M 7.7 - 125km NNW of Lucea, Jamaica

U.S. Department of the Interior
U.S. Geological Survey

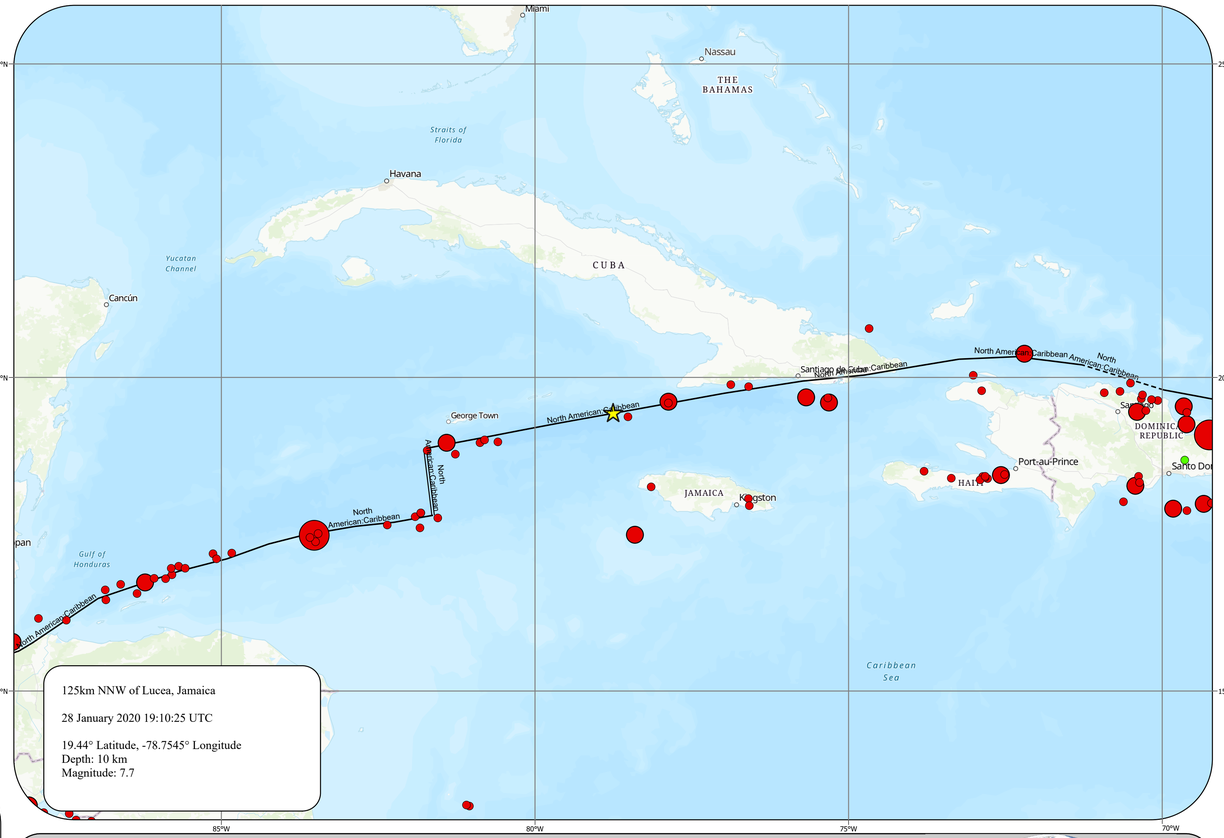
Earthquake Summary Map
prepared in cooperation with
the Global Seismographic Network

