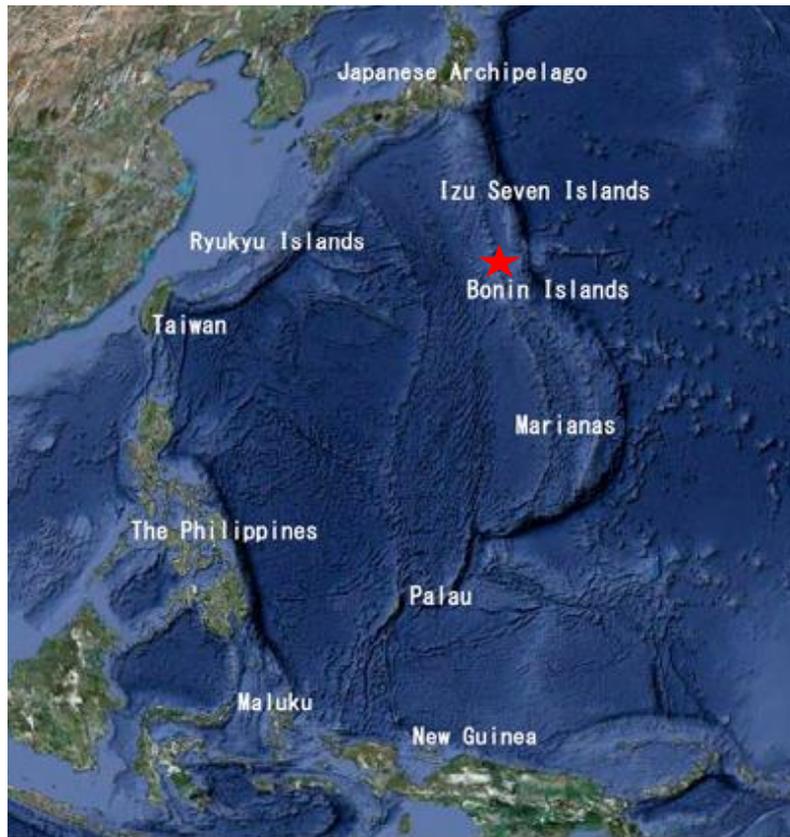


Magnitude 7.8 BONIN ISLANDS, JAPAN

Saturday, May 30, 2015 at 11:23:02 UTC



A major, magnitude 7.8 deep earthquake occurred near the Bonin Islands. The earthquake was located about 874 km (543 mi) south of Tokyo, Japan and west of the Izu Trench. This earthquake occurred at a depth of 678 km (421 miles) within the Pacific Plate where it subducts beneath the Philippine Plate.



The Bonin Islands, also known as the Ogasawara Islands, are an archipelago of over 30 subtropical and tropical islands, some 1,000 kilometers (540 nmi; 620 mi) directly south of Tokyo, Japan.

