Magnitude 5.8 CALIFORNIA
Wednesday, June 24, 2020 at 17:40:49 UTC

A magnitude 5.8 earthquake occurred in the Owens Valley, underneath the bed of Owens Lake, just east of Mt. Whitney, 17.7 km (11 miles) southeast of Lone Pine, CA at a depth of 4.7 km (2.9 miles).

This is the same location as the magnitude 4.6 earthquake that occurred two nights prior, which is now classified as a foreshock to this larger magnitude earthquake.

Some rockfalls (truck-sized boulders!) were reported in Inyo County and shaking was felt in Los Angeles.

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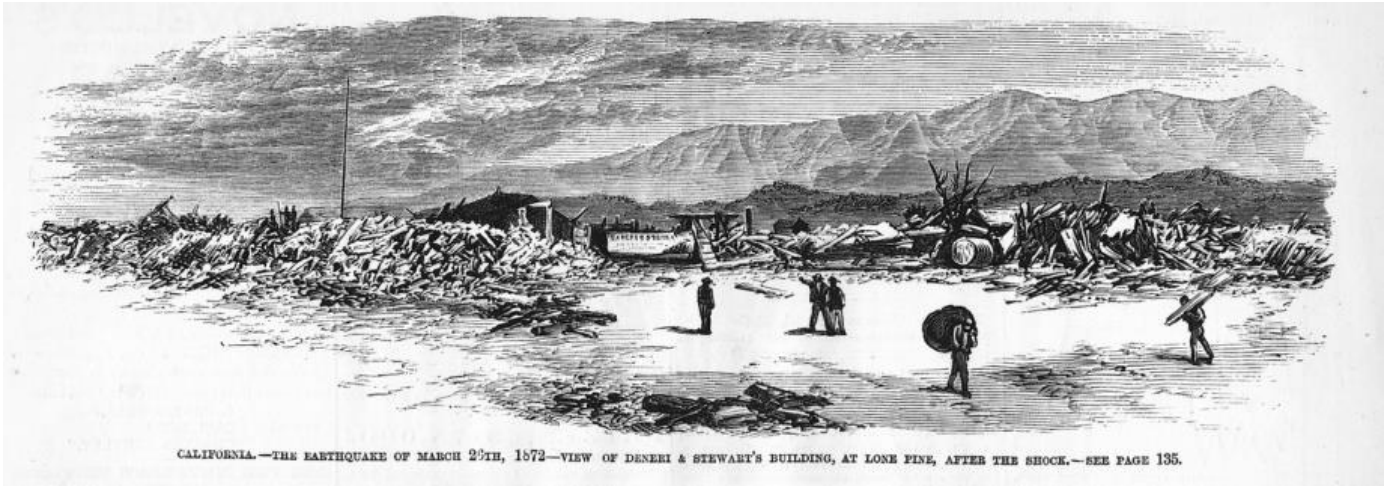
The location of this earthquake was near the location of the 1872 Owens Valley earthquake. That earthquake, estimated to have been in the magnitude range 7.4 - 7.9, was one of the largest on modern record in California.



CALIFORNIA.—THE EARTHQUAKE OF MARCH 26TH, 1872—VIEW OF DENERI & STEWART'S BUILDING, AT LONE PINE, AFTER THE SHOCK.—SEE PAGE 135.

CALIFORNIA.—THE COURT-HOUSE AT INDEPENDENCE, AFTER THE EARTHQUAKE.

Many buildings in the mining towns of Lone Pine and Independence were destroyed by the shaking of the Owens Valley Earthquake in 1872, as shown here in a reproduction of “Frank Leslie’s Illustrated Newspaper” dated May 11, 1872

