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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 Mateo-San Onofre-Carlsbad fault zone, San Onofre-Oceanside section (Class A) No. 294a

Last Review Date: 2012-01-19

citation for this record: **Ryan, H.F., and Bryant, W.A., compilers, 2012, Fault number 294a, San Mateo-San Onofre-Carlsbad fault zone, San Onofre-Oceanside 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 02:52 PM.**

Synopsis	**General:** Clarke and others (1983) and Greene and Kennedy (1986) show a discontinuous zone of unnamed active faults that occur along the base of the continental slope (about 600 m water depth) from just south of Dana Point to the La Jolla fan valley. The faults along the base of the slope include, from north to south, the San Mateo fault zone, San Onofre fault zone, and the Carlsbad fault zone (Ryan and others, 2009). Fisher and Mills (1991) suggest that the San Onofre fault zone (their San Onofre-Oceanside fault) may be a reactivated extension of the Cristiantitos fault, which has been offset to the northwest along the Newport-Inglewood/Rose Canyon fault zone [127c]. The San Onofre fault zone lies between compressional structures, which

	are also imaged along the base of the continental slope: the San Mateo fault zone (San Mateo fold and thrust belt of Fischer and Mills, 1991) and the Carlsbad fault zone. The San Mateo fault zone is composed of an inner and outer belt (Fischer and Mills, 1991), with the outer belt composed of folds imaged above a blind thrust (Fisher and Mills, 1991; Crouch and Suppe, 1993; Rivero and others, 2000). Less is known about the Carlsbad fault zone, but it has been described in Fisher and Mills (1991) and Rivero and others (2000). **Sections:** This fault has 3 sections. In this compilation, the San Mateo-San Onofre-Carlsbad fault zone is separated into sections based on differing styles of displacement. The northernmost is the San Mateo thrust section, which lies offshore of San Mateo Point and is underlain by the Oceanside fault [187]. The central San Onofre section is a high-angle fault that is modified from the San Onofre-Oceanside fault of Fischer and Mills (1991). The southernmost Carlsbad section is offshore of Carlsbad, California and is generally a high angle fault that shows reverse sense of motion.
Name comments	**General:** This structure previously was unnamed. It includes the San Mateo fold and thrust belt, San Onofre-Oceanside fault and the Carlsbad thrust of Fischer and Mills (1991). Fault names that will be used in this compilation, from north to south, are: San Mateo fault zone, San Onofre fault zone, and Carlsbad fault zone (Ryan and others 2009). Ryan and others (2009) renamed the San Onofre-Oceanside fault of Fischer and Mills (1991) as the San Onofre fault zone to avoid any confusion with the Oceanside fault [187]. The Carlsbad thrust of Fischer and Mills (1991) generally is characterized by dips greater than 60°, so Ryan and others (2009) prefer to rename this fault the Carlsbad fault zone. **Section:** The San Onofre-Oceanside section consists of the San Onofre fault zone, a high angle strike-slip fault (San Onofre-Oceanside fault zone of Fischer and Mills, 1991). The northern end of the section is along the shelf near San Mateo Point and extends southeastward to about 5 km north of Carlsbad Canyon.
County(s) and State(s)	SAN DIEGO COUNTY, CALIFORNIA
Physiographic province(s)	PACIFIC BORDER
Reliability of	

location	Compiled at 1:unspecified scale. *Comments:* Location of fault from Qt_flt_ver_3-0_Final_WGS84_polyline.shp (Bryant, W.A., written communication to K.Haller, August 15, 2017) attributed to 1:250,000-scale map by Ryan and others (2009 #8244). The San Mateo fault zone was mapped using seismic reflection data including deep penetration industry multichannel seismic reflection profiles with a nominal trackline spacing of about 3 km that are available for the offshore region (USGS, 2005). These data were supplemented by both high resolution mutlcihannel reflection profiles with a trackline spacing of about 4 km that have a vertical resolution of 2-4 m (Normark and others, 1999) and high resolution boomer profiles that have a vertical resolution of less than 1 m and were used to document recency of faulting (Gutmacher and others, 2000).
Geologic setting	The San Mateo-San Onofre-Carlsbad fault zone lies beneath the continental margin between two major northwest trending strike-slip fault zones: the Newport-Inglewood-Rose Canyon [127] and the Coronado Bank [131] fault zones in the inner California continental borderland.
Length (km)	km.
Average strike	
Sense of movement	Reverse, Right lateral *Comments:* Borrero and others (2004) state that displacement along the San Mateo fault zone is reverse with a significant dextral slip-slip component.
Dip Direction	NE *Comments:* A dip of 45° was calculated for the San Mateo fault zone by Borrero and others (2004), based on seismic reflection profiles. The blind thrust beneath the outer fold belt has a much lower dip (on the order of 10°) (Fisher and Mills, 1991).
Paleoseismology studies	
Geomorphic	Folds above the San Mateo thrust deform the sea floor.

expression	
Age of faulted surficial deposits	If the San Mateo fault zone is an offshore extension of the San Joaquin Hills uplift, the most recent movement was 122 ka (Grant and others, 1999) and may be as young as late Holocene (Grant and others, 2002).
Historic earthquake	
Most recent prehistoric deformation	undifferentiated Quaternary (<1.6 Ma) *Comments:* Based on age of faulted deposits.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Rivero and others (2000) propose a deformation rate of 0.27–0.41 mm/yr similar to the uplift rate of the San Joaquin Hills (Grant and others, 1999).
Date and Compiler(s)	2012 Holly F. Ryan, U.S. Geological Survey William A. Bryant, California Geological Survey
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Questions or comments?