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REGISTRATION OF EARTHQUAKES  
AT  
WICHITA MOUNTAINS SEISMOLOGICAL OBSERVATORY  
FORT SILL, OKLAHOMA, U.S.A.

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Operated under the Technical Supervision of the  
Air Force Technical Applications Center (AFTAC)

by

The Geotechnical Corporation  
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Advanced Research Projects Agency (ARPA)  
Department of Defense  
United States Government

THE REGISTRATION OF EARTHQUAKES  
 AT THE  
WICHITA MOUNTAINS SEISMOLOGICAL OBSERVATORY

STATION

STATION ABBREVIATION:	WMSO
STATION IDENTIFICATION ON FILM SEISMOGRAMS:	α **
GEOGRAPHICAL LOCATION *: (Vault No. 6)	34° 43' 05.3" N. Latitude 98° 35' 20.7" W. Longitude
GEOCENTRIC LOCATION *: (Vault No. 6)	34° 32' 09.8" N. Latitude 98° 35' 20.7" W. Longitude
ALTITUDE (Meters) *: (Vault No. 6)	505 meters (1658 feet)
GEOLOGY:	The station is located on the Carlton (porphyritic) granophyre of the Wichita Mountains of Oklahoma.

Noise Level: The periods of the predominant microseisms at WMSO are 0.5 second and 6 seconds. Amplitude distribution curves for the 0.5-second microseisms are shown on page 2 as true ground motion in millimicrons and as trace amplitude in millimeters at the operating gain of 500K. Both curves are 1/2 peak-to-peak.

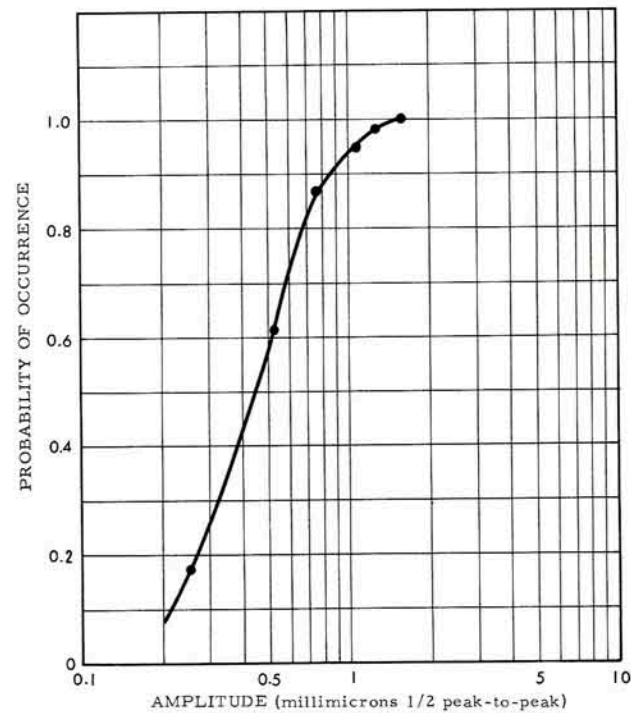
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\* The coordinates refer to the location of vault No. 6 which houses the 3-component groups of short-period and intermediate-band seismometers from which arrival times are determined.

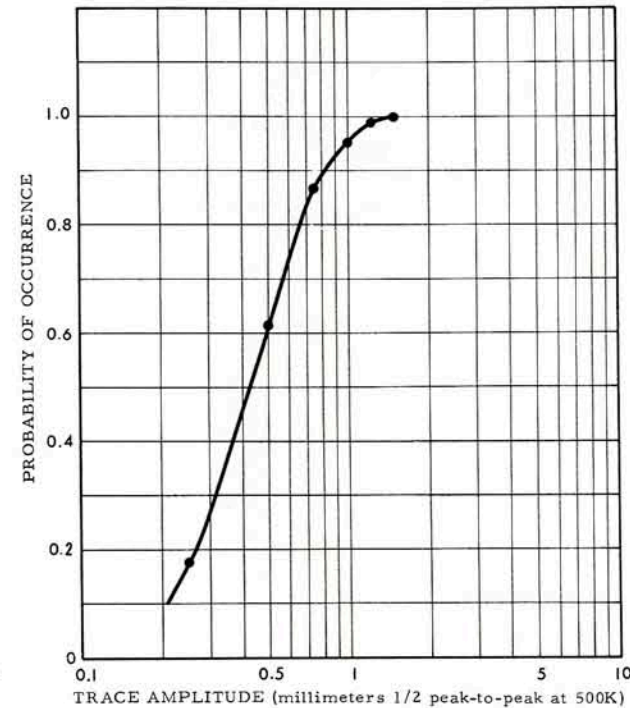
\*\* WMO after 27 November 1962.



SEISMOGRAPHS



Probability of predominant 0.5-sec microseisms occurring at or less than a given amplitude at unity magnification\*



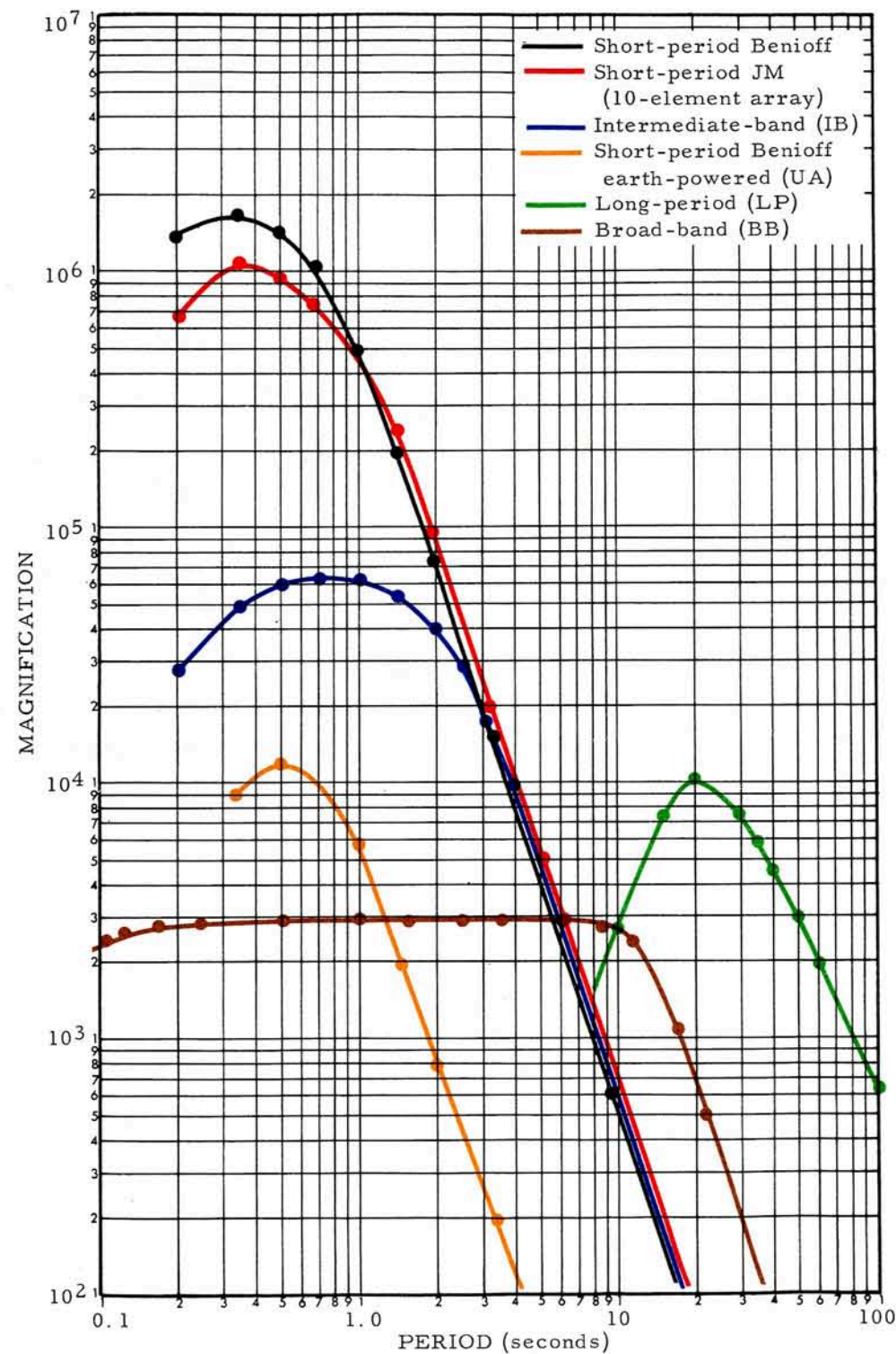
Probability of predominant 0.5-sec microseisms occurring at or less than a given trace amplitude in millimeters at operating gain of 500K\*

	$T_s$	$\lambda_s$	$T_g$	$\lambda_g$	$\sigma^2$
SP Vertical Johnson-Matheson	1.25	0.50	0.32	0.64	0.014
SP Vertical Benioff	1.0	1.0	0.2	1.0	0.01
SP Horizontal Benioff	1.0	1.0	0.2	1.0	0.01
UA SP Vertical Benioff, earth-powered	1.0	0.5	0.0625		0.2
IB Vertical Melton	2.5	0.65	0.64	1.5	0.002
IB Horizontal Sprengnether	2.5	0.65	0.64	1.5	0.0005
BB Vertical Press-Ewing	12.5	0.4	0.64	9.0	0.0002
BB Horizontal Sprengnether	12.5	0.4	0.64	9.0	0.0004
LP Vertical Sprengnether	20.0	0.7	30	1.0	0.004
LP Horizontal Sprengnether	20.0	0.7	30	1.0	0.004

- SP = Short Period
- UA = Un-amplified (SP Vertical Benioff, earth-powered)
- IB = Intermediate Band
- BB = Broad Band
- LP = Long Period
- $T_s$  = Free period of seismometer in secs.
- $\lambda_s$  = Damping constant of seismometer
- $T_g$  = Free period of galvanometer in secs.
- $\lambda_g$  = Damping constant of galvanometer
- $\sigma^2$  = Coupling coefficient

NOTE: Response curves are on page 4.

INTERPRETATION OF SYMBOLS



Response characteristics of seismographs

1. Earthquakes Listed

All local (L), near-regional (NR), regional (R), and distant earthquakes (T) are tabulated on the following pages.

2. System

In the column headed "Syst." (system), the seismograph (SP, UA, IB, BB, or LP) and component (Z, N, or E) used to measure arrival time are designated. When no component designation appears, the phase is read from the vertical component. When neither system nor component designation appears, the phase is read from the SP vertical component.

3. Phase

- a. An "i" (impetus) preceding a phase designates sudden beginning of the motion. (A designation of "i" in the case of initial P motion indicates a signal-to-noise ratio exceeding about 5/1.)
- b. An "e" (emersio) designates gradual beginning.
- c. An "i" or "e" alone designates an unidentified phase.
- d. The ( ) (parenthesis marks) indicate uncertainty.

4. Time

- a. Date and arrival time are given in Greenwich Civil Time (G.C.T.).
- b. The arrival time is reported as the earliest time on Z, N, or E. Single Z rather than the array summation ( $\Sigma$ ) is used for measuring arrival times on the SP seismographs.

5. Ground Motion

- a. In the columns headed "A" and "T" are tabulated earth displacement in millimicrons and period in seconds, respectively. An amplitude of 999 indicates that a signal cannot be measured reliably. A "c" or "d" in the "A" column indicates compression or dilation, respectively, of the ground as indicated by the vertical component instrument.

The value of "A" for P phases is the maximum amplitude in the first ten seconds. All amplitudes are 1/2 peak to peak amplitudes.

- b. Trace amplitudes are measured to the nearest 1/2 millimeter at X10 view.



6. Direction

In the column headed "Dir." (direction), the direction of the epicenter as viewed from WMSO is indicated. For teleseisms, direction is obtained only from P and Rayleigh waves and is listed opposite the phase from which it is obtained. For close events, direction may be obtained from P-wave step-out shown on the individual short-period vertical traces.

7. Type

Earthquakes are identified as either:

- L (local) - - - - - 0-1.4°
- NR (near-regional) - - - - - 1.4-6.0°
- R (regional) - - - - - 6-16°
- T (teleseismic) - - - - - 16-180°

8. Magnitude Column

Magnitudes of earthquakes, as calculated from WMSO seismograms, are reported for all events for which sufficient epicentral information is available, and for which adequate data are available from the WMSO records.

- m - - - - - Unified Magnitude - calculated from maximum amplitude and predominant period of P wave.
- M - - - - - Surface Wave Magnitude - calculated from maximum amplitudes of surface waves in the period range 17-23 seconds (reported when P was not recorded or cannot be measured reliably).

No station correction factor has been determined for WMSO to date.

