

MINISTRY OF PUBLIC WORKS, EGYPT



PHYSICAL DEPARTMENT

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Royal Observatory Helwan

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**SEISMOLOGICAL AND MAGNETIC REPORT**  
**FOR THE YEAR 1939**

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PUBLISHED UNDER THE DIRECTION OF

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*Director of the Observatory*

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## INTRODUCTION

The seismological Service in Egypt is carried out at Hélwan Observatory, a section of the Physical Department, under the direction of the Ministry of Public Works.

A Milne-Shaw East West component seismograph had been in use since November, 1921, replacing the two Milne instruments which had been previously in use. The room at the Observatory in which the Milne-Shaw was housed, is subject to considerable solar radiation and to wind currents. The seismograph records showed crowding in the lines, and sometimes considerable overlapping that made the records very difficult to read.

To remedy this defect, and to provide sufficient space for the two recently bought seismographs a new building was constructed.

It consists essentially of a double-walled and double-ceiling room  $7 \times 7 \times 4$  metres; the floor of the inner room is about 3 m. less below ground level. The outer surface of the rooms is covered with Selton blocks to minimise the variations in the temperature.

The diurnal variation in temperature is about  $0.02^{\circ}$  C. and the extreme seasonal change not more than  $10^{\circ}$  C.

A large massive concrete pillar at the centre supports the three seismographs namely :—

- (1) N-S Component Milne-Shaw installed on May 19, 1938.
- (2) E-W , , re-installed on April 13, 1939.
- (3) Galitzin Wilip vertical seismograph installed on June, 1938.

An improvement in the N-S and vertical Galitzin components is the time scale of the records, being 15 mm. = 1 minute.

Monthly reports of the phases of the various earthquakes recorded are sent regularly to about 70 observatories.

We wish to acknowledge with thanks the regular receipt of bulletins from the following stations, continuance of which will be appreciated :—

Station	Station	Station
Batavia	Bucarest	Cape Town
Collmberg (Leipzig)	Florissant	Gottingen
Hamburg	Helgeland	Jesuit (Central Station)
Kew	Ksara	La Plata
Malaga	Melbourne	Ottawa
Paris	Pittsburgh	Praha
Passedena	Riverview	Rocco di Papa
Saint Louis	San Fernando	State College
Strasbourg	Uccle	Zurich

## Seismological Bulletin

Constants of the Station.

 $\varphi = 29^\circ 51' \text{ N.}$     $\lambda = 31^\circ 20' \text{ E.}$     $h = 115 \text{ m.}$ 

NATURE OF STRATA: Limestone rock.

INSTRUMENTS: Galitzin Wilip Aperiodic Seismograph, Photo Galvanometric Registration, Vertical Component.

Milne-Shaw Seismographs, Photographic Registration, two Horizontal Components.

Component	Date From which Constants Apply	Pendulum Free Period $T$ sec.	Galvanometer Free Period $T_1$ sec.	Damping Constant	Transmission Coefficient $K$	Static Magnification $V$
N	Monthly	12.0				250
E	,	12.0				250
Z	9-6-1938	11.16	11.13	+0.05	175	1000

Phases of the Seismogram:—

- P (undae primae superiores) Direct P-type waves whose path lies wholly above the first major discontinuity.
- P (undae primae) Normal first preliminary tremor; condensation rarefaction or Longitudinal waves that have passed below the suberustal or Mohorovičić discontinuity.
- PKP P waves that have traversed the earth's core.
- PP P wave reflected once at the earth's surface.
- PPP P wave reflected twice at the earth's surface.
- pP P wave from a deep focus reflected near the epicentre.
- $\frac{S}{S}$  (undae secundae superiores) Direct S-type waves whose path lies wholly above the uppermost major discontinuity.
- S (undae secundae) Normal second preliminary tremors, traverse or shear waves which have passed below the Mohorovičić discontinuity.
- PS (undae transformatae) waves transformed from P to S on reflection at the earth's surface.
- sS S Type waves from a deep focus reflected near the epicentre.
- SS S Type waves reflected once at the earth's surface.
- SSS S Type waves reflected twice at the earth's surface.
- SKS S Waves transformed to P-waves on reflection into the core and back to S-waves when leaving the core.
- SKKS S Waves in the mantle reflected and internally reflected as P-waves in the core.
- L (undae longae) Long surface waves of irregular form at the beginning of the "principal phase".
- M (undae maximae) Shorter and more regular waves of large amplitude which follow the L-waves.
- F (finis) End of discernible movement.

