M.O. 370
(Richmond)

Air Ministry

METEOROLOGICAL OFFICE

THE OBSERVATORIES' YEAR BOOK 1933

Comprising the meteorological and geophysical results obtained from autographic records and eye observations at the observatories at Lerwick, Aberdeen, Eskdalemuir, Cahirciveen (Valentia Observatory), and Richmond (Kew Observatory), and the results of soundings of the upper atmosphere by means of registering balloons.

RICHMOND (KEW OBSERVATORY)

Published by the authority of the
METEOROLOGICAL COMMITTEE

LONDON
HIS MAJESTY'S STATIONERY OFFICE
1935

RICHMOND (KEW OBSERVATORY).

Latitude	51° 28 N.
Longitude	0° 19 W.
G.M.T. of Local Mean Noon	12h 1m.

"Heights in Metres above Sea Level".

Barometer	10·4
Raingauge Site	5·5
Dines Tube Anemograph	28

"Heights in Metres above Ground"

Thermometer Bulbs	3·0
Sunshine Recorder	13·3
Dines Tube Anemograph	23
Beckley Raingauge Rim	0·53

INTRODUCTION.

The Observatory was built in 1769 as the private observatory of King George III. Since 1842 it has been devoted to physics and meteorology. The meteorological records are continuous from 1854. The Observatory is in the Old Deer Park, Richmond (Surrey), about 10 miles (16 km.) to the west of the City of London. The Observatory stands on a low artificial mound whose level is about 1½ metres higher than that of the surrounding park. Round the Observatory a golf course has been laid out. The river Thames is distant about 300 metres on the north and west. Kew Gardens, which are extensively wooded, lie to the east-north-east, the nearest point of the Gardens being about 600 metres away. The town of Richmond, to the south-east, is about 1,100 metres distant. On the east side of the Park is the main road from Richmond to Kew; on the south side the railway from Richmond to Twickenham. An open area partly wooded, Syon Park, lies to the north-north-east across the river. Richmond Park is about 1½ miles (2½ km.) to the south-east. General views of the Observatory building and the exposure lawn are to be found in the 1928 volume. The photographs were taken in 1925, but the only changes (before the end of 1933) which need be noted are the substitution of other experimental screens for the small marine screens which were being tested in 1925, the removal in 1929 of the hedge near the North Wall Screen and the igation carried out for the Atmospheric Pollution Committee by Mr.J.G.Clark.† When the normal volume of air, 2 litres, is aspirated (it is drawn through a hole 3·2 mm. in diameter) shade number 1 answers to 0·32 milligrams per cubic metre. The Owens apparatus was designed in the first place for dealing with the air of cities, and the amount of pollution at the Observatory is usually so small that the shade recorded when the 2 litres are aspirated is either 0 or 1.

Preliminary experiments with a spare recorder having justified the assumption that increasing the volume of air would increase the shade number in proportion, an auxiliary tank was brought into use at the beginning of July, 1928. With this tank in operation each spot on the filter paper corresponds with 6·4 litre of air. The unit shade is therefore equivalent to 0·1mg/m^3. When fog prevails the auxiliary tank is put out of action and the unit shade reverts to the value 0·32 mg/m^3.

Special attention is now paid to the maintenance of consistency in the standard of shades. Each new scale of shades is compared directly with the standard preserved by Dr. Owens. New scales of shades were taken into use on the following dates:-

June 7, 1925; July 1, 1926; (retrospectively) January 1, 1928; August 1, 1930; January 1, 1931; June 1, 1931; and March 1, 1933.

During 1933 the highest estimate of pollution was 3·2 mg/m^3, this value occurring on December 18th from 21h to 23h. There were 52 days on which the pollution reached 1·0 mg/m^3; the number of hours credited with 1·0 mg/m^3. or more being 261. The months in which these days and hours occurred are given in the accompanying table.

	days	hours
Jan.	11	37
Feb.	3	7
Mar.	5	13
Sept.	1	7
Oct.	7	43
Nov.	12	70
Dec.	13	84
Year	52	261

Table 544 gives for each month mean hourly values derived from all the days for which complete records were obtained. There were 351 such days in the year. The highest and lowest of these hourly values are in heavy type.

Table 545 gives diurnal inequalities derived from the data in Table 544 after the application of non-cyclic corrections. The principal reason for computing the diurnal inequalities was to facilitate comparisons with the corresponding diurnal variations in barometric pressure and in the potential gradient of atmospheric electricity.

The mean values computed for recent years are given in the following table, together with the means for successive pairs of months. The unit is 1 mg/m^3.

---

†"Report of the Advisory Committee for Atmospheric Pollution," 3rd Report, 1916-1917, p. 20.

	1926	1927	1928	1929	1930	1931	1932	1933
Jan.-Feb. ..	·29	·25	·22	·40	·18	·24	·32	·25
Mar.-Apr. ..	·30	·10	·18	·27	·13	·15	·26	·17
May-June ..	·08	·07	·09	·05	·05	·06	·09	·10
July-Aug. ..	·07	·05	·05	·06	·07	·07	·05	·08
Sept.-Oct. ..	·19	·17	·15	·10	·13	·25	·15	·21
Nov.-Dec. ..	·26	·21	·25	·21	·29	·33	·29	·43
Year	·20	·14	·15	·18	·14	·18	·19	·21

The nature of the diurnal variation is most easily recognised in Table 545. There is always a well defined minimum during the night and another in the early afternoon. The first maximum of the day usually occurrs about 9h and the second one follows about 12 hours later. This double oscillation is apparently due to two causes, the variation in human activity in producing pollution and the variation in the wind which disperses it. In 1933 the principal maximum was in the evening from January to May and from October to December; in the forenoon in the remaining months. The principal minimum occurred in the afternoon from March to September; in the early morning in the remaining months. Curves illustrating the diurnal variation of atmospheric pollution will be found in the Annual Reports of the Advisory Committee on Atmospheric Pollution and in a paper‡ by Dr. Whipple on the relation between Atmospheric Pollution and Potential Gradient.

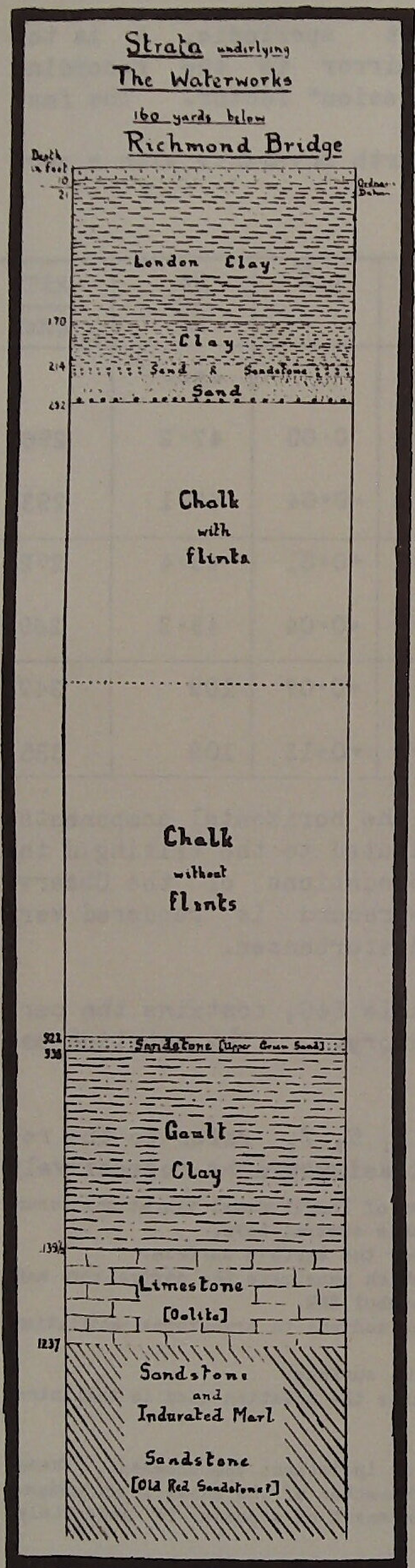
SEISMOLOGY

Notes on Instruments.- The seismographs, three Galitzin pendulums with galvanometric registration, were transferred from Eskdalemuir Observatory during the latter part of 1925 and have been in regular operation since the beginning of 1926. Earth movements in the north, east and vertical directions are recorded. The pendulums, which are in the old magnetograph room, are mounted on a massive concrete pillar, separated from the floor. The galvanometers and recording apparatus are accommodated on slate slabs in the old seismograph room, which housed the Milne instrument until it was put out of action on June 17th, 1925. To eliminate temperature variation as far as possible, the windows of the pendulum room are provided with triple glass and also shielded by louvred screens from direct sunshine which might fall on them morning and evening. The annual range of temperature variation is about 10°C. and the mean daily range about 0·2°C. To diminish the sensitivity of the vertical pendulum to temperature changes the steel controlling spring was replaced in May, 1928, by one made of elinvar, an alloy which has a temperature coefficient of elasticity about one-tenth that of steel*. A detailed report on the behaviour of the spring has been published in a paper† by F.J. Scrase. The difficulties usually associated with the operation of the vertical pendulum have been greatly diminished.

‡ "London, Roy. Met. Soc., Q.J.," Vol. 55 (1929) No. 231.

* Y. Dammann. "Contribution à l'étude des propriétés elastiques de l'élinvar. Son utilisation dans les séismographes, "Publ. Bur. Cent. Seis. Int., Strasbourg," Ser. A, Fasc. No. 5, 1927, pp. 122-129.

† "London, Inst. Physics, J. Sci. Instr., " 6, 1929, p.385



A Strahan
Prof Paper No 10, Survey of India

The concrete pillar rests on gravel. The underlying geological strata are shown in the diagram on this page. The diagram is based on the results obtained*in sinking a well near Richmond Bridge. The Richmond boring terminated at a depth of 440 metres in Old Red Sandstone. At Stonebridge Park, 8 km. to the north, a boring was carried down† to a depth of 600 metres, the last 280 metres being in Old Red Sandstone. There is no information as to deeper strata near Richmond. It may be noted, however, that the sandstone beds dip at about 30° and that a boring at Little Missenden, Bucks, entered Silurian rocks at a depth of 370 metres with no evidence of the presence of Old Red Sandstone.

For detailed description of the Galitzin seismograph and for particulars of interpretation of the records, reference may be made to Fürst B Galitzin's "Vorlesungen über Seismometric (Leipzig, 1914), or to G.W. Walker's "Modern Seismology" (London, 1913).††

Timing is controlled by a half-seconds clock (Morrison 8587) which is rated daily by comparison with the Greenwich wireless time-signal relayed from Daventry. Time breaks are made electro-magnetically every minute and seismometric readings can be determined to the nearest second.

The free periods of the Galvanometers (T_1), were determined in November, 1925,and were found to have suffered very little change since the original determinations at Eskdalemuir were made. The lengths of the simple equivalent pendulums(l) are assumed to have remained unaltered.

The values of the other constants which are used for deriving the scale values were re-determined in October, 1933. In the case of the horizontal instruments it was found that tha magnifications agreed closely with those obtained from the previous tests in September, 1932. The pendulums were adjusted on January, 30th, May 30th and December 6th, to counter slight tilting of the pillar.

In the following table are summarised the values of the constants. T is the free period of the pendulum, μ is a damping coefficient which van-

* "London. J. Geol. Soc.", 40, 1884, 41, 1885, p. 523.
† Records of London Wells, "Mem. Geol. Surv. Eng., London", 1913.
†† The graphical method adopted at Kew for determining the constants of the pendulums is explained in a memoir br F.J. Scrase, "Geophysical Memoirs" No. 49, 1930.

ishes when the free movement of the pendulum is just aperiodic, A is the length of the beam of light from the galvanometer mirror to the recording drum (usually about 1100 mm), and k is the "transmission" factor. The factor $\frac{kAT}{4\pi l}$ determines the magnification for regular earth movements with a period equal to that of the pendulum.

Component	l	T_1	1933	T	μ^2	$\frac{kA}{\pi l}$	$\frac{kAT}{4\pi l}$
	mm.	sec.		sec.		$sec.^{-1}$	
N	118	24·68	Jan. 1 to Oct. 3	25·1	0·00	47·2	296
			Oct. 3 to Dec. 31	24·9	-0·04	47·1	293
E	118	24·80	Jan. 1 to Oct. 3	25·1	+0·01	43·4	272
			Oct. 3 to Dec. 31	24·8	-0·04	43·3	269
Z	360	13·04	Jan. 1 to Oct. 4	12·8	+0·07	109	349
			Oct. 4 to Dec. 31	12·3	+0·13	109	335

In windy weather the seismographs, especially the horizontal components, are affected by slow oscillations, which are attributed to the tilting of the ground, the movement being conveyed through the foundations of the Observatory. On occasions the reading of an earthquake record is rendered very difficult, if not impossible, by these irregular disturbances.

Notes on Tables.-The "Seismological Diary", Table 546, contains the particulars of the earthquake recorded at the Observatory. The notation employed is as follows*:-

In the second column of the diary the entries N, E, Z, refer to the records from the north-south, east-west and vertical seismographs respectively.

P is the normal first phase (longitudinal waves). Other types of longitudinal vibrations occur when the waves are reflected from (PcP) or penetrate (PKP) the earth's central core.

PP, PPP... are longitudinal waves reflected once, twice ... near the earth's surface.

S is the normal second phase (transverse waves). The waves which penetrate the central core and pass through it as longitudinal vibrations are designated by the symbol SKS.

PS and PPS are waves which suffer a change or changes from longitudinal to transverse oscillation or vice versa, on reflection near the surface.

SS, SSS...are transverse waves reflected once, twice... near the surface

For the supplementary reflected waves from deep focus earthquakes the notation used is that introduced by F.J. Scrase, London. Proc. Roy. Soc., A. 132 (1931).

L indicates long waves (surface waves).

i is the sudden commencement of a phase. e means a gradual or indistinct commencement. These letters are used as prefixes to the phase symbols, but where the character of the phase is not assignable the letters are used as independent symbols. When the commencement of a phase is moderately clear the prefixes are not used.

---

*The notation was amended from the beginning of 1933, the most important change being the adoption of a special letter, K, for the compressional waves through the core. This symbol has been taken from the Georgetown bulletins, and is now being introduced in the International Seismological Summary, 1930. Previously a pulse which started and finished as a transverse wave but passed through the core as a compressional wave was denoted by ScPcS. In the new notation such a pulse is denoted by SKS.

All times entered against the above phases are the times of arrival of the phases at the station. The phases denoted by M are successive prominent maxima occurring during the principal or surface phase.

The period is the duration of a double oscillation (to and fro movement).

The entries under A are the amplitudes, in microns (=0·001 mm.), of the components of the true displacement of the ground from the position of rest. Displacements to the north, east and upwards are regarded as being positive, When successive positive and negative displacements have the same magnitude the time of occurrence is given for the positive one.

