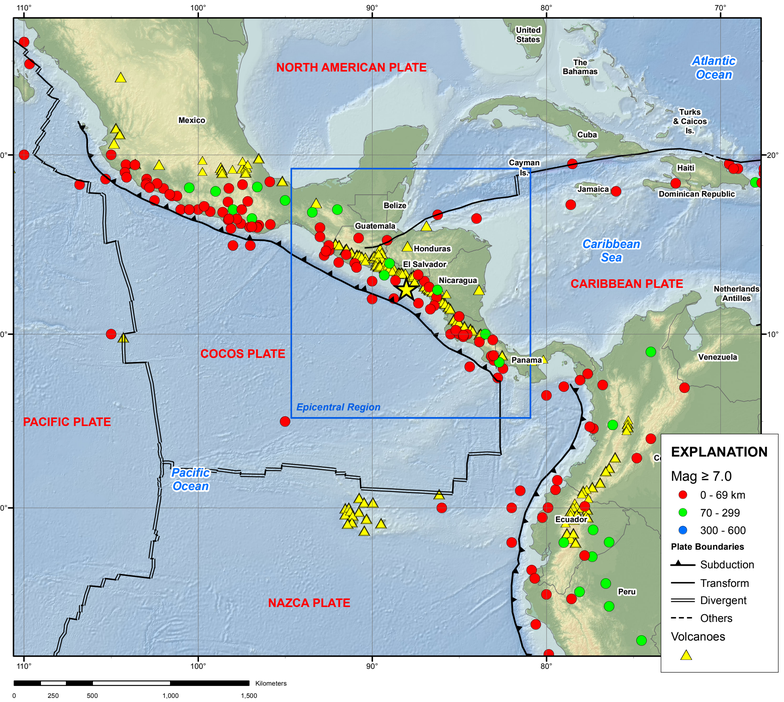
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

EARTHQUAKE SUMMARY MAP

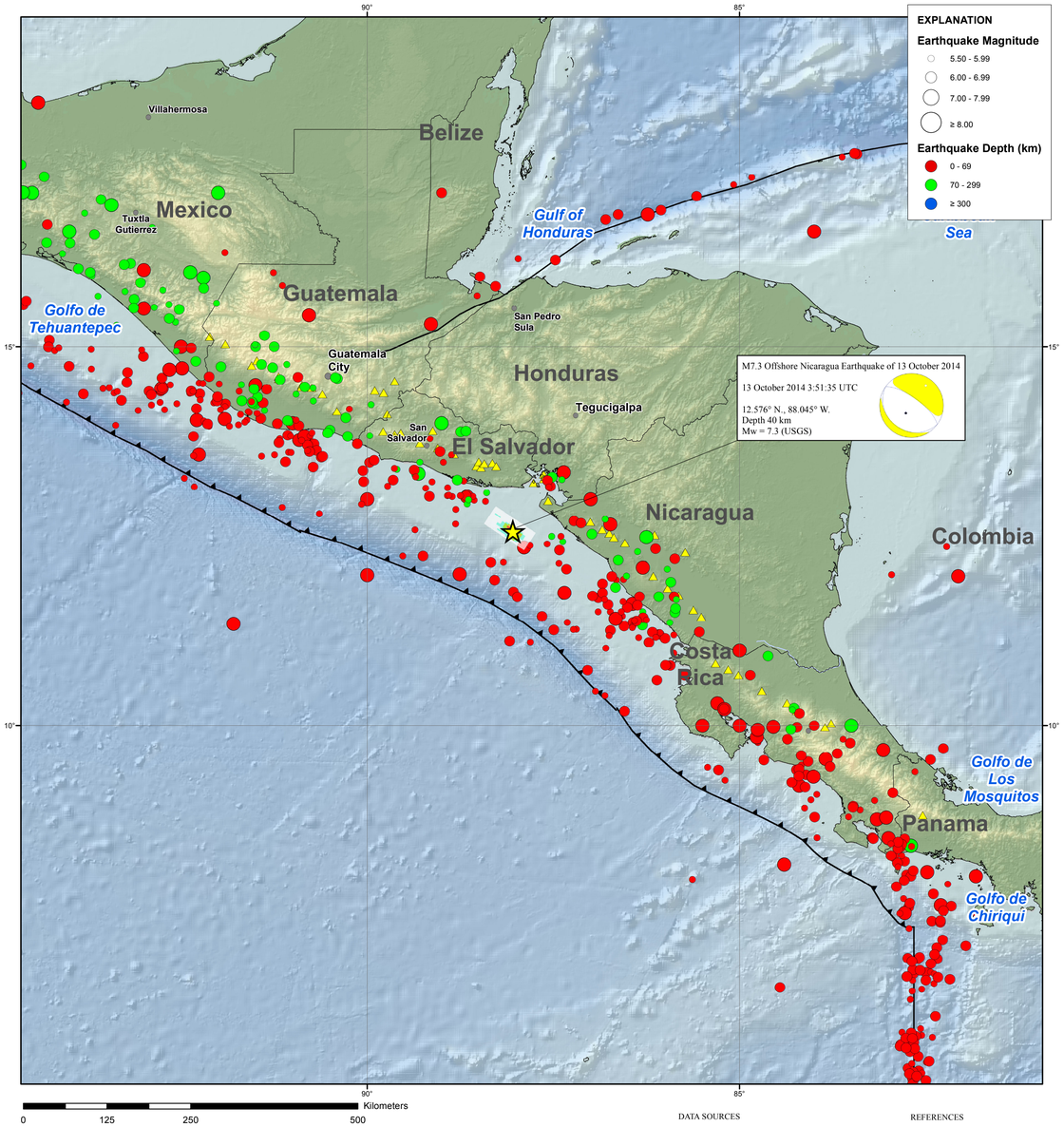
Prepared in cooperation with the Global Seismographic Network