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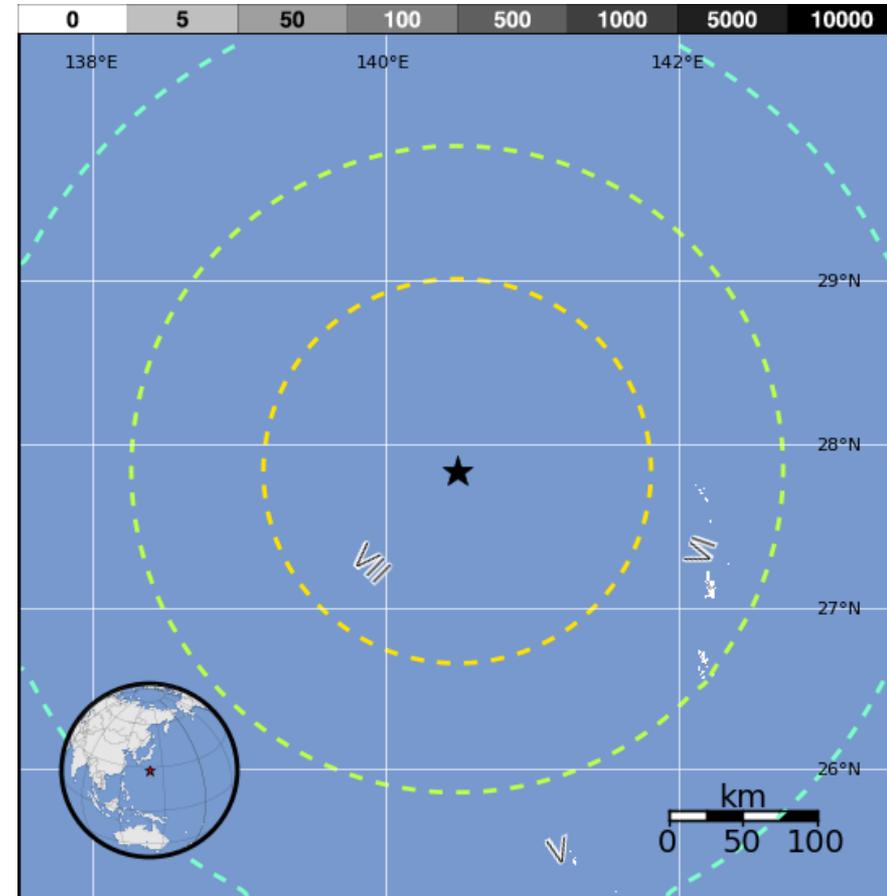
USGS PAGER

Population Exposed to Earthquake Shaking

Due to the depth of the earthquake at 678 km (421 miles) and the few islands in the region, the USGS estimated that only 2000 people experienced strong shaking from this earthquake.

Additionally, a tsunami was not generated because the ocean floor is not displaced by an earthquake this deep.

MMI	Shaking	Pop.
I	Not Felt	--*
II-III	Weak	--*
IV	Light	--*
V	Moderate	0k
VI	Strong	2k
VII	Very Strong	0k



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.

Image courtesy of the US Geological Survey

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This map shows the rate and direction of motion of the Pacific Plate with respect to the Philippine Plate near the Izu Trench.

At the location of the earthquake, the Pacific plate moves approximately westwards with respect to the Philippine Sea plate at a rate of 39 mm/yr.

