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MD
29/9/31

BULLETIN E.26.

DEPARTMENT OF SCIENTIFIC & INDUSTRIAL RESEARCH.

SEISMOLOGICAL REPORT - NEW ZEALAND AND FIJI. JANUARY, 1931.

Dominion Observatory,
Kelburn, Wellington,
NEW ZEALAND.

Lat.41°17'S: Long.174°46'E: Height above M.S.L.401.5 feet.

INSTRUMENTS: Milne-Shaw Horizontal Seismographs Nos.13 and 36.
Magnetic Damping.
Galitzin-Wilip Vertical Seismograph, photo-galvanometric registration.

NOTE: Wood-Anderson Short-Period Seismograph installed 1931 January 28

CONSTANTS:

COMPONENT	Date of Determination	Galvanometer Free Period	Pendulum Free Period	Damping	AK
Milne-Shaw (N)	1930 Oct.3	-	9.8 secs.	20: 1	-
Milne-Shaw (E)	1930 Sept.29	-	9.8 sets.	20: 1	-
Galitzin-Wilip (Z)	1930 Nov.11	10.70 secs	10.33 "	1.72: 1	168.4

SUVA, FIJI: Lat.18°9'S: Long.178°26'E: Height above M.S.L.10 feet.
Milne-Twin-Boom Horizontal Seismograph .Undamped.

For notation used in this report see "MODERN SEISMOLOGY" by G.W. Walker.

OBSERVERS

R.C. Hayes, F.R.Met.Soc.
C.J.Westland, F.R.A.S.

DIRECTOR.

C.E. Adams.

1931	Phase	Greenwich Time h m s	Period s	AN	AE	AZ	Dist. deg.	
Jan.2	eZ	10 2 20					91	0. 9h 48m 37s.
	PR1	5 39						
	S	13 1						Acc.to Jesuit S.A.
	L	31 33						15 N, 108.5 W.
	M	10 37	22		65	33		
	M	10 42	18	42		25		
8	e	1 22						
	L	1 25						Weak record of remote quake.
	M	1 30	12			4		Very small on Milne-Shaw.
9		10 43						Small movements.
10	e	21 30 24					25	0.21h 24m 46s.
	S	34 47						
	M	21 40	10	7	2	3		Wellington & Riverview indicate epicentre near New Hebrides.
12	e	21 21 40						Small, but suggests a repetition from same epicentre as on 10d.
	e	21 26						Neither of these registered at Suva.
	L	21 32						
13		5 26						Small movements.

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1931	Phase	Greenwich Time h m s	Period s	AN μ	AE μ	AZ μ	Dist. deg.	
Jan.14	e	16 24						A series of waves with periods 6 to 8s and trace-amplitude not exceeding 1.5 mm.Probably nearby,but indecipherable
	F	17 15						
15	e	2 4 48						
	PR1	2 8 27						
	(S)	2 15 0					99	These phases,if correctly idenfified,do not fit well with epicentre and time given by Jesuit S.A. viz.15N,97W.0.1h 50m 20s
	e	18 50						
	SR1	21 30						
		2 27						
		2 30						
	L	2 36 15						
	M	2 38	24		460			
	M	2 43	20	85	275			
	W1	4 15	22?		20			
15		21 48						Weak record of distant quake given by Zikawei as 5.7 deg.distant
15	eP	22 51 55						
	S	22 58 33						44.5 At sea north of New Guinea.
	L	23 5						
	M	23 14	18	20	55			
	M	23 16	18			35		
16	eZ	19 41 45					100	
	(S)	44 17						On E comp Milne-Shaw only
	e	46 38						
	SR1	19 53						Repetition of quake on 15d 1h 50m
	SR2	19 56						Jesuit S.A.gives 0-19h19m26
	L	20 6						
	M	20 11	18		20	9		Found on Suva,but very sma
17	e 1	3 15 12					95	Not clear records on any comp. e 1 may be (S),e 2
	e 2	3 22						may be SR1.
	L	3 35 30			25	12		
	M	3 40	18					Jesuit S.A.gives 25N,110W,0 2h 49m 58s
								Very small on Suva.e 1. 3h 15.5m.
								clock error not known e 2. 3 32 = L?
								M 3 39
18	e	13 47						Weak record of quake in Dutch East Indies.
18		15 25						Small movements
18		20 18						
19	PZ	12 33 32					60	0 12h 23m 21s
	SZ	41 41						
	L	12 54						
	M	12 58	18	9	20	10		Acc.to Manila "In region of 14S,112E."
								Not found on Suva.
19	PZ	16 0 15						
	SZ	4 54					25.7	
	L	16 7						
	M	16 11	12			12		rather confused on Milne-Shaw.
								Not found on Suva.
21		0 20						Weak record of distant quake. Acc.to Batavia ther is one in Java at 20d23h 43m,but identification very doubtful.
22		3 30						Small movements.

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1931	Phase	Greenwich Time h m s	Period s	AN μ	AE μ	AZ μ	Dist. deg.	
January								
24	P	13 52 34					65	0 13h 41m 49s.
	S	14 1 14						
	L	14 15 30						Acc.to Manila, 11.5 N. 125 E
	M	14 25	18	6	8	10		Not found on Suva.
25	e	13 11 27						Small, not found on NS comp.
	L	13 18						Not recorded at Suva.
27	e	20 28 0					96	Burma.
	(S)	20 33 30						0 20h 9m 18s
	SR1	20 41 0						Manila gives
	SR2	20 45 30						26 N, 93 E.
	L	20 56						
	M	21 6	22	45		56		much obscured by micros.
	M	21 9	20		75			
28	e	2 30						
	M	2 35	12		13			
28	PZ	21 34 7					62	Only EW recording, & much disturbed by repair work in buildings
	SZ	42 32						0 - 21h 23m 40s
	e	21 46						Manila gives 12 N, 146.5 E.
	L	21 51 15						
	M	21 55	18		110			
	M	21 57	18			66		NS not working

The records from the Wood-Anderson Torsion Seismometer are available as from January 28. AE And AN continue to be computed from the Milne-Shaw records. The abbeviation WA refers tothe Wood-Anderson instrument.

28	eP	17 9 29						WA small
	eS	9 50						
29	Pg	2 59 46						WA
	Sg	50						
29	P	5 17 52						WA
	S	18 49						
31	Pg	4 30 25						WA small
	Sg	30 41						

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DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

DOMINION OBSERVATORY, KELBURN, WELLINGTON, NEW ZEALAND.

SEISMOLOGICAL REPORTS FOR FEBRUARY, 1931.

IN this report a large number of tremors and similar small movements have been omitted. In some parts of the records they are practically continuous, and it has been considered that they need not be shown in detail in the printed report, as they afford no opportunities for study.

The first quake recorded is that which occurred in Hawke's Bay District, R.-F. 10. Napier and Hastings were partially destroyed with considerable loss of life. The seismograph records, together with the geological evidence so far obtained, indicate a provisional epicentre near the coast-line of Hawke's Bay in latitude 39° 20′ S, longitude 177° 0′ E.

The reports of the various stations are arranged in the order in which the stations were established.

For notation used in this report, see "Modern Seismology," by G. W. Walker; and Monthly Notices of the Royal Astronomical Society, Geophysical Supplements.

Observers: R. C. HAYES, F.R.Met.Soc.; C. J. WESTLAND, F.R.A.S.

Director: C. E. ADAMS, D.Sc., F.R.A.S.

Dominion Observatory, Wellington.

LATITUDE: 41° 17′ S. Longitude: 174° 46′ E. Height above M.S.L.: 401·5 ft.

INSTRUMENTS.

Milne-Shaw Horizontal Seismographs Nos. 13 and 36: Magnetic damping.
Galitzin-Wilip Vertical Seismograph: Photo-galvanometric registration.
Wood-Anderson Short-period Seismograph.

CONSTANTS.

Component.	Date of Determination.	Galvanometer Free Period.	Pendulum Period.	Damping.	$\frac{Ak}{\pi L}$
		Sec.	Sec.		
Milne-Shaw (N) ..	1930, Oct. 3 ..	..	9·8	20 : 1	..
Milne-Shaw (E) ..	1930, Sept. 30	..	9·8	20 : 1	..
Galitzin-Wilip (Z) ..	1930, Nov. 11	10·70	10·33	1·72 : 1	168·4
Wood-Anderson (N) ..	1931, Jan. 28	..	0·5	5 : 1	..

Date.	Phase.	Greenwich Time.	Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h. m. s.	s.	μ	μ	μ	Deg.	
Feb. 2	P	22 47 20	..	..	..	..	2·6	Milne-Shaw put out of action at once.
	P*	47 24						R.-F. 10, in Hawke's Bay District. Napier and Hastings partially destroyed with considerable loss of life.
	Pg	47 36						
Feb. 2	P	22 52 38	..	..	..	..	2·7	Tentative epicentre: 39° 20′ S., 177° 0′ E. Time at origin = 22 h. 46 m. 41 s.
	S	53 11						Confused.
Feb. 2	P	22 57 42	..	..	..	..	2·8	Confused. These readings are made with considerable difficulty, the ground being in motion all the time. Also in many places the traces cross one another.
	S	58 16						
Feb. 2	P	23 53 10	..	..	..	..	2·5	
	S	41						
Feb. 2	P	23 56 47	..	..	..	..	2·9	
	S	57 22						
Feb. 3	P	0 11 43	..	..	..	..	2·4	
	S	12 12						
Feb. 3	P	0 15 28	..	..	..	..	2·6	
	S	16 0						
Feb. 3	P	0 23 35	..	..	..	..	3·0	
	S	24 12						
Feb. 3	P	0 29 29	..	..	..	..	2·3	
	S	57						
Feb. 3	P	0 41 43	..	..	..	..	2·4	
	P*	51						
	Pg	56						
	S	42 12						
	Sg	25						
Feb. 3	P	0 48 12	..	..	..	..	3·1	
	S	50						
Feb. 3	P	0 52 35						
	P*	44						
	Pg	51						
Feb. 3	P	1 26 13	..	..	..	..	2·8	
	S	47						
	M	27 52	2	8	11	14		
Feb. 3	P	1 28 34	..	..	..	..	3·1	
	S	29 2						
Feb. 3	P	1 31 45	..	..	..	..	2·6	
	S	17						
	M	30	2	23	50	22		
Feb. 3	P	1 52 3	..	..	..	..	2·2	
	S	30						
Feb. 3	P	1 55 54						
	P*	56 4	..	..	..	..	2·4	
	S	56 23						
	M	50	2	20	33	18		

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Date.	Phase.	Greenwich Time.	Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h. m. s.	s.	μ	μ	μ	Deg.	
Feb. 3	P	2 9 29						
	Pg	41	..	..	..	..	2·5	
	S	10 0						
	Sg	20						
Feb. 3	P	2 10 49						
	S	11 22	..	..	..	..	2·7	
	M	11 30	2	47	43	45		
Feb. 3	P	2 26 31	..	..	..	..	2·2	
	S	58						
Feb. 3	P	2 33 35	..	..	..	..	2·4	
	S	34 5						
Feb. 3	P	3 10 38	..	..	..	..	2·6	
	P*	10 47						
	Pg	55						
	Sg	11 30						
Feb. 3	P	3 37 52	..	..	..	..	2·9	
	S	38 27						
Feb. 3	P	3 40 10	..	..	..	..	3·3	
	S	50						
Feb. 3	P	3 59 33	..	..	..	..	2·1	
	S	59						
Feb. 3	P	4 49 1	..	..	..	..	2·4	
	S	30						
Feb. 3	P	4 56 19	..	..	..	..	2·7	
	S	52						
Feb. 3	P	5 5 14	..	..	..	..	2·4	
	Pg	32						
	S	44						
	Sg	6 7						
Feb. 3	P	5 30 42	..	..	..	..	2·8	
	S	31 16						
Feb. 3	P	5 36 9	..	..	..	..	2·5	
	S	40						
Feb. 3	P	5 40 9	..	..	..	..	2·4	
	S	39						
Feb. 3	P	5 46 33						
	P*	42	..	..	..	..	2·4	
	Pg	50						
	S	47 3						
	M	20	2	40	33	37	..	R.-F. 2, in Wellington.
Feb. 3	P	6 8 40						
	S	9 8						
Feb. 3	P	6 29 41	..	..	..	..	2·7	
	S	30 14						
	M	6 31	2	94	100	44	..	R.-F. 3, in Wellingtou.

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Date.	Phase.	Greenwich Time.	Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h. m. s.	s.	μ	μ	μ	Deg.	
Feb. 3	P	6 56 44	..	..	..	..	2·5	
	S	57 15						
Feb. 3	P	7 0 24						
	P*	33	..	..	..	..	2·3	
	Pg	40						
	S	52						
	S*	1 7						
Feb. 3	P	7 11 12	..	..	..	..	3·0	
	S	41 48						
Feb. 3	P	7 43 30	..	..	..	..	2·6	
	P*	39						
	Pg	48						
	S	44 2						
	S*	13						
	Sg	24						
Feb. 3	P	7 35 39	..	..	..	..	2·7	
	S	36 12						
Feb. 3	P	7 46 41	..	..	..	..	2·8	
	S	47 15						
Feb. 3	P	7 56 44	..	..	..	..	2·5	
	S	57 15						
Feb. 3	P	8 26 40	..	..	..	..	2·5	
	P*	48						
	Pg	57						
	S	27 11						
	Sg	34						
Feb. 3	P	8 37 39	..	..	..	..	2·7	
	S	38 12						
Feb. 3	P	8 41 29	..	..	..	..	2·5	Hawke's Bay, R.-F. 7. Epicentre: 39°·5 S., 177° E.
	P*	39						
	Pg	44						
	S	42 2						
	S*	13						
	M	8 43	2	250	290	70		
Feb. 3	P	9 11 28	..	..	..	..	2·4	
	S	58						
Feb. 3	P	9 13 6						
	S	42	..	..	..	..	3·0	
Feb. 3	P	9 24 22	..	..	..	..	2·4	
	S	52						
Feb. 3	P	9 59 40	..	..	..	..	2·7	
	S	10 0 13	..	..	..	..	..	All records about this time much confused.
Feb. 3	P	10 1 32						
	P*	41	..	..	..	..	2·4	
	Pg	48						
	S	2 1						
	Sg	23						

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Date.	Phase.	Greenwich Time.	Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h. m. s.	s.	μ	μ	μ	Deg.	
Feb. 3	P	11 48 16	..	..	..	..	3·0	
	S	53						
Feb. 3	P	12 13 58	..	..	..	..	3·0	
	S	14 34						
Feb. 3	P	12 28 18	..	..	..	..	2·0	
	S	42						
Feb. 3	P	12 34 29	..	..	..	..	3·1	
	S	35 7						
	M	25	2	87	87	63		
Feb. 3	P	13 24 49	..	..	..	..	2·8	
	S	25 23						
Feb. 3	P	14 16 17	..	..	..	..	2·0	
	S	41						
	M	17 20	2	33	20	18		
Feb. 3	P	15 10 49	..	..	..	..	1·8	Doubtful result; not clear.
	S	11 11						
Feb. 3	P	16 6 25	..	..	..	..	3·1	
	S	7 3						
Feb. 3	P	16 37 51	..	..	..	..	2·5	
	P*	38 1						
	S	22						
	Sg	43						
Feb. 3	P	17 25 19	..	..	..	..	2·6	
	S	51						
Feb. 3	P	18 56 19	..	..	..	..	3·2	
	S	58						
Feb. 3	P	19 21 32						
	P*	43	..	..	..	..	2·4	
	Pg	50						
	S	22 2						
	Sg	11						
Feb. 3	P	20 24 43	..	..	..	..	2·8	
	S	25 17						
Feb. 3	..	20 28	..	..	..	..	..	Local, small.
Feb. 3	P	20 37 21	..	..	..	..	1·5	Not a Hawke's Bay shock.
	S	40						
Feb. 3	P	20 56 38	..	..	..	..	1·8	Reported felt at Murchison. R.-F. 4.
	S	57 0						
	M	10	2	20	30	6		
Feb. 3	P	21 5 35	..	..	..	..	2·4	
	S	6 15						
Feb. 3	P	21 27 21	..	..	..	..	2·7	
	S	54						

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Date.	Phase.	Greenwich Time.	Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h. m. s.	s.	μ	μ	μ	Deg.	
Feb. 4	P	1 41 22	..	..	..	..	2·0	
	S	46						
Feb. 4	P	2 30 12	..	..	..	..	2·8	
	S	46						
Feb. 4	P	4 45 47	..	..	..	..	2·4	
	P*	57						
	S	46 17						
	S*	28						
	Sg	39						
	M	47 15	2	70	120	90		
Feb. 4	P	6 2 33	..	..	..	..	2·7	
	S	3 6						
Feb. 4	P	6 43 33	..	..	..	..	2·7	
	S	44 6						
Feb. 4	P	8 15 29	..	..	..	..	2·8	
	S	16 3						
Feb. 4	P	8 26 24	..	..	..	..	2·4	
	P*	34						
	S	27 54						
	S*	28 7						
Feb. 4	P	9 5 44	..	..	..	..	2·5	
	S	6 15						
Feb. 4	P	12 37 30	..	..	..	..	2·6	
	S	38 2						
Feb. 4	P	13 30 48						
	S	31 18	..	..	..	..	2·4	
Feb. 4	P	14 5 38	..	..	..	..	2·4	
	P*	47						
	Pg	6 3						
	S	8						
	S*	24						
	Sg	27						
	M	35	2	87	106	63		
Feb. 4	P	15 49 53	..	..	..	..	2·4	
	S	50 23						
Feb. 4	P	16 43 25	..	..	..	..	2·9	
	S	44 0						
Feb. 4	P	16 48 10	..	..	..	..	3·1	
	S	48						
Feb. 4	P	18 10 2	..	..	..	..	2·6	
	S	34						
Feb. 4	P	18 11 43	..	..	..	..	3·6	
	S	12 26						
Feb. 4	P	18 17 52	..	..	..	..	3·3	
	S	18 32						
	M	18 19	2	13	16	20		

International Seismological Centre

Date.	Phase.	Greenwich Time.	Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h. m. s.	s.	μ	μ	μ	Deg.	
Feb. 4	P	18 59 57	..	..	..	..	3·5	
	S	19 0 39						
Feb. 4	P	23 16 6	..	..	..	..	2·2	
	S	33						
Feb. 5	P	0 53 13	..	..	..	..	3·4	
	S	54						
Feb. 5	P	2 31 26	..	..	..	..	3·3	
	S	32 6						
Feb. 5	P	2 37 45	..	..	..	..	2·9	
	S	38 20						
	M	30	2	13	13	8		
Feb. 5	P	7 38 0	..	..	..	..	2·9	
	S	35						
Feb. 5	P	7 42 51	..	..	..	..	2·9	
	S	43 26						
Feb. 5	P	8 57 46	..	..	..	..	..	Hawke's Bay, R.-F. 6.
	P*	54						
	Pg	58 1						
	S*	28						
	M	59	2					
Feb. 5		9 10	12	94	180	85	..	Part of a remote quake obscured by the near one. Its distance from Suva is 11 deg.
Feb. 5	P	9 34 2	..	..	..	..	3·2	
	S	41						
Feb. 5	P	10 39 20						
	S	50	..	..	..	..	2·4	Not clear.
	M	40 10	2	15	18	11		
Feb. 5	P	12 1 41	..	..	..	..	3·8	
	S	2 12						
Feb. 5	P	12 27 30	..	..	..	..	2·9	
	S	28 5						
Feb. 5	P	14 30 11	..	..	..	..	3·2	
	S	50						
Feb. 5	P	14 33 2	..	..	..	..	2·4	
	S	31						
	M	35	2	5	7	4		
Feb. 5	P	15 30 57	..	..	..	..	2·4	
	S	31 26						
Feb. 5	P	20 34 6	..	..	..	..	2·5	From 20 h. 30 m. tremors of short period are continuous for several hours.
	S	37						
Feb. 5	P	22 32 45	..	..	..	..	2·4	
	S	33 15						
	M	40	2	13	15	18		
Feb. 6	e	0 34 32	..	..	..	..	..	Indistinct. Karamea, R.-F. 3.
	e	56						

International Seismological Centre

Date.	Phase.	Greenwich Time.	Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h. m. s.	s.	μ	μ	μ	Deg.	
Feb. 6	P	3 9 55	..	..	..	..	3·2	
	S	10 34						
Feb. 6	P	3 54 10	..	..	..	..	3·1	
	S	48						
Feb. 6	P	7 1 26	..	..	..	..	2·3	
	S	54						
Feb. 6	P	7 46 20	..	..	..	..	2·7	
	S	47 53						
Feb. 6	Pg	9 41 14	..	..	..	..	1·8	Probably not a Hawke's Bay Shock.
	Sg	38						
Feb. 6	P	10 8 32	..	..	..	..	3·0	
	S	9 8						
Feb. 6	P	11 31 24	..	..	..	..	3·8	
	S	32 9						
	M	30	2	6	10	6		
Feb. 6	P	13 45 10	..	..	..	..	2·1	
	S	36						
Feb. 6	P	15 1 12	..	..	..	..	2·7	
	S	45						
Feb. 6	P	16 41 38	..	..	..	..	1·7	Probably not a Hawke's Bay shock.
	S	42 1						
Feb. 6	P	17 2 37	..	..	..	..	2·4	
	S	3 7						
Feb. 6	P	21 31 2	..	..	..	..	2·4	
	S	32						
Feb. 6	P	21 58 26	..	..	..	..	3·2	
	S	59 5						
Feb. 6	P	22 55 18	..	..	..	..	4·3	Evidently not a Hawke's Bay shock.
	S	56 10						
Feb. 6	P	23 28 14	..	..	..	..	2·5	
	P*	24						
	Pg	33						
	S	45						
	Sg	29 5						
	M	15	2	7	12	6		
Feb. 7	P	0 13 54						
	P*	14 2	..	..	..	..	2·5	
	Pg	11						
	S	25						
	Sg	45						
	M	50	2	7	10	30		
Feb. 7	P	4 5 52						
	P*	6 1	..	..	..	..	2·9	
	Pg	10						
	S	27						
	S*	36						
	Sg	44						
	M	50	2	40	58	30		

International Seismological Centre

Date.	Phase.	Greenwich Time.	Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h. m. s.	s.	μ	μ	μ	Deg.	
Feb. 7	P	4 45 39	..	..	..	..	2·3	
	S	46 7						
Feb. 7	P	10 8 34	..	..	..	..	3·0	
	S	9 10						
	M	20	2	23	36	18		
Feb. 7	P	12 27 27	..	..	..	..	3·0	
	S	28 3						
Feb. 7	P	13 41 41	..	..	..	..	3·6	
	S	42 24						
Feb. 7	P	15 26 53	..	..	..	..	3·0	
	S	27 29						
Feb. 8	P	0 20 38	..	..	..	..	2·5	
	S	21 9						
Feb. 8	P	1 44 30	..	..	..	..	2·4	Max., R.-F. 6.
	P*	39						
	S	45 0						
	M	1 45	2	285	420	..		Felt in Wellington. R.-F. 4.
Feb. 8	P	5 17 14	..	..	..	..	2·7	
	S	47						
	Sg	18 12						
Feb. 8	P	7 21 33	..	..	..	..	2·9	
	S	22 9						
	M	30	2	8	10			
Feb. 8	P	10 11 39	..	..	..	..	2·5	Max., R.-F. 5.
	S	12 10						
	M	30	2	72	80	70		
Feb. 8	P	18 23 27	..	..	..	..	3·4	
	S	24 8						
Feb. 8	P	20 41 43	..	..	..	..	2·3	
	S	42 11						
	M	30	2	54	50	40		
Feb. 9	P	1 37 34	..	..	..	..	3·1	
	S	38 12						
	M	20	2	4	4	3		
Feb. 9	P	3 36 0	..	..	..	..	2·9	
	S	35						
Feb. 9		11 54	..	..	..	..	..	Confused; phases not recognizable.
Feb. 9	P	15 8 25	..	..	..	..	3·0	
	S	9 1						
Feb. 9	P	16 30 7	..	..	..	..	2·7	
	S	40						
	M	16 31	2	4	..	6		
Feb. 9	P	20 14 7	..	..	..	..	2·4	
	S	36						

