



UNOSAT

Haiti, Cuba, Jamaica – Tropical Cyclone Matthew-16

3 October 2016

Population Exposure Analysis

3 October 2016

Geneva, Switzerland

UNOSAT Contact:

Email: unosat@unitar.org

T: +41 22 767 4020 (UNOSAT Operations)

24/7 hotline: +41 76 411 4998

Postal Address:

UNITAR – UNOSAT, IEH
Chemin des Anémones 11,
CH-1219, Genève, Suisse



Overview

Matthew-16 is a category 4 tropical cyclone moving northwest, over the Caribbean Sea, with winds reaching 220 km/h. Tropical cyclone Matthew will remain powerful through Monday night, the 3rd of October 2016, when it is predicted to approach southwestern Haiti and Jamaica. The tropical cyclone is then expected to reach Cuba on Tuesday afternoon, the 4th of October 2016 (USNHC).

Along with strong winds, rain accumulation is also predicted to cause adverse effects—such as flash floods, mud slides, and storm surges—in Haiti, Cuba, and Jamaica. Southern Haiti is expected to accumulate ~380 to 640 mm of rainfall, western Haiti is expected to receive ~200 to 300 mm, and northern Haiti is expected to receive ~30 to 80 mm. ~250 to 510 mm is predicted over eastern Jamaica and eastern Cuba (CDEMA Operational Plan for tropical Cyclone Matthew).

The most likely scenario forecasts tropical cyclone Matthew's center to pass over the western tip of Haiti as a category 4 cyclone. This may result in significant wind and flood damages in Haiti and Jamaica. Precarious and well-constructed homes may experience extreme damages and lose roofs, trees may break or uproot causing road blockages, and electricity and water may be unavailable for several days to weeks after tropical cyclone Matthew passes. The cyclone's current travel speed is a mere 7 km/h and could be just as slow when leaving, giving it more time to cause damage (Reuters). Haiti is especially vulnerable to floods because of steep terrain and few trees to hold rainfall.

Based on data of the observed and predicted tropical cyclone path, wind speeds, and population data (from WorldPop) acquired on the 3rd of October 2016, UNITAR-UNOSAT conducted a population exposure analysis for Haiti, Cuba, and Jamaica:

- In Haiti, 213,827 people are living within 120km/h wind zones, 792,920 people are living within 90km/h wind zones, and 8,880,729 people are living within 60km/h wind zones.
- In Cuba, 357,154 people are living within 120km/h wind zones, 1,242,420 people are living within 90km/h wind zones, and 2,683,681 people are living within 60km/h wind zones.
- In Jamaica, 1,923,662 people are living within 60km/h wind zones.

Population exposure estimates are based on cyclone track (JRC) and WorldPop data

Population Exposure in Haiti



10,654,000

Total population of Haiti

213,827

Total population living in **120 km/h** wind speed zones

792,920

Total population living in **90 km/h** wind speed zones

8,880,729

Total population living in **60 km/h** wind speed zones

Country / Department /Commune	Wind Speed Zones			Total
	120 km/h	90 km/h	60 km/h	
HAITI	213,827	792,920	8,880,729	9,887,476
ARTIBONITE	2,957	31,027	1,043,861	1,077,845
Anse Rouge			10,474	10,474
Desdunes			20,907	20,907
Dessalines/Marchandes		115	119,936	120,051
Ennery			224,961	224,961
Gonaives			29,435	29,435
Gros Morne		7,996	83,171	91,167
La Chapelle	2,957	22,916	10,997	36,870
L'Estere			19,910	19,910
Marmelade			42,953	42,953
Petite Riviere de l'Art			122,880	122,880
Saint-Marc			119,797	119,797
Saint-Michel de l'Attal			104,996	104,996
Terre Neuve			27,900	27,900
Verrettes			105,543	105,543
CENTRE	18,911	14,833	638,960	672,705
Belladere			4,097	4,097
Boucan Carre	6,274		7,893	14,167
Cerca La Source			46,260	46,260
Hinche			100,662	100,662
Lascahobas	12,637		19,600	32,237
Maissade			30,550	30,550
Mirebalais		3,143	45,681	48,824
Saut d'Eau			315,715	315,715
Savanette			8,145	8,145
Thomassique			49,126	49,126
Thomonde		11,690	11,231	22,922
GRANDE ANSE	93,958	88,904	349,760	532,622
Abricots	7,518	8,653	4,789	20,959

