

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.



1.

Bulletin for January, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
January 1 No. 1	iSKP Z F E	20 ^h 37 ^m 39.9 ^s dil 21 31	Epicenter by U.S.C.G.S. 18° S., 169° E. New Hebrides Islands Region. H = 20 ^h 16 ^m 20 ^s Δ = 116°3
January 3 No. 2	iP Z iP Z eP n e N F N	12 ^h 27 ^m 50 ^s comp 12 27 51 dil 12 27 51.4 12 38 36 12 58	Weak; secondaries lost when changing records. Epicenter by U.S.C.G.S. 18° N., 106° W., off coast of Colima, Mexico. H = 12 ^h 21 ^m 31 ^s Magnitude 6 1/4 - 6 1/2 by Pasadena; 6 1/4 by Berke- ley. Δ = 31°5
January 3 No. 3	eP Z iP Z e e e N M N F N	13 ^h 10 ^m 44 ^s comp 13 10 44.2 dil 13 10 44.3 13 14 59 13 20 38 13 26	Aftershock of preceding quake, No. 2. H = 13 ^h 04 ^m 24 ^s Magnitude 6 1/4 by Pasa- dena; 6 1/2 by Berkeley.
January 5 No. 4	iP Z eP N iS E iSR ₁ E M N F N	00 ^h 59 ^m 19.2 ^s comp 00 59 22 01 04 44 01 06 42 01 12.0 02 11	Epicenter by U.S.C.G.S. 7° N., 81° W., near southern coast of Panama. H = 00 ^h 52 ^m 40 ^s h about 100 km. Magnitude 6.7 by Pasadena Δ = 34°5

Bulletin for January, 1951

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January 6 No. 5	iP Z iP n ipP Z epP n iPR ₁ Z epPR ₁ Z e E eS E i N e E esS E i N e E F N	05 ^h 30 ^m 34.7 ^s comp 05 30 35.0 05 31 29.9 comp 05 31 31 05 34 35.7 05 35 33 05 39 20 05 42 04 05 42 26 05 42 26 05 44 11 05 44 14 05 44 29 06 39	Epicenter by U.S.C.G.S. 36°5 N., 70°5 E., Hindu Kush region, northeastern Afghanistan. Felt in Kashmir Province, India. H = 05 ^h 17 ^m 19 ^s h about 250 km. Magnitude 6.8 by Pasadena Δ = 98°5
January 6 No. 6	iP Z iP n eP e epP N e E iS N iS E iSR ₁ E M N F E	07 ^h 58 ^m 11.3 ^s dil 07 58 11.4 07 58 12 07 58 26 08 03 21 08 03 36 08 03 39 08 05 44 08 10.9 10 43	Epicenter by U.S.C.G.S. 7°5 N., 81° W., southern Panama. Felt in Panama and Canal Zone. H = 07 ^h 51 ^m 31 ^s h about 100 km. Δ = 34°0
January 9 No. 7	iP Z M E F E	16 10 20 comp 16 29.0 16 43	Epicenter by U.S.C.G.S. 81° N., 122° E., Arctic Ocean, about 250 miles northeast of Lenin Land Island. H = 16 ^h 00 ^m 24 ^s Δ = 57°4
January 10 No. 8	iP Z ipP Z ipP e M E F E	19 ^h 14 ^m 11.3 ^s comp 19 14 21.9 19 14 21.9 19 37.6 19 06	Epicenter by U.S.C.G.S. Aleutian Islands Region. H = 19 ^h 03 ^m 35 ^s ** h about 100 km. about 65°
January 10 No. 9	iP Z ipP Z M E F E	19 ^h 34 ^m 21.2 ^s dil 19 34 31.2 comp 20 18.1 20 44	Aftershock of preceding quake, No. 8 Δ = 125°

Bulletin for January, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
January 14 No. 10	M E F E	11 ^h 14.6 ^m 11 53	Epicenter by U.S.C.G.S. 23° S., 176° W., Tonga Islands region. H = 10 ^h 19 ^m 24 ^s ** h about 100 km. Δ = 109°0
January 15 No. 11	iP' Z ipP' Z iSKS E eSKS N iSKS e iSKS n esSKS E isSKS N eSKKS E e N iPS E epPS E eSR ₁ E e E M N F E	04 ^h 30 ^m 46 ^s dil 04 31 14 dil 04 37 25 04 37 25 04 37 26.3 04 37 27 04 38 21 04 38 22 04 38 38 04 40 12 04 41 28 04 42 02 04 47 39 04 48 21 05 04.3 06 46	Epicenter by U.S.C.G.S. 15° S., 167° E., New Hebrides Islands. H = 04 ^h 12 ^m 14 ^s h about 150 km. Magnitude 6 1/2 - 6 3/4 by Pasadena. Δ = 115°9
January 18 No. 12	iP Z iP n iP e iS E e e i n M E F E	21 ^h 26 ^m 08.4 ^s comp 21 26 08.6 21 26 08.7 21 34 28 21 35 54 21 35 55.2 21 49.1 22 58	Epicenter by U.S.C.G.S. 52° N., 177° W., Aleu- tian Islands. Felt at Finger Bay, Adak. H = 21 ^h 15 ^m 50 ^s h about 60 km. Magnitude 6 1/4 - 6 1/2 by Pasadena; 6 3/4 by Berkeley. Δ = 62°7
January 20 No. 13	M E F E	13 ^h 27.3 ^m 13 46	Epicenter by U.S.C.G.S. New Mexico - Guatemala Border. H = 13 ^h 12 ^m 20 ^s ** Δ about 25°
January 22 No. 14	M E F E	11 ^h 32.4 ^m 12 07	Epicenter by U.S.C.G.S. 33° S., 178° W., Kermadec Islands region. H = 10 ^h 30 ^m 45 ^s Δ = 115°5

Bulletin for January, 1951

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January 22 No. 15	L E M E F E	13 ^h 22.5 ^m 13 27.9 14 03	Epicenter by U.S.C.G.S. 17°5 S., 41° E., Mozambique Channel. H = 12 ^h 16 ^m 02 ^s Δ = 126°3
January 23 No. 16	i Z i E i n i n i E M E F E	07 ^h 08 ^m 36.2 ^s comp 07 23 50 07 24 05.2 07 24 42.6 07 24 48 07 49.2 08 47	Epicenter by U.S.C.G.S. 55° S., 136° W., South Pacific Ocean H = 06 ^h 52 ^m 42 ^s Δ = 107°7
January 24 No. 17	iP Z iP e iP E e n eS E iS E eSR ₁ N i N iM N F E	07 ^h 23 ^m 02.9 ^s comp 07 23 03.5 07 23 04 07 23 28 07 27 50 07 28 00 07 28 56 07 31 51 07 32 30 08 34	Epicenter by U.S.C.G.S. 33° N., 115 3/4° W., Imperial Valley, Cali- fornia. H = 07 ^h 17 ^m 01 ^s Magnitude 5 3/4 by Pasa- dena; 6 1/4 - 6 1/2 by Berkeley. Δ = 28°2
January 28 No. 18	e(P) e eS E M N F N	05 ^h 50 ^m 59 ^s comp 05 56 11 06 02.5 06 34	Epicenter by U.S.C.G.S. 43° N., 128° W., off Cape Mendocino, Cali- fornia. H = 05 ^h 43 ^m 47 ^s Δ = 34°3
January 29 No. 19	iP Z eP n ipP Z ipP n iS n iS e F e	10 ^h 33 ^m 39.6 ^s dil 10 33 39.7 10 34 04.2 comp 10 34 04.7 10 39 11.1 10 39 13.2 10 47	High frequency motion. Epicenter by U.S.C.G.S. 15°5 N., 92° W., near southern coast of Chiapas, Mexico. H = 10 ^h 27 ^m 59 ^s h about 100 km. Δ = 27°6

Bulletin for January, 1951

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
January 30 No. 20	eP NE	19 ^h 06 ^m 35 ^s	Epicenter by U.S.C.G.S. 15°5 N., 99° W., off southern coast of Mexico H = 19 ^h 00 ^m 30 ^s Magnitude 6 1/4 - 6 1/2 by Pasadena. Foreshock: H = 11 ^h 16 ^m 43 ^s Δ = 30°3
	iP Z	19 06 37 dil	
	eP N	19 06 38	
	eP e	19 06 38.9	
	iP n	19 06 38.9	
	eS N	19 11 34	
	iS E	19 11 37	
	eSR ₁ E	19 12 42	
	i E	19 18 53	
	F E	19 58	
January 30 No. 21	iP Z	23 ^h 20 ^m 03 ^s dil	Epicenter by U.S.C.G.S. 34° N., 33° E., Eastern Mediterranean Sea, near Cyprus. Felt in Cairo and Israel. H = 23 ^h 07 ^m 40 ^s h about 100 km. Δ = 84°0
	eP e	23 20 03.4	
	eSKS E	23 30 19	
	eS E	23 30 42	
	iSKKS N	23 30 47	
	ePS E	23 31 36	
	eSR ₁ N	23 36 20	
	F N	00 10	

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

Two Sprengnether short-period horizontal.



6.

