CLEVELAND

SEISMOLOGICAL OBSERVATORY
JOHN CARROLL UNIVERSITY, CLEVELAND 18, OHIO, U. S. A.
41° 29' 27.90" North, 81° 31' 52.22" West, h = 326 m.

Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical.

Bulletin for January, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
January 2		15^h07^m to 15 17	Surface waves
January 2		19^h51^m to 20 12	Surface waves
January 4 No. 1	ePR_1 Z $epPR_1$ Z iSKS E iSKKS E eS N i E i E isSKS E isS N i E i N F E	$9^h14^m26^s$ 9 16 54 9 19 43.8 9 20 41.3 9 21 28 9 23 20.8 9 23 40 9 24 29.8 9 25 22.8 9 [illegible] 49.8 9 29 19.8 10 26	Epicenter by U.S.C.&G.S. 21° S. 180° H = $8^h56.5^m$ h = 600 km. Tonga Island Region. Δ meas = 110°
January 6 No. 2	iP Z e E i N i E i Z i N i N iPR_2 E i Z iS N iS E i NE i Z (M) E F - lost in changing records.	$17^h29^m19.5^s$ comp 17 29 20 17 29 20.4 17 29 23.6 17 29 24.1 17 29 25.8 17 30 15.6 17 30 20.6 17 31 53.7 17 34 20 17 34 22 17 34 41 17 35 30.3 17 43 54	Epicenter by U.S.C.&G.S. 16°5N. 98° W. H = 17^h 23.4^m Oaxaca, Mexico Magnitude by Pasadena, about 7. Δ meas = 28°9

Bulletin for January, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
January 6 No. 3	iP Z i Z Secondaries and F lost in surface waves of preceding shock.	$18^h06^m04.2^s$ 18 12 12.8	Aftershock of preceding quake.
January 7		17^h22^m to 17 37	Surface waves
January 8		05^h24^m to 05 30	Surface waves
January 9		21^h16^m to 21 26	Surface waves
January 10		01^h02^m to 01 10	Surface waves
January 10 No. 4	e(PS) E eSR$_1$ E L E M E F E	$05^h44^m09^s$ 05 49 36 06 07.2 06 11.4 06 52	Epicenter by U.S.C.&G.S. 20° S. 169° E. H = 05^h 14.5^m New Hebrides Islands Region Δ meas = 113°5
January 10		07^h02^m to 07 51	Seismic activity and surface waves. Probable aftershock of quake No. 4.
January 11		21^h26^m to 22 00	Surface waves
January 12		19^h27^m to 19 38	Surface waves
January 13		18^h09^m to --lost in changing	Surface waves records at18^h26^m

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
January 14 No. 5	e(P) E e(P) Z iS N e E eSR_1 E eSR_1 N e N eL E iM N F E	$02^h35^m17^s$ 02 35 22 02 43 01 02 43 16 02 47 04 02 47 06 02 47 14 02 51.9 02 58 26 04 19	Epicenter by U.S.C.&G.S. 10° S. 109° W. H = 02^h 25.4^m 1,200 miles North of Easter Islands. Δ meas = 57°4
January 16 No. 6	eP Z iP E i Z i N iS N i N M N F - lost in changing records.	$13^h19^m21.9^s$comp 13 19 23.9 dil main shock 13 19 30.9 13 19 36.2 13 28 24 13 29 15 13 32.6	Epicenter by U.S.C.&G.S. 52° N. 172° E. H = 11^h 08.5^m h = 100 km. Aleutian Islands Pasadena gives magnitude 6 3/4 Δ meas = 67°7
Earthquake of January 17th - 7th hour lost.			
January 18		14^h33^m to 15 23	Seismic activity
January 20 No. 7	ePR_1 Z iPS N ePS E eSR_2 N L N M E F - lost in changing records at 12^h34^m.	$10^h04^m00.7^s$ 10 13 42.4 10 13 43 10 19 57 10 31.7 10 42.6	Epicenter by U.S.C.&G.S. 33° S. 179° E. H = 9^h 44.0^m Kermadec Island region. Depth slightly greater than normal. Pasadena reports magnitude about 7. Δ meas = 117°8
January 21		18^h19^m to 18 47	Seismic activity

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
January 22	Quake of 12^h lost; no time on records.		Epicenter by U.S.C.&G.S. 22° S. 175° W. H = 12^h 55.3^m h about 150 km. Tonga Islands Region.
January 23		20^h33^m to 21 00	Surface waves
January 24 No. 8	iP' Z iPR$_1$ Z i N e Z i E i Z i Z iSKP N i N i Z iSKKS N iPS N i E i N iSR$_1$ N F - lost in changing records at 22^h04^m.	$06^h05^m43.2^s$ 06 07 15.0 06 07 18 06 07 22 06 07 24 06 07 25 06 07 36.2 06 08 34 06 08 54 06 08 55.3 06 14 19 06 17 18 06 17 31 06 19 12 06 24 21	Epicenter by U.S.C.&G.S. 10° N. 122° E. H = 17^h 46.6^m Off southwest coast of Panay, Philippine Is. 17 reported dead, at least $500,000 property damage Pasadena reports magnitude 8 1/4 Δ meas = 124°2
January 24 No. 9	(e) Z eP Z i Z eS E	$23^h13^m46^s$ 23 14 05 comp 23 14 35.5 23 19 24	Epicenter by U.S.C.&G.S. 19° N. 108° W. H = 23^h 08.1^m Central Mexico Record weak Secondaries obscured by microseisms. The P phase is 29 sec. early and the S phase 27 sec. early. No reason is apparent for this discrepancy. Δ meas = 31°7

Bulletin for January, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
January 26 No. 10	eP' Z e(PR_1) Z eSKS N i N eSKKS N ePS N ePPS N i N iSR_1 E e E F N	$14^h29^m43.0^s$ 14 31 08.5 14 36 29 14 36 56 14 38 30 14 41 24 14 43 04 14 48 01 14 48 16 14 51 04 16 33	Epicenter by U.S.C.&G.S. 10° N. 122° E. $H = 14^h\ 10.8^m$ Aftershock of Philippine Quake of January 24, 17^h Δ meas = 124?2
January 26		19^h16^m to 19 31	Surface waves
January 27 No. 11	e N eP' E i E iSKS E iS· N iS N e E iPS E i E isSKS E isS NE ipPS E i E iSR_1 N i E i E i E $isSR_1$ N F E	$12^h15^m36^s$ 12 15 53 12 19 29 12 21 31 12 23 05 12 23 09 12 24 41 12 24 56 12 25 27 12 25 51 12 27 18 12 28 36 12 30 54 12 30 57 12 31 00 12 32 42 12 34 21 12 35 11 14 32	Epicenter by U.S.C.&G.S. 20° S. 178° W. $H = 11^h\ 58.3^m$ h = 600 km. Tonga Islands Region. Pasadena reports magnitude 7.25 Δ meas = 108°
January 28 No. 12	e(P') Z i Z iPR_1 Z iPR_1 N i(S) NE ePPS E e N e E e E F E	$04^h06^m28^s$ 04 08 43.7 04 09 43.4 04 09 45.3 04 15 28.1 04 19 19 04 19 34 04 20 35 04 26 03 06 05	Epicenter by U.S.C.&G.S. 10° N. 122° E. $H = 3^h\ 47.2^m$ Aftershock of Philippine Quake of January 24, 17^h Δ meas 124?2 Record weak.

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
January 28 No. 13	eP Z eSKS N eSKS E ePS E e N e E M E F - lost in changing records at 17^h38^m.	$16^h04^m51^s$ 16 15 31 16 15 32 16 17 14 16 27 25 16 27 37 16 43.8	Epicenter by U.S.C.&G.S. 38° N. 68° E. H = 15^h 51.3^m Turkistan Δ meas = 96°0
January 30		00^h28^m to 01 00	Surface waves
January 30		00^h26^m to 00 32	Surface waves
January 30		03^h25^m to 03 51	Seismic activity
January 30 No. 14	e(PR_1) NE e(PR_2) N e E eSKS E e SKS N ePS NE eSR_1 N e E e N e E e E e E e N L N M N F E	$09^h02^m41^s$ 09 04 15 09 06 41 09 09 46 09 09 49 09 11 53 09 17 31 09 17 44 09 18 28 09 18 36 09 22.1 09 30 16 09 30 19 09 35.5 09 43.8 11 29	Epicenter by U.S.C.&G.S. 24° N. 64° E. H = 8^h 43.6^m Arabian Sea off the coast of Baluchestan Δ meas = 106°8 Record weak

MICROSEISMIC REPORT

Amplitudes are read to the nearest tenth millimeter
at 0, 6, 12, 18 hrs., G.M.C.T.
Decimal point is dropped in recording the amplitude

January, 1948

	Component EW				Component NS			
Hour / Date	0	6	12	18	0	6	12	18
1	14	22	19	39	21	28	23	33
2	36	33	30	36	39	42	50	35
3	30*	60*	60*	65	40*	55*	53*	83
4	73	48	29	29	85	59	33	23
5	17	20	10	10	20	14	13	20
6	18	19	10	Lost	21	16	13	Lost
7	13	10	10	12	11	10	10	14
8	12	17	21	18	12	21	23	30
9	21	21	15	12	23	22	16	17
10	12	12	14	13	12	14	22	21
11	12	11	15	22	21	15	21	22
12	22	20	15	15	31	25	Lost	20
13	12	12	13	12	17	15	13	12
14	10	09	08	10	18	12	Lost	17
15	10	12	21	14	21	33	Lost	21
16	19	17	12	NR**	20	21	20	NR**
17	NR	NR	NR	04	NR**	NR**	NR**	06
18	05	12	Lost	12	10	10	Lost	27
19	10	Lost	Lost	Lost	22	15	12	15
20	09	12	06	15	22	20	20	12
21	12	14	12	10	30	22	22	17
22	07	07	05	05	12	10	13	12
23	15	12	10	09	19	12	10	19
24	12	24	22	40	21	31	31	40
25	32	32	19	20	33	35	33	31
26	13	12	12	12	22	15	15	15
27	09	11	10	12	10	12	06	12
28	20	20	21	Lost	Lost	18	23	Lost
29	19	21	18	20	20	20	19	20
30	20	13	12	14	14	13	12	20
31	13	15	14	12	20	12	14	20

* Several periods presents ranging from 4 - 7 seconds.
** NR--No record

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41° 29′ 27.90″ North, 81° 31′ 52.22″ West, h = 326 m.
Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical.

Bulletin for February, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
February 1		21^h18^m to 21 59	Seismic activity mainly surface waves
February 3		01^h22^m to 02 15	Surface waves
February 4		02^h34^m to 03 24	Surface waves
February 4		03^h54^m to 04 09	Surface waves
February 5		19^h47^m to 19 57	Surface waves
February 6		02^h10^m to 02 47	Seismic activity
February 6 No. 15	M F F N	$21^h33.7^m$ 21 45	
February 6		22^h55^m to 00 24	Seismic activity and surface waves
February 9 No. 16	iP Z iP NE i N i NE iS E iS N eSP Z i N i N F E	$13^h10^m22.9^s$ dil 13 10 24 13 10 26 13 10 31 13 20 22 13 20 24 13 20 53 13 21 23 13 22 00 17 23	Epicenter by U.S.C.&G.S. 37° N. 26° E. Aegean Sea. H = 12^h 58.4^m Δ meas = 78°2 Pasadena reports magnitude about 7.25

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
February 10		20^h13^m to 20 21	Surface waves
February 11 No. 17	eP Z eP Z iP Z ePR_1 Z iPR_1 Z eS NE eSR_1 E eSR_1 N e NE e N M NE F E	$15^h49^m53.7^s$ dil 15 49 55 comp, main shock 15 49 56.7 15 51 35 15 51 36.4 15 56 19 15 59 18 15 59 19 15 59 26 15 59 38 16 04 25 17 11	Epicenter by U.S.C.&G.S. 64° N. 147° W. Central Alaska $H = 15^h 41.9^m$ Δ meas = 43.0
February 11		17^h40^m to 18 01	Surfaces waves Probable after-shock of preceding quake.
February 13	L E F E	$05^h45.7^m$ 07 19	Sinusoidal waves
February 14		01^h42^m to 02 01	Surface waves
February 14		06^h38^m to 07 20	Seismic activity
February 14		10^h50^m to 11 02	Surface waves
February 14 No. 18	eP Z i Z eS E e N e E eL NE eM E F E	$22^h09^m26.3^s$ 22 09 37.5 22 16 44 22 19 03 22 19 18 22 24.5 22 27.5 22 57	Epicenter by U.S.C.&G.S. 90° S. 78° W. $H = 22^h 00.5^m$ Western Peru Δ meas = 50°8 Record weak. Secondaries obscured by microseisms.

