USGS science for a changing world

U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

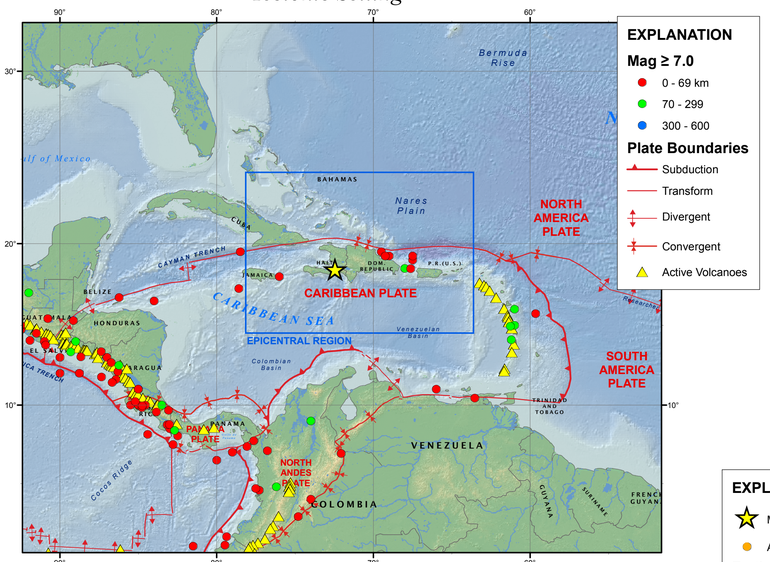
EARTHQUAKE SUMMARY MAP

M7.0 Haiti Earthquake of 12 January 2010

Prepared in cooperation with the Global Seismographic Network

GSN

Tectonic Setting



EXPLANATION

Mag ≥ 7.0
- 0 - 69 km
- 70 - 299
- 300 - 600

Plate Boundaries
- Subduction
- Transform
- Divergent
- Convergent
- Active Volcanoes

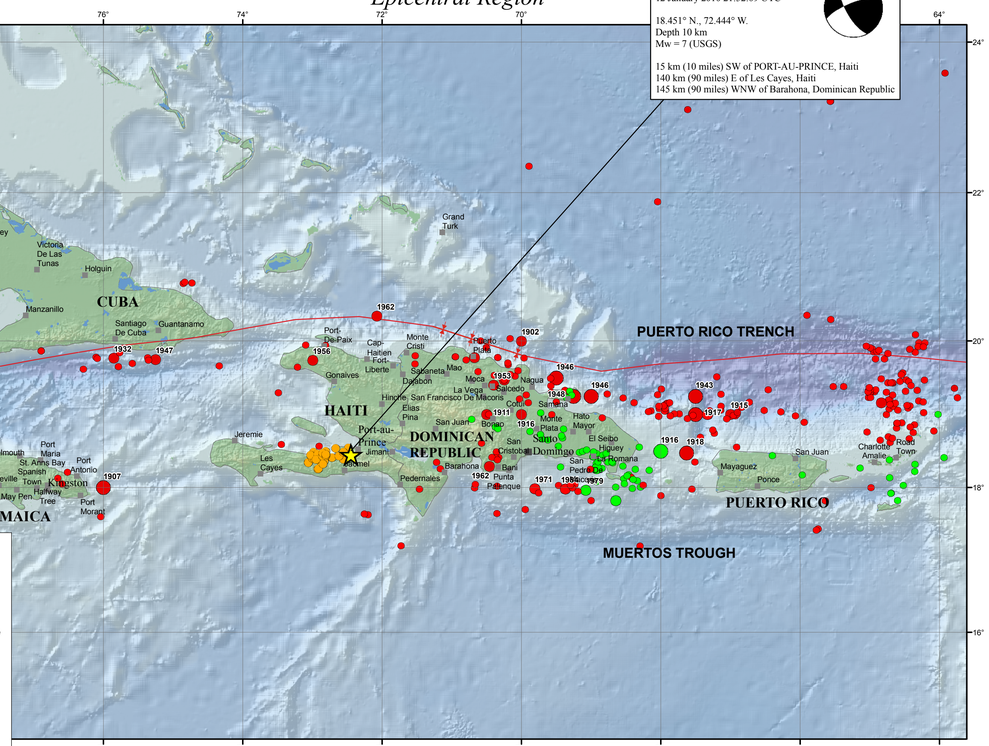
RELATIVE PLATE MOTIONS

In the region of this earthquake, earthquakes define the boundary between the North American and Caribbean Plates, which move past each other at about 20 mm/yr.

