CANADA
DEPARTMENT OF MINES AND TECHNICAL SURVEYS
Observatories Branch

PUBLICATIONS

of the

DOMINION OBSERVATORY

OTTAWA

Volume XXXII • No. 3

EARTHQUAKES OF EASTERN CANADA AND ADJACENT AREAS 1928 - 1959

W. E. T. Smith

This document was produced by scanning the original publication.

Ce document est le produit d'une numérisation par balayage de la publication originale.

Price $1.00

ROGER DUHAMEL, F.R.S.C.
QUEEN'S PRINTER AND CONTROLLER OF STATIONERY
OTTAWA, 1966

98122—1

EARTHQUAKES OF EASTERN CANADA AND ADJACENT AREAS, 1928-1959

By W. E. T. Smith

ABSTRACT: This is the second in a series of papers intended to describe the entire known earthquake history of eastern Canada. The area considered embraces northeastern North America and its adjacent waters east of longitude 85° W and bounded by the 40th and 60th parallels.

The two lists in the earlier paper, one of earthquakes in eastern Canada and the other of those in the northeastern United States, have been continued. From 1928 to 1959 there were 405 shocks in eastern Canada and 312 in the northeastern United States. To 1959 the shocks total 743 in the Canadian lists and 729 in the United States lists. Each list is accompanied by a geographical index.

Either an intensity or a magnitude has been assigned to each shock, and a linear relation between these scales has been accepted. All earthquakes are shown on the maps by symbols proportional to their sizes regardless of the scale on which these sizes are expressed. Isoseismal maps of six of the larger earthquakes have been included.

In general, only essential information about each shock is given, but a number of the Canadian entries are annotated and striking or unusual features of all the important shocks have been included. After each entry in the text all the sources of information consulted are indicated by letters and numbers, which can be readily identified in the references.

RÉSUMÉ: La présente étude est la deuxième d'une série qui a pour but de décrire toute l'histoire connue des tremblements de terre de l'est du Canada. Cette région comprend le nord-est de l'Amérique du Nord et les eaux adjacentes à l'est de la longitude 85° O et elle est limitée par les 40° et 60° parallèles.

L'auteur continue les deux listes données dans l'étude antérieure, l'une des tremblements de terre dans l'est du Canada et l'autre des tremblements de terre du nord-est des États-Unis. De 1928 à 1959, il y eut 405 secousses dans l'est du Canada et 312 dans le nord-est des États-Unis. Jusqu'en 1959, le total des secousses s'établissait à 743 sur les listes canadiennes et 729 sur les listes des États-Unis. Chaque liste est accompagnée d'un index géographique.

L'auteur a attribué à chaque secousse un degré d'intensité ou une magnitude et établi une relation linéaire entre ces échelles. Tous les tremblements de terre sont indiqués sur les cartes à l'aide de symboles proportionnels à leur importance, quelle que soit l'échelle selon laquelle cette importance est exprimée. Des cartes isoséismiques de six des plus gros tremblements de terre accompagnent l'étude.

De façon générale, pour chaque secousse l'auteur ne donne que les renseignements essentiels, mais un certain nombre de tremblements de terre canadiens sont annotés et les caractéristiques inhabituelles ou remarquables des secousses importantes sont données. Après chaque mention dans le texte, toutes les sources de renseignements examinées sont indiquées par des lettres et des numéros qui permettent de les identifier facilement dans la bibliographie.

Introduction

This paper is a continuation of *Earthquakes of Eastern Canada and Adjacent Areas, 1534-1927* by Smith (*S5*).* It deals with the same area, namely those parts of Canada, the United States and their adjacent waters lying between longitudes 50°W and 85°W and between latitudes 40°N and 60°N. As before, the data are presented in two lists, one for eastern Canada and the other for the northeastern United States. The numbering of the entries is consecutive with that of the previous lists. The Canadian list (page 91) contains 405 entries, which bring the total to 743, and the United States list (page 109) contains 312 entries for a total of 729. Each list is accompanied by a geographical index in sections of one degree latitude by one degree longitude. Two maps are in the pocket at the back. One shows the earthquakes in these lists and the other is a cumulative map showing all shocks to 1959. In either, a diagram in the legend relates the size of each earthquake to that of the symbol representing it.

*See references.

This catalogue is based largely on seismograph record- but uses press reports (*S2*), replies to special questions naires, scientific papers, etc. as supplementary data. In its preparation, Canadian seismograph records of events listed as "local" earthquakes in the *Seismological Bulletin* (*S3*) were re-examined. About a thousand such events were discarded as not germane to the seismicity of the area. Some were useless, each being a mere trace of an event recorded at one station only. Many were blasts from known sources, and it was determined that many more were blasts because they occurred in "families" at the same distance from a station and always during the work day. A few were rockbursts in mines; a few others were either not seismic or not of local origin. Those regarded as earthquakes were carefully studied and their epicentres redetermined. In the last-mentioned, readings from the *Bulletin of the Northeastern Seismological Association* (NESA) were used wherever applicable. NESA was an organization embracing the Canadian network and the seismograph stations at Cambridge, Burlington, Williamstown, Weston and Fordham in the United

States. A joint bulletin (*N2*) was published from 1938 to 1950 and the present work owes a great deal to this effort. Use was also made of readings taken from the bulletins issued by individual United States stations outside this period.

All sources consulted in connection with each shock may be determined from the references by letters and figures inserted after each entry. These designations have been so assigned as to form an extension of the previous references, and this accounts for some departure from strictly alphabetic order. The aim of complete Canadian coverage has been continued, and United States shocks felt in Canada have been included in the Canadian list with the United States list number in parentheses. Canadian shocks felt in the United States are indicated by numbers in an addendum to the United States list.

Two changes have been made. Universal (Greenwich Mean) time has been used throughout rather than Local time, and isoseismal maps showing the distribution of seismic intensities have been included for Canadian shocks for which data were available. The majority of these shocks were felt in both Canada and the United States. In most cases the isoseismals in United States territory have been taken from reports published by the United States Coast and Geodetic Survey (*U1*). In the remainder they are based on data collected by that organization and supplied to the Dominion Observatories. Isoseismals in Canadian territory are based on data collected by the Dominion Observatories and supplemented by press reports. The distribution of populated places in eastern Canada tends to be along rivers and railways, with few settlements and large uninhabited areas to the north. It follows that data (even if plentiful) from replies to special questionnaires are in the nature of a series of "traverses" (not necessarily in optimum positions) across the area of interest. Under such conditions it is not possible to prepare isoseismal maps from which detailed engineering or geological conclusions may be drawn. The isoseismals on the maps in this paper are drawn to separate areas of different intensity on the modified Mercalli intensity scale given in a later section. The isoseismal map for the St. Lawrence earthquake of March 1, 1925, which was reported in the earlier paper, is shown as Figure 7, in the appendix.

Instruments

Short-period instruments, having a free period of about one second, are best adapted to the recording of local earthquakes. Instruments of longer periods will not be discussed unless the station has no instruments of shorter periods. In such cases the period will be stated.

At the beginning of 1928, the following seismographs were already in operation in eastern Canada: 2 Bosch (5 to 6 sec) at Ottawa; 2 Mainka (7 to 9 sec) at Halifax; 2 Milne-Shaw (12 sec) at Toronto; 1 short-period Wood-Andersen at Seven Falls and another short-period Wood-Andersen at Shawinigan Falls. Use of the Bosch instruments at Ottawa was discontinued after the installation mentioned in the following paragraph quoted from Hodgson (*H9*):

"In April, 1937, a vertical Benioff seismograph, with both long and short period recording, was installed at Ottawa. Similar equipment had previously been placed in operation at Harvard, Mass.; and, at about the same time, vertical Benioffs were installed at the University of Vermont, Burlington, Vt., at Williams University, Williamstown, Mass., and at the Jesuit University at Weston, Mass. These together with the short period instruments at the two Quebec stations, afford a well distributed recording system. A joint program of research is now the subject of consideration* by those in charge of these stations, which should make it possible to record every 'local' tremor and to locate many of them; so that from this time (1937) forward seismological research may hope to have a much more complete history of the Earthquakes of Eastern Canada and Adjacent Areas."

Though not included in the foregoing, Fordham also participated in the program.

The Mainkas at Halifax were replaced in 1938 by the Bosch instruments formerly at Ottawa. In 1940 a field seismograph began operation at Kirkland Lake. From early 1942 the Toronto station no longer contributed to the *Seismological Bulletin* (*S3*). Late in 1945 the field station at Kirkland Lake closed. It was reopened in the summer of 1947 as a regular station operating with a short-period Sprengnether.

For a few years after 1952 a Leet-Blumberg visual-recording displacement instrument operated at Ottawa. In 1953 the Bosch instruments at Halifax were replaced by a short-period Benioff that also had long-period recording. The following year a short-period Benioff was put into operation at Seven Falls and in 1955 a short-period Willmore seismorgraph was added at Halifax and another replaced the Sprengnether at Kirkland Lake. A short-period Willmore instrument was installed at Shawinigan Falls in 1956. In April of that year a new station with three short-period Benioffs was opened at Montreal by the Jesuit Seismological Association. The Kirkland Lake Station was closed permanently at the end of June 1957, and later that year the Benioff was removed from Halifax, the Willmore being considered sufficient. Some use was made of records and readings from a number of temporary stations between Kirkland Lake and Ottawa. These were established by Hodgson (*H12*, *H13*), as part of a crustal study.

Unless it is otherwise indicated, the instruments just enumerated continued to operate through 1959.

*This resulted in the formation of NESA, mentioned earlier. The quotation presages the present work.

Relative Sizes of Earthquakes

The severity of each earthquake is indicated on either the *Instrumental Magnitude Scale* of Gutenberg and Richter (*G4*, *R3*) or the *Modified Mercalli Intensity Scale of 1931* as set up by Wood and Neumann (*W2*) or, occasionally, on both. The discussion of these scales in a similar section in the previous paper need not be repeated here. Figure 1 shows the relation of magnitude to maximum intensity and revised relations of both to the total energy liberated, to the radius of perceptibility and to the maximum acceleration to be expected. The attenuation of the last-mentioned with distance is shown at the bottom. These relations were formulated from earthquake data of other areas. Limited studies indicate that, with the exception of the radius of perceptibility, they may be applied in northeastern North America. The isoseismal maps show that earthquakes in this area are felt to much greater distances than the scale implies. The new figure is based on the following formulae with references appended.

$M = 1 + 2I/3$ (not revised), *G4*;
$\log E = 11.4 + 1.5M$ for $M \geq 4.6$, *R5*;
$\log E = 9.9 + 1.9M_L - 0.024\ M^2_L$ for $M < 4.6$, *R5*;
r (values given in tabular form), *R5*;
$\log a = I/3 - 1/2$, *G4*, *R5*.

The notation is explained in the caption of Figure 1, with the exception of M_L, which is the magnitude derived from local earthquake data.

The small earthquakes were not recorded at great distances, and their magnitudes had to be determined from the records of nearby stations. It was necessary to relate maximum trace amplitudes recorded on a variety of instruments to those that would have been recorded on a standard seismograph. Details of how this was done and how M_L magnitudes were determined are given by Smith (*S6*). Magnitudes (M) of the larger earthquakes are taken from Gutenberg and Richter (*G3*). Because of these two designations of magnitude, the energy scale in Figure 1 has been divided, somewhat arbitrarily, between the two energy formulae included in the list just given. It should be noted that the difference between them at magnitude 4 corresponds to only 0.2M and is smaller at higher magnitudes. This is probably less than the precision of a magnitude determination. In a section of the previous paper, magnitude and energy were used to cast light on the significance of earthquakes. Though that section is still valid, the reader is referred to a much more comprehensive treatment is a paper by Hodgson (*H24*), which deals with the whole subject of earthquake risks in Canada.

For shocks of intensity IV or greater, the rating is that of one of the sources given as a reference, which is usually *U1*. For many shocks smaller than IV, intensities were assigned by the writer even though the information was often scanty. This was done to facilitate their use in a more sophisticated treatment of the seismicity of the area now being undertaken by the Seismological Service of Canada. That study is outlined in some detail in Hodgson's paper cited in the previous paragraph. The abridged version of the modified Mercalli scale is reproduced in the following section.

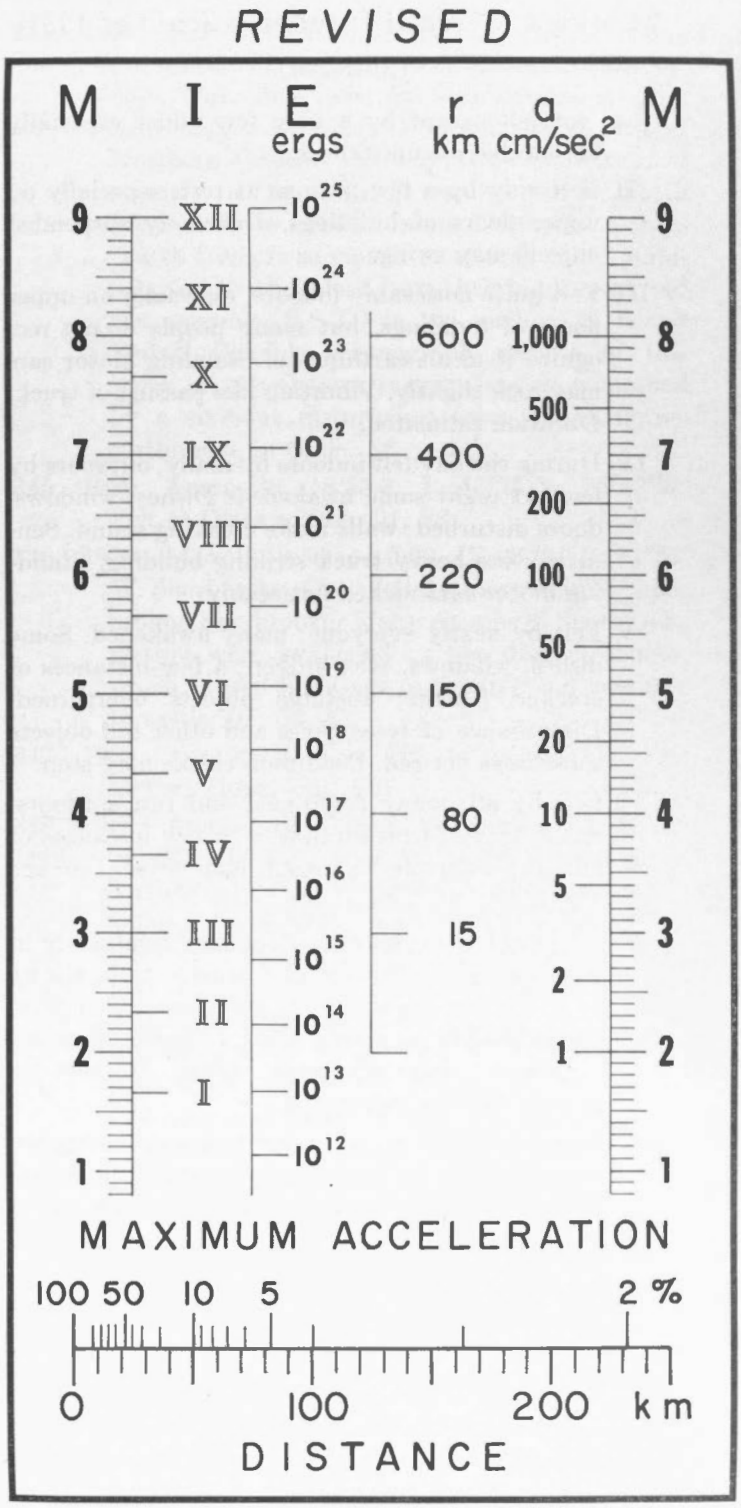

Figure 1. M is the magnitude on the Gutenberg and Richter scale; I is the maximum intensity on the modified Mercalli scale; E is the total energy; r is the radius of perceptibility; a is the maximum acceleration.

Modified Mercalli Intensity Scale of 1931

(Abridged)

I Not felt except by a very few under especially favourable circumstances.

II Felt only by a few persons at rest, especially on upper floors of buildings. Delicately suspended objects may swing.

III Felt quite noticeably indoors, especially on upper floors of buildings, but many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibration like passing of truck. Duration estimated.

IV During the day felt indoors by many, outdoors by few. At night some awakened. Dishes, windows, doors disturbed; walls make creaking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.

V Felt by nearly everyone; many awakened. Some dishes, windows, etc., broken; a few instances of cracked plaster; unstable objects overturned. Disturbance of trees, poles and other tall objects sometimes noticed. Pendulum clocks may stop.

VI Felt by all; many frightened and run outdoors. Some heavy furniture moved; a few instances of fallen plaster or damaged chimneys. Damage slight.

VII Everybody runs outdoors. Damage **negligible** in buildings of good design and construction; **slight** to moderate in well-built ordinary structures; **considerable** in poorly built or badly designed structures; some chimneys broken. Noticed by persons driving motor cars.

VIII Damage **slight** in specially designed structures; **considerable** in ordinary substantial buildings with partial collapse; **great** in poorly built structures. Panel walls thrown out of frame structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. Sand and mud ejected in small amounts. Changes in well water. Persons driving motor cars disturbed.

IX Damage **considerable** in specially designed structures; well designed frame structures thrown out of plumb; **great** in substantial buildings, with partial collapse. Buildings shifted off foundations. Ground cracked conspicuously. Underground pipes broken.

X Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations, ground badly cracked. Rails bent. Landslides considerable from river banks and steep slopes. Shifted sand and mud. Water splashed (slopped) over banks.

XI Few, if any (masonry), structures remain standing. Bridges destroyed. Broad fissures in ground. Underground pipe lines completely out of service. Earth slumps and land slips in soft ground. Rails bent greatly.

XII Damage total. Waves seen on ground surfaces. Lines of sight and level distorted. Objects thrown upward into the air.

Locations

Epicentre co-ordinates are furnished for most earthquakes in this paper. A few in the Canadian list were recorded on one station only, and their distances from the recording station are given. Where epicentres were found from data of Canadian stations, the seismograms were interpreted by using travel-time curves of the main phases (P_n, P_1, S_n, S_1) computed for various depths within the earth's crust and plotted on a single sheet. These curves were based on the seismic velocities and crustal model as determined by Hodgson (*H12*, *H13*) for the Canadian Shield. The epicentral co-ordinates so found include uncertainties. It should be understood that these are not statistical evaluations. They were assigned by the writer upon consideration of the number and quality of the seismic traces, the positions of the epicentres relative to the recording stations, etc. and are an indication of his confidence in the precision of the locations. When both uncertainties were adjudged to be less than 20′ of arc, the earthquake was plotted as a filled circle; otherwise the circle was not filled. In some cases, within a certain range of epicentral distance, focal depths were estimated from the travel-time curves on the basis of P_n to P_1 and S_n to S_1 arrival-time intervals. This procedure for estimating depths is regarded as experimental. Little is known of the actual focal depths of earthquakes in the area. Their relatively large radii of perceptibility led to speculation that they were rather deep; Lehmann (*L11*), however, investigated a few of the larger ones and found that any conclusion of abnormal depth was unwarranted.

Many epicentres were redetermined from Canadian instrumental data together with readings from the bulletins of NESA (*N2*) or other northeastern North American stations. In such cases uncertainties were assigned as already explained. Normally the new epicentral co-ordinates were not significantly different, and those in the lists published by Leet, Linehan, etc. (*L5* through *L10* and *N2*) were retained. Epicentres from these lists for which no Canadian data were available and certain epicentres taken from other sources or determined in other ways are followed by (a) to indicate that they are fairly precise and are plotted as filled circles on the maps. When the precision of epicentral co-ordinates is not designated, the minutes or tenths of degrees frequently cited must not be regarded as significant, for they refer to the place from which the shock was reported or the centre of an area over which it was felt.

Revision

The location of an earthquake that occurred on June 11, 1638, was given in the earlier paper (No. 2 of the Canadian list) as 46°.5N, 72°.5W and its intensity as IX. Reasons were advanced which favoured this new location, even though Mather *et al.* (*M3*) had previously placed the earthquake "Off Cape Ann" at intensity VIII. The writer now considers those reasons inadequate. Accordingly, on the cumulative map herewith, this shock has been removed from the vicinity of Trois Rivières, Que., and plotted at 42°.5N, 69°.0W, off Cape Ann, at intensity VIII. No revision of the numbering has been made in either list.

Acknowledgments

Grateful acknowledgment is made to Dr. J. H. Hodgson, Director of the Dominion Observatories, and to Dr. Kenneth Whitham, Chief of the Division of Seismology, for directing this study. Rev. M. Buist, S.J., of Jean-de-Brébeuf College, has supplied records from the Montreal seismograph station on a routine basis since early 1956. The accompanying maps were drawn by J. W. Geuer, who also gave valued advice on the method of depicting the earthquake data.

EARTHQUAKES OF EASTERN CANADA

339. 1928 JANUARY 27. IV. 48°.0N, 70°.2W. About 25 miles north of La Malbaie, Que. Felt in the parishes of Tadoussac, St-Siméon, Ste-Marguerite, L'Anse-St-Jean and La Malbaie for about 30 seconds. Not felt farther up the Saguenay than L'Anse-St-Jean. *S2*.

340. (423) 1928 March 18. 15:20. V-VI. ($M_L = 4.1$ determined from a Shawinigan Falls seismogram.) 44°.5N, 74°.3W. Saranac Lake, N.Y. Perceptible over 12,000 square miles. Felt north of the Canada-United States border from Montreal up the St. Lawrence nearly to Prescott, Ont. The effects were strongest at Saranac Lake and Malone, N.Y., where dishes were jarred from the shelves. *B5*, *H1*, *Q1*, *S1.20*, *S2*, *S3*, *U1*.

341. 1928 MARCH 19. 19:07. II. 46°.6N, 72°.5W. A light tremor occurred at St-Narcisse, Champlain Co., Que. *S2*.

342. 1928 APRIL 1. II. 45°31′N, 74°39′W. Reports from Vankleek Hill, Ont., state that three different shocks were felt "about April 1." Note on *S3* manuscript.

343. (436) 1928 NOVEMBER 20. 02:30. IV. 45°.0N, 67°.2W. About 10 miles northwest of Eastport, Me. Felt over a radius of 20 miles. Buildings were shaken and bottles fell from shelves. Heard as a roaring noise at Deer Island, N.B. *S2*, *U1*.

344. 1928 DECEMBER 1. a.m. VI. 50°.0N, 81°.5W. Along the Abitibi River about 10 miles north of Fraserdale, Ont. Felt over an area extending from Southclute to mileage 70 on the Timiskaming and Northern Ontario Railway extension, but most strongly to the north. It was not felt at North Bay. A press report dated December 1 says "earth tremors so violent as to rock camp buildings and toss bushmen from their bunks occurred last evening (E.S.T.) in the vicinity of Island Falls." Possible seismograph records of this shock on the Ottawa instruments were masked by a six-hour disturbance from a destructive earthquake in Chile. *S2*.

345. 1929 APRIL 30. 18:53.3. I. 45°25′N, 75°42′W. Felt at Ottawa, Ont. *Q1*, *S3*.

346. 1929 MAY 11. 9:30 to 10:00. IV. 45°24′N, 71°54′W. Sherbrooke, Que. Felt for more than 30 miles around Sherbrooke. Many citizens of Sherbrooke district were awakened by two distinct shocks, which caused buildings to tremble and windows to rattle. *Q1*, *S2*, *S3*.

347. 1929 AUGUST 12. 8:45. III. 44°.0N, 78°.3W. Felt at Port Hope, Ont. *U1*.

348. (449) 1929 AUGUST 12. 11:24.8. VIII. $M_L = 5.8$. 42°52′N, 78°21′W. (a). Near Attica, N.Y. This shock was felt generally in those parts of Ontario and Quebec lying to the south and west of a line joining Parry Sound, Ont., to Montreal, Que., and thence running south to the International Boundary. The effects were mainly the rattling of windows and the swaying of hanging objects, with a few instances of cracked plaster, moved furniture and broken dishes. The intensity does not seem to have exceeded V in Canada. *B5*, *H1*, *H10*, *I2*, *J1*, *Q1*, *S1.21*, *S2*, *S3*, *U1*.

349. 1929 SEPTEMBER 9. 1:59:10. II. 46°23′N, 75°58′W. Felt at Maniwaki, Que., for about 45 seconds. Not reported felt by neighbouring towns and villages. *Q1*, *S2*, *S3*.

350. 1929 SEPTEMBER 9. 18:43.8. I-II. 46°12′N, 75°58′W. Felt at Burbridge, Que., like the passing of a truck, the motion being accompanied by a low rumbling sound. Described as less "severe" than the previous shock at Maniwaki. *Q1*, *S3*.

351. 1929 NOVEMBER 18. 20:32:00.7. M = 7.2 (*G3*). 44°.5N, 56°.3W. (a). In the Atlantic Ocean, just off the continental shelf, about 170 miles south of the Burin Peninsula, Nfld. This position of the epicentre was recently computed through the courtesy of the United States Coast and Geodetic Survey, who used the facilities of their epicentre-determination program. In the absence of any evidence that it was abnormal, the depth was restricted to 33 km. Data from 119 seismograph stations were available. Doxsee

(*D9*) previously placed the epicentre at 45°.5N and 55°.0W, using the stereographic projection method with the data from 66 stations. The magnitude (7.2) is that given by Gutenberg and Richter (*G3*). Magnitudes of the five main aftershocks—Nos. 352, 353, 354, 356, and 357—were derived from it by comparing the seismograph trace amplitude of each with that of the main shock.

The earthquake was felt throughout Newfoundland, the Maritime Provinces, eastern Quebec and the northern New England States. It was reported perceptible as far west as Ottawa, Ont., and south to Claymont, Del. Minor damage due directly to earth tremors was reported from villages in Newfoundland, Cape Breton and the mainland of Nova Scotia. An isoseismal map based on reports from 331 localities is shown in Figure 2. The positions of two ships, the Caledonia and the Olympic are also shown at the time when they reported a severe earthquake felt on board. The earthquake was accompanied by a tsunami, which reached the shore at the time of high tide. An abnormally high tide had been expected in any case, and there was a heavy gale at sea. The resulting tidal wave struck the south end of the Burin Peninsula and the west side of Placentia Bay with great force. Doxsee (*D9*) reports 27 lives lost along with many homes and much fishing equipment, provisions, etc.

