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Introductory Note By Thomas L. Wright and Jennifer S. Nakata

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Summary 45
January, February, and March 1967
By Arnold T. Okamura, Robert Y. Koyanagi,
and Willie T. Kinoshita

Summary 46
April, May, and June 1967
By Robert Y. Koyanagi, Arnold T. Okamura,
and Willie T. Kinoshita

Summary 47
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By Arnold T. Okamura, Robert Y. Koyanagi,
and Willie T. Kinoshita

Summary 48
October, November, and December 1967
By Robert Y. Koyanagi, Arnold T. Okamura,
and Willie T. Kinoshita

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INTRODUCTORY NOTE

The Hawaiian Volcano Observatory Summaries have been published in the current format since 1956. The Quarterly Summaries (1956 through 1973) and the Annual Summaries (1974 through 1985) were originally published as Administrative Reports. These reports have been compiled and published as U.S. Geological Survey Open-File Reports. The quarterly reports have been combined and published as one annual summary. All the summaries from 1956 to the present are now available as .pdf files at http://www.usgs.gov/pubprod.

The earthquake summary data are presented as a listing of origin time, depth, magnitude, and other location parameters. Network instrumentation, field station sites, and location algorithms are described. Tilt and other deformation data are included until Summary 77, January to December 1977. From 1978, the seismic and deformation data are published separately, due to differing schedules of data reduction.

There are eight quarters—from the fourth quarter of 1959 to the third quarter of 1961—that were never published. Two of these (4th quarter 1959, 1st quarter 1960) have now been published, using handwritten notes of Jerry Eaton (HVO seismologist at the time) and his colleagues. The seismic records for the remaining six summaries went back to California in 1961 with Jerry Eaton. Other responsibilities intervened, and the seismic summaries were never prepared.

Chronology

The following Kīlauea eruption chronology covers the two recent reports and the six missing quarters:

Location	Beginning Date	Ending Date	Comment
Kīlauea Iki crater (Kīlauea's summit)	11/14/1959	12/20/1959	19 eruptive episodes
Kapoho (lower east rift zone)	1/13/1960	2/18/1960	4 eruption stages
Halemaumau (Kīlauea's summit)	2/24/1961	2/24/1961	Intermittent activity during uninterrupted inflation following the 1960 eruption
Halemaumau (Kīlauea's summit)	3/22/1961	3/25/1961	Same as above.
Halemaumau (Kīlauea's summit)	7/10/1961	7/17/1961	Same as above.
Heiheiahulu (middle east rift zone)	9/22/1961	9/25/1961	First historical east rift eruption at this location

The 1959-1960 eruptions were among two of the most spectacular Kīlauea eruptions. The HVO staff was kept busy with acquisition of unusually high quantities of instrumental data and observations of the two sequences, which were separated by less than one month. Even with a year's interval before the beginning of the summit-east rift sequence in 1961, the staff never caught up, and the seismic records were set aside for later study.

A total of 1,672 earthquakes—1,106 for 1960 and 566 for 1961—are part of HVO's cataloged database. The annual listings have been appended to the 1st Quarter Report of 1960 and to the 4th Quarter Report for 1961. The number of earthquakes is probably low, biased toward the larger magnitudes. The entire HVO catalog, including 1960 and 1961, is accessible from the ANSS CATALOG SEARCH site at http://www.ncedc.org/anss/catalog-search.

Thomas L. Wright and Jennifer S. Nakata

UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

HAWAIIAN VOLCANO OBSERVATORY

SUMMARY 45

January, February, and March, 1967

By Arnold T. Okamura, Robert Y. Koyanagi,

and Willie T. Kinoshita

Issued May 1969

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Summary of activities

In this quarterly report, the map showing the tilting on Kilauea Volcano will include a contour map showing the total amount of altitude change at the summit. This map is based on measurements at a system of bench marks beginning near Bird Park and continues from there along the Crater Rim road to the Crater Rim - Chain of Craters road junction and then to BM 35YY at Makaopuhi Crater. Also included in this system of bench marks are spur loops, one into the center of the caldera east of Halemaumau and one southward almost to Ahua Kamokukolau tilt station. All of the changes are based on an assumed 0.0 change at HVO 23, a bench mark that is about 2-1/2 miles northwest of Halemaumau.

The summit uplifted a total of 0.5 foot during the first quarter of 1967. Uplift apparently took place in surges, with shiftings of the center of maximum inflation around various parts of the Kilauea Caldera. Precise leveling at the summit along with the tilt data showed that: (1) Between mid-October 1966 and January 12, 1967, the area of maximum uplift was 0.38 foot and located about 2 km south-southeast of Halemaumau. (2) Between January 12 and February 10 the summit uplifted an additional 0.2 foot and the "maximum" area shifted to about 2 km due south of Halemaumau. (3) Between February 10 and February 27 the uplift amounted to only 0.15 foot, but the striking feature of this level run was that it showed a change from roughly circular patterns of the past to an elongate pattern seemingly oriented along the southwest edge of the Caldera. (4) Between February 27 and March 30 the summit uplifted another 0.17 foot, with the maximum about 2 km due south of Halemaumau. Level data showed that the pattern had again returned to a circular pattern.

All of the structural deformation at the summit took place apparently with no seismic activity, as the shallow Caldera earthquake count stayed at low levels through most of the period. Two flurries of quakes from other sources did occur during this quarter. The first on December 31, 1966, and again January 6, 7, 1967, emanated from about 30 km beneath Kilauea. The second occurred late in February and consisted of several dozen small shallow quakes on the lower east rift near Kapoho.

Tilting of the ground around Kilauea Caldera

Tilting of the ground around the summit of Kilauea is monitored daily by a short-base water-tube tiltmeter at Uwekahuna (table 1), and at irregular intervals it is measured on a regional scale by means of a network of field tilt-bases and a portable water-tube tiltmeter (table 2). The attitude of the ground surface at each tilt-base is reported in terms of north-south and east-west tilt coordinates. Both coordinates at each station were arbitrarily set equal to 500 when measurements at that station were begun. Increasing tilt coordinates correspond to northward and eastward tilting of the earth's surface; that is, to a relative subsidence toward the north and east. A one-unit change in coordinate correponds to a tilting of 1 microradian (1 mm per km) in the direction indicated.

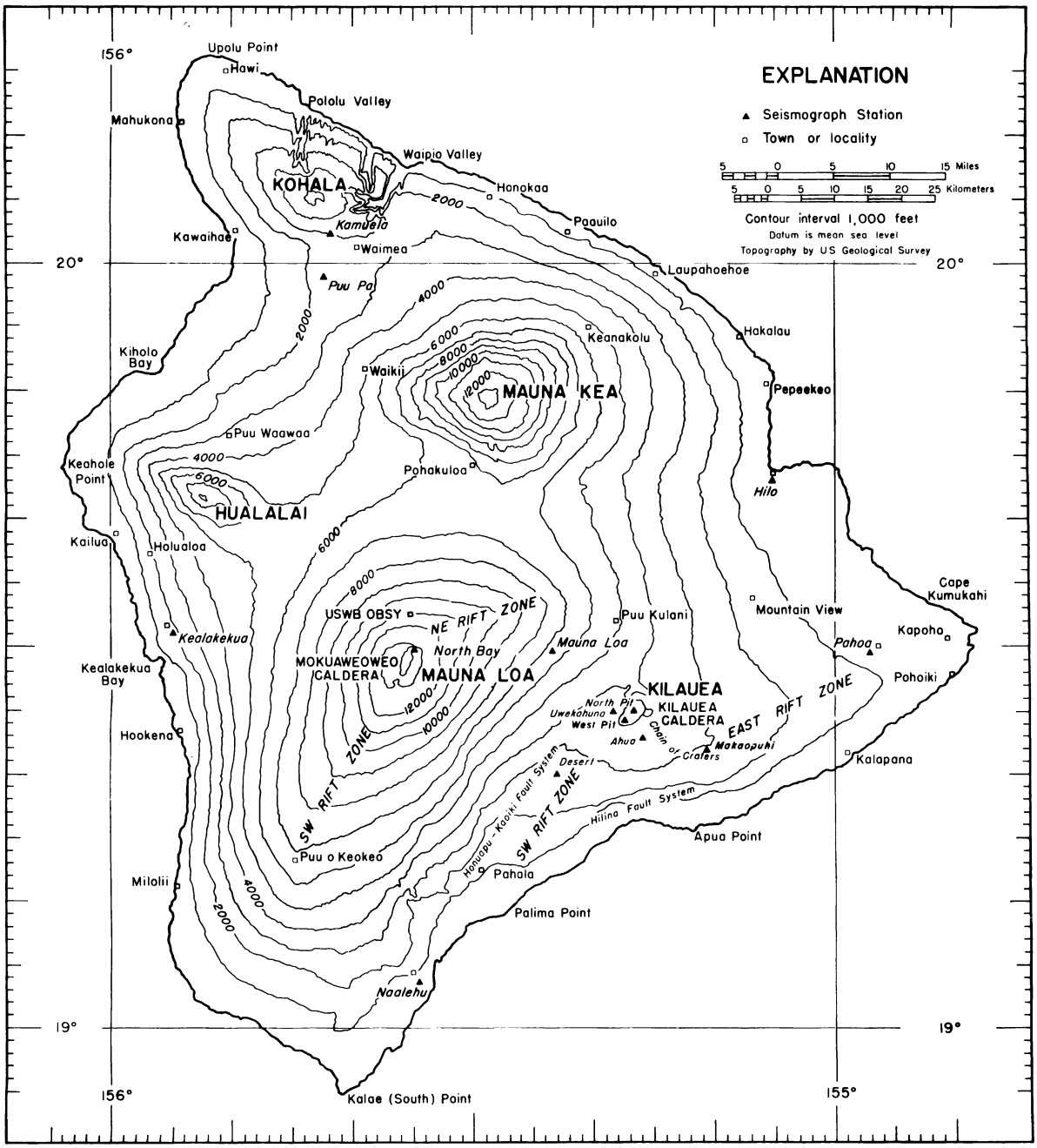

Figure 1.--Map of the Island of Hawaii showing seismograph stations operated by the U.S. Geological Survey, principal settlements, and selected geologic features. Epicenters of local earthquakes are given in table 4 in terms of geographic coordinates, which are indicated at the edges of the map.

Location of and essential data on each tiltmeter station are listed in table 6, which is published only in the first-quarter issue each year.

Table 1.--Tilt coordinates at Uwekahuna, January, February, and March, 1967

Date (1967)	N-S	E-W	Date (1967)	N-S	E-W
Jan. 1	490	431	Feb. 19	507	434
8	489	432	26	507	438
15	490	430	Mar. 5	507	437
22	491	433	12	509	438
29	492	433	19	512	435
Feb. 5	495	432	26	515	434
12	504	431			

Table 2.--Tilt coordinates and changes at bases around Kilauea Caldera

(See fig. 2 and table 6)

Tilt base (location)	Date (1967)	Tilt coordinates		Rate (10^{-6} rad/mo) and direction of tilting since last reading		Date of last reading (1966)
		N-S	E-W			
Uwekahuna (U on fig. 2)	Feb. 8	536.3	426.0	8.9	N. 29.1°W.	Dec. 8
Tree Molds (TM)	13	451.0	504.1	2.4	N. 0.2°E.	8
Sand Spit (SS)	12	865.6	692.2	19.9	N. 9.9°E.	5
Keamoku (Kea)	13	498.2	429.7	10.3	N. 52.9°W.	6
Ahua Kamokukolau (Kam)	12	516.5	517.9	25.8	S. 16.4°E.	5
Kipuka Nene (KN)	15	300.1	501.0	0.8	S. 21.2°E.	7
Hilina Pali (HP)			No data this epoch			
Kapapala Ranch (Kap)	15	491.8	509.7	0.1	N. 48.9°W.	6
Mehana (M)	14	558.5	564.6	2.7	N. 17.7°E.	9

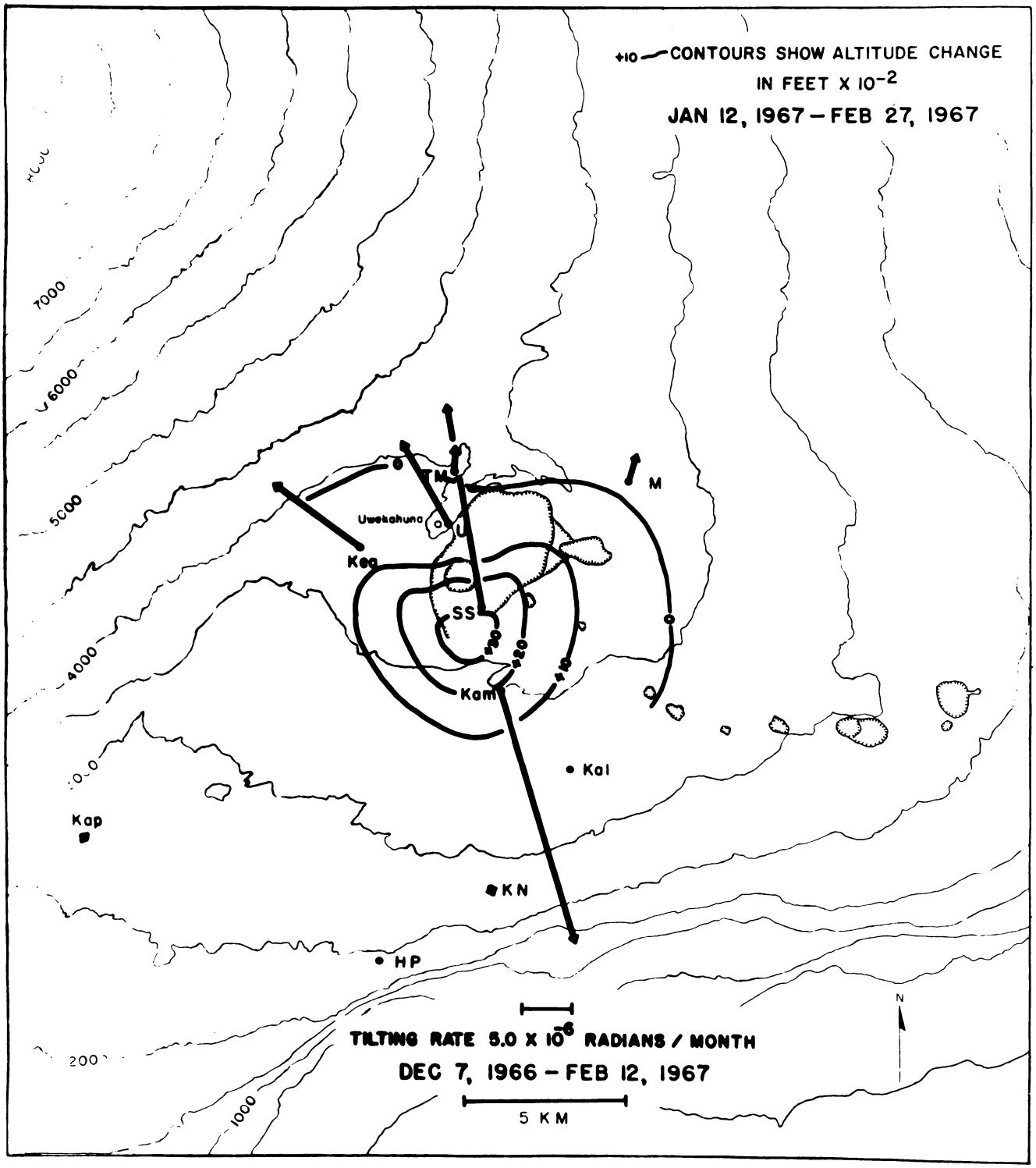

Figure 2.--Tilting of the ground around Kilauea Caldera between December 7, 1966, and February 12, 1967. The vector depicting tilting at a given tilt base points in the direction of maximum relative subsidence and has a length proportional to the rate of tilting during the measurement interval. Closed circles represent field tilt bases; open circles, short-base water-tube tiltmeters. See table 2 for explanation of abbreviations.

Seismic summary

Events recorded by the U.S. Geological Survey seismograph network in Hawaii fall into two categories: Local earthquakes and tremor originating in the region of the Hawaiian Islands (usually within 100 km of at least one seismograph), and distant earthquakes originating more than 3,000 km from Hawaii. As an index of seismic activity at Hawaiian volcanoes, daily counts of earthquakes and minutes of tremor recorded by seismographs in Hawaii are listed in table 3. The earthquakes are separated into groups on the basis of region of origin as determined by analysis of records obtained daily at the Observatory (stations U, M, M(2), A, D, N, WP, MP, K, O). Earthquakes of magnitude 2.0 or greater are generally sufficiently well recorded to be located with greater precision; they are listed individually in table 4.

Location of and essential data of each seismograph station are listed in table 5 in the first-quarter issue each year.

Acknowledgments

Several people or agencies reported "felt" earthquakes during the first quarter, 1967. Their assistance is gratefully acknowledged.

Table 3.--Numbers of earthquakes and minutes of tremor recorded on seismographs around Kilauea Caldera

Tremor is separated into three categories: deep, intermediate, and shallow, on the basis of relative amplitudes on seismographs in the summit region. Unless otherwise stated, tremor is presumed to be associated with movement of magma within the central complex of Kilauea.

Earthquake categories are: Kilauea summit, 30 km earthquakes from a source about 30 km beneath the Kilauea summit region; long-period, earthquakes characterized by low-frequency waves that originate about 5 km beneath Kilauea summit; and shallow earthquakes in the Kilauea Caldera region; shallow earthquakes along the SW. rift zone of Kilauea and the adjacent portion of the Kaoiki fault system; earthquakes along the eastern half of Kilauea's east rift zone--detected largely on the Pahoa seismograph; earthquakes from the upper east rift zone and the adjacent fault systems of Kilauea's south flank; and earthquakes from other regions: west Hawaii, Mauna Kea, etc.

