

LOSS ASSESSMENT FOR HURRICANE IRMA

Final Report (12/09/2017)

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Hurricane Irma developed on August 30 of 2017 near the Cape Verde Islands on the western African coast. 24 hours later after its formation it attained Category 2 status and shortly afterward it became a Category 3 major hurricane. After that, the intensity started fluctuating between Category 2 and 3 and on September 4, it strengthened into a Category 4 hurricane, with winds of 130 mph. Hurricane Irma continued deepening and became a Category 5 hurricane by September 5, with winds of 175 mph. On September 6, its center made landfall along the northern coast of the island of Barbuda at peak strength (185 mph) and made successive landfalls on Saint Maarten and the British Virgin Islands with the same intensity. On September 8 Irma weakened back to Category 4 but reached once again Category 5 status on September 9 when it approached and made landfall in the northern coast of the island of Cuba. After that it started weakening and dropped to a Category 3 status before it gained once more a Category 4 status as it moved towards the Florida Keys on September 10. Irma dropped back to Category 3 by the time it made a second Florida landfall that same day and finally weakened to a Category 2 hurricane on September 11 before completely dissipating over southwestern Florida.

1 HAZARD

The hazard was computed with the final hurricane track reported by the Tropical Cyclone Guidance Project by NCAR's Research Applications Laboratory with coordinates, wind speed, and pressure data from August 31, when it reached hurricane status, to September 12 when it dissipated. The Figure 1 shows the path followed by the hurricane.

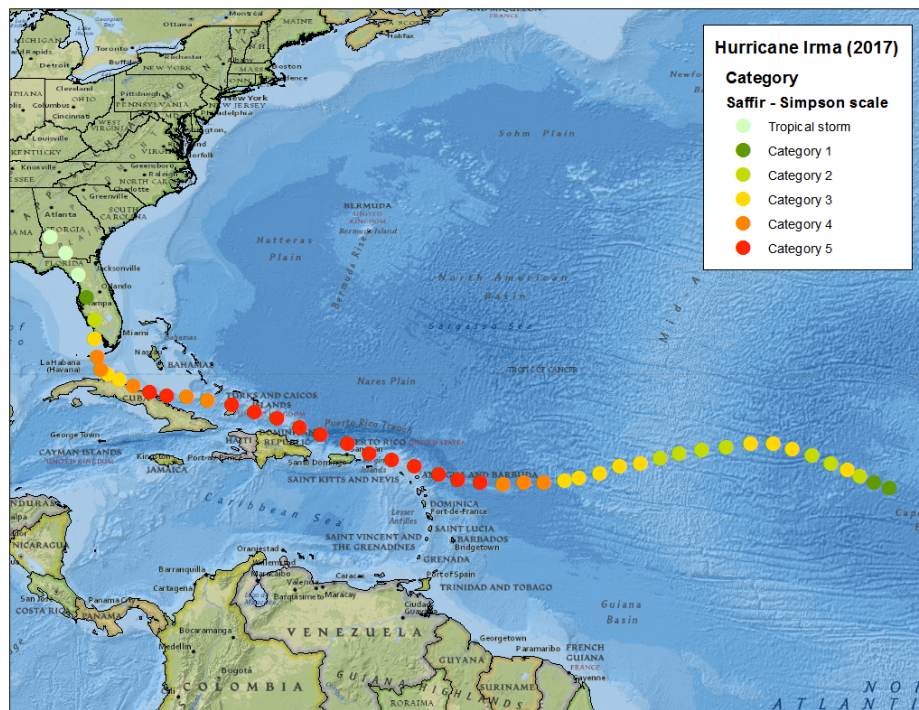


Figure 1. Hurricane Irma, track and category

After computation, a hazard map with wind speed reaching 367 km/h was obtained¹. The hazard map is presented in the Figure 2.

