M 7.1 - 18km W of Searles Valley, CA

U.S. Department of the Interior
U.S. Geological Survey

Earthquake Summary Map
prepared in cooperation with
the Global Seismographic Network

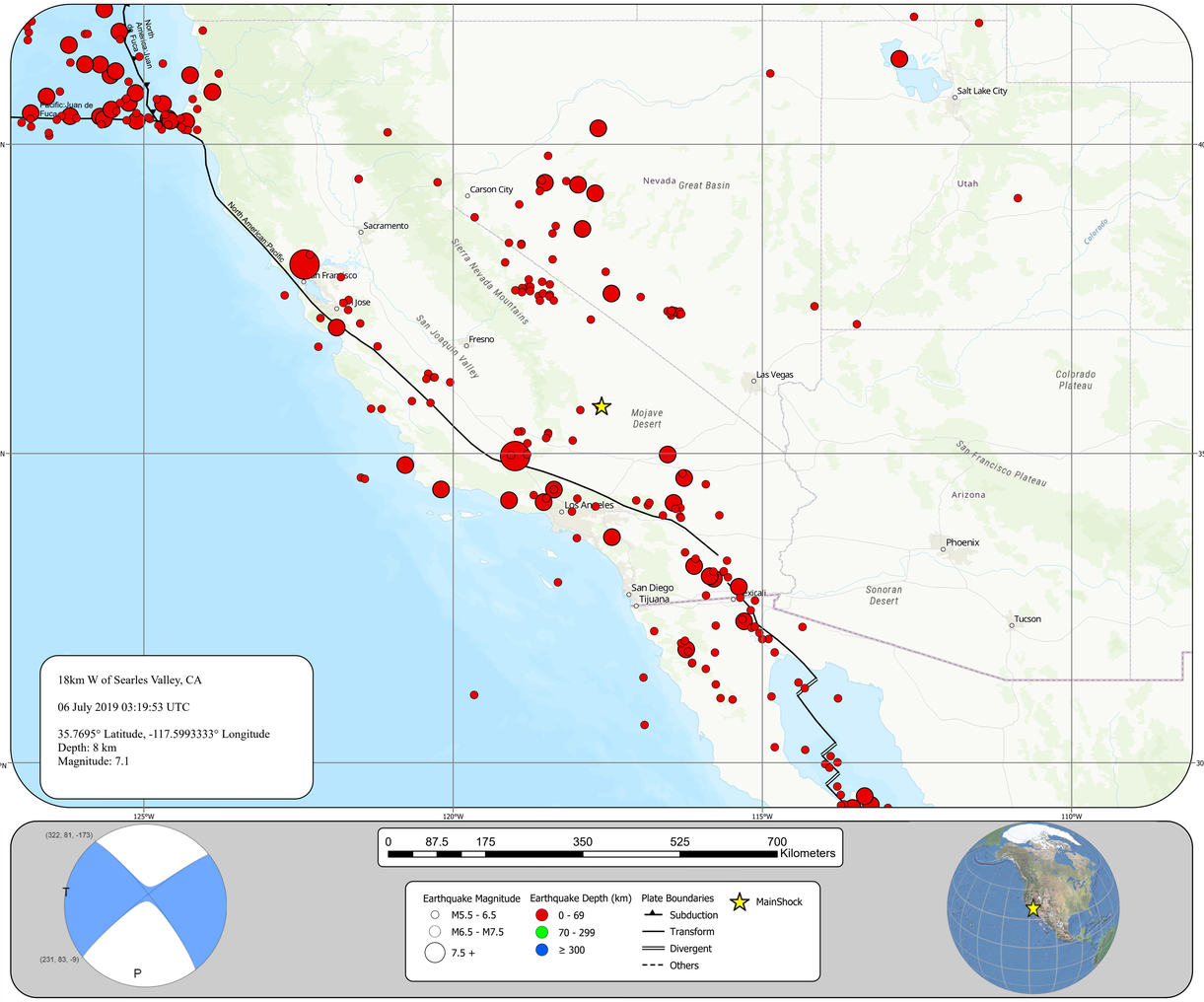
Tectonic Summary

The July 6th, 2019, 03:19 UTC (July 5th 20:19 locally) Mw 7.1 earthquake in eastern California, southwest of Searles Valley, occurred as the result of shallow strike slip faulting in the crust of the North America plate. Focal mechanism solutions for the earthquake indicate rupture occurred on a steeply dipping fault as the result of either right lateral slip on a plane striking NW-SE, or as left lateral slip on a plane striking SW-NE. At the location of this earthquake, approximately 150 km northeast of San Andreas Fault - the major plate boundary in the region – the Pacific plate moves to the northwest with respect to the North America plate at a rate of approximately 48 mm/yr. The location of the earthquake falls within the Eastern California shear zone, a region of distributed faulting associated with motion across the Pacific:North America plate boundary, and an area of high seismic hazard. More detailed studies will be required to precisely identify the causative fault associated with this event, though seismic activity over the past 2 days has been occurring on two conjugate fault structures in the Airport Lake Fault Zone.