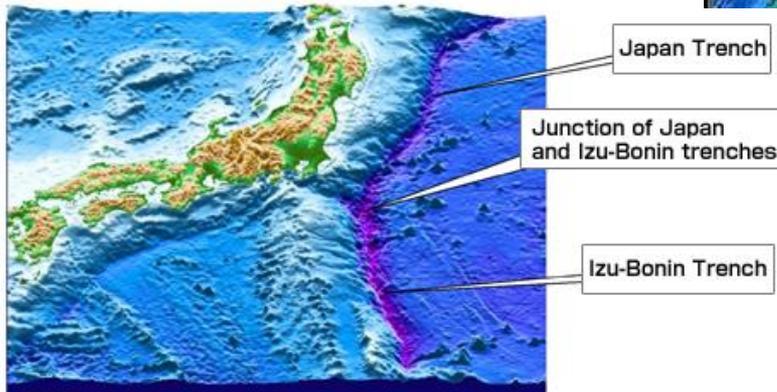
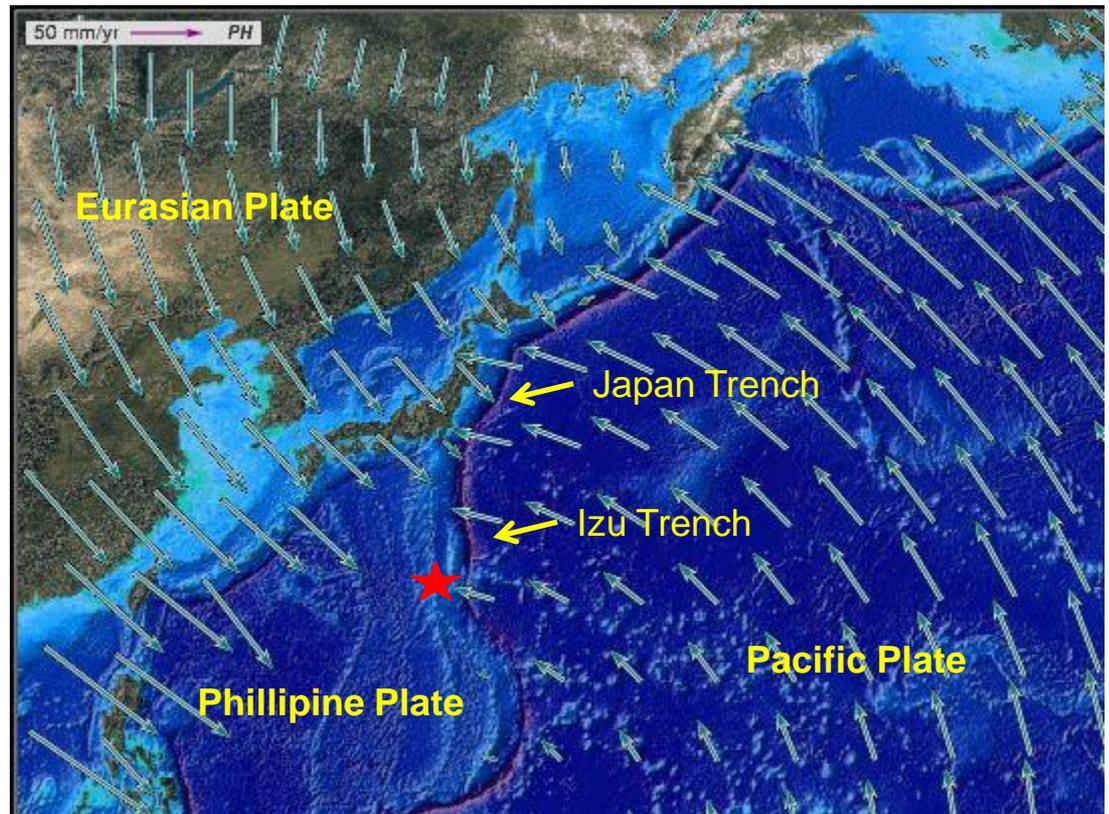