International Seismological Centre

Date.	Phase.	Greenwich Time.			Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h.	m.	s.	s.	μ	μ	μ	Deg.	
Feb. 10	Pz	6	45	52	..	..	..	..	72	0 = 6 h. 34 m. 24 s.
	Sz		55	16						
	SR_1	7	0	44						
	L		10	55	..	..	..	..	..	According to U.S.C.G.S., 5 S., 102 E.
	M		16	0	20	..	700			
	M			50	20	270				
	M			55	18	..	..	370		
Feb. 10	P	7	5	3	..	..	..	..	2·7	Not shown by Milne-Shaw, but found on Wood-Anderson, which does not record the distant quake.
	S			36						
Feb. 10	P	7	31	18						
	S			50	..	..	..	..	2·6	
Feb. 10	P	8	7	23						
	S			53	..	..	..	..	2·4	
Feb. 10	..	10	39		..	..	..	..	..	Local, small.
Feb. 10	P	17	15	20	..	..	..	..	2·4	
	S			50						
	M		16	20	2	9	11	6		
Feb. 10	P	17	21	18	..	..	..	..	2·5	
	S			49						
	M		22	40	2	70	50	90	..	Felt in Wellington. R.-F. 2.
Feb. 10	P	20	51	44	..	..	..	..	2·4	
	S		52	13						
Feb. 10	P	21	29	56	..	..	..	..	2·5	
	S		30	27						
Feb. 10	P	22	46	24	..	..	..	..	2·2	
	S			51						
Feb. 11	P	0	15	53	..	..	..	..	2·3	
	S		16	21						
	M			40	2	3	2	5		
Feb. 11	P	17	3	20	..	..	..	..	2·5	
	P*			30						
	Pg			36						
	S			51						
	Sg		4	12						
	M			30	2	245	260	140	..	Felt in Wellington. R.-F. 3.
Feb. 12	S	6	4	52						
			9	24	..	..	..	..	72	After-shock from same epicentre as on Feb. 10.
			14	50						
	L		21	40						
	M	6	27		24	46	95	40		
Feb. 12		13	7		..	..	..	..	..	Local, small.
Feb. 12	P	21	42	6						
	S		43	11	..	..	..	..	5·6	Reported felt in Otago. R.-F. 4, at Queenstown.
	M			20	3	3	2			
Feb. 13	P	1	28	0	..	..	..	..	2·6	Milne-Shaw put out of action at once. Lat. 39·8 S., long. 177·8 E. 0 = 1 h. 27 m. 21 s. This is the most severe after-shock experienced. At Napier and Hastings the movement was much less than that on Feb. 2, but at other localities further inland it was regarded as the more violent of the two.
	Pg			10						

Date.	Phase.	Greenwich Time.	Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h. m. s.	s.	μ	μ	μ	Deg.	
Feb. 13	P	1 40 32	..	..	..	..	2·7	Recorded by Wood-Anderson, but much confused.
	S	41 5						
Feb. 13	P	1 55 14	..	..	..	..	2·4	
	P*	24						
	Pg	32						
	S	44						
Feb. 13	P	2 5 44	..	..	..	..	2·8	
	P*	53						
	S	6 18						
	Sg	31						
Feb. 13	P	2 53 48	..	..	..	..	2·6	
	P*	52						
	S	54 20						
Feb. 13	P	3 5 51	..	..	..	..	2·4	
	P*	6 0						
	Pg	8						
	S	20						
Feb. 13	P	3 58 41	..	..	..	..	2·6	
	P*	51						
	Pg	59						
	S	59 13						
	Sg	27						
	M	50	2	27	8			
Feb. 13	P	4 50 10	..	..	..	..	2·0	
	S	33						
Feb. 13	P	4 56 54	..	..	..	..	2·3	
	S	57 23						
Feb. 13	P	9 49 52	..	..	..	..	2·6	
	P*	50 0						
	Pg	9						
	S	24						
	Sg	32						
	M	55	2	13	22	8		
Feb. 13	P	11 48 37	..	..	..	..	2·2	
	P*	46						
	Pg	53						
	S	49 4						
	M	50	2	16	22	15		
Feb. 13	P	13 42 54	..	..	..	..	2·4	
	P*	43 3						
	S	24						
	S*	36						
	Sg	45						
	M	44	2	5	6	4		
Feb. 13	Pg	15 16 28	..	..	..	..	1·5	Shown on Takaka seismogram as small local shock.
	Sg	48						
Feb. 13	P	15 40 42						
	P*	51	..	..	..	..	2·4	
	Pg	41 3						
	S	12						
	M	40	2	6	9			

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Date.	Phase.	Greenwich Time.			Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h.	m.	s.	s.	μ	μ	μ	Deg.	
Feb. 13	P	20	58	29	..	..	..	..	2·4	
	Pg			45						
	S			58						
	Sg		59	21						
	M			30	2	16	13	15		
Feb. 14	P	0	34	41	..	..	..	..	2·3	
	P*			51						
	Pg			56						
	S		35	9						
	S*			24						
Feb. 14	P	2	20	38	..	..	..	..	2·4	
	P*			48						
	Pg			56						
	S		21	8						
	M			20	2	3	5	8		
Feb. 14	S	14	19	52	..	..	..	..	..	This appears to be another after-shock from the epicentre of Feb. 10 and 12.
	L		35	50						
	M		40	30	20	24	40	36		
Feb. 14	P	14	55	30	..	..	..	..	2·3	
	Pg			44						
	S			58						
	Sg		56	19						
Feb. 14	P	21	37	26	..	..	..	..	2·5	
	P*		38	5						
	Pg			11	..	..	..	..	..	Not found on Galitzin.
	S			27						
	Sg			46	..	..	..	..	..	No vertical component ?
	M			50	2	2	5			
Feb. 15	P	6	6	21	..	..	..	..	2·4	
	P*			31						
	S			51						
	M		7	0	2	3	5	2		
Feb. 15	P	6	18	34	..	..	..	..	2·8	
	P*			45						
	Pg			51						
	S		19	8						
	S*			19						
	Sg			24						
	M			30	2	7	12	6		
Feb. 16	Pg	7	13	4	..	..	..	..	0·7	Small.
	Sg			13						
Feb. 16	Pg	11	49	7	..	..	..	..	1·4	South Island; Max., R.-F. 6.
	Sg			26						
	M			30	2 ?	35	60	9	..	Felt in Wellington. R.-F. 2.
Feb. 16	e 1	19	1	33						
	e 2		15	0	..	..	..	..	85	e 1 may be P, but e 2 cannot be S.
	L		31	40						
	M	19	35		20	19	9	13	..	Epicentre at sea N.E. of Japan. 0 = 18 h. 48 m. 25 s., computed from data in Koti and Nagoya seismological reports.

Date.	Phase.	Greenwich Time.			Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h.	m.	s.	s.	μ	μ	μ	Deg.	
Feb. 16	P	21	27	31	..	..	..	..	2·5	South Island ; R.-F. 4.
	S		28	2						
Feb. 17	S	1	56	56	..	..	..	..	29	Suva shows d = 15 deg. Epicentre probably in vicinity of New Hebrides.
	L		59	50						
	M	2	0	20	16	16	13	10		
Feb. 18	P	7	43	46	..	..	..	..	2·6	
	P*			55						
	Pg		44	0						
	S			18						
	Sg			35						
	M			45	2	..	..	5		
Feb. 19	P	6	39	54	..	..	..	..	2·5	
	P*		40	4						
	S			25						
	S*			37						
	Sg			48						
Feb. 19	e 1	18	1	10	..	..	..	..	..	According to Batavia, epicentre is south of Sumatra. Not clear whether same as that of Feb. 10 and 12.
	e 2		7	43						
	e 3		11	20						
	L		17	20	27					
	M		22	45	22	65	130	85		
Feb. 20	Pg	5	32	13	..	..	..	..	1·5	
	Sg			33						
Feb. 20	e	5	47	0	..	..	..	..	83 ?	Manchuria. 0 = 5 h. 33 m. 23 s. Milne-Shaw seismograms peculiar, no trace of L and M waves. According to Jesuit S.A. and other authorities, the focus is abnormally deep.
	PR_1		49	54						
	S		56	27						
Feb. 20	P	13	57	57						
	P*		58	8	..	..	..	..	2·6	Wairoa ; R.-F. 6.
	Pg			11						
	S			29						
	S*			41						
	Sg			50						
	M	13	59	0	2	55	67	..	..	Galitzin not working.
Feb. 20	P	17	14	10	..	..	..	..	2·5	
	S			41						
Feb. 21	P	0	22	24	..	..	..	..	2·6	
	S			56						
Feb. 21	P	13	40	17	..	..	..	..	2·6	
	Pg			39						
	S			52						
	M		41		2	7	11	6		
Feb. 22	Pg	18	30	10	..	..	..	..	1·0	
	Sg			24						
Feb. 23	P	1	10	28						
	S			58						
Feb. 23	P	10	25	46	..	..	..	..	1·9	South Island. R.-F. 3.
	S		26	9						

International Seismological Centre

Date.	Phase.	Greenwich Time.	Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h. m. s.	s.	μ	μ	μ	Deg.	
Feb. 24	P	8 26 50	..	..	..	..	2·5	Max., R.-F. 5.
	P*	27 0						
	Pg	7						
	S	21						
	S*	32						
	M	45	2	20	30	22		
Feb. 24	P	11 31 8	..	..	..	..	1·9	
	S	31						
Feb. 24	Pg	23 0 8	..	..	..	..	0·4	
	Sg	13						
	M	20	2	25	33			
Feb. 24	Pg	23 11 57	..	..	..	..	0·4	Small.
	Sg	12 2						
Feb. 24	Pg	23 15 31	..	..	..	..	0·4	Small.
	Sg	37						
Feb. 24	Pg	23 15 55	..	..	..	..	0·4	Small.
	Sg	16 1						
Feb. 24	P	23 43 29	..	..	..	..	2·8	Max., R.-F. 5.
	P*	38						
	Pg	50						
	S	44 3						
	S*	12						
	Sg	21						
	M	30	2	60	23	77		
Feb. 25	P	7 29 48	..	..	..	..	1·5	
	S	30 8						
Feb. 25	M	8 31	2	10	15	9	..	Confused shock, instruments not in agreement.
Feb. 25	..	20	..	..	..	..	..	Traces of remote quake. Suva record shows distance = 5 deg.
Feb. 25	P	23 36 16	..	..	..	..	3·1	
	S	36 54						
	M	37 0	2	3	5	6		
Feb. 26	Pg	3 6 14	..	..	.	..	0·5	Cook Strait. R.-F. 4.
	Sg	21						
	M	30	2	50	45	40		
Feb. 26	P	3 19 20	..	..	..	..	1·6	
	S	40						
Feb. 26	Pg	5 16 39	..	..	..	..	0·5	Local, very small.
	Sg	45						
Feb. 26	P	9 21 35	..	..	..	..	2·5	
	S	22 6						
	M	10	2	6	7	5		
Feb. 26	P	15 5 17	..	..	..	..	2·0	
	S	42						
Feb. 26	P	18 49 29	..	..	..	..	2·0	Felt at Murchison. R.-F. 6. Epicentre : 42° S., 172° E.
	P*	37						
	Pg	42						
	S	54						
	M	50 0	2	190	135	130		

International Seismological Centre

International Seismological Centre

Date.	Phase.	Greenwich Time.	Period.	A_N.	A_E.	A_Z.	Dist.	Remarks.
1931.		h. m. s.	s.	μ	μ	μ	Deg.	
Feb. 26	P	19 25 52	..	..	..	..	2·7	
	S	26 25						
	M	30	2	7	8	4		
Feb. 27	P	7 36 12	..	..	..	..	3·0	
	S	48						
	M	37 10	2	8	10	7		
Feb. 27	P	9 47 57	..	..	..	..	76	At sea, south-east from Philippine Islands. Manila gives: In region of 2 N., 126 E.
	S	57 36						
	L	10 11						
	M	17	18	33				
	M	18	18	..	35	28		
Feb. 27	..	14 27	..	..	..	..	..	A series of waves, some have period 6 sec., probably near by, not recorded elsewhere.
Feb. 28	P	16 47 23						
	P*	34	..	..	..	..	3·0	
	S	59						
	S*	48 3						
	M	15	2	9	16	10		
Feb. 28	P	18 31 53	..	..	..	..	2·4	
	P*	32 2						
	Pg	8						
	S	22						
	S*	36						
	Sg	43						
	M	50	2	1	4			

International Seismological Centre

Suva, Fiji.

LATITUDE : 18° 9′ S. LONGITUDE : 178° 26′ E. HEIGHT ABOVE M.S.L. : 10 ft.
INSTRUMENT : Milne Twin-boom Horizontal Seismograph. Undamped.

CONSTANTS.
(1931, Feb. 7.)

Component.	Pendulum Period.	Magnification.
	Sec.	
N	10·0	6
E	8·0	6

OBSERVER : Miss MUNE, Telephone Exchange, Suva.

Date.	Phase.	G.M.T.	Distance.	Remarks.
1931.		h. m.	Deg.	
Feb. 2	P	22 51·8	..	Δ T not known.
	e	54	23·5	New Zealand earthquake.
	S	56·0	..	Large amplitudes; continuous movements till paper changed at 0 h. 11 m.
	L	58·5	..	
Feb. 3	..	..	..	Movements almost continuous.
Feb. 4	..	..	..	
Feb. 5	e	8 50	11	Doubtful.
	P	51·8		
	S	54·0		
	L	54·6		
Feb. 10	..	7	..	Weak record of quake south of Sumatra.
Feb. 13	P	1 31·8	23·5	New Zealand.
	S	36·0		
Feb. 17	P	1 51·2	15	
	S	54·1		
	L	55		
Feb. 19	..	18	..	Traces only; repetition of quake south of Sumatra.
Feb. 25	P	20 54·2	5	
	S	55·1		
	L	55·3		

International Seismological Centre

Arapuni.

LATITUDE: 38° 5′ S. LONGITUDE: 175° 39′ E.
INSTRUMENT: Milne Horizontal Seismograph, undamped: E.-W. component.
CONSTANTS (1931, February): Pendulum Period = 27 secs. Magnification = 5·6.
OBSERVER: District Engineer, Public Works Department, Arapuni.

NOTE.—Throughout the report for this station, the G.M.T. is only approximate, as the clock correction is not known.

Date.	Phase.	G.M.T.	Period.	A.	Distance.	Remarks.
1931.		h. m. s.	Secs.	mms.	Deg.	
Feb. 2 ..	P (?)	22 47 (20)	..	..	1·7	May be P*. Δ T not known.
	Pg	47 30				
	S	47 41				
Feb. 2 ..	P	23 56 —	..	..	..	Very confused record. Δ T not known.
Feb. 3 ..	P	8 41 (30)	..	..	2·2	Δ T not known.
	Pg	41 42				
	S	41 57	..	2		
Feb. 3 ..	P	12 34 (0)	.	..	2·0	,,
	S	34 24				
	Sg	34 36	..	1		
Feb. 4 ..	P	4 46 (0)	..	..	2·0	,,
	S	46 24				
	Sg	46 42	..	2		
Feb. 4 ..	P	14 5 (40)	..	..	2·0	,,
	S	6 4	..	1		
Feb. 4 ..	P (?)	23 16 (0)	..	..	1·7 ?	,,
	S	16 21				
	Sg	16 36	..	1		
Feb. 5 ..	P	8 58 (0)	..	..	2·0	,,
	P*	58 6				
	Pg	58 12				
	S	58 24				
	Sg	58 39	..	3		
Feb. 8 ..	P	1 44 (30)	..	..	2·1	,,
	Pg	44 42				
	S	56				
	Sg	45 8	..	9		
Feb. 8 ..	P	10 11 (0)	..	..	1·9	,,
	S	11 23	..	1		
Feb. 10 ..	P	6 46 (0)	..	.	73	,,
	PR_1	50 24				
	S	55 24				
	SR_1	7 1 36				
	L	8				
	M	13	20	14		
Feb. 10 ..	P	17 21 (0) ?	..	..	2·0 ?	,,
	S	21 24	..	2		

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	A.	Distance.	Remarks.
		h. m. s.	Secs.	mms.	Deg.	
1931.						
Feb. 11 ..	P	17 3 (20)	..	..	2·0	△T not known.
	Pg	3 32				
	S	3 44				
	Sg	4 2	..	9		
Feb. 12 ..	e	6 23 —				
	M	28 —	21	3		
Feb. 13 ..	P	1 28 (10)	..	..	1·8	Very confused record. △T not known.
	Pg	28 16				
	Sg	28 39	..	23		
Feb. 14 ..	e	14 20 —	..	..	..	△T not known.
	M	25 —	22	3		
Feb. 19 ..	e	18 2 —	..	..	..	,,
	L	14 —				
	M	20 —	22	5		
Feb. 24 ..	P	8 27 (0)	..	..	2·0	,,
	S	24	..	1		
Feb. 24 ..	P	23 0 (0)	..	..	2·0	,,
	S	0 24	..	1		
Feb. 26 ..	P	18 50 (0)	..	..	5·0	,,
	Pg (?)	30				
	S	51 0	..	3		
Feb. 27 ..	e	10 1	..	..	..	,,
	L	12				
	M	15	25	2		

International Seismological Centre

Takaka.

LATITUDE : 40° 51′ S. LONGITUDE : 172° 48′ E.

INSTRUMENT : Imamura Strong Motion Seismograph : three components ; oil damping.

CONSTANTS.

Component.	Pendulum Free Period.	Damping.	Magnification.
	Sec.		
N	10	30 : 1	2
E	10	20 : 1	2
Z	4	1·5 : 1	2

Observer : Mr. W. J. SMITH, Postmaster, Takaka.

NOTE.—Throughout the report for this station, the G.M.T. is only approximate, as the clock correction is not known.

Date.	Phase.	G.M.T.	Period.	A_N.	A_E.	A_Z.	Distance.	Remarks.
1931.		h. m. s.	Secs.	mms.	mms.	mms.	Deg.	
Feb. 2	P	22 47 (30)	..	..	..	..	4·4	ΔT not known.
	P*	45						
	Pg	48 0						
	S	23						
	Sg	45						
	M	49 30	14	31	15	5		
Feb. 2	P	23 54 (0)	..	..	..	..	3·9	,,
	S	47						
	S*	52						
Feb. 2	P	23 57 (0)	..	..	..	..	3·8	,,
	Pg	22						
	S	46						
Feb. 3	P	0 12 (0)	..	..	..	..	3·8	,,
	P*	12						
	S	46						
Feb. 3	P ?	1 32 (0)	..	..	..	..	3·1 ?	,,
	S	38						
Feb. 3	P	2 11 (0)	..	..	..	..	4·2	,,
	S	50						
Feb. 3	P ?	5 47 (0)	..	..	..	..	3·0 ?	,,
	S	37						
Feb. 3	P	6 30 (0)	..	..	..	..	3·2	,,
	P*	14						
	S	30 39						
Feb. 3	P	8 42 (0)	..	..	..	..	3·6	,,
	P*	9						
	Pg	22						
	S	43	..	1	1			
	Sg	43 16						
Feb. 3	P	12 35 (0)	..	..	..	..	3·1	,,
	S	38						
	Sg	36 5						

Date.	Phase.	G.M.T.	Period.	A_N.	A_E.	A_Z.	Distance.	Remarks.
1931.		h. m. s.	Secs.	mms.	mms.	mms.	Deg.	
Feb. 3	P	14 17 (0)	..	..	..	..	3·3	△T not known.
	S	40						
Feb. 4	P	4 46 (0)	..	..	..	..	4·1	,,
	P*	12						
	S	49						
Feb. 4	P	14 6 (0)	..	..	..	..	3·6	,,
	S	43						
	Sg	7 15						
Feb. 4	P	23 17 (0)	..	..	..	..	3·2	,,
	S	39						
Feb. 5	P	8 58 (0)	..	..	..	..	4·0	,,
	P*	9						
	Ps	18						
	S	48						
Feb. 7	P	4 6 (0)	..	..	..	..	3·8	,,
	S	46						
Feb. 8	P	1 45 (0)	..	..	..	..	4·0	,,
	P*	9						
	Pg	27						
	S	48						
	S*	46 0	3	3	2	1		
	Sg	24						
Feb. 8	P	10 12 (0)	..	..	..	..	3·8	,,
	S	46						
Feb. 11	P	17 4 (0)	..	..	..	..	3·3	,,
	Pg	18						
	S	40						
	S*	51						
	M	54	3	1	2			
Feb. 13	P	1 28 (17)	..	..	..	..	4·3	,,
	Pq ?	20						
	P*	34						
	Pg	52						
	S	29 9						
	S*	20						
	Sg	41						
	M	50	6	17	21	4		
Feb. 16	Sg	11 49 (0)	..	..	..	..	..	Felt at Takaka. △T not known.
Feb. 25	P	23 44 (0)	..	..	..	..	3·6	△T not known.
	S	43						
Feb. 26	Pg	18 50 (0)	..	..	..	..	1·2	,,
	Sg	14						
	M	20	2	4	3	1		

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Hastings.

Latitude: 39° 38′. Longitude: 176° 53′ E.

Instrument: Milne-Jaggar Local Shock Recorder.

Observer: Mr. Henry de Denne, 304 South Nelson Street, Hastings.

Note.—Throughout the report for this station, the G.M.T. is only approximate, as the clock correction is not known.

