Magnitude 7.2 SOUTH OF SAND POINT, ALASKA

Sunday, July 16, 2023 at 06:48:22 UTC

Latitude 54.460° N
Longitude 160.760° W
Depth 32.6 km

At 10:48 pm Alaska time on July 15th, a magnitude 7.2 earthquake struck 88 km (55 miles) southwest of Sand Point at a depth of 32.6 km (20.3 miles).

Thirteen aftershocks followed ranging from magnitude 3.0 to magnitude 5.7.

No major damage was reported.

The initial National Tsunami Warning Center alert for coastal Alaska was canceled after determining that there was no threat.

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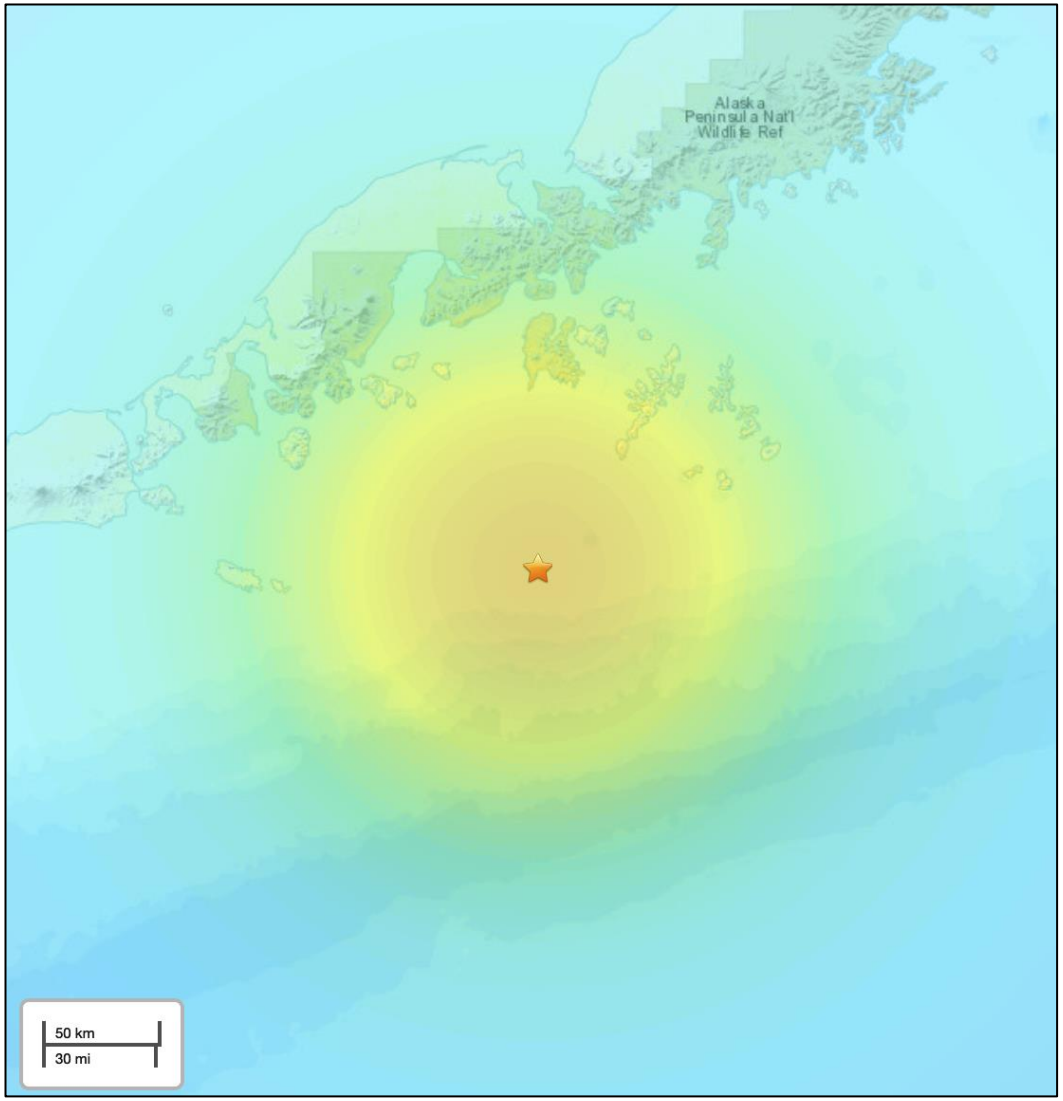
The Modified-Mercalli Intensity scale is a twelve-stage scale, from I to XII, that indicates the severity of ground shaking. Intensity is dependent on the magnitude, depth, bedrock, and location.

