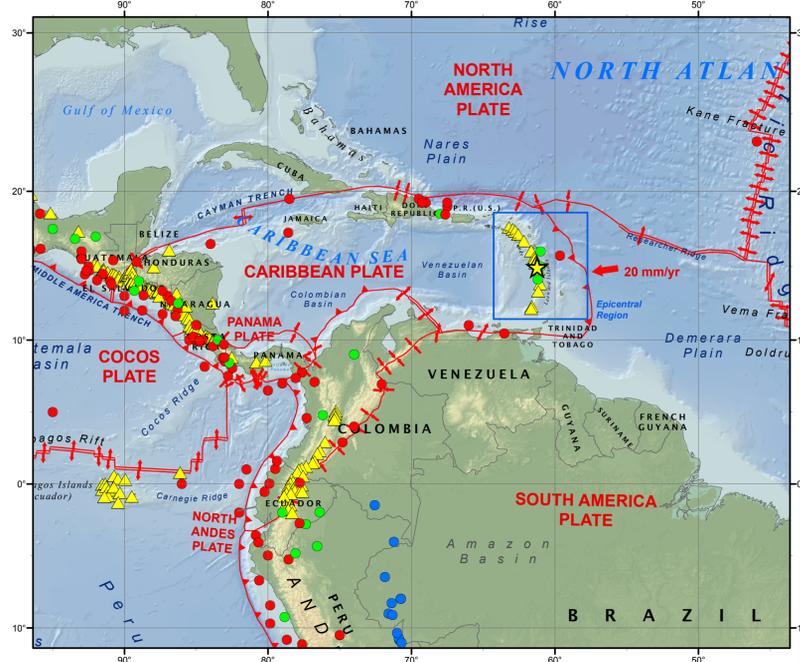


# M7.4 Martinique, Windward Islands, Earthquake of 29 November 2007



## Tectonic Setting

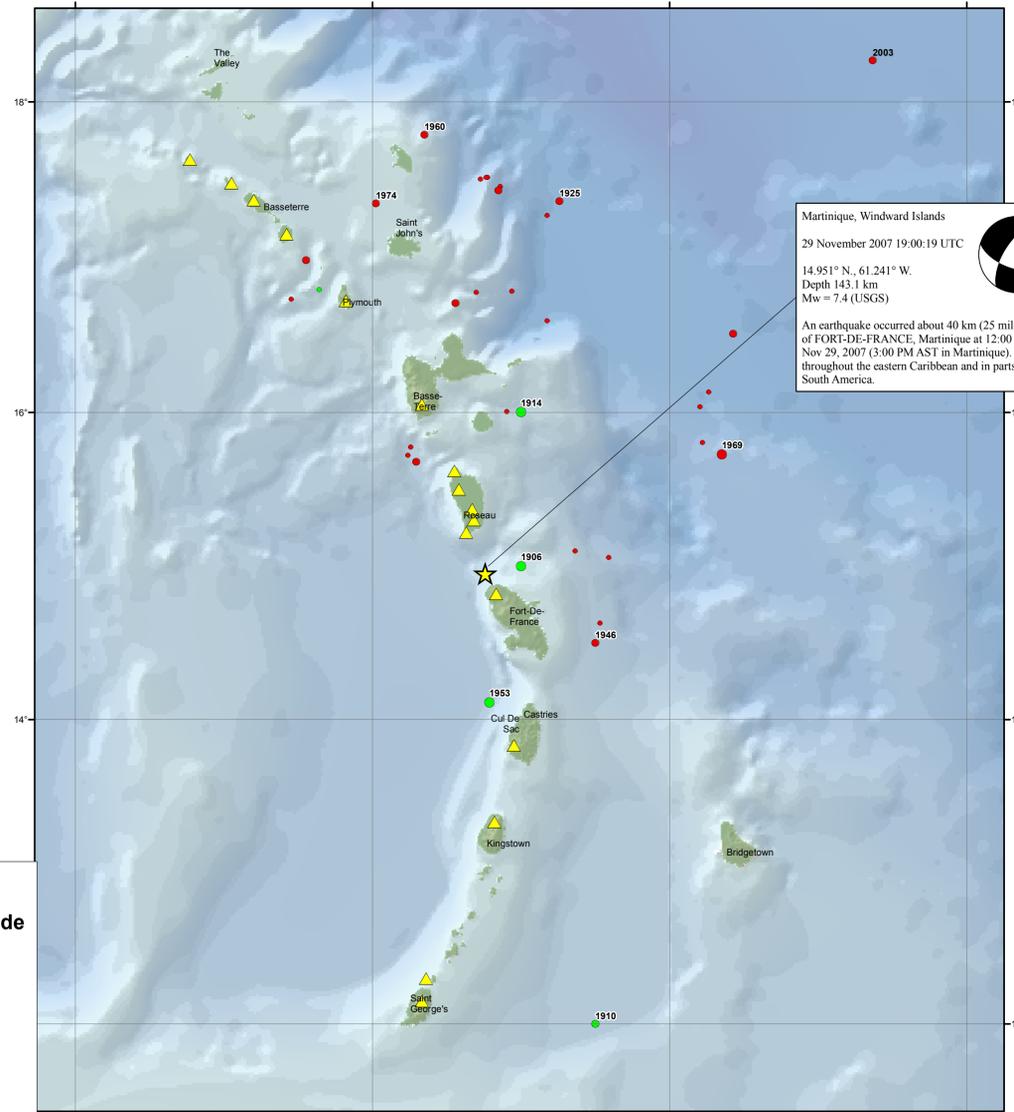


RELATIVE PLATE MOTIONS  
The broad red vectors represent the motion of the South America Plate relative to the Caribbean Plate. The motion of the South America Plate is generally west northwest with respect to the Caribbean Plate.

SCALE 1:25,000,000  
0 200 400 800 1,200 1,600 Kilometers

**EXPLANATION**  
Mag >= 7.0  
● 0 - 69 km  