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
February 14 No. 19	eS N	$22^h16^m55^s$	Epicenter by U.S.C.&G.S. 64° N. 147° W. H = 22^h 02.2^m Central Alaska Δ meas = 43°0 Phases obscured in preceding quake.
February 15		00^h 52^m to 01 02	Surface waves
February 15		04^h 24^m to 04 30	Surface waves
February 18 No. 20	eP Z iP Z iP NZ iP NZ ipP Z ipP N i N i N i N i N iS N i E isS N isS E esS N i E M N F E	^{h} ^{m} ^{s} $20^h39^m06^s$ comp 20 39 06.7 dil 20 39 07.9 20 39 09.6 main shock 20 39 19.0 20 39 22.0 20 39 49 20 40 01 20 40 28 20 40 40.5 20 46 33 20 46 38 20 46 59 20 47 03 20 47 05 20 48 53 21 01.4 22 19	Epicenter by U.S.C.&G.S. 82° N. 43° E. H = 20^h 29.8^m Arctic Region Δ meas = 53°6 Pasadena reports magnitude 6 3/4. Records indicate a focal depth of 30 km.
February 22		11^h57^m to 14 00	Surface waves
February 24 No. 21	iP Z eM N F E	$08^h21^m29.2$ dil 08 31 50 08 47	Record weak
February 26		02^h38^m to 02 53	Seismic activity

Bulletin for February, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
February 27		02^h59^m to 03 41	Surface waves
February 28		06^h37^m to 06 44	Surface waves
February 28 No. 22	eP Z eP E e N e Z e Z e PR_{22} E i PR_{22} N iS E iS N eS NE e N i E iM N iM E F N	$02^h05^m07.5^s$ comp 02 05 08.5 02 05 09.9 02 05 14.3 02 06 29.5 02 06 37 02 06 37.6 02 10 48 02 10 52 02 10 58 02 13 18 02 13 31 02 16 24 02 16 25 05 07	Δ S - P = 34°9 H = 01^h 58^m 13.5^s Epicenter by U.S.C.&G.S. 53°5 N. 133° W. H = 01^h 58.1^m Queen Charlotte Islands Region Pasadena reports magnitude 6 1/2 Δ meas = 35.9°
February 29		04^h59^m to 05 09	Surface waves
February 29		20^h36^m to 20 55	Surface waves

MICROSEISMIC REPORT

Amplitudes are read to the nearest tenth millimeter
at 0, 6, 12, 18 hrs., G.M.C.T.
Decimal point is dropped in recording the amplitude

February, 1948

	Component EW				Component NS			
Date \ Hour	0	6	12	18	0	6	12	18
1	20	22	25	21	20	20	32	29
2	20	20	19	12	22	17	Lost	22
3	13	11	10	09	17	24	17	10
4	07	06	09	12	08	06	Lost	12
5	13	11	7	10	12	16	Lost	08
6	07	07	10	12	11	10	12	12
7	10	12	08	08	12	10	Lost	09
8	05	03	03	03	04	05	Lost	03
9	04	09	12	15	10	12	20	20
10	30	41	49	52	36	43	40	52
11	27	21	13	10	40	22	17	12
12	09	05	03	03	10	10	05	03
13	05	03	12	12	03	05	10	12
14	12	20	19	09	14	20	12	10
15	10	20	33	31	11	20	21	22
16	23	115	103	50	49	75	93	71
17	37	20	17	10	33	33	20	13
18	7	7	12	10	10	10	10	10
19	10	12	13	10	10	12	20	10
20	10	13	6	05	8	10	10	03
21	06	06	09	06	03	05	08	05
22	04	06	05	05	03	05	05	03
23	09	11	12	12	11	12	15	15
24	08	09	10	12	12	12	10	11
25	21	13	13	11	21	13	12	10
26	10	04	04	04	08	08	03	03
27	04	03	03	04	05	05	07	07
28	04	05	04	04	08	08	10	03
29	04	06	11	13	07	08	12	13

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41° 29' 27.90" North, 81° 31' 52.22" West, h = 326 m.

Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical.

Bulletin for March, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
March 1 No. 23	iP' Z i Z e Z iPR_1 Z ePR_1 N i EZ iSKP NE iSKP Z i E i Z iSKKS E iSKKS N i NE i E F E	$01^h31^m41.4^s$ 01 31 50.8 01 31 56 01 34 15.6 01 34 18 01 34 23.9 01 35 10 01 35 11.8 01 35 21 01 35 26.9 01 41 03 01 41 04 01 44 36 01 47 32 05 44	Epicenter by U.S.C.& G.S. 3° S. 130°5 E. $H = 01^h\ 12.7^m$ Off west coast of New Guinea Δ meas = 132°
March 3 No. 24	eP' Z e Z i N iPR_1 E i E i Z e N e E eSKP E e N eS E iPS NE iPPS N iSR_1 N iSR_1 E L E M E F N	$09^h28^m39.4^s$ 09 29 44 09 29 48.9 09 29 49.4 09 29 59.1 09 30 08.5 09 30 33 09 30 40 09 31 19 09 34 16 09 37 41 09 39 33 09 40 56 09 46 08 09 46 12 09 00.9 09 10.0 11 57	Epicenter by U.S.C.& G.S. 18° N. 119° E. $H = 09^h\ 09.9^m$ Off northwest coast of Luzon, Philippine Islands. Pasadena reports magnitude 6 3/4. Δ meas = 118°

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
March 4 No. 25	iP Z i Z i Z eS E eS N eSR$_1$ N e E L E M E F E	02^{h}02^{m}12.7^s dil 02 02 20.0 02 02 24.6 02 09 47 02 09 51 02 13 29 02 14 09 02 17.6 02 21.8 02 49	Epicenter by U.S.C.& G.S. 10° S. 75° W. H = 1^h 53.1^m Central Peru Δ meas = 52°0
March 5		05^{h}41^m to 05 49	Sinusoidal surface waves.
March 7		06^{h}15^m to 06 27	Surface waves
March 7 No. 26	iP Z iP Z iS E ePS E e E M E F N	19^{h}01^{m}36^s 19 01 38 19 10 49 19 11 42 19 18.9 19 26.4 20 03	Epicenter by U.S.C.& G.S. 54° N. 161° E. H = 18^h 50.2^m Off east coast of Kamchatka Δ meas = 71°4 Record weak
March 8 No. 27	L E M E F E	16^{h}58.7^m 17 07.1 17 42	Epicenter by U.S.C.& G.S. 6° S. 157° E. H = 16^h 07.9^m Solomon Islands Region. Δ meas = 117°2 Record weak and obscured by micro-seisms.
March 9 No. 28	ePR$_1$ E ePR$_1$ Z ePPS NE eSR$_1$ N e E e E L N M E F E	19^{h}08^{m}18^s 19 08 19 19 19 42 19 25 06 19 25 30 19 37 24 19 39.3 19 45.8 21 31	Epicenter by U.S.C.& G.S. 3° S. 147° E. H = 18^h 48.0^m Off northeast coast of New Guinea. Pasadena reports magnitude 6 1/2 Δ meas = 121°8

Bulletin for March, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
March 10 No. 29	ePS E M E F E	$11^h54^m43^s$ 12 21.7 14 05	Epicenter by U.S.C.& G.S. 29° S. 177° E. H = 11^h 25.3^m Kermadec Islands region. Pasadena reports magnitude 6 1/4 Δ meas = 116°9
March 10		21^h05^m to 21 41	Surface waves
March 12		20^h35^m to 21 08	Seismic activity
March 13		02^h29^m to 02 54	Surface waves
March 13		03^h47^m to 04 11	Surface waves
March 13 No. 30	eP' Z iP' Z ePR$_1$ NE iPR$_1$ Z i Z iSKP NEZ iSKKS NE i N ePS E i N ePPS E e NE e NE F N	$20^h21^m45^s$ 20 21 50 20 23 59 20 23 59.1 20 24 36.4 20 25 01 20 30 46 20 34 05 20 34 09 20 34 50 20 35 37 20 35 53 20 36 41 22 21	Epicenter by U.S.C.& G.S. 1° N. 126° E. H = 20^h 02.5^m Molucca Passage Possibly deeper than normal. Pasadena reports magnitude about 6 3/4. Δ meas = 130°8

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
March 14 No. 31	iP NZ i N i Z ePR$_2$ N eS N eS E e N e E e E L E M E F E	$22^h06^m38.6^s$ comp 22 06 40.6 22 06 53.6 22 10 14 22 14 32 22 14 34 22 16 24 22 16 26 22 17 33 22 24.8 22 28.3 22 38	Epicenter by U.S.C.& G.S. 17° S. 75° W. H = 21^h 56.7^m Off southwest coast of Peru. Pasadena reports magnitude 6 3/4. Δ meas = 59°0 Record weak
March 15		12^h10^m -- F - lost in change at 13^h	
March 16		03^h28^m to 04 23	Seismic activity mainly surface waves
March 16		14^h51^m to 17 08	Seismic activity obscured by noise
March 16		17^h49^m -- Lost in change at 18^h 16^m	Surface waves
March 17 No. 32	M N F N	$20^h32.1^m$ 21 26	Epicenter by U.S.C.& G.S. 16° N. 146° E. H = 19^h 41.6^m Slightly deeper than normal Mariana Islands Region Δ meas = 107°5
March 21 No. 33	iP' Z iPS N iSR$_1$ E M N F N	$21^h53^m32.9^s$ comp 22 03 22 22 08 48 22 31.1 23 33	Epicenter by U.S.C.& G.S. 59° S. 27°W. Sandwich Is. region. H = 21^h 34.6^m Δ meas = 110°6 Record weak.

Bulletin for March, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
March 22 No. 34	iP Z e N (i) E iS NE i E i E L E F N	$00^h15^m44.3^s$ dil 00 19 42 00 21 43 00 23 29 00 25 23 00 26 04 00 29.3 00 46	Epicenter by U.S.C.& G.S. 14° S. 75° W. $H = 00^h\ 06.3^m$ Southwest coast of Peru. h = 100 km. Δ meas = 55°9 Record weak
March 22 No. 35	iP NZ ePR_1 N iS NE iSR_1 E e N i E L N M N F N	$21^h40^m41.2^s$ comp 21 41 39 21 46 05 21 47 42 21 48 31 21 49 31 21 49.9 21 51.8 22 48	Epicenter by U.S.C.& G.S. 11°5N. 86°5 W. Near coast of Nicaragua. $H = 21^h\ 34.5^m$ Δ meas = 30°4 Record weak
March 22 No. 36	iP NZ iS N L N M N F N	$23^h47^m28.7^s$ 23 52 52 23 56.8 23 57.8 00 40	Aftershock of preceding quake $H = 23^h\ 41.2^m$ Δ meas = 30°4 Record weak
March 23 No. 37	eP Z	$00^h18^m04^s$ comp	Aftershock of preceding quake
March 23 No. 38	eP E eP Z iP Z ipP Z i Z eS N iS E i(SKS) E i N F N	$18^h22^m58^s$ 18 22 58.1 comp 18 23 00.1 dil 18 23 47.3 18 23 50.7 18 32 25 18 32 25.4 18 32 54 18 32 59.4 19 25	Epicenter by U.S.C.& G.S. 51° N. 155° E. Off southern coast of Kamchatka. $H = 18^h\ 11.6^m$ Depth about 200 km. Δ meas = 75°6

