

The CCRIF Excess Rainfall (XSR 3.0) Model

Historical events database



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Data collected and sources

CCRIF has created a database of **historical rainfall events** that occurred in the Caribbean and Central America from 1998 to 2022 and the **resulting economic losses**. A number of reports and databases were considered, such as those from NOAA¹, DFO², Swiss Re, Munich Re, AON, Wikipedia and different local sources. Figure 1 shows the number of events gathered from each source.

The information collected includes event start and end dates, event types (i.e., tropical cyclone, flood/rain or unknown), maximum Saffir-Simpson scale category (applicable to tropical cyclones only), economic losses, number of deaths, and number of people affected, when available. The distribution of the events among the different event types is presented in Figure 2.

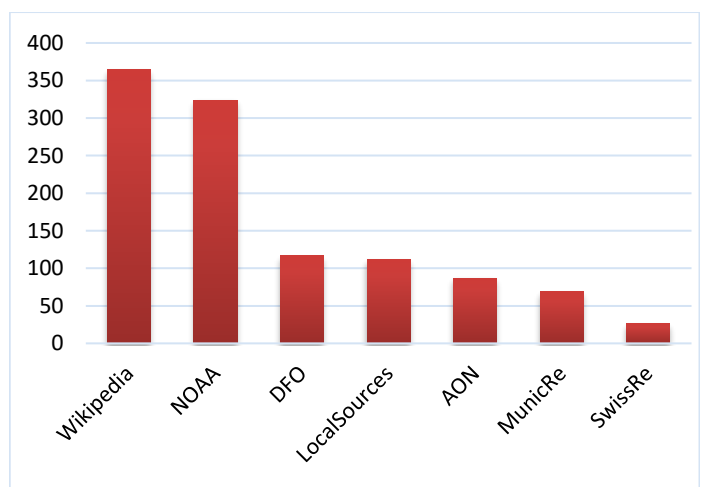


Figure 1. Number of events (1998-2022) gathered from each source for all the groups.

¹ NOAA: National Oceanic and Atmospheric Administration, U.S. Department of Commerce

