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Quaternary Fault and Fold Database of the United States

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San Jacinto fault, Superstition Mountain section (Class A) No. 125g

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 125g, San Jacinto fault, Superstition Mountain 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 02:16 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:** Same as Superstition Mountain fault (no. 505) of Jennings (1994 #2878); first mapped by Tarbet (1951 #6400) and named by Dibblee (1954 #6376); northern end of Superstition Mountain section is placed at southern limit of Borrego Mountain earthquake rupture, although northern continuity of the surface trace is probable (Rockwell, personal communication, 1999). **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	

County(s) and State(s)	IMPERIAL COUNTY, CALIFORNIA
Physiographic province(s)	BASIN AND RANGE
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* 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 23 km of a total fault length of 244 km.
Average strike	(for section) versus N58°W (for whole fault)
Sense of movement	Right lateral
Dip	60° SW.–80° NE. *Comments:* Based on mapping by Treiman (1989 #6402).
Paleoseismology studies	Fish Creek basin (site 125-6): at the northwest end of the Superstition Mountain section, this study site is just south of the southern end of the Borrego Mountain earthquake rupture; trenches provided data on slip history and slip rate (Gurrola and Rockwell, 1996 #6380).

Geomorphic expression	scarps, deflected and linear drainages, ponded and beheaded drainages, shutter ridge, benches
Age of faulted surficial deposits	Holocene lacustrine, fluvial and aeolian deposits (including deposits dated 1440–1637 A.D.); Pleistocene Brawley formation; Pliocene Borrego formation
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Events on the northernmost Superstition Mountain fault (presumed to be continuous with Borrego Mountain section) timed at 1440–1637 A.D., 1280–1640 A.D., 820–1280 A.D., and pre-964 A.D. (Gurrola and Rockwell, 1996 #6380).
Recurrence interval	340 yr *Comments:* Average estimated by Working Group on California Earthquake Probabilities (1995 #4945); 240–410 yr average recurrence interval for past four events (Gurrola and Rockwell, 1996 #6380); Wesnousky (1986 #5305) calculates 468 yr.
Slip-rate category	Between 1.0 and 5.0 mm/yr *Comments:* 1.0 mm/yr (Wesnousky, 1986 #5305); 5–9 mm/yr inferred based on estimated 2 m slip/event and 240–490 yr recurrence (Gurrola and Rockwell, 1996 #6380); 4.0±2.0 mm/yr extrapolated from Borrego Mountain section by Working Group on California Earthquake Probabilities (1995 #4945). Petersen and others (1996 #4860) assign a slip rate of 5.0 mm/yr (with minimum and maximum assigned slip rates of 2.0 mm/yr and 8.0 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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