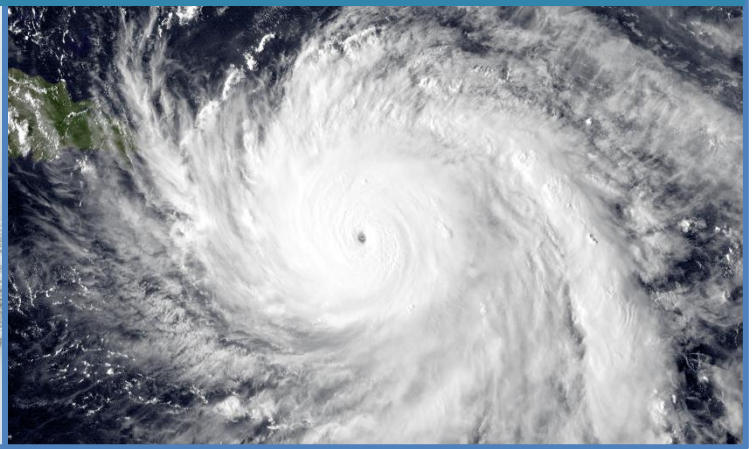




The CCRIF Tropical Cyclone Model Historical events database



SPHERA: System for Probabilistic Hazard Evaluation and Risk Assessment – Data collected and sources

CCRIF SPC has created a database of **historical tropical cyclones** that occurred in the Caribbean and Central America from 1990 to 2022, and the **resulting economic losses**. A number of reports and databases were considered, such as those from NOAA¹, Local sources (CDEMA², ECLAC³; local newspapers, local websites, etc.) DFO⁴, Wikipedia, Swiss Re, Munich Re, AON. Table 1 shows the information type available from each source.

Table 1. Information type available from each source

Source	Period	Fatalities & Overall Losses	Insured Losses	People Affected	Structures Affected
NOAA	1851 – present	X			
AON	2008 – present	X	X		X
MunichRe	1980 – present	X	X		
SwissRe	1990 – present	X	X		X
Wikipedia	Until present	X			
Local sources	Until present	X		X	

The information collected includes event start and end dates, maximum Saffir-Simpson scale category,

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

² CDEMA: Caribbean Disaster Emergency Management Agency

³ ECLAC: United Nations Economic Commission for Latin America and the Caribbean

⁴ DFO: Dartmouth Flood Observatory

economic losses, number of deaths, and number of people affected, when available. The distribution of the events among the different categories is presented in Figure 1.

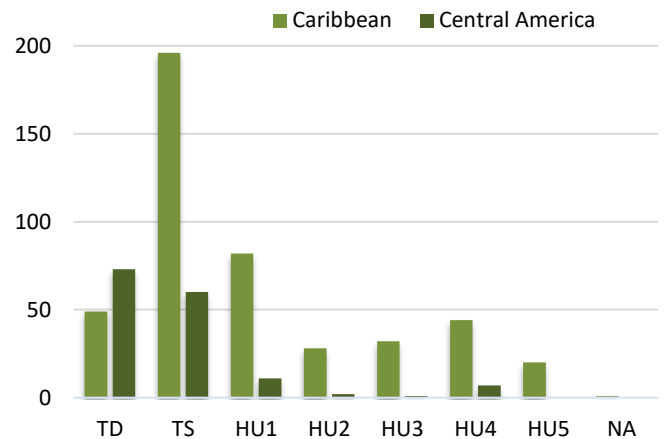


Figure 1. Number of events for each Saffir-Simpson scale category. The tropical cyclone severity scale includes TD (Tropical Depression), TS (Tropical Storm), and HU (Hurricane) categories from 1 to 5 in the Saffir-Simpson hurricane wind scale.

