HARVARD UNIVERSITY

Division of Geological Sciences

SEISMOGRAPH STATION

Oak Ridge Observatory

Bulletin Number 16

January 1, 1941 through June 30, 1941

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Constants of the station:

Latitude: 42° 30' 26" North
Longitude: 71° 33' 45" West
Altitude: 180 meters

Mail address for the station:

Harvard Seismograph Station
Geological Museum
Cambridge, Massachusetts, U.S.A.

Time:

All determinations are reduced to Universal Time. Clock rated daily by time signals from Arlington, Virginia. Accurate within 0.1 second unless otherwise specified.

Instruments:

Three Benioff 113.7 kg. long and short period combinations, (one vertical, and two horizontal components oriented respectively north-south and east-west) with galvanometric registration and magnetic damping.

Normal Operating Constants

Instrument	To sec.	Tg sec.	e	Drum speed	Displacement for acceleration of 10^{-6} gravity
ZSP	1.0	0.2	20:1	60 mm/min	15 mm
NSP	1.0	0.2	20:1	60 mm/min	15 mm
ESP	1.0	0.2	20:1	60 mm/min	15 mm
ZLP	1.0	14.0	20:1	30 mm/min	12 mm
NLP	1.0	14.0	20:1	30 mm/min	12 mm
ELP	1.0	14.0	20:1	30 mm/min	12 mm

Displacements of the ground upward or toward the north or east are designated by +, down or toward the south or west by -.

Tables used:

For teleseisms, Jeffreys-Bullen 1939
For local earthquakes and blasts, Harvard travel times (Reference: Bulletin Seismological Society of America, Vol. 31, No. 4, October 1941)

Date 1941	Phase		Time (U.T.) h m s	Remarks
Jan. 2	eS_a	Z	03-43-19	Aftershock of Ossipee,N.H. earthquakes
Jan. 2	e	Z	17-07-59	
	e	Z	10-23.3	
	i	ZNE	10-40	Z -,N +, E -.
Jan. 2	iP_1	ZNE	18-19-33.4	Local, probably blast.
	iS_1	NE	43.6	H = 18-19-19.8; Δ=83 km.
	iL	ZNE	47.3	
Jan. 3	e	Z	09-22-32	
	e	Z	29-59	
	eL	Z	35.0	
Jan. 4	eP_a	N	11-10-39	Aftershock of Ossipee, N.H.
	eP_1	N	41	earthquakes
	eS_n	N	58	
Jan. 5	eL	ZE	19-34	JSA:H=18-46-44; epicenter at 2°S, 123°7 E; probably somewhat deeper than normal
Jan. 6	eL	ZNE	10-05	JSA: 7°0 N, 87°0 W
Jan. 7	eP	E	16-58-49.5	Local, probably blast.
	eS	E	59-00.8	H=16-58-34.4; Δ=92 km.
	e	E	01.6	
	iL	E	03.8	
Jan. 7	eP	E	18-51-04.0	Similar to 16^h58^m
	e	N	05.3	H=18-50-48.9; Δ=92 km.
	eS	E	15.8	
	iL	E	19.3	
Jan. 8	e	NE	21-42-36	
	e	ZNE	57	
Jan. 8	e	ZNE	22-09-32	Local, probably blast.
Jan. 9	eP	N	16-40-08.3	Local, probably blast.
	e	N	09.1	H=16-39-55.3; Δ=79 km.
	eS	ZNE	18.0	
	iL	ZNE	21.5	
Jan. 9	eP	NE	19-58-52.1	Local, probably blast.
	e	ZNE	59-12.6	
	e	N	14.1	

Date 1941	Phase		Time (U.T.) h m s	Remarks
Jan. 9	eP	N	20-05-21.7	Similar to 16^h40^m
	e	N	22.2	H=20-05-08.4; Δ=81 km.
	eS	ZNE	31.6	
	iL	ZNE	35.6	
Jan. 11	eL	ZE	03-50	
Jan. 11	eL	ZE	09-58	
Jan. 13	eL	ZE	17-22	USCGS:H=16-27.7; epicenter at 3°S, 144° E.
Jan. 14	e	N	16-45-39.2	
Jan. 15	e	Z	04-10-36	
Jan. 17	eP	ZNE	12-41-27.9	Caribbean. Δ=24°
	eS	ZNE	45-43.4	
	e	ZNE	13-05-02.4	
Jan. 18	eP	ZN	23-25-24	Aftershock of Ossipee,N.H.
	eS	ZNE	42	earthquakes,Dec. 20-24,1940
Jan. 19	e	ZE	03-31.0	
	eL	ZE	35	
Jan. 19	i	ZN	08-39-28	Deep focus?
Jan. 21	eP	ZN	02-28-09.8	Aftershock in Ossipee
	iP	ZNE	10.3	region, New Hampshire
	iP_1	ZNE	11.3	
	iS_n	ZNE	28.2	
	iS_2	ZNE	29.0	
	iS_1	ZNE	30.8	
Jan. 22	iP_1	ZN	15-30-57.6	Local, probably blast
	iP_1P_1	N	58.6	Δ = 74 km.
	iS_1S_1 ?	ZNE	31-08	
	eL	ZNE	10.5	
Jan. 22	eP_1	N	21-24-44.6	Δ = 71 km.
	eP_1P_1	N	45.5	
	iS	ZNE	55.0	
	eL	ZNE	58	
Jan. 23	iP_2	ZNE	00-15-23.4	New Hampshire aftershock
	iP_1	ZNE	25.2	
	eS_n	ZNE	40.0	
	iS_1	ZNE	42.2	

