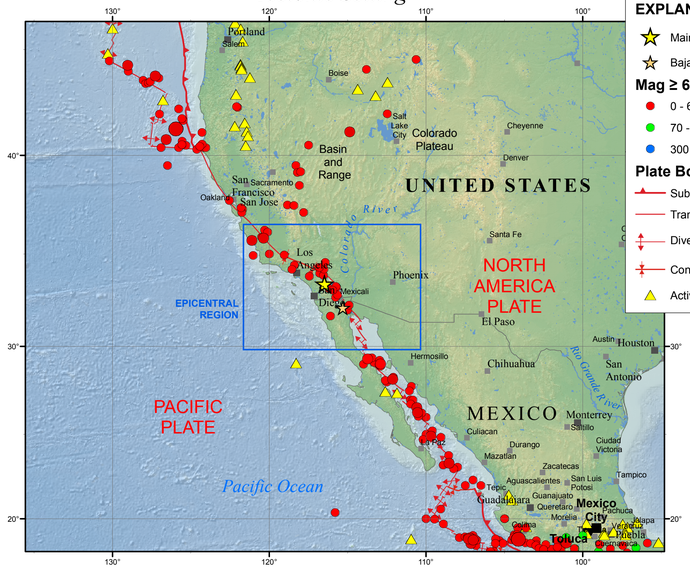
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

