

# CLEVELAND

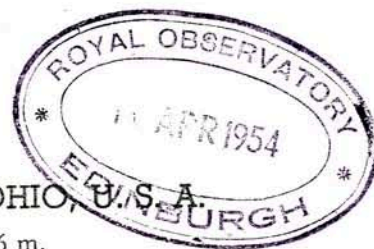
SEISMOLOGICAL OBSERVATORY

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 January, 1954

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
January 1 No. 1	iSKP Z	13 <sup>h</sup> 27 <sup>m</sup> 10 <sup>s</sup> dil	Epicenter by U.S.C.G.S. 8.5° S., 124° E. H=13 <sup>h</sup> 04 <sup>m</sup> 17 <sup>s</sup> , h about 100 km. Magnitude 6½ by Pasadena. Δ = 140.4°
January 2 No. 2	e Z e Z e n e e iL e	02 <sup>h</sup> 25 <sup>m</sup> 41.3 <sup>s</sup> 02 25 43.7 02 25 46.4 02 26 45.9 02 26 53.5	Near shock. Phase interrelations doubtful
January 6 No. 3	iP Z es N	16 <sup>h</sup> 02 <sup>m</sup> 59 <sup>s</sup> 16 10 09	Epicenter by U.S.C.G.S. 76° N., 7° E., Southwest of Spetzbejen H=15 <sup>h</sup> 53 <sup>m</sup> 59 <sup>s</sup> . Δ = 50.0°
January 12 No. 4	eSKP E eSKS N iSKS E	14 <sup>h</sup> 39 <sup>m</sup> 15 <sup>s</sup> 14 43 13 14 43 16	Epicenter by U.S.C.G.S. 49° S., 165° E., off coast of South Island New Zealand. H=14 <sup>h</sup> 16 <sup>m</sup> 22 <sup>s</sup> . Magnitude 6 3/4-7 by Pasadena. Δ = 134.2°
January 12 No. 5	eSR <sub>1</sub> N eL N eM N	23 <sup>h</sup> 47 <sup>m</sup> 28 <sup>s</sup> 23 48 53 23 50 00	Epicenter by U.S.C.G.S. 35° N., 119.1° W., Near Wheeler Ridge, California, U.S.A. Minor property damage. H=23 <sup>h</sup> 33 <sup>m</sup> 46.5 <sup>s</sup> . Magnitude 5.7 by Pasadena, 6¼ by Berkeley. Δ = 29.7°

Bulletin for January, 1954

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January 13 No. 6	ePFS N ePFS E eSR <sub>1</sub> N L N M N	00 <sup>h</sup> 47 <sup>m</sup> 10 <sup>s</sup> 00 47 12 00 52 59 00 16.4 00 26.7	Epicenter by U.S.C.G.S. 49° S., 165° E. off coast of South Island New Zealand. H=00 <sup>h</sup> 13 <sup>m</sup> 06 <sup>s</sup> . Magnitude 7½ by Pasadena. Δ = 134.2° Foreshocks Jan. 12 H=14 <sup>h</sup> 16 <sup>m</sup> 22 <sup>s</sup> Magnitude 6 3/4-7 by Pasadena. Jan. 12 H=14 <sup>h</sup> 20 <sup>m</sup> 26 <sup>s</sup>
January 16 No. 7	iP Z iP e eF n iP Z (e) E eS E	22 <sup>h</sup> 52 <sup>m</sup> 20 <sup>s</sup> dil 22 52 20.1 22 52 20.5 22 52 27 22 57 43 22 58 23	Epicenter by U.S.C.G.S. 49° N., 129.5° W. off coast of Vancouver Is- land, British Columbia. H=22 <sup>h</sup> 45 <sup>m</sup> 27 <sup>s</sup> . Δ = 35.5°
January 20 No. 8	eP Z eP n iP Z iPR <sub>2</sub> 'Z ePR <sub>2</sub> n iPR <sub>2</sub> e iPR <sub>2</sub> NE eS N	04 <sup>h</sup> 23 <sup>m</sup> 47 <sup>s</sup> comp 04 23 48 04 23 49 dil 04 25 27 04 25 27.8 04 25 27.9 04 25 30 04 29 48	Epicenter by U.S.C.G.S. 8.5° N., 103.5° W. Pacific Ocean south of H=04 <sup>h</sup> 16 <sup>m</sup> 25 <sup>s</sup> . Magnitude 6 by Pasadena. Δ = 38.3°



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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.

Two Sprengnether short-period horizontal.



Bulletin for February, 1954

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
February 1 No. 9	eP      eZ iPR <sub>1</sub> n iPR <sub>1</sub> Z iPR <sub>1</sub> e e        N eSKS    e eSKS    E eS       N ePS      N eSR <sub>1</sub> E	01 <sup>h</sup> 20 <sup>m</sup> 53 <sup>s</sup> dil 01 20 0612 01 20 07 comp 01 20 07.3 01 26 20 01 31 25 01 31 29 01 32 46 01 34 13 01 40 28	Epicenter by U.S.C.G.S. 24.5° N 142.5° E Volcano Islands H = 01-06-51 Magnitude 7½ by Pasadena  Δ = 102.6°
February 1 No. 10	eP      e eP      Z e        Z e        E i        N e        E e        e iL      N	04 <sup>h</sup> 37 <sup>m</sup> 53.3 <sup>s</sup> 04 37 56 dil 04 39 05 04 40 48 04 41 07 04 41 19 04 43 18.3 04 46 59	Epicenter by U.S.C.G.S. 32½° N, 115½° W Lower California, H = 04 <sup>h</sup> 31 <sup>m</sup> 59.5 <sup>s</sup> Magnitude 5 3/4-6 by Pasadena. Δ = 28.4° Foreshock H = 04 <sup>h</sup> 23 <sup>m</sup> 54 <sup>s</sup> Magnitude 5½ by Pasadena
February 2 No. 11	iP      n iP      Z	16 <sup>h</sup> 56 <sup>m</sup> 55.3 <sup>s</sup> 16 56 57 comp	

Bulletin for February, 1954

Gnwh. Date and Number	Phase and Component	G.M.C.T.	Remarks
February 2 No. 12	eP Z eP n ePr <sub>1</sub> N eS E eS N eSR <sub>1</sub> N	17 <sup>h</sup> 54 <sup>m</sup> 20 <sup>s</sup> comp 17 54 21 17 56 09 18 01 16 18 01 17 18 04 45	Epicenter by U.S.C.G. 83°N, 7°E off Northeast coast of Greenland H = 17 <sup>h</sup> 45 <sup>m</sup> 45 <sup>s</sup> Δ = 49.0
February 5 No. 13	eP <sup>1</sup> Z e E iSKS E eSKS ne eSKKS E ePS E eSR <sub>1</sub> N e e	09 <sup>h</sup> 38 <sup>m</sup> 55 <sup>s</sup> 09 40 37 09 45 31 09 45 33 09 46 56 09 49 46 09 56 18 09 59 33	Epicenter by: U.S.C.G.S. 4.5°S, 153°E, off coast of New Britain H = 09 <sup>h</sup> 19 <sup>m</sup> 42 <sup>s</sup> Magnitude, 6 3/4-7 Pasadena, 6 1/4 Berkeley Δ = 118.9
February 5 No. 14	eP Z eP e iP Z eP n ePP Z iS E isS E	15 <sup>h</sup> 23 <sup>m</sup> 46 <sup>s</sup> dil 15 23 29.4 15 23 30 dil 15 23 30 15 23 36 15 27 57 15 28 15	Epicenter: U.S.C.G.S. 17.5°N, 92.5°W Chiapas, Mexico. Exten- property damage. H = 15 <sup>h</sup> 17 <sup>m</sup> 59 <sup>s</sup> h about 100 km Magnitude: 6 1/2 Pasadena. Δ = 25.7
February 7 No. 15	iP <sup>1</sup> Z ePR <sub>1</sub> Z eS E ePS E e(PPS) E	06 <sup>h</sup> 33 <sup>m</sup> 56 <sup>s</sup> dil 06 34 58 06 42 49 06 44 42 06 45 19	Epicenter: U.S.C.G.S. 15°S, 167.5°E New Hebrides Islands H = 06 <sup>h</sup> 15 <sup>m</sup> 21 <sup>s</sup> h about 100 km Magnitude: 6 Pasadena 6 1/2-6 3/4/ Berkeley Δ = 115.5°

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Gnwch. Date and Number	Phase and Component	G.M.C.T.	Remarks
February 8 No. 16	iP Z iPP Z epP n isP n isP Z eS E isS E	14h29 <sup>m</sup> 36 <sup>s</sup> dil 14 30 05 14 30 05 14 30 20 14 30 21 14 38 08 14 38 56	Epicenter: U.S.G.S. 22.5° S, 68° W Northern Chile-Bolivia border. Minor damage at Calama, Chile. H = 14h19m09s h about 150 km Δ = 65.3°
February 9 No. 17	iP Z ipP Z e N is e is n	09h02m34s dil 09 02 50 dil 09 06 49 09 07 12 09 07 13	Epicenter: U.S.C.G.S. 19° N, 64° W Leeward Islands H = 08h56m25s h about 60 km Δ = 27.0°
February 11 No. 18	eP n iP Z isKS nN is E iPS E	00h44m01s 00 44 02 dil 00 54 42 00 55 40 00 56 58	Epicenter: U.S.C.G.S. 39.5° N, 101° E Ningsia Province, China H = 00h30m16s Magnitude: 7 <sup>1</sup> / <sub>4</sub> -7 <sup>1</sup> / <sub>2</sub> Pasadena 7 -7 <sup>1</sup> / <sub>4</sub> Berkeley Δ = 100.0°
February 14 No. 19	iP Z ePS E eSR <sub>1</sub> E	06h50m22s 06 58 16 07 00 14	Epicenter: U.S.C.G.S. 6.5° S, 81° W Near Coast of Northern Peru. H = 06h41m44s Δ = 48.0°

