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

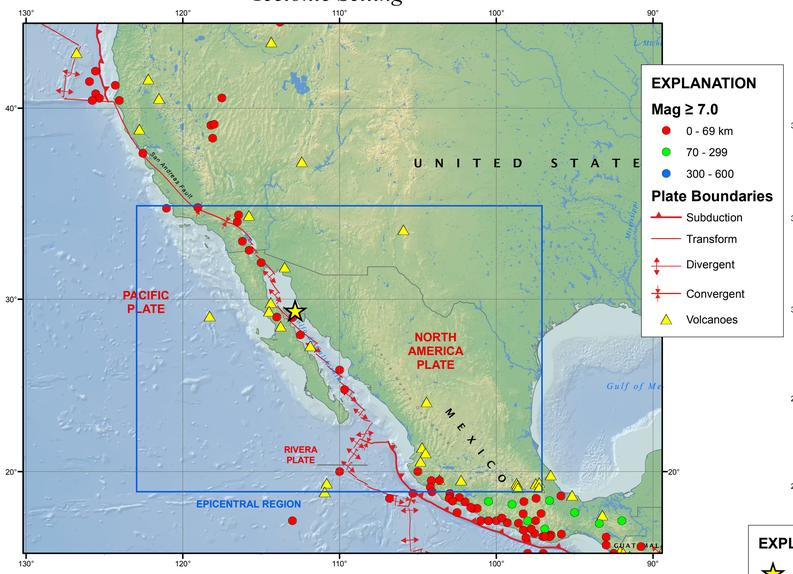
EARTHQUAKE SUMMARY MAP XXX

Prepared in cooperation with the Global Seismographic Network

GSN

M6.9 Gulf of California Earthquake of 3 August 2009

Tectonic Setting



EXPLANATION

Mag ≥ 7.0
- 0 - 69 km
- 70 - 299
- 300 - 600

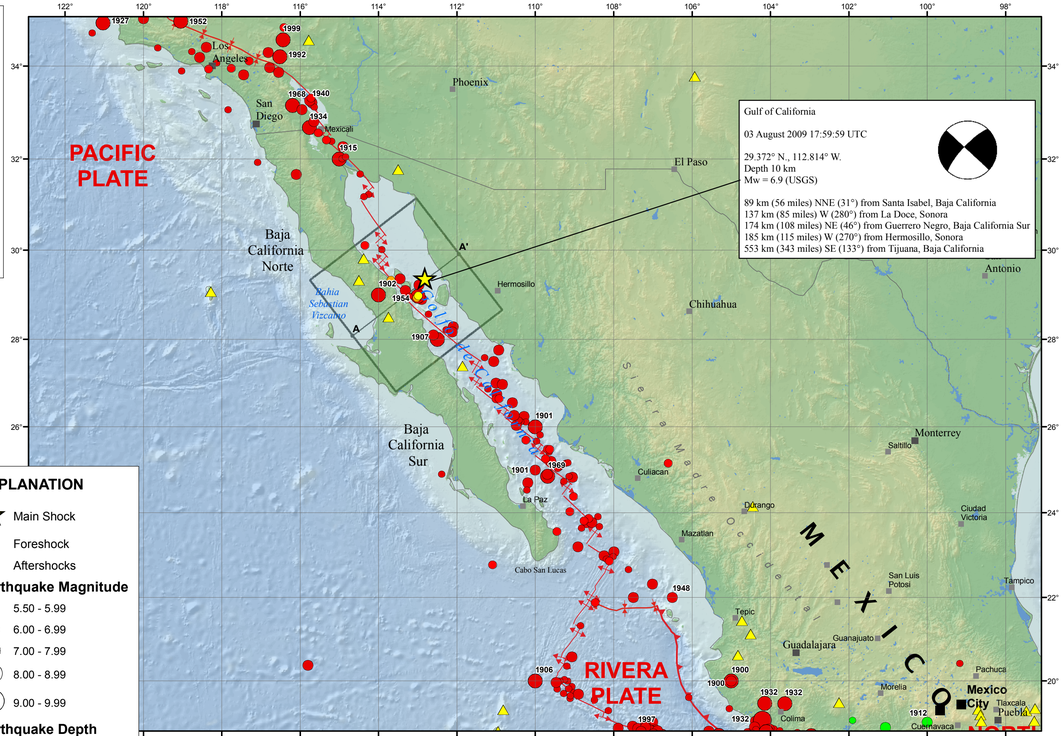
Plate Boundaries
- Subduction
- Transform
- Divergent
- Convergent
- Volcanoes

