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驚 峯 地 震 研 究 室

地 震 專 報

Seismological Bulletin

The Chiufeng Seismic Station

Lat. $40^{\circ} 3' 55''$ N Long. $116^{\circ} 5' 46''$ E

No. 3.

Jan.—Feb. 1931.

Published by

The Geological Survey of China

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(2) r in mm

$$r = \frac{\frac{n-1}{2} \sum l - \epsilon_0 \sum l}{2(n-1)(\epsilon_0 + 1)}$$

$$\epsilon_0 = \frac{l_1 - l_{n-1}}{l_2 - l_n}$$

	Trial	l ₁	l ₂	l ₃	l ₄	l ₅	l ₆	l ₇	l ₈	l ₉	l ₁₀
E	1	24	21	18	16	15	13.5	12	10.5	9	8
	2	35.5	31.5	26.5	23.5	21	18.5	16.5	14.5	12.5	10.5
	3	25.5	22.5	19.5	17	15.5	13.5	11.5	10	9	7.5
N	1	20.5	18	16	14.5	13	11.5	9.5	8.5	7	6
	2	16	14	12.5	10.5	9	7.5	6.5	5.5	4.5	3
	3	25.5	22.5	20.5	18	16	14	12	10	8.5	6.5
Z	1	26.5	23	20	17.5	15	13	11	10	8.5	7
	2	33.5	29.5	25.5	22.5	19.5	17	14.5	12	10	8
	3	26	22.5	19.5	17	14.5	12.5	10.5	8.5	7	5.5

l ₁₂	l ₁₃	l ₁₄	l ₁₅	l ₁₆	l ₁₇	l ₁₈	l ₁₉	l ₂₀	$\frac{n}{\sum l}$	ϵ_0	r	Mean
5.5	4.5	3.5	2.5	1.5	1				172.5	1.1	.16	rE=.16
8	7	6	5	4	2.5	1.5	1		254.5	1.1	.16	
5	4.5	3.5	2.5	2	1				176	1.1	.14	
3.5	2.5	1.5	1						137.5	1.11	.11	rN=.11
1									92	1.08	.21	
4	2.5	1.5	.5						167	1.09	.21	
5	4	3	2	1					172.5	1.1	.17	rZ=.17
4.5	3	1.5	1						208	1.1	.21	
2.5	1.5	.5							152	1.1	.23	

(3) ϵ

$$\epsilon = \frac{Y_1 - r}{Y_2 + r}$$

	E			N			Z			Mean
Trial	Y ₁	Y ₂	ϵ	Y ₁	Y ₂	ϵ	Y ₁	Y ₂	ϵ	
1	6.5	1.5	3.8	7.5	2	3.3	9	2.5	3.2	$\epsilon E = 3.8$
2	4.5	1	3.7	7.5	2	3.3	7.5	2	3.3	$\epsilon N = 3.3$
3	4.5	1	3.7	5.5	1.5	3.2	7	2	3.1	$\epsilon Z = 3.2$

(4) R in mg.

$$R \text{ (Horizontal)} = 800000 \cdot \frac{r}{T_0^2 V^2}$$

$$R \text{ (Vertical)} = 320000 \cdot \frac{r}{T_0^2 V^2}$$

RE = .35

RN = .43

RZ = .34

SEISMIC DATA

PP. 10

 $\varphi 40^{\circ} 3' 55''$ $\lambda 116^{\circ} 5' 46''$ $h 155$ m.

Rock-foundation

Constants		V	T_0	ϵ	r/T_0^2
		AN	95.5	5.6	3.3
Jan. 10.	AE	100.4	5.8	3.8	.0045
	AZ	81.7	4.6	3.2	.0088

Apparatus

I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Sign	Remark	
		(Greenwich)			N-S	E-W	Z	AN	AE	AZ			
		h	m	s	s	s	s	μ	μ	μ			km
30 Jan. 1, 31	iPN	23	57	14	5							2456	
" " " "	iPE	"	"	16									
" " 2 "	SN?	0	1	8									
" " " "	FN	0	46										
31 " 2 "	PZ	10	8	4									
" " " "	FZ	11	13										
32 " 12 "	ePE	20	42	19									
" " " "	FE	21	21										
33 " 15 "	eP'E?	2	9	6								14989	
" " " "	PPE	"	10	46									
" " " "	P ₄ P ₄ SE?	"	12	2									
" " " "	S ₄ P ₄ SE?	"	14	31									
" " " "	PSE?	"	19	57									
" " " "	SSE?	"	26	48									
" " " "	SSSE?	"	31	4									
" " " "	LE	"	44	36									
" " " "	ME ₁	"	54	36									

S. P. Lee

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Uni., 1927).

Seismic Data

SEISMIC DATA

PP. 11

 $\varphi 40^{\circ} 3' 55''$ $\lambda 116^{\circ} 5' 46''$ $h 155$ m.

Rock-foundation

Constants		V	T_0	ϵ	r/T_0^2
		AN	95.5	5.6	3.3
Jan. 10	AE	100.4	5.8	3.8	.0045
	AZ	81.7	4.6	3.2	.0088

Apparatus

I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	AZ			
		h	m	s	s	s	s	μ	μ	μ			
33 Jan. 15' 31	ME ₃	2	58	36			23						
" " " "	FE	4	37										
34 " 15 "	PN	21	5	5								1544	
" " " "	eSE	"	7	45									
" " " "	LN?	"	10	14									
" " " "	FN	22	4										
35 " 15 "	eN	"	51	54								5522	
" " " "	eSE?	"	59	2									
" " " "	FE	23	33										
36 " 24 "	eZ	13	47	26								3422	
" " " "	eE	"	"	28									
" " " "	eSE?	"	52	"									
" " " "	FE	14	43										
37 " 24 "	eN?	15	6	0									
" " " "	FN	"	24										
38 " 27 "	iPN	20	14	9								2511	
" " " "	pPE	"	15	19			6						
" " " "	iE	"	17	39			6						
" " " "	iSN	"	18	1	14								
" " " "	iSSN	"	19	8									

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SEISMIC DATA

PP. 12

 φ $40^{\circ} 3' 55''$ λ $116^{\circ} 5' 46''$ h 155 m. Rock-foundation

Constants		V	T_0	ϵ	r/T_0^2	
Jan. 10	AN	95.5	5.6	3.3	.0051	I. 200kg Horizontal Wiechert II. 80kg Vertical Wiechert
	AE	100.4	5.8	3.8	.0045	
	AZ	81.7	4.6	3.2	.0088	

No. & Date	Phase	Time (Greenwich)			Period			Amplitude			Δ	Sign	Remark
		h	m	s	N-S	E-W	Z	AN	AE	AZ			
					s	s	s	μ	μ	μ			
38 Jan. 27, '31	LE	20	20	19									
" " " "	MN ₁	"	"	50								-	Registration on the south is not very clear
" " " "	ME ₁	"	"	56								+	
" " " "	ME ₂	"	21	41		9			232			-	
" " " "	MN ₂	"	"	42	9								
" " " "	MN ₃	"	22	14	9								
" " " "	ME ₃	"	"	33		10			56			+	
" " " "	ME ₄	"	23	5		9			232			-	
" " " "	MN ₄	"	"	9	9								
" " " "	ME ₅	"	"	30		10			146			+	
" " " "	MN ₅	"	"	54	9								
" " " "	ME ₆	"	24	28		10			60			-	
" " " "	MN ₆	"	"	29	10								
" " " "	ME ₇	"	25	21		9			88			-	
" " " "	MN ₇	"	"	59	10				80			-	
" " " "	ME ₈	"	26	23		7			114			-	
" " " "	MN ₈	"	"	34	9				84			+	

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SEISMIC DATA

PP. 13

 φ $40^{\circ} 3' 55''$ λ $116^{\circ} 5' 46''$ h 155 m. Rock-foundation

Constants		V	T_0	ϵ	r/T_0^2	
due to Jan. 10	AN	95.5	5.6	3.3	.0051	I. 200kg Horizontal Wiechert II. 80kg Vertical Wiechert
	AE	100.4	5.8	3.8	.0045	
	AZ	81.7	4.6	3.2	.0088	

No. & Date	Phase	Time (Greenwich)			Period			Amplitude			Δ	Sign	Remark
		h	m	s	N-S	E-W	Z	AN	AE	AZ			
					s	s	s	μ	μ	μ			
38 Jan. 27 '31	ME ₉	20	27	10		7			86			-	
" " " "	MN ₉	"	"	36	9				74			+	
" " " "	ME ₁₀	"	"	40		7			67			+	
" " " "	MN ₁₀	"	28	11	9				58			+	
" " " "	MN ₁₁	"	"	4	9				52			-	
" " " "	ME ₁₁	"	"	14		7			67			-	
" " " "	ME ₁₂	"	"	34		"			"			-	
" " " "	MN ₁₂	"	29	19	9				37			+	
" " " "	ME ₁₃	"	"	24		7			57			-	
" " " "	MN ₁₃	"	"	59	9				31			+	
" " " "	ME ₁₄	"	30	29		9			11			-	
" " " "	MN ₁₄	"	"	34	9				21			+	
" " " "	ME ₁₅	"	31	9		9			27			-	
" " " "	MN ₁₅	"	"	51	10				16			-	
" " " "	MN ₁₆	"	32	56	10							+	
" " " "	ME ₁₆	"	33	14		9			27			+	
" " " "	MN ₁₇	"	35	31	9							+	

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SEISMIC DATA

PP. 14

φ 40° 3' 55" λ 116° 5' 46" h 155 m.

Rock-foundation

Constants		V	T ₀	ϵ	r/T_0^2
due to	AN	95.5	5.6	3.3	.0051
Jan. 10.	AE	100.4	5.8	3.8	.0045
	AZ	81.7	4.6	3.2	.0088

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time (Greenwich)			Period			Amplitude			Δ	sign	Remark
		h	m	s	N-S	E-W	Z	AN	AE	AZ			
38 Jan. 27, '31	ME ₁₇	20	36	24		12						-	
" " " "	MN ₁₈	"	37	34	12							+	
" " " "	MN ₁₉	"	39	49	10							+	
" " " "	FE	23	11										
39 " 28 "	iPN	21	31	29	4						4389	+	
" " " "	PPE	"	33	4									
" " " "	iSE	"	37	30		6						+	
" " " "	SSN	"	38	35									
" " " "	LN	"	40	51									
" " " "	iE ₁	"	43	35		15						-	
" " " "	iE ₂	"	45	30		14						+	
" " " "	iE ₃	"	46	45		15						+	
" " " "	FN	22	58										
40 Feb. 2, '31	ePN	23	0	22							9822		
" " " "	eS ₄ P ₄ SE?	"	10	44									
" " " "	LE	"	30	2		35							
" " 3 "	FN	1	50										

The epicenter of this earthquake is probably near Napier, New Zealand.

