國立中央研究院氣象研究所

地震季報

QUARTERLY SEISMOLOGICAL BULLETIN

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ACADEMIA SINICA

PEICHIKO, NANKING, CHINA.

中央研究院氣象研究所

INSTITUTE OF METEOROLOGY

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The National Research Institute of Meteorology acknowledges with thanks the receipt of the following seismological publications and bulletins from December 1, 1932, to March 1, 1933.

Stations	Bulletins
Apia	October-December, 1932.
Berkeley	April-September, 1931.
Buffalo	March-April, 1932.
Chiufeng	May-August, 1932.
Christchurch	December, 1932.
Denver	July-October, 1932.
Florissant	July-October, 1932.
Georgetown	November-December, 1932.
Hamburg	January-December, 1932.
Helwan	November-December, 1932.
Hohenheim	January-June, 1932.
Karlsrule	January-June, 1932.
Ksara	1921-1931.
Little Rock	April-May, 1932.
Manila	July-December, 1932.
Melbourne	October-December, 1932.
Mexico	January-December, 1929.
Ottawa	December, 1932.
Pasadena	August-October, 1932.
Perth	August-November, 1932.
Ravensburg	January-June, 1932.
Riverview	December, 1932.
St. Louis	October-November, 1932.
San Fernando	September, 1932.
Stuttgart	January-June, 1932.
Taihoku	January-December, 1932.
Wellington	December, 1932.
Zi-ka-wei	January-December, 1932.

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符號凡例

1. 地震之性質

I.	可辨別　II. 稍强　III. 强
d.	局部地震　(震源在一百粁以內)
v.	近地地震　(震源在一千粁以內)
r.	遠地地震　(震源在五千粁以內)
u.	極遠地震　(震源遠在五千粁之外)

2. 震波圖之相位

P	縱波　(或初期微動之第一前走波)
PR_1, PP	縱波對於地球表面經一次反射之波
PR_2, PPP	縱波對於地球表面經二次反射之波
S	橫波　(或初期微動之第二前走波)
SR_1, SS	橫波對於地球表面經一次反射之波
SR_2, SSS	橫波對於地球表面經二次反射之波
PS, SP	變轉波卽縱波(橫波)對於地球表面反射時所變轉之橫波(縱波)
L	主要動之地面波
M_1, M_2 …	地面波之極大動
C	終期尾動
F	能認別之最終動

3. 運動之種類等

i	相位之明顯者
e	相位之不明顯者
?	相位之可疑者
T	週期(以秒爲單位)
A	實際上地面震動之半震幅(以 μ, 千分之一耗, 爲單位)
△	震央距離(以粁爲單位)

Symbols and Notations

1. Character of the Earthquake—

I. Perceptible. II. Moderately strong. III. Strong.

d (terrae motus domesticus)	Local shock (origin less than 100 km. distant).
v (terrae motus vicinus)	Near shock (origin from 100 to 1,000 km. distant).
r (terrae motus remotus)	Distant shock (origin from 1,000 to 5,000 km. distant).
u (terrae motus ultimus)	Very distant shock or teleseism (origin more than 5,000 km. distant).

2. Phases of the Seismogram—

P (undae primae)	Normal first phase, or first preliminary tremors (longitudinal).
P'	First preliminary tremors which have penetrated the core of the earth.
PRn	Waves n times reflected at the earth's surface.
S (undae secundae)	Second phase, or second preliminary tremors (transverse).
SRn	Waves n times reflected at the earth's surface.
PS, SP	Waves changed from longitudinal to transverse oscillation or vice versa through reflection at the earth's surface.
PPS	Waves twice reflected at the earth's surface, having been longitudinal on two branches of the path and transverse on one branch.

In general, a bar over two letters denoting types of waves indicates refraction. The subscript c denotes the boundary at about 2900 km. depth between the metallic core and the middle shell which surrounds it. Thus:

$\overline{S_c P_c S}$	Waves which have penetrated the core, having been tranverse before entering and after leaving the core, and longitudinal within the core.
$\overline{P_c P_c P_c P}$	Waves refracted at the core boundary into the core, reflected once at this boundary while within the core and again refracted out of the core, having remained longitudinal on all branches of the path.

L (undae longae)	Long waves of surface phase preceding M.
M (undae maximae)	Shorter and more regular waves of large amplitude in the surface phase.
Mn	Maximum waves in the surface phase.
W_2, W_3, W_4 ...	The maximum waves coming again to the station after circumscribing the earth once, twice, etc.
C (coda)	Tail or end portion.
F (finis)	End of discernible movement.

