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DEPARTMENT OF THE INTERIOR
CANADA

HON. THOMAS G. MURPHY, *Minister*

H. H. ROWATT, *Deputy Minister*

PUBLICATIONS
OF THE
Dominion Observatory
OTTAWA

R. MELDRUM STEWART, *Director*

Vol. X

Bibliography of Seismology

No. 14

APRIL, MAY, JUNE, 1932

BY

ERNEST A. HODGSON

OTTAWA
F. A. ACLAND
PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
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1301. AGAMENNONE, G., "Il terremoto Campano del 12 marzo 1911," *Bollettino della Società Sismologica Italiana*, 29, No. 6, 205-225, 10 illustrations, Rome, 1931.
1302. AMERICAN PHYSICAL SOCIETY, "Program of the Annual Meeting, New Orleans, Louisiana, December 29-30, 1931, in affiliation with Section B—Physics—of the American Association for the Advancement of Science," *Bulletin of the American Physical Society*, 6, No. 7, 24 pages in reprint, New York, December 11, 1931.
- On pages 20-23 are listed the papers in the Geophysics Program, of which the following are of interest to seismologists. An abstract of each paper is published in the above report.
- "The Calculation of the Motion of the Ground from Seismograph Records," H. A. Wilson.
- "Earth Amplitudes in Seismic Prospecting," Maurice Ewing.
- "Assymetry of Sound Velocity in Stratified Geologic Formations," Burton McCollum and F. A. Snoll.
- "Velocity of Elastic Waves in Granite," L. Don Leet and Maurice Ewing.
- "The Reflection Seismograph—an Application," Eugene McDermott.
- "Reflection Profiles as Aids to the Reflection Method," H. Rutherford.
- "Seismological Discovery and Partial Detail of the Vermillion Bay Salt Dome," E. E. Rosaire and O. C. Lester, Jr.
- "Some Special Cases of the Reflection and Refraction of Seismic Waves between Similar Rocks, with Application to the Study of Crystal Layers by Distant Quakes," Louis B. Slichter and V. Gabrilovitch Gabriel.
1303. ARAKAWA, H., "Dispersion and Absorption of the Surface Waves in a Visco-elastic Body," *Geophysical Magazine*, 4, No. 4, 285-295, Tokyo, December, 1931.
1304. ARAKAWA, H., "The Effect of Temperature on the Deformation of Infinite or Semi-infinite Elastic Body," *Geophysical Magazine*, 4, No. 4, 297-306, 3 figures, Tokyo, December, 1931.
1305. BARATTA, Mario, "La Catastrofe Sismica Calabro Messinese (28 Dicembre 1908)," *Relazione alla Società Geografica Italiana*, 426 pages, numerous figures, maps, and illustrations, Rome, 1910.
- A detailed description of the Messina earthquake of 1908.
- BAZERQUE, Jean and MAILLET, Raymond, "La prospection séismique du sous-sol." See No. 1356 of this list.
1306. BIRGE, Raymond T., "The Calculation of Errors by the Method of Least Squares," *Physical Review*, 40, No. 2, 207-227, 1 figure, Minneapolis, April 15, 1932.
- The author discusses the subject under the sub-headings: "Present status of least squares' calculations," "Validity of the Gaussian error curve," "Internal versus external consistency," and "Probable error of a function evaluated by least squares."

1307. BODLE, Ralph R., "Earthquake Notes." Publication of the Eastern Section of the Seismological Society of America, 3, No. 4, 1-12, 5 figures, 1 table, Washington, March, 1932.

This issue announces the spring meeting of the Eastern Section at Philadelphia, May 2 and 3. It also presents short articles on: "The North Mississippi Earthquake of December 16, 1931." "The Georgetown Seismological Observatory," "Mexico's First Skyscraper and Earthquakes," "A New Vertical-component Seismometer," "A Photo-cell Attachment for Seismographs," "University of Wisconsin—New Station," "Two-hundred-ton Dynamite Explosion (at Manistique, Mich.)," and other short notes of seismological interest. The list of epicentres determined by the co-operative efforts of the U.S. Coast and Geodetic Survey, the Jesuit Seismological Association, and the U.S. Coast and Geodetic Survey, are listed for the three months ending with February, 1932.

The editor, Ralph R. Bodle, is a member of the staff of the U.S. Coast and Geodetic Survey, Washington, D.C. Items of interest which should find place in *Earthquake Notes* may be brought to his attention at that address.

1308. BOWIE, William, "Sur une cause possible des tremblements de terre ne se manifestant pas à la surface du globe," *Comptes rendus*, 194, No. 6, 507-508, Paris, February 8, 1932.
1309. BULLETIN OF THE SEISMOLOGICAL SOCIETY OF AMERICA, "The New Zealand Earthquake of February 3, 1931," *Bulletin of the Seismological Society of America*, 21, No. 4, 251-260, 11 illustrations, Stanford, December, 1931.
1310. BYERLY, Perry and DYK, Karl, "Richmond Quarry Blast of September 12, 1931, and the Surface Layering of the Earth in the Region of Berkeley," *Bulletin of the Seismological Society of America*, 22, No. 1, 50-55, 3 figures, Stanford, March, 1932.
1311. BYERLY, Perry, HESTER, James, and MARSHALL, Kenneth, "The Natural Periods of Vibration of Some Tall Buildings in San Francisco," *Bulletin of the Seismological Society of America*, 21, No. 4, 268-276, Stanford, December, 1931.

The natural periods of vibration of sixteen buildings in San Francisco have been measured with the Hall vibration recorder. P.B.

1312. COMRIE, L. J. and JEFFREYS, Harold, "A Smoothing Device Applied to the New Seismological Tables," *Monthly Notices Royal Astronomical Society, Geophysical Supplement*, 3, No. 1, 10-13, London, January, 1932.
1313. CROSBY, Irving B., "Drainage Changes and Their Causes in the Saint Maurice Valley in Quebec," *Journal of Geology*, 40, No. 2, 140-153, 2 maps, Chicago, February-March, 1932.
1314. DAVISON, Charles, "Block Movements in the Boso Peninsula (Japan)," *Nature*, No. 3252, 129, 321, 1 map, London, February 27, 1932.

A review of two papers by Miyabe, reported as Nos. 1155 and 1260 of these lists.