Bulletin for February, 1951

Greenwich Date and Number	Phase and Component	G. M. C. T.	Remarks
February 10 No. 22	iP Z eP Z eSR ₁ E M E F E	03 ^h 46 ^m 53.0 ^s dil 03 46 59 04 05 49 04 27.7 05 36	$\Delta = 102^{\circ}6$ H = 03 ^h 32 ^m 55 ^s
February 10 No. 23	iP' Z iP' Z M E F E	22 ^h 11 ^m 20 ^s dil 22 11 31 dil 22 54.1 23 26	Epicenter by U.S.C.G.S. Off north coast of New Guinea. H = 21 ^h 52 ^m 19 ^s ** Δ about 125°
February 12 No. 24	iP Z iP Z eP n iP n eP e iS N eS n eS E e E e n e N e N M E F E	17 ^h 33 ^m 10.2 ^s comp 17 33 11.1 comp 17 33 11.5 17 33 11.7 17 33 12.1 17 42 14 17 42 14 17 42 17 17 42 35 17 43 11 17 43 12 17 50 31 17 59.8 20 33	Epicenter by U.S.C.G.S. 66° N., 136° E., near Verkhoyanski Mts., Siberia. H = 17 ^h 22 ^m 02 ^s Magnitude 6 1/2 by Pasadena. $\Delta = 69^{\circ}2$
February 13 No. 25	M E F E	06 ^h 30.8 ^m 06 49	Epicenter by U.S.C.G.S. near southern coast of lower California. H = 06 ^h 16 ^m 30 ^s ** Δ about 30°

Bulletin for February, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
February 13 No. 26	eP E iP e eP Z eP e iP Z i(SKS) NE i(SKS) e i(SKS) e e e e N F N	12 ^h 13 ^m 38 ^s 12 13 38.6 12 13 39.6 dil 12 13 40 12 13 40.5 comp 12 19 37 12 19 37.1 12 19 43.3 12 20 44 12 20 46 13 53	Epicenter by U.S.C.G.S. 15° S., 175° W. Samoa Islands region. H = 11 ^h 55 ^m 50 ^s h about 250 km. Magnitude 6 3/4 by Berkeley; 7 by Pasadena. Δ = 110°0
February 13 No. 27	ePR ₁ n M E F E	16 ^h 34 ^m 45 ^s 16 42.2 17 07	Epicenter by U.S.C.G.S. 14° N., 91° W., off coast of Guatemala. H = 16 ^h 28 ^m 00 ^s Δ = 28°7
February 13 No. 28	eP Z eP n eP e eP NE iP Z iP e iP n i Z i Z i E i NE i NE iS NE i N i E i E M NE F E	22 ^h 21 ^m 42.9 ^s comp 22 21 43 22 21 43.9 22 21 46 22 21 46.5 dil 22 21 47.9 22 21 48.3 22 22 06.5 22 22 10.5 22 22 47 22 23 47 22 24 07 22 28 46 22 29 52 22 30 56 22 31 34 22 39.5 03 08	Epicenter by U.S.C.G.S. 56° N., 155°5 W., about 150 miles east of Alaska Peninsula. H = 22 ^h 12 ^m 58 ^s Magnitude 7 by Pasadena. Δ = 48°6
February 17 No. 29	eP' n iP' Z iP' e iP' n iP' E iP' n ipP Z (continued on next page)	21 ^h 25 ^m 50.3 ^s 21 25 50.4 dil 21 25 50.7 21 25 50.8 21 25 51 21 25 51.2 21 26 42	Epicenter by U.S.C.G.S. 7° S., 146° E., south- eastern New Guinea. H = 21 ^h 06 ^m 58 ^s h about 100 km. Magnitude 7 1/4 - 7 1/2 by Pasadena; 7 1/4 by Berkeley. Δ = 126°4

Bulletin for February, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
February 17 No. 29 (continued)	iPR ₁ n ePR ₁ e iPR ₁ NEZ iSKP N eSKS e eSKS E eSKS E eSKS n eSKS N esSKS E eSKKS e eSKKS n iSKKS E iPS E epPS E ePPS E e N e(SR ₁) E M E F E	21 ^h 27 ^m 42.3 ^s 21 27 43.0 21 27 43 21 29 07 21 32 33 21 32 34 21 32 37 21 32 37.5 21 32 38 21 34 02 21 34 19.5 21 34 21 21 34 22 21 37 44 21 38 38 21 39 02 21 39 39 21 44 33 22 11.2 23 35	
February 19 No. 30	eP Z eP n eP e iP n iP eZ iS E eSR ₁ E M E F E	22 ^h 23 ^m 29 ^s dil 22 23 29.7 22 23 30.2 22 23 36.9 22 23 37.4 dil 22 33 04 22 37 53 22 51.6 23 29	Epicenter by U.S.C.G.S. 25° S., 117° W., about 500 miles west of Easter Island. H = 22 ^h 11 ^m 54 ^s Magnitude 6 1/2 by Pasadena and Berkeley. Δ = 74°6
February 20 No. 31	eP e iP Z eP n M N F N	15 ^h 35 ^m 30.7 ^s 15 35 31.2 comp 15 35 31.6 16 02.3 16 14	Epicenter by U.S.C.G.S. 22° S., 144° W., Pacific Ocean, about 450 miles northwest of Easter Is. H = 15 ^h 24 ^m 18 ^s Magnitude 6 by Pasadena Δ = 70°6
February 21 No. 32	M E F E	08 ^h 18.4 ^m 08 37	Epicenter by U.S.C.G.S. Kermadec Islands Region H = 07 ^h 19 ^m 23 ^s ** Δ about 115°

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9.

Bulletin for March, 1951



Gnwh. Date and Number	Phase and Component	G. M. C. T	Remarks
March 2 No. 33	eP e eP Z e e F E	01 ^h 39 ^m 15.0 ^s 01 39 16 dil 01 42 35 02 04	Epicenter by U.S.C.G.S. 53° N., 35° W. N. Atlantic Ocean. H = 01 ^h 32 ^m 39 ^s Δ = 3393
March 4 No. 34	iP e iP Z iP N ipP Z epP N e N ePR ₁ N epPR ₁ N ePR ₂ N ipPR ₂ N iS N e N i N M N F N	11 ^h 27 ^m 10.6 ^s 11 27 11 dil 11 27 11 11 27 29 11 27 32 11 27 38 11 29 22 11 29 46 11 30 48 11 31 10 11 35 19 11 37 18 11 47.3 11 50.3 12 12	Epicenter by U.S.C.G.S. 16° S., 74° W., near coast of S. Peru. H = 11 ^h 17 ^m 33 ^s h about 150 km. Magnitude 6 3/4 - 7 by Pasadena. Δ = 5892
March 5 No. 35	eP Z eSKS N eSKKS N esSKS N esSKS E isSKS e esSKKS N e N e N e N e N e E F E	20 ^h 25 ^m 39 ^s comp 20 36 00 20 36 37 20 37 11 20 37 13 20 37 14 20 37 54 20 38 28 20 39 15 20 39 48 20 40 02 20 40 04 22 18	Epicenter by U.S.C.G.S. 29° N., 128° E., Ryukyu Islands. H = 20 ^h 11 ^m 45 ^s h about 150 km. Magnitude 7 by Pasadena Δ = 10498

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March 8 No. 36	iP' Z M E F E	15 ^h 30 ^m 57.6 ^s dil 16 10.9 16 35	Epicenter by U.S.C.G.S. 6° S., 154° E. Solomon Islands region. H = 15 ^h 12 ^m 11 ^s h about 60 km. Δ = 119°7
March 9 No. 37	e N eSKKS E eSR ₁ E L E M E F E	20 ^h 11 ^m 23 ^s 20 13 24 20 25 44 20 46.3 20 53.9 22 32	Epicenter by U.S.C.G.S. 8° S., 124°5 E., Flores Sea Region. H = 19 ^h 44 ^m 16 ^s Magnitude 6 3/4 by Pasa- dena. Δ = 140°5
March 10 No. 38	iP' Z iP' Z iPR ₁ E iSKKS E e(S) N isSKKS E isS N ePS E e e epPS E e e e N e(SR ₁) N F E	22 ^h 16 ^m 00.0 ^s 22 16 42.0 22 17 04 22 23 42 22 24 45 22 24 54 22 25 48 22 26 43 22 27 02 22 27 26 22 27 38 22 33 05 22 33 48 01 17	Epicenter by U.S.C.G.S. 15°5 S., 167°5 E., New Hebrides Islands. H = 21 ^h 57 ^m 37 ^s h about 200 km. Magnitude 7 1/4 - 7 1/2 by Pasadena. Δ = 115°8
March 19 No. 39	eP Z iP Z iP n iP e e N eS E e N M E F E	20 ^h 40 ^m 04.7 ^s dil 20 40 05.3 comp 20 40 05.6 20 40 05.9 20 41 43 20 49 20 20 57 07 20 06.7 20 44	Epicenter by U.S.C.G.S. 57° N., 160° E., Northern Kamchatka H = 20 ^h 28 ^m 55 ^s Δ = 68°7

Bulletin for March, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
March 23 No. 40	iP' Z epP' E epP' Z eSKS E esSKS E ePS E ePPS E eSR ₁ N e N F N	21 ^h 57 ^m 04 ^s 21 58 12 21 58 12 22 03 35 22 05 17 22 06 03 22 09 11 22 13 59 22 29.0 23 11	Epicenter by U.S.C.G.S. 31° S., 180° Longitude. Kermadec Islands. H = 21 ^h 38 ^m 54 ^s h about 300 km. Magnitude 7.1 by Pasadena. Δ = 116°0
March 24 No. 41	iP Z ipP Z eS E eSR ₁ E F E	20 ^h 58 ^m 32.8 ^s dil 20 58 49.3 21 03 25 21 04 27 21 31	Epicenter by U.S.C.G.S. 13° N., 88° W., off southern coast of El Salvador. H = 20 ^h 52 ^m 36 ^s h about 100 km. Δ = 28°8
March 31 No. 42	iP Z iP e iP n iS e iS n F E	09 ^h 28 ^m 41.1 ^s comp 09 28 41.1 09 28 41.3 09 35 14.6 09 35 14.6 09 57	Epicenter by U.S.C.G.S. 60°5 N., 154° W. Southern Alaska. H = 09 ^h 20 ^m 34 ^s h about 250 km. Δ = 46°6



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12.

