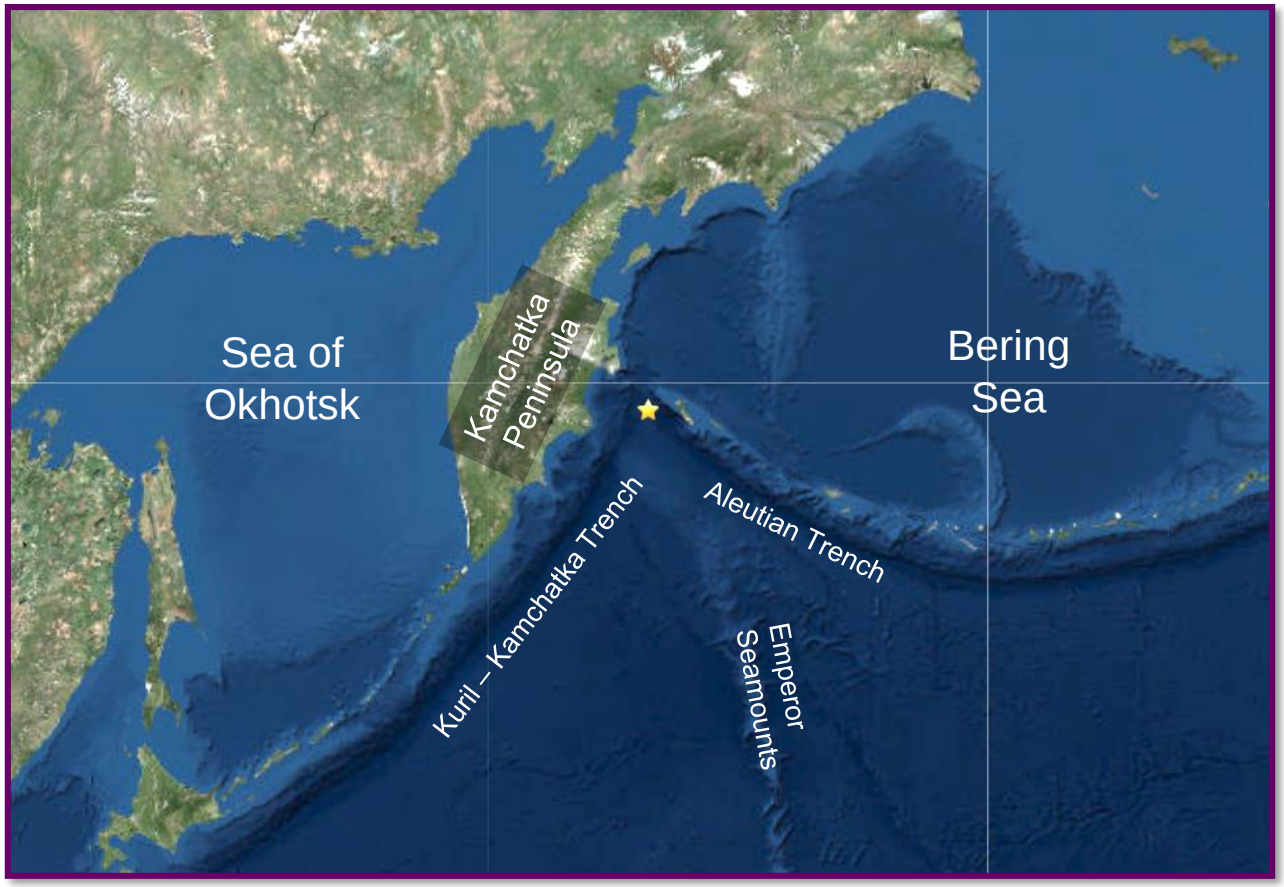
Magnitude 7.3 W of NIKOL'SKOYE, RUSSIA

Thursday, December 20, 2018 at 17:01:55 UTC



A magnitude 7.3 earthquake occurred at a depth of 16.6 km (10 miles) near the intersection of the Aleutian and Kuril-Kamchatka trenches. The epicenter was 83 km (51 miles) west of Nikol'skoye, Russia, on Bering Island, the westernmost island of the Aleutian islands. There have been no reports of damage or injuries and the earthquake did not generate a significant tsunami.