The following formulae, due to Galitzin, are employed for computing the times of the maxima and the amplitudes of sinusoidal waves:-

(1) Lag of the displacement shown by the galvanometer after the maximum displacement of the ground

$$= \frac{T_p}{2\pi}\left[\left(\frac{\pi}{2} + \text{Arctan}\ \frac{2u_1}{u_1^2-1}\right) + \text{Arctan}\ \frac{2u(1-\mu^2)^{\frac{1}{2}}}{u^2-1}\right]$$

each inverse tangent being taken as between 0 and π

(2) Magnification of record=

$$u = \frac{kA\ T_p}{\pi \ell} \qquad \frac{1}{(1+u^2)(1+u_1^2)\ \{1-\mu f(u)\}^{\frac{1}{2}}}$$

in these formulae T_p is the period of the earth wave considered, T, T_1, and μ are as defined on p.363

$$u = \frac{T_p}{T},\ u_1 = \frac{T_p}{T_1}\ \text{and}\ f(u) = \left[\frac{2u}{1+u^2}\right]^2$$

Δ is the distance in kilometres of the epicentre measured along the arc of a great circle. For earthquakes located within 10,000 km. of Kew the distance is generally derived from the interval between P. and S. by the tables, due to Zeissig, given in Klotz's "Seismological Tables" (Publication of the Dominion Observatory, Ottowa, Vol. III, No. 2). For greater distances other phases are considered and Δ is obtained from the travel curves given by Gutenberg.* The azimuth of the epicentre (0° to 360°) is measured from north through east. When an estimation of the azimuth is possible, it is used, together with Δ, for provisional determination of the of the co-ordinates of the epicentre. The co-ordinates given in the Diary have generally been received at a later date; the authorities for these determinations are inserted in brackets. Here the letters J.S.A. signify the Jesuit Seismological Association of America, U.S.C.G.S., the United States Coast and Geodetic Survey., and U.R.S.S. the bulletins issued by the United Soviet States.

Brackets enclosing figures of phase symbols indicate that the information is uncertain.

The total number of shocks recorded during the year was 263. The phases being sufficiently well defined, estimates of the epicentral distances were obtained for 71 shocks, whilst in 8 cases the records of the initial impulses were sufficiently sharp to allow of computations of azimuth and so of estimates of the co-ordinates of the epicentres. There were 8 earthquakes which produced a disturbance at the observatory with an amplitude exceeding 0·1mm. in a horizontal component. These earthquakes originated, in the Pacific Ocean off Northern Chili (February 23rd), in Japan (March 2nd and June 18th) in Alaska (April 27th), in Sumatra (June 24th), in China (August 25th) in the S. Atlantic, Sandwich Group (August 28th), and in Baffin Bay (November 20th).

For comparison the statistics for all the years in which the Galitzin seismographs have been in operation at Kew Observatory are given:-

YEAR	Shocks recorded.	Epicentral distances.	Azimuths estimated.	Shock exceeding 0·1 mm.
1926	306	55	-	10
1927	314	76	6	9
1928	339	97	19	18
1929	320	74	6	12
1930	301	56	6	8
1931	274	53	11	16
1932	246	57	8	8
1933	263	71	8	8

* Handbuch der Geophysik, Berlin, 1929, p. 212.

"Microseisms".-In Table 547 are given the amplitude (A) and period (T_p) of the microseisms shown by the north component seismograph on each day at 0h, 6h, 12h, and 18h. On a few occasions (less than 2 per cent, of the total number) when the north component record was not available measurements of the east component record have been included. The group of waves of greatest amplitude occurring in the 30 minutes centring at the hour in question is selected, and the amplitude tabulated in the mean obtained from the three largest complete waves in that group. The period is derived from a measurement made on the same group*. The total time, to the nearest second, for a number of complete consecutive waves is measured, the number of waves being chosen so that the time is between 23 and 30 seconds. The period is then derived from the following division table:-

Number of Waves	Time interval in seconds.							
	30	29	28	27	26	25	24	23
3	10·0	9·7	9·3	9·0	8·7	8·3	8·0	7·7
4	7·5	7·3	7·0	6·7	6·5	6·3		
5	6·0	5·8	5·6	5·4	5·2			
6	5·0	4·8	4·7	4·5				
7	4·3	4·1	4·0	3·9				
8	3·7	3·6	3·5					
9	3·3	3·2	3·1					
10	3·0	2·9	2·8					
11	2·7	2·6						
12	2·5							

In computing the mean period occasions of zero amplitude are omitted. The mean values of amplitude and period of each month of 1933 and for the year, together with the corresponding mean values for the period 1926 to 1932, are given below:-

MICROSEISMS-MONTHLY AND ANNUAL MEANS

1926 to 1932	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Amplitude (μ)	2·3	1·6	1·4	0·9	0·5	0·5	0·4	0·5	0·7	1·1	1·8	2·1	1·1
Period (sec.)	6·5	6·2	5·8	5·5	4·8	4·6	4·4	4·6	5·0	5·4	6·0	6·4	5·4
1933													
Amplitude (μ)	2·1	1·7	1·2	0·7	0·4	0·1	0·1	0·2	0·2	0·8	0·7	1·4	0·8
Period (sec.)	6·7	5·7	5·7	5·3	5·3	5·2	4·9	4·5	4·8	5·1	5·8	6·4	5·5

The means for the several hours are as follows:-

MICROSEISMS-MEANS AT SPECIFIED HOURS.

1926 to 1932	0h.	6h.	12h.	18h.
Amplitude (μ)	1·16	1·16	1·12	1·15
Period (sec.)	5·43	5·44	5·40	5·43
1933				
Amplitude (μ)	0·84	0·79	0·79	0·79
Period (sec.)	5·46	5·46	5·42	5·46

These figures indicate that there is no regular diurnal variation in amplitude or period of the microseisms recorded at Kew Observatory.†

* F.J.W. Whipple and F.J. Scrase, "On the Frequency of Microseisms of Different Periods at Eskdalemuir and at Kew," "London, Mon. Not. R. Astr.Soc.Geophys. Supp." 2, No. 2, 1928.

† F.J. W. Whipple and A.W. Lee, "Studies in Microseisms," "London, Mon.Not. R. Astr. Soc. Geophys. Supp. "2, No. 7, 1931.

SEISMOLOGICAL DIARY.

Galitzin Seismographs, three components.

546. Richmond (Kew Observatory). Lat. 51° 28′ 6″ N. Long. 0° 18′ 47″ W. Height above M.S.L. 5 metres. **1933.**

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
Jan.			h. m. s.	s.	μ	km.	
1*	ZNE	eL	9 58	...	...	...	New Hebrides.
		F	10 25	...	...	...	15° S., 167° E. (Manila).
3*	ZNE	eL	16 9	...	...	...	Japan.
		F	40	...	...	...	(40° N., 144° E. (Tokyo).
4*	ZNE	eL	2 9	...	...	...	S.E. of Japan
		F	45	...	...	...	26° N., 145° E. (Tokyo).
4*	ZNE	eL	4 29	...	...	...	Coast of Alaska
		F	50	...	...	...	62° N., 148° W. (U.S.C.G.S.)
7	ZN	eP	4 19	...	...	(9000)	Japan,
	ZNE	eS	29 31	...	...	...	40° N., 144° E.
	E	e(SS)	35 00	...	...	...	(Tokyo).
	NE	e	36 16	...	...	...	
	NE	eL	45	...	...	...	
	E	M	46 55	41	−27	...	
	N	M	47 54	38	+30	...	
	Z	eL	52	...	...	...	
	N	M	54 54	20	+31	...	
	E	M	55 3	21	+55	...	
		F	6 5	...	...	...	
8		e	7 13	...	...	...	
		F	40	...	...	...	
9	ZE	iP	2 10 27	...	...	5700‡	Compression.
	Z	ipP	11 17	...	...	...	Azimuth about east.
	ZNE	iS	17 29	...	...	...	Samarkand,
	NE	esS	18 54	...	...	...	40° N., 67° E.
	NE	iScS	19 53	...	...	...	(Strasbourg).
	ZNE	eSS	21 21	...	...	...	Deep focus (0·03).
	N	esSS	22 41	...	...	...	‡Distance and depth
		F	3 15	...	...	...	from tables by F. J. Scrase.
14	ZNE	i(Sg)	8 31 52	...	...	...	Northern England.
	ZNE	i	31 56	...	...	...	Very small.
		F	33	...	...	...	
17		e	19 40	...	...	...	
		F	20 5	...	...	...	
17		e	22 46	...	...	...	
		F	55	...	...	...	
18	ZNE	eL	9 13	...	...	...	
		F	25	...	...	...	
21		e	16 3	...	...	...	
		F	17 10	...	...	...	
21	ZNE	iP	19 34 58	...	...	11200	Dilatation.
	ZNE	iPP	39 2	...	...	...	Indian Ocean,
	E	ePPP	41 17	...	...	...	34° S., 58·5° E.
	NE	eSKS	45 31	...	...	...	(Strasbourg).
	E	iSKKS	46 7	...	...	...	
	E	iS	46 37	...	...	...	
	NE	iPS	48 5	...	...	...	
	NE	iSS	53 37	...	...	...	
	NE	eSSS	57 19	...	...	...	
	NE	L	20 3	...	...	...	
	Z	eL	8	...	...	...	
	N	M	16 43	23	+51	...	
	Z	M	17 36	21	+59	...	
	E	M	17 54	22	−59	...	
	N	M	21 29	20	−51	...	
	E	M	22 22	19	+64	...	
	N	M	24 35	20	+49	...	
	E	M	24 38	18	+58	...	
		F	22 40	...	...	...	
23		e	18 58	...	...	...	
		F	19 5	...	...	...	
7/28	Z	iP	22 56 14	...	...	...	No "N" record.
	E	eL	23 35	...	...	...	Felt in Apia.
	Z	eL	43	...	...	...	14° S., 171° W.
		F	1 0	...	...	...	(U.S.C.G.S.)
29	ZE	e	18 58	...	...	...	No "N" record.
		F	19 5	...	...	...	

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
Feb.			h. m. s.	s.	μ	km.	
3	N	e	22 33 52	...	...	...	Kurile Islands.
	NE	i	33 57	...	...	...	46° N., 151° E.
	NE	L	52	...	...	...	(J.S.A.).
	Z	L	58	...	...	...	
	N	M	59 12	23	− 8	...	
		F	23 30	...	...	...	
8		e	7 10 24	...	...	...	Southern Germany.
		F	12	...	...	...	Very small.
13	NE	e	3 10	...	...	...	Gobi Desert, China.
	NE	L	15	...	...	...	45° N., 89° E.
	Z	eL	20	...	...	...	(Bombay).
	N	M	20 37	18	+19	...	
	E	M	24 59	12	+33	...	
	Z	M	25 1	12	−42	...	
		F	4 5	...	...	...	
14		e	6 45	...	...	...	China.
		F	7 10	...	...	...	43° N., 81° E. (U.R.S.S.)
19		e	5 26	...	...	...	
		F	45	...	...	...	
22		e	18 25	...	...	...	Azores.
		F	40	...	...	...	
23	Z	iP	8 22 31	...	...	10700	Compression.
	ZNE	iPP	26 12	...	...	...	Pacific Ocean off
	ZNE	i	26 36	...	...	...	Northern Chile,
	E	eSKS	33 8	...	...	...	20° S., 71° W.
	NE	iSKKS	33 28	...	...	...	(J.S.A.).
	N	i	34 6	...	...	...	
	NE	iPS	35 18	...	...	...	
	NE	iPPS	35 48	...	...	...	
	NE	iSS	40 7	...	...	...	
	NE	LQ	48	...	...	...	Irregular waves.
	N	M	51 16	44	−150	...	
	E	M	51 21	40	+95	...	
	ZNE	LR	54				
	E	M	59 12	23	+170	...	Very regular waves
	N	M	9 0 16	21	−125	...	from 8h. 58m. to
	Z	M	0 33	19	−125	...	9h. 2m.
		F	11 30	...	...	...	
25		e	23 32	...	...	...	Felt in Sicily.
		F	45	...	...	...	
27		e	17 35	...	...	...	
		F	18 10	...	...	...	
28		e	22 27	...	...	...	Very small.
		F	35	...	...	...	
Mar. 2/3	ZNE	iP	17 43 31	...	...	9400	Amplitudes of iP as
	ZNE	i	43 35	...	...	...	read in mm.
	ZNE	i	43 39	...	...	...	N. E. Z.
	ZNE	iPP	46 58	...	...	...	+5·3 +2·4 −18·7
	Z	iPPP	49 3	...	...	...	
	E	iPPP	49 5	...	...	...	Azimuth=26°.
	E	iSKS	53 51	...	...	...	
	ZN	i	53 57	...	...	...	Destructive in N.E.
	ZNE	iS	54 1	...	...	...	Japan.
	Z	iPS	54 53	...	...	...	
	Z	i	55 3	...	...	...	40° N., 145° E.
	E	i	55 32	...	...	...	(Chinfeng).
	E	i	58 59	...	...	...	
	E	i	59 9	...	...	...	
	E	i	59 16	...	...	...	
	N	SS	59 (43)	...	...	...	
	ZNE	eL	18 7	...	...	...	
	N	M	From	(21)	>350	...	Oscillations off top
	E	M	18 10	(24)	>350	...	and bottom of charts.
	Z	M	to 18 40	(20)	>600	...	
		F	1 30	...	...	...	
3		e	5 15	...	...	...	Probably repetition
		F	50	...	...	...	from preceding epicentre.
3	NE	eL	9 52	...	...	...	Pacific Ocean off
	E	M	10 1 34	22	−15	...	Japan,
	Z	eL	10 2	...	...	...	39° N., 150° E.
		F	11 5	...	...	...	(Manila).

* Confused by microseisms.

SEISMOLOGICAL DIARY—*continued.*

Galitzin Seismographs, three components.

