Normal Earthquakes and Records of Tremors in the Earth's Rotation

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Introduction

January 1, 1959 will mark the completion of the 10th year of Seismographic recording in the city of Terre Haute, Indiana. To the people in general it will mean nothing; but to the few individuals who through the turbulent years extended a helping hand when it was most needed, the occasion will mark a time of rare accomplishment indeed.

Instrument Recording Previous to 1953

The original installation consisted of two modified Bosch-Omori seismographs oriented N-S and E-W. Recording on smoked paper at a magnification of about 25 to 30. The large earthquake of August 21, 1949 in the Queen Charlotte Islands and the great earthquake of August 15, 1950 were well indicated on records by these simple instruments. From 1949 to 1953 a total of 62 well defined earthquakes were reported. The modified Bosch-Omori seismographs worked very well, were easy to maintain, and very inexpensive to operate. The construction of these were published by Seismological Society of America in Earthquake Notes Dec. 1, 1955.

The Introduction of Photographic Recording

In the fall of 1953 a visit to the Institute of Technology of St. Louis University, and a talk with the late Reverend Doctor James B. Mackelwane, opened the way for the construction of a form of instrument using photographic recording. The seismograph is a rough copy of the Milne-Shaw type; but actually, as the years have gone by, I have learned to respect it as a new form of instrument developed out of sheer necessity. Its construction was published in Earthquake Notes, March 1956 under the name of the "Modified Milne-Shaw seismograph." Copies of both publications are still available at a very slight cost.

Normal Earthquakes

With the perfection of photographic recording a tremendous increase in sensitivity was accomplished; making it possible at times to obtain three or four clearly defined earthquake records per day. The reporting of these normal earthquakes is a very accurate determination of the arrival time of the principal wave fronts which for convenience are named P.S. and L. From S minus P the origin time can be found and in a few cases an iP will enable the observer by "Galitzins triangulation" to approximate an epicenter-reference. ("Vorlesungen über Seismometry," B. Galitzin 1914). The computing of magnitude is also

routinely carried on, and accomplished by first finding the ground displacement in microms; then using the equations as developed by Gutenberg and Richter. Magnitudes vary from 2.0 to 8.5 and are a measure of the actual energy spent by an earthquake. The precise calculation is described in a paper I presented before the Seismological Society of America at Saint Louis University June 14, 1958. The original work by "Wood and Anderson" and "Gutenberg and Richter" can be found in the "Bulletin of the Seismological Society of America, 1928, and 1945.' The paper I presented has been accepted for publication in Earthquake Notes 1958.

Records of Tremor in the Earth's Rotation

In the course of study of seismology vibrations of all kinds are constantly encountered. It is understood then why in the fall of 1956 the minute tremors which may be associated with the rotation of the earth were observed. A three hour exposure of the pole star region gave the first clue as to its presence; a special camera developed in 1957 confirmed the presence, and finally the instrument named the "stelar seismometer" was built and provided the necessary evidence that the vibrations have a connection with earthquakes in general.

The stelar seismometer is a telescope lens of long focal length, provided with a recording drum having a speed of one revolution per minute, and a photographic film of great speed. Eastman XXX has been used in the later respect. The records show a normal pattern which vary before, during, and after an earthquake occurs. It is emphasized that this project is only in a most elementary form and much remains to be done in this very interesting field of observational seismology.