Bulletin for March, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
March 24 No. 39	iP' Z	$05^h39^m10.7^s$ dil	Epicenter by U.S.C.& G.S. 6° S. 104° E. Off southern coast of Sumatra H = 05^h 19.5^m Δ meas = 144°4
	eP' N	05 39 10.7	
	i E	05 39 12.7	
	i NE	05 39 13.7	
	ePR_1 N	05 42 26	
	e Z	05 42 30	
	iSKP N	05 42 54	
	e N	05 43 10	
	e(SKS) N	05 46 42	
	ePSKS N	05 52 14	
	e N	05 52 39	
	e E	05 53 37	
	ePPS N	05 55 05	
	e E	05 55 28	
	e N	05 56 45	
	e N	05 57 51	
	e E	05 58 25	
	eSR_1 N	06 01 39	
	e N	06 01 52	
	e E	06 02 22	
	L N	06 32.0	
	F N	07 45	
March 24		22^h48^m to 23 02	Seismic activity
March 25		05^h30^m to 06 04	Sinusoidal surface waves
March 29	eP Z	$10^h34^m36.3^s$ comp	Δ S - P = 76°2 H = 10^h 22^m 57^s Record weak
	i Z	10 34 44.4	
	e N	10 34 46	
	iS E	10 44 24.2	
	eS N	10 44 28	
	ePS E	10 44 54	
	ePS N	10 44 55	
	e E	10 46 21	
	e N	10 46 29	
	L E	10 58.9	
	M E	11 01.6	
	F E	12 03	
March 29		12^h10^m to 13 33	Seismic activity

MICROSEISMIC REPORT

Amplitudes are read to the nearest tenth millimeter
at 0, 6, 12, 18 hrs., G.M.C.T.
Decimal point is dropped in recording the amplitude

March, 1948

	Component EW				Component NS			
Date \ Hour	0	6	12	18	0	6	12	18
1	12	10	09	08	18	15	10	10
2	04	04	07	12	03	03	06	12
3	12	12	12	16	10	12	12	13
4	32	32	22	12	36	33	27	20
5	10	06	08	05	11	07	11	09
6	03	07	06	03	09	09	08	03
7	02	03	03	12	05	05	10	20
8	12*	22	32	40	12*	22	Lost	38
9	32	16	12	11	40	20	20	12
10	11	23	20	22	13	25	24	33
11	20	15	07	11	24	20	12	12
12	10	08	10	05	12	11	12	10
13	06	05	04	03	09	07	09	06
14	02	02	02	03	05	03	03	03
15	03	03	02	02	03	02	02	03
16	02	02	03	02	02	03	03	02
17	Lost	03	06	05	Lost	05	05	04
18	07	12	06	10	05	12	12	09
19	11	11	11	06	10	11	12	10
20	04	02	02	02	07	03	02	02
21	02	03	06	07	04	03	07	12
22	13	22	Lost	10	12	17	Lost	10
23	08	10	07	06	11	07	10	10
24	05	09	07	08	09	08	07	06
25	03	05	04	12	04	09	08	12
26	21	31	Lost	50	12	23	Lost	43
27	46	31	21	22	49	35	30	22
28	12	12	12	11	15	12	12	11
29	07	12	11	07	12	12	12	10
30	09	05	03	03	12	07	05	05
31	02	03	07	02	03	04	06	04

* Period changing from 4 to 7 seconds

CLEVELAND

SEISMOLOGICAL OBSERVATORY
JOHN CARROLL UNIVERSITY, CLEVELAND 18, OHIO, U. S. A.
41° 29′ 27.90″ North, 81° 31′ 52.22″ West, h ≈ 326 m.

Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical.

Bulletin for April, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
April 5		20^h29^m to 20 42	Surface waves
April 10 No. 41	eP Z eS E eS N e N e N L E M N F E	$13^h50^m27.6^s$ comp 13 55 03 13 55 04 13 55 13 13 55 17 13 58.6 14 02.5 14 14	Δ S - P = 26°1 H = 13^h 44^m 51^s
April 12 No. 42	iP NZ eP E iPR_1 Z eS NE iS NE iSR_1 N e E e E i N F N	$06^h20^m55.0^s$ comp 06 20 55.0 06 21 33.1 06 25 25 06 25 28.4 06 26 40 06 26 42 06 26 50 06 26 54 06 41	Epicenter by U.S.C.& G.S. 14° N. 90°5 W. Near coast of Guatamala H = 06^h 15.3^m Depth about 200 km. Δ meas = 28°5
April 12 No. 43	ePR_1 Z eSKS N eSKS E eSKKS E ePS E eSR_1 E eSR_1 N F N	$09^h09^m31^s$ 09 15 03 09 15 08 09 16 31 09 19 32 09 25 52 09 26 01 11 05	Δ = 121° H = 08^h 49^m 14^s
April 13		19^h56^m to 20 20	Surface waves
April 15		20^h07^m to 21 54	Surface waves

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
April 16		21^h12^m to 21 27	Surface waves
April 17 No. 44	eP NZ eP E i N iPR_1 Z iPR_1 E e Z i NE iS E i N iPS NE iSR_1 NE L E M E F E	$16^h25^m08^s$ comp 16 25 09 16 28 49 16 29 08.0 16 29 09 16 32 55 16 33 01 16 36 34 16 36 38 16 38 03 16 43 20 16 54.5 17 01.4 20 55	Epicenter by U.S.C.& G.S. 33° N. 135°5 E. Off southern coast of Honshu Island, Japan. H = 16^h 11.5^m Depth slightly greater than normal Δ meas = 98°4
April 18		10^h07^m to 10 24	Seismic activity
April 18 No. 45	eP' Z ePS NE e E e N eSR_1 N L N M N F E	$12^h38^m58^s$ comp 12 50 37 12 52 48 12 53 39 12 58 05 13 12.0 13 16.5 15 01	Epicenter by U.S.C.& G.S. 3° S. 137° E. Northern New Guinea H = 12^h 19.8^m Δ meas = 125°4
April 19		20^h31^m to 20 42	Surface waves
April 20 No. 46	eP NE iP Z iP Z i Z i N eS E e E e N L E M N F E	$02^h17^m00.7^s$ 02 17 00.8 comp 02 17 01.2 dil 02 17 01.8 02 17 03.0 02 21 56 02 22 19 02 23 52 02 25.2 02 28.0 02 40	Epicenter by U.S.C.& G.S. 14° N. 92° W. Off coast of Guatamala H = 02^h 11.0^m Δ meas = 29°0

Bulletin for April, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
April 21		16^h16^m to 17 13	Surface waves
April 21		17^h28^m to 17 47	Surface waves
April 21 No. 47	eP Z eP NEZ iP Z iP NE iP Z i Z i Z iS N F - lost in following shocks.	$20^h27^m22.6^s$ comp 20 27 23.6 comp 20 27 26.6 dil 20 27 27.1 20 27 27.6 comp 20 27 43.6 20 27 52.6 20 31 55.6	Epicenter by U.S.C. & G.S. 19° N. 69°5 W. Near north east coast of Dominican Republic H = 20^h 22.0^m Pasadena reports magnitude 7 1/4 Δ meas = 24°8
April 21 No. 48	iP Z i Z	$21^h04^m34.5^s$ dil 21 05 53.5	Aftershock of preceding quake; secondaries and F lost in surface waves of preceding shock. H = 20^h 59.2^m by U.S.C. & G.S.
April 21 No. 49	eP Z	$21^h31^m44.3^s$ comp	Aftershock of No. 47. Secondaries and F lost in surface waves of No. 47.
April 21 No. 50	iP Z i Z i Z i Z iS E eS N e N	$22^h07^m58.6^s$ dil 22 08 08.0 22 08 20.0 22 08 26.0 22 08 31.6 22 12 18 22 12 19 22 12 31	Aftershock of No. 47. F lost in surface waves of No. 47. Δ S - P = 24°1 H = 22^h 02^m 44^s

Bulletin for April, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
April 22 No. 51	eP Z eP NZ iP NEZ i Z i E i Z i N i Z i N i Z i Z iS E iS N F N	$00^h33^m37^s$ dil 00 33 39 dil 00 33 42 comp 00 33 50.7 00 33 55.1 00 34 03.0 00 34 11.3 00 34 11.9 00 34 19.2 00 34 21.6 00 34 26.7 00 34 30.4 00 37 59 00 38 02 03 57	Aftershock of No. 47. Δ S - P = 23?7 H = 00^h 28.3^m by U.S.C.& G.S.
April 22 No. 52	iP Z eP E i NZ i E eS E iS N i N i E eSR_1 E L N M N F- lost in following quake.	$10^h54^m22.3^s$ comp 10 54 23.6 10 54 25.4 10 54 26.1 11 03 45 11 03 48 11 03 51 11 03 53 11 08 32 11 14.0 11 17.1	ΔS - P = 72?0 H = 10^h 43^m 02.3^s
April 22 No. 53	eP Z eP NZ iP EZ iS N i E i N iSR_1 E F E	$13^h14^m21.8^s$ comp 13 14 23.6 13 14 28.5 13 18 40.4 13 18 47.0 13 18 48.5 13 19 33 14 55	Δ S - P = 23?8 H = 13^h 09^m 08.8^s Surface waves Small as compared with preliminaries Aftershock of No. 47. H = 13^h 09.0^m by U.S.C.& G.S.
April 22		19^h 53^m to 20 03	Sinusoidal surface waves

Bulletin for April, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
April 23 No. 54	iP Z iP N i E i Z iS E iS N i NE F E	$11^h55^m37.8^s$ dil 11 55 38.4 11 55 39.1 11 55 50.1 11 59 56 11 59 58 12 00 05 13 31	Δ S - P = 23°8 Aftershock of No.47 H = 11^h 50.3^m by U.S.C.& G.S.
April 23		20^h41^m to 20 57	Surface waves
April 24		21^h25^m to 21 36	Sinusoidal surface waves on EW comp. only.
April 24		21^h39^m to 21 50	Seismic activity
April 26 No. 55	eP E eP Z eP E iP NZ e N e E e N eS NE M NE F E	$09^h39^m00^s$ 09 39 02.2 dil 09 39 03 09 39 03.6 comp 09 40 16 09 40 16.2 09 44 23 09 44 29 09 49.9 10 17	Epicenter by U.S.C.& G.S. 51° N. 34° W. North Atlantic Ocean. H = 9^h 32.4^m Δ meas = 33°7
April 27		19^h03^m to 19 21	Surface waves
April 28 No. 56	iP NEZ ipP N epP E esP E isP N eS E iSR_1 E $esSR_1$ E F N	$12^h08^m35.2^s$ comp 12 08 55.4 12 08 57 12 09 11 12 09 11.3 12 14 01 12 16 17.9 12 17 10 12 41	Epicenter by U.S.C.& G.S. 11° N. 63° W. Off coast of Venezuela H = 12^h 01.8^m h = 100 km. Δ meas = 34°6

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
April 28		14^h07^m to 14 24	Surface waves Probable aftershock of preceding quake
April 29		19^h03^m to 19 15	Sinusiodal surface waves
April 30 No. 57	e Z e NE F E	$04^h17^m16^s$ 04 21 34 05 01	Record weak

MICROSEISMIC REPORT

Amplitudes are read to the nearest tenth millimeter
at 0, 6, 12, 18 hrs., G.M.C.T.
Decimal point is dropped in recording the amplitude

April, 1948

Date \ Hour	Component EW				Component NS			
	0	6	12	18	0	6	12	18
1	04	03	04	06	03	03	03	04
2	05	04	02	04	03	03	04	04
3	06	07	09	04	06	08	10	05
4	07	07	10	10	09	09	07	10
5	09	13	12	12	12	17	12	07
6	04	02	C1	02	04	03	01	03
7	03	02	03	01	02	02	01	04
8	06	07	04	04	04	04	03	05
9	02	01	01	03	02	03	03	03
10	04	06	10	07	05	11	Lost	08
11	10	09	10	07	10	10	10	12
12	05	09	04	06	08	04	05	05
13	04	03	02	03	04	03	03	04
14	05	05	03	08	03	04	03	03
15	06	05	03	04	06	05	07	03
16	03	02	02	02	03	03	03	02
17	01	01	01	Lost	02	01	Lost	Lost
18	09	07	04	05	10	05	07	10
19	12	12	10	09	14	13	10	09
20	05	03	01	02	04	04	02	02
21	02	02	01	02	01	01	01	02
22	01	02	01	01	02	02	01	02
23	01	02	Lost	01	03	02	Lost	01
24	01	01	01	01	01	01	01	02
25	01	01	01	01	01	01	02	02
26	03	04	04	05	04	06	07	07
27	06	10	11	09	09	11	08	10
28	06	08	02	02	06	09	03	03
29	02	02	05	03	03	04	04	04
30	04	04	04	02	04	05	05	04

CLEVELAND

SEISMOLOGICAL OBSERVATORY
JOHN CARROLL UNIVERSITY, CLEVELAND 18, OHIO, U. S. A.
41° 29′ 27.90″ North, 81° 31′ 52.22″ West, h ≈ 326 m.
Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical.