For local earthquakes a special notation is used:

$\overline{P}$	The longitudinal wave which has traveled its whole path in the surface layer or crust of the earth.
$\overline{S}$	The transverse wave which has traveled its whole path in the surface layer of the earth.
P*	The longitudinal wave which has traveled the horizontal portion of its path in the intermediate layer.
S*	The corresponding transverse wave.

3. Nature of the motion—

i (impetus)	Sudden beginning of the motion.
e (emersio)	Gradual beginning of the motion.
?	Questionable or uncertain.
m	Maximum wave in any phase.

4. Time—

All determinations are reduced to Greenwich mean time. The contact clock which gives the time mark is daily corrected by radio with the time signal from Zi-ka-wei Observatory.

Constants of the Seismographs

Apparatus	Component	V	T_o	ϵ	$\frac{r}{T_o^2}$
Wiechert 17,000 kg.	N	1527	1.60	3.0	
	E	1510	1.50	4.2	
Wiechert 1,300 kg.	Z	150	4.80	3.4	

$\varnothing = 32°03'11''N$ $\lambda = 118°46'55''E$ h = 60m. Underground: Conglomerate.

No.	Date	Character	Phase	G. M. T. h.	m.	s.	Amplitude A_N	A_E	A_Z	Period T_N	T_E	T_Z	△	Remark
27	1932 Oct. 1	Ir	P	15	11	52							1810	Epicenter: Japan, far off to the NNW of Bonin Island(父島)Deep focus.
			S	15	14	56								
			F	15	22									
28	Oct. 2	Ir	P	3	18	23							2050	
			S	3	21	49								
			F	—	—									
29	Oct. 2	Iu	P?	3	30	—								A distant earthquake.
			eS_E	3	44	16								
			m_E	3	45	50								
			L?	3	50	53								
			M_{1Z}	4	15	28								
			M_{2Z}	4	22	40								
			M_{3Z}	4	31	25								
			M_{4Z}	4	36	45								
			F	4	50									
30	Oct. 3	Iv	P	13	24	1							670	Not recorded on Z.
			S	13	25	7								
			F	13	28									
31	Oct. 3	Iv	P	14	34	27							310	Not recorded on Z.

N. B. We are using the "Table of Travel Times, 1931." published by Rev. Fr. J. B. Macelwane (St. Louis University.)

Ø = 32°03'11"N λ = 118°46'55"E h = 60m. Underground: Conglomerate.

No.	Date	Character	Phase	G. M. T. h.	m.	s.	Amplitude A_N	A_E	A_Z	Period T_N	T_E	T_Z	△	Remark
	1932													
31	Oct. 3 (Contd.)	Iv	eS?	14	35	1								
			F	14	37									
32	Oct. 6	Ir	iP	5	4	17							1600	Epicenter in the sea bottom SW of Hachijo-sh. (八丈島), Japan.
			iS	5	7	0								
			F	5	12									
33	Oct. 9	IIv	eP_N	12	51	56							930	Epicenter in the sea bottom WSW of Yana-kuni-sh. (與那國島), Taiwan.
			iP_N	12	52	1								
			eS	12	53	28								
			i	12	54	7								
			L?	12	54	36								
			M_1	12	54	49								
			M_2	12	55	9								
			M?	12	55	39								
			C	13	0	18								
			F	13	17									
34	Oct. 16	I	iP_Z	12	18	7								A distant earthquake. Epicenter in Kamchatka.
			M_Z	12	50	21								
			eF	13	20									

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No.	Date	Character	Phase	G. M. T. h.	m.	s.	Amplitude A_N	A_E	A_Z	Period T_N	T_E	T_Z	△	Remark
35	1932 Oct. 23	IIIv	iP_N	21	29	52							950	Rather strong. Epicenter in Taiwan. 台灣花蓮港東北東海底
			S_N	21	31	25								
			i_Z	21	31	46								
			L_N ?	21	32	6								
			M_1	21	32	40			+117					
			M_2	21	32	58								
			F	22	0									
36	Oct. 25	Id	iP	0	18	0							89	Very sharply defined.
			iS	0	18	12								
			F	0	19	10								
37	Oct. 25	I	eP_E	12	47	35								Very small.
			i_E	12	49	10								
			i_E	12	49	52								
			F	12	56									
38	Oct. 25	Ir	eP	17	7	3							2250	Epicenter 145.°3 E 46.°3 N. in Japan. 樺太中知床岬東北東海底. Deep focus.
			S	17	10	47								
			F	17	20									
	Oct. 25-31		Strong Microseisms.											

