Magnitude 7.2 GUERRERO, MEXICO
Friday, April 18, 2014 at 14:27:26 UTC

A powerful magnitude-7.2 earthquake shook central and southern Mexico on Friday. The earthquake occurred at a depth of 24 km (15 miles). Its epicenter was in the western state of Guerrero, near the seaside resort of Acapulco. It collapsed several walls and left large cracks in some facades. There were no reports of major damage or casualties.

A parked car suffered damage when a adobe wall collapsed on it after a strong earthquake shook Chilpancingo, Mexico, Friday morning, April 18, 2014. A powerful magnitude-7.2 earthquake shook central and southern Mexico but there were no early reports of major damage or casualties.

(AP Photo/Alejandrino Gonzalez)

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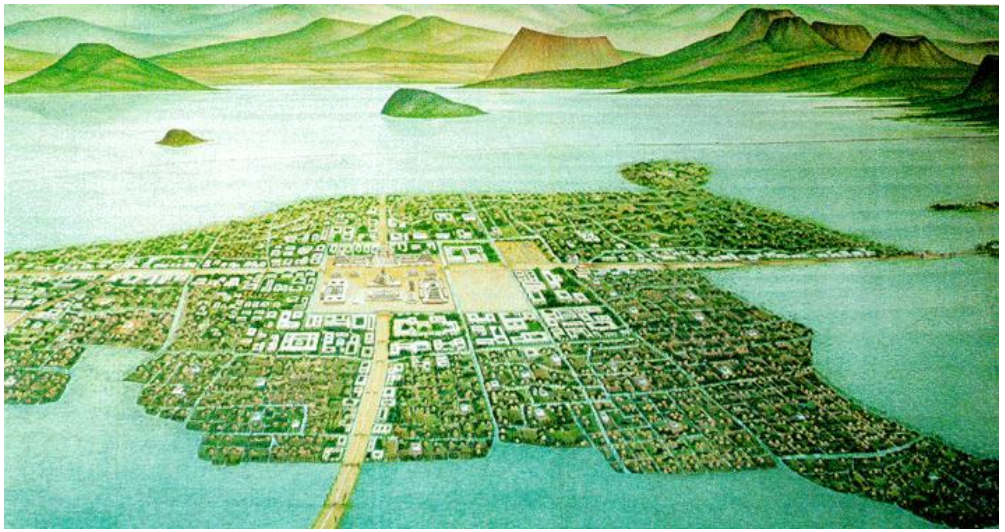
Mexico City had 71 seconds of warning before experiencing shaking from this earthquake, thanks to central Mexico's 21-year-old early earthquake warning system. The Mexican system was developed after a devastating 8.1 earthquake struck the country's west coast in 1985. Once large-amplitude shaking is detected among the nation's seismometers, a signal is transmitted immediately to activate alarms in the capital city that warn residents shaking may be imminent. This system is important to Mexico City, because portions of the city are built on unconsolidated sediments where seismic waves are amplified.

Mexico City



Tenochtitlan- from *The Broken Spears*, Miguel León-Portilla

The capital of the Aztec empire was Tenochtitlan, built on an island in Lake Texcoco. Mexico City was built by the Spanish on the ruins of Tenochtitlan. Both the Aztecs and the Spaniards extended the island; the Aztecs first to create fertile land for planting, and the Spaniards eventually draining the lake to allow the city to grow.

