Climate Services in support of decision-making in the health sector

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CARIBBEAN INSTITUTE FOR METEOROLOGY AND HYDROLOGY

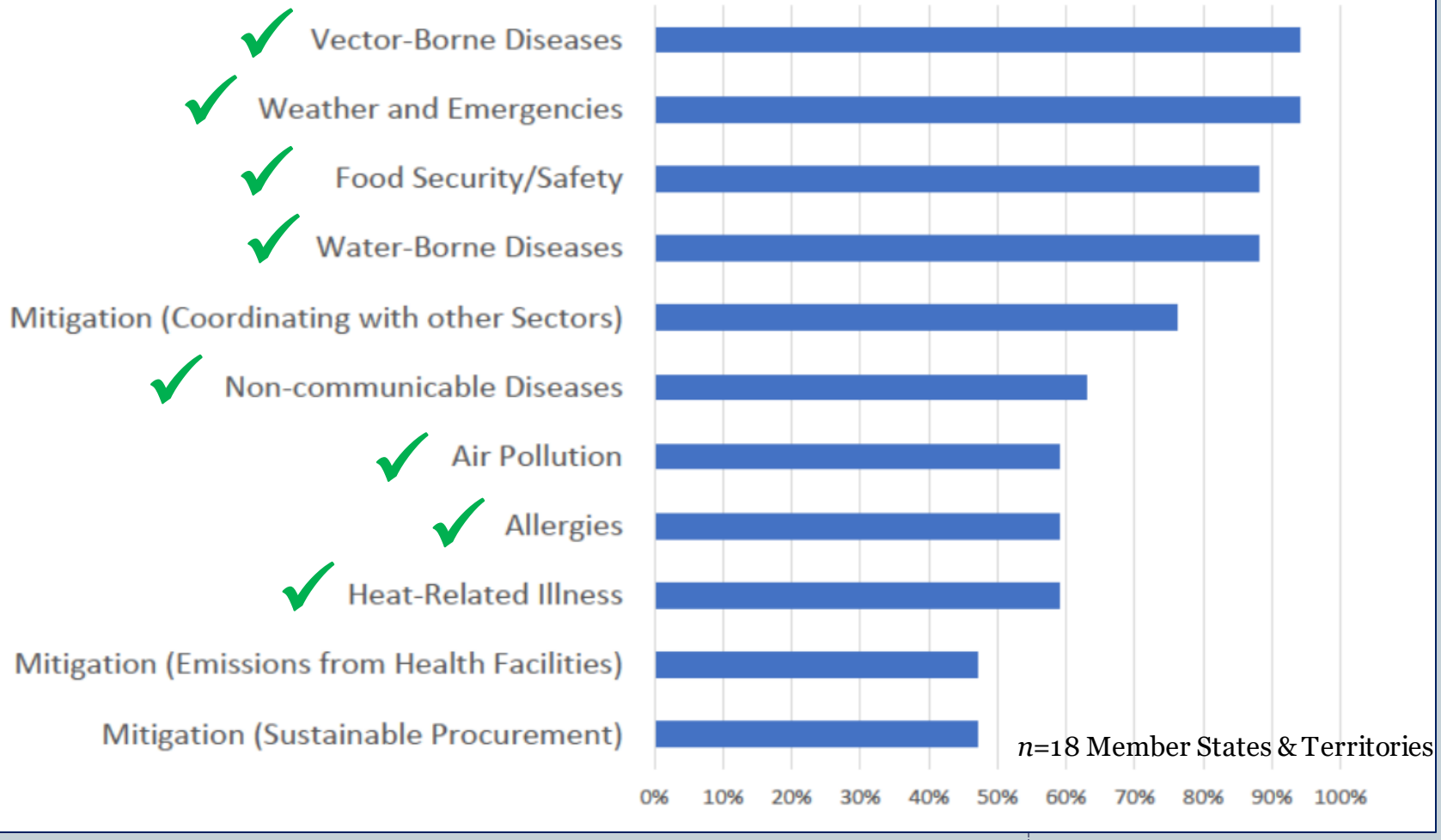
Third Global Conference on Health and Climate Change
16-17 October 2018
St. George's, Grenada

Functions of the Caribbean Institute for Meteorology and Hydrology (CIMH)

- **WMO Regional Training Centre** - Train various categories of meteorological and hydrological personnel
- Operate as a **centre of research** in meteorology, hydrology and associated sciences
- **Regional Climate Data Centre** - Data collection, storage, & dissemination
- **WMO Regional Instrument Centre** – Develop, maintain, repair, and calibrate meteorological & hydrological instruments
- Regional **Centre of Excellence for Training in Satellite Meteorology**
- **WMO Regional Climate Centre** – designated May 2017
- Caribbean **Centre for Climate and Environmental Simulations**
- WMO Pan-American **Centre for Sand and Dust Storm Warning Advisory and Assessment System**
- **Advisor to regional governments** on matters related to meteorology, climatology & hydrology
- Provide specialized **services to industry**

An affiliate of the UWI since 1972

Country Priorities for Climate and Health Action



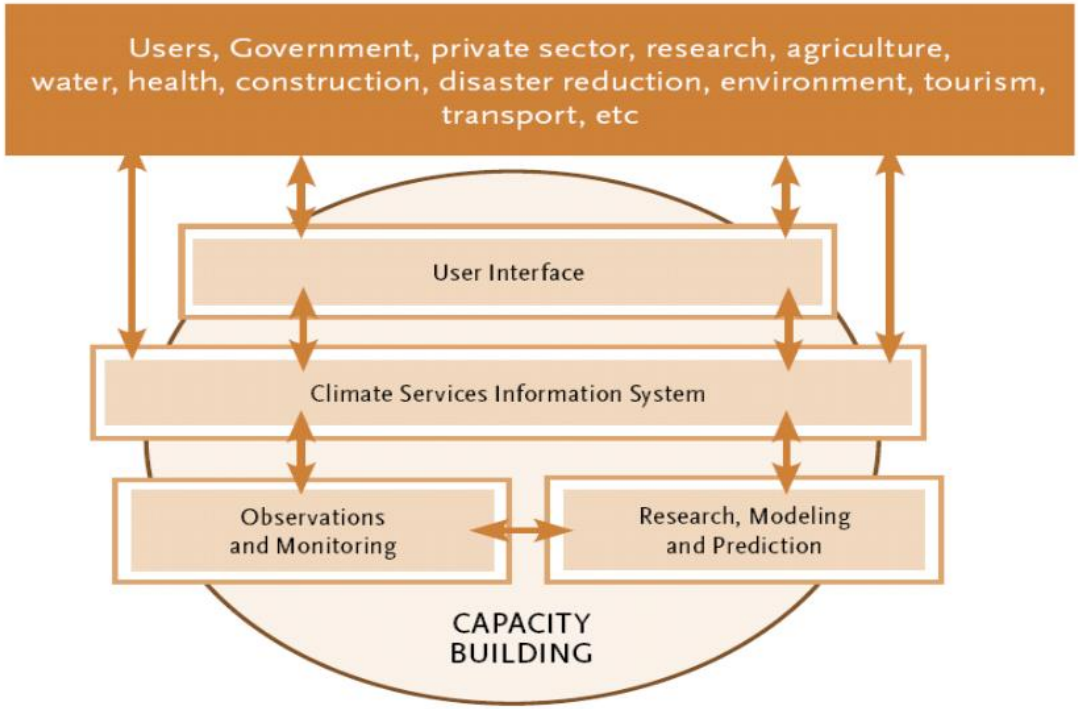
- Caribbean countries rated the following topics as "Extremely Important" or "Important" for a climate change and health agenda
- Many of these are topics where CIMH is actively doing **atmospheric monitoring and forecasting**...and increasingly **inter-disciplinary** work

