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Matsushiro Seismological Observatory
Matsushiro-machi , Nagano-shi,
Nagano-ken, Japan

Matsushiro Seismological Observatory , Japan

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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= 0.63 h_2= 1.7	102,000 (max)
	E	T_1= 1.0 T_2= 0.22	h_1= 0.64 h_2= 1.6	106,000 (max)
	Z	T_1= 1.0 T_2= 0.21	h_1= 0.67 h_2= 1.2	131,000 (max)
Benioff Seismogrph (Long Period)	N	T_1= 1.0 T_2= 89	h_1= 0.63 h_2= 2.5	3,200 (max)
	E	T_1= 1.0 T_2= 55	h_1= 0.64 h_2= 2.5	4,700 (max)
	Z	T_1= 1.0 T_2= 64	h_1= 0.67 h_2= 2.7	3,500 (max)
WWSS Seismograph (Short Period)	N	T_1= 1.0 T_2= 0.75		100,000
	E	T_1= 1.0 T_2= 0.75		100,000
	Z	T_1= 1.0 T_2= 0.75		100,000
WWSS Seismograph (Long Period)	N	T_1= 15 T_2= 100		3,000
	E	T_1= 15 T_2= 100		3,000
	Z	T_1= 15 T_2= 100		3,000
Short Period Vertical Seismograph	Z	T_1= 1.0 T_2= 2.82	h_1= 1.4 h_2= 1.2	32,000 (max)
Wood-Anderson Seismograph	N	T = 0.8	h = 0.8	1,300
	E	T = 0.8	h = 0.8	1,200

Date	Phase	Comp.	Time(GMT) h m s
1.	iP	EZ	01 56 47.8
	S	NE	57 00
	P: W,C		
1.	eP	Z	20 55 14
	i	Z	29
2.	iP NZ, P	E	00 29 11.1
	i	Z	30 59
	i	Z	34 48
	eS	E	35 36
	e	N	36 06
	e	Z	08
	eL	E	40 36
	eL	N	42 31
	P: S,E,D		
	5.1 S., 153.4 E.		
	New Ireland region.		
	h: 55 km ca.		
	H= 00 21 10.8		USCGS
2.	iP	Z	06 32 45.4
	S	EZ	33 17
2.	iP	Z	07 33 09.3
	i	Z	23
	45.7 N., 150.9 E.		
	Kurile Is.		
	h: 87 km ca.		
	H= 07 30 11.7		USCGS
2.	iP	Z	11 47 05.5
2.	iP	Z	12 32 05.6
	S	EZ	33
2.	iP	Z	15 44 15.3
	i	Z	27.0
	i	N	27.5
	i	E	38
	i	N	39
2.	iP	Z	17 38 07.7
	S	NE	31
2.	iP	Z	19 19 29.5
	i	NE	20 02
2.	iP	Z	21 20 32.5
	iS?	N	56
	i	Z	21 01
2.	P	Z	23 04 41
3.	P	Z	02 32 02
	51.8 N., 173.3 W.		
	Andreanof Is.		
	h: 39 km ca.		
	H= 02 24 54.1		USCGS

Date	Phase	Comp.	Time(GMT) h m s
3.	P	Z	03 13 33
	i	Z	15 02
	eL	Z	25.0
	4.5 S., 145.1 E.		
	Near north coast of New Guinea.		
	h: 33 km ca.		
	H= 03 05 47.7		USCGS
3.	P	Z	07 54 21
	54.9 N., 161.5 E.		
	Near east coast of Kamchatka.		
	h: 39 km ca.		
	H= 07 49 04		USCGS
3.	P	N	09 05 16
	i	Z	57
3.	iP	Z	09 38 32.8
	i	NE	33.3
	S	N	39 05
3.	P	Z	10 27 10
	eL	Z	47 20
	59.7 N., 146.3 W.		
	Gulf of Alaska.		
	h: 19 km ca.		
	H= 10 18 00.7		USCGS
3.	P	Z	16 17 31
	S	E	56
	i	N	57
3.	P	Z	16 22 44
	i	NZ	53
3.	P	Z	21 07 35
	i	NE	48
4.	iP Z, P	NE	01 05 04.8
	PP	E	06 30
	PcP	Z	07 19
	S	E	10 56
	e	Z	11 02
	L	Z	13 52
	ScS	E	15 12
	eLr	Z	16 14
	eL	E	37
	P: S,W,C		
	Mag. 6 - 6½ (Pas.)		
	52.2 N., 171.3 W.		
	Fox Is.		
	h: 36 km ca.		
	H= 00 57 44.4		USCGS
4.	P	Z	04 57 06
	e	E	34
4.	iP	Z	08 13 02.6

Date	Phase	Comp.	Time(GMT) h m s	
4.	iP EZ, P N		09 46 53.5	
	S	NE	47 57	
	P: N,W,D			
	31.6 N., 138.3 E.			
	South of Honshu, Japan.			
	h: 372 km ca.			
	H= 09 45 32.8			USCGS
4.	eP	Z	10 22 11	
	eS?	E	50	
4.	iP	Z	10 36 10.8	
	e	Z	39 13	
	S	NE	43 04	
	eSS	Z	46 30	
	Lr	Z	50 58	
	9.9 S., 148.9 E.			
	East New Guinea region.			
	h: 19 km ca.			
	H= 10 27 37.7			USCGS
4.	iP	Z	15 08 20.2	
	i	Z	29.2	
	P: C			
	21.5 S., 70.7 W.			
	Near coast of northern Chile.			
	h: 44 km ca.			
	H= 14 48 30.3			USCGS
4.	iP	Z	15 48 43.7	
	S	NE	49 06	
	S	Z	07	
4.	P	Z	16 02 56	
	S	NZ	03 18	
4.	iP	NZ	16 42 38.5	
	S	N	43 00	
	S	Z	01	
4.	iP Z, P N		16 51 42.1	
	S	Z	52 05	
	P: C			
4.	iP	Z	17 21 40.5	
	S	N	22 03	
	S	Z	04	
4.	iP	EZ	18 55 00	
4.	P	Z	20 23 25	
	e	Z	41	
4.	eP	Z	20 35 50	
	S?	N	36 13	
4.	P	EZ	22 18 40	
	29.7 N., 130.5 E.			
	Ryukyu Is.			(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	continued			
	h: 33 km ca.			
	H= 22 16 25			USCGS
4.	iP	Z	22 20 23.8	
	P: D			
	21.2 S., 179.1 W.			
	Fiji Is. region.			
	h: 624 km ca.			
	H= 22 10 17.1			USCGS
5.	P	Z	05 53 23	
	i	Z	51	
5.	iP	Z	08 23 10.5	
	S	NE	33	
	P: S,W,C			
	36.9 N., 140.3 E.			
	Near east coast of Honshu, Japan.			
	h: 79 km ca.			
	H= 17 22 40			USCGS
5.	P	Z	09 16 02	
5.	P	Z	09 26 48	
	55.9 N., 154.6 W.			
	South of Alaska.			
	h: 33 km ca.			
	H= 09 18 09.9			USCGS
5.	eP	Z	11 05 17	
	i	Z	45	
5.	iP	Z	12 06 32.8	
	i	Z	38	
	i	E	55	
	i	NZ	56	
5.	iP	Z	16 38 11.5	
	S	E	36	
	i	N	40	
6.	eP	Z	03 32 41	
6.	P	E	05 12 52	
	S	E	13 01	
	i	N	04	
6.	eP	Z	10 33 55	
6.	P	Z	13 26 20	
6.	eP	Z	15 21 50	
	16.4 N., 92.1 E,			
	Bay of Bengal,			
	h: 33 km ca.			
	H= 15 13 28.7			USCGS
6.	eP	Z	15 54 05	

Date	Phase	Comp.	Time(GMT) h m s
6.	eP	Z	19 23 55
	e	E	24 25
6.	P	Z	23 04 42
6.	PKP	Z	23 47 06
	PP	E	50 48
	SKKS	E	57 50
	SKSP	Z	00 01 16
	SS	E	11 20
	SSS	E	15 48
	L	E	37 29
	Mag. 6¼ - 6½ (Pas.)		
	27.8 S., 71.1 W.		
	Near coast of northern Chile.		
	h: 33 km ca.		
	H= 23 27 21.2		USCGS
7.	PKP	Z	00 43 15
	27.8 S., 70.9 W.		
	Near coast of northern Chile.		
	h: 33 km ca.		
	H= 00 23 16.3		USCGS
7.	P	Z	04 09 54
	37.6 N., 114.9 E.		
	Northeastern China.		
	h: 33 km ca.		
	H= 04 05 38		USCGS
7.	iP	Z	07 43 59.8
	e	E	45 33
7.	iP	Z	09 25 04.0
	iS?	NE	21.3
	i	Z	21.5
7.	P	Z	10 04 35
	e	Z	06 45
	S	E	10 53
	e	E	11 52
	e	Z	14 10
	eL	E	15 13
	eL	Z	16 48
	5.1 S., 153.9 E.		
	New Ireland region.		
	h: 118 km ca.		
	H= 09 56 40.3		USCGS
7.	iP Z, P N		11 13 34.8
	S	N	14 25
	P: N,C		
	Mag. 6.5 (J.M.A.)		
	33.5 N., 141.6 E.		
	Off east coast of Honshu, Japan.		
	h: 48 km ca.		
	H= 11 12 33.9		USCGS

Date	Phase	Comp.	Time(GMT) h m s
7.	iP	Z	13 19 14.5
	S	E	20 04
7.	P	Z	18 31 46
	e	N	33 38
7.	eP	Z	21 41 59
	46.1 N., 150.8 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 21 38 45.2		USCGS
8.	iP	Z	03 26 14.5
	i	NE	15.3
	P: C		
	13.7 S., 171.5 E.		
	New Hebrides Is. region.		
	h: 630 km ca.		
	H= 03 17 12.6		USCGS
8.	iP	NEZ	13 54 09.6
	P: N,E,D		
	49.1 N., 151.3 E.		
	Northwest of Kurile Is.		
	h: 284 km ca.		
	H= 13 50 42.0		USCGS
8.	eP	Z	14 39 55
8.	iP	Z	16 47 47.5
	e	N	48 13
	S	E	14
	P: D		
8.	P	Z	19 04 03
	e	Z	31
	18.6 S., 69.9 W.		
	Northern Chile.		
	h: 116 km ca.		
	H= 18 44 24.5		USCGS
8.	eP	Z	22 05 18
	S	N	14 17
	S	E	36
	eL	N	21 49
	eL	E	22 22
	Lr	E	25 02
	Lr	N	20
	Mag. 6.2 - 6.4 (Brk.)		
	14.8 S., 174.8 W.		
	Samoa Is. region.		
	h: 16 km ca.		
	H= 21 54 20.8		USCGS
9.	P	Z	09 51 34
	e	N	52 07
	e	Z	09
9.	P	Z	11 12 05

(cont.)

ate	Phase	Comp.	Time(GMT) h m s
	6.7 S., 153.4 E.		
	New Britain region.		
	h: 57 km ca.		
	H= 11 03 50.1		USCGS
9.	P	Z	11 40 58
	i	N	41 22
9.	iP	Z	13 26 53.2
	S	N	27 24
	eL	E	31 14
	eL	Z	20
	P: D		
	31.0 N., 138.0 E.		
	South of Honshu, Japan.		
	h: 40 km ca.		
	H= 22 28 24.2		USCGS
9.	iP	NZ	13 29 44.8
	P: S,D		
9.	eP	Z	13 33 10
	e	N	47
9.	eP	Z	14 48 47
	e	Z	49 17
9.	iP	Z	15 38 44.3
	i	NE	44.5
	S	NE	39 06
	P: D		
	37.0 N., 139.7 E.		
	Honshu, Japan.		
	h: 130 km ca.		
	H= 15 38 15.1		USCGS
9.	eP	Z	22 10 17
	i	N	47
0.	eP	Z	02 35 40
	52.3 N., 171.2 W.		
	Fox Is.		
	h: 53 km ca.		
	H= 02 28 20.5		USCGS
0.	ePKP	Z	06 14 19
	27.8 S., 70.8 W.		
	Near coast of northern Chile.		
	h: 33 km ca.		
	H= 05 54 19.1		USCGS
0.	P	Z	09 43 30
	i	E	31
	29.2 S., 177.6 W.		
	Kermadec Is. region.		
	h: 64 km ca.		
	H= 09 31 40.3		USCGS
0.	iP	Z	10 11 22.7

