Magnitude 6.5 IDAHO
Tuesday, March 31, 2020 at 23:52:31 UTC

A magnitude 6.5 earthquake occurred 72 km (44.7 miles) west of Challis, Idaho at a depth of 10 km (6.2 miles). This earthquake was widely felt across multiple states. There are no reports of damage or injuries.

This earthquake occurred in Central Idaho within the remote Challis National Forest.

IRIS Teachable Moments

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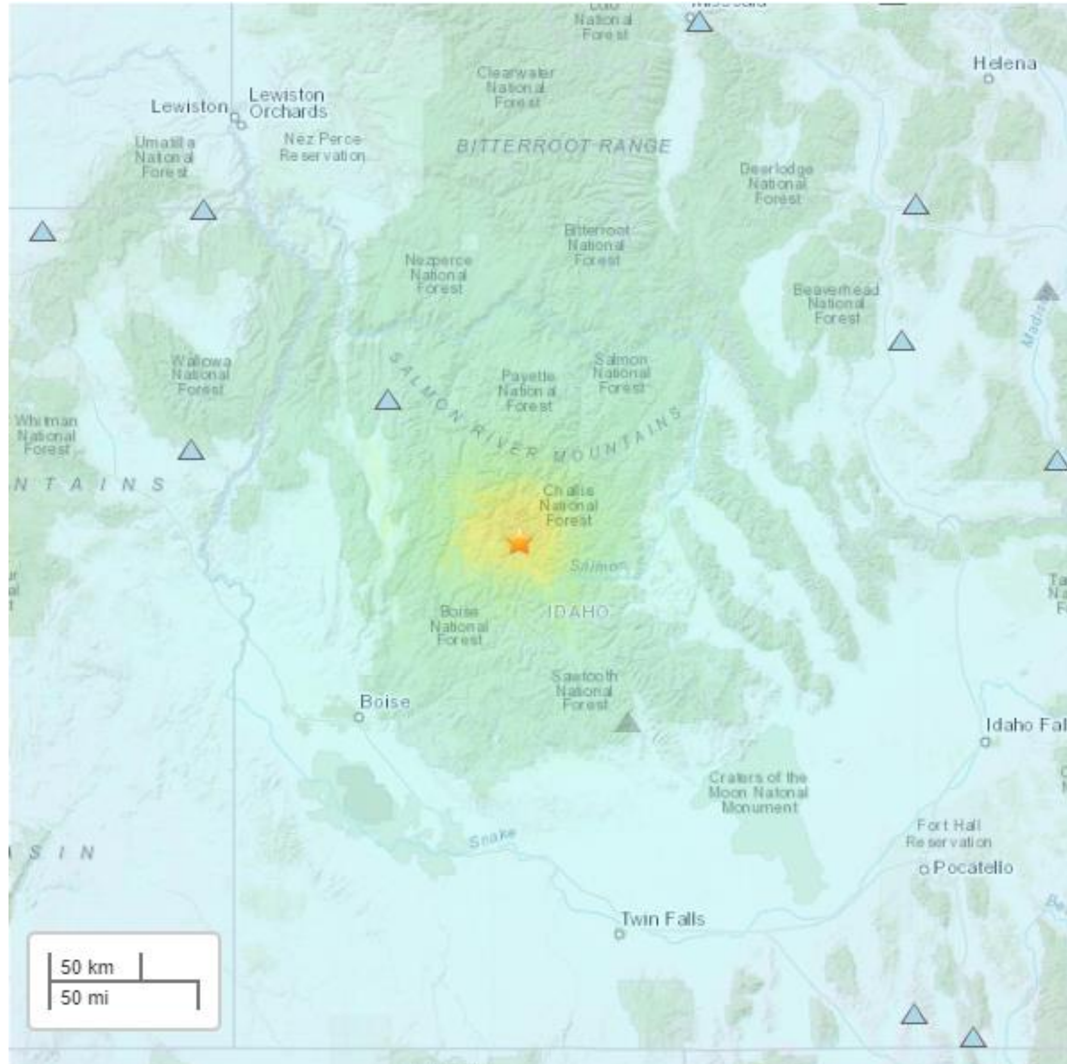
The Modified-Mercalli Intensity scale is a twelve-stage scale, from I to XII, that indicates the severity of ground shaking. Intensity is dependent on the magnitude, depth, local geology, and location.