An unusual result of this earthquake was the breaking of 12 transatlantic cables, each in at least two places, for a total of 28 known breaks. Their positions are shown in Figure 2. For 17 hours and 13 minutes following the shock, there occurred an orderly sequence of breaks, each succeeding broken cable lying in increasingly deeper water extending more than 300 miles south of the epicentral area. Many attempts were made to explain the cause of the cable breaks, but none accounted satisfactorily for the orderly sequence of the breaks until 1952, when Heezen and Ewing (*H22*) proposed the following:

The "severe shock jarred the continental slope and shelf, setting landslides and slumps in

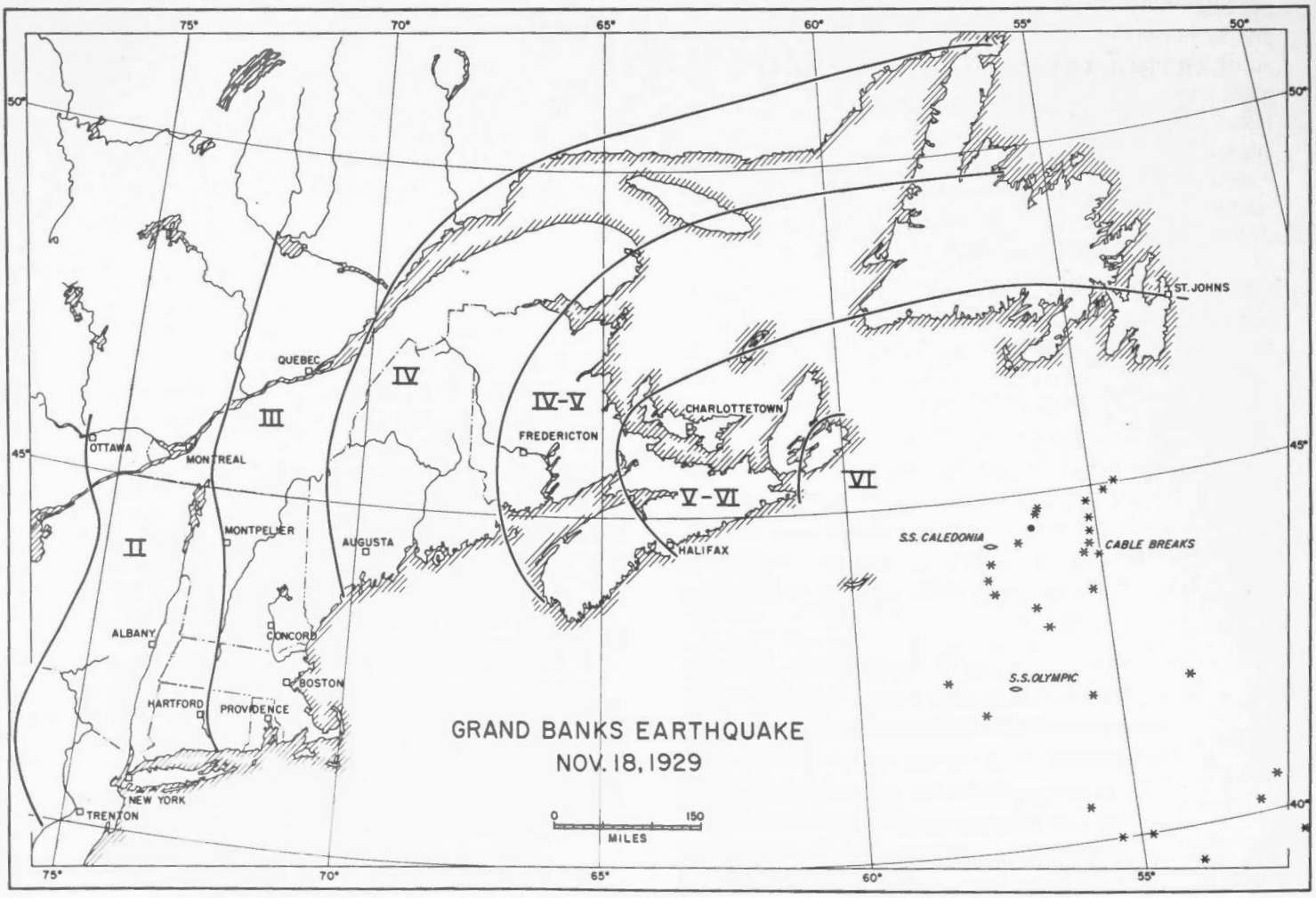

FIGURE 2. Adapted from Doxsee (D9).

motion .... These mass movements, starting on the relatively steep continental slope, raced downward, and by the incorporation of water the moving sediment was transformed from sliding masses into turbidity currents .... The currents had many times the force necessary to break the cables, and snapped each cable shortly after reaching it. In all cases at least two breaks occurred 100 miles or more apart, and the intervening section of cable was either buried or carried seaward so far that it was never found. As the current began to slow down because of decreasing slope, finer and finer sediments were deposited in a manner which produced graded bedding. Since the flow passed the last cable in the area at a distance of about 400 miles from its origin with a velocity of 12 knots and sufficient force to destroy 200 miles of the cable it is probable that the area of deposition extended hundreds of miles farther." *B5, D9, G3, H1, H2, H9, H10, H20, H22, H23, I2, K5, Q1, S1.21, S2, S3, U1.*

352. 1929 NOVEMBER 18. 23:01:48. M=6.0. 44°.5N, 56°.3W. Aftershock of No. 351. *D8, I2, Q1, S2, S3.*

353. 1929 NOVEMBER 18. 23:20:19. M=4.9. 44°.5N, 56°.3W. Aftershock of No. 351. *D8, Q1, S3.*

354. 1929 NOVEMBER 19. 2:01:28. M=5.8. 44°.5N, 56°.3W. Aftershock of No. 351. *I2, Q1, S3.*

355. 1929 DECEMBER 5. 15:36.5. I-II. 45°24′N, 71° 54′W. Felt at Sherbrooke, Que. *Q1, S3.*

356. 1929 DECEMBER 13. 0:58:01. M=4.4. 44°.5N, 56°.3W. Aftershock of No. 351. Felt at Sherbrooke, Guysboro Co., N.S. *S2, S3.*

357. 1929 DECEMBER 13. 11:19:15. M=5.0. 44°.5N, 56°.3W. Aftershock of No. 351. Felt at Sherbrooke, N.S., where pictures were said to have fallen and dishes rattled. *S2, S3.*

358. 1930 JANUARY 4. 14:30:35. M_L=4.6. 46°44′N, 65° 50′W. Blackville, N.B. Felt at Fredericton, N.B., where furniture and other articles in homes and business houses shook. The shock extended along the Nashwaak Valley and the Miramichi Valley; it was particularly strong at Blackville, though no damage was reported there. *Q1, S2, S3.*

359. 1930 FEBRUARY 10. 12:30. II. 46°12′N, 59°57′W. A slight tremor lasting only a few second was felt at Glace Bay, N.S. *S1.22, S2.*

360. 1930 FEBRUARY 16. 12:17. III. 42°50′N, 80°31′W. Felt in Ontario, at Simcoe and Tillsonburg, where it rattled windows and dishes. *S2.*

361. 1930 FEBRUARY 19. 11:38:54. II. 45°25′N, 75° 50′W. Felt most strongly to the west of Ottawa, at Westboro, Britannia and Woodroffe. A few persons noticed the tremor at Almonte. It was also perceptible at Rockcliffe. *Q1, S2, S3.*

362. 1930 JUNE 19. 12:06:56. M_L=3.6. 45°44′N, 71°13′W. About 40 miles northeast of Sherbrooke, Que. *Q1, S3.*

363. 1930 JULY 13. 4:52:40. M_L=3.1. 47°30′N±25′, 69°50′W±25′. Near Kamouraska, Que. *Q1, S3.*

364. 1930 OCTOBER 8. 1:08:41. M_L=3.9. 48°56′N, 68°42′W. Felt at Rivière Bersimis, Que., and other points on the north shore of the lower St. Lawrence. *Q1, S2, S3.*

365. 1930 OCTOBER 15. a.m. I-II. 44°23′N, 78°23′W. Felt at Bridgenorth, Ont. *S2.*

366. 1930 OCTOBER 16. 0:35, II. 46°54′N, 65°38′W. Felt at Millerton, N.B., "like a truck striking the house." Not felt at Newcastle except at the New Brunswick Telephone Co. switchboard. *S2.*

367. 1930 NOVEMBER 22. 5:13:37. M_L=2.3. About 30 miles from Seven Falls, probably in the vicinity of Baie-St-Paul, Que. *Q1, S3.*

368. 1930 DECEMBER 13. 23:18:24. M_L=3.5. 47°39′N, 70°10′W. Felt at Murray Bay, Que. *Q1, S3.*

369. 1930 DECEMBER 19. 1:34:39. M_L=2.6. About 46 miles from Seven Falls, Que. *Q1, S3.*

370. 1930 DECEMBER 25. 22:07:34. M=4.6. 47°38′N± 19′, 70°10′W±18′. Near La Malbaie, Que. Felt over a wide sector of the province of Quebec, including Chicoutimi to the north and Montreal to the west, but most strongly in the Baie-St-Paul area. It may be regarded as a foreshock of a more severe earthquake that occurred at the same location on January 8, 1931. *Q1, S2, S3.*

371. 1931 JANUARY 7. 7:21:30. I-II. 47°27′N, 70°30′W. Felt at Ottawa, Ont. *Q1, S3.*

372. 1931 JANUARY 8. 0:13:37. M=5.4 (*G3*). 47°38′ N±19′, 70°10′W±18′. Near La Malbaie, Que. Felt most strongly in the Baie-St-Paul and La Malbaie areas. A clock in a convent at Rivière Ouelle was stopped. Books were shaken from the shelves of the Technical College library in Quebec City. A vase containing flowers was topped over at Westmount, Que. Houses and window panes rattled in Ottawa, Ont. The shock was felt at Island Pond, Vt., and at Caribou, Van Buren and Madawaska etc., in northern Maine, as well as at Edmundston, N.B. *B5, G3, H1, I2, Q1, S1.23, S2, S3, U1.*

373. 1931 JANUARY 24. 12:29:12. M_L=3.4. 47°27′N, 70°30′W. Near Baie-St-Paul, Que. Felt at St-Féréol, Que. *Q1, S3.*

374. 1931 MARCH 20. 13:14:37. M_L=3.1. About 64 miles from Seven Falls. *Q1, S3.*

375. 1931 APRIL 6. 20:50:35. I. 45°25′N, 75°42′W. Felt at Ottawa, Ont. *Q1, S3.*

376. 1931 April 9. a.m. III. 45°.0N, 67°.0W. Deer Island, N.B. "Press reports state that a slight earthquake centred in the vicinity of Deer Island in Passamaquoddy Bay was felt during the night of April 8th (E.S.T.)." *S1.23.*

377. (475) 1931 April 22. IV. 42°.9N, 78°.9W. "A strong earthquake was felt in Buffalo, N.Y., and surrounding cities [presumably this includes Fort Erie, Ont.] on April 22d, causing panic." *S1.23.*

378. 1931 April 30. 5:57:42. $M_L=2.4$. About 27 miles from Seven Falls, Que. *Q1, S3.*

379. 1931 July 24. 20:11:11: $M_L=3.0$. About 22 miles from Seven Falls, Que. *Q1, S3.*

380. 1931 August 7. IV. 44°37′N, 65°46′W. Digby, N.S. "Earth tremors accompanied by a severe electric storm were felt in the western part of Nova Scotia on the night of August 6th and morning of August 7th (A.D.T.)" *S1.23.*

381. 1931 August 20. 1:12:56. $M_L=2.5$. About 30 miles from Seven Falls, Que. *Q1, S3.*

382. 1931 September 23. 22:47:37. $M_L=4.5$. 47°00′ N±15′, 76°04′W±12′. A few miles north of Kazabazua, Que. *Q1, S3.*

383. 1931 November 8. 4:08:12. $M_L=2.8$. About 30 miles from Seven Falls, Que. *Q1, S3.*

384. 1931 November 14. 14:02:30. $M_L=3.4$. 47°20′N ±20′, 70°10′W±25′. A few miles east of Baie-St-Paul, Que. *Q1, S3.*

385. 1932 January 5. 6:14:13. $M_L=2.1$. About 26 miles from Seven Falls, Que. *Q1, S3.*

386. 1932 January 5. 14:15:32. $M_L=3.2$. About 48 miles from Seven Falls, Que. *Q1, S3.*

387. 1932 March 2. 2:38:50. $M_L=2.9$. About 43 miles from Seven Falls, Que. *Q1, S3.*

388. 1932 March 9. 5:23:39. $M_L=3.8$. 46°28′N±18′, 74°40′W±19′. About 15 miles north of Labelle, Que. This shock was said to have been felt at Ottawa, Ont. *Q1, S1.24, S3.*

389. 1932 June 28. 21:19:57. $M_L=2.2$. About 30 miles from Seven Falls, Que. *Q1, S3.*

390. 1932 July 27. 0:30. I-II. 47°27′N, 70°30′W. Felt at Baie-St-Paul, Que. *Q1.*

391. 1932 August 2. 7:37:50. $M_L=3.0$. 47°27′N, 70°30′W. Felt at Baie-St-Paul, Que. *Q1, S3.*

392. 1932 October 18. 21:05:19. $M_L=2.4$. About 33 miles from Seven Falls, Que. *S3.*

393. 1932 November 26. 5:01:38. $M_L=2.7$. 47°30′N± 16′, 70°28′W±18′. A few miles northwest of Baie-St-Paul. The tremor was reported felt at Murray Bay. *Q1, S3.*

394. 1932 December 21. 11:20:16. I-II. 45°25′N, 75°42′W. Slight local tremor felt in Ottawa, but more strongly at Russell, Ont., where some persons were awakened. *Q1, S2, S3.*

395. 1933 January 11. 23:32. III. 47°27′N, 70°30′W. Felt at Baie-St-Paul, Que. *Q1, S3.*

396. 1933 January 21. 16:04:40. $M_L=3.8$. 45°18′N± 15′, 74°39′W±15′. Near Alexandria, Ont. Residents of Alexandria and the surrounding district in Glengarry County, were alarmed by a severe earthquake at 11 a.m. (E.S.T.) Buildings were shaken and windows rattled. *Q1, S1.25, S3.*

397. 1933 January 30. 4:22:35. $M_L=2.8$. 47°27′N, 70°30′W. Felt at Baie-St-Paul, Que. *Q1, S3.*

398. 1933 February 25. 2:32. III. 45°02′N, 75°44′ W. Cornwall, Ont. Citizens were alarmed by a loud rumbling noise The earth shook sufficiently to rattle dishes on shelves and cause doors to open suddenly. *S2.*

399. 1933 February 25. 9:43:03. $M_L=3.4$. 47°26′N± 18′, 69°56′W±19′. Near St-Pacôme, Que. Reported felt at Baie-St-Paul. *Q1, S3.*

400. 1933 May 27. 4:29:25. $M_L=3.0$. About 43 miles from Seven Falls, Que. *Q1, S3.*

401. 1933 July 14. 4:48:40. $M_L=3.9$. 45°25′N, 75° 42W. Near Ottawa, Ont. Replies to questionnaires show the shock was felt at about 20 places in Ontario and Quebec, ranging from Renfrew, Ont., in the west to Buckingham, Que., in the east and north to Notre-Dame-du-Saus, Que. It seems not to have been felt farther south than Kemptville. *Q1, S2, S3.*

402. 1933 October 30. 0:53:34. $M_L=2.6$. 47°27′N, 70°30′W. Felt at Baie-St-Paul, Que. *Q1, S3.*

403. 1934 February 2. 16:35:08. II. 45°25′N, 75° 42′W. A small shock felt generally in Ottawa Ont. It was also perceptible in the Gatineau district. *Q1, S1.26, S3.*

404. 1934 March 17. III-IV. 43°5N±1°.0, 65°.5W± 1°.0. Southern Nova Scotia. A half dozen towns along the south coast of Nova Scotia were shaken by an earthquake. No damage was reported. *S1.26.*

405. (498) 1934 April 15. 2:58:13. V-VI. ($M_L=4.5$ from Seven Falls and Shawinigan Falls seismograms.) 44°40′N ± 16′, 73°48′W ± 18′. In the Adirondack Mountains, N.Y. This shock was felt at Montreal, Que., and also lightly at Ottawa, Ont. *B5, H1, Q1, S2, S3, U1,*

406. 1934 July 19. 19:15:27. $M_L=4.5$. About 250 miles from Shawinigan Falls, Que. *Q1, S3.*

407. 1935 July 17. 21:56.5. II. 45°25′N, 75°42′W. Ottawa, Ont. Several persons telephoned the newspaper and reported that they had heard a rumbling noise, which they believed to be an earthquake. It was recorded on the Ottawa seismograph. *Q1, S2, S3.*

408. 1935 November 1. 6:03:40. $M=6.25$ (*G3*). VII. 46°47′N, 79°04′W. (a). About 4 miles north and

a little to the east of Timiskaming Station, Que. The shock was felt over an area of more than 500,000 square miles. The limit of perceptibility to the north is not defined because of lack of human habitation. It extends, however, from Fort William, Ont., in the west to the Bay of Fundy in the east and southward into Kentucky and Virginia. The shock was felt at scattered points outside this area. An isoseismal map is shown as Figure 3.

Hodgson (*H16*) (*H17*) made an extensive study of the epicentral region for a month after the shock. He reports that the greatest damage occurred in Timiskaming, Que. Here, about 80 percent of the chimneys were damaged even though they were nearly all lined with tile and capped with cement. The tops of the chimneys "mushroomed" and had to be rebuilt but did not actually fall at the time of the shock. Some cracks developed in solid brick walls though much brick-veneer construction escaped damage. Forty miles from the epicentre, at Mattawa and North Bay, many chimneys were thrown down.

Cracks appeared in the gravel and sand at the edges of islands and borders of lakes. One beside Lake Timiskaming was more than 200 feet long and a stick could be thrust into it to a depth of 3 feet. The deep and clear water of T-Lake, close to the epicentre, was muddied to the colour of "café au lait" by the shock. Other lakes in the area were not affected. Displacement of heavy bodies was common in and near Timiskaming.

From a preliminary analysis of the records from seven seismograph stations, Hodgson (*H17*) concluded that the depth of the focus was about 200 km. This was compatible with subsequent field work, which showed the damage in the epicentral area to be relatively small in view of the large area affected by the shock.

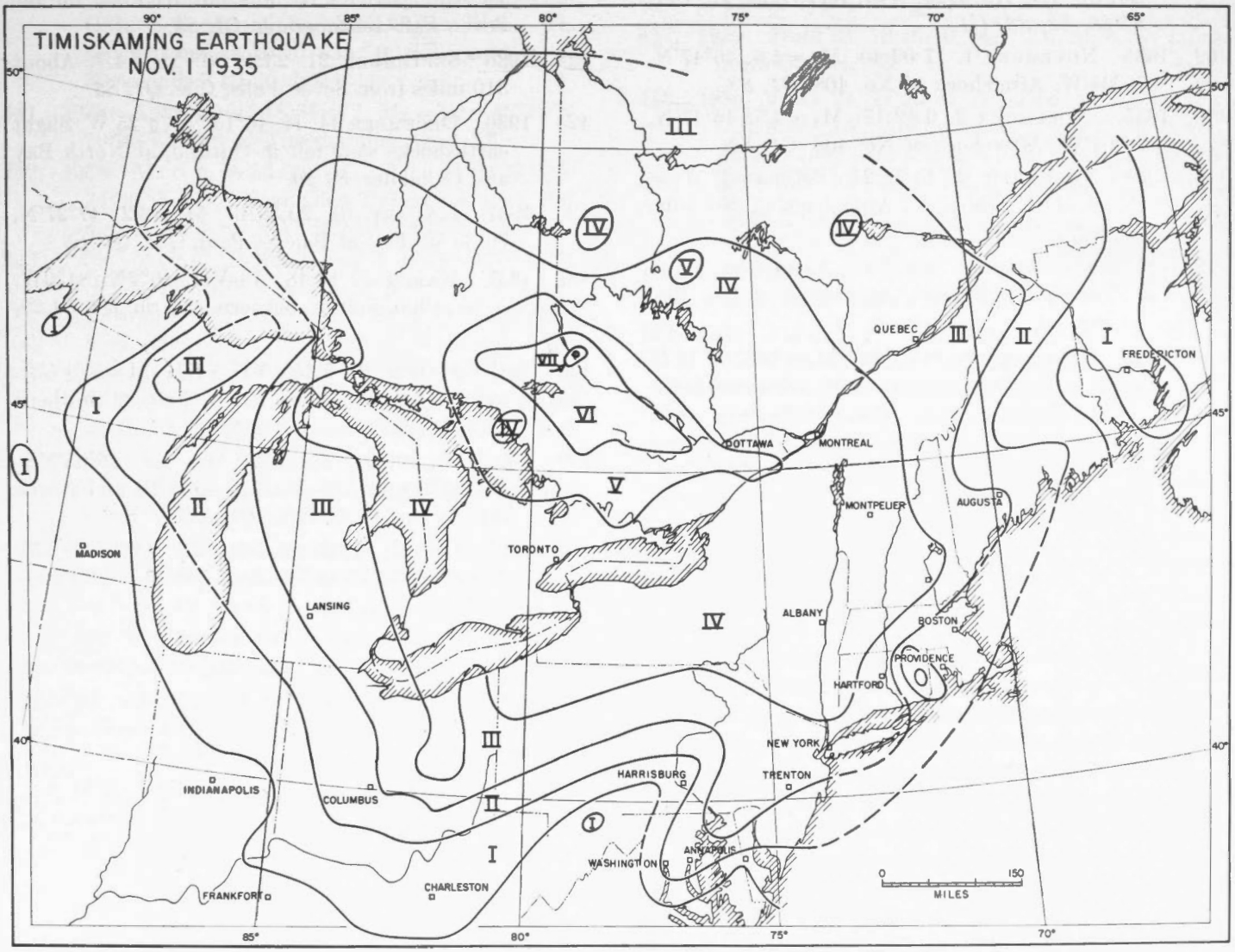

FIGURE 3. United States section from *United States Earthquakes*, 1935 (*U1*).

Later, however, he found (*H18*) that the first-arrival times at 23 stations agreed best with the P-wave travel-time curve for normal-focus earthquakes. Investigating this shock still later, Lehmann (*L11*) found that any conclusion of abnormal depth was unwarranted.

This shock furnished a well-documented instance of the triggering of a landslide by an earthquake. At Parent, Que., 190 miles from the epicentre, more than 100 feet of the Canadian National Railways right of way slid into a small lake. That the slide was imminent and the earthquake acted as a trigger was deduced from the fact that delicately balanced rocks in rock cuts near the slide were not disturbed.

As is usual when shocks are of the size of this one, many aftershocks were felt in the epicentral area. They were very frequent during the rest of November 1 and continued for some months after the main shock. Twelve of the larger ones have been assigned numbers and listed below. *A9, B5, G3, H1, H9, H10, H16, H17, H18, I2, L11, S1.28, S2, S3, U1.*

409. 1935 NOVEMBER 1. 17:02:40. $M_L=4.6$. 46°47′N, 79°04′W. Aftershock of No. 408. *Q1, S3.*

410. 1935. NOVEMBER 2. 0:42:17. $M_L=4.7$. 46°47′N, 79°04′W. Aftershock of No. 408. *Q1, S3.*

411. 1935 NOVEMBER 2. 13:51:21. Estimated $M_L=3.0$. 46°47′N, 79°04′W. Aftershock of No. 408. *Q1, S2, S3.*

412. 1935 NOVEMBER 2. 13:55:42. Estimated $M_L=2.7$. 46°47′N, 79°04′W. Aftershock of No. 408. *Q1, S2, S3.*

413. 1935 NOVEMBER 2. 14:31:58. $M_L=5.4$. 47°14′N ±18′, 78°10′W±15. About 56 miles northeast of Timiskaming, Que. The instrumental data seem to indicate conclusively that the epicentre was some distance from that of No. 408. However, the possibility does exist that this was another aftershock of No. 408. This tremor was reported felt in Ontario (at Kitchener, North Bay, Owen Sound and Toronto), in New York (at Buffalo and Rochester) and in Pennsylvania (at State College). *I2, B5, Q1, S2, S3, U1.*

414. 1935 NOVEMBER 5. 10:10:48, $M_L=4.5$. 46°47′N, 79°04′W. Aftershock of No. 408. *Q1, S2, S3.*

415. 1935 NOVEMBER 7. 16:47:04. Estimated $M_L=2.4$. 46°47′N, 79°04′W. Aftershock of No. 408. *Q1, S2, S3.*

416. 1935 NOVEMBER 15. 16:11:20. Estimated $M_L=3.0$. 46°47′N, 79°04′W. Aftershock of No. 408. *Q1, S3.*

417. 1935 NOVEMBER 25. 6:19:19. $M_L=4.7$. 46°47′N, 79°04′W. Aftershock of No. 408. Felt at Widdifield and Mattawa, both in Ontario. *Q1, S2, S3.*

418. 1935 NOVEMBER 27. 19:31:49. $M_L=4.6$. 46°47′N, 79°04′W. Aftershock of No. 408. *S3.*

419. 1935 DECEMBER 15. 10:15 and 10:45. III. 46°47′N, 79°04′W. Aftershock of No. 408. Two distinct tremors were felt at Timiskaming, Que. The second was more noticeable and was described as similar to a "crack of thunder." *S2.*

420. 1936 JANUARY 20. 6:01. $M_L=4.5$. 46°47′N, 79°04′*W*. Aftershock of No. 408. Felt at Timiskaming, Que., and at Mattawa and North Bay, both in Ontario. *Q1, S2, S3.*

421. 1936. MARCH 25. 1:27:25. $M_L=4.6$. 46°47′N, 79°04′W. Aftershock of No. 408. Felt at Timiskaming, Que., and in the vicinity. *Q1, S3.*

422. 1936 MARCH 29. 0:49:23. $M_L=4.0$. 47°20′N± 15′, 70°15′W±18′. In the St. Lawrence River south of Ile-aux-Coudres. Felt at Baie-St-Paul, Que. *Q1, S3.*

423. 1936 SEPTEMBER 18. 15:00. I. 47°27′N, 70°30′W. A slight shock was felt at Baie-St-Paul, Que., at 10 a.m. (E.S.T.). It was not recorded on the Seven Falls seismograph. *Q1, S3.*

424. 1936 SEPTEMBER 21. 23:48:00. $M_L=4.7$. About 310 miles from Seven Falls, Que. *Q1. S3.*

425. 1936 DECEMBER 14. II. 46°16′N, 79°25′W. Slight earthshocks were felt in Ontario, at North Bay and Callander. *S1.29.*

426. 1937 JANUARY 19. 20:58:13. $M_L=2.2$. 47°27′N, 70°30′W. Felt at Baie-St-Paul, Que. *Q1, S3.*

