

## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES



January, 1916.

Observatory, Eskdalemuir, Langholm. Scotland.

Lat. 55° 19' N.

Long. 3° 12' W.

h = 237 metres.

Instruments. Two horizontal and one vertical Galitzin pendulums with galvanometric registration.  
Milne-Shaw East-West; Omori North-South.

Date	Phase	G.M.T.			Period	Amplitude			△	Remarks.
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>		
1	iP?	13	39	49		<i>n</i>	<i>n</i>	<i>n</i>		Large, masked by wind and microseisms.
	e	13	43	1						
	i	13	49	1						
	F	16								
9	e	14	5	14						
	i	14	7	14						
13	M	7	19		25		80			
	F	7 $\frac{3}{4}$								
13	e	8	50	57						
	L	9	12		60					
		9	15		45		370			
	M	9	22		28		350			
	F	11								
24 J	eP?	7	1	32						
	S?	7	6	30					3210	
	M	7	14		22		230			
	M	7	16		18		250			
	F	8								
26 J	iP	7	42	40						
	iS	7	46	20					2200	
	M	7	50		17		96			
	F	8	20							
26		13 to 15							Small disturbance masked by microseisms.	
30	e	21	17	20						Phases not identified.
	e	21	22	20						
	e	21	42 $\frac{1}{2}$							
	F	23								

Wind and microseisms masked most of the earthquakes during the month. Amplitudes from Milne-Shaw instrument.

## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES.

January and February, 1916.

Observatory, Eskdalemuir, Langholm, Scotland.

Lat. 55° 19' N.

Long. 3° 12' W.

h. 237 metres.

Instruments. Two horizontal and one vertical Galitzin pendulums with galvanometric registration.

Milne-Shaw East-West. Omeri North-South.



Date	Phase	G.M.T.			Period	Amplitude			$\Delta$	Remarks
		h	m	s		$A_x$	$A_y$	$A_z$		
The following earthquake was accidentally omitted from the January bulletin:										
Jan. 31	es? L W	18 18 18	34 56 59		26		17			Masked by microseisms.
February										
✓ 1	P PR <sub>1</sub> S L M M F	7 7 7 8 8 8 10	49 52 59 14 19 20	19 55 45			32 92	8120		
2		22 22	23 46	to			<4 <4			Small waves
6		14 15	54 0	to						Masked by microseisms.
6	S?	22	12	46						Subsequent disturbance masked by microseisms.
10	L M F	2 2 3	46 52 5		25		12			Masked by microseisms.
14	L M	10 10	53 59		31		16			
✓ 15	S? SR <sub>1</sub> ? L M	11 11 12 12	54 58 3 9	25 27	30		24	6000		Masked by microseisms.

## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES.

 February 1916, continued.  
 Observatory, Eskdalemuir, Langholm, Scotland.

Date	Phase	G.M.T.			Period	Amplitude			$\Delta$	Remarks
		h	m	s		$A_n$	$A_e$	$A_z$		
20		10	52	to						Small disturbance
		11	13							
✓ 20	P	17	59	7						
	S	18	8	23					7920	Azimuth N 13°W
	L	18	24							epicentre
	M	18	27		25		32			52°N. 162°E.
	F	21								Harvard confirms
✓ 27	P	20	33	4						Azimuth West
	eS?									
	or Y	20	42	26					8050	
	eS?	20	43	46					if S	
	SR <sub>1</sub>	20	48		large on E-W				9650	
	iL	20	57	43					8200	
	M	20	59		30		155		7400	if velocity 3.5
	M	21	8		18		87			kilometres/sec.
	F	23½								
28	eS?	13	36	10						
	L	13	40½							
	M	13	44		31		7			
29	M	19	28		18		2			

L.F. RICHARDSON.

## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORY, ESKDALEMUIR.

March, 1916.

Observatory, Eskdalemuir, Langholm, Scotland.

Lat.  $55^{\circ} 19' N$ . Long.  $3^{\circ} 12' W$ . h = 237 metres.

Instruments. Two horizontal and one vertical Galitzin pendulums with galvanometric registration.

Milne Shaw East-West. Omori North-South.



