EARTHQUAKE STUDY IN SOUTHERN CALIFORNIA, 1947

B. Gutenberg and C. F. Richter

(Contribution No. 405, Balch Graduate School of the Geological Sciences)

This continues the previous report by GUTENBERG and RICHTER [1947]. Papers published during the year are also listed under FU [1947]; RICHTER [1947]; and WOOD [1947].

The book presenting revised study of the seismicity of the Earth will be published by the Princeton University Press. Until publication, the manuscript will be continuously revised to keep it up to date.

Reports on the following research were prepared for the meetings of the Seismological and Geological Societies of America at Pasadena in April 1948.

Gutenberg has investigated seismograms at epicentral distances from four degrees to 26° , constructed revised travel times for P and S, and determined the amplitudes of both phases as functions of distance. All observations are explained on the assumption that the velocities of both P and S decrease by roughly one per cent in the depth range below the Mohorovičić discontinuity, reach minima at about 80-100 km below the surface, and increase again at about 150 km below which Poisson's ratio remains near 0.30, appreciably higher than its values (near 0.25) in the upper layers.

J. M. Nordquist and L. P. Geldart have investigated coincidences in calendar date between earthquakes in the same area in different years. Such coincidences, at first sight surprisingly numerous, agree closely with the theoretical expectancy on the hypothesis of purely random occurrence.

Hugo Benioff is engaged on investigation of the release of energy in sequences of earthquakes. This includes aftershocks and also the general seismicity of limited regions, and applies to deep as well as to shallow shocks. Preliminary results indicate that each sequence forms an elastic, plastic, or combination elastic-plastic creep series.

C. H. Dix has consulted with those constructing the new electronic digital computer at Princeton, and is considering applications of this and other machines to seismology and geophysics.

The Manix earthquake [RICHTER, 1947] in the central Mojave Desert, developed fault trace phenomena on a very small scale (displacements of a few inches traceable for two to three miles) indicating left-hand strike slip on the roughly east-west Manix fault. This feature has been investigated with reference to the regional geology by J. P. Buwalda and C. F. Richter.

The instrumental records of aftershocks of the Manix earthquake have been studied by Richter and Nordquist. The data clearly indicate a line of epicenters trending slightly south of east from that of the main shock; this line is transverse to the Manix fault.

Response of the strain seismometers has been improved by a new transducer, and a second component at right angles to the first strain instrument has been installed.

Physical constants of all the Pasadena instruments have been checked, and some adjustments made. Figure 1 illustrates the response curves (to continuous sinusoidal waves) for seismometers now in routine service.

Construction has been commenced on a tiltmeter unit.

Routine bulletins for telesisms and local shocks have been issued through June and December 1947, respectively.

Fig. 1--Standard response curves for instruments in routine service at Pasadena

The most important shocks in the southern California area during 1947 were the Manix earthquake of April 10 (magnitude 6 1/2 or over) and a shock near Morongo Valley on July 24 (magnitude 5.5).

No great earthquake (magnitude 7 3/4 or over) occurred anywhere in the World during 1947. The Philippine earthquake of January 24, 1948, was of magnitude 8 at least.

References

- FU, C. Y., On seismic rays and waves (Pt. 1), Bull. Seis. Soc. Amer., v. 37, pp. 331-346, 1947
 GUTENBERG, B., and RICHTER, C. F., Earthquake study in southern California, 1946, Trans. Amer. Geophys. Union, v. 28, pp. 633-634, 1947.
 RICHTER, C. F., The Manix (California) earthquake of April 10, 1947, Bull. Seism. Soc. Amer., v. 37, pp. 171-179, 1947.
 WOOD, HARRY O., Earthquakes in southern California with geological relations (Pts. 1 and 2), Bull. Seis. Soc. Amer., v. 37, pp. 107-157, 217-258 + 4 maps, 1947.

Seismological Laboratory,
 220 N. San Rafael Avenue,
 Pasadena 2, California

(Manuscript received April 5, 1948; presented at the Twenty-Ninth Annual Meeting, Washington, D. C., April 23, 1948; open for formal discussion until November 1, 1948.)