Magnitude 7.0 PHILIPPINES
Wednesday, July 27, 2022 at 00:43:24 UTC

Latitude 17.598° N
Longitude 120.809° E
Depth 10 km

A magnitude 7.0 earthquake shook parts of the northern Philippines leaving at least two people dead and dozens injured. The earthquake set off small landslides and damaged buildings and churches.

A damaged building lies on its side after a strong quake hit Bangued, Abra province, northern Philippines. A strong earthquake shook the northern Philippines on Wednesday, damaging buildings and prompting many people in the capital to run outdoors. (AP Photo)

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The Modified-Mercalli Intensity (MMI) scale is a ten-stage scale, from I to X, that indicates the severity of ground shaking. Intensity is dependent on the magnitude, depth, bedrock, and location.

Severe shaking was felt in the area closest to the 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

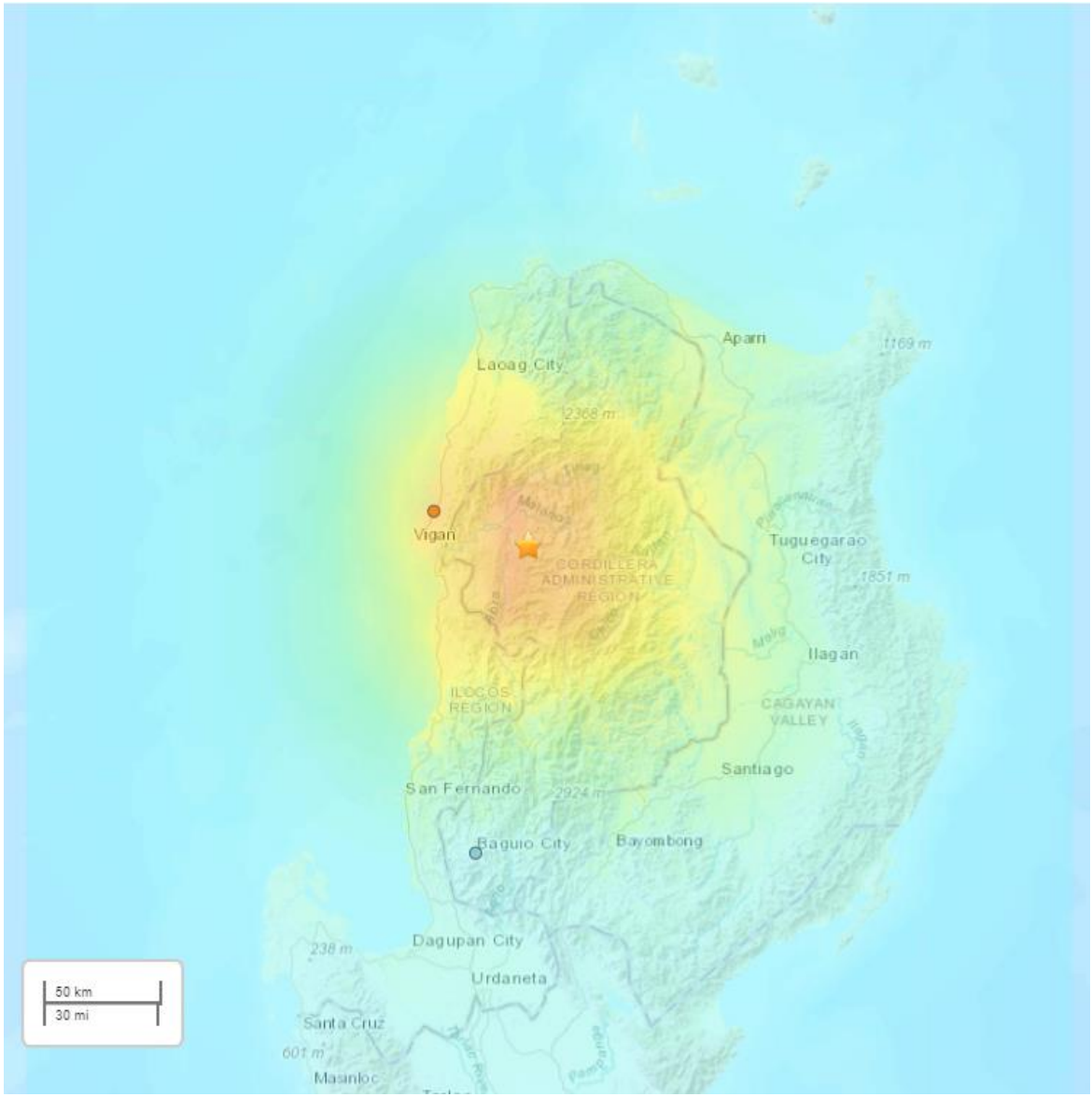

Image courtesy of the USGS

USGS estimated shaking intensity from M 7.0 Earthquake

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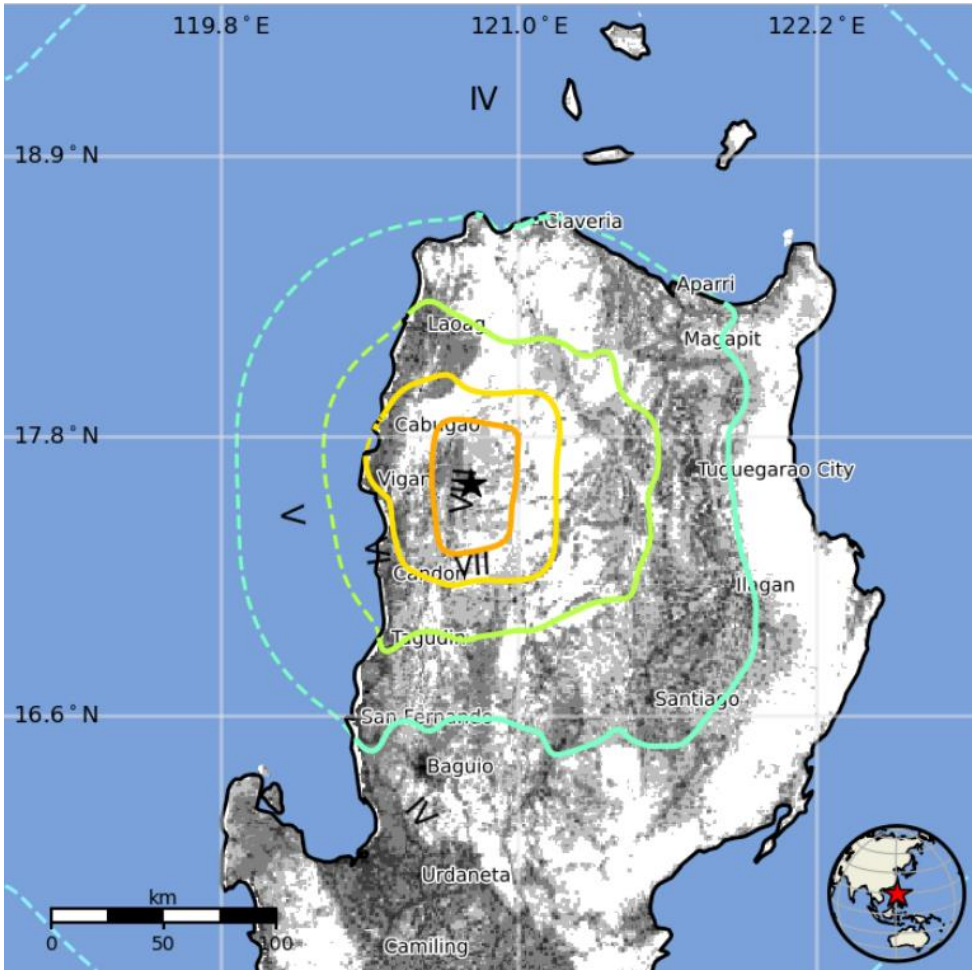
The USGS PAGER map shows the population exposed to different Modified Mercalli Intensity (MMI) levels.

The USGS estimates that 171,000 people felt severe shaking from this earthquake.

I	Not Felt	0 k*
II-III	Weak	0 k*
IV	Light	7,556 k*
V	Moderate	4,109 k
VI	Strong	1,465 k
VII	Very Strong	663 k
VIII	Severe	171 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.