Scale 1:20,000,000

RELATIVE PLATE MOTIONS

The Pacific Plate moves northward relative to the North America Plate at about 45 mm/year in the area of this earthquake.

Epicentral Region



EXPLANATION
- Main Shock
- Foreshock
- Aftershocks

Earthquake Magnitude
- 5.50 - 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

Gulf of California

03 August 2009 17:59:59 UTC

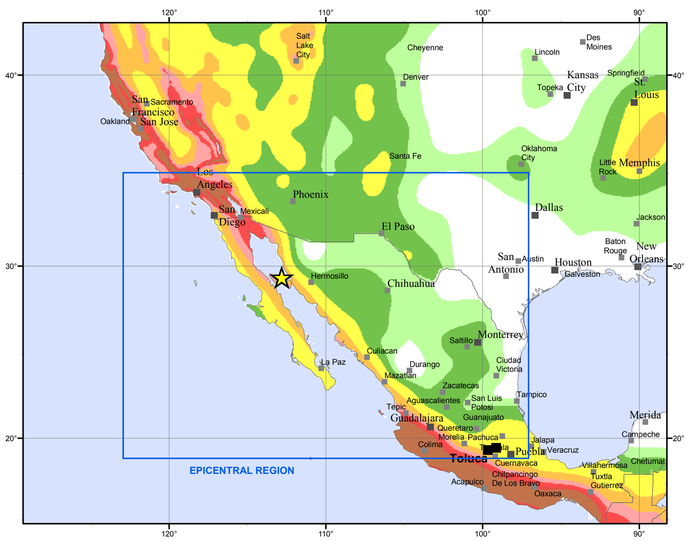
29.372° N., 112.814° W.
Depth 10 km
Mw = 6.9 (USGS)

89 km (56 miles) NNE (31°) from Santa Isabel, Baja California
137 km (85 miles) W (280°) from La Doce, Sonora
174 km (108 miles) NE (46°) from Guerrero Negro, Baja California Sur
185 km (115 miles) W (270°) from Hermosillo, Sonora
553 km (343 miles) SE (133°) from Tijuana, Baja California

Scale 1:8,000,000

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



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.

Scale 1:20,000,000

Peak Ground Acceleration in m/sec**2

.2 .4 .8 1.6 2.4 3.2 4.0 4.8

TECTONIC SUMMARY

The Gulf of California earthquakes of August 3, 2009, occurred in the plate boundary region between the North America and Pacific plate. At the latitude of the earthquake, the Pacific plate moves northwest with respect to the North America plate at about 45 mm/y. The plate boundary beneath the Gulf consists of a series of transform faults separated by small spreading centers or pull-apart basins: earthquakes occur as the result of strike-slip faulting and normal faulting. The seismographically recorded radiation pattern of the main shock of August 3, 18:00 UTC, implies that the shock occurred as the result of strike-slip faulting, but the earthquake has not yet been associated with a specific geologically mapped fault. The largest historically recorded shocks from the Gulf of California have had magnitudes of about 7.