Tectonic Summary

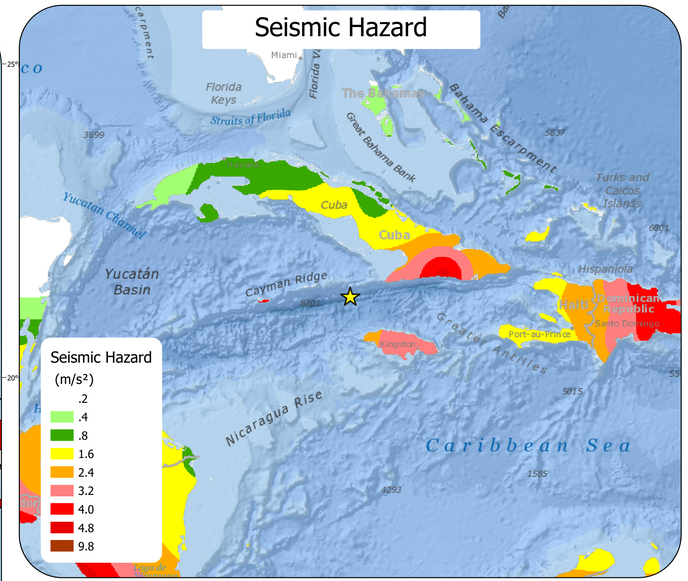
The January 28, 2020, M 7.7 earthquake in the Caribbean Sea to the south of Cuba and northwest of Jamaica occurred as the result of strike-slip faulting on the plate boundary between the North America and Caribbean tectonic plates. Preliminary focal mechanism solutions for the earthquake indicate slip occurred as the result of left-lateral motion on a steep fault striking towards the east-northeast, or as the result of right-lateral motion on a steep fault striking towards the south-southeast. The fault plane striking approximately east-west is consistent with the orientation of the regional plate boundary; this transform structure is named the Oriente Fault. At the location of this earthquake, the North America plate moves to the west-southwest with respect to the Caribbean plate at a rate of approximately 19 mm/yr.

While commonly plotted as points on maps, earthquakes of this size are more appropriately described as slip over a larger fault area. Strike-slip-faulting events of the size of the January 28, 2020, earthquake are typically about 170x25 km (length x width); modeling of this earthquake implies dimensions of about 200x20 km, predominantly west of the hypocenter.

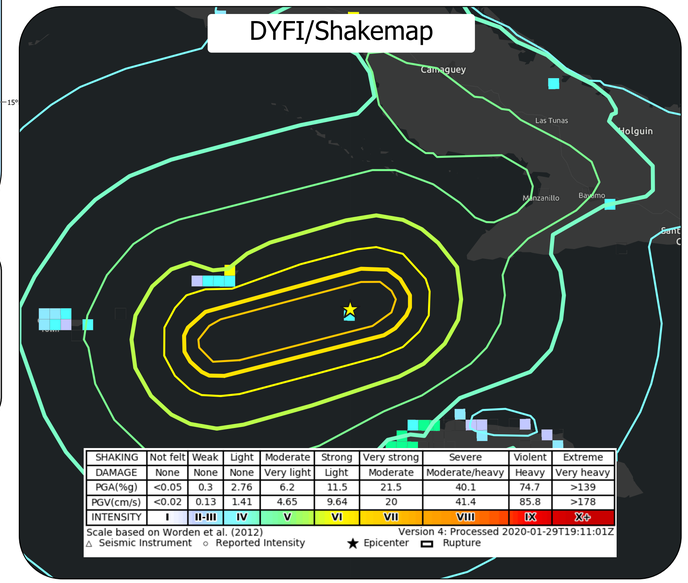
Five other earthquakes of M 6 or larger have occurred within 400 km of the January 28, 2020 event over the preceding half century. These include a M 6.8 earthquake in December 2004, 280 km to the west of today's earthquake, and a M 6.2 event in May 1992, almost 100 km to the east of today's quake. Likely because of their location away from land and major population centers, none of these earthquakes are known to have resulted in shaking-related damage or fatalities.