Date	Phase	G.M.T.			Period	Amplitude			$\Delta$	Remarks.
		h	m	s		$A_n$	$A_e$	$A_z$		
4	M	8	27		20					
	M	8	31		20	4	3			
7		13	56	to						Small waves
		14	4							
8	M	11	58		10	<2	<2		} Similar small earth- quakes	
8	M	12	45		10	<2	<2			
8	M	12	58		10	<2	<2			
8	M	13	3		10	<2	<2			
12	L	3	31		circa 16	15	to 35			
	M	3	33							
16	P	23	1	55				6040	Azimuth NNE or SSW	
	S	23	9	33						
	L	23	12							
	M	23	19		19		3			
	M	23	22		16	3				
	F	23 $\frac{3}{4}$								
✓ 16	P	1	7	57				8610		
	S	1	17	48						
	L	1	33 $\frac{1}{2}$							
	M	1	43		24	4				
	F	2	10							
26	M	0	49		19	13	12		Confused by wind and microseisms.	
30	M	2	32		23		3			
	M	2	40		22	4				
31	P?	11	30	9					Confused by wind and microseisms.	
	e?	11	37	32						
	L	11	40							
	M	11	43		28	6	5			
	M	11	49		18	5				

L. F. RICHARDSON.

EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES

April, 1916  
 observatory, Eskdalemuir, Langholm, Scotland.

Lat. 55° 19' N Long. 3° 12' W. h = 237 metres.



Instruments. Two horizontal and one vertical Galitzin pendulums with galvanometric registration.

Date	Phase	G.M.T.			Period	Amplitude			Δ	Remarks
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>		
2	P F	7	17						Very slight disturbance.	
3	P <sub>e</sub> Max F	8 9 10	54 2 10						Slight disturbance with no marked phases	
6	P F	19	35 39						Very slight disturbance.	
7	P <sub>i</sub> PR <sub>1</sub> PR <sub>2</sub> PR <sub>3</sub> S SR <sub>1</sub> SR <sub>2</sub> SR <sub>3</sub> ? L M F	9 9 9 9 9 10 10 10 10 10 12	39 44 46 49 50 53 1 8 13 31 30	57 4 33 44 35 4 42 33	16	82		9560	Azimuth uncertain	
7	P	15	28 49						Very slight disturbance	
11	P	4	20 30						Slight disturbance obscured by wind effects.	
15	P <sub>i</sub> M M F	12 13 13 14	57 25 36 20	5 14 26	16 22	17 40			Phase times obscured by wind effects.	
16	P F	23	3 36						Very slight disturbance.	
18	P S Max F	4 4 4 6	12 21 36	52 54				7650	Small earthquake: record obscured by wind effects and microseisms	
21	P <sub>i</sub> PR <sub>0</sub> PR <sub>2</sub> S SR <sub>0</sub> SR <sub>2</sub> L F	11 11 11 11 12 12 12 14	44 48 51 54 2 9 15 0	33 6 32 46				9040	At 14h. 12m. 26s, fresh disturbance started with sharply pronounced P: possibly due to oppositely travelling waves.	

EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES

April, 1916. (continued).

Observatory, Eskdalemuir, Langholm, Scotland.

Date	Phase	G.M.T.			Period	Amplitude			Remarks
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>	
24	P S L M F	4 4 4 4 5	37 45 58 59 45	18	20	57		6780	P and S obscured by wind effects. L well marked on E-W instrument.
24	P S L M <sub>H</sub> M <sub>E</sub> M <sub>V</sub> M <sub>V</sub> F	8 8 8 8 8 8 8 10	14 23 35 37 40 43 51 28	12 40	22 20	71 83		8160	Large distant earthquake; azimuth uncertain, L prominent on vertical instrument.
26	P <sub>e</sub> S L M <sub>E</sub> M <sub>N</sub> F	2 2 2 3 3 3	33 43 58 3 4 ?	38 18	20 20	67 41		8400	P indistinct on N-S trace. Azimuth uncertain.
26	P F	6 8	47 30						Prolonged disturbance with no marked phases.

A. RICHMOND MITCHELL.

## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES



May, 1916.