427. (525) 1937 MARCH 2. 14:48. VI-VII. 40°.7N, 84°.0W. Anna, Ohio. Felt in southern Ontario. *H1, S1.29, U1.*

428. (526) 1937 MARCH 9. 5:45. VII-VIII. $M=5\frac{1}{2}\pm$ *G3*). 40°.6N, 84°.0W. Anna, Ohio. Felt in southern Ontario. *G3, H1, U1.*

429. 1937 MARCH 31. 17:09:52. $M_L=2.8$. 45°05′N± 18′, 75°39′±18′. Felt at Kemptville and North Gower, both in Ontario. *Q1, S3.*

430. 1937 JULY 14. 23:01:21. $M_L=2.8$. 45°24′N±15′, 74°01′W±15′. Near Dorion, Que. Felt at Vaudreuil, Que. *B5, Q1, L6, S1.29, S3.*

431. 1937 JULY 28. 0:17. II-III. 46°43′N, 79°05′N. Felt at Timiskaming, Que. *B5, Q1, L6, S1.29, S3.*

432. 1937 SEPTEMBER 24. 6:45:37. $M_L=2.5$. 45°31′N ±17′, 73°34′W±18′. Felt in some sections of Montreal, Que. *B5, Q1, L6, S3.*

433. 1937 SEPTEMBER 30. 7:58:10. $M_L=5.0$. 45°28′N± 30′, 65°50′W±25′. About 10 miles northeast of Rothesay, N.B. Felt in Saint John, N.B., and vicinity. *B5, I2, Q1, L6, S3.*

434. 1937 NOVEMBER 6. 14:31:21. $M_L=4.0$. 46°44′N± 15′, 75°43′W±15′. Near Baskatong Reservoir, Que. *B5, Q1, L6, S3.*

435. 1937 NOVEMBER 12. 14:43:44. $M_L=3.6$. 45°55′N ±18′, 74°20′W±18′. About 18 miles northwest of St-Jérôme, Que., where it was felt. Foreshock of No. 436. *B5, Q1, L6, S1.30, S2, S3.*

436. 1937 NOVEMBER 12. 16:57:33. $M_L=3.7$. 45°55′N ±18′, 74°21′W±18′. About 18 miles northwest of St-Jérôme, Que., where it was felt. There was one foreshock. B*5, I2, Q1, L6, S1.20, S2, S3.*

437. 1938 JANUARY 6. 13:28:42. $M_L=3.2$. 44°54′N, 75°11′W. (a). Felt at Morrisburg, Ont. *B5, L10, S3.*

438. 1938 JANUARY 24. 5:29:02. $M_L=3.0$. 45°34′N± 10′, 76°16′W±12′. Felt at Arnprior, Ont. *B5, L10, S3.*

439. 1938 FEBRUARY 23. 17:56:36. $M_L=3.2$. 46°23′N ±10′, 75°24′W±12′ (about 8 miles northeast of Lac-du-Cerf, Que.) *or* 45°06′N±10′, 74°22W± 12′ (about 12 miles northwest of Athelstan, Que.). *S3.*

440. (536) 1938 MARCH 13. 16:10. II. 42°19′N, 83°03′W. "An earthquake jarred portions of Michigan and Ontario bordering on the Detroit River. The shock came at 10:10 a.m. (C.S.T.) and lasted 30 seconds." *S1.30, U1.*

441. 1938 APRIL 12. 18:55:47. $M_L=3.2$. 46°43′N, 79°05′W. Felt at Timiskaming, Que. *S3.*

442. 1938 MAY 5. 0:33:00. $M_L=3.0$. 45°22′N±15′, 74°30′W±10′. Near Glen Robertson, Ont. Felt also at Malone, N.Y. *B5, L10, S3.*

443. 1938 MAY 17. 18:32. $M_L=4.6$. 49°N±1°0, 68°W ±1°5. Not well located but probably in the St. Lawrence River in the Baie Comeau-Matane area. *S3.*

444. 1938 JUNE 15. 5:07:43. III-IV. 46°5N±0°5, 66°8W±0°5. About 10 miles northeast of Napadogan, N.B. Felt in New Brunswick. *B5, L10, N2.*

445. 1938 JULY 26. 8:18:26. $M_L=1.8$. About 15 miles from Ottawa, Ont. *S3.*

446. 1938 SEPTEMBER 7. 23:18:19. $M_L=3.4$. 45°52′N± 15′, 74°54′W±15′. Near Namur, Que. *B5, L10, N2, S3.*

447. 1938 SEPTEMBER 22. 0:12:16. $M_L=1.9$. About 61 miles from Ottawa. *S3.*

448. 1938 SEPTEMBER 28. 4:33:16. $M_L=4.1$. 48°47′N± 30′, 69°35′W±30′. About 25 miles northwest of Sault-au-Mouton, Que. *S3.*

449. (557) 1938 NOVEMBER 18. 22:19:06. IV-V. 44°45′N, 75°15′W. (a). On the United States side of the St. Lawrence River, across from Morrisburg, Ont. Felt in Ontario from Brockville to Cornwall. *B5, L10, N2, S2, S3, U1.*

450. 1938 NOVEMBER 26. 7:47:58. $M_L=4.2$. 47°02′N± 10′, 76°12′W±12′. About 10 miles southeast of Cabonga Reservoir, Que. *B5, L10, N2, S3.*

451. 1938 DECEMBER 25. 7:46:19. $M_L=3.9$. 47°35′N± 15′, 75°22′W±15′. Along the Gatineau River about 40 miles north by west of Baskatong Reservoir, Que. *B5, L10, N2, S3.*

452. 1939 JANUARY 14. 8:10:16. $M_L=3.3$. 43°15′N, 79°51′W. Slight shock felt at Hamilton, Ont. *S3.*

453. 1939 JANUARY 15. 1:28:53. $M_L=2.7$. 46°38′N± 15′, 75°17′W±15′ (Near Chute-St-Philippe, Que.) *or* 45°02′N±15′, 74°00′W±15′ (about 10 miles southeast of Huntingdon, Que.). *B5, L10, N2, S3.*

454. 1939 FEBRUARY 6. 5:21:45. $M_L=3.0$. 46°30′N, 81°00′W. Slight tremors felt at Sudbury, Ont. *S3.*

455. 1939 FEBRUARY 9. 15:11:18. $M_L=2.8$. 46°28′N± 10′, 74°58′W±10′ (about 5 miles northeast of Nominingue, Que.) *or* 45°18′N±10′, 74°01W± 10′ (near Valleyfield, Que.). *B5, L10, N2, S3.*

456. 1939 MARCH 16. 20:21:03. $M_L=3.6$. 46°25′N± 15′, 77°27′W±15′. About 30 miles north of Chalk River, Ont. *B5, L10, N2, S3.*

457. 1939 JUNE 23. 10:10:10. $M_L=2.6$. About 97 miles from Ottawa. *S3.*

458. 1939 JUNE 24. 17:20:21. $M_L=4.8$. 47°50′N±15′, 70°50′W±15′. About 50 miles north of Seven Falls, Que. The shock was felt along the St. Lawrence River from Baie-St-Paul to Shawinigan Falls, including Quebec City and surrounding communities. *B5, L10, N2, S3.*

459. 1939 AUGUST 15. 8:37:08. $M_L=2.5$. About 107 miles from Ottawa. *B5, L10, N2, S3.*

460. 1939 SEPTEMBER 4. 5:17:02. $M_L=2.7$. 45°57′N, 76°01′W. (a). Felt at Kazabazua, Poltimore, Danford Lake and Whitefish, all in Quebec. *B5, L10, N2, S2, S3.*

461. 1939 OCTOBER 19. 11:53:58. M=5.8 (*G3*). VI. 47°48′N±10′, 70°00′W±18′. About 12 miles northeast of La Malbaie and 22 miles west of Rivière-du-Loup, Que. The shock was felt from Lake Erie eastward to Moncton, N.B., and from the Lake St. John area of Quebec southward to Connecticut. Considering the size of the area over which the tremors were felt, damage in the epicentral region was relatively small. Chimneys were damaged at Rivière-Ouelle and La Malbaie. At the latter place some brick walls were cracked and minor damage to machinery occurred. Small ground fissures were reported from the Tadoussac area.

An isoseismal map is shown as Figure 4. The United States section is adapted from *United States Earthquakes*, 1939 (*U1*). The data on which the Canadian part is based are insufficient. Only 28 filled questionnaires were available and in numerous cases several came from the same

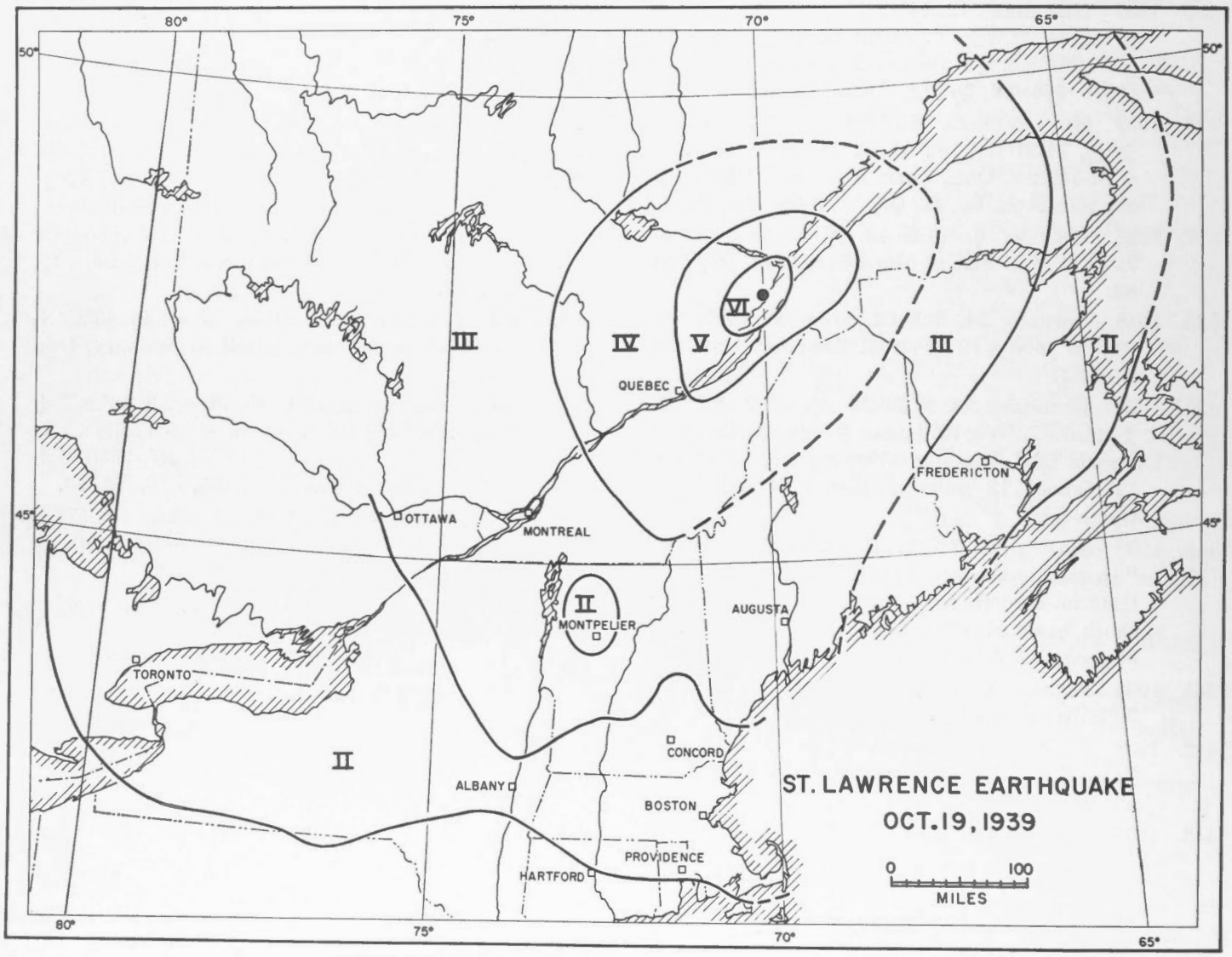

FIGURE 4. United States section from *United States Earthquakes, 1939 (U1)*.

locality. A few reports from newspapers (*S2*) were also used. *A9, B5, G3, H1, I1, I2, N2, S1.32, S2, S3, U1, U2.*

462. 1939 October 19. 14:12:16. $M_L=3.4$. 47°.8N, 70°.0W. Aftershock of No. 461. *S3.*

463. 1939 October 19. 18:37:23. $M_L=3.5$. 47°.5N± 0°.5, 70°.9W±0°.8. Foreshock of No. 464. *S3.*

464. 1939 October 21. 8:07:14. $M_L=4.0$. 47°30′N± 35′, 70°55′W±45′. About 50 miles north-northwest of Quebec City. *A9, B5, L10. N2, S3.*

465. 1939 October 27. 1:36:36. $M_L=5.2$. 47°48′N± 10′, 70°.00′W±18′. Aftershock of No. 461. *B5, I2, L10, N2, S3.*

466. 1939 November 7. 2:40:32. $M_L=4.3$. 47°48′N± 18′., 70°30′W±18′. About 75 miles northwest of Quebec City. *N2, S3.*

467. 1939 November 8. 6:03:40. $M_L=3.5$. About 120 miles from Ottawa. *S3.*

468. 1939 December 2. 20:25:16. $M_L=2.5$. 45°44′N ±15′, 74°58′W±15′ (near St-André-Avellin, Que.) *or* 44°50′N±15′, 76°10′W±15′ (a few miles south of Perth, Ont.). *N2, S3.*

469. 1939 December 8. 1:17:47. $M_L=3.6$. 47°58′N ±15′, 71°24′W±19′. Near the Chicoutimi River, Que. *N2, S3.*

470. 1939 December 25. 10:29:13. $M_L=4.1$. 48°00′N ±10′, 70°30′W±15′. About 30 miles northwest of La Malbaie, Que. *N2, S3.*

471. 1940 January 5. 0:34:14. $M_L=3.0$. 46°43′N, 79°05′W. Slight tremor felt at Timiskaming, Que. *B5, L10, N2, S3.*

472. 1940 February 10. 20:57:17. $M_L=4.0$. 46°30′N ±18′, 76°50′W±18′. About 40 miles north of Waltham, Que. *B5, L10, N2, S3.*

473. 1940 February 15. 8:59:41. $M_L=2.2$. About 61 miles from Ottawa, Ont. S3.

474. 1940 FEBRUARY 15. 10:58:13. $M_L=3.3$. About 200 miles from Ottawa, Ont. *B5, L10, N2, S3.*

475. 1940 MARCH 29. 4:35:29. $M_L=2.2$. About 96 miles from Ottawa, Ont. *S3.*

476. 1940 APRIL 13. 8:13:34. $M_L=3.8$. 47°44′N±25′, 70°44′W±25′. Near the Rivière Malbaie about 15 miles northwest of Baie-St-Paul, Que. *N2, S3.*

477 1940 MAY 16. 14:00:17. $M_L=3.6$. 45°48′N±8′, 73°12′W±10′. About 8 miles west of L'Assomption, Que. *A9, B5, L10, N2, S3.*

478. 1940 JUNE 20. 6:43:35. $M_L=3.0$. About 46 miles from Seven Falls, Que. *S3.*

479. 1940 JUNE 25. 9:50:40. $M_L=2.5$. About 15 miles from Seven Falls, Que. *S3.*

480. 1940 AUGUST 4. 16:20:52. $M_L=3.1$. 46°15′N±10′, 74°47′±12′ (near Labelle, Que.) *or* 45°32′N±10′, 74°12′W±12′ (in the Ottawa River 10 miles below Pointe-Fortune, Que.). *S3.*

481. 1940 AUGUST 7. 23:57:35. $M_L=3.0$. 45°46′N±12′, 74°50′W±15′. About 10 miles northeast of Montebello, Que. *B5, L10, N2, S3.*

482. 1940 SEPTEMBER 11. 1:06:55. $M_L=3.5$. 47°00′N±8′, 71°08′W±10′. About 14 miles north-northeast of Quebec City. Felt in the area between Quebec City and Beaupré, Que. *B5, L10, N2, S3.*

483. 1940 OCTOBER 13. 19:50:51. $M_L=4.7$. 48°02′N±12′, 70°34′W±15′. Near the Rivière Malbaie about 25 miles northwest of Clermont, Que. *A9, B5, L10, N2, S3.*

484. 1940 OCTOBER 19. 7:46:13. $M_L=3.4$. About 258 miles from Ottawa, Ont. *S3.*

485. (589) 1940 DECEMBER 20. 7:27:26. M=5.8. 43°.8N±0°.3, 71°.3W±0°.3. Centered near Lake Ossipie, N.H. This shock was felt in Canada, north of the St. Lawrence River from the Great Lakes down the river for 300 miles. The area thus affected included Montreal, where the intensity was III and thousands were awakened. It was probably felt in southwestern New Brunswick as well, but the southernmost counties of Quebec were the most severely shaken. The intensity reached V in parts of the Quebec counties of Stanstead and Compton. *A9, B5, B7, D8, G3, H1, L7, L8, L10, N2, S2, S3, U1, U2.*

486. (590) 1940 DECEMBER 24. 13:43:44. M=5.8. 43°.8N±0°.3, 71°.3W±0°.3. Aftershock of No. 485. It was felt in Canada over the same areas and to the same degree as the previous shock. *B5, B7, D8, G3, H1, L7, L8, L10, N2, S2, S3, U1, U2.*

487. 1940 DECEMBER 27. 0:17:49. $M_L=2.5$. About 127 miles from Ottawa, Ont. *S3.*

488. 1941 MARCH 4. 18:01:43. $M_L=2.8$. 46°08′N±10′, 76°11′W±12 (about 10 miles northwest of Gracefield, Que.) *or possibly* 44°45′N±10′, 75°02′W±12′ (about 20 miles southwest of Malone, N.Y.). The latter is less likely as it was not recorded in the United States. *S3.*

489. 1941 MARCH 5. 7:29:23. $M_L=3.0$. 46°16′N±10′, 75°30′W±12′ (near Lac-du-Cerf, Que.) *or possibly* 45°06′N±10′, 74°32′W±12′ (about 10 miles northeast of Cornwall, Ont.). The latter is less likely as it was not recorded in the United States *B5, S3.*

490. 1941 APRIL 12. 0:46:44. $M_L=2.5$. About 74 miles from Ottawa, Ont. *B5, S3.*

491. 1941 APRIL 17. 10:16:12. $M_L=2.4$. About 60 miles from Ottawa, Ont. *S3.*

492. 1941 JUNE 8. 20:21:39. $M_L=5.0$. 52°.4N, 75°.3W. In Quebec, about 125 miles east of James Bay. This is the most plausible interpretation of the seismograms. Because of long-continued activity, however, the epicentre may have been farther away from the stations and situated in the Arctic. *S3.*

493. 1941 JUNE 22. 9:59:31. $M_L=3.0$ 47°39′N±15, 70°34′W ±15 (about 15 miles west of Clermont, Que.) *or* 46°54′N±15′, 70°07′W±15′ (near St-Marcel, Que.). *S3.*

494. 1941 JUNE 26. 4:05:45. $M_L=4.1$. 47°24′N±16′, 76°50′W±18′. Near the Cabonga Reservoir, Que. *S3.*

495. 1941 JULY 5. 12:08:55. $M_L=2.7$. About 25 miles from Seven Falls, Que. *B5, S3.*

496. 1941 SEPTEMBER 6. 17:04:57. $M_L=3.8$. 47°26′N±15′, 70°31′W±15′. At Baie-St-Paul, Que. *B5, N2, S3.*

497. 1941 OCTOBER 6. 16:34:28. $M_L=4.0$. 47°38′N±12′, 70°44′W±15′. About 20 miles northwest of Baie-St-Paul, Que. *S3.*

498. 1941 OCTOBER 24. 14:13:59. $M_L=3.6$. 45°42′N±15′, 74°18′W±18′. A few miles northeast of Lachute, Que. This shock was felt at Mille Isles, Kanawana, St-Adolphe-de-Howard, Ste-Marguerite Station and Prefontaine, all in Quebec. *N2, S2, S3.*

499. 1942 FEBRUARY 18. 7:55:12. $M_L=3.1$. 46°50′N±10′, 74°46′W±12′. About 30 miles east of Ste-Anne-du-Lac, Que. *B5, S3.*

500. 1942 MAY 20. 12:19:23. $M_L=4.4$. 45°46′N ± 10′, 74°40′W±12′. Near Kilmar, Que. *B5, N2, S3.*

501. 1942 AUGUST 26. 17:54:22. $M_L=4.1$. 46°45′N±15′, 77°30′W±18′. In Quebec, about 50 miles north of Deep River, Ont. S3.

502. 1942 SEPTEMBER 5. 14:30:24. $M_L=3.1$. 46°58′N±15′, 71°30′W±15′. About 15 miles northwest of Quebec City. *S3.*

503. 1942 SEPTEMBER 11. 11:05:13. $M_L=4.4$. 49°13′N ±25′, 67°24′W±30′. In the St. Lawrence River about 15 miles southeast of Godbout, Que. *N2*, *S3*.

504. 1942 SEPTEMBER 15. 22:32:46. $M_L=3.3$. 46°47′N ±10′, 76°00′W±15′. At the west side of Baskatong Reservoir, Que. *S3*.

505. 1942 NOVEMBER 16. 0:13:29. $M_L=3.6$. 46°25′N± 15′, 75°03′W±18′. Near Nomininguе, Que. *B5*, *N2*, *S3*.

506. 1942 DECEMBER 5. 21:10:51. $M_L\pm4.2$. 46°58′N± 10′, 76°04′W±15′. About 15 miles northwest of Baskatong Reservoir, Que. *S3*.

507. 1943 FEBRUARY 16. 16:51:05. III. 45°47′N±15′, 74°40′N±15′. About 12 miles north-northwest of Hawkesbury, Ont. Felt at Hawkesbury and Alexandria, Ont. *B5*, *N2*, *S2*, *S3*.

508. 1943 FEBRUARY 28. 16:40:01. $M_L=3.7$. 46°30′ N±10′, 75°46′W±15′. About 15 miles west of Mont Laurier, Que. *N2*, *S3*.

509. (619) 1943 MARCH 9. 3.25:34. $M_L=5.5$. 42°.2N, 80°.9W. Lake Erie. Felt at Toronto, London and other Canadian cities. *H1*, *N2*, *S2*, *S3*, *U1*, *U2*.

510. 1943 APRIL 21. 7:21:03. $M_L=2.3$. About 86 miles from Ottawa, Ont. *S3*.

511. 1943 MAY 7. 23:38:12. $M_L=2.4$. About 56 miles from Ottawa. *S3*.

512. 1943 JUNE 8. Early. III. 43°.7N, 65°.7W. "A series of moderate shocks rattled buildings in Yarmouth and Shelburn Counties, N.S., but no damage was reported. Homes were jolted severely enough to awaken sleepers. *S2*.

513. 1943 SEPTEMBER 25. 5:52:36. $M_L=3.3$. 47°33′N± 15′, 70°39′W±15′. About 10 miles northwest of Baie-St-Paul, Que. *S3*.

514. 1943 SEPTEMBER 28. 16:30:25. $M_L=3.8$. 47°16′N ±15′, 70°24′W±10′. In the St. Lawrence River south of Ile-aux-Coudres, Que. *S3*.

515. 1943 NOVEMBER 6. 0:06:41. $M_L\pm3.9$. 47°23′N± 30′, 70°05′W±30′. In the St. Lawrence River east of Ile-aux-Coudres, Que. *B5*, *N2*, *S3*.

516. 1943 DECEMBER 6. 7:19:40. $M_L=3.2$. 47°41′N± 10′, 74°52′W±12′. About 20 miles southwest of Parent, Que. *B5*, *N2*, *S3*.

517. 1944 JANUARY 22. 21:55:09. $M_L=4.3$. 45°50′N± 10′, 76°47′W±12′. About 26 miles north by west of Renfrew, Ont. Felt in the Renfrew area and very lightly with a rattling sound by a few persons in Ottawa, Ont. *A9*, *B5*, *N2*, *S2*, *S3*.

518. 1944 FEBRUARY 5. 12:37:53. $M_L=4.0$. 47°24′W ±12′, 70°30′W±14′. Near Baie-St-Paul, Que. *B5*, *N2*, *S3*.

519. 1944 MARCH 8. 12:49:56. $M_L=4.1$. 46°41′N± 10′, 78°52′W±12′. About 10 miles east of Timiskaming, Que., where it was felt. *N2*, *S3*.

520. 1944 APRIL 9. 12:44:37. $M_L=5.4$. 49°55′N± 20′, 67°26′W±30′. About 20 miles north-northwest of Rivière Pentecôte, Que. *B5*, *N2*, *S3*.

521. 1944 JUNE 6. 6:00. III. 47°36′N, 65°39′W. Citizens of Bathurst, N.B., were startled by an earthquake. *S2*.

522. 1944 JUNE 9. 15:19:09. $M_L=3.7$. 47°18′N±25′, 70°17′N±20′. In the St. Lawrence River 10 miles southeast of Ile-aux-Coudres, Que. *B5*, *N2*, *S3*.

523. 1944 JUNE 23. 6:37:53. $M_L=5.1$. 49°25′N±20′, 67°45′W±30′. About 10 miles northwest of Godbout, Que. *B5*, *N2*, *S3*.

524. 1944 JUNE 24. 23:48:39. $M_L=3.7$. 46°00′N±10′, 74°15′W±12′. About 25 miles north by east of Lachute, Que. *B5*, *N2*, *S3*.

525. 1944 JULY 15. 17:04:24. $M_L=3.0$. About 41 miles from Seven Falls, Que. *S3*.

526. (633) 1944 SEPTEMBER 5. 4:38:45.30±1″.68. $M=5.9$ (*G3*). VIII. 44°.58′.5N±3′.4, 74°.53′.9W±5′.2. About 3 miles north of Massena, N.Y., close to the International Boundary. The uncertainties are such that the epicentre might well be on either side of the boundary. The final calculated values of the co-ordinates, however, placed it just to the south. The details are therefore given in the United States list (No. 633). *B5*, *B6*, *G3*, *H1*, *H10*, *H19*, *I2*, *M14*, *N2*, *S1.35*, *S2*, *S3*, *U1*, *U2*.

527. (634) 1944 SEPTEMBER 5. 8:30:49. $M_L=3.4$. 44°59′N 74°54′W. (a). Aftershock of No. 526. *B5*, *N2*, *S3*.

528. (635) 1944 SEPTEMBER 5. 8:51:06. $M_L=4.6$. 44°59′N, 74°54′W. (a). Aftershock of No. 526. *B5*, *I2*, *N2*, *S3*.

