Magnitude 7.0 PERU

Wednesday, September 25, 2013 at 16:42:42 UTC

An earthquake with a magnitude of 7.0 centered off Peru's sparsely populated southwestern coast shook much of the nation Wednesday. Only minor damage and light injuries were reported.

The shaking broke windows and opened fissures in the walls of some adobe dwellings in the nearest sizeable town, Acari, a mining town of about 4,000 residents. Sand shaken loose by the quake partially blocked a 2 km section of the Pan-American Highway. (AP)

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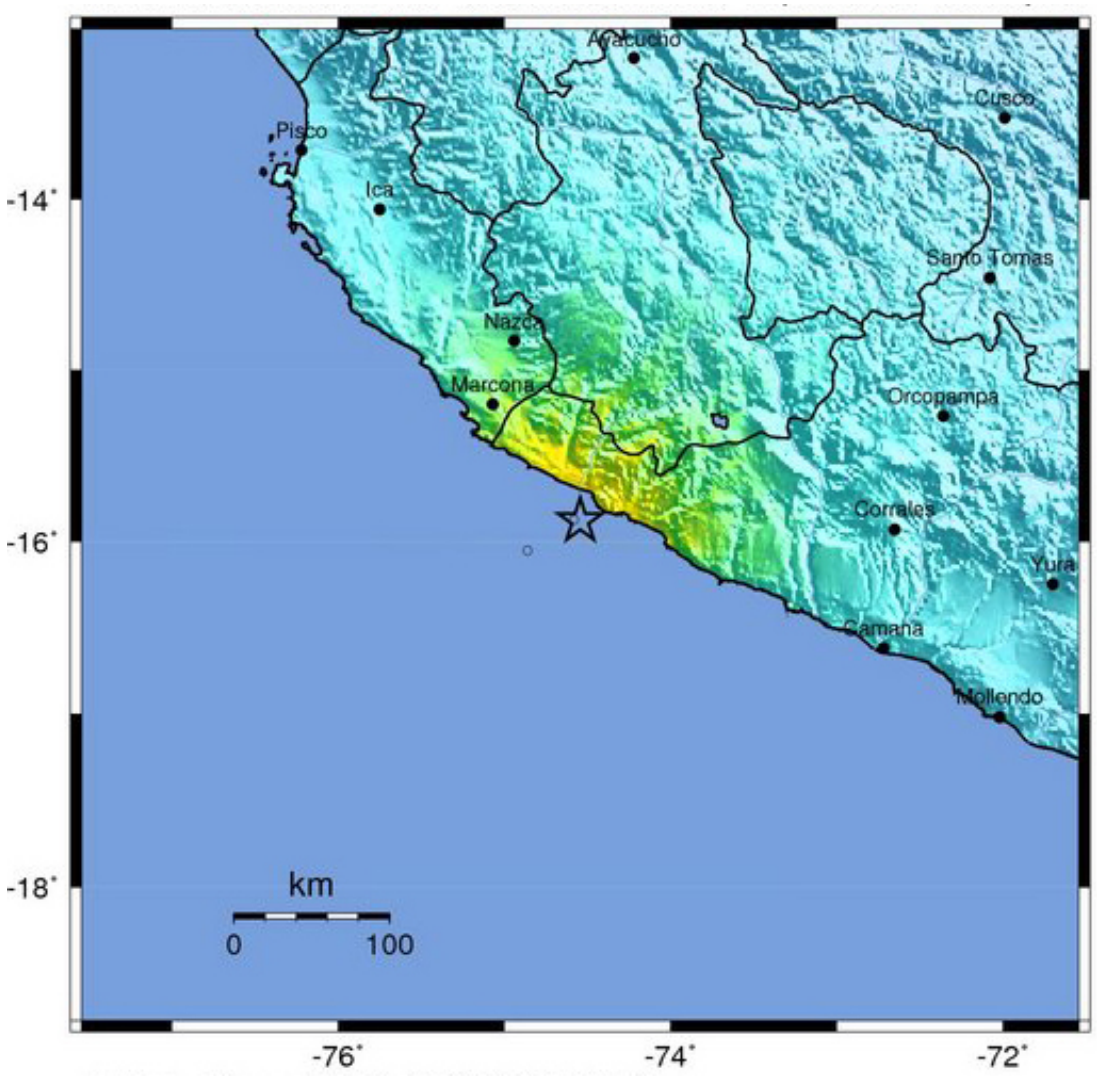
Shaking Intensity

