

MAGNETICAL, METEOROLOGICAL AND SEISMOGRAPHIC OBSERVATIONS

MADE AT THE

GOVERNMENT OBSERVATORIES,
BOMBAY AND ALIBAG,

IN THE YEARS

1916 to 1920

UNDER THE DIRECTION OF

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WITH AN APPENDIX

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	Table.	Page.	Table.	Page.	Table.	Page.	Table.	Page.	Table.	Page.
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AT ALIBAG DURING THE PERIOD 1916 TO 1920.

	1916.		1917.		1918.		1919.		1920.	
	Table.	Page.	Table.	Page.	Table.	Page.	Table.	Page.	Table.	Page.
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List of principal disturbances recorded by the seismographs.

TABLE I.

1916.

 $\phi = 18^{\circ} 53' 36''$; $\lambda = 72^{\circ} 48' 56''$; $h = 11$ Metres. Subsoil-Trap.

Apparatus—Milne's Horizontal Pendulum (E.-W.)

	V	To	ϵ	$\frac{r}{To^2}$
AE ..	9	21	..	..

Date.	Phase.	Time G. M. T.	Period (Sec.)	Amplitude (μ).			Remarks.
				AN	AE	AZ	
1916 January	1 ..	P	H. m. s. 13 33 10	..	..	..	Sensibility to tilt: 1.0 mm. of amplitude on the trace = 0".29.
" "	1 ..	M	14 14 3	..	400	..	
" "	1 ..	F	17 43 16	..	..	..	
" "	13 ..	P	6 27 31	..	..	..	
" "	13 ..	M	6 58 47	..	67	..	
" "	13 ..	F	8 22 47	..	..	..	
" "	13 ..	P	8 31 39	..	..	..	
" "	13 ..	M	8 54 2	..	389	..	
" "	13 ..	F	12 4 54	..	..	..	
" "	24 ..	P	7 3 47	..	..	..	
" "	24 ..	M	7 20 35	..	322	..	
" "	24 ..	F	8 43 59	..	..	..	
" "	26 ..	P	7 48 12	..	..	..	
" "	26 ..	M	8 11 50	..	56	..	
" "	26 ..	F	8 28 30	..	..	..	
" "	26 ..	P	13 1 6	..	..	..	
" "	26 ..	M	13 34 45	..	56	..	
" "	26 ..	F	13 59 20	..	..	..	
" "	31 ..	P	18 41 37	..	..	..	
" "	31 ..	M	19 24 9	..	44	..	
" "	31 ..	F	19 58 29	..	..	..	
" February	1 ..	P	7 45 59	..	..	..	Beginning mixed in tremors. End mixed in tremors. Beginning mixed in tremors. End mixed in tremors. Beginning mixed in tremors. End mixed in tremors.
" "	1 ..	M	8 14 35	..	444	..	
" "	1 ..	F	9 24 35	..	..	..	
" "	6 ..	P	....	..	..	..	
" "	6 ..	M	22 43 53	..	289	..	
" "	6 ..	F	....	..	..	..	
" "	14 ..	P	....	..	..	..	
" "	14 ..	M	10 39 48	..	44	..	
" "	14 ..	F	..	..	..	..	
" "	14 ..	P	17 54 54	..	..	..	
" "	14 ..	M	18 0 48	..	67	..	
" "	14 ..	F	18 13 34	..	..	..	
" "	15 ..	P	12 25 2	..	..	..	
" "	15 ..	M	12 37 2	..	56	..	
" "	15 ..	F	12 59 49	..	..	..	
" "	20 ..	P	18 11 14	..	..	..	
" "	20 ..	M	18 46 52	..	222	..	
" "	20 ..	F	19 24 29	..	..	..	
" "	21 ..	P		..	..	..	
" "	21 ..	M	14 13 35	..	22	..	
" "	21 ..	F		..	..	..	

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TABLE I—*contd.*

Date.	Phase.	Time G. M. T.	Period (Sec.)	Amplitude. (μ).			Remarks.
				AN	AE	AZ	
1916 February 27 ..	P	H. m. s. 20 44 15	..	..	..	..	
" " 27 ..	M	21 59 5	..	..	144	..	
" " 27 ..	F	....	..	..	..	..	End mixed in tremors.
" April 5 ..	P	21 16 25	..	..	..	..	Sensibility to tilt: 1.0 mm. of amplitude on trace = 0.30'.
" " 5 ..	M	21 26 59	..	..	67	..	
" " 5 ..	F	21 39 11	..	..	..	..	
" " 7 ..	P	....	..	..	..	..	P as shown by Tromograph is at 9 ^h 35 ^m 33 ^s .
" " 7 ..	S	9 42 30	..	..	..	..	
" " 7 ..	M	9 53 11	..	..	344	..	
" " 7 ..	F	11 38 58	..	..	..	..	
" " 15 ..	P	12 39 42	..	..	..	..	
" " 15 ..	M	12 54 56	..	..	167	..	
" " 15 ..	F	13 45 45	..	..	..	..	
" " 15 ..	P	15 9 58	..	..	..	..	
" " 15 ..	M	15 33 33	..	..	33	..	
" " 15 ..	F	15 44 2	..	..	..	..	
" " 18 ..	P	....	..	..	..	..	P as shown by Tromograph is at 4 ^h 14 ^m 32 ^s .
" " 18 ..	S	4 26 59	..	..	..	..	
" " 18 ..	M	4 54 43	..	..	67	..	
" " 18 ..	F	5 32 50	..	..	..	..	
" " 21 ..	P	11 41 42	..	..	..	..	
" " 21 ..	M	12 14 42	..	..	167	..	
" " 21 ..	F	....	..	..	..	..	End mixed in tremors.
" " 24 ..	P	8 24 33	..	..	..	..	
" " 24 ..	M	9 43 8	..	..	111	..	
" " 24 ..	F	11 21 13	..	..	..	..	
" " 26 ..	P	....	..	..	..	..	Beginning mixed tremors.
" " 26 ..	M	3 45 25	..	..	56	..	
" " 26 ..	F	4 32 34	..	..	..	..	
" May 9 ..	P	14 39 42	..	..	..	..	
" " 9 ..	M	14 47 15	..	..	200	..	
" " 9 ..	F	....	..	..	..	..	End lost in shifting time.
" " 29 ..	P	11 41 57	..	..	..	..	
" " 29 ..	M	11 48 25	..	..	33	..	
" " 29 ..	F	11 58 11	..	..	..	..	Sensibility to tilt: 1.0 mm. of amplitude on trace = 0.32".
" June 15 ..	P	11 33 33	..	..	..	..	
" " 15 ..	M	11 49 21	..	..	111	..	
" " 15 ..	F	12 15 15	..	..	..	..	
" " 21 ..	P	....	..	..	..	..	Beginning mixed in tremors.
" " 21 ..	M	20 5 21	..	..	67	..	
" " 21 ..	F	....	..	..	..	..	End mixed in tremors.
" " 21 ..	P	....	..	..	..	..	Beginning mixed in tremors.
" " 21 ..	M	22 49 47	..	..	44	..	
" " 21 ..	F	....	..	..	..	..	End mixed in tremors.
" " 24 ..	P	....	..	..	..	..	Beginning mixed in tremors.
" " 24 ..	M	4 12 19	..	..	56	..	
" " 24 ..	F	....	..	..	..	..	End mixed in tremors.
" " 30 ..	P	....	..	..	..	..	Beginning mixed in tremors.
" " 30 ..	M	4 31 26	..	..	56	..	
" " 30 ..	F	5 15 39	..	..	..	..	
" August 3 ..	P	1 42 21	..	..	..	..	
" " 3 ..	M	2 13 49	..	..	66	..	
" " 3 ..	F	3 10 41	..	..	..	..	