Date.	Phase.	G.M.T.	Maximum Amplitude.	Distance.	Remarks.
1931.		h. m. s.	mms.	Deg.	
Feb. 6	Pg	7 46 (0)	19	0·3	ΔT not known.
	Sg	4			
Feb. 7	Pg	4 5 (0)	24	0·3	,,
	Sg	4			
Feb. 8	Pg	5 17 (0)	..	0·6	,,
	Sg	7			
Feb. 10	Pg	8 7 (0)	25	0·4	,,
	Sg	5			
Feb. 10	Pg	16 3 (0)	4	0·2	,,
	Sg	2			
Feb. 10	Pg	17 15 (0)	5	0·5	,,
	Sg	6			
Feb. 10	Pg	17 21 (0)	18	0·3	,,
	Sg	4			
Feb. 10	Pg	19 27 (0)	3	0·3	,,
	Sg	4			
Feb. 11	Pg	0 15 (0)	3	0·4	,,
	Sg	5			
Feb. 11	Pg	17 30 (0)	2	0·3	,,
	Sg	4			
Feb. 11	Pg	19 29 (0)	1	0·2	,,
	Sg	3			
Feb. 12	Pg	14 30 (0)	4	0·2	,,
	Sg	3			
Feb. 12	Pg	17 4 (0)	1	0·3	,,
	Sg	4			
Feb. 13	Pg	1 30 (0)	30+	0·3 ?	,,
	Sg	3			
Feb. 13	Pg	1 43 (0)	15	0·5	,,
	Sg	6			
Feb. 13	Pg	1 45 (0)	7	0·5	,,
	Sg	8			
Feb. 13	Pg	1 50 (0)	12	0·5	,,
	Sg	7			
Feb. 13	Pg	1 53 (0)	3	0·5	,,
	Sg	8			

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Date.	Phase.	G.M.T.	Maximum Amplitude.	Distance.	Remarks.
1931.		h. m. s.	mms.	Deg.	
Feb. 13	Pg Sg	1 55 (0) 8	20	0·5	△T not known.
Feb. 13	Pg Sg	2 2 (0) 6	2	0·5	,,
Feb. 13	Pg Sg	2 5 (0) 6	17	0·5	,,
Feb. 13	Pg Sg	2 18 (0) 6	3	0·5	,,
Feb. 13	Pg Sg	2 19 (0) 6	3	0·5	,,
Feb. 13	Pg Sg	3 8 (0) 5	11	0·4	,,
Feb. 13	Pg Sg	8 33 (0) 6	4	0·5	,,
Feb. 13	Pg Sg	9 55 (0) 8	2	0·6	,,
Feb. 13	Pg Sg	11 47 (0) 6	8	0·5	,,
Feb. 13	Pg Sg	16 26 (0) 0	2	>0·1	,,
Feb. 13	Pg Sg	21 50 (0) 6	10	0·5	,,
Feb. 13	Pg Sg	23 3 (0) 6	9	0·5	,,
Feb. 14	Pg Sg	2 47 (0) 0	6	>0·1	,,
Feb. 15	Pg Sg	4 44 (0) 7	9	0·5	,,
Feb. 15	Pg Sg	4 57 (0) 10	3	0·7	,,
Feb. 15	Pg Sg	10 10 (0) 4	2	0·3	,,
Feb. 15	Pg Sg	14 2 (0) 0	2	>0·1	,,
Feb. 16	Pg Sg	1 23 (0) 4	2	0·3	,,
Feb. 16	Pg Sg	3 5 (0) 6	5	0·5	,,
Feb. 16	Pg Sg	5 9 (0) 2	12	0·2	,,
Feb. 16	Pg Sg	21 27 (0) 6	3	0·4	,,

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Date.	Phase.	G.M.T.	Maximum Amplitude.	Distance.	Remarks.
1931.		h. m. s.	mms.	Deg.	
Feb. 17	Pg	0 37 (0)	4	0·2	ΔT not known.
	Sg	3			
Feb. 17	Pg	5 55 (0)	1	0·6	,,
	Sg	8			
Feb. 17	Pg	14 14 (0)	1	0·5	,,
	Sg	7			
Feb. 17	Pg	17 42 (0)	3	0·5	,,
	Sg	7			
Feb. 18	Pg	7 43 (0)	23	0·2	,,
	Sg	3			
Feb. 18	Pg	8 34 (0)	5	0·5	,,
	Sg	7			
Feb. 18	Pg	21 43 (0)	2	0·5	,,
	Sg	7			
Feb. 18	Pg	21 57 (0)	2	>0·1	,,
	Sg	0			
Feb. 18	Pg	22 37 (0)	12	0·1	,,
	Sg	2			
Feb. 19	Pg	2 13 (0)	2	0·7	,,
	Sg	10			
Feb. 19	Pg	2 24 (0)	2	0·3	,,
	Sg	5			
Feb. 19	Pg	8 44 (0)	2	0·3	,,
	Sg	4			
Feb. 19	Pg	16 14 (0)	3	0·3	,,
	Sg	4			
Feb. 20	Pg	13 54 (0)	40+	0·5	,,
	Sg	5			
Feb. 20	Pg	17 14 (0)	2	0·3	,,
	Sg	4			
Feb. 20	Pg	17 58 (0)	2	0·1	,,
	Sg	2			
Feb. 20	Pg	18 37 (0)	2	0·2	,,
	Sg	3			
Feb. 20	Pg	23 47 (0)	3	0·2	,,
	Sg	3			
Feb. 21	Pg	0 22 (0)	3	0·5	,,
	Sg	6			
Feb. 22	Pg	5 2 (0)	1	0·3	,,
	Sg	4			
Feb. 22	Pg	19 2 (0)	3	0·3	,,
	Sg	4			

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Date.	Phase.	G.M.T.	Maximum Amplitude.	Distance.	Remarks.
1931.		h. m. s.	mms.	Deg.	
Feb. 23	Pg Sg	4 10 (0) 4	3	0·3	△T not known.
Feb. 23	Pg Sg	4 23 (0) 4	3	0·3	,,
Feb. 23	Pg Sg	12 21 (0) 5	2	0·4	,,
Feb. 24	Pg Sg	8 26 (0) 7	28	0·5	,,
Feb. 24	Pg Sg	23 43 (0) 9	40+	0·7	,,
Feb. 25	Pg Sg	1 3 (0) 5	3	0·4	,,
Feb. 25	Pg Sg	8 30 (0) 8	6	0·6	,,
Feb. 26	Pg Sg	9 21 (0) 8	4	0·6	,,
Feb. 26	Pg Sg	19 25 (0) 5	2	0·4	,,
Feb. 27	Pg Sg	12 23 (0) 3	2	0·2	,,
Feb. 28	Pg Sg	1 32 (0) 3	3	0·2	,,
Feb. 28	Pg Sg	16 47 (0) 9	5	0·7	,,
Feb. 28	Pg Sg	18 31 (0) 6	3	0·5	,,

International Seismological Centre

New Plymouth.

LATITUDE : 39° 5′ S. LONGITUDE : 174° 4′ E.

INSTRUMENT : Wood-Anderson short-period Seismograph ; Magnetic damping ; N.–S. component.

Observer : Mr. MCCARE, Chief Draftsman, Lands and Survey Department, New Plymouth.

NOTE.—Throughout the report for this station, the G.M.T. is only approximate, as the clock correction is not known.

Date.	Phase.	G.M.T.	Period.	Amplitude.	Distance.	Remarks.
1931.		h. m. s.	Secs.	mms.	Deg.	
Feb. 7	P	10 8 (35)	..	..	2·3	ΔT not known.
	P*	42				
	Pg	48				
	S	9 4	1	42		
	Sg	25				
Feb. 7	P	13 41 (40)	..	..	2·5	,,
	P*	48				
	S	42 11	1	6		
	S* (?)	26				
Feb. 8	P	7 21 (30)	..	..	2·6	,,
	Pq	34				
	Pg	45				
	S	22 2				
	Sg	20	1	22		
Feb. 9	P	11 54 (0)	..	..	2·3	,,
	Pq	4				
	P*	8				
	Pg	17				
	S	28				
	S*	42	1	33		
	Sg	54				
Feb. 9	P	16 30 (0)	..	..	2·3	,,
	P*	8				
	Pg	17				
	S	28				
	S*	37	1	24		
	Sg	44				
Feb. 9	P	20 14 (0)	..	..	..	,,
	P*	7				
	Pg	16				
	S*	42	1	40		
Feb. 10	P	17 15 (20)	..	..	..	,,
	Pq	24				
	P*	29				
	Pg	41				
	S (?)	16 6				
	S*	13				
	Sg	18	1	60		
Feb. 10	P	17 21 (20)	..	..	2·6	,,
	Pq	24				
	P*	27				
	Pg	34				
	S	52				
	S*	22 2				
	Sg	10	1	32		

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	Amplitude.	Distance.	Remarks.
1931.		h. m. s.	Secs.	mms.	Deg.	
Feb. 13	P	9 26 (0)	..	..	2·7	Δ T not known.
	S	33	1	5		
Feb. 13	P	9 50 (0)	..	..	2·4	„
	Pq	4				
	P*	9				
	Pg	19				
	S	29				
	S*	40	1	23		
	Sg	51				
Feb. 13	P	11 48 (30)	..	..	2·4	„
	Pg	47				
	S	49 0				
	S*	11				
	Sg	24	1	17		
Feb. 13	P	11 56 (0)	..	..	2·3	„
	P*	9				
	Pg	17				
	S	29	1	12		
Feb. 13	P	13 43 (0)	..	..	2·3	„
	P*	8				
	Pg	16				
	Ps	24				
	S	29	1	12		
	S*	38				
	Sg	48				
Feb. 13	P	14 40 (0)	..	..	2·3	„
	P*	7				
	Pg	18				
	S	29	1	11		
	Sg (?)	44				
Feb. 13	P	15 16 (30)	..	..	2·6	„
	Pg	49				
	S	17 2	1	4		
Feb. 13	Pg	17 7 (0)	..	..	0·2	„
	Sg	3				
Feb. 13	P	20 58 (30)	..	..	2·4	„
	Pg	48				
	S	59 0				
	S*	11				
	Sg	27	1	18		
Feb. 13	P	22 8 (0)	..	..	2·3	„
	Pq	5				
	P*	8				
	Pg	18				
	S	29				
	S*	38	1	36		
	Sg	57				
Feb. 14	P	2 3 (0)	..	..	2·3	„
	S	28	1	4		

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Date.	Phase.	G.M.T.	Period.	Amplitude.	Distance.	Remarks.
1931.		h. m. s.	Secs.	mms.	Deg.	
Feb. 14	P	2 20 (40)	..	..	2·6	Δ T not known.
	Pq	44				
	P*	50				
	Pg	58				
	Ps	21 8				
	S	12				
	S*	25	1	8		
	Sg	35				
Feb. 14	P	3 16 (0)	..	..	2·4	„
	S	30	1	3		
Feb. 14	P	11 14 (0)	..	..	2·4	„
	Pg	16				
	S	30	1	4		
	S*	40				
Feb. 14	Pg	11 40 (0)	..	..	1·3	„
	Sg	16	1	5		
Feb. 14	Pg	13 35 (0)	..	..	0·2	„
	Sg	3	<1	9		
Feb. 14	P	14 55 (30)	..	..	2·4	„
	Pg	44				
	S	56 0				
	S*	13	1	7		
	Sg	22				
Feb. 15	P	6 6 (20)	..	..	2·3	„
	Pq	24				
	P*	28				
	S	48				
	S*	7 2	1	22		
	Sg	10				
Feb. 15	P	9 5 (0)	..	..	2·4	„
	P*	11				
	S	30	1	14		
	S*	42				
Feb. 15	P	21 34 (0)	..	..	2·4	„
	Pg	15				
	S	30				
	S*	42	1	8		
	Sg	54				
Feb. 16	P	11 49 (0)	..	..	2·3	„
	Pq	3				
	S	28	<1	56		
	S* (?)	43				
	Sg	54				
Feb. 16	Pg	13 36 (0)	..	..	0·1	„
	Sg	2	<1	22		
Feb. 16	P	18 40 (0)	..	..	2·3	„
	Pg	14				
	S	29				
	S*	43	1	7		

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Date.	Phase.	G.M.T.	Period.	Amplitude.	Distance.	Remarks.
1931.		h. m. s.	Secs.	mms.	Deg.	
Feb. 17	P	17 5 (0)	..	..	2·3	△T not known.
	Pq	4				
	S	28				
	S*	37				
	Sg	48	1	10		
Feb. 18	P	7 43 (40)	..	..	2·7	„
	Pq	45				
	P*	50				
	Pg	44 2				
	Ps	7				
	S	13				
	Sg	32	1	24		
Feb. 18	P	14 54 (0)	..	..	2·4	„
	Pg	14				
	Ps	24				
	S	30	1	16		
Feb. 18	Pg	20 31 (0)	..	..	0·2	„
	Sg	3	<1	63		
Feb. 19	P	2 13 (0)	..	..	2·3	„
	Pq	5				
	S	29				
	S*	43	1	13		
Feb. 19	P	6 40 (0)	..	..	2·4	„
	Pq	4				
	P*	7				
	Pg	19				
	S	30	1	7		
	Sg	49				
Feb. 19	Pg	7 15 (0)	..	..	0·1	„
	Sg	2				
Feb. 19	P	8 44 (0)	..	..	2·5	„
	Ps	22				
	S	31	1	6		
Feb. 19	Pg	9 19 (0)	..	..	0·1	„
	Sg	2				
Feb. 19	P	20 47 (0)	..	..	2·3	„
	Pg	15				
	S	28	1	4		
Feb. 20	P	13 58 (0)	..	..	..	„
	Pq	4				
	P*	10				
	Pg	18	<1	73		
	Ps	26				
Feb. 20	P	15 6 (30)	..	..	2·4	„
	Pg	46				
	S	7 0				
	S*	14	<1	30		
	Sg	22				
Feb. 25	Pg	19 30 (0)	..	..	0·2	„
	Sg	3	<1	15		

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Date.	Phase.	G.M T.	Period.	Amplitude.	Distance.	Remarks.
		h. m. s.	Secs.	mms.	Deg.	
1931. Feb. 26	P	3 6 (30)	..	..	2·2	△T not known.
	Pg	43				
	S	57				
	S*	7 8	1	32		
	Sg	15				
Feb. 26	P	18 49 (30)	..	..	..	,,
	Pq	34				
	P*	40				
	Pg	48	<1	70+		
Feb. 27	Pg	4 8 (0)	..	..	0·2	,,
	Sg	3	<1	12		
Feb. 27	Pg	17 19 (0)	..	..	0·1	,,
	Sg	2	<1	50		
Feb. 28	Sg	5 40 (0)	..	..	..	Local. △T not known.
Feb. 28	Sg	10 10 —	..	..	..	,,

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[200/6/32—3270

International Seismological Centre

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

DOMINION OBSERVATORY, WELLINGTON, NEW ZEALAND.

SEISMOLOGICAL REPORT FOR MARCH, 1931.

NOTE.—In this report small tremors having no marked phases have been omitted.

The reports of the various stations have been arranged in the order in which the stations were established.

Wellington (Dominion Observatory).

LATITUDE: 41° 17′ S. Longitude: 174° 46′ E. Height above M.S.L. = 401·5 ft.

INSTRUMENTS.

Milne-Shaw Horizontal Seismograph No. 13.
Milne-Shaw Horizontal Seismograph No. 36.
Galitzin-Wilip Vertical Seismograph, photo-galvanometric registration.
Wood-Anderson Short-period Seismograph.

NOTE.—All the above seismographs have magnetic damping.

CONSTANTS.

Seismograph.	Date of Determination.	Galvanometer Free Period.	Pendulum Free Period.	Damping.	$\frac{Ak}{\pi L}$
		Sec.	Sec.		
Milne-Shaw (N) ..	1931, Oct. 3 ..	..	9·8	20 : 1	..
Milne-Shaw (E) ..	1931, Sept. 30	..	9·8	20 : 1	..
Galitzin-Wilip (Z) ..	1930, Nov. 11	10·70	10·33	1·72 : 1	168·4
Wood-Anderson (N) ..	1931, Jan. 28	..	0·5	5 : 1	..

OBSERVERS: R. C. HAYES, F.R.Met.Soc.; C. J. WESTLAND, F.R.A.S.
DIRECTOR: C. E. ADAMS, D.Sc., F.R.A.S.

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Date.	Phase.	G.M.T.	Period.	Amplitude.			Distance.	
				N.	E.	Z.		
1931.		h. m. s.	Sec.	mm.	mm.	mm.	Deg.	
Mar. 1	Pg	11 28 10	..	..	..	..	0·8	
	Sg	21						
Mar. 1	Pg	13 53 22	..	..	..	..	0·7	
	Sg	31						
Mar. 1	P	16 29 32	..	..	..	..	1·9	New Plymouth, $\Delta = 3°{\cdot}0$. Epicentre : 42 S., 172 E.
	S	55						
Mar. 1	Pg	19 5 3	..	..	..	..	0·7	
	Sg	13						
Mar. 2	P	2 22 49	..	..	..	..	19·5	Suva, $\Delta = 8°{\cdot}8$; Melbourne, $\Delta = 25°{\cdot}9$; Adelaide, $\Delta = 27°{\cdot}1$. Epicentre : 24 S., 167 E.
	S	26 27						
	L	27 40						
	M	28 40	22	10	43	..	(M.-S.)	
Mar. 2	P	4 32 44	..	..	..	..	1·9	New Plymouth, $\Delta = 2°{\cdot}8$. Epicentre : 42 S., 172 E. R.-F. 6 at Kahurangi Point.
	Pg	54						
	S	33 7						
	M	9	1	14	..	..	(W.-A.)	
	S*	17						
Mar. 2	P	9 39 36	..	..	..	..	2·4?	R.-F. 5 at Waipiro Bay.
	S (?)	40 6						
Mar. 2	P	18 20 45	..	..	..	..	1·1	R.-F. 6 at Horopito.
	S	59						
Mar. 5	Pg	7 41 8	..	..	..	..	0·7	
	Sg	18						
Mar. 7	PZ	10 7 13	..	..	..	..	46 ?	
	SZ	14 0						
	L	19	..	..	..	..	(M.-S.)	
	M	22	16	1	1	4		
Mar. 8	iP	0 31 45	..	..	..	..	..	Local ; R.-F. 2 at Wellington.
Mar. 8	iP	0 32 20	..	..	..	..	..	Local ; R.-F. 3 at Wellington.
Mar. 8	e	8 14						
	M	31	20	1	1	1	(M.-S.)	
Mar. 8	P	11 51 18	..	..	..	..	3·3	Takaka, $\Delta = 4°{\cdot}0$; Arapuni, $\Delta = 2°{\cdot}0$; Hastings, $\Delta = 1°{\cdot}4$. Epicentre : 39 S., 178 E.
	P*	26						
	S	58						
	S*	52 4						
	Sg	24						
	M	50	<1	40	..	..	(W.-A.)	Felt in most of North Island. Max., R.-F. 7 in Hawke's Bay.
Mar. 8	P	14 16 29	..	..	..	..	3·0	
	S	17 6						
Mar. 9	PZ	4 1 50	..	..	..	..	83	
	PR_1	5 13						
	PR_2	7 18						
	S	9 33						
	SR_1	18 0±						
	SR_2	21 50						
	L	32						

(M.-S.) = amplitudes from Milne-Shaw. (W.-A.) = amplitudes from Wood-Anderson.

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	Amplitude.			Distance.	
				N.	E.	Z.		
1931.		h. m. s.	Sec.	mm.	mm.	mm.	Deg.	
Mar. 9	M	35 50	22	..	1	7	(M.-S.)	
	W_2	6 23	20	..	..	3		
Mar. 11	P	2 14 33	..	..	..	..	2·4	R.-F. 3 in centre of North Island.
	S	15 3						
Mar. 11	e	6 15 32	..	..	..	..	59	May be S.
	L	26±						
	M_1	31	18	1	..	2	(M.-S.)	
	M_2	32	18	..	1			
Mar. 11	P	12 37 56	..	..	..	..	70	
	S	47 3						
	L	13 3 40						
	M	8 —	20	2	1	2	(M.-S.)	
Mar. 12	P	21 46 2	..	..	..	..	2·4	Hastings, $\Delta = 0°{\cdot}3$; New Plymouth, $\Delta = 2°{\cdot}3$. Epicentre: 39½ S., 177 E.
	Pg	16						
	S	32						
Mar. 13	P	2 31 18	..	..	..	..	2·1	New Plymouth, $\Delta = 2°{\cdot}5$. Epicentre: 41 S., 172 E. R.-F. 6 at Kahurangi Point.
	S	44						
Mar. 13	P	9 43 30	..	..	..	..	2·0	Takaka $\Delta = 0°{\cdot}5$; New Plymouth, $\Delta = 3°{\cdot}0$. Epicentre: 42 S., 172 E. Felt in South Island. Max., R.-F. 6.
	Pg	43						
	S	54						
Mar. 14	P	14 3 18						
Mar. 14	iS (?)	14 5 36	..	..	..	..	..	Confused with previous tremors.
	M	38	<1	18	..	..	(W.-A.)	
Mar. 18	PZ	8 14 56	..	..	..	..	82	
	PR_1	16 54						
	S	25 10						
	SR_1	31 20						
	L	40 30						
	M	54	16	4	3	14	(M.-S.)	
	W_2	10 52						
Mar. 18	Pg	15 58 35	..	..	..	..	0·7	
	Sg	46						
	M	48	<1	9	..	..	(W.-A.)	
Mar. 18	eP	20 23 0	..	..	..	..	74	
	e	24 27						
	S	32 35						
	SR_1	38 0						
	L	47 30						
	M_1	48	20	3	2	..	(M.-S.)	
	M_2	51	20	2	2			
Mar. 19	P	6 36 54	..	..	..	..	76	
	S	46 38						
	L	7 3						
Mar. 19	P	10 39 16	..	..	..	..	1·8	R.-F. 3 at Dannevirke.
	S	38						
Mar. 20	P	12 14 18	..	..	..	..	2·1	New Plymouth, $\Delta = 2°{\cdot}5$. Epicentre: 41½ S., 172 E. R.-F. 6 at Kahurangi Point.
	S	44						

International Seismological Centre

Date.	Phase.	G.M.T.			Period.	Amplitude.			Distance.	
						N.	E.	Z.		
1931.		h.	m.	s.	Sec.	mm.	mm.	mm.	Deg.	
Mar. 21	P	12	34	50	..	..	..	..	0·9	New Plymouth, $\Delta = 1°{\cdot}0\pm$. Epicentre: $40\frac{1}{2}$ S., 174 E. Felt in North Island. R.-F. 5 at Wanganui.
	S		35	5						
	M		35	12	<1	>15	..	..	(W.-A.)	
Mar. 23	P	6	5	2	..	..	..	..	2·2	Takaka, $\Delta = 0°{\cdot}7$. Epicentre: 41 S., 172 E. R.-F. 6 at Kahurangi Point.
	S			29						
	M			31	<1	7	..	..	(W.-A.)	
Mar. 26	Pg	10	48	24	..	..	..	..	1·3	Takaka, $\Delta = 1°{\cdot}5$; Hastings, $\Delta = 1°{\cdot}4$. New Plymouth, $\Delta = 1°{\cdot}4$. Epicentre: 41 S., 175 E.
	Sg			40						
	M			43	<1	25	..	..	(W.-A.)	Felt around Cook Strait. Max., R.-F. 6.
Mar. 26	P	16	41	48	..	..	..	..	1·3	New Plymouth, $\Delta = 0°{\cdot}7$. Epicentre: 40 S., 175 E. R.-F. 2 at Dannevirke.
	S		42	5						
Mar. 28	P	9	6	30	..	..	..	..	0·6	
	S			38						
Mar. 28	P	12	41	6	..	..	..	..	..	Local.
Mar. 28	PZ	12	47	50	..	..	..	..	50·5	Two shocks.
	P		48	4						
	SN		54	53						
	SZ		55	5						
	L	13	0							
	M_1		10		20	14	15	15	(M.-S.)	
	M_2		14		18	9	14	15	(M.-S.)	
Mar. 30	P	0	9	30	..	..	..	..	2·4	
	S		10	0						
Mar. 31	M	16	57		..	..	1	..	104	

International Seismological Centre

Suva, Fiji.

Latitude: 18° 9′ S. Longitude: 178° 26′ E. Height above M.S.L. = 10 ft.
Instrument: Milne Twin-boom Horizontal Seismograph. Undamped.

Constants.

Component.	Date of Determination.	Pendulum Period.	Magnification.
		Sec.	
N.–S.	1931, March 15 ..	10·0	6
E.–W.	1931, March 15 ..	8·0	6

Observer: Miss Mune, Telephone Exchange, Suva.

Date.	Phase.	G.M.T.	Amplitude. N.	Amplitude. E.	Distance.	
1931.		h. m. s.	mm.	mm.	Deg.	
Mar. 2 ..	iP E	2 21 3	..	..	8·8	
	iS E	22 48				
	M	25	..	10		
Mar. 5 ..	..	2 55	..	..	..	Tremors.
Mar. 7 ..	iP NE	10 5 (0)	..	..	31·3	ΔT not known.
	M	7	1·5			
	S N	10 15				
	SR_1	11 42				
	L	15				
	M	15	..	1·5		
Mar. 7 ..	..	20 20	..	..	..	Tremors.
Mar. 8 ..	..	6 —	..	..	..	Prolonged tremors.
Mar. 8 ..	e N	11 54 0				
	M	12 0	0·8	0·5		
Mar. 9 ..	e N	3 52 31	..	..	..	May be P.
	SR_1	4 9 6				
	L	21				
Mar. 11 ..	eP N	12 36 10	..	..	56·0	
	PR_1	39 30				
	eS N	44 0				
	L	56				
Mar. 14 ..	iE	14 2 (33)	..	..	..	ΔT not known.
	iE	4 30				
	M	5	1·0	1·0		
Mar. 18 ..	eP N(?)	8 17 37	..	..	99 (?)	Not clear.
	S N	29 10				
	L	47				

International Seismological Centre

Date.	Phase.	G.M.T.	Amplitude.		Distance.	
			N.	E.		
1931.		h. m. s.	mm.	mm.	Deg.	
Mar. 18 ..	i N	20 23 0				
	i N	30 39				
	M	32	1·4			
Mar. 19 ..	P N	6 35 54	..	..	66·8	
	S N	44 45				
	M	47	0·8	0·5		
	L	57				
Mar. 21 ..	P N	6 51 (18)	..	..	2·6	ΔT not known.
	S NE	50				
	M	52 0	1·1	1·0		
Mar. 21 ..	e	11 15	..	..	..	ΔT not known.
Mar. 21 ..	e N	11 51 (30)	..	..	..	ΔT not known.
	M	52 0	0·9	1·0		
Mar. 28 ..	eP N	12 47 55	..	..	..	ΔT not known. Very confused shock; no clear phases.
	i N	48 20				
	M_1	55	1·5	2·0		
	i N	13 6 10				
	M_2	57	1·6	1·0		
Mar. 31 ..	..	3 18 —	..	..	..	Tremors.

International Seismological Centre

Arapuni.

LATITUDE : 38° 5′ S. LONGITUDE : 175° 39′ E.
INSTRUMENT : Milne Horizontal Seismograph, undamped. E.-W. component.
CONSTANTS (1931, March 15) : Pendulum period = 22 secs. Magnification = 5·6.
OBSERVER : DISTRICT ENGINEER, Public Works Department, Arapuni.

NOTE.—Throughout the report for this station, the G.M.T. is only approximate, as the clock correction is not known.

