

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN FOR JANUARY 19 49**

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914)  
OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T <sub>1</sub>	PENDULUM FREE PERIOD T.	DAMPING CONSTANT μ <sub>2</sub> .	$\frac{Ak}{\pi^l}$
N.		sec.	sec.		sec <sup>-1</sup>
E.					
Z.					

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.  
TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.  
SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.	
			h.	m.	s.					
1	NE	e	18	30	-	sec.	μ	km.	Confused by microseisms.	
		F	19	35	-					
2	NE	e	05	50	-				Small.	
		F	06	25	-					
2	ZNE	e	12	55	-				Confused by microseisms.	
	ZNE	eL	13	20	-					
	F	14	20	-						
3	NE	e	18	38	-				Very small.	
		F	19	10	-					
4	ZNE	e	03	05	-					
		F		30	-					
4	NE	e	19	51	-				Very small.	
		F	20	10	-					
7	NE	e	18	05	13					
		ZNE	eL		26					-
		F	20	05	-					
9	N	e	17	04	48					
	NE	eL		22	-					
	Z	eL <sub>R</sub>		24	-					
	F		18	10	-					
10	ZNE	e	18	45	-					
		F	19	00	-					
13	ZV,Z	i	09	06	11				Very small.	
	ZV,Z	i		06	40					
	F		09	-						

SEISMOLOGICAL BULLETIN.

JANUARY

19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI-TUDE.	Δ	REMARKS.
			h.	m.	s.				
14	NE	e	02	55	-				
	NE	eL	03	01	-			Z small.	
				20	-				
14	ZV,	iP	15	58	51			(2480)	
	E	i(S)	16	02	52				
	ZN	i		02	56				
	NE	i		03	04				
	E	i(SS)		03	26				
	ZNE	eL		05	-				
	Z	M		09	27	8	-10		
	F		35	-					
18	NE	e	19	25	-			Small.	
		F	20	40	-				
18/19	NE	e	23	45	-			Small.	
		F	00	25	-				
19	NE	e	14	08	-				
	NE	eL		23	-				
		F		45	-				
✓ 19	E	e	15	25	45				
	NE	e		31	-				
	NE	eLQ		40	-				
	Z	eLR		51	-				
	Z	M		58	45	17	-18		
		F		16	50	-			
23	ZNE	e	01	19	-				
		F		40	-				
✓ 23	ZV,	iPP	06	49	05			(11,000)	
	ZV,Z	e		49	14				
	ZN	e(SKS)		55	27				
	E	i(S)		55	38				
	ZN	e PS		58	11				
	N	e SS	07	03	27				
	N	e SSS		07	31				
	N	eL		12	-				
	Z	M		35	24	17	+18		
		F		10	35	-			
24	NE	e	09	49	-			Beginning lost in changing of charts.	
	E	e		58	16			Confused by microseisms.	
	NE	eL	10	28	-				
		F	11	25	-				
27	NE	e	07	53	-				
	NE	eLQ	08	12	-				
	Z	eLR		25	-				
		F	09	30	-				
27	NE	e	11	42	-			Confused by microseisms.	
		F	12	15	-				

# SEISMOLOGICAL BULLETIN.



From the ISC collection scanned by SISMO

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ		REMARKS.
			h.	m.	s.			sec.	μ	
27	NE	e	15	41	55					
	NE	eL	16	04	-					
		F	17	10	-					
28	NE	e	08	20	-					Very small.
		F	09	45	-					



KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.SEISMOLOGICAL BULLETIN FOR FEBRUARY 19 49

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914)  
OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1918).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T 1'	PENDULUM FREE PERIOD T.	DAMPING CONSTANT $\mu^2$ .	$\frac{Ak}{\pi^2}$
N.		sec.	sec.		sec-1
E.					
Z.					

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD. sec.	AMPLI- TUDE. $\mu$	$\Delta$ km.	REMARKS.
			h.	m.	s.				
1	Z	e F	14	22 55	- -				Very small.
1	Z	ePP	18	36	14		13,000		Northern New Guinea. 2½°S., 138°E.(U.S.C.G.S.)
	Z	ePPP		38	34				
	ZNE	ePS		46	06				
	Z	e(PPS)		48	14				
	Z	eSS		52	30				
	NE	e		59	52				
	ZNE	eL	19	04	-				
	Z	M		27	39	22	-20		
		F	21	15	-				
2	ZV,	iP	17	52	56		(8500)		Depth around 200 km. Aleutian Islands. 53°N., 172.5°W.(U.S.C.G.S.)
	ZV,	ipP		53	48				
	ZV,	isP		54	00				
	Z	ipPP		56	32				
	NE	eS	18	02	20				
	NE	epS		03	24				
	N	eSS		03	55				
	ZNE	eL		10	-				
		F		45	-			Small.	
3	ZNE	e	17	49	-			Small.	
		F	18	05	-				
3	ZNE	e	23	32	-			Small; not very distant.	
		F		40	-				
4	ZE	e	15	54	-				
		F	16	05	-				



SEISMOLOGICAL BULLETIN.

FEBRUARY 19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI-TUDE.	Δ	REMARKS.
			h.	m.	s.				
5	ZV, ZE E ZE Z	iP e(S) e eL M F	00	33	30			(2700)	No N-S record. Turkey. Near 40°N, 30°E. (Strasbourg).
						13	-5		
10/11	Z Z ZE ZNE ZNE Z N	ePKP <sub>1</sub> ePKP <sub>2</sub> ePKS <sub>2</sub> ePP eL M eL <sub>2</sub> F	22	16	30			17,000	Small. Samoa Islands. 16°S., 173°W. (U.S.C.G.S).
						22	-12		By path > 180°.
✓13	Z, ZV, Z E Z E Z N E N N E ZNE Z	iPKP <sub>1</sub> iPKP <sub>2</sub> e iPP eSKS ePPS eSS eSSS e e e eL M F	18	44	18			18000	
						20	+25		
14	NE E NE Z	e(S) e eL <sub>Q</sub> eLR F	18	30	(46) 14				Off coast of Mexico. 18.5°N., 105°W. (U.S.C.G.S). Overlapped by next shock.
14	NE Z	eL <sub>Q</sub> eLR F	19	32	-				
14	ZNE	eL F	22	37	-				
17	ZNE	eL F	21	08	-				
19	NE N ZE	e eL <sub>Q</sub> eLR F	01 02	43 07	- -				
21	ZNE	e F	12	02	-				
21	NE	e F	22	04	-				Small.

**SEISMOLOGICAL BULLETIN.**

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
✓ 23	ZV, } ZNE }	iP	16	17	47			6370	Eastern Turkistan. 39½°N., 85°E. (U.S.C.G.S).
	ZV,	iPP		19	51				
	ZV,	iPcP		20	04				
	ZV,	i		25	22				
	ZNE	eS		25	42				
	ZN	ePS		26	24				
	N	eSS		27	44				
	ZN	e		29	26				
	ZNE	e		29	58				
	E	e		31	58				
	NE	eLQ		33	-				
	Z	eLR		38	-				
	Z	M		42	(38)	22	+330		
	Z	F		21	00	-			
24	NE	e	05	50	-			Z obscured by microseisms.	
	NE	eL		57	-				
	F		06	15	-				
24/25	NE	e	23	21	(02)			Doubtful.	
	NE	eLQ		28	-				
	Z	eLp		37	-				
	F		00	20	-				
25	NE	eL	04	58	-			Z obscured by microseisms	
	F		05	25	-				
26	N	e	04	34	20				
	NE	eLQ		48	-				
	Z	eLR		56	-				
	F		05	45	-				
✓ 28	NE	e	00	41	48			20 -10	
	Z	e		42	40				
	ZNE	e		42	53				
	N	e		47	55				
	ZNE	e		51	38				
	NE	eLQ	01	03	-				
	Z	eLR		06	-				
	Z	M		12	45				
Z	F		03	45	-				





SEISMOLOGICAL BULLETIN FOR MARCH 19 49

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914)  
OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T <sub>1</sub>	PENDULUM FREE PERIOD T.	DAMPING CONSTANT μ <sub>2</sub> .	$\frac{Ak}{\pi^2}$
N.		sec.	sec.		sec <sup>-1</sup>
E.					
Z.					

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
2	ZV, Z	eP	06	59	14	14	-6	2310	Arctic Ocean east of Greenland. 72°N., 3°W. (U.S.C.G.S.)
	Z	ePP		59	38				
	ZV,	ePPP		59	53				
	E	eS	07	02	58				
	ZN	eSS		03	10				
	ZNE	eL		04	-				
	Z	M		07	29				
	F		35	-					
4	ZV	eP	01	30	07	18	+7	10870	
	ZN	ePP		34	59				
	E	eS		41	41				
	ZE	ePPS		44	05				
	E	e		57	29				
	NE	eLQ		05	-				
	Z	eLR		12	-				
	M		29	03					
	F		04	05	-				
✓ 4	ZV, ZNE	iP	10	28	11	13	-18	5750	Compression. Movements preceding surface waves very large. Hindu Kush Mountains, Afghanistan. 37°N., 70°E. (U.S.C.G.S.) Depth about 200 km. Commencement of L doubtful.
	NE	i		28	20				
	ZV, NE	isP		29	22				
	NE	esPP		31	21				
	ZNE	e		32	33				
	E	i		33	25				
	NE	is		35	13				
	N	isS		36	34				
	N	i		37	33				
	NE	isS		39	08				
	N	i		45	43				
	E	i		47	52				
	ZNE	eL		(48)	-				
Z	M		11	15	05				
	F		14	20	-				

**SEISMOLOGICAL BULLETIN.**

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
4	ZNE	e F	15 16	57 10	- -				
5	ZNE	e F	02 03	20 15	- -				
6	ZNE	e F	11 12	51 10	- -				
10	ZNE ZE	e e F	21	35 42 50	47 03 -				
11	ZNE	eL F	21	23 25	- -				
11	E ZNE	e eL F	22 23	39 07 40	- - -				
✓ 16/17	ZV,Z ZV ZNE NE NE Z NE ZNE NE NE ZNE Z	iPKP iPP eSKP eSKS e e ePS eSS e eSSS eL M F	22	34 36 37 41 44 46 46 54 56 57 14 33 02	18 21 35 39 09 09 38 28 13 57 09 -	21	+13	14,000	Bismarck Archipelago towards 5°S., 151°E. (Strasbourg)
17	ZNE	e F	10	13 25	- -				
✓ 17/18	Z Z Z NE NE NE NE NE ZNE Z	ePKP ePP eSKP e ePS ePPS eSS e eL M F	21	24 26 27 28 36 38 44 46 05 23 00	(13) 16 54 34 27 11 28 11 - 03 -	22	+18	14,000	Repetition of March 16d.
18	ZNE	e F	00 01	40 20	- -				
19	ZV,Z E E NE	eP eS eSS eL F	18 19	31 42 43 58 35	52 12 16 -			9700	Depth about 170 km.  Not clear on Z.