- DELANEY, John P., S.J., "A Photo-cell Attachment for Seismographs." See pages 7-9 of *Earthquake Notes* reported as No. 1307 of this list.
- DOXSEE, W. W., "Supplementary Stereographic Projection Tables." A mimeographed compilation of d and r values for 63 additional stations, supplementing those published by the late Dr. Klotz. See No. 1348 of this list.

- DYK, Karl and BYERLY, Perry, "Richmond Quarry Blast of September 12, 1931, and the Surface Layering of the Earth in the Region of Berkeley." See No. 1310 of this list.
- EWING, Maurice, "Earth Amplitudes in Seismic Prospecting." Abstract only. See No. 1302 of this list.

1315. EWING, Maurice and LEET, L. Don, "Comparison of Two Methods for Interpretation of Seismic Time-Distance Graphs which are Smooth Curves," *Lehigh University Publication, Institute of Research Circular*, No. 73, Science and Technology No. 59, 6, No. 3, Bethlehem, Pennsylvania, March, 1932. R.R.B.

The paper appeared also in *Transactions American Institute, Mining and Metallurgical Engineers*, Geophysical Prospecting, 263-270, New York, 1932. An abstract by W. Ayvazoglou appears in *Geophysical Abstracts*, No. 35, Item 659. See No. 1353 of this list. F.W.L.

- EWING, Maurice and LEET, L. Don, "Velocity of Elastic Waves in Granite." Abstract only. See No. 1302 of this list.

1316. FREEMAN, John R., "Earthquake Damage and Earthquake Insurance," McGraw-Hill, 904 pages, hundreds of illustrations and tables. Price \$7. New York, 1932.

The chief purpose of this book is to promote research toward better data for engineers, relative to earthquake-resisting construction, and to present a fund of knowledge on earthquake damage, earthquake-resisting construction methods, research on the probable future earthquake activities in the United States and elsewhere, and a host of other data relative to earthquakes and earthquake insurance hitherto unavailable in one source.

The book is addressed primarily to structural engineers, insurance executives, and property owners whose property lies within known earthquake zones. It is presented in a direct and easily followed fashion and is supplied copiously with footnotes, photographs, maps, tables, charts, and other aids to the reader. In addition, care has been taken throughout the book to emphasize in boldface type all those points in the study which the author believes deserve special attention from the reader. MCG-H : J.R.F.

- GABRIEL, V. Gabrilovitch and SLICHTER, Louis B., "Some Special Cases of the Reflection and Refraction of Seismic Waves between Similar Rocks, with Application to the Study of Crystal Layers by Distant Quakes." Abstract only. See No. 1302 of this list.

1317. GOLD, S., "The Projection of Circles on a Mercator Map," *Journal of the Royal Astronomical Society of Canada*, No. 213, 26, 161-170, 4 figures, Toronto, April, 1932.

1318. GUTENBERG, B., "Travel Time Curves at Small Distances and Wave Velocities in Southern California," *Gerlands Beiträge zur Geophysik*, 35, Heft 1, 6-45, 11 figures, bibliography, Leipzig, 1932.

The study is based on the records obtained at ten Californian stations of twenty-one small shocks occurring between September, 1929, and April, 1931. The epicentral distance range concerned is about 600 km. The author discusses the characteristics and gives travel time equations for seventeen phases.

1319. GUTENBERG, B., "Mit welcher Genauigkeit lässt sich die Schallgeschwindigkeit in der Stratosphäre finden?" *Gerlands Beiträge zur Geophysik*, **35**, Heft 1, 46-50, Leipzig, 1932.

The paper is essentially a discussion of the paper by F. J. W. Whipple, reported as No. 1195 of these lists.

- HASEGAWA, Keisuke and INOUE, Win, "On the Barometric Gradients at the Epochs of the Earthquakes in Japan." See No. 1334 of this list.

1320. HECK, N. H., "Filling the Gaps in the Seismological Program," *Bulletin of the Seismological Society of America*, **21**, No. 4, 261-267, Stanford, December, 1931.

1321. HECK, N. H., "Accurate Records of Strong Earthquake Motions," *Bulletin of the Seismological Society of America*, **21**, No. 4, 285-288, Stanford, December, 1931.

- HESTER, James, MARSHALL, Kenneth, and BYERLY, Perry, "The Natural Periods of Vibration of Some Tall Buildings in San Francisco." See No. 1311 of this list.

1322. HILLER, W., "Das Beben in NW-Tirol am 8. Oktober 1930 (00^h 27^m M.E.Z.)," *Seismische Berichte der Württembergischen Erdbebenwarten*, Anhang, pp. 4-6, Stuttgart, 1930.

The paper determines the epicentre of this earthquake, discusses the direction of motion at 12 earthquake stations of the P_n and \bar{P} phases, and deduces therefrom the conditions at the hypocentre.

W.H.

1323. HILLER, W., "Seismische Berichte der Württembergischen Erdbebenwarten, Stuttgart, Hohenheim und Ravensburg, 1931," *Herausgegeben von der meteorolog-geophysikalischen Abteilung des Württembergischen Statistischen Landesamts*, pp. i-iv, A1-A10, and 35-73, Stuttgart, January, 1932.

The report is issued in mimeographed form. Pages i-iv are devoted to an introduction and a description of the work of the three stations in the field of seismology. Pages A1-A10 report particular earthquakes, most of the space being given over to the subject, "Mikroseismische Bearbeitung der beiden Alb-Beben am 11. und 22. Dezember 1931." The macroseismic evidence is reviewed. The epicentres are determined and the depth of focus in the two cases found to be about 35 km. and 20 km. respectively. The depth of the surface of discontinuity—the Mohorovičić layer—was found to be 45 km. The depth to the boundary between the granite and basalt is found at about 20-25 km. for south Germany. Pages 35-73 present the regular earthquake registration reports for the three stations for 1931.

W.H.

1324. HOBBS, W. H., "Stress Conditions within the Lithosphere as Revealed by Earthquakes," *Bulletin of the Geological Society of America*, **41**, 739-746, 2 figures, Washington, 1930.

