DEPARTMENT OF THE INTERIOR
CANADA

HON. CHARLES STEWART, *Minister* W. W. CORY, C.M.G., *Deputy Minister*

PUBLICATIONS

OF THE

Dominion Observatory

OTTAWA

R. MELDRUM STEWART, M.A., *Director*

Vol. X

Bibliography of Seismology

No. 2

APRIL, MAY, JUNE, 1929

BY

ERNEST A. HODGSON, M.A.

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1929

Price, 10 cents

DEPARTMENT OF THE INTERIOR
CANADA

HON. CHARLES STEWART, *Minister* W. W. CORY, C.M.G., *Deputy Minister*

PUBLICATIONS

OF THE

Dominion Observatory

OTTAWA

R. MELDRUM STEWART, M.A., *Director*

Vol. X

Bibliography of Seismology

No. 2

APRIL, MAY, JUNE, 1929

BY

ERNEST A. HODGSON, M.A.

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1929

Bibliography of Seismology

April, May, June, 1929

This, the second issue of the Bibliography of Seismology as a publication of the Dominion Observatory, has been compiled with the assistance of a number of collaborators whose names are listed in the appendix. (A complete list of those who have assisted previously may be found in the appendix to the first issue.) Initials appended to various items of this bibliography indicate the names of those from whom references or asbtracts were received dealing with the respective publications. The co-operation is requested of all interested in making this bibliography as nearly as possible a complete index of publications dealing with the various branches of seismology or its applications.

101. ALDEN, Wm. C., "Landslide and Flood at Gros Ventre, Wyoming," American Institute of Mining and Metallurgical Engineers, Technical Publication No. 140 (Class I, Mining Geology, No. 17), New York, 1928.

— AMBRONN, Richard, "Methoden der angewandten Geophysik," Theod. Steinkopff, 258 pages, 84 illustrations, Dresden and Leipzig, 1926.

A translation of this entitled "Elements of Geophysics," has been made by Margaret C. Cobb. See No. 104 of this list.

102. BROCKAMP, B., "Registrierung von radio-gegebenen Zeichen," *Zeitschrift für Geophysik*, **4**, Heft 7-8, 404-405, 1928.

103. CAVASINO, A., "Bollettino Sismico, Anno 1924," Real Ufficio Centrale di Meteorologia e Geofiscia, 133 pages, Rome, 1928.

Fascicule 1, indicated above, deals with "Microsismi." See index to Fascicule 2 as No. 130 of this list.

104. COBB, Margaret C., "Elements of Geophysics," A translation of Ambronn's "Methoden der angewandten Geophysik," McGraw Hill, xi + 372 pages. Price $5. New York, 1928.

A review of the translation, written by Walter D. Lambert, appears in the *American Journal of Science*, Fifth Series, **15**, No. 89, 444-446, May, 1928.

105. CONRAD, Victor, "Das Schwadorfer Beben vom 8. Oktober 1927: (Ein Beitrag zur Kenntnis der Konstitution der oberen Erdkruste)," *Zeitschrift für Geophysik*, **4**, Heft 6, 286-289, 1928.

The following is the author's summary of this paper: "The examination of 24 diagrams, which reach from 26 to 1268 kilometers distance from the epicentre, confirms the P*-wave which had been found by the writer in the records of the Tauernbeben. The hodograph of the S*-wave discovered by H. Jeffreys could be also confirmed.

"Besides, hodographs were given for a new Px-wave and the co-ordinated distortional Sx-wave. The velocity of the Px-wave is only about three per cent smaller than that of the normal P-wave. The hodographs of both these waves are nearly parallel to each other. These circumstances suggested the writer to think the Px-wave is not directly transmitted but caused at the great discontinuity which A. Mohorovičić found 60 kilometers deep under the earth's surface.

"This explanation follows the idea of W. Schweydar who in case of artificial concussions comes to the conclusion that optical analogy is not always sufficient for explaining the ways of the elastic-waves in the interior of the earth.

"Several methods applied show practically alike that the focus lies in a depth of 28 kilometers. This depth may indicate a thickness of the granitic layer (H. Jeffreys) of 40 kilometers. These results, especially the great frequency of focus, situated in a depth of 30 kilometers, led to considerations regarding the manner of the origin of earthquakes. Mechanical explanations alone do not seem to be sufficient."

106. COTTON, Leo A., "Earthquake Frequency with Special Reference to Tidal Stresses in the Lithosphere," *Bulletin of the Seismological Society of America*, **12**, Nos. 2 and 3, 47-198, 1922.

A bibliography of 116 items is appended.

107. COTTON, Leo A., "Notes on the Relations of Earthquake Frequency and Earth Tides and their Significance in the Problem of Earthquake Forecasting," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section E, Article 9, 1511–1516, 1926 USCGS.

108. DAVISON, Charles, "The Annual Periodicity of Earthquakes," *Bulletin of the Seismological Society of America*, **18**, No. 4, 246-266, December, 1928.

The author introduces his subject by means of an historical review of previous analyses carried out for the purpose of determining the annual periodicity of earthquakes. Then, after describing the mathematical basis for the method of overlapping means used in his investigation, he proceeds to apply the method to a list of 461 Austrian earthquakes (1865-1884) as recorded by Fuchs. By means of tables he presents the results of his analyses of more than 100 lists of earthquakes in various parts of the world. It would be difficult to present his conclusions satisfactorily in a form shorter than that used by the author on pages 263-265. He discusses the results under the headings, "Ordinary earthquakes," "Slightly destructive earthquakes," and "Great destructive earthquakes." A bibliography of thirty-three items in addition to about twenty footnote references to publications accompanies the paper.

