

CLEVELAND



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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.

Bulletin for December, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
December 1 No. 192	ePR ₁ e	05 ^h 26 ^m 36 ^s	Epicenter by U.S.C.G.S. 29° N., 128.5° E. Ryukyu Islands H=05 ^h 08 ^m 30 ^s , h about 60 km. Magnitude 6 3/4- 7 by Pasadena, 7 by Berkeley. Δ = 104°
	epPR ₁ N	05 26 50	
	epPR ₁ Z	05 26 53 dil.	
	ePR ₂ N	05 29 06	
	i e	05 30 07.3	
	eSKS E	05 32 40	
	eSKS N	05 32 46	
	esSKS N	05 33 28	
	esSKS E	05 33 30	
	e E	05 33 59	
	eSKKS N	05 34 29	
	eps N	05 35 50	
	e N	05 36 00	
	ePPS E	05 36 38	
ePPS N	05 36 40		
December 2 No. 193	e Z	04 ^h 43 ^m 54 ^s comp	Epicenter by U.S.C.G.S. 3.5° S., 141.5° E. Northern New Guinea H=04 ^h 24 ^m 50 ^s , Magnitude 6 3/4 by Pasadena. Δ = 126.5°
	e Z	04 43 57 comp	
	ePR ₁ Z	04 44 00 comp	
	ePR ₂ Z	04 45 49 comp	
	iPR ₂ Z	04 45 53.8 dil	
	eSKS E	04 50 44	
	ePS N	04 52 39	
ePS E	04 52 44		
December 3 No. 194	iP Z	15 ^h 32 ^m 38 ^s dil	
	iP e	15 32 38.9	
	iP n	15 32 39.1	
December 4 No. 195	iP Z	15 ^h 01 ^m 33 ^s dil	Epicenter by U.S.C.G.S. 49.5° N., 129.0° W., off coast of Vancouver Island. H=14 ^h 54 ^m 46 ^s . Magnitude 6 1/4 by Pasa- dena, 6 by Berkeley. Δ = 35.0°
	eF n	15 01 33.8	
	iP e	15 01 33.9	
	eF E	15 01 34	
	ePR ₁ E	15 02 29	
	iS E	15 07 04	
eS N	15 07 04		

Bulletin for December, 1953

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
December 7 No. 196	iP nNZ iP e ipP nNZ ipP e iS E isS E iSKS E isSKS E	02 ^h 16 ^m 06 ^s dil 02 16 07.8 02 16 32 02 16 36 02 24 36 02 25 21 02 25 49 02 26 37	Epicenter by U.S.C.G.S. 22° S., 68.5° W., Northern Chile. Heavy casualties and extensive property damage. H=02 ^h 05 ^m 37 ^s , h about 100 km. Magnitude 7 $\frac{1}{4}$ by Pasadena, 7 by Berkeley. Δ =65.0°
December 12 No. 197	iP Z iP n eP N iP Z eS E eSR ₁ E	17 ^h 39 ^m 39 ^s comp. 17 39 40 17 39 40 17 39 41 comp 17 46 12 17 49 20	Epicenter by U.S.C.G.S. 3.5° S., 81° W., Near coast of Peru. Several killed and heavy property damage in Tumbes and Corrales. H=17 ^h 31 ^m 22 ^s . Magnitude 7 $\frac{3}{4}$ by Pasadena. Δ =45.0°
December 13 No. 198	iP Z iP n eP e iP ne ePS N L E	07 ^h 07 ^m 43 ^s dil 07 07 43.5 07 07 43.5 07 07 44.2 07 18 06 07 33.8	Epicenter by U.S.C.G.S. 50° N., 158.5° E. off South Coast of Kamchatka H=06 ^h 56 ^m 00 ^s . Δ =75.0°
December 20 No. 199	eP N iS E eS N i E iPS E ePS N e E	09 ^h 31 ^m 17 ^s 09 40 43 09 40 47 09 40 59 09 41 26 09 41 26 09 41 39	Epicenter by U.S.C.G.S. Central Chile. Slight damage at Illapel. H=09 ^h 19 ^m 40 ^s ** Δ about 74°
December 21 No. 200	iP Z eSKKS e iPS e	17 ^h 49 ^m 05 ^s 17 59 44.2 18 00 19	Epicenter by U.S.C.G.S. 42° N., 141.5° E. Near South coast of Kokkaido, Japan. H=17 ^h 36 ^m 12 ^s . Δ =88.2°
December 24 No. 201	(eP) Z e(F) Z ePS E L E	02 ^h 45 ^m 03 ^s comp 02 45 31 dil 02 54 36 03 02.7	Epicenter by U.S.C.G.S. 51.5° N., 159.5° E. Near East Coast of Kamchatka. H=02 ^h 33 ^m 39 ^s . Δ =70.6°

Bulletin for December, 1953

Gnwh. Date and Number	Phase and Component	C. M. C. T.	Remarks
December 24 No. 202	iP Z i Z eS E e N	23 ^h 32 ^m 41 ^s Comp 23 33 12 23 42 03 23 42 25	Epicenter by U.S.C.G.S. 52° N., 159.5° E, Off East coast of Kamchatka. H=23 ^h 21 ^m 09 ^s Magnitude 5 3/4 - 6 by Pasadena. $\Delta = 72.7^\circ$
December 25 No. 203	iF 'Z eF n iF 'Z iF ne eS E iS e iS N	02 ^h 02 ^m 57 ^s comp 02 02 58 02 03 00 02 03 00.5 02 12 18 02 12 21.8 02 12 23	Epicenter by U.S.C.G.S. 52° N., 159.5° E. Off East coast of Kamchatka. H=01 ^h 51 ^m 26 ^s . Magnitude 6 3/4 by Pasadena. $\Delta = 72.7^\circ$
December 26 No. 204	iF 'Z	13 ^h 24 ^m 26 ^s dil	Epicenter by U.S.C.G.S. 51.5° N., 160° E., off East coast of Kamchatka. H=13 ^h 12 ^m 35 ^s . $\Delta = 73.0^\circ$
December 28 No. 205	eF Z	02 ^h 50 ^m 25 ^s dil	Epicenter by U.S.C.G.S. 38° N., 20.5° E., Near west coast of Greece. Felt: Cephalonia H=02 ^h 38 ^m 42 ^s . $\Delta = 74.0^\circ$

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Bulletin for November, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
November 1 No. 178	iP Z e 'Z iS E eS N e E	21 ^h 07 ^m 42 ^s dil 21 09 47 dil 21 17 38 21 17 49	Epicenter by U.S.C.G.S. Kurile Islands region. H=22 ^h 55 ^m 32 ^s ** ∠ S-P=77.8°
November 2 No. 179	e n i Z e e e n e e i Z	05 ^h 43 ^m 38 ^s 05 43 40 dil 05 43 40 05 44 41 05 44 44 05 45 32 comp.	High frequency motion.
November 3 No. 180	ePR ₁ E eSKS E ePS E eSR ₁ N	04 ^h 08 ^m 48 ^s 04 14 37 04 18 16 04 24 48	Epicenter by U.S.C.G.S. 12.5° S., 166.5° E., New Hebrides Islands. H=03 ^h 49 ^m 04 ^s . Magnitude 7.3 by Pasadena, 7 by Berkeley. ∠ =114.1°
November 9 No. 181	eF nN iP Z eF e ipF Z iS N iS E iPS N isPS N	17 ^h 37 ^m 06 ^s 17 37 06 comp 17 37 07 17 37 19 comp 17 46 21 17 46 29 17 46 53 17 47 10	Epicenter by U.S.C.G.S. 52.5° N., 159° E., Near East coast of Kamchatka. H=17 ^h 25 ^m 42 ^s , h about 60 km Magnitude 6½ by Pasadena. ∠ =72.7°

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
November 10 No. 182	iP Z iP e eP n iP NE i e ipP N ePR ₁ NE ipPR ₁ N iS E esS N i(PS) N isPS E	23h51m59s comp 23 51 59.5 23 51 59.5 23 52 02 23 52 07.5 23 52 21 23 54 55 23 55 08 00 01 28 00 01 55 00 02 15 00 02 34	Epicenter by U.S.C.G.S. 50.5° N., 157° E., Near South Coast of Kamchatka. H=23h40m20s, h about 60 km. Magnitude 7 - 7 $\frac{1}{4}$ by Pasadena. Δ = 75.2°
November 13 No. 183	eP' 'Z e Z ePR ₁ n e Z eSKP n eSKP eZ	16h36m24s comp 16 37 05 dil 16 38 57 16 39 04 16 39 55 16 39 57	Epicenter by U.S.C.G.S. 3.5° S., 96° E., Near West coast of Sumatra. H=16h17m02s. Δ = 136.0°
November 13 No. 184	ePS E e(PPS) E e E e E eSR ₁ N eSR ₁ E L E M E	19h45m01s 19 46 41 19 47 25 19 48 24 19 51 53 19 51 55 20 09.5 20 13.5	Epicenter by U.S.C.G.S. 13° S., 166° E., New Hebrides Islands. H=19h15m37s. Magnitude 6 $\frac{3}{4}$ by Pasadena. Δ = 115.3°
November 14 No. 185	eP Z iP Z eS E M E	12h14m57s comp 20 15 08 dil 20 24 19 20 39.8	Epicenter by U.S.C.G.S. 52° N., 160° E. H=20h03m27s. Δ = 72.6°
November 17 No. 186	iF n iF NZ e eE e N eS E iS N	13h35m55.6s 13 35 56 comp 13 35 56 13 37 21 13 40 46 13 40 49	Epicenter by U.S.C.G.S. 14° N., 92° W, Near coast of Guatemala. H=13h29m52s Magnitude 7 $\frac{1}{4}$ - 7 $\frac{1}{2}$ by Pasa- dena, 7 - 7 $\frac{1}{4}$ by Berkeley. Δ = 28.7°