Source: PAHO Country Survey on Health and Climate Change 2017

Background - GFCS Vision and Pillars

Vision

"To enable better management of the risks of climate variability and change and adaptation to climate change, through the development and incorporation of science-based climate information and prediction into planning, policy and practice on the global, regional and national scale."



Caribbean Roll Out begun in May 2013 in Trinidad and Tobago

REGIONAL WORKSHOP ON CLIMATE SERVICES AT THE NATIONAL LEVEL FOR THE CARIBBEAN

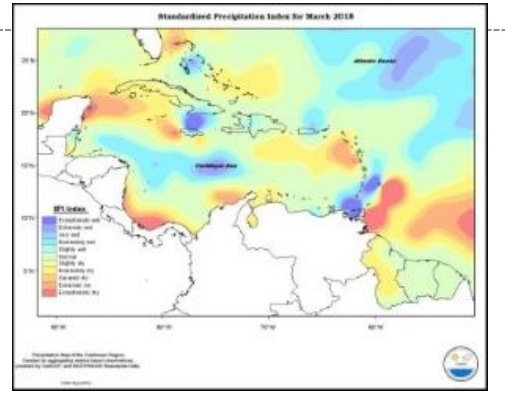
Since then national road map exercises in Belize, Trinidad and Tobago, Suriname, Guyana.

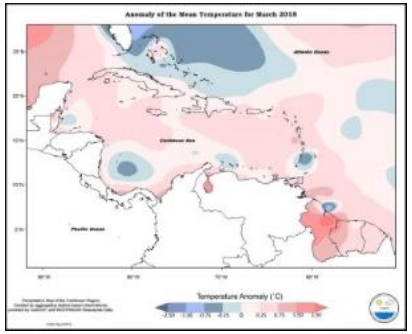
Endorsed at the 53rd Special Meeting of COTED (Environment and Sustainable Development).