Image courtesy of the US Geological Survey

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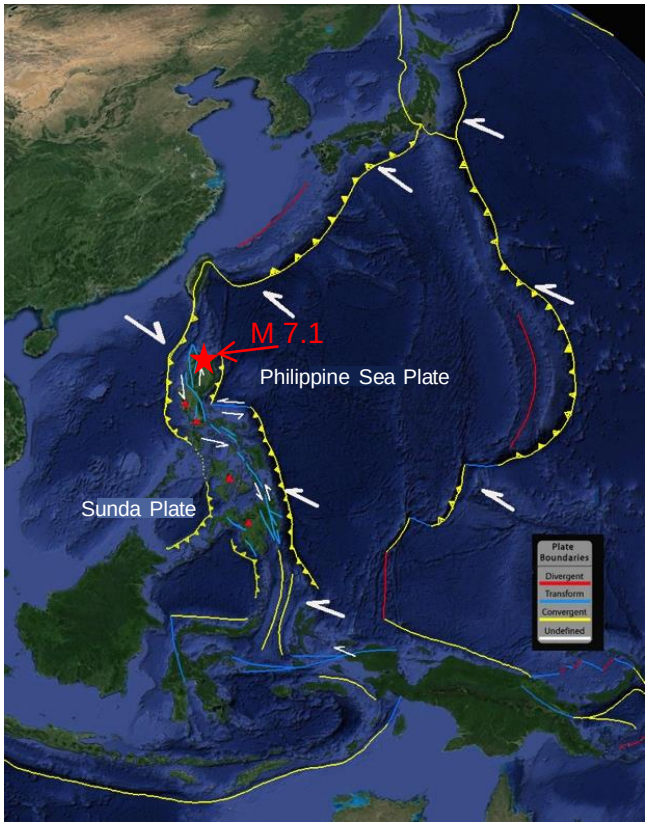
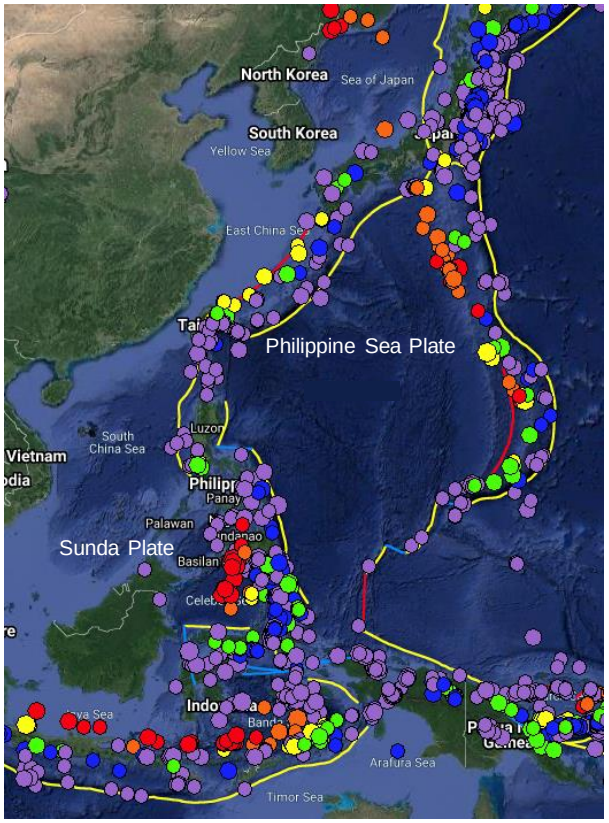
Along its western margin, the Philippine Sea Plate converges with and subducts beneath the Sunda Plate. The Philippines Archipelago has oceanic plates subducting beneath both its east and west sides. These islands contain active volcanoes (red triangles), as well as high earthquake activity.