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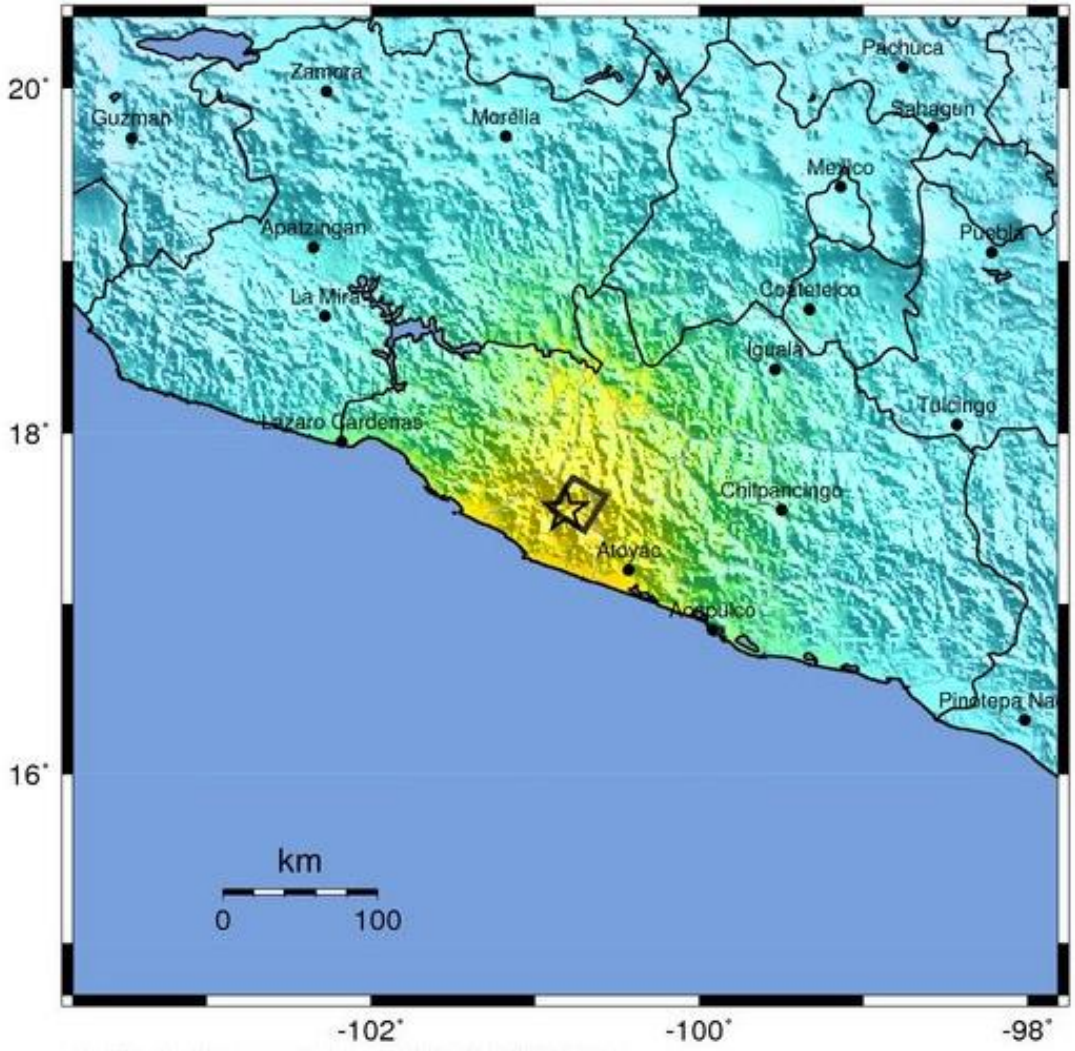
The Modified-Mercalli Intensity scale is a twelve-stage scale, from I to XII, that indicates the severity of ground shaking.

The earthquake was felt across at least a half-dozen states and Mexico's capital.

Modified Mercalli Intensity	Perceived Shaking
X	Extreme
IX	Violent
VIII	Severe
VII	Very Strong
VI	Strong
V	Moderate
IV	Light
II-III	Weak
I	Not Felt

Image courtesy of the US Geological Survey



USGS Estimated shaking Intensity from M 7.2 Earthquake

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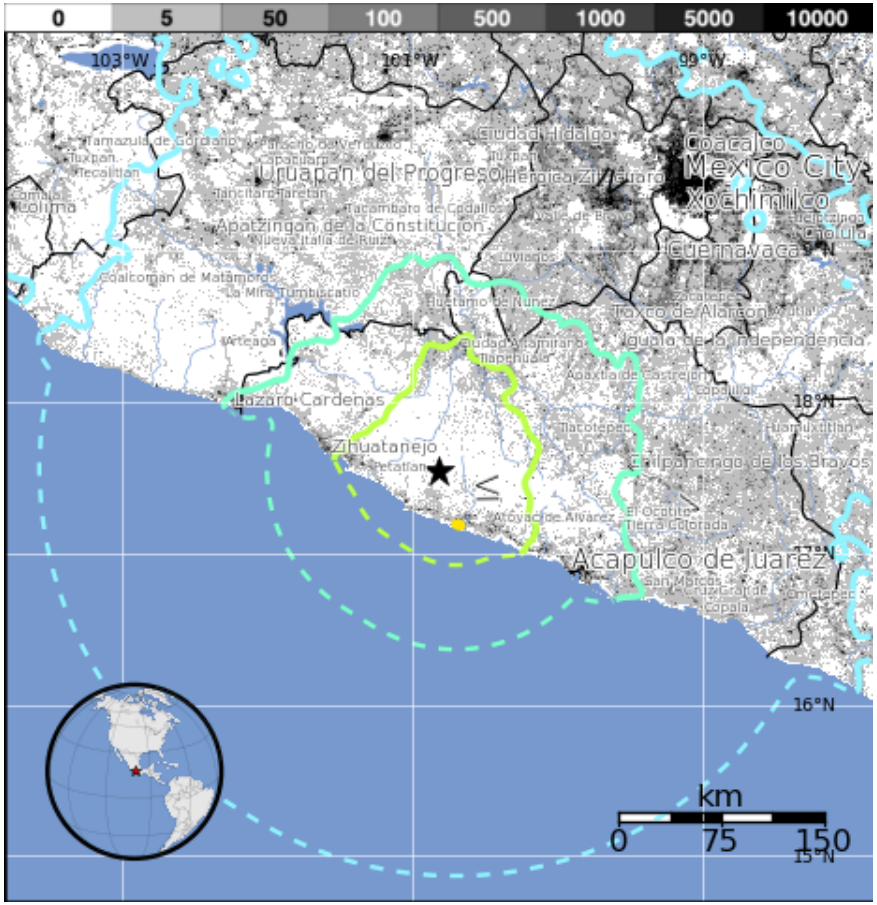
USGS PAGER
Population Exposed to Earthquake Shaking