Bulletin for May, 1948

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
May 3		9^h36^m to 9 44	Surface waves
May 3		19^h27^m to 19 38	Sinusoidal surface waves
May 4		03^h58^m to 04 13	Sinusoidal surface waves
May 5		00^h37^m to 00 56	Sinusoidal surface waves
May 5		09^h44^m to 09 56	Sinusoidal surface waves
May 6		09^h20^m to 09 42	Surface waves
May 8 No. 58	iP Z iP NE i Z i Z	$02^h58^m47.4^s$ comp 02 58 47.7 02 58 58.3 02 59 05.0	Epicenter by U.S.C.&G.S. 46°5 N. 151° E. Kurile Islands T = 2^h 46.5^m ∠ meas = 81°1 No secondaries Record weak
May 9 No. 59	eP Z e Z e Z eSKS E iSKS N iSKKS E	$02^h22^m55.5^s$ 02 23 06.4 02 27 08 02 33 50 02 33 52.4 02 34 26	Epicenter by U.S.C.&G.S. 30° N. 129° E. Off southern coast of Kyushu, Japan H = 2^h 08.8^m

Bulletin for May, 1948

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
May 9 No. 59 (con't)	iS E L E M E F E	$02^h34^m50^s$ 02 58.2 03 05.6 05 16	Pasadena reports magnitude 6 3/4 to 7. Δ meas = 103°1 Record weak
May 9		08^h34^m to 11 04	Seismic activity probable after-shock of preceding quake.
May 11 No. 60	iP NEZ ipP NZ iS N iS E isS E isS N L E M NE F-lost in changing records	$09^h05^m43.3^s$ dil 09 05 59.6 09 13 43 09 13 45 09 14 12 09 14 13 09 22.6 09 27.2	Epicenter by U.S.C.&G.S. 17° S. 71° W. Southern Peru, casualties at Arica, Moquequa, and Tacna. $H = 8^h 55.7^m$ Depth slightly greater than normal. Pasadena reports magnitude 7 1/4 to 7 1/2. Δmeas = 59°3
May 11 No. 61	iP Z ipP Z Secondaries lost in preceding quake.	$09^h43^m48.7^s$ comp 09 44 04.9	Aftershock of preceding quake.
May 12 No. 62	eP Z eP N eP E e Z iSKKS E eSKKS N iSKKS N iS NE iSR_1 E eSR_1 N M E F E	$01^h10^m03^s$ comp 01 10 03 01 10 07 01 11 11.5 01 20 57.0 01 21 00 01 21 03 01 21 19 01 27 12.8 01 27 15 01 45.2 03 56	Epicenter by U.S.C.&G.S. 38° N. 142°5 E. [illegible] = $0^h 56.9^m$ Off northeast coast of Honshu, Japan. Magnitude: by Strasbourg 7 by Pasadena 6 3/4 Δmeas = 91°0

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
May 14 No. 63	eP NE eP Z iP Z iP N iP E iP Z iPR_1 NE iS NE F - lost in following quake.	$22^h40^m52^s$ 22 40 54.5 22 40 59.0 22 40 59.9 22 41 00.0 22 41 00.6 22 43 05 22 48 03	Epicenter by U.S.C.&G.S. 54°5 N. 161° W. South of Alaskan Peninsula. H = 22^h 31.7^m Δ meas = 52°0
May 15 No. 64	iP Z eS E iS N F E	$02^h50^m55.1^s$ comp 02 58 12 02 58 13 03 54	Δ S - P = 49°5 H = 02^h 42^m 05^s Probable aftershock of No. 63.
May 17 No. 65	eP E eP Z iP Z eP N ipP Z eS NE iS E isS E e E e N e NE L NE M NE F E	$17^h57^m42.5^s$ 17 57 43.0 dil 17 57 44.3 dil 17 57 44.5 17 57 54.5 18 04 58 18 05 01 18 05 22 18 07 25 18 07 28 18 07 45 18 12.2 18 16.2 20 58	Epicenter by U.S.C.&G.S. 55° N. 161° W. South of Alaskan Peninsula. H = 17^h 48.6^m Δ meas = 51°7 Record indicates a focal depth of about 50 km. Surface waves small as compared with preliminaries.
May 19		10^h18^m to 10 27	Surface waves
May 20		07^h32^m to 07 59	Surface waves
May 22 No. 66	i Z i Z i Z i Z L N M E F E	$19^h40^m30.2^s$ 19 40 38.8 19 45 57.4 19 55 11.4 20 15.6 20 22.6 23 34	

Bulletin for May, 1948

Gnwch. Date and Number	Phase and Component		G. M. C. T.	Remarks
May 22 No. 67	i	Z	$20^h20^m20^s$	
May 23 No. 68	iSKS	NE	$04^h37^m27^s$	Epicenter by U.S.C.&G.S. 18° S. 169° E. New Hebrides Islands region. H = 04^h 12.5^m h = 200 km. Pasadena reports magnitude about 6. Δ meas = 116°2
	eSKKS	E	04 38 39	
	eS	N	04 39 33	
	e (PS)	N	04 40 51	
	eSR_1	N	04 47 42	
	e	N	04 49 00	
	F	E	05 45	
May 23			09^h56^m to 10 35	Surface waves
May 24			10^h33^m to 10 37 .	Surface waves
May 25 No. 69	e	Z	$07^h29^m46^s$	Epicenter by U.S.C.&G.S. 30° N. 99°5 E. Sikang Province, China. H = 07^h 11.3^m Pasadena and Strasbourg report magnitude about 7 1/4. Δ meas = 108°6
	ePR_1	N	07 30 41	
	ePR_1	Z	07 30 42	
	eSKS	N	07 36 35	
	eS	NE	07 38 15	
	iPS	N	07 40 15	
	iPPS	N	07 40 59	
	eSR_1	E	07 45 48	
	i	E	07 45 57	
	i	N	07 46 21	
	iSR_2	E	07 49 54	
	F	E	11 34	
May 25 No. 70	eP	Z	$15^h19^m45^s$	Epicenter by U.S.C.&G.S. 43°5 N. 127° W. Off coast of Oregon H = 15^h 13.2^m Pasadena reports magnitude 5 1/2 to 6. Δ meas = 33°5
	eS	NE	15 25 11	
	M	N	15 36,7	
	F	E	16 03	

Bulletin for May, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
May 26 No. 71	eP Z e Z e Z ePR_1 Z ePR_1 E e E eS E iS N e(PS) E eSR_1 E e N M NE F E	$09^h25^m29.9^s$ 09 25 38 09 25 39.0 09 27 23.9 09 27 24 09 27 33 09 32 23 09 32 24.9 09 33 01 09 35 20 09 36 14 09 42 46 11 25	Epicenter by U. S. C. & G. S. 56° N. 156° W. South of Alaskan Peninsula. H = 09^h 16.7^m Pasadena reports magnitude 6. Δ meas = 48°7
May 26 No. 72	e(S) E e(S) N $e(SR_1)$ N $e(SR_1)$ E M NE F E	$14^h09^m35^s$ 14 09 42 14 11 47 14 11 52 14 15.2 15 01	Record weak
May 28 No. 73	eP Z iP Z eP N iP Z eP N eS E iS N L N F E	$05^h45^m31.8^s$comp 05 45 32.6 dil 05 45 32.6 05 45 46.0 05 45 46.7 05 53 05 05 53 06 06 02.6 06 24	Epicenter by J.S.A. 12° S. 77° W. Near coast of Peru H = 05^h 36.2^m Slightly deeper than normal. Pasadena reports magnitude 6 3/4-7. Δ meas = 53°8.
May 28 No. 74	eP N iS E F E	$05^h47^m55^s$ 05 55 15 06 24	Aftershock of preceding quake. Δ S - P = 50°6 H = 05^h 38^m 58^s
May 29		01^h45^m to 01 58	Sinusoidal surface waves.
May 29		14^h54^m to 15 21	Surface waves

Bulletin for May, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
May 31		03^h27^m to 03 47	Seismic activity
May 31		07^h20^m to 08 01	Seismic activity
May 31		15^h11^m to 16 14	Seismic activity

MICROSEISMIC REPORT

Amplitudes are read to the nearest tenth millimeter
at 0, 6, 12, 18 hrs., G.M.C.T.
Decimal point is dropped in recording the amplitude

May, 1948

	Component EW				Component NS			
Date \ Hour	0	6	12	18	0	6	12	18
1	05	05	10	12	04	07	10	11
2	07	09	10	10	11	10	12	12
3	10	12	10	04	10	12	12	05
4	04	03	02	02	07	04	03	02
5	02	02	02	01	04	02	02	02
6	02	02	Lost	07	02	04	Lost	07
7	03	04	03	03	04	04	05	05
8	04	04	04	04	03	04	04	03
9	03	03	02	03	06	03	03	04
10	03	04	06	12	06	06	04	09
11	07	12	12	12	04	11	12	13
12	07	04	06	04	09	05	08	07
13	03	03	02	02	03	02	02	02
14	03	04	04	04	02	04	05	05
15	Lost	04	04	03	Lost	04	07	06
16	04	04	04	06	06	09	08	09
17	05	06	04	04	08	09	06	06
18	04	04	06	04	05	04	08	06
19	04	03	03	02	04	06	04	03
20	02	03	02	01	05	05	02	02
21	01	01	01	01	02	02	02	02
22	01	02	01	04	02	02	03	04
23	06	04	03	03	06	05	04	05
24	02	02	02	02	02	02	02	03
25	02	01	01	01	02	02	01	01
26	01	01	01	02	02	01	01	03
27	03	03	02	Lost	03	03	04	Lost
28	02	02	01	01	03	02	02	02
29	02	02	02	02	02	03	02	02
30	01	01	01	01	02	02	Lost	03
31	02	01	01	01	02	01	02	01

CLEVELAND

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JOHN CARROLL UNIVERSITY, CLEVELAND 18, OHIO, U. S. A.
41° 29' 27.90" North, 81° 31' 52.22" West, h = 326 m.

Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical.

Bulletin for June, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
June 1 No. 75	e N e Z L E F E	$19^h19^m00^s$ 19 19 06 20 00.2 21 23	
June 2 No. 76	eP Z eS E	$13^h45^m23.1^s$ 13 50 37	Quake No. 76 and No. 77 are probably two distinct shocks occurring about 10 seconds apart, the first shock being weaker. No. 76 Δ S - P = 31?2 H = 13^h 39^m 00^s No. 77 ΔS - P = 31?3 H = 13^h 39^m 08^s
June 2 No. 77	eP Z eP NE eS E e E e N M N F N	$13^h45^m32.1^s$ 13 45 36 13 50 47 13 51 25 13 51 34 13 57.9 14 52	
June 4		19^h22^m to 19 26	Surface waves
June 5		02^h22^m to 02 30	Seismic activity
June 6		08^h07^m to 08 23	Surface waves
June 7		04^h05^m to 04^h25^m	Surface waves
June 8 No. 78	eP Z eSR_1 E M E F E	$03^h32^m19^s$ 04 11 42 04 32.0 04 48	Δabout 108° Record weak

Bulletin for June, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
June 15 No. 79	eP NEZ eSKS NE eS E eS N (L) NE (M) E F E	$11^h58^m31^s$ 12 08 51 12 09 42 12 09 44 12 27.5 12 34.8 14 33	Epicenter by U.S.C.&G.S. 33°5 N. 136° E. Near Southern coast of Honshu, Japan. H = 11^h 44.7^m Pasadena reports magnitude about 7. Δ meas = 97°8
June 15		18^h49^m to 19 05	Surface waves
June 18 No. 80	eP' Z iP' Z ePR_1 Z e E eSKP Z $i(PR_2)$ Z iSKS E iSKS N e E e N e E e N e NE eSR_1 E eSR_1 N e N F E	$01^h12^m38.6^s$ 01 12 39.1 01 13 56.8 01 14 09 01 15 14 01 16 14.6 01 19 30 01 19 31 01 21 07 01 21 08 01 23 08 01 24 04 01 25 33 01 30 06 01 30 15 01 43 36 03 36	Epicenter by U.S.C.&G.S. 6° S. 155° E. Solomon Islands Region. H = 00^h 53.9^m Possibly deeper than normal. Pasadena reports magnitude about 7. Δ meas = 118°8
June 18		8^h 23^m to 8 55	Surface waves
June 18		11^h01^m to 12 30	Surface waves

