Magnitude 8.0 PERU
Sunday, May 26, 2019 at 07:41:14 UTC

A magnitude 8.0 earthquake occurred early Sunday in a remote part of the Amazon jungle in Peru 92 km (57 miles) east of the small town of Yurimaguas. Early reports indicate some buildings have collapsed, power was knocked out, and there has been one death reported.

Helping limit damage was the earthquake's depth, at 109.9 kilometers (68 miles) below the surface.

An aerial view shows a landslide caused by a quake in Yurimaguas, Peru, Sunday, May 26, 2019. A powerful earthquake struck the Amazon jungle in north-central Peru early Sunday.

Guadalupe Pardo/Pool Photo via AP

IRIS Teachable Moments

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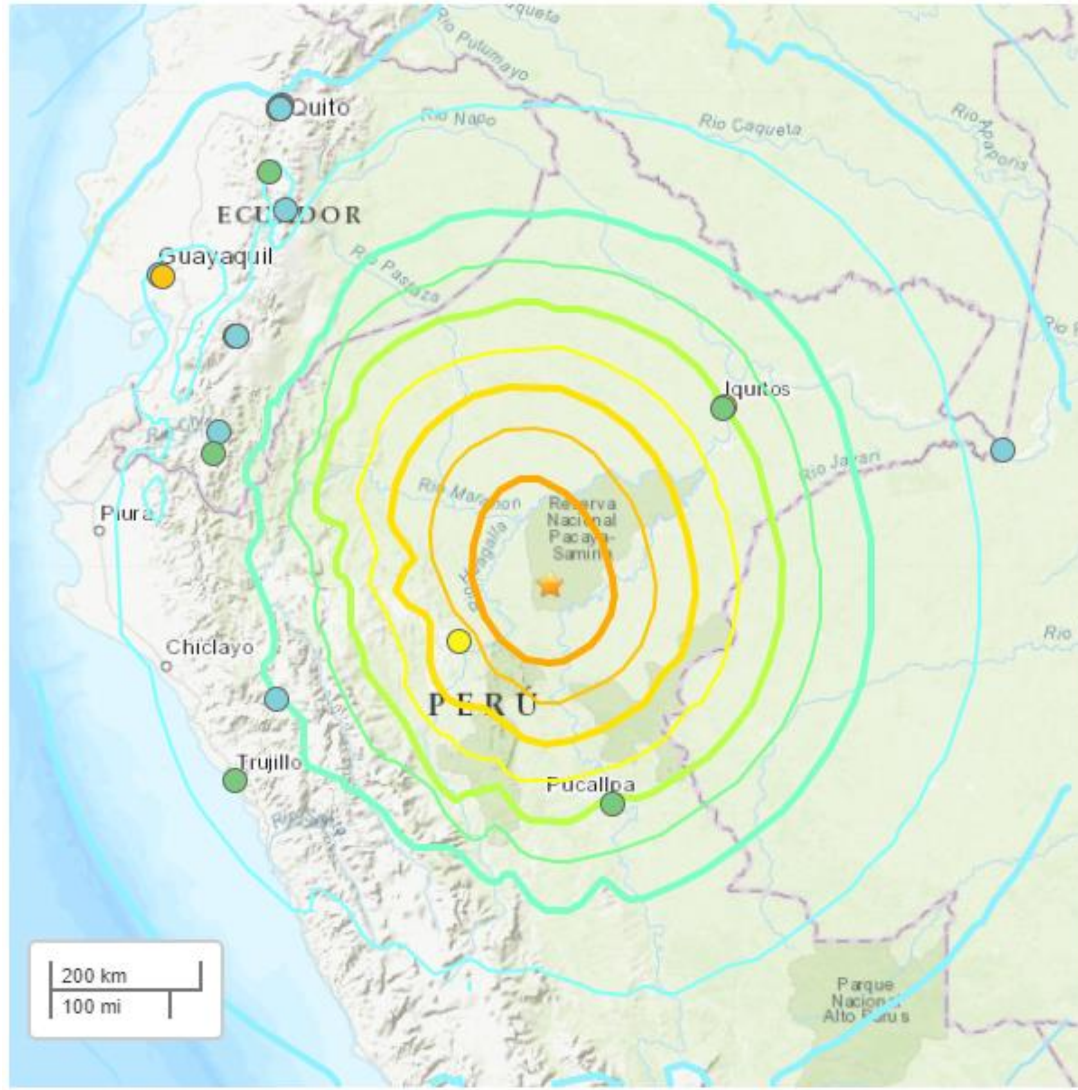
The Modified-Mercalli Intensity (MMI) scale is a twelve-stage scale, from I to XII, that indicates the severity of ground shaking.

