

A magnitude 7.3 earthquake occurred 38.4 km (23.9 mi) ENE of Carúpano, Venezuela at a depth of 123.2 km (76.6 miles). The earthquake, which occurred at 5:31pm local time was felt across the Caribbean. Minor damage reports are widespread. No injuries or deaths were immediately reported.



A powerful earthquake shook eastern Venezuela. Office workers evacuated buildings and people fled homes.

In downtown Caracas, concrete from the top floors of the unfinished Tower of David skyscraper fell to the sidewalk, forcing firefighters to close off traffic.

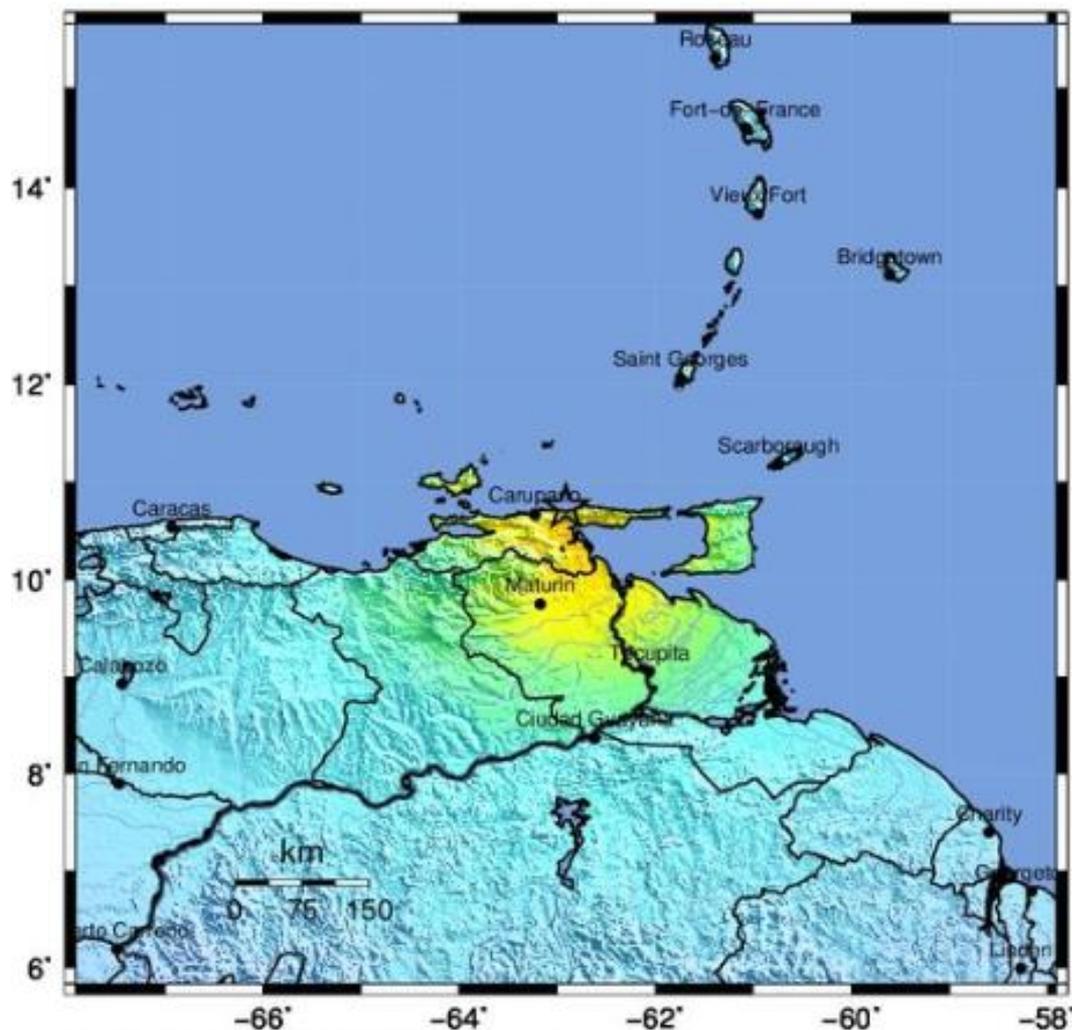
The earthquake was felt in Trinidad, Guyana, Barbados, Grenada, and as far away as Colombia's capital.

