

HAZARDS AND THREATS

EARTHQUAKES

LIST OF MAJOR ACTIVE SURFACE FAULTS IN SOUTHERN CALIFORNIA

**(Bold: L.A. County Operational Area including cities
and L.A. County unincorporated area communities)**

- Arroyo Parida Fault (Santa Barbara, Goleta)
- Banning Fault (Calimesa, Cherry Valley, Banning, Cabazon, White Water)
- Big Pine Fault (Frazier Park)
- Blackwater Fault (Barstow, Johannesburg)
- Blue Cut Fault
- Calico Fault (Newberry Springs, Barstow)
- Camp Rock Fault (Newberry Springs, Barstow)
- **Eagle Rock Fault (Eagle Rock, Glendale, Pasadena)**
- Elsinore Fault (Temecula, Lake Elsinore, Julian)
- Emerson Fault (Landers)
- **Frazier Mountain Thrust Fault (Frazier Park, Gorman, Lebec)**
- Garlock Fault (Frazier Park, Johannesburg, Mojave, Tehachapi)
- Harper Fault (Barstow, Johannesburg)
- Helendale Fault (Lucerne Valley, Apple Valley, Victorville)
- **Hollywood Fault (Hollywood, Beverly Hills, Glendale)**
- Imperial Fault (Brawley, Imperial, El Centro, Calexico, Mexicali)
- Kern Front Fault (Oildale, Bakersfield)
- Lenwood Fault (Lenwood, Barstow)
- Lockhart Fault (Lockhart, Lenwood, Barstow)
- **Los Alamitos Fault (Los Alamitos, Lakewood, Bellflower)**
- Ludlow Fault (Ludlow)
- **Malibu Coast Fault (Malibu, Pacific Palisades)**
- **Newport-Inglewood Fault Zone (Culver City, Inglewood, Gardena, Compton, Signal Hill, Long Beach, Seal Beach, Huntington Beach, Newport Beach, Costa Mesa)**
- Newport-Inglewood-Rose Canyon Fault Zone (San Diego, La Jolla, Linda Vista)
- North Frontal Fault (Apple Valley, Lucerne Valley)
- Oakridge Fault (Santa Paula, Fillmore, Saticoy, Ventura)
- Old Woman Springs Fault (Big Bear, Lucerne Valley)
- Ozena Fault (Ventucopa, Cuyama)
- **Palos Verdes Fault (San Pedro, Palos Verdes Estates, Torrance, Redondo Beach)**

- Panamint Valley Fault (Wildrose, Ballarat, Panamint Springs)
- Pine Mountain Fault (Wheeler Springs)
- Pinto Mountain Fault (Twentynine Palms, Joshua Tree, Yucca Valley)
- Pisgah Fault
- Pleito Fault (Grapevine – Interstate 5, Wheeler Ridge)
- **Raymond Hill Fault (San Marino, Arcadia, South Pasadena)**
- **Redondo Canyon Fault (Palos Verdes Estates, Redondo Beach)**
- Rinconada Fault (Paso Robles, Santa Margarita)
- **San Andreas Fault (Parkfield, Frazier Park, Palmdale, Wrightwood, San Bernardino, Banning, Indio)**
- **San Fernando Fault (San Fernando, Sunland)**
- **San Gabriel Fault (Castaic, Saugus, Sunland)**
- **San Jose Fault (Claremont, La Verne, Pomona)**
- Santa Cruz Island Fault
- **Santa Cruz – Santa Catalina Ridge Fault Zone**
- **Santa Monica Fault (Pacific Palisades, Westwood, Beverly Hills, Santa Monica)**
- **Santa Susana Fault (Piru, Sylmar, San Fernando)**
- **Sierra Madre Fault (Sunland, Altadena, Sierra Madre, Monrovia, Duarte, Glendora)**
- **Soledad Fault (Acton, Soledad Canyon)**
- **Vasquez Creek Fault (refer to Sierra Madre Fault)**
- **Verdugo Fault (Sun Valley, Burbank, Glendale)**
- West Calico Fault
- Wheeler Ridge Fault (Wheeler Ridge)
- **Whittier Fault (Yorba Linda, Hacienda Heights, Whittier)**

For more information on the earthquake faults located in Southern California and Los Angeles County, go to the Southern California Earthquake Center at <http://www.scec.org>.