Nature of the Motion:—

- i (impetus) Sudden beginning of the motion.
- e (emersio) Gradual beginning of the motion.
- T (period) Time of one complete oscillation.
- A Amplitude of the earth motion, measured from the median line in microns.

$$(\mu = \frac{1}{1000} \text{ mm.})$$

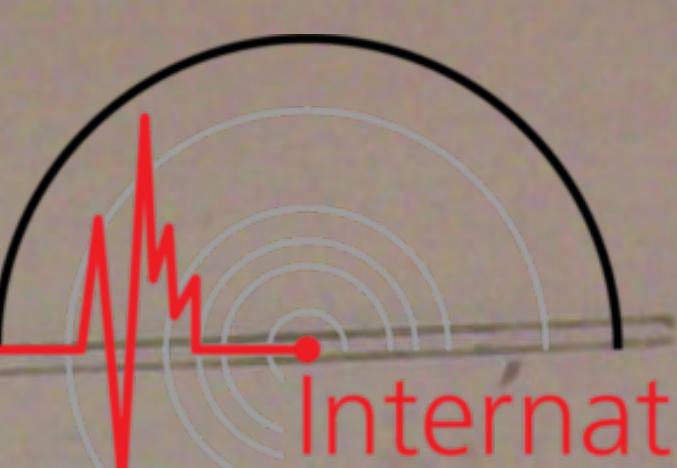
\*\* Confused with the succeeding earthquake.

\*\*\* Lost in changing the paper.

## ROYAL OBSERVATORY, HELWAN

No.	Date	Comp.	Phase	G. M. T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		A <sub>N</sub>	A <sub>E</sub>	A <sub>Z</sub>		
1	January 2	Z Z	eP i F	4 5.1	40	10 54		μ	μ	μ	KM.	Confused with microseisms.
2	10	Z E Z	iP e i P	2 2.7	20 24 26	35 36 39						Dilatation.
3	17	Z E E E	P eS e M F**	9	49 53 55 57	44 50 48 35	6	+21			2480	
4	17	Z Z	i i F	10 10.8	14 16	00 15						
5	18	E E	i i F	2 3.2	09 10	32 46						
6	20	Z Z Z ENZ E	eP i i S M F	1 3.1	27 29 30 32 38	36 07 00 00 24	5	+14			2735	Confused with microseisms.
7	20	E Z	i e F	12 12.5	17 18	21 31						
8	20	Z Z Z EN E	P PP i S M F	14 16.0	25 26 30 35	36 08 57 00		+29			2735	„ „
9	20	Z E E	i i F	20 21 23.1	59 05 06	24 36 30						
10	21	Z Z Z	e e F	12 13.0	43 44 45	27 18 00						
11	22	Z	i F	4 5.7	52	23						
12	23	Z	e	2	10	15						

No.	Date	Comp.	Phase	G. M. T.				Period	Amplitude			Δ	Remarks
				H.	M.	S.	SEC.		A <sub>N</sub>	A <sub>E</sub>	A <sub>Z</sub>		
13	23	Z	iP	2	25	55							2800 Dilatation.
		Z	PPP		26	42							
		Z	i		27	15							
		EN	S		30	24							
		N	M		35	24	9	+122					
		E	M		35	36	9	+38					
14	23	E	M	13	51	39	18						+7
			F	14.4									
15	23	Z	e	17	38	38							
			F	17.8									
16	24	Z	e	2	24	21							
		Z	e		25	06							
17	24	Z	iP	4	14	24							Dilatation.
		Z	e		44								
18	25	EZ	eP	3	47	27							12980
		EZ	PKP		51	00							
19	25	EZ	i		27								2245 Dilatation.
		Z	PP		52	10							
		EZ	i		50								
		E	i		57	48							
		EN	SKKS		59	05							
		E	S	4	00	09							
		E	PS		01	53							
		N	M		35	12	25	+280					
20	27	Z	iP	11	06	15							2245 Dilatation.
		Z	PPP		07	50							
21	29	Z	e		09	18							
		N	e		10	00							
		N	(S)		10								
		N	e		11	38							
			F	11.7									
22	30	EZ	eP	20	13	57							13680 Preceded by microseisms.
		EZ	i		14	06							
23	30	EZ	PKP	20.7									
		E	e										
		E	PP		39	00							
		E	(SKP)		40	30							
		E	i		41	15							
		E	PS		49	05							
		E	M	3	32	42	34						
			F	8.3				+174					