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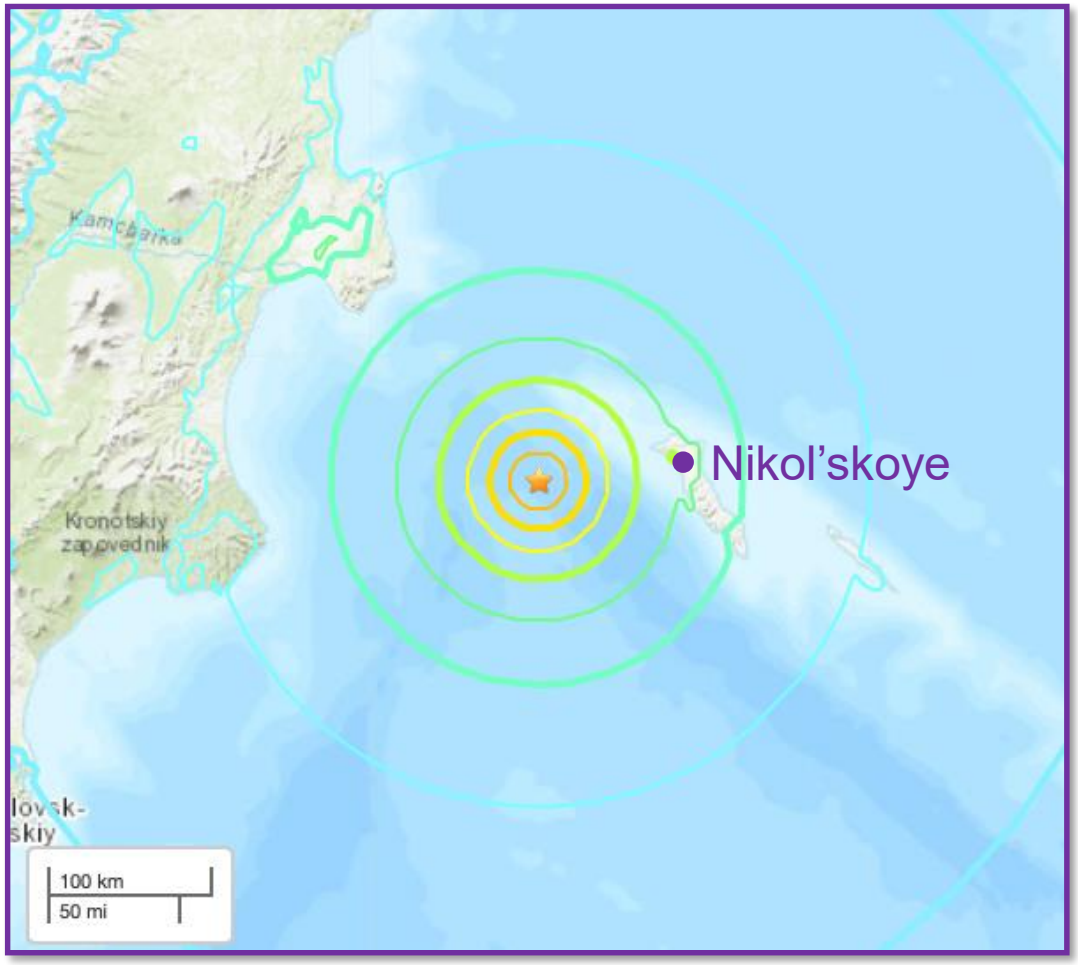
The Modified-Mercalli Intensity scale is a twelve-stage scale, from I to XII, that indicates the severity of ground shaking. Intensity is dependent on the magnitude, depth, bedrock, and location.

Nikol'skoye experienced moderate shaking from this earthquake.

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 7.3 Earthquake

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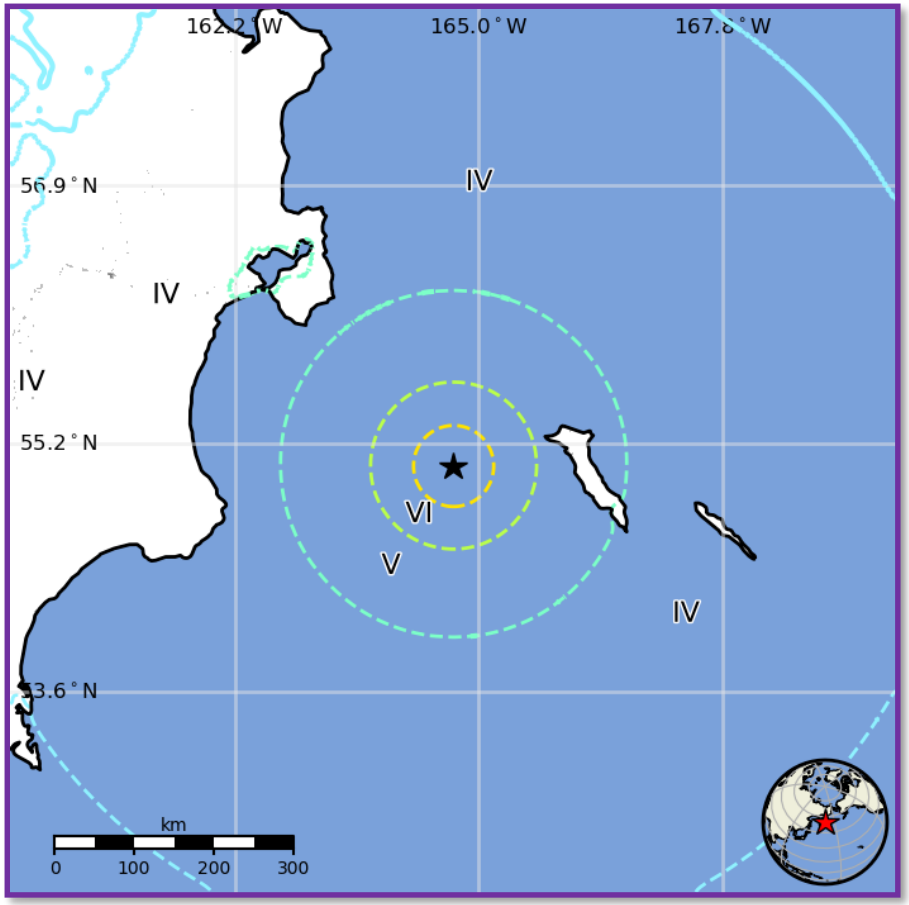
USGS PAGER

Population Exposed to Earthquake Shaking

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

The USGS estimates that 15,000 people felt light to moderate shaking from this earthquake.