546. Richmond (Kew Observatory). Lat. 51° 28′ 6″ N. Long. 0° 18′ 47″ W. Height above M.S.L. 5 metres. **1933.**

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
Mar.			h. m. s.	s.	μ	km.	
3		e	15 50	...	...	...	
		F	16 10	...	...	...	
6		e	13 46	...	...	...	Garo Hills, Assam.
		F	14 5	...	...	...	(Bombay.)
7		e	14 49	...	...	...	Southern Italy.
		F	15 0	...	...	...	
8		e	2 22	...	...	...	Pacific Ocean off
		F	40	...	...	...	Japan.
							42° N., 148° E.
							(U.R.S.S.)
10		e	6 29	...	...	...	Very small.
		F	35	...	...	...	
11	ZNE	eP	2 6 15	...	...	8855	Destructive round long
	NE	eS	16 18	...	...	...	Beach, Southern
	NE	eL	26	...	...	...	California.
	Z	eL	30	...	...	...	33° 35′ N., 117° 59′ W.
	N	M	37 34	22	+24	...	(Pasadena.)
	E	M	39 52	17	+14	...	
	Z	M	44 58	19	−17	...	
		F	3 30	...	...	...	
11	Z	eP	14 34 24	...	...	(10100)	
	N	ePP	38 8	...	...	...	
	ZNE	eSKS	44 19	...	...	...	
	Z	e(S)	45 27	...	...	...	
	NE	eL	15 6	...	...	...	
	E	M	8 44	23	+ 7	...	
	Z	eL	14	...	...	...	
	Z	M	17 39	15	+ 5	...	
	N	M	19 48	16	+ 6	...	
		F	16 10	...	...	...	
11	Z	iP	19 45 7	...	...	...	Western Pacific Ocean.
	Z	i	47 2	...	...	...	24° N., 138° E.
	ZNE	iPP	49 5	...	...	...	(Manila.)
	NE	eSKS	54 53	...	...	...	Deep focus. Surface
	NE	iS	55 31	...	...	...	waves very poorly
	Z	i	56 55	...	...	...	developed.
	E	e	58 57	...	...	...	
	E	iSS	20 2 13	...	...	...	
		F	21 5	...	...	...	
12		e	5 55	...	...	...	Japan.
		F	6 10	...	...	...	36° N., 140° E.
							(U.R.S.S.)
13		e	8 5	...	...	...	
		F	20	...	...	...	
14	ZNE	eP	1 24 30	...	...	2485	Ægean Sea.
	E	eS	28 34	...	...	...	39° N., 25° E.
	N	e	28 42	...	...	...	(U.R.S.S.)
	NE	L	30·0	...	...	...	
	Z	L	32·4	...	...	...	
	N	M	32 29	12	+15	...	
		F	—	...	...	...	Overlapped by next shock.
14	N	e	1 47	...	...	...	
	NE	eL	50	...	...	...	
	Z	eL	56	...	...	...	
		F	2 40	...	...	...	
15	ZNE	eL	6 23	...	...	...	
		F	7 10	...	...	...	
17*	ZN	iP	16 6 58	...	...	8365	Kamtchatka.
	NE	eS	16 36	...	...	...	56° N., 160° E.
	N	iSKS	17 13	...	...	...	(J.S.A.)
	ZE	eSP	17 21	...	...	...	
	N	eSS	20 58	...	...	...	
	E	eL	25	...	...	...	
	ZN	eL	29	...	...	...	
	N	M	} 38 44	20 {	−24	...	
	E	M			+17	...	
	Z	M	48 46	14	−16	...	
		F	17 40	...	...	...	
17*	Z	ePP	19 51 13	...	...	(11800)	Felt in Eastern
	E	eSKS	57 44	...	...	...	Mindanao.
	E	ePS	20 0 19	...	...	...	6·5° N., 128° E.
	NE	e	16 53	...	...	...	(Manila.)
	NE	eL	23	...	...	...	
	N	M	29 57	27	−37	...	
Mar. 17* cont.	E	M	29 57	27	+24	...	
	Z	eL	30	...	...	...	
	E	M	42 22	19	−24	...	
	Z	M	42 26	18	+21	...	
		F	21 25	...	...	...	
18*	N	e	3 35	...	...	...	Western Pacific Ocean.
	NE	eL	51	...	...	...	21° N., 135° E.
							(U.R.S.S.)
	E	M	54 8	46	(−50)	...	Small on "N-S"
	Z	eL	59	...	...	...	component.
	N	M	4 6 40	20	+ 8	...	
		F	30	...	...	...	
22	NE	eS	18 22 46	...	...	...	Felt in Ionian Islands.
	NE	eL	25	...	...	...	
	Z	eL	28	...	...	...	
		F	35	...	...	...	
23	Z	e	18 4 (23)	...	...	...	Gobi Desert, China.
	NE	eL	12	...	...	...	(Bombay.)
	Z	eL	14	...	...	...	
		F	45	...	...	...	
26		e	5 38	...	...	...	} Very small.
		F	45	...	...	...	
26		e	19 47	...	...	...	
		F	55	...	...	...	
28		e	4 54	...	...	...	Alaska.
		F	5 10	...	...	...	58° N., 160° W.
							(U.R.S.S.)
31		e	22 38	...	...	...	Yun nan, China.
		F	55	...	...	...	24° N., 102° E.
							(Bombay).
Apr. 1	NE	eL	16 44	...	...	...	Japan.
	E	M	47 24	24	+ 5	...	39·5° N. 143·5° E.
	Z	eL	48	...	...	...	(Tokyo.)
	N	M	50 9	21	+ 4	...	
		F	17 15	...	...	...	
9	ZNE	iP	2 59 11	...	...	9280	Japan.
	Z	e	59 30	...	...	...	39° N., 143° E.
	ZNE	ePP	3 2 16	...	...	...	(J.S.A.)
	NE	S	9 35	...	...	...	
	N	e	13 37	...	...	...	
	E	eSS	15 9	...	...	...	
	N	eSSS	21 2	...	...	...	
	NE	eL	26	...	...	...	
	Z	eL	32	...	...	...	
	N	M	35 22	21	+23	...	
	E	M	35 33	21	+41	...	
	Z	M	39 36	20	−14	...	
		F	—	...	...	...	Overlapped by next shock.
9	Z	eP	4 10 51	...	...	9250	Pacific Ocean off
	ZNE	eS	21 14	...	...	...	Central America.
	N	e	25 37	...	...	...	19° N., 107° W.
	E	eSS	26 57	...	...	...	(J.S.A.)
	E	eSSS	30 39	...	...	...	
	NE	eL	37	...	...	...	
	Z	eL	39	...	...	...	
	N	M	40 56	25	−12	...	
	N	M	45 58	22	+ 9	...	
	E	M	48 12	17	+23	...	
	Z	M	48 16	17	+17	...	
		F	5 30	...	...	...	
9		e	11 19	...	...	...	Japan.
		F	40	...	...	...	
9		e	21 47	...	...	...	Repetition of shock at
	ZE	eL	53	...	...	...	9d. 4h.
		F	22 10	...	...	...	
12	N	i	14 31 57	...	...	...	Very small.
	N	i	32 16	...	...	...	Felt in Jersey.
	N	i	32 19	...	...	...	
		F	33	...	...	...	
13		e	23 22	...	...	...	
		F	55	...	...	...	

* Confused by wind and microseisms.

546. Richmond (Kew Observatory). Lat. 51° 28′ 6″ N. Long. 0° 18′ 47″ W. Height above M.S.L. 5 metres. **1933.**

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
Apr.			h. m. s.	s.	μ	km.	
16		e	7 26	...	...	...	Between New Zealand
		F	8 25	...	...	...	and Kermadec Islands
							34° S., 178° W.
							(Stuttgart.)
16	ZE	ePP	19 37 6	...	...	(13000)	No "N" record.
	Z	eSP	46 35	...	...	...	New Guinea.
	E	eL	20 13	...	...	...	3° S., 139° E.
	Z	eL	27	...	...	...	(Stuttgart.)
	Z	M	31 58	21	+ 8	...	
		F	21 45	...	...	...	
19		e	2 34	...	...	...	
		F	4 00	...	...	...	
19	Z	ePP	7 1 4	...	...	(10000)	Felt at Fu-chow.
	E	e(S)	8 20	...	...	...	24° N., 122° E.
	NE	eSSS	18 40	...	...	...	(Kôti.)
	NE	eL	30	...	...	...	
	E	M	32 42	26	−16	...	
	N	M	32 55	25	−16	...	
	Z	eL	37	...	...	...	
	N	M	42 9	17	+50	...	
	E	M	42 9	17	+33	...	
	Z	M	42 15	15	−47	...	
		F	8 50	...	...	...	
23	ZNE	iP	6 2 54	...	...	2720	Amplitudes of iP as
	ZNE	i	2 57	...	...	...	read in mm. :—
	NE	iS	7 16	...	...	...	Z. N. E.
	ZNE	i	7 23	...	...	...	+2·7 +1·4 −2·8
	Z	i	7 26	...	...	...	
	NE	L	9	...	...	...	Giving azimuth about
	Z	L	11	...	...	...	115°.
	E	M	13 24	17	+94	...	36·5° N., 26·5°E.
	Z	M	14 1	10	−51	...	(Strasbourg.)
	N	M	15 11	12	+89	...	Destructive in Italian island of Kos, Ægean Sea.
		F	—	...	...	...	Overlapped by next shock.
23	Z	eP	7 26 14	...	...	9310	Pacific Ocean east of
	NE	eS	36 40	...	...	...	Japan.
	NE	L	54	...	...	...	39·7° N., 143·6° E.
	Z	L	8 1	...	...	...	(Tokyo.)
	E	M	2 51	21	−20	...	
		F	9 30	...	...	...	
23	ZNE	eL	11 27	...	...	...	
		F	40	...	...	...	
25	ZN	e	22 42 41	...	...	...	
	ZNE	eL	48	...	...	...	
		F	23 00	...	...	...	
27	ZN	P	2 46 48	...	...	7350	Amplitudes of iP as
	ZNE	iP	46 53	...	...	...	read in mm. :—
	ZNE	iPP	49 14	...	...	...	Z. N. E.
	E	iS	55 35	...	...	...	−10·0 +5·3 −1·4
	N	iPS	55 51	...	...	...	
	N	i	56 50	...	...	...	Giving azimuth about
	E	iSS	59 36	...	...	...	344°.
	NE	eL	3 5	...	...	...	
	Z	eL	9	...	...	...	Alaska.
	N	M	11 54	28	+101	...	61° N., 150° W.
	Z	M	18 3	13	−67	...	(U.S.C.G.S.)
	E	M	19 47	15	−48	...	
		eL_2	5 8	...	...	...	Via Antipodes.
		F	6 0	...	...	...	
27	Z	e(PP)	12 12 27	...	...	...	
	NE	e(S)	17 11	...	...	...	South of Aleutian Islands.
	Z	e	19 17	...	...	...	50° N., 170° W.
	NE	eL	34	...	...	...	(U.R.S.S.)
	Z	eL	37	...	...	...	
		F	13 40	...	...	...	
28		eS	22 38 48	...	...	...	
	NE	L	42	...	...	...	Eastern Mediterranean.
	N	M	43 18	16	− 9	...	35° N., 28° E.
	Z	eL	45	...	...	...	(U.R.S.S.)
		F	23 0	...	...	...	

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
May			h. m. s.	s.	μ	km.	
1	Z	eP	19 1 45	...	...	...	South of Aleutian Islands.
	E	eL	30	...	...	...	50° N., 170° W.
	ZN	eL	34	...	...	...	(J.S.A.)
		F	—	...	...	...	Overlapped by next shock.
1	Z	iP	20 3 23	...	...	9010	Pacific Ocean off
	E	eS	13 34	...	...	...	Kurile Islands.
	E	eL	26	...	...	...	45° N., 153° E.
	ZN	eL	31	...	...	...	(U.R.S.S.)
	E	M	35 5	28	−13	...	
	Z	M	44 51	18	+ 6	...	
		F	22 5	...	...	...	
2		e	0 2	...	...	...	
		F	35	...	...	...	
4		e	0 18	...	...	...	
		F	35	...	...	...	
5	NE	eL	4 43	...	...	...	
	Z	eL	52	...	...	...	
	E	M	52 36	20	− 5	...	
		F	5 20	...	...	...	
6	Z	iP	5 45 52	...	...	8900	Pacific Ocean off
	E	iS	55 57	...	...	...	Central America.
	ZN	e	56 2	...	...	...	6° N., 83° W.
	NE	e	6 1 6	...	...	...	(J.S.A.)
	N	eL	8	...	...	...	
	ZE	eL	11	...	...	...	
	E	M	12 51	27	−13	...	
	Z	M	15 44	20	−10	...	
		F	7 10	...	...	...	
6		e	21 12	...	...	...	Very small.
		F	30	...	...	...	
7		e	17 28	...	...	...	
		F	35	...	...	...	
8		e	1 22	...	...	...	Ægean Sea.
		F	40	...	...	...	38·5° N., 24·0° E. (U.R.S.S.)
8	ZE	iP	10 46 11	...	...	8770	Compression.
	ZE	i	46 15	...	...	...	
	ZE	ePP	49 19	...	...	...	Pacific Ocean off
	E	eS	56 10	...	...	...	Mexico.
	N	eL	11 9	...	...	...	16° N., 101° W.
	ZE	eL	13	...	...	...	(J.S.A.)
	N	M	20 14	24	+21	...	
	E	M	23 41	18	+27	...	
	Z	M	24 36	17	+17	...	
		F	13 35	...	...	...	
8		e	18 50	...	...	...	Very small.
		F	19 15	...	...	...	
9		e	3 25	...	...	...	
		F	40	...	...	...	
11	Z	eP	19 14 18	...	...	2210	Dilatation.
	ZNE	iP	14 20	...	...	...	Amplitudes of iP as
	Z	PP	15 40	...	...	...	read in mm :—
	ZNE	eS	17 59	...	...	...	Z. N. E.
	ZNE	eL	20	...	...	...	+6·0 +2·0 −3·4
	N	M	20 56	14	+85	...	Azimuth = 118° giv-
	E	M	22 18	11	−62	...	ing epicentre near
	Z	M	22 22	8	+41	...	40° N., 23° E.
		F	20 15	...	...	...	Gulf of Salonica.
15		e	20 11	...	...	...	
		F	30	...	...	...	
16	ZE	eP	1 25 (28)	...	...	10000	North-west of Suma-
	NE	eSKS	35 (50)	...	...	...	tra.
	NE	eL	2 3	...	...	...	6° N., 95° E.
	Z	eL	7	...	...	...	(U.R.S.S.)
	N	M	5 32	25	+14	...	
	E	M	15 17	19	+11	...	
		F	3 35	...	...	...	
18		e	0 40	...	...	...	Kamtchatka.
		F	1 5	...	...	...	

SEISMOLOGICAL DIARY—*continued.*

Galitzin Seismographs, three components.

