Magnitude 7.0 N of ANCHORAGE, ALASKA

Friday, November 30, 2018 at 17:29:28 UTC

A magnitude 7.0 earthquake occurred just before 8:30 am local time 8 miles north of Anchorage at a depth of 40.9 km (25.4 miles). There are reports of major infrastructure damage and damage to many homes and buildings.

A tsunami warning was temporarily issued for coastal regions of Cook Inlet and the Southern Kenai Peninsula, but it has since been canceled.

A car is trapped on a collapsed section of the offramp in Anchorage, Friday, Nov. 30, 2018. Back-to-back earthquakes measuring 7.0 and 5.8 rocked buildings and buckled roads Friday morning in Anchorage, prompting people to run from their offices or seek shelter under office desks, while a tsunami warning had some seeking higher ground. (AP Photo)

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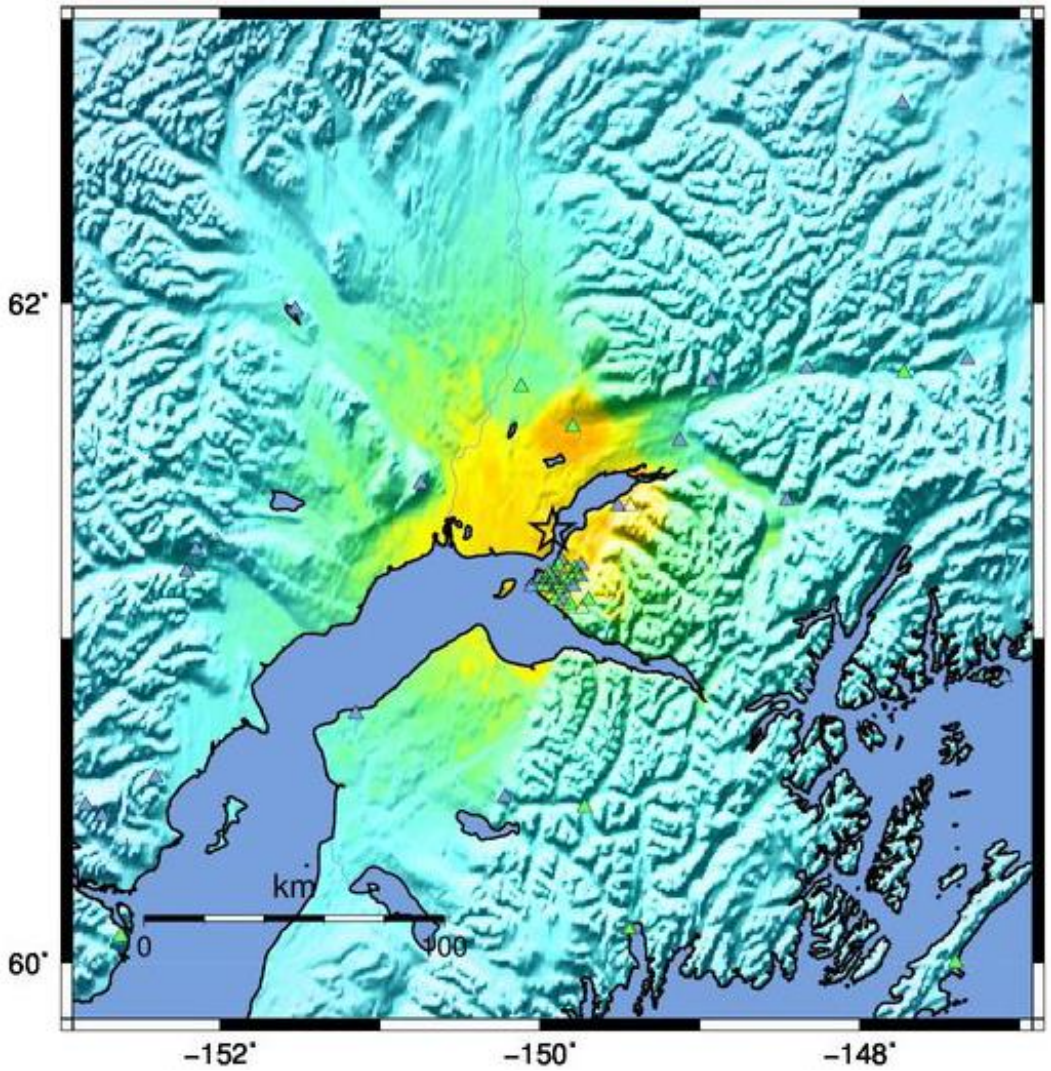
The Modified-Mercalli Intensity scale is a twelve-stage scale, from I to XII, that indicates the severity of ground shaking. Intensity is dependent on the magnitude, depth, bedrock, and location.