Gnwch. Date and Number	Phase and Component		G.M.C.T.	Remarks
June 21 No. 81	eP'	Z	$12^h24^m34^s$	Epicenter by U.S.C.&G.S. 3° N. 126° E. Celeber Sea.
	ePR_1	E	12 26 38	
	ePR_1	Z	12 26 41	H = 12^h 05.4^m
	eSKP	NZ	12 27 53	Δmeas = 129°3
	ePR_2	E	12 29 32	
	eSKS	N	12 31 38	
	e	E	12 36 02	
	e	N	12 36 23	
	F	N	14 31	
June 21 No. 82	iP	NEZ	$13^h18^m09.3^s$	
	i	NEZ	13 18 14.9	
	i	NE	13 18 18.1	
	i	Z	13 18 19.5	
June 22			01^h15^m to 01 27	Surface waves
June 27			00^h59^m to 01 54	Surface waves
June 27 No. 83	iP	NEZ	$12^h53^m40.8^s$	Δ S - P = 24°2
	e	E	12 55 02	H = 12^h 48^m 24^s
	eS	N	12 57 58	
	iS	NE	12 58 02	
	i	N	13 00 01	
	i	N	13 00 51	
	F	E	14 17	
June 27 No. 84	eP	Z	$21^h48^m10^s$	ΔS - P = 45°5
	e	Z	21 48 34	H = 21^h 39^m 50^s
	eS	N	21 54 58	
	eS	E	21 55 00	
	eSR_1	N	21 57 53	
	L	N	22 01.1	
	M	N	22 04.5	
	F	E	23 43	
June 28 No. 85	eP	N	$07^h26^m57^s$	ΔS - P = 96°7
	iP	Z	07 26 58.0	H = 07^h 13^m 28^s
	e	E	07 37 40	Considerable damage reported on west coast of Honshu Island, Japan.
	e	N	07 37 41	
	iS	N	07 38 23	
	iS	E	07 38 27	
	i	N	07 38 40	
	iPS	N	07 39 42	
	F	E	11 16	

Bulletin for June, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
June 28 No. 86	iP NZ eP E e E e N F E	$07^h30^m58.1^s$ 07 30 59 07 41 17 07 42 07 11 16	Same epicenter as preceding quake. Secondaries difficult to distinguish.
June 29		00^h00^m to 00 25	Surface waves
June 29 No. 87	iP Z iP E eP N e Z iPR_1 Z iPR_1 E iSKS NE eSKKS E eS N e(PS) E e E e N e E M NE F E	$10^h42^m23.7^s$dil 10 42 24 10 42 24 10 45 31 10 46 30.4 10 46 31 10 53 01 10 53 29 10 54 04 10 55 37 10 56 46 11 11.0 11 16.5 11 19.0 13 35	Δ about 101°
June 29 No. 88	iP Z eP NZ eS N F N	$15^h01^m38.1^s$dil 15 01 38 15 10 21 15 27	$\Delta S - P = 64°0$ $H = 14^h\ 51^m\ 09^s$
June 29 No. 89	iP NEZ i Z iS N iS E i(SKKS)?N F E	$16^h18^m59.0^s$comp 16 19 40 16 29 26 16 29 27 16 29 44 18 00	$\Delta S - P = 84°2$ $H = 16^h\ 06^m\ 30^s$, using normal tables. Quake probably has some depth.
June 29		18^h07^m to 18 20	Seismic activity
June 29		20^h03 to 20 30	Seismic activity

Bulletin for June, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
June 30		02^h47^m to 03 13	Seismic activity
June 30 No. 90	eP NZ iP Z ipP Z i Z isP Z iS NE isS N ePS E e E e E L NE M N F E	$12^h32^m49^s$ 12 32 49.2comp 12 32 54.6 12 32 56.4 12 32 59.4 12 42 18 12 42 26 12 42 56 12 43 18 12 43 47 12 56.0 13 01.2 14 26	Slight depth of focus. h about 25 km. $\Delta S - P = 73^s8$ $H = 12^h\ 21^m\ 18^s$
June 30		22^h17^m to 22 40	Seismic activity

MICROSEISMIC REPORT

Amplitudes are read to the nearest **tenth** millimeter
at 0, 6, 12, 18 hrs., G.M.C.T.
Decimal point is dropped in recording the amplitude

June, 1948

	Component EW					Component NS			
Date \ Hour	0	6	12	18		0	6	12	18
1	01	01	01	01		02	02	01	01
2	02	03	02	02		03	03	03	03
3	02	02	02	02		04	02	02	03
4	02	02	02	01		03	03	02	02
5	02	03	07	09		02	03	05	12
6	10	11	07	05		12	13	12	11
7	06	07	08	12		12	09	11	15
8	20	12	11	10		12	14	14	18
9	10	06	05	05		12	10	09	05
10	04	04	06	06		07	06	09	09
11	07	06	05	05		08	09	06	06
12	04	03	03	03		07	04	04	04
13	03	03	03	03		06	04	05	05
14	03	03	03	02		03	04	03	05
15	03	02	02	01		04	03	02	02
16	01	01	01	01		02	01	01	01
17	01	02	02	02		01	02	02	03
18	03	01	Lost	02		02	02	01	01
19	Lost	02	02	03		Lost	02	02	02
20	03	05	10	11		03	05	08	10
21	09	10	05	06		10	08	05	10
22	07	10	05	07		10	11	08	11
23	06	09	04	04		07	09	06	03
24	03	03	03	10		03	03	02	10
25	09	04	03	06		06	04	03	05
26	10	06	09	07		10	08	10	07
27	08	11	12	11		09	12	11	11
28	08	05	03	03		10	05	03	03
29	01	01	01	01		02	01	01	01
30	01	01	00	01		01	01	00	00

CLEVELAND

SEISMOLOGICAL OBSERVATORY
JOHN CARROLL UNIVERSITY, CLEVELAND 18, OHIO, U. S. A.
41° 29' 27.90" North, 81° 31' 52.22" West, h = 326 m.
Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical.

Bulletin for July, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
July 2		03^h52^m to 04 10	Seismic activity
July 5 No. 91	eP Z iPR_1 Z e Z eSKS E eSKS N ePS N ePPS N F E	$14^h07^m05.5^s$ 14 11 09.1 14 15 19.1 14 17 43 14 17 44 14 20 14 14 21 06 16 31	Δ = 102° H = 13^h 53^m 09^s
July 7 No. 92	ePR_1 E (i) Z eSKKS E eS NE e(PS) N L NE M NE F E	$02^h36^m59^s$ 02 37 06 02 44 09 02 44 19 02 45 43 03 05.9 03 12.7 05 11	Epicenter by U.S.C.&G.S. 33° N. 136° E. Off southern coast of Honshu Island Japan. Reported felt along peninsula south of Osaka. H = 02^h 19.1^m Magnitude by Pasadena 6 1/2; by Strasbourg 6 3/4. Δ meas = 98°5
July 8 No. 93	eP N iP Z ipP Z ePR_1 N e N iS E eS N esS N eSR_1 E e E M E F E	$12^h43^m14^s$ 12 43 14.0comp 12 43 33.2 12 45 07 12 46 02 12 50 09 12 50 12 12 50 36 12 53 19 12 53 35 13 00.8 13 44	Epicenter by U.S.C.&G.S. 71° N. 6° W. Near Jan Mayen Land. H = 12^h 34.6^m Record gives depth 75 - 100 km. Δmeas = 46°7

Bulletin for July, 1948

Gnwch. Date and Number	Phase and Component		G.M.C.T.	Remarks
July 12			23^h26^m to 23 57	Seismic activity
July 14 No. 94	ePR_1	E	$22^h49^m49^s$	Epicenter by U.S.C.&G.S. 4° S. 142° E. New Guinea. H = 22^h 28.9^m Pasadena reports magnitude 6 1/4 to 6 1/2. Δ meas = 126°
	(e)	Z	22 50 11	
	eS	E	23 00 52	
	eS	N	23 00 54	
	e	N	23 06 38	
	e	E	23 06 46	
	e	E	23 08 14	
	e	N	23 19.7	
	L	E	23 27.2	
	L	N	23 27.6	
	F	E	01 27	
July 15 No. 95	eP	Z	$11^h09^m12^s$	Epicenter by U.S.C.&G.S. 10° N. 104° W. Pacific Ocean 550 miles off S.W. coast of Mexico. H = 11^h 02.0^m Magnitude by Pasadena about 6. Δ meas = 37.2° Record gives a depth of about 35 km.
	eP	Z	11 09 14.0	
	iP	Z	11 09 15.1	
	i	N	11 09 16.5	
	i	E	11 09 16.8	
	ipP	Z	11 09 21.2	
	ePR_1	NE	11 10 28	
	ePR_2	NE	11 10 47	
	iS	N	11 15 03	
	eS	NE	11 15 08	
	esS	E	11 15 14	
	isS	E	11 15 15.3	
	L	N	11 20.7	
	F	N	12 31	
July 16 No. 96	eP	Z	$7^h18^m13.6^s$	Epicenter by U.S.C.&G.S. 14.5° N. 92° W. Near coast of Guatemala. H = 7^h 12.5^m h about 100 km. Magnitude by Pasadena about 6 1/4. Δ meas 28°6
	iP	Z	7 18 17.0	
	eP	N	7 18 30	
	eP	E	7 18 31	
	iP	Z	7 18 31.4	
	eS	E	7 22 57	
	eS	N	7 22 58	
	iS	E	7 22 32	
July 16 No. 97	iP	Z	$7^h25^m33.0^s$	Epicenter and focal depth same as for pre-preceding quake No. 96. H = 7^h 19.7^m Magnitude by Pasadena 6 3/4. Δ meas = 28°6
	iP	Z	7 25 51.0	
	iS	E	7 30 12	
	M	E	7 36.2	
	M	N	7 36.4	
	F	N	9 05	

Bulletin for July, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
July 17 No. 98	eP Z e Z eS N e E F N	$9^h36^m36.0^s$ 9 36 53.0 9 40 56 9 41 19 10 05	Δ S - P = 24°1
July 18 No. 99	eP Z eP Z ePR$_1$ NE i N e E e Z e N e N e N e N e N e N F N	$07^h02^m39^s$ 07 02 40 07 06 04 07 06 10 07 06 17 07 06 18 07 06 19 07 15 19 07 17 00 07 18 21 07 18 52 07 22.9 09 16	Δ about 92° Record weak. Interpretation doubtful.
July 18		23^h09^m to 01 05	Seismic activity, mainly surface waves
July 19 No. 100	eP NEZ eS N eS E e E L N M N F N	$22^h32^m08^s$ dil 22 36 50 22 36 53 22 37 06 22 40.8 22 43.0 23 07	Epicenter by U.S.C.&G.S. 15° N. 91°5 W. Near coast of Guatemala. Possibly deeper than normal. H = 22^h 26.3^m Δ meas = 27°2
July 20		01^h07^m to 03 29	Surface waves

Bulletin for July, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
July 20 No. 101	eP E iP Z iP N ipP N iPR_1 N $ipPR_1$ N e N i N i N i E iS E iS N i E isS N i N i E i E F E	$11^h12^m09^s$ 11 12 09.2 comp 11 12 09.8 11 12 31.0 11 14 21.4 11 14 42 11 15 50 11 15 57 11 20 04 11 20 06 11 20 18 11 20 22 11 20 28 11 20 56 11 21 20 11 21 52 11 22 19 14 20	Epicenter by U.S.C.&G.S. 17° S. 74°5 W. Off coast of southwestern Peru $H = 11^h 02.4^m$ Depth about 100 km. Magnitude by Pasadena about 7 1/4. Δ meas = 59°0
July 22 No. 102	eP Z eS N eS E eL E eL N iM E eM N F - lost in following quake.	$20^h12^m14^s$ 20 17 43 20 17 46 20 23 20 20 23 26 20 26 14 20 26 18	Epicenter by U.S.C.&G.S. 49°5 N. 130°5 W. Off west coast of Vancouver Island. $H = 20^h 05.4^m$ Δ meas = 35°3
July 22 No. 103	eP Z eL E eL N eM NE F E	$20^h59^m19^s$ 21 10 37 21 10 39 21 13 34 21 50	Epicenter by U.S.C.&G.S. 49°5 N. 130°5 W. Off west coast of Vancouver Island. $H = 20^h 52.7^m$ Δ meas = 35°3
July 23		12^h41^m to 15 05	Seismic activity, mainly surface waves.