Date (1967)	Tremor (minutes)			Earthquakes						
				Kilauea summit			SW. rift and Kaoiki	Eastern east rift	Upper east rift	Others
	Deep	Inter-mediate	Shallow	30 km	Long period	Shallow				
Jan. 1	----	-------	--------	8	-------	60	10	1	17	----------
2	----	-------	--------	5	1	65	10	1	28	1 Kona
3	----	-------	--------	11	-------	85	9	1	6	----------
4	----	-------	--------	8	-------	100	14	--------	9	----------
5	----	-------	--------	4	-------	80	8	--------	14	----------
6	----	-------	--------	43	-------	103	10	--------	18	1 Mauna Kea
7	31	-------	--------	50	4	94	13	--------	26	1 Kohala
8	----	-------	--------	4	5	116	14	1	8+	1 offshore Keahole Pt. 1 Mauna Kea
9	----	-------	--------	4	2	57+	6	--------	9	----------
10	----	-------	--------	3	7	75+	5	1	14	----------
11	----	-------	--------	3+	-------	electrical storm-off	7+	--------	7+	1 Mauna Loa

Table 3.--Numbers of earthquakes and minutes of tremor recorded on seismographs around Kilauea Caldera--Continued

Date (1967)	Tremor (minutes)			Earthquakes						
				Kilauea summit			SW. rift and Kaoiki	Eastern east rift	Upper east rift	Others
	Deep	Intermediate	Shallow	30 km	Long period	Shallow				
Jan. 12	22	--------	--------	2	-------	36+	5	--------	14+	----------
13	----	9	--------	6	-------	72	20	1	21	1 Kona; 1 S. flank of Mauna Kea
14	----	--------	--------	?	-------	70±	?	3	?	?/instrument turned off;
15	?	?	?	?	?	?	?	?	?	electrical storm
16	----	--------	--------	7	-------	135	7	2	3+	----------
17	20	--------	--------	14	-------	93	9	1	22	----------
18	----	8	--------	4	12	61	13	2	20	----------
19	11	--------	--------	4	-------	75	8	6	19	----------
20	----	--------	--------	-----	5	68	22	12	19	----------
21	----	2	--------	1	16	100	20	29	10	----------
22	----	--------	--------	3	-------	124	12	43	21	----------
23	----	--------	--------	4	-------	149	59	36	28	----------
24	----	--------	--------	5	-------	108	28	41	30	----------
25	----	--------	--------	4	-------	104	9	19	35	----------
26	----	--------	--------	3	-------	152	20	3	20	----------
27	----	36	--------	13	10	118	17	12	20	1 Mauna Kea 1 E. flank Mauna Loa
28	----	--------	--------	9	6	138	23	--------	20	----------
29	----	--------	--------	10	5	119	18	1	25	----------
30	----	3	--------	4	3	102	15	--------	47	1 Kohala
31	----	--------	--------	1	10	151	15	4	30	----------
Feb. 1	----	--------	--------	2	-------	150±	7	3	65	----------
2	----	--------	--------	4	4	142	13	5	51	3 Mauna Loa
3	----	--------	--------	4	2	136	34	4	45	1 offshore N. of Maui
4	----	--------	--------	2	4	137	10+	6	14+	----------
5	----	3+	--------	8	-------	105	5	--------	28	1 S. flank of Mauna Loa
6	----	2	--------	4	2	131	19	3	29	----------

Feb. 7	16	---	---	2	4	173	16	3	20	---
8	---	---	---	2	2+	159	17	3	12+	2 Kona
9	---	---	---	2	1	141	7	---	19	1 Kona
10	---	---	---	1+	---	45+	7+	---	4+	1 S. flank of Mauna Loa
11	2	---	---	---	1	101	17	---	21	---
12	---	---	---	3	---	72	16	---	20	1 E. flank of Mauna Kea 1 offshore S. of Maui
13	---	---	---	3	---	50	18	---	15	---
14	26	---	---	---	---	65	7	2	11	---
15	---	---	---	---	---	69	16	3	18	1 Kona
16	---	---	---	---	---	50	11	1	30	---
17	33	---	---	---	1	98	15	10	27	1 Mauna Loa
18	---	---	---	---	1	113	21	4	14	---
19	---	---	---	---	---	87	35	1	12	1 offshore, 1 S. flank Mauna Loa
20	---	---	---	1	---	56	28	1	8+	---
21	---	---	---	---	1	78	38	1	12	1 NW. flank Mauna Loa
22	---	---	---	5	---	53	27	2	4	1 flank Mauna Loa
23	---	---	---	3	---	45	26	1	10	1 offshore
24	---	---	---	3	2	41	29	1	19	---
25	---	---	---	3	1	47	68	1	13	1 Mauna Loa
26	---	---	---	3	---	35	71	---	24	---
27	---	4	---	8	---	41	39	---	15	---
28	---	---	---	2	2	29	29	---	15	---
Mar. 1	---	---	---	1	---	40	16	3	5	1 offshore
2	---	---	---	---	---	40	19	---	10	---
3	---	---	---	---	---	44	18	1	32	1 S. of Maui
4	---	---	---	---	---	50	23	---	18	1 Kohala
5	---	---	---	---	5	48	22	---	64	---
6	---	---	---	1	2	56	14	---	27	---
7	---	---	---	---	---	60	15	1	15	---
8	---	---	---	3	---	80	4	---	15	---
9	---	---	---	3	---	88	13	---	34	1 offshore
10	---	---	---	---	1	128	15	---	26	1 Kona

Table 3.--Numbers of earthquakes and minutes of tremor recorded on seismographs around Kilauea Caldera--Continued

Date (1967)	Tremor (minutes)			Earthquakes						
				Kilauea summit			SW. rift and Kaoiki	Eastern east rift	Upper east rift	Others
	Deep	Intermediate	Shallow	30 km	Long period	Shallow				
Mar. 11	----	--------	-------	1	------	118	19	-------	16	2 flank Mauna Kea 1 offshore
12	5	--------	-------	3	3	163	18	-------	18+	----------
13	----	--------	-------	1	3	103	7	-------	21	1 flank Mauna Kea
14	----	--------	-------	2	------	102	9	-------	41	1 flank Mauna Loa 1 Kona
15	5	--------	-------	-----	------	130	13	-------	28+	----------
16	----	--------	-------	4	1	98	14	-------	10+	1 S. flank Mauna Loa
17	30	--------	-------	?	------	36	2	-------	5+	----------
18	----	--------	-------	2	1	72	8	-------	20	1 Mauna Loa
19	----	--------	-------	-----	2	95	12	-------	6	----------
20	----	--------	-------	-----	1	110	7	-------	7	----------
21	----	--------	-------	-----	3	133	3	-------	4	----------
22	----	--------	7	-----	1	43	1	-------	------	1 S. flank Mauna Loa
23	----	--------	-------	3	------	68	7	-------	2	----------
24	----	--------	-------	1	------	88	--------	-------	13	----------
25	----	--------	-------	2	------	103	14	-------	13	----------
26	----	--------	-------	1	2	98	5	-------	4	----------
27	----	--------	-------	1	------	87	11	-------	7	----------
28	----	--------	-------	3	4	77	20	1	19	----------
29	----	--------	60	3	------	57	29	-------	19	1 offshore
30	----	--------	-------	-----	5	41	--------	-------	5	----------
31	----	--------	-------	-----	------	?	?	-------	15	?/instrument turned off; electrical storm

Table 4.--Local earthquakes recorded by seismographs of the U.S. Geological Survey,

January, February, and March, 1967

Entries for a given quake are: date, origin time (Hawaiian Standard Time), magnitude, depth, epicenter, and felt report. All earthquakes of magnitude 2.5 and larger, as well as many favorably located smaller ones, occurring on or near the island of Hawaii are included in the list.

Date (1967)	Time			Magnitude	Depth (km)	Epicenter			Felt Report
	h	m	s			Lat. N.	Long. W.	Description	
Jan. 1	00	12	31.5	1.9	8	19°23.1'	155°27.7'	9 km NW. of Desert seismometer	----------
1	01	13	00.3	2.3	27	19°23.2'	155°18.5'	5 km WNW. of Ahua seismometer	----------
2	13	14	30.1	2.3	6	19°21.9'	155°31.1'	14 km WNW. of Desert seismometer	----------
2	14	33	39.0	2.6	3	19°15.7'	155°47.3'	15 km NE. of Milolii	----------
2	18	17	22.0	2.6	5	19°19.9'	155°11.9'	4 km SW. of Makaopuhi seismometer	----------
3	18	47	36.6	2.4	8	19°23.7'	155°26.8'	9 km NW. of Desert seismometer	----------
5	16	51	53.7	2.4	0	19°35.1'	155°46.4'	17 km NE. of Kealakekua	----------
6	01	56	32.0	2.7	35	19°48.3'	155°24.3'	14 km NE. of Pohakuloa	----------
6	19	00	28.4	2.1	10	19°19.7'	155°08.5'	6 km SE. of Makaopuhi seismometer	----------
6	20	36	20.9	3.9	35	19°22.7'	155°18.0'	4 km W. of Ahua seismometer	Kealakekua, Hilo, Kilauea summit area, Naalehu, Kamuela
7	13	42	13.8	2.8	35	19°23.3'	155°18.7'	5 km WNW. of Ahua seismometer	----------
7	23	31	34.0	2.6	8	20°03.3'	155°36.8'	9 km ENE. of Kamuela	----------
8	00	24	16.9	2.0	5	19°24.2'	155°27.4'	10 km NW. of Desert seismometer	----------
8	01	12	03.9	3.5	8	19°44'	156°09'	9 km W. of Keahole Pt.	----------
8	05	16	36.3	2.2	8	19°54.1'	155°32.9'	12 km ENE. of Waikii	----------
9	20	54	34.2	2.7	5	19°21.2'	155°06.3'	8 km ESE. of Makaopuhi seismometer	----------
9	20	55	15.8	3.0	3	19°21.3'	155°05.5'	9 km ESE. of Makaopuhi seismometer	----------
9	21	48	33.8	2.0	3	19°21.8'	155°07.8'	5 km E. of Makaopuhi seismometer	----------
10	07	52	30.8	3.3	3	19°23.9'	155°05.2'	10 km ENE. of Makaopuhi seismometer	Hilo
10	23	21	01.7	3.8	5	19°20.2'	155°04.5'	11 km SE. of Makaopuhi seismometer	Hilo, Pahoa
11	09	16	07.7	2.7	28	19°23.3'	155°17.2'	3 km NW. of Ahua seismometer	----------
11	17	52	10.1	2.6	10	19°28.9'	155°36.1'	3 km SW. of North Bay seismometer	----------

Table 4.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, January, February, and March, 1967--Continued

Date (1967)	Time			Magnitude	Depth	Epicenter			Felt Report
	h	m	s			Lat. N.	Long. W.	Description	
Jan. 13	03	16	42.8	2.5	8	19°25.8'	155°26.2'	11 km NW. of Desert seismometer	----------
13	10	35	07.2	2.0	0	19°37.8'	155°42.0'	26 km NE. of Kealakekua	----------
13	12	11	19.2	2.0	8	19°49.0'	155°35.0'	8 km SE. of Waikii	----------
15	02	37	06.6	2.7	0	19°25.0'	155°05.1'	11 km NE. of Makaopuhi seismometer	----------
15	13	31	29.9	2.5	28	19°20.0'	155°26.0'	5 km WSW. of Desert seismometer	----------
17	06	59	58.0	2.2	28	19°24.0'	155°18.2'	3 km SW. of Uwekahuna seismometer	----------
19	10	18	30.0	3.0	5	19°22.9'	155°27.0'	9 km NW. of Desert seismometer	----------
22	01	24	20.2	2.9	8	19°18.0'	155°09.1'	8 km SE. of Makaopuhi seismometer	----------
22	11	31	42.8	3.7	8	19°23.7'	155°27.3'	9 km NW. of Desert seismometer	Hilo
23	16	59	14.9	4.6	8	19°26.8'	155°26.0'	8 km SW. of Mauna Loa seismometer	Hilo, Kilauea summit area, Pahala, Pahoa, Kealakekua, Mt. View
23	18	53	50.3	2.2	5	19°26.0'	155°26.5'	9 km SW. of Mauna Loa seismometer	----------
23	21	50	07.4	2.0	5	19°26.0'	155°26.5'	10 km SW. of Mauna Loa seismometer	----------
24	10	49	53.1	2.1	5	19°24.0'	155°02.8'	14 km ENE. of Makaopuhi seismometer	----------
24	12	23	36.8	1.8	5	19°25.7'	154°56.0'	7 km SSE. of Pahoa	Kapoho
25	03	24	56.8	2.3	5	19°26.7'	154°54.4'	7 km SE. of Pahoa	----------
25	04	10	55.3	2.4	5	19°26.5'	155°25.5'	8 km SW. of Mauna Loa seismometer	----------
26	04	30	54.8	2.7	0	19°27.8'	154°53.8'	6 km SE. of Pahoa	Kapoho
26	04	32	03.8	3.4	5	19°26.9'	154°54.2'	7 km SE. of Pahoa	Kapoho
27	14	19	45.5	2.3	10	19°24.7'	155°36.8'	10 km SSW. of North Bay seismometer	----------
27	16	02	31.2	2.5	8	19°57.1'	155°17.8'	7 km SW. of Laupahoehoe	----------
28	06	15	51.9	2.5	28	19°17.0'	155°20.8'	7 km SE. of Desert seismometer	----------
28	12	42	59.1	2.4	1	19°24.2'	154°56.1'	10 km S. of Pahoa	----------
28	12	43	33.2	3.0	8	19°28.9'	154°54.1'	5 km ESE. of Pahoa	----------
28	21	43	48.7	2.3	3	19°26.0'	154°55.0'	8 km SE. of Pahoa	Kapoho
30	03	54	07.6	2.2	5	19°19.8'	155°12.0'	5 km SW. of Makaopuhi seismometer	----------

Jan. 30	23	42	01.1	2.2	13	20°11.5'	155°42.6'	Pololu Valley	----------
31	03	06	43.9	2.1	7	19°21.0'	155°07.8'	5 km SE. of Makaopuhi seismometer	----------
Feb. 1	23	30	41.5	4.5	5	19°21.7'	155°05.5'	9 km E. of Makaopuhi seismometer	Hilo, Kealakekua, Pahala, Kilauea summit area, Honokaa, Waimea, Mt. View, Naalehu
1	23	36	36.1	2.7	5	19°21.6'	155°03.7'	12 km E. of Makaopuhi seismometer	----------
2	15	32	06.1	2.7	5	19°21.1'	155°06.7'	7 km ESE. of Makaopuhi seismometer	----------
2	22	50	39.9	2.7	10	19°23.8'	155°39.2'	13 km SW. of North Bay seismometer	----------
3	02	08	42.7	2.3	0	19°26.3'	155°35.9'	6 km SW. of North Bay seismometer	----------
3	02	58	45.5	2.4	8	19°29.2'	155°32.3'	4 km ESE. of North Bay seismometer	----------
3	05	26	20.5	2.3	10	19°27.6'	155°36.0'	4 km SW. of North Bay seismometer	----------
3	17	25	02.2	2.1	8	19°25.3'	155°31.0'	17 km NW. of Desert seismometer	----------
3	18	49	33.0	3.1	5	19°22.4'	155°04.7'	10 km E. of Makaopuhi seismometer	----------
3	22	07	54.1	3.2	8	20°53'	155°59'	15 km N. of Hana, Maui	----------
4	21	51	59.5	2.0	5	19°25.4'	155°26.9'	11 km SW. of Mauna Loa seismometer	----------
5	17	20	52.1	2.4	3	19°21.8'	155°01.7'	16 km E. of Makaopuhi seismometer	----------
5	18	48	42.2	2.0	8	19°10.4'	155°39.7'	14 km NW. of Naalehu	----------
6	00	05	43.7	2.7	8	19°26.0'	155°29.0'	12 km SW. of Mauna Loa seismometer	----------
7	04	30	42.9	3.5	28	19°18.9'	155°18.0'	8 km SW. of Ahua seismometer	Pahala, Hilo, Kilauea summit area
7	11	16	45.1	2.1	5	19°24.2'	155°29.4'	13 km NW. of Desert seismometer	----------
7	13	49	47.8	2.4	5	19°20.3'	155°04.2'	12 km SE. of Makaopuhi seismometer	----------
8	07	45	26.4	2.9	0	19°34.2'	155°49.1'	12 km NE of Kealakekua	Kealakekua
10	17	51	42.5	2.2	8	19°09.8'	155°40.8'	15 km NW. of Naalehu	----------
11	00	35	19.3	2.3	5	19°20.6'	155°04.7'	11 km ESE. of Makaopuhi seismometer	----------
11	00	58	12.8	2.0	5	19°23.7'	155°25.4'	7 km NW. of Desert seismometer	----------
11	07	15	14.2	2.1	5	19°23.1'	155°24.4'	6 km NW. of Desert seismometer	----------
12	11	45	04.8	3.7	8	19°56.5'	155°26.8'	13 km SW. of Paauilo	Kamuela, Honokaa, Hilo, Laupahoehoe
12	14	26	21.0	1.9	8	19°22.5'	155°25.2'	5 km NW. of Desert seismometer	----------
12	16	01	14.8	3.4	13	20°02'	156°53'	115 km WNW. of Keahole Point	----------
12	18	35	21.8	1.8	10	19°24.8'	155°24.8'	9 km NNW. of Desert seismometer	----------

Table 4.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, January, February, and March, 1967--Continued

Date (1967)	Time			Magnitude	Depth	Epicenter			Felt Report
	h	m	s			Lat. N.	Long. W.	Description	
Feb. 13	01	46	42.1	2.2	10	19°22.0'	155°07.8'	5 km E. of Makaopuhi seismometer	----------
13	19	48	03.5	2.1	5	19°21.2'	155°04.0'	11 km ESE. of Makaopuhi seismometer	----------
14	14	29	35.2	2.1	5	19°20.5'	155°07.2'	6 km SE. of Makaopuhi seismometer	----------
15	03	51	43.4	2.0	0	19°28.3'	155°47.0'	15 km ESE. of Kealakekua	----------
16	21	49	12.0	3.3	0	19°26.8'	154°59.2'	7 km SW. of Pahoa	Kapoho
16	21	52	37.0	1.8	5	19°25.8'	154°55.8'	7 km SSE. of Pahoa	Kapoho
17	18	08	00.3	3.3	5	19°32.2'	155°41.8'	13 km NW. of North Bay seismometer	----------
17	23	28	54.9	1.5	8	19°24.0'	155°28.3'	11 km NW. of Desert seismometer	----------
18	23	59	26.2	1.5	2	19°20.6'	155°30.3'	12 km WNW. of Desert seismometer	----------
19	05	42	39.5	2.0	3	18°53.9'	155°13.1'	43 km ESE. of Naalehu	----------
19	20	44	27.3	2.0	8	19°08.7'	155°41.2'	14 km NW. of Naalehu	----------
21	05	33	22.4	2.4	0	19°36.4'	155°40.9'	16 km NW. of North Bay seismometer	----------
21	08	23	43.7	2.0	5	19°19.9'	155°19.7'	7 km ESE. of Desert seismometer	----------
22	02	10	18.9	1.9	5	19°19.0'	155°08.9'	6 km SE. of Makaopuhi seismometer	----------
22	21	08	57.7	2.5	0	19°30.5'	155°41.8'	12 km WNW. of North Bay seismometer	----------
23	05	32	15.5	3.0	5	19°06.4'	155°32.5'	7 km NE. of Naalehu	----------
23	17	33	44.1	2.6	5	19°16.7'	155°26.0'	9 km SW. of Desert seismometer	----------
24	02	04	26.0	2.2	5	19°21.4'	155°19.8'	7 km ENE. of Desert seismometer	----------
25	10	29	16.5	2.7	3	19°31.8'	155°36.4'	5 km NW. of North Bay seismometer	----------
27	05	42	24.0	2.1	5	19°25.4'	155°27.0'	12 km NW. of Desert seismometer	----------
Mar. 1	10	24	30.1	2.7	35	18°56.2'	155°30.0'	17 km SE. of Naalehu	----------
1	18	16	48.4	2.0	5	19°23.0'	155°23.0'	5 km NNE. of Desert seismometer	----------
3	11	40	04.8	2.5	13	20°20'	156°17'	47 km S. of Haleakala seismograph	----------
3	13	38	25.1	2.1	5	19°20.2'	155°05.4'	11 km ESE. of Makaopuhi seismometer	----------
4	09	26	56.2	2.7	5	19°25.9'	155°29.8'	13 km SW. of Mauna Loa seismometer	----------
5	14	17	36.0	2.0	8	19°20.3'	155°11.8'	3 km SW. of Makaopuhi seismometer	----------
7	07	02	42.2	2.1	8	19°21.2	155°01.9'	15 km E. of Makaopuhi seismometer	----------
7	11	28	02.5	1.7	.25	19°21.1'	155°19.8'	7 km SW. of Ahua seismometer	Pahala
8	05	09	02.5	2.3	5	19°19.0'	155°13.1'	7 km SW. of Makaopuhi seismometer	----------