The area near the epicenter experienced severe shaking from this earthquake.

MMI	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 8.0 Earthquake

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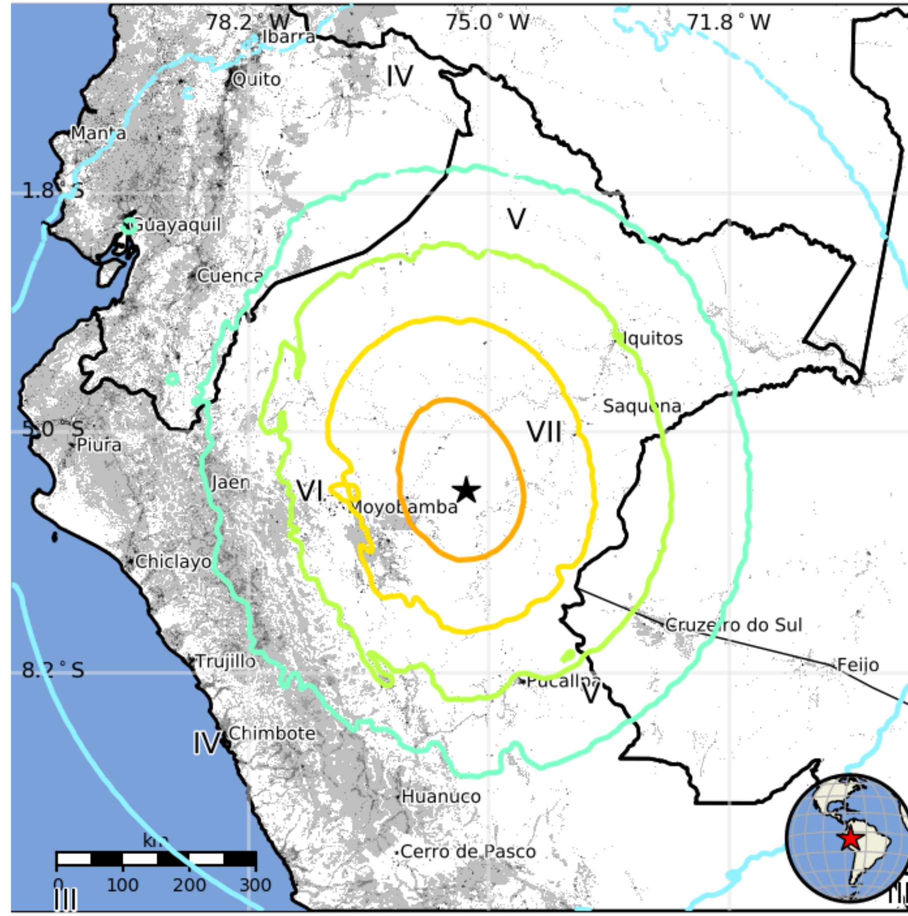
The USGS PAGER map shows the population exposed to different Modified Mercalli Intensity (MMI) levels.

159,000 people were exposed to severe shaking from this earthquake.

