

# 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](#).

## Ortigalita fault zone, Piedra Azul section (Class A) No. 52c

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### Compiled in cooperation with the California Geological Survey

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#### Synopsis

**General:** The Ortigalita fault zone is a major Holocene dextral strike-slip fault in the central Coast Ranges that is an eastern part of the larger San Andreas fault system. The Ortigalita fault zone extends from about 20 km northwest of San Luis Reservoir southeast to the vicinity of Panoche Valley. The Ortigalita fault zone is characterized by en echelon fault traces separated by pull-apart basins. Anderson and others (1982 #5344; 1982 #5345) excavated trenches along each of the four sections, demonstrating that the Ortigalita fault zone is latest Pleistocene to Holocene (active) and that the Little Panoche Valley section is late

Holocene active. Most of the Ortigalita fault zone is delineated by geomorphic evidence of latest Pleistocene to Holocene dextral strike-slip displacement and is locally marked by complex dextral normal offset, primarily at the section boundaries marked by pull-apart basins (Anderson and others, 1982 #5344; 1982 #5345; Hart, 1985 #5350; Manson, 1985 #5355). Late Quaternary slip rates and recurrence intervals are unknown, although Anderson and others (1982 #5344) concluded that the recurrence interval for the entire Ortigalita fault zone is about 2–5 k.y. Clark and others (1984 #2876) reported a minimum vertical slip rate of 0.01–0.04 mm/yr. The dextral slip component is probably greater than the vertical component, but this has not been documented.

**Sections:** This fault has 4 sections. Anderson and others (1982 #5344) defined four segments of the Ortigalita fault, from north to south: Cottonwood Arm, Los Banos Valley, Piedra Azul, and Little Panoche. There is insufficient data to define these as seismogenic fault segments. The names and segment boundaries from Anderson and others (1982 #5344) are adopted as sections for this compilation and include the Cottonwood Arm [52a], Los Banos Valley [52b], Piedra Azul [52c], and Little Panoche [52d] sections.

**Name  
comments**

**General:** The Ortigalita fault zone was first recognized and mapped by Anderson and Pack (1915 #5347) for a fault that juxtaposes Cretaceous Franciscan Complex rocks against Upper Cretaceous Chico Group along the eastern side of Ortigalita Peak. The fault was first named by Taliaferro (1943 #5356), who identified a steeply west-dipping reverse fault (cross-section VII) that he named the Ortigalita Thrust. The fault has also been referred to as the Tesla-Ortigalita fault (e.g., Cotton, 1972 #5348). This compilation refers to the Ortigalita fault zone (most common name) as the zone of faults from about 20 km northwest of San Luis Reservoir southeast to Panoche Valley that are characterized by predominantly dextral late Pleistocene and Holocene strike-slip.

**Section:** The Piedra Azul section corresponds to the Piedra Azul segment of Anderson and others (1982 #5344). This section extends from the Carrisalito Flat area southeast to the north end of Little Panoche Valley. Carrisalito Flat is a pull-apart basin between Los Banos Valley [52b] and Piedra Azul [52c] sections.

**Fault ID:** Refers to number 214 (Ortigalita fault) of Jennings (1994 #2878) and number L03 (Ortigalita fault) of Working

	Group on Northern California Earthquake Potential (1996 #1216).
<b>County(s) and State(s)</b>	FRESNO COUNTY, CALIFORNIA MERCED COUNTY, CALIFORNIA
<b>Physiographic province(s)</b>	PACIFIC BORDER
<b>Reliability of location</b>	Good Compiled at 1:62,500 scale.  <i>Comments:</i> Locations based on digital revisions to Jennings (1994 #2878) using original mapping by Dibblee (1975 #4832) at 1:62,500 scale and mapping by Anderson and others (1982 #5345), Lettis (1982 #5353), and Manson (1985 #5355) at 1:24,000 scale.
<b>Geologic setting</b>	The Ortigalita fault zone consists of near vertical dipping dextral strike-slip faults located along the eastern border of the central Diablo Range (Anderson and others, 1982 #5344; Lettis, 1985 #5354). This fault zone separates the Franciscan core of the range from the Great Valley Sequence of the eastern foothills of the range (Anderson and others, 1982 #5344). The fault's style of displacement locally is complex with minor reverse and normal components to the predominant dextral strike-slip displacement (Anderson and others, 1982 #5344; 1982 #5345; Manson, 1985 #5355). Cumulative dextral displacement is unknown, but the large-scale dextral displacement of Los Banos Creek suggests at least 5 km of offset (Manson, 1985 #5355). Anderson and La Forge (1990 #5346) estimated that at least 1–2 km of dextral slip is indicated by the size of pull-apart basins associated with the Ortigalita fault zone. Lettis (1985 #5354) argued that the location of Basalt Hill, an outlier of the late Miocene Quien Sabe volcanic field, limits the amount of significant late Cenozoic dextral displacement along the Ortigalita fault zone. Elevations of the Quien Sabe volcanic rocks on either side of the Ortigalita fault zone also limit the amount of late Cenozoic vertical displacement (Lettis, 1985 #5354).
<b>Length (km)</b>	This section is 23 km of a total fault length of 71 km.
<b>Average strike</b>	N13°W (for section) versus N28°W (for whole fault)
<b>Sense of movement</b>	Right lateral  <i>Comments:</i> Focal mechanisms indicate predominantly dextral