Observatory, Eskdalemuir, Langholm, Scotland.

Lat. 55° 19'N.

Long. 3° 12'W.

h = 237 metres.

Instruments. Two horizontal and one vertical Galitzir pendulums with galvanometric registration.

Date	Phase	G.M.T.			Period	Amplitude			△	Remarks
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>		
3	P. F	4 6	54 7							Disturbance with no prominent phases except long wave maximum from 5h. 41m. to 5h. 46m.
7	L	12	3							
8	P <sub>i</sub> L M F	13 14 14 15	57 21 29 13	41	21	11	10			Small earthquake S obscure
10	P <sub>e</sub> ? S F	21 21 23	48 58	30 20						Small earthquake L not prominent.
11	L F	10 11	46 9		18	9				Small earthquake with feebly marked initial phases.
13	L	5	55							Very slight disturbance.
14	P F	12 12	36 50							Slight disturbance obscured by wind effects.
15	L F	0 1	38 6							Slight disturbance.
17	S? Max	12 13	56 0	20 20		43				Earthquake phases obscured by wind effects and microseisms.
17	P F	15 15	13 32							Slight disturbance.

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EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORY 1916

May, 1916 (continued)

Observatory, Eskdalemuir, Langholm, Scotland.

Date	Phase	G.M.T.			Period	Amplitude			Remarks.
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>	
20	L	22	57					Time uncertain owing to time marking arrangements being under adjustment	
23	L	23	22					Slight disturbance.	

Note. The horizontal instruments were under adjustment on 26th May, 10h.-13h, and 17h.-20h.

A. CRICHTON MITCHELL.

Superintendent.



EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATIONS

May, 1916 (continued)

Observatory, Eskdalemuir, Langholm, Scotland.

Date	Phase	G.M.T.			Period	Amplitude			Remarks.
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>	
20	L	23	57						Time uncertain owing to time marking arrangements being under adjustment
23	L	23	22						Slight disturbance.

Note. The horizontal instruments were under adjustment on 26th May, 10h.-13h, and 17h.-20h.

A. CRICHTON MITCHELL.  
Superintendent.

CORRECTION TO EARTHQUAKE BULLETIN, May 1916.

The earthquake entered under 8th May 1916 at 13h. 57m. 41s, should have been entered under 9th May 1916 at 13h. 57m. 41s.

ESKDALEMUIR OBSERVATORY,  
31st July, 1916.

(Signed) A. Crichton Mitchell  
Superintendent.

## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES.

June 1916.

Observatory, Eskdalemuir, Langholm, Scotland.

Lat. 55° 19' N. Long. 3° 12' W. h. = 237 metres.

Instruments. Two horizontal and one vertical Galitzin pendulums with galvanometric registration.

Date	Phase	G.M.T.			Period	Amplitude			△	Remarks
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>		
1	L	15	10	to						
		15	24							
2	P	14	11	11					Timing indistinct on horizontal trace. P taken from vertical.	
	F	14	55							
5		1	50	to					Very slight disturbance, chiefly, E-W.	
		2	20							
9	Pe	21	43	1					Very distant earthquake. Remarkably smooth waves after L. Direction of oscillation NW-SE at 22h. 16m: NE-SW at 22h. 28m.	
	e	21	49	33						
	e	21	50	53						
	L	22	21		30					
	M <sub>N</sub>	22	23			10				
	M <sub>E</sub>	22	29				9			
	F	23	50							
11		0	30	to					Prolonged slight disturbance.	
		1	30							
14		14	26	to					Slight disturbance.	
		15	10							
15	Pe	11	53							
	L	12	18		32					
	M	12	32		19		6½			
	M <sub>E</sub>	12	33		22		7			
	M <sub>N</sub>	12	36		19		6			
15	L	16	53						Noticeable on E-W instrument.	
16		23	40	to					Very slight disturbance.	
		24								
19	e	1	39	33						
	e	1	45	48						
	L	1	58		24					
	M	2	2		20		4			
19		4	9	to					Very slight disturbance.	
		4	50							

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## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES.

