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Quaternary Fault and Fold Database of the United States

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Cape Blanco anticline (Class A) No. 894

Last Review Date: 2002-05-31

citation for this record: **Personius, S.F., compiler, 2002, Fault number 894, Cape Blanco anticline, 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 03:15 PM.**

Synopsis	The east striking Cape Blanco anticline was formed during ongoing compression in the forearc of the Cascadia subduction zone [781] along the central Oregon coast, and is an onshore extension of a broad fold and thrust belt that is actively deforming the accretionary wedge offshore. This deformation could be caused by localized folding and faulting during shallow upper-plate earthquakes or by local deformation during large subduction zone earthquakes. The Cape Blanco anticline is not mapped on bedrock maps of the area, but the fold is expressed in the underlying Cenozoic bedrock, and warps the 80 ka Cape Blanco, 105 ka Pioneer, and 125 ka Silver Butte marine terrace platforms at Cape Blanco. As with other folds and faults located in the Cascadia forearc, it is unknown if coseismic displacements on this fold are always related to great megathrust earthquakes on the subduction zone, or whether some displacements are related to smaller earthquakes in the North American plate.

Name comments	The Cape Blanco anticline is an east-striking anticline originally recognized and named after Cape Blanco by R.J. Janda (unpub. data in Janda, 1970 #4116; Kelsey, 1990 #4107). The fold has been mapped and described in detail onshore by Kelsey (1990 #4107), and mapped offshore by Goldfinger and others (1992 #464). **Fault ID:** This fold is included in structure number 39 of Pezzopane (1993 #3544) and structure number 17 of Geomatrix Consultants, Inc. (1995 #3593).
County(s) and State(s)	CURRY COUNTY, OREGON
Physiographic province(s)	PACIFIC BORDER
Reliability of location	Poor Compiled at 1:250,000 scale. *Comments:* The axial trace is from 1:135,000-scale (approximate) figure 9 of Kelsey (1990 #4107).
Geologic setting	The east striking Cape Blanco anticline was formed during ongoing compression in the forearc of the Cascadia subduction zone [781] along the central Oregon coast (Kelsey, 1990 #4107; Kelsey and others, 2002 #5043). The fold is an onshore extension of a broad fold and thrust belt that is actively deforming the accretionary wedge offshore [784] (Goldfinger and others, 1992 #464; McNeill and others, 1998 #4089). This deformation could be caused by localized folding and faulting during shallow upper plate earthquakes (Goldfinger, 1994 #3972; McNeill and others, 1998 #4089) or by local deformation during large subduction zone earthquakes (McInelly and Kelsey, 1990 #4102; Kelsey, 1990 #4107; Kelsey and others, 2002 #5043). An extensive sequence of buried lowland soils in the nearby Sixes River Valley suggests that both may be occurring (Kelsey and others, 2002 #5043). The Cape Blanco anticline is not mapped on bedrock maps of the area (Dott, 1962 #4115; 1971 #4160; Beaulieu and Hughes, 1976 #4161; Ramp and others, 1977 #4146; Walker and MacLeod, 1991 #3646), but the fold is expressed in the underlying Cenozoic bedrock (Kelsey, 1990 #4107). Geomatrix Consultants, Inc. (1995 #3593) postulate the presence of a 30°dipping blind thrust beneath the anticline. Witter and others

	(1997 #4193) and Witter (1999 #4194) infer that the structure is a fault-propagation fold that overlies a blind reverse fault. As with other folds and faults located in the Cascadia forearc, it is unknown if coseismic displacements on this fold are always related to great megathrust earthquakes on the subduction zone, or whether some displacements are related to smaller earthquakes in the North American Plate.
Length (km)	8 km.
Average strike	N74°W
Sense of movement	Anticline, Thrust *Comments:* The axis of the anticline is tilted east (Kelsey, 1990 #4107), consistent with eastward plunge (Janda, 1970 #4116). Geomatrix Consultants, Inc. (1995 #3593) postulate the presence of a 30° dipping blind thrust beneath the anticline, and Witter and others (1997 #4193) and Witter (1999 #4194) infer that the structure is a fault-propagation fold that overlies a blind reverse fault.
Dip Direction	N; S *Comments:* East plunging
Paleoseismology studies	
Geomorphic expression	The Cape Blanco anticline is an east-striking anticline that warps the Cape Blanco, Pioneer, and Silver Butte marine terrace platforms at Cape Blanco. These platforms have been dated or correlated to sea level highstands at 80 ka, 105 ka, and 125 ka, respectively (Kelsey, 1990 #4107; Muhs and others, 1990 #4113). The fold also appears to tilt young fluvial terraces (Janda, 1970 #4116), and causes changes in relative sea level curves (Witter and others, 1997 #4193; Witter, 1999 #4194).
Age of faulted surficial deposits	The Cape Blanco anticline warps the Cape Blanco, Pioneer, and Silver Butte marine terrace platforms at Cape Blanco. These platforms have been dated or correlated to sea level highstands at 80 ka, 105 ka, and 125 ka, respectively (Kelsey, 1990 #4107; Muhs and others, 1990 #4113). Witter and others (1997 #4193) and Witter (1999 #4194) used changes in Holocene relative sea level curves at sites across the anticline to infer Holocene

