

## Simplified table of Kīlauea historical activity modified from Macdonald and others (1983).

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Note that this table is a “living” document and subject to be updated. See version footnote.

Activity year	First observed start (mo-day)	Duration (days, or otherwise noted)	Activity area	Activity description	Short summary	Impacts	Summit subsidence volume (km <sup>3</sup> )	Area covered by lava (km <sup>2</sup> )	Total volume erupted (km <sup>3</sup> )
<a href="#">2018</a>	May 3	124	lower East Rift Zone, summit	flank eruption, summit subsidence	Largest lower East Rift Zone eruption and caldera collapse in at least 200 years	716 structures in Leilani Estates, Kapoho, and Lanipuna Gardens destroyed; 30 miles public road covered	0.8 <sup>a,f</sup>	35.50 <sup>a,b</sup>	1.06 <sup>b,c</sup>
<a href="#">2008–2018</a>	March 19	10 years	summit	summit eruption	Eruption within Halema’uma’u, lava lake	-	-	0.36 <sup>c</sup>	< 0.01 <sup>c</sup>
<a href="#">1983–2018</a>	January 3	35 years	middle East Rift Zone	flank eruption	From 1983 to 2018, the middle East Rift Zone was nearly continuously active at Pu’u ‘Ō’ō, Kupaianaha and other nearby vents. Pauses in activity occurred over durations of weeks to months. Lava first entered the ocean 3 years and 11 months after the eruption began (Heliker and Mattox, 2003)	4 deaths; 215 structures destroyed in Kalapana and Royal Gardens; Chain of Craters Road/Highway 130 covered/re-graded numerous times	-	144.10 <sup>b,c</sup>	4.40 <sup>b,c</sup>
1982	September 25	< 1	summit	summit eruption	Fissure within Kīlauea caldera	-	-	0.79 <sup>e</sup>	< 0.01 <sup>e</sup>
1982	April 30	< 1	summit	summit eruption	Fissure within Kīlauea caldera	-	-	0.31 <sup>e</sup>	< 0.01 <sup>e</sup>
1979	November 16	1	upper East Rift Zone	flank eruption	In and near to Pauahi Crater	-	-	0.17 <sup>e</sup>	< 0.01 <sup>e</sup>
<a href="#">1977</a>	September 13	18	lower East Rift Zone, summit	flank eruption, summit subsidence	Between two prehistoric cones, Kalalua and Puu Kaua. Associated major summit deflation	-	Not reported <sup>f</sup>	6.58 <sup>e</sup>	0.03 <sup>e</sup>
<a href="#">1975</a>	November 29	< 1	summit	summit eruption	Eruption on Kīlauea caldera floor, directly following a M 7.2 earthquake, the most severe since 1868	-	-	0.16 <sup>e</sup>	< 0.01 <sup>e</sup>
<a href="#">1974</a>	December 31	< 1	Southwest Rift Zone	flank eruption	Just west of Kīlauea caldera, upper Southwest Rift Zone. The volume is only approximate, because of the difficulty in estimating the large amount that poured into open cracks	-	-	7.14 <sup>e</sup>	0.01 <sup>e</sup>