9. Remarks Column

a. Magnitudes, as obtained from the U. S. Coast & Geodetic Survey Preliminary Determination of Epicenter cards, are reported for events recorded at WMSO. The designations for the U. S. Coast & Geodetic Survey stations which report magnitudes are:

- B - Berkley
- PL - Palisades
- PS - Pasadena
- CGS - U. S. Coast and Geodetic Survey

b. Epicentral locations, time of origins, and depth of foci are obtained from the U. S. Coast & Geodetic Survey Preliminary Determination of Epicenters cards.

c. The nature of the surface waves is indicated subjectively.

d. Epicentral locations and distances reported by the station are accompanied by an indication of the phases used to determine epicentral distance, e. g.,  $\Delta(S-P) = 6^\circ$ , Central Colorado.

e. Operational notes refer to operational difficulties that affect analysis of data.

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.	C.	T.	A	T			m	M	
1963			h.	m.	s.							
01 Jan		eP	04	12	17.9	20	0.8		T	4.9		Colombia
		epP			53.1		1.1					6.9 N 73.1 W
		e		13	14.1		1.2					h about 151 km
		e(PP)			48.9		1.2					O = 04 05 27.5
		e(PcP)		14	41.6		0.5					$\Delta = 36^\circ$
		e		16	42.6		1.0					
		e		18	12.7		0.7					
01 Jan	N	eSur	05	30	57.5		1.1		(R)			
01 Jan		e	05	48	02.6		1.0		(R)			
	N	eSur		50	32.2		0.7					
01 Jan		eP	08	57	51.7	1	0.8		T			
		e			57.3		0.9					
01 Jan		eP'	12	35	33.0	4	1.1		T	5.3		Solomon Islands
												6.8 S 155.9 E
												h about 165 km
												O = 12 17 38.6
												$\Delta = 106^\circ$
01 Jan		eP	12	57	14.9	6	1.0		T	4.2		Colombia
		ePP		58	31.7		1.1					7.4 N 74.1 W
												h about 33 km
												O = 12 50 21.7
												$\Delta = 35^\circ$
												Medium surface waves on LP
01 Jan	LPZ	eP	14	01	42.2	2	0.7		T	4.8		Mariana Islands
		eSur		34	50							20.8 N 144.6 E
												h about 43 km
												O = 13 48 06.5
												$\Delta = 98^\circ$
												Medium surface waves on LP
01 Jan		eP	15	55	14.9	1	0.5		T			
01 Jan		eP	16	40	28.5	18	0.9		T	5.2		Tonga Islands
		e			36.9		1.5					20.0 S 175.4 W
		epP		41	00.6		1.1					h about 130 km
		e			14.0		0.9					O = 16 27 38.1
		ePKKP		57	54.7		0.9					$\Delta = 90.5^\circ$
		e		58	31.5		1.0					
01 Jan		eP' <sub>1</sub>	19	56	02.2	10	1.1		T			Indian Ocean
		e			25.1		1.8					40.2 S 81.3 E
		e			53.9		1.1					h about 33 km
		eP' <sub>2</sub>		57	32.6		1.0					O = 19 35 55.1
		e			43.7		1.0					$\Delta = 175^\circ$
		e		58	01.1		1.1					Strong surface waves, Rayleigh type, on LP.
		e			41.1		1.4					

(continued on next page)





DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
			h.	m.	s.							
1963												
02 Jan		eP'	15	15	00.9	4	0.9		T			Near south coast of western New Guinea
		e			40.5		1.1					4.1 S 135.2 E
		ePP	16	37.4			1.6					h about 33 km
		e			57.6		1.6					O = 14 56 05.4
		e	17	28.5			1.3					$\Delta = 122^\circ$
		e			38.8		1.6					Strong surface waves on LP
		ePKKP <sub>1</sub>	25	01.5			1.1					
		ePKKP <sub>2</sub>			38.0		1.1					
	LP	eSur	53	28								
	LP	eSur	56	50						5.4		
02 Jan		eP	15	45	28.1	10	1.5		T			
02 Jan		eP	16	08	40.0	121	2.2		T	5.8		South Pacific Ocean
		e			49.8		1.6					52.9 S 118.2 W
		e	09	22.7			2.0					h about 30 km
	LPE	e	28	55			20.0					O = 15 55 47.9
	LPE	e	32	35			24.0					$\Delta = 90^\circ$
	LPE	e			43		32.0					Strong surface waves, Love and Rayleigh type, on LP
	LPE	eSur	34	06								
	LP	eSur	40	10								
02 Jan		eP	16	23	29.1	5	0.9		T			
		e			37.2		1.0					
		e			46.1		0.8					
02 Jan	E	eP	17	12	14.5	1	0.2		L			$\Delta (S-P) = 0.3^\circ$
		eS			21.0		0.5					
		eSur			41.8		0.6					
02 Jan		iP	17	44	36.3	c 13	0.5		L			$\Delta (S-P) = \text{less than } 0.1^\circ$
		eS			38.0	999						
02 Jan		eP	18	08	16.2	3	0.4	SE	NR			$\Delta (S-P) = 1.7^\circ$
		e			25.8		0.4					
		eS			37.9	999						
02 Jan	E	eP	20	58	00.3	2	0.6		NR			$\Delta (S-P) = 2.4^\circ$
		eS			31.6		0.6					
02 Jan		eP	21	02	02.1	2	0.7		T			
02 Jan	E	eP	21	30	31.1	2	0.5		NR			$\Delta (S-P) = 2.8^\circ$
		eS			31	06.2	0.5					
	E	eSur			11.5		0.5					
02 Jan		eP	21	46	04.1	15	0.8	SE	T			$[\Delta (PcP-P) = 35.5^\circ]$
		e			16.8		0.9					
		e			33.2		1.5					
		e			46.7		1.0					
		e	47	01.5			1.5					
		e			43.8		1.0					
		e(PcP)	48	33.6			0.6					

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
			h.	m.	s.							
1963												
02 Jan		eP	23	54	23.4	2	0.4		NR			$\Delta (S-P) = 4.3^\circ$
	E	eS			55	16.6	0.7					
03 Jan		eP	01	11	57.7	6	1.3		T			
03 Jan		eP	03	19	02.5	3	1.2		T	4.7		Ryukyu Islands
		e			14.2		1.2					29.7 N 130.1 E
		e			51.0		0.9					h about 33 km
		ePP	22	59.9			1.2					O = 03 05 03.5
		e	24	04.2			1.2					$\Delta = 100.5^\circ$
	LP	eSPP	32	18			20.0					Medium surface waves
		e	35	35.2			1.0					Rayleigh type, on LP.
	LPN	eSS	37	35			18.0					
	LP	e	39	29			19.0					
	LP	eSur	53	41								
03 Jan		eP	03	24	15.7	3	1.0		T			
		e			26.3		1.5					
03 Jan	LP	eSur	07	24	08				T	4.5		Santa Cruz Islands
												12.9 S 166.0 E
												h about 74 km
												O = 06 35 28.2
												$\Delta = 105.5^\circ$
												Weak surface waves
												Rayleigh type, on LP.
03 Jan		eP	08	19	08.3	4	1.1		T			
		e			21	18.5	1.1					
03 Jan		eP	09	54	09.4	2	0.8		T			Mag. 5-1/4 (PL)
		e			43.0		1.1					New Britain
		eP'	58	10.2		6	1.3					5.3 S 151.5 E
		e			24.0		1.2					h about 74 km
		ePP			49.5		1.5					O = 09 39 46.8
		e	59	13.6			1.1					$\Delta = 110^\circ$
		e			22.2		0.9					Strong surface waves, Love and Rayleigh type, on LP. Initial arrival is P diffracted.
		e			45.8		2.1					
		e	10	00	32.4		1.1					
		e			54.1		1.5					
	LPE	ePS	08	12			17.0					
	LPE	e	09	33			23.0					
		ePKKP <sub>1</sub>			27.2		1.1					
		ePKKP <sub>2</sub>			41.8		1.5					
		e	11	10.7			1.2					
		e			40.5		1.1					
	LPN	eSur	25	58								
	LP	eSur	30	28								5.0
03 Jan		eP	13	30	30.8	10	1.2	S	T			
		e			40.0		1.4					
03 Jan		eP	19	10	31.6	6	1.2		T			
		e			11	46.9	1.0					

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.	C.	T.	A	T			m	M	
1963			h.	m.	s.							
03 Jan		eP	22	04	27.4	2	0.3		R			
		e			55.8		0.5					
	E	eSur	06	22.6		999						
04 Jan		eP	00	00	38.8	3	0.3	SE	NR			
		e			48.9		0.4					
		eS	01	00.7		999						
04 Jan		eP	00	35	25.5	34	1.6		T	5.0	1500 km south of Cape Verde Islands	
		e			32.3		2.3				1.2 N 27.7 W	
		e			38.1		1.8				h about 33 km	
		e			45.1		1.3				O = 00 23 55.1	
		e	36	09.3			1.9				$\Delta = 74^\circ$	
		e	37	09.9			1.1				Strong surface waves, Love and Rayleigh type, on LP	
		ePP	38	13.5			1.8					
	LPN	eS	44	58			14.0					
	LPN	eSS	50	06			20.0					
	LPN	e	53	22			22.0					
	LPN	eSur	55	33								
	LP	eSur	59	00								
	LP	eP'P'	01	02	57.4		1.6					
04 Jan		eP	00	58	24.3	3	1.0		T			
		e			31.6		1.0					
04 Jan		eP	02	03	26.7	4	1.0		T			
04 Jan		eP	03	15	51.9	4	1.1		R			
	E	eSur	19	59.3			1.1					
04 Jan		eP	05	55	52.1	12	1.3		T	5.2	Bonin Islands region	
		e			56 01.4		1.2				29.7 N 142.2 E	
		e			09.4		1.8				h about 33 km	
		e			35.0		1.6				O = 05 42 35.3	
		e			52.8		1.6				$\Delta = 94^\circ$	
		e	57	05.6			1.0				Medium surface waves, Love and Rayleigh type, on LP	
	LPN	ePS	06	08	39		18.0					
	LPN	eSur	23	58								
	LP	eSur	31	07								
04 Jan		eP	06	10	02.6	4	1.1		T			
04 Jan		eP	12	24	34.7	4	1.1		T		Phase at 12 26 00.5 is possible new event.	
		e			25 21.7		0.6					
		e			26 00.5		0.7					
04 Jan		e	12	35	26.6		1.1		T		Solomon Islands region	
		e			36 54.2		1.1				4.7 S 154.0 E	
	LPE	e			41 27		22.0				h about 69 km	
	LP	e			44 33		20.0				O = 12 16 38.0	
	LPN	e			45 52		20.0				$\Delta = 106^\circ$	
		e			46 34.3		1.0				Strong surface waves, Love and Rayleigh type, on LP.	
	LP	e			48 31		18.0					
	LPN	eSur	13	02	56							
	LP	eSur	06	33						5.2	Phase at 12 44 33 is possible new event.	

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.	C.	T.	A	T			m	M	
1963			h.	m.	s.							
04 Jan		eP	13	45	53.1	5	1.0	E	T		Medium surface waves on LP	
		e			59.9		1.2					
	LP	eSur	14	02	13							
04 Jan		eP	14	30	55.0	12	0.9		T			
04 Jan		eP	18	03	49.6	2	0.8		T			
04 Jan		eP	18	17	53.0	25	0.5		L		$\Delta (S-P) = \text{less than } 0.1^\circ$	
		eS			54.5	999						
04 Jan		eP	18	27	20.8	17	1.6		T			
		e			36.9		1.0					
04 Jan		eP	21	23	59.6	8	0.9		T	4.4	Colombia	
		e			24 05.0		0.7				6.9 N 73.1 W	
		epP			35.3		0.9				h about 160 km	
		e			57.2		1.3				O = 21 17 10.0	
											$\Delta = 36.5^\circ$	
04 Jan		eP	22	02	43.0	1	0.4		NR		$\Delta (S-P) = 3.3^\circ$	
	E	eS			03 23.2		0.5					
	E	eSur			40.5		0.7					
04 Jan		iP	22	06	58.8	c 20	0.6	NE	L		$\Delta (S-P) = \text{less than } 0.1^\circ$	
		eS			07 00.9	999						
04 Jan	LP	eSur	23	14	18				T		Weak surface waves on LP	
04 Jan		eP	23	59	49.9	9	1.5		T			
		e			57.7		1.0					
05 Jan		eP	00	01	56.6	6	0.7		T	4.7	Kurile Islands	
		e			02 17.6		1.1				46.5 N 153.7 E	
											h about 33 km	
											O = 23 50 09.1	
											$\Delta = 76^\circ$	
05 Jan		eP	00	39	31.4	5	1.1		T			
05 Jan		eP	00	40	32.1	10	0.8	SW	T			
		e			39.8		0.5					
		e			48.6		1.1					
05 Jan		eP	00	46	51.9	3	1.1		T			
05 Jan		eP'	03	52	18.5	2	0.8		T		Sangihe Islands	
											3.4 N 125.3 E	
											h about 126 km	
											O = 03 33 33.5	
											$\Delta = 124.5^\circ$	





DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
			h.	m.	s.							
(continued from preceding page)												
1963		e			40.7							
	LPN	eS	31	08			1.5					
	LPN	e			55		19.0					
	LPN	e	33	24			17.0					
	LPE	e(Sur)	34	07			19.0					
	LPE	e	35	21								
	LP	eSur	37	00			19.0					
06 Jan		iP	07	02	24.5	c 12	0.4		L		$\Delta$ (S-P) = less than 0.1°	
		eS			25.6	999						
06 Jan		eP	07	41	39.7	10	1.4		T	4.6	Kurile Islands	
		e			51.6		1.1				46.8 N 153.6 E	
		e	42	01.8			0.9				h about 33 km	
											O = 07 29 54.3	
											$\Delta = 76^\circ$	
06 Jan		eP	08	17	05.3	2	0.7		T	4.4	Near south coast of	
		e			18.9		0.8				Hokkaido, Japan	
											41.7 N 142.4 E	
											h about 57 km	
											O = 08 04 31.4	
											$\Delta = 86^\circ$	
06 Jan		eP	09	38	20.3	5	1.3		T			
06 Jan		eP	10	02	17.4	5	1.0		R			
		e			30.7		0.5					
		e			45.4		0.8					
		eSur	04	18		999						
06 Jan		eP	10	15	23.0	2	0.5		T			
06 Jan		eP	12	15	02.2	4	1.2		T			
06 Jan		eP	17	33	41.2	21	1.0		T	4.8	Central Alaska	
		epP			34 07.6		1.2				62.7 N 151.1 W	
		e(PP)			35 26.5		0.9				h about 116 km	
		e			56.2		0.8				O = 17 25 53.8	
		eScP			39 11.6		1.0				$\Delta = 42.5^\circ$	
06 Jan		eP	17	46	59.1	3	1.1		T			
06 Jan		eP	18	11	08.4	5	1.1		R	4.2	Montana-Idaho border	
		e			17.6		1.1				44.7 N 112.0 W	
		e			32.6		0.9				h about 33 km	
		e	12	15.6			0.8				O = 18 07 47.8	
		e			30.8		1.1				$\Delta = 14^\circ$	
		e	13	55.8			1.1				Strong surface waves	
	E	eSur	15	10.9			1.6				on SP. Weak on LP.	
	LPN	eSur			37							
06 Jan		eP	18	45	17.1	4	1.0		T		Phase at 18 48 59.9 is	
		e			23.6		1.0				possible new event	
		e			48 59.9		1.2					

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
			h.	m.	s.							
(continued on next page)												
1963		eP'	20	06	13.2	4	1.0		T		Near Flores Islands	
06 Jan		e			19.3		1.0				8.9 S 123.8 E	
		e	08	28.4			1.1				h about 33 km	
		ePP			39.5		1.2				O = 19 46 58.8	
		eSKP	09	34.1			1.5				$\Delta = 133.5^\circ$	
		e	10	16.4			1.2					
		e			42.0		1.3					
06 Jan		eP	21	32	33.6	22	0.7		T	5.3	Kurile Islands	
		e			37.4		0.7				47.4 N 155.9 E	
		e			53.8		0.9				h about 33 km	
		e	33	15.9			0.9				O = 21 20 56.5	
		e			34.6		0.9				$\Delta = 75^\circ$	
	LP	eSur	22	01	44						Weak surface waves on LP	
06 Jan		eP	21	56	18.8	1	0.4		NR		$\Delta$ (S-P) = 2.8°	
	E	eS			52.2		0.4					
06 Jan		eP	22	40	48.1	4	0.7		T	4.2	Leeward Islands	
		e			41 16.8		1.0				15.2 N 60.8 W	
											h about 72 km	
											O = 22 33 27.1	
											$\Delta = 39^\circ$	
06 Jan		eP	23	18	28.4	4	1.4		T			
06 Jan		eP	23	21	18.3	1	0.4		NR		$\Delta$ (S-P) = 2.2°	
		eS			45.8	999						
07 Jan		eP	03	43	19.2	7	1.0	SE	T			
		e			34.9		0.6					
07 Jan		eP	06	43	08.3	5	0.9		T			
		e			36.0		1.2					
07 Jan	LP	eSur	07	18	29				T		Solomon Islands region	
											6.4 S 154.7 E	
											h about 80 km	
											O = 06 24 49.2	
											$\Delta = 107^\circ$	
											Weak surface waves on LP	
07 Jan		eP'	12	07	19.9	19	1.4		T		Mag. 5-1/2-5-3/4 (PL)	
		e			35.8		1.5				Halmahera region	
		e			56.5		1.2				0.6 N 126.7 E	
		e	08	11.9			1.7				h about 42 km	
		e			43.7		1.0				O = 11 48 22.7	
		ePP	09	08.8			1.6				$\Delta = 125.5^\circ$	
		e			28.4		1.8				Strong surface waves,	
		eSKP	10	39.9			1.2				Rayleigh type, on LP	
		e	11	13.4			1.5					
		e	12	37.0			1.5					
		e	13	04.8			1.3					



DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
		ePKKP <sub>1</sub>	17	08.1		1.2					(continued from preceding page)	
		e		20.0		1.1						
		ePcPP'	20	45.5		1.1						
	LPE	e	34	38		33.0						
	LPN	e(Sur)	41	25								
	LP	eSur	47	37						5.8		
	LP	eSur	50	05								
07 Jan		eP	14	20	41.7	2	0.7		T			
	N	eSur	24	40.8		1.7						
07 Jan		eP	16	28	45.0	5	1.0		T			
07 Jan		eP	18	02	59.0	3	0.4	ESE	NR		$\Delta$ (S-P) = 1.6°	
		eS	03	20.2		999						
07 Jan		eP	18	41	22.4	4	1.2		T	4.6	Samoa Islands 15.9 S 173.0 W h about 33 km O = 18 28 41.2 $\Delta$ = 87°	
07 Jan		eP	20	26	35.2	2	0.5	S	NR		$\Delta$ (S-P) = 2.5°	
	N	eS	27	06.6		0.5						
07 Jan		eP	21	11	49.2	3	0.4		NR		$\Delta$ (S-P) = 1.7°	
		e		58.9		0.5						
		eS	12	10.8		999						
08 Jan		eP	12	11	59.0	3	1.3		T			
08 Jan		eP	16	16	56.5	4	0.9		T			
08 Jan		eP	17	51	46.8	8	0.9		T			
08 Jan		eP	18	47	31.0	5	1.1		T			
08 Jan		eP	20	02	44.0	7	1.0		T	5.2	Samoa Islands region 17.0 S 171.8 W h about 33 km O = 19 50 04.9 $\Delta$ = 87°	
08 Jan		eP	20	45	24.9	2	0.9		T			
08 Jan		eP	21	15	09.3	5	0.3	(SE)	NR		$\Delta$ (S-P) = 1.7°	
		eS		31.4		999						
08 Jan		eP	22	14	01.9	8	0.3		NR		$\Delta$ (S-P) = 2.3°	
		eS		30.9		999						

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
09 Jan		eP	02	16	05.0	6	1.2		T	4.9	Kermadec Islands 28.9 S 177.4 W h about 71 km O = 02 02 38.5 $\Delta$ = 97.5° Weak surface waves, Rayleigh type, on LP.	
		e		22.0		1.5						
	LP	eSur	48	00								
09 Jan		eP	03	26	47.6	10	1.3		T	5.2	Mariana Islands 18.6 N 145.4 E h about 192 km O = 03 13 26.4 $\Delta$ = 99°	
		epP	27	34.3		1.5						
		e	30	27.6		1.5						
		ePP		48.4		1.9						
		e	31	35.5		1.2						
09 Jan		eP	03	43	38.7	9	1.5		T			
09 Jan		eP	04	18	42.7	2	0.6		T			
09 Jan		eSKP	07	16	18.5		1.1		T		Timor region 10.3 S 124.0 E h about 33 km O = 06 53 28.0 $\Delta$ = 135°	
09 Jan		eP	09	20	14.6	6	1.0		T			
09 Jan		eP'	18	41	27.9	5	1.2		T		Republic of the Congo 3.3 S 29.4 E h about 33 km O = 18 22 33.4 $\Delta$ = 122.5° Medium surface waves, Rayleigh type, on LP	
		e	44	48.5		1.1						
	LPN	eSur	19	16	00					5.0		
	LP	eSur	24	58								
09 Jan		eP	22	03	07.6	15	0.8	ENE	NR		$\Delta$ (S-P) = 1.7°	
		eS		29.6		999						
09 Jan		eP	23	09	34.8	3	0.9		T			
		e		42.0		1.0						
		e		58.7		1.4						
09 Jan		eP	23	18	36.3	4	0.3	SE	NR		$\Delta$ (S-P) = 1.7°	
		eS		58.7		999						
10 Jan		eP	00	20	48.3	11	0.8	NE	L		$\Delta$ (S-P) = less than 0.1°	
		eS		50.0		999						
10 Jan		eP	05	22	36.4	4	1.0		T	3.5	Off coast of Jalisco, Mexico 18.8 N 106.3 W h about 33 km O = 05 18 36.9 $\Delta$ = 17.5° Strong surface waves on LP	
		e		46.0		1.3						
		e		53.8		1.3						
		e	23	02.7		1.3						
		e	24	04.5		1.5						
	LPE	eS	25	52		20.0						
	LPE	eSur	27	11								

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
10 Jan		eP e	09 57	45.7		2	0.9		T			
				50.4			0.9					
10 Jan		eP	17 25	12.5		8	0.8		T	4.6	Kamchatka 52.6 N 157.2 E h about 125 km O = 17 14 07.3 $\Delta = 71^\circ$	
10 Jan		eP eS	18 05	17.4		5	1.1		L		$\Delta (S-P) = \text{less than } 0.1^\circ$	
				20.0		999						
10 Jan		eP eS	22 59	07.0		2	0.2		NR		Quarry blast by Gifford-Hill Co., 4800 lbs, in 30 holes 30' deep. O = 22 58 37.82 recorded origin. $\Delta (S-P) = 1.7^\circ$	
				29.0		999						
11 Jan		eP	05 06	19.9		4	1.0		T			
11 Jan		eP e	06 00	34.4		4	0.7		T			
				46.3			0.9					
11 Jan		eP e	06 48	55.1		9	0.8		T	4.6	Near south coast of Panama 7.5 N 82.5 W h about 33 km O = 06 42 41.8 $\Delta = 31^\circ$	
				49 05.1			0.8					
11 Jan		eP e e e e e e e ePP eS eP'P'	12 24	33.5		22	1.4		T	5.1	Near coast of southern Chile 45.0 S 75.7 W h about 33 km O = 12 12 16.2 $\Delta = 83^\circ$ Medium surface waves, Rayleigh type, on LP	
				41.1			1.5					
				19.6			1.4					
				39.5			1.4					
				12.5			1.8					
				32.0			1.3					
				48.7			1.4					
				05.7			2.0					
				43.2			1.8					
	LPN	eS	34 47				26.0					
		eP'P'	51 10.4				1.2					
	LP	eSur	52 17									
11 Jan		eP e e e e	14 41	23.8		16	1.0		T	4.4	Off coast of El Salvador 12.6 N 88.2 W h about 33 km O = 14 36 11.0 $\Delta = 24^\circ$ Medium surface waves, Rayleigh type, on LP.	
				30.8			1.2					
				11.2			1.2					
				16.0			1.3					
				05.6			1.5					
	LPN	eSur		40			15.0					
	E	e(Sur)		24.0			2.5					
	LP	eSur		13								

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
11 Jan		eP	16 05	04.2		11	1.5		T			
11 Jan		eP	17 35	25.6		3	0.7		T			
11 Jan		eP eS	23 05	26.2		1	0.3		NR		$\Delta (S-P) = 2.7^\circ$	
				59.0		999						
12 Jan		eP	00 00	18.9		13	1.2		T			
12 Jan		eP	02 08	46.7		2	0.7		T			
12 Jan		iP e ePP ePcP e eScP eSur	03 47	27.3		c 190	0.9		T	5.8	Northern Colombia 4.8 N 76.7 W h about 102 km O = 03 40 34.8 $\Delta = 36^\circ$ Medium surface waves on LP.	
				14.8			1.0					
				52.6			1.3					
				49 52.6			0.6					
				51 29.5			1.1					
				53 33.2			1.4					
	LP	eSur	58 48									
12 Jan		eP e e eSur	06 06	16.8		8	0.7		T	4.0	Near coast of Oaxaca, Mexico 16.7 N 98.3 W h about 33 km O = 06 02 10.0 $\Delta = 18^\circ$ Strong surface waves on SP	
				27.0			0.7					
				07 11.7			1.0					
	E	eSur	12 03.5				1.7					
12 Jan		eP	09 41	55.1		9	1.1		T			
12 Jan		eP e	10 36	52.4		12	0.8		T			
				37 05.9			1.0					
12 Jan		eP e	10 42	41.1		17	0.9		T			
				48 18.4			0.7					
12 Jan		eP	10 50	32.6		5	0.8		T			
12 Jan		eP	11 16	45.1		7	1.0		T			
12 Jan		eP e e e e	11 31	22.9		20	0.9		T			
				29.0			1.1					
				34.1			0.9					
				40.0			2.2					
				46.3			0.7					
12 Jan		eP	12 21	42.0		11	0.9		T	4.8	Fox Islands, Aleutians 53.0 N 170.6 W h about 105 km O = 12 12 36.5 $\Delta = 52^\circ$	



DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
12 Jan		eP'	23	40	38.5	11			T			Mindanao, P. I.
13 Jan	LP	eSur	00	20	14							7.1 N 125.2 E h about 84 km O = 23 21 52.1 $\Delta = 122^\circ$ Weak surface waves on LP
13 Jan		eP	00	56	21.8	4			T			
13 Jan		eP	01	32	22.2	1			T			
13 Jan		eP	02	43	09.2	1		R		3.5		San Diego County, California
		e	44	29.5								32.9 N 116.5 W h about 33 km O = 02 39 38.7 $\Delta = 14.5^\circ$ Strong surface waves on SP, IB, and LP, Love and Rayleigh type, on LP.
	N	eSur	47	24.5								
	LPN	eSur	45									
	LP	eSur	48	17								
13 Jan	LP	eP	04	29	09.0	6			T	4.3		Tonga Islands
		eSur	57	17								15.7 S 174.8 W h about 236 km O = 04 16 44.0 $\Delta = 88^\circ$ Medium surface waves, Rayleigh type, on LP.
13 Jan		eP	06	55	40.9	1			T			
		e			52.9							
13 Jan		eP	08	36	30.5	6			T			
13 Jan		eP	09	10	37.5	15			T			
13 Jan		eP	12	11	33.5	3			T			
		e			45.2							
13 Jan		eP'	13	08	03.4	5			T			New Britain
		e			10.8							6.5 S 149.3 E
	LP	eSur	43	00						4.5		h about 29 km O = 12 49 30.2 $\Delta = 113^\circ$ Weak surface waves, Rayleigh type, on LP
13 Jan		eP	13	29	03.4	3			T			
13 Jan		eP	13	56	10.4	6			T	4.9		New Hebrides Islands region
												14.0 S 171.2 E h about 634 km O = 13 43 42.1 $\Delta = 98^\circ$

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
13 Jan		eP	14	13	11.7	11			T			
13 Jan		eP	14	35	22.2	12			T			
		e			46.0							
13 Jan		eP	15	33	29.7	7			T			
13 Jan		eP	15	43	20.8	3			T			
13 Jan		eP	16	58	51.8	16			T			
		e			59 01.1							
		e			25.3							
13 Jan	LP	eSur	17	20	35				T			5.2 Auckland Islands region
												49.7 N 163.7 E h about 33 km O = 16 21 13.1 $\Delta = 121^\circ$ Weak surface waves, Rayleigh type, on LP.
13 Jan		eP	17	31	31.9	8			T	4.5		San Juan Province, Argentina
		e			46.8							31.8 S 68.2 W
		e			51.4							h about 142 km
		e	32	02.6								O = 17 20 22.9
		e			16.5							$\Delta = 72.5^\circ$
13 Jan		eP	18	04	49.8	25			T			
		e			59.5							
13 Jan		eP	19	13	31.5	2			T			
		e			51.3							
13 Jan		eP	21	32	40.5	3			T			
13 Jan		eP	23	35	11.5	3			T			
14 Jan		eP	00	32	32.0	2			T			
		e			51.0							
		e			56.9							
		e	33	33.8								
14 Jan		eP	00	55	42.4	3			T			
		e			56 19.6							
14 Jan		eP	02	25	47.8	6			T	4.3		Central Alaska
		epP			26 09.2							62.2 N 150.1 W
		e			50.5							h about 91 km
		ePcP	27	39.1								O = 02 18 02.0
		e(ScP)	31	43.7								$\Delta = 42^\circ$
14 Jan		eP	04	45	43.7	5			T			

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
			h.	m.	s.							
1963												
14 Jan		eP	11	33	46.6	3	1.0		T	5.0	Loyalty Islands	
	LPN	e		46	00		28.0				21.2 S 169.3 E	
		e		47	00.7		1.4				h about 33 km	
	LPE	e			20		24.0				O = 11 19 47.5	
		ePKKP		49	40.7		0.9				$\Delta = 103^\circ$	
	LPN	eSS		53	15		22.0				Strong surface waves,	
	LPN	e		56	11		15.0				Rayleigh type, on LP	
	LPN	eSSS			58		22.0					
	LPN	e		58	06		20.0					
	LPN	e		59	35		17.0					
	LPN	e	12	00	15		23.0					
	LPE	e		03	20		30.0					
	LPN	e(Sur)		04	50							
	LPN	e		09	17		23.0					
	LP	eSur		11	21							
14 Jan		eP	15	48	16.9	6	1.1		T	4.9	Tonga Islands region	
											20.0 S 175.0 W	
											h about 33 km	
											O = 15 35 16.3	
											$\Delta = 90^\circ$	
14 Jan		eP	17	25	09.1	4	1.1		T			
14 Jan	E	eP	21	36	01.4	1	0.3		NR		$\Delta (S-P) = 1.4^\circ$	
		eS			30.5		0.4					
		eSur			37.1	999						
14 Jan		eP	22	38	26.4	5	1.2		T			
14 Jan	E	eP	23	01	25.5	2	0.5		NR		$\Delta (S-P) = 2.9^\circ$	
		eS		02	01.5		0.5					
14 Jan	E	eP	23	21	20.7	1	0.4		NR		$\Delta (S-P) = 2.0^\circ$	
		eS			55.3		0.4					
14 Jan		eP	23	41	18.7	3	0.7	SE	NR		$\Delta (S-P) = 1.6^\circ$	
		eS			39.2	999						
15 Jan		eP	00	06	10.0	3	0.3		NR		$\Delta (S-P) = 1.7^\circ$	
		e			19.6		0.4					
		eS			31.7	999						
15 Jan		eP	00	33	01.7	2	0.5		T			
		e			46.1		1.2					

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
			h.	m.	s.							
1963												
15 Jan		eP	01	41	51.1	53	1.4		T	5.4	Denmark Strait	
		e		42	03.6		1.8				68.9 N 17.1 W	
		e			12.3		1.3				h about 33 km	
		e			34.5		1.1				O = 01 32 20.0	
		e			54.0		1.4				$\Delta = 54.5^\circ$	
		e		43	04.2		1.2				Strong surface waves,	
		ePP			53.7		1.5				Love and Rayleigh type,	
		e		44	08.4		1.6				on LP.	
		e			39.2		1.3					
	LPE	eS		49	37		20.0					
	LPE	eSS		53	07		21.0					
	LPE	e(SSS)		54	13		21.0					
	LPE	eSur		57	28							
	LPE	eSur		59	40							
15 Jan		eP	02	46	33.8	6	1.3		T	5.1	Mariana Islands	
		e			49.2		1.2				13.4 N 145.3 E	
		e(P')		50	47.7	4	0.9				h about 38 km	
		ePP			57.5		1.5				O = 02 32 39.9	
		e		51	05.6		1.6				$\Delta = 103^\circ$	
		e			26.7		2.0				Medium surface waves,	
		ePKKP	03	02	38.3		1.3				Love and Rayleigh type,	
	LPN	eSS		05	36		22.0				on LP.	
	LPN	eSur		17	14							
	LPN	eSur		23	00							
15 Jan		eP	03	27	59.9	20	0.8		T		Possible new event at	
		e		28	10.3		0.8				03 31 41.4.	
		e			20.9		1.3					
		e			33.7		0.8					
		e			49.2		1.2					
		e		29	44.5		1.0					
		e		30	10.8		1.0					
		e		31	41.4		0.5					
15 Jan		eP	04	15	59.5	2	1.2		T			
15 Jan		eP	04	51	00.1	16	0.8	SE	T			
		e			08.4		0.9					
		e			22.1		1.2					
		e			44.1		0.6					
15 Jan		eP	05	32	40.6	9	1.2		T	4.7	Jan Mayen Island region	
		e			45.9		0.9				69.0 N 16.6 W	
		e		33	17.5		1.2				h about 33 km	
		e			27.5		1.0				O = 05 23 10.4	
		ePcP			46.3		0.7				$\Delta = 54.5^\circ$	

(continued on next page)



DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
	LPE	eS	40	30		19.0					(continued from preceding page)	
	LPE	eSS	44	00		19.0					Strong surface waves,	
	LPE	e	45	00		21.0					Love and Rayleigh type,	
	LP	eSur	47	29							on LP.	
	LP	eSur	49	06								
15 Jan		eP	05	34	13.2	1	0.2		NR		$\Delta$ (S-P) = 2.2°	
		e			18.3		0.3					
	N	eS			40.3		0.5					
15 Jan		eP	06	05	23.7	6	1.4		T			
15 Jan		eP	06	44	08.6	5	1.1		T	4.4	Near coast of central Chile 37.4 S 73.4 W h about 42 km O = 06 32 29.5 $\Delta$ = 75°	
15 Jan		eP	08	34	28.3	3	1.0		T			
15 Jan		eP	08	52	38.0	12	0.8	S	T			
		e			45.7		0.8					
		e			53 04.5		1.1					
		e			54 05.6		1.2					
15 Jan		eP	10	21	22.3	2	0.6		T			
15 Jan	LP	eSur	10	34	24				T		Solomon Islands region 10.6 S 164.9 E h about 89 km O = 09 47 42.9 $\Delta$ = 101° Medium surface waves, Rayleigh type, on LP.	
15 Jan		eP	10	35	40.3	2	1.2		T			
15 Jan	LPE	eSur	13	21	03				T		Weak surface waves on LP	
15 Jan		eP	13	55	51.2	46	0.8		T	5.7	Off west coast of Nicaragua 11.5 N 87.8 W h about 33 km O = 13 50 28.3 $\Delta$ = 25°	
		e			56 16.4		0.8					
		e			57 01.7		0.8					
		e			58 12.3		0.7					
		e			58 50.6		1.4					
15 Jan		eP	14	11	16.8	2	0.7	S	R			
		e			22.9		0.5					
		e			32.1		0.6					
		e			40.6		0.6					
	N	eSur	14	27.9			0.9					

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
15 Jan		eP	15	17	14.9	8	0.9		T	5.2	Mediterranean Sea 36.0 N 23.9 E h about 81 km O = 15 04 15.0 $\Delta$ = 92°	
		e			32.4		1.0					
15 Jan		eP	16	56	34.5	4	1.0		T			
		e			44.7		0.9					
		e			50.0		0.9					
15 Jan		eP	17	06	43.5	11	0.7	E	NR		$\Delta$ (S-P) = 2.0°	
		e			46.9		0.5					
	IBN	eS	07	08.4			0.6					
15 Jan		eP	17	51	54.0	4	1.2		T			
15 Jan		eP	17	52	02.2	8	0.9		T	4.8	Fiji Islands 17.1 S 179.6 W h about 276 km O = 17 39 19.2 $\Delta$ = 92°	
		e			12.4		0.8					
		e			17.1		0.6					
	E	eSKS	18	02	05.3		3.4					
	N	eS			47.2		2.5					
	LPE	e	04	00			16.0					
	LPE	ePS			30		20.0					
	LPN	eSS	08	37			20.0					
15 Jan		eP	18	11	52.6	2	0.9		T			
15 Jan		eP	19	14	24.8	7	1.3		T		Possible new event at 19 15 43.3	
		e			15 43.3		1.3					
		e			19 31.1		1.1					
15 Jan		eP	19	34	06.6	9	1.5		T			
15 Jan		eP	19	38	54.5	75	1.0		T	5.8	Fiji Islands 20.5 S 177.9 W h about 496 km O = 19 26 34.3 $\Delta$ = 92° Possible new events at 19 43 41.1 and 19 47 47.1	
		e			39 20.3		1.3					
		e			27.1		1.3					
		e			37.3		0.8					
		e			47.3		1.0					
		e	40		21.0		1.2					
		e			36.4		1.2					
		epP			51.7		1.0					
		e	41		01.3		1.0					
		e			57.1		1.0					
		e	42		21.3		1.0					
		ePP			32.7		1.3					
		e			55.8		1.3					
		e	43		41.1		0.8					
		e	44		12.2		0.9					
		e			34.2		0.8					
		e	45		02.8		0.6					
		e			17.5		1.6					
		e	47		47.1		0.9					
		e	48		05.5		1.2					

(continued on next page)

