

No.	Date	Phase	Time	Periods	Ampli- tudes	Remarks
			h. m. s.	s.	mm.	
278	1913 Jan. 7	Ee	23 52 17			Cf. Manila P 22-53-33.
		eL	23 52 25			
	8	F	0 05 15			
*279	11	EeL	13 55 39			Cf. Manila P 13-20.
		F	16 03			
280	15	NP	18 58 56			Distance 3700 kms. O near λ 100° W, ϕ 17° 33' N.? Cf. Manila e 19-11.
		PR ₁	19 00 16			
		S	19 04 26			
		L	19 13 20			
		F	19 28			
		EP	18 59 00			
		PR ₁	19 00 18			
		S	19 04 28			
		L	19 12 57			
		F	20 07			
		281	19	NEL	18 16 30	
F	18 50					
EeS	17 43 54					
L	18 12 18					
F	18 52 ca					
282	19	NeL	19 12 14			Cf. Graz L19h., 28m. Falls within Record 281 at Ottawa, W ¹ ? If so, Δ = 13,300 kms?
		F	19 13 28			
283	22	Ee?	18 30 06	var.		Pulsations? Unheard from.
		F	18 35 34			
284	23	Ee	12 29 07	var.		Cf. Ithaca, N. Y. e? 12-09; F 14:01.
		F	12 32			
285	23	NeS?	14 45 12	6		Cf. Sydney eP 13-59.3 D. 5800? kms. (Sydney) Ottawa e L 14-55.5.
		eL	15 05 02	20	0.1	
		F	15 51 47			
		EeS?	14 46 31	8		
		L	15 04 37	20-25	0.15	
		F	15 51 48			

No.	Date	Phase	Time			Periods	Ampli- tudes	Remarks
			h.	m.	s.			
286	1913 Jan. 31	NeP	22	54	52	10	mm.	D. 4120 kms. Ottawa Δ 4220 kms. Cornell Δ 4220 kms. O = 22h. 47m. 34s. O, near 100 W, 16 N.
		PR ₁	22	56	09			
		S	23	00	46			
		eL?	23	10	21			
		F	23	30	ca			
		EeL	23	08	45			
287	Feb. 9	EeS?	8	23	02	8 28-24		Doubtful record. Not reported elsewhere.
		eL	8	29	20			
		F	8	32	ca			
288	27	Ee?	20	56	36			Hour doubtful. Not heard from.
		eL	20	59	48			
		F	21	08	41			
289	Feb. 20	EeS?	9	22	53			Dist. 10,600 kms.? Ja- pan? O = 8h. 57m. 08s.
		L	9	41	54			
		F	10	23				
289a	23	EeS?	3	08	21	6	0.16	Qr. Guayaquil, Ecuador P & S masked by mi- croseisms.
		M	3	22	27			
		F	3	29	ca			
290	Mar. 3	Ne	3	27	41	9-8		Among microseisms of 3 to 4 secs. period. E record in tangled lines of undamped pen- dulum.
		F	3	29	14			
291	4	ES?	11	40	21	6 18 20	0.15	L-S? 4m. 34s.: 4500? kms. Micros. N-S damped 4:1.
			11	42	40			
		L	11	44	43			
		F	11	59	25			
291a	8	EeL	15	31	18	24-12		Very faint. Not heard from.
		F	15	35	31			
292	8	EeP	15	59	46	3 26		Undamped. D 3440 kms.
		S	16	04	59			
		eL	16	07	14			