I	Not Felt	0 k*
II-III	Weak	0 k*
IV	Light	14 k*
V	Moderate	1 k
VI	Strong	0 k
VII	Very Strong	0 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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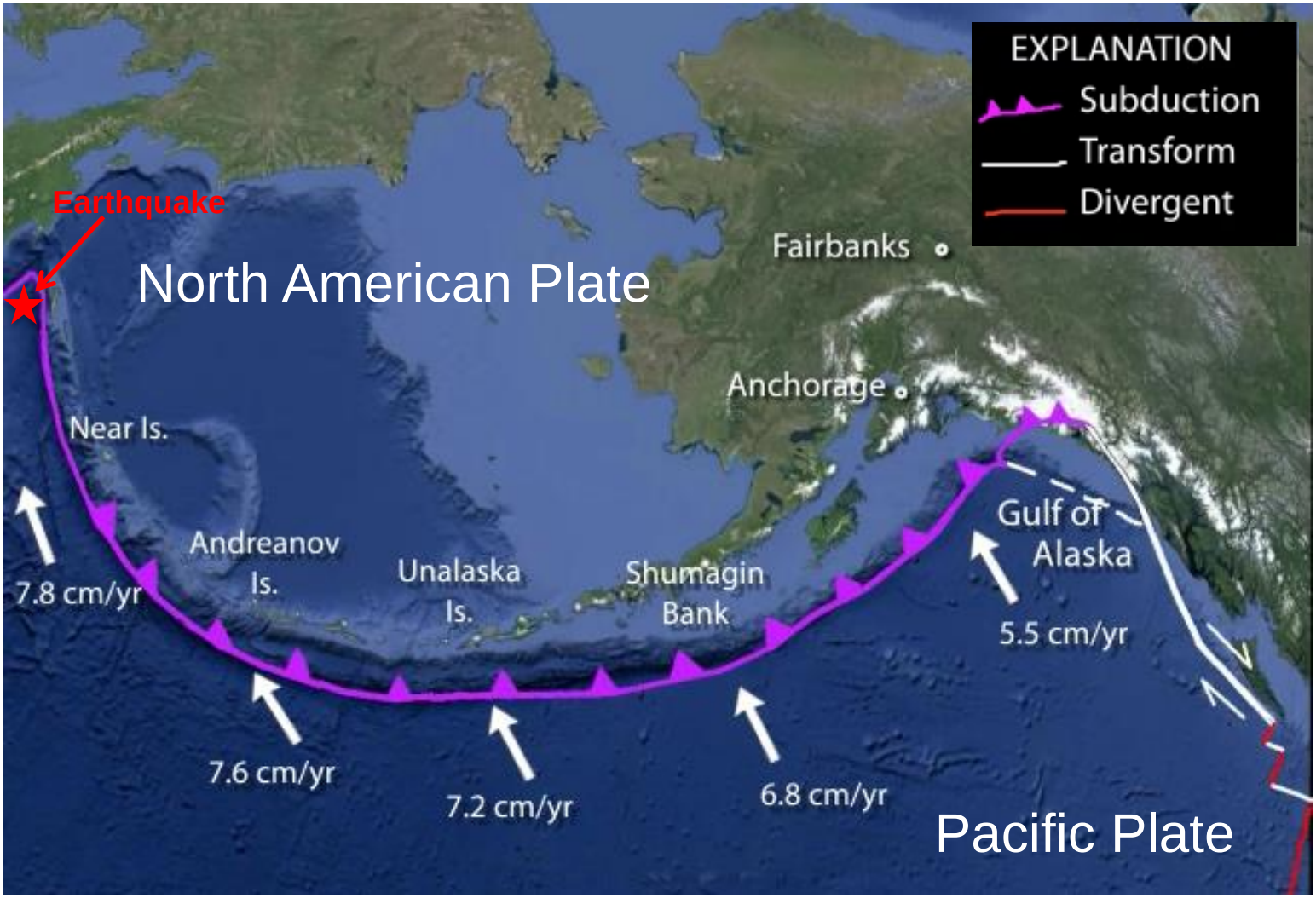

The Pacific Plate subducts beneath the North American Plate at the Alaska-Aleutian Trench. From east to west along the trench, plate convergence becomes progressively more oblique. At the western end of the trench, Pacific – North America relative plate motion is right-lateral strike-slip. The mechanism of this earthquake is normal faulting rather than strike-slip. This suggests that the earthquake is related to plate convergence at the Kuril - Kamchatka Trench rather than relative plate motion at the Alaska-Aleutian Trench.