The area closest to the earthquake felt strong to 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 6.5 Earthquake

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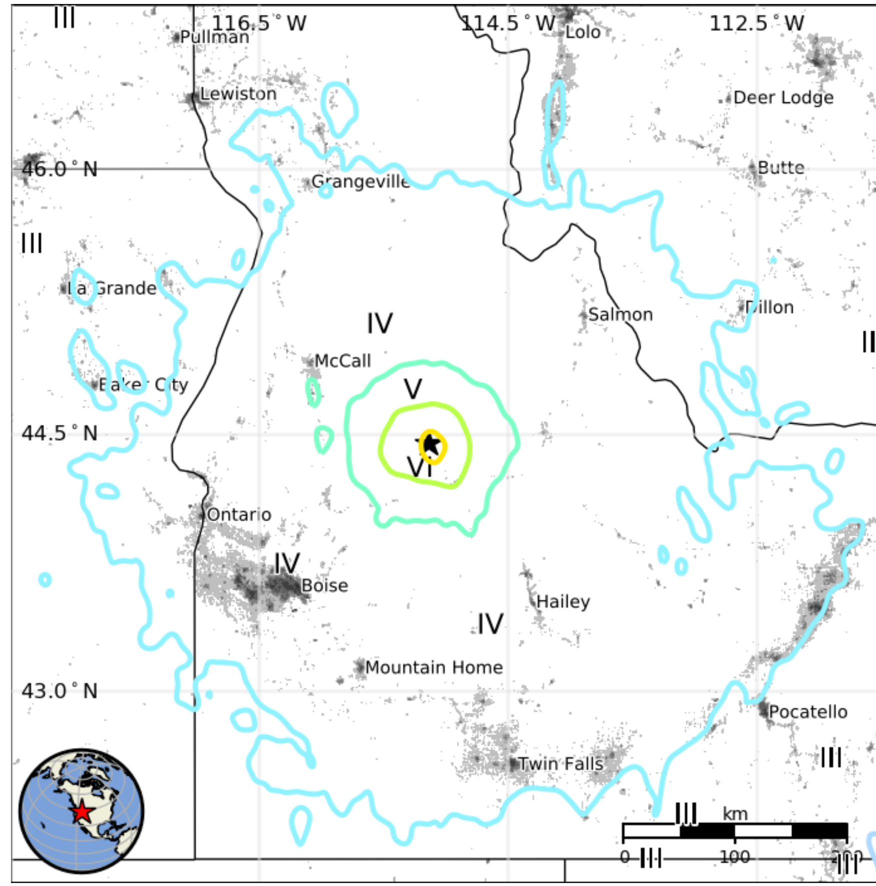
The USGS PAGER map shows the population exposed to different Modified Mercalli Intensity (MMI) levels.

The USGS estimates that 4000 people felt moderate shaking from this earthquake while over a million people felt light shaking.

I	Not Felt	0 k*
II-III	Weak	624 k*
IV	Light	1,392 k
V	Moderate	4 k
VI	Strong	0 k
VII	Very Strong	0 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