CHATSWORTH FAULT

Type of Fault: Reverse

Length: 20 km

Nearby Communities: Chatsworth, Simi Valley

Most Recent Surface Rupture: Late Quaternary

Slip Rate: unknown

Interval between Major Ruptures: unknown

Probable Magnitudes: 6.0-6.8

Other Notes:

- The Chatsworth Fault is a north-dipping fault.

EAGLE ROCK FAULT

Type of Fault: Thrust

Length: 11 km

Nearest Communities: Eagle Rock, Pasadena, Glendale

Most Recent Surface Rupture: Late Quaternary

Other Notes:

- The Eagle Rock Slip Rate is probably less than 0.1 mm/year...Possibility of simultaneous rupture with the Verdugo Fault (Reverse Fault Type located to nearby communities in Sun Valley, Burbank, Glendale)...The Eagle Rock Fault dips to the northeast.

ELSINORE FAULT

Type of Fault: Right-lateral strike-slip

Length: 180 km (not including the Whittier, Chino and Laguna Salada Faults)

Nearest Communities: Temecula, Lake Elsinore, Julian

Most Recent Surface Rupture: May 15, 1910 – Elsinore Earthquake (Magnitude: 6.0, 7:47 a.m. PST) – No surface rupture found

Probable Magnitudes: 6.5-7.5

Other Notes: Recurrence interval given above suggest slips of 1.25 to 1.5 meters per surface rupturing event

EMERSON FAULT

Type of Fault: Right-lateral strike-slip

Length: 55 km

Nearest Community: Landers

Last Major Rupture: June 28, 1992 – Landers Earthquake

Slip Rate: 0.5 mm/year

Interval between Major Ruptures: 9,000 years

Probable Magnitudes: 6.5-7.3

Other Notes:

- Simultaneous rupture with nearby faults can occur, as it did in 1992, where a rupture along the Johnson Fault was transferred to the Emerson Fault via the Kickapoo Fault. Rupture on the Emerson Fault was in turn passed on to the Camp Rock Fault to the north. In a similar way, future rupture along the Copper Mountain Fault to the south could propagate northward to the Emerson Fault.

FRAZIER MOUNTAIN THRUST FAULT

Type of Fault: Thrust

Length: 13 km

Nearest Communities: Frazier Park, Lebec, Gorman

Most Recent Rupture: Quaternary

Other Notes:

- The Frazier Mountain Thrust Fault is a north-dipping fault.

GARLOCK FAULT

Type of Fault: Left-lateral strike-slip

Length: 250 km

Nearest Communities: Frazier Park, Tehachapi, Mojave, Johannesburg

Most Recent Surface Ruptures: 1050 A.D. near Tehachapi; 1500 A.D. near Johannesburg (Searles Valley)

Probable Magnitudes: 6.8-7.6

Other Notes:

- The Garlock Fault Zone is one of the most obvious geologic features in Southern California, marking the northern boundary of the area known as the Mojave Block, as well as the southern ends of the Sierra Nevada and the valleys of the west-most basin and range province. While no earthquake has produced surface rupture on the Garlock Fault in historic times (although cracks opened along a short segment of the fault in 1952, due to the shaking of the Kern County Earthquake, and groundwater removal has also caused slip in the Fremont Valley area, there have been a few sizable earthquakes recorded along the Garlock Fault zone. The most recent was a magnitude 5.7 earthquake located near town of Mojave on July 11, 1992...It is thought to have triggered by the Landers Earthquake, just two weeks earlier...At least one section of the fault has shown movement by creep in recent years...These facts, along with the freshness of scarps left behind from previous ruptures and the on-going seismicity associated with the fault zone, leave little doubt that the Garlock Fault Zone will rupture again in the future.

HARPER FAULT

Type of Fault: Right-lateral strike-slip

Length: 70 km

Nearest Communities: Barstow, Johannesburg

Most Recent Surface Rupture: Holocene

Interval between Major Ruptures: 3500 years

Probable Magnitudes: 6.5-7.2

Other Notes:

- Roughly continuous with the Harper Lake Fault (Right-lateral strike-slip fault, nearest communities: Barstow, Lenwood); probable magnitude of a surface rupture event is greater in the case of a simultaneous rupture with the Harper Fault.

