



CANADA



SEISMOLOGIC STATION, DOMINION OBSERVATORY
OTTAWA

R. MELDRUM STEWART, *Director*
ERNEST A. HODGSON, *Seismologist*
W. W. DOXSEE, *Assistant Seismologist*

$\phi = 45^\circ 23' 38''$ N. $\lambda = 75^\circ 42' 57''$ W. $h = 83$ m.

Lithologic foundation: boulder clay over limestone (Ordovician). Time: Mean Greenwich, midnight to midnight.
Time correction; within .25s.

INSTRUMENTS—FIXED CONSTANTS

| INSTRUMENT | SYMBOL | REGISTRATION | DAMPING | PAPER SPEED | MASS |
|---------------------|--------|--------------|----------|-----------------|-----------|
| Bosch..... | I | Photographic | Air | 15 mm. per min. | 200 g |
| Bosch..... | II | Photographic | Magnetic | 15 mm. per min. | 200 g |
| Milne-Shaw..... | 17 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Milne-Shaw..... | 23 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Deformation..... | D | Photographic | Air | 17 mm. per min. | 20 g. ca. |
| Spindler-Hoyer..... | W | Smoked Sheet | Air | 15 mm. per min. | 80 kgm. |

INSTRUMENTS—DETERMINED CONSTANTS

| INSTRUMENT | τ | r/τ^2 | v | ϵ | COMP. | 1" tilt | DETERMINED |
|------------|--------|------------|-----|------------|-------|----------|---------------|
| I..... | 5.2 | | 120 | 2:1 | NS | displ'nt | Dec. 3, 1930 |
| II..... | 6.4 | | 120 | 10:1 | EW | | Dec. 3, 1930 |
| 17..... | 12.0 | | 250 | 20:1 | EW | 45 mm. | Dec. 30, 1930 |
| 23..... | 12.0 | | 250 | 20:1 | NS | 43 mm. | Dec. 22, 1930 |
| D..... | | | | | | | |
| D..... | | | | | | | |
| W..... | 6.0 | | 160 | 10:1 | Vert. | | Dec. 12, 1930 |

From..... To..... No.....
January 1, 1931..... January 7, 1931..... 1

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|-------------------|--|--|--------|-----------|-------|-------|----------|--|
| | | | | A_E | A_N | A_Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4091 Jan. 2 | | 0 - 40 to 1 - 15 | | | | | | I waves of small amplitude |
| 4092 Jan. 2 | O eP iPR ₂ iS eSR ₁ ? eSR ₂ N eL M | 9-48-51 9-56-15 9-57-46 10-02-07 10 - 04.5 10-04-55 10 - 06 10 - 14 | | | | | 4080 | Saskatoon Record: O = 9-49-01 P = 9-55-45 S = 10-01-05 L = 10-05 Δ = 3550 km. F lost in next quake |
| 4093 Jan. 2 | | 11 - 28 to 13 - 05 | | | | | | No. 4092 masks preliminaries |
| 4094 Jan. 7 | | 7-21-30 to 7-21-40 | | | | | | Slight local shock |



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From January 7, 1931 to January 17, 1931 No. 2

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|-----------------------------|---|--|--------|----------------|----------------|----------------|----------|--|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4095 Jan. 8 | O eP iS iL F | 0-13-40 0-14-47 0-15-41 0-15-43 0 - 21 | | | | | 490 | Felt in Ottawa. Epicentre near Baie St. Paul, P.Q. |
| 4096 Jan. 12 | eS ? eL F | 20-54-00 21 - 02 22 - 09 | | | | | | Pronounced sinu- soidal L waves |
| 4097 Jan. 15 | O iP i _Z iPR ₂ iS iSR ₁ iSR ₂ eL M F | 1-50-34 1-57-30 1-57-41 1-58-32 2-03-00 2-04-36 2-05-11 2-06-30 2 - 15 6 - 35 | | | | | 3710 | Epicentre in Mexico. Halifax Record: O = 1-50-34 P = 1-58-17 S = 2-04-23 Δ = 4340 km. Saskatoon Record: O = 1-50-42 P = 1-57-56 S = 2-03-40 Δ = 3950 km. |
| 4098 Jan. 15 | | 21 - 48 to 22 - 33 | | | | | | Sinusoidal trace |
| 4099 Jan. 15 to 16 | e e eL F | 23-16-30 23-20-20 23 - 35 1 - 01 | | | | | | |
| 4100 Jan. 16 | iS ? eL ? F | 17-03-34 17 - 10 17 - 25 | | | | | | |
| 4101 Jan. 16 | O eP iS eSR ₂ eL F | 19-19-46 19-26-38 19-32-05 19-34-18 19 - 37 20 - 34 | | | | | 3650 | |
| 4102 Jan. 17 | i e eL ME MN F | 2-56-07 3-02-22 3 - 06 3 - 09 3 - 10 5 - 30 | | | | | | Saskatoon Record: O = 2-50-20 P = 2-55-55 S = 3-00-21 Δ = 2770 km. |



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SEISMOLOGIC STATION, DOMINION OBSERVATORY

From January 17, 1931 to January 27, 1931 No.

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|-----------------|---|--|--------|----------------|----------------|----------------|----------|--|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4103 Jan. 17 | O iP iS eL F | 5-35-42 5-42-38 5-48-08 5 - 53 6 - 23 | | | | | 3710 | |
| 4104 Jan. 19 | | 20-50-33 to 20-50-39 | | | | | | Slight local shock |
| 4105 Jan. 20 | e ? L F | 9 - 52 10 - 11 10 - 15 | | | | | | Small amplitude |
| 4106 Jan. 23 | O iP iS eL F | 5-52-00 5-58-53 6-04-20 6 - 11 6 - 40 | | | | | 3660 | |
| 4107 Jan. 23 | | 23 - 43 to 23 - 48 | | | | | | Trace only |
| 4108 Jan. 24 | | (14 - 40) to 16 - 00 | | | | | | Preliminaries lost; sheets being changed. |
| 4109 Jan. 25 | O eP iS eL F | 12-37-41 12-43-23 12-47-55 12 - 51 13 - 30 | | | | | 2850 | |
| 4110 Jan. 27 | e e i L F | 14-49-09 14-51-10 14-52-17 14 - 56 15 - 07 | | | | | | Short periods |
| 4111 Jan. 27 | O eP ePR ₂ eS _c P _c S ePPS eSR ₁ eL M F | (20 - 14) 20-28-18 20-34-27 20-38-35 20-42-35 20-47-25 20 - 58 21 - 12 23 - 14 | | | | | (11,500) | All phases better marked on NS components. Interpretation with Gutenberg's curves. |



OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From January 28, 1931 to January 31, 1931 No. 4

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--|--------------------|-----------|--------|----------------|----------------|----------------|----------|---|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4112 | O | (21 - 25) | | | | | (12,000) | Interpretation with Gutenberg's curves. |
| Jan. 28 | ePR ₁ E | 21-43-55 | | | | | | |
| to | eN | 21-45-11 | | | | | | |
| 29 | eScPcPcS | 21-50-43 | | | | | | |
| | ePS | 21-53-14 | | | | | | |
| | eSR ₁ | 21-59-25 | | | | | | |
| | eL | 22 - 10 | | | | | | |
| | F | 0 - 34 | | | | | | |
| 4113 | O | 17-09-12 | | | | | 4620 | |
| Jan. 29 | eP | 17-17-14 | | | | | | |
| | e | 17-22-47 | | | | | | |
| | eSN | 17-23-35 | | | | | | |
| | eSE | 17-23-41 | | | | | | |
| | eSR ₁ ? | 17-25-37 | | | | | | |
| | eSR ₂ | 17-27-04 | | | | | | |
| | eL | 17 - 29 | | | | | | |
| | F | 18 - 10 | | | | | | |
| <p>N. B. Quakes Nos. 4088 and 4089 should have been dated December 24 and 25th respectively.</p> | | | | | | | | |
| <p><i>W. W. Lawrence</i></p> | | | | | | | | |

SEISMOLOGICAL BULLETINS RECEIVED

January,

1931.



We acknowledge, with thanks, the receipt of the following seismological publications and bulletins.

| STATIONS | BULLETINS | RECEIVED | | |
|--|--|-----------------|---------------------------------|------------|
| Toronto | October, 1929 | January 2, 1931 | | |
| Victoria | October, 1929 | " 2, 1931 | | |
| Pulkovo | July 1928 - September, 1929 and March, 1930 | " 2, 1931 | | |
| Baku | | | | |
| Irkutsk | | | | |
| Kucino | | | | |
| Makeevka | | | | |
| Sverdlovsk | | | | |
| Tachkent | | | | |
| Theodosia | January - March, 1930 | " 2, 1931 | | |
| Yalta | | | | |
| Simferopol | | | | |
| Sebastopol | October, 1930 | " 2, 1931 | | |
| Manila | | | | |
| Fordham | | | June 1 - November 30, 1930 | " 5, 1931 |
| Rome | | | November 26 - December 9, 1930 | " 7, 1931 |
| Cartuja | | | August 18 - October 24, 1930 | " 7, 1931 |
| Riverview | | | Provisional for November 1930 | " 7, 1931 |
| Sydney | | | November, 1930 | " 7, 1931 |
| Perth | | | February 12 - November 30, 1930 | " 7, 1931 |
| Wellington | | | Preliminary for November, 1930 | " 8, 1931 |
| Helwan | | | November, 1930 | " 8, 1931 |
| United States Coast and Geodetic Survey | | | July, August and Sept. 1927 | " 10, 1931 |
| Strasbourg | | | November, 1930 | " 13, 1931 |
| Paris | | | November, 1930 | " 13, 1931 |
| Central Bureau | | | November, 1930 | " 13, 1931 |
| Zi-Ka-Wei | | | Sept. 22 - October 1, 1930 | " 13, 1931 |
| Zurich | October 26 - December 21, 1930 | " 13, 1931 | | |
| Zi-Ka-Wei | October 8 - 28, 1930 | " 16, 1931 | | |
| Rome | December 10 - 23, 1930 | " 24, 1931 | | |
| Theodosia | March - December, 1928 | " 24, 1931 | | |
| Yalta | | | | |
| Simferopol | | | | |
| Helwan | December, 1930 | " 24, 1931 | | |
| Richmond | December, 1930 | " 26, 1931 | | |
| Algiers | November, 1930 | " 27, 1931 | | |
| Georgetown | Seismological Despatches | " 28, 1931 | | |
| Georgetown | November and December, 1930 | " 28, 1931 | | |
| Zagreb | July - September, 1930 | " 30, 1931 | | |
| Karlsruhe | July, August and Sept. 1930 | " 30, 1931 | | |
| Tananarive | July and August, 1930 | " 30, 1931 | | |

DOMINION OBSERVATORY
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$\phi = 45^\circ 23' 38''$ N. $\lambda = 75^\circ 42' 57''$ W. $h = 83$ m.

Lithologic foundation: boulder clay over limestone (Ordovician). Time: Mean Greenwich, midnight to midnight.
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| INSTRUMENT | SYMBOL | REGISTRATION | DAMPING | PAPER SPEED | MASS |
|---------------------|--------|--------------|----------|-----------------|-----------|
| Bosch..... | I | Photographic | Air | 15 mm. per min. | 200 g |
| Bosch..... | II | Photographic | Magnetic | 15 mm. per min. | 200 g |
| Milne-Shaw..... | 17 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Milne-Shaw..... | 23 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Deformation..... | D | Photographic | Air | 17 mm. per min. | 20 g. ca. |
| Spindler-Hoyer..... | W | Smoked Sheet | Air | 15 mm. per min. | 80 kgm. |

INSTRUMENTS—DETERMINED CONSTANTS

| INSTRUMENT | T. | r/T^2 | v | ϵ | COMP. | l" tilt displ't | DETERMINED |
|------------|------|---------|-----|------------|-------|--------------------|---------------|
| I..... | 5.2 | | 120 | 2:1 | NS | | Dec. 3, 1930 |
| II..... | 6.4 | | 120 | 10:1 | EW | | Dec. 3, 1930 |
| 17..... | 12.0 | | 250 | 20:1 | EW | 45 mm. | Dec. 30, 1930 |
| 23..... | 12.0 | | 250 | 20:1 | NS | 43 mm. | Dec. 22, 1930 |
| D..... | | | | | | | |
| D..... | | | | | | | |
| W..... | 6.0 | | 160 | 10:1 | Vert. | | Dec. 12, 1930 |

From..... February 1, 1931..... To..... February 3, 1931..... No..... 5.....