MMI	Shaking	Population
I	Not Felt	0 k*
II-III	Weak	2,241 k*
IV	Light	23,068 k
V	Moderate	4,640 k
VI	Strong	727 k
VII	Very Strong	591 k
VIII	Severe	159 k
IX	Violent	0 k
X	Extreme	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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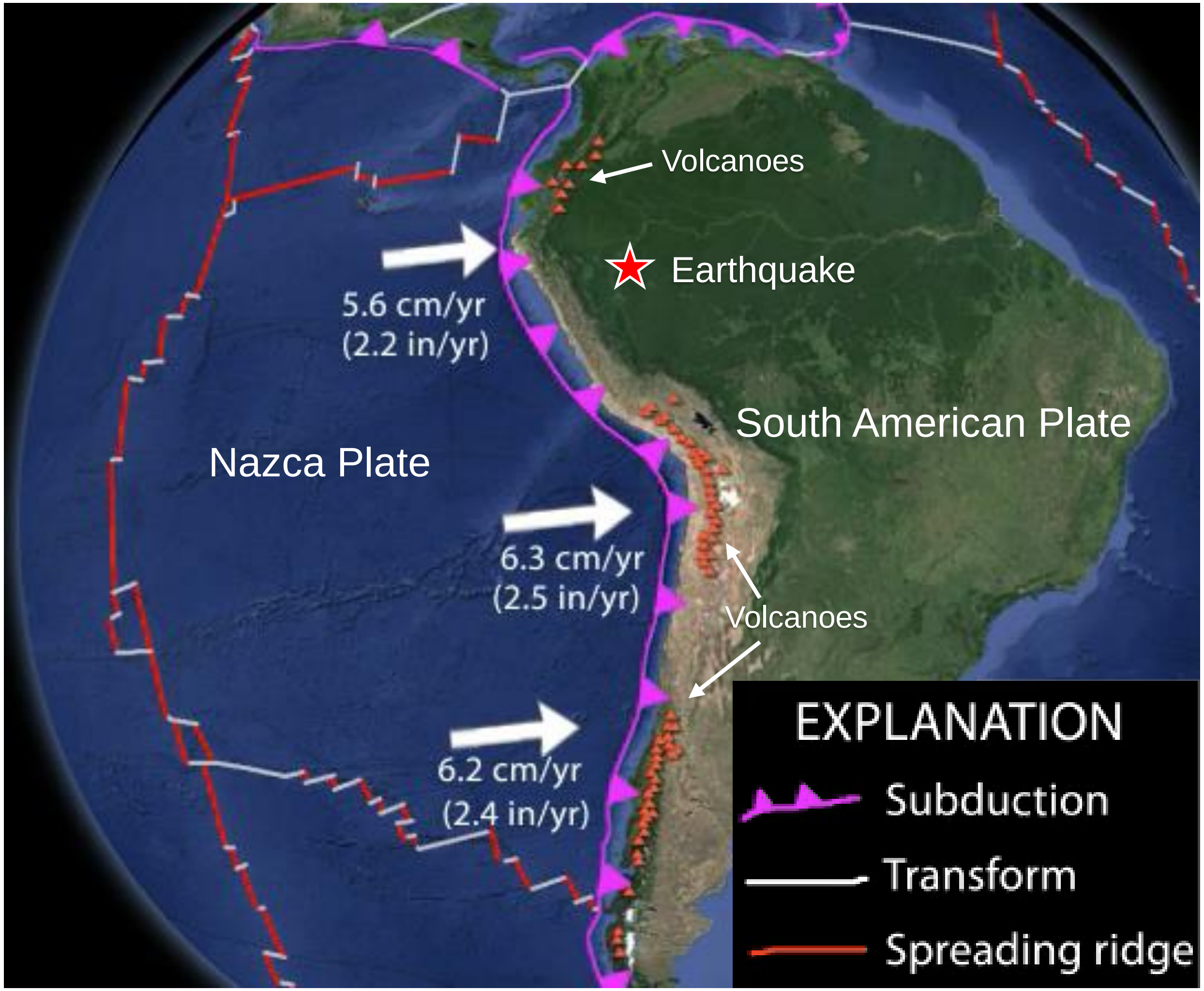
This illustration shows the rate and direction of motion of the Nazca Plate with respect to the South American Plate. Locations of active Andean volcanoes are shown by the orange triangles.

The May 26 earthquake is shown by the red star. At the location of this earthquake, the Nazca Plate subducts beneath the South America Plate at a velocity of about 56 mm/yr.