529. (636) 1944 SEPTEMBER 5. 10:56:51. $M_L=3.3$. 44°59′N, 74°54′W. (a). Aftershock of No. 526. *B5*, *N2*, *S3*.

530. (637) 1944 SEPTEMBER 9. 23:24:48. $M_L=4.1$. 44°59′N, 74°54′W. (a). Aftershock of No. 526. *B5*, *I2*, *N2*, *S3*, *U1*.

531. 1944 OCTOBER 14. 13:26:17. $M_L=4.2$. 48°.5N± 1°.0, 67°.0W±2°.0. In the mouth of the St. Lawrence River. *S3*.

532. (638) 1944 OCTOBER 31. 8:42:25. $M_L=4.0$. 44°59′N, 74°54′W. (a). Aftershock of No. 526. *B5*, *N2*, *S1.36*, *S3*, *U1*.

533. 1944 NOVEMBER 5. 19:07:53. $M_L=5.1$. 48°43′N ±18′, 80°48′W±19′. About 30 miles northwest of Timmins, Ont. *N2*, *S2*, *S3*.

534. 1945 FEBRUARY 15. 6:03:21. $M_L=2.3$. About 40 miles from Ottawa. *S3*.

535. 1945 JUNE 12. 7:58:15. $M_L=4.3$. 47°05′N±10′, 75°24′W±15′. About 25 miles northeast of Baskatong Reservoir, Que. *B5, N2, S3.*

536. 1945 JUNE 18. 15:20:07. $M_L=4.7$. 47°11′N±10′, 71°07′W±12′. About 12 miles north by east of Quebec City. *B5, N2, S3.*

537. 1945 JULY 2. 13:29:52. $M_L=3.9$. 48°28′N±15′, 76°48′W±15′. About 20 miles northeast of Senneterre, Que. *S3.*

538. 1945 SEPTEMBER 12. 9:36:43. $M_L=2.8$. 45°01′N ±15′, 74°22′W ± 18′. On the Canada-United States boundary about 20 miles east of Cornwall, Ont. *B5, N2, S3.*

539. 1945 OCTOBER 9. 13:18:44. $M_L=4.9$. 48°04′N± 15′, 69°58′W±18′. About 10 miles northwest of Baie-des-Rochers, Que. *B5, N2, S3.*

540. 1945 DECEMBER 7. 5:54:21. $M_L=3.1$. About 35 miles from Seven Falls, Que. *B5, S3.*

541. 1946 JANUARY 17. 8:04:54. $M_L=4.3$. 49°.4N± 0°.3, 68°.7W±0°.3. About 30 miles northwest of Baie Comeau, Que. *A9, B5, N2, S3.*

542. 1946 APRIL 21. 5:05:56. $M_L=3.6$. 45°44′N±19′, 73°26′W±8′. About 19 miles northeast of Montreal, Que. *B5, N2, S3.*

543. 1946 JULY 14. 21:37:14. M_L±3.0. About 208 miles from Ottawa, Ont. *S3.*

544. 1946 AUGUST 28. 9:10:16. $M_L=2.7$. 45°44′N± 25′, 76°51′W±10′. Near Beachburg, Ont. Felt at Pembroke, Ont. *B5, S2, S3.*

545. 1946 SEPTEMBER 1. 4:39:41. $M_L=3.3$. 47°20′N± 18′, 71°28′W±18′. In uninhabited country along the Jacques Cartier River, Que. It is possible that this shock occurred at 47°16′N±18′, 70° 10′W±18′, near St-Aubert, Que. In the absence, however, of reports that it was felt, the previous location is preferred. *B5, N2, S3.*

546. 1946 SEPTEMBER 4. 0:12:24. $M_L=2.5$. About 68 miles from Ottawa, Ont. *B5, S3.*

547. 1946 SEPTEMBER 19. 0:53:29. $M_L=3.2$. 47°43′N± 15′, 75°00′W±15′. About 20 miles southwest of Parent, Que. *B5, N2, S3.*

548. 1946 SEPTEMBER 26. 21:19:08. $M_L=3.4$. 46°26′N ±10′, 72°09′W±12′. About 9 miles south of Deschaillons, Que. *B5, N2, S3.*

549. 1946 OCTOBER 6. 3:34:29. $M_L=1.9$. About 23 miles from Seven Falls, Que. *S3.*

550. 1947 JANUARY 2. 18:15. III. 47°02′N, 70°56′W. Felt for about 55 seconds at Ste-Anne-de-Beaupré, Que. *S2.*

551. 1947 JANUARY 19. 0:45:02. $M_L=3.9$. 46°48′N± 15′, 76°42′W±18′. About 40 miles west of Baskatong Reservoir, Que. *B5, S3.*

552. 1947 FEBRUARY 2. 16:50:32. $M_L=4.2$. 47°40′N± 10′, 70°32′W±15′. About 16 miles west of La Malbaie, Que. *N2, S3.*

553. 1947 MARCH 26. 23:06:14. $M_L=2.5$. 46°10′N± 10′, 75°00′W±10′ (about 15 miles west of La Conception, Que.) *or* 45°26′N±10′, 74°.25W± 10′ (about 15 miles northeast of Alexandria, Ont.). *S3.*

554. 1947 MARCH 29. 12:28:52. $M_L=4.0$. 47°22′N± 15′, 70°14′W±12′. In the St. Lawrence River east of Ile-aux-Coudres, Que. *N2, S3.*

555. 1947 AUGUST 8. 5:39:08. $M_L=4.4$. 46°32′N±10′, 81°07′W±15′. Near Sudbury, Ont. *S3.*

556. 1947 SEPTEMBER 1. 13:32:20. $M_L=2.8$. 46°46′N± 18′, 77°48′W±19′. Near Lac Dumoine Que. *S3.*

557. 1947 SEPTEMBER 14. 19:29:49. $M_L=4.3$. 47°00′N ±30′, 81°20′W±15′. Near Laforest, Ont. *S3.*

558. 1947 OCTOBER 22. 9:36:38. $M_L=3.8$. 47°33′N± 15′, 70°43′W±15′. About 10 miles northwest of Baie-St-Paul, Que. *B5, N2, S3.*

559. 1947 NOVEMBER 3. 19:51:45. $M_L=4.5$. 45°40′N ±18′, 81°10′N±19′. In Georgian Bay, Ont. *S3.*

560. 1948 JANUARY 1. 18:33:45. $M_L=4.9$. 47°20′N± 18′, 70°26′W±15′. Depth about 18 km. About 25 miles northeast of Seven Falls. Felt at Ste-Anne-du-Beaupré, Que. *A9, B5, M13, N2, S3.*

561. 1948 JANUARY 1. 18:44:40. $M_L=3.2$. 47°20′N, 70°26′W. (a). Aftershock of No. 560. *S3.*

562. 1948 JANUARY 16. 6:02:56. $M_L=4.3$. 50°.0N± 1°.0, 69°.0W±1°.0. About 65 miles northwest of Baie-Comeau, Que. *B5, N2, S3.*

563. 1948 FEBRUARY 28. 21:19:13. $M_L=2.8$. 47°10′N ±8′, 74°37′W±10′. About 15 miles west of Manouane, Que. *B5, S3.*

564. 1948 MAY 7. 12:02:26. $M_L=4.0$. 45°45′N, 73°38′ W. (a). About 25 miles north-northeast of Montreal. Felt at Montreal, Ottawa, Cornwall and towns along the Canada-United States border. *A9, B5, H21, N2, S2, S3.*

565. 1948 JUNE 9. 3:04:12. $M_L=3.7$. 45°14′N±10′, 73°52′W±12′. About 22 miles south-southwest of Montreal, Que. *B5, N2, S2, S3.*

566. 1948 JULY 7. 07:38:01. $M_L=3.5$. 45°11′N±10′, 73°54′W±12′. Aftershock of No. 565. *B5, N2, S2, S3.*

567. 1948 SEPTEMBER 10. 1:22:05. $M_L=2.2$. 45°34′N ±12′, 76°00′W±12′. In Gatineau Park, 18 miles northwest of Ottawa, Ont. *B5, S3.*

568 1948 SEPTEMBER 21. 10:34:21. $M_L=2.4$. About 91 miles from Ottawa, Ont. *B5, S3.*

569. 1948 NOVEMBER 13. 16:49:57. $M_L=3.5$. 46°42′N ±12′, 70°18′W±14′. Near St-Paul-de-Montminy, Que. *N2, S3.*

570. 1948 November 23. 4:33:35. $M_L=2.9$. About 94 miles from Ottawa, Ont. *B5, S3.*

571. 1949 February 3. 1:31:46. $M_L=1.7$. 45°25′N±10′, 75°35′W±15′. Near Rockcliffe, Ont., where it was felt. *B5, S2, S3.*

572. 1949 August 31. 4:51:10. $M_L=2.5$. About 97 miles from Ottawa, Ont. *B5, S3.*

573. 1949 October 11. 9:35:54. Estimated $M_L=2.5$. About 44 miles from Seven Falls, Que. *B5, S3.*

574. 1949 October 16. 23:33:42. V. $M_L=4.2$. 45°18′N ±12′, 74°50′W±15′. A few miles west of Alexandria, Ont. The shock was felt at Ottawa and Montreal and in the United States at Massena, N.Y. *B5, N2, S2, S3, U1.*

575. 1949 October 30. 20:51:13. $M_L=3.4$. 46°28′N±25′, 72°07′W±15′. Near Parisville, Que. *N2, S3.*

576. 1950 January 6. 23:18:32. $M_L=2.3$. 46°20′N±18′, 77°35′W±15′. Near Rapides-des-Joachims, Que. *S3.*

577. 1950 January 26. 8:02:00. $M_L=1.8$. About 32 miles from La Cave, Que. *S3.*

578. 1950 March 3. 5:11:13. $M_L=2.6$. About 46 miles from Ottawa, Ont. *S3.*

579. 1950 March 6. 16:14:12. $M_L=4.0$. 46°.0N±0°.6, 74°.5W±0°.7. A few miles west of Ste-Agathe, Que. *B5, N2, S3.*

580. 1950 April 14. 18:20:49. $M_L=4.9$. 47°50′N±12′, 75°30′W±15′. Near the headwaters of the Gatineau River. *B5, N2, S3.*

581. 1950 June 29. 9:13:33. $M_L=4.8$. 49°.9N±1°.0, 68°.1W±1°.0. Along the Toulnustouc River, Que. *B5, N2, S3.*

582. 1950 August 4. 6:45:21. $M_L=3.2$. 47°20′N±30, 70°15′W±20′. In the St. Lawrence River south of Ile-aux-Coudres, Que. *S3.*

583. 1950 August 4. 14:29:29. $M_L=4.0$. 45°12′N±8′, 74°43′W±10′. About 11 miles west of Lancaster, Ont. It was felt in the Cornwall, Ont.-Massena, N.Y., area. *B5, N2, S3, U1.*

584. 1950 August 5. 23:59:07. $M_L=3.5$. 45°04′N±10′, 74°45′W±12′. Aftershock of No. 583. *B5, S3.*

585. 1950 September 28. 10:59:24. $M_L=3.0$. About 45 miles from Seven Falls, Que. *S3.*

586. 1950 October 15. 6:42:21. $M_L=1.8$. About 55 miles from Ottawa, Ont. *S3.*

587. 1950 October 29. 5:59:26. $M_L=3.0$. 45°49′N, 77°07′W. (a). Felt at Pembroke, Ont. *S3.*

588. 1950 November 7. 2:51:53. $M_L=1.8$. About 9 miles from Seven Falls, Ont. *S3.*

589. 1950 November 14. 1:18:47. $M_L=2.0$. About 81 miles from Ottawa, Ont. *S3.*

590. 1951 June 9. 5:27:18. $M_L=2.2$. About 72 miles from Ottawa, Ont. *S3.*

591. 1951 June 27. 13:17:50. $M_L=5.0$. 45°N, 57°W. About 200 miles south of Newfoundland. *S1.40, S1.41.*

592. 1951 June 28. 1:03:57. $M_L=4.8$. 50°00′N±10′, 67°30′W±12′. About 30 miles west of Sept-Iles, Que. *N2, S3.*

593. 1951 July 25. 0:22:52. Estimated $M_L=3.3$. 47°12′N±8′, 71°22′W±10′. Along the Jacques Cartier River, Que. Felt at Ancienne Lorette, near Quebec City. *S3.*

594. 1951 July 25. 6:49:33. Estimated $M_L=2.7$. 47°12′N±8′, 71°22′W±10′. Aftershock of No. 593. *S3.*

595. 1951 July 31. 1:31:44. $M_L=2.1$. About 61 miles from Ottawa, Ont. *S3.*

596. 1951 August 2. 0:32:03. $M_L=0.7$. About 16 miles from Ottawa, Ont. *S3.*

597. 1951 August 8. 9:36:24. $M_L=3.3$. 45°56′N±15′, 74°40′W±19′. Near Arundel, Que. *S3.*

598. 1951 September 19. 8:19:38. $M_L=5.1$. 49°18′N±20′, 66°15′W±25′. Depth about 14 km. About 20 miles northeast of Ste-Anne-des-Monts, Que. *S3.*

599. 1951 September 25. 15:45:00. $M_L=3.7$. 46°13′N ±5′, 75°22′W±10′. About 15 miles northwest of Notre-Dame-du-Laus, Que. *S3.*

600. 1951 October 25. 7:07:53. $M_L=3.8$. 45°16′N±10′, 74°44′W±15′. About 10 miles southwest of Alexandria, Ont. Felt in the Cornwall-Massena area. *S3, U1.*

601. 1951 October 25. 7:30:30. $M_L=2.8$. 45°08′N ±15′, 74°46′W±10′. Aftershock of No. 600. *S3.*

602. (677) 1951 November 6. 17:54:42. $M_L=3.7$. 45°00′N ±8′, 73°30′W±10′. On the Canada-United States Border about 10 miles west of Rouses Point, N.Y. Felt at Brome, Que., and Lancaster, Ont. *B5, B8, I2, S1.41, S3, U1, U2.*

603. 1951 December 28. 22:33:01. $M_L=2.7$. 45°50′N ±18′, 74°30′W±18′. Foreshock of No. 604. *S3.*

604. 1951 December 31. 20:15:54. $M_L=2.9$. 45°50′N ±18′, 74°30′W±18′. About 10 miles southeast of Arundel, Que. *S3.*

605. 1952 January 24. 9:29:48. $M_L=2.8$. 47°00′N±19′, 77°00′W±19′. Depth about 18 km. About 25 miles southwest of Cabonga Reservoir, Que. *S3.*

606. 1952 February 2. 6:20:36. $M_L=2.5$. 46°52′N±15′, 70°27′W±10′. Foreshock of No. 609. *S3.*

607. 1952 February 2. 10:55:55. $M_L=2.5$. 46°52′N ±15′, 70°27′W±10′. Foreshock of No. 609. *S3.*

608. 1952 February 2. 11:15:53. $M_L=2.3$. 46°52′N ±15′, 70°27′W±10′. Foreshock of No. 609. *S3.*

609. 1952 February 3. 2:33:46. $M_L=2.8$. 46°52′N±15′, 70°27′W±10′. About 37 miles east of Quebec City. *S3.*

610. 1952 FEBRUARY 26. 0:56:58. $M_L=3.7$. 46°48′N ±8′, 70°12′W±11′. At Ste-Apolline, Que. *S3*.

611. 1952 MARCH 17. 4:14:41. $M_L=3.8$. 47°06′N± 8′, 76°10′W±10′. Near Cabonga Reservoir, Que. *S3*, *U2*.

612. 1952 MARCH 30. 13:11:07. $M_L=4.4$. 47°50′N± 10′, 69°53′W±15′. In the St. Lawrence River about 15 miles west of Rivière-du-Loup, Que. *S3*.

613. 1952 APRIL 19. 2:50:53. $M_L=3.8$. 47°28′N±7′, 70°35′W±10′. About 6 miles west of Baie-St-Paul, Que. *S3*.

614. 1952 APRIL 20. 19:06:01. $M_L=3.5$. 47°30′N±7′, 70°41′W±10′. Aftershock of No. 613. *S3*.

615. 1952 APRIL 26. 4:59:44. $M_L=3.7$. 47°00′N±19′, 78°30′W±19′. About 28 miles northeast of Temiskaming, Que. *S3*.

616. 1952 JULY 19. 1:16:17. $M_L=4.3$. 46°52′N±12′, 75°50′W±15′. Near Baskatong Reservoir, Que. Felt at Maniwaki, Lochiel and Orlo, all in Quebec. *I2*, *S1.41*, *S3*, *U2*.

617. 1952 AUGUST 22. 19:13:44. $M_L=3.3$. About 176 miles from Halifax, N.S. *S3*.

618. 1952 SEPTEMBER 8. 1:52:12. $M_L=2.8$. About 142 miles from Ottawa, Ont. *S3*.

619. 1952 SEPTEMBER 12. 12:03:24. $M_L=3.3$. About 122 miles from Halifax, N.S. *S3*.

620. 1952 OCTOBER 14. 22:03:42. $M_L=5.6$. 48°01′±5′, 69°47′W±5′. On the north shore of the St. Lawrence River about 10 miles south of Tadoussac, Que., and about 20 miles northwest of Rivière-du-Loup, Que. The origin time and co-ordinates given were calculated by Hodgson (*H21*) from the first-arrival time data of eight seismograph stations. The complexity of the seismic traces suggested a double shock, but this could not be definitely established. The tremors were felt

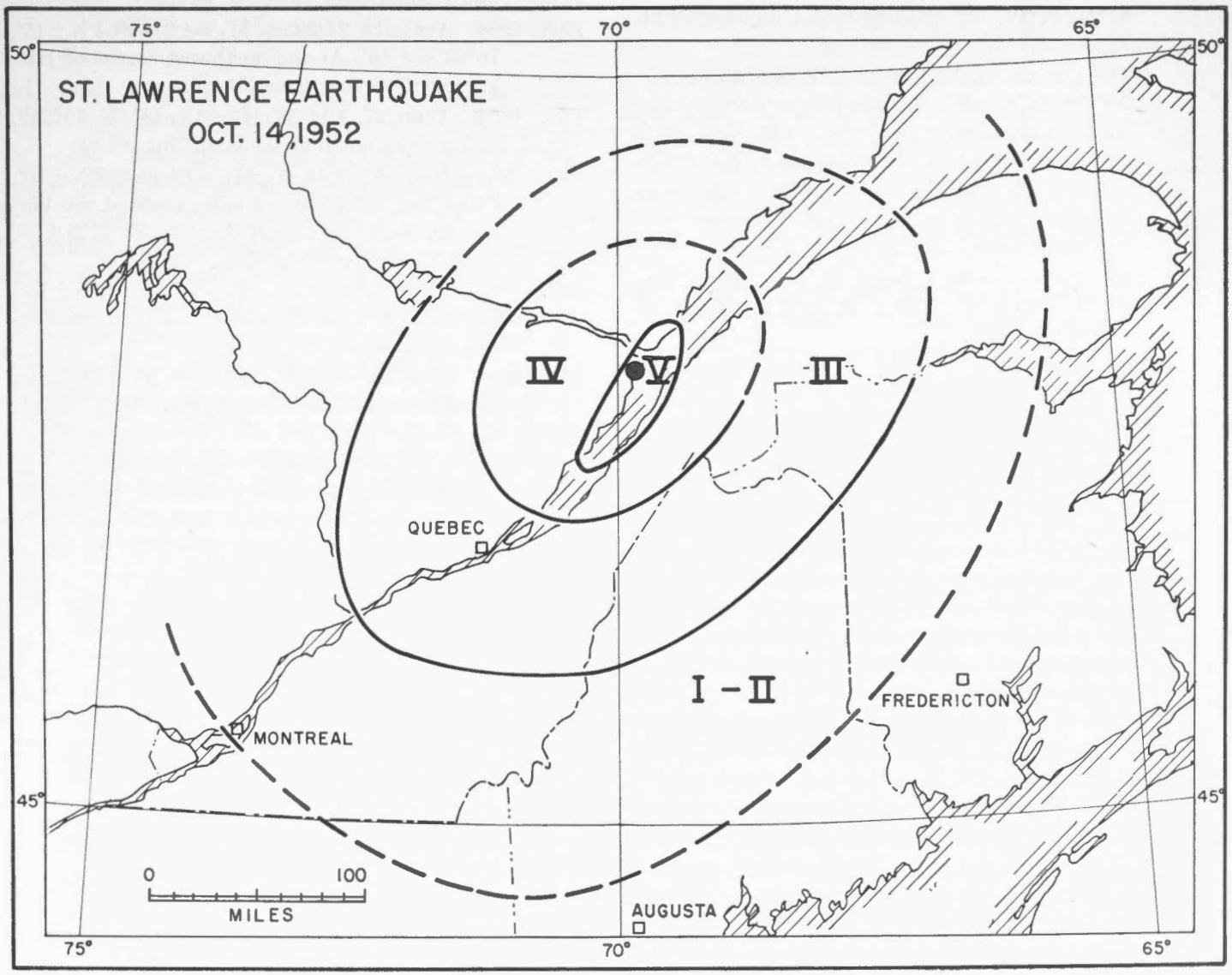

FIGURE 5. Adapted from Hodgson (*H21*).

generally in an area along both sides of the St. Lawrence River, from Trois-Rivières to Cap-Chat and extending northward to Lake St. John and southward into Maine and New Brunswick. A maximum intensity of V occurred in the Rivière-du-Loup area, where dishes were jarred from shelves.

Questionnaires distributed in Canada produced more than 300 replies that the shock was felt. A similar canvass of adjacent parts of the United States was conducted through the courtesy of the United States Coast and Geodetic Survey. The results are shown as isoseismals in Figure 5, which has been adapted from Hodgson (*H21*). The limits of perceptibility were poorly defined, as indicated by broken lines. *B5*, *H1*, *H21*, *I2*, *S1.42*, *S2*, *S3*, *U1*, *U2*.

621. 1952 October 18. 9:54:34. $M_L=2.8$. About 76 miles from Ottawa, Ont. *S3*.

622. 1952 October 20. 1:04:35. Estimated $M=5$. 57°N, 57°W. Off the coast of Labrador, Nfld. *I2*, *S1.42*.

623. 1952 December 25. 4:28:33. $M_L=3.6$. 43°51′N±20′, 80°58′W±20′. About 30 miles northwest of Toronto, Ont. *S3*.

624. 1953 January 24. 9:58:37. $M_L=5.3$. 49°04′N±15′, 66°00′W±15′. In the Gaspé Peninsula about 10 miles south of Marsoui, Que. The shock was felt in the Gaspé Peninsula. *S3*, *U2*.

625. 1953 February 28. 6:24:03. $M_L=3.5$. 48°04′N±8′, 74°26′W±10′. About 20 miles northeast of Parent, Que. *S3*.

626. 1953 August 21. 8:03:02. $M_L=2.5$. About 133 miles from Ottawa, Ont. *S3*.

627. 1953 September 14. 22:52:57. $M_L=5.1$. 49°.1N±0°.5, 65°.2W±0°.5. About 10 miles south of Grande-Vallée, in the Gaspé Peninsula, Que. Replies to questionnaires show that the shock was felt along the north coast of the Gaspé Peninsula from Ste-Marthe-de-Gaspé eastward to Pointe-Jaune. Its effects were strongest near the middle of this extent at Rivière-la-Madeleine and Grande-Vallée, where the intensity was IV-V. It was not felt farther south on the peninsula except at Cortéréal, from which intensity II was reported. *S3*.

628. 1953 September 17. 5:53:31. $M_L=2.4$. 45°48′N±15′, 74°46′W±15′. About 15 miles northwest of Hawkesbury, Ont. *S3*.

629. 1953 September 27. 16:50:29. $M_L=4.0$. About 325 miles from Halifax, N.S., probably in the Atlantic Ocean. *S3*.

630. 1953 November 21. 4:02:57. $M_L=3.5$. About 208 miles from Halifax, N.S., probably in the Atlantic Ocean. *S3*.

631. 1953 November 28. 15:47:07. $M_L=2.7$. 45°56′N±10′, 73°08′W±15′. In the St. Maurice river valley, Que. *S3*.

632. 1954 January 10. 21:04:30. $M_L=3.9$. 49°10′N±15′, 68°14′W±19′. In the St. Lawrence River about five miles south of Baie-Comeau, Que. *S3*, *S5*.

633. 1954 January 27. 3:55:10. $M_L=2.4$. About 67 miles from Ottawa, possibly in the Cornwall, Ont.—Malone, N.Y. area. *S3*, *S5*.

634. 1954 February 7. 20:24:16. $M_L=3.8$. 47°42′N±20′, 70°15′W±20′ (near Pointe-au-Pic, Que.) *or* 47°00′N±20′, 69°50′W±20′ (between Ste-Félicité and St-Omer, Que.). *S3*, *S5*.

635. 1954 February 21. 9:00:37. $M_L=3.5$. 47°40′N±5′, 70°37′W±10′ (9 miles north-northwest of St-Urbain, Que.) *or* 46°53′N±10′, 70°.08W±10′ (near St-Marcel, Que.). *S3*, *S5*.

636. 1954 March 28. 0:58:04. $M_L=1.9$. About 44 miles from Seven Falls. *S3*, *S5*.

637. 1954 April 12. 21:22:01. $M_L=4.3$. 46°54′N±15′, 76°03′W±18′. At the northwest corner of Baskatong Reservoir, Que. *S3*, *S5*.

638. 1954 April 27. 2:14:08. $M_L=4.1$. 43°.1N, 79°.2W. A few miles north of Welland, Ont. *S3*,*S5*.

639. 1954 June 26. 7:44:47. $M_L=2.4$. 46°42′N±10′, 74°58′W±10′ (about 12 miles north of Ste-Veronique, Que.) *or* 45°07′N±10′, 73°47′N±10′ (near St-Chrysostôme, Que.). *S3*, *S5*.

640. 1954 June 30. 7:41:07. $M_L=3.7$. 47°00′N±15′, 70°07′W±10′. Between St-Cyrille and Ste-Félicité, Que. *S3*, *S5*.

641. 1954 July 22. 7:34:37. $M_L=2.1$. 56 miles from Seven Falls, possibly on the Quebec-Main border. *S3*, *S5*.

642. 1954 August 28. 15:23:01. $M_L=5.2$. 45°10′N±18′, 56°52′W±12′. In the Atlantic Ocean, 140 miles south-southwest of Grand Bank, Nfld and 170 miles southeast of Glace Bay, N.S. *S3*, *S5*.

643. 1954 September 8. 1:29:53. $M_L4.3$. 49°02′N±15′, 68°22′W±17′. Depth 18 km. In the St. Lawrence River about 15 miles southwest of Baie-Comeau, Que. *S3*, *S5*.

