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Blanco transform fault zone (Class A) No. 782

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Synopsis	The Blanco transform fault zone is a northwest-striking system of strike-slip faults and associated pull apart basins that form the southwestern transform margin of the Juan de Fuca Plate offshore Oregon. The zone apparently offsets the Juan de Fuca Ridge and Gorda Ridge spreading centers in a left-lateral sense, but delineation of seafloor magnetic anomalies, establishment of the concept of seafloor spreading at ocean ridges, and earthquake focal mechanism studies helped establish the presently accepted configuration of the Blanco transform fault zone as a complex right-lateral transform fault zone. Little detailed information on the ages of faulted deposits along the fault zone has been described, but Pleistocene and Holocene turbidite sediments, including some containing the Mazama ash, are deformed in some of the pull apart basins, so latest movement occurred in the latest Quaternary.

Name comments	The Blanco transform fault zone is a transform fault system that forms the southwestern margin of the Juan de Fuca Plate. The zone was first identified by Menard (1959 #4254), who subsequently informally named the zone the "Cape Blanco" fracture zone (Menard, 1962 #4252). The zone was studied in more detail and renamed the "Blanco fracture zone" by McManus (1965 #4253). The name "Blanco transform fault zone" appears to be widely used in more recent reports (Embley and others, 1987 #4257; Dziak and others, 1991 #4301; Embley and Wilson, 1992 #4303; Dziak, 1997 #4295) and is retained herein.
County(s) and State(s)	CURRY COUNTY, OREGON (offshore)
Physiographic province(s)	PACIFIC BORDER (offshore)
Reliability of location	Poor Compiled at 1:500,000 scale. *Comments:* The mapped trace is from 1:500,000-scale mapping of Goldfinger and others (1992 #464); only the easternmost part of the zone is shown on the map.
Geologic setting	The Blanco transform fault zone is a northwest-striking system of strike-slip faults and associated pull apart basins that form the southwestern transform margin of the Juan de Fuca Plate offshore Oregon. The zone apparently offsets the Juan de Fuca Ridge and Gorda Ridge spreading centers in a left-lateral sense, but delineation of seafloor magnetic anomalies (Vine and Wilson, 1965 #4259), establishment of the concept of seafloor spreading at ocean ridges (Wilson, 1965 #4260), and earthquake focal mechanism studies (Tobin and Sykes, 1968 #4256) helped establish the presently accepted configuration of the Blanco transform fault zone as a complex right-lateral transform fault zone (Atwater, 1970 #1199; Embley and others, 1987 #4257; Dziak and others, 1991 #4301; Embley and Wilson, 1992 #4303; Dziak, 1997 #4295).
Length (km)	102 km.
Average strike	N11°E
Sense of movement	Right lateral, Thrust, Normal *Comments:* The Blanco transform fault zone is a northwest-

	striking system of strike-slip faults and associated pull-apart basins that form a right-lateral transform fault zone along the southwestern margin of the Juan de Fuca Plate (Atwater, 1970 #1199; Embley and others, 1987 #4257). Focal mechanism studies suggest a slight component of normal oblique slip, down-to-the-northeast (Dziak, 1997 #4295). The faults shown on the map plate are mostly thrust and normal faults mapped in the Gorda basin, east of the Gorda Ridge (Goldfinger and others, 1992 #464), at the eastern end of the Blanco transform fault zone.
Dip Direction	SE *Comments:* Dip data from focal mechanism studies of Dziak (1997 #4295) suggest 58–89° NE.
Paleoseismology studies	
Geomorphic expression	The geomorphology of the transform fault zone has been studied with submersible dives, bathymetric, sidescan sonar, and seismic reflection data, and widely scattered coring and drilling investigations. The zone is marked by a series of long, right-stepping linear strike ridges, separated by shorter pull apart basins (Embley and others, 1987 #4257; Embley and Wilson, 1992 #4303; Dziak, 1997 #4295). These topographic features were used by Embley and others (1987 #4257) and Embley and Wilson (1992 #4303) to delineate three major segments, a western segment, a middle Cascadia segment, and an eastern segment. The Cascadia segment is bifurcated by the Cascadia submarine channel, which shows right-lateral separation across the Blanco transform fault zone (Dziak, 1997 #4295). Holocene subsidence in the Cascadia depression no longer allows sediment to cross the fault zone (Duncan, 1968 #4245; Griggs and Kulm, 1970 #4244; Griggs and Kulm, 1973 #4246; Embley and others, 1987 #4257). Herein the informal segments of Embley and others (1987 #4257) and Embley and Wilson (1992 #4303) are discussed together because little is known about their earthquake histories, and only the eastern end of the eastern segment is located on the map.
Age of faulted surficial deposits	Little detailed information on the ages of faulted deposits along the fault zone has been described, but Pleistocene and Holocene turbidite sediments, including some containing the Mazama ash, are deformed in some of the pull apart basins (Griggs and Kulm, 1970 #4244; Griggs and Kulm, 1973 #4246; Embley and others,

	1987 #4257).
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Deformation of Pleistocene and Holocene turbidite sediments, including those containing the Mazama ash (Griggs and Kulm, 1970 #4244; Griggs and Kulm, 1973 #4246; Embley and others, 1987 #4257) indicate most recent displacement in the latest Quaternary along some parts of the Blanco fracture zone. Goldfinger and others (1992 #464) map these structures as active in the late Pleistocene and Holocene.
Recurrence interval	
Slip-rate category	Greater than 5.0 mm/yr *Comments:* Studies of magnetic anomalies in the Juan de Fuca Plate indicate sea-floor spreading rates of 30–50 mm yr in the last 4 Ma (Vine, 1966 #4258), and convergence rate of 35–45 mm/yr in a NE direction across the Cascadia subduction zone (Riddihough, 1984 #4176; DeMets and others, 1990 #3186; DeMets and others, 1994 #4285; McCaffrey and Goldfinger, 1995 #4232). Such high rates of deformation of the Juan de Fuca Plate suggest high rates of slip on the Blanco transform fault zone. Braunmiller and Nábělek (2008 #7702) used relocated historical earthquakes to determine that the average slip rate along the entire Blanco Transform fault zone is 20 mm/yr. The eastern part of the transform zone appears to be characterized by higher slip rates than the western part.
Date and Compiler(s)	2011 Stephen F. Personius, U.S. Geological Survey David J. Lidke, U.S. Geological Survey
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