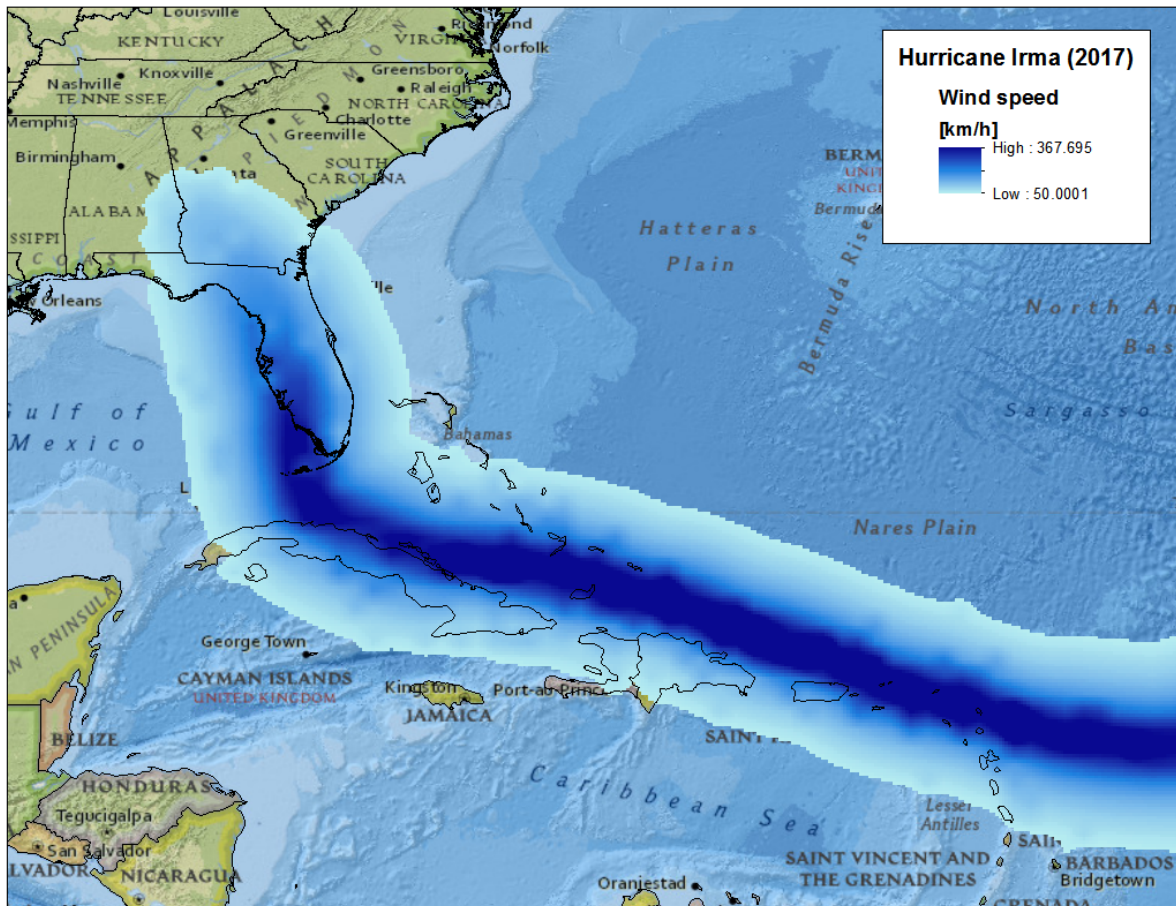


Figure 2. Hurricane Irma hazard map

2 EXPOSURE

For risk assessment, the exposure from the Global Assessment Report 2015 with a 5x5 kilometer resolution was used and 18 countries from the Caribbean, and the states of Florida, Georgia and Alabama were included in the calculations. The exposure elements for the United States in this model were reduced to the mentioned states for computation purposes.

¹ This is the wind speed for 3-seconds gusts. Be careful when comparing it to the one reported as the cyclone maximum wind speed, which is generally averaged in 1 minute.



Figure 3. Exposure from GAR15 for affected area in the Caribbean and the United States

The countries included are St. Lucia, Martinique, Dominica, Guadeloupe, Montserrat, Antigua and Barbuda, St. Kitts and Nevis, US Virgin Islands, Jamaica, Dominican Republic, Puerto Rico, Haiti, Anguilla, British Virgin Islands, Cayman Islands, Cuba, The Bahamas, Turks and Caicos Islands and the United States. The total exposed value is \$55.8 billion dollars and the following table shows the exposed values for each one of the listed countries.

