Sub-Seasonal to seasonal forecasting at CIMH

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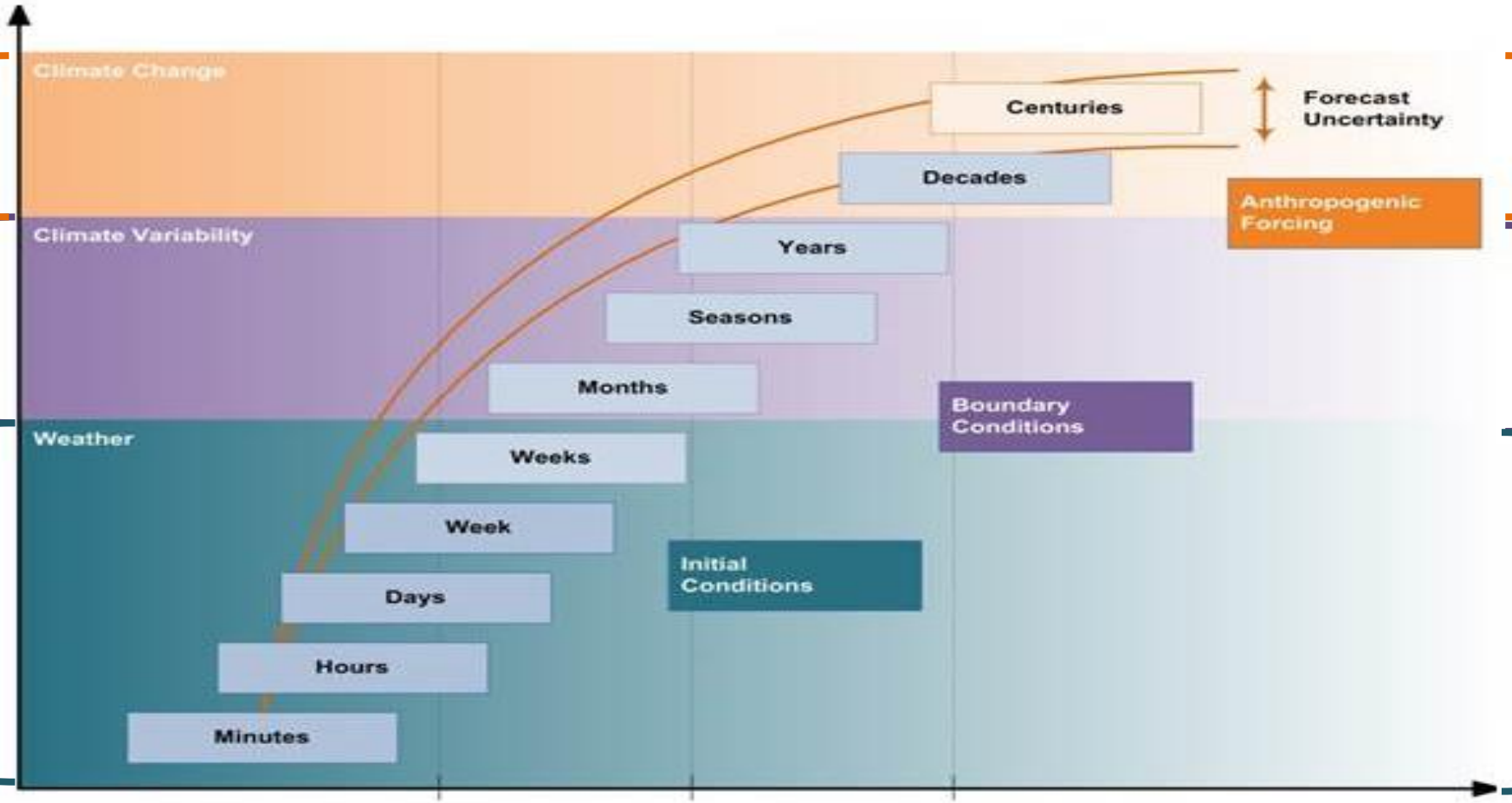
Climate Information and Decision making

CCCCC/CSGM, Mona

CIMH/ CariCOF

NMHS



Climate change projections

Seasonal climate forecasts

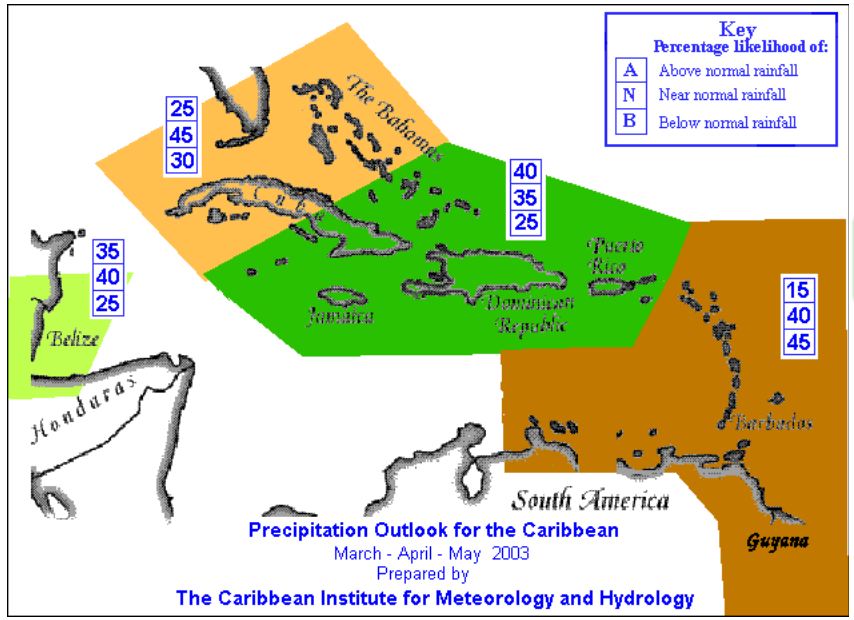
Weather forecasts

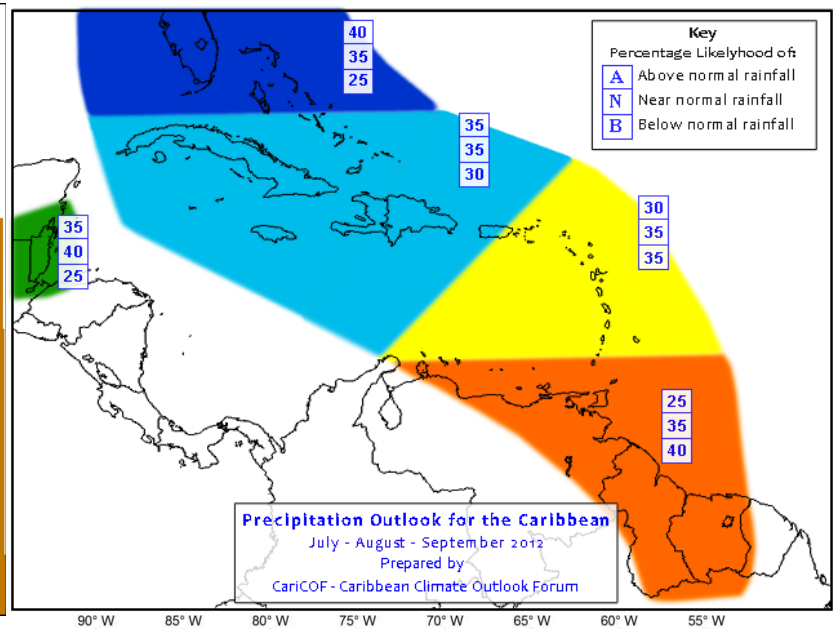
Decision-making across timescales

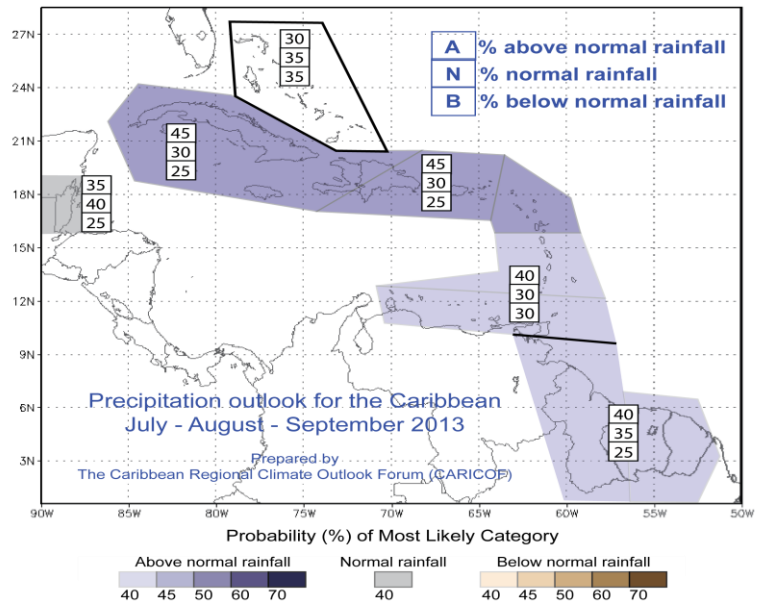
Climate prediction framework

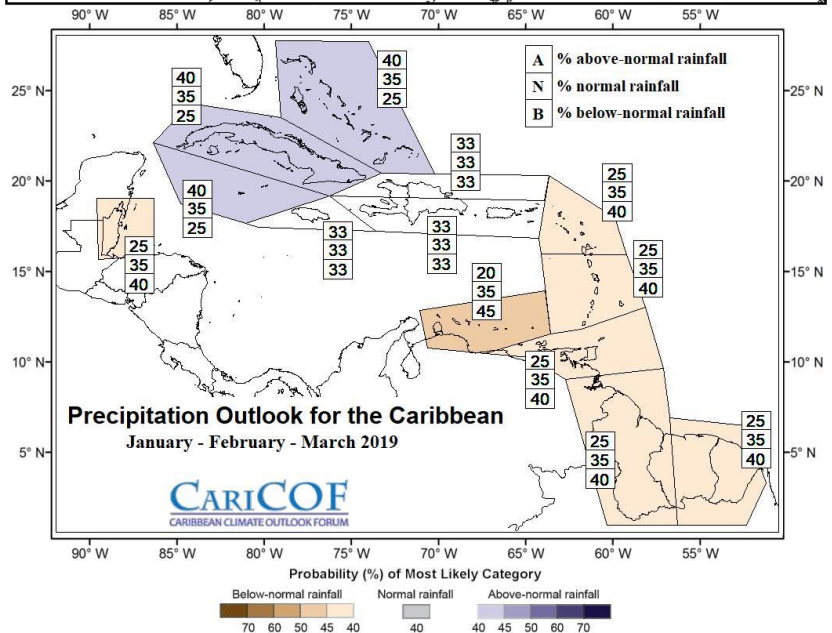
CIMH's current seasonal prediction products and services

Provision of seasonal climate outlooks









Regional precipitation outlooks since 1998 (CIMH / CariCOF)