	movement.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* The Cape Blanco anticline warps the 80 ka Cape Blanco terrace, so this structure has been active in the late Quaternary (Kelsey, 1990 #4107). The fold also has uplifted a beach berm dated at 1,800–3,200 yr BP (Kelsey, 1990 #4107) and caused changes in relative sea level curves at sites across the anticline (Witter and others, 1997 #4193; Witter, 1999 #4194), so the fold has also undergone Holocene deformation. The fold is shown as active in the Pliocene or Pleistocene by Goldfinger and others (1992 #464) and as active in the middle and late Quaternary (<700–780 ka) by Pezzopane (1993 #3544), Geomatrix Consultants, Inc. (1995 #3593) and Madin and Mabey (1996 #3575).
Recurrence interval	
Slip-rate category	Between 0.2 and 1.0 mm/yr *Comments:* Kelsey (1990 #4107) reports late Holocene uplift rates of 6–10 mm/yr, and maximum late Quaternary (<125 ka) rates of 0.5–1.5 mm/yr on the Cape Blanco anticline.
Date and Compiler(s)	2002 Stephen F. Personius, U.S. Geological Survey
References	#4161 Beaulieu, J.D., and Hughes, P.W., 1976, Land use geology of western Curry County, Oregon: State of Oregon, Department of Geology and Mineral Industries Bulletin 90, 148 p., 12 pls., scale 1:62,500. #4115 Dott, R.H., Jr., 1962, Geology of the Cape Blanco Area, southwest Oregon: The ORE-BIN, v. 24, no. 8, p. 121-133. #4160 Dott, R.H., Jr., 1971, Geology of the southwestern Oregon Coast west of the 124th meridian: State of Oregon, Department of Geology and Mineral Industries Bulletin 69, 63 p., 2 pls. #3593 Geomatrix Consultants, Inc., 1995, Seismic design mapping, State of Oregon: Technical report to Oregon Department of Transportation, Salem, Oregon, under Contract

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#3972 Goldfinger, C., 1994, Active deformation of the Cascadia Forearc—Implications for great earthquake potential in Oregon and Washington: Oregon State University, unpublished Ph.D. dissertation, 246 p., http://hdl.handle.net/1957/36664.

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#4113 Muhs, D.R., Kelsey, H.M., Miller, G.H., Kennedy, G.L., Whelan, J.F., and McInelly, G.W., 1990, Age estimates and uplift rates for Late Pleistocene marine terraces—Southern Oregon portion of the Cascadia Forearc: Journal of Geophysical Research, v. 95, no. B5, p. 6685-6698.

#3544 Pezzopane, S.K., 1993, Active faults and earthquake ground motions in Oregon: Eugene, Oregon, University of Oregon, unpublished Ph.D. dissertation, 208 p.

#4146 Ramp, L., Schlicker, H.G., and Gray, J.J., 1977, Geology, mineral resources, and rock material of Curry County, Oregon: State of Oregon, Department of Geology and Mineral Industries Bulletin 93, 79 p., 2 pls.

#3646 Walker, G.W., and MacLeod, N.S., 1991, Geologic map of Oregon: U.S. Geological Survey, Special Geologic Map, 2 sheets, scale 1:500,000.

#4194 Witter, R.C., 1999, Late Holocene paleoseismicity, tsunamis and relative sea-level changes along the south-central Cascadia subduction zone, southern Oregon: University of Oregon, unpublished Ph.D. dissertation, 178 p.

#4193 Witter, R.C., Kelsey, H.M., and Hemphill-Haley, E., 1997, A paleoseismic history of the south-central Cascadia subduction zone—Assessing earthquake recurrence intervals and upper-pl. deformation over the past 6600 years at the Coquille River Estuary, southern Oregon: Technical report to U.S. Geological Survey, under Contract 1434-HQ-97-GR-03036, 54 p.