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Hualalai Volcano, northwest volcanic lineament (Class B) No. 2602a

Last Review Date: 2006-09-16

citation for this record: **Cannon, E.C., and Burgmann, R., compilers, 2006, Fault number 2602a, Hualalai Volcano, northwest volcanic lineament, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, https://earthquakes.usgs.gov/hazards/qfaults, accessed 01/04/2021 10:24 AM.**

Synopsis	**General:** Hualalai Volcano, the oldest of the three active volcanoes on Hawai'i, has three poorly defined volcanic lineaments inferred along broad topographic ridges, the northwest [2602a], north [2602b], and south-southeast [2602c] volcanic lineaments. Other researchers, including Moore and others (1987 #6962) and Kauahikaua and others (2002 #6947), use the term "rift zone" rather than "volcanic lineament." The rift zones in Moore and others (1987 #6962) appear to radiate from a central point approximately 5 km east of the summit of Hainoa Crater. Holcomb and others (2000 #6945) offer alternative rift zone models. Offshore, the North Kona slump is located on the western flanks of Hualalai and Mauna Loa Volcanoes (Moore and Chadwick, 1995 #6959). The landslide head may correspond with the northwest rift zone on Hualalai (Moore and Chadwick, 1995 #6959).

	Sections: This fault has 3 sections. The sections are the northwest [2602a], north [2602b], and south-southeast [2602c] volcanic lineaments.
Name comments	**General:** Hualalai Volcano is located on sheet 1 of 3 of the 1:100,000-scale geologic map compiled by Wolfe and Morris (1996 #6977), available in digital format from Trusdell and others (2006 #6976). Wolfe and Morris (1996 #6977) use the 1:50,000-scale geologic map of Hualalai from Moore and Clague (1991 #6960). **Section:** Informal section name based on Moore and others (1987 #6962).
County(s) and State(s)	HAWAII COUNTY, HAWAII
Physiographic province(s)	
Reliability of location	Poor Compiled at 1:100,000 scale. *Comments:* The northwest volcanic lineament may follow a preexisting, shield-stage rift zone structure (Wolfe and Morris, 1996 #6977). Peterson and Moore (fig. 7.2, 1987 #6970) show the general trend of the northwest rift zone on a regional-scale map of Hawai'i. Holcomb and others (2000 #6945) offer alternative rift zone models. Moore and others (1987 #6962) present an aerial photograph of the northwest rift zone. Fault location generalized from Trusdell and others (2006 #6976).
Geologic setting	The surface of postshield-stage Hualalai consists of transitional to postshield-stage Holocene and Pleistocene Hualalai Volcanics, and the Pleistocene Wa'awa'a Trachyte Member (Moore and Clague, 1991 #6960; Wolfe and Morris, 1996 #6977). The transition from shield- to postshield-stage volcanism occurred between 130 ka and 105 ka (Wolfe and Morris, 1996 #6977). The most recent eruption occurred along the northwest rift zone in 1800-1801 (Clague and Dalrymple, 1987 #6937; Moore and others, 1987 #6962; Kauahikaua and others, 2002 #6947). Based on records of increased seismicity, Moore and others (1987 #6962) speculate that an intrusion occurred in 1929. Future eruptions may have short periods of precursory seismic activity (Moore and others, 1987 #6962), although there is concern for the

	possibility of a rapid rise of magma without much seismic activity (D.A. Swanson, written commun., 2005).
Length (km)	km.
Average strike	N. 55° W. (for section) versus N. 32° W. (for whole fault)
Sense of movement	Normal *Comments:* Unknown, presumably extension that produces normal faulting.
Dip Direction	NE; SW *Comments:* Unknown, presumably near vertical to vertical.
Paleoseismology studies	
Geomorphic expression	A broad topographic ridge trends northwest on Hualalai with lava flow paths initiating at the ridge crest and continuing down opposite sides of the ridge. Hualalai Volcanics spatter and scoria cones crop out along the broad topographic ridge. The northwest rift zone, described as "prominent" with numerous volcanic vents, is 2-4 km wide and 24 km long on land (Moore and others, 1987 #6962). During the 1800-1801 eruption, lava flowed from vents on the northwest rift zone (Moore and others, 1987 #6962; Kauahikaua and others, 2002 #6947). Offshore, the rift zone may extend an additional 70 km to the northwest as a submarine ridge (Fornari, 1987 #6942; Moore and others, 1987 #6962; Moore and Chadwick, 1995 #6959). Moore and Chadwick (1995 #6959) suggest that to the west the landslide head from the offshore North Kona slump may be in the vicinity of the northwest rift zone axis.
Age of faulted surficial deposits	The ages of Hualalai Volcanics scoria and spatter cones that define the volcanic lineament range in age from 0.0-0.2 ka to older than 10.0 ka; the oldest Hualalai Volcanics basalt flow is older than 13 ka (Wolfe and Morris, 1996 #6977). See Moore and others (1987 #6962) for a detailed list of dated samples from Hualalai.
Historic earthquake	
Most recent	middle and late Quaternary (<750 ka)