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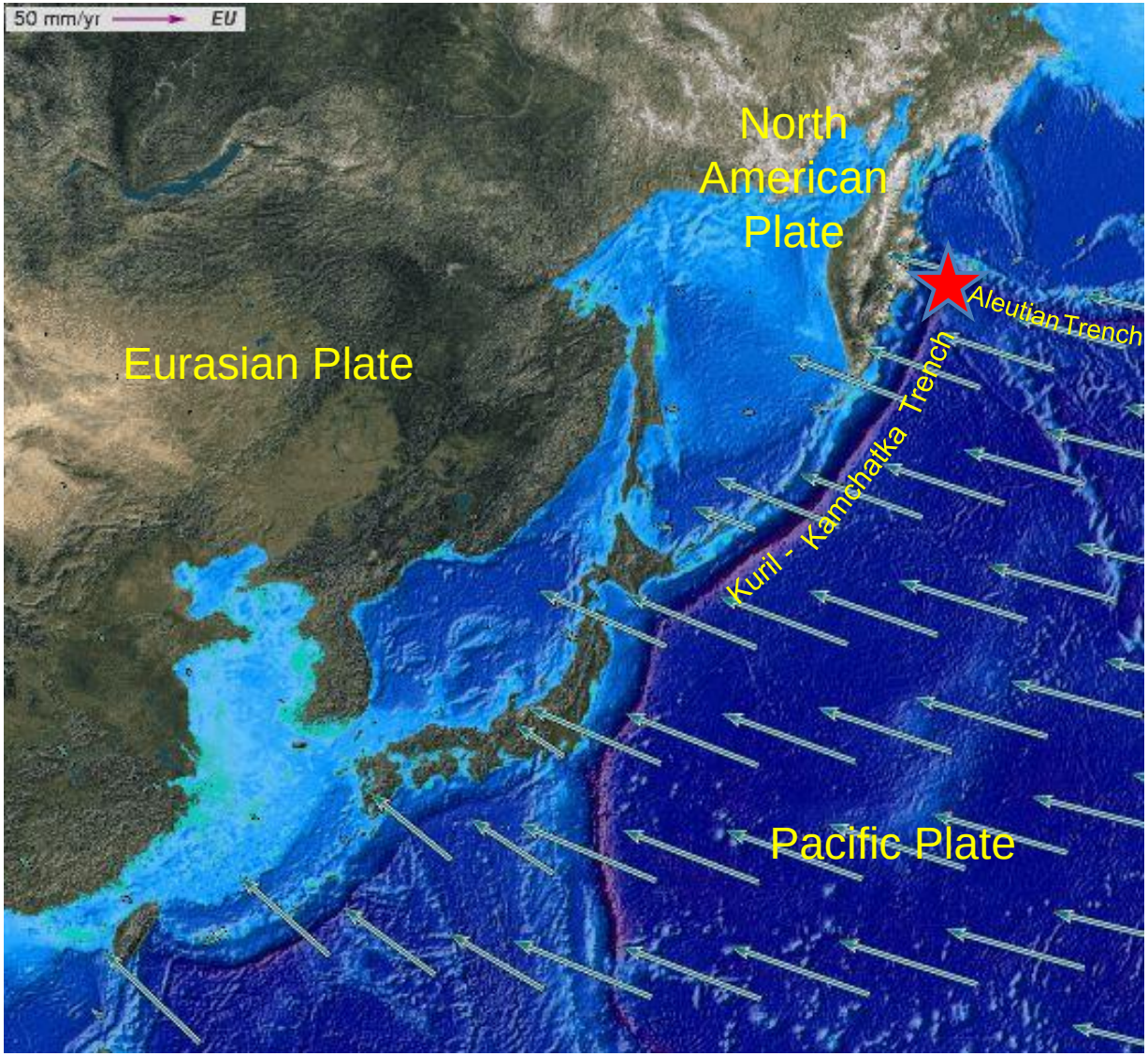
The blue arrows show the motion of the Pacific Plate with respect to the North American Plate. The red star is the epicenter of the this earthquake at the intersection of the Aleutian Trench with the Kuril-Kamchatka Trench.

At the northern end of the Kuril-Kamchatka Trench, the Pacific Plate subducts beneath the North American Plate at a rate of 76 mm/yr (7.6 cm/yr).