EARTHQUAKE SUMMARY MAP

M5.4 Southern California Earthquake of 7 July 2010

Prepared in cooperation with the Global Seismographic Network

Tectonic Setting



EXPLANATION

- Main Shock
- Baja, CA 20100404

Mag ≥ 6.0

- 0 - 69 km
- 70 - 299
- 300 - 600

Plate Boundaries

- Subduction
- Transform
- Divergent
- Convergent
- Active Volcanoes

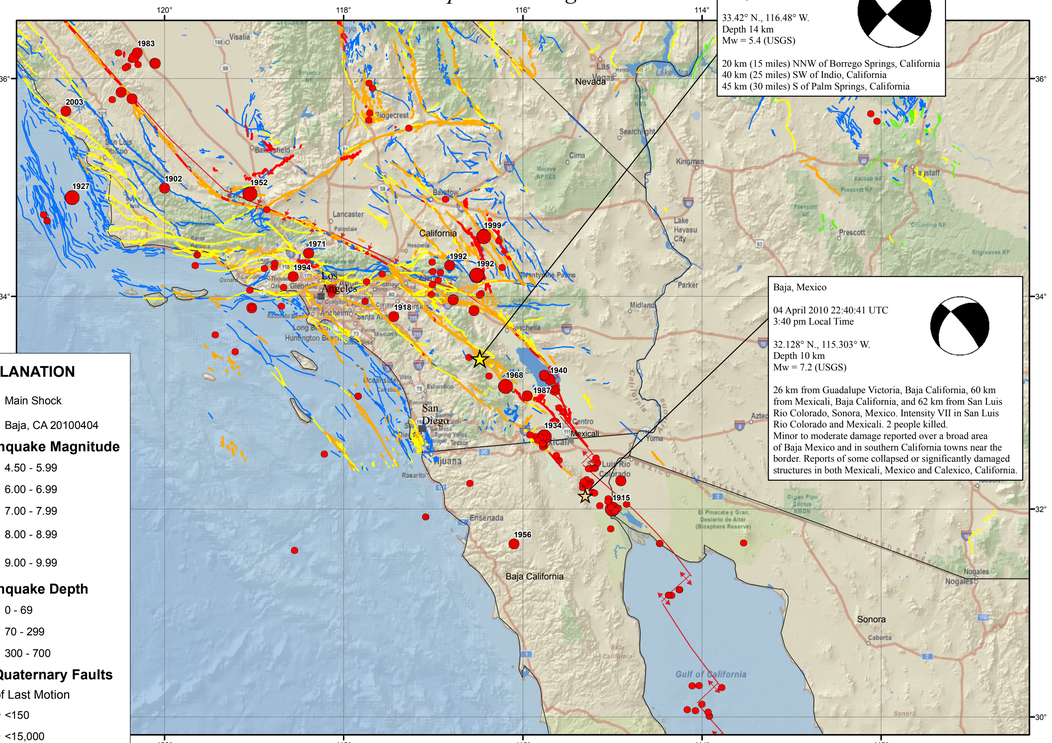
Scale 1:20,000,000

0 250 500 1,000 1,500 Kilometers

RELATIVE PLATE MOTIONS

In the region of this earthquake, the Pacific Plate moves northwest with respect to the North America Plate at about 45 mm/yr.

Epicentral Region



EXPLANATION

- Main Shock
- Baja, CA 20100404

Earthquake Magnitude

- 4.50 - 5.99
- 6.00 - 6.99
- 7.00 - 7.99
- 8.00 - 8.99
- 9.00 - 9.99

Earthquake Depth

- 0 - 69
- 70 - 299
- 300 - 700

US Quaternary Faults

Age of Last Motion

- <150
- <15,000
- <130,000
- <750,000
- <1,600,000

Scale 1:3,500,000

0 125 250 500 Kilometers

Borrego Springs, CA

07 July 2010 23:53:33 UTC

33.42° N., 116.48° W.
Depth 14 km
Mw = 5.4 (USGS)

20 km (15 miles) NNW of Borrego Springs, California
40 km (25 miles) SW of Indio, California
45 km (30 miles) S of Palm Springs, California

Baja, Mexico

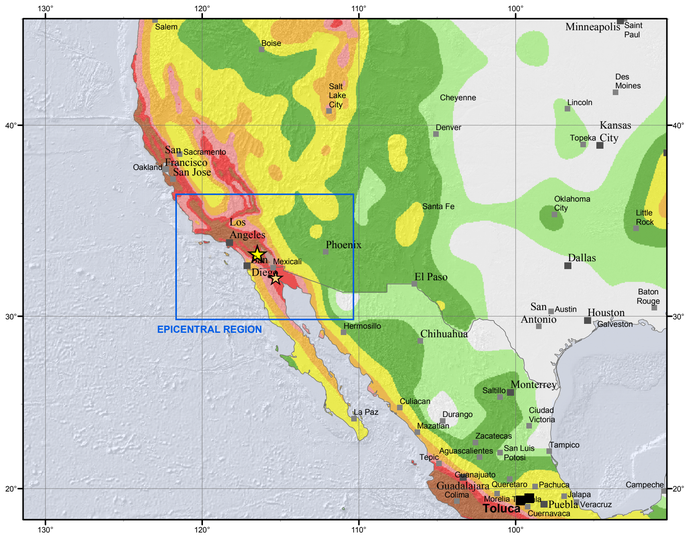
04 April 2010 22:40:41 UTC
3:40 pm Local Time

32.128° N., 115.303° W.
Depth 10 km
Mw = 7.2 (USGS)

26 km from Guadalupe Victoria, Baja California, 60 km from Mexicali, Baja California, and 62 km from San Luis Rio Colorado, Sonora, Mexico. Intensity VII in San Luis Rio Colorado and Mexicali. 2 people killed.
Minor to moderate damage reported over a broad area of Baja Mexico and in southern California towns near the border. Reports of some collapsed or significantly damaged structures in both Mexicali, Mexico and Calexico, California.

Note on earthquakes: From 1900-1963, earthquakes shown are from Centennial Catalog, magnitudes greater than 5.5. From 1964-2002, earthquakes are from HDF catalog, magnitudes greater than 4.5. From 2003 to present, earthquakes are from NEIC, magnitudes greater than 4.5.

Seismic Hazard



EPICENTRAL REGION

Scale 1:20,000,000

0 250 500 1,000 1,500 Kilometers

Seismic hazard is expressed as peak ground acceleration (PGA) on firm rock, in meters/sec², expected to be exceeded in a 50-yr period with a probability of 10 percent.