Mar. 9	22	39	45.1	2.2	3	19°16.3'	155°28.8'	12 km SW. of Desert seismometer	Pahala
10	05	07	28.6	2.0	0	19°35.7'	155°50.1'	12 km NE. of Kealakekua	----------
10	06	13	04.9	2.0	0	20°00.8'	155°32.8'	16 km ESE. of Kamuela	----------
11	03	15	01.2	2.6	8	19°45'	156°16'	20 km W. of Keahole Point	----------
13	16	52	38.1	2.1	8	19°20.8'	155°09.5'	3 km SE. of Makaopuhi seismometer	----------
14	18	42	28.3	3.8	8	19°16.7'	155°13.3'	4 km NW. of Apua Point	Hilo, Kilauea summit area
14	18	44	50.1	2.0	8	19°15.7'	155°14.3'	5 km W. of Apua Point	Kilauea summit area
14	21	11	58.3	1.7	25	19°23.3'	155°15.7'	2 km NNE. of Ahua seismometer	----------
14	21	19	41.4	1.8	8	19°27.0'	155°40.0'	10 km SW. of North Bay seismometer	----------
15	12	21	09.2	2.2	0	19°24.1'	155°02.0'	16 km ENE. of Makaopuhi seismometer	----------
16	11	49	35.6	2.3	10	19°11.7'	155°30.6'	3 km WSW. of Pahala	----------
16	17	28	04.5	2.3	3	19°25.1'	155°23.2'	9 km N. of Desert seismometer	----------
17	15	28	26.4	2.0	29	19°25.3'	155°16.0'	Kilauea Caldera	----------
17	18	15	21.1	1.8	25	19°21.7'	155°17.7'	3 km SW. of Ahua seismometer	----------
18	02	34	10.1	2.7	0	19°22.4'	155°32.8'	17 km WNW. of Desert seismometer	----------
18	08	51	00.1	2.4	5	19°25.8'	155°34.0'	8 km SSE. of North Bay seismometer	----------
19	04	12	23.4	2.3	5	19°24.1'	155°26.9'	9 km NW. of Desert seismometer	----------
22	13	15	34.6	2.0	10	19°23.2'	155°24.2'	6 km NW. of Desert seismometer	Pahala
22	17	05	47.9	2.5	3	19°21.8'	155°26.8'	7 km NW. of Desert seismometer	----------
22	18	12	14.9	2.0	8	19°10.7'	155°28.8'	3 km S. of Pahala	----------
23	14	24	43.7	2.7	30	19°22.9'	155°18.7'	5 km WNW. of Ahua seismometer	Pahala
24	14	58	36.5	4.3	8	19°46.5'	155°41.0'	10 km SSW. of Waikii	Islandwide
26	13	36	25.0	2.2	30	19°21.0'	155°20.1'	8 km SW. of Ahua seismometer	----------
27	12	56	15.4	2.7	3	19°19.3'	155°20.7'	5 km SE. of Desert seismometer	Pahala
27	13	06	37.0	2.7	0	19°22.5'	155°23.6'	4 km N. of Desert seismometer	Pahala
27	13	10	54.4	2.0	8	19°15.0'	155°32.7'	19 km SW. of Desert seismometer	----------
27	18	25	46.8	3.0	6	19°08.1'	155°23.9'	6 km SE. of Palima Point	----------
28	05	08	22.7	2.5	10	19°21.3'	155°06.0'	8 km ESE. of Makaopuhi seismometer	----------
29	04	07	21.3	2.2	9	19°20.3'	155°11.3'	3 km SW. of Makaopuhi seismometer	----------
29	15	38	04.0	2.8	8	20°06'	156°10'	35 km WNW. of Kawaihae	----------

Table 5.--U.S. Geological Survey seismograph stations in Hawaii

/On island of Hawaii unless otherwise stated/

Station	Symbol	Location		Altitude (m) above sea level	Equipment (Z, vertical; N, north-south; E, east-west)
		Lat N.	Long W.		
Uwekahuna (Hawaiian Volcano Observatory)	U	19°25.4'	155°17.6'	1,240	Long-period Press-Ewing: N, E, Z. (Seismometer and galvanometer periods are 15 and 90 seconds, respectively) Short-period Sprengnether: E, Z. HVO-1: Z[1]. Short-base liquid-level tiltmeter.
Mauna Loa	M	19°29.8'	155°23.3'	2,010	Remote recording HVO-2: Z[2].
Ahua	A	19°22.4'	155°15.9'	1,070	Do.
Desert	D	19°20.2'	155°23.3'	815	Do.
Mauna Loa (2)	M(2)	19°27.6'	155°20.7'	1,475	Remote recording 1.0 sec. EV-17 Z.
North Pit	N	19°24.9'	155°17.0'	1,115	Do.
West Pit	WP	19°24.7'	155°17.5'	1,115	Do.
Makaopuhi	MP	19°21.8'	155°10.7'	885	Do.
Kealakomo	K	19°18.5'	155°09.6'	201	Do. (installed Sept. 28, 1966)
Outlet	O	19°23.4'	155°16.8'	1,084	Do.
Hilo	Hi	19°43.2'	155°05.3'	20	HVO-1: Z Wood-Anderson: N, E. Operated by Joseph De Mello at St. Joseph's School.
Kipapa, Oahu	Kip	21°25.4'	158°00.9'	76	HVO-1: Z. Operated by U.S. Coast and Geodetic Survey.
Pahoa	Pa	19°29.7'	154°56.8'	205	HVO-1: Z. Operated by Kongo Kimura at Pahoa School
Haleakala, Maui	Ha	20°46.0'	156°15.0'	2,090	HVO-1: Z. Wood-Anderson: N, E. Operated by the staff of Haleakala National Park, Maui.
Naalehu	Na	19°03.8'	155°35.2'	205	1.0 sec. EV-17 seismometer, 0.5 sec. galvanometer: Z. Operated by Virginia Ah Yee at Naalehu School.

Kamuela	Ka	20°01.9'	155°42.0'	740	1.0 sec. EV-17, 0.286 sec. galvanometer. Operated by Michael Foster at H.P.A., Kamuela.
North Bay	NB	19°29.7'	155°34.8'	4,005	1.0 sec. EV-17: Z. with helicorder. Operated by U.S. Weather Bureau.
Kealakekua	Ke	19°31.2'	155°55.3'	505	1.0 sec. EV-17, 0.286 sec. galvanometer: Z, EW, and NS. Operated by Henry Nelson at Kona County Hospital.

1/ HVO-1 is a moving-coil, hinged, vertical-component seismograph with seismometer and galvanometer periods of 0.5 second. Overdamping of both seismometer and galvanometer is used to control the strong galvanometer reaction. This seismograph has a peak magnification of about 20,000 at a period of 0.25 second. Recording is optical, on photographic paper.

2/ HVO-2 is a moving-coil, vertical-component seismograph with a seismometer period of 0.8 second. Its signal is transmitted over telephone wires to the Hawaiian Volcano Observatory, where it is recorded on smoked paper.

Table 6.--U.S. Geological Survey tiltmeter stations in Hawaii

Station	Symbol	Location		Frequency of reading	Base length M	Description
		Lat N.	Long W.			
Tree Molds	TM	19°26.3'	155°17.3'	Quarterly	50.79	NS. and EW.
Sand Spit	SS	19°24.1'	155°16.8'	--do-----	25.40	Equilateral triangle
Keamoku	Kea	19°25.1'	155°19.0'	--do-----	47.55	Do.
Ahua Kamokukolau	Kam	19°22.7'	155°16.6'	--do-----	50.79	Do.
Kipuka Nene	KN	19°19.4'	155°16.7'	--do-----	50.79	Do.
Hilina Pali	HP	19°18.2'	155°18.6'	--do-----	47.73	Do.
Kapapala Ranch	Kap	19°20.5'	155°23.8'	--do-----	50.79	Do.
Mehana	M	19°26.2'	155°14.3'	--do-----	25.00	Do.
Uwekahuna	U	19°25.5'	155°17.4'	--do-----	50.79	Do.
Uwekahuna Vault		19°25.4'	155°17.6'	Daily	3.48	NS. and EW.

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HAWAIIAN VOLCANO OBSERVATORY

SUMMARY 46

April, May, and June 1967

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Tilting of the ground around the summit of Kilauea is monitored daily by a short-base water-tube tiltmeter at Uwekahuna (table 1), and at irregular intervals it is measured on a regional scale by means of a network of field tilt-bases and a portable water-tube tiltmeter. The attitude of the ground surface at each tilt-base is reported in terms of north-south and east-west tilt coordinates. Both coordinates at each station were arbitrarily set equal to 500 when measurements at that station were begun. Increasing tilt coordinates correspond to northward and eastward tilting of the earth's surface; that is, to a relative subsidence toward the north and east. A one-unit change in coordinate corresponds to a tilting of 1 microradian (1 mm per km) in the direction indicated.

Location of and essential data on each tiltmeter station are listed in table 6, which is published only in the first quarter issue each year.

Table 1.--Tilt coordinates at Uwekahuna

April, May, and June, 1967

Date (1967)	N-S	E-W	Date (1967)	N-S	E-W
April 2	517	436	May 21	535	435
9	522	430	28	537	431
16	523	429	June 4	539	430
23	525	432	11	539	430
30	527	434	18	539	431
May 7	529	433	25	540	430
14	531	433			

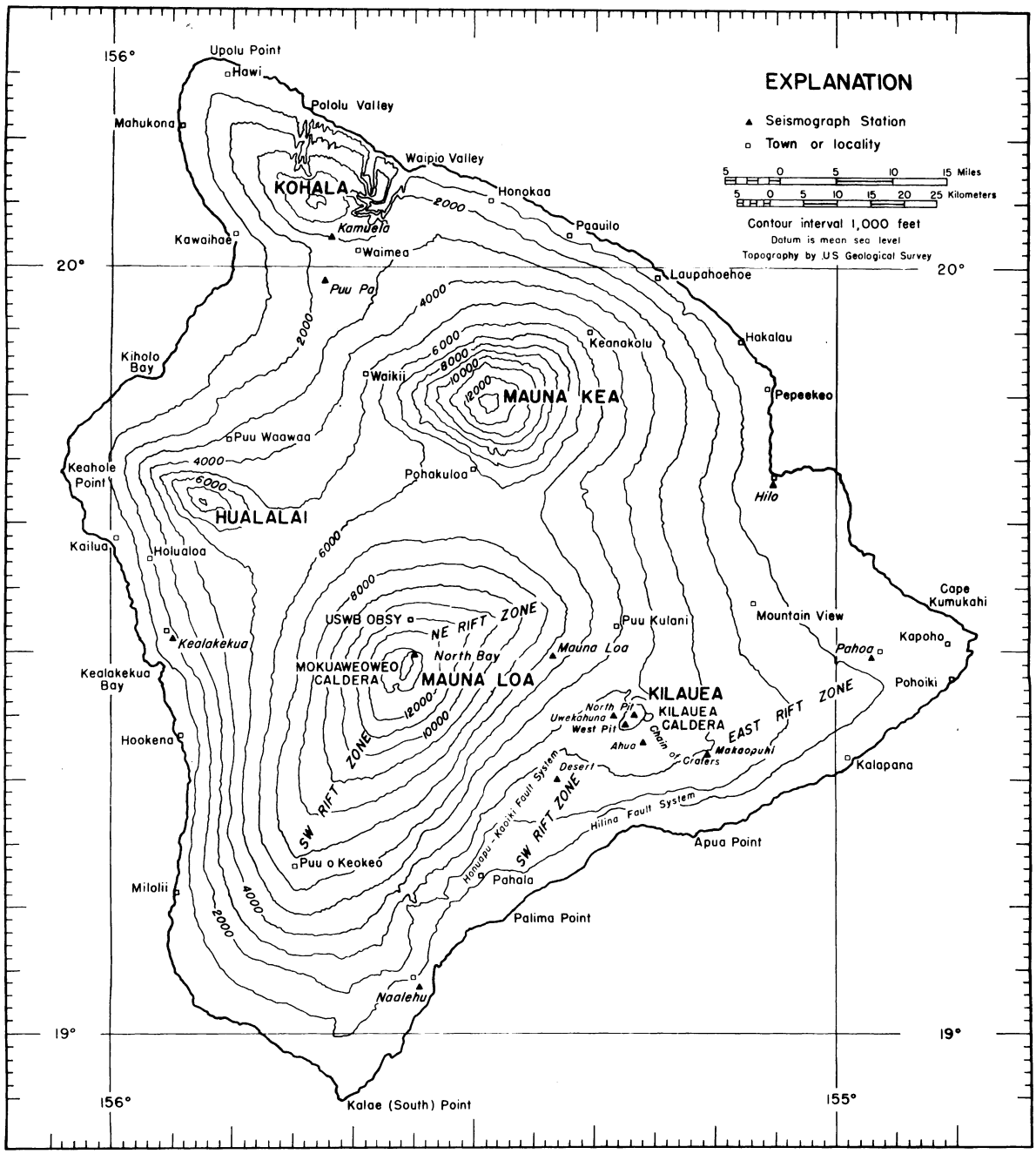

Figure 1.--Map of the Island of Hawaii showing seismograph stations operated by the U.S. Geological Survey, principal settlements, and selected geologic features. Epicenters of local earthquakes are given in table 4 in terms of geographic coordinates, which are indicated at the edges of the map.

Table 2.--Tilt coordinates and changes at bases around Kilauea Caldera

(See fig. 2)

Tilt base (location)	Date (1967)	Tilt coordinates		Rate (10^{-6} rad/mo) and direction of tilting since last reading		Date of last reading (1967)
		N-S	E-W			
Uwekahuna (U. on fig. 2)	June 5	566.9	421.3	8.4	N. 8.7° W.	Feb. 14
Tree Molds (TM)	7	463.7	504.1	3.9	N. 0.2° W.	13
Sand Spit (SS)	7	913.2	700.9	12.5	N. 10.4° E.	12
Keamoku (Kea)	6	536.1	399.7	12.8	N. 38.4° W.	13
Ahua Kamokukolau (Kam)	5	457.3	553.5	18.4	S. 31.0° E.	12
Kipuka Nene (KN)	8	303.9	508.1	2.1	S. 61.9° E.	15
Hilina Pali (HP)	28	456.0	503.6	1.5	S. 14.4° W.	Dec. 7, 1966
Kapapala Ranch (Kap)	6	494.8	507.0	0.7	N. 82.8° W.	Feb. 15
Mehena (M)	7	560.2	568.7	1.2	N. 67.8° E.	14

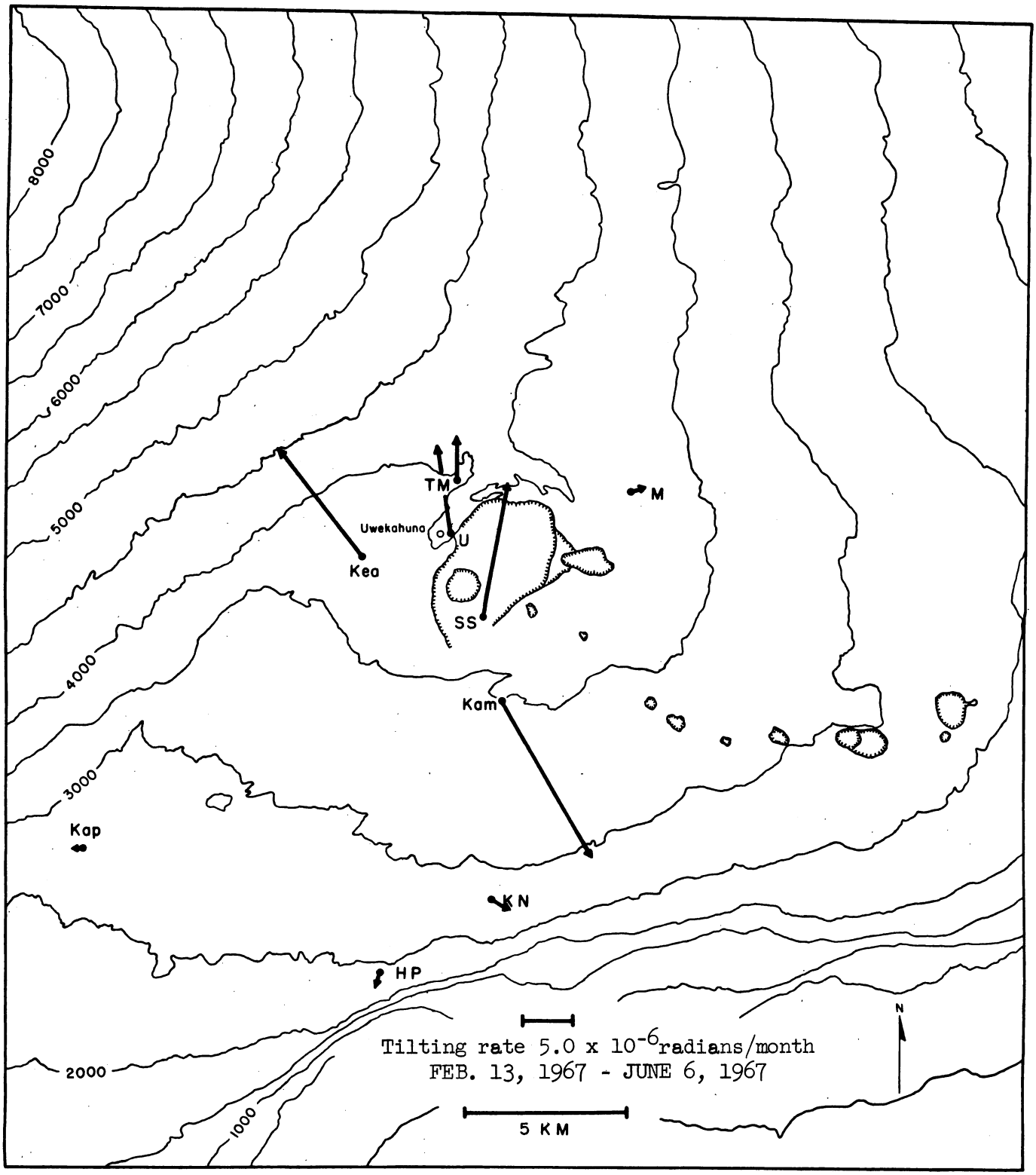

Figure 2.--Tilting of the ground around Kilauea Caldera between February 13 and June 6, 1967. The vector depicting tilting at a given tilt base points in the direction of maximum relative subsidence and has a length proportional to the rate of tilting during the measurement interval. Closed circles represent field tilt bases; open circles, short-base water-tube tiltmeters. See table 2 for explanation of abbreviations.

Seismic summary

Events recorded by the U.S. Geological Survey seismograph network in Hawaii fall into two categories: Local earthquakes and tremor originating in the region of the Hawaiian Islands (usually within 100 km of at least one seismograph), and distant earthquakes originating more than 3,000 km from Hawaii. As an index of seismic activity at Hawaiian volcanoes, daily counts of earthquakes and minutes of tremor recorded by seismographs in Hawaii are listed in table 3. The earthquakes are separated in groups on the basis of region of origin as determined by analysis of records obtained daily at the Observatory (U, M, M(2), A, D, N, WP, MP, K, O). Earthquakes of magnitude 2.0 or greater are generally sufficiently well recorded to be located with greater precision; they are listed individually in table 4.

Location of and essential data on each seismograph station are listed in table 5, which is published only in the first quarter issue each year.

Table 3.--Number of earthquakes and minutes of tremor recorded on seismographs around Kilauea Caldera

Tremor is separated into three categories: deep, intermediate, and shallow, on the basis of relative amplitudes on seismographs in the summit region. Unless otherwise stated, tremor is presumed to be associated with movement of magma within the central complex of Kilauea.

Earthquake categories are: Kilauea summit, 30 km earthquakes from a source about 30 km beneath the Kilauea summit region; long-period, earthquakes characterized by low-frequency waves that originate about 5 km beneath Kilauea summit; and shallow earthquakes in the Kilauea Caldera region; shallow earthquakes along the SW. rift zone of Kilauea and the adjacent portion of the Kaoiki fault system; earthquakes along the eastern half of Kilauea's east rift zone--detected largely on the Pahoa seismograph; earthquakes from the upper east rift zone and the adjacent fault systems of Kilauea's south flank; and earthquakes from other regions: west Hawaii, Mauna Kea, etc.