(AP Photo/Ariana Cubillos)

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

Those nearest the earthquake experienced 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

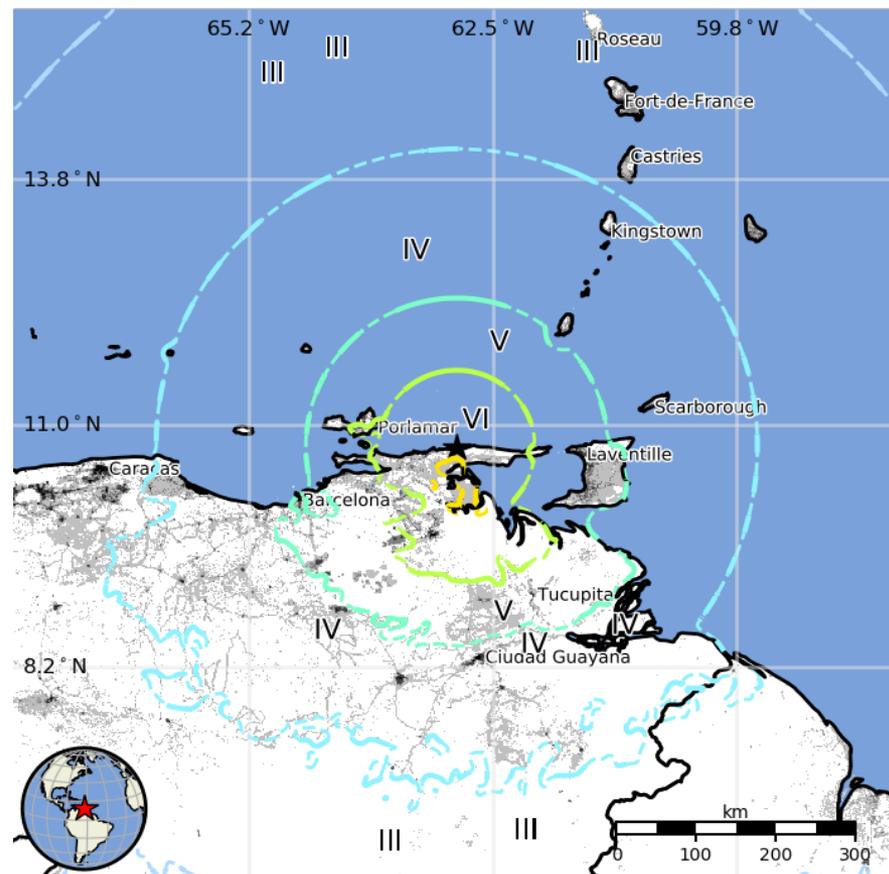


USGS Estimated shaking Intensity from M 7.3 Earthquake

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

The USGS estimates that over 52,000 people felt very strong shaking from this earthquake.

MMI	Shaking	Pop.
I	Not Felt	--*
II-III	Weak	9,239 k*
IV	Light	3,928 k
V	Moderate	2,587 k
VI	Strong	2,089 k
VII	Very Strong	52 k
VIII	Severe	0 k
IX	Violent	0 k
X	Extreme	0 k