Date 1941	Phase		Time (U.T.) h m s	Remarks
Jan. 24	i	ZNE	05-20-19	
Jan. 29	i	ZN	18-01-03	Local, probably blast
	i	ZN	17	
Jan. 30	e	NE	18-40-38	Local, probably blast
	e	NE	47.4	
	eL	NE	50.5	
Feb. 1	iP	Z	16-52-39.9	Local, probably blast
	iS	Z	49.9	Δ = 82 km.
	iL	Z	53.4	
Feb. 2-3	i	ZN	23-45-41.4	Z -, N -. Deep focus?
	eL	ZN	00-04	
Feb. 6	e	N	18-21-03.3	Local, probably blast
	e	ZNE	11.3	
	e	ZNE	16.3	
Feb. 7	e	Z	15-24-48	
	e	Z	26-00	
	e	Z	27-24	
	e	Z	28-41	
	e	Z	54	
	eL	Z	31	
Feb. 9	eP	Z	09-51-47	USCGS:H=09-44.1;epicenter
	ePP	Z	53-13	40°7 N, 125°4 W
	eL	ZE	10-04	JSA:H=09-44-05;epicenter at 41°1 N, 125°5 W. Felt in Eureka, California
Feb. 9	eL	ZE	20-24	
Feb. 10	i	ZNE	18-26-44.3	
Feb. 11	eP	Z	14-42-15	USCGS:H=14-35.4;epicenter
	e	Z	43-04	at 14°5 N, 94°0 W
	i	Z	37	JSA:H=14-35-23;epicenter
	e	Z	45-39	at 14°2 N, 94°0 W; depth
	eL	Z	49	slightly greater than normal
Feb. 12	e	N	22-24-16	Aftershock of Ossipee,N.H.
	e	ZNE	34.5	earthquakes
Feb. 13	eL	ZNE	15-09.5	

Date 1941	Phase		Time (U.T.) h m s	Remarks
Feb. 13	iP	N	18-58-40.1	Local, probably blast
	iS	ZNE	50.8	H=18-58-25.7; Δ=88 km.
	iL	ZNE	52.3	
Feb. 25	iP	N	20-14-04.8	
	eS	NE	15.0	
	iL	ZNE	19	
Feb. 28	iP	NE	19-50-19.0	Local, blast?
	iS	NE	40.3	Δ=174 km.
Mar. 6	iP	ZNE	19-07-24.0	Local, blast.
	iS	ZNE	34.5	Δ=86 km.
Mar. 6	iP	N	19-46-08.0	Local, blast.
	iS	ZNE	18.0	Δ=82 km.
	iL	ZN	21.5	
Mar. 6	i	ZNE	20-55-34.1	
	i	ZNE	56-11.6	
	i	ZNE	22.6	
Mar. 6	iP	N	21-09-57.1	Local, blast.
	iS	ZNE	10-07.1	Δ = 83 km.
	iL	ZNE	10.6	
Mar. 14	i	Z	16-41-51.5	
	e	Z	44-28	
Mar. 15	eP	Z	05-53-18	USCGS:H=05-46.3;epicenter
	i	ZE	33	at 28°.1 N, 113°.6 W
	ePP	Z	54-55	JSA:H=05-46-17;epicenter
	eS	Z	59-18	at 28°.7 N, 114°.0 W;depth
	eL	ZNE	06-05	probably 50 km.
	eL	ZNE	08	
Mar. 16	i	Z	07-54-22.5	
	i	Z	55-34.5	
	i	Z	57-15.5	
	eL	Z	08-25	
Mar. 16	eL	ZE	17-32	
Mar. 21	i	ZNE	01-59-15	
Mar. 21	iP	Z	08-06-43	USCGS:H=07-58.4;epicenter
	eS	Z	13-35	at 7°.3 N, 36°.6 W; depth
	eL	Z	21	possibly 100 km.
Mar. 22	e	ZN	01-58-12	

Date 1941	Phase		Time (U.T.) h m s	Remarks
Mar. 22	i	ZN	14-45-51.8	
Mar. 22	e	ZNE	18-53-41	
	i	Z	42.7	
	i	Z	55.7	
	e	ZNE	57	
	e	ZNE	54-12	
Mar. 24	iP_1	N	16-12-48	Local, probably blast
	iS_1	NE	58	H=16-12-34.3; Δ=82 km.
	iS_1S_1	NE	13-00	
	eL	ZNE	02	
Mar. 24	i	Z	21-15-28	Δ = 5.7 km.
	i	Z	28.7	
Apr. 1	iP	N	20-47-06	Local, blast.
	iS	E	16.8	H=20-46-51.7; Δ=88 km.
	iL	ZNE	20	
Apr. 3	iP	ZNE	15-06-31	Foreshock of 15^h31^m
	ipP	ZNE	07-27	
Apr. 3	iP	ZNE	15-31-54.5	Z -, N -, E +.
	epP	Z	32-55	USCGS: H=15-21; epicenter
	eS	E	40-24	probably in region of
	e	E	41-25	25°S, 69°W; depth about 200 km.
	eL	ZE	47	
Apr. 3	i	ZNE	21-30-11.5	Local, blast.
	e	ZNE	24.5	
	e	ZNE	30	
Apr. 4	e	NE	08-11-33	
	e	Z	12-03	
	e	NE	07.5	
	e	NE	11	
Apr. 7	eP	Z	23-34-47	JSA: H=23-29-16; epicenter
	iP	Z	49.7	at 17°.7 N, 78°.4 W
	eS	Z	39-17	
	eL	Z	46.5	
Apr. 8	e	Z	23-40-07	
Apr. 9	eL	Z	15-00-17	Local
Apr. 9	eP	ZE	17-15-45	JSA: H=17-08-26; epicenter
	e	Z	27-45	at 28°.3 N, 114°.9 W. Felt
				in San Diego, California