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
	E	eSKS			40.4							(continued from preceding page)
	E	eS		49	23.8							
		e		55	27.0							
		ePKKP		56	02.3							
		e	20	04	08.4							
		eP'P'			16.5							
15 Jan		eP	19	56	41.8	9						
		e		57	09.5							
15 Jan		eP	20	32	36.8	1						
		e			49.4							
15 Jan		eP	20	38	49.6	2						
15 Jan		eP	21	20	30.0	4	SE	NR			$\Delta$ (S-P) = 1.6°	
		e			39.3							
		eS			51.2	999						
15 Jan	N	eP	21	32	32.5	2		NR			$\Delta$ (S-P) = 2.5°	
		eS		33	03.3							
		eSur			09.3	999						
15 Jan		eP	22	31	56.2	9		T	5.4		South Atlantic Ocean	
		ePP		36	04.7						31.3 S 13.4 W	
		e			20.5						h about 33 km	
	LPE	ePS		45	22						O = 22 17 50.9	
	LPE	ePPS		46	10						$\Delta$ = 103°	
	LPE	e		48	49						Strong surface waves,	
	LPE	eSS		51	00						Love and Rayleigh type,	
	LPE	e		56	03						on LP. Weak surface	
	LPN	eSKKKS		58	50						waves on BB.	
	LPN	eSur	23	02	41							
	LP	eSur		06	43							
15 Jan		eP	22	42	47.7	1		R				
		e		43	01.6							
		e			09.9							
		e			17.3							
		e			25.8							
	E	eSur		46	05.5							
15 Jan		eP	23	13	09.5	2		NR			$\Delta$ (S-P) = 2.3°	
		eS			37.9	999						
15 Jan		eP	23	30	34.2	5		T				
15 Jan		eP	23	37	14.7	1		NR			$\Delta$ (S-P) = 2.3°	
	E	eS			43.9							
16 Jan		eP	02	28	19.4	3		R				
	E	eSur		32	33.3							

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
16 Jan		eP	02	40	46.1	3						
16 Jan		eP	03	27	18.2	19		T	5.4		South Pacific Ocean	
		e			28.5						54.0 S 133.5 W	
		e			43.6						h about 33 km	
		e			51.8						O = 03 14 05.9	
		e		28	00.7						$\Delta$ = 94.5°	
		e			21.1						Medium surface waves,	
		e			44.2						Rayleigh type, on LP.	
		e		29	07.5							
		e		30	38.3							
		ePP		31	05.1							
	LPN	eSKS		37	55						15.0	
	LPN	eS		38	40						18.0	
	LPN	ePS		39	32						18.0	
		ePKKP		44	18.8						1.2	
	LPN	eSS		45	03						18.0	
		e		47	34.9						1.8	
		e		51	02.7						1.1	
		eP'P'		52	38.4						1.5	
	LP	eSur		59	14							
16 Jan		eP	03	59	47.7	8		T	4.4		Colombia	
		e			53.3						7.5 N 74.5 W	
		e		04	00	25.5					h about 33 km	
		ePP		01	05.5						O = 03 52 56.1	
											$\Delta$ = 35°	
16 Jan		eP	04	34	45.3	4		T				
		e		35	11.2							
16 Jan		eP	04	38	51.4	7		T				
16 Jan		e	05	10	28.4			T			Nicobar Islands	
		ePP			58.4						9.7 N 93.9 E	
		eSKP		11	39.2						h about 70 km	
											O = 04 49 11.9	
											$\Delta$ = 134°	
16 Jan	N	eP	05	40	15.5	1		R				
		eSur		42	38.8							
16 Jan		eP	05	54	47.6	14		T	4.9		Andreanof Islands,	
		e			55.7						Aleutian Islands.	
		e		55	00.8						51.3 N 179.9 W	
		e			13.1						h about 38 km	
		e			24.1						O = 05 44 52.3	
		e			46.4						$\Delta$ = 58.5°	
		e			58.0						Medium surface waves	
		e		56	11.0						Rayleigh type, on LP.	
		ePP		57	01.7						1.5	
		e			19.7						1.1	
	LPE	eS		06	03	08					20.0	

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DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G. C. T.			A	T			m	M	
1963			h.	m.	s.							
	LPE	eScS	05	15		20.0					(continued from preceding page)	
	LP	eSur	12	10								
	LP	eSur	15	05								
16 Jan		eP	06	47	14.2	12	1.1	T	4.8		1300 km southwest of Iceland	
		e			24.6		1.6				54.2 N 34.9 W	
		e			47.5		1.5				h about 33 km	
		e	48	30.5			1.5				O = 06 38 40.4	
		e			45.0		1.0				$\Delta = 48^\circ$	
		e			54.2		1.0				Medium surface waves,	
		ePP	49	07.9			1.2				Rayleigh type, on LP.	
	LPE	e	53	00			18.0					
	LPE	eS	54	09			19.0					
	LP	eSur	07	02	58							
16 Jan		eP	06	53	30.0	19	1.1	T	5.0		1300 km southwest of Iceland	
		e			45.2		1.2				54.3 N 35.2 W	
		e			59.4		1.1				h about 33 km	
		e	54	25.7			1.0				O = 06 44 56.8	
		e			44.3		1.0				$\Delta = 47.5^\circ$	
		ePcP	55	00.6			1.0				Medium surface waves,	
		e			06.3		1.1				Rayleigh type, on LP.	
		ePP			17.1		1.5					
		e			26.1		1.2					
	LPE	eS	07	00	27		21.0					
	LP	eSur	09	54								
16 Jan		eP	08	51	41.1	2	1.0	T				
16 Jan		eP	12	41	10.7	19	1.4	T	4.9		1300 km southwest of Iceland	
		e			15.9		1.4				54.4 N 35.0 W	
		e			25.5		1.5				h about 33 km	
		e			36.7		1.1				O = 12 32 37.6	
		e			54.2		1.5				$\Delta = 47.5^\circ$	
		e	42	10.8			1.0				Strong surface waves,	
		e			23.6		1.4				Rayleigh type, on LP.	
		e			41.2		1.3					
		ePcP			46.6		1.0					
		ePP	43	01.7			2.5					
	LPN	eS	48	15			15.0					
	LPN	eSS	51	38			14.0					
	LP	eSur	55	55								
16 Jan		eP	13	34	28.1	2	1.1	T				
16 Jan		eP	15	19	40.9	5	0.6	T	4.6		Northern Chile	
		epP	20	14.0			1.0				24.0 S 68.2 W	
		e			52.2		1.0				h about 150 km	
		ePP	22	02.2			1.1				O = 15 09 16.6	
											$\Delta = 65^\circ$	
16 Jan		eP	16	19	17.6	3	0.6	T				
16 Jan		eP	17	14	23.6	2	0.6	T				

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G. C. T.			A	T			m	M	
1963			h.	m.	s.							
16 Jan		eP	20	28	47.8	10	0.9	T	4.3		Peru	
		e		29	09.1		0.9				4.2 S 76.2 W	
		epP			39.3		1.2				h about 190 km	
		ePcP	30	33.0			0.9				O = 20 20 56.0	
											$\Delta = 44^\circ$	
											Possible new event at 20 29 09.1	
16 Jan		eP	21	03	40.7	4	1.1	T				
16 Jan		eP	21	07	16.9	7	0.8	NE	T			
	E	e	09	42.8			1.2					
		eSur	11	11.5			1.6					
16 Jan		eP'	21	28	04.2	22	1.1	T			South of Java	
		e			14.9		1.3				11.1 S 111.6 E	
		e			20.0		1.0				h about 94 km	
		e			26.1		1.1				O = 21 08 38.8	
		e			35.4		1.2				$\Delta = 141^\circ$	
		e			56.3		1.4					
		e	29	19.6			1.1					
		eSKP	31	23.4			1.2					
		e			38.8		1.6					
16 Jan		eP	21	47	46.0	3	0.4	NR			$\Delta (S-P) = 1.6^\circ$	
		e			57.9		0.5					
		eS	48	07.1		999						
16 Jan		eP	21	58	55.1	1	0.5	NR			$\Delta (S-P) = 2.5^\circ$	
	E	eS	59	26.8			0.6					
16 Jan		eP	22	55	52.4	3	0.3	SE	NR		$\Delta (S-P) = 1.7^\circ$	
		e			56	02.4	0.4					
		eS			14.0	999						
17 Jan		eP	03	39	05.4	7	1.3	T	4.5		600 km west of Chiloe, Chile	
		e			25.5		1.2				43.6 S 83.6 W	
		e			40	36.1	1.3				h about 33 km	
		e			47	51.1	1.7				O = 03 27 02.0	
											$\Delta = 80^\circ$	
17 Jan		eP	04	03	28.2	7	0.7	T	4.4		Sea of Okhotsk	
											52.3 N 152.5 E	
											h about 454 km	
											O = 03 52 42.2	
											$\Delta = 74^\circ$	
17 Jan		eP	04	31	04.3	6	1.1	T	4.6		Off coast of Peru	
		e			11.7		1.0				10.6 S 78.7 W	
		e			25.1		1.0				h about 46 km	
		ePcP	32	28.8			0.9				O = 04 22 22.5	
		e			49.8		1.1				$\Delta = 49^\circ$	
		e	33	13.0			1.5					

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
			h.	m.	s.							
1963												
17 Jan		eP'	06	15	19.7	2	0.5		T			Luzon, P. I. 14.0 N 120.6 E h about 207 km O = 05 56 54.8 $\Delta = 120^\circ$
17 Jan		eP	08	05	03.6	5	1.3		T			
17 Jan		eP	14	14	05.4	6	1.1		T			
17 Jan		eP e e e	16	42	20.9 32.7 45.3 55 15.9	4	1.1 1.1 1.3 1.5		T			
17 Jan		eP e e ePcP ePP e	19	39	29.8 56.0 40 05.4 55.0 41 29.8 42 04.1	10	0.9 1.0 1.0 1.0 1.2 1.1		T	4.2		Peru 7.6 S 75.3 W h about 201 km O = 19 31 12.6 $\Delta = 48^\circ$
17 Jan		eP e	20	59	47.2 21 00 46.1	26	2.0 1.4		T			
17 Jan		eP	21	10	59.1	4	1.1		T			
17 Jan	E	eP eSur	22	07	48.4 08 48.5	3	0.6 0.5		R			
17 Jan	E	eP eS	23	38	15.4 44.2	3	0.4 0.5		NR			$\Delta (S-P) = 2.3^\circ$
17 Jan		eP eS	23	07	25.0 46.8	2	0.3 999		NR			$\Delta (S-P) = 1.7^\circ$
18 Jan		eP	02	55	31.7	5	1.4		T			
18 Jan		eP	03	10	28.8	1	0.8		T			
18 Jan		eP e ePP	03	24	44.2 26 45.1 28 41.1	9	1.1 1.2 1.7		T	4.8		South of Honshu, Japan 33.1 N 135.8 E h about 425 km O = 03 12 05.7 $\Delta = 95.5^\circ$
18 Jan		eP' <sub>1</sub> eP' <sub>2</sub> e e	06	09	03.8 09.4 10 17.2 58.6	8 26	1.5 1.2 1.1 1.2		T			Western Australia 32.0 S 117.1 E h about 35 km O = 05 49 18.4 $\Delta = 150^\circ$

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
			h.	m.	s.							
1963												
18 Jan		eP e e e e(PP) ePcP	08	39	55.4 40 04.5 12.7 35.3 41 26.5 42 06.5	9	0.7 0.9 0.8 1.0 1.3 0.6	SE	T			$\Delta (PcP-P) = 39^\circ$
18 Jan		eP	11	53	30.3	1	0.6		T			
18 Jan		eP	13	50	28.3	1	0.6		T			
19 Jan		eP	01	09	45.2	4	1.1		T			
19 Jan		eP	07	35	03.3	7	1.1		T	4.8		South of Hokkaido, Japan 40.9 N 142.4 E h about 33 km O = 07 22 24.5 $\Delta = 86^\circ$
19 Jan		eP	19	33	50.4	8	1.0		T	4.1		Off north coast of Honduras 16.9 N 85.0 W h about 33 km O = 19 29 03.6 $\Delta = 21^\circ$
19 Jan		e eSur	19	34	04.6 37 35.5		0.5 999		R			
19 Jan		eP e eSur	19	55	46.0 59.5 59 34.9	26	1.1 1.0 999		T	4.6		Off north coast of Honduras 17.0 N 85.0 W h about 33 km O = 19 50 59.4 $\Delta = 21^\circ$
20 Jan		eP e e	03	00	20.5 28.8 01 26.4	6	1.0 0.9 1.1		T			N
20 Jan		eP	08	01	46.5	4	1.4		T			
20 Jan		eP e e e e N eSur	08	26	33.7 39.2 43.9 53.3 29 42.9	1	0.4 0.7 0.6 0.4 0.7		S	R		
20 Jan		eP e e e LPE LPE LP	09	05	32.5 50.0 06 00.8 44.6 13 29 21 29 28 26	5	1.3 1.4 0.7 1.2 20.0 26.0		T	4.4		Andreanof Islands, Aleutian Islands 51.9 N 173.2 W h about 30 km O = 08 56 06.2 $\Delta = 54.5^\circ$ Weak surface waves on LP



DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
20 Jan		eP	11 02	31.9	12	1.6		T	4.3		Vancouver Island region	
		e		44.9		1.2					50.3 N 129.4 W	
		e	03 04.6			1.4					h about 31 km	
	LP	eSur	10 45								O = 10 56 51.4 $\Delta = 27.5^\circ$	
											Medium surface waves Rayleigh type, on LP.	
20 Jan		eP	13 19	36.9	33	1.0		R	5.1		Gulf of California	
		e	20 44.1			1.1					26.4 N 110.7 W	
		e	21 46.2			1.2					h about 27 km	
		e	22 03.6			1.2					O = 13 16 27.0	
		e	22 16.1			1.0					$\Delta = 12.5^\circ$	
		eSur	23 22.2		999						Strong surface waves on all systems	
20 Jan		eP	15 06	10.3	1	0.4	(SW)	NR			$\Delta (S-P) = 5.4^\circ$	
		e		21.3		0.5						
		e		29.1		0.7						
		eS	07 14.3		999							
		eSur		42.2	999							
20 Jan		eP	18 18	15.5	5	1.0		T				
		e		27.8		0.8						
20 Jan		eP	22 24	35.0	7	0.9		R	4.5		Gulf of California	
		e		39.2		1.1					26.7 N 110.7 W	
		e	25 02.0			1.0					h about 37 km	
		e		08.3		0.9					O = 22 21 28.7	
		e		39.5		1.4					$\Delta = 12.5^\circ$	
		e	26 08.0			1.1					Strong surface waves	
		e	27 00.6			1.0					on all systems	
		e		13.9		1.0						
		e		52.7		1.2						
	LPN	eSur	28 09									
		eSur		24.5	999							
	LP	eSur		42								
	BB	eSur	29 00			12.0						
20 Jan	LPN	eSur	22 33	34				R			Strong surface waves on	
	BBN	eSur	34 27			9.0					all systems	
21 Jan		eP	01 06	55.0	9	1.4		T				
		e	07 28.7			1.5						
		e	15 28.2			1.0						
21 Jan		eP	02 39	57.0	2	0.8	S(E)	T				
21 Jan		eP	03 47	13.2	5	1.4		T				
21 Jan		eP	04 26	52.5	13	1.5		T				

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
21 Jan		eP	04 27	04.3	18	1.2		T	4.7		Mendoza Province,	
		ePcP		20.6		0.8					Argentina	
		e		35.3		0.9					34.3 S 69.7 W	
		epP		45.2		1.2					h about 183 km	
		e	29 02.1			1.4					O = 04 15 50.2	
		eP'P'	54 42.0			1.1					$\Delta = 74^\circ$	
21 Jan		eP	04 36	19.9	3	0.7		T	4.5		Southern Kamchatka	
		e		38.3		1.2					53.3 N 157.4 E	
		e		37 24.6		1.4					h about 33 km	
		e		39 30.6		1.2					O = 04 25 04.6	
		e		47 13.3		1.4					$\Delta = 70.5^\circ$	
		eP'P'	05 04	03.0		1.4						
21 Jan		eP	04 48	23.9	6	1.4		T				
		e		56 20.4		1.4						
		e	05 05	01.3		1.4						
21 Jan	LPZ	eSur	05 19	50				T			Weak surface waves, Rayleigh type, on LP	
21 Jan		eP	05 32	46.7	11	1.5		T			Possible new event at	
		e		37 04.0		1.5					05 37 04.0	
21 Jan		eP	05 58	05.3	5	1.2		T				
21 Jan		eP	07 44	50.4	5	0.7		T	4.2		Panama-Costa Rica border	
		e		45 00.2		1.0					9.3 N 83.0 W	
		e		18.4		1.4					h about 88 km	
		e		43.9		0.7					O = 07 38 56.9	
		e(PP)		51.0		1.2					$\Delta = 29^\circ$	
21 Jan	LP	eP'	10 54	31.8	2	1.0		T			Western New Guinea	
		eSur	11 36	22					4.6		3.0 S 136.2 E	
											h about 57 km	
											O = 10 35 39.0	
											$\Delta = 121^\circ$	
											Weak surface waves on LP	
21 Jan		eP	14 54	51.3	17	1.1		T	4.8		Kenai Peninsula, Alaska	
		e		55 08.2		1.0					59.5 N 151.2 W	
	LP	eSur	15 09	40							h about 67 km	
											O = 14 47 05.4	
											$\Delta = 42^\circ$	
											Medium surface waves, Rayleigh type, on LP	
21 Jan		eP	18 48	33.5	5	0.7		T	4.9		Tonga Islands	
											18.0 S 175.4 W	
											h about 64 km	
											O = 18 35 41.5	
											$\Delta = 90^\circ$	

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
21 Jan		eP	19	21	11.8	2	0.5	NR			$\Delta(S-P) = 1.7^\circ$	
	E	eS			20.4		0.4					
		eS			32.4		0.5					
21 Jan		eP	21	35	17.9	3	0.3	NR			$\Delta(S-P) = 1.7^\circ$	
	E	eS			27.9		0.3					
		eS			39.0		0.5					
21 Jan		eP	22	06	09.3	4	0.5	SE R				
	E	eS			23.2		0.5					
		eS			31.6		0.5					
		eSur	09		23.0		1.5					
21 Jan		eP	22	59	16.6	3	0.3	NR			$\Delta(S-P) = 1.7^\circ$	
		eS			26.7		0.4					
		eS			38.4	999						
21 Jan		eP	23	30	52.1	1	0.3	NR			$\Delta(S-P) = 1.7^\circ$	
		eS		31	02.1		0.4					
		eS			14.2	999						
21 Jan		eP	23	43	19.8	999		L			$\Delta(S-P) = \text{less than } 0.1^\circ$	
		eS			21.0	999						
22 Jan		eP	02	07	40.9	6	1.4	T				
22 Jan		eP	04	42	23.5	2	0.7	T				
22 Jan		eP	07	23	21.1	12	1.4	T				
		eS			26.6		0.6					
22 Jan		eP	07	58	07.1	7	1.5	T				
22 Jan		eP	08	41	34.0	3	1.0	T	4.2	Peru		
		eS			50.0		1.0			11.3 S 74.7 W		
		eS		42	25.1		1.6			h about 33 km		
		ePcP			49.0		1.0			O = 08 32 33.2		
		ePP		43	39.4		1.3			$\Delta = 51^\circ$		
22 Jan		eP	09	26	09.8	4	1.2	T				
22 Jan		eP	11	40	47.7	3	1.0	T	4.3	Near coast of central Chile		
										30.8 S 72.2 W		
										h about 33 km		
										O = 11 29 41.3		
										$\Delta = 69.5^\circ$		
22 Jan		eP	12	43	08.3	6	1.1	T				
22 Jan		eP	14	56	36.7	1	0.3	NR			$\Delta(S-P) = 1.7^\circ$	
		eS			57.9	999						

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
22 Jan		eP	16	18	48.5	3	0.7	T	4.3		Kurile Islands	
											48.3 N 155.2 E	
											h about 50 km	
											O = 16 07 14.0	
											$\Delta = 74^\circ$	
22 Jan		eP	16	23	16.6	2	0.6	T	4.2		Kurile Islands	
	E	eS			30.6		0.5				48.4 N 155.2 E	
											h about 50 km	
											O = 16 11 42.1	
											$\Delta = 74^\circ$	
22 Jan		eP	19	29	00.5	2	0.4	NR			$\Delta(S-P) = 1.9^\circ$	
		eS			24.5	999						
23 Jan		eP	14	52	33.6	6	1.1	T	4.7		South of Fiji Islands	
											22.6 S 178.3 W	
											h about 299 km	
											O = 14 39 49.0	
											$\Delta = 94.5^\circ$	
23 Jan		eP	23	19	27.2	3	0.9	T				
23 Jan		eP	23	21	40.5	2	0.9	T				
24 Jan		eP	00	08	19.3	2	1.1	T				
24 Jan		eP	02	39	03.7	5	1.0	S T				
24 Jan		eP	03	00	07.0	11	1.3	T	4.5		Near coast of Venezuela	
		eS			38.4		0.7				8.4 N 60.8 W	
		ePP	01		52.9		1.7				h about 66 km	
	LPN	eS	10		20		13.0				O = 02 52 09.0	
	LPE	eSur	14		00						$\Delta = 43.5^\circ$	
											Weak surface waves on LP	
24 Jan		eP	03	09	12.1	4	1.2	T				
24 Jan		eP	03	47	53.0	2	0.6	T				
		eS		48	08.9		1.2					
24 Jan		eP	04	11	42.9	2	0.8	T				
24 Jan		eP	08	04	34.7	4	1.1	T				
24 Jan		eP'	09	47	32.8	4	0.6	T			Java Sea	
		eS			42.4		1.6				6.0 S 112.6 E	
		eS			54.5		0.7				h about 493 km	
		eS		48	52.7		1.3				O = 09 29 11.6	
		eSKP		50	19.8		1.0				$\Delta = 140.5^\circ$	
		ePP			39.5		1.2					
		eS		51	05.5		1.0					

(continued on next page)



DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.	C.	T.	A	T			m	M	
1963			h.	m.	s.							
		e			23.6							(continued from preceding page)
		e	52	07.4								
		e			53.6							
		ePcPP'	58	57.5								
24 Jan	LP	eSur	10	07	03							Solomon Islands 10.1 S 160.8 E h about 33 km O = 10 14 52.0 $\Delta = 104.5^\circ$ Weak surface waves on LP.
24 Jan		eP	10	13	08.2	6	1.2		T			
24 Jan		eP	12	21	43.5	21	1.7		T	5.1		Tonga Islands region 15.2 S 173.6 W h about 33 km O = 12 09 01.2 $\Delta = 87^\circ$ Strong surface waves, Rayleigh type, on LP.
		e			54.1		1.4					
		e	22	06.5			0.8					
		e			40.4		1.5					
		e			53.2		1.7					
		e	23	10.7			1.0					
	LPE	eS	32	12			21.0					
	LPE	e	38	17			20.0					
	LP	eSur	48	55								
24 Jan		eP	14	07	40.6	2	0.7		T			
24 Jan		eP	15	16	56.6	6	0.9		T			
24 Jan		eP	21	24	28.1	3	0.8		T			
24 Jan		eP	21	48	04.0	40	1.3		T	4.7		King County, Washington 47.5 N 121.9 W h about 33 km O = 21 43 13.0 $\Delta = 21^\circ$ Strong surface waves on LP
		e			18.3		1.1					
		e			32.5		1.3					
	LPN	eSur	55	17								
	LPN	e	56	56			15.0					
24 Jan		eP'	22	46	18.1	4	0.7		T			Off east coast of Mindanao, P. I. 8.0 N 126.8 E h about 67 km O = 22 27 32.5 $\Delta = 120^\circ$ Strong surface waves, Love and Rayleigh type, on LP.
		e			34.0		1.1					
		e			40.3		1.1					
		ePP	47	49.3			1.8					
		e	48	54.6			1.4					
		e	49	43.5			1.2					
		e	51	28.7			0.9					
		ePKKP <sub>1</sub>	56	28.9			0.7					
		ePKKP <sub>2</sub>		40.3			1.1					
	LPE	ePS	57	56			22.0					
	LPN	eSS	23	04	07		24.0					
	LPN	eSSS	08	09			22.0					
	LPN	e(PKPSKS)	12	18			22.0					
	LPN	eSur	18	12								
	LP	eSur	21	48						4.6		

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.	C.	T.	A	T			m	M	
1963			h.	m.	s.							
25 Jan		eP	00	13	15.8	5	1.0		T	4.2		Southern Alaska 61.9 N 148.9 W h about 78 km O = 00 05 34.8 $\Delta = 41.5^\circ$
25 Jan		eP	00	45	48.2	4	0.7		T			
		e		46	08.2		0.9					
25 Jan	LPN	eSur	09	02	03				T			Weak surface waves on LP
25 Jan		eP	11	14	51.9	1	0.7		T			
25 Jan		eP	13	02	58.2	5	1.2		T	4.8		Mariana Islands region 21.8 N 143.8 E h about 190 km O = 12 49 42.0 $\Delta = 98^\circ$
		e		03	46.1		1.0					
		epP			50.6		1.5					
		e		04	14.6		1.3					
		e		05	45.3		1.0					
		e		06	09.8		1.2					
		e		07	09.1		1.0					
		e			16.3		1.4					
		e			53.3		1.1					
		e		08	03.9		1.2					
		e			50.7		1.0					
25 Jan		eP	13	11	56.9	26	1.4		T	5.2		Rat Islands, Aleutian Is. 51.4 N 178.1 E h about 33 km O = 13 01 53.3 $\Delta = 58^\circ$ Medium surface waves on LP
		e		12	03.3		1.2					
		e			08.0		0.9					
	LPN	eSur	32	40								
25 Jan		eP	14	42	23.7	5	0.7		T			
25 Jan		eP	18	58	42.6	2	0.7		T			
25 Jan		eP	19	07	12.6	3	0.2		NR			$\Delta$ (S-P) = 1.7°
		eS		34.3	999							
25 Jan		eP	20	34	12.6	35	1.8		T	5.1		Tonga Islands 19.0 S 173.3W h about 129 km O = 20 21 31.6 $\Delta = 89^\circ$
		e			22.3		1.4					
		e			37.5		1.2					
		e(pP)			46.8		1.0					
		e		35	07.9		1.1					
25 Jan		eP	20	40	36.8	3	1.0		T			
26 Jan		eP	00	24	52.2	5	0.5		R			
	E	eSur	26	19.4	999							