M7.3 Offshore Nicaragua Earthquake of 13 October 2014

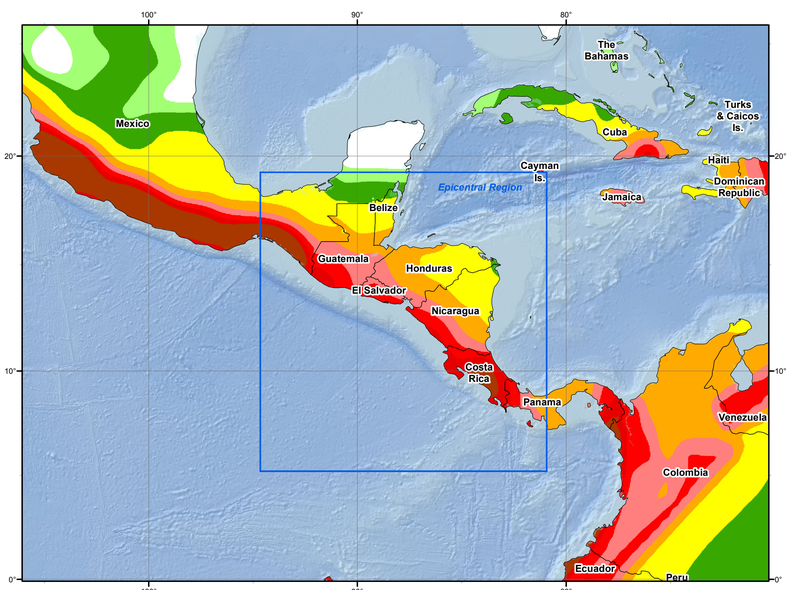
Tectonic Setting



Epicentral Region



Seismic Hazard



Seismic hazard is expressed as peak ground acceleration (PGA) on firm rock, in meters/sec^2, expected to be exceeded in a 50-yr period with a probability of 10 percent.

Peak Ground Acceleration in m/sec**2

.2 .4 .8 1.6 2.4 3.2 4.0 4.8

PAGER

M 7.3, NEAR THE COAST OF NICARAGUA

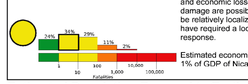
Origin Time: Tue 2014-10-14 03:51:35 UTC (21:51:36 local)
Location: 12.58°N 88.05°W Depth: 40 km

Earthquake Shaking: Yellow Alert

PAGER Version 2

Created: 50 minutes, 34 seconds after earthquake

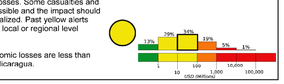
Estimated Fatalities



Yellow alert for shaking-related fatalities and economic losses. Some casualties and damage are possible and the impact should be relatively localized. Past yellow alerts have required a local or regional level response.

Estimated economic losses are less than 1% of GDP of Nicaragua.

Estimated Economic Losses



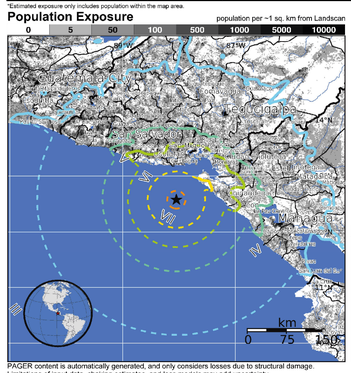
Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)		- -*	9,030k*	12,829k	3,328k	1,364k	47k	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	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



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

Historical Earthquakes (with MMI levels):

Date (UTC)	Dist. (km)	Mag.	Max MMI(#)	Shaking Deaths
1987-11-17	119	6.4	VIII(24k)	0
1996-03-03	163	6.7	VIII(46k)	0
2000-07-06	231	5.4	VII(173k)	7

Recent earthquakes in this area have caused secondary hazards such as tsunamis, landslides, and fires that might have contributed to losses.