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--------------|---|---------------------------|--------|----------------|----------------|----------------|----------|--|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| N.B. | Milne-Shaw seismographs Nos. 17 and 23 | now have a paper speed of | | | | | | |
| 4114 | O | 22-46-36 | | | | | 14,200 | New Zealand Interpretation of phases according to Gutenberg. |
| Feb. | eP' | 23-05-54 | | | | | | |
| 2 | iPR ₁ | 23-08-03 | | | | | | |
| to | eP _c P _c S | 23-09-20 | | | | | | |
| 3 | eS _c P _c P _c S | 23-13-56 | | | | | | |
| | eN | 23-15-38 | | | | | | |
| | eU | 23-16-18 | | | | | | |
| | eS _c P _c SP | 23-18-11 | | | | | | |
| | ePPS | 23-19-42 | | | | | | |
| | eN | 23-21-04 | | | | | | |
| | ePR ₂ | 23-21-27 | | | | | | |
| | e | 23-22-48 | | | | | | |
| | iSR ₁ | 23-25-18 | | | | | | |
| | iPSS | 23-26-20 | | | | | | |
| | eN | 23-27-37 | | | | | | |
| | eN | 23-28-00 | | | | | | |
| | eE | 23-29-40 | | | | | | |
| | iSR ₂ | 23-30-05 | | | | | | |
| | eN | 23-32-42 | | | | | | |
| | iN | 23-37-03 | | | | | | |
| | eN | 23-37-39 | | | | | | |
| | eL | 23-40 | | | | | | |
| | F | 3-40 | | | | | | |



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OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From February 3, 1931 to February 12, 1931 No. 6

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--------------------|--|--|--------|----------------|----------------|----------------|----------|---------------------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4115 Feb. 3 | | 5-57 to 6-09 | | | | | | L waves of small amplitude |
| 4116 Feb. 3 | | 9-56 to 10-00 | | | | | | Trace only |
| 4117 Feb. 7 | | 1-16 to 1-24 | | | | | | Small amplitude |
| 4118 Feb. 7 | e _N e e _N e _L F | 3-37-16 3-38-30 3-43-41 3-47 4-17 | | | | | | L waves quite pronounced |
| 4119 Feb. 8 | e _N ? e _L F | 2-22-40 2-46 3-18 | | | | | | |
| 4120 Feb. 9 | | 2-43 to 2-52 | | | | | | Trace on NS component only |
| 4121 Feb. 10 | | 2-24 to 2-44 | | | | | | Same as No. 4115 |
| 4122 Feb. 10 | O eP' iPR ₁ iP _c P _e S e _S c _c P _c S e _S c _c P _c SP eRPS e _N eSR ₁ eSR ₂ eL ? F | (6-34-12) 6-54-00 6-56-54 6-57-38 7-03-45 7-07-19 7-10-39 7-12-42 7-15-29 7-21-42 7-27 9-30 | | | | | (16,000) | Interpretation according to Gutenberg |
| 4123 Feb. 11 | | 18-03 to 18-49 | | | | | | Trace only |
| 4124 Feb. 12 | e e e L F | 6-06-28 6-13-38 6-24-45 7-01 3-05 | | | | | | May be two quakes |



CANADA



OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From February 12, 1931 to February 20, 1931 No. 7

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--------------------|---|---|--------|----------------|----------------|----------------|----------|---------------------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4125 Feb. 12 | e e e eL F | 8-14-36 8-18-18 8-21-24 8-25 8-40 | | | | | | Small amplitude |
| 4126 Feb. 13 | O eP ₁ e _E ePR ₁ ePR ₂ ? eScPcS ePPS _E ePR ₂ iScPcPcS e eSR ₂ eL F | 1-29-22 1-48-40 1-49-49 1-50-48 1-54-32 1-55-33 2-02-05 2-04-38 2-05-51 2-10-42 2-14-24 2-18 4-50 | | | | | 14,200 | Interpretation according to Gutenberg |
| 4127 Feb. 14 | e eL F | 14-39 15-02 16-21 | | | | | | Sheets being changed. |
| 4128 Feb. 16 | e eL ? F | 19-11-44 19-27 20-13 | | | | | | |
| 4129 Feb. 19 | e _E e _N e _E e _E eL F | 18-15-28 18-21-17 18-22-27 18-37-32 18-45 20-09 | | | | | | |
| 4130 Feb. 20 | i e _N i _N i e _N i i e _E e _N eL F | 5-46-51 5-50-17 5-55-18 5-55-30 5-56-37 5-57-16 5-57-56 6-01-33 6-02-32 (6-10) 6-54 | | | | | | |
| 4131 Feb. 20 | | 10-38 to 10-56 | | | | | | Trace only |



OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From February 20, 1931 to February 28, 1931 No. 8

| No. and Date | Phase | Time h m s | Period s | Amplitude | | | Distance km. | Remarks |
|--------------------|-----------------|---------------|-------------|----------------|----------------|----------------|--|---------|
| | | | | A_E μ | A_N μ | A_Z μ | | |
| 4132 Feb. 27 | e ^{N?} | 10-23-26 | | | | | Small amplitude but better marked on EW components | |
| | e ^{E?} | 10-24-09 | | | | | | |
| | e ^E | 10-28-30 | | | | | | |
| | e ^N | 10-30-06 | | | | | | |
| | e ^L | 10-35 | | | | | | |
| | F | 11-35 | | | | | | |

W. W. Doree

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|--|---|------------------|
| Rome | December 24 - January 7, 1931 | February 2, 1931 |
| Riverview | January, February and March/31 | " 4, 1931 |
| Riverview | Provisional for December, 1930 | " 4, 1931 |
| Wellington | Preliminary for December, 1930 | " 5, 1931 |
| Reykjavik | October 11 - December 3, 1930 | " 5, 1931 |
| United States Coast and Geodetic Survey | January - August, 1928 | " 6, 1931 |
| Nagoya | December, 1930 | " 10, 1931 |
| Fordham | December, 1930 and January/31 | " 10, 1931 |
| Hamburg | October, November and Dec./30 | " 11, 1931 |
| Zi-Ka-Wei | November 4 - 25, 1930. | " 12, 1931 |
| Manila | November, 1930 | " 12, 1931 |
| Victoria | November, 1929 | " 13, 1931 |
| Toronto | November, 1929 | " 13, 1931 |
| Strasbourg | December, 1930 | " 14, 1931 |
| Paris | | |
| Central Bureau | | |
| Toronto | January, 1931 | " 16, 1931 |
| Pasadena | January, 1931 | " 16, 1931 |
| | Preliminary February 2 and 3/31 | " 16, 1931 |
| Oxford | International Seismological Summary for April, May and June, 1927 | " 17, 1931 |
| Stuttgart | January - June, 1930 | " 17, 1931 |
| Hohenheim | | |
| Ravensburg | | |
| Melbourne | October, November and Dec./30 | " 18, 1931 |
| Perth | December, 1930 | " 19, 1931 |
| Sydney | December, 1930 | " 19, 1931 |
| Domodossola | Year 1930 | " 21, 1931 |
| Richmond | January, 1931 | " 23, 1931 |
| Firenze | January - July, 1930 | " 24, 1931 |
| Rome | Year 1926 | " 24, 1931 |
| Rome | January 22 - February 4, 1931 | " 24, 1931 |
| Zurich | January 15 - February 8, 1931 | " 26, 1931 |
| Karlsruhe | October, November, and Dec./30 | " 26, 1931 |
| Kobe | July 1 - September 30, 1930 | " 26, 1931 |
| Sumoto | | |
| Toyooka | | |
| DeBilt | Year 1928 | " 27, 1931 |
| Nagoya | January, 1931 | " 27, 1931 |
| La Plata | November and December, 1930 | " 27, 1931 |
| Rome | January 8 - 21, 1931 | " 12, 1931 |

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$\phi = 45^\circ 23' 38''$ N. $\lambda = 75^\circ 42' 57''$ W. $h = 83$ m.

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INSTRUMENTS—FIXED CONSTANTS

| INSTRUMENT | SYMBOL | REGISTRATION | DAMPING | PAPER SPEED | MASS |
|---------------------|--------|--------------|----------|-----------------|-----------|
| Bosch..... | I | Photographic | Air | 15 mm. per min. | 200 g |
| Bosch..... | II | Photographic | Magnetic | 15 mm. per min. | 200 g |
| Milne-Shaw..... | 17 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Milne-Shaw..... | 23 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Deformation..... | D | Photographic | Air | 17 mm. per min. | 20 g. ca. |
| Spindler-Hoyer..... | W | Smoked Sheet | Air | 15 mm. per min. | 80 kgm. |

INSTRUMENTS—DETERMINED CONSTANTS

| INSTRUMENT | T. | r/T_0^2 | V | ϵ | COMP. | 1" tilt | DETERMINED |
|------------|------|-----------|-----|------------|-------|-----------|---------------|
| I..... | 5.2 | | 120 | 2:1 | NS | displ'nt. | Dec. 3, 1930 |
| II..... | 6.4 | | 120 | 10:1 | EW | | Dec. 3, 1930 |
| 17..... | 12.0 | | 250 | 20:1 | EW | 45 mm. | Dec. 30, 1930 |
| 23..... | 12.0 | | 250 | 20:1 | NS | 43 mm. | Dec. 22, 1930 |
| D..... | | | | | | | |
| D..... | | | | | | | |
| W..... | 6.0 | | 160 | 10:1 | Vert. | | Dec. 12, 1930 |

From..... March 1, 1931..... To..... March 7, 1931..... No..... 9.....

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--------------------|--|---|--------|-----------|-------|-------|----------|---------------------------------|
| | | | | A_E | A_N | A_Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4133 March 2 | eE eN eE e e eE e eL F | 2-45-08 2-47-40 2-49-18 2-55-16 2-56-02 2-57-02 2-59-14 3-10 4-32 | | | | | | |
| 4134 March 7 | eE? eN e eL F | 0-41-16 0-49-10 0-50-12 0-55 1-51 | | | | | | Microseisms mask preliminaries. |
| 4135 March 7 | | 11-07 to 11-30 | | | | | | L waves of small amplitude |



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SEISMOLOGIC STATION, DOMINION OBSERVATORY

From March 15, 1931 to March 29, 1931 No. 11

| No. and Date | Phase | Time h m s | Period s | Amplitude | | | Distance km. | Remarks |
|---------------------|-----------------------|----------------------|-------------|---------------------|---------------------|---------------------|-----------------|-------------------------------|
| | | | | A _E μ | A _N μ | A _Z μ | | |
| 4144 March 18 | O | 8-02-23 | | | | | 8760 | May be another quake. |
| | eP _N | 8-14-23 | | | | | | |
| | iS _N | 8-24-21 | | | | | | |
| | i _N | 8-29-05 | | | | | | |
| | e _N | 8-31-12 | | | | | | |
| | eL _N | 8-39 | | | | | | |
| | W ₂ ? F | 10-24 11-41 | | | | | | |
| 4145 March 18 | e | 20-35-03 | | | | | 6750 | Better marked on EW. |
| | e _N | 20-39-32 | | | | | | |
| | e _E | 20-40-18 | | | | | | |
| | e _N | 20-45-00 | | | | | | |
| | e | 20-50-20 | | | | | | |
| | L | 21-10 | | | | | | |
| | F | 22-26 | | | | | | |
| 4146 March 19 | O | 6-42-08 | | | | | 6750 | Better marked on EW. |
| | eP _E | 6-52-22 | | | | | | |
| | ePR _{1N} | 6-55-05 | | | | | | |
| | iS | 7-00-38 | | | | | | |
| | eL F | 7-10 8-15 | | | | | | |
| 4147 March 25 | | 13-46 to 13-56 | | | | | Trace only, | |
| | | | | | | | | |
| 4148 March 28 | e | 12-57-54 | | | | | 6750 | May be two quakes. |
| | e | 13-01-24 | | | | | | |
| | e | 13-07-08 | | | | | | |
| | e | 13-07-25 | | | | | | |
| | e _N | 13-12-45 | | | | | | |
| | e _E | 13-13-42 | | | | | | |
| | eL? F | 13-19 15-35 | | | | | | |
| 4149 March 29 | e | 17-43-00 | | | | | 6750 | lost in next quake |
| | eL | 17-50 | | | | | | |
| | F | | | | | | | |
| 4150 March 29 | e | 18-14-29 | | | | | 6750 | |
| | F | 19-09 | | | | | | |
| 4151 March 29 | | 19-41 to 20-12 | | | | | 6750 | L waves of small amplitude |
| | | | | | | | | |



OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From March 29, 1931 to March 31, 1931 No. 12

| No. and Date | Phase | Time h m s | Period s | Amplitude | | | Distance km. | Remarks |
|--------------------|---------------------------------------|--|-------------|---------------------|---------------------|---------------------|-----------------|---------|
| | | | | A _E μ | A _N μ | A _Z μ | | |
| 4152 March 30 | | 15-20 to 15-35 | | | | | Trace only. | |
| 4153 March 31 | O eP _N eS eL F | 16-02-00 16-09-03 16-14-38 16-19 17-38 | | | | 3800 | | |
| <i>W. W. Doane</i> | | | | | | | | |

SEISMOLOGICAL BULLETINS RECEIVED

March

1931



We acknowledge, with thanks, the receipt of the following seismological publications and bulletins.

| STATIONS | BULLETINS | RECEIVED |
|---|---|---------------|
| Zi-Ka-Wei | December 2 - 15, 1930 | March 2, 1931 |
| Beograd | Years 1927-28 and 29 | " 2, 1931 |
| Wellington | Preliminary for January, 1931 | " 3, 1931 |
| Georgetown | January, 1931 and Seismological Despatches | " 4, 1931 |
| Strasbourg) | January, 1931 | " 5, 1931 |
| Paris) | | |
| Central Bureau) | | |
| Zi-Ka-Wei | December 20 - 23, 1930 | " 10, 1931 |
| Cartuja | October - December, 1930 | " 10, 1931 |
| Mizusawa | Year 1929 | " 10, 1931 |
| Nagasaki | September, October and November 1930 | " 11, 1931 |
| Riverview | January, 1931 | " 11, 1931 |
| Manila | December, 1930 | " 12, 1931 |
| Rome | February 5 - 18, 1931 | " 12, 1931 |
| Port-au-Prince | Meteorological Bulletin 1928 | " 12, 1931 |
| Toronto | February, 1931 | " 14, 1931 |
| Zurich | Year 1929 | " 14, 1931 |
| Helwan | January, 1931 | " 14, 1931 |
| Pasadena | February, 1931 | " 17, 1931 |
| La Plata | January, 1931 | " 19, 1931 |
| Bergen | Year 1930 | " 20, 1931 |
| Koti | January 5 - March 9, 1930, and October 24 - December 13, 1930 | " 23, 1931 |
| United States Coast and Geodetic Survey | October, November and December 1927 | " 23, 1931 |
| Zurich | February 20 - March 9, 1931 | " 24, 1931 |
| Algiers | January and February, 1931 | " 26, 1931 |
| Richmond | February, 1931 | " 26, 1931 |
| Nagoya | February, 1931 | " 26, 1931 |
| Beograd | November and December, 1930 | " 26, 1931 |
| Rome | February 19 - March 4, 1931 | " 26, 1931 |
| Zi-Ka-Wei | January 1 - 15, 1931 | " 27, 1931 |
| San Fernando | December, 1930, and January, 1931 | " 28, 1931 |
| Taunus | August - December, 1930 | " 31, 1931 |
| Frankfurt | January, 1931 | " 31, 1931 |
| Wellington and Suva | October, November and December 1930 | " 31, 1931 |

DOMINION OBSERVATORY

OTTAWA - CANADA

R. Meldrum Stewart,
Director.

Ernest A. Hodgson,
Seismologist.

