

HAWAIIAN SEISMIC EVENTS DURING 1967

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Abstract.—Several tens of thousands of earthquakes were recorded in Hawaii during 1967; of those, 551 with a magnitude of from 2.0 to 4.6 were located. Of the 140 earthquakes felt by residents, 11 were felt over the entire island.

Hawaiian earthquake locations for 1967, determined by the U.S. Geological Survey's Hawaiian Volcano Observatory, are graphically presented in this report. It is the sixth of a series of reports (Koyanagi, 1964; Koyanagi and Endo, 1965; Koyanagi and Okamura, 1966; Koyanagi, 1968; Koyanagi, 1969) presenting the locations and other data on a selected group of earthquakes during each calendar year.

Earthquakes having a magnitude of 2.0 or greater beneath the five volcanoes of the island of Hawaii (fig. 1) and offshore along the Hawaiian Ridge from lat 18° to 23° N. and long 154° to 161° W. are plotted in figures 2 and 3. The earthquakes are divided into 3 depth groups (less than 10, 10–20, and 20–60 kilometers) (fig. 4) and 2 magnitude groups (2.0–3.5, and greater than 3.5).

Methods of locating earthquakes and evaluating probable accuracy remain unchanged throughout the series of reports. (Eaton, 1962, p. 16–18.) P-wave arrivals and S–P values are applied to Hawaiian seismic-wave traveltime curves. Earthquakes with a magnitude of 2.5 or greater beneath the island of Hawaii are generally located within a 5-km sphere of error, although errors as great as 10 km may be expected from earthquakes located offshore.

During the year, several new seismic stations were added to the existing network on the island of Hawaii. These are omitted from figure 1 and located as follows:

	<i>North latitude</i>	<i>West longitude</i>
Mauna Loa (2).....	19°27.6'	155°20.7'
Kealakomo.....	19°18.5'	155°09.6'
Cone Peak.....	19°23.7'	155°19.7'
Kipuka Nene.....	19°20.1'	155°17.4'
Outlet.....	19°23.4'	155°16.8'

CHRONOLOGY OF KEY 1967 SEISMIC EVENTS

Many seismic "events" of considerable significance are made up of swarms of earthquakes smaller than the