109. DAVISON, Charles, "The Eleven-year and Nineteen-year Periods and Other Related Periods of Earthquake Frequency," *The London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science*, **7**, No. 43, 580-586, March, 1929.

The author concludes that:—

(1) In the earthquakes of the Northern Hemisphere, there are periods of 11, 22, 33, 19, and 38 years, with maximum epochs in 1709, 1716, 1724, 1715-16, and 1724-25, respectively.

(2) All over the Northern Hemisphere the maximum epoch of each period is approximately the same.

(3) The periods of 11, 33, and 19 years affect similarly the destructive earthquakes of each intensity. The periods of 22 and 38 years are apparently confined to destructive earthquakes of intensities 3 and 2 only.

110. DEGOLYER, E. L., et al., "Geology of Salt Dome Oilfields" (A Symposium on the Origin, Structure and General Geology of Salt Domes with Special Reference to Oil Producion and Treating Briefly of the Salt Domes of North America), American Association of Petroleum Geologists, 797 pages, numerous maps, sections and diagrams. Price $6. Tulsa, Oklahoma, 1926.

This was a special publication without any designation other than its title. It forms a compilation of thirty-four papers, written by thirty authors. The papers therein published were presented at a symposium on salt domes, held at the Houston meeting of the American Association of Petroleum Geologists. They appeared originally in the Bulletin of the Association, but were later collected and reprinted in the above volume. Although the compilation deals chiefly with American domes, there are also good descriptions of those of Germany and Roumania. D.C.B.

111. DEVIK, Olaf, "Ein Accelerograph für das Praktikum," *Physikalische Zeitschrift*, **29**, No. 10, 308-311, 1928.

An abstract appears in *Physikalische Berichte*, **10**, No. 4, 343, February, 1929. J.B.M.

112. FLAMMARION, Camille, "L'Éruption du Krakatoa, et les Tremblements de Terre," Ernest Flammarion, editor, 249 pages, 18 illustrations. Price 60 centimes. Paris.

113. FREUDENBERG, W., "Die Graübunder Erdbeben und Wetterstürze im August, 1927," *Geologische Rundschau*, **19**, Heft 4, 319-320, 1928.

114. FUJIWHARA, Sakuhei and TAKAYAMA, Takeo, "On the Mechanism of the Great Sagami Bay Earthquake on September 1, 1923," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 149-176, March, 1929.

The table of contents and synopsis given by the authors read as follows:—

"1. Introduction.
"2. Sketch of the former theories.
"3. Facts to be explained.
"4. Outline of the proposed theory.
"5. Explanation of the facts from the proposed theory.
"6. Discussions on the proposed theory.
"7. Comparison with other theories.
"8. Discussions on the recognized facts.

"A theory of the earth vertical formation is proposed for the explanation of the mechanism of the great Sagami Bay Earthquake, 1923, based on the observed facts and results of survey, making use of model experiments."

115. GALITZIN, B., "Étude comparative du mouvement du sol dans la phase principale d'un tremblement de terre," *Saint Petersbourg Comptes rendus, Commission sismique permanente*, **7**, Book 1. P.B.

116. GALITZIN, B., "Détermination de la profondeur du foyer d'un tremblement de terre et de la vitesse de propagation des ondes sismiques dans les couches superficielles de l'écorce terrestre," *Comptes rendus de l'Académie des Sciences de France*, **155**, 375-379, Paris, July, 1912.

117. GEIJER, Per, "A Fault Surface," *Economic Geology*, **23**, No. 7, 804-805, November, 1928. J.B.M.

118. GHERZI, E., "Microséismes et déferlement des vagues sur les côtes," *Zeitschrift für Geophysik*, **1**, Heft 4, 163, 1924-25.

119. GHERZI, E., "Note sur des microséismes solitaires (ondes "Z") de longue période et sur microséismes à groupes," *Zeitschrift für Geophysik*, **4**, 422-424, 1928.

120. GUTENBERG, B., "Die seismische Bodenunruhe," Dissertation Göttingen 1911, *Beiträge zur Geophysik*, **11**, 314-353, 1912.

121. GUTENBERG, B., "Untersuchungen über die Bodenunruhe mit Perioden von 4^s-10^s in Europa," *Veröffentlichungen des zentral Bureaus der internationalen seismologishen Assoziation*, 106 pages, 121 figures, Strassburg, 1921.

122. HARBOE, E. G., "Das Erdbebenobservatorium auf der Disko-Insel," *Beiträge zur Geophysik*, **11** (Kleine Mitteilungen), 9-28, Leipzig, 1911.

The paper reports the earthquakes recorded at Disko island from October 20, 1907, to August 9, 1909. The instruments used were two components of a mechanically-recording Bosch horizontal seismograph having a stationary mass of 100 kilograms, a magnification of 100, and a paper speed of 18 millimeters per minute. A total of 66 earthquakes were recorded of which the majority were weak and gave records which were illegible. The local or near quakes occurred in groups, practically all being felt in the period from November to February in each year. None were severe. The report concludes with a tabulation of the microseismic activity observed during the above period.

123. (1) HECK, N. H., "Some Joint Needs of Oceanography and Seismology in the Pacific Region," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **1**, 200-202, 1926.

The paper stresses the need of maps showing the configuration of the ocean bottom. USCGS+N.H.H.