The USGS PAGER map shows the population exposed to different Modified Mercalli Intensity (MMI) levels.

Over 41,000 people experienced very strong shaking and 439,000 experienced strong shaking from this earthquake.



The color coded contour lines outline regions of MMI intensity. The total population exposure to a given MMI value is obtained by summing the population between the contour lines. The estimated population exposure to each MMI Intensity is shown in the table below.

Image courtesy of the US Geological Survey

Estimated Modified Mercalli Intensity	I	II-III	IV	V	VI	VII	VIII	IX	X
Est. Population Exposure	--*	2,837k*	39,297k	1,940k	439k	41k	0k	0k	0k
Perceived Shaking	Not Felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme

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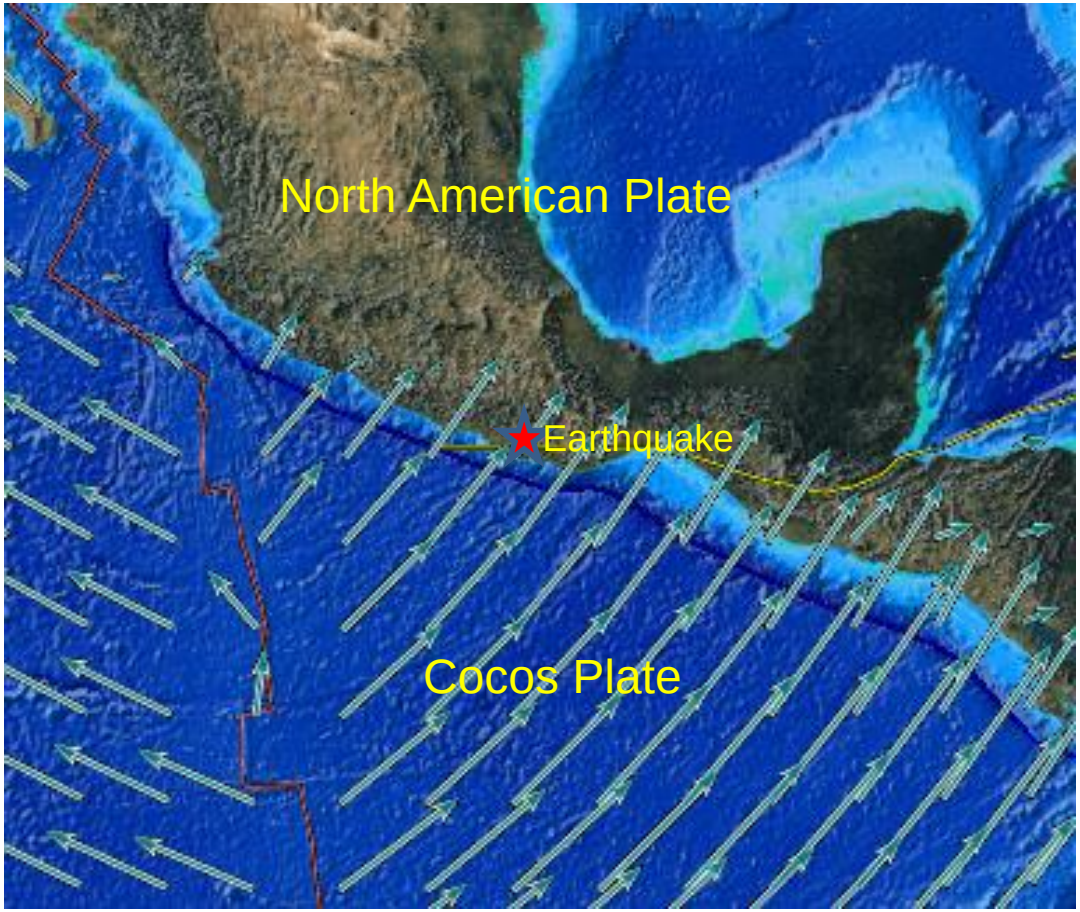

Arrows show plate motion relative to the North American Plate.