**SEISMOLOGICAL BULLETIN.**

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
22	ZNE	e F	02	19	-				
				45	-				
23	N	e	07	18	(33)				
	NE	eLQ		37	-				
	Z	eLR		44	-				
		F	08	55	-				
24	ZNE	e F	20	03	-				
				25	-				
✓ 24/25	ZN, ZNE	1P	21	08	43			8430	Pacific Ocean off coast of California.
	Z	ePP		11	38				42°N., 126½°W. (U.S.C.G.S).
	Z	ePPP		14	30				
	NE	eS		18	28				
	NE	eSS		23	18				
	N	e(SSS)		26	54				
	ZNE	eL		29	-				
	Z	M		42	59	15	-16		
		F	00	15	-				
25	ZNE	e F	02	52	-				
			03	00	-				
26	ZNE	e F	03	04	-				
				30	-				
27	Z	e F	03	01	-				Very small.
				20	-				
✓ 27	Z	eP	06	48	32			11600	No. "N-S" record.
	ZE	ePP		53	09				
	ZE	eSKS	07	00	20				Celebes Sea.
	ZE	ePS		02	35				4°N., 127½°E. (U.S.C.G.S.).
	ZE	ePPS		03	36				
	E	eLQ		24	-				
	Z	eLR		28	-				
	Z	M		18	23	25	-70		
		F	19	25	-				
27	ZNE	eL F	12	51	-				
			13	50	-				
27	Z	e	21	03	44				
	ZNE	eL F		33	-				
			22	15	-				
28	Z	eP	07	21	42			5570	
	NE	eS		28	52				
	N	eSS		32	14				
	ZNE	eL F		36	-				
				50	-				
28	ZE	e(P)	13	04	09			(14,000)	Interpretations doubtful.
	NE	eSKS		14	27				
	E	eSS		26	33				
	NE	eSSS		31	15				
	E	e		35	09				
	ZNE	eL F		41	-				
			14	15	-				

**SEISMOLOGICAL BULLETIN.**

DATE	COMP.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
28	ZNE	e F	19	08	-				Very small.
29	NE E NE Z	e e eLQ eLR F	03	04	43				Very small.
				17	19				
			04	52	-				
			04	00	-				
				45	-				
30	NE NE NE	e(PPP) e(S) eL F	12	48	15				No "Z" record.
				53	43				
			13	04	-				
				25	-				
30	NE	e F	14	03	-				No "Z" record.
				30	-				
30	ZV, N ZNE	i e eL F	15	07	24				eNE
				13	33				
				56	-				
			17	25	-				
30	ZNE	e F	19	36	-				Not very distant.
				45	-				
30	ZNE	e F	21	37	-				Small.
				50	-				
31/1	Z	e	21	59	04				
	NE	e	22	02	26				
	NE	e		16	07				
	E	e		21	30				
	NE	e		23	18				
	ZNI	eL F		44	-				
			24	10	-				

**KEW OBSERVATORY, RICHMOND, SUR****SEISMOLOGICAL BULLETIN FOR APRIL, 19 49**

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914)  
OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T 1	PENDULUM FREE PERIOD T.	DAMPING CONSTANT $\mu^2$ .	$\frac{A^2}{\pi^2}$
N.		sec.	sec.		sec <sup>-1</sup>
E.					
Z.					

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD. sec.	AMPLI- TUDE. $\mu$	$\Delta$ km.	REMARKS.
			h.	m.	s.				
1	Z	e	09	15	06			Chart changing	
	ZNE	eL F		45	-				
1	NE	eL	18	53	-			Very small.	
		F	19	15	-				
2	ZNE	e	08	03	-				
		F		25	-				
2	ZNE	e	17	05	-				
		F		25	-				
3	N NE Z	e	07	17	-				
		eLQ		38	-				
		eLR F		44	-				
3	ZV, E	iP	12	28	34		340	Very small amplitude Records from ZV and short period E-W instruments; also shown by Galitzin seismographs.	
		eS		29	13				
		F		32	-				
3	ZV, E ZV,	iP	12	34	36		330	ditto.	
		eS		35	13				
		e F		36	10				
3	E	e	13	07	-			Possibly not seismic.	
		F		10	-				
4	NE	e	22	49	-			Large microseisms especially on Z component.	
		F	23	35	-				



SEISMOLOGICAL BULLETIN.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI-TUDE.	Δ	REMARKS.				
			h.	m.	s.					sec.	μ	km.	
5	ZV, ZNE	iP	09	38	08			9000	Near Vladivostok. 43°N., 131°E. (U.S.C.G.S.) Depth about 550 Km.				
	ZV,	ipP		40	07								
	ZV,	isP		41	07								
	NE	e(PPP)		43	17								
	NE	eS		47	15								
	NE	eSKS		47	37								
	NE	eSS		51	56								
	NE	eL		59	-								
	F		10	55	-			Small and obscured by Z component microseisms.					
6	NE	e	00	10	-				Very small.				
		F		30	-								
7	NE	e	16	06	50				Small on Z component.				
		eL		20	-								
		F	17	00	-								
11	ZV,	ePKP	00	08	05								
	N	e		22	23								
	NE	e		31	14								
	NE	eLQ	01	02	-								
	Z	eLR		08	-								
	F		02	15	-								
13	ZV,	eP	15	22	02			6075	Doubtful; changing driers.				
	ZNE	eS		29	41								
	ZNE	eL		36	-								
		F	16	05	-								
13	ZV,	iP	20	06	51			7740	e ZNE. Destructive between Olympia and Tacoma. 47.1°N., 122.7°W. (U.S.C.G.S.)				
	ZV, Z	ePcP		07	02								
	ZNE	ePP		09	39								
	ZNE	ePPP		10	47								
	E	iS		15	59								
	NE	ePS		16	49								
	N	e		18	39								
	ZNE	eSS		20	59								
	ZNE	eSSS		23	35								
	ZNE	eL		26	-								
	Z	M		37	43					18	-25		Small. Large.
	ZNE	eL2	22	20	-								
		F	23	20	-								
14	NE	e	16	43	-				Very small.				
		F	17	25	-								
14	ZNE	e	18	15	-				Very small.				
		F	19	15	-								
14	ZNE	e	23	37	-				Very small.				
		F		50	-								
16	ZNE	e	20	10	-				Very small.				
		F		55	-								
18	ZNE	e	01	03	-				Very small.				
		F		55	-								



SEISMOLOGICAL BULLETIN.

19 77

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
18	ZN	e	21	54	16				No Galitzin
	ZN	e		54	30				E record
	ZN	eL	22	38	-				
		F	23	45	-				
19	-	-	-	-	-				10h. 00m. to 16h. 12m. (G.M.T.); adjusment of E.
✓ 20	ZV,ZNE	eP	03	43	42			12,000	Destructive in Southern Chile. 38°S., 73°W. (Strasbourg).
	Z	e		43	52				
	ZN	ePP		46	33				
	ZNE	e		47	30				
	ZNE	ePKP		51	46				
	NE	eSKS		54	02				
	ZNE	ePS		57	15				
	ZNE	e	04	00	22				
	ZNE	e		02	18				
	ZNE	eSS		03	14				
	NE	eSSS		06	14				
	NE	eLQ		14	-				
	Z	eLR		19	-				
	Z	M		37	26	17	-25		
		F	07	20	-				
22	-	-	-	-	-				Standardisation of E; 10h. 29m. to 14h. 18m. (G.M.T.).
22	NE	e	17	41	-				
	ZV,	e		55	29				
	ZNE	eL	18	19	-				
		F	19	05	-				
23	ZV,ZE	ePKP	11	35	12			(11500)	
	Z	ePP		35	39				
	E	ePS		44	42				
	Z	ePPS		45	02				
	NE	eSS		50	26				
	ZNE	eL	12	13	-				
		F	13	55	-				
24	ZV,ZNE	iP	04	30	54			5390	Compression.
	ZE	iPP		32	52				
	NE	eS		37	54				
	ZNE	e		38	08				
	ZNE	eSS		41	49				
	E	e		45	05				
	ZNE	eL		47	-				
	Z	M		59	37	14	-14		
		F	06	15	-				
✓ 25	ZV,	iP	14	08	05			10500	North of Chile.
	ZV,ZE	epP		08	35				20°S., 69.5°W. (U.S.C.G.S.).
	ZNE	ePP		11	31				Depth about 100 Km.
	ZNE	ePPP		14	39				
	ZNE	eSKS		18	29				
	ZNE	eS		19	26				
	NE	isS		20	19				
	ZNE	e		24	35				



**SEISMOLOGICAL BULLETIN.**

APRIL 1949

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI-TUDE.	Δ	REMARKS.
			h.	m.	s.				
	Z	eSS	14	26	11				
	NE	e		27	01				
	ZNE	eSSS		28	35				
	ZNE	eL		31	-				
	Z	M		48	50	18	-19		
		F	17	10	-				
25	ZNE	eL	20	20	-				
		F		55	-				
25	E	e	23	20	27				
	ZNE	eL		38	-				
		F		50	-				
30	ZV,Z	iP	01	37	36			12,000	e NE Compression
	ZV,Z	iP		38	12				Depth about 150 Km.
	ZV,ZN	iPP		42	03				
	ZV,ZNE	iPPP		42	36				
	Z	i		46	23				
	NE	eSKS		48	03				
	NE	eS		49	32				
	NE	epS		50	19				
	NE	e(sPS)		52	01				
	E	eSS		56	43				
	NE	eSSS		57	47				
	E	eSSS	02	01	25				
	E	e		03	15				
	NE	e		05	47				
	ZNE	eL		15	-				
	Z	M		27	54	18	-23		
		F	04	30	-				
30	NE	e	14	49	-				Very small.
		F	15	10	-				



KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.SEISMOLOGICAL BULLETIN FOR MAY 1949

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914)  
OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T I.	PENDULUM FREE PERIOD T.	DAMPING CONSTANT $\mu^2$ .	$\frac{Ak}{\pi^2}$
N.		sec.	sec.		sec <sup>-1</sup>
E.					
Z.					