Simplified tectonic boundaries



Magnitude 6–8 earthquakes 2000-2018

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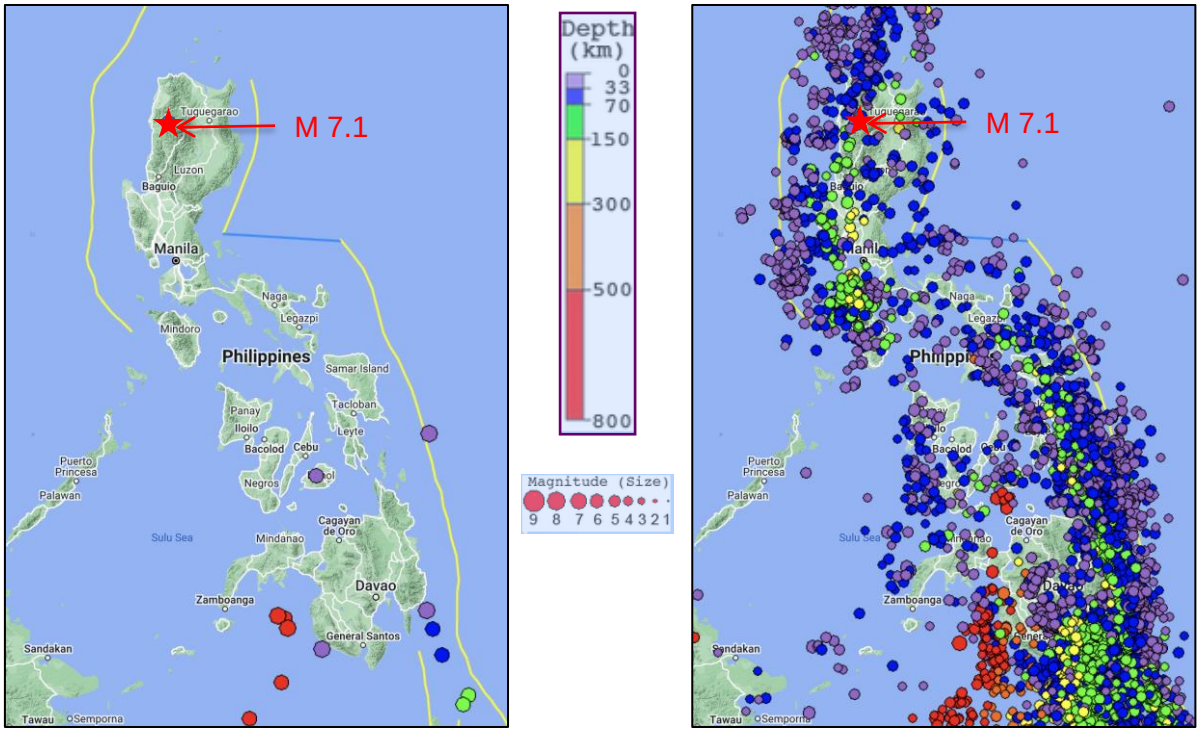
Historical seismicity 2000–2022 in the region of the July 27, 2022 earthquake with location marked by red star. Image on the left shows earthquakes >M7; Image on the right shows earthquakes >M4 for the same period.

Earthquakes are color-coded by depth as shown by the legend between the maps. Depths of earthquakes increase from east to west across the subduction zone boundary between the Philippine Sea and Sunda Plates.



Created using the IRIS Earthquake Browser (IEB)

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The July 27, 2022 earthquake is shown by the red star on the map below. In the region of this earthquake, the Philippine Sea Plate moves west with respect to the Sunda Plate at a rate of 8.5 cm/yr. At the Philippine Trench, the Philippine Sea Plate subducts beneath the Philippine Islands that are located on the eastern side of the Sunda Plate.