123. (2) HECK, N. H., "Report on Network of Earthquake Observations of Countries Bordering the Pacific," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section E, Article 1, 1486-1497, five maps, 1926.

The paper calls attention to changes made in the network of Pacific earthquake stations. The maps show the principal epicentres which have occurred beneath the sea in the Pacific region from 1904 to 1922, exclusive of 1912. Projected changes in the network are outlined. USCGS+N.H.H.

123. (3) HECK, N. H., "Transmission of Earthquake Waves Across the Pacific," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section E, Article 5, 1504-1507, 1926. USCGS+N.H.H.

123. (4) HECK, N. H. and SERVICE, Jerry H., "Correct Values of the Velocity of Sound for Echo Soundings in the Pacific Ocean," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **1**, 202-204, 1926.

The paper gives an abstract of a paper by the same authors published as Special Publication No. 108 of the United States Coast and Geodetic Survey. USCGS+N.H.H.

124. HECKER, O., "Ergebnisse der Beobachtungen der mikroseismischen Bewegungen an den europäischen Stationen an vier Tagen des Winters 1911/12," *Beiträge zur Geophysik*, **13** (Kleine Mitteilungen), 13-32, 1914.

125. HEILAND, C., "Geophysical Methods of Prospecting, Principles and Recent Successes," *Quarterly of the Colorado School of Mines*, **24**, No. 1, 163 pages. Price $1. March, 1929.

The Seismic Method is dealt with on pages 82-98. The author describes the method in a general way, indicates the areas in the United States and Mexico in which the seismic method has been known to have been used, reproduces some typical records obtained, lists the 70 salt domes which have been located by seismic methods, and discusses the depth which can be penetrated by the use of such methods, and the cost per acre to carry on the work. On page 86 he notes a third method developed by Prof. James Fisher to determine the depth of overburden in prospective dam sites, etc. This method appears to have great possibilities as the cost of surveying is greatly reduced.

126. HERITSCH, F., "Analogien im seismischen Verhalten der nordöstlichen Alpen und der West-Karpathen," *Geologische Rundschau*, **10**, 118-125, 1920.

127. IMAMURA, Akitune, "On the Seismic Activity of Central Japan," *Japanese Journal of Astronomy and Geophysics*, **6**, No. 2, 119-137, with 9 figures, Tokyo, 1928.

128. IMAMURA, Akitune, "On the Kurile Earthquake of January 13, 1929," *Proceedings of the Imperial Academy*, **5**, No. 3, 133-135, Tokyo, 1929.

The author describes the records of the earthquake which occurred on the above date, at approximately $\phi = 47°$N., $\lambda = 155°$ E. The records obtained on seismographs having a free period of more than a minute show well-marked movements, of period approximately one minute, which are not recorded on the instruments of shorter period.

129. IMAMURA, Akitune and NASU, Nobuji, "Supplement to the Report of the Network of Earthquake Observations in Japan. Synopsis of the Seismological Observatories of the Imperial Universities," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section E, Article 3, 1498-1503, 1926.

The paper to which the above is a supplement is one by Shin'ichi Kunitomi on "Organization of the Seismic Observation in Japan," published by the Central Meteorological Observatory, Tokyo, October, 1926.

130. INGRAO, G., "Bollettino Sismico, Anno 1924," Real Ufficio Centrale di Meteorologia e Geofisica, 25 pages, Rome, 1928.

Fascicule 2, indicated above, deals with "Macrosismi." See index to Fascicule 1 as No. 103 of this list.

131. ISHIMOTO, Mishio, "Construction d'un pendule horizontal de quartz et observations sur les variations de l'inclinaison de la surface terrestre," *Japanese Journal of Astronomy and Geophysics*, **6**, No. 2, 83-118, 16 figures, 4 tables, Tokyo, 1928.

132. ISHIMOTO, Mishio, "Sur le mécanisme de la production des ondes sismiques," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 127-147, March, 1929.

In Japanese with an abstract in French.

— ISHIMOTO, Mishio and SUYEHIRO, Kyoji, "On the Vibration of Low Monolithic Buildings." See No. 183 of this list.

133. (1) ISHIMOTO, Mishio and TUZI, Kônosuke, "Variations diurnes de marche d'une horloge astronomique et leurs relations avec l'apparition des tremblements de terre," *Proceedings of the Imperial Academy*, **5**, No. 1, 17-20, Tokyo, January, 1929.

133. (2) ISHIMOTO, Mishio and TUZI, Kônosuke, "Monthly Means of the Daily Rates of the Riefler Clock in the Tokyo Astronomical Observatory and their Bearing on the Occurrence of Earthquakes," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 355-360, March, 1929.

134. KABURAKI, Tokio, "Effect of the Kwantô Earthquake upon Marine Organisms," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section E, Article 12, 1523-1527, 1926. USCGS.

135. KOTÔ, Bundjiro, "The Iwatsuki Seismic Zone as a Factor of the Great Tokyo Earthquake of 1923," *Proceedings of the Imperial Academy*, **5**, No. 3, 130-132, Tokyo, March, 1929.

136. LAMBERT, Walter D., "The Variations of Latitude, Tides and Earthquakes," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section E, Article 10, 1517-1522, 1926. USCGS.

137. (1) LA NATURE SUPPLÉMENT, "L'aviation pendant le tremblement de terre du Japon," No. 2610, 113, April, 12, 1924.

137. (2) LA NATURE SUPPLÉMENT, "Les automobiles et le tremblement de terre du Japon," No. 2619, 185, June 14, 1924.