Bulletin for April, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
April 2 No. 43	iP Z eP n eP n iP Z eP N e(PR ₂) NE eS N M N F E	00 ^h 19 ^m 37.2 ^s comp 00 19 37.5 00 19 42.5 00 19 42.8 dil 00 19 43 00 20 40 00 24 43 00 31.0 02 14.0	Epicenter by U.S.C.G.S. 13° N., 90° W., off coast of El Salvador. H = 00 ^h 13 ^m 34 ^s Magnitude 6 1/4 - 6 1/2 by Pasadena. Δ = 29°5
April 2 No. 44	iP' Z	22 ^h 28 ^m 24 ^s dil	Epicenter by U.S.C.G.S. 6° S., 149° E., near west coast of New Britain. H = 22 ^h 09 ^m 29 ^s Δ = 124°
April 13 No. 45	iP' Z iP' e ePR ₁ e M E F E	10 ^h 34 ^m 14 ^s dil 10 34 14.0 10 37 00 11 43.5 12 25	Epicenter by U.S.C.G.S. 10° S., 119° E., about 300 miles east of Java. H = 10 ^h 14 ^m 38 ^s Δ = 144°6
April 14 No. 46	eP N iP Z iP n iPP N iPP Z iS NE eS ne iPS NE ePS e iSS E i E F E	00 ^h 55 ^m 52 ^s 00 55 52.9 dil 00 55 53.9 00 56 37 00 56 39 dil 01 04 26 01 04 26 01 05 30 01 05 31 01 06 16 01 07 01 01 57	Epicenter by U.S.C.G.S. 22° N., 66°5 W. Northern Argentina. H = 00 ^h 45 ^m 28 ^s h about 250 km. Magnitude 7 by Pasadena. Δ = 67°0

Bulletin for April, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
April 14 No. 47	iP Z iP Z eS NE eS e eS n ePS N ePS n M N F N	13 ^h 44 ^m 30.5 ^s dil 13 44 32.3 comp 13 53 53 13 53 53 13 53 58 13 54 43 13 54 44 14 12.8 15 29	Epicenter by U.S.C.G.S. 61° N., 136° E., eastern Siberia. H = 13 ^h 32 ^m 59 ^s Magnitude 6 3/4 by Pasa- dena. Δ = 72°1
April 15 No. 48	eSKS N (L) N (M) N F N	00 ^h 06 ^m 05 ^s 00 41.9 00 48.1 01 28	Epicenter by U.S.C.G.S. 28°5 N., 94° E., Assam. H = 23 ^h 40 ^m 51 ^s Δ = 110°5
April 23 No. 49	iP Z eP e iP Z eP e eS E (M) N F E	01 ^h 03 ^m 09 ^s dil 01 03 09.6 01 03 14 comp 01 03 14.4 01 11 54 01 23.8 02 42	Epicenter by U.S.C.G.S. 19° N., 155°5 W., near southern coast of Island of Hawaii. Felt. H = 00 ^h 52 ^m 21 ^s Magnitude 6 1/2 by Pasa- dena; 6.0 by Berkeley. Δ = 65°9
April 23 No. 50	iP Z iP n epP Z esP n eS E eS n iS e e E e E F E	13 ^h 27 ^m 03 ^s comp 13 27 03.4 13 27 59 13 28 13 13 35 07 13 35 07 13 35 11.6 13 36 36 13 38 25 14 09	Epicenter by U.S.C.G.S. 20°5 S., 67° W., southern Bolivia. H = 13 ^h 17 ^m 00 ^s h about 250 km. Magnitude 6 1/4 - 6 1/2 by Pasadena. Δ = 63°7
April 29 No. 51	iP Z eS N M E F E	07 ^h 45 ^m 38 ^s dil 07 52 52 08 04.7 08 32	Epicenter by U.S.C.G.S. 80°5 N., 121° E., Arctic Ocean, about 200 miles east of Lenin Land Island. H = 07 ^h 35 ^m 46 ^s Δ = 57°6

Bulletin for April, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
April 30 No. 52	ePR ₁ E	15 ^h 48 ^m 24 ^s	Epicenter by U.S.C.G.S. 8° S., 153° E., Solomon Islands Region. H = 15 ^h 28 ^m 00 ^s Magnitude 6 1/4 - 6 1/2 by Pasadena. Δ = 121°7
	eSKS E	15 53 58	
	eSKS N	15 54 00	
	eSKKS E	15 55 26	
	ePS E	15 58 15	
	e E	16 02 23	
	eSR ₁ E	16 04 53	
	L N	16 18.6	
	M N	16 24.3	
	F N	17 58	

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15.

Bulletin for May, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
May 1 No. 53	iP' Z	05 ^h 22 ^m 15 ^s comp	Epicenter by U.S.C.G.S. 50°5 S., 149° E., about 400 miles south of Tasmania. H = 05 ^h 02 ^m 41 ^s Magnitude 7 by Pasadena. Δ = 144°0
	iP' n	05 22 17.3	
	iP' e	05 22 18.9	
	eP' NE	05 22 19	
	ePR ₁ E	05 25 34	
	eSKKS E	05 32 26	
	eSKKS E	05 32 28	
	ePSKS N	05 35 35	
	e E	05 35 46	
	e E	05 37 02	
	iSR ₁ E	05 44 40	
	iSR ₂ E	05 49 03	
M E	06 11.7	After shock of No. 57.	
F E	07 59		
May 3 No. 54	iP Z	04 ^h 14 ^m 59 ^s comp	Epicenter by U.S.C.G.S. 15°5 N., 61° W., Lee- ward Islands. H = 04 ^h 08 ^m 49 ^s h about 150 km. Δ = 31°3
	eP n	04 14 59.1	
	eP e	04 14 59.4	
	iPR ₁ Z	04 16 01	
	iPR ₁ e	04 16 03.5	
	iPR ₁ n	04 16 03.7	
	eS E	04 19 58	
	e E	04 21 26	
	eSR ₁ E	04 21 37	
	e E	04 22 10	
F E	04 50		
May 4 No. 55	eP en	12 ^h 05 ^m 26 ^s	Epicenter by U.S.C.G.S. 44° N., 142° E., Hokkaido, Japan. H = 11 ^h 53 ^m 05 ^s h about 200 km. Δ = 86°2
	iP Z	12 05 27 dil	
	ipP Z	12 06 23.8	
	ipP Z	12 06 25	
	epP e	12 06 25	
	ipP n	12 06 25.4	
	iS e	12 15 26.2	
	iS e	12 15 26.9	
	eS NE	12 15 27	
	iS n	12 15 27.2	
	eSP N	12 16 30	

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Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
May 6 No. 56	iP Z e E M N F N	21 ^h 48 ^m 40 ^s dil 21 56 17 22 00.8 22 14	Epicenter by U.S.C.G.S. 11° N., 85°5 W., near northwest coast of Costa Rica. H = 21 ^h 42 ^m 20 ^s Δ = 30°7
May 6 No. 57	eP Z iP Z eS E e E M E F E	23 ^h 09 ^m 19 ^s comp 23 09 22 comp 23 14 09 23 15 01 23 18 47 01 06	Epicenter by U.S.C.G.S. 13°5 N., 88° W., eastern El Salvador. Many killed, extensive property dam- age. H = 23 ^h 03 ^m 35 ^s h about 150 km. Δ = 28°8
May 6 No. 58	iP Z	23 ^h 13 ^m 51 ^s comp	Aftershock of preceding quake. H = 23 ^h 08 ^m 04 ^s h about 150 km.
May 7 No. 59	iP Z eP ne iP _{R1} e eS E eS N M E F E	20 ^h 28 ^m 23 ^s comp 20 28 24 20 29 03.5 20 33 13 20 33 16 20 37.8 20 19	Aftershock of No. 57. H = 20 ^h 22 ^m 37 ^s h about 150 km.
May 8 No. 60	iP Z M N F N	20 ^h 09 ^m 35 ^s dil 20 29.3 20 44	Epicenter by U.S.C.G.S. 7°5 S., 80° W., near coast of Peru. H = 20 ^h 07 ^m 08 ^s h about 200 km. Δ = 49°0
May 10 No. 61	iP Z eP n iP n eP e e Z i n ipP Z (continued on next page)	21 ^h 44 ^m 39.3 ^s comp 21 44 40 21 44 40.3 21 44 41 21 44 47.7 21 44 48.9 21 44 51.9	Epicenter by U.S.C.G.S. 34° S., 72° W., near coast of central Chile. H = 21 ^h 33 ^m 02 ^s h about 100 km. Δ = 75°8

Bulletin for May, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
May 10 No. 61 (continued)	ipP n iS EN eS e e E e E ePS N	21 ^h 44 ^m 52.3 ^s 21 54 17 21 54 17 21 54 29 21 54 38 21 54 48	
May 11 No. 62	eP N eP n eP N iP n iP Z iPR ₁ e iPR ₂ e i e e E iS N eS E i e F N	02 ^h 21 ^m 46 ^s 02 21 47 02 22 03 02 22 04 02 22 04 02 22 26 02 22 51 02 24 44 02 25 17 02 26 34 02 26 35 02 27 31 04 00	Epicenter by U.S.C.G.S. 13° N., 87°5 W., near coast of Nicaragua H = 02 ^h 15 ^m 51 ^s h about 100 km. Δ = 28°8
May 13 No. 63	iP n eP Z eS E M E F E	10 ^h 05 ^m 07.1 ^s 10 05 08 10 09 20 10 13.0 10 21	Epicenter by U.S.C.G.S. 20° N., 75° W., near S. coast of Cuba. H = 10 ^h 00 ^m 10 ^s h about 100 km. Δ = 22°2
May 15 No. 64	iP Z ipP Z iSP Z eS N iS E eSS E i E i E	05 ^h 29 ^m 03.1 ^s comp 05 29 18 05 29 31 05 37 27 05 37 29 05 37 54 05 38 54 05 39 20	Epicenter by U.S.C.G.S. 21° S., 69°5 W. Northern Chile. H = 05 ^h 18 ^m 46 ^s h about 100 km. Magnitude 6 1/2 - 6 3/4 by Pasadena. Δ = 63°8
May 19 No. 65	iP Z	16 ^h 04 ^m 16.5 ^s comp	Epicenter by U.S.C.G.S. 38° N., 4° W., south central Spain. Felt. H = 15 ^h 54 ^m 25 ^s Δ = 57°8