	<p>strike-slip offset along the Piedra Azul section (LaForge and Lee, 1982 #5352). Fault planes with horizontal slickensides were exposed in a trench excavated by Anderson and others (1982 #5344).</p>
<p><b>Dip Direction</b></p>	<p>V</p> <p><i>Comments:</i> Focal mechanism along the Piedra Azul section reported by La Forge and Lee (1982 #5352) indicate near vertical to steeply northeast dipping dextral strike-slip faults.</p>
<p><b>Paleoseismology studies</b></p>	<p>Anderson and others (1982 #5344) conducted a detailed study of the fault zone, and about nine fault-normal trenches were excavated along traces of the Ortigalita fault zone for the Cottonwood Arm, Los Banos Valley, Piedra Azul, and Little Panoche Valley sections. Two study sites were examined along the Piedra Azul section.</p> <p>Site 52-4 consists of one fault normal trench excavated across a SW-facing escarpment. The trench exposed a 5-m-wide zone of faults that offset post-Tulare Formation colluvium.</p> <p>Site 52-5 consists of one fault normal trench excavated across a SW-facing scarp. The trench exposed deformed sediment overlain by unfaulted sag-pond deposits. The base of the unfaulted sag-pond deposits is about 9,970±225 yr BP based on radiocarbon dating of organic material sampled near the base of the section.</p>
<p><b>Geomorphic expression</b></p>	<p>The Piedra Azul section is locally marked by moderately to well defined geomorphic features indicative of late Pleistocene and possible Holocene dextral displacement, such as linear drainages, scarps on bedrock, linear troughs, dextrally deflected drainages, shutter ridges, and linear tonal contrasts (Manson, 1985 #5355). South of Wisenor Flat, the Piedra Azul section is poorly expressed (Manson, 1985 #5355).</p>
<p><b>Age of faulted surficial deposits</b></p>	<p>Faults of this section offset gravel of the Tulare Formation and post-Tulare colluvium (late Pleistocene, (Lettis, 1982 #5353). The fault is overlain by undisturbed colluvium that is about 35–40 ka, based on soil profile development (Anderson and others, 1982 #5344). Sag-pond deposits exposed in a trench excavated across a scarp on a trace of the Piedra Azul section are 9,970±225 years B.P. based on radiocarbon ages of organic material sampled at the</p>

	base of the deposit. Deposits underlying the sag-pond deposits are deformed, suggesting that surface fault rupture last occurred slightly before 10 ka (Anderson and others, 1982 #5344).
<b>Historic earthquake</b>	
<b>Most recent prehistoric deformation</b>	latest Quaternary (<15 ka)  <i>Comments:</i> Anderson and others (1982 #5344) reported that the Piedra Azul section last ruptured between 10 ka and 35 ka (i.e., latest Pleistocene time) on the basis of faulted post-Tulare deposits and unfaulted 9,970±225 yr BP sag-pond deposits.
<b>Recurrence interval</b>	<i>Comments:</i> Anderson and others (1982 #5344) concluded that the average recurrence interval for movement somewhere along the entire fault is about 2–5 k.y. based on their observations that there have been at least four major surface rupturing earthquakes on the Ortigalita fault zone in the past 15 k.y. There is no documentation for recurrence intervals on specific fault sections, although Anderson and others (1982 #5344) state that recurrence of large earthquakes on individual sections may be on the order of 10–15 k.y.
<b>Slip-rate category</b>	Between 1.0 and 5.0 mm/yr  <i>Comments:</i> Clark and others (1984 #2876) reported late Pleistocene vertical displacement rates of about 0.01–0.04 mm/yr for the Cottonwood Arm [52a] and Los Banos Valley [52b] sections; the dextral component of slip is unknown. Clark and others (1984 #2876) qualify this slip rate by stating that the vertical rate is an extreme minimum, that trench exposures and geomorphic expression of the fault zone suggest a much greater dextral slip rate on the order of 0.5–1.0 mm/yr or greater. Petersen and others (1996 #4860) used a probable slip rate of 1±0.5 mm/yr, so the 1–5 mm/yr category seems to fit best.
<b>Date and Compiler(s)</b>	2000 William A. Bryant, California Geological Survey Sereyna E. Cluett, California Geological Survey
<b>References</b>	#5344 Anderson, L.W., Anders, M.H., and Ostenaar, D.A., 1982, Late Quaternary faulting and seismic hazard potential, eastern Diablo Range, California, <i>in</i> Hart, E.W., Hirschfeld, S.E., and Schulz, S.A., eds., Proceedings, Conference on earthquake

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