Magnitude 7.2 OAXACA, MEXICO
Friday, February 16, 2018 at 23:39:42 UTC

A magnitude 7.2 earthquake has occurred in Oaxaca, Mexico at a depth of 24.6 km (15 miles). It was felt as far away as Guatemala. There have been no reported deaths directly linked to the earthquake.

Emergency warning systems were activated in Mexico City, 348 km (216 miles) from the epicenter of the quake. The seismic alarm sounded 72 seconds before tremors were felt, giving residents time to flee to the streets.

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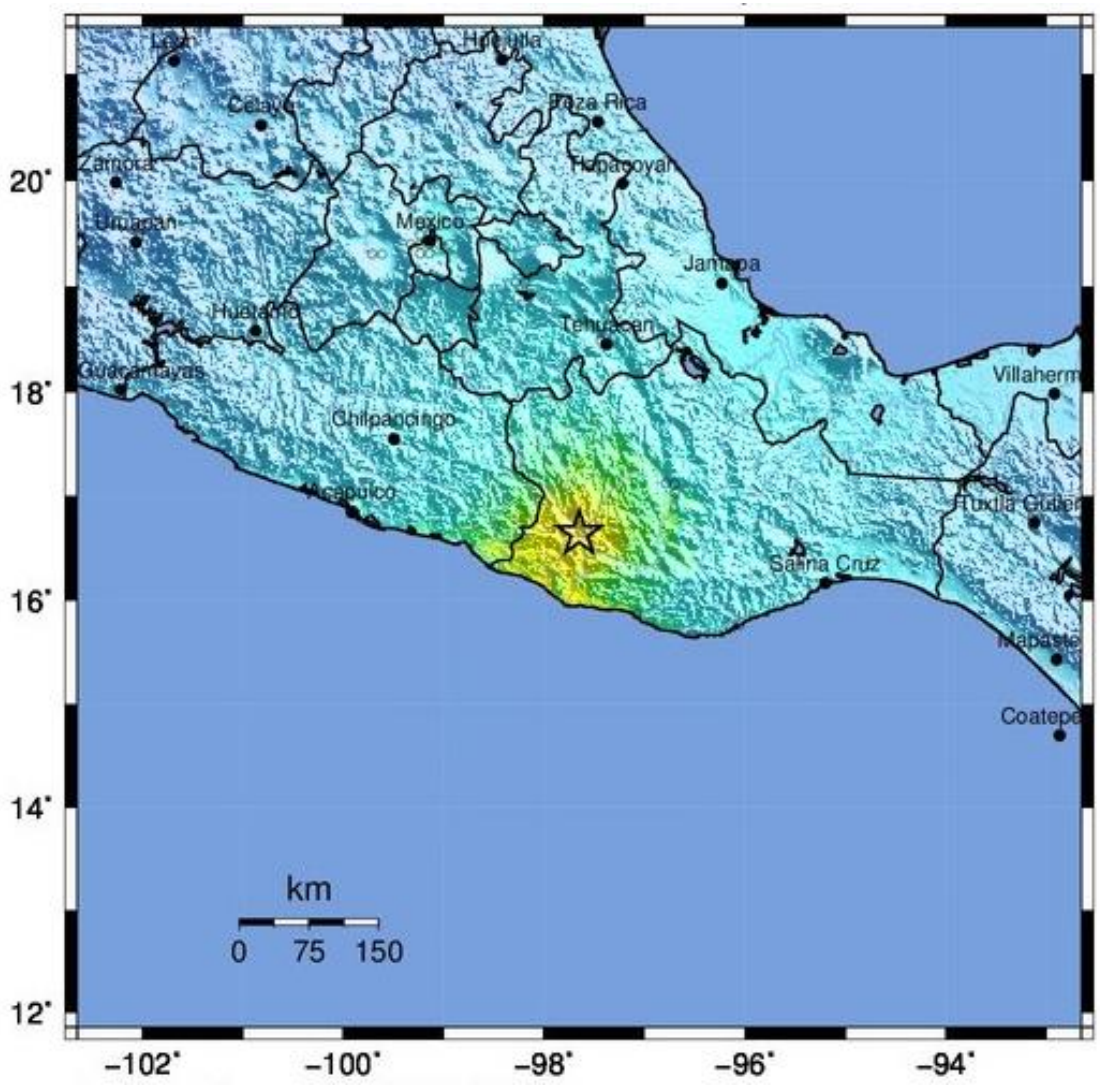
The Modified-Mercalli Intensity scale is a twelve-stage scale, from I to XII, that indicates the severity of ground shaking.