Bulletin for May, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
May 28 No. 66	ePR ₁ Z	16 ^h 18 ^m 23 ^s comp	Epicenter by U.S.C.G.S. 29° N., 86°5 E., southern Tibet. Δ = 108°7
May 29 No. 67	eP' Z iPR ₁ Z ePR ₁ E eSKP E ePS E eSR ₁ N eSR ₁ E M E F E	06 ^h 22 ^m 23 ^s comp 06 24 09 dil 06 24 22 06 25 46 06 34 20 06 41 08 06 41 31 06 05.4 08 51	Epicenter by U.S.C.G.S. 3° S., 138°5 E., northern New Guinea. H = 06 ^h 03 ^m 06 ^s Magnitude 6 1/2 - 6 3/4 by Pasadena. Δ = 127°5
May 30 No. 68	eP' Z ePR ₁ Z ePR ₁ NE iSKP NE i NE iSR ₁ N F N	20 ^h 16 ^m 21 ^s dil 20 18 53 dil 20 18 54 20 19 52 20 21 00 20 36 40 22 06	Epicenter by U.S.C.G.S. 3° S., 126°5 E., Molucca Islands. H = 19 ^h 57 ^m 01 ^s Magnitude 6 1/4 - 6 1/2 by Pasadena. Δ = 134°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 June, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
June 1 No. 69	iP Z ipP Z ePR ₁ Z eS NE esS N e NE e N F E	20 ^h 12 ^m 04 ^s comp 20 12 32 dil 20 14 17 20 20 00 20 20 45 20 21 42 20 22 31 21 01	Epicenter by U.S.C.G.S. 52°5 N., 172° W., Aleutian Islands. Felt. H = 20 ^h 02 ^m 14 ^s h about 100 km. Δ = 58°7 Aftershock: H = 20 ^h 04 ^m 53 ^s
June 2 No. 70	iP' Z ePR ₁ N ePR ₁ Z i Z ePS N F E	07 ^h 07 ^m 12 ^s dil 07 09 09 07 09 12 dil 07 12 50 07 19 21 09 40	Epicenter by U.S.C.G.S. 7° N., 117° E., near N. coast of Borneo. H = 06 ^h 47 ^m 52 ^s Δ = 128°8
June 5 No. 71	iP n iP Z iP n ipP Z iPR ₂ Z F N	01 ^h 40 ^m 42 ^s 01 40 45 dil 01 40 53 01 40 55 01 42 00 02 15	Epicenter by U.S.C.G.S. 9°5 N., 86°0 W., near coast of Costa Rica. H = 01 ^h 34 ^m 20 ^s h about 60 km. Δ = 32°0
June 5 No. 72	iP Z ePR ₁ Z epPR ₁ Z isPR ₁ N eSKKS E isKKS N esSKKS E i E e(PS) N e E F N	17 ^h 11 ^m 38 ^s comp 17 15 48 17 16 03 17 16 13 17 22 33 17 22 34 17 23 26 17 23 40 17 25 02 17 25 13 19 50	Epicenter by U.S.C.G.S. 30° N., 132° E., south of Kyushu, Japan. Felt in southern Kyushu. H = 16 ^h 57 ^m 47 ^s h about 100 km. Magnitude 6 3/4 - 7 by Pasadena. Δ = 102°3

Bulletin for June, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
June 6 No. 73	iP Z iP ne i Z i ne ipP n ipP Z i n i Z iS E i N iSR ₁ E i N M n F E	16 ^h 19 ^m 10.3 ^s dil 16 19 11.1 16 19 16.3 comp 16 19 17.1 16 19 20.8 16 19 21 16 19 28.8 16 19 29 16 26 01 16 26 08 16 29 21 16 29 28 16 37.3 18 53	Epicenter by U.S.C.G.S. 71°5 N., 8° W., Jan Mayen Island. H = 16 ^h 10 ^m 52 ^s h about 60 km. Magnitude 7 by Pasadena Δ = 46°0 Station note: John Carroll University records seem to indi- cate 2 earthquakes about 7-8 seconds apart. The unidentified phases represent this possible interpretation.
June 16 No. 74	eP Z eS E e N F N	23 ^h 53 ^m 34 ^s comp 00 59 33 00 06 01 00 38	Foreshock of following quake. H = 23 ^h 46 ^m 58 ^s . Magnitude 5 1/2 by Pasadena.
June 17 No. 75	iP Z iS N iS E eM N	09 ^h 47 ^m 12.5 ^s comp 09 52 52 09 52 55 09 59 27	Epicenter by U.S.C.G.S. 44°5 N., 130° W. About 300 miles off the coast of Oregon. H = 09 ^h 40 ^m 15 ^s . Magnitude 6 by Pasadena. Δ = 35.2 Foreshock and after- shock.
June 17 No. 76	eP Z	11 ^h 05 ^m 44 ^s dil	Aftershock of preceding quake. H = 10 ^h 58 ^m 43 ^s .
June 18 No. 77	iP Z ipP N ePR ₁ N eS N F N	17 ^h 50 ^m 38.5 ^s comp 17 50 57 17 51 41 17 55 35 18 22	Epicenter by U.S.C.G.S. 11° N., 85° W., Costa Rica-Nicaragua border. H = 17 ^h 44 ^m 27 ^s . h about 100 km. Δ = 30°5

Bulletin for June, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
June 20 No. 78	i ne i Z i Z iS n i n i n i n F e	18 ^h 44 ^m 31.4 ^s 18 44 31.7 dil 18 44 35.8 18 44 46.9 18 46 28.8 18 46 35.1 18 46 39.4 18 51.7	Epicenter by U.S.C.G.S. 35°5 N., 103° W., northern New Mexico- Texas border. Felt. H = 18 ^h 37 ^m 10 ^s * Δ = 18°0
June 25 No. 79	iP Z ipP Z eS NE eSR ₁ E F ₁ E	16 ^h 20 ^m 38.5 ^s 16 21 00 16 27 09 16 30 43 17 27	Epicenter by U.S.C.G.S. 61° N., 150° W. Southern Alaska; felt at Anchorage. H = 16 ^h 12 ^m 32 ^s h about 100 km. Magnitude 6 1/4 by Pasadena. Δ = 44°9
June 25 No. 80	i(P) e i e	20 ^h 24 ^m 41.9 ^s 20 27 24	Epicenter by U.S.C.G.S. 1° N., 85° W., about 300 miles off coast of Ecuador. H = 20 ^h 16 ^m 26 ^s Δ = 40°3

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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.



22.

Bulletin for July, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
July 2 No. 81	eSKS E ePS E M N F E	22 ^h 11 ^m 28 ^s 22 14 29 22 44.4 23 42	Epicenter by U.S.C.G.S. 21° S., 176° W., Tonga Islands Region. H = 21 ^h 46 ^m 30 ^s Magnitude 6 by Pasadena 6 - 6 1/4 by Berkeley. Δ = 106°8
July 8 No. 82	iP' Z ePR ₁ Z ePR ₁ E iSKS N eSKKS N ePS E F N	06 ^h 03 ^m 20 ^s dil 06 05 11 06 05 14 06 10 36 06 11 56 06 15 10 08 15	Epicenter by U.S.C.G.S. 11° N., 122° E., Panay Island, Philippines. H = 05 ^h 44 ^m 20 ^s Magnitude 6 1/2 by Pasadena. Δ = 123°8
July 9 No. 83	iP Z iP NE ipP Z iS NE isS E i E F E	00 ^h 09 ^m 45.0 ^s 00 09 45 00 09 53.5 00 14 32 00 14 45 00 15 35 01 18	Epicenter by U.S.C.G.S. 16° N., 96° W., near coast of Oaxaca, Mexico. Felt. H = 00 ^h 03 ^m 54 ^s h about 60 km. Magnitude 6 1/4 by Pasadena. Δ = 28°4
July 11 No. 84	i(P) Z i(pP) Z	13 ^h 06 ^m 44.5 ^s comp 13 07 16	Epicenter by U.S.C.G.S. 52° N., 178° E., Andreanof Island, Aleutian Islands. H = 12 ^h 56 ^m 19 ^s h about 150 km. Δ = 62°2