W. W. Doxsee,
Assistant Seismologist.



SEISMOLOGIC STATION, DOMINION OBSERVATORY OTTAWA

R. MELDRUM STEWART, *Director*

ERNEST A. HODGSON, *Seismologist*

W. W. DOXSEE, *Assistant Seismologist*

$\phi = 45^\circ 23' 38''$ N. $\lambda = 75^\circ 42' 57''$ W. $h = 83$ m.

Lithologic foundation: boulder clay over limestone (Ordovician). Time: Mean Greenwich, midnight to midnight.
Time correction; within .25s.

INSTRUMENTS—FIXED CONSTANTS

| INSTRUMENT | SYMBOL | REGISTRATION | DAMPING | PAPER SPEED | MASS |
|---------------------|--------|--------------|----------|-----------------|-----------|
| Bosch..... | I | Photographic | Air | 15 mm. per min. | 200 g |
| Bosch..... | II | Photographic | Magnetic | 15 mm. per min. | 200 g |
| Milne-Shaw..... | 17 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Milne-Shaw..... | 23 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Deformation..... | D | Photographic | Air | 17 mm. per min. | 20 g. ca. |
| Spindler-Hoyer..... | W | Smoked Sheet | Air | 15 mm. per min. | 80 kgm. |

INSTRUMENTS—DETERMINED CONSTANTS

| INSTRUMENT | T. | r/T. ² | v | ε | COMP. | 1" tilt | DETERMINED |
|------------|------|-------------------|-----|------|-------|----------|---------------|
| I..... | 5.2 | | 120 | 2:1 | NS | displ'nt | Dec. 3, 1930 |
| II..... | 6.4 | | 120 | 10:1 | EW | | Dec. 3, 1930 |
| 17..... | 12.0 | | 250 | 20:1 | EW | 45 mm. | Dec. 30, 1930 |
| 23..... | 12.0 | | 250 | 20:1 | NS | 43 mm. | Dec. 22, 1930 |
| D..... | | | | | | | |
| D..... | 6.0 | | 160 | 10:1 | Vert. | | Dec. 12, 1930 |
| W..... | | | | | | | |

From April 1, 1931 To April 6, 1931 No. 13

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|----------------------------|--|---|--------|----------------|----------------|----------------|----------|----------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4154 April 1 | | 13-26 to 14-05 | | | | | | L waves of small amplitude |
| 4155 April 3 | e eL F | 2-13-24 2-20 3-33 | | | | | | |
| 4156 April 3 to 4 | e eE eE eE eE eE eL FE? | 23-42-37 23-43-49 23-46-46 23-50-45 23-51-58 23-53-09 23-57 0-59 | | | | | | |
| 4157 April 6 | eE eE eE eN eE eL F | 7-10-05 7-15-46 7-17-15 7-17-33 7-20-04 7-40 9-24 | | | | | | |



OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From April 6, 1931 to April 19, 1931 No. 14

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|------------------|--------------------------|--|--------|----------------|----------------|----------------|----------|--|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4158 April 6 | | 20-50-35 to 20-50-40 | | | | | | Local |
| 4159 April 8 | | 20-06 to 20-47 | | | | | | Trace only |
| 4160 April 9 | e eL F | 23-24-00 23-35 0-14 | | | | | | Trace only on NS. |
| 4161 April 11 | | 16-04 to 16-51 | | | | | | L waves of small amplitude |
| 4162 April 12 | | 2-48 to 4-00 | ca | | | | | Same type as 4161 |
| 4163 April 12 | | 3-55 to 4-40 | | | | | | Same type as 4161 |
| 4164 April 13 | | 20-01 to 20-19 | | | | | | Trace only |
| 4165 April 15 | O eP eS eL F | 16-58-48 17-05-28 17-10-47 17-15 18-02 | | | | | 3530 | |
| 4166 April 16 | | 22-54 to 23-08 | | | | | | L waves of small amplitude |
| 4167 April 18 | | 13-26 to 13-36 | | | | | | Same type as 4166 |
| 4168 April 18 | | 17-51 to 17-54 | | | | | | Trace only |
| 4169 April 19 | e eE eL F | 2-07-51 2-13-20 2-18 4-00 | ca | | | | | Long train of sinusoidal L waves beginning at 2-20 |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

April 19, 1931

April 30, 1931

No. 15

From to No.

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|---------------------|--|--|--------|----------------|----------------|----------------|----------|---|
| | | | | A _E | A _N | A _Z | | |
| 4170 April 19 | | h 17-45 to 17-53 | s | μ | μ | μ | km. | L waves of small amplitude |
| 4171 April 20 | | 9-03 to 9-41 | | | | | | Same type as 4170 |
| 4172 April 20 | U eP eS F | 19-54-33 19-55-11 19-55-40 19-59 | | | | | 260 | Felt in Eastern New York State |
| 4173 April 22 | eL eN eN eL F | 0-19-05 0-28-46 0-32-37 0-37-18 0-45 2-21 | | | | | | L waves of small amplitude |
| 4174 April 23 | e eN eL F | 23-54-55 0-03-35 0-14 0-30 | | | | | | L waves of small amplitude |
| 4175 April 24 | e L F | 2-32-15 2-43 3-08 | | | | | | |
| 4176 April 24 | e P'E e SCPPS PPS SR1 eL M F | 17-42-39 17-45-20 17-49-36 17-52.3 17-58.4 18-04.0 18-18.7 18-29 20-16 | | | | | (13500) | Interpretation based on Gutenberg's Tables. |
| 4177 April 20 | | 4-50 to 5-21 | | | | | | Trace only |
| 4178 April 27 | U eP eS eL F | 16-50-41 17-02-55 17-13-07 17-29 18-39 | | | | | 9020 | |

41. 16. 11 02588

SEISMOLOGICAL BULLETINS RECEIVED

April,

1931.



We acknowledge, with thanks, the receipt of the following seismological publications and bulletins.

| STATIONS | BULLETINS | RECEIVED |
|--|-----------------------------------|---------------|
| Sydney | January, 1931 | April 1, 1931 |
| Perth | January, 1931 | " 1, 1931 |
| Wellington | February, 1931 | " 1, 1931 |
| Georgetown | February, 1931 | " 2, 1931 |
| Georgetown | Seismological Despatches | " 2, 1931 |
| Riverview | Provisional for February, 1931 | " 2, 1931 |
| Paris | February, 1931 | " 7, 1931 |
| Strasbourg | | |
| Central Bureau | | |
| Manila | January, 1931 | " 8, 1931 |
| Rome | March 5 - 18, 1931 | " 8, 1931 |
| Zi-Ka-Wei | January 15 - 24, 1931 | " 9, 1931 |
| Tananarive | September and October, 1930 | " 10, 1931 |
| Toronto | December, 1930 | " 10, 1931 |
| Uccle | October, November and December/30 | " 14, 1931 |
| Sydney | February, 1931 | " 15, 1931 |
| Sydney | Seismogram of New Zealand quake | " 15, 1931 |
| La Plata | February, 1931 | " 18, 1931 |
| Beograd | January 1 - March 9, 1931 | " 20, 1931 |
| Batavia | Sept., Oct., Nov. and Dec. 1930 | " 20, 1931 |
| Toronto | March, 1931 | " 21, 1931 |
| Perth | February, 1931 | " 22, 1931 |
| Zi-Ka-Wei | January 24 - 31, 1931 | " 23, 1931 |
| Pasadena | March, 1931 | " 23, 1931 |
| Jena | January - December, 1930 | " 24, 1931 |
| Rome | March 19 - April 1, 1931 | " 25, 1931 |
| Algiers | March, 1931 | " 27, 1931 |
| Richmond | March, 1931 | " 27, 1931 |
| Georgetown | March, 1931 | " 30, 1931 |
| Georgetown | Seismological Despatches | " 30, 1931 |
| United States Coast and Geodetic Survey | July - September, 1930 | " 30, 1931 |

DOMINION OBSERVATORY
OTTAWA - CANADA

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CANADA



SEISMOLOGIC STATION, DOMINION OBSERVATORY
OTTAWA

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$\phi = 45^\circ 23' 38''$ N. $\lambda = 75^\circ 42' 57''$ W. $h = 83$ m.

Lithologic foundation: boulder clay over limestone (Ordovician). Time: Mean Greenwich, midnight to midnight.
Time correction; within .25s.

INSTRUMENTS—FIXED CONSTANTS

| INSTRUMENT | SYMBOL | REGISTRATION | DAMPING | PAPER SPEED | MASS |
|---------------------|--------|--------------|----------|-----------------|-----------|
| Bosch..... | I | Photographic | Air | 15 mm. per min. | 200 g |
| Bosch..... | II | Photographic | Magnetic | 15 mm. per min. | 200 g |
| Milne-Shaw..... | 17 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Milne-Shaw..... | 23 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Deformation..... | D | Photographic | Air | 17 mm. per min. | 20 g. ca. |
| Spindler-Hoyer..... | W | Smoked Sheet | Air | 15 mm. per min. | 80 kgm. |

INSTRUMENTS—DETERMINED CONSTANTS

| INSTRUMENT | T. | r/T_s^2 | v | ϵ | COMP. | 1" tilt | DETERMINED |
|------------|------|-----------|-----|------------|-------|----------|---------------|
| I..... | 5.2 | | 120 | 2:1 | NS | displ'nt | Dec. 3, 1930 |
| II..... | 6.4 | | 120 | 10:1 | EW | | Dec. 3, 1930 |
| 17..... | 12.0 | | 250 | 20:1 | EW | 45 mm. | Dec. 30, 1930 |
| 23..... | 12.0 | | 250 | 20:1 | NS | 43 mm. | Dec. 22, 1930 |
| D..... | | | | | | | |
| D..... | | | | | | | |
| W..... | 6.0 | | 160 | 10:1 | Vert. | | Dec. 12, 1930 |

From May 1, 1931 To May 8, 1931 No. 16

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|---------------|--|--|--------|----------------|----------------|----------------|----------|-----------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4179 May 1 | O eP _N eS _E eL F | 22-36-46 22-44-09 22-50-00 22-53 23-54 | | | | | 4070 | |
| 4180 May 2 | | 22-51 to 23-00 | | | | | | L waves of small amplitude. |
| 4181 May 4 | | 3-42 to 3-46 | | | | | | Same type as No. 4180. |
| 4182 May 6 | e _N eL? F | 15-34-05 15-55 17-13 | | | | | | |
| 4183 May 8 | | 0-42 to 0-50 | | | | | | Trace only. |



CANADA



OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From..... May 8, 1931..... to..... May 20, 1931..... No..... 17.....

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|-------------------|--|---|--------|----------------|----------------|----------------|----------|-------------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4184 May 9 | e _N eL F | 10-46-55 10-51 11-40 | | | | | | Chiefly short period L waves. |
| 4185 May 10 | e _N e eL F | 19-37-14 19-47-04 20-03 20-45 | | | | | | |
| 4186 May 11 | | 4-30 to 4-45 | | | | | | Trace only. |
| 4187 May 12 | O eP _N eS eL F | 1-38-05 1-48-54 1-57-44 2-14 3-10 | | | | | 7400 | |
| 4188 May 13 | | 9-26 to 9-38 | | | | | | Trace on EW only. |
| 4189 May 13 | | 16-27 to 16-35 | | | | | | Trace only. |
| 4190 May 13 | | 23-54 to 0-21 | | | | | | Trace only. |
| 4191 May 15 | e _N e _N e _N F | 8-08-34 8-12-05 8-17-04 8-26 | | | | | | Small amplitude. |
| 4192 May 16 | | 2-33 to 2-35 | | | | | | Trace only. |
| 4193 May 16 | O eP eS eL F | 20-47-26 20-54-19 20-59-47 21-05 22-10 | | | | | 3660 | |
| 4194 May 20 | O eP e _N eS eSR ₂ ? eL F | 2-22-52 2-31-06 2-33-55 2-37-37 2-40-52 2-42 6-00 | | | | | 4790 | |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From May 20, 1931 to May 31, 1931 No. 18

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|-------------------|--|--|--------|----------------|----------------|----------------|----------|-----------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4195 May 20 | O eP _N eS _N eL F | 21-54-01 22-05-30 22-14-57 22-25 23-36 | | | | | 8150 | Small amplitude. |
| 4196 May 23 | | 3-38 to 4-20 | | | | | | L waves of small amplitude. |
| 4197 May 24 | eE L F | 0-50-06 1-13 1-45 | | | | | | |
| 4198 May 26 | | 16-15 to 16-35 | | | | | | Trace only. |
| 4199 May 27 | | 6-36 to 6-55 ca | | | | | | L waves of small amplitude. |
| 4200 May 27 | e eL F | 6-56-11 7-11 8-10 | | | | | | |
| 4201 May 27 | e eL ? F | 10-29-16 10-49 11-15 | | | | | | |
| 4202 May 28 | e F | 3-34-17 3-51 | | | | | | Small amplitude. |
| 4203 May 28 | | 5-31 to 5-39 | | | | | | Trace only. |
| 4204 May 28 | | 19-09 to 19-50 | | | | | | L waves of small amplitude. |
| 4205 May 29 | eE eN eL ? F | 5-31-07 5-31-32 5-38 6-00 | | | | | | |
| 4206 May 30 | | 11-58 to 12-44 | | | | | | L waves of small amplitude. |

W. W. B. see

SEISMOLOGICAL BULLETINS RECEIVED



May
1931.