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD. sec.	AMPLITUDE. $\mu$	$\Delta$ km.	REMARKS.
			h.	m.	s.				
2	ZE	e	12	08	51				Small
	Z	e			35				
	ZNE	eL			-				
	F	30			-				
3	ZV,ZNE	iP	06	08	29		8600	Dilatation. Kurile Islands. 49°N., 153½°E. (U.S.C.G.S.) Depth about 100 Km.	
	ZV,ZE	iP			57				
	ZV,	iSP			28				
	Z	iPP			02				
	E	eSPP			59				
	NE	eS			08				
	E	eSS			11				
	E	e			10				
	E	iSS			08				
	E	eSSS			43				
	ZNE	i			31				
	ZNE	eL			31				
	F	35			-				
	F	30			-				
5	NE	e	22	18	-				
	F	55			-				
6	ZV,	e	14	40	22				
	ZE	e			30				
	ZN	e			03				
	NE	e			41				
	ZE	e			54				
	NE	e			24				
	ZNE	eL			-				
	Z	M			53				
	F	45			-				
			18	+7					



**SEISMOLOGICAL BULLETIN.**

.....19...42

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.	
			h.	m.	s.					sec.
8	Z	ePP	21	41	04			10300	Off coast of Northern Chile 20°S., 71°W. (U.S.C.G.S.) Depth about 120 Km.	
	ZE	eSKS		47	57					
	ZE	eS		48	52					
	NE	ePS		50	44					
	N	e		59	44					
	ZNE	L	22	13	-					Small.
		F	23	00	-					
9	ZNE	e	02	03	-				Small; may be microseismic.	
		F		25	-					
2 9	Z	iP	13	49	20			9870	Compression, eNE  Near coast of north western Sumatra 5°N., 95°E. (U.S.C.G.S.).	
	Z	i		49	48					
	Z	ePP		52	55					
	ZE	iSKS		59	51					
	ZNE	eS	14	00	13					
	ZNE	ePS		00	41					
	ZNE	ePPS		02	41					
	NE	eSS		06	09					
	ZE	eSSS		11	45					
	ZE	e		13	44					
	NE	eLQ		15	-					
	Z	eLR		20	-					
	Z	M		37	33	16	-9			
		F	16	30	-					
10	E	e(SKS)	00	47	51					
	ZNE	eL	01	06	-					
		F		40	-					
10	ZV,E	e	06	25	07				Short period instruments.	
	ZV,E	e		26	36					
	ZV,E	e		27	14					
		F		29	-					
11	Z	e	13	40	-					
		F	14	30	-					
12	ZNE	e	11	13	-					
		F		30	-					
13	ZN	e	07	20	23					
	E	e		24	09					
	ZNE	eL		26	-					
		F		35	-					
13	ZV,	iP	20	19	27			2890	eZNE. eZNE.	
	ZV,	iPP		19	40					
	ZNE	eS		23	56					
	ZNE	eSS		24	23					
	NE	ePcS		26	05					
	ZNE	eL		27	-					
		F	21	05	-					
16	ZV,ZNE	e	04	52	15					
	Z	e		52	28					
	ZNE	e		54	19					
	ZNE	e	05	01	59					
	ZNE	e		03	13					



**SEISMOLOGICAL BULLETIN.**

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
	ZNE	e	05	04	10				
	ZE	e		08	53				
	ZNE	eL		34	-				
		F	07	15	-				
17	ZV,	iP	02	41	49			8690	Kurile Islands. 48°N., 155°E. (U.S.C.G.S.).
	E	eS		51	47				
	N	e	03	04	32				
	ZNE	eL		09	-				
		F		50	-				
18	ZNE	e	17	08	-				
		F		30	-				
19	ZNE	e	06	03	-				
		F		35	-				
20	-	-	-	-	-				Standardisation of Z; 10h. 14m. to 16h. 13m.
21	ZNE	e	17	51	-				
		F	18	00	-				
✓ 21/22	ZV,ZNE	eP	21	52	43			9890	Off east coast of Honshu, Japan. 37°N., 142°E. (U.S.C.G.S.).
	ZNE	ePP		56	08				
	ZNE	ePPP		58	00				
	ZNE	eSKS	22	03	14				
	NE	eS		03	37				
	Z	eFS		04	07				
	ZNE	eSS		09	14				
	ZNE	e		12	21				
	ZNE	eL		17	-				
	Z	M		34	42	18	+19		
		F	00	35	-				
23	ZE	e (PKP)	04	37	23				
	Z	e		47	27				
	NE	e	05	02	11				
	NE	e		06	23				
	ZNE	eL		35	-				
		F	06	45	-				
24	Z	e	12	29	31				
	ZNE	eL		49	-				
		F	13	25	-				
24	ZNE	eL	17	01	-				
		F		55	-				
24	ZNE	e	19	48	-				
		F	20	05	-				
25	ZNE	e	05	50	-				
		F	06	05	-				
25	ZNE	e	07	15	21				
		F		30	-				

**SEISMOLOGICAL BULLETIN.**

MAY,

19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ		REMARKS.
			h.	m.	s.			sec.	μ	
25	ZV, ZNE	iP	08	33	22	11	-13		6260	
	ZNE	ePPP		36	33					
	ZE	ePcS		38	33					
	NE	eS		41	11					
	ZE	e(PS)		41	25					
	NE	e		42	01					
	NE	eScS		43	17					
	ZNE	eSS		45	35					
	ZNE	eL		49	-					
	Z	M		58	47					
	F		10	45	-					
26	Z	e	06	32	-					No E.W records.
		F	07	25	-					
30	ZV,	ePP	01	49	39			(11,000)		No long period Z record.
	NE	iSKS		56	22					
	NE	e(S)		57	11					
	NE	ePS		58	11					
	N	e	02	02	31					
	NE	eSSS		10	33					
	NE	eL		14	-					
		F		55	-					

M.O. 513

E.M. 100

21 JUL 1949

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.

Hall

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN FOR JUNE 1949

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

 CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914)  
 OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1918).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T <sub>1</sub>	PENDULUM FREE PERIOD T.	DAMPING CONSTANT $\mu^2$ .	$\frac{Ak}{\pi^2}$
N.		sec.	sec.		sec <sup>-1</sup>
E.	22 April 1949	17.8	18.3	+0.04	70.8
Z.	20 May 1949	14.2	12.5	-0.05	133.

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	$\Delta$	REMARKS.
			h.	m.	s.				
1	ZNE	e F	08 09	44 10	- -			Small.	
4/5	ZNE	e F	23 00	55 10	- -			Small.	
9	ZNE	e F	04 05	56 20	- -			Small	
9	ZV,Z ZV,Z Z Z Z ZNE	iPKP i ePP e e(SKSP) eL F	21 21 21 21 21 22	38 39 40 42 51 10	05 07 24 57 11 -		(15500)	Samoa Islands Region. 14°S., 176°W. (U.S.C.G.S.)	
								Indefinite	
10	ZNE	e F	06 07	51 00	- -			Small	
11	Z E ZNE	e(P) e(S) eL F	07 07 08	50 57 13	04 03 -		(5370)		
11	E ZNE	e e F	14 15	36 58 45	05 - -				
12	ZE Z Z Z	eP epP esP ePP	18 18 18 18	04 07 08 08	51 03 01 57		10,500	Northern Argentina 27°S., 64°W. (U.S.G.G.S.) Depth about 600 Km.	

M.O.....513..

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

**JUNE** .....19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
	ZNE	eS	18	14	30				
	ZE	e		17	20				
	NE	eSS		18	38				
	ZN	eSS		22	03				
	E	eSSS		25	35				
	ZNE	eL		30	-				Small.
		F	19	15	-				
14	ZNE	e	00	44	(17)				Doubtful.
	ZE	e	01	01	13				
	ZNE	eL		07	-				
		F	02	00	-				
15	ZNE	eL	10	18	-				
		F		55	-				
16	ZNE	e	07	35	-				
		F	08	00	-				
16	Z	eP	18	06	52			(6600)	
	ZNE	ePS		15	04				
	NE	eSSS		19	08				
	ZNE	eL		21	-				
		F		30	-				
17	ZE	eP	01	43	22			6010	
	N	eS		51	58				
	ZNE	eSS		56	04				
	ZNE	eL	02	01	-				
		F		25	-				
17	ZV,	iP	04	26	37			2905	e, ZNE.
	ZV,	i		26	42				e, ZNE.
	Z	ePP		27	16				
	ZNE	eS		31	13				
	ZNE	e		31	26				
	ZNE	eSS		32	16				
	ZNE	eL		35	-				
		F	05	00	-				
19	ZV,Z	e	09	07	14				Changing charts
	ZV,Z	e		08	32				09.50h-m 10.01h.m.
	Z	e		11	56				
	ZE	e		21	11				
	ZNE	e	10	05	02				
	NE	e		07	48				
	ZNE	eL		17	-				
		F	11	00	-				
19	ZE	eP	12	32	24			5370	Small.
	ZE	eS		39	22				No N record
	ZE	eL		44	-				North Atlantic Ocean.
		F	13	05	-				25°N., 45°W.(U.S.C.G.S).
22	ZE	e	01	57	-				No N record
		F	02	30	-				
22	Z	e	13	19	56				
	ZNE	eL		35	-				
		F		55	-				