Strong shaking was felt 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 7.2 Earthquake

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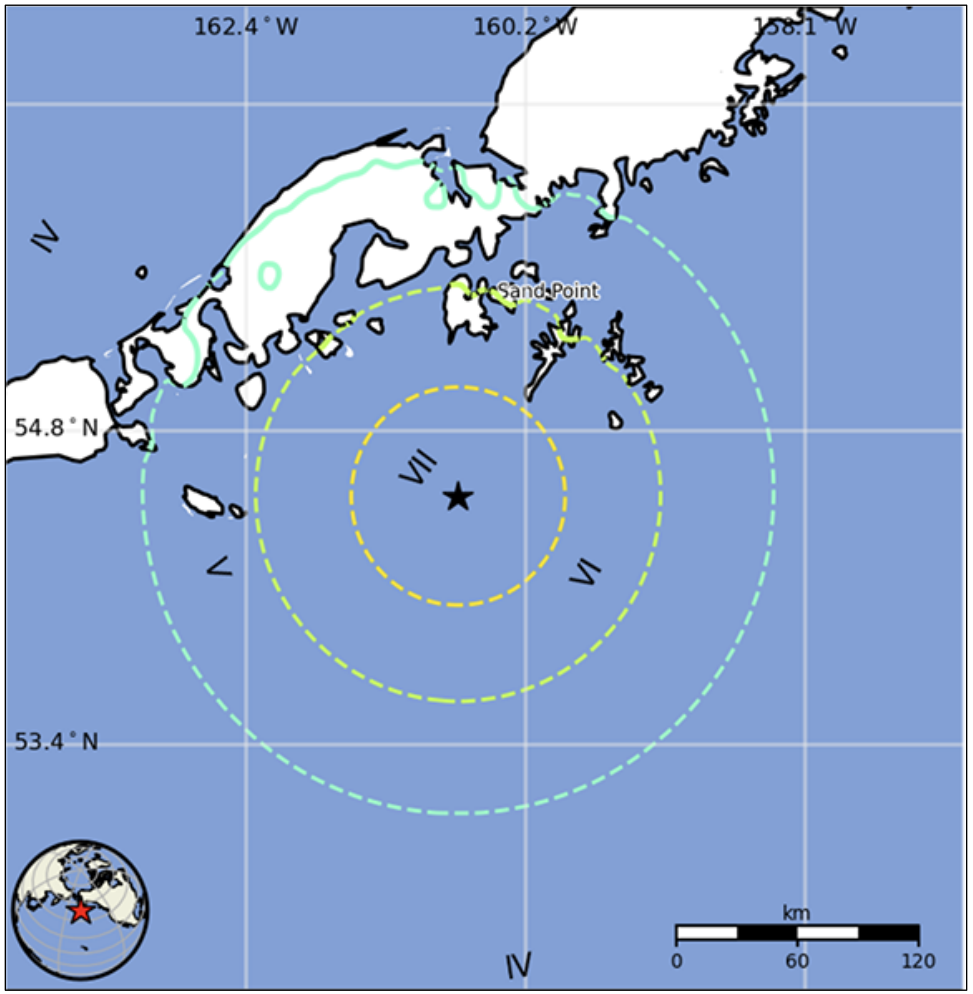
The USGS PAGER map shows the population exposed to different Modified Mercalli Intensity (MMI) levels.

The USGS estimates that three thousand people felt moderate to strong shaking from this earthquake.

I	Not Felt	0 k*
II-III	Weak	0 k*
IV	Light	0 k*
V	Moderate	1 k
VI	Strong	2 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 map on the right was compiled by the Alaska Earthquake Center. They noted that: "*The July 16, 2023 M7.2 earthquake occurred within the M7.8 aftershock zone. While the M7.8 aftershock activity greatly diminished since its peak in the summer of 2022, the Earthquake Center was still observing elevated levels of seismic activity within the M7.8 aftershock zone in 2023. Thus, the July 16, 2023 M7.2 earthquake can be recognized as a late aftershock of the M7.8 earthquake*."