IRIS
Teachable Moments

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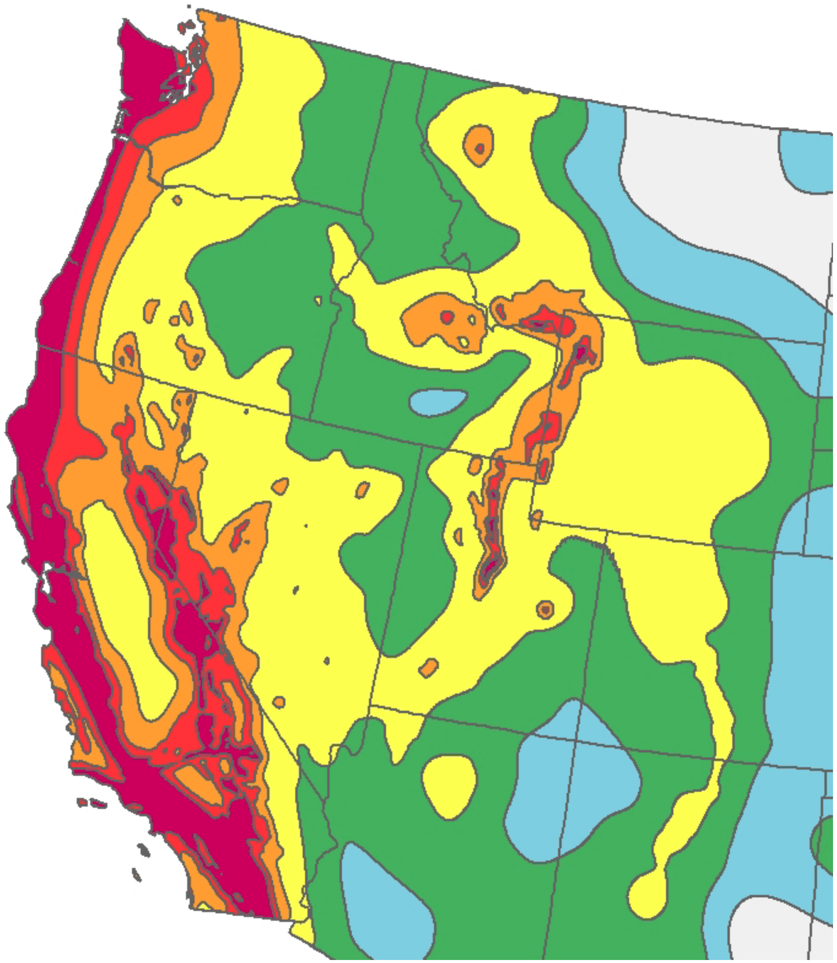

While this earthquake was unusual for the area, the region does have a moderate seismic hazard. Historic seismicity in the immediate vicinity of this earthquake is sparse; no earthquakes of M5+ have occurred within 50 km of this event over the past 50 years.

The most notable historic seismicity in the region occurred about 100 km to the east on the Lost River fault zone. This was the site of the 1983 M6.9 Borah Peak earthquake.

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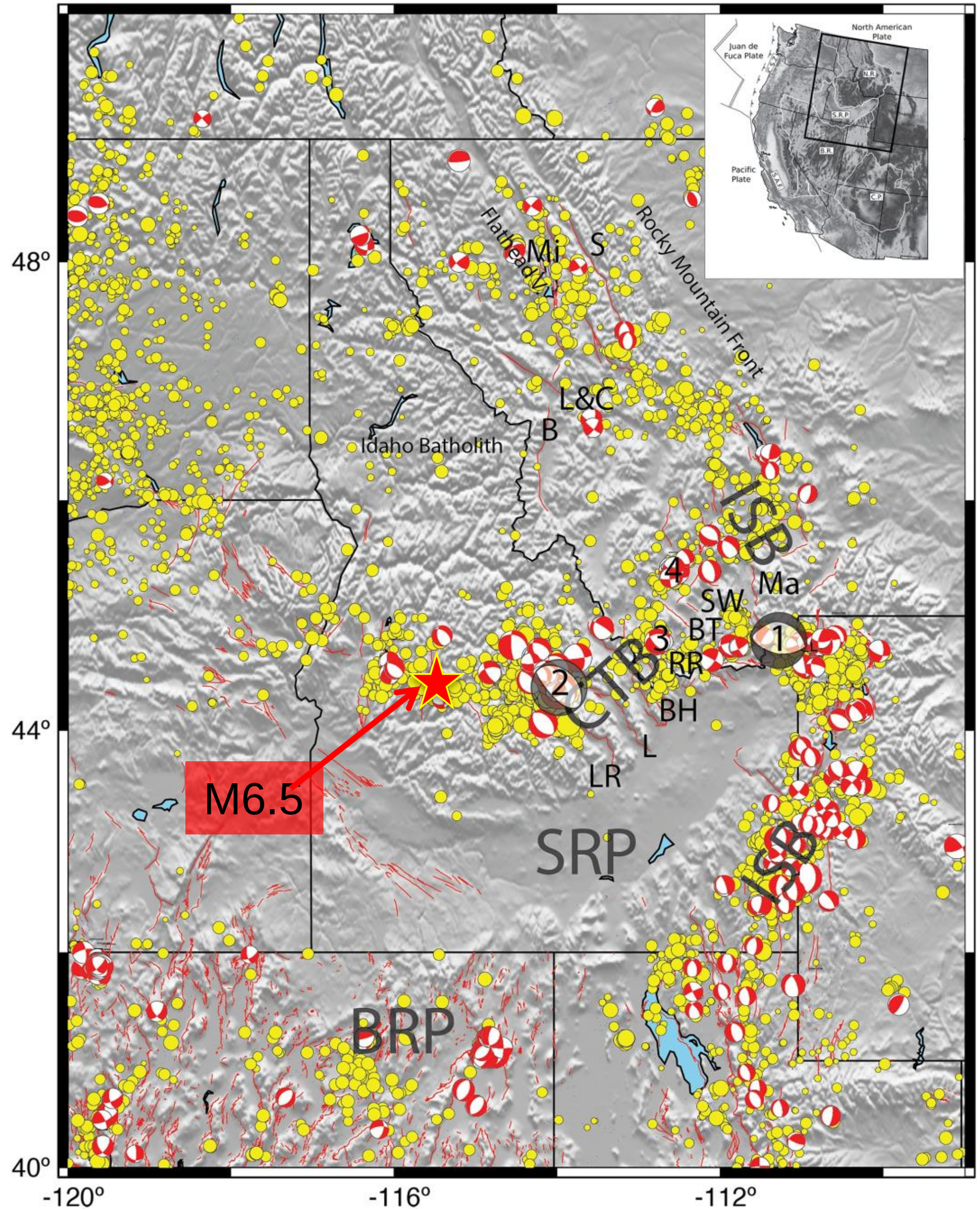
According to the USGS: This earthquake "is within the western part of the Centennial Tectonic Belt, an area of southwest-northeast extension north of the Snake River Plain."

