Magnitude 7.0 PAPUA NEW GUINEA
Friday, July 17, 2020 at 02:50:23 UTC

A magnitude 7.0 earthquake occurred 194.1 km (120.6 miles) NNE of Port Moresby, National Capital, Papua New Guinea at a depth of 79.8 km (50 miles).

There are no immediate reports of damage.

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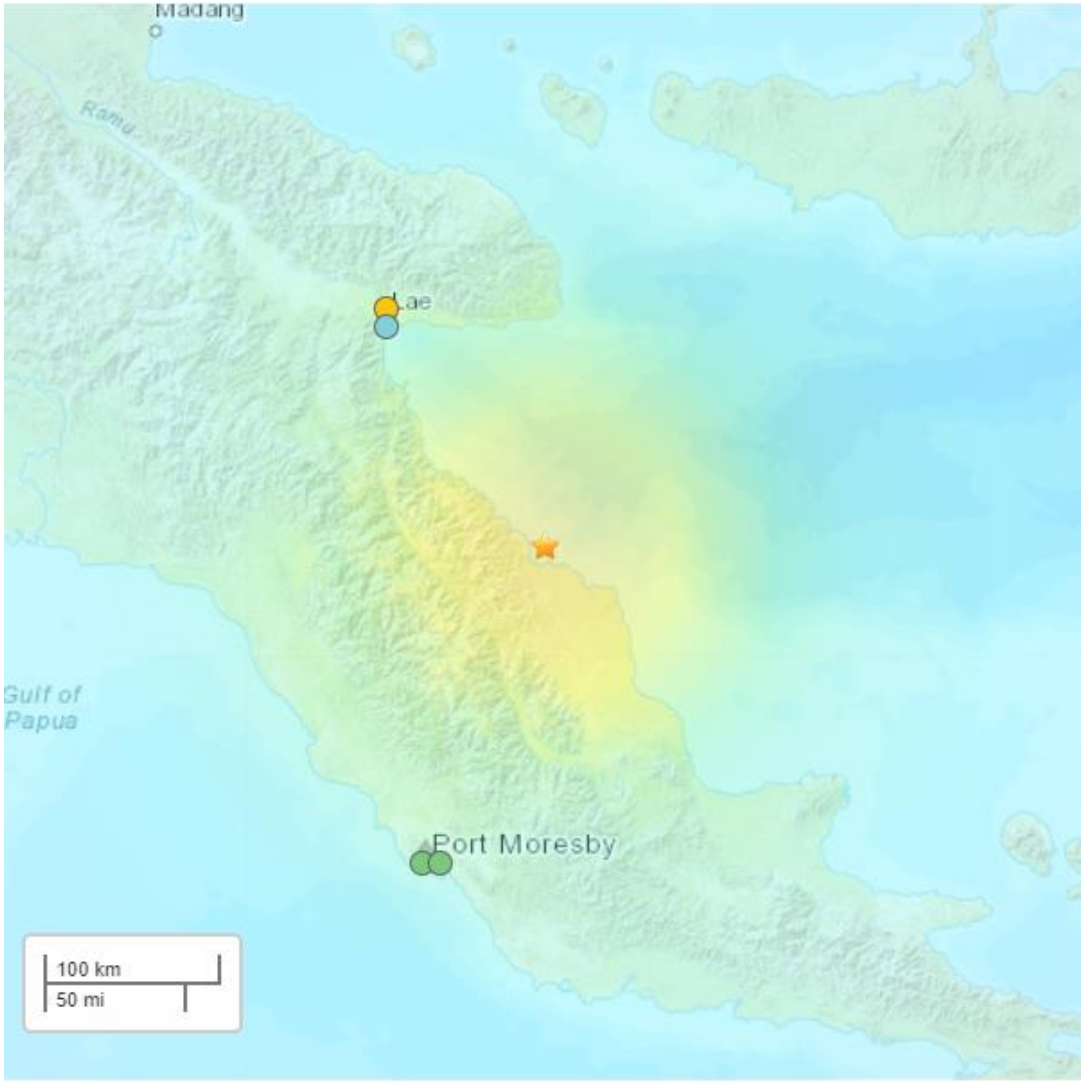
The Modified-Mercalli Intensity scale is a twelve-stage scale, from I to XII, that indicates the severity of ground shaking.