Date (1967)	Tremor (minutes)			Earthquakes						
				Kilauea summit			SW. rift and Kaoiki	Eastern east rift	Upper east rift	Others
	Deep	Intermediate	Shallow	30 km	Long period	Shallow				
Apr. 1	----	-------	-------	1	2	69	10	-------	----	----------
2	----	-------	-------	1	2	65	8	-------	9	----------
3	----	-------	-------	4	9	100	13	-------	8	----------
4	----	1	-------	-----	18	200	25	-------	9	----------
5	----	-------	-------	-----	7	149	11	-------	18	----------
6	----	-------	-------	27	6	148	23	-------	18	1 east flank Mauna Kea
7	----	107	-------	3	77	70	43	-------	10	----------
8	----	14	-------	1	165	43	26	-------	10	1 south flank Mauna Loa 1 off south shore of Hawaii
9	1	-------	-------	4	11	106	23	-------	13	----------
10	----	-------	-------	4	12	104	10	-------	7	----------
11	----	-------	-------	2	1	32	5	-------	13	1 west Hawaii
12	----	-------	1	1	1	129	15	-------	10	----------

Apr. 13	----	---------	------	1	4	125	25	--------	23	1 Mauna Loa
14	----	---------	------	1	------	94	16	--------	12	----------
15	----	---------	------	-----	------	93	24	--------	9	----------
16	----	---------	------	-----	15	128	3+	--------	8	----------
17	----	---------	------	-----	------	104	13	1	7	----------
18	----	---------	------	2	119	18	18	--------	10	2 Mauna Loa
19	1	---------	1	1	28	139	16	--------	6	----------
20	1	1	------	-----	90+	177	18	--------	15+	1 Kohala
21	----	---------	------	-----	1	43	7	--------	2	----------
22	----	---------	------	1	6	43	37	--------	5	----------
23	----	---------	------	3	12	46	23	--------	11	----------
24	----	---------	------	1	13	58	18	--------	11	1 Mauna Loa
25	30	---------	------	3	13	37	14	--------	10	1 south flank Mauna Loa
26	----	---------	------	1	23	45	16	--------	6	----------
27	----	---------	------	3	22	41	27	--------	6	----------
28	----	2	------	-----	3	45	15	--------	12	----------
29	----	---------	------	-----	------	53	19	--------	7	----------
30	4	---------	------	3	------	36	14	--------	6	----------
May 1	----	---------	------	-----	1	33	12	--------	3	2 west Hawaii 1 south flank Mauna Loa
2	----	---------	------	-----	2	72	18	--------	15+	----------
3	1	---------	------	-----	14	54	63	--------	7	----------
4	----	---------	------	-----	5	52	44	--------	9	----------
5	----	---------	------	1	4	47	32	--------	5	1 west Hawaii
6	----	---------	------	1	6	40	16	--------	6	1 Mauna Kea
7	1	---------	------	2	7	59	15	--------	9	----------
8	----	---------	------	1	13	73	14	--------	12	----------
9	----	---------	------	4	14	62	25	--------	4	----------
10	----	---------	------	-----	30	61	26	--------	7	----------
11	----	---------	------	-----	18	64	33	--------	7	1 west Hawaii
12	----	3	------	-----	19	23	18	--------	10	----------
13	----	---------	------	-----	8	81	22	--------	10	----------
14	----	---------	------	2	7	58	20	--------	7	----------
15	----	---------	------	2	------	77	16	--------	3	----------
16	----	1	------	-----	1	101	11	--------	8	1 Kohala
17	----	---------	------	-----	3	81	20	--------	6	1 west Hawaii

Table 3.--Number of earthquakes and minutes of tremor recorded on seismographs around Kilauea Caldera--Continued

Date (1967)	Tremor (minutes)			Earthquakes						
				Kilauea summit			SW. rift and Kaoiki	Eastern east rift	Upper east rift	Others
	Deep	Intermediate	Shallow	30 km	Long period	Shallow				
May 18	----	-------	-------	2	3	61	36	------	6+	----------
19	----	-------	-------	-----	2	39	31	------	8	1 off north shore of Hawaii
20	----	-------	-------	4	4	51	49	------	15	1 off SE. shore of Hawaii
21	----	-------	-------	-----	2	60	12	------	7	1 off east shore of Hawaii
22	----	-------	-------	2	3	167	16	------	3	----------
23	----	-------	-------	-----	4	121	6	------	4	1 west Hawaii
24	----	-------	-------	-----	4	94	13	------	3	1 west Hawaii; 4 Mauna Kea
25	----	-------	-------	-----	-----	67	21	------	8	3 Mauna Kea
26	----	-------	-------	-----	-----	57	7	------	13	2 Mauna Kea
27	----	-------	-------	3	15	33	7	------	9	----------
28	----	-------	-------	-----	2	45	9	------	14	1 Mauna Loa; 1 Mauna Kea
29	----	-------	-------	-----	-----	47	9	------	5	1 Mauna Kea 2 off SE. shore of Hawaii
30	----	-------	-------	-----	1	61	11	------	20	----------
31	----	2	1	-----	1	56	19	------	7	----------
June 1	----	-------	-------	1	-----	46	10	------	8	1 off NW. shore of Hawaii
2	----	-------	-------	-----	-----	50	3	------	1	----------
3	----	-------	-------	2	-----	38	19	------	18	----------
4	----	-------	-------	1	1	82	16	------	3	1 Mauna Kea
5	----	-------	1	-----	2	98	12	------	15	----------
6	----	-------	-------	-----	7	102	12	------	7	----------
7	----	1	-------	1	12	205	15	------	3	1 Mauna Kea
8	----	2	-------	-----	115	?	25	------	6	----------
9	----	-------	-------	-----	-----	112	32	------	9	4 Mauna Kea
10	----	-------	-------	-----	1	88	12	------	8	----------
11	----	-------	-------	2	-----	88	10	------	7	----------
12	----	-------	-------	3	5	119	11	------	5	----------

June 13	----	--------	-------	-----	------	102	14	-------	3	1 Mauna Kea
14	----	--------	-------	-----	------	82	16	-------	6	1 off SE. shore of Hawaii
15	----	--------	2	-----	3	89	4	-------	4	1 Mauna Kea
16	----	--------	-------	1	------	80	5	-------	5	1 off SE. shore of Hawaii
17	----	--------	-------	2	5	65	18	-------	11	----------
18	----	--------	-------	-----	20	123	5	-------	3	----------
19	----	--------	-------	1	8	102	9	-------	9	----------
20	----	--------	60+	3	11	111	8	-------	3	----------
21	----	--------	-------	5	3	84	5	-------	3	----------
22	----	--------	1	-----	------	107	6	-------	6	1 Mauna Loa; 1 west Hawaii
23	----	--------	?	2	------	117	7	-------	11	----------
24	----	--------	-------	-----	1	445	11	-------	15	1 Mauna Kea
25	----	--------	-------	-----	------	623	8	-------	13	1 off NW. shore of Hawaii.
26	----	--------	1	1	1	463	4	-------	6	1 west Hawaii
27	----	--------	1?	2	5	271	6	-------	6	----------
28	----	--------	2	-----	4	353	6	-------	5	----------
29	----	--------	1	3	30	205	5	-------	8	----------
30	----	--------	-------	7	1	70	9	-------	14	----------

Table 4.--Local earthquakes recorded by seismographs of the U.S. Geological Survey,

April, May, and June 1967

Entries for a given quake are: date, origin time (Hawaiian Standard Time), magnitude, depth, epicenter, and felt report. All earthquakes of magnitude 2.5 and larger, as well as many favorably located smaller ones, occurring on or near the island of Hawaii are included in the list.

Date (1967)	Time			Magnitude	Depth (km)	Epicenter			Felt Report
	h	m	s			Lat N.	Long W.	Description	
Apr. 2	13	07	44.5	1.4	1	19°19.2'	155°12.5'	6 km SW. of Makaopuhi	----------
5	22	48	05.3	2.0	10	19°23.0'	155°29.0'	11 km NW. of Desert seismometer	----------
6	15	57	10.8	3.2	45	19°47.7'	155°03.0'	9 km NE. of Hilo	----------
6	22	57	08.4	4.0	25	19°23.8'	155°16.4'	3 km NW. of Ahua seismometer	Island-wide
7	02	17	47.3	3.1	30	19°24.7'	155°17.7'	2 km SSW. of Uwekahuna	Kilauea summit area
8	01	12	45.8	3.4	0	19°13.7'	155°33.5'	19 km NNE. of Naalehu	----------
8	03	52	58.5	3.0	45	18°57.0'	155°32.7'	13 km SSE. of Naalehu	----------
10	09	24	18.2	2.4	35	19°28.5'	155°26.8'	7 km SW. of Mauna Loa seismometer	----------
11	04	56	29.0	2.0	10	19°21.2'	155°09.4'	2 km SE. of Makaopuhi seismometer	----------
11	11	34	23.8	2.0	0	19°27.7'	155°47.7'	15 km SE. of Kealakekua	----------
13	18	06	10.0	3.5	3	19°28.0'	155°37.3'	5 km SW. of North Bay seismometer	----------
14	04	18	30.3	2.2	13	19°22.7'	155°25.8'	6 km NW. of Desert seismometer	----------
14	20	28	28.6	2.3	33	19°22.2'	155°18.4'	5 km WSW. of Ahua seismometer	----------
15	23	58	46.0	2.7	10	19°20.3'	155°30.7'	3 km west of Desert seismometer	----------
16	21	15	47.6	2.2	10	19°21.0'	155°07.1'	6 km ESE. of Makaopuhi seismometer	----------
18	00	57	22.9	2.6	5	19°26.3'	155°32.0'	8 km SE. of North Bay seismometer	----------
18	23	00	12.0	2.3	8	19°12.5'	155°46.9'	25 km NW. of Naalehu	----------
19	00	56	46.1	2.7	10	19°22.2'	155°23.6'	4 km NNW. of Desert seismometer	----------
19	03	23	21.6	2.0	10	19°19.8'	155°11.7'	4 km SW. of Makaopuhi seismometer	----------
20	16	00	14.0	3.6	8	20°04.8'	155°51.7'	5 km NW. of Kawaihae	Kamuela
22	17	40	05.8	1.7	3	19°21.3'	155°20.0'	6 km NE. of Desert seismometer	----------
23	07	06	43.0	2.9	40	19°16.8'	155°10.0'	4 km NE. of Apua Point	----------
24	00	16	28.5	3.2	6	19°31.3'	155°38.6'	7 km NW. of North Bay seismometer	----------
25	09	37	52.3	3.3	8	19°10.2'	155°38.8'	14 km NW. of Naalehu	----------

Apr.	27	23	05	23.6	2.2	8	19°18.9'	155°22.0'	4 km SE. of Desert seismometer	----------
	28	07	43	17.2	2.1	8	19°24.2'	155°28.9'	12 km NW. of Desert seismometer	----------
	28	07	50	01.6	2.4	10	19°24.2'	155°24.4'	8 km NW. of Desert seismometer	----------
	29	18	43	30.5	2.7	5	19°24.3'	155°23.4'	8 km north of Desert seismometer	----------
	29	18	45	31.2	2.8	6	19°24.8'	155°22.7'	13 km NNE. of Desert seismometer	----------
May	1	00	34	18.1	2.4	3	19°13.9'	155°34.4'	19 km west of Naalehu	----------
	1	04	56	11.7	2.4	28	19°21.9'	155°16.8'	2 km SW. of Ahua seismometer	----------
	1	08	13	12.8	2.3	29	19°21.3'	155°18.1'	5 km SW. of Ahua seismometer	----------
	1	14	08	10.2	2.6	0	19°22.8'	155°51.2'	5 km east of Hookena	----------
	1	19	40	53.3	2.7	0	19°21.3'	155°47.0'	13 km ESE. of Hookena	----------
	2	23	37	38.2	2.0	9	19°21.0'	155°04.9'	10 km ESE. of Makaopuhi seismometer	----------
	3	19	00	33.3	4.5	8	19°22.5'	155°27.2'	8 km NW. of Desert seismometer	Hilo, Kealakehua, Naalehu, Kamuela, Honokaa, Kilauea summit area
	3	19	46	22.6	2.7	10	19°23.5'	155°27.0'	9 km NW. of Desert seismometer	Naalehu
	4	01	17	30.7	2.7	6	19°22.7'	155°27.2'	8 km NW. of Desert seismometer	----------
	4	22	22	26.6	2.2	7	19°22.8'	155°28.9'	11 km NW. of Desert seismometer	----------
	5	19	42	53.2	2.9	3	19°31.8'	155°48.5'	12 km ENE. of Kealakekua	----------
	6	17	08	45.0	2.0	3	19°54.0'	155°21.0'	2 km SW. of Keanakolu	----------
	11	20	37	46.1	2.5	0	19°24.3'	155°55.1'	13 km south of Kealakekua	----------
	13	16	05	08.2	3.3	13	19°24.2'	155°27.2'	10 km NW. of Desert seismometer	Naalehu, Kilauea summit area
	15	01	27	49.7	2.4	8	19°24.7'	155°25.0'	9 km NNW. of Desert seismometer	Naalehu
	16	08	05	15.4	2.7	3	20°16.0'	155°53.6'	Near Upolu Point	----------
	16	10	59	49.3	2.6	1	19°23.4'	155°03.9'	12 km ENE. of Makaopuhi seismometer	----------
	17	02	07	50.1	2.0	5	19°26.8'	155°24.0'	5 km south of Mauna Loa seismometer	----------
	17	08	06	30.7	2.0	0	19°31.8'	155°47.8'	13 km ENE. of Kealakekua	----------
	18	03	04	19.3	2.2	8	19°03.5'	155°23.7'	20 km east of Naalehu	----------
	19	01	07	36.8	3.2	13	20°40'	155°47'	45 km north of Upolu Point	----------
	19	03	52	48.1	2.5	8	19°23.0'	155°24.2'	5 km NW. of Desert seismometer	Naalehu
	20	07	21	13.2	2.4	8	19°05.7'	155°26.2'	6 km SSE. of Palima Point	----------
	20	18	27	47.2	3.1	10	19°21.6'	155°08.3'	4 km east of Makaopuhi seismometer	----------
	21	16	55	38.0	3.4	45	19°23.0'	154°49.3'	15 km south of Cape Kumukahi	Kilauea summit area, Hilo
	22	03	46	08.5	2.2	8	19°17.9'	155°15.4'	8 km south of Ahua seismometer	----------

Table 4.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, April, May, and June 1967--Continued

Date (1967)	Time			Magnitude	Depth (km)	Epicenter			Felt Report
	h	m	s			Lat N.	Long W.	Description	
May 22	20	51	38.2	2.4	8	19°25.2'	155°24.0'	10 km NNW. of Desert seismometer	----------
23	21	47	56.7	2.5	5	19°21.3'	155°57.2'	6 km SW. of Hookena	----------
24	07	42	53.9	2.5	5	19°29.5'	155°57.0'	5 km SW. of Kealakekua	----------
24	12	28	26.8	2.6	0	19°52.4'	155°23.5'	10 km NE. of Mauna Kea summit	Paauilo
24	12	49	43.5	3.2	0	19°55.3'	155°20.1'	1 km north of Keanakolu	----------
24	13	09	25.9	3.0	0	19°52.8'	155°22.0'	5 km SW. of Keanakolu	Laupahoehoe, Paauilo, Honokaa
24	13	34	32.0	3.2	10	20°04.5'	155°23.2'	5 km NW. of Paauilo	----------
25	01	29	38.0	3.0	13	20°10.0'	155°23.0'	14-1/2 km NNW. of Paauilo	Paauhau
25	01	33	17.5	2.7	13	20°02.1'	155°23.5'	2 km west of Paauilo	Laupahoehoe
25	06	15	40.7	2.6	5	19°18.5'	155°24.0'	3 km SW. of Desert seismometer	----------
25	00	50	29.1	2.2	0	19°50.0'	155°14.4'	14 km SW. of Hakalau	----------
26	05	47	28.4	3.4	7	19°59.8'	155°24.6'	6-1/2 km SW. of Paauilo	Kohala
26	10	32	07.0	2.1	0	19°53.8'	155°23.0'	5-1/2 km SW. of Keanakolu	----------
27	20	09	17.4	2.0	28	19°22.4'	155°17.8'	4 km west of Ahua seismometer	----------
28	06	53	31.2	1.9	5	19°27.7'	155°25.5'	5 km SW. of Mauna Loa	----------
28	15	36	47.4	2.0	5	19°26.1'	155°38.8'	10 km SW. of North Bay seismometer	----------
28	23	41	42.9	2.7	10	19°49.0'	155°30.7'	4 km WSW. of Mauna Kea summit	----------
29	02	05	16.2	2.2	6	19°19.6'	155°13.8'	6 km SE. of Ahua seismometer	----------
31	03	15	23.2	2.8	40	19°17.8'	154°43.0'	27 km SSE. of Cape Kumukahi	----------
31	17	44	14.0	2.6	0	19°52.9'	155°20.9'	4 km SW. of Keanakolu	----------
31	20	07	37.9	2.6	40	19°05.9'	155°22.9'	9 km SE. of Palima Point	----------
June 1	11	36	57.5	2.8	8	19°21'	156°17'	44 km WNW. of Upolu Point	----------
4	05	38	14.9	2.5	8	19°57.6'	155°19.2'	5 km NE. of Keanakolu	----------
7	09	02	42.0	2.1	4	19°23.5'	155°24.0'	6 km north of Desert seismometer	----------
7	09	34	15.5	2.2	6	19°22.0'	154°52.9'	10 km ENE. of Kalapana	----------
7	17	42	00.3	2.2	0	19°52.3'	155°23.3'	7 km SW. of Keanakolu	----------
8	13	27	57.5	2.5	29	19°20.9'	155°19.0'	6 km SW. of Ahua seismometer	Kilauea summit area

June	9	00	34	24.6	2.9	10	19°58.1'	155°23.1'	8 km NW. of Keanakolu	----------
	9	03	10	05.7	3.4	7	19°57.2'	155°23.8'	8 km NW. of Keanakolu	Hilo, Honokaa
	9	04	15	54.4	2.4	0	19°53.3'	155°22.8'	5 km SW. of Keanakolu	----------
	9	10	22	18.4	3.1	7	20°01.8'	155°22.3'	1 km SW. of Paauilo	Paauilo, Honokaa
	12	11	09	42.5	2.0	9	19°19.3'	155°16.7'	6 km SW. of Ahua seismometer	----------
	12	17	03	05.9	2.0	5	19°23.7'	155°24.5'	7 km NW. of Desert seismometer	----------
	13	14	50	53.7	3.6	5	19°55.8'	155°23.5'	6 km WNW. of Keanakolu	Kamuela, Honokaa, Laupahoehoe, Hilo
	14	02	31	56.9	2.9	50	19°07.8'	155°14.0'	15 km SSW. of Apua Point	----------
	14	17	24	25.8	2.4	40	19°06.3'	155°23.3'	8 km SE. of Palima Point	----------
	15	01	38	36.0	2.1	29	19°21.6'	155°18.7'	5 km SW. of Ahua seismometer	----------
	15	16	05	16.6	2.9	0	19°54.8'	155°22.9'	5 km west of Keanakolu	----------
	16	13	40	30.3	3.3	8	18°58.3'	154°59.5'	38 km SE. of Apua Point	----------
	17	23	10	52.8	2.0	6	19°23.5'	155°25.5'	7 km NW. of Desert seismometer	----------
	20	14	08	57.9	2.4	29	19°21.9'	155°18.2'	4 km WSW. of Ahua seismometer	----------
	21	17	02	57.0	3.4	45	19°25.3'	155°00.0'	10 km SW. of Pahoa	----------
	22	00	50	36.7	2.4	0	19°28.8'	155°46.8'	16 km SE. of Kealakekua	----------
	22	01	58	24.6	2.9	10	19°10.5'	155°43.1'	18 km NW. of Naalehua	----------
	23	23	01	18.0	2.7	29	19°22.8'	155°15.7'	1 km NE. of Ahua seismometer	----------
	24	07	42	05.5	3.2	8	19°52.0'	155°34.8'	8 km ENE. of Waikii	Hilo
	25	08	35	21.5	2.7	8	20°05'	156°14'	40 km west of Kawaihae	Kilauea summit area
	26	22	20	13.2	2.6	3	19°18.8'	155°59.4'	13 km SW. of Hookena	----------
	27	12	27	44.0	2.0	8	19°19.0'	155°00.2'	5 km SW. of Kalapana	----------
	28	20	18	35.4	2.5	10	19°07.8'	155°28.6'	14 km NE. of Naalehu	----------
	30	06	23	46.0	2.4	5	19°12.3'	155°00.3'	17 km SSW. of Kalapana	----------
	30	22	51	54.1	3.1	25	19°22.7'	155°17.8'	3 km west of Ahua seismometer	Pahala, Kilauea summit area

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HAWAIIAN VOLCANO OBSERVATORY

SUMMARY 47

July, August, and September 1967

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Tilting of the ground around Kilauea Caldera

Tilting of the ground around the summit of Kilauea is monitored daily by a short-base water-tube tiltmeter at Uwekahuna (table 1), and at irregular intervals it is measured on a regional scale by means of a network of field tilt-bases and a portable water-tube tiltmeter. The attitude of the ground surface at each tilt-base is reported in terms of north-south and east-west tilt coordinates. Both coordinates at each station were arbitrarily set equal to 500 when measurements at that station were begun. Increasing tilt coordinates correspond to northward and eastward tilting of the earth's surface; that is, to a relative subsidence toward the north and east. A one-unit change in coordinate corresponds to a tilting of 1 microradian (1 mm per km) in the direction indicated.

Location of and essential data on each tiltmeter station are listed in table 6, which is published only in the first quarter issue each year.