546. Richmond (Kew Observatory). Lat. 51° 28′ 6″ N. Long. 0° 18′ 47″ W. Height above M.S.L. 5 metres. **1933.**

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
			h. m. s.	s.	μ	km.	
May 19	Z	eP	18 7 30	...	...	5990	Atlantic Ocean.
	ZNE	iP	7 34	...	...	...	1·5° S., 11° W.
	ZNE	eS	15 5	...	...	...	(Strasbourg.)
	NE	eL	20	...	...	...	
	Z	eL	24	...	...	...	
	N	M	27 41	26	+55	...	
	E	M	31 27	15	−43	...	
	Z	M	31 57	13	+39	...	
		F	20 10	...	...	...	
20		e	5 50	...	...	...	
		F	7 0	...	...	...	
23		e	17 29	...	...	...	
		F	18 00	...	...	...	
30		e	12 22	...	...	...	Very small.
		F	45	...	...	...	
30		e	14 48	...	...	...	
		F	55	...	...	...	
31		e	20 6	...	...	...	Greece.
		F	15	...	...	...	39·5° N., 23·0° E.
							(U.R.S.S.)
June 1	ZN	eP	2 45 13	...	...	2280	Felt in eastern Mace-
	ZNE	eS	49 00	...	...	...	donia.
		eL	51	...	...	...	40·5° N., 22·5° E.
	N	M	52 3	13	+ 3	...	(U.R.S.S.)
		F	3 10	...	...	...	
2	Z	eP	7 51 30	...	...	9550	Japan.
	E	eS	8 1 57	...	...	...	31·7° N., 131·1° E.
	NE	eL	22	...	...	...	(Tokyo.)
	Z	eL	26	...	...	...	
	N	M	33 56	20	+10	...	
	E	M	37 48	18	−11	...	
		F	9 10	...	...	...	
2		e	13 27	...	...	...	Very small.
		F	40	...	...	...	North of New Guinea.
							0°., 136·5° E.
							(U.R.S.S.)
3	Z	eP	17 22 2	...	...	(10000)	Japan.
	Z	ePP	25 32	...	...	...	29° N., 129·5° E.
	ZNE	eL	58	...	...	...	(Manila.)
	N	M	18 1 5	19	+ 8	...	
	Z	M	6 30	15	− 8	...	
		F	45	...	...	...	
4		e	13 32	...	...	...	
		F	40	...	...	...	
4		e	14 9	...	...	...	Very small
		F	15	...	...	...	
6		e	2 51	...	...	...	Philippine Islands.
	NE	eL	3 18	...	...	...	14° 20′ N., 121° 35′ E.
	Z	eL	27	...	...	...	(Manila.)
	Z	M	30 46	19	− 7	...	
	N	M	32 8	20	− 6	...	
		F	4 0	...	...	...	
7	Z	eP	11 57 49	...	...	8400	Southern China.
	NE	eS	12 7 29	...	...	...	25·2° N., 101·9° E.
	NE	eL	23	...	...	...	(Chiufeng.)
	Z	eL	28	...	...	...	
	Z	M	35 8	15	− 7	...	
		F	14 00	...	...	...	
8	Z	iP	18 23 10	...	...	9300	Pacific Ocean off
	ZNE	ePP	26 25	...	...	...	Japan.
	NE	eL	52	...	...	...	40·2° N., 144·0° E.
	ZE	eL	55	...	...	...	(Tokyo.)
	E	M	57 10	25	+ 9	...	
		F	20 00	...	...	...	
10		e	12 4	...	...	...	Caribbean Sea.
							17° N., 85° W.
							(J.S.A.)
		F	—	...	...	...	Overlapped by next shock.

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
			h. m. s.	s.	μ	km.	
June 10	Z	eP	12 10 52	...	...	2050	Compression.
	ZNE	iP	10 57	...	...	...	Atlantic Ocean west
	NE	eS	14 20	...	...	...	of Iceland.
	ZNE	L	15	...	...	...	64° N., 25° W.
	Z	M	17 4	15	+16	...	(J.S.A.)
	E	M	17 27	13	−16	...	
	N	M	18 20	12	+17	...	
		F	14 10	...	...	...	
10	ZNE	eL	14 23	...	...	...	
		F	40	...	...	...	
10		e	15 21	...	...	...	
		F	35	...	...	...	
10		e	16 38	...	...	...	
		F	17 00	...	...	...	
10		e	20 42	...	...	...	Very small.
		F	55	...	...	...	
11		e	13 28	...	...	...	
		F	35	...	...	...	
11		e	14 34	...	...	...	
		F	15 35	...	...	...	
12	Z	eP	15 34 22	...	...	...	Pacific Ocean.
	ZNE	eL	16 2	...	...	...	50° N., 145° W.
		F	45	...	...	...	(U.R.S.S.)
12	ZNE	eL	21 50	...	...	...	Japan.
		F	22 10	...	...	...	38·8° N., 141·7° E.
							(Tokyo.)
13	Z	eP	20 45 59	...	...	9100	Pacific Ocean off
	Z	ePcP	46 15	...	...	...	Japan.
	Z	ePP	49 10	...	...	...	40·7° N., 143·7° E.
	NE	eS	56 15	...	...	...	(Tokyo.)
	E	eL	21 12	...	...	...	
	ZN	eL	17	...	...	...	
	N	M	22 25	20	+ 9	...	
	E	M	24 00	18	− 9	...	
	Z	M	26 53	20	− 7	...	
		F	22 5	...	...	...	
13	Z	eP	22 30 33	...	...	7230	Alaska.
	Z	ePP	32 54	...	...	...	61° N., 149° W.
	NE	eS	39 14	...	...	...	(J.S.A.)
	E	eL	51	...	...	...	
	ZN	eL	54	...	...	...	
	E	M	59 52	18	+ 3	...	
	N	M	23 0 52	19	+ 6	...	
		F	50	...	...	...	
14		e	21 33	...	...	...	
		F	45	...	...	...	Very small.
16		e	1 30	...	...	...	
		F	2 5	...	...	...	
18	E	e	5 0	...	...	...	
	ZNE	eL	8	...	...	...	
	N	M	10 28	24	− 7	...	
		F	6 0	...	...	...	
18/19	ZNE	iP	21 50 9	...	...	9200	Amplitudes of iP as
	ZNE	iPP	53 20	...	...	...	read in mm. :—
	ZN	ePPP	55 29	...	...	...	Z. N. E.
	NE	iS	22 0 29	...	...	...	+4·7 −2·0 (−0·8)
	E	i	0 34	...	...	...	
	ZE	i	0 57	...	...	...	Large movement.
	ZE	iPS	1 27	...	...	...	
	N	iPPS	2 20	...	...	...	
	E	iSS	6 18	...	...	...	Emergent on N-S
	E	iSSS	9 38	...	...	...	component.
	NE	L	15	...	...	...	
	Z	L	20	...	...	...	
	E	M	20 28	36	−200	...	
	N	M	22 24	30	−155	...	North of Japan.
	E	M	23 20	27	+165	...	38·5° N., 142·8° E.
	N	M	26 57	23	+140	...	(Tokyo.)
	E	M	27 56	20	+125	...	
	N	M	29 18	23	−195	...	
	E	M	29 35	22	+125	...	
	N	M	30 29	22	−170	...	
	Z	M	30 44	21	−185	...	

SEISMOLOGICAL DIARY—*continued.*

Galitzin Seismographs, three components.

546. Richmond (Kew Observatory). Lat. 51° 28′ 6″ N. Long. 0° 18′ 47″ W. Height above M.S.L. 5 metres. **1933.**

Date.	Compt.	Phase.	G.M.T. h. m. s.	Period. s.	Amplitude. μ	Δ km.	Remarks.
June 18/19 cont.	Z	M	32 56	17	−135	...	
		F	1 45	...	...	...	
19		e	19 23	...	...	...	Alaska.
		F	50	...	...	...	60° N., 145° W. (U.R.S.S.)
24/25	ZNE	eP	22 8 46	...	...	(11200)	Destructive in southern Sumatra.
	E	iSKS	19 40	...	...	...	5° S., 104·2° E.
	E	iSS	29 6	...	...	...	(Batavia.)
	NE	eL	37	...	...	...	
	N	M	44 50	43	+340	...	
	Z	eL	45	...	...	...	
	E	M	51 48	29	+135	...	
	N	M	56 36	24	+150	...	
	E	M	23 1 16	20	+185	...	
	Z	M	1 28	20	+100	...	
	N	M	3 6	20	+145	...	
	E	M	4 25	17	+135	...	
	Z	M	4 37	18	+110	...	
		F	2 40	...	...	...	
25		e	6 36	...	...	...	Very small. Borneo.
		F	7 0	...	...	...	2° N., 112° E. (U.R.S.S.)
25	ZNE	e	21 14	...	...	...	Nevada.
	ZNE	eL	24	...	...	...	39° N., 119° W.
	Z	M	30 54	14	+ 6	...	(U.S.C.G.S.)
		F	22 20	...	...	...	
27	ZE	eP	15 44 41	...	...	2200	Iceland.
	NE	eS	48 21	...	...	...	
	ZNE	L	50	...	...	...	
		F	16 15	...	...	...	
28		e	12 9	...	...	...	Very small.
		F	30	...	...	...	
28/29	Z	e	23 46 38	...	...	8330	Aleutian Islands.
	NE	e	56 14	...	...	...	53° N., 163° W.
	ZNE	eL	0 10	...	...	...	(J.S.A.)
		F	1 5	...	...	...	
29		e	3 9	...	...	...	
		F	30	...	...	...	
29		e	15 30	...	...	...	Very small.
		F	35	...	...	...	
29	ZNE	eP	16 58 37	...	...	...	Iceland. (29: 16 58 37 and 18 33 50)
	ZNE	eL	17 3	...	...	...	
		F	15	...	...	...	
29	ZNE	eP	18 33 50	...	...	...	
	ZNE	eL	39	...	...	...	
		F	50	...	...	...	
July 2		e	12 7	...	...	...	
		F	40	...	...	...	
3		e	15 52	...	...	...	
		F	16 15	...	...	...	
7		e	8 7	...	...	...	Very small.
		F	25	...	...	...	
9	ZNE	iP	1 42 16	...	...	8900	Compression.
	NE	eS	52 21	...	...	...	Kurile Islands.
	E	eL	2 5	...	...	...	45° N., 150° E.
	ZN	eL	13	...	...	...	(U.S.C.G.S.)
	E	M	14 52	25	− 9	...	
	N	M	21 29	18	− 9	...	
	Z	M	24 15	16	+ 7	...	
		F	4 25	...	...	...	
9	Z	eP	5 46 59	...	...	9550	Pacific Ocean off Mexico.
	NE	eS	57 27	...	...	...	17° N., 105° W.
	N	eL	11	...	...	...	(U.S.C.G.S.)
	ZE	eL	14	...	...	...	
		F	45	...	...	...	
9	NE	e(S)	9 50 22	...	...	...	Earlier phases lost during changing of charts.

Date.	Compt.	Phase.	G.M.T. h. m. s.	Period. s.	Amplitude. μ	Δ km.	Remarks.
July 9 cont.	ZNE	eL	10 10	...	...	...	Overlapped by next shock.
		F	—	...	...	...	
9	Z	eP	10 0 29	...	...	...	
		F	11 30	...	...	...	
9	Z	e	11 33 47	...	...	...	Very small; traces only on horizontal components.
		F	12 40	...	...	...	
9	ZNE	iP	12 42 52	...	...	8930	Compression.
	NE	iS	52 59	...	...	...	Kurile Islands.
	NE	L	13 12	...	...	...	45° N., 150° E.
	Z	L	16	...	...	...	(U.S.C.G.S.)
	E	M	15 32	25	−35	...	Repetition of 9d. 1h.
	Z	M	23 40	21	+22	...	
		F	15 45	...	...	...	
9	Z	eP	16 19 19	...	...	8910	Kurile Islands.
	E	eS	29 25	...	...	...	Further repetition.
	NE	eL	48	...	...	...	
	Z	eL	52	...	...	...	
		F	17 35	...	...	...	
9	Z	eP	18 3 49	...	...	...	
	ZNE	eL	38	...	...	...	
		F	19 10	...	...	...	
9		e	21 49	...	...	...	
		F	22 15	...	...	...	
9		e	23 0	...	...	...	
		F	30	...	...	...	
10	Z	eP	0 34 7	...	...	...	East Indies.
	ZNE	eL	1 8	...	...	...	(Manila.)
		F	30	...	...	...	
10	ZNE	iP	3 34 33	...	...	9030	Compression.
	E	eS	44 45	...	...	...	Pacific Ocean off Mexico.
	E	eL	4 2	...	...	...	17° N., 104° W.
	ZN	eL	5	...	...	...	(U.S.C.G.S.)
	E	M	12 1	16	+26	...	Repetition of 9d. 5h.
	Z	M	12 4	16	+23	...	
		F	5 30	...	...	...	
10	Z	eP	10 53 36	...	...	...	
	ZNE	eL	11 40	...	...	...	
		F	12 30	...	...	...	
10		e	12 35	...	...	...	
		F	13 0	...	...	...	
11		e	7 44	...	...	...	
		F	50	...	...	...	
12		e	12 50	...	...	...	Very small. (12: 12 50 and 14 15)
		F	13 5	...	...	...	
12		e	14 15	...	...	...	
		F	25	...	...	...	
14	Z	e(P)	1 58 11	...	...	...	
		F	2 5	...	...	...	
18	Z	ePP	19 24 15	...	...	...	Caroline Islands.
	E	eL	58	...	...	...	8° N., 144° E.
	ZN	eL	20 5	...	...	...	(Manila.)
		F	40	...	...	...	
19	ZNE	eL	5 45	...	...	...	
		F	6 0	...	...	...	
19		e	11 27	...	...	...	Aleutian Islands.
		F	12 30	...	...	...	50° N., 170° W. (J.S.A.)
19	ZN	e	13 44 18	...	...	...	Aleutian Islands.
	ZNE	eL	14 15	...	...	...	50° N., 170° W.
		F	15 (10)	...	...	...	(J.S.A.)
19	ZN	eP	15 11 47	...	...	(8700)	Aleutian Islands.
	ZNE	eL	40	...	...	...	51° N., 174° W.
		F	16 50	...	...	...	(U.S.C.G.S.)

SEISMOLOGICAL DIARY—*continued.*

Galitzin Seismographs, three components.

