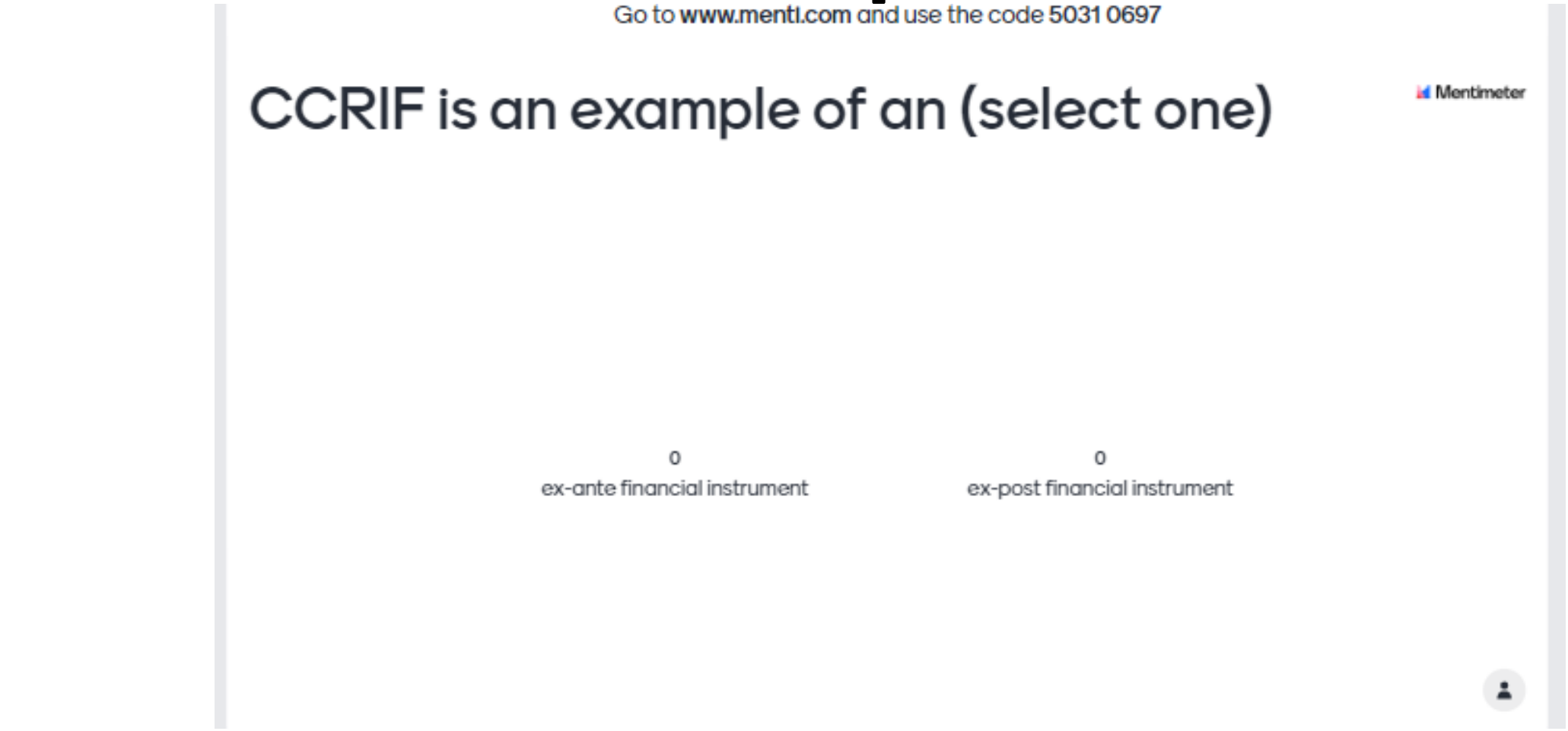
Introduction to Disaster Risk Financing and CCRIF Parametric Insurance

DAY 3

Prepared by: CCRIF SPC

CCRIF SPC – A Disaster Risk Financing Tool

CCRIF Recap


Go to www.menti.com and use the code 5031 0697
CCRIF is an example of an (select one)
Mentimeter
0
ex-ante financial instrument
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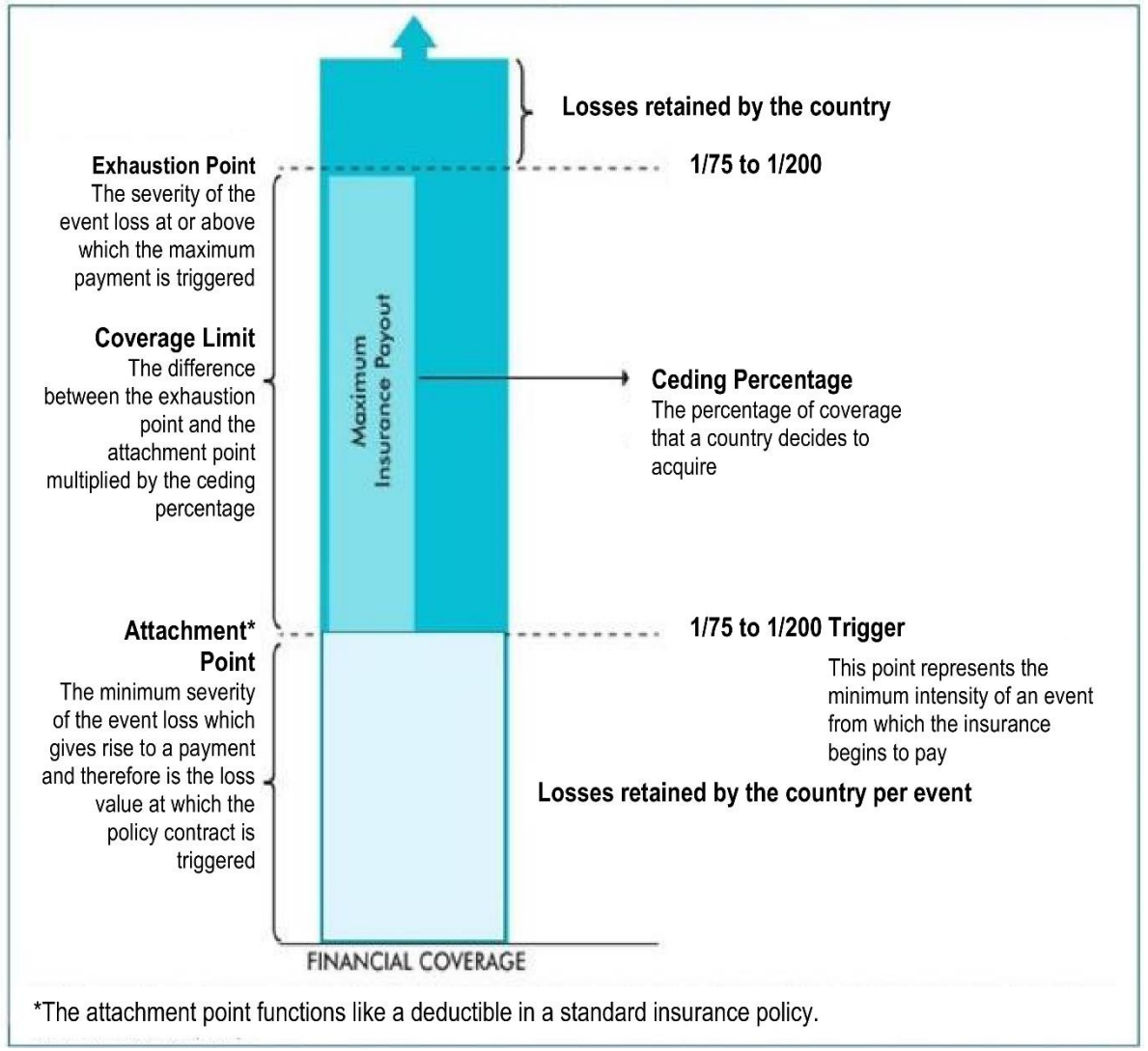
ex-post financial instrument

Elements of CCRIF Policies



CCRIF policy premiums depend on the selection by Governments of 3 elements:

- **Attachment Point**
- **Ceding Percentage**
- **Exhaustion Point**

These are informed by the country's risk profiles

A CCRIF policy is triggered when the modelled loss for an event in a member country equals or exceeds the attachment point specified in the country's policy contract.

Elements of CCRIF Policies - Exercise

Attachment Point

- Why would a country increase its AP?
- What kinds of events will a higher AP provide coverage for?

Exhaustion Point

- Why would a country increase its EP?
- What kinds of events will a higher EP provide coverage for?

Ceding percentage

- Why would a country increase its ceding percentage?

How do these changes affect policy premium?

Elements of CCRIF Policies - Demonstration

	Original Policy Scenario	Change in Attachment Point	Change in Exhaustion Point	Change in Ceding Percentage
Attachment Point ($)	$120,158,789	$169,416,559	$120,158,789	$120,158,789
Attachment Point (yrs)	10	15	10	10
Exhaustion Point ($)	$1,032,458,571	$1,032,458,571	$1,449,365,357	$1,032,458,571
Exhaustion Point (yrs)	100	100	150	100
Ceding Percentage	50%	50%	50%	75%
Coverage limit (Maximum payout) ($)	$456,149,891	$431,521,006	$664,603,284	$684,224,837
Premium ($)	**$713,391**	**$617,772**	**$841,498**	**$1,070,087**

Attachment Point decrease →

Exhaustion Point increase →

Ceding Percentage increase →

Premium increase

How CCRIF Policies are Triggered and Payouts Calculated – TC

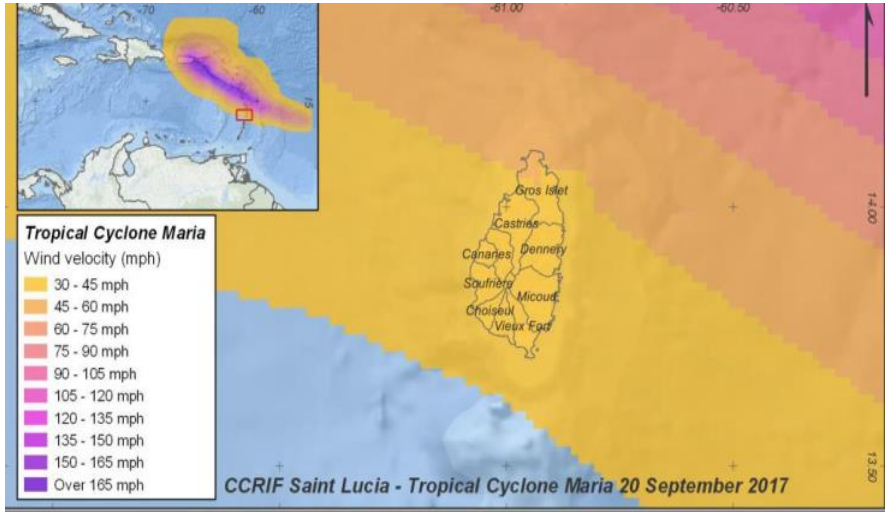
A CCRIF policy is triggered when the modelled loss for an event in a member country equals or exceeds the attachment point specified in the policy contract.