M.O. 513

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

JUNE 19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
23/24	Z	ePKP	22	46	32			(16000)	No N record. New Hebrides Islands. 16°S., 168°E.(U.S.C.G.S.)
	ZE	epPKP		47	12				
	Z	e		47	25				
	Z	eaPKP		47	38				
	ZE	eSKS		53	11				
	ZE	e	23	01	04				
	ZE	eSS		08	24				
	ZE	e		18	04				
	Z	e		23	02				
	ZE	eL		28	-				
	F		00	25	-				
√24/25	ZV,ZE	eP	22	52	52			11,500	No N record. Java region 7°S., 105°E. (U.S.C.G.S.)
	ZV,ZE	ePP		57	02				
	Z	ePPP		59	22				
	E	eSKS	23	03	26				
	E	e		03	44				
	ZE	ePPS		06	14				
	E	eSSS		15	52				
	E	e		23	28				
	ZE	eL		32	-				
	Z	M		48	48	18	+7		
	F		01	30	-				
25	ZV,Z	ePKP	19	36	58				
	Z	e		38	24				
	ZNE	eL	20	34	-				
	F		21	40	-				
26	ZV,	eP	05	46	44			(2205)	No Z record.
	NE	e(s)		50	20				
	NE	e		53	30				
	E	e		53	39				
	NE	e		54	30				
	NE	eL		56	-				
	F		06	05	-				
26	NE	e	06	20	-				
	F			30	-				
26	ZV,	e(PKP)	09	00	06			(12000)	No Z record. Very doubtful.
	NE	ePP		00	42				
	NE	eSKS		06	40				
	NE	e(s)		08	36				
	NE	ePPS		11	26				
	NE	eSS		15	42				
	NE	eL		37	-				
	F		11	15	-				
26	NE	e	16	16	-				
	F		17	45	-				Small.
27	NE	eL	01	04	-				
	F			45	-				
27/28	ZV	e	23	13	20				
	ZNE	eL	00	08	-				
	F			50	-				Small.

M.O.....513.....

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

JUNE, .....19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ		REMARKS.
			h.	m.	s.			sec.	μ	
28	Z	eP	20	16	38			4950		
	ZNE	eS		23	12					
	N	eS <sub>c</sub> s		25	56					
	ZNE	eL		29	-					
		F	21	00	-					
30	ZNE	e	02	43	-					
		F	03	15	-					





**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

*Hall*

**SEISMOLOGICAL BULLETIN FOR JULY 1949**

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914)  
OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T <sub>1</sub>	PENDULUM FREE PERIOD T.	DAMPING CONSTANT μ <sup>2</sup> .	$\frac{Ak}{\pi^2}$
N.		sec.	sec.		sec <sup>-1</sup>
E.	22 April 1949	17.8	18.3	+0.04	70.8
Z.	20 May 1949	14.2	12.5	-0.05	133.

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
1	ZNE	e F	22	27	-				
				45	-				
2	ZNE	e F	03	01	-				
				10	-				
2	ZV,Z	iPKP	11	47	55			18,000	
	Z	e		48	24				
	Z	e		49	08				
	Z	ePP		52	49				
	ZE	ePPP		56	49				
	ZE	ePPP	12	00	41				> 180°.
	ZNE	e		03	03				
	NE	e(SKSP)		09	03				
	ZE	e(SSS)		18	23				
	ZNE	eL		58	-				
	Z	M	13	10	38	18	+4		
		F		55	-				
✓2	ZV,ZNE	eP	20	11	29			10,920	Marianas Islands region
	ZV,	i		11	38				16°N., 148°E. (U.S.C.G.S.)
	ZV,ZNE	iPP		15	56				
	ZV,	i		16	10				
	Z	i(PPP)		16	53				
	Z	ePKS		21	27				
	NE	eSKS		22	05				
	NE	eSKKS		22	18				
	NE	eS		23	05				
	NE	e		23	25				
	ZNE	e(SP)		25	05				
	Z	e(SPP)		25	49				
	ZNE	e		26	16				
	NE	eSS		30	51				
	ZE	e		40	21				



SEISMOLOGICAL BULLETIN.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI-TUDE.	Δ	REMARKS.
			h.	m.	s.				
	ZNE	eL	20	49	-				
	E	M		53	16	27	+18		
	Z	M	21	09	07	17	-12		
		F	23	20	-				
3	ZNE	e	08	49	-				
		F	09	05	-				
4	ZNE	e	02	41	-				
		F		50	-				
4	ZV,ZE	iP	03	49	25			5,290	Compression Persian Gulf region. 27½°N., 56°E. (U.S.C.G.S).
	ZV,Z	ePP		51	19				
	ZNE	eS		56	21				
	ZE	ePS		56	55				
	ZE	e		57	37				
	ZNE	eScS		59	19				
	E	eSS	04	00	18				
	E	eSSS		00	53				
	ZNE	eL		06	-				
	E	M		15	17	16	-2		
	Z	M		15	20	14	+2		
		F	05	35	-				
5	Z	e	02	38	53				
	ZNE	eL		56	-				
		F	03	25	-				
6	ZV,Z	e	20	09	11				Small.
	ZNE	eL		58	-				
		F	21	15	-				
7	Z	e(P)	04	38	29			(3430)	
	ZE	e(S)		43	34				
	ZNE	eL		46	-				
		F	05	20	-				
7	ZE	eP	12	26	33			3015	
	ZNE	eS		31	11				
	Z	e(SS)		32	08				
	NE	e		35	23				
	NE	e		36	27				
	ZNE	eL		37	-				
		F		55	-				
8	ZNE	eP	08	11	15			5430	
	ZNE	eS		18	17				
	ZNE	eSS		21	01				
	ZN	eSSS		23	16				
	ZNE	e		24	21				
	N	e		29	57				
	ZNE	eL		32	-				
		F		55	-				

SEISMOLOGICAL BULLETIN.

JULY, 1949

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
8	Z	eP	12	52	54			8850	Off West Coast of Guatemala. 13°N, 91°W. (U.S.C.G.S.).
	NE	ePP		57	37				
	NE	e	13	00	23				
	E	eS		02	58				
	ZNE	eL		21	-				
		F	14	20	-				
8	ZV,ZN	iP	18	22	51			2,335	
	Z	ePP		23	19				
	E	iS		26	37				
	ZNE	eL		28	-				
		F	19	10	-				
8/9	ZNE	e	23	22	-				
		F	00	05	-				
9	Z	e	01	07	21				Small.
	ZNE	e		12	19				
	ZNE	eL		34	-				
		F		55	-				
9	ZV,Z	eP	18	54	07			6070	North Atlantic Ocean. 33°N., 71°W. (U.S.C.G.S.).
	Z	ePP		56	04				
	ZE	eS	19	01	46				
	ZNE	eSS		05	01				
	ZNE	eL		09	-				
		F		55	-				
✓ 10	ZV,E	eP	04	02	28			5540	Compression. Eastern Turkestan 39°N., 71°E. (U.S.C.G.S.).
	ZV,E	i		02	32				
	ZV,ZNE	iPP		04	26				
	ZN	ePPP		05	07				
	ZV,	i		06	13				
	NE	eS		09	37				
	ZV,N	iPS		09	47				
	N	eScS		12	24				
	ZV,E	iSS		13	29				
	ZV,E	eSSS		14	49				
	E	e		16	19				
	ZNE	eL		18	29				
	Z	M		37	18				
		F	09	50	-				
10	Z	e	10	48	-				Small.
		F		55	-				
10	ZV,ZE	eP	11	06	19				
	ZNE	eL		14	-				
		F	12	00	-				
10	ZV,Z	iP	12	06	43				Aftershock from Turkistan.
	ZV,Z	e(PP)		08	41				
		F	13	15	-				
10	ZV,Z	iP	14	22	17			(4150)	Compression. e,E.
	Z	e(S)		28	04				
	ZNE	e		33	01				
	ZNE	eL		34	-				
		F	-	-	-				
									Overlapped by next shock.

SEISMOLOGICAL BULLETIN.

JULY,

19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
10	ZV,Z ZE	iP e F	15	16	43 22 05				Overlapped by next shock.
10	ZV,ZE ZE ZNE E ZNE ZNE Z	iP i ePP eS eSS eL M F	15	27	52 48 21 55 45 - 14	11	-9	5445	Compression. Aftershock from Turkestan. Overlapped by next shock.
✓ 10	ZV,Z ZV,Z ZNE E ZN Z ZNE Z	iP i eS eSS eSSS e eL M F	15	58	10 17 13 49 11 09 - 24	17	-55	5445	} e, NE. Aftershock from Turkestan. Overlapped by next shock.
✓ 10	ZV,Z ZV,Z ZV,ZNE ZNE ZNE ZNE Z E	iP iPP iPPP eS eSS eL M M F	16	32	53 51 55 03 49 - 40 42	15 16	-65 +80	5555	Compression. Aftershock from Turkestan.
10	ZNE	e F	23	37	- 50				Small.
11	ZV,	e F	01	10	03 -				Small.
11	ZNE	e F	04	21	- 40				
✓ 11	ZV,Z ZV,Z ZV,Z Z NE ZNE Z Z ZNE E	iP i iPP ePPP iSKS e e(SSS) e eL M F	16	23	22 35 54 41 20 37 37 39 06 - 44 -	16	-2	9500	Dilatation, e,NE. Honshu, Japan. 34°N., 132°E. (U.S.C.G.S.). e,Z.
12	ZV, ZV,	e e F	10	50	15 35 -				Small.



