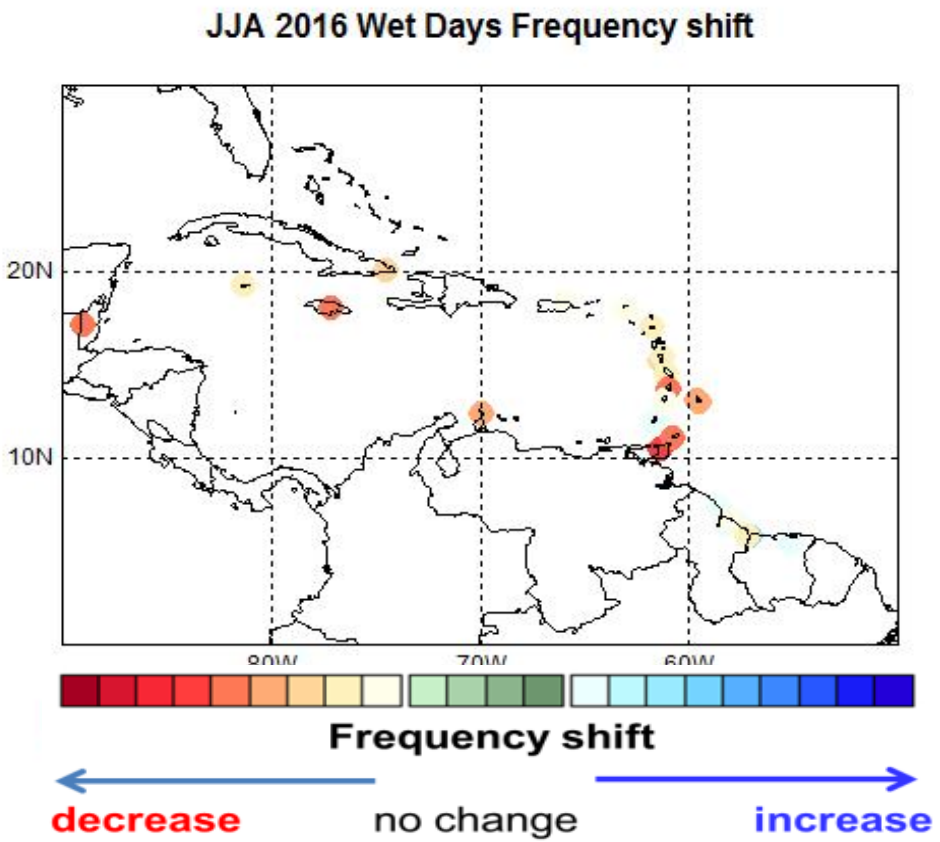
1) June to November rainfall above- to normal in much of the region;
2) Roughly 80% confidence that second half of wet season will be wetter or usual in ABC Islands, Belize, Greater Antilles and Leeward Islands.

IMPLICATIONS:

- Moist conditions may favour mosquito breeding;
- Higher chance of extreme rainfall than in a usual wet season.

How often will it rain in the next three months?

June – July – August 2016 wet days outlook



USUALLY: Across the region during June-July-August, about 35 to 70 days are wet days.

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 than normal (*low to medium confidence***) are forecast across the region.**

IMPLICATION:

- **Increasing surface wetness;**
- **Increasing disruption of outdoor activities (however perhaps less often than usual).**

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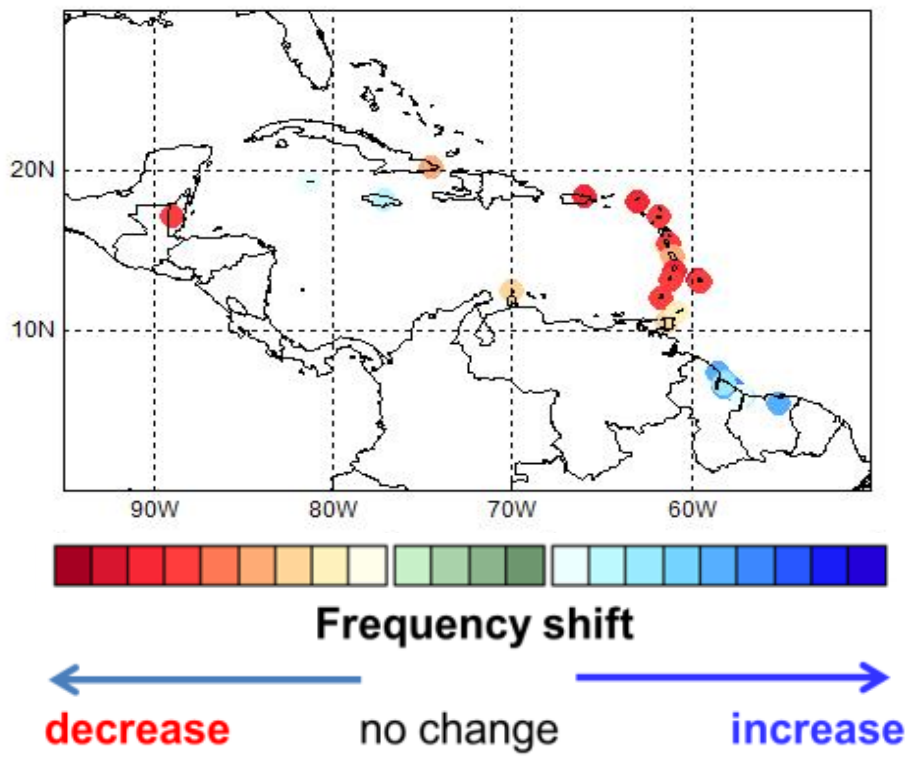
How many wet spells will we see?

June – July – August 2016 wet and very wet spells outlook

JJA 2016 frequency of 7-day wet spells



USUALLY: Roughly 3 to 6 wet spells occur between June & August, of which 1 to 3 are very wet.

FORECAST:
Fewer wet spells than normal are forecast, except for the Guianas where more wet spells are forecast (*low to medium confidence***).**

IMPLICATION:
Recharging of large water reservoirs after a prolonged drought.