 International  
Seismological  
Centre

No.	Date	Comp.	Phase	G. M. T.			Period	Amplitude			$\Delta$	Remarks
				H.	M.	S.		A <sub>N</sub>	A <sub>E</sub>	A <sub>Z</sub>		
23	31	Z	eP	00	05	50		$\mu$	$\mu$	$\mu$	12865	
		Z	e		06	00						
		E	PKP		09	27						
		E	e		10	05						
		EZ	PP			30						
		E	e		17	27						
		E	(S)		18	20						
		E	PS		20	10						
			F	2.5								
24	February 2-3	Z	eP	23	53	48					2620	
		E	e		54	55						
		EN	e		58	06						
		E	S			15						
		EN	SS		59	15						
		E	M	09	05	04						
			F	0.6								
25	3	Z	iPKP	5	45	28					14145	Dilatation.
		EZ	PP		47	27						
		E	e		48	00						
		E	e		49	25						
		E	SKKS		54	20						
		E	PS		57	36						
		EN	SS	6	04	32						
		E	M		51	54	17					
			F	9.0								
26	3	Z	i	20	33	10						
		Z	i			21						
		EZ	i			37						
		E	i		37	09						
			F	22.6								
27	8	Z	iP	20	55	46						
		Z	i			57						
		-	F	22.2								
28	9	Z	i	2	50	06						
		EZ	i		52	00						
		EZ	e			19						
			F	5.1								
29	9	Z	P	11	56	36					6610	
		EN	S	12	05	46						
		E	PS		06	16						
		E	i			41						
			F	13.0								
30	13	Z	e	15	48	06						
			F	16.8								
31	14	Z	e	17	17	27						
		Z	i		18	29						
			F	17.5								
32	16	Z	i	12	21	14						
			F	13.1								
33	16	Z	iP	19	03	50					9445	
		Z	pP		04	12						
		Z	PP		07	15						
		Z	pPP			39						
		E	S	14		12						



No.	Date	Comp.	Phase	G. M. T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		A <sub>N</sub>	A <sub>E</sub>	A <sub>Z</sub>		
46	13	Z	iPn	3	38	42	SEC.	μ	μ	μ	Km.	Dilatation.
		Z	i			48						
		Z	Pg		39	07						
		E	S*		40	06						
		F		4.0								
47	13	Z	e	5	30	00	12	5				
		Z	i		31	15						
		F		5.6								
48	13	E	M	22	28	05	12	5				
		F		22.8								
49	15	Z	eP	6	24	12						
		Z	i		29	30						
		E	e		31	03						
		F		6.7								
50	15	Z	P	20	55	51						Near earthquake.
		E	e		57	12						
		F		21.0								
51	20	Z	iP	3	34	45					9555	Dilatation (h = 200 Kms.)
		Z	i		35	03						
		Z	pP			30						
		Z	i		36	12						
		Z	PP		38	15						
		Z	PPP		40	06						
		N	S		45	00						
		N	i			20						
		EN	sS		46	21		24	17			
		E	M	4	18	44						
52	20	Z	eP	16	38	21						
		Z	i		39	52						
		F		17.2								
53	20	Z	e	20	40	42						
		Z	e		46	06						
		F		21.0								
54	21	EZ	iP	1	21	42					6935	Dilatation.
		Z	PP		24	06						
		E	i		26	00						
		N	S		30	12						
		N	SS		34	36						
		E	L		41	24		12	52			
		E	M		59	54						
55	22	EZ	iF	5.2								Preceded by microseisms.
		Z	eP	4	05	10						
		E	i			42						
		F		6.0	15	12						
56	22	EZ	i	7	41	40						
		EZ	i		42	06						
		EZ	i		45	12						
57	22	Z	F	10.1								
		EZ	e	17	49	21						
		EZ	F	18.0	50	10						