The Modified Mercalli Intensity (MMI) scale depicts shaking severity. The area nearest the earthquake experienced 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 7.0 Earthquake

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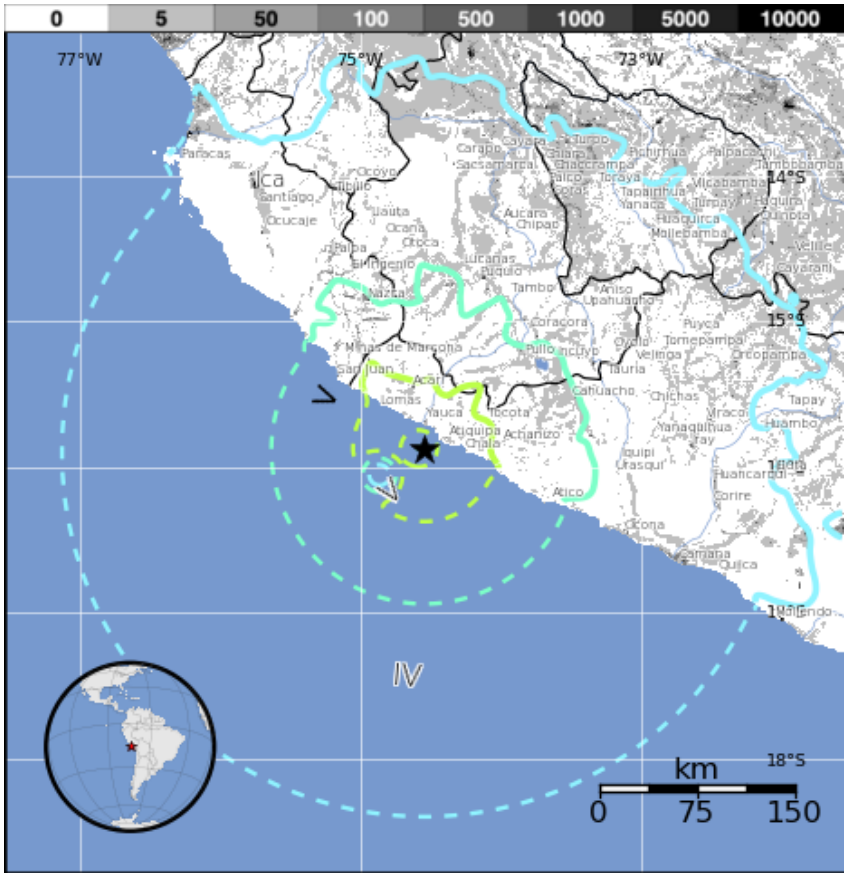
The USGS PAGER map shows the population exposed to different Modified Mercalli Intensity (MMI) levels.

The USGS is estimating that 14,000 people were exposed to strong shaking from this earthquake.

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 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	--*	1,677k*	1,472k	96k	14k	0k	0k	0k	0k
Perceived Shaking	Not Felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme

