

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](#).

Kilauea Volcano, southwest rift zone (Class A) No. 2608c

Last Review Date: 2006-09-16

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Synopsis

General: Kilauea Volcano is the youngest subaerial volcano in Hawai'i. Kilauea's extensional structures include Kilauea's caldera [2608a], the east rift zone [2608b], and the southwest rift zone [2608c]. Two additional fault systems are located to the southeast of Kilauea's caldera: the Koa'e fault system [2609], and the Hilina fault system [2610]. The Koa'e and Hilina fault systems are assigned their own fault numbers rather than grouping these faults into a single extensional feature for Kilauea. Another categorization scheme by Delaney and others (1998 #6939) subdivides Kilauea Volcano into four geographic regions: (1) western south flank and lower southwest rift zone, (2) summit and upper rift zones, (3) middle east rift zone, and (4) central and eastern south flank. Along the coast and offshore of Kilauea's south flank to the southeast, the Hilina fault system [2610] may define the headscarp to the submarine Hilina slump and

	<p>subsequent Papa'u sand-rubble flow (see Moore and others, 1989 #6961; Moore and Chadwick, 1995 #6959).</p> <p>Sections: This fault has 3 sections. The sections designated for Kilauea Volcano are Kilauea's caldera [2608a], the east rift zone [2608b], and the southwest rift zone [2608c].</p>
Name comments	<p>General: Neal and Lockwood (2003 #6966) present a 1:24,000-scale geologic map of the Kilauea summit region. Kilauea Volcano is also located on sheets 2 and 3 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).</p>
County(s) and State(s)	HAWAII COUNTY, HAWAII
Physiographic province(s)	HAWAIIAN-EMPEROR ISLAND-SEAMOUNT CHAIN
Reliability of location	<p>Good Compiled at 1:24,000 scale.</p> <p><i>Comments:</i> 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 from this compilation.</p>
Geologic setting	Kilauea Volcano is an active shield-stage volcano (Wolfe and Morris, 1996 #6977) situated on the southeast flank of older Mauna Loa Volcano [2605].
Length (km)	This section is 30 km of a total fault length of 76 km.
Average strike	N. 34° E. (for section) versus N. 51 E. (for whole fault)
Sense of movement	<p>Normal</p> <p><i>Comments:</i> Unknown, presumably extension resulting in normal faulting (Wolfe and Morris, 1996 #6977).</p>
Dip Direction	<p>NW; SE</p> <p><i>Comments:</i> Unknown, presumably near vertical to vertical (Wolfe and Morris, 1996 #6977), some northeast-striking normal fault traces show hanging wall blocks down to either the northwest or to the southeast.</p>

Paleoseismology studies	
Geomorphic expression	Open cracks, fissure vents, and normal faults generally trend northeast along the southwest rift zone (Wolfe and Morris, 1996 #6977).
Age of faulted surficial deposits	Surface lava flows ranging in age from 20th century to 1,500-3,000 yr B.P. are cut by faults (Wolfe and Morris, 1996 #6977). See Holcomb (1987 #6944) for more details on ages and names of individual lava flows.
Historic earthquake	Ka'u earthquake 1868
Most recent prehistoric deformation	latest Quaternary (<15 ka) <i>Comments:</i> Modern seismic events for the southwest rift zone includes seismic swarms related to intrusions in August 1981 and June 1982, and the November 16, 1983, ML6.6 Ka'oiki earthquake (Wyss and Koyanagi, 1992 #6981; Delaney and others, 1998 #6939). Delaney and others (1998 #6939) state that extension across the southwest rift zone has probably occurred since 1984, whereas between 1976-1984, some locations along the southwest rift zone had extension while other locations had compression.
Recurrence interval	
Slip-rate category	Greater than 5.0 mm/yr <i>Comments:</i> The geodetic baseline across the southwest rift zone shows variable extension over time. The maximum horizontal extension rate observed at baseline Keakapulu-HVO128 for the time period from November 1984 to 1996 (after the November 16, 1983, Ka'oiki earthquake) is approximately 3 cm/yr (Delaney and others, 1998 #6939). However, the baseline extended 80 cm due to the August 1981 seismic swarm (Delaney and others, 1998 #6939). See Delaney and others (1998 #6939) for a discussion of spreading rates for Kilauea Volcano from 1976-1996. The estimated slip rate of greater than 5 mm/yr for the southwest rift zone is based on geodetic baseline deformation rates as an approximation for longer-term fault slip rates.
Date and	2006

Compiler(s)	Eric C. Cannon, none Roland Burgmann, University of California at Berkeley
References	<p>#6939 Delaney, P.T., Denlinger, R.P., Lisowski, M., Miklius, A., Okubo, P.G., Okamura, A.T., and Sako, M.K., 1998, Volcanic spreading at Kilauea, 1976-1996: <i>Journal of Geophysical Research</i>, v. 103, no. B8, p. 18,003-18,023.</p> <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/.</p> <p>#6944 Holcomb, R.T., 1987, Eruptive history and long-term behavior of Kilauea Volcano, <i>in</i> Decker, R.W., Wright, T.L., and Stauffer, P.H., eds. <i>Volcanism in Hawaii</i>: U.S. Geological Survey Professional Paper 1350, v. 1, p. 261-350.</p> <p>#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., <i>Mauna Loa revealed-Structure, composition, history, and hazards</i>: American Geophysical Union Geophysical Monograph, v. 92, p. 21-44.</p> <p>#6961 Moore, J.G., Clague, D.A., Holcomb, R.T., Lipman, P.W., Normark, W.R., Torresan, M.E., 1989, Prodigious submarine landslides on the Hawaiian Ridge: <i>Journal of Geophysical Research</i>, v. 94, no. B12, p. 17,465-17,484.</p> <p>#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.</p> <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.</p> <p>#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.</p>

#6981 Wyss, M., and Koyanagi, R.Y., 1992, Iseismal maps, macroseismic epicenters, and estimated magnitudes of historic earthquakes in the Hawaiian Islands: U.S. Geological Survey Bulletin 2006, 93 p.

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