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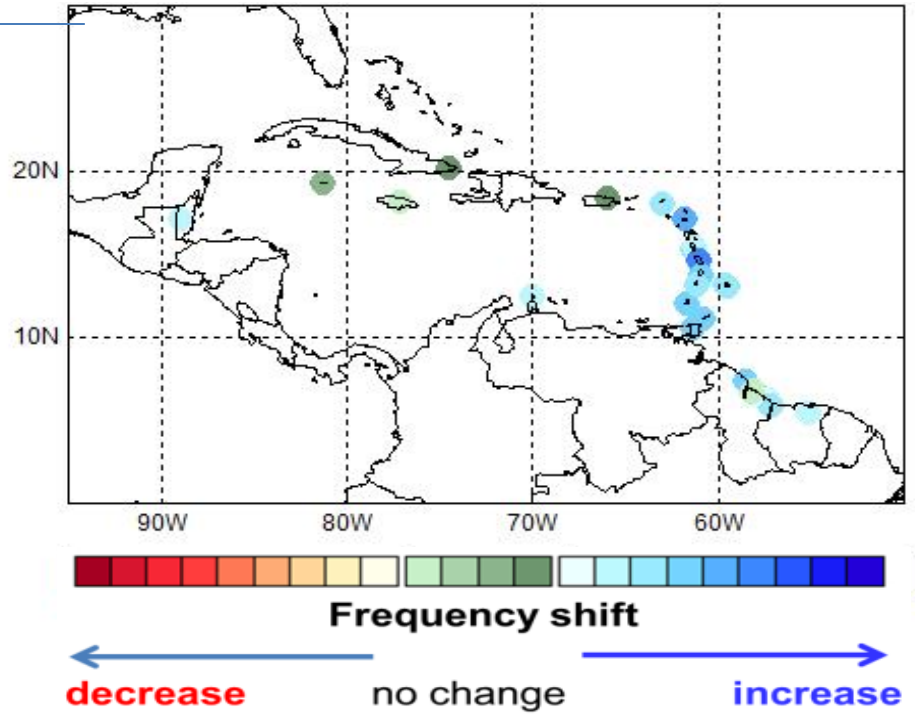
Extreme wet spells frequency shifts

Forecast for: June to August 2016

JJA 2016 frequency of *extreme (top 1%)*
3-day wet spells



USUALLY: Up to 1 extreme wet spell occurs between June & August.

FORECAST:
There is an increased chance of extreme wet spells in the Lesser Antilles (*medium to high confidence***), whereas no frequency shifts are forecast elsewhere.**

IMPLICATION: Flash flood potential developing.

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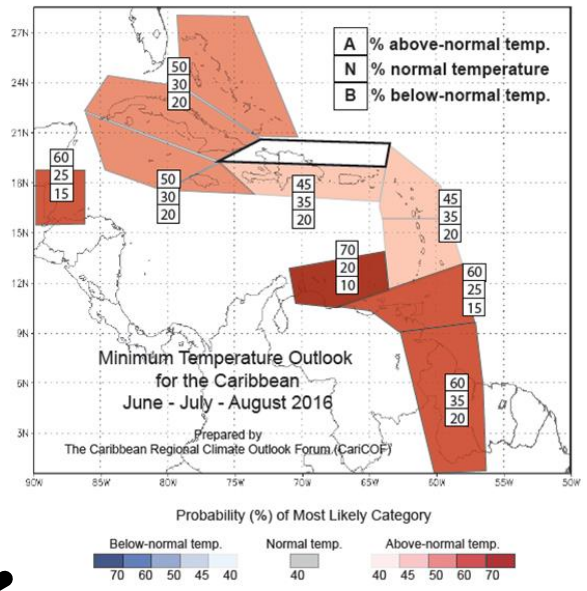
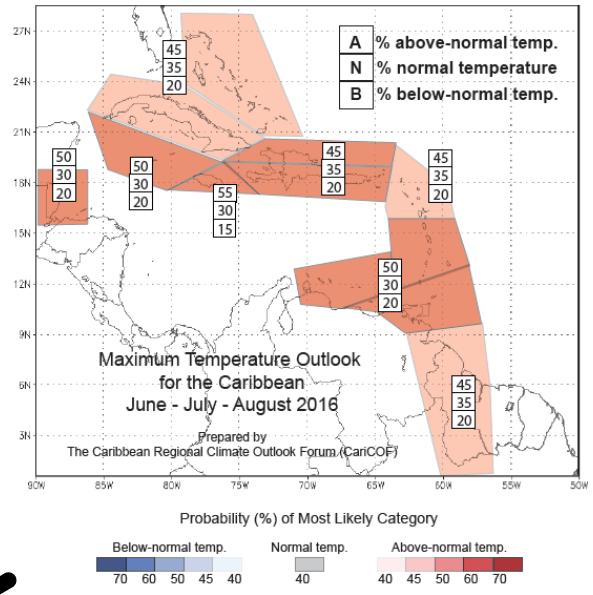
How hot will the next three to six months be?