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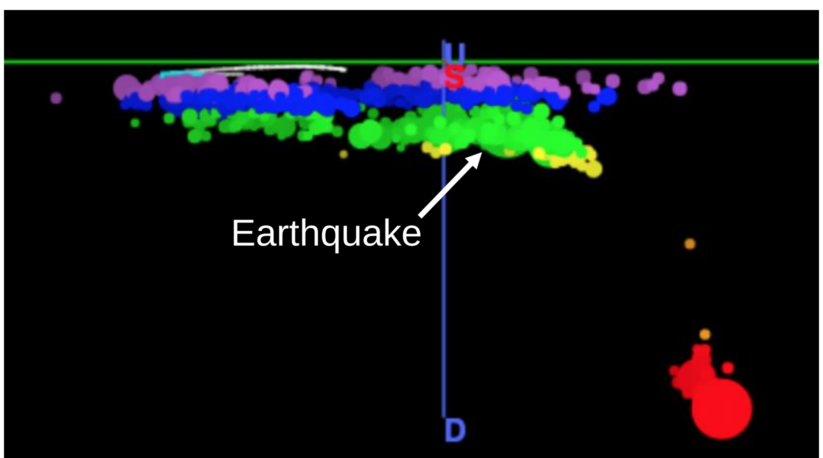
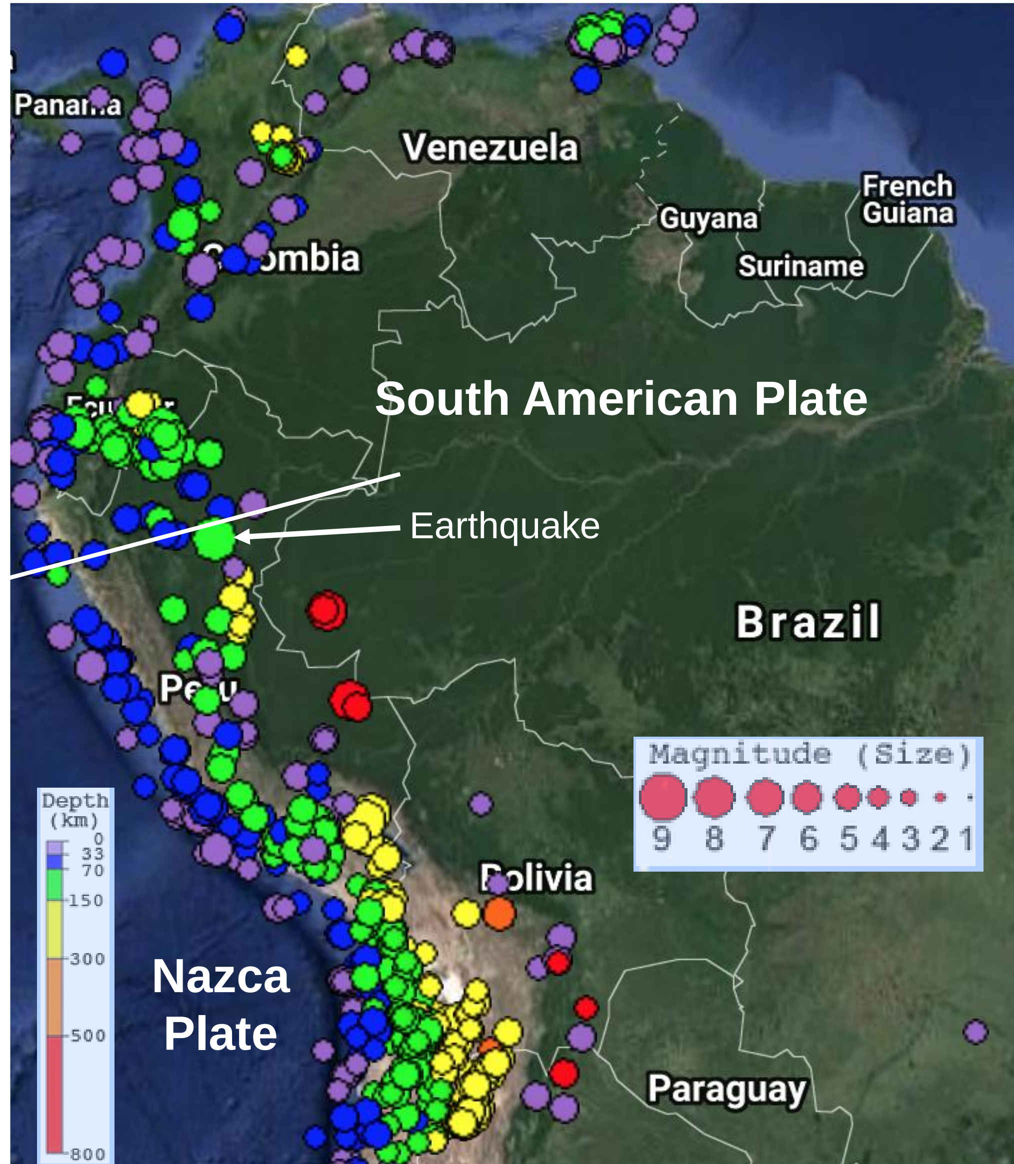
Epicenters are shown on a map of historic seismicity on the right. Earthquakes between the Nazca and South American Plates and within the Nazca Plate increase in depth from west to east. A 3D view along the cross section indicated by the thin white line is shown below. The depth and extensional mechanism shown in Slide 7 indicate that this earthquake occurred within the top of the Nazca Plate as it bends to dive more steeply beneath the South American Plate.