From June 2013, 0-month lead + 3-ml

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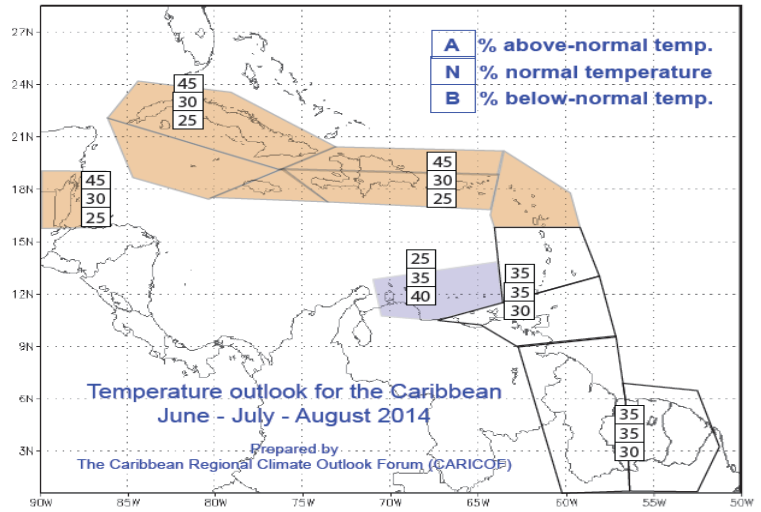
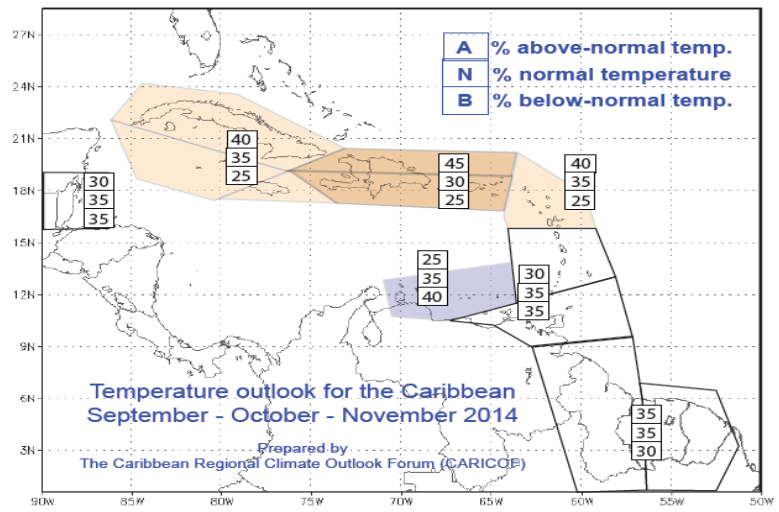
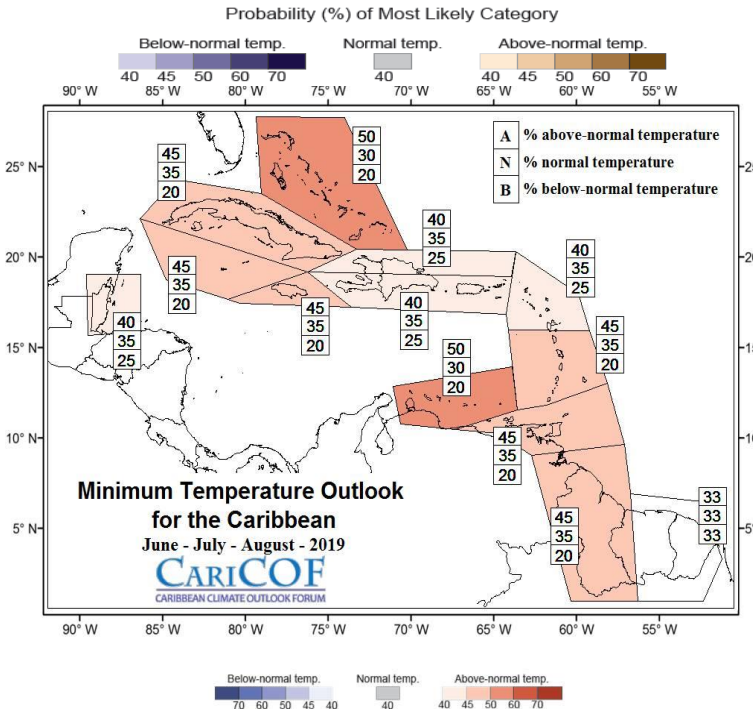
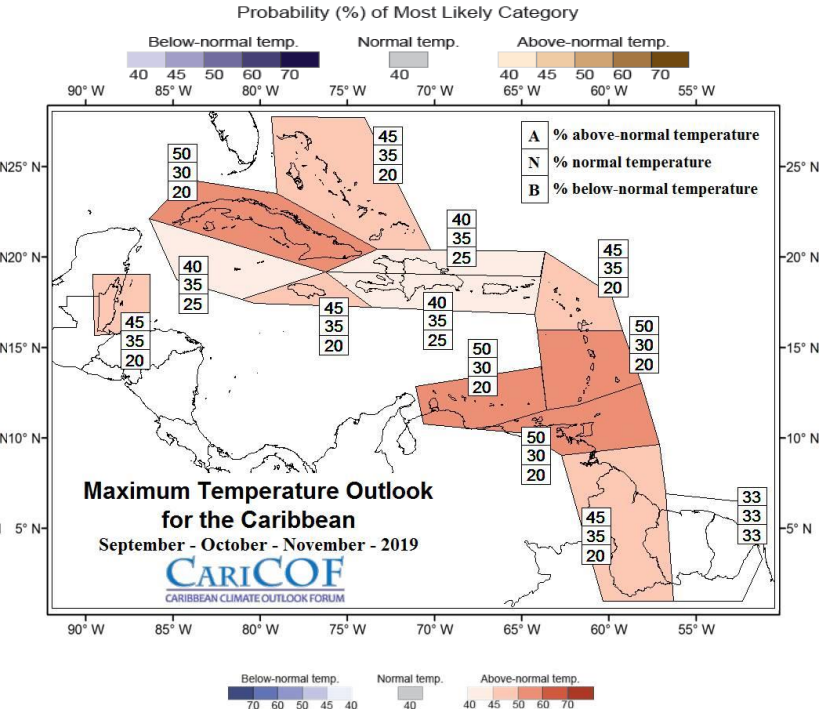
Provision of seasonal climate outlooks









Regional mean temperature outlooks since 2014, min. and max. temp. outlooks since 2015 (CariCOF)

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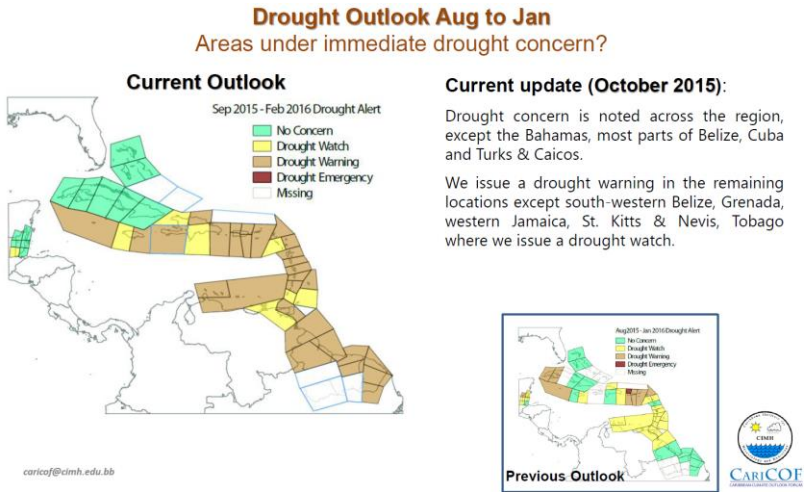
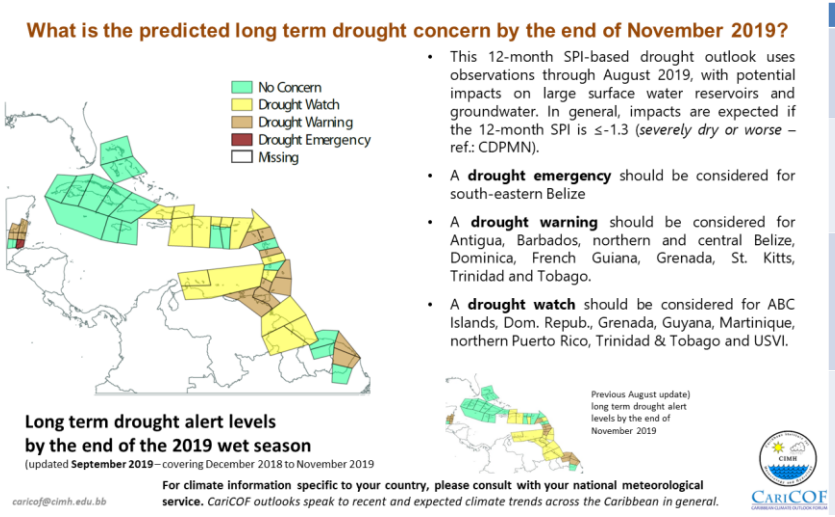


Regional drought outlooks since 2014 (CIMH / CariCOF)



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

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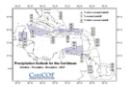
Precipitation outlook



Wet day frequency shifts

Forecast for: October to December 2019

OND 2019
Frequency of wet days

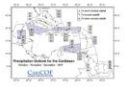
USUALLY: Out of 92 days in Oct-Nov-Dec, there are about 35 to 50 wet days (coastal Guianas: 20-40; ABC Islands: 15-35).

FORECAST: OND rainfall may be wetter than usual in the ABC Islands, Belize and Cayman, but drier than usual in French Guiana and Suriname. **The forecast indicates a fraction fewer wet days in Guyana (*medium confidence*), possibly also in Belize, Cayman, Puerto Rico and the Lesser Antilles (*low confid.*), but little change elsewhere (*low confid.*).**

IMPLICATIONS:

- **Surface wetness associated to the many wet days keeps environmental conditions more conducive to mosquito breeding and moisture related pests.**
- **Surface dryness possibly enhanced in Guyana and Suriname until late-November.**

Precipitation outlook



Wet days outlook

Wet spells outlook

Very wet spells outlook

Extreme wet spells frequency shifts

Forecast for: October to December 2019

SON 2019 frequency of
extreme (top 1%) **3-day wet spells**

USUALLY: Up to 2 extreme wet spell occur from October to December (Guianas: up to 1).

FORECAST: OND rainfall may be wetter than usual in the ABC Islands, Belize and Cayman, but drier than usual in French Guiana and Suriname. The forecast indicates a fraction fewer wet days **and wet spells** in Guyana (*medium confidence*), possibly also in Belize, Cayman, Puerto Rico and the Lesser Antilles (*low confid.*), **but little change elsewhere** (*low confid.*).

No significant change in the number of extreme wet spells is forecast (*low confid.*).

IMPLICATION:

Significant potential for flash flood, in view of the usual peak in the number of extreme wet spells until December in Belize and the Islands, and from late November onwards in the coastal Guianas.

Regional outlooks of rainfall and extreme rainfall frequency since 2015 (CIMH / CariCOF)

October to December 2019

	No. of wet days		No. of 7-day wet spells (20% wettest)		No. of 7-day very wet spells (10% wettest)		No. of 3-day extremely wet spells (1% wettest)	
	Climatology	Forecast	Climatology	Forecast	Climatology	Forecast	Climatology	Forecast
Antigua (VC Bird)	32-44	30-45	3-5.6	2.6-5.5	1.3-3.2	1.2-3.6	0-1	0-1.3
Aruba (Beatrix)	18-44	18-39	3.3-8.6	2.8-6.8	1.3-6.8	1-5.3	0-2.5	0-2.4
Barbados (CIMH)	35-48	33-48	3.4-5.6	2.9-5.5	1.3-3.9	1.2-3.7	0-2	0-1.9
Barbados (GAIA)	35-49	34-49	3.3-5.6	2.9-5.3	1.5-3.4	1.5-3.6	0-2	0-1.9
Belize (C. Farm)	33-49	29-48	2.8-5.4	2.7-5.5	1.4-2.6	1.4-2.9	0-1	0-1.3
Cayman	22-39	21-40	2.2-4.7	1.9-5.1	1-3.7	0.8-3.3	0-2.6	0-2.1
Cuba (Punta Maisi)	18-32	17-34	2.6-5.8	2.5-5.9	1.3-4.3	1.2-4.2	0-2	0-1.9
Dom. Republic (Las Americas)	26-35	23-38	2.5-4.9	2.1-5.3	0.4-3	0.5-3.2	0-1.9	0-1.1
Dominica (Canefield)	41-54	38-53	2.6-4.7	2.1-4.5	1-2.6	0.7-2.7	0-1.1	0-1.5
Dominica (Douglas Charles)	57-69	55-69	3-5.8	2.6-5.7	1.7-3.7	1.4-3.6	0-1.2	0-1.6
Grenada (MBIA)	33-48	31-47	3.4-5.6	2.7-5.4	1.4-3.4	1.1-3.7	0-2	0-1.9
Guyana_73	13-25	12-23	1.3-3.4	1-2.8	0.2-2.4	0-2.2	0-1.3	0-0.5
Guyana (Albion)	18-40	13-37	0.8-4.5	0.3-3.4	0-2.3	0-2	0-1.4	0-0.8
Guyana (Blairmont)	20-41	17-38	1-3.9	0.5-3.2	0.4-2.1	0-2	0-1	0-1.2
Guyana (Charity)								
Guyana (Enmore)	17-49	16-43	0.9-4.3	0.7-3.3	0.4-2.9	0.3-2.4	0-2	0-1.8
Guyana (Georgetown)	28-46	28-46	1.2-4.5	0.8-3.3	0.4-2.8	0.3-2.4	0-1.9	0-1.9
Guyana (Greatfall)								
Guyana (New Amsterdam)	23-40	20-38	1.1-3.9	0.4-3.2	0.4-2.2	0.1-2.1	0-1	0-1.4
Guyana (Skeldon)	26-39	22-40	1.3-3.6	1.1-3.1	0.4-1.9	0.4-1.9	0-1.5	0-1
Guyana (Timehri)	40-51	36-50	1.7-4.1	1.5-3.4	0.4-2.3	0.5-2.2	0-1	0-0.9
Guyana_Wales	30-48	28-46	1.7-4.4	1-3.6	0.4-2.6	0.3-2.2	0-1	0-1.1
Jamaica (Worthy Park)	24-39	22-40	2.6-5.1	2.1-4.3	1.1-2.6	0.9-3	0-1	0-1.1
Martinique (FDF Desaix)	49-61	46-63	3.3-6.2	2.6-5.9	1.4-3.2	1.3-3.2	0-2	0-1.7
Puerto Rico (San Juan)	39-52	35-54	3-5.9	2.8-5.4	0.9-3.4	1-3.6	0-1	0-1.1
St. Lucia (Hewanorra)	41-54	37-53	3-5.3	2.7-5.1	1.3-3.4	1.1-3.3	0-1.1	0-1.5
St. Maarten (TNCM)	36-50	34-51	2.7-5.6	2.6-5.4	1.6-3.8	1.2-3.4	0-1.9	0-2.1
St. Vincent (ET Joshua)	52-64	49-64	3.4-6.4	2.7-5.9	1.7-3.6	1.2-3.4	0-2	0-2.3
Suriname (Zanderij)	28-44	27-45	1.3-2.6	1.1-2.5	0-1.5	0-2.3	0-1	0-0.7
Tobago (ANR Robinson)	41-53	39-51	2.9-5.6	2.4-5.2	1.4-3.4	1.3-3	0-1	0-1.7
Trinidad (Piarco)	39-50	38-49	3.3-6	3.1-5.5	1.6-3.6	1.5-3.3	0-2	0-1.9

brown is a decrease in frequency, light blue an increase, grey none are expected

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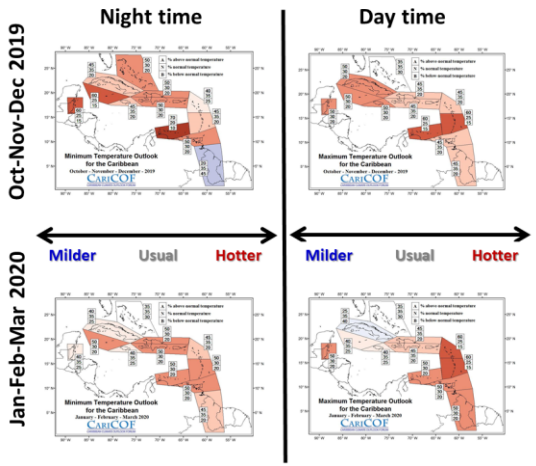
Provision of seasonal climate outlooks

How hot will the next three to six months be?