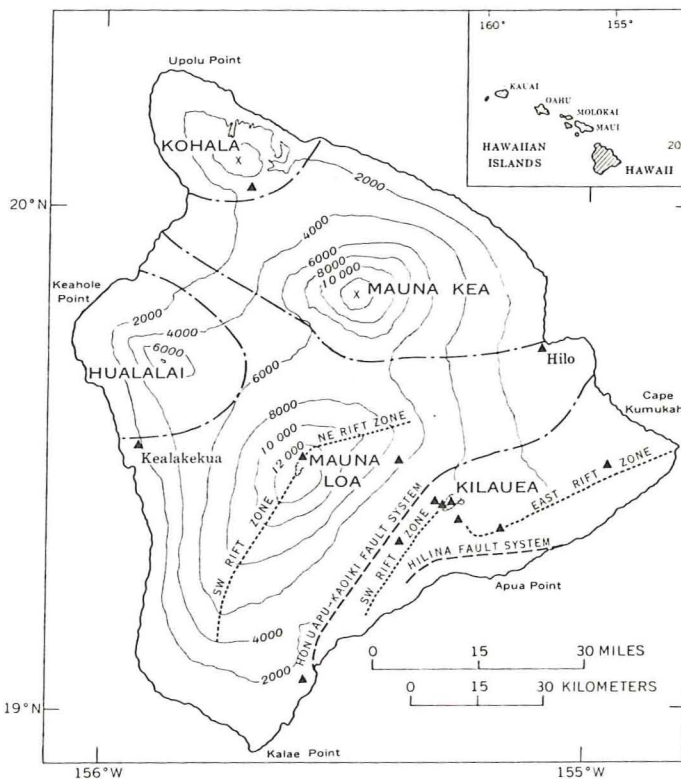


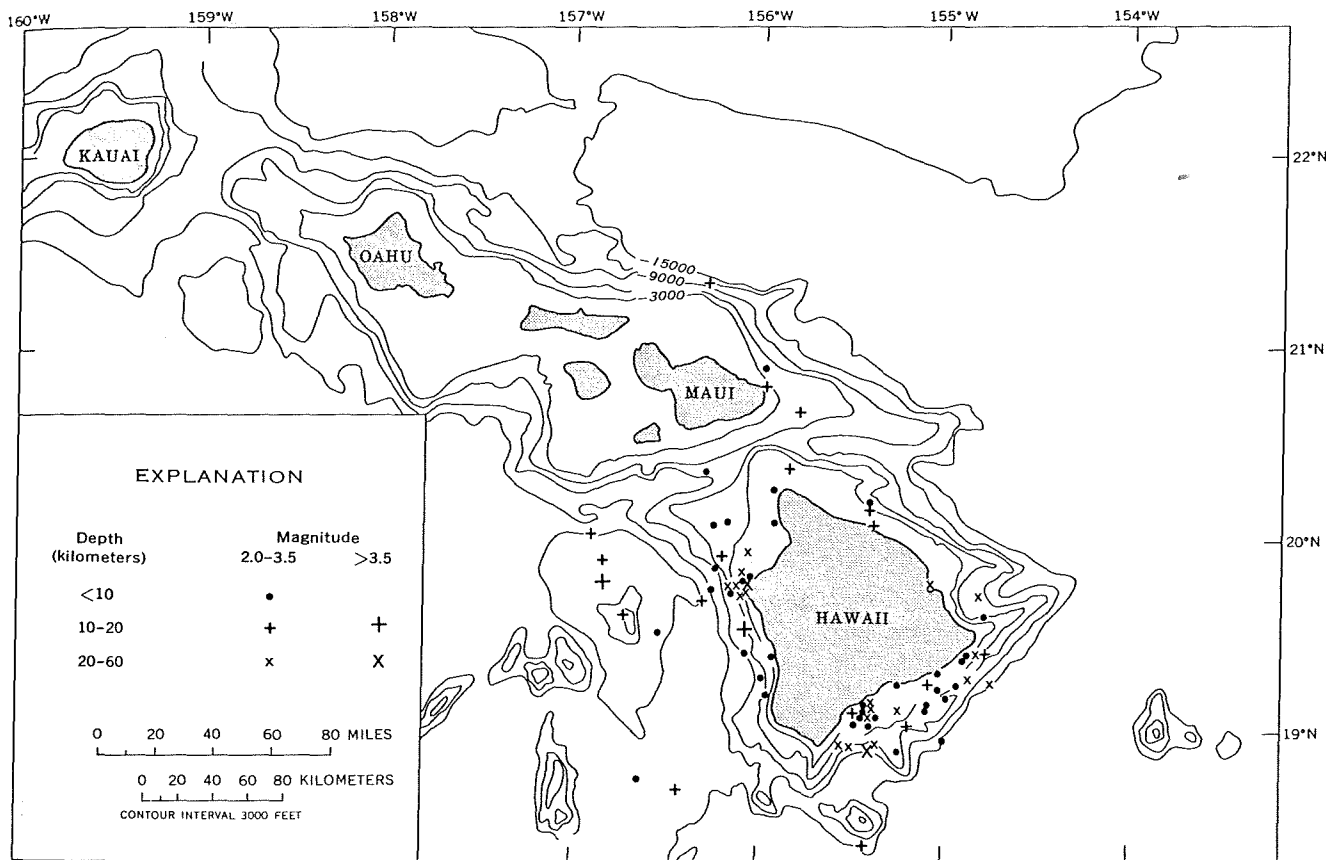
FIGURE 1.—Map of the island of Hawaii, showing the five volcanoes and their principal structural features. Dot-and-dash lines are boundaries of volcanic systems. Location of seismograph stations is indicated by closed triangles. Contour interval is 2,000 feet, and datum is mean sea level.

magnitude cutoff of 2.0 used in selecting the events for plotting. The following paragraphs describe such events and add other notes that put the seismic events of the year into perspective.