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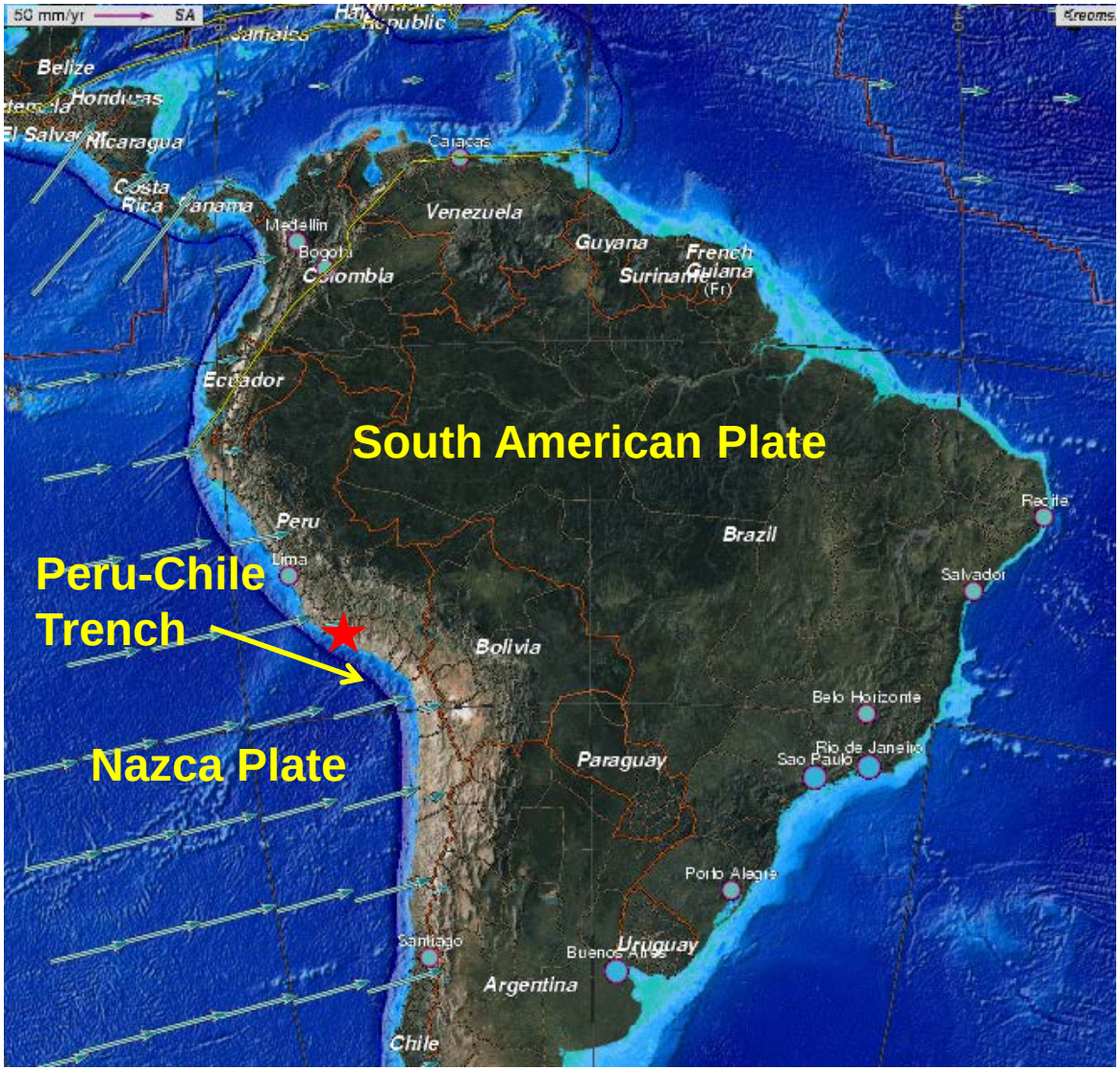
The Nazca Plate subducts beneath the South America plate at the Peru-Chile Trench offshore of western South America.

At the latitude of the earthquake, the Nazca Plate moves to the east-northeast with respect to the South America Plate with a velocity of about 70 mm/y.



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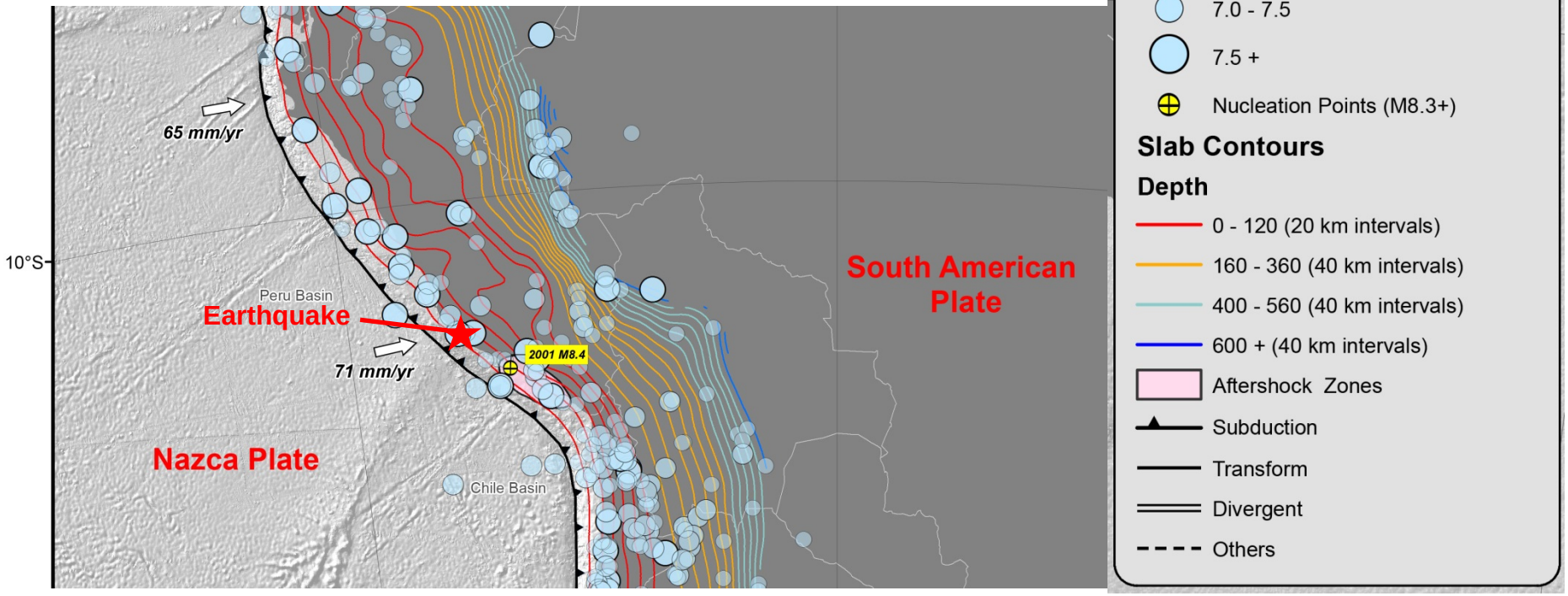
This region experiences a large number of earthquakes. Within 250 km of the epicenter, there have been 17 earthquakes of M6 and larger since 1973. The largest, a M8.4 earthquake of June 23, 2001, occurred along the plate boundary to the south. It killed at least 74 people and destroyed over 17,000 homes.