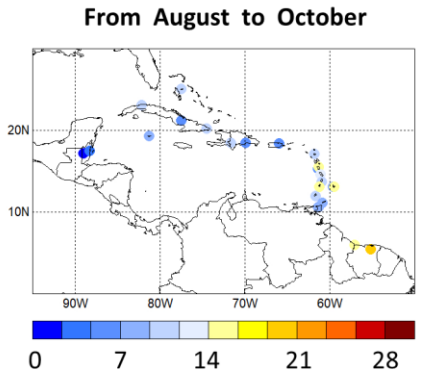
USUALLY:

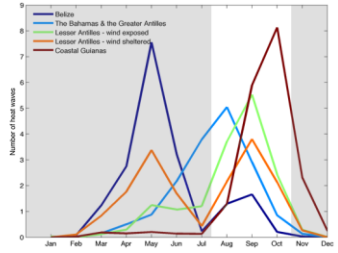
- The **Caribbean heat season** runs from May till October.
- In most years, September is the peak of the heat season with extreme heat also occurring in October as well.
- After October, heat discomfort will rapidly decrease.

FORECAST:

1. The **forecast suggests temperatures to be at least as warm as** usual between October and March, with the possible exception of Guyana at night from October to December.
2. As such, it is expected that the heat season will end warmer than usual, with potentially dangerous heat exposure during dry spells in October in the Guianas and Windward Islands.

How many heatwave days do we historically get on average?

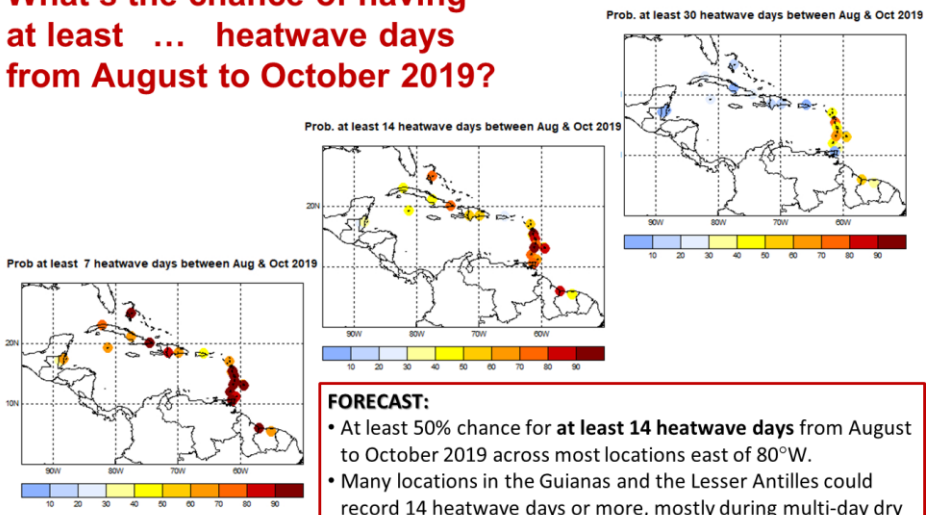




USUALLY:

- In most years, **at least 7 heatwave days are counted from August to October** throughout most areas in the Caribbean, with the exception of Belize and in cool highland areas.
- In September, (i.e. during the **peak of the Caribbean heat season**) all stations can record heatwaves.

What's the chance of having at least … heatwave days from August to October 2019?



FORECAST:

- At least 50% chance for **at least 14 heatwave days** from August to October 2019 across most locations east of 80°W.
- Many locations in the Guianas and the Lesser Antilles could record 14 heatwave days or more, mostly during multi-day dry spells, and especially in areas experiencing drought

Experimental heat outlooks since 2017 (CIMH / CariCOF)

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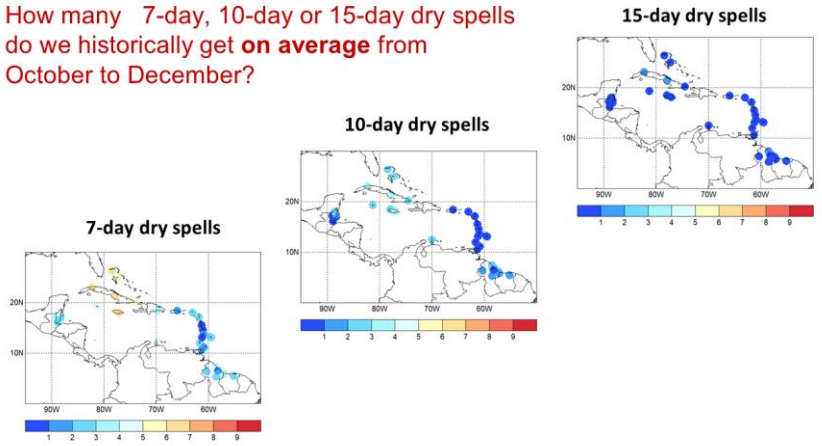
How many 7-day, 10-day or 15-day dry spells do we historically get **on average** from October to December?

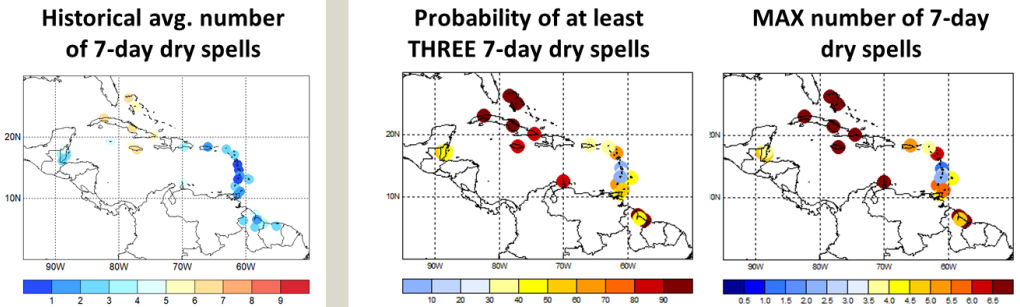


October to December 2019	No. of 7-dy dry spells		No. of 10-dy dry spells		No. of 15-dy dry spells	
	Climatology	Forecast	Climatology	Forecast	Climatology	Forecast
Antigua (GreenCas)	1-4	1-5	0-2	0-3	0-0	0-0
Aruba (Beatrix)	2-6	3-8	1-2	1-5	0-2	0-2
Bahamas (Freeport)	5-7	4-8	1-3	2-6	0-2	0-2
Bahamas (NewProvi)	4-7	4-7	2-2	2-5	0-2	0-2
Barbados (CIMH)	1-4	1-4	0-1	0-2	0-0	0-0
Barbados (GAIA)	1-3	1-4	0-1	0-2	0-1	0-1
Belize_Belmopan	1-4	1-4	0-1	0-3	0-1	0-1
Belize (C. Farm)	2-5	1-4	0-1	0-3	0-1	0-0
Belize_Melinda	1-4	1-4	0-1	0-2	0-0	0-0
Belize_PG-Airpor	1-4	1-5	0-1	0-3	0-1	0-0
Belize_PGorda	1-4	1-5	0-1	0-2	0-0	0-0
Belize_Towerhill	3-5	2-6	1-2	1-4	0-1	0-1
Cayman	3-6	3-7	1-2	1-5	0-1	0-2
Cuba_Camaguey	5-8	3-10	2-3	2-6	0-3	0-3
Cuba_Casablanca	4-8	4-9	2-2	3-7	0-2	0-3
Cuba (Punta Maisi)	3-7	3-8	1-2	1-5	0-1	0-2
Dominica (Douglas Charles)	0-1	0-1	0-0	0-0	0-0	0-0
Dom. Republic (Las Americas)	2-5	2-6	1-0	1-3	0-1	0-1
Grenada (MBIA)	2-4	1-4	0-1	0-2	0-0	0-0
Guyana_Aishalton						
Guyana (Albion)	3-8	3-10	1-2	1-6	0-3	0-3
Guyana_Apaikwa	1-4	1-5	0-1	0-3	0-1	0-1
Guyana_Bmont7	4-8	3-9	2-2	2-6	0-2	0-2
Guyana_BmontFron	3-7	4-8	1-2	1-5	0-2	0-2

Experimental dry spell frequency outlooks since 2017 (CIMH / CariCOF)

7-day dry spells from October to December 2019

What is the FORECAST for October to December 2019?



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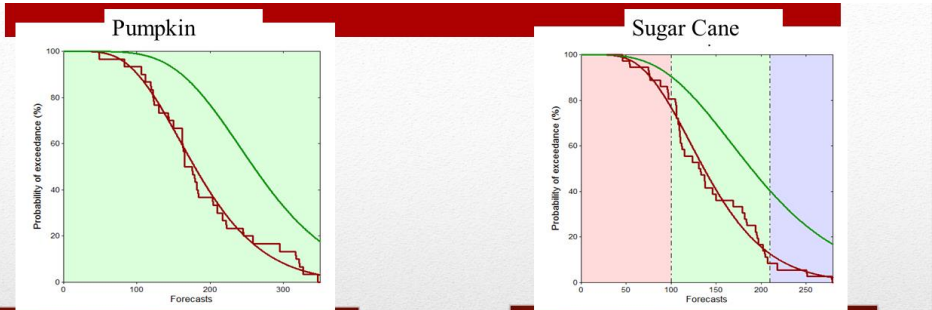


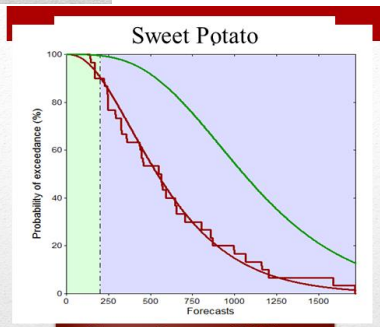
Pumpkin (DJF) – 508mm

Station	Prob. (%)	Station	Prob. (%)
Bowmans	0.0	Lears	23.3
Broomfi	9.4	Pickering	2.2
CIMH	0.08	Union	1.6
Drax-Hall	11.6	Walkers	18.8
GAIA	2.0	Warleigh	14.9

Sugar Cane (JFM) – 210mm

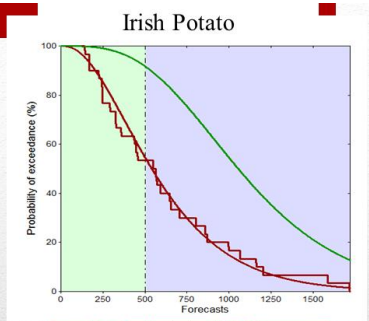
Station	Prob. (%)	Station	Prob. (%)
Bowmans	64.8	Lears	87.2
Broomfi	44.4	Pickering	52.9
CIMH	36.2	Union	41.2
Drax-Hall	74.5	Walkers	81.6
GAIA	43.3	Warleigh	80.0

Experimental probabilistic rainfall requirement outlooks for specific crops since 2017 (CIMH / CariCOF)



Sweet Potato (DJF) – 200mm

Station	Prob. (%)
Georgetown	99.5
New Amsterdam	99.8
Timheri	99.9



Irish Potato (DJF) – 500mm

Station	Prob. (%)
Georgetown	91.2
New Amsterdam	86.9
Timheri	94.8

Guyanese Farmer

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Need for S2S prediction services and ongoing capacity building

What S2S information is needed?

In the Caribbean, there is a **need for early warning information** across climate timescales on **rapid onset events such as flash floods, dry spells and heat waves.**

But …

- **limited Early warning capacity** to improve preparedness and response action;
- **limited human, technological and financial resources** to build and sustain early warning capacity;
- **limited knowledge of community vulnerabilities** to flooding and flash floods, and to heat stress in humans and animals.

CLIMATE PREDICTION SERVICES *for* CLIMATE RISK MANAGEMENT AT MULTIPLE TIMESCALES

Credit: Simon Mason, International Research Institute for Climate and Society

What S2S information is needed?