June, 1916 (continued)  
Observatory, Eskdalemuir, Langholm, Scotland.

Date	Phase	G.M.T.			Period	Amplitude			△	Remarks
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>		
20	L	7	38							
21		1 46	to						Slight disturbance; imperfectly marked initial phases.	
		2 10								
21		20 22							Slight disturbance.	
		20 47								
21	P	21 45	11					8280	No well-marked long waves.	
	PR <sub>1</sub>	21 48	24							
	S	21 54	45							
	SR <sub>1</sub>	21 58	55							
	M <sub>1</sub>	22 1		16		24				
	F	24								
24	e	4 22	9						Slight disturbance.	
	S(?)	4 27	21							
	L	4 37		30						
24	e	7 9							Slight disturbance. Initial phases obscure.	
	M	7 32		21	2½					
	M <sub>N</sub>	7 33		18		2½				
	E									
25	L	19 2		17						
28		18 18	to						Slight disturbance with maximum at 18h. 33m.	
		18 34								
30	P	3 12	45					9140	Epicentre in lat. 2 N; long. 92 W.	
	S	3 23	3							
	L	3 34								
	M <sub>N</sub>	3 38		25	17					
	M <sub>N</sub>	3 49		20		19				
	F <sub>E</sub>	6								

A. CRICHTON MITCHELL

Superintendent.

## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES.

July, 1916

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Date	Phase	G.M.T.			Period	Amplitude			$\Delta$	Remarks
		h	m	s		$A_n$	$A_e$	$A_z$		
3	L	4	1	to	18					
		4	12		to					
					20					
3	P <sub>i</sub>	9	52	51					7800	Mexico. L not prominent but a few well marked waves of 32 secs. period at 10h. 53m.
	PR	9	56	5						
	S	10	2	7						
	M <sub>N</sub>	10	14	3	12	3				
	M <sub>E</sub>	10	14	5	14		9			
	F	10	17	45	19		7			
9		12								Long waves
15		15	20	to						Slight disturbance without definitely marked phases. Long Waves of 16secs. period and low amplitude.
		16	20							
14		15	43	to						Long waves.
		15	56							
14	e	14	30	(?)						
	M <sub>N</sub>	14	36	2	16	8				
	M <sub>E</sub>	14	36	2	16		7			
15	c	8		(?)						Slight disturbance. Record of initial phases lost while changing sheets.
	F	8	35							
16	P	18	27	0						P faint and doubtful. Motion NW-SE, 18h.58m. - 19h.7m. NE-SW, 19h.7m. - 19h. 10m.
	S <sup>e</sup> (?)	18	37	10						
	SR(?)	18	42	30						
	L	18	53							
	M <sub>E</sub>	19	3		20		5			
	M <sub>N</sub>	19	4		18	4				
	F	19	30							

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## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES.

July, 1916 (continued)  
 Observatory, Eskdalemuir, Langholm, Scotland.



Date	Phase	G.M.T.			Period	Amplitude			$\Delta$	Remarks.
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>		
17	P <sub>e</sub>	1	8	34		u	u	u		P prominent on vertical instrument.
	M <sub>E</sub>	1	30	4						
	M <sub>E</sub>	1	33	44						
21	L	22	40	to	18 to 22					
		23	9							
22		6	15	to						Faint disturbance No definite phases.
		7	10							
23	L	11	12	to						
		11	35							
27		12	17	to						Prolonged slight disturbance. No definite phases.
		13	50							
28		17	59	to						Ditto.
		18	43							
31		0	13	to						Ditto.
		0	40							

A. CRICHTON MITCHELL

Superintendent.

EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES



August, 1916

Observatory, Eskdalemuir, Langholm, Scotland.

Lat. 55° 19' N.

Long. 3° 12' W.

h = 237 metres.

Instruments. Two horizontal and one vertical Galitzin pendulums with galvanometric registration.