Earthquakes are shallow at the Peru-Chile Trench and increase to > 500 km depth towards the east as the Nazca Plate subducts deeper beneath the South American Plate.



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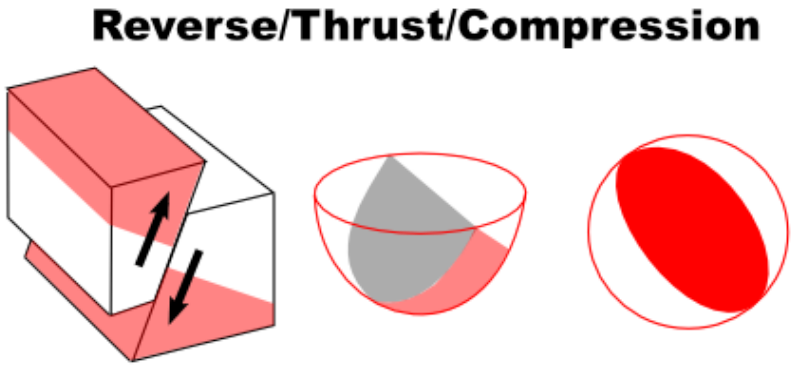
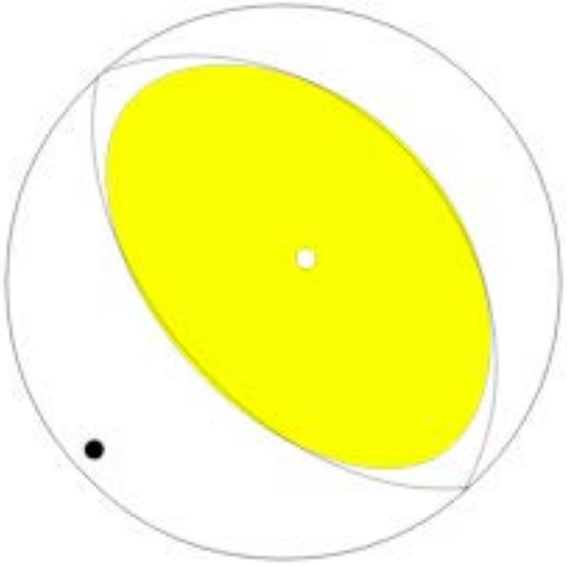
This earthquake occurred at a depth of 40 km as thrust-faulting on or near the thrust-interface between the South America Plate and the subducting Nazca Plate.