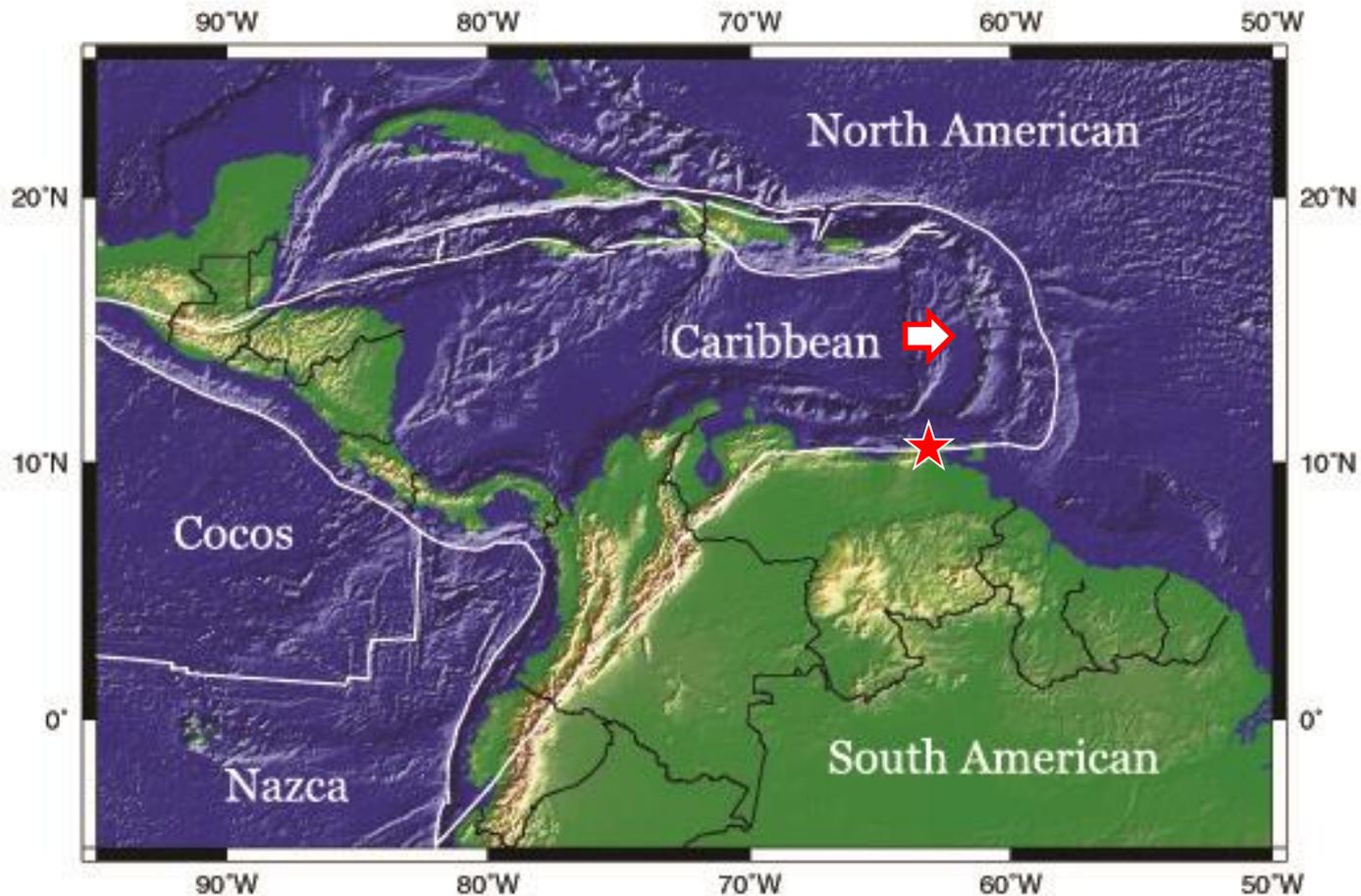


The color coded contour lines outline regions of MMI intensity. The total population exposure to a given MMI value is obtained by summing the population between the contour lines. The estimated population exposure to each MMI Intensity is shown in the table.