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February 15 No. 20	eP Z eS E eSR E	03 <sup>h</sup> 29 <sup>m</sup> 47 <sup>s</sup> comp 03 35 27 03 37 50	Epicenter: U.S.C.G.S. 5.5° N, 82.5° W H = 03 <sup>h</sup> 22 <sup>m</sup> 45 <sup>s</sup> Magnitude: 6 $\frac{1}{4}$ - 6 $\frac{1}{2}$ Pasadena. $\Delta$ = 35.0°
February 15 No. 21	iP Z	15 <sup>h</sup> 49 <sup>m</sup> 26 <sup>s</sup> dil	Foreshock of following quake: U.S.C.G.S. H = 15 <sup>h</sup> 40 <sup>m</sup> 37 <sup>s</sup>
February 15 No. 22	iP n eP Z iP Z eS E e(SR <sub>1</sub> ) E	19 <sup>h</sup> 59 <sup>m</sup> 31.9 <sup>s</sup> 19 59 32 dil 19 59 37 comp 20 06 28 20 09 21	Epicenter: U.S.C.G.S. 6.5° S, 81° W Near coast of Northern Peru. H = 19 <sup>h</sup> 50 <sup>m</sup> 52 <sup>s</sup> $\Delta$ = 48.0°
February 19 No. 23	iP Z eP n e N eS N eS E iS N e N e E	00 <sup>h</sup> 46 <sup>m</sup> 42 <sup>s</sup> dil 00 46 42 00 47 48 00 51 39 00 51 42 00 51 42 00 52 06 00 52 10	Epicenter: U.S.C.G.S. 11.5° N, 87.5° W off Coast of Nicaragua H = 00 <sup>h</sup> 40 <sup>m</sup> 25 <sup>s</sup> Magnitude: 6 $\frac{3}{4}$ - 7 Pasadena. $\Delta$ = 30.1° Aftershock: H = 20 <sup>h</sup> 02 <sup>m</sup> 00 <sup>s</sup> Magnitude: 6 Pasadena
February 19 No. 24	ePR <sub>1</sub> E e E e N eSKS E eS N ePS E	19 <sup>h</sup> 27 <sup>m</sup> 35 <sup>s</sup> 19 32 37 19 32 38 19 33 17 19 35 12 19 37 08	Epicenter: U.S.C.G.S. 30° S, 178° W Kermades Islands H = 19 <sup>h</sup> 07 <sup>m</sup> 44 <sup>s</sup> Magnitude: 7 Pasadena 7 - 7 $\frac{1}{4}$ Berkeley $\Delta$ = 113.5°

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February 19 No. 25	iP N ePR <sub>2</sub> N eS N i(S) E e(S) N	21 <sup>h</sup> 40 <sup>m</sup> 55 <sup>s</sup> 21 42 00 21 45 44 21 46 16 21 46 17	Epicenter: U.S.C.G.S. 12.5°N, 87.5°W Near Coast of Nicaragua H = 21 <sup>h</sup> 34 <sup>m</sup> 41 <sup>s</sup> Magnitude: 6 3/4 - 7 Pasadena △ = 29.5°
February 20 No. 26	iP N e(PR) N eS N eS E	02 <sup>h</sup> 06 <sup>m</sup> 59 <sup>s</sup> 02 07 45 02 12 16 02 13 36	△ S - P = 31.6° H = 02 <sup>h</sup> 00 <sup>m</sup> 32 <sup>s</sup>
February 20 No. 27	iP <sup>1</sup> Z iP <sup>1</sup> Z iP <sup>1</sup> Z i <sub>p</sub> <sup>pl</sup> Z iSKP NE eSKS E iPSKS Z	18 <sup>h</sup> 53 <sup>m</sup> 25 <sup>s</sup> comp 18 53 28 comp 18 53 37 comp 18 56 14 dil 18 57 11 18 59 12 19 05 00 dil	Epicenter: U.S.C.G.S. 7°S, 124.5°E Flores Sea H = 18 <sup>h</sup> 35 <sup>m</sup> 05 <sup>s</sup> h about 600 km Magnitude: 6 1/2 - 6 3/4 Pasadena △ = 139.0°
February 20 No. 28	iP Z	19 <sup>h</sup> 59 <sup>m</sup> 48 <sup>s</sup> comp	Epicenter: U.S.C.G.S. Windward Islands region H = 19 <sup>h</sup> 53 <sup>m</sup> 00 <sup>s</sup> h about 100 km △ p - h = 35.0°
February 21 No. 29	iP Z	16 <sup>h</sup> 19 <sup>m</sup> 28 <sup>s</sup> dil	Epicenter: U.S.C.G.S. 52°N, 175.5°W Andreanof Islands, Aleutian Islands H = 16 <sup>h</sup> 09 <sup>m</sup> 11 <sup>s</sup> △ = 60.5°

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February 21 No. 30	iP      Z i        E i        N e        E	23 <sup>h</sup> 45 <sup>m</sup> 29 <sup>s</sup> 23 50 10 23 50 11 23 51 14	Epicenter: U.S.C.G.S. 12.5° N, 87° W Near Coast of Nicaragua H = 23 <sup>h</sup> 39 <sup>m</sup> 25 <sup>s</sup> h about 60 km Δ = 29.3



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

Two Sprengnether short-period horizontal.



Bulletin for March, 1954

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
March 3 No. 31	iP <sup>1</sup> Z iP <sup>1</sup> Z iP <sup>1</sup> e iPR <sub>1</sub> Z iPR <sub>1</sub> e iSKP NE ePPS N ePPS <sup>†</sup> E e E iSR <sub>1</sub> E	06 <sup>h</sup> 22 <sup>m</sup> 01 <sup>s</sup> dil 06 22 06 dil 06 22 08.5 06 24 04 dil 06 24 07.3 06 25 24 06 35 33 06 35 35 06 36 29 06 41 52	Epicenter : U.S.C.G.S. 5.5° S, 142.5° E Central New Guinea H = 06 <sup>h</sup> 02 <sup>m</sup> 55 <sup>s</sup> Magnitude: 7½ Pasadena 7 - 7½ Berkeley Δ = 127.0° Aftershock: H = 15 <sup>h</sup> 21 <sup>m</sup> 27 <sup>s</sup>
March 3 No. 32	iP Z	07 <sup>h</sup> 56 <sup>m</sup> 01 <sup>s</sup> comp	Epicenter: U.S.C.G.S. 53° N, 160° E Near East Coast of Kamchatka H = 07 <sup>h</sup> 44 <sup>m</sup> 36 <sup>s</sup> Δ = 72.2°
March 7 No. 33	iP Z iP Z iP e iPR <sub>1</sub> Z iPS N e N	01 <sup>h</sup> 56 <sup>m</sup> 47 <sup>s</sup> dil 01 56 54 dil 01 56 54.5 01 58 25 02 07 35 02 07 53	Epicenter: U.S.C.G.S. Ascension Island Region H = 01 <sup>h</sup> 44 <sup>m</sup> 30 <sup>s</sup> D about 79°

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March 9 No. 34	eP Z iP Z iS NE e E eSR <sub>1</sub> N	02 <sup>h</sup> 32 <sup>m</sup> 02 <sup>s</sup> comp 02 32 09 02 40 27 02 43 25 02 44 36	Epicenter: U.S.C.G.S. 1.5°N, 30.5°W Atlantic Ocean. North east of Brazil. H = 02 <sup>h</sup> 21 <sup>m</sup> 43 <sup>s</sup> Δ = 61.3°
March 9 No. 35	eP Z iP Z iS E eS n e N ePS N e N e E	05 <sup>h</sup> 51 <sup>m</sup> 06 <sup>s</sup> comp 05 51 07 dil 05 00 44 05 00 44 05 00 57 05 01 18 05 01 47 05 09 21	Epicenter: U.S.C.G.S. 50°N, 157°E Off South Coast of Kamchatka H = 05 <sup>h</sup> 39 <sup>m</sup> 20 <sup>s</sup> Magnitude: 6½ - 6½ Pasadena Δ = 75.3°
March 11 No. 36	iP Z eP e iP n iPR <sub>2</sub> e iPR <sub>2</sub> n iS N iS E esS N	10 <sup>h</sup> 36 <sup>m</sup> 01 <sup>s</sup> 10 36 01.9 10 36 02.0 10 37 00.8 10 37 00.9 10 40 46 10 40 48 10 41 18	Epicenter: U.S.C.G.S. 14.5°N, 90.5°W Guatemala H = 10 <sup>h</sup> 30 <sup>m</sup> 10 <sup>s</sup> h about 100 km. Magnitude: 5½ - 5¾ Pasadena Δ = 28.0°
March 19 No. 37	eP e iP Z eS N iS E iM Z iM n iM N	10 <sup>h</sup> 00 <sup>m</sup> 27.5 <sup>s</sup> 10 00 28 dil 10 05 07 10 05 15 10 09 17 10 09 24 10 09 43	Epicenter: U.S.C.G.S. 33.3°N, 116.1°W Santa Rose Mts., Cali. Slight Property damage. H = 09 <sup>h</sup> 54 <sup>m</sup> 27 <sup>s</sup> Magnitude: 6 - 6½ Pasadena 6.4 Berkeley. Δ = 28.4° Additional Shocks: H = 10 <sup>h</sup> 21 <sup>m</sup> 17 <sup>s</sup> Magnitude: 5 Pasadena

