

# 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, east rift zone (Class A) No. 2608b

Last Review Date: 2006-09-16

*citation for this record:* Cannon, E.C., and Burgmann, R., compilers, 2006, Fault number 2608b, Kilauea Volcano, east rift zone, 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:** 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><b>Sections:</b> 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>
<b>Name comments</b>	<p><b>General:</b> 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>
<b>County(s) and State(s)</b>	HAWAII COUNTY, HAWAII
<b>Physiographic province(s)</b>	HAWAIIAN-EMPEROR ISLAND-SEAMOUNT CHAIN
<b>Reliability of location</b>	<p>Good Compiled at 1:100,000 scale.</p> <p><i>Comments:</i> The 1:100,000-scale geologic map compiled by Wolfe and Morris (1996 #6977) shows surficial fissure vents, faults, and open cracks.</p>
<b>Geologic setting</b>	Kilauea Volcano is an active shield-stage volcano (Wolfe and Morris, 1996 #6977) situated on the southeast flank of older Mauna Loa Volcano [2605].
<b>Length (km)</b>	This section is 45 km of a total fault length of 76 km.
<b>Average strike</b>	N. 67° E. (for section) versus N. 51 E. (for whole fault)
<b>Sense of movement</b>	<p>Normal</p> <p><i>Comments:</i> Unknown, presumably extension resulting in normal faulting (Wolfe and Morris, 1996 #6977).</p>
<b>Dip Direction</b>	<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>

<b>Paleoseismology studies</b>	
<b>Geomorphic expression</b>	Fissure vents and open cracks generally trend northeast along the east rift zone (Wolfe and Morris, 1996 #6977). Along the submarine Puna Ridge, fissure vents trend N. 45° E. along the crest of the ridge (see Fornari, 1987 #6942). The North Puna Ridge debris avalanches flow northward off the submarine ridge. Other debris avalanches may exist, but bathymetric data is limited (see Moore and Chadwick, 1995 #6959).
<b>Age of faulted surficial deposits</b>	Surface lava flows ranging in age from 20th century to 750-1,500 yr B.P. are cut by faults (Wolfe and Morris, 1996 #6977). See Holcomb (1987 #6944) for details of ages and names of individual lava flows.
<b>Historic earthquake</b>	Ka'u earthquake 1868
<b>Most recent prehistoric deformation</b>	latest Quaternary (<15 ka) <i>Comments:</i> The Kea'au-Heiheiahulu baseline across the east rift zone extended about 20 cm probably due to the June 25, 1989, ML6.1 Kalapana earthquake (Wyss and Koyanagi, 1992 #6981; Delaney and others, 1998 #6939).
<b>Recurrence interval</b>	
<b>Slip-rate category</b>	Greater than 5.0 mm/yr <i>Comments:</i> Geodetic baselines across the east rift zone show variable extension over time. Looking at extension averaged over 1986-1989, baselines Kea'au-Heiheiahulu and Kaloli2-Kapoho have average extension rates of 2.2±0.3 cm/yr and 0.7±0.5 cm/yr, respectively, with extension rates decreasing eastward along the east rift zone (Delaney and others, 1998 #6939). The Kea'au-Heiheiahulu baseline extended approximately 20 cm, probably due to the June 25, 1989, ML6.1 Kalapana earthquake (Wyss and Koyanagi, 1992 #6981; Delaney and others, 1998 #6939). See Delaney and others (1998 #6939) for a discussion of spreading rates for the east rift zone from 1976-1995. The estimated slip rate of greater than 5 mm/yr for the east rift zone is based on geodetic baseline deformation rates as an approximation for longer-term fault slip rates.

<b>Date and Compiler(s)</b>	2006 Eric C. Cannon, none Roland Burgmann, University of California at Berkeley
<b>References</b>	<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>#6942 Fornari, D.J., 1987, The geomorphic and structural development of Hawaiian submarine rift zones, <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. 125-132.</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 <i>in</i> 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.

[Questions or comments?](#)

[Facebook](#) [Twitter](#) [Google](#) [Email](#)

[Hazards](#)

[Design Ground Motions](#)[Seismic Hazard Maps & Site-Specific Data](#)[Faults](#)[Scenarios](#)

[Earthquakes](#)[Hazards](#)[Data](#)[Education](#)[Monitoring](#)[Research](#)

[Home](#)[About Us](#)[Contacts](#)[Legal](#)