

*Dominion Observatory, Ottawa*



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METEOROLOGICAL DEPARTMENT

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*Director General of Observatories*

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Till the end of 1937, the seismic data from the observatories of India Meteorological Department were being published annually as part D of the Annual Summary of the India Weather Review. Since 1938, the data are being published in the present series of the Quarterly Seismological Bulletin. With the kind co-operation of the Surveyor-General of India, the Director of the Nizamiah Observatory, Hyderabad and of the Superintendent, Colombo Observatory, it has been possible to incorporate in the bulletin the data of their respective observatories, viz ; Dehra Dun, Hyderabad and Colombo. The instrumental seismological data are collected and edited at the Colaba Observatory, Bombay and the non-instrumental voluntary observations at the Meteorological Office, Poona.

**TABLE 1.**  
*List of Seismograph Stations.*

Station.	Latitude.	Longitude.	Height above M. S. L.	Lithologic foundation.	Officer-in-charge of Observatory.
Agra . . . . .	27°38' N.	78°01' E.	163 meters . . . .	Indo-Gangetic Alluvium	Superintending Meteorologist.
Bombay . . . . .	18°54' N.	72°49' E.	6 meters . . . . .	Deccan Trap . . . .	Director.
Calcutta . . . . .	22°32' N.	88°20' E.	(1) 7 meters . . . . (2) 6 meters.	Alluvium . . . . .	Meteorologist.
Colombo . . . . .	6°54' N.	79°52' E.	7 meters . . . . .	Beach-Sand resting on gneiss probably decomposed.	Superintendent.
Dehra Dun . . . . .	30°19' N.	78°03' E.	682 meters . . . . .	Gravel . . . . .	Director, Branch, Geodetic Survey of India.
Hyderabad . . . . .	17°26' N.	78°27' E.	528 meters . . . . .	Granite . . . . .	Director, Nizamiah Observatory.
Kodalkannal . . . . .	10°14' N.	77°28' E.	2343 meters . . . . .	Rock . . . . .	Director.

(1) Milne-Shaw, (2) Omori-Ewing.

**TABLE 2.**  
*The instruments and their constants.*

Station.	Component.	Type of Instrument.	Mass.	Period.	Static magnification.	Damping ratio.	Remarks.
Agra . . . . .	N	Omori-Ewing . . . . .	kg.	secs.	29	1	
	E	Milne-Shaw . . . . .	45	31			
Bombay . . . . .	N	Milne-Shaw . . . . .	0.47	12	250	20 : 1	
	E	Milne-Shaw . . . . .	0.45	12			
Calcutta . . . . .	N	Milne-Shaw . . . . .	0.45	12	250	20 : 1	
	N	Omori-Ewing . . . . .	50	28			
	E	Omori-Ewing . . . . .	50	28			
Colombo . . . . .	E	Milne-Shaw . . . . .	0.45	12	250	20 : 1 18 : 1 22 : 1	For July- For Aug. For Sept.
Dehra Dun . . . . .	N	Omori . . . . .	50	30	12	..	
Hyderabad . . . . .	N	Milne-Shaw . . . . .	0.45	12	250	20 : 1	
	E	Milne-Shaw . . . . .	0.45	12			
Kodalkannal . . . . .	E	Milne-Shaw . . . . .	0.45	10	250	20 : 1	



UPPER AIR OBSERVATORY, AGRA.

Table header for page 52: Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks.

July, 1940.

July 1940 data: July 30 observations with phases like eP, PP, PPP, eS, S and various time/amp values.

August, 1940.

August 1940 data: Multiple entries from Aug 1 to Aug 18 with various phases and remarks such as 'Slight. Depth of focus of the order of 175 km?' and 'Very great.'

UPPER AIR OBSERVATORY, AGRA.

Table header for page 53: Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks.

August, 1940.

August 1940 data: Aug 18 and Aug 22 observations with phases like e, Mn, F, e(P?), e(S?), P, PP, S, IS, i, SS, SSS.

September, 1940.

