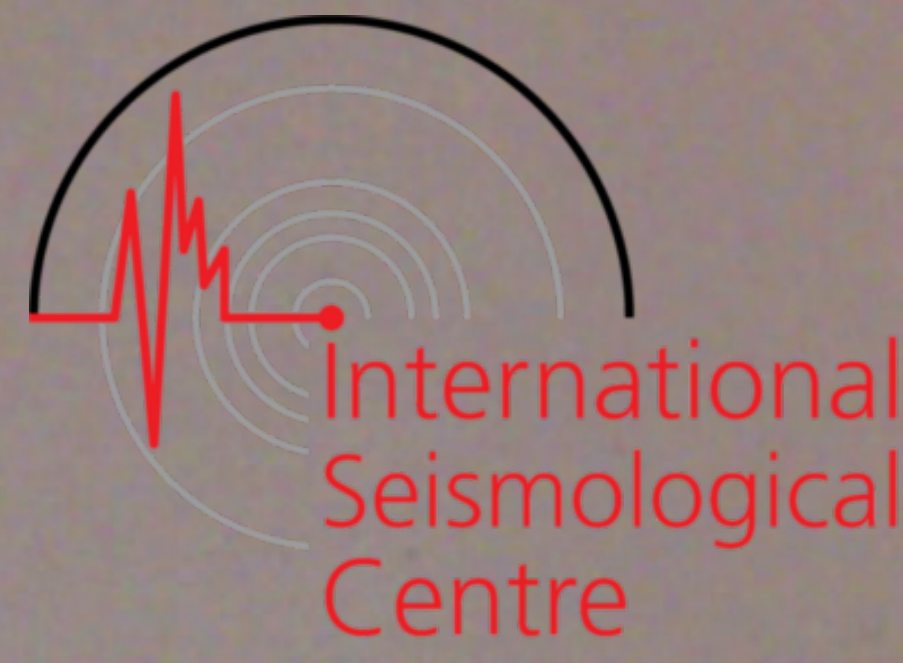




ROYAL OBSERVATORY, HELWAN



**SEISMOLOGICAL,  
MAGNETIC AND METEOROLOGICAL REPORT  
FOR THE YEAR 1943**

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**M. R. MADWAR Bey, PH.D., F.R.A.S., F.R.S.E.**

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1943



## INTRODUCTION

The seismological service in Egypt is carried out at Helwan 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 metres 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  $0.2^{\circ}\text{C}$ . and the extreme seasonal change not more than  $10^{\circ}\text{C}$ .

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.



## ROYAL OBSERVATORY, HELWAN

### Seismological Bulletin

Constants of the Station:

$\phi=29^{\circ} 51'N.$      $\lambda=31^{\circ} 20'E.$      $h=115$  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	Galvanometer Free Period T <sub>1</sub>	Damping Constant	Transmission Coefficient K	Static Magnification V
		sec.	sec.			
N	Monthly	12.0				250
E	"	12.0				250
Z	9.6.1938	11.16	11.13	+0.03	173	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 subcrustal 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.
- 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.

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



ROYAL OBSERVATORY, HELWAN



No.	Date	Comp	Phase	G.M.T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		Sec.	μ	μ		
	January											
1	2	Z Z NE	P (PP) (S) F	12 12'9	02 04 09	12 12 44				5845	Preceded by microseisms	
2	5	Z Z Z Z E E	P i i i i i F	13 14'0	39 41 42 43 49 53	42 49 39 25 15 27					" " "	
3	6	NE	M F	11 11'7	02						Very weak	
4	7	Z Z Z N	P i PP M F	3 4 4'5	40 43 14	16 48 26				9135	Preceded by microseisms	
5	7	Z Z Z NEZ	(eP) e e (S) F	11 11'8	17 18 19	27 54 21 30				1110	" " "	
6	7	Z Z EZ Z	(eP) e e e F	22 23'1	38 39 40 41	17 18 06 33					" " "	
7	9	Z Z	i e F	00 0'3	02	00 18						
8	11	Z N NZ E Z	Pn Pg Sn S* Sg F	11 12 12'4	58 59 00	05 43 30 56 18				832	" " "	
9	11	Z Z Z E E	iP e PP (S) M F	19 20 21'0	56 58 59 03 16	49 21 40 54 33	12	+27		5555	Dilatation	
10	12	Z Z Z E	eP e e M F	9 9'8	11 13 17 31	36 15 18 00					Very weak	
11	13	Z	(eP) F	8 9'0	31	00					" "	
12	14	Z N	(eP) (S) F	19 21'0	21 31	30 06					" "	
13	14/15	Z	(eP) F	23 0'4	49	03					" "	
14	20	Z Z	i e	12	42 46	30 15					" "	
15	20	Z Z Z	i e e F	13 14'1	50 54 58	14 12 27						
16	26	Z Z E	eP (S) M F	22 23'0	24 30 38	45 24 44	9	+9				