Necessary attributes of valuable climate forecasts

- **Good forecasts:**
  - **Accurate**
  - **Reliable** (= well calibrated)
  - **Sharp** (= limited uncertainty/very high probabilities)

- **Useful forecasts:**
  - **Timely**
  - **Understandable**
  - **Salient** (= relevant)
  - **Contextualised** (= previous + usual climatological context and climate impacts)

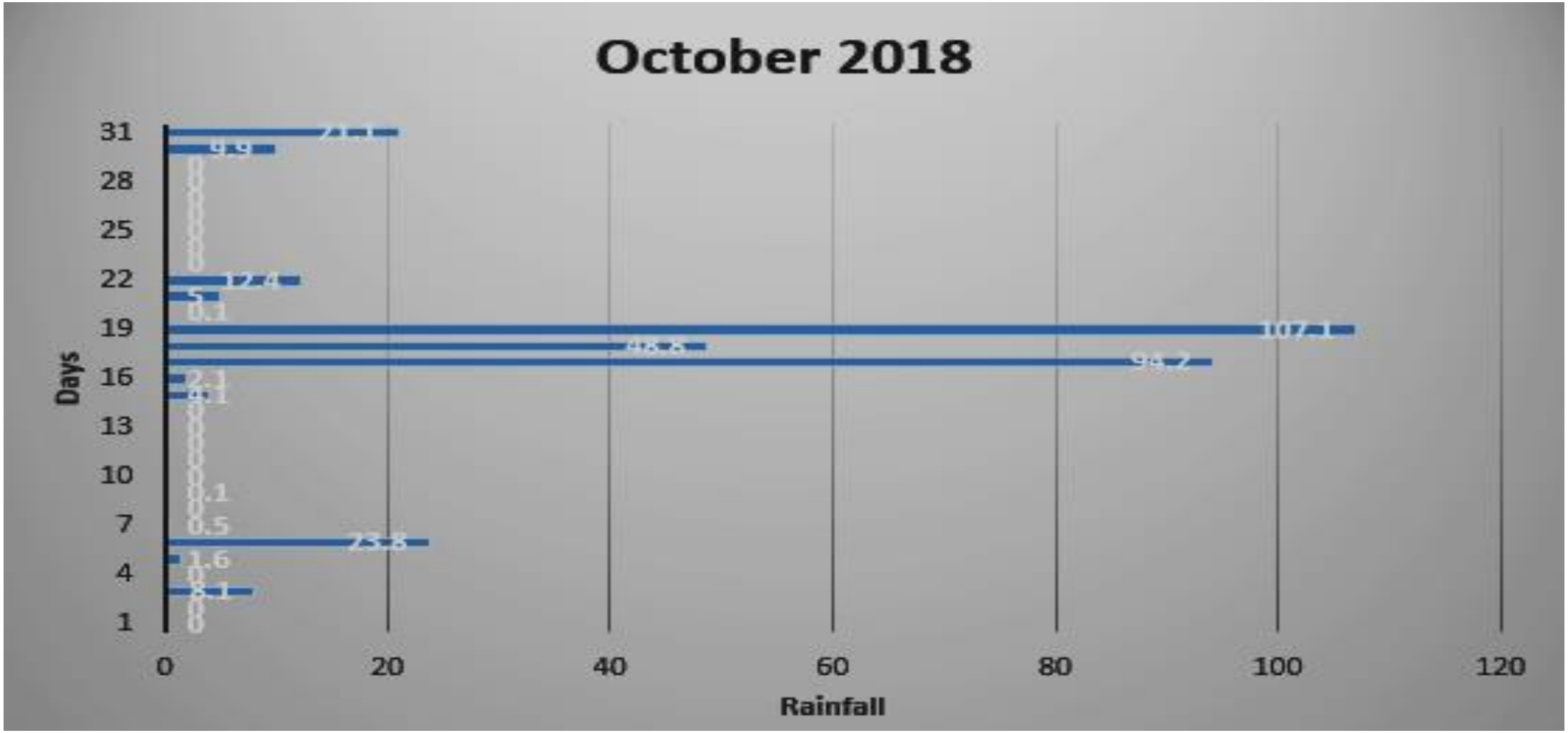
- **Manageable operations:**
  - **Cost-effective**
  - **Sustainable**

What S2S information is needed?

Ideas on priorities for operational climate prediction services

	National (NMHS/NCC)	**Regional** (RCC)	**Global** (GPC)
Goodness			
focus	Reduce uncertainty → **need for techniques for sharper forecasts**	Building a common standard	Provision of state of the art prediction
Usefulness	**TOP PRIORITY** (*once operations are sustainable*)	**TOP PRIORITY**	
focus	Tailored information needs → **Need for tailored presentation formats**	Addressing prioritised climate capacity needs	Provision of prioritised climate variables
Manageability	**TOP PRIORITY** (*to get started*)		
focus	Sustainable provision → **Need for automation**	Tools provision Regional services needs	Resource optimisation

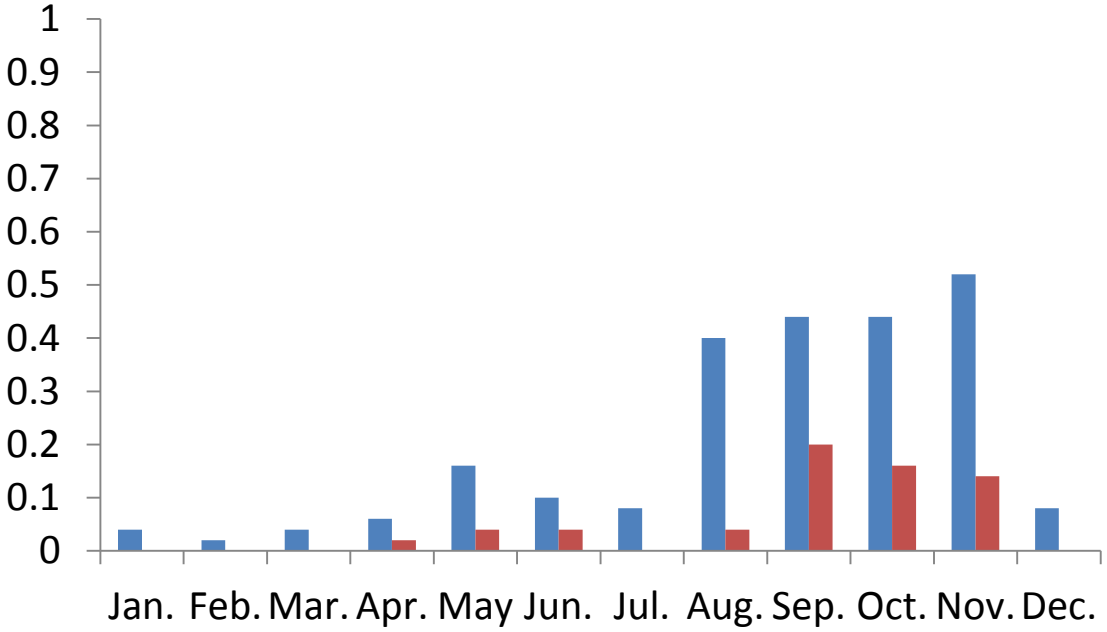
WHAT IS AN EXTREME WET SPELL?



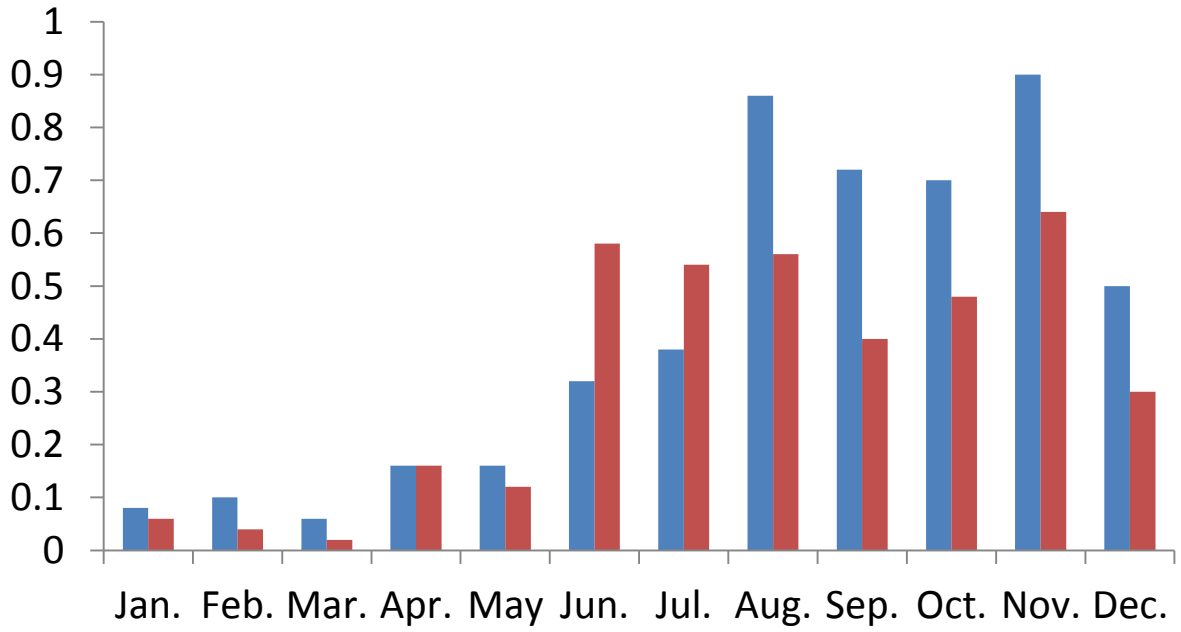
Extreme wet spell = (*CariCOF definition*) period of 3 consecutive days of which the rainfall total is among **top 1%** of historical 3-day rainfall totals (1985-2014)

WHEN DO EXTREME WET SPELLS AND FLASH FLOODS OCCUR?

BARBADOS



TRINIDAD



Avg. # Extr. Wet Spells

Avg. # Reported Floods

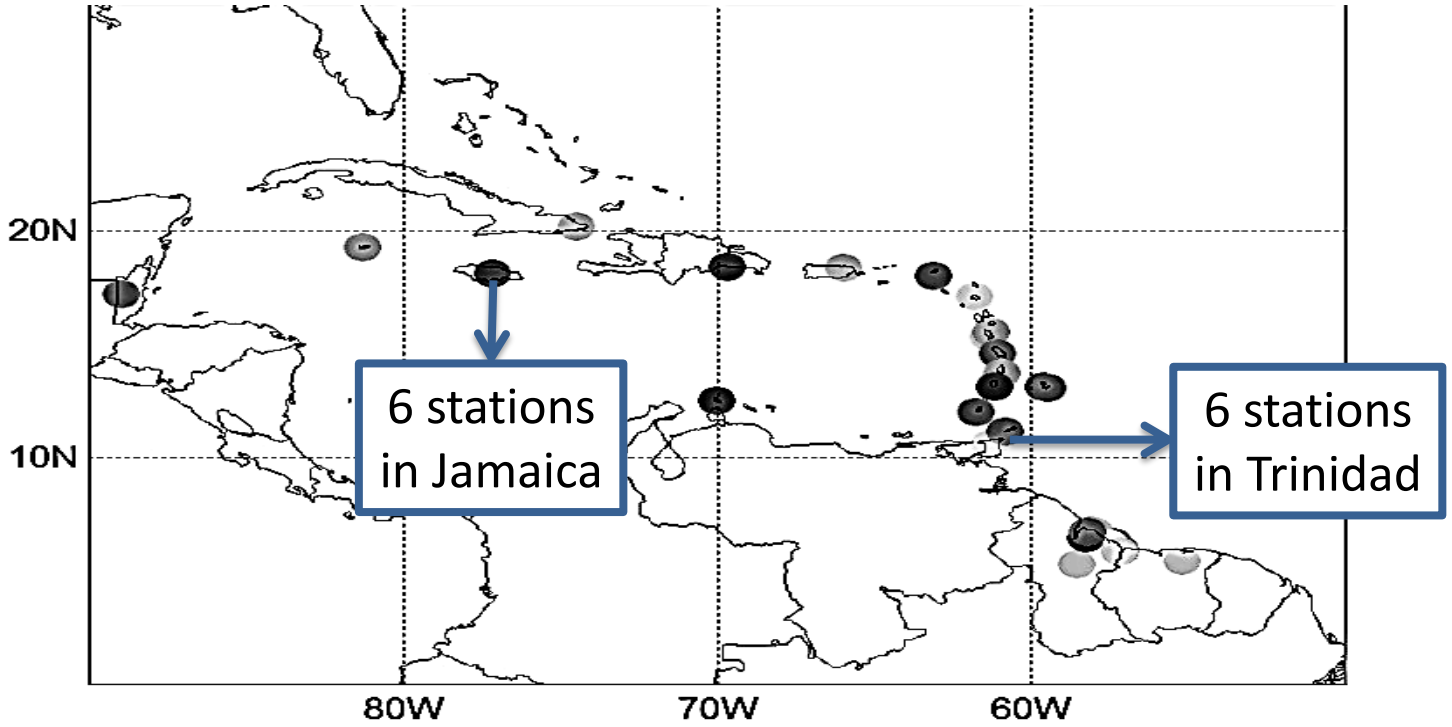
EXTREME WET SPELLS AND FLASH FLOOD POTENTIAL

Researching the optimal percentile threshold for extreme wet spells

Island/Territory	# all reported floods	3-day rainfall sum 99th percentile	Threshold percentile (3-day rainfall sum) at optimal hit rate	# Hits = Extr. Wet spell & flood	Hit Rate in %
Antigua	7	84.1 mm	99 (84.1mm)	7	100
Bahamas	**35**	**102.9mm**	**97(70.9mm)**	**11**	**31**
Barbados	**32**	**82-92mm**	**96 (48-50mm)**	**29**	**91**
Belize	9	107.1-200.6mm	98 (84.6-171.8mm)	7	78
Dominica	14	155.7mm	97 (97.5mm)	10	71
Grenada	10	79.5mm	90 (26.5mm)	5	50
Guyana	12	99.4-130.8mm	97 (70.6-94.5mm)	10	83
Jamaica	**53**	**86.7-165.9 mm**	**96 (48.6-89.4 mm)**	**36**	**68**
St. Kitts	10	99.2mm	99 (99.2mm)	1	10
Saint Lucia	**29**	**104.9mm**	**95 (58.1mm)**	**17**	**59**
St. Vincent	**35**	**122.8mm**	**98 (95.7mm)**	**16**	**46**
Suriname	6	90.6mm	95 (61.3 mm)	3	50
Trinidad	**245**	**87-117mm**	**90 (38-46mm)**	**199**	**81**

DATA REQUIREMENTS – DAILY RAINFALL RECORDS

- 65 stations across the Caribbean.
- Typically, the smallest islands have 1 or 2 sufficiently long records (i.e. at least 25-30 years) of daily rainfall; the larger islands and countries tend to have more.