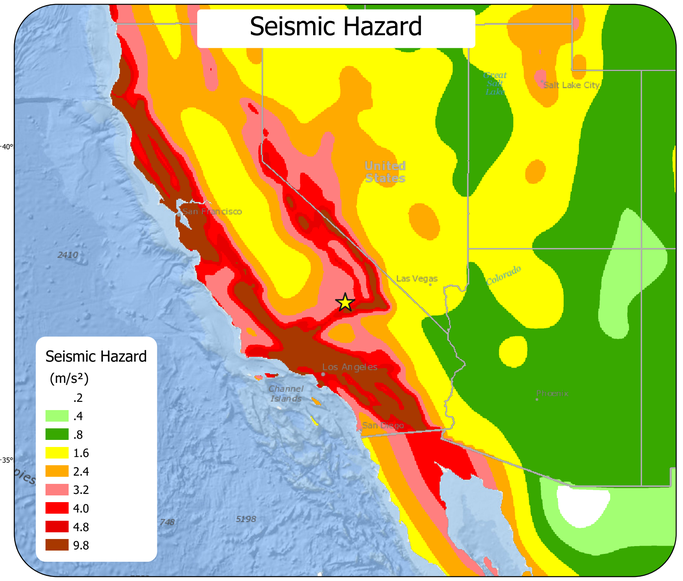
This earthquake occurs approximately 34 hours after and 11 km northwest of a M 6.4 event in the same region, on July 4th, 2019, at 17:33 UTC. The July 4th event was preceded by a short series of small foreshocks (including a M4.0 earthquake 30 minutes prior), and was followed by a robust sequence of aftershocks, including almost 250 M 2.5+ earthquakes (up until the M 7.1 event). Those events aligned with both nodal planes (NE-SW and NW-SE) of the focal mechanism solution of the M 6.4 event, which was very similar in faulting style to today's M 7.1 earthquake. The sequence includes two other M5+ earthquakes, one of which occurred 20 seconds before the M 7.1 event. The M 7.1 earthquake occurred at the NW extension of the prior sequence.

While commonly plotted as points on maps, earthquakes of this size are more appropriately described as slip over a larger fault area. Strike-slip-faulting events of the size of the July 6, 2019, earthquake are typically about 70x15 km (length x width).

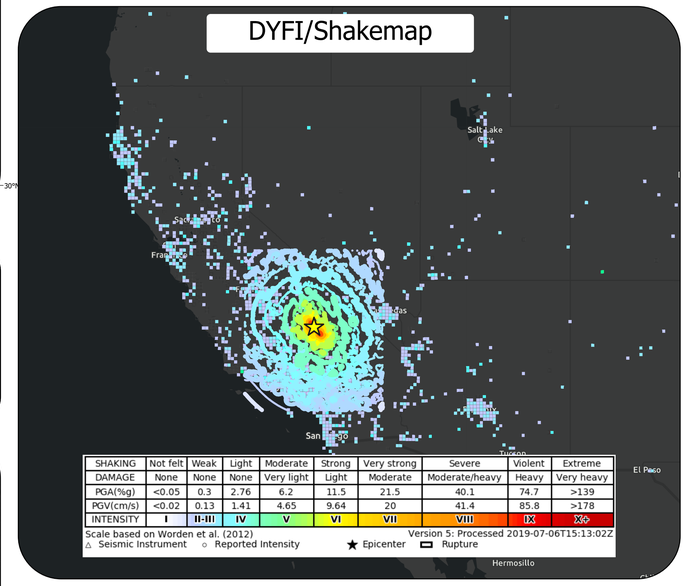
This region of eastern California has hosted numerous moderate sized earthquakes. Over the past 40 years, prior to the July 4th event, 8 other M5+ earthquakes have occurred within 50 km of the July 6th, 2019 earthquake. The largest of these was a M 5.8 event on September 20, 1995, just 3 km to the west of today's event, which was felt strongly in the China Lake-Ridgecrest area, and more broadly from Los Angeles to Las Vegas.



Seismic Hazard



DYFI/Shakemap



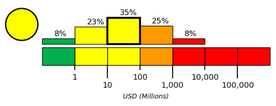
Earthquake Impact

Yellow alert for economic losses. Some damage is possible and the impact should be relatively localized. Estimated economic losses are less than 1% of GDP of the United States. Past events with this alert level have required a local or regional level response.

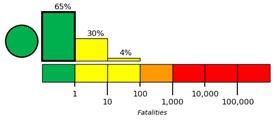
Recent earthquakes in this area have caused secondary hazards such as tsunamis, landslides and liquefaction that might have contributed to losses.

