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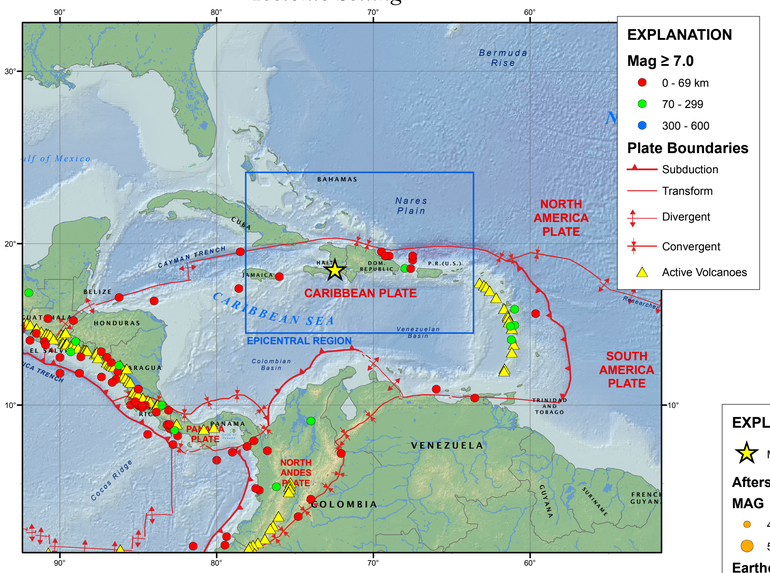
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

