



*Geophysics Library*

The  
Seismological Bulletin  
of  
The Kōti Meteorological Observatory

KŌTI, JAPAN

No. 3

— 1929 —

Published by  
The Kōti Meteorological Observatory  
Kōti, Japan  
1930

## SYMBOLS and NOTATIONS

### 1. Phase of the Seismogram:—————

P	Normal preliminary tremors or Dilatational waves
P'	First preliminary tremors which have penetrated the core of the earth
$\bar{P}$	Dilatational waves penetrated only upperfirst layer
P*	" " " " " and uppersecond layers
PR <sub>n</sub>	" " n-times reflected at the earth's surface
PS	Waves changed from dilatational to distortional character or vice versa through reflection at the earth's surface
S	Normal secondary tremors or Distortional waves
$\bar{S}$	Distortional waves penetrated only upperfirst layer
S*	" " " " " and uppersecond layers
SR <sub>n</sub>	" " n-times reflected at the earth's surface
L	Long waves
Q	Shorter and more regular waves in the surface phase
M <sub>(M1, M2, ...)</sub>	Maximum motion usually in the surface phase
C	Tail
F	Finis

### 2. Nature of the motion

i	Sudden beginning of the motion
e	Gradual " " " "

### 3. First motion, Maximum and Mean amplitude

We classify First motion, Max. and mean amplitude by the nest symbols as follow

*	Maximum or Mean amplitude
nomark	First motion of each phases

### 4. Amplitude

A	Amplitude of the earth motion in microns ( $\mu$ )			
A <sub>E</sub>	E-W component of A,	+	toward	N,
A <sub>N</sub>	N-S " " "	+	"	E,
A <sub>Z</sub>	Vertical " " "	+	"	Zenith

### 5. Time

(I) Greenwich mean civil time is adopted

(II) Time Keeping : We receive twice a day but Sunday and Flagday once the time signal of the Tokyo Astronomical Observatory at 2<sup>h</sup> and 12<sup>h</sup> G.M.C.T. using a chronograph which connect with the Nardin's Chronometer and the Leroy electrical clock (this is connected with all seismographs), and we determine the  $\Delta t$  and the  $\frac{\partial(\Delta t)}{\partial t}$

Table of values of  $\frac{\partial(\Delta t)}{\partial t}$  and  $\frac{\partial^2(\Delta t)}{\partial t^2}$  in 1929

		No.	$\frac{\partial(\Delta t)}{\partial t}$	$\frac{\partial^2(\Delta t)}{\partial t^2}$
Chronometer	Nardin	2116	+ 3. <sup>s</sup> 5	± 0. <sup>s</sup> 2
Pendulum clock	Leroy	—	+ 2. <sup>s</sup> 4	± 0. <sup>s</sup> 3

## CONSTANTS

Position of Seismological room:—

$$\lambda = 133^{\circ} 31' 52'' \text{ E}$$

$$\varphi = 33^{\circ} 33' 28'' \text{ N}$$

$$h = 40.4\text{m}$$

Underground = Serpentine

### Constants of Seismographs

Date	Apparatus	Comp.	$T_0$	$\epsilon$	$\frac{r}{T_0^2} \left( \frac{\text{mm}}{\text{sec}^2} \right)$	V
Jan. 15 1929	Wiechert 200kg	N	4.6	5.1	0.03	104
	" "	E	4.7	4.7	"	93
	" 80kg	Z	3.6	4.5	0.05	87
Feb. 25	Wiechert 200kg	N	5.3	4.4	0.006	98
	" "	E	5.2	3.8	0.002	79
	" 80kg	Z	4.2	4.0	0.005	74
Feb. 28	Omori 16kg	N	16.2	2.9	0.004	20
	" "	E	16.8	3.4	0.002	"
May. 4	Wiechert 200	N	5.1	5.6	0.005	94
	" "	E	5.2	4.6	0.007	84
	" 80	Z	4.9	6.5	0.005	63
	Omori 16	N	16.4	2.5	0.004	20
	" "	E	16.8	3.4	0.002	"
Aug. 1	Wiechert 200	N	5.3	4.8	0.002	110
	" "	E	5.3	4.8	0.002	88
	" "	Z	4.3	6.0	0.007	64
Nov. 7	Wiechert 200	N	5.4	4.4	0.004	78
	" "	E	6.2	5.0	0.005	63
	" 80	Z	4.2	4.0	0.014	65
	Omori 16	N	17.8	3.2	0.007	20
	" "	E	18.0	3.8	0.003	20
	Omori Portable Seis. (11.3 kg)	N	4.0	1.	0.01	50
	" " (11.6 kg)	E	4.0	1.	0.02	"

"Notice"

Those marked by M. is the results observed by Mr. T. Daiho, Director of the Muroto Mekeorological station.

Muroto:  $\lambda=134^{\circ} 10' 54'' \text{ E}$ ;  
 $\varphi=33^{\circ} 14' 52'' \text{ N}$ ;  
 $h=184.7\text{m}$