Overall, the population in this region resides in structures that are highly resistant to earthquake shaking, though some vulnerable structures exist. The predominant vulnerable building types are unreinforced brick masonry and reinforced masonry construction.

Estimated Economic Losses



Estimated Fatalities



Ground-Failure

Landslides

Limited area affected

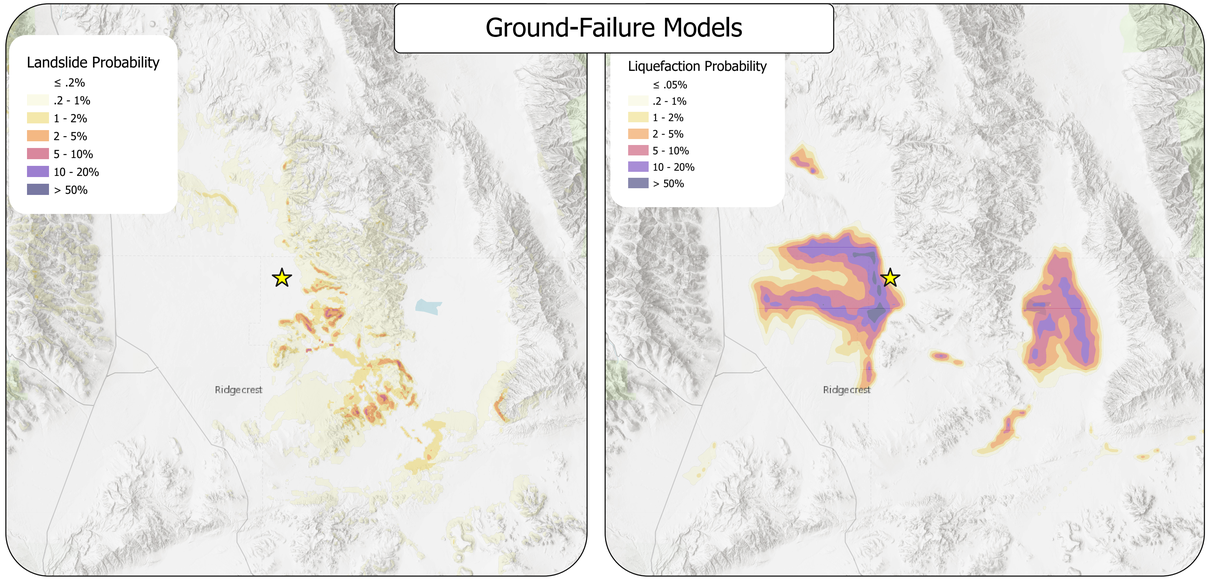
Little or no population exposed

Liquefaction

Limited area affected

Little or no population exposed

Ground-Failure Models



DATA SOURCES

EARTHQUAKES AND SEISMIC HAZARD
USGS, National Earthquake Information Center
NOAA, National Geophysical Data Center
IASPEI, Centennial Catalog (1900 - 1999) and extensions (Engdahl and Villaseñor, 2002)

EHB catalog (Engdahl et al., 1998)
HDF (unpublished earthquake catalog, Engdahl, 2003)
Global Seismic Hazard Assessment Program
Volcanoes of the World (Siebert and Simkin, 2002)

PLATE TECTONICS AND FAULT MODEL
PB2002 (Bird, 2003)
Ji, C., D.J. Wald, and D.V. Helmberger, Source description of the 1999 Hector Mine, California earthquake; Part I: Wavelet
domain inversion theory and resolution analysis, Bull. Seism. Soc. Am., Vol 92, No. 4. pp. 1192-1207, 2002.
DeMets, C., Gordon, R.G., Argus, D.F., 2010. Geologically current plate motions, Geophys. J. Int. 181, 1-80.

BASE MAP
NIMA and ESRI, Digital Chart of the World
USGS, EROS Data Center
NOAA GEBCO and GLOBE Elevation Models

REFERENCES

Bird, P., 2003, An updated digital model of plate boundaries: Geochem. Geophys. Geosyst., v. 4, no. 3, pp. 1027-80.

Engdahl, E.R., and Villasenor, A., 2002, Global Seismicity: 1900-1999, chap. 41 of Lee, W.H.K., and others, eds., International Earthquake and Engineering Seismology, Part A: New York, N.Y., Elsevier Academic Press, 932 p.

Engdahl, E.R., Van der Hilst, R.D., and Buland, R.P., 1998, Global teleseismic earthquake relocation with improved travel times and procedures for depth determination; Bull. Seism. Soc. Amer., v. 88, p. 722 743.

DISCLAIMER

Base map data, such as place names and political boundaries, are the best available but may not be current or may contain inaccuracies and therefore should not be regarded as having official significance.

Map updated by U.S. Geological Survey
National Earthquake Information Center
09 July 2019
https://earthquake.usgs.gov/
Map not approved for release by Director USGS