<a href="#">1974</a>	September 19	< 1	summit	summit eruption	Fissure within Halema'uma'u and Kīlauea caldera. Of this, about 4,400,000 cubic meters drained down into cracks in the floor of Halema'uma'u	-	-	1.14 <sup>e</sup>	0.01 <sup>e</sup>
<a href="#">1974</a>	July 19	3	summit	summit eruption	Fissures north of Keanakāko'i Crater, at the base of the south wall of Keanakāko'i Crater, and on Kīlauea caldera floor	-	-	2.88 <sup>e</sup>	0.01 <sup>e</sup>
1973	November 10	29	upper East Rift Zone	flank eruption	Pauahi: from Pauahi Crater eastward 2.4 km to near Pu'u Huluhulu	-	-	1.23 <sup>e</sup>	< 0.01 <sup>e</sup>
1973	May 5	< 1	upper East Rift Zone	flank eruption	From 1 km west of Hi'iaka Crater to Pauahi Crater. Of the erupted volume, about 220,000 cubic meters drained down into fissures in the floors of the craters	-	-	0.19 <sup>e</sup>	< 0.01 <sup>e</sup>
<a href="#">1972–1974</a>	February 3	900	upper East Rift Zone	flank eruption	Maunaulu: between 'Ālo'i and 'Alae craters, which were completely filled by the lava flows in 1969–1970. Lava first entered the ocean ~six months after the eruption onset (August, 1972)	-	-	46 <sup>b</sup>	0.16 <sup>b</sup>
<a href="#">1971</a>	September 24	5	summit, Southwest Rift Zone	summit eruption, flank eruption	Began in Kīlauea caldera, then migrated 12 km down Southwest Rift Zone. The volume is only approximate, because of the difficulty in estimating the large amount that poured into open cracks	-	Not reported <sup>f</sup>	3.94 <sup>e</sup>	0.01 <sup>e</sup>
<a href="#">1971</a>	August 14	< 1	summit	summit eruption	Fissure within Kīlauea caldera	-	-	2.22 <sup>e</sup>	0.01 <sup>e</sup>
<a href="#">1969–1971</a>	May 24	874	upper East Rift Zone	flank eruption	Maunaulu: between 'Ālo'i and 'Alae craters, which were completely filled by the lava flows in 1969–1970. Lava first entered the ocean ~one month after the eruption onset (June 26)	-	-	50 <sup>b</sup>	0.19 <sup>b</sup>
<a href="#">1969</a>	February 22	6	middle East Rift Zone, summit	flank eruption, summit subsidence	Between 'Alae and Nāpau craters	-	0.004 <sup>f</sup>	6.96 <sup>e</sup>	0.02 <sup>e</sup>
<a href="#">1968</a>	October 7	15	middle East Rift Zone, summit	flank eruption, summit subsidence	From the east flank of Kānenuiohamo for about 3 km eastward. "Severe" subsidence reported at the summit	-	Not reported <sup>f</sup>	4.13 <sup>e</sup>	0.01 <sup>e</sup>

<a href="#">1968</a>	August 22	5	middle East Rift Zone, summit	flank eruption, summit subsidence	In Hi'iaka Crater and at scattered points for 21 km farther east; about 2,900,000 cubic meters poured into Hi'iaka Crater, but most of it drained back in the feeding fissure at the end of the eruption	-	0.01 <sup>f</sup>	0.10 <sup>e</sup>	< 0.01 <sup>e</sup>
1967–1968	November 5	251	summit	summit eruption	Eruption within Halema'uma'u, lava lake	-	-	0.76 <sup>e</sup>	0.09 <sup>e</sup>
<a href="#">1965</a>	December 24	< 1	upper to middle East Rift Zone, summit	flank eruption, summit subsidence	In and east of 'Ālo'i Crater. Cracking and subsidence in summit area prior to, during, and after the eruption	-	Not reported <sup>f</sup>	0.59 <sup>e</sup>	< 0.01 <sup>e</sup>
1965	March 5	10	middle East Rift Zone, summit	flank eruption, summit subsidence	Makaopuhi Crater to Kalalua crater	-	0.03 <sup>f</sup>	7.31 <sup>e</sup>	0.02 <sup>e</sup>
<a href="#">1963</a>	October 5	1	middle East Rift Zone, summit	flank eruption, summit subsidence	In and near Nāpau Crater	-	0.03 <sup>f</sup>	3.24 <sup>e</sup>	0.01 <sup>e</sup>
1963	August 21	2	upper East Rift Zone, summit	flank eruption, summit subsidence	In and near 'Alae Crater	-	0.002 <sup>f</sup>	0.07 <sup>e</sup>	< 0.01 <sup>e</sup>
1962	December 7	2	upper to middle East Rift Zone	flank eruption	Five outbreaks from 'Ālo'i Crater to Kānenuiohamo	-	-	0.09 <sup>e</sup>	< 0.01 <sup>e</sup>
<a href="#">1961</a>	September 23	2	lower East Rift Zone, summit	flank eruption, summit subsidence	Fourteen outbreaks along a 21-km discontinuous fissure east of Nāpau Crater	-	0.05 <sup>f</sup>	0.64 <sup>e</sup>	< 0.01 <sup>e</sup>
<a href="#">1961</a>	July 10	7	summit	summit eruption	Eruption within Halema'uma'u	-	-	0.47 <sup>e</sup>	0.01 <sup>e</sup>
<a href="#">1961</a>	March 3	22	summit	summit eruption	Eruption within Halema'uma'u	-	-	0.01 <sup>e</sup>	< 0.01 <sup>e</sup>
<a href="#">1961</a>	February 24	< 1	summit	summit eruption	Eruption within Halema'uma'u. About 230,000 cubic meters of lava poured into Halema'uma'u, but most of it drained back into the vents	-	-	0.01 <sup>e</sup>	< 0.01 <sup>e</sup>
<a href="#">1960</a>	January 13	36	lower East Rift Zone, summit	flank eruption, summit subsidence	Kapoho. Lava entered the ocean ~two days after eruption onset (January 15)	Kapoho Village (70 structures) destroyed	0.02 <sup>f</sup>	10.56 <sup>b,e</sup>	0.250 <sup>b</sup>
<a href="#">1959</a>	November 14	36	summit	summit eruption	Kīlauea Iki Crater. 17 eruptive phases, filled Kīlauea Iki Crater with lava lake 335 feet deep	-	-	0.86 <sup>e</sup>	0.05 <sup>e</sup>
<a href="#">1955</a>	February 28	87	lower East Rift Zone, summit	flank eruption, summit subsidence	Between Heiheiāhulu and Kapoho. Puna 1955 eruption. Lava entered the ocean ~16 days after eruption onset (March 16)	21 houses destroyed; 6.3 miles public road covered	0.15 <sup>f</sup>	16.48 <sup>b,e</sup>	0.11 <sup>b,e</sup>
<a href="#">1954</a>	May 31	3	summit	summit eruption	Eruption within Halema'uma'u and Kīlauea caldera	-	-	1.18 <sup>e</sup>	0.01 <sup>e</sup>
<a href="#">1952</a>	June 27	136	summit	summit eruption	Eruption within Halema'uma'u, lava lake	-	-	0.59 <sup>e</sup>	0.05 <sup>e</sup>
1934	September 6	33	summit	summit eruption	Eruption within Halema'uma'u, lava lake	-	-	0.40	0.01