SEISMOLOGICAL BULLETIN

Date	Phase	Time G.M.C.T.			Period	Amplitude			Remarks
		h.	m.	s.		$A_E$	$A_N$	$A_Z$	
					s	$\mu$	$\mu$	$\mu$	
<i>January</i>									
1	iP <sub>E</sub>	16	40	42.0		-5	± 0		$\varphi = 33^{\circ}.07' N, \lambda = 130^{\circ}.47' E$
	iP* <sub>E</sub>			47.9	1.6	-31	± 0		Depth = 20km
	S <sub>E</sub> ?	41	07.5						O = 16 40 09
	iS* <sub>NZ</sub>		16		2				$\Delta = 259\text{km}$
	M <sub>Z</sub>		25		3	* +50		* -50	
	M <sub>E</sub>		32		4		* -65		
	M <sub>N</sub>		35		4				
	F		48 ±						
M	iP*	16	40	55.5					$\Delta = 312$
	iS*			33.0					
4	eP	02	09	38					Bungo-strait $\Delta = 130\text{km}$
	eP̄			43					eP ~ eP̄ = 5. <sup>s</sup> 9
	eS			50					樽原 12 <sup>s</sup> 微. 緩. (戸障子僅動)
	M			56		* +25	* ± 7	* ± 7	本山 25 <sup>s</sup> " "
	F		12.5						
13	iP	00	08	03.3	4	+3.6	+3.9	-5.2	iP ~ i = 7 <sup>s</sup> 5
	i			11	3	+160	+200	-200	Beginnig of waves of very remarkable amplitude
	M			17	4	* ± 160	* ± 182	* ± 232	Maximum amplitude in i phase
	PR <sub>1</sub>			41					uncertain
	iS <sub>E</sub>	12	05						Very distinct. supperposed 3 <sup>s</sup> waves on 10 <sup>s</sup> waves
	SR <sub>1E</sub>			48	10	* +640			This may not be SR <sub>1</sub>
	eSR <sub>1Z</sub>			55	13			* -300	
	iSR <sub>1N</sub>			57	10		* -450		
	F	03	08 ±						
M	P	00	08	07.1					
	i			13		-243	-167		5 <sup>s</sup> 8
13	eP	18	48	46					uncertain
	iS			52 46					
	F	19	06 ±						
16	iP	08	10	45		+2.0	+4.6	+3.0	South China sea
	iPR <sub>1</sub>			11 16					
	iS			14 36					
	F	09	37 ±						
M	P	08	10	48					
	F			40 ±					

(2)

## SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.			Period	Amplitude			Remarks
		h.	m.	s.		$A_E$	$A_N$	$A_Z$	
					s	$\mu$	$\mu$	$\mu$	
17	eP	22	33	56					
	eS		38	16					
	F	23	17±						
20	iP	15	00	46.5					
	i		01	16					
	i		02	05					
	F		18±						
29	eP	22	15	01					Near Yasima, Kagawa
	iS			13					橋原 10 弱 急 家屋動搖
	F		16.2						本山 10 微 "
30	eP	17	00	36					長澤 5 弱 稍急
	ePRz		01	50					
	eS		05	47					
	F		10±						
<i>February</i>									
1	iPe	17	23	08					Central Asia
	e		24	11	5	*	+ 4		
	e			27	5	*	+ 6		
	S		30	17	8			* -20	
	F		55±						
3	eP	02	45	35					uncertain by pulsation
	S		46	22					
	Q		47	26	5. 5. 3*	±11*	±17*	+ 4	Near Nase
	F		57±						
3	e	07	07.5						
	F		12±						
6	iP	06	53	46.5					
	eS		57	28	6. 5*	±14*	- 9		
	F	07	16±						

## SEISMOLOGICAL BULLETIN

Date	Phase	Time G.M.C.T.			Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
		h.	m.	s.	s	μ	μ	μ	
9	eP	12	28	25.7					Very weak Near Kumamoto city
	P*			30.6					
	S		29	00					Rather regular two waves
	M <sub>Z</sub>			06					
	M <sub>N</sub>	12	29	20	1.6			* ±20	
	eL			24	5.0			* ±29	
C		29.5			5.5.4	* ±20	* ±30	* ±20	
F		35±							
M	eP	12	28	41.9					
	S		29	19.4					
	F			37.6					
M.9	eP	13	06	20.0					
	F	13	11.6						
M.10	eP	21	37	23.0					
	eS			33.5					
	F			39.8					
14	eP	14	40	54					Near Nase
	eS		42	64					
	L			43.0	10.12	* ±17	* ±21		
	F			59±					
15	eP	05	46	34					Ditto
	e		51	02					
	F	06	05±						
<i>March</i>									
7	iP	01	42	50.0	6	+ 9.7	+ 6.7	- 24.0	△ about 44°
	PR <sub>1</sub>			44.6					Regular waves
	ePcSz		49	13	10				
	iS <sub>E</sub>			24	12				
	iPS <sub>N</sub>			38	8				
	ePSz				8				
	i(S <sub>C</sub> S) <sub>E</sub>		52	58	12.11	* - 340	* + 250		or SR <sub>1</sub>
	i <sub>Z</sub>		53	12	10			* ±180	
	M <sub>N1</sub>		55.1		13		* ±200		
	M <sub>E1</sub>		55.9		15	* ±530			
	M <sub>Z1</sub>		56.5		11			* ±150	
	M <sub>N2</sub>		58.0		12		* ±170		
	M <sub>Z2</sub>		58.4		11			* ±200	
	M <sub>E2</sub>			* ±330					
F		06.0							
M	iP	01	42	50.5					
	PR <sub>1</sub>		44	56					
	S		49	26.0					
	L		52	58					
	F	03	24.2						

(4)

## SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.			Period	Amplitude			Remarks
		h.	m.	s.		$A_E$	$A_N$	$A_Z$	
9	eP?	02	06	10		$\mu$	$\mu$	$\mu$	These never not instrumental error
	eS?		07	16					
9	eP	02	14	43					These have the wave type usually observed in Distant-quake Epic.: W off Mariamse IIs. (J.I.M.O.)
	i		15	06					
	eS		17	12					
	L		18.1						
	$M_E$		18.6		16	$* \pm 9.5$			
	QZ	02	18.3						
	MZ		19.2		17			$* + 260$	
	Q <sub>N</sub>		18.9						
	M <sub>N</sub>		19.4		15			$* + 90$	
	F	03	03 $\pm$						
	M	eP	02	14	34.9				
eS?			16	53.9					
eL			18	12					
F			47 $\pm$						
10	eP	14	38	50					
	iS		42	08	7	$* + 22$	$* \pm 11$		
	F	15	03 $\pm$						
15	P	01	59	21.2					
	eS	02	01	43					
	L		01.5		8				
	F		15 $\pm$						
15	P	10	14	05.5				Tp and A are very small	
	iP			14.3	1	+ 6	+ 5	+ 6	Very clear beginning
	e			26					Epic. :Bungo-strait, $\Delta=160$ km
	iz eH			31.5					樽原 18 <sup>S</sup> 微 緩 戸障子僅動
	F		16.0						
M	eP	10	14	15.8					
	eS			38.1					
	F			15.6					
18	S?	23	25	19				P is undetermined by pulsation	
	L		27.7					Epic: off Kinkazan	
	F		23.6						

SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.			Period	Amplitude			Remarks
		h.	m.	s.		$\Lambda_E$	$\Lambda_N$	$\Lambda_Z$	
20	iP	20	04	24		$\mu$ +	$\mu$ +	$\mu$	Z-component unknown as lines
	iS		05	03					doubled by temp.
	M			05	0.6*	$\pm 5^*$	$\pm 10$		Epic.: Kii-strait
	F			06.1					
M	e	20	05	07					
樽原25			03	17±					
31	eP	20	19	39					16 <sup>s</sup> 微. 緩. 戸障子僅動
	eS		22	01					Epic.: $\lambda=142^\circ.9E$ ; $\varphi 38^\circ.0N$ (C.M.O.)
	L		23	22					
	M <sub>N</sub>			07	8			* -17	
	M <sub>E</sub>		24	07	9	* +47			
	M <sub>Z</sub>			09	10			* -80	
	F			39±					
<i>April</i>									
15	P	05	59	51					Very weak, time uncertain
	S	06	00	20					1 <sup>s</sup> waves
	L			33	4	* ± 6	* ± 6		Rather regular 3 waves
	F			02.7					Epic.: Amakusa-nada, Kyusu
16	P	00	54	42±1					Occued in time break, weak trace
	S <sub>H</sub>		56	06					
	L <sub>N</sub>			18	8				Irregular waves usually appear in L phase
	iz		57	03	3				} Suddenly beginning of M <sub>Z</sub> and M <sub>N</sub>
	i <sub>N</sub>			04	4				
	M			57.1	5. 4. 3	* -12	* +28	* +19	Epic.: $\lambda=141^\circ.3E$ ; $\varphi=36^\circ.4N$ (C.M.O.)
	F	01	07±					$\Delta=778\text{km}$	
M	eP	00	54	43.1					
	S		56	14.4					
	F	01	02	4					
17	P	18	35	51					Aftershock
	S		37	13					$\Delta=758$
	L			52					
	F			42±					
M	eP	18	37	02.8					
	S			20.2					
	F			41.9					
23 M	M	14	19	11	3~4				Epic.: Kogai-gawa, Kwanto
	e	14	18	46					
29	P	15	42	13					Very hasty motion. $T_p < 0^s.1$
	F			43.0					Too slight to determine S etc Epic.: Hyuga-nada



## SEISMOLOGICAL BULLETIN

Date	Phase	Time G.M.C.T.			Period	Amplitude			Remarks
		h.	m.	s.		$\Lambda_E$	$\Lambda_N$	$\Lambda_Z$	
					s	$\mu$	$\mu$	$\mu$	
<i>May</i>									
1	ePz	15	47	39.9					} Very weak
	ePH			42.9					
	i		48	00					
	SH		55	56.0					
	SR <sub>1E</sub>	16	00.0						
	eL <sub>N</sub>		06		50.~40.				Tp gradually decrease from 50 <sup>s</sup> to 40 <sup>s</sup>
	QH		11.4						Entrance of M <sub>N1</sub> and M <sub>E1</sub>
	M <sub>N1</sub>		12.8		23		*±600		
	M <sub>E1</sub>		12.8		18	*±400			Max. amp. of wave series consist of 5 very sinous of nearly equall amp.
	M <sub>N2</sub>		14.4		18		*±500		
	M <sub>N3</sub>		15.4		16		*±230		only one wave
	M <sub>E2</sub>		15.5		18	*±250			
	M <sub>Z</sub>	16	17.0		17			*±360	
	M <sub>E3</sub>		17.2		13	*±300			Destructive earthquake in Persia
	C <sub>E1</sub>		18.6		15	*±100			
	C <sub>E2</sub>		19.5		15	*±130			
	C <sub>N1</sub>		19.9		15		*±100		
	C <sub>N2</sub>		20.0		15		*±150		
	C <sub>E3</sub>		22.0		11	*±150			
	C <sub>N3</sub>		22.4		15		*±100		
	F		17.0						
M	e	15	48	00.5					
	e	16	04	01					
	e		11	42	16.~12.				
	M <sub>H</sub>		12	26	16				
	F		45±						
2	eP	15	29	48					
	S		33	06					
	LE		35		23				
7	L <sub>N</sub>	16	53±						
	Q <sub>N.Z</sub>		54.0		20. 20				Heavy pulsation prevailing,
			to 57±						
13	L	14	20±						
18	e		07±						
20	i $\bar{S}$	14	37	31					
	F		38.5						Epic. : Kii-straît

# SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.			Period s	Amplitude			Remarks
		h	m	s		A <sub>E</sub> μ	A <sub>N</sub> μ	A <sub>Z</sub> μ	
21	P	09	16	53				Epic. ; Amakusa-nada	
	e			57					
	S*		17	08					
	F		20	±					
21	eP	16	36	06.3	—	—	—	Very slight beginning both on Z and H Epic. ; $\lambda=131^{\circ}.8E, \varphi=31^{\circ}.8N$ (C.M.O.) $\Delta=260km$ Slightly felt at the office. } Shorter period waves superposed Entrance of M <sub>E2</sub>	
	P*			11.2		ws			
	iP			21.0					
	iS			32.3					
	M <sub>Z1</sub>		37.0		??		*±600?		
	M <sub>E1</sub>		37.1		19	*+ 2,100			
	M <sub>N1</sub>		37±		18		*± 1,200		
	eE		37.9		18				
	M <sub>E2</sub>		38.5		18	*+ 1,500			
	M <sub>E3</sub>		40.0		14	*±600			
	F	17	40	±					
M	iP*	16	33	14.0	—	10	—10		樽原 50 <sup>s</sup> 微 緩 幡多中村 2 <sup>m</sup> " " 弘見 2 <sup>m</sup> " "
	iP			25.2					
	L			42.7					
	M <sub>1</sub>		49		2.5	*-250	*-250		
	M <sub>2</sub>		37 14		"	*-370	*-350		
	M <sub>3</sub>		32		"	*+550	*-480		
	M <sub>4</sub>		38 22		"	*-550	*-500		
	M <sub>5</sub>		59		"	*-590	*+470		
	F	17	05	±					
21	eP	16	59	±				Aftershock	
21	eP*	17	11	06				Ditto	
	P			14					
	S			30					
	F		13	±					
M	e	17	11	22				Ditto	
	F		15.7						

## SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.			Period	Amplitude			Remarks	
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>		
21	eP	h	m	s	s	μ	μ	μ	Ditto	
	eS	17	21	58						
	F		22	21						
				24±						
21	e	18	13±						Ditto	
26	eP	08	49	37			—			
	eS		55	21						
	F	09	12±							
26	eP	22	50	57					Weak both on Z and H	
	eS <sub>N</sub>	23	00	07						
	L		09±							
27	F	00	38±						Epic. ; British Columbia	
M	eS	23	00	06						
	eL		09	14						
	F	00	03±							
31	eP	00	13	00					Weak	
	e <sub>NZ</sub>			12						
	S		15	19						
	M <sub>N</sub>	16	25	6						
	M <sub>E</sub>		46	6						
F	24±			* ± 8	* ± 4			Epic. ; λ=142°.5E , φ=41°.9N (C.M.O.)		
<i>June</i>										
1	e	18	01	52	6	* ± 4	* ± 6			Beginning may be more earlier, and may correspond to S
	M <sub>H</sub>		03.2							
	F		13±							
										Epic. ; λ=129°.8E , φ=26°.0N (C.M.O.)
2	iP <sub>H</sub>	21	39	37.1	8. 8. 5	+ 1,000	+ 350	+ 230		Value of Z is approximatly estimated
	i <sub>H</sub> (S)	40	20							
	e <sub>N</sub> (S)									
	i									
	M	40.5	13.13. 6	*-700						
e <sub>N</sub> (L?)	42.0									
M <sub>NZ</sub>	43.3	12		*±100				Entrance of M		
F	22 10±									
M	iP	21	39	33.5	4	*-560	*-200			△=294km
	S		40	18.4						
	M		21							
F	22 00±								本 山 50 <sup>S</sup> 微 緩	

# SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.			Period	Amplitude			Remarks				
						$\Delta_E$	$\Delta_N$	$\Delta_Z$					
4	eP	h	m	s	10.4	$\mu$	$\mu$	$\mu$	May be S of new shock				
	iSH	15	21	22		-	-	+					
	eH		25	34		+	-	-					
	ie		27	58									
	en	}	31	20		+	-						
	F		49±										
7	eP	19	53	15.2	1.4	* ±13	* ±10	* ±14	Epic.; Bango-strait $\Delta=170\text{km}$				
	iP*			18.7									
	iP			25.4									
	iS			32.3									
	iS*			37.3									
	ME			32					} Very clear beginning				
	MZ			38									
	MN			41									
	F			56±					樽原山 1 <sup>m</sup> 弱(弱) 緩 本 山 30 <sup>s</sup> 微 "				
M	iP	19	53	16.7									
	iS			34.1									
	F			55.1									
9	ePH	09	12	09	5				Indistinct on E Epic.; $\lambda=150^\circ.0E$ , $\phi=44^\circ.0N$ (C.M.O.) $\Delta=1830\text{km}$				
	S		15	39									
	SR <sub>1N</sub>		16	22									
		LE			16.6	23							
		QE			17.8								
		ME			19.5								
	MN			21.1	15		* ±110		Sinous waves				
	eE			26.2	16		* ±70						
	F	10		31±									
M	eP	09	12	12									
	eS		15	47									
	eL		18	01									
	F			40±									
11	P	19	33	07					Epic.; Hguga-nada				
	S			27									
	L			34									
	ME			31						2		* - 4	
	MZ			33						1			* ± 4
	MN			40	2		* ± 5						
	F			35.4									
12	eP	11	50	19	12								
	e			49									
	ePR <sub>1</sub>		52	26									
	eSE			56.1									
	eSN			56.4									
	eE			59.1									
	LN	12	01.3										
	F		12.2										
13	eP	00	16	27.2					Entrance of 4 <sup>s</sup> waves on the long wave, may be new shock				
	e		18	26									
	e(S?)		20	01									
	e		22	02									

## SEISMOLOGICAL BULLETIN

Date	Phase	Time G.M.C.T.	Period	Amplitude			Remarks
				A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
Continued		h m s	s	μ	μ	μ	
	M <sub>E</sub>	22.6	20	* ± 430			
	M <sub>Z</sub>	24.5	20			* ± 250	
	F	Continued next quake					
M	eP	00 16 33.1					
	eS	20 08.0					
	eL	23 52					
	L	01 04 ±					
13	eP	00 30 08.0					
	S	33 40					
	L	35 34	21~24	* ± 460	* ± 300	* ± 330	
	M <sub>N1</sub>	37 40	17		* ± 300		
	M <sub>N2</sub>	54	17		* ± 330		
	M <sub>E</sub>						
	F	03.0		* ± 200			
13	eP	09 30 10.5		+ 1	+ 8	+ 11	Very gradual beginning
	i <sub>N,Z</sub>	22	4	- 40	- 36		
	S	34 51.3					
	eL <sub>E</sub>	35.3	29~33	* ± 500			Irregular two waves
	eL <sub>N</sub>	35.9	30				
	eL <sub>Z</sub>	36.6	24				
	M <sub>N</sub>	39.2	20		* ± 300		Regular eight waves of nearly equal A. and Tp. Epic. ; λ=126°E , φ=14°N (J.S.A.)
	e <sub>N</sub>	39.5	19		* ± 300		
	F	to 42.0					
	F	10 30 ±					
M	P	09 30 10.2					
	eS	33 55.4					
	eL	36 42					
	F	10 38 ±					
13	eP	19 53 10					
	eS	57 45					
	Q	02 30					
	F	Continued next quake					
13	e	20 26 ±					
13	eP	23 06 11					
	eS	10 39					
14	F	00 30 ±					
15	e	20 26 ±					Heavy pulsation prevailing
16	eP <sub>Z</sub>	22 59 52					Clear both on Z and H
	i	10					
	S <sub>c</sub> P <sub>c</sub> S	10 28					Epic. ; λ=173°E , φ=41°S (J.S.A.) Δ=88°
	eS <sub>N</sub>	11 10	20	* ± 60	* ± 100		
	eE	15.4					
	e <sub>N</sub>	15.7	22		* ± 70		Entrance of M <sub>1</sub>
	e <sub>H</sub>	16.2					
	M <sub>1</sub>	—	20	* ± 100	* ± 120		
	e <sub>H</sub>	22.5	34				
	M <sub>E2</sub>	23.8	27	* ± 300			
	M <sub>E3</sub>	24.8	30	* ± 500			
	eL <sub>N</sub>	27 ±					

SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.	Period	Amplitude			Remarks
				$A_E$	$A_N$	$A_z$	
Continued		h m s	s	$\mu$	$\mu$	$\mu$	
16	eE	29 ±	20	* ±90			
		to 32 ±					
	eN	31.5					
		to 34.0					
			19		* ±100		
	M <sub>N2</sub>	34.4	16	* ±60			
	M <sub>E4</sub>	37.6	18	* ±60			
	M <sub>N3</sub>	38.7	18	* ±60			
	M <sub>E5</sub>						
	eE	48.2	16				Sinous waves group
		to 50.2					
17	F	02.0					
M	eP	23 00 01					
	S	11 17					
	eL	23 08					
	F	00 03 ±					
17	e	06 45 42					Bay of Tabe, Wakayama
	F	56.6					$\Delta=170\text{km}$
M	P	06 45 18					$\Delta=140\text{km}$
	S	31					
	F	47 ±					
17	eP	10 21 58					
	eS	26 21					
	F	11 34 ±					
19	eP	07 36 19					
	e	40 55					
	F	37 ±					
26	e	08 47 16					
26	P	16 50 55.3					Epic. ; $\lambda=141^{\circ}.3E$ , $\varphi=36^{\circ}.1N$ (C.M.O.)
	S	52 34.2					$\Delta=760\text{km}$
	e	56					
	F	17 17 ±					
M	e	16 51 ±					Very indistinct
	F	58 ±					
27	eP' z	13 06 59.3				+	Verg weak beginning
	i	07 03.8					
	ez	18					
	$\overline{eP_cP_cS}$	11 07					or PR <sub>1</sub>
	$\overline{S_cP_cP_cS_c}$	17 50					Epic. ; $\lambda=29^{\circ}.7 W \pm 0^{\circ}.4$
	SR <sub>1H</sub>	31.0	14				$\varphi=55^{\circ}.8 S \pm 0^{\circ}.6$
	PSS <sub>H</sub>	32.0	37. 40				O=12 <sup>h</sup> 46 <sup>m</sup> 25 <sup>s</sup> ± 2 <sup>s</sup> (E. Tams)
	SR <sub>2H</sub>	35.4	30				Zf. f. Geo. VI, 361
	eN	40.4					$\Delta=143^{\circ}41' = 16,000\text{km}$
	eE	47 ±	40				} May be L
	eN	48 ±					

## SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.	Period	Amplitude			Remarks
				A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
Continued		h m s	s	μ	μ	μ	
27	eE	52±	76?				
	eN	53.0	m				
	eE	56±	0.7				
	eQ	14 13.6 to 18.0	22	*±200	*±200		Regular both on Z and H
	eN	28.0 to 30.0					Probably be W <sub>2</sub>
	ez	29± to 31±					
	e	43± to 50±	16, 16, 19				
	F	15.5					
M	e	13 07 10					
	F	15.0					
30	eP	02 50 13					Uncertain by pulsation
	S	54 49					
	L	58.7	20				
	F	04 00±					
<i>July</i>							
3	eP <sub>Z</sub>	20 02 53.1	2		± 0	+	Superposed very short period
	eP <sub>E</sub>	54.1	2	+			
	eE	03.1 to 03.5	4				Very irregular waves(?), and such a gradual motion as this, usually appear in the interval of P and S, is the characteristic of the earthquakes occur in the vicinity of Wakayama.
	iS <sub>N</sub>	} 03 13.9	0.5				
	eS <sub>E</sub>						
	L <sub>N</sub>	23	4				Superposed ca 0 <sup>s</sup> 7 waves
	M <sub>N</sub>	28	0.7		* ±50		
	M <sub>Z</sub>	30	1.2			* ±20	Epic.; Upper course of R. Arita.
	M <sub>E</sub>	31	0.8	* ±24			λ=135°E, φ=34°1N (C.M.O.)
	C <sub>N</sub>	40					△=184km
	F	09±					本 山 50 <sup>s</sup> 微 緩 (△=175km)
M	P	20 02 48.7					Slightly felt by some one, but no feeling at the Muroto St.
	S	51.6					
	L	03 20					
	M	03 21		*--100	*+160		
	F	07.7					
5	eP	14 26 30					
	eS	32 28					
	eL	35.4					
	F	15 30±					
5	eP	22 43 34					
	eS	50 00					
	eL	53.0					
6	eP	02 11 10					
	eS	17 24					

SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.			Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
7	eP	h	m	s	s	μ	μ	μ	Epic. ; Neighbourhood of Kamtchakta
	ePR <sub>1N</sub>	21	30	41	9	—	—	+	
	eS		32	13			* ±24		
			36	41					
	LN		39.4						
	QN		40.8						
		to	41.8		24		* ±200		
	QE		41.0						
		to	43.0		23	* ±200			
	QZ		41.8						
		to	45±		24				
8	F	00	30±						
M	eP	21	30	41.6					
	eL		40±						
	F	22	29±						
12	eP	18	00	48				Epic. ; NE off Nase (C.M.O.)	
13	eP	14	58	24				Kamtchakta	
	eS		04	38					
	F		21±						
14	iP	09	41	44.9		—	—	+	Ditto
	e		42.0						
	iS <sub>N</sub>	}	45	45.2	9		— 40		Regular two waves
	eS <sub>Z.E</sub>						* ±200		
	SR <sub>1N</sub>		46	26					
	M <sub>Z</sub>		49	20	20				* ±200
	ME <sub>1</sub>			45	21	* ±60			
	ME <sub>2</sub>		50.8		20	* ±60			
	F	10	35±						
M	P	09	41	45.1					
	eS		45	46.5					
	eL		49	19					
	F	10.0							
17	e	10	52	09					Pulsation prevailing,
21	P	13	20	43					Epic. ; Kinu-gawa (C.M.O.)
	S		24	39					
	F		36±						
26	ePE	22	49	30.6	4	—	—	+	} Superposed 1 <sup>s</sup> waves Trapezoidal waves usually appear in the front of M series
	iS <sub>N</sub>		50	29	7				
	eLN			35					
	eLZ			39					
	iS <sub>N</sub>			41					
	QN			52					
	QZ			54					
	MN <sub>1</sub>		51	04	4		* -124		
	ME <sub>1</sub>			08	4	* ±54			
	MZ <sub>1</sub>			10	4.5			* -55	
	eE			27					
	ME <sub>Z</sub>			30	14	* ±180			
MN <sub>Z</sub>			33	6, 5		* ±95	* -90		
CE			47						
F	23	38±							

Epic. ; λ=139°13' E, φ=35°29' N  
O=22<sup>h</sup> 48<sup>m</sup> 02<sup>s</sup>  
△=564km  
Entrance of ME<sub>2</sub>



## SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.			Period	Amplitude			Remarks
		h	m	s		$\mu$	$\mu$	$\mu$	
M	eP <sub>x</sub> S M F	22	49	28.9 50 42.9 55	s	$\mu$	$\mu$	$\mu$	$\Delta=528\text{km}$
		23	02	$\pm$		* +70	* $\pm 108$		
<i>August</i>									
1	iP iSE	05	09	57 16 26					
1	e	06	04	09					
3	eP iS* M <sub>Z</sub> M <sub>E</sub>	16	00	48.3 23.1 // 28	1.2 1.2	* +17		* -15	Epic. ; $\lambda=130^{\circ}34' E$ , $\varphi=34^{\circ}20' N$ O=16 <sup>h</sup> 00 <sup>m</sup> 05 <sup>s</sup> $\Delta=294\text{km}$
	e <sub>N</sub> M <sub>N</sub> C <sub>N</sub> F			33 43 51 07 $\pm$	5		* $\pm 20$		{ Entrance of M <sub>N</sub> This may correspond to Q, Vel. 3.3km/sec.
M	P* e F	16	01	01.7 47.4 04 $\pm$					$\Delta=350\text{km}$ May not be S.
8	e e L F	13	10	01 12 41 15 28 48 $\pm$					
M	eL	13	17	18					
8	eP <sub>E</sub> S e	13	34	08 41 54					Epic. ; $\lambda=130^{\circ}.3E$ , $\varphi=33^{\circ}.5N$ (C.M.O.) $\Delta=300\text{km}$
M	eP̄ S F	13	34	23.6 34 59.9 36.7					
19	P S <sub>N</sub> eZE L <sub>E</sub> M <sub>E1</sub> M <sub>E2</sub> M <sub>N1</sub> M <sub>E3</sub> M <sub>N2</sub> M <sub>N3</sub> M <sub>E3</sub> F	02	46	27 49 08 20 50.3 51.1 52.3 53.3 53.4 54.3 54.8 03 31 $\pm$	9 13, 7 22 23 18 17 16 12 15 13		* $\pm 100$ * $\pm 60$ * $\pm 40$ * $\pm 80$ * $\pm 70$ * $\pm 70$ * $\pm 60$		Epic. ; $\lambda=122^{\circ}.4E$ , $\varphi=24^{\circ}.4N$ (C.M.O.) $\Delta=1,470\text{km}$
20	e	23	48	$\pm$					
20	eP eS F	16	41	40 44 23 17 05 $\pm$					Aftershock of Aug. 19

SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.			Period s	Amplitude			Remarks
		h	m	s		A <sub>E</sub> μ	A <sub>N</sub> μ	A <sub>Z</sub> μ	
28	eP	18	54	08	17, 18	* ± 280	* ± 250		Weak beginning Doubtful  Entrance of M <sub>1</sub> series Figures of both comp.s of horizontal very alike each other, in the manner, E to W and W to S
	eS <sub>N</sub>		56	09					
	e			36					
	e <sub>H</sub>		57	30					
	M <sub>H1</sub>		58	03					
	C <sub>H1</sub>		58.5						
	M <sub>H2</sub>		59.4						
e <sub>N</sub>	19	00	23	15		* ± 180	Entrance of M <sub>N3</sub> Two waves Epic. ; λ=143°.1E, φ=41°.0N (C.M.O.) Δ=1,180km (K.)		
M <sub>N3</sub>		00.6							
F	20	02 ±							
M	e	18	56	30					
	F	19	08.4						
31	eS?	03	04	04				} Epic. ; Kwanmon-strait	
31	eS F	03	07	50 08.2					
<i>September</i>									
2	P	11	18	10					
	S		22	35					
	F	13	22 ±						
2	S	20	16	44				P indistinct Epic. ; Bay of Tabe (C.M.O.)	
	F		17.5						
M	iP	20	16	22.5					
	iS			33.6					
	F		17	20					
本山 5		06	37.1					10 <sup>s</sup> 微 緩	
5	P̄	12	56	25	0.3	* ± 13	* -10		May be S̄ Epic. ; Iyo-nada, Seko-Umi (C.M.O.) Δ=Ca. 90km 長澤 05 <sup>s</sup> 弱(弱) 稍急 檮原 40 <sup>s</sup> 微 緩 戸障子揺 May be S of distant quake
	e			36					
	e			38					
	M <sub>H</sub>			39					
	F		57	20					
11	e <sub>H</sub>	22	25	29	9				
17	e	19	28.6						
20	eP	04	10	35?				Too slight to determine accurately Epic. ; 30km N off Yakusima, Kyushu	
	e		11	23					
	F		19 ±						
28	P	14	59	56					
	S		02	50					
30	iP̄	15	59	06.0		+ 3.3	± 0	+ 4. 3	Epic. ; 40km NW off Cape Sata, Sikoku Δ=Ca, 160km 檮原 05 <sup>s</sup> 微 急 戸障子揺 長澤 03 <sup>s</sup> " 緩 中 村 — " —
	iS̄			26.0					
	M			—	0.6	* ± 9	* ± 7	* ± 9	
	F	16	33 ±						
M	P	15	59	07.6					
	S?			35.4					
	F	16	01 ±						

## SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.	Period	Amplitude			Remarks
				$A_E$	$A_N$	$A_Z$	
			s	$\mu$	$\mu$	$\mu$	
<i>October</i>							
M. 2	S? F?	h m s 19 17 18 17.6					
5	eP eS F	17 05 41 10 18 33±					Epic. ; $\lambda=160^\circ E$ , $\varphi=55^\circ N$ (J.S.A.)
5	eP	19 04 11					
6	P S F	08 02 03 10 39 09 14±					Epic. ; $\lambda=156^\circ W$ , $\varphi=19^\circ.5N$ (J.S.A.)
10	P S M F	19 45 58.2 46 21.6 23 48 20	1.7,0.4,0.6*	-25*	-13*	-10	Epic. ; $\lambda=131^\circ.1E$ , $\varphi=32^\circ.9N$ (C.M.O.) $\Delta=210km$ 樽原 50s 微緩 戸障子搖
M	eP S F	19 46 07.9 32.5 48±					
16	e eN M <sub>N</sub> to M <sub>E</sub> F	20 39 23 43 23 44.7 47± 47.2 21 04±	12	* ±50			
19	ePz eZ <sub>N</sub> i iP' / Z <sub>N</sub> eP' / E	10 32 42 50 33 01 57	4 3 3				Faint dilatation Epic. ; $\lambda=72^\circ W$ , $\varphi=21^\circ.5S$ (J.S.A.), $\Delta=154^\circ$ These values of Epic. are not suitable to explain our results By Gutenberg's Lauf Zeit Kurve, $\Delta$ estimated ca 166° Surface waves (Q?)
	iz eE F	36 56 11 05.8 14±	24				
24	eL <sub>E</sub> eL <sub>N</sub> eE eN eE	06 42.5 43± 47 20 49.3 49.4	25 13 12				
24	iP* P eS* <sub>N</sub> M <sub>1</sub> M <sub>2</sub> e M <sub>3</sub>	18 58 11.0 37.0 47 50 59 59 05 59.2	1.3 2 6, 4, 4	+ 46 * ±10 * ±10 * ±11	+ 1.4 * ±9 * ±6 * ±9	+ 4.3 * ±12	Epic. ; Near Unzen-Dake, Nagasaki. $\Delta=320km$ (C.M.O.) Entrance of M <sub>3</sub> series
M	eP e e e F	18 56 01.4 52.9 58 15.9 42.2 59.8 19 05					Too late by 2m or this may be P*

SEISMOLOGICAL BULLETIN



Date	Phase	Time G.M.C.T.			Period	Amplitude			Remarks
						A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
		h	m	s	s	μ	μ	μ	
M 26	eP S F	21	27	35.7 52.9					
			28.7						
28	P S F	01	52	01 14 35					Epic. ; Hiuti-uada (C.M.O.) 櫛原 06 <sup>S</sup> 微急 戸障子急搖
<i>November</i>									
1	P F	16	03	42 05.3					
5	iP eS F	11	43	40 48 18					Epic. ; λ=126°.5E, φ=10°N (M.W.B.)
		12	08	±					
13	P eS F	10	31	19 32 41					
				37 ±					
15	eP PR <sub>1</sub> PR <sub>2</sub> eS <sub>N</sub> eSR <sub>1N</sub> iS <sub>c</sub> S <sub>N</sub>	18	55	28 56 03	5, 3 4		+	+	E comp. unknown by instrumental defect
				26	4~5		* ±15	* ± 7	Epic. ; λ=143°E, φ=3°.5N (J.S.A.)
		19	00	00	15		* ±110		
			01	34	14~16		* ±180		
			06	11	17		* ±200		
M	e e e F	18	56	16					
		19	00	58					
				02 30					
				39 ±					
17	eP i eSR <sub>1E</sub> eL <sub>E</sub> eL <sub>N</sub> F	03	49	11 54 54 04					Epic. ; λ=123°.5E, φ=11°N (J.S.A.) △=24°
				54.5	33				
				56.3	30				
		04	57	±					
M	P F	03	49	15					
		04	35	±					
18	eL	05	59	±					Heavy microseismos covers
18	iP S F	10	42	38 45					大野見 微震
				43.1					
18	eL F	21	29	±					
		22	03	±					