Anse d'Hainault			34,429	34,429
Beaumont	3,529		9,797	13,326
Bonbon			39,629	39,629
Chambellan		10,342	5,741	16,083
Corail	10,147	197	485	10,829
Dame-Marie	18,759	10,589	105,690	135,037
Jeremie	17,643	50,942	21,285	89,871
Les Irois			28,711	28,711
Moron	24,214		11,475	35,689
Pestel		3,007	59,160	62,167
Roseaux	12,148	5,173	28,569	45,891
NIPPES		6,832	418,324	425,156
Anse A Veau			12,859	12,859
Arnaud			23,811	23,811
Baraderes		2,698	26,101	28,800
Fonds Des Negres			31,219	31,219
Grand Boucan			8,495	8,495
L'Asile			57,936	57,936
Miragoane		4,134	19,563	23,697
Paillant			92,066	92,066
Petit Trou De Nippes			43,672	43,672
Petite Riviere de Nippes			31,676	31,676
Plaisance du Sud			70,925	70,925
NORD	2,408	39,120	1,102,889	1,144,416
Acul du Nord	2,408	70	108,901	111,378
Bahon			28,427	28,427
Bas Limbe			18,761	18,761
Borgne		7,971	62,301	70,272
Cap Haitien			21,584	21,584
Dondon			87,648	87,648
Grande Riviere Du Nord			52,208	52,208
La Victoire			13,543	13,543
Limbe			124,901	124,901
Limonade		7,538	2,268	9,807
Milot		8,958	31,775	40,733
Pignon			33,358	33,358
Pilate		5,541	138,518	144,059
Plaine du Nord			111,281	111,281
Plaisance		9,041	92,388	101,429
Port Margot			59,375	59,375
Quartier Morin			11,705	11,705
Ranquitte			12,587	12,587
St. Raphael			91,359	91,359
NORD EST	406	17,464	418,846	436,716
Capotille			16,688	16,688
Caracol			126,185	126,185
Carice			30,670	30,670
Ferrier			11,334	11,334
Fort Liberte			37,388	37,388

Mombin Crochu			26,774	26,774
Mont Organise			37,492	37,492
Ouanaminthe	406	17,464	15,164	33,034
Perches			27,058	27,058
Sainte Suzanne			57,130	57,130
Terrier Rouge			10,511	10,511
Trou du Nord			17,328	17,328
Valliere			5,123	5,123
NORD OUEST		13,058	560,494	573,552
Anse A Foleur			33,316	33,316
Baie de Henne			22,094	22,094
Bassin Bleu			24,664	24,664
Bombardopolis			32,052	32,052
Chamsolme			22,938	22,938
Jean Rabel		13,058	156,412	169,470
La Tortue			15,032	15,032
Mole Saint Nicolas			22,613	22,613
Port De Paix			185,212	185,212
Saint Louis du Nord			46,162	46,162
OUEST	90,767	187,638	1,345,199	1,623,604
Anse A Galet	10,807		47,272	58,079
Arcahaie	13,031		61,882	74,912
Cabaret			30,387	30,387
Carrefour		28,526	487,559	516,084
Cite Soleil			15,885	15,885
Cornillon/Grd Bois			67,220	67,220
Croix-Des-Bouquets	13,011	19,141	59,181	91,333
Delmas			7,133	7,133
Fonds Verrettes			2,634	2,634
Ganthier		30,704	111,419	142,123
Grand-Goave	5,900	51,264	11,893	69,056
Gressier		17,496	14,533	32,029
Kenscoff			29,465	29,465
Leogane	5,238	12,596	227,652	245,486
Petion-Ville			36,685	36,685
Petit Goave	25,139	1,671	67,805	94,615
Pointe A Raquette	17,642	7,115	10,929	35,686
Port-au-Prince			22,704	22,704
Tabarre			20,339	20,339
Thomazeau		19,124	12,621	31,746
SUD	2,843	238,109	805,453	1,046,405
Aquin		49,766	66,664	116,429
Arniquet		2,182	37,728	39,910
Camp Perrin		17,691	3,039	20,730
Cavaillon		21,056	37,688	58,743
Chantal			56,677	56,677
Chardonnières			30,800	30,800
Coteaux		3,739	15,006	18,745
Ile A Vache			20,140	20,140