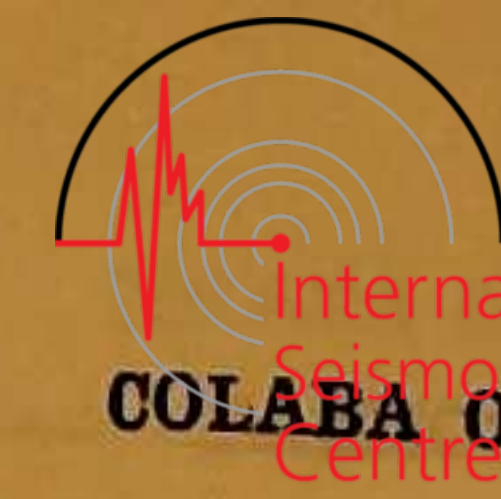
September 1940 data: Sep 1, 3, 7, 12, 19, 20, 21 observations with various phases and remarks like 'Mixed up with the following shock' and 'Felt throughout Afghanistan'.

UPPER AIR OBSERVATORY, AGRA.

Table with columns: Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks. Includes data for September 1940 with various seismic observations and remarks like 'Slight. Direction of first motion W.' and 'Moderate. Depth of focus about 600 km.'

UPPER AIR OBSERVATORY, AGRA.

G. CHATTERJEE, Superintending Meteorologist.



COLABA OBSERVATORY, BOMBAY.

Table with columns: Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks. Includes data for July and August 1940 with various seismic observations and remarks like 'Moderate. Depth of focus about 350-400 km.' and 'Slight. Large waves'.

August, 1940.

Slight. Epc. In Anatolia. 300 killed and several hundred injured and 12 villages destroyed in Central Anatolia. Felt in many places in Anatolia and also in Istanbul. (Reuter).

COLABA OBSERVATORY, BOMBAY.

Table with columns: Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks. Includes sub-header 'August, 1940.' and detailed seismic data for various dates in August.

COLABA OBSERVATORY, BOMBAY.

International Seismological Centre

Table with columns: Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks. Includes sub-header 'September 1940.' and detailed seismic data for various dates in September.

COLABA OBSERVATORY, BOMBAY.

Table with columns: Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks. Includes data for September 1940 with various seismic event records and magnitudes.

COLABA OBSERVATORY, BOMBAY.

S. R. SAVUR, Director.



ALIPHRE OBSERVATORY, CALCUTTA.

Table with columns: Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks. Includes data for July and August 1940 with various seismic event records and magnitudes.

ALIPORE OBSERVATORY, CALCUTTA.

Date.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.	Date.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.
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August, 1940.

1940.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.	1940.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.
Aug. 5	N	I e eL F	10 11 56 13 4 14 59	...	...	...		Aug. 18	E*	IP* IS IS* IS̄ F	10 9 34 10 30 10 52 11 7 32	...	...	...	Slight. *From Omori-Ewing E-W component as Milne-Shaw trace had a bad congestion of lines.
" 5	N	e I I IL F	21 38 9 41 14 43 0 46 14 22 12	...	...	...	Slight.	" 20	N	e F	17 49 22 19 5	...	...	...	Tremor.
" 8	N	IP IS ISS F	14 52 30 55 48 56 4 15 14	...	...	2,030	Slight. First movement-South.	" 22	N	IP IPP IS IScS IPS eSS eL M Mn F	3 39 33 42 39 49 53 50 10 50 35 55 33 4 7 59 15 21 20 56 17 01	...	...	9,180	Moderate. First movement—South.
" 11	N	e I F	5 27 11 40 19	...	...	...	Tremor.	" 29	E*	eP IS IL M Mn F	08 00 10 08 40 09 40 10 43 11 53 43	...	...	1,510	Moderate. *From Omori-Ewing E-W component as the Milne-Shaw trace was badly congested.
" 13	N	IP ePP IS eSS eL M Mn F	16 44 23 45 54 50 28 53 0 56 40 16 0 59 4 54 14 226 17 43	...	...	4,350	Moderate. First movement—North.	" 30	N	I Mn F	12 40 14 47 14 13 04	...	...	...	Slight.
" 15	N	e Mn F	21 39 59 41 6 22 13	...	...	...	Slight.	" 30	N	IP ePeP IS eSS eL M F	15 07 27 11 16 11 38 12 21 14 35 16 40	...	...	2,050	Slight. First movement—North.
" 16	N	e Mn F	16 18 55 31 48	...	...	...	Slight, distant.	" 31	N	e Mn F	00 42 44 47 14 01 09	...	...	...	Slight, distant.
" 18	N	e I Mn F	16 15 33 22 13 23 33	...	...	...	Slight, distant.					...	...	...	

