

KONINKLIJK  
NEDERLANDS METEOROLOGISCH INSTITUUT

No. 108

SEISMIC RECORDS  
AT DE BILT

36

1948

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TE VERKRIJGEN BIJ HET  
STAATSDRUKKERIJ-EN UITGEVERIJBEDRIJF  
'S-GRAVENHAGE

PRIJS F 1.00



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## INTRODUCTION

### SEISMOGRAPHIC STATION DE BILT

The geographic coordinates of the seismographic station are:  $52^{\circ} 6',1$  N and  $5^{\circ} 10',6$  E. The instruments are standing 3 m above mean sea-level on a subsoil consisting of sand (diluvial deposits).

The instruments are:

a set of seismographs (two horizontal and one vertical) with galvanometric recording according to GALITZIN,

one astatic horizontal seismograph according to WIECHERT,  $M = 200$  kg,

two horizontal pendulums according to BOSCH,  $M = 25$  kg.

THE GALITZIN SEISMOGRAPHS AT DE BILT. Below are given: the period of the galvanometer T1, the reduced length of pendulum l, the distance between the mirror of the galvanometer and the recording paper A1, and the rough values for the natural period of the undamped pendulum T, of the damping constant  $\mu$  and of the multiplying factor k for the year 1948.

	NS comp.	EW comp.	Z comp.
Period of galvanometer T1	24,43 sec	24,96 sec	12,0 sec
Reduced length of pendulum l	123 mm	123 mm	406 mm
Distance A1	1380 mm	1380 mm	1380 mm
Period of pendulum T	25 sec	25 sec	12 sec
Damping constant $\mu$	0,0	0,0	0,0
Multiplying factor k	11,0	11,0	175

THE WIECHERT AND BOSCH SEISMOGRAPHS AT DE BILT. The mean values of the natural period of the undamped pendulum T, of the damping ratio  $\varepsilon$  and of the static magnification V are for the year 1948:

	T	$\varepsilon$	V
WIECHERT (NS comp.)	5,0 sec	4	160
„ (EW comp.)	5,0 sec	4	170
BOSCH (NS comp.)	18,0 sec	4	20
„ (EW comp.)	18,0 sec	4	20

## PREFACE

This seismic Yearbook was composed under the supervision of Dr. J. Veldkamp, director of the Geophysical Section. The records have been reduced by Mr J. Oldeman, scientific assistant.

*The Director in Chief of the Royal  
Netherlands Meteorological Institute,*

*Ir. C. J. Warners.*

DE BILT, October 1952.

## SEISMOGRAPHIC STATION HEERLEN

The geographic coordinates of the seismographic station are: 50° 53',0 N and 5° 59',0 E.

The instrument, a horizontal seismograph, M = 450 kg, is standing 100 m above mean sea-level on a subsoil consisting of loess.

The mean values of the constants are for the year 1948:

T	$\epsilon$	V	V max.	T max.
2	3	400	600	2

## EXPLANATION OF THE TABLES

The data given in this Yearbook have been obtained from the GALITZIN records in general. The velocity of the recording paper is 30 mm per minute, allowing a good time-accuracy. Only when the earthquake was extraordinarily strong, so that the GALITZIN records could not be disentangled, the records of the seismographs WIECHERT and BOSCH were used. The velocity of the paper of these seismographs is 10 mm and 15 mm per minute respectively. When the WIECHERT and BOSCH records were used, this has been mentioned in the column "remarks".

The data from the seismograph at Heerlen are mentioned in a few cases.

The time is Greenwich mean time, from midnight till midnight counted as 0 till 24 hours. In the column "direction" + means an upward movement of the soil (compression), - means a downward movement (dilatation). Uncertain data have been given in parentheses. The subjoined symbols were used for the phases.

- P = normal first phase, or first longitudinal tremor.  
 pP = P-wave one time reflected at the earth's surface near the epicenter.  
 PP = P-wave reflected halfway between epicenter and station.  
 PPP = P-wave two times reflected at the earth's surface.  
 PPPP = P-wave three times reflected.  
 S = second phase, arrival of the transversal tremor.  
 sS = S-wave reflected at the earth's surface near the epicenter.  
 PS = wave changed from longitudinal to transversal oscillation through reflection at the earth's surface.  
 PPS = wave twice reflected, having been transversal on one branch of the path.  
 SS = S-wave reflected halfway between epicenter and station.  
 SSS = S-wave two times reflected at the earth's surface.

- SSSS = S-wave three times reflected at the earth's surface.  
 PcP = P-wave reflected at the core boundary.  
 ScS = S-wave reflected at the core boundary.  
 P' = PKP = wave having penetrated the core.  
 S' = SKS = transversal wave, having been longitudinal within the core.  
 PKS = alternating wave having penetrated the core.  
 pP' = P'-wave reflected near the epicenter.  
 sS' = S'-wave reflected near the epicenter.  
 SKKS = alternating wave which has been reflected within the core.  
 L = long waves or surface waves.  
 M = maximum of the surface waves.  
 L' = surface waves travelling around the major arc.  
 M' = maximum of these waves.  
 i = sudden beginning of the phase.  
 e = gradual beginning of the phase.  
 F = end of discernable movement.  
 H. = time of the shock at point of origin.  
 h = depth of the origin.  
 $\Delta$  = distance of epicenter.

The indices H, N, E, and Z refer to the horizontal, north-south, east-west and vertical components of the movement.

The distance of epicenter and the depth of origin have been calculated by means of curves constructed with the aid of the time tables of Jeffreys and Bullen (1940).

The data given in the column "amplitude" are the maximal amplitudes measured from the medium line. The amplitudes have been calculated by means of the formula:

$$V = \frac{A_1 k T_b}{\pi l} \cdot \frac{1}{\left\{1 + \left(\frac{T_b}{T}\right)^2\right\}}$$

Here  $A_1$  is the distance between galvanometer mirror and recording paper,  $k$  is the multiplying factor,  $T_b$  the period of the wave,  $l$  the reduced length of the pendulum,  $T$  the free period of the undamped seismograph, and  $V$  the magnification. The period of the galvanometer is assumed to be equal to the free period of the undamped seismograph.

For the horizontal components of the Galitzin records the following mean values were used:  $k = 11,0$  and  $T = 24,5$  sec.

For the vertical component of the Galitzin records they were:  $k = 175$  and  $T = 12,0$  sec.

It was tried to give the amplitudes and periods of the first P- and S-waves. As the movement of these waves is irregular in general, the accuracy of these data is small. The amplitudes of the maxima of L-waves have been calculated in cases of very strong earthquakes.

The amplitudes have been omitted when the oscillations were very irregular.

The seismological bulletins of the following stations were available: Alicante, Almeria, Batavia, BCIS (Bureau Central International Seismologique), Beograd, Bogota, Bucarest, Budapest, Firenze, Granada, Graz, Helsinki, Helwan, Istanbul, John Carroll University (Cleveland), JSA (Jesuit Seismological Association), Kew, Ksara, La Paz, La Plata, Oak Ridge Observatory of the Harvard University, Ottawa, Paris, Pasadena, Perth, Pittsburgh, Poona, Praha, Prato, Reykjavik, Riverview N.S.W., Roma, Stuttgart, Tamanrasset, Toledo, Trieste, Uccle, Uppsala, URSS (Russia), USCGS (United States Coast and Geodetic Survey), Wellington (New Zealand), Western Samoa, Zürich.

#### THE MICROSEISMIC ACTIVITY

The table on page VII gives the character of the microseismic activity (see also 1915 p. 101 and 1916 p. 101). The employed numbers 0, 1, 2 and 3 mean:

- 0 very weak and weak
- 1 moderate
- 2 strong
- 3 very strong

For measuring the microseismic activity the records of the GALITZIN seismograph were employed. In the table below the amplitudes of the oscillations (measured from the medium line) and the corresponding amplitudes of the movement of the soil are given.

Character	Ampl. record	Ampl. soil
0	0— $\frac{1}{2}$ mm	0— $1\frac{1}{4}$ $\mu$
1	$\frac{1}{2}$ —2 "	$1\frac{1}{4}$ —5 "
2	2—4 "	5—10 "
3	>4 "	>10 "

#### CHARACTER OF THE MICROSEISMIC MOVEMENT

Date 1948	Jan.	Febr.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1	1,3	2	0,1	2,3	0	0	1	0	1,0	0,1	1	1,2
2	3,2	2,3,2	1	3,2	0	0,1	1,0	0	0,1	1	1,0,1	2,3
3	2	2,3,2	1	2	0	1,2,1	0	0	1,2,1	1	1,2	3
4	2	2,3,2	1	2,1	0	1	0	0	1,0	1,0	2,3	3
5	2,3	2	1	1	0	1,2	0,1,0	0	0,1	0	3	3
6	3,2	2,3,2	1	1,0,1	0	2,1	0,1,0	0	1	0,1	3,2	3,2
7	2	2,1	1,2	1,2	0	1	0	0,1	1,2	1,0	2,1	2
8	2,3	1,2	2,3	2	0	1,0	0,1	1,3,1	2,1	0,1	1,2	2
9	3,2,3	2,3,2	3,2	2,1	0	0	1,0	1,0	1,0	1	2,3	2,1
10	3,2	2,1	2	1,0	0	0	0	0	0	1	3	1,2
11	2,3	1	2,1	0,1,0	0	0	0,1	0	0	1	3,2	2,3
12	3	1,2,1	1	0,1,0	0	0	1	0,1	0,1	1	2,1	3,2
13	3	1	1	0	0,1	0	1,0	1	1,0	1	1,0	2
14	3,2	1	1,0	0	1	0	0	1,0	0,1	1	0	2
15	2,1	1	0,1	0	1	0	0	0,1	1,0,1	1	0,1	2
16	1	1	1,2	0	1	0	0	1,0	1	1	1,2	2
17	1,2	1	2,3,2	0	1,0	0,1,0	0	0	1,2	1,2	2,3,2	2
18	2,3	1,2,1	2	0	0	0	0	0	2,1	2	2	2
19	3,2	1,2	2,3	0	0	0	0,1	0,1	1	2,1	2,3	2,1
20	2,3,2	2,1	3	0	0,1	0,1	1,0,1	1	1	1	3,2	1,2
21	2,1	1,2,1	3,2	0	1,0,1	1,0	1	1,2	1	1	2,1	2,1
22	1,2,1	1,2,1	2,1	0	1,0	0	1,2,1	2	1,0	1,3,2	1,2	1,2
23	1,2,1	1,2,1	1	0,1,0	0,1	0	1,0	2,1	0	2,1	2	2,1
24	1,2,1	1,0	1	0,1	1,2,1	0	0	1	0	1	2,1	1
25	1,2	0,1	1	1,0	1,0	0	0,1	1,2,1	0	1,2,1	1	1
26	2,3	1,2,1	1	0	0,1	0	1	1,2,1	0,1	1	1	1,2
27	3,2,1	1,2,1	1	0,1	1,0	0,1	1	1,0	1,2,3	1,2	1	2
28	1,2,1	1,0	1	1,2,1	0	1	1	0,1,0	3	2,1	1	2,3
29	1,2	0	1	1	0	1	1,0	0,1,0	3,2,1	1,2	1	3
30	2		1	1,0	0	1,0,1	0	0,1	1,0	2,1	1	3
31	2		1,2		0		0	1		1		3

Date 1948	Phase	Time			Direction	Period	Amplitude	Remarks
		h	m	s				
Jan. 1 (1)	eL F	6	55			s	(1) Disturbed by microseisms.	
Jan. 4 (2)	iPKP ipPKP iz F	9	15	19	(+)		(2) Disturbed by strong microseisms. Tonga Islands region. BCIS: 20° $\frac{1}{4}$ S 178° $\frac{1}{4}$ W, H. 8 <sup>h</sup> 56 <sup>m</sup> 38 <sup>s</sup> , h = 600 km. USCGS: 21° S 180° W, H. 8 <sup>h</sup> 56,5 <sup>m</sup> , h = 600 km. JSA: 21° $\frac{3}{4}$ S 178° $\frac{5}{8}$ W, H. 8 <sup>h</sup> 56 <sup>m</sup> 40 <sup>s</sup> , h = 600 km.	
Jan. 5 (3)	eH F	23	40				(3) Disturbed by strong microseisms.	
Jan. 6 (4)	iP (iz iPP eS ePS (eH eSS eL F	17	35	59	+		(4) Disturbed by microseisms. USCGS: 16° $\frac{5}{8}$ N 98° W, H. 17 <sup>h</sup> 23,4 <sup>m</sup> . JSA: 16° $\frac{9}{16}$ N 98° $\frac{8}{16}$ W, H. 17 <sup>h</sup> 23 <sup>m</sup> 26 <sup>s</sup> , h = about 60 km. Tacubaya: 16°10' N 98°00' W. Felt in States of Guerrero and Oaxaca (Mexico).	
Jan. 10 (5)	eL F	6	28				(5) Disturbed by strong microseisms. BCIS: 20° S 173° $\frac{1}{4}$ E, H. 5 <sup>h</sup> 14,9 <sup>m</sup> . USCGS: 20° S 169° E, H. 5 <sup>h</sup> 14,5 <sup>m</sup> . JSA: 19° $\frac{6}{10}$ S 170° $\frac{3}{10}$ E, H. 5 <sup>h</sup> 14 <sup>m</sup> 45 <sup>s</sup> . New Hebrides Islands region.	
Jan. 16 (6)	eP eS eSS eL F	11	20	25			(6) Disturbed by microseisms. BCIS: 53° N 176° E, H. 11 <sup>h</sup> 08,7 <sup>m</sup> , h = 100 km. USCGS: 52° N 172° E, H. 11 <sup>h</sup> 08,5 <sup>m</sup> , h = 100 km. JSA: 52° $\frac{5}{10}$ N 177° $\frac{7}{10}$ E, H. 11 <sup>h</sup> 09 <sup>m</sup> 00 <sup>s</sup> , h = 100 km. Aleutian Islands.	
Jan. 16 (7)	eL F	22	38				(7) Disturbed by microseisms.	
Jan. 17 (8)	eS eL F	2	33,8				(8) Disturbed by microseisms. Trieste: 38° $\frac{5}{10}$ N 21° E, H. 2 <sup>h</sup> 26 <sup>m</sup> 13 <sup>s</sup> . Ionian Is.	
Jan. 17 (9)	ePP ePKS eS eSS eL F	7	29	34	+		(9) Disturbed by microseisms. BCIS and USCGS: 15° N 147° E, H. 7 <sup>h</sup> 11,3 <sup>m</sup> , h = 100 km. JSA: 14° N 152° E, H. 7 <sup>h</sup> 11,5 <sup>m</sup> , probably deep. Marianas Islands region.	
Jan. 20 (10)	eL F	11	10				(10) Disturbed by very strong microseisms. USCGS: 33° S 179° E, H. 9 <sup>h</sup> 44,0 <sup>m</sup> . JSA: 34° $\frac{0}{10}$ S 178° $\frac{3}{10}$ W, H. 9 <sup>h</sup> 44 <sup>m</sup> 08 <sup>s</sup> . Wellington: 34° $\frac{1}{10}$ S 117° $\frac{1}{10}$ E, H. 9 <sup>h</sup> 44 $\frac{1}{10}$ <sup>m</sup> . Kermadec Islands region.	