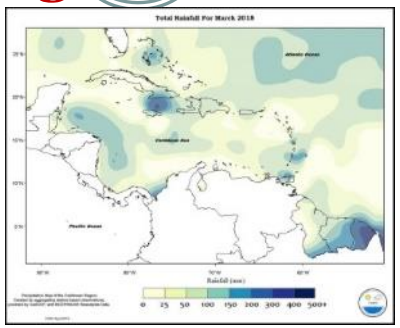
Climate Monitoring product suite

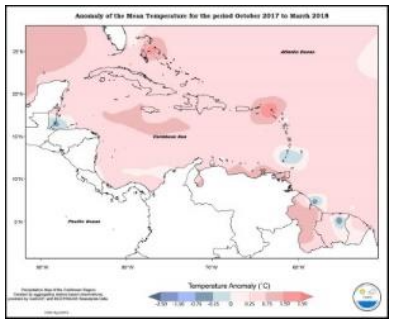
Drought and rainfall, temperature

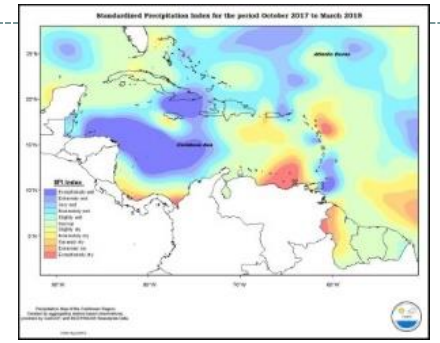
Supports our regional Climate Watch

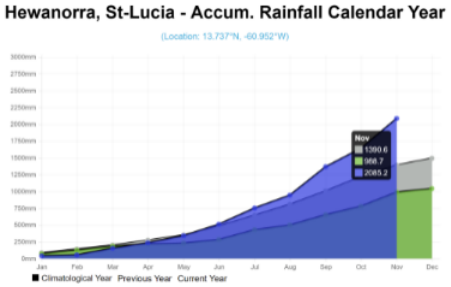


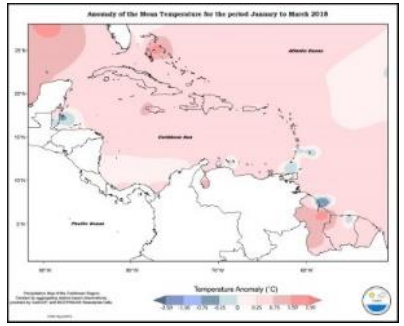


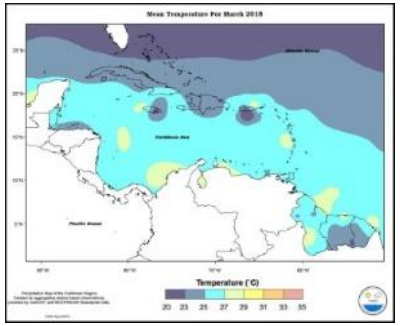


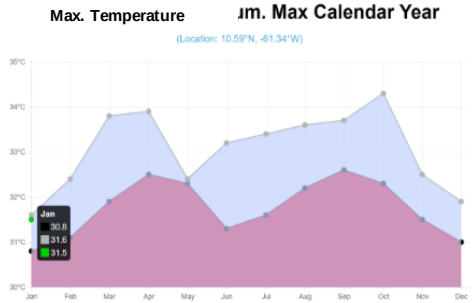


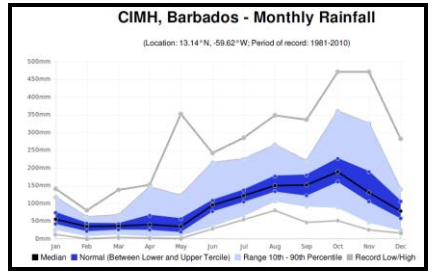


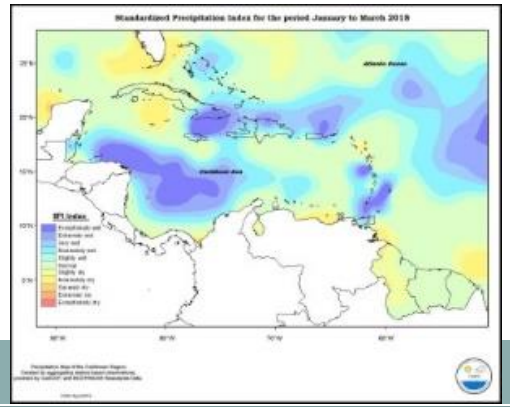








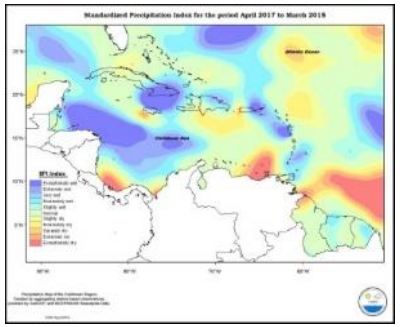


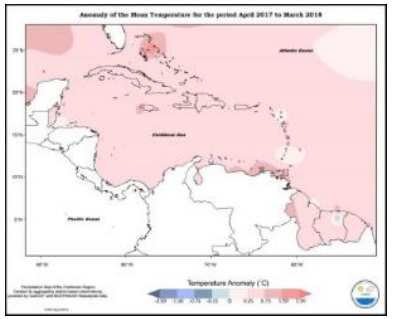


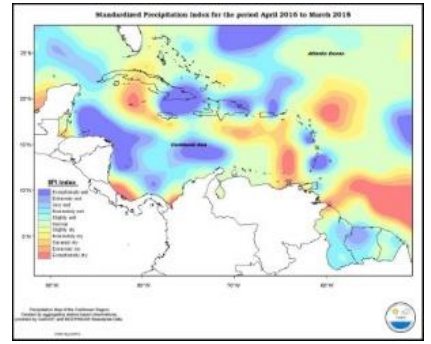
Produced through two in-house-built tools

Caribbean Climate Monitor

CariCOF Outlook Generator



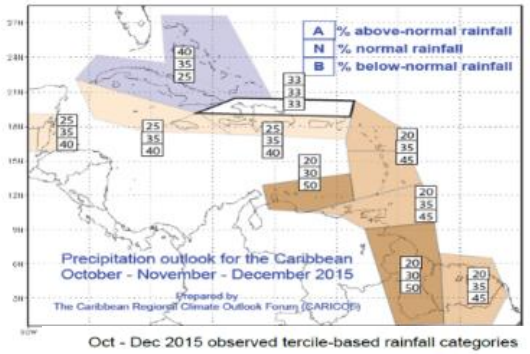




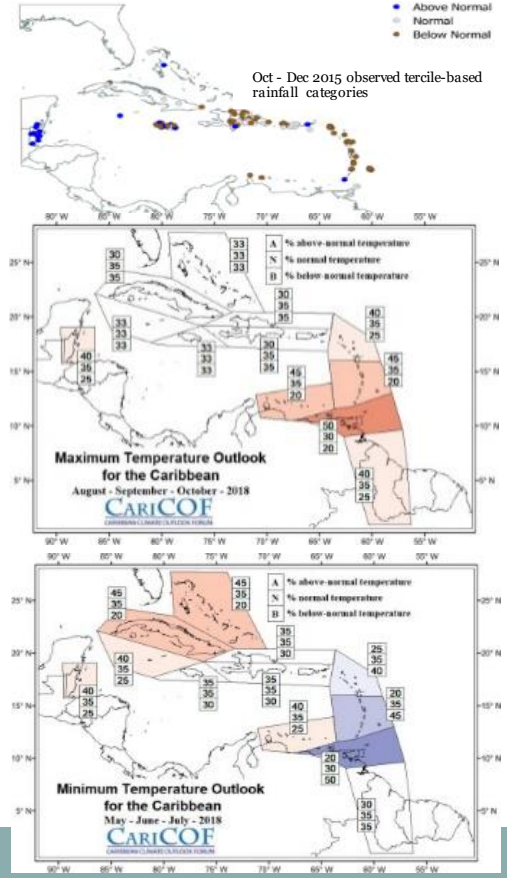
Reference Climatologies

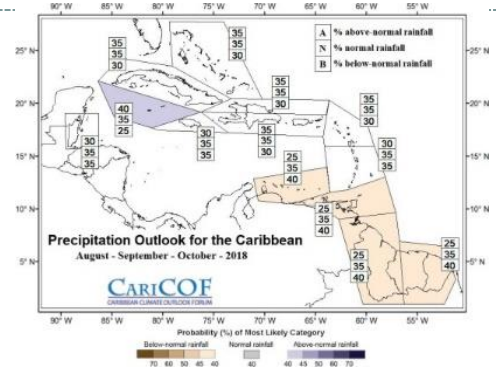
https://rcc.cimh.edu.bb/caribbean-climatology/1981-2010/