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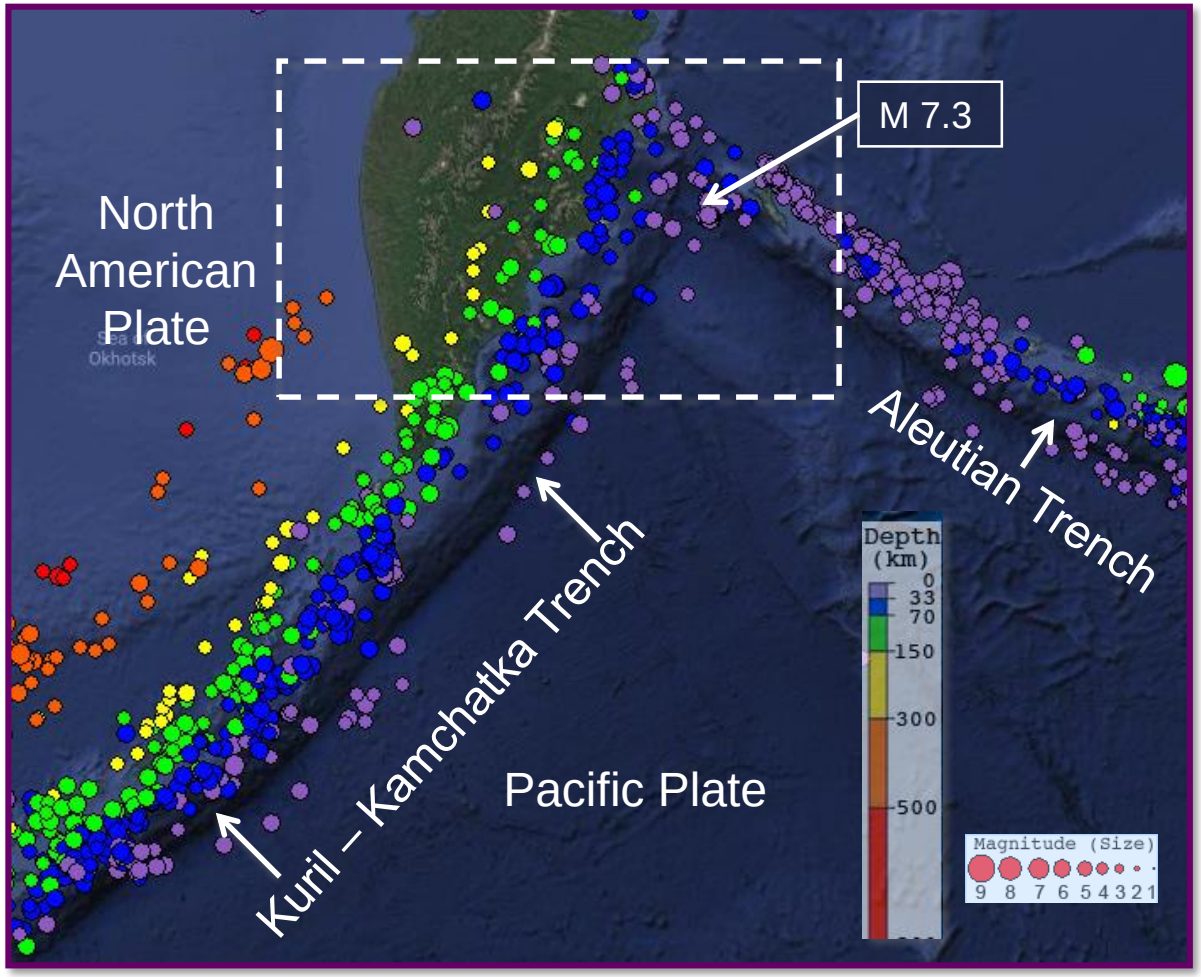
The map on the right shows regional seismicity in the area where the northern Kuril-Kamchatka Trench meets the westernmost Aleutian Trench. Earthquake depths in the the Kuril-Kamchatka subduction zone increase from southeast to northwest as the Pacific Plate dives deeper beneath the North American Plate.

This earthquake is located just east of the axis of the Kuril-Kamchatka Trench. A cross section of earthquakes within the area outlined by the dashed rectangle is shown in the next slide.