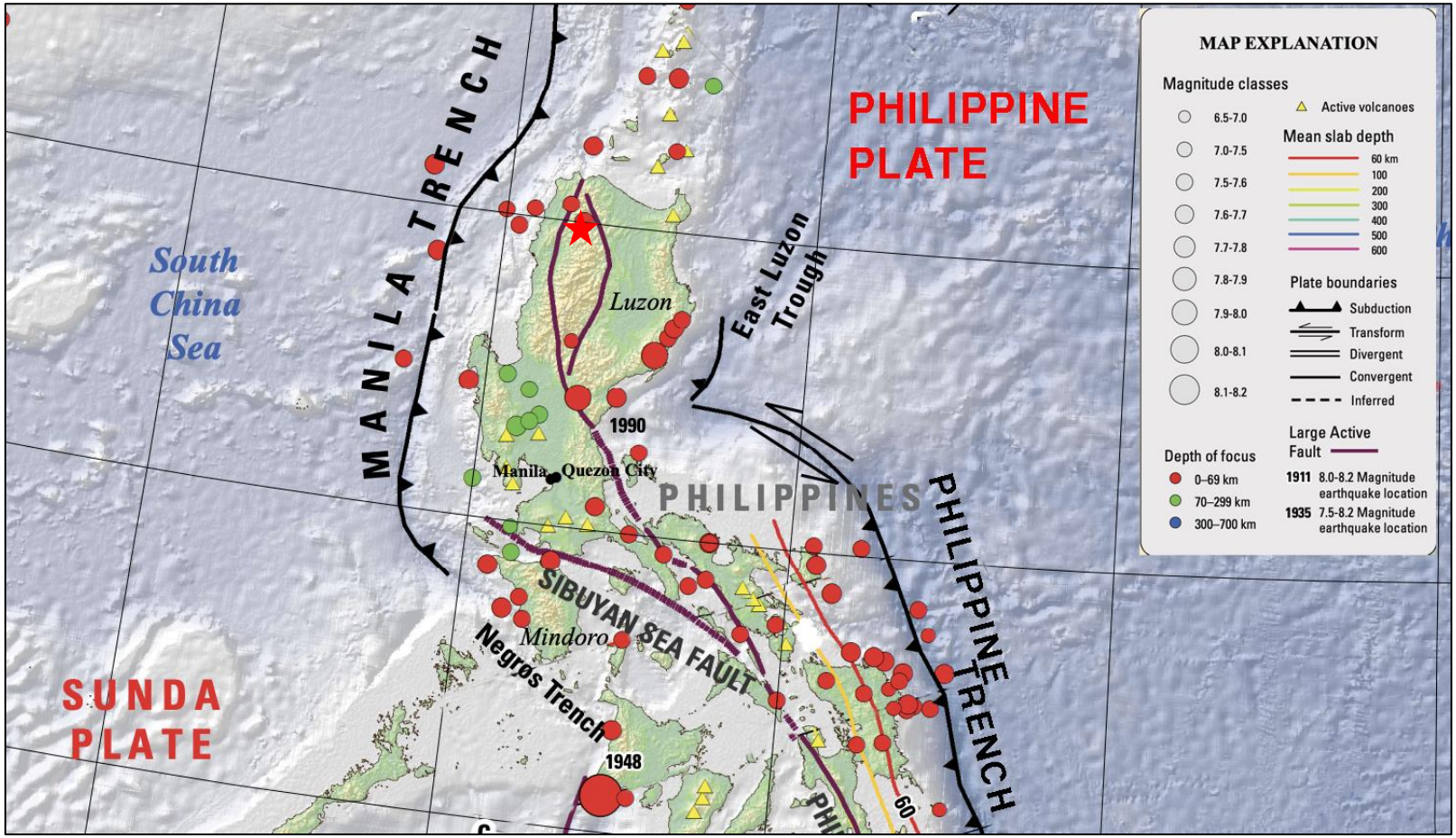

Image courtesy of US Geological Survey

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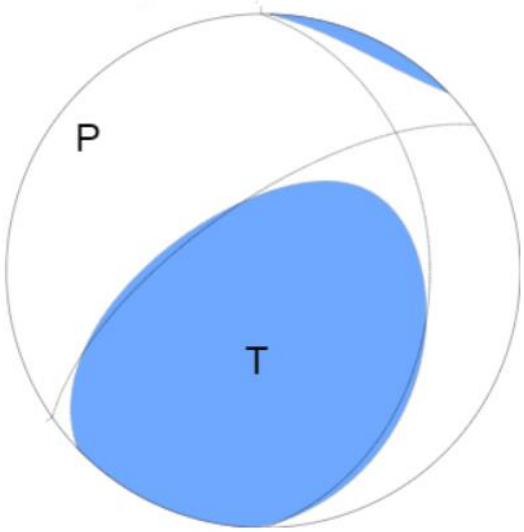
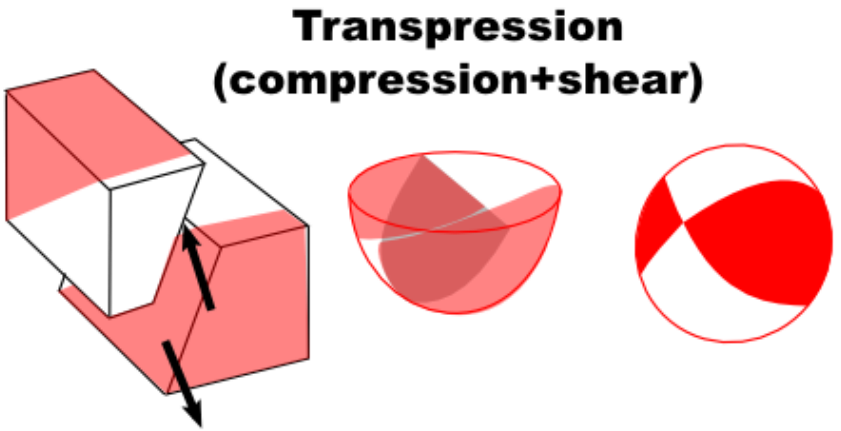
The focal mechanism is how seismologists plot the 3-D stress orientations of an earthquake. Because an earthquake occurs as slip on a fault, it generates primary (P) waves in quadrants where the first pulse is compressional (shaded) and quadrants where the first pulse is extensional (white). The orientation 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 focal mechanism indicates this earthquake occurred as the result of oblique reverse faulting likely in the Philippine Sea Plate above the Sunda Plate.