Images courtesy of the UC Berkeley Seismological Laboratory

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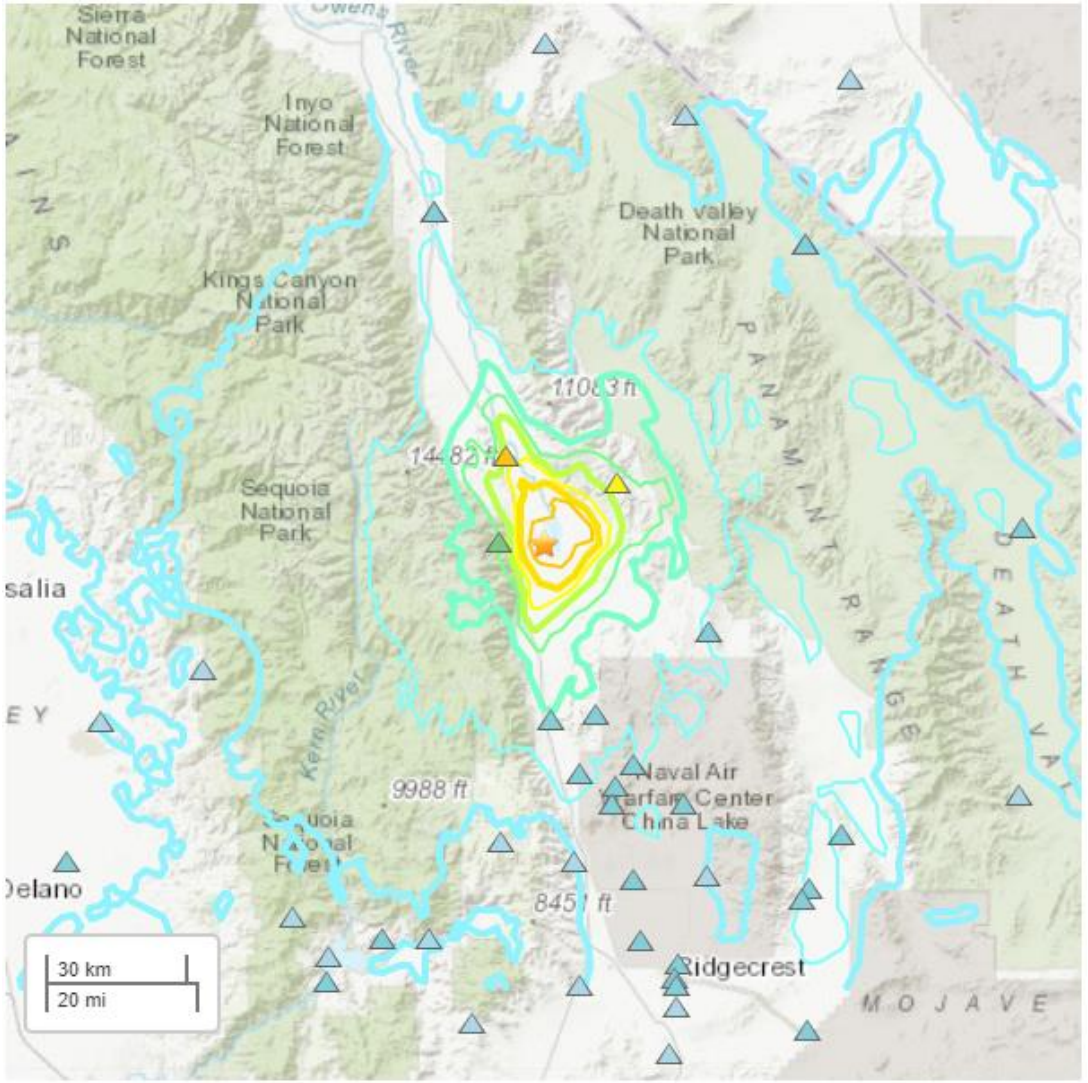
The Modified-Mercalli Intensity scale is a twelve-stage scale, from I to XII, that indicates the severity of ground shaking. Intensity is dependent on the magnitude, depth, local geology, and location.

The area closest to the earthquake felt strong 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 5.8 Earthquake