No.	Date	Phase	Time	Periods	Ampli- tudes	Remarks
	1913		h. m. s.	s.	mm.	
		M?	16 09 56	27	2.2	Qr. Guajiniquilapa, Guatemala ca 90° 17' W. ca 14° 12' N. L. Vd. Bull. Seism. soc. Amer., 3, p. 35.
		F	16 46 30			
		Ee	16 52 31			
		F?	16 56 09			
292a	Mar. 9	L	16 23 40	20		Faint LL N-S; masked by microseisms.
		F?	16 34			
293	10	EeL	14 45 41	18-20		Very flat waves. Micros. N-S 3.51s pd. (Cf. Sydney, N. S. W., M. 14-08-21).
		F	15 05 03			
*294-5	14	NP	9 04 19	2-3		P. pds. in groups.
			9 07 12	3		
			9 08 22	6		
			9 08 38	4-3		Qr. Sanger Id. Eastern Mindinao, ϕ 3° 30' N. λ 125° 30' E.
			9 09 27	3-6		
			9 12 02			
			9 12 05			
			9 23 59			
		L	9 42 44			
		EP	9 04 21	2		E-W undamped comp.
			9 05 00	6		
			9 05 55	2-4		
			9 06 35	8-10		
			9 09 47	6-8		
			9 12 19			
			9 23 54	35	20	Excessive motion of un- damped pendulum. i throw E.
		L	9 42 44			Sinusoidals set in.
		M	9 50 10			LL 100 > 70 > 46 > 40s.
		L	9 53 44	26-20		Sinusoidals repeated.
			10 21 44	100	2	
			10 26 35	15		
		(F)	11 23 30			
		L	11 24 14	36-40		
		F	11 29 12			
296	15	NP	22 37 41	4		Distance 1750? kms.

No.	Date	Phase	Time	Periods	Ampli- tudes	Remarks
	1913		h. m. s.	s.	mm.	
		L?	22 41 18	6		
		F	22 47			
		EeP	22 38 16	4		vd. Ottawa, Ithaca (Cornell).
		eL?	22 41 50			
		F	22 48 ca.			
297	Mar. 17	EeS?	13 55 54			Not reported elsewhere.
		L?	13 59 48	20-13		Wind effects?
		F	14 19 30			
298	31	NP	3 51 40	2		
		S	4 02 04			Dist. 7865 kms.
		L	4 16 15	20		O, 3h. 40m. 30s.
		M	4 19 42		0.5	
			4 23 15		0.75	O near λ 180° W; ϕ ca. 49° N.
		F	5 47 ca			
		EP	3 51 43	3-4		
		S	4 00 53	8		
		L	4 16 01	24		
		M	4 19 59		12.5	
			4 24 21		7.5	
		F	6 49			
299	31	eL	7 35 12	20		From epicentre of 298?
		F	7 48			
299a	Apr. 13	EL	7 36 26			Cf. Ottawa e 6-59.
		F	7 43 49			O in So. Japan?
299b	1	E	— — —			Tangled record, Vd. Ottawa e 10-41-12. Cornell e 11-25-30.
300	25	Ne	18 55			Qr. Mindanao.
		L	19 03 52			
		M	19 10 41			
		F	19 38			
		EeP	18 18 37	5-4		
		S	18 34 37	10		
		eL	19 01 34	20		
		F	20 36			

No.	Date	Phase	Time	Periods	Ampli- tudes	Remarks
			h. m. s.	s.	mm.	
301	1913 Apr. 29	NP	0 30 03	0.4		Dist. 435 kms. Qf. St. Lawrence Valley south of Ottawa. O = 0h 29 m. 7s.
		M	0 30 53	0.5	.7	
		F	0 33 34			
		EP	0 30 02			
		M	0 30 50		.8	
		F	0 33 34			
302	Apr. 30	NeL	0 06 59	20		Vd. Ottawa & Graz. O in East. Hemisph.
		M	0 12 20			
		F	0 16 21			
		EeL	0 06 43	20		
		F	0 31 40			
303	30	NeL	12 11 31	16		5250 kms. plus.
		F	12 18 49			
		EeS	11 53 48	8		
		L	12 06 01	25		
		F	12 55			
304	May 8	EeP	18 54 00			Very faint LL. N-S damped 4 : 1. 5890 kms.
		?PR ₁	18 55 05			
		S	19 01 30	10		
			19 03 34	06		
		eL	19 09 32	20		
			19 16 29	24		
		F	19 34 50	18		
305	16	Ne	12 13 42	3		Cf. Ottawa P 11-53-39.
			12 15 45	6		
		F	12 30 44			
306	18	NeL	3 08 19	24		Very faint NS micros. 3-4s pd. eEW in tangled lines.
		F	3 17 06			
		Ee?	2 59 47			
		L?	3 02 56	24		
		L	3 08 07	20		
			3 11 31	20		
307	24	EeL	8 00 07	18		
		L	8 15 45			

