

SEISMOLOGICAL BULLETIN
OF
Matsushiro Seismological Observatory, Japan
MATSUSHIRO

Seismological Bulletin

JULY , AUGUST

1964

Latitude 36° 52' 30" N.

Longitude 138° 12' 32" E.

Elevation 140 M.

Instrumental Constants

Instrument	Comp.	Period (sec)	Damping ratio	Magnification
Benioff Seismograph (Short Period)	N E Z	T ₁ = 1.0 T ₂ = 3.23 T ₁ = 1.0 T ₂ = 0.23 T ₁ = 1.0 T ₂ = 0.21	h ₁ = 0.50 h ₂ = 1.7 h ₁ = 0.70 h ₂ = 2.5 h ₁ = 0.72 h ₂ = 1.2	105,000 (max) 105,000 (max) 131,000 (max)
Benioff Seismograph (Long Period)	N E Z	T ₁ = 1.0 T ₂ = 70 T ₁ = 1.0 T ₂ = 62 T ₁ = 1.0 T ₂ = 84	h ₁ = 0.55 h ₂ = 3.3 h ₁ = 0.70 h ₂ = 3.6 h ₁ = 0.72 h ₂ = 2.3	7,500 (max) 3,500 (max) 7,500 (max)
Short Period Seismograph	Z	T ₁ = 1.0 T ₂ = 3.52	h ₁ = 1.4 h ₂ = 1.2	32,000 (max)
Gallen Seismograph	N E Z	T ₁ = 15 T ₂ = 100 T ₁ = 15 T ₂ = 100 T ₁ = 7.5 T ₂ = 100	h ₁ = 1.0 h ₂ = 1.2 h ₁ = 1.0 h ₂ = 1.2 h ₁ = 0.76 h ₂ = 0.87	1,750 (max) 1,600 (max) 660 (max)

Matsushiro Seismological Observatory

Matsushiro-machi, Nagano-shi

Nagano-ken, Japan

1000 kg Long Period Seismograph	N S	T ₁ = 15 T ₂ = 100 T ₁ = 15 T ₂ = 100	h ₁ = 1.0 h ₂ = 1.2 h ₁ = 1.0 h ₂ = 1.2	1,750 (max) 1,600 (max)
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Matsushiro Seismological Observatory, Japan

Seismological Bulletin

Latitude 36° 32' 30"N.

Longitude 138° 12' 32"E.

Elevation 440 M.

Instrumental Constants

Instruments	Comp.	Period (sec)		Damping ratio		Magnification
Benioff Seismograph (Short Period)	N	T ₁ = 1.0	T ₂ = 0.23	h ₁ = 0.68	h ₂ = 1.7	103,000 (max)
	E	T ₁ = 1.0	T ₂ = 0.22	h ₁ = 0.70	h ₂ = 1.6	106,000 (max)
	Z	T ₁ = 1.0	T ₂ = 0.21	h ₁ = 0.72	h ₂ = 1.2	131,000 (max)
Benioff Seismograph (Long Period)	N	T ₁ = 1.0	T ₂ = 70	h ₁ = 0.68	h ₂ = 5.9	7,330 (max)
	E	T ₁ = 1.0	T ₂ = 62	h ₁ = 0.70	h ₂ = 5.6	9,640 (max)
	Z	T ₁ = 1.0	T ₂ = 84	h ₁ = 0.72	h ₂ = 7.3	7,590 (max)
Short Period Seismograph	Z	T ₁ = 1.0	T ₂ = 2.82	h ₁ = 1.4	h ₂ = 1.2	32,000 (max)
Galitzin Seismograph	N	T ₁ = 15	T ₂ = 100	h ₁ = 1	h ₂ = 1.2	1,350 (max)
	E	T ₁ = 15	T ₂ = 100	h ₁ = 1	h ₂ = 1.1	1,640 (max)
	Z	T ₁ = 7.5	T ₂ = 100	h ₁ = 0.76	h ₂ = 0.87	860 (max)
Wood-Anderson Seismograph	N	0.8		0.8		1,050
	E	0.8		0.8		1,200
1000 kg Long Period Seismograph	N	33.0		0.60		100
	E	30.0		0.62		100

July , 1964

Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
1. P	NE		00 37 25	53.9 N., 151.7 W.			
S	NE		47	Alaska aftershock.			
1. eP	N		00 51 43	h: 20 km ca.			
50.8 N., 176.7 E.				H= 06 05 33.7			USCGS
Rat ls.							
h: 33 km ca.				1. iP	NEZ	06 24 10.8	
H= 00 45 07.2			USCGS	iS	NE	39.4	
				P: S, W, D			
1. P	NZ		01 20 06	1. P?	NEZ	06 41 16.7	
1. iP Z, P N			02 09 55.9	1. iP	Z	07 17 03.7	
S	NEZ		10 05	i	NE	03.8	
P: D				S	NEZ	23	
1. iP	Z		02 50 14.3	P: D			
i	NE		14.4	Mag. 4.1 (Mat.)			
i	NE		23	35.4 N., 140.1 E.			
i	Z		51 05	Eastern Honshu, Japan.			
S	NE		52 20	h: 74 km ca.			
Lq	E		38	H= 07 16 32			USCGS
Lq	N		40				
Lr	NE		53 20	1. P	Z	07 52 45	
P: D				i	NE	46.0	
Mag. 5 $\frac{1}{2}$ -6 (Mat.)				S	NEZ	53 10	
46.3 N., 146.9 E.				1. iP	Z	08 55 45.9	
Kurile ls.				i	E	46.4	
h: 33 km ca.				S	NEZ	03 00 10	
H= 02 47 33.9			USCGS	P: D			
1. eP	Z		03 00 24	1. iP	NZ	09 23 40.0	
S?	NE		58	P: C			
1. P	NZ		03 18 10	1. eP	Z	09 33 13	
i	NZ		15.2	eS	NE	39 05	
S	NEZ		36	eLq	E	41.6	
1. P	NZ		04 03 25.6	Lr	E	43 43	
i	Z		30.6	2.0 S., 141.2 E.			
S	NEZ		50	Off north coast of western			
i	N		09 03	New Guinea.			
P: C				h: 33 km ca.			
1. iP	NZ		04 17 13.3	H= 09 25 54			USCGS
i	N		19				
S	E		36	1. iP	NE	09 49 32.7	
i	Z		37	i	NEZ	45	
i	N		49	eS	NE	51 54	
P: S, D				L	N	52 38	
1. iP	Z		04 30 53.9	L	NE	54 05	
i	N		31 06.7	P: D			
P: C				Mag. 5 $\frac{1}{2}$ -6 (Mat.)			
1. iP	Z		06 04 06.8	45.2 N., 150.3 E.			
i	Z		12	Kurile ls.			
iS	E		30.9	h: 75 km ca.			
P: C				H= 09 46 49.6			USCGS
1. eP	Z		06 14 26	1. P	EZ	09 55 22	
(cont.)				e	NEZ	34	
				eS	N	57 37	
				44.6 N., 149.9 E.			
				Kurile ls.			
				h: 33 km ca.			
				H= 09 52 31.8			USCGS

July, 1964

Date Phase Comp. Time(GMT)

1. eP Z 11 38 57
e E 42 14
eL E 44 00

1. eP Z 11 50 23
e E 54 21

1. iP NZ 13 30 10.5
S NE 36
P: N, D

1. P NZ 13 31 55
E 32 23
e N 24

1. P Z 13 38 41
e N 43
eS E 44 53
e Z 46 09
eL E 48 20
eL E 52 39
52.7N., 168.2W.
Fox Islands.
h: 33 km ca.
H= 13 31 06.2 USCGS

1. iP EZ 13 40 11.4
i N 11.7
i EZ 42 36.4
P: E, C
1.8N., 127.1E.
Molucca Passage.
h: 33 km ca.
H= 13 33 10 USCGS

1. iPNZ, PE 14 08 18.0
S E 49
P: S, C

1. P Z 14 26 18.3

1. P NEZ 15 00 47
S NEZ 01 09

1. iPZ, PE 15 54 52.4
i N 55 12
i NE 15.6
i Z 15.8
P: C

1. P NEZ 17 19 34
i Z 39
S NE 20 00
i E 03.5

1. iPEZ, PN 18 57 29.6
S E 53.4
P: E, D

1. iP EZ 19 47 02.3
i N 02.5
(cont.)

Date Phase Comp. Time(GMT)

iS Z 19 47 15.6
P: E, D
36.2N., 139.8E.
Honshu, Japan.
h: 50 km ca. JMA

1. iPKP Z 20 40 26.8
i Z 41 05
PKP: D
17.1S., 69.1W.
Peru-Bolivia border region.
h: 147 km ca.
H= 20 20 56.6 USCGS

1. P Z 21 21 59
S NEZ 22 24.5

1. P EZ 21 52 40.7
S N 53 03.6

1. iP Z 21 55 15.5
P: D

1. iP NEZ 22 47 41.4
S NE 43 40
L E 52
P: S, E, D
31.1N., 139.6E.
South of Honshu, Japan.
h: 147 km ca.
H= 22 46 18.7 USCGS

1. PKP Z 23 08 44
i N 45.4
ePP? Z 12 13
eFSPS E 31 50
eL E 52 33
14.3S., 73.1W.
Southern Peru.
h: 139 km ca.
H= 22 49 23.4 USCGS

2. iP NE 01 28 12.0
eS E 35 44
e N 43 49
e E 44 15
P: N, E
60.1N., 146.0W.
Alaska aftershock.
h: 14 km ca.
H= 01 19 02.7 USCGS

2. iP Z 02 02 33.4
S N 49.5
i E 50
P: D

2. P Z 02 54 57
S NE 55 19

2. iP NZ 02 58 51.8
(cont.)

Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
July 1964				July 1964			
2. P	NEZ	N	23 15 27	2. P	NEZ	N	02 22 21.4
2. iP	NZ	E	23 44 29.5	2. P	NEZ	N	03 12 14.0
P: S, C			53	2. P	NEZ	N	05 10 22.0
3. iP	Z	NZ	01 25 22	2. P	NEZ	N	05 17 00
eS			48	2. P	NEZ	N	05 20 00
P: C				2. P	NEZ	N	05 20 00
3. iP	Z	NE	02 21 05.6	2. P	NEZ	N	05 20 00
iS			06.3	2. P	NEZ	N	05 20 00
S	NEZ	N	32	2. P	NEZ	N	05 20 00
iP: C			38	2. P	NEZ	N	05 20 00
3. iP	NEZ	NZ	02 47 58.9	2. P	NEZ	N	05 20 00
iS			48	2. P	NEZ	N	05 20 00
S	NEZ	NZ	05	2. P	NEZ	N	05 20 00
P: S, E, C			30	2. P	NEZ	N	05 20 00
3. iP	NEZ	N	03 24 53.4	2. P	NEZ	N	05 20 00
iS			25	2. P	NEZ	N	05 20 00
iS	N	E	16.0	2. P	NEZ	N	05 20 00
P: N, W, D			16.5	2. P	NEZ	N	05 20 00
3. iP	Z	E	03 29 35.0	2. P	NEZ	N	05 20 00
iS			36.2	2. P	NEZ	N	05 20 00
iS	Z	E	40.2	2. P	NEZ	N	05 20 00
P: C			59.5	2. P	NEZ	N	05 20 00
3. iP	Z	E	04 36 34.3	2. P	NEZ	N	05 20 00
S			57	2. P	NEZ	N	05 20 00
P: D			58	2. P	NEZ	N	05 20 00
3. iP	NEZ	N	06 36 20.8	2. P	NEZ	N	05 20 00
iS			39.0	2. P	NEZ	N	05 20 00
iS	N	E	40.0	2. P	NEZ	N	05 20 00
P: S, E, D				2. P	NEZ	N	05 20 00
36.2N., 139.8E.				2. P	NEZ	N	05 20 00
Honshu, Japan.				2. P	NEZ	N	05 20 00
h: 130 km ca.				2. P	NEZ	N	05 20 00
JMA				2. P	NEZ	N	05 20 00
3. P	Z	NZ	06 48 18	2. P	NEZ	N	05 20 00
iS			23.9	2. P	NEZ	N	05 20 00
iS	N		54.5	2. P	NEZ	N	05 20 00
3. iPNZ, PN	E	NZ	07 22 19.1	2. P	NEZ	N	05 20 00
eS			43	2. P	NEZ	N	05 20 00
iS			44.5	2. P	NEZ	N	05 20 00
P: C				2. P	NEZ	N	05 20 00
3. iP	NEZ	Z	08 17 02.0	2. P	NEZ	N	05 20 00
iS			07	2. P	NEZ	N	05 20 00
eS	NE		26	2. P	NEZ	N	05 20 00
L	NEZ		50	2. P	NEZ	N	05 20 00
P: S, W, C				2. P	NEZ	N	05 20 00
Mag. 5.7 (Mat.)				2. P	NEZ	N	05 20 00

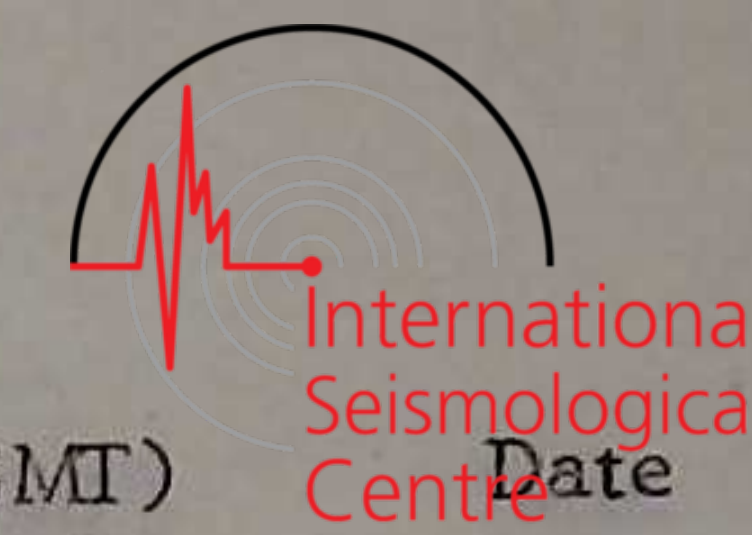
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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
July 1964				July 1964			
2. P	NEZ	N	23 15 27	38.2N., 138.9E.			
2. iP	NZ	E	23 44 29.5	Near west coast of Honshu,			
P: S, C			53	Japan.			
3. iP	Z	NZ	01 25 22	h: 33 km ca.			
eS			48	H= 08 16 33.7			
P: C				USCGS			
3. iP	Z	NE	02 21 05.6	3. P	Z	NEZ	08 33 53
iS			06.3	S			34 15
S	NEZ	N	32	3. P	NZ		08 40 04.3
iP: C			38	iS	N		08.5
3. iP	NEZ	N	02 47 58.9	S	NE		26.5
iS			48	3. iP	NEZ		09 02 57.1
S	NEZ	NZ	05	S	NE		03 13
P: S, E, C			30	P: S, E, D			
3. iP	NEZ	N	03 24 53.4	3. P	Z		09 28 20
iS			25	eS	N		23
iS	N	E	16.0	S	NE		43.4
P: N, W, D			16.5	3. iP	Z		10 20 18.1
3. iP	Z	E	03 29 35.0	iS	N		18.6
iS			36.2	S	NE		41
iS	Z	E	40.2	P: D			
P: C			59.5	3. P	NZ		10 57 14
3. iP	Z	E	04 36 34.3	iS	N		42.9
S			57	iS	N		58 00
P: D			58	3. eP	Z		11 20 36
3. iP	NEZ	N	06 36 20.8	3. P	Z		13 20 06.0
iS			39.0	eP: C	E		27 43
iS	N	E	40.0	3. P	Z		13 49 18
P: S, E, D				iS	NE		23.3
36.2N., 139.8E.				S			42
Honshu, Japan.				3. e	Z		13 55 34
h: 130 km ca.				e	N		14 00 53
JMA				e	E		04.5
3. P	Z	NZ	06 48 18	3. P	EZ		14 19 28
iS			23.9	33.9N., 74.5E.			
iS	N		54.5	Kashmir.			
3. iPNZ, PN	E	NZ	07 22 19.1	h: 94 km ca.			
eS			43	H= 14 10 33.0			
iS			44.5	USCGS			
P: C				3. iPNZ, PE			
3. iP	NEZ	Z	08 17 02.0	S	NE		14 59 54.2
iS			07	iS	Z		15 00 17
eS	NE		26	P: N, C			18
L	NEZ		50	3. P	Z		15 12 19.2
P: S, W, C				iS	NE		19.5
Mag. 5.7 (Mat.)				P: C	NE		43.5
(cont.)				3. iP	NEZ		15 23 49.0
				(cont.)			