During the first quarter, on January 6–7, Hawaiian Volcano Observatory seismographs recorded a flurry of nearly a hundred deep Kilauea earthquakes. The largest event of this episode registered a magnitude of 3.9, and was felt islandwide. Throughout most of the quarter, increased activity prevailed along the east rift zone of Kilauea. Upper east rift earthquakes averaged 20 per day, and in the second half of January, nearly 200 earth-



FIGURE 2.—Plot of epicenters of earthquakes having a magnitude of 2.0 or greater beneath the island of Hawaii during each quarter of 1967. Dot-and-dash lines are boundaries of volcanic systems, long-dashed lines are fault systems, and short-dashed lines are rift zones. Geographic names are shown in figure 1.



Base from U.S. Navy Hydrographic Office Preliminary Sheet BC 04N

FIGURE 3.—Map of the Hawaiian Islands, showing epicenters of earthquakes having a magnitude of 2.0 or greater that occurred off the island of Hawaii during 1967.

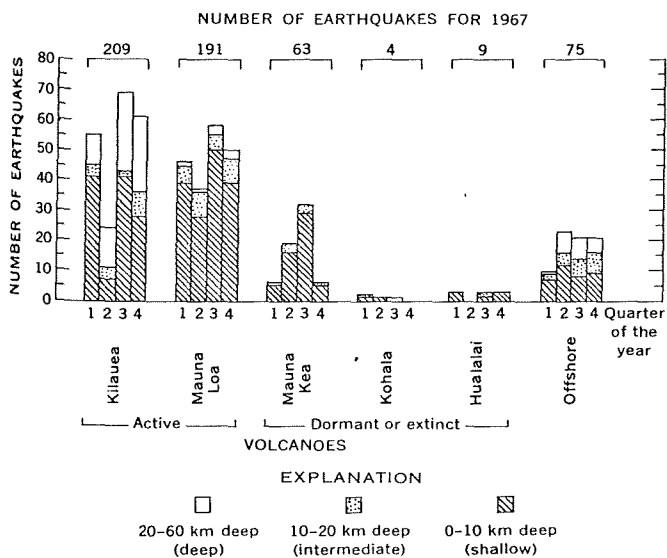


FIGURE 4.—Geographic location and the distribution, with depth, of earthquakes having a magnitude of 2.0 or greater that occurred in the Hawaiian Islands during 1967.

earthquake with a magnitude of 4.6 and 8 kilometers beneath the Kaoiki scarp, which was felt islandwide on January 23 at 16^h/59^m, proved to be the largest event of the year.¹

Several flurries of shallow Kilauea caldera earthquakes were recorded during the second quarter. Also, from the last week of May and continuing into September, earthquake activity was noted beneath the northeast flank of Mauna Kea. Nearly a dozen shocks were felt by residents on the coastal slopes of Mauna Kea.

Starting in September and extending through October, increased levels of Kilauean seismic activity were recorded. The daily number of earthquakes generally ran high for deep and shallow sources beneath the caldera and for sources beneath the southwest and, to a lesser extent, southeast flanks. With the exception of a relatively few large earthquakes, however, most of the seismic activity described above consisted of small earthquakes with a magnitude less than 2.0.

The summit eruption of Kilauea started on the morning of November 5 and continued into the following year. Observatory seismographs traced the seismic pat-

¹ Times are in hours and minutes, Hawaiian standard time.

quakes occurred in shallow zones along the eastern part of the rift. Several of these events were felt locally. An

terms of the erupting volcano as they recorded earthquakes and harmonic tremor.

SUMMARY

Of several tens of thousands of earthquakes recorded in Hawaii during 1967, 551 had a magnitude of 2.0 or greater. Among the larger events, 443 had magnitudes of 2.0 to 2.9, 98 had magnitudes of 3.0 to 3.9, and 10 had magnitudes of 4.0 to 4.6. As in previous years, the largest concentrations of earthquakes were beneath the active volcanoes Mauna Loa and Kilauea. Most of the events originated from shallow sources (less than 10 km) beneath active structures, and a moderate number of deep Kilauean earthquakes originated from a source about 30 km beneath the summit area.

Some 140 shocks were felt by Hawaii residents during the year. Eleven of these which ranged in magnitude from 3.9 to 4.6, were perceptible over the entire island.

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