Date	Phase	G.M.T.			Period	Amplitude			△	Remarks.
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>		
3	P <sub>s</sub>	1	50	34				9450		
	PR	1	54	21						
	S	2	1	7						
	SR	2	8	3						
	M <sub>E</sub>	2	32	3	32		53			
	M <sub>N</sub>	2	32	13	29	39				
	F	4								
		15	1	to					Faint dis-	
		15	10						turbance.	
5		4	35	to					Faint dis-	
		4	44						turbance.	
6	L	23	24	to	19				Long waves.	
		24	20							
8	P	4	37	3				9230	Slight earth-	
	PR	4	40	39						quake.
	S	4	47	25						
	SR	4	53	29						
	L	5	4							
	M <sub>N</sub>	5	9	39	28	8				
	M <sub>N</sub>	5	18	4	18	7				
	F	6								
	i	19	6	16						Preliminary phases very faint.
	i	19	10	0						
i	19	16	50							
L	19	41								
M <sub>E</sub>	19	43	31	26		7				
M <sub>N</sub>	19	43	42	25	6					
14		7	31	to				Faint dis-		
		7	45				turbance.			
		21	50	to				Faint dis-		
		22	6				turbance.			
15	L	0	41							
		9	25	to						
		9	41							
		14	7	to						
		14	22							
		16	46	to						
		16	54							

CONTINUED

## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES

August 1916 (continued)

Observatory, Eskdalemuir, Langholm, Scotland.

International  
Seismological  
Centre

Date	Phase	G.M.T.			Period	Amplitude			Remarks
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>s</sub>	
16	P	7	9	57				2350	
√	S(?)	7	13	50					
	M <sub>N</sub>	7	16	35	14	19			
	F <sub>N</sub>	8	5						
		8	21	to					Faint disturbance
		8	48						
		9	52	to					Faint disturbance.
		10							
	L	13	30		14	2			Long waves.
17	L	11	9	to	18				Long waves.
		11	18						
18	P <sub>i</sub>	0	25	24					Distant slight earth- quake. Steep emer- gence. L incon- spicuous.
	S	0	26	3					
		16	59	to					
		16	44						
25	P <sub>e</sub>	9	57	44					
√	PR	10	1	35					
	S	10	8	23					
	SR	10	14	56					
	L	10	20						
	M <sub>N</sub>	10	26	13					
	M <sub>N</sub>	10	34	33	23	28			
	M <sub>E</sub>	10	35	3	26	20			
	F	12	40						
26		11	14 <sup>1</sup> / <sub>2</sub>	to					Slight disturbance No definitely marked phases.
		12	0						
27	P <sub>e</sub>	22	55	1				9000	
√	S(?)	23	5	12					
	L	23	21						
	L <sub>N</sub>	23	27		32	16			
	L <sub>N</sub>	23	36	35	18	17			
	F	24							
28		See Note							
30		16	20	to					Prolonged faint disturbance.
		17	0						

Note. The traversing clock of the horizontal Galitzin seismograph stopped during the passage of the large earthquake on 28th Aug. P was recorded on the vertical Galitzin instrument at 6h.50m.5s. and on the Milne-Shaw instrument at 6h.50m.4s. The maximum vertical displacement was recorded at 7h. 19m. 37s.

## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORY

September, 1916.

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Lat. 55° 19' N.

Long. 3° 12' W.

h = 237 metres.

Instruments. Two horizontal and one vertical Galitzin pendulums with galvanometric registration.



Date.	Phase.	G.M.T.			Period	Amplitude			△	Remarks
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>		
3		0	2	to 0 25					Faint Disturbance	
3	Pe Pi M <sub>E</sub> M <sub>N</sub> M <sub>N</sub>	7	34	36 6 8 15 8 18 8 32	35 28 21		9 6		S doubtful. Prominent feature was the occur- rence of groups of long waves separated by periods of compara- tive quiescence. Early phase ill-defined.	
5	Pe S (?) L L L L F	22	34	32 4 23 15 23 22 23 34 0 23 0 45	22 20 17				Distant earthquake.	
9		13	28	to 13 52					Faint Disturbance	
11	Pe(?) Pi S M <sub>N</sub> M <sub>N</sub> M <sub>N</sub> F	6	49	44 31 55 44 34 24 8 15	36 33 21	21 29 15		7820	Large vertical displace- ment at 6h.59m.	
15	↓ P PR <sub>1</sub> S SR <sub>1</sub> L M <sub>N</sub> M <sub>N</sub>	7	13	49 22 57 52 44 5 35	33 18	30 18.5		8950	F obscured by wind effects.	
21	Pe F	19	25	34 42					Faint disturbance	



## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES.