1931–1932	December 23	13	summit	summit eruption	Eruption within Halema'uma'u, lava lake	-	-	0.30	0.01
1930	November 19	18	summit	summit eruption	Eruption within Halema'uma'u, lava lake	-	-	0.20	0.01
1929	July 25	4	summit	summit eruption	Eruption within Halema'uma'u, lava lake	-	-	0.20	< 0.01
1929	February 20	2	summit	summit eruption	Eruption within Halema'uma'u, lava lake	-	-	0.20	< 0.01
1927	July 7	13	summit	summit eruption	Eruption within Halema'uma'u, lava lake	-	-	0.10	< 0.01
1924	July 19	11	summit	summit eruption	Eruption within Halema'uma'u	-	-	0.10	< 0.01
<a href="#">1924</a>	May 11	17	summit	summit eruption, summit subsidence	Violent phreatic explosions, possibly accompanied by an East Rift Zone submarine lava flow. One person killed by falling rocks	1 death	0.20 <sup>f</sup>	No lava	No lava
1923–1924	-September 4	170	summit	summit eruption	Gradual filling following draining of Halema'uma'u after 1923 flank eruption	-	-	-	-
1923	August 25?	1	upper to middle East Rift Zone, summit	flank eruption, summit subsidence	Eruption West of Makaopuhi Crater, Halema'uma'u drains and becomes "tumbled mass of broken blocks"	-	Not reported <sup>f</sup>	0.02 <sup>e</sup>	< 0.01 <sup>e</sup>
1922–1923	September 2	361	summit	summit eruption	Gradual filling of the depression created by the 1922 collapse	-	-	-	-
1922	July 17	11	Summit	summit eruption	Brief eruption that generated small lava lake within 1922 collapse	-	-	-	-
1922	May 28	2	middle East Rift Zone, summit	flank eruption, summit subsidence	Eruption at Nāpau and Makaopuhi craters, Halema'uma'u drains, collapse	-	0.02 <sup>f</sup>	0.06 <sup>e</sup>	< 0.01 <sup>e</sup>
1919–1922	November 29	~2.5 years	summit	summit eruption	Gradual filling of the depression created by the 1919 collapse	-	-	-	-
1919–1920	December 21	238	summit, Southwest Rift Zone	flank eruption	Brief eruption of radial crack within caldera, followed by Maunaiki eruption	-	-	12.52 <sup>e</sup>	0.04 <sup>e</sup>
1919	April 20	223	Southwest Rift Zone, summit	flank eruption, summit subsidence	The "Postal Rift": several separate flows, with short intervals without extrusion	-	0.01 <sup>f</sup>	4.2	0.03
1916–1919	June 8	~3.5 years	summit	summit eruption	Gradual filling of the depression created by the 1916 collapse	-	-	-	-
1916	June 5	2	summit	summit subsidence	Collapse of summit, no eruption (intrusion in East Rift Zone?)	-	0.01 <sup>f</sup>	-	-
1906–1916	December 2	~9.5 years	summit	summit eruption	Gradual filling of the depression created by the 1894 collapse	-	-	-	-