## Magnitude 7.3 VENEZUELA

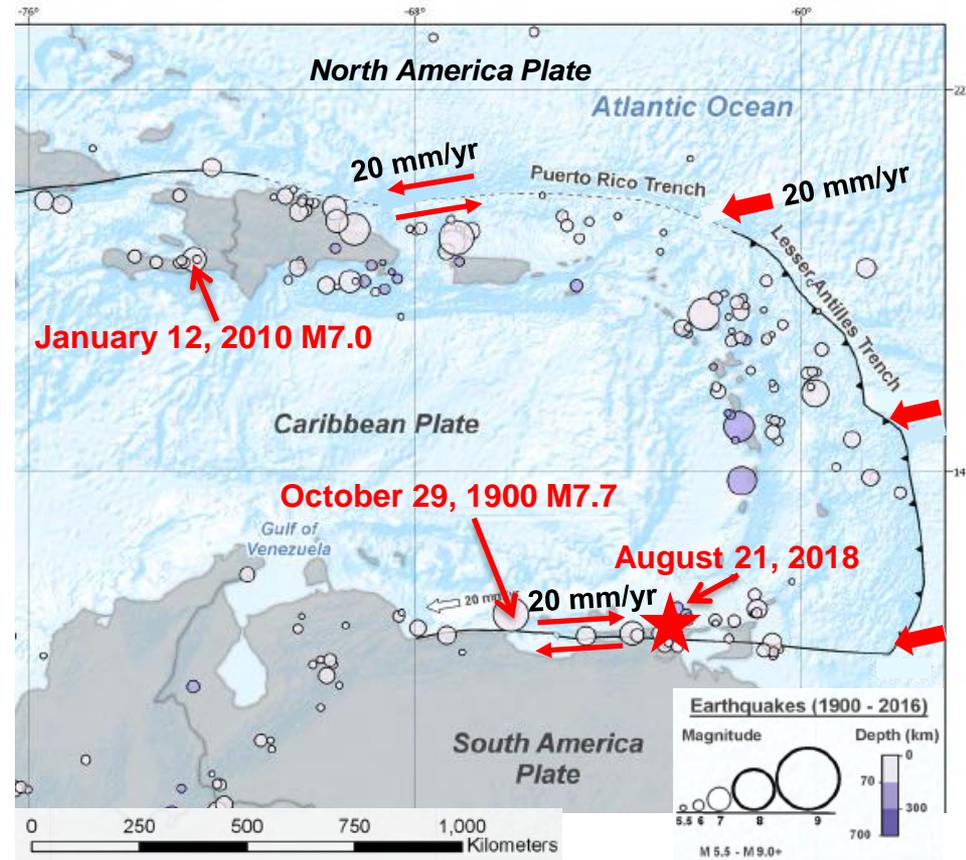
Tuesday, August 21, 2018 at 21:31:42 UTC

The tectonics of this area are dominated by the eastward motion of the Caribbean plate with respect to the South American plate, at a rate of approximately 20mm/yr. However, there is a small component of compression along this boundary.



The Caribbean Plate has a left-lateral transform boundary with the North American Plate along its northern edge. (The January 12, 2010 Haiti earthquake occurred on a strike-slip fault associated with that transform boundary.) This boundary connects to the east with the northern part of the Lesser Antilles Trench where subduction begins beneath the Caribbean Plate to the west.

At the southern end of the Lesser Antilles Trench, plate motions transition to a right-lateral transform fault system along northern Venezuela. Today's earthquake (red star) occurred at the southernmost end of the Caribbean subduction zone.



*Courtesy of US Geological Survey*

The rates of motion across all three plate boundaries are about 20 mm/yr.

The largest earthquake in this region over the last 118 years was the M7.7 Caracas earthquake of October 29, 1900.

The most recent 1000 earthquakes are shown on the map with earthquakes color coded by depth.

The South America Plate begins its subduction beneath the Caribbean Plate about 550 km to the east of today's earthquake and reaches depths close to 150 km in the vicinity of this event.

This earthquake occurred within the subducting South American plate and fits this general depth pattern. See a 3-D view on the next slide.