Table 1.--Tilt coordinates at Uwekahuna

July, August, and September 1967

Date (1967)	N-S	E-W	Date (1967)	N-S	E-W
July 2	545	427	Aug. 20	545	426
9	548	428	27	549	426
16	548	426	Sept. 3	549	423
23	548	426	10	553	420
30	548	427	17	558	413
Aug. 6	549	422	24	559	413
13	547	419			

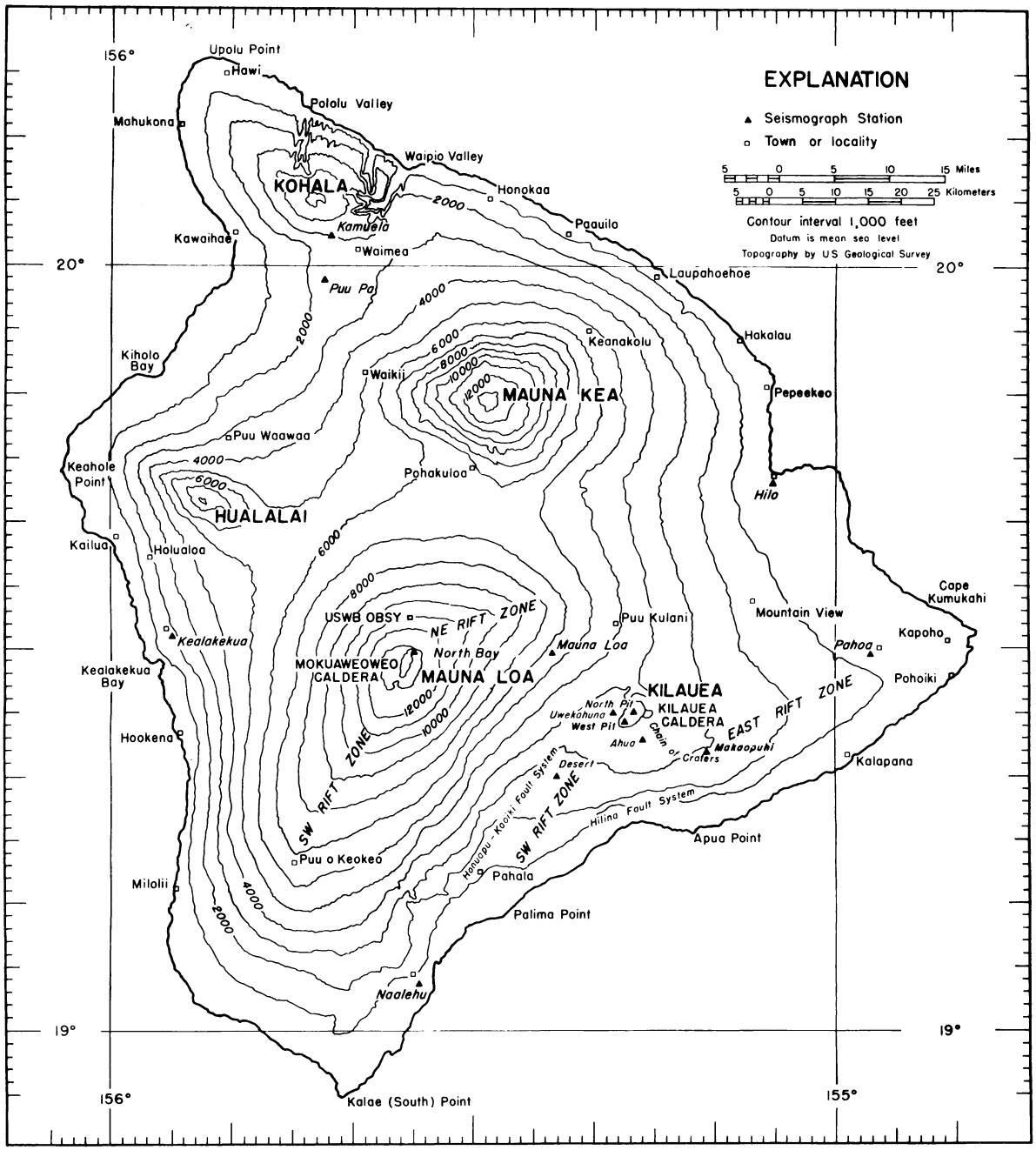

Figure 1.--Map of the Island of Hawaii showing seismograph stations operated by the U.S. Geological Survey, principal settlements, and selected geologic features. Epicenters of local earthquakes are given in table 4 in terms of geographic coordinates, which are indicated at the edges of the map.

Table 2.--Tilt coordinates and changes at bases around Kilauea Caldera

(See fig. 2)

Tilt base (location)	Date (1967)	Tilt coordinates		Rate (10^{-6} rad/mo) and direction of tilting since last reading		Date of last reading (1967)
		N-S	E-W			
Uwekahuna (U. on fig. 2)	Sept. 5	583.4	414.3	5.76	N. 23.0° W.	June 5
Tree Molds (TM)	7	471.7	502.8	2.6	N. 9.0° W.	7
Sand Spit (SS)	6	898.5	713.4	6.4	S. 40.5° E.	7
Keamoku (Kea)	5	551.5	383.9	7.29	N. 45.7° W.	6
Ahua Kamokukolau (Kam)	6	420.1	565.4	12.6	S. 17.8° E.	5
Kipuka Nene (KN)	7	302.2	309.8	0.8	S. 44.5° E.	8
Hilina Pali (HP)		Not read this epoch				
Kapapala Ranch (Kap)	5	496.5	508.5	0.8	N. 40.9° E.	6
Mehena (M)	6	563.0	573.2	1.75	N. 58.7° E.	7

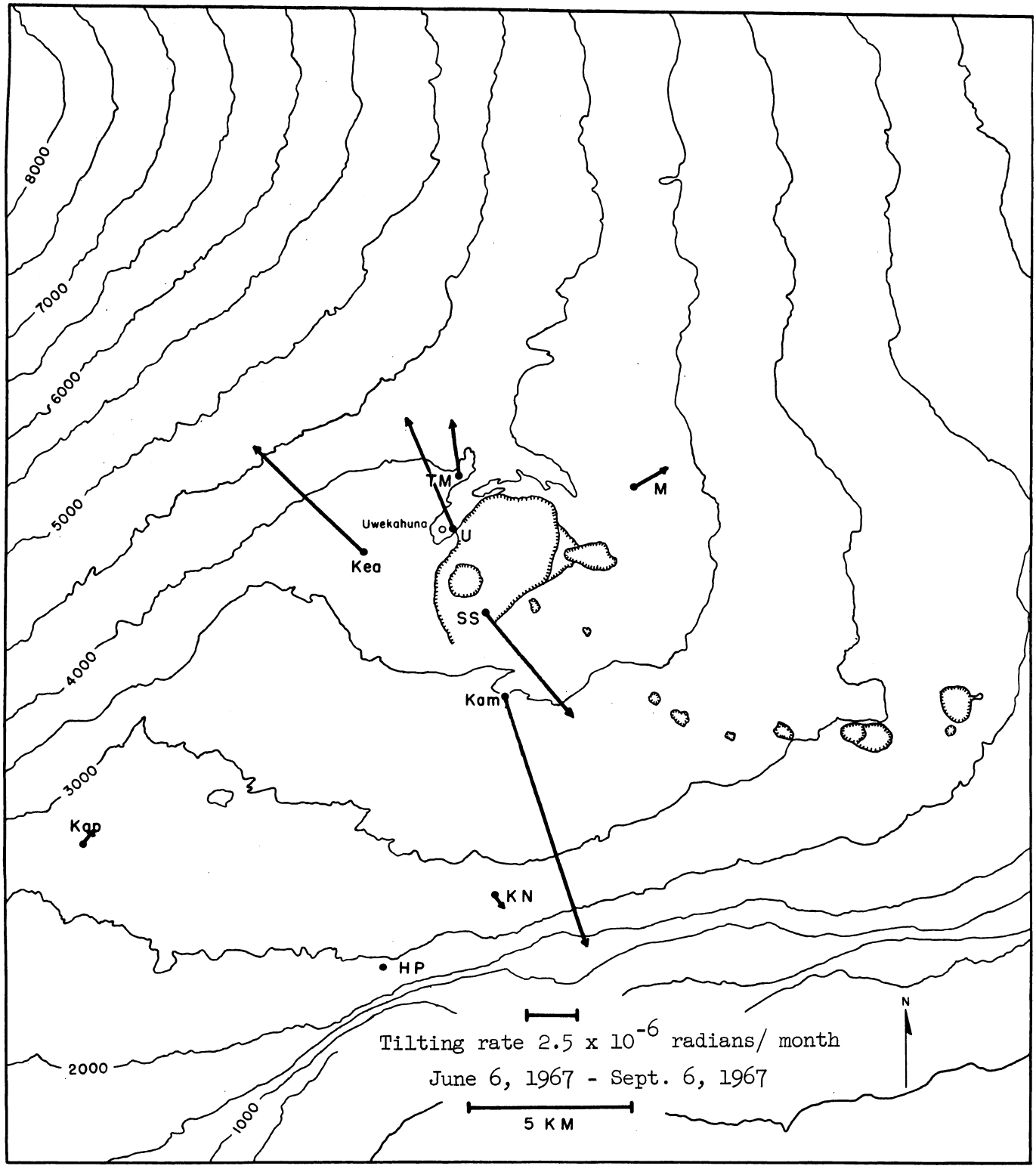

Figure 2.--Tilting of the ground around Kilauea Caldera between June 6 and September 6, 1967. The vector depicting tilting at a given tilt base points in the direction of maximum relative subsidence and has a length proportional to the rate of tilting during the measurement interval. Closed circles represent field tilt bases; open circles, short-base water-tube tiltmeters. See table 2 for explanation of abbreviations.

Seismic summary

Events recorded by the U.S. Geological Survey seismograph network in Hawaii fall into two categories: Local earthquakes and tremor originating in the region of the Hawaiian Islands (usually within 100 km of at least one seismograph), and distant earthquakes originating more than 3,000 km from Hawaii. As an index of seismic activity at Hawaiian volcanoes, daily counts of earthquakes and minutes of tremor recorded by seismographs in Hawaii are listed in table 3. The earthquakes are separated in groups on the basis of region of origin as determined by analysis of records obtained daily at the Observatory (U, M, M(2), A, D, N, WP, MP, K, O). Earthquakes of magnitude 2.0 or greater are generally sufficiently well recorded to be located with greater precision; they are listed individually in table 4.

Location of and essential data on each seismograph station are listed in table 5, which is published only in the first quarter issue each year.

Table 3.--Number of earthquakes and minutes of tremor recorded on seismographs around Kilauea Caldera

Tremor is separated into three categories: deep, intermediate, and shallow, on the basis of relative amplitudes on seismographs in the summit region. Unless otherwise stated, tremor is presumed to be associated with movement of magma within the central complex of Kilauea.

Earthquake categories are: Kilauea summit, 30 km earthquakes from a source about 30 km beneath the Kilauea summit region; long-period, earthquakes characterized by low-frequency waves that originate about 5 km beneath Kilauea summit; and shallow earthquakes in the Kilauea Caldera region; shallow earthquakes along the SW. rift zone of Kilauea and the adjacent portion of the Kaoiki fault system; earthquakes along the eastern half of Kilauea's east rift zone--detected largely on the Pahoa seismograph; earthquakes from the upper east rift zone and the adjacent fault systems of Kilauea's south flank; and earthquakes from other regions: west Hawaii, Mauna Kea, etc.

Date (1967)	Tremor (minutes)			Earthquakes							
				Kilauea summit			SW. rift and Kaoiki	Eastern east rift	Upper east rift	Koae	Others
	Deep	Inter-mediate	Shallow	30 km	Long period	Shallow					
July 1	----	-------	-------	11	------	167	40	-------	6	3	1 Mauna Kea
2	----	-------	1	1	------	163	34	-------	5	6	2 off SE. shore of Hawaii
3	----	-------	-------	8	5	84	48	-------	6	2	----------
4	----	-------	-------	1	2	118	56	-------	4+	4	----------
5	----	-------	-------	2	2	107	46	-------	8	8	----------
6	----	-------	-------	2	9	92	26	-------	8	6	1 Kohala
7	----	-------	-------	----	11	53	27	-------	2	3	----------
8	2	-------	-------	----	2	83	35	-------	10	6	1 Kohala
9	----	-------	-------	----	------	80	73	-------	4	4	----------
10	2	-------	1	1	6	73	32	1	8+	5	----------
11	----	-------	-------	----	5	57	17	-------	10	8	1 Mauna Loa
12	----	-------	-------	1	4	30	23	-------	11	8	1 west Hawaii
13	----	-------	-------	1	4	75	28	-------	10	4	----------
14	----	-------	4	1	------	35	16	-------	10	5	----------

July 15	29	-------	-------	3	1	43	20	-------	14	4	1 off west shore of Hawaii
16	----	-------	-------	1	------	50	16	-------	12	----	----------
17	----	-------	-------	1	4	47	14	-------	11	2	----------
18	----	-------	-------	1	------	40	?	-------	8	3	----------
19	----	-------	-------	1	------	67	7	-------	10	4	----------
20	----	1	-------	----	------	67	?	-------	-----	----	2 off west shore of Hawaii
21	----	60	-------	----	1	38	3+	-------	2	----	----------
22	----	60	-------	----	4	43	8+	-------	1	----	----------
23	----	-------	-------	----	4	65	30	-------	10	8	1 Mauna Kea
24	----	-------	2	1	17	65	17	-------	16	4	----------
25	----	-------	-------	----	6	42	37	-------	7	6	1 west Hawaii
26	----	-------	10	3	17	45	14	-------	11	1	----------
27	----	-------	-------	----	4	52	13	-------	5	11	----------
28	----	2	-------	----	------	51	6	1	10	2	----------
29	----	9	-------	----	2	94	16	-------	8	8	1 Mauna Loa
30	----	-------	-------	4	24	95	7	2	6	5	1 Mauna Loa; 1 off west shore of Hawaii; 1 west Hawaii
31	----	-------	-------	12	------	104	7	-------	6	9	1 Mauna Loa
Aug. 1	----	-------	-------	4	10	102	11	-------	12	3	----------
2	----	-------	-------	2+	------	60+	5+	-------	3+	?	----------
3	----	-------	electrical storm					1	-----	----	----------
4	----	15	-------	10	2	94	16	1	6	1	----------
5	----	-------	-------	----	------	83	6	-------	4	11	----------
6	----	14	-------	2	------	58	7	-------	5	----	----------
7	----	-------	-------	2+	9+	70+	7+	-------	7+	----	----------
8	----	-------	-------	----	5+	63+	3	-------	6	----	----------
9	----	-------	-------	1	------	150	3	1	11	3	----------
10	----	-------	-------	----	2	148	2	-------	16	2	----------
11	----	52	-------	----	------	96	9	-------	14	3	1 west Hawaii
12	----	-------	-------	----	------	141	12	-------	17	2	----------
13	----	9	-------	3	1	148	6	-------	9	5	1 west Hawaii
14	----	-------	-------	4	------	92	7	-------	12	6	4 Mauna Kea 1 west Hawaii

Table 3.--Number of earthquakes and minutes of tremor recorded on seismographs around Kilauea Caldera--Continued

Date (1967)	Tremor (minutes)			Earthquakes							
				Kilauea summit			SW. rift and Kaoiki	Eastern east rift	Upper east rift	Koae	Others
	Deep	Intermediate	Shallow	30 km	Long period	Shallow					
Aug. 15	----	--------	-------	-----	------	113	4	-------	14	----	2 Mauna Kea 1 west Hawaii
16	----	--------	-------	-----	------	91	6	-------	6	2	2 Mauna Loa 1 Mauna Kea
17	----	--------	-------	-----	1	65	3	-------	7	1	5 Mauna Kea 1 west Hawaii
18	----	--------	-------	4	------	65	8	-------	13	4	5 Mauna Kea
19	----	3	-------	3	------	63	3	-------	16	2	3 Mauna Kea; 1 west Hawaii; 1 off west shore of Hawaii
20	34	9	-------	-----	------	67	4	-------	6	1	1 Mauna Kea
21	----	--------	-------	1	3	46	10	-------	8	----	----------
22	----	--------	-------	-----	------	39	5	-------	9	----	1 Mauna Kea 1 Mauna Loa
23	----	--------	-------	2	------	55	5	-------	17	----	----------
24	----	--------	-------	2	------	39	17	-------	14	1	----------
25	----	--------	-------	-----	------	31	4	-------	12	4	----------
26	----	--------	-------	1	------	31	6	-------	11	----	1 Mauna Kea
27	----	--------	-------	1	------	39	5	-------	23	5	----------
28	----	6	-------	-----	3	79	10	-------	9	7	----------
29	----	--------	-------	2	------	58	11	-------	10	7	----------
30	----	--------	-------	-----	1	72	35	-------	7	6	1 Mauna Loa
31	----	--------	-------	2	------	66	62	-------	8	2	1 Kohala
Sept. 1	----	--------	-------	6	------	69	36	-------	20	4	----------
2	?	--------	-------	3	------	155	51	-------	7	1	----------
3	----	--------	-------	4	------	111	67	-------	14	2	1 west Hawaii
4	----	--------	-------	3	------	120	79	-------	11	12	----------

Sept. 5	----	--------	-------	1	------	108	51	-------	18	5	1 Mauna Kea; 1 off south shore of Hawaii
6	31	--------	-------	2	------	100	79	-------	7	7	----------
7	----	--------	-------	20	10	57	88	-------	16	8	1 Mauna Kea
8	----	26	-------	3	32	80	63	-------	12	7	1 west Hawaii
9	9	--------	-------	3	42	25	92	-------	9	3	----------
10	----	--------	-------	----	5	119	37+	-------	22	8	----------
11	----	--------	-------	6	------	109	140	-------	6	----	1 west Hawaii
12	----	--------	-------	1	------	147	101	-------	3	5	----------
13	----	--------	-------	2	------	131	144	-------	5	3	1 west Hawaii
14	----	--------	-------	1	9	177	63	-------	14	6	1 west Hawaii
15	----	--------	-------	----	22	159	94	-------	4	3	----------
16	----	--------	9	----	18	196+	150+	-------	11	8	1 west Hawaii
17	----	--------	-------	----	1	164	56	-------	11	3	1 west Hawaii 1 Mauna Kea
18	----	--------	-------	3	1	97	38	-------	7	12	----------
19	----	--------	-------	1	------	128	56	-------	20	7	----------
20	----	--------	-------	12	4	138	76	-------	16	2	----------
21	10	--------	-------	1	11	192	55	-------	11	5	1 west Hawaii
22	----	--------	-------	7	4	204	60	-------	8	6	1 west Hawaii
23	----	--------	-------	5	18	318	97	-------	16	7	1 Mauna Kea 1 west Hawaii
24	----	--------	-------	21+	------	529	70+	-------	31+	----	----------
25	----	--------	-------	3	4	326	63	1	18	16	1 west Hawaii; 1 off west shore of Hawaii; 1 Mauna Kea
26	----	6	-------	4	------	178	50	1	18	13	----------
27	----	--------	-------	2	------	221	54	-------	27	3	1 Mauna Loa
28	----	--------	-------	3	93+	190	71	-------	16	4	2 Mauna Kea
29	----	--------	-------	8	17+	212	41	-------	12	2	1 Mauna Loa
30	----	--------	-------	16	3	203	49	-------	12	14	----------

Table 4.--Local earthquakes recorded by seismographs of the U.S. Geological Survey,

July, August, and September 1967

Entries for a given quake are: date, origin time (Hawaiian Standard Time), magnitude, depth, epicenter, and felt report. All earthquakes of magnitude 2.5 and larger, as well as many favorably located smaller ones, occurring on or near the island of Hawaii are included in the list.