DATA REQUIREMENTS – FLOOD DATA

- Historical record of currently 9000+ reported climate impacts in the Caribbean.
- Number of reported floods per country: 0 reports in 11 territories, >15 reports in 7 territories, 25 to 50 reports in 5 territories, 245 in Trinidad.
- LIMITATIONS:
  - Most often, no distinction between flash floods, long-term flooding, riverine flooding or coastal flooding.
  - Very large inhomogeneities and incompleteness, impacting on hit and false alarm rates.

Event	Island	Parish	Location	Date
FLOOD	Trinidad	Islandwide		10/9-11/1981
FLOOD			North Coast Towns, Uriah Butler Highway	12/02-04/1985
FLOOD			Caroni	10/14-15/1986
FLOOD				11/12/1986
FLOOD		Central Trinidad & Southern Trinidad		9/6/1988
FLOOD		Northern Trinidad		09/30-10/01/1988
FLOOD			Maracas, St. Joseph, Belmont Hills	11/3/1988
FLOOD		Islandwide		11/13/1988
FLOOD		Central Trinidad		11/15/1989
FLOOD		Islandwide		11/19/1988
FLOOD		Islandwide		11/24/1988
FLOOD		Debe Penal, Siparia	Mafaeking, Barackpoe	12/5/1990
FLOOD			Caroni	8/16/1991
FLOOD		Southern Trinidad & Central Trinidad		07/08-12/1992
FLOOD		Sangre Grande	St.Helena, Arena, Caparo, Montrose	09/09-10/1993

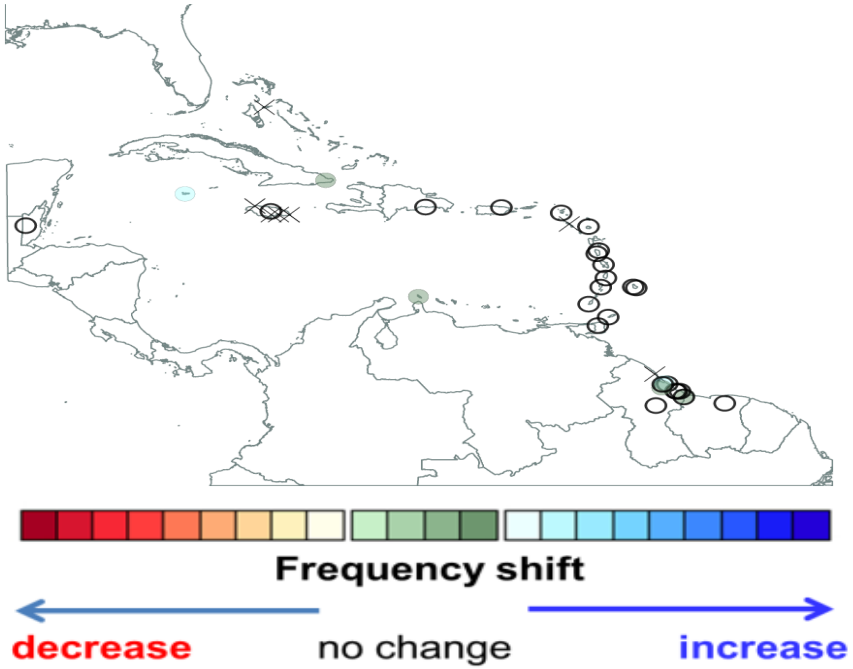
FLASH FLOODS

CariCOF Seasonal prediction information on extreme wet spells

Tropical Storm Kirk (27-28 Sept. 2018) led to near-record rainfall in Barbados, triggering widespread flash flooding.

Image credit: NOAA

The Jul.-Aug.-Sep. 2018 seasonal forecast suggested:



USUALLY: Up to 1 extreme wet spells between July and September, the peak season.

FORECAST: usual number of extreme wet spells.

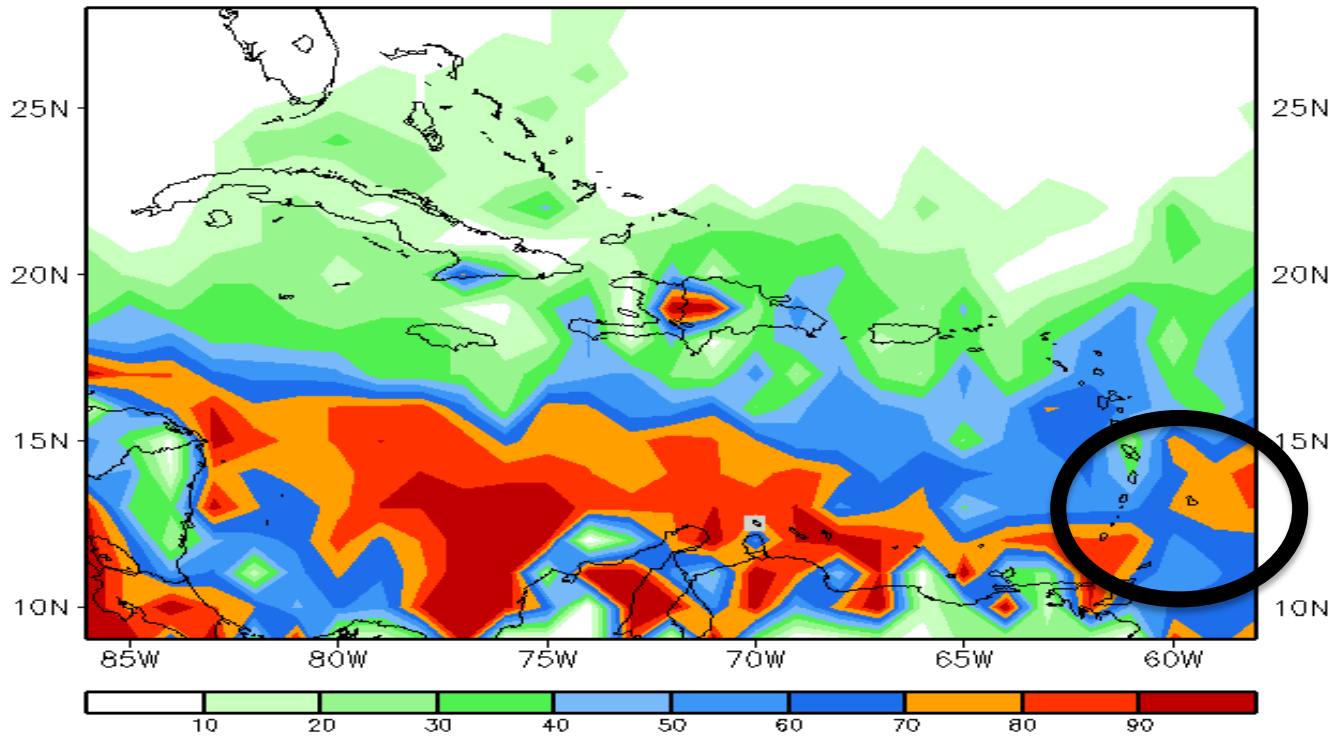
IMPLICATION:

Flash flood potential is becoming a concern across the region.

FLASH FLOODS

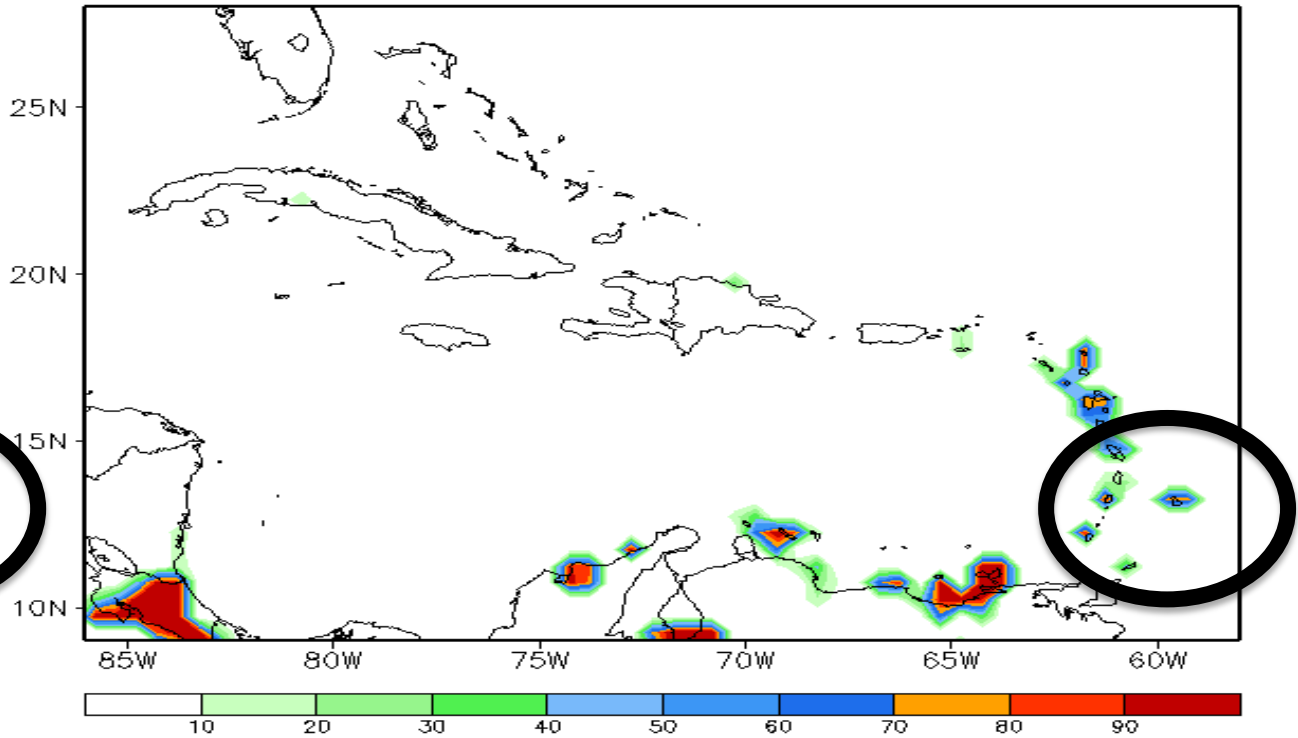
Augmenting early warning with mid- and short-range forecasts – TS Kirk 2018

MID-RANGE (1 week lead time)
forecast for 24 – 30 Sep. 2018



Increased chance for extreme rainfall over Barbados in the following week.

SHORT-RANGE (1 day lead time)
Forecast for 26 – 28 Sep. 2018



>70% chance for an extreme wet spell in Barbados over the next 3 days.

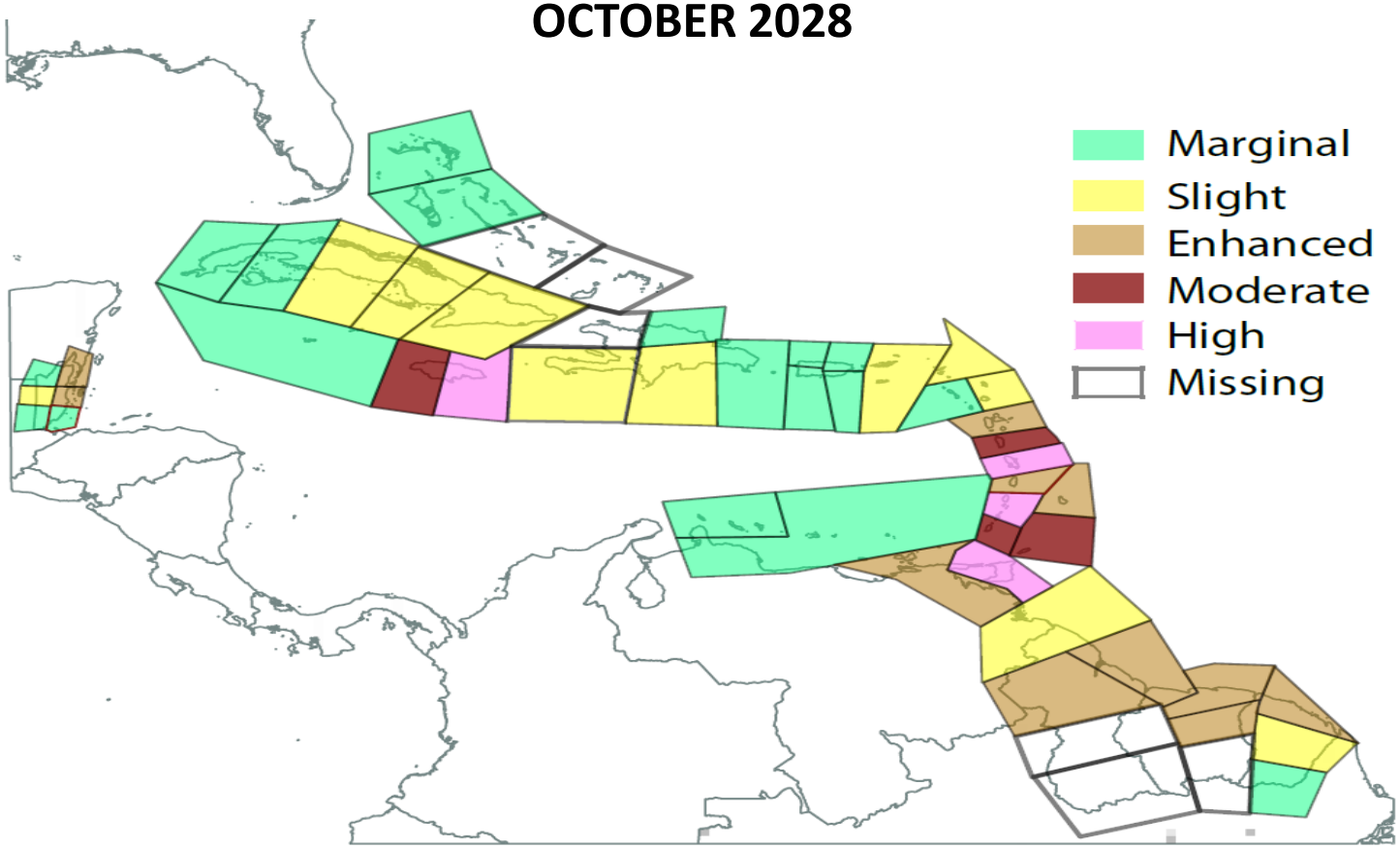
Credit: US Regional Climate Centre (*in demonstration phase*) at NOAA