HELENDALE FAULT

Type of Fault: Right-lateral strike-slip

Length: 90 km

Nearest Communities: Lucerne Valley, Apple Valley, Victorville

Most Recent Surface Rupture: Holocene

Slip Rate: 0.8 mm/year

Probable Magnitudes: 6.5-7.3

Other Notes:

- The Helendale Fault seems to cut through the North Frontal Fault Zone of the San Bernardino Mountains.

HOLLYWOOD FAULT

Type of Fault: Left-reverse

Length: 15 km

Nearest Communities: Hollywood, Beverly Hills, Glendale

Most Recent Surface Rupture: Holocene

Slip Rate: 0.33 mm/year and 0.75 mm/year

Interval between Major Ruptures: 1600 years

Probable Magnitudes: 5.8-6.5

Other Notes:

- Could be considered a westward extension of the Raymond Fault (Left-lateral, 26 km long, nearest communities: San Marino, Arcadia, South

Pasadena)...Roughly parallel to the Santa Monica Fault (Left-reverse, 24 km long, nearby communities: Pacific Palisades, Westwood, Beverly Hills, Santa Monica).

IMPERIAL FAULT

Type of Fault: Right-lateral strike-slip

Length: 69 km

Nearest Communities: Brawley, Imperial, El Centro, Calexico, Mexicali

Most Recent Surface Rupture: October 15, 1979 – Imperial Valley Earthquake (Magnitude 6.4, 4:54 p.m. PDT)...Fault ruptured at Imperial (Main and North extension), Brawley and Rico Faults.

Slip Rate: 15 and 20 mm/year

Interval between Major Ruptures: Varies, earthquakes as large as or larger than that of 1979 may occur every 30-40 years, whereas earthquakes the size of that of 1940 may occur only every 700 years or so.

Probable Magnitudes: 6.0-6.7 for events similar to 1979 rupture; 6.5-7.0 for events similar to 1940 rupture.

Other Notes:

- Probably, the most intriguing of all these is the one associated with the smallest earthquake to break the surface...The March 4, 1966, surface rupture set the record for the smallest tectonically-induced seismic event (a natural earthquake along a fault, caused by plate tectonics, not a cave-in or explosion) ever to produce surface rupture – 9.7 kilometers of the Imperial Fault ruptured that day, with a maximum offset of 1.5 centimeters, in a magnitude 3.6 earthquake.

KERN FRONT FAULT

Type of Fault: normal

Length: 9 km

Nearest Communities: Oildale, Bakersfield

Most Recent Surface Rupture: Actively creeping due to fluid withdrawal.

Other Notes:

- The Kern Front Fault travels to the West...The fault, as well as the nearby New Hope Fault and Premier Fault have been creeping since the late 1940's, as people began removing fluids (oil, water) from the sub-surface rock formations.

LENWOOD FAULT

Type of Fault: Right-lateral strike-slip

Length: 75 km

Nearest Communities: Lenwood, Barstow

Most Recent Surface Rupture: Holocene

Slip Rate: 0.8 mm/year

Interval between Major Ruptures: 4000-5000 years

Probable Magnitudes: 6.5-7.4

Other Notes:

- The Lenwood Fault's creep has been recorded, though not verified, at northwestern end of fault...The Lenwood Fault triggered a slip near the southeast end in 1992 due to the Landers Earthquake.

LOCKHART FAULT

Type of Fault: Right-lateral strike-slip

Length: 70 km

Nearest Communities: Lockhart, Lenwood, Barstow

Most Recent Surface Rupture: Holocene, near its center; Late Quaternary, northwest center; Quaternary, southeast center...The North Lockhart Fault rupture took place in Late Quaternary in age.

Other Notes:

- The Lockhart Fault forms an essentially continuous fault system (150 km long) with the Lenwood Fault...Presently, there is no evidence that the Lenwood-Lockhart Fault system has ever ruptured together, but such an event might be possible.