546. Richmond (Kew Observatory). Lat. 51° 28′ 6″ N. Long. 0° 18′ 47″ W. Height above M.S.L. 5 metres. **1933.**

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
			h. m. s.	s.	μ	km.	
July 19	ZNE	eP	20 12 29	...	...	2800	Ægean Sea.
	NE	eS	16 57	...	...	...	36° N., 27° E.
	Z	e	17 6	...	...	...	(Strasbourg.)
	NE	L	18	...	...	...	
	N	M	21 18	16	−25	...	
		F	21 0	...	...	...	
20/21	Z	eP	23 26 34	...	...	9210	Pacific Ocean off
	NE	eS	36 55	...	...	...	Japan.
	E	eL	54	...	...	...	41° N., 146° E.
	ZN	eL	57	...	...	...	(Stuttgart.)
		F	0 35	...	...	...	
21/22	Z	eP	20 21 13	...	...	12170	Near Sandwich
	Z	e(PP)	25 23	...	...	...	Islands.
	E	eS	33 40	...	...	...	(Bombay.)
	Z	e	35 6	...	...	...	
	N	ePS	35 24	...	...	...	
	E	ePPS	36 3	...	...	...	
	N	eSS	41 31	...	...	...	
	E	eL	52	...	...	...	
	ZN	eL	21 2	...	...	...	
	N	M	8 31	19	−20	...	
	Z	M	8 36	20	−24	...	
		F	0 10	...	...	...	
22	ZNE	eP	21 7 2	...	...	8420	Amplitudes of eP as
	NE	eS	16 43	...	...	...	read in mm. :—
	N	eSS	21 44	...	...	...	Z. N. E.
	N	eSSS	25 37	...	...	...	+1·5 −0·8 (+0·2)
	Z	ePKKP	25 49	...	...	...	
	E	eL	27	...	...	...	Azimuth between N.
	ZN	eL	32	...	...	...	and NNW.
	E	M	34 14	26	−33	...	Aleutian Islands.
	N	M	43 27	20	−37	...	52° N., 169° W.
	E	M	44 53	20	+40	...	(U.S.C.G.S.)
	N	M	46 34	19	−40	...	
	Z	M	46 37	18	+41	...	
		eL_2	23 17	...	...	...	Via Antipodes.
		F	1 15	...	...	...	
23	Z	eP	4 26 10	...	...	(11000)	Pacific Ocean off
	E	eSKS	36 52	...	...	...	Peru.
	ZNE	eL	57	...	...	...	16·5° S., 77·5° W.
		F	5 45	...	...	...	(Stuttgart.)
23	Z	eP	9 44 41	...	...	...	Atlantic Ocean.
	ZNE	eL	54	...	...	...	30° N., 40° W.
		F	10 30	...	...	...	(Stuttgart.)
24	Z	e	10 22	...	...	...	Very small; traces
		F	40	...	...	...	only on horizontal components.
24	Z	ePKP	19 15 11	...	...	(16000)	Felt in Samoa.
	ZN	ePP	18 37	...	...	...	15° S., 175° W.
	N	eSKS	25 17	...	...	...	(J.S.A.)
	ZNE	eL	20 2	...	...	...	
	Z	M	15 1	20	+22	...	
	N	M	15 6	20	+18	...	
	E	M	20 (0)	20	+11	...	
		F	22 10	...	...	...	
25	Z	e	3 40·2	...	...	...	Possibly not seismic.
		F	43	...	...	...	
25	Z	e	5 5 6	...	...	...	
	NE	L	27	...	...	...	
		F	45	...	...	...	
31	Z	iP	11 40 26	...	...	...	Confused by micro-
	ZNE	L	46	...	...	...	seisms and wind.
	ZNE	M	48	...	...	...	Greenland.
		F	12 10	...	...	...	67° N., 52° W. (U.R.S.S.)
31		e	16 11	...	...	...	
		F	25	...	...	...	
Aug. 4		e	18 21	...	...	...	Very small.
		F	30	...	...	...	
5		e	1 4	...	...	...	Solomon Islands.
	NE	eL	44	...	...	...	(Stuttgart.)
	Z	eL	53	...	...	...	
		F	3 5	...	...	...	

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
			h. m. s.	s.	μ	km.	
Aug. 7	Z	eP	3 15 19	...	...	(9370)	Very small.
	E	e(S)	25 48	...	...	...	
	ZNE	eL	41	...	...	...	
		F	4 10	...	...	...	
7		e	13 30	...	...	...	
		F	14 5	...	...	...	
11	ZNE	iP	9 5 47	...	...	8430	Kachin.
	Z	ePP	8 41	...	...	...	27° N., 97° E.
	ZNE	eS	15 29	...	...	...	(Manila.)
	E	eSSS	24 8	...	...	...	
	ZNE	eL	31	...	...	...	
	E	M	35 44	25	+15	...	
	N	M	35 57	25	+21	...	
		F	10 45	...	...	...	
13	Z	eP	9 41 46	...	...	...	Indian Ocean.
	Z	ePP	45 49	...	...	...	31° S., 56° E.
	ZNE	eL	10 18	...	...	...	(Stuttgart.)
		F	12 10	...	...	...	
14		e	22 52	...	...	...	
		F	23 5	...	...	...	
15	ZNE	eP	0 50 8	...	...	2570	Felt in Ponta Delgada,
	E	eS	54 19	...	...	...	Azores.
	ZNE	eL	55	...	...	...	
		F	2 0	...	...	...	
15	NE	eL	3 41	...	...	...	Pacific Ocean, S.E. of
	Z	eL	49	...	...	...	Japan.
		F	4 15	...	...	...	28° N., 143° E. (Manila.)
15	NE	eL	20 24	...	...	...	
	Z	eL	26	...	...	...	
		F	35	...	...	...	
17		e	6 34	...	...	...	
		F	45	...	...	...	
18			—	...	...	...	No records 5h. 15m. to 8h. 15m.
20	NE	eL	12 36	...	...	...	Felt in S.E. Luzon.
	Z	eL	45	...	...	...	13·6° N., 124·8° E.
		F	13 0	...	...	...	(Manila.)
22		eL	11 47	...	...	...	
		F	12 20	...	...	...	
25	ZNE	eP	8 2 2	...	...	8430	Compression.
	E	eS	11 44	...	...	...	Destructive near
	NE	eSS	16 27	...	...	...	Chentu, China.
	NE	eSSS	19 30	...	...	...	30·5° N., 103·5° E.
	NE	L	23·8	...	...	...	(Chinfeng.)
	Z	eL	26	...	...	...	
	N	M	31 7	23	−135	...	
	E	M	35 44	24	+175	...	
		F	10 45	...	...	...	
25		e	21 18	...	...	...	
		F	35	...	...	...	
26	ZE	eP	20 23 56	...	...	2160	North Atlantic Ocean.
	ZNE	eS	27 33	...	...	...	
		L	28·4	...	...	...	
	N	M	29 5	19	+ 6	...	
		F	21 5	...	...	...	
28/29	Z	eP	22 34 23	...	...	12670	S. Atlantic, Sandwich
	ZNE	ePKP	38 21	...	...	...	Group.
	Z	ePP	39 19	...	...	...	58° S., 27° W.
	NE	iSKS	45 3	...	...	...	(J.S.A.)
	E	iS	47 8	...	...	...	
	NE	iPS	48 51	...	...	...	
	Z	iSP	48 55	...	...	...	
	NE	eSS	54 51	...	...	...	
	N	eSSS	58 27	...	...	...	
	N	eSSSS	23 2 15	...	...	...	
	NE	eL	5	...	...	...	
	Z	eL	8	...	...	...	
	E	M	20 59	18	−78	...	
	N	M	22 23	20	+135	...	
	Z	M	22 38	18	−130	...	
		F	3 15	...	...	...	

SEISMOLOGICAL DIARY—*continued.*

Galitzin Seismographs, three components.

546. Richmond (Kew Observatory). Lat. 51° 28′ 6″ N. Long. 0° 18′ 47″ W. Height above M.S.L. 5 metres. **1933.**

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
			h. m. s.	s.	μ	km.	
Aug. 29	ZN	isP	15 6 30	...	...	(9500)	Brazil.
	NE	iSKS	13 48	...	...	...	8° S., 71° W.
							(J.S.A.)
	ZNE	iS	13 59	...	...	...	Focus about 400 km.
	ZNE	iSP	15 6	...	...	...	Below normal.
		eL	30	...	...	...	"L" waves very
		F	16 5	...	...	...	poorly developed.
31	NE	e	3 10	...	...	...	
	NE	eL	23	...	...	...	
	Z	eL	27	...	...	...	
		F	50	...	...	...	
Sept. 2	Z	eP	16 53 34	...	...	(10000)	Pacific Ocean off
	ZN	ipP	55 11	...	...	...	Japan. Focus about
	NE	iSKS	17 3 24	...	...	...	400 km. below
	NE	iS	3 51	...	...	...	normal.
	ZNE	iSP	5 8	...	...	...	30° N., 139° E.
							(Stuttgart.)
	NE	eL	10	...	...	...	"L" waves very
	Z	eL	15	...	...	...	poorly developed.
	N	M	39 36	17	+ 7	...	
	Z	M	39 42	16	− 6	...	
		F	18 50	...	...	...	
6		e	2 40	...	...	...	
		F	3 25	...	...	...	
6		e	18 30	...	...	...	
		F	19 5	...	...	...	
6/7	Z	iPKP	22 27 9	...	...	(17000)	Small on horizontal
							components.
	Z	ipPKP	29 34	...	...	...	Pacific Ocean.
	N	e(SKKS)	36 47	...	...	...	24° S., 178° W.
							(J.S.A.)
							Focus about 600 km.
							below normal.
	ZNE	eL	48	...	...	...	"L" waves very
		F	0 40	...	...	...	poorly developed.
7		e	9 9	...	...	...	
		F	20	...	...	...	
7		e	18 53	...	...	...	Very small.
		F	19 10	...	...	...	
7/8		e	23 10	...	...	...	
		F	0 10	...	...	...	
8		e	7 2	...	...	...	Very small.
		F	10	...	...	...	
9	Z	iPKP	21 39 19	...	...	(15000)	Small on horizontal
	NE	ePKS	42 52	...	...	...	components.
		eL	22 23	...	...	...	Pacific Ocean near
		F	23 45	...	...	...	Santa Cruz Island.
							11° S., 165° E.
							(Stuttgart.)
12	ZN	eP	12 36 42	...	...	...	
		eL	42	...	...	...	
		F	55	...	...	...	
12		e	13 55	...	...	...	
		F	14 10	...	...	...	
17		e	4 44	...	...	...	Very small.
		F	5 10	...	...	...	
20	NE	eL	0 7	...	...	...	South of Aleutian
	Z	eL	15	...	...	...	Islands.
		F	40	...	...	...	48° N., 175° W.
							(U.R.S.S.)
21	NE	eL	1 22	...	...	...	East Indies.
	Z	eL	31	...	...	...	12° N., 120° E.
		F	55	...	...	...	(U.R.S.S.)
21	NE	e	3 47	...	...	...	
	ZNE	eL	59	...	...	...	Japan.
		F	4 45	...	...	...	35° N., 135° E.
							(U.R.S.S.)
21	NE	eL	10 28	...	...	...	Pacific Ocean off
	Z	eL	35	...	...	...	Japan.
	E	M	38 56	18	− 7	...	35° N., 143° E.
	N	M	39 11	18	+ 7	...	(Stuttgart.)
		F	11 15	...	...	...	

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
			h. m. s.	s.	μ	km.	
Sept. 21		e	20 27	...	...	...	Very small.
		F	21 10	...	...	...	
22	Z	e(P)	11 57 10	...	...	...	Pacific Ocean
	Z	i	57 23	...	...	...	(Stuttgart.)
	N	e	12 1 3	...	...	...	Deep focus.
		F	15	...	...	...	
22	ZNE	eL	12 56	...	...	...	
		F	13 45	...	...	...	
24	ZNE	eP	15 31 24	...	...	8600	Aleutian Islands.
	NE	eS	41 14	...	...	...	51° N., 177° W.
	NE	eL	45	...	...	...	(U.S.C.G.S.)
	Z	eL	50	...	...	...	
	E	M	16 1 54	23	+13	...	
	N	M	6 38	22	+12	...	
		F	17 20	...	...	...	
25	E	e	14 34	...	...	...	
	N	eL	38	...	...	...	
	ZE	eL	43	...	...	...	
		F	15 15	...	...	...	
25	ZNE	eP	19 1 27	...	...	6710	Compression.
	Z	i	1 39	...	...	...	Tibet.
	ZNE	ePP	3 41	...	...	...	33° N., 85° E.
	ZNE	ePPP	5 5	...	...	...	(Stuttgart.)
	NE	eS	9 41	...	...	...	
	Z	e	15 21	...	...	...	
	ZNE	eL	19	...	...	...	
	E	M	29 13	18	−78		
	Z	M	29 49	16	−80	...	
	N	M	29 56	16	−77	...	
		F	21 20	...	...	...	
26	Z	eP	3 36 6	...	...	...	Destructive around
	N	e	40 (17)	...	...	...	Lama dei Peligni,
	ZNE	iL	41 11	...	...	...	Central Italy.
		F	4 5	...	...	...	
27	ZNE	eL	22 48	...	...	...	
		F	23 10	...	...	...	
27/28	ZNE	eL	23 45	...	...	...	Very small.
		F	0 5	...	...	...	
30	Z	ePP	14 41 29	...	...	...	New Guinea.
	NE	eL	15 17	...	...	...	3° S., 139° E.
	Z	eL	27	...	...	...	(Stuttgart.)
	N	M	35 31	...	+11	...	
	Z	M	35 36	...	− 9	...	
		F	17 15	...	...	...	
Oct. 2		eL	15 18	...	...	...	
		F	—	...	...	...	Overlapped by next shock.
2	ZE	iP	15 42 4	...	...	9450	Compression.
	ZN	i	42 56	...	...	...	Azimuth about W.
	ZN	i	43 51	...	...	...	Coast of Ecuador.
	Z	iPP	45 24	...	...	...	2·5° S., 80° W.
	E	iSKS	52 29	...	...	...	(J.S.A.)
	NE	iS	52 37	...	...	...	Focus about 230 km.
	Z	e	53 45	...	...	...	below normal.
	E	i	53 54	...	...	...	
	NE	L	16 4	...	...	...	
	Z	L	9	...	...	...	
	E	M	15 9	23	−39	...	
	E	M	18 35	19	−36	...	
	Z	M	18 41	17	−32	...	
	N	M	20 15	18	+24	...	
	Z	M	22 40	17	−35	...	
		F	19 40	...	...	...	
3		e	19 19	...	...	...	No records, 3d. 8h. 32m.
		F	20 5	...	...	...	to 15h. 5m. and
							4d. 8h. 45m. to 12h. 0m.
3		e	22 32	...	...	...	during standardiza-
		F	45	...	...	...	tion, etc.
5		e	5 58	...	...	...	
		F	6 15	...	...	...	

SEISMOLOGICAL DIARY—*continued.*

Galitzin Seismographs, three components.