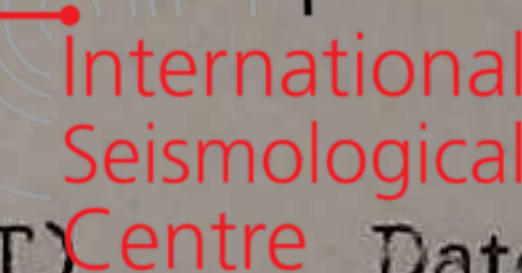
July , 1964	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
Date			h m s				h m s
	iSN, SEZ		15 24 16.5	3.	eP	Z	22 03 34
	P: N, W, D				eS	E	04 18
3.	P	EZ	15 26 15	3.	e	NEZ	22 05 14
	S	N	42				
3.	iP	NZ	15 34 17.3	3.	P	Z	22 08 47.3
	i	N	38.8		P: C		
	i	N	51.7		21.95., 170.1E.		
	P: D				Loyalty Is. region.		
					h: 45 km ca.		
					H= 21 58 08.1	USCGS	
3.	P	Z	15 58 35	3.	iP	NEZ	23 31 50.5
	i	N	35.5		e	NE	32 05
	S	NE	59 01		P: S, E, D		
3.	P	Z	16 41 03	3.	P	NZ	23 47 46.5
	i	NZ	03.9		e	E	48 06
	i	E	04.4		eS	N	32
	S	NE	26.5				
3.	eP	Z	16 42 31	4.	P	NZ	00 06 30
	S	NE	53		eS	E	55
3.	iP	Z	17 35 12.3	4.	P	Z	00 14 19
	i	NE	12.5		i	Z	29
	e	N	33		eS	E	42
	i	Z	34				
	P: D			4.	iP	Z	01 55 14.2
3.	iP	EZ	17 40 12.6		i	N	39.4
	i	N	13.0		iS	NEZ	40.5
	S	NE	33		P: C		
	P: E, D			4.	iP	NZ	03 37 13.8
3.	P	NZ	17 59 32		iS	N	40.0
	S	NEZ	57		P: N, D		
3.	P	NZ	19 39 30	4.	P	NZ	04 04 40
	iSNZ, SE		50.0		S	NE	05 03
3.	eP	Z	20 11 26	4.	iP	Z	04 10 26.5
	e	N	13 31		i	NE	26.9
	e	N	44		iS	N	39.5
	e	E	46		P: C		
3.	iP	NZ	20 15 53.9	4.	iP	NZ	04 36 20.5
	S	NEZ	17 09		i	E	20.9
	P: S, D				i	NE	37 04.5
3.	iP	EZ	20 37 41.5		i	N	08.5
	P: W, D				P: N, C		
3.	iP	NEZ	21 28 42.5	4.	iP	NZ	05 23 10.4
	S	NEZ	55		i	E	10.8
	P: S, W, D				i	NZ	16
3.	iP	EZ	21 43 09.9		S	NEZ	37
	i	N	10.0		P: S, C		
	i	NEZ	16.0	4.	iP	NZ	05 40 23.7
	i	NZ	44 13.8		iS	NE	29.0
	P: E, D				P: S		
				4.	iPNZ, PE		06 02 45.7

July , 1964	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
Date			h m s				h m s
	e	NE	06 03 04		i	E	13 46 47.5
	i	E	06.1		P: C		
	P: S, C						
4.	iP	NEZ	06 25 23.0	4.	iP	EZ	14 12 38.0
	S	NEZ	45		iS	E	13 00.5
	P: S, W, C				i	NZ	01.3
	P: S, W, C				P: D		
4.	iP	Z	06 31 10.5	4.	iP	NZ	14 16 18.7
	iS	E	32.5		iS	E	44.7
	i	N	33.0		i	N	45.0
	P: D				P: N, D		
4.	iP	Z	06 36 27.5	4.	iP	NEZ	14 35 56.0
	S	E	57.5		eS?	E	36 28
	P: C				i	Z	45
	P: C				P: S, W, C		
4.	iP	Z	06 40 57.5	4.	iPNZ, PE		14 52 04.9
	eS	N	41 22		S	E	35
	P: C				P: S, C		
4.	iP	Z	10 19 45.0	4.	P	Z	14 58 11
	iS	NEZ	20 00		i	NZ	17.3
	P: C						
4.	iP	Z	10 54 52.0	4.	iP	NZ	15 14 49.0
	i	NZ	52.5		e	N	15 23
	i	E	52.9		i	E	29.2
	iS	NE	59 22.0		P: N, D		
	L	E	11 00 27	4.	iP	Z	15 19 49.1
	L	N	02 33		S	N	20 15
	P: C				i	E	16
	Mag. 6 (Mat.)				P: C		
	11.7N., 144.5E.						
	Mariana Islands.						
	h: 33 km ca.						
	H= 10 49 28.8	USCGS		4.	iP	EZ	17 12 53.6
					i	N	53.7
					iS	NE	57.5
4.	iPKT	Z	12 33 16.1		P: W, C		
	i	NE	17.5	4.	eP	NZ	17 16 38
	i	N	42.7				
	P: C			4.	P	NEZ	18 06 44
	15.5S., 72.5W.				S	NEZ	07 10
	Southern Peru.						
	h: 148 km ca.	USCGS		4.	iP	EZ	18 50 33.8
	H= 12 13 56.9				i	N	34.0
4.	iP	NZ	13 09 07.9		i	NE	50.7
	i	E	10 08.0		P: E, D		
	P: N, D			4.	P	NEZ	19 33 00
					eS	N	22
4.	P	Z	13 17 42		i	E	23.2
	58.9N., 148.1W.			4.	P	NZ	20 00 19.6
	Alaska aftershock.				iS	E	46.5
	h: 33 km ca.	USCGS					
	H= 13 08 41			4.	P	Z	20 58 16
4.	iP	Z	13 46 18.8		S	E	39.5
	i	NE	19.0				
	i	NZ	23.0	4.	eP	Z	22 52 42
	iS	N	47.3		i	N	42.7
	(cont.)						(cont.)



International
Seismological
Centre

Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
July, 1964							
	iS	E	22 53 09.3		S	NE	09 31 07
					P: S, W, C		
4.	iP	NEZ	23 43 01.5	5.	P	NZ	10 05 57
	i	EZ	02.9		S	NE	06 20
	S	N	30		i	NE	31.5
	i	E	31				
	P: N, E, D			5.	iP	NZ	11 26 50.0
					eS?	E	28 05
5.	eP	EZ	00 30 01		e	N	07
	iS	E	27.8		P: S, C		
5.	P	EZ	01 57 48.5	5.	P	NZ	12 17 48
	eS	N	58 06		S	NE	18 13
5.	P	NEZ	03 23 44	5.	iP	NEZ	12 25 33.3
	eS	E	31 14		e	N	26 00
	Lq	N	35 20		e	N	26
	eLr	E	37 50		P: S, W, C		
	eL	N	45 48				
	60.8N., 144.9E.			5.	eP?	Z	12 42 46
	Alaska aftershock.				e	EZ	43 05.3
	h: 30 km ca.				e	EZ	51.7
	H= 03 14 33.3	USCGS			e	E	48 14
					e	E	50 26
5.	eP	Z	03 50 24		e	N	40
	i	NZ	31.9	5.	iP	Z	13 18 27.5
	S	NE	55		iS	E	54.1
5.	iP	Z	04 52 05.9		i	N	54.9
	iS	NE	09.8		P: C		
5.	iP	NZ	05 58 10.3	5.	iP	NZ	14 07 25.9
	S	NE	16		S	NE	56
	P: D				P: N, C		
5.	iP	NZ	07 15 58.7	5.	P	Z	14 29 19
	S	E	16 23		i	N	19.8
	i	N	23.5		S	EZ	46
	e	E	32	5.	iP	Z	15 13 23.0
	P: N				i	N	23.5
5.	iP	NZ	07 23 44.4		eS	NE	47
	e	NE	24 09		P: D		
	P: S, C			5.	iP	NZ	15 28 43.3
5.	iP	EZ	08 02 36.2		i	N	48.0
	i	N	36.7		i	E	48.9
	S	NZ	03 14		iS	NE	29 07.5
	P: E, D				P: S, C		
	35.8N., 140.6E.			5.	eP	Z	15 30 24
	Near east coast of Honshu,				S	E	50
	Japan.			5.	iP	Z	16 08 23.0
	h: 156 km ca.				S	NE	48
	H= 08 01 59.3	USCGS		5.	eP	EZ	16 48 54
5.	P	NZ	08 44 27.6		e	E	51 38
	S	NE	50				
	P: S, C			5.	iP	NEZ	09 30 44.3
5.	iP	NEZ	09 30 44.3				(cont.)



Date

USCGS

49	35.5
50	25.0

USCGS

4 37 31

5 50 46

5 55 43.1

7 35 58.5

40 11

47 44

58 50

30

7 52 22

19.

7 30 33

USCGS

10 14 10

USCGS

P: S, E, C
37.1N., 71.4E.
Hindu Kush.

USCGS

0 47 51.6

2 11 59.5

2 44 46

4 26 13

4 27 45.0

15 21 28.1

16 22 50.3

16 55 45.

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July, 1964

Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
7.	iP	NZ	15 47 19.3	8.	P	NZ	04 35 42
	eS	E	46		S	NE	36 09
	i	NE	50				
	P: N, D			8.	eP	Z	04 40 46
					S	NE	41 08
7.	eP	Z	16 38 00	8.	eP	Z	06 17 56
	eS	E	45 33		S	NE	18 27.5
	eSS	E	49 10				
	eL	E	50 35	8.	eP	Z	07 12 19
	11.25., 163.2E.				eS	E	16 20
	Solomon Is. region.				L	E	19 15
	h: 13 km ca.				19.2N., 121.1E.		
	H= 16 28 42.9		USCGS		Near north coast of Luzon,		
					P.I.		
7.	iP	NEZ	17 22 40.1		h: 37 km ca.		
	e	E	45		H= 07 07 16.0		USCGS
	S	N	23 08.3				
	P: S, W, C			8.	iP	NZ	07 52 32.4
					i	E	32.8
7.	iP	Z	19 52 18.5		S	E	57 54
	i	NZ	20.0		Lq	E	08 00 00
	S	E	45		Lr	Z	01 40
	P: C				P: S, D		
7.	P	Z	21 21 38.5		Mag. 6-6½ (Mat.)		
	35.8N., 73.4E.				3.2N., 128.4E.		
	Hindu Kush.				Molucca Passage.		
	h: 19 km ca.				h: 50 km ca.		
	H= 21 12 33.6		USCGS		H= 07 45 43.6		USCGS
7.	P	NZ	21 54 13	8.	eP	Z	10 44 31
7.	iP	NZ	22 23 56.4	8.	eP	Z	11 57 35
	eS	N	24 25		6.4S., 154.8E.		
	P: N, D				New Britain region.		
					h: 73 km ca.		
7.	P	Z	23 55 08		H= 11 49 23.7		USCGS
	e	N	14				
	S	NEZ	38.5	8.	iP	EZ	12 03 19.1
					i	N	19.4
8.	P	Z	00 35 10		iPPP	NE	05 46
	i	NE	10.8		iPcS	NEZ	08 50
	S	NE	38.3		iS	E	09 25
					i	NZ	30
8.	P	NZ	01 11 20		L	NZ	12 40
	S	NE	46		L	EZ	13 50
					P: E, C		
8.	P	Z	01 46 11		Mag. 7.2 (Mat.)		
	15.3S., 173.1W.				5.5S., 129.8E.		
	Tonga Islands.				Banda Sea.		
	h: 33 km ca.				h: 165 km ca.		
	H= 01 35 02.5		USCGS		H= 11 55 39		USCGS
8.	P	NZ	01 50 52	8.	iP	NEZ	13 01 57.2
	e	NE	55 30		iS	E	02 02.5
	e	E	02 04 30		P: D		
	e	E	07 22				
8.	iP	Z	04 01 35.8	8.	P	Z	13 04 01.5
	S	NE	02 00		S	NE	31
				8.	iP	EZ	13 19 09.0
					i	N	09.5
					(cont.)		

Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
July 1964							
13 19 32.5	i	N	13 19 32.5	9.	P	Z	10 22 00
44.0	i	NE	44.0		S	NE	25
20 36	i	NE	20 36				
49	i	NE	49				
P: E, C							
8.	iP	NEZ	15 22 06.6	9.	P	NEZ	11 33 35
iS		Z	08.5		eS	NE	42 46
P: S, W, D					eScS	NE	43 35
8.	iP	Z	18 58 44.3		eSS	NE	47 00
i		NE	44.5		Lq	NE	52 35
iS		NEZ	59 07.5		Lr	Z	56 17
P: D							
8.	P	EZ	20 59 51				
8.	P	NZ	21 58 59	9.	iPNZ, PE		12 03 02.4
S		NE	59 32		S	NE	41
8.	iP	Z	23 55 02.5		P: S, E, D		
S		NE	35		Mag. 6.0 (Mat.)		
P: C					34.2N., 140.9E.		
9.	iP	NEZ	01 43 55.3		Off east coast of Honshu,		
S		NE	44 22.5		Japan.		
P: N, D					h: 49 km ca.		
9.	iP	NEZ	02 01 07.0		H= 12 02 11.9		
S		NZ	31		USCGS		
P: N, E, D				9.	eP	Z	12 12 03
9.	iP	NZ	04 18 59.5	9.	P	NEZ	12 36 30
S		NEZ	19 22.5		S	NE	53.5
P: S, C				9.	eP	E	13 23 48
9.	P	E	04 22 38		S	E	24 13
eS		E	23 03	9.	iP	Z	15 20 01.2
9.	eP	Z	05 45 27		i	N	01.4
eS		N	46 14		S	E	28
9.	P	NEZ	05 52 44		i	NZ	30
eS		N	53 04	9.	eP	Z	15 45 40
eS		E	57 13		S	Z	46 13
e		N	40	9.	eP	Z	15 47 27ca.
L		E	58 50		S	NE	49
L		N	59 00	9.	iP	Z	16 49 34.9
Mag. 5.1 (Mat.)					i	NE	35.0
15.4N., 119.3E.					e	Z	57 02
Near west coast of Luzon,					S	NE	30
P.I.					ScS	E	58 47
h: 53 km ca.					i	E	59 18
H= 05 47 09.2					i	N	17 02 32
USCGS					L	E	04 02
9.	e	NEZ	09 41 14		L	N	10
9.	P	NZ	09 47 37		L	EZ	51
S		NE	48 00		L	EZ	07 12
9.	eP	Z	10 10 20		L	N	16
S		NE	55		ePKP ₁ PKP ₁ Z		18 14
					iPKP ₂ PKP ₂ Z		19 09.5

July, 1964

Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
	e	N	17 21 46	10.	iP	Z	02 56 16.2
	P: C				eS?	NE	55
	Mag. 7 $\frac{1}{2}$ (Mat.)				P: C		
	15.5S., 167.6E.			10.	iP	Z	03 05 53.9
	New Hebrides Islands.				i	N	54.3
	h: 121 km ca.				S	NE	06 18
	H= 16 39 49.3	USCGS			P: D		
9.	iP	NEZ	18 49 28.0	10.	P	Z	03 12 30
	i	Z	50 01		eS	N	13 07
	P: S, W, C			10.	iP	Z	04 28 44.9
	49.4N., 153.5E.				S	NE	29 25
	Sea of Okhotsk.				P: D		
	h: 140 km ca.						
	H= 18 45 32.9	USCGS					
9.	P	Z	20 30 18.4	10.	iP	Z	05 58 46.7
	S	NE	42		iS	NE	59 13.5
					P: C		
9.	iP	NZ	21 09 54.9	10.	iP	Z	08 08 53.8
	i	Z	55.4		iS	NE	09 17.0
	S	NE	10 18		P: D		
	P: N, D						
9.	iP	Z	21 29 30.2	10.	iP	Z	10 20 17.7
	i	NE	30.4		S	E	21 41
	S	NE	54		i	NE	43.0
	P: C			10.	iP	EZ	10 52 11.6
9.	eP	Z	21 51 05		i	N	11.9
	S	N	56 45		e	N	53 49
	e	E	58		P: E, C		
	Lq	E	59 51				
	Lr	N	22 01 44	10.	P	N	12 10 19.6
	Lr	Z	50		i	NE	20.7
					iS	NE	43.0
	1.8S., 141.6E.			10.	eP	Z	14 17 42
	Off coast of North-East				eL	E	22 53
	New Guinea.			10.	iP	Z	15 39 32.3
	h: 33 km ca.				i	N	33.0
	H= 21 43 46.3	USCGS			S	E	56
9.	iP	Z	21 59 33.3		i	N	56.5
	i	E	33.4		P: D		
	eS	NE	22 01 40	10.	P	NZ	16 04 10
	P: C				iS	E	35.9
	44.2N., 149.5E.				i	N	38.0
	Kurile Islands.						
	h: 33 km ca.						
	H= 21 56 48.4	USCGS					
9.	iP	Z	22 56 19.9	10.	eP	Z	17 12 31
	i	NE	20.2		eL	E	16 43
	S	NEZ	53				
	P: C						
9.	P	Z	23 10 53.5	10.	P	N	18 25 51.0
	S	E	11 17		S	E	26 16
10.	iP	NEZ	01 16 56.3		i	NE	18.0
	iS	NE	59.5				
	P: S, C			10.	P	NEZ	18 42 00