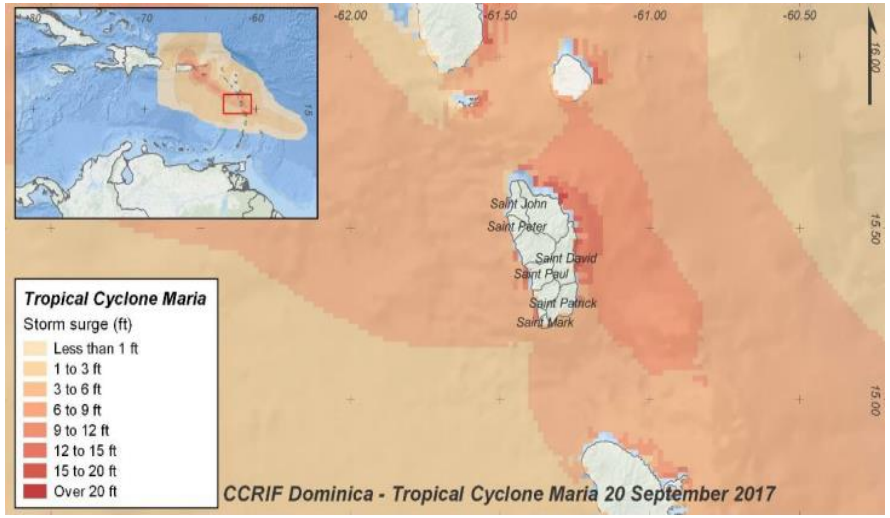
Tropical Cyclone

A payout to a country depends on the

- **storm's intensity, track and storm surge**
- relative to the distribution and exposure of government assets
- and on the **attachment and exhaustion points** and coverage limit that the country has selected.

Once the trigger level (**attachment point**) has been reached, the payout increases as the modelled loss increases, due to higher hazard intensity, a closer track and/or greater storm surge for the storm (relative to the distribution and exposure of assets) until the **coverage limit** has been reached.





How CCRIF Policies are Triggered and Payouts Calculated – EQ

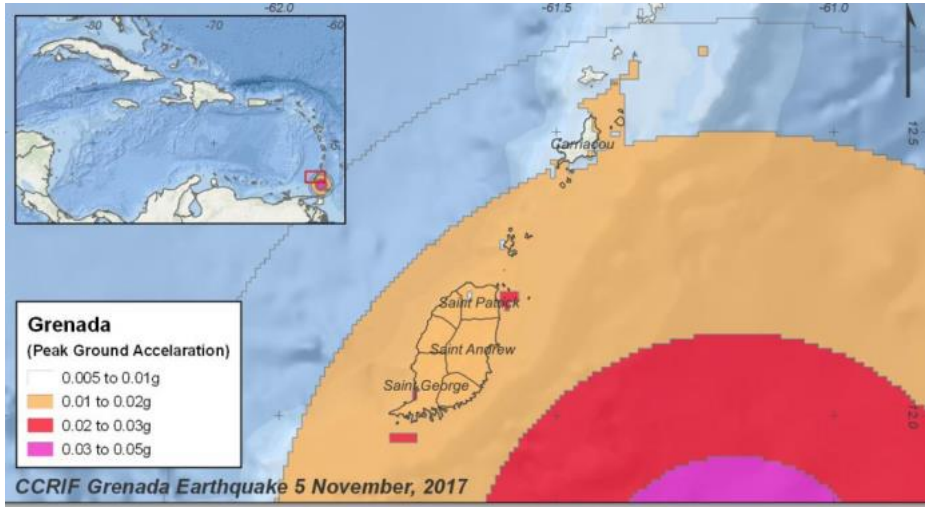
A CCRIF policy is triggered when the modelled loss for an event in a member country equals or exceeds the attachment point specified in the policy contract.

Earthquake

A payout to a country depends on the

- **source magnitude and hypocentre (location and depth) of the earthquake** which is translated into a ground shaking intensity
- relative to the distribution and exposure of government assets
- and on the **attachment and exhaustion points** and **coverage limit** that the country has selected

Once the trigger level (**attachment point**) has been reached, The payout increases as the level of losses increases, and losses are directly calculated from the amount of ground shaking in the affected country and what assets are exposed to what level of shaking – until the **coverage limit** has been reached



How CCRIF Policies are Triggered and Payouts Calculated – XSR

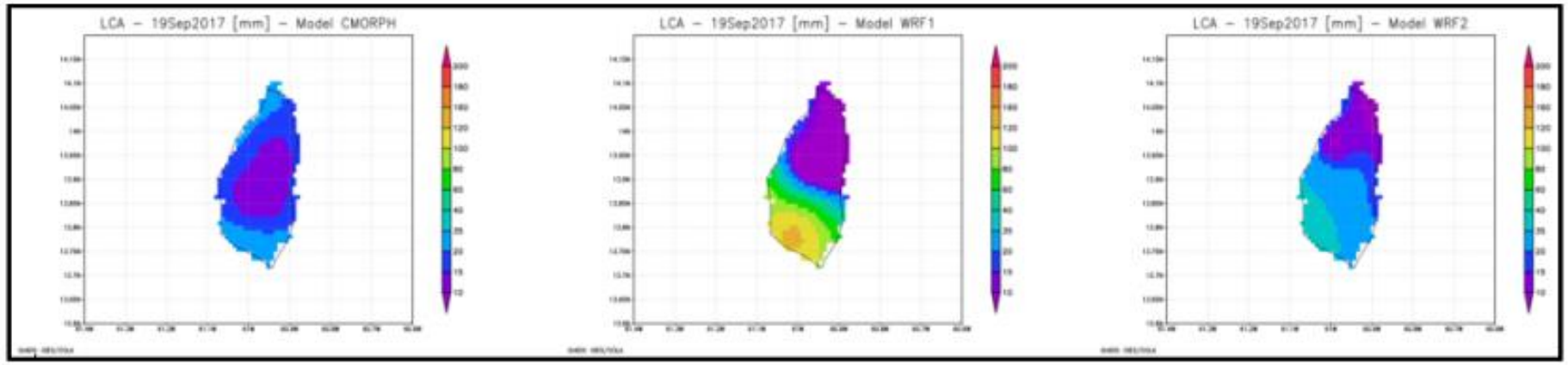
A CCRIF policy is triggered when the modelled loss for an event in a member country equals or exceeds the attachment point specified in the policy contract.

Excess Rainfall

A payout to a country depends on the

- **peak aggregate rainfall for the event**
- the distribution of high rainfall relative to exposure
- and the proportion of the country/exposure impacted

Once the trigger level (**attachment point**) has been reached, as the Rainfall Index Loss increases, the payout increases until the maximum payout (**coverage limit**) has been reached.



Special Features of CCRIF TC and EQ Policies

In 2017, CCRIF introduced two new policy features for tropical cyclone and earthquake policies: the Reinstatement of Sum Insured Cover and Aggregated Deductible Cover.

These features are voluntary endorsements to the main policies and allow member countries to access coverage designed to be supplemental to the existing TC and EQ policy structures.

Reinstatement of Sum Insured Cover

RSIC

- Establishes a reinstatement of cover provision
- This prevents a country of being exposed until the next policy year in case the coverage limit is exhausted

Aggregated Deductible Cover

ADC

- Provides a mínimum payment for TC or EQ that do not trigger a CCRIF policy
- It was also designed to reduce basis risk.
- It aims to reduce the probability of a missed event.
- The sum insured for this product is up to the annual net premium

Understanding Country Policy Characteristics

Sample tropical cyclone coverage

	TROPICAL CYCLONE
Annual Premium per peril (US$)	$100,000
Attachment Point/Return Period (years)	10
Exhaustion Point/Return Period (years)	50
Attachment Point ($ of loss)	$12,500,000
Exhaustion Point ($ of loss)	$50,000,000
Full Loss Limit (US$)	$37,500,000
Ceding Percentage	60%
Coverage Limit (US$)	$22,500,000
5-yr event, policy payout	
12-yr event, policy payout	
25-yr event, policy payout	
50-yr event, policy payout	
80-yr event, policy payout	

Understanding Country Policy Characteristics

Sample tropical cyclone coverage

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Full Loss Limit (US$)	$37,500,000
Ceding Percentage	60%
Coverage Limit (US$)	$22,500,000
5-yr event, policy payout	0
12-yr event, policy payout	$ 1,275,065
25-yr event, policy payout	$ 18,488,876
50-yr event, policy payout	$ 22,500,000
80-yr event, policy payout	$22,500,000

COAST Policy for Fisheries

COAST Fisheries Model: Two Independent Components	**Adverse Weather Tier 1**	Fisherfolk economic activity interruption	Wave height
			Heavy rainfall
	Tropical Cyclone Tiers 2 and 3	Direct damages to assets (*e.g.* boats, equipment, infrastructure, etc)	Wind speed
			Storm surge