EARTHQUAKE SUMMARY MAP

Prepared in cooperation with the Global Seismographic Network
GSN

# M7.0 Haiti Earthquake of 12 January 2010

## Tectonic Setting

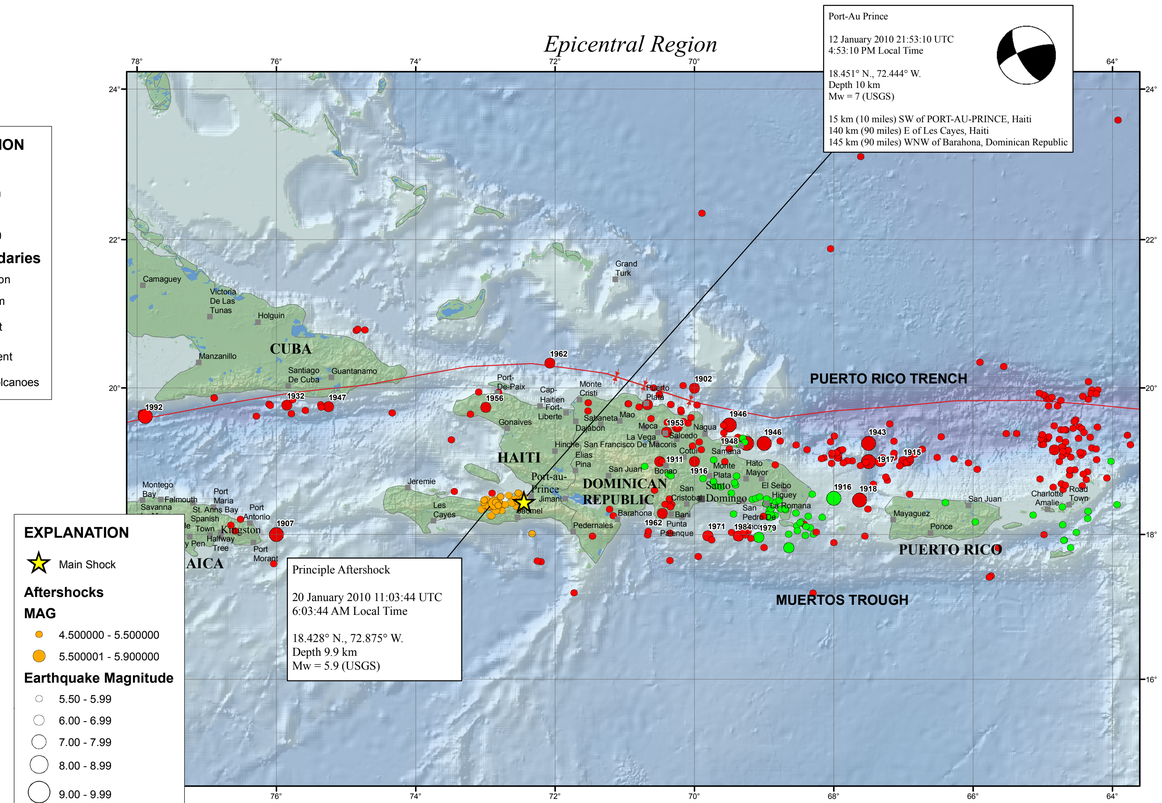



Scale 1:20,000,000

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.

## Epicentral Region




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.

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**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

USAID FROM THE AMERICAN PEOPLE
GSN

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

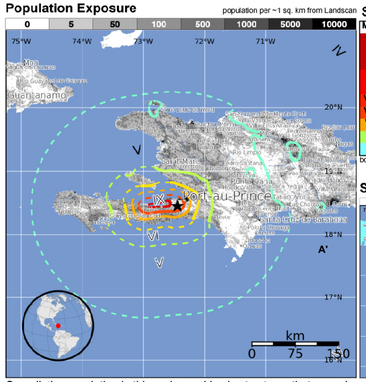
### Estimated Population Exposed to Earthquake Shaking

| 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



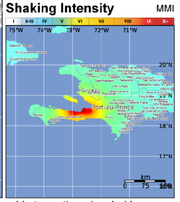

### Selected City Exposure

| 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 |

old cities appear on map (k = x1000)

### Shaking Intensity

MMI



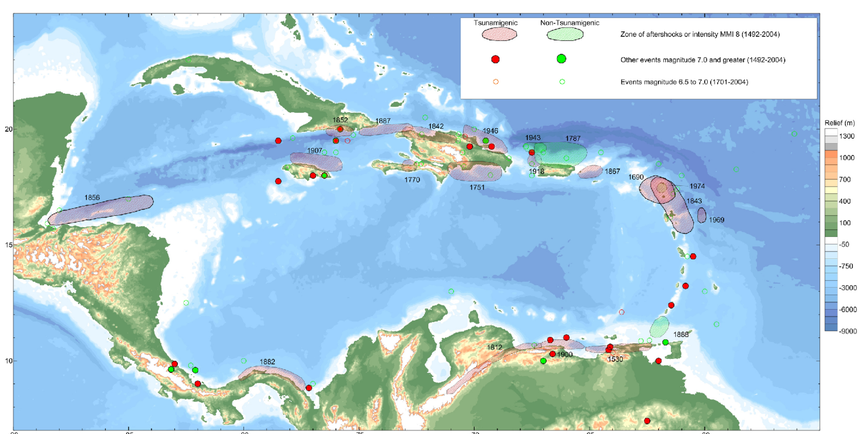
Overall, the population in this region resides in structures that are vulnerable to earthquake shaking, though some resistant structures exist. On June 24, 1984 (UTC), a magnitude 6.7 earthquake 329 km East of this one struck the Dominican Republic, with estimated population exposures of 320,000 at intensity 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

## 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.

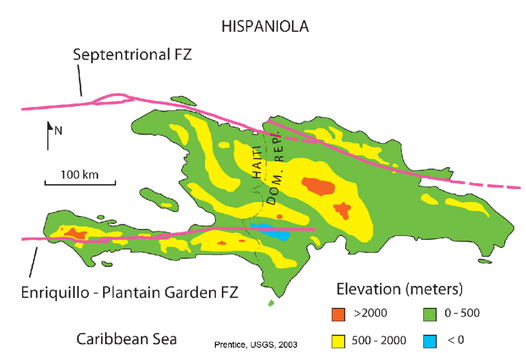
TECTONIC SUMMARY

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, and 1751, though none of these has been confirmed in the field as associated with this fault.




Prentice, USGS, 2003

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

**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 |

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
19 January 2010 Version 4
Map not approved for release by Director USGS