## SEISMIC RECORDS AT DE BILT

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
		h m s		s	$\mu$	
Jan. 22 (11)	iPKP eSS F	14 15 01 14 38,7 15 30	+			(11) Disturbed by strong microseisms. BCIS: $22^{\circ} \frac{1}{2}$ S $177^{\circ}$ W, H. $13^{\text{h}}55,3^{\text{m}}$ , h = 150 km. USCGS: $22^{\circ}$ S $175^{\circ}$ W, H. $13^{\text{h}}55,3^{\text{m}}$ , h = 150 km. JSA: $22^{\circ},8$ S $177^{\circ},1$ W, H. $13^{\text{h}}55^{\text{m}}23^{\text{s}}$ , h = 150 km. Tonga Islands region.
Jan. 22 (12)	eL F	21 00 21 30				(12) Disturbed by strong microseisms.
Jan. 24 (13)	iP iSKS iPS eSS eL M F	18 00 17 18 10 40 18 12 38 18 18 33 18 30,5 18 40 23 00	+		26 >1000	(13) Disturbed by microseisms. BCIS: $9^{\circ},5$ N $122^{\circ},1$ E, H. $17^{\text{h}}46^{\text{m}}37^{\text{s}}$ . USCGS: $10^{\circ}$ N $122^{\circ}$ E, H. $17^{\text{h}}46,6^{\text{m}}$ . JSA: $10^{\circ},8$ N $121^{\circ},9$ E, H. $17^{\text{h}}46^{\text{m}}46^{\text{s}}$ . Southwest coast of Panay (Philippines). Damage at Iloilo and Jaro.
Jan. 25 (14)	eL F	6 47 7 30				(14) Disturbed by microseisms.
Jan. 26 (15)	eL F	14 56 16 00				(15) Disturbed by very strong microseisms. USCGS: aftershock of (13), H. $14^{\text{h}}10,8^{\text{m}}$ . JSA: $10,8$ N $121,9$ E, H. $14^{\text{h}}10^{\text{m}}43^{\text{s}}$ .
Jan. 27 (16)	iPKP iPP F	12 17 07 12 20 35 13 40	-			(16) Disturbed by very strong microseisms. BCIS: aftershock of (2), H. $11^{\text{h}}58,6^{\text{m}}$ . USCGS: $20^{\circ}$ S $178^{\circ}$ W, H. $11^{\text{h}}58,3^{\text{m}}$ , h = 600 km. JSA: $20^{\circ},3$ S $178^{\circ},4$ W, H. $11^{\text{h}}58^{\text{m}}26^{\text{s}}$ , h = 600 km. Tonga Islands region.
Jan. 28 (17)	eSS eL F	4 21 4 40 5 30				(17) Disturbed by strong microseisms. BCIS: $1^{\circ} \frac{1}{2}$ N $127^{\circ}$ E, H. $3^{\text{h}}47,3^{\text{m}}$ . Moluccas. JSA: $2^{\circ}$ N $127^{\circ}$ E, H. $3^{\text{h}}47^{\text{m}}26^{\text{s}}$ , h = about 100 km. USCGS: aftershock of (13), H. $3^{\text{h}}47,2^{\text{m}}$ . No records from Jan. 28 $7^{\text{h}}40^{\text{m}}$ till Jan. 29 $8^{\text{h}}15^{\text{m}}$ .
Jan. 30 (18)	iP ePP eS eSS eSSS eL F	8 52 58 8 55 00 9 00 15 9 04,0 9 06,3 9 10 11 00	+			(18) Disturbed by strong microseisms. BCIS: $25^{\circ}$ N $65^{\circ}$ E, H. $8^{\text{h}}43,8^{\text{m}}$ . USCGS: $24^{\circ}$ N $64^{\circ}$ E, H. $8^{\text{h}}43,6^{\text{m}}$ . JSA: $25^{\circ},0$ N $59^{\circ},1$ E, H. $8^{\text{h}}44^{\text{m}}06^{\text{s}}$ . Arabian Sea, off coast of Baluchistan.
Febr. 4 (19)	eL F	5 25 5 35				(19) Disturbed by very strong microseisms.
Febr. 6 (20)	eL F	23 07 23 50				(20) Disturbed by very strong microseisms.

## SEISMIC RECORDS AT DE BILT

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
		h m s		s	$\mu$	
Febr. 9 (21)	iP eS eL ME F	13 03 20 13 07 27 13 10 13 12 16 30	+		12 1000	(21) Disturbed by very strong microseisms. Roma: $33^{\circ},7$ N $25^{\circ},2$ E. Trieste: $35^{\circ},3$ N $27^{\circ},5$ E, H. $12^{\text{h}}58^{\text{m}}14^{\text{s}}$ . Praha: $35^{\circ},3$ N $26^{\circ},1$ E. BCIS: $35^{\circ},5$ N $27^{\circ},2$ E, H. $12^{\text{h}}58^{\text{m}}13^{\text{s}}$ . JSA: $35^{\circ},8$ N $27^{\circ},3$ E, H. $12^{\text{h}}58^{\text{m}}23^{\text{s}}$ . Damage at Karpathos (Dodecanese).
Febr. 10 (22)	eL F	16 11 16 20				(22) Disturbed by microseisms. BCIS: aftershock of (21), H. $15^{\text{h}}58^{\text{m}}50^{\text{s}}$ .
Febr. 10 (23)	e F	19 51 20 10				(23) Disturbed by microseisms. BCIS: H. $18^{\text{h}}17,7^{\text{m}}$ . Epicenter probably south of Macquarie Isl.
Febr. 11 (24)	eL F	16 08 16 50				(24) Disturbed by microseisms. USCGS: $64^{\circ}$ N $147^{\circ}$ W, H. $15^{\text{h}}41,9^{\text{m}}$ . JSA: $63^{\circ},5$ N $146^{\circ},0$ W, H. $15^{\text{h}}41^{\text{m}}57^{\text{s}}$ . Central Alaska.
Febr. 12 (25)	eL F	22 39 22 50				(25) Disturbed by microseisms. BCIS: aftershock of (21), H. $22^{\text{h}}27,1^{\text{m}}$ .
Febr. 13 (26)	eS eSS eL F	5 14,3 5 18 5 23 6 30				(26) Disturbed by very strong microseisms. BCIS: $35^{\circ} \frac{1}{2}$ N $82^{\circ}$ E, H. $4^{\text{h}}56^{\text{m}}58^{\text{s}}$ . Trieste: $45^{\circ}$ N, $90^{\circ}$ E, H. $4^{\text{h}}57,0^{\text{m}}$ . Roma: $42^{\circ},5$ N $82^{\circ},2$ E. Northwest Tibet.
Febr. 14 (27)	eH eL F	22 31 22 40 23 15				(27) Disturbed by strong microseisms. USCGS: $9^{\circ}$ S $78^{\circ}$ W, H. $22^{\text{h}}00,5^{\text{m}}$ . JSA: $8^{\circ},2$ S $76^{\circ},8$ W, H. $22^{\text{h}}00^{\text{m}}37^{\text{s}}$ . Western Peru.
Febr. 15 (28)	e F	15 50 16 05				
Febr. 16 (29)	eL F	18 06 18 30				
Febr. 17 (30)	e F	2 05 2 40				(30) Epicenter probably south of Tasmania.
Febr. 18 (31)	eL F	2 25 3 00				
Febr. 18 (32)	iP iz iPP iPcP iz eS eL F	20 36 20 20 36 48 20 37 26 20 39 20 20 39 46 20 41 35 20 45 22 00	+			(32) Disturbed by microseisms. BCIS: $82^{\circ},3$ N $41^{\circ}$ E, H. $20^{\text{h}}29^{\text{m}}48^{\text{s}}$ . USCGS: $82^{\circ}$ N $43^{\circ}$ E, H. $20^{\text{h}}29,8^{\text{m}}$ . JSA: $82^{\circ},2$ N $40^{\circ}$ E, H. $20^{\text{h}}29^{\text{m}}54^{\text{s}}$ . Northwest of Franz Josef Isl.

## SEISMIC RECORDS AT DE BILT

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks		
							h	m
Febr. 23 (33)	ePP	9 46 20				(33) BCIS: 6° S 150° $\frac{1}{2}$ E, H. 9 <sup>h</sup> 25,6 <sup>m</sup> . Bismarck Archipelago.		
	ePPP	9 49,0						
	ePPS	9 58,0						
	eL	10 22						
	eL'	11 10						
	F	12 00						
Febr. 24 (34)	e	9 00				(34) JSA: 32° $\frac{1}{2}$ N 118° $\frac{1}{2}$ W. Pasadena: H. 8 <sup>h</sup> 15 <sup>m</sup> 10 <sup>s</sup> .		
	F	9 30						
Febr. 24 (35)	e	22 12						
	F	22 20						
Febr. 27 (36)	eL	3 03				(36) Disturbed by microseisms.		
	F	3 15						
Febr. 28 (37)	iP	2 09 15	+			(37) USCGS: 53° $\frac{1}{2}$ N 133° W, H. 1 <sup>h</sup> 58,1 <sup>m</sup> . JSA: 53° $\frac{1}{2}$ N 133° $\frac{1}{2}$ W, H. 1 <sup>h</sup> 58 <sup>m</sup> 05 <sup>s</sup> . Region of Queen Charlotte Islands.		
	iPcP	2 09 48						
	ePP	2 11 48						
	ePPP	2 13 30						
	eS	2 18 26						
	eSS	2 23,0						
	eSSS	2 26,3						
	eL	2 31						
	F	3 40						
	Febr. 28 (38)	eL		12 41				
F		13 10						
March 1 (39)	iP	1 27 03				(39) BCIS: 4° $\frac{1}{4}$ S 127° $\frac{1}{2}$ E, H. 1 <sup>h</sup> 12 <sup>m</sup> 28 <sup>s</sup> . USCGS: 3° S 130° $\frac{1}{2}$ E, H. 1 <sup>h</sup> 12,7 <sup>m</sup> . JSA: 4° $\frac{1}{2}$ S 127° E, H. 1 <sup>h</sup> 12 <sup>m</sup> 36 <sup>s</sup> . Moluccas.		
	ePKP	1 30 52						
	ePP	1 31 42						
	ePPP	1 34 04						
	eSKS	1 37 43						
	ePS	1 41,1						
	eL	2 07						
	F	6 00						
March 2 (40)	e	9 01				(40) BCIS: Atlantic Ocean.		
	F	9 14						
March 3 (41)	iP	9 22 50	+	4	3	(41) BCIS: 18° $\frac{1}{2}$ N 118° $\frac{3}{4}$ E, H. 9 <sup>h</sup> 9 <sup>m</sup> 52 <sup>s</sup> . USCGS: 18° N 119° E, H. 9 <sup>h</sup> 9,9 <sup>m</sup> . JSA: 18° $\frac{1}{2}$ N 118° $\frac{1}{2}$ E, H. 9 <sup>h</sup> 9 <sup>m</sup> 58 <sup>s</sup> . Northwest of Luzon.		
	iPP	9 26 20						
	iPPP	9 28 20						
	iSKS	9 33 22						
	eS	9 33 38						
	eSS	9 39,6						
	eL	9 50						
	F	12 00						

## SEISMIC RECORDS AT DE BILT

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
March 4 (42)	eP	2 06 12				(42) USCGS: 10° S 75° W, H. 1 <sup>h</sup> 53,1 <sup>m</sup> . JSA: 10° $\frac{3}{4}$ S 74° $\frac{1}{2}$ W, H. 1 <sup>h</sup> 53 <sup>m</sup> 06 <sup>s</sup> .
	e(SKS)	2 16,8				
	eL	2 32				
	F	3 15				
March 4 (43)	eH	15 05				(43) Istanbul: Aegean Sea.
	F	15 15				
March 4 (44)	e	17 52				(44) Istanbul: aftershock of (43).
	F	18 00				
March 4 (45)	e	23 44				
	F	24 05				
March 5 (46)	e	9 24				
	F	9 30				
March 6 (47)	iP	20 17 57				(47) BCIS: 35° $\frac{1}{2}$ N 26° $\frac{1}{2}$ E, H. 20 <sup>h</sup> 12 <sup>m</sup> 50 <sup>s</sup> . Trieste: 36° $\frac{1}{2}$ N 29,1 E, H. 20 <sup>h</sup> 12,8 <sup>m</sup> , h=about 100 km. East Crete.
	eS	20 21 56				
	eL	20 24				
	F	20 50				
March 7 (48)	e	6 12				
	F	6 40				
March 7 (49)	eP	19 01 47				(49) Disturbed by microseisms. BCIS and USCGS: 54° N 161° E, H. 18 <sup>h</sup> 50,2 <sup>m</sup> . JSA: 51° $\frac{1}{4}$ N 159° $\frac{1}{8}$ E, H. 18 <sup>h</sup> 50 <sup>m</sup> 23 <sup>s</sup> , h=about 150 km. off East Coast of Kamchatka.
	eS	19 11 16				
	eL	19 26				
	F	20 30				
March 8 (50)	e	16 45				(50) Disturbed by very strong microseisms. BCIS and USCGS: 6° S 157° E, H. 16 <sup>h</sup> 07,9 <sup>m</sup> . JSA: 5° $\frac{1}{2}$ S 150° $\frac{1}{2}$ E, H. 16 <sup>h</sup> 07 <sup>m</sup> 38 <sup>s</sup> . Solomon Islands region.
	eL	17 10				
	F	18 00				
March 9 (51)	(ePP	18 08)				(51) Disturbed by very strong microseisms. BCIS and USCGS: 3° S 147° E, H. 18 <sup>h</sup> 48,0 <sup>m</sup> . JSA: 3° S 145° $\frac{1}{2}$ E, H. 18 <sup>h</sup> 47 <sup>m</sup> 47 <sup>s</sup> . off Northeast Coast of New Guinea.
	ePS	19 18,0				
	eSS	19 25,0				
	eSSS	19 29,4				
	eH	19 37,5				
	eL	19 44				
	F	21 15				
March 9 (52)	eE	23 04				(52) Disturbed by very strong microseisms.
	F	23 10				
March 10 (53)	eSSS	12 13,5				(53) Disturbed by very strong microseisms. BCIS: 21° S 174° E, H. 11 <sup>h</sup> 25,5 <sup>m</sup> . USCGS: 29° S 177° E, H. 11 <sup>h</sup> 25,3 <sup>m</sup> . JSA: 21° $\frac{1}{2}$ S 173° $\frac{1}{2}$ E, H. 11 <sup>h</sup> 25 <sup>m</sup> 33 <sup>s</sup> . Kermadec Islands region.
	eL	12 37				
	F	14 00				



Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
		h m s		s	$\mu$	
March 10 (54)	eL F	21 04 21 30				(54) Disturbed by very strong microseisms. BCIS: probable epicenter: Moluccas.
March 12 (55)	eL F	21 05 21 30				(55) BCIS: 16° S 75° W. La Paz: H. 20 <sup>h</sup> 17 <sup>m</sup> 54 <sup>s</sup> . Off coast of Peru, foreshock of (59).
March 13 (56)	eH eS eL F	8 11 8 14,2 8 16,5 8 25				(56) Disturbed by microseisms. BCIS: 33° N 0°, 1 E, H. 8 <sup>h</sup> 06 <sup>m</sup> 00 <sup>s</sup> , Mts des Ksours (Algeria). Alicante: 34° N 0° E. Trieste: 34°, 1 N 1°, 3 W, H. 8 <sup>h</sup> 06 <sup>m</sup> 07 <sup>s</sup> .
March 13 (57)	eP iPP iz iPS (iPPS) eSS eL F	20 16 54 20 21 26 20 21 54 20 30 28 20 31 25) 20 36 20 54 23 00				(57) Disturbed by microseisms. BCIS: 1° N 126° E, H. 20 <sup>h</sup> 02 <sup>m</sup> 28 <sup>s</sup> , Molucca Passage. USCGS: 1° N 126° E, H. 20 <sup>h</sup> 02 <sup>m</sup> 5 <sup>s</sup> . JSA: 1°, 2 N 125°, 5 E, H. 20 <sup>h</sup> 02 <sup>m</sup> 30 <sup>s</sup> .
March 14 (58)	e F	21 43 22 05				No records from March 13 23 <sup>h</sup> till March 14 4 <sup>h</sup> .
March 14 (59)	eP eS ePPS eL F	22 09,8 22 21,0 22 23,0 22 42 23 15				(59) USCGS: 17° S 75° W, H. 21 <sup>h</sup> 56,7 <sup>m</sup> , Peru. JSA: 15°, 5 S 74°, 1 W, H. 21 <sup>h</sup> 57 <sup>m</sup> 00 <sup>s</sup> .
March 15 (60)	eL F	2 20 2 50				
March 15 (61)	eP eS eL F	11 36,5 11 47,0 12 07 13 00				(61) USCGS: 40° N 140° E, H. 11 <sup>h</sup> 24,1 <sup>m</sup> , Honshu (Japan). JSA: 37°, 8 N 139°, 2 E, H. 11 <sup>h</sup> 24 <sup>m</sup> 00 <sup>s</sup> .
March 15 (62)	ez F	21 57 22 03				
March 16 (63)	ez eL F	3 04,5 3 25 4 10				(63) Disturbed by microseisms. BCIS: aftershock of (41), H. 2 <sup>h</sup> 40,6 <sup>m</sup> .
March 16 (64)	eL F	18 13 19 00				(64) Disturbed by strong microseisms. BCIS: aftershock of (53), 21° S 174° E, H. 16 <sup>h</sup> 57,8 <sup>m</sup> .
March 17 (65)	eL F	20 35 21 10				(65) BCIS and USCGS: 16° N 146° E, H. 19 <sup>h</sup> 41,6 <sup>m</sup> , deeper than normal. JSA: 15°, 0 N 148°, 2 E, H. 19 <sup>h</sup> 41 <sup>m</sup> 51 <sup>s</sup> , h = 100 km. No records from March 21 19 <sup>h</sup> 30 <sup>m</sup> till March 22 8 <sup>h</sup> 12 <sup>m</sup> .

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
		h m s		s	$\mu$	
March 22 (66)	eH eSSS eL F	21 57 22 03,0 22 10 23 00				(66) USCGS: 11° $\frac{1}{2}$ N 86° $\frac{1}{2}$ W, H. 21 <sup>h</sup> 34,5 <sup>m</sup> , off coast of Nicaragua.
March 23 (67)	eL F	0 18 0 50				(67) USCGS: aftershock of (66) H. 23 <sup>h</sup> 41,2 <sup>m</sup> . JSA: H. 23 <sup>h</sup> 41 <sup>m</sup> 14 <sup>s</sup> .
March 23 (68)	iP iPP epPP ez eS ePS esS eSS eL F	18 22 48 18 25 39 18 26,5 18 28 38 18 32 08 18 33 08 18 33 35 18 38 11 18 45 19 30	— (—)			(68) USCGS: 51° N 155° E, H. 18 <sup>h</sup> 11,6 <sup>m</sup> , h = about 200 km. JSA: 50°, 4 N 153°, 6 E, H. 18 <sup>h</sup> 11 <sup>m</sup> 35 <sup>s</sup> , h = about 200 km. Trieste: 50°, 3 N 152°, 7 E, H. 18 <sup>h</sup> 11,4 <sup>m</sup> , h = about 200 km Off southern coast of Kamchatka.
March 23 (69)	e F	21 39 22 00				
March 24 (70)	e F	0 17 0 25				
March 24 (71)	eL F	4 08 4 30				(71) South America.
March 24 (72)	iP iPPP eSKS ePS eSS eL F	5 33 28 5 39 48 5 44 00 5 45 00 5 52,5 6 05 8 20				(72) BCIS: 6° S 106° E, H. 5 <sup>h</sup> 19,6 <sup>m</sup> , South of Sumatra. USCGS: 6° S 104° E, H. 5 <sup>h</sup> 19,5 <sup>m</sup> . JSA: 7°, 2 S 104°, 9 E, H. 5 <sup>h</sup> 19 <sup>m</sup> 44 <sup>s</sup> , h = about 100 km.
March 24 (73)	eL F	22 42 23 00				(73) Uccle: H. 22 <sup>h</sup> 31 <sup>m</sup> 13 <sup>s</sup> . Atlantic Ocean?
March 26 (74)	ez eH e eL F	13 41 50 12 48,0 13 51,0 14 25 15 15				No records from March 25 12 <sup>h</sup> 30 <sup>m</sup> till March 26 9 <sup>h</sup> 20 <sup>m</sup> .
March 26 (75)	e F	18 12 18 30				(75) BCIS: Atlantic Ocean?
March 28 (76)	e F	18 50 19 00				No records from March 27 2 <sup>h</sup> 10 <sup>m</sup> till 8 <sup>h</sup> and from March 28 0 <sup>h</sup> 20 <sup>m</sup> till 7 <sup>h</sup> 50 <sup>m</sup> .

## SEISMIC RECORDS AT DE BILT

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
March 29 (77)	iP	10 27 31				(77) Only Wiechert record. BCIS: 35° 2' N 23° 3' E, H. 10 <sup>h</sup> 22 <sup>m</sup> 39 <sup>s</sup> .
	eS	10 31 32				
	F	10 42				
April 2 (78)	eL	23 10				
	F	23 20				
April 4 (79)	eL	5 03				(79) Ionian Islands.
	F	5 10				
April 9 (80)	eL	15 29				
	F	15 55				
April 12 (81)	eH	6 28,5				(81) USCGS: 14° N 90° ½ W, H. 6 <sup>h</sup> 15,3 <sup>m</sup> , h = about 200 km. JSA: 14° 4' N 90° 7' W, H. 6 <sup>h</sup> 15 <sup>m</sup> 20 <sup>s</sup> , h = about 200 km. Near coast of Guatemala.
	eL	7 10				
	F	7 25				
April 12 (82)	iPP	9 10 11				(82) BCIS: 7° S 152° ½ E, H. 8 <sup>h</sup> 49,2 <sup>m</sup> . South of Bismarck Archipelago.
	ePKS	9 11,5				
	eSS	9 27 20				
	eL	9 48				
	F	11 10				
April 15 (83)	ez	20 07 37				(83) South Pacific.
	eL	20 31				
	F	21 30				
April 17 (84)	iP	16 24 05	+	6	23	(84) BCIS: 33° 3' N 135° 9' E, H. 16 <sup>h</sup> 11 <sup>m</sup> 28 <sup>s</sup> . USCGS: 33° N 135° ½ E, H. 16 <sup>h</sup> 11,5 <sup>m</sup> , slightly deeper than normal. JSA: 32° 7' N 135° 6' E, H. 16 <sup>h</sup> 11 <sup>m</sup> 40 <sup>s</sup> , h = 100 km. CMO: 33° 1' N 135° 7' E, h = 40 km. Off southern coast of Honshu Island.
	iPP	16 27 20				
	iPPP	16 29 07				
	iS	16 34 26				
	iPS	16 35 30				
	eSS	16 40 12				
	eSSS	16 44 00				
	eL	16 52				
	ME	17 09 30				
	F	20 00				
April 18 (85)	ePP	12 39 53				(85) BCIS: 2° ½ S 137° ½ E, H. 12 <sup>h</sup> 19 <sup>m</sup> 45 <sup>s</sup> . USCGS: 3° S 137° E, H. 12 <sup>h</sup> 19,8 <sup>s</sup> . JSA: 3° S 138° E, H. 12 <sup>h</sup> 19 <sup>m</sup> 55 <sup>s</sup> . North of New Guinea.
	ePPP	12 42 24				
	eSKS	12 45,1				
	ePS	12 49,5				
	eSS	12 56,5				
	eL	13 14				
	eL'	14 37				
	F	15 25				
April 20 (86)	e	19 56				
	F	20 20				

## SEISMIC RECORDS AT DE BILT

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
April 21 (87)	e	1 45				
	F	2 05				
April 21 (88)	ePP	15 43,6				(88) Disturbed by visitors. BCIS: 13° ½ S 166° ½ E, H. 15 <sup>h</sup> 21,2 <sup>m</sup> . New Hebrides.
	eSS	16 02				
	eL	16 35				
	F	17 35				
April 21 (89)	eP	20 32 48	(—)			(89) BCIS: 19° 3' N 69° 3' W, H. 20 <sup>h</sup> 22 <sup>m</sup> 01 <sup>s</sup> . USCGS: 19° N 69° ½ W, H. 20 <sup>h</sup> 22,0 <sup>m</sup> , near northeast coast of Dominican Republic. JSA: 19° 0' N 69° 2' W, H. 20 <sup>h</sup> 22 <sup>m</sup> 03 <sup>s</sup> .
	iP	20 32 56				
	ePP	20 35 29				
	eS	20 41 38				
	eSS	20 45,5				
	eSSS	20 49,1				
	eL	20 52				
	ME	20 56				
	F	0 30				
	22	300				
April 22 (90)	iP	0 39 04	+			(90) Aftershock of (89). BCIS: H. 0 <sup>h</sup> 28 <sup>m</sup> 17 <sup>s</sup> . USCGS: H. 0 <sup>h</sup> 28,3 <sup>m</sup> . JSA: H. 0 <sup>h</sup> 28 <sup>m</sup> 19 <sup>s</sup> .
	iP	0 39 10				
	ePP	0 41,5				
	iS	0 47 52				
	iPS	0 48 18				
	iScS	0 49,1				
	eSS	0 52,0				
	eSSS	0 55,3				
	eL	0 59				
	F	3 40				
April 22 (91)	ez	5 09 53				
	eL	5 22				
	F	5 45				
April 22 (92)	iP	10 46 47	+			(92) BCIS: 38° 5' N 20° 6' E, H. 10 <sup>h</sup> 42 <sup>m</sup> 41 <sup>s</sup> , Ionian Islands. Roma: 38° 6' N 19° 5' E, H. 10 <sup>h</sup> 42 <sup>m</sup> 48 <sup>s</sup> . Trieste: 38° 7' N 20° 4' E, H. 10 <sup>h</sup> 42 <sup>m</sup> 44 <sup>s</sup> . Praha: 38° 5' N 20° E.
	iS	10 50 09				
	eL	10 51,5				
	ME	10 55				
	F	13 00				
15	580					
April 22 (93)	eS	13 28 33				(93) Aftershock of (89). BCIS: H. 13 <sup>h</sup> 09 <sup>m</sup> 00 <sup>s</sup> . USCGS: H. 13 <sup>h</sup> 09,0 <sup>m</sup> . JSA: H. 13 <sup>h</sup> 08 <sup>m</sup> 59 <sup>s</sup> .
	eL	13 40				
	F	14 30				
April 22 (94)	e	15 41				(94) BCIS: aftershock of (92), H. 15 <sup>h</sup> 32,6 <sup>m</sup> .
	F	16 15				
April 22 (95)	eS	17 06,2				(95) BCIS: aftershock of (92), H. 16 <sup>h</sup> 58,6 <sup>m</sup> .
	eL	17 07				
	F	17 15				
April 23 (96)	e	5 50				
	F	6 00				

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
April 23 (97)	iP	12 01 06	(—)			(97) Aftershock of (89). BCIS: H. 11 <sup>h</sup> 50 <sup>m</sup> 17 <sup>s</sup> . USCGS: H. 11 <sup>h</sup> 50,3 <sup>m</sup> . JSA: H. 11 <sup>h</sup> 50 <sup>m</sup> 20 <sup>s</sup> .
	eS	12 09 52				
	eScS	12 11 04				
	eL	12 20				
	F	13 40				
April 23 (98)	e	20 28				
	F	20 50				
April 26 (99)	iP	9 37 41				(99) North Atlantic Ocean. BCIS: 50° $\frac{1}{4}$ N 34° $\frac{1}{4}$ W, H. 9 <sup>h</sup> 32,3 <sup>m</sup> . USCGS: 51° N 34° W, H. 9 <sup>h</sup> 32,4 <sup>m</sup> . JSA: 50°,0 N 34°,1 W, H. 9 <sup>h</sup> 32 <sup>m</sup> 20 <sup>s</sup> .
	ez	9 39 32				
	eS	9 42,0				
	eL	9 44				
	F	10 20				
April 26 (100)	eL	10 54				
	F	11 10				
April 30 (101)	e	15 02				(101) Disturbed by microseisms. BCIS: 35°,9 N 30°,7 E, H. 14 <sup>h</sup> 50 <sup>m</sup> 45 <sup>s</sup> .
	F	15 15				
May 1 (102)	eL	2 12				
	F	2 40				
May 1 (103)	e	15 37				
	F	16 05				
May 2 (104)	eH	12 44 30				
	F	13 00				
May 3 (105)	ePP	12 18,5				(105) South Atlantic Ocean. BCIS: 50° S 0° E, H. 11 <sup>h</sup> 59,6 <sup>m</sup> .
	eL	12 55				
	F	13 15				
May 3 (106)	ePP	14 01 28				(106) Disturbed by visitors. BCIS: Aftershock of (105), H. 13 <sup>h</sup> 42,8 <sup>m</sup> .
	ePS	14 11,8				
	eSS	14 16,5				
	eL	14 38				
	F	15 05				
May 3 (107)	e	19 00				
	F	19 10				
May 3 (108)	e	21 14				
	F	21 30				
May 3 (109)	eL	22 08				(109) BCIS: aftershock of (105), H. 21 <sup>h</sup> 07,6 <sup>m</sup> .
	F	22 15				
May 4 (110)	e	22 24				
	F	22 30				