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	E	10 11 23
	6.9 S., 110.6 E.		
	Java.		
	h: 220 km ca.		
	H= 10 02 46.4		USCGS
11.	P	EZ	02 01 35
	eS	E	55
	i	N	59
11.	P	Z	03 03 15
	i	Z	38
11.	eS	N	04 55 34
	e	Z	40
11.	iP	NZ	12 43 22.9
	i	Z	53
	eS	E	45 20
	41.5 N., 142.4 E.		
	Hokkaido, Japan region.		
	h: 33 km ca.		
	H= 12 41 55		USCGS
11.	iP	Z	16 13 37.0
	iP	NE	37.4
	i	Z	39.3
	S	NE	14 16
	L	Z	40
	L	NE	50
	P: D		
	34.3 N., 141.2 E.		
	Off east coast of Honshu, Japan.		
	h: 53 km ca.		
	H= 16 12 46.9		USCGS
11.	P	NZ	17 01 37
	eS	N	06 48
	eL	E	08 48
	L	Z	10 22
	L	N	33
	6.9 N., 126.1 E.		
	Mindanao, P.I.		
	h: 58 km ca.		
	H= 16 55 20.7		USCGS
11.	P	Z	18 12 00
	i	NE	09
	eL	NZ	16 00
	46.4 N., 153.3 E.		
	Kurile Is.		
	h: 50 km ca.		
	H= 18 08 38.1		USCGS
12.	eP	N	01 12 37
	iP	Z	38.2
	i	E	39.5
	S	N	54.9
	iS	EZ	55.0

Date	Phase	Comp.	Time(GMT) h	m	s
12.	iP	Z	01	21	19.4
	e	N			20
	eS	E			50
	P: D				
12.	iP	EZ	02	19	21.0
	S	N			54
	P: E,D				
12.	iP	NEZ	02	59	58.1
	i	Z	03	00	10
	S	N		01	10
	i	Z			20
	i	E			36
	i	Z			40
	P: N,E,C				
	33.6 N., 132.2 E.				
	Shikoku , Japan.				
	h: 19 km ca.				
	H= 02 58 30.8	USCGS			
12.	P	EZ	04	26	08
	i	Z		27	42.5
	i	E			43
	eL	N		38	00
	eL	Z		42	00
12.	eP	NZ	05	01	51
	S	N		02	25
	S	E			33
12.	eL	N	08	54	00
	eL	Z			18
	6.9 N., 126.8 E.				
	Mindanao , P.I.				
	h: 80 km ca.				
	H= 08 38 13	USCGS			
12.	P Z, eP N		11	51	31
	i	E			33
	S	NE		52	57
	S	Z			58
13.	iP	NEZ	04	30	38.0
	iS NE , S Z			31	19.5
	P: N,W,D				
13.	P	NEZ	07	07	56
	i	NE		08	02
	i	Z		09	28
	S	NE		11	22
	S	Z			30
	L	NE		12	24
	L	Z		13	00
	P: N,E,C				
	24.1 N., 122.2 E.				
	Taiwan region.				
	h: 8 km ca.				
	H= 07 03 39.2	USCGS			

Date	Phase	Comp.	Time(GMT) h	m	s
13.	P	NEZ	07	25	41
	i	EZ			49
	i	N			52
	S NE, eS Z			26	04
13.	P	Z	08	35	26
	10.4 S., 151.9 E.				
	Dentrecasteaux Is. region.				
	h: 23 km ca.				
	H= 08 26 35.6	USCGS			
13.	PKP 1	Z	16	26	37
	PKP 1	N			38
	i	Z			43
	PKP 2	Z		27	02
	PKP 2	NE			04
	pPKP	Z			51
	PP	Z		30	38
	i	E		38	30
	SS	N		50	00
	SS	E			30
	SS	Z		51	00
	L	E	17	00	00
	L	Z		10	00
	24.2 S., 66.9 W.				
	Salta Province , Argentina.				
	h: 192 km ca.				
	H= 16 07 04.9	USCGS			
13.	iP NZ, P E		20	48	50.0
	S?	N		50	02
	P: N,D				
	42.4 N., 141.3 E.				
	Hokkaido, Japan region.				
	h: 59 km ca.				
	H= 20 47 14	USCGS			
13.	PKP	Z	21	49	25
	24.3 S., 67.0 W.				
	Chile-Argentina border region.				
	h: 177 km ca.				
	H= 21 29 26.4	USCGS			
14.	P	NEZ	08	11	46
	22.5 S., 179.6 W.				
	South of Fiji Is.				
	h: 610 km ca.				
	H= 08 01 27.8	USCGS			
14.	P	E	12	33	13
	iP	NZ			13.1
	PPP	N		35	44
	ScP	Z		38	35
	PcS	E			44
	S	NE		39	38
	sS	Z		40	28
	Lq	N		42	53
	Lq	E		43	00
	Lr	Z		47	00

(cont.)

Date	Phase	Comp.	Time(GMT) h	m	s
	Mag. 6¼ (Pas.)				
	7.5 S., 127.9 E.				
	Banda Sea.				
	h: 115 km ca.				
	H= 12 25 09.7		USCGS		
14.	P	Z	12	48	07
	i	NZ			15.5
	i	E			16
	i	Z		50	19
14.	iP	NEZ	14	15	36.4
	S	N			53
	S	E			54
	P: S,W,D				
	35.5 N., 137.8 E.				
	Central Japan.				
	h: 50 km ca.		J.M.A.		
14.	iP	Z	17	50	31.0
	P	NE			32
	PP	Z		52	00
	S	NEZ		56	24
	L	N		59	08
	L	E			16
	L	Z			20
	Lr	Z	18	02	00
	P: C				
	Mag. 6¼ (Pas.)				
	52.7 N., 171.2 W.				
	Fox Is.				
	h: 34 km ca.				
	H= 17 43 10.0		USCGS		
14.	P	NEZ	18	19	03
	26.8 N., 127.9 E.				
	Ryukyu Is.				
	h: 33 km ca.				
	H= 18 15 46		USCGS		
14.	iP	NZ	19	27	02.0
	P: D				
14.	iP	NEZ	21	09	46.0
	iS	NEZ			51.0
	P: N,W,C				
14.	eP	Z	22	28	25
15.	e	E	02	10	00
	e	N		16	00
	37.9 N., 13.1 E.				
	Sicily				
	h: 33 km ca.				
	H= 01 33 02.7		USCGS		
15.	eP	Z	02	11	39

Date	Phase	Comp.	Time(GMT) h	m	s
15.	e	Z	02	19	00
	eL	E		41	00
	eL	N		43	00
	eL	Z		44	00
	37.9 N., 13.1 E.				
	Sicily.				
	h: 33 km ca.				
	H= 02 01 08.5		USCGS		
15.	iP EZ, P N		04	23	42.0
	P: E,D				
15.	iP	EZ	12	12	33.4
	iP	N			34.0
	i	Z			52
	i	N		13	10
	P: E.D				
15.	iP Z, P NE		16	27	38.0
	S	NE		28	54
	P: C				
15.	iP	Z	19	38	10.9
	i	E			12
	i	N			15
	eS	NE		41	40
	i	Z			48
	L	N		42	56
	L	EZ		43	00
	P: D				
	37.8 N., 115.3 E.				
	Northeastern China.				
	h: 33 km ca.				
	H= 19 33 58.9		USCGS		
16.	iP Z, P N		08	22	47.4
	P: N,C				
16.	P	NEZ	09	10	14
	S?	N			45
16.	eL	E	17	20	00
	eL	N		26	00
	eL	Z		28	00
	eL	NE		30	00
	eL	Z		37	00
	37.9 N., 13.1 E.				
	Sicily.				
	h: 14 km ca.				
	H= 16 42 44.3		USCGS		
16.	P EZ, eP N		23	33	23
	i	N			30
	i	Z			31
	S	NEZ			46
17.	P	NEZ	00	09	27
	i	N			54
	i	E		10	06

Date	Phase	Comp.	Time(GMT) h	m	s
17.	P	NEZ	04	02	06
	S	NE			54
17.	iP	EZ	06	50	27.0
	i	N			27.6
	S	N		51	12
	i	E			16
	i	Z			28
	P: E,C				
17.	e	NZ	10	35	00
17.	P	EZ	13	06	43
	i	N			45
	S	NE		07	11
	i	Z			16
17.	iP	NEZ	17	56	48.3
	i	NZ			56
	S N , eS E			57	11
	P: N,W,C				
	35.9 N., 140.1 E.				
	Near east coast of Honshu, Japan.				
	h: 65 km ca.				
	H= 17 56 18.7	USCGS			
17.	iP	EZ	19	46	25.5
	i	N			28
	i	Z			33
	i	N			36
	i	N			55
	i	E		47	07
	P: E,D				
18.	iP	NE	01	43	46.8
	iP	Z			47.0
	iS	NE		44	04.5
	P: N,E				
18.	P	Z	11	21	26
	i	N			28
	i	N			50
	i	EZ			57
	i	N		22	12
18.	eP	Z	12	14	19
	S	NZ		23	10
	eL	N		30	00
	L	Z		33	00
	14.6 S., 178.4 W.				
	Fiji Is. region.				
	h: 33 km ca.				
	H= 12 03 37.4	USCGS			
18.	iP	NEZ	15	16	18.0
	S	EZ			40
	i	N			43
	P: S,E,D				

Date	Phase	Comp.	Time(GMT) h	m	s
18.	iP	Z	21	58	32.1
	e	E			35
	P: D				
18.	iP	Z	23	15	32.8
	P	NE			33
	S	E			55
	S	N			56
	P: D				
18.	P	NEZ	23	37	48
	i	NEZ			51.1
	S	N		39	40
	41.1 N., 142.6 E.				
	Hokkaido, Japan region.				
	h: 47 km ca.				
	H= 23 36 22.3	USCGS			
19.	P	NZ	05	20	14
	e	E			16
	S	NZ			38
	S	E			39
19.	iP 1	Z	06	13	25.0
	iP NE , iP2 Z				26.0
	i	N		14	10
	PcP	Z			40
	PP	E		15	16
	iS	NE		20	32
	i	Z			52
	Lq	N		24	00
	Lq	E			08
	L	Z			12
	Lr	Z		27	24
	P: C				
	Mag. 6.0 (CGS)				
	9.4 N., 158.4 E.				
	Solomon Is.				
	h: 33 km ca.				
	H= 06 04 38.2	USCGS			
19.	eP	Z	14	20	55
	i	Z		21	27
	PP	Z	15	23	00
	7.2 S., 108.6 E.				
	Java.				
	h: 142 km ca.				
	H= 14 12 02.1	USCGS			
19.	PKP	Z	14	59	35
	i	Z			48.5
	L	E	15	40	00
	L	N		43	00
	L	Z		50	00
	42.6 S., 75.2 W.				
	Off coast of southern Chile.				
	h: 22 km ca.				
	H= 14 39 37.8	USCGS			

ate	Phase	Copm.	Time(GMT) h	m	s
19.	iP	NEZ	18	27	03.0
	i	Z		29	58
	e	N		47	40
	eL	EZ		50	00
	P: S,W,C				
19.	L?	N	20	52	44
	43.4 N., 126.6 W.				
	Off coast of Oregon.				
	h: 33 km ca.				
	H= 20 23 37.9		USCGS		
20.	iP	Z	01	57	52.2
	P	E			53.0
	i	Z		58	10
	S	NE			14
	P: D				
20.	P	NEZ	02	32	21
	i	Z			25
	i	NE			26.5
	i	Z			29.0
	S	NZ			59
	34.9 N., 135.7 E.				
	Central Honshu, Japan.				
	h: 10 km ca.		J.M.A.		
20.	P	Z	03	39	43.5
	P	E			44
	i	N			47
	e	E		40	45
	i	N			48
20.	eP	NEZ	06	46	18
	eS	N		47	00
	i	E			04
20.	P	Z	09	46	19
	P	E			20
	i	E			44
	i	Z			52
20.	eP	Z	15	16	12
	i	NE			20
20.	P	NEZ	16	52	04
	i	Z			14
	i	Z	17	00	14
	iS N, S E				50
	i	NE		04	50
	i	Z		05	20
	Lq	E		07	34
	Lq	N			38
	L	Z		08	00
	Lr	Z		10	44
	Lr	NE		11	00
	Mag. 6 - 6.2 (Brk.)				
	16.2 S., 178.1 E.				
	Fiji Is.		(cont.)		