Anchorage experienced very strong 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 7.0 Earthquake

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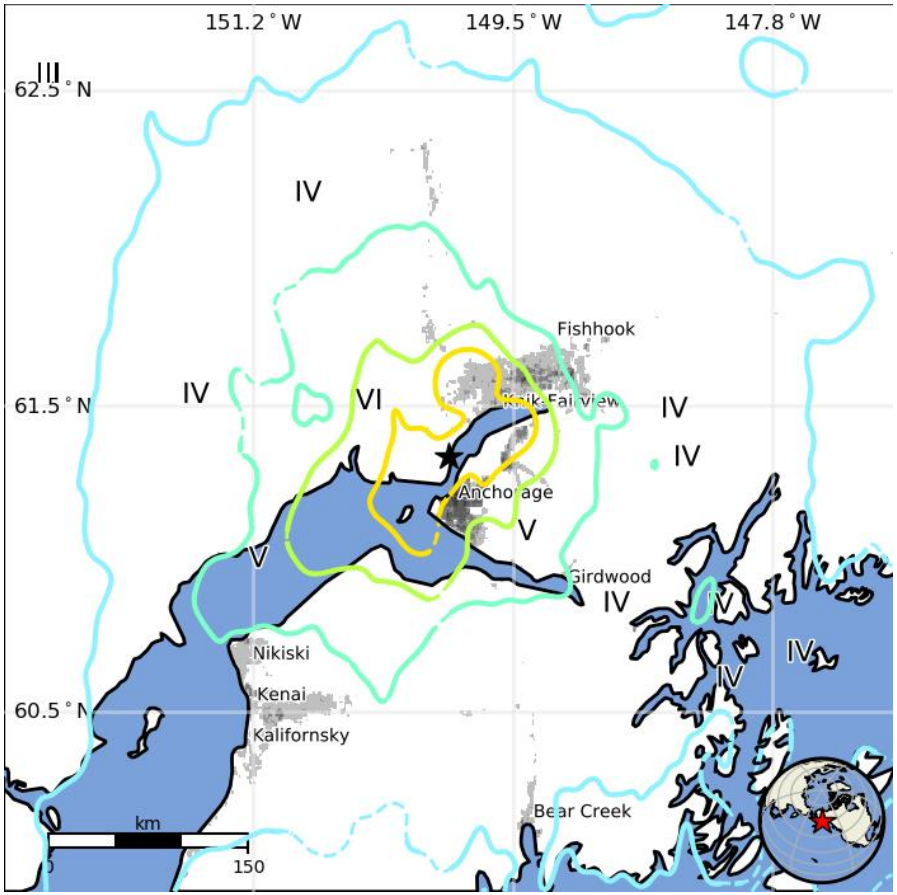
The USGS PAGER map shows the population exposed to different Modified Mercalli Intensity (MMI) levels.

The USGS estimates that 52,000 people felt very strong shaking from this earthquake.