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
May 7 (111)	iP	15 01 08	(—)			(111) Ionian Sea. BCIS: 39° N 19° E, H. 19 <sup>h</sup> 57,2 <sup>s</sup> . Roma: 39°,5 N 18° E, H. 19 <sup>h</sup> 56 <sup>m</sup> 51 <sup>s</sup> .
	eS	15 04 19				
	eL	15 06				
	F	15 25				
May 7 (112)	e	18 49				
	F	18 55				
May 8 (113)	iP	2 58 28	+			(113) BCIS: 46°,3 N 150°,5 E, H. 2 <sup>h</sup> 46 <sup>m</sup> 29 <sup>s</sup> . USCGS: 46° $\frac{1}{2}$ N 151° E, H. 2 <sup>h</sup> 46,5 <sup>m</sup> . JSA: 45°,8 N 150°,5 E, H. 2 <sup>h</sup> 46 <sup>m</sup> 41 <sup>s</sup> , h = 100 km. CMO: 45° N 150° E, H = 250 km. Kurile Islands.
	ePP	3 01 50				
	eS	3 08 20				
	eL	3 23				
	F	4 10				
May 9 (114)	iP	2 21 36	+			(114) BCIS: 29°,7 N 130°,7 E, H. 2 <sup>h</sup> 08 <sup>m</sup> 52 <sup>s</sup> . CMO: 32°,0 N 131°,5 E. USCGS: 30° N 129° E, H. 2 <sup>h</sup> 08,8 <sup>m</sup> . JSA: 30°,0 N 130°,8 E, H. 2 <sup>h</sup> 09 <sup>m</sup> 15 <sup>s</sup> , h = 150 km ca. Kyu Shu (Japan).
	ipP	2 21 49				
	iPP	2 24 52				
	iS	2 31 58				
	isS	2 32 18				
	eSS	2 37,7				
	eL	2 50				
F	5 00					
May 9 (115)	ePKP	8 35 52				(115) South Pacific, near Apia.
	eL	9 37				
	F	10 40				
May 11 (116)	iP	9 09 03	+	4	5	(116) BCIS: 17°,0 S 71°,0 W, H. 8 <sup>h</sup> 55 <sup>m</sup> 45 <sup>s</sup> , h = 50-75 km. USCGS: 17° S 71° W, H. 8 <sup>h</sup> 55,7 <sup>m</sup> , slightly deeper than normal. JSA: 17°,2 S 69°,8 W, H. 8 <sup>h</sup> 55 <sup>m</sup> 50 <sup>s</sup> , h = 100 km. Southern Peru, casualties and damage at Arica, Moquegua and Tacna.
	ipP	9 09 20				
	iPPP	9 15 10				
	e(SKS)	9 19 35				
	eS	9 20,3				
	ePS	9 21,5				
	eSS	9 26,5				
eL	9 43					
F	11 45					
May 11 (117)	ez	9 34 10	(—)			(117) In the previous shock.
	ez	9 34 21				
May 12 (118)	iP	1 09 23	+	4	7	(118) BCIS: 38°,2 N 142°,5 E, H. 0 <sup>h</sup> 56 <sup>m</sup> 56 <sup>s</sup> . USCGS: 38° N 142° $\frac{1}{2}$ E, H. 0 <sup>h</sup> 56,9 <sup>m</sup> . JSA: 38° N 142° E, H. 0 <sup>h</sup> 57 <sup>m</sup> 03 <sup>s</sup> . CMO: 37°,8 N 147°,3 E, h = 40 km. Off northeast coast of Honshu, Japan.
	ipP	1 09 40				
	ePP	1 12 40				
	ePPP	1 14 25				
	iS	1 19 42				
	ePPS	1 20 48				
	eL	1 35				
F	4 40					
May 13 (119)	e	21 38				No records May 12 from 7 <sup>h</sup> 55 <sup>m</sup> till 14 <sup>h</sup> 00 <sup>m</sup> .
	F	21 55				

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
May 14 (120)	e F	0 15 1 05				(120) BCIS: H. 23 <sup>h</sup> 50,6 <sup>m</sup> . Probably epicenter, Sunda Islands.
May 14 (121)	eP eS eL F	13 31 34 13 42 00 14 00 15 25				(121) BCIS: aftershock of (118), H. 13 <sup>h</sup> 19,1 <sup>m</sup> . CMO: 37° 9' N 142° 1' E, h = 40 km.
May 14 (122)	iP eS eL F	18 51 50 19 01,8 19 16 20 55	—			(122) BCIS: 44° 1/2' N 148° 1/2' E, H. 18 <sup>h</sup> 39 <sup>m</sup> 40 <sup>s</sup> . JSA: 43° N 148° 1/2' E, H. 18 <sup>h</sup> 39 <sup>m</sup> 40 <sup>s</sup> . Off east coast of Honshu.
May 14 (123)	iP eS eL F	22 43 16 22 52 46 23 07 3 55	+			(123) BCIS: 54° 5' N 161° 5' W, H. 22 <sup>h</sup> 31 <sup>m</sup> 41 <sup>s</sup> . USCGS: 54° 1/2' N 161° W, H. 22 <sup>h</sup> 31,7 <sup>m</sup> . JSA: 54° 7' N 160° 2' W, H. 22 <sup>h</sup> 31 <sup>m</sup> 49 <sup>s</sup> . South of Alaska Peninsula.
May 15 (124)	iz iz	2 53 16 2 53 35				(124) In the previous shock. Aftershock of (123). BCIS: H. 2 <sup>h</sup> 41 <sup>m</sup> 50 <sup>s</sup> , JSA: H. 2 <sup>h</sup> 41 <sup>m</sup> 50 <sup>s</sup> .
May 15 (125)	eL F	18 50 19 30				
May 16 (126)	eL F	21 58 22 30				
May 19 (127)	eL F	18 09 18 25				No records from May 17 11 <sup>h</sup> 23 <sup>m</sup> till May 18 8 <sup>h</sup> 08 <sup>m</sup> . (127) Istanbul: region of Varto-Hinis (Turkey)
May 20 (128)	eP eH eL	7 18 29 7 22 05 7 23 30				(128) BCIS: 39° N 23° W, H. 7 <sup>h</sup> 13,6 <sup>m</sup> . Atlantic Ocean, east of Azores. F during change of papers from 7 <sup>h</sup> 38 <sup>m</sup> till 7 <sup>h</sup> 51 <sup>m</sup> .
May 20 (129)	eL F	17 57 18 15				
May 21 (130)	eL F	19 52 20 00				
May 22 (131)	eP eS eL F	5 12 53 5 16 49 5 19 29 5 50				(131) BCIS: 35° N 24° 1/2' E, H. 5 <sup>h</sup> 07,8 <sup>m</sup> . Off south coast of Kriti.
May 22 (132)	ePKP ePP ez eL F	19 41,5 19 46,4 19 59,2 20 40 22 15				(132) Wellington: 42° 5' S 172° 9' E, H. 19 <sup>h</sup> 21,5 <sup>m</sup> . JSA: 42° S 173° E, H. 19 <sup>h</sup> 21 <sup>m</sup> 29 <sup>s</sup> .

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
May 22 (133)	e F	22 55 23 25				
May 23 (134)	ePKP iPP ipPP eSKKS ez ePPS eL F	4 31,6 4 34 49 4 35 05 4 41 25 4 46 39 4 47 21 5 16 6 20	—			(134) USCGS: 18° S 169° E, H. 4 <sup>h</sup> 12,5 <sup>m</sup> , h = about 200 km. JSA: 16° 5' S 168° 5' E, H. 4 <sup>h</sup> 12 <sup>m</sup> 26 <sup>s</sup> , h = 100 km. New Hebrides Islands region.
May 23 (135)	e eL F	9 48 9 53 10 30				
May 25 (136)	eP eS iPS eL F	7 22 37 7 31 51 7 32 11 7 43 11 30				(136) Change of papers (Galitzin seism.) from 7 <sup>h</sup> 31 <sup>m</sup> till 7 <sup>h</sup> 43 <sup>m</sup> eS and iPS by Wiechert seismograph. BCIS: 30° 5' N 100° 0' E, H. 7 <sup>h</sup> 11 <sup>m</sup> 23 <sup>s</sup> . USCGS: 30° N 100° 5' E, H. 7 <sup>h</sup> 11,3 <sup>m</sup> . JSA: 30° 0' N 100° 0' E, H. 7 <sup>h</sup> 11 <sup>m</sup> 27 <sup>s</sup> , CMO: 29° N 99° E Sikang (China). 800 reported dead at Lihwa.
May 25 (137)	e F	15 55 16 05				(137) USCGS: 43° 1/2' N 127° W, H. 15 <sup>h</sup> 13 <sup>m</sup> 02 <sup>s</sup> . JSA: 43° 9' N 126° 6' W, H. 15 <sup>h</sup> 13 <sup>m</sup> 07 <sup>s</sup> . Off coast of Oregon.
May 25 (138)	eL F	16 57 17 15				(138) BCIS: aftershock of (136) H. 16 <sup>h</sup> 20,6 <sup>m</sup> .
May 25 (139)	eL F	19 18 19 45				(139) BCIS: aftershock of (136) H. 18 <sup>h</sup> 43,3 <sup>m</sup> .
May 26 (140)	e F	3 20 3 35				
May 26 (141)	iP eS eSS eSSS eL F	9 28 13 9 37 30 9 42 00 9 45,5 9 53 11 00	+			(141) BCIS: 56° 1/2' N 154° W, H. 9 <sup>h</sup> 16 <sup>m</sup> 52 <sup>s</sup> . USCGS: 56° N 156° W, H. 9 <sup>h</sup> 16,7 <sup>m</sup> . JSA: 55° 8' N 152° 6' W, H. 9 <sup>h</sup> 16 <sup>m</sup> 58 <sup>s</sup> . South of Alaska Peninsula.
May 26 (142)	e e F	14 18 14 46 15 00				(142) Disturbed by visitors.
May 26 (143)	eH F	16 31,5 16 45				(143) BCIS: Probably aftershock of (111).
May 26 (144)	eL F	17 09 30 17 30				

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
		h m s		s	$\mu$	
May 27 (145)	e F	17 26,5 17 31				
May 28 (146)	eL F	6 21 6 40				(146) USCGS: 12° S 77° W, H. 5 <sup>h</sup> 36,2 <sup>m</sup> . JSA: 13°,1 S 76°,2 W, H. 5 <sup>h</sup> 36 <sup>m</sup> 16 <sup>s</sup> . La Paz: 13°,5 S 77° W, H. 5 <sup>h</sup> 36 <sup>m</sup> 07 <sup>s</sup> , off coast of Peru.
May 28 (147)	eL F	15 25 16 00				
May 29 (148)	eL F	0 35 0 55				
May 29 (149)	iP eS eL F	4 52 28 4 55 24 4 57 5 30	—			(149) BCIS: 45° $\frac{1}{4}$ N 26° $\frac{1}{2}$ E, H. 4 <sup>h</sup> 48 <sup>m</sup> 57 <sup>s</sup> , h = 150 km. Vrancea (Romania).
May 31 (150)	eL F	22 50 23 10				May 29 from 14 <sup>h</sup> 00 <sup>m</sup> till 16 <sup>h</sup> 30 <sup>m</sup> disturbed by visitors.
June 1 (151)	eL F	4 06 4 45				
June 1 (152)	eL F	16 58 17 25				
June 1 (153)	iP eS eScS eL F	19 08 56 19 19 00 19 19 18 19 36 21 40				(153) BCIS: 6° N 95° E, H. 18 <sup>h</sup> 56,2 <sup>m</sup> . North of Sumatra.
June 2 (154)	eL F	14 23 14 45				(154) Disturbed by visivors. BCIS and JSA: 13° N 94° W, H. 13 <sup>h</sup> 38 <sup>m</sup> 50 <sup>s</sup> . Off coast of Guatemala.
June 7 (155)	eS iz F	7 17 22 7 17 36 7 30				(155) Stuttgart: 48°58' N 8°20' E, H. 7 <sup>h</sup> 15 <sup>m</sup> 18,6 <sup>s</sup> , h = 20-30 km. Slight damage at Karlsruhe.
June 8 (156)	eS eSS eL F	3 37 3 43 3 58 4 40				(156) BCIS: 35° S 55° E, H. 3 <sup>h</sup> 12,4 <sup>m</sup> . Indian Ocean.
June 8 (157)	ez F	11 16 20 11 20				(157) BCIS: Probable epicenter Figi Islands.