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March 21 No. 38	iP <sup>1</sup> Z iPR <sub>1</sub> N iPR <sub>1</sub> Z iPR <sub>1</sub> n e N eSKS N iSKKS N i E eS E i N i E iPS N epPS N ePPS E iPPS N i E i E	24 <sup>h</sup> 00 <sup>m</sup> 33 <sup>s</sup> 24 01 27 24 01 28.3 24 01 28.6 24 04 54 24 07 02 24 08 11 24 08 53 24 08 59 24 09 29 24 10 09 24 10 49 24 11 23 24 12 13 24 12 16 24 19 01 24 20 16	Epicenter: U.S.C.G.S. 24.5° N., 95° E Northwest Burma Felt in Eastern India H = 23 <sup>h</sup> 42 <sup>m</sup> 05 <sup>s</sup> h about 150 km. Magnitude: 7 - 7 $\frac{1}{4}$ Pasadena $\Delta$ = 114.5°
March 22 No. 39	eP NE iP Z iP e eP n ePR <sub>1</sub> N eS E es N	17 <sup>h</sup> 16 <sup>m</sup> 31.6 <sup>s</sup> 17 16 31.6 17 16 31.7 17 16 32.1 17 17 03 17 21 10 17 21 11	Epicenter: U.S.C.G.S. 17° N, 95.5° W Southern Mexico H = 17 <sup>h</sup> 10 <sup>m</sup> 50 <sup>s</sup> h about 60 Km $\Delta$ = 27.1°
March 22 No. 40	iP Z iP n	19 <sup>h</sup> 09 <sup>m</sup> 10 <sup>s</sup> 19 09 10	Epicenter : U.S.C.G.S. 55.5° N, 157° E Near east coast of Kamchatka H = 18 <sup>h</sup> 58 <sup>m</sup> 02 <sup>s</sup> $\Delta$ = 71.7°

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March 26 No. 41	iP Z ipP Z iPS e iPS E	04 <sup>h</sup> 48 <sup>m</sup> 14.6 <sup>s</sup> dil 04 48 35 dil 04 59 26 04 59 27	Epicenter: U.S.C.G.S. 42° N, 142° E Off South coast of Hokkaido, Japan H = 04 <sup>h</sup> 35 <sup>m</sup> 25 <sup>s</sup> h about 60 km Δ = 88.0°
March 27 No. 42	eP Z e n epP e ipP Z ipP Z ipP N epP e ipP n	18 <sup>h</sup> 29 <sup>m</sup> 43 <sup>s</sup> dil 18 29 48.3 18 30 15.6 18 30 17 dil 18 30 19 dil 18 30 20 18 30 20 18 30 20.3	Epicenter: U.S.C.G.S. 7° S, 75.5° W Central Peru H = 18 <sup>h</sup> 21 <sup>m</sup> 05 <sup>s</sup> Δ = 49.9°
March 28 No. 43	iP n eP n iP e iS E iS N i(PS) E	20 <sup>h</sup> 47 <sup>m</sup> 10.5 <sup>s</sup> 20 47 13.8 20 47 13.9 20 55 52 20 55 57 20 57 00	Epicenter: U.S.C.G.S. 52° N, 176° E Rat Islands, Aleutian Islands. H = 20 <sup>h</sup> 36 <sup>m</sup> 22 <sup>s</sup> Magnitude: 6½ Berkeley Δ = 65.4°
March 29 No. 44	iP NEZ iP ne ipP Z ipP E iS E iS e iS Z iS n	06 <sup>h</sup> 26 <sup>m</sup> 07 <sup>s</sup> comp 06 26 07.1 06 28 08 06 28 11 06 33 25 06 33 26 06 33 27 06 33 27.3	Epicenter: U.S.C.G.S. 37° N, 3.5° W Near South Coast of Spain Extensive Property damage at Granada and Malaga.

(cont. on next pg.)

## Bulletin for March, 1954

Gnwch. Date and Number	Phase and Component	G. M. C.T.	Remarks
March 29 (Cont.) No. 44	i N i NE i n isS NE	06 <sup>h</sup> 33 <sup>m</sup> 32 <sup>s</sup> 06 34 51 06 34 51.1 06 36 54	H = 06 <sup>h</sup> 17 <sup>m</sup> 05 <sup>s</sup> h about 650 km Magnitude: 7 $\frac{1}{2}$ - 7 $\frac{1}{2}$ Pasadena $\Delta$ = 58.7 $^{\circ}$
March 30 No. 45	iS N	16 <sup>h</sup> 59 <sup>m</sup> 31 <sup>s</sup>	Epicenter: U.S.C.G.S. 20 $^{\circ}$ N, 155 $^{\circ}$ W Near northeast coast of Hawaii, T.H. H = 16 <sup>h</sup> 40 <sup>m</sup> 03 <sup>s</sup> $\Delta$ = 64.8 $^{\circ}$
March 30 No. 46	iP e iP Z iS N i N e N e E	18 <sup>h</sup> 52 <sup>m</sup> 37.4 <sup>s</sup> 18 52 38 19 01 22 19 02 38 19 09 11 19 09 12	Epicenter: U.S.C.G.S. 20 $^{\circ}$ N, 155 $^{\circ}$ W Near northeast coast of Hawaii, T.H. H = 18 <sup>h</sup> 41 <sup>m</sup> 54 <sup>s</sup> Magnitude: 6 $\frac{1}{2}$ Pasadena Additional Shock: H = 16 <sup>h</sup> 40 <sup>m</sup> 03 <sup>s</sup> $\Delta$ = 64.8 $^{\circ}$
March 31 No. 47	iPR <sub>1</sub> Z iPR <sub>1</sub> neZ iPR <sub>1</sub> neZ iPR <sub>1</sub> NE ePR <sub>2</sub> n ePS N i E iPPS E i E iSR <sub>1</sub> E	18 <sup>h</sup> 45 <sup>m</sup> 23 <sup>s</sup> comp 18 45 25 dil 18 45 31 dil 18 45 32 18 47 57.5 18 54 55 18 55 11 18 56 00 18 56 22 19 00 05	Epicenter: U.S.C.G.S. 13.5 $^{\circ}$ N, 58 $^{\circ}$ E Arabian Sea H = 18 <sup>h</sup> 25 <sup>m</sup> 48 <sup>s</sup> Magnitude: 7 $\frac{1}{2}$ - 7 $\frac{1}{2}$ Pasadena $\Delta$ = 114.0 $^{\circ}$

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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.  
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BULLETIN FOR APRIL, 1954

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
April 1 No. 48	iP Z iP e eP n eS N eS E isS e isS n	14 <sup>h</sup> 14 <sup>m</sup> 26 <sup>s</sup> comp. 14 14 27.0 14 14 28.2 14 18 54 14 18 56 14 19 10.9 14 19 13.4	Epicenter: U.S.C.G. 19.5°N, 67°W North of Puerto Rico H = 14 <sup>h</sup> 08 <sup>m</sup> 59 <sup>s</sup> h about 60 km Δ = 25.9°
April 1 No. 49	eP Z eS E es N eSR <sub>1</sub> E	18 <sup>h</sup> 30 <sup>m</sup> 55 <sup>s</sup> dil 18 40 48 18 40 52 18 46 06	Epicenter: U.S.C.G. 46.5°N, 153.5°E Kurile Islands H = 18 <sup>h</sup> 18 <sup>m</sup> 47 <sup>s</sup> h about 60 km Magnitude 6½ Pasa. Δ = 80.4°
April 1 No. 50	iP Z eP n es N is n es e	23 <sup>h</sup> 16 <sup>m</sup> 44 <sup>s</sup> 23 16 44 23 21 33 23 21 33.5 23 21 35	Epicenter: U.S.C.G. 17.5°N, 92°W Southern Mexico Felt: Tichucakco, Chiopos H = 23 <sup>h</sup> 11 <sup>m</sup> 22 <sup>s</sup> Δ = 25.8°

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## Bulletin for April, 1954

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
April 5 No. 51	eP n iP Z iP e ipP Z ipP e eiP n ePS E	18 <sup>h</sup> 02 <sup>m</sup> 53.5 <sup>s</sup> 18 02 53.7 18 02 55.7 18 03 20 18 03 20.5 18 03 20.7 18 12 10	Epicenter: U.S.C.G.S. 23° S, 67.5° W Argentina-Bolivia- Chile border. Felt: Calama, Chile H = 17 <sup>h</sup> 52 <sup>m</sup> 22 <sup>s</sup> h about 150 km Δ = 66.1°
April 8 No. 52	iP Z iP n e Z e n	16 <sup>h</sup> 51 <sup>m</sup> 26.0 <sup>s</sup> 16 51 26.2 16 52 07 16 52 13.1	Epicenter: U.S.C.G.S. 23.5° S, 116° W Easter Islands Region H = 16 <sup>h</sup> 39 <sup>m</sup> 52 <sup>s</sup> Δ = 72.7°
April 11 No. 53	ePS E	03 <sup>h</sup> 03 <sup>m</sup> 04 <sup>s</sup>	Epicenter: U.S.C.G.S. 7° S, 155° E H = 03 <sup>h</sup> 03 <sup>m</sup> 03 <sup>s</sup> Δ = 119.9°
April 11 No. 54	eP e iP Z ip n epP e ipF Z	05 <sup>h</sup> 50 <sup>m</sup> 53.7 <sup>s</sup> 05 50 54 comp 05 50 54.5 05 51 40.9 05 51 42 dil	Epicenter: U.S.C.G.S. Northern Chile- Argentina border H = 05 <sup>h</sup> 40 <sup>m</sup> 00 <sup>s</sup> ** h about 150 km Δ p - h = 70.2°
April 11 No. 55	iPR <sub>1</sub> Z iPR <sub>1</sub> NE ePR <sub>1</sub> Z esks N e E ePs N esR <sub>1</sub> N	10 <sup>h</sup> 45 <sup>m</sup> 12 <sup>s</sup> comp 10 45 19 10 45 20 dil 10 51 06 10 54 26 10 54 44 11 01 46	Epicenter: U.S.C.G.S. 12° N, 58° E Arabian Sea H = 10 <sup>h</sup> 25 <sup>m</sup> 27 <sup>s</sup> Δ = 115.2°