Date 1941	Phase		Time (U.T.) h m s	Remarks
Apr. 10	iP	N	16-38-58	Local, blast.
	iF	N	39-08.3	H=16-38-42.7; Δ=94 km.
	iS	E	09.5	
	eL	ZNE	12	
Apr. 10	iP	N	18-46-24	H=18-46-08.7; Δ=94 km.
	iF	N	34.5	
	iS	E	35.5	
	eL	ZNE	38	
Apr. 10	i	ZNE	19-50-32.4	Blast about 1000 feet
	i	NE	33.2	from station
Apr. 15	eL	ZNE	04-45	
Apr. 15	eL	ZNE	07-57	
Apr. 15	i	Z	16-44-07	
Apr. 15	iP	ZNE	19-16-50	Compression to northeast.
	iPP	ZNE	18-17	Destructive in Mexico
	i	Z	21-23	JSA: H=19-10-00; epicenter
	iS	NE	22-21	at 18°.9 N, 103°.5; depth
	iSS	NE	25-03	about 100 km.
Apr. 16	e	Z	01-45-15	JSA: H=01-38-30; epicenter
	e	Z	51-23	and depth as in preceding
	eL	Z	02-03	
Apr. 16	i	Z	15-41-22	
Apr. 16	e	N	21-05-41.9	Local
	e	N	42.3	
	e	N	42.7	
	e	N	54.7	
	e	N	56.4	
Apr. 18	iP_2	ZNE	15-13-35.7	Local, blast
	iP_1	ZNE	36.4	H=16-13-10; Δ=161 km.
	i	N	53.7	Azimuth southwest
	i	E	54.1	
	i	Z	54.4	
	i	ZNE	55.1	
	iS_1	ZNE	56.1	
Apr. 18	iP_2	Z	19-58-44.9	Local, blast in South
	iP_1	E	45.9	Bethlehem, New York?
	iS_n	N	59-05.4	H=19-58-15; Δ=187.5 km.
	i_{o2}	ZNE	06.9	
	iS_1	E	07.7	

Date 1941	Phase	Time (U.T.) h m s	Remarks
Apr. 19	eP	Z 08-07-20	Δ about 90°
	eL	E 37.5	
	eL_R	Z 48	
Apr. 19	e	Z 10-36-47.7	Local
Apr. 20	eP	Z 17-51-35	JSA:H=17-38-30; epicenter
	i	Z 39	at 38°.5 N, 69°.0 E
	eSKS	ZN 18-02-15	
	eL	ZNE 08.6	
Apr. 21	eP	Z 03-04-10	JSA:H=02-54-08; epicenter
	eS	Z 12-18	at 53°.0 N, 165°.5 W
	eL	ZNE 25	
Apr. 21	e	Z 18-11-18	
	e	Z 16-10	
Apr. 21	eL	ZE 23-31	
Apr. 22	$i(S_1)$	ZNE 19-04-08.3	Local, blast?
Apr. 22	$i(S_1)$	ZNE 19-09-19.8	Local, blast?
Apr. 23	i	ZN 18-08-04.2	Local, blast?
Apr. 23	e	Z 18-44-59.7	Local, blast?
	eL	Z 45-01.7	
Apr. 23	iP_1	ZNE 21-36-45.5	Compression to northeast
	iP_1P_1	ZNE 46.5	Local, blast.
	i	ZE 52	H=21-36-28.0; Δ=106 km.
	i(F)	N 57.7	
	iS_1	ZNE 58.5	
	iS_1S_1	ZE 37-00	
	eL	E 04	
Apr. 24	i	Z 01-09-51	
	i	ZNE 14-38.5	
Apr. 25	eL	ZNE 12-35	
Apr. 26	iP_2	NE 19-18-32.7	H=19-18-04; Δ=177 km.
	iP_1	NE 34.2	
	iS_2	NE 53.5	
	iS_1	NE 55.7	
	i	NE 57.5	
	eL	NE 19-02.0	

Date 1941	Phase	Time (U.T.) h m s	Remarks
Apr. 26	iP_1	NE 19-20-38.5	H=19-20-10; Δ=177 km.
	iS_1	NE 21-00.5	
Apr. 28	eL	E 20-04	
	eL	Z 06	
Apr. 29	eL	ZE 04-04	
Apr. 29	i	ZNE 14-06-13	
	i	ZNE 14.5	
	i	E 17.5	
	e	ZE 40.3	
	i	N 43	
Apr. 29	iL	ZNE 14-10-25.4	Blast
Apr. 29	el	ZNE 14-53-30	Blast
Apr. 29	i	ZNE 16-40-27.6	
Apr. 29	e	N 17-27-16	
	i	ZNE 20.5	
May 1	iP_2	ZNE 19-29-56.5	Rarefaction southwest
	iP_1	ZNE 57.2	H=19-29-33.7; Δ=139 km.
	iS_2	ZNE 30-13.7	Blast
	iS_1	ZNE 14.5	
May 1	iP_2	ZNE 19-30-01.8	Blast at same location as
	iP_1	ZNE 02.5	preceding.
	iS_2	ZNE 19.0	H=19-29-39.0
	iS_1	ZNE 19.8	
May 1	iP_2	ZNE 20-04-22.2	Blast at same location as
	iS_2	ZNE 39.4	preceding.
	iS_1	ZNE 40.2	H=20-03-59.4
May 4	i	Z 22-27-25.3	Deep focus?
May 4	i	Z 22-57-05.2	Deep focus?
May 4	i	Z 23-43-49.7	Deep focus?
May 5	eL	Z 16-05	
May 7	iP_2	ZNE 20-25-22.9	Blast at Δ=145 km.
	iS_2	ZNE 40.3	H=20-24-59.5