Yellow circles on this map show epicenters of recorded earthquakes scaled by magnitude. Earthquakes are concentrated within the Centennial Tectonic Belt (CTB), the Intermountain Seismic Belt (ISB), and Basin & Range Province (BRP) with very few events in the Snake River Plain (SRP). Epicenters of the 1959 M7.3 Hebgen Lake earthquake (#1) and the 1983 M6.9 Borah Peak earthquake (#2) are shown along with the epicenter of this M6.5 earthquake (red star).



Citation: Schmeelk, D., R. Bendick, M. Stickney, and C. Bomberger (2017), Kinematic evidence for the effect of changing plate boundary conditions on the tectonics of the northern U.S. Rockies, Tectonics, 36, 1090–1102.

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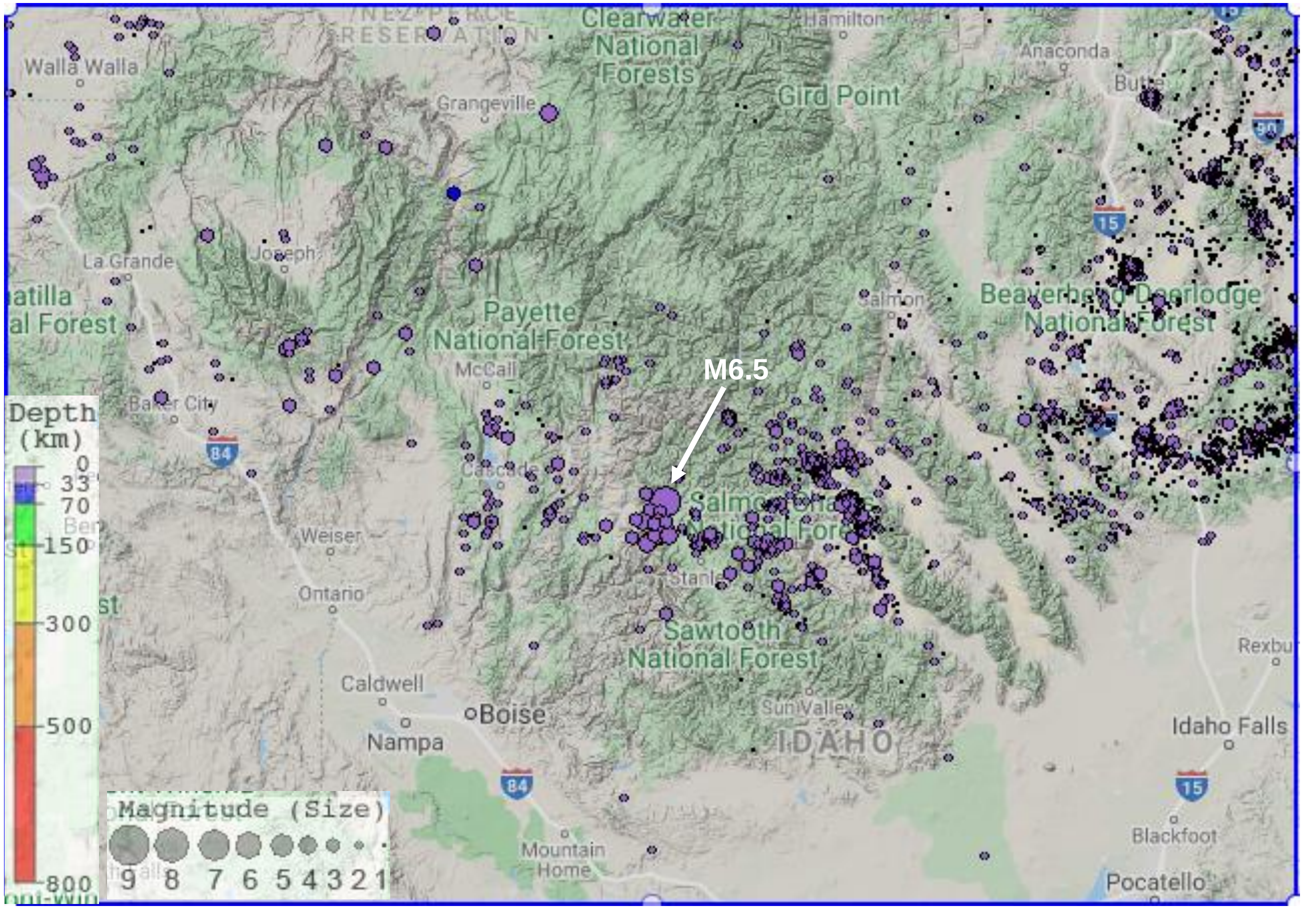
This map shows regional historical seismicity. The most recent 4000 earthquakes are plotted along with this M6.5 that occurred as the result of strike slip faulting within the shallow crust of the North American Plate.



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

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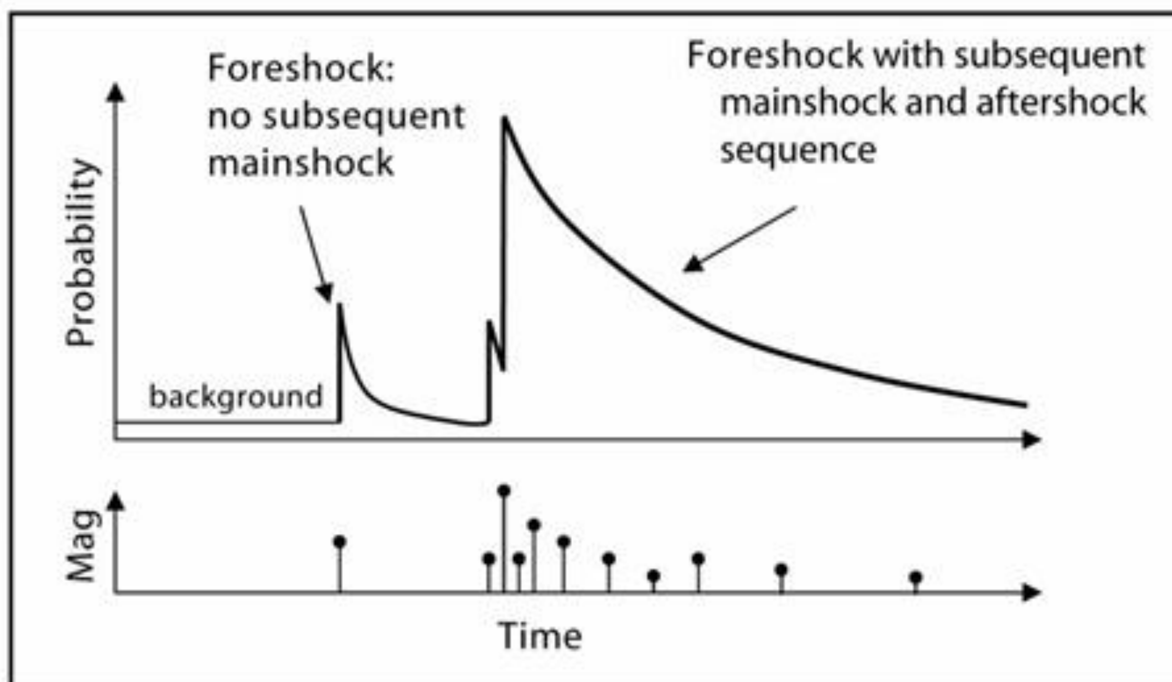
The USGS advises everyone to be aware of the possibility of aftershocks, especially when in or around vulnerable structures such as unreinforced masonry buildings.