Bulletin for July, 1948

Gnwch. Date and Number	Phase and Component		G.M.C.T.	Remarks
July 24 No. 104	eP	NE	$06^h15^m10^s$	Epicenter by U.S.C.&G.S. 35° N. 24° E. Off south coast of Crete. H = 06^h 03.2^m Magnitude by Pasadena about 6 1/2. Δ meas = 78°0 Record indicates a focal depth 60-70 Km.
	iP	Z	06 15 10.5	
	i	N	06 15 12	
	epP	NE	06 15 24	
	ipP	Z	06 15 24.9	
	iS	E	06 25 01	
	iS	N	06 25 04	
	i	E	06 25 26	
	isS	E	06 25 34	
	isS	N	06 25 36	
	i	E	06 25 39	
	L	NE	06 39.7	
	M	E	06 44.6	
	M	N	06 44.7	
	F	N	08 02	
July 28 No. 105	i	Z	$08^h24^m51.0^s$	Record weak.
	i	Z	08 24 52.8	
	e	NE	08 25 52	
	i	NE	08 39 48	
	F	N	09 12	
July 28 No. 106	eP	Z	$14^h28^m37^s$dil	Δ S - P = 32°6 H = 14^h 22^m 01^s
	eP	N	14 28 37	
	eS	N	14 34 01	
	e	N	14 38 18	
	M	E	14 39.3	
	F	E	15 08	
July 29 No. 107	iP	Z	$00^h45^m27.6^s$comp	Δ = 99° H = 00^h 32^m 36^s
	iP	Z	00 45 30.9	
	i	Z	00 45 40.9	
	i	Z	00 45 43.9	
	iPR_1	Z	00 49 16.9	
	i	Z	00 49 28.8	
	eSKS	N	00 55 40	
	F	N	02 18	
July 31 No. 108	iP	N	$19^h11^m02^s$	Δ S - P = 33°0 H = 19^h 04^m 22^s
	i	N	19 12 08	
	iS	E	19 16 28	
	e	E	19 16 55	
	iM	E	19 21 42	
	F	E	20 02	

MICROSEISMIC REPORT

Amplitudes are read to the nearest tenth millimeter
at 0, 6, 12, 18 hrs., G.M.C.T.
Decimal point is dropped in recording the amplitude

July, 1948

	Component EW					Component NS			
Date \ Hour	0	6	12	18		0	6	12	18
1	01	02	01	01		02	02	01	01
2	01	01	01	01		01	02	01	02
3	02	01	01	01		02	02	01	01
4	01	02	02	03		02	03	02	02
5	03	02	01	01		03	02	02	03
6	01	02	02	02		03	03	02	03
7	02	03	05	10		03	02	07	10
8	08	04	03	02		10	08	06	05
9	NR	NR	NR	03		03	03	03	03
10	03	03	03	02		03	03	02	03
11	02	02	01	01		02	02	01	01
12	01	01	02	01		02	02	02	02
13	02	01	01	01		01	01	01	01
14	01	01	01	02		01	Lost	Lost	01
15	Lost	02	01	03		Lost	03	01	02
16	02	02	02	01		02	02	03	02
17	04	05	03	04		04	04	04	03
18	03	02	02	01		02	02	02	02
19	01	02	02	01		01	02	02	01
20	01	01	00	01		02	02	00	01
21	02	02	01	01		02	02	01	01
22	01	02	01	02		01	02	01	02
23	01	02	02	02		02	02	02	02
24	02	02	01	02		02	03	02	03
25	02	02	03	02		02	02	Lost	Lost
26	02	01	01	01		Lost	Lost	01	01
27	01	01	01	01		01	01	02	02
28	02	01	01	02		02	02	02	02
29	01	01	01	NR		02	02	01	NR
30	01	01	01	01		01	01	01	01
31	02	01	02	02		01	01	02	03

NR = No Record

CLEVELAND

SEISMOLOGICAL OBSERVATORY
JOHN CARROLL UNIVERSITY, CLEVELAND 18, OHIO, U. S. A.
41° 29′ 27.90″ North, 81° 31′ 52.22″ West, h = 326 m.
Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical.

Bulletin for August, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
August 7 No. 109	eP Z ePR$_1$ N ePR$_1$ Z e N eSKS NE eS E F N	14^{h}53^{m}28^s 14 57 19 14 57 22 14 57 57 15 04 07 15 04 50 17 16	Epicenter by U.S.C.&G.S. 34° N. 142° E. Off S. E. coast of Honshu Island, Japan. H = 14^h 40.2^m Δ meas = 94°7
August 11 No. 110	iP ZNE iP E iPR$_1$ N iPR$_1$ E iS N iS E i E F N	10^{h}41^{m}49.6^{s}comp 10 41 49.9 10 42 29.2 10 42 29.6 10 46 15 10 46 17 10 47 32 12 40	Epicenter by U.S.C.&G.S. 17°5 N. 95°5 W. Southern Mexico, reported felt in State of Vera Cruz. H = 10^h 36.2^m h about 50 km. Magnitude by Pasadena about 7. Δ meas = 27°0
August 19 No. 111	e(S) N e(S) E e E eM NE F N	01^{h}33^{m}09^s 01 33 13 01 36 09 01 36 20 02 08	
August 19 No. 112	eP NE eP NE iP Z iP Z epP N i Z esP N esP E isP Z eS E iS N	13^{h}58^{m}54^s 13 58 54 13 58 54.5 dil 13 59 01.5 13 59 15 13 59 17.7 13 59 26 13 59 27 13 59 27.1 14 05 25 14 05 25.8	Epicenter by U.S.C.&G.S. 62° N. 151° W. (south central Alaska) H = 13^h 50.8^m Depth about 100 km. Magnitude by Pasadena 6 1/4. Δ meas = 45°1

(Continued on next page)

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
August 19 No. 112 (Continued)	eS E	$14^h05^m26^s$	
	esS E	14 06 02	
	esS N	14 06 05	
	iSR_1 N	14 08 38	
	e E	14 08 46	
	F E	14 51	
August 19 No. 113	iP NEZ	$20^h06^m00.3^s$ dil	Epicenter by U.S.C.&G.S. 5° N. 82° W. (south of Panama)
	ePR_1 N	20 07 09	
	ePR_2 N	20 07 28	
	iS E	20 11 39.1	H = 19^h 59.0^m
	i E	20 13 55	Magnitude by Pasadena 6 1/2.
	M E	20 17.2	Δ meas = 36°4
	F E	21 11	
August 25 No. 114	eP Z	$06^h20^m10^s$	Δ S - P = 66°0
	iP N	06 20 10.2	H = 06^h 09^m 38^s
	iP N	06 20 10.4	Epicenter by U.S.C.&G.S. 24° S. 63° W. (Salta Province, Argentina)
	eP E	06 20 11	
	iP Z	06 20 11.0	Possibly deeper than normal. Magnitude by Pasadena 7 1/2.
	iP N	06 20 12	
	iP N	06 20 12.5	
	iP Z	06 20 12.6	
	e E	06 20 14.3	
	ePR_1 Z	06 22 42	
	e N	06 28 55	
	iS E	06 29 05	
	eS N	06 29 05	
	M E	06 44.6	
	F E	11 25	
August 26		14^h57^m to 15 33	Surface waves
August 27 No. 115	iP Z	$16^h59^m22.2$ dil	Δ S - P = 66°5
	iP N	16 59 23	H = 16^h 48^m 37^s
	i Z	16 59 32	Surface waves small
	i Z	17 00 02	
	iS E	17 08 19	
	iS N	17 08 20	
	i E	17 08 41	
	e N	17 08 46	
	e N	17 09 07	
	e E	17 09 08	
	F E	17 33	

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
August 28 No. 116	iP Z iP Z eS E eS N e E e N F N	$02^h38^m57.1^s$ 02 39 04.1 02 47 52 02 47 55 02 55 28 02 55 36 04 25	Δ S - P = 66?1$_s$ H = $02^h\ 28^m\ 14^s$
August 28		09^h52^m to 10 39	Surface waves
August 29 No. 117	e Z e E e N eL E F - lost in following quake	$17^h51^m29^s$ 18 02 22 18 03 08 18 23.7	
August 29 No. 118	e Z e E F E	$18^h42^m58^s$ 18 49 52 20 13	
August 30		00^h22^m to 00 56	Surface waves
August 30		02^h02^m to 02 13	Surface waves
August 30		10^h16^m to 10 36	Surface waves

MICROSEISMIC REPORT

Amplitudes are read to the nearest tenth millimeter
at 0, 6, 12, 18 hrs., G.M.C.T.
Decimal point is dropped in recording the amplitude

August, 1948

	Component EW					Component NS			
Date \ Hour	0	6	12	18		0	6	12	18
1	03	03	02	02		05	04	03	03
2	02	02	04	NR		03	03	05	NR
3	05	03	03	02		05	05	03	05
4	02	03	05	04		05	05	05	06
5	04	04	02	03		04	03	03	03
6	04	03	02	02		03	03	02	02
7	02	01	01	01		02	02	01	01
8	01	01	01	01		02	01	01	01
9	02	01	01	01		02	01	01	01
10	02	01	01	NR		01	02	01	NR
11	01	01	01	01		01	01	01	01
12	02	02	01	NR		01	02	01	NR
13	01	01	01	02		01	02	02	02
14	02	03	02	02		03	03	03	03
15	03	03	02	02		05	04	02	02
16	04	03	03	02		04	04	03	02
17	02	02	02	01		03	02	01	01
18	02	01	02	02		02	02	02	04
19	03	05	02	05		06	05	05	07
20	04	04	05	04		07	08	05	05
21	03	02	03	03		04	04	04	04
22	03	02	03	03		04	04	04	04
23	01	01	01	02		02	02	02	02
24	03	02	02	01		02	04	01	02
25	03	*	03	03		02	*	03	06
26	06	07	07	09		08	11	10	11
27	10	08	10	06		08	11	10	11
28	07	07	NR	07		06	10	NR	09
29	07	08	06	07		09	07	07	07
30	07	07	10	08		07	07	NR	08
31	10	09	10	11		10	10	11	13

NR = No Record
* - Lost in Quake

CLEVELAND

SEISMOLOGICAL OBSERVATORY
JOHN CARROLL UNIVERSITY, CLEVELAND 18, OHIO, U. S. A.
41° 29' 27.90" North, 81° 31' 52.22" West, h = 326 m.
Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical.

Bulletin for September, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
September 1 No. 119	iM N F N	$19^h 32^m 47^s$ 19 44	
September 1 No. 120	e N iM N F N	$20^h 04^m 27^s$ 20 08 14 20 31	
September 1 No. 121	eM N F N	$20^h 50^m 15^s$ 21 01	
September 2 No. 122	ePPS Z e N eSR_1 N F N	$23^h 55^m 29^s$ 23 58 24 00 00 29 01 57	Epicenter by U.S.C.&G.S. 10° N. 125° E. Off north coast of Mindanao, Philippine Islands. H = 23^h 34.7^m Magnitude 7 by Strasbourg. Δmeas = 123°4
September 6 No. 123	eP Z iP N iP Z e Z iS E isS E F E	$8^h 20^m 56.5^s$ 8 20 56.9 8 20 57.7 8 21 11 8 29 35 8 29 52 10 31	Epicenter by J.S.A. 23°4 S. 71°3 W. H = 08^h 10^m 36^s Depth about 200 km. Δmeas = 65.9 By U.S.C.&G.S. 24°5 S, 68°5 W. Northeastern Chile. H = 08^h 10.2^m h about 100 km.