**SEISMOLOGICAL BULLETIN.**

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.				
			h.	m.	s.					sec.	μ	km.	
13	ZV,	i	10	22	54								
	E	e		34	00								
	ZNE	eL		40	-								
		F	11	10	-								
13	ZNE	eL	18	55	-								
		F	19	15	-								
14	ZV,	i	00	49	05				Small. e,ZNE.				
		F	01	00	-								
14	ZNE	eP	03	55	24		3910						
	Z	e		58	21								
	ZNE	eS	04	00	57								
	ZNE	eL		04	09								
		F		15	-								
14	ZE	e	10	16	57								
	ZE	e		18	36								
	ZNE	eL		19	-								
		F		45	-								
15	ZNE	e	00	12	-								
		F		40	-								
18	ZE	e(P)	00	51	57				Probably two or more shocks superposed.				
	ZNE	e		52	13								
	ZNE	e		53	01								
	ZNE	e		58	18								
	ZNE	e	01	00	25								
	ZNE	e		02	05								
	ZNE	e		04	01								
	ZNE	e		09	20								
	ZNE	e		11	39								
	ZE	e		18	30								
	ZNE	eL		28	-								
	E	M		44	01					22	+2		
		F		03	00					-			
18	Z	eP	05	01	01		4020						
	Z	ePP		01	57								
	E	eS		06	40								
	ZE	eSS		07	21								
	ZE	e		10	25								
		F		25	-								
18	Z	e	10	40	-								
		F		55	-								
18	Z	e	06	55	-								
		F	07	20	-								
19	ZNE	e	13	50	-								
		F	14	10	-								
19	ZV,ZNE	iP	17	51	06		5530		Compression.				
	ZNE	iPP		52	57								
	ZNE	eS		58	15								
	ZNE	eSS	18	01	39								
	ZE	iSSS		02	03								

**SEISMOLOGICAL BULLETIN.**

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
	ZNE	eL	18	08	-	13	-18		
	Z	M	19	19	-				
19	ZNE	F	19	25	-				
20/21	ZNE	e	21	55	-				
		F	22	15	-				
	Z	e(P)	22	38	43				
	E	e(PPP)		44	55				
	NE	e(SS)		57	41				
	ZNE	eL	23	16	-				
21		F	00	10	-				
	Z	e	08	14	43				
	Z	e		15	01				
	ZNE	e		26	27				
	Z	e		27	13				
	ZNE	eL		48	-				
		F	09	10	-				
22	-	-	-	-	-			11h. 24m. to 16h. 35m. Standardisation of N-S	
23	ZNE	e	02	50	-			Small.	
		F	03	05	-				
23	ZE	e	06	00	15				
	ZNE	eL		26	-				
		F	-	-	-			Overlapped by next shock.	
23	ZNE	e	07	03	11				
		F		40	-				
23	ZV,Z	i(P)	10	46	08			(9490) Compression. e,NE.	
	ZV,Z	e		46	56				
	ZV,	i		47	11				
	ZNE	e		47	33				
	ZNE	iPP		49	35				
	NE	ePPP		53	01				
	ZE	e(S)		56	45				
	ZNE	eL	11	07	-				
	E	M		47	28	23	+3		
		F	13	15	-				
23	ZV,Z	eP	15	08	31			2650	
	ZNE	iPP		08	36				
	ZE	e		10	31				
	ZNE	e		11	09				
	NE	eS		12	43				
	Z	eSS		13	15				
	ZNE	eL		14	-				
	Z	M		57	02	13	+100		
	E	M		57	20	16	+120		
		F	18	55	-				

M.O. 513

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

JULY, 19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
27	ZV,ZNE	eP	11	21	15			9010	
	ZNE	e		21	32				
	ZNE	e		22	17				
	ZNE	ePP		24	07				
	ZNE	eS		31	21				
	ZNE	ePS		31	41				
	ZNE	eL		12	10	-			
		F	13	05	-				
✓ 27	ZV,ZE	i	15	31	32				Compression.
	ZV,ZE	i		32	04				
	ZV,Z	i		32	26				
	ZNE	e		35	37				
	ZNE	e		37	32				
	ZNE	e		38	29				
	ZNE	e		45	55				
	ZN	e		48	58				
	ZN	e		56	45				
	ZNE	e	16	01	25				
	NE	e		16	09				
	ZNE	eL		22	-				
	Z	M		39	14	20	+11		
	F		18	15	-				
28	ZNE	e	04	24	-				
		F		40	-				
28	ZNE	e	05	27	-				
		F		55	-				
29	ZNE	e	08	18	-				
		F		55	-				
29	ZNE	e	11	25	-				
		F	12	05	-				
30	ZV,Z	eP	17	50	40		4020		
	ZV,Z	ePP		52	01				
	ZNE	eS		56	19				
	ZE	eSS		58	21				
	ZNE	eL		59	-				
		F	18	20	-				
31	ZNE	e	00	40	-				
		F	01	05	-				





M.O. 513

EDINBURGH

**AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.**

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND**

*Ball*

**SEISMOLOGICAL BULLETIN FOR AUGUST, 1949**

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914)  
OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T I	PENDULUM FREE PERIOD T.	DAMPING CONSTANT $\mu_2$ .	$\frac{At}{\pi^2}$
N.	22 July 1949	sec. 21.6	sec. 23.2	-0.06	sec-l 52.1
E.	22 April 1949	17.8	18.3	+0.04	70.8
Z.	20 May 1949	14.2	12.5	-0.05	133.

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD. sec.	AMPLI- TUDE. $\mu$	$\Delta$ km.	REMARKS.
			h.	m.	s.				
1	ZV	eP	07	49	03				No Z record.
	NE	e	08	05	11				
	NE	eL F		08	-				
1	ZNE	e F	22	55	-				Small.
			23	00	-				
3	ZNE	eL F	21	13	-				
			22	05	-				
4	ZNE	eL F	08	57	-				
			10	05	-				
5	ZNE	eL F	00	58	-				
			01	35	-				
✓5	ZNE	eP	19	21	16		9175		Central Ecuador. 1°S, 78°W. (U.S.C.G.S.)
	ZNE	e		21	22				
	Z	ePP		24	12				
	Z	e		29	51				
	N	eS		31	38				
	ZNE	eSS		37	12				
	ZNE	e		39	44				
	ZNE	eL		43	-				
	E	M		50	17				
		F		22	20				
5	ZNE	e F	23	00	-				
				55	-				

20

M.O.....513.....

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

AUGUST, .....19 49.....

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
✓ 6	ZV, ZNE	iPKP	00	55	13	19	-11	17,000	Tonga Islands region. 19°S., 174½°E. (U.S.C.G.S.)
	NE	e		55	32				
	Z	iPP		56	18				
	NE	iPKS		59	44				
	N	i (SKKS)	01	05	39				
	Z	i		06	18				
	E	eSS		17	38				
	E	i (SSS)		23	46				
	N	e		24	26				
	NE	eLQ		37	-				
	Z	eLR		46	-				
	E	M	02	06	00				
		F	03	45	-				
8	Z	eP	07	20	52				
	NE	e(SF)		33	26				
	NE	eSS		39	20				
	NE	e		45	58				
	ZNE	eL		53	-				
8	ZNE	e	14	53	-				
		F	15	10	-				
8	ZNE	e	19	45	-				
		F	20	15	-				
9	ZNE	e	22	02	-				Small.
		F		10	-				
10	ZNE	e	16	50	-				Small.
		F	17	10	-				
11	ZN, ZNE	eP	14	45	08			(2,460)	
	ZE	e(PP)		45	25				
	E	e(S)		49	04				
	NE	e(SS)		50	31				
	E	e		51	12				
	ZNE	eL		52	-				
11	ZNE	e	15	40	-				
		F			-				
11	ZNE	e	16	17	-				
		F		30	-				
12	ZNE	e	08	04	-				
		F		45	-				
✓ 13	ZV,	e(PKP)	18	43	51	38	+16		Admiralty Islands region. 0°, 146°E. (U.S.C.G.S.)
	ZV,	e		47	09				
	ZN	e		57	27				
	NE	e	19	13	08				
	NE	e		15	31				
	ZNE	eL		19	-				
	N	M	21	23	02				
	F	21	25	-					

SEISMOLOGICAL BULLETIN.

AUGUST, 19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
13	ZNE	e F	19	05	-				
				55	-				
16	ZNE	e F	12	20	-				
				55	-				
17	ZV,Z	iP	18	46	20				Felt in Northern Japan. 43°N., 146°E. (U.S.C.G.S.). overlapped by next shock.
	ZV,Z	i		46	32				
		F	-	-	-				
✓ 17	ZV,ZNE	iP	18	50	31			3,375	Damage in Eastern Turkey. 39°N., 40°E. (U.S.C.G.S.)
	ZNE	iS		55	32				
	ZNE	eSS		56	51				
	ZNE	e		57	58				
	ZNE	e		59	07				
	ZNE	eL	19	03	-				
	F	M		03	36	20	-110		
	N	M		04	22	20	+140		
	Z	M		07	17	13	+120		
		F	23	20	-				
18	ZNE	e F	06	10	-				
				25	-				
✓ 18	ZV,ZE	eP	13	45	26			8,630	Near South western coast of Panama. 8½°N., 82½°W. (U.S.C.G.S.)
	Z	ePP		49	01				
	E	e		51	57				
	ZNE	eS		55	21				
	NE	eSS	14	00	31				
	NE	e		01	33				
	ZNE	eSSS		03	59				
	ZNE	eL		07	-				
	E	M		13	53	28	-8		
		F	15	20	-				
22	ZV,ZNE	eP	04	12	13			7,705	Queen Charlotte Islands. 54°N., 133°W. (U.S.C.G.S.)
	ZV,ZNE	i		12	21				
	ZV,ZNE	i		12	55				
	ZV,ZNE	ePP		14	49				
	ZV,ZNE	ePPP		16	35				
	E	iS		21	19				
	N	i		21	23				
	E	i		21	55				
	E	i		22	42				
	ZV,ZNE	eSS		26	17				
	ZV,ZNE	eSSS		28	55				
	ZNE	eL		30	-				
	E	M+		37(52)		22			
	ZV,ZNE	M+		42(39)		17			
		F	10	50	-				
22	ZNE	e F	15	37	-				
			16	00	-				
22	ZNE	e F	20	50	-				
			21	25	-				

\*Short period records  
(Wood-Anderson and ZV).  
Galitzins beyond limit  
of registration.  
< 250 μ.