Aftershock sequences follow predictable patterns as a group, although the individual earthquakes are themselves not predictable. The graph below shows how the number of aftershocks and the magnitude of aftershocks decay with increasing time since the main shock. The number of aftershocks also decreases with distance from the main shock.

Aftershocks usually occur geographically near the main shock. The stress on the main shock's fault changes drastically during the main shock and that fault produces most of the aftershocks.



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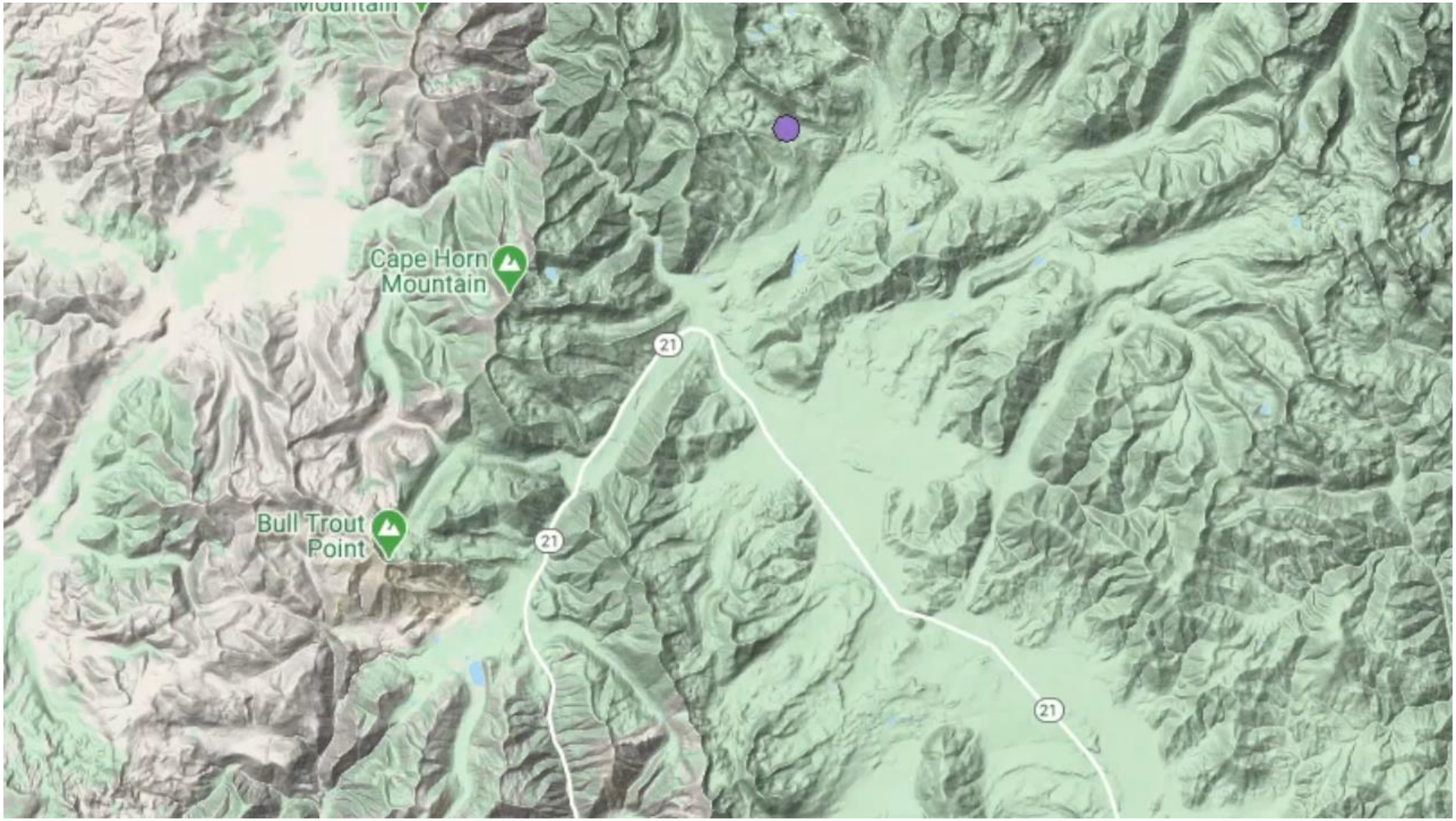
This animation shows the 16 aftershocks that occurred in the first 4 hours after the mainshock. Three aftershocks larger than M3 occurred in the first hour.