644. 1954 September 11. 18:55:52. $M_L=4.6$. 47°20′N±18′, 75°38′W±15′. Depth 18 km. In the river valley about 30 miles north of the northern arm of Baskatong Reservoir, Que. *S3*, *S5*.

645. 1954 September 26. 0:59:12. $M_L=3.6$. 66 miles from Halifax, N.S. *S3*, *S5*.

646. 1954 October 16. 6:45:00. $M_L=5.3$. 44°50′N±18′, 56°48′W±10′. In the Atlantic Ocean, 170 miles south-southwest of Grand Bank, Nfld., and 185 miles southeast of Glace Bay, N.S. *S3*, *S5*.

647. 1955. JANUARY 24. 1:22:29. $M_L=3.6$. 45°04′N±25′, 59°02′W±20′. Depth 11 km. In the Atlantic Ocean about 90 miles southeast of Glace Bay, N.S. *S3*, *S5*.

648. 1955 FEBRUARY 1. 12:40:27. $M_L=4.0$. 47°40′N±12′, 70°30′W±15′. About 20 miles north of Baie-St-Paul, Que. *S3*, *S5*.

649. 1955 FEBRUARY 1. 12:45:02. $M_L=2.7$. 47°40′N±12′, 70°30′W±15′. Aftershock of No. 648. *S3*, *S5*.

650. 1955 FEBRUARY 1. 20:48:48. $M_L=3.2$. 47°40′N±12′, 70°30′W±15′. Aftershock of No. 648. *S3*, *S5*.

651. 1955 MARCH 3. 21:03:51. $M_L=2.0$. 45°48′N±17′, 74°43′W±15′. About 25 miles southwest of Ste-Agathe, Que. *S3*, *S5*.

652. 1955 APRIL 3. 6:14:09. $M_L=2.0$. 45°48′N±18′, 74°34′W±14′. About 22 miles southwest of Ste-Agathe, Que. *S3*, *S5*.

653. 1955 APRIL 4. 3:17:07. $M_L=3.6$. 51°35′N±30′, 79°18′W±30′. About 25 miles west of Rupert House, Que. *S3*, *S5*.

654. 1955 APRIL 15. 1:45:10. $M_L=1.8$. About 44 miles from Seven Falls, Que. *S5*.

655. 1955 JUNE 29. 1:17:40. $M_L=3.0$. 43°46′N±20′, 79°38′W±20′. About 15 miles northwest of Toronto, Ont. *S3*, *S5*.

656. 1955 JULY 1. 1:37:39. $M_L=3.1$. About 25 miles from Kirkland Lake, Ont. *S3*, *S5*.

657. 1955 OCTOBER 7, 18:09:52. $M_L=3.5$. 45°13′N±10′, 73°54′W±12′. Depth 0 (?) km. About 24 miles southwest of Montreal. *S3*, *S5*.

658. 1955 OCTOBER 20. 20:58:32. $M_L=3.2$. 48°56′N±18′, 70°12′W±15′. Depth 29 km. On the Portneuf River, 55 miles northeast of Chicoutimi, Que. Foreshock of No. 660. *S3*, *S5*.

659. 1955 OCTOBER 20. 21:16:24. $M_L=3.3$. 48°56′N±18′, 70°12′W±15′. Depth 27 km. A second foreshock of No. 660. *S3*, *S5*.

660. 1955 OCTOBER 20. 21:31:06. $M_L=3.4$. 48°56′N±18′, 17°12′W±15′. Depth 24 km. On the Portneuf River, 55 miles northeast of Chicoutimi, Que. There were two foreshocks during the preceding 35 minutes. *S3*, *S5*.

661. 1955 NOVEMBER 1. 7:45:52. $M_L=3.5$. 46°30′N±10′, 75°52′W±10′. About 8 miles northeast of Maniwaki, Que., where it was felt. *S3*, *S5*.

662. 1955 NOVEMBER 21. 16:10:41. $M_L=4.9$. 50°35′N±19′, 63°30°W±19′. About 25 miles north of Havre-St-Pierre, Que. *S3*, *S5*.

663. 1955 NOVEMBER 26. 6:50:09. $M_L=2.0$. 46°20′N±15′, 73°23′W±18′. Close to St-Gabriel, Que. *S3*, *S5*.

664. 1955 DECEMBER 3. 11:38:18. $M_L=2.4$. 45°40′N±18′, 75°03′W±18′. About 20 miles northeast of Buckingham, Que. *S3*, *S5*.

665. 1956 JANUARY 10. 12:08:18. $M_L=3.3$. 45°40′N±7′, 75°28′W±7′. About 22 miles northeast of Ottawa, Ont. *S3*, *S5*.

666. 1956 JANUARY 30. 9:43:13. $M_L=3.7$. 47°03′N±15′, 71°10′W±15′. About 15 miles north of Quebec City, where it was felt. *S3*, *S5*.

667. 1956 FEBRUARY 2. 19:24:16. $M_L=3.1$. 45°27′N±10′, 74°49′W±10′, About 10 miles north of Maxville, Ont. *S3*, *S5*.

668. 1956 FEBRUARY 11. 10:29:55. $M_L=2.0$. 46°0N±0.2°, 75°3W±0.3 (47 miles northeast of Ottawa, Ont.) *or* 44°8N±0.2°, 75°1W±0.3° (just to the southeast of Morrisburg, Ont.). *S3*, *S5*.

669. 1956 FEBRUARY 16. 10:29:31. $M_L=2.0$. 45°52′N±7′, 74°58′W±7′. Five miles southwest of Namur, Que. *S3*, *S5*.

670. 1956 MARCH 6. 23:38:10. $M_L=3.1$. 44°51′N±10′, 75°23′W±10′. About 4 miles north of Cardinal, Ont. *S3*, *S5*.

671. 1956 APRIL 6. 4:51:37. $M_L=4.9$. 59°4N±0.5°, 74°1W±1.2°. At Payne Lake, Que., about 150 miles northeast of Port Harrison, Que. *S3*, *S5*.

672. 1956 MAY 12. 0:39:46. $M_L=2.6$. 47°51′N±12′, 72°22′W±15′. About 10 miles southwest of Kiskisink, Que. *S3*, *S5*.

673. 1956 MAY 26. 0:44:17. $M_L=1.6$. 45°31′N, 73°34′W. Recorded only at Montreal and reported as an "underground rumble." *S3*, *S5*.

674. 1956 JUNE 1. 10:30. $M_L=1.7$. 45°16′N, 66°03′W. Felt by employees of Irving Pulp and Paper Ltd. at a plant near the Reversing Falls, in St. John, N.B. First of two shocks on June 1. *S5*.

675. 1956 JUNE 1. 11:40. $M_L=1.9$. 45°16′N, 66°03′W. Felt, over the noise and vibration of heavy machinery in operation, at the plant of Irving Pulp and Paper Ltd. near the Reversing Falls, in St. John, N.B. There was one foreshock. *S5*.

676. 1956 JUNE 5. 7:45:16. $M_L=5.1$. 56°8N±0.5°, 58°9W±1.0°. About 100 miles off the coast of Labrador, Nfld. *S3*, *S5*.

677. 1956 JUNE 15. 0:53:37. $M_L=3.9$. 47°06′N±7′, 76°26′W±10′. Depth 18 km. At the Cabonga Reservoir, about 55 miles north-northwest of Maniwaki, Que. *S3*, *S5*.

678. 1956 AUGUST 3. 12:51:39. $M_L=4.1$. 49°25′N±12′, 66°10′W±18′. In the St. Lawrence River about 55 miles south of Sept-Iles, Que. This is the first of at least two and possibly four shocks that occurred in a span of about 40 seconds. *S3*, *S5*.

679. 1956 August 3. 12:52:09. $M_L=4.3$. 49°25′N±12′, 66°10′W±18′. In the St. Lawrence River about 55 miles south of Sept-Iles, Que. This is the second and main shock of a pair, or possibly the third of a series of four shocks, that occurred in a span of about 40 seconds. *S3*, *S5*.

680. 1956 August 22. 16:38:12. $M_L=2.4$. 45°24′N±4′, 75°38′W±4′. Five miles east of Ottawa seismograph station. Felt with intensity II at Eastview, Ont., and in Ottawa South and Ottawa East. *S2*, *S3*, *S5*.

681. 1956 October 10. 5:51:20. $M_L=2.7$. 47°18′N±12′, 70°20′W±10′. In the St. Lawrence River south of Ile-aux-Coudres, Que. *S3*, *S5*.

682. 1956 October 27. 14:40:06. $M_L=3.4$. 48°15′N±20′, 69°00′W±25′. Near the south shore of the St. Lawrence River about 15 miles downstream from Trois-Pistoles, Que. There was one aftershock, at 15:03:53, October 27. *S3*, *S5*.

683. 1956 October 27. 15:03:53. $M_L=3.4$. 48°15′N±20′, 69°00′W±25′. Near the south shore of the St. Lawrence River about 15 miles downstream from Trois-Pistoles, Que. Aftershock of No. 682. *S3*, *S5*.

684. 1956 November 4. 11:53:24. $M_L=4.0$. 46°13′N±8′, 75°44′W±8′. About 16 miles southeast of Maniwaki, Que. *S1.44*, *S3*, *S5*.

685. 1956 November 16. 7:17:55. $M_L=2.9$. 46°12′N±6′, 74°46′W±6′. About 26 miles northwest of Ste-Agathe, Que. *S3*, *S5*.

686. 1956. December 1. 14:00:00. $M_L=2.3$. 49°25′N, 82°26′W. Felt within a 10-mile radius of Kapuskasing, Ont. The reports were furnished by the Kapuskasing *Northern Tribune*. The maximum intensity was II. Not recorded at Kirkland Lake. *S5*.

687. 1956 December 28. 1:41:25. $M_L=2.7$. 45°10′N±7′, 74°16′W±7′. In the St. Lawrence River south of Rivière Beaudette, Que. *S3*, *S5*.

688. 1957 February 19. 5:18:33. $M_L=3.5$. 48°24′N±25′, 69°56′W±25′. Depth 25 km. About 25 miles northwest of Tadoussac, Que. *S3*, *S5*.

689. 1957 May 13. 8:07:36. $M_L=2.8$. 46°36′N±7′, 74°04′W±7′. About 15 miles west of St-Zenon, Que. *S3*, *S5*.

690. 1957 May 25. 12:27:49. $M_L=2.8$. 45°58′N±7′, 74°20′W±7′. Depth 4 (?) km. About 10 miles west of Ste-Adèle, Que. Felt at Ste-Agathe, Lac-St-Denis, Lac-Louisa and Ste-Adèle, all in Quebec. *S3*, *S5*.

691. 1957 June 29. 11:25:09. $M_L=4.2$. 42°55′N±18′, 81°19′W±18′. Depth 26 km. About 9 miles south-southeast of London, Ont. Felt at London, Ont. *S2*, *S3*, *S5*.

692. 1957 August 4. 12:40:58. $M_L=3.7$. 46°35′N±15′, 67°05′W±15′. Depth 19 km. About 8 miles east of Juniper, N.B. *S3*, *S5*.

693. 1957 August 6. 23:50:38. $M_L=4.0$. 47°29′N±18′, 70°25′W±18′. Depth 19 km. Between Baie-St-Paul and Les Eboulements, Que. *S3*, *S5*.

694. 1957 August 17. 1:30:07. $M_L=3.3$. 46°44′N±12′, 70°07′W±12′. Depth 25 km. About 7 miles northwest of Lac-Frontière, Que. *S3*, *S5*.

695. 1957 August 21. 2:40:33. $M_L=3.0$. 44°48′N±10′, 76°10′W±10′. About 10 miles south-southwest of Smiths Falls, Ont. Felt at Smiths Falls. *S3*, *S5*.

696. 1957 October 4. 0:15:26. $M_L=2.1$. 45°19′N±5′, 75°12′W±5′. About 25 miles east of Ottawa, Ont. *S3*, *S5*.

697. 1957 October 9. 14:16:58. $M_L=3.1$. 48°25′N±15′, 69°54′W±15′. Depth 20 km. About 20 miles northwest of Tadoussac, Que. *S3*, *S5*.

698. 1957 October 16. 19:13:27. $M_L=4.8$. 50°30′N±19′, 64°52′W±19′. About 20 miles north of Sheldrake, Que. *S3*, *S5*.

699. 1957 October 27. 8:48:27. $M_L=3.2$. 46°23′N±15′, 78°45′W±15′. About 6 miles northwest of Mattawa, Ont., where it was felt. *S3*, *S5*.

700. 1957 November 2. 4:00:16. $M_L=2.6$. 46°12′N±10′, 74°57′W±10′. About 10 miles southwest of Labelle, Que. *S3*, *S5*.

701. 1957 November 13. 20:45:38. $M_L=3.3$. 48°40′N±45′, 69°33′W±30′. About 20 miles northwest of Sault-au-Mouton, Que. Foreshock of No. 702. *S3*, *S5*.

702. 1957 November 13. 20:49:19. $M_L=3.5$. 48°40′N±25′, 69°33′W±30′. About 20 miles northwest of Sault-au-Mouton, Que., with one foreshock and one aftershock all within a nine-minute interval. *S3*, *S5*.

703. 1957 November 13. 20:54:17. $M_L=3.3$. 48°40′N±25′, 69°33′W±30′. Aftershock of No. 702. *S3*, *S5*.

704. 1957 November 30. 6:27:51. $M_L=2.5$. 45°01′N±5′, 74°46′W±5′. In the St. Lawrence River, about 5 miles west of Cornwall, Ont., where it was felt. Houses creaked at Massena, N.Y. *S3*, *S5*.

705. 1958 January 24. "Shortly after noon E.S.T." M_L estimated at 3.5. 44°59′N, 81°15′W (Lion's Head, Ont.). Reports that the shock was felt in the Bruce Peninsula from Wiarton north were forwarded by D. R. McIvor, of Lion's Head, Ont. *S5*.

706. 1958 February 2. 1:54:44. $M_L=2.8$. 46°38′N±7′, 75°26′W±15′. About 7 miles northeast of Mont Laurier, Que. *S3*, *S5*.

707. 1958 FEBRUARY 4. 8:06:43. $M_L=5.1$. 57°.9N± 10°, 53°.5W± 1.5°. In the Labrador Sea. *S3*, *S5*.

708. 1958 FEBRUARY 12. 13:29:54. $M_L=2.6$. 44°50′N ±7′, 75°18′W±7′. At Iroquois, Ont. *S3*, *S5*.

709. 1958 MARCH 1. 17:41:49. $M_L=3.9$. 46°54′N±7′, 76°02′W±7′. Depth 9 km. Near Baskatong Reservoir, about 40 miles north of Maniwaki, Que. *S3*, *S5*.

710. 1958 MARCH 19. 6:39:25. $M_L=3.1$. 46°00′N±10′, 77°08′W±10′. About 15 miles north of Pembroke, Ont. *S1.45*, *S3*, *S5*.

711. 1958 MARCH 23. 22:04:17. $M_L=3.4$. 45°33′N± 20′, 67′07′W±20′. About 10 miles southeast of McAdam, N.B. *S3*, *S5*.

712. 1958 APRIL 7. 7:42:05. $M_L=2.7$. 46°10′N±7′, 75°12′W±12′. About 20 miles north of Chêneville, Que. *S3*, *S5*.

713. 1958 MAY 6. 16:02:49. $M_L=3.7$. 48°34′N±15′, 70°19′W±15′. About 35 miles northeast of Chicoutimi, Que. There were two aftershocks. *S3*, *S5*.

714. 1958 MAY 6. 16:11:09. $M_L=3.5$. 48°34′N±15′, 70°19′W±15′. About 35 miles northeast of Chicoutimi, Que. Aftershock of No. 713. *S3*, *S5*.

715. 1958 MAY 6. 16:31:38. $M_L=3.4$. 48°34′N±15′, 70°19′W±15′. About 35 miles northeast of Chicoutimi, Que. Aftershock of No. 713. *S3*, *S5*.

716. 1958 MAY 14. 17:41:21. $M_L=5.4$. 46°58′N±10′, 76°33′W±10′. Depth 9 km. Near Bark Lake, Que. Felt at Lac-des-Loups, 115 miles northwest of Ottawa, by a motorist on the highway between the Quebec communities of Mont Laurier and Val d'Or. It was also felt in Ontario, at Bracebridge and Lanark, and startled many at Ottawa. *S3*, *S5*.

717. 1958 JULY 13. 21:32:49. $M_L=2.4$. 46°10′N±5′, 76°23′W±10′. About 10 miles north of Lac Dumont, Que. *S3*, *S5*.

718. 1958 JULY 18. 23:56:27. $M_L=3.2$. 46°42′N±5′, 71°24′W±5′. Depth 3 km. In the St. Lawrence River about 15 miles above Quebec City. *S3*, *S5*.

719. 1958 JULY 22. 1:46:40. $M_L=4.3$. 43°00′N±25′, 79°30′W±25′. Depth 5 km. About 15 miles west of Welland, Ont. Felt at St. Catharines and vicinity. *S1.46*, *S3*, *S5*.

720. 1958. JULY 25. 3:45:11. $M_L=3.8$. 46°34′N±5′, 75°48′W±5′. Depth 15 km. In the Gatineau river valley about 15 miles north of Maniwaki, Que. *S3*, *S5*.

721. 1958. JULY 27. 8:58:00. $M_L=3.0$. 47°19′N±15′, 70°18′W±20′. In the St. Lawrence River south of Ile-aux-Coudres, Que. *S3*, *S5*.

722. 1958 AUGUST 4. 20:25:58. $M_L=3.9$. 43°08′N± 20′, 80°00′W±20′. Depth 0 km. Near Caledonia, Ont. *S3*, *S5*.

723. 1958 AUGUST 8. 22:15:03. $M_L=4.0$. 47°56′N±5′, 70°23′W±5′. Depth 0 km. In an uninhabited area about 30 miles up Rivière Malbaie, Que. *S3*, *S5*.

724. 1958 AUGUST 12. 3:22:12. $M_L=3.9$. 48°36′N± 12′, 69°23′W±12′. Depth 5 km. About 10 miles northwest of Sault-au-Mouton, Que. On September 11, two smaller disturbances and one of equal magnitude occurred, all within a quarter of an hour, at this location within the stipulated uncertainties. *S3*, *S5*.

725. 1958 AUGUST 22. 14:25:05. $M_L=3.6$. 43°00′N± 1.0°, 79°00′W±1.0°. On the Niagara Peninsula, Ont. *S3*, *S5*.

726. 1958 SEPTEMBER 11. 17:34:44. $M_L=3.5$. 48°32′N ±15′, 69°44′W±15′. About 20 miles west of Sault-au-Mouton, Que. Foreshock of No. 728. *S3*, *S5*.

727. 1958 SEPTEMBER 11. 17:41:17. $M_L=3.5$. 48°32′N ±15′, 69°44′W±15′. About 20 miles west of Sault-au-Mouton, Que. Foreshock of No. 728. *S3*, *S5*.

728. 1958 SEPTEMBER 11, 17:49:56. $M_L=3.9$. 48°32′N ±15′, 69°44′W±15′. About 20 miles west of Sault-au-Mouton, Que. This earthquake was preceded by two foreshocks within a quarter of an hour of the main disturbance. *S3*, *S5*.

729. 1958 SEPTEMBER 29. 10:45:29. $M_L=3.8$. 48°23′N ±15′, 69°15′W±15′. In the St. Lawrence River about 20 miles north of Trois-Pistoles, Que. *S1.46*, *S3*, *S5*.

730. 1958 SEPTEMBER 30. 0:13:58. $M_L=3.7$. 45°11′N ±5′, 73°44′W±5′. Depth 21 km. About 10 miles southeast of Beauharnois, Que. Felt at Montreal and north to Ste-Julienne, Que. Buildings creaked in Malone, N.Y. *S3*, *S5*.

731. 1958 OCTOBER 21. 9:32:51. $M_L=4.1$. 49°.6N± 0.5°, 68°.0W±0.5°. Depth 14 km. About 30 miles north-northeast of Baie-Comeau, Que. A report was received that a "fire ball" was seen about the time of origin of this disturbance. *S3*, *S5*.

732. 1958 OCTOBER 22. 8:34:33. $M_L=2.4$. 45°52′N± 7′, 74°28′W±8′. About 15 miles southwest of Ste-Agathe, Que. *S3*. *S5*.

733. 1958 DECEMBER 23. 23:14:16. $M_L=3.7$. 46°59′N ±7′, 69°49′W±7′. About 5 miles northeast of Ste-Félicité, Que. *S3*, *S5*.

734. 1959 FEBRUARY 9. Between 2:00 and 3:30. $M_L=2.4$. 43°N±?, 81°W±?. East of London, Ont. This shock was not recorded. The epicentre and magnitude were estimated from reports supplied through the courtesy of the London *Free Press*. The earthquake was felt by a few

persons in London and in Charlotteville Township, and by one person on a farm at Walsingham, Norfolk County, all in Ontario. *S5*.

735. 1959 April 16. 16:36:25. $M_L=3.5$. 47°07′N±7′, 70°20′W±7′. About 10 miles southeast of Bonsecours, Que. *S3*, *S5*.

736. 1959 May 14. 14:23:40. $M_L=2.5$. 47°00′N±7′, 70°19′W±7′. About 9 miles south of Bonsecours, Que. *S3*, *S5*.

737. 1959 May 21. 9:38:51. $M_L=3.9$. 46°33′N±7′, 76°27′W±7′. About 30 miles northwest of Maniwaki, Que. *S3*, *S5*.

738. 1959 May 24. 10:52:03. $M_L=3.5$. 48°48′N, 79° 12′W. The co-ordinates are those of La Sarre, Que., where the shock was reported to have been felt. The magnitude was derived from the Ottawa seismogram, which also indicated that the epicentral distance was about the same as that from Ottawa to La Sarre. The shock was not recorded elsewhere. *S3*, *S5*.

739. 1959 May 29. 2:16:49. $M_L=3.0$. 46°32′N±7′, 76° 43′W±7′. About 40 miles northwest of Maniwaki, Que. *S3*, *S5*.

740. 1959 August 1. 13:52:49. $M_L=4.1$. 48°25′N± 12′, 68°19′W±12′. About 10 miles east of Rimouski, Que. *S3*, *S5*.

741. 1959 August 22. 3:52:30. $M_L=3.2$. 46°57′N±5′, 70°47′W±5′. In the St. Lawrence River just east of the Island of Orleans. *S3*, *S5*.

742. 1959 September 25. 1:36:30. $M_L=3.9$. 50°11′N± 35′, 68°12′W±35′. Between the Manicouagan and Toulnustouc rivers, about 40 miles above their junction, in the Province of Quebec. *S3*, *S5*.

743. 1959 October 18. 7:47:22. $M_L=2.6$. 45°54′N± 7′, 75°07′W±7′. Near Chêneville, Que. *S3*, *S5*.

ADDENDUM

Two United States earthquakes felt also in Canada were inadvertently omitted from this list. No. 617US, at Dover-Foxcroft, Me., must certainly have been felt in adjacent parts of Quebec, and 656US, in central Michigan, was felt from Windsor to Leamington in the southern tip of Ontario. They have been included in the index to the Canadian list.

GEOGRAPHICAL INDEX*

40°N-41°N
84°W-85°W Nos. **427** (**525** US), **428** (**526** US).

42°N-43°N
78°W-79°W Nos. **348** (**449** US), 377 (475 US).
80°W-81°W Nos. 360, **509** (**619** US).
81°W-82°W No. 691.
83°W-84°W No. 440 (536 US).
85°W No. **656** US.

43°N-44°N
65°W-66°W Nos. 404, 512.
71°W-72°W Nos. **485** (**589** US), **486** (**590** US).
73°W-74°W No. 657.
79°W-80°W Nos. 452, 638, 655, **719**, 725.
80°W-81°W Nos. 623, 722.
81°W-82°W No. 734.

44°N-45°N
56°W-57°W Nos. **351**, **352**, **353**, **354**, **356**, **357**, **646**.
62°W-63°W No. 380.
73°W-74°W No. **405** (**498** US).
74°W-75°W Nos. **340** (**423** US), **526** (**633** US), 527 (634 US), **528** (**635** US), 529 (636 US), 530 (637 US), 532 (638 US).
75°W-76°W Nos. 437, 449 (557 US), 670, 708.
76°W-77°W No. 695.
78°W-79°W Nos. 347, 365.
81°W-82°W No. 705.

45°N-46°N
56°W-57°W No. **642**.
57°W-58°W No. **591**.
59°W-60°W No. 647.
65°W-66°W No. **433**.
66°W-67°W Nos. 674, 675.
67°W-68°W Nos. 343 (436 US), 376, 711.
69°W-70°W No. **617** US.
71°W-72°W Nos. 346, 355, 362.
73°W-74°W Nos. 432, 477, 542, 564, 565, 566, 602 (677 US), 631, 673, 730.
74°W-75°W Nos. 342, 396, 430, 435, 436, 442, 446, 481, 498, **500**, 507, 538, 574, 583, 584, 597, 600, 601, 603, 604, 628 651, 652, 667, 669, 687, 690, 704, 732.
75°W-76°W Nos. 345, 361, 375, 394, 398, 401, 403, 407, 429, 571, 664, 665, 680, 696, 743.
76°W-77°W Nos. 438, 460, **517**, 544, 567.
77°W-78°W No. 587.
81°W-82°W No. **559**.

46°N-47°N
59°W-60°W No. 359.
65°W-66°W Nos. **358**, 366.
66°W-67°W No. 444.
67°W-68°W No. 692.
69°W-70°W No. 733.
70°W-71°W Nos. 569, 606, 607, 608, 609, 610, 694, 741.
71°W-72°W Nos. 502, 718.
72°W-73°W Nos. 341, 548, 575.
73°W-74°W No. 663.
74°W-75°W Nos. 388, 499, 524, 579, 685, 689, 700.
75°W-76°W Nos. 349, 350, 434, 489, 505, 508, 599, **616**, 661, 684, 706, 712, 720.
76°W-77°W Nos. 472, 488, 504, 506, 551, **637**, 709, **716**, 717, 737, 739.
77°W-68°W Nos. 456, 501, 556, 576, 710.
78°W-79°W Nos. 519, 699.
79°W-80°W Nos. **408**, **409**, **410**, 411, 412, **414**, 415, 416, **417**, **418**, 419, **420**, **421**, 425, 431, 441, 471.
81°W-82°W Nos. 454, **555**.