FLASH FLOODS

Towards a next generation of tailored forecasts

CARIBBEAN FLASH FLOOD POTENTIAL OUTLOOK

OCTOBER 2028



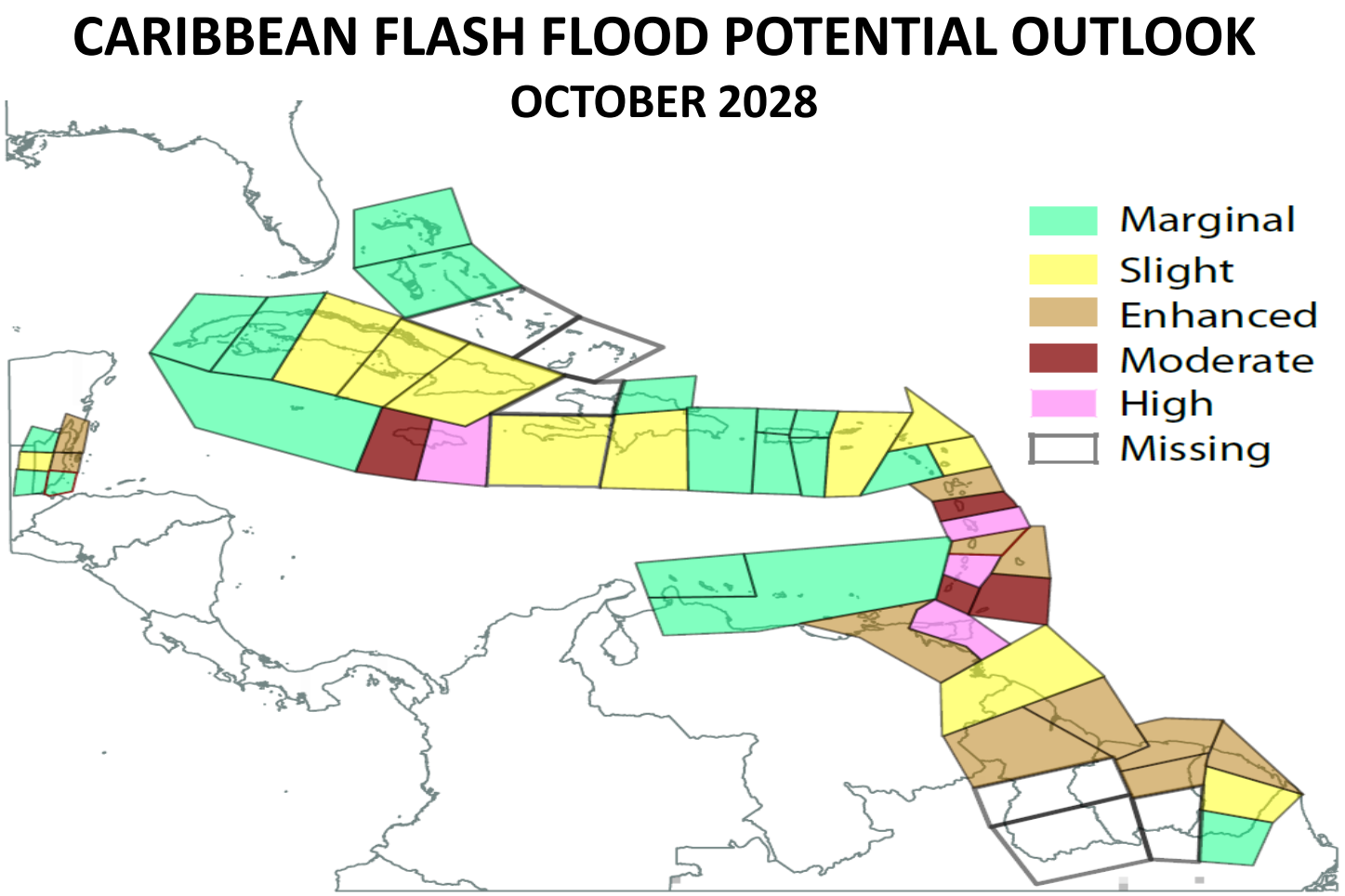
flash flood potential =

the hydro-meteorological factor of flash flood risk

closely linked to flash flood occurrence

FLASH FLOODS

Towards a next generation of tailored forecasts



Product development planned across weather, S2S and seasonal timescales.

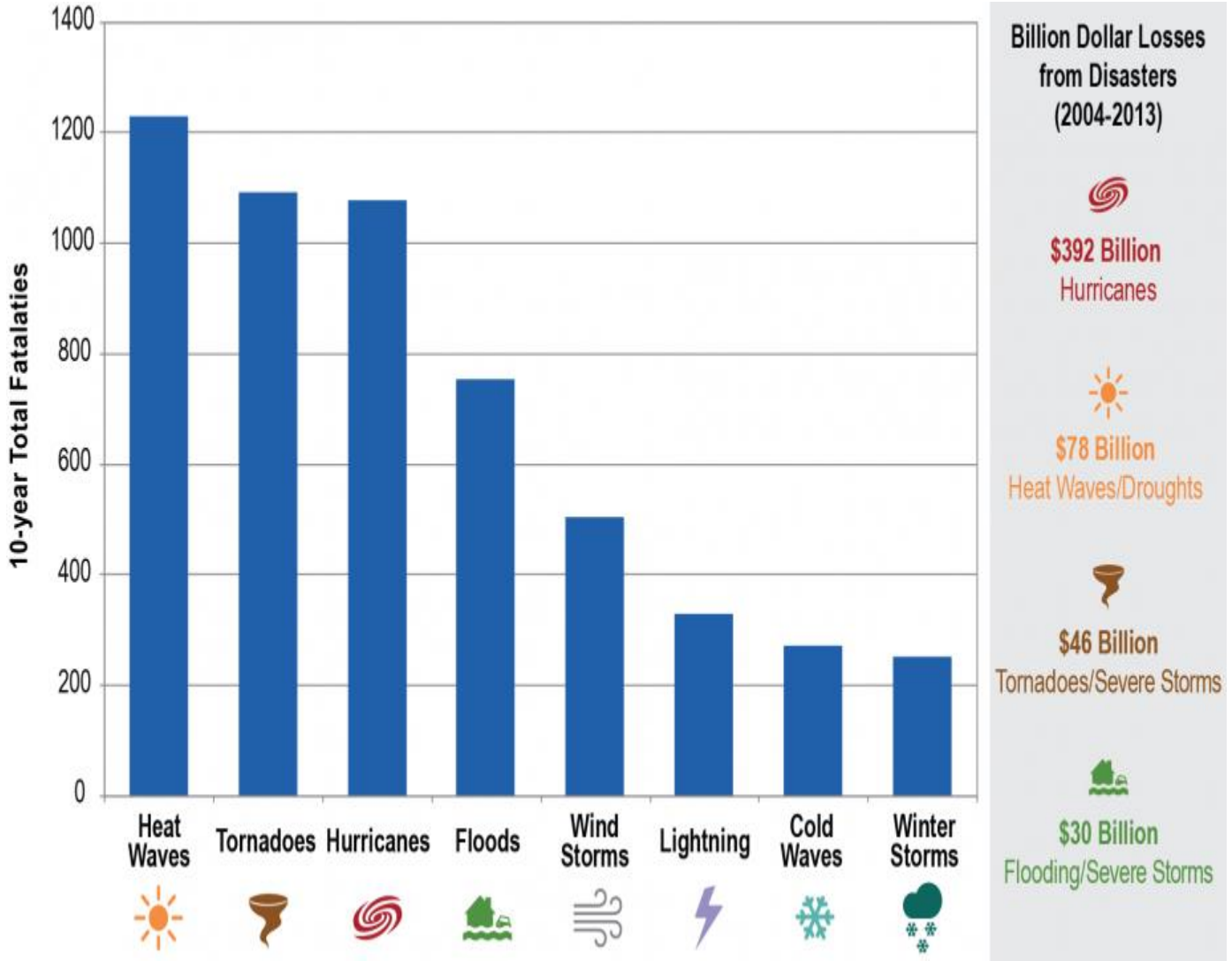
Programmatic support for capacity development:

Upcoming Intra-ACP EU GFCS Programme

+ potentially:

Weather-Ready Nations and potential upcoming USAID programme

How does heat affect our society?



Credit: La CooperativA Campesina de California

Heat waves are called a “silent killer”.

Bu excessive heat can also lead to a range of illnesses:

- **physical illnesses: dehydration, heat rashes, heat cramps, heat exhaustion, heat strokes**
- **Mental illnesses: aggression, apathy**

How does heat affect our society?

Productivity – hundreds of thousands of man-hours lost to heat, when unmitigated; child's learning ability impaired.

Food security – crops wilt more easily in extreme heat, poultry and livestock experience severe heat stress.

> CEO of the Barbados Agricultural Society (BAS), James Paul, "There is increased mortality of chickens, the broilers and layers, especially layers." and "disrupt the breeding cycle of some animals, especially dairy cows", affecting next year's milk supplies – **NationNews, 15-09-2019**

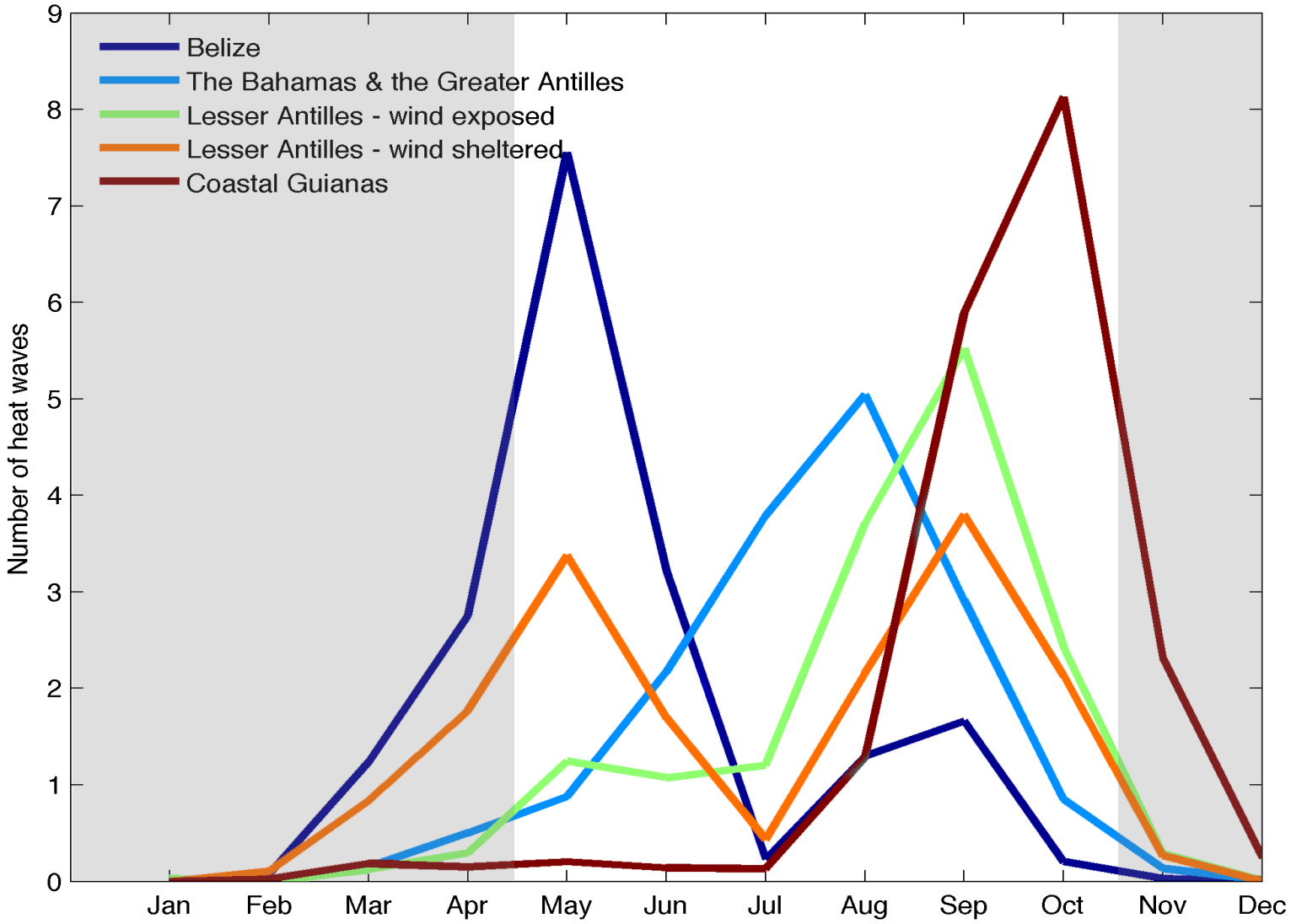
Energy – cooling demand increases and energy production typically decreases with heat.