The area near the epicenter experienced 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 7.0 Earthquake

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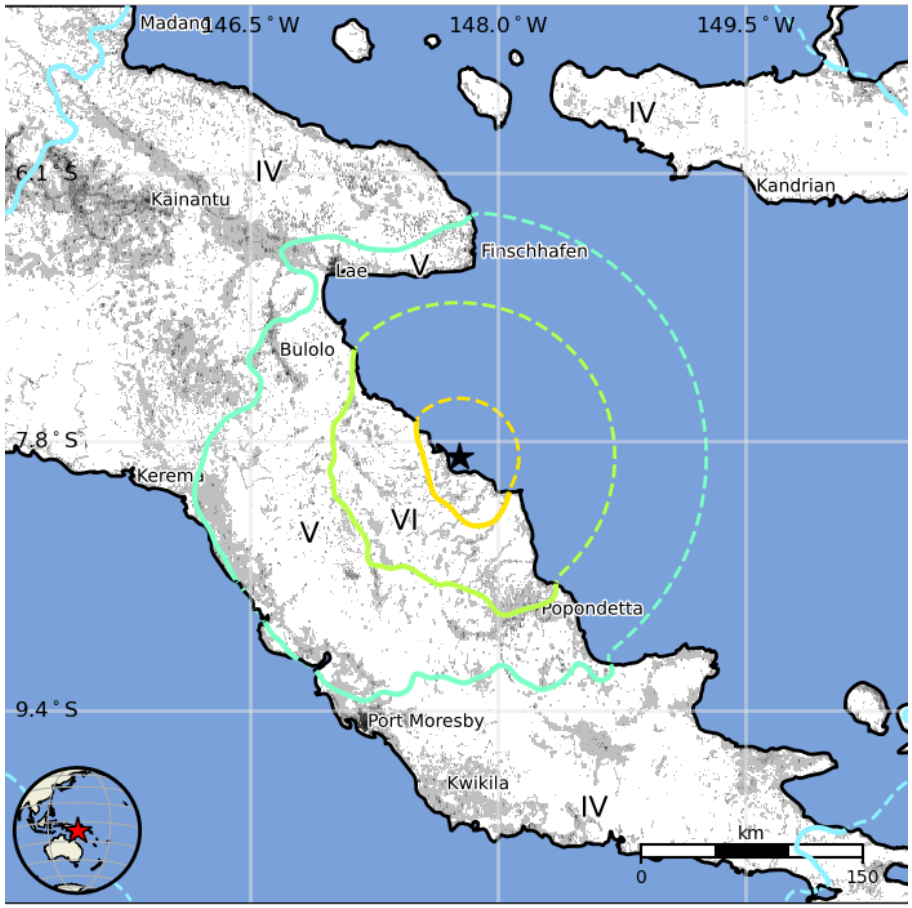
USGS PAGER
Population Exposed to Earthquake Shaking

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

20,000 people were exposed to very strong shaking from this earthquake.

I	Not Felt	0 k*
II-III	Weak	180 k*
IV	Light	2,088 k
V	Moderate	493 k
VI	Strong	96 k
VII	Very Strong	20 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.