137. (3) LA NATURE SUPPLÉMENT, "Le tremblement de terre du Japon du 1er septembre 1923," No. 2626, 33, August, 2, 1924.

137. (4) LA NATURE SUPPLÉMENT, "Tremblements de terre en Algérie," No. 2642, 161, November 22, 1924.

137. (5) LA NATURE SUPPLÉMENT, "Les tremblements de terre du 8 janvier 1925 dans la Côte-d'Or (Observations de M. Bidault de l'Ile)," No. 2655, 57, February 21, 1925.

137. (6) LA NATURE SUPPLÉMENT, "Un nouveau tremblement de terre au Japon," No. 2670, 177, June 6, 1925.

137. (7) LA NATURE SUPPLÉMENT, "Le tremblement de terre de Californie," No. 2675 9, July 11, 1925

138. MACHATSCHEK, F., "Eine neue geotektonische Theorie," *Petermanns Mitteilungen*, **74**, Heft, 7-8, 197-199, 1928.

139. MACK, K., "Die Ermittelung der Herdentfernung eines Erdbebens mittels Oberflächenwellen," *Zeitschrift für angewandte Geophysik*, **1**, Heft 2, 39-42, December, 1922.

140. (1) MAINKA, C., "Über mikroseimische Bodenunruhe und Oberflächenwellen," *Physikalische Zeitschrift*, **14**, No. 12, 555-557, June 15, 1913.

140. (2) MAINKA, C., "Über die Häufigkeit einzelner Mi.U.-Perioden," *Physikalische Zeitschrift*, **14**, No. 25, 1285-1286, December 15, 1913.

141. MAINKA, C., "Ortsbestimmung von Erdbebengebieten mit Hilfe des Zeitunterschiedverfahrens und anderes," *Zeitschrift für angewandte Geophysik*, **1**, Heft 2, 43-56, December, 1922.

142. MARTEL, R. R., "The Southern California Council in Earthquake Protection," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section D, Article 1, 1433-1438, 1926.

The paper outlines the organization of the above-mentioned council—a body formed shortly after the Santa Barbara earthquake of 1925, through the initiative of Dr. Millikan.

143. MATSUZAWA, Takeo, "Preliminary Notes on the Transmission of Earthquake Waves across the Pacific," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section E, Article 7, 1508-1509, 1926. USCGS.

144. (1) MATSUZAWA, Takeo, "Observation of some Recent Earthquakes and their Time-distance Curves," (Part II), *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 177-204, March, 1929.

The paper discusses the time-distance curves of the following earthquakes:—
(1) Etigo, October 27, 1927.
(2) Hokkaidô, February 4, 1926.
(3) Hokkaidô, July 13, 1927.
(4) Tango, March 7, 1927.
(5) Haneda, August 3, 1926.
(6) South-western Japan, June 5, 1926.
(7) Kii-Suidô, July 7, 1928.
It is fully illustrated.

144. (2) MATSUZAWA, Takeo, "Observation of Some Recent Earthquakes and Their Time-distance Curves," (Part III), *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 205-212, March, 1929.

This paper summarizes the results outlined in the two first parts for the *P* phase.

144. (3) MATSUZAWA, Takeo, "Observation of Some Recent Earthquakes and their Time-Distance Curves," (Part IV), *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 213-229, March, 1929.

This paper outlines the results obtained from the analyses in Parts I and II and having reference to the surface waves. The conclusions are as follows:—

"In this paper the real existence of two kinds of surface waves, that is Rayleigh waves and waves of Love's type, has been affirmed from the seismometrical point of view. Especially in the case of trans-Pacific waves from a remote origin, they can be distinctly identified. They both undergo dispersion of a certain character which is to be expected from the theory of elasticity, qualitatively, at least. From the dispersion of waves across the Pacific it would seem justifiable to assume that the superficial earth's crust under the Pacific also is stratified.

"Velocities of propagation of the S, S^* and $\bar{S}$ waves determined in part II are quite consistent with the mode of dispersion of the waves of Love's type here obtained. Under the Pacific, however, it seems that the layer in which the velocity of propagation of the distortional movement is 3.15 km/sec. may be absent. Comparison of Fig. 5-a with

Fig. 6 will show that the thickness of the upper layer may be much less than 50 km. As the density of each layer is not known for certain, the author will not attempt to find, by arbitrarily adjusting the constants, a value for the thickness by means of which the observed dispersion might be explained in a plausible manner.

"It is also remarkable to note that the dispersion of trans-Pacific waves is different, quantitatively, from that of transcontinental waves, which difference would furnish plausible evidence for the existence of a different crustal stratification in both regions, as has been suggested by some European writers."

145. MEISZNER, O., "Über den Zusammenhang der mikroseismischen Bewegung mit meteorologischen Faktoren," *Beiträge zur Geophysik*, **13** (Kleine Mitteilungen), 204-209, 1914.

146. MENDEL, Henry, "Die seismische Bodenunruhe in Hamburg und ihr Zusammenhang mit der Brandung," 47 pages, 6 figures, 12 tables, Hamburg, 1929.

This paper is the author's doctorate thesis in the Faculty of Science and Mathematics of the University of Hamburg.

147. MEYERMANN, B., "Die Änderung der Rotationsgeschwindigkeit der Erde," *Naturwissenschaften*, **16**, Heft 20, 353-354, 1928, and **16**, Heft 24, 494, 1928.

A brief review by Güntherschulze is given in *Physikalische Berichte*, **9**, Heft 19, 1818, October 1, 1928.