Map generated using IRIS Earthquake Browser

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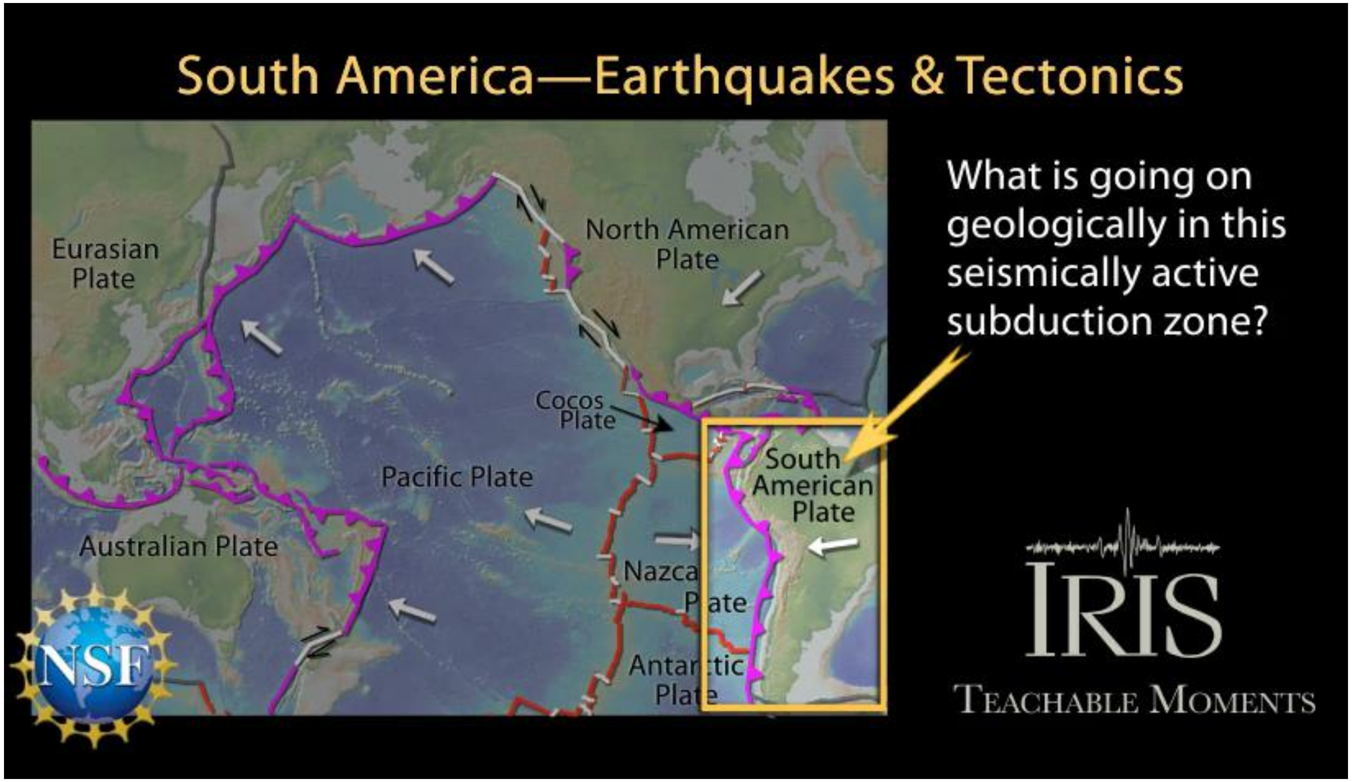
At the location of this earthquake, the oceanic Nazca Plate moves east relative to the South American Plate, subducting at the Peru-Chile Trench west of the Ecuadoran coast and sinking into the mantle beneath South America. This earthquake occurred at an intermediate-depth, where earthquakes occur within the subducting slab rather than at the shallow plate interface between subducting and overriding tectonic plates.