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
11.	iP	EZ	16 18 21.5	11.	iP	Z	23 43 20.5
	S	N	57.0		S	E	52
	P: E, D				i	N	54.0
11.	iP NZ, P E		17 42 01.2		i	E	54.3
	P: N, C				P: N, D		
	15.5 S., 167.7 E.			12.	P	EZ	01 02 29
	New Hebrides Is.				i	N	29.7
	h: 143 km ca.			12.	iP	NEZ	01 46 02.7
	H= 17 32 16.8	USCGS			iS	E	31.9
11.	eP	Z	17 56 16		P: N, E, D		
	66.4 N., 19.7 W.				Mag. 5.8 (Mat.)		
	Northern Iceland.				38.6 N., 139.2 E.		
	h: 19 km ca.				Near west coast of Honshu,		
	H= 17 44 29.8	USCGS			Japan.		
					h: 13 km ca.		
11.	P	NZ	18 20 19		H= 01 45 25.6	USCGS	
	iS	NEZ	42.5	12.	P	Z	01 58 13
11.	e	E	18 29.0		S	NE	46
11.	P	Z	18 58 25	12.	iP	Z	02 01 37.2
	i	Z	30		iS	NE	02 03.2
	S	NE	19 02 51		i	N	05.0
	L	N	04 40		i	E	05.3
	Mag. 5.2-6 (Mat.)				P: C		
	12.2 N., 141.6 E.			12.	iP	NZ	02 08 48.8
	Mariana Is. region.				i	Z	49.9
	h: 61 km ca.				S	Z	09 18
	H= 18 53 15.8	USCGS			i	NZ	19
11.	iP	NEZ	19 46 23.6	12.	P: N, D		
	e	Z	50	12.	P	NZ	02 42 57
	eS	N	47 00		iS	E	43 22.5
	P: S, W, C				i	N	23.0
11.	iP	NEZ	20 34 48		i	E	25.0
	S	NE	42 21	12.	iP NZ, P E		03 52 13.0
	eLq	E	49 10		iS	NEZ	40.0
	Lr	Z	52 36		i	E	42
	P: C				P: S, W, C		
	Mag. 6 (Mat.)			12.	iP	NZ	05 23 21.5
	59.7 N., 146.2 W.				iS E, S N		47.2
	Alaska aftershock.				P: N, D		
	h: 40 km ca.			12.	iP	Z	07 05 55.0
	H= 20 25 40.3	USCGS			i	N	07 14
11.	eP	Z	21 14 59		P: C		
	i	Z	15 23	12.	P	NZ	08 32 47
	59.7 N., 146.5 W.				S	NE	33 16
	Alaska aftershock.			12.	P	Z	09 30 26
	h: 33 km ca.			12.	iP	Z	09 35 04.5
	H= 21 05 49.9	USCGS			P: C		
11.	P	NZ	23 00 36.2				
	i	E	01 02				
	i	E	04.0				
	i	N	04.2				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
12.	iP	Z	10 48 44.0				
	iS	N	49 06.0				
	i	E	06.6				
	P: S, C						
12.	iP Z, P E		10 56 31.7	12.	P	Z	20 23 06
	iS E, S N		56.5		S	NE	28 48
	i	NEZ	57 06		eL	NE	31 47
	P: D				eL	E	33 47
12.	iP	EZ	11 29 48.0		eL	N	34 27
	iS	NE	48.5				
	P: E						
12.	eP	Z	15 59 31				
	S	N	53	12.	iP	NEZ	21 01 13.0
	i	E	58.9		iS	NE	42.0
12.	iPKP1	Z	17 08 06.0		P: S, W, C		
	PKP2	EZ	23	12.	iP	Z	21 04 45.0
	PKP1: C				i	N	45.2
	24.5 S., 66.9 W.				i	N	46.5
	Chile-Argentina border.				i	Z	47.2
	h: 164 km ca.				i	Z	51.3
	H= 16 48 21.7	USCGS			i	E	52.1
12.	P	Z	17 16 17.5		i	Z	05 12
	i	E	18.5		P: C		
	S	NZ	41	12.	P	NEZ	21 06 33.5
	i	Z	42		S	NE	07 00
	P: C			12.	iP	NEZ	21 13 42.5
12.	iP	NEZ	17 31 44.1		i	N	48
	S	NEZ	32 07		i	Z	49
	P: N				S	Z	14 04
12.	iP	NZ	17 56 42.0		P: S, W, C		
	i	E	42.2	12.	ePKP?	Z	21 28 51
	iS	NE	57 04.8		i	Z	29 09
	i	Z	05.6				
	P: S, D						
12.	iP	NEZ	17 59 13.7				
	iS	NE	36.6				
	P: S, W, C			13.	P	Z	01 24 48
12.	iP	NZ	18 38 44.0				
	i	E	44.5				
	S	Z	39 09				
	i	NEZ	19.2				
	P: N, D			13.	iP	NEZ	01 40 02.6
12.	iP	NZ	20 20 34.1		i	E	21
	i	E	34.3		iS	N	22
	eS	N	21 03		i	EZ	23
	eS	E	36		P: S, W, C		
	i	N	56	13.	iP Z, P E		01 59 41.0
	P: S, C				iS	NZ	02 00 05.7
	40.5 N., 142.5 E.				P: S, C		

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
13.	P iS	Z NEZ	09 19 37 20 05.0
13.	eP i iS	Z Z E	09 34 34 37.2 50.2 50.7
13.	P P: C	Z	10 14 29 25.0 S., 179.9 W. Fiji Is. h: 424 km ca. H= 10 03 45.3
13.	iP eL P: D	Z E	10 18 05.5 32 52 15.9 S., 167.9 E. New Hebrides Is. h: 33 km ca. H= 10 08 07.2
13.	iP i iSPP S Lq Lq Lr P: E, C	EZ N Z EZ N E NE	11 06 08.0 08.7 08 13.5 11 52 14 53 15 05 17 35 Mag. 5½ (Mat.) 23.7 N., 94.7 E. Northwestern Burma. h: 117 km ca. H= 10 58 47.7
13.	iP eS eL P: C	Z E E	12 05 58.0 15 17 26 47 42.5 N., 126.7 W. Near coast of Oregon. h: 33 km ca. H= 11 54 50.7
13.	iP Z, P E iS i P: D	E Z	13 15 07.5 32.0 34.0
13.	iP iS P P: N W, C	Z E	15 03 54.5 04 39.3 20.9 S., 169.9 E. New Hebrides Is. h: 89 km ca. H= 14 53 27.0

Date	Phase	Comp.	Time(GMT) h m s
13.	P iP iPcP eS e P: D	Z Z N E	16 00 47 56.6 N., 154.0 W. Alaska aftershock. h: 25 km ca. H= 15 52 04.8 16 58 19.1 59 39.6 17 05 05 10 32 8.3 S., 113.7 E. Java. h: 153 km ca. H= 16 49 38.8
13.	iP iNE S i P: C	Z E NE	17 16 46.6 46.8 17 11 14.6
13.	iP i iPcP eL P: N, C	NZ E Z E	17 18 03.0 03.5 21 03.4 24 11 8.0 N., 126.8 E. Mindanao, P. I. h: 104 km ca. H= 17 12 01.3
13.	eP? eL	Z E	18 19 20ca. 24 12
13.	P i S	Z N NE	20 06 41 41.5 07 08
13.	PKP1 PKP2 eL	Z Z E	21 21 52 22 00 22 14.0 7.7 N., 34.7 W. North Atlantic Ocean, h: 33 km ca. H= 21 02 33.3
14.	P S	NZ NE	00 13 51 14 12
14.	eP eS	Z E	04 10 21ca. 15 00 Mag. 4½-5 (Mat.) 53.6 N., 172.0 E. Near Is., Aleutian Is. h: 33 km ca. H= 04 04 18.2

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
15.	iP i i i P: S, E, D	EZ Z E N	06 30 47.0 31 05 06 11	15.	iP S i P: N, E	NE NE Z	13 21 12.5 35 37
15.	iP iPcP P: C	Z Z	07 33 26.0 35 36.4	15.	P i S	Z N NEZ	14 03 07 08.5 35
	52.1 N., 170.6 W. Fox Is. h: 30 km ca. H= 07 26 01.4 USCGS			15.	P	NEZ	16 52 59
15.	iP P: C	Z	08 34 10.3	15.	iP i eS e P: C	EZ N N E	18 59 00.0 00.3 27 19 00 55 57
	11.3 S., 166.1 E. Santa Cruz Is. h: 130 km ca. H= 08 24 56.5 USCGS				44.0 N., 148.1 E. Kurile Is. h: 30 km ca. H= 18 56 26.0 USCGS		
15.	P S	N NE	09 22 05 25	15.	eP e e	EZ E N	21 10 20 32 41
15.	iP iS P: N	N NE	10 25 27.0 52.0	15.	iP i i i P: S, C	NZ N E N	22 36 52.1 54 37 08 38 16
15.	iP Z, P N S i P: C	E E N	10 32 41.1 33 06 07.5	16.	P iS	NZ NEZ	01 09 40 10 07.9
15.	iP i i S P: D	Z N E NE	12 08 39.9 40.1 40.5 09 03	16.	P P: C	NEZ	04 28 06.5
	1.5 N., 126.4 E. Molucca Passage. h: 69 km ca. H= 04 21 05.3 USCGS			16.	iP i S i i P: N, C	NZ EZ NE E NE	09 21 27.9 28.6 22 46 50 51
15.	iP Z, P E i S P: C	N Z	12 17 36.8 37.3 58		29.9 N., 138.0 E. South of Honshu, Japan. h: 461 km ca. H= 09 19 45.3 USCGS		
15.	P e i	Z NZ NEZ	12 58 50 59 01 08	16.	S	NEZ	09 23 57
15.	iP i S i P: S, C	NZ E E NZ	12 59 12.3 12.5 36.4 37.0	16.	P S	Z NEZ	09 24 29 55
	P: S, C			16.	iP P: C	Z	10 19 30.0

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
		Northern Celebes.				60.0 N., 143.4 W.	
		h: 97 km ca.				Alaska aftershock.	
		H= 12 45 47.7	USCGS			h: 33 km ca.	
						H= 23 36 21.0	USCGS
18.	P	Z	13 22 06.7	19.	iP	EZ	01 07 12.1
	S	NE	32		i	N	13.1
	i	N	33.5			P: W, C	
18.	iP Z, P E		14 03 26.2	19.	P	NZ	02 53 29
	S	N	56		S	NE	55
	i	E	58				
		P: C		19.	P	Z	03 47 52
18.	iP Z, PN		14 23 02.9		i	N	52.8
	i	NE	03.5		i	E	53.1
	iS	E	25		S?	N	49 12
	i	N	26.6		i	E	19
		P: D		19.	iP	EZ	04 29 40.3
18.	iP	Z	15 51 38.3		i	N	41.1
	i	NE	38.5		S	NEZ	30 04
	S	E	52 02			P: W, C	
	i	N	02.8	19.	P	Z	06 08 12
		P: D				49.9 N., 78.1 E.	
18.	iP	NZ	17 21 16.6			Kuzakh S.S.R.	
	i	Z	22.0			h: 0 km ca.	
	S	E	41			H= 05 59 58.9	USCGS
	i	N	42	19.	P	NZ	06 59 34
		P: S, C			i	NE	46
18.	iP	Z	17 35 35.0	19.	P	Z	07 14 00
	i	N	35.5		i	EZ	01.
		P: C			i	Z	06
		53.1 N., 158.4 E.			iS	E	27.
		Southern Kamchatka.		19.	iP	NEZ	12 10 45.
		h: 95 km ca.			eS	N	11 02
		H= 17 30 51	USCGS			P: S, E, C	
18.	P	NZ	20 07 58	19.	P	NEZ	12 33 24
	S	N	10 09		i	Z	36
	eL	E	11 39		i	NE	38
		44.6 N., 149.0 E.			i	Z	48
		Kurile Is.				44.4 N., 149.3 E.	
		h: 33 km ca.				Kurile Is.	
		H= 20 05 13.8	USCGS			h: 33 km ca.	
18.	P	NEZ	21 20 00			H= 12 30 39	USCGS
	S	E	23.6	19.	eL	E	14 08 05
	i	Z	25.6		L	E	11 40
18.	eP	Z	21 32 18			15.1 S., 173.4 W.	
	i	NE	20.6			Tonga Is. region.	
	iS	E	45.6			h: 33 km ca.	
18.	P	NZ	23 45 41			H= 13 40 06.6	USCGS
	e	E	00 00 13	19.	iP	Z	14 47 21.
	eL	E	04 50			(cont.)	
		(cont.)					

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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
20.	P	Z	19 03 07		eLr	Z	01 54.0
	eSKS	E	13 42		eLr	E	54.5
		E	21 00		Mag. 5 $\frac{1}{2}$ -5 $\frac{1}{2}$ (Mat.)		
	eLq	L	28 20		19.8 N., 108.8 W.		
	eLr	E	33 48		Off coast of Jalisco, Mexico.		
	Mag. 5 $\frac{1}{2}$ (Mat.)				h: 31 km ca.		
	19.8 N., 109.0 W.				H= 01 09 25.8	USCGS	
	Revilla Gigedo Is. region.			21.	P	NZ	03 17 13.8
	h: 33 km ca.				i	E	14.7
	H= 18 49 43.5	USCGS			eS	NE	41
20.	P	Z	19 15 54		i	EZ	44.0
					L	E	57
20.	P	Z	22 31 07	21.	iP	Z	04 00 14.1
	L	E	36 22		i	NE	14.9
20.	P	N	22 32 00		i	Z	01 06
	e	N	06		S	NE	09 33
	S	E	24		ScS	EZ	10 12
20.	eP	Z	22 43 50		L	E	18 43
	51.2 N., 179.6 W.				L	N	19 31
	Andreas Is.				eLr	N	23 43
	h: 33 km ca.				eLr	Z	24.0
	H= 22 37 23.6	USCGS			P: D		
20.	eP	Z	22 51 09		Mag. 5 $\frac{1}{2}$ -5 $\frac{1}{2}$ (Mat.)		
	iS	NEZ	23.0		26.0 S., 178.0 W.		
20.	P	Z	22 55 06		Fiji Is. region.		
	i	Z	24		h: 222 km ca.		
	35.5 S., 179.7 E.				H= 03 43 59.1		
	Off north coast of North Is.,			21.	P	Z	06 55 26
	New Zealand.				i	E	26.4
	h: 223 km ca.				i	N	26.7
	H= 22 43 15	USCGS			iS	NEZ	48.4
20.	eP	Z	23 07 54	21.	iPKP1	Z	07 53 02.2
	eS	E	18 02		PKP2	Z	27.9
	SSS?	E	26 57		PKP1: D		
	eL	E	28 47		20.0 S., 69.8 W.		
	Mag. 5 $\frac{1}{2}$ -5 $\frac{1}{2}$ (Mat.)				Near coast of northern Chile.		
	34.4 S., 179.2 E.				h: 84 km ca.		
	Off north coast of North Is.,				H= 07 33 19.6	USCGS	
	New Zealand.			21.	P	Z	10 03 14.6
	h: 162 km ca.				S	N	08 58
	H= 22 56 01	USCGS			i	E	09 04
21.	P	NEZ	00 02 49		e	E	11 40
	i	EZ	53.4		eLq	E	14 00
	i	N	03 12		Lr	N	16 15
	i	E	13		Lr	Z	17 40
	i	NEZ	22		Mag. 5-5 $\frac{1}{2}$ (Mat.)		
21.	eP	Z	01 22 53		72.1 N., 130.2 E.		
	eS	E	34 17		Laptev Sea.		
	eLq	E	47 47		h: 33 km ca.		
	Lq	N	49.0		H= 09 56 16.6	USCGS	
	(cont.)			21.	iP	Z	10 09 21.6
					i	E	21.7
					i	N	21.9

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Date	Phase	Comp.	Time(GMT)
			h m s
	S	L	10 09 44
	i	N	51
	P: C		

21.	eP	NEZ	12 52 05
	S	N	27
	i	E	23.4

21.	iP	NEZ	13 04 02.2
	iS	N	10.9
	i	N	20.5
	i	E	21.5
	i	Z	23.7
	P: S, E, D		

21.	P	Z	13 18 56
	i	E	59
	i	N	19 04
	S	E	23 44
	L	E	24 31
	iL	N	25 20
	L	Z	26 18
	ScS	N	29 42
	ScS	E	44
	Mag. 6 (Mat.)		
	11.5 N., 121.9 E.		
	Panay, P.I.		
	h: 34 km ca.		
	H= 13 13 00.2		
	USCGS		

21.	eP	NZ	16 03 19
	i	E	20
	S	NZ	45
	i	E	46

21.	P	Z	18 15 31.0
	i	N	31.8
	i	E	32.2
	S	NZ	50
	i	E	50.7

21.	P	Z	19 25 14.6
	i	NE	16
	S	N	57.5
	i	E	59

21.	eP	Z	20 36 55
	i	NE	37 30
	i	E	42

21.	iP	N	20 41 15.1
	i	Z	15.3
	i	E	15.5
	i	NZ	23
	eS	NE	46
	P: S		

21.	iP	NZ	21 09 45.6
	i	E	46.5

(cont.)