Map created using the IRIS Earthquake Browser: *www.iris.edu/ieb*

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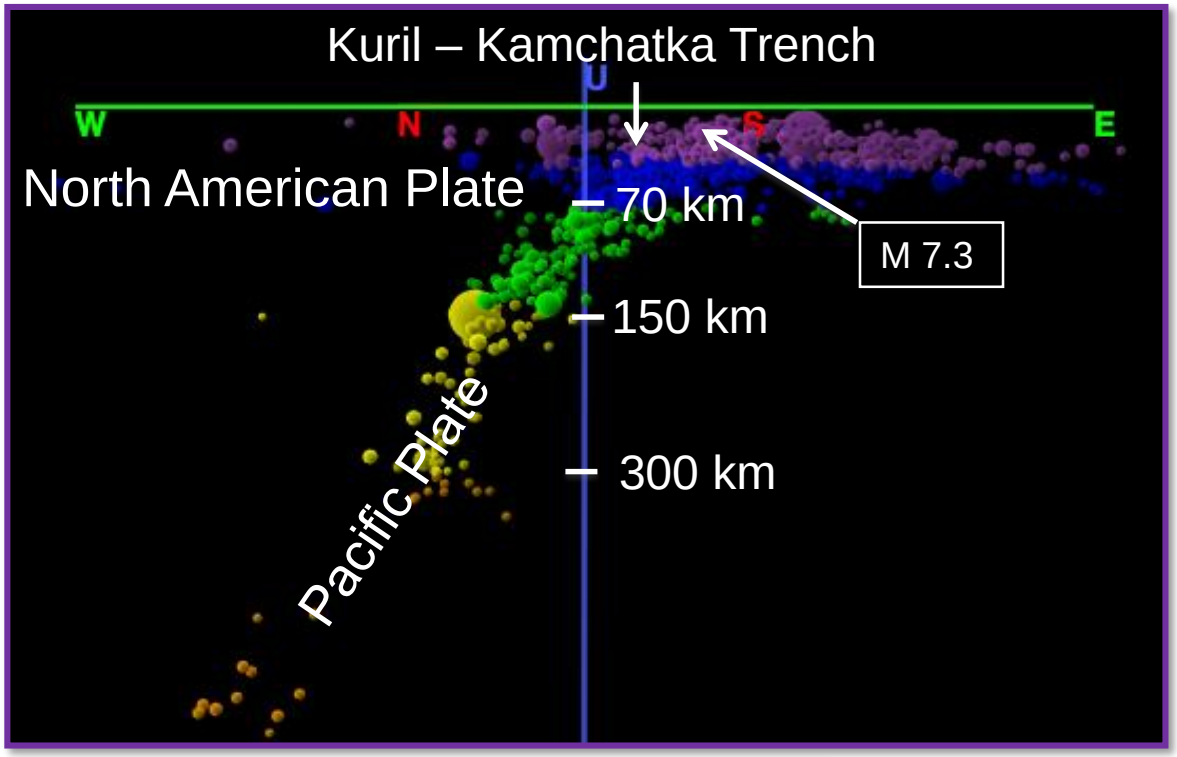
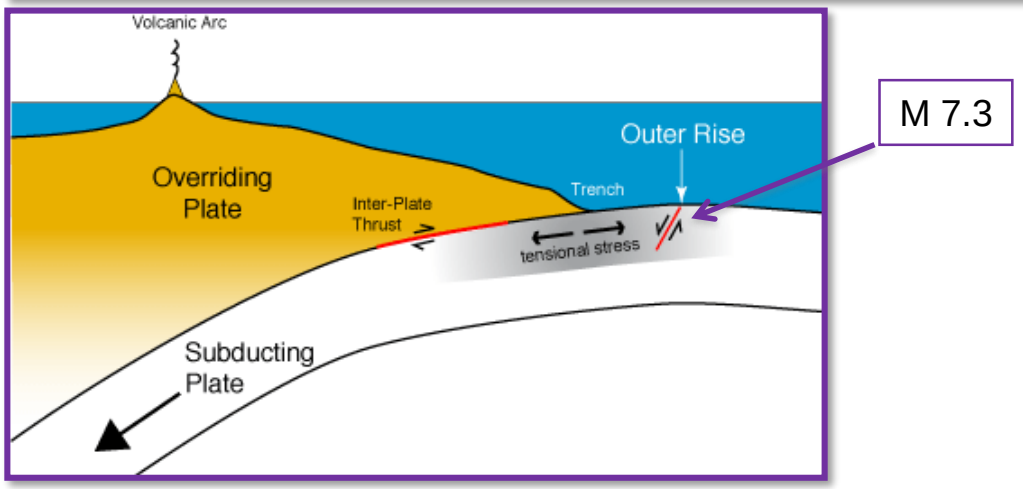
The cross section on the right shows earthquakes near the northern end of the Kuril-Kamchatka Trench. Events deeper than 100 km are within the subducting lithosphere of the Pacific Plate.

This earthquake occurred within the top part of the Pacific Plate where it bends down into the Kuril-Kamchatka Trench. The cartoon cross section at lower right shows how the upper portion of the subducting plate is put under tension as it bends. Normal-faulting earthquakes, like this event, often result from this tension in the "outer rise" area.