Mexico is one of the most seismologically and volcanically active regions on Earth. It is part of the circum-Pacific "Ring of Fire".

Most of Mexico rests on the North American Plate. The Pacific Ocean floor off southern Mexico, however, is on the Cocos Plate. In the region of this earthquake, the Cocos Plate moves northeastward at a rate of 60 mm/yr toward the North American Plate.

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This earthquake is shown by the blue star on the map below. The Cocos Plate subducts towards the north beneath the North American Plate at the Middle America Trench. The depth of this earthquake fits the pattern of shallow and intermediate depth earthquakes that cluster along the megathrust plate boundary.

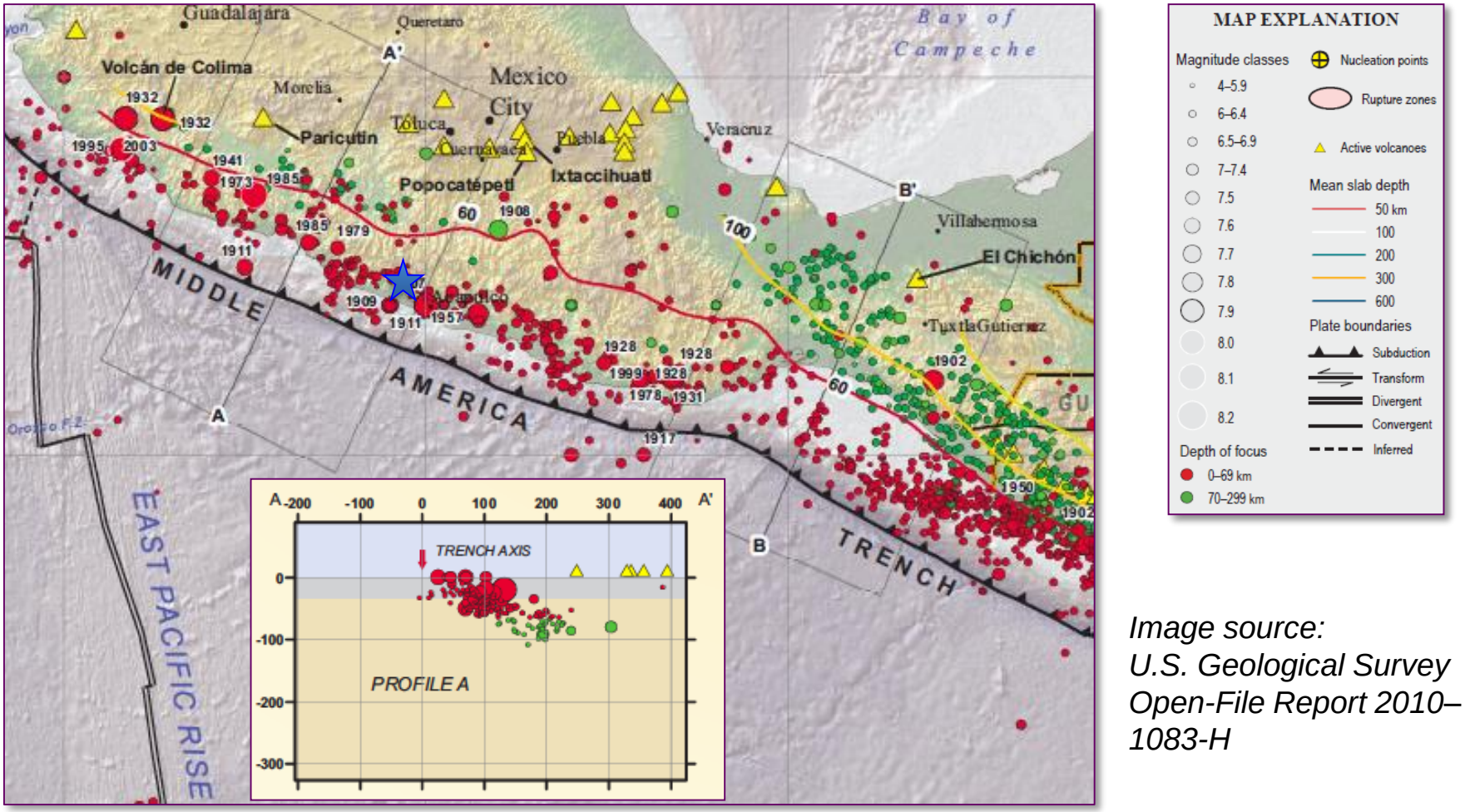

Image source:
U.S. Geological Survey Open-File Report 2010–1083-H

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Tectonic setting and seismic wave path animation.