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
26 Jan		eP	04	07	50.3	3	1.0		T	4.2	Jan Mayen Islands region 71.6 N 9.2 W h about 33 km O = 03 58 04.0 $\Delta = 57$	
26 Jan		eP	08	02	16.3	1	0.9		T			
26 Jan		eP	08	08	21.7	2	0.8		T			
26 Jan		eP	10	04	18.8	22	1.1		T			
		e			46.9		1.3					
		e	05	04	04.6		1.3					
26 Jan		eP	10	18	30.0	2	0.9		T			
26 Jan		eP	19	24	42.6	4	1.0		T	4.6	Tonga Islands region 15.7 S 172.9 W h about 33 km O = 19 12 02.5 $\Delta = 86.5^\circ$	
		e			54.8		1.2					
26 Jan		eP	20	22	56.9	7	0.2		L		$\Delta$ (S-P) = less than $0.1^\circ$	
		eS			58.7	999						
26 Jan		eP	21	06	28.1	4	1.1		T			
26 Jan		eP	21	24	28.6	5	1.1		T			
26 Jan		eP	21	27	36.5	14	1.4		T			
26 Jan		eP	21	27	59.6	8	1.1		T	4.4	Colombia 4.6 N 76.5 W h about 92 km O = 21 20 41.2 $\Delta = 39^\circ$	
26 Jan	N	eP	22	12	27.7	2	0.5		NR		$\Delta$ (S-P) = $2.5^\circ$	
		eS			58.8		0.5					
27 Jan		eP	00	18	27.2	2	0.9		T			
27 Jan		eP	00	54	56.5	4	1.1		T			
27 Jan		eP	01	03	03.2	5	1.0		T	4.5	Tonga Islands region 15.2 S 175.3 W h about 85 km O = 00 50 26.6 $\Delta = 88^\circ$	
		e			47.0		1.0					
27 Jan		ePP	01	25	21.0		1.7		T		Ryukyu Islands 25.6 N 128.3 E h about 61 km O = 01 06 58.4 $\Delta = 105^\circ$	
		e			39.0		1.7					
		e	26	40	40.8		1.6					
		ePKKP	36	53	53.8		1.2					

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
27 Jan		eP	03	04	05.3	23	1.6		R	4.6	Mag. 4 3/4 (PS) Baja, California 31.6 N 115.7 W h about 33 km O = 03 00 38.7 $\Delta = 14.5^\circ$	
		e			41.2		1.3					
		e	05	20	20.2		1.1					
		e			44.0		1.1					
		e	06	46	46.9		1.2					
	N	eSur	08	16	16.5		3.0					
	BBZ	eSur	09	51			10.0				Strong surface waves on LP and BB. Surface waves on SP.	
27 Jan		eP	11	47	44.1	2	0.6		T			
27 Jan		eP	11	55	28.7	9	1.2		T	4.5	Gulf of Alaska 59.4 N 153.4 W h about 94 km O = 11 47 36.3 $\Delta = 43^\circ$	
		e			48.0		1.1					
		e			57.6		1.1					
		e	57	38	38.0		0.9					
		eScP	12	00	59.4		0.9					
	LPE	e	02	19			18.0				Weak surface waves on LP.	
	LPE	e(SS)	05	47			22.0				Phases at 11 55 48.0 and 11 57 38.0 are possible new events.	
	LPE	eSur	09	23								
27 Jan		eP	15	28	26.2	12	1.0		R	4.5	Idaho 44.3 N 114.5 W h about 31 km O = 15 24 46.5 $\Delta = 15^\circ$	
		e			30.0		0.7					
		e			33.1		0.8					
		e			48.6		1.2					
		e	29	47	47.5		1.5					
		e	30	24	24.2		1.3				Strong surface waves on all systems	
		e	31	07	07.2		1.0					
		e			27.4		1.3					
		e			42.8		1.1					
		e	32	10	10.9		1.2					
		eSur			43.3		3.7					
	LPN	eSur	33	08								
	BB	eSur	34	19			10.0					
27 Jan		eP	16	36	23.4	1	0.7		T			
		e			35.4		1.2					
27 Jan	LP	eSur	19	36	46				T	5.2	New Britain 5.2 S 152.3 E h about 72 km O = 18 46 14.6 $\Delta = 111^\circ$ Medium surface waves on LP.	
27 Jan	UA	eP	19	48	53.2	23	0.7		T	5.8	Mag. 5 1/2-5 3/4 (PS) Caspian Sea near Azerbaijan, SSR 41.2 N 49.8 E h about 33 km O = 19 35 14.3 $\Delta = 98.5^\circ$	
		e		49	09.4		0.7					
	IB	e			20.5		0.9					
		e			39.7		0.9					
		e			53.0		0.8					
		e	50	39	39.5		0.7					

(continued on next page)



DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.	C.	T.	A	T			m	M	
1963			h.	m.	s.							
		e	52	16.2		1.2					(continued from preceding page)	
		ePP		58.6		1.7					Strong surface waves,	
		e	53	38.7		0.9					Love and Rayleigh type,	
		e	55	04.0		1.4					on LP; medium on BB.	
		e		32.0		1.0						
		e	56	12.3		1.2						
		e	57	31.7		1.1						
		ePKKP	20	05	16.1	0.7						
		e		44.5		0.8						
		e	06	01.6		1.4						
	LPE	eSur	20	19								
	LP	eSur	24	44								
28 Jan		eP	00	27	08.6	7	1.1		T			
		e			17.5		1.0					
		e			21.5		1.0					
		e	28	21.6		1.6						
28 Jan		eP	00	36	42.7	6	1.3		T			
28 Jan		eP	01	16	10.5	10	1.6		T			
28 Jan	UA	eP	02	20	58.0	36	0.8	5.4	T		Central Peru	
		e		21	33.6		1.1				10.8 S 76.7 W	
		e		22	12.6		1.0				h about 105 km	
		ePcP			16.6		0.8				O = 02 12 14.3	
		e			42.6		1.0				$\Delta = 50^\circ$	
		e	23	31.2		1.9						
	E	eS	28	05.8		1.7						
28 Jan		eP	02	34	06.1	3	1.1		T			
		e		35	06.3		1.2					
28 Jan		eP	02	58	29.7	2	1.0		T			
28 Jan		eP	04	17	55.2	9	1.0	4.9	T		Near south coast of	
		e			58.4		1.5				Hokkaido, Japan	
		e	18	14.2		1.1					43.5 N 144.6 E	
		e			20.6		1.0				h about 33 km	
		e			29.3		1.5				O = 04 05 30.9	
		e			48.7		0.9				$\Delta = 82.5^\circ$	
		e	19	08.0		1.1					Medium surface waves	
		e	21	33.2		1.4					on LP.	
	LP	eSur	46	47								
28 Jan		eP	05	39	57.1	1	0.7	4.2	T		Tonga Islands region	
											16.8 S 173.5 W	
											h about 88 km	
											O = 05 27 17.6	
											$\Delta = 88^\circ$	

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.	C.	T.	A	T			m	M	
1963			h.	m.	s.							
28 Jan		eP	07	59	59.1	8	1.0		T	4.6		Tonga Islands region
		e	08	00	17.6		1.0					16.7 S 172.5 W
		epP			40.7		1.5					h about 154 km
		e	02	03.7			1.5					O = 07 47 32.8
												$\Delta = 87^\circ$
28 Jan		eP	10	17	11.6	4	1.1		T			
		e			18.0		1.1					
28 Jan		eP'	10	22	07.9	1	0.6		T			Macquarie Islands region
												52.4 S 159.6 E
												h about 33 km
												O = 10 03 21.4
												$\Delta = 125^\circ$
28 Jan		eP	10	53	00.7	6	1.1		T	5.0		New Hebrides Islands
		e			11.7		0.7					19.0 S 169.6 E
												h about 220 km
												O = 10 39 30.6
												$\Delta = 102^\circ$
28 Jan		eP	12	26	49.5	6	1.1		T			Mag. = 6 1/2 (PS)
		e		27	05.3		1.0					New Britain
		e			20.6		1.5					2.6 S 149.9 E
		e		29	30.6		1.0					h about 33 km
		e		30	11.4		1.6					O = 12 12 19.8
		e			17.4		1.8					$\Delta = 109^\circ$
		e			34.0		1.5					Initial arrival is
		eP'			54.2	21	1.6					P diffracted.
		e		31	09.4		2.1					Strong surface waves,
		e			15.2		1.2					Love and Rayleigh type,
		ePP			20.5		2.1					on LP and BB.
		e			32.2		1.9					
		e			40.7		1.5					
		e			48.7		1.3					
		e		32	05.3		1.8					
		e			12.3		1.0					
		e			36.1		1.5					
		e			51.3		1.5					
		e		33	21.9		1.1					
		e			34.8		1.7					
	LP	ePPP			36		13.0					
	LP	e		35	14		17.0					
		e		36	55.9		1.2					
	LPE	eSKS		37	37		19.0					
	LPN	eS		39	01		28.0					
	LPE	ePS		40	49		31.0					
		e		41	25.5		1.0					
	LPE	ePPS		46			26.0					
		ePKKP		42	04.2		0.9					
		e			22.4		1.5					
		e			38.3		1.0					
		e			55.1		1.5					

(continued on next page)

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
	LPE	e	43	17		27.0					(continued from preceding page)	
	LPE	eSS	46	33		28.0						
	LPE	eSSS	50	20		20.0						
	LPE	ePKPPKS	54	15		20.0						
	LPN	eSur	57	37								
	LP	eSur	13	02	43				6.2			
28 Jan		eP	13	09	22.2	258	2.3	T	5.8		Mag. = 6-6 1/2 (PS)	
		e			38.5		1.1				Alaska Peninsula	
		e			53.6		1.5				54.7 N 161.6 W	
		e	10	08.7			1.0				h about 33 km	
		e	11	27.5			1.2				O = 13 00 50.7	
		e			46.2		1.1				$\Delta = 47^\circ$	
		e	12	27.5			1.3				Strong surface waves on	
		e	13	50.0			1.5				all systems.	
		e	15	15.7			1.5				Possible new event	
	E	eS	16	08.0			2.1				at 13 40 05.7.	
	E	e(PS)			21.2		3.8					
	E	e			42.2		5.0					
		e	17	34.7			1.4					
		e	18	19.0			1.4					
		e			31.8		1.3					
		e	20	41.6			1.9					
		e	22	42.4			1.8					
		e	23	46.7			1.1					
		eSur	26	27.0		20.0						
		e(P'P')	40	05.7			1.5					
		e			13.4		1.0					
		e			26.5		0.9					
		e			32.3		1.2					
		e	41	27.2			1.3					
		e			46.7		1.4					
		e			52.4		1.8					
28 Jan		eP	14	02	40.7	3	0.8	T	4.6		Fiji Islands	
		e			03 11.1		1.1				19.7 S 178.1 W	
		epP			04 55.7		1.2				h about 587 km	
											O = 13 50 28.3	
											$\Delta = 93^\circ$	
28 Jan	N	eP	21	53	20.3	1	0.4	NR			$\Delta (S-P) = 2.4^\circ$	
		eS			50.3		0.6					
28 Jan		eP	23	24	20.2	2	0.6	T				
28 Jan		eP	23	39	37.4	3	0.3	SE NR			$\Delta (S-P) = 1.6^\circ$	
		e			47.2		0.3					
		eS			58.8	999						
29 Jan		eP	02	47	31.6	3	1.2	T				
29 Jan		eP	03	39	36.2	9	1.5	T				

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
1963			h.	m.	s.							
29 Jan		eP	04	38	14.4	5	0.9	T	4.3		South of Panama	
											5.8 N 78.4 W	
											h about 31 km	
											O = 04 31 29.6	
											$\Delta = 34^\circ$	
29 Jan		eP	05	12	43.3	2	1.0	T				
29 Jan		eP	06	01	48.1	5	1.3	T				
		e			07 28.3		1.5					
29 Jan		eP'	07	47	14.6	35	1.9	T			Indian Ocean, southwest	
		e			28.5		1.8				of Chagos Islands	
		e			37.3		1.4				12.7 S 66.1 E	
		e			52.5		1.6				h about 33 km	
		e			48 27.1		1.1				O = 07 27 17.9	
		e			50 59.4		1.3				$\Delta = 155^\circ$	
		ePP			51 13.0		1.5					
29 Jan		eP	08	04	08.1	5	1.2	T				
29 Jan		eP	08	14	03.8	9	1.5	T	4.9		Off coast of Honshu, Japan	
		e			14.7		1.2				40.3 N 144.2 E	
											h about 27 km	
											O = 08 01 26.8	
											$\Delta = 85.5^\circ$	
29 Jan		eP	08	35	37.9	6	1.5	T				
29 Jan		eP	09	32	36.1	25	0.9	T	5.1		Kurile Islands	
		e			42.5		0.6				49.7 N 154.9 E	
		e			44.8		1.2				h about 126 km	
		e			53.3		0.8				O = 09 21 14.3	
		epP			33 08.3		0.8				$\Delta = 73^\circ$	
		e			22.2		0.8				Possible new event	
		e			37.4		0.8				at 09 53 15.3.	
		e			34 30.4		1.2					
		e			35 01.4		1.2					
		ePP			21.8		1.4					
		e			34.7		1.3					
		e			36 10.0		1.2					
		e			39 20.0		1.6					
	LPE	eS	42	00			19.0					
	E	e			21.1		2.7					
	E	eScS			40.6		2.2					
	LPE	ePPS			56		22.0					
		e	45	06.8			1.2					
	LPE	eSS	46	26			20.0					
	LPE	e	47	35			20.0					
	LPE	e	50	20			19.0					
		e	51	12.8			1.1					
	LP	e	22				26.0					