546. Richmond (Kew Observatory). Lat. 51° 28′ 6″ N. Long. 0° 18′ 47″ W. Height above M.S.L. 5 metres. **1933.**

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
Oct.			h. m. s.	s.	μ	km.	
5	ZNE	eP	6 26 2	...	...	2050	Compression.
	NE	eS	29 30	...	...	...	North Atlantic Ocean.
	ZNE	eL	31	...	...	...	(Stuttgart.)
		F	55	...	...	...	
5	ZE	iP	13 37 56	...	...	4830	Persia.
	NE	eS	44 29	...	...	...	34° N., 54° E.
	E	e	47 52	...	...	...	(U.R.S.S.)
	ZNE	eL	51	...	...	...	
	E	M	57 32	22	+16	...	
	N	M	58 50	22	−17	...	
	Z	M	14 5 39	12	+11	...	
		F	15 50	...	...	...	
7		e	3 34	...	...	...	
		F	4 15	...	...	...	
14	Z	eP	22 30 39	...	...	8500	Gulf of Alaska.
	NE	eS	40 24	...	...	...	54° N., 158° W.
	NE	eL	56	...	...	...	(Stuttgart.)
	Z	eL	23 0	...	...	...	
		F	45	...	...	...	
*16	NE	eL	5 4	...	...	...	Afghanistan.
	Z	eL	10	...	...	...	32° N., 67° E.
		F	15	...	...	...	(U.R.S.S.)
*17	ZNE	eL	14 15	...	...	...	
		F	40	...	...	...	
20		e	11 17	...	...	...	Possibly not seismic.
		F	40	...	...	...	Confused by wind and
							and microseims.
21	E	eL	3 30	...	...	...	Pacific Ocean east of
	ZN	eL	35	...	...	...	Japan.
		F	4 40	...	...	...	35° N., 135° E.
							(U.R.S.S.)
22	ZNE	eL	12 35	...	...	...	Kurile Islands.
		F	13 15	...	...	...	(Stuttgart.)
23	ZNE	eL	5 22	...	...	...	
		F	6 10	...	...	...	
23	ZNE	e	14 4 26	...	...	...	Indian Ocean.
	NE	eL	20	...	...	...	(Tananarive.)
	Z	eL	23	...	...	...	
	N	M	28 51	22	+ 6	...	
		F	15 5	...	...	...	
24		e	16 35	...	...	...	Very small. (24 and 24)
		F	17 0	...	...	...	
24		e	22 45	...	...	...	
		F	55	...	...	...	
25/26	Z	eP	23 41 14	...	...	(10500)	Chile.
	Z	isP	42 6	...	...	...	22° S., 68° W.
	N	ePP	45 15	...	...	...	(J.S.A.)
	NE	iSKS	51 28	...	...	...	Focus about 180 km.
	NE	iS	52 2	...	...	...	below normal.
	Z	isS	53 34	...	...	...	
	N	ePS	53 38	...	...	...	
		eL	0 8	...	...	...	
	N	M	20 35	20	+14	...	
	E	M	20 45	19	−15	...	
	Z	M	20 50	20	−16	...	
		F	1 40	...	...	...	
26	Z	e	12 40	...	...	...	Confused by wind and
		eL	55	...	...	...	microseisms.
		F	14 45	...	...	...	
30		e	8 20	...	...	...	New Hebrides.
		F	40	...	...	...	17° S., 172° E.
							(U.R.S.S.)
Nov. 1	ZE	eL	16 17	...	...	...	
		F	40	...	...	...	
2	Z	eP	12 38 56	...	...	...	Horizontal compon-
	ZNE	eL	13 0	...	...	...	ents disturbed by
							wind.
	Z	M	23 21	18	+ 7		South of Aleutian
		F	14 15	...	...	...	Islands.
							48° N., 168° W.
							(J.S.A.)

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
Nov.			h. m. s.	s.	μ	km.	
5	NE	eL	21 5	...	...	...	Aleutian region.
	N	M	9 30	24	+ 6	...	49° N., 179° W.
		F	22 0	...	...	...	(U.R.S.S.)
6		e	7 27	...	...	...	Persia.
		F	40	...	...	...	35° N., 53° E.
							(U.R.S.S.)
8		e	0 54 6	...	...	...	Felt in Southern
		F	58	...	...	...	Germany.
19	Z	ePKP	3 30 57	...	...	(15500)	New Hebrides.
	NE	eSS	53 5	...	...	...	16° S., 167° E.
	NE	e	54 31	...	...	...	(Stuttgart.)
	NE	eL	4 21	...	...	...	
	Z	eL	29	...	...	...	
		F	5 45	...	...	...	
20/21	ZNE	eP	23 28 34	...	...	3810	Compression.
	ZNE	iP	28 39	...	...	...	Amplitudes of iP as
	ZNE	iPP	30 8	...	...	...	read in mm. :—
	Z	iP_cP	31 4	...	...	...	Z. N. E.
	NE	iS	34 10	...	...	...	−14·0 +9·7 −4·2
	E	iSS	36 16	...	...	...	Azimuth = 335° giv-
	ZNE	eL	37	...	...	...	ing epicentre near
							75° N., 65° W.
							Baffin Bay.
	E	M	38–41	22	>310*	...	*Maxima too large to
	N	M	39–40	(20)	>270*	...	be recorded com-
	E	M	44 33	14	>260*	...	pletely.
	N	M	44 43	14	>250*	...	
	Z	M	44 47	14	+340	...	
	N	M	47 7	11	+170	...	
	Z	M	47 10	11	−165	...	
	· Z	M	50 17	11	−140	...	
		F	3 30	...	...	...	
22	ZE	e	0 11	...	...	...	Central America.
	NE	eL	25	...	...	...	9° N., 83° W.
	Z	eL	27	...	...	...	(J.S.A.)
		F	1 5	...	...	...	
22	E	e	5 14	...	...	...	Central America.
	N	eL	25	...	...	...	9° N., 84° W.
	ZE	eL	29	...	...	...	(J.S.A.)
		F	6 5	...	...	...	
22		e	8 50	...	...	...	
		F	9 40	...	...	...	Very small.
22	Z	iPKP	13 1 28	...	...	(14000)	Arafura Sea.
	ZNE	iPKS	4 45	...	...	...	
	ZE	eSKS	8 39	...	...	...	
	N	eSS	21 14	...	...	...	
	NE	eL	40	...	...	...	
	Z	eL	48	...	...	...	
	N	M	58 21	22	+22	...	
	E	M	59 22	23	−20	...	
	Z	M	14 6 10	18	+15	...	
		F	15 30	...	...	...	
22	NE	e	19 44	...	...	...	
	NE	eL	47	...	...	...	
	Z	eL	52	...	...	...	
		F	20 5	...	...	...	
22	NE	eL	23 17	...	...	...	
	Z	eL	21	...	...	...	
		F	40	...	...	...	
23	ZNE	e	1 20	...	...	...	Very small.
		F	25	...	...	...	Central Italy.
23	NE	eS	19 19 49	...	...	...	Central America.
	ZNE	eL	35	...	...	...	9° N., 83° W.
	E	M	38 13	22	−5	...	(J.S.A.)
		F	20 20	...	...	...	
28	Z	iP	11 17 44	...	...	4720	Persia.
	NE	eS	24 11	...	...	...	33° N., 55° E.
	ZNE	eL	27	...	...	...	(Stuttgart.)
	E	M	36 51	25	+25	...	
	N	M	39 11	22	−30	...	
	Z	M	40 23	22	−21	...	
		F	12 35	...	...	...	

* Confused by microseisms.

SEISMOLOGICAL DIARY—*continued.*

Galitzin Seismographs, three components.

546. Richmond (Kew Observatory). Lat 51° 28′ 6″ N. Long 0° 18′ 47″ W. Height above M S.L. 5 metres. **1933.**

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
			h. m. s.	s.	μ	km.	
Nov. 29	ZNE	eL	5 38	...	...	...	
		F	6 20	...	...	...	
29	ZNE	eL	19 47	...	...	...	
		F	20 15	...	...	...	
30		e	4 54	...	...	...	
		F	5 5	...	...	...	
Dec. 2	ZNE	eL	6 45	...	...	...	" N " record defective (broken contact between pendulum coils and leads) 2d. 9h. 38m. to 7d. 11h. 57m.
		F	7 15	...	...	...	
2	ZE	eL	20 55	...	...	...	
		F	22 5	...	...	...	
4	E	iS	19 54 39	...	...	...	Karafuto. 47° N., 144° E. (Stuttgart.)
	E	iPS	55 1	...	...	...	
		F	20 15	...	...	...	
6			—	...	...	...	No records 10h. 19m. to 11h. 25m. Adjustments for tilt of pillar.
7			—	...	...	...	No records 10h. 45m. to 11h. 57m. Repairing " N."
9	ZNE	eL	8 25	...	...	...	Kashmir. 37° N., 75° E. (U.R.S.S.)
		F	35	...	...	...	
12	Z	iPKP	14 30 20	...	...	(13800)	New Britain. 5° S., 153° E. (Manila.)
	Z	ePKS	33 35	...	...	...	
	N	eSKS	37 24	...	...	...	
	NE	eL	15 7	...	...	...	
	Z	eL	16	...	...	...	
	N	M	19 20	25	−13	...	
		F	16 45	...	...	...	
13	ZNE	iP	21 36 16	...	...	9250	Compression. Horizontal components disturbed by wind.
	ZNE	i	36 23	...	...	...	
	N	i	45 39	...	...	...	
	NE	iS	46 39	...	...	...	

Date.	Compt.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
			h. m. s.	s.	μ	km.	
Dec. 13 cont.	E	i	50 30	...	...	...	Pacific Ocean off Central America. 18° N., 104° W. (U.S.C.G.S.)
	NE	e	55 46	...	...	...	
	NE	eL	22 3	...	...	...	
	Z	eL	6	...	...	...	
	E	M	13 15	17	−54	...	
	N	M	13 23	20	−21	...	
	Z	M	13 45	16	−46	...	
		F	23 10	...	...	...	
14	ZNE	eL	8 3	...	...	...	Repetition from preceding epicentre.
	E	M	6 47	15	+12	...	
	Z	M	6 49	15	+11	...	
		F	25	...	...	...	
14		e	19 18	...	...	...	Persia. 32° N., 54° E. (U.R.S.S.)
		F	45	...	...	...	
15	ZE	iP	7 46 47	...	...	2410	Atlantic Ocean. 54° N., 35° W. (J.S.A.)
	ZNE	i	46 50	...	...	...	
	ZE	iPP	47 8	...	...	...	
	ZNE	iS	50 45	...	...	...	
	ZNE	L	51 43	...	...	...	
	N	M	52 42	19	−27	...	
	E	M	53 15	17	−34	...	
	Z	M	53 28	16	+30	...	
		F	8 25	...	...	...	
18		e	21 44	...	...	...	
		F	55	...	...	...	
19		e	18 4	...	...	...	
		F	25	...	...	...	
21/22		e	23 59	...	...	...	Very small. Pacific Ocean South of Japan. 25° N., 137° E. (U.R.S.S.)
		F	0 30	...	...	...	
24	NE	e	11 27	...	...	...	Pacific Ocean. 37° N., 171° E. (U.R.S.S.)
	E	eL	46	...	...	...	
	ZN	eL	52	...	...	...	
		F	12 55	...	...	...	

MICROSEISMS OF NORTH COMPONENT: AMPLITUDE (μ = ·001 mm.) AND PERIOD (seconds).
Derived from readings for the period of thirty minutes centring at the exact hours, Greenwich Mean Time.

547. RICHMOND (Kew Observatory). 1933.

Month.	JANUARY							
Hour G.M.T.	0h.		6h.		12h.		18h.	
	A.	Tp	A.	T.p	A.	Tp	A.	Tp
Day.	μ	s	μ	s	μ	s	μ	s
1	5·4	7·7	6·4	7·0	4·1	7·0	2·6	6·7
2	2·4	6·7	1·9	6·3	2·2	7·3	4·2	6·7
3	4·8	6·7	4·6	7·5	6·5	9·0	6·6	8·0
4	5·5	9·0	4·7	9·0	8·1	8·3	4·8	8·3
5	4·3	8·7	2·7	8·3	2·8	8·0	3·3	9·0
6	3·1	8·7	2·3	8·7	3·3	8·0	3·8	8·3
7	2·3	8·0	2·0	7·0	1·8	8·0	2·0	7·0
8	1·8	6·7	1·8	7·0	2·2	7·7	2·0	7·7
9	2·2	7·5	1·8	7·0	1·8	7·5	1·8	6·7
10	1·3	6·5	1·3	6·5	0·9	6·7	0·9	6·7
11	1·6	8·0	0·9	7·3	1·2	7·5	1·8	6·7
12	1·8	7·0	1·4	7·3	3·4	7·0	1·8	6·7
13	2·6	7·3	3·6	8·7	2·9	8·7	3·1	8·0
14	1·7	7·7	3·6	7·0	3·3	7·3	4·6	7·5
15	4·1	8·3	4·6	8·0	4·0	7·7	4·5	8·3
16	3·7	8·3	4·9	8·0	3·5	7·7	2·8	8·0
17	2·8	8·0	1·8	7·0	1·6	7·3	1·2	6·0
18	0·8	6·5	1·4	5·8	1·1	6·5	1·6	5·0
19	1·2	7·5	1·8	6·7	1·9	6·5	1·8	7·0
20	1·5	7·5	1·6	6·0	0·5	4·0	0·8	4·1
21	0·5	4·3	0·5	4·7	1·6	5·0	1·0	6·0
22	1·4	6·0	1·8	6·7	2·0	6·0	1·4	5·8
23	1·3	5·4	0·9	5·0	0·5	4·7	0·7	4·8
24	1·1	5·0	0·7	7·0	1·2	6·0	0·4	6·0
25	1·4	6·5	0·8	6·5	1·4	6·5	0·6	6·0
26	0·5	4·5	0·5	5·4	0·2	6·0	0·2	5·0
27	0·2	5·0	0·0	---	0·0	---	0·3	4·7
28	...	...	0·5	5·0	0·7	5·6	0·7	5·0
29	0·7	5·0	0·7	5·0	0·5	4·5	0·3	4·3
30	0·6	6·0	0·4	6·0	0·2	5·0	0·4	5·6
31	0·6	5·4	1·1	5·6	1·2	5·4	2·4	6·0
Mean	2·1	6·9	2·0	6·8	2·1	6·7	2·1	6·5
Mean for Day.	A = 2·1 μ ; Tp = 6·7s.							