Date	Phase	Comp.	Time(GMT)
			h m s
	PPP	Z	21 11 36.5
	PPP	E	37.0
	ScP	NZ	15 23
	S	E	27
	ScS	E	19 43
	ScS	N	44
	i	Z	55
	Lq	E	20 13
	Lr	N	22 00
	Lr	Z	18

P: N, C
Mag. 5.1-5.1 (Mat.)
4.6 S., 153.3 E.
New Britain region.
h: 60 km ca.
H= 21 01 49.5 USCGS

22.	iP N, P E		04 08 48.0
	S	E	09 08
	i	N	11.0
	i	E	12.0
	P: S		

22.	iP	N	04 42 33.5
	i	E	34
	i	N	43 03
	iS	EZ	04.0
	P: N		

22.	eL	E	08 05.0
	54.2 S., 132.4 W.		
	South Pacific Ocean.		
	h: 33 km ca.		
	H= 07 04 34		
	USCGS		

22.	P N, eP E		08 16 19
	iS E, S NZ		44.0

22.	P	NE	08 26 16.3
	i	E	19.5
	S	NEZ	41

22.	iP	NE	12 05 26.6
	S	E	51.0
	L	E	06 10
	P: S, W		

22.	P	NEZ	12 31 10
	22.2 S., 175.4 W.		
	Tonga Is.		
	h: 33 km ca.		
	H= 12 19 38.5		
	USCGS		

22.	P	NE	15 24 15.0
	i	E	21
	iS	NE	46.4

22.	P	N	16 13 20.0
	i	E	21
	i	N	25.0

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
22.	eP i i	Z E N	16 26 23 27 08 09		S P: D	NE	12 12 54
22.	P i	N E	16 28 36 36.5	23.	P i i i	EZ N N E	12 32 08 10 40 52
22.	P i iS	N E NE	17 21 58.5 22 00.0 15.5	23.	eP	Z	13 18 45
22.	P i	NE NE	20 20 05 24 15	23.	eP i eS i	Z N E N	15 15 21 22 47 50
			13.2 N., 144.3 E. Mariana Is. h: 146 km ca. H= 20 15 04.6	23.	iP iS N, S E P: N, E, C	NEZ	16 44 35.4 45 01.5
22.	eL	E	20 46 20				
22.	P S	NE NE	20 57 51 58 49	23.	iP i iS i i P: W	E NZ N E Z	16 49 09.1 09.3 50.4 51.0 52.0
22.	P i S i	N E E N	21 14 27 30 58 59	23.	iP i i P: E, D	EZ N N	18 09 26.9 27.1 46
23.	PKP	Z	02 13 02				
			28.8 S., 70.3 W. Northern Chile. h: 37 km ca. H= 01 53 11.4	23.	iP i eS eL P: N, E, D Mag. 4½-5 (Mat.) 59.9 N., 149.2 W. Alaska aftershock. h: 55 km ca. H= 19 08 06.6	NEZ Z E E	19 17 01.5 07.0 24 19 31 26
23.	P i S i	Z N NE Z	04 44 41.7 42.0 45 04 05.0				
23.	eP i i i	Z E N N	05 07 10 13 16 08 06	23.	PKP	Z	19 39 10
23.	eP	Z	07 04 33				
23.	iP EZ, P N P: W, D		08 24 45.5	23.	P i i i i P: S	NZ E NEZ E N E	20 08 19.4 20 45 53 54 09 07
23.	iP P: C	Z	09 17 44.5				
23.	iP Z, P E iS i P: S, E, D	E N N	10 34 53.7 35 08.7 09.1				
23.	P i	Z N	12 12 36.6 37.0				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
23.	iP NZ, P E i N i E P: S, W, D		20 39 27.0 40 07.0 07.5		i N L N Lr Z P: N, E, D Mag. 6.3 (Mat.) 47.2 N., 153.3 E. Kurile Is. h: 33 km ca. H= 08 12 40.0		03 19 21 20 32 22 31 USCGS
23.	P Z i N i E i E i Z		22 13 47.5 48.4 49.0 14 12.5 13.0	24.	eP EZ i N		08 33 26 31
24.	iP NEZ i NE S E P: N, E, D		00 55 40.0 48 56 07	24.	eP Z i EZ		08 56 35 40
24.	P NEZ S? N i E		02 26 12.4 27 19 33	24.	P NEZ		09 04 10
24.	eP Z i NE		02 41 07 14.6	24.	P NEZ		09 05 34
24.	P Z i E i N		02 41 45.9 52 53.0	24.	P NEZ		09 11 14
24.	iP Z i NEZ eS? E P: D		05 50 41.1 51 36 52 04	24.	iP Z, P NE P: N, E, D		09 20 39.0
24.	P Z i NEZ i Z S N i E i N i EZ i E L N L E L Z		06 54 28 29.6 31.0 57 19 22 39 45 58 04 28 07 00.0 00.5	24.	P Z i NE		09 38 57 58
	Mag. 5.8 (Mat.) 46.9 N., 153.9 E. Kurile Is. h: 33 km ca. H= 06 50 52.8		USCGS	24.	iP NEZ S N P: N, E, D		10 05 53.0 08 51
24.	P NEZ		07 01 45	24.	iP NZ i E S NE i N L NZ L E P: S, D		11 00 03.5 04.0 04 18 23 07 12 48
24.	eP NEZ 46.9 N., 153.8 E. Kurile Is. h: 33 km ca. H= 07 13 01.2		07 16 36 USCGS				(cont.)
24.	iP NEZ S EZ		08 16 15.5 19 15.0 (cont.)				(cont.)

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
			13.1 N., 145.0 E. Mariana Is. h: 43 km ca. H= 10 54 52.5 USCGS				h: 33 km ca. H= 14 25 58.5 USCGS
24.	P	Z	11 03 46	24.	P	NZ	14 51 21
	i	E			i	E	23
24.	P	Z	12 13 06				46.8 N., 153.8 E. Kurile Is. h: 33 km ca. H= 14 47 43.5 USCGS
	i	N	08				
	i	Z	15	24.	iP	NEZ	15 33 10.9
	L	E	18 20		iS	NE	35.5
			46.8 N., 154.1 E. Kurile Is. h: 33 km ca. H= 12 09 27.0 USCGS		P: N, E, D		
24.	P	Z	12 39 38.4	24.	eP	Z	15 42 05
	i	NE	39.9		i	Z	19
	i	NE	52	24.	P	Z	16 22 47
	S	E	42 34		i	N	48
	i	N	47		iS	N	23 10.0
	L	Z	44.0		i	E	11
			46.9 N., 154.0 E. Kurile Is. h: 33 km ca. H= 12 35 59.5 USCGS	24.	iP	NEZ	16 38 02.9
24.	P	Z	13 01 22		i	Z	10
	i	N	22.5		S	E	41 20
	iS	NE	46.0		i	N	22
24.	P	E	13 28 54.0		eL	N	42 00
	i	NZ	54.3		L	E	43 00
	S	EZ	31 51		P: N, E, D		
	i	N	59				47.2 N., 153.9 E. Kurile Is. h: 33 km ca. H= 16 34 29.2 USCGS
	L	E	32 18	24.	iP	NEZ	17 06 25.0
	eLr	Z	40		iS E, S N		09 20.0
	L	N	57		i	Z	21
	P: W				Lq	N	44
			Mag. 5.6 (Mat.) 47.0 N., 153.7 E. Kurile Is. h: 33 km ca. H= 13 25 18.3 USCGS		Lr	Z	10 15
24.	P	Z	13 36 09		L	N	36
	i	N	10		L	E	54
24.	P Z, eP	N	13 56 04		P: S, W, C		
			6.6 S., 154.8 E. Solomon Is. h: 62 km ca. H= 13 47 48.6 USCGS		Mag. 5.8 (Mat.) 47.1 N., 153.6 E. Kurile Is. h: 33 km ca. H= 17 02 49.2 USCGS		
24.	eP	Z	14 29 35	24.	eP	NZ	17 21 11
	i	NE	36		i	E	16
	i	Z	43.5				46.9 N., 154.0 E. Kurile Is. h: 33 km ca. H= 17 17 32 USCGS
			46.8 N., 153.6 E. Kurile Is.	24.	iP	NEZ	17 51 58.5
					eS	NZ	54 23
					P: N, E, D		

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(cont.)

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
		45.1 N., 150.5 E. Kurile Is. h: 33 km ca. H= 17 43 59.0	USCGS	25.	P eS? i	NZ N NE	00 14 13 50 56
24.	P S i	NEZ NE Z	18 12 02 25 26	25.	iP e	NEZ E	01 33 10.0 43 44
24.	iP i i S? i	NEZ Z E NE Z	18 53 38.4 47 55 35 46 47.5		P: N, E, D 52.3 N., 159.3 E. Off south coast of Kamchatka. h: 70 km ca. H= 01 33 20.6	USCGS	
		47.0 N., 153.8 E. Kurile Is. h: 33 km ca. H= 18 50 04.1	USCGS	25.	P i S i	Z N EZ N	02 08 25.0 25.4 51 54
24.	P i	Z NEZ	18 55 38 48	25.	P i e e el	Z NEZ N E E	02 19 39 47.5 24 10 15 25 03
		46.7 N., 153.9 E. Kurile Is. h: 33 km ca. H= 18 52 02.1	USCGS		46.7 N., 153.8 E. Kurile Is. h: 33 km ca. H= 02 16 02	USCGS	
24.	P i	EZ N	18 58 51 55	25.	P i eS L L	Z NE E E N	02 31 56 32 03 37 56 40 23 42 37
		46.9 N., 154.0 E. Kurile Is. h: 33 km ca. H= 18 55 14.1	USCGS		1.3 S., 141.0 E. West New Guinea region. h: 48 km ca. H= 02 24 33.9	USCGS	
24.	iP S	NEZ NE	19 36 30.8 37 22	25.	P i eS?	N EZ E	03 53 33 35 04 05 09
		P: S, E, D 33.9 N., 141.7 E. Off east coast of Honshu, Japan. h: 73 km ca. H= 19 35 31.4	USCGS	25.	iP iS P: N, W, C	NEZ EZ, S N NEZ, W, C	08 27 32.3 49.6
24.	P i S i	NZ E E N	19 41 26 27 51 54	25.	P i i i i	Z N E NZ	09 03 05 06 15 30
24.	P i	Z NZ	22 03 45.0 52		iS N E, S Z		40.5
		57.7 N., 152.2 W. Alaska aftershock. h: 10 km ca. H= 21 54 54.0	USCGS	25.	P i i S	Z N E NE	11 57 20 20.5 25 53 13
24.	iP Z, P NE P: C		22 15 17.2	25.	iP NZ, P E iS P: N, D		12 23 40.6 23 06.5
		47.0 N., 153.9 E. Kurile Is. h: 33 km ca. H= 22 11 38.2	USCGS				

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Date	Phase	Comp.	Time(GMT) h m s
25.	iP EZ, P N		12 31 16.6
	i	Z	32 16
	c	L	40 43
	eL	E	50 30
	P: E, D		
	19.9 S., 176.2 W.		
	Tonga Is.		
	h: 205 km ca.		
	H= 12 20 22.2		
	USCGS		
25.	eP	NZ	14 07 33
	i	NZ	57
	i	Z	03 07
25.	P	NZ	15 00 11.5
	S	E	35
	i	NZ	37
	P: N, D		
25.	eP	NZ	16 58 40
	i	NZ	47
	i	E	48.0
	S	NEZ	59 05
25.	P	NZ	18 07 50
	eS	NE	11 06
	46.8 N., 154.1 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 18 04 11.2		
	USCGS		
25.	iP	NEZ	19 23 39.5
	iS	N	24 14.5
	i	EZ	15.5
	P: S, W, D		
25.	PKP	Z	19 50 57
	i	E	51 00
	i	Z	06
	i	N	07
	i	N	21
	i	E	25
	SKKS	N	20 01 36
	SKKS	E	40
	SKSP	Z	05 09
	i	L	32
	SS1	N	14 16
	SS2	E	15 10
	SS3	E	19 44
	i	E	26 22
	Lq	E	33 00
	Lr	Z	41 49
	Lr	E	42 10
	Lr	N	44 36
	Mag. 6 $\frac{1}{2}$ (Mat.)		
	27.9 S., 70.9 W.		
	Northern Chile.		
	h: 26 km ca.		
	H= 19 31 07.0		
	USCGS		

Date	Phase	Comp.	Time(GMT) h m s
25.	P	Z	20 23 09.0
	i	N	09.1
	i	L	10.5
	S N, eS E		
	P: C		
25.	iP NZ, P E		21 36 21.5
	i	EZ	36
	S	NE	41 50
	Lq	E	43 48
	Lq	N	44 05
	Lr	N	45 50
	Lr	E	54
	Lr	Z	56
	i	E	46 40
	P: S, D		
	Mag. 6 $\frac{1}{2}$ -6 $\frac{1}{2}$ (Mat.)		
	2.9 N., 123.2 E.		
	North of Holmagera.		
	h: 22 km ca.		
	H= 21 29 33.2		
	USCGS		
25.	iP	Z	22 56 37.4
	i	NE	38.0
	P: C		
	9.7 S., 159.6 E.		
	Solomon Is.		
	h: 21 km ca.		
	H= 22 47 42.7		
	USCGS		
26.	eL	E	06 11 34
26.	iP	NEZ	06 30 59.0
	i	Z	39 14
	P: N, W, D		
	23.4 S., 150.0 E.		
	Fiji Is. region.		
	h: 555 km ca.		
	H= 06 28 32.7		
	USCGS		
26.	P	EZ	07 42 41.7
	i	N	42
26.	iP	E	09 21 19.5
	i	NZ	19.7
	i	E	40
	S	NZ	45
	P: W		
	36.7 N., 141.0 E.		
	Central Honshu, Japan.		
	h: 60 km ca.		
	JMA		
26.	iP Z, P NE		11 39 42.2
	S	NE	52
	P: N, D		
26.	iP	NEZ	11 51 34.2
	P: N, E, D		
	52.3 N., 176.2 W.		

(cont.)

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Date Phase Comp. Time(GMT)
h m s

Andreanof Is.
h: 100 km ca.
H= 11 44 45.0 USCGS

26. P Z 11 54 00.0

26. P NEZ 12 43 00.0
i NE 48.0

26. iPKP Z 14 14 40.3
2.6 N., 78.5 W.
Ecuador.
h: 38 km ca.
H= 13 55 37.4 USCGS

26. iP NEZ 16 16 41.3
iS EZ, S N 49.5
P: S, W, C

26. i Z 16 17 10.5
i E 13
i N 25
i E 27

26. iP Z 16 44 06.2
i NE 06.5
iS? N 26.9
i E 27.0
i Z 27.1
P: C

26. iP NZ, P E 17 18 19.7
S? NE 41
P: N, W, D

26. iP NZ 17 24 18.7
i E 19
iS E, S NZ 52.0
P: N, C

26. P NEZ 18 38 11.5
S E 41 03
i N 13

Mag. 4 $\frac{1}{2}$ -5 (Mat.)
46.8 N., 153.8 E.
Kurile Is.
h: 33 km ca.
H= 18 34 34.6 USCGS

26. P NZ 19 27 50.8
i E 51
iS E 28 05.6
i NZ 06.0

26. eP Z 19 47 50
i NE 52
eS N 50 38
eL E 52 40
(cont.)