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| STATIONS | BULLETINS | RECEIVED |
|--|---|--------------|
| Rome | April 2 - 15, 1931 | May 6, 1931. |
| Manila | February, 1931 | " 6, 1931. |
| Copenhagen | July - September, 1928 | " 12, 1931. |
| Toledo | } July and August, 1930 | " 12, 1931. |
| Almeria | | |
| Malaga | | |
| Alicante | | |
| Riverview | | |
| Zi-Ka-Wei | Provisional for March, 1931 | " 12, 1931. |
| Riverview | February, 1931 | " 12, 1931. |
| Sydney | April, May and June, 1928 | " 12, 1931. |
| Wellington | March, 1931 | " 14, 1931. |
| Paris | Preliminary for March, 1931. | " 14, 1931. |
| Strasbourg | } March, 1931 | " 14, 1931. |
| Central Bureau | | |
| Pasadena | | |
| Toronto | April, 1931 | " 16, 1931. |
| Victoria | April, 1931 | " 16, 1931. |
| Nagasaki | December, 1929 | " 16, 1931. |
| Hamburg | December, 1930 and January, 1931 | " 18, 1931. |
| Zagreb | January, February and March, 1931 | " 18, 1931. |
| Chiufeng | October - December, 1930 | " 26, 1931. |
| Georgetown | January and February, 1931. | " 26, 1931. |
| | April, 1931 and Seismological Despatches | " 26, 1931. |
| United States Coast and Geodetic Survey | October, November and Dec. 1930 | " 26, 1931. |
| Fordham | February, March and April, 1931 | " 27, 1931. |
| Rome | April 16 - 29, 1931 | " 28, 1931. |
| Richmond | April, 1931 | " 28, 1931. |
| Victoria | January, February and March, 1931 | " 28, 1931. |
| Innsbruck | June 26 - November 24, 1930 | " 29, 1931. |
| Graz | November 2 - December 31, 1930 | " 29, 1931. |
| Lemberg | and January 1 - February 13, 1931 | |
| | and July 14 - December 31, 1930 | " 29, 1931. |
| Wien | and January 1 - March 8, 1931 | |
| | and November 4 - December 31, 1930 | " 29, 1931. |
| Helwan | and January 1 - 25, 1931 | |
| | February, March and April, 1931 | " 29, 1931 |

DOMINION OBSERVATORY
OTTAWA - CANADA

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$\phi = 45^\circ 23' 38''$ N. $\lambda = 75^\circ 42' 57''$ W. $h = 83$ m.

Lithologic foundation: boulder clay over limestone (Ordovician). Time: Mean Greenwich, midnight to midnight.
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| Milne-Shaw..... | 17 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Milne-Shaw..... | 23 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Deformation..... | D | Photographic | Air | 17 mm. per min. | 20 g. ca. |
| Spindler-Hoyer..... | W | Smoked Sheet | Air | 15 mm. per min. | 80 kgm. |

INSTRUMENTS—DETERMINED CONSTANTS

| INSTRUMENT | T_s | r/T_s^2 | v | ϵ | COMP. | 1" tilt displ't | DETERMINED |
|------------|-------|-----------|-----|------------|-------|--------------------|---------------|
| I..... | 5.2 | | 120 | 2:1 | NS | | Dec. 3, 1930 |
| II..... | 6.4 | | 120 | 10:1 | EW | | Dec. 3, 1930 |
| 17..... | 12.0 | | 250 | 20:1 | EW | 45 mm. | Dec. 30, 1930 |
| 23..... | 12.0 | | 250 | 20:1 | NS | 43 mm. | Dec. 22, 1930 |
| D..... | | | | | | | |
| D..... | 6.0 | | 160 | 10:1 | Vert. | | Dec. 12, 1930 |
| W..... | | | | | | | |

From June 1, 1931 To June 9, 1931 No. 19

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|----------------|---------------|----------------------------|--------|-----------|-------|-------|----------|--|
| | | | | A_E | A_N | A_Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4207 June 1 | | 12-52 to 13-15 ca. | | | | | | Sinusoidal L waves Operator in vault. |
| 4208 June 2 | | 4-44 to 4-49 | | | | | | Trace on EW only. |
| 4209 June 4 | eN? L F | 11-08-48 11-14 11-25 | | | | | | |
| 4210 June 7 | | 0-46 to 0-56 | | | | | | Trace. |
| 4211 June 9 | | 5-57 to 6-15 | | | | | | Trace. |
| 4212 June 9 | | 12-50 to 13-20 | | | | | | L waves of small amplitude. |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From June 9, 1931 to June 18, 1931 No. 20

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--------------------|---------------------|----------------------|--------|----------------|----------------|----------------|--|---------|
| | | | | A _E | A _N | A _Z | | |
| 4213 June 19 | O | 13-57-58 | S | μ | μ | μ | 8970 km | |
| | ePN | 14-10-09 | | | | | | |
| | ePR ₁ N? | 14-14-15 | | | | | | |
| | eSE | 14-20-18 | | | | | | |
| | eSR ₁ | 14-26-00 | | | | | | |
| | eL | 14-40 | | | | | | |
| | F | 16-25+ | | | | | | |
| 4214 June 9 | eN | 16-26-06 | | | | | May be two quakes | |
| | eE | 16-28-05 | | | | | | |
| | eL? | 16-50 | | | | | | |
| | F | 18-55 | | | | | | |
| 4215 June 11 | | 19-40 to 20-11 | | | | | L waves of small amplitude on EW only. | |
| 4216 June 13 | eE | 16-00-22 | | | | | Small amplitude. | |
| | eN | 16-01-27 | | | | | | |
| | eE | 16-03-10 | | | | | | |
| | eN | 16-09-07 | | | | | | |
| | eE | 16-10-20 | | | | | | |
| | eN | 16-22-42 | | | | | | |
| | eN | 16-26-06 | | | | | | |
| | eL? | 16-30 | | | | | | |
| F | 17-58 | | | | | | | |
| 4217 June 15 | O | 11-19-55 | | | | 6700 | | |
| | ePN | 11-30-06 | | | | | | |
| | eS | 11-38-19 | | | | | | |
| | eSR ₂ E | 11-45-10 | | | | | | |
| | eL | 11-49 | | | | | | |
| F | 13-00 | | | | | | | |
| 4218 June 17 | e | 12-33-07 | | | | | Operator in vault. | |
| | e | 12-35-02 | | | | | | |
| | eL? | 12-55 | | | | | | |
| | F | 13-30+ | | | | | | |
| 4219 June 17 | e | 17-34-05 | | | | | Trace. | |
| | eL | 17-55 | | | | | | |
| | F | 19-12 | | | | | | |
| 4220 June 17 | | 20-26 to 20-39 | | | | | | |
| | | | | | | | | |
| 4221 June 18 | eN | 0-33-02 | | | | | | |
| | eL | 0-41 | | | | | | |
| | F | 0-49 | | | | | | |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From June 18, 1931 to June 27, 1931 No. 21

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--------------------|--|---|--------|----------------|----------------|----------------|----------|-----------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4222 June 19 | | 23-31 to 23-56 | | | | | | Trace on EW only. |
| 4223 June 20 | | 1-52 to 2-10 | | | | | | Trace |
| 4224 June 20 | O eP _N eS eL F | (15-05-15) 15-13-56 15-20-49 (15-30) 15-55 | | | | | (5200) | Small amplitude. |
| 4225 June 20 | | 20-53 to 20-56 | | | | | | Trace |
| 4226 June 21 | O eP _E ePR ₂ eS eSR _{2N} eL F | 12-22-54 12-30-22 12-31-48 12-36-17 12-39-01 12-43 13-30+ | | | | | 4140 | Operator in vault. |
| 4227 June 22 | e _E e L _E F _E | 14-49-31 14-50-06 14-58 15-14 | | | | | | |
| 4228 June 22 | | 16-21 to 17-10 | | | | | | L waves of small amplitude. |
| 4229 June 23 | e _E e _E eL F | 6-39-02 6-45-18 7-04 7-50 | | | | | | |
| 4230 June 25 | | 13-01 to 13-04 | | | | | | Trace May not be seismic |
| 4231 June 27 | | 12-52 to 13-30 | | | | | | Trace |
| 4232 June 27 | | 16-48 to 17-10 | | | | | | Trace |



OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From June 27, 1931 to June 30, 1931 No. 22

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|-----------------|---|--|--------|---------------------|---------------------|---------------------|----------|-----------------------------|
| | | | | A _E μ | A _N μ | A _Z μ | | |
| | | h m s | s | | | | km. | |
| 4233 June 27 | e eL F | 18-29-04 18-55 20-20 | | | | | | |
| 4234 June 28 | | 17-00 to 17-35 | | | | | | L waves of small amplitude. |
| 4235 June 29 | O eP _N ? eS eL ? F | (20-24-14) 20-35-52 20-45-28 20-57 21-33 | | | | | (8320) | <i>Quoted from H. ...</i> |

SEISMOLOGICAL BULLETINS RECEIVED

June

1931



We acknowledge, with thanks, the receipt of the following seismological publications and bulletins.

| STATIONS | BULLETINS | RECEIVED |
|--|---|---------------|
| San Fernando | March and April, 1931. | June 1, 1931. |
| Zi-Ka-Wei | February 11 - 16, 1931 | " 1, 1931. |
| Apia | February and March, 1931 | " 2, 1931. |
| Zurich | March 27 - May 20, 1931. | " 2, 1931. |
| Rome | April 30 - May 13, 1931. | " 4, 1931. |
| Uccle | January 1 - February 19, 1931. | " 4, 1931. |
| Riverview | Provisional for April, 1931. | " 4, 1931. |
| Osaka | July - September, 1931. | " 4, 1931. |
| Nagasaki | February 3 - 28, 1931. | " 5, 1931. |
| Strasbourg | } April, 1931. | " 5, 1931. |
| Paris | | |
| Central Bureau | | |
| Tananarive | November and December, 1930. | " 6, 1931. |
| Toledo | } January - August, 1928. | " 8, 1931. |
| Almeria | | |
| Malaga | | |
| Alicante | | |
| United States Coast and Geodetic Survey | Year 1929 | " 8, 1931. |
| Fordham | May, 1931 | " 11, 1931. |
| Wellington | Preliminary for April, 1931. | " 12, 1931. |
| Matuyama | September 10 - December 26, 1929. | " 15, 1931. |
| Toledo | } July, August and September, 1930. | " 15, 1931. |
| Almeria | | |
| Malaga | | |
| Alicante | | |
| Manila | March, 1931. | " 16, 1931. |
| Zi-Ka-Wei | February 19 and 20th, 1931. | " 16, 1931. |
| Rome | May 14 - 27, 1931. | " 17, 1931. |
| Pasadena | May, 1931. | " 17, 1931. |
| Georgetown | May, 1931, and Seismological Despatches. | " 19, 1931. |
| Toronto | May, 1931. | " 19, 1931. |
| Frankfurt | January 27 - March 31, 1931. | " 20, 1931. |
| Göttingen | Year 1930. | " 22, 1931. |
| Göttingen | January 1 - May 15, 1929 | " 22, 1931. |
| Richmond | May, 1931. | " 22, 1931. |
| Karlsruhe | January, February and March, 1931. | " 22, 1931. |
| Perth | March 5 - April 30, 1931 | " 24, 1931. |
| Sydney | April, 1931. | " 24, 1931. |
| Helwan | May, 1931. | " 24, 1931. |
| Algiers | April and May, 1931. | " 26, 1931. |
| Cartuja | January and February, 1931 | " 26, 1931. |

DOMINION OBSERVATORY
OTTAWA - CANADA

R. Meldrum Stewart,
Director.

Ernest A. Hodgson,
Seismologist.

W. W. Doxsee,
Assistant Seismologist.



OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY



R. MELDRUM STEWART, *Director*

ERNEST A. HODGSON, *Seismologist*

W. W. DOXSEE, *Assistant Seismologist*

$\phi = 45^{\circ} 23' 38''$ N. $\lambda = 75^{\circ} 42' 57''$ W. $h = 83$ m.

Lithologic foundation: boulder clay over limestone (Ordovician). Time: Mean Greenwich, midnight to midnight.
Time correction: within .25s.