September, 1940.

1940.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.	1940.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.
Sep. 1	N	e I F	18 50 55 55 22 19 30	...	...	2,880	Slight.	Sep. 3	N	eP IS IS* IS̄ F	10 59 40 20 01 11 01 41 02 01 18	...	...	880	Slight.
" 3	N	IP IS IS* eS̄ F	14 42 35 44 06 44 36 44 56 15 08	...	...	880	Moderate. First movement—North.	" 4	N*	IP IS IL M	19 14 34 17 05 17 49 18 55	...	...	1,520	Moderate. First movement—North. *From Omori-Ewing N-S component. Milne-Shaw records lost due to mirror being off the scale.



ALIPORE OBSERVATORY, CALCUTTA.

Date.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.	Date.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.
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September, 1940.

1940.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.	1940.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.
1940. Sep.	N*	Mn F	19 19 37 45	...	...	...		1940. Sep.	N	IP ePP IS eSS IPeP IScS Mn F	03 42 00 42 08 45 05 45 18 46 51 54 09 59 32 10 16	...	...	1,890	Slight. First movement—North.
" 7	N	eP Mn F	10 31 16 49 41	...	...	...	Slight, distant.	" 22-23	N	IP IPP IS ISS F	22 58 16 23 00 03 03 16 06 20 01 05	...	...	4,040	Moderate. First Movement—North. Focal depth about 700 km.
" 10	N	e F	14 50 23	...	...	...	Tremor.	" 23	N	I Mn F	10 41 50 50 12	...	...	...	Slight, distant.
" 12	N	I Mn F	00 29 03 38 25 01 15	...	...	...	Slight, distant.	" 25	N	eP IS IScS F	19 38 11 43 33 48 36 20 32	...	...	3,830	Slight.
" 12	N	IP IPP IS ePS eScS ISS F	13 28 27 30 45 37 15 37 27 38 24 41 23	...	...	7,330	Moderate. First movement—North.	" 26	N	IP e F	04 08 59 10 04 11 49	...	...	(8,750)	Slight. First movement—North.
" 18	N	e F	11 59 36 12 4	...	...	...	Tremor.	" 26	N	IP e IS IPs IScS eSS F	05 27 20 47 00 47 22 10 01	...	...	...	Tremor.
" 18	N	I F	21 49 52 22 5	...	...	...	Tremor.	" 26	N	I F	05 27 20 47	...	...	...	Tremor.
" 19	N	I F	16 44 31 54	...	...	...	Tremor.	" 27	N	e I F	08 46 01 49 45 09 36	...	...	...	Slight, distant.
" 19	N	IP IS F	18 33 07 43 58 21 18	...	...	9,890	Slight. First movement—North.	" 28	N	eP? IS ISS M Mn F	08 18 35 21 35 23 32 26 26 11 20 09 08	...	...	(1,530)	Slight.
" 20	N	e IS M F	00 11 01 18 42 32 59	...	...	...	Slight.					...	...	...	
" 21	N	IP ePP IS ISS M Mn F	13 53 24 53 35 56 58 57 17 59 58 14 03 08 8 59 57	...	...	2,190	Moderate. First movement—North.					...	...	...	

METEOROLOGICAL OFFICE, ALIPORE, CALCUTTA.

S. K. PRAMANIK, Meteorologist.



COLOMBO OBSERVATORY, CEYLON.

Date.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.	Date.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.
July, 1940.															
1940.								1940.							
July 5-6	E		h. m. s.	sec. mm.	Km.			July 17	E	e	6 53 30	...	...	...	Slight.
		Record lost from to	21 53 ...	...	...					F	7 01 ...	...	...	...	
			00 50 ...	...	...						12 01 30	...	...	...	Slight.
" 10	E	P	5 58 54	...	...		End merged into microseisms.	" 17	E	e	00 30	...	...	...	
		S	6 05 54	...	...					F	15 46 12	...	...	...	
		F	40 30	...	...			" 21	E	P	52 26	...	...	...	
" 13	E	e	18 00 30	...	...		Slight.			S	16 03 34	...	...	...	
		F	42 30	...	...					M	04 25	...	0.6	...	
" 14	E	P	6 05 40	...	...		S waves commence with comparatively big amplitude.	" 27	E	e	13 53	...	...	...	Slight.
		S	16 33	...	...					F	15 36	...	...	...	
		L	31 25	...	...			" 30	E	e	00 38 30	...	...	...	Slight.
		M	48 09	...	1.1					F	58 30	...	...	...	
		F	7 45 30	...	...							...	...	...	