47°N-48°N
65°W-66°W No. 521.
69°W-70°W Nos. 363, 399, **612**.
70°W-71°W Nos. 368, **370**, 371, **372**, 373, 384, 390, 391, 393, 395, 397, 402, 422, 423, 426, **458**, **461**, 462, 463, 464, **465**, **466**, 496, 497, 513, 514, 515, 518, 522, 550, 552, 554, 558, **560**, 561, 582, 613, 614, 640, 648, 649, 650, 681, 693, 721, 733, 735, 736.
71°W-72°W Nos. 469, 482, **536**, 545, 593, 594, 666.
72°W-73°W No. 672.
74°W-75°W Nos. 516, 563.

*Serial numbers in bold face designate earthquakes of intensity V (equivalent to $M_L=4.3$) or greater. Serial numbers followed by "US" refer to the United States list on page 109.

70°W-76°W Nos. 451, **535**, 547, **580**, 644.
76°W-77°W Nos. **382**, 450, 494, 611, 677.
77°W-78°W No. 605.
78°W-79°W Nos. **413**, 615.
81°W-82°W No. 557.

48°N-49°N
67°W-68°W No. 531.
68°W-69°W Nos. 364, 740.
69°W-70°W Nos. 448, **539**, **620**, 682, 683, 688, 697, 701, 702, 703, 724, 726, 727, 728, 729.
70°W-71°W Nos. 339, 470, **483**, 658, 659, 660, 713, 714, 715.
74°W-75°W No. 625.
76°W-77°W No. 537.
79°W-80°W No. 738.
80°W-81°W No. 533.

49°N-50°N
65°W-66°W No. **627**.
66°W-67°W Nos. 598, 624, 678, 679.
67°W-68°W Nos. **503**, **520**, **523**.
68°W-69°W Nos. **443**, **541**, **581**, 632, **643**, 731.
82°W-83°W No. 686.

50°N-51°N
63°W-64°W No. **662**.
64°W-65°W No. **698**.
67°W-68°W No. **592**.
68°W-69°W No. 742.
69°W-70°W No. **562**.
81°W-82°W No. **344**.

51°N-52°N
79°W-80°W No. 653.

52°N-53°N
75°W-76°W No. **492**.

56°N-57°N
58°W-59°W No. **676**.

57°N-58°N
53°W-54°W No. **707**.
57°W-58°W No. **622**.

59°N-60°N
74°W-75°W No. **671**.

EARTHQUAKES OF NORTHEASTERN UNITED STATES

418. 1928 January 13. 19:50. IV-V. 41°.2N, 71°.6W. Block Island, R.I. *U1*.

419. 1928 January 21. 5:30. IV. 45°.3N, 69°.0W. Three shocks at short intervals, followed in three hours by two more, were felt at Milo, Me. *S2*.

420. 1928 February 8. a.m. VI. 45°.3N, 69°.0W. Milo, Me. *B5*, *H1*, *S1.20*, *S2*, *U1*.

421. 1928 February 9. a.m. IV. 45°.3N, 69°.0W. Two shocks felt at Milo, Me. *S2*.

422. 1928 February 17. 5:29. III. 45°.3N, 69°.0W. Milo, Me. *B5*, *S1.20*, *U1*.

423. 1928 March 18. 15:20. V-VI. 44°.5N, 74°.3W. Saranac Lake, N.Y. *B5*, *H1*, *Q1*, *S1.20*, *S2*, *S3*, *U1*.

424. 1928 March 22. 13:30. IV. 45°.3N, 69°.0W. Milo, Me. *B5*, *S1.20*, *U1*.

425. 1928 March 28. "Night." IV. 45°.3N, 69°.0W. Milo, Me. *B5*, *S1.20*, *U1*.

426. 1928 March 29. "Morning." III. 45°.3N, 69°.0W. Milo, Me. *B5*, *U1*.

427. 1928 April 25. 23:38. V. 44°.5N, 71°.2W. Berlin, N.H. *B5*, *S1.20*, *S2*, *U1*.

428. 1928 April 28. 22:07. IV. 43°.2N, 71°.5W. Concord, N.H. *U1*.

429. 1928 May 22. 0:24. II. 43°.2N, 71°.5W. Concord, N.H. *U1*.

430. 1928 May 26. II. 43°.2N, 71°.7W. Contoocook, N.H. *U1*.

431. 1928 August 30. 9:10 (?). II. 44°.3N, 68°.6W. Brooklin, Me. *U1*.

432. 1928 September 9. 21:00. IV. 41°.5N, 82°.0W. Lorain and Cleveland, Ohio. *H1*, *U1*.

433. 1928 October 15. II. 45°.1N, 71°.4W. Pittsburg, N.H. *U.1*.

434. 1928 October 17. 0:30. III. 42°.8N, 71°.6W. Milford and Wilton, N.H. *B5*, *U1*.

435. 1928 November 5. 4:00. II. 43°.3N, 71°.0W. Rochester, N.H. *U1*.

436. 1928 November 20. 2:30. IV. 45°.0N, 67°.2W. Perry, Me. *S2*, *U1*.

437. 1928 December 1. II. 43°.3N, 71°.0W. Rochester, N.H. *U1*.

438. 1928 December 8. 4:12. II. 41°.8N, 72°.5W. Ellington, Conn. *U1*.

439. 1928 December 12. 19:07. II. 44°.6N, 69°.6W. Waterville, Me. *U1*.

440. 1928 December 25. 2:00. II. 46°.2N, 67°.9W. New Limerick, Me. *U1*.

441. 1929 January 13. II. 43°.3N, 71°.0W. Rochester, N.H. *U1*.

442. 1929 January 15. 2:45. III. 43°.3N, 71°.0W. Rochester, N.H. *U1*.

443. 1929 February 5. 17:10. II. 43°.3N, 71°.7W. Weare, N.H. *S2*, *U1*.

444. 1929 February 5. 19:09 to 19:17. IV-V. 44°.0N, 70°.3W. Auburn, Me. *B5*, *H1*, *S1.21*, *S2*, *U1*.

445. 1929 March 8. 9:06. V. 40°23′N, 84°11′W. Bellefontaine, Ohio. *H1*, *S1.21*, *S2*, *U1*.

446. 1929 March 29. 0:00. II. 45°.2N, 67°.3W. Calais, Me. *U1*.

447. 1929 June 5. 7:00. III. 44°.8N, 74°.3W. Malone, N.Y. *S2*, *U1*.

448. 1929 August 12. 6:00 to 7:00. III. 42°.2N, 77°.2W. Between Little Valley and Binghampton, N.Y. Probably a foreshock of No. 449. *U1*.

449. 1929 August 12. 11:24.8. VIII. $M_L=5.8$. 42° 52′N, 78°21′W. (a). Near Attica, N.Y. The shock was felt in the northeast corner of Ohio, northern Pennsylvania, most of New York and

parts of New Hampshire, Vermont, Massachusetts and Connecticut. The shock was most severe in the eastern part of the city of Attica. Here 251 house chimneys were thrown down and a number of brick buildings damaged. *B5, H1, H10, I2, J1, Q1, S1.21, S2, S3, U1.*

450. 1929 SEPTEMBER 17. 4:45. II. 42°.2N, 71°.0W. Holbrook, Mass. *U1.*

451. 1929 OCTOBER 8. 12:20. III. 44°.0N, 70°.2W. Lewiston, Me. *B5, S1.21, S2, U1.*

452. 1929 OCTOBER 9. 0:30. III. 44°.5N, 69°.5W. Waterville, Me. *U1.*

453. 1929 DECEMBER 2. 22:14. IV. 42°.8N, 78°.3W. Attica, N.Y. *U1.*

454. 1929 DECEMBER 3. 12:50. IV. 42°.8N, 78°.3W. Attica, N.Y. *S2, U1.*

455. 1929 DECEMBER 5. 15:00. II. 44°.8N, 69°.7W. Skowhegan, Me. *U1.*

456. 1930 JANUARY 4. II. 43°.1N, 75°.3W. Clinton, N.Y. *U1.*

457. 1930 JANUARY 17. p.m. I. 42°.8N, 78°.3W. Attica, N.Y. *U1.*

458. 1930 JANUARY 24. 3:45. I. 46°.4N, 84°.3W. Sault Ste. Marie, Mich. *U1.*

459. 1930 FEBRUARY 14. 6:15. III-IV. 43°.4N, 71°.7W. Franklin, N.H. *S1.22, S2, U1.*

460. 1930 MARCH 11. 23:30. II. 44°.0N, 70°.0W. Topsham, Me. *S1.22, U1.*

461. 1930 MARCH 19. 0:15. IV. 43°.3N, 71°.6W. Concord, N.H. *U1.*

462. 1930 MARCH 27. 19:30. III. 42°.1N, 72°.7W. West Springfield, Mass. *S1.22, U1.*

463. 1930 JUNE 26. 21:45. IV. 40°.5N, 84°.0W. Bellefontaine, Lima and Wapakoneta, Ohio. *U1.*

464. 1930 JUNE 27. 7:23. III. 40°.5N, 84°.0W. Sidney and Lima, Ohio. *U1.*

465. 1930 JULY 11. 0:15. II. 40°.7N, 83°.2W. Marion, Ohio. *S1.22, U1.*

466. 1930 AUGUST 1. 2:00. III. 41°.5N, 70°.8W. New Bedford, Mass. *B5, S1.22, U1.*

467. 1930 SEPTEMBER 29. 21:15. III. 40°.3N, 82°.4W. Sidney, Ohio, *U1.*

468. 1930 SEPTEMBER 30. 23:50. II. 40°.3N, 84°.2W. Sidney, Ohio. *U1.*

469. 1930 NOVEMBER 2. 2:35. III. 44°.8N, 74°.3W. Malone and Chestnut Falls, N.Y. *S1.22, S2, U1.*

470. 1930 NOVEMBER 13. 6:00. I. 45°.0N, 69°.2W. Corinna, Me. *U1.*

471. 1930 NOVEMBER 20. a.m. III. 42°.6N, 83°.4N. Felt most severely in the regions of Oxbow, Union, Gree, Cass, Orchard and Straits Lakes, all in Michigan. No reports of damage were received. *S2.*

472. 1930 DECEMBER 25. p.m. I. 44°.5N, 69°.6W. Waterville, Me. *U1.*

473. 1931 MARCH 21. 15:48. II. 40°.3N, 82°.4W. Sidney, Ohio. *U1.*

474. 1931 APRIL 20. 19:54. VII. ($M_L = 5.0$ determined from a Seven Falls seismogram.) 43°.4N, 73°.7W. Lake George, N.Y. *B5, H1, S1.23, S3, U1.*

475. 1931 APRIL 22. IV. 42°.9N, 78°.9W. "A strong earthquake was felt in Buffalo, N.Y., and surrounding cities on April 22d, causing panic." *S1.23.*

476. 1931 MAY 4. 10:17. III. 42°.4N, 72°.5W. Amherst, Mass. *S1.23, U1.*

477. 1931 MAY 4. 18:43. I. 44°.8N, 77°.3W. Malone, N.Y. *U1.*

478. 1931 JUNE 7. 0:00. II. 43°.2N, 77°.6W. Rochester, N.Y. *U1.*

479. 1931 JULY 1. 2:45. IV. 41°.6N, 73°.4W. New Milford, Conn. *U1.*

480. 1931 SEPTEMBER 20. 23:05. VII. 40°.2N, 84°.3W. Anna, Ohio. *I2, H1, J2, Q1, S3, U1.*

481. 1931 NOVEMBER 3. 15:30. II. 44°.6N, 75°.2W. Canton, N.Y. *U1.*

482. 1932 JANUARY 21. p.m. IV. 41°.1N, 81°.6W. Akron, Ohio. *S1.24, U1.*

483. 1932 JULY 20. 23:30. II. 42°.2N, 73°.2W. Lake Garfield, Mass. *B5, U1.*

484. 1932 OCTOBER 15. 3:10. III. 43°.6N, 71°.5W. Meredith, N.H. *B5, S1.24, U1.*

485. 1932 OCTOBER 16. 19:12. II. 42°.9N, 72°.3W. Keene, N.H. *B5, U1.*

486. 1932 NOVEMBER 4. 5:00. II. 43°.2N, 71°.5W. Concord, N.H. *B5, U1.*

487. 1932 DECEMBER 7. 3:15 to 4:05. IV. 44°.4N, 74°.1 W. Gabriels, N.Y. *B5, U1.*

488. 1932 DECEMBER 7. 16:45. III. 44°.4N, 74°.1W. Gabriels, N.Y. *B5, U1.*

489. 1933 JANUARY 17. 5:30. III. 41°.7N, 71°.0W. Fall River and New Bedford, Mass. *B5, S1.25, U1.*

490. 1933 JANUARY 25. 2:00. V. 40°.2N, 74°.7W. Trenton, N.J. *B5, H1, U1.*

491. 1933 FEBRUARY 23. 4:20. III. 40°.3N, 82°.4W. Sidney, Ohio, *U1.*

492. 1933 MAY 20. 19:57. III. 44°.8N, 74°.7W. Lawrenceville, N.Y. *U1.*

493. 1933 JUNE 26. 14:10. III. 41°.0N, 73°.8W. Scarsdale, N.Y. *U1.*

494. 1933 OCTOBER 29. p.m. IV. 43°.0N, 73°.7W. St. Johnsville, N.Y. *B5, H1, S1.26, U1.*

495. 1934 JANUARY 30. 10:30. IV. 41°.8N, 72°.6W. South Windsor, Conn. *B5, U1.*

496. 1934 APRIL 11. 3:00. III. 44°.0N, 72°.7W. Rutland and Montpelier, Vt. *B5, U1.*

497. 1934 April 11. 3:24. III. 44°.0N, 72°.7W. Rutland and Montpelier, Vt. *B5, U1.*

498. 1934 April 15. 2:58:13. V-VI. (M_L=4.5 from Seven Falls and Shawinigan Falls seismograms.) 44°40′N±16′, 73°48′W±18′. In the Adirondack Mountains, N.Y. *B5, H1, Q1, S2, S3, U1.*

499. 1934 April 15. 18:05. III. 44°.8N, 74°.3W. Malone, N.Y. *B5, U1.*

500. 1934 June 5. 20:11. III. 44°.8N, 74°.3W. Malone, N.Y. *B5, U1.*

501. 1934 August 2. 14:58. IV. 42°.6N, 70°.7W. Gloucester, Mass. *B5, U1.*

502. 1934 August 2. 14:59. IV. 43°.7N, 70°.3W. Portland, Me. *B5, S1.26, U1.*

503. 1934 August 2. 17:50. III. 43°.7N, 70°.3W. Portland, Me. *B5, U1.*

504. 1934 August 3. 2:30. IV. 43°.7N, 70°.3W. Portland, Me. *B5, S1.26, U1.*

505. 1934 August 26. 11:36. III. 44°.9N, 67°.0W. Eastport, Me. *B5, U1.*

506. 1934 October 29. 20:07. V. 42°.2N, 80°.2W. Erie, Pa. *H1, S1.27, U1.*

507. 1935 January 15. 1:15. II. 44°.1N, 70°.2W. Lewiston, Me. *B5, S1.27, U1.*

508. 1935 January 28. 6:00. IV. 44°.8N, 74°.3W. Malone, N.Y. *B5, S1.27, U1.*

509. 1935 January 28. 9:01:32. III. (M_L=3.2 determined from a Shawinigan Falls seismogram.) 44°.8N, 74°.3W. Felt at Malone, N.Y. *B5, Q1, S3, U1.*

510. 1935 January 30. 20:20. II. 42°.6N, 71°.3W. Billerica, Mass. *B5, U1.*

511. 1935 March 4. 2:40. II. 44°.9N, 67°.0W. Eastport, Me. *B5, U1.*

512. 1935 April 24. 1:24. IV. 42°10′N, 70°13′W. Off Cape Cod, Mass. *B5, H1, L5, U1.*

513. 1935 August 9. 7:30 to 8:00. II. 41°.4N, 72°.1W. New London, Conn. *B5, U1.*

514. 1935 September 13. 3:49. II. 43°.2N, 71°.5W. Concord, N.H. *B5, U1.*

515. 1935 November 1. 6:30. II. 44°.15′N, 72°.35′W. Montpelier, Vt. *B5, U1.*

516. 1935 November 1. 6:30. II. 42°38°N, 74°35′W. Richmondville, N.Y. *B5, U1.*

517. 1936 January 31. 7:30. II. 41°.1N, 83°.2W. Tiffin, Ohio. *U1.*

518. 1936 June 14. 5:40. III. 43°.5N, 71°.5W. Central New Hampshire. *B5, C2, U1.*

519. 1936 June 15. III. 43°.8N, 71°.4W. Center Sandwich, N.H. (The following report and that for June 14 may refer to the same shock.)

"The second shock felt in New England within a year rocked this town [Center Sandwich, N.H.] on June 15." *S1.28.*

520. 1936 June 21. 3:40 to 4:40. III. 44°.7N, 74°.2W. Mountain View, N.Y. *B5, U1.*

521. 1936 August 26. 8:55 to 9:05. III. 41°.4N, 80°.4W. Greenville, Pa. *B5, U1.*

522. 1936 November 10. 2:46. IV. 43°33′N, 71°26′W. Lakeport, N.H. *B5, C2, S1.29, S2, U1.*

523. 1936 November 10. 4:02. IV. 44°39′N, 71°40′W. Lancaster, N.H. *B5, C2, S1.29, S2, U1.*

524. 1937 February 21. II. 42°.1N, 76°.8W. Elmira, N.Y. *B5, S1.29, U1.*

525. 1937 March 2. 14:48. VI-VII. 40°.7N, 84°.0W. Anna, Ohio. *H1, I2, S1.29, U1, W7.*

526. 1937 March 9. 5:45. VII-VII. M=5½±(*G3*). 40°.6N, 84°.0W. Anna, Ohio. *G3, H1, I2, U1, W7.*

527. 1937 March 10. 5:30 IV. 44°.6N, 75°.2W. Canton, N.Y. *B5, H1, U1.*

528. 1937 June 9. 0:04. II. 40°.3N, 75°.9W. Reading, Pa. *B5, U1.*

529. 1937 July 19. 3:51. IV. 40°43′N, 70°42′.5W. Western Long Island, N.Y. *B5, L6, S1.29, U1.*

530. 1937 July 27. 9:10. III. 41°50′N, 72°26′W. Manchester, Conn. *B5, L6, P3, U1.*

531. 1937 September 5. 11:08:15. Estimated M_L=3.5. 41°.5N, 66°.0W. On Georges Bank near Corsair Gorge, in the Atlantic. *B5, L6.*

532. 1937 September 30. 22:08:22. III. 40°50′N, 74° 15′W. Verona, N.J. *U1.*

533. 1937 October 12. 3:00 and 6:00. II. 41°.2N, 73°.8W. Westchester County, N.Y. *U1.*

534. 1937 October 12. 11:00 to 12:00. II. 43°.3N, 70°.5W. Kennebunkport, Me. *U1.*

535. 1937 December 2. 22:01. II. 44°.5N, 73°.2W. Burlington, Vt. *B5, L6, U1.*

536. 1938 March 13. 16:10. II. 42°19′N, 83°03′W. Detroit, Mich. *S1.*

537. 1938 April 1. 22:15. III. 43°18′N, 70°59′W. Rochester, N.H. *B5, S1.30, U1.*

538. 1938 April 3. II. 43°18′N, 70°59′W. Rochester, N.H. *U1.*

539. 1938 April 13. 1:—. II. 43°10′N, 73°07′W. Manchester, Vt. *B5, U1.*

540. 1938 May 16. 19:25. II-III. 40°.8N, 74°.3W. Felt in Verona, N.J. *B5, L9.*

541. 1938 June 14. 4:02. II. 41°22′N, 73°25′W. Bethel, Conn. *P3, U1.*

542. 1938 June 14. 19:30. I. 41°22′N, 73°25′W. Bethel, Conn. *B5, P3, U1.*

543. 1938 June 23. 3:57:56. IV. 42°37′N, 71°25′W. (a). Chelmsford, Mass. *B5, L9, N2, U1.*

544. 1938 JULY 15. 22:45:47. V. 40°22′N, 78°14′W. (a). Southern Blair Co., Pa. *B5, H1, I2, L4, L10, U1.*

545. 1938 JULY 29. 7:44:07. III. 41°.0N, 73°.7W. Manhattan Island and Bronx, N.Y., also Palisades and Westchester Co. N.Y. *B5, L10, N2, S1.30, U1.*

546. 1938 AUGUST 2. 9:02:30. III-IV. 41°05′N, 73°42′W. (a). Southwest Connecticut. *B5, L10, N2, U1.*

547. 1938 AUGUST 22. 12:48:13. $M_L=4.1$. 44°.7N±0°.3, 68°.8W±0°.3. Bangor, Me., and vicinity. *B5, H1, L10, N2, S3, U1.*

548. 1938 AUGUST 23. 3:36:34. $M_L=4.6$. 40°15′N±18′, 74°15′W±18′. Near Trenton, N.J. Foreshock of No. 549. *B5, H1, L10, N2, S3, U1.*

549. 1938 AUGUST 23. 5:04:55. $M_L=4.8$. 40°15′N±18′, 74°15′W±18′. Near Trenton, N.J. One foreshock and one aftershock, each of comparable magnitude. *B5, L10, N2, S3.*

550. 1938 AUGUST 23. 5:18:23. III. 41°.2N, 73°.7W. Felt in Westchester Co., N.Y. *B5, L10, N2.*

551. 1938 AUGUST 23. 7:03:29. $M_L=4.6$. 40°15′N±18′, 74°15′W±18′. Near Trenton, N.J. Aftershock of No. 549. *B5, L10, N2, S3.*

552. 1938 AUGUST 23. 7:11:46. III. 41°.2N, 73°.7W. Felt in Westchester Co., N.Y. *B5, L10, N2.*

553. 1938 AUGUST 23. 11:11:08. III. 40°.2N, 74°.2W. Felt in New Jersey. *B5, L10, N2.*

554. 1938 AUGUST 27. 22:36:25. III. 40°.2N, 74°.2W. Felt in Trenton, N.J. *B5, L10, N2.*

555. 1938 SEPTEMBER 20. III. 41°.4N, 72°.2W. Connecticut. *B5, P3, U1.*

556. 1938 OCTOBER 21. 7:18:55. II. 41°10′N, 73°40′W. (a). Southern Dutchess Co., N.Y. *B5, L10, N2.*

557. 1938 NOVEMBER 18. 22:19:06. IV-V. 44°45′N, 75°15′W. (a). Upper New State. *B5, L10, N2, S3, U1.*

558. 1938 DECEMBER 6. 19:38. III. 40°.8N, 74°.3W. Felt at Verona, N.J. *B5, L10, N2.*

559. 1939 FEBRUARY 1. 10:37:37. II. 42°.6N, 71°.4W. (a). Near North Chelmsford, Mass. *B5, L10, N2.*

560. 1939 FEBRUARY 21. "Early morning." II. 44°50′N, 74°18′W. Malone, N.Y. *B5, U1.*

561. 1939 FEBRUARY 24. 0:20. III. 42°52′N, 78°17′W. Attica, N.Y. *S1.31, S2, U1.*

562. 1939 MARCH 18. 13:03. III. 40°24′N, 84°03′W. Jackson Center, Ohio. *U1.*

563. 1939 APRIL 2. Between 2:30 and 3:30. II. 40°02′N, 76°18′W. Lancaster, Pa. *B5, U1.*

564. 1939 JUNE 1. 3:36. III. 44°36′N, 75°12′W. Canton, N.Y. *B5, U1.*

565. 1939 JUNE 18. 2:20. IV. 40°.4N, 84°.2W. Felt strongest at Anna and Botkins, Ohio. *U1.*

566. 1939 JULY 9. 11:50. II. 40°24′N, 84°12′W. Anna, Ohio, *U1.*

567. 1939 SEPTEMBER 13. 1:22:04. II. 40°.8N, 74°.0W. (a). Felt in Union City, N.J. *B5, L10, N2.*

568. 1939 SEPTEMBER 21. 20:30:01. II. 41°25′N, 74°05′W. (a). Orange Co., N.Y. *B5, L10, N2.*

569. 1939 OCTOBER 10. "Early." II-III. 43°.4N, 71°.6 W. (a). "Residents of Tilton, Northfield and Sanbornton, New Hampshire, reported an earth tremor in their communities early on October 10." *S1.32.*

570. 1939 OCTOBER 11. 18:49:08. II-III. 42°.9N, 71°.4 W. (a). *S1.32* says: "Three earth shocks were felt in southern New Hampshire. Reports, from Derry, East Manchester and Goffstown told of houses shaking and a dull roar at times." *B5, L10, N2, S1.32.*

571. 1939 OCTOBER 21. 8:59:33. II. 43°.3N, 73°.3W. (a). Felt at Glen Falls, N.Y. *B5, L10, N2.*

572. 1939 OCTOBER 25. 14:46:39. II. 42°.2N, 73°.8W. (a). Felt in Hudson, N.Y. *B5, L10, N2.*

573. 1940 JANUARY 2. 2:05:44. III. 42°.5N, 71°.5W. (a). Felt at Littleton, Mass. *B5, L10, N2, U1.*

574. 1940 JANUARY 3. 1:30 and 2:00. II. 41°10′N, 71°35′W. Block Island, R.I. *U1.*

575. 1940 JANUARY 28. 23:11:51. V. 41°38′N, 70°48′W. (a). Buzzards Bay, Mass. *B5, H1, L10, N2, S1.32, S2, U1.*

576. 1940 MARCH 2. 4:15:36. III. 41°.5N, 72°.5W. (a). Moodus, Conn. *B5, L10, N2, U1.*

577. 1940 MARCH 13. 1:29:00. III. 41°.5N, 72°.5W. (a). Moodus, Conn. *B5, L10, N2, P3, U1.*

578. 1940 MARCH 28. 11:42:35. $M_L=3.8$. 44°.7N, 69°.9W. (a). Felt at Stark and New Vineyard, Me. *B5. L10, N2, S3, U1.*

579. 1940 APRIL 12. 1:58:10. II. 42°.8N, 74°.6W. West-central New York State. *B5, L10, N2.*

580. 1940 APRIL 13. 8:23:27. $M_L=2.6$. 44°50′N±15′, 74°52′W±18′. Near Massena, N.Y. *N2, S3.*

581. 1940 MAY 20. 1:26. II. 44°36′N, 75°12′W. Canton, N.Y. *B5, U1.*

582. 1940 MAY 28. 20:06. II. 40°16′N, 76°54′W. Felt at Harrisburg, Pa. *B5, L10, N2, U1.*

583. 1940 MAY 31. 16:00 to 16:30. II. 41°06′N, 81°31′W. Akron, Ohio. *U1.*

584. 1940 JUNE 16. 1:30. III. 40°56′N, 82°17′W. Nankin, Ohio. *U1.*

585. 1940 JULY 28. 8:30. II. 40°56′N, 82°17′W. Nankin, Ohio. *U1.*

586. 1940 AUGUST 15. 9:35. II. 40°56′N, 82°17′W. Nankin, Ohio. *U1.*

587. 1940 AUGUST 19. 2:30. II. 40°56′N, 82°17′W. Nankin, Ohio. *U1.*

588. 1940 SEPTEMBER 26. 23:30:15. $M_L=2.9$. 44°.7N, 73°.4W. (a). Near Plattsburg, N.Y. *B5, L10, N2, S3, U1.*

589. 1940 DECEMBER 20. 7:27:26. M=5.8. 43°.8N±0°.3, 71°.3W±0°.3. Centred near Ossipee Lake, N.H. This shock was followed by a dozen aftershocks large enough to be located from instrumental data. The first, No. 590 in this list, was of equal magnitude. Three others, of magnitude 3 to 4, are listed as Nos. 591, 592 and 593. The remaining eight to which magnitudes have not been assigned but which were presumably smaller, occurred at the following times: December 24,—13:00:32, 14:32:48, 18:12:06; January 2—3:42:33; January 4—11:10:13; January 18—23:25:00; January 23—0:14:57; February 12—22:23:57. One observer in the vicinity of the epicentre, reported that 129 aftershocks had occurred by the end of January. The two largest shocks reached intensity VII at Tamworth and Wonalancet, both in New Hampshire. They were felt from Pennsylvania and New Jersey eastward through Maine and in southern Canada. *B5, B7, D8, G3, H1, I2, L7, L8, L10, N2, S2, S3, U1, U2.*

590. 1940 DECEMBER 24. 13:43:44. M=5.8. 43°.8N±0°.3, 71°.3W±0°.3. Aftershock of No. 589. *B5, B7, D8, G3, H1, I2, L7, L8, L10, N2, S2, S3, U1, U2.*

591. 1940 DECEMBER 25. 5:03:43. $M_L=4.0$. 43°.8N, 71°.3W. (a). Aftershock of No. 589. *B5, L10, N2, S3, U1.*

592. 1940 DECEMBER 27. 19:56:09. $M_L=3.9$. 43°.8N, 71°.3W. (a). Aftershock of No. 589. *B5, L10, N2, S3,* U1.

