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Quaternary Fault and Fold Database of the United States

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Lo'ihi Seamount, Lo'ihi caldera (Class A) No. 2611a

Last Review Date: 2006-09-16

citation for this record: **Cannon, E.C., and Burgmann, R., compilers, 2006, Fault number 2611a, Lo'ihi Seamount, Lo'ihi 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 02:54 PM.**

Synopsis	**General:** Lo'ihi is the youngest seamount of the Hawaiian-Emperor island-seamount chain. The base of the volcano is approximately 5 km below sea level, and the summit platform is approximately 1.2 km below sea level (Caplan-Auerbach and Duennebier, 2001 #6936). Volcanic rocks from the seamount have preshield-stage alkalic, transitional, and shield-stage tholeiitic signatures (Clague and Dalrymple, 1987 #6937; Langenheim and Clague, 1987 #6949). Growing up through the Mauna Loa Punalu'u slump and building concurrently with Hilina slump activity, Lo'ihi may rise above the sea surface within the next few tens of thousands of years (Moore and Chadwick, 1995 #6959). The seamount has a summit caldera and two major rift zones: the north and the south rift zones. Lo'ihi is seismically active, and a seismic swarm in 1996 produced summit deformation (Caplan-Auerbach and Duennebier, 2001 #6936). Similar to the subaerial

	volcanoes of Hawai'i, magmatic activity and gravitational failure of the Lo'ihi volcanic edifice can generate underwater faulting and catastrophic mass movement. **Sections:** This fault has 3 sections. The sections designated for Lo'ihi Seamount are Lo'ihi's caldera [2611a], the north rift zone [2611b], and the south rift zone [2611c].
Name comments	**General:** Lo'ihi (Hawaiian for "long") Seamount is the north-south elongate underwater volcano south of Kilauea Volcano [2608] (Malahoff, 1987 #6956).
County(s) and State(s)	HAWAII COUNTY, HAWAII (offshore)
Physiographic province(s)	
Reliability of location	Poor Compiled at 1:500,000 scale. *Comments:* Large contour intervals are used on maps showing the caldera. The bathymetric contour interval on maps from Malahoff (fig. 6.2, 1987 #6956), Smith and others (fig. 3d, 1999 #6973), and Caplan-Auerbach and Duennebier (fig. 2, 2001 #6936) are 50 fathoms (approximately 91 m), 100 m, and 100 m, respectively. Traces are generalized for this compilation.
Geologic setting	Lo'ihi is the southeasternmost and youngest member of the Hawaiian-Emperor island-seamount chain. The seamount has an age of probably less than 0.5 Ma (Malahoff, 1987 #6956) and has a height of about 4,000 m, but it remains submerged on the deep southeastern flank of the Island of Hawai'i (Caplan-Auerbach and Duennebier, 2001 #6936). Moore and Chadwick (1995 #6959) map the seafloor surface of Lo'ihi as mostly submarine basaltic pillow lavas. Three significant debris avalanches are located on the east, west, and south flanks that cover about one-half of the volcano (Malahoff, 1987 #6956; Moore and Chadwick, 1995 #6959).
Length (km)	This section is 6 km of a total fault length of 27 km.
Average strike	N. 88° W. (for section) versus N. 43° W. (for whole fault)
Sense of movement	Normal *Comments:* Unknown, probably normal due to extension.

Dip	*Comments:* Faults dip in various directions around the rim of the volcano.
Paleoseismology studies	
Geomorphic expression	Prior to a 1996 seismic swarm, Malahoff (1987 #6956) described a summit caldera 2.7 km in diameter containing two pit craters, East Pit and West Pit. Caplan-Auerbach and Duennebier (2001 #6936) state that, coincident with a seismic swarm in July and August 1996 (maximum ML4.9), part of the summit caldera (about 100 m high) collapsed to form a third summit crater called Pele's Pit (600 m wide and 300 m deep).
Age of faulted surficial deposits	<0.5 Ma.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) *Comments:* The formation of Pele's Pit occurred in 1996 (Caplan-Auerbach and Duennebier, 2001 #6936).
Recurrence interval	
Slip-rate category	Greater than 5.0 mm/yr *Comments:* Slip rate not reported; Lo'ihi is an actively growing and deforming submarine volcano with rift zones. The assigned slip-rate category of greater than 5 mm/yr is based on slip rates for the calderas of Hawai'i's two other active volcanoes, Moku'aweoweo caldera [2605a] on Mauna Loa Volcano, and Kilauea's caldera [2608a] on Kilauea Volcano.
Date and Compiler(s)	2006 Eric C. Cannon, none Roland Burgmann, University of California at Berkeley
References	#6936 Caplan-Auerbach, J. and Duennebier, F.K., 2001, Seismicity and velocity structure of Loihi Seamount from the

1996 earthquake swarm, Bulletin of the Seismological Society of America, v. 91, no. 2, 178-190.

#6937 Clague, D.A., Dalrymple, G.B., 1987, The Hawaiian-Emperor volcanic chain. Part I. Geologic evolution, *in* Decker, R.W., Wright, T.L., and Stauffer, P.H., eds., Volcanism in Hawaii: U.S. Geological Survey Professional Paper 1350, v. 1, p. 5-54.

#6949 Langenheim, V.A.M., and Clague, D.A., 1987, The Hawaiian-Emperor volcanic chain, Part II, Stratigraphic framework of volcanic rocks of the Hawaiian Islands, *in* Decker, R.W., Wright, T.L., and Stauffer, P.H., eds., Volcanism in Hawaii: U.S. Geological Survey Professional Paper 1350, v. 1, p. 55-84.

#6983 Langenheim, V.A.M., Clague, D.A., 1987, The Hawaiiian-Emperor volcanic chain. Part II. Stratigraphic framework of volcanic rocks of the Hawaiian Islands, *in* Decker, R.W., Wright, T.L., and Stauffer, P.H., eds., Volcanism in Hawaii: U.S. Geological Survey Professional Paper 1350, v. 1, p. 55-84.

#6956 Malahoff, A., 1987, Geology of the summit of Loihi Submarine Volcano in: Decker, R.W., Wright, T.L., and Stauffer, P.H., eds., Volcanism in Hawaii: U.S. Geological Survey Professional Paper 1350, v. 1, p. 133-144.

#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.

#6973 Smith, J.R., Malahoff, A., and Shor, A.N., 1999, Submarine geology of the Hilina slump and morpho-structural evolution of Kilauea volcano, Hawaii, Journal of Volcanology and Geothermal Research, v. 94, p. 59-88.