Significant Earthquakes Mag >= 6.9

Year	Mon	Day	Time	Lat	Long	Dep	Mag
1900	01	20	0633	20.000	-105.000	0	7.3
1900	05	16	2012	20.000	-105.000	0	6.9
1901	03	05	1045	25.000	-110.000	0	6.9
1901	12	09	0217	26.000	-110.000	0	7.1
1902	12	12	2310	29.000	-114.000	0	7.1
1906	04	10	2118	20.000	-110.000	0	7.2
1907	10	16	1457	28.000	-112.500	0	7.2
1912	11	19	1355	19.000	-100.000	80	6.9
1915	11	21	0013	32.000	-115.000	0	7.1
1927	11	04	1351	34.915	-121.031	15	7.1
1932	06	03	1036	19.457	-104.146	25	7.9
1932	06	18	1012	19.452	-103.632	54.3	7.9
1932	06	22	1259	19.028	-104.379	25	6.9
1934	12	31	1845	32.685	-115.761	15	7.1
1940	05	19	0436	33.222	-115.697	15	6.9
1948	12	04	0022	22.000	-106.500	0	6.9
1952	07	21	1152	34.949	-119.046	10	7.3
1954	04	29	1134	28.971	-112.993	9.3	7.1
1968	04	09	0229	33.160	-116.192	15	7.0
1969	08	17	2014	24.851	-109.683	29.5	7.2
1992	06	28	1157	34.198	-116.515	15	7.3
1995	10	09	1535	19.052	-104.208	26.2	8.0
1997	05	01	1137	18.851	-107.383	12.8	6.9
1999	10	16	0946	34.555	-116.436	15	7.2

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.

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

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.

USGS science for a changing world

USAID FROM THE AMERICAN PEOPLE

M 6.9, GULF OF CALIFORNIA

Origin Time: Mon 2009-08-03 17:59:56 UTC
Location: 29.07°N 112.87°W Depth: 10 km

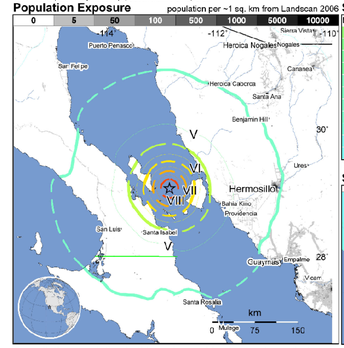
PAGER
Version 2
Created 1 hrs, 62 mins after earthquake

Estimated Population Exposed to Earthquake Shaking

ESTIMATED POPULATION EXPOSURE (k = x1000)		- -*	- -*	1,373k*	425k	3k	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
	Vulnerable Structures	none	none	none	Light	Moderate	Moderate/Heavy	Heavy	V. Heavy	V. Heavy

*Estimated exposure only includes population within the map area

Population Exposure population per ~1 sq. km from Landscan 2006

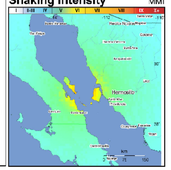


Selected City Exposure

MMI	City	Population
V	Bahia Kino	5k
V	Santa Isabel	21k
V	Providencia	4k
V	San Luis	7k
V	Heroica Caborca	52k
V	Pitiquito	5k
IV	Altar	8k
IV	Hermosillo	595k
IV	Guaymas	103k
IV	Ciudad Obregon	250k
IV	Heroica Nogales	185k

bold cities appear on map (k = x1000)

Shaking Intensity VMI



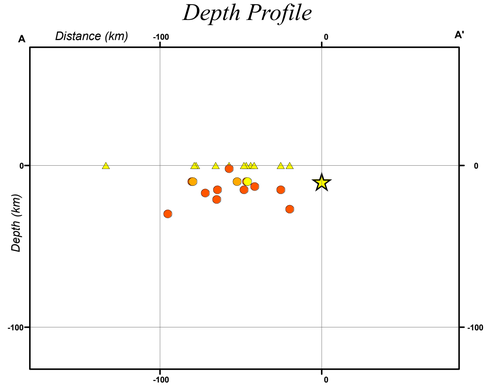
Overall, the population in this region resides in structures that are a mix of vulnerable and earthquake resistant construction. On June 9, 1980 (UTC), a magnitude 6.3 earthquake occurred near the Victoria, Mexico, region 379 km northwest of the location of this earthquake, with estimated population exposures of 22,000 at intensity IX or greater and 120,000 at intensity VIII, resulting in an estimated 1 fatality.

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

http://earthquake.usgs.gov/pager

Event ID: us2009jwbh

Depth Profile



Map prepared by U.S. Geological Survey
National Earthquake Information Center
3 August 2009
Map not approved for release by Director USGS