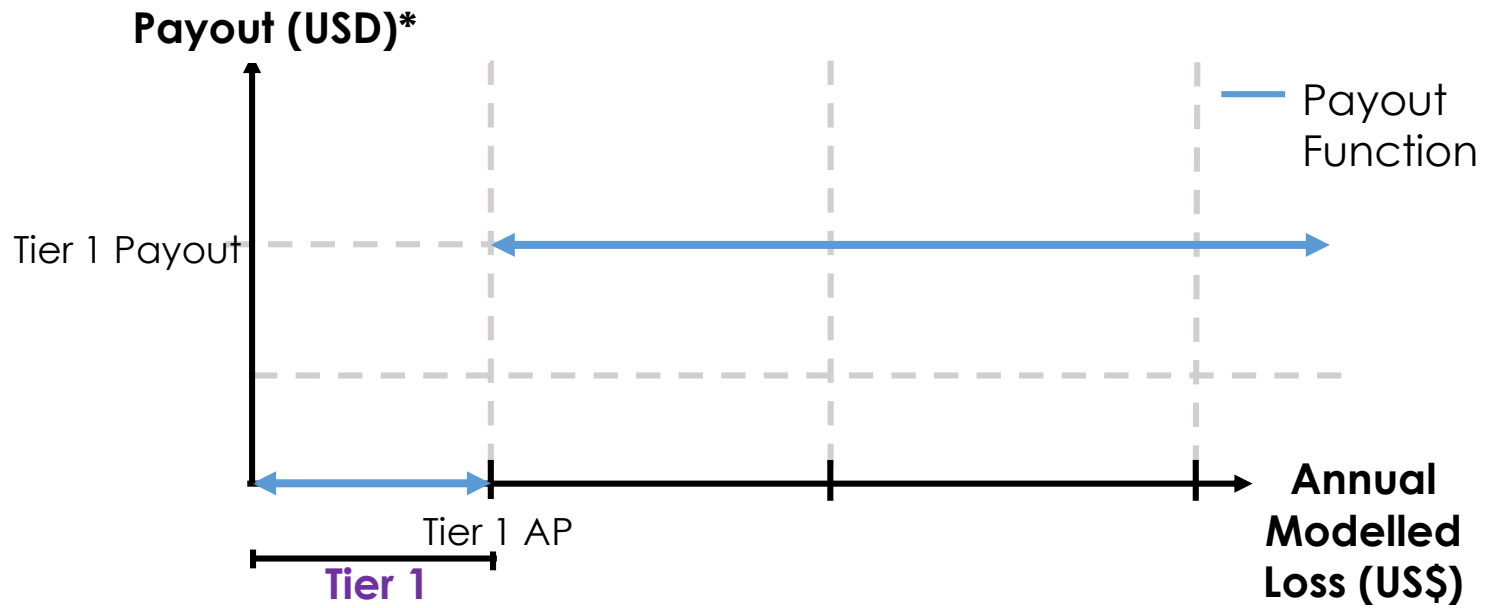
How CCRIF Policies are Triggered and Payouts Calculated – COAST

The COAST parametric insurance product follows a three-tier payment scheme organized as follows:

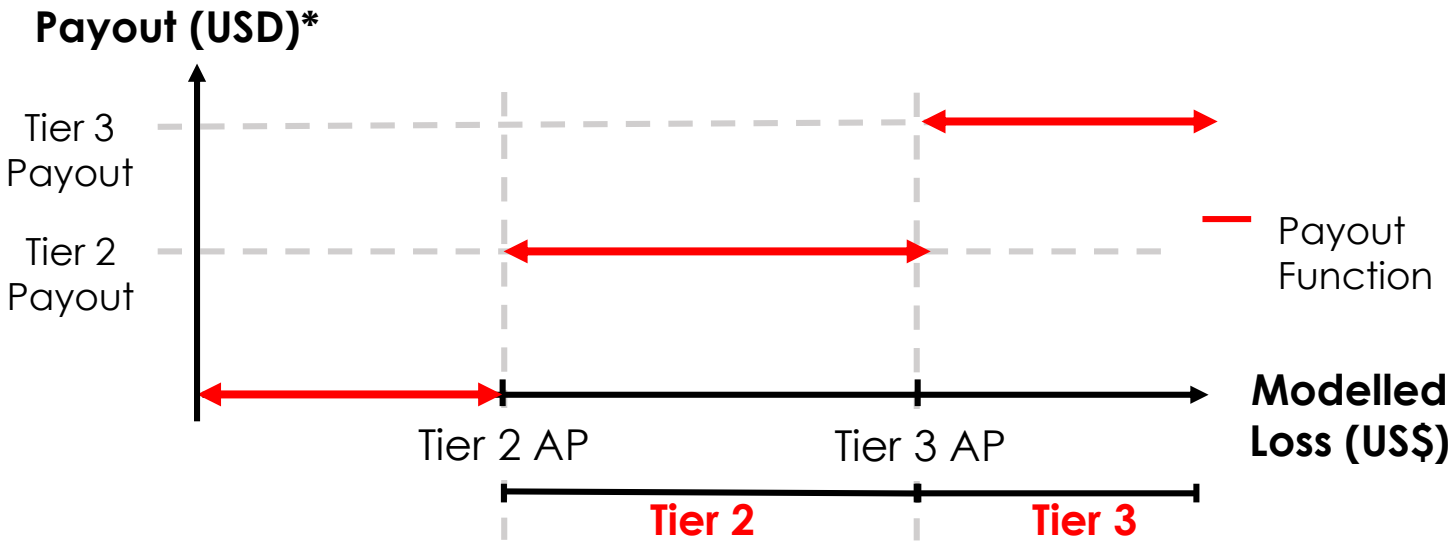
- Tier 1 consists of a lump sum payment provided once an annual aggregate deductible threshold is met using the Adverse Weather component.
- Tier 2 consists of a lump sum payment provided if a Tropical Cyclone event loss falls within a defined interval.
- Tier 3 provides a lump sum payment if a Tropical Cyclone event loss is above the Tier 2 interval´s upper limit.

COAST Payouts

Adverse Weather Component



Tropical Cyclone Component



The claims verification, administration and payout process - COAST

The main steps are:

- CCRIF issues an **event briefing** after an event has been completed if there has been a loss above a certain value on the COAST LPP component or TC component.

- If a country's policy is triggered by an event (i.e. if the country losses are greater than the policy's Tier 1 Attachment Point (for Adverse Weather) or Tier 2 or Tier 3 Attachment Point (for Tropical Cyclone)), **CCRIF will automatically contact the Ministry of Finance** about the next steps required to receive payment.

- After the Ministry of Finance receives payment, the process to disseminate funds to the pre-determined beneficiaries is conducted.

Country risk profiles

The link between the CCRIF models and the policies

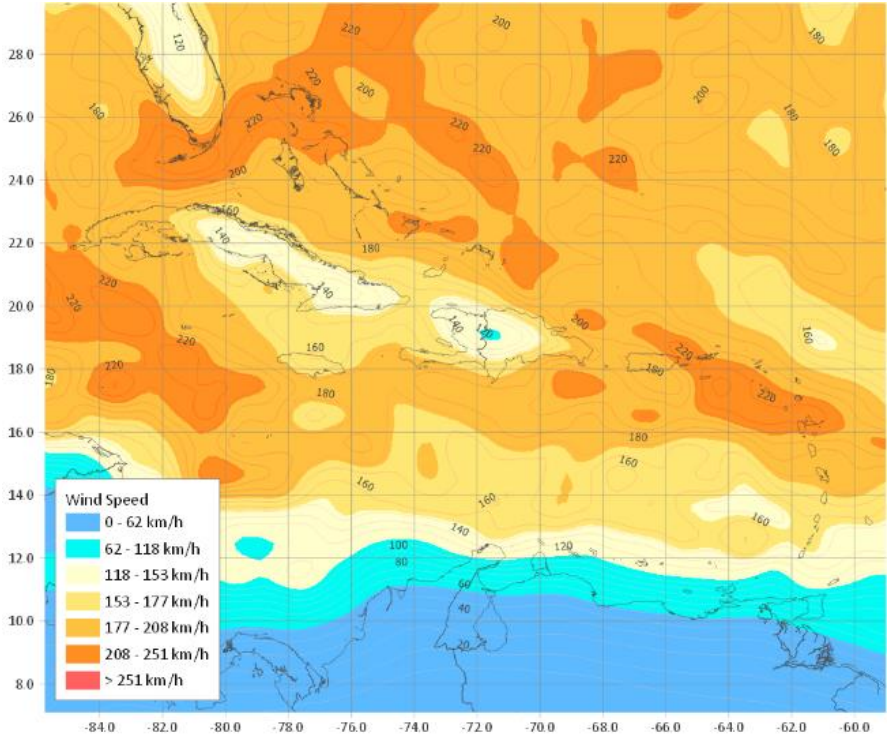
AIM

- ✓ **Provide information to the Country Risk Managers with simplicity, accuracy and robustness** about the demographical, geological, economic characteristics of their territories.
- ✓ **Assess the impact of historical losses** which may have caused damages, both to the infrastructure, population and economy
- ✓ **Illustrate and facilitate the risk transfer decisions.**
- ✓ **Help decision-making process**, but not substitute it. A country risk manager has to make his/her own decision and decide what is best for the country, given the combination of exposure to risk, risk proneness and also considering budgeting restrictions.

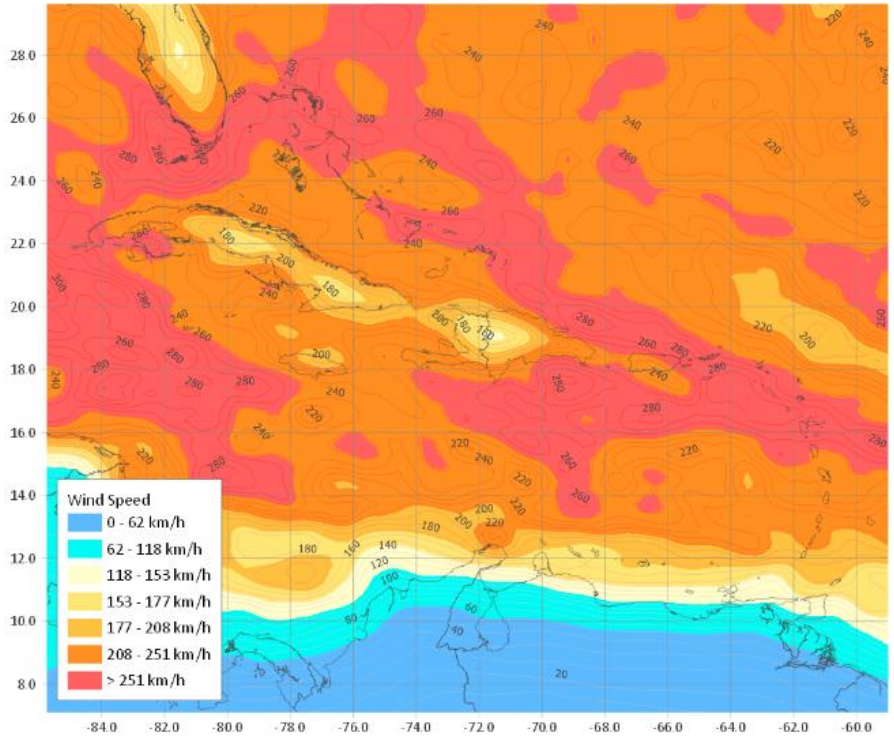
CONTENT

- ✓ Hazard Profile
- ✓ Exposure Profile
- ✓ Risk Profile
- ✓ **Most severe historical events and their estimated economical loss**