Bulletin for September, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
September 6 No. 124	iP Z	$16^h41^m04.9^s$	Epicenter by J.S.A. 15°2 N. 93°4 W. H = 16^h 35^m 16^s h about 100 km. △ meas = 28°3 By U.S.C.&G.S. 14° N. 93°5 W. Off East coast of Guatemala. H = 16^h 35.1^m
	i Z	16 41 27.9	
	i N	16 41 37.5	
	i Z	16 41 38.2	
	e E	16 41 38.2	
	i N	16 41 49.2	
	iPR_1 N	16 41 55.2	
	iPR_1 Z	16 41 59.0	
	eS E	16 46 12	
	F E	17 23	
September 8 No. 125	eP Z	$15^h23^m26^s$	Epicenter by J.S.A. 21° S. 174°2 N. H = 15^h 09^m 14^s △ meas = 105°7 By U.S.C.&G.S. 21° S. 174° W. Tonga Islands Region. Reported felt at Apia and on Niue Island. H = 15^h 09.2^m Magnitude 8 by Pasadena
	eP NE	15 23 29	
	e N	15 26 52	
	eP' N	15 27 15	
	iP' E	15 27 19	
	iPR_1 Z	15 27 42	
	iPR_1 E	15 27 45	
	iPR_2 E	15 29 59	
	iSKS NE	15 33 59	
	iS E	15 35 24	
	iPS E	15 36 54	
	F E	21 16	
September 9		6^h33^m to 8 27	Seismic activity mainly surface waves. Probable aftershock of preceeding quake.
September 9		14^h51^m to 15 40	Surface waves.
September 10 No. 126	iP Z	$14^h01^m11.5^s$	Epicenter by J.S.A. 43°3 N. 146°6 E. H = 13^h 48^m 35^s △ meas = 84°8 By U.S.C.&G.S. 44° N. 146°5 E. Off East coast of Hokkaido, Japan. H = 13^h 48.5^m Slightly deeper than normal. Magnitude about 7 1/2 by Pasadena.
	iP E	14 01 11.5	
	i Z	14 01 19.9	
	i Z	14 01 26.5	
	i Z	14 01 28.5	
	iS N	14 11 27	
	iS E	14 11 29	
	i E	14 11 53	
	iSR_1 E	14 17 08	
	eSR_1 N	14 17 18	
	F E	17 44	

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
September 13 No. 127	e(SR_1) E e E e E F E	$21^h19^m46^s$ 21 20 34 21 21 15 21 39	Epicenter by J.S.A. 14°0 N. 92°9 W. H = 21^h 07^m 42^s △ meas = 29°0 By U.S.C.&G.S. 13°5 N. 93° W. Off coast of Guatemala. H = 21^h 07.6^m
September 18 No. 128	eS E e(SR_1) E F E	$08^h48^m08^s$ 08 50 08 09 16	Epicenter by J.S.A. 9°5 N. 84°7 W. H = 08^h 36^m 12^s △ meas = 32°0 By U.S.C.&G.S. 8° N. 84° W. Off S.W. coast of Costa Rica. H = 08^h 36.1^m
September 19 No. 129	iP Z F E	$06^h24^m34.4^s$ 04 58	Epicenter by J.S.A. 49°3 N. 179°5 W. H = 06^h 14^m 02^s h about 50 km. △ meas = 64°8 By U.S.C.&G.S. 52° N. 178° W. Aleutian Islands Region. H = 06^h 14.1^m
September 22 No. 130	iP Z eS N F N	$07^h28^m30.4^s$dil 07 37 04 07 39	Epicenter by U.S.C.&G.S. 22° S. 68° W. Northern Chile. H = 07^h 18.0^m Depth about 100 km. △meas = 64°8
September 22 No. 131	iP Z	$21^h35^m11.4^s$comp	Epicenter by U.S.C.&G.S. 17°5 N. 82° W. Caribbean Sea, west of Jamaica. H = 21^h 29.7^m △ meas = 24°0

Bulletin for September, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
September 28 No. 132	ePR_1 Z	$21^h56^m36^s$	Epicenter by U.S.C.&G.S.
	eSKKS NE	22 03 26	23° N. 94° E.
	iS E	22 04 04	Burma
	e E	22 04 43	$H = 21^h\ 36.6^m$
	iPS N	22 05 57	$\triangle$ meas = 115°7
	iSR_1 E	22 12 28	
	L N	22 37.6	
	M N	22 43.0	
	F N	23 22	

MICROSEISMIC REPORT

Amplitudes are read to the nearest tenth millimeter
at 0, 6, 12, 18 hrs., G.M.C.T.
Decimal point is dropped in recording the amplitude

September, 1948

	Component EW					Component NS			
Date \ Hour	0	6	12	18		0	6	12	18
1	13	13	22	30		13	13	20	30
2	23	21	20	13		23	22	NR	13
3	13	32	NR	NR		12	23	NR	NR
4	NR	NR	NR	NR		NR	NR	NR	NR
5	02	03	02	02		03	03	03	02
6	03	02	03	03		02	02	02	02
7	02	02	02	01		02	02	01	01
8	02	02	02	NR		01	02	02	NR
9	02	02	02	03		02	02	03	03
10	03	03	01	04		04	03	02	01
11	03	03	NR	02		02	02	NR	02
12	02	02	02	05		02	02	03	06
22				12					NR
23	13	20	11	28		NR	NR	NR	NR
24	23	22	18	23		29	23	32	27
25	26	22	12	10		32	23	20	13
26	09	10	10	17		14	14	12	12
27	19	13	14	17		18	14	13	12
28	11	12	10	11		12	12	13	13
29	11	09	07	08		12	12	12	08
30	04	04	03	02		06	07	07	03

Because of a change in instrumental constants, no microseismic readings are available for the period September 13, 00hr. to September 22, 18 hr.

NR = No Record

CLEVELAND

SEISMOLOGICAL OBSERVATORY
JOHN CARROLL UNIVERSITY, CLEVELAND 18, OHIO, U. S. A.
41° 29′ 27.90″ North, 81° 31′ 52.22″ West, h = 326 m.
Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical.

Bulletin for October, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
October 1 No. 133	iP Z ipP E ipP Z ePR$_1$ NE iPR$_1$ Z e E e NZ i Z F N	11^{h}38^{m}58.6^s 11 39 17 11 39 19.5 11 39 44 11 39 45.5 11 43 29 11 43 34 11 43 42.0 13 25	Epicenter by U.S.C.&G.S. 17° N. 99° W. Near coast of Mexico. Reported felt in Guerrero. h about 100 km. H = 11^h 33.1^m Magnitude 6 1/2 by Pasadena. Δ meas = 28°9
October 2		15^{h}12^m to 15 55	Surface waves
October 2		16^{h}11^m to 16 31	Seismic activity
October 4		06^{h}25^m to 08 04	Seismic activity, mainly surface waves.
October 5 No. 134	iP Z iP Z iP Z iP E iPR$_1$ Z ePR$_1$ NE iSKS NE i(SKKS-S) E i(SKKS-S) N iPS N iPS E F E	20^{h}25^{m}23.9^s dil 20 25 26.0 dil 20 25 28.5 dil 20 25 28.5 20 29 13.3 20 29 18 20 35 54 20 36 52 20 36 56 20 37 40 20 37 46 01 00	Epicenter by U.S.C.&G.S. 38° N. 58° E. Near Turkmen S.S.R. - Iran border. Heavy casualties and property damage reported from Ashkhabad and Meshed. H = 20^h 12.1^m Magnitude 7 1/2 by Pasadena and 6 1/2 - 7 by Strasbourg. Δ meas = 92°5
October 8		20^{h}02^m to 20 22	Surface waves

Bulletin for October, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
October 10		18^h20^m to 18 39	Surface waves
October 15 No. 135	iPR_1 Z ePR_1 N ePR_1 E ePS N ePS E e NE e N e N eSR_1 N eSR_1 E F E	$23^h03^m16.9^s$ 23 03 17 23 03 20 23 12 43 23 12 44 23 13 24 23 14 20 23 17 23 23 19 03 23 19 07 01 21	Epicenter by U.S.C.&G.S. 60° S. 20° N. Sandwich Islands Group. $H = 22^h 43.8^m$ $\triangle$ meas = 113°6
October 21 No. 136	iP Z eP N ePR_2 N eS E eSR_1 E F - lost in following quake	$04^h56^m17.0^s$ 04 56 17 04 57 08 05 01 02 05 02 22	Epicenter by U.S.C.&G.S. 12°5 N. 88° W. Off West coast of Nicaragua. $H = 04^h 50.2^m$ Magnitude by Pasadena 5 3/4. $\triangle$ meas = 29°5
October 21 No. 137	eSKS E ePS N iPS E M E F E	$05^h27^m32^s$ 05 31 41 05 31 42 06 04.4 08 04	Epicenter by U.S.C.&G.S. 8° S. 155° E. $H = 05^h 01.8^m$ Solomon Islands region. Deeper than normal. Magnitude 6 1/2 by Pasadena. $\triangle$ meas = 120°6
October 23		05^h49^m to 06 37	Surface waves
October 23		16^h12^m to 16 43	Seismic activity and surface waves.

Bulletin for October, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
October 24		$18^h 00^m$ to 18 16	Surface waves
October 27 No. 138	eP Z iP Z eS E eS- N eSR$_1$ N F E	$18^h 43^m 36.7^s$ 18 43 37.6 18 50 09 18 50 10 18 52.8 19 08	ΔS - P = 43° H = 18^h 55^m 38^s

MICROSEISMIC REPORT

Amplitudes are read to the nearest tenth millimeter
at 0, 6, 12, 18 hrs., G.M.C.T.
Decimal point is dropped in recording the amplitude

October, 1948

	Component EW				Component NS			
Date \ Hour	0	6	12	18	0	6	12	18
1	02	03	NR	02	03	03	NR	02
2	02	02	03	05	03	02	03	04
3	05	06	05	01	06	09	09	03
4	03	03	04	03	03	02	03	04
5	02	05	06	09	03	06	08	09
6	06	08	08	12	07	10	11	12
7	10	07	12	09	11	12	12	08
8	10	07	04	07	11	08	06	07
9	09	22	22	20	11	21	23	25
10	15	21	13	14	22	20	16	13
11	12	09	10	NR	12	12	10	NR
12	05	09	34	52	08	12	37	57
13	54	23	22	12	62	46	20	12
14	12	07	09	05	12	09	08	06
15	05	06	09	11	09	04	07	08
16	05	11	09	09	10	12	11	11
17	12	13	12	12	20	22	17	14
18	11	11	12	12	16	13	14	12
19	11	11	11	06	16	13	13	07
20	07	08	05	05	08	11	05	06
21	11	NR	05	05	09	07	07	04
22	03	04	04	07	04	06	06	09
23	05	03	03	07	09	07	09	07
24	05	08	10	10	11	10	11	20
25	12	14	08	17	15	15	12	17
26	12	15	10	15	15	14	15	15
27	11	10	09	08	13	11	12	13
28	08	07	08	NR	12	12	12	NR
29	NR	NR	NR	12	NR	NR	NR	11
30	10	09	10	11	12	09	10	10
31	08	10	05	05	13	10	06	07

NR = No Record

CLEVELAND

SEISMOLOGICAL OBSERVATORY
JOHN CARROLL UNIVERSITY, CLEVELAND 18, OHIO, U. S. A.

41° 29' 27.90" North, 81° 31' 52.22" West, h = 326 m.

Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical.
Two Sprengnether short-period horizontal.

Bulletin for November, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
November 1		10^h11^m to 10 23	Surface waves
November 1		11^h58^m to 12 10	Surface waves
November 1 No. 139	eP E eP N iP Z iS NE ePS N iPS E M N F E	$12^h16^m46^s$ 12 16 46 12 16 46.3 12 25 45 12 26 41 12 26 43 12 42.4 13 52	Epicenter by U.S.C.&G.S. 57° N. 161° E. Kamchatka H = 12^h 05.8^m △ meas = 69°0
November 3 No. 140	e E eSR_1 E M E F E	$05^h47^m40^s$ 05 55 12 06 17.5 06 59	Epicenter by U.S.C.&G.S. 20°5 S. 169°5 E. Loyalty Islands H = 05^h 18.9^m Magnitude about 7 by Pasadena. △ meas = 117°3
November 6		15^h05^m to 15 28	Seismic activity and surface waves.
November 12		18^h28^m to 19 29	Surface waves

Bulletin for November, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
November 13 No. 141	eSKS E eS N e N M E F E	$07^h25^m17^s$ 07 26 38 07 38 41 07 54.8 08 59	△ about 96°
November 13 No. 142	M E F E	$23^h42.6^m$ 01 25	
November 19 No. 143	iP Z iP N iPR_1 Z iPR_1 N eS E e(sS) N eSR_1 N L N M N F N	$01^h10^m39.7^s$ 01 10 40.1 01 11 43.9 01 11 44.3 01 15 47.7 01 16 12 01 17 11 01 19 12 01 20 50 02 49	Epicenter by U.S.C.&G.S. 9° N. 84° W. Near coast of Western Costa Rica $H = 01^h 04.3^m$ h about 100 km. Magnitude 7 - 7 1/4 by Pasadena. △ meas = 32°5
November 20 No. 144	e E i N i E e E F E	$04^h31^m06^s$ 04 31 49 04 32 09 04 33 09 04 50	
November 20 No. 145	e E i N e E e E e E F E	$08^h38^m46^s$ 08 39 02 08 39 02 08 40 01 08 40 17 08 54	
November 21 No. 146	ePR_1 E $epPR_1$ E eS N e(PS) NE e E e E e E M E F E	$19^h29^m48^s$ 19 30 35 19 37 24 19 39 27 19 40 22 19 41 13 19 46 45 20 10.6 21 43	Epicenter by U.S.C.&G.S. 11° S. 167° E. Queen Charlotte Islands. $H = 19^h 10.6^m$ h about 150 km. Magnitude by Pasadena about 7. △ meas = 12,600 km.