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$\phi = 32°03'11''N$ $\lambda = 118°46'55''E$ h = 60m. Underground: Conglomerate,

No	Date	Character	Phase	G. M. T. h.	m.	s.	Amplitude A_N	A_E	A_Z	Period T_N	T_E	T_Z	△	Remark
	1932													
39	Oct. 29	I	S?	11	30	1								Uncertain. Probably surface waves of distant quake.
			L	11	34	8								
			F	11	47									
40	Oct. 30	Iu	iP_Z	20	57	1								A distant earthquake.
			M	21	29	6								
			F	21	46									
41	Nov. 3	Ir	P_E	19	48	37								Epicenter in the Caroline Islands. Increase in Period.
			e_E	19	56	17								
			F	20	8									
42	Nov. 6	Ir	eP	21	51	55							1470	
			eS	21	54	25								
			F	22	3									
43	Nov. 9	Ir	iP_E	18	35	27							2750	Very faint record on N-S.
			eS_E	18	39	49								
			L_N?	18	43	27								
			F	18	50									
	Nov. 12-15		Strong Microseisms.											

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No	Date	Character	Phase	G. M. T. h.	m.	s.	Amplitude A_N	A_E	A_Z	Period T_N	T_E	T_Z	△	Remark
44	1932 Nov. 12	I	P_Z?	22	54	39								Obscured by micro-seisms.
			F	23	1									
45	Nov. 13	IIr	iPz	4	50	51								Epicenter: Northern part of Japan Sea, 43.°5 N, 137.°3 E. Deep seated earthquake.
			iz	4	51	51								
			m	4	54	54								
			m	4	56	36								
			S?	4	57	30								
			iz	4	59	20								
			F	5	24									
46	Nov. 18	Ir	ePz	13	52	2								Epicenter: Eastward of the Philippine Islands.
			m	13	53	22								
			F	14	10									
	Nov. 20-21		Microseisms											
47	Nov. 22	I	iz	14	58	40								A distant quake. Very faint.
			ez	15	5	32								
48	Nov. 24	I	eP	23	42	18							1240	Beginning uncertain.
			eS	23	44	21								
			F	23	51									

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Ø = 32°03'11"N λ = 118°46'55"E h = 60m. Underground: Conglomerate.

No.	Date	Character	Phase	G. M. T. h.	m.	s.	Amplitude A_N	A_E	A_Z	Period T_N	T_E	T_Z	△	Remark
	1932													
	Nov. 25-26		Microseisms strong											
49	Nov. 26	Ir	iP_Z	4	27	43							2420	Destructive in Hokaido, Japan. Epc: The mouth of the river Sin-Kan-gawa, 42.4° N, 142.3°E. 新冠川河口。
			iS_Z	4	31	40								
			SS_Z	4	32	40								
			L	4	34	28								
			M_1	4	37	3								
			M_2	4	39	58								
			M_3	4	42	46								
			M_4	4	45	49								
			M_5	4	47	56								
			F	5	4									
50	Nov. 28	I	iP_E	3	42	4							2270	
			eS_E	3	45	49								
			eL_E	3	50	39								
			F	4	00									
51	Nov. 29	I	P_Z	11	31	1							2420	Very slight trace.
			e_Z	11	36	15								
			e_Z	11	43	5								
			e_Z	12	4	45								May be another quake.

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Ø = 32°03'11''N λ = 118°46'55''E h = 60m. Underground: Conglomerate.

No.	Date	Character	Phase	G. M. T. h.	m.	s.	Amplitude A_N	A_E	A_Z	Period T_N	T_E	T_Z	△	Remark
51	1932 Nov. 29 (Contd.)	I	e_Z	12	31	55								Very long period waves continuing for about 30 minutes.
52	Nov. 29	Iv	P_Z	15	30	35								Obscured by a minute mark.
			F	15	41									
53	Dec. 4	IIr	iP_N	8	17	22							3300	Epc. 122°E, 2°N north of Celebes Island.
			iP_Z	8	17	21							3250	Deep focus
			$PP_{Z,N}$	8	18	51								
			eS_N	8	22	24								
			eS_Z	8	22	20								
			i_Z	8	23	7			-97			12		A solitary wave.
			i_Z	8	24	42								
			i_Z	8	26	48								
			L	8	27	17								
			M_1	8	29	3			444			18		Very well defined.
			M_2	8	33	2			†99			14		
			M_3	8	36	31								
			M_4	8	38	16								
			M_5	8	40	48								
			C	8	46	48								
			F	9	20									
54	Dec. 4	Ir	eP_N	10	39	5							3240	Epc. Same as No. 53.