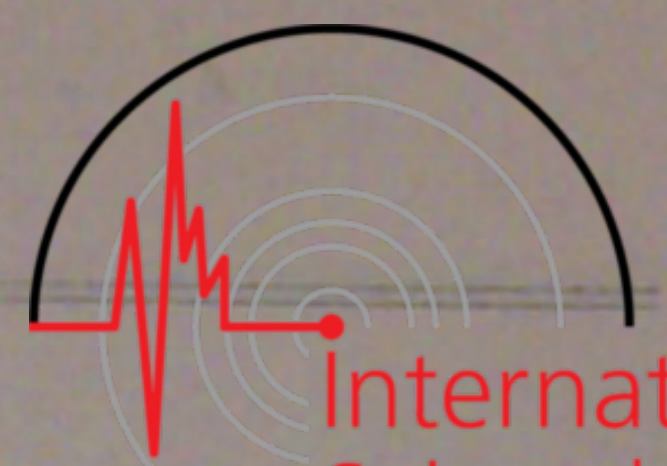






No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			Δ	Remarks	
				H.	M.	S.		Sec.	A <sub>e</sub>	A <sub>n</sub>			A <sub>z</sub>
								μ	μ	μ	Kms.		
29	28	Z Z Z Z Z EN	iP i PP PPP PcP iS F	13     14'6	00 01 54 02 12 03 46 06	54 23 54 12 46 00					4345	Dilatation	
30	March 2	Z Z EZ	eP e e F	9   9'8	13 15 21	52 50 06						Very weak	
31	4	Z Z Z	i i i	6   6'1	51 53	06 25 27							
32	5	Z Z Z N Z E	eP e (pP) (S) (sS) M F	00   1  3'2	49 50 58 00 30	10 36 33 18 32						" "	
33	7	NZ E EN EN	iP PP S PS F	3    6'1	14 17 24 25	11 30 42 34					9435	Dilatation	
34	7	Z Z Z	e e e F	23   23'3	05 06	13 51 09						Very weak	
35	9	Z Z Z Z N EN N N N	P PP i i PPP SKS S PS (SS) M F	10         18	02 06 07 08 09 13 14 16 21 51	51 54 22 45 09 25 50 02 35 24	18	-267			11335	Preceded by microseisms	
36	9	Z N	eP M F	11 12 14'0	42 11	54							Confused with the following earthquake Confused with the preceding earthquake
37	9	Z Z Z N	e e e M F	20   22'0	00 06 41	20 51 33						Very weak	
38	10	EN	M F	4 5'0	06								
39	10	N Z Z N EN N N E	PP e e SKS S PS PPS M F	8        9 11'0	33 34 38 39 41 42 43 23	(36) 15 51 50 12 40 30 40	15	-28			11665	Preceded by microseisms	
40	11	Z Z Z Z N	e i i e e e F	9    10 12'0	53 54 57 15	33 51 06 48 56 18						" " "	
41	14	Z Z Z	eP e (PP)	12	12 15	09 30 42						10045	





No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		Sec.	A <sub>e</sub>	A <sub>n</sub>		
								μ	μ	μ	Kms.	
41	14 contd.	E	(SKS)		22	33						
		E	(S)		23	05						
			F									Confused with the following choc Replica
42	14	Z	eP	12	55	36					10045	
		Z	e		56	12						
		Z	(PP)		59	03						
		N	(SKS)	13	06	00						
		E	(S)			32						
			F	14	3							
43	14	Z	iPKP	17	30	34					15935	Compression
		EZ	e		31	15						
		E	(PP)		34	06						
		E	e		35	02						
		N	(SS)		52	24						
			F									Confused with the following choc Confused with the preceding choc
44	14	Z	e	18	56	36						
		Z	e		57	42						
		Z	i	19	06	00						
		Z	i			57						
			F	21	0							
45	15	EZ	(PKP)	2	44	00					17665	Very weak
		Z	(PKKP)			33						
		Z	e		46	45						
		EZ	e		47	12						
		E	(PP)		48	12						
		E	e		49	12						
			F	7	0							
46	15	Z	e	5	05	15						
		N	e		13	40						
			F									Lost in changing the paper
47	15/16	Z	iPKP	23	18	30					16665	Compression h = 300 km.
		Z	(PKKP)			52						
		Z	(pPKP)		19	54						
		Z	(SPKP)		20	24						
		Z	(PP)		22	20						
		Z	i		23	15						
		Z	(SPP)		24	06						
		EN	i		28	40						
		N	i		29	21						
		EN	i		41	16						
			F	1	5							
48	17/18	Z	eP	23	16	50						Very weak
		Z	i		17	12						
		Z	e		19	18						
		N	M	00	02							
			F	0	7							
49	20	Z	e	5	10	24						Confused by microseisms
		Z	i		13	22						
		Z	i			42						
			F	5	6							
50	21	Z	eP	20	55	56					13780	" " "
		Z	e		57	00						
		Z	PP	21	00	(01)						
		Z	SKS		06	10						
		E	S		08	54						
		EN	PPS		12	18						
		N	G		31	42						
			F	23	9							
51	25	Z	eP	2	53	15						" " "
		Z	i		55	39						
		Z	i		56	15						
		Z	i		57	45						
			F	3	2							
52	25	Z	P	18	45	25						" " "
		Z	e		46	11						
		N	e		51	52						
		N	e		53	06						
		N	e		54	30						
		EN	e	19	00	03						
		E	M		19	52	18					
		N	M		29	24	14	+103	-95			
			F	20	5							





No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		Sec.	A <sub>e</sub>	A <sub>n</sub>		
								μ	μ	μ	Kms	
53	26	Z Z Z Z	P i i i F	17 18 19.2	57 58 02	00 10 51 09						
54	29	E E	e M F	5 6.5	30 44	14						
55	April 1	Z Z Z EN N N E N	P e PP S SS SSS M M F	14 15 18.0	30 31 33 40 45 48 00 09	15 14 12 12 16 34 03 24	24 24	-349	-286		8665	
56	5	Z Z Z Z N N N	P e PP PPP S e M F	2 3.8	03 04 08 09 17	04 39 09 25 40 18 48	18	+114			3790	
57	6	Z Z Z EZ E N N N N	eP e e e e PPS e SS M F	16 17 22.0	22 25 26 36 37 41 16	07 54 23 55 00 36 42 44 (40)	(18)	+855			11910	Preceded by microseisms
58	7	N E Z N Z Z	eP PPP i S i i F	6 6.5	01 02 04 05	24 36 45 00 12 06					1565	" " "
59	7	Z Z Z	e e e F	6 7.6	28 29	30 54 21						" " "
60	7	Z Z Z E	P e PP eS F	8 9 10.2	58 01 08	30 39 39 48					9155	" " "
61	7	EN E	e e F	13 14 15.7	36 18	30						
62	2/8	Z Z Z NZ Z EN E N	e e e e i i e e M F	23 * 00 2.2	36 37 38 41 42 47 48 32	48 30 06 46 12 45 21 30 24	15	+43				" " "
63	9	Z Z EN N N	P e PP S SS F	9 11.0	03 05 07 14 21	48 27 27 50 25					10180	" " "
64	9	NZ Z	ePn (Pg)	19	48	06 27					500	" " "