Environment – heat exacerbates drought, facilitates fires, can pose severe stress on animals, accelerates the spreading of vector borne diseases such as Dengue, etc.

Excessive heat severely **impacts on a broad range of societal needs**

There is need for heat action plans.

The Caribbean Heat Season



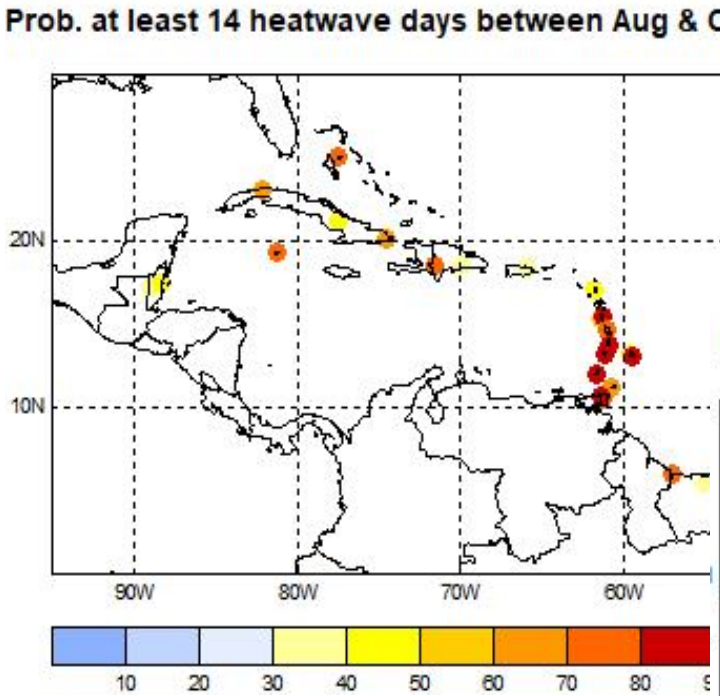
Caribbean Heat Season (May to October)

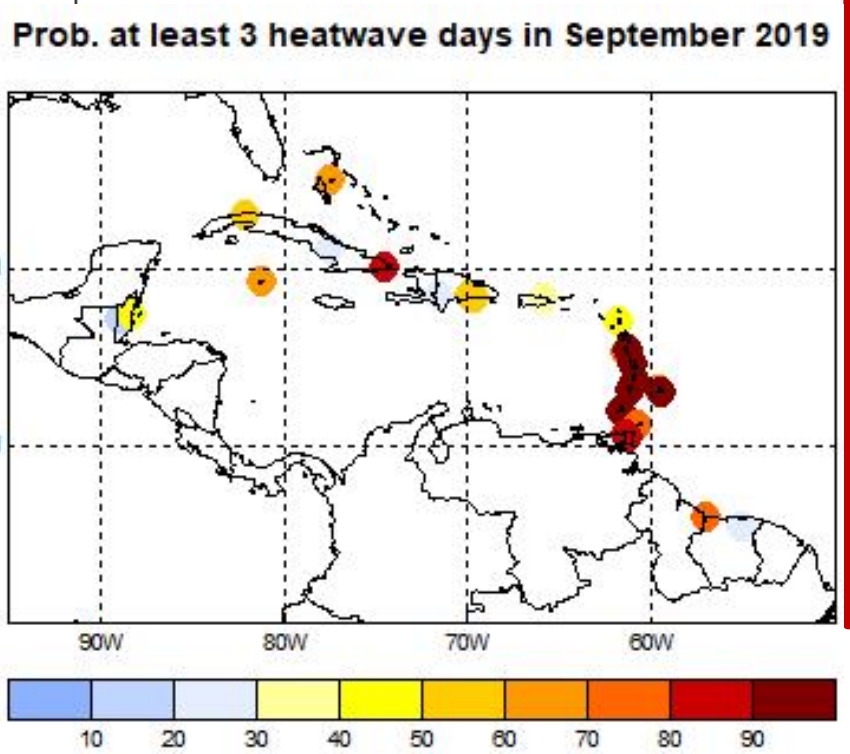
the part of the year during which we regularly get **heat waves**

SEASONAL & MONTHLY HEATWAVE FREQUENCY FORECASTS

seasonal early warning for heat stress

What's the chance of having at least … heatwave days from August to October 2019?





FORECAST:

More than 90% chance of having at least 14 heatwave days in Barbados, Trinidad and the Windward Islands. 40-80% in other places.

IMPLICATION:

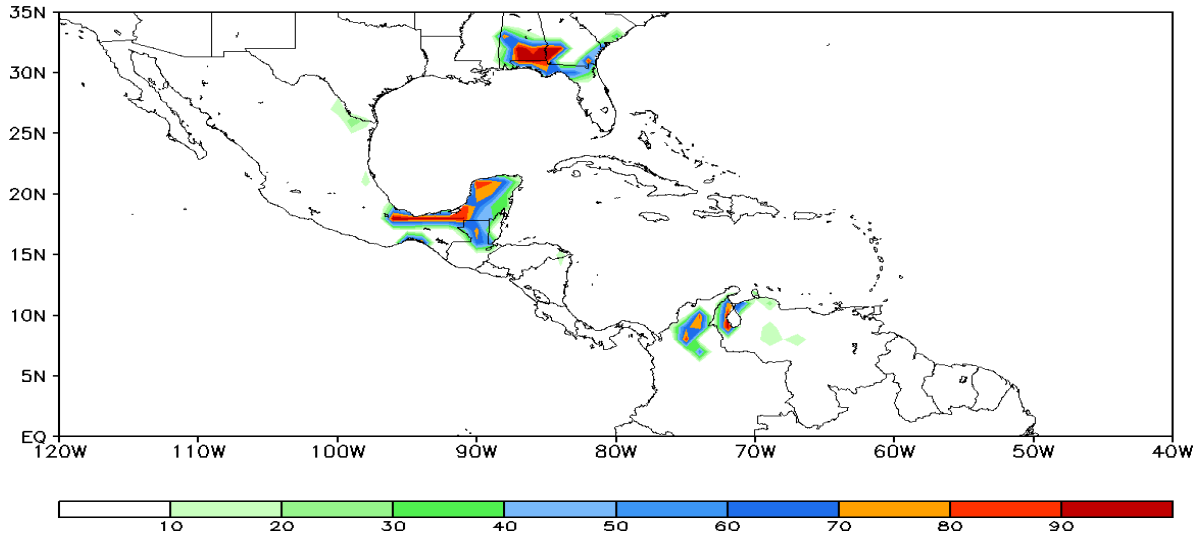
heat stress will peak in September and very likely exceed that of 2017 and 2018.

RCC-Washington - Week-1 and week-2 Heat Waves forecasts

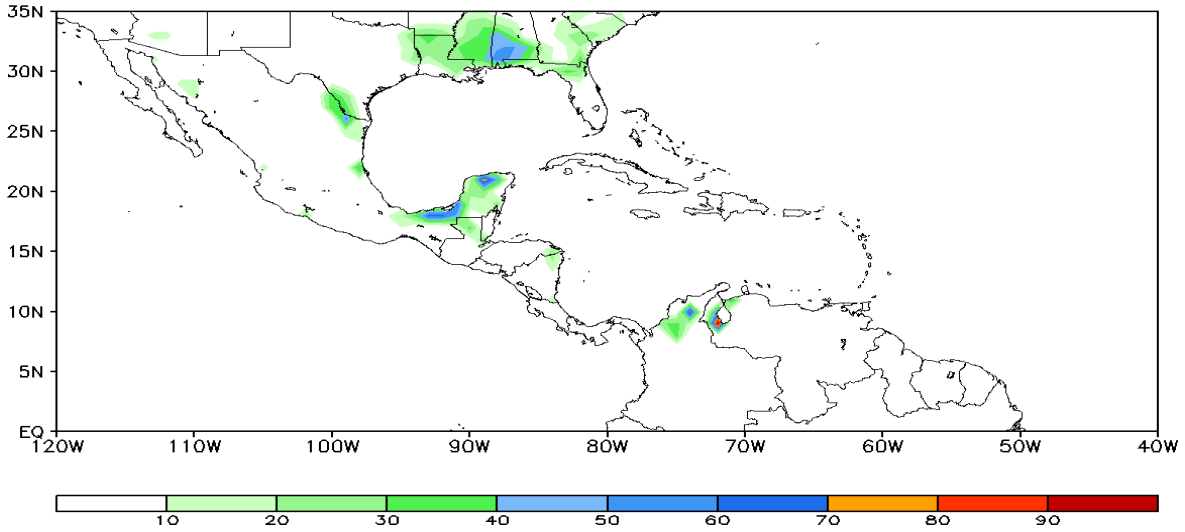
The heat wave forecasts indicates the probability that the NOAA's Heat Index > 38°C during at least 2 consecutive days.

The NOAA's Heat Index is an index combining the relative humidity with the air temperature. It is a measure of how hot is really feels to the human body.

Week-1 Probabilistic Heat Wave Forecast
Valid: 24 – 30 May 2019 (IC: 23 May 2019)

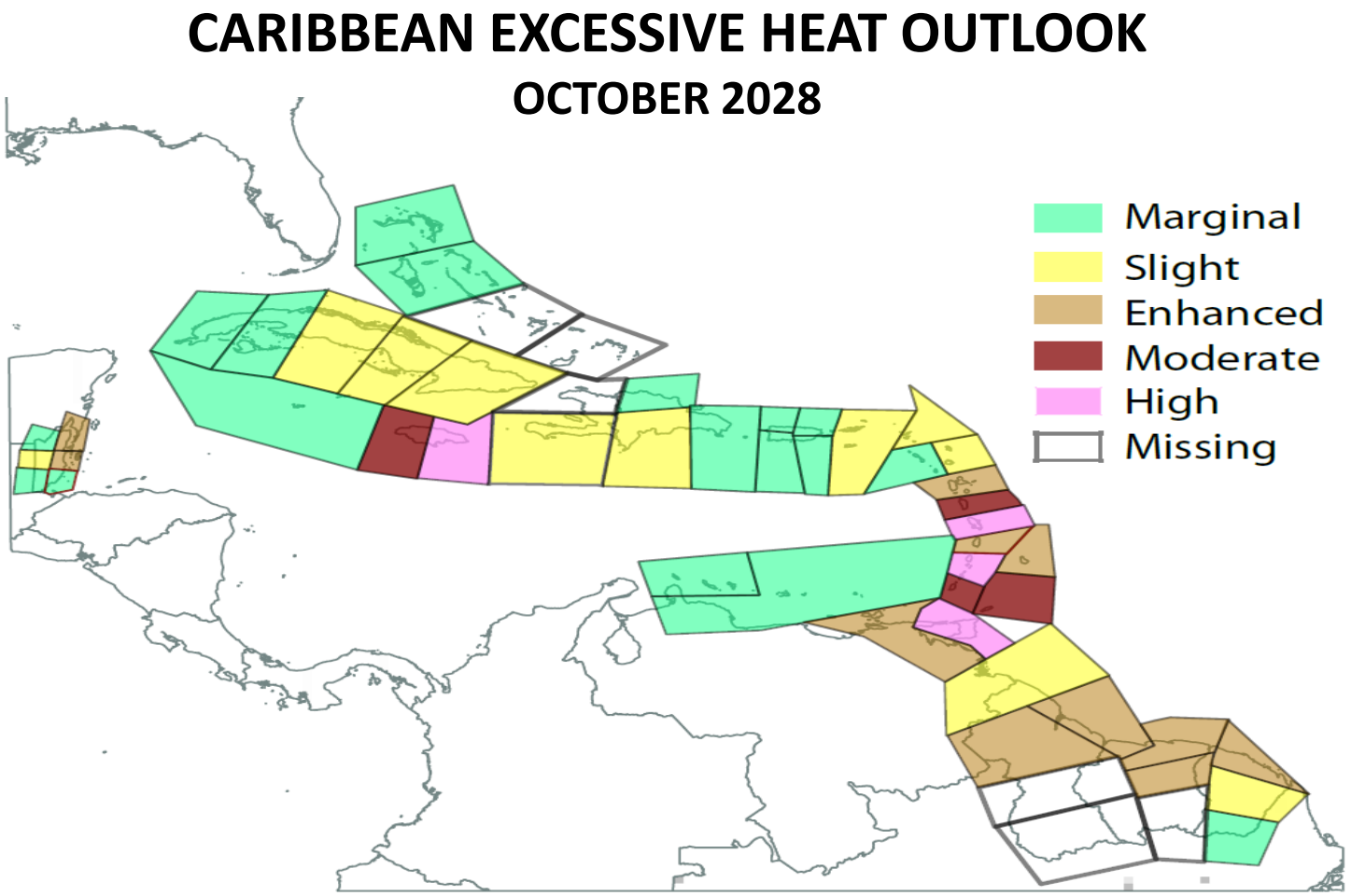


Week-2 Probabilistic Heat Wave Forecast
Valid: 31 May – 6 June 2019 (IC: 23 May 2019)



HEAT PREDICTION ACROSS TIMESCALES

seasonal early warning for heat stress



Product development planned across weather, S2S and seasonal timescales.