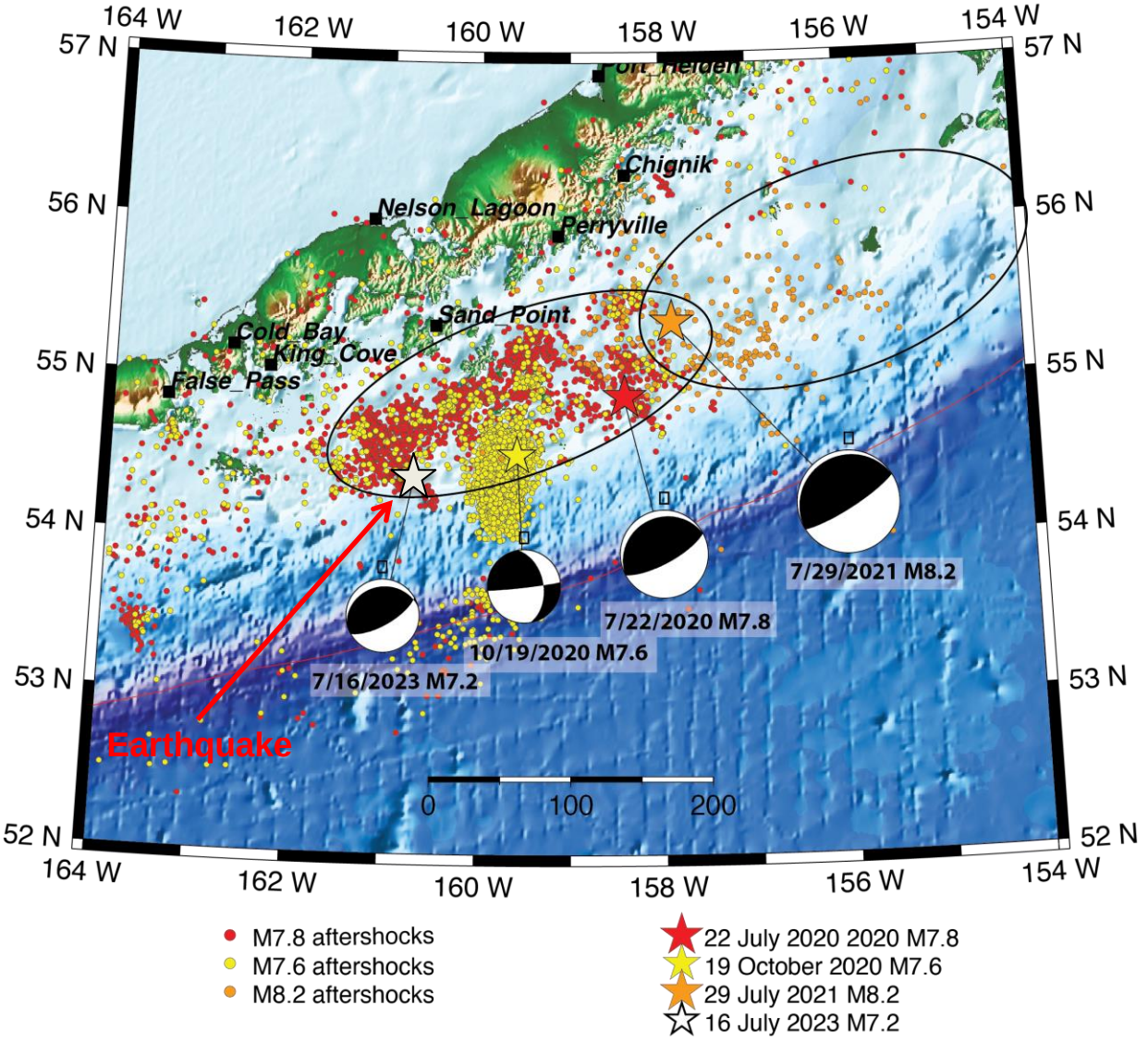

Image courtesy of the Alaska Earthquake Center

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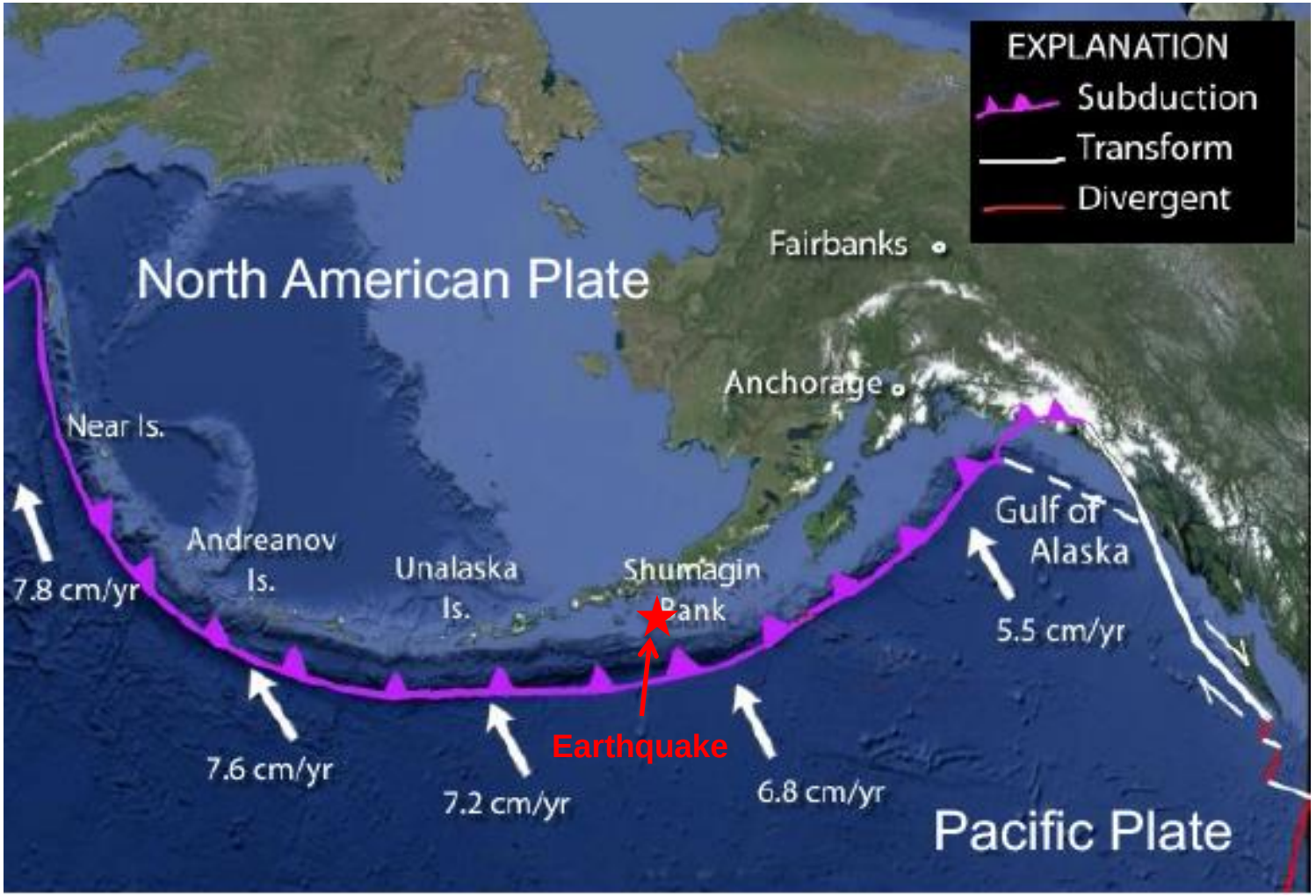

The Pacific Plate subducts beneath the North American Plate at the Alaska–Aleutian Trench just south of this earthquake. Rates of relative plate motion range from 5.5 cm/yr in the Gulf of Alaska to 7.8 cm/yr at the western end of the Aleutian Island chain. The rate