Date Phase Comp. Time(GMT)
h m s

47.0 N., 153.7 E.
Kurile Is.
h: 33 km ca.
H= 19 44 12.8 USCGS

26. iP NZ 20 30 56.0
i E 57
PcP Z 33 35.6
PcP E 36
eL E 38 34
eL N 41 30

P: S, D
4.1 N., 126.4 E.
Talaud Is. region.
h: 33 km ca.
H= 20 24 13.0 USCGS

26. P NZ 21 45 16
S E 46 14
i Z 16

26. eP Z 22 01 53
iS E 02 15.5
i NZ 16
i E 28

26. P NE, Z 22 09 45
iS E 10 08.0
i N 08.4
i Z 08.8

26. P NZ 23 30 00
iS E, S N 27.0

27. P Z 00 21 53
eS N 27 05
e E 20
L E 30 00
eL N 33 26

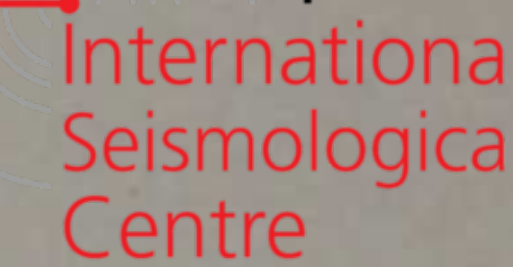
Mag. 4 $\frac{1}{2}$ -5 (Mat.)
61.5 N., 163.9 E.
Northern Kamchatka.
h: 8 km ca.
H= 00 15 44.7 USCGS

27. iP Z 01 00 36.0
i NE 37
S NE 59
P: D

27. P Z 07 42 20
i E 21
S NE 48
i Z 50

27. P NEZ 09 39 20.5

27. iP Z 11 08 09.5
(cont.)



ate Phase Comp. Time(GMT)

27.	P	Z	19	54	15
	i	NE			18

28.	P	EZ	09 11 51.5
	i	N	52
	S?	N	12 24

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Date	Phase	Comp.	Time(GMT)
			h m s
28.	P	Z	10 14 31
28.	eP	Z	12 35 30
	e	E	13 01.0
	51.3 S., 139.3 E. About 1,000 km southwest of Tasmania. h: 34 km ca. H= 12 22 43.0		
			USCGS
28.	P	Z	15 14 41.3
	i	N	41.5
	i	Z	41.3
	i	E	42
	i	N	46
	i	E	15 03
	i	N	11
	P: C		
28.	P	Z	16 00 59
28.	iP	NZ	18 10 57.
	i	E	58.
	eS?	E	13 14
	P: N, D 44.3 N., 148.8 E. Kurile Is. h: 33 km ca. H= 13 08 17.0		
			USCG
28.	P	NZ	18 27 37
	i	NEZ	46
	46.5 N., 153.7 E. Kurile Is. h: 33 km ca. H= 18 24 03.0		
			USCG
28.	P	Z	18 52 51
	i	NE	53
	S	N	19 03 16
	i	E	33
	SS	E	09 15
	Lq	N	15 54
	L	N	19 32
	Lr	Z	20 15
	Mag. 6½ (Mat.) 51.2 S., 133.0 E. About 1,000 km southwest of Tasmania. h: 33 km ca. H= 18 40 04.3		
			USCG
28.	eP	Z	19 08 3
	i	NZ	3
	i	E	5
	i	NE	09 0
28.	P	EZ	21 10 4
	i	N	4
	eS?	N	11 3

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
29.	iP Z, P N i S P: D	E N	08 32 26.7 26.9 49	30.	P i S i	Z NE NE Z	01 41 13 13.7 37 38.7
29.	iP i S i P: S, E, D	NEZ Z N E	08 38 20.1 37 42 54	30.	P iP i iS NE, S P: W, D	Z EZ N Z	01 56 19 02 31 37.7 38.0 32 03.4
29.	P i i i	EZ N EZ E	15 08 17 17.5 23.0 45	30.	P iPKP i eLq Lr P: D	Z Z N E	04 36 41 05 34 46.0 35 34 06 05.0 11.4
29.	iP NZ, P E i i i S P: S, E, C	NZ N N E NZ	15 27 05.8 13 25 34 37	Mag. 6-6½ (Mat.) 11.1 N., 86.2 W. Near west coast of Costa Rica. h: 42 km ca. H= 05 16 03.3 USCGS			
29.	eP i i iS EZ, S N	Z N E N	16 15 27 35 54.5 59.0	30.	P i iS E, S N i i P: C	NEZ Z N Z NZ	06 00 54.4 57.0 01 21.7 24 30
29.	P i iS N, S E	Z NE Z	16 47 07.1 08.0 19 06 05.5 16.5 17.5	30.	iP iS i P: S, E, D	NEZ NE Z	07 41 49.7 42 09.1 10.1
29.	eP i iS NZ, S E i i i	NZ NZ E E N	19 16 07 11.6 31.6 41 42 44	35.9 N., 139.6 E. Near south coast of Honshu, Japan. h: 101 km ca. H= 07 41 25.0 USCGS			
29.	eP i i	EZ E N	21 14 38 47 15 07	30.	P eS i	Z N E	08 40 27.5 41 13 20
30.	iP Z, P NE i P: D	NE Z	01 32 07.2 29	30.	iP EZ, P N iS i P: S, D	NZ NZ E	08 50 17.2 39.1 40.3
17.7 S., 173.2 W. Fiji ls. region. h: 643 km ca. H= 01 22 10.1 USCGS				30.	P i S	NEZ N NE	10 41 41 43 42 08
30.	iP i iS EZ, S N P: E, D	EZ N N	01 37 05.1 05.2 22.6	30.	P eS eL	NEZ NE E	12 15 11.6 16 33 17 34 (cont.)
37.3 N., 140.8 E. Honshu, Japan. h: 75 km ca.				JMA -34-			

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Date	Phase	Comp.	Time(GMT) h m s
			41.9 N., 143.3 E. Near south coast of Hokkaido, Japan. h: 50 km ca. JMA
30.	iP	EZ	13 46 52.9
	i	N	47 13
	P: W, D		
30.	iP	NEZ	13 48 39.3
	i	N	43 18
	i	E	23
	P: N, E, D		
30.	iP	Z	14 37 24.8
	i	Z	33.6
	P: C		
30.	iP NZ, P E		15 03 42.0
	iS E, S NZ		04 06.0
	P: S, C		
30.	P	NEZ	17 32 27
	S	NE	51
30.	P	Z	17 48 03
	i	NE	04
	iS NE, S Z		27.4
30.	P	Z	19 36 36.5
	i	EZ	37.8
	i	N	38.5
	S	E	37 10
	i	N	12
30.	P	EZ	23 00 23
	e	E	07 40
	eLq	E	11 55
	eLr	E	14 30
	eLr	N	36
			14.3 N., 96.2 E. Andaman Is. region. h: 33 km ca. H= 22 52 19.4 USCGS
31.	iP	NEZ	04 02 14.5
	S	NE	03 00
	i	Z	02
	P: S, E, D		
			Mag. 4.7 (Mat.) 32.5 N., 138.7 E. South of Honshu, Japan. h: 200 km ca. H= 04 01 11.1 USCGS
31.	P	E	04 08 09.0
	i	Z	09.3
	i	N	09.5
			(cont.)

Date	Phase	Comp.	Time(GMT) h m s
			04 08 24.0
	S	N	10 35
	L	N	11 07
	L	E	24
	eL	Z	31
	P: E		
			Mag. 5.3 (Mat.) 44.6 N., 151.6 E. Kurile Is. h: 53 km ca. H= 04 05 06.2 USCGS
31.	iP	Z	04 23 48.6
	eS	N	24 12
	i	E	13
	i	E	22.5
	P: D		
31.	iP	Z	05 26 34.0
	iS	NE	40.0
	i	Z	40.1
	P: C		
31.	iP	NEZ	05 43 13.1
	iS NE, S Z		18.5
	P: C		
31.	iP	NEZ	06 00 17.5
	S	NE	06 37
	i	Z	43
	SS	Z	10 16
	SS	N	23
	SS	E	29
	Lq	N	11 42
	Lq	E	44
	Lr	Z	13 00
	Lr	N	50
	Lr	E	15 21
	P: N, W, C		
			Mag. 6 $\frac{1}{2}$ - 6 $\frac{3}{4}$ (Mat.) 6.1 S., 149.4 E. New Britain. h: 63 km ca. H= 05 52 18.8 USCGS
31.	P	EZ	06 05 53
31.	P	Z	06 37 24.0
	i	NE	24.4
	P: C		
			25.7 S., 179.6 W. South of Fiji Is. h: 429 km ca. H= 06 26 36.7 USCGS
31.	iP	NZ	07 24 42.1
	i	E	43
	iS E, S N		25 07.3
	P: S, C		

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
31.	P i S i	EZ N N E	08 10 00 03 30 44	31.	P L	NEZ E	23 55 21 00 08 51
							86.3 N., 40.5 E. Arctic Ocean. h: 10 km ca. H= 23 45 55.2
							USCGS
31.	iP P: C	Z	08 43 50.6				
31.	P S i	NZ NE NE	10 12 09.5 36 39	(add) 2.	iP Z, P N S P: D	NEZ	14 52 14.0 38
31.	P i iS i	Z NE N E	14 39 22.6 23.0 46.5 47.0				
31.	iP i PcP e P: C	Z NE Z E	14 58 15.6 16.1 15 00 47 05 44				
							2.4 N., 128.2 E. Halmahera. h: 23 km ca. H= 14 51 22.0
							USCGS
31.	P i i i i	Z NE NZ N E	18 51 52 55 52 00.5 23 27				
31.	iP Z, P E iS P: D	NEZ	19 54 47.0 53.1				
31.	iP iS	NEZ NEZ	19 55 14.0 21.0				
31.	eP	Z	20 04 08				
31.	eP	Z	20 04 36				
31.	iP NZ, P E i i S P: S, W, C	Z Z Z NE	20 46 14.5 16.6 56 48 37				
							47.8 N., 147.4 E. Sea of Okhotsk. h: 378 km ca. H= 20 43 19.2
							USCGS
31.	P i	NZ E	21 31 47.0 49				
							86.4 N., 38.5 E. Arctic Ocean. h: 33 km ca. H= 21 22 24.3
							USCGS -36-

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Director

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Date	Phase	Comp.	Time(GMT) h m s
1.	iP P: L	Z	01 05 15.7
1.	iP i e P: C	Z NEZ N	01 12 45.1 53 13 16
1.	P	Z	02 37 33
20.0 S., 179.8 E. South of Fiji Is. h: 553 km ca. H= 02 27 13.6			USCGS
1.	iP e P: W, C	EZ NE	04 34 34.1 50
1.	eP e	Z NE	04 57 34 58 00
1.	eP e i	Z N E	05 43 46 44 23 31
1.	P i	Z NZ	06 50 30 53
1.	eP i e	Z Z N	07 52 24 27.3 43
1.	iP NZ, P e i P: C, E, C	E L N	08 14 07.2 20 21
1.	iP Z, P i P: E, C	E NLZ	08 50 19.2 25.4
1.	iP i P: E	LZ NEZ	08 51 07.6 13.9
1.	P P: C	Z	10 00 43
5.5 S., 131.4 E. Banda Sea. h: 33 km ca. H= 00 52 51.3			USCGS
1.	P i i i	NZ NZ E NZ	10 03 35 40 53 04 00 10

Date	Phase	Comp.	Time(GMT) h m s
1.	iP i i P: S, D	NZ NEZ E E	11 42 32.0 43 43 07 10
1.	iP e i P: C	Z N N	11 55 48.8 56 28 44
1.	iP e P: S, C	NZ Z	12 25 02.5 08.4
1.	iP i i P: W	E N E	12 25 22.5 23.5 35.6
1.	P e i i	Z E N L	12 40 34 50 50 01.5 01.8
1.	P e	LZ N	13 08 03 40
1.	PKP P: E	Z	14 14 43
27.7 S., 70.0 W. Near coast of northern Chile. h: 113 km ca. H= 13 54 54.8			USCGS
1.	iP i	Z NLZ	15 14 11.1 17.5
1.	iP i i i P: E, D	LZ N L LZ	17 17 18.1 13.3 38.2 51
1.	iP i i i i P: S, W, C	NEZ Z E NZ NZ E	17 21 08.4 14 28.3 28.8 40.5 40.3
1.	iP i e i i	EZ Z N L N	18 05 29.2 32.3 40.2 50.0 57 58.0

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
1.	ePKP 32.7 S., 71.5 W. Near coast of central Chile. h: 70 km ca. H= 18 11 52	Z	18 31 47			h: 33 km ca. H= 00 15 34.5	USCGS
1.	iP i iS P: E, D	EZ N NE	18 32 17.3 17.6 33.5	2.	eP S	Z NE	00 38 42 39 02
1.	iP S	Z NE	18 39 32.9 57	2.	eP iS	Z E	02 35 57 36 21.9
1.	P e e	Z N N	19 28 15 40 29 27	2.	P	Z	03 12 43
1.	eP	Z	20 13 04			56.1 N., 156.1 W. Alaska aftershock. h: 33 km ca. H= 03 04 16.9	USCGS
1.	iP Z, P NE iS NE P: S, W, D		21 30 18.1 40.3	2.	P i i	Z N NE	04 18 40 48 58.5
1.	eP eL 19.9 S., 66.4 E. Mascarene Is. region. h: 33 km ca. H= 21 33 23	Z E	21 46 15 22 09.8	2.	iP i i P: D	Z NE NE	05 30 58.8 59.0 31 39.4
1.	iP i iS P: S, C	NZ Z E	22 05 11.5 17 31.6	2.	P e	Z E	07 11 02 21 33
1.	eP i S i i	Z Z NE N E	22 26 03 09.7 24 36.0 36.5			3.8 S., 123.2 E. Celebes. h: 37 km ca. H= 07 03 11.4	USCGS
1.	eP i S i	NZ NZ NE E	23 37 42 45.7 38 03 14.0	2.	iP S P: S, W, D	NEZ NE	07 43 50.3 44 36
1.	iP S i P: S, W, C	NEZ E NE	23 55 36.3 56 56 09	2.	iP Z, P L i P: C	N	08 17 52.4 53.0
2.	P i e 52.9 N., 162.3 E. Near east coast of Kamchatka.	NZ Z E	00 20 42 54 29 42			0.1 N., 123.9 E. Northern Celebes. h: 110 km ca. H= 03 10 38.7	USCGS
			(cont.)	2.	PKP S SS L	Z N E N	08 33 56 52 32 56 22 58 13

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
	P: S, W, C			2.	P	Z	21 44 09
	Mag. 5 $\frac{1}{2}$ (Mat.)				i	Z	21
	56.2 N., 149.9 W.			2.	iP	Z	21 52 59.3
	Alaska aftershock.				i	Z	53 09
	h: 31 km ca.			2.	P	Z	21 53 26
	H= 08 36 16.9	USCGS			S	NE	49
2.	iP	NZ	09 22 52.2	2.	iP Z, P N		22 05 50.1
	S	NEZ	23 16		S	E	10 12
	P: S				i	N	12.6
2.	iP	NZ	09 41 56.7		P: S, C		
	S	NE	42 17	3.	iP N, P EZ		00 05 32.7
	i	E	29		S	NE	58
	P: S, C				P: S, D		
2.	eP	Z	10 01 19	3.	iP NZ, P L		00 33 35.9
	i	Z	24		S	E	34 06
2.	iP	Z	11 21 43.0		P: S, C		
	i	Z	46	3.	ePS	E	02 18 10
	i	NE	47.2		eSS?	E	23 05
	P: C				eL	E	52.1
2.	iP	NEZ	11 21 56		Mag. 5 $\frac{1}{2}$ (Mat.)		
	S	E	22 38		19.8 N., 70.7 W.		
	P: N, E, D				Dominican Republic region.		
	34.0 N., 135.0 E.				h: 7 km ca.		
	Near south coast of Honshu,				H= 01 48 23.3	USCGS	
	Japan.			3.	iP Z, P N		04 04 23.3
	h: 30 km ca.	JMA			P: S, C		
2.	iP	Z	13 58 42.3	3.	eP	Z	04 08 42
	S	NEZ	59		i	N	47
	P: C				46.6 N., 153.5 E.		
2.	ePKP	Z	14 17 39		Kurile Is.		
	27.5 S., 70.3 W.				h: 33 km ca.		
	Near coast of northern				H= 04 05 07.5	USCGS	
	Chile.			3.	P	Z	05 08 47
	h: 61 km ca.				i	NE	09 12
	H= 13 57 45	USCGS			S	NE	21
2.	P	Z	15 42 27	3.	iP Z, P N		05 24 48.0
	56.5 N., 149.5 W.				i	NZ	25 11
	Gulf of Alaska.				P: N, D		
	h: 33 km ca.			3.	iP EZ, P N		07 49 20.7
	H= 15 33 31	USCGS			S	N	53 11
2.	eP	Z	15 59 51		L	E	54 21
	44.7 N., 151.5 E.				Lr	Z	55 43
	Kurile Is. region.				P: S, W, D		
	h: 33 km ca.				Mag. 5 $\frac{1}{2}$ -6 (Mat.)		
	H= 15 56 48.4	USCGS			22.6 N., 121.3 E.		
2.	iP	Z	16 22 33.6		Near south coast of Taiwan.		
	i	E	33.9		h: 33 km ca.		
	P: D				H= 07 44 44.3	USCGS	

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Date	Phase	Comp.	Time(GMT) h m s
3.	eP	Z	11 50 59
3.	P i i	Z NE Z	13 13 45 50 14 12
3.	i	N	13 34 58.8
3.	iP Z, P N iS i P: N, D	E N	14 58 07.2 30.4 30.6
3.	iP i i i P: N, D	NZ NEZ Z Z Z	16 06 04.1 04.5 09 29 41
3.	eP	Z	17 02 55
3.	eP	Z	17 05 01
			56.7 N., 152.4 W. Alaska aftershock. h: 20 km ca. H= 16 56 18.2 USCGS
3.	iP i S i P: N, E, D	NEZ Z NEZ Z	17 15 55.1 16 01 16 28
3.	e e	N E	17 27 11 31 24
			8.3 S., 118.7 E. Sumbawa I. region. h: 33 km ca. H= 17 08 11.2 USCGS
4.	iP S	NEZ NE	01 43 34.5 55
			P: S, W, C
4.	P i S	Z NEZ E	01 51 50 51.5 52 11
4.	P S	Z NEZ	02 43 35 51
4.	eP eL	Z E	03 44 05 55.2
			2.5 S., 139.8 E. Near north coast of western New Guinea. h: 33 km ca. H= 03 36 42.0 USCGS

Date	Phase	Comp.	Time(GMT) h m s
4.	P eS	Z E	03 27 59 28 22
4.	P S	Z E	09 22 47 29 11
4.	P	Z	11 41 14
4.	P i	EZ N	11 41 43 43.5
4.	iP S	NEZ NE	13 25 37.1 56
			P: S, E, D Mag. 4.3 (Mat.) 36.1 N., 130.9 E. Honshu, Japan. h: 60 km ca. JMA
4.	iP i S	EZ N L	14 44 45.7 46.0 45 05
			P: E, D Mag. 4.2 (Mat.) 35.9 N., 140.0 E. Honshu, Japan. h: 40 km ca. JMA
4.	P S i	Z L NZ	16 04 11 32 33
4.	iP i S i L eScP ScS ScS	EZ N L N Z N L	17 27 42.3 42.6 30 24 35 32 02 36 24 40 00.5 01
			P: L, D Mag. 5.1 (Mat.) 46.5 N., 151.5 E. Kurile Is. h: 101 km ca. H= 17 24 20.2 USCGS
4.	P	Z	17 45 11
4.	iP i P: D	Z NL	18 33 08.3 38.5
4.	iP S P: C	Z E	20 40 50.5 41 26
4.	iPKP	Z	21 22 23.7
			15.7 S., 70.1 W.