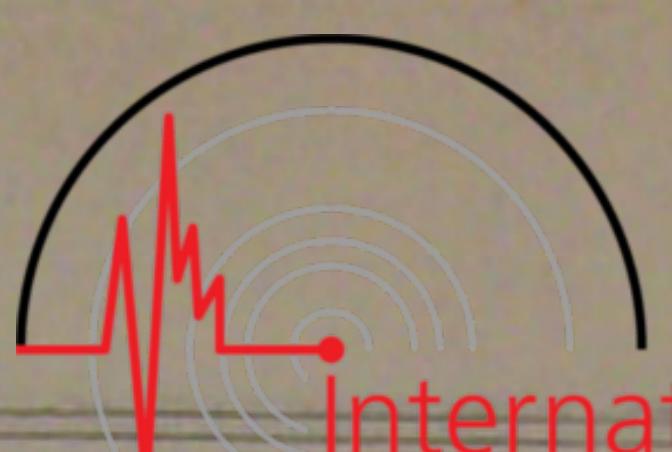
No.	Date	Comp.	Phase	G. M. T.			Period	Amplitude			△	Remarks
								A <sub>N</sub>	A <sub>E</sub>	A <sub>Z</sub>		
58	23	Z EZ	iP i E E E	16	40	24					KM.	Compression.
						50						
					50	42						
					51	36						
					52	34						
59	31	Z EZ	e e F	18.6								
					6	54	00					
						55	26					
					7.1							
April												
60	1	Z	i F	2	22	20						Very weak.
				4.0								
61	1	Z Z E	P e e F	21	07	42						
					10	09						
					13	54						
62	4	E E	e e F	10	33	32						
					39	24						
63	5	Z E	eP e F	00	08	30						Local (not felt).
						37						
64	5	EZ	iPKP Z Z E E E E E E E E F	17	02	05					15780	Dilatation.
					05	06						
						39						
					09	12						
					12	00						
					15	24						
					17	40						
					23	38						
					M	18	18	18	33			
					F	20.5						
65	6	EZ	iP Z Z Z E E E F	4	12	40					2380	Dilatation.
						45						
					13	15						
						24						
					16	36						
					19	54						
					23	18		10	12			
					5.0							
66	15	E	M F	6	23							
				22.2								
67	18	EZ	iP Z Z Z E E E E E F	6	37	24					13020	Dilatation.
						42						
					41	02						
					42	06						
					49	17						
					51	54						
					53	05						
					58	25						
					M	7	32	12	12			
					F	11.1						
68	18	Z Z E	e i e F	16	45	12						
						21						
					46	26						
					17.0							

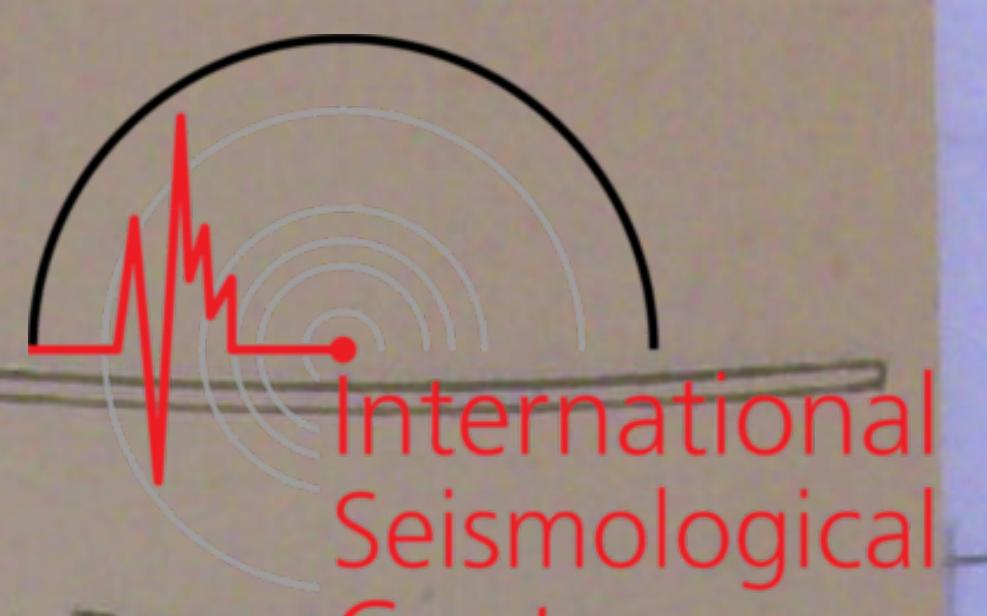


No.	Date	Comp.	Phase	G. M. T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		A <sub>N</sub>	A <sub>E</sub>	A <sub>Z</sub>		
69	18	Z E E	P S e F	17 32 34 18.1	29 51 00	39					1755	
70	20/21	Z E E	iP e e F	22 29 36 0.3	26 29 18	18 27 18					Dilatation.	
71	21	Z Z Z Z Z E E E E	iP i pP i PP S e sS SSS	4 42 43 27 49 50 53 58	40 12 08 27 36 33 00 25	19 33 08 27 36 33 00 25					8890	Compression (h = 550 Kms)
72	23	Z Z Z Z E E E	iP PP PPP S e e M	16 34 35 40 42 44 59	32 36 35 18 00 10 09	36 36 35 18 00 10 12					6020	Dilatation.
73	24	Z NZ N	e i e F	20 21 21 21.2	59 00 09 44	57						
74	26	Z N N	iP e e F	11 38 39 12.2	28 38 39 12.2	30 27 37						Compression.
75	30	Z Z E E E E	P i SKKS S PPS SS	3 16 26 27 29 34	14 36 18 00 48 54	36					12500	
76	May 1	Z Z Z Z NE E NE E E E	iP i i PP PPP SKS SKKS S PS LQ LR F**	6 11 14 15 17 21 22 23 24 44 47	10 20 20 15 39 25 21 00 27 46 54	57					11845	Dilatation.