Date	Phase	Comp.	Time(GMT) h	m	s
	h: 21 km ca.				
	H= 16 41 27.1		USCGS		
20.	P	Z	20	11	10
	P	NE			11
	i	E			15
	i	N			18
	eS	N		14	40
	i	E			46
	i	Z			48
	18.4 N., 146.5 E.				
	Mariana Is.				
	h: 77 km ca.				
	H= 20 06 48.0		USCGS		
20.	iP	NEZ	21	32	47.9
	i	Z		34	44
	S	NE		42	08
	i	Z			22
	i	N		43	48
	i	Z		45	00
	i	N		47	00
	L	E		52	20
	L	NZ		53	00
	P: S,E,D				
	Mag. 6.5 - 6.9 (Brk.)				
	29.9 S., 179.5 W.				
	Kermadec Is.				
	h: 349 km ca.				
	H= 21 21 31.6		USCGS		
21.	eP	Z	00	36	10
21.	iP	NEZ	01	29	20.3
	P: N,E,C				
	8.0 S., 117.6 E.				
	Sumbawa I. region.				
	h: 134 km ca.				
	H= 01 20 49.7		USCGS		
21.	P	Z	04	27	11
	S	NE			59
	33.8 N., 141.7 E.				
	Off east coast of Honshu, Japan.				
	h: 57 km ca.				
	H= 04 26 11.7		USCGS		
21.	P	Z	08	57	18
	i	N			31.6
	eS	N			53
21.	P	Z	12	32	22
21.	ePKP	Z	17	01	50
	PP	NZ		04	30
	PS	NE		16	46
	PPS	Z		17	54
	SS	NE		22	08
					(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	SSS	N	17 28 00
	L	E	39 25
	Lq	N	44 16
	L	Z	47 22
	Lr	EZ	52 40
	Lr	N	54 00
	Mag. 6.2 (Pas.)		
	1.2 S., 14.0 W.		
	North of Ascension I.		
	h: 33 km ca.		
	H= 16 42 29.2		USCGS
21.	P	Z	23 03 20
	i	Z	05 06
22.	P	NEZ	02 27 05
	S	NEZ	28 17
	30.8 N., 138.6 E.		
	South of Honshu, Japan.		
	h: 394 km ca.		
	H= 02 25 35.4		USCGS
22.	iP	NEZ	04 48 48.0
	S	NE	57
	P: N,E,C		
22.	P	Z	07 30 17
22.	iP	NEZ	08 41 54.1
	S	NEZ	42 02.5
	P: N,E,C		
22.	P	Z	10 44 12
	38.2 N., 75.6 E.		
	Southern Sinkiang Province, China.		
	h: 108 km ca.		
	H= 10 35 36.6		USCGS
22.	iP	NEZ	11 14 47.2
	S	EZ	56
	P: N,E,C		
22.	P	Z	18 25 21
	S	N	32 10
	9.8 S., 149.0 E.		
	East New Guinea region.		
	h: 27 km ca.		
	H= 18 16 49.8		USCGS
22.	iP	Z	18 37 13.7
	i	E	14.7
	S	E	38 18
	i	N	21
	L	NZ	40 00
	P: C		
	31.4 N., 138.1 E.		
	South of Honshu, Japan.		
	h: 411 km ca.		
	H= 18 35 49.7		USCGS

Date	Phase	Comp.	Time(GMT) h m s
22.	iP	Z	13 47 19.7
	P: C		
22.	iP Z, P NE		13 47 44.5
	S	E	48 16
	P: D		
22.	iP	Z	19 07 27.1
	e	E	18 28
	L	NZ	20 20
	P: D		
22.	iP	NEZ	22 42 55.4
	iS	NE	43 04.3
	P: N,E,C		
22.	iP	Z	23 39 48.4
	S	N	40 07
	P: C		
22.	P	Z	23 53 47
	70.3 N., 144.4 W.		
	Alaska.		
	h: 9 km ca.		
	H= 23 44 29.7		USCGS
23.	eS	E	00 05 16
	L	NE	07 30
23.	iP NZ, P E		09 19 41.9
	S	N	57
	P: S,D		
23.	iP	NEZ	11 45 44.0
	S	NEZ	46 06
	P: S,E,D		
	35.7 N., 140.0 E.		
	Near east coast of Honshu, Japan.		
	h: 72 km ca.		
	H= 11 45 15.0		USCGS
23.	P	NEZ	16 14 08
	i	Z	16 21
	S	E	20 00
	G	N	22 32
	L	E	23 00
	Lr	Z	24 44
	52.1 N., 171.3 W.		
	Fox Is.		
	h: 53 km ca.		
	H= 16 06 50.1		USCGS
23.	iP NZ, P E		18 28 44.6
	S	NEZ	53.5
	P: N,D		
23.	iP	NEZ	19 17 52.3
	S	E	19 15

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	P: S,W,C		
	40.8 N., 142.8 E.		
	Near east coast of Honshu, Japan.		
	h: 35 km ca.		
	H= 19 16 29.0		USCGS
23.	eS	E	21 24 44
	eL	N	31 54
23.	P	Z	21 45 02
	eS	N	52 16
	3.8 N., 126.6 E.		
	Talaud Is.		
	h: 78 km ca.		
	H= 21 38 22.3		USCGS
24.	iP	Z	05 24 30.5
	eS	N	25 03
24.	iP	Z	07 37 13.7
	P: D		
24.	P	NZ	07 52 31
	i	NE	35
	S	NE	53 12
24.	P	Z	09 36 36
	S	N	59
24.	P	Z	09 38 47
	i	Z	39 03.5
	5.9 S., 149.5 E.		
	New Britain region.		
	h: 97 km ca.		
	H= 09 30 49.9		USCGS
24.	iP	NEZ	10 19 07.9
	S	NEZ	16.2
	P: N,E,C		
24.	P	Z	11 59 09
	1.5 N., 126.6 E.		
	Molucca Passage.		
	h: 93 km ca.		
	H= 11 52 14		USCGS
24.	iP	Z	13 40 55.6
	eS	E	42 09
	e	N	25
	P: C		
24.	P	Z	14 33 28
	54.7 N., 167.9 E.		
	Komandorsky Is. region.		
	h: 33 km ca.		
	H= 14 27 42.9		USCGS
24.	iP	Z	15 04 42.3

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	S	NEZ	15 05 25
	P: C		
24.	P	Z	16 22 39
	S	E	24 12
	S	N	16
24.	iP	NEZ	19 02 07.3
	iS	NE	15.8
	P: N,E,C		
25.	P	NEZ	00 50 28
	S	NZ	51 05
25.	P	Z	04 26 26
	S	NZ	40
25.	P	Z	09 49 57
	S	N	50 30
	S	E	31
25.	eS	N	10 20 30 ca.
	eS	Z	21 00 ca.
	37.8 N., 13.2 E.		
	Sicily.		
	h: 33 km ca.		
	H= 09 56 48.7		USCGS
25.	eP	Z	10 45 57
25.	P	Z	11 29 52
26.	iP	Z	04 54 19.0
	i	NE	24
	i	Z	29.5
	PcP	Z	55 26
	PP	Z	56 23
	S	NEZ	05 01 20
	i	N	03 00
	Lr	NZ	05 00
	P: D		
	Mag. 6½ (Pas.)		
	8.8 S., 120.4 E.		
	Flores I. region.		
	h: 29 km ca.		
	H= 04 45 41.4		USCGS
26.	eP	Z	04 59 35
26.	eP	Z	05 02 10
26.	eP	Z	05 24 47
26.	e 1	E	12 54 25
	e 2	E	13 01 50
26.	P	Z	13 05 05
	e	E	08 22
	eS	Z	11 34

(cont.)

ate	Phase	Comp.	Time(GMT) h m s	
	12.6 S., 167.0 E.			
	Santa Cruz Is.			
	h: 215 km ca.			
	H= 12 55 48.2			USCGS
27.	iP	Z	00 56 45.6	
	i	Z	57 15	
	S	Z	58 15	
	S E, eS N		17	
	P: C			
	28.7 N., 139.3 E.			
	Bonin Is. region.			
	h: 474 km ca.			
	H= 00 54 50.4			USCGS
27.	iP	NEZ	02 54 29.4	
	S	NE	39	
	P: N,E,C			
27.	iP	Z	14 00 48.6	
	i	N	54.0	
	i	E	55.0	
	S	N	04 14	
	i	NE	35	
	L	EZ	40	
	L	Z	06 55	
	P: C			
	23.2 N., 121.6 E.			
	Taiwan.			
	h: 53 km ca.			
	H= 13 56 23.8			USCGS
27.	iP	NEZ	14 11 10.3	
	iS	NEZ	25.0	
	P: S,E,D			
28.	iP	Z	01 47 03.2	
	iS N, S EZ		11.5	
	P: N,E,C			
28.	P	Z	02 21 33	
28.	P	Z	03 54 30.5	
	eS	N	51	
	P: C			
28.	P	Z	11 57 07	
28.	P	Z	12 53 17	
28.	iP	NEZ	15 47 03.4	
	iS	NEZ	11.8	
	P: N,E,C			
28.	iP	NEZ	22 23 01.4	
	i	N	10	
	i	Z	14	
	iS	N	25.1	
	P: S,D			
29.	iP	Z	05 09 08.0	
	(cont.)			

Date	Phase	Comp.	Time(GMT) h m s	
	i	Z	05 09 27.5	
	pP	Z	58	
	P: C			
	36.3 N., 70.4 E.			
	Hindu Kush region.			
	h: 225 km ca.			
	H= 05 00 10.0			USCGS
29.	iP	Z	06 56 52.3	
	S	N	57 11.5	
	P: S,E,D			
29.	P	Z	09 12 33	
29.	iP EZ, P	N	10 21 20.7	
	S	E	23 09	
	L	N	40	
	L	E	48	
	P: E,C			
	Mag. 7.0 (Pas.)			
	43.6 N., 146.7 E.			
	Kurile Is.			
	h: 40 km ca.			
	H= 10 19 05.6			USCGS
29.	P	Z	10 35 09	
29.	P	Z	11 00 50	
29.	P	Z	11 38 50	
	S	N	40 46	
29.	iP	Z	11 46 17.6	
	P: D			
	43.4 N., 147.3 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 11 43 59.1			USCGS
29.	P	Z	11 55 52	
	51.2 N., 179.1 E.			
	Rat Is.			
	h: 45 km ca.			
	H= 11 49 18.7			USCGS
29.	iP	NEZ	12 09 27.1	
	P: N,E,D			
	43.2 N., 147.3 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 12 07 03.0			USCGS
29.	P	NEZ	14 03 53	
	S	NE	05 38	
29.	P	Z	14 12 48	
	S	E	14 29	
	43.5 N., 146.7 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 14 10 33			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
29.	P	Z	14 41 55	
29.	P	Z	14 46 04	
	eS	N	47 45	
	43.1 N., 146.9 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 14 43 50.5			USCGS
29.	P	Z	16 06 28	
	S	N	08 20	
	12.3 N., 125.5 E.			
	Samar, P.I.			
	h: 51 km ca.			
	H= 16 00 07.3			USCGS
29.	iP	NEZ	16 45 08.0	
	S	NE	46 53	
	P: S,W,C			
	43.5 N., 147.2 E.			
	Kurile Is.			
	h: 36 km ca.			
	H= 16 42 50.4			USCGS
29.	iP	Z	17 16 24.1	
	P: D			
	43.4 N., 147.3 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 17 14 06			USCGS
29.	P	Z	18 16 32	
29.	P	Z	19 41 36	
	S	E	43 23	
	43.3 N., 147.3 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 19 39 18			USCGS
29.	P	Z	20 46 21	
	S	N	48 09	
	43.4 N., 147.3 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 20 44 06			USCGS
29.	iP	Z	21 01 07.7	
	S	N	08 20	
	L	N	12 00	
	L	Z	17 00	
	P: C			
	56.4 N., 153.6 W.			
	Kodiak I. region.			
	h: 6 km ca.			
	H= 20 52 21.3			USCGS
29.	P	Z	21 51 12	
29.	P	Z	22 29 51	
	S	E	31 36	