593. 1941 JANUARY 21. 2:27:44. $M_L=3.6$. 43°.8N, 71°.3W. (a). Aftershock of No. 589. *B5, L10, N2, S3, U1.*

594. 1941 FEBRUARY 1. 18:28. II. 44°36′N, 75°12′W. Canton, N.Y. *B5, U1.*

595. 1941 APRIL 3. 19:52:58. $M_L=2.5$. 44°44′N±30′, 73°55′W±30′. Foreshock of No. 596. *N2, S3.*

596. 1941 APRIL 4. 8:10:44. $M_L=3.3$. 44°44°N±12′, 73°55′W±15′. About 20 miles southeast of Malone, N.Y. *B5, N2, S3.*

597. 1941 APRIL 29. 14:05:35. Estimated $M_L=2.5$. 40°.5N, 72°.5W. (a). About 25 miles south of Long Island, N.Y. *B5, N2.*

598. 1941 MAY 19. 11:59:35. Estimated $M_L=2$. 43°.8N, 72°.3W. Near the New Hampshire-Vermont boundary north of Hanover, N.H. *B5, N2.*

599. 1941 JULY 1. 16:59:38. Estimated $M_L=2.0$. 43°21′N, 70°12′W. (a). Off the coast of Maine. *B5, N2.*

600. 1941 JULY 28. 19:24:10. III. 41°08′N, 73°45′W. Felt at Mount Kisco and White Plains, N.Y. *B5, N2.*

601. 1941 AUGUST 30. 10:21:25. $M_L=3.7$. 46°.1N±0°.3, 67°.9W±0°.3. Felt at Houlton, Me. *B5, N2, S3, U1.*

602. 1941 OCTOBER 9. 22:07. II. 43°58′N, 75°55′W. Watertown, N.Y. *B5, U1.*

603. 1941 OCTOBER 11. 8:15:34. Estimated $M_L=3.0$. 42°18′N±18′, 72°15′W±18′. About 3 miles north of Sturbridge, Mass. *B5, N2.*

604. 1941 OCTOBER 20. 21:29. II. 43°58′N, 75°55′W. Watertown, N.Y. *B5, U1.*

605. 1941 OCTOBER 21. 5:23:45. $M_L=2.2$. 44°46′N±14′, 74°48′W±15′. Foreshock of No. 606. *B5, N2, S3.*

606. 1941 OCTOBER 21. 6:10:41. $M_L=3.3$. 44°46′N±14′, 74°48′W±15′. About 15 miles south of Malone, N.Y. *B5, N2, S3.*

607. 1941 DECEMBER 12. 23:28:57. $M_L=2.7$. 44°52′N±10′, 73°42′W±12′. About 12 miles north of Dannemora, N.Y. *B5, N2, S3, U1.*

608. 1942 JANUARY 31. 4:11:57. $M_L=2.7$. 44°44′N±8′, 73°55′W±10′. About 10 miles southwest of Dannemora, N.Y. *B5, N2, S3.*

609. 1942 MARCH 8. 23:37:58. IV. 44°11′N, 70°21′W. About 9 miles northwest of Lewiston, Me. *B5, N2, W6, U1.*

610. 1942 APRIL 23. 20:40:01. Estimated $M_L=2$. 41°18′N±15′, 72°50′W±18′. A few miles east of New Haven, Conn. *B5, N2.*

611. 1942 MAY 24. 7:15:14. $M_L=2.9$. 44°44′N±10′, 73°50′W±12′. Foreshock of No. 612. *B5, N2, S3.*

612. 1942 MAY 24. 11:33:57. $M_L=3.9$. 44°44′N±10′, 73°50′W±12′. About 10 miles southwest of Dannemora, N.Y. *A9, B5, N2, S3.*

613. 1942 OCTOBER 1. 20:58:22. $M_L=2.5$. 44°00′N±30′, 73°35′W±30′. Southern part of Lake Champlain, N.Y. *B5, N2, S3.*

614. 1942 OCTOBER 2. 22:29:51. $M_L=3.0$. 42°34′N±10′, 73°48′W±10′. A few miles south of Albany, N.Y. *N2, S3.*

615. 1942 OCTOBER 24. 17:27:04. $M_L=3.4$. 40°58′N±10′, 75°15′W±15′. Near Stroudsburg, Pa. *N2, S3.*

616. 1942 DECEMBER 9. About 18:00. II. 41°46N, 72°41′W. Hartford, Conn. *U1.*

617. 1943 JANUARY 14. 21:32:38. $M_L=5.4$. 45°15′N±10′, 69°36′W±15′. About 20 miles west of Dover-Foxcroft, Me. *A9, B5, H1, I2, N2, S1.34, S2, S3, U1.*

618. 1943 FEBRUARY 10. 9:45. II. 43°40′N, 70°15′W. Portland, Me. *B5, U1.*

619. 1943 MARCH 9. 3:25:34. $M_L=5.5$. 42°.2N, 80°.9W. Lake Erie. *H1, I2, N2, S2, S3, U1, U2.*

620. 1943 March 14. 14:02:28. $M_L=3.9$. 43°42′N±10′, 71°34′W±14′. Near Lake Winnipesaukee, N.H. *N2, S3*.

621. 1943 March 31. 11:30. II. 42°18′N, 72°38′W. (a). Northampton, Mass. This shock was caused, or accompanied, by a landslide on the west bank of the Connecticut River, which dislocated the tracks of the Boston and Maine Railroad. *B5, N2, U1*.

622. 1943 May 9. 11:03:13. $M_L=3.2$. 44°46′N±10′, 73°50°W±12′. Near Dannemora, N.Y. *B5, N2, S3*.

623. 1943 June 12. II. 44°.5N, 68°.5W. Ellsworth, Me. "Slight earth tremors have been reported in Hancock County almost daily this week." *S1.34*.

624. 1943 July 6. 22:10:15. $M_L=4.1$. 44°55′N±12′, 73°08′W±15′. A few miles east of Swanton, Vt. *A9, B5, I2, N2, S3, U1*.

625. 1943 July 24. 05:18:36. Estimated $M_L=2.5$. 40°.0N, 72°.7W. (a). Off the coast of New Jersey. *N2*.

626. 1943 October 15. 23:00:02. $M_L=2.5$. 44°26′N±30′, 74°14′W±30′. About 20 miles northeast of Tupper Lake, N.Y. *B5, N2, S3*.

627. 1943 December 19. 09:00:44. III-IV. 44°.6N, 69°.6W. Near Waterville, Me. *B5, N2, U1*.

628. 1944 January 16. 10:00. II. 43°09′N, 77°37′W. Rochester, N.Y. *B5, U1*.

629. 1944 February 5. 16:22:01. $M_L=3.7$. 40°48′N±10′, 76°12′W±12′, Near Shenandoah, Pa. *N2, S3*.

630. 1944 March 6. 5:46 and 12:15. II. 43°12′N, 71°33′W. Concord, N.H. *B5, U1*.

631. 1944 April 11. 20:25. III. 43°58′N, 71°42′W. Woodstock, N.H. *B5, U1*.

632. 1944 June 4. 2:08:30. III. 44°09′N, 72°40′W, Northfield, Vt. *B5, N2, U1*.

633. 1944 September 5. 4:38:45.30±1.″68. $M=5.9$ (*G3*). VIII. 44°58′.5N±3′.4, 74°53′.9W±5′.2. About 3 miles north of Massena, N.Y., close to the International Boundary. The origin time and co-ordinates, together with their respective uncertainties, are those calculated by Milne (*M14*), who used data from 23 seismorgraph stations.

The area over which this earthquake was perceptible extends from James Bay south to Virginia and from New Brunswick west to Lake Michigan. However, the area in which the shock was felt with an intensity as great as V or VI is relatively very small. The area of greatest intensity extends farther lengthwise along the St. Lawrence River than perpendicular to it. The region where the intensities were of the order of VI extends from Montreal to the Thousand Islands but at Ottawa, which is 20 miles closer to the epicentre than either, the intensity was only V. The same pattern is evident south of the river. An isoseismal map is shown as Figure 6. The maximum intensity of VIII occurred in the vicinity of Cornwall, Ont., and Massena, N.Y. The total damage was estimated at $2,000,000.

Prior to the earthquake neither seismograph records nor reports from residents gave any indication of increasing seismic activity in the area. Three small events recorded only at Ottawa during the year may or may not have originated near Massena. These occurred as follows:

February 2. 9:44:27. $M_L=2.2$. Distance 53 miles.
August 8. 10:48:38. $M_L=2.5$. Distance 63 miles.
August 10. 8:39:49. $M_L=2.6$. Distance 56 miles.

The main shock was followed by many aftershocks. The list that follows contains 28. Of these, 26 were recorded by at least one Canadian seismorgraph. The other two (those assigned intensities) are based on reports of shocks felt. Five have been assigned numbers in the main list.

1944 September 5, 8:30:49. See No. 634.
1944 September 5. 8:51:06. See No. 635.
1944 September 5. 10:56:51. See No. 636.
1944 September 5. 11:10:54. $M_L=2.8$.
1944 September 7. 13:55:14. $M_L=2.5$.
1944 September 8. 10:11:14. $M_L=2.5$.
1944 September 8. 19:35:21. $M_L=2.8$.
1944 September 9. 23:24:48. See No. 637.
1944 September 13. 22:00:28. $M_L=2.7$.
1944 September 24. 19:30:26. $M_L=2.0$.
1944 October 4, 0:36:26:. $M_L=2.3$.
1944 October 9. 1:45:56. $M_L=2.3$.
1944 October 13. 2:33:58. $M_L=2.7$.
1944 October 31. 8:42:25. See No. 638.
1945 July 24. 1:56:18. $M_L=2.7$.
1945 December 2. 15:22:32. $M_L=3.0$.
1946 February 13. 15:10. II.
1946 March 16. 4:20. II.
1946 May 22. 14:27:57. $M_L=1.7$.
1946 May 22. 14:30:03. $M_L=2.1$.
1946 September 4. 19:29:22. $M_L=2.3$.
1946 November 11. 10:20:47. $M_L=3.0$.
1946 December 25. 4:48:03. $M_L=3.0$.
1947 August 4. 8:25:47. $M_L=2.1$.
1947 August 14. 2:18:34. $M_L=2.1$.
1947 October 3. 15:28:34. $M_L=2.1$.
1948 May 23. 4:07:58. $M_L=2.0$.
1949 November 10. 0:45:51. $M_L=2.0$.

Extensive field studies of this earthquake were made by Hodgson (H19) and Berkey (B6). *B5, B6, G3, H1, H10, H19, I2, M14, N2, S1.35, S2, S3, U1, U2*.

634. 1944 September 5. 8:30:49. $M_L=3.4$. 44°59′N, 74°54′W. (a). Aftershock of No. 633. *B5, N2, S3*.

635. 1944 September 5. 8:51:06. $M_L=4.6$. 44°59′N, 74°54′W. (a). Aftershock of No. 633. *B5, I2, N2.* S3.

636. 1944 September 5. 10:56:51. $M_L=3.3$. 44°59′N, 74°54′W. (a). Aftershock of No. 633. *B5, N2, S3.*

637. 1944 September 9. 23:24:48. $M_L=4.1$. 44°59′N, 74°54′W. (a). Aftershock of No. 633. *B5, I2, N2, S3, U1.*

638 1944 October 31. 8:42:25. $M_L=4.0$. 44°59′N, 74°54′W. (a). Aftershock of No. 633. *B5, N2, S1.36, S3, U1.*

639. 1944 November 13. 11:49. IV. 40°26′N, 84°12′W. Between Anna and Botkins, Ohio. *N2, S3, U1.*

640. 1944 December 14. 3:15. IV. 41°.6N, 72°.8W. Between New Britain and Wallingford, Conn. *B5, N2, S2, U1.*

641. 1945 March 22. 8:03:05. III. 43°12′N, 71°33′W. Concord, N.H. *B5, N2, U1.*

642. 1945 April 15. 13:15, 14:20 and 15:30. III. 43°.0N, 76°.4W. Auburn to South Syracuse, N.Y. *B5, U1.*

643. 1945 July 15. 10:44:59. IV. 44°.9N, 67°.0W. Eastport, Me. *B5, N2, S3, U1.*

644. 1945 August 5. 17:20 to 18:30. III. 43°37′N, 72°31′W. Woodstock, Vt. *B5, U1.*

645. 1945 August 28. 1:37. II. 44°.9N, 67°.0W. Eastport, Me. *B5, U1.*

646. 1945 October 23. 19:30. II. 44°06′N, 70°14′W. Shock reported by Associated Press as felt at Lewiston, Me. *N2.*

647. 1945 December 28. 10:23. II. 44°03′N, 71°12′W. North Conway, N.H. *B5, U1.*

648. 1946 March 20. 2:01, 2:29 and 3:02. III. 44°20′N, 75°55′W. Alexandria Bay, N.Y. *B5, U1.*

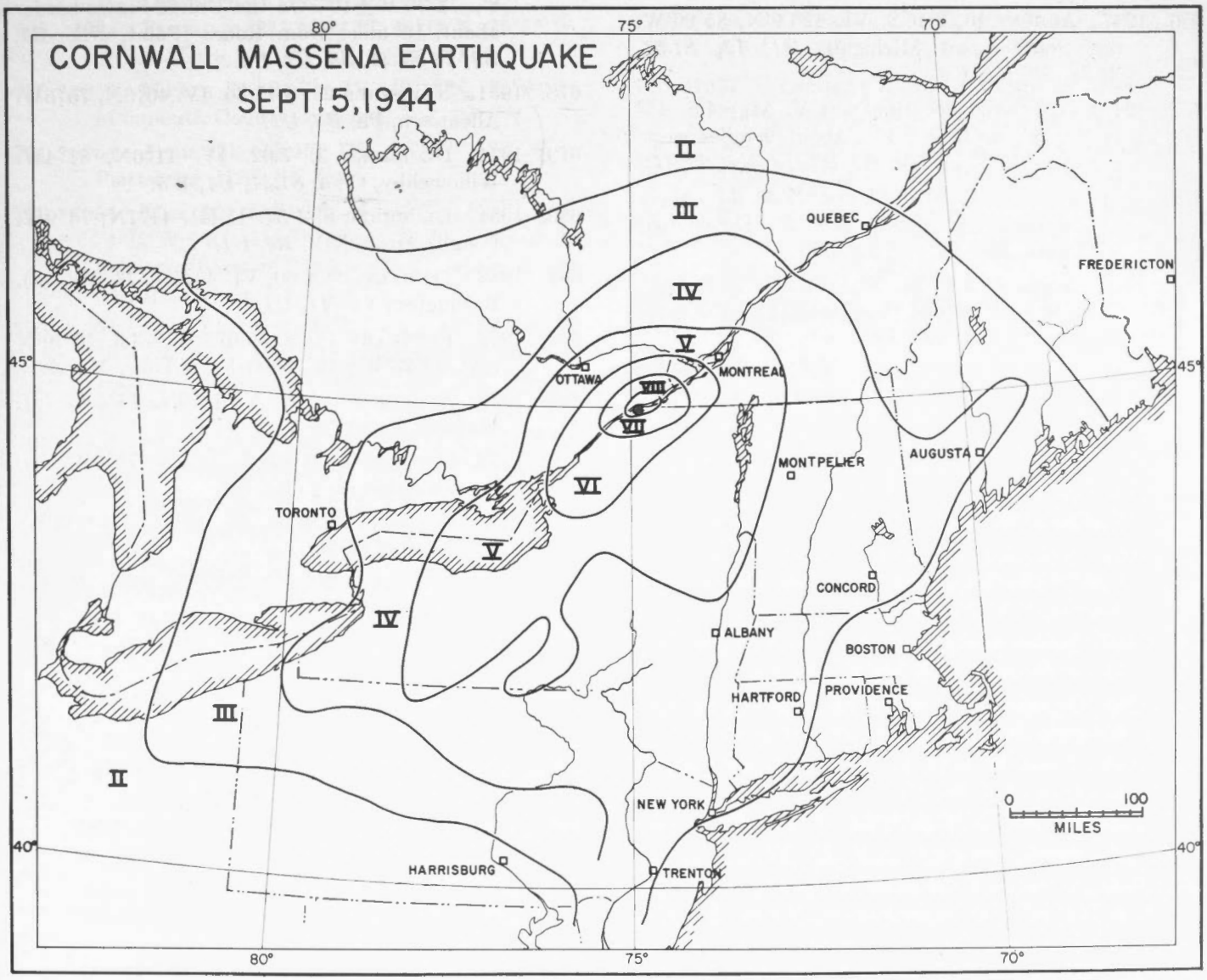

FIGURE 6. Adapted from Milne (M14).

649. 1946 JUNE 20. 23:09. II. 44°26′N, 74°11′W. Gabriels, N.Y. *B5, U1.*

650. 1946 JUNE 27. 21:06:22. M_L=3.0. 44°39′N±12′, 74°32′W±15′. Near St. Regis Falls, N.Y. *N2, S3.*

651. 1946 OCTOBER 28. 20:36:06. M_L=3.6. 41°.5N±1°.0, 76°.6W±1°.0. About 50 miles west of Scranton, Pa. *N2, S3.*

652. 1946 NOVEMBER 10. 11:41:23. M_L=3.1 42°52′N. ±77°27′W±18′. About 25 miles south-southwest of Rochester, N.Y. *B5, N2, S3.*

653. 1946 NOVEMBER 28. 22:00. III. 43°51′N, 73°45′W. Schroon Lake, N.Y. There was some uncertainty as to whether this was an earthquake or an explosion. *U1.*

654. 1947 JANUARY 4. 18:51:04. V. 41°02′N, 73°35′W. (a). Greenwich, Conn. *B5, N2.*

655. 1947 APRIL 1. 13:25:54. III. 41°01′N, 74°18′W. (a). Pompton Lakes, N.J. *B5, N2, U1.*

656. 1947 AUGUST 10. 2:46.8. VI. 42°00′N, 85°00′W. (a). Southcentral Michigan. *H1, I2, S1.37, S1.38, S3, U1, U2.*

657. 1947 DECEMBER 28. 19:58:18. V. M_L=4.5. 45° 16′N±15′, 69°15′W±15′. About 9 miles west-northwest of Milo, Me. *B5, H1. I2, N2, S3, U1.*

658. 1948 JANUARY 6. 20:46:51 and 21:20. *IV.* M_L= 4.0. 45°24′N±10′, 69°17′W±12′. Dover-Foxcroft area, Me. *B5, N2, S3, U1.*

659. 1948 APRIL 4. 2:44:34. M_L=2.5. 44°13′N±15′, 73°48′W±17′. About 15 miles southeast of Lake Placid, N.Y. *B5, N2, S3.*

660. 1948 MAY 4. 2:23:25. IV. 41°23′N, 71°50′W. Westerly, R.I. *N2, U1.*

661. 1948 JUNE 4. 9:00. II. 41°17′N, 72°27′W. Westbrook, Conn. *U1.*

662. 1948 NOVEMBER 21. 15:41. III. 44°.9N, 67°.0W. Eastport, Me. *U1.*

663. 1948 NOVEMBER 22. 23:32:50. M_L=2.9. 44°26′N ±25′, 74°16′W±25′. Between Tupper Lake and Malone, N.Y. *N2, S3.*

664. 1948 NOVEMBER 29. 4:56:47. IV. 45°.2N, 69°.2W, Dover-Foxcroft, Me. *B5, N2, U1.*

665. 1949 FEBRUARY 7. 6:17. III. 44°.9N, 74°.9W. Massena, N.Y. *B5, U1.*

666. 1949 APRIL 17. 0:15. IV. 41°.6N, 71°.5W. North Kingston, R.I. *B5, U1.*

667. 1949 SEPTEMBER 2. 05:48:10. III. 43°.8N, 71°.8W. (a). South Tamworth, N.H. *B5, N2, U1.*

668. 1949 OCTOBER 5. 02:33:48. V-VI. M_L=4.0. 44°.8 N, 70°.5W. (a). Southwestern Maine. *B5, H1, N2, S1.39, S3, U1.*

669. 1950 FEBRUARY 24. 13:04:05. III. 43°03′N, 71° 30′W. New Hampshire. *B5, N2, U1.*

670. 1950 MARCH 20. 22:55:12. M_L=3.3. 41°.5N± 0°.5, 75°.8W±1°.0. Northwest of Scranton, Pa. *N2, S3.*

671. 1950 MARCH 29. 14:43:02. IV. 41°03′N, 73°36′W. (a). Connecticut. *B5, N2, S1.39, U1.*

672. 1951 JANUARY 26. 3:27. III-IV. 41°.5N, 72°.5W. Connecticut River valley. *B5, U1.*

673. 1951 MARCH 31. 3:50:37. IV. 42°.2N, 72°.2W. (a). South-central Massachusetts. *B5, N2, U1.*

674. 1951 JUNE 10. 17:20:38. M_L=4.6. 41°30′N±15′, 71°30′W±19′. Near Narragansett Bay, R.I. *B5, N2, S1.40, S3, U1.*

675. 1951 SEPTEMBER 3. 21:26:25. M_L=4.4. 41°15′N± 15′, 74°15′W±25′. Rockland County, N.Y. *B5, H1, S1.40, S3, U1.*

676. 1951 SEPTEMBER 21. 17:23. II-III. 41°.3N, 70°.1 W. Nantucket, Mass. *B5, U1.*

677. 1951 NOVEMBER 6. 17:54:42. M_L=3.7. 45°00′N± 8′, 73°30′W±10′. On the United States border about, 10 miles from Rouses Point, N.Y. *B5, B8, I2 S1.41, S3, U1, U2.*

678. 1951 NOVEMBER 23. 6:45:36. IV. 40°.6N, 75°.5W. Allentown, Pa. *B5, U1.*

679. 1951 DECEMBER 3. 7:02. IV. 41°.6N, 81°.4W. Willowghby, Ohio. *S1.41, U1, W5.*

680. 1951 DECEMBER 8. 4:37. II-III. 41°.7N, 73°.9W. Poughkeepsie, N.Y. *B5, U1.*

681. 1952 JANUARY 30. 4:00. VI. 44°.5N, 73°.2W. (a). Burlington, Vt. *H1, U1.*

682. 1952 FEBRUARY 18. 20:56:07. M_L=3.3. 46°20′N ±7′, 69°23′W±10′. Near Eagle Lake, Me. *S3.*

683. 1952 AUGUST 25. 0:07. V. 43°.0N, 74°.5W. (a). Mohawk Valley, N.Y. *H1, U1.*

684. 1952 OCTOBER 8. 21:40. V. 41°.7N, 74°.0W. (a). Poughkeepsie, N.Y. *H1, U1.*

685. 1952 OCTOBER 26. 9:05. II. 43°35′N, 71°13′W. Wolfboro, N.H. *B5.*

686. 1952 NOVEMBER 20. III. 42°55′N, 76°34′W. Auburn, N.Y. *U1.*

687. 1952 DECEMBER 21. 12:00. II. 44°.9N, 74°.9W. Massena, N.Y. *U1.*

688. 1953 MARCH 27. 8:50. V. 41°.1N, 73°.5W. (a). Stamford, Conn. *B5, H1, U1.*

689. 1953 MARCH 31. 2:50. III. 43°.7N, 73°.0W. Brandon, Vt. Foreshock of No. 690. *U1.*

690. 1953 MARCH 31. 12:58:34. V. M_L=4.0. 44°04′N± 7′, 73°07′W±10′. About 30 miles south of Burlington, Vt. *B5, H1, S3, U1.*

691. 1953 APRIL 26. 1:17:02. IV. M_L=2.6. 44°43′N, 73°27′W. Plattsburg, N.Y. *S3, U1.*

692. 1953 MAY 11. 6:13:17. IV. 43°59′N, 71°08′W. Conway, N.H. *B5, U1.*

693. 1953 JUNE 11. p.m. IV. 41°40′N, 83°33′W. Toledo, Ohio. *U1.*

694. 1953 AUGUST 17. 4:22:50. IV. 41°.0N, 74°.0W. Bergen County, N.J. *S1.42. U1.*

695. 1954 JANUARY 7. 7:25. VI. 40°17′N, 76°02′W. Sinking Spring. Pa. Minor aftershocks occurred at the following times: January 7—8:00, 8:30, 10:45; January 8—1:25, 1:30, 18:00, 21:45; January 9—7:00, 8:00, 14:00, 16:30, 18:25, 20:00 21:00; January 10—4:00, 22:00; January 13—21:00; January 14—3:30; January 15—19.40; January 17—2.54, 3:32. *H1, S1, S1.43, U1.*

696. 1954 JANUARY 24. 3:30. III. 40°17′N, 76°02′W. Sinking Spring Pa. *U1.*

697. 1954 FEBRUARY 1. 0:37:50. $M_L=3.3$. 43°02′N±15′, 76°39′W±15′. About 3 miles northeast of Montezuma, N.Y. *B5, S3, S5, U1.*

698. 1954 FEBRUARY 21. 20:00. VII. 41°13′N, 75°55′W. Wilkes-Barre, Pa. *B5, H1, U1.*

699. 1954 FEBRUARY 24. 3:55. VI. 41°13′N, 75°55′W. Wilkes-Barre, Pa. *B5, H1, S1.43, U1.*

700. 1954 MARCH 31. 21:25. IV. 40°15′N, 74°00′W. Monmouth County shoreline, N.J. *B5, U1.*

701. 1954 APRIL 21. 15:45. IV. 44°43′N, 73°28′W. Plattsburg, N.Y. *B5, U1.*

702. 1954 MAY 20. 22:01:18. $M_L=2.7$. 44°58′N±8′, 74°12′W±10′. Depth about 20 km. About 10 miles northeast of Malone, N.Y., where it was felt. *B5, S3, S5, U1.*

703. 1954 JULY 29. 19:56:54. $M_L=4.0$. 42°40′N±15′, 70°45′W±18′. About 45 miles west by north of Harvard seismograph station. *B5, H1, N2, S3, S5, U1.*

704. 1954 AUGUST 11. 3:40. IV. 40°17′N, 76°02′W. Sinking Spring, Pa. *U1.*

705. 1954 SEPTEMBER 24. About 11:00. II. 40°17′N, 76°02′W. Sinking Spring, Pa. *U1.*

706. 1954 SEPTEMBER 29. 3:50. I. 43°59′N, 75°55′W. Watertown, N.Y. *B5, U1.*

707. 1954 OCTOBER 7. III. 42°42′N, 71°18′W. Between Pelham, N.H., and Dracut, Mass. *B5, U1.*

708. 1954 DECEMBER 13. 3:53:52. $M_L=3.6$. 44°36′N±10′, 74°36′W±10′. Depth about 12 km. About 25 miles southwest of Malone, N.Y. *B5, S3, S5.*

709. 1954 DECEMBER 15. 17:35. II. 44°47′N, 74°39′W. Lawrenceville, N.Y. *B5, U1.*

710. 1955 JANUARY 20. About 3:00. IV. 40°18′N, 76°02′W. (a). Berks County, Pa. *B5, U1.*

711. 1955 JANUARY 21. 8:40 and 12:20. V. 42°58′N, 73°47′W. Malta (Halls Corners) N.Y. *B5, U1.*

712. 1955 FEBRUARY 3. 2:30 to 2:45. V. 44°30′N, 73°13′W. North Burlington, Vt. Minor aftershocks occurred at 4:06, 4:08 and 4:28. *B5, H1, U1.*

713. 1955 MAY 26. 18:09:23. V. 41°29′N, 81°44′W. Southern suburbs of Cleveland, Ohio. *H1, U1.*

714. 1955 JUNE 29. 1:15:33. IV. 41°29′N, 81°44′W. Southeastern suburbs of Cleveland, Ohio. *H1,* U1.