Date.	Phase.	G.M.T.	Amplitude.	Distance.	
1931.		h. m. s.	mm.	Deg.	
Mar. 2	P	2 22 (0)	..	15·7	ΔT not known.
	S	25 0			
	L	36			
	M	26	10		
Mar. 7	e	10 10 (0)	..	..	,,
	S	13 30			
Mar. 8	P	11 52 (0)	..	2·0	,,
	S	24			
	M	27	10		
	Sg	42			
Mar. 9	S	4 10 (0)	..	..	,,
	SR_1	16 0			
	L	30			
	M	34	3		
Mar. 11	..	6 —	..	..	Tremors.
Mar. 11	S	12 47 (0)	..	..	ΔT not known.
	SR_1	53 40			
	SR_2	56 50			
	L	13 4			
	M	6	2		
Mar. 18	iS	8 25 (0)	..	..	,,
	SR_1	29 30			
	L (?)	38			
	M	42	1·6		
Mar. 28	P	12 48 (0)	..	45·0	,,
	S	54 42			
	M	57	2		
	SR_1	59 40			
	L	13 3 —			
	M	4 —	2		

International Seismological Centre

Takaka.

LATITUDE : 40° 51′ S. LONGITUDE : 172° 48′ E.

INSTRUMENT : Imamura Strong Motion Seismograph : Three components ; oil damping.

CONSTANTS.

Component.	Date of Determination.	Free Pendulum Period.	Damping.	Magnification.
		Sec.		
N	1931, March 15	10	30 : 1	2
E	1931, March 15	10	50 : 1	2
Z	1931, March 15	4	2 : 1	2

OBSERVER : Mr. W. J. SMITH, Postmaster, Takaka.

Date.	Phase.	G.M.T.	Period.	Amplitude.			Distance.	
				N.	E.	Z.		
1931.		h. m. s.	Sec.	mm.	mm.	mm.	Deg.	
Mar. 2	Pg E	4 32 33	..	..	..	..	0·4	
	Sg NE	39	1					
Mar. 4	..	6 40	..	..	..	..	..	Feeble tremors.
Mar. 8	P NE	11 51 21	..	..	..	..	3·8	
	P*	31						
	Pg	49						
	S NE	52 7						
	Sg	57						
	M	53 0	6	2·0	1·5	0·3		
Mar. 13	Pg NE	9 43 7	..	..	..	..	0·4	
	Sg N	13	1	0·9	0·9	0·2		
Mar. 21	..	12 35	..	..	..	..	..	Feeble tremors.
Mar. 23	Pg E	6 4 33	..	..	..	..	0·7	
	Sg E	44	1					
Mar. 26	PE	10 48 35	..	..	..	..	1·5	
	SE	54	1					

International Seismological Centre

Hastings.

Latitude: 39° 38′ S. Longitude: 176° 53′ E.

Instrument: Milne-Jaggar Shock Recorder.

Observer: Mr. Henry de Denne, 304 S. Nelson Street, Hastings.

Note.—Throughout the report for this station the G.M.T. is only approximate, as the clock correction is not known.

Date.	Phase.	G.M.T.	Max. Amplitude.	Distance.	
1931.		h. m. s.	mm.	Deg.	
Mar. 1	Pg	12 15 (0)	..	0·3	ΔT not known.
	Sg	4	2		
Mar. 1	Pg	22 49 (0)	..	0·5	,,
	Sg	7	1		
Mar. 2	Pg	8 12 (0)	..	0·3	,,
	Sg	4	1		
Mar. 2	Pg	9 39 (0)	..	0·3	,,
	Sg	4	6		
Mar. 3	Pg	4 44 (0)	..	0·4	,,
	Sg	6	3		
Mar. 4	Pg	6 47 (0)	..	0·4	,,
	Sg	4	3		
Mar. 4	Pg	18 7 (0)	4	0·1	,,
	Sg	2	..		
Mar. 8	P	0 31 (0)	..	1·7	,,
	S	21	3		
Mar. 8	Pg	11 51 (0)	..	..	,,
	P	12	60+		
Mar. 9	Pg	17 22 (0)	..	0·2	,,
	Sg	3	3		
Mar. 9	Pg	19 36 (0)	..	0·4	,,
	Sg	4	32		
Mar. 9	Pg	19 39 (0)	..	0·4	,,
	Sg	6	7		
Mar. 9	Pg	20 45 (0)	..	0·3	,,
	Sg	4	4		
Mar. 11	Pg	0 57 (0)	..	0·2	,,
	Sg	3	3		
Mar. 11	Pg	2 14 (0)	..	0·5	,,
	Sg	7	5		
Mar. 12	Pg	6 48 (0)	..	0·4	,,
	Sg	5	4		
Mar. 12	Pg	21 46 (0)	..	0·3	,,
	Sg	4	3		

International Seismological Centre

Date.	Phase.	G.M.T.	Max. Amplitude.	Distance.	
1931.		h. m. s.	mm.	Deg.	
Mar. 13	Pg	1 11 (0)	..	0·2	ΔT not known.
	Sg	3	1		
Mar. 14	Pg	11 46 (0)	..	0·4	,,
	Sg	6	4		
Mar. 15	Pg	1 14 (0)	..	0·4	,,
	Sg	6	2		
Mar. 15	Pg	20 40 (0)	..	0·4	,,
	Sg	5	4		
Mar. 16	Pg	7 14 (0)	..	0·4	,,
	Sg	5	3		
Mar. 19	Pg	6 30 (0)	..	0·6	,,
	Sg	8	1		
Mar. 20	Pg	3 38 (0)	..	0·4	,,
	Sg	5	4		
Mar. 24	Pg	13 13 (0)	..	0·4	,,
	Sg	6	1		
Mar. 24	Pg	18 35 (0)	..	0·4	,,
	Sg	3	1		
Mar. 26	Pg	10 48 (0)	..	1·2	,,
	Sg	17	2		
Mar. 26	Pg	22 48 (0)	..	0·2	,,
	Sg	3	1		
Mar. 27	Pg	3 40 (0)	..	0·4	,,
	Sg	6	1		
Mar. 27	Pg	23 40 (0)	..	0·3	,,
	Sg	4	2		

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New Plymouth.

LATITUDE: 39° 5′ S. LONGITUDE: 174° 4′ E.

INSTRUMENT: Wood-Anderson Short Period Seismograph; Magnetic damping.

OBSERVER: Mr. McCABE, Chief Draftsman, Lands and Survey Department, New Plymouth.

NOTE.—Throughout the report for this station the G.M.T. is only approximate, as the clock correction is not known.

Date.	Phase.	G.M.T.	Period.	Ampl.	Distance.	
1931.		h. m. s.	Sec.	mm.	Deg.	
Mar. 1 ..	Pg	11 42 (0)	..	..	0·2	ΔT not known.
	Sg	3	..	36		
	M	6	..	..		
Mar. 1 ..	P	12 15 (0)	..	..	2·2	ΔT not known. Faint record.
	S	27				
Mar. 1 ..	P	16 29 (30)	..	..	3·0	ΔT not known.
	S	30 6				
Mar. 1 ..	P	22 28 (0)	..	..	1·4	,,
	S	18				
	M	27	0·5	15		
Mar. 1 ..	P	22 48 (0)	..	..	2·3	,,
	S	28				
Mar. 2 ..	P	4 32 (40)	..	..	2·8	,,
	S	33 14				
	M	20	0·5	52		
Mar. 2 ..	P	18 20 (40)	..	..	1·4	,,
	S	57				
	M	21 8	0·5	4		
Mar. 3 ..	Pg	5 30 (0)	..	..	0·2	,,
	Sg	3	0·5	10		
Mar. 3 ..	P	17 39 (0)	..	..	2·3	,,
	P*	8				
	Pg	18				
	S	29				
	S*	35				
	M	42	1	8		
	Sg	45				
Mar. 3 ..	Pg	20 34 (0)	..	..	0·2	,,
	Sg	3	1	3		
Mar. 5 ..	P	2 28 (0)	..	..	1·4	,,
	S	18				
	M	28	0·5	18		
Mar. 5 ..	P	19 47 (0)	..	..	2·3	,,
	Pg	13				
	Ps	22				
	S	28				
	S*	31				
	M	35	1	5		

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Date.	Phase.	G.M.T.	Period.	Ampl.	Distance.	
1931.		h. m. s.	Sec.	mm.	Deg.	
Mar. 5 ..	P	20 20 (0)	..	..	2·3	ΔT not known.
	S	28				
	M	38	0·5	3		
						Seismograph out of action from 6th to 12th owing to failure of light, and clock trouble.
Mar. 12 ..	P	6 48 (0)	..	..	2·4	ΔT not known.
	Pg	17				
	Ps	22				
	S	30				
	M	42	1	9		
Mar. 12 ..	P	21 46 (0)	..	..	2·3	,,
	PQ	3				
	Pg	20				
	S	28				
	M	30	0·5	5		
Mar. 13 ..	P	2 31 (0)	..	..	2·5	,,
	Pg	21				
	S	31				
	S*	38				
	M	39	1	12		
Mar. 13 ..	P	9 43 (30)	..	..	3·0	,,
	PQ	34				
	(?)	43				
	Ps	56				
	S	44 6				
	M	12				
	Sg	29	1	70		
Mar. 14 ..	P	14 14 (0)	..	..	..	ΔT not known. Long tremors; probably two shocks confused.
	iS (?)	14 16 (15)				
	M	20	1	13		
Mar. 15 ..	P	1 15 (0)	..	..	2·3	ΔT not known.
	S	29				
	M	34	1	5		
Mar. 15 ..	P	5 29 (0)	..	..	1·4	,,
	S	18				
	M	27	0·5	5		
Mar. 20 ..	P	12 14 (0)	..	..	2·5	,,
	Ps	19				
	S	31				
	Sg	40	0·5			
Mar. 21 ..	Pg	12 34 (0)	..	..	0·9(?)	ΔT not known. Very faint record.
	Sg	11(?)				
	M	..	..	60+		
Mar. 21 ..	P	13 9 (0)	..	..	1·4	ΔT not known. Faint record.
	S	18				

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Date.	Phase.	G.M.T.	Period.	Ampl.	Distance.	
		h. m. s.	Sec.	mm.	Deg.	
1931. Mar. 25 ..	P	1 59 (0)	..	..	2·2	ΔT not known.
	Pg	13				
	Ps	18				
	S	27				
	S*	38				
	Sg	46				
	M	47	1	3		
Mar. 26 ..	P	10 48 (0)	..	..	1·4	ΔT not known. Large amplitude but faint record.
	Pg	11				
	S	17				
	M	..				
Mar. 26 ..	P	15 14 (0)	..	..	1·4	ΔT not known.
	S	17				
	M	23	0·5	4		
Mar. 26 ..	Pg	16 41 (40)	..	..	0·7	,,
	Sg	49				
	M	42 2	0·5	6		
Mar. 27 ..	P	13 3 (0)	..	..	1·5	
	S	19				
	M	24	1	3		
Mar. 30 ..	P	19 49 (0)	..	..	2·1	ΔT not known.
	Ps	21				
	S	26				
	S*	35				
	M	42				
	Sg	48	1	7		
Mar. 31 ..	Pg	1 1 (0)	..	..	0·2	,,
	Sg	3				
	M	8	0·5	15		
Mar. 31 ..	Pg	1 51 (0)	..	..	0·2	,,
	Sg	3				
	M	8	0·5	9		

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International Seismological Centre

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

DOMINION OBSERVATORY, KELBURN, WELLINGTON, NEW ZEALAND.

SEISMOLOGICAL REPORTS

FOR

APRIL, MAY, JUNE, 1931.

IN this report small local tremors having no marked phases have been omitted.

The reports of the various stations are arranged in the order in which the stations were established.

For notation, see "Modern Seismology" by G. W. Walker, and "Monthly Notices of the Royal Astronomical Society," Geophysical Supplements.

Observers: R. C. HAYES, F.R.Met.Soc.; C. J. WESTLAND, F.R.A.S.

Director: C. E. ADAMS, D.Sc., F.R.A.S.

Dominion Observatory, Wellington.

LATITUDE: 41° 17′ S. LONGITUDE: 174° 46′ E. HEIGHT ABOVE M.S.L.: 401·5 FT.

INSTRUMENTS.

Milne-Shaw Horizontal Seismographs, Nos. 13 and 36: Magnetic damping.
Galitzin-Wilip Vertical Seismograph: Photo-galvanometric registration; magnetic damping.
Wood-Anderson Short-period Seismograph: Magnetic damping.

CONSTANTS.

Component.	Date of Determination.	Galvanometer Free Period.	Pendulum Free Period.	Damping.	$\frac{Ak}{\pi L}$
		Sec.	Sec.		
Milne-Shaw (N) ..	1931, June 10	..	9·1	20 : 1	..
Milne-Shaw (E) ..	1930, Sept. 30	..	9·8	20 : 1	..
Galitzin-Wilip (Z) ..	1931, June 22	10·60	3·60	1·72 : 1	156·5
Wood-Anderson (N) ..	1931, Jan. 28 ..	..	0·5	5 : 1	..

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Date.	Phase.	G.M T.	Period.	Amplitude.			Δ	Remarks.
				N.	E.	Z.		
1931.		h. m. s.	Sec.	mm.	mm.	mm.	Deg.	
April 1	..	12 6	..	..	..	..	..	Prolonged tremors.
April 1	..	13 2	..	..	..	..	..	Prolonged tremors.
April 2	P	7 44 21	..	..	..	..	1·7	New Plymouth, Δ = 2·4. Epicentre : 41 S., 173 E. R.-F. 3 at Karamea.
	S	42						
April 2	P	20 28 15	..	..	..	..	3·0	
	S	51						
	M	56	..	2·5	5	..	(M-S)	
April 3	L	2 55	..	..	..	..	..	Records disturbed by high wind.
April 3	P	19 32 36	..	..	..	..	2·2	New Plymouth, Δ = 2°·2. Takaka, Δ = 2·3 ? Epicentre : 41 S., 172 E. R.F. 6 at Kahurangi Point.
	S	33 3						
	M	5	..	5	5	8	(M-S)	
April 3	P	22 21 25	..	..	..	..	1·5	Tilt to S. New Plymouth, Δ = 1·3. Takaka, Δ = 2·3. Epicentre : 40 S., 174 E. Felt widely in central districts. R.-F. 5.
	S	44						
	M	52	..	..	..	18+	..	
April 3	P Z	23 23 28	..	..	..	..	15·7	
	S NZ	26 28						
	M	30	3	4	..	11		
April 4	P	22 45 24	..	..	..	..	2·1	New Plymouth, Δ = 2°·9. Epicentre : 41½ S., 172 E.
	S	50						
April 6	P Z	6 57 4	..	..	..	..	36·0	Dilatation, Az. = N.N.W. Riverview, Δ = 27°·1. Melbourne, Δ = 31°·5. Epicentre : 9 S., 157 E.
	PR_1	58 35						
	S E	7 2 52						
	SR_1	5 30						
	L	8						
	M_1	10	20	4	2	6		
	M_2	13	15	6	5	6		
April 7	L	8 33						
	M	27	20	1	1	1		
April 8	P NE	19 23 22	..	..	..	..	31·8	
	S Z	28 42						
	L	31	15	1	1	1		
April 9	i NE	23 24 48						
	L	44	22					
April 10	Pg	10 19 47	..	..	..	..	0·5	
	Sg	54						
April 11	P NE	15 20 22	..	..	..	..	21·7	
	S	24 20						
	L	26						
	M	27	16	1	1	..		
April 12	P NE	2 5 0	..	..	..	..	19·0	Az. = N.W. Suva, Δ = 10°·5. Melbourne, Δ = 25°·9. Epicentre : 23 S., 168 E.
	S E	8 33						
	SR_1	9 0						
	L	10						
	M_1 E	11 20	15	..	22	..		
	M_1 N	40	16	15	..	..		
	M Z	13 15	16	..	..	15		
	M_2 E	14 0	16	..	20	..		
	M_2 N	30	16	14	..	..		

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	Amplitude. N.	Amplitude. E.	Amplitude. Z.	Δ	Remarks.
1931.		h. m. s.	Sec.	mm.	mm.	mm.	Deg.	
April 12	Pg	2 17 48	..	..	..	..	0·3	
	Sg	52						
April 13	Pg	0 59 8	..	..	..	..	0·8	
	Sg	18						
April 13	Pg	20 19 15	..	..	..	..	0·7	New Plymouth, Δ = 1°·2. Epicentre : 40½ S., 174½ E.
	Sg	24						
April 16	P Z	21 44 13	..	..	..	..	47·5 (?)	
	S N(?)	51 10						
	L	54 10						
	M	57	16	1	..	1		
April 17	P NZ	5 31 0	..	..	..	..	27·9	
	S N	35 50						
	L	38						
	M	42	16	1	..	3		
April 17	P	8 27 21	..	..	..	..	1·7	
	S	42						
April 18	P	3 47 39	..	..	..	..	2·2	
	S	48 6						
April 19	P	5 48 26	..	..	..	..	1·8	Hastings, Δ = 0°·5. New Plymouth, Δ = 2°·5. Epicentre : 40½ S., 177 E.
	S	48						
	M	56	..	4	..	3	(W-A)	
April 21	P	5 21 43	..	..	..	..	2·9	Felt in North Island, R.-F. 4.
	S	22 18						
	M	35	..	5+	..	..	(M-S)	
April 21	P	23 40 56	..	..	..	..	3·0	Hastings, Δ = 1°·0. Arapuni, Δ = 1°·9. Takaka, Δ = 3·9. Epicentre : 39 S., 178 E. Felt extensively in North Island. R.-F. 7 at Waipawa.
	P*	41 1						
	S	33						
	M	35	..	60	..	100+		
April 21	P	23 50 20	..	..	..	..	2·6	New Plymouth, Δ = 2·1. Epicentre : 39 S., 177 E.
	S	52						
April 22	L	0 16						
	M	19	15	4	..	5		
April 22	P	0 31 41	..	..	..	..	2·6	Hastings, Δ = 0°·4 ? New Plymouth, Δ = 2·0. Epicentre : 39 S., 177 E. R.-F. 3 at Taupo.
	S	32 13						
April 22	Pg	13 56 40	..	..	..	..	0·4	
	Sg	46						
April 23	P	0 13 31	..	..	..	..	2·0	New Plymouth, Δ = 1°·2. Epicentre : 40 S., 173 E. R.-F. 4 at Waitara.
	S	56						
	M	59						
April 23	P	17 54 26	..	..	..	..	2·4	Felt in Gisborne and Hawke's Bay districts. R.-F. 6.
	S	56						
	M	55 0	1	5	..	11		
April 23	P	23 59 11	..	..	..	..	2·1	New Plymouth, Δ = 3°·8. Epicentre : 42½ S., 173 E.
	S	37						
	M	24 0 25	..	3	..	..		

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	Amplitude.			Δ	Remarks.
				N.	E.	Z.		
1931.		h. m. s.	Sec.	mm.	mm.	mm.	Deg.	
April 24	P NZ	17 29 40	..	..	..	..	37·0	Riverview, Δ=27°·9. Melbourne, Δ = 31°·6. Epicentre : 8 S., 160 E.
	PR_2	31 30						
	S N	35 34						
	L	38						
	M	41	26	4	..	7		
April 25	P	8 36 31	..	..	..	..	2·0	Takaka, Δ = 1°·2. New Plymouth, Δ = 3°·6. Epicentre : 42 S., 172½ E. Felt in northern portion of South Island. R.-F. 6.
	P*	35						
	Pg	47						
	S	55						
	Sg	37 9						
	M	10	..	16	..	30		
April 26	..	7 0	..	..	..	..	..	Tremors. Hastings, Δ = 0°·7. New Plymouth, Δ = 2°·4. Epicentre : 39 S., 177 E.
April 26	P (?)	7 24 18	..	..	..	..	1·6(?)	R.-F. 4 at Wanganui. New Plymouth, Δ = 1°·4. Epicentre : 40 S., 175½ E.
	S	38						
April 28	Pg	23 14 22	..	..	..	..	0·3	
	Sg	26						
May 1	Pg	12 1 9	..	..	..	..	0·4	
	Sg	15						
May 1	P	13 23 57	..	..	..	..	2·0	R.-F. 6 at Kahurangi Point.
	S	24 22						
May 1	P	23 46 36	..	..	..	..	1·7	
	S	57						
May 2	P	4 19 5	..	..	..	..	3·0	
	S	42						
May 3	e N	2 40 50						
	M	41 50	10	1	1	2		
May 5	P	20 8 16	..	..	..	..	3·3	North Island, R.-F. 4.
	S	56						
	M	9 8	..	2	4	7		
May 6	P	14 56 36	..	..	..	..	4·0	Az., N.E. Arapuni, Δ = 2°·2. Takaka, Δ = 5°·3. Epicentre : 38·5 S., 178·5 E. Felt extensively in North Island. R.-F. 8–9 at Tiniroto.
	P*	45						
	Pg	59						
	S*	57 39						
	Sg	55						
	M	58 01	..	55	64	70+		
May 6	P	15 41 41	..	..	..	..	1·6	Felt at Hastings, Δ = 0°·5. Epicentre : 40 S., 176 E.
	S	42 1						
	M	54	..	2	2	4		
May 6	P	17 53 5	..	..	..	..	2·0	Az., N.N.E. Hastings, Δ = 0°·8. Takaka, Δ = 2°·4. Epicentre : 40 S., 175·5 E. North Island, R.-F. 6 at Waipawa.
	S	29						
	M	30	..	8	11	8		
May 7	P	3 53 53	..	..	..	..	1·6	Hastings, Δ = 0°·8. Epicentre : 40 S., 176 E. North Island, R.-F. 3.
	S	54 13						
	M	57	..	2	2	4		

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	Amplitude. N.	Amplitude. E.	Amplitude. Z.	Δ	Remarks.
1931.		h. m. s.	Sec.	mm.	mm.	mm.	Deg.	
May 7	P	4 56 54	..	..	..	..	4·2	Hastings, $\Delta = 2°{\cdot}0$. Arapuni, $\Delta = 2°{\cdot}2$. Takaka, $\Delta = 4°{\cdot}5+$. Epicentre : 38 S., 178 E. R.-F. 6 at Gisborne.
	P*	57 5						
	Pg	21						
	S	45						
	S*	58						
	Sg	58 12						
	M	15	..	30	31	60		
May 7	P	9 45 54	..	..	..	..	..	Confused.
	M	47 12	..	3	3	7		
May 8	P	11 38 21	..	..	..	..	2·3	R.-F. 4 at Gisborne.
	S	49						
	M	39 32	..	2	3	5		
May 10	..	19 52	..	..	..	..	..	Irregular tremors.
May 11	L	3 47	17	..	..	..	..	Traces.
May 12	L	3 20	20	..	..	..	..	Traces.
May 13	..	6 38	..	..	..	..	..	Slight tremors.
May 14	P	8 51 40	..	..	..	..	3·1	Az., N.E. Hastings, $\Delta = 1°{\cdot}1$. Takaka, $\Delta = 4°{\cdot}2$ (?). Epicentre : 39 S., 178 E. R.-F. 5 at Gisborne and Wairoa.
	P*	50						
	Pg	52 3						
	Ps	13						
	S	18						
	Sg	50						
	M	53 5	..	8	9	18+		
May 15	..	7 45	..	..	..	..	..	Small tremors. Confused movement.
	i NE	57 51						
	i	56 17						
May 16	e NZ	21 23 25	..	..	..	..	..	May be S or SR_1.
	L	28 55						
	M	33	13	1	1	1		
May 17	P NE	12 7 0	..	..	..	..	15·7	Suva, $\Delta = 13°{\cdot}5$ (?). Sydney, $\Delta = 28°$. Epicentre : 27 S., 177 W.
	e	8 30						
	eS Z	10 0						
	M	10+	16	1	1	2		
May 17	..	13 40	..	..	..	..	..	Traces.
May 18	Pg	5 54 29	..	..	..	..	0·6	Cook Strait region. R.-F. 4 at Masterton. Faint records.
	Sg	37						
	M	38	..	10+	14+	7+		
May 19	P	1 58 52	..	..	..	..	1·5	Takaka, $\Delta = 0°{\cdot}2$. Epicentre : 41 S., 173 E. R.-F. 7 at Takaka.
	S	59 11						
	M	13	..	3	4	7		
May 20	iP¹ Z	2 43 12						
	PR_1	48 20						
	PR_2	53 0						
	SR_2	3 16 15						
	L	59						
	M_1	4 0	17	2	2	4		
	M_2	4	20	3	2	4		
	M_3	6	17	2	2	5		