1894–1906	December 19	~12 years	summit	*sporadic, not well-documented eruptions	Mostly inactive, although sporadic brief eruptions within Halema'uma'u occurred infrequently and were not well-documented	-	-	-	-
1894	July 15	~6 months	summit	summit eruption	Gradual filling following the July 1894 draining	-	-	--	-
1894	July 10	5	summit	summit subsidence	Draining of Halema'uma'u lava lake not associated with an eruption (intrusion in Southwest Rift Zone?)	-	0.01 <sup>f</sup>		
1891–1894	End of March	~3 years	summit	summit eruption	Gradual filling of the depression created by the 1891 collapse	-	-	-	-
1891	March 5	3	summit	summit subsidence	Draining of Halema'uma'u lava lake (associated with intrusion?)	-	0.03 <sup>f</sup>		
1886–1891	June 1	~5 years	summit	summit eruption	Gradual filling of the depression created by the 1886 collapse	-	-	-	-
1886	March 6	< 1	summit	summit subsidence	Draining of Halema'uma'u lava lake and subsidence of the summit (associated with submarine eruption?)	-	0.04 <sup>f</sup>	-	-
1877–1886	May 7	~ 10 years	summit	summit eruption	Filling of Halema'uma'u following draining in 1877	-	-	-	-
1877	May 4	hours to days	summit	summit eruption	Eruption near Byron Ledge or Keanakāko'i Crater, lava within Halema'uma'u drains	-	-	0.19 <sup>e</sup>	< 0.01 <sup>e</sup>
1868–1877	April	~9 years	summit	summit eruption	Gradual filling of the depression created by the 1868 collapse	-	-	-	-
1868	April 4	< 1	summit, Southwest Rift Zone	summit eruption, flank eruption, summit subsidence	The Great Ka'ū earthquake, magnitude 7.9, occurred on April 2 and was followed by an eruption in Kīlauea Iki Crater, an eruption on the Southwest Rift Zone, and collapse of the summit	-	0.19 <sup>f</sup>	0.16 (Kīlauea Iki) 0.06 (southwest rift zone)	< 0.01 (Kīlauea Iki) < 0.01 (southwest rift zone)
1840–1868	-	~28 years	summit	summit eruption	Dome built within caldera	-	-	-	-
1840	May 30	26	upper to lower East Rift Zone, summit	flank eruption, summit subsidence	Eruption began in 'Alae Crater and migrated to the lower East Rift Zone. Area given in table is only above sea level. The volume below sea level is unknown, but estimates give the following-146,000,000 cubic meters; this is included in the volume given in the table. Associated summit subsidence	Village destroyed	0.22 <sup>f</sup>	24.72 <sup>be</sup>	0.19 <sup>be</sup>
1832–1840	-	~8 years	summit	summit eruption	Activity at the summit continued and by 1840, the caldera contained a broad dome 100 feet high	-	-	-	-