Seismic Hazard



DYFI/Shakemap



SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	None	None	None	Very light	Light	Moderate	Moderate/heavy	Heavy	Very heavy
PGA(%g)	<0.05	0.3	2.76	6.2	11.5	21.5	40.1	74.7	>139
PGV(cm/s)	<0.02	0.13	1.41	4.65	9.64	20	41.4	85.8	>178
INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

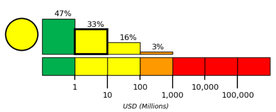
Scale based on Worden et al. (2012) Version 4: Processed 2020-01-29T19:11:01Z
△ Seismic Instrument ○ Reported Intensity ★ Epicenter ▭ Rupture

Earthquake Impact

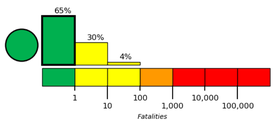
Yellow alert for economic losses. Some damage is possible and the impact should be relatively localized. Estimated economic losses are less than 1% of GDP of Cuba. Past events with this alert level have required a local or regional level response.

Overall, the population in this region resides in structures that are resistant to earthquake shaking, though vulnerable structures exist. The predominant vulnerable building types are unreinforced brick masonry and reinforced masonry construction.

Estimated Economic Losses



Estimated Fatalities



Ground-Failure

Landslide Estimate

Little or no area affected

Little or no population exposed

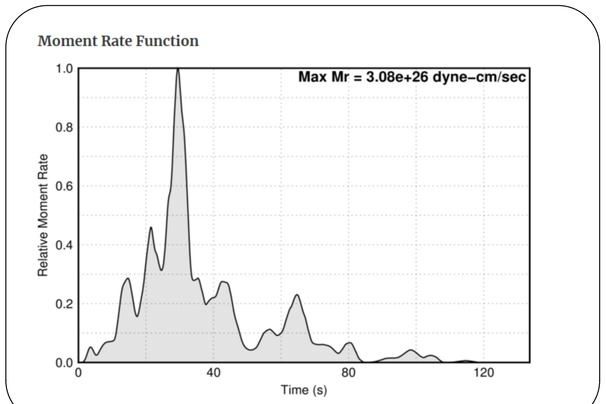
Liquefaction Estimate

Little or no area affected

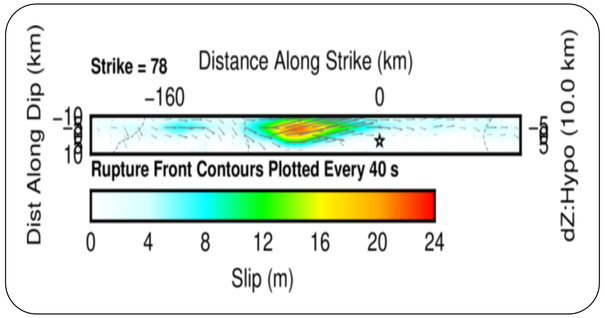
Little or no population exposed

Finite Fault

Moment Rate Function



Cross-section of Slip Distribution



DATA SOURCES

EARTHQUAKES AND SEISMIC HAZARD
USGS, National Earthquake Information Center
NOAA, National Geophysical Data Center
JASPEI, Centennial Catalog (1900 - 1999) and extensions (Engdahl and Villaseñor, 2002)

EHB catalog (Engdahl et al., 1998)
HDF (unpublished earthquake catalog, Engdahl, 2003)
Global Seismic Hazard Assessment Program
Volcanoes of the World (Siebert and Simkin, 2002)

PLATE TECTONICS AND FAULT MODEL
PB2002 (Bird, 2003)
Ji, C., D.J. Wald, and D.V. Helmberger, Source description of the 1999 Hector Mine, California earthquake; Part I: Wavelet
domain inversion theory and resolution analysis, Bull. Seism. Soc. Am., Vol 92, No. 4, pp. 1192-1207, 2002.
DeMets, C., Gordon, R.G., Argus, D.F., 2010. Geologically current plate motions, Geophys. J. Int. 181, 1-80.

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 Villasenor, 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 updated by U.S. Geological Survey
National Earthquake Information Center
30 January 2020
https://earthquake.usgs.gov/
Map not approved for release by Director USGS