## BULLETIN FOR APRIL, 1954

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
April 11 No. 56	iP Z eP n iPR <sub>1</sub> Z eSKS e eSKS E iPPs N	11 <sup>h</sup> 06 <sup>m</sup> 49 <sup>s</sup> comp. 11 06 49.2 11 10 45 11 17 04.2 11 17 05 11 20 24	Epicenter: U.S.C.G.S. 37° N, 70.5° E Hindu Kush H = 10 <sup>h</sup> 53 <sup>m</sup> 20 <sup>s</sup> h about 60 km Δ = 97.6°
April 12 No. 57	iP <sub>4</sub> n iP <sub>3</sub> e iP <sub>2</sub> e iP <sub>2</sub> n eP <sub>2</sub> Z iS <sub>4</sub> e iS <sub>3</sub> n i e i n	21 <sup>h</sup> 24 <sup>m</sup> 51.8 <sup>s</sup> 21 24 52.3 21 24 53.9 21 24 54.4 21 24 54.5 comp 21 25 24.2 21 25 25.2 21 25 30.4 21 25 30.9	Δ S <sub>4</sub> - P <sub>4</sub> = 299 Km H = 21 <sup>h</sup> 24 <sup>m</sup> 07.3 <sup>s</sup> Interpretation based on Walter-Birkenhauer travel-time tables for near earthquakes in East Central North America
April 13 No. 58	iP Z eP e iP n epP Z epP n epP e iS E eS en eS N ePS N ePS E esS E	07 <sup>h</sup> 47 <sup>m</sup> 20 <sup>s</sup> dil 07 47 20 07 47 20.5 07 48 00 comp 07 48 00.9 07 48 03.3 07 56 15 07 56 16.3 07 56 17 07 57 04 07 57 06 07 57 30	Epicenter: U.S.C.G.S. 27.5° S, 66° W Catamarca province, Argentina H = 07 <sup>h</sup> 36 <sup>m</sup> 23 <sup>s</sup> h about 200 km Δ = 70.5°



Bulletin for April, 1954

Gnwch. Date And Number	Phase and Component	G. M. C. T.	Remarks
April 17 No. 59	iP Z eP N eP e eP E iP Z e N e E iS N e E e(SR <sub>1</sub> ) E e N	20 <sup>h</sup> 21 <sup>m</sup> 07 <sup>s</sup> dil 20 21 08 20 21 08.2 20 21 09 20 21 09.2 comp 20 25 18 20 25 20 20 29 35 20 29 57 20 34 22 20 34 38	Epicenter: U.S.C.G.S. 51.5° N, 179° W Andreanof Islands, Aleutian Islands Felt on Adak. H = 20 <sup>h</sup> 10 <sup>m</sup> 37 <sup>s</sup> Magnitude: 6 3/4 - 7 Pasadena 6 3/4 Berkeley Δ = 63.6°
April 21 No. 60	iP Z iP Z	10 <sup>h</sup> 10 <sup>m</sup> 08.5 <sup>s</sup> dil 10 10 10.5	Epicenter: U.S.C.G.S. 43° N, 46° E Dagestan, A.S.S.R. H = 09 <sup>h</sup> 57 <sup>m</sup> 40 <sup>s</sup> Δ = 83.8°
April 21 No. 61	eP Z epP Z epP n eS E eS N i E	20 <sup>h</sup> 32 <sup>m</sup> 24 <sup>s</sup> 20 32 46 20 32 47 20 39 51 20 39 53 20 42 04	Epicenter: U.S.C.G.S. 13° S, 77° W Near coast of Peru Felt At Lima h about 100 km Δ = 54.9°
April 24 No. 62	iP Z iP e iP n	08 <sup>h</sup> 41 <sup>m</sup> 03 <sup>s</sup> 08 41 03.3 08 41 03.6	Epicenter: U.S.C.G.S. 63° N, 148° W Southern Alaska Felt at College H = 08 <sup>h</sup> 33 <sup>m</sup> 04 <sup>s</sup> h about 100 km Δ = 43.7°

Bulletin for April, 1954

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
April 25 No. 63	iP        Z e         n e         e iP        Z eS        NE	00 <sup>h</sup> 39 <sup>m</sup> 28 <sup>s</sup> comp 00 39 41 00 39 42 00 39 42.1 00 48 43	Epicenter: U.S.C.G.S. 0°    , 155° W Atlantic Ocean About 500 miles south- west of Siberia H = 00 <sup>h</sup> 27 <sup>m</sup> 54 <sup>s</sup> Δ = 73.1°
April 25 No. 64	e         E e         N e         E e         e eM        N	20 <sup>h</sup> 45 <sup>m</sup> 02 <sup>s</sup> 20 45 56 20 47 37 20 49 56 20 50 34	
April 26 No. 65	eF        e iP        Z	02 <sup>h</sup> 23 <sup>m</sup> 55 <sup>s</sup> 02 23 56.7 dil	Epicenter: U.S.C.G.S. 42° N, 143° E Near South Coase of Hokkaido, Japan H = 02 <sup>h</sup> 11 <sup>m</sup> 04 <sup>s</sup> Δ = 87.7°
April 26 No. 65	eF        E eF        e iP        Z iP        n e         N eS        E eS        N	09 <sup>h</sup> 25 <sup>m</sup> 19 <sup>s</sup> 09 25 19.7 09 25 20 comp 09 25 20.2 09 27 05 09 31 43 09 31 50	Epicenter: U.S.C.G.S. 0.5° S, 91.5° W Golapagos Islands H = 09 <sup>h</sup> 17 <sup>m</sup> 20 <sup>s</sup> Δ = 43.0°

## Bulletin for April, 1954

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
April 26 No. 66	iP NEZ iP n iPR e eS N eS G	20 <sup>h</sup> 36 <sup>m</sup> 16 <sup>s</sup> comp 20 36 17 20 39 02 20 45 38 20 45 39	Epicenter: U.S.C.G.S. 51° N, 158.5° E Off Southeast coast of Kanchatka H = 20 <sup>h</sup> 24 <sup>m</sup> 44 <sup>s</sup> h. about 60 km Magnitude: 6 <sup>1</sup> / <sub>2</sub> - 6 3/4 Pasadena 6 <sup>1</sup> / <sub>2</sub> Berkeley △ = 74.1°
April 27 No. 67	eP e eP nZ	02 <sup>h</sup> 12 <sup>m</sup> 57 <sup>s</sup> 02 13 02 dil	
April 27 No. 68	iP nNZ eP e iPR <sub>2</sub> N eS E	10 <sup>h</sup> 13 <sup>m</sup> 23 <sup>s</sup> comp 10 13 23 10 14 48 10 18 59	Epicenter: U.S.C.G.S. 6° N, 82.5° W South of Panama H = 10 <sup>h</sup> 06 <sup>m</sup> 24 <sup>s</sup> Magnitude: 7 Pasadena 6 3/4 Berkeley
April 27 No. 69	eP eE iP Z i n	21 <sup>h</sup> 41 <sup>m</sup> 13 <sup>s</sup> 21 41 13 dil 21 41 18	

Bulletin for April, 1954

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
April 29 No. 70	iP e es N iS E	10 <sup>h</sup> 55 <sup>m</sup> 23 <sup>s</sup> 11 00 16 11 00 23	Epicenter: U.S.C.G.S. 29.5° N, 112.5° W Gulf of California Minor damage in Weston Mexico H = 10 <sup>h</sup> 49 <sup>m</sup> 27 <sup>s</sup> Magnitude: 7 <sup>1</sup> / <sub>2</sub> - 7 <sup>1</sup> / <sub>2</sub> Pasadena 6 3/4 Berkeley
April 30 No. 71	eP e eP n eP E eP en iP Z iP E iP en eS n is E i(SR <sub>2</sub> ) E	13 <sup>h</sup> 14 <sup>m</sup> 12.6 <sup>s</sup> 13 14 12.9 13 14 13.6 13 14 14 13 14 14 comp 13 14 16 13 14 17.3 13 23 47.6 13 23 48 13 32 22	Epicenter: U.S.C.G.S. 39.5° N, 22° E Central Greece, 24 killed, 137 injured and 10 million damage. H = 13 <sup>h</sup> 02 <sup>m</sup> 36 <sup>s</sup> Magnitude: 7 Pasadena 6 3/4 Berkeley Δ = 74.0°
April 30 No. 72	eP Z iS N e N	23 <sup>h</sup> 15 <sup>m</sup> 46 <sup>s</sup> dil 23 24 58 23 27 40	Epicenter: U.S.C.G.S. 0.5° N, 19° W Mid Atlantic Ocean H = 23 <sup>h</sup> 04 <sup>m</sup> 30 <sup>s</sup> Δ = 70.0°