SEISMOLOGICAL BULLETIN.

AUGUST, 1949.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
23	ZNE	e F	03	37	-				
				55	-				
23	ZNE	e F	13	50	-				
			14	20	-				
23	Z	eP	15	26	41			(11,000)	
	Z	ePP		30	21				
	ZNE	ePS		38	53				
	ZNE	ePPS		39	33				
	ZNE	ePKKP		42	23				
	ZNE	eSS		44	05				
	ZNE	eL		51	-				
	E	M	16	04	12	19	-4		
		F		50	-				
23	ZNE	e F	20	15	-				Overlapped by next shock.
			-	-	-				
23/24	Z	eP	20	35	35			7,740	
	ZNE	i		35	39				
	Z	i(P <sub>o</sub> P)		36	03				
	ZNE	ePP		38	13				
	ZNE	ePPP		40	01				
	NE	eS		44	43				
	NE	e(PPS)		45	45				
	ZNE	eSS		49	17				
	ZNE	eSSS		52	37				
	ZNE	eL		55	-				
	Z	M	21	05	52	17	+13		
		F	00	15	-				
24	ZNE	e F	06	45	-				
			07	10	-				
24	ZE	e	09	50	27				
	E	e		56	05				
	ZNE	eL	10	12	-				
		F		50	-				
25	Z	eP	04	26	15			(7,335)	
	NE	e(S)		35	02				
	ZNE	eL		48	-				
		F	05	35	-				
25	ZNE	e F	06	00	-				
				05	-				
25/26	Z	e	23	44	30				
	ZNE	e		45	53				
	NE	e		51	15				
	NE	e		52	39				
	ZNE	e		55	21				
	Z	e		58	03				
	ZN	e	00	01	52				
	ZNE	e		05	15				
	ZNE	e		09	53				
	ZNE	eL		22	-				
		F	10	10	-				

M.O.....513.....

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

AUGUST, .....19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
26	ZNE	e	01	30	-				
		F	02	00	-				
26	ZNE	e	06	00	-				
		F	20	-	-				
27	Z	e	22	10	-				Small.
		F	20	-	-				
28	ZV,ZE	1P	19	33	40			2,570	
	ZE	e(PP)		34	03				
	ZNE	eS		37	45				
	ZNE	eL		39	-				
	F		20	10	-				
29	ZNE	e	14	55	-				
		F	15	20	-				
30	ZNE	e	08	35	-				
		F	09	15	-				
30	ZNE	e	17	00	13				
	E	e		01	14				
	N	e		04	00				
	ZNE	eL		05	-				
	F			20	-				
31	ZNE	e	01	05	-				Small.
		F		30	-				



M.O. 513

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.

*Hail*

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN FOR SEPTEMBER, 1949

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914)  
OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T <sub>1</sub>	PENDULUM FREE PERIOD T.	DAMPING CONSTANT μ <sup>2</sup> .	$\frac{Ak}{\pi^2}$
N.	22 July, 1949	21.6 <sup>sec.</sup>	23.2 <sup>sec.</sup>	-0.06	52.1 <sup>sec.<sup>-1</sup></sup>
E.	22 April, 1949	17.8	18.3	+0.04	70.8
Z.	20. May, 1949	14.2	12.5	-0.05	133.

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.	sec.	μ	km.	
1	ZNE	eL F	14	55	-				
			15	15	-				
1	N ZNE	e eL F	19	04	54				
				09	-				
				25	-				
5	E E	e eL F	03	11	-				Wood Anderson only; No Galitzin records.
				53	-				
			04	40	-				
8	ZNE	e F	16	50	-				
			17	05	-				
12	ZNE ZNE Z ZNE ZNE ZNE Z	e(SKS) e e e(PPP) e eL M F	09	44	00				Earlier phases lost in changing of charts.
				45	02				
				48	04				
				50	54				
			10	18	42				
				27	-				
				44	57	21	+4		
			11	55	-				
13	ZNE	e F	07	08	-				
			08	30	-				
13	Z	e F	13	00	38				
				35	-				
14	ZNE ZNE Z	e eL M F	02	13	28				
				27	-				
				29	44	17	+3		
				45	-				

M.O.....513.....

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN.

SEPTEMBER, .....19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
14	Z,ZV	e	17	06	16				
	Z	e		07	44				
	Z	e		08	56				
	ZNE	eL		36	-				
		F	18	25	-				
√ 14/15	ZV,ZNE	iP	20	04	57			12000 Celebes Region 1°N., 126°E. (U.S.C.G.S.)	
	ZNE	iPKP		08	22				
	ZV,ZNE	iPP		09	44				
	ZNE	e		10	32				
	ZNE	e		11	28				
	ZNE	eSKS		15	16				
	Z	eSKKS		15	57				
	N	e		17	04				
	ZNE	ePS		18	58				
	ZNE	e		19	57				
	ZNE	ePPS		20	28				
	ZNE	e		21	32				
	ZNE	e		23	22				
	ZNE	eSS		25	04				
	NE	e		28	03				
	ZNE	eL		32	-				
E	M			58	48	19	-26		
N	M		21	00	29	20	-49		
Z	M			00	44	20	-42		
		F	24	15	-				
16	ZNE	e	19	39	52				
	NE	e		44	36				
	N	e		49	05				
	NE	e		50	06				
	ZNE	eL		02	-				
		F		55	-				
17	ZNE	e	02	45	-				
		F	03	20	-				
17	ZNE	e	11	35	05				
	NE	e		39	04				
	E	e		39	24				
	ZNE	eL		42	-				
		F		55	-				
17	ZNE	e	13	50	-				
		F	14	15	-				
17	ZNE	e	16	40	-				
		F	17	00	-				
17/18	Z	ePKP	23	08	19				
	Z	ePP		10	24				
	Z	e		16	02				
	ZNE	eL		55	-				
	Z	M		26	17	18	+2		
		F	01	15	-				
19	ZNE	e	19	17	-				
		F		50	-				



M.O. 513.....

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

SEPTEMBER, 19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
19/20	ZNE	e	22	10	06	24	-6		
	Z	e		15	00				
	ZNE	e		15	40				
	Z	e		15	56				
	NE	e		19	30				
	ZE	e		22	22				
	ZNE	e		25	22				
	ZNE	eL		31	-				
N	M		37	45					
	F		24	15	-				
20	ZNE	e(L)	03	09	-				
		F	04	45	-				
20	ZNE	e	08	08	-				
		F		25	-				
✓ 20	ZV,Z	iPKP <sub>1</sub>	12	15	16	22	+5	17000	Compression, e,NE. e,NE. Kermadec Islands. 30°S., 178°E. (U.S.C.G.S.)  By path > 180°.
	ZV,Z	iPKP <sub>2</sub>		15	53				
	ZNE	e		16	14				
	ZV,Z	i		19	30				
	ZV,ZN	ePP		19	57				
	E	ePPP		23	58				
	ZNE	e		25	35				
	Z	eSKKS		26	00				
	ZNE	iSKKS		28	24				
	N	ePPS		35	18				
	NE	eSSS		47	40				
	ZNE	eL	13	08	-				
	N	M		22	51				
		F		14	55				
21	ZV,ZE	iP	13	07	14	28	-12	8610	Compression.
	ZV,Z	i		07	21				
	ZE	ePP		10	14				
	ZNE	iS		17	08				
	ZNE	iPS		17	52				
	ZN	ePPS		18	16				
	ZN	e		21	48				
	ZNE	eSS		26	18				
	NE	eSSS		28	54				
	ZNE	eL		32	-				
	N	M		37	44				
F			15	30	-				
21	Z	e	18	39	56				
	Z	e		41	58				
	Z	e		42	36				
	E	e	19	03	16				
	NE	e		11	04				
	ZNE	eL		36	-				
22	Z	e	15	50	34				
	ZN	e	16	01	32				
	ZNE	eL		20	-				
		F		50	-				

M.O... 513

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

SEPTEMBER, 1949

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
✓ 24	ZV,ZNE	eP	04	39	32			14,500	
	ZV,ZNE	e		40	17				
	ZNE	ePKP		42	22				
	NE	ePPP		44	54				
	Z	eSKS		45	41				
	ZNE	eSKKS		49	56				
	ZNE	e		51	07				
	ZNE	ePPS		57	04				
	ZN	e	05	00	58				
	ZNE	eSSS		07	22				
	NE	e		12	20				
	NE	eLr		14	-				
	Z	eLq		21	-				
	Z	M		45	00	17	+3		
	F		07	20	-				
25	ZNE	e	04	05	-				
	F			50	-				
✓ 25	Z	i	15	38	36				
	Z	e		39	04				
	ZN	e		48	24				
	ZNE	e		50	42				
	Z	e		58	40				
	ZNE	eL	16	15	-				
	Z	M		42	22	18	+2		
	F		17	50					
26	ZNE	e	04	13	-				
	F		05	00	-				
27	ZNE	e	12	50	-				
	F		13	20	-				
27	ZV	e	14	16	-			Small.	
	F			18	-				
✓ 27	ZV,Z	iP	15	41	30			7,400	Compression. e,NE. e,NE.
	ZV,Z	i		41	44				
	ZV,ZNE	ePP		44	01				
	ZV	ePPP		45	49				
	NE	e		46	17				
	ZNE	e		47	15				
	ZNE	iS		50	21				
	ZNE	eSKS		50	36				
	ZN	ePS		51	13				
	ZNE	ePPS		51	39				
	ZNE	e		52	45				
	NE	eSS		54	13				
	Z	e		56	15				
	ZNE	eSSS		58	01				
	ZNE	eL	16	01	-				
	N	M		05	38	30	+65		
	Z	M		11	49	19	-70		
	ZNE	eL <sub>2</sub>	18	02	-				Via antipodes.
	F	19	55	-					

M.O. 513.....