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
November 21 No. 187	e n i Z e e i n i e i Z i e	08h33m29s 08 33 31 comp 08 33 31.8 08 38 12.8 08 38 14.3 08 39 11 comp 08 39 14.1	
November 25 No. 188	iP Z eP NE iP Z i NEZ eSKS NE iS NE	18h02m15s sil 18 02 16 18 02 19 comp 18 06 04 comp 18 12 23 18 12 44	Δ S-P=84.7° H=17h49m44s
November 26 No. 189	iP Z ePR ₁ N iPR ₁ Z eSKS E eSKS N eSKKS E eS N ePPS N eSR ₁ N	00h17m04s comp 00 20 44 00 20 46 dil 00 27 44 00 27 45 00 28 03 00 28 11 00 29 32 00 34 32	Δ about 95° H=00h03m42s
November 26 No. 190	iP Z iPR ₁ Z ePR ₁ N ePR ₁ E e E eSKS N eSKS E eSKKS N eS E eSR ₁ E	08h27m39s comp 08 31 27 comp 08 31 36 08 31 37 08 32 12 08 38 11 08 38 15 08 38 37 08 38 56 08 45 22	Δ about 95° H=08h14m17s
November 27 No. 191	e E e E L E	23h14m27s 23 30 54 23 55.0	

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October 5 No. 161	iF nZ i n i n eS N iS neE i N i E	04 ^h 43 ^m 02 ^s comp 04 43 09.9 04 43 14.2 04 52 08 04 52 11 04 52 34 04 53 01	Epicenter by U.S.C.G.S. 53.5° N., 160.5° E., Near East coast of Kam- chatka. H=04 ^h 31 ^m 40 ^s . Magnitude 6 3/4 - 7 by Pasadena, 6 1/2 by Berkeley Δ = 71.0°
October 6 No. 162	e(SKS) E ePS N eSR ₁ N iSR ₁ E L N M N	22 ^h 03 ^m 11 ^s 22 08 34 22 14 49 22 15 05 22 33.5 22 41.4	Epicenter by U.S.C.G.S. 3.5° S., 151° E., New Britain region. H=21 ^h 38 ^m 16 ^s . Magnitude 6 3/4 - 7 by Pasadena. Δ = 119.7°
October 11 No. 163	iF Z iF NEZ iF ne iS N isS N ipPS N	13 ^h 20 ^m 20 ^s dil 13 20 22 dil 13 20 23.4 13 30 01 13 30 24 13 30 51	Epicenter by U.S.C.G.S. 50° N., 155.5° E. Northern Kurile Islands. H=13 ^h 08 ^m 34 ^s , h about 60 km. Magnitude 6 3/4 by Pasadena. Δ = 75.9°
October 13 No. 164	iF eZ iS N iS E iM N	08 ^h 59 ^m 50 ^s comp 09 04 34 09 04 42 09 08 58	Epicenter by U.S.C.G.S. 30° N., 113.5° W., Northern Gulf of Cali- fornia. H=08 ^h 53 ^m 45 ^s . Magnitude 6 1/4 by Pasa- dena. Δ = 28.5°
October 14 No. 165	iP Z iF e iF n i Z iPR ₁ 'Z iS N	14 ^h 59 ^m 54 ^s 14 59 54.6 14 59 54.8 15 00 24.3 comp 15 03 16 comp 15 10 17	Epicenter by U.S.C.G.S. 43° N., 144.5° E., Near East coast of Hokkaido, Japan. H=14 ^h 47 ^m 17 ^s . h about 100 km. Magni- tude 6 3/4 by Pasadena & Berkeley. Δ = 86.0°

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October 16 No. 166	iP e iP NEZ iP n iPR ₁ EZ eS N	09h59m11.9 ^s 09 59 12 comp 09 59 12.4 09 59 51 comp 10 04 01	Epicenter by U.S.C.G.S. 16° N., 96.5° W., Oaxaca, Mexico. H=09h53m15 ^s . Magnitude 6 by Pasadena & Berkeley Δ = 28.4°
October 17 No. 167	eP e iP n iP Z iS E iS N ePS E	21h18m55 ^s 21 18 55.6 21 18 55.8 comp 21 28 20 21 28 21 21 29 02	Epicenter by U.S.C.G.S. 52° N., 159° E. Near Southeast coast of Kam- chatka. H=21h07m22 ^s , Δ = 73.1°
October 19 No. 168	eP Z eP n eP e iPR ₁ Z eS N esS N esS E	18h30m49 ^s comp 18 30 49.6 18 30 49.8 18 31 49 dil 18 35 32 18 35 59 18 36 02	Epicenter by U.S.C.G.S. 19.5° N., 65.5° W. North of Puerto Rica H=18h25m18 ^s h about 60 km. Δ = 25.9°
October 21 No. 169	i Z i Z	03h56m41 ^s comp 04 00 31 dil	
October 21 No. 170	iP Z e(PS) N	11h42m46 ^s 11 53 16	Foreshock of following quake by U.S.C.G.S. H=11h31m01 ^s Δ = 74.0°
October 21 No. 171	iP neZ i Z eS NE	18h51m32 ^s dil 18 51 45 comp 19 01 02	Epicenter by U.S.C.G.S. 38° N., 20.5° E. Near West coast of Greece. Minor damage on Cephalo- nia. H=18h39m50 ^s . Magnitude 6½ by Pasadena Δ = 74.0°
October 21 No. 172	eF Z	23h55m39 ^s dil	Aftershock of preceding quake by U.S.C.G.S. H=23h44m00 ^s Δ = 74.0°
October 25 No. 173	eF Z	00h04m31 ^s dil	Epicenter by U.S.C.G.S. Near West coast of Costa Rica. H=00h58m10 ^s . Δ = about 32°

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October 25 No. 174	iP Z eS E eS N	07h32m46 ^s 07 42 33 07 42 34	Epicenter by U.S.C.G.S. Eastern Islands region. H=07h21m10 ^s . Magnitude 5 3/4 by Pasadena. Δ = about 75°
October 27 No. 175	iP Z i Z eS E eSKKS N KSKKS E	03h53m30 ^s dil 03 53 41 comp 04 04 01 04 04 18 04 04 20	Epicenter by U.S.C.G.S. 43° N. 145° E., Near East coast of Hokkaido, Japan. H=03h40m45 ^s . Δ = 86.1°
October 27 No. 176	iP 'Z iP n iP e epP Z iS e iS NE iS n ipS E isS E isS N	18h30m40 ^s dil 18 30 40.5 18 30 41.7 18 31 40 dil 18 38 41.9 18 38 42 18 38 42.4 18 40 04 18 40 26 18 40 28	Epicenter by U.S.C.G.S. 19° S., 66° W., Southern Boliva. Felt: Calama, Chile. H=18h20m48 ^s . h about 300 km. Magnitude 6 3/4 by Pasadena and Berkeley. Δ = 62.6°
October 28 No. 177	eP Z eS N	08h53m06 ^s 08 58 10	Epicenter by U.S.C.G.S. 16.5° N., 98° W. Near coast of Oaxaco, Mexico. H=08h47m06 ^s . Magnitude 5 3/4 by Pasadena. Δ = 28.6°

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September 4 No. 147	iP Z eP ne ipP Z isP Z iS N esS N isPS E	07 ^h 34 ^m 46 ^s comp 07 34 46 07 35 00 comp 07 35 08 dil 07 44 18 07 44 43 07 45 23	Epicenter by U.S.C.G.S. 50° N., 156.5° E. Kurile Islands. H=07 ^h 23 ^m 05 ^s , h about 60 km. Magnitude 6 3/4 - 7 by Pasadena. Δ = 75.5°
September 4 No. 148	iP nZ eP e iP Z iS N e N ePS N eSR ₁ N	14 ^h 18 ^m 50 ^s dil 14 18 50 14 19 03 dil 14 28 18 14 28 38 14 28 59 14 33 21	Epicenter by U.S.C.G.S. 32° S., 71° N., Near coast of central Chile. Several injured, minor property damage. H=14 ^h 07 ^m 13 ^s , Magnitude 6 3/4 - 7 by Pasadena. Δ = 74.0°
September 5 No. 149	iP Z eP ne eS N iS n	14 ^h 30 ^m 29.5 ^s 14 30 29.5 14 40 10 14 40 13.5	Epicenter by U.S.C.G.S. 38° N., 23° E., Eastern Greece. Several casual- ties and moderate proper- ty damage. H=14 ^h 18 ^m 41 ^s . Δ = 75.0°
September 5 No. 150	iP Z eP N i Z iS E e N e E ePS N e E	19 ^h 09 ^m 52 ^s comp 19 09 52 19 10 06 dil 19 19 24 19 19 42 19 19 45 19 20 03 19 20 22	Epicenter by U.S.C.G.S. 51° N., 157° E., Near South coast of Kamchatka. H=18 ^h 58 ^m 09 ^s , Magnitude 6 1/2 by Pasadena Δ = 74.8°