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	Southern Peru. h: 248 km ca. H= 21 03 07		USCGS
4.	eP	Z	21 44 28
5.	eP	Z	00 07 03
5.	P	Z	01 53 45 17.3 S., 176.4 W. Fiji Is. region. h: 16 km ca. H= 01 47 39.1
			USCGS
5.	iP	LZ	02 38 55.7
	i	N	39 23
	i	E	24
	P: L, C		
5.	P	LZ	04 27 37
	i	NLZ	40
	S	NL	30 22
	L	L	55
	Mag. 4 $\frac{1}{2}$ -4 $\frac{3}{4}$ (Mat.) 27.1 N., 123.1 E. Ryukyu Is. h: 144 km ca. H= 04 24 51.3		USCGS
5.	eP	Z	05 13 09
	i	N	16
	eS	N	17 23
	e	E	30
	10.3 N., 121.0 E. Philippine Is. region. h: 13 km ca. H= 05 03 04.0		USCGS
5.	eP	Z	05 30 14
	S	E	36
	i	N	47
	i	E	48
	i	Z	40
5.	eP	Z	06 11 22
	S	N	46
	i	NEZ	40
5.	PKP	Z	07 07 43
	44.4 S., 72.4 W. Near coast of southern Chile. h: 33 km ca. H= 06 47 27.7		USCGS
5.	PKP	Z	08 46 08
	31.1 S., 60.0 W. San Juan Province, Argentina. h: 33 km ca. H= 08 25 45.7		USCGS
5.	iP	Z	08 43 33.7
	e	N	49 00
	P: D		
5.	P	NLZ	09 56 39
	S	NE	57 03
5.	P	Z	09 55 12
	15.1 S., 177.7 W. Fiji Is. region. h: 393 km ca. H= 09 43 25.4		USCGS
5.	iP	Z	11 17 30.3
	i	N	39.5
	i	E	40.0
	S	E	27 13
	eScS?	E	30
	i	N	44
	isS	L	28 55
	L	E	36 47
	ePKPPKPZ		44 40
	eSKPPKPZ		47 41
	ePKPPKPZ		12 04 35
	P: C		
	Mag. 6 (Mat.) 32.1 S., 179.3 E. South of Kermadec Is. h: 235 km ca. H= 11 06 02.6		USCGS
5.	ePKP	Z	11 21 20
	39.0 S., 74.5 W. Off coast of central Chile. h: 26 km ca. H= 11 01 16.5		USCGS
5.	eP	Z	11 46 46
	i	E	47 12
	S	NE	15
5.	P	LZ	12 16 50
	S	LZ	57
	i	N	57.6
5.	iP Z, P N		14 35 26.5
	i	N	37
	eS	N	36 18
	P: C		
5.	P NE, eP Z		15 13 47
	i	EZ	14 03
5.	i	Z	15 18 27.6
	i	E	29.3
5.	iP	Z	15 48 46.6
	i	N	53
	eS	NE	49 13
	i	L	16
	P: D		

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Date	Phase	Comp.	Time(GMT) h m s
5.	eP S i	Z NEZ N	16 43 40 44 07 15
5.	eP e	Z N	17 14 11 15 07
5.	iP iS Z, S E e i	Z N N	13 26 06.6 29.5 30 44
5.	iP NZ, P E P: N, C		19 10 52.2
5.	eP iP N, P Z iS P: N	Z Z NEZ	19 41 34 21 18 05.1 12.3 13.7
5.	iP P: C	Z	22 41 17.2
5.	PKP1 PKP2 i PP eSKSP? ePPS eSS e eSSS L L P: D	Z Z E Z Z E Z E E E N	22 43 00 22.5 49 46 57 56 28 23 00 04 16 07 38 08 08 11 31 24 58 26 35
Mag. 6½-6¾ (Mat.) 41.1 S., 74.9 W. Off coast of southern Chile. h: 33 km ca. H= 22 23 13.0 USCGS			
6.	iP i eS P: D	Z E N	02 35 40.1 41.2 37 15
31.5 N., 120.0 E. Southwest of Kyushu, Japan. h: 137 km ca. H= 02 33 39.5 USCGS			
6.	eP i S N, eS E	Z Z E	04 54 48 50.2 55 15
6.	iP N, P Z S E, eS N		05 40 06.0 29

Date	Phase	Comp.	Time(GMT) h m s
6.	iP i PcP P: D	Z Z Z	07 20 38.1 21 00 22 05
9.1 S., 120.8 E. Sumba I. region. h: 58 km ca. H= 07 12 01.1 USCGS			
6.	eP i S	Z E NE	07 32 39 33 06 10
6.	i i i	Z N EZ	07 51 22.7 48 49
6.	iP i i	Z E E	09 02 31.8 55.6 03 18
6.	eP P: C	Z	10 57 38
43.4 N., 126.7 W. Off coast of Oregon. h: 33 km ca. H= 10 46 28.9 USCGS			
6.	iP i i S i i	N EZ Z E Z N	12 03 28 29 33 52 54 55
6.	P iS i i	Z N E Z	13 03 31 55.3 56.2 57.5
6.	P	Z	13 20 40
60.4 N., 145.8 W. Alaska aftershock. h: 33 km ca. H= 13 11 31 USCGS			
6.	P i e	Z N E	13 49 12 50 05 53 04
4.2 S., 140.5 E. West New Guinea. h: 50 km ca. H= 13 41 36.5 USCGS			
6.	P S	NZ N	14 05 02.5 18
6.	iP N, P EZ iS N, S EZ P: N		14 05 32.2 38.5

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
6.	iP N, P EZ S i P: N	EZ N	14 09 28.2 34.7 35.0				20.2 S., 174.6 W. Tonga Is. h: 29 km ca. H= 02 15 04 USCGS
6.	iP S P: S, W, D	NEZ NEZ	14 17 14.7 21	7.	iP NZ, P E eS eSS? eL	E E E	05 46 11.0 53 19 57 12 59 48 P: N, C 56.8 N., 152.3 W. Alaska aftershock. h: 33 km ca. H= 05 37 25.1 USCGS
6.	iP i i	Z EZ E	14 20 46.3 53 21 14				
6.	P iS NE, S Z	Z Z	14 54 21 27.5				
6.	iP Z, P NE P: N, W, C 22.5 S., 170.5 W. South of Fiji Is. h: 504 km ca. H= 17 03 28.9 USCGS		17 13 56.5	7.	iP EZ, P N eS P: N, E, D Mag. 4.6 (Mat.) 37.3 N., 141.6 E. Near east coast of Honshu, Japan. h: 60 km ca. JMA		08 05 45.2 06 20
6.	iP NZ, P E S eSS Lr P: S, C Mag. 6-6½ (Mat.) 56.9 N., 152.1 W. Alaska aftershock. h: 39 km ca. H= 18 24 50.5 USCGS	NEZ Z Z	18 33 34.3 40 41 43 46 49 30	7.	iP iS P: C	Z NEZ	10 58 47.6 53.7
6.	P S i	Z E N	23 30 32 56 58	7.	iP S P: C	Z N	10 59 30.9 53
6.	eP S i	Z NEZ NE	23 53 10 19.2 S., 167.6 E. New Hebrides Is. region. h: 43 km ca. H= 23 42 45.7 USCGS	7.	iP S P: S, L, D	NEZ NE	13 03 31.2 43
7.	iP N, P EZ S i P: S	N E	00 00 16.4 23 24	7.	iP iS i	EZ EZ NE	13 09 38.2 40.0 51
7.	iP P: C	Z	01 02 48.3	7.	iP i S EZ, eS N P: C	Z N	13 40 55.3 55.8 41 16
7.	eP S EZ, eS N	Z	01 35 55	7.	P S EZ, eS N	Z	16 22 39 57
7.	iP S P: S	NZ NEZ	02 12 02.8 31	7.	eL S	E N	16 30 18 20 01 10 35
7.	P P: S	Z	02 26 27 (cont.)	7.	eP	Z	23 01 37

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
8.	iP NZ, P E S N e E P: S, E, D		01 21 10.8 27 28		eL E Mag. 5 $\frac{1}{2}$ (Mat.) 12.5 N., 87.8 W. Off west coast of Nicaragua. h: 63 km ca. H= 15 45 10.9		16 33 58
8.	eP Z S N		03 34 26 56	8.	eP Z i E S NEZ		16 21 31 55 57
8.	iP EZ S N		05 12 22.5 58	8.	P Z i NE S NE		16 46 31 32 55
8.	iP Z, P N eS NE P: S, C		05 22 01.7 33	8.	P Z i NE S NE		17 12 53 54 13 22
8.	iP NEZ iS N, eS Z P: S, E, D		06 13 47.0 14 09	8.	eP Z iS S., 176.7 W. Fiji Is. region. h: 354 km ca. H= 18 42 59		18 53 31
8.	iP Z i NE S E i N i E P: D		07 50 17.7 18.4 34 38 40	8.	eL E		21 02 04
3.	iP NEZ S E i E P: S, E, D		08 01 24.6 41 44	8.	P Z 17.5 S., 175.0 W. Tonga Is. h: 193 km ca. H= 20 59 43.6		21 10 34
8.	iP EZ, P N S E e NZ P: N, W, C		08 22 03.0 24 25	9.	e E		01 31.6
8.	eP Z 56.7 N., 152.4 W. Alaska aftershock. h: 33 km ca. H= 09 48 35.6		09 57 21	9.	P Z 17.8 S., 178.6 W. Fiji Is. h: 537 km ca. H= 01 48 12.8		01 58 16
8.	iP NZ iS E, S N P: S, C		13 48 03.0 26.7	9.	iP Z i E S N P: C		01 59 19.3 19.8 48
8.	iP Z i NE e E S E P: D Mag. 5.2 (Mat.) 31.7 N., 140.2 E. South of Honshu, Japan. h: 110 km ca. H= 14 59 41.2		15 00 57.5 57.8 01 52 56	9.	P Z S NEZ		02 29 51 30 06
8.	ePKP Z e E		16 03 46 12 26 (cont.)	9.	P Z P: C 6.2 S., 147.9 E. East New Guinea region. h: 54 km ca. H= 03 12 57.3		03 20 57.4

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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
9.	P S	NZ NEZ	03 32 10 34	9.	iP e P: D	Z E	22 55 52.0 56 03
9.	iP iS P: N, D	NZ E	04 20 08.3 33.4	10.	PKP eL	Z E	01 29 00 02 12 18
9.	iP P: C	NEZ	05 24 30.2				19.1 N., 67.3 W. Mona Passage. h: 33 km ca. H= 01 10 12.4 USCGS
			53.4 N., 153.4 E. Sea of Okhotsk. h: 511 km ca. H= 05 20 32.7 USCGS	10.	iP NE, P S	Z NE	03 02 14.0 15
9.	iP P: S, D	NZ	05 39 43.0	10.	eP iS	Z E	04 50 18 44.5
			10.3 S., 161.3 E. Solomon Is. h: 85 km ca. H= 05 30 46.9 USCGS	10.	eP S	Z NE	05 10 16 38
9.	eP S	Z NE	06 01 47 02 11	10.	eP eS	Z N	06 50 34 51 07
9.	iP iS P: D	Z N	06 20 25.1 50.0	10.	iPKP i i P: D	Z N Z	07 54 26.1 26.3 53.3
9.	ePKP	Z	08 16 22				16.7 S., 70.8 W. Southern Peru. h: 92 km ca. H= 07 34 49.9 USCGS
			45.1 S., 79.2 W. Off coast of southern Chile. h: 33 km ca. H= 07 56 26 USCGS	10.	eP i i	Z EZ E	09 39 56 40 30 41
9.	P S	Z E	12 03 42 04 04	10.	P i	Z E	12 02 54 03 40
9.	iP Z, P E P: D		12 34 22.1	10.	P	Z	13 03 44
9.	iP e e P: D	Z NE Z	13 42 53.6 43 18 19	10.	iP e i i P: D	Z N Z N	14 40 51.5 41 12 16 20
9.	P S?	NZ NEZ	17 41 28 55	10.	eP	Z	14 54 34
9.	P S	NEZ N	17 42 19 37				14.1 S., 166.7 E. New Hebrides Is. h: 44 km ca. H= 14 44 40.1 USCGS
9.	P Z, eP iPcP eS eL Mag. 5 (Mat.) 0.3 S., 125.1 E. Molucca Sea. h: 59 km ca. H= 20 06 36.9 USCGS	NE Z E E	20 13 54 16 08.1 19 51 22 43	10.	P iS i	Z N NE	15 03 35 09 20.2 37
				10.	iP Z, P E i e	N N	15 12 25.1 26 50

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
10.	P i S i P: S	NEZ Z E N	15 15 16 17.2 39 42		P: S, W, C 44.6 N., 148.8 E. Kurile Is. h: 33 km ca. H= 20 16 55.8		USCGS
10.	eP i i i	Z EZ E Z	16 22 33 54 23 03.8 04.1	10.	iP iS i P: S, D	NZ N E	20 45 19.8 44.6 44.8
10.	iP P: S, C	NZ	16 26 50.0	10.	P ePcP e eL	Z Z E E	21 48 18 49 56 53 28 22 00 29
10.	iP i i P: D	Z N N	16 33 37.2 37.7 34 43		Mag. 5 (Mat.) 6.2 S., 154.5 E. Solomon Is. h: 105 km ca. H= 21 40 10.4		USCGS
10.	iP i iS P: S, C	NZ E NE	17 05 51.6 51.8 06 03.6	10.	P i S	Z NE NE	22 13 29 40 14 28
10.	PKP ePP	Z Z	17 17 51 20 01	11.	eP i i	Z Z Z	00 25 37 46 51
			9.2 N., 62.0 W. Near coast of Venezuela. h: 51 km ca. H= 16 58 44.0				USCGS
10.	iP i e eL eL P: N, D	Z E E E N	17 54 56.3 56.5 57 09 30 58 04	11.	P S P eP i S iP P: C	NZ N NEZ Z N Z	02 03 00 02 21 57 22 47 06 16 08 07 43 30 53.8 N., 163.3 E. Off east coast of Kamchatka. h: 40 km ca. H= 07 44 07
			45.1 N., 149.9 E. Kurile Is. h: 40 km ca. H= 17 52 02.5				USCGS
10.	iP e P: C	Z E	18 12 19.1 13 48	11.	P i	NEZ N	08 41 00 09.5
10.	eP eL	Z E	18 29 29 53 46	11.	eP S	Z N	10 00 46 01 13
			30.3 N., 57.7 E. Iran. h: 13 km ca. H= 18 18 35.6				USCGS
10.	eP i i	Z E EZ	19 13 21 30 45	11.	eP i S iP P: C	Z N NE Z	10 14 18 21.0 44 10 34 08.6
10.	iP e	NEZ E	20 19 39.0 22.0 (cont.)				USCGS

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
11.	P	NEZ	12 38 35		i	N	03 16 05
	e	N	46		i	L	14.0
					P: C		
11.	eP	Z	12 45 09	12.	iP	NZ	06 55 37.8
	eS	N	56		i	E	33.4
	e	Z	46 01.5		i	NEZ	58 45
	i	Z	09.8		i	NEZ	59 02.5
11.	P	Z	13 38 32		L	E	07 00 50
11.	iP NZ, P	E	15 34 50.5		ScP	Z	03 37
	iS	E	35 14.0		eScS	Z	07 16
	P: S, C				P: N, D		
11.	iP	NEZ	16 20 38.0				
	iS	NE	56				
	P: S, E, D						
11.	P	Z	16 24 57	12.	iP	Z	07 50 54.0
11.	P	Z	18 09 23		eS	Z	51 21
					P: C		
11.	iP NZ, P	E	19 27 34.8	12.	iP	NEZ	08 50 13.3
	e	NEZ	28 03.5		i	N	56.5
	P: N, D				P: N, W, D		
11.	P	Z	20 50 52	12.	P	Z	09 36 56
	S	NE	51 15				
11.	iP	NZ	21 04 11.0	12.	iP	Z	10 18 34.3
	iS	NE	34.6		S	NE	19 00
	i	N	46.5		P: C		
	i	E	57	12.	P	Z	11 23 33
	P: N, D						
11.	P	Z	21 08 42	12.	P	Z	14 16 08.5
11.	iP	Z	21 51 07.3		i	Z	10.8
	P: C				i	E	15.0
					S	E	43.0
11.	P	NZ	22 16 03	12.	P	Z	16 46 40
	S	NE	26		i	NEZ	46.0
					S	NE	47 06
11.	iP	Z	23 23 49.5	12.	iP	Z	16 57 19.0
	iS	NE	24 07.0		i	Z	22.8
	P: D				S	NE	42
12.	eP	Z	01 25 44		P: C		
12.	iP	NZ	03 07 28.7	12.	iP	Z	17 05 57.2
	i	E	29.3		S	E	06 23
	S	NE	52.0		P: C		
	P: N, D			12.	iP	NE	17 25 06.0
					S	NE	28
12.	iP	Z	03 15 14.0		P: N, E		
	i	NEZ	14.3				
	i	N	23.5	12.	P	Z	18 26 29
	S	E	40.0		i	E	42.5
	i	E	52		S	NZ	27 10