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	P: D			
	43.0 N., 147.2 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 22 27 34			USCGS
29.	iP	Z	22 40 21.8	
	S	N	42 07	
	P: D			
	43.0 N., 147.1 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 22 38 08			USCGS
30.	P	Z	00 12 50	
30.	iP	Z	00 34 46.8	
	S	E	36 30	
	P: D			
30.	iP	NEZ	01 32 30.5	
	eS	N	34 04	
	e	E	15	
	eL	E	52	
	eL	Z	35 00 ca.	
	P: S,W,C			
	43.3 N., 146.8 E.			
	Kurile Is.			
	h: 12 km ca.			
	H= 01 30 12.7			USCGS
30.	iP Z, P NE		01 50 43.5	
	i	NEZ	50.0	
	i	NE	51 04	
	S	NE	52 48	
	Lr	Z	53 24	
	P: C			
	43.3 N., 147.7 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 01 48 28.6			USCGS
30.	P	NEZ	02 22 53	
	S	E	24 42	
	S	N	45	
	43.4 N., 147.7 E.			
	Kurile Is.			
	h: 25 km ca.			
	H= 02 20 31			USCGS
30.	iP Z, P NE		02 40 33.6	
	i	EZ	45.3	
	iS N, S E		42 24.5	
	P: C			
	43.3 N., 147.7 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 02 38 12.6			USCGS
30.	P	Z	02 44 48	
	43.6 N., 147.6 E.			
	Kurile Is.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	h: 33 km ca.			
	H= 02 42 28			USCGS
30.	iP	NEZ	02 56 09.0	
	S	E	57 57	
	P: S,W,C			
	43.4 N., 147.6 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 02 53 47			USCGS
30.	iP	NEZ	03 04 01.0	
	S	E	05 46	
	P: S,W,C			
	43.1 N., 147.2 E.			
	Kurile Is.			
	h: 28 km ca.			
	H= 03 01 44.0			USCGS
30.	iP	Z	03 26 01.9	
	S	NE	27 50	
	P: N,E,D			
	43.3 N., 147.4 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 03 23 41.9			USCGS
30.	iP	NEZ	03 52 14.5	
	P: N,E,C			
	6.1 S., 113.3 E.			
	Java.			
	h: 594 km ca.			
	H= 03 44 24.4			USCGS
30.	iP	Z	04 04 24.5	
	i	NE	25.0	
	S	E	06 12	
	P: C			
30.	iP	NEZ	04 12 53.5	
	i	N	13 03.5	
	eS	E	14 35	
	P: N,E,D			
	43.1 N., 147.1 E.			
	Kurile Is.			
	h: 24 km ca.			
	H= 04 10 36.1			USCGS
30.	eP	Z	04 22 39	
30.	eP	Z	04 59 32	
	eS	E	05 00 09	
30.	iP	NEZ	06 10 53.5	
	eS	N	13 05	
	eL	Z	14 00	
	P: N,E,D			
	43.5 N., 147.1 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 06 08 35.2			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
30.	eP	Z	07 08 53	
	S	N	10 32	
30.	P	Z	07 44 49	
30.	P	Z	08 20 43	
	S	NE	21 35	
30.	P	Z	08 26 31	
	36.4 N., 70.7 E.			
	Hindu Kush region.			
	h: 205 km ca.			
	H= 08 17 32.3			USCGS
30.	P	Z	09 08 46	
	S	N	10 48	
	L	E	11 22	
	43.0 N., 146.9 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 09 06 29			USCGS
30.	iP	Z	10 42 06.2	
	i	NE	42	
	P: D			
30.	P	Z	11 36 54	
	eS	N	38 38	
	43.4 N., 147.0 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 11 34 40			USCGS
30.	eP	Z	14 02 00	
30.	P	Z	14 11 34	
	eS	N	13 18	
	eL	N	14 00 ca.	
30.	iP	NEZ	17 00 09.7	
	eS	Z	01 53	
	P: S,W,C			
30.	iP	Z	18 27 28.8	
	i	Z	32.5	
	i	N	38	
	i	E	40	
	S	N	28 28	
	eS	E	30	
	P: C			
	32.2 N., 141.9 E.			
	South of Honshu, Japan.			
	h: 25 km ca.			
	H= 18 26 08.6			USCGS
30.	iP Z, P NE		18 37 16.8	
	i	NE	26.0	
	eS	NE	39 00	
	eL	NE	39	
	P: E,D			
	43.0 N., 147.2 E.			
	Kurile Is.			(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	h: 25 km ca.			
	H= 18 35 00.9			USCGS
30.	iP	Z	20 32	35.5
	i	Z		36.5
	i	Z		55
	eS	N		59
	P: D			
31.	iP	Z	00 34	22.7
	eS	Z	35	56
	e	N	36	25
	P: C			
31.	iP Z, P N		03 06	35.0
	i	Z	07	09
	i	N		10
	P: S,D			
	6.9 S., 130.3 E.			
	Banda Sea.			
	h: 22 km ca.			
	H= 02 58 29.8			USCGS
31.	iP Z, P NE		04 58	04.0
	S	E	59	40
	i	N		56
	L	N	05 00	25
	P: C			
	43.5 N., 147.6 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 04 55 44			USCGS
31.	P	Z	06 24	02
	i	Z		14.5
	43.5 N., 146.6 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 06 21 46			USCGS
31.	iP	Z	09 26	47.3
	i	N		48.3
	i	N	27	10
	P: C			
31.	eP	Z	11 52	44
	eL	N	12 02	50 ca.
	29.9 N., 92.1 E.			
	Tibet.			
	h: 18 km ca.			
	H= 11 45 16.9			USCGS
31.	P	Z	13 37	11
	4.3 S., 128.6 E.			
	Banda Sea.			
	h: 33 km ca.			
	H= 13 29 24			USCGS
31.	iP	NZ	15 40	35.0
	S	NEZ	41	15
	i	N		25.5
	P: S,C			

Date	Phase	Comp.	Time(GMT) h m s	
31.	iP	Z	16 21	38.0
	i	Z		59.5
	S	N	23	20
	L	N	24	00 ca.
	P: D			
	43.1 N., 146.7 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 16 19 28			USCGS
31.	iP	Z	17 47	24.0
	S	NE		30.8
	P: C			
31.	iP	NZ	19 24	18.2
	i	E		18.5
	eS	N	25	45 ca.
	P: N,D			
31.	iP Z, P E		20 06	51.5
	P: C			
31.	iP	Z	22 00	43.2
	i	Z		57.5
	eS	E	02	25
	L	NE	03	00
	eL	Z		26
	L	E	05	40
	P: D			
	43.0 N., 147.8 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 21 58 24.1			USCGS

Matsushiro Seismological Observatory , Japan

Seismological Bulletin

Feb. 1968

Latitude 36° 32′ 30″N.
Longitude 138° 12′ 32″E.
Elevation 440 M.

Instrumental Constants

struments	Comp.	Period (sec)	Damping ratio	Magnification
enioff Seismograph Short Period)	N	T_1= 1.0 T_2= 0.23	h_1= 0.63 h_2= 1.7	103,000 (max)
	E	T_1= 1.0 T_2= 0.22	h_1= 0.64 h_2= 1.6	106,000 (max)
	Z	T_1= 1.0 T_2= 0.21	h_1= 0.67 h_2= 1.2	131,000 (max)
enioff Seismogrph ong Period)	N	T_1= 1.0 T_2= 89	h_1= 0.63 h_2= 2.5	3,200 (max)
	E	T_1= 1.0 T_2= 55	h_1= 0.64 h_2= 2.5	4,700 (max)
	Z	T_1= 1.0 T_2= 64	h_1= 0.67 h_2= 2.7	3,500 (max)
WSS Seismograph Short Period)	N	T_1= 1.0 T_2= 0.75		100,000
	E	T_1= 1.0 T_2= 0.75		100,000
	Z	T_1= 1.0 T_2= 0.75		100,000
WSS Seismograph ong Period)	N	T_1= 15 T_2= 100		3,000
	E	T_1= 15 T_2= 100		3,000
	Z	T_1= 15 T_2= 100		3,000
hort Period ertical Seismograph	Z	T_1= 1.0 T_2= 2.82	h_1= 1.4 h_2= 1.2	32,000 (max)
ood-Anderson Seismograph	N	T = 0.8	h = 0.8	1,300
	E	T = 0.8	h = 0.8	1,200

Date	Phase	Comp.	Time(GMT) h	m	s
1.	iP	Z	05	07	59.5
	P: D				
	9.1 S., 123.8 E.				
	Timor.				
	h: 13 km ca.				
	H= 04 59 24.5		USCGS		
1.	iP	NEZ	12	49	38.3
	S	N		51	22
	L	E		52	00
	L	Z			14
	L	N			18
	P: N,E,D				
	43.2 N., 146.9 E.				
	Kurile Is.				
	h: 35 km ca.				
	H= 12 47 23.4		USCGS		
1.	iP	NEZ	19	04	24.3
	S	N		06	16
	P: N,E,D				
	42.9 N., 147.0 E.				
	Off coast of Hokkaido, Japan.				
	h: 33 km ca.				
	H= 19 02 09.4		USCGS		
1.	P	NZ	19	34	12
	43.0 N., 146.9 E.				
	Kurile Is.				
	h: 33 km ca.				
	H= 19 31 57		USCGS		
1.	iP	NEZ	21	34	57.6
	S	NE		35	08
	P: N,W,C				
1.	P	NEZ	23	23	45
	18.5 S., 169.0 E.				
	New Hebrides Is.				
	h: 228 km ca.				
	H= 23 13 47.2		USCGS		
2.	P	Z	08	12	00
2.	iP Z, P NE		08	59	54.6
	P: D				
2.	P	Z	09	47	37
	7.9 S., 127.0 E.				
	Banda Sea.				
	h: 116 km ca.				
	H= 09 39 28.3		USCGS		
2.	iP	Z	10	01	20.0
	P: D				
	22.2 S., 171.3 E.				
	Loyalty Is. region.				
	h: 95 km ca.				
	H= 09 50 41.2		USCGS		

Date	Phase	Comp.	Time(GMT) h	m	s
2.	P	NEZ	15	39	12
	eS	N		41	00
	43.2 N., 146.6 E.				
	Kurile Is.				
	h: 50 km ca.				
	H= 15 36 58.6		USCGS		
2.	iP	Z	19	35	51.0
	P: D				
	0.0 , 123.7 E.				
	Northern Celebes.				
	h: 165 km ca.				
	H= 19 28 45.2		USCGS		
2.	iP Z, P NE		20	17	40.4
	eS	E		19	28
	P: D				
	43.2 N., 147.0 E.				
	Kurile Is.				
	h: 25 km ca.				
	H= 20 15 25.7		USCGS		
2.	iP	NEZ	21	06	20.8
	eS	N		07	20
	P: N,E,D				
	39.0 N., 143.4 E.				
	Off east coast of Honshu, Japan.				
	h: 57 km ca.				
	H= 21 05 08		USCGS		
2.	iP Z, P E		21	22	16.0
	P: C				
	0.0 , 124.5 E.				
	Northern Celebes.				
	h: 84 km ca.				
	H= 21 15 01		USCGS		
2.	iP	NEZ	23	53	30.2
	iS	NEZ			38.5
	P: N,E,C				
3.	iP	NEZ	03	29	41.5
	S	N		32	30
	L	Z		33	34
	P: N,E,D				
	46.6 N., 152.6 E.				
	Kurile Is.				
	h: 45 km ca.				
	H= 03 26 16.6		USCGS		
3.	e	Z	05	54	30
	eL	N	06	17	00
	eL	Z		19	00
	16.7 N., 99.4 W.				
	Near coast of Guerrero , Mexico.				
	h: 9 km ca.				
	H= 05 36 14.6		USCGS		

Date	Phase	Comp.	Time(GMT) h m s	
3.	iP	NEZ	11 32 59.0	
	S	NZ	34 38	
	L	N	35 20	
	L	E	32	
	L	Z	36	
	P: S,W,C			
	43.2 N., 146.8 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 11 30 44.4			USCGS
3.	iP NZ, P E		19 55 24.3	
	P: N,E,D			
4.	iP EZ, P N		02 13 17.8	
	S	E	37.5	
	i	N	44	
	P: E,D			
4.	eP	Z	05 10 27	
4.	eP	Z	07 07 32	
	43.8 N., 145.8 E.			
	Hokkaido, Japan.			
	h: 142 km ca.			
	H= 07 05 17			USCGS
4.	iP	NEZ	09 12 41.5	
	S	N	14 26	
	L	N	54	
	L	E	15 14	
	L	Z	40	
	P: N,E,D			
	43.2 N., 147.2 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 09 10 25.3			USCGS
4.	iP	Z	09 28 11.0	
	P: D			
4.	iP	NEZ	11 03 05.3	
	S	NEZ	04 36	
	P: N,E,D			
	Mag. 6½ (PAS.)			
	43.0 N., 147.1 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 11 00 50.1			USCGS
4.	iP	Z	11 08 37.0	
	S	N	10 30	
	P: D			
4.	eP	Z	11 20 00	
4.	PKP	Z	11 47 05	
	i	Z	46	