Peak Ground Acceleration in m/sec**2

.2 .4 .8 1.6 2.4 3.2 4.0 4.8

TECTONIC SUMMARY

A M5.4 earthquake occurred in southern California at 4:53 pm (Pacific Time) about 30 miles south of Palm Springs, 25 miles southwest of Indio, and 13 miles north-northwest of Borrego Springs. The earthquake occurred near the Coyote Creek segment of the San Jacinto fault, which is one of the strands of the San Jacinto fault. The earthquake exhibited sideways horizontal motion to the northwest, consistent with slip on the San Jacinto fault. It was followed by more than 60 aftershocks of M1.3 and greater during the first hour. Seismologists expect continued aftershock activity.

In the last 50 years, there have been four other earthquakes in the magnitude 5 range within 20 km of this location: M5.8 1968, M5.3 on 2/25/1980, M5.0 on 10/31/2001, and M5.2 on 6/12/2005. The biggest earthquake near this location was a M6.0 Buck Ridge earthquake on 3/25/1937.

The earthquake was felt all over southern California, with strong shaking near the epicenter.

The San Jacinto fault, along with the Elsinore, San Andreas, and other faults, is part of the plate boundary that accommodates about 2 inches/year of motion as the Pacific plate moves northwest relative to the North American plate. The largest recent earthquake on the San Jacinto fault, near this location, the M6.5 1968 Borrego Mountain earthquake April 8, 1968, occurred about 25 miles southeast of the July 7 M5.4 earthquake.

This M5.4 earthquake follows the 4th of April 2010, Easter Sunday, Mw7.2 earthquake, located about 125 miles to the south, well south of the US Mexico international border. A M4.9 earthquake occurred in the same area on June 12th at 8:08 pm (Pacific Time). Thus this section of the San Jacinto fault remains active.

Seismologists are watching two major earthquake faults in southern California. The San Jacinto fault, the most active earthquake fault in southern California, extends for more than 100 miles from the international border into San Bernardino and Riverside, a major metropolitan area often called the Inland Empire. The Elsinore fault is more than 110 miles long, and extends into the Orange County and Los Angeles area as the Whittier fault. The Elsinore fault is capable of a major earthquake that would significantly affect the large metropolitan areas of southern California. The Elsinore fault has not hosted a major earthquake in more than 100 years. The occurrence of these earthquakes along the San Jacinto fault and continued aftershocks demonstrates that the earthquake activity in the region remains at an elevated level. The San Jacinto fault is known as the most active earthquake fault in southern California. Caltech and USGS seismologist continue to monitor the on going earthquake activity using the Caltech/USGS Southern California Seismic Network and a GPS network of more than 100 stations.