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

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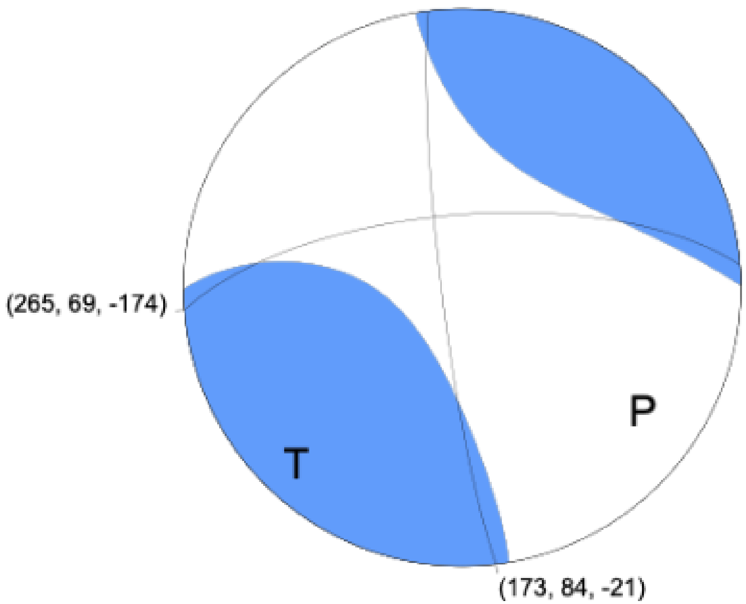
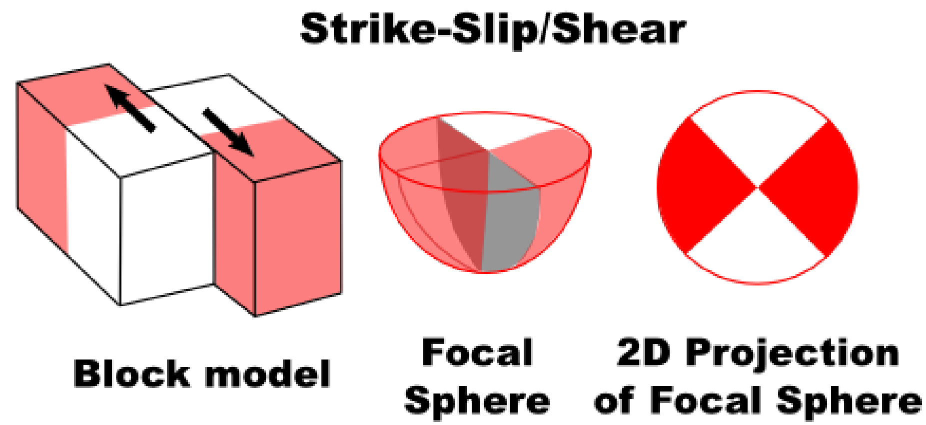
The focal mechanism is how seismologists plot the 3-D stress orientations of an earthquake. Because an earthquake occurs as slip on a fault, it generates primary waves in quadrants where the first pulse is compressional (shaded) and quadrants where the first pulse is extensional (white). The orientation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

This earthquake occurred as a result of strike-slip faulting. Either right-lateral strike-slip faulting on an E – W fault plane OR left-lateral strike-slip faulting on a N – S fault plane are consistent with the focal mechanism.