Animation exploring plate tectonics and earthquakes of the Nazca – South America plate boundary region.

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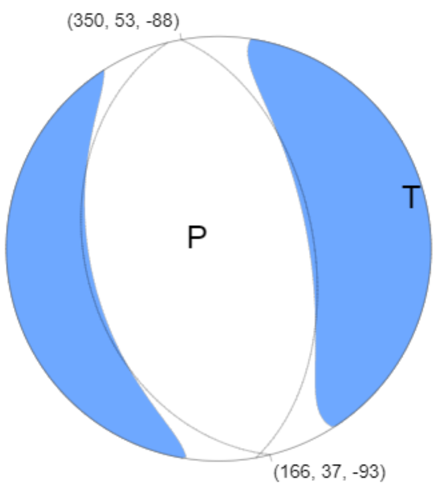
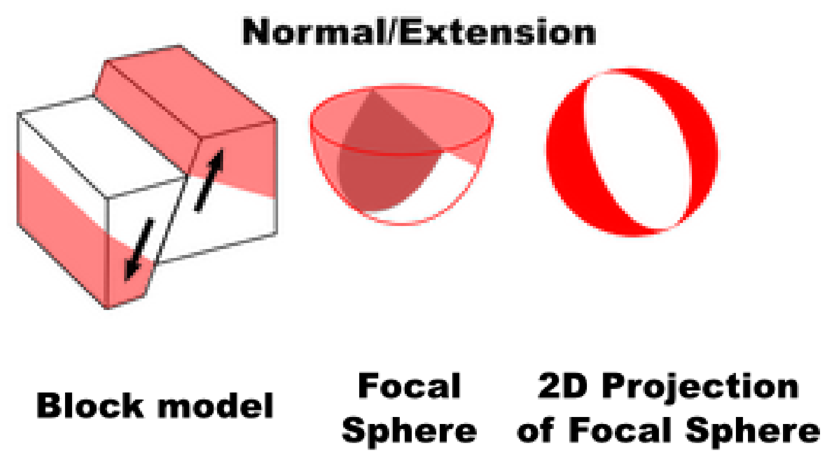
The focal mechanism is how seismologists plot the 3-D stress orientations of an earthquake. Because an earthquake occurs as slip on a fault, it generates primary (P) waves in quadrants where the first pulse is compressional (shaded) and quadrants where the first pulse is extensional (white). The orientation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



USGS W-phase Moment Tensor Solution



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

In this case, the earthquake occurred at a depth of ~110 km, likely within the Nazca Plate which is subducting beneath the South America Plate.

This is a relatively unusual event, as it is not as common for a great (M>8) earthquake to have an extensional mechanism.