Les Anglais		8,968	2,481	11,449
Les Cayes		34,443	15,287	49,731
Maniche		6,332	17,879	24,210
Port-a-Piment			35,689	35,689
Port-Salut			277,706	277,706
Roche-A-Bateau		6,267	58,358	64,624
St. Jean du Sud		10,711	18,923	29,634
St. Louis du Sud		19,649	66,294	85,943
Tiburon	2,843	46,391	17,038	66,272
Torbeck		10,916	28,057	38,973
SUD-EST	1,576	155,937	2,196,943	2,354,457
Anse A Pitre			31,406	31,406
Bainet	1,576		667,736	669,312
Belle Anse		33,146	45,385	78,531
Cayes-Jacmel			641,761	641,761
Cotes de Fer			31,351	31,351
Grand Gosier		70,303		70,303
Jacmel		26,483	681,405	707,888
La Vallee		11,497	7,110	18,607
Marigot		14,508	81,307	95,815
Thiotte			9,483	9,483
Total	213,827	792,920	8,880,729	9,887,476

The population exposure, summarized by Department and Commune, has been calculated using a 100 m resolution WorldPop dataset. This is a preliminary analysis & has not yet been validated in the field.

Download complete excel table from [here](#)

Population Exposure in Cuba



11,245,238

Total population of Cuba

357,154

Total population living in **120 km/h** wind speed zones

1,242,420

Total population living in **90 km/h** wind speed zones

2,863,681

Total population living in **60 km/h** wind speed zones

Country / Province / Municipality	Wind Speed Zones			Total
	120 km/h	90 km/h	60 km/h	
Cuba	357,154	1,242,420	2,863,681	4,463,254
Camagüey			499,318	499,318
Camagüey			270,389	270,389
Esmeralda			23,999	23,999
Florida			36	36
Guáimaro			38,875	38,875
Jimaguayú			10,781	10,781
Minas			37,020	37,020
Najasa			9,112	9,112
Nuevitas			60,989	60,989

Santa Cruz del Sur			19	19
Sibanicú			30,126	30,126
Sierra de Cubitas			17,973	17,973
Ciego de Ávila			6,495	6,495
Bolivia			1,079	1,079
Morón			5,416	5,416
Granma			784,115	784,115
Bartolomé Masó			50,532	50,532
Bayamo			238,368	238,368
Buey Arriba			31,830	31,830
Campechuela			44,758	44,758
Cauto Cristo			20,449	20,449
Guisa			47,777	47,777
Jiguaní			60,237	60,237
Manzanillo			130,099	130,099
Media Luna			34,284	34,284
Niquero			4,761	4,761
Pilón			30,275	30,275
Río Cauto			33,796	33,796
Yara			56,949	56,949
Guantánamo	258,600	251,055		509,655
Baracoa	81,817			81,817
Caimanera	4,726	5,870		10,596
El Salvador		42,449		42,449
Guantánamo	40,039	185,191		225,231
Imías	23,042			23,042
Maisí	26,487	1,190		27,677
Manuel Tames	38,772			38,772
Niceto Pérez		16,356		16,356
San Antonio del Sur	25,372			25,372
Yateras	18,344			18,344
Holguín	98,554	336,202	599,708	1,034,464
Antilla		12,468		12,468
Báguanos		24,688	25,583	50,271
Banes		79,613		79,613
Cacocum			41,167	41,167
Calixto García			54,702	54,702
Cueto		28,091	4,263	32,355
Frak País	5,958	17,721		23,680
Gibara		99	72,484	72,584
Holguín			350,997	350,997
Mayarí		101,160		101,160
Moa	75,708			75,708
Rafael Freyre		42,052	10,183	52,235
Sagua de Tánamo	16,887	30,309		47,196
Urbano Noris			40,329	40,329
Las Tunas			567,122	567,122
Amancio			36,912	36,912
Colombia			72,312	72,312