The author's abstract reads: "Geologists appear to hold firmly in the notion, that normal or 'gravity' faults must of necessity imply an origin in tensional stress conditions when they are formed, a view based on theoretical considerations rather than on field observations. Geological phenomena at the time of great earthquakes indicate clearly, however, that such faults come into existence simultaneously with the reduction of the superficial area of the district within which they are found, and a compressional rather than a tensional stress condition is therefore indicated. The observational verification of this conclusion is derived in part from the behaviour of rails, pipes, bridges, etc.; continuous lines which cross the district rather than isolated objects within it. Theoretically the above conclusion involves a seeming paradox, though one which is explained in the earthquake phenomena when considered with reference to the lithosphere as a whole."

1325. HODGSON, Ernest A., "The Japanese Earthquake," *Journal of the Royal Astronomical Society of Canada*, **18**, No. 10, 412-426, Toronto, December, 1924.
A description of the earthquake of September 1, 1923, which partly destroyed the cities of Tokyo and Yohohama.
1326. HODGSON, Ernest A., "The Seismicity of the Arctic," *Journal of the Royal Astronomical Society of Canada*, **24**, No. 5, 201-210, Toronto, May-June, 1930.
1327. HODGSON, Ernest A., "The *P*-Curve and the *S*-Curve Resulting from a Study of the Tango Earthquake, Japan, March 7, 1927," *Bulletin of the Seismological Society of America*, **22**, No. 1, 38-49, Stanford, March, 1932.
The new curves are compared with the corresponding tabulations as published by Macelwane after Mohorovičić. The *P*-Curves differ considerably in form but the *S*-curves agree within the limits of the errors of observation. Since the above paper was published further work by the author has determined the epicentral time from near station data as 9^h 27^m 46^s instead of 9^h 27^m 35^s tentatively assumed on the basis of other investigations for the purpose of computing the *P*-*O* and *S*-*O* intervals. Consequently both curves as published above are to be subjected to a correction throughout by a constant of -11 sec. A paper dealing with the later part of the investigation will appear soon.
E.A.H.
1328. HUNTER, J. de Graaff, "The Hypothesis of Isostasy," *Monthly Notices Royal Astronomical Society, Geophysical Supplement*, **3**, No. 1, 42-51, 6 charts, London, January, 1932.
1329. IMAMURA, A. and KODAIRA, T., "On the Seiches of the Lake Asino-ko with Special Reference to the N. Idu Earthquake of 1930," *Japanese Journal of Astronomy and Geophysics*, **9**, No. 2, 115-125, 5 figures, 4 tables, Tokyo, 1932.
1330. IMBÒ, Giuseppe, "Dati sismici relativi alla fase esplosiva dello Stromboli del settembre 1930," *Bollettino della Società Sismologica Italiana*, **29**, No. 6, 197-203, Rome, 1931.
1331. INOUE, Win, "Statistical Investigations on Earthquake Numbers," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 43-54, 29 graphs, Tokyo, March, 1932.
The paper is in Japanese with the following brief abstract in English: "The author compared actual earthquake frequencies with the Poisson's formula in statistics. By this investigation, the author noticed that, if we confine our attention to the seismic activity in a somewhat short period, the seismic frequencies, in general, agree with the statistical theory fairly well, whereas they differ from the latter somewhat greatly, if the whole duration of activity of long period was taken into consideration. Further, it was shown that the probability functions of the seismic frequencies were generally expressed by the formulas given."
1332. INOUE, Win, "Earthquake and Pulsation," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 83-93, 22 figures, 2 plates, Tokyo, March, 1932.
In Japanese with abstract in English.
1333. INOUE, Win, "On Earth Tiltings Observed at Mount Tukuba," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 130-144, 5 figures, numerous tables, Tokyo, March, 1932.
1334. INOUE, Win and HASEGAWA, Keisuke, "On the Barometric Gradients at the Epochs of the Earthquakes in Japan," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 55-82, 16 figures, 13 tables, Tokyo, March, 1932.

1335. INUI, Teturo, KOTANI, Masao, and SAKADI, Zyuro, "On the Motion of the Earth's Surface under the Influence of a Heavy Moving Body," *Proceedings of the Physico-Mathematical Society of Japan*, **13**, No. 8, 223-252, Tokyo, 1931.
A lengthy review, in German, by W. Schneider, appears in *Physikalische Berichte*, **13**, Heft 4, 467-469, Braunschweig, February 15, 1932.
1336. ISHIMOTO, Mishio, "Sur le mécanisme de la production des ondes sismiques au foyer: existence d'une source quadruple au foyer," *Proceedings of the Imperial Academy*, **8**, No. 2, 36-39, 3 figures, Tokyo, February, 1932.
1337. ISHIMOTO, Mishio, "Comparison accélérométrique des secousses sismiques dans deux parties de la ville de Tôkyô," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 171-187, 11 figures, 1 table, 8 plates, Tokyo, March, 1932.
1338. JEFFREYS, Harold, "Operational Methods in Mathematical Physics," *Cambridge Tracts in Mathematics and Mathematical Physics*, No. 23 (Second Edition). Price 6s. 6d. Cambridge University Press, 1931.
1339. JEFFREYS, Harold, "Variation of Melting Point within the Earth," *Monthly Notices Royal Astronomical Society, Geophysical Supplement*, **3**, No. 1, 6-9, London, January, 1932.
1340. JEFFREYS, Harold, "On the Stresses in the Earth's Crust Required to Support Surface Inequalities," *Monthly Notices Royal Astronomical Society, Geophysical Supplement*, **3**, No. 1, 30-41, London, January, 1932.
1341. JEFFREYS, Harold, "Seismology," *Nature*, No. 3257, **129**, 487-488, London, April 2, 1932.
A review and discussion of three sections of the *Handbuch der Geophysik*: "Theorie der Erdbebenwellen," by Gutenberg; "Seismometer—Auswertung der Diagramme," by Berlage; and "Geologie der Erdbeben," by Sieberg, which have been reported respectively as Nos. 332, 811, and 885 of these lists. The review deals more particularly with the section by Sieberg.
- JEFFREYS, Harold and COMRIE, L. J., "A Smoothing Device Applied to the New Seismological Tables." See No. 1312 of this list.
1342. JONES, J. H. and JONES, D. T., "A Portable Seismograph for Recording Artificial Earthquakes," *Journal of Scientific Instruments*, **9**, No. 1, 8-16, 13 figures, London, January, 1932.
The author's abstract reads: "A portable seismograph for recording artificial earthquakes is described. The motion of the pendulum is magnified by means of an arrangement of two small magnets and a soft iron element suspended on a phosphor-bronze strip which is attached to the pendulum.
"The coupling of the magnifying system to the pendulum introduces a couple which opposes the restoring moment of the pendulum and lengthens the periodic time of the seismograph.
"Other important features of the instrument are the absence of friction from the magnification linkage and simple methods for the remote control of the 'zero', the period, and the sensitivity.
"An experimental investigation of the relation between the period and the sensitivity is described."
R.R.B.
- KANAI, Kiyoshi and SEZAWA, Katsutada, "Possibility of Free Oscillations of Strata Excited by Seismic Waves. Part III." See No. 1374 of this list.