² DFO: Dartmouth Flood Observatory

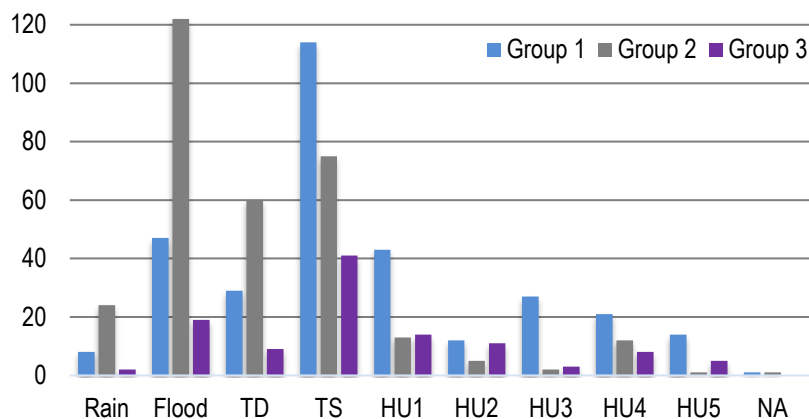


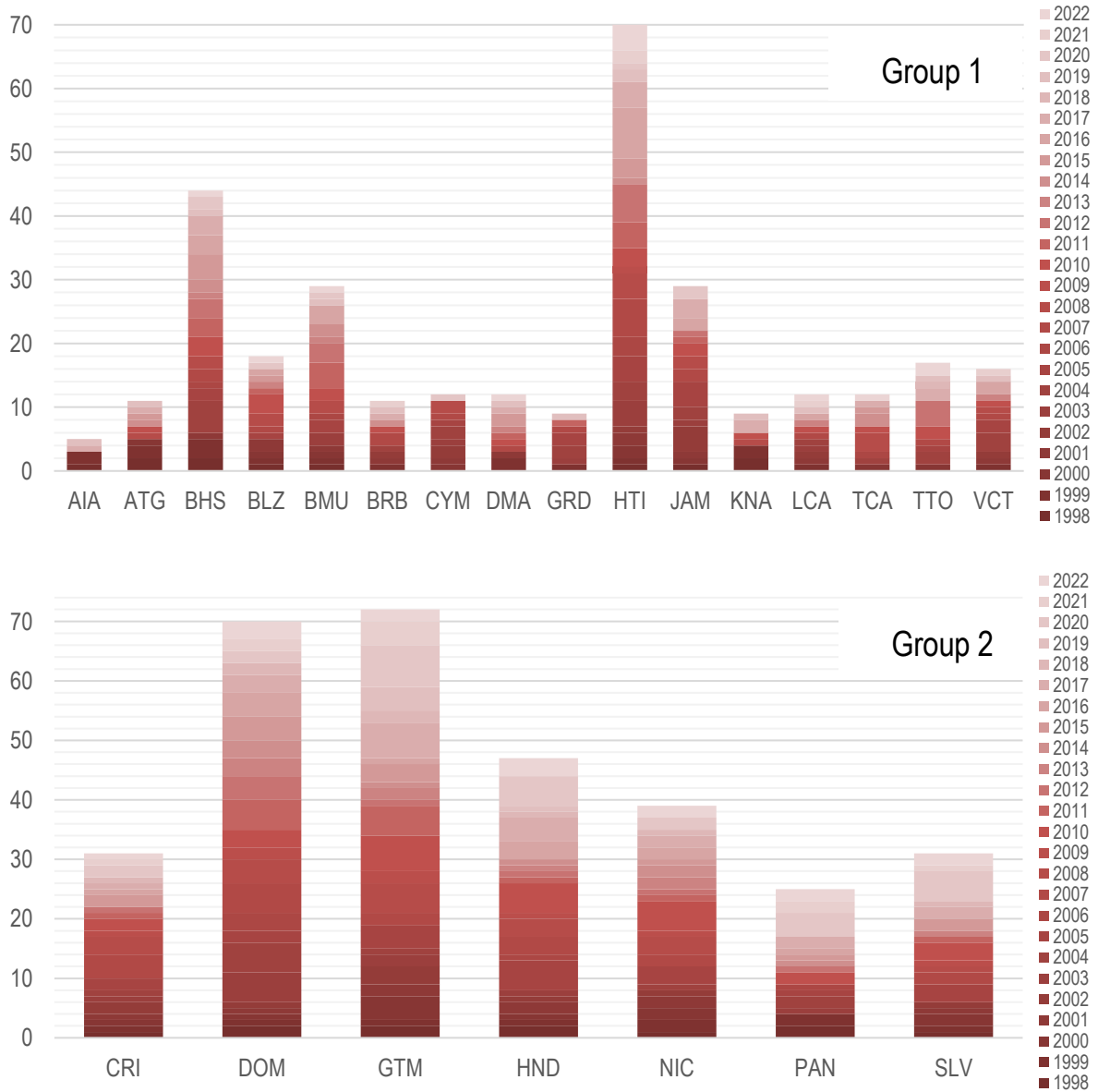
Figure 2. Number of events for each event type. The tropical cyclone severity scale includes TD (Tropical Depression), TS (Tropical Storm), and HU (Hurricane) categories from 1 to 5 in the Saffir-Simpson hurricane wind scale.

The database consists of 316 single reported events for Group 1, 315 for Group 2, and 112 for Group 3, as shown in Table 1 and Figure 3. Events affecting more than one country were counted as a “single” event for each of those countries. Data regarding the impacts of these events on the population and built environment were collected and analyzed for at least 5 events for each country in Group 1, at least 25 events in Group 2, and at least 1 events for each country in Group 3.