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	Amplitude.			Δ	Remarks.
				N.	E.	Z.		
1931.		h. m. s.	Sec.	mm.	mm.	mm.	Deg.	
May 20	P	13 52 12	..	..	..	..	1·5	
	S	31						
	M	—	..	..	..	..	..	Small.
May 20	..	22 40	..	..	..	..	..	Traces.
May 21	P	4 49 42	..	..	..	..	2·4	R.-F. 4–5 at Wairoa.
	S	50 11						
	M	40	..	1	1	3		
May 23	P	19 2 33	..	..	..	..	1·0	
	S	46						
	M	3 25	..	3	4	6		
May 24	L	21 58	12					
May 27	..	7 3	..	..	..	..	..	Traces.
May 28	P	0 53 40	..	..	..	..	3·0 (?)	P not clear. Small.
	S	54 16						
June 1	PR_1	12 4 10	..	..	..	..	43±	
	S	8 25						
	SR_1	11 50						
	L	14						
	M	17	20	1	1	2		
June 2	eL	5 44	..	..	..	..	..	Small.
June 4	iN	10 6 40	..	..	..	..	..	Small and irregular.
	L	16						
June 6	P	6 25 6	..	..	..	..	3·1	
	S	42	..	..	..	..	..	Very small.
June 6	P	16 59 53	..	..	..	..	4·4	
	S	17 0 46						
	M	49	..	1	1	3		
June 7	..	16 37	..	..	..	..	..	Traces.
June 9	iS (?)	14 4 5	..	..	..	..	30 (?)	Records confused by microseisms.
	i	5 50						
	L	6 57						
	M	10	10	4	4	8		
June 9	iN	16 6 20	..	..	..	..	..	Very confused record.
	i	7 50						
	L	9 20						
	M	10 40	15	6	7	11		
June 9	P	16 56 31	..	..	..	..	2·6	P very small. Az., N.E. Felt in Gisborne and Hawke's Bay, R.-F. 5.
	Pg	46						
	S	57 2						
	Sg	25						
	M	44	2	4	4	6		
June 11	L	18 49	..	..	..	..	..	Small.
June 13	eN	15 42 40						
	L	44 35						
	M	47	11	2	2	3		

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	Amplitude.			Δ	Remarks.
				N.	E.	Z.		
1931.		h. m. s.	Sec.	mm.	mm.	mm.	Deg.	
June 14	P	4 24 16	..	..	..	..	2·3	
	S	44	..	..	..	..	..	Very small.
June 15	P	3 23 59	..	..	..	..	2·0	
	S	24 24	..	..	..	..	..	R.-F. 3 at Gisborne.
	Sg	45						
	M	25 12	..	..	..	..	..	Small.
June 16	Pg	17 5 32	..	..	..	..	0·6	
	Sg	40						
	M	42	..	1	2	..		
June 17	P	1 56 42	..	..	..	..	3·6	
	S	57 25						
	Sg	45						
	M	52	1	..	..	..	..	Small amplitudes.
June 17	P (?)	3 59 28	..	..	..	..	1·7 (?)	
	S	49						
	M	58	1	1	2			
June 17	iN	17 16 0	..	..	..	..	..	Small. Strong microseisms.
		25	14	..	..	..	..	
June 19	P	13 17 50	..	..	..	..	4·7	R.-F. 5 at Gisborne.
	S	18 46						
June 21	P	16 7 46	..	..	..	..	2·9	Felt in Gisborne and Hawke's Bay, R.-F. 6. Small amplitudes.
	S	8 21						
June 21	P	20 2 41	..	..	..	..	2·4	Hawke's Bay. R.-F. 6 at Waipawa.
	Pg	56						
	S	3 10						
	Sg (?)	26						
	M	28	..	2	2	2		
June 21	P	22 17 12	..	..	..	..	1·6	Takaka, Δ = 0°·1. Epicentre : 41 S., 173 E. R.-F. 5 at Farewell Spit.
	S	32						
	M	39	..	2	1			
June 21	P	22 22 28	..	..	..	..	1·8	Takaka, Δ = 0°·1. Epicentre : 41 S., 173 E. R.-F. 5 at Farewell Spit.
	S	50						
	M	55	..	1	1			
June 22	P	15 32 9	..	..	..	..	5·2	Hastings, Δ = 2°·3. Arapuni, Δ = 2°·7. Takaka, Δ = 5°·7. Epicentre : 37·5 S., 179 E. Felt in Gisborne and Hawke's Bay, R.-F. 7.
	P*	32						
	Pg	52						
	S	33 10						
	Sg	22						
	M	27	2	48	67	..		
June 25	P	10 50 26	..	..	..	..	3·3	
	S	51 6	..	..	..	..	..	Very small.
June 27	L	18 25	..	..	..	..	..	Very strong microseisms.
June 28	P	17 18 38	..	..	..	..	1·2	R.-F. 4 at Wanganui.
	S	53						Small.

International Seismological Centre

Suva, Fiji.

LATITUDE: 18° 9′ S. LONGITUDE: 178° 26′ E. HEIGHT ABOVE M.S.L. = 10 FT.

INSTRUMENT: Milne Twin-boom Horizontal Seismograph: Undamped.

CONSTANTS.

Component.	Date of Determination.	Pendulum Period.	Magnification.
		Sec.	
N.–S.	1931, April 15th	9·5	6
E.–W.	1931, April 15th	8·0	6

Observer: Miss MUNE, Telephone Exchange, Suva.

Date.	Phase.	G.M.T.	Amplitude. N.	Amplitude. E.	Δ	Remarks.
1931.		h. m. s.	mm.	mm.	Deg.	
April 1..	e N	13 0 —	..	..	..	In hour mark. ΔT not known.
	M	6	..	..	..	
April 3..	iP	23 20 35	..	..	6	
	S	21 45				
	M	23 —	2	4		
April 5..	..	13 45	..	..	..	Tremors.
April 6..	iP N	6 55 30	..	..	25±	
	S	7 0	..	..	..	In hour mark.
	SR_1	1 0				
	L	2 45				
	M	3	2	2		
April 12..	P NE	2 3 55	..	..	10·5	
	S	6 0				
	L	6 50				
	M	8	5+	5		
April 17..	P NE	5 26 27	..	..	4·5	
	S	27 21				
	M	28	5+	5+		
April 21..	iP (?)	23 51 10				
April 22..	P	0 6 45	..	..	6 (?)	Confused with previous shock. Interrupted by changing record. Large amplitude.
	S (?)	8 0				
	M	9 0				
April 23..	..	8 40	..	..	..	Tremors.
April 24..	P N	17 28 30	..	..	26·1	
	PR_1	29 30				
	S	33 5				
	L	35 0				
	M	38	2	—		

International Seismological Centre

Date.	Phase.	G.M.T.	Amplitude. N.	Amplitude. E.	Δ	Remarks.
1931.		h. m. s.	mm.	mm.	Deg.	
May 6..	e N	5 27 24	..	..	..	Tremors.
May 6..	P E	15 1 5	..	..	18·5	P small. New Zealand.
	S N	4 33				
	L	5 30				
	M	6	1	1		
May 7..	..	5 5	..	..	..	Slight tremors; from New Zealand.
May 7..	..	11 1	..	..	..	Slight tremors.
May 15..	P E	7 44 36	..	..	7·5	
	S E	46 6				
	L	30				
	M	47	3	2		
May 17..	P E	12 6 0	..	..	13·5(?)	Small; phases not clear.
	S	8 36				
May 17..	e E	13 27 36				
	M	31	—	1	..	N.–S. component not recording.
May 27..	..	23 50	..	..	..	Tremors.
June 2..	..	5 37	..	..	..	Tremors.
June 3..	e E	21 27 30	..	..	..	Small tremors.
	e	41 30				
	e	50 50				
June 6..	P E	11 56 (0)	..	..	5·1	ΔT not known.
	S N	57 0				
	L (?)	20				
	M	58 0	2	1		
June 9..	P E	13 53 0	..	..	9·6	
	S E	54 50				
	L	55 10				
	M	57	10+	6+	..	Faint record.
June 9..	P NE	16 1 57	..	..	10·0	
	S N	3 57				
	L	4 50				
	M_1	8	5	4		
	M_2	11	6	2		
	M_3	18	5	3		
June 11..	e	18 40 25				
	M	46	1	1		
June 13..	P NE	15 36 (20)	..	..	10·0	ΔT not known.
	S N	38 20				
	L	39 0				
	M	41 30	7	3		
June 17..	..	17 0	..	..	..	Tremors.
June 19..	e N	22 25 30				
	M	30	1	1		
June 22..	..	15 40 0	..	..	..	Tremors; from New Zealand.

International Seismological Centre

Arapuni.

LATITUDE: 38° 5′ S. LONGITUDE: 175° 39′ E.
INSTRUMENT: Milne Horizontal Seismograph; undamped. E.–W. component.

CONSTANTS.

Date of Determination.	Pendulum Period.	Magnification.
	Sec.	
1931, March 15th ..	23	5·6

Observer: DISTRICT ENGINEER, Public Works Department, Arapuni.

Date.	Phase.	G.M.T.	Amplitude.	Δ	Remarks.
		h. m. s.	mm.	Deg.	
1931.					
April 3..	L	23 26 —	1	..	Δ T not known.
April 6..	eP	6 57 (0)	..	38	Δ T not known.
	S	7 3 0			
	L	9 —			
	M_1	11 —	3		
	M_2	14 —	3		
April 8..	..	19 20 —	..	..	Prolonged tremors.
April 12..	eP	2 5 (0)	..	13 (?)	Δ T not known. P not clear.
	iS	7 30			
	M	9 0	11		
April 17..	..	5 30 —	..	..	Tremors.
April 21..	P	23 40 (0)	..	1·9	Δ T not known.
	S	23			
	M	30	8		
	Sg	35			
April 22..	e	0 15 —			
	M	22 —	2		
April 24..	i	17 32 —			
	S	35 —			
	M	37 —	3		
	L	38 —			
	M	40 —	4		
May 6..	iP	14 56 (12)	..	2·2	Δ T not known.
	iS	39			
	M	57	14		
May 7..	iP	4 56 (12)	..	2·2	Δ T not known.
	iS	39			
	M	57	3		
May 17..	e	17 4	..	..	Δ T not known.
	M	5	1		

International Seismological Centre

Date.	Phase.	G.M.T.	Amplitude.	Δ	Remarks.
		h. m. s.	Sec.	Deg.	
1931. May 20..	e	3 0 (0)	..	..	Δ T not known. Phases not clear.
	SR_2	17			
	M	28			
	L	4 0			
	M	3			
June 1..	e	12 4 (0)	..	..	Δ T not known.
	M				
June 2..	..	5 40	..	..	Slight tremors.
June 9..	e	14 5 (0)	..	..	Δ T not known.
	M	8	3		
June 9..	eS (?)	16 7 (0)	..	30 (?)	Δ T not known.
	L	10 36			
	M	12	8		
June 13..	e	15 42 (0)	..	..	Δ T not known.
	M	43 50	3		
June 17..	..	17 15	..	..	Tremors.
June 22..	P	15 32 (0)	..	2·7	Δ T not known.
	S	33			
	M	35			
	Sg	33 0	3		

International Seismological Centre

Takaka.

LATITUDE : 40° 51′ S. LONGITUDE : 172° 48′ E.

INSTRUMENT : Imamura Strong-motion Seismograph : Three components ; oil damping.

CONSTANTS.

Component.	Free Pendulum Period.	Damping.	Magnification.
	Sec.		
N	10	30 : 1	2
E	10	20 : 1	2
Z	4	1·5 : 1	2

Observer : Mr. W. J. SMITH, Postmaster, Takaka.

Date.	Phase.	G.M.T.			Period.	Amplitude.			Δ	Remarks.
						N.	E.	Z.		
1931.		h.	m.	s.	Sec.	mm.	mm.	mm.	Deg.	
April 3	P E	19	32	23	..	..	..	..	2·3	Δ T uncertain.
	Pg			39						
	S E			51						
	Sg		33	3	1	1	1			
April 3	P NE	22	21	5	..	..	..	..	2·3	Δ T uncertain.
	S			33						
	Sg			45	..	1	1			
April 18	..	5	36		..	..	..	..	..	Feeble tremors.
April 20	..	6	30		..	..	..	..	..	Feeble tremors.
April 21	P NE	23	41	6	..	..	..	..	3·9	
	P*			16						
	S			53						
	M		42	3	5	2	2	1		
	Sg			29						
April 25	P NE	8	36	19	..	..	..	..	1·2	Δ T uncertain.
	Pg			32						
	S			35						
	Sg			43	..	2	2	1		
May 6	P*	14	56	49	..	..	..	..	5·3	
	Pg		57	4						
	S			48						
	S*			56						
	Sg		58	16						
	M			28	7	1	1	<1		
May 6	P E	17	53	(0)	..	..	..	..	2·4 (?)	Δ T not known. Very small.
	S			30						
	M			31	1	1	1	<1		

International Seismological Centre

Date.	Phase.	G.M.T.			Period.	Amplitude.			Δ	Remarks.
						N.	E.	Z.		
1931.		h.	m.	s.	Sec.	mm.	mm.	mm.	Deg.	
May 7	P	4	56	57	..	..	..	..	4·5+	P very small.
	Pg		57	26						
	S			51						
	S*		58	11						
	Sg			29						
	M			—	1	..	..	..	..	Small amplitudes.
May 14	P	8	52	(0)	..	..	..	..	4·2 (?)	Δ T not known. Very faint record.
	S			50						
May 19	Pg	1	58	(0)	..	..	..	..	0·1	Δ T not known. Felt locally.
	Sg			2						
	M			3	..	4	6	1		
May 19	..	12	30		..	..	..	..	..	Local tremor.
May 19	Pg	15	10	(0)	..	..	..	..	0·4	Δ T not known.
	Sg			6	..	1	1	<1		
May 19	..	21	20		..	..	..	..	..	Local tremor.
May 20	..	13	52		..	..	..	..	..	Local tremor.
May 20	..	16	—		..	..	..	..	..	Local tremor.
June 20	..	23	21		..	..	..	..	..	Small local shock.
June 21	Pg	22	17	(0)	..	..	..	..	..	Δ T not known. Felt locally.
	Sg			2	..	1	2	<1		
June 21	Pg	22	22	(0)	..	..	..	..	..	Δ T not known. Felt locally.
	Sg			2	..	1	1	<1		
June 22	P E	15	32	(0)	..	..	..	..	5·7	Δ T not known.
	Pg			30						
	S		33	6						
	M			9	2	1	1	<1		
	S*			36						

International Seismological Centre

Hastings.

LATITUDE: 39° 38′ S. LONGITUDE: 176° 53′ E.

INSTRUMENT: Milne-Jaggar Shock Recorder.

Observer: Mr. HENRY DE DENNE, 304 South Nelson Street, Hastings.

Date.	Phase.	G.M.T.	Maximum Amplitude.	Δ	Remarks.
1931.		h. m. s.	mm.	Deg.	
April 2..	Pg	20 28 (0)	..	0·4	Δ T not known.
	Sg	4	3		
April 3..	P	22 21 (0)	..	1·4(?)	Δ T not known. Phases not clear.
	S(?)	17	1		
April 4..	Pg	23 4 (0)	..	0·4	Δ T not known.
	Sg	4	4		
April 6..	Pg	13 13 (0)	..	0·4	,,
	Sg	5	3		
April 8..	Pg	8 26 (0)	..	0·4	,,
	Sg	4	1		
April 8..	Pg	15 18 (0)	..	0·5	,,
	Sg	7	2		
April 12..	Pg	20 58 (0)	..	0·4	,,
	Sg	4	2		
April 16..	Pg	6 34 (0)	..	0·4	,,
	Sg	4	10+		
April 18..	Pg	3 47 (0)	..	1·0	,,
	Sg	12	2		
April 19..	Pg	5 48 (0)	..	0·5	,,
	Sg	7	5		
April 20..	Pg	17 18 (0)	..	0·1	,,
	Sg	2	5		
April 21..	Pg	2 47 (0)	..	0·2	,,
	Sg	3	2		
April 21..	P	23 40 (30)	..	1·0	,,
	Pg	33			
	Sg	43	40+		
April 22..	Pg	0 31 (30)	..	0·4	,,
	Sg	36	3		
April 22..	Pg	23 38 (0)	..	0·4	,,
	Sg	6	5		
April 23..	Pg	17 54 (0)	..	0·6	,,
	Sg	8	8		
April 26..	Pg	6 59 (0)	..	0·7	,,
	Sg	9	2		

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Date.	Phase.	G.M.T.	Maximum Amplitude.	Δ	Remarks.
1931.		h. m. s.	mm.	Deg.	
April 27..	Pg	10 7 (0)	..	0·2	Δ T not known.
	Sg	3	4		
May 5..	Pg	20 8 (0)	..	0·5	„
	Sg	7			
	M	10	8		
May 6..	P	14 56 (10)	..	..	Δ T not known. Large amplitudes. Subsequent phases lost.
	P*	16			
	Pg	25			
May 6..	Pg	15 40 (0)	..	0·5	Δ T not known.
	Sg	7	8+		
May 6..	Pg	17 52 (0)	..	0·8	„
	Sg	10	1		
May 7..	Pg	3 53 (0)	..	0·8	„
	Sg	10	1		
May 7..	P	4 56 (0)	..	2·0	„
	Pg	7			
	S	24	11		
May 8..	P	11 38 (0)	..	1·2	„
	S	15	2		
May 12..	Pg	8 10 (0)	3	..	Δ T not known. Very local.
May 14..	P	8 52 (0)	..	1·1	Δ T not known.
	S	14			
	M	26	5		
May 18..	Pg	19 37 (0)	..	0·5	„
	Sg	7	7		
May 21..	Pg	4 50 (0)	..	0·8	„
	Sg	10	1		
May 23..	..	19 3	..	..	Long confused tremor.
June 3..	Pg	2 55 (0)	..	0·1	Δ T not known.
	Sg	1	2		
June 9..	P	16 56 (0)	..	1·4	„
	Pg	7			
	S	17			
	M	18	4		
	Sg	30			
June 10..	Pg	3 11 (0)	..	0·4	„
	Sg	5			
	M	10	13		
June 14..	Pg	4 24 (0)	..	0·4	„
	Sg	5			
	M	6	14		
June 17..	Pg	1 56 (0)	..	0·4(?)	Very small. Δ T not known.
	Sg	5			
	M	8	2		

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Date.	Phase.	G.M.T.	Maximum Amplitude.	Δ	Remarks.
		h. m. s.	mm,	Deg.	
1931. June 19..	P	13 17 (0)	..	1·3 (?)	Δ T not known. P not clear.
	S	16			
	Sg	31			
	M	36	4		
June 19..	Pg	19 17 (0)	..	0·3	Δ T not known.
	Sg	6			
	M	7	2		
June 21..	Pg	16 7 (0)	..	0·1	Δ T not known.
	Sg	1			
	M	3	9		
June 21..	Pg	20 2 (0)	..	0·2	,,
	Sg	3			
	M	15	24		
June 22..	P	15 32 (0)	..	2·3	,,
	Pg	16			
	S	28			
	M	33	23		
June 23..	Pg	21 57 (0)	..	0·2	,,
	Sg	3			
	M	10	3		
June 25..	Pg	10 50 (0)	..	0·4	,,
	Sg	5			
	M	7	1		

International Seismological Centre

New Plymouth.

LATITUDE: 39° 5′ S. LONGITUDE: 174° 4′ E.

INSTRUMENT: Wood-Anderson Short-period Seismograph: Magnetic damping.

Observer: Mr. McCABE, Chief Draftsman, Lands and Survey Department, New Plymouth.

NOTE.—This station was not recording from April 30th to August 18th.

Date.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
1931.		h. m. s.	Sec.	mm.	Deg.	
April 2..	P	7 44 (20)	..	..	2·4	Δ T not known.
	Pg	43				
	S	45				
	M	45 1	..	13		
	Sg	23				
April 3..	P	19 32 (30)	..	..	2·2	,,
	P*	37				
	Pg	47				
	S	57				
	S*	33 4				
	Sg	26				
	M	29	..	30+		
April 3..	P	22 21 (0)	..	..	1·3	Δ T not known. Very large amplitudes.
	S	17				
	M	—				
April 4..	P	22 45 (0)	..	..	2·9	Δ T not known.
	S	35				
April 4..	P	23 4 (0)	..	..	2·3	,,
	S	28				
April 6..	P	9 27 (0)	..	..	6·9	,,
	S	28 20				
	M	25	0·5	3		
April 6..	P	13 13 (0)	..	..	2·0	,,
	S	25				
	M	28	0·5	4		
April 6..	P	21 56 (0)	..	..	2·3	,,
	S	28	0·5	4		
April 9..	Pg	23 31 (0)	..	..	0·2	,,
	Sg	3				
	M	8	..	21		
April 10..	P	10 57 (0)	..	..	2·3	,,
	S	28				
	M	37	0·5	3		
April 13..	P	20 19 (0)	..	..	1·2	,,
	S	15				
	M	17	..	5		
	S*	22				
	Sg	27				
April 14..	Pg	23 51 (0)	..	..	0·2	,,
	Sg	3				
	M	—				

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
1931.		h. m. s.	Sec.	mm.	Deg.	
April 14..	Pg	23 54 (0)	..	..	0·3	Δ T not known.
	Sg	4				
	M	6	..	10+		
April 15..	Pg	0 14 (0)	..	..	0·2	Δ T not known. Faint record.
	Sg	3				
April 15..	Pg	23 45 (0)	..	..	0·2	Δ T not known.
	Sg	3				
	M	6	..	20		
April 16..	Pg	0 10 (0)	..	..	0·2	,,
	Sg	3				
	M	4	..	12		
April 16..	P	6 34 (0)	..	..	2·3	,,
	P*	6				
	Pg (?)	15				
	S	29				
	M	34	0·5	11		
	Sg	53				
	M	58	0·5	8		
April 16..	P	8 4 (0)	..	..	2·3	,,
	S	28	0·5	7		
April 18..	P	3 47 (30)	..	..	2·2	,,
	Pg	40				
	Ps	49				
	S	57				
	M	48 18	0·5	4		
	Sg	20				
April 19..	P	5 48 (0)	..	..	2·5	,,
	P*	8				
	Ps	22				
	S	30				
	S*	39				
	M	45	0·5	10		
	Sg	48				
April 19..	P	5 54 (0)	..	..	1·8	,,
	P*	8				
	Pg	13				
	S	22				
	Sg	35				
	M	41	0·5	7		
April 20..	P	5 5 (0)	..	..	1·7	,,
	P*	6				
	Pg	11				
	S	21				
	M	35	..	35		
	Sg	42				
April 20..	P	11 32 (0)	..	..	1·3	,,
	S	17				
	M	20	..	5		
April 21..	P	23 41 (0)	..	..	..	Δ T not known. Very large amplitudes ; other phases lost.
	PQ	4				
	P*	12				
	Pg	18	..	80+		

Date.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
1931.		h. m. s.	Sec.	mm.	Deg.	
April 21..	P	23 50 (0)	..	..	2·1	Δ T not known.
	P*	8				
	S	25				
	M	47	1	8		
April 22...	P	0 31 (0)	..	..	2·0	,,
	P*	8				
	S	24				
	S*	34				
	Sg	43	0·5	9		
April 22..	P	23 38 (0)	..	..	2·0	,,
	P*	7				
	Pg	12				
	Ps	17				
	S	24				
	M	38	..	21		
	Sg	41				
April 23..	P	0 13 (0)	..	..	1·2	Δ T not known. Very large amplitudes.
	S	15				
	M	—	..	45+		
April 23..	P	23 59 (0)	..	..	3·8	Δ T not known.
	P*	11				
	Pg	20				
	Ps	34				
	S	45				
	M	24 0 2	..	25		
	Sg	10				
April 25..	P	8 36 (45)	..	..	3·2	,,
	Pg	56				
	S	37 24				
	M	30	..	70		
	Sg	45				
April 25..	P	20 58 (0)	..	..	1·8	,,
	P*	7				
	S	22				
	M	23	..	9		
	S*	32				
	Sg	38				
April 26..	P	7 0 (0)	..	..	2·4	,,
	S	29				
	M	35	..	3		
April 26..	P	7 24 (0)	..	..	1·4	,,
	S	17				
	M	24	..	15		
	Sg	27				
April 26..	P	9 24 (0)	..	..	1·4	,,
	S	17				
	M	24	..	4		
April 27..	P	10 7 (0)	..	..	2·2	,,
	P*	11				
	Ps	23				
	S	27				
	M	31	0·5	7		

W. A. G. Skinner, Government Printer, Wellington.

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International Seismological Centre

BULLETIN E. 30.