LOS ALAMITOS FAULT

Type of Fault: uncertain

Length: 11 km

Nearest Communities: Los Alamitos, Lakewood, Bellflower

Most Recent Surface Rupture: Late Quaternary

Other Notes:

- Age uncertain; fault indistinct...The Los Alamitos Fault may be part of a larger fault system – the Compton-Los Alamitos Fault.

LUDLOW FAULT

Type of Fault: Right-lateral strike-slip

Length: 75 km

Nearest Community: Ludlow

Most Recent Surface Rupture: Quaternary

MALIBU COAST FAULT

Type of Fault: Reverse

Length: 34 km (Malibu Coast Fault has several parallel strands)

Nearest Communities: Malibu, Pacific Palisades

Most Recent Surface Rupture: Holocene in part; otherwise Late Quaternary

Slip Rate: 0.3 mm/year

Interval between Major Ruptures: uncertain

Other Notes:

- This is north-dipping fault...The slip rate may be higher at its eastern end, where it meets the Santa Monica Fault, and develops left-reverse motion.

NEWPORT-INGLEWOOD FAULT ZONE

Type of Fault: Right-lateral; local reverse slip associated with fault steps

Length: 75 km

Nearest Communities: Culver City, Inglewood, Gardena, Compton, Signal Hill, Long Beach, Seal Beach, Huntington Beach, Newport Beach, Costa Mesa

Most Recent Surface Rupture: March 10, 1933 – Long Beach Earthquake (5:54 p.m. PST, 6.4 magnitude) – no surface rupture

Slip Rate: 0.6 mm/year

Interval between Major Ruptures: unknown

Probable Magnitudes: 6.0-7.4

Other Notes:

- Surface trace is discontinuous in the Los Angeles Basin, but the fault zone can easily be noted there by existence of a chain of low hills extending from Culver City to Signal Hill, it roughly parallels the coastline until just south of Newport Bay, where it heads offshore, and becomes the Newport-Inglewood-Rose Canyon Fault Zone.

NEWPORT-INGLEWOOD-ROSE CANYON FAULT ZONE

Type of Fault: Right-lateral strike-slip

Length: 30 km

Nearest Communities: San Diego, La Jolla, Linda Vista

Most Recent Surface Rupture: Holocene, Late Quaternary

Interval between Major Ruptures: unknown

Other Notes:

- The faults in this zone typically dip to the east.

NORTH FRONTAL FAULT

Type of Fault: Thrust

Length: 65 km from end to end, but cut by the Helendale Fault...The Western portion is believed to be 35 km long and eastern section is about 25 km long

Nearest Communities: Apple Valley, Lucerne Valley

Most Recent Surface Rupture: Holocene, Late Quaternary and Quaternary

Slip Rate: 1.0 mm/year on the western segment and 0.5 mm/year on the eastern segment

Interval between Major Ruptures: uncertain

Probable Magnitudes: 6.0-7.1

Other Notes:

- The North Frontal Fault Zone of the San Bernardino Mountains is a zone consisting of numerous fault segments...The primary sense of slip is south-dipping thrust...This zone interacts with several other faults in a variety of intersections...It seems to be offset (right-laterally) by the Helendale Fault and forms a complex junction with the Old Woman Springs Fault...Because this zone is somewhat fragmented, many of the individual fault segments have their own, commonly-used names...Among these are the Ord Mountains Fault, Ocotillo Ridge Fold, Ski Hi Ranch Fault and Black Hawk Spring Fault.

OAKRIDGE FAULT

Type of Fault: Thrust

Length: 90 km

Nearest Communities: Santa Paula, Fillmore, Saticoy, Ventura

Most Recent Surface Rupture: Holocene, Late Quaternary

Probable Magnitudes: 6.5-7.5

Other Notes:

- This fault dips to the south, at a fairly shallow (less than 45 degrees) angle...Thus, epicenters of earthquake on this fault may appear far removed from the surface trace...The fault forms a ridge to the south and is paralleled by the Santa Clara River and California State

Highway 126, from the town of Piru to the coast, just southeast of Ventura...The Oak Ridge thrust continues off shore, out to a point about 20 km due south of Santa Barbara...The offshore segment is associated with a definite zone of actively seismicity, though the only known Holocene surface rupture is found well offshore, between the towns of Bardsdale and Fillmore...At its eastern end, the Oak Ridge thrust becomes progressively more difficult to trace, and appears to be over thrust by the Santa Susana Fault (Thrust fault, 38 km long, nearby communities: Piru, Sylmar, San Fernando), thus becoming a blind thrust fault...The fault was associated with the 1994 Northridge Earthquake.