of subduction in the location of this earthquake is about 6.9 cm/yr. The thrust mechanism (slide 10) and depth of the earthquake indicate that it occurred on or near the Pacific–North America megathrust plate boundary.

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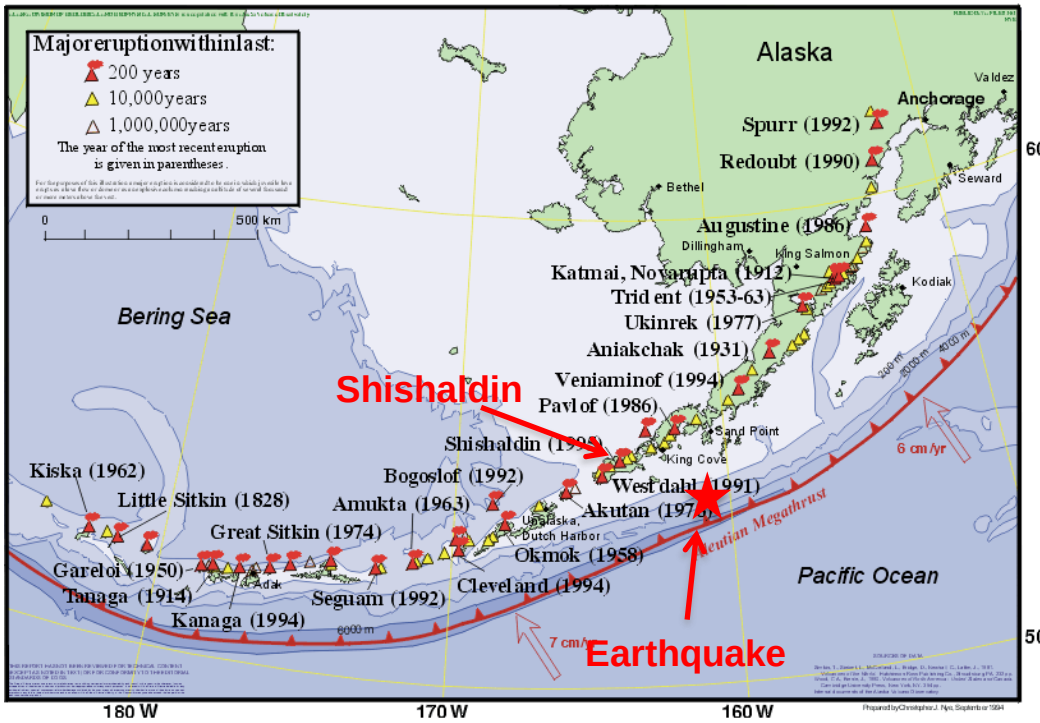
Volcanoes are another feature of subduction zones. Hardly a year goes by without a major eruption from a volcano in the Aleutian Arc.