TABLE I—*contd.*

Date.	Phase.	Time. G. M. T.	Period (Sec.).	Amplitude (μ).			Remarks.
				AN	AE	AZ	
		H. m. s.					
1916 August 8 ..	P	4 59 59	..	..	..	..	
" " 8 ..	M	5 3 54	..	..	33	..	
" " 8 ..	F	5 14 41	..	..	..	..	
" " 25 ..	P	10 7 6	..	..	..	..	
" " 25 ..	M	11 8 6	..	..	167	..	
" " 25 ..	F	11 45 18	..	..	..	..	
" " 28 ..	P	6 42 47	..	..	..	..	
" " 28 ..	M	6 47 55	..	..	1,789	..	
" " 28 ..	F	8 25 38	..	..	..	..	
" September 11 ..	S	6 44 59	..	..	..	..	P as shown by Tromograph is at 6 ^h 38 ^m 6 ^s .
" " 11 ..	M ₁	6 45 29	..	..	100	..	
" " 11 ..	M ₂	7 1 25	..	..	78	..	
" " 11 ..	F	7 32 11	..	..	..	..	
" " 15 ..	P	7 11 32	..	..	..	..	
" " 15 ..	S	7 20 7	..	..	..	..	
" " 15 ..	M	7 38 57	..	..	56	..	
" " 15 ..	F	8 1 50	..	..	..	..	
" " 23 ..	P	7 2 14	..	..	..	..	
" " 23 ..	M	7 12 38	..	..	22	..	
" " 23 ..	F	7 37 38	..	..	..	..	
" October 3 ..	P	1 46 28	..	..	..	..	
" " 3 ..	M	2 56 40	..	..	122	..	
" " 3 ..	F	3 41 24	..	..	..	..	
" " 20 ..	P	17 35 24	..	..	..	..	
" " 20 ..	M	18 14 44	..	..	22	..	
" " 20 ..	F	18 39 56	..	..	..	..	
" " 21 ..	P	19 30 41	..	..	..	..	Beginning uncertain.
" " 21 ..	M	19 38 39	..	..	56	..	
" " 21 ..	F	....	..	..	..	..	End mixed in tremors.
" " 23 ..	P	10 42 48	..	..	..	..	
" " 23 ..	M	10 47 50	..	..	22	..	
" " 23 ..	F	10 53 17	..	..	..	..	
" " 31 ..	P	15 42 56	..	..	..	..	
" " 31 ..	M	16 17 24	..	..	689	..	
" " 31 ..	F	17 11 40	..	..	..	..	
" November 3 ..	P	22 30 50	..	..	..	..	
" " 3 ..	M	22 33 45	..	..	44	..	
" " 3 ..	F	22 42 26	..	..	..	..	
" " 11 ..	P	14 18 43	..	..	..	..	Sensibility to tilt: 1.0 mm. of amplitude on trace = 0.32".
" " 11 ..	M	14 27 28	..	..	56	..	
" " 11 ..	F	14 34 47	..	..	..	..	
" " 11 ..	P	16 9 29	..	..	..	..	
" " 11 ..	M	16 14 32	..	..	33	..	
" " 11 ..	F	16 18 34	..	..	..	..	
" " 14 ..	P	22 45 49	..	..	..	..	
" " 14 ..	M	22 59 43	..	..	22	..	
" " 14 ..	F	23 10 43	..	..	..	..	
" " 21 ..	P	7 32 56	..	..	..	..	
" " 21 ..	M	8 17 20	..	..	33	..	
" " 21 ..	F	8 31 14	..	..	..	..	
" " 24 ..	P	4 34 25	..	..	..	..	
" " 24 ..	M	4 42 47	..	..	22	..	
" " 24 ..	F	4 54 53	..	..	..	..	
" December 14 ..	P	17 36 30	..	..	..	..	
" " 14 ..	M	17 44 12	..	..	22	..	
" " 14 ..	F	17 55 42	..	..	..	..	

TABLE I—concl'd.

Date.	Phase.	Time G. M. T.	Period (Sec.)	Amplitude (μ).			Remarks.
				AN	AE	AZ	
1916 December 23 ..	P	H. m. s. 9 57 52	..	..	..	..	
" " 23 ..	M	10 51 21	..	..	78	..	
" " 23 ..	F	11 28 21	..	..	..	..	
" " 24 ..	P	8 0 12	..	..	..	..	
" " 24 ..	M	8 1 24	..	..	67	..	
" " 24 ..	F	8 5 1	..	..	..	..	

One disturbance at about 2^h on 10th February, another one at about 0^h on 26th March and a third one at about 14^h on 21st April are masked by tremors.

One disturbance at about 19³/₄^h on 14th October, another at about 3¹/₂^h on 26th October, a third one at about 23¹/₂^h on 25th December and a fourth one at about 20¹/₄^h on 26th December 1916, have been masked by tremors,

Thickening of line was noted on the following occasions :—

January.—7^d 13^h 43^m to 47^m ; 9^d 11^h 44^m ; 10^d 19^h 6^m to 10^m ; 17^d 13^h 23^m.