International Seismological Centre

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

DOMINION OBSERVATORY, WELLINGTON W.1, NEW ZEALAND.

SEISMOLOGICAL REPORTS

FOR

JULY, AUGUST, SEPTEMBER, 1931.

IN this report small local tremors having no definite phases have been omitted.

In cases where the clock correction is not known, the time of the P phase (or first phase recorded) is enclosed within a bracket.

The reports of the various stations are arranged in the order in which the stations were established.

For notation see "Modern Seismology," by G. W. Walker; also "Monthly Notices of the Roy l Astronomical Society, Geophysical Supplements."

Tables used: "Tables of the Times of Transmission of the P and S waves of Earthquakes," by Harold Jeffreys, 1932.

Observers: R. C. HAYES, F.R.Met.Soc.; C. J. WESTLAND, F.R.A.S.

Director: C. E. ADAMS, D.Sc., F.R.A.S.

Wellington (Dominion Observatory).

LATITUDE: 41° 17′ S. LONGITUDE: 174° 46′ E. HEIGHT ABOVE M.S.L.: 401·5 FT.

INSTRUMENTS.

Milne-Shaw Horizontal Seismographs, Nos. 13 and 36: Magnetic damping.
Wood-Anderson Short-period Seismograph: Magnetic damping.
Galitzin-Wilip Vertical Seismograph: Photo-galvanometric registration; magnetic damping.

CONSTANTS.

Component.	Date of Determination.	Galvanometer Free Period.	Pendulum Free Period.	Damping.	$\frac{Ak}{\pi L}$
		Sec.	Sec.		
Milne-Shaw (N) ..	1931, June 10	..	9·1	20 : 1	..
Milne-Shaw (E) ..	1930, Sept. 30	..	9·8	20 : 1	..
Wood-Anderson (N) ..	1931, July 29 ..	..	0·65	5 : 1	..
Galitzin-Wilip (Z) ..	1931, June 22	10·60	3·6	1·72 : 1	156·5

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Date.	Phase.	G.M T.	Period.	Amplitude. N.	Amplitude. E.	Amplitude. Z.	Δ	Remarks.
1931.		h. m. s.	sec.	mm.	mm.	mm.	deg.	
July 1	P	10 15 36	..	..	..	..	2·8	R.-F. 4 at Wairoa.
	S	16 10						
July 2	P	7 11 53	..	..	..	..	1·6	Takaka, Δ = 0°·1. Epicentre: 40·8 S., 172·9 E. R.-F. 5–6 at Takaka.
	S	12 13						
July 2	P	8 39 0	..	..	..	..	1·8	
	S	22						
July 3	Pg	2 31 35	..	..	..	..	0·6	
	Sg	44						
July 5	P	20 39 45	..	..	..	..	2·0	Hastings, Δ = 0°·4. Epicentre: 40·5 S., 176·8 E.
	S	40 9						
July 6	L	19 15	..	..	..	..	..	Traces.
July 7	i N	7 22 55	..	..	..	..	..	Records disturbed by microseisms. R.-F. 1–2 at Gisborne.
	L	26						
	M	28						
July 7	..	10 24	..	..	..	..	..	Traces.
July 8	Pg	0 55 29	..	..	..	..	0·4	Cook Strait, R.-F. 3.
	Sg	34						
July 8	..	1 28 4	..	..	..	..	..	Slight tremors. Felt at Tokaanui. R.-F 2.
July 8	Pg	18 46 23	..	..	..	..	0·3 ?	Pg very small.
	Sg	27						
July 8	i N	19 22 50						
	L	26						
	M	28	15	1·2				
July 8	P	20 22 56	..	..	..	..	2·3	R.-F. 4 at Wairoa.
	S	23 54						
July 9	..	7 11	..	..	..	..	..	Sight tremors.
July 10	Pg	8 6 43	..	..	..	..	0·4	
	Sg	49						
July 12	P (?)	5 27 59	..	..	..	..	1·8 (?)	Confused; may be two shocks.
	S	28 21						
July 12	P	12 34 3	..	..	..	..	3·0	R.-F. 3 at Taumarunui.
	S	39						
July 12	P	12 45 40	..	..	..	..	3·5	
	S	46 22						
July 12	i N	17 6 10	..	..	..	..	..	Prolonged irregular movements.
	i S (?)	11 31						
	L	15 30						
July 13	P	2 34 14	..	..	..	..	2·0	
	S	38						
July 13	P	21 8 24	..	..	..	..	4·6	R.-F. 5 at Wairoa.
	S	9 20						
	M	24	3	1·1	2·6	5·9		

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Date.	Phase.	G.M.T.			Period.	Amplitude.			Δ	Remarks.
						N.	E.	Z.		
1931.		h.	m.	s.	sec.	mm.	mm.	mm.	deg.	
July 14	i S (?)	15	53	19	..	..	..	..	..	Records disturbed by microseisms.
	L	16	3		15					
July 14	P	16	37	48	..	..	..	..	2·1	
	S		38	13						
July 14	Pg	19	55	50						
	Sg			52						
July 16	P	9	25	44	..	..	..	..	2·0	
	S		26	8						
July 18	L	12	8		..	..	..	..	..	Heavy microseisms.
July 19	Pg	7	41	38						
	Sg			40						
July 19	Pg	9	8	23	..	..	..	..	0·7	R.-F. 7 at Hinakura (Wairarapa). Epicentre : 41·5 S., 175·7 E.
	Sg			32						
	M			34	..	22+	18+	20+		
July 19	P	9	17	27	..	..	..	..	0·9 (?)	Phases may be Pg and Sg.
	S			38						
July 20	eL N	8	44	40	..	..	..	..	..	Heavy microseisms.
	M		47		18	2·0	1·1	3·0		
July 21	i P	3	40	56	..	..	..	..	27·3	Suva, $\Delta = 19°{\cdot}9$. Riverview, $\Delta = 21°{\cdot}2$. Melbourne, $\Delta = 25°{\cdot}2$. Epicentre : 16 S., 160 E.
	iPR_1		41	25	3					
	i S		45	38	5					
	SR_1		46	48	9					
	L		48	0						
	M		50		14	3·0	5·1	5·5	..	Strong microseisms.
July 22	Pg	10	47	36						
	Sg			41						
July 22	..	12	35		..	..	..	..	..	Tremors.
July 22	P	19	52	58	..	..	..	..	1·6	Cook Strait region. Maximum : R.-F. 4.
	Pg		53	08						
	S			18						
July 23	Pg	2	36	42						
	Sg			44						
July 23	P	9	9	54	..	..	..	..	2·0	R.-F. 4 at Karamea and Kahurangi Point.
	S		10	18						
July 23	iPNEZ	14	27	44	..	..	..	..	31·4	Suva, $\Delta = 22°{\cdot}1$. Riverview, $\Delta = 22°{\cdot}1$. Epicentre : 13 S., 156 E.
	iS		33	6						
	L		36		15					
July 24	P	14	4	1	..	..	..	..	1·0	Takaka, $\Delta = 1°{\cdot}1$. Hastings, $\Delta = 3°{\cdot}0$. Arapuni, $\Delta = 4°{\cdot}0$. Epicentre : 41·5 S., 173·7 E. Felt extensively in central New Zealand. Maximum : R.-F. 6–7.
	P*(?)			5						
	Pg			12						
	S			14						
	Sg			18						
July 24	P	14	15	32	..	..	..	..	1·0	R.-F. 3 at Nelson.
	S			45						

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Date.	Phase.	G.M.T.	Period.	Amplitude.			Δ	Remarks.
				N.	E.	Z.		
1931.		h. m. s.	sec.	mm.	mm.	mm.	deg.	
July 24	P	20 0 46	..	..	..	..	2·1	
	S	1 12						
July 28	i NE	14 50 33	..	..	..	..	..	Confused shock. R.-F. 3 at Puysegur Point.
July 29	P	0 13 28	..	..	..	..	1·9	Hastings, Δ = 0°·8. Takaka, Δ = 3°·2. Epicentre: 40·4 S., 177 E. Felt in southern portion of North Island. Maximum: R.-F. 7.
	Pg	42						
	S	51						
	Sg	14 8						
	M	18	..	24·0	30·0	80		
July 29	P	16 10 36	..	..	..	..	1·1	R.-F. 3 at Waipukurau.
	S	48						
Aug. 1	P	18 48 42	..	..	..	..	1·7	R.-F. 3 at Nelson.
	S	49 1						
Aug. 1	..	10 25	..	..	..	..	..	Traces. Strong microseisms.
Aug. 1	P (?)	19 20 35	..	..	..	..	25·2(?)	Very small. Strong microseisms.
	S	25 0						
	SR_1	26 25						
	L	28 30						
	M	30 5	10	1·9	1·1	2·5		
Aug. 2	P	12 27 58	..	..	..	..	2·1	R.-F. 5 at Reefton.
	S	28 22						
Aug. 4	P	8 54 51	..	..	..	..	2·6	R.-F. 2 at Wellington.
	S	55 21	..	2·1	2+			
Aug. 6	..	16 44	..	..	..	..	..	Irregular tremors. R.-F. 5 at Waipukurau.
Aug. 7	iP Z	2 20 12	..	..	..	..	49·0	
	PR	22 50						
	S	27 15	9					
	SR_1	31 20						
	SR_2	34	20					
	L	38						
	M_1	39 25	20	12·0	11·5	25·0		
	M_2	40 45	16	11·0	8·5	11·5		
	M_3	42 30	14	12·5	9·5	12·0		
Aug. 8	L	21 21	..	..	..	..	..	Traces.
Aug. 9	P	2 50 22	..	..	..	..	1·8	R.-F. 4 at Karamea.
	S	43						
Aug. 9	P	9 11 42	..	..	..	..	1·75	R.-F. 3 at Kahurangi Point.
	S	12 2						
Aug. 9	P	10 38 33	..	..	..	..	3·6	Felt in Gisborne – East Cape region. R.-F. 5 at Wairoa.
	Pg	58						
	S	39 14						
	Sg (?)	42						
	M	47	..	7·0	9·2	17+		
Aug. 10	P	9 20 2	..	..	..	..	2·0	
	Pg	14						
	S	25						
Aug. 10	S N	9 54 25	..	..	..	..	20±	
	L	56 20						
	M	40	15					

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Date.	Phase.	G.M.T.			Period.	Amplitude.			Δ	Remarks.
						N.	E.	Z.		
1931.		h.	m.	s.	sec.	mm.	mm.	mm.	deg.	
Aug. 10	P	16	56	7	..	..	..	..	3·1	Hawke's Bay, R.-F. 5.
	Pg (?)			29						
	S			42						
Aug. 10	P N (?)	21	31	—	..	..	..	..	107	May be P. Very small.
	PR_1		36	16						
	PR_2		38	50	5					
	[S]		42	49						
	SR_1		48	20	15					
	SR_2		54	37						
	L	22	9	20	22					
	M_1		18		28	14·5	16·5	30·0		
	M_2		22		30	17·5	20·5	32·0		
	M_3		25		25	12·5	21·5	32·5		
Aug. 13	P N	22	12	24	..	..	..	..	10·3	Rather confused. Suva, $\Delta = 13°{\cdot}5$. Riverview, $\Delta = 25°{\cdot}2$. Melbourne, $\Delta = 28°{\cdot}9$. Epicentre : 32 S., 179 W.
	S		14	20						
	L (?)		15	24						
	M		19	40	15–20	2·0	3·0	4·0		
Aug. 15	P	2	22	21	..	..	..	..	9·5	
	S		24	8						
	L			42						
Aug. 16	..	12	10		..	..	..	..	..	Prolonged tremors. Heavy micro-seisms.
Aug. 18	e	14	47	36	..	..	..	..	107	
	PR_1		50	23						
	[S]		57	0	..	..	..	..	..	Long series of L waves lasting till 17 h.
	L	15	24		20					
Aug. 19	Pg	13	26	18	..	..	..	..	0·1	R.-F. 2 at Lower Hutt.
	Sg			23						
	M			25	..	1·9	3·5			
Aug. 19	P	19	48	44	..	..	..	..	1·3	R.-F. 2 at Wellington and Patea.
	S			59						
	M		49	1	..	1·6	2·4			
Aug. 22	eL	22	54	55	15					
Aug. 26	i	15	34	25	..	..	..	..	..	May be S.
Aug. 26	..	22	5		..	..	..	..	..	Tremors.
	L		48		..	..	..	..	..	Records disturbed by wind.
Aug. 27	iPZ	15	47	45	..	..	..	..	105±	
	iN		53	12						
	PR_3		57	40						
	S	16	0	0						
	SR_1		7	0						
	SR_2		10	20						
	i		16	10						
	L		22	0						
	M_1		35		23	2·0	4·5	6·0		
	M_2		41		17	3·0	4·7	8·2		
	M_3		47		16	2·8	2·0	4·5		
Aug. 28	Pg	12	56	44	..	..	..	..	0·1	
	i			46						
	Sg			48						
	i			50						

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	Amplitude. N.	Amplitude. E.	Amplitude. Z.	Δ	Remarks.
1931.		h. m. s.	sec.	mm.	mm.	mm.	deg.	
Aug. 29	P	15 19 22	..	..	..	..	3·5 (?)	P very small.
	S	20 2						
Aug. 30	Pg	10 32 12	..	..	..	..	0·1	
	Sg	18						
Sept. 3	L	20 9	..	..	..	..	..	Traces.
Sept. 6	L	17 54	..	..	..	..	..	Traces.
Sept. 8	P	1 23 40	..	..	..	..	1·75	
	P*	46						
	Pg	52						
	S	24 0						
	S*	6						
Sept. 8	P	23 56 56	..	..	..	..	4·7 (?)	Arapuni, $\Delta = 1°{\cdot}6$. Epicentre: North of Bay of Plenty, not well defined. Felt in Coromandel Peninsula and around Bay of Plenty. Maximum: R.-F. 4.
	P* (?)	23 57 0						
	Pg	19						
	S (?)	49						
	S*	58 0						
	Sg	17						
	M	59 15	5	3·8	5·0	11·1		
Sept. 9	P	2 18 45	..	..	..	..	1·5	Felt in Wanganui, Rangitikei, and Manawatu districts. R.-F. 3.
	Pg	53						
	S	19 2						
Sept. 9	P	10 10 45	..	..	..	..	2·7	R.-F. 4–5 at Napier.
	S	11 16						
Sept. 9	P	11 13 36	..	..	..	..	2·9	
	S	14 9						
Sept. 9	Pg	17 12 58	..	..	..	..	0·4	R.-F. 4 in Wairarapa and Wellington.
	Sg	13 4						
	M	7	..	1·5	2·7			
Sept. 9	PN	20 49 7	..	..	..	..	60·8	
	S	57 24						
	PS (?)	58 30						
	SR_1	21 1 40						
	L	9	15					
Sept. 11	Pq	22 23 25	..	..	..	..	2·0+	Az = N.E. Hastings, $\Delta = 0°{\cdot}3$. Arapuni, $\Delta = 2°{\cdot}3$. New Plymouth, $\Delta = 3°{\cdot}0$. Takaka, $\Delta = 3°{\cdot}6$. Christchurch, $\Delta = 4°{\cdot}5+$. Approximate epicentre: 40 S., 177 E. Felt in southern portion of North Island. R.-F. 7 at Porangahau.
	P*	31						
	Pg	35						
	Ps	45						
	S	51						
	S*	52						
	Sg	24 2						
	M	11	..	37·0	77·0	59·0		
Sept. 13	Pg	6 4 33						
	Sg	42						
Sept. 13	L	16 7	..	..	..	..	..	Traces.
Sept. 14	L	3 58	..	..	..	..	..	Traces.
Sept. 14	P	10 46 42	..	..	..	..	1·9	
	S	47 4						

International Seismological Centre

Date.	Phase.	G.M.T.			Period.	Amplitude.			Δ	Remarks.
						N.	E.	Z.		
1931.		h.	m.	s.	sec.	mm.	mm.	mm.	deg.	
Sept. 15	P	20	45	22	..	..	..	..	2·2 (?)	
	S (?)			47						
Sept. 15	P	21	10	21	..	..	..	..	6·2	Az = S.W. Christchurch, Δ = 3°·2. Takaka, Δ = 5°·8. Arapuni, Δ = 8°·8. Approximate epicentre : 45·5 S., 169 E. Felt extensively in southern portion of South Island. Maximum : R.-F. 5.
	Pq			27						
	P*			41						
	Pg		11	3						
	Ps (?)			21						
	S			31						
	S*			51						
	Sg		12	12						
	Ss			28						
	M			55	5	17·8	17·0	38·0		
Sept. 16	eE	18	31	50						
	L		34							
	M		35		13					
Sept. 16	L	19	27		..	..	..	..	..	Traces.
Sept. 17	P	7	5	6	..	..	..	..	2·9	
	Pg (?)			27						
	S			39						
Sept. 17	P	8	36	36	..	..	..	..	2·3	
	S		37	2						
Sept. 19	e	8	11	50						
	L		15		17					
Sept. 20	eL	20	13							
Sept. 20	e	23	48	54						
	i		52	10						
	M		53		8	1·6				
Sept. 21	P	13	35	38	..	..	..	..	5·6	Az = N.E. Arapuni, Δ = 3°·5. Hastings, Δ = 4°·3±. Takaka, Δ = 5°·3. Christchurch, Δ = 7·8+. Suva, Δ = 21°·3. Approximate epicentre : 36 S., 180. Felt over greater part of New Zealand from Auckland to Akaroa. Maximum : R.-F. 7–8 at Opotiki. Large amplitudes.
	i			39						
	i			40						
	i			52						
	i		36	4						
	Pg			24						
	S			42						
	i			48						
	i		37	10						
	Sg			20						
Sept. 22	eL	9	48+		13					
Sept. 25	PN	6	11	22	..	..	..	..	72·0	
	PR_1		14	7						
	PR_2		15	10						
	PR_3		17	7						
	S		20	43						
	SR_1		26	6						
	SR_2		29	30						
	i		33	18						
	L		37							
	M_1		39		25	6·0	7·5			
	M_2		43		20	19·0	7·5			

International Seismological Centre

Date.	Phase.	G.M.T.			Period.	Amplitude.			Δ	Remarks.
						N.	E.	Z.		
1931.		h.	m.	s.	sec.	mm.	mm.	mm.	deg.	
Sept. 25	P	8	23	53	..	..	..	..	1·3	R.-F. 3 at Taumarunui.
	S		24	8						
	i			13						
	i			15						
Sept. 25	P NE	16	40	33	..	..	..	..	24·7	
	S		44	54						
	SR_1		47	0						
	L		49							
	M		50		10	2·5	2·2			
Sept. 25	PN	20	36	55	..	..	..	..	24·6	
	S		41	15						
	L		45							
	M		47		10	1·2	1·2			
Sept. 26	Pg	14	15	30	..	..	..	..	0·6	
	i			36						
	Sg			39						
	i			43						
Sept. 26	L	20	50		17					
Sept. 28	..	5	17		..	..	..	..	..	Traces.
Sept. 29	e	9	2	15						
	M		7		8	1·5	1·7	2·0		
Sept. 30	P	13	0	19	..	..	..	..	1·6 (?)	R.-F. 4 in Hawke's Bay.
	i			24						
	S (?)			37						

International Seismological Centre

Suva, Fiji.

LATITUDE: 18° 9′ S. LONGITUDE: 178° 26′ E. HEIGHT ABOVE M.S.L. = 10 FT.

INSTRUMENT: Milne Twin-boom Horizontal Seismograph: Undamped.

CONSTANTS.

Component.	Date of Determination.	Pendulum Period.	Magnification.
		Sec.	
N.–S.	1931, August 14th	9·6	6
E.–W.	1931, August 14th	7·6	6

Observer: Miss MUNE, Telephone Exchange, Suva.

Date.	Phase.	G.M.T.	Amplitude. N.	Amplitude. E.	Δ	Remarks.
1931.		h. m. s.	mm.	mm.	deg.	
July 6..	..	13 47	..	..	..	Tremors.
July 12..	i E	10 5 30	..	..	..	Tremors.
July 12..	..	17 0	..	..	..	Tremors.
July 14..	..	15 47	..	..	..	Slight tremors.
July 17..	P N	7 49 33	..	..	2·4	
	S	50 0				
	M	30	1·8	0·7		
July 20..	iP N	8 32 (54)	..	..	19·6	
	i	34 42				
	S	36 27				
	M	37 15	1·7	2·0		
July 21..	P N	3 39 24	..	..	19·9	
	i	41 3				
	i	42 20				
	S	43 0				
	M	43 20	2·6	3·0		
	L	44				
	M	45	2·0	3·3		
July 22..	P	12 28 30	..	..	2·6	
	S	29 0				
	M	30 0	1·0	3·3		

International Seismological Centre

Date.	Phase.	G.M.T.	Amplitude. N.	Amplitude. E.	Δ	Remarks.
1931.		h. m. s.	mm.	mm.	deg.	
July 23..	P	14 26 45	..	..	22·1	
	S	30 42				
	L	32 25				
Aug. 1..	..	21 45	..	..	..	Tremor felt by observer while changing record.
Aug. 4..	..	19 45	..	..	..	Tremors.
Aug. 13..	P	22 12 28	..	..	13·5	
	S	14 58				
	L	15 30				
	M_1	17 12				
	M_2	22	2·0	1·1		
Aug. 18..	..	14 50	..	..	..	Tremors.
Aug. 19..	..	1 58	..	..	..	Tremors.
Aug. 23..	..	20 52	..	..	..	Tremors.
Aug. 27..	e_1	15 15 42	..	..	..	Tremors.
	e_2	18 0				
Aug. 27..	e	3 47				
	L	4 38				
Sept. 6..	..	10 32	..	..	..	Tremors.
Sept. 6..	..	17 59	..	..	..	Tremors.
Sept. 8..	..	21 40	..	..	..	Tremors
Sept. 9..	P	20 47 30	..	..	51·6(?)	
	Pr (?)	50 40				
	S (?)	54 50				
Sept. 19..	P	15 35 18	..	..	5·0	
	S	36 15				
	M	37 0	1·0	2·0		
Sept. 20..	e	20 3 30				
	i	4 50				
	M	6 20	1·8	2·6		
Sept. 21..	P	13 39 0	..	..	21·3	New Zealand.
	PR (?)	39 55				
	S	42 50				
	M	43 40	3·2	1·1		
Sept. 24..	P	18 34 15	..	..	6·6	
	S	35 30				
	L	36 0				
Sept. 27..	..	15 30	..	..	..	Tremors.
Sept. 29..	e_1	8 58 30				
	e_2	9 0 0				
	i	2 10				
	M	3 20	0·7	2·0		

Arapuni.

LATITUDE: 38° 5′ S. LONGITUDE: 175° 39′ E.

INSTRUMENT: Milne Horizontal Seismograph; undamped. E.–W. component.

International Seismological Centre

CONSTANTS.

Date of Determination.	Pendulum Period.	Magnification.
	Sec.	
1931, August 15th ..	22·5	5·6

Observer: DISTRICT ENGINEER, Public Works Department, Arapuni.

Date.	Phase.	G.M.T.	Amplitude.	Δ	Remarks.
1931.		h. m. s.	mm.	deg.	
July 23..	eL	14 37			
	M	39	1·2		
July 24..	P	14 4 (40)	..	4·0	
	S	5 25			
Aug. 7 ..	S	2 27 (0)	..	43	Strong microseisms.
	L	33 24			
	M	39	8·5		
Aug. 10..	PR_1	21 36 (0)	..	103	
	[S]	41 30			
	PS	46 0			
	SR_2	55 30			
	SR_3	22 0 0			
	L	8			
	M_1	14	16·0		
	M_2	21	16·5		
Aug. 13..	S	22 13 (0)			
	M	15			
Aug. 18..	..	14 50	..	..	Tremors.
Aug. 27..	P	15 47 (0)	..	104	
	S	58 50			
	L	16 23			
	M	26	8·7		
Sept. 8 ..	P	23 56 (6)	..	1·6	
	Pg	13			
	S	24			
	Sg	30			
Sept. 11..	P	22 23 (2)	..	2·3	
	Pg	15			
	Ps	21			
	S	28			
	Sg (?)	39			
	M	57	2·1		
Sept. 21..	P	13 35 0	..	3·5	
	Pq	6			
	Pg	24			
	i	30			
	S	40	13·0		
	S*	48			
	Sg	57			
Sept. 25..	P	6 11 0	..	75·8	
	S	20 42			
	SR_2	30 0			
	L	39			
	M	44	17·0		

Takaka.