Month.	FEBRUARY							
Hour G.M.T.	0h.		6h.		12h.		18h.	
	A.	Tp	A.	Tp	A.	Tp	A.	Tp
Day.	μ	s	μ	s	μ	s	μ	s
1	2·9	5·8	3·4	6·0	3·6	5·6	3·2	6·0
2	2·0	6·0	3·6	6·5	3·1	6·3	4·5	6·5
3	3·2	7·0	2·5	6·3	2·0	6·7	1·8	6·7
4	1·8	6·7	1·6	5·2	1·3	5·2	1·4	6·0
5	1·8	5·0	2·1	5·6	2·7	5·6	3·4	6·0
6	3·2	6·0	2·3	6·5	2·0	5·8	2·0	5·8
7	2·6	6·0	1·9	6·3	2·0	6·0	2·1	6·3
8	2·4	6·7	2·3	7·0	1·9	6·5	1·9	6·5
9	3·2	6·3	7·7	7·5	5·7	7·0	5·4	7·5
10	5·1	7·5	3·6	7·3	3·3	6·7	2·9	7·3
11	2·5	7·0	1·5	5·6	2·3	5·0	1·8	6·7
12	1·9	6·3	1·0	7·5	1·9	7·5	1·7	7·7
13	2·5	7·0	3·1	7·5	3·3	7·3	3·1	7·5
14	1·9	7·3	1·5	6·7	1·5	6·5	1·6	5·2
15	1·6	5·0	0·9	5·4	0·6	5·6	0·5	5·0
16	0·7	5·0	0·4	6·3	0·4	6·0	0·2	6·0
17	0·3	4·0	0·3	4·3	0·3	4·1	0·3	4·3
18	0·2	5·6	0·2	5·6	0·2	6·0	0·2	5·2
19	0·2	4·8	0·2	4·7	0·2	4·7	0·2	4·7
20	0·5	5·0	1·7	5·6	1·6	5·0	0·8	6·0
21	1·0	6·0	1·4	6·0	1·6	5·0	2·0	6·0
22	1·8	5·8	2·1	5·6	0·2	5·4	0·2	5·0
23	0·3	3·7	0·2	5·4	0·2	6·0	0·2	6·0
24	0·4	5·2	0·2	4·5	0·3	3·7	0·3	3·5
25	0·3	4·3	0·5	4·0	2·3	5·0	1·6	5·0
26	1·6	4·3	1·4	5·0	1·3	4·1	0·3	4·3
27	0·6	5·4	1·1	5·0	1·6	5·0	1·8	5·2
28	1·4	4·7	1·6	5·0	1·3	4·3	0·7	4·8
Mean	1·7	5·7	1·8	5·9	1·7	5·6	1·7	5·8
Mean for Day.	A = 1·7μ ; Tp = 5·7 s.							

Month.	MARCH							
Hour G.M.T.	0h.		6h.		12h.		18h.	
	A.	Tp	A.	Tp	A.	Tp	A.	Tp
Day.	μ	s	μ	s	μ	s	μ	s
1	0·2	4·7	0·2	4·7	0·3	4·0	0·2	5·0
2	0·2	7·0	0·2	6·5	0·3	4·0	...	...
3	0·3	4·3	0·5	5·0	0·9	4·8	0·4	5·6
4	1·9	5·6	2·2	5·2	1·5	6·3	1·4	5·8
5	1·6	5·8	1·1	5·6	0·9	5·4	1·5	5·4
6	2·4	5·4	2·3	5·6	2·3	5·6	2·0	6·0
7	2·0	6·0	2·0	5·8	1·5	5·6	1·6	5·8
8	1·3	5·4	1·2	6·0	0·6	5·6	0·9	5·2
9	0·6	5·6	0·6	5·6	0·8	5·6	1·1	5·6
10	1·1	5·6	1·0	6·0	0·8	6·0	1·0	6·0
11	0·2	5·0	0·6	6·0	0·2	5·4	0·4	4·5
12	0·2	6·0	0·2	5·4	0·2	6·5	0·2	6·0
13	0·2	6·0	0·2	6·0	0·2	6·5	0·2	6·5
14	0·2	7·0	0·8	6·5	0·8	6·5	0·9	6·5
15	1·0	6·3	1·1	5·0	1·1	6·5	1·0	4·5
16	1·7	4·8	2·0	6·0	2·7	7·0	2·8	6·5
17	3·7	7·0	3·1	6·7	3·1	5·8	3·8	6·0
18	3·0	5·4	2·7	6·3	2·8	6·5	2·0	6·0
19	1·9	6·5	1·8	6·7	1·9	6·5	2·3	6·5
20	2·7	7·0	2·7	6·3	2·0	5·8	1·9	6·5
21	1·9	5·6	2·2	5·4	2·0	5·2	1·9	6·5
22	2·1	6·5	2·1	6·3	2·3	6·3	2·3	6·5
23	1·8	5·2	2·0	5·8	2·3	4·3	1·8	4·3
24	2·7	4·0	1·7	4·5	1·4	4·0	0·5	4·0
25	0·3	4·3	0·3	4·1	0·2	5·4	0·3	4·3
26	0·2	5·4	0·4	5·6	0·2	5·6	0·2	6·0
27	0·2	6·0	0·4	6·0	0·2	6·0	0·2	6·0
28	0·5	4·7	0·2	5·2	0·2	5·4	0·2	6·0
29	0·4	6·5	0·8	6·5	0·5	6·7	0·6	6·3
30	0·6	5·8	0·4	5·8	0·2	5·6	0·4	5·6
31	0·4	6·0	0·4	5·6	0·9	5·2	0·7	5·2
Mean	1·2	5·7	1·2	5·7	1·1	5·7	1·2	5·7
Mean for Day.	A = 1·2 μ ; Tp = 5·7s.							

Month.	APRIL							
Hour.G.M.T.	0h.		6h.		12h.		18h.	
	A.	Tp	A.	Tp	A.	Tp	A.	Tp
Day.	μ	s	μ	s	μ	s	μ	s
1	0·2	5·6	0·2	5·0	0·5	5·0	0·5	5·0
2	0·2	5·2	0·4	5·2	1·9	5·4	1·7	5·6
3	1·8	6·0	1·5	5·6	1·1	5·6	1·1	5·6
4	1·2	5·8	0·9	4·8	0·9	5·2	0·4	5·6
5	0·4	5·2	0·4	5·4	0·5	5·0	0·5	5·0
6	0·2	5·0	0·2	5·4	0·2	6·5	0·2	6·0
7	0·2	5·6	0·5	4·8	0·2	5·2	0·2	5·0
8	0·5	5·0	0·2	5·4	0·3	4·3	0·0	---
9	0·2	4·5	0·2	4·5	0·2	5·0	0·2	4·7
10	0·2	5·0	0·2	5·0	0·4	5·6	0·4	5·6
11	0·6	6·0	1·8	5·0	1·4	6·0	1·3	6·3
12	1·5	5·6	0·6	5·4	0·7	5·2	0·8	5·6
13	1·0	6·0	1·2	6·0	0·4	6·3	0·6	6·0
14	0·4	5·2	0·4	5·6	0·5	5·0	0·7	5·2
15	1·9	5·4	1·7	5·4	1·8	5·2	1·9	5·6
16	1·8	5·8	1·3	5·6	1·7	5·6	1·1	5·4
17	0·6	5·4	0·7	5·2	0·2	5·2	0·2	5·0
18	0·3	4·3	0·3	4·3	0·3	4·3	0·3	4·3
19	1·0	4·5	0·5	4·3	0·5	4·5	0·2	4·5
20	0·3	4·0	0·3	4·3	0·3	4·1	0·0	---
21	0·0	---	0·0	---	0·0	---	0·0	---
22	0·0	---	0·0	---	0·3	4·3	0·2	4·7
23	0·2	5·0	0·2	4·8	0·3	4·3	0·5	4·8
24	1·0	5·8	0·5	5·0	0·4	5·6	0·4	5·6
25	1·9	6·3	2·0	6·0	2·0	5·8	2·0	6·0
26	1·4	5·8	1·6	6·0	1·0	6·3	0·9	5·0
27	0·8	6·0	0·5	4·8	0·9	5·0	1·4	5·8
28	1·8	6·0	1·5	6·3	1·8	6·0	0·8	5·6
29	1·4	6·0	1·8	6·0	1·0	5·8	1·0	6·0
30	1·0	6·0	1·0	6·3	0·8	5·6	0·4	6·3
Mean	0·8	5·4	0·7	5·3	0·7	5·3	0·7	5·4
Mean for Day.	A = 0·7μ ; Tp = 5·3s.							

Month.	MAY							
Hour.G.M.T.	0h.		6h.		12h.		18h.	
	A.	Tp	A.	Tp	A.	Tp	A.	Tp
Day.	μ	s	μ	s	μ	s	μ	s
1	0·4	6·5	0·2	6·0	0·2	5·0	0·2	6·0
2	0·0	---	0·3	4·0	0·3	4·0	0·5	4·3
3	1·9	4·1	1·8	4·3	1·7	4·5	1·0	4·7
4	1·1	4·0	0·5	4·3	1·2	4·5	1·2	4·7
5	1·1	5·0	1·2	4·5	1·0	4·5	0·9	5·0
6	0·5	4·3	0·7	4·7	0·2	4·7	0·3	3·7
7	0·3	4·0	0·3	4·3	0·3	4·3	0·3	4·3
8	0·3	4·3	0·0	---	0·0	---	0·3	4·3
9	0·2	5·0	0·5	4·7	0·7	5·0	1·8	5·0
10	1·5	6·3	0·7	5·0	0·4	6·0	0·8	6·3
11	0·9	7·5	0·5	4·8	0·6	6·0	0·8	6·3
12	0·9	6·7	1·0	7·3	0·8	6·0	0·4	5·6
13	0·4	6·0	0·2	5·8	0·2	6·0	0·2	5·2
14	0·0	---	0·0	---	0·0	---	0·0	---
15	0·0	---	0·0	---	0·0	---	0·3	4·0
16	0·5	5·0	0·2	6·0	0·2	6·5	0·2	6·3
17	0·2	6·0	0·2	5·8	0·2	6·0	0·2	5·8
18	0·2	6·0	0·2	6·0	0·2	6·7	0·4	7·0
19	0·4	6·0	1·0	6·0	0·4	6·0	0·4	6·0
20	0·4	5·6	0·4	5·6	0·2	6·0	0·2	5·2
21	0·2	6·0	0·2	6·0	0·2	5·2	0·2	5·2
22	0·2	5·2	0·2	5·6	0·5	5·0	0·5	5·0
23	0·2	5·0	0·2	4·7	0·2	4·8	0·0	---
24	0·0	---	0·0	---	0·0	---	0·0	---
25	0·2	5·0	0·7	7·5	1·1	7·0	1·5	6·5
26	0·4	6·5	0·2	6·5	0·2	4·7	0·4	5·2
27	0·2	5·2	0·2	5·6	0·2	6·0	0·2	5·6
28	0·0	---	0·0	---	0·0	---	0·0	---
29	0·0	---	0·0	---	0·0	---	0·0	---
30	0·0	---	0·0	---	0·0	---	0·0	---
31	0·2	4·7	0·3	3·7	0·3	4·3	0·2	5·0
Mean	0·4	5·4	0·4	5·4	0·4	5·3	0·4	5·3
Mean for Day.	A = 0·4μ ; Tp = 5·3s.							

Month.	JUNE							
Hour.G.M.T.	0h.		6h.		12h.		18h.	
	A.	Tp	A.	Tp	A.	Tp	A.	Tp
Day.	μ	s	μ	s	μ	s	μ	s
1	0·2	5·0	0·0	---	0·0	---	0·0	---
2	0·2	4·7	0·0	---	0·0	---	0·3	4·0
3	0·2	5·0	0·2	4·7	0·0	---	0·0	---
4	0·3	4·3	0·2	4·7	0·3	4·3	0·2	4·7
5	0·3	4·3	0·2	4·7	0·3	4·3	0·2	4·7
6	0·2	5·6	0·2	5·0	0·2	5·4	0·2	5·6
7	0·2	5·4	0·2	5·0	0·0	---	0·0	---
8	0·0	---	0·0	---	0·0	---	0·0	---
9	0·0	---	0·0	---	0·0	---	0·0	---
10	0·0	---	0·0	---	0·0	---	0·0	---
11	0·0	---	0·0	---	0·0	---	0·0	---
12	0·0	---	0·0	---	0·0	---	0·0	---
13	0·0	---	0·0	---	0·0	---	0·0	---
14	0·0	---	0·0	---	0·0	---	0·0	---
15	0·0	---	0·0	---	0·0	---	0·0	---
16	0·0	---	0·0	---	0·0	---	0·0	---
17	0·2	4·5	0·6	6·0	1·0	5·8	1·2	6·0
18	1·9	6·5	1·7	6·5	0·4	6·5	0·4	6·0
19	0·2	5·2	0·6	6·0	0·2	6·0	0·2	7·0
20	0·2	5·2	0·3	4·3	0·3	4·3	0·5	4·7
21	0·2	5·0	0·4	5·6	0·2	4·7	0·2	6·0
22	0·2	5·0	0·4	5·4	0·2	5·0	0·3	4·3
23	0·0	---	0·0	---	0·0	---	0·0	---
24	0·0	---	0·0	---	0·0	---	0·0	---
25	...	...	0·2	4·7	0·3	4·3	0·3	4·3
26	0·2	4·7	0·3	4·3	0·0	---	0·0	---
27	0·0	---	0·0	---	0·2	6·3	0·2	5·0
28	0·2	7·0	0·0	---	0·0	---	0·0	---
29	0·0	---	0·0	---	0·0	---	0·0	---
30	0·0	---	0·0	---	0·0	---	0·0	---
Mean	0·2	5·2	0·2	5·1	0·1	5·2	0·1	5·2
Mean for Day.	A = 0·1μ ; Tp = 5·2s.							

Note.- The Symbol ... indicates that microseisms were not measured, either by reason of occurrence of earthquakes or lack of record.

MICROSEISMS OF NORTH COMPONENT: AMPLITUDE (μ = ·001 mm.) AND PERIOD (seconds).
Derived from readings for the period of thirty minutes centring at the exact hours, Greenwich Mean Time.

547. RICHMOND (Kew Observatory).

JULY

Day	0h. A. (μ)	0h. Tp (s)	6h. A. (μ)	6h. Tp (s)	12h. A. (μ)	12h. Tp (s)	18h. A. (μ)	18h. Tp (s)
1	0·2	5·6	0·2	5·6	0·2	6·0	0·2	5·2
2	0·2	5·4	0·2	5·0	0·2	5·0	0·2	5·0
3	0·2	4·8	0·0	---	0·0	---	0·0	---
4	0·0	---	0·0	---	0·0	---	0·0	---
5	0·0	---	0·0	---	0·0	---	0·0	---
6	0·0	---	0·0	---	0·0	---	0·0	---
7	0·0	---	0·0	---	0·0	---	0·0	---
8	0·0	---	0·0	---	0·0	---	0·0	---
9	0·0	---	0·0	---	0·0	---	0·2	4·5
10	0·3	4·3	0·3	4·3	0·2	4·7	0·2	4·7
11	0·2	4·7	0·2	4·7	0·2	5·4	0·2	5·4
12	0·2	4·8	0·2	5·0	0·2	5·0	0·2	4·8
13	0·0	---	0·0	---	0·0	---	0·0	---
14	0·3	4·3	0·2	4·6	0·2	5·0	0·2	5·0
15	0·2	5·0	0·2	5·8	0·2	5·6	0·2	5·6
16	0·2	5·8	0·2	5·0	0·2	4·7	0·2	4·7
17	0·2	4·5	0·0	---	0·0	---	0·0	---
18	0·0	---	0·0	---	0·0	---	0·2	4·7
19	0·2	4·7	0·2	4·7	0·0	---	0·2	4·7
20	0·2	5·2	0·2	4·7	0·0	---	0·0	---
21	0·0	---	0·0	---	0·0	---	0·0	---
22	0·0	---	0·0	---	0·0	---	0·0	---
23	0·0	---	0·0	---	0·0	---	0·0	---
24	0·0	---	0·0	---	0·0	---	0·0	---
25	0·0	---	0·0	---	0·0	---	0·0	---
26	0·0	---	0·0	---	0·2	5·6	0·2	6·5
27	0·2	5·0	0·2	5·0	0·0	---	0·0	---
28	0·0	---	0·0	---	0·0	---	0·0	---
29	0·4	2·7	0·4	2·9	0·0	---	0·3	3·5
30	0·2	4·7	0·2	4·7	0·3	4·3	0·3	4·3
31	0·2	4·5	0·3	4·1	0·2	6·0	0·5	4·0
Mean	0·1	4·7	0·1	4·7	0·1	5·2	0·1	4·8
Mean For Day	A = 0·1 μ; Tp = 4·9s.							