1343. KAWASUMI, Hirose, "Study on the Propagation of Seismic Waves (First Paper)," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 94-129, 6 figures, 15 tables, Tokyo, March, 1932.
1344. KEESE, W. J., "America's Largest Controlled Blast: 440,966 lb. of dynamite in a single shot," *Explosives Engineer*, **10**, No. 5, 147-150, 15 illustrations, Wilmington, May, 1932.
A brief description of the blasting details of the Manistique blast of March 16, 1932.
1345. KIROV, K. T., "La fréquence des jours à secousses séismiques ressenties en Bulgarie," *Calendrier de l'Institut Météorologique Central de Bulgarie pour l'an 1931*, 133-136, Sofia, 1931.
1346. KIROV, K. T., "Intensité des séismes qui ont eu lieu en Bulgarie du Sud du 14 et du 18 avril 1928," *Calendrier de l'Institut Météorologique Central de Bulgarie pour l'an 1931*, 137-146, 2 plates, Sofia, 1931.
A review in German, signed J. F. Gellert, appears in *Geologisches Zentralblatt*, **46**, No. 5, Item 1262, Leipzig, March 1, 1932.
1347. KISHINOUE, Fuyuhiko, "A Portable Horizontal Pendulum Seismometer," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 188-191, 1 plate, Tokyo, March, 1932.
1348. KLOTZ, Otto, "Seismological Tables," *Publications of the Dominion Observatory*, **3**, No. 2, 19-62, Ottawa, 1916.
The *P*- and *S*-curves are those of Mohorovičić who furnished them in manuscript form. Mohorovičić published them later, in 1922 (See No. 1262 of these lists). The reflected wave tables were prepared from the others on the assumption of reflection at the surface.
The bulk of the tables is made up with compilations for various seismological stations of the *d* and *r* values required in the stereographic method of determining the position of an epicentre.
The number of seismographic stations has greatly increased since 1916. Tables of *d* and *r* values for 63 additional stations have been prepared in mimeographed form by Mr. W. W. Doxsee of the Dominion Observatory, Division of Seismology. Those interested may obtain a copy of these additional tables on application to the Director of the Dominion Observatory, Ottawa, Canada.
- KOCH, H. W. and ZELLER, W., "Kritik der Aufzeichnung von Schwingungsmessern." See No. 1398 of this list.
- KODAIRA, T. and IMAMURA, A., "On the Seiches of the Lake Asino-ko with Special Reference to the N. Idu Earthquake of 1930." See No. 1329 of this list.
- KOTANI Masao, SAKADI, Zyuro, and INUI, Teturo, "On the Motion of the Earth's Surface under the Influence of a Heavy Moving Body." See No. 1335 of this list.
1349. LANDSBERG, H., "Über einen Fall angeblicher Erdbebenvorgefühle," *Zeitschrift für Geophysik*, **8**, Heft 1-2, 107-108, Braunschweig, 1932. H.L.
1350. LARSEN, Palmer, "Index to Geophysical Abstracts, XXI to XXXII," Department of Commerce, Bureau of Mines, Circular No. 6589, 331-364, Washington, January, 1932.

1351. LEE, A. W., "The Determination of Thicknesses of the Continental Layers from the Travel Times of Seismic Waves," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 3, No. 1, 13-21, 3 figures, London, January, 1931.

The author's summary reads: "A novel method is given for analysis of the connection between time of origin of an earthquake, the depth of focus, apparent times of starting of the seismic waves, and the thicknesses of the layers through which they travel.

"Application of the method to the available data for an earthquake near Imotski, Yugoslavia, on 1923 March 15, shows that the focus was near the bottom of the granitic layer. The approximate thicknesses of the layers are determined as 1 km. of sedimentary material, 11.5 km. of granite, and between 22 and 33 km. of intermediate rock.

"The travel times of the waves from the shocks in Jersey on 1926 July 30, and in Herefordshire on 1926 August 15, indicate that the thicknesses of the granitic and basaltic layers were 14 km. and 15 km. and that the foci were 10 km. and 6 km. respectively below the top of the granite."

A.W.L.

1352. LEE, A. W., "The North Sea Earthquake of 1927 January 24," *Monthly Notices of the Royal Astronomical Society, Geophysical Supplement*, 3, No. 1, 21-30, London, January, 1932.

The author's summary reads: "Data given in the *International Seismological Summary* for the North Sea Earthquake of 1927 January 24 have been supplemented by measurements of the original seismograms for Dyce, Edinburgh, Stonyhurst, Copenhagen and Kew, for determination of the epicentre and study of the phases recorded. The epicentre is located as 59°.4 N., 2°.9 E., with time of origin 5^h 18^m 11^s.

Times of transmission for the *P* and *S* phases may be represented closely by the formulae:

$$T_p = 5^h 18^m 22^s + 14.21\Delta - 2.00 (\Delta/10)^2$$

$$T_s = 5^h 18^m 17^s + 25.50\Delta - 3.50 (\Delta/10)^2$$

A number of measurements indicate other waves with velocities 7.0 km./sec. (*P_Q*), 4.0 km./sec. (*S_Q*), and 3.6 km./sec. (*S**).

The focus was situated near the bottom of the granitic layer."

A.W.L.

1353. LEE, Frederick W., "Geophysical Abstracts," United States Bureau of Mines, No. 33 (Circular 6593), 331-353, January; No. 34 (Circular 6569), 354-380, February; No. 35 (Circular 6606), 381-409, March: Washington, 1932.

F.W.L.

— LEE, L. Don and EWING, Maurice, "Comparison of Two Methods for Interpretation of Seismic Time-Distance Graphs which are Smooth Curves." See No. 1315 of this list.