Night time

Day time

Jun-Jul-Aug 2016

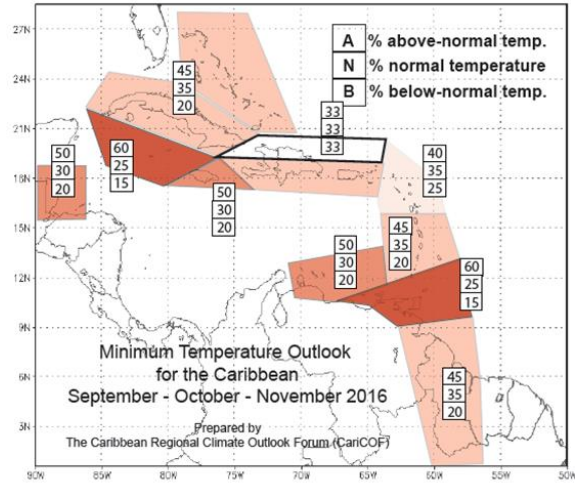


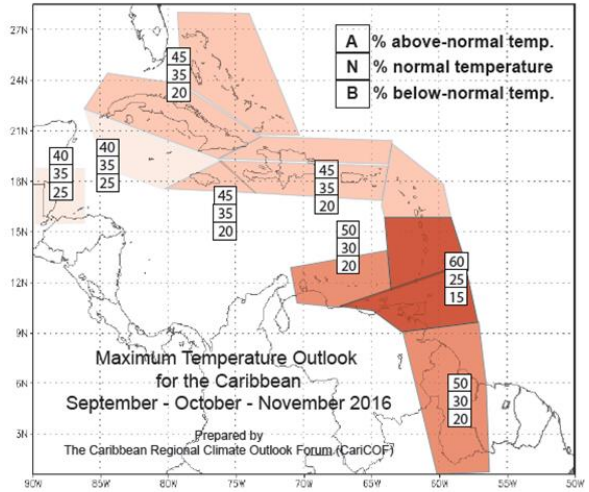


Mild — Usual — Hot

Mild — Usual — Hot

Sep-Oct-Nov 2016



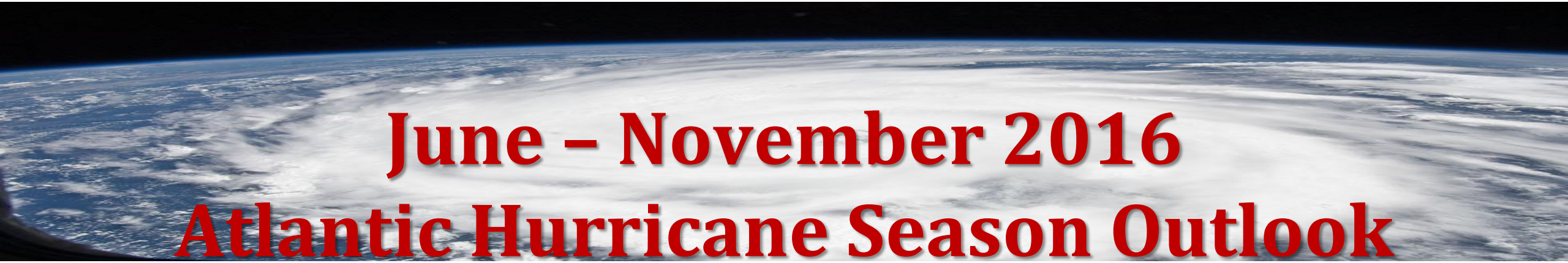


FORECAST:

1) temperatures between June and August will be above- to normal;
2) Both nights and days will be warm.

IMPLICATIONS:

- **Heat intense until September (N C'bean) / October (S C'bean).**
- **Enhanced health risk from heat exposure.**
- **Higher than usual energy costs for cooling.**



June – November 2016
Atlantic Hurricane Season Outlook

an ACTIVE SEASON ?

compiled by CIMH
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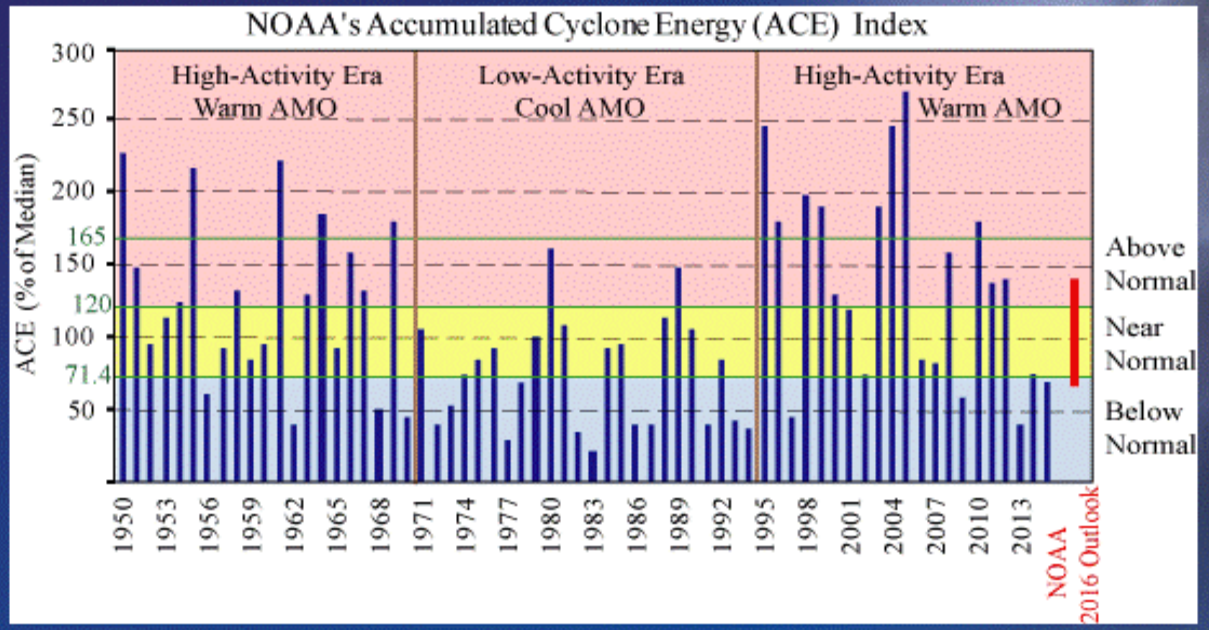
&
Wazita B. Scott, Assistant Climate Forecaster

After Kathy-Ann Caesar, Chief Meteorologist

2016 Hurricane Season Forecasts

Forecast Parameter and 1950-2000 Climatology (in parentheses)	CSU (Gray et al) 14 April 2016	Tropical Storm Risk 27th May 2016	Weather Channel 17th May 2016	NOAA-CPC 27 May 2016 (70% likelihood ranges)
Named Storms (**NS**) (**10**)	**12**	**17**	**14**	**10-16** (B25% - N45% - A30%)
Hurricanes (**H**) (**5.9**)	**5**	**9**	**8**	**4-8**
Intense Hurricanes (**IH**) (**2.3**)	**2**	**4**	**3**	**1-4**
Accumulated Cyclone Energy (**ACE**) (median = **100**)	**90**	**130**	**-**	**65%-140%**