S. P. Lee

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Uni., 1927).



SEISMIC DATA

PP. 15

φ 40° 3' 55" λ 116° 5' 46" h 155 m.

Rock-foundation

Constants		V	T ₀	ϵ	r/T_0^2
due to	AN	95.5	5.6	3.3	.0051
Jan. 10.	AE	100.4	5.8	3.8	.0045
	AZ	81.7	4.6	3.2	.0088

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time (Greenwich)			Period			Amplitude			Δ	Sian	Remark
		h	m	s	N-S	E-W	Z	AN	AE	AZ			
41 Feb 10, '31	ePE	1	28	8							2389		
" " " "	eSN	"	31	58									
" " " "	LN?	"	34	12									
" " " "	FE	2	45										
42 Feb 10, '31	ePZ	6	43	0									
" " " "	MN	7	4	35	19								
" " " "	ME	"	"	50		19							
" " " "	MZ	"	5	0			19						
" " " "	FE	8	30										
43 Feb 11, '31	ePE	19	47	5									
" " 12 "	FN	20	42										
44 Feb 12, '31	ePN	5	52	30									
" " " "	FE	6	50										
45 Feb 13, '31	ePN	0	44	32							9822		Another shock in New Zealand.
" " " "	PPE	"	47	34									
" " " "	FE	2	40										
46 Feb 14, '31	ePE	14	6	45									

S. P. Lee

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Uni., 1927).

SEISMIC DATA

PP. 16

φ 40° 3' 55" λ 116° 5' 46" h 115 m.

Rock-foundation

Constants		V	T ₀	ϵ	r/T ₀ ²
		AN	95.5	5.6	3.3
due to Jan. 10.	AE	100.4	5.8	3.8	.0045
	AZ	81.7	4.6	3.2	.0088

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time (Greenwich)			Period			Amplitude			Sign	Remark
		N-S	E-W	Z	AN	AE	AZ	km				
		h	m	s	s	s	s		μ	μ		
46 Feb. 14 '31	FE	15	25									
47 " 16 "	ePZ	18	53	8							2789	
" " " "	SE?	"	57	26								
" " " "	LN	"	59	10								
" " " "	FE	19	57									
48 " 19 "	ePZ	17	48	58							5567	
" " " "	ePN	"	"	"								
" " " "	eSN	"	56	7								
" " " "	FE	19	21									
49 " 20 "	iPZ	5	37	43		4					1200	-
" " " "	iSN	"	40	20	7			250				+
" " " "	LN?	"	"	59								
" " " "	MZ ₁	"	41	30								
" " " "	MN ₁	"	"	35	7			250				-
" " " "	ME ₁	"	"	42		7			110			-
" " " "	ME ₂	"	42	21		6			61			-
" " " "	MN ₂	"	"	30	6				53			-

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Uni., 1927).

S. P. Lee



SEISMIC DATA

PP. 17

φ 40° 3' 55" λ 116° 5' 46" h 155 m.

Rock-foundation

Constants		V	T ₀	ϵ	r/T ₀ ²
		AN	95.5	5.6	3.3
due to Jan 10	AE	100.4	5.8	3.8	.0045
	AZ	81.7	4.6	3.2	.0088

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time (Greenwich)			Period			Amplitude			Δ	Sign	Remark
		N-S	E-W	Z	AN	Ae	AZ	km					
		h	m	s	s	s	s						
49 Feb 20, 1 '31	ME ₃	5	43	1		6			54				
" " " "	MN ₃	"	"	19	7			48				+	
" " " "	FE	7	20									+	
50 " 27, "	epN	9	45	10						427 ⁸			
" " " "	eSN	"	51	1									
" " " "	FE	10	40										

S. P. Lee

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DETERMINATION OF CONSTANTS

FOR MARCH 1931

PERMANENT CONSTANTS

- (a) of Horizontal Component
M (Steady mass) 200 kg.
H (Height of c.g. of the steady mass above the turning point) 96 cm.
- (b) of Vertical Component
M (Steady mass) 80 kg.
h (Distance of c.g. of the steady mass from the turning point) 54 cm.
h' (Distance of the adding weight from the turning point) 60 cm.

(1) T_0 in sec. & V

Trial	3. T_0 E	3. T_0 N	3. T_0 Z	Mean
1	17 $\frac{1}{2}$	16 $\frac{3}{4}$	14	T_0 E = 5.97
2	17 $\frac{3}{4}$	17	14 $\frac{1}{2}$	T_0 N = 5.61
3	18 $\frac{1}{2}$	16 $\frac{1}{2}$	14 $\frac{3}{4}$	T_0 Z = 4.74

V (Separately determined) = $3840 \left(\frac{a}{m T_0^2} \right)$ (points apart 20 cm.)

V (Simultaneously determined) = $5420 \left(\frac{a}{m T_0^2} \right)$

V (Vertical) = $288 \left(\frac{a}{m' T_0^2} \right)$

Trial	M = 20 g.						M' = 2 g.				Mean
	aE		VE		aN		VN		aZ	VZ	
	Sep.	Simul.	Sep.	Simul.	Sep.	Simul.	Sep.	Simul.			
1	18.1	12.8	97.5	97	15.1	11.3	91.2	97	12.4	79.5	VE = 97.3
2	18	13	97.2	98.8	16	11.3	96	97.6	12.3	79	VN = 96.1
3	17.75	13	96	98.8	15.75	11.4	96	98.8	12.5	80.1	VZ = 79.5

(2) r in mm.

$$r = \frac{\sum_1^{n-1} l - \varepsilon_0 \sum_2^n l}{2(n-1)(1+\varepsilon_0)}$$

$$\varepsilon_0 = \frac{l_1 - l_{n-1}}{l_2 - l_n}$$

Trial		l ₁	l ₂	l ₃	l ₄	l ₅	l ₆	l ₇	l ₈	l ₉	l ₁₀	l ₁₁	l ₁₂
E	1	25.5	22.25	19.5	16.5	14.5	12.5	11	9.25	7.75	6.25	5.25	3.1
	2	33.75	29.75	26.25	23.5	20.75	17.75	15.4	13.25	11.25	9.6	8.2	6.0
	3	22.3	19.5	17	14.7	12.7	10.8	9.25	7.8	6.5	5.2	4.2	3.1
N	1	37.25	33.75	30.75	27.5	25	22.5	20.25	18	15.75	14	11.75	10.0
	2	18	15.75	13.5	12	10.75	9	7.75	6	4.75	3.5	2.25	1.3
	3	37.75	34.5	31.25	28.5	25.75	23.25	20.75	18.75	16.5	14.6	13	10.2
Z	1	23.5	21.4	19.5	17.5	16	14.25	13	11.9	10.4	9.25	7.2	6.0
	2	28.6	26	23.5	21.4	19.25	17.5	15.5	14.25	12.5	11.25	9.25	8.0
	3	26.25	23.5	20.75	18.25	16.2	14.25	12.5	10.8	9.2	8	6.7	5.0

l ₁₃	l ₁₄	l ₁₅	l ₁₆	l ₁₇	l ₁₈	l ₁₉	l ₂₀	∑ ₁ ⁿ l	ε ₀	r	Mean
1.75	1.5							159.75	1.1	.194	r E = .205
5.4	4.25	3	2	1.2				232	1.1	.19	
2.2	1.3	.75						137.4	1.08	.23	
9.5	8	6.5	5.25	4.25	3	2	1.25	306.75	1.08	.18	r N = .202
9.75	8.25	6.8	5.5	4.75	3.6	2.1	1.2	104.5	1.08	.21	
5.3	4.15	3.25	2.5	1.75	1.2	.75		316.75	1.07	.216	
7.25	6.25	5.2	4.25	3.26	2.4	1.75	1.2	189.05	1.08	.128	r Z = .141
4.5	3.4	2.25	1.3	.65				238.81	1.08	.134	
								184	1.09	.16	



(3) ε

$$\varepsilon = \frac{Y_1 - r}{Y_2 + r}$$

Trial	E			N			Z			Mean
	Y ₁	Y ₂	ε	Y ₁	Y ₂	ε	Y ₁	Y ₂	ε	
1	7	1.7	3.6	7.3	1.8	3.6	7.5	1.8	3.8	εE = 3.7
2	3.75	.75	3.7	7	2	3.1	12.25	3.3	3.5	εN = 3.4
3	6.4	1.4	3.8	8.5	2.25	3.4	11	3	3.5	εZ = 3.65

(4) R in mg.

$$R \text{ (Horizontal)} = 800000 \cdot \frac{r}{T_0^2 V^2}$$

$$R \text{ (Vertical)} = 320000 \cdot \frac{r}{T_0^2 V^2}$$

RE = .47

RN = .55

RZ = .32

SEISMIC DATA

PP. 19

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

		V	T ₀	ϵ	r/T ₀ ²
Constants due to Mar. 8, '31	AN	96.1	5.61	3.4	.0064
	AE	97.3	5.97	3.7	.0057
	AZ	79.5	4.74	3.7	.0063

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark	
		(Greenwich)			N-S	E-W	Z	AN	AE	AZ				
		h	m	s	s	s	s	μ	μ	μ				km
51 Mar. 2, '31	ePE	2	30	29									8667	
" " " "	SN?	"	40	31	S									
" " " "	FE	3	29	0										
52 " 8, "	ePE	2	1	11										
" " " "	FE	3	36	0										
53 " 9, "	PZ	3	53	28									2300	The epicentre is near at Hakodate, South Yesso, Japan.
" " " "	iPPZ	"	"	51									-	
" " " "	iSN	"	57	13									+	
" " " "	iSSN	"	"	55	7									-73
" " " "	LE	"	58	59										
" " " "	MN ₁	4	0	17	16									-16
" " " "	MN ₂	"	"	57	15									-22
" " " "	ME ₁	"	1	5	17									+37
" " " "	MN ₂	"	"	7	12									
" " " "	MZ ₁	"	"	13										16
" " " "	ME ₂	"	2	22	12									-18
" " " "	MZ ₂	"	"	26	12									+44
" " " "														-14

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Univ., 1927).