Climate Forecasts product suite

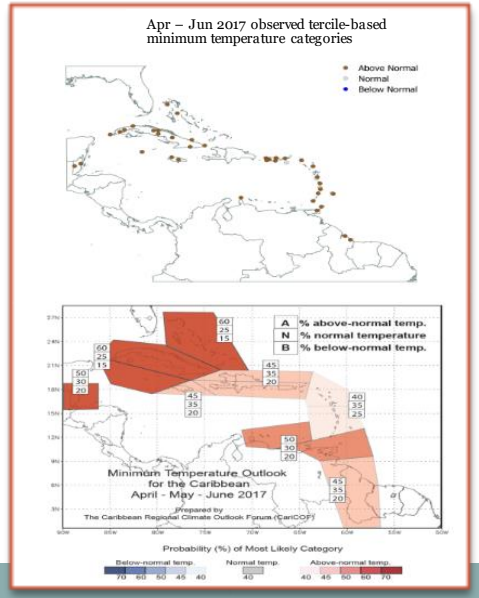


Oct - Dec 2015 observed tercile-based rainfall categories





0-/3-ml Tercile-based precip. and temp. outlooks + verification



Climate Products

Partnering with the NMHSs

Seasonal forecasts up to 3-6 month ahead

Rainfall totals
Mean, maximum and minimum temperatures

More meaningful Drought – alerting system

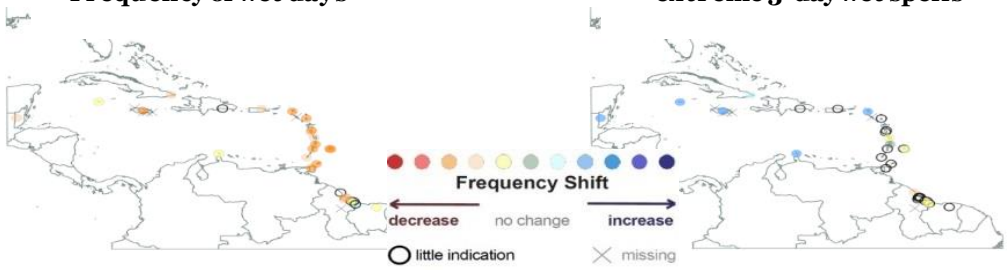
Wet days

(Extreme) wet spells

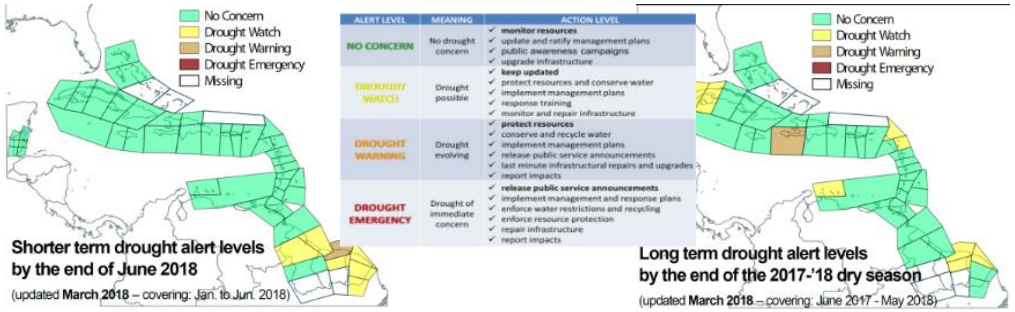
Coral bleaching

MJJ 2018 Frequency of wet days

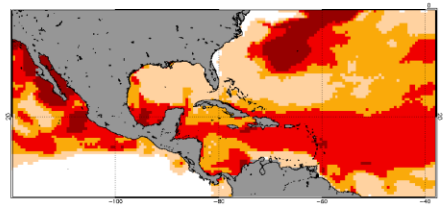
MJJ 2018 frequency of extreme 3-day wet spells



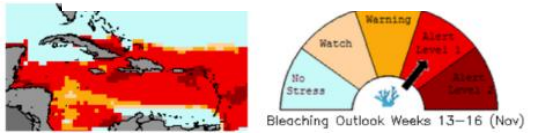
Thematic / hazard-specific outlooks



Coral bleaching thermal stress for Aug. to Nov. 2017



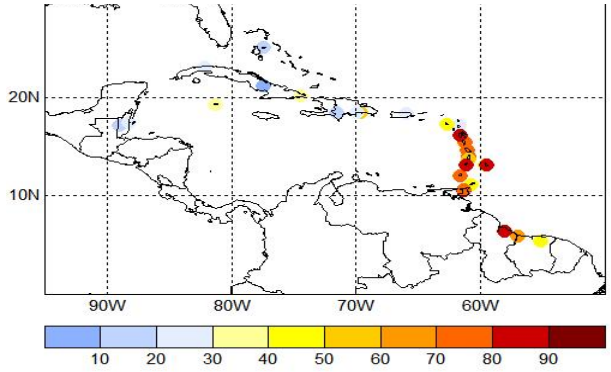
Coral bleaching alert levels (0-/4--ml)



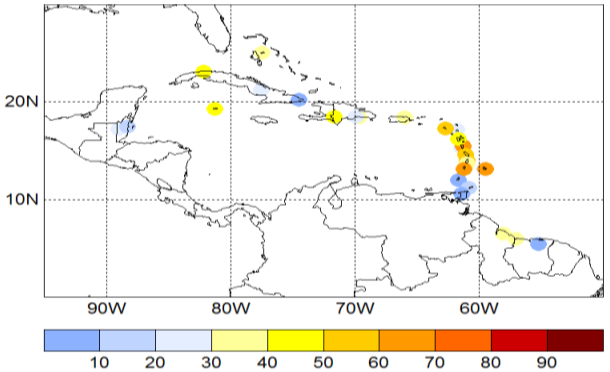
Experimental climate products

Seasonal heatwave frequency outlooks (up to 6 months)

Probability of at least 14 heatwave days between Jun. & Sep.

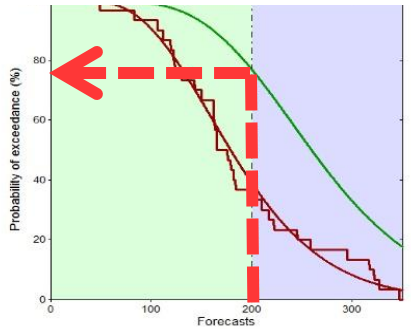


Probability of at least 60 heatwave days between Jun. & Nov.

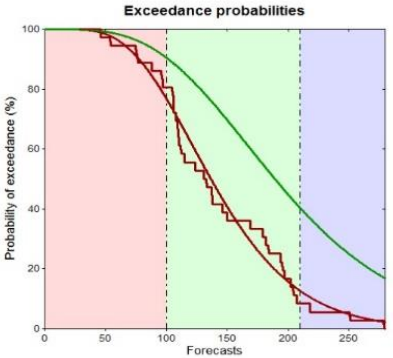


Seasonal rainfall exceedance outlooks for crop water demand (3 months)

Probability of meeting water demand for sweet potato

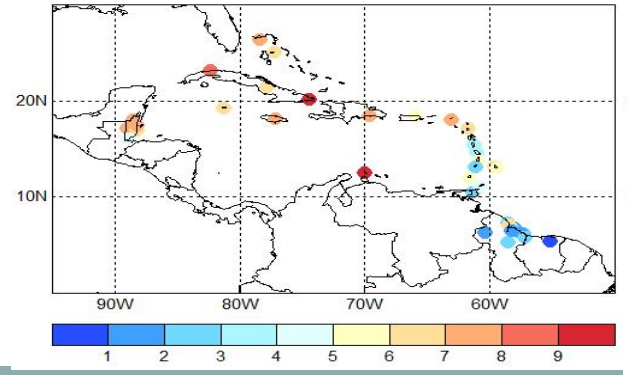


lity of meeting water nd for

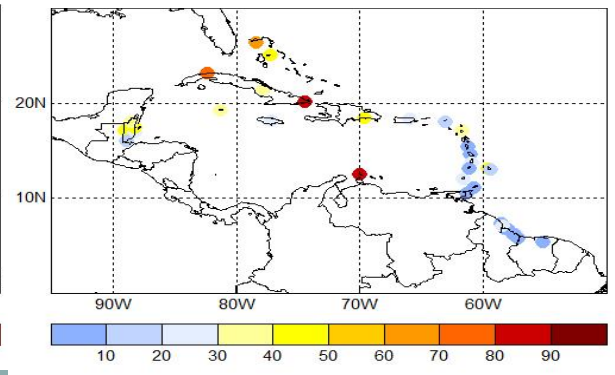


Seasonal dry spells frequency outlooks (3 months)