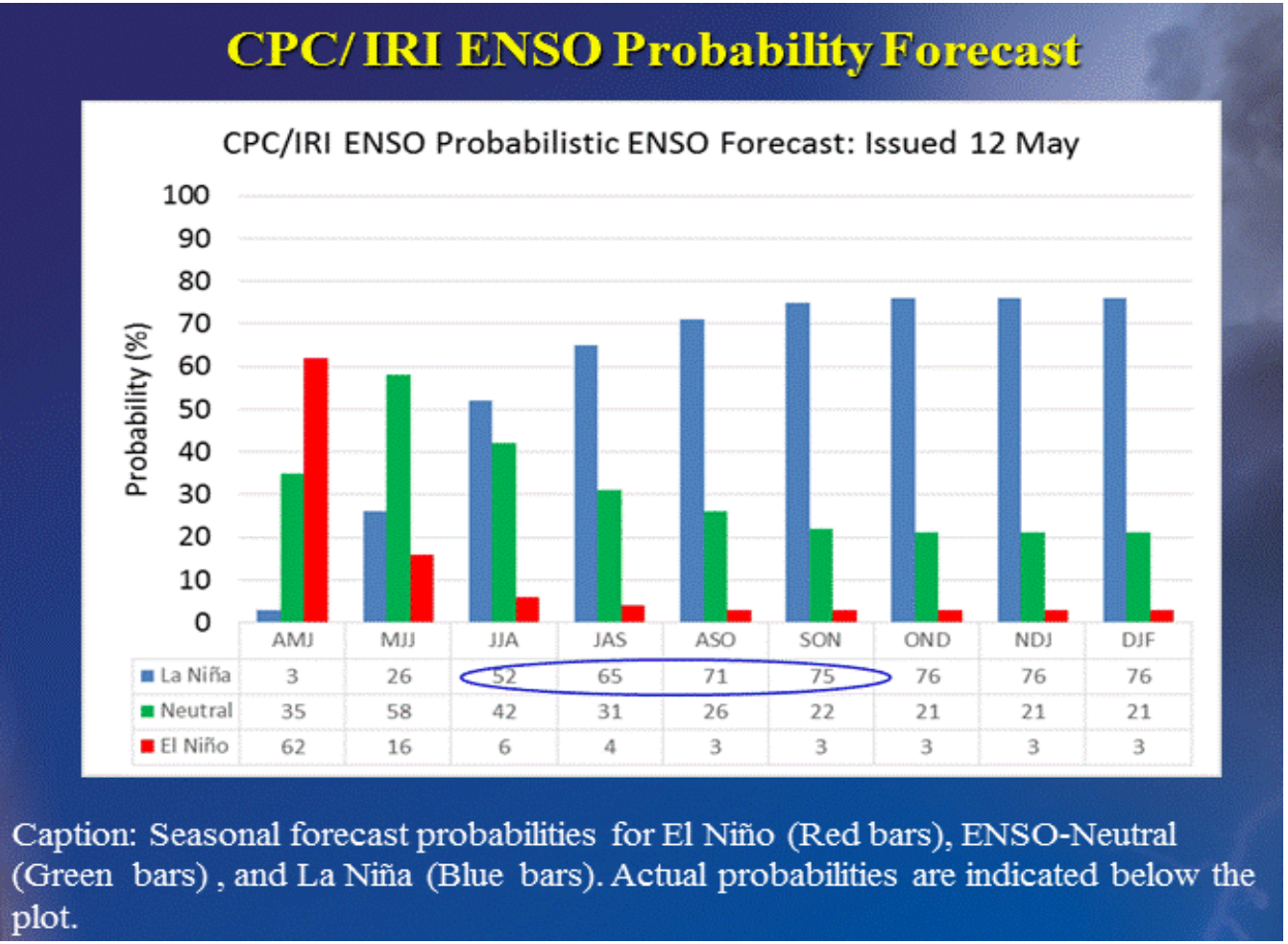
The 2016 Atlantic Outlook in a Historical Perspective



Caption: Seasonal Accumulated Cyclone Energy (ACE) index during 1950-2015 (Blue bars) and NOAA's 2016 outlook range with a 70% probability of occurrence (Red bar). Shading indicates NOAA's ACE thresholds for classifying hurricane season strength. The 165% threshold denotes a hyper-active season.

NOAA's 2016 Atlantic hurricane season outlook indicates a 70% probability of an ACE range of 65%-140% of the median.

El Niño event to be followed by La Niña



Caption: Seasonal forecast probabilities for El Niño (Red bars), ENSO-Neutral (Green bars) , and La Niña (Blue bars). Actual probabilities are indicated below the plot.

- **WHAT?**
  - La Niña (El Niño), a periodic cooling (warming) of the equatorial Pacific waters, causes atmospheric conditions that are favourable for tropical cyclones.
- **WHAT NOW?**
  - The 2015/6 very strong El Niño is fading.
- **WHAT NEXT?**
  - El Niño expected to disappear by May or June.
  - La Niña chances are ~70% at the peak of the Hurricane season (i.e. between August and October).

Caribbean
Landfall probabilities

- **Klotzbach and Gray**
- **Probability for at least one major (category 3, 4 or 5) hurricane tracking into the Caribbean (10-20°N, 60-88°W)**
  - **40% (which is close to a 20th Century average of 42%)**

- **TSR - Caribbean Forecast**
- Lesser Antilles Land falling Numbers in 2016

  Possible **2 Named storms** and **1 Hurricane**

- Tropical North Atlantic Ocean, Caribbean Sea and Mexico (Belize)

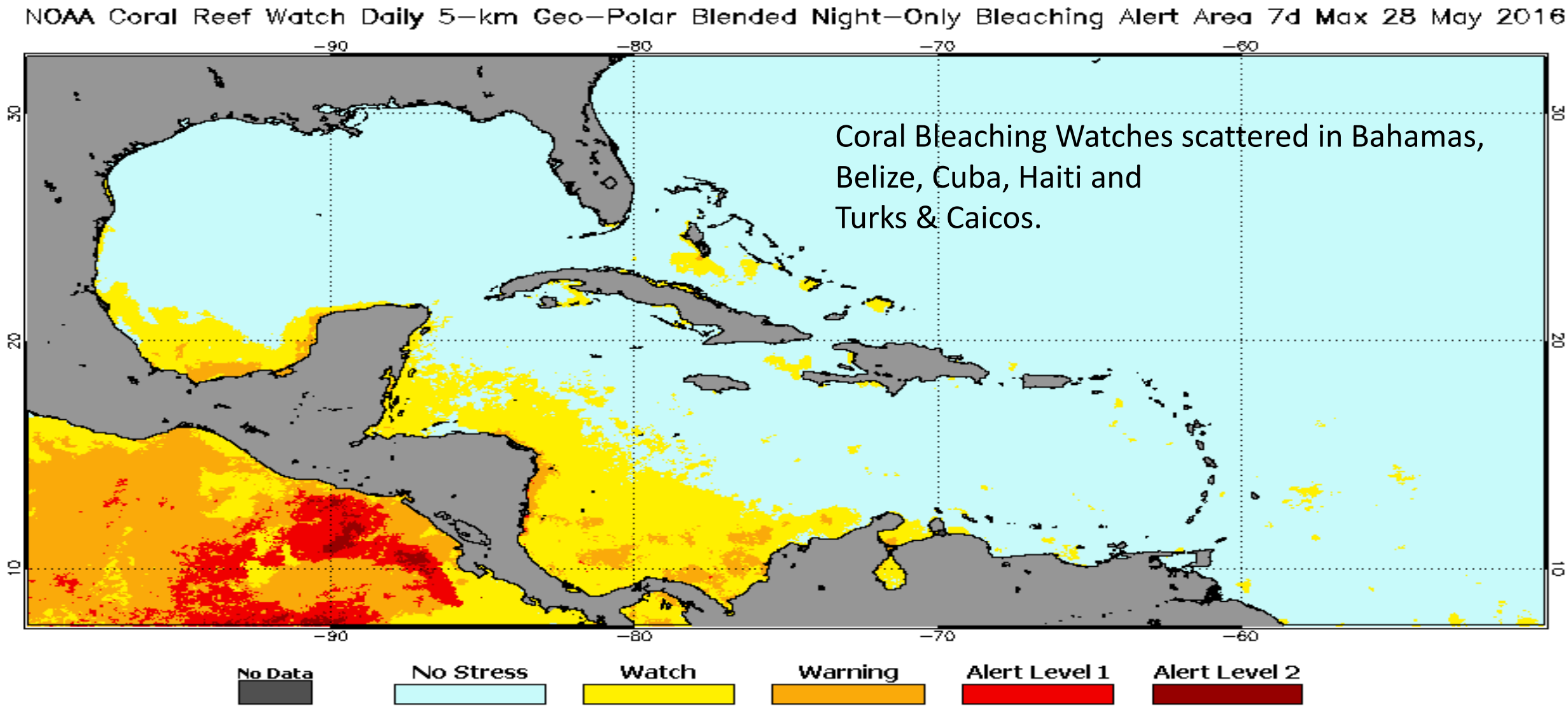
  Possible **12 Named Storms** and **7 Hurricanes**, incl. **4 intense hurricanes**.