Group 1	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
AIA	1	2																		1		1				5
ATG	2	2	1										1				1	1		1		1				11
BHS	2	3		1			5	2	1	2	2		3	3	3	1	2	4	3	3		1	2		1	44
BLZ	1	1	1	2				1		1	2		3	1		1		1	1				1		1	18
BMU	1	1	1	1		2		2	1		2		2	4	3	1	2		3			1	1		1	29
BRB		1		1	1		1			2			1				1			1		1		1		11
CYM			1	1	2	1	2	1		1	2												1			12
DMA		2		1						1			1	1		1		2		1		1			1	12
GRD		1			1	2	2			1				1								1				9
HTI	1	1	2	2	1	4	3	4	3	6	4	1	3	4	6		1	3	8	4		2	1	2	4	70
JAM	1		1	1	4	1	2	4		2	2		2	1	1				2	3			2			29
KNA	2	2									1		1							2		1				9
LCA		1		1	1	1	1			1			1			1			1			1		1	1	12
TCA			1				1		1		3		1				2	1		1		1				12
TTO			1				2	1		1			2		4					2	1	1			2	17
VCT		1		1	1		3	2		1	1		1			1			2			1		1		16
Total	11	18	9	12	10	10	22	19	6	19	20	1	22	15	17	6	9	12	20	19	1	13	8	5	12	316
Group 2	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
CRI	1	1	1	1	2	1	1	2		4	3	1	2	1	1			2	1	1	1		2	1	1	31
DOM	2	1	1	1	1	5	5	2	3	5	4	2	3	5	4	3	3	4	4	3	2		2	2	3	70
GTM	2	1	4	2	3	2	1	4		2	5	2	6	5	1	2	1	3	1	6	2	4	7	4	2	72