I	Not Felt	0 k*
II-III	Weak	1 k*
IV	Light	70 k*
V	Moderate	48 k
VI	Strong	277 k
VII	Very Strong	52 k
VIII	Severe	0 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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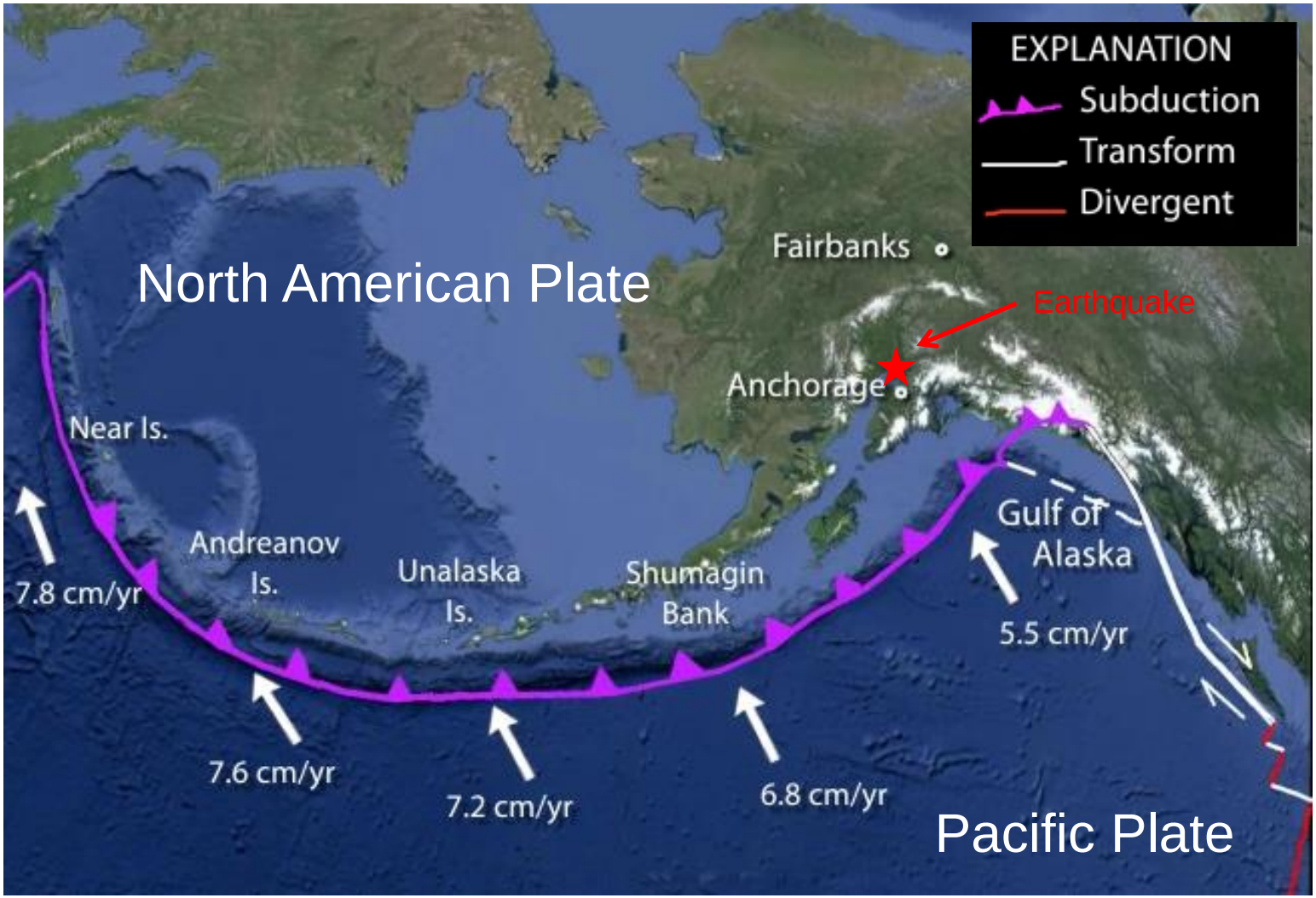

The Pacific Plate converges with and subducts beneath the North American Plate at the Alaska-Aleutian Trench 330 km (205 miles) southeast of Anchorage. Rates of relative plate motion range from 5.5 cm/yr in the Gulf of Alaska to 7.8 cm/yr at the western end of the Aleutian Island chain. In addition to earthquakes on the plate boundary, earthquakes also occur within the North American Plate across southern Alaska.