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
		h m s		s	$\mu$	
June 10 (158)	eL F	19 04 19 30				
June 13 (159)	eS eL F	6 38 10 6 38,8 7 00				(159) Roma: 43°33' N 12°10' E, H. 6 <sup>h</sup> 33 <sup>m</sup> 36 <sup>s</sup> . Trieste: 43°31' N 12°08' E, H. 6 <sup>h</sup> 33 <sup>m</sup> 24 <sup>s</sup> . Destructive at Sansepolcro (Arezzo, Italia).
June 14 (160)	eH F	9 10 9 20				
June 14 (161)	eH F	11 00 11 20				
June 15 (162)	eH F	10 05 10 10				
June 15 (163)	eP iP ePP iS iPS eSS eL F	11 57 15 11 57 24 12 00,5 12 07 35 12 08 26 12 13 28 12 25 14 50	+			(163) USCGS: 33° $\frac{1}{4}$ N 136° E, H. 11 <sup>h</sup> 44,7 <sup>m</sup> . JSA: 33°,2 N 135°,8 E, H. 11 <sup>h</sup> 44 <sup>m</sup> 44 <sup>s</sup> . Off South coast of Hunshu.
June 15 (164)	eL F	15 36 15 45				
June 15 (165)	eL F	21 49 22 20				
June 16 (166)	e F	13 35 13 50				
June 16 (167)	eL F	16 38 16 50				
June 17 (168)	iP eS eL F	6 56 50 7 00 30 7 02,7 7 20	+			(168) BCIS: Probably aftershock of (92) Ionian Islands. Trieste: 37°,5 N 21° E, H. 6 <sup>h</sup> 52,5 <sup>m</sup> .
June 17 (169)	eL F	14 20 14 50				
June 18 (170)	ePP iz ez eSS eL F	1 15 00 1 16 15 1 17 03 1 32,6 1 50 3 30				(170) Disturbed by microseisms. USCGS: 6° S 155° E, H. 0 <sup>h</sup> 53,9 <sup>m</sup> . JSA: 6°,4 S 155°,9 E, H. 0 <sup>h</sup> 53 <sup>m</sup> 58 <sup>s</sup> . Solomon Islands region.

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
June 18 (171)	eL F	8 08 8 30				(171) Only z-record.
June 18 (172)	e F	17 08 17 15				(172) Only z-record. Apia: probably Fiji Islands region, H. 16 <sup>h</sup> 47,2 <sup>m</sup> .
June 18 (173)	iP iPP eSS eL F	18 52 05 18 53 42 19 01,0 19 08 19 45	—			(173) Only z-record. BCIS: H. 18 <sup>h</sup> 44,5 <sup>m</sup> , probable epicenter: Khurasan (Iran).
June 19 (174)	eL F	8 30 9 15				No records from June 18 21 <sup>h</sup> 32 <sup>m</sup> till June 19 8 <sup>h</sup> 04 <sup>m</sup> . (174) BCIS: 43,2 S 169,2 E, H. 7 <sup>h</sup> 05,6 <sup>m</sup> . New Zealand, (South Island).
June 19 (175)	eL F	17 30 17 50				
June 19 (176)	iP eS eL F	23 02 49 23 07 15 23 09 23 50				(176) Δ = 2800 km. BCIS: north of Azores.
June 20 (177)	eL F	0 06 0 25				
June 20 (178)	e F	15 13 15 25				
June 21 (179)	ePP eSKS ePS eL F	12 23 49 12 29,9 12 33 20 12 55 14 10				(179) Disturbed by microseisms. BCIS: 3 <sup>h</sup> N 125° E, H. 12 <sup>h</sup> 05 <sup>m</sup> 04 <sup>s</sup> . USCGS: 3° N 126° E, H. 12 <sup>h</sup> 05 <sup>m</sup> 04 <sup>s</sup> . JSA: 3° N 124° E, H. 12 <sup>h</sup> 05 <sup>m</sup> 04 <sup>s</sup> . Batavia: 0°,6 N 128°,6 E, H. 12 <sup>h</sup> 05,4 <sup>m</sup> , Celebes Sea.
June 23 (180)	eL F	3 51,7 4 10				(180) BCIS: H. 03 <sup>h</sup> 43,9 <sup>m</sup> . Alicante: Felt at Cehegin, Murcia (Spain)
June 23 (181)	eL F	16 39 16 45				
June 24 (182)	eL F	2 16 2 40				
June 26 (183)	e F	4 37 4 50				
June 27 (184)	iP eS eSS eSSS eL F	0 19 50 0 29,2 0 34 0 37 0 43 1 50	+			(184) Disturbed by microseisms. BCIS and JSA: 26 <sup>h</sup> N 98 <sup>h</sup> E, H. 0 <sup>h</sup> 08 <sup>m</sup> 31 <sup>s</sup> . Superior valley of the Me-kong.

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
June 27 (185)	iP eS eSS eL F	13 00 14 13 10,0 13 15 13 28 14 30				(185) Disturbed by microseisms. USCGS: 17° N 85° W, H. 12 <sup>h</sup> 48,3 <sup>m</sup> . JSA: 17° N, 85° W, H. 12 <sup>h</sup> 48 <sup>m</sup> 18 <sup>s</sup> . Off north coast of Honduras.
June 27 (186)	iP ePP ePPP eS ePS eSS eL F	21 50 41 21 53 22 21 55,0 22 00 02 22 00 17 22 04 30 22 16 23 25	+			(186) Disturbed by microseisms. BCIS: aftershock of (141), H. 21 <sup>h</sup> 39 <sup>m</sup> 22 <sup>s</sup> . USCGS: 56° N 158° W, H. 21 <sup>h</sup> 39,2 <sup>m</sup> . JSA: 56 <sup>h</sup> N 154° W, H. 21 <sup>h</sup> 39 <sup>m</sup> 25 <sup>s</sup> . South of Alaska Peninsula.
June 28 (187)	e F	0 17 0 25				
June 28 (188)	iP iz eS eSS eL F	7 25 50 7 26 20 7 36 08 7 41,8 7 51 10 40	+			(188) Change of papers from 7 <sup>h</sup> 29 <sup>m</sup> till 7 <sup>h</sup> 35 <sup>m</sup> . USCGS: 36° N 136 <sup>h</sup> E, H. 7 <sup>h</sup> 13,5 <sup>m</sup> . JSA: 35°,8 N 136,2 E, H. 7 <sup>h</sup> 13 <sup>m</sup> 32 <sup>s</sup> . Near west coast of Honshu Island, Japan. Heavy casualties and severe property damage at Fukui and surrounding territory.
June 29 (189)	iPKP iPP iPKS eSKSP ePS eSS eL F	10 48 03 10 51 23 11 51 39 11 01 36 11 01 52 11 10 05 11 36 13 15	—			(189) USCGS: 16° S 172° W, H. 10 <sup>h</sup> 28,5 <sup>m</sup> . JSA: 16°,1 S 172,9 W, H. 10 <sup>h</sup> 28 <sup>m</sup> 42 <sup>s</sup> , h = 100 km. Samoa Islands region.
June 29 (190)	iP iPP eS eL F	16 12 32 16 13 31 16 17 28 16 21 18 05	(+)			(190) USCGS: 43° N 47° E, H. 16 <sup>h</sup> 06,5 <sup>m</sup> . JSA: 43°,1 N 47°,7 E, H. 16 <sup>h</sup> 06 <sup>m</sup> 35 <sup>s</sup> , h = 75 km. Roma: 40°,3 N 46° E, H. 16 <sup>h</sup> 06,4 <sup>m</sup> . Trieste: 40°,5 N, 46°,5 E, H. 16 <sup>h</sup> 06,3 <sup>m</sup> , h = 100 km. Valley of the Kura, Caucasus.
June 30 (191)	iP iS eL F	12 25 17 12 28 36 12 29 40 14 35				(191) BCIS: 38° 50' N 20° 40' E. Roma and Trieste: 38°,8 N 20°,7 E, H. 12 <sup>h</sup> 21 <sup>m</sup> 16 <sup>s</sup> . Ionian Islands. Casualties and property damage at Levkas. Heerlen gives: i 12 <sup>h</sup> 25 <sup>m</sup> 00 <sup>s</sup> .
July 2 (192)	e F	16 04 16 15				
July 3 (193)	iPKP ipPKP ez F	13 09 10 13 10 46 13 11 18 13 15	—			(193) BCIS: 20° S 176° W, H. 12 <sup>h</sup> 50,1 <sup>m</sup> , h = 400 km. Tonga Islands region.

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
July 3 (194)	e eL F	15 53,4 15 54 16 25				(194) BCIS: North Atlantic Ocean.
July 5 (195)	eP ePP eS eSS eL F	14 01 29 14 03 16 14 7,8 14 11,1 14 15 16 00				(195) BCIS: 30° ½ N 58° ½ E, H. 13 <sup>h</sup> 53,1 <sup>m</sup> . JSA: 30° N 56° E, H. 13 <sup>h</sup> 53,4 <sup>m</sup> . Trieste: 31° 5 N 58° E. Kerman Persia.
July 7 (196)	iP ePP eS ePS eSS eL F	2 31 48 2 35,1 2 42 17 2 43,2 2 48 3 01 5 00	(+)			(196) USCGS: 33° N 136° E, H. 2 <sup>h</sup> 19,1 <sup>m</sup> . JSA: 33° 0 N 136° 4 E, H. 2 <sup>h</sup> 19 <sup>m</sup> 14 <sup>s</sup> . CMO: 33° 0 N 136° 5 E. Off south coast of Honshu (Japan).
July 8 (197)	e F	4 48 5 03				(197) BCIS: 30° W 40° N, H. 4 <sup>h</sup> 35,7 <sup>m</sup> .
July 8 (198)	iP eS eL F	12 39 09 12 42 47 12 44 13 30	+			(198) Disturbed by microseisms. BCIS: 72° N 4° W, H. 12 <sup>h</sup> 34 <sup>m</sup> 30 <sup>s</sup> . USCGS: 71° N 6° W, H. 12 <sup>h</sup> 34,6 <sup>m</sup> . JSA: 71° 3 N, 2° 4 W, H. 12 <sup>h</sup> 34 <sup>m</sup> 40 <sup>s</sup> . Near Jan Mayen (Greenland Sea)
July 11 (199)	e F	16 34 16 40				(199) BCIS: Turkey.
July 14 (200)	ePP ePS eSS eH eL F	22 49 40 22 59 36 23 06,5 23 19,5 23 25 1 40				(200) USCGS: 4° S 142° E, H. 22 <sup>h</sup> 28,9 <sup>m</sup> . JSA: 4° 0 S 143° 4 E, H. 22 <sup>h</sup> 28 <sup>m</sup> 55 <sup>s</sup> . New Guinea.
July 15 (201)	ePP eS ePS eSS eL F	11 19,1 11 26 00 11 26 40 11 33 00 11 46 12 35				(201) USCGS: 10° N 104° W, H. 11 <sup>h</sup> 02,0 <sup>m</sup> . JSA: 11° N 104° W, H. 11 <sup>h</sup> 02 <sup>m</sup> 15 <sup>s</sup> , h = 100 km. Off southwest coast of Mexico.
July 16 (202)	eP eS	7 24 50 7 35 00				(202) USCGS: 14° ½ N 92° W, H. 7 <sup>h</sup> 12,5 <sup>m</sup> , h = 100 km. JSA: 14° 6 N 91° 1 W, H. 7 <sup>h</sup> 12 <sup>m</sup> 28 <sup>s</sup> , h. = 100 km. Near coast of Guatemala. F in next shock.
July 16 (203)	eP eS eSS F	7 31 57 7 42 07 7 47 30 9 10				(203) eL during change of papers from 7 <sup>h</sup> 53 <sup>m</sup> till 8 <sup>h</sup> 00 <sup>m</sup> . Aftershock of (202). USCGS: H. 7 <sup>h</sup> 19,7 <sup>m</sup> . JSA: 14° 3 N 91° 2 W, H. 7 <sup>h</sup> 19 <sup>m</sup> 39 <sup>s</sup> , h = 100 km.

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
July 16 (204)	e F	19 27 19 35				
July 18 (205)	ePP ez eSKKS ePPS eSS eSSS eL F	7 01 27 7 01 57 7 08 28 7 12 7 17 7 21 7 34 9 15	—			(205) Disturbed by microseisms. BCIS: 2° N 121° ½ E, H. 6 <sup>h</sup> 43,5 <sup>m</sup> . Celebes Sea.
July 18 (206)	eH F	20 57 21 20				
July 18 (207)	e eL F	22 51 23 25 1 00				(207) Foreshock of (211).
July 19 (208)	ez F	18 15,5 18 20				(208) Zürich: 45° 48' N 10° 25' E. Trieste: 45° 9 N 10° 7 E, H. 18 <sup>h</sup> 11 <sup>m</sup> 24 <sup>s</sup> . Roma: 45° 53' N 10° 25' E, H. 18 <sup>h</sup> 11 <sup>m</sup> 26 <sup>s</sup> . Bergamasker Alps (Italy).
July 19 (209)	e F	18 31,3 18 40				(209) Aftershock of (208). Trieste: H. 18 <sup>h</sup> 26 <sup>m</sup> 37 <sup>s</sup> . Roma: H. 18 <sup>h</sup> 26 <sup>m</sup> 24 <sup>s</sup> .
July 19 (210)	eL F	23 00 23 20				(210) USCGS: 15° N 91° ½ W, H. 22 <sup>h</sup> 26,3 <sup>m</sup> . JSA: 15° N 91° 4 W, H. 22 <sup>h</sup> 26 <sup>m</sup> 26 <sup>s</sup> , h = 100 km. Near coast of Guatemala.
July 20 (211)	ez ePP eSS eL F	1 02,7 1 05,3 1 24,5 1 38 3 20				(211) Aftershock of (207). BCIS: 24° S 174° E, H. 0 <sup>h</sup> 42,0 <sup>m</sup> .
July 20 (212)	iP ipP iPP ipPP iSKS isSKS ePS eSSS eL F	11 15 45 11 15 59 11 19 36 11 19 57 11 26 20 11 26 47 11 28,5 11 37,5 11 49 13 50	+ (-) + —			(212) USCGS: 17° S 74° ½ W, H. 11 <sup>h</sup> 02,4 <sup>m</sup> . JSA: 16° 0 S 73° 0 W, H. 11 <sup>h</sup> 02,5 <sup>m</sup> . Off southwest coast of Peru.
July 21 (213)	eL F	1 12 1 16				No records from July 21 19 <sup>h</sup> 41 <sup>m</sup> till July 23 8 <sup>h</sup> 18 <sup>m</sup> .