(cont,)

Date	Phase	Comp.	Time(GMT) h m s	
	19.6 S., 68.2 W.			
	Chile-Bolivia border region.			
	h: 114 km ca.			
	H= 11 27 24.8			USCGS
4.	P	Z	13 57 03	
	eS	E	58 48	
	42.9 N., 147.2 E.			
	Off coast of Hokkaido, Japan.			
	h: 33 km ca.			
	H= 13 54 44.6			USCGS
4.	eP	Z	16 24 29	
4.	iP	Z	17 45 44.0	
	i	E	44.6	
	i	N	45.0	
	S	E	47 29	
	P: D			
	43.3 N., 147.5 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 17 43 25			USCGS
4.	P	Z	19 29 02	
	20.8 S., 174.3 W.			
	Tonga Is.			
	h: 34 km ca.			
	H= 19 17 37			USCGS
4.	iP	NEZ	20 17 22.0	
	S	N	19 06	
	P: S,W,C			
4.	eP	Z	21 18 48	
4.	iP	NZ	23 31 58.4	
	S	E	32 29	
	P: N,D			
	36.6 N., 141.2 E.			
	Near east coast of Honshu, Japan.			
	h: 33 km ca.			
	H= 23 31 18			USCGS
5.	P	Z	04 07 09	
5.	P	Z	06 15 12	
	eS	N	16 57	
	43.1 N., 146.9 E.			
	Kurile Is.			
	h: 25 km ca.			
	H= 06 12 50			USCGS
5.	iP	NZ	06 54 05.8	
	eS	N	25	
	P: N,D			

ate	Phase	Comp.	Time(GMT) h m s
5.	P	Z	08 07 28
	S	N	08 22
5.	iP	Z	09 31 41.6
	e	N	34 16
	P: D		
	25.9 N., 128.4 E.		
	Ryukyu Is.		
	h: 33 km ca.		
	H= 09 28 20		USCGS
5.	iP	NEZ	12 39 59.6
	S	NE	40 15
	P: S,W,C		
6.	P	Z	00 06 31
	S	N	52
6.	iP	NEZ	01 38 39.0
	iS	NEZ	58.5
	P: S,E,D		
6.	iP	NEZ	04 10 24.6
	i	N	11 08
	P: N,W,D		
6.	P	NEZ	04 44 33.0
	P: N,E,C		
	0.1 S., 124.3 E.		
	Molucca Sea.		
	h: 40 km ca.		
	H= 04 37 11.9		USCGS
6.	P	Z	04 50 28
6.	P	NEZ	06 51 02
	P: N,E,D		
	55.0 N., 162.1 E.		
	Near east coast of Kamchatka.		
	h: 33 km ca.		
	H= 06 45 42.9		USCGS
6.	iP	Z	09 49 34.8
	i	NE	35.2
	S	NE	50 19
	P: D		
6.	iP NZ, P E		09 53 12.0
	eS	E	57 24
	P: C		
	55.0 N., 161.9 E.		
	Near east coast of Kamchatka.		
	h: 33 km ca.		
	H= 09 47 53.4		USCGS
6.	P	Z	10 35 52
6.	P	Z	11 39 13
	i	Z	22
	i	Z	36

Date	Phase	Comp.	Time(GMT) h m s
6.	P	Z	11 59 42
	eS	N	12 00 11
6.	iP	NEZ	16 37 33.3
	eS	N	44
	P: N,W,C		
6.	P	Z	19 35 00
6.	iP Z, P N		21 38 12.5
	P: D		
6.	P	Z	23 21 43
7.	P	NEZ	00 25 51
	S	N	28 32
	21.6 N., 142.9 E.		
	Mariana Is. region.		
	h: 309 km ca.		
	H= 00 22 28.6		USCGS
7.	P	Z	00 33 37
7.	P	NZ	02 45 17.0
	S	NE	39
	P: S,D		
7.	P	Z	04 14 58
	S	N	16 22
7.	iP NZ, P E		05 31 46.0
	S	NE	32 08
	P: N,D		
7.	P	Z	06 30 36
	eS	N	32 10
	31.0 N., 130.9 E.		
	Kyushu, Japan.		
	h: 52 km ca.		
	H= 06 28 38		USCGS
7.	P	Z	12 06 09
7.	P	NEZ	12 17 30
	S	NE	19 26
	L	N	30 10
	43.0 N., 146.8 E.		
	Kurile Is.		
	h: 42 km ca.		
	H= 12 15 17.3		USCGS
7.	P	Z	12 23 56
	S	NE	24 42
7.	iP	Z	13 21 31.0
	P: D		
	25.3 S., 179.7 E.		
	South of Fiji Is.		
	h: 55 km ca.		
	H= 13 10 52.3		USCGS

ate	Phase	Comp.	Time(GMT) h m s	
7.	P	Z	16 32 52	
	S	NE	33 16	
8.	iP	NZ	02 44 24.6	
	S	E	36	
	P: S,C			
8.	P	Z	09 34 02	
	23.0 N., 120.4 E.			
	Taiwan.			
	h: 55 km ca.			
	H= 09 29 29			USCGS
8.	P	Z	10 29 50	
8.	iP	NEZ	11 10 57.3	
	e	NE	11 56	
	P: S,W,C			
	41.6 N., 140.4 E.			
	Hokkaido, Japan.			
	h: 46 km ca.			
	H= 11 09 40.1			USCGS
8.	iP	NEZ	11 22 01.5	
	iS	NEZ	17.0	
	P: N,W,C			
8.	iP	NEZ	12 06 26.7	
	S	NE	08 16	
	L	N	40	
	L	E	52	
	P: S,W,C			
	43.2 N., 147.2 E.			
	Kurile Is.			
	h: 45 km ca.			
	H= 12 04 12.8			USCGS
8.	P	Z	12 40 10	
	i	N	50 02	
	i	N	13 00 38	
	14.6 N., 54.0 E.			
	Arabian Sea.			
	h: 33 km ca.			
	H= 12 28 21.0			USCGS
8.	P	Z	13 23 12	
	i	NZ	17	
	S	NE	25 07	
	43.2 N., 147.4 E.			
	Kurile Is.			
	h: 36 km ca.			
	H= 13 20 57.0			USCGS
8.	P	Z	20 19 25	
	S	NE	20 15	
8.	iP	NEZ	23 03 34.0	
	P: N,E,D			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	44.7 N., 152.2 E.			
	Kurile Is. region.			
	h: 40 km ca.			
	H= 23 00 32			USCGS
9.	iP	NEZ	01 21 48.5	
	S	NE	22 26	
	P: S,E,D			
9.	iP Z, P	NE	12 28 28.0	
	i	E	31	
	i	N	35	
	S	NE	53	
	P: D			
9.	P	Z	14 29 11	
	S	NEZ	31	
9.	eP	Z	15 38 50	
	53.5 N., 169.7 E.			
	Komandorsky Is. region.			
	h: 33 km ca.			
	H= 15 33 06.3			USCGS
9.	P	Z	16 46 25	
	23.3 N., 171.2 E.			
	Loyalty Is. region.			
	h: 99 km ca.			
	H= 16 35 41.4			USCGS
10.	P	Z	06 33 28	
	i	N	30.3	
	S	Z	49	
10.	iP	NEZ	05 44 13.5	
	S	N	47	
	P: N,W,C			
10.	P	NEZ	09 03 41	
	S	NE	56	
10.	P	Z	09 58 49	
10.	iP	NEZ	10 03 18.0	
	S	E	05 49	
	P: S,W,C			
	46.0 N., 152.3 E.			
	Kurile Is.			
	h: 87 km ca.			
	H= 10 00 05.8			USCGS
10.	iP	NEZ	13 44 13.0	
	S	N	28	
	P: N,W,D			
10.	eP	Z	16 03 43	

ate	Phase	Comp.	Time(GMT) h	m	s
11.	P	NEZ	02	47	54
	S	NEZ		48	41
	i	NE			56
11.	eP	Z	05	40	40
11.	iP	Z	09	45	15.0
	S	N			40.0
	e	EZ			41
	P: D				
11.	iP	NEZ	12	16	11.5
	S	NEZ		17	50
	i	Z			51
	i	N		20	06
	P: N,W,C				
11.	P	Z	20	58	50
	eS	N		59	43
	eL	NE	21	02	00
12.	P	NZ	05	52	49
	i	NEZ			50.3
	ScP?	Z		58	30
	S	NE		59	25
	i	E			49.8
	i	N	06	02	51.0
	SS	NE		04	23
	Lq	N		05	48
	Lq	Z		06	28
	eLr	Z		07	06
	Lr	N			15
12.	P	Z	06	24	13
	i	E			17.5
	9.2 S., 113.0 E.				
	South of Java.				
	h: 33 km ca.				
	H= 06 15 11	USCGS			
12.	iP	NEZ	07	33	28.2
	P: N,C				
12.	eP	Z	07	47	59
	18.4 N., 173.1 W.				
	Tonga Is.				
	h: 26 km ca.				
	H= 07 36 37.4	USCGS			
12.	iPKP	Z	12	01	51.7
	e	NE			53
	e	Z		02	19
	P: C				
	20.9 S., 69.0 W.				
	Northern Chile.				
	h: 100 km ca.				
	H= 11 42 07.7	USCGS			

Date	Phase	Comp.	Time(GMT) h	m	s
12.	iP Z, P	NE	13	26	47.8
	i	Z			57
	S	NE		27	07
	i	Z			46
	P: C				
12.	iP	Z	19	24	07.3
	i	NEZ			07.6
	iS	EZ			46
	iS	N			47
	i	Z			53
	i	N			59
	P: D				
	33.8 N., 140.9 E.				
	South of Honshu, Japan.				
	h: 43 km ca.				
	H= 19 23 13	USCGS			
13.	iP	NZ	02	20	19.8
	i	N			20.3
	i	Z			29.5
	P: S,D				
13.	iP	EZ	04	19	31.7
	i	N			34.5
	i	N		20	06
	P: D				
13.	iP	NZ	06	36	55.0
	i	E			56.0
	P: S,D				
13.	eP	NZ	10	32	25
13.	P	NEZ	11	31	33
	i	E			37.5
	41.4 N., 142.0 E.				
	Hokkaido, Japan.				
	h: 72 km ca.				
	H= 11 30 07	USCGS			
13.	P	NEZ	14	14	23
	i	Z		16	09
	eL	E		25	15
13.	iP	NZ	14	53	06.2
	S	E			29
	i	Z			40
	P: N,W,C				
13.	iP Z, P	NE	15	28	55.0
	S	E		30	37
	P: D				
	43.2 N., 146.6 E.				
	Kurile Is.				
	h: 37 km ca.				
	H= 15 26 40.5	USCGS			

Date	Phase	Comp.	Time(GMT) h	m	s
14.	iP	Z	02	32	10.8
	i	NE			11.7
	i	NZ			14.0
	i	NEZ			17.0
	S	NEZ			52
	P: C				
14.	eP	NEZ	04	12	07
	e	Z			16
	43.3 N., 147.6 E.				
	Kurile Is.				
	h: 33 km ca.				
	H= 04 09 43	USCGS			
14.	eP	NEZ	07	14	31
14.	eP	NEZ	08	51	12
	S	NEZ			46
14.	P	NEZ	10	50	31
	51.0 N., 156.7 E.				
	Kamchatka.				
	h: 89 km ca.				
	H= 10 46 09	USCGS			
14.	iP Z, P N		12	32	53.5
	iS	EZ		33	15.4
	i	N			16.2
	P: C				
14.	P	NZ	14	41	06
	S	E		43	28
	L	E			56
	L	N		44	00
	L	Z			32
14.	P	Z	15	06	11
	i	NE			12.5
14.	P Z, eP NE		17	05	26
	30.8 N., 130.7 E.				
	Kyushu , Japan.				
	h: 33 km ca.				
	H= 17 03 25	USCGS			
14.	iP	NEZ	18	47	47.6
	e	N		48	12
	P: S,E,D				
14.	iP	NZ	19	35	29.0
	i	E			30.0
	S	E		36	16
	i	N			17.2
	P: N,C				
	33.3 N., 138.6 E.				
	South of Honshu, Japan.				
	h: 289 km ca.				
	H= 19 34 30	USCGS			