# 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 MAY, 1954

Gnwch Date and Number	Phase and Component	G.M.C.T.	Epicenter & Remarks
May 2	eP' Z iPR <sub>1</sub> Z	18 <sup>h</sup> 07 <sup>m</sup> 24 <sup>s</sup> c 18 09 59 d	USCGS: 4°N, 94½°E. Off North west coast of Sumatra. H = 17 48 02 * Δ = 135.8°
May 3	iP Z iS E iPS N	15 41 24 c 15 50 40 15 50 58	USCGS: 51½°N, 159½°E. Off Southeast coast of Kamchatka H = 15 <sup>h</sup> 29 <sup>m</sup> 40 <sup>s</sup> * Mag: 6 3/4-7 Pasa. Δ = 73.6
May 3	iP Z ipP Z iS E isS E	17 19 31 c 17 20 05.5 d 17 24 14 17 25 16	USCGS: 12°N, 86°W. Near coast of Nicaragua H = 17 <sup>h</sup> 13 <sup>m</sup> 32 <sup>s</sup> * Mag: 6 Pasadena Δ = 29.7°
May 5	eP Z iP ze iS NE	13 15 46 d 13 15 51 d 13 21 38	USCGS: 27½°N, 112½°W. Gulf of California H = 13 <sup>h</sup> 09 <sup>m</sup> 46 <sup>s</sup> * Mag: 6 3/4 Pasadena. Δ = 29.0°
May 6	iP Z ipP Z iS NE iPS NE	09 13 53.8 c 09 14 30 09 23 23 09 23 54	USCGS: 50° N, 155½°E. Off South coast of Kamchatka H = 09 <sup>h</sup> 02 <sup>m</sup> 14 <sup>s</sup> * about 100km Δ = 76.2°
May 13	eP n iS N	14 52 19.9 14 56 59	USCGS: 17°N, 95½°W. Oaxaca, Mexico, Minor damage H = 14 <sup>h</sup> 46 <sup>m</sup> 38 <sup>s</sup> * h about 100km Mag; 6-6¼ Pas. 6½ Berk. Δ = 27.6°

(May, 1954)

Gnwch Date and Number	Phase and Component	G.M.C.T.	Epicenter & Remarks
May 14	iP Z iPR <sub>1</sub> N eSKS N eSKKS E isSKKS N ePS N	22 52 23.5 d 22 56 22 23 02 32 23 03 13 23 04 35 13 05 03	USCGS: 36°N, 137°E. Near coast of Honshu, Japan. Felt in eastern Honshu. H = 22 <sup>h</sup> 39 <sup>m</sup> 25 <sup>s</sup> * h about 250k Mag: 7 Pasadena Δ = 95.1°
May 26	eP Z eS E	01 54 07 d 02 04 02	USCGS: 51½°N, 159½°E. Off Southeast coast of Kamchatka H = 01 <sup>h</sup> 43 <sup>m</sup> 03 <sup>s</sup> * Δ = 73.7°
May 31	eP' Z eSKP Z	16 08 07 d 16 11 48 d	USCGS: 7°S, 119°E H = 15 <sup>h</sup> 48 <sup>m</sup> 33 <sup>s</sup> Mag: 6¼-6½ Pasa. Δ = 142.3

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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.  
Two Sprengnether short-period horizontal.

## BULLETIN FOR JUNE, 1954

Date	Phase	G.M.C.T.	Epicenter & Remarks
4	iP Z eS E	06 <sup>h</sup> 58 <sup>m</sup> 42.7 <sup>s</sup> c 07 05 09	USCGS: 1½°S, 91½°W. Galapagos Islands H = 06 <sup>h</sup> 50 <sup>m</sup> 42 <sup>s</sup> * Mag: 6 ¾ Pas. 6¼ Berk. Δ = 43.0°
4	iP' Z	11 01 15.9 d	USCGS: Java Sea H = 10 <sup>h</sup> 41 <sup>m</sup> 37 <sup>s</sup> ** Δ = 140° - 145°
4	eP Z eS NE	16 07 46 c 16 12 34	USCGS: Central Gulf of Cali. H = 16 <sup>h</sup> 01 <sup>m</sup> 45 <sup>s</sup> ** Mag: 6 Pasadena Δ = 28° - 29°
5	iP Z	01 54 26 c	USCGS: 18°N, 102½°W. Near coast of Guerrero, Mexico H = 01 <sup>h</sup> 48 <sup>m</sup> 20 <sup>s</sup> * Δ = 29.6°
6	iP' Z eSKP N eSKKS N eSR <sub>1</sub> N	17 09 53 d 17 13 12 17 18 54 17 29 20	USCGS: 3½°S, 136½°E. Western New Guinea. H = 16 <sup>h</sup> 50 <sup>m</sup> 33 <sup>s</sup> * Mag: 7 Pasadena Δ = 129.8°
7	eP' Z iP' Z ipP' Z eS N iSR <sub>1</sub> N	10 33 35 d 10 33 36 c 10 34 58 d 10 42 09 10 50 45	USCGS: 3½°S, 152½°E. Near Britain region. H = 10 <sup>h</sup> 15 <sup>m</sup> 33 <sup>s</sup> h about 450 km Mag: 6 ¾ Pas., Berk. Δ = 119.2°

(June, 1954)

Date	Phase	G.M.C.T.	Epicenter & Remarks
15	iP Z ipP Z eS E esS N	13 38 20 d 13 38 50 c 13 45 06 13 45 47	USCGS: 5°S, 77°W. H = 13 <sup>h</sup> 29 <sup>m</sup> 59 <sup>s</sup> * h about 100km Mag: 6 3/4 - 7 Pas., 6 1/2 - 6 3/4 Berk. Δ = 46.9°
17	iP Z iPR <sub>1</sub> Z eS N	01 51 03.0 d 01 52 56 c 01 58 20	USCGS: 56°N, 159 1/2°N. Off south coast of Kodiak Island H = 01 <sup>h</sup> 42 <sup>m</sup> 22 <sup>s</sup> * Mag: 6 1/2 Pas. Δ = 50.8°
18	iP' Z iP' ne	18 14 17.8 c 18 14 18.6	USCGS: Sunda Strait. Felt: Djakarta H = 17 <sup>h</sup> 54 <sup>m</sup> 40 <sup>s</sup> * Δ about 145°
21	iP Z ipP Z isP Z iS E iSP E isS E isSP E	01 59 22.9 c 01 59 43.5 d 01 59 56.5 c 02 07 47 02 08 37 02 08 58 02 09 52	USCGS: 23°S, 68 1/2°W Northern Chile H = 01 <sup>h</sup> 48 <sup>m</sup> 44 <sup>s</sup> * h about 150 km Mag: 6 1/2 - 6 3/4 Pasadena Δ = 66.3°
21	iP' Z iPR <sub>1</sub> Z	02 26 16.9 d 02 27 57.9 c	USCGS: 6°S, 129°E. Banda Sea H = 02 <sup>h</sup> 06 <sup>m</sup> 53 <sup>s</sup> * Δ = 136.3°

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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.

Two Sprengnether short-period horizontal.

## BULLETIN FOR JULY, 1954

Date	Phase		G.M.C.T.		Epicenter & Remarks
2	eP' ePR eSKKS ePS	Z Z N N	03 <sup>h</sup> 04 <sup>m</sup> 02.8 <sup>s</sup> c 03 05 22 d 03 12 26 03 15 26		USCGS: 13½°N, 123½°E. South-eastern Luzon, P.I. Many casualties & extensive property damage. H = 02 <sup>h</sup> 45 <sup>m</sup> 09 <sup>s</sup> * Mag: 6 ¾ Pas., 7¼ Berk. △ = 121.1°
3	iP' iPR ipPR <sub>1</sub> eSR <sub>1</sub>	Z N N N	22 50 55 c 22 54 12 22 54 32 23 13 48		USCGS: 6½°S, 106°E. Near southwest coast of Java. H = 22 <sup>h</sup> 31 <sup>m</sup> 28 <sup>s</sup> ** h about 100km Mag: 7 Pasadena △ = 145.7°
5	iP ipP	Z Z	14 03 57.9 d 14 04 09.5 c		USCGS: 50½°N, 156½°E. Near South coast of Kamchatka. H = 13 <sup>h</sup> 52 <sup>m</sup> 18 <sup>s</sup> * h about 60 km △ = 75.1°
6	iP iS	Z E	08 16 42 c 08 26 42		USCGS: 46½°N, 153½°E. Kurile Islands. H = 08 <sup>h</sup> 04 <sup>m</sup> 42 <sup>s</sup> h about 100 km. Mag: 6 ¾ Pasadena, 6½ - 6 ¾ Berk. △ = 79.5°
6	iP eS	ZNE N	11 19 10 c 11 23 57		USCGS: 39½°N, 118½°W. Near Fallon, Nevada. Several injured & moderate property dam. H = 11 <sup>h</sup> 13 <sup>m</sup> 19 <sup>s</sup> Mag: 7 Pasa., 6 ¾ Berk.
6	eP iP iS	Z Z N	22 13 33 d 22 13 34.6 c 22 18 19		USCGS: 39½°N, 118½°W. Near Fallon, Nevada. H = 22 <sup>h</sup> 07 <sup>m</sup> 41 <sup>s</sup> Mag: 6 ¾ Pasa., 6¼-6½ Berk. △ = 27.9°
13	ePR <sub>1</sub>	Z	08 25 07 c		USCGS: 3°S, 151°E. Near Britain region. H = 08 <sup>h</sup> 04 <sup>m</sup> 44 <sup>s</sup> △ = 120.2°

(July, 1954)