The area near the epicenter experienced strong and very strong shaking.

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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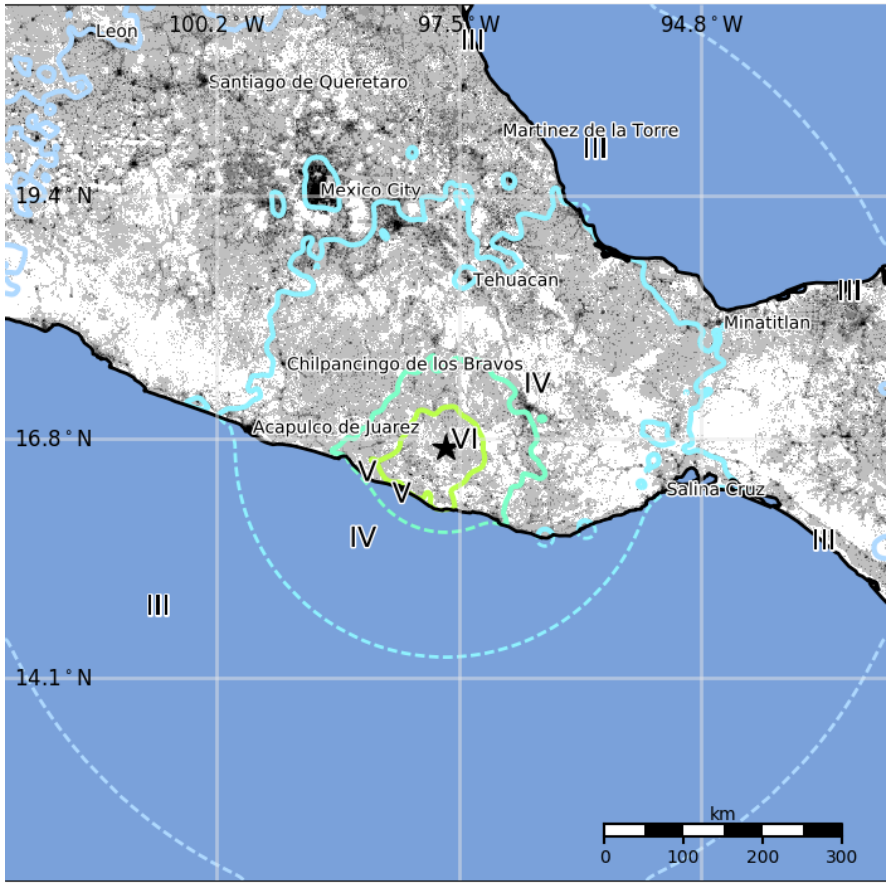
The USGS PAGER map shows the population exposed to different Modified Mercalli Intensity (MMI) levels. From this earthquake, 439,000 people felt strong shaking while 16,000 people felt very strong shaking.

MMI	Shaking	Pop.
I	Not Felt	--*
II-III	Weak	36,712 k*
IV	Light	34,449 k
V	Moderate	1,322 k
VI	Strong	439 k
VII	Very Strong	16 k
VIII	Severe	0 k
IX	Violent	0 k

USGS PAGER

Population Exposed to Earthquake Shaking



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.