Disclaimer

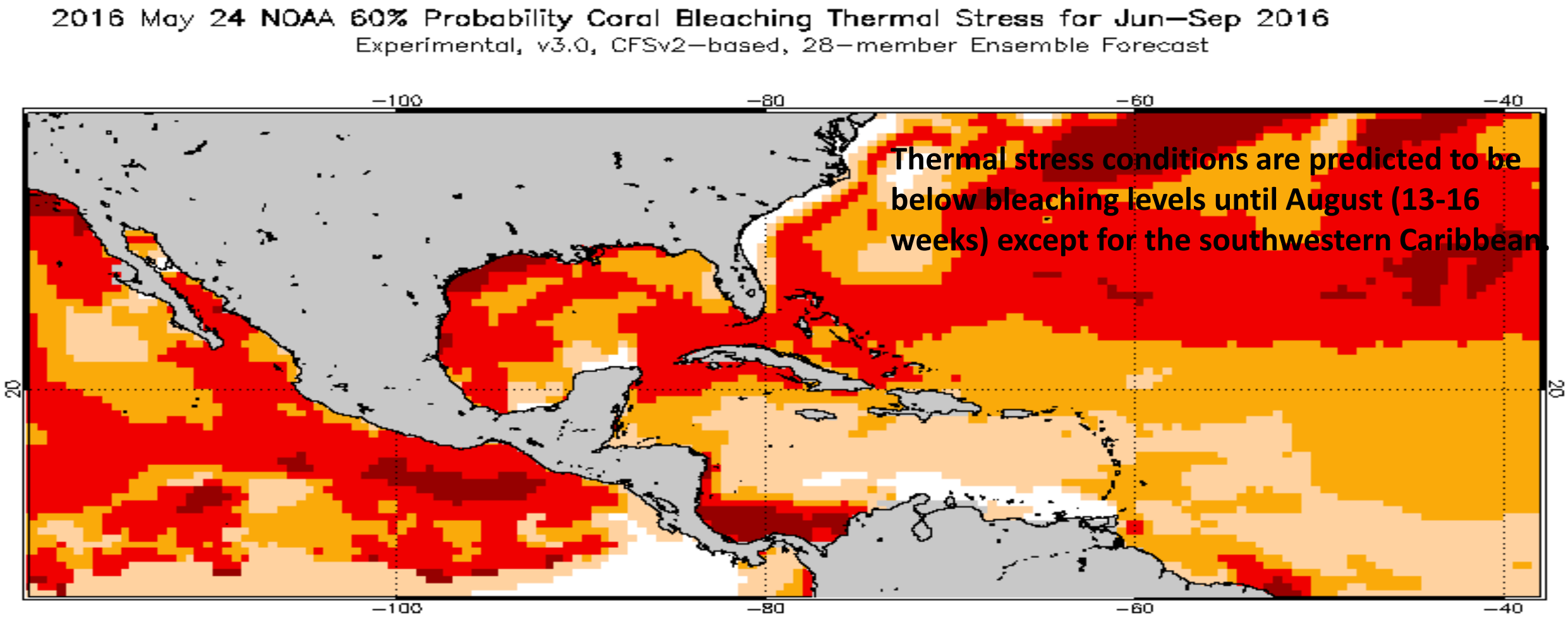
DISCLAIMER

- CIMH is providing special weather interpretation of the current and forecasted tropical weather affecting the Caribbean region.
- CIMH is not an official forecasting agency.

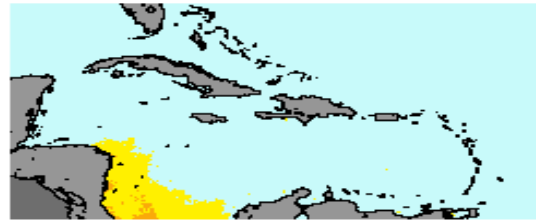
Caribbean Coral Reef Watch

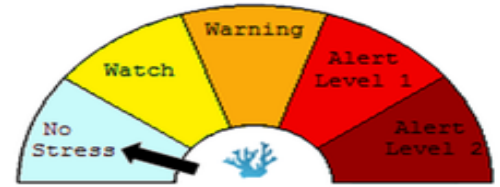


Outlook (Jun – Sept 2016)

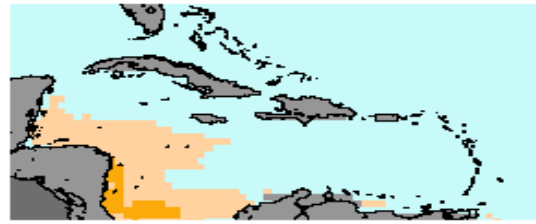


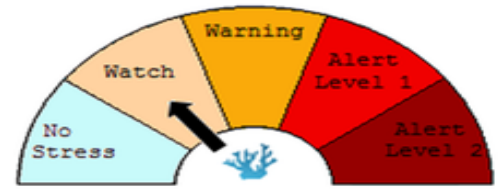
Caribbean Satellite Bleaching Alert Area and Outlook
2016-04-30