February.—7^d 9^h 52^m ; 11^d 19^h 37^m ; 14^d 8^h 50^m to 53^m ; 24^d 10^h 19^m ; 24^d 12^h 21^m ; 28^d 10^h 54^m.

March.—11^d 11^h 13^m to 17^m ; 23^d 14^h 17^m ; 24^d 11^h 46^m.

April.—3^d 11^h 6^m ; 14^d 17^h 55^m to 59^m ; 15^d 9^h 35^m ; 15^d 9^h 40^m ; 15^d 9^h 42^m ; 15^d 9^h 44^m ; 22^d 7^h 12^m ; 24^d 5^h 42^m to 46^m ; 28^d 3^h 29^m.

May.—1^d 6^h 39^m ; 4^d 9^h 9^m to 12^m ; 8^d 8^h 21^m ; 9^d 7^h 32^m ; 17^d 14^h 48^m ; 17^d 14^h 58^m ; 18^d 6^h 18^m to 20^m ; 29^d 7^h 31^m.

June.—1^d 11^h 43^m ; 22^d 1^h 12^m to 15^m ; 22^d 13^h 21^m.

July.—6^d 6^h 50^m ; 16^d 18^h 53^m to 59^m ; 17^d 13^h 20^m ; 20^d 16^h 35^m.

August.—7^d 1^h 41^m ; 13^d 1^h 1^m ; 14^d 5^h 4^m ; 17^d 3^h 14^m to 17^m ; 23^d 19^h 57^m ; 25^d 19^h 17^m ; 26^d 12^h 11^m to 15^m ; 27^d 6^h 2^m to 5^m ; 28^d 6^h 39^m.

September.—3^d 7^h 36^m ; 6^d 4^h 44^m ; 6^d 5^h 59^m ; 13^d 5^h 17^m to 19^m ; 29^d 20^h 21^m to 24^m ; 29^d 20^h 25^m to 27^m.

October.—1^d 18^h 22^m ; 9^d 14^h 50^m ; 11^d 17^h 37^m ; 11^d 18^h 35^m ; 18^d 10^h 38^m ; 22^d 12^h 24^m.

November.—3^d 10^h 5^m ; 8^d 6^h 8^m ; 8^d 6^h 25^m ; 13^d 12^h 48^m to 54^m ; 18^d 12^h 46^m to 54^m ; 21^d 7^h 14^m.

December.—3^d 8^h 44^m to 47^m ; 5^d 21^h 48^m to 52^m ; 22^d 19^h 42^m ; 24^d 7^h 31^m.

TABLE II.

1917.

 $\phi = 18^{\circ} 53' 36''$; $\lambda = 72^{\circ} 48' 56''$; $h = 11$ Metres. *Subsoil-Trap.*

Apparatus—Milne's Horizontal Pendulum (E.-W.)

	V	To	€	$\frac{r}{To^2}$
AE.	9	21 19	(from 1st January to 22nd June). (from 23rd June to 31st December).	

Date.	Phase.	Time G. M. T.	Period (Sec.)	Amplitude (μ).			Remarks.
				AN.	AE.	AZ.	
1917 January 4 ..	P	H. m. s. 17 4 56	..	..	..	..	Sensibility to tilt; 1.0 m.m. of amplitude on the trace = 0".32.
" " 4 ..	M	17 21 30	..	..	44	..	
" " 4 ..	F	17 34 30	..	..	..	..	
" " 20 ..	P	Mixed in tremors.	..	..	..	..	P as shown by the float record is at 20 ^d 23 ^h 20 ^m 35 ^s .
" " 20 ..	S	23 27 20	..	..	..	..	
" " 20 ..	M	23 44 54	..	..	111	..	
" " 20 ..	F	....	..	..	..	..	End mixed in the beginning of another disturbance which is masked by tremors.
" " 26 ..	P	....	..	..	..	..	Beginning uncertain.
" " 26 ..	M	5 56 49	..	..	22	..	
" " 26 ..	F	6 12 13	..	..	..	..	
" " 30 ..	P	Mixed in tremors.	..	..	..	..	P as shown by the float record is at 30 ^d 2 ^h 57 ^m 24 ^s .
" " 30 ..	S	3 6 50	..	..	..	..	
" " 30 ..	M	Traces overlap.	..	..	..	..	
" " 30 ..	F	6 52 0	..	..	..	..	
" " 31 ..	P	4 9 10	..	..	..	..	
" " 31 ..	M	4 35 59	..	..	167	..	
" " 31 ..	F	5 7 19	..	..	..	..	
" February 15 ..	P	Mixed in tremors.	..	..	..	..	P as shown by the float record is at 15 ^d 1 ^h 8 ^m 8 ^s .
" " 15 ..	M	2 8 31	..	..	100	..	
" " 15 ..	F	....	..	..	..	..	End mixed in tremors.
" " 20 ..	P	Mixed in tremors.	..	..	..	..	P as shown by the float record is at 20 ^d 19 ^h 49 ^m 46 ^s .
" " 20 ..	M	21 1 56	..	..	89	..	
" " 20 ..	F	....	..	..	..	..	End mixed in tremors.
" " 21 ..	P	Not well marked.	..	..	..	..	P as shown by the float record is at 21 ^d 10 ^h 1 ^m 11 ^s .
" " 21 ..	M	11 1 29	..	..	56	..	
" " 21 ..	F	11 13 43	..	..	..	..	
" " 22 ..	P	9 47 55	..	..	..	..	P uncertain.
" " 22 ..	M	10 31 49	..	..	67	..	
" " 22 ..	F	10 47 11	..	..	..	..	
" " 25 ..	P	Not well marked.	..	..	..	..	P as shown by the float record is at 25 ^d 5 ^h 29 ^m 21 ^s .
" " 25 ..	S	5 36 42	..	..	..	..	S shown by the float record.
" " 25 ..	M	5 52 47	..	..	33	..	
" " 25 ..	F	....	..	..	..	..	End mixed in the beginning of the following disturbance.