## SEISMIC RECORDS AT DE BILT

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
July 23 (214)	ePP eL F	12 41 54 13 18 15 00				(214) BCIS: 5° S 142° E, H. 12 <sup>h</sup> 21,1 <sup>m</sup> . New Guinea.
July 23 (215)	eL	20 30				(215) F in next shock.
July 23 (216)	iP ePP eS eSS eL F	21 09 25 21 12,1 21 18 28 21 22,7 21 30 22 05	+			(216) BCIS: 15° S 14° W, H. 20 <sup>h</sup> 58,3 <sup>m</sup> .
July 24 (217)	iP iS eL F	6 08 08 6 12 10 6 14 8 45	-			(217) USCGS: 35° N 24° E, H. 6 <sup>h</sup> 03,2 <sup>m</sup> . JSA: 35°,8 N 24°,4 E, H. 6 <sup>h</sup> 03 <sup>m</sup> 22 <sup>s</sup> , h = 100 km. Trieste: 35°,1 N 24°,3 E. Crete. No records July 24 from 8 <sup>h</sup> 50 <sup>m</sup> till 11 <sup>h</sup> 13 <sup>m</sup> .
July 26 (218)	eL F	11 37,5 11 50				(218) Istanbul: 38°,3 N 28°,5 E.
July 26 (219)	eL F	13 46 14 05				
July 26 (220)	e F	20 07 20 25				(220) South Pacific Ocean.
July 26 (221)	eL F	20 55 21 25				
July 26 (222)	eL F	6 11 6 30				
July 28 (223)	e F	8 27 8 35				(223) BCIS: probably aftershock of (218).
July 28 (224)	eL eL F	15 00 15 40 16 20				(224) BCIS: foreshock of (229). USCGS: H. 14 <sup>h</sup> 21,8 <sup>m</sup> . JSA: H. 14 <sup>h</sup> 21 <sup>m</sup> 54 <sup>s</sup> .
July 29 (225)	eP eS eL F	0 45 15 0 55,4 1 15 2 00				(225) BCIS 42° N 150° E, H. 0 <sup>h</sup> 33,0 <sup>m</sup> , slightly deeper than normal. JSA: 43° N 150° E, H. 0 <sup>h</sup> 33 <sup>m</sup> 03 <sup>s</sup> .
July 29 (226)	eP eS	0 49 00 0 59,1				(226) JSA: aftershock of (225), H. 0 <sup>h</sup> 36 <sup>m</sup> 50 <sup>s</sup> .
July 29 (227)	e F	6 44 6 50				

## SEISMIC RECORDS AT DE BILT

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
July 30 (228)	eS eL F	3 43 25 3 50 4 40				(228) No z-record. BCIS: 30° N 49° E, H. 3 <sup>h</sup> 30,1 <sup>m</sup> , Persian Gulf.
July 30 (229)	e F	22 04 22 25				(229) No z-record.
July 31 (230)	eSS eL F	19 27 00 19 43 20 20				(230) No z-record. USCGS 17° N 82° W, H. 19 <sup>h</sup> 04,2 <sup>m</sup> . JSA: 8° N 81° W, H. 19 <sup>h</sup> 04 <sup>m</sup> 16 <sup>s</sup> . Off southwest coast of Panama.
Aug. 1 (231)	eL F	14 34 00 14 50				
Aug. 3 (232)	eL F	10 14 10 40				(232) BCIS: North America.
Aug. 4 (233)	eH eL F	23 41,0 0 14 0 40				
Aug. 5 (234)	eL F	22 55 23 15				
Aug. 6 (235)	iPKP ePP eL F	3 49 27 3 52,7 4 18 5 30				(235) $\Delta$ = about 16000 km. Riverview: H. 3 <sup>h</sup> 29 <sup>m</sup> 33 <sup>s</sup> , felt in Adelaide and the southeast part of Australia.
Aug. 7 (236)	eP eP eSSS eL F	14 52 56 15 03 17 15 12,5 15 26 17 50				(236) USCGS: 34° N 142° E, H. 14 <sup>h</sup> 40,2 <sup>m</sup> . JSA: 34° N 142° E, H. 14 <sup>h</sup> 40 <sup>m</sup> 12 <sup>s</sup> . Off southeast coast of Honshu.
Aug. 10 (237)	eP eS eL F	13 31 53 13 35,9 13 38 14 00				(237) BCIS: 38°,4 N 29°,4 E, H. 13 <sup>h</sup> 27 <sup>m</sup> 00 <sup>s</sup> . Trieste: 38,2 N 29,5 E, H. 13 <sup>h</sup> 26 <sup>m</sup> 56 <sup>s</sup> . Istanbul: 38°,2 N 28°,6 E, region of Alasehir (Turkey).
Aug. 11 (238)	iP ipP eS eSS eL F	10 48 35 10 49 01 10 58 46 11 04,0 11 15 12 35	+			(238) USCGS: 17° $\frac{1}{2}$ N 95° $\frac{1}{2}$ W, H. 10 <sup>h</sup> 36,2 <sup>m</sup> , h = 50 km. JSA: 17°,7 N 95°,1 W, H. 10 <sup>h</sup> 36 <sup>m</sup> 17 <sup>s</sup> , h = 100 km. Felt in the southeast part of Mexico.
Aug. 12 (239)	eL F	4 37 4 45				
Aug. 12 (240)	eL F	23 20 0 55				(240) No z-record. JSA: South Atlantic Ocean near Sandwich Islands, H. 22 <sup>h</sup> 24 <sup>m</sup> 50 <sup>s</sup> .



Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
		h m s		s	$\mu$	
Aug. 14 (241)	eL F	2 08 2 15				
Aug. 14 (242)	iP ePS eL F	17 08 18 17 20 14 17 38 18 15				(242) BCIS: 34° N 141° E, H. 16 <sup>h</sup> 55,6 <sup>m</sup> . CMO: 36°4 N 141°,2 E, h = 40 km. Off southeast coast of Honshu.
Aug. 17 (243)	e F	5 35 5 55				
Aug. 17 (244)	eP ePP eS ePS eL F	17 21 24 17 24 40 17 31 52 17 32 54 17 53 18 50				(244) Aftershock of (236). BCIS: H. 17 <sup>h</sup> 08,8 <sup>m</sup> . JSA: H. 17 <sup>h</sup> 08 <sup>m</sup> 42 <sup>s</sup> . CMO: 35°,2 N 142°,8 E.
Aug. 17 (245)	eE eL F	19 15 19 47 20 25				(245) Stuttgart: aftershock of (236).
Aug. 18 (246)	e F	4 32 4 45				
Aug. 18 (247)	eP eS eL F	19 11 59 19 16 44 19 20 19 50				(247) BCIS: H. 19 <sup>h</sup> 06,2 <sup>m</sup> . Istanbul: 38°29' N 39°14' E.
Aug. 18 (248)	iP eS eL F	21 15 35 21 18,2 21 19 21 50				(248) Trieste: 41°,5 N 16°,2 E, H. 21 <sup>h</sup> 12 <sup>m</sup> 19 <sup>s</sup> . Roma: 41°,5 N 16° E, H. 21 <sup>h</sup> 12 <sup>m</sup> 20 <sup>s</sup> . Golfo di Manfredonia (Adriatic Sea).
Aug. 19 (249)	eL F	2 03 2 30				(249) JSA: 1°,5 N 90° W, H. 1 <sup>h</sup> 19 <sup>m</sup> 26 <sup>s</sup> . North of Galapagos Islands.
Aug. 19 (250)	ePP ePS eSS eL F	11 08,8 11 18,5 11 24,8 11 40 12 15				(250) BCIS: probably aftershock of (240), H. 10 <sup>h</sup> 49,1 <sup>m</sup> .
Aug. 19 (251)	eP ePP eS eSS eL F	14 01 15 14 01 36 14 09 44 14 10,4 14 14,0 14 21 14 50				(251) USCGS: 62° N 151° W, H. 13 <sup>h</sup> 50,8 <sup>m</sup> , h = 100 km. JSA: 62°,7 N 149°,1 W, H. 13 <sup>h</sup> 50 <sup>m</sup> 52 <sup>s</sup> , h = 100 km. Alaska.

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
		h m s		s	$\mu$	
Aug. 19 (252)	iP eS ePS eSS eL F	20 11 38 20 22 00 20 22,9 20 27,6 20 39 21 20	—			(252) USCGS: 5° N 82° W, H. 19 <sup>h</sup> 59,0 <sup>m</sup> . JSA: 5°,3 N 82°,7 W, H. 19 <sup>h</sup> 59 <sup>m</sup> 10 <sup>s</sup> , h = about 100 km.
Aug. 20 (253)	ePP ePPP ePS eL F	19 04,5 19 06,6 19 13,6 19 38 20 30				(253) BCIS: 7° N 127° E, H. 18 <sup>h</sup> 45,9 <sup>m</sup> . East of Mindanao.
Aug. 21 (254)	eL F	8 51 12 9 15				(254) Disturbed by microseisms. BCIS: aftershock of (248). Roma: 41°,6 N 15°,8 E, h = 8 <sup>h</sup> 44 <sup>m</sup> 47 <sup>s</sup> .
Aug. 21 (255)	eN F	15 21 15 35				
Aug. 22 (256)	eL F	23 23,5 23 35				(256) Disturbed by microseisms. BCIS: aftershock of (248). Roma: 41°,5 N 15°,9 E, h. 23 <sup>h</sup> 16 <sup>m</sup> 20 <sup>s</sup> .
Aug. 23 (257)	e F	3 15 3 20				(257) Disturbed by microseisms. BCIS: North Atlantic Ocean.
Aug. 23 (258)	e F	11 59 12 10				(258) Disturbed by microseisms. BCIS: probably near Bear Island (Barents Sea).
Aug. 24 (259)	e F	6 28 6 48				(259) Disturbed by microseisms. BCIS: Anatolia.
Aug. 24 (260)	e(S) eL F	8 27,3 8 43 9 30				(260) Disturbed by microseisms. USSR: 4° N 97° E.
Aug. 25 (261)	iP iz iPP ePS eL F	6 23 00 6 23 11 6 26 53 6 35,9 6 54 9 20	+			(261) Disturbed by microseisms. USCGS: 24° S 63° W, H. 6 <sup>h</sup> 09,4 <sup>m</sup> . JSA: 23°,2 S 64°,6 W, H. 6 <sup>h</sup> 09 <sup>m</sup> 47 <sup>s</sup> , h = about 100 km. Several casualties and extensive property damage at province of Salta (Argentina).
Aug. 26 (262)	eL F	15 30 15 40				(262) Disturbed by microseisms. Apia: H. 14 <sup>h</sup> 08,1 <sup>m</sup> . Samoan Islands region.
Aug. 27 (263)	eP eS eL F	10 47 30 10 50,3 10 51 11 20	(-)			(263) BCIS: 42°,0 N 19°,4 E, H. 10 <sup>h</sup> 44 <sup>m</sup> 06 <sup>s</sup> . Near Scutari, Albania.
Aug. 27 (264)	eL F	11 31 12 45				(264) BCIS: aftershock of (263).

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
		h m s		s	$\mu$	
Aug. 27 (265)	eS F	17 12 27 18 00				(265) BCIS: $28^{\circ} \frac{1}{2}$ S $66^{\circ} \frac{1}{2}$ W, H. $16^{\text{h}}48,5^{\text{m}}$ , h = 250 km. USCGS: $25^{\circ}$ S $68^{\circ}$ W, H. $16^{\text{h}}48,4^{\text{m}}$ . JSA: $27^{\circ},6$ S $66^{\circ},2$ W, H. $16^{\text{h}}48^{\text{m}}32^{\text{s}}$ , h = 200 km. Western Argentina.
Aug. 28 (266)	eP iS eL F	2 39 16 2 48 33 3 03 4 15				(266) BCIS: $56^{\circ}$ N $165^{\circ}$ E, H. $2^{\text{h}}27^{\text{m}}52^{\text{s}}$ . USCGS: $57^{\circ}$ N $161^{\circ}$ E, H. $2^{\text{h}}27,8^{\text{m}}$ . JSA: $57^{\circ},1$ N $164^{\circ},3$ E, H. $2^{\text{h}}28^{\text{m}}05^{\text{s}}$ . Kamchatka.
Aug. 28 (267)	ePKP eL F	12 44,0 13 40 14 45				(267) BCIS: H. $12^{\text{h}}24,5^{\text{m}}$ . JSA: H. $12^{\text{h}}24^{\text{m}}23^{\text{s}}$ . Apia: $20^{\circ}$ S $175^{\circ}$ W, H. $12^{\text{h}}24,6^{\text{m}}$ , naar Tonga Islands.
Aug. 29 (268)	iPKP ePP eSS eL F	17 57 19 18 00,6 18 19,5 18 59 20 15	(—)			(268) USCGS: $15^{\circ} \frac{1}{2}$ S $171^{\circ}$ W, H. $17^{\text{h}}37,8^{\text{m}}$ . JSA: $15^{\circ},2$ S $172^{\circ},4$ W, H. $17^{\text{h}}37^{\text{m}}58^{\text{s}}$ , h = about 100 km. Apia: H. $17^{\text{h}}37,8^{\text{m}}$ . Samoan Islands region. Felt at Apia.
Aug. 29 (269)	iP ePP eS ePS eL F	23 42 19 23 45 44 23 52 53 23 53 46 0 11 1 00				(269) BCIS: $28^{\circ}$ N $132^{\circ}$ E, H. $23^{\text{h}}29,6^{\text{m}}$ . CMO: $30^{\circ},2$ N $132^{\circ},2$ E, H. $23^{\text{h}}29,6^{\text{m}}$ . South of Japan.
Aug. 30 (270)	eL F	1 47 2 15				(270) BCIS: H. $1^{\text{h}}38,2^{\text{m}}$ . North of Iceland.
Aug. 31 (271)	eL F	10 07 10 25				
Sept. 1 (272)	eL	19 57				(272) JSA: foreshock of (273). F in next shock.
Sept. 1 (273)	eS eL F	20 16 30 20 29 21 35				(273) JSA: $23^{\circ}$ N $119^{\circ}$ W, H. $19^{\text{h}}53,0^{\text{m}}$ . Pacific Ocean, west of California.
Sept. 2 (274)	iP ePP eE ePS eL F	23 49 29 23 53 30 23 59 07 23 02,3 0 23 2 30				(274) USCGS: $10^{\circ}$ N $125^{\circ}$ E, H. $23^{\text{h}}34,7^{\text{m}}$ . JSA: $9^{\circ},5$ N $124^{\circ},5$ E, H. $23^{\text{h}}34^{\text{m}}55^{\text{s}}$ . Off northern coast of Mindanao, Philippine Islands.
Sept. 4 (275)	ePS eSS eL F	15 35 21 15 40,8 15 57 16 55				(275) No z-record. BCIS: $35^{\circ}$ S $55^{\circ}$ E, H. $15^{\text{h}}09,0^{\text{m}}$ . Indian Ocean.