prehistoric deformation	*Comments:* The transition from shield- to postshield-stage volcanism occurred between 130 ka and 105 ka for Hualalai (Wolfe and Morris, 1996 #6977). Once the volcano reached the postshield-stage, volcanic activity along the northwest rift zone probably declined greatly and postshield-stage volcanism buried the inactive, shield-stage rift zone. Moore and Chadwick (1995 #6959) comment that the main North Kona slump movement probably occurred prior to 130 ka during shield-stage volcanism. The Holocene and latest Pleistocene (<15 ka) volcanic rocks along the northwest volcanic lineament today indicate that some magma transport may have followed old rift zone pathways to the surface. Some fracturing may have occurred to produce fissures during the 1800-1801 eruption.
Recurrence interval	
Slip-rate category	Less than 0.2 mm/yr *Comments:* Slip rate not reported by Moore and others (1987 #6962). Herein considered to be <0.2 mm/yr and likely inactive. Although eruptions have occurred as recently as 1800-1801 and in the Holocene, the volcano transitioned into postshield-stage volcanism between 130 ka and 105 ka (Wolfe and Morris, 1996 #6977), suggesting that the shield-stage rift zones are inactive at present.
Date and Compiler(s)	2006 Eric C. Cannon, none Roland Burgmann, University of California at Berkeley
References	#6937 Clague, D.A., Dalrymple, G.B., 1987, The Hawaiian-Emperor volcanic chain. Part I. Geologic evolution, *in* Decker, R.W., Wright, T.L., and Stauffer, P.H., eds., Volcanism in Hawaii: U.S. Geological Survey Professional Paper 1350, v. 1, p. 5-54. #6942 Fornari, D.J., 1987, The geomorphic and structural development of Hawaiian submarine rift zones, *in* Decker, R.W., Wright, T.L., and Stauffer, P.H., eds., Volcanism in Hawaii: U.S. Geological Survey Professional Paper 1350, v. 1, p. 125-132. #6945 Holcomb, R.T., Nelson, B.K., Reiners, P.W., and Sawyer, N.-L., 2000, Overlapping volcanoes: The origin of Hilo Ridge, Hawaii: Geology, v. 28, no. 6, p. 547-550.

#6947 Kauahikaua, J., Cashman, K.V., Clague, D.A., Champion, D., and Hagstrum, J.T., 2002, Emplacement of the most recent lava flows on Hualal_i Volcano, Hawai'i, Bulletin of Volcanology, v. 64, p. 229-253, DOI 10.1007/s00445-001-0196-8

#6959 Moore, J.G., and Chadwick, W.W., Jr., 1995, Offshore geology of Mauna Loa and adjacent areas, Hawaii in Rhodes, J.M., and Lockwood, J.P., eds., Mauna Loa revealed-Structure, composition, history, and hazards: American Geophysical Union Geophysical Monograph, v. 92, p. 21-44.

#6960 Moore, R.B., and Clague, D.A., 1991, Geologic map of Hualalai Volcano, Hawaii: U.S. Geological Survey Miscellaneous Investigations Series Map I-2213, scale 1:50,000.

#6962 Moore, R.B., Clague, D.A., Rubin, M., and Bohrson, W.A., 1987, Hualalai Volcano-A preliminary summary of geologic, petrologic, and geophysical data, *in* Decker, R.W., Wright, T.L., and Stauffer, P.H., eds., Volcanism in Hawaii: U.S. Geological Survey Professional Paper 1350, v. 1, p. 571-585.

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#6976 Trusdell, F.A., Wolfe, E.W., and Morris, J., 2006, Digital database of the geologic map of the island of Hawai'i: U.S. Geological Survey Data Series 144 supplement to Miscellaneous Investigations Series Map I-2524-A, 18 p, 1 sheet, scale 1:100,000.

#6977 Wolfe, E.W., and Morris, J., 1996, Geologic map of the island of Hawaii: U.S. Geological Survey Miscellaneous Investigations Series Map I-2524-A, 18 p., 3 sheets, scale 1:100,000.