INSTRUMENTS—FIXED CONSTANTS

| INSTRUMENT | SYMBOL | REGISTRATION | DAMPING | PAPER SPEED | MASS |
|---------------------|--------|--------------|----------|-----------------|-----------|
| Bosch..... | I | Photographic | Air | 15 mm. per min. | 200 g. |
| Bosch..... | II | Photographic | Magnetic | 15 mm. per min. | 200 g. |
| Milne-Shaw | 17 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Milne-Shaw | 23 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Deformation | D | Photographic | Air | 17 mm. per min. | 20 g. ca. |
| Spindler-Hoyer..... | W | Smoked Sheet | Air | 15 mm. per min. | 80 kgm. |

INSTRUMENTS—DETERMINED CONSTANTS

| INSTRUMENT | T_0 | r | v | ϵ | COMP. | 1" tilt | DETERMINED |
|------------|-------|-----|-----|------------|-------|----------|---------------|
| I..... | 5.2 | | 120 | 2:1 | NS | displ'nt | Dec. 3, 1930 |
| II..... | 6.4 | | 120 | 10:1 | EW | | Dec. 3, 1930 |
| 17..... | 12.0 | | 250 | 20:1 | EW | 45 mm. | Dec. 30, 1930 |
| 23..... | 12.0 | | 250 | 20:1 | NS | 43 mm. | Dec. 22, 1930 |
| D..... | | | | | | | |
| D..... | | | | | | | |
| W..... | 6.0 | | 160 | 10:1 | | | Dec. 12, 1930 |

From..... July 1, 1931..... to..... July 9, 1931..... No. 23

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|----------------|-----------------------|--|--------|-----------|-------|-------|----------|-----------------------------|
| | | | | A_E | A_N | A_Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4236 July 2 | | 4-28 to 4-48 | | | | | | L waves of small amplitude. |
| 4237 July 3 | | 23-16 to 23-20 | | | | | | Trace on NS only. |
| 4238 July 5 | | 7-31 to 8-15 | | | | | | L waves of small amplitude. |
| 4239 July 7 | e eN e F | 4-06-36 4-17-44 4-19-14 5-00 ca | | | | | | Micros mask record. |
| 4240 July 9 | eE? eE eLE F | 12-08-10 12-12-32 12-16 13-00 | | | | | | MS 23 NS dismantled |
| 4241 July 9 | | 21-15 to 21-35 | | | | | | Trace |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From July 9, 1931 to July 18, 1931 No. 24

| No. and Date | Phase | Time h m s | Period s | Amplitude | | | Distance km. | Remarks |
|--------------------|---|---|-------------|---------------------|---------------------|---------------------|-----------------|-----------------------------|
| | | | | A _E μ | A _N μ | A _Z μ | | |
| 4242 July 10 | | 21-32 to 21-53 | | | | | | Trace. |
| 4243 July 11 | e _E L _E F | 6-13-15 6-20 6-58 | | | | | | |
| 4244 July 11 | | 16-47 to 16-57 | | | | | | Trace. |
| 4245 July 12 | e _E e _E eL [?] F | 17-15-55 17-20-38 17-35 18-55 | | | | | | Operator in vault. |
| 4246 July 15 | e e _N e _E eL F | 16-47-10 16-48-14 16-55-00 17-01 18-05 | | | | | | |
| 4247 July 16 | | 20-21 to 20-40 | | | | | | Trace. |
| 4248 July 17 | | 4-09 to 4-28 | | | | | | Trace. |
| 4249 July 17 | O eP eS eSR _{2E} ? eL F | 9-13-37 9-20-31 9-25-59 9-29-03 9-32 10-40 | | | | 3680 | | |
| 4250 July 17 | | 12-27 to 12-44 | | | | | | L waves of small amplitude. |
| 4251 July 18 | e _N e i _E eL [?] F | 5-37-52 5-46-44 5-47-27 5-54 6-20 | | | | | | Small amplitude |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From July 18, 1931 to July 23, 1931 No. 25

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|-----------------|--|---|--------|----------------|----------------|----------------|----------|---|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4252 July 18 | O eP ePR ₂ N eS eSR ₁ N eSR ₂ E eL F | 11-23-53 11-34-55 11-39-07 11-43-57 11-48-55 11-52-11 11-56 13-15 ca | | | | | 7640 | |
| 4253 July 19 | | 11-29 to 11-59 | | | | | | Trace. |
| 4254 July 19 | | 20-39 to 21-50 | | | | | | L waves of small amplitude. May be two quakes. |
| 4255 July 20 | eN? eE e eL F | 8-52-06 8-55-06 9-04-00 9-20 10-10 | | | | | | |
| 4256 July 21 | e eE e eE eE eN eE eL F | 3-56-34 3-58-38 4-01-46 4-03-18 4-06-16 4-13-00 4-15-24 4-33 5-30 | | | | | | |
| 4257 July 21 | | 12-26 to 12-35 | | | | | | Trace. |
| 4258 July 21 | | 15-08 to 15-15 | | | | | | Trace on EW only. |
| 4259 July 22 | | 13-24 to 13-45 | | | | | | L waves of small amplitude. Operator in vault. |
| 4260 July 23 | e ? e e e eN eL ? F | 14-40-47 14-45-32 14-47-08 14-59-10 15-03-40 15-10 16-55 | | | | | | Small amplitude |



CANADA



International
Seismological
Centre

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From..... July 23, 1931..... to..... July 31, 1931..... No..... 26.....

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|-----------------|--------------------------|---|--------|---------------------|---------------------|---------------------|----------|-------------------|
| | | | | A _E μ | A _N μ | A _Z μ | | |
| | | h m s | s | | | | km. | |
| 4261 July 27 | O eP eS eL F | 7-16-09 7-22-20 7-27-14 7-31 8-25 | | | | | 3150 | |
| 4262 July 27 | eN eS ? eL F | 16-37.2 16-44-03 16-51 17-35 | | | | | | |
| 4263 July 29 | | 17-40 to 17-50 | | | | | | Trace |
| | N.B. | Milne-Shaw seismographs Nos. 17 and 25 have a paper speed of 15 mm. per minute. | | | | | | |
| | | | | | | | | <i>W W Borden</i> |

SEISMOLOGICAL BULLETINS RECEIVED

July

1931

International
Seismological
Centre

We acknowledge, with thanks, the receipt of the following seismological publications and bulletins.

| STATIONS | BULLETINS | RECEIVED |
|----------------|-----------------------------------|----------|
| Toledo | | |
| Almeria | | |
| Malaga | Sept. and October, 1930 | July 2 |
| Alicante | | |
| Cartuja | Seismological Notes Year 1930 | " 2 |
| Kobe | Oct. 1 - Dec. 31, 1930 | " 2 |
| Firenze | August - December, 1930 | " 2 |
| Pisa | April, 1931 | " 2 |
| Firenze | Sept. 21 - 27, 1929 | " 2 |
| La Paz | June, July and August/30 | " 3 |
| Rome | May 28 - June 10/31 | " 4 |
| Strasbourg | | |
| Paris | May, 1931 | " 7 |
| Central Bureau | | |
| Manila | April, 1931 | " 7 |
| Balavia | Jan. Feb. and March/31 | " 7 |
| Nagasaki | Feb. 2 - 15, 1929 | " 9 |
| " | Sept. Oct. Nov. 10 - 26/30 | " 9 |
| " | Dec. 2 - 22, 1930 and March, 1931 | " 9 |
| Riverview | July, August and Sept./28 | " 10 |
| " | Provisional for May, 1931 | " 10 |
| Wellington | Preliminary for May, 1931 | " 11 |
| Nagoya | Year 1930 | " 11 |
| Graz | Feb. 14 - June 1, 1931 | " 13 |
| Wien | Jan. 26 - April 12, 1931 | " 13 |
| Toronto | June, 1931; Jan 5 - 28/30 | |
| | Feb. 1 - 28, 1930 | " 14 |
| Sydney | May, 1931 | " 16 |
| Kobenhavn | Oct. Nov. & Dec. 1928 | " 17 |
| Tamanarive | Jan. & Feb. 1931 | " 17 |
| Santiago | Year 1929 | " 17 |
| Si-Ka-Wei | Feb. 27 - March 11/31 | " 22 |
| Stonyhurst | April - December, 1928 | " 23 |
| Uccle | Feb. 20 - April 18/31 | " 23 |
| Rome | June 11 - 24, 1931 | " 24 |
| Colaba | Year 1930 | " 24 |
| La Plata | March - April, 1931 | " 25 |
| Richmond | June, 1931 | " 27 |
| Osaka | Oct. - Dec. 1930 | " 27 |
| Berkeley | Apr. - Sept. 1930 | " 27 |
| Lick | | |
| Rome | June 25 - July 8, 1931 | " 30 |
| Nagasaki | Apr. 10 - 30, 1931 | " 30 |

DOMINION OBSERVATORY
O T T A W A - C A N A D A

R. Meldrum Stewart,
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W. W. Doxsee,
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OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY



R. MELDRUM STEWART, *Director*
ERNEST A. HODGSON, *Seismologist*
W. W. DOXBEE, *Assistant Seismologist*

$\phi = 45^{\circ} 23' 38''$ N. $\lambda = 75^{\circ} 42' 57''$ W. $h = 83$ m.

Lithologic foundation: boulder clay over limestone (Ordovician). Time: Mean Greenwich, midnight to midnight.
Time correction: within .25s.

INSTRUMENTS—FIXED CONSTANTS

| INSTRUMENT | SYMBOL | REGISTRATION | DAMPING | PAPER SPEED | MASS |
|---------------------|--------|--------------|----------|-----------------|-----------|
| Bosch..... | I | Photographic | Air | 15 mm. per min. | 200 g. |
| Bosch..... | II | Photographic | Magnetic | 15 mm. per min. | 200 g. |
| Milne-Shaw..... | 17 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Milne-Shaw..... | 23 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Deformation..... | D | Photographic | Air | 17 mm. per min. | 20 g. ca. |
| Spindler-Hoyer..... | W | Smoked Sheet | Air | 15 mm. per min. | 80 kgm. |

INSTRUMENTS—DETERMINED CONSTANTS

| INSTRUMENT | T. | r | v | ε | COMP. | 1" tilt | DETERMINED |
|------------|------|---|-----|------|-------|----------|---------------|
| I..... | 5.2 | | 120 | 2:1 | NS | displ'nt | Dec. 3, 1930 |
| II..... | 6.4 | | 120 | 10:1 | EW | | Dec. 3, 1930 |
| 17..... | 12.0 | | 250 | 20:1 | EW | 45 mm. | Dec. 30, 1930 |
| 23..... | 12.0 | | 250 | 20:1 | NS | 43 mm. | Dec. 22, 1930 |
| D..... | | | | | | | |
| D..... | | | | | | | |
| W..... | 6.0 | | 160 | 10:1 | Vert. | | Dec. 12, 1930 |

From August 1, 1931 to August 7, 1931 No. 27

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|----------------|---|-------------------------------|--------|----------------|----------------|----------------|----------|---|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4264 Aug. 1 | e _E ? e _L ? F | 0-35-30 0-40 1-05 | | | | | | |
| 4265 Aug. 1 | | 20-33 to 21-10 | | | | | | Trace on EW only. May not be seismic |
| 4266 Aug. 5 | | 4-14 to 4-28 | | | | | | Same type as No. 4265. |
| 4267 Aug. 6 | | 16-13 to 17-15 | | | | | | L waves of small amplitude. |
| 4268 Aug. 6 | e e _L ? F | 18-38-15 18-58 19-26 | | | | | | |
| 4269 Aug. 7 | O e _P _N e _{PR} _{LN} | 2-12-52 2-32-14 2-34-20 | | | | | 14,400 | |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

August 7, 1931

August 14, 1931

28

From..... to..... No.....

| No. and Date (cont'd) | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|-----------------------------|---|---|--------|----------------|----------------|----------------|----------|--|
| | | | | A _E | A _N | A _Z | | |
| 4269 Aug. 7 | eS ₀ PcSP ^h ePS _N eS ₀ PcPcS eSR ₂ E eL W ₂ F | 2-45-06 2-45-30 2-49-14 2-57-21 3-10 4-04 5-45 | S | μ | μ | μ | km. | |
| 4270 Aug. 7 | | 2-19 to 2-55 | | | | | | Trace |
| 4271 Aug. 8 | | 9-36 to 10-05 | | | | | | Trace |
| 4272 Aug. 8 | | 13-20 to 13-53 | | | | | | Trace |
| 4273 Aug. 8 | | 21-57 to 22-35 | | | | | | Trace |
| 4274 Aug. 9 | | 1-42 to 1-53 | | | | | | Trace |
| 4275 Aug. 10 | | 10-48 to 11-55 | | | | | | L waves of small amplitude. |
| 4276 Aug. 10 to 11 | O eP eS eSR ₁ N eL W ₂ F | 21-18-45 21-31-29 21-42-10 21-48-36 21-55 23-15 2-20 | | | | | 9630 | Maximum earth amplitude of 850μ at 22-06 Saskatoon Readings eP = 21-31-06 eS = 21-41-06 O = 21-19-04 Δ = 8800 |
| 4277 Aug. 11 | | 7-41 to 8-13 | | | | | | L waves of small amplitude. |
| 4278 Aug. 13 to 14 | eN eN eN e eN eL W ₂ F | 22-29-28 22-34-50 22-36-12 22-39-06 22-50-21 23-01 0-11 0-35 | | | | | | Δ probably of the order of 12,000 km |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From August 14, 1931 to August 18, 1931 No. 29

| No. and Date | Phase | Time h m s | Period s | Amplitude | | | Distance km. | Remarks |
|-----------------|---|---|-------------|---------------------|---------------------|---------------------|-----------------|--|
| | | | | A _E μ | A _N μ | A _Z μ | | |
| 4279 Aug. 14 | O eP eS eL F | 16-14-00 16-22-45 16-29-42 16-42 17-45 | | | | | 5270 | Small amplitude. |
| 4280 Aug. 16 | e eL _E F | 2-24-02 2-42 3-15 | | | | | | |
| 4281 Aug. 16 | O eP _N eS eL F | 8-05-46 8-10-26 8-14-10 8-16 9-11 | | | | | 2250 | |
| 4282 Aug. 16 | e _N e _E F | 11-27-04 11-28-10 11-40 | | | | | | Period of 4 secs. |
| 4283 Aug. 16 | O iP eS e eL F | 11-40-20 11-46-06 11-50-41 11-52-32 11-54 13-40 ca | | | | | 2890 | Saskatoon Record eP = 11-44-24 iS = 11-48-16 O = 11-39-34 Δ = 2340 km. |
| 4284 Aug. 16 | | 13-40 to 14-40 | | | | | | Period of 4 secs Operator in vault |
| 4285 Aug. 17 | | 9-33 to 9-54 | | | | | | Trace |
| 4286 Aug. 17 | | 13-35 to 13-45 | | | | | | Short period L waves. Operator in vault. |
| 4287 Aug. 17 | e _N ? L _E F | 18-11-20 18-40 19-05 | | | | | | |
| 4288 Aug. 18 | O eP _Z i _E eS _E eSR _{1E} eSR _{2E} eL _E W ₂ ? F | 14-21-17 14-33-50 14-44-09 14-44-21 14-50-08 14-54-07 14-59 15-40 17-40 | | | | | 9410 | NS components out of adjustment at time of quake. Saskatoon Reading eP = (14-32-03) iS = (14-42-04) O = (14-20-00) Δ = 8820 |



OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From August 18, 1931 to August 28, 1931 No. 30

| No. and Date | Phase | Time h m s | Period s | Amplitude | | | Distance km. | Remarks |
|-----------------------------|---|--|-------------|---------------------|---------------------|---------------------|-----------------------------|---------|
| | | | | A _E μ | A _N μ | A _Z μ | | |
| 4289 Aug. 18 | e _F ^E | 19-46-36 20-05 | | | | | Period of 6 secs. | |
| 4290 Aug. 22 | | 23-31 to 0-10 | | | | | L waves of small amplitude. | |
| 4291 Aug. 23 | O eP _E eS eL F | 18-01-36 18-08-47 18-14-29 18-20 19-06 | | | | 3910 | | |
| 4292 Aug. 24 to 25 | e _N ? e e e e e _E e eL W ₂ ? F | 21-49-07 21-53-04 21-55-04 21-59-28 21-59-37 22-02-00 22-06-26 22-07-13 22-24 23-30 0-50 | | | | | | |
| 4293 Aug. 25 | | 4-02 to 4-14 | | | | | Trace | |
| 4294 Aug. 25 | e _N eL? F | 22-33-40 22-37 23-15 | | | | | | |
| 4295 Aug. 26 | | 21-50 to 21-55 | | | | | Short period waves | |
| 4296 Aug. 27 | O eP ₁ ? ePR ₁ N ePR ₂ N eS _C P _C SP ePPS _Z e _N eL W ₂ F | (15-20-46) 15-39-46 15-41-01 15-44-02 15-51-26 15-52-15 15-54-00 16-12 17-30 19-40 | | | | (13,200) | | |
| 4297 Aug. 28 | | 1-41 to 1-52 | | | | | Trace | |



OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

August 28, 1931 ~~August 31, 1931~~

31

From..... to..... No.....

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|---------------------|----------------------------------|-----------------------------------|--------|----------------|----------------|----------------|----------|---------|
| | | | | A _E | A _N | A _Z | | |
| 4298 Aug. 28 | | h 29-48 to 23-55 | s | μ | μ | μ | km. | Trace. |
| 4299 Aug 30 | e ? e LN F ^H | 7-44.5 7-49-18 8-00 8-17 | | | | | | |
| <i>W. W. Doree.</i> | | | | | | | | |

SEISMOLOGICAL BULLETINS RECEIVED

August

1931



We acknowledge, with thanks, the receipt of the following seismological publications and bulletins.

| STATIONS | BULLETINS | RECEIVED |
|----------------|---|----------|
| Apia | April, 1931 | August 4 |
| Göttingen | January, February and March/31 | " 4 |
| Manila | May, 1931 | " 4 |
| Naples | May, June, July and August/29 | " 4 |
| Ravensburg | } January - June, 1931 | " 5 |
| Hohenheim | | |
| Stuttgart | | |
| Zi-Ka-Wei | | |
| " | March 12 - 19, 1931 | " 5 |
| " | March 20 - 31, 1930 | " 6 |
| " | August 8 - 21/29; October 24 - December 17, 1929 | " 6 |
| Perth | April 24 - June 17, 1931 | " 6 |
| Riverview | Provisional for June, 1931 | " 6 |
| Wellington | Preliminary for June, 1931 | " 6 |
| Perth | March 31, 1929 - March 22, 1930 | " 6 |
| Central Bureau | Bibliographical Bulletin No. 3 | " 6 |
| Toledo | Copies of seismograms May 20/31 | " 10 |
| Georgetown | June, 1931 | " 12 |
| " | Seismological Despatches | " 12 |
| Hamburg | April, May and June, 1931 | " 12 |
| La Plata | May, 1931 | " 14 |
| Saint Louis | Circular letter New Zealand quake | " 17 |
| San Fernando | Year 1930 | " 17 |
| Rome | July 9 - 22, 1931 | " 18 |
| Paris | } June, 1931 | " 18 |
| Strasbourg | | |
| Central Bureau | | |
| Sydney | June, 1931 | " 19 |
| Barcelona | May 20 - September 22, 1930 | " 20 |
| " | October 11 - December 10, 1930 | " 20 |
| " | January 1 - March 18, 1931 | " 20 |
| Frankfurt | April 1 - May 20, 1931 | " 22 |
| Richmond | July, 1931 | " 22 |
| Zurich | June 7 - August 10, 1931 | " 22 |
| Nagasaki | May 12 - 29, 1931 | " 24 |
| Toronto | April 16 - 30, 1930; March/30 | " 26 |
| " | July, 1931 | " 26 |
| Rome | July 23 - August 5, 1931 | " 26 |
| Pasadena | June and July, 1931 | " 27 |
| San Fernando | May, June and July, 1931 | " 29 |
| Manila | June, 1931 | " 31 |

DOMINION OBSERVATORY
OTTAWA / CANADA

R. Meldrum Stewart,
Director.

Ernest A. Hodgson,
Seismologist.
W. W. Doxsee,
Assistant Seismologist.



OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY



R. MELDRUM STEWART, *Director*

ERNEST A. HODGSON, *Seismologist*

W. W. DOXSEE, *Assistant Seismologist*

$\phi = 45^\circ 23' 38''$ N. $\lambda = 75^\circ 42' 57''$ W. $h = 83$ m.

Lithologic foundation: boulder clay over limestone (Ordovician). Time: Mean Greenwich, midnight to midnight.
Time correction: within .25s.

INSTRUMENTS—FIXED CONSTANTS

| INSTRUMENT | SYMBOL | REGISTRATION | DAMPING | PAPER SPEED | MASS |
|---------------------|--------|--------------|----------|-----------------|-----------|
| Bosch..... | I | Photographic | Air | 15 mm. per min. | 200 g. |
| Bosch..... | II | Photographic | Magnetic | 15 mm. per min. | 200 g. |
| Milne-Shaw | 17 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Milne-Shaw | 23 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Deformation | D | Photographic | Air | 17 mm. per min. | 20 g. ca. |
| Spindler-Hoyer..... | W | Smoked Sheet | Air | 15 mm. per min. | 80 kgm. |

INSTRUMENTS—DETERMINED CONSTANTS

| INSTRUMENT | T. | r | v | e | COMP. | 1" tilt | DETERMINED |
|------------|------|---|-----|------|-------|----------|---------------|
| I..... | 5.2 | | 120 | 2:1 | NS | displ'nt | Dec. 3, 1930 |
| II..... | 6.4 | | 120 | 10:1 | EW | | Dec. 3, 1930 |
| 17..... | 12.0 | | 250 | 20:1 | EW | 45 mm. | Dec. 30, 1930 |
| 23..... | 12.0 | | 250 | 20:1 | NS | 43 mm. | Dec. 22, 1930 |
| D..... | | | | | | | |
| D..... | | | | | | | |
| W..... | 6.0 | | 160 | 10:1 | Vert. | | Dec. 12, 1930 |

From..... September 1, 1931..... to..... September 7, 1931..... No. 32.....

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--------------------|-------------------------------------|---|--------|----------------|----------------|----------------|----------|--|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4300 Sept. 2 | | 15-52 to 16-23 | | | | | | L waves of small amplitude |
| 4301 Sept. 3 | e e F | 9-01-20 9-13-52 9-58 | | | | | | Small amplitude Probably two quakes |
| 4302 Sept. 6 | e e e eS ? e eL F | 8-08-10 8-09-34 8-11-24 8-12-52 8-15-16 8-17 9-16 | | | | | | |
| 4303 Sept. 6 | | 16-03 to 16-08 | | | | | | Trace May be non-seismic. |
| 4304 Sept. 7 | | 22-47 to 22-58 | | | | | | Trace |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From September 7, 1931 to September 20, 1931 No. 33

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|---------------------|--|---|--------|----------------|----------------|----------------|----------|-------------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4305 Sept. 8 | e e eL F | 19-26-04 19-33-02 19-54 20-48 | | | | | | |
| 4306 Sept. 9 | O eP eS eSR ₂ E eL F | 13-40-30 13-47-37 13-53-16 13-56-05 13-58 14-59 | | | | | 3850 | |
| 4307 Sept. 9 | O eP _N eP _E ? ePR ₁ ePR _{2N} iScPcS eScPcPcS i eL F | 20-38.1 20-52-18 20-56-12 20-56-43 20-59-00 21-02-39 21-03-24 21-03-52 21-22 23-20 | | | | | 11,500 | |
| 4308 Sept. 11 | | 23-29 to 23-52 | | | | | | L waves of small amplitude |
| 4309 Sept. 12 | e _E eL? F | 2-14-14 2-16 3-03 | | | | | | |
| 4310 Sept. 12 | e eL F | 15-55-04 16-01 16-25 ca | | | | | | Operator in vault. |
| 4311 Sept. 16 | | 12-35 to 12-43 | | | | | | Trace Period of 5 seconds. |
| 4312 Sept. 16 | e e eL F | 13-06-49 13-09-17 13-30 14-15 | | | | | | Operator in vault. |
| 4313 Sept. 19 | | 9-43 to 9-59 | | | | | | Trace |
| 4314 Sept. 20 | e _Z eL? F | 23-08-25 23-09-05 23-11 | | | | | | Nearby epicentre. |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From.....September 20, 1931..... to.....September 25, 1931..... No. 34.....

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|---------------------|---|--|--------|----------------|----------------|----------------|----------|---------------------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4315 Sept. 21 | e e _N e _N ? eL? F | 2-43-45 2-45-27 2-54-27 3-00 4-26 | | | | | | Micros mask record |
| 4316 Sept. 21 | e _E e e _N eL? F | 10-54-42 11-03-08 11-08-20 11-20 12-35 | | | | | | |
| 4317 Sept. 21 | e _E e _N i _N eL _E ? F _E | 13-56-40 14-08-32 14-12-24 14-22 15-05 | | | | | | Small amplitude |
| 4318 Sept. 21 | e _E L _E F | 21-53-51 22-06 22-25 | | | | | | |
| 4319 Sept. 22 | | 10-26 to 11-15 | | | | | | L waves of small amplitude |
| 4320 Sept. 23 | O eP _Z ? e _E iS eL? F | (22-47-37) 22-48-06 22-48-11 22-48-28 22-48-31 22-50 | | | | | (190) | |
| 4321 Sept. 25 | O eP' iPR ₁ e _E ePR _{2N} ePS ₀ PcSN ePS _N ePPS _Z eSR ₁ eSR _{2N} eL F | 5-59-22 6-19-10 6-22-13 6-23-10 6-25-28 6-32-37 6-33-04 6-34.5 6-40.25 6-45.7 7-04 9-40 | | | | | 16,000 | Interpretation with Macelwane tables. |
| 4322 Sept. 25 | | 22-56 to 23-08 | | | | | | Trace. |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

 From September 25, 1931 to September 30, 1931 No. 35

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|---------------------|---|---|--------|----------------|----------------|----------------|----------|---|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4323 Sept. 25 | e _Z e _L e _Z e _Z e _L F | 19-59-09 20-03 20-07-11 20-09-55 20-16 21-45 | | | | | | Apparently two earth quakes superimposed. |
| 4324 Sept. 27 | | 0-41 to 0-43 | | | | | | Trace on NS only |
| 4325 Sept. 29 | | 9-56 to 10-24 | | | | | | L waves of small amplitude on EW. Trace on NS |

SEISMOLOGICAL BULLETINS RECEIVED

September

1931



We acknowledge, with thanks, the receipt of the following seismological publications and bulletins:-

| STATIONS | BULLETINS | RECEIVED |
|----------------|--|-------------|
| Wellington | Preliminary for July, 1931 | September 2 |
| Zi-Ka-Wei | March 28 - April 6, 1931 | " 8 |
| Rome | August 6 - 9, 1931 | " 9 |
| Cartuja | March and April, 1931 | " 10 |
| Helwan | June and July, 1931 | " 10 |
| Perth | June 22 - August 10, 1931 | " 17 |
| Georgetown | August, 1931, and Seismological Despatches | " 17 |
| Melbourne | April, May and June, 1931 | " 17 |
| Kobe | January 1 - March 31, 1931 | " 17 |
| Sumoto | | |
| Toyooka | | |
| Strasbourg | | |
| Paris | July, 1931 | " 19 |
| Bureau Central | August, 1931 | " 21 |
| Pasadena | | |
| Richmond | August, 1931 | " 21 |
| Riverview | Provisional for July, 1931 | " 22 |
| Sydney | October, November and December/31 | " 22 |
| Cartuja | April, May and June, 1931 | " 24 |
| La Paz | August 24 - November 30, 1930 | " 24 |
| Rome | August 20 - September 2, 1931 | " 25 |
| Algiers | June, July and August, 1931 | " 25 |
| Beograd | March 12 - August 11, 1931 | " 25 |
| Osaka | July, 1931 | " 28 |
| Göttingen | April, May and June, 1931 | " 28 |
| La Plata | June and July, 1931 | " 29 |
| Toronto | August, 1931 | " 30 |
| Victoria | March, 1930 | " 30 |
| Wellington | Preliminary for August, 1931 | " 30 |

DOMINION OBSERVATORY

OTTAWA - CANADA

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SEISMOLOGIC STATION, DOMINION OBSERVATORY



R. MELDRUM STEWART, *Director*
ERNEST A. HODGSON, *Seismologist*
W. W. DOXSEE, *Assistant Seismologist*

$\phi = 45^\circ 23' 38''$ N. $\lambda = 75^\circ 42' 57''$ W. $h = 83$ m.