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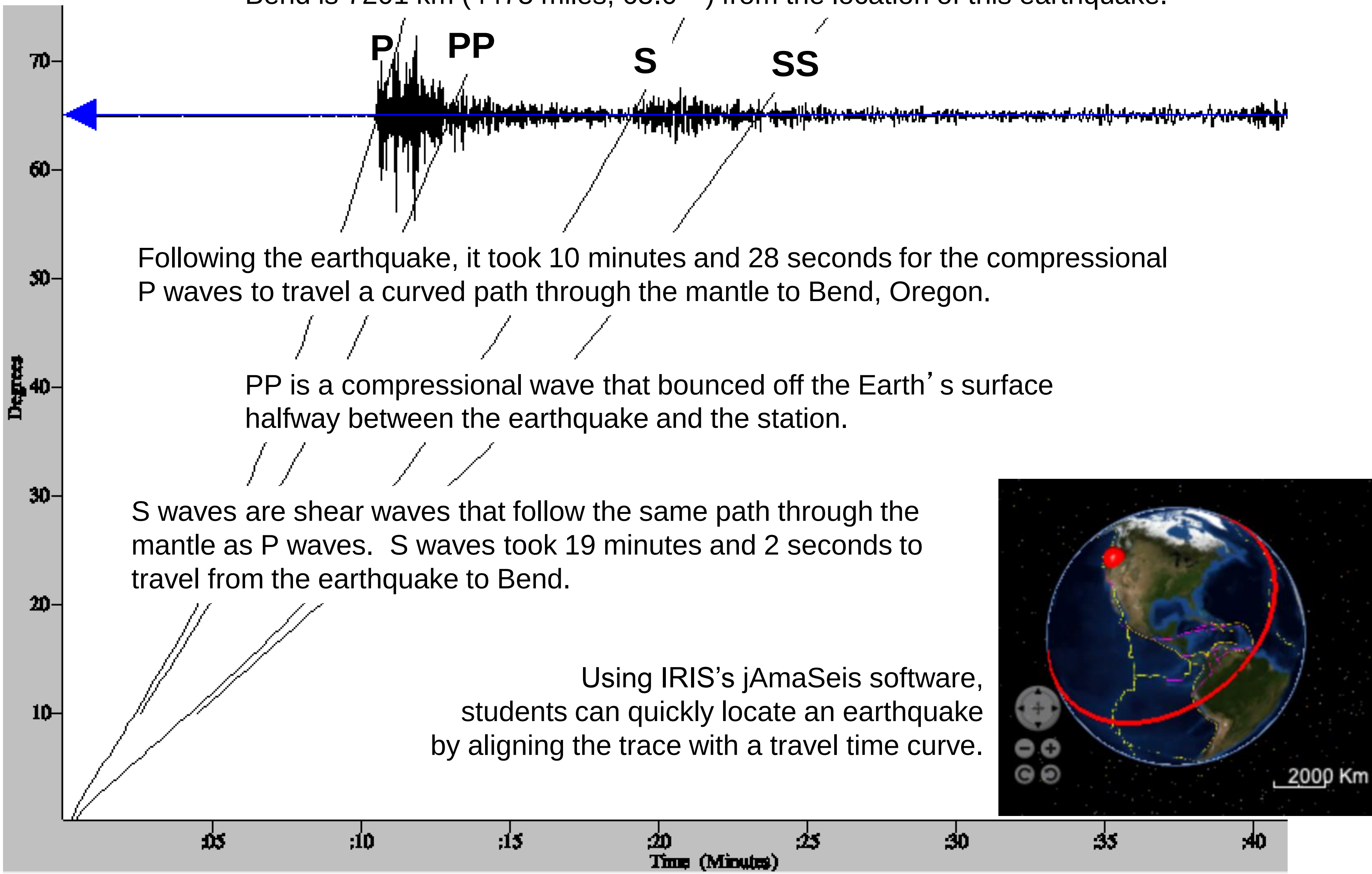
The record of the earthquake in Bend, Oregon (BNOR) is illustrated below. Bend is 7201 km (4475 miles, 65.0°) from the location of this earthquake.



Following the earthquake, it took 10 minutes and 28 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 Earth's surface halfway between the earthquake and the station.

S waves are shear waves that follow the same path through the mantle as P waves. S waves took 19 minutes and 2 seconds to travel from the earthquake to Bend.

Using IRIS's jAmaSeis software, students can quickly locate an earthquake by aligning the trace with a travel time curve.

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