Tropical Cyclone - Hazard

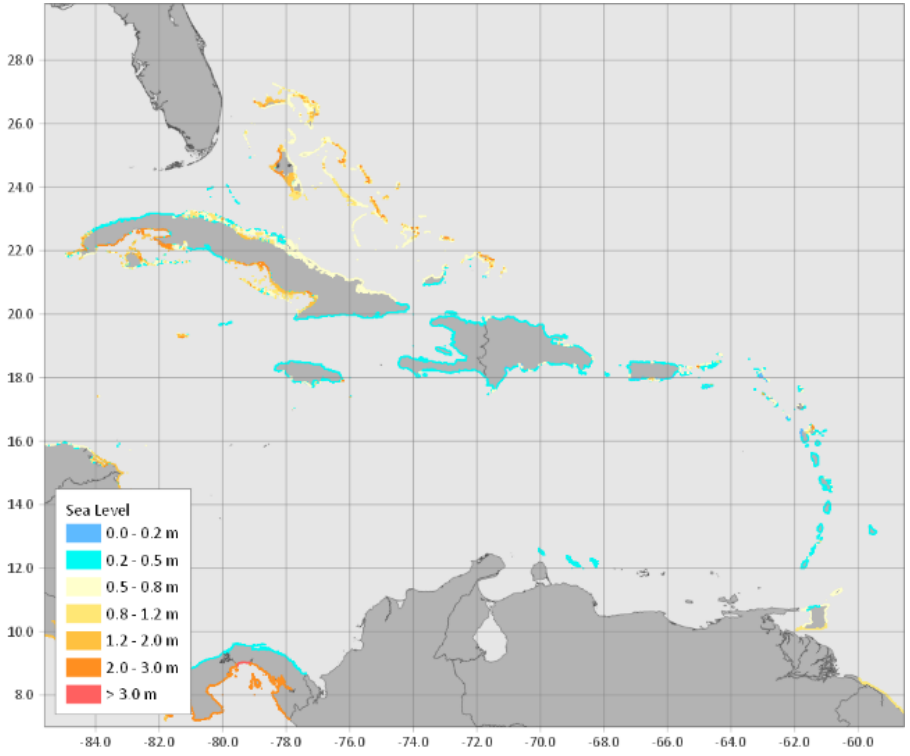


Wind speed for return period of 50 years

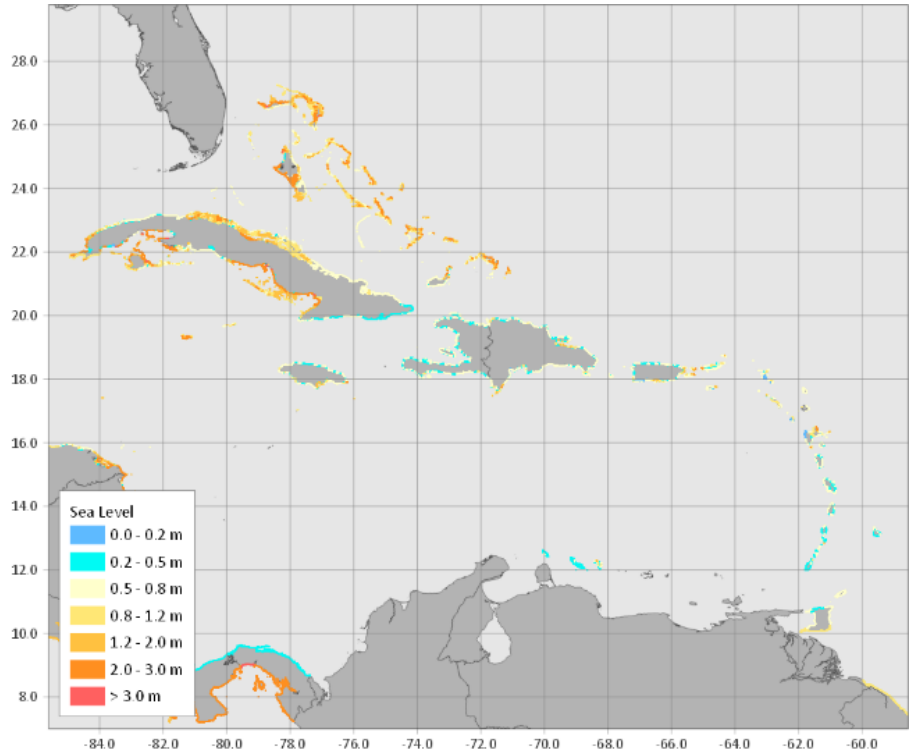


Wind speed for return period of 250 years

Tropical Cyclone - Hazard

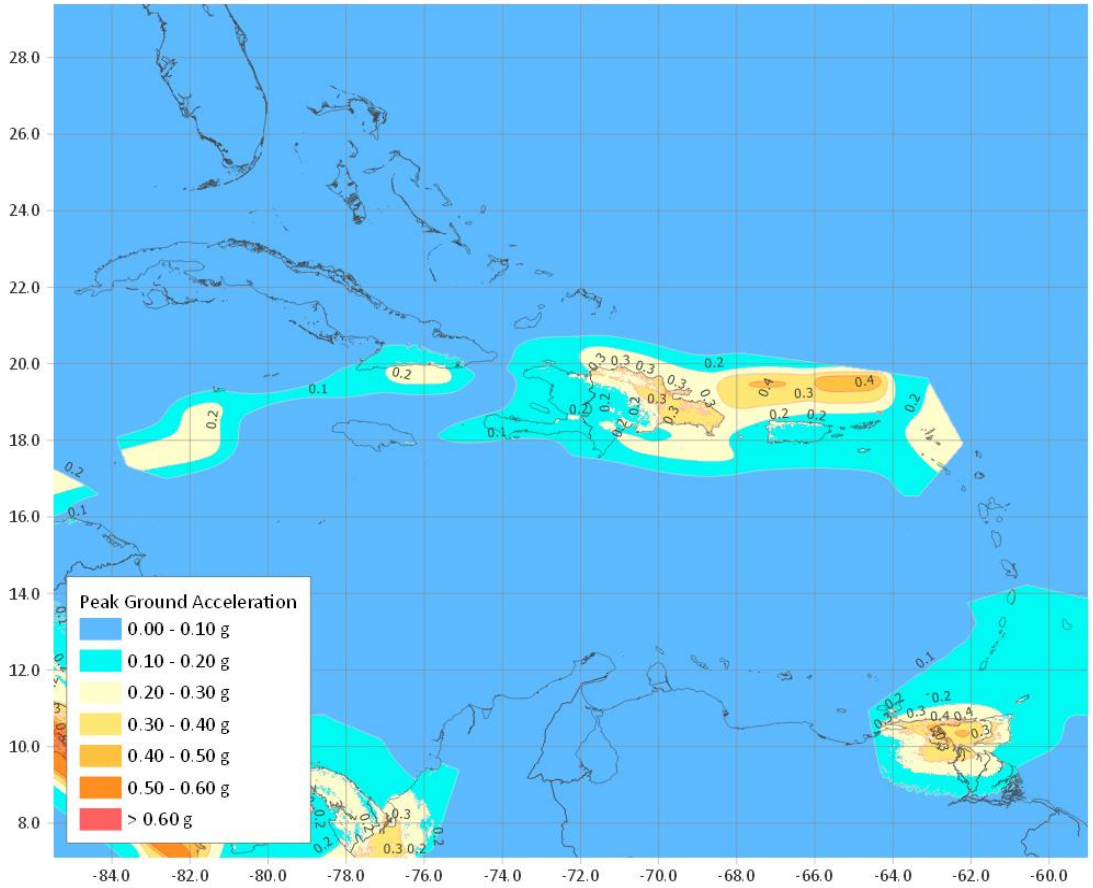


Sea level for return period of 50 years
storm surge + astronomical tide

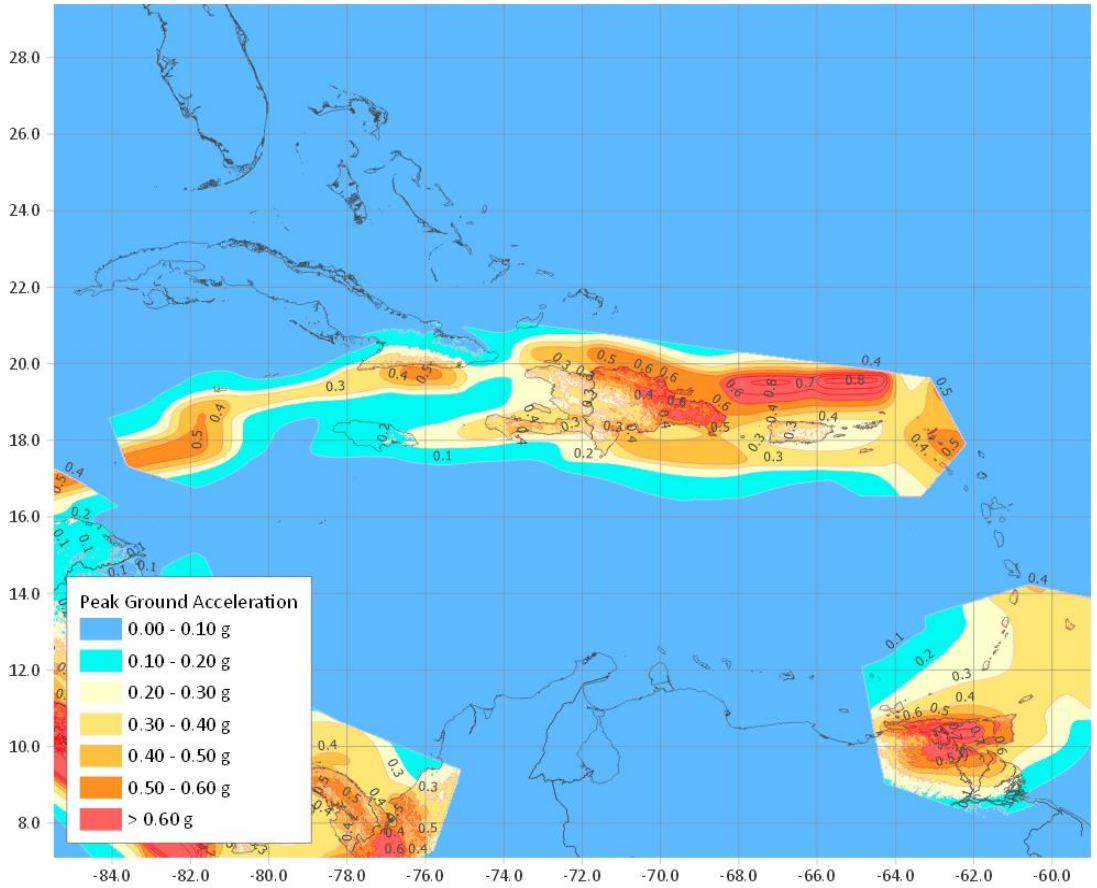


Sea level for return period of 250 years
storm surge + astronomical tide

Earthquake- Hazard

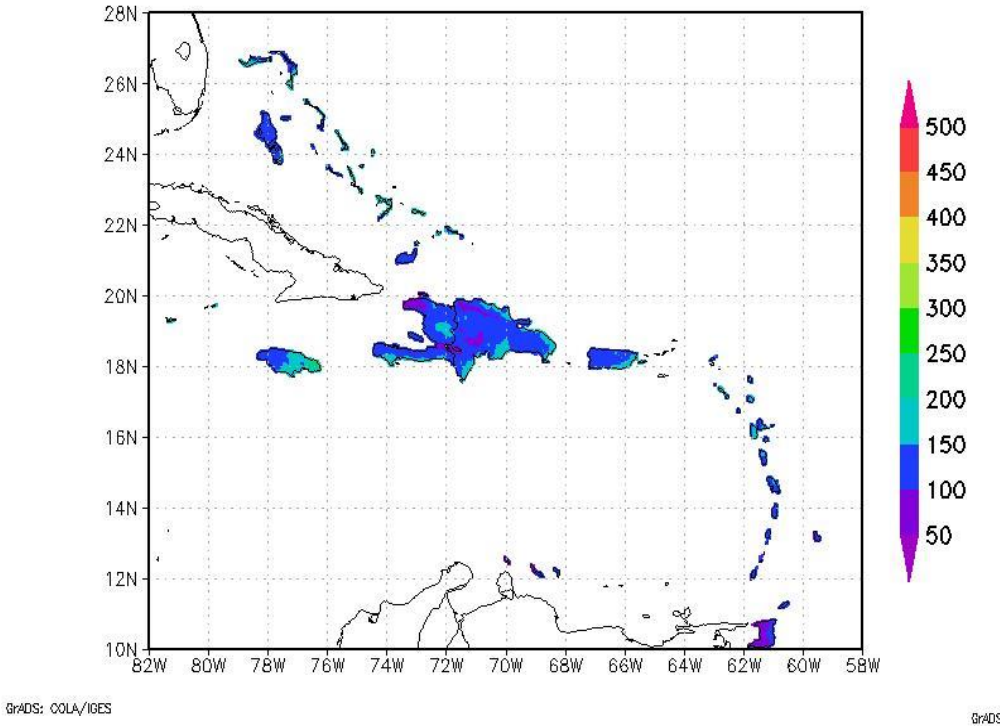


Peak Ground Acceleration (g) with an average return period of 95 years

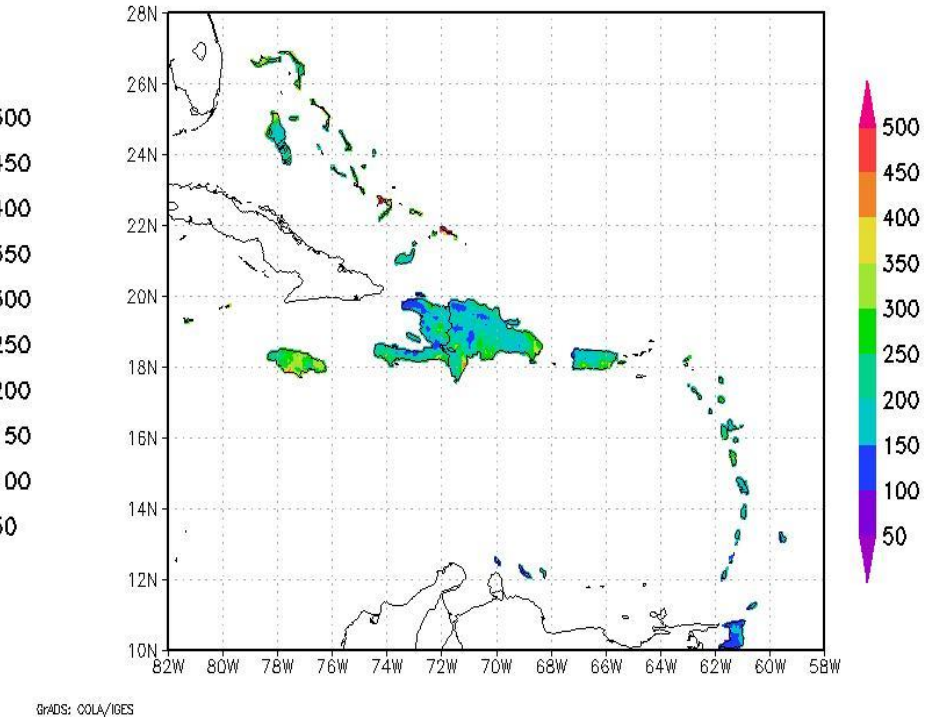