Image courtesy of the US Geological Survey

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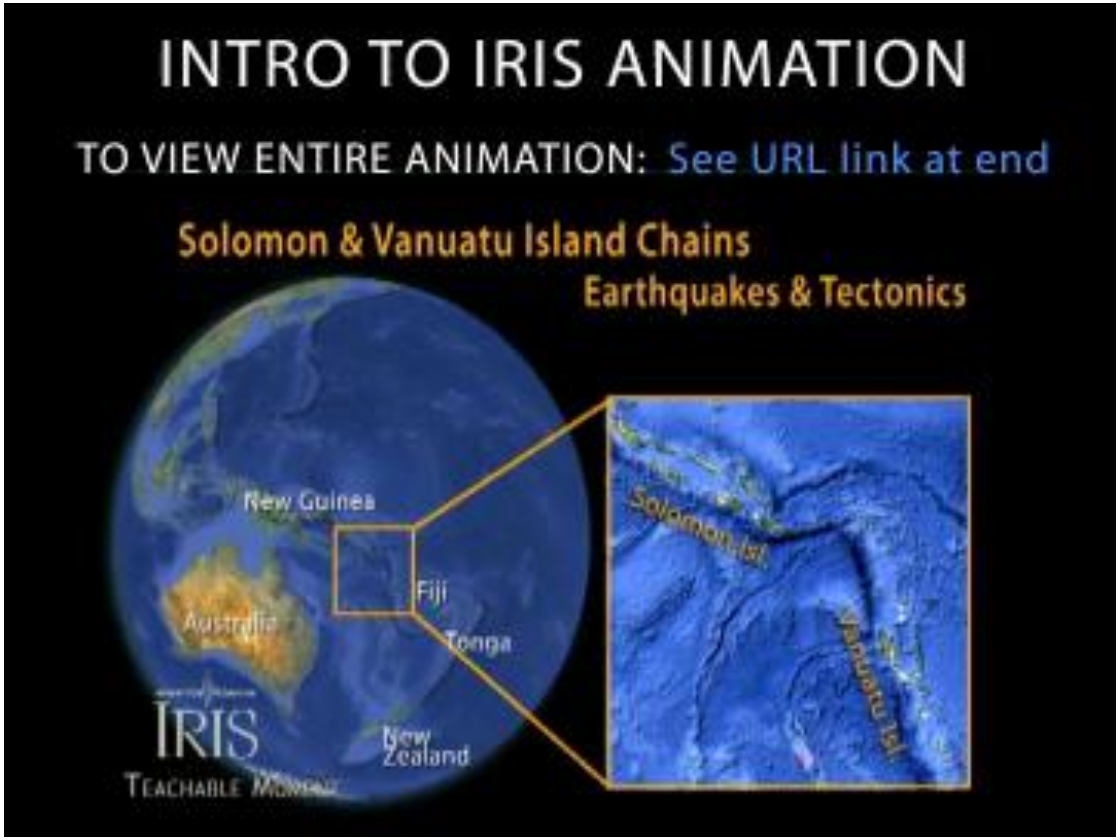
The Solomon and Vanuatu Islands, southeast of Papua New Guinea, are subduction-related features caused by the subduction of the Australian Plate beneath the greater Pacific Plate. It is a seismically active area of frequent large earthquakes. Basically the earthquakes are caused by the northeasterly movement of the Australian Plate as it dives beneath the Pacific Plate, but there are variations along the plate boundary



Animation exploring plate tectonics and earthquakes of the Australian – Pacific Plate boundary region.