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September 7 No. 151	iP Z i Z eS N	04h11m06s dil 04 11 09 dil 04 21 04	Epicenter by U.S.C.G.S. 41° N., 33° E., Northern Turkey. Felt. H=03h58m56s. $\Delta = 78.9^\circ$
September 10 No. 152	eP e eP n iP Z iS E iS n iS N	04h18m26s 04 18 27.5 04 18 28 comp 04 28 44 04 28 45.5 04 28 46	Epicenter by U.S.C.G.S. Near west coast of Cyprus. Heavy casualties and extensive property damage. H=04h06m00s. Magnitude $6\frac{1}{2}$ by Pasadena. $\Delta = 82.6^\circ$
September 14 No. 153	ePR ₁ E eSKS E iS N iSR ₁ N eSR ₂ N	00h46m15s 00 51 51 00 53 26 01 01 00 01 05 25	Epicenter by U.S.C.G.S. 18.5° S., 178.5° E., Fiji Islands. Several killed and extensive property damage. Seismic sea wave. H=00h26m36s, h about 60 km., Magni- tude $6\frac{3}{4}$ by Pasadena. $\Delta = 109.4^\circ$
September 17 No. 154	eP Z ePR ₁ E eS N eSR ₁ N	21h25m51s 21 30 51 21 37 52 21 45 01	Epicenter by U.S.C.G.S. 20.5° S., 174° W., Tonga Islands. H=21h11m48s, h about 100 km., Magni- tude $6\frac{3}{4}$ - 7 by Pasa- dena. $\Delta = 105.2^\circ$
September 23 No. 155	iF neZ ipF NZ isF Z i N iS N iS E ePS N esS E i N	02h26m19s comp 02 26 34 02 26 49 02 26 52 02 35 53 02 35 54 02 36 18 02 36 21 02 36 56	Epicenter by U.S.C.G.S. 50.5° N., 156° E., North- ern Kurile Islands. H=02h14m36s, h about 60 km. Magnitude 7 by Pasadena, $6\frac{3}{4}$ by Berkeley. $\Delta = 75.1^\circ$

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September 26 No. 156	eP e iP n iP Z ipP n isF Z eS N eS E esS E ePS N	01 ^h 14 ^m 10 ^s 01 14 10 01 14 11 comp 01 14 17 01 14 24 01 24 02 01 24 06 01 24 24 01 24 43	Epicenter by U.S.C.G.S. 50° N., 157.5° E., Near South coast of Kamchatka H=01 ^h 02 ^m 30 ^s , h about 60 km. $\Delta = 75.0^\circ$
September 27 No. 157	eP e iP e iP n iP Z ePR ₁ N eS N e N e(SR) E	06 ^h 12 ^m 17 ^s 06 12 18.7 06 12 18.9 06 12 19 comp 06 13 37 06 17 48 06 18 36 06 19 23	Epicenter by U.S.C.G.S. 14° N., 58° W., Windward Islands region. H=06 ^h 05 ^m 27 ^s $\Delta = 34.4^\circ$
September 28 No. 158	iP Z ipF Z epF n iS eE e N iPS E e N isS EN	06 ^h 00 ^m 42 ^s dil 06 01 44 comp 06 01 44 06 08 57 06 09 09 06 10 05 06 10 10 06 10 45	Epicenter by U.S.C.G.S. 22.5° S., 65° W., Bolivia Argentine border region. H=05 ^h 50 ^m 21 ^s h about 250 km. $\Delta = 65.7^\circ$
September 29 No. 159	iP Z iP Z epF Z eFR ₁ NE ePR ₁ Z iPKS Z i E ePS N e N epPS N iSR ₁ N	01 ^h 55 ^m 04 ^s comp 01 55 06 comp 01 56 16 comp 01 56 38 01 56 39 comp 01 57 58 dil 01 58 28 02 06 26 02 06 40 02 07 24 02 12 54	Epicenter by U.S.C.G.S. 36.5° S., 177° E., Off North coast of North Island, New Zealand. Felt: Wellington H=01 ^h 36 ^m 45 ^s , h about 300 km. Magnitude 7 $\frac{1}{4}$ by Pasadena. $\Delta = 121.3^\circ$
September 30 No. 160	iP EZ eP en iP Z iS E iS N i N	23 ^h 10 ^m 12 ^s dil 23 10 12 23 10 15 comp 23 15 02 23 15 04 23 15 43	Epicenter by U.S.C.G.S. 22° N., 107.5° W., off coast of Sinaloa, Mexico. Felt: Mazatlan H=23 ^h 04 ^m 08 ^s , Magnitude 6 $\frac{3}{4}$ - 7 by Pasadena, 6 $\frac{1}{2}$ by Berkeley. $\Delta = 29.5^\circ$

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August 9 No. 123	eP Z epP N ipP Z ePR ₁ N iS E isS E e E e E	06h03m50 ^s comp 06 04 20 06 04 21.7 dil 06 05 48 06 12 18 06 13 08 06 13 36 06 14 29	Epicenter by U.S.C.G.S. 22° S., 68.5° W., Northern Chile. Felt: Colama. H=05h53m24s. h about 150 km. Magnitude 6 $\frac{1}{4}$ by Pasadena. Δ = 65.0°
August 9 No. 124	iP Z eP NE iS E eS N ePS N ePS E	07h52m53 ^s dil 07 52 54 08 02 23 08 02 27 08 02 54 08 02 58	Epicenter by U.S.C.G.S. 38.5° N., 21° E. Near west coast of Greece. H=07h41m05s. Δ = 73.6°
August 11 No. 125	iP NEZ iS E ePS E	03h43m59 ^s comp 03 53 31 03 54 16	Epicenter by U.S.C.G.S. 38.5° N., 21° E. Near west coast of Greece. H=03h32m24s. Magni- tude 6 $\frac{3}{4}$ by Pasadena. Δ = 73.6°
August 12 No. 126	iP NE iP Z iS E iS N e E e E	09h35m30 ^s 09 35 31 comp 09 44 57 09 45 05 09 45 16 09 45 48	Epicenter by U.S.C.G.S. 38.5° N., 21° E. Near west coast of Greece. Heavy casualties and extensive property damage. H=09h23m55s. Magnitude 7 $\frac{1}{4}$ by Pasa- dena and Berkeley. Δ = 73.8°

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August 12 No. 127	iP Z eP n iP e eS N iS N iS E	12 ^h 16 ^m 58 ^s comp 12 16 58 12 16 58.9 12 26 29 12 26 31 12 26 33	Epicenter by U.S.C.G.S. 38° N., 21° E. Off West coast of Greece. H=12 ^h 05 ^m 22 ^s . Magni- tude 6 by Pasadena. Δ = 74.2° Aftershock H=14 ^h 08 ^m 38 ^s
August 12 No. 128	eP Z eP e eP n	13 ^h 50 ^m 58 ^s dil 13 50 59 13 51 05	Epicenter by U.S.C.G.S. 38.5° N., 21° E. Greece aftershock H=13 ^h 39 ^m 23 ^s Δ = 73.6°
August 12 No. 129	iP Z eP n iP e	14 ^h 20 ^m 16 ^s comp 14 20 16 14 20 17.2	Epicenter by U.S.C.G.S. Aftershock of No. 127 H=14 ^h 08 ^m 38 ^s
August 12 No. 130	iP Z eP n iP e	16 ^h 20 ^m 09 ^s dil 16 20 09.1 16 20 12.4	Epicenter by U.S.C.G.S. 38.5° N., 21° E. Greece aftershock H=16 ^h 08 ^m 32 ^s Δ = 73.6°
August 12 No. 131	ePR ₁ Z e E eSKS E eS E eS N ePS E eSR ₁ N M E	17 ^h 12 ^m 20 ^s dil 17 13 01 17 18 42 17 20 03 17 20 05 17 21 38 17 27 27 17 48.4	Epicenter by U.S.C.G.S. 22° S., 175° W. Tonga Islands. H=16 ^h 53 ^m 42 ^s . Magnitude 6½ by Pasa- dena, 6½ by Berkeley. Δ = 106.7°
August 13 No. 132	eP Z	01 ^h 37 ^m 36 ^s comp	Aftershock of No. 127 Greece
August 13 No. 133	iP Z	03 ^h 33 ^m 44 ^s dil	Epicenter by U.S.C.G.S. 38.5° N., 21° E. H=03 ^h 22 ^m 06 ^s . Greece aftershock. Δ = 73.6°

