

# Quaternary Fault and Fold Database of the United States

As of January 12, 2017, the USGS maintains a limited number of metadata fields that characterize the Quaternary faults and folds of the United States. For the most up-to-date information, please refer to the [interactive fault map](#).

## Santa Ynez fault zone, Eastern section (Class A) No. 87d

Last Review Date: 2000-08-01

*citation for this record:* Treiman, J.A., compiler, 2000, Fault number 87d, Santa Ynez fault zone, Eastern 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 03:14 PM.

### Synopsis

**General:** Other than the basic geologic map location from Dibblee (1950 #5977; 1966 #5978) and a few other local studies, very little is known about most of this fault zone. Paleoseismic studies have been done in only two localities--the Alegria Canyon site along the Santa Ynez, South Branch section [87c] and the Rancho San Marcos site near the assigned section boundary between the Santa Ynez, Western section [87b] and Santa Ynez, Eastern sections [87d]. Although the latter study site, demonstrating Holocene displacement, is tentatively placed in the Santa Ynez, Eastern section [87d], the majority of this section (especially in Ventura County) is very poorly studied with respect to recency of activity. The South Branch is a little better known as a result of investigations in the late 1970's and early 1980's for a proposed Liquefied Natural Gas (LNG) facility (Envicom, 1978 #5981; Yerkes and others, 1980 #5993; Rice and others, 1981

	#5986) as well as an earlier study cited by Hart (1978 #5983). <b>Sections:</b> This fault has 4 sections.
<b>Name comments</b>	<b>General:</b> <b>Section:</b> In some usage the eastern section refers only to the portion within Ventura County. However, in this compilation the section extends from its intersection with the Santa Ynez, Western section [87b] near Lake Cachuma eastward to about 16 km west of the San Gabriel fault [89]. <b>Fault ID:</b> Refers to numbers 301 (Pacifico fault), 320 (Santa Ynez fault) and 321 (Santa Ynez fault, south branch) of Jennings (1994 #2878) and number 44 (Santa Ynez fault) of Ziony and Yerkes (1985 #5931).
<b>County(s) and State(s)</b>	VENTURA COUNTY, CALIFORNIA SANTA BARBARA COUNTY, CALIFORNIA
<b>Physiographic province(s)</b>	PACIFIC BORDER
<b>Reliability of location</b>	Poor Compiled at 1:750,000 scale. <i>Comments:</i> Location digitized from 1:750,000 map of Jennings (1994 #2878).
<b>Geologic setting</b>	Santa Ynez fault, an east-west structure along the north side of the Santa Ynez and Topatopa Ranges, is largely responsible for the uplift of these ranges (Dibblee, 1982 #5980). The fault has several kilometers of vertical displacement but also a strong, but unknown sinistral component (Dibblee, 1982 #5980); fault (along with Santa Ynez River fault) is modeled to accommodate clockwise rotation of the Transverse Ranges (Hornafius and others, 1986 #5922).
<b>Length (km)</b>	This section is 94 km of a total fault length of 148 km.
<b>Average strike</b>	N88°E (for section) versus N83°E (for whole fault)
<b>Sense of movement</b>	Left lateral <i>Comments:</i> Prominent sinistral component during recent movements indicated by several studies in Santa Barbara County (Page and others, 1951 #5985; Keaton, 1978 #5984; Sylvester and