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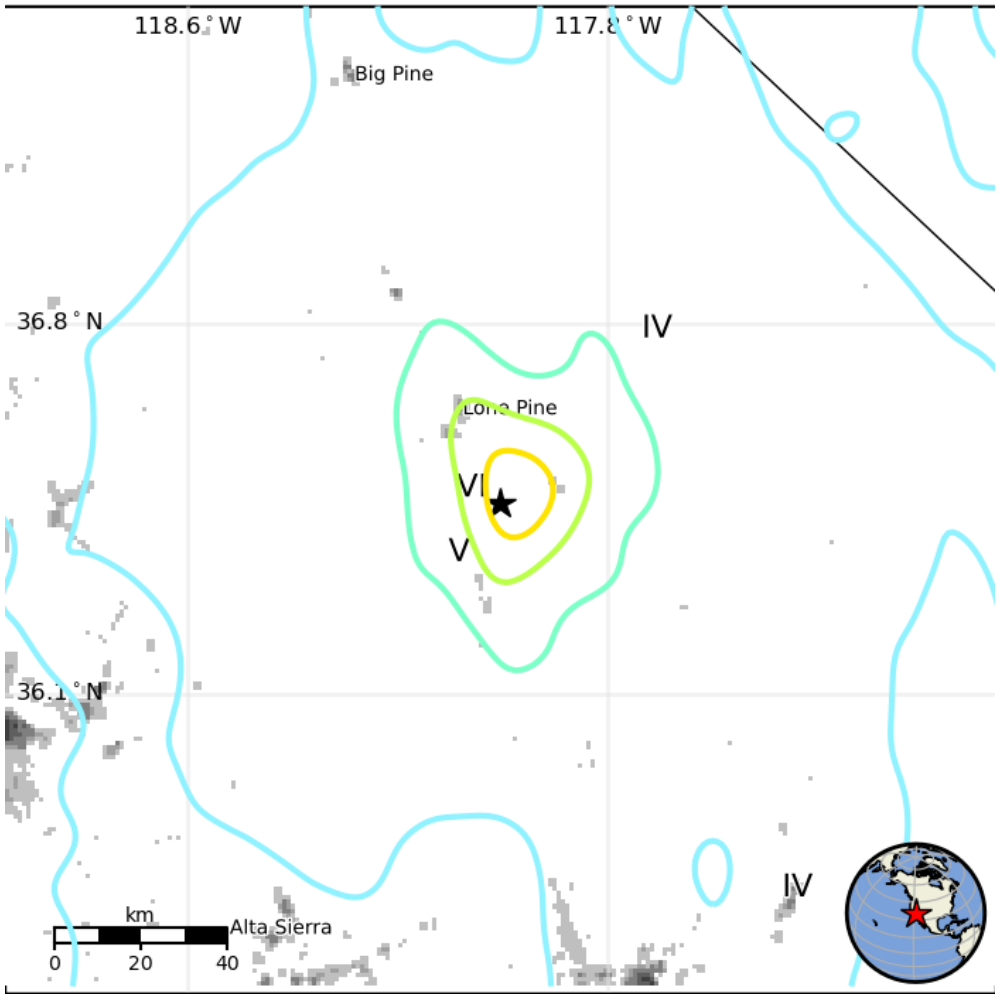
The USGS PAGER map shows the population exposed to different Modified Mercalli Intensity (MMI) levels.

The USGS estimates that 2000 people felt strong shaking from this earthquake.

II-III	Weak	13 k*
IV	Light	200 k
V	Moderate	0 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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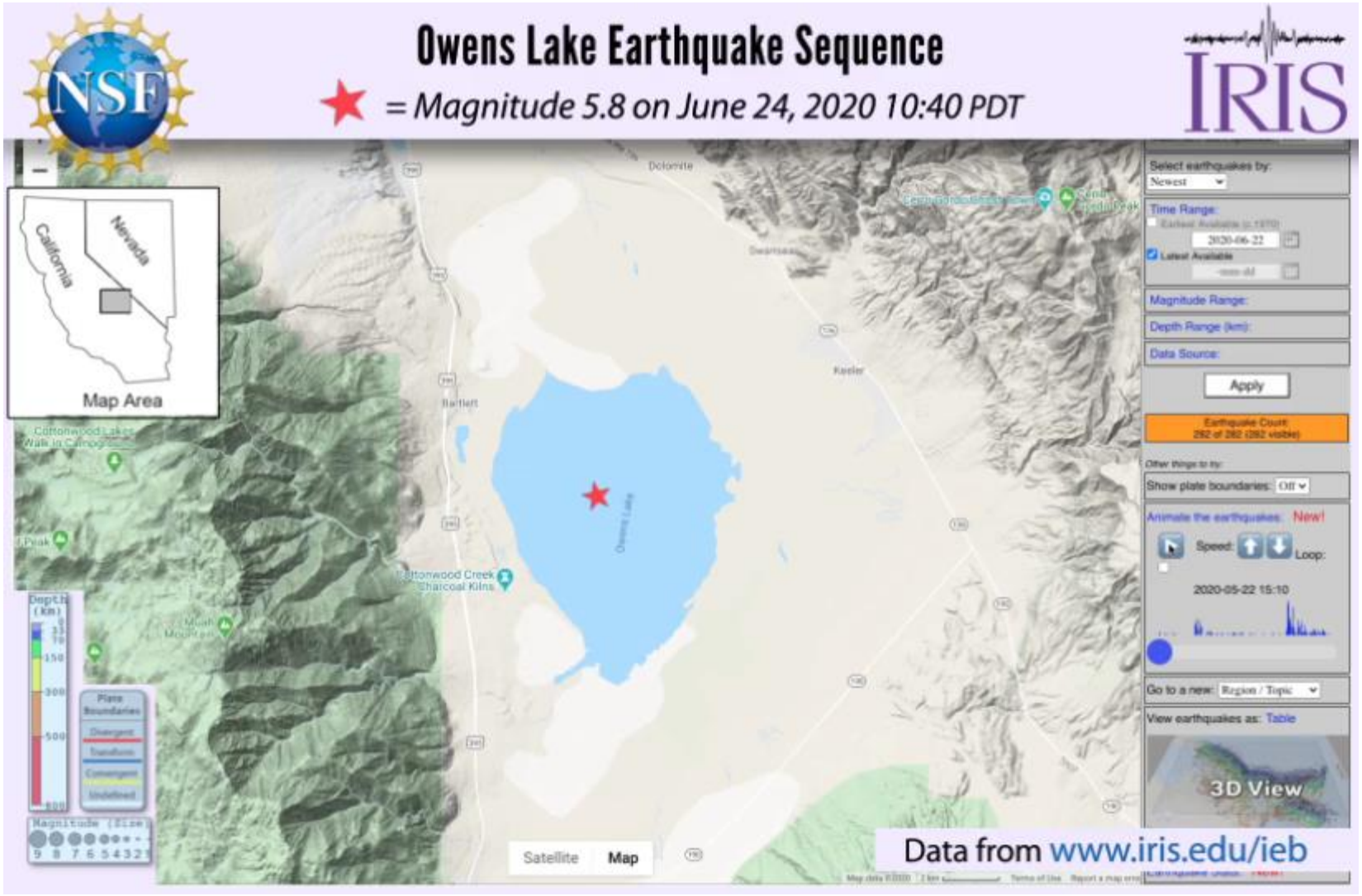