Peak Ground Acceleration (g) with an average return period of 475 years

Country Risk Profile - Excess Rainfall- Hazard

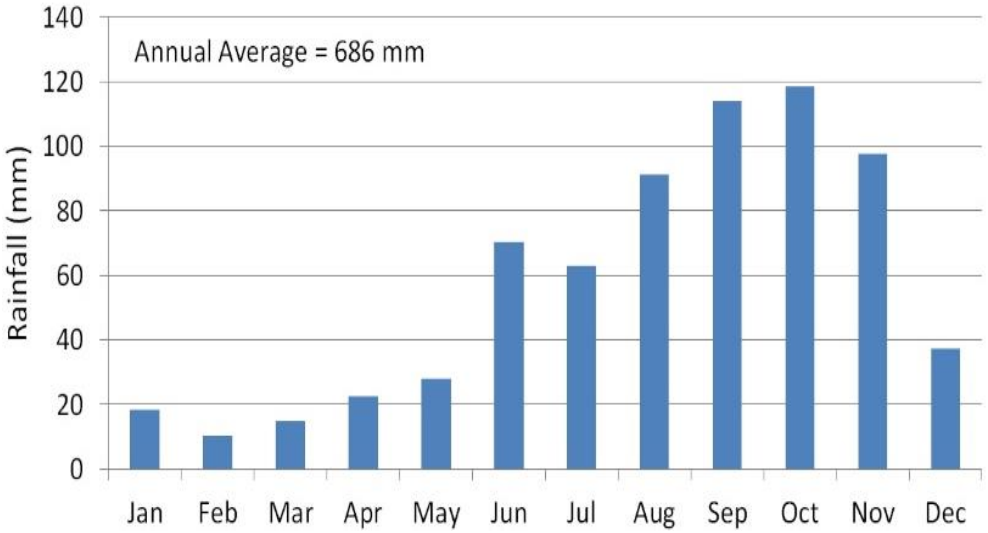


Hazard maps with return period 5 years for the country (amount of daily rainfall in mm)

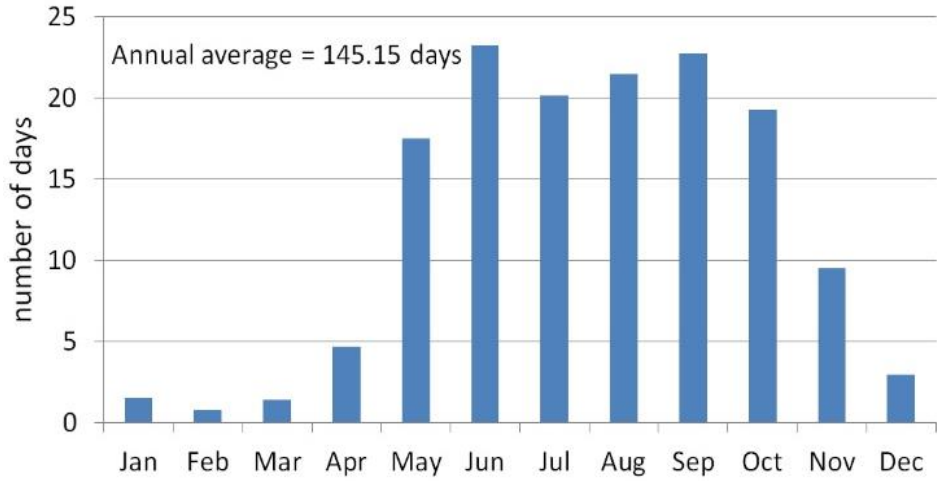


Hazard maps with return period 25 years for the country (amount of daily rainfall in mm)

Excess Rainfall- Hazard



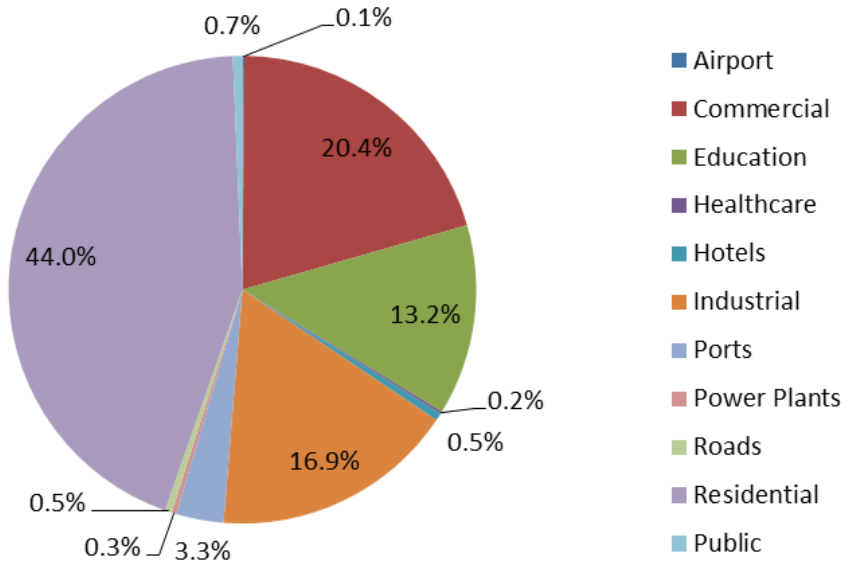
Average monthly rainfall in Country “A” for the period 1998-2018. Excess rainfall events are expected to occur almost exclusively during the wet season (between May and November)