Date (1967)	Time			Magnitude	Depth (km)	Epicenter			Felt Report
	h	m	s			Lat N.	Long W.	Description	
July 1	05	03	49.5	4.2	25	19°27.2'	155°12.8'	9 km ENE. of Uwekahuna seismometer	Island-wide
1	05	34	33.1	2.0	20	19°26.9'	155°14.2'	7 km ENE. of Uwekahuna seismometer	----------
1	10	22	23.7	2.4	8	19°18.6'	155°16.0'	7 km south of Ahua seismometer	----------
1	12	33	08.7	2.8	13	19°52.1'	155°28.4'	15 km WSW. of Keanakolu	----------
1	22	29	13.0	2.0	27	19°24.6'	155°17.5'	2 km SE. of Uwekahuna seismometer	----------
2	09	29	19.1	3.7	25	18°55.9'	155°22.0'	28 km SE. of Naalehu	----------
2	12	11	17.4	2.6	25	18°56.4'	155°21.3'	28 km SE. of Naalehu	----------
2	15	14	59.2	3.5	9	19°22.0'	155°23.9'	4 km NNW. of Desert seismometer	----------
2	17	11	46.1	2.8	4	19°21.0'	155°30.5'	13 km WNW. of Desert seismometer	----------
3	16	12	12.3	2.7	27	19°24.3'	155°17.1'	2 km SE. of Uwekahuna seismometer	----------
5	02	51	10.9	4.1	8	19°23.2'	155°26.7'	8 km NW. of Desert seismometer	----------
5	18	58	12.0	2.4	6	19°23.0'	155°27.2'	9 km NW. of Desert seismometer	----------
6	14	59	04.0	3.5	13	20°21.7'	155°50.0'	14 km north of Hawi	----------
7	00	37	14.7	2.4	8	19°18.1'	155°12.5'	5 km west of Kealakomo seismometer	----------
8	18	46	08.6	2.9	45	20°10.6'	155°49.4'	7 km SSE. of Hawi	----------
9	17	14	17.5	3.0	20	19°33.9'	155°17.9'	12 km NE. of Mauna Loa seismometer	Kilauea summit area, Mt. View
9	21	18	43.6	2.6	8	19°25.8'	155°26.9'	12 km NW. of Desert seismometer	Pahala
9	22	46	13.4	1.8	8	19°20.3'	155°22.5'	2 km east of Desert seismometer	----------
11	16	54	23.8	3.2	2	19°27.5'	155°37.3'	6 km SW. of North Bay seismometer	Mauna Loa summit
12	18	10	27.7	2.5	8	19°29.6'	155°52.7'	5 km SE. of Kealakekua	----------
13	17	27	53.6	2.9	9	19°22.0'	155°26.0'	5 km NW. of Desert seismometer	----------
13	21	39	13.4	2.1	26	19°22.8'	155°17.7'	5 km south of Uwekahuna seismometer	----------

July	14	04	41	57.5	2.0	34	19°22.3'	155°17.2'	5 km south of Uwekahuna seismometer	----------
	15	22	03	29.4	2.8	20	19°47.1'	156°09.7'	38 km NW. of Kealakekua	----------
	20	15	09	06.7	2.8	20	19°47.1'	156°09.7'	38 km NW. of Kealakekua	----------
	20	23	19	02.3	3.1	8	18°47'	156°39'	112 km SW. of Kealakekua	----------
	21	21	34	27.0	3.2	8	19°21.7'	155°25.7'	5 km NW. of Desert seismometer	----------
	22	04	05	02.4	2.0	3	19°25.8'	155°04.2'	14 km ENE. of Makaopuhi seismometer	----------
	22	04	30	25.5	2.3	9	19°24.9'	155°23.6'	9 km north of Desert seismometer	----------
	23	17	54	50.1	2.7	13	19°59.2'	155°35.2'	13 km SE. of Kamuela	----------
	25	05	39	48.2	2.2	8	19°25.8'	155°01.0'	10 km SW. of Pahoa	----------
	25	09	23	24.4	2.5	3	19°22.4'	155°47.2'	22 km SE. of Kealakekua	----------
	25	23	17	05.5	2.0	8	19°18.0'	155°23.2'	4 km south of Desert seismometer	----------
	26	04	32	00.5	2.2	8	19°18.0'	155°23.2'	4 km south of Desert seismometer	----------
	27	01	50	26.9	2.3	28	19°16.6'	155°30.7'	15 km WSW. of Desert seismometer	----------
	27	11	44	44.8	2.0	6	19°17.3'	155°14.9'	10 km SSE. of Ahua seismometer	----------
	28	22	02	18.7	2.2	8	19°21.1	155°13.3'	5 km ESE. of Ahua seismometer	----------
	29	08	43	06.3	2.8	10	19°30.7'	155°42.2'	13 km WNW. of North Bay seismometer	----------
	30	05	20	17.5	2.7	15	19°30.5'	155°35.0'	2 km north of North Bay seismometer	----------
	30	16	48	38.2	3.0	13	19°41'	157°18'	128 km west of Keahole Point	----------
	30	17	51	13.3	2.2	8	19°23.0'	155°03.1'	13 km ENE. of Makaopuhi seismometer	----------
	30	18	53	21.1	2.7	3	19°26.2'	155°48.6'	15 km SE. of Kealakekua	----------
	31	21	45	06.2	2.5	10	19°08.0'	155°40.8'	13 km NW. of Naalehu	----------
Aug.	1	16	06	02.2	2.6	29	19°22.2'	155°16.6'	6 km SE. of Uwekahuna seismometer	----------
	1	18	17	33.8	2.2	8	19°17.6'	155°10.7'	8 km SW. of Kealakomo seismometer	----------
	1	18	18	02.8	2.0	5	19°22.0'	155°09.5'	2 km east of Makaopuhi seismometer	----------
	1	18	56	48.2	2.8	25	19°20.4'	155°13.8'	5 km SE. of Ahua seismometer	----------
	1	19	45	53.8	2.2	7	19°25.0'	155°25.2'	9 km NNW. of Desert seismometer	----------
	2	01	21	17.1	2.0	7	19°22.1'	155°27.6'	8 km WNW. of Desert seismometer	----------
	2	05	17	54.7	2.6	5	19°20.0'	155°01.5'	15 km ENE. of Kealakomo seismometer	----------
	3	19	29	09.8	3.3	7	19°13.6'	155°35.7'	18 km north of Naalehu	Naalehu
	4	11	33	28.1	2.6	26	19°24.7'	155°19.0'	3 km WSW. of Uwekahuna seismometer	----------
	4	17	40	26.9	2.4	8	19°22.2'	155°26.9'	7 km NW. of Desert seismometer	----------
	5	05	51	51.2	3.2	26	19°23.6'	155°16.9'	3 km SSE. of Uwekahuna seismometer	----------
	5	21	13	13.0	2.3	8	19°22.0'	155°26.8'	7 km WNW. of Desert seismometer	----------

Table 4.--Local earthquakes recorded by seismographs of the U.S. Geological Survey,

July, August, and September 1967--Continued

Date (1967)	Time			Magnitude	Depth (km)	Epicenter			Felt Report
	h	m	s			Lat N.	Long W.	Description	
Aug. 7	01	44	48.5	2.6	29	19°22.9'	155°18.8'	5 km SW. of Uwekahuna seismometer	----------
7	19	46	01.6	2.4	9	19°19.0'	155°12.7'	6 km WNW. of Kealakomo seismometer	----------
11	19	43	19.5	2.9	13	19°45.0'	155°55.0'	15 km NNW. of Kailua	----------
12	09	18	14.7	2.5	40	19°17.3'	154°50.2'	25 km SE. of Pahoa	----------
13	06	22	50.3	2.8	8	19°47.9'	156°05.0'	20 km NNW. of Kailua	----------
14	06	06	24.3	2.9	8	19°59.2'	155°21.8'	13 km west of Laupahoehoe	----------
14	09	05	06.1	3.0	8	19°49.2'	156°02.0'	20 km NNW. of Kailua	----------
14	18	26	05.9	2.1	shallow	19°17.7'	155°30.3'	13 km WSW. of Desert seismometer	----------
14	18	27	07.7	2.0	35	19°18.9'	155°08.7'	2 km ENE. of Kealakomo seismometer	----------
14	19	23	32.8	4.0	8	19°58.4'	155°23.5'	16 km WSW. of Laupahoehoe	Hilo, Paauilo, Honokaa, Kilauea summit area
14	19	44	35.8	3.2	8	19°59.4'	155°21.9'	13 km west of Laupahoehoe	Paauilo
14	22	52	27.2	2.5	5	19°56.5'	155°24.0'	18 km WSW. of Laupahoehoe	----------
15	01	02	05.8	2.0	26	19°33.3'	155°08.2'	3 km WNW. of Mt. View	----------
15	06	05	05.6	2.8	6	19°57.3'	155°23.0'	15 km WSW. of Laupahoehoe	----------
15	08	17	40.5	2.4	8	19°59.8'	155°21.6'	12 km west of Laupahoehoe	----------
15	14	53	43.5	2.2	3	19°27.4'	155°42.3'	24 km ESE. of Kealakekua	----------
16	12	25	45.7	2.5	6	19°11.4'	155°40.4'	17 km NW. of Naalehu	----------
16	21	45	39.9	2.5	13	19°28.7'	155°32.8'	4 km SE. of North Bay seismometer	----------
16	23	05	17.4	2.2	3	19°55.0'	155°24.2'	19 km WSW. of Laupahoehoe	----------
17	01	26	56.7	2.8	8	19°23.7'	155°25.7'	7 km NNW. of Desert seismometer	Pahala
17	02	22	34.0	2.2	8	19°58.7'	155°23.6'	16 km west of Laupahoehoe	----------
17	18	08	28.2	2.5	8	19°58.3'	155°23.4'	16 km west of Laupahoehoe	----------
17	18	19	07.9	2.6	8	19°57.4'	155°23.2'	16 km WSW. of Laupahoehoe	----------
17	19	33	12.3	2.5	3	19°20.4'	155°49.8'	8 km SE. of Hookena	----------
17	20	41	21.7	3.9	9	19°59.1'	155°22.5'	14 km west of Laupahoehoe	Laupahoehoe, Paauilo, Honokaa, Pahala, Kilauea summit area

Aug.	17	20	44	01.5	3.2	9	20°00.3'	155°21.5'	13 km west of Laupahoehoe	----------
	18	06	54	45.1	2.3	9	19°58.7'	155°23.6'	16 km west of Laupahoehoe	----------
	18	11	51	14.5	2.0	6	19°23.1'	155°24.6'	6 km NNW. of Desert seismometer	----------
	18	15	09	01.5	2.7	9	19°59.0'	155°22.4'	13 km west of Laupahoehoe	----------
	18	15	12	32.4	3.2	3	19°58.8'	155°21.8'	12 km west of Laupahoehoe	----------
	18	15	45	02.6	2.4	8	19°58.4'	155°21.5'	12 km west of Laupahoehoe	----------
	18	16	07	39.4	3.3	3	19°55.9'	155°23.4'	16 km WSW. of Laupahoehoe	----------
	18	17	12	37.9	2.3	26	19°22.0'	155°17.5'	6 km south of Uwekahuna seismometer	----------
	19	04	59	26.5	2.3	8	19°58.0'	155°23.0'	15 km WSW. of Laupahoehoe	----------
	19	05	08	16.9	3.3	13	19°37'	157°42'	187 km west of Kealakekua	----------
	19	06	14	43.7	2.7	8	19°59.9'	155°19.3'	8 km west of Laupahoehoe	----------
	19	07	23	19.0	2.0	8	19°57.6'	155°23.1'	15 km WSW. of Laupahoehoe	----------
	19	10	34	08.4	2.0	25	19°22.0'	155°17.3'	6 km south of Uwekahuna seismometer	----------
	19	16	40	37.3	2.5	3	19°36.4'	155°44.8'	20 km NE. of Kealakekua	----------
	20	01	17	17.5	2.4	8	19°58.8'	155°20.5'	10 km west of Laupahoehoe	----------
	21	22	02	58.3	3.4	8	19°09.1'	155°31.5'	12 km NE. of Naalehu	Naalehu
	22	01	38	16.8	2.1	3	19°58.3'	155°21.3'	12 km WSW. of Laupahoehoe	----------
	22	07	02	41.0	2.0	8	19°24.0'	155°03.4'	14 km ENE. of Makaopuhi seismometer	----------
	22	08	31	26.1	2.2	8	19°15.8'	155°35.0'	22 km north of Naalehu	----------
	23	02	16	34.2	2.4	13	19°59.6'	155°22.5'	14 km west of Laupahoehoe	----------
	23	17	00	37.8	2.6	7	19°07.3'	155°32.2'	9 km NE. of Naalehu	----------
	24	04	37	53.3	2.0	8	19°26.0'	155°27.5'	13 km NW. of Desert seismometer	----------
	25	08	40	08.7	2.7	6	19°09.0'	155°34.2'	10 km NNE. of Naalehu	----------
	25	09	28	10.9	2.0	6	19°09.0'	155°35.5'	10 km north of Naalehu	----------
	26	05	47	25.5	2.8	7	19°08.7'	155°34.4'	9 km NNE. of Naalehu	----------
	26	09	29	20.4	2.9	8	19°59.8'	155°21.9'	12 km west of Laupahoehoe	----------
	26	23	38	42.7	2.2	3	19°23.3'	155°02.7'	15 km SW. of Pahoa	----------
	27	00	13	52.1	2.7	8	19°22.7'	155°06.5'	7 km east of Makaopuhi seismometer	----------
	27	07	46	19.2	3.5	8	19°18.8'	155°13.8'	8 km SW. of Makaopuhi seismometer	Kilauea summit area
	29	18	20	36.6	2.7	8	19°18.8'	155°13.7'	8 km SW. of Makaopuhi seismometer	----------
	30	09	26	02.5	2.8	8	19°10.5'	155°40.9'	16 km NW. of Naalehu	----------
	30	18	00	41.2	2.1	8	19°19.5'	155°13.5'	7 km SW. of Makaopuhi seismometer	----------
	31	03	32	20.1	2.7	7	19°21.0'	155°23.2'	2 km north of Desert seismometer	----------
	31	04	32	46.8	2.2	7	19°08.0'	155°05.2'	20 km SE. of Kealakomo seismometer	----------
	31	07	56	23.5	3.2	9	19°19.5'	155°25.0'	3 km SW. Desert seismometer	Naalehu

Table 4.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, July, August, and September 1967--Continued

Date (1967)	Time			Magnitude	Depth (km)	Epicenter			Felt Report
	h	m	s			Lat N.	Long W.	Description	
Aug. 31	08	41	40.3	2.0	9	19°20.5'	155°24.6'	3 km west of Desert seismometer	----------
31	13	18	26.7	2.3	9	19°19.0'	155°24.0'	3 km SW. of Desert seismometer	----------
31	14	04	06.8	2.9	30	19°56.8'	156°02.0'	23 km SW. of Kawaihae	----------
Sept. 1	13	08	57.5	2.0	5	19°23.2'	155°18.0'	4 km SSW. of Uwekahuna seismometer	----------
1	22	52	03.3	2.2	5	19°22.4'	155°28.7'	10 km NW. of Desert seismometer	----------
2	09	33	52.1	3.3	30	19°21.9'	155°16.3'	1 km SW. of Ahua seismometer	Kilauea summit area
3	03	24	22.0	2.2	9	19°19.8'	155°13.2'	6 km SW. of Makaopuhi seismometer	----------
3	15	39	08.3	2.8	3	19°20.1'	155°46.2'	14 km SE. of Hookena	----------
3	21	22	53.5	2.1	9	19°18.3'	155°13.8'	8 km SW. of Makaopuhi seismometer	----------
4	06	10	47.8	2.2	30	19°22.0'	155°16.6'	2 km WSW. of Ahua seismometer	----------
4	07	51	19.2	2.5	5	19°21.8'	155°04.9'	10 km east of Makaopuhi seismometer	----------
5	01	22	41.0	2.9	13	18°25'	155°26'	72 km SSE. of Naalehu	----------
5	03	33	16.6	2.4	8	19°53.6'	155°28.2'	26 km WSW. of Laupahoehoe	----------
6	17	41	55.0	2.4	5	19°15.9'	155°24.2'	8 km SSW. of Desert seismometer	----------
6	19	11	05.9	3.1	30	19°17.9'	155°18.4'	10 km SE. of Desert seismometer	Pahala, Kilauea summit area
7	13	28	44.1	2.4	8	19°18.0'	155°13.8'	9 km SW. of Makaopuhi seismometer	----------
7	16	37	45.5	2.2	9	19°08.3'	155°39.8'	12 km NW. of Naalehu	----------
7	19	49	15.1	2.6	8	20°00.2'	155°19.9'	9 km WNW. of Laupahoehoe	----------
8	02	22	32.5	4.0	13	19°25.3'	155°17.9'	1 km NE. of Uwekahuna seismometer	Island-wide
8	03	57	57.6	3.0	6	19°22.9'	155°46.3'	14 km east of Hookena	----------
10	02	33	10.1	2.5	8	19°22.3'	155°26.2'	6 km NW. of Desert seismometer	----------
10	01	55	11.0	2.0	8	19°16.1'	155°21.8'	8 km SSE. of Desert seismometer	----------
10	16	30	28.5	2.5	5	19°15.3'	155°21.3'	10 km SSE. of Desert seismometer	----------
10	16	32	50.9	2.2	8	19°19.3'	155°22.1'	3 km SE. of Desert seismometer	----------
11	11	13	04.8	2.2	8	19°32.8'	155°50.6'	9 km ENE. of Kealakekua	----------
12	00	59	50.9	2.2	8	19°18.3'	155°23.9'	4 km SSW. of Desert seismometer	----------

Sept.	12	01	27	32.0	2.6	6	19°22.1'	155°26.2'	6 km NW. of Desert seismometer	----------
	12	01	38	39.7	2.7	9	19°20.8'	155°24.5'	2 km WNW. of Desert seismometer	----------
	13	17	18	50.6	2.2	5	19°24.3'	155°17.6'	2 km south of Uwekahuna seismometer	----------
	13	18	34	17.2	2.3	8	19°24.5'	155°47.3'	12 km ENE. of Hookena	----------
	14	16	09	42.6	2.9	40	19°42.5'	156°06.3'	6 km WSW. of Keahole Point	----------
	15	07	10	52.8	2.1	7	19°21.2'	155°23.3'	2 km north of Desert seismometer	----------
	16	10	48	02.9	2.6	8	19°30.3'	155°51.7'	7 km ESE. of Kealakekua	----------
	17	12	25	13.4	2.5	3	19°14.2'	155°49.5'	10 km NE. of Milolii	----------
	17	13	04	37.2	2.5	3	19°53.2'	155°41.1'	5 km NW. of Waikii	----------
	18	11	05	28.4	2.4	8	19°08.1'	155°33.7'	9 km NNE. of Naalehu	----------
	19	02	41	43.2	2.2	8	19°24.8'	155°01.2'	17 km ENE. of Makaopuhi seismometer	----------
	19	13	44	57.8	2.2	5	19°23.5'	155°17.5'	3 km south of Uwekahuna seismometer	----------
	19	20	22	39.8	2.5	8	19°07.8'	155°40.5'	12 km NW. of Naalehu	----------
	19	22	58	20.1	2.5	10	19°10.5'	155°39.8'	15 km NW. of Naalehu	----------
	21	11	24	43.0	3.7	13	19°31.8'	156°04.0'	15 km west of Kealakekua	----------
	22	10	50	52.6	2.6	8	19°25.0'	155°23.4'	9 km north of Desert seismometer	----------
	22	16	34	23.6	2.5	8	19°28.4'	155°49.9'	10 km SE. of Kealakekua	----------
	22	19	20	40.9	2.0	8	19°25.0'	155°25.7'	10 km NW. of Desert seismometer	----------
	23	08	37	23.5	3.6	10	19°17.0'	155°22.3'	6 km SSE. of Desert seismometer	Kilauea summit area, Pahala
	23	21	25	04.6	3.5	10	19°40.2'	155°59.5'	18 km NNW. of Kealakekua	----------
	23	17	05	15.4	2.6	5	20°11.4'	155°23.7'	15 km NE. of Honokaa	----------
	24	15	23	32.3	2.1	35	19°23.5'	155°14.2'	6 km SE. of Uwekahuna seismometer	----------
	24	17	01	25.0	2.2	35	19°25.5'	155°15.5'	4 km east of Uwekahuna seismometer	----------
	24	17	08	18.6	2.8	35	19°25.0'	155°15.2'	4 km ESE. of Uwekahuna seismometer	Kilauea summit area
	24	17	45	32.2	2.5	35	19°26.0'	155°15.5'	4 km ENE. of Uwekahuna seismometer	----------
	24	19	42	42.8	2.7	35	19°26.0'	155°15.5'	4 km ENE. of Uwekahuna seismometer	Kilauea summit area
	25	02	27	38.1	2.1	8	19°45.1'	155°31.2'	1 km ENE. of Pohakuloa	----------
	25	04	28	35.8	2.6	5	19°19.6'	155°21.3'	4 km ESE. of Desert seismometer	Pahala
	25	08	14	52.1	3.1	13	19°55'	156°50'	82 km WNW. of Keahole Point	----------
	25	14	45	05.6	2.5	40	19°24.8'	155°15.8'	3 km ESE. of Uwekahuna seismometer	----------
	25	21	53	09.1	2.6	8	19°28.9'	155°52.8'	6 km SE. of Kealakekua	----------
	26	02	01	18.0	2.7	8	19°25.6'	155°24.9'	11 km NNW. of Desert seismometer	----------
	26	11	44	20.1	2.1	8	19°06.8'	155°22.1'	24 km ENE. of Naalehu	----------
	26	12	59	26.4	3.4	45	19°21.3'	155°10.6	1 km south of Makaopuhi seismometer	Kilauea summit area