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN.

SEPTEMBER, 19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
29	Z	e	05	14	18				
	ZNE	e		15	59				
	ZNE	eL		17	-				
29/30	ZNE	F		35	-				
		F	23	40	-				Small.
30	ZNE	F	02	55	-				
		F	03	55	-				Small.
✓ 30	ZV, ZNE	ePKP1	04	18	56			(16,000)	
	ZV, ZNE	ePKP2		19	18				
	ZNE	ePP		22	05				
	ZN	eSKKS		28	59				
	Z	eSP		33	27				
	ZN	e		35	03				
	Z	eSS		40	06				
	NE	ePSS		42	05				
	ZNE	e		52	05				
	Z	e		59	01				
	ZNE	eL	05	13	-				
	Z	M		29	32	19	+8		
		F		06	50	-			
30	ZNE	e	10	10	-				
	F			35	-				
30	ZNE	e	16	35	-				
	F		17	25	-				
30	Z	e	17	54	00				
	ZNE	eL	19	39	-				
	F		20	30	-				
30/1	Z	e	22	30	30				
	ZNE	eL	23	28	-				
	F		01	35	-				



M.O. 513

METEOROLOGICAL OFFICE, EDINBURGH

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON. 24 NOV 1949

 KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND. *Hale*

 SEISMOLOGICAL BULLETIN FOR OCTOBER, 19 49 27

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914) OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T <sub>1</sub>	PENDULUM FREE PERIOD T.	DAMPING CONSTANT μ <sub>2</sub> .	$\frac{Ak}{\pi^2}$
N.	22 July, 1949	21.6 <sup>sec.</sup>	23.2 <sup>sec.</sup>	-0.06	52.1 <sup>sec<sup>-1</sup></sup>
E.	22 April, 1949	17.8	18.3	+0.04	70.8
Z.	20 May, 1949	14.2	12.5	-0.05	133.

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.	
			h.	m.	s.					
	ZV, Z NE ZNE	eP	18	11	28	sec.	μ	km.		
		e		20	14					
		eL		33	-					
		F	19	15	-					
	N	e	03	35	-				Very small.	
		F		40	-					
	ZNE ZN ZNE	e	09	44	10					
		e		45	06					
		eL	10	06	-					
		F	11	05	-					
✓ 4	ZV, ZNE ZV, ZNE ZNE ZNE ZNE NE ZNE ZNE E N	iP	10	30	01	sec.	μ	6,180	Compression. Mid-Atlantic Ocean. 1°S, 21°W. (U.S.C.G.S.).	
		ePP		32	16					
		ePPP		33	12					
		eS		37	46					
		eS <sub>c</sub> S		39	47					
		eSS		41	28					
		eSSS		44	10					
		eL		47	-					
		M		57	27					17
		M		59	16					14
	N	F	12	20	-				Large	
	ZV, ZNE Z ZNE	eP	17	36	58			(3,140)		
		e(s)		41	45					
		e(SS)		43	24					
		eL		44	-					
	ZV, ZNE	F		55	-					
		e(P)	16	27	56					
		e		32	59					
		F		45	-					

M.O. 513

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

OCTOBER, 19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	Δ	REMARKS.
			h.	m.	s.				
5	ZNE	e F	19	28 55	-				
5	ZNE	e F	20	05 30	-				
5	ZNE	e F	21	10 30	-				
5	ZNE	e F	21 22	50 15	-				
✓ 7	ZV,Z Z ZV,ZNE ZV,ZNE ZNE ZNE ZNE NE NE ZNE N Z	iP e iPP ePPP eSKS eS ePPS eSS eSSS eL M M F	12	16 17 20 22 26 27 29 33 38 44 05 05 40	04 58 08 20 44 47 12 43 28 -	18 18	+11 - 9	11,110 Dilatation. e NE. Indian Ocean. 33°S., 56½°E. (U.S.C.G.S.).	
7	NE	e F	17 18	55 20	-				
8	ZV,ZNE ZV,Z ZNE ZNE ZNE	iP iPP eS eSS eL F	03	13 13 16 16 18 04 05	15 43 40 58 -			2,065	
✓ 8	ZV, NE Z N	e eLQ eLR M F	21	17 20 24 32 55	10 -	18	+3	Doubtful.	
10/11	-	-	-	-	-			09h. 05m. to 09h. 29m. No Galitzin records.	
11	ZNE	e F	13	05 20	-				
12	ZNE	e F	01	30 50	-				
12	ZNE	e F	03	05 15	-				
12	ZNE	e F	22 23	55 10	-				
13	ZV,ZN NE ZNE	e e eL	03 04	55 17 53	36 41 -				

M.O. 513

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN.

OCTOBER, 1949

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
Contd. 13	N	M F	05	00	15	18	+2		
13	ZNE N ZNE	e e eL F	05	23	43				
				27	37				
				29	-				
				53	-				
13	ZNE	e F	10	40	-				
			11	00	-				
15	ZNE	e F	21	55	-				
			22	30	-				
16	ZNE	e F	02	30	-				
				55	-				
✓ 19/20	ZV,ZNE ZV,ZNE NE Z ZNE ZNE NE NE ZNE ZNE E Z N	ePKP ePP ePKS eSKKS ePS ePPS eSS e eSSS eL M M M F	21	19	25			14,500	Solomon Islands region. 5½°S, 154°E. (U.S.C.G.S.).
			21		38				
			22		51				
			28		31				
			31		43				
			34		07				
			39		17				
			41		15				
			45		01				
					48				
			22	02	18	34	+85		
				09	05	28	+55		
				09	14	29	+120		
			00	45	-				
20	ZNE	e F	02	45	-				
			03	10	-				
✓ 20	ZV,Z ZNE NE ZN ZE NE NE E ZNE N	ePKP ePP ePKS eSKKS e ePS eSS eSSS eL M F	13	03	59			14,500	Aftershock to 19d 21h.
				06	12				
				07	25				
				12	41				
				14	10				
				16	43				
				23	25				
				27	51				
				35	-				
				53	38	30	+20		
			15	10	-				
21	ZNE	e F	06	55	-				
			07	15	-				
21/22	NE N NE ZNE N	e e e eL M F	21	56	48				
			22	05	19				
				16	47				
				35	-				
				44	59	26	-6		
			00	10	-				
24	ZNE	e F	16	10	-				
				35	-				

30

M.O. 513

7

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

OCTOBER, 1949

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI-TUDE.	Δ	REMARKS.
			h.	m.	s.				
30/31	-	-	-	-	-				09h. 53m. to 09h. 24m. No Galitzin records.
✓ 31	Z	e	18	16	51				
	NE	e		17	55				
	ZNE	e		26	39				
	ZNE	e		30	21				
	NE	e		33	43				
	ZE	e		44	58				
	ZNE	eL		54	-				
	N	M	19	04	24	30	+10		
		F	20	10	-				



M.O. 513

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.

5 DEC 1949

Jell

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN FOR NOVEMBER 1949

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

 CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914)  
 OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1913).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD T <sub>1</sub>	PENDULUM FREE PERIOD T.	DAMPING CONSTANT $\mu^2$ .	$\frac{Ak}{\pi^2}$
N.	22 July, 1949	21.6 <sup>sec.</sup>	23.2 <sup>sec.</sup>	-0.06	52.1 <sup>sec<sup>-1</sup></sup>
E.	22 April, 1949	17.8	18.3	+0.04	70.8
Z.	20 May, 1949	14.2	12.5	-0.05	133.

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	$\Delta$	REMARKS.
			h.	m.	s.				
1	Z	e	13	22	05	12	-4		
	ZNE	e		27	03				
	ZNE	eL		35	-				
	Z	M		46	20				
2	Z	e	02	52	46	34	+10	8,800	Kurile Islands. 48½°N. 154°E. Depth about 200 Km. (U.S.C.G.S.)
				54	20				
	Z	e	03	02	27				
	ZE	e(PPS)		03	35				
	E	e(SS)		10	35				
	E	e		19	00				
	NE	e		24	31				
	ZNE	eL		27	-				
	N	M		32	49				
		F	04	10	-				
2	ZNE	e	04	40	-				
				05	10	-			
3	ZNE	eP	01	24	21				
				24	56				
	E	eSP			25	20			
	ZE	ePP			27	13			
	ZNE	ei-PP			30	00			
	ZNE	eS			33	58			
	NE	ePS			35	01			
	NE	eSS			38	59			
	NE	e			46	31			
	ZNE	eL			53	-			
	F	02	35	-					
4	ZNE	e	21	15	-				
				22	10	-			

31

M.O.....513.....

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.SEISMOLOGICAL BULLETIN.

NOVEMBER.....1949.....

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
✓ 7	Z	ePKP	06	19	10			15,500	New Hebrides region. 14°S. 166½°E.(U.S.C.G.S.).
	ZNE	ePP		22	25				
	NE	ePKS		22	55				
	ZN	ePPP		27	07				
	ZN	ePPS		35	03				
	N	e		36	16				
	ZNE	eSS		40	47				
	NE	eSSS		45	34				
	NE	e		46	47				
	ZNE	e		52	51				
	ZNE	eL		57	-				
	N	M		07	25	50	21	-8	
		F		08	45	-			
11	ZNE	e	11	50	-				
		F	12	15	-				
✓ 11	Z	e	16	09	27			Confused by microseisms.	
	NE	e		17	40				
	ZNE	eL		35	-	15	-3		
	Z	M		42	11				
	F		17	15	-				
13	ZN	e(PP)	04	58	19			(9000)	Confused by microseisms. Near coast of Nicaragua. 11°N. 86°W. (U.S.C.G.S.).
	NE	e(SS)	05	10	23				
	NE	e		16	13				
	ZNE	eL		21	-				
	F		50	-					
✓ 20	ZV,	iP	07	22	10			8,820	Gulf of California. 28½°N. 112°W. (U.S.C.G.S.)
	Z	ePP		25	45				
	Z	ePPP		27	21				
	NE	eS		32	14				
	NE	ePS		32	57				
	NE	eSS		37	25				
	NE	eSSS		40	57				
	ZNE	eL		42	-				
	N	M		51	51	25	-50		
	Z	M		59	22	17	+25		
	F		09	45	-				
✓ 22	Z	iPKP	01	11	27			(15000)	Compression; eNE↓
	Z	i		12	04				
	Z	i		12	22				
	Z	iPP		13	16				
	ZNE	ePPP		16	49				
	Z	eSKKS		20	07				
	ZNE	ePS		24	59				
	ZNE	ePPS		26	03				
	NE	e		28	31				
	ZNE	e		30	19				
	ZE	e(PSS)		34	15				
	ZN	e(SSS)		37	51				
	ZN	e		39	07				
	ZNE	eL		43	-				
	N	M		02	09	49	32	-20	
		F		03	30	-			

M.O.513.....