OLD WOMAN SPRINGS FAULT

Type of Fault: Right-lateral strike-slip, with some vertical slip

Length: 10 km

Nearest Communities: Big Bear, Lucerne Valley

Most Recent Surface Rupture: Holocene

Other Notes:

- The Old Woman Springs Fault is the main trace in a fairly complex system of faulting which interacts, most likely, with both the North Frontal Fault Zone and the Lenwood Fault. The Silver Reef Fault is part of the same system of faults, and the two sometimes overlap in nomenclature.

OZENA FAULT

Type of Fault: Reverse

Length: 40 km

Nearest Communities: Ventucopa, Cuyama

Most Recent Surface Rupture: Quaternary

Other Notes:

- Dips to the south.

PALOS VERDES FAULT

Type of Fault: Right-reverse

Length: 80 km

Nearest Communities: San Pedro, Palos Verdes Estates, Torrance, Redondo Beach

Most Recent Surface Rupture: Holocene, Late Quaternary

Slip Rate: between 0.1 and 3.0 mm/year

Interval between Major Ruptures: unknown

Probable Magnitudes: 6.0-7.0 or greater...Fault geometrics may allow only partial rupture at any one time.

Other Notes:

- The Palos Verdes Fault Zone has two main branches and continues southward as the Palos Verdes-Coronado Bank Fault Line.

PANAMINT VALLEY FAULT

Type of Fault: Normal; right-normal

Length: 95 km

Nearest Communities: Wildrose, Ballarat, Panamint Springs

Most Recent Surface Rupture: Holocene

Slip Rate: 0.1 to 2.0 mm/year; highest rate is at the southern end of the zone

Interval between Major Ruptures: uncertain

Probable Magnitudes: 6.5-7.5

Other Notes:

- The surface trace of this fault zone is complex...The fault typically dips to the west.

PINE MOUNTAIN FAULT

Type of Fault: Reverse

Length: 59 km

Nearest Community: Wheeler Springs

Most Recent Surface Rupture: Late Quaternary

Other Notes:

- This is a north-dipping fault

PINTO MOUNTAIN FAULT

Type of Fault: Left-lateral strike-slip

Length: 73-90 km

Nearest Communities: Twentynine Palms, Joshua Tree, Yucca Valley

Most Recent Surface Rupture: Holocene, experienced triggered slip in 1992, due to shaking from the Landers Earthquake

Other Notes:

- Forms several cross-cutting relations and complex intersections with other faults

PISGAH FAULT

Type of Fault: Right-lateral strike-slip

Length: 34 km

Most Recent Surface Rupture: Holocene; experienced triggered slip in 1992 due to the Landers Earthquake

Slip Rate: 0.8 mm/year

Interval between Major Ruptures: uncertain

Probable Magnitudes: 6.0-7.0; may also rupture in series with Bullion Fault to the south.

PLEITO FAULT

Type of Fault: Thrust

Length: 11 km

Nearest Communities: Grapevine, Wheeler Ridge

Most Recent Surface Rupture: between 345 and 1465 years ago along eastern half; Quaternary along the western half of the fault

Slip Rate: 1.4 mm/year

Interval between Major Ruptures: uncertain

Probable Magnitudes: 6.3-7.3

Other Notes:

- This south-dipping thrust fault is part of a complex zone of thrust fault and folds which mark part of the southern end of the great Central Valley of California...The Pleito thrust may be connected at depth with the nearby, and similar, Wheeler Ridge Fault...At the eastern end of the fault, it may dive below the surface as a blind thrust, forming the northern scarp of the Tehachapi Mountains...Such a relation is only hypothetical, at best, however the potential damage posed by the Pleito Fault could be significant...Motion along this fault could make Interstate 5 impassable at the "Grapevine," when it comes down from Tejon Pass into the southern end of the San Joaquin Valley, and this would block the primary northern transportation route to and from Los Angeles.

