

Quaternary Fault and Fold Database of the United States

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San Jacinto fault, Anza section (Class A) No. 125c

Last Review Date: 1999-03-01

Compiled in cooperation with the California Geological Survey

citation for this record: Treiman, J.A., and Lundberg, M., compilers, 1999, Fault number 125c, San Jacinto fault, Anza section, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, <https://earthquakes.usgs.gov/hazards/qfaults>, accessed 12/14/2020 02:15 PM.

Synopsis

General: This is the most seismically active fault in southern California, with significant earthquakes (larger than M5.5), including surface rupturing earthquakes in 1968 (M6.6 Borrego Mountain earthquake) and 1987 (M6.6 Superstition Hills and M6.2 Elmore Ranch earthquakes), and numerous smaller shocks within each of its main sections. Slip rates in the northern half of the fault system are around 12 mm/yr but are only around 4 mm/yr for faults in the southern half where strands overlap or are sub-parallel.

Sections: This fault has 7 sections. Sections taken from segments defined by Working Group on California Earthquake Probabilities (1995 #4945) and by Petersen and others (1996 #4860), and include from north to south into: San Bernardino section [125a], San Jacinto Valley section [125b], Anza section [125c], Coyote Creek section [125d], Borrego Mountain section [125e], Superstition Hills section [125f], and Superstition Mountain section [125g]. Sanders and Magistrale (1997 #6396) defined 18 segments based on inferred and observed historic ruptures and bends or steps in the continuity of the faults (these "segments" are listed under the seven sections described herein). Wesnousky (1986 #5305) divided the fault zone into nine segments, including the entire Claremont fault in the northern segment, including the Casa Loma fault with the Clark fault, and distinguishing the Hot Springs, Thomas Mountain and Buck Ridge faults as separate segments, in addition to the Coyote Creek, Borrego Mountain, Superstition Hills and Superstition Mountain sections as used by Working Group on California Earthquake Probabilities (1995 #4945).

**Name
comments**

General: San Jacinto fault named by Lawson and others (1908 #4969). Later mapping of major parts of zone by Fraser (1931 #6379), Dibblee (1954 #6376) and Sharp (1967 #6397). Major named faults within the zone include the Claremont, Casa Loma, Clark, Buck Ridge, Coyote Creek, Superstition Mountain, and Superstition Hills faults. See section discussions for more detail.

Section: Section represented herein includes Clark fault (no. 459), with major splays including the Buck Ridge fault (no. 471), Coyote Mountain fault (no. 478) of Jennings (1994 #2878); also Thomas Mountain fault. Anza section herein incorporates Anza, Horse Canyon, Clark Valley, Santa Rosa, Arroyo Salada and Buck Ridge segments of Sanders and Magistrale (1997 #6396). Clark and Buck Ridge faults named by Dibblee (1954 #6376); Coyote Mountain fault mapped by Sharp (1967 #6397) and named by Theodore and Sharp (1975 #6401); Thomas Mountain. fault first mapped by Fraser (1931 #6379). The northern end of this section is where the Clark fault branches into the Casa Loma and Claremont faults. The southern end of the section is at the southeastern end of the Clark fault, as it becomes the Santa Rosa fault and a series of splays termed the Arroyo Salad faults. The southern half of this section overlaps the Coyote Creek section and part of the Borrego Mountain section.

Fault ID: Refers to numbers 400 (Lytle Creek fault), 401 (San

	Jacinto fault), 402 (Glen Helen fault), 429 (Rialto-Colton fault), 447 (Claremont fault), 457 (Casa Loma fault), 458 (Hot Springs fault), 459 (Clark fault), 471 (Buck Ridge fault), 478 (Coyote Mountain fault), 479 & 480 (Coyote Creek fault), 504 (Superstition Hills fault), 505 (Superstition Mountain fault) and 506 (Wienert fault) of Jennings (1994 #2878); numbers 2 (Glen Helen fault), 3 (San Jacinto fault), 4 (Lytle Creek fault), 5 (Claremont fault), 6 (Casa Loma fault), 7 (Hot Springs fault), and 8 Clark fault) of Ziony and Yerkes (1985 #5931).
County(s) and State(s)	SAN DIEGO COUNTY, CALIFORNIA RIVERSIDE COUNTY, CALIFORNIA
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Good Compiled at 1:24,000 scale. <i>Comments:</i> Traces based on State of California Alquist-Priolo Earthquake Fault Zone maps.
Geologic setting	The San Jacinto fault zone is a major element of the San Andreas fault system in southern California, with historic earthquakes (if not ground rupture) associated with most of its sections. This dextral fault zone branches off from the San Andreas near Cajon pass and extends southeastward through the Peninsular Ranges for 240 km into southwestern Imperial Valley. Sharp (1967 #6397) believes that this is currently the most active strand of the San Andreas system in southern California, but is relatively young, with only about 24 km of total dextral offset. The fault zone may be divided into four principal sections: the Claremont, Clark, Coyote Creek and Superstition sections which are separated by major discontinuities (Sanders and Magistrale, 1997 #6396). The fault zone is further subdivided for seismic-hazard modeling purposes into from 5 to as many as 20 "segments" by various authors. The principal faults within the zone overlap in a right-stepping fashion, with a major overlap (50 km in length) occurring between the Clark and Coyote Creek faults.
Length (km)	This section is 85 km of a total fault length of 244 km.
Average strike	(for section) versus N58°W (for whole fault)
Sense of movement	Right lateral