Jesús Menéndez			49,048	49,048
Jobabo			44,025	44,025
Las Tunas			200,049	200,049
Majibacoa			41,558	41,558
Manatí			31,484	31,484
Puerto Padre			91,734	91,734
Santiago de Cuba	655,163	406,922	1,062,085	
Contramaestre			105,069	105,069
Guamá			34,530	34,530
Mella	24,214		10,618	34,832
Palma Soriano	1,307		122,793	124,099
San Luis	72,575		8,664	81,239
Santiago de Cuba	423,190		95,945	519,135
Segundo Frente	39,169			39,169
Songo-La Maya	94,708			94,708
Tercer Frente			29,304	29,304
Total	357,154	1,242,420	2,863,681	4,463,254

The population exposure, summarized by Province and Municipality, has been calculated using a 100 m resolution WorldPoP dataset. This is a preliminary analysis & has not yet been validated in the field.

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Population Exposure in Jamaica



2,812,329

Total population of Jamaica

0

Total population living in **120 km/h** wind speed zones

0

Total population living in **90 km/h** wind speed zones

1,923,662

Total population living in **60 km/h** wind speed zones

Country / Parishes	Wind Speed Zones			Total
	120 km/h	90 km/h	60 km/h	
Jamaica			1,923,662	1,923,662
Clarendon			240,525	240,525
Kingston			94,870	94,870
Manchester			11,483	11,483
Portland			84,327	84,327
Saint Andrew			605,979	605,979
Saint Ann			133,185	133,185
Saint Catherine			539,008	539,008
Saint Mary			117,310	117,310
Saint Thomas			96,976	96,976
Total	0	0	1,923,662	1,923,662

The population exposure, summarized by Parishes, has been calculated using a 100 m resolution WorldPoP dataset. This is a preliminary analysis & has not yet been validated in the field.

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CARIBBEAN

Haiti- Jamaica- Cuba

Analysis:(03-08 october 2016) | Published 03 October 2016



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Tropical Cyclone Matthew-16 : Path and Wind Speed Zones

This map illustrates the tropical cyclone Matthew's path with high, medium and low wind impact zones predicted between 03 October and 08 October 2016. The tropical cyclone path and wind speed zones were derived from Joint Research Centre data. This is a preliminary analysis and has not yet been validated in the field. Please send ground feedback to UNITAR-UNOSAT.

Legend

- Capital
- Cyclone Track
- Predicted Track
- International Border
- National Boundary

Wind Speed Zone

- High (120km)
- Medium (90km)
- Low (60km)