Date 1941	Phase	Time (U.T.)	h m s	Remarks
May 8	e	ZE	10-40-29	JSA: Probably vicinity of
	e	ZE	49-32	Tonga Islands, Pasadena
	e	ZE	50-53	suggests depth of 550 km.
May 8	e	N	17-58-00.5	Local
	e	N	41.0	
	e	N	43.5	
May 8	eL	ZNE	19-15-18.5	Local
May 8	i	ZN	19-24-41.5	
May 9	e	Z	06-53-16	
	e	E	07-10-00	
	eL	ZNE	28	
May 10	iP_2	ZE	11-57-39.8	H=11-57-09.6; Δ=188 km.
	iS_2	N	58-01.7	Blast near Albany, N.Y.
May 11	iP	ZN	05-17-28.5	JSA:H=05-07-57; epicenter at 13°0 S, 77°0 W
May 12	eL	ZE	04-59.5	
May 13	eP	ZE	16-09-25	USCGS:H=16-01.9;epicenter
	eS	N	15-37	at 40°3 N,125°0 W
	iS	E	47	JSA:H=16-01-40;epicenter
	eSS	N	18-17	at 39°8 N, 127°5 W
	eL_Q	N	21.0	Felt in Eureka,California
	eL_R	ZE	23.0	
May 16	eL	ZNE	03-01	
May 16	eL	ZNE	08-13	
May 16	iP_2	ZNE	18-22-52.8	Rarefaction to southwest
	iP_1	ZNE	53.3	According to NESA, a blast
	iS_2	ZNE	23-07.1	near North Bloomfield,
	iS_1	Z	07.8	Connecticut
	i	Z	16.8	
May 17	eP'	Z	02-43-41	USCGS: H=02-24.7;epicenter
	e	Z	49	at 12°9 S, 166°7 E
	e	Z	44-23	JSA: H=02-24-53; epicenter
	ePP	Z	45-00	at 11°2 S, 165°8 E
	e	ZN	55-00	
	eSS	N	03-01.5	
	eL_R	ZN	24	

Date 1941	Phase		Time (U.T.) h m s	Remarks
May 17	i	Z	06-26-54.6	Deep focus?
	i	Z	27-16.6	
May 18	eL	ZE	12-15	From west
May 19	iP_2	N	11-59-59.5	H=11-59-35; Δ=150 km.
	iS_2	N	12-00-17.3	Blast
	iS_1	ZNE	18.5	
May 19	iP_1	ZNE	20-20-16.4	H=20-19-59; Δ=106 km.
	iP_1P_1	ZNE	17.2	Blast
	iF	ZNE	29	
	iS_1	ZNE	29.5	
	iS_1S_1	ZNE	30.5	
May 20	iP_1	Z	16-59-21	Δ=140 km.
	iS_1	Z	38	
May 20	i	ZNE	22-20-34.5	
May 20	i	ZNE	23-27-06.8	
May 20	i	ZNE	23-32-28.7	
May 21	i	ZNE	21-25-14	
May 21	i	ZNE	21-47-20	
May 21	i	ZNE	21-51-40	
May 21	e	ZNE	21-59-09	Local, probably blast
	eL	ZNE	13	
May 23	e	Z	20-03-19	
May 29	eL	ZNE	12-24	
May 29	e	ZE	15-12-07	Series of five. According
	e	N	24.5	to NESA, probably blasts
	eL	Z	27	near South Portland, Maine
	e	ZE	15-13-45	
	e	N	14-02	
	eL	Z	09	
	e	N	15-14-30	
	eL	Z	41	
	e	Z	15-15-01	
	e	Z	19	
	e	ZE	15-16-25.5	
	e	N	44.5	
	eL	ZNE	52	

Date 1941	Phase	Time (U.T.) h m s	Remarks
May 29	eP	ZN 15-20-11	Local
	eS	ZN 29	
May 30	eL	ZE 18-29	
June 3	i(S_1)	ZNE 15-12-57.5	
June 3	i(S_1)	ZNE 15-16-59.5	
June 3	i	ZNE 16-03-48	
June 3	i	ZNE 16-33-08.5	
	i	ZNE 11	
June 3	i	ZNE 19-43-32.5	
June 3	iP	ZNE 21-50-50.7	Blast. H=21-50-47; Δ= 23 km.
	iS	ZNE 53.5	
	iL	ZNE 55.1	
June 3	eL	ZNE 23-36-48	Local
June 4	iP_1	ZNE 21-28-12	Compression to northeast. Azimuth S 51° W
	iS_1	ZNE 14.4	H=21-28-08.8; Δ=19.6 km.
	iM	ZNE 16	
June 6	iP_2	ZNE 14-54-37.2	Series of blasts at Δ=152 km.
	iS_2	ZNE 55.5	H_I = 14-54-12.4
	iS_2	ZNE 14-55-12	H_{II}= 14-54-29.2
	iP_2	ZNE 14-58-49	H_{III} = 14-58-24.2
	iS_2	ZNE 59-07.3	
	iS_2	ZNE 15-02-31.5	H_{IV} = 15-01-48.7
June 6	iP_1	ZNE 19-14-10	H=19-13-42; Δ=167 km.
	iS_1	ZNE 31	
June 7	iS_1	Z 15-59-10	
	i	N 11.5	
	iL	ZE 13	
June 8	e	NE 20-26-29	
June 9	eL	ZNE 06-33	
June 9	eL	ZNE 09-07	