Bulletin for July, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
July 11 No. 85	eP Z ipP Z iPR ₁ ZNne i NE iSKS NE e E ePS N esSKS E e N i N e N F E	18 ^h 34 ^m 57 ^s comp 18 36 49 18 39 10 18 41 39 18 44 42 18 44 55 18 47 21 18 48 05 18 49 21 18 53 12 18 55 46 22 28	Epicenter by U.S.C.G.S. 28°5 N., 139°5 E., Bonin Island Region. Felt. H = 18 ^h 22 ^m 00 ^s h about 550 km. Magnitude 7 by Pasadena. Δ = 100°4 Agreement very poor.
July 11 No. 86	iP Z iPR ₂ Z e n eSR ₁ n	23 ^h 49 ^m 32 ^s dil 23 50 27 23 54 33 23 55 09	Epicenter by U.S.C.G.S. 12° N., 69°5 W., eastern Dominican Republic. H = 23 ^h 44 ^m 10 ^s h about 100 km. Δ = 25°5
July 13 No. 87	ePR ₁ Z iPR ₁ Z	20 ^h 13 ^m 26 ^s dil 20 13 32.9	Epicenter by U.S.C.G.S. 7° S., 156° E., Solomon Islands. H = 19 ^h 54 ^m 00 ^s * Δ = 119°0
July 14 No. 88	eP Z	07 ^h 15 ^m 53 ^s dil	Foreshock of following quake. H = 07 ^h 03 ^m 49 ^s
July 14 No. 89	iP Z eS E F E	07 ^h 30 ^m 14.6 ^s comp 07 40 08 09 01	Epicenter by U.S.C.G.S. 47° N., 154°5 E., Kurile Islands. H = 07 ^h 18 ^m 12 ^s Δ = 78°8
July 16 No. 90	eP' Z epP' Z iPR ₁ NEZ eSKS NE esSKS E eSP N e NE ePPS E epPPS NE eSR ₁ N F E	10 ^h 59 ^m 11 ^s comp 10 59 42 11 00 57 11 06 00 11 06 56 11 10 55 11 11 33 11 12 22 11 13 02 11 18 12 13 01	Epicenter by U.S.C.G.S. 6° S., 146° E., Eastern New Guinea. H = 10 ^h 40 ^m 23 ^s h about 200 km. Magnitude 6 1/2 by Pasadena. Δ = 125°5

Bulletin for July, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
July 18 No. 91	iP Z iP e iP NE iP n eS E iS N F E	09 ^h 16 ^m 49.6 ^s comp 09 16 50.0 09 16 50 09 16 50.0 09 25 27 09 25 28 13 49	Epicenter by U.S.C.G.S. 1° N., 27° W., Mid-Atlantic Ocean. H = 09h 06m 16s Magnitude 6 1/2 by Pasadena; 6 3/4 by Berkeley. Δ = 64°1
July 18 No. 92	iP Z	09 ^h 45 ^m 56 ^s dil	Aftershock of preceding quake.
July 19 No. 93	iP Z eS E e N F E	20 ^h 51 ^m 44.9 ^s comp 21 00 10 21 01 32 22 32	Epicenter by U.S.C.G.S. 51°5 N., 177°5 W., near Adak, Aleutian Islands; felt. H = 20h 41m 25s h about 60 km. Magnitude 5 3/4 - 6 by Pasadena; 6 1/4 by Berkeley. Δ = 62°3 Aftershocks.
July 19 No. 94	iP e iP Z	21 ^h 17 ^m 25.7 ^s 21 17 25.9 dil	Aftershock of preceding quake. H by U.S.C.G.S. 21h 07m 07s
July 19 No. 95	iP Z iP e	23 ^h 58 ^m 09.5 ^s 23 58 10.5	Second aftershock of quake No. 93. H by U.S.C.G.S. 23h47m50s
July 22 No. 96	iP Z ipP e ipP Z	09 ^h 11 ^m 23.3 ^s dil 09 11 40.9 09 11 41.7	Epicenter by U.S.C.G.S. 51° N., 178°5 W., near Adak, Aleutian Islands. H = 09h 01m 02s h about 60 km. Δ = 63°5

Bulletin for July, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
July 24 No. 97	eP Z ipP e ipP Z iS e esS N e N F E	17 ^h 51 ^m 33.5 ^s comp 17 51 51.7 17 51 54.9 17 56 13 17 57 13 17 58 02 17 12	Epicenter by U.S.C.G.S. 18°5 N., 101°5 W., southern Mexico. H = 17 ^h 45 ^m 40 ^s h about 100 km. Δ = 28°6
July 25 No. 98	iP eZ	12 ^h 24 ^m 40 ^s dil	Epicenter by U.S.C.G.S. Nicaragua. H = 12 ^h 18 ^m 49 ^s ** h about 200 km.
July 25 No. 99	iP Z ePR ₁ N eS N esS N F E	18 ^h 48 ^m 06.7 ^s comp 18 48 48 18 52 45 18 53 55 19 00	Epicenter by U.S.C.G.S. 14° N., 90°5 W., off coast of Guatemala. H = 18 ^h 42 ^m 14 ^s h about 100 km. Magnitude 6 1/4 by Pasadena. Δ = 28°6
July 26 No. 100	eP Z epP Z iSKKS E F E	10 ^h 12 ^m 48 ^s comp 10 13 01 10 23 31 11 22	Epicenter by U.S.C.G.S. 41° N., 143° E., south of Hokkaido, Japan; felt H = 10 ^h 00 ^m 00 ^s h about 100 km. Magnitude 6 1/4 by Pasa- dena. Δ = 88°7
July 28 No. 101	iSKS E F E	23 ^h 27 ^m 42 ^s 01 00	Epicenter by U.S.C.G.S. 37° N., 143° E., off east coast of Honshu, Japan. H = 23 ^h 04 ^m 33 ^s Magnitude 5 3/4 - 6 by Pasadena. Δ = 91°7

Bulletin for July, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
July 29 No. 102	iP Z i Z e E e N iS N F N	23 ^h 52 ^m 04 ^s dil 23 52 12 23 54 32 23 54 45 23 55 34 00 21	$\Delta S - P = 18^{\circ}5$ H = 23 ^h 47 ^m 49 ^s
July 30 No. 103	iP Z iP n e n	16 ^h 57 ^m 40 ^s dil 16 57 41.1 16 57 47.8	Epicenter by U.S.C.G.S. 10°5 N., 85° W., near west coast of Costa Rica. H = 16 ^h 51 ^m 25 ^s h about 100 km. $\Delta = 31^{\circ}0$

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.



27.

Bulletin for August, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
August 1 No. 104	iP Z ipP Z ePR ₁ N eS E iS N F N	03 ^h 29 ^m 57.4 ^s comp 03 30 05 03 31 23 03 35 55 03 35 58 04 01	Epicenter by U.S.C.G.S. 3° N., 84° W., off west coast of Colombia. H = 03 ^h 22 ^m 46 ^s h about 100 km. Magnitude 6 1/4 by Pasa- dena. Δ = 38°6
August 2 No. 105	iSKS NE eSKKS E eSKKS N eSP E	04 ^h 04 ^m 30 ^s 04 05 50 04 05 51 04 08 49	Epicenter by U.S.C.G.S. New Britian Island region. H = 03 ^h 40 ^m 27 ^s h about 500 km. Magnitude 6 - 6 1/4 by Pasadena. Δ = 118°0
August 2 No. 106	eSKS N ePS N	10 ^h 40 ^m 10 ^s 10 42 09	Epicenter by U.S.C.G.S. 1700 miles south of Easter Island. H = 10 ^h 16 ^m 03 ^s ** Magnitude 6 1/2 by Pasa- dena; 6 1/2 - 6 3/4 by Berkeley. Δ = 97°5
August 2 No. 107	iP Z eS E eSR ₁ E M E F E	20 ^h 36 ^m 11 ^s dil 20 40 58 20 42 39 20 45.0 21 47	Foreshock of following quake, by U.S.C.G.S. H = 20 ^h 30 ^m 17 ^s Magnitude 5 3/4 by Pasa- dena.
August 3 No. 108	iP Z eS E eSR ₁ E M E F E	00 ^h 29 ^m 54 ^s comp 00 34 45 00 36 18 00 38.8 02 32	Epicenter by U.S.C.G.S. 13° N., 87°5 W., near south coast of Nicaragua H = 00 ^h 23 ^m 58 ^s h about 100 km. Magnitude 6 by Pasadena and Berkeley. Δ = 29°0

Bulletin for August, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks	
August 3 No. 109	iP eS M F	Z E E E	05 ^h 31 ^m 43 ^s comp 05 36 34 05 40.8 06 45	Aftershock of preceding quake. H = 05 ^h 25 ^m 45 ^s Magnitude 5 1/2 by Pasadena.
August 6 No. 110	iP eS M F	Z E E E	08 ^h 14 ^m 52 ^s dil 08 19 43 08 23.9 09 33	Epicenter by U.S.C.G.S. 13° N., 87°5 W., near south coast of Nicaragua. H = 08 ^h 08 ^m 56 ^s Δ = 29°0
August 6 No. 111	ePS ePS F	N E E	15 ^h 40 ^m 51 ^s 15 40 54 17 30	Epicenter by U.S.C.G.S. 6° S., 152° E., New Britain Island. H = 15 ^h 10 ^m 42 ^s Δ = 120°9
August 8 No. 112	eP eS M F	Z E N E	22 ^h 35 ^m 24 ^s comp 22 39 55 22 47.4 23 03	Epicenter by U.S.C.G.S. 44° N., 128° W., off coast of Oregon. H = 22 ^h 28 ^m 40 ^s Δ = 34°2
August 10 No. 113	iP e ePR ₂ ePR ₂ eS M F	Z N E E NE NE E	05 ^h 41 ^m 21 ^s dil 05 41 35 05 44 02 05 44 06 05 48 28 05 56.0 06 39	Epicenter by U.S.C.G.S. 8°5 N., 40° W., Atlantic Ocean, 700 miles off north coast of Brazil. H = 05 ^h 32 ^m 33 ^s Magnitude 6 by Pasadena. Δ = 49°7
August 10 No. 114	eP iP iP iPS	e Z n NE	23 ^h 12 ^m 21.8 ^s 23 12 22 23 12 22.3 23 23 11	Epicenter by U.S.C.G.S. 46° N., 143°5 E., off north coast of Hokkaido, Japan. H = 23 ^h 00 ^m 21 ^s h about 300 km. Δ = 84°1

