

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](#).

San Gabriel fault zone, Palomas section (Class A) No. 89a

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Synopsis

General: Quaternary to late Quaternary active dextral normal fault zone that locally exhibits evidence of Holocene displacement. The fault zone extends for about 135 km from the Frazier Mountain area southeast to the Saugus/Castaic area where the fault's strike changes to an east-west trend through the southern San Gabriel Mountains. The fault apparently either dies out or is truncated by the San Antonio fault [328] in the eastern San Gabriel Mountains (Ehlig, 1973 #7867; Weber, 1982 #7881, 1986 #7882; Powell, 1993 #5753; Matti and Morton, 1993 #5737).

Sections: This fault has 5 sections. There is insufficient data to delineate seismogenic segments. Weber (1982 #7881) described 5 segments that delineate the San Gabriel fault zone, and his nomenclature is adopted in this compilation, although section

boundaries are slightly modified. From north to south they included the Palomas [89a], Honor Rancho [89b], Newhall [89c], San Gabriel River [89d], and Big Tujunga [89e] sections. Crowell (1982 #7857) suggested that dextral offset on the San Gabriel fault began in late Miocene (about 10 Ma) and mostly ceased by the end of Miocene time and concluded that dextral slip within the San Andreas transform system switched from the San Gabriel to the San Andreas fault [1] about 5 Ma. Weber (1982 #7881), however, questioned this interpretation, and noted that Pliocene Hungry Valley Formation is disrupted by the San Gabriel fault and that a few kilometers of dextral offset occurred after deposition of the Hungry Valley Formation. Weber (1982 #7881) presented geomorphic and stratigraphic evidence of late Quaternary dextral normal offset. Cotton (1986 #7848, 1987 #7854) documented evidence of Holocene strike-slip displacement along the Honor Rancho section [89b] of the San Gabriel fault at the Rye Canyon [89-1a] and Trench A [89-1b] paleoseismic sites. Alluvial package mismatches across faults exposed at the Rye Canyon site [89-1a] indicate significant strike-slip offset. Cotton (1986 #7848, 1987 #7854) reported a preliminary Holocene dextral slip rate of about 0.6 mm/yr, based on dextrally offset paleochannel and fold axis exposed at the Trench A site [89-1b]. Uncertainty values were not reported in Cotton (1987 #7854).

**Name
comments**

General: Fault first mapped and named by Kew (1924 #6014) for northwest striking fault extending from Tujunga Canyon northwest to the vicinity of Holser Canyon. Kew (1924 #6014) named the fault based on exposures in the western San Gabriel Mountains. Additional named faults forming the San Gabriel fault zone include: Canton, Castaic Valley, Daisy, De Mille, Dillon, Gold Creek, Piru, Placerita, and Ybarra faults. The San Gabriel fault zone bifurcates near Big Tujunga Creek and strands here have been referred to as the Vasquez or Vasquez Creek fault (Miller, 1928 #5961; Jahns and Proctor, 1975 #6093, Crook and others, 1987 #5956), the Sierra Madre fault (Eckis, 1934 #6087; Ehlig, 1968 #7865), or the South Branch of the San Gabriel fault (Crowell, 1962 #7855, 1981 #7856; Ehlig, 1973 #7867, 1975 #7868, 1981 #7869, 1982 #7870; Weber, 1982 #7881).

Section: Palomas section is generally based on the Palomas segment first proposed by Weber (1982 #7881). The section extends from the vicinity of Hungry Valley southeast along the linear part of Buck Creek, then parallel to and west of Interstate 5 in the Big Oak Flat area, then along the Palomas Canyon to the