Date	Phase		G.M.C.T.	Epicenter & Remarks
18	iP	Z	01 <sup>h</sup> 03 <sup>m</sup> 34.1 <sup>s</sup> d	USCGS: Revilla Gigedo Is. region H = 00 <sup>h</sup> 56 <sup>m</sup> 50 <sup>s</sup> ** $\Delta$ P-H = 33.6°
18	iP eS	Z E	06 45 48.6 c 06 54 51	USCGS: 55°N, 161½°E. Near east coast of Kamchatka. H = 06 <sup>h</sup> 34 <sup>m</sup> 35 <sup>s</sup> ** $\Delta$ = 70.3°
18	eP isKS isKKS	Z N N	09 21 00 d 09 31 25 09 32 04	USCGS: 35½°N, 140½°E. Near east coast of Honshu, Japan. Felt. H = 09 <sup>h</sup> 07 <sup>m</sup> 44 <sup>s</sup> ** Mag: 6 ½ Pasadena. $\Delta$ = 94.2°
23	eP iP ipP es ePS	Z Z Z NE N	04 44 53 c 04 44 54.4 d 04 45 04.4 c 04 54 11 04 55 11	USCGS: 31°S, 70½°W. Central Chile-Argentina border, Several injured and minor property dam. in Coquimbo, Chile. H = 04 33 26 h about 60 km Mag: 6 ¾ Pasa., 6½ Berk. $\Delta$ = 73.8°
26	iP	Z	18 16 04.4 c	
26	iP is	Z NE	20 28 11.3 c 20 38 20	USCGS: 41°S, 73°W. Central Chile. One killed & moderate property damage in Osorno. H = 20 <sup>h</sup> 15 <sup>m</sup> 45 <sup>s</sup> ** Mag: 6½ - 6½ Pasa., 6 ¾ Berk. $\Delta$ = 83.2°
26	iP eS	Z N	22 18 10.9 c 22 24 49	USCGS: 12½°N, 44°W. H = 22 <sup>h</sup> 09 <sup>m</sup> 57 <sup>s</sup> ** Mag: 6½ Pas. $\Delta$ = 44.0°
27	iP eS	Z N	06 54 57.8 c 07 01 40	USCGS: 12½°N, 44°W. H = 06 <sup>h</sup> 46 <sup>m</sup> 44 <sup>s</sup> ** $\Delta$ = 44.0°
27	eP eS	Z NE	21 06 07.8 d 21 12 51	USCGS: Mid Atlantic Ocean H = 20 <sup>h</sup> 57 <sup>m</sup> 45 <sup>s</sup> ** $\Delta$ P-H=46.0°

(July, 1954)

Date	Phase		G.M.C.T.		Epicenter & Remarks
29	iP	Z	03 33 39.6	d	USCGS: $16\frac{1}{2}^{\circ}\text{S}$ , $70\frac{1}{2}^{\circ}\text{W}$ . Southern Peru. $H = 03^{\text{h}}23^{\text{m}}46^{\text{s}}*$ h about 100 km $\Delta = 59.9^{\circ}$
	ipP	Z	03 34 07	d	
	iS	N	03 41 49		
29	iP	Z	03 46 08.6	d	USCGS: $49\frac{1}{2}^{\circ}\text{N}$ , $158^{\circ}\text{E}$ . $H = 03^{\text{h}}34^{\text{m}}20^{\text{s}}*$ Mag: 6 Pas., $6\frac{1}{4} - 6\frac{1}{2}$ Berk. $\Delta = 75.5^{\circ}$
	iS	E	03 55 49		
29	iPR <sub>z</sub>	Z	06 50 09.4	c	USCGS: $28^{\circ}\text{S}$ , $179^{\circ}\text{W}$ . Kermadec Islands region. $H = 06^{\text{h}}27^{\text{m}}59^{\text{s}}*$ $\Delta = 114.0^{\circ}$
29	iP	nZ	22 29 34.0	d	USCGS: $17\frac{1}{2}^{\circ}\text{N}$ , $92\frac{1}{2}^{\circ}\text{W}$ . Tabasco, Mexico. $H = 22^{\text{h}}23^{\text{m}}54^{\text{s}}*$ $\Delta = 25.7^{\circ}$
	eS	N	22 34 03		
30	iP	Z	08 58 09.2	d	USCGS: $36\frac{1}{2}^{\circ}\text{S}$ , $97^{\circ}\text{W}$ . Pacific Ocean, Southwest of Easter Is. $H = 08^{\text{h}}46^{\text{m}}00^{\text{s}}$ Mag: $6\frac{1}{2}$ Pasa. $\Delta = 79.5^{\circ}$
	iS	NE	09 08 06		
	ePS	N	09 08 54		
31	eP	Z	01 13 43	d	USCGS: $39^{\circ}\text{N}$ , $104^{\circ}\text{E}$ . $H = 00^{\text{h}}59^{\text{m}}57^{\text{s}}$ Ningsia Prov., China. Mag: $6\frac{1}{2}$ Pas. $\Delta = 99.8^{\circ}$
	eSKS	N	01 24 20		

EJW:ard

# CLEVELAND

## SEISMOLOGICAL OBSERVATORY

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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.

Two Sprengnether short-period horizontal.

### BULLETIN FOR AUGUST, 1954

Date	Phase and Component		G. M. C. T.	EPICENTER
2	eP	Z	10 <sup>h</sup> 24 <sup>m</sup> 46.7 <sup>s</sup> d	USCGS: 39½°N, 118½°W. Near Fallon, Nevada. Minor property damage. H = 10 <sup>h</sup> 18 <sup>m</sup> 53 <sup>s</sup> * Mag: 5¼ - 5½ Pasadena, 5¼ Berkeley Δ = 27.9°
2	eP	Z	23 40 43 d	USCGS: 37°S, 99½°W. Southeast of Easter Island. H = 23 <sup>h</sup> 28 <sup>m</sup> 33 <sup>s</sup> * Δ = 80.3°
	iP	Z	23 40 46.0 d	
	eSKS	EN	23 50 43	
	eS	E	23 50 50	
3	iP	Z	18 29 55 c	USCGS: 40°N, 25°E. Northern Greece H = 18 <sup>h</sup> 18 <sup>m</sup> 11 <sup>s</sup> * Δ = 75.5°
	eS	N-	18 39 35	
5	iP	Z	09 00 32.9 d	USCGS: 52°N, 176° E. Rat Islands, Aleutian Islands. H = 08 <sup>h</sup> 49 <sup>m</sup> 52 <sup>s</sup> * h about 60 km. Mag: 6 Pas., 6-6½ Berk. Δ = 66.0°
	eS	E	09 09 12	
6	iP	Z	16 30 46.9 c	USCGS: 1°S, 23½° W. Mid Atlantic Ocean. H = 16 <sup>h</sup> 19 <sup>m</sup> 45 <sup>s</sup> * Δ = 68.2°
	eS	E	16 39 43	
	ePS	E	16 40 36	
7	iP	Z	09 47 33.5	USCGS: Bolivia - Chile - Peru border region. H = 09 <sup>h</sup> 37 <sup>m</sup> 42 <sup>s</sup> ** h about 200 km Δ P-H = 61.1°
	ipP	Z	09 48 11.1	
	e(PS)	E	07 56 44	
9	iP	Z	19 28 07.7 d	USCGS: 53°N, 161°E. Off East coast of Kamchatka. H = 19 <sup>h</sup> 16 <sup>m</sup> 48 <sup>s</sup> * h about 60 km. Mag: 6½-6¾ Pas., 6½ Berkeley. Δ = 72.1°
	eS	N	19 37 21	
11	iP	Z	11 17 52.7 c	USCGS: 19½°N, 69½°N. Near North coast of Dominican Republic. H = 11 <sup>h</sup> 12 <sup>m</sup> 36 <sup>s</sup> *, h about 100 km Δ = 23.8°
	ipP	Z	11 18 07.3 c	
	eS	N	11 22 19	
	isS	e	11 22 42.2	
	eSR <sub>1</sub>	e	11 23 13.3	

(August, 1954)

Date	Phase and Component		G. M. C. T.	Epicenter
14	iP	Z	01 <sup>h</sup> 48 <sup>m</sup> 16.3 <sup>s</sup> d	USCGS: 51°N, 160½°E. Off Southeast Coast of Kamchatka. H = 01 <sup>h</sup> 36 <sup>m</sup> 43 <sup>s</sup> * Δ = 74.0°
18	eP	Z	04 56 24 d	USCGS: 21½°S, 176°W. Tonga Islands H = 04 <sup>h</sup> 42 <sup>m</sup> 20 <sup>s</sup> *, h about 150 km. Mag: 7 Pas., 7¼ Berkeley Δ = 107.5°
	epP	Z	04 56 53 c	
	isP	Z	04 57 07 c	
	iPR <sub>1</sub>	Z	05 00 50 d	
	ipPR <sub>1</sub>	Z	05 01 27 d	
	isKS	NE	05 06 50	
	eSKKS	NE	05 07 39	
iS	N	05 08 19		
20	iP	Z	23 07 77.4 d	USCGS: 71°N, 14°W. Jan Mayen fore-shock. H = 22 <sup>h</sup> 59 <sup>m</sup> 16 <sup>s</sup> * Δ = 44.2°
	es	N	23 14 03	
21	iP	Z	00 33 46.7 d	USCGS: 71°N, 13½°W. Jan Mayen fore-shock. H = 00 <sup>h</sup> 25 <sup>m</sup> 35 <sup>s</sup> * Δ = 44.5°
	es	N	00 40 24	
21	iP	Z	00 34 15.3 d	Jan Mayen foreshock.
	eS	N	00 40 53	
21	iP	Z	07 27 57.8 c	USCGS: 70½°N, 14°W. Jan Mayen fore-shock. H = 07 <sup>h</sup> 19 <sup>m</sup> 46 <sup>s</sup> * Δ = 44.0°
	es	N	07 34 38	
21	iP	Z	13 13 16.5 d	USCGS: 70½°N, 14°W. Jan Mayen fore-shock. H = 13 <sup>h</sup> 05 <sup>m</sup> 05 <sup>s</sup> * Δ = 44.0°
21	iP	Z	17 48 16.1 d	USCGS: 71°N, 14°W. Jan Mayen fore-shock. H = 17 <sup>h</sup> 40 <sup>m</sup> 05 <sup>s</sup> * Δ = 44.2°
21	iP	Z	22 59 13.8 d	USCGS: 72°N, 13°W. Jan Mayen Is. region. H = 22 <sup>h</sup> 51 <sup>m</sup> 00 <sup>s</sup> * Δ = 44.7°
	eS	N	22 05 52	
22	iP	Z	10 16 13.1 d	USCGS: 71°N, 14½°W. Jan Mayen after-shock. H = 10 <sup>h</sup> 08 <sup>m</sup> 02 <sup>s</sup> * Δ = 44.0°
	es	N	10 22 51	
24	iP	Z	05 57 21 d	USCGS: 39½°N, 118½°W. Near Fallon, Nevada. Minor property damage at Fallon and Lovelock. H = 05 <sup>h</sup> 51 <sup>m</sup> 31.5 <sup>s</sup> Mag: 6.8 P as., 6½ Berk. Δ = 27.9°
	iS	NE	06 02 18	
27	iSKS	N	11 19 28	USCGS: 24½°N, 143°E, Volcano Is. H = 10 <sup>h</sup> 55 <sup>m</sup> 02 <sup>s</sup> *, h about 100 km Mag: 6.7 Pas., Δ = 103.0°
	eSKKS	N	11 20 35	
	ePS	N	11 22 14	