Table 1. Exposed value (from GAR15), USD Million

Country name	Exposed Value
	[USD Million]
Anguilla	\$ 865.50
Antigua and Barbuda	\$ 6,257.29
British Virgins Islands	\$ 3,849.50
Cayman Islands	\$ 8,554.03
Cuba	\$ 174,919.00
Dominica	\$ 2,027.94
Dominican Republic	\$ 202,173.00

Country name	Exposed Value
	[USD Million]
Guadeloupe	\$ 41,119.10
Haiti	\$ 28,268.60
Jamaica	\$ 70,711.40
Martinique	\$ 39,559.90
Montserrat	\$ 158.42
Puerto Rico	\$ 259,030.00
St Kitts and Nevis	\$ 4,112.06
St Lucia	\$ 3,361.85
The Bahamas	\$ 45,743.70
Turks and Caicos Islands	\$ 1,049.28
United States	\$ 54,922,500.00
<i>Florida</i>	\$ 2,625,660.00
<i>Georgia</i>	\$ 1,345,320.00
<i>Alabama</i>	\$ 172,681.90
Virgin Islands	\$ 5,344.44

3 ESTIMATED LOSSES

This table shows the general results for the area affected by Hurricane Irma. The expected loss from this model is \$62,207 million dollars, which is equivalent to a 0.11% relative loss for the entire area affected by the hurricane. Results presented consider only strong winds associated with hurricanes, storm surge and rainfall are not considered.

Table 2. Total expected loss results

Results		
Exposed value	USD Million	\$ 55,819,605.01
Expected loss	USD Million	\$ 62,207.29
	%	0.11

According to the results presented on the map the most significant losses are observed on Antigua and Barbuda, Anguilla, British Virgin Islands and Turks and Caicos.