	<p><i>Comments:</i> Sharp (1967 #6397) interprets total of 15 miles dextral offset and 1-2 miles vertical component (northeast side down) on Clark fault and 4 miles dextral offset on Buck Ridge fault.</p>
Dip Direction	<p>V; NE; SW</p> <p><i>Comments:</i> Sharp (1967 #6397) shows Clark fault dipping from 57° NE. to 90° near Hog Lake, but also records southwest dips on some splays east of Anza as well as shallowly southwest dipping thrust fault elements of the fault near where the Buck Ridge fault branches off and at the stepover to the Coyote Creek fault. Further to the southeast he shows dips varying from 64° NE. to 77° SW. Buck Ridge fault dips 68–75°? NE. (Sharp, 1967 #6397) and Thomas Mountain fault dips 67° SW. at one locality but is generally vertical (Sharp, 1967 #6397).</p>
Paleoseismology studies	<p>Hog Lake (125-2): trenching revealed evidence of several past earthquakes (Klinger and Rockwell, 1989 #6384).</p> <p>Anza (125-3): mapping and dating (using 14C and relative soil development) of offset alluvial deposits yielded slip-rate data (Rockwell and others, 1990 #6394).</p>
Geomorphic expression	<p>The Clark fault is marked by shutter ridges, scarps, linear and deflected drainages, hillside troughs, notches, sag ponds, aligned gullies, truncated spurs. The Buck Ridge fault is marked by scarps, shutter ridges, linear and deflected drainages, notches, swales, benches, aligned gullies and ponded alluvium.</p>
Age of faulted surficial deposits	<p>Holocene/Pleistocene sediments, including Pleistocene Bautista beds (Sharp, 1967 #6397)</p>
Historic earthquake	
Most recent prehistoric deformation	<p>latest Quaternary (<15 ka)</p> <p><i>Comments:</i> The most recent event is believed to be since 1700 A.D. (Klinger and Rockwell, 1989 #6384); estimated at about 1750 A.D. with previous events around 1530 and 1210 A.D. (reported by Working Group on California Earthquake Probabilities, 1995 #4945). Possible historical earthquakes</p>

	include the March 19, 1954, M6.2 Arroyo Salada earthquake at the southeastern end of the fault section; March 25, 1937, M5.9 Buck Ridge earthquake; and February 25, 1980, M5.5 earthquake occurred between Clark fault and Buck Ridge fault.
Recurrence interval	250 yr <i>Comments:</i> Recurrence interval estimated by Klinger and Rockwell (1989 #6384); Working Group on California Earthquake Probabilities (1995 #4945) calculated 250 yr for a M7.0-7.5 earthquake; Wesnousky (1986 #5305) calculated 128 yr for Casa Loma-Clark faults and 294 yr for Buck Ridge fault.
Slip-rate category	Greater than 5.0 mm/yr <i>Comments:</i> Minimum slip rate of 8–12 mm/yr during the past 0.73 m.y. (Sharp, 1981 #6398); Rockwell and others (1990 #6394) report a rate of 13 (+10,-6) mm/yr during the past 50 k.y., 12 (+9,-5) mm/yr during the past 17 k.y., 1 (+9,-5) mm/yr during the past 14 k.y., and 9.2±2 mm/yr during the past 9.5 k.y. Wesnousky (1986 #5305) assigns 10 mm/yr to the Clark fault and 2 mm/yr separately to the Buck Ridge fault (this slip-rate ratio is also suggested by Sanders, 1989 #6395). Petersen and others (1996 #4860) assign a slip rate of 12.0 mm/yr (with minimum and maximum assigned slip rates of 6.0 mm/yr and 18.0 mm/yr, respectively) for probabilistic seismic hazard assessment for the State of California.
Date and Compiler(s)	1999 Jerome A. Treiman, California Geological Survey Matthew Lundberg, California Geological Survey
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