— MIYABE, Naomi and TERADA, Torahiko, "Experimental Investigations of the Deformation of Sand Mass by Lateral Pressure." See No. 188 of this list.

— MIYABE, Naomi and TERADA, Torahiko, "A Long Period Fluctuation in Latitude of the Seismic Activity on the Earth." See No. 189 of this list.

148. MOHOROVIČIĆ, A., "A Critical Review of the Seismic Instruments Used Today and of the Organization of Seismic Service," *Bulletin of the Seismological Society of America*, **14**, No. 1, 38-59, March, 1924.

The changes in the seismic service within the past five years is quite forcibly brought home by a reading of this paper. Some of the criticisms, unfortunately, still apply.

149. (1) MONTESSUS de BALLORE, F., "Périodes de Brückner et tremblements de terre destructeurs," *Comptes rendus de l'Académie des Sciences de France*, **155**, 379-380, Paris, July, 1912.

149. (2) MONTESSUS de BALLORE, F., "Tremblements de terre et taches solaires," *Comptes rendus de l'Académie des Sciences de France*, **155**, 560-561, Paris, September, 1912.

149. (3) MONTESSUS de BALLORE, F., "Observations sismologiques faites à l'île de Pâques," *Comptes rendus de l'Académie des Sciences de France*, **155**, 625-626, Paris, September, 1912.

149. (4) MONTESSUS de BALLORE, F., "Sur les tremblements de terre des provinces baltiques de la Russie (Esthonie, Livonie et Courlande)," *Comptes rendusde l'Académie des Sciences de France*, **155**, 1200-1201, Paris, December, 1912.

150. MORISHITA, Masanobu, "Some Interesting Geological Features Observed on the Median Line of Southwest Japan," *Proceedings of the Imperial Academy*, **5**, No. 1, 38-41, Tokyo, January, 1929.

— MUTO, K., UCHIDA, Y., and SAIDA, T., "An Investigation of the Vibration of a Steel Frame." See No. 194 of this list.

151. NAITO, Tachu, "Earthquake-proof Construction" (Abstract only), *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section D, Article 5, 1474-1481, 13 illustrations, 1926. USCGS.

152. NAKANO, H., "Rayleigh Waves in Cylindrical Co-ordinates," *The Geophysical Magazine*, **1**, No. 6, 255-303, Tokyo, September, 1928.

153. NASU, Nobuji, "On the Aftershocks of the Tango Earthquake," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 245-331, March, 1929.
In Japanese with a long abstract in English.

154. NASU, Nobuji, "On the Crustal Block that Played an Important Role in the Destructive Tango Earthquake of 1927," *Proceedings of the Imperial Academy*, **5**, No. 4, 164-166, Tokyo, 1929.

—— NASU, Nobuji and IMAMURA, Akitune, "Supplement to the Report of the Network of Earthquake Observations in Japan." See No. 129 of this list.

155. NEUMANN, Frank, "The Southern Appalachian Earthquake of November 2, 1928", *Bulletin of the Seismological Society of America*, **18**, No. 4, 243-245, December, 1928.
The paper presents the results of a questionnaire campaign carried on by the United States Coast and Geodetic Survey. The origin indicated was northwest of Asheville, N.C., and close to the boundary between North Carolina and Tennessee.

156. (1) NIKIFOROV, P., "Reorganization of the Seismological Service of the U.S.S.R. on the Pacific," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section E, Article 14, 1528-1529, 1926. USCGS.

156. (2) NIKIFOROV, P., "A New Seismograph of Short Reduced Length," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section E, Article 15, 1529-1530, 1926.
The author describes a seismograph of very short reduced length, and points out that it was announced in 1924 previous to the publication by Wood and Anderson of the description of their torsion seismometer. He compares the two instruments as to freedom from horizontal displacements of the hanging weight and expresses the opinion that the Wood-Anderson seismograph is weaker than the Russian design in this regard.

—— NISHIMURA, Genrokuro and SEZAWA, Katsutada, "Generation of Rayleigh Waves from an Internal Source of Multiplet Type." See No. 174 of this list.

—— NISHIMURA, Genrokuro and SEZAWA, Katsutada, "Elastic Equilibrium of a Spherical Body under Surface Tractions of a Certain Zonal and Azimuthal Distribution." See No. 175 of this list.

157. ODDONE, E., "Tremblements de terres et taches solaires," Comptes rendus des Séances de la deuxième Réunion de la Commission permanente et de la première Association générale de l'Association internationale de Sismologie, page 213, Strasbourg, 1908.

158. ODDONE, E., "Per l'interpretazione delle onde sismiche superficiali," *Atti della Reale Accademia Nazionale dei Lincei*, **8**, Fascicoli 1-2, 64-70, 1928. USCGS.

159. (1) OMORI, F., "Preliminary Note on the Formosa Earthquake of March 17, 1906," *Bulletin of the Imperial Earthquake Investigation Committee*, **1**, 53-69, Tokyo, 1907.

159. (2) OMORI, F., "Notes on the Secondary Causes of Earthquakes," *Bulletin of the Imperial Earthquake Investigation Committee*, **2**, No. 2, 101–135, Tokyo, 1908.

159. (3) OMORI, F., "The Semi-destructive Earthquake of April 26, 1922," *Imperial Earthquake Investigation Committee, Seismological Notes*, No. 3, 1-30, Tokyo, December, 1922.

160. PIGOT, E. F., S. J., "Some Remarkable Seismograms from Pacific Epicentres," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section E, Article 13, 1527, 1926.