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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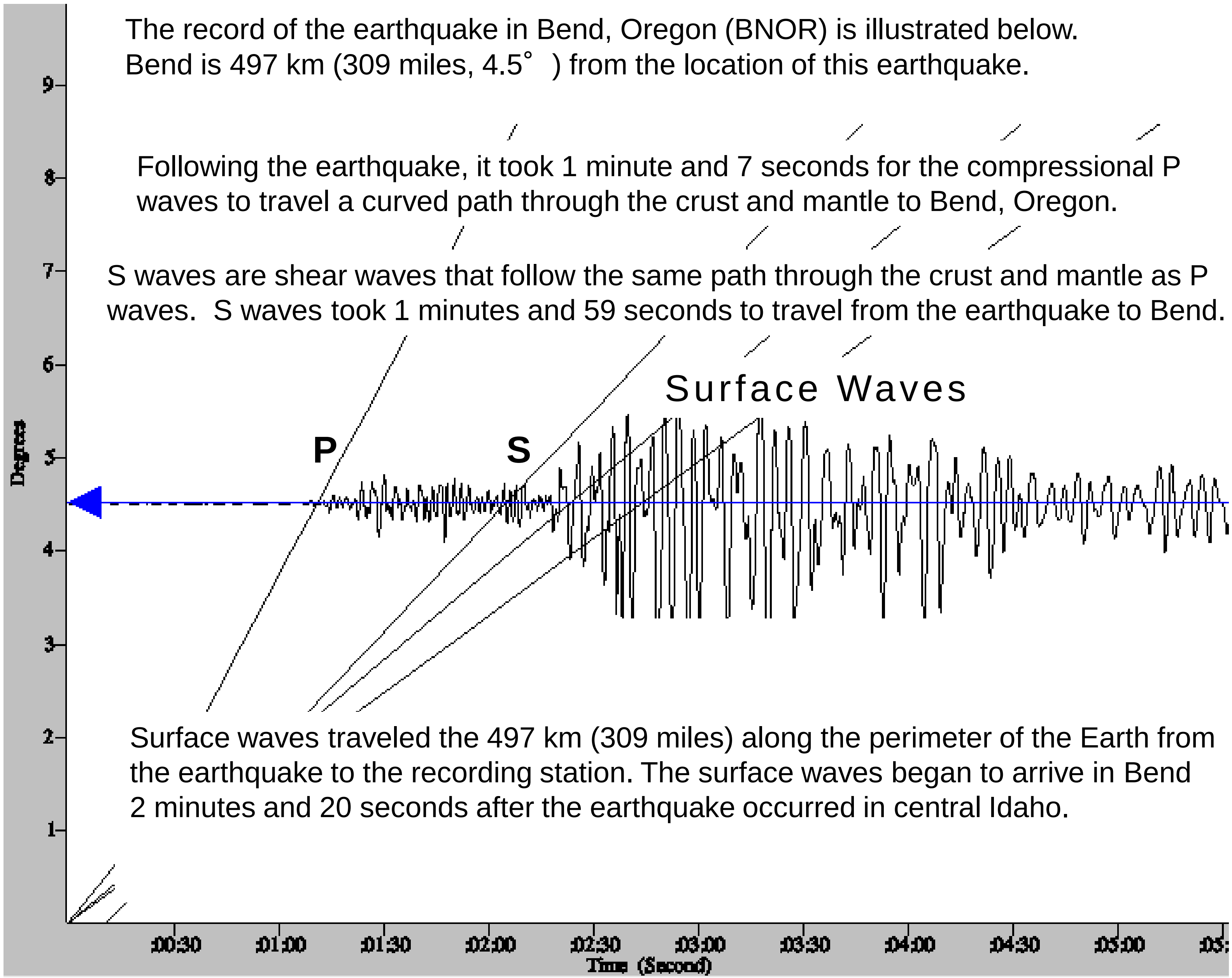
The record of the earthquake in Bend, Oregon (BNOR) is illustrated below. Bend is 497 km (309 miles, 4.5°) from the location of this earthquake.

Following the earthquake, it took 1 minute and 7 seconds for the compressional P waves to travel a curved path through the crust and mantle to Bend, Oregon.

S waves are shear waves that follow the same path through the crust and mantle as P waves. S waves took 1 minutes and 59 seconds to travel from the earthquake to Bend.

Surface waves traveled the 497 km (309 miles) along the perimeter of the Earth from the earthquake to the recording station. The surface waves began to arrive in Bend 2 minutes and 20 seconds after the earthquake occurred in central Idaho.



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