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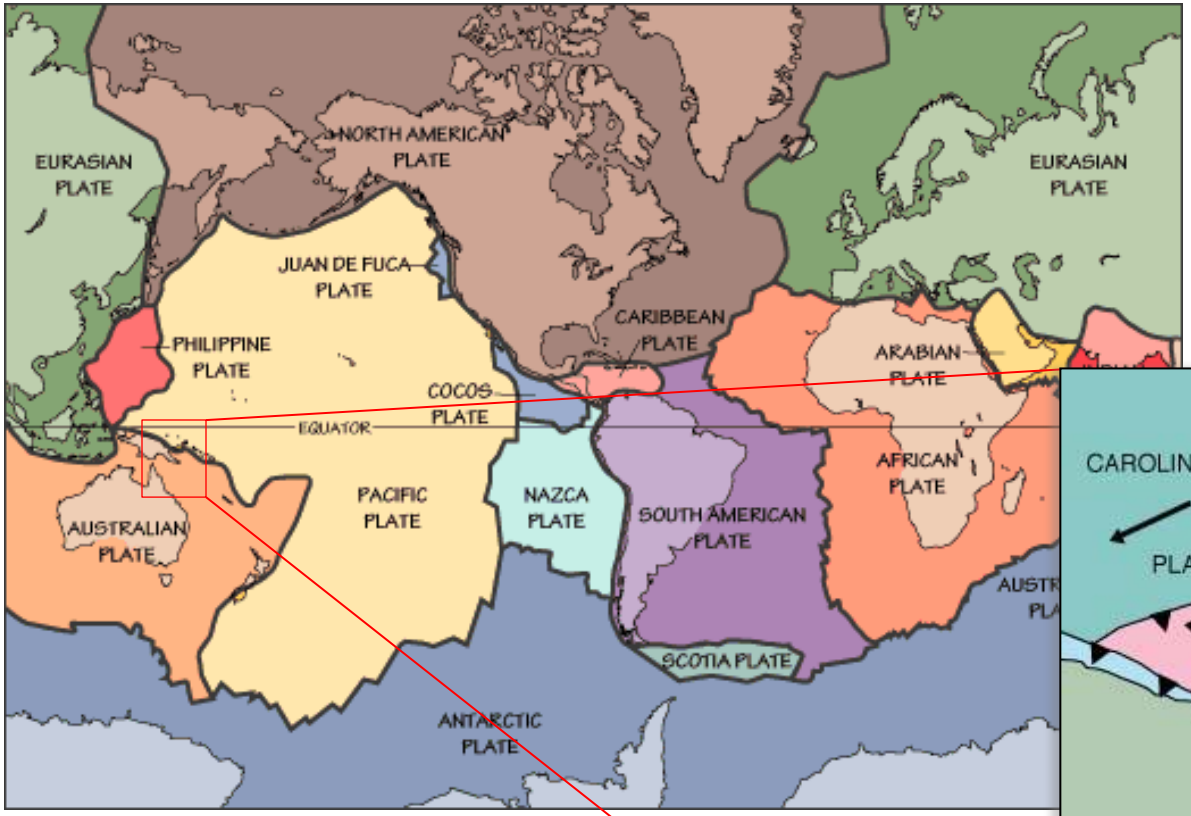
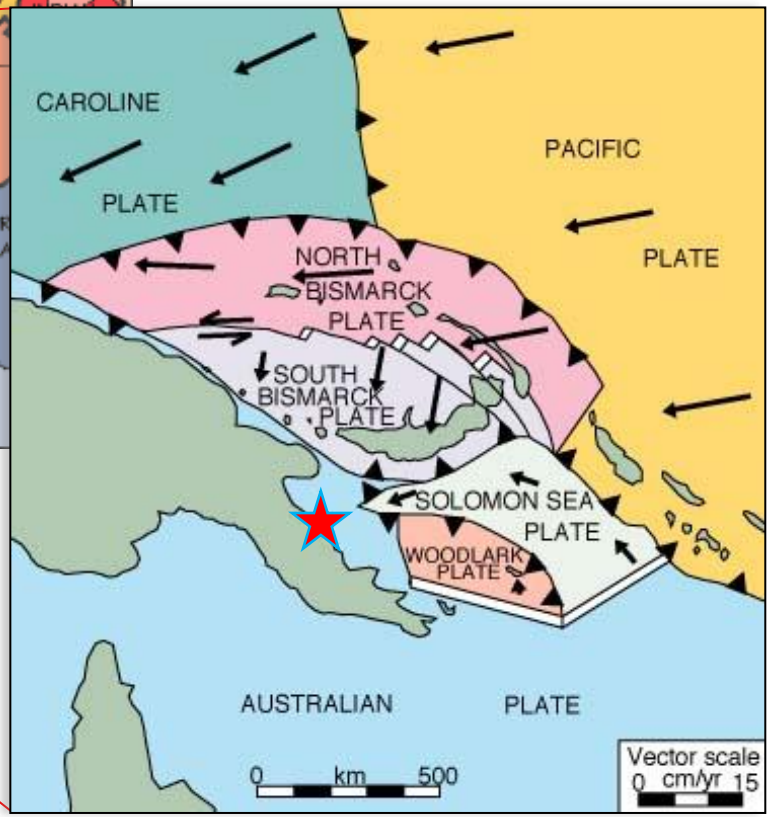
IRIS Teachable Moments



Arrows on the map below show motions relative to the Australian Plate. The red star shows the location of the July 17th earthquake. This earthquake occurred on the northeast side of the Papuan Peninsula where the Australian Plate subducts .