Image courtesy of the US Geological Survey

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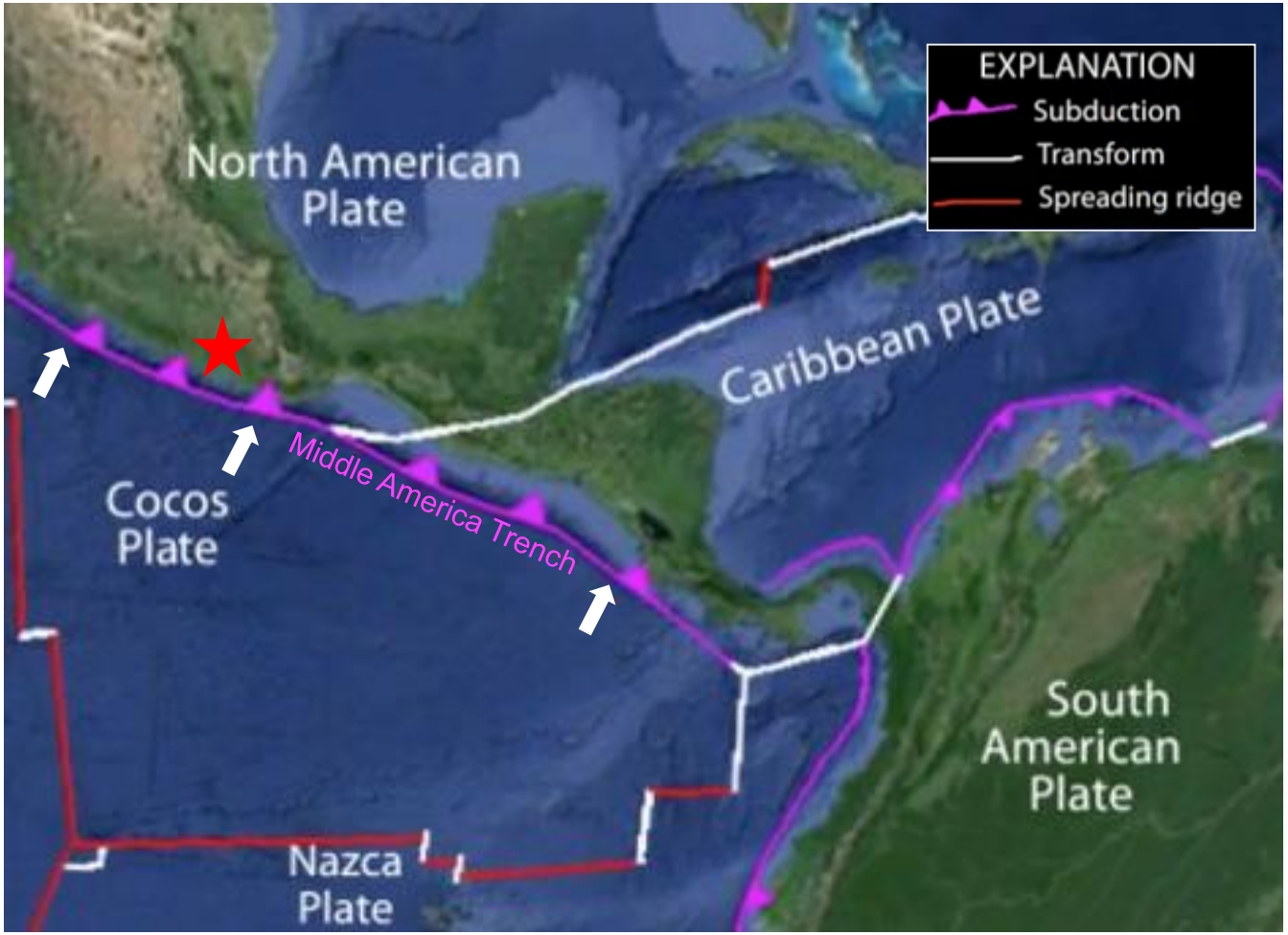
Mexico is one of the most seismologically and volcanically active regions on Earth. It is part of the circum-Pacific "Ring of Fire".

Most of Mexico rests on the North American Plate. However, the Pacific Ocean floor off southern Mexico is on the Cocos Plate. In the region this earthquake, the Cocos Plate is subducting beneath the North American Plate at a rate of about 7 cm/yr.