No.	Date	Comp.	Phase	G. M. T.	Period	Amplitude			△	Remarks
						A <sub>N</sub>	A <sub>E</sub>	A <sub>Z</sub>		
77	1	Z	iP	H. 6 12 45 Z PeP Z PP E S E PS E SS E SSS F	SEC. 13 25 15 57 23 05 53 28 42 31 53 9.6	μ	μ	μ	Km. 9220	Dilatation.
		Z	PeP							
		Z	PP							
		E	S							
		E	PS							
		E	SS							
		E	SSS F							
78	1	Z	iP	8 40 45						Compression.
79	1	Z	i F	12 03 02 13.0						
80	1	Z	iP	16 18 20 Z i Z PP E S E e F	SEC. — 53 21 36 28 42 29 45 18.1				9220	Dilatation.
		Z	i							
		Z	PP							
		E	S							
		E	e							
81	2	Z	e	13 33 45					12335	Probably two earthquakes.
		Z	PP	34 24						
		Z	i	35 51						
		Z	i	36 30						
		Z	PPP	37 35						
		E	SKS	40 30						
		E	S	42 06						
		ZE	i	45 16						
		E	e	47 10						
		E	SS	50 00						
		E	i	51 25						
		E	i	52 12						
		E	SSS F	54 00						
				16.6						
82	6	Z	eP	6 18 54					13220	
		EZ	e	19 36						
		Z	PKP	22 25						
		E	SKP	25 16						
		E	i	27 10						
		E	i	28 35						
		E	(SKS)	29 10						
		E	PS	33 40						
83	6	E	PPS	34 42						
		F	8.8							
		Z	P	17 12 33						
		E	e	23 00						
84	6	E	e	24 42						
		E	e	26 30						
		E	F	18.6						
		EZ	eP	20 25 36						
85	8	E	e	27 42						
		E	e	28 50						
		E	e	35 36						
		F	22.5							
85	8	NZ	iP	1 55 18					5065	Compression.
		Z	e	56 32						
		Z	PP	57 57						
		Z	i	57 21						
		NE	PPP	40						





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No.	Date	Comp.	Phase	G. M. T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		A <sub>N</sub>	A <sub>E</sub>	A <sub>Z</sub>		
96	19	Z E E E Z E	eP e e e e e	18 50 51 54 19 08	44 14 05 10 00 40	12	Sec.	$\mu$	$\mu$	$\mu$	KM.	Probably two earthquakes.
97	20	Z Z Z EN	(eP) i i (S)	9 40 41 F	38 40 41 42	48 39 48 03						Preceded by microseisms.
98	21	Z Z Z Z E E E	P i i i e e SP sSP	20 43 44 45 50 51 52	40 03 33 12 00 15	39 48 43 50						Deep focus.
99	23	Z Z Z Z E	iP i i PPP S	4 26 30	25 19 50	22 33 47					3690	Compression
100	25	Z Z E	eP e (eS)	6 39 40	28 12 12	51						
101	26	Z E E	iP e (eS)	9 10 11.0	50 00 11.0	39 50 20						Dilatation
102	26	E	M F	18 21.0	57	12	20		6			
103	27	Z Z Z E E E	P i i PP i S PS e F	3 57 4 03 04 05 5.2	55 57 16 16 15 50 25	16 30 35 51					7745	
104	30	Z NZ E E E	P e e (S) M F	10 19 20 32 45	13 06 12 45	42 06 48	12		5			
105	31	Z NZ	eP e F	00 0.8	26 28	46 48						