1832	January 9	Days?	summit	summit eruption, summit subsidence	East rim of summit, eruption on Byron Ledge	-	0.53 <sup>f</sup>	0.30 <sup>d</sup>	< 0.01 <sup>d</sup>
1823–1832	February	~9 years	summit	summit eruption	The first known published description of Kīlauea summit is from the year 1823. Thereafter until the summit collapse of 1832, lava- lake eruptive activity was likely nearly continuous in the caldera. Before the mid-1800s, however, records of the many overflows from the lava lake are sparse. The table only lists the periods of activity and significant subsidence events	-			
1823	February–July?	Days?	Southwest Rift Zone, summit	flank eruption, summit subsidence	Keaīwa Lava Flow of 1823, lower Southwest Rift Zone. Area given in table is only above sea level. The volume below sea level is unknown, but estimates give the following- 2,200,000 cubic meters; this is included in the volume given in the table	-	0.49 <sup>f</sup>	12.64 <sup>b,e</sup>	0.01 <sup>b,e</sup>
between <a href="#">1790–1823</a> , after keala’alea lava flows*	-	weeks to months	Southwest Rift Zone	flank eruption	Kamakai’a Lava Flow, middle Southwest Rift Zone	-	-	13.74 <sup>d</sup>	0.03 <sup>d</sup>
between <a href="#">1790–1815</a> *	-	weeks to months	Southwest Rift Zone	flank eruption	Keala’alea lava flows, middle Southwest Rift Zone	-	-	11.9 <sup>d</sup>	0.02 <sup>d</sup>
likely between <a href="#">1790–1823</a> *	-	days to weeks	Southwest Rift Zone	flank eruption	Black cone lava flow, lower Southwest Rift Zone	-	-	0.45 <sup>d</sup>	< 0.01 <sup>d</sup>
between 1790–1823*	-	years	summit	summit eruption	Likely refilling of area of subsidence created in 1790	-	-	-	-
<a href="#">1790</a> *	November?	-	lower East Rift Zone, summit	flank eruption, summit subsidence	Keonelelehe: violently explosive summit activity, killing 80 or more members of a Hawaiian war party near the summit or upper Southwest Rift Zone. Summit caldera collapse; associated flank lava flow	80–400 deaths	Not reported <sup>f</sup>	37.21 <sup>e</sup>	0.20 <sup>e</sup>
1750?*	-	-	middle to lower East Rift Zone	flank eruption?	Heiheiāhulu?	-	-	4.10	0.01

<sup>a</sup>Neal and others (2018)

<sup>b</sup>Eruption generated an ocean entry. The total erupted volume reported in the table includes subaerial and submarine volumes. Submarine volume estimates (km<sup>3</sup>) for each eruption are: 2018–0.77 (HVO unpublished data); 1983–2018-unknown; 1972–1974-unknown; 1969–1971-unknown; 1960-unknown; 1955-unknown; 1840-0.1 (Kauhikaua and Trusdell, 2020); 1823–0.002 (Macdonald and others, 1983).

<sup>c</sup>Unpublished HVO data

<sup>d</sup>Area derived from Orr (2018), volume calculated assuming 2-meter flow thickness

<sup>e</sup>Area derived from Orr (2018), volume calculated with Macdonald and others' (1983) derived flow thickness; except for 1955, volume was calculated with Moore (1992) derived flow thickness.

<sup>f</sup>Summit subsidence volumes in 1823, 1832, 1840, 1868, 1886, 1891, 1894, 1916, 1919, 1922, and 1924 from Finch (1940). Finch (1940) also reports other smaller volume rapid drops in the lava at the summit in 1849, 1855, 1871, 1879, and 1913, not associated with flank eruptions and which are not included in the table. Other subsidence volumes are from Neal and others (2018)–2018; Moore and others (1980)–1977; Duffield and others (1982)–1971; Swanson and others (1976)–1969; Jackson and others (1975)–1968; Fiske and Koyanagi (1968)–December 1965; Moore and Koyanagi (1969)–March 1965, August and October 1963; Richter and others (1964)–1961; Richter and others (1970)–1960; Macdonald and Eaton (1964)–1955; Finch (1923)–1923.

\*Timing is not well-constrained

**Note:** Summit eruptions referring to “filling” imply both exogeneous (lava-lake overflows) and endogenous (intrusion) Kilauea growth. Subdivisions of eruptive activity at the summit between 1823 and 1924 and compilation of eruption impacts based on unpublished work by Jim Kauahikaua, HVO.

**Version Notes:** Version 1, posted June 4, 2020.

#### References:

Duffield, W.A., Christiansen, R.L., Koyanagi, R.Y., and Peterson, D.W., 1982, Storage, migration, and eruption of magma at Kilauea Volcano, Hawaii, 1971–1972: *Journal of Volcanology and Geothermal Research*, v. 13, p. 273–307.

Finch, R.H., 1923, Volcanic Conditions in August: *Monthly Bulletin of the Hawaiian Volcano Observatory*, v. 11, no. 8, p. 71–77.

Finch, R.H., 1940, Engulfment at Kilauea Volcano: *The Volcano Letter*, no. 470, p. 1–12.

Fiske, R.S., and Koyanagi, R.Y., 1968, The December 1965 eruption of Kilauea Volcano, Hawaii: U.S. Geological Survey Professional Paper 607, 21 p., accessed at <https://pubs.usgs.gov/pp/0607/report.pdf>.