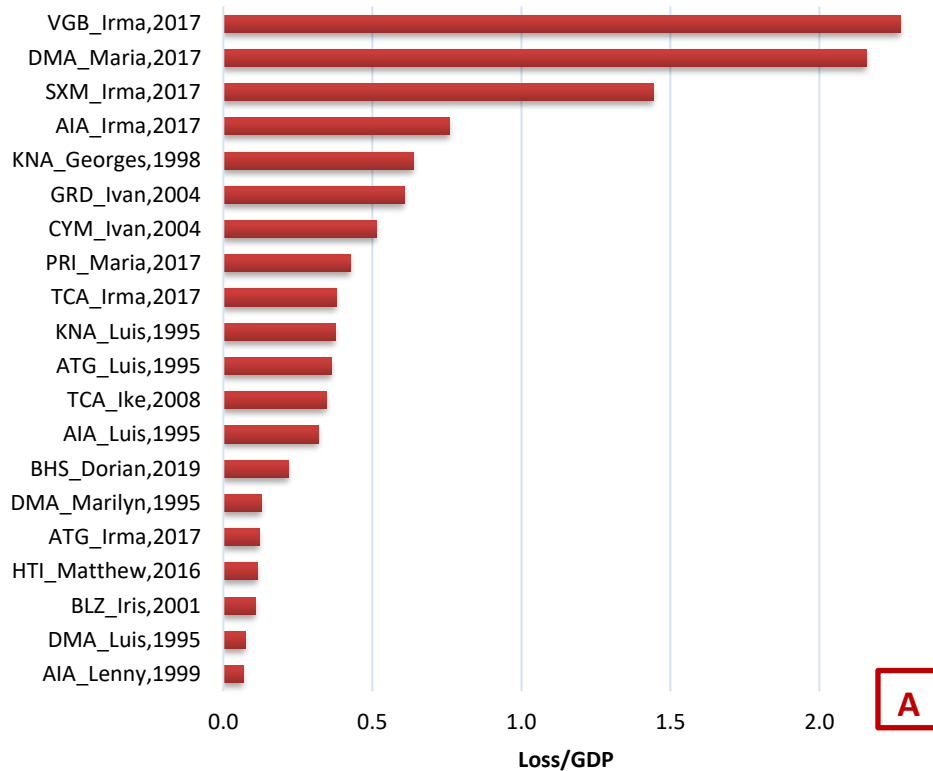
The database consists of 452 single reported events in the Caribbean region, and 154 in the Central America region, as shown in Table 2 and Figure 2. Events affecting more than one country were counted as a “single” event for each of those countries. All the countries were analysed accurately and exhaustively.

Table 2. Number of single events by year and country for the Caribbean region (A) and for the Central America region (B).
 Note: the country codes are listed in the Glossary

	1990	1991	1992	1993	1994	1995	1996	1997	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		
AIA					2				1	2																	1							7	
ATG					2				2	2	1										1				1	1								13	
BES					2						1								1	1								1					7		
BHS		1	1		2	2			2	2		1			5	2	1	2	2			3	3	3		2	4	3	3		1	2		48	
BLZ									1	1	1	2				1		1	2			3	1	1			1			1			1	17	
BMU	1	1				1			1	1	1	1			2		2	1		2				1	2		3			1	1		1	32	
BRB					1					1		1	1		1			2							1				1				1	12	
CUW							1												1	1													4		
CYM											1	1	2	1	2	1															1		12		
DMA				1	2					2		1										1		1		2		1					1	14	
DOM				1	1	1	2		1	1	1	1			2	3	1	2	3	4		1	2	2	2	2	2	2	2	1		2	2	2	46
GLP					3				1	1	1	1						1	1				1			1		1					1	14	
GRD	1									1					2	2			1														8		
HTI				1	1		1		1		1	1	1	1	2	4	2	3	4			2	2	2	1	2	2	2			1	1	38		
JAM				1	1	1			1		1	1	2	1	2	3			2	2			1							2			24		
KNA					2				2	2																		2					11		
LCA				1	1				1		1	1	1	1					1								1						1	12	
MSR					2					1								1															7		
MTQ	1			1	1	2	1			1		1							1			1				1	2		1				17		
PRI				1	1	2	2		1	2	2	1	1	2	1			1	3	3				1	1	2		2	1	1	3		1	41	
SAP							1									1		1										1					7		
SXM					2					1	1							1										1					7		
TCA											1				1				3						2	1							1	12	
TTO	1			1							1				2	1							3					2					1	16	
VCT					1					1		1	1		3	2			1	1							1					1		15	
VGB					1	1			1	1	1						1											1						10	
total	4	2	1	5	7	30	12	0	15	23	16	15	9	10	25	20	12	28	29	0	27	17	17	6	13	18	14	24	2	18	15	7	11	452	
CRI				2	1	1	2		1			1				1					1	1					1	1		2			1	18	
GTM				1		1	2		1		1	1	1			2					5	3			1	1		1	1		5		1	32	
HND				2		1	3		1	1	1	2			5			1	3	1	4	1			1	1		1	1		4		1	36	
NIC				2		1	3		1	1	1	1	1		3			2	2	1	4	1			1	1		1	1		2		2	33	
PAN					1				1							1												1					1	8	
SLV				2		1	1		1		1		1			2		2	1	1	3	1		1				2	1		4		2	27	
total	0	0	0	9	2	4	11	1	6	2	4	5	3	0	0	14	0	6	10	3	17	7	0	4	3	0	5	7	3	1	19	0	8	154	