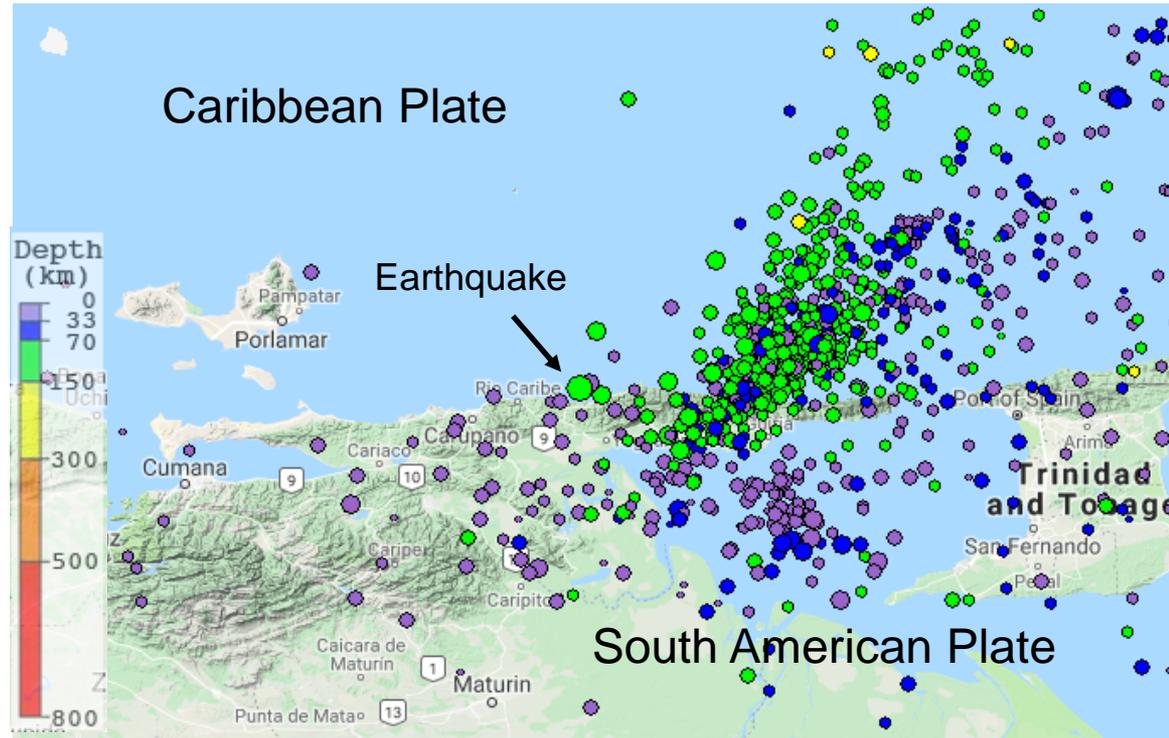
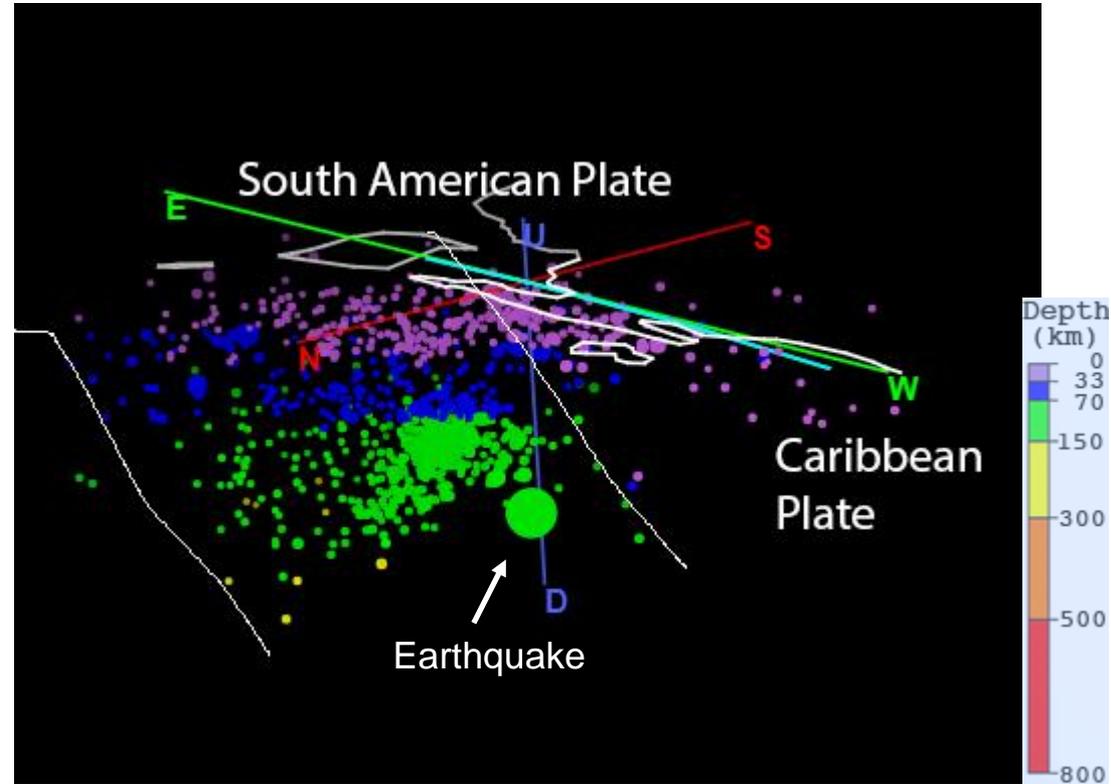