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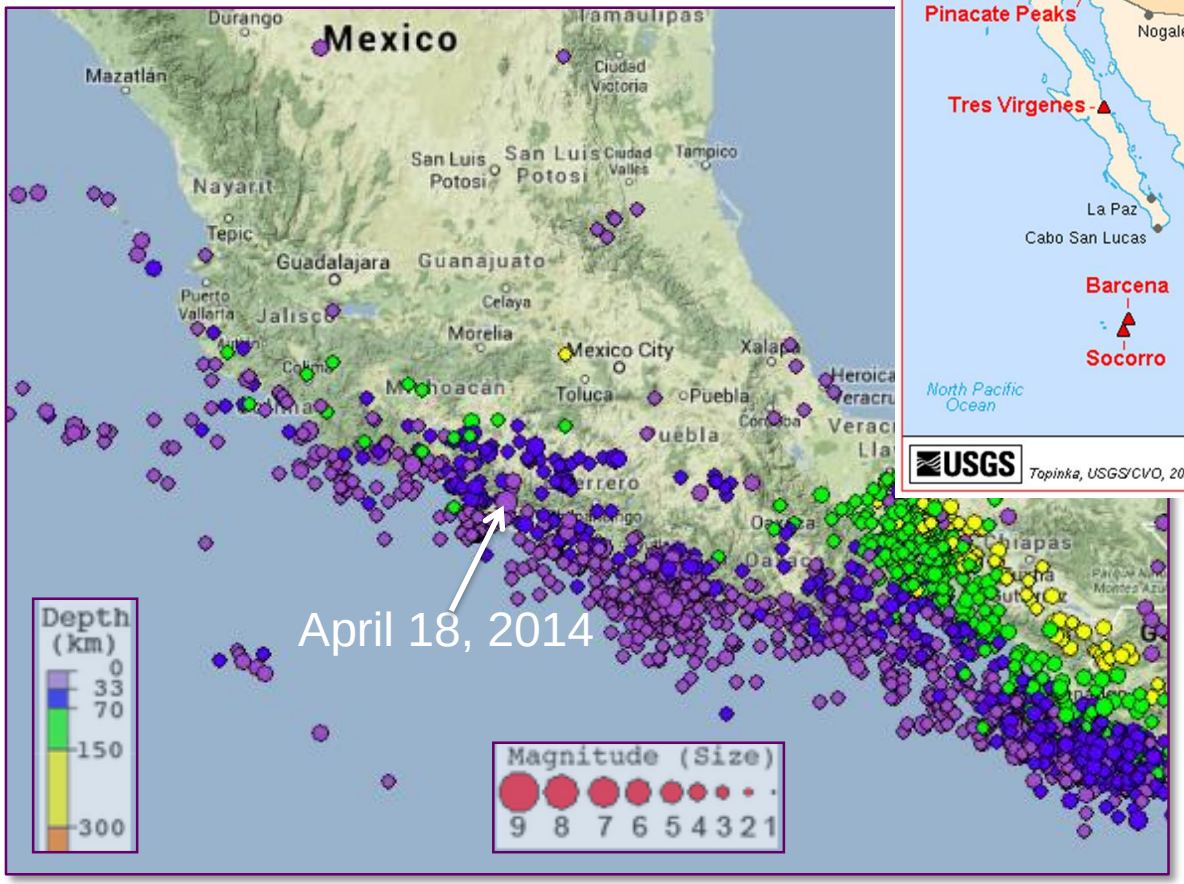
Mexico has a long history of destructive earthquakes and volcanic eruptions. In September 1985, a magnitude 8.1 earthquake centered in the subduction zone off Acapulco killed more than 9,500 people and left more than 100,000 homeless in Mexico City, more than 300 km away.



Major volcanoes of Mexico are show above. Regional seismicity is plotted on the map on the left..