August, 1940.

Aug. 1	E	P	15 18 58	...	...		S and L(?) waves commence with comparatively big amplitude. M uncertain. F merged into microseisms.	Aug. 16	E	e	16 30	...	...	...	Slight.
		S	27 33	...	...					F	17 03	...	...	...	
		L?	40 02	...	...			" 20	E	e	17 50 30	...	...	...	Slight.
		F	18 03 30	...	...					F	18 46	...	...	...	
" 1	E	e	20 00	...	...		Slight.	" 22	E	P	03 41 08	...	...	...	
		F	08	...	...					PP	45 06	...	...	...	
" 11	E	e	17 43 30	...	...		Slight.			S	51 51	...	...	...	
		F	18 10 30	...	...					SS	59 21	...	...	...	
" 12	E	e	15 47	...	...		Slight.			L	04 13 21	...	...	...	
		F	16 13 30	...	...					M	28 22	...	2.0	...	
" 13	E	e	05 29	...	...		Slight.	" 22	E	e	23 34 30	...	...	...	Slight.
		F	06 01	...	...					F	56	...	...	...	
" 13	E	P	15 40 28	...	...			" 29	E	e	08 11 30	...	...	...	Slight.
		S	54 20	...	...					F	40	...	...	...	
		L	16 12 47	...	...			" 30	E	e	15 19 30	...	...	...	Slight.
		M	15 50	...	2.3					F	31	...	...	...	
		F	17 37 30	...	...							...	...	...	

September, 1940.

Sep. 1	E	e	18 57	...	...		Slight.	Sep. 7	E	P	19 32 01	...	...	...	M very small and not pronounced, wave of longest period taken.
		F	10 14 30	...	...					S	28 56	...	...	...	
" 3	E	eP	14 46 21	...	...		L, M cannot be picked out. Amplitude small.			L	52 50	...	...	...	
		S?	50 48	...	...					M	57 42	...	< 0.5	...	
		F	15 43 30	...	...			" 12	E	P	20 14	...	...	...	
" 3	E	e	20 03 30	...	...		Slight.			S	13 28 38	...	...	...	M not pronounced, wave of longest period taken.
		F	35	...	...					L	38 18	...	...	...	
" 4	E	e	19 23 30	...	...		Slight.			M	47 28	...	...	...	
		F	56 30	...	...					F	58 11	...	< 0.5	...	
				...	...						14 36	...	...	...	

COLOMBO OBSERVATORY, CEYLON.

Seismological Centre

Date.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.	Date.	Compt.	Phase.	G. M. T.	Per.	Amp.	Δ	Remarks.
September, 1940.															
Sep. 19	E	P	18 33 05	...	...	...	S, L, M cannot be picked out.	Sep. 22-23	E	IP	22 59 05	...	...	...	S commences sharply with waves of big amplitude. Wave of longest period taken as M.
		F	20 09	...	...	...				IS	23 04 48	...	...	...	
" 21	E	P	13 56 05	...	...	...	Time of (S?) uncertain by several seconds due to a time mark gap.	" 26	E	P	18 55	...	...	...	L, M cannot be picked out. Amplitude very small.
		S?	14 01 12	...	...	...				S?	00 17 30	...	< 0.5	...	
		F	10	...	...	...		" 30	E	e	04 09 12	...	...	...	Slight.
" 22	E	P	03 41 35	...	...	...				S?	19 47	...	...	...	
		M	04 08 35	...	...	< 0.5				F	05 02 30	...	...	...	
		F	25	...	...	...				e	11 36 30	...	...	...	
				...	...	...				F	12 31 30	...	...	...	

COLOMBO OBSERVATORY  
CEYLON.

D. T. E. DASSANAYAKE,  
Superintendent.

HAIG OBSERVATORY, SURVEY OF INDIA, DEHRA DUN.