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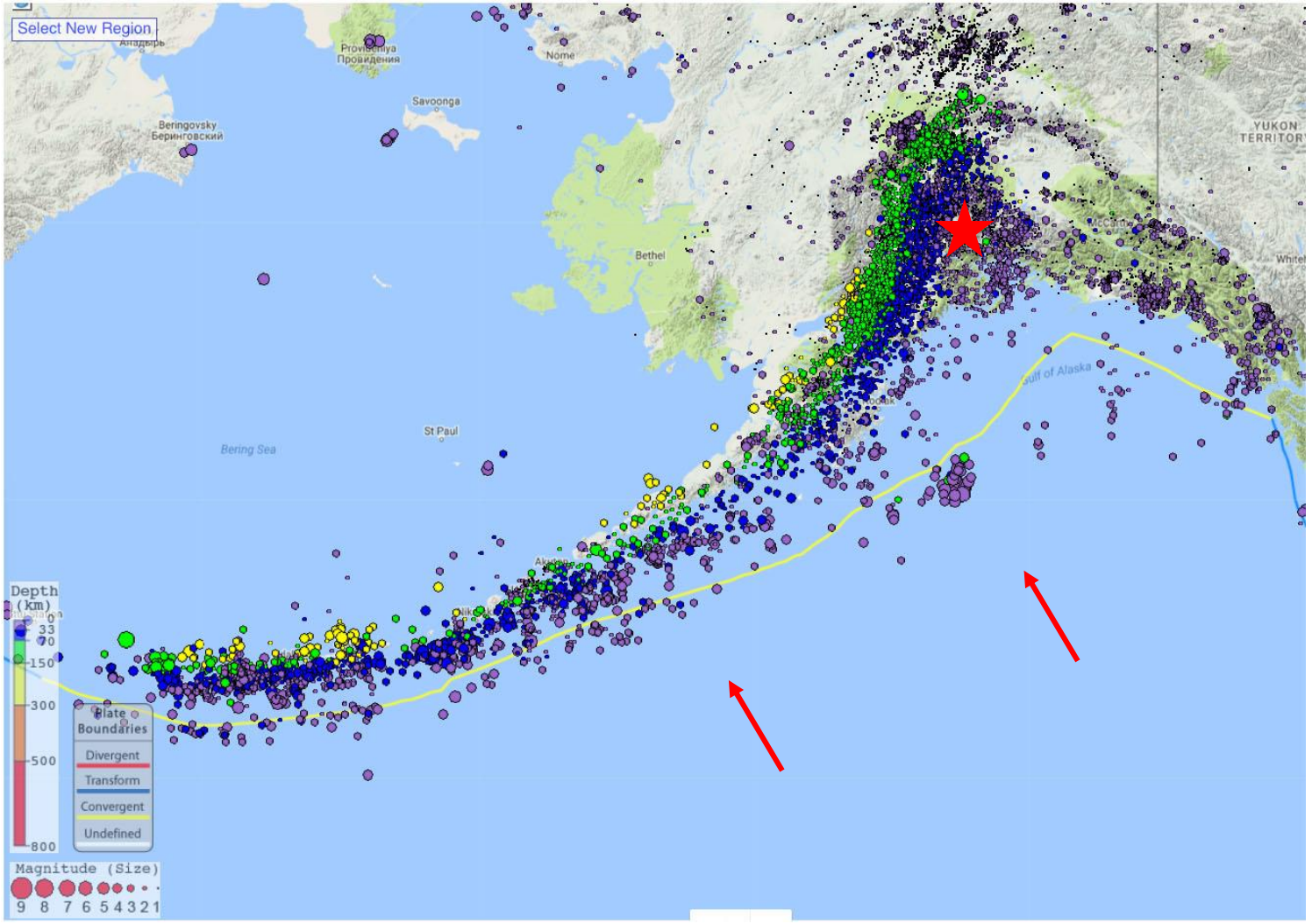
Epicenters are shown on a map of regional historic seismicity for earthquakes greater than magnitude 4 since 1978.



50 years of seismicity (1978-2018)

Map created from IRIS Earthquake Browser (www.iris.edu/ieb)