Mt. Shishaldin experienced an explosive eruption on Friday and Saturday July 14–15. A continuous ash plume with an altitude of about 16,000 ft above sea level extended over 80 miles to the SSE from the volcano.

Shishaldin Volcano eruption plume, Jul. 14, 2023. (Photo courtesy of Lee Cooper, onboard the Canadian Coast Guard icebreaker Sir Wilfrid Laurier.)



By Sunday July 16th, there was a decline in explosive activity. The Aviation Color Code was reduced to ORANGE and the Volcano Alert Level reduced to *WATCH*. Explosive eruptive activity can resume quickly and with little warning.

There is no relationship between the eruption and this earthquake.

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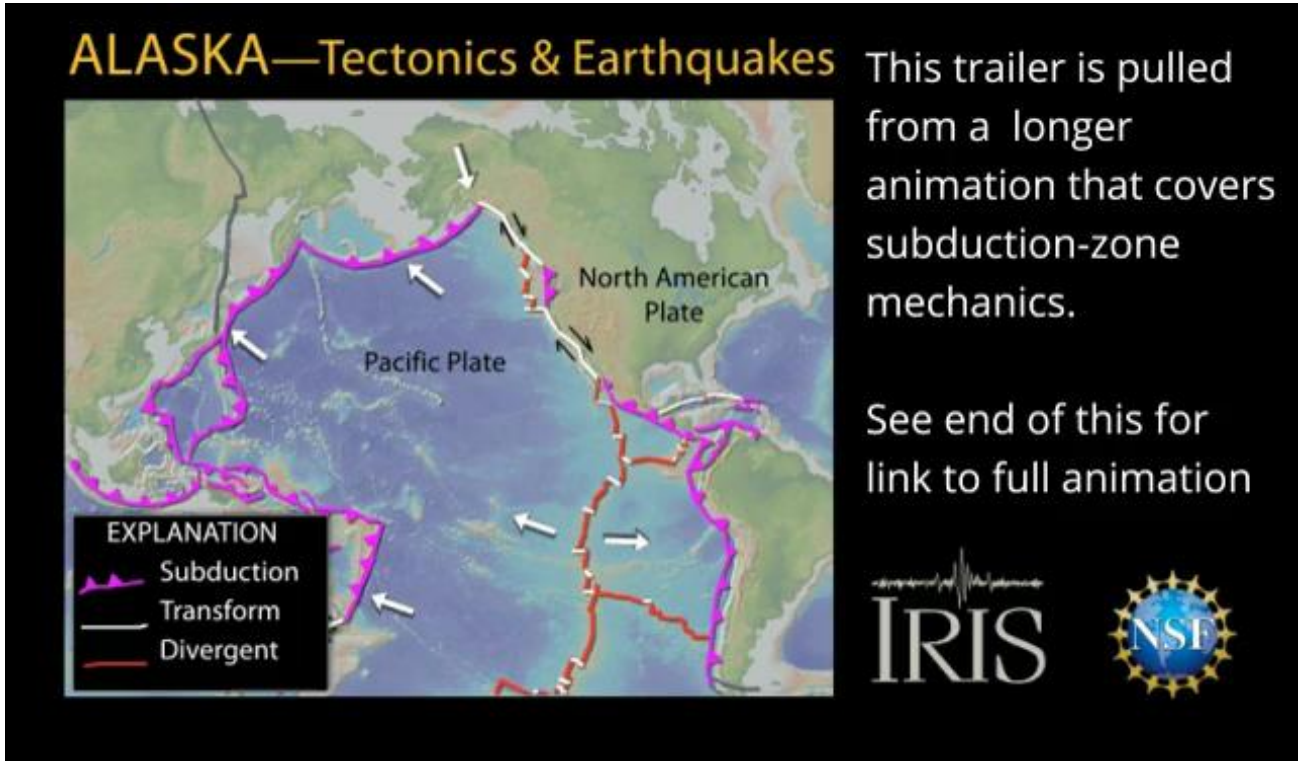
While the M7.2 July 16, 2023 earthquake was a “major” earthquake with magnitude greater than 7.0, it is not unusual. Since 2000, there have been 12 other magnitude 7 or larger earthquakes on the Pacific–North America subduction zone at the Alaska–Aleutian Trench. According to the US Geological Survey, there have been eight “Great” magnitude 8 and 9 earthquakes on this subduction zone plate boundary since 1900. The magnitude 8.6 April 1, 1946 earthquake occurred just 150 km west-southwest of the July 16, 2023 earthquake. The 1946 earthquake generated a tsunami that took 159 lives in Hilo, Hawaii.