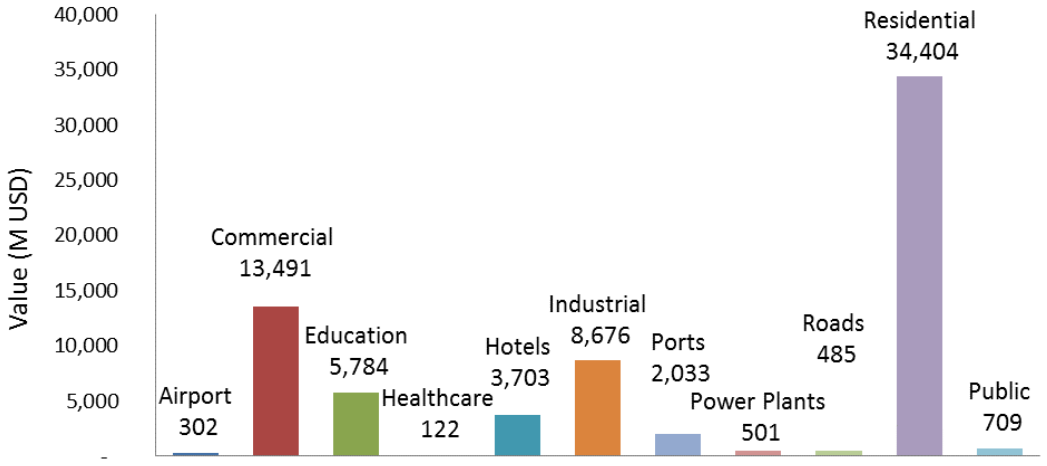


Monthly average number of days with extreme precipitation (over 50 mm/d at least at one location) in Country “A” for the period 1998-2018

Exposure

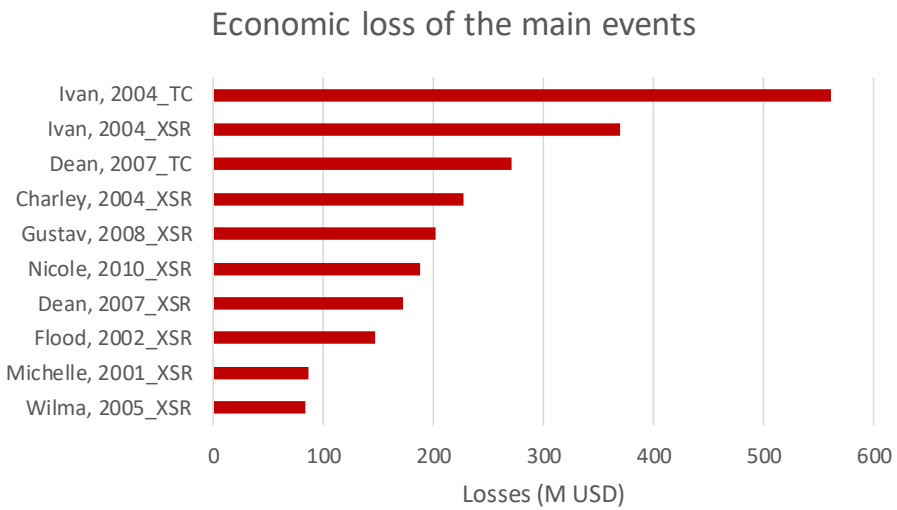
The two graphs show the breakdown of the replacement value of the assets at risk, classified by occupancy class, in terms of percentage (top) and absolute value (bottom).



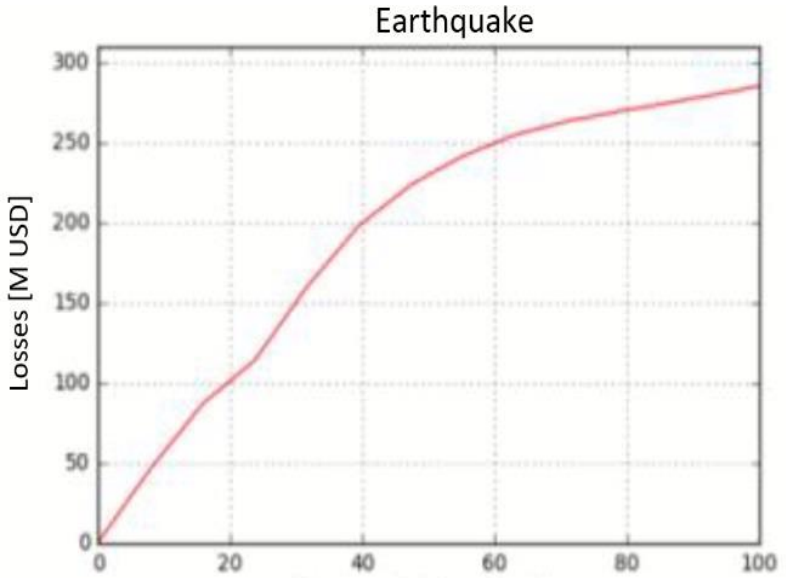


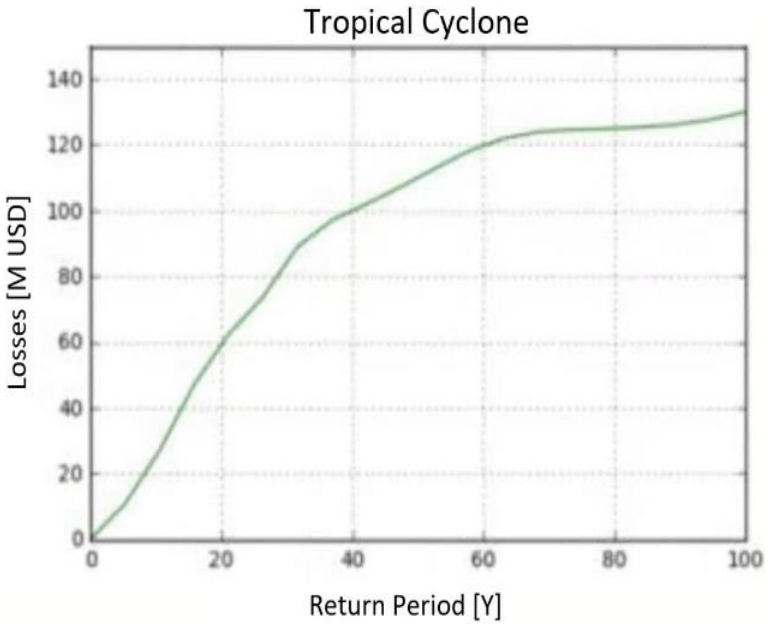
Historical Losses

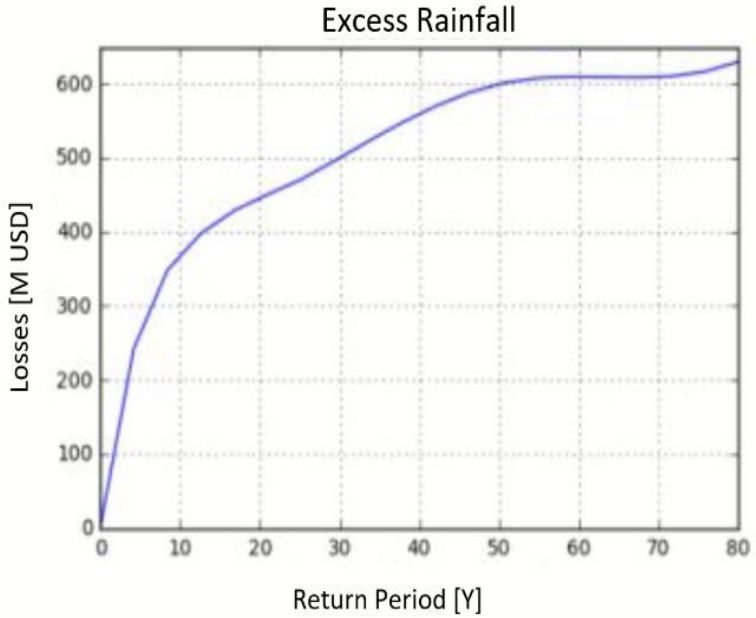
Event	*Hazard*	*Start Date*	*End Date*	*Hurricane Category*	*Number of fatalities*	*Losses (M USD)*
Ivan, 2004	TC	10/9	12/9	HU4	17	560.875
Ivan, 2004	XSR	10/9	12/9	HU4	17	370.36
Dean, 2007	TC	19/8	20/8	HU4	4	270.548
Charley, 2004	XSR	11/8	12/8	HU1	1	226.8
Gustav, 2008	XSR	28/8	30/8	TS	14	202.22
Nicole, 2010	XSR	28/9	29/9	TS	13	187.55
Dean, 2007	XSR	19/8	20/8	HU4	4	172.75
Flood, 2002	XSR	22/5	30/5		9	147.1
Michelle, 2001	XSR	2/11	4/11	TS	3	86.43
Wilma, 2005	XSR	15/10	20/10	TD	1	82.69



Risk – TC, EQ, XSR

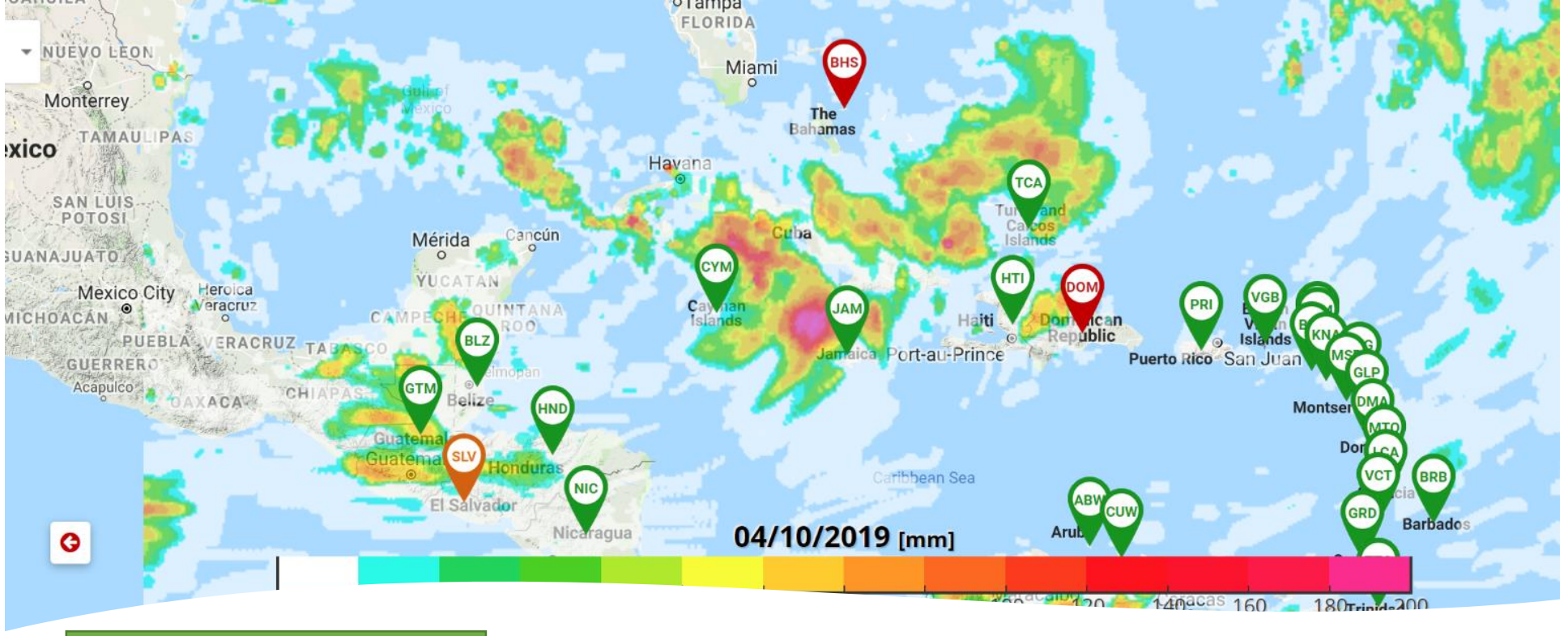






Return Period (Years)	*Loss (M USD) EQ*	*Loss (M USD) TC*	*Loss (M USD) XSR*
5	*25*	*10*	*270*
10	*60*	*25*	*370*
25	*120*	*70*	*470*
50	*230*	*110*	*600*
Average Annual Loss	*75*	*55.5*	*295*

What are some possible uses of the country risk profiles?