No.	Date	Phase	Time		Periods	Ampli- tudes	Remarks
			h. m. s.	s.			
308	1913 May 30	NeL	12 24 58	25	0.9	mm.	Micros. mask P and S. Sydney, N. S. W. re- ports "S. of New Po- merania?" Masked by microseisms.
			12 39 58	42			
			12 59 56	20			
		F	13 25				
		EeP?	12 09 32	2			
		S	12 18 12	6			
		eL	12 37 42				
		M	12 42 30	38			
		L	12 52 33	20			
		F	13 00 21	16			
		F	14 08 30				
309	June 4	EeL	10 52 09	20			Sinusoidal waves.
			10 58 47	36			
			11 03 47	24			
		F	12 06 ca				
310	7	EeL	10 46 18	20	.2		Undamped pendulum. Merges into next?
		M	10 52 07	20			
		F?					
311	7	EL	11 36 13	20			Possibly 310 & 311 one record. Not traceable on N-S damped com- ponent.
		F	11 48 ca				
312	14	EeP	8 43 40	2			S-P : 3580 kms.
		S?	8 49 02	6			
		eL?	8 56 07	22			
		F	9 31 47				
313	14	EP	9 44 06	2			S—P:7635 kms. Qf Trnova, Bulgaria. Graz O = ϕ 42° 13' N. λ 26° 17° E.
		S	9 53 08				
		L	10 04 30				
		M	10 10				
		F	11 29				
314	14	eP?	11 38 33	3			Micros. only N-S on damped comp. S-P: 3230? kms.
		S	11 43 32	9			
		L	11 47 24	20			
		F	12 ca				

No.	Date	Phase	Time	Periods	Ampli- tudes	Remarks
315	1913 June 22	NP	h. m. s. 14 01 06	s.	mm.	S _E -P _N 9m. 5s. 7700 kms. Changed records. Undamped pendulum.
		S	14 10 43			
		L?	14 23 23			
		F?	14 28			
		EP	14 01 11			
		S	14 10 11			
		L	14 25 44			
		M	14 28 33			
		F	15 41			
*316	June 26	NePR	5 16 54	3		Damped 4:1. Micro- seisms. See note p. 75. Qf. Samoa & Tonga Ids. Damped amplitudes very small. Undamped pendulum. .8 i5E Looks like iS. Sinusoidals — well- formed. 38E 37W
		S	5 24 37	11		
			5 32 07			
			5 39 44	20		
			44 31	54		
		eL?	46 43	35		
			49 01	16		
			49 49	14		
			5 51 27	26		
		F	7 15 ca			
		EeP?	5 11 46			
		P	5 12 12			
		ePR ₁ ?	5 16 52	7		
		S	5 23 05	11		
			5 25 23	20		
			5 32 53	30		
L	5 50 33	28				
	52 47	30				
	54 20	22				
M	56 56	22				
	57 04	22				
C	5 57 36					
F	8 13 ca					
317	29	Ee	15 40			Doubtful record, wind?
		L?	15 42 34	24		
		F	15 49			
318	July 7	Ee?	17 47 44	11		Undamped pendulum.

No.	Date	Phase	Time	Periods	Ampli- tudes	Remarks
	1913		h. m. s.	s.	mm.	
		eL?	18 30 42	30		
			18 41 19	20		
			19 16 09	16		
		F	19 53			
319	July 8	EeP?	8 54	3		
		S?	8 56	6		
		F	9 04			
320	8	EeL	22 03 10	28		
			04 00	20		
		F	22 35 ca			Lost in wind waves of long periods.
321	9	Ne	0 26 25	3		Damped 4:1.
		S?	0 26 40	6		
		F	0 39			
		Ee?	0 22 14			Undamped pendulum.
		S	0 24 10			
		L?	0 25 17			
		F	0 58			
322	9	EeL	12 47 19	10		
		F	12 54			
323	12	EeL	10 56 09			Vd. Czernowitz e P 10- 36-48.
		F	12 ca			
*324	22	EP?	6 46 04			Recorded in tangled lines.
		S?	6 54 04			Ottawa record differs.
		L?	6 59 55			
		F				
325	24	EP?	9 04 28			
		S	9 09 46	• 8		3550 ? kms.
		eL	9 11 07	16		Vd. Ottawa.
		F	9 23			
326	25					Present, but in tangled lines. Ottawa P 12-44- 46.