RAYMOND HILL FAULT

Type of Fault: Left-lateral; only minor reverse

Length: 26 km

Nearest Communities: San Marino, Arcadia, South Pasadena

Most Recent Surface Rupture: Holocene

Interval between Major Ruptures: 4500 years

Slip Rate: 0.10 and 0.22 mm/year

Probable Magnitudes: 6.0-7.0

Other Notes:

- The Raymond Hill Fault dips at about 75 degrees to the north...There is evidence that at least eight surface-rupturing events have occurred along this fault in the last 36,000 years...The exact nature of the slip along the Raymond Fault has been a subject of debate...The fault produces a very obvious south-facing scarp along much of its length, and this has made many favor reverse-slip as the predominant sense of fault motion...In 1988, the Pasadena Earthquake (Left lateral strike-slip with very minor reverse motion, December 3, 1988, 3:38 a.m. PST, magnitude 5.0) occurred. Apparently located on the Raymond Fault, the motion of this earthquake were predominately left-lateral, with a reverse component only about 1/15th the size of the lateral component. This corresponds with a scarp height of about 30 meters (reverse slip) vs. a left-lateral stream offset of about 400 meters (lateral slip), which are found along the scarp of the Raymond Fault located south of Pasadena. If the Raymond Fault is primarily believed to be a left-lateral fault, it could be responsible for transferring slip southward from Sierra Madre Fault Zone to other fault systems.

REDONDO CANYON FAULT

Type of Fault: Right-reverse

Length: 11 km

Nearest Communities: Palos Verdes Estates, Redondo Beach

Most Recent Surface Rupture: Holocene

Slip Rate: uncertain

Interval between Major Ruptures: unknown

Probable Magnitudes: 5.8-6.5

RINCONADA FAULT

Type of Fault: Right-lateral strike-slip

Length: 120 km

Nearest Communities: Paso Robles, Santa Margarita

Most Recent Surface Rupture: Late Quaternary

Other Notes:

- The Rinconada Fault is part of a large fault system that runs from Monterey Bay in the north to south of the Cuyama River...This fault makes up the bulk of the length of Rinconada Fault system at least 56 km of right-lateral displacement can be seen in rocks cut by this fault.

SAN ANDREAS FAULT

Type of Fault: Right-lateral strike-slip

Length: 1200 km (550 km south of Parkfield and 650 km north)

Nearest Communities: Parkfield, Frazier Park, Palmdale, Wrightwood, San Bernardino, Banning, Indio

Last Major Rupture: January 9, 1857 (Fort Tejon Earthquake, right-lateral strike-slip, 8:20 a.m. PST, 7.9 magnitude - Mojave segment); April 18, 1906 (Northern segment)

Interval between Major Ruptures: average about 140 years on the Mojave segment; recurrence interval varies greatly...From under 20 years (at Parkfield only) to over 300 years

Probable Magnitudes: 6.8-8.0

SAN FERNANDO FAULT

Type of Fault: Thrust

Length: 17 km

Nearest Communities: San Fernando, Sunland

Most Recent Surface Rupture: February 9, 1971 (Sylmar-San Fernando Earthquake - 6:01 a.m. PST, 6.5 magnitude – Faults involved: San Fernando and Santa Susana)

Other Notes:

- The Sylmar-San Fernando Earthquake occurred on the San Fernando Fault Zone, a zone of thrusting faulting which broke the surface in the Sylmar-San Fernando area...The total surface rupture was roughly 19 km (12 miles) long...The maximum slip was up to two meters (six feet)...The Sylmar-San Fernando Earthquake caused over \$500 million in damages and 65 fatalities...Majority of the fatalities occurred when

the Veteran's Administration Hospital collapsed...Other hospitals including Olive View Community Hospital located in Sylmar suffered severe damage...Newly constructed freeway overpasses also collapsed...It believed that the loss of life could have been much greater had the earthquake struck at a busier time of the day...In response to the Sylmar-San Fernando Earthquake, building codes were strengthened and the Alquist Priolo Special Studies Act was passed in 1972...The purposed of the act is to prohibit the location of most structures for human occupancy across the traces of active faults and to mitigate thereby the hazard of fault rupture.