No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		Sec.	A <sub>e</sub>	A <sub>n</sub>		
				μ	μ	μ	Kms.					
64	9 contd.	NZ	i			48						
		NZ	(Sn)		49	03						
		E	i			45						
		Z	i			22						
		Z	i		50							
		Z	F	20	4	00						
65	11	Z	iP	14	58	45					10245	Dilatation
		Z	i		59	00						
		Z	i			18						
		Z	PP	15	02	24						
		EN	SKS		09	11						
		Z	S			50						
		N	i		10	24						
		N	M		41	24	24	+143				
		F	18	1								
66	12	Z	e	4	21	42						
		Z	e		26	21						
		EN	e		36	12						
		N	M	5	00							
		F	5	6								
67	12	Z	iP	19	56	07					10345	
		Z	i			18						
		Z	i			33						
		Z	PP			45						
		EN	SKS	20	06	33						
		E	S		07	16						
		F	21	4								
68	14	NZ	iP <sub>n</sub>	8	17	50					945	
		N	(Sn)		19	26						
		N	(S*)		20	00						
			F	8	7							
69	15	E	e	12	00	24						
		N	e		01	39						
		EN	(eS)		04	14						
		EN	(PS)		05	24						
		N	M		47	46	12	+27				
		E	M		48	34	15		-50			
		F	14	3								
70	16	Z	iP	11	48	21					2665	Compression
		Z	PP			51						
		Z	PPP			09						
		N	S			36						
		F	12	6								
71	26	EZ	iP <sub>n</sub>	2	46	57					1165	Dilatation
		E	e		47	06						
		E	Sn		48	(57)						
		Z	ScS	3	00	18						
			F	3	4							
72	29	Z	e	00	02	12					13735	
		Z	(PKP)			31						
		Z	(PP)			15						
		Z	e			03						
		E	(S)			05						
		Z	(PPS)			36						
		Z	e			21						
	F	1	2									
73	29	Z	iP	15	37	30					9565	
		NZ	e			51						
		Z	PP			51						
		EN	SKS			51						
		E	S			08						
		N	PS			54						
	F	16	7									
74	29	Z	eP	20	49	58					4365	
		Z	i			45						
		Z	i			09						
		Z	PP			21						
		N	S			08						
		N	M			46	8	+8				
	F	21	4									
75	30	Z	e	8	39	15						
		Z	e		41	42						
			F	9	1							





No.	Date	Comp	Phase	G.M.T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		Sec.	A <sub>e</sub>	A <sub>n</sub>		
	May							μ	μ	μ	Kms.	
76	1	Z Z Z N EN	(P) e e e M F	16 17 18.5	50 51 52 56 28	24 33 02 52						Preceded by microseisms
77	1	Z Z Z EZ Z	e e e i i F	20 21.0	33 35 36 37 41	45 27 30 51 12						
78	2	Z Z Z Z EN N EN N	eP e e PP SKS S PS M F	17 18 21.1	32 34 36 42 44 45 16 34	18 27 20 36 54 15 46 34	20	+46		11765		
79	3	Z E Z Z Z E E	eP e PP e PPP SKS S	2	11 12 15 16 18 22 23	54 05 58 09 15 30 40				11335		
80	3	E E	PS M F	2 5.0	24 55	58 00	18	+124				
81	3	Z Z N	e e i	12	04 15	27 42 04						Very weak
82	3	Z Z EN	(eP) e (SKS) F	12 13 14.0	52 03	26 53 00						" "
83	3	Z Z Z Z N	eP e i i i F	10 17 17.4	50 51 52 00	02 39 18 49 48						
84	7	Z N	iP (S) F	20 21.7	35 45	18 27						Compression
85	11	Z Z Z NZ NZ	P <sub>11</sub> e P <sub>g</sub> S <sub>n</sub> S* F	20 21.2	28 29 30	45 52 15 00 24				720		
86	15	Z Z Z Z NZ	e e e i i F	16 17.2	51 58	12 48 06 40 54						Preceded by microseisms
87	22	Z Z N Z N	(eP) e e e M F	9 10 11.4	21 22 31 32 02	38 28 30 27						" " "
88	22	Z Z Z NZ N	eP e e S SS F	22 22.8	08 09 10 11	38 06 02 45 06				1265		" " "