Selected City Exposure

from GeoNames.org

MMI	City	Population
VII	Jiquilillo	4k
VI	**Chinilagua**	**6k**
VI	Intipuca	4k
VI	Puerto Morazan	8k
VI	**Monjaras**	**7k**
VI	El Realejo	6k
IV	**San Salvador**	**526k**
IV	**Managua**	**973k**
IV	**Tegucigalpa**	**851k**
III	San Pedro Sula	489k
III	**Guatemala City**	**995k**

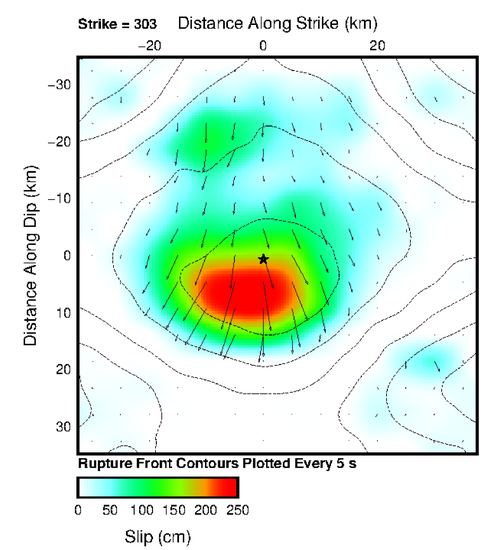
bold cities appear on map (k = x1000)

PAGER content is automatically generated, and only considers losses due to structural damage. Limitations of input data, shaking estimates, and loss models may add uncertainty.
http://earthquake.usgs.gov/pager

Event ID: usb000slwn

Finite Fault Model

Distribution of the amplitude and direction of slip for subfault elements of the fault rupture model are determined from the inversion of teleseismic body waveforms and long period surface waves. Arrows indicate the amplitude and direction of slip (of the hanging wall with respect to the foot wall); the slip is also colored by magnitude.The view of the rupture plane is from above. The strike of the fault rupture plane is 303° and the dip is 69°NNE. The dimensions of the subfault elements are 5 km in the strike direction and 5 km in the dip direction.The rupture surface is approximately 35 km along strike and 25 km downdip. The seismic moment release based upon this plane is 1.11E+27 dyne-cm.



TECTONIC SUMMARY

The October 14, 2014 M 7.3 earthquake off the coast of El Salvador occurred as the result of normal faulting in the Central America subduction zone. The location and depth of the earthquake are consistent with its occurrence either within the subducting oceanic Cocos plate, or in the accretionary wedge of the overriding Caribbean plate, rather than on the main subduction zone thrust. At the latitude of this event, the Cocos plate is converging with the Caribbean plate at a rate of roughly 73 mm/yr in an east-northeast direction. The approximate depth of the subducted Cocos plate at the location of the earthquake is 50 km.

The portion of the Middle America subduction zone bordering El Salvador and Nicaragua, locus of the October 14 earthquake, is very seismically active, with events of M 7.3 (2012), M 7.7 (2001), M 7.7 (1992) and M 7.3 (1982) all having occurred within 200 km of the October 14 earthquake in the past 35 years. The 2001 M7.7 earthquake involved normal faulting with similar orientation to the October 14 event, and likely occurred within the subducting Cocos plate. It caused substantial damage in El Salvador and Guatemala, with the majority of fatalities caused by a triggered landslide. The 2001 earthquake also triggered aftershocks in the overriding Carribean plate, including a M 6.6 event in the vicinity of San Salvador.

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)
EHB catalog (Engdahl et al., 1998)
HDF (unpublished earthquake catalog, Engdahl, 2003)
Global Seismic Hazard Assessment Program

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 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 Academic Press, 932 p.

Engdahl, E.R., Van der Hilst, R.D., and Buland, R.1998, Global teleseismic earthquake relocation wit improved travel times and procedures for depth determination;Bull. Seism. Soc. Amer., v. 88, p. 72

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 signifiance.

Map updated by U.S. Geological Survey National Earthquake Information Center
13 October 2014
http://earthquake.usgs.gov/
Map not approved for release by Director USGS