(August, 1954)

Date	Phase and Component	G. M. C. T.	Epicenter
30	iS N	08 <sup>h</sup> 20 <sup>m</sup> 11 <sup>s</sup>	USCGS: 44°N, 147½°E. Kurile Is. H = 07 <sup>h</sup> 57 <sup>m</sup> 25 <sup>s</sup> * h about 60 km Mag: 6¼ Pasadena, Δ = 84.0°
31	eS E	22 31 13	USCGS: 39½°N, 118½°W. Near Fallon, Nevada. Felt: H = 22 <sup>h</sup> 20 <sup>m</sup> 32 <sup>s</sup> Mag: 6½ Pas., 5½ Berkeley Δ = 27.9°

EJW:ard

# 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 SEPTEMBER, 1954

Date	Phase and Component		G. M. C. T.	Epicenter
1	e	E	05h29m07s	USCGS: 39½°N, 118½°E. Near Fallon, Nevada, Felt: H = 05 18 46.5 Mag: 6¼ Pas., 5¼ Berk., Δ = 27.9°
	eSR <sub>1</sub>	E	05 30 57	
4	iP <sub>1</sub>	Z	03 47 35.5	USCGS: 3°S, 139½°E. Northern New Guinea. H = 03h28m32s* h about 60 km Mag: 6¼ Pasadena Δ = 127.6°
	ePS	E	03 59 32	
	ePPS	E	04 01 05	
	eSR <sub>1</sub>	E	04 06 35	
5	ePR <sub>1</sub>	E	08 04 59	USCGS: 19°S, 176°E. Fiji Islands region. H = 07h45m31s* Mag: 6½ Pasadena Δ = 112.2°
	eSKS	E	08 10 54	
	eSKKS	E	08 11 56	
	is	N	08 12 50	
	iSR <sub>1</sub>	N	08 20 33	
6	eP	Z	18 42 22.3 c	USCGS: 51°N, 158°E. Near Southeast coast of Kamchatka. H = 18h30m48s* h about 60 km. Mag: 6½ Pasadena Δ = 74.8°
	iP	Z	18 42 23.3 d	
	ipP	Z	18 42 37.1 d	
	isP	Z	18 42 47.1 d	
	eS	E	18 51 51	
	isS	E	18 52 19	
	eSP	E	18 52 54	
9	iP	Z	01 15 04 c	USCGS: 36°N, 1½°E. Northern Algeria. 1600 killed and major property damage. H = 01h04m37s* Mag: 6 3/4 Psa., 6 3/4 - 7 Berk. Δ = 62.8°
	iPR <sub>1</sub>	E	01 17 26	
	iS	N	01 23 25	
	iSR <sub>1</sub>	E	01 27 51	
10	iP	Z	05 54 30	USCGS: 36°N, 2°E. Northern Algeria aftershock. H = 05h44m04s* Δ = 63.3°
	es	N	06 03 00	
11	iP <sub>4</sub>	e	18 58 49.7	Local shock; Δ S <sub>4</sub> -P <sub>4</sub> = 357 km H = 18 57 57.9
	iP <sub>3</sub>	n	18 58 51.1	
	iP <sub>2</sub>	e	18 58 54.4	
	iS <sub>4</sub>	e	18 59 27.8	
	iS <sub>3</sub>	n	18 59 28.6	



(September, 1954)

Date	Phase and Component	G. M. C. T.	Epicenter
12	iP Z eSKKS N	07 <sup>h</sup> 56 <sup>m</sup> 44.8 <sup>s</sup> d 08 07 26	USCGS: 41°N, 143°E. Off south coast of Hokkaiko, Japan. H = 07 <sup>h</sup> 43 <sup>m</sup> 50 <sup>s</sup> *. Mag: 6 $\frac{1}{4}$ Pasadena $\Delta$ = 88.4°
13	iPR <sub>1</sub> Z ipPR <sub>1</sub> E iSKS E esSKS E is N isS E ePS E ePPS E eSR <sub>1</sub> E	02 28 23 02 29 03 02 34 23 02 35 11 02 35 52 02 36 49 02 37 36 02 38 35 02 41 41	USCGS: 21°S, 175 $\frac{1}{2}$ °W. Tonga Islands H = 02 <sup>h</sup> 09 <sup>m</sup> 55 <sup>s</sup> *. h about 150 km. Mag: 6 $\frac{3}{4}$ Pasadena. $\Delta$ = 106.7°
15	eSKS E eSKKS E iS E isSKS E isR <sub>1</sub> N	18 19 12 18 20 05 18 20 46 18 23 18 18 28 26	USCGS: 18°S, 178 $\frac{1}{2}$ °W. Fiji Islands H = 17 <sup>h</sup> 56 <sup>m</sup> 08 <sup>s</sup> *. h about 600 km Mag: 7 Pasadena. $\Delta$ = 107.8°
17	iPR <sub>1</sub> Z eSKS E iSKKS E isSKS N esSKKS E	11 21 43 .9 d 11 27 19 11 28 29 11 29 09	USCGS: 20 $\frac{1}{2}$ °S, 177 $\frac{1}{2}$ °W. Fiji Islands Region. H = 11 <sup>h</sup> 03 <sup>m</sup> 19 <sup>s</sup> *, h about 250 Mag: 7 - 7 $\frac{1}{4}$ Pas., 7 $\frac{1}{4}$ Berk. $\Delta$ = 108.0°
23	iP Z iS E	21 55 30.0 d 22 05 13	USCGS: 49°N, 156°E. Kurile Is. Region. H = 21 <sup>h</sup> 43 <sup>m</sup> 36 <sup>s</sup> * Mag: 6 $\frac{1}{4}$ Pas., $\Delta$ = 76.5°
28	iP Z iS E	00 36 29.3 c 00 45 51	USCGS: 52°N, 160°E. Off Southeast coast of Kamchatka. H = 00 <sup>h</sup> 25 <sup>m</sup> 00 <sup>s</sup> * $\Delta$ = 73.0°

EJW:ard



# 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 OCTOBER, 1954

Date	Phase and Component		G. M. C. T.	Epicenter
1	ePR <sub>1</sub>	E	03 <sup>h</sup> 15 <sup>m</sup> 17 <sup>s</sup>	USCGS: 11°S, 166°E. Santa Cruz Islands. H = 02 <sup>h</sup> 55 <sup>m</sup> 31 <sup>s</sup> Mag: 6 3/4 - 7 Pas., 6 1/2 - 6 3/4 Berk. Δ = 115.0°
	iPR <sub>1</sub>	Z	03 15 18.4 d	
	eSKS	E	03 21 14	
	eSKKS	E	03 22 21	
	ePS	E	03 24 54	
	eSR <sub>1</sub>	E	03 31 09	
3	eSKS	E	03 12 58	USCGS: 10°S, 166°E. Santa Cruz Is. H = 02 <sup>h</sup> 47 <sup>m</sup> 19 <sup>s</sup> *. Mag: 6 3/4-7 Pas. Δ = 114.0°
	iPS	E	03 16 41	
	eSR <sub>1</sub>	N	03 22 37	
3	iP	Z	11 26 57 d	USCGS: 60°N, 151°W. Kenai Peninsula Alaska. Minor damage at Anchorage, Seward, Valdez and Homer. H = 11 <sup>h</sup> 18 <sup>m</sup> 46 <sup>s</sup> *. h about 100 km Mag: 6 3/4-7 Pas., 6 1/2 Berk. Δ = 45.5°
	iP	ne	11 26 57.4	
	ipP	n	11 27 18.7	
	iS	NE	11 33 40	
3	iSKP	Z	23 44 19.4 c	USCGS: 1/2°S, 127°E. Molucca Islands H = 23 <sup>h</sup> 21 <sup>m</sup> 39 <sup>s</sup> *. Δ = 132.5°
17	iP	Z	23 03 33.1 d	USCGS: 31 1/2°N, 116 1/2°W. Lower Calif. Felt: San Diego & Imperial Valley California. H = 22 <sup>h</sup> 57 <sup>m</sup> 18 <sup>s</sup> * Mag: 5.8 Pas., 6 Berk. Δ = 29.7°
	eS	N	23 08 31	
	e	E	23 09 04	
19	iP	Z	17 55 15.9 d	USCGS: 57 1/2°N, 32 1/2°W. North Atlantic Ocean. H = 17 <sup>h</sup> 48 <sup>m</sup> 14 <sup>s</sup> *. Δ = 34.8°
	eS	N	18 00 47	
21	iP'	Z	00 30 24 d	USCGS: 41°N, 81°E. South Indian Ocean. H = 00 <sup>h</sup> 10 <sup>m</sup> 10 <sup>s</sup> *. Mag: 7 Pas. Δ = 167.4°
	iPR <sub>1</sub>	Z	00 35 23 d	
	eSR <sub>1</sub>	E	00 56 19	

(October, 1954)