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

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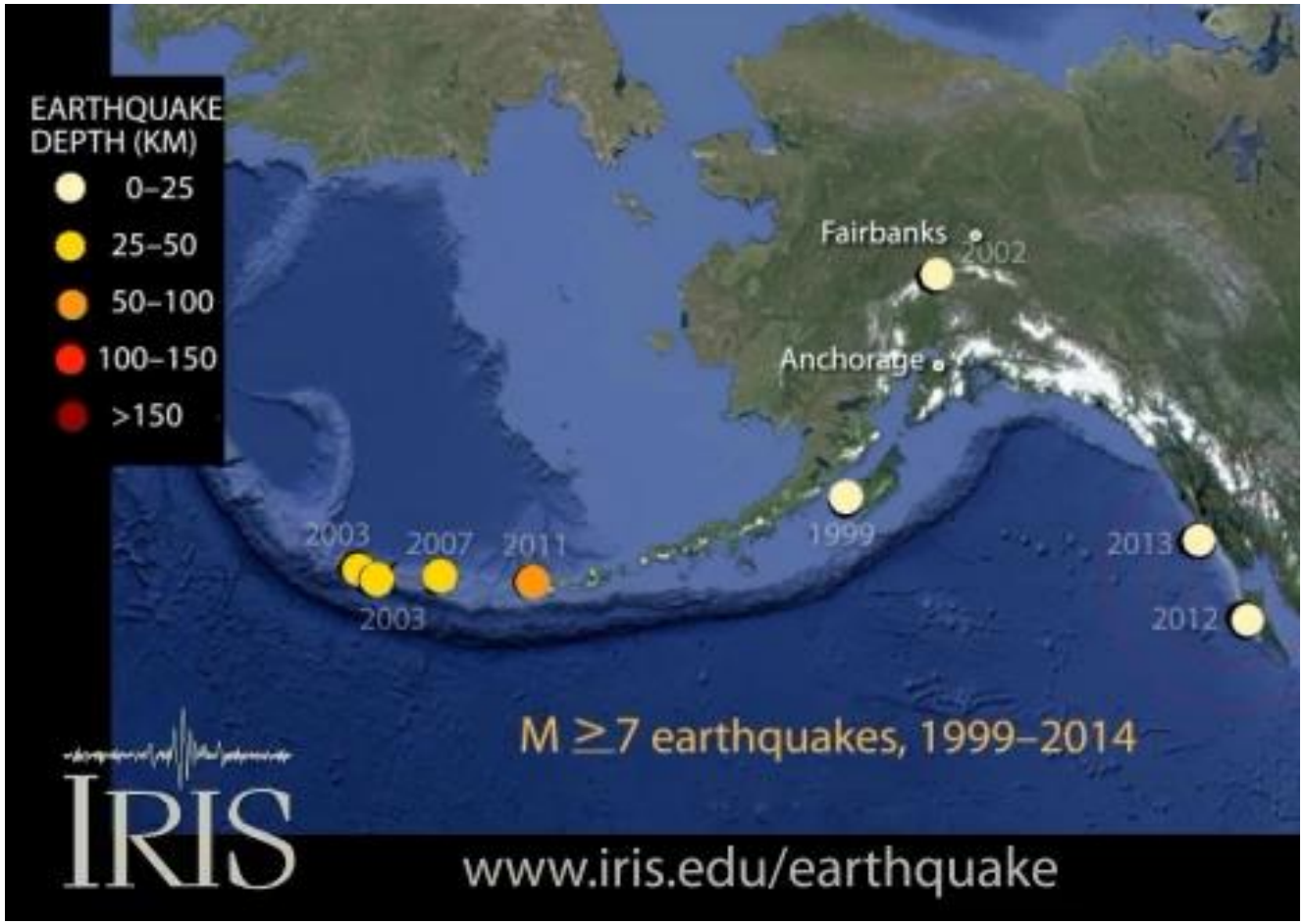
Earthquakes happen frequently in the Aleutians and fill in almost the entire arc.
This animation shows the biggest earthquakes in a 15-year period along with all the M>4 events.