Jackson, D.B., Swanson, D.A., Koyanagi, R.Y., and Wright, T.L., 1975, The August and October 1968 east rift eruptions of Kilauea Volcano, Hawaii: U.S. Geological Survey Professional Paper 890, 33 p., accessed at <https://pubs.usgs.gov/pp/0890/report.pdf>.

Kauahikaua, J. and Trusdell, F., 2020, Have humans influenced volcanic activity on the lower East Rift Zone of Kilauea Volcano? A publication review: U.S. Geological Survey Open-File Report 2020–1017, 17 p., <https://doi.org/10.3133/ofr20201017>.

Macdonald, G.A., Abbott, A.T., and Peterson, F.L., 1983, *Volcanoes in the sea: the geology of Hawaii* (2nd ed.): Honolulu, University of Hawaii Press, 517 p.

Macdonald, G.A., and Eaton, J.P., 1964, Hawaiian volcanoes during 1955: U.S. Geological Survey Bulletin 1171, 170 p. ; pls. 1-5 in pocket, accessed at <https://pubs.usgs.gov/bul/1171/report.pdf>.

Moore, R.B., 1992, Volcanic geology and eruption frequency, lower east rift zone of Kilauea Volcano, Hawaii: *Bulletin of Volcanology*, v. 54, no. 6, August, p. 475–483, doi:10.1007/BF00301393, accessed at <https://doi.org/10.1007/BF00301393>.

Moore, R.B., Helz, R.T., Dzurisin, D., Eaton, G.P., Koyanagi, R.Y., Lipman, P.W., Lockwood, J.P., and Puniwai, G.S., 1980, The 1977 eruption of Kilauea Volcano, Hawaii, in McBirney, A.R., ed., Gordon A. Macdonald Memorial Volume (special issue): *Journal of Volcanology and Geothermal Research*, v. 7, no. 3/4, p. 189–210.

Moore, J.G., and Koyanagi, R.Y., 1969, The October 1963 eruption of Kilauea Volcano, Hawaii: U.S. Geological Survey Professional Paper 614-C, p. C1–C13, accessed at <https://pubs.usgs.gov/pp/0614c/report.pdf>.

Neal, C.A., Brantley, S.R., Antolik, L., Babb, J.L., Burgess, M., Calles, K., Cappos, M., Chang, J.C., Conway, S., Desmither, L., Dotray, P., Elias, T., Fukunaga, P., Fuke, S., Johanson, I.A., Kamibayashi, K., Kauahikaua, J., Lee, R.L., Pekalib, S., Miklius, A., Million, W., Moniz, C.J., Nadeau, P.A., Okubo, P., Parcheta, C., Patrick, M.R., Shiro, B., Swanson, D.A., Tollett, W., Trusdell, F., Younger, E.F.,

Zoeller, M.H., Montgomery-Brown, E.K., Anderson, K.R., Poland, M.P., Ball, J.L., Bard, J., Coombs, M., Dietterich, H.R., Kern, C., Thelen, W.A., Cervelli, P.F., Orr, T., Houghton, B.F., Gansecki, C., Hazlett, R., Lundgren, P., Diefenbach, A.K., Lerner, A.H., Waite, G., Kelly, P., Clor, L., Werner, C., Mulliken, K., Fisher, G., and Damby, D., 2019, The 2018 rift eruption and summit collapse of Kīlauea Volcano: *Science*, v. 363, no. 6425, p. 367–374, doi:10.1126/science.aav7046.