No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		Sec.	A <sub>e</sub>	A <sub>n</sub>		
								μ	μ	μ	Kms.	
89	25/26	EZ Z Z Z E E E E E	iP e e e SKS S PS SS M F	23       00 2'8	20 21 23 24 31 32 33 38 05	45 49 06 20 12 09 19 43 32	24		-365		10720	Dilatation
90	27	Z Z Z	e e e F	19   19'6	29   	00 42 57						Very weak
91	28	Z Z	e e F	00  0'7	29  	39 57						" "
92	28	Z Z N	eP PP M F	15   15'6	14  24	15 53					2965	" "
93	28	Z Z Z	eP PPP eS F	20   20'6	20  23	15 28 02					1580	" "
94	29	Z Z Z	e e e	6   	10 11 12	45 12 00						" "
95	June 1	Z Z Z	e i i F	13   13'9	42 43	45 12 36						Preceded by microseisms
96	2	Z Z N	P e i F	3   3'5	02  07	12 39 42						" " "
97	3	Z Z Z Z Z Z E	(PKP) (PKKP) e (SKP) (PP) (PPP) e F	12      13'0	31 32 34 35 38 41	51 06 14 20 42 52 32					16945	
98	3	Z Z Z	e e e	20   	13 14 17	39 00 38						
99	3	Z Z Z N	(PKP) (PKKP) (PP) (PSKS) F	21    23'3	08  12 22	00 24 00 15					17345	
100	7	Z Z N	e e i F	11   12'0	44 47 48	24 18 20						" " "
101	7/8	Z Z Z N N N	iP e PP S e M F	23     00	31 32 34 41  02	51 18 45 30 55 12	20	-103			8220	Dilatation
102	8	Z Z Z N N	eP e PP S SS M F	1     3'0	25 26 27 33 39 52	12 12 21 08 14 06	15	+43			6380	Confused with the succeeding





No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		Sec.	A <sub>e</sub>	A <sub>n</sub>		
								μ	μ	μ	Kms.	
103	8	Z Z Z	e e e F	14	41 42 43	24 18 06						
104	8/9	Z Z Z Z N N N	P e PP PPP S SS M F	20   21  1'6	54 55 57 58 04 09 27	18 18 09 45 00 02 30	18	+ 516		8335		
105	9	Z Z N N N	F PP PPP S M F	3   7'4	17 20 22 27 45	47 33 05 15	(24)	+1450		8045		
106	10	Z Z Z Z	ePN Pg SN Sg F	18   19'0	52  53 54	36 57 12 24				320		
107	13	Z Z Z E E E E	iP e e SKS SKKS S i F	5   35	24 25 27 34 35	14 15 27 41 15 32 51				10380	Dilatation	
108	13	Z	eP F	6	10	51					Confused with the succeeding choc Confused with the preceding choc " " " succeeding "	
109	13	Z Z EN	iP e e F	8  39	28  39	39 54 28					Compression	
110	13	Z Z Z NZ Z N N N	iP e e PP e SKS S PS F	8  8 9 12'0	49  50 52 54 59 00 01	33 47 03 58 45 57 21 18				9845	Dilatation	
111	13	N Z Z	e e e F	13  14'0	49  51	48 57 03					Very weak	
112	13	Z Z	P e F	16  17'5	36	00 15						
113	13	Z Z Z EZ EN N	P e (PP) SKS SKKS PS F	17  18 20'2	51 52 55 02 04	51 03 36 17 48 09				10445		
114	14	Z Z Z EN	P e e S F	3  4'5	10 12 13 19	41 18 26 33				7280		
115	14	Z Z NZ	iP e i F	7  8'1	49 51 52	56 09 04					Dilatation	





No	Date	Comp.	Phase	G.M.T.			Period Sec.	Amplitude			Δ Kms.	Remarks
				H.	M.	S.		A <sub>c</sub> μ	A <sub>n</sub> μ	A <sub>y</sub> μ		
116	14	Z Z Z N N	iP e PP SKS S F	16	34 35 38 45	56 13 27 18 54				10110		
				17.7								
117	14	Z Z Z	eP e e	23	13 14	45 06 57					Very weak	
118	15	Z ENZ NZ Z N EN Z	iP e PP PPP SKS S PS F	11	23 26 28 33 34 35	19 36 48 45 37 08 06				9990	Dilatation	
				13.0								
119	15	Z N	e e F	18	40 47	52 12						
				21.0								
120	16	Z Z Z Z Z	(eP) o e e e F	6 7	58 59 00	18 12 03 26 54						
				8.0								
121	19	Z Z Z Z	eP e e e F	9	27 28 31 32	00 00 00 27					Very weak	
				11.5								
122	20	Z EZ	iP iS F	15	35 37	27 39				1320	Dilatation (Turkey)	
											Confused with the succeeding choc	
123	20	Z Z	eP S F	16	50 52	33 45				1320	Replica	
											Confused with the succeeding choc	
124	20	Z Z Z N	eP e e (S) F	17	49 50 51 58	45 06 14 11						
				20.0								
125	24	Z Z Z EZ E	e e i i e F	20	40 41 44 50	48 33 06 18 15						
				21.2								
126	25	Z Z Z Z	P i i e F	19	32 36 46	15 30 08 33					Very weak	
				20.3								
127	27	Z Z Z EN N	P <sub>n</sub> i P* S <sub>n</sub> S* F	10	07 08 09	30 51 04 52 36				790		
				10.6								
128	29	Z Z Z E E E EN	P e i SKS S i PS F	9	17 18 22 28 29	58 30 06 16 43 15 42				9780		
				10.5								
129	31	Z Z Z ENZ	e e e i	11	01 03 07 11	22 20 17 00						





