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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.

Koa'e fault system (Class A) No. 2609

Last Review Date: 2006-09-16

citation for this record: **Cannon, E.C., and Burgmann, R., compilers, 2006, Fault number 2609, Koa'e fault system, 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 02:54 PM.**

Synopsis	The Koa'e fault system is located south of Kilauea's caldera [2608a]. The Koa'e fault system, along with the east [2608b] and southwest [2608c] rift zones of Kilauea Volcano, forms a zone of extension between the main Kilauea edifice and the mobile south flank of Kilauea Volcano (Duffield, 1975 #6940).
Name comments	The Koa'e fault system is located on sheet 2 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). Note that the fault system name "Kuae" on the Wolfe and Morris (1996 #6977) topographic base map is a misprint (D.A. Swanson, written commun., 2005).
County(s) and State(s)	HAWAII COUNTY, HAWAII
Physiographic	HAWAIIAN EMPEROR ISLAND SEAMOUNT CHAIN

province(s)	HAWAIIAN-EMPEROR ISLAND-SEAMOUNT CHAIN
Reliability of location	Good Compiled at 1:24,000 scale. *Comments:* Location of fault based on 1:24,000-scale geologic mapping of surficial and concealed faults by Dutton and others (2007 #7948); features shown as cracks are omitted form this compilation.
Geologic setting	The Koa'e fault system is composed of a set of east-trending normal faults located south of Kilauea's caldera that separate the main Kilauea edifice to the north from Kilauea's mobile flank to the south (Duffield, 1975 #6940). The Koa'e fault system strikes across the south flank from the east rift zone [2608b] to the southwest rift zone [2608c] of Kilauea Volcano.
Length (km)	19 km.
Average strike	N. 69° E.
Sense of movement	Normal *Comments:* From Duffield (1975 #6940), Wolfe and Morris (1996 #6977), and Neal and Lockwood (2003 #6966).
Dip Direction	N; S *Comments:* Mostly vertical (Duffield, 1975 #6940).
Paleoseismology studies	
Geomorphic expression	Duffield (1975 #6940) states that the fault zone is composed of individual fractures less than 200 m long that form en echelon patterns. The east- to northeast-trending sinuous normal faults commonly form grabens with north-facing fault scarps being dominant (Duffield, 1975 #6940; Wolfe and Morris, 1996 #6977; Neal and Lockwood, 2003 #6966).
Age of faulted surficial deposits	Mapped faults cut lava flows with ages that range between approximately 200 and 1,500 yr B.P., and also cut a 1969 lava flow (Neal and Lockwood, 2003 #6966).
Historic earthquake	Kalapana earthquake M7.2 1975 Ka'u earthquake 1868

Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* Associated with the earthquake of November 29, 1975, 04:47 am local time (Hawaiian Standard Time; Wyss and Koyanagi, 1992 #6981), Ms7.2 mainshock, VII Modified Mercalli intensity (Tilling and others, 1976 #6974).
Recurrence interval	
Slip-rate category	Greater than 5.0 mm/yr *Comments:* Although Duffield (1975 #6940) did not provide a slip rate for this fault system, he does mention that "the observed displacements in the Koa'e fault system may have taken place in the last 500 years" (p. 11) and possibly as much as 650 yr ago (D.A. Swanson, written commun., 2005). Duffield (1975 #6940) mentions that the average dilation across the Koa'e fault system is about 25 m. The maximum dilation measured by other researchers is about 30 m (D.A. Swanson, written commun., 2005). Measured horizontal extension across the Koa'e fault system after the 1975 Kalapana earthquake was as much as 2 m (Tilling and others, 1976 #6974). Although variable through time, the data suggest that this dilation has probably been greater than 5 mm/yr in the recent past.
Date and Compiler(s)	2006 Eric C. Cannon, none Roland Burgmann, University of California at Berkeley
References	#6940 Duffield, W.A., 1975, Structure and origin of the Koae fault system, Kilauea Volcano, Hawaii: U.S. Geological Survey Professional Paper 856, 12 p. #7948 Dutton, D.R., Ramsey, D.W., Bruggman, P.E., Felger, T.J., Lougee, E., Margriter, S., Showalter, P., Neal, C.A., and Lockwood, J.P., 2007, Database for the geologic map of the summit region of Kilauea Volcano, Hawaii: U.S. Geological Survey Data Series 293, http://pubs.usgs.gov/ds/2007/293/. #6966 Neal, C.A. and Lockwood, J.P., 2003, Geologic map of the summit region of Kilauea Volcano, Hawaii: U.S. Geological Survey Geologic Investigations Series I-2759, 14 p., 1 sheet, scale 1:24,000.

	#6974 Tilling, R.I., Koyanagi, R.Y., Lipman., P.W, Lockwood, J.P., Moore, J.G., and Swanson, D.A., 1976, Earthquake and related catastrophic events. Island of Hawaii, November 29, 1975-A preliminary report: U.S. Geological Survey Circular 740, 33 p. #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. #6981 Wyss, M., and Koyanagi, R.Y., 1992, Isoseismal maps, macroseismic epicenters, and estimated magnitudes of historic earthquakes in the Hawaiian Islands: U.S. Geological Survey Bulletin 2006, 93 p.