● 70 - 299  
● 300 - 600  
Plate Boundary  
— Subduction  
— Transform  
+ Divergent  
+ Convergent

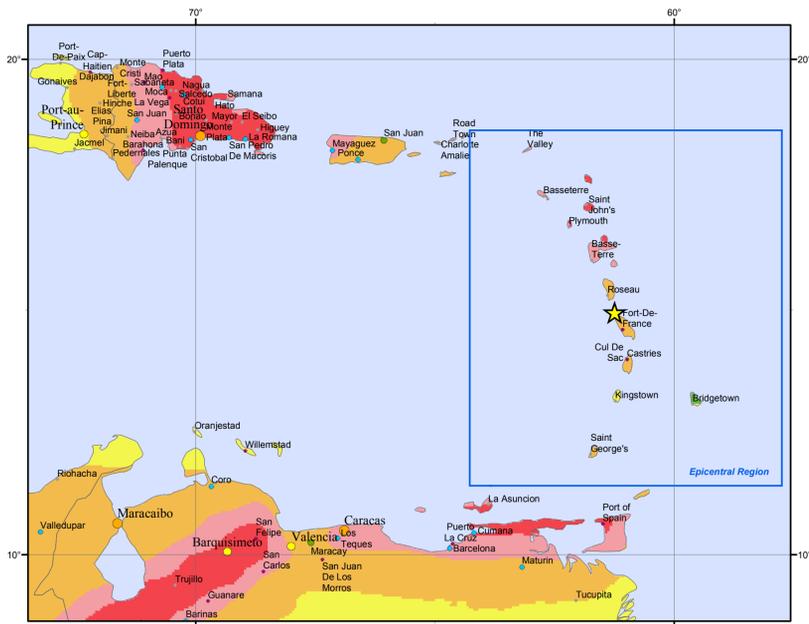
## Epicentral Region



Martinique, Windward Islands  
29 November 2007 19:00:19 UTC  
14.951° N., 61.241° W.  
Depth 143.1 km  
Mw = 7.4 (USGS)  
An earthquake occurred about 40 km (25 miles) NNW of FORT-DE-FRANCE, Martinique at 12:00 PM MST, Nov 29, 2007 (3:00 PM AST in Martinique). Felt throughout the eastern Caribbean and in parts of northern South America.