No.	Date	Comp.	Phase	G.M.T.			Period Sec.	Amplitude			$\Delta$ Kms.	Remarks
				H.	M.	S.		$A_e$ $\mu$	$A_n$ $\mu$	$A_z$ $\mu$		
129	31 contd.	N N	i i F	12.1	15	40 48						
130	July 2	N EN N Z	(eP) e i e F	12	16 20 21	54 13 18 35					Preceded by microseisms	
131	8	Z Z E N N	e e e e F	14	49 59 01	00 12 30 54 24						
132	9	ZN Z	e e	19	01 02	48 24						
133	9	N Z EN E EN EN	(eP) e i (iS) i i F	19	06 09 10 11	45 36 40 49 22 30						
134	11	Z Z Z Z EN E N N N	(ePKP) e (PKKP) e e (SKKS) e e M F	2	30 31 33 35 41 43 51 52	06 30 00 15 20 39 06 48 12	18	+38				
135	13	ZN N	e e F	16	06 07	18 54					Very weak	
136	14	Z Z	e e F	20	04 06	54 03					" "	
137	15	Z ENZ	eP e	20 21	50 00	28 36					" "	
138	16	Z Z Z Z ZN E E	P PP e e S PcP M F	1 2	56 57 58 59 01 02	15 27 10 03 18 18 54	9	-51	1745			
139	21	Z Z Z Z Z Z Z	(PKP) (PKKP) (sPKP) (sPKKP) e e (PP) (sPP) F	4	33 34 35 36 37	24 45 03 21 41 54 10 45			16780	h = 100 km.		
140	22	Z Z Z EN N Z Z	iP i e e e i i F	7	12 13 14 15 16 17	24 39 12 36 15 18 02					Dilatation	
141	23	Z Z Z Z Z	iP e e PP PPP	15	05 06 07 08 10	35 00 08 48 42			9220			





No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		A <sub>e</sub>	A <sub>n</sub>	A <sub>z</sub>		
							Sec.	μ	μ	μ	Kms.	
141	23 contd.	N N N	iS SS M F	18·0	15 21 38	50 21 24	24	+238				Preceded by microseisms
142	24	Z Z Z	e e e F	16·4	15 56 59	32 00 15						
143	28	Z Z Z Z	iP e e i F	18·1	17 34 35 39 42	42 06 06 02						Dilatation
144	29	Z Z Z EN EN EN N	P PP PPP S PS SS M F	3	15 18 20 25 26 31 55	06 12 14 30 17 12 12	22	+199		9300		Confused with the succeeding earthquake
145	29	Z Z N	eP e (S) F	8·6	7 28 38	00 27 35						
146	30	Z Z Z E	iP e PP S F	2·7	1 15 18 25	21 28 45 45				9300		Dilatation
147	August 1	Z Z	PKP e F	15·9	14 31	12 21						Very weak
148	1	Z Z Z Z Z	PKP e PP SKP e e F	18·2	16 37 38 40 41 43 44	42 36 56 05 39 33					16345	
149	2	Z Z Z Z Z N	PKP e PP SKP PSKS M F	4·2	1 06 07 09 19 06	00 33 15 38 27 38	18	+43			16165	
150	7	Z Z Z E EN	eP e e e e F	20·3	19 48 49 50 52 54	48 45 22 11 06						
151	9	Z E E	e e e F	18·2	17 10 21	58 27 53						- -
152	10	Z E N	e e e F	15·1	14 03 12 14	22 30 52						- -
153	10	Z Z Z ZN N N N N N	iP e e e e SKS SKKS S PS M F	16	15 25 26 28 33 36 37 38 12	57 29 00 06 06 (25) 06 34 44 12	15	+29		11110		Dilatation  Confused with the succeeding earthquake





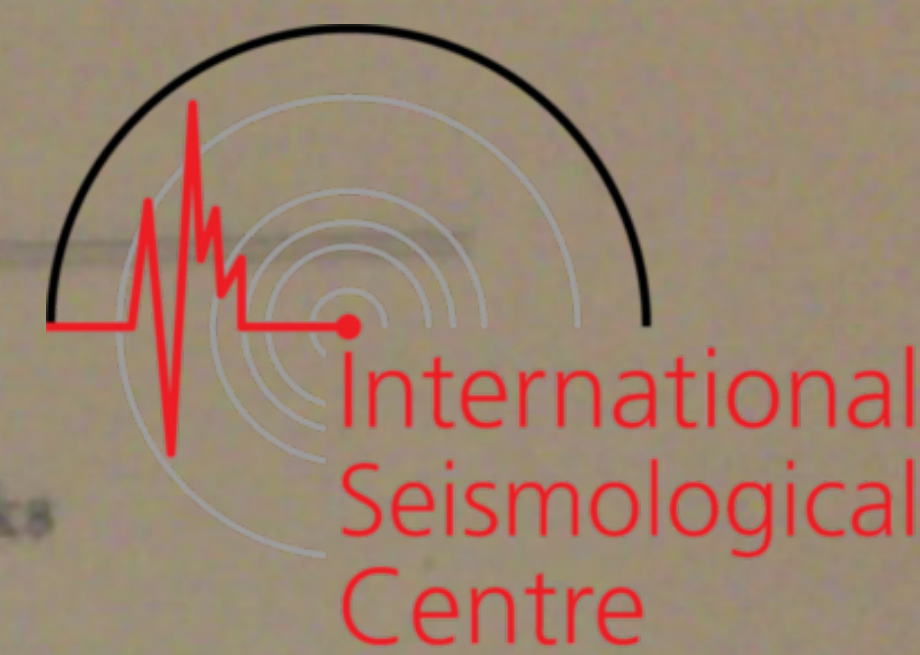
No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			Δ	Remarks
				H.	M.	S		Sec.	A <sub>e</sub>	A <sub>n</sub>		
				μ	μ	μ	Kms.					
154	10	Z Z	iP i F	15 18 3	49	12 23					Dilatation	
155	12	Z N	P e F	5 6.1	03 13	15 48						
156	13	Z N	eP e M F	7 8 9.0	47 56 12	51 24 05	12	+16				
157	14	Z Z Z	e e e	8	27 28 29	36 00 03						
158	15	Z EN	eP e F	00 1.6	26 36	12 50					Preceded by microseisms	
59	15	Z Z Z	P e e F	2 3.9	48 49	15 42 26						
160	19	Z Z N	e e i F	12 13.1	41 49	39 50 42						
161	20	Z Z Z Z Z N	P e e e PP e S F	1 3.1	35 36 37 38 40 46	00 05 54 33 00 00				10155		
162	21	N Z	e e F	19 19.9	44 45	21 03					Very weak	
163	22	Z Z	eP e F	10 11.1	53	00 21					" "	
164	23	Z Z	P e F	7 9.0	26	21 51					" "	
165	27	Z	e F	1 3.1	01	39					" "	
166	30/31	Z Z E N	eP e e i F	23 00 0.3	50 51 01	52 13 20 50						
167	31	Z Z	P i F	15 16.0	44	22 27					" "	
168	31	EN N	e e F	16 17.8	35 39	42 24						
169	September 5	Z Z ZE Z E N N N N	P pP PP sPP SKKS S sS sPS SS F	8 11.5	47 48 51 58 59 00 04	36 03 21 53 03 24 06 10 30				10110	h=100 km.	
170	5	Z Z ENZ Z	PKP e PP SKP	4	00 01 03 04	48 09 27 17						