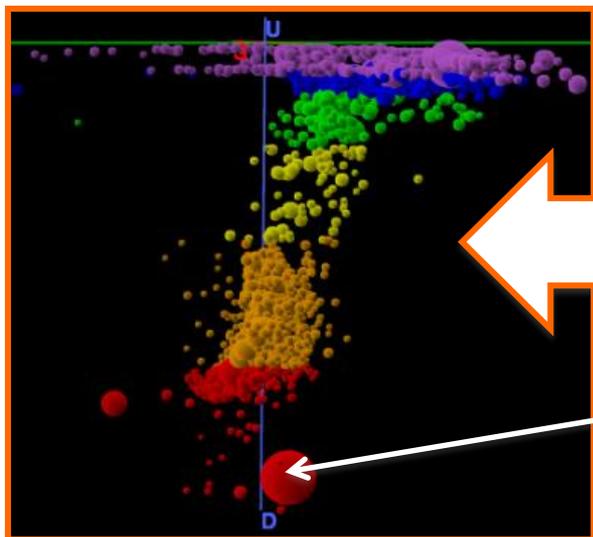
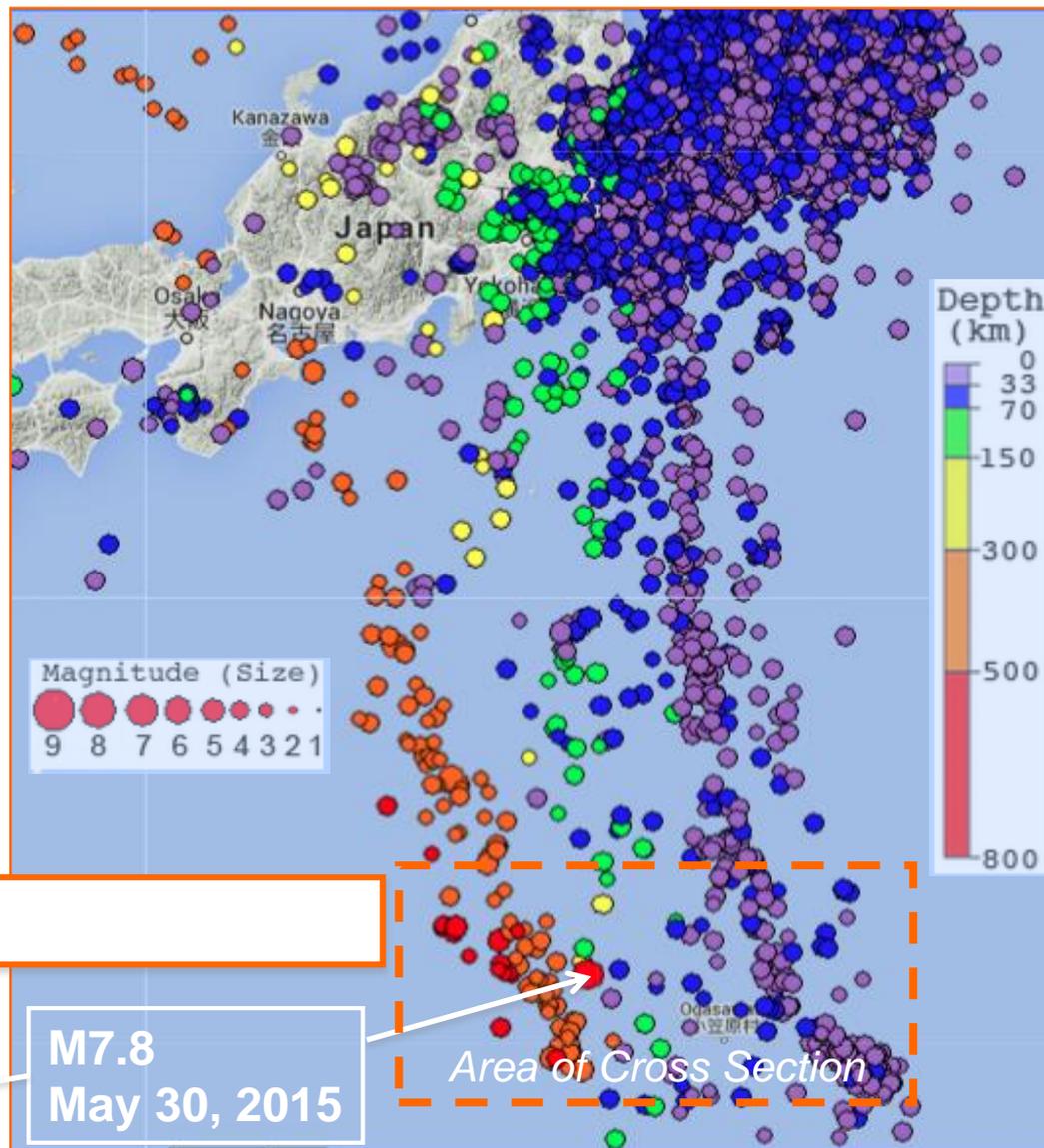