AUGUST

Day	0h. A. (μ)	0h. Tp (s)	6h. A. (μ)	6h. Tp (s)	12h. A. (μ)	12h. Tp (s)	18h. A. (μ)	18h. Tp (s)
1	0·3	4·1	0·3	3·5	0·3	3·7	0·3	4·0
2	0·0	---	0·0	---	0·0	---	0·3	4·3
3	0·3	4·3	0·2	4·8	0·0	---	0·3	4·3
4	0·2	4·8	0·2	4·8	0·0	---	0·0	---
5	0·2	4·8	0·0	---	0·0	---	0·0	---
6	0·0	---	0·0	---	0·0	---	0·0	---
7	0·0	---	0·0	---	0·0	---	0·0	---
8	0·2	4·7	0·2	5·0	0·2	5·0	0·2	5·0
9	0·3	4·3	0·2	4·5	0·0	---	0·0	---
10	0·2	4·7	0·0	---	0·0	---	0·0	---
11	0·3	3·3	0·3	4·3	0·3	3·6	0·3	4·3
12	0·3	3·6	0·0	---	0·0	---	0·0	---
13	0·0	---	0·0	---	0·0	---	0·0	---
14	0·0	---	0·0	---	0·0	---	0·0	---
15	0·0	---	0·0	---	0·3	4·3	0·2	4·5
16	0·2	5·0	0·2	4·5	0·2	4·5	0·0	---
17	0·3	4·0	0·3	4·3	0·0	---	0·2	4·5
18	1·3	6·7	...	...	0·2	4·7	0·2	4·7
19	0·5	4·7	0·2	4·8	0·2	4·7	0·2	4·7
20	0·5	5·0	0·2	4·8	0·2	4·8	0·2	4·5
21	0·2	4·5	0·5	4·8	0·0	---	0·2	4·7
22	0·3	3·6	0·3	4·3	0·3	3·2	0·3	4·0
23	0·3	4·0	0·2	4·8	0·3	4·0	0·3	3·7
24	0·3	4·3	0·3	4·3	0·3	4·3	0·3	3·7
25	0·3	4·3	0·3	4·3	0·0	---	0·0	---
26	0·2	5·6	0·3	4·3	0·0	---	0·2	4·7
27	0·5	4·7	0·5	4·8	0·5	4·8	0·5	5·0
28	0·3	4·3	0·3	4·0	0·3	4·3	0·2	4·8
29	...	...	0·2	5·0	0·2	4·7	0·2	4·7
30	0·2	4·7	0·3	4·3	0·3	4·3	0·2	4·7
31	0·2	5·0	0·0	---	0·2	4·7	0·3	4·3
Mean	0·3	4·5	0·2	4·5	0·1	4·3	0·2	4·5
Mean For Day	A = 0·2 μ; Tp = 4·5s.							

SEPTEMBER

Day	0h. A. (μ)	0h. Tp (s)	6h. A. (μ)	6h. Tp (s)	12h. A. (μ)	12h. Tp (s)	18h. A. (μ)	18h. Tp (s)
1	0·2	4·5	0·2	4·7	0·2	4·7	0·2	4·7
2	0·0	---	0·3	4·1	0·0	---	...	...
3	0·0	---	0·0	---	0·0	---	0·0	---
4	0·0	---	0·0	---	0·0	---	0·2	6·0
5	0·2	5·6	0·2	6·0	0·0	---	0·2	4·7
6	0·2	4·5	0·2	5·2	0·2	4·7	0·4	5·6
7	0·4	5·6	0·5	4·7	0·2	5·0	0·3	4·0
8	0·3	4·3	0·3	4·0	0·3	4·0	0·2	6·0
9	0·2	4·7	0·2	4·7	0·2	5·0	0·2	5·6
10	0·2	5·0	0·2	4·7	0·0	---	0·0	---
11	0·0	---	0·0	---	0·0	---	0·0	---
12	0·0	---	0·0	---	0·0	---	0·0	---
13	0·0	---	0·0	---	0·0	---	0·0	---
14	0·0	---	0·2	5·0	0·2	4·7	0·2	4·5
15	0·2	4·5	0·2	6·0	0·3	4·0	0·5	5·0
16	0·2	5·4	0·5	5·0	0·2	5·0	0·5	5·0
17	0·2	5·0	0·3	4·3	0·3	4·3	0·2	4·7
18	0·5	4·3	0·4	5·2	0·5	4·0	0·5	4·3
19	0·5	4·5	0·7	5·0	0·5	4·8	0·5	4·8
20	0·5	4·7	0·6	5·6	0·2	4·8	0·3	4·0
21	0·2	5·6	0·4	5·4	0·3	4·3	0·3	4·0
22	0·0	---	0·0	---	0·0	---	0·0	---
23	0·0	---	0·0	---	0·0	---	0·2	5·0
24	0·5	5·0	0·6	6·0	0·8	5·6	0·2	5·6
25	0·5	4·7	0·4	6·7	0·2	5·0	0·3	4·3
26	0·2	4·7	0·2	5·0	0·0	---	0·0	---
27	0·0	---	0·0	---	0·0	---	0·0	---
28	0·0	---	0·0	---	0·0	---	0·0	---
29	0·0	---	0·0	---	0·3	4·0	0·3	4·3
30	0·2	4·5	0·3	4·0	0·3	3·7	0·3	3·7
31								
Mean	0·2	4·8	0·2	5·1	0·2	4·6	0·2	4·8
Mean For Day	A = 0·2 μ; Tp = 4·8s.							

OCTOBER

Day	0h. A. (μ)	0h. Tp (s)	6h. A. (μ)	6h. Tp (s)	12h. A. (μ)	12h. Tp (s)	18h. A. (μ)	18h. Tp (s)
1	0·3	4·0	0·3	4·0	0·0	---	0·0	---
2	0·2	4·8	0·2	6·0	0·0	---	0·3	4·1
3	0·2	5·0	0·2	4·8	...	...	0·2	5·6
4	0·2	5·8	0·2	6·0	0·2	4·7	0·2	5·0
5	0·2	5·0	0·2	4·7	0·0	---	0·0	---
6	0·2	4·8	0·2	5·0	0·2	4·6	0·2	5·0
7	0·2	5·0	0·0	---	0·0	---	0·0	---
8	0·0	---	0·0	---	0·3	3·7	0·3	3·7
9	0·8	4·3	0·7	5·4	1·6	5·0	1·5	5·6
10	2·0	5·4	0·7	5·6	2·0	5·2	1·3	6·0
11	1·7	5·4	1·5	5·0	2·1	5·0	1·9	6·5
12	3·5	5·4	2·5	5·6	1·9	5·6	1·4	5·8
13	1·1	5·4	0·4	5·8	0·5	5·0	0·7	5·0
14	0·8	5·8	1·0	6·0	1·0	5·8	0·7	5·2
15	0·8	5·8	1·4	6·0	1·4	6·0	1·4	6·0
16	2·5	8·0	2·8	7·3	3·0	7·0	1·9	7·3
17	1·7	7·3	1·6	7·3	1·6	6·0	1·5	6·5
18	1·0	6·0	1·1	5·6	1·1	5·6	1·3	5·4
19	2·0	5·4	0·9	5·0	1·9	4·3	0·8	4·3
20	0·9	4·0	0·3	3·9	0·6	4·0	0·3	4·3
21	0·9	4·0	0·6	3·7	0·3	4·1	0·3	3·7
22	0·5	4·7	0·3	4·5	0·3	4·5	0·3	4·3
23	0·3	4·0	0·3	4·3	0·2	5·0	0·2	4·7
24	0·3	4·3	0·3	4·3	0·3	3·7	0·0	---
25	0·3	4·0	0·3	4·0	0·3	4·0	0·2	5·0
26	...	...	0·7	5·0	1·9	6·3	1·5	5·6
27	0·8	4·5	0·6	3·7	1·5	3·7	0·9	7·0
28	1·8	7·0	1·7	7·5	2·3	7·0	1·8	7·0
29	2·1	4·3	1·3	4·3	0·6	4·0	0·5	4·8
30	0·3	4·1	0·2	4·8	0·2	4·7	0·2	5·0
31	0·3	4·3	0·3	3·3	0·6	4·0	0·4	5·4
Mean	0·9	5·1	0·7	5·1	0·9	4·9	0·7	5·3
Mean For Day	A = 0·8 μ; Tp = 5·1s.							

NOVEMBER

Day	0h. A. (μ)	0h. Tp (s)	6h. A. (μ)	6h. Tp (s)	12h. A. (μ)	12h. Tp (s)	18h. A. (μ)	18h. Tp (s)
1	1·5	6·5	1·0	6·0	1·0	5·8	0·4	5·6
2	0·7	5·4	0·8	4·3	0·4	3·2	0·5	4·3
3	1·0	4·7	1·0	4·5	1·0	5·8	0·4	5·8
4	0·2	4·7	0·2	4·7	0·2	5·0	0·3	4·5
5	0·3	4·0	0·3	4·3	0·4	6·5	0·5	5·0
6	0·4	6·5	0·6	6·5	0·4	5·6	0·4	5·8
7	0·4	6·3	0·7	5·2	0·5	4·8	0·2	6·5
8	0·4	6·3	0·8	6·5	0·4	6·3	0·4	6·3
9	0·5	7·5	0·9	7·0	0·4	6·0	0·8	5·8
10	0·5	5·0	0·4	5·6	0·2	5·6	0·2	5·0
11	0·4	6·5	0·6	6·0	0·6	6·0	1·0	6·0
12	1·4	5·8	1·8	8·0	2·9	7·5	1·7	7·5
13	0·9	6·7	0·9	6·7	1·4	7·0	1·4	6·0
14	1·4	6·0	0·9	7·5	1·6	8·7	2·2	7·7
15	2·2	8·3	3·5	7·7	3·8	9·0	3·3	8·0
16	2·7	7·7	2·8	8·7	1·9	7·5	1·7	7·5
17	1·0	6·0	0·3	7·5	0·5	4·3	0·2	4·7
18	0·3	4·3	0·3	4·5	0·5	4·7	0·4	5·4
19	0·2	5·0	0·5	5·0	0·2	5·0	0·5	5·0
20	0·5	5·0	0·6	5·6	0·7	5·0	0·7	5·4
21	...	...	0·6	6·0	0·2	5·0	0·2	6·0
22	0·4	6·0	0·2	6·0	0·3	4·3	0·2	6·0
23	0·2	5·6	0·2	6·0	0·2	5·6	0·2	5·4
24	0·2	6·0	0·2	5·6	0·2	6·0	0·2	6·0
25	0·4	6·0	0·2	5·8	0·2	6·0	0·3	4·3
26	0·3	3·7	0·0	---	0·3	3·7	0·5	5·0
27	0·7	5·4	0·4	5·4	...	...	1·1	5·6
28	0·9	5·4	0·7	5·2	...	...	0·2	5·2
29	0·2	6·0	0·3	4·3	0·2	5·0	0·3	3·9
30	0·2	5·6	0·2	4·8	0·2	5·0	0·2	6·0
31								
Mean	0·7	5·8	0·7	5·9	0·7	5·7	0·7	5·7
Mean For Day	A = 0·7 μ; Tp = 5·8s.							

DECEMBER

Day	0h. A. (μ)	0h. Tp (s)	6h. A. (μ)	6h. Tp (s)	12h. A. (μ)	12h. Tp (s)	18h. A. (μ)	18h. Tp (s)
1	0·4	6·5	0·4	6·5	0·8	6·0	0·9	6·5
2	0·6	6·5	0·2	6·0	2·1	4·8	0·8	6·5
3	1·1	4·8	0·5	5·4	1·2	5·6	1·4	5·6
4	1·8	5·0	2·3	5·6	2·1	5·6	1·5	5·0
5	2·0	5·0	1·2	5·6	0·6	7·3	1·0	7·3
6	1·0	7·0	0·9	6·0	1·6	7·0	0·6	6·5
7	0·4	7·0	0·2	6·5	0·6	6·7	0·4	5·6
8	0·4	6·7	0·3	3·7	0·3	4·0	0·3	4·3
9	1·6	5·0	0·5	4·3	0·2	4·7	0·3	3·7
10	0·3	3·6	0·3	4·3	0·0	---	0·0	---
11	0·0	---	0·0	---	0·0	---	0·0	---
12	0·0	---	0·0	---	0·3	3·5	0·2	4·7
13	0·2	4·8	0·6	4·0	0·9	4·0	0·6	4·5
14	1·4	5·0	1·6	5·2	1·3	5·6	1·1	5·2
15	1·9	6·5	1·8	7·0	1·8	7·0	1·8	6·7
16	0·4	6·0	0·4	6·5	0·6	6·5	0·4	6·5
17	1·4	7·0	0·9	6·5	0·6	6·3	1·7	6·7
18	1·7	7·3	0·6	6·3	0·9	6·5	1·3	6·3
19	1·0	6·3	1·6	6·0	1·0	6·3	0·9	6·7
20	0·9	6·7	1·1	6·5	1·3	7·0	1·8	7·0
21	1·9	6·5	1·8	6·7	1·8	7·7	1·8	7·0
22	1·8	6·0	1·8	6·7	1·6	8·7	1·9	7·3
23	2·0	7·0	1·8	7·0	1·6	7·0	1·7	7·5
24	1·7	6·7	1·1	6·7	0·8	5·6	0·2	6·0
25	0·2	6·5	0·2	5·6	0·4	7·0	0·8	6·0
26	2·0	6·0	2·0	6·0	2·0	7·5	2·4	7·7
27	3·0	7·7	1·9	7·3	1·9	8·3	2·7	8·7
28	2·8	8·0	2·7	7·5	5·0	9·0	4·7	9·0
29	4·6	9·0	3·1	8·7	3·8	9·0	2·8	8·7
30	3·3	8·0	3·4	6·5	3·0	8·0	4·5	8·0
31	3·9	7·5	4·0	7·7	2·4	6·7	2·6	8·0
Mean	1·5	6·4	1·3	6·1	1·4	6·6	1·4	6·5
Mean For Day	A = 1·4 μ; Tp = 6·4s.							