— LEE, L. Don and EWING, Maurice, "Velocity of Elastic Waves in Granite." Abstract only. See No. 1302 of this list.

— LESTER, O. C. and ROSAIRE, E. E., "Seismological Discovery and Partial Detail of the Vermillion Bay Salt Dome." Abstract only. See No. 1302 of this list.

1354. MACELWANE, James B., S.J., "Our Present Knowledge Concerning the Interior of the Earth," *Bulletin of the Seismological Society of America*, 21, No. 4, 243-250, bibliography, Stanford, December, 1931.

This paper was presented at a meeting of the Eastern Section of the Seismological Society of America, Columbia, S.C., June 11 and 12, 1931. It is a concise review with bibliographical references of the subject indicated by the title.

1355. MAEDA, S., "The Seismological Bulletin in Osaka from 1882 to 1929." Published by the Osaka Meteorological Observatory, 122 pages, 1931.

The body of the text deals with the two subjects: "Report of the Earthquakes" and "Number of Earthquakes." The supplement is devoted to a discussion of "The Great Earthquakes in Japan" and "The Catastrophic Earthquakes in Osaka District." The text is partly in Japanese, partly in English.

1356. MAILLET, Raymond and BAZERQUE, Jean, "La prospection séismique du sous-sol," *Annales des Mines, Douzième Série, Tome XX, 10^e Livraison de 1931*, 287-341, 29 figures, Paris, 1931.

The publication includes:

(1) a discussion of theory, with formulas for computation on the assumption of straight-line paths, and the effect of a buried low-speed layer.

(2) description of some instruments used, and certain phases of field procedure.

(3) several examples of actual shooting done by the authors. L.D.L.

1357. MARRISON, W. A., "Quartz Crystal Resonators," *Bell Laboratories Record*, **10**, No. 6, 194-199, 6 figures, New York, February, 1932.

— MARSHALL, Kenneth, BYERLY, Perry, and HESTOR, James, "The Natural Periods of Vibration of Some Tall Buildings in San Francisco." See No. 1311 of this list.

— McCOLLUM, Burton and SNOLL, F. A., "Assymmetry of Sound Velocity in Stratified Geologic Formations." Abstract only. See No. 1302 of this list.

1358. McCOMB, H. E., "Testing of Photographic Recorders," *Bulletin of the Seismological Society of America*, **22**, No. 1, 56-59, 2 figures, Stanford, March, 1932.

The author illustrates a method of determining the rate of a recording drum by the simple process of photographing short lines at right angles to the progress movement of the drum due to its angular rotation, the regularity of the registered lines being an indication of the uniformity of rate of rotation.

— McDERMOTT, Eugene, "The Reflection Seismograph—an Application." Abstract only. See No. 1302 of this list.

1359. MINTROP, L., "On the History of the Seismic Method for the Investigation of Underground Formations and Mineral Deposits." Publication of the Seismos Company, 128 pages, 14 illustrations, Hannover, 1930.

The publication is a valuable outline of the subject indicated by the title, from the time of Mallet to date, including many of the patent papers which mark various steps of the development. Being the publication of a company interested in its own investments, the treatment is somewhat biased but it is nevertheless an important contribution to the history of seismic prospecting.

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1361. MUTO, K., "Synopsis of Precise Levellings Executed for the Purpose of Investigating Crustal Deformations," *Japanese Journal of Astronomy and Geophysics*, **9**, No. 2, 99-100, 4 tables, 1 plate, Tokyo, 1932.

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1364. ODDONE, E., "Un contributo della sismometria alla storia della terra," *Atti della Reale Accademia Nazionale dei Lincei*, **14**, 192-197, 1931.
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1365. OTUKA, Yanosuke, "The Geomorphology of the Kano-gawa Alluvial Plain, the Earthquake Fissures of Nov. 26, 1930, and the Pre- and Post-seismic Crust Deformations," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 235-246, 16 figures, 6 plates, Tokyo, March, 1932.
1366. RICHTER, Charles F., "Earthquake of January 28, 1931," *Bulletin of the Seismological Society of America*, **21**, No. 4, 284, Stanford, December, 1931.
1367. RIZZO, G. B., "Sulla propagazione dei movimenti prodotti dal terremoto di Messina del 28 Dicembre 1908," *Reale Accademia delle Scienze di Torino, Anno 1909-1910, Series 2*, Tome 61, 355-417, 1 plate, Torino, 1910.
An analysis of the travel times of the earthquake waves of the Messina shock. The author deduces a curve for P and for S , as well as for three phases which he calls L_1 , L_2 , and L_3 . The former are found to be in strikingly good agreement with the curves proposed by Jeffreys in 1931. See No. 942 of these lists.
- ROSAIRE, E. E. and LESTER, O. C., "Seismological Discovery and Partial Detail of the Vermillion Bay Salt Dome." Abstract only. See No. 1302 of this list.
1368. ROTHÉ, E., "Rapport de la Section de Séismologie," Comité National Français de Géodésie et Géophysique, Assemblée générale du 9 mai 1931, *Compte rendu*, 25-36, Paris, 1931.
- RUTHERFORD, H., "Reflection Profiles as Aids to the Reflection Methods." Abstract only. See No. 1302 of this list.
1369. RUTLEDGE, George, "A Reliable Method of Obtaining the Derivative Function from Smoothed Data of Observation," *Physical Review*, **40**, No. 2, 262-268, 3 tables, Minneapolis, April 15, 1932.
The author's abstract reads: "In this process of differentiation there is involved no attempt to determine empirically an equation capable of representing the given data sufficiently well to admit differentiation. On the contrary, a differentiating tool is applied successively to various small sections of the data. This tool is the fourth degree polynomial determined by five points."

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1370. SAYLES, Robert W., "Bermuda During the Ice Age," *Proceedings of the American Academy of Arts and Sciences*, 66, No. 11, 381-467, 17 figures, 11 tables, 13 plates, bibliography, Boston, November, 1931.

The author discusses the formation of the series of marine beaches on Bermuda. He finds as the latest movement of the shorelines, one of retreat due to erosion. A twelve-foot drop in sea-level is recorded by an emerged bench, "cut in geologically very recent time, perhaps during the time of written history." R.W.S.