Lithologic foundation: boulder clay over limestone (Ordovician). Time: Mean Greenwich, midnight to midnight.
Time correction: within .25s.

INSTRUMENTS—FIXED CONSTANTS

| INSTRUMENT | SYMBOL | REGISTRATION | DAMPING | PAPER SPEED | MASS |
|---------------------|--------|--------------|----------|-----------------|-----------|
| Bosch..... | I | Photographic | Air | 15 mm. per min. | 200 g. |
| Bosch..... | II | Photographic | Magnetic | 15 mm. per min. | 200 g. |
| Milne-Shaw | 17 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Milne-Shaw | 23 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Deformation | D | Photographic | Air | 17 mm. per min. | 20 g. ca. |
| Spindler-Hoyer..... | W | Smoked Sheet | Air | 15 mm. per min. | 80 kgm. |

INSTRUMENTS—DETERMINED CONSTANTS

| INSTRUMENT | T. | r | v | ε | COMP. | 1" tilt | DETERMINED |
|------------|------|---|-----|------|-------|----------|---------------|
| I..... | 5.2 | | 120 | 2:1 | NS | displ'nt | Dec. 3, 1930 |
| II..... | 6.4 | | 120 | 10:1 | EW | | Dec. 3, 1930 |
| 17..... | 12.0 | | 250 | 20:1 | EW | 45 mm. | Dec. 30, 1930 |
| 23..... | 12.0 | | 250 | 20:1 | NS | 43 mm. | Dec. 22, 1930 |
| D..... | | | | | | | |
| D..... | | | | | | | |
| W..... | 6.0 | | 160 | 10:1 | Vert. | | Dec. 12, 1930 |

From October 1, 1931 to October 3, 1931 No. 56

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|-------------------|---|----------|--------|----------------|----------------|----------------|----------|---|
| | | | | A _E | A _N | A _Z | | |
| 4326 Oct. 1 | O | 11-45-32 | s | μ | μ | μ | 3650 km. | |
| | eP | 11-52-24 | | | | | | |
| | eS | 11-57-50 | | | | | | |
| | eSR _{LN} ? | 12-00-09 | | | | | | |
| | eL | 12-02 | | | | | | |
| | F | 13-40 | | | | | | |
| 4327 Oct. 3 | O | 19-13-21 | | | | | 13,700 | Interpretation with Gutenberg's curves. Saskatoon Readings: O = 19-12.7 Δ = 11,800 km. PR ₁ = 19-31.5 S _c P _c P _c S = 19-38.3 PS = 19-40.7 SR ₂ = 19-50.9 L = 19-59 Halifax Readings: O = 19-13.1 Δ = 14,600 km. PR ₁ = 19-35.0 SR ₁ = 19-52.7 L = 20-06 |
| | eP _E | 19-29-05 | | | | | | |
| | e _z | 19-32-07 | | | | | | |
| | ePR ₁ | 19-34-03 | | | | | | |
| | ePR _{2N} | 19-36-54 | | | | | | |
| | eS _c P _c S | 19-39-26 | | | | | | |
| | e | 19-43-38 | | | | | | |
| | ePPS _E | 19-45-20 | | | | | | |
| | e | 19-47-35 | | | | | | |
| | ePR _{2E} | 19-49-33 | | | | | | |
| | eS _c P _c P _c S | 19-50-10 | | | | | | |
| | iSR _{1E} | 19-50-34 | | | | | | |
| | e | 19-53-38 | | | | | | |
| | eSR ₂ | 19-55-45 | | | | | | |
| | eL | 20-03 | | | | | | |
| W ₂ | 21-10 | | | | | | | |
| W ₃ | 22-58 | | | | | | | |
| F | 23-30 + | | | | | | | |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From October 3, 1931 to October 8, 1931 No. 37

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|------------------------------|--|--|--------|----------------|----------------|----------------|----------|--|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4328 Oct. 3 to 4 | e eL W ₂ ? F | 23-24-50 23-44 0-48 2-38 | | | | | | Early phases masked by previous quake. |
| 4329 Oct. 5 | | 6-11 to 6-21 | | | | | | Trace. |
| 4330 Oct. 5 | e _N ? e _N e e _N L _E L _N F | 22-23-15 22-45-10 22-54-27 23-01-35 23-05 23-20 0-02 | | | | | | Small amplitude. |
| 4331 Oct. 6 | | 12-56 to 13-07 | | | | | | L waves with 9 sec. period. |
| 4332 Oct. 6 | | 14-45 to 15-15 | | | | | | Same type as No. 4331. |
| 4333 Oct. 6 | | 18-04 to 18-33 | | | | | | L waves of small amplitude. |
| 4334 Oct. 6 | e _N ? e _N e _N eL? F | 18-45-30 18-50-24 18-54-28 19-10 20-09 | | | | | | |
| 4335 Oct. 7 | e eL F | 9-37-45 9-42 9-58 | | | | | | |
| 4336 Oct. 7 | | 16-46 to 16-59 | | | | | | Trace on EW only. |
| 4337 Oct. 8 | | 2-58 to 3-37 | | | | | | L waves of small amplitude. |
| 4338 Oct. 8 | | 17-52 to 18-14 | | | | | | Trace on EW only. |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From October 8, 1931 to October 12, 1931 No. 38

| No. and Date | Phase | Time h m s | Period s | Amplitude | | | Distance km. | Remarks |
|--------------------|---|--|-------------|---------------------|---------------------|---------------------|---|----------------------|
| | | | | A _E μ | A _N μ | A _Z μ | | |
| 4339 Oct. 9 | | 0-26 to 0-50 | | | | | | Trace. |
| 4340 Oct. 9 | | 3-49 to 4-15 | | | | | | Trace. |
| 4341 Oct. 9 | | 23-43 to 23-52 | | | | | | Period of 8 seconds. |
| 4342 Oct. 10 | O eP ₁ eP ₂ eP ₁ eS _c P _c S eS _c P _c P _c S ePS ePS _c P _c S eN eSR ₁ eN eE eSR ₂ M eSR ₃ eN e eL W ₂ F | 0-19-47 0-35-17 0-38-47 0-40-07 0-45-55 0-47-23 0-49-48 0-50-05 0-55-09 0-57-00 0-59-32 0-59-47 1-01-49 1-05-17 1-08-24 1-09-40 1-16 2-29 6-56 | | | | 13,300 | Interpretation with Gutenberg's and Macelwane's curves. | |
| 4343 Oct. 10 | eE eL F | 7-49-30 8-04 8-56 | | | | | | |
| 4344 Oct. 10 | eE eN eE eL F | 16-57-15 16-58-06 17-05-05 17-08 18-38 | | | | | | |
| 4345 Oct. 12 | eE L F | 1-08-17 1-36 2-10 | | | | | | |
| 4346 Oct. 12 | eE eN eL eLE F | 3-30-06 3-36-22 3-57 4-15 5-24 | | | | | | Probably two quakes. |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From October 12, 1931 to October 23, 1931 No. 39

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--------------------|--|--|--------|----------------|----------------|----------------|----------|---|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4347 Oct. 12 | e _E e _N e _N e _L F | 13-54-02 14-00-20 14-04-19 14-20 15-05 | | | | | | |
| 4348 Oct. 13 | | 5-36 to 6-20 | | | | | | L waves of small amplitude. |
| 4349 Oct. 13 | | 12-23 to 12-45 | | | | | | Trace. |
| 4350 Oct. 17 | | 12-50 to 13-10 | | | | | | L waves of small amplitude. |
| 4351 Oct. 18 | 0 e _{PE} ? e _{PR₂N} e _{SN} e _E e _{SR₂N} e _L F | (0-53-09) 1-04-35 1-09-26 1-14-00 1-15-26 1-22-24 1-30 3-15 | | | | | (8100) | |
| 4352 Oct. 18 | i _E i _N e e _E e _N e _E e _L ? F | 4-54-37 4-57-03 5-00-23 5-02-04 5-05-29 5-08-45 5-18 6-20 | | | | | | Small amplitude. |
| 4353 Oct. 21 | e _N L F | 2-02-08 2-10 2-21 | | | | | | |
| 4354 Oct. 21 | | 9-58 to 10-10 | | | | | | Trace. |
| 4355 Oct. 21 | | 14-31 to 15-05 | | | | | | Operator in vault. L waves of small amplitude. |
| 4356 Oct. 23 | | 12-46 to 13-06 | | | | | | Trace. |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From October 23, 1931 to October 31, 1931 No. 40

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|---|-----------------|----------------------------|--------|----------------|----------------|----------------|----------|-----------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4357 Oct. 23 | | (20-30) to (22-00)ca | | | | | | Operator in vault. |
| 4358 Oct. 26 | eS ? eL F | 4-37-32 4-43 5-20 | | | | | | |
| 4359 Oct. 27 | | 19-15 to 20-00 | | | | | | Trace. |
| 4360 Oct. 28 | | 6-27 to 7-20 | | | | | | L waves of small amplitude. |
| <p>N. B. Milne-Shaw No. 23 dismantled from October 23rd to October 31st.</p> <p style="text-align: center;"><i>W. W. Dorsee</i></p> | | | | | | | | |

SEISMOLOGICAL BULLETINS RECEIVED

October,

1931.



We acknowledge, with thanks, the receipt of the following seismological publications and bulletins:-

| STATIONS | BULLETINS | RECEIVED |
|-----------------|---------------------------------|-----------|
| Sydney | July, 1931 | October 1 |
| Uccle | April 19 to July 5, 1931 | " 1 |
| Wellington | Year 1930 | " 1 |
| Manila | July, 1931 | " 3 |
| Balboa | | |
| Bozeman | | |
| Charlottesville | | |
| Chicago | | |
| Columbia | January, February and March/31 | " 3 |
| Honolulu | | |
| Pittsburg | | |
| San Juan | | |
| Seattle | | |
| Sitka | | |
| Tucson | | |
| Toledo | | |
| Almeria | November and December, 1930 | " 3 |
| Malaga | | |
| Alicante | | |
| Rome | September 3 to September 16/31 | " 7 |
| Kobenhavn | January to September, 1929 | " 8 |
| Reykjavik | January, February and March/31 | " 9 |
| Miyazaki | Year 1930 | " 13 |
| Toronto | September, 1931 | " 13 |
| Riverview | August, 1931 | " 15 |
| Georgetown | September, 1931 | " 15 |
| " | Seismological Despatches | " 15 |
| Zi-Ka-Wei | April 6 to April 24, 1931 | " 15 |
| Paris | | |
| Strasbourg | August, 1931 | " 19 |
| Bureau Central | | |
| Pasadena | September, 1931 | " 20 |
| Jinsen (Zinsen) | July and August, 1931 | " 21 |
| Zurich | August 18 to October 3, 1931 | " 22 |
| Algiers | September, 1931 | " 22 |
| Zagreb | January to June, 1931 | " 22 |
| Richmond | September, 1931 | " 26 |
| Jinsen (Zinsen) | September, 1931 | " 28 |
| Nagasaki | June and July, 1931 | " 28 |
| Sydney | August, 1931 | " 29 |
| Perth | August 13 to September 11/31 | " 29 |
| Rome | September 17 to September 30/31 | " 29 |
| Fordham | June to September, 1931 | " 29 |
| Manila | August, 1931 | " 30 |

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$\phi = 45^\circ 23' 38''$ N. $\lambda = 75^\circ 42' 57''$ W. $h = 83$ m.

Lithologic foundation: boulder clay over limestone (Ordovician). Time: Mean Greenwich, midnight to midnight.
Time correction: within .25s.

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| INSTRUMENT | SYMBOL | REGISTRATION | DAMPING | PAPER SPEED | MASS |
|---------------------|--------|--------------|----------|-----------------|-----------|
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| Bosch..... | II | Photographic | Magnetic | 15 mm. per min. | 200 g. |
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| Milne-Shaw..... | 23 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Deformation..... | D | Photographic | Air | 17 mm. per min. | 20 g. ca. |
| Spindler-Hoyer..... | W | Smoked Sheet | Air | 15 mm. per min. | 80 kgm. |

INSTRUMENTS—DETERMINED CONSTANTS

| INSTRUMENT | T. | r | v | ε | COMP. | DETERMINED |
|------------|------|---|-----|------|-------|---------------------------------|
| I..... | 5.2 | | 120 | 2:1 | NS | 1" tilt displ't Dec. 3, 1930 |
| II..... | 6.4 | | 120 | 10:1 | EW | Dec. 3, 1930 |
| 17..... | 12.0 | | 250 | 20:1 | EW | 45 mm. Dec. 30, 1930 |
| 23..... | 12.0 | | 250 | 20:1 | NS | 46 mm. Nov. 9, 1931 |
| D..... | | | | | | |
| D..... | | | | | | |
| W..... | 6.0 | | 160 | 10:1 | Vert. | Dec. 12, 1930 |

From November 1, 1931 to November 2, 1931 No. 41

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|---|---|--|--------|----------------|----------------|----------------|----------|---------------------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| N. B. Milne-Shaw No. 23 not operating from November 1 to 9th. | | | | | | | | |
| 4361 Nov. 1 | e _E e _L F | 19-31-02 19-42 20-46 | | | | | | |
| 4362 Nov. 2 | O i _P e _S e _{SR} _{2E} ? e _L F | 0-31-58 0-38-50 0-44-16 0-47-18 0-51 2-30 | | | | | 3650 | |
| 4363 Nov. 2 | e _E e _E e _N e _E e _L W ₂ ? F | 10-16-45 10-20-50 10-27.4 10-28-02 10-47 11-51 14-03 | | | | | | Δ probably of the order of 12,000 km. |



CANADA

OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

November 2, 1931

November 11, 1931

42

From..... to..... No.....