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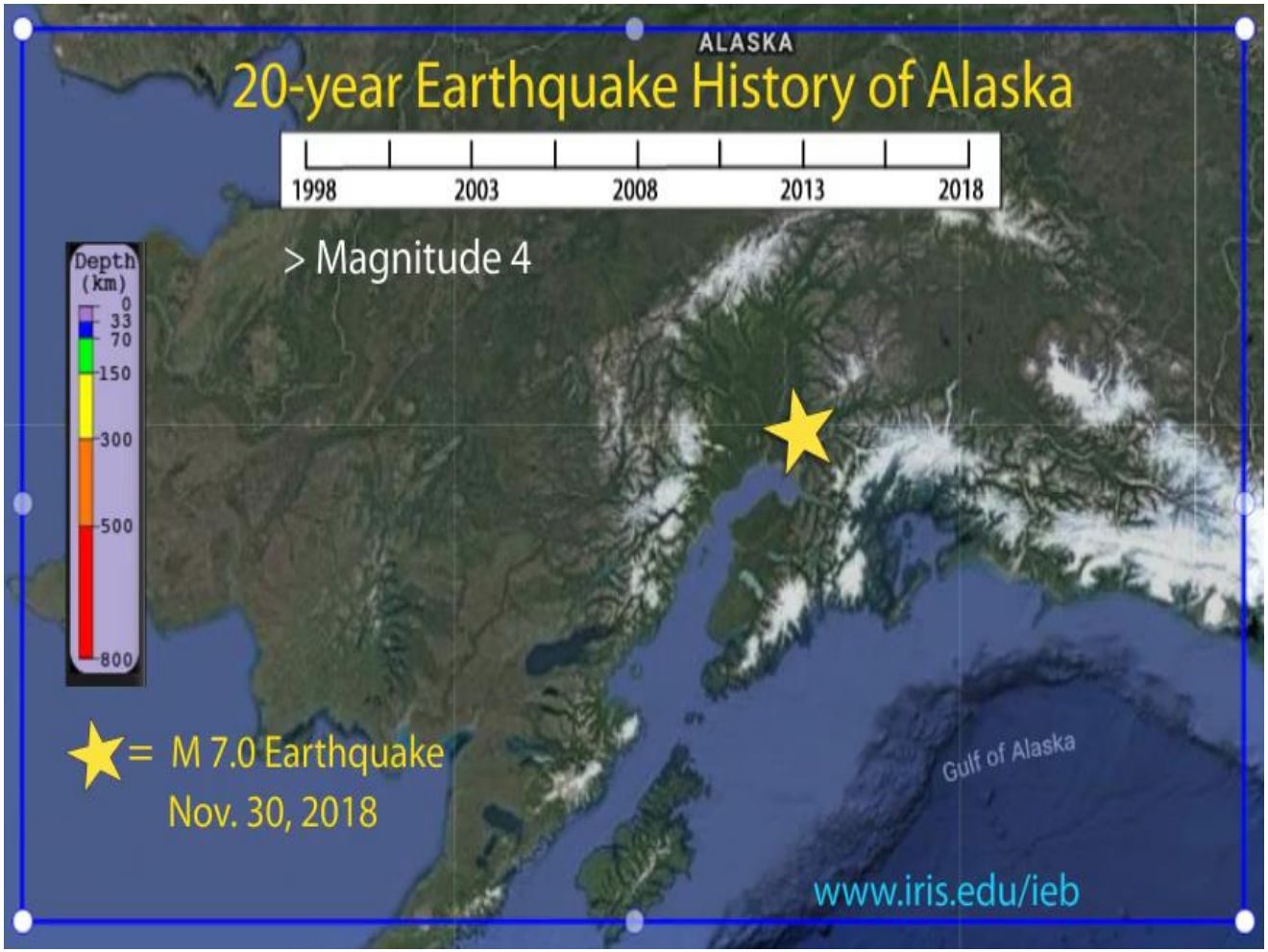

This animation explores the relationship between this earthquake and the historical seismicity of the region.

Animation created from IRIS Earthquake Browser (www.iris.edu/ieb)

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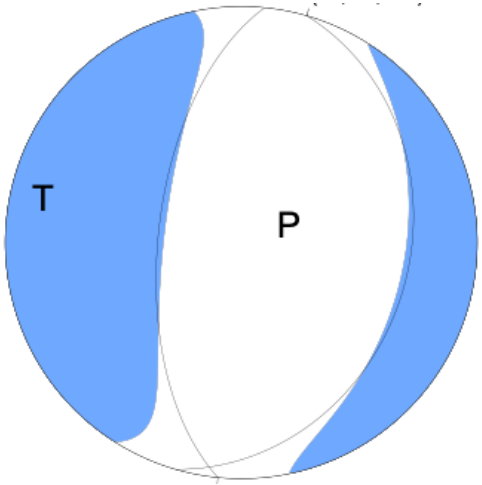
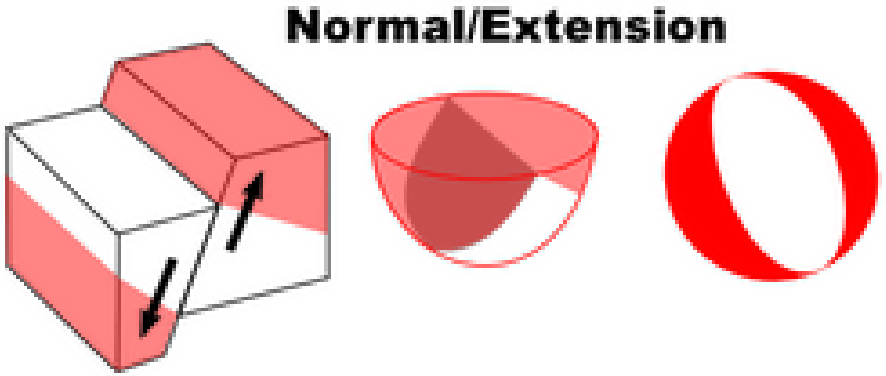
The focal mechanism is how seismologists plot the 3-D stress orientations of an earthquake. Because an earthquake occurs as slip on a fault, it generates primary (P) waves in quadrants where the first pulse is compressional (shaded) and quadrants where the first pulse is extensional (white). The orientation 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 40 km, placing it within the subducting Pacific Plate.