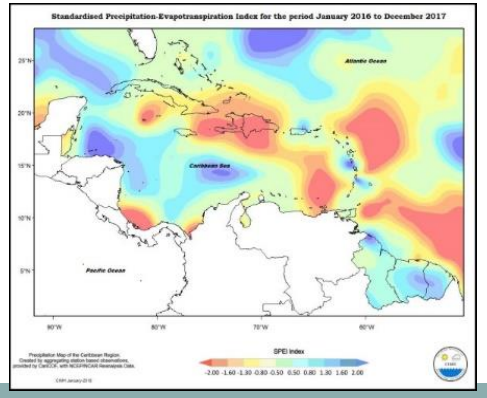
MAX. number of 7-day dry spells
7d max MJJ2018

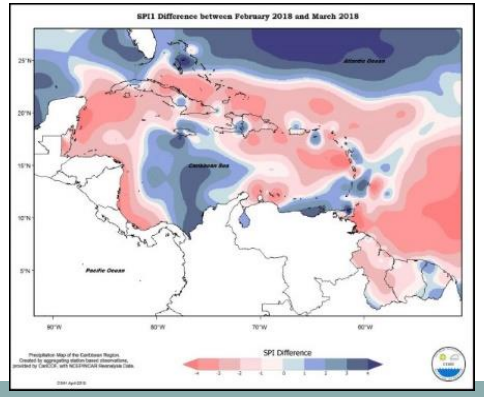


Probability of at least ONE 15-day dry spell between May & Jul.



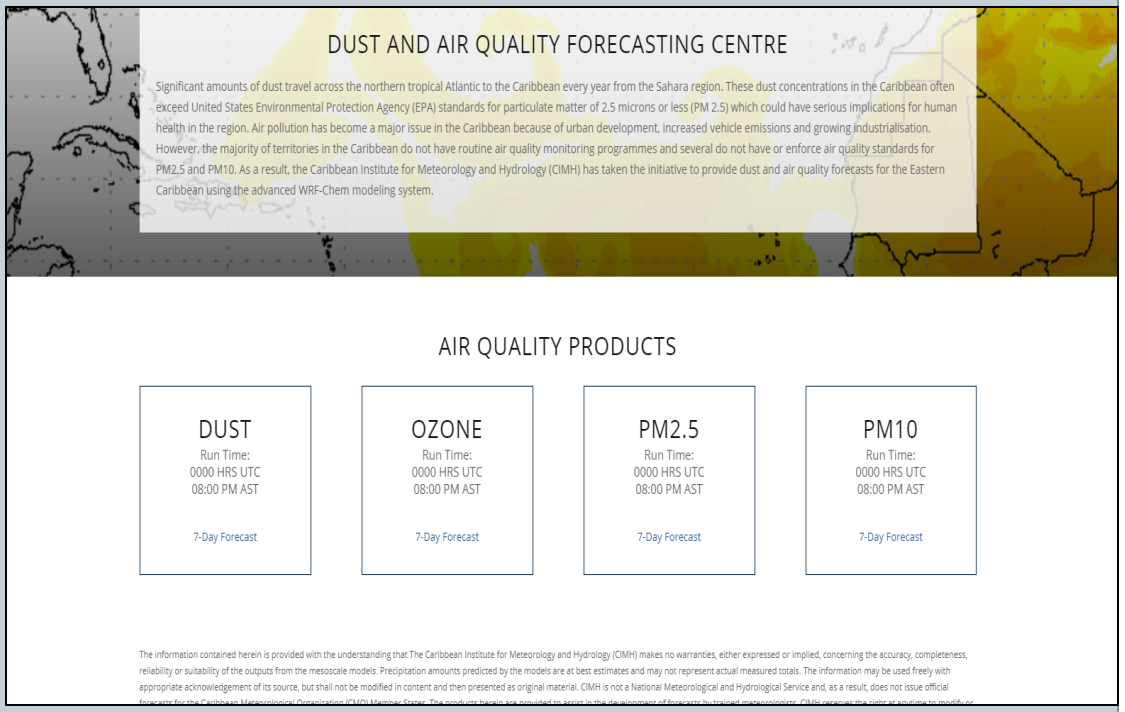
Drought monitoring products (SPEI, SPI change)





Sand and Dust Storm-Warning and Alerting System

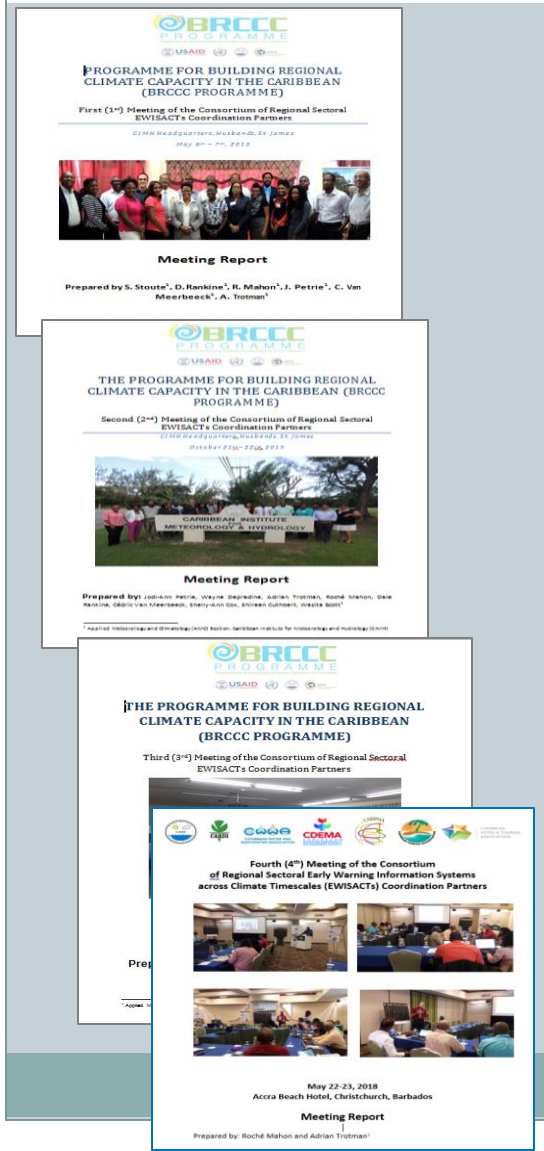
- CIMH is the Pan-American node of the network
- Significant amounts of desert dust travel to the Caribbean annually from the Sahara region
  - Concentrations in the Caribbean often exceed WHO and United States Environmental Protection Agency (EPA) standards for PM2.5 and PM10
  - Serious implications for human health in the region
- CIMH has embarked on providing dust and air quality forecasts for the Caribbean
  - Weather Research and Forecasting model coupled with Chemistry (WRF-Chem)
    - Coupled weather prediction/dispersion model- simulates the release and transport of constituents; Saharan dust transport and concentration
    - Coupled weather/dispersion/air quality model with full interaction of chemical species- prediction of PM2.5, PM10 and ozone (O_3)

