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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.**

## Ka'oiki-Honu'apo fault system (Class A) No. 2607

**Last Review Date: 2006-09-16**

***citation for this record:*** **Cannon, E.C., and Burgmann, R., compilers, 2006, Fault number 2607, Ka'oiki-Honu'apo 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.**

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| **Synopsis** | The Ka'oiki-Honu'apo fault system is located along the southeastern flank of Mauna Loa Volcano. The northeast end is adjacent to the Ka'oiki seismic zone [2606]. |
| **Name comments** | The Ka'oiki-Honu'apo fault system is 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). |
| **County(s) and State(s)** | HAWAII COUNTY, HAWAII |
| **Physiographic province(s)** | HAWAIIAN-EMPEROR ISLAND-SEAMOUNT CHAIN |
| **Reliability of** | Good |

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| **location** | Compiled at 1:24,000 scale.<br><br>*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 Ka'oiki-Honu'apo fault system has a complex faulting history because it is located between the active Mauna Loa and Kilauea Volcanoes (see Jackson and others, 1992 #6946). Earthquakes indicate low-angle thrust-faulting events, probably related to seaward displacement of the Mauna Loa volcanic edifice, especially prior to Kilauea's development (Lipman, 1980 #6950). Additionally, the similar focal mechanisms for the 1962, 1974, and 1983 Ka'oiki earthquakes in the adjacent Ka'oiki seismic zone [2606] are interpreted to represent right-lateral strike-slip motion on northeast-trending faults (Endo, 1985 #6941; Jackson and others, 1992 #6946). In the southwest region, the deep canyons of the Ninole Hills on the southeast flank of Mauna Loa are thought to represent rapid incision into headwall landslide scarps related to movement offshore of the Punalu'u slump (Lipman and others, 1990 #6954; Moore and Chadwick, 1995 #6959). |
| **Length (km)** | 58 km. |
| **Average strike** | N. 25° E. |
| **Sense of movement** | Normal<br><br>*Comments:* Fault scarps generally trend northeast to east with southeast- to south-side down hanging-wall blocks. In the southwest at Waikapuna, normal faults that cut the surface generally trend northwest and have either northeast- or southwest-side down hanging-wall blocks. |
| **Dip Direction** | SE; E; NE; SW<br><br>*Comments:* Fault-dip directions from surficial and buried normal faults (Wolfe and Morris, 1996 #6977). |
| **Paleoseismology studies** | |
| **Geomorphic expression** | Observed fault scarps result from faulted late Pleistocene- to Holocene-age lava flows that are locally draped by younger lava |

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| | flows. Jackson and others (1992 #6946) state that some scarps in the Ka'oiki area represent more than 100 m of vertical displacement and that most scarps are draped by unfaulted Mauna Loa basalt flows. |
| **Age of faulted surficial deposits** | In the far southwestern region, faults cut lava flows as young as 3,000-5,000 yr B.P. at the surface (Wolfe and Morris, 1996 #6977). For the majority of the fault system, fault scarps are overlain by unfaulted 200-750 yr B.P. to 3,000-5,000 yr B.P. lava flows (Wolfe and Morris, 1996 #6977). |
| **Historic earthquake** | Ka'oiki earthquake M6.7 1983<br>Ka'oiki earthquake ML6.6 1974<br>Ka'oiki earthquake 1962<br>Ka'u earthquake 1868 |
| **Most recent prehistoric deformation** | latest Quaternary (<15 ka)<br><br>*Comments:* Many of the concealed and inferred faults probably have been active in the Holocene, draped by unfaulted younger lava flows. Faults in the southwest cut 3,000-5,000 yr B.P. Mauna Loa lava flows at the ground surface (Wolfe and Morris, 1996 #6977). To the northeast in the Ka'oiki seismic zone [2606], Jackson and others (1992 #6946) interpret ground fractures in the Ka'oiki area as having been formed by the November 16, 1983, ML6.6 Ka'oiki earthquake at 06:13 a.m. local time (Hawaiian Standard Time; Wyss and Koyanagi, 1992 #6981). |
| **Recurrence interval** | |
| **Slip-rate category** | Between 1.0 and 5.0 mm/yr<br><br>*Comments:* Jackson and others (1992 #6946) do not estimate a slip rate. The slip rate category assigned here of 1-5 mm/yr is based on documented large fault scarps that are overlain by unfaulted late Holocene lava flows. |
| **Date and Compiler(s)** | 2006<br>Eric C. Cannon, none<br>Roland Burgmann, University of California at Berkeley |
| **References** | #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/. |

#6941 Endo, E.T., 1985, Seismotectonic framework for the southeast flank of Mauna Loa volcano, Hawaii: Seattle, University of Washington, unpublished Ph.D. dissertation, 349 p.

#6946 Jackson, M.D., Endo, E.T., Delaney, P.T., Arnadottir, T., and Rubin, A.M., 1992, Ground ruptures of the 1974 and 1983 Kaoiki earthquakes, Mauna Loa Volcano, Hawaii: Journal of Geophysical Research, v. 97, no. B6, p. 8775-8796.

#6950 Lipman, P.W., 1980, The southwest rift zone of Mauna Loa: Implications for structural evolution of Hawaiian volcanoes: American Journal of Science, v. 280-A, p. 752-776.

#6954 Lipman, P.W., Rhodes, J.M., and Dalrymple, G.B., 1990, The Ninole Basalt-Implications for the structural evolution of Mauna Loa Volcano, Hawaii: Bulletin of Volcanology, v. 53, no. 1, p. 1-19.

#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.

#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.