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No	Date	Character	Phase	G. M. T. h.	m.	s.	Amplitude A_N	A_E	A_Z	Period T_N	T_E	T_Z	△	Remark
	1932													
54	Dec. 4 (Contd.)	Ir	P_Z	10	39	9							3200	
			$S_{Z,N}$	10	44	3								
			M	10	50	48								
			F	11	18									
	Dec. 6-8		Strong Microseisms											
55	Dec. 7	Iu		17-18										Long period as well as long duration surface waves were feebly recorded.
56	Dec. 8	I	eP_Z	15	22	7								
			L?	15	31	9								
			M	15	34	23								
			F	15	51									
57	Dec. 11	Iu	eP	4	32	31							6330?	A distant quake.
			eS?	4	40	13								
			F	5	6									
	Dec. 13		Strong Microseism											
58	Dec. 15	I	eP	19	38	31								Epc. 122.1°E 21.6°N.
			m_Z	19	39	54						4		Felt at Taito, Formosa.
			F	20	5									

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No.	Date	Character	Phase	G. M. T. h.	m.	s.	Amplitude A_N	A_E	A_Z	Period T_N	T_E	T_Z	△	Remark
	1932													
59	Dec. 16	Ir	eP	7	19	53								East of the Philippine Islands.
			eL?	7	28	59								
60	Dec. 20													Very slight trace of surface waves was recorded about $12^h\ 40^m$. Epc. Japan?
61	Dec. 21	Iu	eP_E	6	23	23								A distant earthquake.
			PR_1	6	27	0								
			PR_2	6	29	17								
			S_E?	6	33	55								
			M	6	54	40								Very long period.
			F	8	0									
62	Dec. 24	Ir	$P_{N,E}$	6	38	42							4650	Epc. 148°E, 3°S nearby to New Guinea.
			S_N	6	45	8								
			eL	6	48	31								
			M	6	51	25						27		
			F	7	15									
63	Dec. 25	IIIr	$iP_{N,P,Z}$	2	8	55	−63	†116	†53	11	10	8	2330	The great Kansu earthquake. Azi. S62°E up, dist. 21° gives an epicenter at 39°N 95°E which agrees closely with that determined by the steoreographic method. Reported shaken disastrously at the northwestern part of the province of Kansu.
			iS_N	2	12	44							2350	
			iS_Z	2	12	46			759			14		
			L_Z	2	14	35								
			All three components are out of scale.											
			F	4	18									

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No	Date	Character	Phase	G. M. T. h.	m.	s.	Amplitude A_N	A_E	A_Z	Period T_N	T_E	T_Z	△	Remark
64	1932 Dec. 25	I	e	3	3	20								The 1st after shock. Superposed on the main shock.
			F	3	15									
65	Dec. 25	I	eP	6	12	57								The 2nd. after shock.
			F	6	24									No further phases distinguishable.
66	Dec. 25	I	eP	8	3	44								The 3rd. after shock.
			F	8	14									
67	Dec. 25	I	eP	11	22	45								The 4th. after shock.
			F	11	33									
68	Dec. 25	I	eP	12	30	34								The 5th. after shock.
			F	12	42									
69	Dec. 25	I	eP	17	15	37								The 6th. after shock.
			F	17	20									
70	Dec. 25	I	eP?	20	11	22								The 7th. after shock.
			F	20	19									
71	Dec. 26	I	eP	16	10	34								The 8th. after shock.
			F	16	18									

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No.	Date	Character	Phase	G. M. T. h.	m.	s.	Amplitude A_N	A_E	A_Z	Period T_N	T_E	T_Z	△	Remark
	1932													
72	Dec. 26	IIIv	$iP_{N,E,Z}$	21	16	35							910	P phase much stronger than all others. Epc. 126.3°E, 25.2°N. Felt at Naha and Ishigakish.
			iS_Z	21	18	5								
			m_Z	21	18	32			40			5		
			C	21	26	18								
			F	21	50									
73	Dec. 26	I	iP	22	35	55								Probably the after shock of the former (No. 71).
			F	22	48									
74	Dec. 28	I	eP	8	29	46								Very feebly recorded.
			e	8	35	36								
			F	—	—									

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