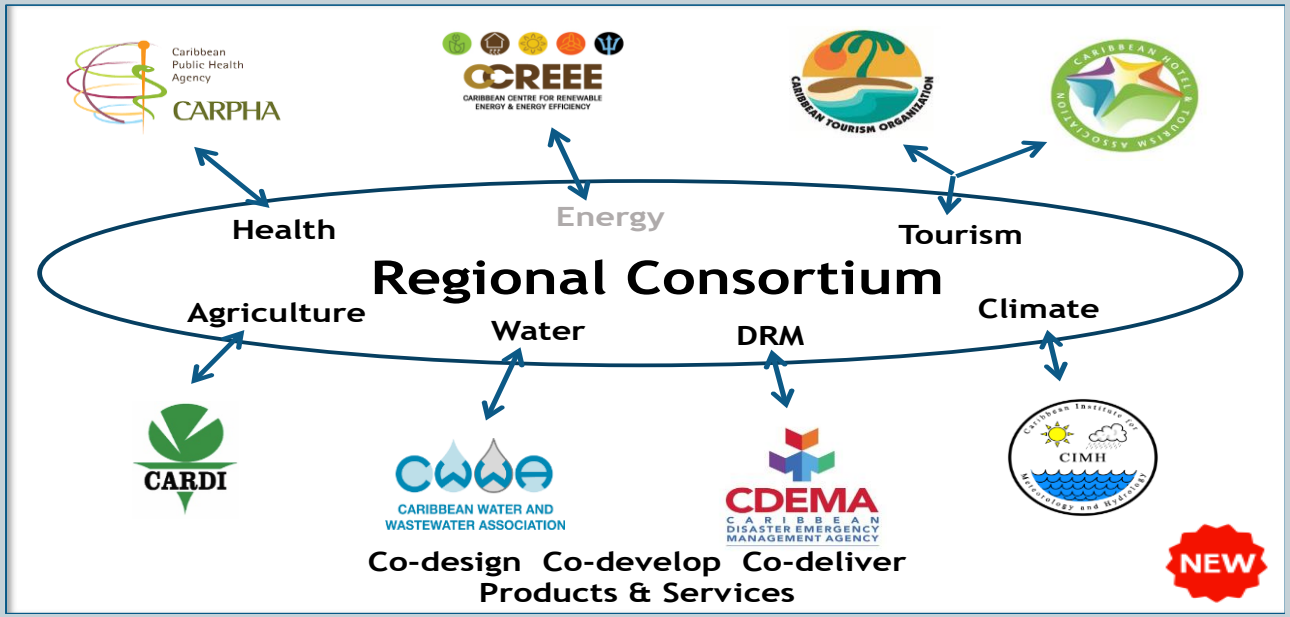


Find the latest 7 day forecast for dust, ozone, PM 2.5 and PM 10 here: http://dafc.cimh.edu.bb/

Consortium of Sectoral EWISACTs Partners

The Consortium is a key regional mechanism to champion the design, development and delivery of tailored climate products and services in the agriculture and food security, disaster risk management, energy, health, tourism and water sectors.





4 Consortium Meetings hosted by CIMH:

May 2015, October 2015, July 2016, May 2018

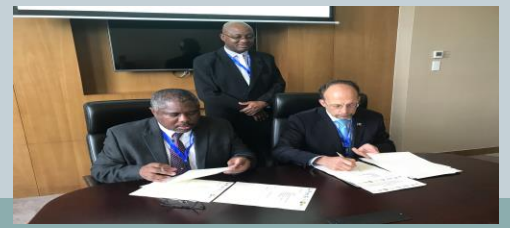
Recognised Observers – 5Cs, UWI CSGM, CCCCC, OECS

New partnerships being brokered – CCREEE

CTO and CHTA sign the LoA, September 16th, 2016

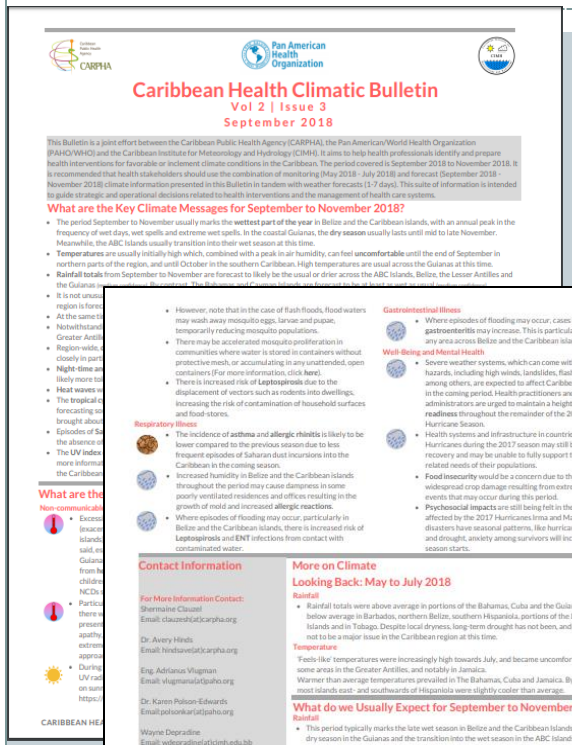
CWWA signs the LoA, October 26th, 2016

CARDI and CDEMA sign the LoA, December 6th, 2016



CARPHA and CIMH sign the LoA, April 26th, 2017

Caribbean Health-Climatic Bulletin


Caribbean Health Climatic Bulletin
Vol 2 | Issue 3
September 2018

What are the Key Climate Messages for September to November 2018?