Date 1941	Phase	Time (U.T.) h m s	Remarks
June 12	iL	ZNE 20-25-39.5	Local
June 12	iL	ZNE 20-32-45.0	Local
June 12	e	Z 21-53-56.5	
	e	Z 54-35	
	e	Z 49.5	
June 13	iP_2	ZNE 17-54-20	Series of six blasts at
	iS_2	ZNE 39	Δ = 147 km.
	iL	ZNE 44.5	H = 17-53-55.6
	iP_2	ZNE 17-55-59.5	H = 17-55-35.1
	iS_2	ZNE 56-17	
	iP_2	ZNE 17-56-50	H = 17-56-25.6
	iS_2	ZNE 57-08.2	
	iS_2	ZNE 17-57-47.5	
	iP_2	ZNE 17-59-13.7	H = 17-58-49.3
	iS_2	ZNE 30.5	
	iP_2	ZNE 18-00-40	H= 18-00-15.6
	iS_2	ZNE 58	
June 18	i	ZN 01-27-23.5	Deep focus
June 18	e	Z 04-28-57	
June 18	e(P)	Z 10-34-26	Probably Caribbean region.
	e(S)	Z 37-52	$\Delta = 18^{\circ}.7$
June 18	iP	ZNE 11-14-54	Compression southwest
	iS	NE 19-30	USCGS:H=11-09-06; epicenter
	eG	NE 20.0	at $51^{\circ}.5$ N, $32^{\circ}.0$ W
	eL_Q	NE 22	
	eL_R	ZNE 23	
June 20	eM	N 14-15-58.5	Blast
June 20	iP_1	ZNE 15-24-24.4	H=15-24-11.2; Δ=81 km.
	iS_1	ZNE 34.5	Blast
	eL	ZNE 38	
June 20	iP_1	NE 19-24-24.2	Local, blast?
	iS_1	NE 35.8	
	iL	NE 37.8	
June 21	i	ZNE 19-09-52.5	Z -, N -, E -.
	i	ZN 10-05.1	

Date 1941	Phase		Time (U.T.) h m s	Remarks
June 26	eP'	Z	12-11-00	USCGS:H=11-52.1; epicenter
	iP'	Z	06	at 13° N, 93° E
	ePP	ZNE	12-47	JSA:H=11-52-00; epicenter
	i	ZNE	13-01	at 9° N, 93° E
	eSKP	Z	15-04	
	e	E	20-40	
	ePKKS	Z	24-16	
	eL	ZNE	28	
June 27	i	NE	08-15-45	
June 27	e	Z	17-17-43	
	e	Z	19-58	
	eL	ZE	24	
June 29	eL	ZE	23-00	
June 30	e	Z	17-23.5	
	eL	ZE	27	

Cambridge, Massachusetts
October 3, 1942

L. Don Leet
Mary P. Collins

HARVARD UNIVERSITY

SEISMOGRAPH STATION

OAK RIDGE OBSERVATORY

Bulletin Number 17

July 1, 1941 through December 31, 1941 .

Paper No. 83, published under the auspices of the Committee on Experimental Geology and Geophysics and of the Division of Geological Sciences at Harvard University.

Constants of the station:

Latitude: 42° 30' 26" North

Longitude: 71° 33' 45" West

Altitude: 180 Meters

Mail address for the station:

Harvard Seismograph Station

Geological Museum

Cambridge, Massachusetts, U.S.A.

Time:

All determinations are reduced to Universal Time. Clock rated daily by time signals from Arlington, Virginia. Accurate within 0.1 second unless otherwise specified.

Instruments:

Three Benioff 112.7 kg. long and short period combinations, (one vertical, and two horizontal components oriented respectively north-south and east-west) with galvanometric registration and magnetic damping.

Normal Operating Constants

Instrument	To sec.	Tg sec.	e	Drum speed	Displacement for acceleration of 10^{-6} gravity
ZSP	1.0	0.2	20:1	60 mm/min	15 mm
NSP	1.0	0.2	20:1	60 mm/min	15 mm
ESP	1.0	0.2	20:1	60 mm/min	15 mm
ZLP	1.0	14.0	20:1	30 mm/min	12 mm
NLP	1.0	14.0	20:1	30 mm/min	12 mm
ELP	1.0	14.0	20:1	30 mm/min	12 mm

Displacements of the ground upward or toward the north or east are designated by +, down or toward the south or west by -.

Tables used:

For teleseisms, Jeffreys-Bullen 1939
For local earthquakes and blasts, Harvard travel times (Reference: Bulletin Seismological Society of America, Vol. 31, No. 4, October 1941).