The location, depth, and thrust-faulting mechanism of this earthquake suggest that it occurred on or near the subduction zone boundary between the Cocos and North American Plates.

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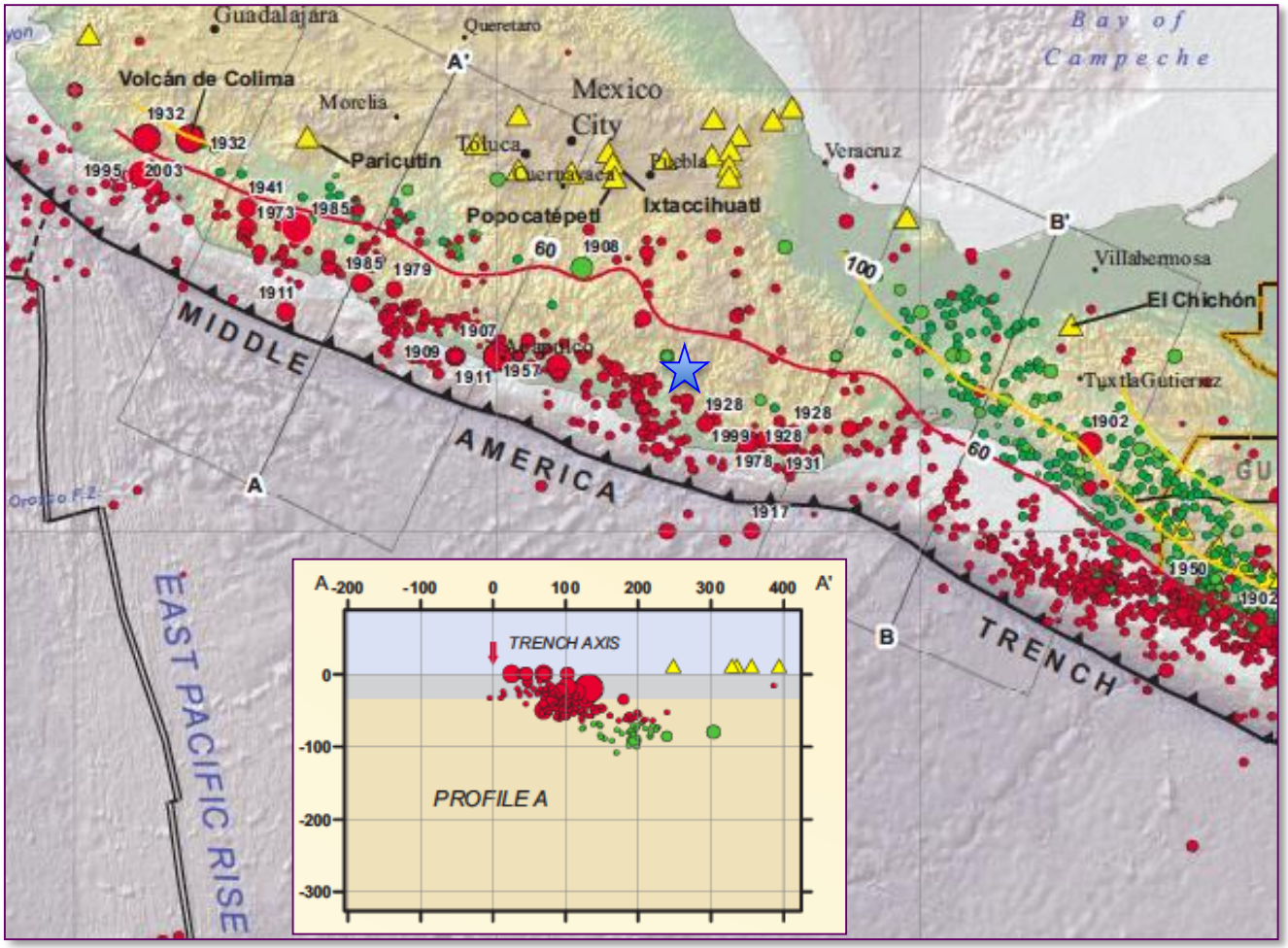
This epicenter of this earthquake is shown by the blue star on the map below. The Cocos Plate subducts towards the north-northeast beneath the North American Plate at the Middle America Trench. The depth of this earthquake fits the pattern of shallow and intermediate depth earthquakes that cluster along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