No.	Date	Phase	Time			Periods	Ampli- tudes	Remarks	
			h.	m.	s.				
327	1913 July 26	EP?	20	58	29	6	mm.	4140 kms. O 20h. 51m. 47s. O in Roumania λ 27° 10' E. ϕ 40° 37' N.	
		S	21	04	24				
		L	21	11	09				
		F?	21	45					
*328	28	EP?	5	49	36			6430 kms. O, 5h. 39m. 42s. O. S. Amer.?	
		S	5	57	35				
		L	6	07	19				
		F	7	03					
329	Aug. 1	EeP	17	23	24			8090 kms. Vd. Pola Record. O, 17h. 11m. 04s. O in S. Atlantic?	
		S	17	33	25				
		L	17	48	55				
		F	18	59					
330	5	EeS?	2	05		6		Doubtful record. Not heard from.	
		NL	2	16					16
		EF	2	52					
331	6	NP	22	24	30	4	1.25	6520 kms. O: 22h. 14m. 50s. Damped 4:1. Qr Caraveli and Qui- cacha, Peru.	
		S	22	32	34	8			
		L	22	46	18	22			
		M	22	49	19	25			
		F	23	49	16				
		EP	22	24	36				
		S	22	32	36				
		L	22	42	12				
		M	22	50	51				
		F?							
332	7	EeP?	2	16	36	3-4		Not heard from.	
		L	2	39	36	20			
		F	3	22					
*333	13	NP	4	44	19			Straits of Sunda (Ba- tavia).	
		EL	5	15	58				
		NL	5	42					
		NF	6	33					



No.	Date	Phase	Time	Periods	Ampli- tudes	Remarks
334	1913 Aug. 15	EP?	h. m. s.	s.	mm.	Undamped pendulum. Dist. 6000 kms? Pulkovo gives 26.9° N, 141.5° E.
		S?	19 27 24	4		
		L	19 35 00	8		
			19 46 59	28		
		F	19 54 34	20	0.25	
335	17	Ee	20 39 19			Ottawa L 18-04-30.
		L	17 59 53	6		
		F	18 04 08	10		
336	31	Ee	18 09 43			Ottawa eL 18-07.
		L	18 01 01	10		
		F?	18 07 34	26		
*337	Sept. 3	NeS	18 48			
		EeL?	21 17 29?			
		L?	21 26 03?			
338	Oct. 2	NP	21 54 25?			S-P, 5m. 45s. 3970 kms. Felt on Panama. O = 4h. 24m. 14s.
		S	4 30 53			
		L?	4 36 38			
		M	4 45 05			
		F	4 50 36			
		EP	5 25			
		S	4 30 36			
		L	4 36 18			
		L	4 47 36			
		F	4 47 36			
339	4	EP?	5 35			P and S in micros. Qr. Panama. 3725? kms.
		S?	22 12 26			
		eL?	22 17 57			
		F	22 20 53			
339a	8	EeL?	22 46 ca			
			1 50 15	34		
		F?	1 52 09	16		
340	9	EeP?	1 55 03			But Cf. Ottawa eP? 18-41-52. 7670? kms.
		S	18 39 04	4-3		
		L	18 48 07	9		
			18 51 25	12		

No.	Date	Phase	Time			Periods	Ampli- tudes	Remarks
			h.	m.	s.			
	1913							
		L	18	57	16	20		
		F	19	13	29			
341	Oct. 11	Ee						
		S	2	08	13			
		eL	2	13	05			
			2	29	56			
		L	3	30	47			
		F	3	49				
342	11	EeP	4	27	30	3		
			4	28	50			
		S?	4	39	32			N. W. coast of Japan.
		eL	4	45	07	20		
			5	12	02			Sinusoidals begin.
		F	6	10				E-W comp. not recording between Oct. 11d. 13h. 15m. and 12d. 14h 26m.
343	Oct. 11	EeS	9	33	34			Vienna P 9h. 22 m. 7s
		eL	10	00	02			Sinusoidals set in.
		F	10	48	ca			Japan.
344	12	Ee	17	50	12			O east of 75° W. L.
		eL	17	56	18	20		
		F	18	05				
345	14	EeP?	8	28	23			
		S?						
		eL	8	42	24	36		
		M	8	48	02			
		L	9	07	05	60		
		L	10	56	40			Vienna P 8-28-02.
		F	11	38	ca			
346	23	EeS	15	13	22			Δ 4150 kms?
		eL	15	17	10			Vienna P 15-13-46.
		F	15	39				