Image courtesy Japan Agency for Marine-Earth Science and Technology

Magnitude 7.8 BONIN ISLANDS, JAPAN

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The epicenter of this magnitude 7.8 earthquake is shown on a map of regional historical seismicity on the right. On the E-W oriented cross section below, intermediate and deep earthquakes within the Pacific Plate illustrate its steep angle of subduction beneath the Philippine Plate.



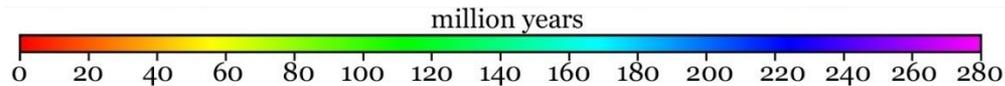
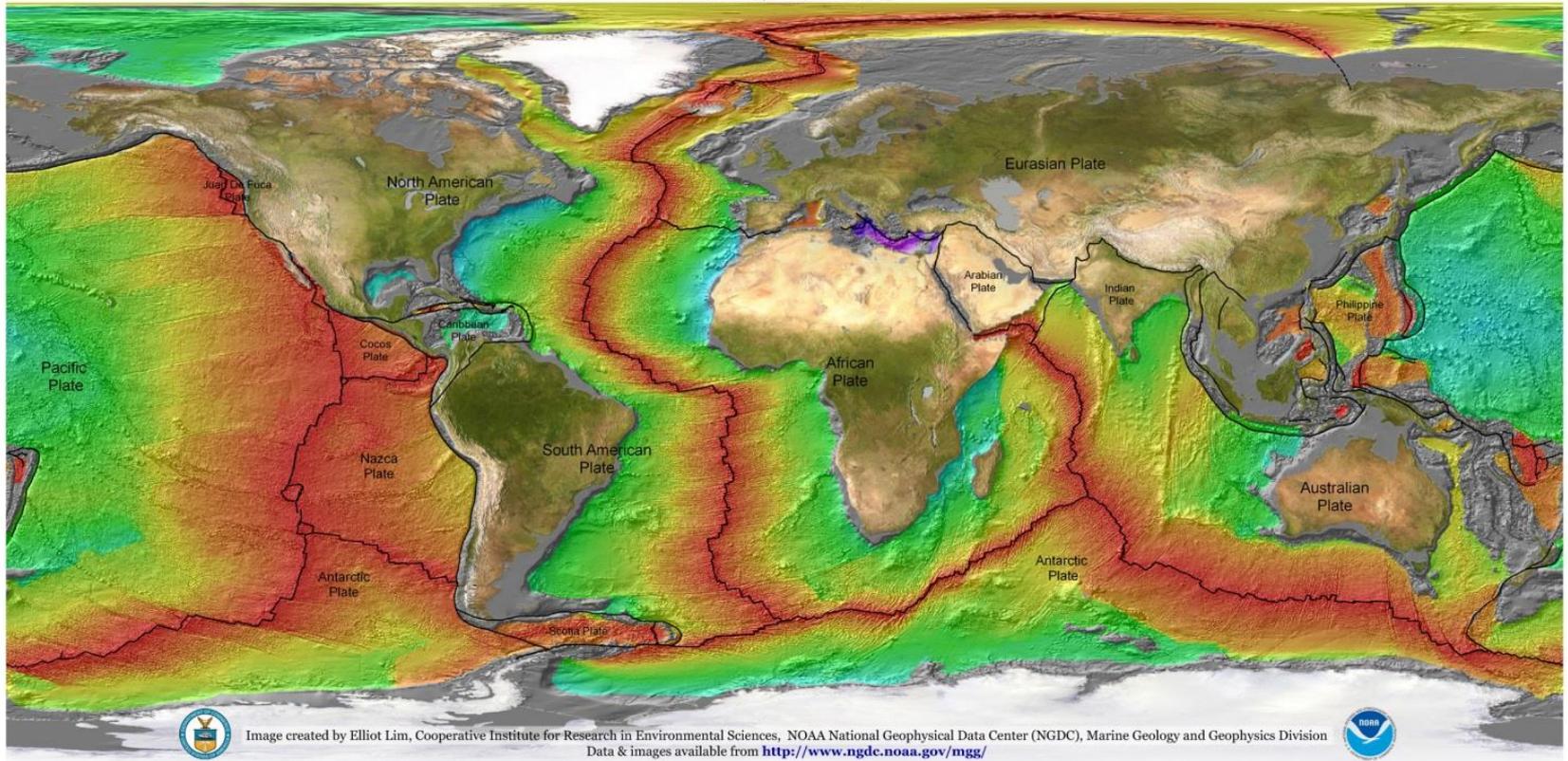
Magnitude 7.8 BONIN ISLANDS, JAPAN

Saturday, May 30, 2015 at 11:23:02 UTC

Age of Oceanic Lithosphere (m.y.)