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--------------------|---|---|--------|----------------|----------------|----------------|----------|----------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4364 Nov. 2 | O eP ₁ ePR ₂ ePPS ₂ eL _? W ₂ F | 17-04-14 17-24-15 17-31-13 17-41-33 18-00 18-56 19-59 | | | | | 16,700 | |
| 4365 Nov. 2 | | 23-34 to 0-01 | | | | | | Trace. |
| 4366 Nov. 3 | | 17-01 to 17-44 | | | | | | Trace. |
| 4367 Nov. 4 | e _E eL _? F | 18-10.2 18-27 19-24 | | | | | | |
| 4368 Nov. 5 | | 2-08 to 2-21 | | | | | | Period of 9 seconds. |
| 4369 Nov. 5 | e _E L _E W ₂ F | 7-12-45 7-15 8-17 8-42 | | | | | | May be two quakes. |
| 4370 Nov. 5 | e _E eL F | 12-43-00 12-58 14-20 ca | | | | | | |
| 4371 Nov. 6 | | 4-41 to 4-58 | | | | | | Trace. |
| 4372 Nov. 11 | | 4-51 to 5-20 | | | | | | L waves of small amplitude |
| 4373 Nov. 11 | e _N e _N e _E F | 13-01-03 13-09-25 13-14-28 14-05 | | | | | | |
| 4374 Nov. 11 | | 15-25 to 15-40 | | | | | | Operator in vault. |



CANADA

OTTAWA, CANADA
SEISMOLOGIC STATION, DOMINION OBSERVATORY

From November 11, 1931 to November 21, 1931 No. 43

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--------------------|--|--|--------|----------------|----------------|----------------|----------|--|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4375 Nov. 12 | | 17-14 to 17-45 | | | | | | L waves of small amplitude. |
| 4376 Nov. 13 | | 9-30 to 9-37 | | | | | | Period of 11 seconds. |
| 4377 Nov. 14 | | 5-49 to 6-01 | | | | | | Trace. |
| 4378 Nov. 14 | e _E ? eL F | 14-04-40 14-11 14-32 | | | | | | |
| 4379 Nov. 16 | | 10-19 to 10-37 | | | | | | Trace. |
| 4380 Nov. 17 | | 21-16 to 21-29 | | | | | | Trace. |
| 4381 Nov. 18 | e _N e _E e _N e _E e _N eL F | 3-59-09 4-00-48 4-06-52 4-08-43 4-11-02 4-30 5-33 | | | | | | Small amplitude. |
| 4382 Nov. 20 | | 10-53 to 11-02 | | | | | | Period of 9 seconds. |
| 4383 Nov. 20 | | 11-26 to 11-35 | | | | | | Small amplitude. |
| 4384 Nov. 20 | e _E e _E e _E e _E e _E ? eL? W ₂ F | 14-36-40 14-46-43 14-48-10 14-49-12 14-53.8 15-13 16-10 17-25 | | | | | | No.23 not operating at start of quake. |
| 4385 Nov. 21 | e _E L F | 17-51-22 18-00 18-50 | | | | | | |



OTTAWA, CANADA
SEISMOLOGIC STATION, DOMINION OBSERVATORY

From November 21, 1931 to November 30, 1931 No. 44

| No. and Date | Phase | Time h m s | Period s | Amplitude | | | Distance km. | Remarks |
|--------------------|-------|----------------------|-------------|---------------------|---------------------|---------------------|------------------|---------|
| | | | | A _E μ | A _N μ | A _Z μ | | |
| 4386 Nov. 24 | | 9-52 to 10-10 | | | | | Trace. | |
| 4387 Nov. 25 | | 11-47 to 11-52 | | | | | Small amplitude. | |
| 4388 Nov. 25 | | 15-19 to 15-34 | | | | | Trace. | |

W. W. Dorse

SEISMOLOGICAL BULLETINS RECEIVED

November

1931



We acknowledge, with thanks, the receipt of the following seismological publications and bulletins.

| STATIONS | BULLETINS | RECEIVED |
|-----------------|---|------------------|
| Osaka | August, 1931 | November 2, 1931 |
| Helwan | August and September, 1931 | " 2, 1931 |
| Zi-Ka-Wei | April 24 - May 14, 1931 | " 6, 1931 |
| Balboa | } April, May and June, 1931 | " 7, 1931 |
| Bozeman | | |
| Charlottesville | | |
| Chicago | | |
| Columbia | | |
| Honolulu | | |
| Pittsburg | | |
| San Juan | | |
| Seattle | | |
| Sitka | | |
| Tucson | } October, November and December/27 Preliminary for September, 1931 | " 9, 1931 |
| Oxford | | |
| Wellington | | |
| Rome | October 1 - 14, 1931 | " 12, 1931 |
| Paris | } September, 1931 | " 14, 1931 |
| Strasbourg | | |
| Bureau Central | | |
| Zi-Ka-Wei | May 17 - 23, 1931 | " 17, 1931 |
| Batavia | April, May and June, 1931 | " 17, 1931 |
| Rome | October 15 - 28, 1931 | " 18, 1931 |
| Richmond | October, 1931 | " 23, 1931 |
| Manila | Philippine Epicentres 1920-1929 | " 23, 1931 |
| Apia | July, August and September, 1931 | " 24, 1931 |
| Riverview | Provisional for September, 1931 | " 24, 1931 |
| Wellington | Year 1930 | " 24, 1931 |
| San Fernando | August, 1931 | " 24, 1931 |
| Algiers | October, 1931 | " 24, 1931 |
| Wellington | January, 1931 | " 25, 1931 |
| Osaka | September, 1931 | " 27, 1931 |
| La Plata | September, 1931 | " 27, 1931 |
| Toronto | May, 1930 to October, 1931 | " 27, 1931 |
| Victoria | April and May, 1930 | " 27, 1931 |
| Mizusawa | Year 1930 | " 28, 1931 |
| Zi-Ka-Wei | April 27 - July 29, 1931 | " 28, 1931 |
| Pasadena | October, 1931 | " 30, 1931 |
| Karlsruhe | July, August and September, 1931 | " 30, 1931 |
| Karlsruhe | April, May and June, 1931 | " 30, 1931 |

DOMINION OBSERVATORY
OTTAWA-CANADA

R. Meldrum Stewart,
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OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY



R. MELDRUM STEWART, *Director*
ERNEST A. HODGSON, *Seismologist*
W. W. DOXSEE, *Assistant Seismologist*

$\phi = 45^{\circ} 23' 38''$ N. $\lambda = 75^{\circ} 42' 57''$ W. $h = 83$ m.

Lithologic foundation: boulder clay over limestone (Ordovician). Time: Mean Greenwich, midnight to midnight.
Time correction: within .25s.

INSTRUMENTS—FIXED CONSTANTS

| INSTRUMENT | SYMBOL | REGISTRATION | DAMPING | PAPER SPEED | MASS |
|---------------------|--------|--------------|----------|-----------------|-----------|
| Bosch..... | I | Photographic | Air | 15 mm. per min. | 200 g. |
| Bosch..... | II | Photographic | Magnetic | 15 mm. per min. | 200 g. |
| Milne-Shaw | 17 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Milne-Shaw | 23 | Photographic | Magnetic | 8 mm. per min. | 1 lb. |
| Deformation | D | Photographic | Air | 17 mm. per min. | 20 g. ca. |
| Spindler-Hoyer..... | W | Smoked Sheet | Air | 15 mm. per min. | 80 kgm. |

INSTRUMENTS—DETERMINED CONSTANTS

| INSTRUMENT | T. | r | v | ε | COMP. | l" tilt | DETERMINED |
|------------|------|---|-----|------|-------|----------|----------------|
| I..... | 5.2 | | 120 | 2:1 | NS | displ'nt | Dec. 3, 1930. |
| II..... | 6.4 | | 120 | 10:1 | EW | | Dec. 3, 1930. |
| 17..... | 12.0 | | 250 | 20:1 | EW | 45 mm. | Dec. 30, 1930. |
| 23..... | 12.0 | | 250 | 20:1 | NS | 46 mm. | Nov. 9, 1931. |
| D..... | | | | | | | |
| D..... | | | | | | | |
| W..... | 6.0 | | 160 | 10:1 | Vert. | | Dec. 12, 1930. |

From December 1, 1931 to December 10, 1931 No. 45

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--------------------|--|---|--------|----------------|----------------|----------------|----------|-----------------------------|
| | | | | A _E | A _N | A _Z | | |
| | | h m s | s | μ | μ | μ | km. | |
| 4389 Dec. 1 | e e eL F | 4-03-10 4-09.0 4-23 5-50 | | | | | | |
| 4390 Dec. 1 | e _N e e _N eL? W _{2E} ? F | 18-53-32 18-58-28 19-07-40 19-13 19-43 20-25 | | | | | | |
| 4391 Dec. 3 | e F | 10-36-38 10-57 | | | | | | Period of 10 secs. |
| 4392 Dec. 6 | | 5-08 to 5-35 | | | | | | Micros mask. |
| 4393 Dec. 10 | | 2-13 to 2-35 | | | | | | L waves of small amplitude. |



CANADA



OTTAWA, CANADA

SEISMOLOGIC STATION, DOMINION OBSERVATORY

From December 10, 1931 to December 31, 1931 No. 46

| No. and Date | Phase | Time | Period | Amplitude | | | Distance | Remarks |
|--------------------|---|--|--------|----------------|----------------|----------------|----------|---|
| | | | | A _E | A _N | A _Z | | |
| | | h. m. s. | s. | μ | μ | μ | km. | |
| 4394 Dec. 13 | | 16-37 to 16-51 | | | | | | Trace. |
| 4395 Dec. 14 | e _E [?] e _N L F | 19-38.5 19-41-28 19-56 20-11 | | | | | | |
| 4396 Dec. 18 | e _N e _N e _N eL ? F | 10-12-00 10-26-20 10-30-12 11-00 12-00 | | | | | | |
| 4397 Dec. 20 | | 15-11 to 15-26 | | | | | | L waves of small amplitude. |
| 4398 Dec. 22 | | 3-21 to 3-29 | | | | | | Trace. |
| 4399 Dec. 24 | O iP eS _N eL F | 3-41-21 3-49-23 3-55-44 4-00 4-34 | | | | | | Small amplitude. |
| 4400 Dec. 25 | | 4-11 to 5-25 | | | | | | L waves of small amplitude. |
| 4401 Dec. 28 | | 11-46 to 11-59 | | | | | | L waves of small amplitude. |
| 4402 Dec. 31 | eL ? L F | 1-23 1-40 2-11 | | | | | | Sinusoidal L waves of 20 secs. period and small amplitude |

W. W. Doree

SEISMOLOGICAL BULLETINS RECEIVED

1931



We acknowledge, with thanks, the receipt of the following seismological publications and bulletins:-

| STATIONS | BULLETINS | RECEIVED |
|----------------|----------------------------------|------------|
| Rome | October 29 - November 11, 1931 | December 2 |
| Helwan | October, 1931 | " 4 |
| Manila | September, 1931 | " 7 |
| Hamburg | July, Aug., Sept. and October/31 | " 7 |
| Nagasaki | August and September, 1931 | " 9 |
| Riverview | Provisional for October, 1931 | " 9 |
| Zinsen | October, 1931 | " 9 |
| Perth | September 21 - October 4, 1931 | " 9 |
| Melbourne | July, 1931 | " 9 |
| Georgetown | October and November, 1931 | " 9 |
| " | Seismological Despatches | " 9 |
| Wellington | October, 1931 | " 10 |
| Osaka | October, 1931 | " 10 |
| Paris | } October, 1931 | " 12 |
| Strasbourg | | |
| Bureau Central | | |
| Zi-Ka-Wei | June 12 - 25, 1931 | " 14 |
| Zi-Ka-Wei | May 24 - June 11, 1931 | " 15 |
| Rome | November 12 - 25, 1931 | " 17 |
| Cartuja | June, July and August, 1931 | " 18 |
| Toronto | June, 1930 and November, 1931 | " 18 |
| Victoria | June, 1930 | " 18 |
| Graz | May 7 - August 27, 1931 | " 21 |
| Lemberg | March 9 - September 25, 1931 | " 21 |
| Innsbruck | November 25/30 - April 12/31 | " 21 |
| Wien | April 12 - June 23, 1931 | " 21 |
| Richmond | November, 1931 | " 21 |
| Sydney | September, 1931 | " 22 |
| Pasadena | November, 1931 | " 28 |
| Algiers | November, 1931 | " 28 |
| Zi-Ka-Wei | June 27 - July 18, 1931 | " 29 |
| Helwan | November, 1931 | " 29 |
| Kobe | April, May and June, 1931 | " 29 |

DOMINION OBSERVATORY
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