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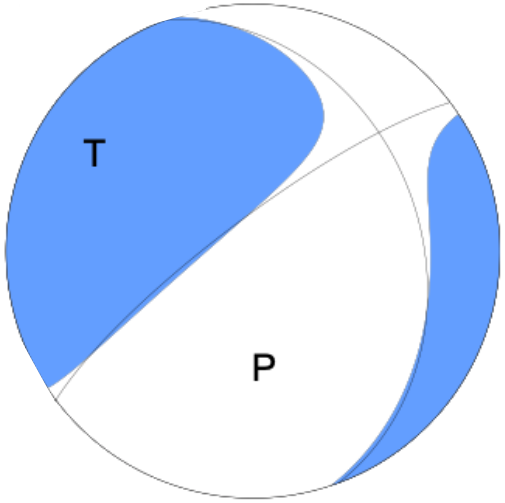
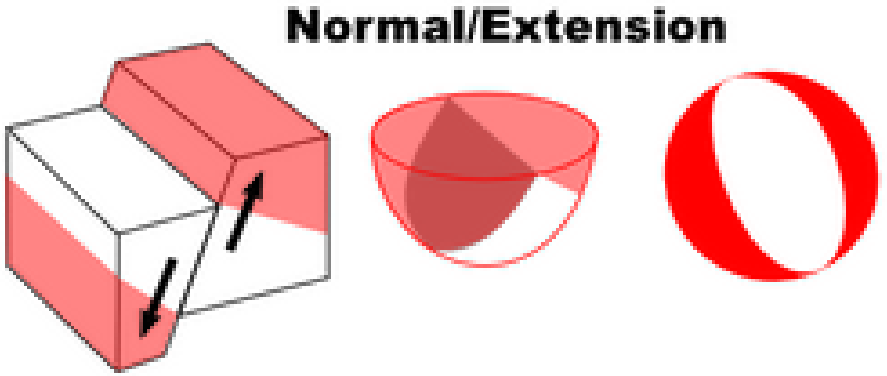
The focal mechanism is how seismologists plot the 3-D stress orientations of an earthquake. Because an earthquake occurs as slip on a fault, it generates primary (P) waves in quadrants where the first pulse is compressional (shaded) and quadrants where the first pulse is extensional (white). The orientation 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 normal faulting. The earthquake occurred at a depth of 16.6 km (10 miles) within the Pacific Plate where it bends into the Kuril-Kamchatka Trench.

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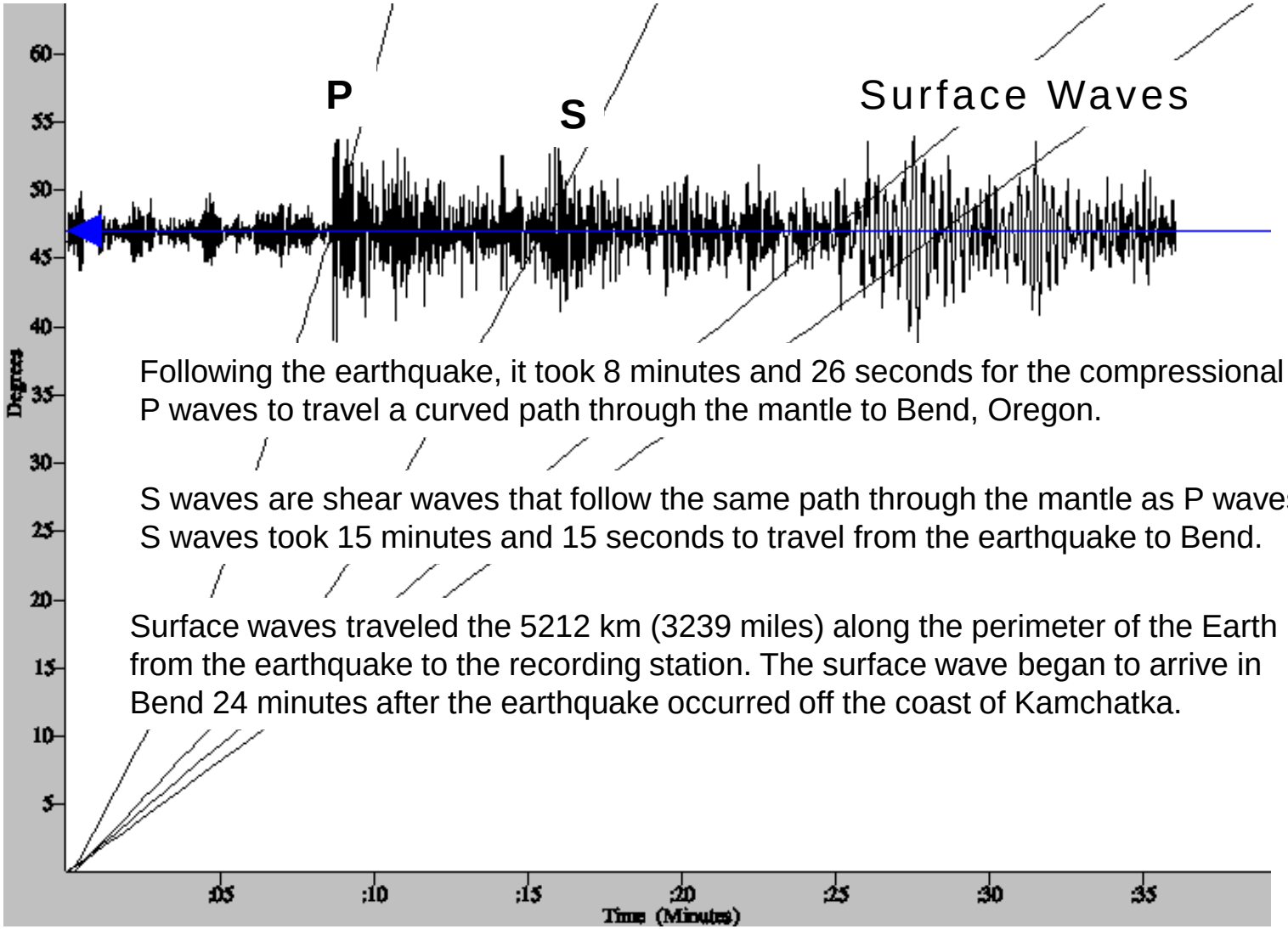
The record of the earthquake in Bend, Oregon (BNOR) is illustrated below. Bend is 5162 km (3208 miles, 46.5˚) from the location of this earthquake.