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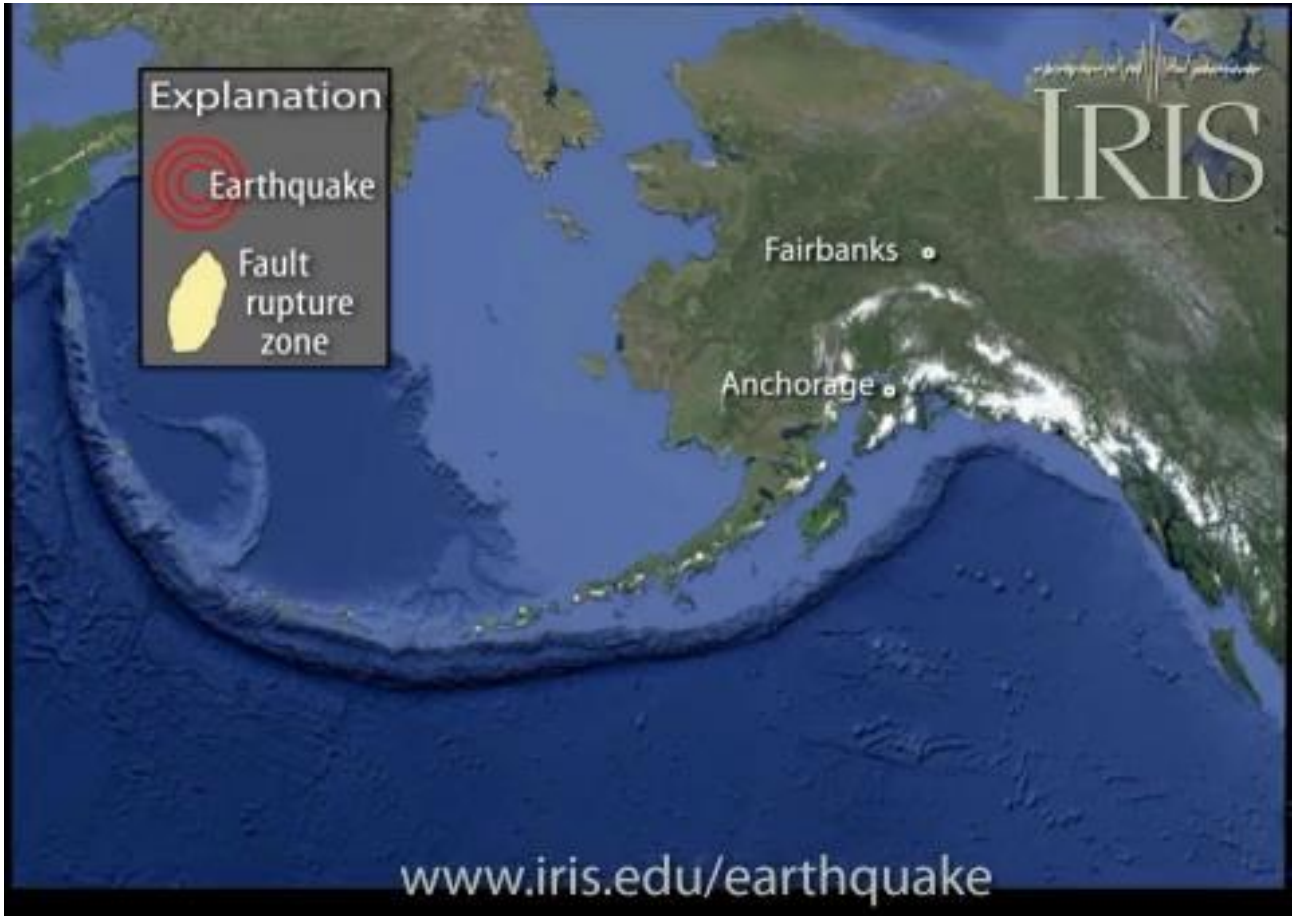
Plotted in this animation, M8+ earthquakes have ruptured nearly the entire Aleutian arc in the past 85 years except for a small segment near the Shumagin Islands, commonly referred to as the Shumagin Gap.



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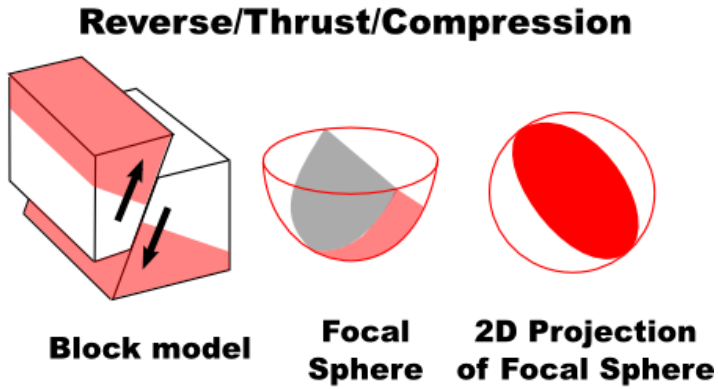
Shaded areas show quadrants of the focal sphere in which the P-wave first-motions are away from the source, and unshaded areas show quadrants in which the P-wave first-motions are toward the source. The letters represent the axis of maximum compressional strain (P) and the axis of maximum extensional strain (T) resulting from the earthquake.