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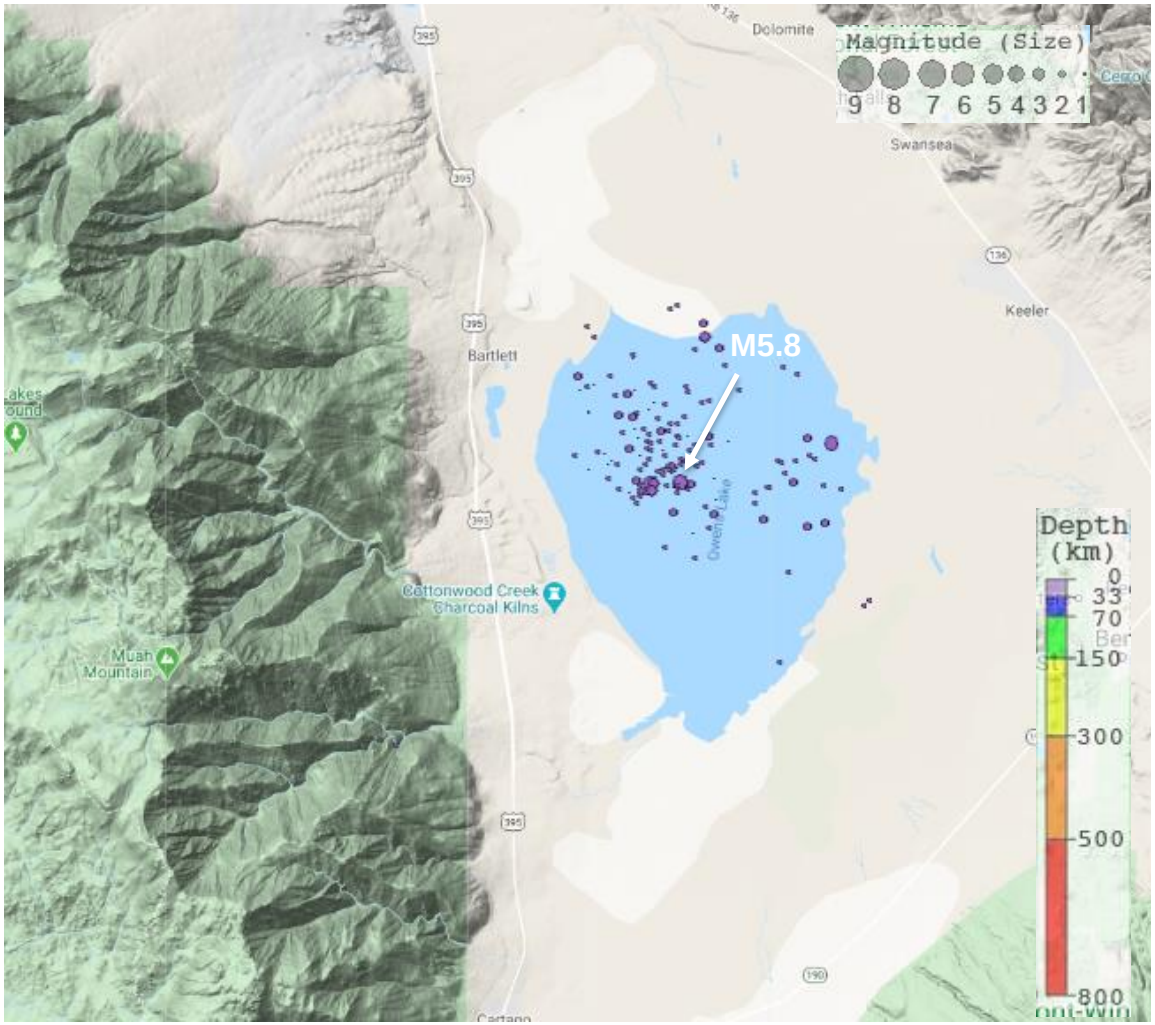
This map shows 143 regional earthquakes that have occurred since Sunday. These include 86 foreshocks and 56 aftershocks at this time.