SEISMIC DATA

PP. 20

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

		V	T ₀	ϵ	r/T ₀ ²
Constants due to Mar. 8, '31	AN	96.1	5.61	3.4	.0064
	AE	97.3	5.97	3.7	.0057
	AZ	79.5	4.74	3.7	.0063

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark	
		(Greenwich)			N-S	E-W	Z	AN	AE	AZ				
		h	m	s	s	s	s	μ	μ	μ				km
53 Mar. 9, '31	MN ₄	4	2	47	12									
" " " "	MZ ₂	"	"	53										12
" " " "	MZ ₄	"	3	1										-14
" " " "	MZ ₄	"	3	1										11
" " " "	ME ₂	"	"	11	12									-29
" " " "	MN ₅	"	"	22	13									+16
" " " "	MZ ₅	"	"	44										12
" " " "	ME ₄	"	"	56	12									-20
" " " "	ME ₅	"	4	38	12									
" " " "	MZ ₆	"	"	49										11
" " " "	MN ₆	"	5	25	12									
" " " "	ME ₆	"	"	43	12									
" " " "	ME ₇	"	8	13	15									
" " " "	ME ₈	"	9	12	12									
" " " "	ME ₉	"	11	14	13									
" " " "	ME ₁₀	"	12	46	12									
" " " "	ME ₁₁	"	13	43	11									
" " " "	ME ₁₂	"	14	50	12									

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Univ., 1927).

SEISMIC DATA

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to		V	T ₀	ϵ	r/T_0^2
		AN	96.1	5.61	3.4
Mar. 8, '31	AE	97.3	5.97	3.7	.0057
	Az	79.5	4.74	3.7	.0063

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
53 Mar. 9, '31	FE	5	59	0									
54 " 11, '31	ePE	12	32	36							3267		
" " " "	eSE	"	37	26									
" " " "	FE	13	51	0									
55 " 12, "	ePE	10	46	38									
" " " "	FE	11	47	0									
56 " 15, "	ePE	16	38	7									
" " " "	FE	17	13	0									
57 " 18, "	ePE	8	11	15									
" " " "	FN	10	38	0									
58 " " "	ePN	20	20	36							3833		
" " " "	iSE	"	26	3			5						
" " " "	iE ₁	"	30	49								-	
" " " "	iE ₂	"	31	22			6					+	
" " " "	FE	21	58	0					-50				
59 " 19, "	PN	6	30	2									
" " " "	iPPN	"	"	22			5				2356		

The time-mark is not Clear on Z-Component.

The earthquake is Southern China.

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Univ., 1927).



SEISMIC DATA

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to		V	T ₀	ϵ	r/T_0^2
		AN	96.1	5.61	3.4
Mar. 8, '31	AE	97.3	5.97	3.7	.0057
	Az	79.5	4.74	3.7	.0063

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
59 Mar. 19, '31	iSE	6	34	0									→
" " " "	iSSE	"	"	35			6			+169			
" " " "	FE	7	"	0									
60 " 28, "	PN	12	47	15								5200	
" " " "	iSE	"	54	3									-
" " " "	FE	14	21	0									
61 " 29, "	ePE	17	56	21								2400	
" " " "	SE	18	0	13									
" " " "	FE	"	28	0									
62 Apr. 3, "	ePE	23	30	46									
" " 4, "	FE	0	12	0									
63 " 6, "	ePE	6	54	10									
" " " "	FN?	8	4	0									
64 " 8, "	ePE	19	11	24									
" " " "	FN	20	15	0									
65 " 9, "	ePE	23	6	15								2544	
" " " "	SE	"	10	16									

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Univ., 1927).

SEISMIC DATA

PP. 23

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to		V	T_0	ϵ	r/T_0^2
		AN	96.1	5.61	3.4
Mar. 8, '31	AE	97.3	5.97	3.7	.0057
	AZ	79.5	4.74	3.7	.0063

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	AZ		
		h	m	s	s	s	s	μ	μ	μ		
65 Apr. 9, '31	FE	0	10	0								
66 " 19, "	ePE	2	35	39								
" " " "	FE	3	18	0								
67 " 24, "	ePE	17	32	5								
" " " "	FE	18	47	0								
68 " 28, "	ePN	16	59	46								
" " " "	FE	18	2	0								

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Univ., 1927).

S. P. Lee
L. H. Chia, Assist.



DETERMINATION OF CONSTANTS

FOR MAY 1931

PERMANENT CONSTANTS

- (a) of Horizontal Component
 - M (Steady mass) 200 kg.
 - H (Height of c.g. of the steady mass above the turning point) 96 cm.
- (b) of Vertical component
 - M (Steady mass) 80 kg.
 - h (Distance of c.g. of the steady mass from the turning point) 54 cm.
 - h' (Distance of the adding weight from the turning point) 60 cm.

(1) T_0 in sec. & V

Trial	3. T_0 E	3. T_0 N	3. T_0 Z	Mean
1	18 $\frac{1}{2}$	17 $\frac{1}{2}$	14 $\frac{1}{2}$	T_0 E = 6.2
2	18 $\frac{1}{2}$	17 $\frac{1}{2}$	14 $\frac{3}{4}$	T_0 N = 5.74
3	18 $\frac{1}{2}$	17 $\frac{1}{2}$	14 $\frac{1}{4}$	T_0 Z = 4.9

V (Separately determined) = $3840 \left(\frac{a}{m T_0^2} \right)$ (points apart 20 cm.)

V (Simultaneously determined) = $5430 \left(\frac{a}{m T_0^2} \right)$

V (Vertical) = $288 \left(\frac{a}{m' T_0^2} \right)$

Trial	M = 20 g.						M' = 2 g.				Mean
	aE		VE		aN		VN		aZ	VZ	
	Sep.	Simul.	Sep.	Simul.	Sep.	Simul.	Sep.	Simul.			
1	19.25	14	96.4	98.5	16	12	93.2	98.4	13.25	79.49	VE = 97.1 VN = 95.46
2	19	14.25	94.85	98.6	15.8	12.3	92.16	100.6	13.2	79.2	VZ = 79.1
3	19.4	13.75	96.77	97.56	15.75	11.8	91.78	96.6	13.1	78.62	

(2) r in mm.

$$r = \frac{\sum_1^{n-1} l - \epsilon_0 \sum_2^n l}{2(n-1)(1+\epsilon_0)}$$

$$\epsilon_0 = \frac{l_1 - l_{n-1}}{l_2 - l_n}$$

Trial	l_1	l_2	l_3	l_4	l_5	l_6	l_7	l_8	l_9	l_{10}	l_{11}	l_{12}
E	1	26.5	22.8	19.7	16.5	14	11.6	9.4	7.3	5.5	3.9	2.5
	2	23.75	20	16.5	13.4	10.8	8.4	6.25	4.2	2.3	1.25	.75
	3	24.75	21.2	18	15.3	13	10.7	8.75	6.75	5.25	3.5	2.25
N	1	24.75	22.5	20.25	18	16	14	12.2	11.2	10	8	6.25
	2	18.5	16.5	14.5	12.7	11	9.3	7.9	6.4	5	3.75	2.5
	3	17.7	15.8	14.2	12.5	10.75	9.3	8	6.8	5.5	4.7	3.75
Z	1	26.3	23.25	20.6	18.25	16	13.75	11.8	10.25	8.5	6.75	5.3
	2	20.5	18.2	15.7	13.6	11.5	9.7	8.2	6.6	5.2	3.75	2.75
	3	36.5	32.5	28.8	25.75	22.8	20.2	17.75	15.3	13.2	11.2	9.25

l_{13}	l_{14}	l_{15}	l_{16}	l_{17}	l_{18}	l_{19}	l_{20}	$\sum_1^n l$	ϵ_0	r	Mean
								140.95	1.1	.3	r E = .26
								107.5	1.17	.2	
3.5	2.4	1.5	.75					130.65	1.1	.28	
.6								176.1	1.07	.215	r N = .188
2.25	1.5							115.55	1.07	.19	
2.8	1.75	1						115.5	1.08	.16	
1	.7							170.3	1.1	.18	r Z = .18
5.8	4.25	3.3	2.5	1.5	.8	.5		119.75	1.1	.18	
								259.4	1.1	.18	

(3) ϵ

$$\epsilon = \frac{Y_1 - r}{Y_2 - r}$$

Trial	N			E			Z			Mean
	Y_1	Y_2	ϵ	Y_1	Y_2	ϵ	Y_1	Y_2	ϵ	
1	6.2	1.5	3.6	5	1	3.8	8.75	2	3.9	$\epsilon N = 3.5$
2	5.8	1.4	3.5	5.25	1.1	3.7	7	1.75	3.5	$\epsilon E = 3.8$
3	5	1.25	3.4	6.2	1.2	4	9	2.2	3.7	$\epsilon Z = 3.7$

(4) R in mg.

$$R \text{ (Horizontal)} = 800000 \cdot \frac{r}{T_0^2 V^2}$$

$$R \text{ (Vertical)} = 320000 \cdot \frac{r}{T_0^2 V^2}$$

RE = .576

RN = .500

RZ = .384

SEISMIC DATA

PP. 24

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

		V	T_0	ϵ	r/T_0^2
Constants due to May 2, '31	AN	95.46	5.74	3.5	.0057
	AE	96.98	6.2	3.8	.0068
	Az	79.1	4.9	3.7	.0075

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time (Greenwich) h m s	Period			Amplitude			Δ Sign	Remark
			N-S	E-W	Z	AN	AE	Az		
			s	s	s	μ	μ	μ		
69 May, 12, '31	ePN	1 43 17								
" " " "	FE	2 31 0								
70 " 13, "	ePZ	23 7 25								
" " " "	FE	" 37 0								
71 " 17, "	ePN	9 36 23								
" " " "	FE	" 58 0								
72 " 20, "	ePE	2 36 34						9222		
" " " "	SE	" 46 59								
" " " "	ME ₁	3 12 33		21						
" " " "	ME ₂	" 15 52		16						
" " " "	FN	4 19 0								
73 " 28, "	ePE?	18 51 29								
" " " "	FE	19 28 0								
74 June 2, '31	iPN	2 41 39								
" " " "	SE	" 44 43								
" " " "	FE	3 15 0								

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Univ., 1927).