Bulletin for August, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
August 13 No. 134	ePR ₁ E ePR ₁ Z ₁ ePR ₁ Z ₁ e E eSKS E e N esS N esSP E eSR ₁ N esSR ₁ N	09 ^h 43 ^m 07 ^s 09 43 17 comp 09 43 18 dil 09 44 06 09 48 44 09 51 03 09 51 46 09 53 30 09 59 17 10 00 01	Epicenter by U.S.C.G.S. 21.5° S., 170° E. Loyalty Islands. H=09 ^h 23 ^m 23 ^s , h about 150 km. Magnitude 6 3/4 -7 by Pasadena, 6 3/4 -7 1/4 by Berkeley. Δ =117.6° Agreement poor.
August 16 No. 135	iP Z iP n ipF Z epF n eS N esS N esS E	03 ^h 18 ^m 28.3 ^s dil 03 18 29 03 19 04 03 19 05.0 03 25 27 03 26 24 03 26 26	Epicenter by U.S.C.G.S. 7° S., 74° W. Central Peru-Brazil border. H=03 ^h 09 ^m 50 ^s , h about 150 km. Δ =49.0°
August 21 No. 136	eP n iP Z iP e e E e E eS e	13 ^h 37 ^m 20 ^s 13 37 21 comp 13 37 22.5 13 41 29 13 41 37 13 41 46	Epicenter by U.S.C.G.S. 18° N., 67° W. Near west coast of Puerto Rico. H=13 ^h 31 ^m 30 ^s . Δ =26.5° Foreshock H=13 ^h 31 ^m 05 ^s .
August 21 No. 137	iP Z	16 ^h 53 ^m 04.2 ^s	Epicenter by U.S.C.G.S. 4° N., 76.5° W. Western Colombia, Felt H=16 ^h 45 ^m 57 ^s , h about 150 km. Δ =37.5°
August 22 No. 138	iP' Z	00 ^h 40 ^m 07.4 ^s comp	Epicenter by U.S.C.G.S.
August 23 No. 139	eP Z eS E iS N e(PS) E e N	07 ^h 24 ^m 46 ^s 07 39 30 07 39 32 07 39 49 07 43 22	Epicenter by U.S.C.G.S. 1° S., 14° W., Mid- Atlantic Ocean H=07 ^h 18 ^m 06 ^s Δ =75.0°

Bulletin for August, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
August 24 No. 140	iP Z iP n eS NE iSR ₁ E	13 ^h 26 ^m 51 ^s comp 13 26 52 13 31 35 13 33 00	Epicenter by U.S.C.G.S. 14.5° N., 91° W. Guatemala. H=13 ^h 21 ^m 00 ^s h about 100 km. Magni- tude 6½ by Pasadena, 6 ¾ by Berkeley Δ = 28.0°
August 25 No. 141	ePR ₁ E eSKS E ePS NE e(PPS) E	02 ^h 24 ^m 33 ^s 02 30 10 02 34 19 02 35 57	Epicenter by U.S.C.G.S. 5° S., 152° E. New Britain. H=02 ^h 04 ^m 13 ^s . Magnitude 7 by Berkeley Δ = 120.0°
August 26 No. 142	iP n eP Z eS NE	19 ^h 16 ^m 06.1 ^s 19 16 07 19 26 03	Δ S-P=78.0° H=19 ^h 04 ^m 10 ^s
August 27 No. 143	iP Z eP e epF Z eSKS e iSKKS NEe eSKKS n	22 ^h 29 ^m 05 ^s comp 22 29 05.2 22 29 46 dil 22 39 13 22 39 26 22 39 26	Epicenter by U.S.C.G.S. 44° N., 142.5° E. Hokkaido, Japan. Felt: Hokkaido and northern Honshu. H=22 ^h 16 ^m 30 ^s , h about 100 km. Mag- nitude 6 by Pasadena. Δ = 85.8°
August 31 No. 144	iP Z iP nN'Z eS NE	08 ^h 04 ^m 04 ^s comp 08 04 05 dil 08 13 17	Epicenter by U.S.C.G.S. 53.5° N., 160° E., Near east coast of Kamchatka H=07 ^h 52 ^m 46 ^s , h about 60 km. Magnitude 6¼ by Pasadena. Δ = 71.4°
August 31 No. 145	eP Z iP Z eS N	17 ^h 21 ^m 35 ^s comp 17 21 42 dil 17 31 03	Epicenter by U.S.C.G.S. 53° N., 160° E., Near east coast of Kamchatka H= 17 ^h 10 ^m 06 ^s Δ = 71.8°

Bulletin for August, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
August 31 No. 146	eP Z	17h26m ⁴ 9s	Epicenter by U.S.C.G.S. 53° N., 160° E., Near east coast of Kamchatka H=17h15m20s Δ = 71.8°
	iP Z	17 26 54	
	iP n	17 26 54.5	
	eP e	17 26 55	
	eS N	17 36 15	

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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.



Bulletin for July, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
July 1 No. 104	eP NE eP Z ePR ₁ E eS N e(SR ₂) E	03h11m12s 03 11 13.5 comp 03 13 59 03 20 44 03 29 25	Epicenter by U.S.C.G.S. 50.5° N., 157° E., Near South coast of Kamchat- ka. H=02h59m35s. h about 60 km. Magni- tude 6 3/4 by Pasadena. Δ = 75.0°
July 1 No. 105	eP neZ	04h26m51s comp	
July 2 No. 106	eP Z iP ₁ Z ePR ₁ Z i n i E e E iPS N i E i E	07h11m31s comp 07 15 17 dil 07 16 24 comp 07 20 57 07 21 43 07 24 53 07 25 51 07 26 09 07 27 29	Epicenter by U.S.C.G.S. 18.5° S., 169° E., New Hebrides Islands. H=06h56m51s. h about 200 km. Magni- tude 7 3/4 by Pasadena. Δ = 116.5°
July 2 No. 107	iP Z eS E i E	13h41m08s dil 13 49 00 13 50 55	Epicenter by U.S.C.G.S. 15° S., 75° W., Near coast of Southern Peru. H=13h31m26s. h about 60 km. Δ = 56.7°
July 7 No. 108	iP ₁ Z iPR ₁ Z eSKP N eSKKS N eSR ₁ E e E	04h26m49s comp 04 29 58 dil 04 30 24 04 36 02 04 47 21 04 49 58	Epicenter by U.S.C.G.S. 1° N., 100° E., Sumatra. H=04h07m23s. Δ = 137.6°

Bulletin for July, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
July 9 No. 109	iP eZ iPR ₁ E iS N e N eSR ₁ N	21h30m29s dil 21 31 19 21 35 50 21 36 51 21 38 00	Epicenter by U.S.C.G.S. 30° N., 42.5° W., North Atlantic Ocean. H=21h23m48s. Δ = 33.3°
July 10 No. 110	iP Z iPR ₁ Z ePR ₂ Z eS N e N	14h29m10s comp 14 31 58 dil 14 32 54 comp 14 38 17 14 41 45	H=14h18m12s. Δ S-P=68.5°
July 12 No. 111	ePR ₁ E eSKS E eSKKS N ePS E ePPS E iSR N	07h04m11s 07 09 16 07 11 03 07 14 46 07 15 47 07 21 12	Epicenter by U.S.C.G.S. 2° S., 139.5° E., Near North coast of New Guinea. H=06h43m05s. Magnitude 6½ by Pasa- dena. Δ = 126.0°
July 20 No. 112	ePR ₁ Z e Z iS N isS N iPS E epPS E eSR ₁ N esSR ₁ N	08h27m06s dil 08 27 47 08 34 41 08 35 31 08 36 33 08 36 54 08 42 18 08 42 58	Epicenter by U.S.C.G.S. 21° S., 177° W., Tonga Islands region. H=08h08m20s. h about 100 km. Magnitude 6½ by Pasadena. Δ = 107.2°
July 22 No. 113	eP n iP Z ipP Z eS N isS NE esP n isSP E	05h52m51.6s 05 52 53 comp 05 53 07 dil 05 32 20 05 32 47 05 33 01 05 33 26	Epicenter by U.S.C.G.S. 51° N., 157° E., Near South coast of Kamchat- ka. H=05h11m15s. h about 60 km. Magni- tude 6 3/4-7 by Pasa- dena, 6 3/4 by Berkeley Δ = 74.6°
July 22 No. 114	e(P) E	17h57m28s	Foreshock of following quake. H=17h50m22s.