Table 4.--Local earthquakes recorded by seismographs of the U.S. Geological Survey,

July, August, and September 1967--Continued

Date (1967)	Time			Magnitude	Depth (km)	Epicenter			Felt Report
	h	m	s			Lat N.	Long W.	Description	
Sept. 27	12	45	23.4	2.2	8	19°25.5'	155°30.5'	10 km SE. of North Bay seismometer	----------
28	00	05	55.0	3.2	20	19°29.0'	155°13.9'	9 km NE. of Uwekahuna seismometer	Hilo, Pahoa, Kilauea summit area
28	03	22	44.0	2.6	7	19°24.2'	154°51.1'	14 km SE. of Pahoa	----------
28	12	77	46.7	2.8	6	19°24.7'	155°28.7'	13 km NW. of Desert seismometer	----------
28	16	48	08.2	2.7	8	19°59.2'	155°20.5'	10 km west of Laupahoehoe	----------
28	18	29	37.4	2.6	8	19°59.2'	155°20.5'	10 km west of Laupahoehoe	----------
29	16	16	54.7	2.0	30	19°23.0'	155°18.1'	5 km SSW. of Uwekahuna seismometer	----------
29	18	42	51.9	2.7	8	19°25.0'	155°40.5'	13 km SW. of North Bay seismometers	----------
30	13	33	54.2	2.1	8	19°09.5'	155°05.7'	15 km SE. of Apua Point	----------
30	15	51	16.8	2.4	40	19°15.0'	155°23.4'	10 km south of Desert seismometer	----------

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UNITED STATES
DEPARTMENT OF THE INTERIOR
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HAWAIIAN VOLCANO OBSERVATORY

SUMMARY 48

October, November, and December 1967

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Tilting of the ground around Kilauea Caldera

Tilting of the ground around the summit of Kilauea is monitored daily by a short-base water-tube tiltmeter at Uwekahuna (table 1), and at irregular intervals it is measured on a regional scale by means of a network of field tilt-bases and a portable water-tube tiltmeter. The attitude of the ground surface at each tilt-base is reported in terms of north-south and east-west tilt coordinates. Both coordinates at each station were arbitrarily set equal to 500 when measurements at that station were begun. Increasing tilt coordinates correspond to northward and eastward tilting of the earth's surface; that is, to a relative subsidence toward the north and east. A one-unit change in coordinate corresponds to a tilting of 1 microradian (1 mm per km) in the direction indicated.

Location of and essential data on each tiltmeter station are listed in table 6, which is published only in the first quarter issue each year.

Table 1.--Tilt coordinates at Uwekahuna

October, November, and December 1967

Date (1967)	N-S	E-W	Date (1967)	N-S	E-W
Oct. 1	560	412	Nov. 19	569	401
8	564	409	26	567	398
15	572	407	Dec. 3	563	401
22	574	400	10	560	404
29	575	398	17	559	402
Nov. 5	572	401	24	558	405
12	571	397	31	558	404

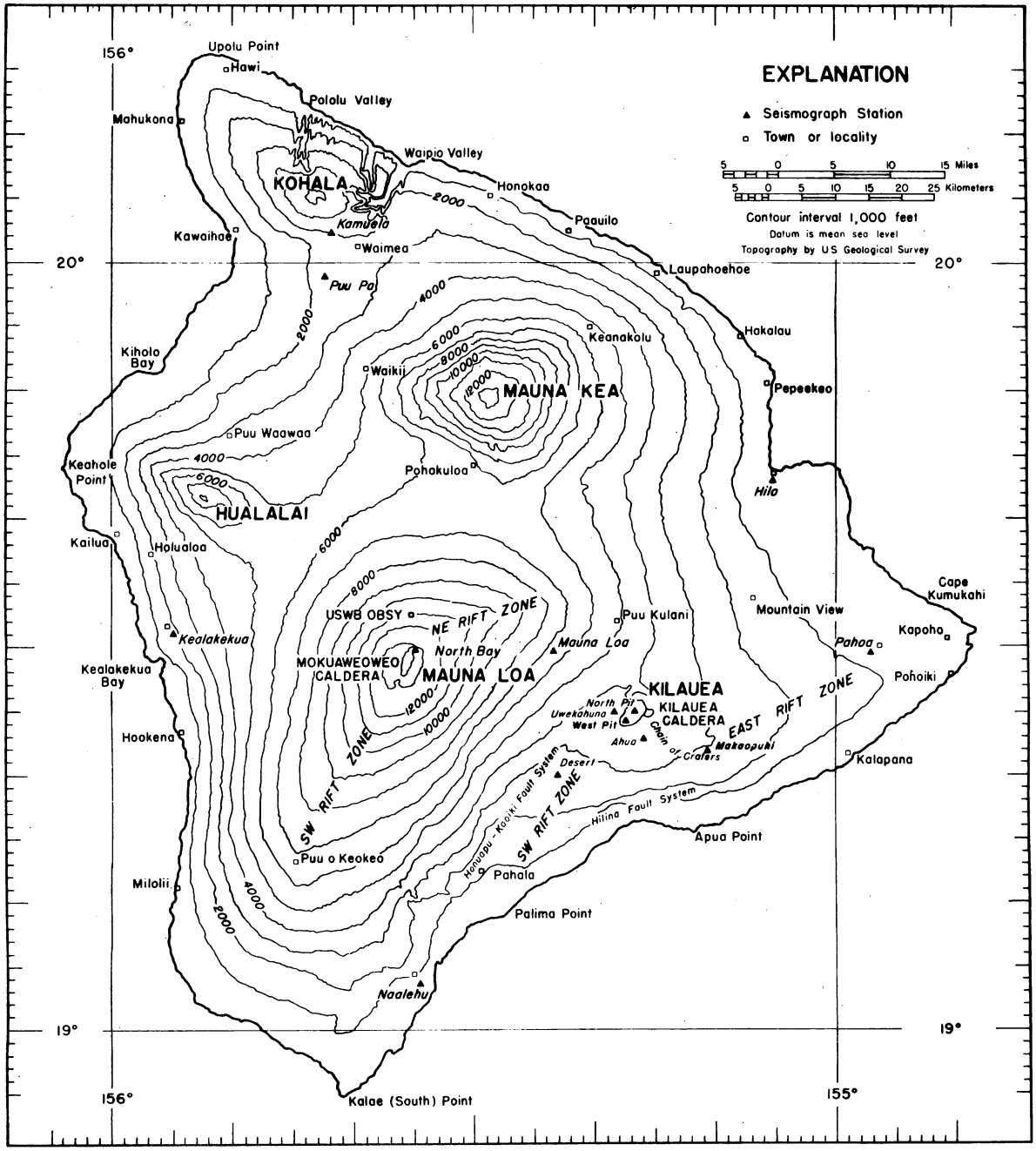

Figure 1.--Map of the Island of Hawaii showing seismograph stations operated by the U.S. Geological Survey, principal settlements, and selected geologic features. Epicenters of local earthquakes are given in table 4 in terms of geographic coordinates, which are indicated at the edges of the map.

Table 2.--Tilt coordinates and changes at bases around Kilauea Caldera

(See fig. 2)

Tilt base (location)	Date (1967)	Tilt coordinates		Rate (10^{-6} rad/mo) and direction of tilting since last reading		Date of last reading (1967)
		N-S	E-W			
Uwekahuna (U on fig. 2)	Nov. 9	597.8	404.7	8.9	N. 33.7° W.	Sept. 6
Tree Molds (TM)	7	474.8	505.0	1.6	N. 21.3° E.	7
Sand Spit (SS)	8	894.6	701.2	6.0	N. 72.0° W.	6
Keamoku (Kea)	8	559.7	367.0	8.8	N. 63.5° W.	5
Ahua Kamokukolau (Kam)	8	402.8	557.2	9.1	S. 25.5° W.	6
Kipuka Nene (KN)	7	299.6	308.5	1.45	S. 26.5° W.	7
Hilina Pali (HP)		Not read this epoch				
Kapapala Ranch (Kap)	8	496.9	509.5	0.36	N. 67.0° E.	5
Mehena (M)	8	571.1	578.8	4.77	N. 34.4° E.	6

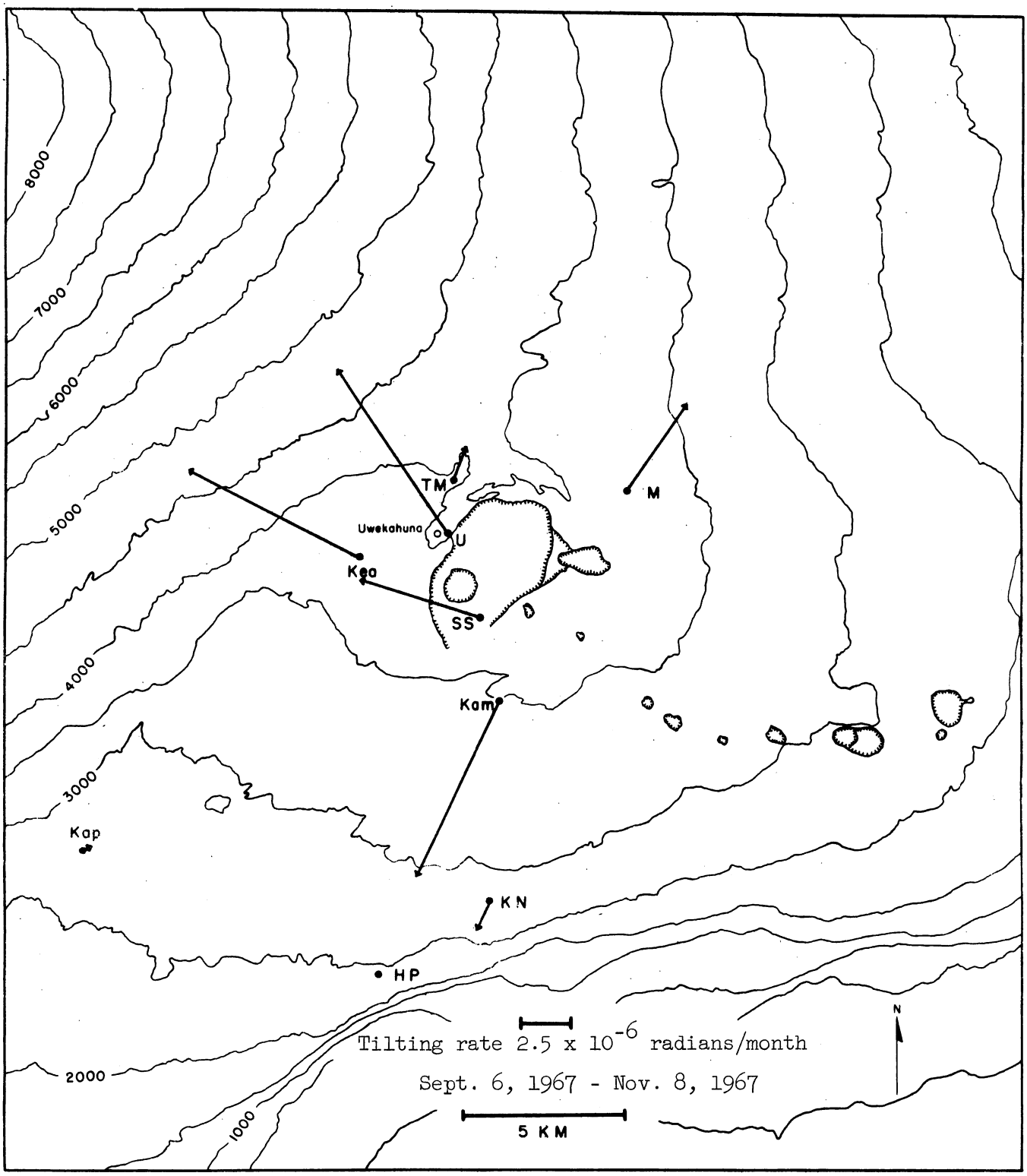

Figure 2.--Tilting of the ground around Kilauea Caldera between September 6 and November 8, 1967. The vector depicting tilting at a given tilt base points in the direction of maximum relative subsidence and has a length proportional to the rate of tilting during the measurement interval. Closed circles represent field tilt bases; open circle, short-base water-tube tiltmeter. See table 2 for explanation of abbreviations.

Seismic summary

Events recorded by the U.S. Geological Survey seismograph network in Hawaii fall into two categories: Local earthquakes and tremor originating in the region of the Hawaiian Islands (usually within 100 km of at least one seismograph), and distant earthquakes originating more than 3,000 km from Hawaii. As an index of seismic activity at Hawaiian volcanoes, daily counts of earthquakes and minutes of tremor recorded by seismographs in Hawaii are listed in table 3. The earthquakes are separated in groups on the basis of region of origin as determined by analysis of records obtained daily at the Observatory (U, M, M(2), A, D, N, WP, MP, K, O). Earthquakes of magnitude 2.0 or greater are generally sufficiently well recorded to be located with greater precision; they are listed individually in table 4.

Location of and essential data on each seismograph station are listed in table 5, which is published only in the first quarter issue each year.

Table 3.--Number of earthquakes and minutes of tremor recorded on seismographs around Kilauea Caldera

Tremor is separated into three categories: deep, intermediate, and shallow, on the basis of relative amplitudes on seismographs in the summit region. Unless otherwise stated, tremor is presumed to be associated with movement of magma within the central complex of Kilauea.

Earthquake categories are: Kilauea summit, 30 km earthquakes from a source about 30 km beneath the Kilauea summit region; long-period, earthquakes characterized by low-frequency waves that originate about 5 km beneath Kilauea summit; and shallow earthquakes in the Kilauea Caldera region; shallow earthquakes along the SW. rift zone of Kilauea and the adjacent portion of the Kaoiki fault system; earthquakes along the eastern half of Kilauea's east rift zone--detected largely on the Pahoa seismograph; earthquakes from the upper east rift zone and the adjacent fault systems of Kilauea's south flank; and earthquakes from other regions: west Hawaii, Mauna Kea, etc.

Date (1967)	Tremor (minutes)			Earthquakes							
				Kilauea summit			SW. rift and Kaoiki	Eastern east rift	Upper east rift	Koae	Others
	Deep	Intermediate	Shallow	30 km	Long period	Shallow					
Oct. 1	----	--------	-------	5	------	208	26	-------	10	8	----------
2	----	--------	-------	9	3	251	35	-------	22	6	1 west Hawaii
3	----	--------	-------	5	------	152	29	-------	19	5	----------
4	----	--------	-------	3	4	245	27	-------	12	5	2 Mauna Loa
5	----	--------	-------	3	4	255	35	-------	16	10	----------
6	10	--------	-------	6	2	297	37	1	19	15	1 off SE. shore of Hawaii
7	----	--------	-------	7	------	405	32	-------	15	5	1 off east shore of Hawaii 1 off SE. shore of Hawaii
8	----	--------	-------	6	------	406	37	-------	3	6	1 west Hawaii
9	----	--------	-------	3	------	211	44	-------	22	4	1 off north shore of Hawaii 1 SW. flank of Mauna Loa 1 west Hawaii
10	15	--------	-------	1	3+	249	35	-------	17	3	----------
11	----	--------	-------	----	8	468	32	-------	32	12	----------

		Harmonic tremor and small shocks during Halemaumau eruption obscured the seismograms for accurate count of local seismic events									
Oct.	12	----	--------	-------	-----	15	407	46	--------	27	18	2 Mauna Loa 1 west Hawaii
	13	----	--------	-------	-----	4	317	7	--------	4	8	----------
	14	----	--------	-------	1	6	319	2	--------	15	8	----------
	15	----	--------	-------	3	11	197	65	--------	10	9	----------
	16	----	--------	-------	5	20	153	107	1	17	5	----------
	17	37	--------	-------	9	25	145	44	1	11	2	----------
	18	----	--------	-------	8	29	258	61	--------	30	5	2 SW. flank of Mauna Loa
	19	----	--------	-------	3	15	292	46	--------	13	9	----------
	20	----	--------	-------	-----	6	373	21	--------	22	9	----------
	21	----	--------	-------	3	13	247	26	--------	26	3	----------
	22	----	--------	-------	6	7	235	35	--------	11	7	1 west Hawaii
	23	----	--------	-------	-----	42	206	17	--------	25	4	----------
	24	----	--------	-------	3	21	202	24	--------	17	11	----------
	25	----	--------	-------	7	8	191	30	--------	24	14	----------
	26	----	--------	-------	1+	3+	123+	4+	--------	4+	11+	----------
	27	----	--------	-------	2	------	135	52	--------	12	1	1 Mauna Kea
	28	----	--------	-------	3	2	136	39	1	8	11	----------
	29	----	--------	-------	5	------	152	25	--------	20	20	1 Mauna Kea
	30	----	--------	5	-----	------	189	22	--------	9	6	1 SW. flank of Mauna Loa 1 off NW. shore of Hawaii
	31	----	--------	10	-----	17	141	16	--------	16	6	----------
Nov.	1				-----	5	74	20	--------	10	6	----------
	2				-----	2	113	10	2	12	3	----------
	3				-----	------	109	4	--------	10	----	1 off NW. shore of Hawaii
	4				-----	2	67	-------	--------	12	10	----------
	5				The start of the eruption in Halemaumau Crater							1 off SE. shore of Hawaii
	6				5	------	335	4	--------	11	3	1 Mauna Loa
	7				3	------	300	8	--------	3	2	----------
	8				2	------	150	8	--------	4	2	----------
	9				-----	------	70	6	--------	6	1	----------
	10				-----	------	?	?	--------	------	----	1 Mauna Loa
	11				-----	------	?	?	--------	------	----	----------
	12				-----	------	?	?	--------	9	----	----------
	13				-----	------	?	?	--------	------	----	1 off east shore of Hawaii

Table 3.--Number of earthquakes and minutes of tremor recorded on seismographs around Kilauea Caldera--Continued

Date (1967)	Tremor (minutes)			Earthquakes							
				Kilauea summit			SW. rift and Kaoiki	Eastern east rift	Upper east rift	Koae	Others
	Deep	Intermediate	Shallow	30 km	Long period	Shallow					
Nov. 14	Harmonic tremor and small shocks during Halemaumau eruption obscured the seismograms for accurate count of local seismic events			-----	------	?	--------	-------	-----	----	----------
15				-----	------	?	--------	-------	-----	----	----------
16				-----	------	?	--------	-------	-----	----	----------
17				1	------	?	3	-------	4	----	----------
18				-----	------	?	1	-------	-----	1	----------
19				-----	2	120	9	-------	13	----	----------
20				1	------	50	11	-------	10	----	----------
21				?	?	?	?	-------	4	----	1 Mauna Kea
22				-----	2	83	20	-------	6	----	----------
23				1	------	47	11	1	10	1	----------
24				?	------	93	3	-------	?	2	1 Mauna Kea; 1 west Hawaii
25				1	------	26	10	-------	9	----	----------
26				5	------	37	5	-------	3	2	1 off east shore of Hawaii
27				1	------	13	26	-------	7	1	----------
28				-----	------	40	9	-------	10	----	----------
29				1	------	14	4	-------	15	1	----------
30				1	------	165	8	-------	11	----	----------
Dec. 1	----			5	------	71	9	-------	10	1	1 Mauna Kea
2	----			3	------	90	9	-------	5	1	2 Mauna Loa
3	----			1	------	-------	5	-------	7	----	----------
4	----			-----	------	55	7	-------	9	1	1 off west shore of Hawaii
5	----			1	------	71	7	-------	9	----	----------
6	23			1	------	-------	8	-------	8	----	----------
7	----			1	------	30	7	-------	21	----	1 SW. flank of Mauna Loa
8	----			1	------	45	4	-------	12	----	1 west Hawaii
9	----			-----	------	23	30	-------	33	6	1 Mauna Loa; 2 west Hawaii

Dec. 10	----	Harmonic tremor and small shocks during	-----	------	40	10	--------	------	1	1 off west shore of Hawaii
11	----		2	------	5	4	--------	39	1	----------
12	----		4	------	244	14	--------	36	----	----------
13	----		-----	------	5	10	--------	33	2	1 off NW. shore of Hawaii
14	----		2	------	170	5	--------	48	3	1 off south shore of Hawaii
15	----		13	------	115	10	--------	51	2	1 off SE. shore of Hawaii
16	----		2	------	2	8	--------	30	----	----------
17	----		7	15	30	14	--------	18	----	2 Mauna Loa; 2 SW. flank of Mauna Loa
18	----		12	------	90	11	--------	31	----	----------
19	----		13	------	30	7	--------	35	1	----------
20	----		6	------	97	15	--------	30	----	----------
21	----		4	------	25	17	--------	37	----	----------
22	----		21	2	110	13	--------	29	2	1 west Hawaii
23	----		5	------	20	13	--------	17	----	1 west Hawaii
24	----		3	------	50	18	--------	9	----	1 west Hawaii
25	----		1	------	141	13	--------	9	----	----------
26	----		5	------	69	9	--------	15	----	----------
27	10		1	------	185	14	--------	27	----	----------
28	----		6+	------	220	7	--------	30	2	1 off NE. shore of Maui
29	----		-----	------	55+	17	--------	8	----	----------
30	----		6	------	50+	11	--------	14	----	1 Mauna Kea
31	----		-----	------	90+	14	--------	6	----	----------

Halemaumau eruption obscured the seismograms

for accurate count of local seismic events

Table 4.--Local earthquakes recorded by seismographs of the U.S. Geological Survey

October, November, and December 1967

Entries for a given quake are: date, origin time (Hawaiian Standard Time), magnitude, depth, epicenter, and felt report. All earthquakes of magnitude 2.5 and larger, as well as many favorably located smaller ones, occurring on or near the island of Hawaii are included in the list.