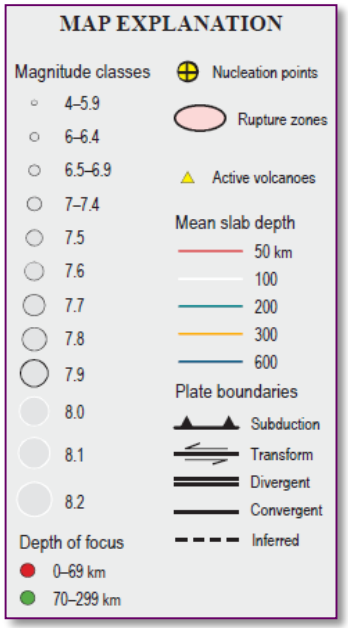


Image source:
U.S. Geological Survey Open-File Report 2010–1083-H

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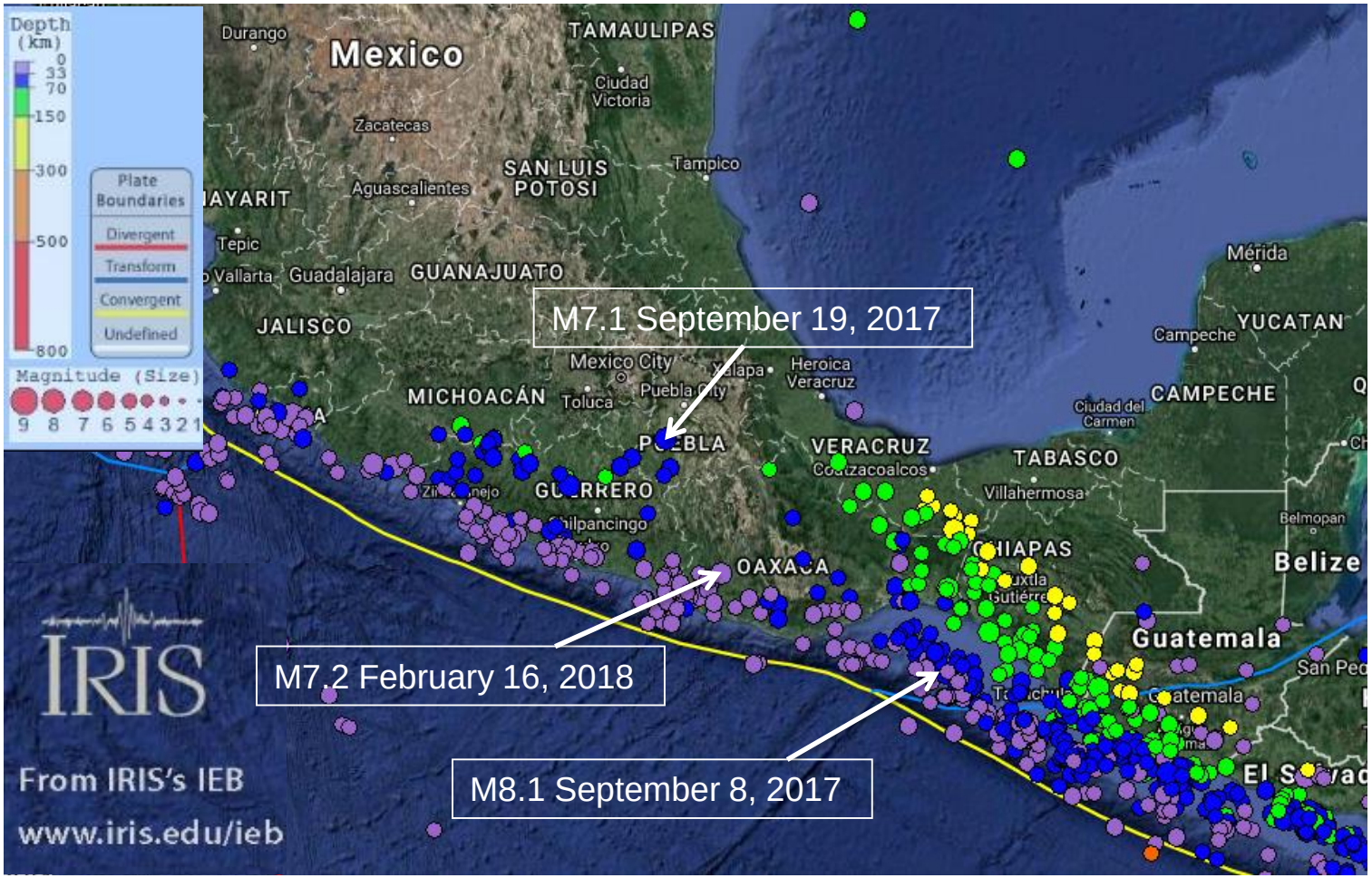
This map of historic seismicity shows all magnitude 5 or larger earthquakes in southern Mexico since January 1, 2000. In addition to this M7.2 earthquake, Mexico experienced a great M8.1 earthquake on September 8 and a major M7.1 earthquake on September 19 of 2017.