Date	Phase	Time (UT)	Remarks
1941			
July 7	i	ZN 21-29-19	Local
	i	ZN 30-14	
	i	ZN 30-33.5	
July 8	i	ZNE 19-19-15	Local
July 8	i	ZNE 20-20-56	Local
	i	ZNE 21-16	
July 10	i	ZNE 09-39-41	
July 10	iP_1	ZNE 17-51-10	Local. Distance = 80 km.
	iS_1	ZNE 51-20	
	iL	ZNE 51-23	
July 11	eP	Z 01-23-55	S-P distance = $38^{\circ}3$
	ePP	Z 25-32	
	eS	NE 29-50	USC&GS: $5^{\circ}3$ N, $82^{\circ}7$ W, 0=01-16-33
	eL	ZNE 32.5	JSA: $5^{\circ}6$ N, $83^{\circ}1$ W, 0=01-16-35
July 11	e	ZN 23-12-43	
	e	ZN 13-05	
July 12	e	ZN 06-26-31	
	e	ZN 13-05	
July 13	eL	ZNE 15-20 ca	
July 13	eL	ZNE 16-21 ca	
July 16	eP	ZNE 03-20-32	USC&GS: $24^{\circ}3$ N, $109^{\circ}2$ W
	eS	ZNE 26-11	0=03-13-25
	e	ZNE 28.5	JSA: $24^{\circ}9$ N, $109^{\circ}0$ W
	eL	NE 31.5	0=03-13-30
July 16	i	ZNE 17-53-19.4	Local
	i	ZNE 53-20.0	
	i	ZNE 53-28.2	
	i	ZNE 53-31.4	
	iL	ZNE 53-34	
July 16	i	ZNE 19-50-50.8	Local. Similar to preceding
	i	ZNE 50-59.6	but larger
	iL	ZNE 51-05	
July 18	i	ZNE 18-00-36	Local
	i	ZNE 00-58	

Date 1941	Phase	Time (UT)	Remarks
July 18	i	ZNE 19-59-20.6	Local
	i	ZNE 59-29	
	i	ZNE 59-32.3	
July 18	i	ZNE 22-51-25	Local
	i	ZNE 51-35	
	i	ZNE 51-38	
July 19	e	Z 09-30-33	
	eL	ZNE 40 ca	
July 19	eL	ZNE 16-17 ca	
July 20	eL	ZNE 07-09 ca	
July 21	e	ZNE 14-03-04	Local
	eL	ZNE 03-06	
July 21	eL	ZNE 17-05 ca	
July 21	iP_1	ZE 20-39-20.6	Local. Distance = 95 km.
	iS_1	ZNE 39-32.6	
	iL	ZNE 39-35	
July 22	e	ZNE 06-47.5	
July 22	i	ZNE 14-37-09	Local
	i	ZNE 37-20.3	
	iL	ZNE 37-21.5	
July 22	i	ZNE 17-48-48	Local
	i	ZNE 48-58.5	
	i	ZNE 49-03	
July 23	eP	Z 01-24-33	JSA: $18^{\circ}.8$ N. $106^{\circ}.7$ W
	ePP	Z 26-17	0=01-17-26
	eS	E 30-35	
	eL	ZNE 40.5	
July 23	eL	ZNE 10-36 ca	
July 23	eP	Z 21-11-25	JSA: $14^{\circ}.3$ N, $93^{\circ}.2$ W
	eS	N 17-16	0=21-04-10
	eL	ZNE 20	
July 24	i	ZNE 16-59-47.7	Local
	i	ZNE 17-00-04.2	

Date 1941	Phase		Time (UT)	Remarks
July 26	ePP	ZN	20-30-43	JSA: 19°.1 N, 142°.5 E
	ePPP	Z	32-35	0=20-11-21
	e	Z	34-57	
	eSKS	Z	36-40	
	ePS	E	40-05	
	eL	ZNE	21-07	
July 28	i	ZNE	16-38-31.0	Local
	i	ZNE	38-34.0	
	i	ZNE	38-35.2	
July 29	i	ZNE	20-39-39.6	Local
	i	ZNE	39-50.5	
	i	ZNE	39-53.5	
July 30	iP	ZNE	02-00-13	Rarefaction
	ipP	ZE	00-23	
	ePP	ZNE	02-06	USC&GS: 60°.9 N, 149°.2 W
	eS	E	07-24	JSA: 60°.7 N, 149°.5 W
	eSS	E	10-19	
	eL	ZNE	11	
August 2	eP'	Z	12-00-23	USC&GS: 30°S, 178½°W
	ePP	Z	01-44	Depth probably 100 km.
	e	Z	03-10	JSA: 30°.3 S, 177°.8 W
	eSKS	Z	07-19	0=11-41-25
	e	Z	08-53	
	eL	Z	11	
August 4	iP	Z	11-04-04	USC&GS: 52°N, 176½°W
	eS	NE	13-00	Depth about 100 km.
	eL	ZE	26	JSA: 54°.3 N, 179°.2 E
				Depth = 75 km.
				0=10-53-17
August 4	i	Z	15-05-22	Local or blast
	iL	Z	05-23	
August 4	iP_1	Z	23-04-02.0	Local or blast. Distance = 80 km.
	iS_1	Z	04-12.0	
	iL	Z	04-16.5	
August 5	iP_1	ZNE	12-59-09.5	Local or blast. Distance = 75 km.
	iS_1	ZNE	59-19.5	
	iL	ZNE	59-23.5	
August 5	i	ZNE	19-42-34	