Bulletin for July, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
July 22 No. 115	iP Z eP E iS N iSR ₁ N	18 ^h 21 ^m 17 ^s 18 21 24 18 16 44 18 18 46	Epicenter by U.S.C.G.S. 26.5° N., 44.5° W., North Atlantic Ocean. H=18 ^h 04 ^m 30 ^s . $\Delta = 33.7^\circ$
July 26 No. 116	iPR ₁ Z i Z iSKS N iSKKS E e N ePS E ePPS N e N	17 ^h 11 ^m 23 ^s comp 17 12 29 dil 17 17 30 17 18 16 17 20 21 17 20 33 17 21 43 17 22 04	Epicenter by U.S.C.B.S. 17.5° N., 143° E., Maricenas Islands. H=16 ^h 53 ^m 16 ^s . h about 200 km. Magnitude 7 by Pasadena. $\Delta = 106.6^\circ$
July 28 No. 117	eP n eP Z	05 ^h 49 ^m 40.5 ^s 05 49 44 dil	Epicenter by U.S.C.G.S. 31° N., 141.5° E., South of Honshu, Japan. H=05 ^h 37 ^m 05 ^s . $\Delta = 96.6^\circ$
July 29 No. 118	eP N eP Z ePR ₁ N eS N e E i N e N eM N	18 ^h 21 ^m 40 ^s 18 31 41 comp 18 22 43 18 26 18 18 26 34 18 26 56 18 29 03 18 33 11	Δ S-P=26.3° H=18 ^h 16 ^m 02 ^s
July 29 No. 119	eP Z eS NE	23 ^h 32 ^m 09 ^s comp 23 42 35	Δ S-P=84.0° H=23 ^h 19 ^m 41 ^s
July 30 No. 120	eS E	06 ^h 31 ^m 22 ^s	
July 31 No. 121	e E e N e NE e N	00 ^h 08 ^m 50 ^s 00 08 55 00 09 37 00 13 23	
July 31 No. 122	eP N iP Z ePR ₁ Z eS E iS N iPS N	23 ^h 09 ^m 21 ^s 23 09 21.1 dil 23 12 03 comp 23 19 03 23 19 06 23 19 31	Δ S-P=75.6° H=22 ^h 57 ^m 39 ^s

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Bulletin for June, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
June 2 No. 87	eP n iP Z iS e iS E	22 ^h 21 ^m 08.8 ^s 22 21 12 dil 22 25 29.3 22 25 32	Epicenter by U.S.C.G.S. 19.5° N., 70° W. Near north coast of Domini- can Republic. H=22 ^h 15 ^m 54 ^s . Δ = 23.5°
June 7 No. 88	iP Z iP ne eS E iS N iS E e E	12 ^h 29 ^m 13 ^s comp 12 29 13.3 12 33 28 12 33 34 12 33 42 12 35 00	Epicenter by U.S.C.G.S. 20° N., 70° W., Near north coast of Domini- can Republic. Felt. H=12 ^h 23 ^m 56 ^s . Δ = 23.4°
June 8 No. 89	eP Z eP N eS N iS E e(SR ₁) E	11 ^h 51 ^m 56 ^s 11 52 06 12 01 17 12 01 18 12 04 50	Epicenter by U.S.C.G.S. 52° N., 159½° E., Near east coast of Kamchatka H=11 ^h 40 ^m 25 ^s . Δ = 73.2°
June 10 No. 90	iP Z iPR ₁ Z iSKP NE ePS N e E	18 ^h 43 ^m 06 ^s dil 18 43 22 dil 18 46 34 18 55 58 18 59 02	Epicenter by U.S.C.G.S. 4° S., 128° E., Near south coast of Ceram Islands. H=18 ^h 23 ^m 43 ^s . Δ = 134.5°
June 14 No. 91	e(PR ₁) E eS E eS N	04 ^h 23 ^m 57 ^s 04 28 17 04 28 19	Epicenter by U.S.C.G.S. 33° N., 115.3/4° W., Imperial Valley, Calif. Slight property damage. H=04 ^h 17 ^m 27.5 ^s . Magni- tude 5.4 by Pasadena, 6 by Berkeley. Δ = 28.3°

Bulletin for June, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
June 15 No. 92	eP Z iP Z eP N eS N iS E eSR ₁ E	17h55m50s comp 17 55 56 17 55 56 18 02 38 18 02 43 18 06 14	Epicenter by U.S.C.G.S. 56½° N., 154° W., Near south coast of Kodiak. H=17h47m14s. Δ=47.5°
June 16 No. 93	eP Z eP n eP e eS N e E e N	19h57m24s 19 57 24.6 19 57 24.8 20 04 34 20 07 26 20 08 58	Epicenter by U.S.C.G.S. 55.5° N., 160° W., Near south coast of Alaska Peninsula. H=19h48m25s. h about 60 km. Δ=51.3°
June 17 No. 94	eP Z	01h46m30s comp	Epicenter by U.S.C.G.S. 52° N., 171° W., Fox Islands, Aleutian Islands. H=01h36m31s. Δ=58.5°
June 17 No. 95	iP Z ipP Z eS N	14h18m17.2s comp 14 18 37 comp 14 26 09	Epicenter by U.S.C.G.S. 15.5° S., 75.0° W., Near coast of southern Peru. H=14h08m33s. h about 60 km. Δ=57.5°
June 19 No. 96	M E	22h49m31s	Epicenter by U.S.C.G.S. 26° N., 110° W., Gulf of California. H=22h34m30s. Δ=28.1°
June 23 No. 97	iP Z eP NE epP E ipP NZ eS NE esS N esS E e NE	14h05m09s comp 14 05 09 14 05 22 14 05 23 comp 14 14 37 14 15 01 14 15 02 14 15 40	Epicenter by U.S.C.G.S. 51° N., 157.5° E., Near south coast of Kamchat- ka. H=13h53m28s. Magnitude 6½ by Pasa- dena. Δ=74.1° Records show about 70 km of depth.

Bulletin for June, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
June 24 No. 98	iP Z iP n iP e	21h30m55s 21 30 55.1 21 30 55.3	Epicenter by U.S.C.G.S. 45° N., 151° E., Kurile Islands. H=21h18m30s. $\Delta = 81.6^\circ$
June 25 No. 99	iP Z i Z eSKP EN	11h03m27s comp 11 03 48 comp 11 07 07	Epicenter by U.S.C.G.S. 8½° S., 123½° E., off East coast of Flores Island. H=10h43m56s. $\Delta = 141.1^\circ$ Foreshock of following quake.
June 25 No. 100	iP Z eSKP n eSKP e eSKP NE eSR ₁ E	11h04m32s dil 11 08 06 11 08 07 11 08 10 11 25 24	Epicenter by U.S.C.G.S. 8½° S., 123½° E., off East coast of Flores Island. H=10h44m57s. Magnitude 6 3/4-7 by Pasadena. $\Delta = 141.6^\circ$
June 26 No. 101	eP ₁ Z ePR ₁ N ePR ₁ Z eSKP NE eSR ₁ N	06h02m26s comp 06 05 15 06 05 19 comp 06 06 00 06 23 33	Epicenter by U.S.C.G.S. 8° S., 124° E., Flores Island region. H=05h42m50s. $\Delta = 140.0^\circ$
June 29 No. 102	eP N eP N eP n eP Z eS E e(SR ₁) E	03h34m43s 03 34 52 03 35 03.3 03 35 04 comp 03 40 11 03 42 41	Epicenter by U.S.C.G.S. 7° N., 82.5° W., off coast of Panama. H=03h27m43s. $\Delta = 34.2^\circ$
June 30 No. 103	iP Z i e i Z	17h22m29s dil 17 23 23 17 23 29	

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Bulletin for May, 1953

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
May 2 No. 68	e Z eS E	18h50m36 ^s dil 18 59 07	Epicenter by U.S.C.G.S. off East coast of Kamchatka. H=18h38m12s** Δ = about 72°
May 4 No. 69	iP Z e Z	11h40m30 ^s dil 11 40 57	Epicenter by U.S.C.G.S. 53.5° N., 161° E. Near East coast of Kamchatka H=11h29m08s. Δ = 71.4°
May 4 No. 70	iP Z iP ne ipP Z ipP n iS e	15h36m54 ^s dil 15 36 54.8 15 38 51 comp 15 38 51.9 15 45 24.1	Epicenter by U.S.C.G.S. 28° S., 62.5° W., Santiago del Estero, Argentina. H=15h26m30s h about 600 km. Magnitude 6½ by Pasadena Δ = 72.5°
May 6 No. 71	iP NZ iPR N iS NE i E iSR ₁ E	17h28m42 ^s comp 17 31 32 17 38 42 17 40 26 17 43 31	Epicenter by U.S.C.G.S. 36.5° S., 73° W., Central Chile. Several killed. Minor property damage Concepcion and vicinity. H=17h16m48s, h about 100 km. Magnitude 7½- 7 ¾ by Pasadena. Δ = 78.8°
May 11 No. 72	eP Z ePR ₁ E eSKS E ePS N iPS E	10h35m36 ^s dil 10 36 48 10 42 25 10 46 34 10 46 44	Epicenter by U.S.C.G.S. 21.5° S., 160° E. Loyalty Islands. H= 10h16m36 ^s . Magnitude 6 ¾ by Pasadena, 7 by Berkeley. Δ = 118.5°