Bulletin for August, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
August 12 No. 115	iPR ₁ Z e E	21 ^h 30 ^m 59.5 ^s 21 35 17	Epicenter by U.S.C.G.S. 3°5 N., 141° E., near N. coast of New Guinea. H = 21 ^h 10 ^m 00 ^s Δ = 126°3
August 13 No. 116	eP Z iP Z eS E eS N L E F N	18 ^h 45 ^m 37 ^s dil 18 45 39 dil 18 55 31 18 55 32 19 08.4 22 17.	Epicenter by U.S.C.G.S. 43° N., 32°5 E., Black Sea off north coast of Turkey. Severe causal- ties and heavy property damage. H = 18 ^h 33 ^m 40 ^s Magnitude 6 3/4 by Pasa- dena; 6 1/2 by Berkeley. Δ = 77°4
August 20 No. 117	iP neZ iPR ₁ Z eS ₁ N e N L N M N F N	05 ^h 56 ^m 02 ^s dil 05 56 32 06 00 49 06 01 33 06 04 59 06 05 45 06 56	Epicenter by U.S.C.G.S. 23°5 N., 108° W., Gulf of California. H = 05 ^h 49 ^m 58 ^s Magnitude 5 1/2 by Pasa- dena; 5 3/4 by Berkeley. Δ = 28°5
August 21 No. 118	iP Z iP ne iP Z iS N M N F N	11 ^h 07 ^m 44 ^s dil 11 07 46.2 11 07 46.5 dil 11 16 32 11 28.7 15 30	Epicenter by U.S.C.G.S. 19 3/4° N., 156° W., near west coast of Hawaii. Slight property damage on Kona Coast. H = 10 ^h 56 ^m 57.5 ^s Magnitude 6 3/4 by Pasa- dena; 7 by Berkeley. Δ = 65°3
August 22 No. 119	iP Z eS NE M E F E	05 ^h 48 ^m 04 ^s comp 05 53 08 05 58.1 06 24	Epicenter by U.S.C.G.S. 10° N., 83° W., Costa Rica; H = 05 ^h 41 ^m 31 ^s Δ = 31°5

Bulletin for August, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
August 24 No. 120	iP NZ iP ne ePR ₁ N eS E iS NE F E	14 ^h 33 ^m 30 ^s comp 14 33 31 14 36 37 14 43 19 14 43 22 15 23	Epicenter by U.S.C.G.S. 47° N., 151° E. Kurile Islands. H = 14 ^h 21 ^m 15 ^s Magnitude 6 1/2 by Pasadena. $\Delta = 80^{\circ}$
August 26 No. 121	iP Z eP ne eS E M E F E	18 ^h 44 ^m 24 ^s dil 18 44 24.2 18 49 44 18 53.9 19 23	Epicenter by U.S.C.G.S. 24° N., 109° W., Gulf of California. H = 18 ^h 38 ^m 23 ^s $\Delta = 29^{\circ}$
August 28 No. 122	eSKS E eSKKS E eS N ePS or sSKS E esSKKS E ess N esSP E e E e E	16 ^h 54 ^m 43 ^s 16 55 57 16 56 54 16 58 47 16 59 45 17 00 52 17 02 29 17 03 32 17 06 20	Epicenter by U.S.C.G.S. 27° S., 178° E., Kermadec Islands Region H = 16 ^h 31 ^m 11 ^s h about 600 km. $\Delta = 115^{\circ}3$
August 31 No. 123	eS N	10 ^h 34 ^m 02 ^s	Epicenter by U.S.C.G.S. 19° S., 179° W., Fiji Islands Region. H = 10 ^h 09 ^m 18 ^s * h about 600 km. $\Delta = 108^{\circ}$

CLEVELAND

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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 September, 1951

31.

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
September 1 No. 124	eP Z iS NE	04 ^h 53 ^m 05 ^s dil 05 03 01	Foreshock of following quake by U.S.C.G.S. H = 04 ^h 40 ^m 40 ^s ** Magnitude 5 3/4 by Pasadena.
September 1 No. 125	iP Z iP Z eP N eS N eS E M N F N	09 ^h 01 ^m 22 ^s dil 09 01 34 dil 09 01 36 09 11 34 09 11 39 09 30.0 10 10	Epicenter by U.S.C.G.S. 33° S., 110° W., Easter Island Region. H = 08 ^h 49 ^m 18 ^s Magnitude 6 1/2 by Pasadena. Δ = 79°1
September 5 No. 126	iP Z iP Z iP n eS N F N	07 ^h 49 ^m 15 ^s dil 07 49 21.8 comp 07 49 22.2 07 59 31 09 19	Δ S - p = 82°0 H = 07 ^h 36 ^m 57 ^s Δ = 46°3
September 8 No. 127	iP N iP Z iP n F N	06 ^h 44 ^m 17 ^s 06 44 20 dil 06 44 21.2 07 22	16° S., 134° W. Central Alaska. H = 12° 30' 40" Δ = 46°5
September 9 No. 128	eS E M N F E	05 ^h 08 ^m 30 ^s 05 34.9 06 09	Epicenter by U.S.C.G.S. 16° S., 173° W., Samoa Islands Region. Felt in Apia. H = 04 ^h 43 ^m 00 ^s Magnitude 6 1/2 - 6 3/4 by Pasadena; 6 1/4 - 6 1/2 by Berkeley. Δ = 101°6

Bulletin for September, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
September 12 No. 129	iP Z eP e iP n	15 ^h 22 ^m 38 ^s comp 15 22 38 15 22 38.4	Epicenter by U.S.C.G.S. 45°5 N., 151° E., Kurile Islands Region. H = 15 ^h 10 ^m 18 ^s Δ = 81°2
September 14 No.130	(iSR ₁) Z eM N F N	07 ^h 21 ^m 47 ^s dil 07 26 04 07 30	Epicenter by U.S.C.G.S. 49° N., 128°5 W., off west coast of Vancouver Island. H = 07 ^h 07 ^m 21 ^s Δ = 34°0
September 19 No. 131	iP Z iP n ipP Z ipP n isp Z eS E F E	04 ^h 24 ^m 05 ^s dil 04 24 06 04 24 30 04 24 30.7 04 24 41 04 32 20 05 54	Epicenter by U.S.C.G.S. 17° S., 71° W., near coast of Northern Chile H = 04 ^h 14 ^m 09 ^s h about 100 km. Δ = 59°5
September 20 No. 132	iP Z iP n eSR ₁ E F E	05 ^h 56 ^m 32.2 ^s 05 56 32.8 06 06 22 06 30	Epicenter by U.S.C.G.S. 5°5 S., 81° W., near coast of Peru. H = 05 ^h 48 ^m 03 ^s Δ = 46°8
September 20 No. 133	iP Z M E F E	12 ^h 47 ^m 05.7 ^s comp 13 02 11 13 20	Epicenter by U.S.C.G.S. 65° N., 154° W. Central Alaska. H = 12 ^h 38 ^m 40 ^s Δ = 46°5
September 21 No. 134	iP Z iS E M E F E	04 ^h 27 ^m 27.0 ^s comp 04 31 45 04 38 05 04 57	Epicenter by U.S.C.G.S. 19° N., 70° W., Dominican Republic. H = 04 ^h 22 ^m 11 ^s h about 100 km. Δ = 24°3

Bulletin for September, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
September 22 No. 135	ePR ₁ E ePR ₁ N eS N eSR ₂ N M E F E	23 ^h 49 ^m 30 ^s 23 49 32 23 54 05 23 57 05 00 00.0 00 16	Epicenter by U.S.C.G.S. 16°5 N., 47° W., North Atlantic Ocean. H = 23 ^h 40 ^m 37 ^s Δ = 38°7
September 24 No. 136	eM E eS E ePS NE M E F N	13 23 10 13 32 05 13 32 32 13 50.1 15 00	Epicenter by U.S.C.G.S. 49°5 N., 156° E., Kurile Islands. H = 13 ^h 10 ^m 41 ^s h about 100 km. Δ = 75°0
September 27 No. 137	iP Z eP e iP Z iP e eS E e E M E F E	19 ^h 30 ^m 54.7 ^s dil 19 30 54.9 19 30 57.1 19 30 58.1 19 36 19 19 39 40 19 43.5 21 01	Epicenter by U.S.C.G.S. 49° N., 129° W., off coast of Vancouver Island, British Col. H = 19 ^h 24 ^m 12 ^s . Magnitude 5 3/4 by Berkeley. Δ = 34°0
September 28 No. 138	e E M E F E	02 ^h 17 ^m 43 ^s 02 28.9 03 13	Epicenter by U.S.C.G.S. about 300 miles south of Fiji Islands. H = 01 ^h 25 ^m 22 ^s Δ approximately 112°
September 29 No. 139	e E e E e E M E F E	23 ^h 53 ^m 58 ^s 23 57 54 23 59 04 00 27.6 02 34	

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.

34.