In the region of Papua New Guinea, the Pacific Plate converges with the Australian Plate at a rate of 9.5 cm/yr. The Australian Plate is broken into microplates that accommodate its convergence with and subduction beneath the Pacific Plate. Earthquakes in this region are generally associated with the large-scale convergence of these two major plates and with complex interactions of the associated microplates.

Image courtesy OSU; simplified from Hamilton (1979)

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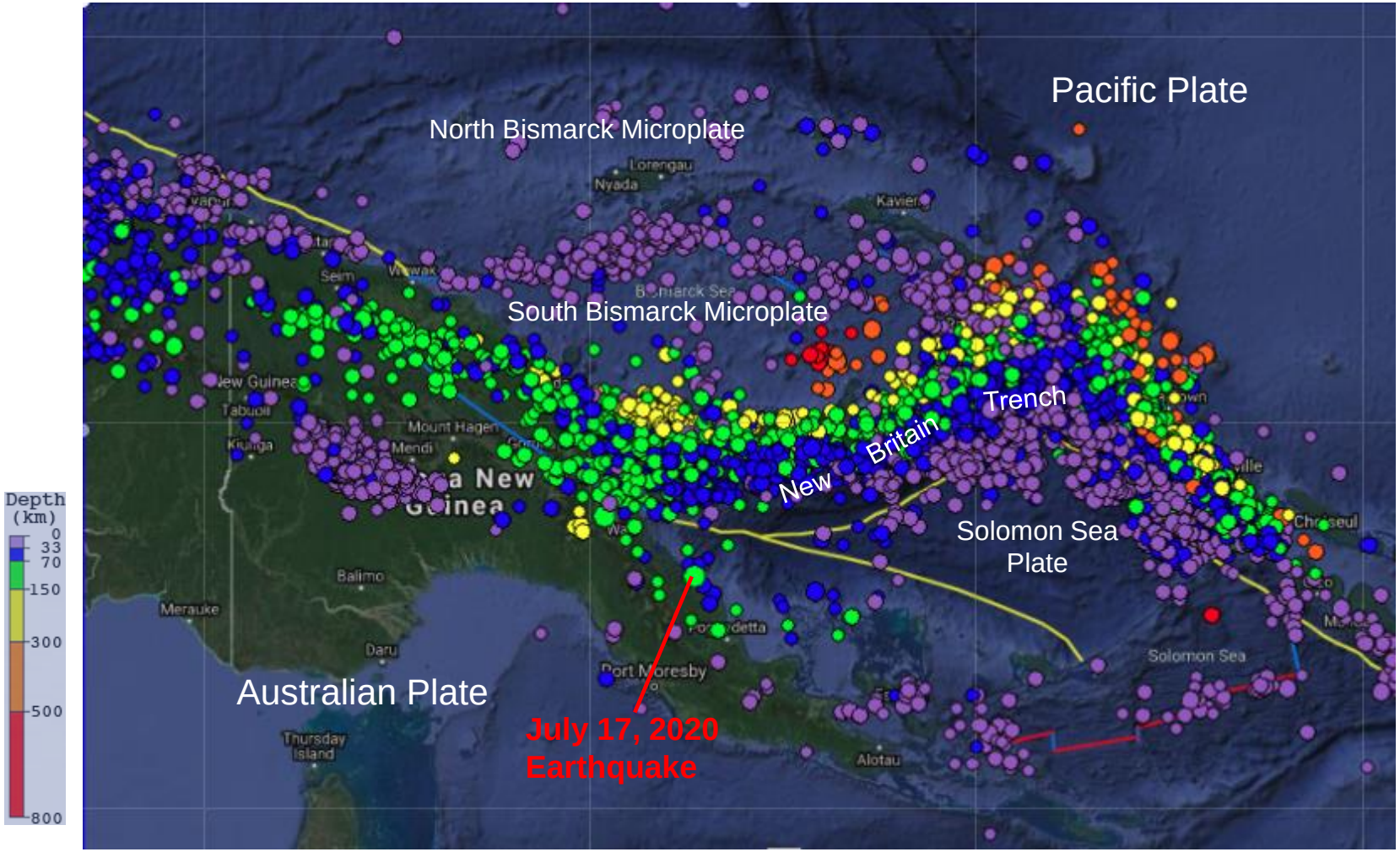

Map created with the IRIS Earthquake Browser

This seismicity map covers the same region as the microplate tectonic map of the previous slide. Locations of the 5000 most recent earthquakes are shown.