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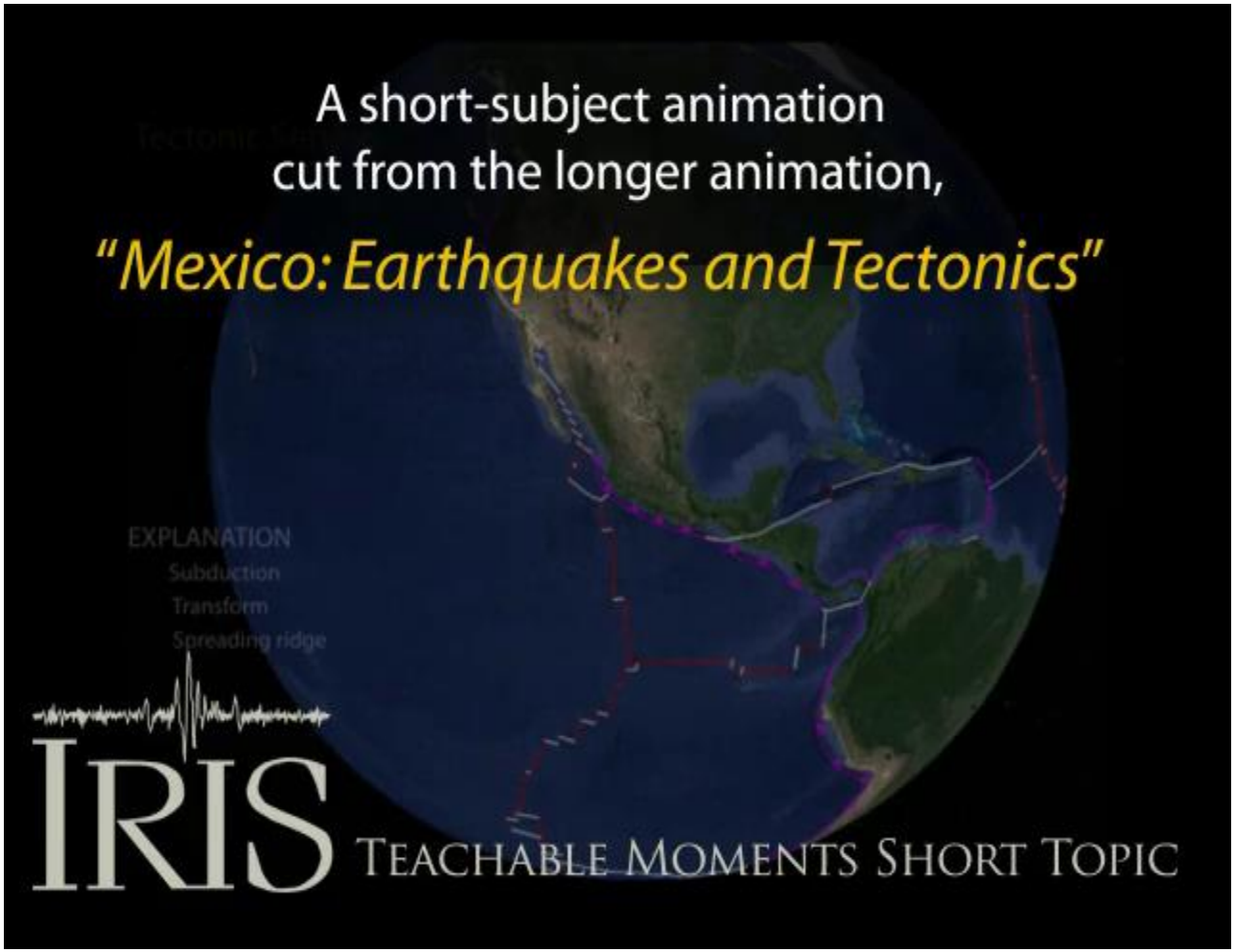
Animation of the regional tectonics of SW Mexico.