International Seismological Centre

LATITUDE: 40° 51′ S. LONGITUDE: 172° 48′ E.

INSTRUMENT: Imamura Strong-motion Seismograph: Three components; oil damping.

CONSTANTS.

Component.	Date of Determination of Damping.	Free Pendulum Period.*	Damping.	Magnification.
		Sec.		
N	1931, Sept. 9	10	10 : 1	2
E	,, ,,	10	18 : 1	2
Z	,, ,,	5	2·3 : 1	2

Observer: Mr. W. J. SMITH, Postmaster, Takaka.

Date.	Phase.	G.M.T.	Period.	Amplitude.			Δ	Remarks.
				N.	E.	Z.		
1931.		h. m. s.	sec.	mm.	mm.	mm.	deg.	
July 2	Pg	7 11 (0)	..	..	..	..	0·1	Felt locally. R.-F. 6.
	Sg	1	..	1·3	1·1			
July 2	..	8 39	..	..	..	..	..	Small tremor, felt locally.
July 7	..	10 24	..	..	..	..	..	Double shock, felt locally.
July 8	..	0 55	..	..	..	..	..	Small tremor, felt locally.
July 24	P	14 4 0	..	..	..	..	1·1	Az = S.E.
	S	13						
	M	18	..	2·5	3·5	1·0		
July 29	P	0 14 (45)	..	..	..	..	3·2	
	S	15 22	..	..	..	..	..	Small amplitudes.
Aug. 9	Pg	9 11 (5)	..	..	..	..	0·2	
	Sg	8						
Aug. 9	..	10 35	..	..	..	..	..	Prolonged tremors.
Sept. 8	Pg	1 23 (9)	..	..	..	..	0·2	
	Sg	11						
Sept. 11	P	22 23 42	..	..	..	..	3·6	
	P*	47						
	Pg (?)	24 5						
	S	23						
	i	32						
	M	37						
	Sg (?)	47	1	1·4	1·0	0·3		
Sept. 15	P	21 10 10	..	..	..	..	5·8	
	Pg	48						
	S	11 16						
	S*	37						
	Sg	56	1	..	..	..	..	Small amplitudes.
Sept. 21	Pq	13 35 58	..	..	..	..	5·3	
	Pg	36 34						
	S	37 4						
	Sg	47	1					

* Values supplied by maker.

International Seismological Centre

Hastings.

LATITUDE : 39° 38′ S. LONGITUDE : 176° 53′ E.

INSTRUMENT : Milne-Jaggar Seismograph.

Observer : Mr. HENRY DE DENNE, 304 South Nelson Street, Hastings.

Date.	Phase.	G.M.T.			Amplitude.	Δ	Remarks.
1931.		h.	m.	s.	mm.	deg.	
July 1..	Pg	10	15	(0)	..	0·7	
	Sg			10			
	M			20	2·0		
July 5..	Pg	20	39	(0)	..	0·4	
	Sg			7			
	M			8	2·6		
July 8..	P (?)	20	23	(0)	..	1·1 (?)	P not clear.
	S			13	..	..	Small amplitude.
July 13..	..	21	7		..	..	Confused tremors.
July 24..	P	14	4	(20)	..	3·0	
	Pg			42			
	S			54			
	Sg		5	21			
July 26..	Pg	20	11	(0)	..	0·2	
	Sg			3			
	M			4	2·0		
July 28..	Pg	21	35	(0)	..	0·3	
	Sg			4			
July 29..	Pg	0	13	(30)	..	0·8	
	Sg			41			
	M			43	25·0		
July 29..	Pg	4	36	(0)	..	0·8	
	Sg			11			
	M			12	3·0		
Aug. 2..	P (?)	12	59	—	..	..	P not clear.
	S			30			
	M			32	24·0		
Aug. 9..	P	10	37	(0)	..	3·1	
	Pg			20			
	S			35			
	Sg		38	3			
	M			—	6·2		
Aug. 10..	Pg	16	56	(0)	..	0·1	
	Sg			2			
	M			3	16·0		
Aug. 15..	P (?)	2	23	(30)	..	1·0 (?)	P not clear.
	Pg			33			
	S			41			
	Sg			45	2·0		
Aug. 18..	Pg	11	30	(0)	..	0·6	
	Sg			8			
	M			10	2·0		

International Seismological Centre

Date.	Phase.	G.M.T.	Amplitude.	Δ	Remarks.
1931.		h. m. s.	mm.	deg.	
Aug. 23..	Pg	2 22 (0)	..	0·7	
	Sg	9			
Aug. 29..	Pg	20 10 (0)	..	0·7	
	Sg	10			
	M	13	1·6		
Sept. 9..	Pg	10 8 (0)	..	0·4	
	Sg	6			
	M	8	4·0		
Sept. 11..	Pg	22 22 (0)	..	0·3	Prolonged movements; possibly a double shock.
	Sg	4			
	M	20	30·0		
Sept. 21..	P	13 35 (0)	..	4·3±	
	Pg	25			
	M	35	32·0		
Sept. 30..	Pg	13 0 (0)	..	..	Very local.
	M	3	10·5	..	Phases not clear.

New Plymouth.

Latitude: 39° 4′ S. Longitude: 174° 4′ E. Height above M.S.L. = 112 ft.

Instrument: Wood-Anderson Short-period Seismograph: Magnetic damping.

Observer: Mr. H. W. Todd, Warder, the Prison, New Plymouth.

Note.—This station was not recording from April 30th to August 18th.

Date.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
1931.		h. m. s.	sec.	mm.	deg.	
Aug. 20..	P	1 58 (6)	..	..	1·9	
	Pg	19				
	S	28				
	Sg	39				
Aug. 20..	P	2 2 (51)				
Aug. 20..	P	2 8 (7)	..	..	1·9	
	Pg	20				
	S	29				
	S*	36				
	Sg	47				
Aug. 20..	Pg	2 53 (18)	..	..	0·1	
	Sg	20				
Aug. 21..	Pg	22 49 50	..	..	0·5	
	Sg	50 1				
Aug. 25..	P	21 51 9	..	..	1·9	
	P*	17				
	S	31				

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
1931.		h. m. s.	sec.	mm.	deg.	
Aug. 25..	P	22 19 26	..	..	0·7 (?)	
	Pg (?)	32				
	Sg	42				
Aug. 26..	Pg	0 0 50	..	..	0·5	
	Sg	57				
Sept. 2..	P	1 22 (34)	..	..	2·0	
	i	42				
	i	46				
	S	57				
Sept. 2..	P	2 45 (24)	..	..	1·4	
	S	40				
Sept. 2..	P	3 22 (32)	..	..	1·2	
	S	46				
	iSG (?)	56				
Sept. 2..	P	3 46 (11)	..	..	1·1	
	S	23				
Sept. 11..	Pq	22 23 (28)	..	..	3·0	
	Pg	38				
	Ps	51				
	S*	24 1				
	Sg	19				
	i	34				
Sept. 15..	P	21 10 —	..	..	..	Indistinct.
	S	11 58				
	S*	12 29				
	Sg	48				
	Ss	57				
Sept. 24..	P	3 11 24	..	..	1·2 (?)	
	S (?)	38				
Sept. 24..	P (?)	4 42 33	..	..	1·7 (?)	
	S	52				
Sept. 25..	P	8 24 (24)	..	..	1·4	
	S	40				
	M	42	..	7·0		

International Seismological Centre

Christchurch (Magnetic Observatory).

LATITUDE: 43° 32′ S. LONGITUDE: 172° 37′ E.

INSTRUMENT: Wood-Anderson Short-period Seismograph: Magnetic dampin .

NOTE.—A Wood-Anderson Seismograph, belonging to the Dominion Observatory, was installed at the Magnetic Observatory, Christchurch, in July, 1931. By the courtesy of the Director of the Magnetic Observatory, the records are forwarded to the Dominion Observatory for measurement.

Date.	Phase.	G.M.T.	Δ	Remarks.
1931.		h. m. s.	deg.	
July 29	P	14 4 18	2·3±	
	P*	27		
	Pg (?)	33		
	i	36		
Aug. 26	P	14 33 8	2·6±	
	P*	17		
Sept. 9	Sg (?)	11 15 0		
	i	4		
	i	8		
Sept. 11	P*	22 24 21	4·5+	
	Pg	28		
	i	31		
	Ps	47		
	S*	25 16		
Sept. 15	P	21 10 1	3·2	P measured from Galitzin record.
	P*	10		
	Pg	28		
	S	37		
	Sg (?)	11 21		
Sept. 21	P	13 36 12	7·8+	Faint record.
	i	14		
	Pq	27		
	P*	37		
	Pg	37 17		
	S*	38 10		
	Sg	39 4		

W. A. G. SKINNER, Government Printer, Wellington.

200/12/32—10844

International Seismological Centre

DEPARTMENT OF SCIENTIFIC AND INDUSTRIAL RESEARCH.

DOMINION OBSERVATORY, WELLINGTON W.1, NEW ZEALAND.

SEISMOLOGICAL REPORTS

FOR

OCTOBER, NOVEMBER, DECEMBER, 1931.

IN this report, where the clock correction is not known, the time of P (or the first phase recorded) is enclosed in brackets.

The reports of the various stations are arranged in the order in which the stations were established.

For notation see "Modern Seismology," by G. W. Walker; also "Monthly Notices of the Royal Astronomical Society, Geophysical Supplements."

Tables used: "Tables of the Times of Transmission of the P and S waves of Earthquakes," by Harold Jeffreys, 1932.

Observers: R. C. HAYES, F.R.Met.Soc.; C. J. WESTLAND, F.R.A.S.

Director: C. E. ADAMS, D.Sc., F.R.A.S.

Wellington (Dominion Observatory).

LATITUDE: 41° 17′ S. LONGITUDE: 174° 46′ E. HEIGHT ABOVE M.S.L.: 401·5 FT.

INSTRUMENTS.

Milne-Shaw Horizontal Seismographs, Nos. 13 and 36: Magnetic damping.
Wood-Anderson Short-period Seismograph: Magnetic damping.
Galitzin-Wilip Vertical Seismograph: Photo-galvanometric registration; magnetic damping.

CONSTANTS.

Component.	Date of Determination.	Galvanometer Free Period.	Pendulum Free Period.	Damping Ratio.	$\frac{Ak}{\pi L}$
		Sec.	Sec.		
Milne-Shaw (N) ..	1931, Oct. 8 ..	..	9·3	20 : 1	..
Milne-Shaw (E) ..	1931, Oct. 7 ..	..	8·7	20 : 1	..
Wood-Anderson (N) ..	1931, Oct. 1 ..	..	0·57	10 : 1	..
Galitzin-Wilip (Z) ..	1931, June 22 ..	10·6	3·60	1·72 : 1	156·5

International Seismological Centre

Date.	Phase.	G.M T.	Period.	Amplitude. N.	Amplitude. E.	Amplitude. Z.	Δ	Remarks.
1931.		h. m. s.	sec.	mm.	mm.	mm.	deg.	
Oct. 3	P	3 40 52	..	..	..	..	4·1 (?)	Christchurch, Δ = 6°·1. Epicentre: 42 S., 179 E.
	i	56						
	S (?)	41 39						
Oct. 3	eP NEZ	19 19 47	..	..	..	..	33·1	Az. = N.N.W. Apia, Δ = 26°·6. Adelaide, Δ = 31°. Riverview, Δ = 28°·7. Melbourne, Δ = 33°·2. Manila, Δ = 46°·6. Epicentre: 10 S., 162 E. Destructive quake with earthquake sea wave at San Christoval, Solomon Islands.
	iP	20 0	5					
	PR_1	21 10	7					
	iS	25 10	8					
	SR_1	27 10						
	SR_2	27 45	15					
	iL	27 52						
	M_1	29	17	53	46	54		
	M_2	33	15	50	59	67		
	M_3	38	12	59	43	102		
	M_4	44	10	48	63	94		
	W_1	21 34 45	19					
Oct. 3	iP Z	22 54 13	..	..	..	..	31·7	Riverview, Δ = 26°·0. Melbourne, Δ = 29°·2. Epicentre: 11 S., 161 E.
	PR_1	55 29						
	iS	59 27	8					
	SR_1	23 1 33						
	iL	4 10						
	M	9	17	30	26	39		
Oct. 4	W	1 6	15					
Oct. 4	..	6 20	17	..	..	..	..	Tremors. R.-F. 2 at Waingake.
Oct. 4	eL	6 39	..	..	..	..	..	Prolonged movements.
Oct. 4	eL	8 47	..	..	..	..	..	Traces.
Oct. 4	L	9 39	..	..	..	..	..	Traces.
Oct. 4	..	11 48	..	..	..	..	..	Traces.
Oct. 4	..	13 45	15	..	..	..	..	Traces.
Oct. 5	i	7 14 30	..	..	..	..	..	Felt at Tuai and Wairoa. Maximum: R.-F. 5.
	e	22 36						
	L	27	17					
Oct. 5	..	7 47	..	..	..	..	..	Confused shock.
Oct. 5	..	11 45	..	..	..	..	..	Slight tremors.
Oct. 6	P	11 4 1	..	..	..	..	1·8	
	S	22						
Oct. 6	e	17 16	..	..	..	..	..	Traces.
Oct. 6	i	18 21 28						
	L	31	16					
Oct. 7	Pg	8 26 16	..	..	..	..	0·6	
	Sg	24						
Oct. 7	eL	12 5	..	..	..	..	..	Traces.
Oct. 7	e	16 0						
Oct. 8	eL	2 9	19					

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	Amplitude.			Δ	Remarks.
				N.	E.	Z.		
1931.		h. m. s.	sec.	mm.	mm.	mm.	deg.	
Oct. 8	..	16 7	..	..	..	..	..	Irregular movements. Pronounced microseisms.
Oct. 8	..	17 44	..	..	..	..	..	Tremors. R.-F. 3–4 at Murchison.
Oct. 8	Pg	20 55 42	..	..	..	..	0·7	
	Sg	52						
Oct. 9	..	4 2	..	..	..	..	..	Irregular movements. Strong microseisms.
Oct. 9	..	5 12	..	..	..	..	..	Very slight tremors.
Oct. 10	iP	0 26 32	..	..	..	..	33·8	Az. = N.N.W. Apia, Δ = 22°·5. Riverview, Δ = 29°·0 Melbourne, Δ = 33°·2. Manila, Δ = 49°·7. Epicentre: 9 S., 164 E. Very prolonged movements.
	PR_1	28 9	7					
	iS	34 30						
	iL	36 46						
	M_1	38	16	18	18	22+		
	M_2	42	15	28	16	20		
	M_3	45	15	21	25	34		
	W	3 13	16					
Oct. 10	..	7 30	..	..	..	..	..	Irregular movements. Records disturbed by wind.
Oct. 12	i	0 54	..	..	..	..	..	Irregular movements. Strong microseisms.
Oct. 12	..	3 8	..	..	..	..	..	Irregular tremors.
Oct. 12	e	10 35	..	..	..	..	..	Small tremors.
Oct. 12	Pg	11 33 41	..	..	..	..	0·5	
	Sg	48						
Oct. 12	e	13 34 28	..	..	..	..	..	May be S. Strong microseisms.
	L	40						
Oct. 12	Pg	14 45 14	..	..	..	..	0·4	
	Sg	20						
Oct. 13	Pg	4 35 16	..	..	..	..	0·7	
	Sg	25						
Oct. 13	e	4 46 45	..	..	..	..	..	May be S.
	L	52	20					
Oct. 13	eL	11 32 20	11					
Oct. 13	i	20 28 28						
	L	32	12					
Oct. 15	..	13 2	..	..	..	..	..	Local tremor.
Oct. 16	i	23 1 24	..	..	..	..	..	Small local tremor.
Oct. 18	P	0 43+	..	..	..	..	48+	P not definite.
	PR_1	45 24						
	S	50 13						
	SR	52 55						
	L	55						
	M	56	18	2	2	2		

International Seismological Centre

Date.	Phase.	G.M.T.	Period.	Amplitude.			Δ	Remarks.
				N.	E.	Z.		
1931.		h. m. s.	sec.	mm.	mm.	mm.	deg.	
Oct. 18	i	4 33 54	..	..	..	..	..	May be P of distant shock. Local and distant shock superimposed.
	i	36 1						
	Pg	4 36 16	..	..	..	..	1·0	
	Sg	29	..	9	6	16		
	eL	4 43	12	4	12	4		
	M	45						
Oct. 18	eL	23 41	15					
Oct. 21	..	22 6	..	..	..	..	..	Local.
Oct. 22	..	1 33	..	..	..	..	..	Small, irregular movements.
Oct. 22	Pg	5 0 23	..	..	..	..	0·3	
	Sg	28						
Oct. 22	..	7 30	..	..	..	..	..	Small, irregular movements.
Oct. 23	..	5 39	..	..	..	..	..	Tremors.
Oct. 23	iP	11 50 14	..	..	..	..	22·1	Suva, Δ = 13°·8. Riverview, Δ = 21°·8. Epicentre: 20 S., 167 E.
	iS	54 11						
	L	57	15					
Oct. 23	..	12 20	..	..	..	..	..	Irregular local tremor.
Oct. 23	e	20 20 28						
	e	24						
	L	26						
	M	28	15	2	2			
Oct. 24	i	7 0 44	..	..	..	..	..	Small local shock.
Oct. 24	iP	11 35 16	..	..	..	..	27·0	Suva, Δ = 13°·5. Riverview, Δ = 22°·4. Epicentre: 16 S, 164 E.
	eS	39 56						
	iL	42						
	M_1	43	15	2	1			
	M_2	47	10	2	2			
Oct. 24	P	17 31 38	..	..	..	..	10·4±	P small and doubtful.
	S	33 42						
Oct. 25	..	14 22	..	..	..	..	..	Small local tremor.
Oct. 26	..	0 12	..	..	..	..	..	Small local tremor.
Oct. 26	..	19 51	..	..	..	..	..	Small local tremor.
Oct. 26	..	23 9	..	..	..	..	..	Small local tremor.
Oct. 27	P NZ	18 15 22	..	..	..	..	..	Confused record; phases not clearly defined.
	i	16 10						
	L	17 40	18					
Oct. 28	P	6 18 38	..	..	..	..	1·6	Christchurch, Δ = 1·5. R.-F. 4 at Murchison. Epicentre: 42 S., 173 E.
	S	56						
	Sg	19 9						
Oct. 30	Pg	0 27 50	..	..	..	..	0·8	
	Sg	28 1						
Nov. 2	e	1 17						
	L	21	15					
	e	27						

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Date.	Phase.	G.M.T.	Period.	Amplitude.			Δ	Remarks.
				N.	E.	Z.		
1931.		h. m. s.	sec.	mm.	mm.	mm.	deg.	
Nov. 2	P	10 15 35	..	..	..	..	80·0	
	S	25 39	15					
	SR_1	30 58	27					
	SR_2	34 55						
	L	43						
	M	48	20	2				
Nov. 2	e P (?)	17 10 40	..	..	..	..	44·4 (?)	Very small movement. Phases difficult to identify.
	i S (?)	17 15						
	SR_1	20 45						
	SR_2	22 45						
	L	26	18					
	M	35	12	4				
Nov. 2	..	22 43	..	..	..	..	..	Tremors.
Nov. 4	eL	18 37	..	..	..	..	..	Very small movements.
Nov. 4	..	19 30	..	..	..	..	..	Slight local shock.
Nov. 5	eL	7 37	20					
Nov. 6	..	21 18	..	..	..	..	..	Irregular tremors.
Nov. 7	P	0 5 7	..	..	..	..	2·2	R.-F. 5–6 at Murchison.
	S	32	..	2	2	2		
Nov. 8	..	10 47	..	..	..	..	..	Local tremors. Felt at Tuai and Wairoa. R.-F. 4.
Nov. 8	P	17 42 6	..	..	..	..	2·1	New Plymouth, Δ = 2°·5 (?). Felt in north-west portion of South Island. Maximum: R.-F. 6. Epicentre: 41 S., 172 E.
	Pq	9						
	S	30						
	S*	42	..	1	2			
Nov. 10	..	4 30	..	..	..	..	..	Irregular tremors. Records disturbed by high wind.
Nov. 10	..	10 38	..	..	..	..	..	Tremors. Felt in Otago and Southland. R.-F. 4.
Nov. 11	..	1 55	..	..	..	..	..	Small local tremors.
Nov. 11	i	3 50 14	..	..	..	..	..	Local tremor.
Nov. 11	P Z	4 0 56	..	..	..	..	..	Felt at Suva, Fiji. Poorly defined.
	i	6 25						
	i	7 0						
	SR_1(?)	10	16					
Nov. 11	Pg	17 26 23	..	..	..	..	1·0	
	Sg	37						
Nov. 12	P Z	16 23 26	..	..	..	..	23·1	Felt at Suva and Levuka, Fiji. Suva, Δ = 2°·4. Epicentre in vicinity of Fiji Islands.
	PR	24 56						
	S	27 32						
	L	32	15					
Nov. 13	..	17 35	..	..	..	..	..	Small local tremors.
Nov. 13	Pg	21 0 36	..	..	..	..	0·9	
	Sg	49						

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Date.	Phase.	G.M.T.	Period.	Amplitude. N.	Amplitude. E.	Amplitude. Z.	Δ	Remarks.
1931.		h. m. s.	sec.	mm.	mm.	mm.	deg.	
Nov. 14	L	5 44	..	..	..	..	..	Irregular movements.
Nov. 14	..	15 57	..	..	..	..	..	Local tremors.
Nov. 14	..	21 47	..	..	..	..	..	Local tremors.
Nov. 16	e N	9 28 0						
	i	30 22	..	..	..	..	..	May be S.
	L	36	10					
Nov. 16	..	18 40	..	..	..	..	..	Slight tremors. R.-F. 4 at Kahurangi Point.
Nov. 17	..	16 48	..	..	..	..	..	Local tremors.
Nov. 17	..	18 47	..	..	..	..	..	Local tremors.
Nov. 18	e Z	3 36 44						
	i	41 59	..	..	..	..	..	May be S.
	L	43						
	M	49	16	4	3	4		
Nov. 18	i	6 14 5	..	..	..	..	..	May be S of local shock.
Nov. 18	Pg	9 16 47	..	..	..	..	0·9	New Plymouth, Δ = 1°·8. Christchurch, Δ = 2°·9. Felt at Wellington and Nelson. R.-F. 3. Epicentre : 40·8 S., 173·8 E.
	i	50						
	i	54						
	Sg	59						
Nov. 18	..	9 26	..	..	..	..	..	Local tremor.
Nov. 18	P E	18 52 42	..	..	..	..	8·1	
	i	53 28						
	S	54 14						
Nov. 18	Pg	21 11 52	..	..	..	..	0·9	
	Sg	12 4						
Nov. 19	..	3 35	..	..	..	..	..	Small local tremor.
Nov. 20	P Z	14 23 2	..	..	..	..	33·8	Az. = N.W. Apia, Δ = 24°. Riverview, Δ = 25°·9. Melbourne, Δ = 30°·0. Epicentre : 11 S., 162 E.
	PR	24						
	S	28 30						
	L	32						
	M	33	20	3	2	4		
Nov. 21	P Z	6 47 34	..	..	..	..	19·7	
	S	51 8						
	L	53	15					
Nov. 21	P Z	12 27 19	..	..	..	..	20·4	
	S	31 0						
	L	33	15					
Nov. 21	P Z	17 11 20	..	..	..	..	20·5	Az. = N.W. Riverview, Δ = 26°·0. Epicentre : 21 S., 177 E.
	S E	14 56						
	S Z	15 2						
	L	17	14					
Nov. 21	L	23 44						
Nov. 22	..	10 35	..	..	..	..	..	Local tremor.