TABLE II—*contd.*

Date.	Phase.	Time G M. T.	Period (Sec.)	Amplitude (μ).			Remarks.
				AN.	AE.	AZ.	
1917 February 25 ..	P	H. m. s. Mixed in the end of the preceding disturbance.	..	..	..	..	P as shown by the float record is at 25 ^d 5 ^h 55 ^m 11 ^s .
" " 25 ..	S	6 2 34	..	..	..	..	S as shown by the float record.
" " 25 ..	M	6 18 35	..	..	44	..	
" " 25 ..	F	6 38 47	..	..	..	..	
" March 6 ..	P	....	..	..	..	..	Beginning doubtful.
" " 6 ..	M	4 34 28	..	..	22	..	
" " 6 ..	F	4 42 18	..	..	..	..	
" " 15 ..	P	....	..	..	..	..	P as shown by the float record is at 15 ^d 0 ^h 24 ^m 44 ^s .
" " 15 ..	M	0 55 5	..	..	100	..	
" " 15 ..	F	....	..	..	..	..	End mixed in tremors.
" April 3 ..	P	12 50 7	..	..	..	..	
" " 3 ..	M	12 59 7	..	..	56	..	
" " 3 ..	F	13 17 38	..	..	..	..	
" " 12 ..	P	3 0 14	..	..	..	..	
" " 12 ..	M	3 10 7	..	..	189	..	
" " 12 ..	F	3 36 43	..	..	..	..	
" " 16 ..	P	19 1 25	..	..	..	..	
" " 16 ..	M	19 4 25	..	..	56	..	
" " 16 ..	F	19 13 58	..	..	..	..	
" " 21	P	Mixed in tre- mors.	..	..	..	..	P as shown by the float record is at 21 ^d 0 ^h 53 ^m 41 ^s .
" " 21 ..	M	0 56 44	..	..	189	..	
" " 21 ..	F	....	..	..	..	..	End mixed in tremors.
" " 29 ..	P	12 13 12	..	..	..	..	
" " 29 ..	M	12 23 53	..	..	33	..	
" " 29 ..	F	12 38 0	..	..	..	..	
" May 1 ..	P	18 42 8	..	..	..	..	
" " 1 ..	M	19 35 36	..	..	1,600	..	
" " 1 ..	F	....	..	..	..	..	End mixed in tremors.
" " 2 ..	P	Mixed in tre- mors.	..	..	..	..	
" " 2 ..	M	2 31 49	..	..	44	..	
" " 2 ..	F	2 41 49	..	..	..	..	
" " 4 ..	P	Mixed in tre- mors.	..	..	..	..	
" " 4 ..	M	1 54 7	..	..	122	..	
" " 4 ..	F	2 18 45	..	..	..	..	
" " 9 ..	P	....	..	..	..	..	P as shown by the float record is at 9 ^d 16 ^h 6 ^m 13 ^s .
" " 9 ..	S	16 14 45	..	..	..	..	
" " 9 ..	M	16 43 11	..	..	111	..	
" " 9 ..	F	....	..	..	..	..	End mixed in tremors.
" " 31 ..	P	9 7 27	..	..	..	..	
" " 31 ..	M	9 51 27	..	..	722	..	
" " 31 ..	F	11 41 58	..	..	..	..	
" June 4 ..	P	2 7 46	..	..	..	..	
" " 4 ..	M	2 31 10	..	..	33	..	
" " 4 ..	F	2 50 46	..	..	..	..	
" " 8 ..	P	Mixed in tre- mors.	..	..	..	..	
" " 8	M	2 24 40	..	..	44	..	
" " 8 ..	F	2 56 40	..	..	..	..	
" " 9 ..	P	18 1 39	..	..	..	..	

TABLE II—*contd.*

Date.			Phase.	Time. G. T. M.	Period (Sec.)	Amplitude (μ).			Remarks.
						AN.	AE.	AZ.	
1917	June	9 ..	M	H. m. s. 18 8 39	..	..	33	..	
"	"	9 ..	F	18 19 44	..	..	..	..	
"	"	13 ..	P	7 0 37	..	..	..	..	
"	"	13 ..	M	7 53 41	..	..	178	..	
"	"	13 ..	F	9 9 29	..	..	..	..	
"	"	26 ..	P	6 9 32	..	..	..	..	
"	"	26 ..	M	7 5 32	..	..	922	..	
"	"	26 ..	F	....	..	..	..	..	End mixed in tremors.
"	July	4 ..	P	0 47 51	..	..	..	..	
"	"	4 ..	M	1 11 3	..	..	211	..	
"	"	4 ..	F	2 12 21	..	..	..	..	
"	"	4 ..	P	....	..	..	..	..	P mixed in tremors.
"	"	4 ..	M	6 12 15	..	..	67	..	
"	"	4 ..	F	6 40 21	..	..	..	..	
"	"	4 ..	P	22 16 50	..	..	..	..	
"	"	4 ..	M	22 22 38	..	..	44	..	
"	"	4 ..	F	22 42 14	..	..	..	..	
"	"	12 ..	P	5 10 38	..	..	..	..	
"	"	12 ..	M	5 22 48	..	..	56	..	
"	"	12 ..	F	5 39 46	..	..	..	..	
"	"	25 ..	P	3 42 33	..	..	..	..	
"	"	25 ..	M	4 20 10	..	..	56	..	
"	"	25 ..	F	5 4 40	..	..	..	..	
"	"	27 ..	P	....	..	..	..	..	P mixed in tremors.
"	"	27 ..	M	4 10 31	..	..	556	..	
"	"	27 ..	F	5 46 31	..	..	..	..	
"	"	29 ..	P	....	..	..	..	..	P lost in shifting time.
"	"	29 ..	M	15 13 12	..	..	167	..	
"	"	29 ..	F	16 2 49	..	..	..	..	
"	"	29 ..	P	21 57 33	..	..	..	..	
"	"	29 ..	M	22 48 43	..	..	278	..	
"	"	29 ..	F	....	..	..	..	..	F mixed in tremors.
"	"	31 ..	P	0 3 42	..	..	..	..	
"	"	31 ..	M	0 14 16	..	..	467	..	
"	"	31 ..	F	1 17 26	..	..	..	..	
"	"	31 ..	P	3 32 15	..	..	..	..	
"	"	31 ..	M	3 44 3	..	..	100	..	
"	"	31 ..	F	4 28 2	..	..	..	..	
"	August	5 ..	P	16 29 14	..	..	..	..	
"	"	5 ..	M	17 1 38	..	..	78	..	
"	"	5 ..	F	18 16 20	..	..	..	..	
"	"	30 ..	P	†4 17 19	..	..	..	..	In Milne's instrument the disturbance is lost in faulty record.
"	"	30 ..	S	†4 25 24	..	..	..	..	
"	"	31 ..	P	11 59 26	..	..	..	..	
"	"	31 ..	M	13 6 13	..	..	167	..	
"	"	31 ..	F	13 54 37	..	..	..	..	
"	September	4 ..	P	16 48 29	..	..	..	..	
"	"	4 ..	M	16 58 11	..	..	56	..	
"	"	4 ..	F	17 11 11	..	..	..	..	
"	"	15 ..	P	9 44 50	..	..	..	..	
"	"	15 ..	M	10 8 32	..	..	44	..	
"	"	15 ..	F	10 27 41	..	..	..	..	
"	"	17 ..	P	....	..	..	..	..	P mixed in tremors.
"	"	17 ..	M	22 28 46	..	..	44	..	
"	"	17 ..	F	....	..	..	..	..	F mixed in tremors.
"	"	24 ..	P	†20 20 3	..	..	..	..	
"	"	24 ..	S	20 29 50	..	..	..	..	