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 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. An introduction to focal mechanisms can be found in the animation at following URL: http://www.iris.edu/hq/programs/education_and_outreach/animations/25

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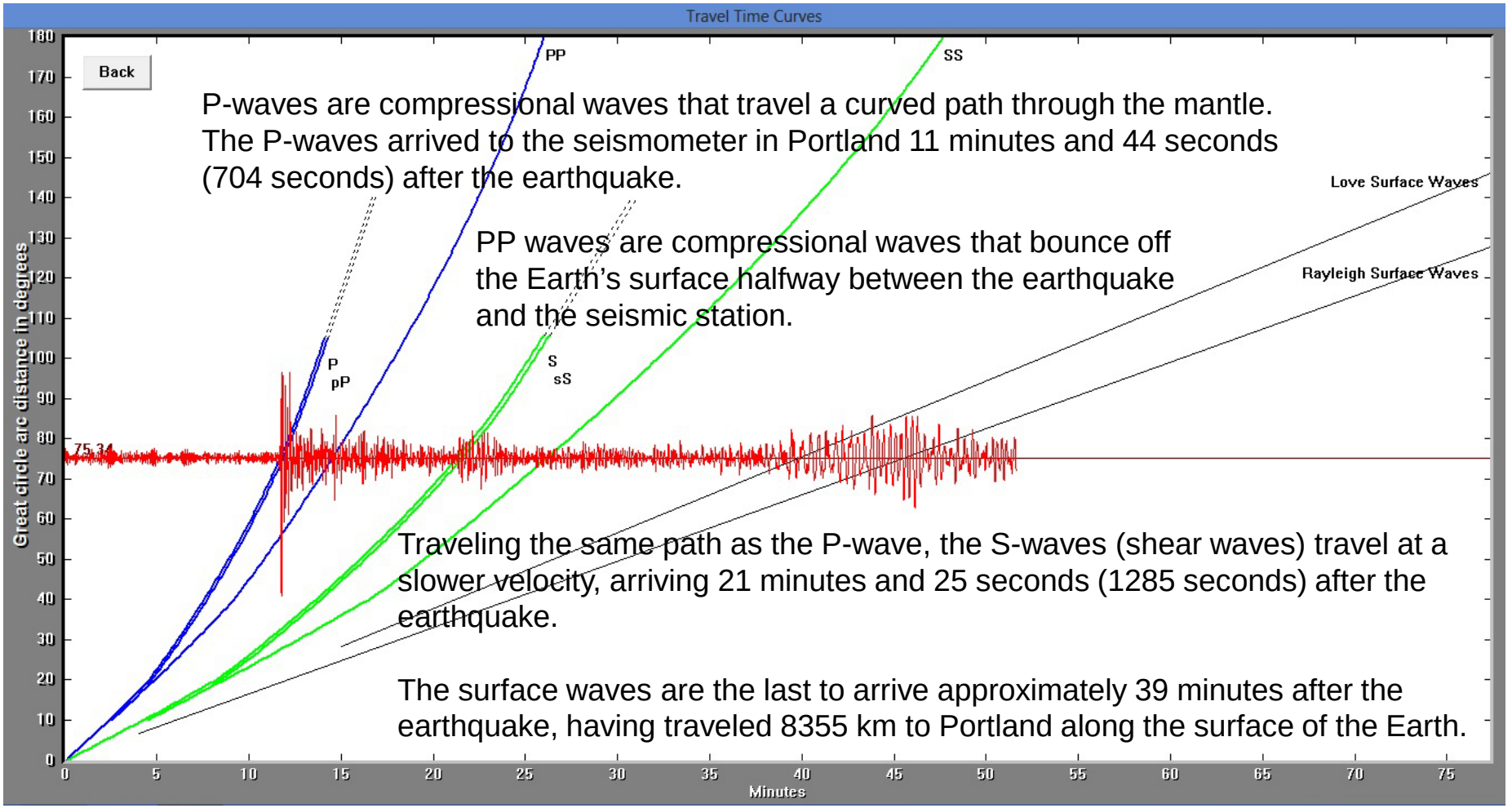
The record of the earthquake on the University of Portland seismometer (UPOR) is illustrated below. Portland is about 8355 km (~5192 miles, 75.27 degrees) from the location of this earthquake.



P-waves are compressional waves that travel a curved path through the mantle. The P-waves arrived to the seismometer in Portland 11 minutes and 44 seconds (704 seconds) after the earthquake.

PP waves are compressional waves that bounce off the Earth's surface halfway between the earthquake and the seismic station.

Traveling the same path as the P-wave, the S-waves (shear waves) travel at a slower velocity, arriving 21 minutes and 25 seconds (1285 seconds) after the earthquake.

The surface waves are the last to arrive approximately 39 minutes after the earthquake, having traveled 8355 km to Portland along the surface of the Earth.

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Teachable Moments are a service of

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