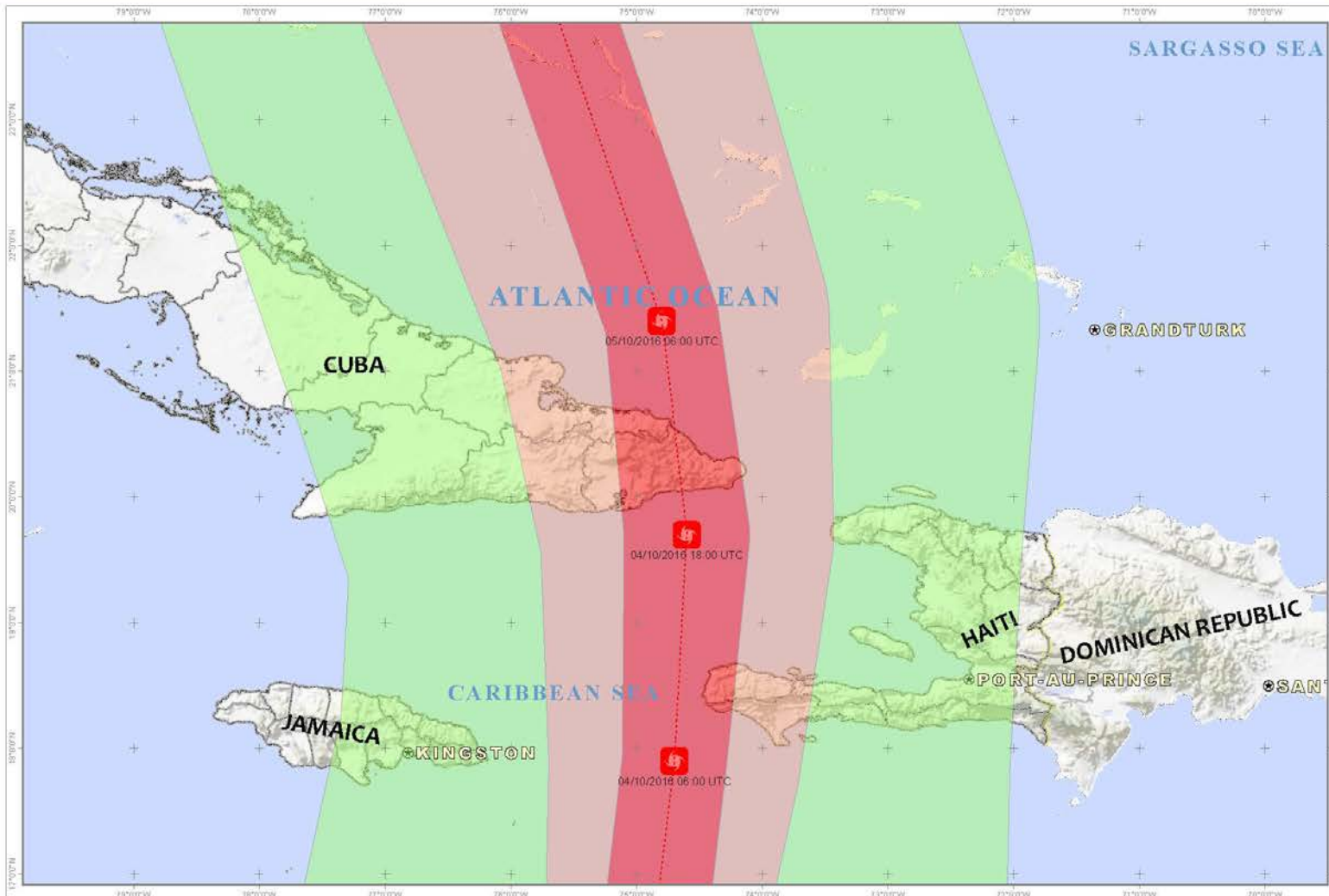
Map Scale for A3: 1:3,500,000



Analysis conducted with ArcGIS v10.3

Coordinate System: GCS_WGS_1984
Datum: WGS 1984

Units: Degree



Wind Speed Data : Joint Research Centre
Date Series : 03 October 2016
Copyright : JRC
Source : JRC

Baseline Data : HDX, GADM
Analysis : UNITAR - UNOSAT
Production : UNITAR - UNOSAT

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