Image from IRIS Earthquake Browser http://www.iris.edu/ieb

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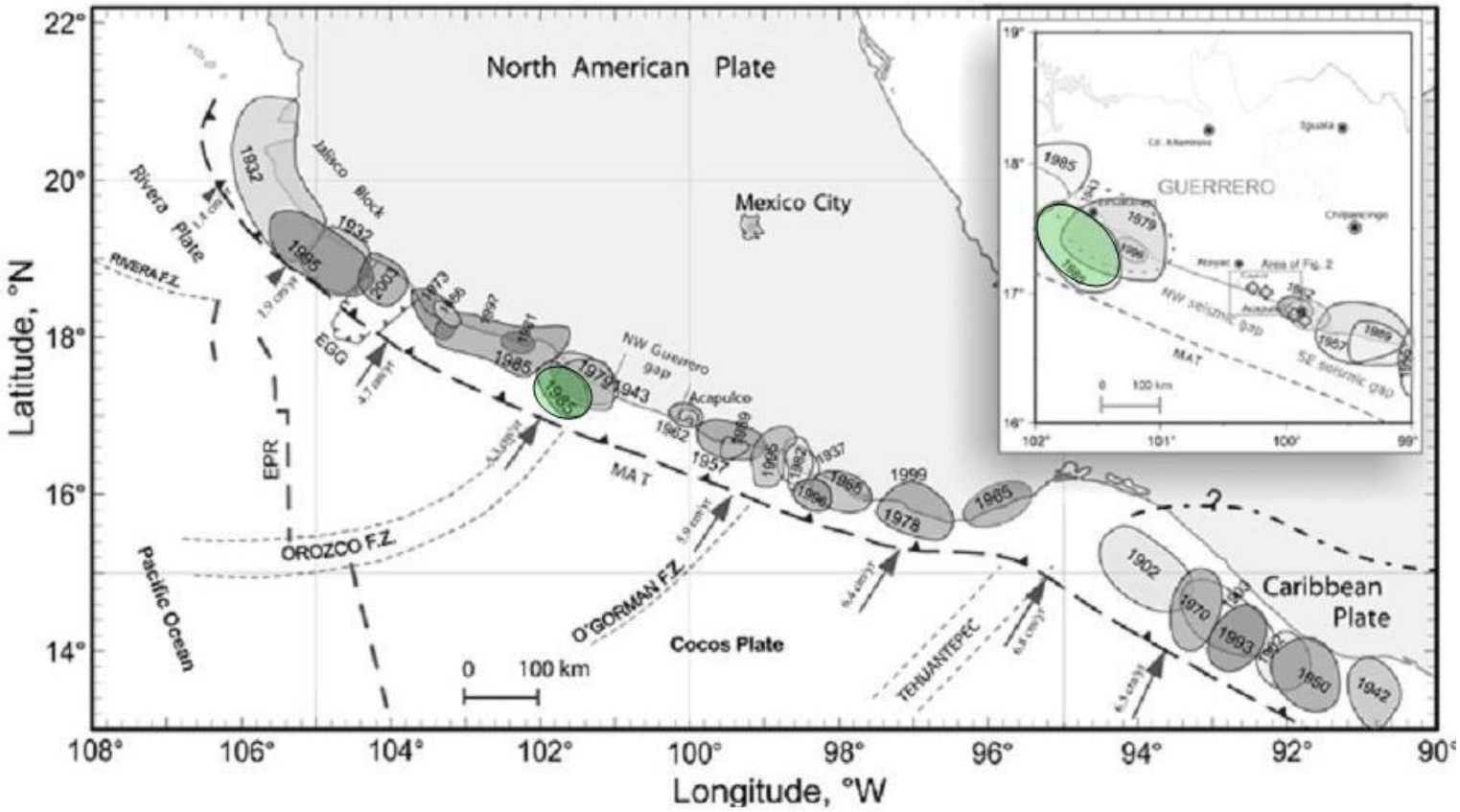
This earthquake occurred within the 'Guerrero Seismic Gap' – an approximately 200 km long segment of the Cocos-North America plate boundary identified to have experienced no significant earthquakes since 1911 (M 7.6). The plate interface in this region is known to be locked. As a result, seismologists expect a major earthquake in this region.



The locations of each of the major and great quakes which occurred along Mexico's Pacific coastline are shown as grey areas, with the extremely destructive 1985 quake marked in green. The area just to the southeast of the green region is empty and represents a seismic gap.