Image from IRIS Earthquake Browser <http://www.iris.edu/ieb>

This 3D view is from the NW.

This earthquake occurred near the southern end of the Caribbean subduction zone. At shallow depth, the plate boundary in this region transitions to transform faulting along the San Sebastian – El Pilar fault system along Northern Venezuela.

The depth and focal mechanism solution of today's earthquake is consistent with faulting at depth, within the subducted lithosphere of the South America Plate, rather than along the shallow right-lateral transform plate boundary.



This modified screen capture from the 3-D feature of IRIS' Earthquake Browser shows a cross sectional view from the earthquakes on the previous slide.

This earthquake occurred as the result of oblique reverse faulting at intermediate depth.

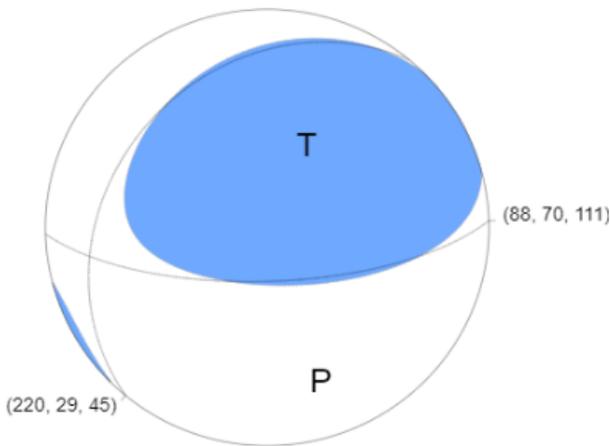
Intermediate-depth earthquakes represent deformation within subducted lithosphere rather than at the shallow plate interfaces between subducting and overriding tectonic plates.