	Darrow, 1979 #5989; Darrow and Sylvester, 1984 #5976); normal component indicated by uplift of ranges to the south (Dibblee, 1982 #5980).
<b>Dip Direction</b>	N  <i>Comments:</i> Fault is near vertical in the western part of this section and dips steeply north in the central portion (VonderLinden, 1992 #5991); 83?-90? N at Jameson Lake/Juncal Dam (Page and others, 1951 #5985); 72? N at Juncal Dam (Willis, cited by VonderLinden, 1992 #5991); Alder Creek trace at Juncal dam dips 60?-70? S; variable N and S dips in Ventura County (Weber and others, 1976 #5992).
<b>Paleoseismology studies</b>	Site 87d-1, Rancho San Marcos: Two late-Pleistocene and one Holocene stream terrace were found to be displaced by faulting as exposed in three-dimensional trenching; age assignments based on soil development and comparison to dated terraces in another drainage (Darrow and Sylvester, 1984 #5976; Troutman and others, 1986 #5990).
<b>Geomorphic expression</b>	Sinistrally deflected drainages, fault-line troughs, ponded alluvium, faceted spurs, saddles, fault-line valleys (Page and others, 1951 #5985; Keaton, 1978 #5984; VonderLinden, 1992 #5991).
<b>Age of faulted surficial deposits</b>	Holocene and late-Pleistocene stream terraces; various Tertiary bedrock units
<b>Historic earthquake</b>	
<b>Most recent prehistoric deformation</b>	late Quaternary (<130 ka)  <i>Comments:</i> Offset of fluvial terrace estimated to be <3 ka at western end of this section (Darrow and Sylvester, 1984 #5976); Ziony and others (1974 #581) indicate late Quaternary displacement; Smith (1977 #5988) discusses prior work and concludes that there is equivocal evidence of late Quaternary displacement, but no evidence for Holocene activity within the Ventura County portion of the fault zone.
<b>Recurrence</b>	

<b>interval</b>	
<b>Slip-rate category</b>	<p>Between 1.0 and 5.0 mm/yr</p> <p><i>Comments:</i> Data from site 87d-1 suggests slip rate of greater than 1 mm/yr based on 5-10 m sinistral separation of mid- to late Holocene terrace deposits (Darrow and Sylvester, 1984 #5976; Troutman and others, 1986 #5990); at Blue Canyon--0.5-3.4 mm/yr for north strand and 0.1-6.7 mm/yr for south strand (Clark and others, 1984 #2876). Slip rate assigned to this part of the fault by Petersen and others (1996 #4860) for probabilistic seismic hazard assessment for the State of California was 2.0 mm/yr (with minimum and maximum assigned slip rates of 1.0 mm/yr and 3.0 mm/yr, respectively).</p>
<b>Date and Compiler(s)</b>	<p>2000</p> <p>Jerome A. Treiman, California Geological Survey</p>
<b>References</b>	<p>#5974 Arnold, R., and Anderson, R., 1907, Geology and oil resources of the Santa Maria oil district, Santa Barbara County, California: US Geological Survey Bulletin 322, 161 p.</p> <p>#5975 Clark, D.G., Slemmons, D.B., Caskey, S.J., and dePolo, D.M., 1994, Seismotectonic framework of coastal central California, <i>in</i> Alterman, I.B., McMullen, R.B., Cluff, L.S., and Slemmons, D.B., eds., Seismotectonics of the central California Coast Ranges: Geological Society of America Special Paper 292, p. 9-30.</p> <p>#2876 Clark, M.M., Harms, K.H., Lienkaemper, J.J., Harwood, D.S., Lajoie, K.R., Matti, J.C., Perkins, J.A., Rymer, M.J., Sarna-Wojcicki, A.M., Sharp, R.V., Sims, J.D., Tinsley, J.C., III, and Ziony, J.I., 1984, Preliminary slip rate table and map of late Quaternary faults of California: U.S. Geological Survey Open-File Report 84-106, 12 p., 5 plates, scale 1:1,000,000.</p> <p>#5976 Darrow, A.C., and Sylvester, A.G., 1984, Final technical report, activity of the central reach of the Santa Ynez fault—Continuation of investigations: Technical report to U.S. Geological Survey, under Contract 14-08-0001-21367, September 10, 1984, 18 p., 14 pls.</p> <p>#5977 Dibblee, T.W., Jr., 1950, Geology of southwestern Santa Barbara County, California: [California] Division of Mines Bulletin 150, 95 p., 17 pls.</p>

#5978 Dibblee, T.W., Jr., 1966, Geology of the central Santa Ynez Mountains, Santa Barbara County, California: California Division of Mines and Geology Bulletin 186, 99 p., 4 pls.

#5979 Dibblee, T.W., Jr., 1978, Analysis of geologic-seismic hazards to Point Conception LNG terminal site: Technical report to County of Santa Barbara, March 1978, 72 p.