# International Seismological Centre



No.	Date	Comp.	Phase	G. M. T.			Period	Amplitude			Δ	Remarks	
								A <sub>N</sub>	A <sub>E</sub>	A <sub>Z</sub>			
127	5/6	ZE	iPcP	22	59	45						10000	Compression (h = 650 Km.s.)
		ZE	iP			54							
		ZE	pP	23	02	14							
		Z	PP		03	40							
		Z	pPP		05	32							
		Z	PPP		06	02							
		Z	sPP			54							
		ZEN	SKS		09	21							
		N	S		10	22							
		E	i		11	10							
128	12	ZE	sS		13	54							Dilatation.
		Z	F	2.0									
		Z	iP	20	21	06						10655	
		Z	(PcP)			18							
		Z	e			45							
		E	SKS		31	38							
129	12/13	E	i			45							11245
		E	S		32	55							
		E	F	21.5									
		Z	P	23	12	30							
		Z	PP		16	30							
		E	e		23	25							
		E	i		24	30							
130	14	E	PS		25	32							10035
		E	SS		31	13							
		E	F	2.0									
		Z	P	8	44	33							
		Z	PP		48	06							
131	15	E	(SKKS)		55	18							
		E	S			30							
		E	F	10.0									
		Z	eP	21	45	30							
132	16	E	e		50	33							
		E	e		54	20							
		Z	P	12	31	16							
		E	e		39	06							
133	16	E	SSS		45	42							
		E	M		58	30	12						
		E	F	14.5									
		Z	eP	21	46	36							
134	18	E	S		50	24							2280
		E	M		55	42	15						
		E	F	22.4									
		Z	eP	3	40	42							
135	18	E	e		53	18							
		E	(PS)		54	06							
		E	PPS		55	00							
		E	M	4	28	39	18						
		E	F	6.5									
136	18	Z	iP	10	55	00							Local (not felt).
		EN	e		56	12							
		E	e			31							
136	18	ZE	eP	11	34	30							6580
		E	eS		42	54							
		E	e		43	42							