Date	Phase		Time (UT)	Remarks
1941				
August 5	eP	ZNE	20-49-27	Local. Distance = 80 km.
	eS	ZNE	49-37	
	iL	ZNE	49-41	
August 6	iP	Z	06-24-38	USC&GS: 55½°N, 160° W
	iS	NE	32-21	Depth probably 200 km.
	i	NE	32-55	JSA: 55°2 N, 161°1 W
	i	NE	33-21	Depth = 150 km.
	iScS	Z	34-15	0=06-15-14
	eSS?	NE	35-20	
August 10	e	Z	05-22.8	
	e	Z	27-24	
	e	Z	55.8	
August 15	iP	Z	06-17-38	USC&GS: 19° N, 27° W
	iS	NE	24-12	JSA: 20°1 N, 27°8 W
	eL	ZNE	37.6	Depth = 35 km.
Sept. 3	iP_1	ZNE	20-06-08.0	Local or blast. Distance = 104 km.
	i	Z	06-08.9	
	iS_1	Z	06-20.7	
	i	Z	06-21.1	
	i	Z	06-22.3	
Sept. 4	e	Z	10-41-38	JSA: 5°.7 S, 153°.9 E
	e	Z	41-42	Depth = 100 km.
	i	ZE	42-26	Felt at Rabaul, New Britain
	i	ZE	42-57	
	e	ZE	55	
	eL	ZNE	59	
Sept. 6	iS_1	ZNE	17-07-17.7	
	i	ZNE	07-27.8	
Sept. 6	iS_1	ZNE	17-34-48.5	
Sept. 6	i	ZNE	18-10-44.5	Local or blast
	i	ZNE	10-57.4	
	i	ZNE	11-02.7	
	i	ZNE	11-05.7	
Sept. 9	iP'	Z	07-38-42	USC&GS: 7° S, 153° E
	iPP	Z	40-32	0=07-19.6
	ePKS	Z	42-16	JSA: 5°0 S, 155°6 E
	ePPP?	Z	43-18	0=07-19-50
	e	Z	44-15	
	eSKS	ZE	45-43	Distance about 124°
	eL	ZE	08-19.5	

Date 1941	Phase		Time (UT)	Remarks
Sept. 10	i	Z	20-09-53	
Sept. 10	iP_1	ZNE	22-02-25.8	Local or blast. Distance = 22 km.
	iS_1	ZNE	02-28.5	
	iL	ZNE	02-29.9	
Sept. 12	eP'	Z	07-21-18	USC&GS: Near 2° N, 130° E
	ePP	ZN	23-41	JSA: Region of 14° N, 128° E
	ePKS	ZNE	24-48	
	ePPP?	Z	26-21	
Sept. 13	i	ZNE	01-30-38	Local
Sept. 13	iP	ZE	18-22-12	S-P distance = 39°3
	ePP	E	23-35	
	e	Z	25-48	USC&GS: 18°.7 N, 106°.9 W
	eS	ZNE	28-14	JSA: 19°.0 N, 106°.7 W
	e	ZNE	29-12	0=18-14-55
	eSS	ZNE	31-20	
	eL	ZNE	35	
Sept. 14	eL	ZNE	05-15 ca	
Sept. 14	e	ZE	17-02.0	
	eL	ZE	05 ca	
Sept. 14	e	Z	18-57-45	
	e	Z	58-17	
	eL	Z	19-01	
Sept. 16	eP'	Z	21-57-58	USC&GS: 28½° S, 178° W
	ePP	Z	59-35	0=21-39.1
	eSKS	Z	22-04-50	
	eSKKS	N	06-10	
	ePS	N	09-25	
	e	N	16-06	
	eL	ZN	37	
Sept. 17	e	Z	07-06-48	
	e	Z	06-57	
	i	Z	07-03	
	e	Z	08-10	
	i	ZN	10-03	
	i	N	11-49	
	i	Z	13-25	
	e	Z	13-48	
	e	NE	16-06	

Date 1941	Phase	Time (UT)	Remarks
Sept. 17	iP	ZNE 20-15-48.0	Local or blast. Distance = 83 km.
	iS	ZNE 15-48.5	
	iL	ZNE 16-03.0	
Sept. 17	e	ZNE 23-18-18	Local or blast
	e	ZNE 18-45	
Sept. 18	e	Z 02-26-36	
	eL	Z 03-11.5	
Sept. 18	iP	ZN 13-23-43.0	Distance = 56°7, depth about 100 km.
	ipP	ZN 24-08	
	i	Z 24-15	USC&GS: 13° S, 73° W
	iS	N 31-25	Depth about 100 km.
	e	ZN 31-43	JSA: 12°3 S, 72°5 W
	i	E 34-07	Depth 110 km.
	eL	ZNE 35	Considerable damage reported at Cuzco, Peru
Sept. 24	iP	ZNE 01-13-15	Distance = 77°5 0=01-01-16
	i	Z 13-26	USC&GS: 52° N, 158° E
	e	Z 14-03	0=01-01-01
	iS	NE 23-06	JSA: 50°0 N, 158°3 E
	eL	ZNE 35	Depth 100 km.
			0=01-01-27
Sept. 26	eP	ZNE 17-53-14	Local or blast
	eS	ZNE 53-34	
Sept. 28	i	ZNE 05-43-27	Deep focus
Oct. 1	eL	ZNE 20-11 ca	
Oct. 3	i	ZNE 02-49-49	
Oct. 3	iP	ZE 16-20-41	Felt in northern California
	i	Z 21-04	and Oregon. Some damage in
	iPP	ZE 22-08	Humboldt County, California
	iS	NE 26-49	USC&GS:) 40°6 N, 124°6 W
	e	E 27-37	JSA:) 0=16-13-12
	e	E 28-11	
	eSS	N 29-30	
	e	E 29-57	
	eSSS	NE 30-25	
	eL	E 32.5	
Oct. 3	e	ZNE 22-42-35.5	Felt in San Juan, Puerto Rico?
	e	ZNE 23-01-32	