SEISMIC DATA

PP. 25

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

		V	T_0	ϵ	r/T_0^2
Constants due to May 2, '31	AN	95.46	5.74	3.5	.0057
	AE	96.98	6.2	3.8	.0068
	Az	79.1	4.9	3.7	.0075

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time (Greenwich) h m s	Period			Amplitude			Δ Sign	Remark
			N-S	E-W	Z	AN	AE	Az		
			s	s	s	μ	μ	μ		
75 June 5, '31	iPZ	22 16 40						259	The first near earthquake ever recorded.	
" " " "	iSE	" 17 15				10		+	Δ is obtained by Omori's formula.	
" " " "	iLE	" " 21				184		+	μ is obtained in the limit of $T_i T_0$ Negligible.	
" " " "	MF	" " 30				72		-		
" " " "	FE	" 31 0								
76 " 9, "	ePN	12 30 57								
" " " "	FN	13 5 0								
77 " 17, "	PZ	12 14 10						2489	The epicentre of this earthquake is most probably near at Tokyo.	
" " " "	PPE	" " 25								
" " " "	iE ₁	" 17 36						+	The diurnal variation of the contact-clock is irregular so that the time of arrival may have a few secs. error.	
" " " "	iE ₂	" " 47						+		
" " " "	SE	" 18 7								
" " " "	FE	" 43 0								
78 " 23, "	ePN	6 19 23						2489	The epicentre is probably near at Tokyo.	
" " " "	SN	" 23 20								
" " " "	FN	" 57 0								
79 " 29, "	PE	16 46 58						1822		

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Univ., 1927).

SEISMIC DATA

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

PP. 26

Granite-foundation

Constants due to		V	T ₀	ϵ	r/T ₀ ²
		AN	95.46	5.74	3.5
May 2, '31	AE	96.98	6.2	3.8	.0068
	Az	79.1	4.9	3.7	.0075

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
79 June 29, '31	iSN	16	50	4								+	
" " " "	FE	17	15	0									
80 " " " "	PN	20	25	1							1262		
" " " "	iSE	"	26	50									
" " " "	FE	"	49	0									

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Univ., 1927).



DETERMINATION OF CONSTANTS (due July)

PERMANENT CONSTANTS

- (a) of Horizontal Component
 - M (Steady mass) 200 kg.
 - H (Height of c. g. of the steady mass above the turning point) 96 cm.
- (b) of Vertical Component
 - M (Steady mass) 80 kg.
 - h (Distance of c. g. of the steady mass from the turning point) 54 cm.
 - h' (Distance of the adding weight from the turning point) 60 cm.

(1) T₀ in sec. & V

Trial	3.T ₀ E	3.T ₀ N	3.T ₀ Z	Mean
1	18.2	17.6	14.2	T ₀ E=6.13
2	18.6	17.8	14	T ₀ N=5.91
3	18.4	17.8	14	T ₀ Z=4.7

V (Separately determined) = 3840 $\left(\frac{a}{mT_0^2}\right)$

V (Simultaneously determined) = 5430 $\left(\frac{a}{mT_0^2}\right)$

V (Vertical) = 288 $\left(\frac{a}{m'T_0^2}\right)$

Trial	m = 20 g.						m' = 2 g.				
	aE		VE		aN		VN		aZ	VZ	Mean
	Sep.	Simul.	Sep.	Simul.	Sep.	Simul.	Sep.	Simul.			
											VE=99.1
1	18.75	14.25	95.6	103.2	16.5	11.8	90.6	91.8	12.5	81.5	VN=90.6
2	19.25	14	98.3	101	16.25	11.8	89.1	91.8	12.6	82.1	VZ=81.5
3	18.75	14	95.6	101	16.2	11.75	89.1	91.2	12.4	81	

(2) r in mm.

$$r = \frac{\sum_1^{n-1} l - \epsilon_0 \sum_2^n l}{2(n-1)(1+\epsilon_0)}$$

$$\epsilon_0 = \frac{l_1 - l_{n-1}}{l_2 - l_n}$$

Trial	l ₁	l ₂	l ₃	l ₄	l ₅	l ₆	l ₇	l ₈	l ₉	l ₁₀	l ₁₁	
E	1	34.75	30	26	22.25	18.8	15.75	13	10.5	8.25	6.3	4.75
	2	35	30.3	25.8	22	18.6	15.5	12.6	10.2	8	6.1	4.25
	3	31.7	27.25	23.2	19.6	16.25	13.25	10.75	8.8	7.3	5.5	4
N	1	17.75	15.75	14	12.2	10.6	9.2	7.8	6.7	5.3	4.2	3
	2	24.3	21.75	19.25	17.2	15	13.2	11.25	9.75	8.25	7	5.5
	3	34	30.25	26.8	24	21.25	18.5	16	14.25	12.6	10.75	9.25
Z	1	27.5	24.4	21.6	19.2	16.8	14.5	12.5	10.75	9	7.25	5.8
	2	31.8	28.5	25.4	22.75	20.25	18.1	16.2	14.1	12.25	10.5	9
	3	29.2	26.1	23.3	21	18.75	16.5	14.75	12.8	11.2	9.4	8

l ₁₃	l ₁₄	l ₁₅	l ₁₆	l ₁₇	l ₁₈	l ₁₉	l ₂₀	$\sum_1^n l$	ϵ_0	r	Mean
2	1.1										
1.3	.4							196.7	1.13	.23	r E = .23
2	1.25	.5						192.75	1.13	.25	
1.5	.75							174	1.13	.21	
3.5	2.5	1.75	.8					117.6	1.08	.17	r N = .18
6.4	4.7	3.5	2.6	1.5	.7			165.5	1.08	.20	
3.25	2.2	1.25	.75	.3				244.75	1.1	.17	
6.25	4.75	3.75	2.75	1.75	1			181.45	1.1	.18	r Z = .173
5.4	4.25	3	1.8	1				236.85	1.09	.17	
								213.2	1.09	.17	

(3) ϵ

$$\epsilon = \frac{Y_1 - \tau}{Y_2 + \tau}$$

Trial	E			N			Z			Mean
	Y ₁	Y ₂	ϵ	Y ₁	Y ₂	ϵ	Y ₁	Y ₂	ϵ	
1	5.2	1.25	3.36	5.25	1.25	3.5	6.2	1.5	3.6	$\epsilon E = 3.75$
2	5	1	3.9	4	.8	3.9	6	1.4	3.7	$\epsilon N = 3.6$
3	4	.7	4	4.8	1.2	3.4	7.5	1.8	3.8	$\epsilon Z = 3.7$

(4) R in mg.

$$R \text{ (Horizontal)} = 800000 \cdot \frac{r}{T_0^2 V^2}$$

$$R \text{ (Vertical)} = 320000 \cdot \frac{r}{T_0^2 V^2}$$

RE = .472

RN = .496

RZ = .384

SEISMIC DATA

PP. 27

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due July 1, '31		V	T ₀	ϵ	r/T_0^2
		AN	90.6	5.91	3.6
	AE	99.1	6.13	3.75	.0069
	Az	81.5	4.7	3.7	.0078

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az		
		h	m	s	s	s	s	μ	μ	μ		
81 July 12, '31	ePN	16	51	15							3367	
" " " "	ePE	"	"	"								
" " " "	SN	"	56	10								
" " " "	SE	"	"	11								
" " " "	iN	17	2	7								
" " " "	FE	18	6									
82 " 15 "	ePN	16	37	49							3156	
" " " "	ePE	"	"	"								
" " " "	SN	"	42	32								
" " " "	{ SE?	"	"	"								
" " " "	{ m	"	"	37		12						
" " " "	FE	17	25									+
83 " 18 "	ePN	11	30	24								
" " " "	ePE	"	"	"							3644	
" " " "	ePZ	"	"	"								
" " " "	SE	"	35	38								
" " " "	e(M?)	"	45	47		15						

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).

SEISMIC DATA

PP. 28

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to July 1, '31		V	T ₀	ϵ	r/T_0^2
		AN	90.6	5.91	3.6
	AE	99.1	6.13	3.75	.0069
	Az	81.5	4.7	3.7	.0078

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az		
		h	m	s	s	s	s	μ	μ	μ		
83 July 18, '31	FE	12	23	0								
84 " 21 "	ePN	3	48	13							8367 (N)	E-W Component is not clear.
" " " "	ePZ	"	"	"								
" " " "	iSN	"	58	0								
" " " "	SZ	"	"	4								
" " " "	MN	"	"	6 7								+
" " " "	FN	4	17	0								
85 " 23 "	iPN	14	30	25								
" " " "	iPE	"	"	"								
" " " "	iN	"	37	59								
" " " "	{ iE	"	38	1								
" " " "	{ m	"	"	6		4						-
" " " "	FE	15	18	0								
86 " 25 "	ePN	12	48	39								
" " " "	ePE	"	"	"								
" " " "	FN	13	11	0								
87 " 29 "	ePN	10	43	53								

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L. H. Chia, Assist.

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SEISMIC DATA

PP. 29

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to July 1, '31		V	T_0	ϵ	τ/T_0^2
		AN	90.6	5.91	3.6
	AE	99.1	6.13	3.75	.0069
	Az	81.5	4.7	3.7	.0078

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
87 July 29, '31	ePE	10	43	53									
" " " "	FN	11	4	0									
88 Aug. 6 "	ePZ	18	19	56						2978			
" " " "	SZ	"	24	12									
" " " "	SN	"	"	19									
" " " "	{SE	"	"	"									
" " " "		{m	"	"	41	4		53					
" " " "	iZ	"	"	57									
" " " "	iE	"	25	0									
" " " "	FE	"	58	0									
89 " 7 "	ePN	2	20	27						5500			
" " " "	ePE	"	"	"									
" " " "	ePZ	"	"	"									
" " " "	SN	"	27	32									
" " " "	SE	"	"	"									
" " " "	eLE	"	37	28									
" " " "	eLN	"	"	29									

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).