Image courtesy UC Berkeley Seismological Laboratory

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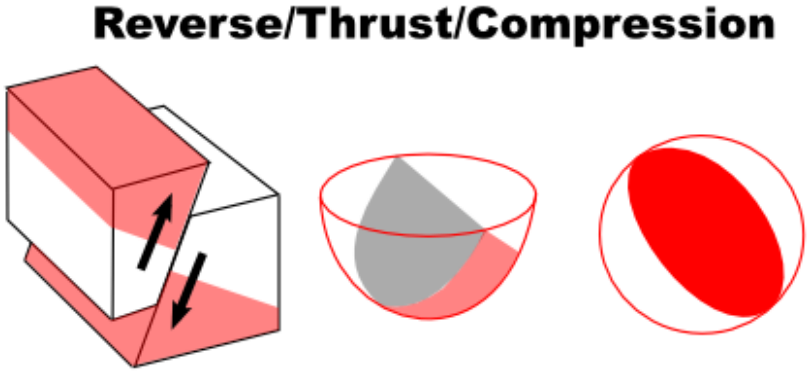
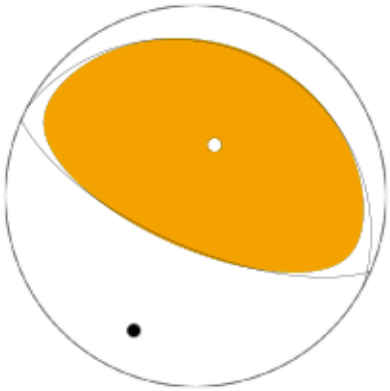
The focal mechanism is how seismologists plot the 3-D stress orientations of an earthquake. Since an earthquake occurs as slip on a fault, it generates primary (P) waves in quadrants of compression (shaded) and extension (white). The orientation of these quadrants determined from recorded seismic waves determines the type of fault that produced the earthquake.

In this case, the focal mechanism indicates a thrust fault dipping slightly to the north consistent with the earthquake occurring on the convergent boundary between the subducting Cocos Plate and the overriding North American Plate.





Shaded areas show quadrants of the focal sphere in which the P-wave first-motions are away from the source, and unshaded areas show quadrants in which the P-wave first motions are toward the source. The dots represent the axis of maximum compressional strain (in black, called the "P-axis") and the axis of maximum extensional strain (in white, called the "T-axis") resulting from the earthquake.

USGS WPhase Centroid Moment Tensor Solution

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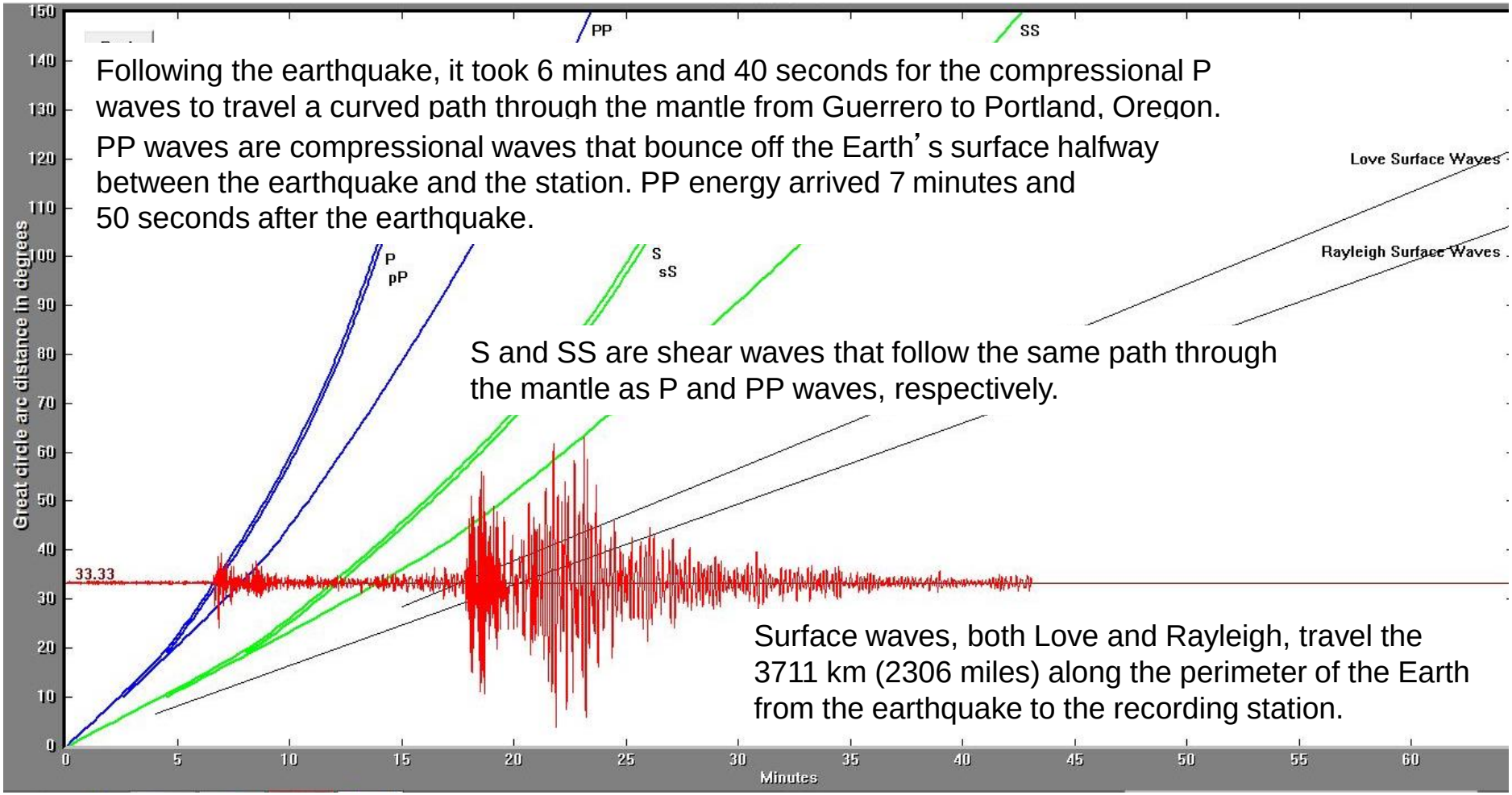
The record of the earthquake on the University of Portland seismometer (UPOR) is illustrated below. Portland is about 3711 km (2306 miles, 33.43°) from the location of this earthquake.