Bulletin for October, 1951



Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
October 1 No. 140	eP e iP Z i Z i(SR ₁) n e E e E M E F E	10 ^h 21 ^m 13.8 ^s 10 21 14.2comp 10 22 47 10 31 54 10 35 08 10 37 14 10 41.6 11 21	Epicenter by U.S.C.G.S. 55° N., 166° W., Fox Islands, Aleutian Is- lands. H = 10 ^h 11 ^m 40 ^s Δ = 54°8
October 2 No. 141	iP n iP n iP Z iP Z eS EN F N	06 ^h 45 ^m 34.5 ^s 06 45 37.9 06 45 39 dil 06 45 43 comp 06 51 50 07 10	Δ S - P = 38°8 H = 06 ^h 38 ^m 17 ^s
October 8 No. 142	eP Z eP E eS N eS E eSR ₁ N M N F N	04 ^h 17 ^m 07 ^s dil 04 17 07 04 22 15 04 22 19 04 24 00 04 27.7 05 32	Epicenter by U.S.C.G.S. 40° N., 125° W., off Cape Mendocino, Calif. H = 04 ^h 10 ^m 35 ^s Magnitude 5 3/4 by Pasadena; 5 3/4 - 6 by Berkeley. Δ = 33°1
October 11 No. 143	iP' Z iP' Z eSKS E eSKKS E ePS EN M E F E	01 ^h 56 ^m 26 ^s dil 01 56 38 02 03 20 02 04 46 02 07 41 02 39.0 04 11	Epicenter by U.S.C.G.S. 5° S., 152° E., New Britain Island. H = 01 ^h 37 ^m 31 ^s Magnitude 6 3/4 by Pasa- dena; 7 by Berkeley. Δ = 119°7
October 13 No. 144	M N	20 ^h 03.4 ^m	Epicenter by U.S.C.G.S. 43°5 N., 127° W., off coast of Oregon. H = 19 ^h 45 ^m 06 ^s Δ = 33°5

Bulletin for October, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
October 16 No. 145	eS N M N M N	07 ^h 10 ^m 40 ^s 07 21.2 07 40	Epicenter by U.S.C.G.S. 76° N., 5° E., Arctic Ocean. H = 06 ^h 54 ^m 33 ^s ** Δ = 49°7
October 18 No. 146	iP Z eP n eP e ipP Z iS E iss E i N eSR ₁ E F E	08 ^h 39 ^m 12 ^s dil 08 39 12 08 39 12 08 39 28 08 49 51 08 50 25 08 51 33 08 55 51 10 03	Epicenter by U.S.C.G.S. 42° N., 142° E., near S. coast of Hokkaido, Japan. H = 08 ^h 26 ^m 25 ^s h about 100 km. Magnitude 6 1/4 by Pasa- dena. Δ = 88°2
October 19 No. 147	i(P) Z eSKKS E ePS E	15 ^h 04 ^m 37 ^s comp 15 14 58 15 15 29	Epicenter by U.S.C.G.S. 41° N., 142° E., off S. coast of Hokkaido, Japan. H = 14 ^h 51 ^m 14 ^s ; h about 100 km. Δ = 89°1
October 21 No. 148	eP' Z ePR ₁ Z e Z eSKS N iPS N i N	21 ^h 52 ^m 54.2 ^s comp 21 53 28 dil 21 58 57 21 59 37 22 02 44 22 07 16	Epicenter by U.S.C.G.S. Foreshock of following quake. H = 21 ^h 34 ^m 13 ^s Magnitude 6 3/4 by Pasa- dena; 6 3/4-7 by Berkeley. Δ = 110°8
October 22 No. 149	eP' Z ePR ₁ Z	03 ^h 48 ^m 08 ^s dil 03 48 49 dil	Epicenter by U.S.C.G.S. 24° N., 122° E., off E. coast of Formosa; heavy casualties and extensive property damage. Main shock H = 03 ^h 29 ^m 26 ^s Magnitude 7 by Pasadena 6 1/2 by Berkeley Δ = 110°8

Bulletin for October, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
October 22 No. 150	ePR ₁ Z	04 ^h 47 ^m 32 ^s dil	Epicenter by U.S.C.G.S. Aftershock of preceding quake. H = 04 ^h 28 ^m 05 ^s
October 22 No. 151	iPR ₁ Z	05 ^h 02 ^m 34 ^s comp	Aftershock of quake #149. H = 05 ^h 43 ^m 01 ^s Magnitude 6 1/4 - 6 1/2 by Pasadena. Δ = 110°8
October 23 No. 152	eS E e(PS) NE M E F E	01 ^h 46 ^m 33 ^s 01 48 30 02 18.7 03 42	Epicenter by U.S.C.G.S. Aftershock of quake #149. H = 01 ^h 19 ^m 35 ^s Δ = 110°8
October 23 No. 153	eSKS N eS E eSR ₁ E M E F E	09 ^h 20 ^m 48 ^s 09 22 07 09 29 45 09 58.4 10 58	Epicenter by U.S.C.G.S. Aftershock of quake #149. H = 08 ^h 55 ^m 13 ^s Δ = 110°8
October 25 No. 154	i(PR ₁) Z eS E eSR ₁ E M N F E	04 ^h 12 ^m 55 ^s dil 04 16 25 04 17 40 04 24.8 04 49	Epicenter by U.S.C.G.S. 15° N., 93° W., near coast of Guatemala. H = 04 ^h 06 ^m 00 ^s Magnitude 5 3/4 by Pasa- dena. Δ = 28°2
October 25 No. 155	i Z eSKS E eS E ePPS N e E M E F E	12 ^h 39 ^m 45 ^s dil 12 44 53 12 46 54 12 49 25 12 50 59 13 23.9 14 22	Epicenter by U.S.C.G.S. Aftershock of quake #149. H = 12 ^h 19 ^m 38 ^s Δ = 110°8

Bulletin for October, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
October 28 No. 156	iP Z e E i Z iP' NE ePR ₁ E eS ₁ E M N F E	07 ^h 07 ^m 13 ^s 07 10 16 07 10 18 07 10 49 07 11 55 07 20 22 07 59.6 09 15	Δ about 118° H = 06 ^h 51 ^m 58 ^s
October 31 No. 157	iSKP Z F N	07 ^h 18 ^m 40 ^s dil 08 20.4	Epicenter by U.S.C.G.S. 3° N., 101° E., Malacca Straits. H = 06 ^h 56 ^m 21 ^s . Magnitude 6 1/2 - 6 3/4 by Pasadena. Aftershock: H = 08 ^h 03 ^m 11 ^s Magnitude 6 1/4 by Pasa- dena. Δ = 136°6

CLEVELAND



From the ISC collection scanned by SISMOS

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, 1951

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
November 2 No. 158	iP Z iSKS N M N	22 ^h 08 ^m 15.0 ^s comp 22 18 36 22 45.8	Epicenter by U.S.C.G.S. 44° N., 45° E., Northern Caucasia. H = 21 ^h 53 ^m 52 ^s Δ = 83°0
November 6 No. 159	iP Z iP Z	14 ^h 09 ^m 13.3 ^s dil 14 09 20.0 dil	Foreshock of following quake. H = 14 ^h 57 ^m 15 ^s
November 6 No. 160	iP Z eP e eP n i NE iS E	16 ^h 52 ^m 10.0 ^s dil 16 52 10.7 16 52 11 16 52 40 17 02 02	Epicenter by U.S.C.G.S. 47° N., 154° E., Kurile Islands. H = 16 ^h 40 ^m 06 ^s Magnitude 7 - 7 1/4 by Pasadena; 7 1/4 by Berkeley. Δ = 78°9 Foreshock: H = 14 ^h 57 ^m 15 ^s Aftershock: H = 18 ^h 50 ^m 27 ^s
November 6 No. 161	i e i n iS ₄ n iS ₂ n iS ₁ e iS ₁ n	17 ^h 57 ^m 19.0 ^s 17 57 19.1 17 57 40.8 17 58 07.0 17 58 12.1 17 58 12.5	Epicenter by U.S.C.G.S. 45° N., 73°6 W., Clinton County, New York. Felt in northern New York and Vermont. H = 17 ^h 54 ^m 41.5 ^s Δ = 765 km. Phase design- ations based on Walter- Birkenhauer Travel Time Tables for Near Earth- quakes in East Central North America.
November 6 No. 162	iP Z iP Z	19 ^h 02 ^m 32.5 ^s dil 19 02 45.3 dil	Epicenter by U.S.C.G.S. Aftershock of quake #160. H = 18 ^h 50 ^m 27 ^s . Δ = 78°9

Bulletin for November, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
November 8 No. 163	iP Z iP Z eS N eL N F N	13 ^h 54 ^m 30.6 ^s dil 13 54 38.6 dil 14 01 30 14 11 43 16 23	Epicenter by U.S.C.G.S. 54°5 N., 160° W., off S. coast of Alaskan Peninsula. H = 13 ^h 45 ^m 09 ^s Magnitude 6 1/4 by Pasa- dena; 7 by Berkeley. Δ = 51°5
November 9 No. 164	eP N eS E	08 ^h 08 ^m 54 ^s 08 19 31	Epicenter by U.S.C.G.S. Aftershock of #160. H = 07 ^h 57 ^m 28 ^s . Δ = 78°9
November 9 No. 165	iP Z ipP Z ipP e iS E iPS E esS E isPS E	22 ^h 18 ^m 20.6 ^s 22 18 50.6 22 18 55 22 26 46 22 27 38 22 28 10 22 29 07	Epicenter by U.S.C.G.S. 22° S., 68° W., Chile- Bolivia border. H = 22 ^h 07 ^m 53 ^s . h about 700 km. Magnitude 6 1/4 by Berkeley. Δ = 65°3
November 12 No. 166	iP Z eP N iS NE i(PS) N F E	08 ^h 21 ^m 33 ^s dil 08 21 33 08 31 35 08 32 47 10 31	Epicenter by U.S.C.G.S. 47° N., 154° E., H = 08 ^h 09 ^m 26 ^s Magnitude 6 1/2 - 6 3/4 by Berkeley. Δ = 78°9
November 12 No. 167	iP Z i e ipP Z iSR ₁ e	09 ^h 42 ^m 39.7 ^s comp 09 42 46.2 09 42 50.7 09 49 45	Epicenter by U.S.C.G.S. 17° N., 61° W., Leeward Islands. Felt in Antigua. H = 09 ^h 36 ^m 36 ^s h about 400 km. Magnitude 5 3/4 by Pasadena. Δ = 30°6
November 15 No. 168	iP Z eS NE iM N F N	08 ^h 37 ^m 13.2 ^s dil 08 46 36 09 02.1 09 58	Epicenter by U.S.C.G.S. Foreshock of No. 171, Kamchatka. H = 08 ^h 25 ^m 63 ^s h about 60 km. Δ = 72°7