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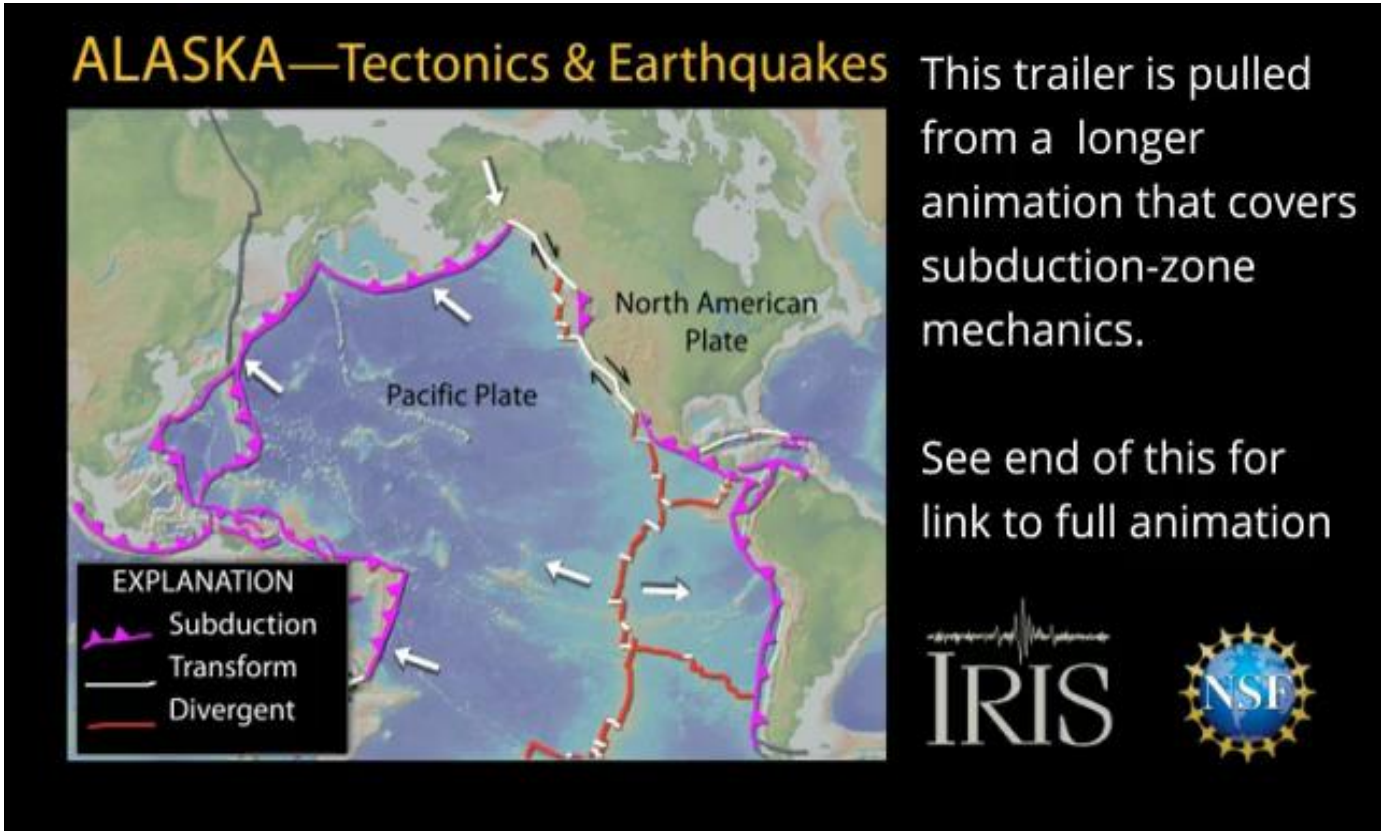
According to the USGS, over the past century, 14 other M 6+ earthquakes have occurred within 150 km of this event. Two of these – a M 6.6 earthquake in July 1983 and a M 6.4 event in September 1983 – were at a similarly shallow depth and caused damage in the region of Valdez. The M 9.2 great Alaska earthquake of March 1964, was a megathrust earthquake that ruptured several hundred kilometers of the Alaska-Aleutians subduction zone plate boundary beneath Anchorage, Cook Inlet, the Kenai Peninsula, and Kodiak Island.