Date	Phase and Components	G. M. C. T.	Epicenter
21	iP        Z ipP      Z iS        NE isS      N	06 <sup>h</sup> 57 <sup>m</sup> 42.8 <sup>s</sup> c 06 57 59.8 c 07 02 29 07 03 04	USCGS: 14°N, 90½°W. Guatemala H = 06 <sup>h</sup> 51 <sup>m</sup> 48 <sup>s</sup> *. h about 60 km Mag: 6½ Pas., Δ = 28.5°
24	iP        Z es        E	09 50 14 c 09 55 10	USCGS: 31½°N, 116°W. Lower Cali. Felt: San Diego & Imperial Valley Counties, Cali. H = 09 <sup>h</sup> 44 <sup>m</sup> 05 <sup>s</sup> * Mag: 6.0 Pas, 5 3/4 Berk. Δ = 29.2°

EJW:ard

# 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, 1954

Date	Phase and Component	G. M. C. T.	Epicenter
1	iP n ipP Z eS N eSR <sub>1</sub> E	21 <sup>h</sup> 02 <sup>m</sup> 24.1 <sup>s</sup> 21 02 31 21 07 19 21 08 23	USCGS: 14°N, 92°W. Off coast of Guatemala. H = 20 <sup>h</sup> 56 <sup>m</sup> 22 <sup>s</sup> , h about 60 km. Δ = 29.0°
2	eSKP N e(SKS) N eSR <sub>1</sub> E eSR <sub>2</sub> E	08 47 19 08 50 10 08 59 42 09 05 12	USCGS: 7½°S, 119°E. Sumbawa Is. Region. H = 08 <sup>h</sup> 24 <sup>m</sup> 08 <sup>s</sup> *. Mag: 6½ Pas., 6 ¾ Berk. Δ = 142.6°
12	iP Z iP n iP Z	12 32 54.7 d 12 32 55.1 12 33 00.7 d	USCGS: 31½°N, 116°W. Lower Cali. Felt: San Diego and El Centro H = 12 <sup>h</sup> 26 <sup>m</sup> 47 <sup>s</sup> *. Mag: 6.1 Pas., 6½ Berkeley. Δ = 29.2°
18	iP Z ipP Z isP Z eS E esS E	05 31 48.8 05 32 05.1 05 32 14.5 05 41 35 05 41 58	USCGS: 49°N, 155°E. Kurile Islands H = 05 <sup>h</sup> 20 <sup>m</sup> 04 <sup>s</sup> h about 100 km. Δ = 76.8°
18	iP Z eSKKS e	20 57 59.4 d 21 08 49	USCGS: 39°N, 142°E. Honshu, Japan H = 20 <sup>h</sup> 44 <sup>m</sup> 55 <sup>s</sup> *. Δ = 91.0°
19	eP Z iP Z ipP Z eS E isS E e(SR <sub>1</sub> ) E	06 08 16.0 c 06 08 17.0 d 06 10 17.6 d 06 18 32 06 22 04 06 25 06	USCGS: 41°N, 131½°E. Sea of Japan H = 05 56 03. h about 600 km Mag: 6½-6 ¾ Pasadena Δ = 92.7°
21	eSKS E ePS E	08 03 00 08 07 03	USCGS: 29°S, 178°W. Kermadec Is. H = 07 <sup>h</sup> 37 <sup>m</sup> 27 <sup>s</sup> *. Δ = 113.7°
23	iP Z	10 11 06.6 d	USCGS: 53°N, 159½°E. Off coast of Kamchatka. H = 09 <sup>h</sup> 59 <sup>m</sup> 45 <sup>s</sup> *. h about 60 km. Mag: 5½ Pasadena Δ = 72.7°

(November, 1954)

Date	Phase and component		G. M. C. T.	Epicenter
23	iP	Z	10 28 59.0 c	USCGS: $52\frac{1}{2}^{\circ}\text{N}$ , $160^{\circ}\text{E}$ . Off coast of Kamchatka. $H = 10^{\text{h}}17^{\text{m}}35^{\text{s}}$ , h about 60 km. Mag: $5\frac{3}{4}$ Pasadena $\Delta = 73.0^{\circ}$
	iP	Z	10 28 59.4 d	
	ipP	Z	10 29 13.4 c	
	eS	E	10 38 20	
23	eP	Z	21 24 20.7 d	USCGS: $52^{\circ}\text{N}$ , $160\frac{1}{2}^{\circ}\text{E}$ . off Southeast coast of Kamchatka. $H = 21^{\text{h}}12^{\text{m}}55^{\text{s}}$ * h about 60 km. Mag: $6-6\frac{1}{2}$ Pasadena $\Delta = 73.0^{\circ}$
	eS	E	21 33 42	
25	iP	Z	11 23 13.4 c	USCGS: $40\frac{1}{2}^{\circ}\text{N}$ , $126^{\circ}\text{W}$ . Off Cape Mendocino, California. Felt: North California. $H = 11^{\text{h}}16^{\text{m}}36^{\text{s}}$ Mag: $6\frac{1}{2}$ Pas., $6\frac{1}{4}$ Berk. $\Delta = 33.0^{\circ}$
	iP	Z	11 23 15.4 c	
	iS	N	11 28 38	
	iS	N	11 28 42	
25	iPR <sub>1</sub>	Z	20 55 44.1 c	USCGS: $15^{\circ}\text{N}$ , $94\frac{1}{2}^{\circ}\text{W}$ . Off coast of Chiapas, Mexico. $H = 20^{\text{h}}48^{\text{m}}50^{\text{s}}$ * $\Delta = 28.7^{\circ}$
27	iP	Z	16 08 34.5 c	USCGS: $12^{\circ}\text{N}$ , $87^{\circ}\text{W}$ . Near coast of Nicaragua. $H = 16^{\text{h}}02^{\text{m}}22^{\text{s}}$ * $\Delta = 30.2^{\circ}$
29	iP	Z	01 50 27.0 c	USCGS: $53\frac{1}{2}^{\circ}\text{N}$ , $160^{\circ}\text{E}$ . Near east coast of Kamchatka. $H = 01^{\text{h}}39^{\text{m}}02^{\text{s}}$ * $\Delta = 72.0^{\circ}$

# 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, 1954

Date	Phase and Component	G. M. C. T.	Epicenter
3	eS E	08 <sup>h</sup> 58 <sup>m</sup> 13 <sup>s</sup>	USCGS: 44°N, 127°W. Off coast of Oregon. H = 08 <sup>h</sup> 46 <sup>m</sup> 02 <sup>s</sup> * Δ = 32.9°
4	eSKS E ePS E	07 26 16 07 30 33	USCGS: 5°S, 152½°E. New Britain Region. H = 07 <sup>h</sup> 00 <sup>m</sup> 29 <sup>s</sup> *. Mag: 6½ Pasadena. Δ = 120.0°
4	i(SR <sub>1</sub> ) ne	18 20 36.0	USCGS: 20°N, 69°W. Near North coast of the Dominican Republic. H = 18 <sup>h</sup> 10 <sup>m</sup> 23 <sup>s</sup> *. Δ = 24.0°
4	iP NEZ ipP Z iPR <sub>1</sub> E iS <sup>1</sup> NE	18 38 04.0 d 18 38 23.2 d 18 39 16 18 43 35	USCGS: 11°N, 61°W. Near Trinidad, One killed, several injured and extensive property damage. H = 18 <sup>h</sup> 31 <sup>m</sup> 07 <sup>s</sup> *. h about 60 km. Mag: 6¼-6½ Pas., 6¼-6½ Berk. Δ = 35.5°
10	iP N e E eS E	13 05 44 13 09 55 13 10 01	USCGS: 18½°W, 81½°W. West of Jamaica. H = 13 <sup>h</sup> 00 <sup>m</sup> 27 <sup>s</sup> . Mag: 6¼-6½ Pas., Δ = 22.7° Phase arrival times late.
16	iP Z ePR <sub>1</sub> e N iS N	06 13 03.6 c 06 13 46 06 17 38 06 17 52	USCGS: 39½° N, 118°W. Near Fallon, Nevada. Moderate property damage. H = 11 <sup>h</sup> 07 <sup>m</sup> 10 <sup>s</sup> . Mag: 7-7½ Pas., 6¾ Berk. Δ = 27.6°
19	iP Z ipP Z is E i(PS) E isS e	10 34 02.0 d 10 35 00.8 c 10 42 27 10 43 34 10 44 05.5	USCGS: 23°S, 66½°W. Jujuy Province Argentina. Felt: Northern Chile H = 10 <sup>h</sup> 23 <sup>m</sup> 40 <sup>s</sup> *. h about 250 km. Mag: 6½-6¾ Pas., Δ = 66.4°

(December, 1954)

Date	Phase and Component	G. M. C. T.	Epicenter
21	iP	Z	USCGS: 41°N, 124°W. Humboldt County, California. Several injured and extensive property damage. H = 19 <sup>h</sup> 56 <sup>m</sup> 25 <sup>s</sup> *. Mag: 6½-6¾ Pas., 6¼ Berk. Δ = 31.8°
	iPR <sub>2</sub>	Z	
	iS-	E	
	iSR <sub>1</sub>	E	
28	iP'	Z	USCGS: 5°S, 152½°E. New Britain Region. H = 01 <sup>h</sup> 00 <sup>m</sup> 37 <sup>s</sup> *. Δ = 120.0°
	i	Z	
	e(SKS)	E	
	e(S)	E	
	ePS	E	
30	iP	Z	USCGS: 53°N, 168°W. Fox Islands Aleutian Islands. Felt: Unalaska. H = 11 <sup>h</sup> 32 <sup>m</sup> 26 <sup>s</sup> *. h about 60 km. Mag: 6½-6¾ Pas., Δ = 56.9°