Only the abstract appears, which reads as follows: "Out of a large number of Pacific seismograms obtained at Riverview Observatory, near Sydney, from 1909, March, to date, a few have been selected exhibiting certain characteristics which seem of considerable interest. Among these are:—

"(1) The existence of certain wave-forms, apparently not yet published as having been observed.

"(2) Divergence in wave-length for corresponding phases.

"(3) Large amplitude of iP wave-front, and consequent accuracy in azimuth determination by Galitzin method.

"A brief description of instrumental equipment at Riverview is added."

In the same volume of the Proceedings, Father Pigot is reported as having presented a "Note on Sub-oceanic Wave-velocities in Pacific Region" (Vol. 2, page 1507). The abstract alone appears, as follows: "Evidence is adduced from large earthquakes (in the New Guinea region especially) supporting the Angenheister contention of increased velocity of surface-waves under oceanic areas."

161. Reid, Harry Fielding, "Note on Surface Earthquake Waves," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo,* **2,** Section E, Article 16, 1531-1533, 1926. USCGS.

162. Reid, Harry Fielding, "The Advance of an Earthquake Disturbance," *Terrestrial Magnetism* **33,** No. 3, 148, 1928.

163. Renquist, Henrik, "Über kartographische Darstellung der Seismizität," *Zeitschrift für Geophysik,* **4,** Heft 7-8, 348-352, 1928.

164. Rothé, E., "Summary of the Note Presented to the Pan-Pacific Congress of October, 1926," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo,* **2,** Section E, Article 8, 1926. USCGS.

165. Ruaño, Roque (Rev.), "How Earthquakes Affect Different Types of Structures and the Means by which such Structures, Especially Their Foundations, May be Protected Against Earthquakes" (Summary only), *Proceedings of the Third Pan-Pacific Science Congress, Tokyo,* **2,** Section D, Article 3, 1460, 1926. USCGS.

166. Rudolph, O. C., "Recording Vibration Meter," *Instruments,* **2,** No. 3, 103–104, March, 1929.

The instrument as described does not seem to be astatic. While it is said to be modeled on the Wiechert vertical component seismograph, it seems to omit the most essential element of that instrument. J.B.M.

167. Rudski, M. P., "Über die Bewegung des horizontals Pendels," *Gerland's Beiträge zur Geophysik,* **6,** 138-155, 1904. P.B.

— Saida, T., Muto, K., and Uchida, Y., "An Investigation of the Vibration of a Steel Frame." See No. 194 of this list.

168. Saita, Tokitaro, "Earthquake-proof Construction in Japan," *Proceedings of the Third Pan-Pacific Science Congress. Tokyo,* **2,** Section D, Article 2, 1438-1459, 1926.

This is a most valuable summary of the papers published in Japan on the above subject. Brief abstracts are given of the more important papers. The data obtained are presented in condensed form.

169. Sano, Riki, "Notes on Earthquake-proof Building Construction," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo,* **2,** Section D, Article 4, 1461-1473, 1926.

This paper is a valuable tabulation of regulations which have been found useful in reducing the damage to buildings in earthquake areas. The regulations are listed under the following headings:—

(1) Building Site and Foundation.
(2) Brickwork.
(3) Steel Skeleton Construction.
(4) Reinforced Concrete Construction.
(5) Wooden Frame Construction.

A total of sixty concise specifications are listed in this article. It is illustrated by means of twenty text-figures.

170. SARNETZKY, Heinrich, "Grundzuge der Luft- und Erdbildmessung," Gebrüder Borntraeger, Sammlung Borntraeger, **14**, 236 pages, 117 figures, 4 tables. Berlin, 1928.

A beautifully printed, fully illustrated presentation of the theory and practice of aerial surveying and mapping. This book should prove of interest and value to those investigating field conditions after an earthquake by means of aerial photographs.

171. SCHWINNER, Robert, "Zur Deutung der Transversalbeben in den nordöstlichen Alpen," *Zeitschrift für Geophysik*, **5**, Heft 1, 16-31, 1929.

—— SERVICE, Jerry H. and HECK, N. H., "Correct Values of the Velocity of Sound for Echo Soundings in the Pacific Ocean." See No. 123 (4) of this list.

172. SEZAWA, Katsutada, "Formation of Deep-water Waves due to Subaqueous Shocks," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 19-46, March, 1929.

The author summarizes his results as follows:—

"(1) In spite of very small displacements of the compressional waves in the neighbourhood of the origin in the interior of the water, the excited surface waves have relatively large amplitudes.

"(2) The generated surface waves are chiefly the ordinary gravity waves having the same frequency as that of the origin together with their wave length proper to the period.

"(3) The distribution of the wave motion on the surface of water always conspires with the modes of oscillation at the origin.

"(4) This fails in a three-dimensional case where a doublet oscillates horizontally. In this, notwithstanding the maintenance of the natures of the vertical and the horizontal components of displacement in wave profile and in azimuthal distribution, the azimuthal component of displacement quickly disappears as the distance from the disturbed portion is increased."

173. SEZAWA, Katsutada, "Further Studies on Rayleigh-waves having Some Azimuthal Distribution," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 1-18, March, 1929.

The author's summary is as follows:—

"(1) Rayleigh-waves having azimuthal distribution can be transmitted on the surface of a semi-infinite solid or a spherical surface without diffusion of displacements in each wave front.

"(2) Though in the case of the propagation of Rayleigh-waves on plane surface the nature of the vertical and the horizontal components of displacement in wave profile and in azimuthal distribution is maintained for all distances, the azimuthal component of displacement quickly disappears as the distance from the origin increases, showing the nature quite different from the bodily elastic waves.

