

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](#).

Mauna Loa Volcano, Moku'aweoweo caldera (Class A) No. 2605a

Last Review Date: 2006-09-16

citation for this record: Cannon, E.C., and Burgmann, R., compilers, 2006, Fault number 2605a, Mauna Loa Volcano, Moku'aweoweo caldera, 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 02:53 PM.

Synopsis

General: Mauna Loa last erupted in 1984 and is swelling toward its next eruption (D.A. Swanson, written commun., 2005). Faults associated with Mauna Loa include the Kealakekua fault system [2603], Kahuku fault system [2604], Moku'aweoweo caldera [2605a], northeast rift zone of Mauna Loa [2605b], southwest rift zone of Mauna Loa [2605c], the Ka'oiki seismic zone [2606], and the Ka'oiki-Honu'apo fault system [2607]. The Kealakekua and Kahuku fault systems, the Ka'oiki seismic zone, and the Ka'Miki-Honu'apo fault systems are described separately. In addition, several historic eruptions have occurred on Mauna Loa's flanks from radial vents oriented radially to the summit (Trusdell, 1995 #6975). The radial vents represent rock-breaking events and their broad distribution on Mauna Loa is not confined to rift zone locations. Plate 1 shows the radial vents based on Wolfe and Morris (1996 #6977). Refer to Trusdell (1995 #6975) for

	<p>additional information on volcanic hazards associated with radial vents.</p> <p>Sections: This fault has 3 sections. The sections designated for Mauna Loa Volcano include Moku'aweoweo caldera [2605a], the northeast rift zone [2605b], and the southwest rift zone [2605c].</p>
<p>Name comments</p>	<p>General: Mona Loa Volcano is located on sheets 1-3 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> <p>Section: Moku'aweoweo calderas approximately 8 km long in the northeast-southwest direction and has a maximum width of 3 km in the northwest-southeast direction. The caldera is composed of six craters and pits (listed northeast to southwest): North Pit, Lua PMholo, Moku'aweoweo, South Pit, Lua Hohonu, Lua Hou (Wolfe and Morris, 1996 #6977). The northeast rift zone [2605b] continues northeast out of North Pit, and the southwest rift zone [2605c] trends southwest out of South Pit.</p>
<p>County(s) and State(s)</p>	<p>HAWAII COUNTY, HAWAII</p>
<p>Physiographic province(s)</p>	<p>HAWAIIAN-EMPEROR ISLAND-SEAMOUNT CHAIN</p>
<p>Reliability of location</p>	<p>Good Compiled at 1:100,000 scale.</p> <p><i>Comments:</i> Based on caldera-concentric and steep caldera and crater wall surficial normal faults (Wolfe and Morris, 1996 #6977). Location of fault generalized from Trusdell and others (2006 #6976).</p>
<p>Geologic setting</p>	<p>Mauna Loa is an active shield-stage volcano (Wolfe and Morris, 1996 #6977). The most recent eruption occurred in 1984. Surficial volcanic rocks on Mauna Loa include the Holocene and Pleistocene Ka'u Basalt (historic eruptions to 10-31 ka), and the Pleistocene Kahuku (>31 ka) and Ninole (100-300 ka) Basalts (see Wolfe and Morris, 1996 #6977). For a detailed history of Holocene eruptions on Mauna Loa, see Lockwood and Lipman (1987 #6955). Observations from geodetic networks on Mauna Loa show deformation related to inflation and deflation of the magma reservoir, and southeast motion of the southeast flank (Miklius and others, 1995 #6957). The deep canyons of the</p>

	Ninole Hills located on the southeast flank may result from 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)	This section is 7 km of a total fault length of 59 km.
Average strike	N. 28° E. (for section) versus N. 33° E. (for whole fault)
Sense of movement	Normal <i>Comments:</i> Wolfe and Morris (1996 #6977) show surficial normal faulting along caldera-concentric faults southeast of Moku'aweoweo caldera, and around steep caldera and crater walls.
Dip	 <i>Comments:</i> Dip direction varies based on northwestern blocks down for surficial normal faulting southeast of Moku'aweoweo caldera (Wolfe and Morris, 1996 #6977) and on various strikes of steep caldera and crater wall normal faults.
Paleoseismology studies	
Geomorphic expression	The craters and pits form depressions at the summit of Mauna Loa Volcano producing steep normal faults. Surficial normal faulting along caldera-concentric faults occurs southeast of Moku'aweoweo caldera.
Age of faulted surficial deposits	The Moku'aweoweo caldera contains lava flows from historic eruptions in 1880, 1926, 1940, 1942, 1949, and 1975.
Historic earthquake	Ka'u earthquake 1868
Most recent prehistoric deformation	latest Quaternary (<15 ka) <i>Comments:</i> The caldera has historically active lava flows, fissure vents, craters, and pits from eruptions in 1880, 1926, 1940, 1942, 1949, 1975, and 1984 (Wolfe and Morris, 1996 #6977). The caldera-concentric faults cut lava flows of ages ranging from 200 to 750 yr B.P. and 750 to 1,500 yr B.P. (Wolfe and Morris, 1996 #6977).

Recurrence interval	
Slip-rate category	<p>Greater than 5.0 mm/yr</p> <p><i>Comments:</i> Surface deformation in the Moku'aweoweo caldera is related to inflation and deflation of Mauna Loa's magma reservoir. Miklius and others (1995 #6957) summarize the geodetic monitoring efforts on Mauna Loa. Deformation is complex both in time and space. For example, the largest permanent extension between geodetic stations on the rim of Moku'aweoweo for the time period 1974-1994 was approximately 1.4 m between stations HVO93 and HVO92, while another pair of stations, HVO93 and ML1, only had about 0.9 m of permanent extension for the same time period (Miklius and others, 1995 # 6957). Extension and contraction events were noted for the 1975 and 1984 eruptions. A slip rate of >5 mm/yr is assigned to Moku'aweoweo caldera as a result of observed deformation in the caldera.</p>
Date and Compiler(s)	<p>2006</p> <p>Eric C. Cannon, none</p> <p>Roland Burgmann, University of California at Berkeley</p>
References	<p>#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: <i>Bulletin of Volcanology</i>, v. 53, no. 1, p. 1-19.</p> <p>#6955 Lockwood, J.P., and Lipman, P.W., 1987, Holocene eruptive history of Mauna Loa 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. 509-535.</p> <p>#6957 Miklius, A., Lisowski, M., Delaney, P.T., Denlinger, R.P., Dvorak, J.J., Okamura, R.T., and Sako, M.K., 1995, Recent inflation and flank movement of Mauna Loa Volcano, <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. 199-205.</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>

#6975 Trusdell, F.A., 1995, Lava flow hazards and risk assessment on Mauna Loa Volcano, 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. 327-336.

#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.

[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](#)