Table header for page 64 with columns: Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks, Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks.

July, 1940.

Main data table for July 1940, split into two columns. Left column: July 10, 14; Right column: July 17, 30. Includes phases like eP, eS, M1, F and various time/amplitude readings.

August, 1940.

Main data table for August 1940, split into two columns. Left column: Aug. 1, 2, 3-5, 8, 12; Right column: Aug. 13, 22, 29, 30. Includes phases like eP, eS, M1, F and various time/amplitude readings. Includes notes like 'Felt in Hokkaido-North Japan' and 'Felt at Darjeeling'.

HAIG OBSERVATORY, SURVEY OF INDIA, DEHRA DUN.

Table header for page 65 with columns: Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks, Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks.

September, 1940.

Main data table for September 1940, split into two columns. Left column: Sep. 1, 3; Right column: Sep. 3, 4, 21, 22. Includes phases like eP, eS, M1, F and various time/amplitude readings. Includes note: 'Felt at Peshawar, Lahore and other places. (Two periods superposed).'

DEHRA DUN.

E. A. GLENNIE, Lt.-Col., D. S. O., R. E., Director, Geodetic Branch, Survey of India.



KODAIKANAL OBSERVATORY, KODAIKANAL.

Table header for page 68: Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks, Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks.

July, 1940.

Main data table for July 1940. Includes entries for July 2, 10, 14, and 17. Columns include Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks, Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks.

August, 1940.

Main data table for August 1940. Includes entries for Aug. 1, 13, 15, 22, 29, and 30. Columns include Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks, Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks.

Table header for page 69: Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks, Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks.

September, 1940.

Main data table for September 1940. Includes entries for Sep. 1, 3, 7, 12, 19, 21, 22-23, 25, 26, 30. Columns include Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks, Date, Compt., Phase, G. M. T., Per., Amp., Δ, Remarks.

SOLAR PHYSICS OBSERVATORY, KODAIKANAL.

A. L. NARAYAN, Director.

The following table contains a list of earthquakes that are reported by voluntary observers from various stations.

Place at which felt.	Date.	G. M. T. of earthquake.	Duration.	Intensity (Rossi-Forel scale.)	Number of shocks.	Remarks.	Place at which felt.	Date.	G. M. T. of earthquake.	Duration.	Intensity (Rossi-Forel scale.)	Number of shocks.	Remarks.
	1940.	h. m.	Secs.					1940.	h. m.	Secs.			
Drosh . . . . .	July 18	15 28	3	4	1		Dhubri . . . . .	Sep. 1	17 35	7	6	2	
Drosh . . . . .	" 19	05 29	2	4	1		Bunder Abbas . . . . .	" 12	11 35	2	...	1	
Drosh . . . . .	" 30	04 00	1	4	1		Chakdara . . . . .	" 18	18 45 21 00	20 2	4	4 1	
Dhubri . . . . .	Aug. 2	03 03	25	6	2		Parachinar . . . . .	" 21	13 52	2	4	1	
Gauhati . . . . .	" 2	03 05	15	5	1		Gulmarg . . . . .	" 21	13 45	10	8	3	
Darjeeling (St. Paul's School).	" 2	03 06	20	6	3		Peshawar . . . . .	" 21	13 46	15-20	6	3	
Mukteswar . . . . .	" 2	10 00	4	4	1		Rawalpindi . . . . .	" 21	13 50	50	5	3	
Gulmarg . . . . .	" 3	01 59	3	7	1		Chakdara . . . . .	" 21	13 52	10	6	1	
Gulmarg . . . . .	" 3	09 15	6	8	2		Kabul . . . . .	" 21	13 53	15	5	2	
Drosh . . . . .	" 8	14 37	5	5	2		Srinagar . . . . .	" 21	13 53	60	8	5	
Rawalpindi . . . . .	" 8	14 45	30	3	3		Drosh . . . . .	" 21	14 00	4	5	2	
Gilsit . . . . .	" 8	14 41	90	6	1		New Delhi . . . . .	" 25	05 21	...	3	2	
Gulmarg . . . . .	" 8	14 48	9	8	3		Sbillong . . . . .	" 20	21 06	1	4	1	

J. M. SIL,  
Meteorologist, Poora.



International  
Seismological  
Centre