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DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.	C.	T.	A	T			m	M	
1963			h.	m.	s.							
	LPE	e	52	29		35.0					(continued from preceding page)	
		e	53	15.3		0.9						
	LPE	e	57	32		23.0						
		eP'P'	10	00	04.9	1.1						
29 Jan	LPE	eSur	14	55	24				T		Weak surface waves on LP	
29 Jan		eP	17	06	46.2	5	1.0		T	4.7	Tonga Islands	
		e			58.6		1.4				15.2 S 173.4 W	
											h about 33 km	
											O = 16 54 03.7	
											$\Delta = 87^\circ$	
29 Jan		eP	17	55	05.8	1	0.7		T			
29 Jan		eP	18	16	33.7	2	0.4	SE	NR		$\Delta (S-P) = 1.6^\circ$	
		eS			55.1	999						
29 Jan		eP	20	43	45.6	25	1.1		T	5.2	Chile-Bolivia border	
		e		44	05.9		0.6				21.5 S 68.6 W	
		e			16.2		1.0				h about 73 km	
		ePcP			25.3		0.8				O = 20 33 27.0	
		e			46.0		1.2				$\Delta = 63^\circ$	
		e			56.2		1.1					
		e	45	05.1			1.0					
		e(PP)			53.8		1.4					
		e	46	17.3			0.8					
		e			58.1		1.6					
29 Jan		eP	22	55	03.9	3	0.3		NR		$\Delta (S-P) = 1.7^\circ$	
		e			14.1		0.4					
		eS			25.5	999						
29 Jan		eP	22	59	24.3	1	0.8		T	3.8	Fox Islands, Aleutian Is.	
											52.7 N 168.4 W	
											h about 33 km	
											O = 22 50 22.7	
											$\Delta = 51^\circ$	
30 Jan		eP	02	13	40.6	3	1.1		T			
30 Jan		eP	04	29	32.0	4	1.2		T			
30 Jan		eP	04	48	27.5	6	1.1		T	4.5	Alaska Peninsula	
		e			47.9		1.3				54.8 N 161.6 W	
		e			57.3		0.8				h about 33 km	
		e		49	02.6		1.6				O = 04 39 56.3	
		e			51.5		1.5				$\Delta = 46.5^\circ$	
		ePcP			57.4		0.9				Medium surface waves,	
	LPE	eSur	05	02	03						Love and Rayleigh type,	
	LP	eSur	04	00							on LP.	

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.	C.	T.	A	T			m	M	
1963			h.	m.	s.							
30 Jan		eP	05	54	13.3	2	0.9		R	4.0	Yellowstone National Park,	
		e			28.2		0.6				Wyoming	
		e			55	18.1		1.0			44.9 N 110.8 W	
	E	eSur			58	21.0		1.3			h about 33 km	
											O = 05 51 00.9	
											$\Delta = 14^\circ$	
30 Jan		eP'	06	27	29.3	3	0.5		T		Northern Celebes	
		e			52.0		1.1				0.2 N 123.4 E	
											h about 33 km	
											O = 06 08 25.4	
											$\Delta = 127.5^\circ$	
30 Jan		eP	09	32	48.6	2	1.0		T			
		e			55.4		0.9					
		e			33	02.3		0.9				
30 Jan		eP	10	02	44.7	3	0.6		T	4.4	Near coast of	
		e		03	02.7		0.6				southern Kamchatka	
											50.8 N 157.4 E	
											h about 31 km	
											O = 09 51 23.7	
											$\Delta = 72^\circ$	
30 Jan		eP	10	24	22.2	9	1.9		T	5.7	Mag. = 6 1/2 (PS)	
		e			33.9		1.9				Sandwich Islands region	
		e			42.4		1.0				55.6 S 28.3 W	
		e		25	06.5		1.3				h about 33 km	
		e			24.2		1.3				O = 10 10 04.1	
		e			30.8		1.1				$\Delta = 108^\circ$	
		e			49.3		1.2				Initial arrival is	
		e		26	05.5		1.0				P diffracted.	
		e			26.0		1.2				Strong surface waves,	
		e		27	23.9		1.5				Love and Rayleigh type,	
		e			34.7		1.2				on LP and BB.	
		e			52.1		1.9				Possible new event at	
		e		28	10.8		1.5				10 44 29.1.	
		ePP			47.4		1.8					
		e			59.3		2.6					
		e		29	09.2		2.2					
		e			19.4		1.3					
		e			50.6		1.6					
		e		30	00.6		1.4					
	LP	e			17		20.0					
		e			31	11.1	2.8					
	LP	ePPP			16		20.0					
	LPN	eSKS			35	03	21.0					
	LPE	eS			36	30	22.0					
	E	e			37	49.1	7.0					
		e				57.4	1.4					
	LPN	ePS			38	15	21.0					
		e			39	05.0	1.1					

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DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
			h.	m.	s.							
(continued from preceding page)												
1963		ePKKP <sub>1</sub>		49.2		1.0						
		ePKKP <sub>2</sub>		59.2		1.1						
		e	40	12.8		1.3						
		e		21.4		1.2						
		e		35.3		1.1						
		e		50.9		1.9						
		e	41	01.8		1.5						
		e	42	43.8		1.1						
	LPE	eSS	44	07	999							
		e		29.1		1.8						
		e		51.0		1.5						
	LPE	eSSS	48	09	999							
	LPE	eSur	54	52								
	LP	eSur	59	22								
30 Jan		eP'	10	52	32.9	4	1.0		T		India-Nepal border	
		e		53.9		1.0					29.7 N 80.5 E	
		e		53	52.8	1.2					h about 57 km	
		ePKKP	11	03	11.3	1.2					O = 10 33 59.1	
		e		58.9		1.2					Δ = 115.5°	
30 Jan		eP	11	15	33.4	3	1.3		T			
30 Jan		eP	12	31	28.5	4	1.3		T			
30 Jan		eP	14	48	38.8	2	1.3		R		Start is indefinite	
	N	eSur		50	03.8	2.4						
30 Jan		eP	18	06	05.6	3	0.3	NE	L		Δ (S-P) = less than 0.1°	
	N	eS		08.4		1.2						
30 Jan		eP	18	48	27.3	6	0.7	WNW	R			
	N	eSur		49	55.5	1.4						
30 Jan		eP	19	47	41.6	6	1.2		T			
30 Jan		iP	20	57	19.3	9	0.2	NE	L		Δ (S-P) = less than 0.1°	
		eS		21.2	c 999							
30 Jan		eP	22	02	52.8	2	0.5	(E)	NR		Δ (S-P) = 2.7°	
	E	eS		03	24.9	0.6						
30 Jan		eP	23	06	52.8	7	0.5		R	4.5	Colorado	
		e		07	18.9	0.7					39.8 N 104.6 W	
		eSur		08	50.0	999					h about 33 km	
											O = 23 05 09.6	
											Δ = 6.75°	
31 Jan		eP	00	56	31.5	7	0.5	SE	T			
		e		58.4		1.2						
		e		57	06.8	0.5						

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
			h.	m.	s.							
1963												
31 Jan		eP	02	28	28.6	1	0.6		T			
		e			38.2		0.7					
31 Jan		eP	03	17	47.0	14	1.2		T	4.6	Central Alaska	
		e			51.2		1.3				63.5 N 149.4 W	
											h about 56 km	
											O = 03 09 58.3	
											Δ = 42°	
31 Jan		eP	04	18	15.0	6	1.0		T		Strong surface waves	
		e			26.3		1.1				on LP	
		e			19	03.3	1.2					
	LPE	e			21	46	22.0					
	LPE	eSur			22	45						
	LP	e(Sur)			24	28						
31 Jan		eP	04	43	51.9	3	1.2		T			
31 Jan		eP	05	20	51.3	16	1.5		T	5.6	Ryukyu Islands	
		e		21	00.6		1.1				27.9 N 126.3 E	
		e		22	38.5		1.0				h about 33 km	
		e		23	05.0		0.8				O = 05 06 46.0	
		e			19.8		1.1				Δ = 104°	
		e			54.1		1.0				Strong surface waves	
		e		24	32.5		1.5				on BB and LP	
		ePP		25	07.3		2.5					
		e			40.6		1.9					
		e		26	03.0		2.0					
		e			30.2		2.0					
	LP	ePPP		27	04		16.0					
		e			30.6		1.1					
		e			59.8		1.5					
		e		28	10.7		1.1					
		e			50.9		0.9					
	LPN	eSKS		31	35		17.0					
	LPE	ePS		34	26		21.0					
	LPE	ePPS		35	32		20.0					
		ePKKP		36	46.5		1.7					
	LPE	e		37	06		14.0					
		e			33.9		2.1					
	LPE	eSS		40	06		20.0					
		e			37.4		1.4					
	LPE	e		41	46		20.0					
	LPE	e		44	16		25.0					
	LPE	e(Sur)		53	07							
	LP	eSur		06	00	00						
31 Jan		eP	06	07	35.9	7	0.9	SW	T			
		e			42.4		1.1					
		e		08	08.9		1.2					
		e			27.6		1.1					
		e			43.2		1.5					
		e		09	02.7		1.8					



DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
			h.	m.	s.							
1963												
31 Jan		eP	11	36	06.3	3	1.2		T	4.2		Alaska Peninsula
		e			33.0		0.9					54.7 N 161.7 W
		e			55.3		0.7					h about 33 km
		ePP	37	42.5			1.5					O = 11 27 30.7
	LPE	eSur	50	32								$\Delta = 47^\circ$
	LP	eSur	53	32								Weak surface waves, Love and Rayleigh type, on LP.
31 Jan		eP	15	20	02.6	17	1.0		T	5.3		Ionian Sea, west of Crete
		e			24.4		0.9					35.8 N 21.9 E
		e			29.9		1.4					h about 33 km
		e			40.4		1.1					O = 15 07 00.4
		ePP	23	37.8			1.2					$\Delta = 90^\circ$
31 Jan		eP	16	34	30.5	1	0.7		T	4.1		Fiji Islands
		epP	35	57.8			1.3					21.5 S 178.1 W
												h about 373 km
												O = 16 21 52.8
												$\Delta = 90^\circ$
31 Jan		eP	16	53	13.8	30	1.4	SE	T			
		e			30.5		1.5					
		e			35.2		1.4					
		e			48.1		1.2					
		e			58.6		1.1					
		e	54	26.4			1.0					
31 Jan		eP	17	19	42.4	9	0.9		T	5.4		Turkman SSR
		e	20	09.4			0.6					41.4 N 50.2 E
		e	21	05.2			1.1					h about 33 km
		e	22	45.9			0.9					O = 17 06 04.4
		e	23	02.4			1.1					$\Delta = 98.5^\circ$
		e			08.6		0.7					Phase at 17 22 45.9
		ePP			47.6		1.3					is possible new event.
31 Jan		eP	18	53	02.3	4	0.8		T	4.5		Fox Islands, Aleutian Is.
		e			30.0		1.6					52.7 N 168.7 W
		e	54	32.9			1.0					h about 33 km
												O = 18 44 00.2
												$\Delta = 51^\circ$
31 Jan		eP	19	20	57.3	7	1.0		T	4.3		Bering Sea
		e			21 04.1		0.8					54.2 N 167.5 E
		e			28.6		1.3					h about 53 km
												O = 19 10 22.6
												$\Delta = 64.5^\circ$
31 Jan		eP	20	00	13.7	6	0.7	ESE	NR			$\Delta(S-P) = 1.6^\circ$
		e			15.4		0.5					
		e			18.4		0.4					
		e			23.3		0.7					
		e			27.6		0.5					
		eS			34.4	999						

DATE	Syst.	Phase	Arrival Time			Ground Motion		Dir.	Type	Magnitude		Remarks
			G.C.T.			A	T			m	M	
			h.	m.	s.							
1963												
31 Jan		eP	21	44	22.5	1	0.4		NR			$\Delta(S-P) = 2.4^\circ$
	N	eS			52.7		0.5					
		eSur			57.9	999						
31 Jan		eP	23	10	14.3	1	0.3		NR			$\Delta(S-P) = 2.8^\circ$
		e			18.0		0.3					
		eS			46.9	999						
		eSur			51.0	999						