Programmatic support for capacity development:

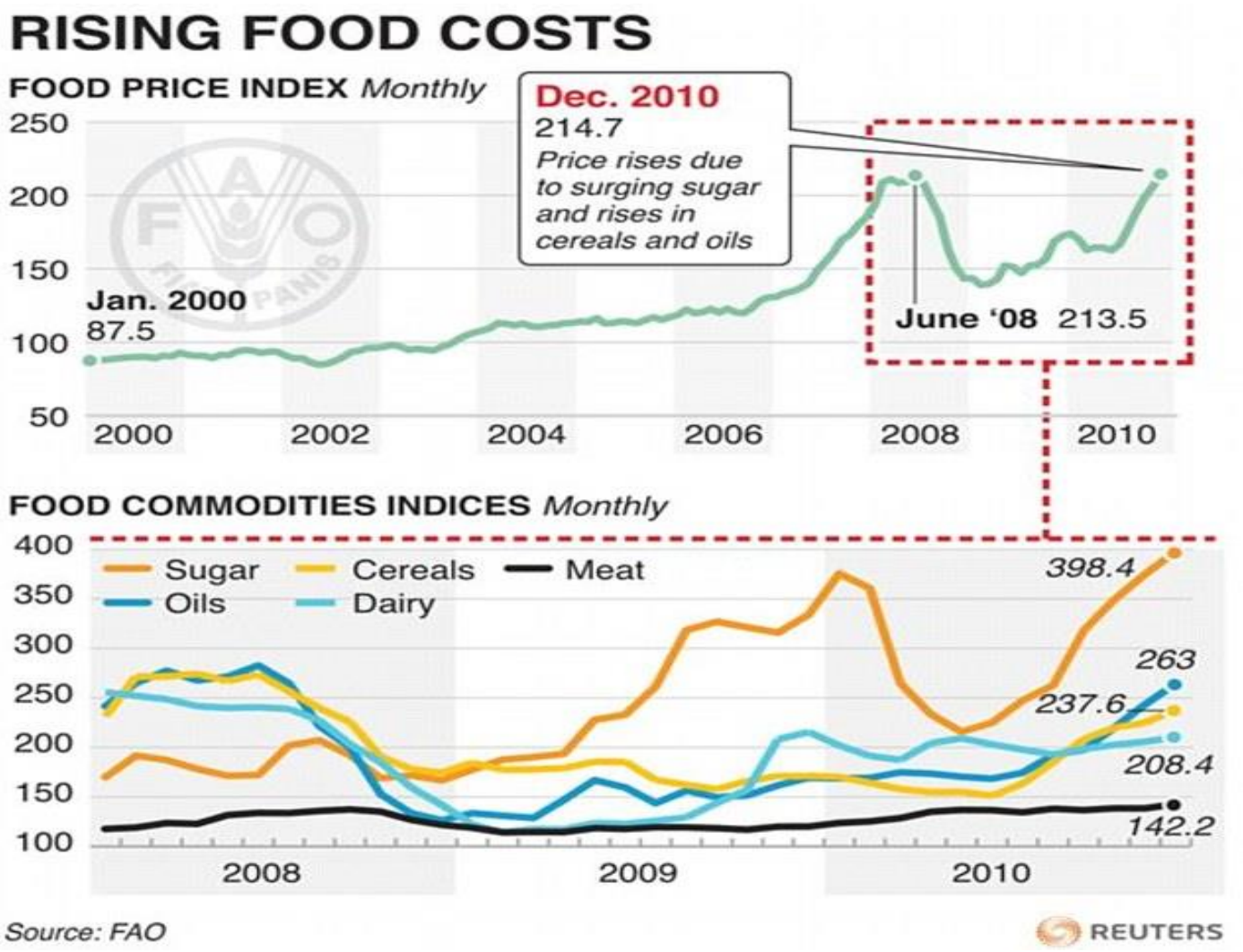
Upcoming Intra-ACP EU GFCS Programme (focusing on human and animal health)

+ potentially:
Weather-Ready Nations (focusing on the weather time scale)

DRY SPELLS

seasonal early warning for agricultural crop water stress

Dry spells and crop failure risk

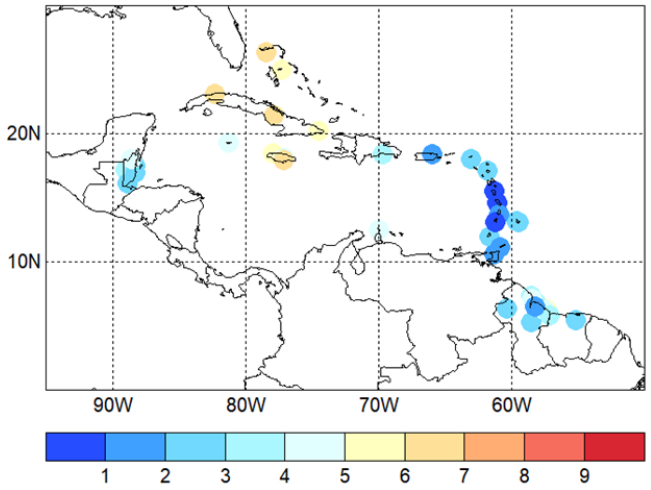


DRY SPELLS

seasonal early warning for agricultural crop water stress

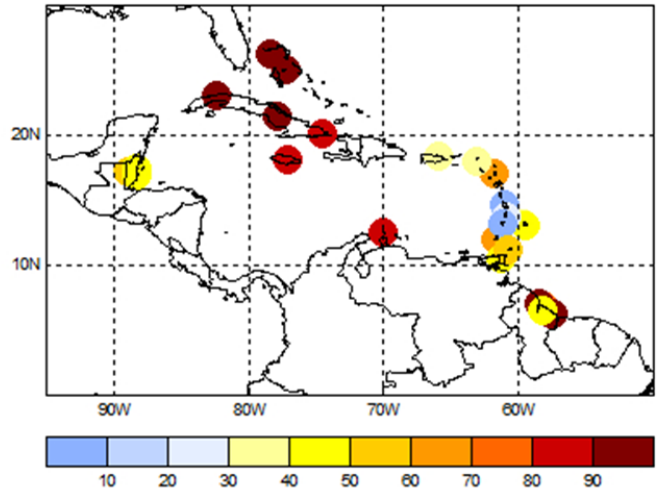
7-day dry spells from October to December 2019

Historical avg. number of 7-day dry spells

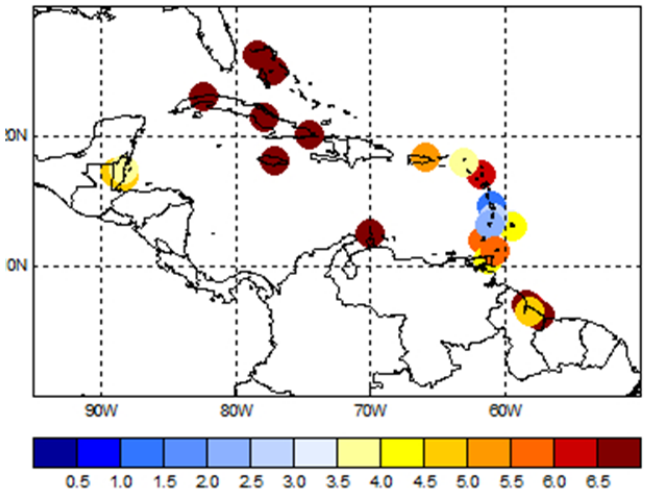


What is the FORECAST for October to December 2019?

Probability of at least THREE 7-day dry spells



MAX number of 7-day dry spells

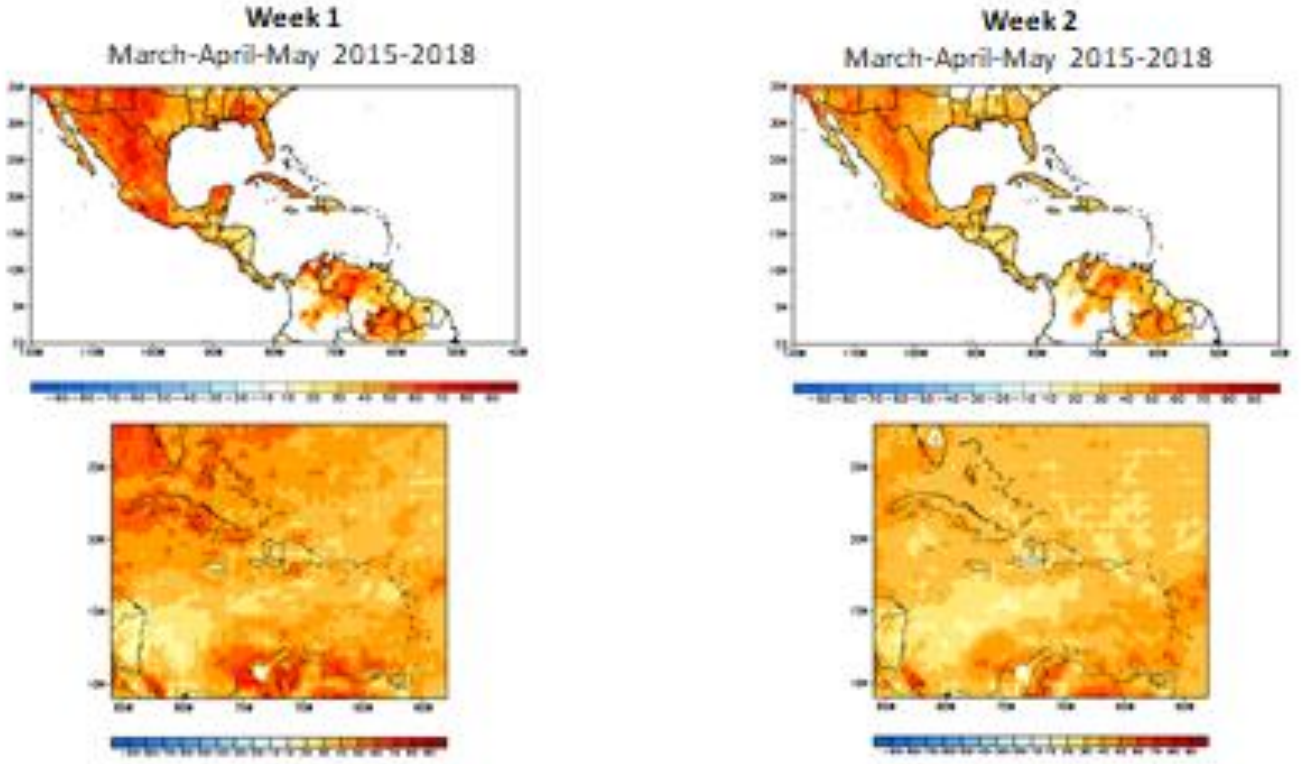


DRY SPELLS

seasonal early warning for agricultural crop water stress

7-day Dry Spell

Week 1 and Week 2 Heidke Skill Score Maps



- Week 1 and week 2 forecasts perform reasonably well over the Caribbean
- Week 1 forecast: high HSS over Cuba and The Bahamas

Useful skill levels in GFS and CFSv2's sub-seasonal forecasts make the development of downscaled S2S dry spell forecast products the ideal test bed.

In going to operations, research will be needed in the presentation format of dry spell outlooks.

What capacities exist and need development at CIMH & in NMHSs?

Current capacity of the RCC

Institutional Capacity – RCC has the mandate for the capacity building in and provision of tailored climate information for the Caribbean.

Technological/Infrastructural Capacity – computational facilities allowing mostly statistical downscaling of existing global model output, through CPT and the automated system CAROGEN.

Procedural Capacity – RCC coordinates the capacity development within CariCOF, which sets regional standards for procedures in climate prediction.

Human Resources – the RCC has 2 academic staff, 2 contracted staff.

Financial Resources – delivery of operational climate monitoring and prediction products and services covered by CIMH's core funding; capacity development efforts rely on programmes, financed through project funding

Additional capacity needs for S2S

Institutional Capacity – none.

Technological/Infrastructural Capacity

(1) reliance on NOAA CPC for the generation of CFS/NMME outputs;
(2) reliance on the IRI for the development of an S2S enabled version of CPT.

Procedural Capacity

(1) Partnership between CIMH, NOAA and IRI to develop a regional standard for downscaled S2S predictions of flash flood potential, heat waves, dry spells;
(2) Need for substantial automation of procedures.

Human Resources

Need for at least 2 additional academic staff, 1 dedicated IT support staff and project staff.

Financial Resources

Continued need for project funds to support programme delivery.

Ongoing challenges in capacity development for S2S prediction

DATA CHALLENGES FOR R&D

Climate Data

(1) daily data collection, digitisation, storage and quality control outside of airport stations lie beyond the scope of most NMHSs, leading to scant data records needed for R&D in S2S prediction;

(2) no existing formal or informal region-wide data sharing policy for daily data is in place, limiting the number of records that can be utilised for the development of S2S products.

Impact data

(1) Incompleteness and inhomogeneity of flood data requires additional steps in R&D for flash flood prediction.

Sector outcome data

(1) inexistence, incompleteness, inhomogeneity of sector outcome data records inhibit R&D of tailored S2S and seasonal prediction products;

(2) data quality assurance and data sharing policies are mostly not in place, putting onus on RCC to campaign for such.

OPERATIONAL CHALLENGES for S2S

Staffing

With only 2 academic personnel on staff, including only 1 specialist climatologist, the RCC's time commitment on operations has far exceeded its limits.

Scheduling of workflow

(1) Climate monitoring and prediction currently only possible at monthly intervals;
(2) Station data sharing currently takes too much time to allow monitoring at sub-monthly intervals.
(3) Scheduling of co-production with regional sectoral partners at sub-monthly intervals will prove extremely challenging.

Automation

In light of regional standardisation and reduction of human resources spent on operations, the current automation through CAROGEN needs expansion and improvements in functionality.

Can we provide S2S prediction services for the Caribbean?

ONLY in partnership with RCC-Washington, IF thoroughly researched, WITH hazard-specific information

Thank you!

contact us at:
rcc@cimh.edu.bb

For climate monitoring information, climate outlooks and climate bulletins, please visit:
rcc.cimh.edu.bb