"(3) The law of pull and push is applicable even to the surface waves, with the condition that the azimuthal component is out of consideration. This law is also valid in the case of the transmission of waves caused by the arbitrary disturbance.

"(4) When the disturbance acts on an interior point of the body the azimuthal distribution of displacement on the surface is in conformity with the motion of the source to a certain extent.

"(5) Even at the equatorial circle of the sphere long Rayleigh-waves as affected by the curvature of the surface have the azimuthal and the ordinary components of comparable magnitudes; in the vicinity of the seismic pole these waves have the large azimuthal component compared with the vertical and the radial components.

"(6) Short waves show the nature of giving the large azimuthal component only in very vicinity of the seismic epicentre."

174. SEZAWA, Katsutada and NISHIMURA, Genrokuro, "Generation of Rayleigh Waves from an Internal Source of Multiplet Type," *Proceedings of the Imperial Academy*, **5**, No. 2, 75-77, Tokyo, February, 1929.

175. SEZAWA, Katsutada and NISHIMURA, Genrokuro, "Elastic Equilibrium of a Spherical Body under Surface Tractions of a Certain Zonal and Azimuthal Distribution," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 47-62, March, 1929.

176. SHIDA, Toshi, "On the Elasticity of the Earth and the Earth's Crust," *Memoirs of the College of Science and Engineering, Kyoto Imperial University*, **4**, No. 1, 112, 1912.

177. SIMMONS, W. C., "The East African earthquake of January 6, 1928," *Nature*, No. 3056, **121**, 844, 1928.

178. SKUTSCH, Rudolf, "Über Apparate zur Aufzeichnung von Bewegungen," *Glassers Annalen*, **103**, No. 9, 109-113, 1928.

An abstract appears in *Physikalische Berichte*, **10**, No. 4, 347, February, 1929. J.B.M.

179. SOHON, F. W., S. J., "A Graphical Determination of the actual amplitude of the Earth's Motion from Seismological Data," *Bulletin of the Seismological Society of America*, **14**, No. 3, 185-196, September, 1924.

180. SPIESS, Commandant, "Note sur le tremblement de terre de Provence du 11 juin 1909," *Comptes rendus, Congrès de Sociétés savantes, Poitiers*, 1926.

181. SUYEHIRO, Kyoji, "A Device for Preventing the Instability of Horizontal Seismometers," *Proceedings of the Imperial Academy*, **4**, No. 10, 597-699, Tokyo, December, 1928.

182. SUYEHIRO, Kyoji, "On the Damped Transversal Vibration of Prismatic Bars," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 63-70, March, 1929.

183. SUYEHIRO, Kyoji and ISHIMOTO, Mishio, "On the Vibration of Low Monolithic Buildings," *Proceedings of the Third Pan-Pacific Science Congress, Tokyo*, **2**, Section D, Article 6, 1482-1486, 1926. USCGS.

184. TAKAHASI, Ryûtarô, "Tilting Motion of the Earth Crust Caused by Tidal Loading," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 85-108, March, 1929.

His summary reads:—

"(1) The tilting of the earth crust near a sea shore follows quite faithfully the ebb and flood of the oceanic tides. At Aburatubo a rise of sea water by 34 cm. produces a tilting of 0″.22 at a point of 23 metres apart from the beach line.

"(2) Almost the whole of the observed amount of tilting may be explained by the effect of the tidal loading. The deflections of the tiltmeter from the other possible causes are all less than the order of 0″.01.

"(3) Even the small secondary undulations of tides or the seiches in the Aburatubo Bay produce a sensible tilting of the ground.

"(4) Neither Boussinesq's solution nor any other known is not fitted for the present case. Shida's postulate of increase of the effective rigidity of the earth crust with distances does not hold good in this case.

"(5) The most plausible way of explaining the tilting phenomena seems to be of assuming a sudden jump in the value of the effective rigidity of the crust at a distance of about 150 metres from the observing station, taking for the rigidity of the earth crust within the distance of the discontinuity that of the rock underlying the observing station and for the effective rigidity of the crust beyond the discontinuity one of the order of 10^{11} c.g.s."

185. TAKAHASI, Ryûtarô, "A Graphical Determination of the Position of the Hypocentre of an Earthquake and the Velocity of the Propagation of the Seismic Waves," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 231-244, March, 1929.

— TAKAYAMA, Takeo and FUJIWHARA, Sakuhei, "On the Mechanism of the Great Sagami Bay Earthquake on September 1, 1923." See No. 114 of this list.

186. TAMS, E., "Zur Frage der täglichen Perioden in der Stoszfrequenz der vogtländischen Erdbebenschwärme," *Zeitschrift für angewandte Geophysik*, **1**, Heft 7, 193-213, December, 1923.

187. TAMS, E., "Die Seismizität der Ozeane und Kontinente," *Zeitschrift für Geophysik*, **4**, Heft 7-8, 321-348, 1928.

An abstract of the above paper appeared in an earlier issue of *Zeitschrift für Geophysik* (**4**, Heft 5, 245-246, 1928).

188. TERADA, Torahiko and MIYABE, Naomi, "Experimental Investigations of the Deformation of Sand Mass by Lateral Pressure," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 109-126, March, 1929.

This paper is beautifully illustrated by twenty-nine photographs of deformation tests.