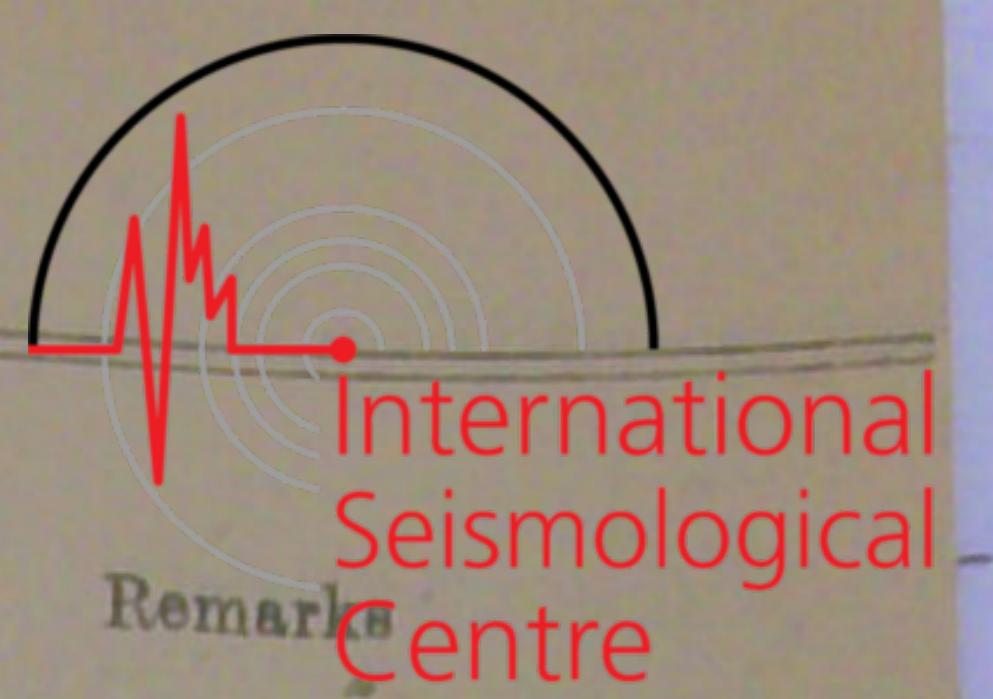




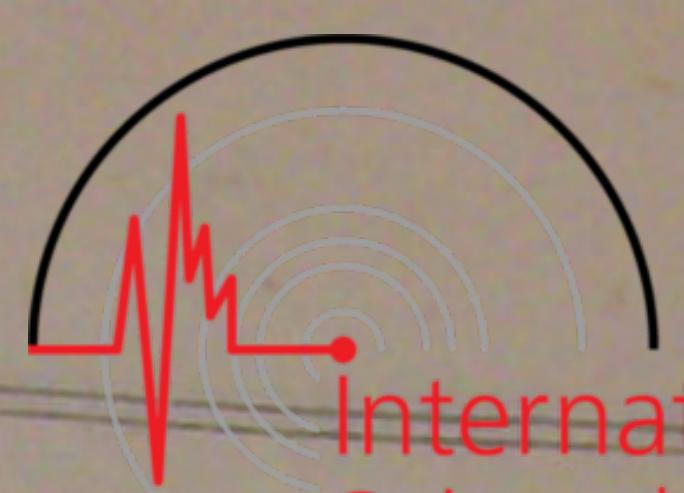


No.	Date	Comp.	Phase	G. M. T.	Period	Amplitude			△	Remarks
						A <sub>N</sub>	A <sub>E</sub>	A <sub>Z</sub>		
156	11	EN	i	6 25 00						
157	12	Z Z Z Z EZ EZ E E E	iP PeP pP sP (PP) i e S (sS) F	2 26 27 35 27 20 39 29 20 30 09 31 05 36 00 37 30 4.6						8890 Compression (h = 200 Kms)
158	12	Z Z Z E EN E	iP i i (SKS) S PS F	10 02 42 03 24 05 16 13 10 35 14 45 11.5						9945 Compression.
159	16	EN Z Z Z	eP i i (S) F	9 40 24 42 05 48 43 03 10.1						
160	16	E	e F	17 32 18 19.2						
161	18	Z Z Z	eP i i F	5 12 08 45 13 06 -5.3						
162	18	Z Z	e i	12 00 09 01 12						
163	18	Z Z ZE ZE E	iPKP i PP SKP PSKS F**	22 35 28 42 38 24 39 09 48 50						15665 Dilatation.
164	18/19	Z N Z Z	P S SS i F	22 57 10 23 01 06 02 46 1.0						2300
165	19	Z Z Z	P i i F	1 07 00 10 06 48 3.0						
166	21	Z	e	6 53 24						Local (very weak).
167	21	NE E	i e F	15 42 54 43 18 17.0						
168	22	Z Z E	iP i e	00 19 03 22 16 24						10055 Dilatation.







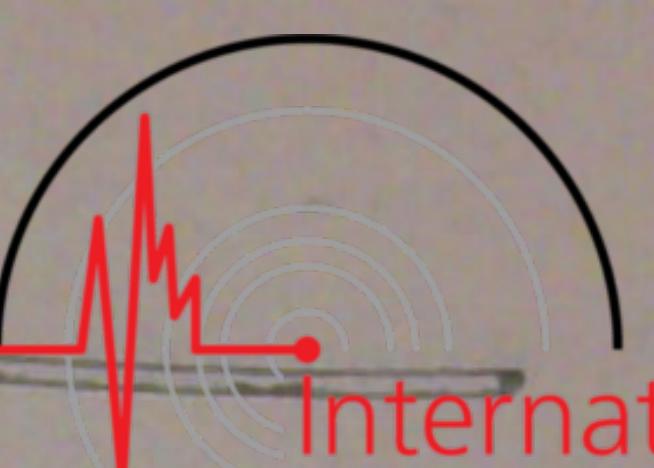


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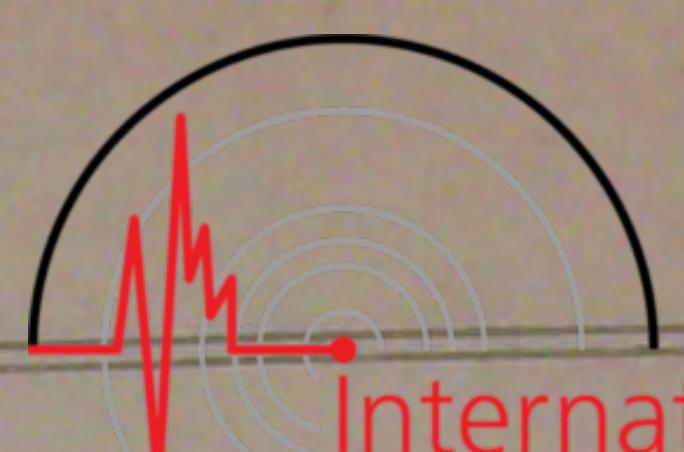
No.	Date	Comp.	Phase	G. M. T.			Perion	Amplitude			△	Remarks
								A <sub>S</sub>	A <sub>E</sub>	A <sub>N</sub>		
216	20	ZN ZN	Pn Sn F	17	14	45						690
				17.4	15	57						
217	20	Z E	e e F	20	31	00						
				22.0	34	06						
218	22	Z E	eP e F	14	52	09						Very weak.
				15	02	30						
219	22	E	M F	23	23							
				23.8								
220	26	Z Z Z E	P PP e S F	1	07	03						6110
					09	15						
					10	23						
					14	52						
221	30	Z Z Z E	eP PP e S M F	2	48	00						2890
					33							
					49	27						
					52	35						
					57	15	10					2
222	30	Z Z Z Z ZE Z N E E E E	iP (sPeP) (pP) sP iPP ipPP SKS S (ScS) ss PPS F	13	32	15						11110
					35							
					54							
					33	09						
					36	06						
					36	42						
					42	44						
					43	30						
					43	45						
					44	40						
					44	40						
					46	25						
					15.3							
223	30/31	E	e F	23	19	28						
	—			0.4								
224	Novem. 4	Z Z Z Z Z	iP i PP e i eS F	10	19	00						3065
					15							
					39							
					20	35						
					21	57						
					23	48						
					12.3							
252	4	Z Z ZN	e e i F	12	39	40						
					44	50						
					13.1	36						
226	5	Z Z N N	P PP S M F	2	12	50						7135
					15	15						
					21	37						
					38	52	15	16				
					3.4							