1371. SCHÜNEMANN, Heinrich, "Die Seismische Bodenunruhe II. Art in Hamburg (Wellenperioden 10 sec.—40 sec.) und ihre Ursache." Dissertation presented to the Faculty of Mathematics and Natural Science of the University of Hamburg, 43 pages, 9 figures, numerous tables, bibliography, Hamburg, 1931.

The following is a translation of an abstract furnished by Professor Tams: A systematic study is here made of the wave periods and amplitudes resulting from seven severe storms as registered on the horizontal seismographs of Hecker at Hamburg from 1908 to 1914. The relation between the two magnitudes is investigated. On the basis of about 4,800 measurements, it is shown that the amplitudes lie, as a rule, between 3μ and 5μ , although a maximum of 23μ was reached. It also appears that the periods lie between the limits of 11 and 26 seconds, the usual period being 28 seconds. As in the case of microseisms of the first class, large values of the period are associated with amplitudes. As to the cause, it is shown that there is a strong correlation for Hamburg between the strength of the earth movement and the strength of the local winds (velocity and pressure). The theory of direct effect of resulting air movements in the recording room upon the registering pendulum is not tenable. In agreement with observations at Kew, Ottawa, and Washington, it is shown also for Hamburg that the earth movements are always weakest in the direction more or less parallel to the longer axis of the superposed building, for which case a relatively smaller surface is exposed to the action of the wind. E.T.

1372. SCIENCE NEWS LETTER. The following series of short articles of interest to seismologists have appeared at intervals during the past few months and have been reported for review in these lists. In each case, the place of publication is Washington.

(1) "Instrument with Pendulum Measures 'Quake Force'," No. 535, 20, 24, July 11, 1931.

A popular review of a paper by Prof. J. A. Anderson of Mount Wilson Observatory, dealing with a device consisting of a series of pendulums and electrically operated semaphores which record the force of seismic disturbances—a seismic intensity meter.

F.L.T.

(2) "Explosives Used to Produce Earth Tremors Artificially," No. 545, 20, 191, September 19, 1931.

A popular description of experiments with explosives to determine effects of vertical-walled valleys on earthquake waves. Experiments are being conducted in Yosemite National Park (U.S.A.) by the Carnegie Institution of Washington and the California Institute of Technology under the direction of John P. Buwalda, Beno Gutenberg, and Henry Salvatori.

F.L.T.

1372. SCIENCE NEWS LETTER—*Concluded.*

(3) "Submarine Shock Breaks Earthquake Moratorium," No. 562, **21**, 41, January 16, 1932.

Reports from five seismograph stations indicated that the earthquake "moratorium" existing since November 20, 1931, had been broken, a submarine disturbance having occurred near Easter island, South Pacific ocean, on January 4. F.L.T.

(4) "U.S. Submarine S-48 May Determine Cause of Santiago Earthquake," No. 566, **21**, 101, February 13, 1932.

The U.S. submarine S-48, carrying an international expedition sponsored by the U.S. Navy Department and Princeton University and other institutions to study causes of changes in earth's crust in the region of Cuba and the Caribbean, will survey the four-mile depression known as Bartlett Deep, south of Cuba, where the Santiago earthquake and other disturbances are thought to have originated. F.L.T.

(5) "Watching for Earthquakes Latest Task of Electric Eye," No. 567, **21**, 121, February 20, 1932.

The note announces the use of a photo-electric cell in conjunction with a seismograph by Rev. John P. Delaney, S.J. of Canisius College, Buffalo, for the purpose of attracting the attention of the seismologist to the fact that an earthquake is being registered. Without some such arrangement the record would not be detected until the removal and development of the photographic sheet, an attention accorded the seismograph but once a day as a rule. W.W.D.

(6) "Giant Blast Felt as Quake by Distant Seismographs," No. 572, **21**, 192, March 26, 1932.

A short account of the great blast at Manistique, Michigan, with a section of the seismogram obtained at Canisius College, Buffalo. It was also registered at the University of Wisconsin and at Georgetown University, Washington, D.C. The explosion was filmed from the air by the U.S. Bureau of Mines, the records being made for further study. F.L.T.

For other reports on this blast see No. 1344 of this list.

(7) "Submarine Cruise Yields Data on Earthquakes," No. 573, **21**, 209, April 2, 1932.

Deals with gravity determinations made during the West Indian cruise of the U.S. submarine S-48, the expedition having been under the leadership of Dr. Richard M. Field and Dr. F. A. Vening Meinesz. W.W.D.

(8) "Great Submarine Gorge Acted as Dump Cart for Glaciers," No. 574, **21**, 232, April 9, 1932.

Prof. Shepard's theory as to the new submarine valley discovered subsequent to the earthquake of November 18, 1929. W.W.D.

See also the note by E.A.H. in connection with Prof. Shepard's article reported as No. 1375 of this list.

1373. SEZAWA, Katsutada, "Notes on the Waves in Visco-elastic Solid Bodies," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 20-22, Tokyo, March, 1932.

1374. SEZAWA, Katsutada and KANAI, Kiyoshi, "Possibility of Free Oscillations of Strata Excited by Seismic Waves. Part III," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 1-18, 19 figures, 2 plates, Tokyo, March, 1932.

1375. SHEPARD, Francis P., "Saint Lawrence (Cabot Strait) Submarine Trough," *Bulletin of the Geological Society of America*, 42, No. 4, 853-864, 9 figures, New York, December, 1931.

The author's summary reads: "Evidence has been presented to show that the Grand Banks earthquake was associated with the irregular topography of the continental slopes and deep ocean basin rather than with the Saint Lawrence submarine trough, suggesting that the proximity of the trough may be coincidental. Evidence was also introduced to the effect that glaciers have moved down the Saint Lawrence trough, that the form of the trough is suggestive of glacial erosion, and that similar troughs occur off other glaciated coasts. Therefore, the conclusion seems warranted that the trough has been shaped principally by glacial erosion." w.w.d.

The epicentre of the earthquake to which Prof. Shepard refers was, on the certain evidence of the seismograph records, located well off the coast and in the Saint Lawrence submarine trough, i.e. at Lat. 44.5° N. Long. 55° W. This does not, necessarily, imply that the earthquake and the trough are evidences of a common force but it does preclude the possibility of the epicentre having been appreciably closer to the continental slopes than the co-ordinates named. If it be mechanically possible that the glacial debris could gradually flow out of an old river gorge after having been disturbed by the earthquake tremors as suggested by Prof. Shepard in a recent note in *Science News Letter* (see No. 1372 (8) of this list), it would account for the breaking of submarine cables at intervals up to 24 hours after the earthquake as reported by Hodgson and Doxsee (see No. 723 of these lists), but to account in this way for the final breaking of cables we shall have to assume that the debris was carried more than 400 miles in a single day and that there was enough of it in the gorge to be spread over this great area involved, to a depth sufficient to rupture the cables. E.A.H.