189. TERADA, Torahiko and MIYABE, Naomi, "A Long Period Fluctuation in Latitude of the Seismic Activity on the Earth," *Bulletin of the Earthquake Research Institube, Tokyo Imperial University*, **6**, 333-343, March, 1929.

190. TSUBOI, Chûji, "An Interpretation of the Results of the Repeated Precise Levellings in the Tango District after the Tango Earthquake in 1927," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 71-83, March, 1929.

191. TURNER, H. H., "The International Seismological Summary for 1925, July, August, September," University Observatory, 181-252, Oxford, 1928.

— TUZI, Kônosuke and ISHIMOTO, Mishio, "Variations diurnes de marche d'une horloge astronomique et leurs relations avec l'apparition des tremblements de terre." See No. 133 (1) of this list.

— TUZI, Kônosuke and ISHIMOTO, Mishio, "Monthly Means of the Daily Rates of the Riefler Clock in the Tokyo Astronimical Observatory and their Bearing on the Occurrence of Earthquakes." See No. 133 (2) of this list.

192. TYNAN, J. W., S. J., "Earthquakes and Seismographs," *Science and Invention*, **16**, No. 9, 816-817, 865-872, January, 1929.

Profusely illustrated by cuts and diagrams of the Fordham University station, and the Galitzin-Wilip, Milne-Shaw, and Wenner seismographs. J.B.M.

193. TYNAN, J. W., S. J., "The Wilip-Galitzin Seismograph," *Instruments*, **2**, No. 3, 91–94, March, 1929.

This article describes the Wilip-Galitzin seismographs as installed at Fordham Universitv. New York. J.B.M.

194. UCHIDA, Y., SAIDA, T., and MUTO, K., "An Investigation of the Vibration of a Steel Frame," *Bulletin of the Earthquake Research Institute, Tokyo Imperial University*, **6**, 345-353, March, 1929.
In Japanese with an abstract in English.

195. WADATI, K., "Shallow and Deep Earthquakes," *The Geophysical Magazine*, **1**, No. 4, 161-202, Tokyo, March, 1928.
The chief headings of his discussion are as follows:—
1. Introduction.
2. General Remarks on the Depth of Earthquake Foci.

I. On the Depth of Shallow Earthquakes.
3. A Simple Method for Estimating the Depth of Shallow Earthquakes.
4. Depths of Local Shocks in the Kwantô District.

II. On the Existence of Deep Earthquakes.
6. Abnormal Distribution of Seismic Intensity.
7. (P-S) Wave.
8. Location of Epicenter.
9. Deep Earthquakes.

III. On the Deep Earthquake of July 27th, 1926.
10. Observational data.
11. Epicenter.
12. The "Laufzeit" Curve of (P-S) Wave.
13. Determination of Depth of Focus.
14. Numerical Calculations.
15. Discussion on the Calculation.
16. Distribution of Seismic Intensity and the Depth of Focus.
17. Seismograms of Deep Earthquakes.
18. On the Omori's "Seismograms showing no Preliminary Tremor."

IV. The Deep Earthquake Zone and Other Problems.
19. The Deep Earthquake Zone.
20. On the Relation Between the Occurrences of Deep and Shallow Earthquakes.
21. On the Velocity of Seismic Waves in the Upper Earth's Crust.
22. On the Effect of the Surface Layers.
23. Summary.

196. WANNER, E., "Jahresbericht des Schweizerischen Erdbebendienstes 1927," *Annalen der Schweizerischen Meteorologischen Zentralanstalt*, No. 5, 1-20, Zürich, 1927.

197. WEIKMANN, L., "Der Umbau des Leipziger Seismographen und die in den Jahren 1925, 1926, und 1927 aufgezeichneten Erdbeben," *Berichten der mathematisch-physikalischen Klasse der Sächsischen Akademie der Wissenschaften zu Leipzig*, **80**, 496 pages + 14 tafeln.
A report from Erdbebenwarte des Geophysikalischen Institutes der Universität Leipzig.

198. WELLMANN, Hermann, "Untersuchungen über die Perioden der Nachläufer in Fernbebenregistrierungen," *Zeitschrift für angewandte Geophysik*, **1**, Heft 7, 214-217, December 1923.

199. WHIPPLE, F. J. W., "The Action of wind on seismographs," *Zeitschrift für Geophsik*," **4**, Heft 7-8, 417-419, 1928.
The author states that the instruments at Kew very distinctly register movements due to wind which are not the result of air currents set up by the wind in the seismograph vault or the instrument cases. He estimates the amount of tilt necessary to account for the amplitudes shown by their instruments for a typical storm. The paper is illustrated by a reproduction of parts of the records examined. F.J.W.W.

200. YAMAMOTO, Rokuro, "Contributions à l'étude des constitutions intérieures du globe terrestre," *Japanese Journal of Astronomy and Geophysics*, **6**, No. 3, 161-176, Tokyo, 1929.

LIST OF COLLABORATORS

The appended initials are those used to indicate, in each case, the items contributed by the respective collaborator.

Barton, Donald C., D.C.B.
Petroleum Building, Houston, Tex., U.S.A.

Byerly, Perry, P. B.
Bacon Hall, Berkeley, Cal., U.S.A.

Heck, N. H. N.H.H.
United States Coast and Geodetic Survey, Washington, D.C., U.S.A.

Macelwane, James, B., S. J., J.B.M.
Saint Louis University, Saint Louis, Mo., U.S.A.

United States Coast and Geodetic Survey, USCGS.
Washington, D.C., U.S.A.

Whipple, F. J. W., F.J.W.W
Kew Observatory, Richmond, Surrey, England.