Date	Phase	Comp.	Time(GMT) h	m	s
15.	eP	Z	00	14	10
15.	P	NEZ	02	50	06
	eL	NE		59	00
	Lr	NE	03	00	10
	eL	Z		01	30
	52.2 N., 171.4 W.				
	Fox Is.				
	h: 61 km ca.				
	H= 02 42 47.3	USCGS			
15.	P	NZ	03	00	26
	i NZ, e E				27.0
	i	Z			33
	S	E			47
15.	P	NEZ	12	51	09
15.	P	NEZ	15	06	24
15.	eP	Z	15	33	21
15.	iP	EZ	15	48	34.8
	i	N			35.0
	i	NEZ			43.3
	P: E,D				
15.	P	NZ	18	18	42
	i	E			44.0
	i	NE			45.0
15.	iP NZ, P E		19	00	19.6
	P: S,C				
	4.4 S., 155.1 E.				
	Solomon Is.				
	h: 516 km ca.				
	H= 18 53 00.3	USCGS			
15.	iP EZ, P N		21	13	19.0
	i	N			20.0
	S	N			42
	P: E,D				
15.	eP	NEZ	21	44	21
16.	P	Z	03	11	03
16.	P	NEZ	03	20	26
	S	NEZ			50
16.	eP	Z	06	29	03
16.	eP	Z	06	47	23
16.	iP	NEZ	07	01	34.0
	i	Z		03	19.5
	i	NE		05	31.5
	P: N,W,D				

Date	Phase	Comp.	Time(GMT) h m s
16.	eP	Z	07 35 22
	i	Z	31
	i	NE	32
	17.8 N., 144.9 E.		
	Mariana Is. region.		
	h: 24 km ca.		
	H= 07 31 02		USCGS
16.	iP	NZ	11 48 01.2
	P: S,C		
16.	iP	NEZ	14 26 50.0
	i	NE	27 02.0
	e	Z	50
	S	NE	29 23
	P: N,E,D		
	49.7 N., 147.7 E.		
	Sea of Okhotsk.		
	h: 582 km ca.		
	H= 14 23 42.6		USCGS
16.	iP	Z	14 33 55.6
16.	eP	Z	15 11 16
	i	NEZ	28
	e	NEZ	12 20
16.	iP	NEZ	18 39 49.5
	P: N,E,D		
16.	iP Z, P NE		20 39 48.5
	e	Z	40 04
	eS	N	41 45
	P: C		
	44.3 N., 148.8 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 20 37 08.9		USCGS
16.	iP	NZ	23 30 28.0
	i	E	28.7
	S	NE	31 00
	P: N,C		
	34.1 N., 139.0 E.		
	Near south coast of Honshu, Japan.		
	h: 33.km ca.		
	H= 23 29 47		USCGS
16.	P	NEZ	23 42 12
	S	NZ	43
17.	P	NEZ	00 12 05
	i	E	08.5
	i	E	29.2
	S	NEZ	38
	34.1 N., 139.1 E.		
	Near south coast of Honshu, Japan.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	h: 33 km ca.		
	H= 00 11 25		USCGS
17.	eP	NZ	05 55 35
	eS	N	41
17.	P	NEZ	10 41 03
17.	P	NZ	10 56 34
17.	P	NEZ	13 22 20
	iS	NEZ	52
	i	NE	57.0
	P: D		
17.	iP EZ, P N		14 33 04.0
	eS	N	33
	P: E,C		
17.	P	NZ	15 36 52
	i	Z	53.5
	i	NEZ	56.5
	S	NZ	37 22
17.	eP	NZ	16 26 37
	e	EZ	27 21
	e	Z	32
17.	iP	NEZ	16 59 28.1
	i	N	28.6
	S	NE	59
	i	Z	17 00 21
	i	N	01 11.0
	P: S,W,D		
17.	P	NEZ	17 22 54
	S	NZ	58
17.	iP NZ, P E		17 26 02.3
	P: S,D		
	4.4 N., 127.7 E.		
	Talaud Is.		
	h: 98 km ca.		
	H= 17 19 31.8		USCGS
18.	iP	EZ	01 43 31.7
	i	NEZ	46
	S	Z	55
	i	Z	44 19
	P: S,E,D		
18.	P	NEZ	01 47 07
	S	NE	29
18.	eP	NEZ	04 13 15
	6.1 N., 149.0 E.		
	New Britain region.		
	h: 63 km ca.		
	H= 04 05 16		USCGS

ate	Phase	Comp.	Time(GMT) h	m	s
18.	iP Z, P	NE	06	21	38.3
	i	N			44
	S	NZ			51
	i	E			51.5
	P: D				
18.	P	NZ	06	34	43
	e	N			56
18.	iP	NEZ	09	37	00.8
	i	Z			22.5
	iPP	Z		38	32.8
	i	Z		41	37.8
	S	NEZ		43	00
	P: E,D				
	7.2 S., 125.9 E.				
	Banda Sea.				
	h: 457 km ca.				
	H= 09 29 26.1		USCGS		
18.	P	NEZ	10	32	06
	28.4 N., 142.3 E.				
	Bonin Is. region.				
	h: 33 km ca.				
	H= 10 29 57		USCGS		
18.	iP Z, P	NE	10	49	40.6
	P: D				
18.	iP Z, P	NE	11	13	40.3
	i	Z			46.3
	i	N			48.0
	P: C				
18.	P	NEZ	14	14	28.2
18.	iP	EZ	15	20	49.5
	e	N		21	18
	i	N			30
	P: W,C				
18.	P	NEZ	15	35	02
	S	NEZ			34
18.	iP Z, P	NE	20	14	55.1
	i	NEZ			58.5
	P: D				
	13.8 N., 145.4 E.				
	Mariana Is.				
	h: 100 km ca.				
	H= 20 09 53.0		USCGS		
18.	P	Z	20	25	01
18.	iP	Z	22	26	06.3
	i	N			08.0
	S	NE			23
	P: C				

Date	Phase	Comp.	Time(GMT) h	m	s
19.	eP	NEZ	07	21	15
	S	NE			40
19.	iP	NEZ	13	30	38.0
	i	NEZ			43.5
	e	N		31	24
	P: N,E,D				
19.	iP	Z	14	03	13.2
	i	NE			13.8
	iPP	Z		05	01.5
	S	N		09	40
	eLq	E		13	03
	eL	Z		17	32
	L	N			45
	L	Z		20	28
	PKPPKP	E		34	44
	P: D				
	5.5 S., 153.1 E.				
	New Ireland region.				
	h: 73 km ca.				
	H= 13 55 12.2		USCGS		
19.	P	NEZ	14	49	18
	i	NEZ			21.1
	i	Z			42
	S	Z		50	03
	i	Z			31
	38.3 N., 141.8 E.				
	Near east coast of Honshu, Japan.				
	h: 50 km ca.				
	H= 14 48 24.9		USCGS		
19.	iP Z, P	NE	20	10	31.3
	i	Z		12	40
19.	P	Z	20	44	35
	S	E			56
19.	P	EZ	22	58	07
	S	NE	23	08	23
	Lq	NE		19	33
	eLr	Z		25	23
	eL	N		28	28
	L	E		30	18
	L	Z			50
	Mag. $7\frac{1}{4}$ - $7\frac{1}{2}$ (PAS.)				
	39.4 N., 25.0 E.				
	Aegean Sea.				
	h: 7 km ca.				
	H= 22 45 41.2		USCGS		
20.	P	NZ	00	38	17
	e	Z			47
	6.8 S., 130.1 E.				
	Banda Sea.				
	h: 73 km ca.				
	H= 00 30 17.8		USCGS		

Date	Phase	Comp.	Time(GMT) h m s
20.	iP	Z	02 39 02.7
	P: C		
20.	P	Z	05 15 02
	58.4 N., 151.7 W.		
	Kodiak Is. region.		
	h: 34 km ca.		
	H= 05 06 11.9		USCGS
20.	iP	Z	07 16 26.0
	i	NE	26.5
	e	E	17 23
	P: D		
20.	eP	E	14 44 24
	eS	N	45 12
20.	iP Z, P NE		17 32 02.0
	i	NEZ	15.0
	i	EZ	32.0
	S	E	33 16
	P: D		
	41.2 N., 142.6 E.		
	Hokkaido, Japan.		
	h: 36 km ca.		
	H= 17 30 34.5		USCGS
20.	P	NZ	21 25 28
20.	iP	NEZ	23 29 48.9
	S	NE	30 38
	i	Z	56
	P: N,W,D		
	38.2 N., 135.2 E.		
	Sea of Japan.		
	h: 347 km ca.		
	H= 23 28 49.1		USCGS
20.	P	Z	23 53 34
	S	N	54 58
	i	NE	55 20
	e	Z	44
	i	Z	50
	i	NZ	56
	32.0 N., 130.8 E.		
	Kyushu , Japan.		
	h: 33 km ca.		
	H= 23 51 43.0		USCGS
21.	iP	Z	01 46 46.0
	i	NEZ	47.5
	S	NEZ	48 14
	P: C		
	32.0 N., 130.6 E.		
	Kyushu , Japan.		
	h: 3 km ca.		
	H= 01 44 50.5		USCGS

Date	Phase	Comp.	Time(GMT) h m s
21.	iP	Z	06 25 13.8
	i	E	14.5
	P: D		
	52.3 N., 175.3 W.		
	Andreanof Is.		
	h: 103 km ca.		
	H= 06 18 21.6		USCGS
21.	iP	NEZ	06 27 56.6
	P: N,E,D		
	52.3 N., 175.3 W.		
	Andreanof Is.		
	h: 107 km ca.		
	H= 06 21 03.6		USCGS
21.	eP	Z	08 10 44
	eS	N	12 56
21.	P	NZ	09 05 35
	PcP	Z	07 34
	S	N	11 34
	L	E	15 12
	Lr	N	17 44
	4.0 S., 128.5 E.		
	Banda Sea.		
	h: 18 km ca.		
	H= 08 57 49.1		USCGS
21.	eP	Z	09 30 57
	eS	N	31 27
21.	iP	NEZ	10 19 20.7
	S	NE	36
	P: S,E,D		
21.	iP	Z	12 40 59.0
	i	Z	41 11
	eS	N	46 10
	L	NE	48 00
	L	Z	50 40
	P: D		
	7.0 N., 126.8 E.		
	Mindanao , P.I.		
	h: 39 km ca.		
	H= 12 34 42.7		USCGS
21.	iP	EZ	15 42 08.8
	P: E,C		
21.	iP	NEZ	17 09 22.5
	S	NEZ	39
	P: S,E,D		
21.	eP	Z	19 15 31
	L	N	23 44
	51.4 N., 176.1 W.		
	Andreanof Is.		
	h: 49 km ca.		
	H= 19 08 39.3		USCGS

ate	Phase	Comp.	Time(GMT) h m s
21.	P	Z	19 36 55
	51.6 N., 176.0 W.		
	Andreanof Is.		
	h: 57 km ca.		
	H= 19 30 04.9		USCGS
21.	P	Z	19 39 01
	i	Z	24
	e	N	45 18
	eL	N	47 48
	30.2 S., 179.0 W.		
	Kermadec Is.		
	h: 228 km ca.		
	H= 19 27 30.0		USCGS
21.	iP	Z	21 14 49.4
	PP	NEZ	16 04
	S	NE	20 24
	L	N	22 48
	L	Z	23 08
	P: C		
	51.4 N., 176.0 W.		
	Andreanof Is.		
	h: 47 km ca.		
	H= 21 07 56.9		USCGS
21.	P	Z	21 17 18
21.	eP	Z	21 21 59
	51.4 N., 175.8 W.		
	Andreanof Is.		
	h: 52 km ca.		
	H= 21 15 08.0		USCGS
21.	P	Z	21 25 33
	PP	N	26 41
	51.6 N., 175.9 W.		
	Andreanof Is.		
	h: 50 km ca.		
	H= 21 18 42.7		USCGS
22.	iP	Z	01 32 05.0
	i	Z	31
	P: C		
22.	eP	Z	02 14 18
	eS	N	24 40
	eL	NE	42 20
	44.4 S., 167.6 E.		
	South I., New Zealand.		
	h: 33 km ca.		
	H= 02 01 46.1		USCGS
22.	P	Z	06 06 43
22.	P	NEZ	10 21 01
	S	NE	22 40
	L	NE	23 15