The statistics on these events (count, magnitude range, percentage of plotted events).

3 0—1 2.1%	75 1—2 52.4%	52 2—3 36.4%
10 3—4 7.0%	2 4—5 1.4%	1 5—6 0.7%
0 6—7 0.0%	0 7—8 0.0%	0 8—9 0.0%



Explore this plot in the [IRIS Earthquake Browser]

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Exploring earthquake sequences:

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The map on the right shows these earthquakes and the broad tectonic zones of California and the Great Basin.

Most of the relative motion between the Pacific and North American Plates occurs on the San Andreas Fault. However, 15% to 25% of that relative plate motion occurs within the Walker Lane – Eastern California Shear Zone. This fault system lies east of the Sierra Nevada Mountains and extends into the Mojave Desert. The Walker Lane – Eastern California Shear Zone includes both normal faults that accommodate crustal extension and strike-slip faults that are dominantly right-lateral.

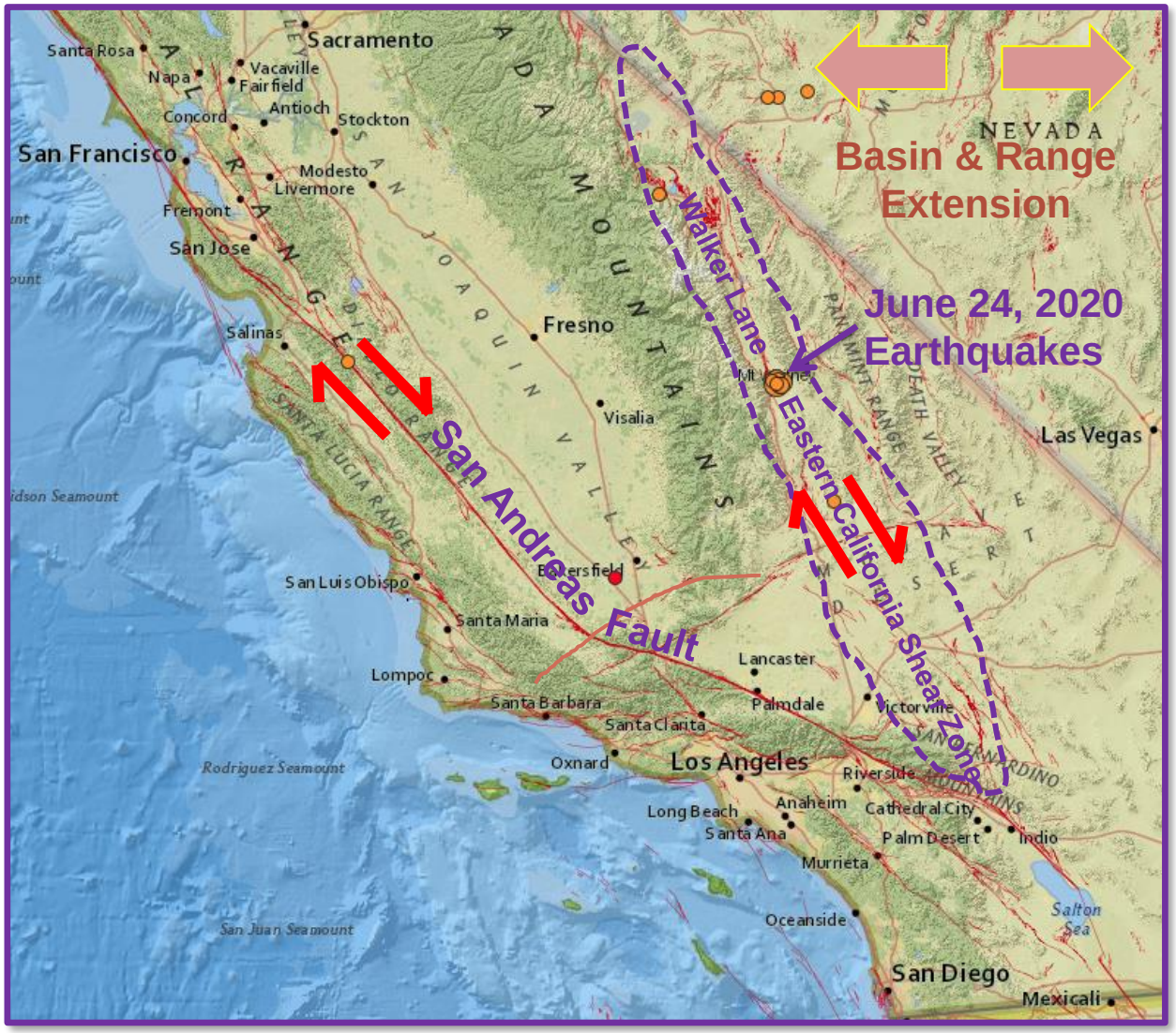

Image courtesy of the U.S. Geological Survey

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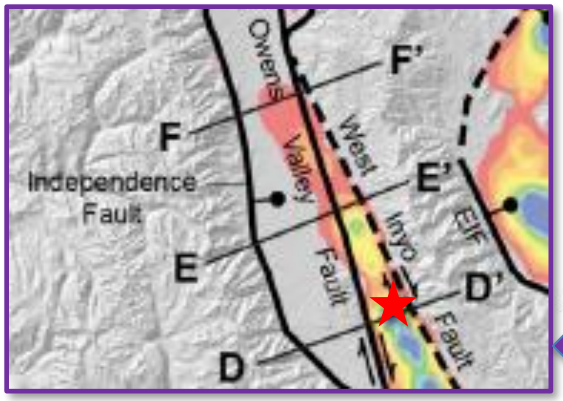
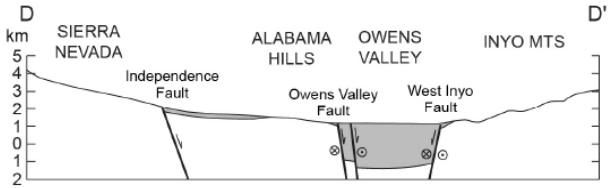
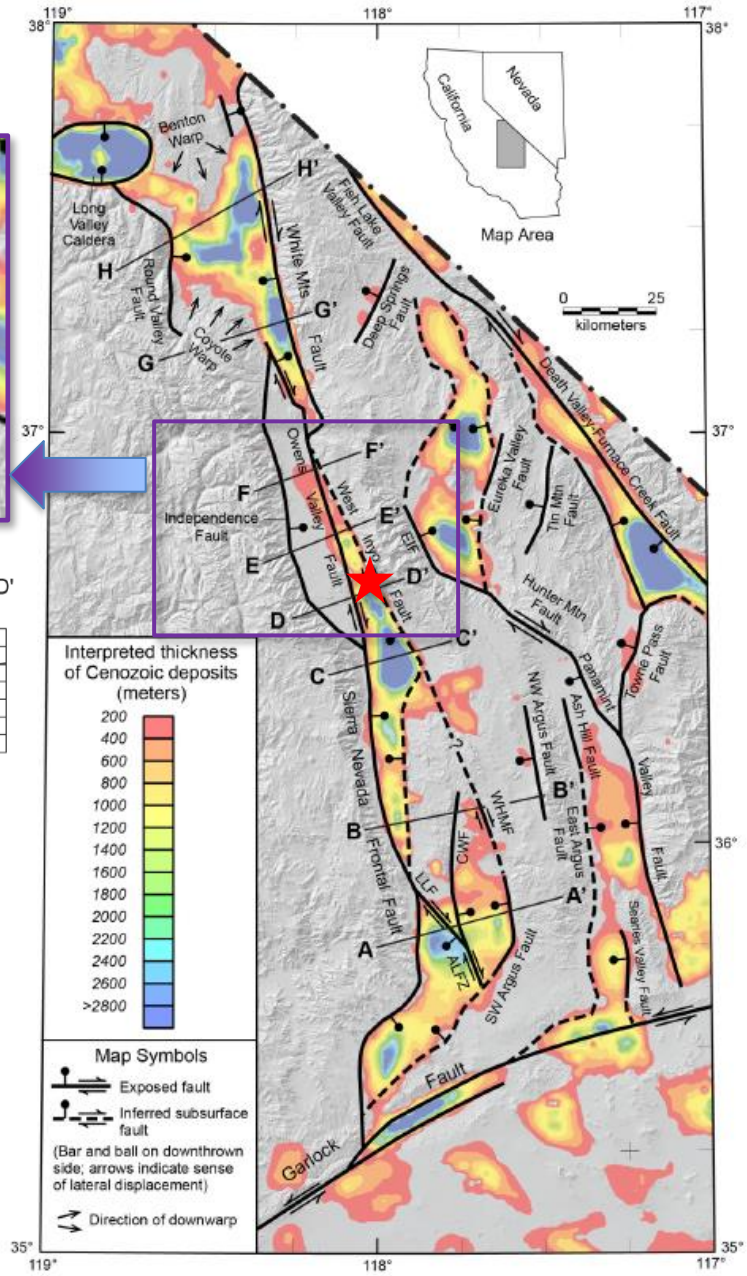
★ M5.8 June 24, 2020