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
		h m s		s	$\mu$	
Sept. 4 (276)	eL F	17 17 17 40				(276) No z-record.
Sept. 6 (277)	ePP eS ePS eL	8 28,0 8 35,6 8 37 07 9 01				(277) BCIS: $24^{\circ}$ S $70^{\circ}$ W, H. $8^{\text{h}}10,2^{\text{m}}$ , h deeper than normal. USCGS: $24^{\circ} \frac{1}{2}$ S $68^{\circ} \frac{1}{2}$ W, H. $8^{\text{h}}10,2^{\text{m}}$ , h = 100 km. JSA: $23^{\circ},4$ S $73^{\circ},1$ W, H. $8^{\text{h}}10^{\text{m}}36^{\text{s}}$ , h = 200 km. Northeastern Chile. F in next shock.
Sept. 6 (278)	eL F	9 50 11 00				(278) BCIS: $16^{\circ} \frac{1}{2}$ S $177^{\circ} \frac{1}{2}$ W, H. $8^{\text{h}}41,9^{\text{m}}$ . Apia: H. $8^{\text{h}}42,9^{\text{m}}$ . Near Fiji Islands.
Sept. 6 (279)	eZ F	17 18 17 25				(279) USCGS: $14^{\circ}$ N $93^{\circ} \frac{1}{2}$ W, H. $16^{\text{h}}35,1^{\text{m}}$ . JSA: $15^{\circ},2$ N $93^{\circ},4$ W, H. $16^{\text{h}}35^{\text{m}}16^{\text{s}}$ , h = 100 km. Off coast of Guatemala.
Sept. 7 (280)	iP iPP iz epPP iS esS eH eL F	8 23 40 8 24 22 8 25 02 8 26 14 8 30 26 8 31 53 8 34,0 8 40 9 05	+			(280) h = 200 km. BCIS: $36^{\circ},5$ N $70^{\circ},5$ E, H. $8^{\text{h}}15^{\text{m}}20^{\text{s}}$ , h = 220 km. Trieste: $36^{\circ},5$ N $74^{\circ}$ E, H. $8^{\text{h}}15,2^{\text{m}}$ , h = 200 km. Hindu Kush.
Sept. 7 (281)	eL F	22 38 22 50				(281) Disturbed by microseisms.
Sept. 8 (282)	iPKP iPPP iSS eL F	15 28 58 15 36 08 15 51,5 16 28 21 40				(282) USCGS: $21^{\circ}$ S $174^{\circ}$ W, H. $15^{\text{h}}09,2^{\text{m}}$ . JSA: $21^{\circ},0$ S $174^{\circ},2$ W, H. $15^{\text{h}}09^{\text{m}}14^{\text{s}}$ . Tacubaya: $21^{\circ}20'$ S $174^{\circ}25'$ W, H. $15^{\text{h}}09^{\text{m}}13^{\text{s}}$ . Tonga Islands.
Sept. 9 (283)	ePKP eL F	6 29 00 7 18 8 05				(283) BCIS: aftershock of (282), H. $6^{\text{h}}09,3^{\text{m}}$ .
Sept. 9 (284)	ePKP eL F	14 24 35 15 28 16 10				(284) BCIS: aftershock of (282), H. $14^{\text{h}}04,7^{\text{m}}$ .
Sept. 9 (285)	e F	22 37,5 22 45				
Sept. 10 (286)	e F	2 58 3 10				
Sept. 10 (287)	eL F	7 05 7 15				

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
		h m s		s	$\mu$	
Sept. 10 (288)	cP ePP eS eSS eL F	12 10,9 12 12,8 12 17,7 12 21,1 12 27 13 00				(288) Trieste: $39^{\circ}$ N $74^{\circ}$ E, H. $12^{\text{h}}02,5^{\text{m}}$ . Turkestan.
Sept. 10 (289)	iP eS eSS eL F	14 00 40 14 10 36 14 15,8 14 26 18 15				(289) USCGS: $44^{\circ}$ N $146^{\circ}\frac{1}{2}$ E, H. $13^{\text{h}}48,5^{\text{m}}$ . JSA: $43^{\circ},3$ N $146^{\circ},6$ E, H. $13^{\text{h}}48^{\text{m}}35^{\text{s}}$ , slightly deeper than normal. Off east coast of Hokkaido.
Sept. 10 (290)	CHZ	17 58				(290) In previous shock.
Sept. 10 (291)	ez eL F	23 42,6 0 28 1 00				(291) BCIS: Near Samoan Islands.
Sept. 11 (292)	eL F	2 17 2 30				
Sept. 11 (293)	eL F	5 50 6 00				
Sept. 11 (294)	eP epP eS iz isS eL F	8 57 02 8 57 34 9 00 36 9 00 45 9 01 16 9 02,5 9 35				(294) BCIS: $37^{\circ},2$ N $23^{\circ},2$ E, H. $8^{\text{h}}52^{\text{m}}41^{\text{s}}$ , h = 130 km. Trieste: $38^{\circ}$ N $22^{\circ}\frac{1}{2}$ E, H. $8^{\text{h}}52,7^{\text{m}}$ . Greece. Felt at Athens.
Sept. 12 (295)	ePKP eL F	3 39,5 4 32 5 05				(295) BCIS: aftershock of (282), H. $3^{\text{h}}19,8^{\text{m}}$ . Apia: H. $3^{\text{h}}20,3^{\text{m}}$ .
Sept. 12 (296)	CH eNZ F	14 09 14 14 18 14 25				
Sept. 13 (297)	eS eL F	21 30,8 21 50 22 25				(297) No z-record. USCGS: $13^{\circ}\frac{1}{2}$ N $93^{\circ}$ W, H. $21^{\text{h}}07,6^{\text{m}}$ . JSA: $14^{\circ}$ N $92^{\circ},9$ W, H. $21^{\text{h}}07^{\text{m}}42^{\text{s}}$ . Off coast of Guatemala.
Sept. 14 (298)	ePKP eL F	8 32 41 9 24 10 15				(298) BCIS: aftershock of (282) H. $8^{\text{h}}12,9^{\text{m}}$ . Apia: H. $8^{\text{h}}13,0^{\text{m}}$ .
Sept. 15 (299)	CH eL F	4 21 4 24 4 40				

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
		h m s		s	$\mu$	
Sept. 16 (300)	eL F	8 54 9 20				
Sept. 19 (301)	iP eS eL F	6 25 59 6 35 29 6 51 7 30				(301) BCIS and USCGS: $52^{\circ}$ N $178^{\circ}$ W, H. $6^{\text{h}}14,1^{\text{m}}$ . JSA: $49^{\circ},3$ N $179^{\circ},5$ W, H. $6^{\text{h}}14^{\text{m}}02^{\text{s}}$ . Aleutian Islands region.
Sept. 20 (302)	eL F	13 44 14 05				(302) Disturbed by microseisms.
Sept. 20 (303)	eL F	18 09 18 35				(303) Disturbed by microseisms. Trieste: $34^{\circ},1$ N $26^{\circ},9$ E, H. $17^{\text{h}}59^{\text{m}}50^{\text{s}}$ . Southeast of Crete.
Sept. 21 (304)	eP eS	17 46 38 17 56 46				(304) BCIS: near Peninsula Malaya. F in next shock.
Sept. 21 (305)	eP eS eL F	17 58 38 18 02,1 18 04 18 50				(305) BCIS: $35^{\circ}\frac{1}{2}$ N $21^{\circ}\frac{1}{2}$ E, H. $17^{\text{h}}53,8^{\text{m}}$ . Roma: $38^{\circ}$ N $21^{\circ}$ E, H. $17^{\text{h}}54,0^{\text{m}}$ . Southwest of Greece.
Sept. 23 (306)	eP eS eL F	1 04,7 1 14 50 1 32 2 15				(306) Disturbed by microseisms. BCIS: $43^{\circ}$ N $142^{\circ}\frac{1}{2}$ E, H. $0^{\text{h}}52^{\text{m}}40^{\text{s}}$ . JSA: $41^{\circ}$ N $142^{\circ}$ E, H. $0^{\text{h}}52^{\text{m}}40^{\text{s}}$ . CMO: $40^{\circ},8$ N $143^{\circ},7$ E, h = 60 km. Japan.
Sept. 23 (307)	eP eS eL F	15 23 15 15 33,4 15 54 16 35				(307) BCIS: $42^{\circ}$ N $147^{\circ}\frac{1}{2}$ E, H. $15^{\text{h}}11,0^{\text{m}}$ . East of Hokkaido, Japan.
Sept. 24 (308)	ePP ePPP ePS eL F	21 02,1 21 04 45 21 12 04 21 55 23 10				(308) BCIS: Probably New Guinea.
Sept. 24 (309)	eP iPP eS eL F	23 40,8 23 44 21 23 51,5 0 15 1 05				(309) CMO: $22^{\circ}$ N $122^{\circ}$ E. BCIS: felt at Iloilo, Philippines.
Sept. 25 (310)	eL F	4 05 4 35				
Sept. 26 (311)	iPKP ePP eL F	1 18 24 1 20 39 2 00 2 25				(311) BCIS: $8^{\circ}\frac{1}{2}$ S $160^{\circ}$ E, H. $0^{\text{h}}59,2^{\text{m}}$ . Solomon Islands.

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks	
							h
Sept. 28 (312)	eP	21 48 12				(312) Disturbed by strong microseisms. USCGS: 23° N 94° E, H. 21 <sup>h</sup> 36,6 <sup>m</sup> . JSA: 22°,9 N 94°,4 E, H. 21 <sup>h</sup> 36 <sup>m</sup> 53 <sup>s</sup> , h = 100 km. Burma.	
	eS	21 57,4					
	eSS	22 02,0					
	eSSS	22 05					
	eL	22 09					
	F	23 00					
Sept. 30 (313)	eL	3 38				(313) Apia: H. 2 <sup>h</sup> 03,2 <sup>m</sup> . Samoan Islands.	
	F	3 45					
Sept. 30 (314)	eL	19 39					
	F	20 00					
Oct. 1 (315)	eL	3 55					
	F	4 25					
Oct. 1 (316)	iP	11 45 45	—			(316) USCGS: 17° N 99° W, H. 11 <sup>h</sup> 33,1 <sup>m</sup> , h = 100 km. JSA: 17°,4 N 99°,2 W, H. 11 <sup>h</sup> 33 <sup>m</sup> 11 <sup>s</sup> , h = 100 km. Felt in Guerrero, Mexico.	
	ipP	11 46 06	+				
	eS	11 56 21					
	esS	11 56 39					
	F	12 20					
Oct. 1 (317)	eL	22 22					
	F	22 30					
Oct. 2 (318)	ePKP	14 42,2				(318) BCIS: probably near Kermadec Islands.	
	eL	15 52					
	F	16 30					
Oct. 4 (319)	eL	5 38					
	F	5 50					
Oct. 4 (320)	iP	6 09 36	+			(320) BCIS: H. 5 <sup>h</sup> 56,7 <sup>m</sup> . Probably north of Philippines.	
	ePP	6 12 58					
	eS	6 20 06					
	eL	6 37					
	F	7 35					
Oct. 4 (321)	eL	11 51					
	F	12 00					
Oct. 5 (322)	eL	0 24					
	F	0 45					
Oct. 5 (323)	iP	20 19 37	—			(323) BCIS: 37°,6 N 57°,8 E, H. 20 <sup>h</sup> 12 <sup>m</sup> 07 <sup>s</sup> . USCGS: 38° N 58° E, H. 20 <sup>h</sup> 12,1 <sup>m</sup> . JSA: 36°,1 N 58°,5 E, H. 20 <sup>h</sup> 12 <sup>m</sup> 00 <sup>s</sup> . Destructive in Turkmen (SSR) and Iran.	
	ipP	20 19 42	—				
	iS	20 21 09					
	iS	20 25 42					
	eL	20 31					
	F	1 15					

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks	
							h
Oct. 6 (324)	iP	1 32 19	—			(324) Aftershock of (323). BCIS: H. 1 <sup>h</sup> 24,8 <sup>m</sup> .	
	iPP	1 33 51					
	eS	1 38 18					
	ePS	1 38 30					
	eSS	1 41 00					
	eL	1 46					
	F	2 30					
Oct. 7 (325)	e	1 57					
	F	2 05					
Oct. 8 (326)	eP	19 13 32	(+)			(326) BCIS: 28° N 105° E, H. 19 <sup>h</sup> 01,9 <sup>m</sup> . Roma: 25°,9 N 101° E, H. 19 <sup>h</sup> 02,1 <sup>m</sup> . Upper valley of the Yangtze Kiang (China)	
	eS	19 23 10					
	eSSS	19 31 30					
	eL	19 39					
	F	20 25					
Oct. 10 (327)	eL	2 44					
	F	3 15					
Oct. 10 (328)	eP	17 47 54				(328) BCIS: 35°,8 N 23°,4 E, H. 17 <sup>h</sup> 43,1 <sup>m</sup> . Trieste: 34°,8 N 24°,1 E, H. 17 <sup>h</sup> 42 <sup>m</sup> 54 <sup>s</sup> . Roma: 36°24' N 25°18' E, H. 17 <sup>h</sup> 42 <sup>m</sup> 54,3 <sup>s</sup> . Near Crete. (Greece).	
	eS	17 51 54					
	eL	17 54					
	F	18 30					
Oct. 11 (329)	e	17 33					
	F	17 45					
Oct. 12 (330)	iz	13 57 35	—			(330) BCIS: South Pacific Ocean, deep.	
Oct. 13 (331)	eL	14 38				(331) Disturbed by visitors.	
	F	15 00					
Oct. 15 (332)	ePP	23 04				(332) Disturbed by microseisms. USCGS: 60° S 20° W, H. 22 <sup>h</sup> 43,8 <sup>m</sup> . JSA: 60° S 19° W, H. 22 <sup>h</sup> 43 <sup>m</sup> 50 <sup>s</sup> . Sandwich Islands Group.	
	ePS	23 13					
	eSS	23 19					
	eL	23 38					
	F	1 30					
Oct. 16 (333)	e	15 29				(333) Disturbed by microseisms. BCIS: South Pacific Ocean.	
	F	15 34					
Oct. 18 (334)	eL	9 10				(334) Disturbed by very strong microseisms. BCIS: 35°,5 N 27°,2 E, H. 8 <sup>h</sup> 59 <sup>m</sup> 50 <sup>s</sup> . Roma: 35°,4 N 26°,8 E, H. 8 <sup>h</sup> 59 <sup>m</sup> 54 <sup>s</sup> . Trieste: 35°,6 N 27°,5 E, H. 8 <sup>h</sup> 59 <sup>m</sup> 55 <sup>s</sup> . Karpathos (Dodecanese)	
	F	9 30					
Oct. 19 (335)	e	3 17				(335) Disturbed by microseisms. BCIS: aftershock of (334), H. 3 <sup>h</sup> 04,5 <sup>m</sup> . Trieste: H. 3 <sup>h</sup> 04 <sup>m</sup> 33 <sup>s</sup> .	
	F	3 25					