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	32.0 N., 130.7 E.		
	Kyushu , Japan.		
	h: 11 km ca.		
	H= 10 19 07.6		USCGS
22.	iP	NEZ	15 34 34.0
	eS	N	58
	P: N,D		
22.	eP	Z	16 56 50
	51.4 N., 176.1 W.		
	Andreanof Is.		
	h: 54 km ca.		
	H= 16 49 58.6		USCGS
22.	P	Z	17 53 49
	i	NEZ	50.0
	PcP	Z	56 19
	L	N	18 02 16
	51.4 N., 176.3 W.		
	Andreanof Is.		
	h: 49 km ca.		
	H= 17 46 57.4		USCGS
22.	P	Z	18 20 50
	51.4 N., 176.2 W.		
	Andreanof Is.		
	h: 66 km ca.		
	H= 18 13 59.3		USCGS
23.	P	Z	00 17 30
	51.5 N., 176.3 W.		
	Andreanof Is.		
	h: 65 km ca.		
	H= 00 10 39.5		USCGS
23.	iP	NEZ	02 14 56.8
	S	NE	15 18
	P: S,E,D		
23.	P	NEZ	02 24 09
23.	P	NEZ	05 32 59
	S	E	33 11
23.	P	EZ	05 39 56
	S	E	40 24
23.	P	Z	08 19 45
	eL	N	28 00
	51.6 N., 175.9 W.		
	Andreanof Is.		
	h: 55 km ca.		
	H= 08 12 55.7		USCGS
23.	P	EZ	09 39 17
	51.5 N., 176.3 W.		
	Andreanof Is.		
	h: 49 km ca.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	H= 09 32 26.1		USCGS
23.	P	Z	10 18 21.0
	P: C		
23.	iP	NEZ	11 04 43.0
	S	E	07 49
	i	NE	50
	P: S,E,D		
	18.8 N., 145.3 E.		
	Mariana Is.		
	h: 620 km ca.		
	H= 11 01 00.3		USCGS
23.	iP	NEZ	12 07 03.5
	P: N,C		
23.	iP	Z	16 22 29.5
	P: C		
	6.1 S., 130.5 E.		
	Banda Sea.		
	h: 119 km ca.		
	H= 16 14 41		USCGS
23.	iP	NEZ	19 38 45.5
	i	Z	39 07
	S	NE	41 52
	P: S,E,D		
	18.7 N., 145.2 E.		
	Mariana Is.		
	h: 617 km ca.		
	H= 19 35 02.5		USCGS
24.	P	Z	10 23 20
	S	N	33 20
	PPS?	N	34 54
	eSS	N	38 28
	L	N	44 34
	32.5 N., 177.7 W.		
	South of Kermadec Is.		
	h: 21 km ca.		
	H= 01 11 11.6		USCGS
24.	P	Z	03 54 54
	eL	N	04 05 14
	53.8 N., 163.4 W.		
	Unimak I.		
	h: 19 km ca.		
	H= 03 46 53.4		USCGS
24.	P	Z	04 31 58
	S	E	32 30
24.	PKP	Z	07 51 13
	15.7 S., 71.2 W.		
	Southern Peru.		
	h: 60 km ca.		
	H= 07 31 35.2		USCGS

Date	Phase	Comp.	Time(GMT) h m s
24.	eP	Z	11 47 55
	i	Z	48 07
	S	EZ	51
24.	P	NEZ	14 36 19
24.	P	NZ	14 42 03
24.	P	Z	14 50 18
	eS	E	52
24.	P	NEZ	15 11 28
	S	NE	58
	34.4 N., 139.1 E.		
	Near south coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 15 10 50		USCGS
24.	P	NZ	15 20 59.5
	S	NE	21 32
	P: N,C		
24.	P	NEZ	15 25 13
	S	NEZ	44
	34.2 N., 139.2 E.		
	Near south coast of Honshu, Japan.		
	h: 37 km ca.		
	H= 15 24 29.8		USCGS
24.	P	Z	15 29 51
24.	P	Z	15 31 14
24.	iP	NZ	15 34 14.5
	S	N	48
	P: N,C		
24.	P	NEZ	15 35 00
	S	NEZ	28
24.	P	Z	15 45 23.0
	P: C		
24.	iP	Z	15 46 34.7
	S	Z	47 04
	P: C		
24.	eP	Z	15 48 27
	eS	Z	49 02
24.	P	Z	15 51 01
24.	P	Z	15 52 21
24.	P	NZ	16 02 10
	i	NZ	13

(cont.)

ate	Phase	Comp.	Time(GMT) h m s
	i	NZ	16 02 32
	S	E	48
	34.5 N., 138.9 E.		
	Near south coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 16 01 37		USCGS
24.	P	NEZ	16 07 12
	S	E	45
24.	iP	NZ	16 09 03.0
	eS	E	36
	P: N,C		
	34.3 N., 139.0 E.		
	Near south coast of Honshu, Japan.		
	h: 34 km ca.		
	H= 16 08 23		USCGS
24.	P	Z	16 21 08
24.	P	Z	16 31 20
	S	Z	50
24.	P	Z	16 42 11
	S	E	50
24.	iP	NZ	16 50 27.6
	S	E	56
	P: S,D		
	34.2 N., 139.2 E.		
	Near south coast of Honshu, Japan.		
	h: 4 km ca.		
	H= 16 49 44.9		USCGS
24.	eP	Z	16 57 54
24.	P	NZ	17 04 06
24.	iP	NZ	17 14 23.3
	S	N	55
	P: S,D		
24.	iP	NEZ	17 20 30.5
	S	N	21 06
	P: S,E,D		
24.	P	EZ	17 28 57.0
	S	N	29 40
	P: E		
24.	P	NEZ	18 29 39
24.	iP	EZ	19 03 39.5
	S	NE	04 13
	P: E,D		

Date	Phase	Comp.	Time(GMT) h m s
24.	iP	NEZ	19 16 12.2
	S	E	45
	P: S,E,D		
24.	P	Z	19 55 40
24.	P	NEZ	19 59 01
24.	P	NZ	20 14 04
24.	iP	NZ	21 29 09.6
	S	N	43
	P: C		
24.	P	NZ	22 01 23
24.	P	NEZ	22 54 57
	S	E	55 29
25.	eP	Z	01 55 10
	eS	N	43
25.	P	Z	03 25 03
25.	P	Z	08 51 35
	S	NZ	53 45
25.	iP	NZ	10 28 03.5
	i	E	04.5
	S	NE	29 40
	P: S,C		
	45.0 N., 142.2 E.		
	Hokkaido, Japan.		
	h: 295 km ca.		
	H= 10 25 58.1		USCGS
25.	eP	Z	12 13 21
25.	eP	Z	14 47 09
25.	P	NEZ	15 22 11
25.	P	EZ	16 49 19
	S	NE	48
25.	iP	Z	18 15 12.7
	i	NE	13
	i	Z	28
	PcP	Z	17 42
	S	N	20 48
	L	N	22 28
	Lr	N	23 44
	P: C		
	51.4 N., 176.0 W.		
	Andreanof Is.		
	h: 50 km ca.		
	H= 18 08 19.9		USCGS

Date	Phase	Comp.	Time(GMT) h	m	s
25.	iP	NEZ	18	38	15.7
	S	E			50
	P: N,C				
25.	iP	NZ	19	13	13.0
	S	E			45
	P: S,D				
25.	iP	NEZ	19	33	05.5
	S	N			08.5
	P: N,E,C				
25.	iP	NEZ	20	01	16.7
	S	N			44
	P: N,E,D				
	37.6 N., 141.4 E.				
	Near east coast of Honshu, Japan.				
	h: 66 km ca.				
	H= 20 00 31.5	USCGS			
25.	iP	NEZ	21	19	09.5
	S?	Z			54
	P: N,E,D				
25.	iP	NZ	22	41	54.0
	S?	E		42	28
	P: N,C				
26.	P	Z	00	48	40
	S	N		49	37
26.	P	Z	03	37	40
26.	iP	NEZ	04	38	47.5
	i	Z		39	21
	P: S,E,D				
26.	P	Z	10	54	50
	i	NEZ			54.5
	S	NE		58	42
	eL	N		59	54
	Lr	Z	11	01	40
	Lr	N		02	30
	Mag. 6 3/4 (PAS.)				
	22.7 N., 121.5 E.				
	Taiwan.				
	h: 24 km ca.				
	H= 10 50 16.7	USCGS			
26.	eP	Z	11	02	39
26.	iP	NEZ	13	40	19.0
	S	E		41	46
	P: N,E,D				
	42.0 N., 142.2 E.				
	Hokkaido, Japan.				
	h: 72 km ca.				
	H= 13 38 46.4	USCGS			

Date	Phase	Comp.	Time(GMT) h	m	s
26.	P	Z	15	07	16
26.	iP	EZ	18	31	13.6
	S	E			46
	P: E,D				
26.	iP	EZ	20	42	18.7
	S	NE			35.5
	P: E,C				
26.	P	Z	21	56	53
26.	P	Z	23	17	06
	i	Z			08.4
	i	Z			23.3
	e	Z		18	18
27.	P	NZ	02	32	45
	i	NEZ			46
	S	NE		33	33
	32.7 N., 140.7 E.				
	South of Honshu, Japan.				
	h: 41 km ca.				
	H= 02 31 38.6	USCGS			
27.	P	Z	02	56	12
	eS	N		58	03
	42.9 N., 147.0 E.				
	Off coast of Hokkaido, Japan.				
	h: 37 km ca.				
	H= 02 53 57.2	USCGS			
27.	iP	NEZ	05	24	16.5
	S	NE		28	32
	L	E		29	16
	L	N			40
	P: S,D				
	12.2 N., 140.7 E.				
	West Caroline Is.				
	h: 19 km ca.				
	H= 05 19 00.5	USCGS			
27.	P	Z	07	03	37.5
27.	P	NEZ	10	59	54
	S	NE	11	04	10
	L	E		05	00
	L	Z		06	14
	12.1 N., 140.6 E.				
	West Caroline Is.				
	h: 33 km ca.				
	H= 10 54 38.5	USCGS			
27.	eP	Z	11	52	36
	i	NE			55
27.	P	Z	11	53	07
	S	NEZ			12

Date	Phase	Comp.	Time(GMT) h m s
27.	iP	NZ	16 19 41.5
	S	NE	21 13
	P: D		
27.	eP	Z	18 54 45
28.	eP	EZ	03 32 13
	e	N	36 54
	20.4 N., 143.8 E.		
	Mariana Is. region.		
	h: 66 km ca.		
	H= 03 28 21.9		USCGS
28.	iP	NEZ	10 58 59.8
	S	NE	59 19.5
	P: S,W,C		
28.	iP	NEZ	12 09 06.4
	i	NE	07
	S	NE	55
	P: C		
	Mag. 5.8 - 6.2 (BRK.)		
	32.9 N., 137.7 E.		
	South of Honshu, Japan.		
	h: 349 km ca.		
	H= 12 08 01.5		USCGS
28.	eP	Z	12 18 50
28.	eP	Z	13 03 34
	eS	E	05 16
28.	P	Z	18 37 32
	eS	E	43 24
	eL	NE	45 40
	2.2 N., 126.6 E.		
	Molucca Passage.		
	h: 59 km ca.		
	H= 18 30 40.7		USCGS
28.	iP	Z	21 10 15.0
	i	NE	15.8
	P: C		
	3.0 N., 122.8 E.		
	Celebes Sea.		
	h: 510 km ca.		
	H= 21 03 54.5		USCGS
29.	iP	NEZ	07 32 00.5
	S	NE	33 17
	P: N,E,D		
	31.1 N., 143.3 E.		
	South of Honshu, Japan.		
	h: 33 km ca.		
	H= 07 30 20		USCGS
29.	iP	NEZ	10 19 36.5
	iS	NE	54.5
	P: N,E,D		