The map on the far right illustrates faults and thickness of valley deposits in the East Sierra Valley System. On the near right, details of faults near the epicenter are shown. The M5.8 earthquake may have occurred on the Owens Valley Fault or on the West Inyo Fault.





The cross section along map line D – D' is shown above. About 2,000 meters of sediment filled the Owens Valley as the crustal block forming the floor of the valley dropped down by normal faulting on the Owens Valley and West Inyo faults. Both faults are composite faults that with a combination of normal and right-lateral strike-slip displacement. That combination of displacements is consistent with the focal mechanism of the June 24 earthquake.



Map from Stevens et al. (2013)

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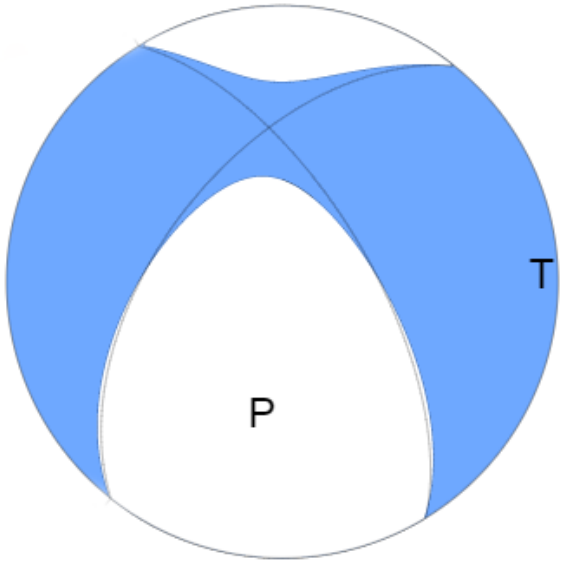
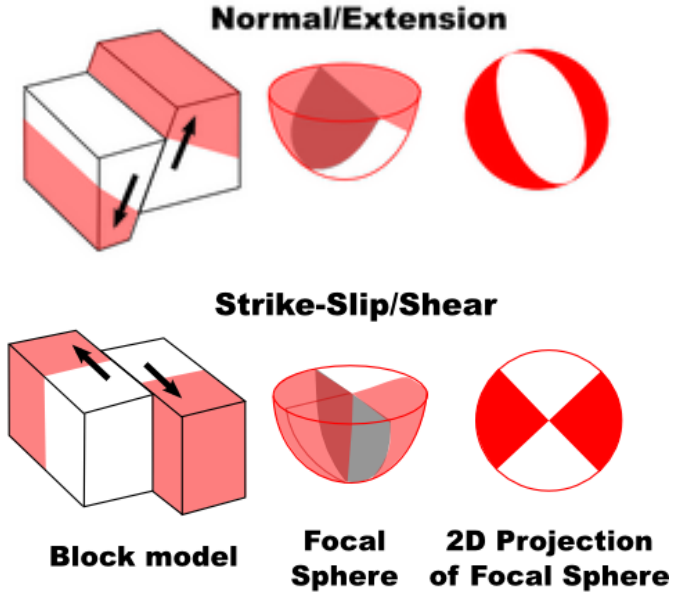
The focal mechanism is how seismologists plot the 3-D stress orientations of an earthquake. Because an earthquake occurs as slip on a fault, it generates primary waves in quadrants where the first pulse is compressional (shaded) and quadrants where the first pulse is extensional (white). The orientation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

This earthquake occurred as a result of oblique strike-slip/normal faulting, having components of both motions.



