EARTHQUAKE STUDY IN SOUTHERN CALIFORNIA, 1946

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This continues the previous report [see "References" at end of paper, GUTENBERG and RICHTER, 1946a].

Data from the New Mexico atomic bomb test of 1945 have been published by GUTENBERG [1946], and those from the second Bikini test by GUTENBERG and RICHTER [1946b]. For both tests the travel times of P are within about two seconds of those calculated from the standard travel times of earthquake waves as corrected for a surface focus. The seismograms are very small; there is no basis for the exaggerated newspaper sensation, nor for the suggestion that seismograms might be used to detect such atomic bombs. Air waves from the New Mexico test included direct waves, refracted waves through the stratosphere, and strong waves traveling near the tropopause with little loss of energy.

Research in connection with the Navy's microseism project has led to a further publication by GUTENBERG [1947]. It appears that a large fraction of the energy in microseisms associated with hurricanes is transmitted from the surface to the bottom of the ocean by elastic waves. Vertical geological discontinuities interfere with the propagation of microseisms to a distance.

The revised study of the seismicity of the earth has been completed, and will be published in book form.

S. T. Martner has prepared a paper on the Dominguez Hills earthquakes of June 18, 1944.

A study of travel times at distances from 05° to 25° , particularly with reference to minor observed waves and to the structure of the crust, is being undertaken by Gutenberg.

The theoretically expected phase PKKKP has been tentatively identified on seismograms of the Central American earthquake of January 26, 1947. Preliminary epicenter and origin time are assigned by the United States Coast and Geodetic Survey as follows: 13°N , $86^{\circ}5\text{W}$, $0 = 10^{\text{h}}06.7^{\text{m}}$.

Readings attributed to PKKKP are: Pasadena, $10^{\text{h}}55^{\text{m}}57^{\text{s}}$; Mt. Wilson, $10^{\text{h}}55^{\text{m}}56^{\text{s}}$; Riverside, $10^{\text{h}}55^{\text{m}}49^{\text{s}}$; Palomar, $10^{\text{h}}55^{\text{m}}51^{\text{s}}$; and Tucson (courtesy, U. S. C. and G. S.) $10^{\text{h}}55^{\text{m}}25^{\text{s}}$.

Isolated instances of this sort have been noticed before. The Alaskan earthquake of May 4, 1934, with epicenter at $61^{\circ}1/4\text{ N}$, $147^{\circ}1/2\text{ W}$, origin time $04^{\text{h}}36^{\text{m}}07^{\text{s}}$, and depth 80 km, produced a small wave at Pasadena at $05^{\text{h}}24^{\text{m}}44^{\text{s}}$.

A group of small shocks near Pomona, probably associated with the minor San Jose fault, is being investigated by Richter and Martner.

Routine bulletins for teleseisms and local shocks have been issued through the third quarter of 1946.

The most important shocks in the Southern California area during 1946 were the Walker Pass earthquake of March 15 (noted in the previous report), a shock of magnitude 5.6 on July 18 in the central Mojave Desert, and one of magnitude 5.0 on September 27, on the San Andreas fault in San Geronio Pass. The second of these is the largest Mojave Desert shock in twenty years of recording at Pasadena. (A larger one occurred on April 10, 1947.)

The great earthquakes shown in Table 1 (magnitude $7\frac{3}{4}$ and over) occurred during the year.

Table 1--Great earthquakes of 1946 (magnitude 7 3/4 and over) (preliminary determination)

Date	Time	Latitude	Longitude	Magnitude
	h m s	°	°	
August 4	17 51 05	19 1/4 N	69 W	8.1
September 12 ^a	15 20 20	23 1/2 N	96 E	7 3/4
September 29	03 01 55	4 1/2 S	153 1/2 E	7 3/4
December 20	19 19 05	32 1/2 N	134 E	8.2

^aSecond of two shocks, three minutes apart.

References

- GUTENBERG, B., Interpretation of records obtained from the New Mexico atomic bomb test, July 16, 1945, Bull. Seism. Soc. Amer., v. 36, pp. 327-330, 1946.
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