TABLE II—concl'd.

Date.	Phase.	Time G. M. T.	Period (Sec.)	Amplitude (μ).			Remarks.
				AN.	AE.	AZ.	
1917 September 24 ..	M	H. m. s. 20 31 3	..	..	11	..	F uncertain. P mixed in tremors.
" " 24 ..	F	....	..	..	..	..	
" October 17 ..	P	†1 30 12	..	..	..	..	F mixed in tremors.
" " 17 ..	M	1 33 56	..	..	56	..	
" " 17 ..	F	....	..	..	..	..	F mixed in tremors.
" November 4 ..	P	12 9 26	..	..	..	..	
" " 4 ..	S	12 14 2	..	..	..	..	F mixed in tremors.
" " 4 ..	M	12 20 53	..	..	856	..	
" " 4 ..	F	13 40 34	..	..	..	..	F mixed in tremors.
" " 16 ..	P	3 39 30	..	..	..	..	
" " 16 ..	S	3 48 43	..	..	..	..	F mixed in tremors.
" " 16 ..	M	4 27 45	..	..	400	..	
" " 16 ..	F	6 39 33	..	..	..	..	F mixed in tremors.
" " 16 ..	P	....	..	..	..	..	
" " 16 ..	M	22 39 28	..	..	67	..	F mixed in tremors.
" " 16 ..	F	....	..	..	..	..	
" " 18 ..	P	3 6 47	..	..	..	..	F mixed in tremors.
" " 18 ..	S	3 13 49	..	..	..	..	
" " 18 ..	M	3 28 49	..	..	222	..	F mixed in tremors.
" " 18 ..	F	4 10 1	..	..	..	..	
" " 28 ..	P	†14 47 43	..	..	..	..	The times from Milne's record are uncertain as the disturbance occurred at shifting time.
" " 28 ..	S	†14 52 16	..	..	..	..	
" " 28 ..	M	....	..	..	..	..	F mixed in tremors.
" " 28 ..	F	....	..	..	..	..	
" December 1 ..	P	†9 52 22	..	..	..	..	F mixed in tremors.
" " 1 ..	S	9 56 15	..	..	..	..	
" " 1 ..	M	9 58 15	..	..	22	..	F mixed in tremors.
" " 1 ..	F	10 4 31	..	..	..	..	
" " 14 ..	P	8 8 52	..	..	..	..	F mixed in tremors.
" " 14 ..	M	8 14 27	..	..	44	..	
" " 14 ..	F	8 24 48	..	..	..	..	F mixed in tremors.
" " 21 ..	P	18 16 3	..	..	..	..	
" " 21 ..	M	18 52 48	..	..	178	..	F mixed in tremors.
" " 21 ..	F	19 51 49	..	..	..	..	
" " 21 ..	P	21 46 7	..	..	..	..	F mixed in tremors.
" " 21 ..	M	21 47 19	..	..	44	..	
" " 21 ..	F	22 6 7	..	..	..	..	F mixed in tremors.
" " 28 ..	P	....	..	..	..	..	
" " 28 ..	M	22 9 37	..	..	111	..	F mixed in tremors.
" " 28 ..	F	....	..	..	..	..	

One disturbance at about 0^h on 21st January, another at about 0^h on 24th January and a third one at about 1½^h on 18th February are masked by tremors.

One disturbance at about 23½^h on 29th December is masked by tremors.

Thickening of line was noted on the following occasions:—

January.—17^d 10^h 41^m; 30^d 8^h 6^m to 8^m.

February.—12^d 12^h 16^m to 18^m; 14^d 6^h 5^m; 14^d 6^h 9^m to 11^m; 26^d 10^h 10^m to 13^m.

March.—1^d 5^h 59^m to 6^h 2^m; 21^d 3^h 54^m; 24^d 14^h 4^m; 31^d 17^h 39^m.

April.—14^d 4^h 39^m; 20^d 11^h 30^m; 20^d 12^h 10^m; 24^d 3^h 36^m.

May.—8^d 19^h 43^m; 16^d 14^h 19^m; 29^d 4^h 1^m.

June.—2^d 0^h 13^m to 17^m; 16^d 18^h 37^m; 27^d 8^h 39^m to 44^m.

July.—1^d 7^h 16^m; 4^d 21^h 36^m to 41^m; 9^d 2^h 32^m; 10^d 20^h 25^m to 29^m; 23^d 18^h 2^m to 6^m; 31^d 7^h 14^m to 19^m.

August.—12^d 11^h 52^m to 58^m; 15^d 4^h 37^m to 44^m; 23^d 16^h 36^m; 25^d 21^h 51^m to 56^m; 26^d 20^h 17^m to 27^m; 27^d 16^h 55^m.

September.—28^d 23^h 36^m to 38^m.

October.—16^d 17^h 40^m; 19^d 18^h 7^m to 12^m; 21^d 7^h 44^m to 47^m; 22^d 8^h 49^m to 56^m.

November.—6^d 12^h 9^m to 17^m.

December.—28^d 11^h 32^m to 36^m.

Times marked with † are as shown by the float record (Tilt seismograph).

TABLE III.