Date	Phase	Time (UT)	Remarks
1941			
Oct. 4	iP	ZNE 17-20-05.5	Local. Distance = 105 km.
	iS	ZNE 20-18.4	
Oct. 5	eL	ZNE 12-01	
Oct. 6	iP	ZNE 05-20-57.5	Local. Distance = 44 km.
	iS	ZNE 21-03	
	iL	ZNE 21-07.5	
Oct. 6	eL	ZNE 07-21 ca	
Oct. 6	e	Z 16-36-44	
Oct. 6	eP	ZNE 21-12-58	Local or blast. Distance = 105 km.
	eS	ZNE 13-11	
	eL	ZNE 13-15	
Oct. 6	i	ZN 22-15-43.5	Local or blast
	i	ZN 15-46.0	
Oct. 8	eL	ZNE 04-37	
Oct. 8	eL	ZNE 06-24	
Oct. 9	i	ZNE 14-30-37	Local
Oct. 9	i	ZNE 21-26-56	
Oct. 10	i	ZNE 12-28-24.0	
	i	ZNE 28-30.4	
	i	ZNE 28-31.7	
Oct. 10	e	ZNE 17-03.6	
Oct. 11	iP_1	ZNE 08-15-42	Local. Distance = 59 km. 0=08-15-33
	lS_1	ZNE 15-49	
Oct. 12	e	ZNE 20-08-17	
	i	ZNE 09-49	
	e	ZNE 09-56	
Oct. 16	eL	ZNE 16-13	
Oct. 17	eP_2	ZNE 16-32-55	Local or blast. Distance = 170 km.
	eS_2	ZNE 33-16	
Oct. 21	i	ZNE 02-56-27	Local
	i	ZNE 56-41	

Date	Phase	Time (UT)	Remarks
1941			
Oct. 21	iS_1	ZNE 05-25-24	
Oct. 21	iP_1	ZNE 06-11-39.0	Local. Distance = 335 km.
	iS_1	NE 12-21.9	NESA: 44°.8 N, 74°.2 W
Oct. 21	i	ZNE 18-14-27	Local
Oct. 31	eL	ZNE 07-34	
Oct. 31	eL	ZNE 13-32	
Nov. 5	i	ZNE 15-47-14	Local
	i	ZNE 47-35	
Nov. 5	e	Z 17-57-44	
	i	Z 57-50	
	e	Z 59-25	
	eL	Z 18-16	
Nov. 6	iP'?	Z 07-25-11.5	
	iPP?	Z 28-29	
	eL	Z 08-10	
Nov. 6	eP	Z 12-39-33	USC&GS: 54° N, 163° W
	iS	E 47-22	JSA: 54°.5 N, 157°.8 W
	eL	ZE 57	S-P distance = 56°.2
Nov. 8-9	eP'	Z 23-56-39	Distance about 136°
	iP'	Z 56-47	JSA: 0°.7 N, 125°.0 E
	iPP	ZN 59-13	Depth = 120 km.
	i	ZNE 59-20	
	eSS	ZNE 00-17.0	
Nov. 12	e	Z 10-26-41	Destructive in Turkey
	eL	Z 43	
Nov. 14	eL	ZNE 09-01	Destructive in Los Angeles area
Nov. 16	iP	N 09-46-16	Distance = 33°.5. Depth about 80 km.
	ipP	N 46-34	USC&GS: 13½° N, 88° W
	ePP	ZN 47-28	JSA: 13°.2 N, 88°.5 W, depth 100 km.
	iS	N 51-30	
	eL	ZN 56	
Nov. 18	eP	ZNE 17-00-28	Complicated by strong microseism
	ePP	ZNE 04-40	storm. Surface waves very large.
	e	Z 07-24	
	e	Z 10-14	

Date	Phase	Time (UT)	Remarks
1941			
Nov. 24	eL	ZNE 22-40	
Nov. 25	iP	ZN 18-11-32.5	S-P distance = $40^{\circ}3$
	iS	N 17-38	USC&GS: $36\frac{1}{2}^{\circ}$ N, $19\frac{1}{2}^{\circ}$ W
Nov. 27	iP	ZNE 08-56-14	
Nov. 28	i	Z 19-30-45.0	
	i	Z 31-05.8	
Dec. 3	i	ZN 01-58-48	
Dec. 5	iP	ZNE 21-53-55.8	Damage reported in eastern Costa Rica & western Panama
	i	ZNE 54-03	USC&GS: 8° N, 83° W
	i	N 54-14	JSA: $9^{\circ}0$ N, $83^{\circ}2$ W
	i	N 54-49	
	iPP	ZNE 55-30	
	i	ZNE 57-40	S-P distance = 37° 0=21-46-48
	iS	ZNE 59-39	
	eL	ZNE 22-04	
Dec. 6	i	Z 01-31-51	
	eL	Z 40	
Dec. 6	iP	ZNE 21-31-40	USC&GS: 8° N, 83° W
	i	ZNE 32-14	JSA: $8^{\circ}7$ N, $84^{\circ}3$ W. Possibly somewhat deep
	i	ZNE 34-11	
	iS	NE 37-25	
	eL	ZNE 40	S-P distance = 37°
Dec. 8	eL	ZNE 08-00	
Dec. 12	eS_1	ZNE 23-30-25	
Dec. 16	eL	ZNE 19-16	
Dec. 17	i	Z 20-05-04.6	
	i	Z 05-16.8	
	i	Z 05-19.0	
Dec. 27	i	Z 18-25-55.0	