(*Extracted from: http://www.iris.edu/hq/inclass/animation/235*)

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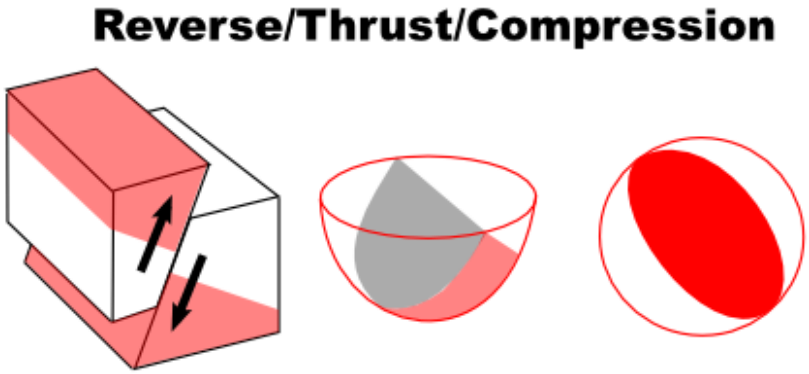
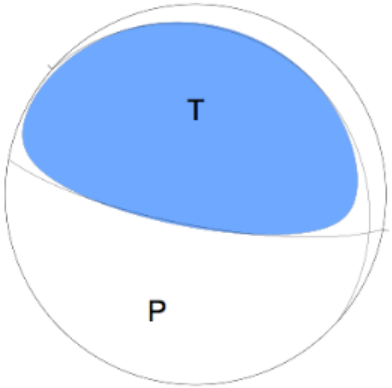
The focal mechanism is how seismologists plot the 3-D stress orientations of an earthquake. Since an earthquake occurs as slip on a fault, it generates primary (P) waves in quadrants of compression (shaded) and extension (white). The orientation of these quadrants determined from recorded seismic waves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

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





The tension axis (T) reflects the minimum compressive stress direction. The pressure axis (P) reflects the maximum compressive stress direction.