SEISMIC DATA

PP. 30

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to July 1, '31		V	T_0	ϵ	τ/T_0^2
		AN	90.6	5.91	3.6
	AE	99.1	6.13	3.75	.0069
	Az	81.5	4.7	3.7	.0078

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
89 Aug. 7, '31	ME ₁	2	40	39		18						-	
" " " "	NZ ₁	"	"	57			19					-	
" " " "	ME ₂	"	42	31		18						-	
" " " "	FE	3	58	0									
90 " 10 "	{ePE	21	23	16							2522		Azimuth obtained from inertial motion is N 59° W and down. Accordingly, the epicentre is found to be 48° N 89° E roughly.
" " " "		{m	"	"	28	7		107				-	
" " " "	{ePN	"	"	16									
" " " "		{m	"	"	28	7		92				+	
" " " "	{ePZ	"	"	16									
" " " "		{m	"	"	29		6		63			-	
" " " "	iPPN	"	"	20	6			228				+	
" " " "	iPPE	"	"	"		6		393				-	
" " " "	iPPZ	"	"	21			6		146			-	
" " " "	iPPPN	"	24	26	5.5			170				+	
" " " "	iPPPE	"	"	34		6		164				+	
" " " "	iN ₁	"	25	4	6			78				+	
" " " "	iE ₁	"	"	13		6.5		144				-	

S. P. Lee
L. H. Chia, Assist.

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SEISMIC DATA

PP. 31

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to July 1, '31		V	T ₀	ϵ	r/T_0^2
	AN	90.6	5.91	3.6	.0052
AE	99.1	6.13	3.75	.0069	
Az	81.5	4.7	3.7	.0078	

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
90Aug.10,'31	iZ ₁	21	25	14									
" " " "	iN ₂	"	"	21	6			84				-	
" " " "	iZ ₂	"	"	31			4		78			+	
" " " "	iE ₂	"	"	37		7			106			+	
" " " "	iN ₃	"	26	8	7							-	
" " " "	iE ₃	"	"	12		6			99			+	
" " " "	iZ ₃	"	"	17									
" " " "	iSZ	"	27	12									
" " " "	iSN	"	"	13	10			27				+	
" " " "		m	"	"	35	10			159			+	
" " " "	iSE	"	"	13									
" " " "		m	"	"	35		10						
" " " "	iLN?	"	29	29								+	
" " " "	iLE?	"	"	49								+	
" " " "	ME ₁	"	32	2		9			371			-	
" " " "	ME ₂	"	"	33		6.5			859			-	
" " " "	ME ₃	"	33	38		5			964			-	

The registration of main wave is in full scale and unable to be analysed on vertical component.

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).



SEISMIC DATA

PP. 32

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to July 1, '31		V	T ₀	ϵ	r/T_0^2
	AN	90.6	5.91	3.6	.0052
AE	99.1	6.13	3.75	.0069	
Az	81.5	4.7	3.7	.0078	

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
90Aug.10,'31	ME ₄	21	34	38			5			661		-	
" " " "	ME ₅	"	35	20			8			484		-	
" " " "	ME ₆	"	36	20			6.5			768		-	
" " " "	ME ₇	"	37	10			9			405		-	
" " " "	ME ₈	"	38	9			8			320		-	
" " " "	ME ₉	"	39	49			4			524		-	
" " " "	ME ₁₀	"	40	15			8			369		-	
" " " "	ME ₁₁	"	42	0			7			275		-	
" " " "	ME ₁₂	"	"	51			10			126		+	
" " " "	ME ₁₃	"	43	33			8			222		-	
" " " "	ME ₁₄	"	"	54			8			250		-	
" " " "	ME ₁₅	"	45	1			9			115		-	
" " " "	ME ₁₆	"	46	1			8			139		-	
" " " "	ME ₁₇	"	47	20			14			27		-	
" " " "	ME ₁₈	"	49	20			11.5			62		-	
" " " "	ME ₁₉	"	51	29			9			170		-	
" " " "	ME ₂₀	"	"	51			12			79		-	

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).

SEISMIC DATA

PP. 33

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to July 1, '31		V	T_0	ϵ	r/T_0^2
		AN	90.6	5.91	3.6
	AE	99.1	6.13	3.75	.0069
	Az	81.5	4.7	4.7	.0078

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
90 Aug. 10, '31	ME ₁₁	21	53	23		10			131			-	
" " " "	ME ₁₂	"	54	57		12			58			-	
" " " "	ME ₁₃	"	55	45		13.5			41			-	
" " " "	ME ₁₄	"	58	17		11			59			-	
" " " "	ME ₁₅	22	0	10		9			80			-	
" " " "	ME ₁₆	"	2	25		13			33			-	
" " " "	ME ₁₇	"	5	41		9			71			-	
" " " "	eE(W ₁ ?)	23	29	11									
" " 11 "	FE?	1	6	0									
" " " "	eE	"	44	33									
91 " 11 "	ePN	1	53	34									
" " " "	ePE	"	"	"									
" " " "	FN	"	59	0									
" " " "	FE	"	"	"									
92 " 11, '31	ePN	3	35	55									
" " " "	ePE	"	"	58									
" " " "	FN	"	54	0									

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).



SEISMIC DATA

PP. 34

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to July 1, '31		V	T_0	ϵ	r/T_0^2
		AN	90.6	5.91	3.6
	AE	99.1	6.13	3.75	.0069
	Az	81.5	4.7	3.7	.0078

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
93 Aug. 11, '31	ePN	7	11	59								1256	
" " " "	ePE	"	"	"									
" " " "	SN	"	14	10									
" " " "	SE	"	"	"									
" " " "	LN?	"	15	28									
" " " "	iE	"	"	56		8							
" " " "	FN	"	42	0									
94 " " " "	ePE	17	49	19									
" " " "	eE	"	51	53									
" " " "	FE	18	13	0									
95 " 16 "	ePE	2	8	5								4411	
" " " "	ePN	"	"	"									
" " " "	ePZ	"	"	6									
" " " "	SE	"	14	7									
" " " "	SN	"	"	"									
" " " "		m	"	"	14	3							
" " " "	iN	"	15	0									

Of earthquakes No. 95 to No. 97 time of arrival is not reliable as the time-signal having been missed.

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).

SEISMIC DATA

PP. 35

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to		V	T_0	ϵ	r/T_0^3
		AN	90.6	5.91	3.6
July 1, '31	AE	99.1	6.13	3.75	.0069
	Az	81.5	4.7	3.7	.0078

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
95 Aug. 16, '31	FN	2	40	0									
96 " 17 "	ePN	20	50	25									
" " " "	ePE	"	"	27									
" " " "	FE	21	11	0									
97 " 18 "	iPE	14	28	22							2378	-	
" " " "	iPN	"	"	"									
" " " "	iPZ	"	"	"									
" " " "	PPZ	"	"	49									
" " " "	PPE	"	"	"									
" " " "	iSN	"	32	12									
" " " "	SZ	"	"	13								-	
" " " "	iSE?	"	"	22									
" " " "	MZ ₁	"	34	32								-	
" " " "	MN ₁	"	"	34			4			121		-	
" " " "	ME ₁	"	"	40									
" " " "	MZ ₂	"	"	46					4	111		+	
" " " "	MN ₂	"	"	50					6	131		+	

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).

SEISMIC DATA

PP. 36

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to		V	T_0	ϵ	r/T_0^3
		AN	90.6	5.91	3.6
July 1, '31	AE	99.1	6.13	3.75	.0069
	Az	81.5	4.7	3.7	.0078

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
97 Aug. 18, '31	ME ₂	14	35	4									
" " " "	MZ ₂	"	"	"			3			180		+	
" " " "	MN ₂	"	"	33									
" " " "	MZ ₄	"	"	36				5		113		-	
" " " "	ME ₃	"	"	37			6			174		-	
" " " "	ME ₄	"	36	5			11			69		+	
" " " "	MZ ₅	"	"	24				11		50		-	
" " " "	MN ₄	"	"	30									
" " " "	ME ₅	"	"	41			12			84		-	
" " " "	ME ₆	"	37	1			7			129		+	
" " " "	MZ ₆	"	"	6				5		123		-	
" " " "	MZ ₇	"	"	29				4		86		-	
" " " "	ME ₇	"	"	36			6			224		+	
" " " "	MN ₆	"	"	38			6			157		-	
" " " "	MZ ₈	"	"	48				4.5				-	
" " " "	ME ₈	"	38	2				5		161		+	
" " " "	MN ₇	"	"	18			5			150		-	

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).



SEISMIC DATA

PP. 37

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to July 1, '31		V	T ₀	ϵ	r/T_0^3
	AN	90.6	5.91	3.6	.0052
AE	99.1	6.13	3.75	.0069	
Az	81.5	4.7	3.7	.0078	

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
97 Aug. 18, '31	MZ ₀	14	38	26			6			52		-	The main wave registered by N-S component is clear on the northern side.
" " " "	ME ₀	"	"	34			6			236		-	
" " " "	MN ₀	"	"	37	7					157		+	
" " " "	ME ₁₀	"	39	0			8			100		+	
" " " "	MN ₀	"	"	12	5					146		-	
" " " "	ME ₁₁	"	"	22			8			90		-	
" " " "	MN ₁₀	"	"	30	7.5					102		-	
" " " "	ME ₁₂	"	40	"			6.5			96		+	
" " " "	MN ₁₁	"	"	34	8					67		-	
" " " "	ME ₁₃	"	41	30			6			98		+	
" " " "	MN ₁₂	"	"	35	7					95		-	
" " " "	MN ₁₃	"	"	56	9					44		-	
" " " "	MN ₁₄	"	42	22	6					113		-	
" " " "	ME ₁₄	"	"	26								-	
" " " "	FE	15	17	0									
98 " 24 "	ePN	3	8	50									
" " " "	ePE	"	"	51									

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).