SAN GABRIEL FAULT

Type of Fault: Primarily right-lateral strike-slip

Length: 140 km

Nearest Communities: Castaic, Saugus, Sunland

Most Recent Surface Rupture: Late Quaternary west of the intersection with the Sierra Madre Fault Zone; Quaternary east of that intersection; Holocene only between Saugus and Castaic.

Interval between Major Ruptures: unknown

Slip Rate: 1 mm/year to 5 mm/year

Other Notes:

- The Slip Rate and recurrence interval probably vary significantly along the length of the San Gabriel Fault Zone...The Western half is probably much more active that the eastern half...Dip is generally steep and to the north.

SAN JOSE FAULT

Type of Fault: Left-lateral strike-slip; minor reverse component possible

Length: 18 km

Nearby Communities: Claremont, La Verne, Pomona

Last Significant Earthquake: February 28, 1990 (Upland Earthquake, 3:44 p.m. PST, magnitude 5.4, three km NW of Upland about 48 km east of Los Angeles)

Most Recent Surface Rupture: Late Quaternary

Slip Rate: between 0.2 and 2.0 mm/year

Interval between Major Ruptures: unknown

Probable Magnitudes: 6.0-6.5

Other Notes:

- The San Jose Fault travels steeply to the north.

SANTA CRUZ ISLAND FAULT

Type of Fault: Left-reverse

Length: 90 km

Most Recent Surface Rupture: Holocene, offshore; Late Quaternary on Santa Cruz Island

Interval between Major Ruptures: 4000 years

Slip Rate: 0.9 mm/year

Probable Magnitudes: 6.5-7.5

Other Notes:

- The Santa Cruz Island Fault is a north-dipping fault.

SANTA CRUZ – SANTA CATALINA RIDGE FAULT ZONE

Type of Fault: Right-lateral strike-slip; also right-reverse

Length: 60 km (seismically active portion)

Nearest Communities: Always more than 30 km from mainland

Most Recent Surface Rupture: Holocene in part, otherwise Quaternary

Interval between Major Ruptures: unknown

Slip Rate: unknown

Probable Magnitudes: 6.5-7.3

Other Notes:

- The Santa Cruz – Santa Catalina Island Ridge Fault Zone is believed to be much longer than the 60 km seismically active portion...The fault zone may extend far to the south to link up with the San Diego Trough Fault Zone, making it possibly over 150 km long.

SANTA MONICA FAULT

Type of Fault: Left-reverse

Length: 24 km

Nearest Communities: Pacific Palisades, Westwood, Beverly Hills, Santa Monica

Most Recent Surface Rupture: Late Quaternary

Slip Rate: 0.27 and 0.39 mm/year

Probable Magnitudes: 6.0-7.0

Other Notes:

- The Santa Monica Fault is a north-dipping fault...Its Slip Rate may be greatest at its western end.

SANTA SUSANA FAULT ZONE

Type of Fault: Thrust

Length: 38 km

Nearby Communities: Piru, Sylmar, San Fernando

Most Recent Surface Rupture: Late Quaternary, except for a short segment which ruptured slightly during the 1971 Sylmar-San Fernando Earthquake

Slip Rate: 5 and 7 mm/year

Interval between Major Ruptures: uncertain

Probable Magnitudes: 6.5-7.3

Other Notes:

- The Santa Susana Fault and the other faults in this complex zone travel to the north

SIERRA MADRE FAULT**Type of Fault:** Reverse**Length:** 55-75 km**Nearest Communities:** Sunland, Altadena, Sierra Madre, Monrovia, Duarte, Glendora**Most Recent Surface Rupture:** Holocene**Interval between Major Ruptures:** Several thousand years**Slip Rate:** 0.36 and 4 mm/year**Probable Magnitudes:** 6.0-7.0**Other Notes:**