Date (1967)	Time			Magnitude	Depth (km)	Epicenter			Felt Report
	h	m	s			Lat N.	Long W.	Description	
Oct. 1	00	23	59.0	2.0	10	19°15.7'	155°04.5'	15 km SE. of Makaopuhi seismometer	----------
2	15	21	58.1	2.7	3	19°40.1'	156°00.0'	18 km NNW. of Kealakekua	----------
2	20	05	25.1	2.0	25	19°25.7'	155°16.5'	2 km ENE. of Uwekahuna seismometer	----------
3	00	37	49.0	2.3	8	19°17.5'	155°27.5'	9 km SW. of Desert seismometer	----------
3	13	26	40.7	2.0	13	19°18.6'	155°13.6'	8 km SE. of Ahua seismometer	----------
4	00	38	16.0	2.0	8	19°31.8'	155°45.2'	17 km ENE. of Kealakekua	----------
4	21	41	39.8	2.6	8	19°30.9'	155°50.1'	9 km east of Kealakekua	----------
5	01	25	21.1	2.0	7	19°19.4'	155°13.6'	7 km SE. of Ahua seismometer	----------
5	15	59	37.4	2.0	30	19°24.4'	155°17.5'	2 km south of Uwekahuna seismometer	----------
6	04	49	16.8	2.0	8	19°26.0'	155°23.8'	11 km NNW. of Desert seismometer	----------
6	06	16	27.5	2.3	6	19°14.2'	154°55.0'	14 km SE. of Kalapana	----------
6	04	26	37.1	2.0	8	19°09.8'	155°25.5'	7 km SE. of Pahala	----------
7	13	19	42.8	2.4	8	19°36.7'	154°47.7'	21 km NE. of Pahoa	----------
7	20	32	59.6	2.3	8	19°10.1'	154°58.7'	21 km south of Kalapana	----------
8	22	39	56.0	2.0	6	19°27.0'	155°52.5'	9 km SE. of Kealakekua	----------
9	08	25	06.2	2.4	8	20°05.9'	155°55.5'	13 km NW. of Kawaihae	----------
9	12	00	22.8	2.4	8	19°25.6'	155°55.1'	10 km south of Kealakekua	----------
9	13	04	10.9	2.3	5	19°23.5'	155°17.1'	4 km SSE. of Uwekahuna seismometer	----------
9	20	01	09.6	2.7	8	19°10.5'	155°36.5'	13 km NNW. of Naalehua	----------
9	23	43	38.0	3.2	10	19°23.1'	155°29.0'	11 km WNW. of Desert seismometer	Pahala
10	00	09	01.2	2.0	10	19°22.3'	155°28.0'	9 km WNW. of Desert seismometer	----------
10	08	58	04.5	2.2	20	19°26.1'	155°26.8'	13 km NW. of Desert seismometer	----------
11	08	16	51.9	2.5	45	19°17.1'	155°09.2'	2 km SSE. of Kealakomo seismometer	----------

Oct.	12	04	41	33.7	2.7	13	19°28.8'	155°46.7'	16 km ESE. of Kealakekua	----------
	12	06	25	23.7	2.7	13	19°28.3'	155°46.7'	16 km ESE. of Kealakekua	----------
	12	20	49	11.2	2.9	7	19°34.0'	155°52.2'	7 km NE. of Kealakekua	Kealakekua
	14	16	27	09.7	2.5	30	19°20.8'	155°17.9'	5 km SW. of Ahua seismometer	----------
	15	05	57	58.7	3.7	5	19°25.2'	155°28.7'	13 km NW. of Desert seismometer	Hilo, Pahala, Kilauea summit area
	15	11	01	54.0	2.2	6	19°19.6'	155°25.0'	3 km WSW. of Desert seismometer	----------
	15	12	44	21.1	2.5	8	19°20.1'	155°24.8'	3 km west of Desert seismometer	----------
	16	04	10	03.7	2.5	8	19°21.9'	155°13.0'	5 km ESE. of Ahua seismometer	----------
	16	11	45	04.8	2.0	10	19°14.3'	155°32.6'	8 km NW. of Pahala	----------
	17	04	37	54.9	2.1	5	19°22.0'	155°23.6'	3 km NNW. of Desert seismometer	----------
	17	08	48	06.4	2.0	5	19°22.0'	155°23.5'	3 km NNW. of Desert seismometer	----------
	17	11	45	27.1	2.5	10	19°21.0'	155°24.1'	2 km NW. of Desert seismometer	----------
	17	12	20	12.3	2.8	8	19°20.5'	155°26.3'	5 km WNW. of Desert seismometer	Pahala
	18	00	07	40.0	2.3	30	19°28.0'	155°15.5'	6 km NE. of Uwekahuna seismometer	----------
	18	06	57	20.1	2.1	8	19°09.5'	155°40.3'	14 km NW. of Naalehu	----------
	18	23	04	50.2	2.4	8	19°09.2'	155°40.5'	14 km NW. of Naalehu	----------
	19	11	16	31.0	3.3	40	19°23.0'	154°56.6'	5 km NE. of Kalapana	----------
	19	14	16	07.8	2.0	30	19°23.3'	155°17.0'	4 km SSE. of Uwekahuna seismometer	----------
	20	19	52	00.8	2.1	7	19°23.6'	155°02.7'	13 km ENE. of Makaopuhi seismometer	----------
	21	07	44	54.6	2.4	8	19°11.9'	155°32.3'	7 km west of Pahala	----------
	21	09	57	25.6	2.3	30	19°37.7'	155°10.0'	11 km NW. of Mt. View	----------
	21	19	35	17.3	2.3	10	19°24.5'	155°03.9'	12 km ENE. of Makaopuhi seismometer	----------
	21	23	11	25.3	2.0	30	19°22.4'	155°18.4'	6 km SSW. of Uwekahuna seismometer	----------
	22	03	15	34.7	2.0	8	19°20.3'	155°09.5'	3 km SSE. of Makaopuhi seismometer	----------
	22	13	35	32.1	2.1	8	19°34.5'	155°48.8'	13 km ENE. of Kealakekua	----------
	22	18	08	34.0	2.1	8	19°22.7'	155°24.3'	5 km NNW. of Desert seismometer	----------
	23	11	20	22.2	2.4	7	19°23.0'	155°24.9'	6 km NW. of Desert seismometer	----------
	26	02	18	02.5	2.0	9	19°23.0'	155°06.3'	7 km ENE. of Makaopuhi seismometer	----------
	27	00	01	34.6	2.2	8	19°53.0'	155°28.7'	15 km WNW. of Keanakolu	----------
	27	06	53	32.8	2.0	10	19°22.8'	155°04.7'	9 km ENE. of Makaopuhi seismometer	----------
	27	12	42	32.0	3.0	32	19°20.0'	155°15.5'	4 km SSE. of Ahua seismometer	Kilauea summit area
	28	07	16	38.4	2.5	10	19°23.1'	155°27.8'	9 km NW. of Desert seismometer	----------
	29	03	34	37.2	3.8	10	19°59.5'	155°33.9'	15 km ESE. of Kamuela	Kamuela, Kohala, Pahala

Table 4.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, October, November, and December 1967--Continued

Date (1967)	Time			Magnitude	Depth (km)	Epicenter			Felt Report
	h	m	s			Lat N.	Long W.	Description	
Oct. 30	12	47	17.1	2.2	8	19°23.0'	155°27.8'	9 km NW. of Desert seismometer	Pahala
30	13	00	42.4	3.0	3	19°08.8'	155°37.9'	10 km NW. of Naalehu	----------
30	16	10	53.8	3.2	3	19°51.6'	156°12.2'	20 km NW. of Keahole Point	----------
30	21	28	00.4	3.0	60	19°23.0'	155°01.2'	5 km NW. of Kalapana	----------
31	15	50	28.7	2.2	9	19°20.2'	155°24.0'	2 km west of Desert seismometer	----------
31	18	16	56.3	3.1	25	19°21.2'	155°17.2'	3 km SW. of Ahua seismometer	Pahala, Kilauea summit area
Nov. 1	04	19	11.3	3.2	25	19°22.2'	155°18.5'	6 km SSW. of Uwekahuna seismometer	----------
1	08	40	55.3	2.5	30	19°21.6'	155°17.8'	7 km south of Uwekahuna seismometer	----------
2	10	22	07.6	2.7	8	19°25.2'	155°03.0'	10 km NW. of Kalapana	----------
2	14	46	51.0	3.0	9	19°28.6'	154°53.4'	6 km SE. of Pahoa	----------
3	00	52	43.0	4.1	13	19°49'	156°50'	80 km WNW. of Keahole Point	----------
4	13	34	41.0	2.7	9	19°20.2'	155°12.1'	5 km SW. of Makaopuhi seismometer	----------
4	20	14	07.3	3.0	9	19°10.6'	155°26.5'	5 km SE. of Pahala	----------
5	02	04	29.5	2.8	5	19°24.0'	155°17.8'	3 km SSW. of Uwekahuna seismometer	----------
5	02	20	16.8	3.4	5	19°24.0'	155°17.6'	3 km south of Uwekahuna seismometer	Kilauea summit area
5	02	57	26.5	2.8	5	19°23.7'	155°17.6	3 km south of Uwekahuna seismometer	----------
5	16	05	00.8	3.1	3	19°02.6'	155°29.0'	11 km ESE. of Naalehu	----------
6	12	01	25.8	2.5	10	19°20.8'	155°08.5'	3 km SE. of Makaopuhi seismometer	----------
8	13	31	59.8	2.2	7	19°24.6'	155°24.8'	8 km NNW. of Desert seismometer	----------
10	00	13	29.3	2.4	5	19°26.8'	155°40.5'	11 km SW. of North Bay seismometer	----------
11	17	14	36.2	2.5	30	19°19.2'	155°17.5'	6 km SSW. of Ahua seismometer	----------
12	03	40	42.0	2.7	6	19°18.2'	155°12.3'	8 km SW. of Makaopuhi seismometer	----------
13	07	45	56.4	3.0	40	19°41.9'	154°49.1'	28 km ESE. of Hilo	----------
13	17	04	44.3	2.0	5	19°15.3'	155°28.0'	12 km SW. of Desert seismometer	----------
15	05	33	17.0	2.4	5	19°22.8'	155°27.5'	9 km NW. of Desert seismometer	----------

Nov.	17	17	04	43.8	2.4	8	19°26.3'	155°24.1'	7 km SSW. of Mauna Loa seismometer	----------
	19	22	58	14.6	3.2	10	19°21.1'	155°25.0'	3 km NW. of Desert seismometer	Pahala
	20	10	27	20.5	2.0	40	19°08.3'	155°24.8'	9 km SE. of Pahala	----------
	20	10	37	37.8	2.0	25	19°21.5'	155°30.9'	13 km WNW. of Desert seismometer	----------
	21	06	23	47.1	2.8	8	19°53.5'	155°38.8'	4 km north of Waikii	----------
	23	19	59	04.7	3.0	3	19°15.2'	155°34.6'	12 km WNW. of Pahala	----------
	24	16	53	38.8	2.4	8	19°26.9'	155°48.8'	14 km SE. of Kealakekua	----------
	24	17	33	16.5	2.0	8	19°21.1'	155°24.2'	2 km NW. of Desert seismometer	----------
	24	18	58	52.2	2.9	8	19°59.0'	155°22.8'	5 km SSW. of Paauilo	----------
	26	00	38	27.5	2.7	13	19°24.7'	154°46.0'	21 km SE. of Pahoa	----------
	26	06	25	48.5	3.3	9	19°20.8'	155°17.2'	4 km SW. of Ahua seismometer	Hilo, Mt. View, Kilauea summit area
	28	08	40	26.2	2.9	7	19°19.8'	155°12.4'	6 km SW. of Makaopuhi seismometer	----------
	30	22	08	00.5	2.5	8	19°26.8'	155°24.9'	6 km SW. of Mauna Loa seismometer	----------
Dec.	1	05	37	35.0	2.3	5	19°54.9'	155°18.2'	3 km east of Keanakolu	----------
	1	13	04	09.9	2.1	7	19°19.5'	155°15.0'	6 km SSE. of Ahua seismometer	----------
	1	21	59	01.5	2.3	30	19°21.7'	155°18.8'	7 km SSW. of Uwekahuna seismometer	----------
	2	06	47	35.3	2.4	8	19°25.1'	155°24.9'	10 km NNW. of Desert seismometer	----------
	2	11	56	37.1	2.4	8	19°25.0'	155°35.3'	8 km SSW. of North Bay s eismometer	----------
	2	21	26	39.2	2.5	8	19°27.3'	155°40.8'	11 km WSW. of North Bay s eismometer	----------
	4	18	12	52.7	2.8	8	19°31'	156°31'	63 km west of Kealakekua	----------
	7	09	54	56.4	2.3	10	19°09.5'	155°37.6'	12 km NW. of Naalehu	----------
	7	16	14	12.8	3.1	10	19°20.3'	155°12.8'	5 km SW. of Makaopuhi seismometer	Hilo, Pahala, Kilauea summit area
	8	10	46	58.4	3.3	27	19°45.2'	156°04.0'	3 km north of Keahole Point	----------
	8	13	07	02.2	3.1	8	19°25.8'	155°25.9'	11 km NW. of Desert seismometer	Pahala
	9	02	06	03.8	3.8	25	19°47.3'	156°03.2'	6 km NNE. of Keahole Point	----------
	9	19	10	53.5	2.8	27	19°50.3'	156°04.8'	10 km NNW. of Keahole Point	----------
	9	20	36	34.4	2.6	8	19°33.3'	155°41.7'	14 km WNW. of North Bay seismometer	----------
	10	00	29	23.0	2.7	8	19°25.3'	156°02.7'	17 km SW. of Kealakekua	----------
	11	10	48	32.8	2.5	20	19°21.9'	155°19.8'	7 km WSW. of Ahua seismometer	----------
	12	19	24	42.8	2.2	30	19°22.2'	155°18.2'	6 km SSW. of Uwekahuna seismometer	----------
	12	23	58	17.1	2.4	8	19°19.3'	155°13.1'	7 km SW. of Makaopuhi seismometer	----------
	13	01	52	29.6	3.0	13	19°56'	156°11'	26 km NW. of Keahole Point	----------
	14	09	39	50.0	2.9	13	18°42'	156°27'	84 km WSW. of Kalae	----------
	15	03	43	42.0	2.0	13	19°02.1'	155°11.2'	25 km south of Apua Point	----------

Table 4.--Local earthquakes recorded by seismographs of the U.S. Geological Survey, October, November, and December 1967--Continued

Date (1967)	Time			Magnitude	Depth (km)	Epicenter			Felt Report
	h	m	s			Lat N.	Long W.	Description	
Dec. 15	17	29	43.1	2.0	25	19°22.6'	155°21.0'	6 km NE. of Desert seismometer	----------
15	17	31	12.4	2.3	27	19°22.8'	155°19.1'	5 km SW. of Uwekahuna seismometer	----------
16	06	33	34.8	2.3	30	19°22.2'	155°19.4'	7 km SW. of Uwekahuna seismometer	----------
17	00	06	19.5	2.6	8	19°23.1'	155°36.0'	13 km SSW. of North Bay seismometer	----------
17	19	19	14.4	2.3	0	19°13.4'	155°41.2'	21 km NW. of Naalehu	----------
17	21	11	37.8	2.1	8	19°30.8'	155°49.5'	10 km east of Kealakekua	----------
17	23	06	33.7	2.7	8	19°09.9'	155°35.0'	10 km north of Naalehu	----------
18	20	02	51.5	2.8	10	19°19.2'	155°04.0'	12 km SE. of Makaopuhi seismometer	----------
19	20	41	31.1	3.3	8	19°24.0'	155°25.5'	8 km NW. of Desert seismometer	----------
22	17	44	43.7	2.1	8	19°25.7'	155°47.8'	16 km SE. of Kealakekua	----------
23	05	14	55.9	2.4	27	19°22.3'	155°18.9'	6 km SSW. of Uwekahuna seismometer	----------
23	10	09	50.1	2.4	8	19°26.8'	155°49.2'	13 km SE. of Kealakekua	----------
23	13	50	03.9	2.3	3	19°23.3'	155°28.5'	11 km WNW. of Desert seismometer	----------
24	01	43	34.4	2.7	25	19°22.2'	155°18.5'	6 km SW. of Uwekahuna seismometer	----------
24	17	28	15.3	2.5	3	19°28.1'	155°51.0'	9 km SE. of Kealakekua	----------
25	16	26	39.8	2.2	8	19°21.0'	155°07.1'	5 km SE. of Makaopuhi seismometer	----------
25	16	47	11.0	2.0	9	19°18.5'	155°13.1'	8 km SW. of Makaopuhi seismometer	----------
25	23	38	36.1	2.0	8	19°20.0'	155°08.8'	4 km SE. of Makaopuhi seismometer	----------
26	15	28	30.0	2.5	35	19°23.8'	155°17.0'	3 km SSE. of Uwekahuna seismometer	----------
27	10	08	29.9	2.0	10	19°21.7'	155°07.5'	5 km east of Makaopuhi seismometer	----------
28	03	26	56.2	2.3	7	19°19.2'	155°12.0'	6 km SW. of Makaopuhi seismometer	----------
28	11	20	29.5	3.2	13	20°49'	155°58'	10 km NE. of Hana, Maui	----------
29	03	59	30.2	3.3	8	19°19.1'	155°04.2'	11 km SE. of Makaopuhi seismometer	----------
29	04	22	49.2	2.2	30	19°21.0'	155°20.9'	5 km NE. of Desert seismometer	----------
30	03	39	37.8	2.3	5	19°54.2'	155°32.5'	22 km SE. of Kamuela	----------
30	22	08	40.1	2.2	31	19°23.5'	155°14.8'	6 km NE. of Ahua seismometer	----------

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