September, 1916 (continued)

Observatory, Eskdalemuir, Langholm, Scotland.



Date.	Phase.	G.M.T.			Period	Amplitude			Remarks.
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>	
✓ 23	Pe	5	54	47				9000	
	S	6	4	57					
	SR	6	10	33					
	L	6	18						
	M <sub>E</sub>	6	23	33	20		17		
	M <sub>N</sub>	6	24	38	20	8.6			
	M <sub>E</sub>	6	29	43	18		16.5		
	M <sub>Z</sub> F	6 7	30 50		18				
24	L <sub>T</sub>	18	20				Groups of clearly marked long waves of low amplitude.		
	L <sub>E</sub>	20	16						
25	Pe	2	39						
	L	2	47	17					
✓ 26	P	15	7	31					
	S	15	11	47					
	L	15	14	55					
	M <sub>N</sub>	15	16	27	23	19.5			
	M <sub>E</sub>	15	17		19			12.5	
	F	15	50						
27		23	35	to			Faint disturbance.		
		23	50						
28		12	23	to			ditto.		
		12	40						
✓ 29	Pe	19	7	49					
	S	19	18	20					
	L	19	33						
	M <sub>N</sub>	19	36		35	6			
	M <sub>E</sub>	19	42		25			5.8	
	M <sub>E</sub>	19	46		10	7.5			
	F	20	30						

A. CRICHTON MITCHELL.

Superintendent.

EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORY

October, 1916.



Observatory, Eskdalemuir, Langholm, Scotland.

Lat. 55° 19' N. Long. 3° 12' W. h = 237 metres.

Instruments. Two horizontal and one vertical Galitzin pendulums with galvanometric registration.

Date.	Phase.	G.M.T.			Period	Amplitude.			△	Remarks.
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>		
1	Pe L F	2	36	36	25	"	"	"		Prolonged slight disturbance.
2		2	7	to						Faint disturbance
		2	30							
3	Pi PR S M <sub>N</sub> M <sub>E</sub> L <sub>E</sub> M <sub>N</sub> F	1	39	32	29		33.3		9610	Latter portion probably due to separate slight disturbance, whose phases cannot be separated. Prominent L on vertical at 2h. 22m.
		1	43	16						
		1	56	16						
		1	57	23						
		1	57	28						
		2	4							
		2	6	25	29	45.5				
		5	40							
3	Pe(?) S(?) L	13	42	22						
		13	51	14						
		14	5							
11		18								Moderate disturbance: phases masked by wind effects and microseisms. Prominent displacement at 18h. 47m. 10s. on E-W: period 22 secs: amplitude 21 μ.
20	P M F	17	27	12	19	6.3				Prolonged irregular disturbance. Phases masked by microseisms. Displacement NE-SW at 18h. 38m., during passage of well-marked L waves.
		18	23	6						
		19	45							

EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORIES.

October, 1916 (continued).

Observatory, Eskdalemuir, Langholm, Scotland.

Date.	Phase.	G.M.T.			Period.	Amplitude.			△	Remarks
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>		
21		10	48	to		<i>u</i>	<i>u</i>	<i>u</i>		Faint disturbance with maximum about 10h. 56m.
21	P(?) L	19	48	34	24					Slight disturbance.
21		22	25	to						Slight disturbance, with no prominent feature except a few well marked L waves on E-W about 23h. 24m.
23	L	11	22	to						
25		0	19	to						Faint disturbance.
31	Pi PR <sub>1</sub> PR <sub>2</sub> S SR <sub>1</sub> SR <sub>2</sub> L M <sub>N</sub> M <sub>E</sub> M <sub>N</sub>	15	42	38					8320	Epicentre 46°N. lat. 163°W. long. Large earthquake with well marked phases. F masked by wind effects. Oppositely travelling waves observed at 18h. 10m.
		15	45	54						
		15	47	35						
		15	52	14						
		15	57	13						
		16	1	5						
		16	7	5						
		16	10	39	23	30.4				
		16	13	55	20		40.8			
		16	14	15	21	54.7				

A. CRICHTON MITCHELL.

Superintendent.

## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORY

November 1916.

Observatory, Eskdalemuir, Langholm, Scotland.

Lat. 55° 19' N. Long. 3° 12' W. h = 237 metres.

Instruments: Two horizontal and one vertical Galitzin pendulums with galvanometric registration.



Date.	Phase	G.M.T.			Period	Amplitude			$\Delta$	Remarks.
		h	m	s		$A_n$	$A_e$	$A_z$		
3		22	31	to 22 54		$\mu$	$\mu$	$\mu$		Slight disturbance: features masked by large microseisms. Max. displacement at 22h 45m 44s on N-S instrument.
8		13	5	to 13 49						Prolonged faint disturbance.
10		9	30	to 10						Slight disturbance masked by wind effects and large microseisms.
14		14	7	to 14 26						Prolonged faint disturbance. L, of period 19 secs. at 14h 16m.
14	Pe S(?) L MN ME	22	55	3 23 5 23 14 23 19 43 23 19 43	24 24	17		17	6700	From 23h 14m to 23h 22m displacements were NW-SE; afterwards direction changed until at 23h 27m, they were NE-SW. Maxima too faint on photographic trace for accurate measurement, observed on N and S about 23h 28m. Large vertical maximum of 16 secs. period at same time.
15	L	23	23	to 23 30						
16		0	10	to 0 22						Faint disturbance.
21	Pz S SR <sub>1</sub> (?) L MN ME F	6	37	44 6 47 45 6 53 31 7 4 49 7 6 39 7 13 10 8 15	25	23		21	8900	P inconspicuous on horizontal traces and masked by microseisms. Time of P taken from vertical instrument.
24	L	4	47	to 4 58						Part of slight disturbance, earlier phases of which were masked by wind effects.
24	L	12	36	to 12 50						ditto; but disturbance larger.
30		SEE NOTE								

## EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORY

December, 1916.

Observatory, Eskdalemuir, Langholm, Scotland.

Lat. 55° 19' N. Long. 3° 12' W. h = 237 metres.

Instruments: Two horizontal and one vertical Galitzin pendulums with galvanometric registration.

Date.	Phase	G.M.T.			Period	Amplitude			△	Remarks
		h	m	s		A <sub>n</sub>	A <sub>e</sub>	A <sub>z</sub>		
2		12 50	to	14 50					Prolonged slight disturbance.	
2	L	0 0	to	0 15	22					
5	L	22 24	to	22 48						
6		22 29	to	23					Slight disturbance. No well marked phases, except a few long waves about 22h 41m.	
14	P S M <sub>N</sub> F	17 4 9 17 13 40 17 18 56 18 45							No well marked long waves.	
23 ✓	P PR <sub>1</sub> SN SR <sub>1</sub> LN LE MN ME F	9 37 49 9 41 51 9 49 25 9 55 55 10 12 ½ 10 12 ½ 10 17 18 10 19 23 11 40			19 16	11	10	10870		
24		8 25	to	8 40					Faint disturbance.	
26	L	5 4	to	5 17					Part of slight disturbance. Wind effects masked preliminary phases.	
26	L	21 21	to	21 28						
27		22 10	to	23 15					Slight disturbance. Preliminary phases inconspicuous. L of period 19 secs. at 22h 56m.	

A. CRICHTON MITCHELL

SUPERINTENDENT



EARTHQUAKE BULLETIN OF THE METEOROLOGICAL OFFICE OBSERVATORY

November 1916 (continued)

Observatory, Eskdalemuir, Langholm, Scotland.



NOTE: The time marking arrangements failed to act properly from 3h to 4h on 30th November 1916, and in consequence no entries have been made regarding the slight earthquake recorded on that day. M<sub>B</sub> is however estimated to have occurred about 3h 52m, with a period of 19 seconds, and an amplitude of 13/4

A. CRICHTON MITCHELL

SUPERINTENDENT

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