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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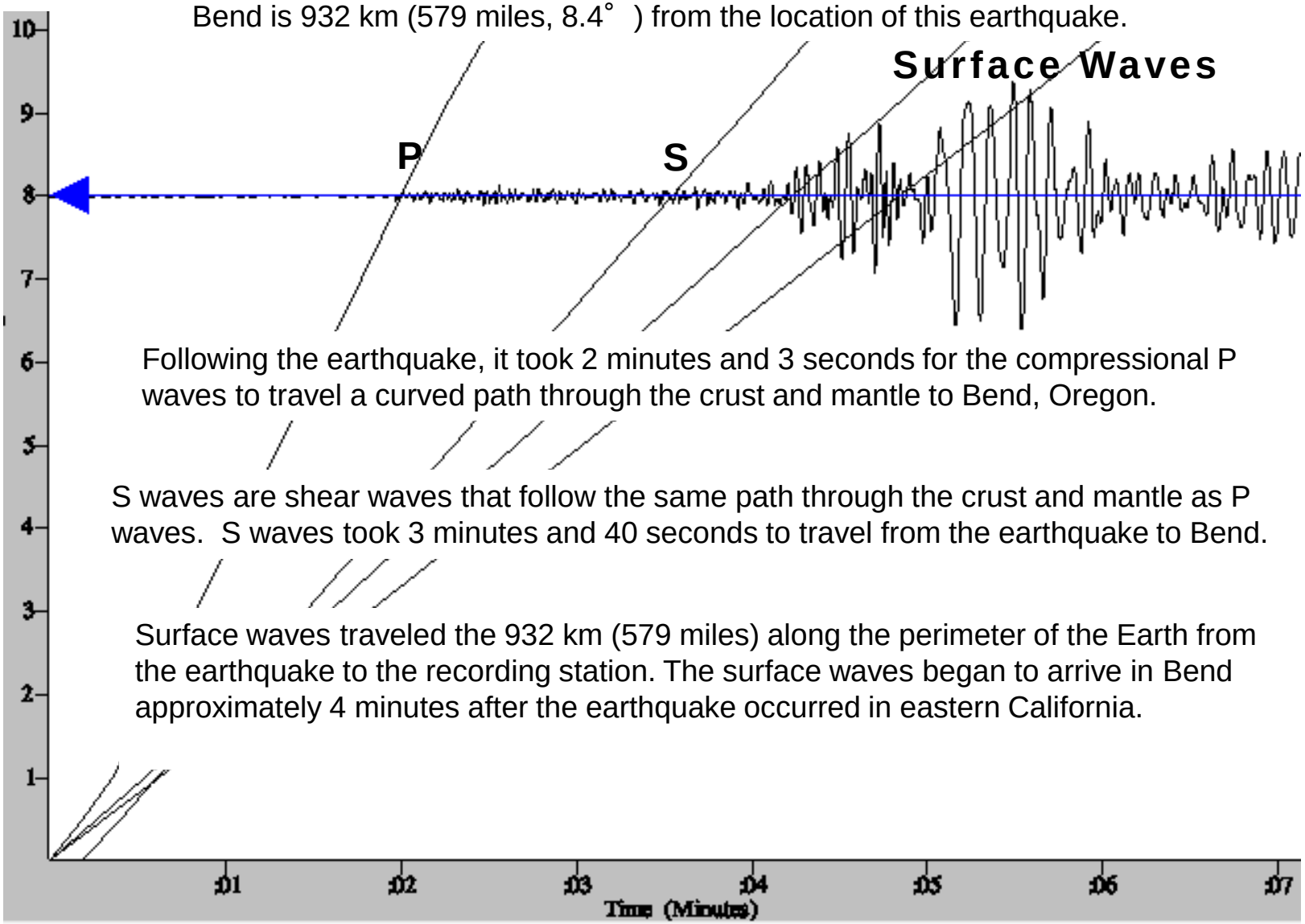
The record of the earthquake in Bend, Oregon (BNOR) is illustrated below. Bend is 932 km (579 miles, 8.4°) from the location of this earthquake.



Following the earthquake, it took 2 minutes and 3 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 3 minutes and 40 seconds to travel from the earthquake to Bend.

Surface waves traveled the 932 km (579 miles) along the perimeter of the Earth from the earthquake to the recording station. The surface waves began to arrive in Bend approximately 4 minutes after the earthquake occurred in eastern California.

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