No.	Date	Phase	Time	Periods	Ampli- tudes	Remarks
	1913		h. m. s.	s.	mm.	
347	Oct. 26	Ee F	22 46 38 22 52 08			Nos. 347-350 have short periods up to 15 secs. Stylus caught fuzz and dropped it during these records which may thus be artificial; but Cf. Cornell (Ithaca) No. 119 e23-17-41; F 23-25.
348		Ee F	22 57 05 23 02 10			
349		Ee F	23 16 36 23 53 30			
350	27	Ee F	0 21 20 0 42 04			Ottawa eL 23-17-12.
351	Nov. 4	EeL F	10 31 02 10 55 ca	24		P and S obscured by microseisms and diurnal wave entanglement of lines. Vienna eL 10-52.
352	10	EeL M C F	22 11 32 22 14 59 22 20 52 23 03 47	24 22-24	1.5	Record faint; on undamped pendulum only. P and S obscured by microseisms. Vienna P 21-31-53.
353	19	EeP? eS? eL F	3 44 41 4 00 18 4 14 18 4 23 26 4 27 00 5 12 33 5 13 45 5 32 ca	10 20 40 30-24 17		No record E-W from Nov. 13d. 14h. 16m. until Nov. 14d. 13h. 53m. Stylus tilted over on joint in smoked paper. No record N-S from Nov. 17d. 20h. 53m. until Nov. 18d. 13h. 45m. Ottawa S? 3-54-14.
354	23	Ee eL?	21 38 36 21 42 42 21 52 41 22 02 01	28-30 31		e is eS? Cf. Innsbruck eL 21-57. Vienna eL 21-54.

No.	Date	Phase	Time	Periods	Amplitudes	Remarks
	1913		h. m. s.	s.	mm.	
		L	22 05 56	18		
			22 10 31	16		
		F	22 22 07			On E-W comp. from 4h. 45m. Nov. 26 to end of run, stylus was held against rim of drum by excessive diurnal and cyclonic tilt.
355	Dec. 21	Ee?	16 32 13	12		Comp. set up shortly before 16-28-40.
		eL	16 35 12	16-34		P and S in microseisms.
			16 40 18	20		Cf. Vienna P 15-49-06.
			16 44 12	20		O east of Vienna.
		F	17 06 58			
356	25	ES	7 01 56			
		eL	7 08 56	20-16		Δ 5310? kms. Trieste
		F	7 10 26			Δ 4080. Vienna Δ 4280.
						O? in Atlantic off Africa?

NUMBER OF EARTHQUAKES RECORDED SINCE JAN. 1, 1910. (G. M. T).

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Sums.
1910	5	2	5	5	12	9	8	4	10	3	11	12	86
1911	8	11	3	5	6	6	3	2	8	7	8	5	72
1912	3	4	4	7	7	25	13	8	6	4	6	10	97
1913	9	2	10	5	5	9	10	8	1	12	4	2	77
Sums.	25	19	22	22	30	49	34	22	25	26	29	29	332
Aver.	6.2	4.7	5.5	5.5	7.5	12.2	8.5	5.5	6.2	6.5	7.2	7.2	83

Records Nos. 246, 269, 274, 276, 283, 287, 288, 291a, 297, 317, 330, are subject to some doubt. They have not been reported by other stations in the exchanges sent to the University, and several of them are

associated with irregular periods characteristic of local disturbances probably caused by winds. Several similar records accord with reports from distant stations as that at Batavia, Java, as is indicated in the Remarks, and it is possible that more complete reports from very distant stations would show that these records represent the decadent maxima of long waves of distant weak earthquakes. They have been recorded because the periods of the wave motion display a seismic character.

Record 299b was too much tangled by reason of the wandering of the stylus under the impulse of the diurnal wave to be read with certainty on the E component. It was not recorded by the N damped component. It will be observed that for the 18 months covered by this report only three earthquakes were recorded whose origin was in the United States or immediately on its borders in Canada. No. 250 is correlated with shocks felt in Arizona but the records are unsatisfactory. No. 277a is evidently the record of a quake felt in South Carolina, but definite wave phases could not be determined. No. 301 is a satisfactory record of a local shock whose origin lay probably north of the St. Lawrence river on a straight line between Cambridge and Ottawa. For an account of the data compiled by Dr. Otto Klotz of Ottawa concerning this earthquake, see Publications of the Dominion Observatory, Ottawa, 1913, 1, no. 5, p. 131-152.