No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			$\Delta$	Remarks
				H.	M.	S.		Sec.	$A_e$	$A_n$		
									$\mu$	$\mu$	Kms.	
170	6 contd.	Z E N	PPP PSKS PPS F	8.8	06 13 15	26 30 42						
171	6	Z N Z	e e e F	9	39 43 44	39 12 51						Very weak
172	6	Z N	e e F	13	33 38	04 30						" "
173	6	Z Z	e e F	16	35 37	16 51						" "
174	8	Z NE N	P e e F	17	30 40	13 03 48						" "
175	9	Z Z Z N	eP i (PPP) (S) F	4.8	4 12 13 14 17	40 21 00 48						
176	9	N E	e M F	18	17 21	16						" "
177	10	Z Z N	eP e M F	2	44 50 53	27 57						" "
178	10	Z Z ZE NZE	Pn P* e Sn F	6	53 54	18 34 15 35				745		Felt in Palestine
179	10	ZE N N N N	P e SKS S e SS F	8	49 59 00 06	20 52 45 20 52 36				10221		Preceded by microseisms
180	11	Z Z Z Z Z N N N	PKP PKKP e e e e PSKS PPS M F	19	54 55 57 58 20 07 11 57	00 08 09 48 52 24 54 42				16880		Very weak
181	12	N N N	i e M F	1	54 56 24	54 48						
182	14	Z Z ZE ZE E E	PKP e e e e M F	2	29 21 24 24 30 24	43 00 09 24 15						
183	14	ZE Z ZE Z E	PKP e e PP PSKS F	4	06 09 10 20	45 54 59 03 15				16255		Confused with the succeeding earthquake
												Confused with the preceding earthquake





No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		A <sub>e</sub>	A <sub>n</sub>	A <sub>z</sub>		
							Sec.	μ	μ	μ	Kms.	
184	14	Z Z Z N	PKP PKKP PP M F	7 9 11:0	33 08	00 18 48	15	+71			17800	
185	16	Z Z N	PKP (PKP) i F	00 2:3	26 30 36	54 27 21						Very weak
186	17	N	e F	10 12:0	50	27						
187	19	Z Z Z Z EN	PKP e e e M F	5 6 8:0	07 08 11 07	36 51 48 15						" "
188	22/23	Z Z Z Z EN	PKP PKKP pPKKP PP M F	23 00 2:5	38 39 41 40	10 30 19 54					16665	" " h=200 km.
189	23	Z Z N Z Z	P e e e e F	5 6:0	41 42 44 45 47	08 15 48 36 09						" "
190	23	Z Z N EN	eP e e e F	15 16:6	19 20 25 29	35 12 32 00						" "
191	24	Z Z Z Z Z	iP (PcP) e (pP) (PP) (S) F	11 13:0	38 39 40 45	24 57 18 15 51 42					6665	Dilatation h=600 kms.
192	26	Z Z Z N N N	iP i PP S e M F	2 2 4:2	19 22 28 29 53	38 36 02 38 36 54	14	+26			7780	Compression
193	26	EN	M F	13 14:2	53							Very weak
194	26	N	e F	18 19:4	34	36						
195	27/28	Z ZE Z Z E	(PKP) (PKKP) e (PP) e F	22 0:6	23	30 55 33 30 36						
196	28	Z Z Z EN	e e e e F	11 13:3	03 04 05 10	33 04 12 00						
197	28	Z Z N N N N NZ	P (PP) e (S) i i i F	17 18:0	22 24 37 28 30	49 00 56 06 38 36 54					3665	