For additional information check, www.scsn.org, and http://earthquake.usgs.gov/

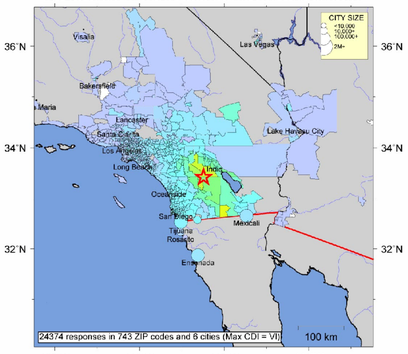
Significant Earthquakes Mag >= 6.5

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1902	03	22	2212	35.000	-120.000	0	6.8
1915	11	21	0013	32.000	-115.000	0	7.1
1918	04	21	2232	33.812	-117.440	15	6.8
1927	11	04	1351	34.915	-121.031	15	7.1
1934	12	31	1845	32.685	-115.761	15	7.1
1940	05	19	0436	33.222	-115.697	15	6.9
1952	07	21	1152	34.949	-119.046	10	7.3
1956	02	09	1432	31.669	-116.099	10	6.8
1968	04	09	0229	33.160	-116.192	15	7.0
1971	02	09	1400	34.401	-118.392	6.4	6.7
1983	05	02	2342	36.234	-120.304	10	6.5
1987	11	24	1315	33.070	-115.952	1.9	6.5
1992	06	28	1157	34.198	-116.515	15	7.3
1992	06	28	1505	34.289	-116.817	12.4	6.5
1994	01	17	1230	34.185	-118.563	19	6.7
1999	10	16	0946	34.555	-116.436	15	7.2
2003	12	22	1915	35.706	-121.102	7	6.6
2010	04	04	2240	32.297	-115.278	4	7.2

USGS Community Internet Intensity Map

SOUTHERN CALIFORNIA

Jul 7 2010 16:53:33 local 33.4205N 116.4887W M5.4 Depth: 14 km ID:ci10738069



INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
SHAKING	Not felt	Weak	Light	Moderate	Strong	Very strong	Severe	Violent	Extreme
DAMAGE	none	none	none	Very light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy

Processed: Thu Jul 22 14:32:16 2010

USGS science for a changing world

USAID FROM THE AMERICAN PEOPLE

M 5.4, 13.2 mi NNW of Borrego Springs, CA

Origin Time: Wed 2010-07-07 23:53:33 UTC
Location: 33.42°N 116.49°W Depth: 14 km

PAGER
Version 7

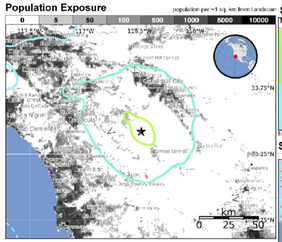
Created: 1 day, 1 hour after earthquake

Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)	...*	687k*	6,195k	743k	4k	0	0	0	0
ESTIMATED MODIFIED MERCALLI INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+
PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
POTENTIAL DAMAGE: Resistant Structures	none	none	none	V. Light	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy
POTENTIAL DAMAGE: Vulnerable Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy

*Estimated exposure only includes population within 5 km of map area.

Population Exposure

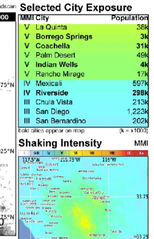


Selected City Exposure

MMI	City	Population
V	La Quinta	38k
V	Borrego Springs	3k
V	Coachella	21k
V	Palm Desert	49k
V	Indian Wells	4k
V	Rancho Mirage	17k
IV	Mexicali	507k
IV	Riverside	298k
III	Chula Vista	213k
III	San Diego	1,223k
III	San Bernardino	202k

Bold cities appear on map. (k = x1000)

Shaking Intensity



Overall, the population in this region resides in structures that are vulnerable to earthquake shaking, though some resistant structures exist. A magnitude 5.9 earthquake 169 km Northwest of this one struck Whittier Narrows, California on October 1, 1987 (UTC), with estimated population exposures of 20,000 at intensity VIII and 1,292,000 at intensity VII, resulting in a reported 8 fatalities. On January 17, 1994 (UTC), a magnitude 6.7 earthquake 209 km Northwest of this one struck Northridge, California, with estimated population exposures of 211,000 at intensity IX or greater and 1,968,000 at intensity VIII, resulting in a reported 60 fatalities. Recent earthquakes in this area have caused landslides and liquefaction that may have contributed to losses.

This information was automatically generated and has not been reviewed by a seismologist.

http://earthquake.usgs.gov/pager

Event ID: ci10738069

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)
HDF (unpublished earthquake catalog) (Engdahl, 2003)
Global Seismic Hazard Assessment Program

PLATE TECTONICS AND FAULT MODEL
PB2002 (Bird, 2003)
Finite Fault Model, Chen Ji, UC Santa Barbara (2007)

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

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.

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 Villaseñor, 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 Academeic 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.

Map prepared by U.S. Geological Survey
National Earthquake Information Center
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Map not approved for release by Director USGS