Scale 1:20,000,000

0 250 500 1,000 1,500 Kilometers

Epicentral Region



EXPLANATION
- Main Shock
- Aftershocks

Earthquake Magnitude
- 5.50 - 5.99
- 6.00 - 6.99
- 7.00 - 7.99
- 8.00 - 8.99
- 9.00 - 9.99

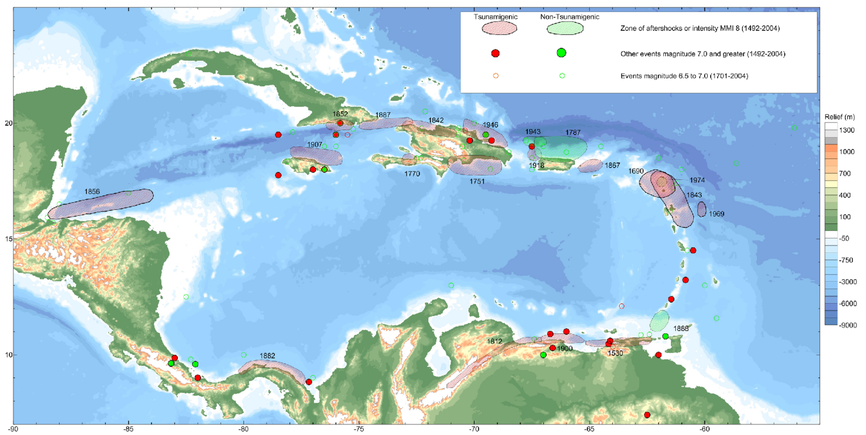
Earthquake Depth
- 0 - 69
- 70 - 299
- 300 - 700

Scale 1:4,500,000

0 125 250 500 Kilometers

Note on earthquakes: From 1900 - 1963, earthquakes shown are from Centennial Catalog, magnitudes greater than 5.5. From 1964 - 2002, earthquakes are from HDF catalog, magnitudes greater than 4.5. From 2003 to present, earthquakes are from NEIC, magnitudes greater than 4.5.

Historic Earthquakes and Tsunami 1492 - 2004



Note: Historic earthquakes in the interior and west coast of Central and South America are not included in this figure.

from McCann, 2006, Estimating the threat of tsunamigenic earthquakes and earthquake induced landslide tsunami in the Caribbean, in Caribbean Tsunami Hazard, Proceedings of the NSF Caribbean Tsunami Workshop, 2004, p.43-65.

USGS science for a changing world

M 7.0, HAITI REGION
Origin Time: Tue 2010-01-12 21:53:09 UTC
Location: 18.45°N 72.45°W Depth: 10 km

GSN USAID FROM THE AMERICAN PEOPLE

PAGER
Version 5
Created: 17 hours, 10 minutes after earthquake

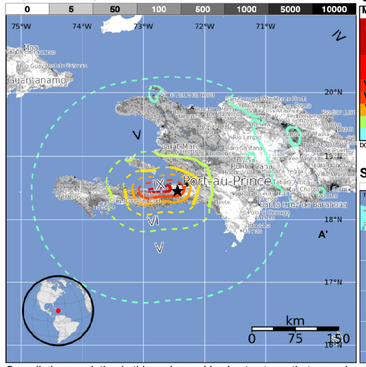
Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)		- *	- *	7,090k*	6,308k	777k	749k	1.884k	710k	137k
ESTIMATED MODIFIED MERCALLI INTENSITY		I	II-III	IV	V	VI	VII	VIII	IX	X+
PERCEIVED SHAKING		Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	Resistant Structures	none	none	none	V. Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
	Vulnerable Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy

*Estimated exposure only includes population within the map area.

Population Exposure

population per ~1 sq. km from Landscan

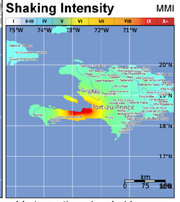


Selected City Exposure

MMI	City	Population
X	Petit Goave	15k
X	Leogane	12k
X	Grand Goave	5k
IX	Carrefour	442k
IX	Gressier	4k
VIII	Miragoane	6k
VIII	Port-au-Prince	1,235k
VII	Delmas 73	383k
V	Verrettes	49k
III	Santo Domingo	2,202k

bold cities appear on map (k = x1000)

Shaking Intensity



Overall, the population in this region resides in structures that are vulnerable to earthquake shaking, though some resistant structures exist. On June 24, 1984 (UTC), a magnitude 6.7 earthquake 329 km East of this one struck the Dominican Republic with estimated population exposures of 320,000 at intensity VII and 2,964,000 at intensity VI, resulting in an estimated 5 fatalities. Recent earthquakes in this area have caused landslides that may have contributed to losses.