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
Oct. 21 (336)	ePP ePKS ePS eL F	5 23 05 5 24 17 5 33,3 6 05 7 30				(336) Disturbed by microseisms. USCGS: 8° S 155° E, H. 5 <sup>h</sup> 01,8 <sup>m</sup> . JSA: 7°,2 S 156°,0 E, H. 5 <sup>h</sup> 01 <sup>m</sup> 40 <sup>s</sup> . Solomon Islands.
Oct. 23 (337)	eL F	5 29 6 00				(337) Disturbed by microseisms. BCIS: Formosa—Philippines region.
Oct. 23 (338)	eL F	16 17 16 50				(338) Disturbed by microseisms. BCIS: probably Kuril Islands region.
Oct. 26 (339)	eL F	20 37 21 05				
Oct. 27 (340)	eL F	19 05 19 30				(340) Disturbed by microseisms. USCGS: 17° N 61° W, H. 18 <sup>h</sup> 37,3 <sup>m</sup> . JSA: 17°,1 N 61°,4 W, H. 18 <sup>h</sup> 37 <sup>m</sup> 22 <sup>s</sup> . Lesser Antilles.
Oct. 28 (341)	iP iPP eS eL F	20 57 55 21 01 10 21 08 16 21 25 22 30	+	+		(341) BCIS: 36°½ N 141° E, H. 20 <sup>h</sup> 45 <sup>m</sup> 32 <sup>s</sup> , h = 100 km. USCGS: 36° N 141° E, H. 20 <sup>h</sup> 45,4 <sup>m</sup> , slightly deeper than normal. JSA: 37°,6 N 141°,1 E, H. 20 <sup>h</sup> 45 <sup>m</sup> 38 <sup>s</sup> , h = 100 km. CMO: 36°,2 N 141°,3 E. Near coast of Honshu, Japan.
Nov. 1 (342)	iP ePP eS eL F	12 17 11 12 19 46 12 26,5 12 42 14 00	+			(342) BCIS: 57° N 163° E, H. 12 <sup>h</sup> 05 <sup>m</sup> 53 <sup>s</sup> . USCGS: 57° N 161° E, H. 12 <sup>h</sup> 05,8 <sup>m</sup> . JSA: 56°,0 N 162°,8 E, H. 12 <sup>h</sup> 06 <sup>m</sup> 00 <sup>s</sup> . CMO: 56° N 161° E. Kamchatka.
Nov. 1 (343)	eL F	23 53 0 30				
Nov. 2 (344)	iP eS eL F	10 04 08 10 12 55 10 27 11 05				(344) BCIS: 5° N 65° E, H. 9 <sup>h</sup> 53,0 <sup>m</sup> , Indian Ocean.
Nov. 3 (345)	iPKP iz ePP eSSS eL F	5 38 34 5 39 20 5 42,1 6 07 6 27 7 35				(345) BCIS and USCGS: 20°½ S 169°½ E, H. 5 <sup>h</sup> 18,9 <sup>m</sup> . JSA: 19°,0 S 169°,0 E, H. 5 <sup>h</sup> 18 <sup>m</sup> 54 <sup>s</sup> . Loyalty Islands.
Nov. 12 (346)	ePKP eL F	17 54,0 18 58 19 10				(346) BCIS: 22° S 174° W, H. 17 <sup>h</sup> 33,6 <sup>m</sup> . Tonga Islands.

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
Nov. 13 (347)	iP eS eL F	4 49 23 4 53 03 4 55 5 30	(+)			(347) Disturbed by microseisms. BCIS: 40°½ N 27°½ E, H. 4 <sup>h</sup> 44,9 <sup>m</sup> . Roma: 39°,5 N 30°,7 E, H. 4 <sup>h</sup> 44 <sup>m</sup> 18 <sup>s</sup> . Sea of Marmara.
Nov. 13 (348)	iPKP eL F	7 20,3 8 20 9 30				(348) Disturbed by microseisms. Aftershock of (346). BCIS: 18° S 175° W, H. 7 <sup>h</sup> 00,4 <sup>m</sup> . JSA: 19°,6 S 175°,1 W, H. 7 <sup>h</sup> 00 <sup>m</sup> 30 <sup>s</sup> .
Nov. 13 (349)	eL F	9 58 10 10				(349) Disturbed by microseisms. BCIS: 41°,1 N 8°,9 E, H. 9 <sup>h</sup> 52 <sup>m</sup> 11 <sup>s</sup> . Roma: 40°56' N 8°53' E, H. 9 <sup>h</sup> 52 <sup>m</sup> 06 <sup>s</sup> . Felt at Sardinia and Corsica.
Nov. 13 (350)	ePKP eSS eL F	23 08 25 23 31 12 0 08 1 25				(350) BCIS: Probably aftershock of (346).
Nov. 14 (351)	eL F	6 57 7 30				(351) JSA: 39°,0 N 141°,8 E, H. 6 <sup>h</sup> 15 <sup>m</sup> 40 <sup>s</sup> . CMO: 36°,9 N 141°,6 E.
Nov. 14 (352)	eL F	15 22 15 45				(352) BCIS: South Pacific.
Nov. 17 (353)	e F	19 48 20 00				
Nov. 18 (354)	e F	0 54 1 05				
Nov. 19 (355)	iP ePP eS eL F	1 16 39 1 19,5 1 26,8 1 38 2 30				(355) Disturbed by microseisms. USCGS: 9° N 84° W, H. 1 <sup>h</sup> 04,3 <sup>m</sup> , h = about 100 km. JSA: 9°,8 N 83°,9 W, H. 1 <sup>h</sup> 04 <sup>m</sup> 26 <sup>s</sup> , h = about 100 km. Near coast of western Costa Rica.
Nov. 21 (356)	iPKP ipPKP ePP epPP eSS eSSS eL F	19 29 38 19 30 24 19 32 30 19 33 00 19 50 34 19 55 20 17 21 15	+	+		(356) Disturbed by microseisms. h = 175 km. BCIS: 14° S 167° E, H. 19 <sup>h</sup> 10 <sup>m</sup> 31 <sup>s</sup> , h = about 200 km. USCGS: 11° S 167° E, H. 19 <sup>h</sup> 10,6 <sup>m</sup> , h = about 150 km. JSA: 13°,1 S 166°,4 E, H. 19 <sup>h</sup> 10 <sup>m</sup> 34 <sup>s</sup> , h = about 200 km. Queen Charlotte Islands.
Nov. 22 (357)	eP eS eSS eL F	9 18 50 9 28,8 9 34,0 9 44 10 30				(357) Disturbed by microseisms. BCIS and USCGS: 51° N 180° W, H. 9 <sup>h</sup> 06,8 <sup>m</sup> . JSA: 48°,8 N 178°,5 E, H. 9 <sup>h</sup> 06 <sup>m</sup> 47 <sup>s</sup> . Aleutian Islands.

Date 1948	Phase	Time h m s	Direction	Period s	Amplitude μ	Remarks
Nov. 22 (358)	eL F	23 53 0 00				(358) Disturbed by strong microseisms. BCIS: 82° $\frac{1}{2}$ N 20° E, H. 23 <sup>h</sup> 33,0 <sup>m</sup> . North of Spitsbergen.
Nov. 26 (359)	ePP ePS eSS eL F	5 57,2 6 06 58 6 13 6 33 8 30				(359) Disturbed by microseisms. USCGS: 5° S 145° E, H. 5 <sup>h</sup> 36,5 <sup>m</sup> . JSA: 5°,0 S 145°,8 E, H. 5 <sup>h</sup> 36 <sup>m</sup> 36 <sup>s</sup> . New Guinea.
Nov. 27 (360)	e F	17 30 17 45				
Nov. 28 (361)	eP eS eSSS eL F	21 54 25 22 03 17 22 11,3 22 18 22 45				(361) BCIS: 27° N 94° E, H. 21 <sup>h</sup> 43,1 <sup>m</sup> . Northern Burma.
Dec. 1 (362)	eL F	19 47 20 10				(362) Disturbed by microseisms.
Dec. 4 (363)	iP ePP eS eSS eSSS eL F	0 35 28 0 38 46 0 46,1 0 51,5 0 55 1 02 2 00	+			(363) Disturbed by microseisms. USCGS: 21° $\frac{1}{2}$ N 106° $\frac{1}{2}$ W, H. 0 <sup>h</sup> 22,8 <sup>m</sup> . JSA: 21°,5 N 106°,1 W, H. 0 <sup>h</sup> 22 <sup>m</sup> 47 <sup>s</sup> . Off west coast of Mexico. Several casualties and damage on Maria Madre Island.
Dec. 4 (364)	eL F	23 20 23 50				(364) Disturbed by very strong microseisms. USCGS: 33°,9 N 116°,4 W, H. 23 <sup>h</sup> 43,15 <sup>m</sup> . JSA: 33°,9 N 116°,5 W, H. 23 <sup>h</sup> 43 <sup>m</sup> 17 <sup>s</sup> . Pasadena: 33°55' N 116°23' W, H. 23 <sup>h</sup> 43 <sup>m</sup> 17 <sup>s</sup> . Southern California.
Dec. 5 (365)	eL F	6 11 7 40				(365) Disturbed by very strong microseisms. BCIS and USCGS: 53° S 158° E, H. 6 <sup>h</sup> 26,4 <sup>m</sup> . JSA: 57° S 162° E, H. 6 <sup>h</sup> 25 <sup>m</sup> 37 <sup>s</sup> . Riverview 58° S 162° E. Southeast of New Zealand.
Dec. 6 (366)	eL F	14 56 15 10				(366) Disturbed by strong microseisms.
Dec. 8 (367)	e F	17 13 17 50				(367) Disturbed by strong microseisms.
Dec. 10 (368)	e F	2 25 2 37				(368) Disturbed by microseisms.
Dec. 10 (369)	iP eL F	9 53 31 10 21 11 00	+			(369) Disturbed by microseisms. BCIS and USCGS: 57° N 163° E, H. 9 <sup>h</sup> 42,5 <sup>m</sup> . JSA: 53°,0 N 160°,0 E, H. 9 <sup>h</sup> 42 <sup>m</sup> 10 <sup>s</sup> , h = 100 k. Near east coast of Kamchatka.

Date 1948	Phase	Time h m s	Direction	Period s	Amplitude μ	Remarks
Dec. 12 (370)	eP ePPS eL F	13 29 10 13 39,7 13 55 14 50				(370) Disturbed by very strong microseisms. USCGS: 52° N 178° E, H. 13 <sup>h</sup> 17,3 <sup>m</sup> , slightly deeper than normal. JSA: 52°,2 N 178°,2 E, H. 13 <sup>h</sup> 17 <sup>m</sup> 32 <sup>s</sup> , h = 60 km. Aleutian Islands.
Dec. 14 (371)	eL F	16 56 17 10				(371) Disturbed by strong microseisms.
Dec. 15 (372)	eL F	19 55 20 30				(372) Disturbed by strong microseisms. USCGS: 22° N 143° E, H. 19 <sup>h</sup> 11,4 <sup>m</sup> , h = about 200 km. JSA: 22°,0 N 142°,4 E, H. 19 <sup>h</sup> 11 <sup>m</sup> 50 <sup>s</sup> , h = about 250 km. Bonin Islands region.
Dec. 16 (373)	eL F	8 27 9 45				(373) Disturbed by strong microseisms. BCIS: 21° S 176° W, H. 7 <sup>h</sup> 18,2 <sup>m</sup> . USCGS: 20° S 179° W, H. 7 <sup>h</sup> 18,2 <sup>m</sup> . JSA: 20° S 177° W, H. 7 <sup>h</sup> 18,3 <sup>m</sup> . Fiji Islands region,
Dec. 18 (374)	eL F	15 27 15 45				(374) Disturbed by strong microseisms. BCIS: 18° S 168° E, H. 14 <sup>h</sup> 13,3 <sup>m</sup> . New Hebrides.
Dec. 19 (375)	eL F	6 13 6 20				(375) Disturbed by strong microseisms.
Dec. 20 (376)	eL F	23 50 0 20				(376) Disturbed by strong microseisms.
Dec. 21 (377)	eL F	20 45 21 15				(377) Disturbed by microseisms. USCGS: 19° N 69° $\frac{1}{2}$ W, H. 20 <sup>h</sup> 13,4 <sup>m</sup> . JSA: 19°,1 N 68°,3 W, H. 20 <sup>h</sup> 13 <sup>m</sup> 28 <sup>s</sup> . Near northeast coast of Dominican Republic.
Dec. 22 (378)	iz F	11 53 00 12 00				(378) Disturbed by microseisms.
Dec. 23 (379)	iP epP ePPP iS esS eSS eL F	8 52 36 8 53 10 8 57 00 9 01 56 9 02 42 9 06,5 9 19 10 30				(379) Disturbed by microseisms. USCGS: 56° N 166° E, H. 8 <sup>h</sup> 41,3 <sup>m</sup> , h = about 100 km. JSA: 55,4° N 166°,7 E, H. 8 <sup>h</sup> 41 <sup>m</sup> 25 <sup>s</sup> , h = about 100 km. Off east coast of Kamchatka.
Dec. 23 (380)	eL F	16 09 16 30				(380) Disturbed by microseisms.
Dec. 24 (381)	eL F	8 21 8 25				(381) Disturbed by microseisms.

Date 1948	Phase	Time	Direction	Period	Amplitude	Remarks
Dec. 24 (382)	eL F	9 40 10 00				(382) Disturbed by microseisms.
Dec. 26 (383)	eL F	7 55 8 30				(383) Disturbed by microseisms. USCGS: $22^{\circ}\frac{1}{2}$ S $69^{\circ}$ W, H. $7^{\text{h}}12,5^{\text{m}}$ , h=about 100 km. JSA: $22^{\circ},9$ S $68^{\circ},5$ W, H. $7^{\text{h}}12^{\text{m}}30^{\text{s}}$ , h=about 75 km. Northern Chile.
Dec. 26 (384)	eL F	10 37 11 00				(384) Disturbed by microseisms.
Dec. 28 (385)	eL F	5 33,7 5 45				(385) Disturbed by strong microseisms. BCIS: $36^{\circ}$ N $22^{\circ},9$ E, H. $5^{\text{h}}23,1^{\text{m}}$ . Off northwest coast of Crete.
Dec. 31 (386)	eL F	0 24 1 00				(386) Disturbed by very strong microseisms. USCGS: $51^{\circ}$ N $131^{\circ}$ W, H. $23^{\text{h}}49,9^{\text{m}}$ . JSA: $51^{\circ},5$ N $130^{\circ},0$ W, H. $23^{\text{h}}49^{\text{m}}53^{\text{s}}$ . Off coast of British Columbia.