- The Sierra Madre Fault dips to the north...It was determined that the fault was not responsible for the 1991 Sierra Madre Earthquake (Reverse fault, June 28, 1991, magnitude 5.8, 7:43 a.m. PDT, occurred on Clamshell-Sawpit Canyon Fault, an offshoot of the Sierra Madre Fault Zone in the San Gabriel Mountains – no surface rupture though it triggered rockslides that blocked some mountain roads...Roughly \$40 million in property damage occurred in the San Gabriel Valley...Unreinforced masonry buildings were the hardest hit...Two fatalities, one in Arcadia and Glendale...100 were reported injured, mostly minor.
- The Sierra Madre Fault Zone is often divided into five segments, labeled with the letters A through E, to more easily characterize this fairly complex system...Segment A is known as the Vasquez Creek Fault which runs between the San Gabriel Fault and the intersection of B and C segments of the Sierra Madre Fault...At the junction of C and D segments, the Clamshell-Sawpit Canyon Fault...One of the strands that make up segment D is known as the Duarte Fault because of its location near that community...Segment E represents the easternmost part of this fault zone, and at its eastern end it meets up with several other faults in a complex zone northwest of the town of Upland, near the epicenter of the 1990 Upland Earthquake...The general trend of the

Sierra Madre Fault Zone continues eastward from this point along the base of the San Gabriel Mountains, but this eastern continuation is known as the Cucamonga Fault Zone which is believed to be more active than the Sierra Madre Fault Zone...While rupture on the Sierra Madre Fault Zone it is believed could be limited to one segment at a time, but it has been recently suggested that a large event on the San Andreas Fault to the north similar to the 1857 Fort Tejon Earthquake could cause simultaneous rupture on reverse faults south of the San Gabriel Mountains...There is no conclusive evidence about this happening simultaneously on Sierra Madre Fault Zone and so it is classified as unknown.

SOLEDAD FAULT

Type of Fault: Left-lateral normal

Length: 20 km

Nearest Communities: Acton, Soledad Canyon

Most Recent Surface Rupture: Quaternary

Other Notes:

- The Soledad Fault dips to the north.

VASQUEZ CREEK FAULT (Please refer to Sierra Madre Fault)

VERDUGO FAULT

Type of Fault: Reverse

Length: 21 km

Nearest Communities: Sun Valley, Burbank, Glendale

Most Recent Surface Rupture: Holocene, Late Quaternary along northern segment

Interval between Major Ruptures: uncertain

Slip Rate: 0.5 mm/year

Probable Magnitudes: 6.0-6.8

Other Notes:

- The Verdugo Fault dips to the northeast.

WEST CALICO FAULT

Type of Fault: Right-lateral strike-slip

Length: 50 km

Most Recent Rupture: Holocene; exhibited triggered slip during 1992 as a result of the Landers Earthquake

Interval between Major Ruptures: 1500 years

Slip Rate: 1.0 and 2.6 mm/year

Probable Magnitudes: 6.5-7.1 (greater with West Calico Fault)

Other Notes:

- Combined with the Calico and West Calico Faults it is believed to be 95 km in length due to overlap in parallel fault strands.

WHEELER RIDGE FAULT

Type of Fault: Thrust

Length: 30 km

Nearest Community: Wheeler Ridge

Most Recent Surface Rupture: Holocene

Probable Magnitudes: 6.0-7.1

Other Notes:

- Wheeler Ridge Fault is a south-dipping thrust fault that is associated with a complex series of folds and scarps to the west of the town of Wheeler Ridge (and Interstate 5)...It may connect at depth with the Pleito Thrust Fault.

WHITTIER FAULT

Type of Fault: Right-lateral strike-slip with some reverse slip

Length: 40 km

Nearest Communities: Yorba Linda, Hacienda Heights, Whittier

Most Recent Surface Rupture: Holocene

Interval between Major Ruptures: 4500 years

Slip Rate: 2.5 and 3.0 mm/year

Interval between Major Ruptures: unknown

Probable Magnitudes: 6.0-7.2

Other Notes:

- The Whittier Fault dips toward the northeast.

Keys:

- Kilometer (km)
- Holocene – The most recent geologic era; from about 10,000 years ago to the present. The Holocene is the latest epoch of the Quaternary period.
- Pre-Quaternary: Refers to any time before 1.6 million years ago.
- Quaternary – The period of geologic time starting 1.6 million years ago and continuing to the present day. It is divided into two epochs: the Pleistocene and the Holocene with the division between these two falling at about 10,000 years before the present.
- Late Quaternary – Refers to the time between 700,000 years ago and the present day. It does not necessarily exclude the Holocene epoch.

Source: Southern California Earthquake Center – <http://www.scec.org>

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