USGS W-Phase Moment Tensor Solution

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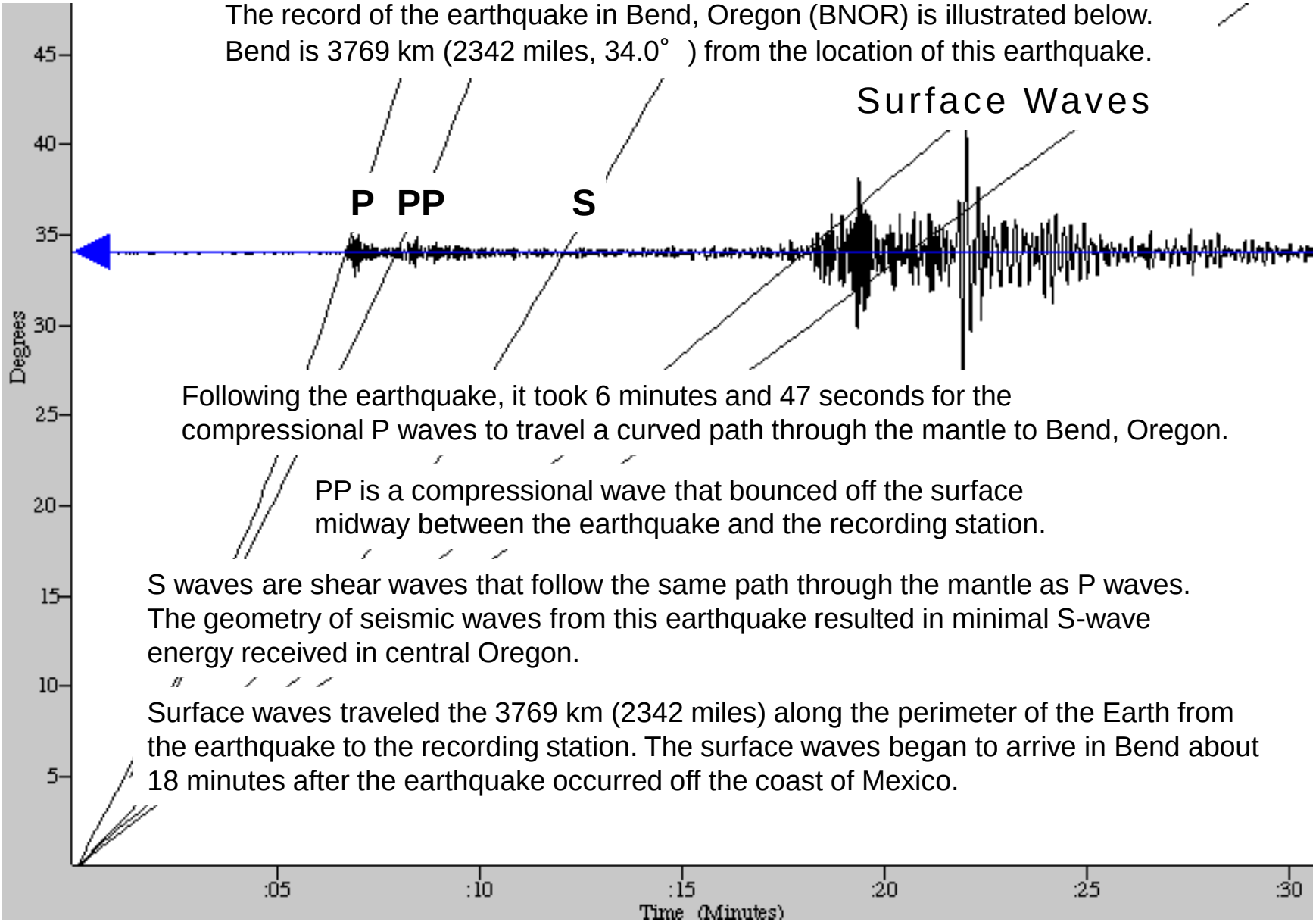
The record of the earthquake in Bend, Oregon (BNOR) is illustrated below. Bend is 3769 km (2342 miles, 34.0˚) from the location of this earthquake.



Following the earthquake, it took 6 minutes and 47 seconds for the compressional P waves to travel a curved path through the mantle to Bend, Oregon.

PP is a compressional wave that bounced off the surface midway between the earthquake and the recording station.

S waves are shear waves that follow the same path through the mantle as P waves. The geometry of seismic waves from this earthquake resulted in minimal S-wave energy received in central Oregon.

Surface waves traveled the 3769 km (2342 miles) along the perimeter of the Earth from the earthquake to the recording station. The surface waves began to arrive in Bend about 18 minutes after the earthquake occurred off the coast of Mexico.

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