Contact Information

More on Climate

Looking Back: May to July 2018

What do we Usually Expect for September to November?

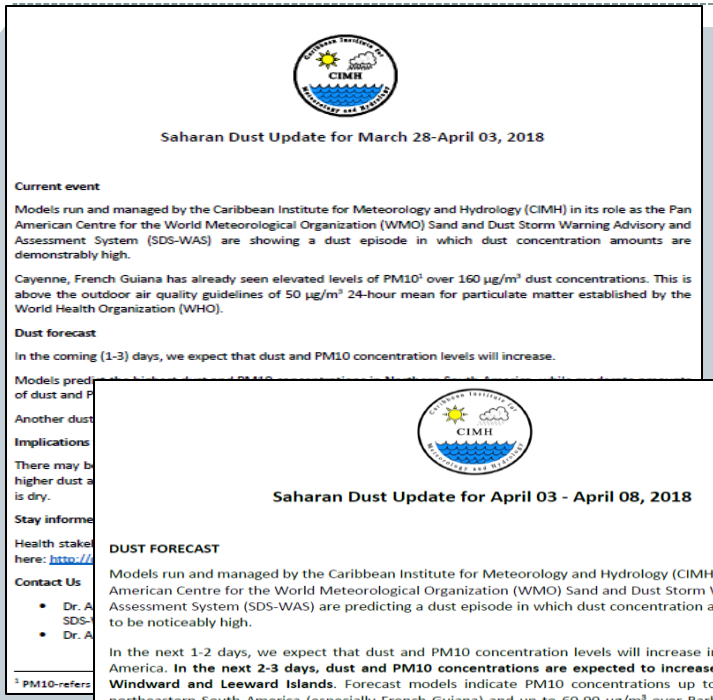
Disclaimer

6 issues since May 2017

- Insights on typical climate conditions for upcoming season;
- An outlook (how wet, how dry, how hot etc.) for the upcoming season
- Key climate messages for that period; and
- Advises on health implications arising from seasonal climate information.

Find the latest HCB here: http://rcc.cimh.edu.bb/caribbean-health-climatic-bulletin/

Special Saharan Dust Advisories


Saharan Dust Update for March 28-April 03, 2018

Current event

Models run and managed by the Caribbean Institute for Meteorology and Hydrology (CIMH) in its role as the Pan American Centre for the World Meteorological Organization (WMO) Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) are showing a dust episode in which dust concentration amounts are demonstrably high.

Cayenne, French Guiana has already seen elevated levels of PM10[1] over 160 µg/m³ dust concentrations. This is above the outdoor air quality guidelines of 50 µg/m³ 24-hour mean for particulate matter established by the World Health Organization (WHO).

Dust forecast

In the coming (1-3) days, we expect that dust and PM10 concentration levels will increase.


Saharan Dust Update for April 03 - April 08, 2018

DUST FORECAST

Models run and managed by the Caribbean Institute for Meteorology and Hydrology (CIMH) in its role as the Pan American Centre for the World Meteorological Organization (WMO) Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS) are predicting a dust episode in which dust concentration amounts are expected to be noticeably high.

In the next 1-2 days, we expect that dust and PM10 concentration levels will increase in northeastern South America. **In the next 2-3 days, dust and PM10 concentrations are expected to increase over Barbados, the Windward and Leeward Islands**. Forecast models indicate PM10 concentrations up to 90-120 µg/m³ over northeastern South America (especially French Guiana) and up to 60-90 µg/m³ over Barbados, the Windward and Leeward Islands. This is above the outdoor air quality guideline of 50 µg/m³ 24-hour mean for particulate matter established by the World Health Organization (WHO).

IMPLICATIONS FOR RESPIRATORY ILLNESS

Persons with asthma and those prone to allergic rhinitis may become increasingly symptomatic due to the significantly elevated dust and PM10 concentrations. **Medical facilities may experience increased numbers** of patients with respiratory illnesses. This situation may be exacerbated in territories where the ground surface is dry.

STAY INFORMED

Health stakeholders are encouraged to **consult the 7-day dust forecast in the coming days**. Access this product here: http://dafc.cimh.edu.bb/dust-prediction/

CONTACT US

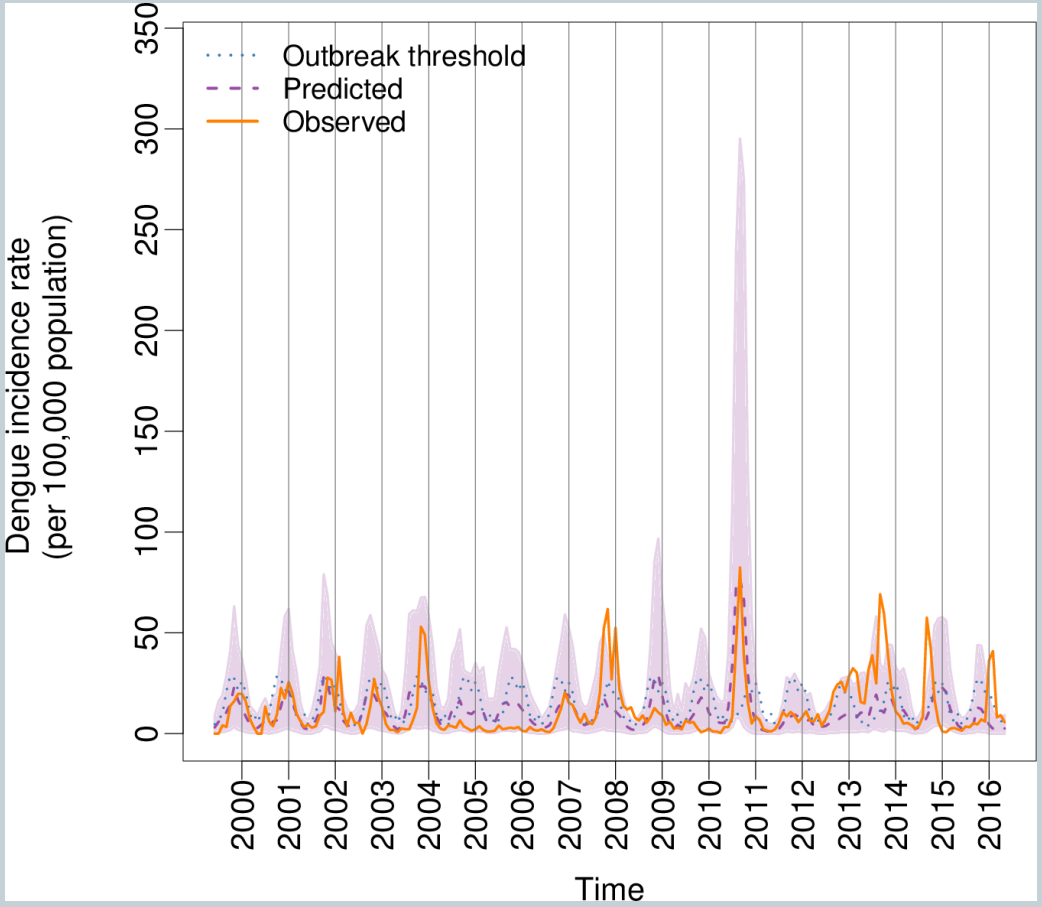
- Dr. Andrea Sealy, Meteorologist and Chair of the Pan American Regional Steering Group for the WMO SDS-WAS: asealy@cimh.edu.bb
- Dr. Ashford Reyes, Meteorologist: areyes@cimh.edu.bb