Date.	Phase.	G.M.T.	Period.	Amplitude.			Δ	Remarks.
				N.	E.	Z.		
1931.		h. m. s.	sec.	mm.	mm.	mm.	deg.	
Nov. 25	..	0 5	..	..	..	..	..	Local tremor.
Nov. 25	..	5 59	..	..	..	..	..	Local tremor.
Nov. 25	P	9 47 35	..	..	..	..	2·2	Az. = W.S.W. Takaka, Δ = 1·8; Az. = S.W. Glenmuick, Δ = 1°·6. Christchurch, Δ = 2°·1. New Plymouth, Δ = 3°·2. Felt entensively in central districts of New Zealand. Maximum: R.-F. 6. Epicentre: 41·7 S., 171·9 E.
	Pg	37						
	i	53						
	S	48 0						
	Sg	12						
	i	20	..	8	6+	11		
Nov. 25	..	16 16	..	..	..	..	..	Local tremors.
Nov. 26	i E	12 4 40						
	L	7	15					
Nov. 26	P N	12 35 27	..	..	..	..	30·7	Az. = N.W. Adelaide, Δ = 28°·3. Epicentre: 12 S., 156 E.
	S	40 34						
	L	41	17					
Nov. 28	..	3 50	..	..	..	..	..	Local tremor.
Nov. 28	P	16 55 42	..	..	..	..	3·2	Az. = S.E. Christchurch, Δ = 5·3. Epicentre: 41 S., 179 E.
	S	56 19						
Dec. 1	P Z	3 25 55	..	..	..	..	30·0	Az. = S.S.W.
	PR	27 12						
	S	30 57						
	L	35						
	M	37	10	2	3	5		
Dec. 1	P Z	18 15 38	..	..	..	..	..	Az. = S.S.W.
	PR	17 1						
	e	22	..	..	..	..	..	May be SR_1.
Dec. 2	..	7 38	..	..	..	..	..	Local tremor.
Dec. 3	P	9 45 9	..	..	..	..	2·4	R.-F. 3 at Murchison.
	S	36						
Dec. 3	e	12 52	..	..	..	..	..	Tremors.
Dec. 3	e	15 15	..	..	..	..	..	Tremors.
Dec. 4	..	19 57	..	..	..	..	..	Local tremors.
Dec. 5	Pg	3 5 52	..	..	..	..	0·4	
	Sg	58						
Dec. 6	P Z	4 10 50	..	..	..	..	27·3	
	S	15 32						
	L	17	15					
Dec. 7	..	5 19	..	..	..	..	..	Slight tremors.
Dec. 7	..	15 42	..	..	..	..	..	Slight tremors.
Dec. 7	P Z	18 57 16	..	..	..	..	24·6	Az. = S.S.W. Adelaide, Δ = 26°. Riverview, Δ = 27°·9. Epicentre: 60 S., 160 E.
	S	19 1 36						
	L	4						
Dec. 8	Pg	7 50 22	..	..	..	..	0·6	
	Sg	30						

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Date.	Phase.	G.M.T.	Period.	Amplitude. N.	Amplitude. E.	Amplitude. Z.	Δ	Remarks.
1931.		h. m. s.	sec.	mm.	mm.	mm.	deg.	
Dec. 8	i	22 18 8	..	..	..	..	..	Local tremor.
Dec. 10	i	2 14 5	..	..	..	..	..	Local tremor.
Dec. 10	e	8 8	..	..	..	..	..	Tremors.
Dec. 10	..	8 25	..	..	..	..	..	Local tremor.
Dec. 10	e	8 44 38						
Dec. 10	i	17 48 4	..	..	..	..	..	Local tremors.
Dec. 10	..	23 35	..	..	..	..	..	Slight tremors.
Dec. 11	e	5 25 54						
	L	28 28	7					
Dec. 11	e N	13 45 48						
	i	47 17	..	..	..	..	..	May be S.
	L	48	8					
Dec. 11	Pg	22 53 37	..	..	..	..	0·3	
	Sg	42						
Dec. 12	..	10 6	..	..	..	..	..	Slight local tremor.
Dec. 13	P	1 43 52	..	..	..	..	3·9	
	Pq	44 1						
	S	36						
	S* (?)	54						
	Sg	59	..	1	1			
Dec. 13	e	10 0 27	..	..	..	..	..	May be P.
	i	1 28						
	L	2	10					
Dec. 13	..	21 29	..	..	..	..	..	Slight tremors.
Dec. 15	P	10 6 2	..	..	..	..	1·8	R.-F. 3 at Kahurangi Point.
	i	6	..	..	..	..	..	May be Pg.
	S	22						
Dec. 15	P	10 25 26	..	..	..	..	2·5	
	S	55						
Dec. 15	i	10 31 42						
	i	32 30						
Dec. 15	e	11 43 40						
	i	46 36						
Dec. 15	P	19 13 24	..	..	..	..	2·0	Felt in north-west portion of South Island. R.-F. 3.
	Pg	39						
	S	47						
Dec. 18	P NE	10 18 5	..	..	..	..	8·0	
	S	19 35						
	L	20	10					
Dec. 18	i	14 19 55	..	..	..	..	..	May be Sg. Irregular local shock.
Dec. 18	P	19 18 4	..	..	..	..	3·2	
	S	41						

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Date.	Phase.	G..MT.	Period.	Amplitude.			Δ	Remarks.
				N.	E.	Z.		
1931.		h. m. s.	sec.	mm.	mm.	mm.	deg.	
Dec. 19	P	5 47 30	..	..	..	..	1·6	
	P*	35						
	Pg	40						
	S	48						
	S*	54						
Dec. 20	P Z	5 11 28	..	..	..	..	8·1	
	S	13 0						
	L	14		8				
Dec. 20	..	5 42		..	..	..	..	Local tremor.
Dec. 20	..	15 41		..	..	..	..	Local tremor.
Dec. 20	e	18 45		..	..	..	..	R.-F. 3 at Murchison.
Dec. 21	..	8 0		..	..	..	..	Tremors.
Dec. 21	i Z	10 20 10	..	..	..	..	..	May be S.
	L	28		15				
Dec. 21	..	16 5		..	..	..	..	Slight tremors.
Dec. 22	P	7 0 36	..	..	..	..	1·8	R.-F. 3 at Hokitika.
	S	56	..	2	..	2		
Dec. 23	P	4 7 8	..	..	..	..	1·8	R.-F. 5 at Taumarunui.
	S	28						
Dec. 23	L	21 30						
Dec. 24	Pg	14 17 46	..	..	..	..	0·8	
	Sg	57						
Dec. 25	..	2 58		..	..	..	..	Slight tremors.
Dec. 25	P Z	3 10 5	..	..	..	..	27·0	Melbourne, Δ = 14°·4 ? Adelaide, Δ = 17°. Riverview, Δ = 21°·1. Epicentre : 53 S., 140 E.
	S	14 45						
	L	16						
	M	17		16	3	3	6	
Dec. 25	..	18 8		..	..	..	..	Tremors.
Dec. 25	P	21 11 53	..	..	..	..	1·8	Az. = N.W. Christchurch, Δ = 3°·2. Felt at Nelson and Blenheim, R.-F. 4. Epicentre : 40·4 S., 172·7 E.
	Pg	12 11						
	S	14						
	Sg	30	..	4+	6+	4+	..	In time mark.
Dec. 26	..	15 26		..	..	..	..	Local tremor.
Dec. 27	P	6 28 44	..	..	..	..	1·8	
	S	29 5						
Dec. 27	..	12 16		..	..	..	..	Tremors.
Dec. 28	..	0 14		..	..	..	..	Local tremor.
Dec. 28	..	7 0		..	..	..	..	Local tremor.
Dec. 30	Pg	5 29 29	..	..	..	..	1·0	
	Sg	42						
Dec. 31	..	23 49		..	..	..	..	Local tremor.

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Suva, Fiji.

LATITUDE: 18° 9′ S. LONGITUDE: 178° 26′ E. HEIGHT ABOVE M.S.L. = 10 FT.

INSTRUMENT: Milne Twin-boom Horizontal Seismograph: Undamped.

CONSTANTS.

Component.	Date of Determination.	Pendulum Period.	Magnification.
		Sec.	
N.–S.	1931, November 14	9·2	6
E.–W.	1931, November 14	7·5	6

Observer: Miss MUNE, Telephone Exchange, Suva.

Date.	Phase.	G.M.T.			Amplitude. N.	Amplitude. E.	Δ	Remarks.
1931.		h.	m.	s.	mm.	mm.	deg.	
Oct. 3..	iP	19	17	0	..	..	22±	Very faint records. Large amplitudes.
	L (?)		22	48				
	W	21	30					
	M_1		32		4	2		
	M_2	22	8		2	3		
Oct. 3..	P	22	50	30	..	..	22·4	
	S		54	30				
	L		55	30				
	M	23	0		11+	11+		
Oct. 5..	e	3	14	0				
	i		15	25				
Oct. 5..	..	5	12		..	..	..	Faint tremors.
Oct. 6..	i	20	18	0	..	..	..	Tremors.
Oct. 7..	..	16	0		..	..	..	Tremors.
Oct. 10..	eP	0	24	12	..	..	21·1	
	iP		24	20				
	i		26	0				
	S		28	0				
	L		30					
	M_1		32		9	5		
	M_2		34		8	7		
	M_3		39		7	5		
Oct. 10..	i	3	0		..	..	..	Renewed movements till after 4 h.; may be W waves of shock at 0 h. 24 m.
Oct. 12..	e	0	43	(24)	..	..	..	Tremors.
Oct. 12..	i	3	3	(36)	..	..	..	Tremors.
Oct. 12..	e	10	21	(54)	..	..	..	Prolonged tremors.

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Date.	Phase.	G.M.T.	Amplitude. N.	Amplitude. E.	Δ	Remarks.
1931.		h. m. s.	mm.	mm.	deg.	
Oct. 12..	i	13 26 (42)				
Oct. 13..	e	2 34 0				
Oct. 13..	e_1	10 59 30				
	e_2	11 20 0				
	e_3	27 0				
Oct. 13..	e	20 15 10				
Oct. 15..	..	..	..	..	..	Microseisms.
Oct. 18..	P	0 42 (50)	..	..	29·0	
	i	46 20				
	S	47 45				
	SR_1	49 0				
	L	51 0				
	M	53	2	1		
Oct. 18..	P	4 33+				
	i	34 24				
	i	34 42	..	..	..	May be S.
	L	35 6				
	M	35+	2	2		
Oct. 22..	e	1 29 12				
Oct. 23..	P	11 47 0	..	..	13·8	
	S	49 33				
	L	50 24				
	M	51	2	2		
Oct. 23..	i	20 10 30				
	e	16 30				
Oct. 24..	P	11 33 0	..	..	13·5	
	S	35 30				
	M	37	2	2	..	Prolonged.
Oct. 26..	..	..	..	..	..	Microseisms.
Oct. 27..	e	18 15 27				
	i	22 30				
	M	25	1	1		
Nov. 2..	P	10 14 21	..	..	61·4	
	S	22 42				
	SR_1	27 36				
	L	33				
Nov. 2..	e	17 11 36				
	L	18				
Nov. 6..	i	21 5 30				
	L	6 36				
Nov. 9..	..	23 4	..	..	..	Tremors.
Nov. 11..	P	3 56 21	..	..	2·1	Felt at Suva.
	S	45				
	M	59	15+	9		
Nov. 11..	i	4 43 0				
	M	44	1	1		

International Seismological Centre

Date.	Phase.	G.M.T.	Amplitude. N.	Amplitude. E.	△	Remarks.
1931.		h. m. s.	mm.	mm.	deg.	
Nov. 11..	i	4 53 30				
	M	54	2	1		
Nov. 12..	P	16 17 45	..	..	2·4	Felt at Suva and Levuka, Fiji.
	S	18 12				
	i	19 36				
	M	20	5+	10		
Nov. 16..	P	9 20 0				
	e	22 6	..	..	..	May be S.
	L	23 30				
	M	24	2	1		
Nov. 18..	P	3 33 0	..	..	14·6	
	S	35 42				
	L	36 36				
	M	39	8	6		
Nov. 18..	..	11 35	..	..	..	Tremors.
Nov. 20..	i	14 20 42				
	M	21	2	1		
Nov. 21..	e	6 45 7	..	..	..	Prolonged tremors. Faint records.
Nov. 21..	..	12 27	..	..	..	Prolonged tremors. Faint records.
Nov. 21..	..	17 10	..	..	..	Tremors.
Nov. 25..	..	..	..	..	..	Heavy microseisms.
Nov. 26..	..	..	..	..	..	Heavy microseisms.
Nov. 27..	..	..	..	..	..	Microseisms.
Dec. 2..	..	..	..	..	..	Heavy microseisms.
Dec. 3..	..	..	..	..	..	Microseisms.
Dec. 6..	P	4 8 6	..	..	13·5 (?)	
	S	10 36	..	..	..	Doubtful.
Dec. 7..	P	5 17 0	..	..	5·8	
	S	18 6				
Dec. 8..	P	23 56 24	..	..	1·6	
	S	42				
	M	57	1	3		
Dec. 11..	..	5 32	..	..	..	Tremors.
Dec. 18..	e	10 24 30				
	M	26	1	1		
Dec. 21..	..	10 20	..	..	..	Tremors.
Dec. 24..	i	11 7 0	..	..	..	Small shock.
Dec. 27..	P	12 6 36	..	..	..	Shock not recorded on N.–S. component.
	S	7 12				
	Sg	48				
	M	..	..	..	..	Faint records; maximum phases not readable.

International Seismological Centre

Arapuni.

LATITUDE: 38° 5′ S. LONGITUDE: 175° 39′ E.

INSTRUMENT: Milne Horizontal Seismograph; undamped. E.–W. component.

CONSTANTS.

Date of Determination.	Pendulum Period.	Magnification.
	Sec.	
1931, November 15th ..	20	5·6

Observer: DISTRICT ENGINEER, Public Works Department, Arapuni.

Date.	Phase.	G.M.T.	Amplitude.	Δ	Remarks.
1931.		h. m. s.	mm.	deg.	
Oct. 3..	P	19 19 48	..	29·7	
	S	24 40			
	L	27			
	M	27+	35+	..	Boom swinging against stops.
Oct. 3..	i	19 59+	..	..	Renewed movements.
Oct. 3..	e	21 20+			
	M	35	3		
Oct. 3..	S	22 59 0	..	24±	
	L	23 1 30			
	M	4	12		
Oct. 3..	e	22 4+			
	M	13	3		
Oct. 6..	..	18	..	..	Slight tremors.
Oct. 10..	eP	0 27 0	..	34·2	
	PR_1	28 0			
	S	32 30			
	SR_1	34 27			
	L	36 30			
	M	37	9+		
Oct. 10..	M	1 26	4	..	Tremors.
Oct. 10..	M	1 48	4	..	Tremors.
Oct. 10..	e	2 32 24			
	M	35	2		
Oct. 10..	e	3 5 42			
	M	13	2	..	May be W waves of shock at 0 h. 27 m.
Oct. 12..	e	3 14			
Oct. 12..	..	11 30	..	..	Tremors.

International Seismological Centre

Date.	Phase.	G.M.T.	Amplitude.	Δ	Remarks.
1931.		h. m. s.	mm.	deg.	
Oct. 18..	e	0 50 36	..	..	May be S.
	L	54 0			
	M	55	2		
Oct. 23..	e	20 14	..	..	Record disturbed by microseisms.
Oct. 24..	..	..	..	..	Record disturbed by heavy microseisms.
Nov. 2..	e	7 0 35			
Nov. 2..	S	10 25 50	..	76	
	SR_1	34			
	L	40			
	M	..			
Nov. 2..	iS	17 17 30	..	43	
	eSR_1	20 36			
	L	24			
	M	26	3		
Nov. 11..	S	4 5			
Nov. 18..	e	3 40 24			
	iS (?)	42 0			
Nov. 20..	S	14 28 25	..	24+	
	L	31			
	M	33	4		
Nov. 21..	iS	6 51 32	..	..	Small.
Nov. 21..	iS	12 31 12	..	..	Small.
Nov. 21..	e	17 14 0			
	iS	15 15	..	..	Small.
Nov. 26..	L	12 8			
Nov. 26..	L	12 43			
Dec. 1..	i	3 32 0			
	iL	34			
Dec. 6..	iS	4 14 25	..	25	
	L	17			
Dec. 7..	L	19 6			
Dec. 11..	i	5 26 18			
Dec. 11..	i	13 46 0			
Dec. 13..	e	9 59 48			
Dec. 18..	iS	10 18 33			
	e	31			
Dec. 25..	L	3 17 —	..	..	No minute marks.
	M	19			
Dec. 27..	..	12 18 —	..	..	Tremors. No minute marks.

International Seismological Centre

Takaka.

LATITUDE : 40° 51′ S. LONGITUDE : 170° 48′ E.

INSTRUMENT : Imamura Strong-motion Seismograph : Three components ; oil damping.

CONSTANTS.

Component.	Free Pendulum Period.	Damping Ratio.	Date of Determination of Damping.	Magnification.
	Secs.			
N	10	9 : 1	1931, Nov. 23	2
E	10	8 : 1	1931, Nov. 23	2
Z	4	1·25 : 1	1931, Nov. 23	2

NOTE.—The values for pendulum periods, and the magnifications, are those supplied by the makers.

Observer : Mr. W. J. SMITH, Postmaster, Takaka.

Date.	Phase.	G.M.T.	Period.	Amplitude. N.	Amplitude. E.	Amplitude. Z.	Δ	Remarks.
1931.		h. m. s.	secs.	mm.	mm.	mm.	deg.	
Oct. 3	L	19+	11	..	..	..	..	Small amplitudes.
Oct. 6	Pg	11 4 (0)						
	Sg	4 1	..	2	1	<1	0·1	
Oct. 12	..	21 0	..	..	..	..	..	Small local shock.
Oct. 12	..	21 6	..	..	..	..	..	Small local shock.
Oct. 14	..	2 0	..	..	..	..	..	Small local shock.
Oct. 18	..	4 30	..	..	..	..	..	Local shock.
Oct. 30–Nov. 19	..	..	..	..	..	..	..	Seismograph out of action, owing to breakdown of driving clock.
Nov. 25	Pg	9 47 (0)		..	..	..	1·0	Az. = S.W.
	Sg		13					
	M		14	..	2	1	<1	
Dec. 15	..	10 6	..	..	..	..	..	Small local shock.
Dec. 15	..	19 13	..	..	..	..	..	Small local shock.
Dec. 27	Sg (?)	6 28	..	..	..	..	..	Local shock.

International Seismological Centre

Hastings.

LATITUDE: 39° 38′ S. LONGITUDE: 176° 53′ E.

INSTRUMENT: Milne-Jaggar Seismograph.

Observer: Mr. HENRY DE DENNE, 304 South Nelson Street, Hastings.

NOTE.—A number of small, unimportant tremors have been omitted from this report.

Date.	Phase.	G.M.T.	Amplitude.	Δ	Remarks.
1931.		h. m. s.	mm.	deg.	
Oct. 1..	Pg	10 2 (0)	..	0·3	
	Sg	4			
	M_1	4	11		
	M_2	11	9		
Oct. 4..	P	6 10 (0)	..	1·8 (?)	
	S (?)	21	..	..	Small amplitude; prolonged shock.
Oct. 5..	Pg	7 49 (0)	..	1·1 (?)	
	i	11			
	Sg (?)	16			
	M	18	6		
Oct. 8..	Pg	22 10 (0)	..	0·4	
	Sg	6			
	M	6	2		
Nov. 8..	Pg	10 47 (0)	..	0·4	
	Sg	6			
	M	6	1		
Nov. 11..	Pg	2 25 (0)	..	0·3	
	Sg	4			
	M	9	2		
Dec. 2..	Pg	7 37 (0)	..	0·8	
	Sg	11			
	M	19	2		
Dec. 11..	Pg	2 39 (30)	..	0·2	
	Sg	33			
	M	34	4		

New Plymouth.

International Seismological Centre

Latitude: 39° 4′ S. Longitude: 174° 4′ E. Height above M.S.L. = 112 ft.

Instrument: Wood-Anderson Short-period Seismograph: Magnetic damping.

Observer: Mr. H. W. Todd, Warder, the Prison, New Plymouth.

Date.	Phase.	G.M.T.	Period.	Amplitude.	Δ	Remarks.
1931.		h. m. s.	secs.	mm.	deg.	
Oct. 1..	..	13 0	..	..	..	Tremors.
Oct. 3..	P	19 19 (53)	..	..	31·9	
	S	25 8				
	L	30	15	..	..	Small amplitudes.
Oct. 4..	..	6 20	..	..	..	Slight confused tremors.
Oct. 5..	P	7 16 54	..	..	2·5	
	S	17 23				
	i	34	..	..	..	May be Sg.
Oct. 10..	..	0 30+	..	..	..	Tremors.
	L	40	15	..	..	Solomon Islands.
Oct. 16..	P	23 3 (14)	..	..	1·2	
	S	28				
	M	29	..	3		
Oct. 18..	i	4 34 (37)	..	..	..	Confused shock.
	i	37 4				
Nov. 7..	P	0 5 19	..	..	3·0 (?)	P small and indistinct.
	P*	29				
	S	53				
	M	6 10	..	2		
Nov. 8..	P	17 42 16	..	..	2·5 (?)	P not clear.
	P*	29				
	S	45				
	S*	57				
	M	59	..	3		
Nov. 13..	..	23 2	..	..	..	Slight tremors.
Nov. 15..	P	9 4 48	..	..	1·6	
	S	5 6				
	M	10	..	4		
Nov. 18..	Pg	6 14 37	..	..	1·1	
	Sg	52				
	M	53	..	11		
Nov. 18..	P	9 17 4	..	..	1·8	
	S	25	..	..	..	Small amplitudes.
Nov. 20..	Pg	12 32 7	..	..	0·4	Felt locally, R.-F. 4–5.
	Sg	12				
	M	15	..	15+		
Nov. 25..	P	9 47 52	..	..	3·2	
	Pg	48 5				
	Ps	12				
	i	19				
	S	29				
	Sg	46				
	Ss (?)	49				
	M	50	..	4		

International Seismological Centre

Christchurch (Magnetic Observatory).

LATITUDE: 43° 32′ S. LONGITUDE: 172° 37′ E.

INSTRUMENT: Wood-Anderson Short-period Seismograph: Magnetic damping.

OBSERVER: The Director, Magnetic Observatory, Christchurch.

Date.	Phase.	G.M.T.	Δ	Remarks.
1931.		h. m. s.	deg.	
Oct. 3	P	19 20 4	37·6	
	eS	25 56		
	L	30 3±		
	M	37 25		
Oct. 3	P	3 41 24	6·3	
	S	42 35		
Oct. 10	P	0 26 56	38±	
	PR_1	27 57		
	eS	32 50±	..	Not well defined.
	L	38		
Oct. 17	P	5 16 (16)	2·0	
	S	39		
Oct. 18	P	20 9 29	2·4	
	S	56		
Oct. 18	e	4 34 24	..	May be P of a remote quake.
Oct. 18	Pg	4 37 20	0·7	
	Sg	29		
Oct. 21	P	22 4 48	3·5 (?)	
	i	5 6		
	S (?)	28		
Oct. 24	i	17 33 45	..	May be S.
Oct. 26	Pg	4 20 15	..	Very local.
Oct. 28	P	6 18 36	1·5	
	S	53		
Nov. 7	P	0 5 10	1·7	
	Pg	20		
	S	29		
	S*	38		
Nov. 9	..	10 12	..	Small shock; partly obliterated by hour-mark.
Nov. 10	P	10 38 13	3·9	
	i	49		
	i	53		
	S	57		
	S* (?)	39 7		
Nov. 14	Pg	10 30 10	0·7	Felt locally.
	Sg	20		

International Seismological Centre

Date.	Phase.	G.M.T.	Δ	Remarks.
1931.		h. m. s.	deg.	
Nov. 18	..	6 15	..	Local shock.
Nov. 18	P	9 17 3	2·9	
	S	36		
Nov. 25	P	9 47 41		
	Pg	51	2·1	
	S	48 5		
	Sg	19		
Nov. 28	P	16 56 20	5·3	
	S	57 20		
Nov. 28	Pg	21 18 3	0·9	
	Sg	15		
Dec. 3	P	7 56 9	3·1	
	Pg	33		
	S	44		
Dec. 3	P	9 48 44	7·9	
	S	50 13		
	S*	43		
Dec. 6	P	3 43 5	3·1 (?)	
	i	22		
	S (?)	40		
Dec. 12	..	17 38	..	Tremors.
Dec. 18	P	10 19 1	10·5 (?)	
	S (?)	20 59		
Dec. 18	..	13 20	..	Confused shock.
Dec. 18	..	17 18	..	Confused tremors.
Dec. 22	P	7 0 23	1·9 (?)	
	S (?)	45		
Dec. 25	P	21 12 15	3·2	
	S	52		

G. H. Loney, Government Printer, Wellington.

[200/5/33—86