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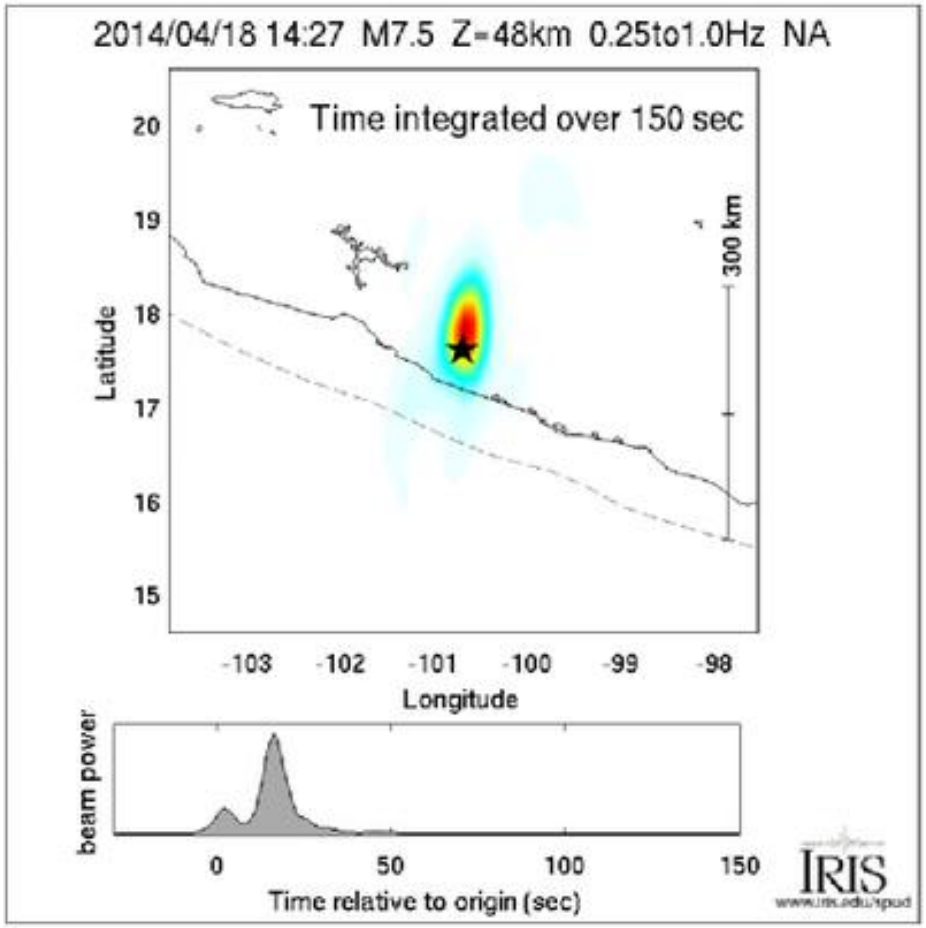
Back Projections are movies created from an automated data processing sequence that stacks up P wave energy recorded on many seismometers on a flat grid around the source region. This grid is meant to be a fault surface and creates a time and space history of the earthquake.

Warmer colors indicate greater beam power. In the movies, a red circle shows the location of the peak beam power when absolute beam powers are low.

Duration of rupture along the fault can be seen in the graph.



More info: http://www.iris.edu/spud/backprojection

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