Nos. 294-5 and 316 are records of the most important earthquakes of 1913, both in the Pacific island region.

LACUNAE IN RECORDS. The seismograph was out of commission from Sunday, 25 August about 15h. G. M. T. to Monday, 26 August, 13h. 18m. G. M. T. 1912. Reports from other stations do not indicate that any important earthquake was elsewhere recorded during this interval.

NEW ENGLAND EARTHQUAKES. December 11, 1912, a moderate shock was felt at 5:15 A. M. from Augusta, Me. to beyond Fredericton, N. B. (Reid: in American Year-Book for 1913, p. 630). The shock of 28 April in the St. Lawrence valley south of Ottawa was also felt in neighboring portions of Vermont. November 3, 1913, a light shock was felt in southwestern Rhode Island. No trace of the disturbance was recognizable on the records at this Station. According to press despatches the time was variously given from 9:30 A. M. to as late as 10:14 by household clocks. Most of the reports indicate a time about 9:30 A. M. Eastern S. T. In southern Rhode Island sounds were heard in the air like the booming of guns. In the town of Carolina a chair is said to have been overturned in the office of the town clerk.

The motion was felt on the southwest as far as Watch Hill. It seems to have been felt only on the western side of Narragansett Bay and to have been most noticeable in the southern towns. The southern coast of Connecticut and Rhode Island appears to be a much dissected fault scarp, in the latter state of little elevation above the sea and much encumbered with morainal deposits. The occurrence heretofore as in 1847-8 of earthquakes along this line from eastern Rhode Island to New York City and southwestward along the "Fall Line" suggests that this earthquake had its origin in a slight slip along a fault on the northern shore of the New England Sounds. The absence of reports of a shock felt on Block Island coupled with the distance to which the shock was felt northward in western Rhode Island possibly points to a low angle of dip of this fault to the north. No faults have been detected in the rocks on the mainland in southwestern Rhode Island to which the shock may be attributed, but the region is heavily drift covered and the crystalline rocks of the western part of the state have never been delineated on a map available for study. In this connection the observation of the late Prof. W. H. Niles on the meridional compression of the gneisses in the quarry at Monson, Mass., (about sixty miles northwest of the Rhode Island shore) and the occurrence of similar phenomena in western Rhode Island, verbally described to me by the late Professor Packard of Brown University, deserve note as indicating the existence of a superficial compression of the rocks in southern New England in a direction consonant with the above suggestion of the attitude of the supposed fault-plane bordering the south coast. At the locality described by Professor Packard a ledge of rock was reported to throw off large spalls with a loud noise, in a manner and at times favoring the supposition that it was yielding to earth pressure like that exhibited in the Monson quarry.

Condition of the Station:— From the latter part of June until about 1st December, 1913, the seismograph was greatly disturbed by the construction of the Ethnological Section of the University Museum adjoining the instrument room and also by the use of the basement of the Geological Section as a workshop.

Educational Use of the Station:— The seismograph has been regularly visited by the classes in elementary geology, and seismograms with a statement of the theory of seismic waves and their registration have formed a part of the instruction concerning earthquakes and the subject of faults in the courses in Dynamic and Structural Geology. As an adjunct to the Geological Laboratory the Station has proved to be an important object lesson in enforcing upon all classes of students

the discoveries of modern seismology. Classes from the public schools of Boston, and students of geology from neighboring colleges, also visit the Station. These visits are availed of by the Professor in charge to give a brief lecture on the entire working of the Station and the results obtained by the instrumental study of seismograms. The instrument room is provided with glass windows through which the instrument may be seen by students without disturbing the records. If the plant served no other purpose than this educational adjunct to the Geological Laboratory, its installation would have been worth the relatively small cost for so impressive an exhibit and convincing demonstration of some of the properties of the earth's interior. If as an enthusiastic seismologist has stated, "The seismograph is to the earth's interior what the telescope is to the space outside our earth," any department of instruction concerned with the geophysics of the globe should have a working seismograph as a part of its apparatus.