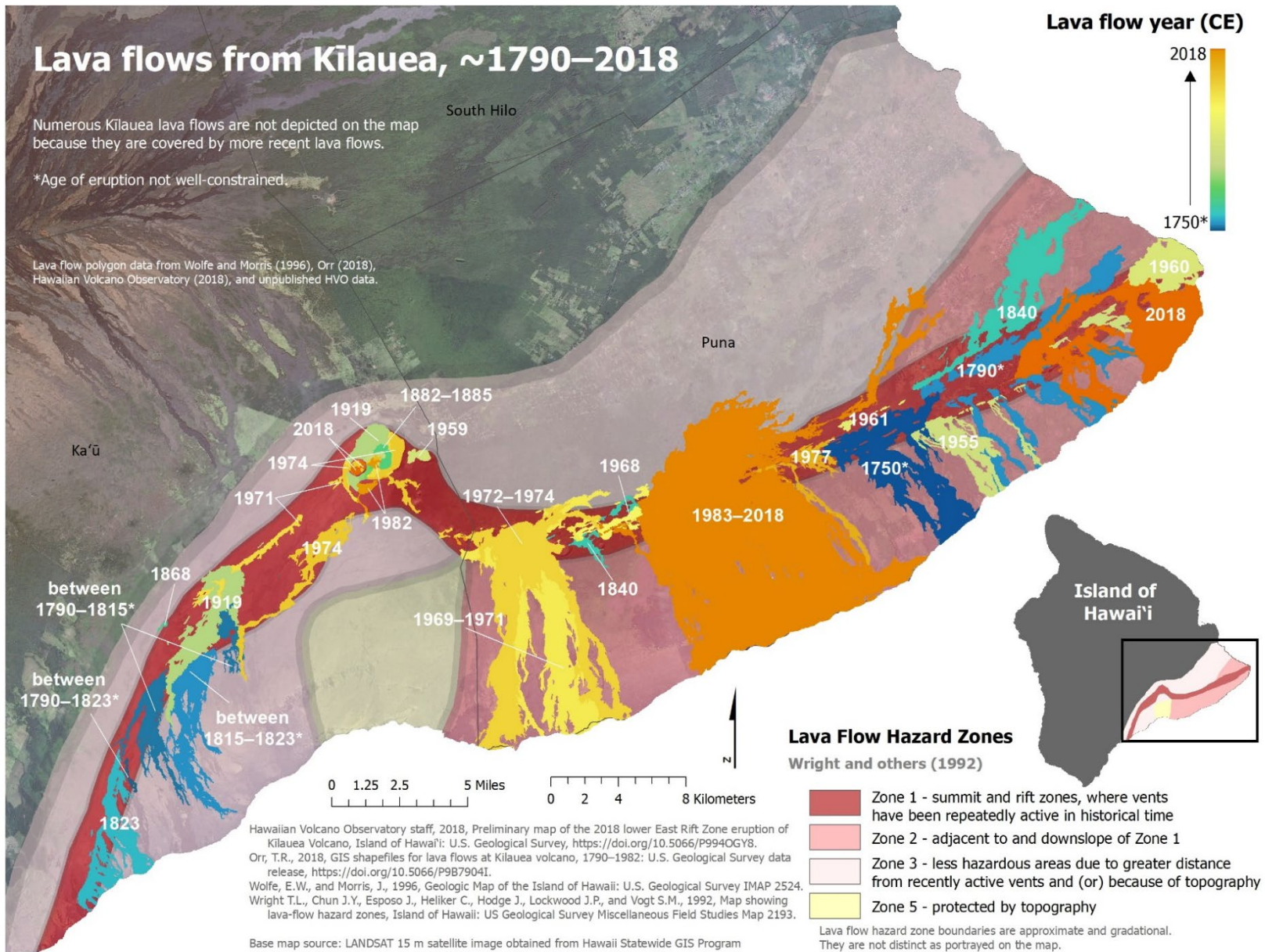
Orr, T.R., 2018, GIS shapefiles for lava flows at Kīlauea volcano, 1790–1982: U.S. Geological Survey data release, <https://doi.org/10.5066/P9B7904I>.

Richter, D.H., Ault, W.U., Eaton, J.P., and Moore, J.G., 1964, The 1961 eruption of Kīlauea Volcano, Hawaii: U.S. Geological Survey Professional Paper 474-D, p. D1-D34, accessed at <https://pubs.usgs.gov/pp/0474d/report.pdf>.

Richter, D.H., Eaton, J.P., Murata, K.J., Ault, W.U., and Krivoy, H.L., 1970, Chronological narrative of the 1959-60 eruption of Kīlauea Volcano, Hawaii, in *The 1959–60 eruption of Kīlauea Volcano, Hawaii*: U.S. Geological Survey Professional Paper 537-E, p. E1–E73, accessed at <https://pubs.usgs.gov/pp/0537e/report.pdf>.

Swanson, D.A., Jackson, D.B., Koyanagi, R.Y., and Wright, T.L., 1976, The February 1969 east rift eruption of Kīlauea Volcano, Hawaii: U.S. Geological Survey Professional Paper 891, 30 p., accessed at <https://pubs.usgs.gov/pp/0891/report.pdf>.





Map showing the subaerial extents of historical lava flows from Kīlauea. Lava flow hazard zones and districts of the County of Hawai'i are also depicted.