2 advisories issued in 2018

Climate services for *Aedes aegypti* borne diseases

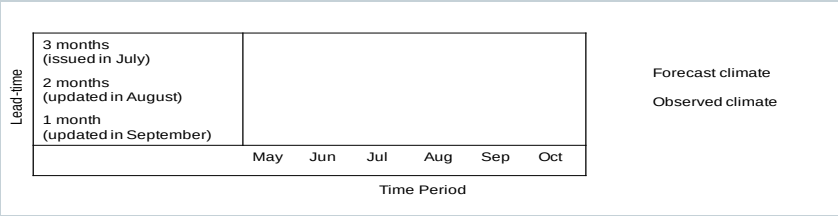
Annual dengue costs to Caribbean: **approx. $321.4 million USD** excluding costs of vector control and other prevention programmes (Shepard et al, 2011)

Climate driven spatio-temporal model to support dengue early warning



Model able to successfully predict months with dengue outbreaks versus non-outbreaks in most years…overall proportion of correct predictions (hits and correct rejections) of 86% (81%:91%) compared with 64% (58%:71%) for the baseline model

- Statistical model to test whether dengue outbreaks in Barbados could be predicted using weather station data for temperature and a precipitation index.
- Risk of dengue outbreaks increased with increasing minimum temperature (Tmin; up to 25°C).
- Disease outbreaks more likely to occur 4 to 5 months after periods of drought and 1 month after periods of excess rainfall.
- Results suggest that a drought period followed by intense rainfall 4 to 5 months later could provide optimum conditions for an imminent dengue outbreak.
- Probabilistic dengue outlooks could be included in the Caribbean Health-Climatic Bulletin.

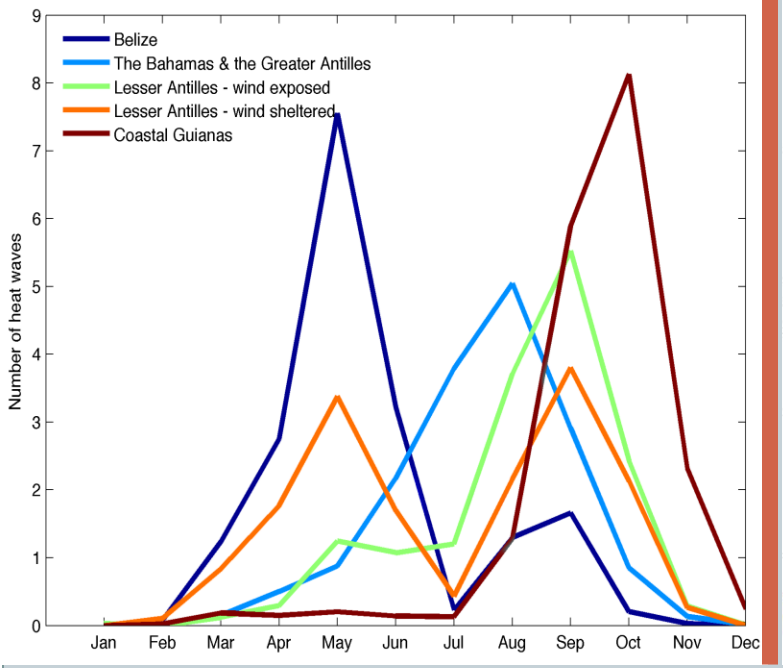


Type of climate information needed to produce a dengue forecast in Barbados for the target month of October

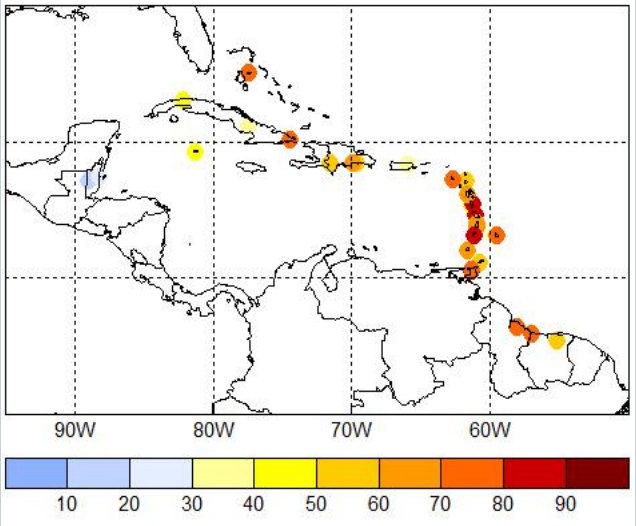
Source: Lowe R, Gasparrini A, Van Meerbeeck CJ, Lippi CA, Mahon R, Trotman AR, Rollock L, Hinds AQJ, Ryan SJ, Stewart-Ibarra AM (2018) Nonlinear and delayed impacts of climate on dengue risk in Barbados: A modelling study. *PLoS Med* 15(7): e1002613. https://doi.org/10.1371/journal.pmed.1002613

Climate services for heat related non-communicable diseases

Historical seasonality of heat waves



Forecast probability of exceeding 14 heatwave days between Aug & Nov 2017



Climate change

Increased frequency & intensity of heat waves already observed in the Caribbean (Stephenson et al., 2014) and projected to worsen in future

- Excessive heat exposure, especially during **heat waves**, engenders NDCs from heat stress.
- Heat waves **deadliest meteorological hazard** in USA (Smith and Katz, 2013).
- **Excess mortality** in the thousands during major heat waves (e.g. 2003 Europe, 2010 Russia, 2015 & 2016 South Asia).
- Early warning information relying on historical occurrences and climate predictions can **help improve preparedness** to heat waves.
- **1-month to 6-month heat wave forecasts** experimentally delivered by the Caribbean RCC since 2017.

rcc.cimh.edu.bb

Thank you