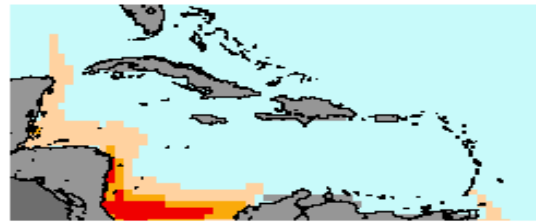


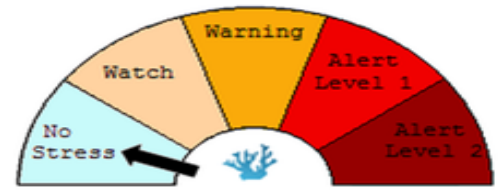
Current Coral Bleaching Alert Level



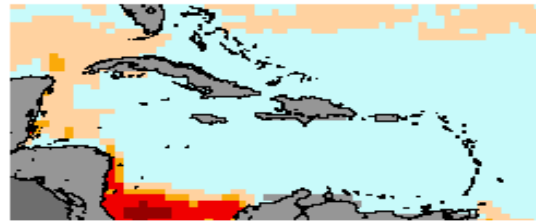


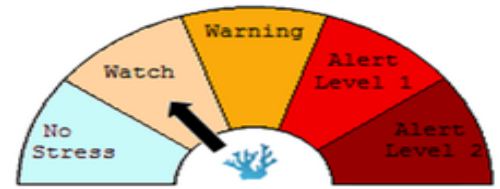
Bleaching Outlook Weeks 1-4 (May)



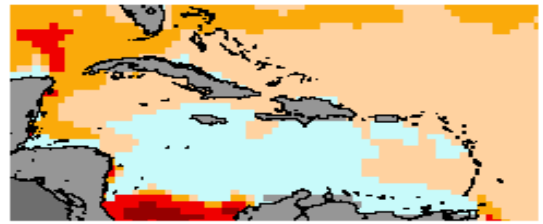


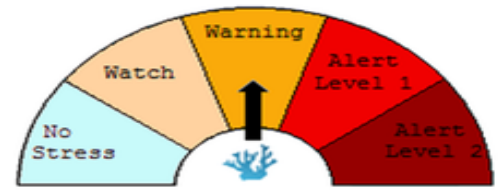
Bleaching Outlook Weeks 5-8 (Jun)



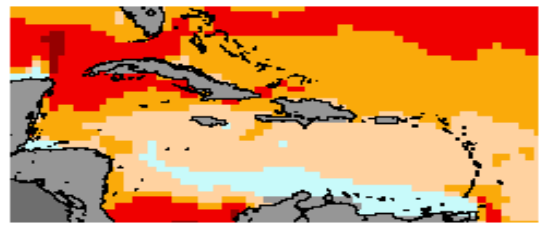


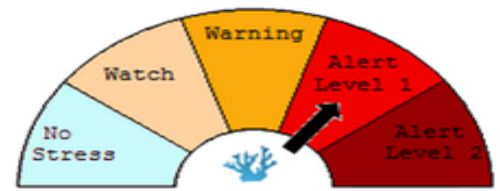
Bleaching Outlook Weeks 9-12 (Jul)





Bleaching Outlook Weeks 13-16 (Aug)





Bleaching Outlook Weeks 17-20 (Sep)

The Wet/Hurricane Season Outlook

Summary

- **For June-July-August 2016**:
  - **Gradual drought alleviation** across the region.
  - Surface water reservoirs recharge, soil moisture replenishment and increased river flow.
  - Water shortage related problems in agriculture to disappear in many places.
  - **Where it has not already started, the wet season may start abruptly** in June. Rains to often disrupt outdoor activities.
  - Extremely wet spells may occur. Serious **potential for flash flooding and landslides**.
- **For September-October-November 2016:**
  - Probably wetter than usual, ending drought in most places.
  - Excessive rainfall could **increase risk of flash flooding & long-term flooding**.
  - **Chance of more hurricane activity** than in past five years.
- **Beyond November 2016:**
  - La Niña increases chances of a **wetter dry season (secondary wet season in coastal Guianas) for most**, This could be similar to dry season of 2011 (where some said there was no dry season).

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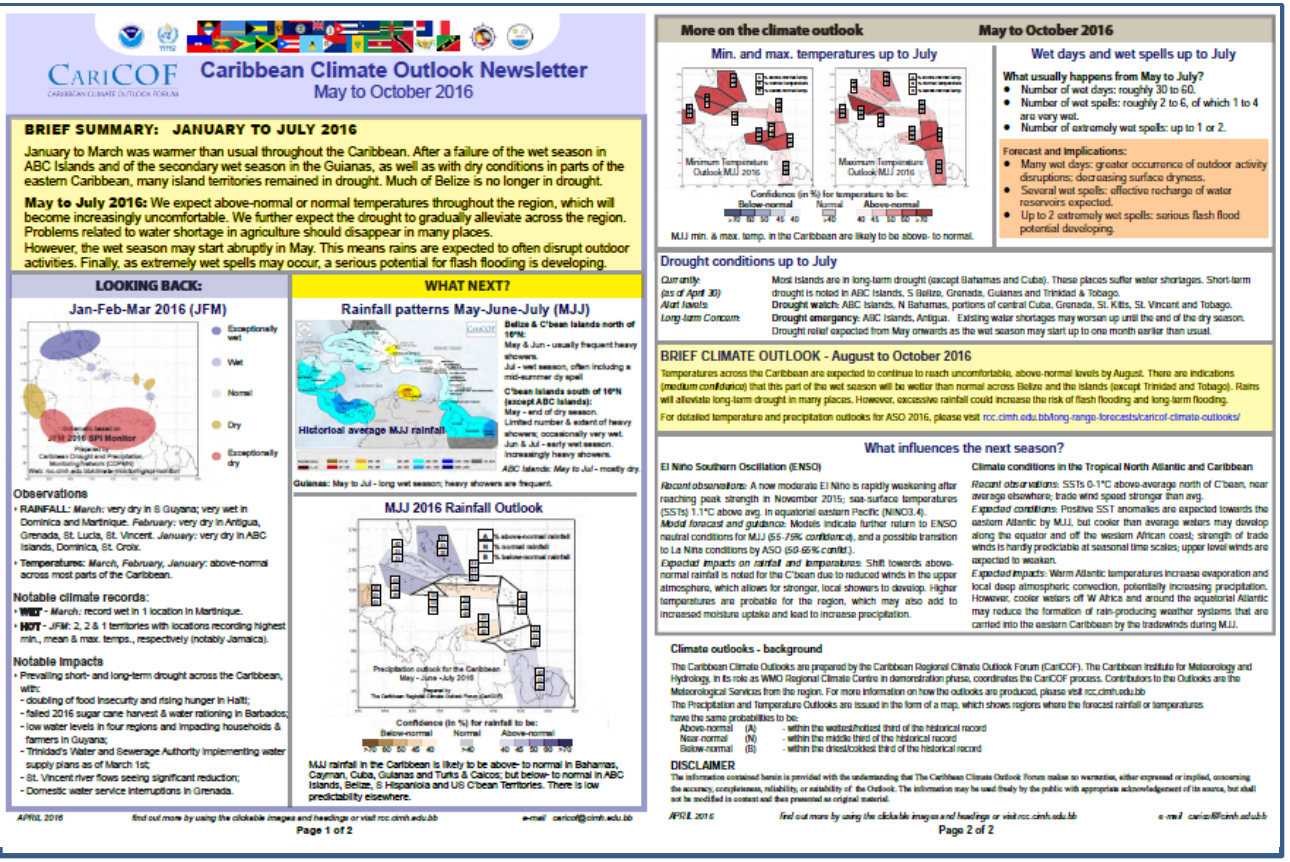
CARIBBEAN CLIMATE OUTLOOK FORUM

Where can we read about this?