WeMAp

wemap.ccrif.org

The Web Monitoring Application (WeMAp) allows CCRIF members and other users to monitor earthquakes as well as the development of potentially damaging heavy rainfall, tropical cyclones, and earthquakes and analyze their intensity and assess their impact.

It has 4 components: the Real-Time Forecasting System (RTFS) for tropical cyclones (an update of the original CCRIF RTFS) and Monitoring Tools for tropical cyclones, earthquakes and rain events (including but not limited to cyclonic events).

CCRIF's Web Monitoring Application - WeMAp

Purpose of WeMAp

WeMAp allows the user to easily access information about hazards related to tropical cyclones and rainfall and their impacts.

While some of the information displayed by WeMAp is publicly available and issued by third-party agencies (eg NOAA), WeMAp displays exposure and hazard maps generated by CCRIF's XSR and SPHERA models.

Replaces and expands on CCRIF's Real-Time Forecasting System – in place since 2010

WeMAp Components

Tropical Cyclone Monitoring Tool*

- for wind and storm surge events induced by tropical cyclones
- Tropical Cyclone track produced by NOAA
- wind fields produced by the SPHERA model for the TC peril
- storm surge maps produced by the SPHERA models for the TC peril

Excess Rainfall Monitoring Tool*

- including but not limited to cyclonic events
- daily precipitation at 1km and 8km resolutions from CMORPH, WRF5, WRF7
- aggregated precipitation at 1km resolution

Earthquake Monitoring Tool*

- magnitude, location, time of event from USGS

Real-Time Forecasting System (RTFS)

- for tropical cyclones
- real-time estimates of the expected hazard levels and impacts on population and infrastructure

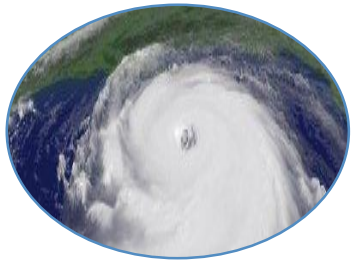
*The TC, XSR, EQ tools monitor actual data, while the RTFS shows the expected future development of active tropical cyclones.

Use of WeMAp

WeMAp outputs include maps and reports. What can information from WeMAp be used for?

Use of WeMAp

WeMAp outputs include maps and reports. Information from WeMAp can be used for:



CONTINGENCY PLANNING

- Obtain a preview of what might happen if a given storm continues along its projected path, and activate appropriate contingency plans based on this insight
- Update country plans as needed with new information from latest forecast

SHELTER MANAGEMENT

- Identify impact areas and shelter locations to support shelter allocation decisions
- Identify potential damage to shelters and plan for alternatives

EMERGENCY INTERVENTION

- Identify areas where population is at risk and issue warnings, plan for assistance

Use of WeMAp

370 users from the Caribbean and Central America currently have WeMAp accounts

CIMH

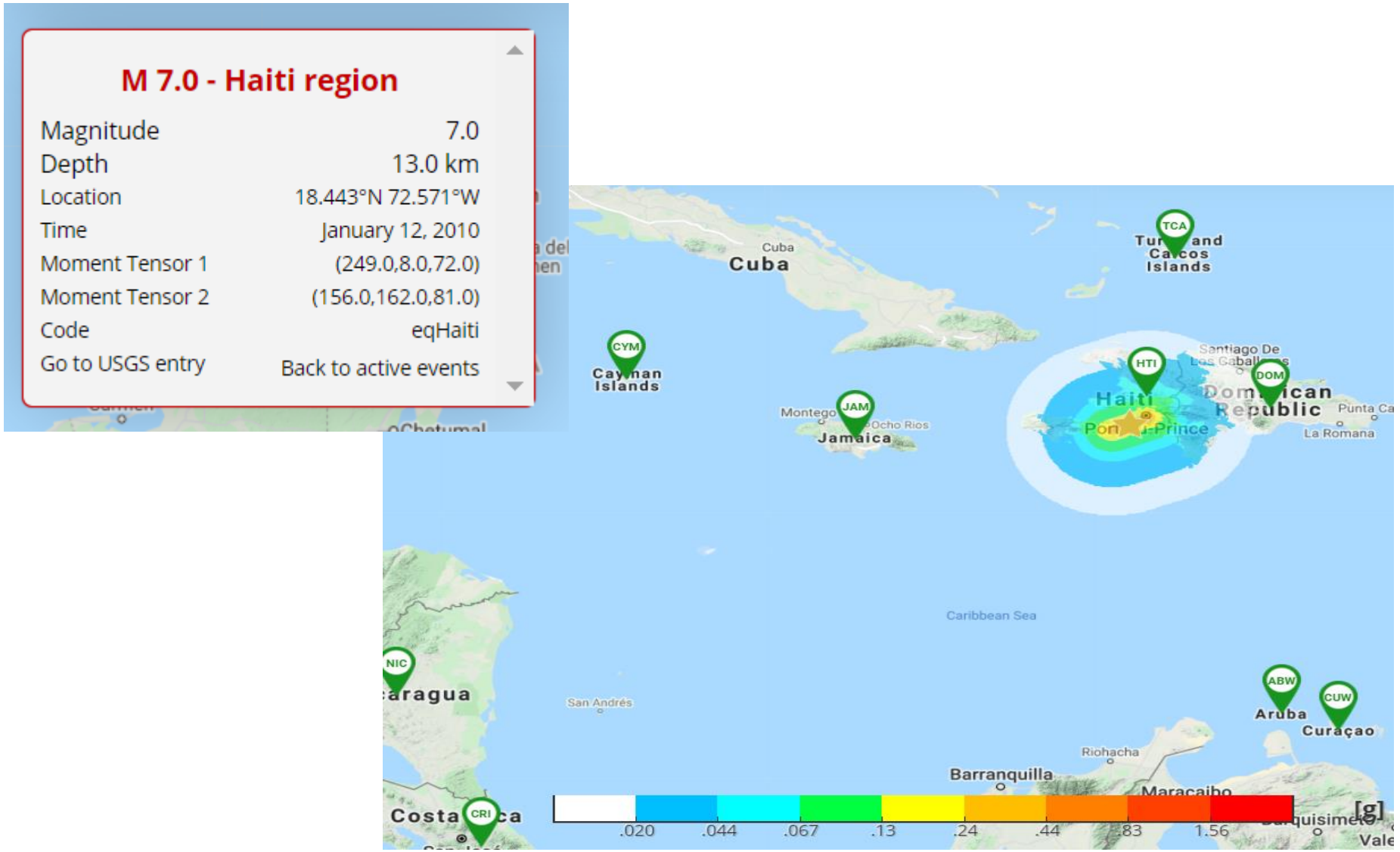
CIMH uses the outputs for:

- Providing input into the Caribbean Dewetra Platform
- Briefing the CDEMA country preparedness team(s) each time a storm is approaching one or more of the CDEMA member states. This involves individual briefings with countries and the provision of briefs on approaching events which incorporate information from the WeMAp tool

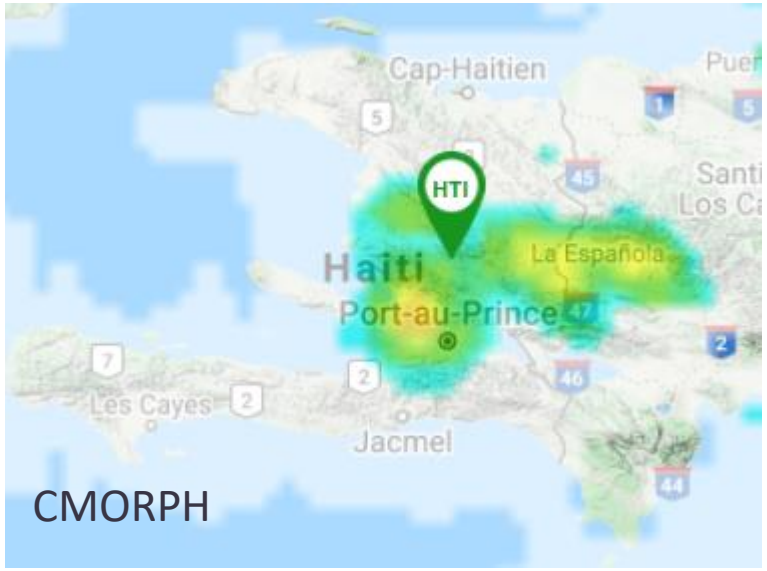
National Meteorological Offices

National meteorology officers can use WeMAp to understand particular events and raise public awareness about an approaching system in order to aid preparedness.