- SLICHTER, Louis B. and GABRIEL, V. Gabrilovitch, "Some Special Cases of the Reflection and Refraction of Seismic Waves between Similar Rocks, with Application to the Study of Crystal Layers by Distant Quakes." Abstract only. See No. 1302 of this list.

- SNOLL, F. A. and McCOLLUM, Burton, "Assymetry of Sound Velocity in Stratified Geologic Formations." Abstract only. See No. 1302 of this list.

1376. SOHON, F. W., S.J., "Introduction to Theoretical Seismology: Part II, Seismometry," John Wiley and Sons, 149 pages, 26 figures, 5 plates, 8 tables. Price \$2.75. New York, 1932.

The publishers' announcement describes the book as "An adequate treatment of the mathematical theory of the seismograph." The table of contents is as follows: Oscillatory Motion: The Horizontal Seismograph: The Vertical Seismograph: The Recorder: Amplification: Actual Magnification: Friction: Galvanometric Registration: The Onset of a New Phase: The Tapping Test: Appendix-Miscellaneous Graphical Methods: Identification of Phases: Zeissig's Method for Determining Epicentres: Solution of Spherical Triangles: The Stereographic Projection: Tables and Index.

As stated by the author, the purpose of the book is to enable the observer of earthquakes to understand the principles which underlie his instrument, in order that he may be able to test it, keep it in adjustment, understand its shortcomings, and give an intelligent account of its behaviour.

The book is the first of two companion volumes to be published. Part I, Geodynamics, by James B. Macelwane, S.J., is now in preparation. These have been needed for many years by English-speaking seismologists. The volume which has already appeared should be in the hands of everyone interested in seismology or its applications, whether engaged in research or in routine observation in charge of instruments. It should result in a marked improvement in the quality of the data obtained and compiled for detailed study both in the purely academic work and in the application of the seismograph to geophysical prospecting.

1377. SOMMERVILLE, D. M. Y., "A Criticism of Professor L. A. Cotton's Theory Regarding Tidal Stresses and the Prediction of Earthquakes," *Monthly Notices Royal Astronomical Society, Geophysical Supplement*, 3, No. 1, 1-5, 1 figure, London, January, 1932.

— SWINNERTON, A. C., "Contributions to the Study of Mountain-Building." See No. 1395 of this list.

1378. TABER, Stephen, "Santiago Earthquake not Major Shock, Says Geologist," *Science News Letter*, No. 566, 21, 101, Washington, February 13, 1932.

A description of the Santiago earthquake by Dr. Taber who was at Guantanamo Naval Station near Santiago during the quake. Dr. Taber surveyed the damage; he states that it was mainly caused by poorly constructed buildings, as was the case in the Porto Rico earthquake of 1928.

F.L.T.

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1381. TERADA, Torahiko, "On Swarm Earthquakes," *Bulletin of the Earthquake Research Institute*, 10, Part 1, 29-35, 4 figures, Tokyo, March, 1932.

1382. TERADA, Torahiko and MIYABE, Naomi, "Landslide at Hatano," *Bulletin of the Earthquake Research Institute*, 10, Part 1, 192-199, 6 figures, 8 tables, 2 plates, Tokyo, March, 1932.

In Japanese, with a lengthy abstract in English.

1383. TIERCY, Georges, "Les dimensions du sphéroïde terrestre," *Comptes rendus de la Société de Physique de Genève*, 47, No. 3, 134-136, 1930.

The following measurements of the earth ellipsoid, as proposed by the author of the above paper for general use, are quoted from a short abstract by K. Jung, in *Physikalische Berichte*, 12, Heft 22, 2696, Braunschweig, November 15, 1931, namely:

Equatorial axis, $a = 6378.250$ km.

Polar axis, $b = 6356.555$ km.

Flattening, $(a-b)/a = 1/294$

Average density = 5.525

Density of the crust = 2.6

1384. TSUBOI, Chuji, "On the Possibility of Finding the Permanent Crust Dislocation Caused by an Earthquake by Means of its Seismogram," *Proceedings of the Imperial Academy*, 7, No. 10, 371-374, 2 figures, Tokyo, December, 1931.

See also the paper by H. A. Wilson, reported in No. 1302 of this list. The methods proposed are practically identical.

1385. TSUBOI, Chuji, "Report on the Activity of the Earthquake Research Institute, Tokyo Imperial University, During the Second Half of 1930," *Gerlands Beiträge zur Geophysik*, 35, Heft 1, 113-122, 8 figures, Leipzig, 1932.