Bulletin for May, 1953

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
May 13 No. 73	iP Z eS n	04 ^h 27 ^m 11 ^s dil 04 35 59.2	Epicenter by U.S.C.G.S. 52° N., 174° E., Fear Islands, Aleutian Is- lands. H=04 ^h 16 ^m 28 ^s . h about 100 km. Δ =66.5°
May 18 No. 74	eP Z eP EZ eS N eSR ₁ N	08 ^h 18 ^m 51 ^s comp 08 18 53 dil 08 24 15 08 26 19	Epicenter by U.S.C.G.S. 28.5° N., 44° W., Mid- Atlantic Ocean. H=08 ^h 12 ^m 12 ^s . Δ =32.8°
May 19 No. 75	iP Z EP ne eP N eS N E	03 ^h 22 ^m 42 ^s dil 03 22 42 03 22 43 03 32 05	Epicenter by U.S.C.G.S. 51° N., 159° E., Off South coast of Kamchatka H=03 ^h 11 ^m 06 ^s . Magnitude 6½ by Pasadena, Berkeley Δ =74.0°
May 20 No. 76	eSKS NE eS E eSR ₁ E	08 ^h 10 ^m 16 ^s 08 11 35 08 18 58	Epicenter by U.S.C.G.S. 53° S., 134° W., South Pacific Ocean. H=07 ^h 45 ^m 26 ^s . Magnitude 7¼ by Pasadena. Δ =104.7°
May 20 No. 77	eP Z	23 ^h 21 ^m 10 ^s sil	Epicenter by U.S.C.G.S. 50° N., 130° W. Off coast of Vancouver, British Columbia. H=23 ^h 14 ^m 23 ^s . Aftershock May 21, 1953 H= 12 ^h 29 ^m 51 ^s . Δ =34.1°
May 21 No. 48	eP Z eP n eS NE	02 ^h 02 ^m 06 ^s 02 02 06.7 02 07 16	Epicenter by U.S.C.G.S. Near South coast of Guatemala. H=01 ^h 56 ^m 10 ^s ** Δ S-P=30.7°

Bulletin for May, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
May 21 No. 79	eP Z M N	12h36m47s 12 47 56	Epicenter by U.S.C.G.S. Aftershock of May 20, No. 77. H=12h29m51s
May 24 No. 80	e Z ePR ₁ Z ePR ₁ E ePR ₁ N ePR ₂ N eSKS N ePS N ePPS N e N	01h38m11s dil 01 38 21 dil 01 38 28 01 38 30 01 40 47 01 44 29 01 47 40 01 48 10 01 48 34	Epicenter by U.S.C.G.S. 51° S., 28° W., Sand- wich Islands Region H=01h19m55s. Δ = 103.7°
May 24 No. 81	iP Z eP n eP n eP e	06h05m02.2s 06 05 02.4 06 05 02.8 06 05 03.0	Epicenter by U.S.C.G.S. 10½° N., 85½° W., near coast of Costa Rica H=05h58m40s. Δ = 31.0°
May 25 No. 82	iP Z eP n eP e	17h52m13.4s dil 17 52 13.9 17 52 14	Epicenter by U.S.C.G.S. 51° N., 159½° E., off South coast of Kam- chatka. H=17h40m30s. Δ = 74.0°
May 26 No. 83	eP n eP e iP Z epP Z isP Z eS E eSKKS N esS E	01h55m59.7s 01 55 59.8 01 55 59.8 dil. 01 56 11.3 comp 01 56 21.4 comp 02 06 33 02 06 48 02 07 01	Epicenter by U.S.C.G.S. 42° N., 142.5° E., Near South coast of Hokkaido, Japan. H=01h43m11s, h about 60 km. Δ = 87.5°
May 31 No. 84	iP ¹ Z e N ePPS E eSR ₂ E	05h19m41s sil 05 25 27 05 35 00 05 46 41	Epicenter by U.S.C.G.S. 9° S., 158° E., Flores Sen H=05h00m15s h about 100 km. Δ = 143.5°

Bulletin for May, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
May 31 No. 85	eP E iP NZ eP n iP n iPR ₁ NE eS E iS N	20h03m49s 20 03 50 dil 20 03 50 20 03 51.5 20 03 57 20 08 09 20 08 13	Epicenter by U.S.C.G.S. 20° N., 70.5° W., near north coast of Domini- can Republic. Felt. H=19h58m35s. Magnitude 7 by Pasadena, 7½ by Berkeley. $\Delta = 23.1^\circ$
May 31 No. 86	eP Z eP n iS n eS e	21h01m35s comp 21 01 35.6 21 05 58 21 05 59.6	Epicenter by U.S.C.G.S. Aftershock of preceding quake. H=20h56m18s.

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Bulletin for April, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
April 1 No. 54	eP Z eP n eS E eS N	22h44m38s dil 22 44 41 22 49 49 22 50 02	Epicenter by U.S.C.G.S. 7½° N., 78½° W., Near coast of Panama. H=22h3m51s. Δ=33.7°
April 2 No. 55	iP ¹ Z ePR ₁ N eS E eSR ₁ N	04h14m54s comp 04 16 21 04 20 24 04 32 46	Epicenter by U.S.C.G.S. 5° S., 151½° E., New Britain. H=04h56m06s. h about 60 km. Δ=120.3°
April 3 No. 56	M E	02h32m4	
April 3 No. 57	e N M E	05h06m46s 05 13 13	Epicenter by U.S.C.G.S. 15½° S., 172° W., Samoan Islands region. H=05h01m57s. Δ=101.0°
April 6 No. 58	eP ¹ Z eP ¹ Z iPR ₁ Z iSKP Z iSKP NE i Z e E e E eSR ₁ E	00h55m29s dil 00 55 37 dil 00 58 05 comp 00 59 02 comp 00 59 06 00 59 26 01 05 20 01 08 19 01 16 26	Epicenter by U.S.C.G.S. 7° S., 132° E., Banda Sea. H=00h36m12s. Δ=134.6°
April 6 No. 59	eP n eP Z e n M E	12h26m07.4s 12 26 10 comp 12 27 06 12 50.0	Epicenter by U.S.C.G.S. 52° N., 155° E., Near east coast of Kamchatka H=12h14m41s. Δ=74.7°

Bulletin for April, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
April 14 No. 60	iP Z iP NE iS E i E isS N	13h37m28s 13 37 29 13 43 53 13 46 11 13 47 02	Epicenter by U.S.C.G.S. 7 $\frac{1}{2}$ ° S., 71 $\frac{1}{2}$ ° W., Western Brazil H=13h29m28s. h about 650 km. Magnitude 7 by Pasadena. Δ =50.0°
April 15 No. 61	iP Z	01h28m51s comp	Epicenter by U.S.C.G.S. 49° N., 156° E., Kurile Islands. H=01h16m57s Δ =75.5°
April 17 No. 62	iP nZ	00h11m21s dil	Epicenter by U.S.C.G.S. 5° S., 77° W., North- ern Peru. H=00h02m50s Magnitude 6-6 $\frac{1}{4}$ by Pasadena. Δ =46.9°
April 18 No. 63	iP Z ePR ₂ Z i NE iS n iS N	23h32m45s dil 23 34 16 dil 23 34 27 23 38 41 23 38 42	Epicenter by U.S.C.G.S. 10° N., 102° W., off South coast of Mexico. H=23h25m40s Δ =36.0°
April 19 No. 64	iP Z iP e eS N M E	22h58m15s 22 58 15.2 23 06 58 23 21 11	Epicenter by U.S.C.G.S. 50 $\frac{1}{2}$ ° N., 179° W., Andreanof Islands, Aleutian Islands. Felt: Adak H=22h47m39s. Δ =64.1°
April 20 No. 65	iSKS E M E	11h26m23s 11 52.8	Epicenter by U.S.C.G.S. Kermadec Islands. H=11h00m31s. Δ =about 115°

Bulletin for April, 1953

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
April 23 No. 66	eP1 Z	16h42m57s dil	Epicenter by U.S.C.G.S. 4° S., 154° E., New Britain region. Minor damage. H=16h24m17s. Magnitude 7½-7¾ by Pasadena. $\Delta = 117.90$
	e E	16 44 54	
	eSKKS E	16 50 52	
	eS E	16 52 16	
	e(P.S) E	16 54 46	
	e E	16 56 38	
	e ne	17 04 08	
M Z	17 26.0		
April 24 No. 67	eP Z	02h18m38s dil	Epicenter by U.S.C.G.S. 75.5° N., 6° E., off west coast of Spitz- bergen. H=02h09m44s. $\Delta = 49.60$
	iP Z	02 18 44 comp	
	iS N	02 25 50	

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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 March, 1953

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
March 3 No. 40	eP Z eSKS E ePS E	11h ⁴⁵ m ⁴⁹ s comp 12 52 44 12 56 51	Epicenter by U.S.C.G.S. 20° S., 169° E., Loyalty Islands. H=11h ²⁶ m ⁵⁵ s Magnitude 6 3/4 by Pasadena, 7 by Berkeley Δ=117.7°
March 3 No. 41	iP Z	23h ⁰⁵ m ⁵⁵ s dil	Epicenter by U.S.C.G.S. 48° N., 155° E., Kurile Islands. H=22h ⁵³ m ⁵⁴ s Δ=77.8°
March 4 No. 42	iP Z epP Z ipP Z eS E ePS E esS E esPS E	01h ⁰⁸ m ^{17.2} s dil 01 10 15.9 comp 01 10 16.2 dil 01 16 43 01 17 21 01 19 58 01 21 16	Epicenter by U.S.C.G.S. 28° S., 62.5° W., Santiago del Estor Province, Argentina H=00h ⁵⁷ m ⁵² s. h about 600 km. Magnitude 6 1/4 by Pasadena. Δ=72.2°
March 5 No. 43	iP neZ ipP Z iS E esS E e E	21h ¹² m ⁵⁷ s comp 21 13 13 comp 21 22 22.2 21 22 44 21 23 29	Epicenter by U.S.C.G.S. 51° N., 158° E., Near South coast of Kam- chatka. H=21h ⁰¹ m ²³ s. h about 60 km. Magni- tude 6 3/4 by Pasadena and Berkeley. Δ=75.0°
March 6 No. 44	iP Z ipP Z eSR ₁ E	07h ⁰⁶ m ³⁰ s comp 07 06 45 dil 07 16 34	Epicenter by U.S.C.G.S. 58 1/2° N., 156 1/2° W., Alaskan Peninsula H=06h ⁵⁷ m ²⁴ s h about 100 km. Δ=48.2° Poor agreement.