SEISMIC DATA

PP. 38

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to July 1, '31		V	T ₀	ϵ	r/T_0^3
	AN	90.6	5.91	3.6	.0052
AE	99.1	6.13	3.75	.0069	
Az	81.5	4.7	3.7	.0078	

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
98 Aug. 24, '31	FE	3	37	0									
99 " " "	ePE	21	43	17							4433		
" " " "	ePN	"	"	"									
" " " "	SE	"	49	20									
" " " "	SN	"	"	21									
" " " "	eE	"	58	19									
" " " "	eN	"	"	20									
" " " "	iE ₁	22	1	52			14						-
" " " "	iN ₁	"	2	4	13								-
" " " "	iE ₂	"	4	35			13						-
" " " "	iN ₂	"	5	24	11								-
" " " "	iN ₃	"	7	58	12								-
" " " "	FE	23	49	0									
100 " 26 "	ePE	11	1	1									
" " " "	ePN	"	"	"									
" " " "	iN	"	2	36									
" " " "	iE	"	"	41			8						

S. P. Lee
L. H. Chia, Assist.

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SEISMIC DATA

PP. 39

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to July 1, '31		V	T ₀	ϵ	r/T_0^3
	AN	90.6	5.91	3.6	.0052
AE	99.1	6.13	3.75	.0069	
Az	81.5	4.7	3.7	.0078	

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
100 Aug. 26, '31	FE	11	41	0									
101 " 27 "	ePE	15	35	5							4433	Balchistan earthquake	
" " " "		"	"	17									
" " " "	ePZ	"	"	5									
" " " "		"	"	17									
" " " "	ePN	"	"	7									
" " " "	PPN	"	36	46									
" " " "	PRE ₂	"	37	33									
" " " "	PRE ₃	"	"	44									
" " " "	eSE	"	41	8									
" " " "	eSN	"	"	10									
" " " "		"	"	18									
" " " "	iE	"	"	34		6							
" " " "	iN	"	42	2									
" " " "	iSSE	"	43	48									
" " " "	LN	"	50	0									
" " " "	ME ₁	"	54	2		16			11		+		

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).



SEISMIC DATA

PP. 40

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to July 1, '31		V	T ₀	ϵ	r/T_0^3
	AN	90.6	5.91	3.6	.0052
AE	99.1	6.13	3.75	.0069	
Az	81.5	4.7	3.7	.0078	

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
101 Aug. 27, '31	MZ ₁	15	54	6			14					-	
" " " "	MN ₁	"	"	49	12			25				+	
" " " "	ME ₁	"	"	56		9						-	
" " " "	ME ₂	"	55	33		11		24				-	
" " " "	MZ ₂	"	"	37			11					+	
" " " "	MN ₂	"	56	5	11			19				+	
" " " "	MZ ₃	"	"	9			11					-	
" " " "	ME ₄	"	"	10		11		30				+	
" " " "	ME ₅	"	57	48		12		28				-	
" " " "	MZ ₄	"	"	52			11			15		+	
" " " "	MN ₃	"	"	"	12			21				-	
" " " "	MN ₄	"	58	45	12			24				-	
" " " "	MZ ₅	"	59	10			12					-	
" " " "	MZ ₆	"	"	46			16					-	
" " " "	ME ₇	16	0	13		10						+	
" " " "	MN ₅	"	"	35	9							+	
" " " "	ME ₈	"	"	53		11						+	

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).

SEISMIC DATA

PP. 41

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due to		V	T ₀	ϵ	r/T_0^2
		AN	90.6	5.91	3.6
July 1, '31	AE	99.1	6.13	3.75	.0069
	Az	81.5	4.7	3.7	.0078

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
101 Aug. 27, '31	ME ₉	16	2	59		10						+	
" " " "	ME ₁₀	"	4	33		9						-	
" " " "	ME ₁₁	"	5	57		15						+	
" " " "	MN ₇	"	6	53	11							-	
" " " "	FE	18	7	0									

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L. H. Chia, Assist.

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DETERMINATION OF CONSTANTS (due Sep. 1)

PERMANENT CONSTANTS

- (a) of Horizontal Component
M (Steady mass) 200 kg.
H (Height of c. g. of the steady mass above the turning point) 96 cm.
- (b) of Vertical Component
M (Steady mass) 80 kg.
h (Distance of c. g. of the steady mass from the turning point) 54 cm.
h' (Distance of the adding weight from the turning point) 60 cm.

(1) T₀ in sec. & V

Trial	3.T ₀ E	3.T ₀ N	3.T ₀ Z	Mean
1	18.4	17.8	14.2	T ₀ E=6.15
2	18.6	18	14	T ₀ N=5.9
3	18.4	17.6	14	T ₀ Z=4.7

V (Separately determined) = $3840 \left(\frac{a}{mT_0^2} \right)$ (point apart 20 cm.)

V (Simultaneously determined) = $5430 \left(\frac{a}{mT_0^2} \right)$

V (Vertical) = $288 \left(\frac{a}{m'T_0^2} \right)$

Trial	m = 20 g.						m' = 2 g.				Mean	
	aE		VE		aN		VN		aZ	VZ		
	Sep.	Simul.	Sep.	Simul.	Sep.	Simul.	Sep.	Simul.				
											VE=99.6	
1	19.4	14	98.5	100.5	17.2	12.75	94.8	99.4	11.6	75.6	VN=96.5	
2	19.2	14.1	97.5	101.2	17.2	12.6	94.8	98.4	11.6	75.6	VZ=75.4	
3	19.4	14.1	98.5	101.2	16.8	12.75	92.5	99.4	11.5	74.9		

(1) (2) DATA (2) ϵ in mm.

$$r = \frac{\sum_{i=1}^{n-1} l_i - \epsilon_0 \sum_{i=1}^n l_i}{2(n-1)(1+\epsilon_0)}$$

$$\epsilon_0 = \frac{l_1 - l_{n-1}}{l_2 - l_n}$$

Trial	l_1	l_2	l_3	l_4	l_5	l_6	l_7	l_8	l_9	l_{10}	l_{11}	l_{12}
E	1	31.75	27.25	23.5	20	16.9	13.8	11.4	9.25	7.25	5.3	3.8
	2	32.2	27.8	23.8	20.4	17.2	14.5	11.8	9.7	7.7	6	4.25
	3	24.8	21.5	18.25	15.3	12.75	10.5	8.75	7.25	5.6	4.4	3
N	1	38.5	34.4	29.75	26.8	23.7	20.7	17.3	14.3	12.5	10.3	8.4
	2	30.5	27	24.3	21.3	18.5	16.75	14.5	12.5	10.7	9	7.25
	3	29.6	26.7	24.2	21.5	19	17	15	13.25	11.5	9.8	8.5
Z	1	26	23.2	20.6	18.3	16.4	14.3	12.7	11	9.5	8	6.7
	2	30	27	24.2	21.5	19.25	17.2	15.3	13.3	11.6	10	8.75
	3	29	26	23.4	20.75	18.25	16.2	14.3	12.5	10.75	9.25	7.8

l_{13}	l_{14}	l_{15}	l_{16}	l_{17}	l_{18}	l_{19}	l_{20}	$\sum_{i=1}^n l_i$	ϵ_0	r	Mean
1.25	.5							174.2	1.1	.21	$r E = .216$
1.7	.7							180.75	1.1	.21	
1	.75	.3						135.95	1.1	.23	
5.25	3.75	2.4	1.3	.6				256.75	1.1	.24	$r N = .20$
4.25	2.75	1.75	.8					207.6	1.1	.19	
5.5	4.5	3.5	2.2	1.25	.6			220.6	1.09	.17	
4	2.8	2	1					181.7	1.08	.19	$r Z = .18$
6	4.75	3.7	2.7	1.8	1			225.3	1.08	.19	
5.3	4.2	3.2	2.25	1.6	.8			212.05	1.09	.17	

$$\epsilon = \frac{Y_1 - r}{Y_2 + r}$$

Trial	E			N			Z			Mean
	Y_1	Y_2	ϵ	Y_1	Y_2	ϵ	Y_1	Y_2	ϵ	
1	4.8	.8	3.9	7.3	1.6	3.9	6.75	1.8	3.3	$\epsilon E = 3.7$
2	4.5	.8	3.7	3.5	.6	4.1	5.6	1.5	3.2	$\epsilon N = 4.0$
3	5.3	1.2	3.5	4.25	.8	4	5	1.2	3.5	$\epsilon Z = 3.3$

(4) R in mg.

$$R \text{ (Horizontal)} = 800000 \cdot \frac{r}{T_0^2 V^2}$$

$$R \text{ (Vertical)} = 320000 \cdot \frac{r}{T_0^2 V^2}$$

RE = .46

RN = .49

RZ = .50

SEISMIC DATA

PP. 42

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due		V	T ₀	ϵ	r/T_0^2
		AN	96.5	5.9	4
Sep. 1, '31	AE	99.6	6.15	3.7	.0057
	Az	75.4	4.7	3.3	.0081

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
102 Sep. 6, '31	ePN	5	50	11									
" " " "	FN	6	16										
103 " 8 " "	ePN	19	13	32									
" " " "	ePE	"	"	"									
" " " "	ePZ	"	"	"									
" " " "	FN	"	59										
104 " 9 " "	iPN	20	44	43						3489	-		
" " " "	iPE	"	"	"									
" " " "	iPZ	"	"	"									
" " " "	eSN	"	49	47									
" " " "		m	"	"	50								
" " " "	iSE	"	"	47							+		
" " " "		m	"	"	50						+		
" " " "	eSZ	"	"	47							-		
" " " "	FE	22	20										
105 " 12 " "	ePN	2	0	43									
" " " "	ePE	"	"	"									

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).

S. P. Lee
L. H. Chia, Assist.



SEISMIC DATA

PP. 43

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due		V	T ₀	ϵ	r/T_0^2
		AN	96.5	5.9	4
Sep. 1, '31	AE	99.6	6.15	3.7	.0057
	Az	75.4	4.7	3.3	.0081

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
105 Sep. 12, '31	FN	2	34										
106 " 16 " "	ePN	12	47	23								2122	
" " " "	ePE	"	"	"									
" " " "	SN	"	50	54									
" " " "	SE	"	"	55									
" " " "	FE	13	16										
107 " 17 " "	ePN	19	57	30									
" " " "	ePE	"	"	"									
" " " "	FE	20	14										
108 " 19 " "	ePE	7	47	27									
" " " "	ePN	"	"	29									
" " " "	FE	8	22									2144	Japanese earthquake
109 " 21 " "	ePN	2	24	21									
" " " "	iPE	"	"	"						4		+	
" " " "	PPE	"	"	55									
" " " "	iSE	"	27	56						6		+	
" " " "	iSN	"	"	57						7		-	

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).