1386. VAN DIJK, G., (1) "Seismische Registreringen te Heerlen. 2 Mei 1929-7 Mei 1930," *Jaarverslag Geologisch Bureau voor het Nederlandsche Mijng gebied 1929*, 41-44, 3 illustrations, De Bilt, 1930.
- (2) "Seismische Registreringen te Heerlen, 8 Mei 1930-30 April 1931," *Jaarverslag Geologisch Bureau voor het Nederlandsche Mijng gebied 1930*, 25-27, 4 illustrations, De Bilt, 1930. G.v.D.
1387. VARI, Venanzio, "Il terremoto dell'Alta Irpinia (23 luglio 1930)," *Bollettino della Società Sismologica Italiana*, **29**, No. 6, 183-196, 12 illustrations, Rome, 1931.
1388. VISSER, S. W., "Aardbevingen en getijden (Earthquakes and Tides)," *Natuurkundig Tijdschrift voor Nederlandsch Indië*, **91**, 153-156, 6 figures, 1 table, Batavia, 1931.
- A review, in German, signed Neumann van Padang, appears in *Geologisches Zentralblatt*, **46**, No. 5, Item 1257, Leipzig, March 1, 1932.
1389. WADATI, K., "Shallow and Deep Earthquakes" (Third Paper), *Geophysical Magazine*, **4**, No. 4, 231-283, 11 figures, 10 tables, 4 plates, Tokyo, December, 1931.
1390. WANNER, E., "Jahresbericht des Schweizerischen Erdbebendienstes 1930," *Annalen der Schweizerischen Meteorologischen Zentralanstalt*, Jahrgang 1930, No. 5, 15 pages, 1 plate, Zürich, 1931.
1391. WATANABE, Akira, "The Geomorphology of the Coastal District of Southeastern Sikoku: a Contribution to the Knowledge of the Recent Crustal Movements of the Area under Discussion," *Bulletin of the Earthquake Research Institute*, **10**, Part 1; 209-234, 7 figures, 2 plates, Tokyo, March, 1932.
1392. WENNER, Frank, "Development of Seismological Instruments at the Bureau of Standards," *Bulletin of the Seismological Society of America*, **22**, No. 1, 60-67, 3 figures, 1 table, Stanford, March, 1932.
- In particular, this paper is devoted to a description of an accelerometer developed for seismometric registration.
1393. WIECHERT, E., "Über Erdbebenwellen, I, Theoretisches über Ausbreitung der Erdbebenwellen," *Nachrichten der Königlichen Gesellschaft der Wissenschaften zu Göttingen, mathematisch-physikalische Klasse*, 1-115, 1907.
- This is the first of a series of important papers on seismology by Wiechert and his associates—Zoeppritz, Gutenberg, and Geiger. These were numbered successively: (I and II), III, V, VI, VIIA, (VIIa and VIIb). The bracketed numbers appeared consecutively in the same issue of the *Nachrichten*. No. IV never appeared as such but a note by Gutenberg in the introduction to VIIA indicates that the subject to be dealt with was that of the determination of paths of rays by the Herglotz' method—a subject treated by Wiechert and Geiger in 1910 in the *Physikalische Zeitschrift* and reported as No. 293 of these lists. The successive issues II, III, V, VI, VIIA and (VIIa and VIIb) are reported, respectively, as Nos. 1399, 299, 300, 230, 233, and 1400 of these lists.
- WILSON, H. A., "The Calculation of the Motion of the Ground from Seismograph Records." Abstract only. See No. 1302 of this list.

Compare also No. 1384 of this list, a paper by Tsuboi proposing the same method.

1394. WOOD, Harry O. and NEUMANN, Frank, "Modified Mercalli Intensity Scale of 1931," *Bulletin of the Seismological Society of America*, **21**, No. 4, 277-283, Stanford, December, 1931.
1395. WOODWORTH, Jay Backus, "Contributions to the Study of Mountain-Building," *American Journal of Science*, **23**, 155-171, New Haven, February, 1932.
This paper is compiled by A. C. Swinnerton from notes of the late Prof. Woodworth. R.W.S.
1396. YABE, Hisakatsu and TAYAMA, Risaburo, "Hôjô Trough," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 200-208, 1 figure, 1 plate, Tokyo, March, 1932.
1397. YAMAGUTI, Seiti, "Statistical Relation between the Frequencies of Earthquakes in Japan and Other Parts of the World," *Bulletin of the Earthquake Research Institute*, **10**, Part 1, 36-42, 3 figures, 4 tables, Tokyo, March, 1932.
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1398. ZELLER, W. and KOCH, H. W., "Kritik der Aufzeichnung von Schwingungsmessern," *Zeitschrift des Vereines deutscher Ingenieure*, **75**, No. 50, 1509-1511, Berlin, December, 1931.
A mathematical treatment applied to instruments. Deals with the general theory and with the practice of measurements of oscillations. W.H.
1399. ZOEPPRITZ, Karl, "Über Erdbebenwellen, II, Laufzeitkurven," *Nachrichten der Königlichen Gesellschaft der Wissenschaften zu Göttingen, mathematisch-physikalische Klasse*, 115-135, 2 figures, 2 plates, 1907.
See also No. 1393 of this list.
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For an outline of the series of which this is the last see No. 1393 of this list.

LIST OF COLLABORATORS

The items for this issue of the *Bibliography* were compiled while the editor was stationed at the Geophysical Laboratory of Saint Louis University. The compilation was made possible through the kindness of Rev. James B. Macelwane, S.J., Dean of the Graduate School and Director of the Department of Geophysics, who arranged that all incoming scientific journals containing articles on seismology or allied subjects should pass through the hands of the editor. Although none of the listed items is marked with Dr. Macelwane's initials, his co-operation in the work of this entire issue is hereby gratefully acknowledged.

The initials appended to various items throughout the *Bibliography* indicate, in each case, the contribution by the respective collaborator.

- Bodle, Ralph R.,
Editor, "Earthquake Notes,"
United States Coast and Geodetic Survey,
Washington, D.C., U.S.A. R.R.B.
- Byerly, Perry,
Bacon Hall, Berkeley, Cal., U.S.A. P.B.
- Doxsee, W. W.,
Seismological Division,
Dominion Observatory, Ottawa, Canada. W.W.D.
- Freeman, John R.,
Consulting Engineer,
Room 815, Grosvenor Building,
Providence, R.I., U.S.A. J.R.F.
- Hiller, William,
Württembergisches Statistisches Landsamt,
Stuttgart, Germany. W.H.
- Landsberg, H.,
Universitätsinstitut für Meteorologie und Geophysik,
Frankfurt a.M.,
Germany. H.L.
- Lee, A. W.,
Kew Observatory, Richmond,
Surrey, England. A.W.L.
- Lee, Frederick W.,
Editor, "Geophysical Abstracts,"
United States Bureau of Mines,
Washington, D.C., U.S.A. F.W.L.

- Leet, L. Don, L.D.L.
Geological Museum,
Harvard University,
Cambridge, Mass., U.S.A.
- McGraw-Hill Book Co., McG-H.
Publishers,
New York City, U.S.A.
- Sayles, Robert W., R.W.S.
Geological Museum,
Harvard University,
Cambridge, Mass., U.S.A.
- Tams, Ernst, E.T.
Hauptstation für Erdbebenforschung,
Hamburg 36, Germany.
- Troyer, F. W., F.W.T.
Director Astronomical Press Service,
128 Saint Clements Ave.,
Toronto, Ont., Canada.
- van Dijk, G., G.v.D.
Director, Koninklijk Nederlandsch Meteorologisch Instituut,
De Bilt, Netherlands.