HND	2	1	1	2	1	1		5	1	3	3	1	5	1	1	1	1		3	4	1	1	5		3	47
NIC	1	2	2	2	1		1	3		2	3	1	5	1	1	2	2	1	2	2	1		2		2	39
PAN	2	2				1	2	1	1				2		1		1	1	1	2			4	2	2	25
SLV	1	1	2	1	1			3		2	1	1	3	1		1		2		2	1		5	1	2	31
Total	11	9	11	9	9	10	10	20	5	18	19	8	26	14	9	9	8	13	12	20	8	5	27	10	15	315

Group 3 ISO/Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
ABW										1																1
BES			1								1	1								1		1				5
CUW										1	1		1													3
GLP	1	1	1	1											1											12
GUY						1	1	1	1		1									1				2	1	9
MSR			1						1											1						5
MTQ		1		1						1				1	1					1		1				11
PRI	1	2	2	3	1	4	1		1	3	3		1	3	2	1	2	2		2	1	1	3		2	41
SAP								1		1										1			3			7
SUR									1															1	1	4
SXM		1	1	1					1																	5
VGB	1	1	1			1			1				2							1						9
Total	3	6	7	5	1	5	2	2	7	9	7	0	6	4	3	1	3	7	0	9	1	7	6	4	7	112

Table 1. Number of single events by year and country for Group 1, Group 2 and Group 3. Note: the country codes are listed in the Glossary.



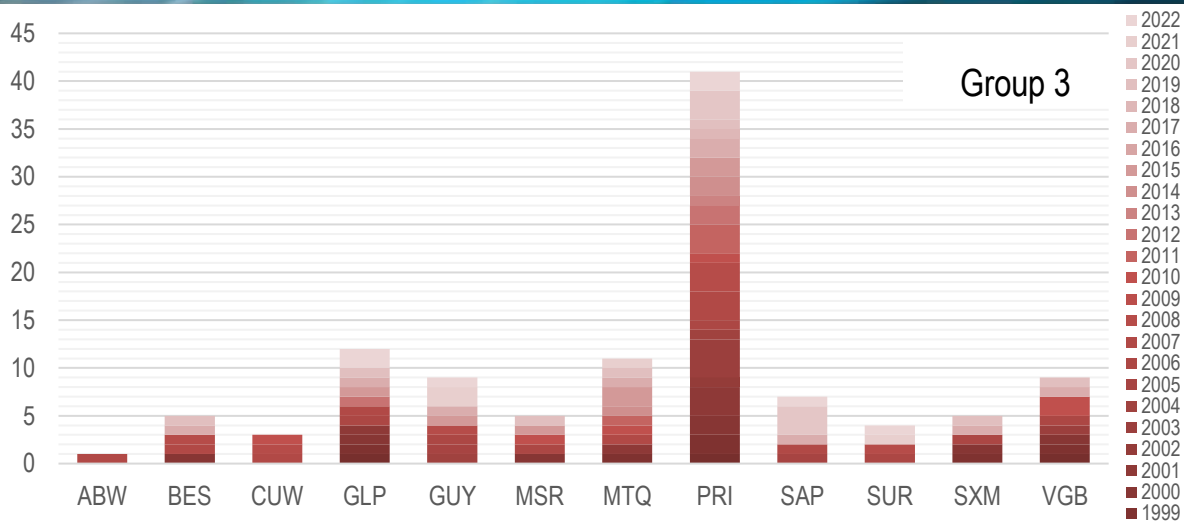
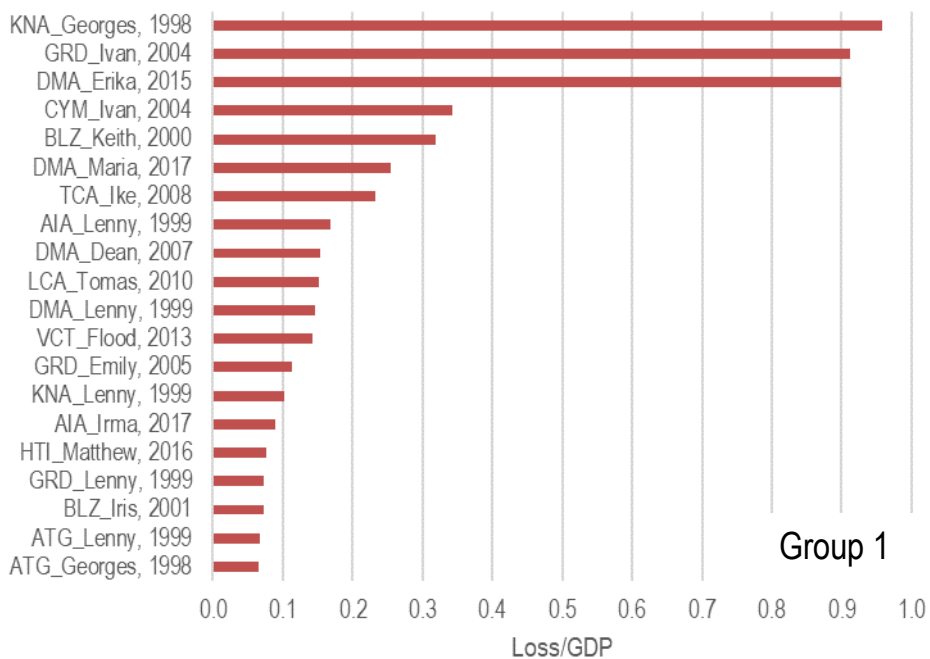


