Jump to Navigation

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.

South Ninitat fault zone (Class A) No. 595

Last Review Date: 2003-07-03

citation for this record: **McCrory, P.A., compiler, 2003, Fault number 595, South Ninitat fault zone, 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 03:04 PM.**

Synopsis	The South Ninitat fault zone is a 2-km wide zone that extends for at least 59 km from the abyssal plain to the middle of the continental slope. The fault is apparently a young fault (~300 ka) with a relatively high slip rate (~6.7 mm/y). Available seismic reflection data, swath bathymetry, side-scan sonar data, and visual observations via manned submersible suggest that the fault zone accommodates left-lateral, strike-slip motion within the Juan de Fuca plate as it descends into the Cascadia subduction trench. The South Ninitat fault zone is one of nine left-lateral, strike-slip faults whose motion is attributed to the oblique component of convergence along the Cascadia subduction zone [#781].
Name comments	Goldfinger and co-workers (e.g., Goldfinger and others, 1997 #4090) first recognized, mapped, and named the South Ninitat fault zone and similar faults offshore of Oregon and Washington using a combination of seismic reflection data, swath bathymetry,

	side-scan sonar data, and observations via manned submersible dives.
County(s) and State(s)	GRAYS HARBOR COUNTY, WASHINGTON (offshore)
Physiographic province(s)	PACIFIC BORDER (offshore)
Reliability of location	Poor Compiled at 1:250,000 scale. *Comments:* Traces not published on a bathymetric base map. The fault-trace locations are based on mapping of Goldfinger and others (1997 #4090) using a combination of seismic reflection data, swath bathymetry, and side-scan sonar data. The data set used to map this fault zone and similar ones offshore Oregon and Washington are adequate to provide reasonably good locations, however, to date the Washington fault traces have only been released as page-sized illustrations in journal articles.
Geologic setting	The South Ninitat fault zone is one of nine west-northwest-trending left-lateral, strike-slip faults that cut obliquely across the Pacific Northwest continental slope as mapped by Goldfinger and co-workers (Personius and others, 2003 #6313). Goldfinger and others (1997 #4090) interpret these faults as forearc block boundaries that accommodate clockwise rotation (Goldfinger and others, 1996 #4088) resulting from dextral shear associated with oblique subduction. Goldfinger has proposed three different origins for these faults: (1) upper plate faults accommodating the transverse component of oblique subduction (Goldfinger and others, 1996 #4088); (2) lower plate faults accommodating the transverse component of oblique subduction (Goldfinger and others, 1997 #4090); (3) lower plate faults associated with tangential hydrodynamic drag on the slab as it descends into the mantle (Goldfinger and others, 2002 #6315). Some of the faults cut through the Juan de Fuca oceanic plate just west of the trench, favoring the interpretation that these structures originate in the down-going plate. If true, then rotation of the overlying forearc blocks would represent passive deformation. Ninitat turbidite fan strata above the abyssal plain are offset 2.0? 0.8 km left laterally along the South Ninitat fault zone Goldfinger and others, 1997). Faulting began 300 ka ?40 k.y., based on the pattern of offset fan strata and estimated age of these strata. The western end of fault zone is within the Juan de Fuca plate,

	however, available data do not resolve offset of oceanic crust. Although the fault zone has a relatively high slip rate compared with other known faults associated with the Cascadia plate boundary, no earthquakes have been recorded along the zone during the past 40 years. In fact only one strike-slip earthquake with magnitude greater than 5 has been recorded along any of the nine fault zones (Daisy Bank fault, offshore Oregon, in Goldfinger and others, 1997 #4090). Therefore, the seismic hazard posed by this fault zone and related ones remains unresolved.
Length (km)	62 km.
Average strike	N82°W
Sense of movement	Left lateral *Comments:* Strike-slip (left-lateral), with minor component of dip-slip, southwest side down (Goldfinger and others, 1997 #4090).
Dip	85° to vertical *Comments:* Assumed to have sub-vertical dip (85?-90?) to the north based on predominantly strike-slip displacement (Goldfinger and others, 1997 #4090). The vertical exaggeration of seismic reflection data, however, precludes accurate determination of fault dip (all strands with dips >30? appear to have vertical dips).
Paleoseismology studies	
Geomorphic expression	The base of the continental slope has a 7.7-km left step where crossed by the South Ninitat fault (Goldfinger and others, 1997 #4090).
Age of faulted surficial deposits	Seafloor deposits are not faulted where data are available to assess surface features.
Historic earthquake	
Most recent prehistoric	middle and late Quaternary (<750 ka)

deformation	*Comments:* Middle to late Quaternary (<300 ka) (Goldfinger and others, 1997 #4090). Note, few wells or boreholes have been drilled offshore; therefore, the age of seismic stratigraphic units, and in turn, the age of fault activity are not well constrained.
Recurrence interval	
Slip-rate category	Greater than 5.0 mm/yr *Comments:* >5 mm/yr geologic slip rate; the specific slip rate for this zone is 6.7?3 mm/yr (Goldfinger and others, 1997 #4090)
Date and Compiler(s)	2003 Patricia A. McCrory, U.S. Geological Survey
References	#6315 Goldfinger, C., Dziak, R.B., and Fox, C.G., 2002, Offshore structure of the Juan de Fuca pl. from marine seismic and sonar studies, *in* Kirby, S.H., Wang, K., and Dunlap, S., eds., The Cascadia subduction zone and related subduction systems: U.S. Geological Survey Open-File Report 02-328, p. 13-16. #4088 Goldfinger, C., Kulm, L.D., Yeats, R.S., Hummon, C., Huftile, G.J., Niem, A.R., and McNeill, L.C., 1996, Oblique strike-slip faulting of the Cascadia Submarine Forearc—The Daisy Bank fault zone off central Oregon, *in* Bebout, G.E., Scholl, D.W., Kirby, S.H., and Platt, J.P., eds., Subduction top to bottom: Geophysical Monograph 96, p. 65-74. #4090 Goldfinger, C., Kulm, L.D., Yeats, R.S., McNeill, L., and Hummon, C., 1997, Oblique strike-slip faulting of the central Cascadia submarine forearc: Journal of Geophysical Research, v. 102, no. B4, p. 8217-8243. #6313 Personius, S.F., Dart, R.L., Bradley, L.-A., and Haller, K.M., 2003, Map and data for Quaternary faults and folds in Oregon: U.S. Geological Survey Open-File Report 03-095, 579 p., 1 pl., scale 1:750,000.

Search... Search

Home About Us Contacts Legal