1918.

 $\phi = 18^{\circ} 53' 36''$; $\lambda = 72^{\circ} 48' 56''$; $h = 11$ Metres. *Subsoil-Trap.*

Apparatus—Omori-Ewing Horizontal Pendulum (E.-W.).

	V	To	ϵ	$\frac{r}{To^2}$
AE ..	20	32	..	..

Date.	Phase.	Time G. M. T.	Period (Sec.)	AMPLITUDE (μ)			Remarks.
				AN.	AE.	AZ.	
1918 January 30	.. P.	H. m. s. 21 28 1	..	..	..	..	
" " 30	.. S.	21 35 36	..	..	..	..	
" " 30	.. M.	21 43 5	..	..	135	..	
" February 4	.. P.	19 0 34	..	..	..	..	
" " 4	.. M.	19 11 39	..	..	35	..	
" " 7	.. P.	5 29 35	..	..	..	..	
" " 7	.. M.	5 47 46	..	..	75	..	
" " 12	.. P.	3 10 47	..	..	..	..	
" " 12	.. M.	....	..	..	..	..	M not well marked.
" " 13	.. P.	2 39 30	..	..	..	..	
" " 13	.. M.	2 56 35	..	..	25	..	
" " 13	.. P.	6 14 58	..	..	..	..	
" " 13	.. M.	6 22 2	..	..	135	..	
" March 24	.. P.	23 19 53	..	..	..	..	
" " 24	.. M.	23 28 32	..	..	35	..	
" " 31	.. P.	8 8 17	..	..	..	..	
" " 31	.. M.	....	..	..	..	..	M not well marked.
" April 10	.. P.	2 12 37	..	..	..	..	
" " 10	.. M.	2 26 56	..	..	25	..	
" " 13	.. P.	0 57 19	..	..	..	..	
" " 13	.. M.	1 8 17	..	..	180	..	
" " 21	.. P.	23 35 49	..	..	..	..	
" " 21	.. M.	....	..	..	..	..	M not well marked.
" May 19	.. P.	0 28 23	..	..	..	..	
" " 19	.. M.	0 34 52	..	..	25	..	
" " 20	.. P.	14 54 18	..	..	..	..	
" " 20	.. M.	15 36 57	..	..	50	..	
" " 20	.. P.	18 14 41	..	..	..	..	
" " 20	.. M.	19 9 40	..	..	35	..	
" " 23	.. P.	13 2 26	..	..	..	..	
" " 23	.. M.	....	..	..	..	..	M not well marked.
" June 3	..	A slight disturbance is recorded at about 20 minutes past midnight of 3rd, but the movements are small and indefinite and it is difficult to locate the phases exactly.					Record in other seismograph is vitiated by air tremors.
" July 1	.. P.	6 17 9	..	..	..	..	
" " 3	.. M.	....	..	..	..	..	Max. not well marked.
" " 3	.. P.	7 3 25	..	..	..	..	
" " 3	.. S.	7 12 58	..	..	..	..	
" " 3	.. M.	7 37 18	..	..	890	..	
" " 8	.. P.	10 26 11	..	..	..	..	
" " 8	.. S.	10 29 29	..	..	..	..	
" " 8	.. L.	10 31 18	..	..	..	..	
" " 8	.. M.	....	..	..	..	..	Amplitude too large, stopped by guards.
" " 11	.. P.	17 15 48	..	..	..	..	

TABLE III—*contd.*

Date.		Phase.	Time G. M. T.	Period (Sec.)	AMPLITUDE (μ)			Remarks.
					AN.	AE.	AZ.	
			H. m. s.					
1918 July	11	.. M.	....	..	..	..	..	Max. not well marked.
" "	21	.. P.	6 22 25	..	..	..	..	P as shown by the float record. (Tilt Seismograph.)
" "	21	.. M.	....	..	..	..	..	Max. not well marked.
" August	15	.. P.	12 26 58	..	..	..	..	
" "	15	.. S.	12 34 30	..	..	..	..	
" "	15	.. M.	....	..	..	..	..	Amplitude too large, stopped by guards.
" "	15	.. P.	17 39 32	..	..	..	..	
" "	15	.. M.	18 6 0	..	..	55	..	
" September	7	.. P.	17 27 9	..	..	..	..	P as shown by the tilt seismograph is at 17h. 27m. 31s.
" "	7	.. S.	17 37 15	..	..	..	..	S—P = 10m. 6s.; $\Delta = 80^\circ 3'$
" "	7	.. L.	17 51 29	..	..	..	..	V=4 Km. per sec.
" "	7	.. M.	....	..	..	..	..	Amplitude too large, stopped by guards.
" "	7	.. M.	19 59 46	..	..	..	..	Maximum by the major arc as shown by the tilt seismograph.
" "	11	.. P.	4 15 29	..	..	..	..	
" "	11	.. M.	....	..	..	..	..	Max. not well marked.
" "	12	.. P.	9 43 13	..	..	..	..	
" "	12	.. M.	....	..	..	..	..	Max. not well marked.
" "	14	.. P.	17 24 49	..	..	..	..	
" "	14	.. M.	17 47 21	..	..	15	..	
" "	22	.. P.	10 1 35	..	..	..	..	
" "	22	.. M.	....	..	..	..	..	Max. not well marked.
" "	29	.. P.	12 14 15	..	..	..	..	
" "	29	.. M.	12 30 26	..	..	55	..	
" "	30	.. P.	18 15 12	..	..	..	..	
" "	30	.. M.	....	..	..	..	..	Max. not well marked.
" October	1	.. P.	1 22 25	..	..	..	..	
" "	1	.. M.	1 26 45	..	..	45	..	
" "	11	.. P.	14 33 54	..	..	..	..	
" "	11	.. M.	15 19 46	..	..	300	..	
" "	16	.. P.	20 14 43	..	..	..	..	
" "	16	.. M.	....	..	..	..	..	Max. not well marked.
" "	27	.. P.	15 50 44	..	..	..	..	
" "	27	.. M.	16 17 42	..	..	10	..	
" "	27	.. P.	17 18 49	..	..	..	..	
" "	27	.. M.	17 50 25	..	..	60	..	
" November	8	.. P.	4 49 11	..	..	..	..	
" "	8	.. M.	5 16 9	..	..	455	..	
" "	11	.. P.	....	..	..	..	..	Commencement doubtful. P as shown by Milne's seismograph is at 7h. 37m. 54s.
" "	11	.. M.	7 42 33	..	..	5	..	
" "	18	.. P.	18 52 6	..	..	..	..	
" "	18	.. M.	19 18 19	..	..	1335	..	
" "	22	.. P.	16 25 3	..	..	..	..	
" "	22	.. M.	16 33 25	..	..	10	..	
" "	24	.. P.	23 8 3	..	..	..	..	
" "	24	.. M.	23 30 33	..	..	35	..	