715. 1955 AUGUST 16. 7:35. V. 42°52′N, 78°17′W. Attica, N.Y. *B5, H1, U1.*

716. 1956 JANUARY 27. 11:03:27. $M_L=4.4$. 40°.5N±1°.0, 84°.0W±1°.8. South of Lima, Ohio, where it was felt in the southern part of the city according to the bulletin of the Cleveland seismograph station. *H1, S3, S5, U1.*

717. 1956 JULY 27. 1:34:44. $M_L=3.4$. 44°42′N±10′, 73°47′W±12′. About 30 miles south-southeast of Malone, N.Y. *S3, S5.*

718. 1956 AUGUST 3. 22:11:06. $M_L=2.3$. 44°56′N±10′, 74°41′W±10′. About 10 miles east of Massena, N.Y. *S3, S5.*

719. 1956 SEPTEMBER 21. Shortly before 17:00. II. 41°45′N, 71°12′W. Swansea, Mass. *U1.*

720. 1957 FEBRUARY 20. 15:45. IV. 44°56′N, 74°53′W. Massena, N.Y. *U1.*

721. 1957 MARCH 23. 19:02. VI. $M_L=4.8$. 40°38′N, 74°50′W. Depth 10 km. West-central New Jersey. *B5, N2, S3, U1.*

722. 1957 APRIL 24. 0:41:59. V. 44°25′N, 72°00′W. St. Johnsbury, Vt. *B5, U1.*

723. 1957 APRIL 26. 11:40:06. VI. $M_L=4.7$. 43°.6N, 69°.8W. (a). Near Portland, Me. *B5, N2, S1.44, S3, S5, U1.*

724. 1958 JANUARY 11. 16:36. IV. 44°56′N, 74°53′W. Massena, N.Y. *U1.*

725. 1958 MAY 1. 22:46:31. V. 41°29′N, 81°44′W. Cleveland, Ohio. *U1.*

726. 1958 MAY 6. About 19:00. IV. 42°39′N, 73°49′W. Albany, N.Y. *U1.*

727. 1958 SEPTEMBER 19. 17:45. V. 43°35′N, 70°13′W. Cape Elisabeth, Me. *U1.*

728. 1958 NOVEMBER 21. 23:30. IV. 43°58′N, 71°41′W. Woodstock, N.H. *U1.*

729. 1959 APRIL 13. 21:20:19. $M_L=3.4$. 41°55′N±25′, 73°16′W±25′. Near Pine Mountain, Conn. *S3, S5.*

ADDENDUM

The following numbered shocks listed in the Canadian section of this publication were felt also in parts of the northeastern United States: 351, 372, 408, 413, 442, 461, 574, 583, 600, 620, 704, 730. These do not include the United States shocks that were referred to by number in the Canadian list.

GEOGRAPHICAL INDEX*

40°N-41°N
72°W-73°W Nos. 597, 625.
73°W-74°W No. 529.
74°W-75°W Nos. **490**, 532, 540, **548**, **549**, **551**, 553, 554, 558, 567, 700, **721**.
75°W-76°W Nos. 528, 615, 678.
76°W-77°W Nos. 563, 582, 629, **695**, 696, 704, 705, 710.
78°W-79°W No. **544**.
82°W-83°W Nos. 467, 473, 491, 584, 585, 586, 587.
83°W-84°W No. 465.
84°W-85°W Nos. **445**, 463, 464, 468, **480**, **525**, **526**, 562, 565, 566, 639, **716**.

41°N-42°N
66°W-67°W No. 531.
70°W-71°W Nos. 466, **575**, 676.
71°W-72°W Nos. **418**, 489, 574, 660, 666, **674**, 719.
72°W-73°W Nos. 438, 495, 513, 555, 576, 577, 610, 616, 640, 661, 672.
73°W-74°W Nos. 479, 493, 533, 541, 542, 545, 546, 550, 552, 556, 600, **654**, 671, 680, **688**, 729.
74°W-75°W Nos. 568, 655, **675**, **684**, 694.
75°W-76°W Nos. 670, **698**, **699**.
76°W-77°W No. 651.
80°W-81°W No. 521.
81°W-82°W Nos. 482, 583, 679, **713**, 714, **725**.
82°W-83°W No. 432.
83°W-84°W Nos. 517, 693.

42°N-43°N
70°W-71°W Nos. 501, 512, 703.
71°W-72°W Nos. 434, 450, 510, 543, 559, 570, 573, 707.
72°W-73°W Nos. 462, 476, 485, 603, 621, 673.
73°W-74°W Nos. 483, 572, 614, **711**, 726.
74°W-75°W Nos. 516, 579.
76°W-77°W Nos. 524, 686.
77°W-78°W Nos. 448, 652.
78°W-79°W Nos. **449**, 453, 454, 457, 475, 561, **715**.
80°W-81°W Nos. **506**, **619**.
83°W-84°W Nos. 471, 536.
85°W No. **656**.

43°N-44°N
69°W-70°W No. **723**.
70°W-71°W Nos. 502, 503, 504, 534, 537, 538, 599, 618, **727**.
71°W-72°W Nos. 428, 429, 430, 435, 437, 441, 442, 443, 459, 461, 484, 486, 514, 518, 519, 522, 569, **589**, **590**, 591, 592 593, 620, 630, 631, 641, 667, 669, 685, 692, 728.
72°W-73°W Nos. 598, 644.
73°W-74°W Nos. **474**, 494, 539, 571, 653, 689.
74°W-75°W No. **683**.
75°W-76°W Nos. 456, 602, 604, 706.
76°W-77°W Nos. 642, 697.
77°W-78°W Nos. 478, 628.

44°N-45°N
56°W-57°W No. **351** C.
67°W-68°W Nos. 505, 511, 643, 645, 662.
68°W-69°W Nos. 431, 547, 623.
69°W-70°W Nos. 439, 452, 455, 578, 627.
70°W-71°W Nos. 444, 451, 460, 507, 609, 646, 668.
71°W-72°W Nos. **427**, 523, 647.
72°W-73°W Nos. 496, 497, 515, 632, **722**.
73°W-74°W Nos. **498**, 588, 595, 596, 607, 608, 611, 612, 613, 622, 624, 659, **681**, 690, 691, 701, **712**, 717.
74°W-75°W Nos. **423**, 447, 469, 487, 488, 492, 499, 500, 508, 509, 520, 560, 580, 605, 606, 626, **633**, 634, **635**, 636, 637, 638, 649, 650, 663, 665, 687, 702, 708, 709, 718, 720, 724.
75°W-76°W Nos. 481, 527, 557, 564, 581, 594, 648.
77°W-78°W No. 477.

45°N-46°N
67°W-68°W Nos. 436, 446.
69°W-70°W Nos. 419, **420**, 421, 422, 424, 425, 526, 470, 472, **617**, **657**, 658, 664.
70°W-71°W No. 433.
73°W-74°W Nos. 535, 677, 730 C.
74°W-75°W Nos. 442 C, 574 C, 583 C, 600 C, 704 C.

46°N-47°N
67°W-68°W Nos. 440, 601.
69°W-70°W No. 682.
79°W-80°W No. **408** C.
84°W-85°W No. 458.

47°N-48°N
70°W-71°W No. **372** C.
78°W-79°W No. **413** C.

48°N-49°N
69°W-70°W No. **620** C.

*Serial numbers in bold face designate earthquakes of intensity V (equivalent to $M_L = 4.3$) or greater. Serial numbers followed by "C" refer to the Canadian list on page 91.

Appendix

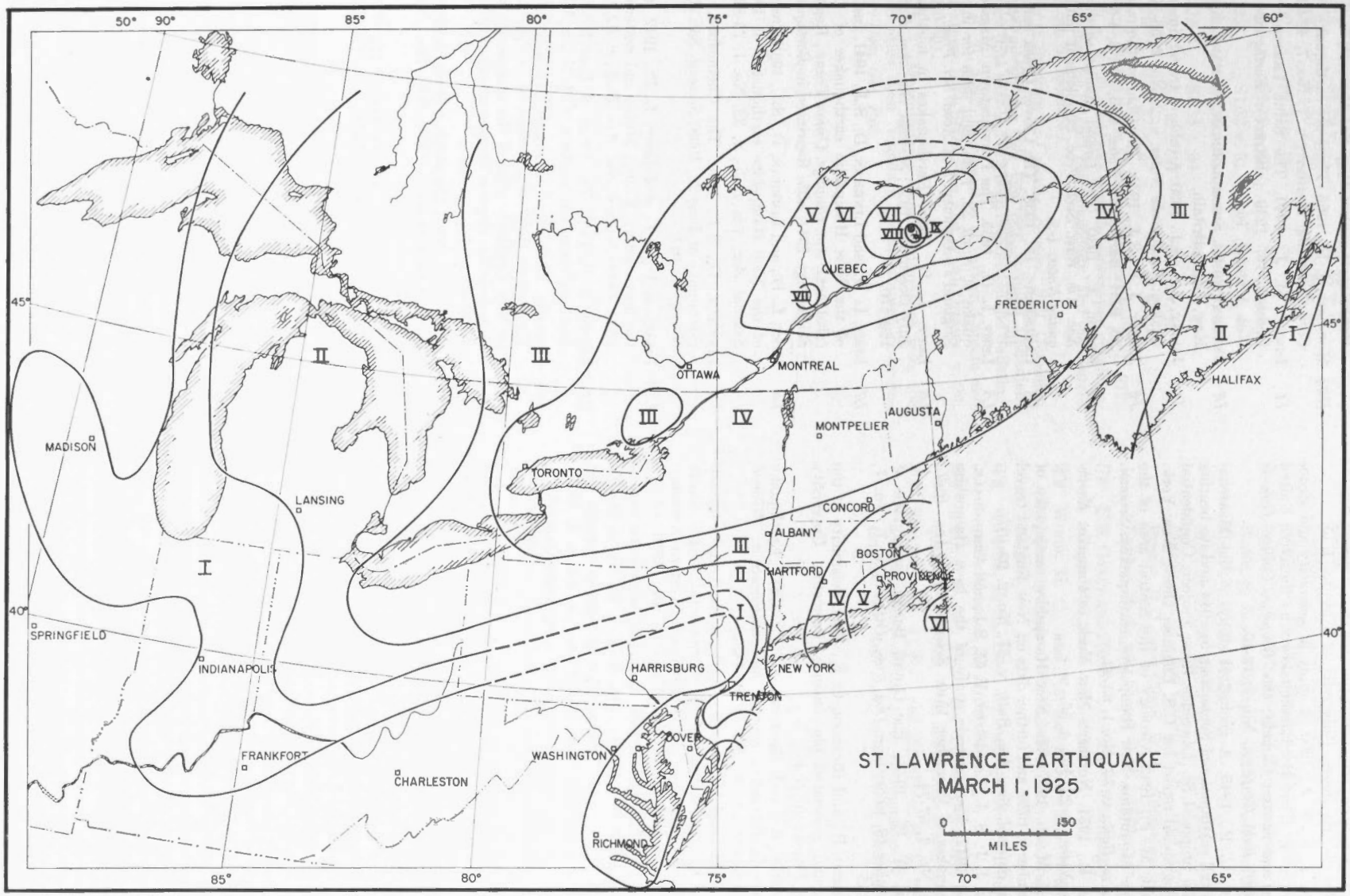

FIGURE 7. United States data supplied through the courtesy of the United States Coast and Geodetic Survey.

References

A9 ALVEY, G. C., 1949. Trial travel-time for the Canadian Shield: Master of Arts thesis, University of Toronto, 1-45.

B5 BROOKS, J. E., S. J., 1960. A study in seismicity and structural geology. Part II—Earthquakes of northeastern United States and eastern Canada: *Obs. Géophys. Collège Jean-de Brébeuf, Bull. Géophys.*, No. 7, 12-40.

B6 BERKEY, C. P., 1945. A geological study of the Massena-Cornwall earthquake of September 5, 1944 and its bearing on the proposed St. Lawrence River Project: Confidential mimeographed report for U.S. Engineer Office, New York.

B7 BILLINGS, M. P., 1942. Geology of the central area of the Ossipee Mountains, New Hampshire, earthquakes: *Seismol. Soc. Am. Bull.*, v. 32, No. 1, 83-92.

B8 BRAZEE, R., 1951. Northern New York earthquake: *Earthquake Notes*, v. 22, No. 4, 36.

C2 COLLINS, M. P., 1937. The New Hampshire earthquake of November 9, 1936, and further data on New England travel times: *Seismol. Soc. Am. Bull.*, v. 27, No. 2, 99-107.

D8 DEVLIN, J. J., S. J., LANGGUTH, L. C., S.J., and ARRINGDALE, R. L., 1942. Macroseismic study of the New Hampshire earthquakes of December 1940: *Seismol. Soc. Am. Bull.*, v. 32, No. 2, 67-74.

D9 DOXSEE, W. W., 1948. The Grand Banks earthquake of November 18, 1929: *Dom. Obs. Pub.*, Ottawa, v. 7, No. 7, 323-335.

G3 GUTENBERG, B., and RICHTER, C. F., 1954. Seismicity of the earth and associated phenomena: Princeton University Press, Princeton, N.J.

G4 GUTENBERG, B., and RICHTER, C. F., 1956. Earthquake magnitude, intensity, energy, and acceleration: *Seismol. Soc. Am. Bull.*, v. 46, No. 2, 105-145.

H1 HECK, N. H., and EPPLEY, R. A., 1958. Earthquake history of the United States. Part I—Continental United States and Alaska (exclusive of California and Western Nevada): *U.S. Coast Geod. Surv. Pub.*, No. 41-1, rev. (1956) ed.

H2 HODGSON, E. A., 1925. The St. Lawrence earthquake February 28, 1925: *Seismol. Soc. Am. Bull.*, v. 15, No. 2, 84-105.

H9 HODGSON, E. A., 1937. Earthquakes in eastern Canada and adjacent areas: *Roy. Can. Inst. Proc.*, ser. 3A, v. 2, 30-35.

H10 HODGSON, E. A., 1945. Industrial earthquake hazards in eastern Canada: *Seismol. Soc. Am. Bull.*, v. 35, No. 4, 151-174.

H12 HODGSON, J. H., 1953. A seismic survey in the Canadian Shield. I—Refraction studies based on rockbursts at Kirkland Lake, Ont.: *Dom. Obs. Pub.*, Ottawa, v. 16, No. 5, 109-163.

H13 HODGSON, J. H., 1953. A seismic survey in the Canadian Shield. II—Refraction studies based on timed blasts: *Dom. Obs. Pub.*, Ottawa, v. 16, No. 6, 165-181.

H16 HODGSON, E. A., 1936. Preliminary report of the earthquake of November 1, 1935: *Earthquake Notes*, v. 7, No. 4, 1-4.

H17 HODGSON, E. A., 1936. The Timiskaming earthquake of November 1, 1935. The location of the epicentre and determination of focal depth: *Roy. Astr. Soc. Soc. Can. J.*, v. 30, No. 4, 113-123.

H18 HODGSON, E. A., 1937. Timiskaming earthquake—data and time-distance curves for dilatational waves: *Am. Geophys. Union Trans.*, v. 18, 116-118.

H19 HODGSON, E. A., 1945. The Cornwall-Massena earthquake, September 5, 1944: *Roy. Aster. Soc. Can. J.*, v. 39, No. 1, 5-13.

H20 HODGSON, E. A., and DOXSEE, W. W., 1930. The Grand Banks earthquake, November 18, 1929: *Earthquake Notes*, v. 2, Nos. 1 and 2, 72-81.

H21 HODGSON, J. H. Unpublished isoseismal map and/or calculations of epicentral co-ordinates.

H22 HEEZEN, B. C., and EWING, M., 1952. Turbidity currents and submarine slumps, and the 1929 Grand Banks earthquake: *Am. J. Sci.*, v. 250, 849-873.

H23 HEEZEN, B. C., ERICSON, D. B., and EWING, M., 1954. Further evidence for a turbidity current following the 1929 Grand Banks earthquake: *Deep-Sea Research*, v. 1, 193-202.

H24 HODGSON, J. H., 1965. There are earthquake risks in Canada: *Can. Consulting Engineer*, v. 7, No. 7, 42-51.

I1 INNES, M. J., 1940. The Saint Lawrence earthquake of October 19, 1939 (abstract): *Earthquake Notes*, v. 12, Nos. 1 and 2, 16.

I2 INTERNATIONAL SEISMOLOGICAL SUMMARY. Kew Observatory, Kew, Great Britain.

J1 JOLIAT, J. S., S.J., 1930. A table of travel times for near earthquakes: *Earthquake Notes*, v. 2, No. 2, 56-59.

J2 JOLIAT, J. S., S.J., 1931. The Ohio earthquake of September 20, 1931: *Earthquake Notes*, v. 3, No. 3, 4-5.

K5 KEITH, A., 1930. The Grand Banks earthquake: *Seismol. Soc. Am. East. Sect. Proc.* Supplement published in *Earthquake Notes*, 1-5.

L4 LANDSBERG, H., 1938. The Clover Creek earthquake of July 15, 1938: *Seismol. Soc. Am. Bull.*, v. 28, No. 4, 237-241.

L5 LEET, L. D., 1935. The Provincetown, Massachusetts, earthquake of April 23, 1935, and data for investigating New England's seismicity: *Nat. Acad. Sci. Proc.*, v. 21, No. 6, 308.

L6 LEET, L. D., 1938. Earthquakes in northeastern America July-December, 1937: *Seismol. Soc. Am. Bull.*, v. 28, No. 3, 169-176.

L7 LEET, L. D., and LINEHAN, D., S.J., 1941. Instrumental study of the New Hampshire earthquakes of December, 1940 (abstract): *Am. Geophys. Union Trans.*, Reports and Papers, Seismology 1941, 405. Reprinted in *Earthquake Notes*, 1941.

L8 LEET, L. D., and LINEHAN, D., S.J., 1942. Instrumental study of the New Hampshire earthquakes of December, 1940: *Seismol. Soc. Am. Bull.*, v. 32, No. 1, 75-82.

L9 LINEHAN, D., S.J., 1940. The Chelmsford, Massachusetts, earthquake of June 23, 1938: *Seismol. Soc. Am. Bull.*, v. 30, No. 2, 99-107.

L10 LINEHAN, D., S.J., and LEET, L. D., 1942. Earthquakes of the northeastern United States and eastern Canada 1938, 1939, 1940: *Seismol. Soc. Am. Bull.*, v. 32, No. 1, 11-17.

L11 LEHMANN, I., 1955. The times of P and S in northeastern America: *Annali di Geofisica*, v. 8, No. 4, 351-371.

M3 MATHER, K. F., and GODFREY, H., assisted by HAMPSON, KATHERINE, 1927. The record of earthquakes felt by man in New England: copy of the manuscript of a paper presented to the Eastern Section of the Seismological Society of America in May 1927.

M13 MILNE, W. G., 1948. The earthquake in Montmorency County, Quebec, on January 1, 1948: *Dom. Obs. Pub.*, v. 7, No. 8, 337-344.

M14 MILNE, W. G., 1949. The location of the Cornwall-Massena earthquake September 5, 1944: *Dom. Obs. Pub.*, v. 7, No. 9, 345-362.

N2 NORTHEASTERN SEISMOLOGICAL ASSOCIATION (NESA) Bulletins 1938-1950. The material for the various years was prepared by the following:

Linehan, D., S.J., 1938 through 1948;

Powers, E. R., S.J., 1943 and 1946;

Langguth, L. C., S.J., 1939 through 1941;

Devlin, J. J., S.J., 1941;

Monagle, J. I., S.J., 1944 through 1947;

Devane, J. F., S.J., 1948 through 1950.

P3 PERRY, E. L., 1941. The Moodus earthquakes and the cause of earthquakes in New England: *Am. Geophys. Union Trans.*, Reports and Papers, Seismology 1941, 401-404. Reprinted in *Earthquake Notes*, 1941.

Q1 QUEBEC SEISMOGRAPHIC STATIONS REPORTS. Mimeographed reports prepared by the Seismological Service of Canada for the years 1928 to 1953 inclusive.

R3 RICHTER, C. F., 1935. An instrumental earthquake magnitude scale: *Seismol. Soc. Am. Bull.*, v. 25, No. 1, 1-32.

R5 RICHTER, C. F., 1958. Elementary Seismology: published by W. H. Freeman and Company, Inc., San Francisco.

S1 SEISMOLOGICAL NOTES, 1928. *Seismol. Soc. Am. Bull.*, v. 18-49.

S1.20 v. 18	S1.29 v. 27	S1.38 v. 38
S1.21 v. 19	S1.30 v. 28	S1.39 v. 40
S1.22 v. 20	S1.31 v. 29	S1.40 v. 41
S1.23 v. 21	S1.32 v. 30	S1.41 v. 42
S1.24 v. 22	S1.33 v. 31	S1.42 v. 43
S1.25 v. 23	S1.34 v. 33	S1.43 v. 44
S1.26 v. 24	S1.35 v. 34	S1.44 v. 47
S1.27 v. 25	S1.36 v. 35	S1.45 v. 48
S1.28 v. 26	S1.37 v. 37	S1.46 v. 49

S2 SEISMOLOGICAL SERVICE OF CANADA. Scrapbooks: v. 1, 277-347; v. 2; v. 3. These books contain newspaper clippings. References may be located chronologically, and the sources of many can be identified.

S3 SEISMOLOGICAL SERVICE OF CANADA. *Seismol. Bull.* Dominion Observatory, Ottawa. This reference includes Canadian-seismogram data that had not been included in the Bulletin.

S5 SMITH, W. E. T., 1962. Earthquakes of eastern Canada and adjacent areas, 1534-1927: *Dom. Obs. Pub.*, Ottawa, v. 26, No. 5, 269-301.

S6 SMITH, W. E. T., Magnitudes of local earthquakes from the records of other than "standard" seismographs: To be published in *Dom. Obs. Pub.*

U1 UNITED STATES EARTHQUAKES. Annual publication of the U.S. Coast and Geodetic Survey, 1928-1959. The various issues were prepared by the following persons:
Heck, N. H., and Bodle, R. R., 1928 and 1929;
Newmann, F., and Bodle, R. R., 1930;
Newmann, F., 1931 through 1938 also 1940 and 1941;
Bodle, R. R., 1939 also 1942 through 1944;
Bodle, R. R., and Murphy, L. M., 1945 and 1946;
Murphy, L. M., 1947;
Murphy, L. M., and Ulrich, F. P., 1948 through 1950;
Murphy, L. M., and Cloud, W. K., 1951 through 1955;
Brazee, R. J., and Cloud, W. K., 1956 through 1958;
Eppley, R. A., and Cloud, W. K., 1959.

U2 U.S. COAST AND GEODETIC SURVEY. Preliminary determination of epicentre cards. 1938-1959.

W2 WOOD, H. O., and NEUMANN, F., 1931. Modified Mercalli Intensity Scale of 1931: *Seismol. Soc. Am. Bull.*, v. 21, no 4, 277-283.

W5 WALTER, E. J., 1951. Willoughby, Ohio, earthquake: *Earthquake Notes*, v. 22, No. 4, 36.

W6 WEEKS, W. H., 1942. The Lewiston-Auburn, Maine, earthquake of March 8, 1942. *Earthquake Notes*, v. 13, No. 4, 1.

W7 WESTLAND, A. J., S.J., and HEINRICH, R. R., 1940. A macroseismic study of the Ohio earthquakes of March, 1937: *Seismol. Soc. Am. Bull.*, v. 30, No. 3, 251-260.