Our bulletins aim to offer more digestible overviews:


CariCOF Caribbean Climate Outlook Newsletter
May to October 2016

BRIEF SUMMARY: JANUARY TO JULY 2016

January to March was warmer than usual throughout the Caribbean. After a failure of the wet season in ABC Islands and of the secondary wet season in the Guianas, as well as with dry conditions in parts of the eastern Caribbean, many island territories remained in drought. Much of Belize is no longer in drought.

May to July 2016: We expect above-normal or normal temperatures throughout the region, which will become increasingly uncomfortable. We further expect the drought to gradually alleviate across the region. Problems related to water shortage in agriculture should disappear in many places.
However, the wet season may start abruptly in May. This means rains are expected to often disrupt outdoor activities. Finally, as extremely wet spells may occur, a serious potential for flash flooding is developing.

LOOKING BACK:

Jan-Feb-Mar 2016 (JFM)

Observations
- RAINFALL: March: very dry in S Guyana; very wet in Dominica and Martinique. February: very dry in Antigua, Grenada, St. Lucia, St. Vincent. January: very dry in ABC Islands, Dominica, St. Croix.
- Temperatures: March, February, January: above-normal across most parts of the Caribbean.

Notable climate records:
- WET - March: record wet in 1 location in Martinique.
- HOT - JFM: 2, 2 & 1 territories with locations recording highest min., mean & max. temps., respectively (notably Jamaica).

Notable impacts
- Prevailing short- and long-term drought across the Caribbean, with:
- doubling of food insecurity and rising hunger in Haiti;
- failed 2016 sugar cane harvest & water rationing in Barbados;
- low water levels in four regions and impacting households & farmers in Guyana;
- Trinidad's Water and Sewerage Authority implementing water supply plans as of March 1st;
- St. Vincent river flows seeing significant reduction;
- Domestic water service interruptions in Grenada.

WHAT NEXT?

Rainfall patterns May-June-July (MJJ)

Belize & C'bean islands north of 16°N:
May & Jun - usually frequent heavy showers.
Jul - wet season, often including a mid-summer dry spell

C'bean islands south of 16°N (except ABC Islands):
May - end of dry season. Limited number & extent of heavy showers; occasionally very wet.
Jun & Jul - early wet season. Increasingly heavy showers.

ABC Islands: May to Jul - mostly dry.

Guianas: May to Jul - long wet season; heavy showers are frequent.

MJJ 2016 Rainfall Outlook

MJJ rainfall in the Caribbean is likely to be above- to normal in Bahamas, Cayman, Cuba, Guianas and Turks & Caicos; but below- to normal in ABC Islands, Belize, S Hispaniola and US C'bean Territories. There is low predictability elsewhere.

APRIL 2016 — find out more by using the clickable images and headings or visit rcc.cimh.edu.bb — e-mail: caricof@cimh.edu.bb

Page 1 of 2

More on the climate outlook — May to October 2016

Min. and max. temperatures up to July

MJJ min. & max. temp. in the Caribbean are likely to be above- to normal.

Wet days and wet spells up to July

What usually happens from May to July?
- Number of wet days: roughly 30 to 60.
- Number of wet spells: roughly 2 to 6, of which 1 to 4 are very wet.
- Number of extremely wet spells: up to 1 or 2.

Forecast and implications:
- Many wet days: greater occurrence of outdoor activity disruptions; decreasing surface dryness.
- Several wet spells: effective recharge of water reservoirs expected.
- Up to 2 extremely wet spells: serious flash flood potential developing.

Drought conditions up to July

Currently (as of April 30): Most islands are in long-term drought (except Bahamas and Cuba). These places suffer water shortages. Short-term drought is noted in ABC Islands, S Belize, Grenada, Guianas and Trinidad & Tobago.
Alert levels: Drought watch: ABC Islands, N Bahamas, portions of central Cuba, Grenada, St. Kitts, St. Vincent and Tobago.
Long-term Concern: Drought emergency: ABC Islands, Antigua. Existing water shortages may worsen up until the end of the dry season.
Drought relief expected from May onwards as the wet season may start up to one month earlier than usual.

BRIEF CLIMATE OUTLOOK - August to October 2016

Temperatures across the Caribbean are expected to continue to reach uncomfortable, above-normal levels by August. There are indications (medium confidence) that this part of the wet season will be wetter than normal across Belize and the islands (except Trinidad and Tobago). Rains will alleviate long-term drought in many places. However, excessive rainfall could increase the risk of flash flooding and long-term flooding.

For detailed temperature and precipitation outlooks for ASO 2016, please visit rcc.cimh.edu.bb/long-range-forecasts/caricof-climate-outlooks/

What influences the next season?

El Nino Southern Oscillation (ENSO)

Recent observations: A now moderate El Niño is rapidly weakening after reaching peak strength in November 2015; sea-surface temperatures (SSTs) 1.1°C above avg. in equatorial eastern Pacific (NINO3.4).
Model forecast and guidance: Models indicate further return to ENSO neutral conditions for MJJ (55-75% confidence), and a possible transition to La Nina conditions by ASO (50-65% confid.).
Expected impacts on rainfall and temperatures: Shift towards above-normal rainfall is noted for the C'bean due to reduced winds in the upper atmosphere, which allows for stronger, local showers to develop. Higher temperatures are probable for the region, which may also add to increased moisture uptake and lead to increase precipitation.