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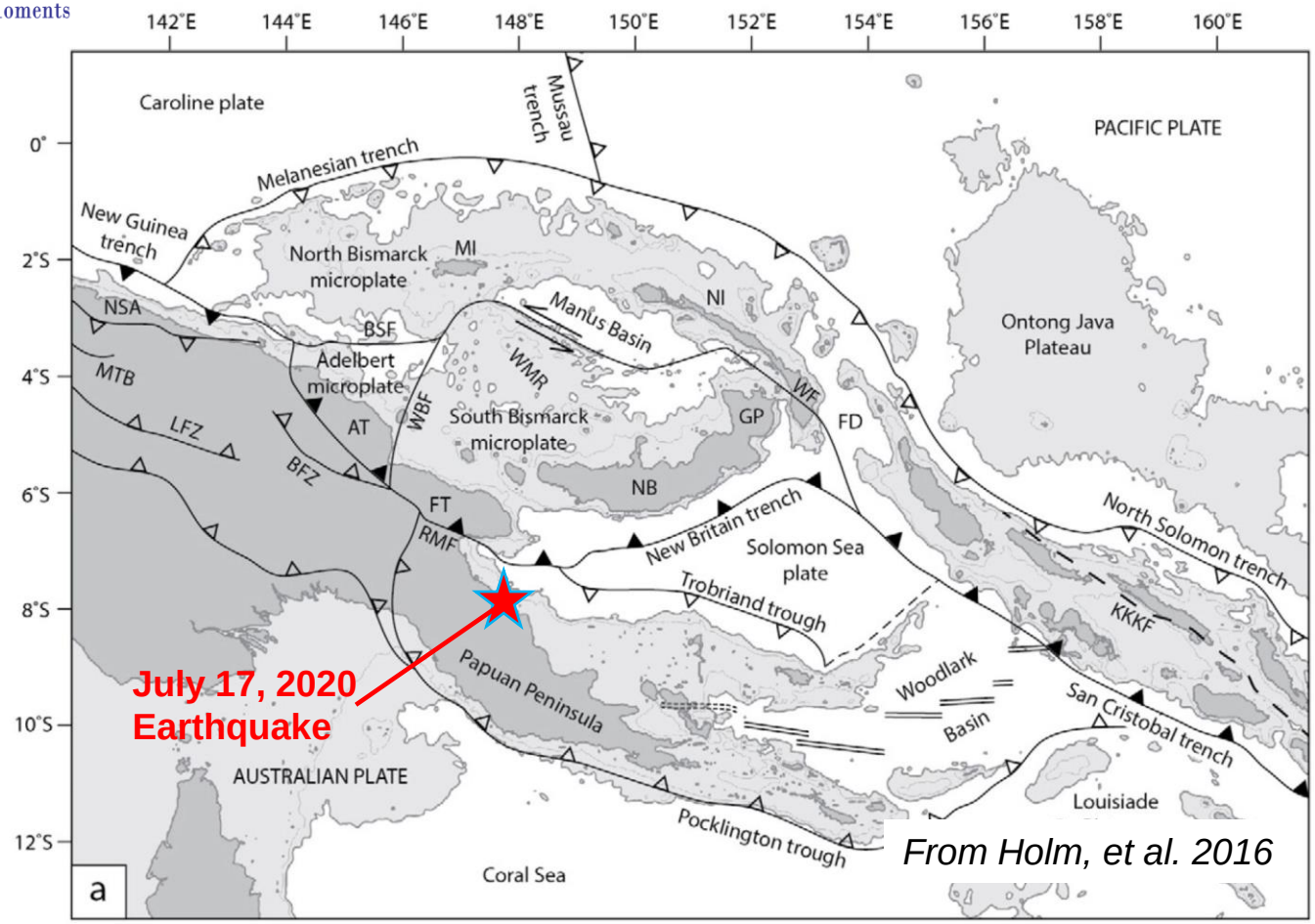