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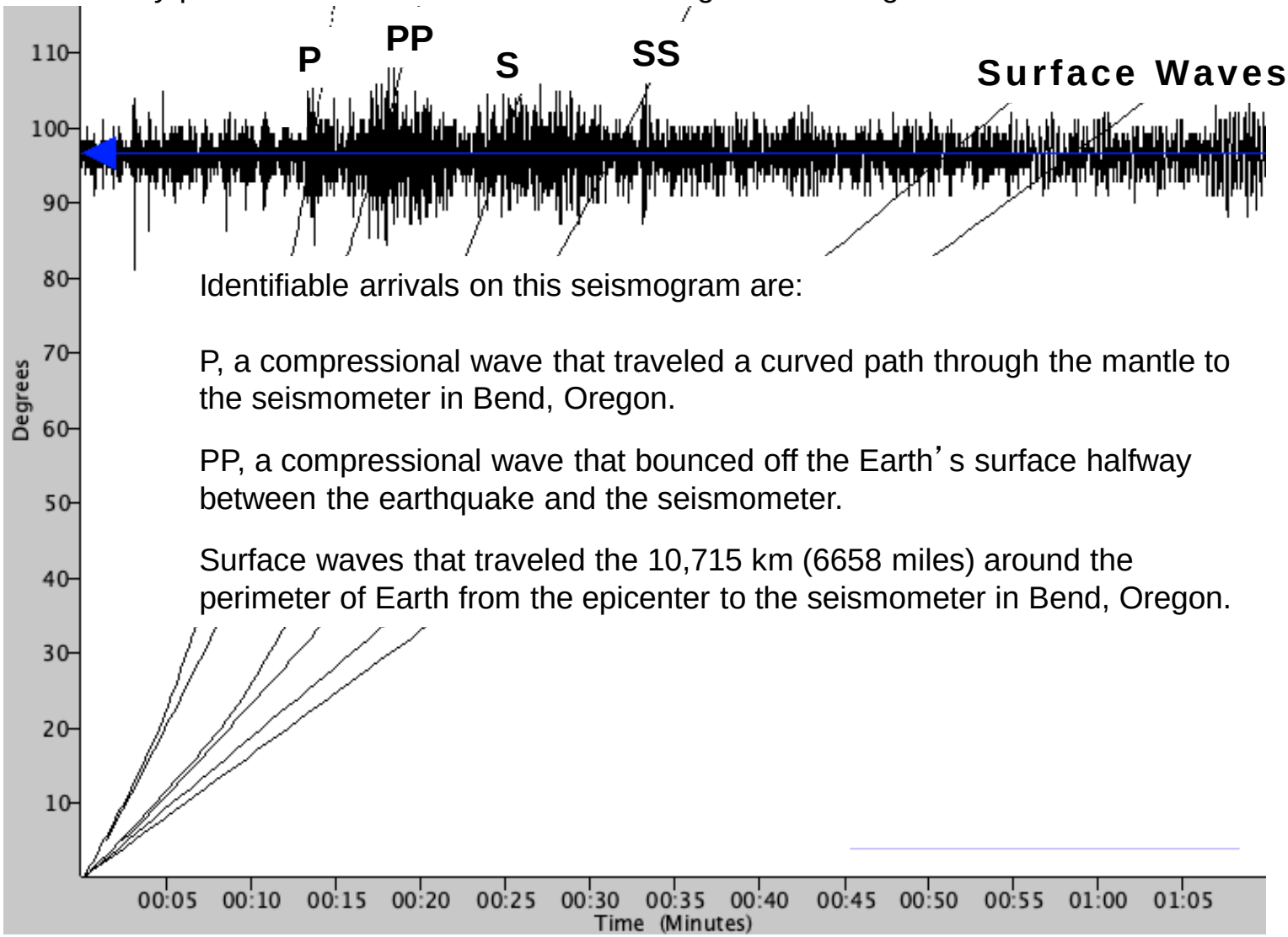
The record of the earthquake in Bend, Oregon (BNOR) is illustrated below. Bend is 10,715 km (6658 miles, 96.5˚) from the location of this earthquake. At this distance, it is challenging to identify particular seismic waves on a seismogram of a magnitude 7.1 earthquake.



Identifiable arrivals on this seismogram are:

P, a compressional wave that traveled a curved path through the mantle to the seismometer in Bend, Oregon.

PP, a compressional wave that bounced off the Earth's surface halfway between the earthquake and the seismometer.

Surface waves that traveled the 10,715 km (6658 miles) around the perimeter of Earth from the epicenter to the seismometer in Bend, Oregon.

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