TABLE III—*contd.*

Date.	Phase.	Time G. M. T.	Period (Sec.)	AMPLITUDE (μ)			Remarks.
				AN.	AE.	AZ.	
1918 November 29	P.	H. m. s. 10 47 9	..	..	..	..	Commencement doubtful. P as shown by Milne's seismograph is at 7h. 22m. 41s.
" " 29	M.	10 49 52	..	..	25	..	
" " 30	P.	....	..	..	..	..	
" " 30	M.	7 27 47	..	..	15	..	
" December 1	P.	2 39 45	..	..	..	..	Beginning doubtful.
" " 1	S.	2 43 24	..	..	..	..	
" " 1	M.	2 46 8	..	..	770	..	
" " 2	P.	10 5 55	..	..	..	..	
" " 2	M.	10 54 22	..	..	100	..	
" " 4	P.	12 7 17	..	..	..	..	
" " 4	S.	12 22 3	..	..	..	..	
" " 4	M.	13 3 57	..	..	750	..	
" " 6	P.	....	..	..	..	..	
" " 6	M.	9 44 12	..	..	30	..	
" " 25	P.	10 34 31	..	..	..	..	
" " 25	M.	10 42 50	..	..	30	..	

Small disturbances were also recorded on the following dates ; but the movements are small and it is difficult to locate the phases exactly.

1918 August :—16d 3 $\frac{1}{2}$ h ; 16d 8 $\frac{3}{4}$ h ; 17d 7 $\frac{3}{4}$ h ; 23d 6 $\frac{1}{4}$ h ; 23d 7 $\frac{1}{2}$ h.

" September :—8d 0h ; 8d 6h.

" October :—14d 13h ; 19d 4 $\frac{3}{4}$ h ; 25d 5h.

" December :—4d 19 $\frac{1}{4}$ h ; 6d 8 $\frac{3}{4}$ h ; 10d 9 $\frac{1}{4}$ h ; 16d 20 $\frac{1}{4}$ h.

TABLE IV.

1919.

$\phi = 18^{\circ} 53' 36''$; $\lambda = 72^{\circ} 48' 56''$; $h = 11$ Metres. *Subsoil-Trap.*
Apparatus—Omori-Ewing Horizontal Pendulum (E.-W.).

	V	To	€	$\frac{r}{T_0^2}$
AE ..	20	32	..	..

Date.			Phase.	Time G. M. T.			Period (Sec.).	Amplitude (μ).			Remarks.
								AN.	AE.	AZ.	
				H.	m.	s.					
1919 January	1	..	P.	1	43	7	..	..	..	..	
" "	1	..	S.	1	50	42	..	..	..	..	
" "	1	..	M.	1	52	22	..	..	760	..	
" "	1	..	P.	*3	18	33	..	..	..	..	
" "	1	..	P.	*5	0	56	..	..	..	..	
" "	6	..	P.	*22	41	0	..	..	..	..	
" "	18	..	P.	5	59	37	..	..	..	..	Beginning doubtful.
" "	18	..	M.	6	13	8	..	..	25	..	
" February	12	..	P.	13	15	56	..	..	..	..	
" "	12	..	M.	13	24	23	..	..	20	..	
" March	2	..	P.	4	38	21	..	..	..	..	
" "	2	..	M.	4	54	48	..	..	30	..	
" "	2	..	P.	*12	4	33	..	..	..	..	
" "	2	..	M.	13	13	19	..	..	30	..	
" "	21	..	P.	1	11	15	..	..	..	..	
" "	21	..	M.	1	34	38	..	..	15	..	
" April	2	..	P.	0	42	28	..	..	..	..	
" "	2	..	M.	0	56	44	..	..	30	..	
" "	17	..	P.	11	41	50	..	..	..	..	
" "	17	..	M.	12	27	32	..	..	335	..	
" "	21	..	P.	7	33	21	..	..	..	..	
" "	21	..	M.	7	42	3	..	..	15	..	
" "	21	..	P.	9	56	49	..	..	..	..	
" "	21	..	M.	....			..	..	..	..	Maximum not well marked.
" "	21	..	P.	....			..	..	..	..	Beginning doubtful.
" "	21	..	M.	12	26	11	..	..	25	..	
" "	27	..	P.	0	30	44	..	..	..	..	
" "	27	..	M.	0	53	57	..	..	25	..	
" "	30	..	P.	7	32	47	..	..	..	..	
" "	30	..	S.	7	47	23	..	..	..	..	
" "	30	..	M.	8	21	22	..	..	3,000	..	
" May	1	..	P.	5	14	20	..	..	..	..	
" "	1	..	M.	5	34	15	..	..	50	..	
" "	3	..	P.	1	2	54	..	..	..	..	
" "	3	..	M.	1	34	19	..	..	160	..	
" "	6	..	P.	†19	54	8	..	..	..	..	†P as shown by Colaba Seismograph (E. W.).
" "	23	..	P.	*6	12	14	..	..	..	..	
" "	23	..	S.	*6	16	49	..	..	..	..	
" "	23	..	P.	*18	11	33	..	..	..	..	
" "	29	..	P.	11	10	50	..	..	..	..	
" "	29	..	M.	11	15	48	..	..	45	..	

Times marked with * are shown by the Float record (Tilt Seismograph).