EQ: Haiti 2010

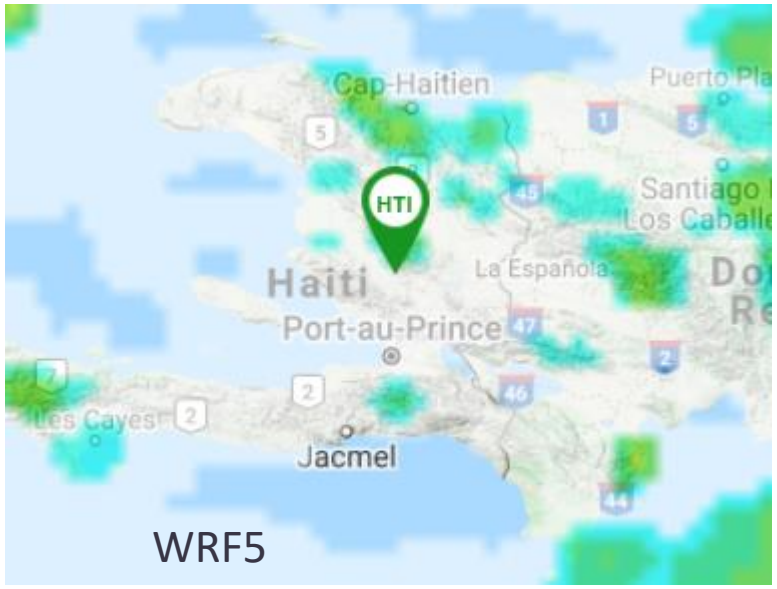


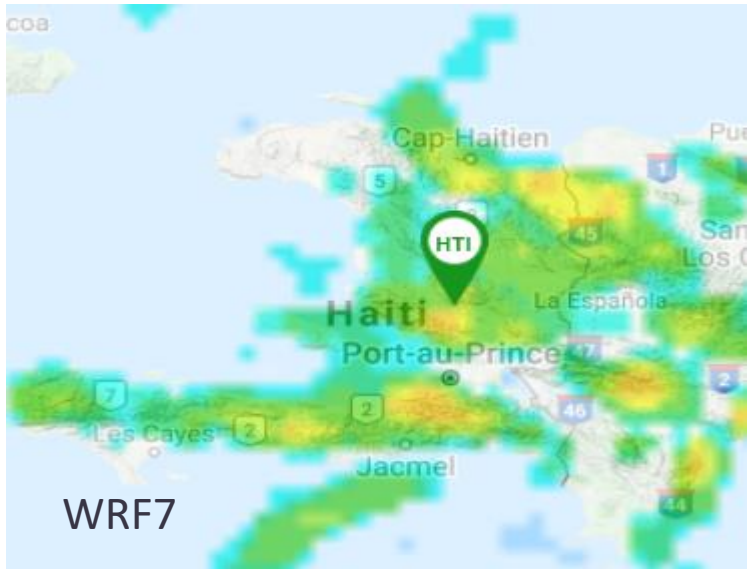
XSR: Data sources



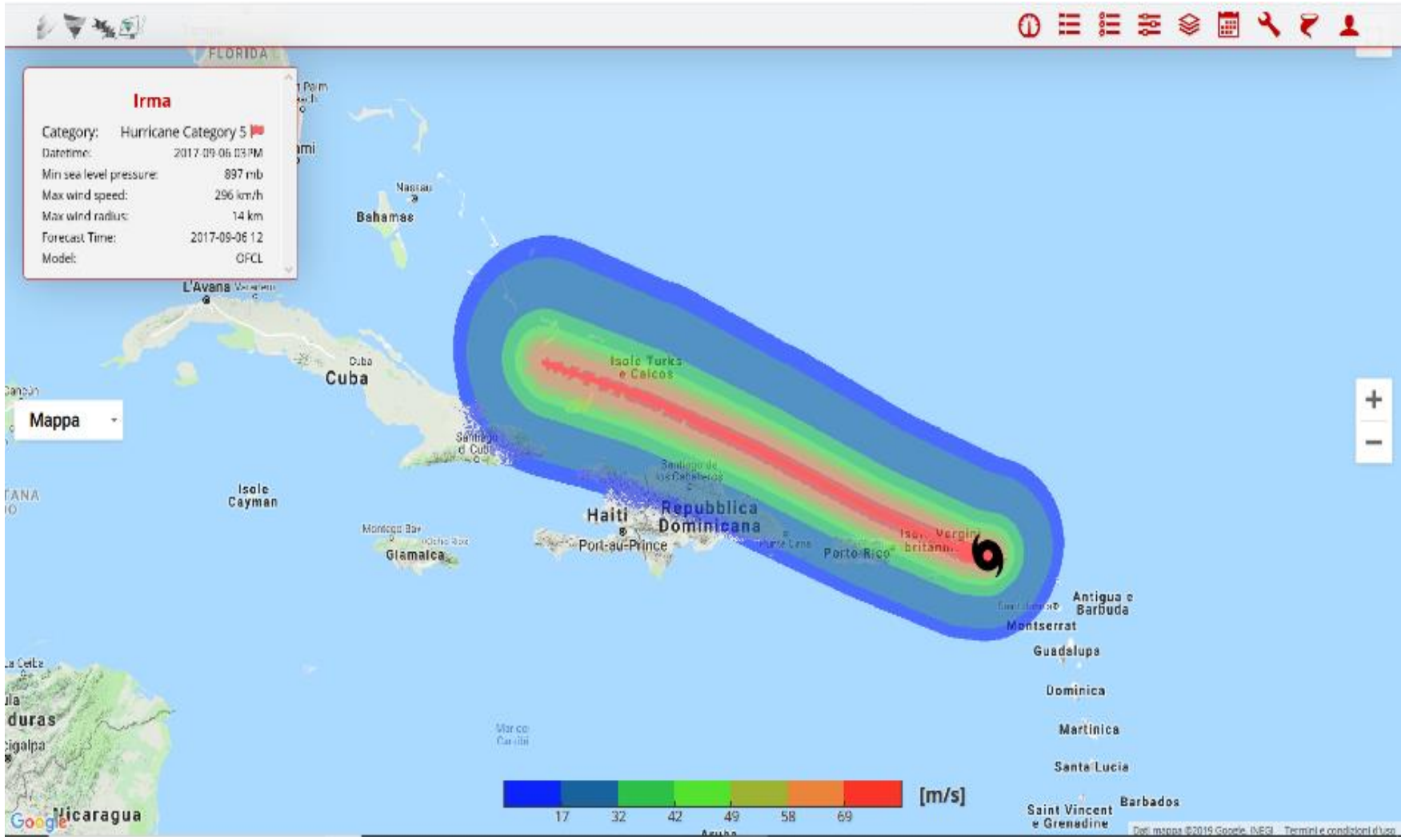
- **CMORPH: (**NOAA Climate Prediction Center) Low-orbiter satellite-based precipitation model which captures more precisely the ***spatial and temporal location*** of the rainfall caused by the event. Historical database - 20 years: 1998 - 2018

WRF: (NOAA) computes the amount of rainfall based on climate conditions. This weather forecast model reproduces the ***intensity*** of the rainfall event



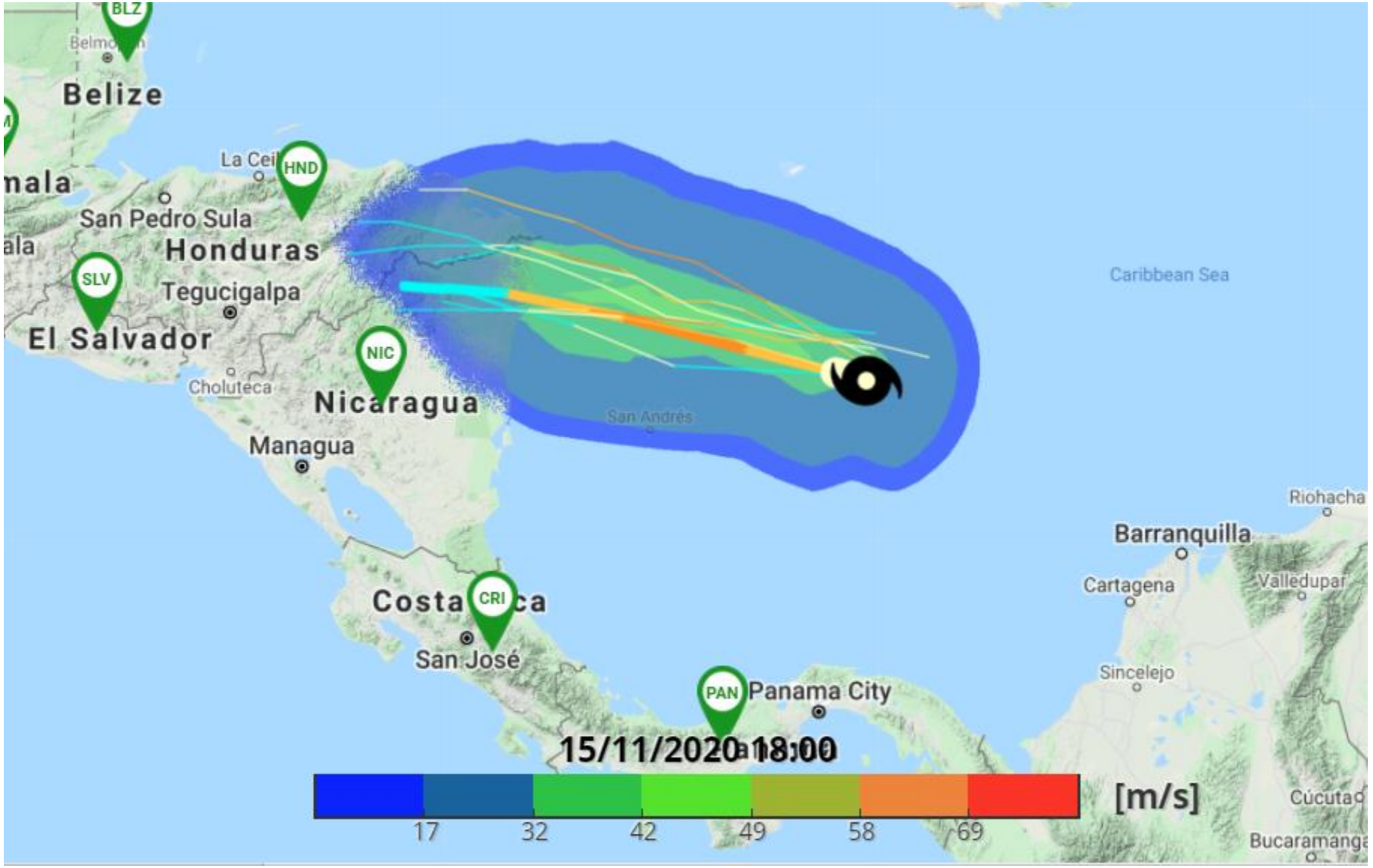


TC: Irma September 2017



Footprint map of wind speed

RTFS: Iota November 2020



Probabilistic median wind field – next 48 hours

WeMAp – Exercise

Exercise

During Tropical Cyclone Elsa in 2021, which countries were directly affected by winds of 17 m/s or higher?

wemap.ccrif.org

Temporary Access

Username: Student

Password: DRF2020-2021