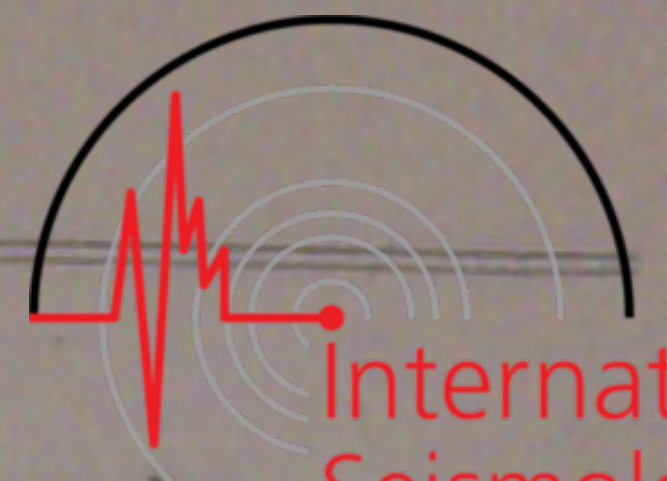
No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		A <sub>e</sub>	A <sub>n</sub>	A <sub>z</sub>		
							Sec.	μ	μ	μ	Kms.	
198	29	EN	M F	5 6.2	48							
199	29	N	M F	10 11.7	49							
200	October 1	Z Z E	P e e F	18 19.1	04 13	10 21 15						Very weak
201	3	ZN Z ZN Z	P i e e F	8 9.2	32 33 36 37	54 48 54 15						
202	4	Z ZE	e e F	10 11 13.1	59 02	10 00						" "
203	5	Z Z E Z Z	P (PP) e (S) (SS) F	1 2.2	45 46 48 51	18 06 45 24 49					3310	" "
204	5	Z N Z Z N N	(eP) e i i i M F	20 21 21.3	58 01 03 04 07	00 16 06 54 18 30	10	+17				" "
205	7	N N N	e • e F	15 15.9	32 35 36	12 18 12						
206	10	N	e F	00 1.4	57	48						" "
207	12	Z Z EN N N N	P PP PcP S SS M F	5 6.0	11 12 15 16 17 21	40 18 06 18 18 18	0	-49			3945	
208	16	Z EN	iPn Sn F	13 14.2	10 11	34 45					677	Dilatation felt in Cairo
209	17/18	Z Z N	e e e F	22 23 1.1	57 58 14	45 18 24						Very weak
210	19	Z Z N	e e e F	1 2.2	25 29 36	55 18 26						" "
211	21	Z	e	11	37	24						" "
212	21/22	Z Z Z ENZ Z	iPKP PKKP i SKP PP F	23 23	28 29 31 32	05 09 29 39 54					18620	Dilatation
213	22	Z Z Z E	e e e M F	00 1 1.7	13 15 16	27 45 03						Confused with the succeeding earthquake
214	22	EZ Z	iP e	16	13 14	22 06					8765	Compression





No.	Date	Comp.	Phase	G. M. T.			Period	Amplitude			Δ	Remarks
				H.	M.	S.		A <sub>e</sub>	A <sub>n</sub>	A <sub>z</sub>		
							Sec	μ	μ	μ	Kms.	
214	22 contd.	Z N N	e S PS F			33 23 24 05						
215	23	Z Z	eP e F	17.9								
216	23	EN E E E EN EN N	P e PP PPP iS (PPS) M F	17	32 33 34 36 40 55	50 02 54 09 28 48 (06)	24	+825			6055	
217	24	Z Z Z N	P e e e F	13	53	09 33 15 36						Very weak
218	24	Z E Z E Z N N	iPKP PKKP PP i PSKS (SS) M F	16	24 25 28 35 39 48 44	31 01 36 45 03 15					17545	Dilatation
219	24/25	ZN Z N N	iP e e e F	23	35	32 51 00 18						"
220	27	Z Z N	P e M F	16	23	36 47						Very weak
221	November 2	Z N	e e F	3	46	48 18						" "
222	2	Z Z Z Z NZ N N N N N E	eP i PP e i SKS S PPS SS M M F	18	22	07 38 04 11 07 42 42 28 18	18 16	-162	-120		10780	
223	3	NZ Z N EN N E N	iP e SKS S PS PPS M F	14	45	12 18 38 57 03 27 20	16	-80			9835	Dilatation
224	4	NZ Z Z Z N N	(iPKP) (PKKP) e e e M F	6	22	18 36 03 47 42 42	18	+43				"
225	4	NE	M	15	55							
226	4	NE	M F	23 23.7	00							





No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			$\Delta$ Kms.	Remarks
				H.	M.	S.		Sec.	$A_e$ $\mu$	$A_n$ $\mu$		
227	5	N NE	e e F	4 4.6	22 23	12 33					Very weak	
228	5	Z Z N	eP e e F	10 11.2	40 41 47	39 04 24					" "	
229	6	Z Z Z Z	eP e e e F	6	41 42 43 45	39 06 57 15					" "	
230	6	Z Z Z NE Z NE E E N N N N	eP i i e PP e i SKS i PS PPS e F	8 9 14.2	45 48 49 50 54 55 56 58 59 00 05	39 50 54 27 18 36 18 06 30 30 00				12220	Preceded by microseisms	
231	7	NE Z Z Z	Pn i e e F	00 0.2	02	15 18 30 42					Very weak	
232	7	Z Z Z N N	iP i i (S) M F	8 9 9.8	37 38 47 11	43 58 24 42					Dilatation	
233	9	Z Z Z Z NEZ N	iP PcP pP PP S sS F	11 12 13.0	59	09 13 35 30 26 12				9390	" h = 100 km.	
234	13	Z Z Z Z N	P e e e e F	11 11 12.0	00 01 03 05 11	41 19 28 05 28					Preceded by microseisms	
235	13	Z Z Z Z N N	PKP e e e (PPS) M F	17 18 19.0	03 04 20 02	27 36 45 00 08				16645	Preceded by microseisms	
236	13	Z Z Z EZ Z Z N	PKP (pPKP) (sPKP) (PP) (sPP) (PPP) i F	19 21.4	03 04 07 08 10 25	21 02 32 09 05 28 06				16110	h = 150 km.	
237	15	Z	i	00	04	07						
238	15	Z EZ E Z	ePn Sn Sg i F	11 12.2	44 46 48	46 06 51 00				777		