Bulletin for November, 1951

Onwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
November 15 No. 169	iP Z ipP Z iS Z	10 ^h 42 ^m 54 ^s comp 10 43 06 10 52 14	Epicenter by U.S.C.G.S. Foreshock of #171, Kamchatka. H = 10 ^h 31 ^m 33 ^s h about 60 km. Δ = 72°7
November 15 No. 170	iP Z i Z eS E iS N esS E isPS NE M N F N	19 ^h 53 ^m 34 ^s dil 19 54 58 comp 20 02 54 20 02 55 20 03 08 20 03 37 20 20.1 21 26	Epicenter by U.S.C.G.S. 52°5 N., 160°5 E., Near coast of Kamchatka. H = 19 ^h 42 ^m 12 ^s h about 60 km. Magnitude 6 1/4 - 6 1/2 by Pasadena; 6 1/4 by Berkeley. Δ = 72°4 Aftershocks: Nov. 16 - H = 15 ^h 03 ^m 26 ^s Nov. 16 - H = 15 ^h 20 ^m 44 ^s
November 15 No. 171	iP Z	20 ^h 31 ^m 26 ^s dil	Probable aftershock of preceding quake.
November 15 No. 172	iP Z epP Z ePR ₁ N eS N esS N	22 ^h 10 ^m 41 ^s comp 22 10 49 comp 22 13 11 22 20 06 22 20 47	Epicenter by U.S.C.G.S. Aftershock of #171. H = 21 ^h 59 ^m 18 ^s . h about 60 km. Δ = 72°4
November 16 No. 173	iP Z eS N e N iPS N	15 ^h 15 ^m 14 ^s comp 15 24 14 15 24 22 15 24 53	Epicenter by U.S.C.G.S. Aftershock of #171. H = 15 ^h 03 ^m 26 ^s h about 60 km. Δ = 72°4
November 16 No. 174	iP Z	15 ^h 32 ^m 05 ^s dil	Epicenter by U.S.C.G.S. Aftershock of #171. H = 15 ^h 20 ^m 44 ^s . h about 60 km. Δ = 72°4
November 18 No. 175	iPR ₁ Z	09 ^h 45 ^m 32 ^s dil	Epicenter by U.S.C.G.S. Foreshock of following quake. H = 09 ^h 26 ^m 33 ^s Δ = 108°3

Bulletin for November, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
November 18 No. 176	ePR ₁ N iPR ₁ Z ePR ₂ N eSKS E iSKS nN ePS N	09 ^h 54 ^m 34 ^s 09 54 35 dil 09 56 54 10 00 51 10 00 52 10 03 56	Epicenter by U.S.C.G.S. 31° N., 90°5 E., Eastern Tibet; felt North of Lhasa. H = 09h35m43s Magnitude 7 1/2 by Pasa- dena. Δ = 108°3 Foreshock: H = 09h26m33s
November 24 No. 177	ePR ₁ N ePS N	19 ^h 06 ^m 37 ^s 19 16 06	Epicenter by U.S.C.G.S. Foreshock of following quake. H = 18 ^h 47 ^m 13 ^s Magnitude 6 1/4 by Pasa- dena. Δ = 111°9
November 24 No. 178	eP' N ePR ₁ N e ₁ Z e n iSKKS N ePS N	19 ^h 08 ^m 44 ^s 19 09 37 19 09 48 19 09 53 19 16 39 19 19 09	Epicenter by U.S.C.G.S. 23° N., 121°5 E., Near coast of Formosa. Heavy casualties and extensive property damage. H = 18 ^h 50 ^m 19 ^s Magnitude 7 1/4 by Pasadena; 7 by Berkeley. Δ = 111°9 Foreshock: H = 18 ^h 47 ^m 13 ^s Magnitude 6 1/4 by Pasa- dena.
November 30 No. 179	eP Z iP Z iP e iPR ₂ e eS NE M N	07 ^h 58 ^m 03 ^s dil 07 58 08 dil 07 58 08.6 08 59 31.5 08 03 32 08 07.6	Epicenter by U.S.C.G.S. 32° N., 41° W., North Atlantic Ocean. H = 07h51m17s Δ = 33°7

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, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
December 6 No. 180	eP Z iP Z eS E	14 ^h 37 ^m 22 ^s dil 14 37 29 comp 14 41 59	Epicenter by U.S.C.G.S. 5°5 N., 77°5 W., Near west coast of Colombia. H = 14 ^h 29 ^m 18 ^s . Δ = 36°1
December 7 No. 181	iP' Z iP' Z epP' E iSKP E e(PPS) E	04 ^h 33 ^m 51 ^s 04 33 54 04 35 03 04 37 33 04 49 15	Epicenter by U.S.C.G.S. 34° S., 56°5 E., Indian Ocean about 900 miles S.E. of Madagascar. H = 04 ^h 14 ^m 20 ^s . h about 100 km. Magnitude 7 3/4 by Pasadena. Δ = 146°6
December 11 No. 182	iP N iP Z iPR ₁ Z iS NE e N isS N i Z i e i E i(SR ₁) E	01 ^h 43 ^m 12 ^s 01 43 13 comp 01 43 48 01 47 44 01 48 09 01 48 21 01 48 27 01 48 32 01 48 33 01 48 45	Epicenter by U.S.C.G.S. 17° N., 94°5 W., Oaxaca, Mexico. Slight property damage. H = 01 ^h 37 ^m 34 ^s h about 100 km. Magnitude 7 by Pasadena, 6 1/2 - 6 3/4 by Berkeley. Δ = 27°0 Epicenter by Seismological Service of the Geological Institute of Mexico 16°28' N., 96°54' W., H = 01 ^h 37 ^m 52 ^s . h greater than normal. Magnitude 6.5
December 23 No. 183	eP Z eP e iP Z	06 50 09 dil 06 50 14.9 06 50 17 dil	

Bulletin for December, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
December 23 No. 184	ePR ₁ Z eS ₁ e iSR ₁ e	07 ^h 04 ^m 46 ^s dil 07 08 27 07 10 12.8	Epicenter by U.S.C.G.S. 15° N., 61° W., Windward Islands. H = 06 ^h 57 ^m 20 ^s h about 100 km. Δ = 31°7
December 24 No. 185	M N	06 ^h 07.8 ^m	Epicenter by U.S.C.G.S. about 200 miles off the coast of Colima, Mexico. H = 05 ^h 50 ^m 41 ^s **
December 25 No. 186	iP Z eS N	16 ^h 10 ^m 30 ^s dil 16 20 03	Epicenter by U.S.C.G.S. 49° N., 155° E., Kurile Islands. H = 15 ^h 58 ^m 28 ^s . h about 60 km., Δ = 77°1 Foreshock December 23, 1951 - H = 11 ^h 29 ^m 31 ^s
December 26 No. 187	iP Z iP e eS N M N	00 ^h 53 ^m 07 ^s comp 00 53 07.4 00 58 21 01 03.2	Epicenter by U.S.C.G.S. 32°6 N., 118°7 W., Pacific Ocean, off coast of S. California. Felt. H = 00 ^h 46 ^m 49 ^s . Magnitude 5 1/2 - 5 3/4 by Pasadena. Δ = 30°9
December 26 No. 188	iP Z iS E eS N L N M N	17 ^h 05 ^m 24 ^s 17 14 54 17 15 00 17 23.7 17 30.1	Epicenter by U.S.C.G.S. 49°5 N., 156° E., northern Kurile Islands. H = 16 ^h 53 ^m 23 ^s * Δ = 75°1
December 28 No. 189	eP eZ iP NEZ iP eZ i N iS N L N M N	09 ^h 26 ^m 19.2 ^s comp 09 26 20.2 comp 09 26 29.7 dil 09 30 49 09 31 22 09 34.2 09 37.0	Epicenter by U.S.C.G.S. 17° N., 98°5 W., Guerrero, Mexico; felt. H = 09 ^h 20 ^m 25 ^s * Magnitude 7 1/4 - 7 1/2 by Pasadena 6 3/4 - 7 by Berkeley. Δ = 28°8

Bulletin for December, 1951

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
December 30 No. 190	eP e iP Z e(S) N e(SR ₁) N	17 ^h 50 ^m 24.6 ^s 17 50 25.1 comp 17 57 21 18 00 20	Epicenter by U.S.C.G.S. 62°5 N., 146° W., Southern Alaska. H = 17 ^h 42 ^m 28 ^s . h about 100 km. Δ = 42°8
December 30 No. 191	eP Z eS E e N eSR ₁ N M N	22 ^h 29 ^m 33 ^s dil 22 39 13 22 44 09 22 44 20 23 02.5	Epicenter by U.S.C.G.S. Foreshock of following quake. H = 22 ^h 17 ^m 51 ^s * Magnitude 6 1/2 by Pasa- dena. Δ = 76°1
December 30 No. 192	eP Z eP e eP N eS E	22 ^h 34 ^m 46 ^s dil 22 34 48 22 34 58 22 44 31	Epicenter by U.S.C.G.S. 23° S., 114°5 W., Pacific Ocean, west of Easter Islands. H = 22 ^h 23 ^m 05 ^s Magnitude 6 1/2 by Pasa- dena. Δ = 76°1
December 31 No. 193	iP Z iPR ₁ Z ePR ₁ e e N eS N	20 ^h 11 ^m 46 ^s dil 20 12 39.8 comp 20 12 41.6 20 17 16 20 17 44	Epicenter by U.S.C.G.S. 13° N., 90°5 W., Near south coast of Guatemala. H = 20 ^h 05 ^m 40 ^s . Δ = 29°7