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

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The National Tsunami Warning Center in Palmer, Alaska issued a Tsunami Warning for Cook Inlet and the Kenai Peninsula. That warning was cancelled at 9:58 AM after no tsunami observations had occurred. Most tsunamis are generated by displacement of the ocean floor during megathrust earthquakes on subduction zone plate boundaries. With a depth of 40 km (25 miles) , this earthquake did not offset the ocean floor to produce a tsunami.

However, local landslide-generated tsunamis caused by earthquake ground shaking are a major hazard to coastal communities in Alaska. Indeed, landslide-generated tsunamis that inundated communities in the Gulf of Alaska caused the majority of fatalities during the 1964 Great Alaska earthquake and tsunami. So evacuation from shoreline areas to high ground is an appropriate emergency response whenever ground shaking is felt.

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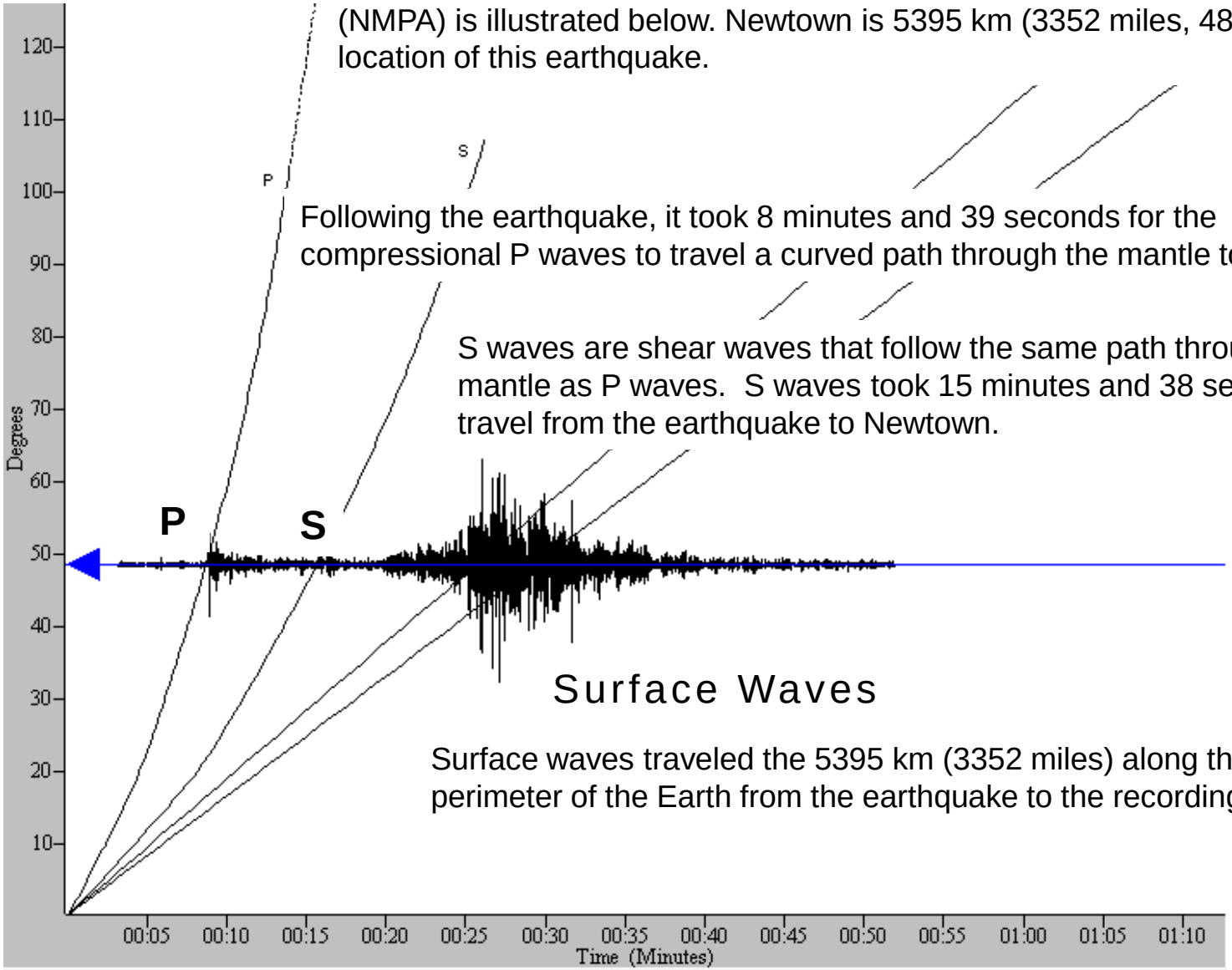
The record of the earthquake at Newtown Middle School in Newtown, PA (NMPA) is illustrated below. Newtown is 5395 km (3352 miles, 48.6˚) from the location of this earthquake.