#5980 Dibblee, T.W., Jr., 1982, Geology of the Santa Ynez-Topatopa Mountains, southern California, *in* Fife, D.L., and Minch, J.A., eds., Geology and mineral wealth of the California Transverse Ranges: South Coast Geological Society, Annual Symposium and Guidebook Number 10, p. 40-56.

#5981 Envicom, 1978, Engineering geologic investigation of potentially active faults, Hollister Ranch, Santa Barbara County, California: Consultants report, January 4, 1978, 8 p. plus attachments (on file with Fault Evaluation Report FER-12 at California Division of Mines and Geology, San Francisco office).

#5982 Hall, C.A., Jr., 1978, Origin and development of the Lompoc-Santa Maria pull-apart basin and its relation to the San Simeon-Hosgri strike-slip fault, western California, *in* Silver, E.A., and Normark, W.R., eds., San Gregorio-Hosgri fault zone, California: California Division of Mines and Geology Special Report 137, p. 25-31.

#5983 Hart, E.W., 1978, Supplement #1 to fault evaluation report FER-12 [Santa Ynez fault, south branch]: California Division of Mines and Geology Fault Evaluation Report FER-12, microfiche copy in California Division of Mines and Geology Open-File Report 90-12, 2 p.

#5922 Hornafius, J.S., Luyendyk, B.P., Terres, R.R., and Kamerling, M.J., 1986, Timing and extent of Neogene tectonic rotation in the western Transverse Ranges, California: Geological Society of America Bulletin, v. 97, p. 1476-1487.

#2878 Jennings, C.W., 1994, Fault activity map of California and adjacent areas, with locations of recent volcanic eruptions: California Division of Mines and Geology Geologic Data Map 6, 92 p., 2 pls., scale 1:750,000.

#5984 Keaton, J.R., 1978, Geomorphic evidence for late

Quaternary displacement along the Santa Ynez fault zone, Blue Canyon, eastern Santa Barbara County, California: Geological Society of America Abstracts With Programs, v. 10, no. 3, p. 111.

#5985 Page, B.M., Marks, J.G., and Walker, G.W., 1951, Stratigraphy and structure of mountains northeast of Santa Barbara, California: Bulletin of the American Association of Petroleum Geologists, v. 35, no. 8, p. 1727-1780.

#5962 Petersen, M.D., and Wesnousky, S.G., 1994, Review, fault slip rates and earthquake histories for active faults in southern California: Bulletin of the Seismological Society of America, v. 84, no. 5, p. 1608-1649.

#4860 Petersen, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic seismic hazard assessment for the State of California: California Department of Conservation, Division of Mines and Geology Open-File Report 96-08 (also U.S. Geological Open-File Report 96-706), 33 p.

#5986 Rice, S.J., Treiman, J.A., Borchardt, G., Jones, A.L., Mualchin, L., Chapman, R.H., and Sherburne, R.W., 1981, Geologic and seismic hazards evaluation of the proposed Little Cojo Bay LNG terminal site, Point Conception, California: California Division of Mines and Geology Open File Report OFR 82-22, 68 p.

#5988 Smith, T.C., 1977, Fault evaluation report FER-22 [Santa Ynez fault, eastern segment]: California Division of Mines and Geology Fault Evaluation Report FER-22, microfiche copy in California Division of Mines and Geology Open-File Report 90-12, 9 p., 3 pls.

#5989 Sylvester, A.G., and Darrow, A.C., 1979, Structure and neotectonics of the western Santa Ynez fault system in southern California: Tectonophysics, v. 52, p. 389-405.

[Questions or comments?](#)

[Facebook](#) [Twitter](#) [Google](#) [Email](#)

[Hazards](#)

[Design](#) [Ground Motions](#) [Seismic Hazard Maps & Site-Specific Data](#) [Faults](#) [Scenarios](#)

[Earthquakes](#)[Hazards](#)[Data](#)[Education](#)[Monitoring](#)[Research](#)

[Home](#)[About Us](#)[Contacts](#)[Legal](#)