

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](#).

Lo'ihl Seamount, south rift zone (Class A) No. 2611c

Last Review Date: 2006-09-16

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Synopsis

General: Lo'ihl 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 Duennebler, 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'ihl 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'ihl is seismically active, and a seismic swarm in 1996 produced summit deformation (Caplan-Auerbach and Duennebler, 2001 #6936). Similar to the subaerial

	<p>volcanoes of Hawai'i, magmatic activity and gravitational failure of the Lo'ihi volcanic edifice can generate underwater faulting and catastrophic mass movement.</p> <p>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].</p>
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	<p>Poor Compiled at 1:500,000 scale.</p> <p><i>Comments:</i> Large contour intervals are used on maps showing the south rift zone. 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.</p>
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 18 km of a total fault length of 27 km.
Average strike	N. 29° W. (for section) versus N. 43° W. (for whole fault)
Sense of movement	<p>Normal</p> <p><i>Comments:</i> Presumably normal faulting due to extension.</p>

Dip Direction	W; NW <i>Comments:</i> Presumably near-vertical to vertical.
Paleoseismology studies	
Geomorphic expression	The south rift zone forms a bathymetrically high ridge that trends generally south to south-southeast along the 17-km-long rift zone (Malahoff, 1987 #6956). Where Malahoff (1987 #6956) shows a single south rift zone, Smith and others (1999 #6973) interpret the south rift zone with an additional rift zone splay trending to the southwest. Moore and Chadwick (1995 #6959) comment that significant mass wasting of the volcanic edifice has occurred on Lo'ihi, producing steep headwalls and leaving behind rift zones that resemble "narrow blade-like ridges."
Age of faulted surficial deposits	Malahoff (1987 #6956) estimates the age of Lo'ihi as younger than 0.5 Ma.
Historic earthquake	
Most recent prehistoric deformation	latest Quaternary (<15 ka) <i>Comments:</i> Caplan-Auerbach and Duennebieer (2001 #6936) do not report whether deformation occurred on the south rift zone as a result of the 1996 seismic swarm.
Recurrence interval	
Slip-rate category	Greater than 5.0 mm/yr <i>Comments:</i> Slip rate not reported; Lo'ihi is an actively growing and deforming submarine volcano with rift zones that probably have active extension. The assigned slip-rate category of greater than 5 mm/yr is based on slip rates for the rift zones found on Hawai'i's two other active volcanoes, the rift zones of Mauna Loa [2605b, 2605c] and Kilauea [2608b, 2608c] Volcanoes.
Date and Compiler(s)	2006 Eric C. Cannon, none Roland Burgmann, University of California at Berkeley

References

#6936 Caplan-Auerbach, J. and Duennebieber, 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 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.

#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.

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