Following the earthquake, it took 8 minutes and 26 seconds for the compressional P waves to travel a curved path through the mantle to Bend, Oregon.

S waves are shear waves that follow the same path through the mantle as P waves. S waves took 15 minutes and 15 seconds to travel from the earthquake to Bend.

Surface waves traveled the 5212 km (3239 miles) along the perimeter of the Earth from the earthquake to the recording station. The surface wave began to arrive in Bend 24 minutes after the earthquake occurred off the coast of Kamchatka.

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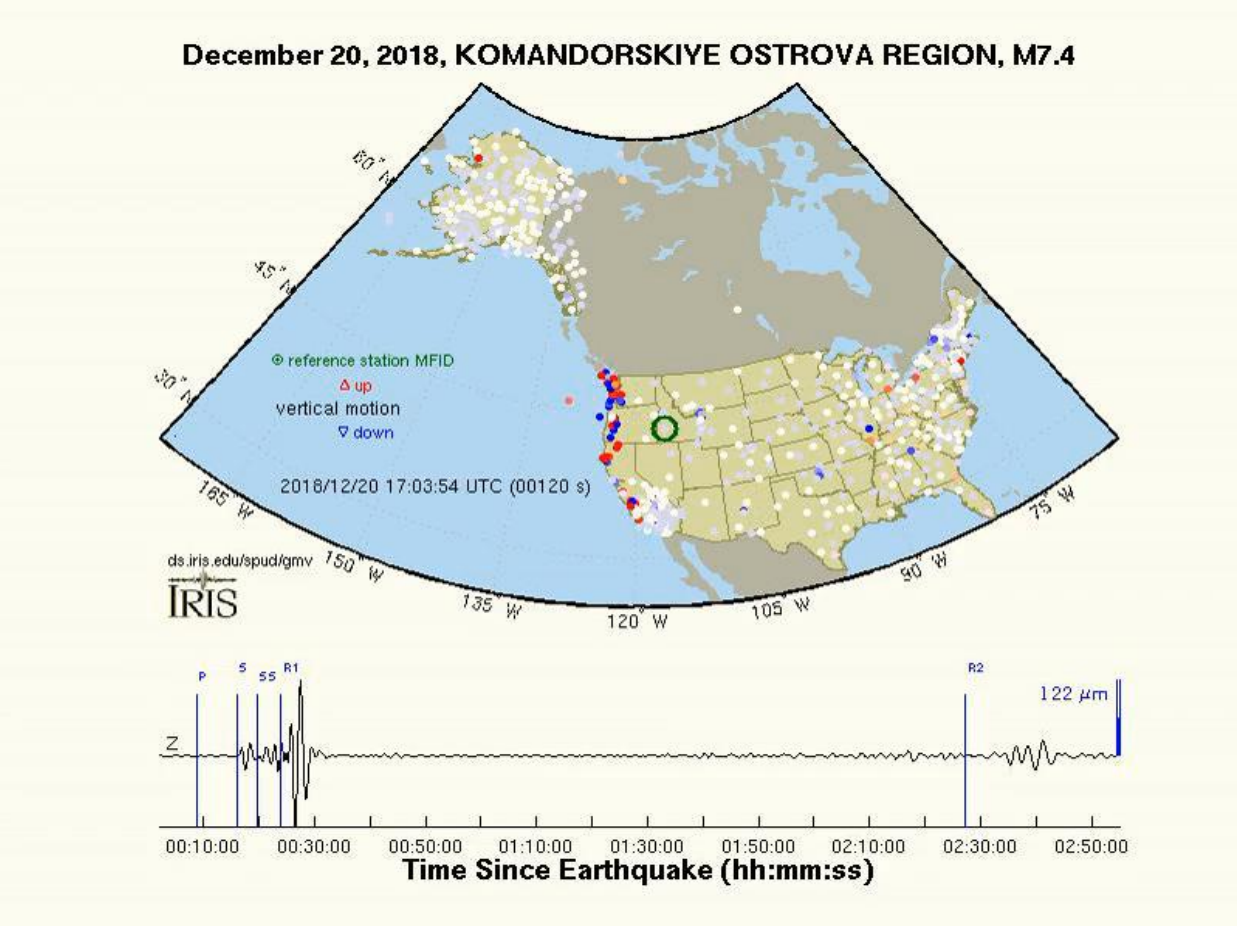
As earthquake waves travel along the surface of the Earth, they cause the ground to move. With the earthquake recording stations in EarthScope's Transportable Array, the ground motions can be captured and displayed as a movie, using the actual data recorded from the earthquake.

The circles in the movie represent earthquake recording stations and the color of each circle represents the amplitude, or height, of the earthquake wave detected by the station's seismometer.



Seismic waves crossing the US recorded by the USArray.

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