No.	Date	Comp.	Phase	G. M. T.			Period	Amplitude			△	Remarks		
				H.	M.	S.		SEC.	$\mu$	$\mu$	$\mu$			
227	7	Z E	e e F	4 15 5.1	05	23		SEC.	$\mu$	$\mu$	$\mu$	KM.	Very weak.	
					15	18								
228	8	Z N E E N E	P S e SS L M	17 30 31 30 33 37	26	20	10		2565	Preceded by microseisms.				
					30	33								
					31	00								
					30									
					33	50								
					37	32								
229	10	Z E E E	e e e F	20 46 47 48 22.1	40	57	10		10					
					46	34								
					47	24								
					48	06								
230	17	Z Z Z	P i e	18 19 19.5	58	21						Very weak.		
					28									
					00	47								
231	18	Z Z	e F	00 1.3	33	00								
					34	08								
232	18	Z Z Z N N E	iP i PP SKS S e F	1 45 48 55 56 57 3.0	28		9720		Dilatation.					
					52									
					51									
					48									
					48									
					55									
233	21	Z ZEN Z ZE ZEN EN EN	P PPP i PP SKS S e PeP F	8 51 52 53 54 55 56 10.0	50		1955							
					51									
					52	08								
					53	05								
					54	39								
					55	12								
					56	12								
234	21	ZE ZE Z EE E EN EN	iP pP sP PeP PP PPP i i s s F	11 08 09 10 11 12 13 14 16 13.0	09	09	5110	Dilatation h = 200 kms.						
					53									
					18									
					36									
					00									
					54									
					30									
					13	13								
					42									
					00									
235	24/25	ZE Z ZE E	eP e e F	23 42 43 48 1.6	41	38								
					42	21								
					43	24								
					48	30								
					1.6									
236	26													





No.	Date	Comp.	Phase	G. M. T.			Period	Amplitude			△	Remarks
								A <sub>N</sub>	A <sub>E</sub>	A <sub>Z</sub>		
247	21	Z	(eP)	21	09	06					KM.	
248	21/22	ZE E	iP M F	21 59 1.8	13	32						Very violent (confused inscription.)
249	22	Z ZE E SKS E S E PS E i E M F	eP PP e SKS S E PS i M F	4 5 09 10 12 42 6 9.0	58 02 00 36 06 42 01 30	30 45 00 36 06 42 30					11890	Probably a replica.
250	23	Z Z E E	iP e S M F	12 53 57 13.6	49 30 14	18 36 30					2580	Compression.
251	25	N N	e e F***	6	38	28 39						
252	25	Z E E	e e e F	13 09 13.6	01 12 30	56 12 30						
253	27	Z E	iP M F**	00 .	00	07		(10)				Dilatation (Very violent, confused inscriptions.)
254	27	Z Z E	iP i M F	2 3 5.0	51 13	15 30						Dilatation
255	27	Z Z Z Z	e e e e	20 09 03 45	08 09 03 45	03 24 03 45						Preceded by microseisms.
256	27	Z Z E	P e eS F	22 39 23.0	37 39	(03) 15 18						Preceded by microseisms.
257	28	ZN Z E N E	iP PP i S SS. F	3 30 31 4.5	28 26 04	06 15 37					1400	Compression.
258	28	Z Z	e e F	14 15.1	53	09 28						
259	28	Z Z Z Z	e e e i F	17 49 18.0	48 49	27 52 15 39						





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Remarks