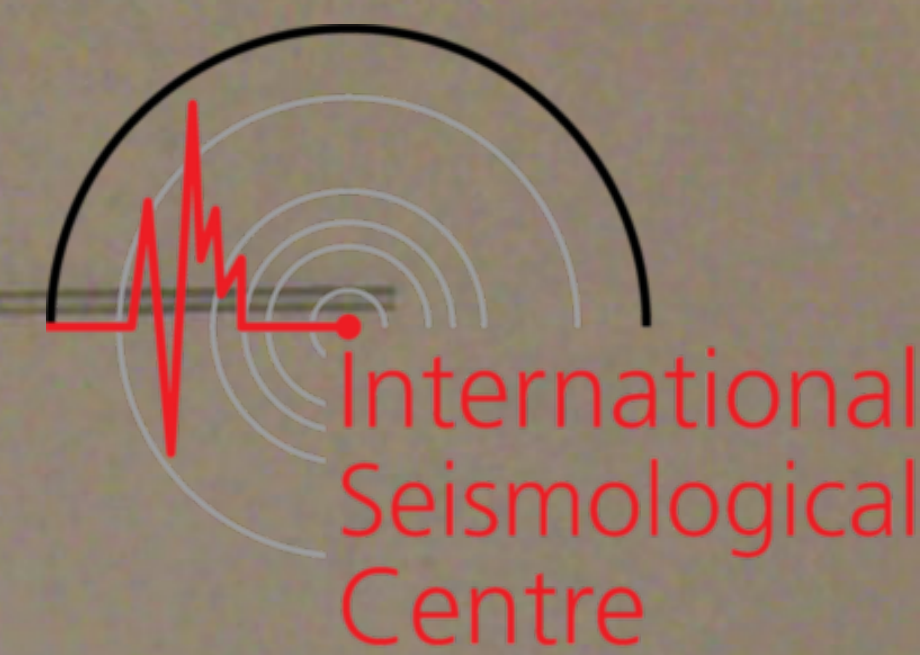






No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			$\Delta$	Remarks
								$A_e$	$A_n$	$A_z$		
								$\mu$	$\mu$	$\mu$		
				H.	M.	S.	Sec.				Kms.	
252	28	Z Z Z E E	p i i e M F	17 18 19.0	23 24 26 34 01	41 36 46 12						
253	29	Z Z Z E E	p e e e F	18 20.0	48 49 50 52 53	29 00 00 54 22						
254	29	Z Z Z	e i e F	21 23.0	31	12 20 42						
255	December 1	Z Z EZ E E E	ep ePKP PP (PS) PPS SS F	6 8.0	19 23 24 34 35 40	27 12 09 00 06 30					13165	
256	1	Z Z EZ Z E E E E E E	e e PP PPP e o eS PS e M F	10 11 12.6	48 52 53 55 59 00 01 03 04 40	52 33 33 47 30 27 18 11 06 00	20		+63		11220	
257	2	Z Z Z Z	(PKP) (PKKP) e (PP) F	2 4.2	13 14 17	54 19 42 54						Very weak
258	2	Z EZ Z Z Z Z E E E E	P PcP pP e PP PPP S sS e e F	5 6.5	21 22 24 26 31 32 34	03 06 45 30 15 03 06 57 36 09					9110	h=150 km.
259	3	Z EZ Z	e i e F	2 2.5	10 11 12	30 38 23						Very weak
260	3	Z Z Z E	e e e e F	4 5 6.2	55 56 57 03	36 54 51 00						" "
261	3	Z Z Z EZ E	P e PP S PS F	7	05 06 08 15 16	23 03 35 40 26					9134	
262	5	Z Z E	P e e e F	3 3.8	22 23 27	41 22 48						Lost in changing the paper. Very weak
263	6	Z Z	e e	1	36 27	09 00						Very weak





No.	Date	Comp.	Phase	G.M.T.			Period	Amplitude			$\Delta$	Remarks
				H.	M.	S.		Sec,	$A_e$	$A_n$		
								$\mu$	$\mu$	$\mu$	Kms.	
264	6	Z	eP	6	20	06					13690	Very weak
		Z	e	6	20	24						
		E	e		29	48						
265	13	Z	e	16	07	03						"
		E	e		17	15						
			F	16.6								
266	23	Z	ePKP	19	19	00	20					
		NZ	PP		20	36						
		Z	e		21	09						
		Z	SKP		22	00						
		E	SKKS		27	30						
		E	PPS		32	00						
		E	M	21	11	39						
	F	22.5			-69							
267	31	Z	P	9	41	06						
		EZ	e			24						
		E	e			42						
		EN	i			45						
		E	e	10.3		46						
	F				49							

Tremors were also recorded at:

Month	D	H	D	H	D	H	D	H
Jan	12	11	23	14	24	10,22		
Feb	3	0,20	6	10	14	10	18	16
Mar	21	20	24	00				
	1	18	4	11,21	10	0,1	13	13
Apr	14	10	19	21	22	9	25	12
	31	12,23						
	5	5	8	19	9	00	11	9
May	13	10,13	18	14	23	19	27	00
	30	2						
	18	2,7	24	15				
June	10	8,12	11	10,18	28	17		
July	4	10,14	5	4,22	7	14	17	11
	21	2	29	13	30	3		
Aug	6	12	15	15	17	15	22	15
	25	12						
Sept	10	15	11	2	12	20	13	23
	14	16	16	15				
Oct	5	11	8	12	15	22	20	3
	21	6	23	22	30	1		
Nov	4	16	5	12,22	16	10	17	12
	18	23	23	1,22	27	22	29	20
Dec	21	15	22	13	23	16	27	2,5