Bulletin for March, 1953

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
March 9 No. 45	ePR ₁ Z eSKS N ePS NE eSR ₁ N	10 ^h 24 ^m 10 ^s 10 30 17 10 33 40 10 40 11	Epicenter by U.S.C.G.S. 4½° S., 153½° E., New Britain region. H=10 ^h 03 ^m 41 ^s . Magnitude 6½ by Pasadena, 6 3/4 by Berkeley. Δ=119.2°
March 14 No. 46	iP ₁ Z iPR ₁ Z eSR ₁ E	17 ^h 19 ^m 36 ^s dil 17 21 41 17 38 33	Epicenter by U.S.C.G.S. Near S.E. coast of Mindanao, Philippine Islands. Felt at Davao. H=17 ^h 00 ^m 32 ^s . Δ=about 125°.
March 17 No. 47	iP Z M E	06 ^h 44 ^m 40 ^s dil 07 11.2	Epicenter by U.S.C.G.S. 51° N., 159° E., Near S.E. coast of Kamchatka H=06 ^h 32 ^m 52 ^s . Δ=74.0°
March 17 No. 48	iP Z iP n iS E iPS E	13 ^h 16 ^m 21 ^s comp 13 16 23.2 13 25 54 13 26 27	Epicenter by U.S.C.G.S. 50½° N., 156½° E., Kurile Islands. H=13 ^h 04 ^m 33 ^s . Δ=75.6°
March 17 No. 49	iP n iP Z	14 ^h 33 ^m 36.1 ^s 14 33 39 comp	
March 18 No. 50	iP Z iS E iS N e N	19 ^h 18 ^m 08 ^s dil 19 27 50 19 27 51 19 29 13	Epicenter by U.S.C.G.S. 40° N., 27½° E., West Turkey. Heavy casual- ties and extensive property damage. H=19 ^h 06 ^m 11 ^s . Magnitude 7 3/4 by Pasadena, 8 by Berkeley. Δ=76.6°

Bulletin for March, 1953

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
March 19 No. 51	iP NEZ iP ne iS E iS N	08h34m13 ^s dil 08 34 13 08 39 15 08 39 22	Epicenter by U.S.C.G.S. 14° N., 61° W., Windward Islands. Felt: Para- maribo, Dutch Guinea and Trinidad. H=08h27m57 ^s . h about 200 km. Magnitude 7 3/4 by Pasadena and Berkeley. $\Delta = 32.9^\circ$
March 23 No. 52	iP Z ipF Z	04h52m07 ^s dil 04 52 39	
March 25 No. 53	iP Z eS E e N	06h01m11 ^s comp 06 09 03 06 11 02	Epicenter by U.S.C.G.S. 52½° N., 169° W, Fox Islands, Aleutian Islands. H=05h51m21 ^s . $\Delta = 57.5^\circ$ Foreschock March 23, 1953 - H=12h36m13 ^s .

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Two Sprengnether short-period horizontal.


Bulletin for February, 1953

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
February 6 No. 20	iP Z iP Z eS E eSKS E	13 ^h 25 ^m 47 ^s comp 13 26 00 13 36 22 13 36 25.6	Epicenter by U.S.C.G.S. 42½° N., 143½° E., Near S.E. Coast of Hokkaido, Japan. H=13 ^h 12 ^m 29 ^s Δ=87.5°
February 7 No. 21	iP Z eP n iS E	18 ^h 35 ^m 05 ^s dil 18 35 05.5 18 44 48	Epicenter by U.S.C.G.S. 49° N., 156° E., Kurile Islands. H=18 ^h 23 ^m 12 ^s Δ=76.5°
February 7 No. 22	iP Z eP e i Z eS E eS N e E ePS N ePS e	22 ^h 43 ^m 07 ^s dil 22 43 07.2 22 43 34 dil 22 52 58 22 53 00 22 53 23 22 53 35 22 53 46	Epicenter by U.S.C.G.S. 35½° N., 24½° E., Crete. H=22 ^h 31 ^m 08 ^s Δ=78.3°
February 9 No. 23	iP Z eS E eSR ₁ E	21 ^h 42 ^m 24 ^s dil 21 50 24 21 54 15	Epicenter by U.S.C.G.S. 52½° N., 169° W, Fox Islands, Aleutian Islands. H=21 ^h 32 ^m 36 ^s Δ=58.3°
February 10 No. 24	iP Z	08 ^h 08 ^m 22 ^s dil	Epicenter by U.S.C.G.S. 52° N., 169° W., Fox Islands, Aleutian Islands. H=07 ^h 58 ^m 29 ^s Δ=58.6°

Bulletin for February, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
February 12 No. 25	iM E iM N	01h47m15 ^s 01 47 16	Epicenter by U.S.C.G.S. Foreshock of following quake. Yukon, Canada. H=01h27m18 ^s $\Delta = 35.6^\circ$
February 12 No. 26	eM E	04h50m42 ^s	Epicenter by U.S.C.G.S. 65° N., 129° W., Yukon, Canada H=04h31m16 ^s $\Delta = 35.6^\circ$
February 12 No. 27	eP Z iSKS E iSKS N iSKS e iPS E ePS E	08h28m27 ^s comp 08 39 21 08 39 22 08 39 24.0 08 41 15 08 41 20	Epicenter by U.S.C.G.S. 35° N., 54½° E., Northern Iran. Heavy casualties and exten- sive property damage in Turut and vicinity. H=08h15m29 ^s . Magnitude 7 by Pasadena $\Delta = 94.2^\circ$
February 14 No. 28	eSKS N eSKS E eSKKS N ePS E	22h12m47 ^s 22 12 48 22 13 39 22 15 48	Epicenter by U.S.C.G.S. 18½° N., 146° E. H=21h48m12 ^s . h about 60 km. Magnitude 6½ by Pasadena. $\Delta = 106.4^\circ$
February 14 No. 29	iP Z iP n epP Z eS E esS E iSR e	22h18m04 ^s dil 22 18 04 22 18 43 22 24 14 22 25 32 22 27 43.5	Epicenter by U.S.C.G.S. 1½° S., 77½° W., Central Ecuador H=22h10m20 ^s . h about 200 km. $\Delta = 43.2^\circ$
February 16 No. 30	iP Z eP n e E eL E	10h17m10 ^s comp 10 17 11.3 10 25 50 10 26 30	Epicenter by U.S.C.G.S. 8½° N., 83° W., near coast of Costa Rica. H=10h10m22 ^s $\Delta = 33.0^\circ$

Bulletin for February, 1953

Gnwh. Date and Number	Phase and Component	G.M. C. T.	Remarks
February 19 No. 31	iP e eP n iP Z iS N iPS E e N eSR ₁ N	15 ^h 29 ^m 00.0 ^s 15 29 00.1 15 29 02 dil 15 38 14 15 38 25 15 41 12 15 42 53	Epicenter by U.S.C.G.S. 0°, 18° W., Mid-Atlantic Ocean H=15 ^h 17 ^m 40 ^s Δ = 70.4°
February 23 No. 32	eP Z e Z	03 ^h 53 ^m 06 ^s dil 03 54 00	Epicenter by U.S.C.G.S. 53° N., 161° E., off East coast of Kamchatka H=03 ^h 41 ^m 45 ^s Δ = 72.3°
February 25 No. 33	iP NEZne ipF neZ iPR ₁ NE eS N eS E eSR ₁ N eSR ₁ E	21 ^h 25 ^m 02 ^s dil 21 25 16 21 26 58 21 32 19 21 32 23 21 35 00 21 35 10	Epicenter by U.S.C.G.S. 56° N., 156.5° W. Off South coast of Alaskan Peninsula H=21 ^h 16 ^m 18 ^s . h about 60 km. Magnitude 6 3/4 by Pasadena Δ = 50.1°
February 26 No. 34	iP neZ iP Z eS NE ePS E	00 ^h 43 ^m 52 ^s dil 00 43 57 00 53 09 00 53 46	Epicenter by U.S.C.G.S. 51° N., 156.5° E. Near South Coast of Kamchatka. H=00 ^h 32 ^m 07 ^s Δ = 75.4°
February 26 No. 35	iP Z i Z	07 ^h 49 ^m 29 ^s comp 07 49 44 comp	Epicenter by U.S.C.G.S. 50° N., 157° E. Off South coast of Kamchatka. H=07 ^h 37 ^m 45 ^s Δ = 75.5°
February 26 No. 36	eP ¹ Z ePR ₁ Z eSKS E	12 ^h 01 ^m 39 ^s 12 02 11 12 07 59	Epicenter by U.S.C.G.S. 11° S., 164.5° E. Santa Cruz Islands Region. H=11 ^h 42 ^m 26 ^s Magnitude 7 1/4 by Pasadena, Berkeley Δ = 115.9°