According to the USGS, the preliminary location, depth and focal mechanism of the event indicate rupture occurred on a north-northwest-dipping thrust fault. This is consistent with the July 16, 2023 earthquake occurring on the Pacific–North America subduction zone megathrust.

USGS W-phase Moment Tensor Solution



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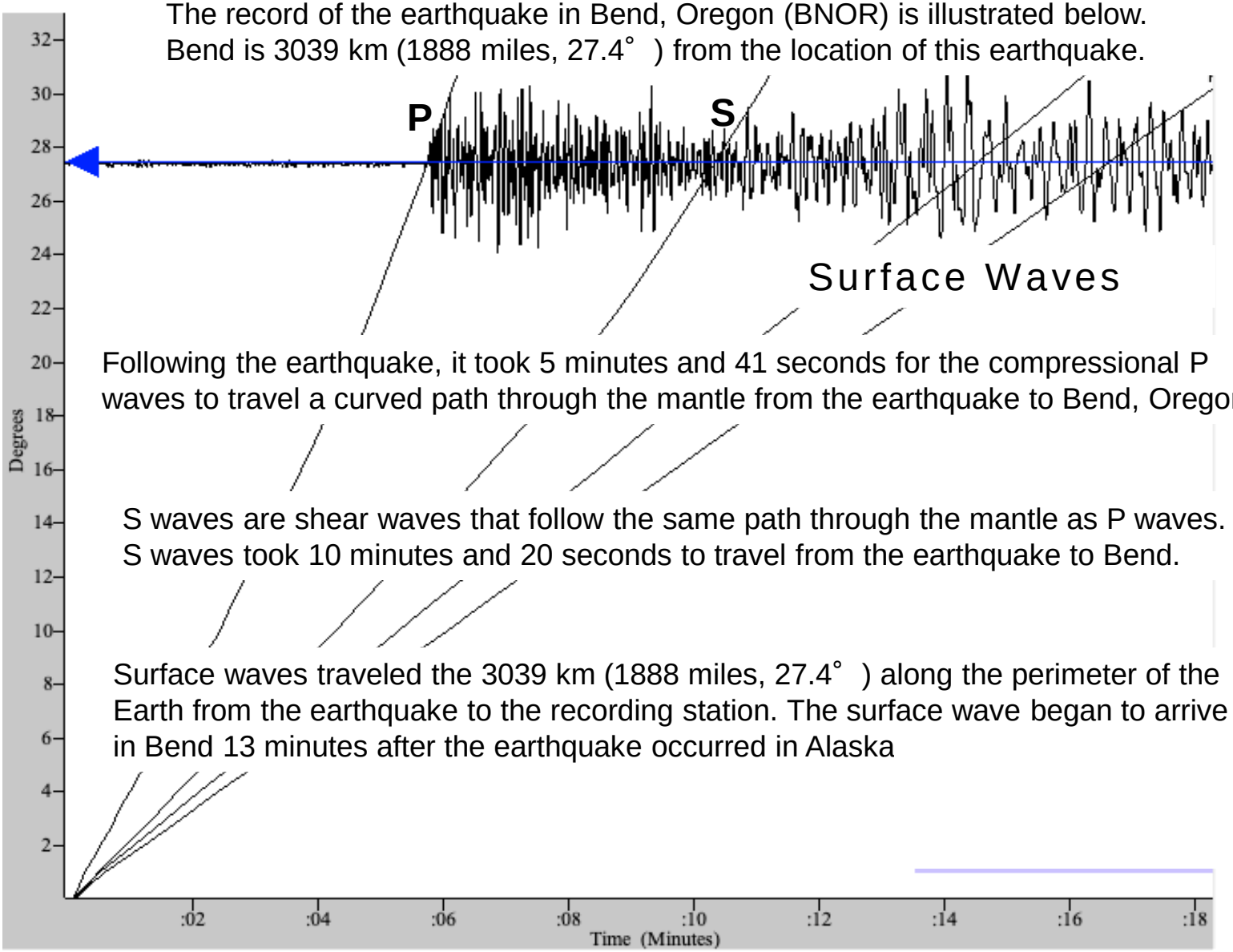
The record of the earthquake in Bend, Oregon (BNOR) is illustrated below. Bend is 3039 km (1888 miles, 27.4˚) from the location of this earthquake.



Following the earthquake, it took 5 minutes and 41 seconds for the compressional P waves to travel a curved path through the mantle from the earthquake to Bend, Oregon.

S waves are shear waves that follow the same path through the mantle as P waves. S waves took 10 minutes and 20 seconds to travel from the earthquake to Bend.

Surface waves traveled the 3039 km (1888 miles, 27.4˚) along the perimeter of the Earth from the earthquake to the recording station. The surface wave began to arrive in Bend 13 minutes after the earthquake occurred in Alaska

Teachable Moments are a service of

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