Date	Phase	Time G.M.C.T.			Period	Amplitude			Remarks
		h	m	s		A <sub>E</sub>	A <sub>N</sub>	A <sub>Z</sub>	
20	iP	05	54	56.3	1.0	+ 9.0	+ 3.1	- 11.6	Epic. ; $\lambda=135^{\circ}12' E$ , $\varphi=34^{\circ}03' N$
	i			57.3		- 14	+ 5	+ 12	$\Delta=163\text{km}$
	i			58.1	1.0	+ 31	+ 17	- 35	Rather strongly felt at this office
	PM	interval from i <sub>2</sub> to S			1.0	* $\pm 80$	* $\pm 70$	* $\pm 100$	There exist 4 <sup>s</sup> waves, superposed 1 <sup>s</sup> waves, this is the characteristic of the earthquakes occur in the neighbourhood of Wakakayama. C.f. July 3.
	iS		55	10.7					室戸測候所; 室戸, 弱震, 緩
	iS*			15.7					安藝 " " , 多數人戶外出
	M <sub>E1</sub>			17	Ca. 10	* - 110			西豐永 " " { 地震中遠雷 ノ如地鳴
	M <sub>E2</sub>			19	"	* + 125			東豐永, 本山 " "
	M <sub>N1</sub>			20	"		* - 160		後免 " " 地震前自動車 走ル如地鳴
	M <sub>Z1</sub>			22	difficult			* + 215	上野尻, 田野, 大栃, " "
	M <sub>N2</sub>			29	Ca. 1.5			* + 154	
	e			55.5	E=7				Surface phase
	M <sub>Z2</sub>			30	difficult			* + 154	
	M <sub>E3</sub>			36	1.6	* - 105			桑尾, 中村, 清水 微震, 緩 田野々 弱 急 地鳴 二發大砲如
	C			55.8					
P		06	06 $\pm$						
M	P	05	54	52.0					
	S		55	08.7				Rather strongly felt	
	M			12	2.8	? *	- 450		
	F	06	01 $\pm$						
<i>December</i>									
8	P	02	37	37					Epic. Bungo-straight (C.M.O.) 檮原, 本山 微震, 緩
	F			38.3					
9	iP	06	58	26					
	eS	07	05	14		+	+	+	
	eL		11	33	35				
	F			38 $\pm$					
13	eP	09	44.9						
	F			53 $\pm$					
17	iP <sub>Z</sub>	11	05	17.7	1.6			+ 1.3	Epic. ; $\lambda=172^{\circ}.4E$ , $\varphi=53^{\circ}.4N$ , $\Delta=33^{\circ}50'$ Phases correspond to these two i <sub>1</sub> and i <sub>2</sub> appeared on the almost seismograms in Japan.
	i <sub>1H</sub>			24.2	4.0	- 6	- 6		
	i <sub>1Z</sub>			24.6	3.8			+ 10	
	i <sub>2</sub>			35.3	4, 4, 5	- 13	- 10	+ 24	
	eS <sub>H</sub>		10	54					
	e <sub>N</sub>		14	57					
	M <sub>N</sub>		15	32	20			* - 2,000	
	e <sub>E</sub>		17	17					
	M <sub>E</sub>			52	17	* + 1,000			
	F	14	19 $\pm$						

SEISMOLOGICAL BULLETIN

Date	Phase	Time G.M.C.T.			Period s	Amplitude			Remarks
		h	m	s		$\Delta_E$ $\mu$	$\Delta_N$ $\mu$	$\Delta_Z$ $\mu$	
Same quake	S <sub>II</sub>	11	10	56				By Omori H. S.	
	eE		12	17	24				
	iN			25					
	eE		13	09					
	eN		14	57					
	M <sub>N</sub>		15	35	20		* — 1,640		
	eN		16	30	22				
	eN			59	14				
	iE		17	18					
	M <sub>E</sub>			52	20	* ± 910			
	eE		19	40					
	eN		21	28	18				
	iN		24	49	17				
	iE		25	24	12				
	iN		26	04	17				
iN		31	35	12					
eN		32	53	20					
M	P	11	05	24.1				May be correspond to i <sub>1</sub>	
	S		10	39.7					
	L		13	36					
	M <sub>N1</sub>		15	15	19		* +40		
	M <sub>N2</sub>		17	01					
	M <sub>EN3</sub>		18	34	14	* +20	* -18		
	M <sub>N4</sub>		20	23	17		* +20		
	F	12	47 ±						
18	eN	07	03	34					
	eL <sub>N</sub>		04	34	27				
	eL <sub>E</sub>		05	05	25				
	eN		06	00	15.5				
	eE			36					
	eN		07	28					
	F		31 ±						
21	e	01	47	49				檮原 微震 緩	
	F		49	07					
31	P	01	09	13					
	S		13	29					
	L		15	53					
	F	02	40 ±						
31	eP	04	52	09				Uncertain by pulsation	
	S		56	32					

March

本 山	4	05	21 ±	20 <sup>s</sup> , 微, 緩, 地鳴西方ヨリ	} 震央; 本山附近
全	"	05	34 ±	25 <sup>s</sup> , ", 稍急, " "	
全	5	02	39 ±	20 <sup>s</sup> , ", 緩, " "	
檮 原	25	03	17 ±	16 <sup>s</sup> , ", ", 戸障子揺ル 震央; 愛媛—三崎半島北方	

April

檮 原	7	13	26 ±	05 <sup>s</sup> , 微, 急, 方向南 震央; 檮原附近
-----	---	----	------	---

## 昭和四年に於ける本縣及附近の地震活動の消長に就て

當所地震計室に於て本年中に檢測せし地震總數は百二十五回にして内二回は有感殘餘の百二十三回は無感地震なり。

又管内に於て人身觀測による成績は次の如し

本山、櫛原、十四回。長澤、四回。田野、二回。東豐永、西豐永、安藝、室戸、魚梁瀬、幡多、大栃、上野尻、各一回。

當所に於て覺感ありし二回の地震の詳細は次の如し

### (一) 五月二十二日の日向灘の地震

本地震は日向灘に發したる近年稍稀なる強震にして隼田氏によれば、宮崎市を去る東方三十五軒、深さ五十四軒の所謂モホロピチツクの不連續層附近に於て水平斷層によりて生起せるものにして、宮崎市及其附近の地に於ては相當の被害を見たり。幸本縣は距離に於て稍へたゞりたるも他方地質上の影響に依るにや被害なかりしものなり。

### (二) 十一月二十日の和歌山縣有田川河口附近の地震

此の地震は有田川河口に其の震央を有する勢力稍大なるものにして震央附近の地は墓石轉倒する程度の強震にして被害も相當ありたり。當所に於ては何等被害なかりしも震度は3にして戸障子鳴動せり、又管内各地に於ても伊野町以東の地は震度3に及びたるものの如く人々戸外に出づる程度なり。

管内各地の觀測より本年の本縣及土佐灣に於ける地震活動の消長を推斷するに、吉野川流域に存在せる微弱なる地震帶の極く勢力弱き局部的地震の稀に生起せし以外には云ふべき地震の發生を見ず。

現在に於ては本縣及土佐灣は地震活動の靜止状態にあるものの如し。

昭和五年八月廿七日印刷 (非賣品)  
昭和五年九月五日發行

發行者 高知測候所

印刷所 高知縣印刷所