	<p>vicinity of Castaic Valley where the fault zone bends to a more east-southeasterly strike. Named faults include: San Gabriel, Canton, Castaic Valley, and Piru faults.</p> <p>Fault ID: Refers to numbers 316 (San Gabriel fault - Western Part) and 384 (San Gabriel fault – Eastern Part) of Jennings (1994 #2878), and number 63 (San Gabriel fault – Central part) of Ziony and Yerkes (1985 #5931).</p>
<p>County(s) and State(s)</p>	<p>LOS ANGELES COUNTY, CALIFORNIA VENTURA COUNTY, CALIFORNIA</p>
<p>Physiographic province(s)</p>	<p>PACIFIC BORDER</p>
<p>Reliability of location</p>	<p>Good Compiled at 1:24,000 scale.</p> <p><i>Comments:</i> Location of fault from Qt_ft_ver_3-0_Final_WGS84_polyline.shp (Bryant, W.A., written communication to K.Haller, August 15, 2017) attributed to 1:24,000-scale map by Weber (1982 #7881).</p>
<p>Geologic setting</p>	<p>San Gabriel fault zone is one of the principal structural elements of the Transverse Ranges. The San Gabriel fault zone consists of steeply dipping faults that extend for about 135 km from the eastern San Gabriel Mountains along a generally east-west strike, through the Saugus/Castaic area where the fault zone is characterized by a northwest strike. Near Big Tujunga Canyon the South Branch San Gabriel fault branches off southeast of the east-striking San Gabriel fault. The South Branch San Gabriel (Vasquez Creek) fault may have up to 5 km of cumulative dextral displacement as reported by Powell (1993 #5753), but other workers interpret 22–38 km of dextral offset (Matti and Morton, 1993 #5737; Ehlig, 1968 #7866). Beyer and others (2009#7849) suggested that as much as 12.2 km of post Miocene dextral separation. Farther southeast the South Branch San Gabriel fault dips to the northeast at a shallow angle and is characterized by an unknown amount of reverse or thrust displacement (Smith, 1986 #7880). Northwest of the Saugus area the fault zone forms the southwestern edge of the Ridge basin and terminates near Frazier Mountain (Yeats and others, 1994 #7883). Principal sense of displacement is dextral strike-slip, although there is a down-to-north component of normal stratigraphic separation (Yeats and others, 1994 #6114; Powell, 1993 #7883). Maximum cumulative</p>

	dextral displacement is controversial—estimates range from 0–5 km (Weber, 1982 #7881, 1986 #7882), to a maximum of 70 km (Ehlert, 1982 #7864). Most estimates fall in the 30–45 km range. The reader is referred to Powell (1993 #5753) and Yeats and others (1994 #6114) for summaries of previous estimates of displacement along the San Gabriel fault zone.
Length (km)	km.
Average strike	
Sense of movement	Right lateral, Normal <i>Comments:</i> Sense of displacement is dominantly dextral strike-slip, but there is a minor down-to-the-northeast normal stratigraphic separation (Ehlig, 1973 #7867; Weber, 1982 #7881, 1986; Yeats and others, 1994 #6114).
Dip	70°–85° NE <i>Comments:</i> Yeats and others (1994 #6114), Yeats and Stitt (2003 #7883), and Crowell (2003 #7858) show cross sections along Palomas section, based in part on oil well data.
Paleoseismology studies	
Geomorphic expression	The Palomas section is generally moderately to poorly defined. Weber (1982 #7881) observed geomorphic evidence suggestive of late Quaternary dextral strike-slip displacement along the Palomas section such as low apparent scarps in older landslide and alluvial deposits in the Beartrap Creek area, a dextrally offset and beheaded drainage in the Canton Canyon area, and the linear expression of Palomas Canyon with an associated 4 km long linear alignment of up-hill facing scarps and dextrally deflected drainages. Weber (1982 #7881) concluded that this section of the fault zone lacks geomorphic evidence of Holocene offset, although he concedes that minor geomorphic features that may imply relatively recent activity are likely to have been obliterated by rapid erosion and sedimentation.
Age of faulted surficial deposits	Fault offsets pre-Cambrian gneiss and Mesozoic granitic rocks on the southwest against Miocene sedimentary rocks (Castaic Formation, Violin Breccia) on the northeast along northern part of Palomas section (Crowell, 2003 #7858). Southeast of the junction

	<p>with the Santa Felicia fault [281], strands of the Palomas section offset Tertiary sedimentary rocks (Fernando, Towsley, Modelo formations) on the southwest against Tertiary sedimentary rocks of the Castaic Formation on the northeast. (Yeats and Stitt, 2003). Plio-Pleistocene Saugus Formation is offset along most of the central and southern parts of the Palomas section. Older alluvium and ancient landslide deposits may be offset in Piru Creek and locally older alluvium and older landslide deposits are offset (Weber, 1982 #7881, 1986 #7882). The age of these alluvial deposits is not well constrained, but Weber (1986 #7882) infers that some deposits may be latest Pleistocene.</p>
Historic earthquake	
Most recent prehistoric deformation	<p>late Quaternary (<130 ka)</p> <p><i>Comments:</i> Age of most recent event is not known. Weber (1982 #7881, 1986 #7882) reported that Palomas section of San Gabriel fault zone offsets older alluvium and landslide deposits (Weber's Qoa and Qob units, inferred locally to be latest Pleistocene).</p>
Recurrence interval	
Slip-rate category	<p>Between 0.2 and 1.0 mm/yr</p> <p><i>Comments:</i> No slip rate estimates have been made for the Palomas section and there is some uncertainty regarding amount of dextral displacement that has occurred in late Quaternary time. Yeats and others (1994 #6114) reported that post-Saugus Formation (late Pleistocene) dextral offset suggests late Quaternary slip rate of 1.3 mm/yr northwest of Honor Rancho oil field.</p>
Date and Compiler(s)	<p>2017</p> <p>William A. Bryant, California Geological Survey</p>
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