Most harmful events

Hurricane Irma in 2017 in the British Virgin Islands and Hurricane Iota in 2020 in Nicaragua were the most harmful events to strike countries in the Caribbean and Central American regions respectively in the last 28 years (in terms of losses to GDP ratio). Figure 3 summarizes the losses caused by the most severe events affecting the countries in the Caribbean region and in the Central America region. When multiple values were obtained from reports, the average values were presented in the table. Note that these losses are estimates of wind and storm surge-induced losses; rain-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 current US dollar values using a macroeconomic approach that accounts for the trend of GDP growth from the time of the event.



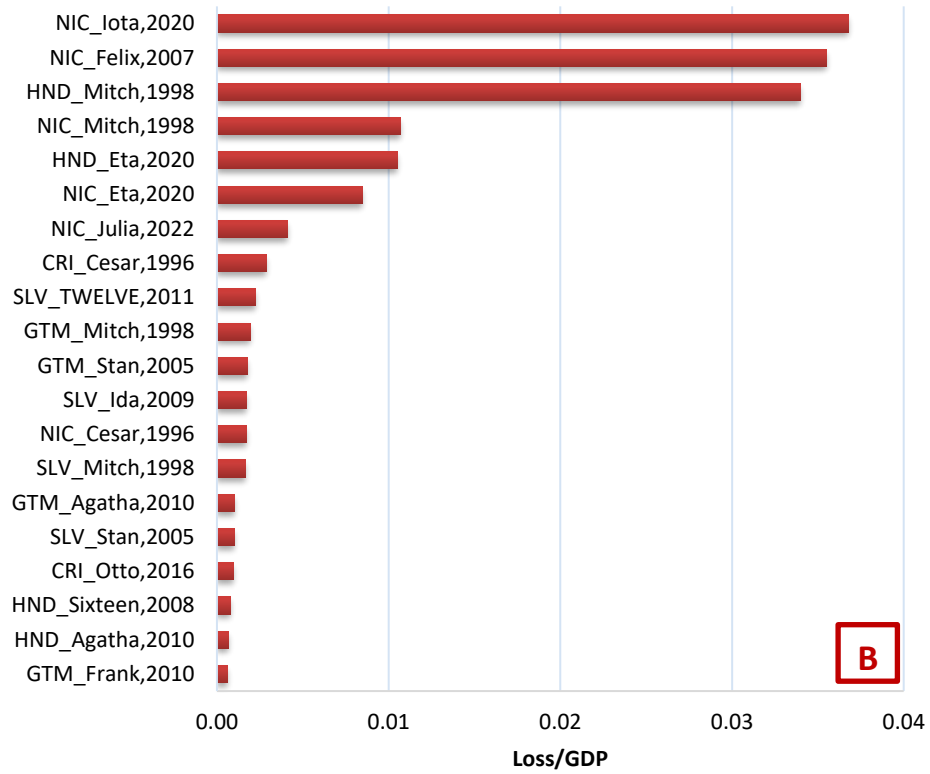


Figure 3. Ratio of wind and storm surge-induced losses to GDP for the 20 most harmful events from 1990 to 2022 for the Caribbean region (A) and the Central America region (B). For each event, country code, name and year are reported.

Glossary

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