From Holm, et al. 2016

Strike-slip Fault

Thrust Fault

NB New Britain

GP Gazelle Peninsula

The map above shows microplates and structures in the Papua New Guinea - Solomon Sea region with the location of the July 17th earthquake indicated by the red star. At the New Britain trench, the Australian and Solomon Sea plates subduct beneath the South Bismarck microplate. The focal mechanism of the May 17th earthquake indicates that it was produced by thrust faulting. Given the epicenter location, depth of 80 km, and thrust-faulting mechanism, this earthquake most likely occurred within the Australian Plate as it begins to subduct beneath the South Bismarck microplate.

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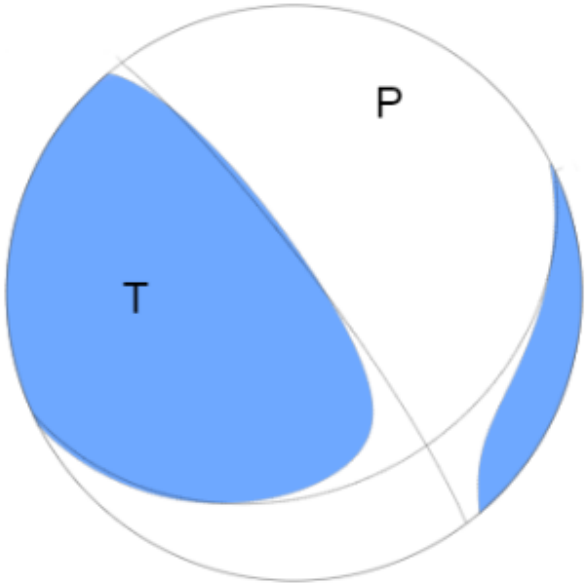
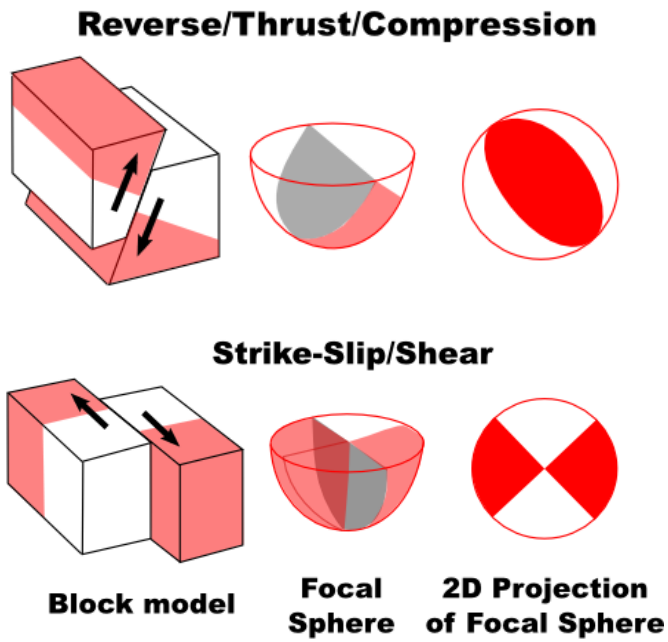
The focal mechanism is how seismologists plot the 3-D stress orientations of an earthquake. Because an earthquake occurs as slip on a fault, it generates primary waves in quadrants where the first pulse is compressional (shaded) and quadrants where the first pulse is extensional (white). The orientation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

This earthquake occurred as a result of oblique strike-slip/thrust faulting, having components of both motions.



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.