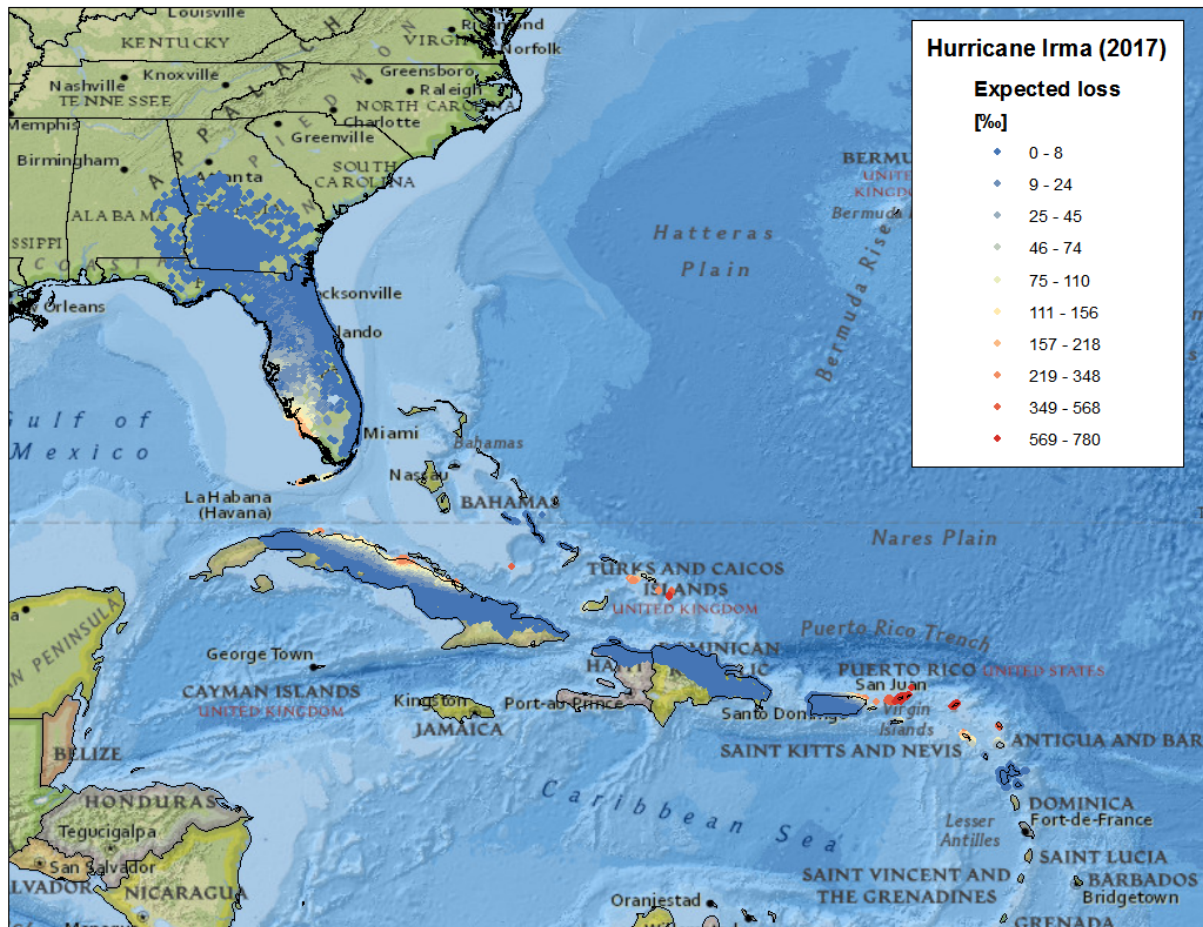


Figure 4. Expected loss (relative to exposed value)

The table below presents aggregated results by country. The major economic losses are observed in the state of Florida with an expected loss of \$47,761 million dollars, Puerto Rico with an expected loss of \$7,649 million dollars, the British and US Virgin Islands with an expected loss value of \$2,465 and \$1,337 million dollars respectively and Cuba with an expected loss of \$1,106 million dollars. These values represent a 1.8%, 2.95%, 64.05%, 25.03% and 0.63% in expected losses relative to the exposed value for each of the countries mentioned above (in the case of Florida is the expected loss relative to the exposed value of the state).

The major losses, relative to the total exposed value of the country, are presented on Anguilla, British Virgin Islands, Turks and Caicos, US Virgin Islands and St. Kitts and Nevis.

Table 3. Expected loss results by country

Country name	Expected Loss	Expected Loss
	[USD Million]	[%]
Anguilla	\$ 555.15	64.14
Antigua and Barbuda	\$ 374.16	5.98
British Virgins Islands	\$ 2,465.60	64.05
Cayman Islands	\$ -	0.00
Cuba	\$ 1,106.37	0.63
Dominica	\$ -	0.00
Dominican Republic	\$ 42.84	0.02
Guadeloupe	\$ 41.79	0.10
Haiti	\$ 0.52	0.00
Jamaica	\$ -	0.00
Martinique	\$ -	0.00
Montserrat	\$ 1.50	0.95
Puerto Rico	\$ 7,649.07	2.95
St Kitts and Nevis	\$ 464.60	11.30
St Lucia	\$ -	0.00
The Bahamas	\$ 4.07	0.01
Turks and Caicos Islands	\$ 284.11	27.08
United States	\$ 47,879.68	0.09
<i>Florida</i>	\$ 47,761.32	1.82
<i>Georgia</i>	\$ 117.76	0.01
<i>Alabama</i>	\$ 0.60	0.00
Virgin Islands	\$ 1,337.72	25.03

The aggregated results of Antigua and Barbuda do not show the magnitude of damage and loss expected on the island of Barbuda. According to the GAR15 exposure model used on this assessment, Barbuda has only 1.4% of the total exposed value of the country. The table below shows results for the island of Barbuda compared to the country's total expected loss.

Table 4. Expected loss results for Barbuda

Results		Total country	Barbuda
Exposed value	USD Million	\$ 6,257.29	\$ 90.34
Expected loss	USD Million	\$ 374.16	\$ 42.36
	%	5.98	46.89