*This information was automatically generated and has not been reviewed by a seismologist.

http://earthquake.usgs.gov/pager Event ID: us2010rja6

Significant Earthquakes Mag >= 6.5

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1902	02	17	0031	20.000	-70.000	0	6.9
1907	01	14	2136	18.000	-76.000	0	7.0
1911	10	06	1016	19.000	-70.500	0	6.8
1915	10	11	1933	19.000	-67.000	0	6.8
1916	04	24	0426	18.500	-68.000	80	7.0
1916	11	30	1317	19.000	-70.000	0	6.8
1917	07	27	0101	19.000	-67.500	50	7.0
1918	10	11	1414	18.473	-67.631	35	7.3
1932	02	03	0616	19.770	-75.850	25	6.8
1943	07	29	0302	19.250	-67.500	0	7.6
1946	08	04	1751	19.250	-69.000	0	7.9
1946	08	08	1328	19.500	-69.500	0	7.5
1947	08	07	0040	19.750	-75.250	50	6.8
1948	04	21	2022	19.250	-69.250	40	7.1
1953	05	31	1958	19.400	-70.400	33	6.9
1956	07	09	0956	19.737	-72.994	43.9	6.9
1962	01	08	0100	18.291	-70.461	32.6	6.7
1962	04	20	0547	20.339	-72.074	35	6.7
1971	06	11	1256	17.984	-69.808	59	6.5
1979	03	23	1932	17.964	-69.076	81.5	6.7
1984	06	24	1117	17.982	-69.369	44.1	6.7
1992	05	25	1655	19.618	-77.883	23.1	6.8

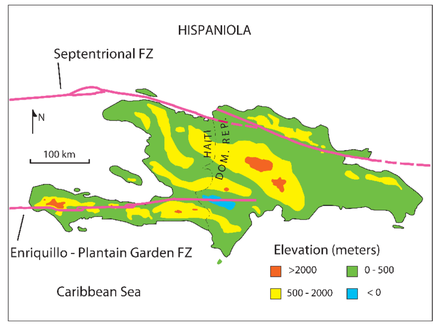
TECTONIC SUMMARY

The Haiti earthquake of January 12, 2010, occurred in the boundary region separating the Caribbean plate and the North America plate. This plate boundary is dominated by left-lateral strike slip and compression, and accommodates about 20 mm/y slip, with the Caribbean plate moving eastward with respect to the North America plate.

Haiti occupies the western part of the island of Hispaniola, one of the Greater Antilles islands, situated between Puerto Rico and Cuba. At the longitude of the January 12 earthquake, motion between the two Caribbean and North American plates is partitioned between two major east-west trending, strike-slip fault systems -- the Septentrional fault system in northern Haiti and the Enriquillo-Plaintain Garden fault system in southern Haiti.

The location and focal mechanism of the earthquake are consistent with the event having occurred as left-lateral strike slip faulting on the Enriquillo-Plaintain Garden fault system. This fault system accommodates about 7 mm/y, nearly half the overall motion between the Caribbean plate and North America plate

The Enriquillo-Plaintain Garden fault system has not produced a major earthquake in recent decades. The EPGFZ is the likely source of historical large earthquakes in 1860, 1770, 1761, 1751, 1684, 1673, and 1618, though none of these has been confirmed in the field as associated with this fault.



from Prentice, et al, 2003, Journal of Geophysical Research, V 108, B3, p.2149

DISCLAIMER

Base map data, such as place names and political boundaries, are the best available but may not be current or may contain inaccuracies and therefore should not be regarded as having official significance.

DATA SOURCES

EARTHQUAKES AND SEISMIC HAZARD
USGS, National Earthquake Information Center
NOAA, National Geophysical Data Center
IASPEI, Centennial Catalog (1900 - 1999) and extensions (Engdahl and Villaseñor, 2002)
HDF (unpublished earthquake catalog) (Engdahl, 2003)
Global Seismic Hazard Assessment Program

PLATE TECTONICS AND FAULT MODEL
PB2002 (Bird, 2003)

BASE MAP
NIMA and ESRI, Digital Chart of the World
USGS, EROS Data Center
NOAA GEBCO and GLOBE Elevation Models

REFERENCES

Bird, P., 2003, An updated digital model of plate boundaries: Geochem. Geophys. Geosyst., v. 4, no. 3, pp. 1027- 80.

Engdahl, E.R. and Villaseñor, A., 2002, Global Seismicity: 1900 - 1999, chap. 41 of Lee, W.H.K., and others,eds., International Earthquake and Engineering Seismology, Part A: New York, N.Y., Elsevier Academeic Press, 932 p.

Engdahl, E.R., Van der Hilst, R.D., and Buland, R.P., 1998, Global teleseismic earthquake relocation with improved travel times and procedures for depth determination: Bull. Seism. Soc. Amer., v. 88, p. 722-743.

Map prepared by U.S. Geological Survey
National Earthquake Information Center
13 January 2010 Version 2
Map not approved for release by Director USGS