Images courtesy of the U.S. Geological Survey

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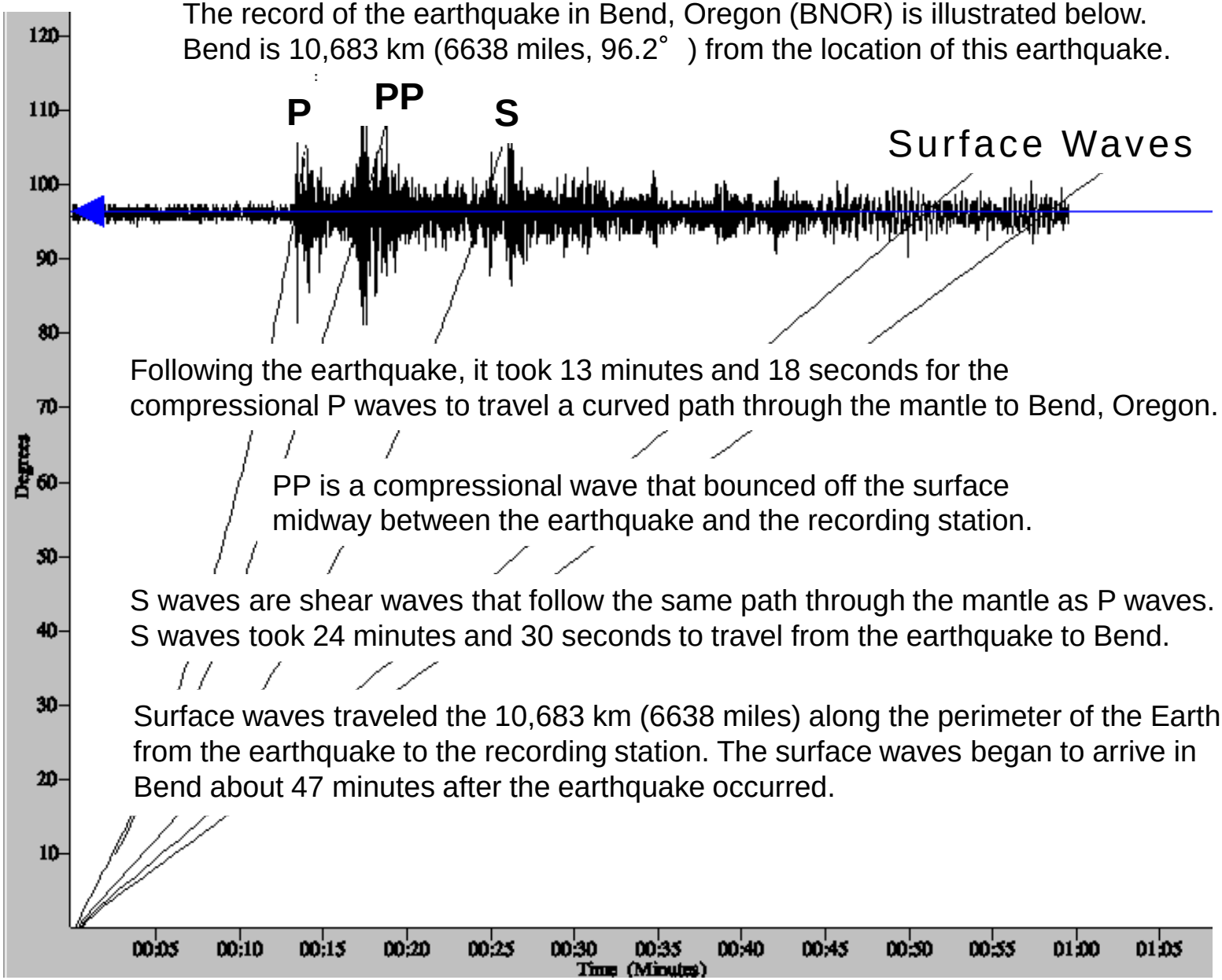
The record of the earthquake in Bend, Oregon (BNOR) is illustrated below. Bend is 10,683 km (6638 miles, 96.2˚) from the location of this earthquake.



Following the earthquake, it took 13 minutes and 18 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. S waves took 24 minutes and 30 seconds to travel from the earthquake to Bend.

Surface waves traveled the 10,683 km (6638 miles) along the perimeter of the Earth from the earthquake to the recording station. The surface waves began to arrive in Bend about 47 minutes after the earthquake occurred.

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