Scale at the Equator 1:2,500,000  
Mercator Projection  
0 100 200 400 Kilometers

## Seismic Hazard



**EXPLANATION**  
Earthquake Magnitude  
○ 4.00 - 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 1:7,500,000  
0 200 400 800 1,200 1,600 Kilometers  
Seismic hazard is expressed as peak ground acceleration (PGA) on firm rock, in meters/sec<sup>2</sup>, expected to be exceeded in a 50-yr period with a probability of 10 percent.  
Peak Ground Acceleration in m/sec<sup>2</sup>  
0.2 0.4 0.8 1.6 2.4 3.2 4.0 4.8

## DISCUSSION

The Martinique earthquake 29 November 2007 occurred in the inclined seismic zone that dips to the west beneath the Lesser Antilles island arc. In the region of Martinique, the South America plate moves to the west-northwest with respect to the Caribbean plate with a velocity of about 2 cm/yr. This relative motion is accommodated largely by the South America plate thrusting beneath the Caribbean plate. The earthquake occurred within the subducted South America plate, in response to stresses generated by plate's slow distortion, rather than the thrust fault that constitutes the interface between the Caribbean and South America plates. The subducted South American plate is seismically active to depths of almost 200 km beneath the Lesser Antilles island arc near Martinique.

Earthquakes, such as this one, that have focal-depths between 70 and 300 km are commonly termed "intermediate-depth" earthquakes. Intermediate-depth earthquakes typically cause less damage on the ground surface above their foci than is the case with similar magnitude shallow-focus earthquakes, but large intermediate-depth earthquakes may be damaging nonetheless and may be felt at great distance from their epicenters

## Significant Earthquakes Mag >= 6.5

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1906	12	03	2259	15.000	-61.000	100	7.2
1910	01	23	1849	12.000	-60.500	100	6.9
1914	10	03	1722	16.000	-61.000	100	7.4
1925	07	07	1743	17.362	-60.742	35	6.8
1946	05	21	0936	14.500	-60.500	50	6.5
1953	03	19	0827	14.111	-61.213	126	7.1
1960	05	31	1102	17.790	-61.650	35	6.6
1969	12	25	2132	15.727	-59.648	9.7	7.2
1974	10	08	0950	17.347	-61.977	23.3	6.9
2003	05	14	0603	18.266	-58.633	41	6.7

**USGS** **USAID**  
M 7.4, MARTINIQUE REGION, WINDWARD ISLANDS  
Origin Time: Thu 2007-11-29 19:00:19 UTC  
Location: 14.95°N 61.24°W Depth: 143 km  
Version 3  
Created: 1 hr, 10 mins after earthquake

ESTIMATED POPULATION EXPOSURE (k = x1000)	0	4,340*	1,337*	594k	819k	225k	0	0	0
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
	Vulnerable Structures	none	none	none	V. Light	Moderate	Moderate/Heavy	Heavy	V. Heavy

**Estimated Population Exposed to Earthquake Shaking**

**Population Exposure** population per ~1 sq. km from Landsat 2005

**Selected City Exposure**

MMI City	Population
VII Fort-de-France	89k
VI Basse-Terre	11k
V Roseau	16k
V Bridgetown	98k
IV Port-of-Spain	49k
IV Basseterre	12k
IV Road Town	8k
III San Juan	418k
III Cumana	257k
III Maturin	410k
III Barcelona	424k

**Shaking Intensity** (k = x1000)

Users should consider the preliminary nature of this information and check for updates as additional data becomes available. Population exposure estimates are NOT a direct estimate of earthquake damage; comparable shaking will result in significantly lower losses in regions with well built structures than in regions with vulnerable structures. Overall, structures in this region are a mix of vulnerable and resistant construction. A magnitude 5.8 earthquake struck the Martinique region on July 12, 1990 (UTC), with estimated population exposures of 450,000 at intensity V and 1 million at intensity IV. No shaking-related deaths were reported.

This information was automatically generated and has not been reviewed by a seismologist.  
<http://earthquake.usgs.gov/pager> Event ID: us2007kha5

## 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 Villasehor, 2002)  
HDF (unpublished earthquake catalog) (Engdahl, 2003)  
Global Seismic Hazard Assessment Program

PLATE TECTONICS AND FAULT MODEL  
PB2002 (Bird, 2003)  
Finite Fault Model, Chen Ji, UC Santa Barbara (2007)

BASE MAP  
NIMA and ESR/L 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: Geochim. Geophys. Geosyst., v. 4, no. 3, pp. 1027-80.

Engdahl, E.R. and Villasehor, 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 Academic 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.

## 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.

Map prepared by U.S. Geological Survey National Earthquake Information Center 2007  
Map not approved for release by Director USGS