**Right-lateral, oblique-slip  
Thrust Fault**



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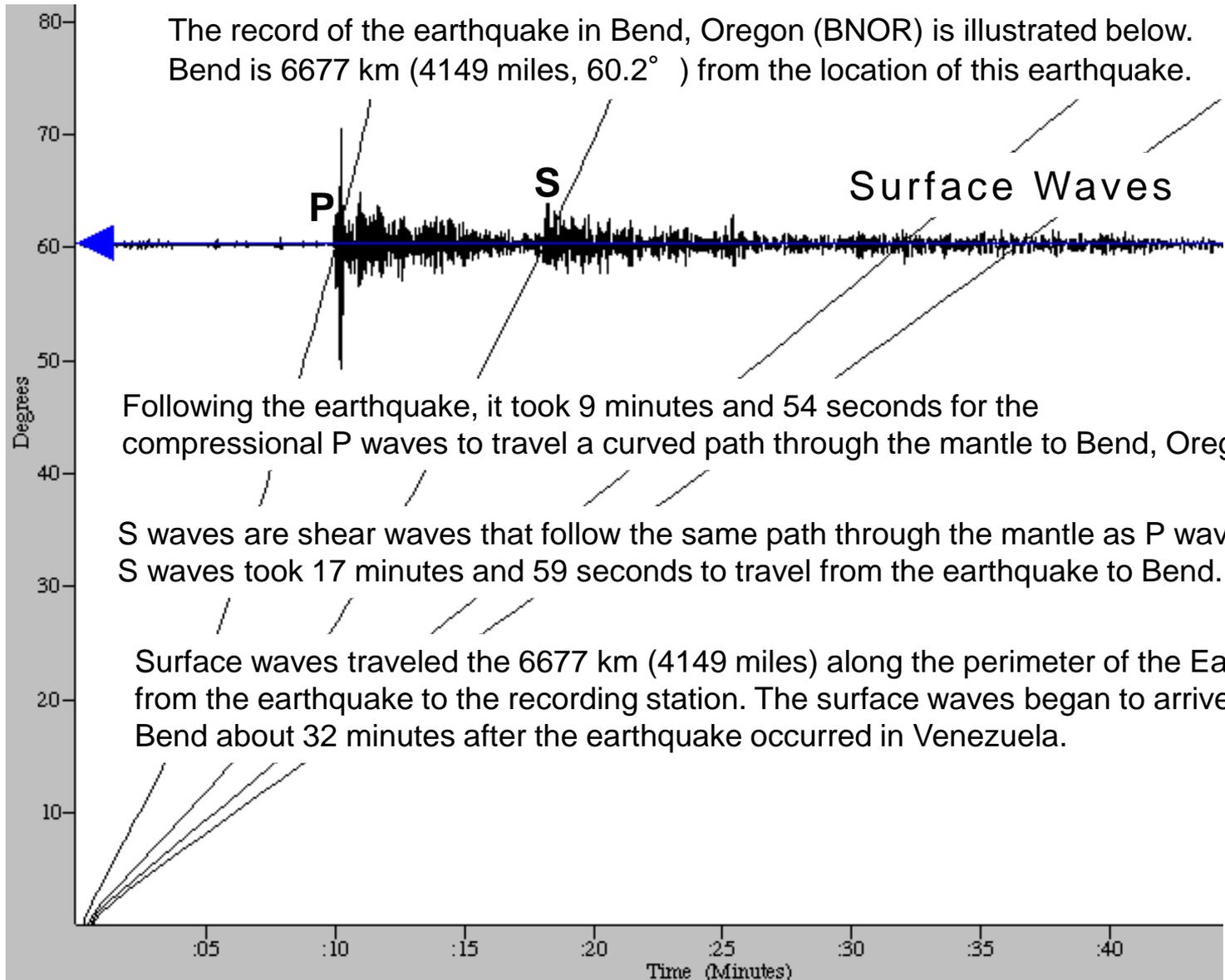
USGS Centroid Moment  
Tensor Solution

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 letters represent the axis of maximum compressional strain (P) and the axis of maximum extensional strain (T) resulting from the earthquake.

# Magnitude 7.3 VENEZUELA

Tuesday, August 21, 2018 at 21:31:42 UTC

The record of the earthquake in Bend, Oregon (BNOR) is illustrated below. Bend is 6677 km (4149 miles,  $60.2^\circ$ ) from the location of this earthquake.



Following the earthquake, it took 9 minutes and 54 seconds for the compressional P waves to travel a curved path through the mantle to Bend, Oregon.

S waves are shear waves that follow the same path through the mantle as P waves. S waves took 17 minutes and 59 seconds to travel from the earthquake to Bend.

Surface waves traveled the 6677 km (4149 miles) along the perimeter of the Earth from the earthquake to the recording station. The surface waves began to arrive in Bend about 32 minutes after the earthquake occurred in Venezuela.

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