Following the earthquake, it took 8 minutes and 39 seconds for the compressional P waves to travel a curved path through the mantle to Newtown, PA.

S waves are shear waves that follow the same path through the mantle as P waves. S waves took 15 minutes and 38 seconds to travel from the earthquake to Newtown.

Surface Waves

Surface waves traveled the 5395 km (3352 miles) along the perimeter of the Earth from the earthquake to the recording station.

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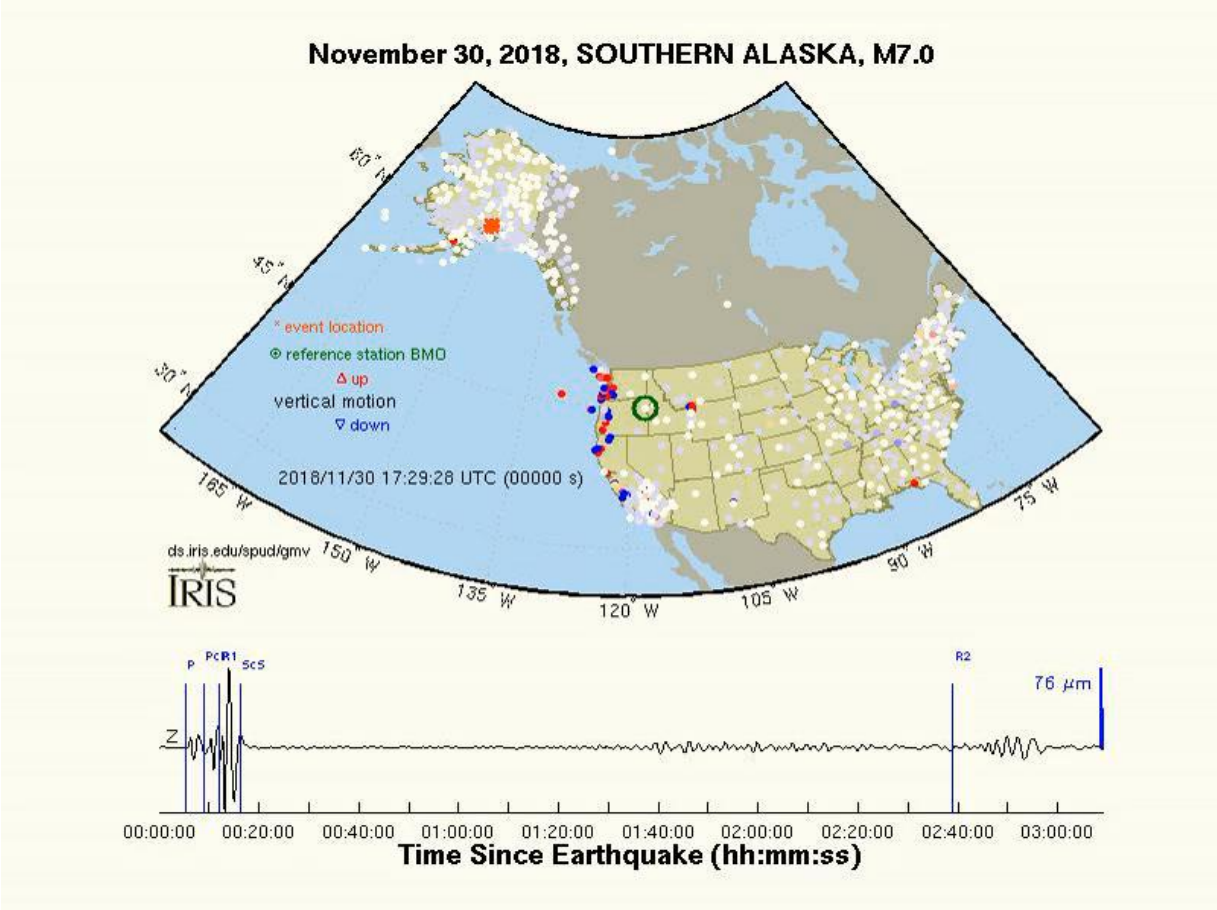
As earthquake waves travel along the surface of the Earth, they cause the ground to move. With the earthquake recording stations in EarthScope's Transportable Array, the ground motions can be captured and displayed as a movie, using the actual data recorded from the earthquake.

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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