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
12.	P eS	N N	13 30 07 21		P: S, E, D Mag. $6\frac{1}{2}$ - $6\frac{1}{2}$ (Mat.) 5.4 S., 154.3 E. Solomon Is. h: 383 km ca. H= 00 31 14.1		USCGS
12.	iP S P: C	Z Z	19 04 47.2 55.5				
12.	iP EZ, P iS P: E, C	N NE	19 16 02.5 09.2	13.	P i i	Z Z Z	03 20 03 10 31.4
12.	P S i	Z E E	19 21 59.5 22 23.8 37.3	13.	iP i S P: S, C	NZ N E	03 34 30.0 36.0 55
12.	iP EZ, P eS eSSS L P: W, D Mag. $5\frac{1}{2}$ (Mat.) 31.0 N., 49.8 E. Western Iran. h: 33 km ca. H= 19 26 26.1	N E E E	19 37 44.0 47 10 55 24 20 03 00	13.	P eL 54.4 N., 158.7 E. Kamchatka. h: 33 km ca. H= 04 20 55	NEZ E	04 25 55 32 17
			USCGS				USCGS
12.	P i S	E Z N	20 01 36 41 02 10	13.	iP i i i S eL P: D Mag. $5\frac{1}{2}$ - $5\frac{1}{2}$ (Mat.) 6.0 S., 130.4 E. Banda Sea. h: 127 km ca. H= 04 28 23.2	Z Z N L E E	04 36 09.8 10.2 10.7 11.0 42 22 45 24
12.	iP S	Z NE	22 53 01.3 08.5				USCGS
12.	P S	NE E	23 03 41 04 02.6				
12.	P S	Z E	23 41 22 43	13.	P S i	Z NE E	06 14 10 33 45.0
12.	P	Z	23 45 53	13.	eP eS	Z E	07 15 40 16 09
13.	iP iS P: N, W, C	NEZ NE	00 04 43.4 05 03.5	13.	P i i S	NZ E E E	08 26 47.5 49.5 27 11 14.3
13.	eP eS	N N	00 20 40 21 27				
13.	iP i i pP S ScS sSS i L PKP1PKP1Z PKP2PKP2Z	NEZ E Z E NE E E E	00 38 48.9 49.3 49.7 39 51 44 52 48 07 50 36 54 00 01 00 05 10 09 11 31 (cont.)	13.	P i S i	Z Z NE Z	09 09 01.5 10.8 23 24.0
				13.	P	Z	09 25 34
				13.	iP S P: N, E, D	NEZ E	09 57 36.4 49.3

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
13.	iP	Z	10 58 47.5	13.	i	NE	07 17 38.2
	P: C						
			19.3 S., 177.6 W.				9.8 S., 123.8 E.
			Fiji Is. region.				Timor.
			h: 551 km ca.				h: 33 km ca.
			H= 10 48 34				H= 07 08 55.9
			USCGS				USCGS
13.	P	Z	12 40 59	14.	iP Z, P NE		08 03 05.4
	iS	NE	41 22.5		S	NE	26.0
					P: C		
13.	P	Z	12 53 19	14.	iP NZ, P E		09 25 57.8
					iS	NE	26 21.5
13.	iP	EZ	14 11 38.5		P: N, C		
	i	N	39.8				
	S	NE	12 08	14.	P	Z	10 32 14
	P: E, C				i	Z	29.0
					i	Z	43.0
13.	eP	Z	15 05 32	14.	iP	Z	10 37 36.3
	eS	Z	06 12		P: C		
13.	iP	Z	17 17 43.5	14.	iP	Z	10 58 04.0
	P: D				P: D		
13.	e	E	19 42 23	14.	eP	Z	11 49 31
	eL	E	47 42		i	N	48.5
			10.5 S., 13.3 W.				
			Ascension I. region.	14.	P	NZ	14 42 45
			h: 33 km ca.		e	E	43 07
			H= 18 26 30.7		i	Z	20
			USCGS				
13.	P	NEZ	20 09 18	14.	P	Z	15 25 47
	S	E	41.3				
13.	iP	NEZ	20 34 59.6	14.	iP	NEZ	16 42 30.7
	P: N, W, C				iS	NEZ	41.0
					P: N, W, D		
13.	iP	Z	20 57 16.3	14.	eP	Z	16 48 42
	S	E	48				
	P: D			14.	iP	NEZ	16 58 31.2
					S	E	55
13.	P	NEZ	22 39 29		P: N, E, D		
	S	NE	52				
13.	P	Z	23 43 33	14.	iP	NEZ	17 27 13.0
					iS	NE	29.5
14.	P	EZ	01 47 29		P: S, E, D		
	i	N	31				
	S	NZ	48 02	14.	P	Z	18 53 57
					i	E	54 02.3
14.	P	Z	04 41 23		i	E	17.0
	S	E	42 46		S	NE	25.5
	i	N	47				
14.	P	Z	07 00 50	14.	P	EZ	19 33 19
	i	N	54.5		eS	Z	49
	i	NE	01 14.0	14.	P	Z	21 53 49
	i	NE	26		S	E	22 07 38
					S	E	12 21
14.	P	Z	07 17 34.5		eL	E	14 45
			(cont.)				(cont.)

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
	Lr	E	22 25 13				
	Mag. 5 $\frac{1}{2}$ -5 $\frac{1}{2}$ (Mat.)				Near east coast of Honshu, Japan.		
	18.8 S., 163.2 E.				h: 74 km ca.		
	New Hebrides Is.				H= 11 40 46.5		
	h: 26 km ca.				USCGS		
	H= 21 48 31.2						
15.	P	Z	03 19 22	16.	eP	Z	11 50 05
					i	Z	13.0
					i	NE	16.0
					S	N	59 04
15.	P	Z	03 44 05	16.	P	Z	12 36 45.4
	eL	E	57 00ca.		i	NZ	50.5
	5.5 S., 104.1 E.				S	NE	37 14
	Southern Sumatra.				P: D		
	h: 33 km ca.						
	H= 03 34 50.8				USCGS		
15.	iP	NEZ	06 53 53.0	16.	iP	NEZ	13 34 10.6
	S	NE	54 23.5		S	N	30.6
	P: N, E, C				i	E	31.5
					P: S, W, C		
15.	P	Z	10 18 57	16.	P	Z	14 03 17
	i	Z	19 03	16.	P	Z	14 31 14.5
	eS	N	48		eS	Z	43
15.	P	Z	11 40 00	16.	iP	NEZ	18 05 31.6
15.	P	Z	14 22 56		S	E	44.6
15.	P	Z	14 37 45.5		P: N, E, C		
15.	P	NZ	15 44 26	16.	P	Z	21 17 53
	S	NE	50		S	NEZ	18 15
					i	E	25.5
15.	P	NEZ	18 42 53	16.	iP	Z	21 39 27.0
	S	N	43 09		P: C		
15.	iP	Z	20 23 24.5		39.7 N., 52.6 E.		
	eS	Z	24 03		Caspian Sea.		
	P: C				h: 33 km ca.		
					H= 21 28 49.1		
					USCGS		
15.	P	Z	20 55 31	16.	P	Z	21 45 50
	S	NE	56 39		S	NE	46 22
	i	E	58	17.	iP	Z	00 30 17.0
16.	P	Z	01 42 33		P: C		
16.	P	Z	01 51 47		35.0 N., 26.0 E.		
16.	P	Z	04 25 59		Crete.		
	i	Z	26 16		h: 18 km ca.		
					H= 00 17 40.9		
					USCGS		
16.	P	Z	08 12 01	17.	eP	N	03 33 04
					eS	E	47
16.	iP	NEZ	11 41 59.4	17.	P	Z	05 23 22
	i	Z	42 29		S	E	45
	S	NE	43 19	17.	P	Z	07 00 32
	P: S, W, C				eS	N	01 49
	40.3 N., 142.2 E.				e	E	55
	(cont.)						

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
17.	P S i	Z E E	07 40 33 53 41 51.5	17.	iP pP S L	NEZ Z E L	16 45 06.5 20.0 50 20 53 12
17.	eP S	Z Z	09 20 22 40	P: N, E, D Mag. 4 $\frac{3}{4}$ -5 (Mat.) 51.5 N., 177.8 E. Rat Is., Aleutian Is. h: 42 km ca. H= 16 33 44.4 USCGS			
17.	P S	NZ E	09 35 38 36 02	17.	P	Z	17 15 31
17.	iP LZ, P N S P: W, D	E	11 45 21.3 34	17.	iP P: C	Z	17 18 30.6
17.	iP i i eS P: N, E, D Mag. 4 $\frac{3}{4}$ (Mat.) 46.3 N., 151.9 E. Kurile Is. h: 33 km ca. H= 11 51 11.3 USCGS	NLZ Z Z L	11 54 39.4 50.3 55 02 57 24	17.	iP i iS P: S, C	NZ EZ NEZ	18 13 26.2 27.2 54.6
17.	P	Z	12 06 27	17.	P e i	Z Z NE E	18 51 41 52 20 18 55 17 44 53
17.	iP Z, P N S P: C	NEZ	12 54 04.4 14	17.	iP i P: S, E, D	NEZ E	20 28 25.5 51
17.	eP	Z	13 19 52	17.	P eS	Z N	21 10 08 58
17.	iP S P: C	Z NEZ	13 32 28.5 51	17.	P eS	EZ N	22 02 19 47
17.	iP S i L P: S, W, C Mag. 5.0 (Mat.) 42.6 N., 142.8 E. Hokkaido, Japan. h: 33 km ca. H= 14 54 01.4 USCGS	NEZ E Z E	14 55 44.0 57 05 27 40	17.	P eS	Z NE	22 14 07 23 28 07 37
17.	P L Lr Mag. 5 $\frac{1}{4}$ -5 $\frac{1}{2}$ (Mat.) 72.2 N., 1.7 E. Norwegian Sea. h: 33 km ca. H= 15 15 18.9 USCGS	Z E E	15 26 14 43 00 45 36ca.	18.	P	L	00 20 36
17.	P i	Z Z	16 09 13 36	18.	PKP pPKP	Z Z	00 45 49 46 43
				7.2 S., 74.4 W. Peru-Brazil border region. h: 156 km ca. H= 00 26 51.3 USCGS			
				18.	P S	Z E	00 51 32 52

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Date	Phase	Comp.	Time(GMT) h m s
13.	P i eS	Z N E	01 27 41 23 14 24
13.	iP S i P: S, C	NZ NE N	04 19 20.5 43.6 57.0
13.	iP i S eL P: N, E, D	NLZ L L E	04 37 44.5 55.5 39 34 40 00
			42.8 N., 145.3 E. Hokkaido, Japan. h: 33 km ca. H= 04 35 43.6
18.	PKP1 i i PKP2 i PP SKSP i SS i SSS Lr Lr P: C	EZ Z Z E Z E E E E E Z	05 04 49.0 56.0 05 06.0 16.0 08 30 40 19 10 23 53 28 53 29 43 33 14 54 40 55 00
			Mag. $6\frac{1}{2}$ - $6\frac{3}{4}$ (Mat.) 26.4 S., 71.5 W. Off coast of northern Chile. h: 3 km ca. H= 04 44 58.0
13.	iPEZ, P S P: W, D	N NE	05 22 15.3 57
18.	P eS	Z N	05 39 33 40 08
13.	eP	Z	06 26 15
13.	iP P: E, C	NLZ	09 40 15.3
13.	iP S P: S, E, C	NEZ NE	10 32 16.0 35
13.	P eS eL	Z E E	11 21 21 30 30ca. 44 28ca.

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
			0.5 N., 67.2 E. Carlsberg Ridge. h: 33 km ca. H= 11 09 43.4
18.	iP i i	Z Z Z	11 49 01.5 21.5 26.7
18.	P i i S	NZ Z N E	13 03 56 57.6 04 04.2 21.0
18.	iP Z, P S P: C	NL E	13 39 00.0 23
18.	iP S P: S, W, C	NEZ NEZ	13 49 52.5 50 16
18.	iP NZ, P S P: S, D	E NE	15 26 57.6 27 36.5
18.	iP P: C	Z	15 38 12.3
			5.7 N., 58.0 E. Carlsberg Ridge. h: 33 km ca. H= 15 26 11.4
18.	eP e	Z E	15 48 10 53 07
18.	P e P: C	Z E	15 56 13 16 07 30ca.
18.	eP eS	Z NEZ	16 41 02 28
18.	P S	Z NL	17 05 56.5 06 20.2
13.	eP	Z	19 01 03
18.	eP	Z	20 21 28
18.	P	Z	21 03 55
18.	eP	Z	23 54 31ca.
19.	P	Z	00 03 26
19.	P iS	Z NE	00 14 36 15 04.0

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Date	Phase	Comp.	Time(GMT) h m s
19.	iP NZ, P L S NE P: S, D		01 07 38.2 08 02
19.	iP P: D	Z	03 01 29.3
19.	eP S	Z N	16 00 20 45
19.	P iS	Z NE	07 31 01 28.6
19.	iP P: D	Z	07 47 35.3
19.	P eS L Lr	Z E E E	09 44 20 53 38 10 02 20 07 57
19.	eP	Z	10 49 32ca.
19.	iP i iS P: E, D	EZ NEZ NEZ	11 51 56.8 52 00.6 14
19.	iP P: D	Z	13 47 42.3
19.	P iS	Z NE	14 38 58 39 21.0
19.	P eS S S L	Z Z E E E	15 31 24 33 39 40 43 45 12 49 41
Mag. 5 $\frac{1}{2}$ (Mat.) 28.2 N., 52.7 E. Southern Iran. h: 52 km ca. H= 15 20 13.9 USCGS			
19.	P i S	Z EZ E	15 39 48 49.5 40 13.8
19.	iP i P: W, C	EZ N	17 00 25.0 51
19.	iP iS P: N, E, D	NEZ N	17 15 24.7 37.5
19.	P eS	EZ E	18 48 38 49 25

Date	Phase	Comp.	Time(GMT) h m s
19.	eP	Z	18 51 40
19.	P eS	Z E	19 03 04 07 47
19.	iP i i e P: S, W, C	NEZ N E E	20 04 19.0 26.5 27.0 05 02
19.	iP NZ, P S E P: S, C	E E	20 24 12.6 37
19.	P S i	NEZ NE E	21 27 57 28 24 37
19.	P eS	Z NE	21 35 44 36 08
19.	P S	NEZ E	22 04 19 43
19.	P S eL	NZ E E	22 05 26 50 06 05
19.	eP	Z	22 51 28
28.4 N., 52.7 E. Southern Iran. h: 58 km ca. H= 22 40 17.9 USCGS			
20.	P S	Z E	02 18 11 34
20.	e	E	02 39 08
72.1 N., 1.4 E. Norwegian Sea. h: 33 km ca. H= 02 08 15.8 USCGS			
20.	P i i ePcP PP eL	Z Z Z E N E	04 26 53.5 54.3 27 10.3 28 24 47 42 50
4.1 N., 95.4 E. Northern Sumatra. h: 93 km ca. H= 04 18 01 USCGS			
20.	eL	E	04 29 16
20.	P	Z	05 20 01 (cont.)