Bulletin for November, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
November 22 No. 147	eP Z eP N eS E eS N e E e N eL NE eM E F E	$09^h 17^m 27^s$ 09 17 36 09 25 56 09 25 58 09 27 12 09 27 14 09 35.8 09 41.2 11 10	Epicenter by U.S.C.&G.S. 51° N. 180° Long. Aleutian Islands $H = 09^h 06.8^m$ Δ meas = 63°9
November 22 No. 148	eP Z iP Z eS E eS N ePS N ePS E e N M N F N	$23^h 42^m 10^s$ 23 42 10.2 23 49 56 23 50 01 23 50 25 23 50 28 23 51 58 00 04.3 00 17	Δ S - P = 54°9 $H = 23^h 32^m 42^s$
November 23		$16^h 46^m$ to 17 01	Surface waves
November 26 No. 149	iP' Z iPR_1 Z ePR_1 E e(PS) E iSR_1 E L E M E F E	$05^h 55^m 47.5^s$ 05 57 38.9 05 57 42 06 07 18 06 14 21 06 35.8 06 42.6 08 14	Epicenter by U.S.C.&G.S. 5° S. 145° E. New Guinea $H = 05^h 36.5^m$ Magnitude 6 3/4 by Pasadena. Δ = 126°9

MICROSEISMIC REPORT

Amplitudes are read to the nearest tenth millimeter
at 0, 6, 12, 18 hrs., G.M.C.T.
Decimal point is dropped in recording the amplitude

November, 1948

	Component EW					Component NS			
Date \ Hour	0	6	12	18		0	6	12	18
1	04	05	03	08		05	06	04	05
2	03	05	12	29		04	07	18	31
3	66	68	103	80		56	121	111	101
4	72	35	27	20		90	30	32	23
5	20	17	29	24		22	22	31	24
6	11	07	09	06		16	05	08	07
7	08	03	07	07		10	09	10	09
8	07	11	08	10		12	17	14	14
9	11	21	20	32		23	22	31	57
10	33	23	22	13		53	32	22	17
11	14	14	18	14		13	13	22	23
12	18	15	12	11		20	16	14	13
13	10	09	05	02		11	08	08	04
14	04	06	11	22		04	12	20	23
15	17	21	28	29		18	30	42	31
16	20	15	19	22		25	14	20	23
17	19	17	16	12		21	14	Lost	14
18	05	06	12	07		08	05	10	07
19	07	10	09	08		08	09	10	06
20	09	06	06	10		12	09	09	12
21	11	12	15	12		12	10	14	12
22	09	11	11	13		13	14	15	15
23	22	27	25	16		32	29	30	27
24	20	32	34	31		30	53	50	37
25	26	24	16	30		26	22	21	23
26	21	20	22	23		24	20	32	21
27	12	09	08	08		13	10	08	08
28	10	17	15	13		12	19	19	14
29	16	12	13	20		16	17	20	22
30	22	22	26	22		21	21	28	30

CLEVELAND

SEISMOLOGICAL OBSERVATORY
JOHN CARROLL UNIVERSITY, CLEVELAND 18, OHIO, U. S. A.

41° 29′ 27.90″ North, 81° 31′ 52.22″ West, h = 326 m.

Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical. Two Sprengnether short-period horizontal.

Bulletin for December, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
December 4 No. 150	iP Z iP N iP E iS E iS N i N i E F - lost in following quake.	$00^h\ 28^m\ 46.3^s$ 00 28 47 00 28 47 00 33 43 00 33 45 00 33 57 00 34 00	Epicenter by U.S.C.&G.S. 21°5 N. 106°5 W. Off W. coast of Mexico; several casualties and extensive damage reported on Maria Madre Island. H = $00^h\ 22.8^m$ Magnitude by Pasadena about 7. △ meas = 28°8
December 4 No. 151	iP Z e E e(S) NE iM E F N	$02^h49^m32.0^s$ 02 53 37 02 54 54 03 01 41 03 23	Probable aftershock of preceding quake.
December 4 No. 152	eP Z iP Z eP N i Z eS E e E eL E eM N e E F E	$23^h49^m10^s$ 23 49 11 23 49 12 23 49 20 23 54 05 23 56 02 23 57 10 23 58 32 00 00 06 01 32	Epicenter by U.S.C.&G.S. 39°9 N. 116°4 W.-S.Calif. Felt extensively with damage at Palm Springs. H = $23^h\ 43.15^m$ Magnitude by Pasadena about 6 1/2. △ meas = 27°9

Bulletin for December, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
December 5 No. 153	eP' Z eP'' Z eSKP N e NE e NE e E e N eSR$_1$ N e E e E eSR$_2$ N e NE F E	06^{h}45^{m}38.8^s 06 45 40.3 06 49 23 06 49 31 06 50 01 06 50 54 07 06 11 07 06 58 07 07 40 07 11 17 07 12 24 07 22.6 09 57	Epicenter by U.S.C.&G.S. 53° S. 158° E. Southeast of New Zealand H = 06^h 26.4^m Magnitude about 7 by Pasadena. Δ meas = 138°6
December 12 No. 154	e E M E F E	13^{h}43.9^m 13 51.4 13 46	Epicenter by U.S.C.&G.S. 52° N. 178° E. Aleutian Islands. H = 13^h 17.3^m Slightly deeper than normal. Magnitude by Pasadena 6 1/2 to 6 3/4 Δ meas = 64°7
December 15 No. 155	iSKS E iSKS N esSKS E esS E e E L E F E	19^{h}35^{m}18^s 19 35 19 19 36 32 19 38 21 19 58.0 20 01.4 20 27	Epicenter by U.S.C.&G.S. 22° N. 143° E. Bonin Islands Region. H = 19^h 11.4^m Depth about 200 km. Magnitude by Pasadena about 7. Δ meas = 104°8
December 16 No. 156	L E M E F E	08^{h}07.2^m 08 12.8 09 04	Epicenter by U.S.C.&G.S. 20° S. 179° W. Fiji Islands Region H = 07^h 18.2^m Magnitude by Pasadena about 6 1/2. Δ meas = 109°0

Bulletin for December, 1948

Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
December 21		20^h23^m to 20 40	Seismic activity and surface waves
December 23 No. 157	iP Z iP NE iS N eS E isS N eSR$_1$ N L E F E	$08^h52^m15.5^s$dil 08 52 16 09 01 11 09 01 11 09 02 13 09 05 28 09 14.8 11 18	Epicenter by U.S.C.&G.S. 56° N. 166° E. Off east coast of Kamchatka. H = 08^h 41.3^m Depth about 100 km. Magnitude by Pasadena about 7. $\triangle$ meas = 68°1
December 26 No. 158	iP Z iS E iPS N M E F E	$07^h23^m02.1^s$ 07 31 38 07 31 55 07 45.2 07 59	Epicenter by U.S.C.&G.S. 22°5 S. 69° W. Northern Chile H = 07^h 12.5^m Northern Chile H = 07^h 12.5^m Depth about 100 km. $\triangle$ meas = 65°1
December 29 No. 159	M N F N	$13^h08^m42^s$ 14 00	Epicenter by U.S.C.&.G.S. 39°5 N. 120°2 W. Northeastern California H = 12^h 53^m 29^s Magnitude by Pasadena about 6. $\triangle$ meas = 29°2
December 30 No. 160	eP Z eP N eP Z ePR$_2$ Z iS NE i(SR$_1$) NE iL NE F N	$23^h56^m43^s$ 23 56 44 23 56 46 23 58 11 00 02 15 00 04 42 00 06.7 01 36	Epicenter by U.S.C.&G.S. 51° N. 131° W. Off coast of British Columbia. H = 23^h 49.9^m Magnitude by Pasadena about 7. $\triangle$ meas = 35°1

MICROSEISMIC REPORT

Amplitudes are read to the nearest tenth millimeter
at 0, 6, 12, 18 hrs., G.M.C.T.
Decimal point is dropped in recording the amplitude

December, 1948

	Component EW				Component NS			
Date \ Hour	0	6	12	18	0	6	12	18
1	17	13	12	11	20	20	12	13
2	11	13	32	40	12	20	45	43
3	40	30	23	16	45	46	23	27
4	17	17	17	16	16	22	16	12
5	Lost	13	13	21	Lost	17	19	21
6	32	15	10	12	22	25	20	20
7	13	12	14	13	22	13	13	20
8	12	08	09	14	16	16	13	12
9	15	18	20	31	22	23	24	42
10	33	33	34	22	32	43	44	23
11	22	22	27	38	23	27	50	36
12	27	39	39	33	38	41	41	40
13	31	23	22	24	34	33	21	23
14	18	20	12	14	21	21	17	13
15	13	15	13	13	12	18	21	21
16	16	22	36	41	21	33	43	37
17	41	27	22	21	37	31	21	20
18	11	08	10	12	12	11	11	14
19	13	16	15	22	20	22	23	36
20	36	51	65	68	35	49	81	70
21	46	32	30	40	73	43	36	60
22	32	48	55	30	40	42	60	30
23	22	17	18	14	31	23	21	15
24	19	21	19	19	26	26	29	19
25	13	29	36	44	22	30	41	48
26	45	52	32	29	68	57	51	33
27	21	30	40	36	26	36	34	41
28	29	18	09	05	25	21	12	12
29	13	12	12	11	14	14	15	10
30	08	09	10	11	12	10	16	15
31	20	20	20	19	24	20	21	21

CLEVELAND

SEISMOLOGICAL OBSERVATORY
JOHN CARROLL UNIVERSITY, CLEVELAND 18, OHIO, U. S. A.
41° 29′ 27.90″ North, 81° 31′ 52.22″ West, h = 326 m.
Seismographs: Two Sprengnether long-period horizontal, one Sprengnether vertical.
Two Sprengnether short-period horizontal.

The Seismological Observatory of John Carroll University acknowledges with thanks the receipt of the following bulletins from January 1, 1948 to December 31, 1948:

BEOGRAD	January - October, 1948
BERKELEY	July - December, 1941 July - December, 1947
BRISBANE	May, 1948
BUCAREST	February - June, 1948
CAPE GIRARDEAU	July - October, 1942
DE BILT	May, August, September, October, 1948
ESPANA	April, September, 1948
FIRENZE	March, April, July - October, 1948
FLORISSANT	July - December, 1943
HELSINKI	January - June
HELWAN	April, May, 1948
ISTANBUL	March - August, 1948
JESUIT SEISMOLOGICAL ASSOCIATION	Bulletins #1 to #115 (1948)
KSARA	January - October, 1948
NANKING	January - June, 1948
OTTAWA	March - August, 1948
PASADENA	May - August, 1948
PERTH	April - June, 1948

PERU	January - December, 1947
ROME	March - September, 1948
SAMOA	April - September, 1948
SANTA CLARA	January - November, 1948
ST. LOUIS UNIVERSITY	July - December, 1943
ST. LOUIS UNIVERSITY GROUP	January - December, 1944 January , February, 1945
STRASBOURG	Bulletin du Bureau Central Seismologique Francais: June, July September, October, 1948 Union Geodesique et Geophysique Internationale: April, May, July, August, 1948 Bulletin d' echange Nr. 20 Institut de Physique du Globe: July - November, 1948
TRIESTE	March - June, 1948
UCCLE	March - October, 1948
WELLINGTON	May, July, August, 1948