Climate conditions in the Tropical North Atlantic and Caribbean

Recent observations: SSTs 0-1°C above-average north of C'bean, near average elsewhere; trade wind speed stronger than avg.
Expected conditions: Positive SST anomalies are expected towards the eastern Atlantic by MJJ, but cooler than average waters may develop along the equator and off the western African coast; strength of trade winds is hardly predictable at seasonal time scales; upper level winds are expected to weaken.
Expected impacts: Warm Atlantic temperatures increase evaporation and local deep atmospheric convection, potentially increasing precipitation. However, cooler waters off W Africa and around the equatorial Atlantic may reduce the formation of rain-producing weather systems that are carried into the eastern Caribbean by the tradewinds during MJJ.

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/coldest 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.

APRIL 2016 — find out more by using the clickable images and headings or visit rcc.cimh.edu.bb — e-mail: caricof@cimh.edu.bb

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CariCOF Caribbean Climate Outlook Newsletter

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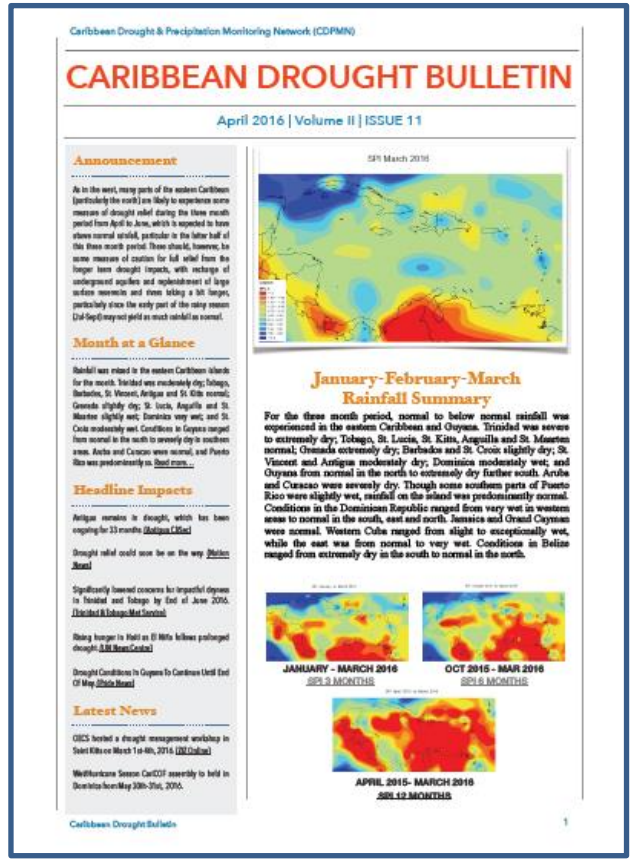
Caribbean Drought & Precipitation Monitoring Network (CDPMN)

CARIBBEAN DROUGHT BULLETIN

April 2016 | Volume II | ISSUE 11

Announcement

Month at a Glance

Headline Impacts

Latest News

January-February-March Rainfall Summary

JANUARY - MARCH 2016 SPI 3 MONTHS

OCT 2015 - MAR 2016 SPI 6 MONTHS

APRIL 2015- MARCH 2016 SPI 12 MONTHS

Caribbean Drought Bulletin

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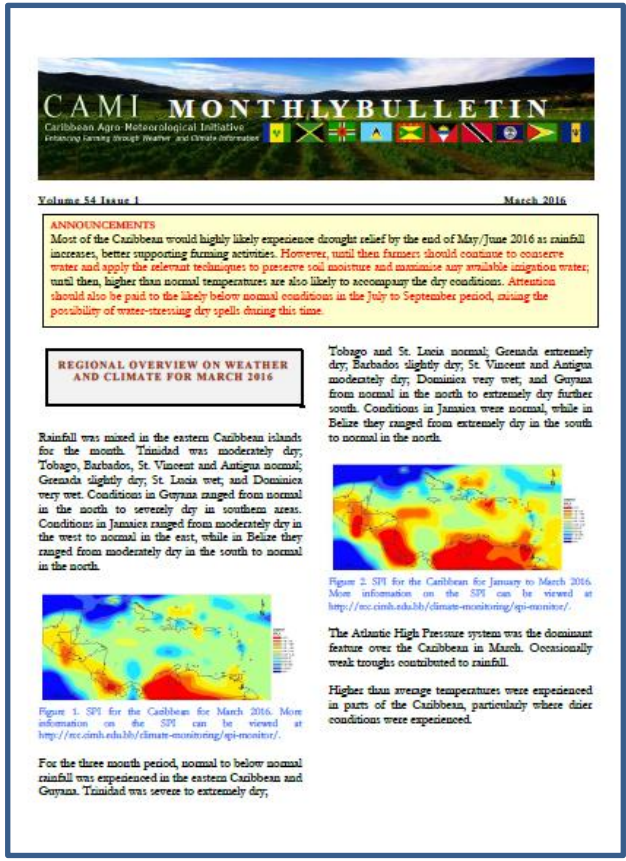
CAMI MONTHLY BULLETIN

Caribbean Agro-Meteorological Initiative

Volume 54 Issue 1 — March 2016

ANNOUNCEMENTS

Most of the Caribbean would highly likely experience drought relief by the end of May/June 2016 as rainfall increases, better supporting farming activities. However, until then farmers should continue to conserve water and apply the relevant techniques to preserve soil moisture and maximise any available irrigation water; until then, higher than normal temperatures are also likely to accompany the dry conditions. Attention should also be paid to the likely below normal conditions in the July to September period, raising the possibility of water-stressing dry spells during this time.

REGIONAL OVERVIEW ON WEATHER AND CLIMATE FOR MARCH 2016

Rainfall was mixed in the eastern Caribbean islands for the month. Trinidad was moderately dry; Tobago, Barbados, St. Vincent and Antigua normal; Grenada slightly dry; St. Lucia wet; and Dominica very wet. Conditions in Guyana ranged from normal in the north to severely dry in southern areas. Conditions in Jamaica ranged from moderately dry in the west to normal in the east, while in Belize they ranged from moderately dry in the south to normal in the north.

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

For the three month period, normal to below normal rainfall was experienced in the eastern Caribbean and Guyana. Trinidad was severe to extremely dry; Tobago and St. Lucia normal; Grenada extremely dry; Barbados slightly dry; St. Vincent and Antigua moderately dry; Dominica very wet; and Guyana from normal in the north to extremely dry further south. Conditions in Jamaica were normal, while in Belize they ranged from extremely dry in the south to normal in the north.

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

The Atlantic High Pressure system was the dominant feature over the Caribbean in March. Occasionally weak troughs contributed to rainfall.

Higher than average temperatures were experienced in parts of the Caribbean, particularly where drier conditions were experienced.

Regional Agroclimatic Bulletin

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Thank you

All data, information, tools and products are available at

rcc.cimh.edu.bb

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