Figure 3. Number of single events for each country from 1998 to 2022 for Group 1, Group 2 and Group 3. Note: the country codes are listed in the Glossary.

Most harmful events

Hurricane Georges in 1998, Hurricane Mitch also in 1998 and a Flood in 2004 were the most harmful events that have struck the Caribbean and Central America regions, respectively during the past 25 years (Figure 4). Figure 4 summarizes the losses caused by the most severe events affecting the Group 1, Group 2, and Group 3 countries. When multiple values were obtained from reports, the average values were presented in the table. Note that these losses are estimates of rain-induced losses only; wind-induced losses are not included. The fraction of the total losses induced by tropical cyclones on a country was estimated on the basis of the Saffir-Simpson scale category of the storm when it hit that country. The original reported loss values were updated to 2022 dollar values using a macroeconomic approach that accounts for the trend of GDP growth from the time of the event.



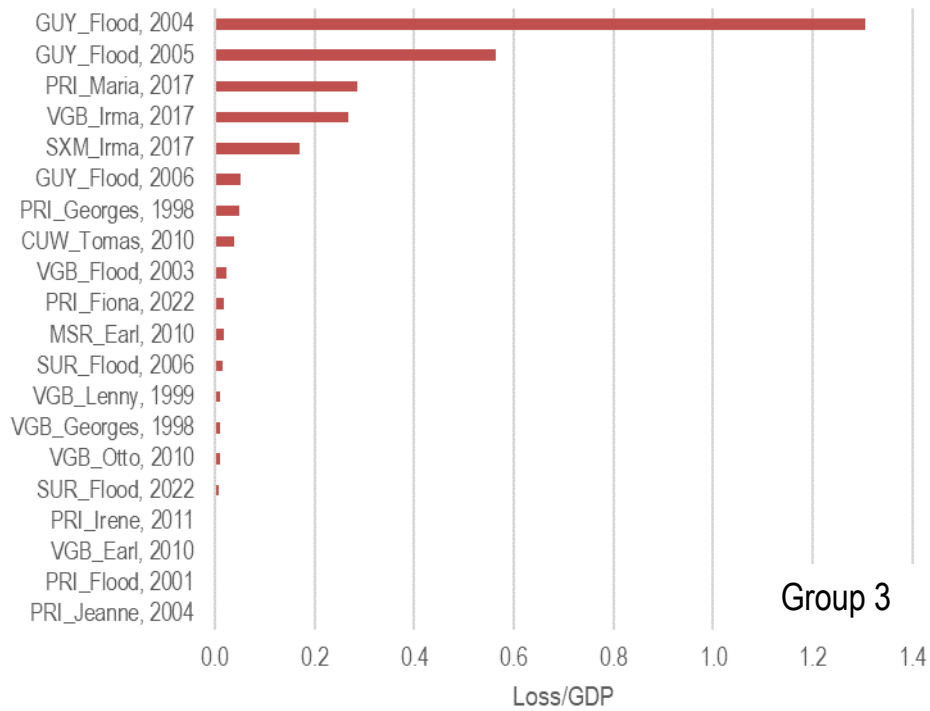
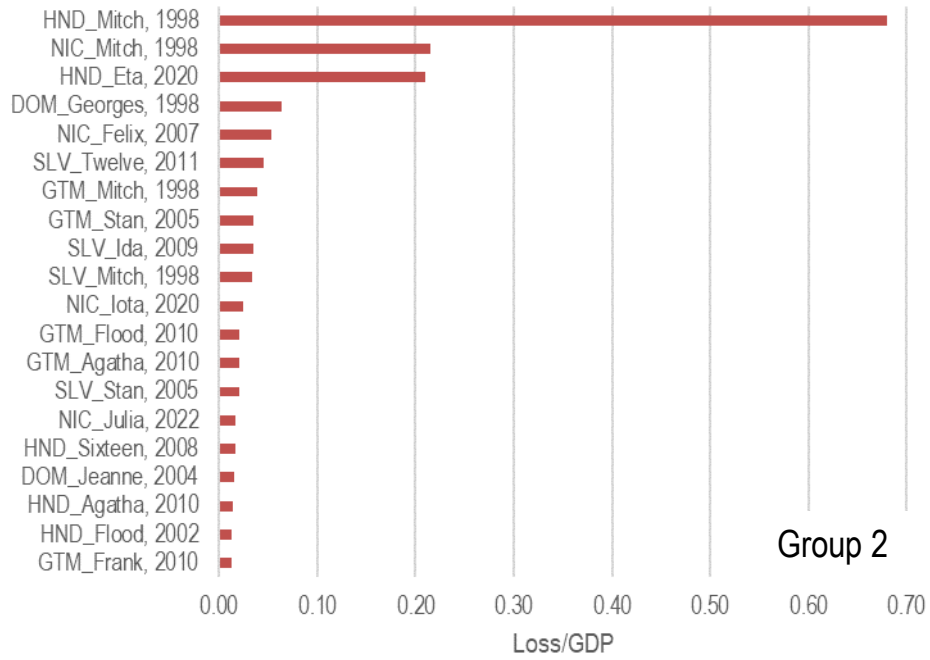


Figure 4. Ratio of rain-induced losses to GDP for the 20 most harmful events from 1998 to 2022 for Group 1, Group 2, and Group 3. For each event, country code, name (if cyclone) and year are reported.

Glossary

Group	Code	Country
3	ABW	Aruba
1	AIA	Anguilla
1	ATG	Antigua and Barbuda
3	BES	Bonaire, Saba, Sint Eustatius
1	BHS	The Bahamas
1	BLZ	Belize
1	BMU	Bermuda
1	BRB	Barbados
2	CRI	Costa Rica
3	CUW	Curacao
1	CYM	Cayman Islands
1	DMA	Dominica
2	DOM	Dominican Republic
3	GLP	Guadeloupe
1	GRD	Grenada
2	GTM	Guatemala
3	GUY	Guyana
2	HND	Honduras
1	HTI	Haiti
1	JAM	Jamaica
1	KNA	Saint Kitts and Nevis
1	LCA	Saint Lucia
3	MSR	Montserrat
3	MTQ	Martinique
2	NIC	Nicaragua
2	PAN	Panama
3	PRI	Puerto Rico
3	SAP	San Andrés, Providencia and Santa Catalina
2	SLV	El Salvador
3	SUR	Suriname
3	SXM	Sint Maarten
1	TCA	Turks and Caicos Islands
1	TTO	Trinidad and Tobago
1	VCT	Saint Vincent and the Grenadines
3	VGB	British Virgin Islands

The current members of CCRIF are:

Caribbean – Anguilla, Antigua & Barbuda, Barbados, Belize, Bermuda, British Virgin Islands, Cayman Islands, Dominica, Grenada, Haiti, Jamaica, Montserrat, Saint Kitts & Nevis, Saint Lucia, Saint Vincent & the Grenadines, Sint Maarten, The Bahamas, Trinidad & Tobago and Turks & Caicos Islands

Central America – Guatemala, Nicaragua and Panama

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