Bulletin for February, 1953

Gnwh. Date and Number	Phase and Component	G. M. C. T.	Remarks
February 26 No. 37	iP Z iF Z eS N	16h14m42s comp. 16 14 45 dil 16 19 04	Epicenter by U.S.C.G.S. 19° N., 73.5° W. Gulf of Gonaves Haiti. H=16h09m25s $\Delta = 23.3^\circ$
February 28 No. 38	iF Z eS N eS E	04h30m46s comp 04 35 50 04 35 54	Epicenter by U.S.C.G.S. 18.5° N., 105° W. Near Coast of Colima, Mexico H=04h24m33s $\Delta = 30.6^\circ$
February 28 No. 39	eF Z eS E	21h59m28s dil 22 04 39	Epicenter by U.S.C.G.S. Aftershock of preceding quake. H=21h53m15s

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Bulletin for January,



1.

Gnwch. Date and Number	Phase and Component	G. M. C. T.	
January 5 No. 1	iP Z iP n e N iS E iS e	07 ^h 59 ^m 19.8 ^s dil 07 59 21.1 08 01 27 08 08 07 08 08 09	Epicenter by U.S.C.G.S. 54° N., 170° E., Komandorskie Islands region. Felt: Attu. H = 07 ^h 48 ^m 17 ^s . Magni- tude 6 3/4 - 7 by Pasadena. Δ = 67.3°
January 5 No. 2	iP Z iP nE iS E iS n e n e n	10 ^h 18 ^m 22.1 ^s comp 10 18 22 10 28 03 10 28 06 10 28 27 10 29 00	Epicenter by U.S.C.G.S. 49° N., 156° E., Kurile Islands. H = 10 ^h 06 ^m 25 ^s . Magni- tude 6 3/4 by Pasadena. Δ = 76.9°
January 6 No. 3	eP n	23 ^h 30 ^m 19 ^s	Foreshock of earthquake No. 5. H = 23 ^h 23 ^m 30 ^s by U.S.C.G.S.
January 7 No. 4	iP Z eS E ePS N	06 ^h 00 ^m 47 ^s dil 06 09 26 06 10 21	Epicenter by U.S.C.G.S. 53.5° N., 161° E., off East coast of Kamchatka H = 05 ^h 48 ^m 54 ^s Δ = 72.0°
January 7 No. 5	iP n iP n iP e e E eSR ₁ E	12 ^h 06 ^m 59.1 ^s 12 07 06.8 12 07 35.3 12 12 46 12 14 03	Epicenter by U.S.C.G.S. 9 1/2° N., 83° W., Costa Rica. Several injured and slight property damage. H = 12 ^h 00 ^m 30 ^s Δ = 32.0°

Bulletin for January, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
January 7 No. 6	iP Z i Z eSR ₁ E	14 ^h 27 ^m 20.4 ^s dil 14 27 35.4 comp 14 45 04	Epicenter by U.S.C.G.S. 5 $\frac{1}{2}$ ^o S., 150 $\frac{1}{2}$ ^o E., New Britain. H = 14 ^h 08 ^m 20 ^s $\Delta = 121.8^{\circ}$
January 11 No. 7	iP neZ eS E eS N	23 ^h 00 ^m 45.6 ^s comp 23 06 38 23 06 42	Epicenter by U.S.C.G.S. 65 ^o N., 133 ^o W., Yukon, Canada. H = 22 ^h 53 ^m 30 ^s Magnitude: 6 $\frac{1}{2}$ by Pasadena 6 by Berkeley $\Delta = 37.6^{\circ}$
January 12 No. 8	iP N iP Z iP ne iP Z iP Z iS E i N	17 ^h 35 ^m 24 ^s 17 35 25.6 comp 17 35 26.1 17 35 28 dil 17 35 29 comp 17 45 02 17 45 28	Epicenter by U.S.C.G.S. 49 $\frac{1}{2}$ ^o N., 156 ^o E., Kurile Islands. H = 17 ^h 23 ^m 39 ^s . h about 60 km. Magnitude: 6 $\frac{3}{4}$ - 7 by Pasa- dena; 6 $\frac{1}{4}$ by Berkeley. $\Delta = 76.5^{\circ}$.
January 17 No. 9	eP Z ipP Z isP Z eS E esS E	17 ^h 41 ^m 38 ^s comp 17 42 10 dil 17 43 23.2 comp 17 51 06.1 17 51 38.3	Epicenter by U.S.C.G.S. 50 $\frac{1}{2}$ ^o N., 155 ^o E., Kurile Islands. H = 17 ^h 30 ^m 03 ^s h about 150 km. $\Delta = 76.3^{\circ}$
January 19 No. 10	eP Z eS E iS N	05 ^h 10 ^m 16 ^s dil 05 20 52 05 20 54	Epicenter by U.S.C.G.S. 42 ^o N., 143 ^o E., Near S.E. coast of Hokkaido, Japan. Felt. H = 04 ^h 57 ^m 22 ^s $\Delta = 87.0^{\circ}$

Bulletin for January, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
January 20 No. 11	iP' Z iP' n iPR ₁ n iPR ₁ Z iSKP n ePS E	17 ^h 52 ^m 21 ^s dil 17 52 22 17 54 39.4 17 54 40 dil 17 55 43.5 18 04 35	Epicenter by U.S.C.G.S. 1 $\frac{1}{2}$ ^o N., 126 ^o E., Molucca Passage. H = 17 ^h 33 ^m 06 ^s Magnitude 6 $\frac{1}{2}$ by Pasadena. $\Delta = 131.4^{\circ}$
January 21 No. 12	iP Z iP ne ipP Z epP n iS N esS N ePS NE	01 ^h 54 ^m 43 ^s comp 01 54 43.2 01 54 55 dil 01 54 55.3 02 04 19 02 04 43 02 04 52	Epicenter by U.S.C.G.S. 50 ^o N., 156 ^o E., Kurile Islands. H = 01 ^h 43 ^m 00 ^s h about 60 km. $\Delta = 76.0^{\circ}$
January 24 No. 13	iM e	09 ^h 45 ^m 28.6 ^s	Foreshock of following earthquake.
January 24 No. 14	iS e iM n iM e iM Z	10 ^h 03 ^m 50.2 ^s 10 05 13.7 10 05 14.4 10 05 15	Epicenter by U.S.C.G.S. Gaspé Peninsula, Quebec Felt. H = 09 ^h 58 ^m 33 ^s Δ about 8 ^o - 9 ^o
January 25 No. 15	iP Z eP n i e iPR ₁ Z eS N eS E e E e N	19 ^h 53 ^m 12 ^s comp 19 53 13 19 53 26.7 19 53 40 dil 19 57 31 19 57 33 19 57 59 19 59 22	Epicenter by U.S.C.G.S. 19 ^o N., 73 $\frac{1}{2}$ ^o W., Off west coast of Haiti. H = 19 ^h 47 ^m 58 ^s . $\Delta = 23.2^{\circ}$.
January 27 No. 16	eP Z eP e iP Z iS E eS N ePS N	03 ^h 24 ^m 23 ^s dil 03 24 27.1 03 24 28 comp 03 33 48 03 33 49 03 34 04	Epicenter by U.S.C.G.S. 52 ^o N., 159 $\frac{1}{2}$ ^o E., off east coast of Kamchatka H = 03 ^h 12 ^m 55 ^s . $\Delta = 73.5^{\circ}$.

Bulletin for January, 1953

Gnwch. Date and Number	Phase and Component	G. M. C. T.	Remarks
January 27 No. 17	eP Z eP e	04 ^h 17 ^m 53 ^s dil 04 17 53.3	Epicenter by U.S.C.G.S. 52° N., 160° E., off southeast coast of Kamchatka. H = 04 ^h 06 ^m 24 ^s Δ = 73.3°
January 30 No. 18	ePR ₁ Z ePS ₁ E eSR ₁ N eSR ₁ E	22 ^h 06 ^m 19 ^s comp 22 16 26 22 22 13 22 22 22	Epicenter by U.S.C.G.S. 12° S., 166½° E., Santa Cruz Islands. H = 21 ^h 46 ^m 50 ^s h about 100 km. Δ = 114.8°
January 31 No. 19	iP Z eS E iS N	22 ^h 05 ^m 02 ^s comp 22 15 31 22 15 36	Epicenter by U.S.C.G.S. 15° S., 18° W., Mid- Atlantic Ocean. H = 21 ^h 52 ^m 25 ^s Δ = 82.3°