Data source:

Muller, R.D., M. Sdrolias, C. Gaina, and W.R. Roest 2008. Age, spreading rates and spreading symmetry of the world's ocean crust, *Geochem. Geophys. Geosyst.*, 9, Q04006, doi:10.1029/2007GC001743.



The subducting Pacific Plate adjacent to the Izu Trench is more than 120 million years old and is therefore very cold when it subducts beneath the Philippine Plate. Consequently, the subducting plate is well defined by seismicity to depths of 700 km.

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To produce earthquakes, rocks must be brittle so they can accumulate elastic energy as they bend then rapidly release that energy during earthquake rupture. Rocks are brittle at low temperatures but become viscoelastic when they reach temperatures of about 600 ° C.

With the exception of subducting oceanic plates, rock in Earth's mantle below about 100 km depth is viscoelastic and cannot rupture to produce earthquakes.

However, rapidly subducting cool oceanic plates can reach depths up to about 700 km into the hot mantle and continue to produce earthquakes. The deepest earthquakes are thought to be due to phase changes of minerals in the high pressure and temperature conditions at those depths.

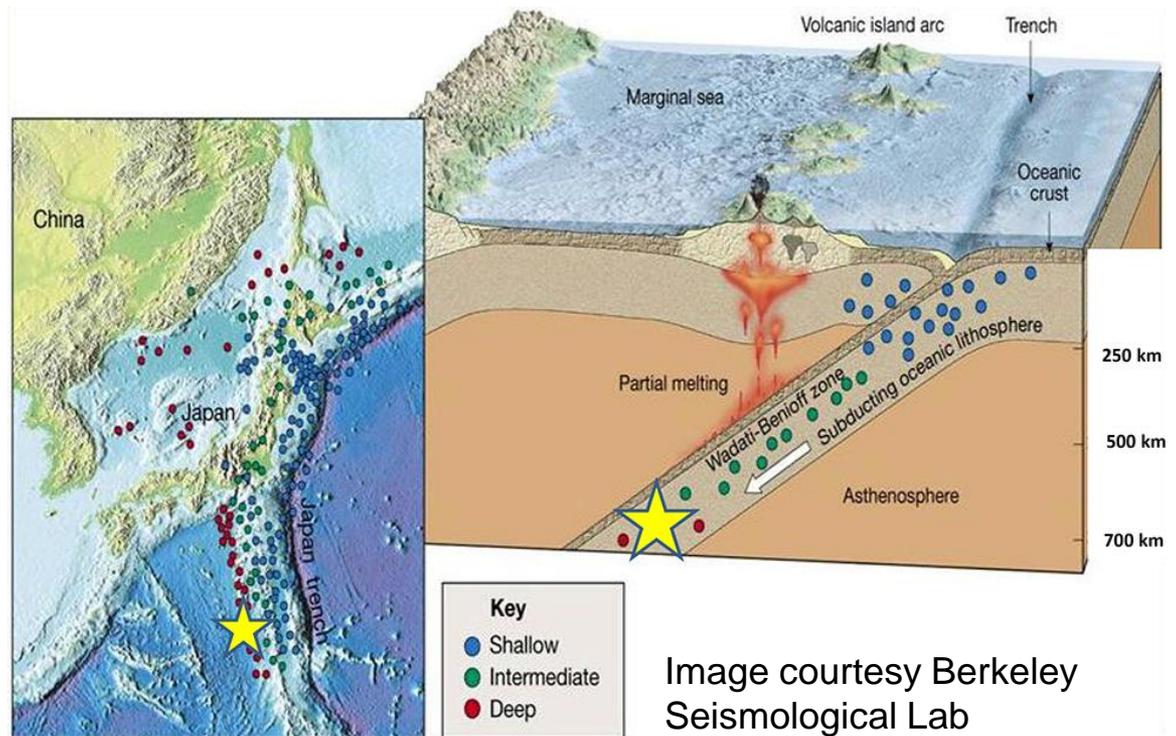
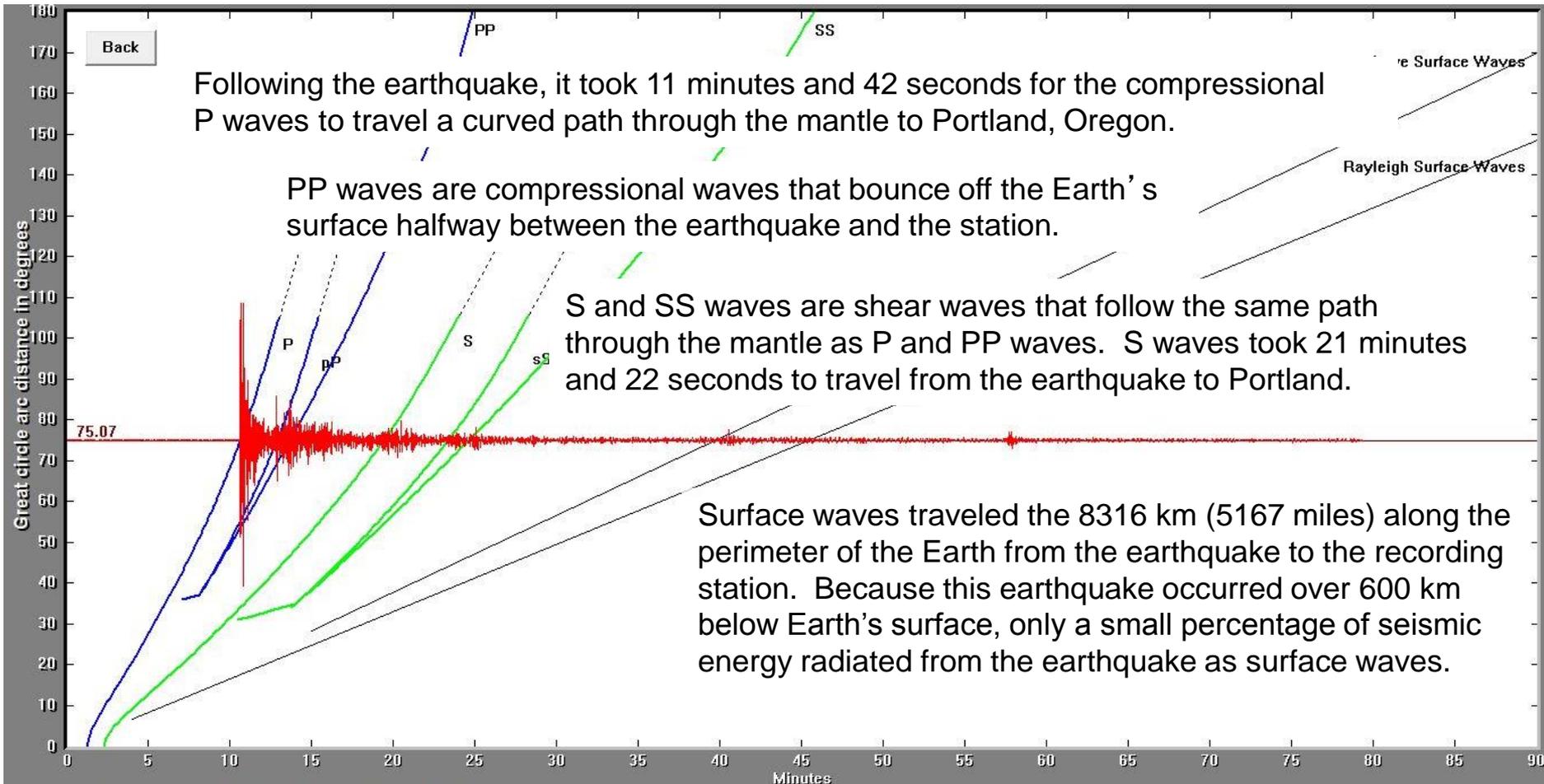


Image courtesy Berkeley Seismological Lab

Magnitude 7.8 BONIN ISLANDS, JAPAN

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The record of the earthquake on the University of Portland seismometer (UPOR) is illustrated below. Portland is 8316 km (5167 miles, 74.92°) from the location of this earthquake.



Teachable Moments are a service of

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and
The University of Portland