TABLE IV—*contd.*

Date.		Phase.	Time. G. M. T.	Period (Sec.).	Amplitude (μ).			Remarks.
					AN.	AE.	AZ.	
			H. m. s.					
1919 June	1	..	P. *12 51 2	..	..	..	..	
" "	15	..	P. 18 53 52	..	..	..	..	
" "	15	..	M.	..	..	..	..	Maximum not well marked.
" "	16	..	P.	..	..	..	..	Beginning uncertain.
" "	16	..	M.	..	..	..	..	Maximum not well marked.
" "	30	..	P. †7 39 34	..	..	..	..	†P as shown by Colaba Seismograph (E.W.).
" "	30	..	M. 7 48 23	..	..	85	..	
" July	8	..	P. 21 14 59	..	..	..	..	
" "	8	..	M. 21 32 28	..	..	390	..	
" "	21	..	P. 19 10 30	..	..	..	..	
" "	21	..	M.	..	..	..	..	Maximum not well marked.
" "	24	..	P. 2 8 8	..	..	..	..	
" "	24	..	M. 2 14 28	..	..	510	..	
" August	29	..	P. 5 53 56	..	..	..	..	
" "	29	..	M. 6 17 24	..	..	50	..	
" "	31	..	P. 17 34 44	..	..	..	..	
" "	31	..	M.	..	..	..	..	Maximum not well marked.
" September	5	..	P. 7 57 53	..	..	..	..	
" "	5	..	M.	..	..	..	..	Maximum not well marked.
" "	13	..	P. 12 38 18	..	..	..	..	
" "	13	..	M. 12 46 16	..	..	10	..	
" "	26	..	P. 19 48 43	..	..	..	..	
" "	26	..	M.	..	..	..	..	Maximum not well marked.
" October	4	..	P. 17 54 33	..	..	..	..	
" "	4	..	M.	..	..	..	..	Maximum not well marked.
" "	12	..	P. 21 55 45	..	..	..	..	
" "	12	..	S. 22 1 28	..	..	..	..	
" "	12	..	M. 22 11 53	..	..	35	..	
" "	24	..	P. 20 35 8	..	..	..	..	
" "	24	..	M. 20 42 19	..	..	10	..	
" "	29	..	P. 14 43 37	..	..	..	..	
" "	29	..	M.	..	..	..	..	Maximum not well marked.
" November	18	..	P. 22 4 9	..	..	..	..	
" "	18	..	M. 22 22 54	..	..	10	..	
" December	20	..	P. 19 42 37	..	..	..	..	
" "	20	..	M. 20 8 25	..	..	5	..	
" "	20	..	P. 20 45 57	..	..	..	..	
" "	20	..	S. 20 52 34	..	..	..	..	
" "	20	..	M. 21 6 13	..	..	70	..	

Times marked with * are shown by the Float record (Tilt Seismograph).

A disturbance was recorded at about 11 hours on the 7th November but the movements are small and it is difficult to locate the phases exactly.

TABLE V.

1920.

$\phi = 18^{\circ} 53' 36''$; $\lambda = 72^{\circ} 48' 56''$; $h = 11$ Metres. Subsoil-Trap.
Apparatus—Omori-Ewing Horizontal Pendulum (E.-W.).

	V	To	€	$\frac{r}{T_0^2}$
AE ..	20	32	..	..

Date.	Phase.	Time. G. M. T.	Period (Sec.).	Amplitude (μ).			Remarks.
				AN.	AE.	AZ.	
		H. m. s.					
1920 February 2	.. P.	11 34 29	..	..	..	..	
" " 2	.. M.	12 4 35	..	..	855	..	
" " 8	.. P.	5 51 3	..	..	..	..	Beginning doubtful.
" " 8	.. M.	....	..	..	..	..	Maximum not well marked.
" " 27	.. P.	....	..	..	..	..	Disturbance partially lost in shifting time, a little before 4 hours.
" March 17	.. P.	18 43 5	..	..	..	..	
" " 17	.. M.	18 58 43	..	..	30	..	
" " 20	.. P.	18 54 48	..	..	..	..	
" " 20	.. M.	....	..	..	..	..	Maximum cannot be deter- mined as the movements are very small.
" May 2	.. P.	8 37 3	..	..	..	..	
" " 2	.. M.	8 40 26	..	..	90	..	
" " 2	.. P.	14 55 56	..	..	..	..	
" " 2	.. M.	14 59 13	..	..	120	..	
" " 7	.. P.	5 50 4	..	..	..	..	
" " 7	.. M.	6 10 57	..	..	75	..	
" " 7	.. P.	21 44 23	..	..	..	..	
" " 7	.. M.	....	..	..	..	..	Maximum cannot be deter- mined as the movements are very small.
" " 13	.. P.	2 0 17	..	..	..	..	
" " 13	.. M.	....	..	..	..	..	Maximum cannot be deter- mined as the movements are very small.
" June 5	.. P.	4 30 4	..	..	..	..	
" " 5	.. M.	4 51 16	..	..	675	..	
" " 9	.. P.	11 40 0*	..	..	..	..	*Beginning doubtful as it is mixed in tremors.
" " 9	.. M.	....	..	..	..	..	Maximum cannot be deter- mined as the movements are very small.
" August 15	.. P.	7 7 29	..	..	..	..	
" " 15	.. M.	....	..	..	..	..	Do. do.
" " 15	.. P.	8 30 14	..	..	..	..	
" " 15	.. M.	....	..	..	..	..	Maximum cannot be deter- mined as the movements are very small.
" September 20	.. P.	14 56 4†	..	..	..	..	†These times are given from Colaba seismograph No. 1 as the Omori seismograph record is lost owing to stoppage of the driving clock.
" " 20	.. M.	15 36 55†	..	..	..	..	
" October 12	.. P.	7 2 13	..	..	..	..	
" " 12	.. M.	7 4 44	..	..	175	..	

TABLE V—*contd.*

Date.			Phase.	Time. G. M. T.	Period (Sec.).	Amplitude (μ).			Remarks.
						AN.	AE.	AZ.	
1920	October	18	..	P.	M. m. s. 8 22 30	..	..	..	
"	"	18	..	M.	8 31 27	..	60	..	
"	"	20	..	P.	10 12 24	..	..	..	
"	"	20	..	M.	10 31 47	..	30	..	
"	"	28	..	P.	13 59 43	..	..	..	
"	"	28	..	M.	14 7 25	..	35	..	
"	December	10	..	P.	5 36 59	..	..	..	
"	"	10	..	M.	....	..	..	..	Maximum cannot be exactly determined as the movements are very small.
"	"	16	..	P.	12 12 29	..	..	..	
"	"	16	..	M.	....	..	..	..	Maximum cannot be determined as the trace had gone out of the field.
"	"	25	..	P.	11 39 43	..	..	..	
"	"	25	..	M.	11 54 0	..	305	..	