S. P. Lee
L. H. Chia, Assist.

SEISMIC DATA

PP. 44

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due		V	T ₀	ϵ	r/T ₀ ³
		July 1, '31	AN	96.5	5.9
	AE	99.6	6.15	3.7	.0057
	Az	75.4	4.7	3.3	.0081

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
109 Sep. 21, '31	iN ₁	2	28	41	6							-	
" " "	iN ₂	"	30	5	12							-	
" " "	iN ₃	"	31	19	11							+	
" " "	iE ₁	"	31	41		12						-	
" " "	iE ₂	"	32	59		11						-	
" " "	iN ₄	"	33	40	10							-	
" " "	iE ₃	"	34	32		11						+	
" " "	iE ₄	"	36	2		10						-	
" " "	FE	3	36										
110 " 21 "	ePN	9	31	58							2478		Japanese earthquake
" " "	ePZ	"	32	0									
" " "	ePE?	"	"	1									
" " "	SN	"	35	54									
" " "	iSE	"	"	55								-	
" " "	SZ	"	"	58								-	
" " "	iLE	"	38	11									
" " "	iLN	"	"	22								+	
												+	

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).



SEISMIC DATA

PP. 45

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due		V	T ₀	ϵ	r/T ₀ ³
		Sep. 1, '31	AN	96.5	5.9
	AE	99.6	6.15	3.7	.0057
	Az	75.4	4.7	3.3	.0081

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
110 Sep. 21, '31	ME ₁	9	39	21									
" " "	MN ₁	"	"	22									
" " "	MZ ₁	"	"	27			6					-	
" " "	MZ ₂	"	"	51									
" " "	MN ₂	"	40	7	6			92				+	
" " "	ME ₂	"	"	14									
" " "	MN ₃	"	"	22	6			67				-	
" " "	ME ₃	"	"	51									
" " "	MN ₄	"	"	56	7			57				-	
" " "	MN ₅	"	41	22	7			62				+	
" " "	MN ₆	"	"	37	7			66				+	
" " "	MN ₇	"	42	11	7			49				+	
" " "	ME ₄	"	"	20		8						-	
" " "	MN ₈	"	43	6	5							+	
" " "	FN	10	56										
111 " 25 "	ePE	6	8	18							5411		
" " "	{ePN	"	"	"									
" " "	{m	"	"	32	5								

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).

SEISMIC DATA

PP. 48

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due		V	T ₀	ϵ	r/T_0^2
		AN	96.5	5.9	4
Sep. 1, '31	AE	99.6	6.15	3.7	.0057
	AZ	75.4	4.7	3.3	.0081

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
112 Oct. 3, '31	eSN	19	32	48									
" " "	eSE	"	"	49									
" " "	PSN	"	33	4									
" " "	PSE	"	"	5									
" " "	iE	"	35	24		9						+	
" " "	LN?	"	40	2									
" " "	LE	"	"	19									
" " "	ME ₁	"	46	32		18							-
" " "	MZ ₁	"	"	37									
" " "	MN ₁	"	47	26	20			6					+
" " "	MN ₂	"	"	59	20								+
" " "	ME ₂	"	48	4		19							-
" " "	MZ ₂	"	"	8			19						+
" " "	MN ₂	"	49	19	19								-
" " "	ME ₂	"	"	46		16							-
" " "	MN ₃	"	51	35	17			7					+
" " "	MZ ₂	"	"	42			18						+

S. P. Lee
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SEISMIC DATA

PP. 49

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M. Granite-foundation

Constants due		V	T ₀	ϵ	r/T_0^2
		AN	96.5	5.9	4
Sep. 1, '31	AE	99.6	6.15	3.7	.0057
	AZ	75.4	4.7	3.3	.0081

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
112 Oct. 3, '31	ME ₄	19	51	46		18			7				+
" " "	MZ ₄	"	52	34			19						+
" " "	ME ₅	"	"	39		17							-
" " "	MZ ₅	"	53	5			17						-
" " "	MN ₅	"	"	16	18			5					+
" " "	MZ ₆	"	"	35			17						-
" " "	ME ₆	"	54	41		16			9				-
" " "	MZ ₇	"	55	26			16						+
" " "	MN ₆	"	"	31	16			6					+
" " "	ME ₇	"	56	34		15							-
" " "	MN ₇	"	57	10									+
" " "	MZ ₈	"	"	14			17						+
" " "	MZ ₉	20	0	32			15						
" " "	ME ₈	"	1	49		16							-
" " "	ME ₉	"	4	58		16.5							+
" " "	MN ₈	"	5	5	16								+
" " "	MZ ₁₀	"	6	44									

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L. H. Chia, Assist.

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SEISMIC DATA

PP. 50

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due Sep. 1, '31		V	T ₀	ϵ	r/T_0^2
	AN	96.5	5.9	4	.0057
AE	99.6	6.15	3.7	.0057	
Az	75.4	4.7	3.3	.0081	

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
112 Oct. 3, '31	ePN	22	58	35									After Shock
" " "	ePE	"	"	"									
" " 4 "	FN	1	40										
113 " 5 "	ePE	22	38	6									
" " "	ePN	"	"	"									
" " "	ePZ	"	"	"									
" " "	FE	23	20										
" " "	FZ	"	"	"									
114 " 9 "	ePE	15	49	38									
" " "	ePN	"	"	39									
" " "	FN	16	9										
" " "	FE	"	15										
115 " 10 "	ePZ	0	30	57									
" " "	ePN	"	"	59						6900			
" " "	ePE	"	"	"									
" " "	iZ ₁	"	31	11									
" " "	iZ ₂	"	"	27									

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L. H. Chia, Assist.

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SEISMIC DATA

PP. 51

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

Constants due Sep. 1, '31		V	T ₀	ϵ	r/T_0^2
	AN	96.5	5.9	4	.0057
AE	99.6	6.15	3.7	.0057	
Az	75.4	4.7	3.3	.0081	

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
115 Oct. 10, '31	iZ ₁	0	31	50									
" " "	iN	"	32	8									
" " "	eSZ	"	39	25									
" " "	SN	"	"	25									
" " "	SE	"	"	26									
" " "	PSE	"	"	38									
" " "	eLE?	"	46	59									
" " "	eLN?	"	47	31									
" " "	eLZ?	"	48	14									
" " "	MZ ₁	"	53	32			24						
" " "	MN ₁	"	"	37	22								+
" " "	MN ₂	"	55	19	19								-
" " "	MZ ₂	"	"	33			20.5						+
" " "	ME ₁	"	"	39	19.5								+
" " "	ME ₂	"	59	56	20								-
" " "	MZ ₃	"	"	57			16.5						
" " "	MN ₃	"	"	59	17								+

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).

SEISMIC DATA

PP. 52

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

		V	T ₀	ϵ	r/T_0^2
Constants due Sep. 1, '31	AN	96.5	5.9	4	.0057
	AE	99.6	6.15	3.7	.0057
	Az	75.4	4.7	3.3	.0081

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
115 Oct. 10, '31	ME ₂	1	1		17							+	
" " "	MN ₄	"	"	"	19							+	
" " "	MZ ₄	"	"	10			16.5					+	
" " "	ME ₄	"	3	30	17							-	
" " "	FE	4	43										
116 " " "	ePN	16	42	57							3444		
" " "	ePE	"	"	"									
" " "	ePZ	"	"	58									
" " "	SE	"	47	56									
" " "	SN	"	"	58									
" " "	eLN	"	52	21									
" " "	eLE	"	"	"									
" " "	FE	17	59										
117 " 18 "	ePZ	4	42	38									
" " "	ePE	"	"	"									
" " "	ePN	"	"	39									
" " "	FE	5	30										

S. P. Lee
L. H. Chia, Assist.

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Manelwane (St. Louis Univ., 1927).



SEISMIC DATA

PP. 53

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

		V	T ₀	ϵ	r/T_0^2
Constants due Sep. 1, '31	AN	96.5	5.9	4	.0057
	AE	99.6	6.15	3.7	.0057
	Az	75.4	4.7	3.3	.0081

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az			
		h	m	s	s	s	s	μ	μ	μ			
118 Oct. 18, '31	ePN	7	15	21									
" " "	ePE	"	"	22									
" " "	FN	"	47										
" " "	FE	"	50										
119 " 27 "	ePN	2	36										
" " "	ePE	"	"	1									
" " "	FN	"	3										
120 " 28 "	ePN	5	40	1							2544		
" " "	ePE	"	"	2									
" " "	SE	"	44	2									
" " "		m	"	"	14								
" " "	SN	"	"	3									
" " "		m	"	"	14								
" " "	MN	"	49	20	16								
" " "	FN	"	6	36									
121 " 29 "	ePE	8	47	1									
" " "	FE	9	4										

S. P. Lee
L. H. Chia, Assist.

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DETERMINATION OF CONSTANTS (due Nov. 1)

PERMANENT CONSTANTS

- (a) of Horizontal Component
 - M (Steady mass) 200 kg.
 - H (Height of c. g. of the steady mass above the turning point) 96 cm.
- (b) of Vertical Component
 - M (Steady mass) 80 kg.
 - h (Distance of c. g. of the steady mass from the turning point) 54 cm.
 - h' (Distance of the adding weight from the turning point) 60 cm.

(1) T_0 in sec. & V

Trial	3-T _{0E}	3-T _{0N}	3-T _{0z}	Mean
1	18	17½	14	T _{0E} =5.96
2	17½	17½	14	T _{0N} =5.8
3	17½	17½	13½	T _{0z} =4.64

V (Separately determined) = $3840 \left(\frac{a}{mT_0^2} \right)$
(points apart 20 cm.)