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

NOVEMBER, .....19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
23	ZV,	eP	16	55	(59)			(2600)	Minute breaks missing.
	ZNE	eS	17	00	(07)				
	ZNE	eL		02	-				
		F		20	-				
27	<del>Z</del> ,ZNE	iPKP <sub>1</sub>	09	01	58			16,700	Compression. Depth of focus about 200 Km.
	Z	epPKP <sub>1</sub>		02	10				
	ZE	esPKP <sub>1</sub>		02	28				
	Z	ePKP <sub>2</sub>		02	48				
	ZN	ePP		06	06				
	NE	ePPP		09	24				
	ZNE	eSKKS		13	04				
	Z	eSKSP		16	24				
	ZE	ePS		17	59				
	NE	eSS		24	14				
	E	e		35	01				
	ZE	e		44	02				
	<del>ZNE</del>	eL		46	-				
		F		10	50	-			
								Maximum missing during changing of charts.	



M.O. 513

AIR MINISTRY, METEOROLOGICAL OFFICE, LONDON.

25 JAN 1950

Hall

KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.

SEISMOLOGICAL BULLETIN FOR DECEMBER, 1949

Lat. 51° 28' 6" N, Long. 0° 18' 47" W, Height above M.S.L. 5m.

LITHOLOGIC FOUNDATION: RIVER GRAVEL RESTING ON LONDON CLAY.

INSTRUMENTS: GALITZIN APERIODIC SEISMOGRAPHS, PHOTO-GALVANOMETRIC REGISTRATION, THREE COMPONENTS.

 CONSTANTS: FOR NOTATION SEE FÜRST B. GALITZIN "VORLESUNGEN ÜBER SEISMOMETRIE" (LEIPZIG, 1914)  
 OR G. W. WALKER "MODERN SEISMOLOGY" (LONDON, 1918).

COMPONENT.	DATE FROM WHICH CONSTANTS APPLY.	GALVANOMETER FREE PERIOD $T_1$ .	PENDULUM FREE PERIOD $T$ .	DAMPING CONSTANT $\mu^2$ .	$\frac{Ak}{\pi l}$
N.	22 July, 1949	21.6 <sup>sec.</sup>	23.2 <sup>sec.</sup>	-0.06	52.1 <sup>sec.<sup>-1</sup></sup>
E.	22 April, 1949	17.8	18.3	+0.04	70.8
Z.	20 May, 1949	14.2	12.5	-0.05	133.

TIME SERVICE: MINUTE TIME-MARKS ARE MADE ELECTROMAGNETICALLY BY CONTACT CLOCK.

TIME COMPARISONS ARE MADE DAILY WITH SIGNALS FROM GREENWICH OBSERVATORY.

SEISMOMETRIC READINGS CAN BE DETERMINED TO THE NEAREST SECOND.

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLITUDE.	$\Delta$	REMARKS.
			h.	m.	s.				
2	ZNE	e F	02	01	-				Confused by microseisms.
2	ZNE	e F	20	58	-				Confused by microseisms.
7	ZNE	e	16	20	-				
	ZNE	eL		26	-				
		F		40	-				
10	NE	e F	20	17	-				No Z record.
16	ZNE	e(L)	15	33	-				
		F	16	30	-				
V 17	ZV,Z	eFKP	07	13	31			13,500	Confused by microseisms.
	ZV,ZN	iPP		14	17				
	ZNE	e		14	47				Southern MAGALLANES Province.
	Z	i		18	11				54°S, 71°W. (U.S.C.G.S.).
	ZNE	eSKS		19	33				
	ZNE	iPS		23	41				
	ZNE	ePPS		24	35				
	ZNE	eSKKP		25	45				
	ZNE	e		27	57				
	ZNE	iSS		30	46				
	ZNE	e		38	17				
	ZNE	eL		45	-				
	E	M		55	32	22	+180		
	N	M		55	43	22	+200		
	Z	M		55	58	22	+140		
		F	11	30	-				

37

M.O.....513.....

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

DECEMBER, 19 49

DATE	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
17	ZNE	eL F	13 14	55 30	- -				Confused by microseisms.
✓ 17	Z	ePKP	15	28	25			13,500	Confused by microseisms.
	Z	ePP		29	09				
	Z	e		29	57				
	Z	eSKS		34	31				Repetition of
	ZNE	ePS		38	11				17d 07h.(G.M.T.)
	ZNE	eSKKI		42	41				
	ZNE	eSS		44	41				
	ZNE	eSSS		49	03				
	ZNE	e		52	19				
	ZNE	e		54	11				
	ZNE	eL		57	-				
	N	M	16	16	20	24	+150		
	E	M		16	24	23	+240		
	Z	M		20	38	19	-90		
		F	20	00	-				
20	ZNE	e F	00 01	45 30	- -				Large microseisms.
21	ZNE	e F	12 13	57 20	- -				
21	ZV,ZNE	iP	19	45	04			10,200	Southern Bolivia.
	ZV,	i(PP)		48	46				20°S, 64°W. Depth about
	NE	eSKS		54	40				600 Km. (U.S.C.G.S.)
	Z	eSP		56	23				
	ZNE	ePS		58	42				
	NE	e		59	06				
	ZNE	eL	20	01	-				
		F		50	-				
✓ 22	ZV,Z	iP	09	42	46			8,500	e, NE.
	ZV,ZNE	epP		43	13				Mexico
	ZNE	ePPP		49	36				16°N, 93°W. Depth about
	ZNE	eS		52	42				100 Km. (U.S.C.G.S.)
	ZNE	eSS		53	40				
	ZNE	ePPS		54	08				
	ZE	eSS		57	16				
	ZNE	eSSS	10	01	52				
	ZNE	eL		04	-				
	Z	M		13	58	23	+10		
	E	M		14	06	22	-7		
		F		55	-				
23	ZNE	e F	22	20 40	- -				
25	ZV,Z	i(P) F	23	30 36	09 -				e, NE.

M.O. 513

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

DECEMBER, 19 49

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.
			h.	m.	s.				
25/26	ZV,Z	iP	23	37	32			9320	e, NE.
	ZV,Z	iPP		39	27				
	NE	eS		48	01				
	NE	ePPS		50	49				
	NE	eSS		53	29				
	ZNE	eL		59	-				
	Z	M		17	37	17	-7		
	E	M		17	47	19	-10		
	F		01	05	-				
✓ 26	ZV,Z	iPKP	06	43	34			(17500)	e, NE. e, NE.
	ZV,Z	i		44	36				
	ZV,Z	i		45	31				
	ZV,Z	ePP		47	03				
	ZNE	e		48	05				
	ZV,Z	eSKS		50	34				
	ZV,Z	iSKKS		54	31				
	ZN	eSS	07	05	59				
	ZNE	eSSS		11	03				
	ZNE	eL		23	-				
	N	M		41	12	23	-25		
	E	M		43	58	24	+18		
	Z	M		44	07	20	-20		
	F		09	45	-				
✓ 28	ZV,ZNE	ePP	00	16	35			12,000	
	ZV,Z	ePPP		18	56				
	ZNE	eSKS		22	06				
	NE	eS		24	26				
	ZN	ePPS		26	11				
	ZN	e		27	25				
	ZNE	eSS		32	27				
	NE	eSSS		35	46				
	ZNE	e		39	10				
	ZNE	eL		40	-				
	E	M		50	46	22	-21		
	N	M		52	35	28	+15		
	Z	M		54	38	20	+10		
	F		02	10	-				
28	Z	eP	06	30	51			2360	
	NE	eS		34	39				
	ZNE	e(L)		36	-				
		F		07	05	-			
29	ZV,ZNE	eP	03	17	14			10,000	
	ZV,ZNE	e		17	27				
	ZE	e		17	50				
	ZNE	ePP		21	12				
	ZN	ePPP		23	08				
	ZNE	e(SKS)		26	16				
	ZV,ZNE	eS		28	12				
	E	ePPS		30	52				
	ZNE	eSS		34	32				
	ZNE	e		36	08				
	ZNE	e		41	32				
	ZNE	eL		49	-				

M.O. 513.....

**KEW OBSERVATORY, RICHMOND, SURREY, ENGLAND.**

**SEISMOLOGICAL BULLETIN.**

DECEMBER, 1949

DATE.	COMPT.	PHASE.	G.M.T.			PERIOD.	AMPLI- TUDE.	Δ	REMARKS.	
			h.	m.	s.					sec.
contd. 29	E N Z	M M M F	04	05	34	18	+110	14,700	Records very faint.	
				05	42	18	-190			
				05	42	18	> 200			
29	ZNE	eL F	07	10	-					
29	ZNE	eL F	11	05	-				Overlapped by next shock.	
			-	-	-					
29	Z ZNE	e eL F	11	27	40					
				50	-					
			12	15	-					
29	Z ZE Z ZNE NE Z ZNE N Z	iPP iPKS eSKS ePS ePPS e eL M M F	17	03	24					Probably another shock superposed.
				04	10					
				07	52					
				14	08					
				15	14					
				17	46					
				55	-					
			18	09	46	21	+4			
				10	18	20	+5			
			19	20	-					