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
	L	E	05 46 20ca.	20.	P	NEZ	21 01 05
					eS	E	29
			28.1 N., 52.6 E.				
			Southern Iran.				
			h: 47 km ca.	20.	iP	Z	23 31 55.5
			H= 05 03 50.3		eS	N	32 15
			USCGS		P: D		
20.	P	Z	05 50 58	21.	P	Z	04 25 05
	eL	E	06 16 30		i	N	07
	P: C				i	N	14
			Mag. 5½ (Mat.)		S	NE	30
			23.2 N., 52.6 E.	21.	P	Z	04 36 08
			Southern Iran.		i	Z	27
			h: 52 km ca.				
			H= 05 33 47.7				
			USCGS				
20.	iP	NEZ	06 46 32.5	21.	eP	Z	07 41 40
	i	NZ	39.8		e	N	42 33
	S	E	47 04				
	P: N, W, D			21.	eL	E	08 36 31
							28.3 N., 52.2 E.
20.	SS	E	13 13 34				Southern Iran.
	eL	E	26 10				h: 54 km ca.
			37.4 S., 78.3 E.				H= 07 59 17.0
			Mid-Indian Rise.				USCGS
			h: 33 km ca.	21.	P	Z	08 42 31
			H= 12 48 47.7				
			USCGS	21.	iP EZ, P N		08 53 20.1
					P: E, C		
20.	iP	Z	15 41 23.6				
	iS	NEZ	26.3	21.	P	Z	11 33 04
	P: D				eS	E	25
20.	P	Z	16 15 23				
20.	P	NZ	16 58 19	21.	iP	NEZ	14 03 48.5
	S	NE	44		eS	E	04 38
							P: N, W, C
20.	iP	Z	17 20 04.7	21.	eL	E	17 27.8
	S	NE	26				40.1 N., 40.9 E.
	P: D						Turkey.
							h: 44 km ca.
20.	P	Z	17 37 14				H= 16 49 12.9
	L	E	45 12				USCGS
			Mag. 5½ (Mat.)	21.	eP	Z	20 06 55
			3.0 N., 123.3 E.		i	Z	07 09
			Halmahera.				
			h: 178 km ca.	21.	iP	NEZ	23 27 50.1
			H= 17 30 42.3		P: E		
			USCGS				
20.	P	NZ	17 39 49	21.	iP	NEZ	23 32 14.2
	S	NE	40 13		S	NE	37
					P: S		
20.	iP	NZ	18 26 15.3	22.	iP EZ, P N		00 08 25.6
	i	E	15.8		eS	E	16 03
	eS	N	47		eSS	E	20 16
	P: N, D				L	E	22 20
					L	Z	26 00
20.	P	Z	20 23 14				P: E, C
	S	NEZ	42				Mag. 5-5½ (Mat.)
20.	P	Z	20 32 11.3				(cont.)
	S	NZ	36.6				

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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
			12.2 S., 110.5 E. Northwest of Australia h: 35 km ca. H= 23 58-56.6 USCGS	22.	P S	Z NE	18 47 41 48 08
22.	P S	NEZ NE	00 50 34 56	22.	P i P: D	Z N	19 37 37.5 38 02
22.	iP P: D	Z	01 14 55.7	22.	iP S P: N, W, C	NEZ NE	19 39 28.3
			1.5 N., 126.2 E. Molucca Passage. h: 33 km ca. H= 01 07 51 USCGS	22.	iP S P: N, E, D	NEZ NE	19 44 01.5 25.5
22.	P	Z	02 01 55	22.	iP S P: N, E, D	NEZ NE	20 11 51.0 12 15.0
22.	iP S P: S, E	NEZ N	02 15 38.0 16 03	22.	P S P: N, D	NZ E	23 26 30.0 27 14
22.	eL	E	03 05 52	23.	P	Z	00 43 40
22.	P L	Z E	03 15 52 42 31	23.	P e P: C	Z N	00 55 32.0 55
			Mag. 5½ (Mat.) 31.5 N., 114.3 W. Gulf of California. h: 15 km ca. H= 03 03 20.7 USCGS	23.	P	Z	01 01 52
22.	iP S	Z NE	05 20 39.5 21 03	23.	P S P: N	NEZ E	02 51 23.1 46
22.	iP P: D	Z	07 30 05.0	23.	iP is P: N, E, C	NEZ E	04 40 10.5 21.5
22.	P S i	Z E N	07 50 25 51 08 13	23.	P S	Z E	07 19 11 33
22.	eP	Z	12 50 24	23.	iP EZ, P S N	NEZ N	07 38 14.8 42.5
			10.5 S., 161.6 E. Solomon Is. h: 50 km ca. H= 12 41 22.1 USCGS	23.	P es	Z E	09 29 29 53
22.	P S	Z NEZ	15 21 15 21	23.	iP Z, P es NE P: D	NE E	09 55 50.5 56 50
22.	iP S P: S, E, D	NEZ N	16 48 09.8 34				33.1 N., 142.1 E. Off east coast of Honshu, Japan. h: 33 km ca. H= 09 54 40 USCGS
22.	P	Z	18 06 08	23.	eP eL	Z E	11 14 00 23.0
22.	P i S	NZ E NE	18 06 13 50 07 00				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
23.	eP	Z	11 59 53		S	N	17 39 12
	eS	N	12 00 16		i	Z	15
23.	PKP1	Z	13 46 13		eL	E	42.5
	PKP2	Z	34		P: N, E, C		
			21.6 S., 60.6 W.			0.2 N., 123.8 E.	
			Northern Chile.			h: 127 km ca.	
			h: 71 km ca.			H= 17 26 15.1	USCGS
23.	iP	NEZ	14 13 01.6	24.	iP Z, P NE		18 28 25.5
	iS	NE	11.2		S	NE	46.5
	P: S, W, D				P: N, C		
23.	iP	NZ	15 32 04.7	24.	iP	NZ	18 48 17.5
	i	E	05.5		S	NE	42.5
	ScP	Z	37 41.5		P: S, C		
	S	N	38 31	24.	eL	E	20 05 45
	i	E	40			12.9 N., 120.3 E.	
	L	E	43 26			Mindoro, Philippine Is.	
	L	N	45 35			h: 33 km ca.	
	P: N, C					H= 19 53 59.7	USCGS
			Mag. 6 $\frac{1}{4}$ -6 $\frac{1}{2}$ (Mat.)	24.	P	Z	20 40 23
			6.1 S., 149.4 E.				
			New Britain region.	24.	P	Z	22 05 49
			h: 63 km ca.		i	NEZ	49.5
			H= 15 24 05.3		eS	E	13 00
24.	P	Z	01 07 43		L	E	18 28
	eS	N	08 10		L	Z	22 17
	e	E	29			Mag. 5 $\frac{1}{2}$ -5 $\frac{3}{4}$ (Mat.)	
24.	P	Z	01 09 32			58.4 N., 150.3 W.	
	eS	NE	40			Gulf of Alaska.	
24.	P	Z	05 14 39			h: 22 km ca.	
24.	P	Z	06 59 26			H= 21 56 54.2	USCGS
			51.9 N., 161.8 E.	25.	iP	Z	03 04 12.2
			Off east coast of		P: D		
			Kamchatka.			7.0 S., 129.4 E.	
			h: 33 km ca.			Banda Sea.	
			H= 06 54 26.4			h: 143 km ca.	
						H= 02 56 17	USCGS
24.	iP	Z	09 53 21.5	25.	P	Z	05 53 50
	eS	NE	54 38			5.4 S., 147.1 E.	
	P: C					East New Guinea region.	
			41.6 N., 144.1 E.			h: 203 km ca.	
			Near south coast of			H= 05 46 12.1	USCGS
			Hokkaido, Japan.	25.	iP	Z	09 27 08.6
			h: 40 km ca.		eS	N	23
					i	NEZ	25.5
24.	iP	NEZ	14 28 29.4		P: C		
	S	NEZ	50.2	25.	iP	NZ	11 12 43.0
	P: N, E, D				i	E	43.3
24.	eP	Z	15 04 58		iS	NE	13 06.0
24.	iP	NEZ	17 33 28.0		P: S, C		
	PcP	NZ	35 38				
			(cont.)				

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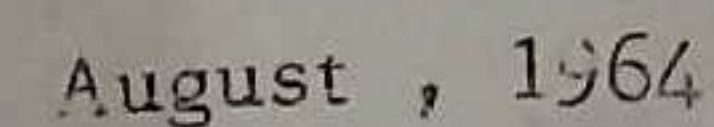
Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
25.	eP	Z	11 24 13	25.	iP NZ, P E		20 55 25.5
	S	NE	34 31		i	Z	43
	L	E	51 24		S	NE	56 11
	Mag. 5 $\frac{1}{2}$ -5 $\frac{1}{2}$ (Mat.)				P: S, W, D		
	36.1 N., 28.7 E.			25.	iP NZ, P E		22 39 17.5
	Dodecanese Is.				i	E	27
	h: 50 km ca.				S	N	37
	H= 11 11 53.6				i	E	38
	USCGS				P: S, D		
25.	iP	NEZ	12 54 34.0	25.	P	Z	22 42 25
	P: N, E, D				eS	NE	48
25.	iP Z, P E		13 07 43.3	25.	iP	NEZ	23 39 12.8
	i	N	45.0		S	NE	43
	S	N	08 17		P: N, E, C		
	P: C			26.	P	E	01 05 42
25.	iP Z, P NE		13 55 06.6		S	Z	48
	i	NZ	09.0	26.	P	NZ	03 59 25
	PPP	Z	56 57		i	E	31
	eS	N	14 00 56		S	NEZ	51
	i	NZ	01 29	26.	iP	NEZ	04 39 08.8
	L	E	07 39		i	E	19
	L	Z	14 44		S	N	30.5
	P: N, E, D				i	E	31.0
	Mag. 7 (Mat.)				P: N, W, C		
	78.2 N., 126.6 E.			26.	P	Z	05 43 23
	East of Severnaya Zemlya.				i	NZ	23.8
	h: 50 km ca.				i	Z	44 23
	H= 13 47 20.6				S	NEZ	45 41
	USCGS				i	E	51
25.	eP	Z	14 14 44		Mag. 5.7 (Mat.)		
25.	eP	Z	14 49 57		47.2 N., 148.4 E.		
	35.7 N., 29.1 E.				North west of Kurile Is.		
	Eastern Mediterranean Sea.				h: 308 km ca.		
	h: 24 km ca.				H= 05 40 27.1		
	H= 14 37 32.5				USCGS		
	USCGS			26.	P	Z	07 38 59
25.	iP	Z	17 29 46.5		S	N	41 08
	i	Z	30 13.0		45.1 N., 151.0 E.		
	P: C				Kurile Is.		
25.	iP	NEZ	18 38 44.9		h: 33 km ca.		
	S	E	39 01.5		H= 07 35 55.7		
	P: S, W, D				USCGS		
25.	iP	NEZ	20 39 17.8	26.	P	NZ	10 52 57
	S	NEZ	39		i	NEZ	53 14
	P: S, E, D				i	NE	26
25.	P	Z	20 41 19	26.	P	Z	13 06 45
	S	N	40		ePcP	Z	09 02
25.	iP	NZ	20 44 23.8		0.2 N., 126.6 E.		
	S	NZ	31		Molucca Passage.		
	P: N, C				h: 33 km ca.		
25.	eP	N	20 51 51		H= 12 59 31.1		
	i	Z	55		USCGS		
	eS	NE	52 03				

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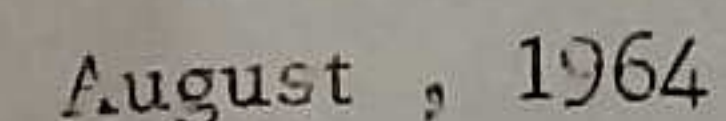
Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
26.	iP S P: E, C	NEZ NE	13 45 50.7 46 00	27.	eP eS eL L L	Z NE E E Z	06 27 30 29 51 30 47 31 51 32 37
26.	iP i P: S, W, C	Z E	15 57 09.7 29.8	27.	iP S i eL eL P: C	Z N E E Z	08 05 11.3 14 34 15 00 22 36 27 38
26.	iP NZ, P i S P: S, C	E E NE	17 06 30.1 30.6 41	27.	Mag. 5 $\frac{1}{2}$ -5 $\frac{1}{2}$ (Mat.) 17.5 S., 173.0 W. Tonga Is. h: 33 km ca. H= 07 53 54.8		USCGS
26.	iP Z, P iS? P: C	NE E	21 26 34.0 43	27.	iP i i S P: E, C	EZ Z E NE	11 12 11.2 24 26 40.0
26.	iP S P: D	Z NE	22 34 17.6 35 03	27.	eP eL	Z E	12 09 34 34.6
26.	iP eL eL P: C	Z E E	23 53 50.0 00 04 56 10 16	27.	Mag. 5 $\frac{1}{2}$ -5 $\frac{1}{2}$ (Mat.) 28.2 N., 55.7 E. Southern Iran. h: 69 km ca. H= 11 58 41.3		USCGS
27.	P S i L L	NEZ E N E Z	01 37 39 40 07 09 28 41 28	27.	P L L	Z E N	13 07 47 31 53 34 43
27.	Mag. 5-5 $\frac{1}{2}$ (Mat.) 23.7 N., 143.6 E. Volcano Is. region. h: 39 km ca. H= 01 34 26.7		USCGS	27.	eP eS? iP S P: N, E, C	Z N NEZ NEZ	13 26 33 50 28.9 42
27.	P i PcP eS eL eL L	EZ Z Z E Z E	04 52 56 53 08 54 52 59 12 05 03 29 07 08 08 37	27.	iP i S i i P: S, W, C	NEZ Z E NZ NE	14 09 27.5 35 57 10 11 24
27.	Mag. 5-5 $\frac{1}{2}$ (Mat.) 5.6 S., 133.9 E. Aroe Is. region. h: 9 km ca. H= 04 45 02.6		USCGS	27.	iP i i S L	Z NE NE NE	15 42 27.4 31 52

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
27.	P	Z	15 45 01	23.	iP	NLZ	04 45 41.3
	i	N	03		pP	Z	47 43.5
	i	E	07		PP	E	48 46
	S	NE	37		eS	E	54 10
27.	P	Z	15 45 17		eSS	L	58 36
27.	iP	NZ	15 49 21.6		eSSS	E	05 02 12
	iS	N	31.2		P: S, F, L		
	P: N, D				19.3 S., 173.2 N.		
					Fiji Is. region.		
					h: 530 km ca.		
					H= 04 35 20.3	USCGS	
27.	iP	E	17 50 22.5	23.	P	Z	10 24 31
	P: E				i	Z	34
27.	iP	EZ	18 24 14.4		i	Z	42
	i	N	14.7		S	E	54
	i	Z	21	28.	P	Z	13 30 03
	S	EZ	40		eS	E	36 40
	i	E	53				
	P: W, C				7.1 N., 95.1 E.		
	36.3 N., 140.9 E.				Nicobar Is. region.		
	Near east coast of Honshu,				h: 33 km ca.		
	Japan.				H= 13 21 13.5	USCGS	
	h: 20 km ca.	JMA		28.	P	NEZ	13 30 46
27.	eP	Z	19 44 22		i	Z	32 15
	S	E	54 20		i	E	41
	eL	E	20 13 25		e	N	45 44
	eL	Z	19 23				
	Mag. 5½ (Mat.)				7.6 N., 95.6 E.		
	35.5 N., 28.7 E.				Nicobar Is. region.		
	Eastern Mediterranean Sea.				h: 33 km ca.		
	h: 33 km ca.				H= 13 22 05	USCGS	
	H= 19 31 56.9	USCGS		28.	P	Z	14 17 07
27.	P	Z	20 26 55		i	Z	17
	i	Z	59		S	NLZ	30.5
	S	NE	27 19	28.	iP	Z	14 52 43.7
28.	P	Z	00 29 27		eL	L	15 24 33
	eS	N	55		P: C		
	i	Z	30 33		24.4 S., 179.3 E.		
28.	iP	Z	00 37 32.3		South of Fiji Is.		
	i	Z	39.9		h: 540 km ca.		
	iS	NEZ	55.5		H= 14 42 18.5	USCGS	
	P: C			28.	P	Z	16 04 47
28.	iP	NEZ	01 42 03.3		S	E	05 12
	i	Z	16		i	NE	15.0
	iS	NEZ	20.0	28.	P	Z	18 21 38
	P: N, W, D				i	NE	43
23.	P	Z	04 28 00		eS	L	25 20
	i	E	02		L	L	26 30
	e	N	29 22		Mag. 5-5½ (Mat.)		
23.	iP	EZ, P N	04 36 41.5		23.5 N., 120.6 E.		
	S	N	59.5		Taiwan.		
	P: W, D				h: 10 km ca.		
					H= 18 17 03.2	USCGS	



Date	Phase	Comp.	Time(GMT) h m s
27.	iP i ePPP P: C	Z Z N	04 16 30.4 50 1 08
	57.8 N., 156.0 W. Alaska Peninsula. h: 78 km ca. H= 04 03 03.2		USCGS
29.	P S	Z NEZ	05 44 00 23
29.	ePKP1 i iPKP2 epPKP	Z Z Z Z	06 24 54 55 25 05.5 26 11
	19.3 S., 66.3 W. Southern Bolivia. h: 232 km ca. H= 06 05 24.2		USCGS
29.	eP i	Z Z	07 40 48 41 02.4
29.	eP eS	Z N	10 13 40 14 02
29.	P S?	Z NE	10 44 25 27
29.	iP i eS e i P: C	Z NZ L N Z	13 04 36.0 53 05 23 33 38.5
	20.7 S., 174.1 W. Tonga Is. h: 33 km ca. H= 13 25 25.9		USCGS
29.	eL	E	13 52 46
	13.7 S., 172.6 E. New Hebrides Is. region. h: 33 km ca. H= 13 25 25.9		USCGS
29.	P i S i	Z Z E L	17 38 23 20.7 S., 174.1 W. Tonga Is. h: 33 km ca. H= 17 26 55.5
			USCGS
29.	P i S i	Z Z E L	18 40 47 58 41 10 24
29.	e eL	E E	21 28 08 31 52
29.	eP	Z	21 33 22



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(cont.)