V (Simultaneously determined) = $5430 \left(\frac{a}{mT_0^2} \right)$

V (Vertical) = $288 \left(\frac{a}{m'T_0^2} \right)$

Trial	m = 20 g.								m' = 2 g.		Mean
	aE		VE		aN		VN		az	Vz	
	Sep.	Simul.	Sep.	Simul.	Sep.	Simul.	Sep.	Simul.			
											VE=98.7
1	18	13.2	96.4	100.7	17	12.25	97	98.6	11.7	78.1	VN=96.9
2	18	13.2	96.4	100.7	16.75	12	95.6	96.7	11.75	78.5	Vz=78.5
3	18.2	13	98.4	99.4	16.7	12.2	95.2	98.1	11.8	79	

(2) r in mm.

$$r = \frac{\sum_1^{n-1} l - \epsilon_0 \sum_2^n l}{2(n-1)(1+\epsilon_0)}$$

$$\epsilon_0 = \frac{l_1 - l_{n-1}}{l_2 - l_n}$$

Trial		l_1	l_2	l_3	l_4	l_5	l_6	l_7	l_8	l_9	l_{10}	l_{11}	l_{12}
E	1	27.5	23.4	20.25	17.75	15	12.75	10.7	8.75	7.2	5.75	4.25	3
	2	30.5	26.3	22.5	19	16.2	13.5	11	9	7.3	5.3	3.8	2.7
	3	34.75	30	26	22.25	19	16	13.5	11	9.2	7.2	5.7	4.2
N	1	31	27.8	24.7	22	19.4	17.3	15.5	13.75	12.25	10.6	9.75	8.3
	2	26	23.2	20.5	18.2	16	14.25	12.5	10.8	9.7	8.25	6.5	5.2
	3	24.5	22.2	20	18	16.2	14.3	12.75	11.2	9.8	8.5	7.2	6
z	1	23.75	21.25	18.8	16.75	14.6	12.5	11.2	9.5	7.75	6.2	5	3.8
	2	26.2	23.5	21	19	16.75	14.7	13	11.5	10	8.3	7.2	5.7
	3	27	24.25	22	19.5	17.5	15.5	13.7	12	10.5	9.2	7.8	6.5

l_{12}	l_{14}	l_{15}	l_{16}	l_{17}	l_{18}	l_{19}	l_{20}	$\sum_1^n l$	ϵ_0	r	Mean
1.8	1							159.1	1.15	.14	rE = .18
1.5	.7							169.3	1.14	.19	
3	1.75	.8						204.35	1.13	.20	
6.3	5	4	2.8	1.8	1			233.25	1.08	.195	rN = .18
4	2.8	2	1.1					181	1.09	.17	
4.75	3.75	2.75	1.8					183.7	1.07	.185	
2.8	1.7	1						156.6	1.09	.18	rz = .17
4.5	3.25	2.3	1.3	.6				188.8	1.09	.16	
5.4	4.25	3.2	2.25	1.3				201.85	1.08	.18	

(3) ϵ

$$\epsilon = \frac{Y_1 - r}{Y_2 + r}$$

	E			N			z			Mean
Trial	Y_1	Y_2	ϵ	Y_1	Y_2	ϵ	Y_1	Y_2	ϵ	
1	6	1.5	3.5	6.5	1.5	3.8	8.3	2.2	3.4	rE = 3.6
2	5.9	1.4	3.6	8.6	2.4	3.3	7	1.8	3.5	rN = 3.5
3	8.5	2	3.7	7.5	2	3.3	8.5	2	3.8	rZ = 3.6

(4) R in mg.

$$R \text{ (Horizontal)} = 800000 \cdot \frac{r}{T_0^2 V^2}$$

$$R \text{ (Vertical)} = 320000 \cdot \frac{r}{T_0^2 V^2}$$

$$RE = .42$$

$$RN = .46$$

$$Rz = .41$$

SEISMIC DATA

PP. 54

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

		V	T ₀	ϵ	r/T_0^2
Constants due Nov. 1, '31	AN	96.9	5.8	3.5	.0054
	AE	98.7	5.96	3.6	.0051
	AZ	78.5	4.64	3.6	.0079

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark		
		(Greenwich)			N-S	E-W	Z	AN	AE	AZ					
		h	m	s	s	s	s	μ	μ	μ				km	
122 Nov. 1, '31	ePE	18	56	48								1900			
" " "	ePN	"	"	"								2100			
" " "	SE?	19	0	1											
" " "	SN?	"	"	17											
" " "	LE?	"	1	41											
" " "	LN?	"	"	"											
" " "	M	"	3	8											
" " "	FE	"	"	47											
123 " 2 "	iPz	10	6	23								1811	+	Kiyusyu-(Japan) earthquake	
" " "	iPN	"	"	35								1667	+		
" " "	iPE	"	"	"									-		
" " "		m	"	"	42										
" " "	iPPN	"	"	46											
" " "	iPPE	"	"	"											
" " "	iN	"	7	3											
" " "	iE	"	"	9											
" " "	iSN	"	9	27											

S.P. Lee, Seismologist
L.H. Chia, Assistant

N. B. We are using the table of "Laufzeitkurve", published by Rev. Fr. J. B. Macelwane (St Louis Univ., 1927).



SEISMIC DATA

PP. 55

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

		V	T ₀	ϵ	r/T_0^2
Constants due Nov. 1, '31	AN	96.9	5.8	3.5	.0054
	AE	98.7	5.96	3.6	.0051
	AZ	78.5	4.64	3.6	.0079

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ	Sign	Remark		
		(Greenwich)			N-S	E-W	Z	AN	AE	AZ					
		h	m	s	s	s	s	μ	μ	μ				km	
123 Nov. 2, '31	iSE	10	9	28									+		
" " "	Sz	"	"	"											
" " "	iz	"	"	49										-	
" " "	Lz	"	10	41											
" " "	LN	"	11	19											
" " "	iLE	"	"	21										-	
" " "	iN	"	"	42			5			456				-	
" " "	ME ₁ ?	"	13	25										+	
" " "	MZ ₁	"	"	"										-	
" " "	MN ₁ ?	"	"	27			12.5			72				-	
" " "	MN ₂	"	14	33						240				+	
" " "	MN ₃	"	15	36						157				+	
124 " " "	ePN	11	4	10										1867	After shock
" " "	ePE	"	"	"										1767	
" " "	ePz	"	"	11										1822	
" " "	eSE	"	7	12											
" " "	Sz?	"	"	17											

S.P. Lee, Seismologist.
L.H. Chia, Assistant.

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SEISMIC DATA

PP. 56

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M. Granite-foundation

Constants due		V	T_0	ϵ	r/T_0^3
		AN	96.9	5.8	3.5
Nov. 1, '31	AE	98.7	5.96	3.6	.0051
	Az	78.5	4.64	3.6	.0079

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az		
		h	m	s	s	s	s	μ	μ	μ		
124 Nov. 2, '31	SN	11	7	20								
" " "	iN ₁	"	9	10	5							
" " "	iN ₂	"	10	54	5							
" " "	FE	12	32									
125 " " "	ePN?	17	12	48						5867		
" " "	ePE	"	"	"						5878		
" " "	ePz	"	"	"								
" " "	SE	"	20	13								
" " "	SN	"	"	14								
" " "	FE	18	5									
126 " 3, "	ePz?	16	24	25								
" " "	ePE	"	"	27								
" " "	ePN	"	"	"								
" " "	FN	17	12									
" " "	FE	"	15									
127 " 5, "	PE	12	24	10								
" " "	PN	"	"	11						4411		
										4389		

S.P. Lee, Seismologist.
L.H. Chia, Assistant.

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SEISMIC DATA

PP. 57

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M. Granite-foundation

Constants due		V	T_0	ϵ	r/T_0^3
		AN	96.9	5.8	3.5
Nov. 1, '31	AE	98.7	5.96	3.6	.0051
	Az	78.5	4.64	3.6	.0079

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	Az		
		h	m	s	s	s	s	μ	μ	μ		
127 Nov. 5, '31	iPz	12	24	11							4456	
" " "	SN?	"	30	11								
" " "	SE?	"	"	12								
" " "	Sz?	"	"	15								
" " "	iz ₁	"	"	37			5					+
" " "	iN ₁	"	"	46	8			73				-
" " "	iE ₁	"	"	48								
" " "	iz ₂	"	"	57			5					-
" " "	iE ₂	"	32	12		6.5		118				+
" " "	iz ₃	"	"	19			7					+
" " "	iz ₄	"	33	12								+
" " "	iN ₂	"	40	53								-
" " "	FE	13	45									
128 " 20, "	ePN?	14	27	16								
" " "	ePE	"	"	22								
" " "	ePz	"	"	"								
" " "	FN	15	25									

S.P. Lee, Seismologist.
L.H. Chia, Assistant.

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SEISMIC DATA

PP. 58

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

		V	T ₀	ϵ	r/T_0^2
Constants due Nov. 1, '31	AN	96.9	5.8	3.5	.0054
	AE	98.7	5.96	3.6	.0051
	AZ	78.5	4.64	3.6	.0079

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	AZ		
		h	m	s	s	s	s	μ	μ	μ		
129 Nov. 24, '31	ePz	9	3	1							2111	
" " "	ePN	"	"	"								
" " "	ePE	"	"	"								
" " "	Sz	"	6	31								
" " "	SN	"	"	"								
" " "	SE	"	"	"								
" " "	LE	"	7	48								
" " "	LN	"	"	"								
" " "	Lz	"	"	49								
" " "	IE	"	8	13		2.5						+
" " "	iN	"	"	"	2.5							-
" " "	ME	"	"	27		6		100				+
" " "	MN	"	"	35	6							-
" " "	FN	"	"	43								
130 Dec. 6, "	ePN	23	4	47								1556
" " "	ePE	"	"	"								1578
" " "	ePz	"	"	48								1622

S.P. Lee, Seismologist.
L.H. Chia, Assistant.

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SEISMIC DATA

PP. 59

ϕ 40° 3' 55" λ 116° 5' 46" h 155 M.

Granite-foundation

		V	T ₀	ϵ	r/T_0^2
Constants due Nov. 1, '31	AN	96.9	5.8	3.5	.0054
	AE	98.7	5.96	3.6	.0051
	AZ	78.5	4.64	3.6	.0079

Apparatus
I. 200kg Horizontal Wiechert
II. 80kg Vertical Wiechert

No. & Date	Phase	Time			Period			Amplitude			Δ Sign	Remark
		(Greenwich)			N-S	E-W	Z	AN	AE	AZ		
		h	m	s	s	s	s	μ	μ	μ		
130 Dec. 6, '31	SN	23	7	29								
" " "	SE	"	"	31								
" " "	Sz	"	"	36								
" " "	iN	"	"	56								
" " "	LE	"	8	42								
" " "	LN	"	9	0								
" " "	MN	"	10	2	6							+
" " "	ME	"	"	3		7						+
" " "	FE	"	"	36								
" " "	FN	"	"	40								
131 " 18 "	ePz	9	58	0								
" " "	ePN	"	"	1								
" " "	ePE	"	"	"								
" " "	Fz	10	58									
132 " 22 "	ePE?	13	15	11								
" " "	ePN	"	"	16								
" " "	FN	"	"	43								

S.P. Lee, Seismologist.
L.H. Chia, Assistant.

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