Date	Phase	Comp.	Time(GMT) h m s
29.	P	Z	10 29 36
	i	NZ	47
	6.9 S., 155.7 E.		
	Solomon Is.		
	h: 80 km ca.		
	H= 10 21 15.8		USCGS
29.	eP	Z	10 47 57
29.	iP	NZ	13 10 30.9
	i	NE	40
	eS	E	11 11
	P: N,C		
29.	iP	NZ	14 28 24.5
	P: N,C		
	9.0 S., 153.7 E.		
	Dentrecasteaux Is. region.		
	h: 14 km ca.		
	H= 14 19 48.4		USCGS
29.	iP	NEZ	15 50 52.8
	i	NEZ	51 40
	S	NEZ	54 32
	P: N,E,D		
	52.8 N., 157.5 E.		
	Kamchatka.		
	h: 151 km ca.		
	H= 15 46 18.2		USCGS
29.	iP	NEZ	16 01 41.3
	S	Z	02 00
	P: S,E,D		
29.	P	Z	16 39 27
	PcP	Z	41 33
	S	NE	45 48
	L	N	48 04
	L	E	49 00
	ScS ?	E	56
	eL	N	53 00
	2.9 S., 119.6 E.		
	Celebes.		
	h: 50 km ca.		
	H= 16 31 34.4		USCGS
29.	iP	Z	17 20 38.4
	P: D		
29.	iP	EZ	17 46 31.5
	i	NE	47 03
	P: W,C		
29.	P	Z	18 43 22
	i	Z	44 10
29.	P	NEZ	23 19 50
	S	NE	20 14

Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
29.	iP	NZ	23 45 42.0				
	PcP	Z	46 33				
	P: N,C						
	14.6 S., 167.2 E.						
	New Hebrides Is.						
	h: 183 km ca.						
	H= 23 36 08.5		USCGS				

Mineo Takehana

Director

SEISMOLOGICAL BULLETIN
OF
MATSUSHIRO

MARCH , APRIL

1968

Matsushiro Seismological Observatory
Matsushiro-machi, Nagano-shi,
Nagano-ken, Japan

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	N	T_1= 1.0 T_2= 0.23	h_1= 0.63 h_2= 1.7	103,000 (max)
Seismograph	E	T_1= 1.0 T_2= 0.22	h_1= 0.64 h_2= 1.6	106,000 (max)
(Short Period)	Z	T_1= 1.0 T_2= 0.21	h_1= 0.67 h_2= 1.2	131,000 (max)
Benioff	N	T_1= 1.0 T_2= 89	h_1= 0.63 h_2= 2.5	3,200 (max)
Seismogrph	E	T_1= 1.0 T_2= 55	h_1= 0.64 h_2= 2.5	4,700 (max)
(Long Period)	Z	T_1= 1.0 T_2= 64	h_1= 0.67 h_2= 2.7	3,500 (max)
WWSS	N	T_1= 1.0 T_2= 0.75		100,000
Seismograph	E	T_1= 1.0 T_2= 0.75		100,000
(Short Period)	Z	T_1= 1.0 T_2= 0.75		100,000
WWSS	N	T_1= 15 T_2= 100		3,000
Seismograph	E	T_1= 15 T_2= 100		3,000
(Long Period)	Z	T_1= 15 T_2= 100		3,000
Short Period Vertical Seismograph	Z	T_1= 1.0 T_2= 2.82	h_1= 1.4 h_2= 1.2	32,000 (max)
Wood-Anderson	N	T = 0.8	h = 0.8	1,300
Seismograph	E	T = 0.8	h = 0.8	1,200

Date	Phase	Comp.	Time(GMT) h m s
1.	iP Z, P NE		03 13 12.3
	S	NZ	44
	P: C		
1.	iP Z, P N		09 07 09.3
	P: D		
1.	eP	Z	12 51 23
1.	PKP	Z	23 20 06
	14.6 N., 45.1 W.		
	North Atlantic ridge.		
	h: 32 km ca.		
	H= 23 00 26.0		USCGS
2.	P	NEZ	02 54 02
	i	Z	06
	i	N	07
	e	NE	19
2.	iP	NEZ	07 05 53.2
	i	E	06 03
	S	N	17
	P: N,E,D		
2.	PKP	Z	11 33 58
	60.7 S., 25.5 W.		
	South Sandwich Is. region.		
	h: 33 km ca.		
	H= 11 14 01.1		USCGS
2.	eP	Z	11 59 12
	e	NZ	15
	e	E	16
	S	E	42
2.	iP	Z	13 57 28.5
	i	NZ	30.5
	S	E	54
	P: D		
2.	eS	Z	16 29 05
	eL	N	31 25
	eL	E	33.0
	L	Z	35 07
	29.9 N., 100.2 E.		
	Szechwan Province , China.		
	h: 24 km ca.		
	H= 16 17 29.0		USCGS
2.	eP	EZ	20 42 28
2.	iP	NEZ	21 26 19.2
	S	Z	26
	S	E	27
	i	N	27.9
	P: N,E,C		

Date	Phase	Comp.	Time(GMT) h m s
2.	P	NEZ	22 14 07
	S	NEZ	23 48
	e	Z	32 30
	i	E	39
	L	N	34 38
	6.1 S., 71.4 W.		
	Chagos Archipelago region.		
	h: 33 km ca.		
	H= 22 02 24.8		USCGS
2.	iP	NZ	23 43 44.6
	P: N,C		
	4.0 N., 128.0 E.		
	North of Halmahera.		
	h: 129 km ca.		
	H= 23 37 15.2		USCGS
3.	P	Z	03 43 02
	19.4 S., 169.5 E.		
	New Hebrides Is.		
	h: 211 km ca.		
	H= 03 32 57.1		USCGS
3.	iP	Z	05 27 22.7
	i	NE	22.9
	S	EZ	41
	P: D		
3.	P	EZ	08 01 34
	2.8 N., 128.3 E.		
	Halmahera.		
	h: 110 km ca.		
	H= 07 54 52.7		USCGS
3.	iP	EZ	08 19 37.6
	eS	EZ	55
	P: E,D		
3.	iP	NEZ	09 23 17.5
	S	N	38
	P: N,E,D		
3.	P	EZ	09 40 33
	34.7 N., 72.3 E.		
	West Pakistan.		
	h: 33 km ca.		
	H= 09 31 20.2		USCGS
3.	P	Z	12 13 55
	e	Z	14 50
	23.5 S., 179.9 E.		
	South of Fiji Is.		
	h: 556 km ca.		
	H= 12 03 29.3		USCGS
3.	P	Z	17 46 03.7
	eS	N	33
	S	EZ	34

Date	Phase	Comp.	Time(GMT) h m s
3.	iP	NEZ	20 34 01.3
	S	NEZ	28
	P: S,E,D		
3.	iP	NEZ	23 02 13.1
	i	NZ	03 34
	i	Z	40
	S	NEZ	07 28
	L	E	09 45
	P: S,W,D		
4.	P	NZ	00 01 06
	S	Z	26
	S	NE	27
4.	iP	EZ	03 31 17.4
	i	N	17.7
	S	EZ	39
	i	N	41
	P: E,D		
4.	iP	NEZ	09 22 43.1
	e	Z	24 11
	P: S,W,C		
4.	iP	NEZ	10 05 08.2
	e	E	06 17
	e	Z	40
	P: S,W,C		
4.	eP	Z	11 53 54
4.	iP	EZ	12 08 08.5
	i	N	09.0
	eS	NE	38
	P: E,D		
4.	P	Z	23 44 50
5.	P	Z	00 30 11
	eS	E	36 43
	eL	E	39 45
	53.8 N., 163.3 W.		
	Unimak I. region.		
	h: 2 km ca.		
	H= 00 22 06.9		USCGS
5.	P	Z	00 38 57
	e	Z	39 09
	53.8 N., 163.3 W.		
	Unimak I. region.		
	h: 33 km ca.		
	H= 00 30 57.4		USCGS
5.	P	Z	01 54 05
5.	P	Z	04 08 47
	S	Z	09 11
	i	E	16

Date	Phase	Comp.	Time(GMT) h m s
5.	P	NEZ	05 47 52
	i	EZ	59
	S	NE	48 17
5.	iP	Z	06 00 13.6
	iS	NEZ	21.5
	P: D		
5.	P	Z	14 47 41
	18.1 S., 174.7 W.		
	Tonga Is.		
	h: 137 km ca.		
	H= 14 36 41.5		USCGS
5.	P	NEZ	18 22 33
	S	N	27 12
	i	N	26
	L	E	28 34
	L	Z	29 28
	L	N	30 50
	Mag. 5 3/4 - 6 (PAL.)		
	9.6 N., 126.3 E.		
	Mindanao, P.I.		
	h: 61 km ca.		
	H= 18 16 39.6		USCGS
5.	P	EZ	18 44 01
	9.6N., 126.2 E.		
	Mindanao, P.I.		
	h: 60 km ca.		
	H= 18 38 06.3		USCGS
5.	iP NZ, P E		20 25 48.6
	S	NEZ	56
	P: N,D		
5.	P	NEZ	21 31 27
	21.8 S., 170.9 E.		
	Loyalty Is. region.		
	h: 86 km ca.		
	H= 21 20 49.8		USCGS
6.	iP	NEZ	00 12 57.3
	i	NEZ	58.3
	eS	NE	13 13
	P: S,E,D		
	36.2 N., 139.8 E.		
	Honshu, Japan.		
	h: 53 km ca.		
	H= 00 12 33.1		USCGS
6.	iP	NEZ	01 54 29.4
	e	E	47
	e	N	50
	e	Z	54
	P: S,E,D		
6.	iP	NZ	16 54 03.5
	i	E	03.7

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	S	N	16 56 23
	P: N,D		
	48.3 N., 146.3 E.		
	Sea of Okhotsk.		
	h: 463 km ca.		
	H= 16 51 10.8		USCGS
7.	eP	E	02 05 31
	S	N	06 02
7.	iP	NEZ	02 55 13.1
	S	NE	36
	P: N,W,C		
	35.6 N., 140.0 E.		
	Near east coast of Honshu, Japan.		
	h: 52 km ca.		
	H= 02 54 43.4		USCGS
7.	iP	EZ	03 01 24.5
	i	N	25.5
	S	NZ	55
	P: W,C		
7.	eP	EZ	07 32 25
	PP	Z	35 02
	eS	E	41 39
	eS	N	40
	SS	N	46 20
	e	E	49 12
	L	E	51 56
	L	N	53 08
	L	Z	54 16
	71.7 N., 3.1 W.		
	Jan Mayen I. region.		
	h: 07 21 06.5		USCGS
7.	iP	Z	13 30 21.8
	i	E	22.1
	i	N	30
	ePP	Z	32 11
	S	N	36 35
	i	EZ	56
	e	E	39 37
	L	Z	43 24
	L	N	40
	P: D		
7.	P	NZ	17 43 33.5
	6.1 N., 125.5 E.		
	Mindanao, P.I.		
	h: 215 km ca.		
	H= 17 37 20.9		USCGS
7.	iP	Z	18 25 37.6
	eS	EZ	26 06
	P: D		

Date	Phase	Comp.	Time(GMT) h m s
8.	P	NEZ	11 25 27
	S	NE	26 20
8.	P	Z	17 18 12
	e	N	20
	e	E	21
	29.8 N., 130.2 E.		
	Ryukyu Is.		
	h: 23 km ca.		
	H= 17 15 54.9		USCGS
8.	P	Z	19 52 54
	S	NE	53 23
8.	P	NEZ	21 47 02
	S	EZ	19
	S	N	20
8.	eP	EZ	23 17 57
	S	N	18 50
	S	E	51
	i	Z	54
8.	eP	E	23 20 30
	e	N	36
9.	eP	Z	00 56 12
	eS	N	01 01 54
	eL	N	05 25
	eL	EZ	40
9.	P	NZ	03 27 26
	e	Z	58
	PcP	Z	29 09.3
	5.6 S., 154.0 E.		
	Solomon Is.		
	h: 86 km ca.		
	H= 03 19 23.7		USCGS
9.	iP	Z	05 08 57.7
	i	Z	09 10.4
	e	N	12
	i	N	15.5
	i	Z	21.5
	P: C		
9.	eP	Z	06 30 39
	eS	E	35 04
	S	N	06
	eL	Z	37 02
	eL	Z	39 55
	12.2 N., 141.0 E.		
	South of Mariana Is.		
	h: 38 km ca.		
	H= 06 25 24.5		USCGS
9.	P	Z	08 33 25
	P	NE	26

Date	Phase	Comp.	Time(GMT) h m s
9.	eP	Z	15 06 11
	eL	N	29 22
9.	PKP	Z	17 46 18
	24.2 S., 66.8 W.		
	Salta Province , Argentina.		
	h: 148 km ca.		
	H= 17 26 15.7		USCGS
10.	eP	NZ	02 47 22
	e	EZ	44
	S	N	48 17
10.	eP	Z	03 56 14
	i	Z	18.7
	i	N	20.5
	e	Z	58 52
	eS	N	04 01 10
	e	E	15
	L	E	03 45
	L	N	48
	L	Z	04 30
	52.1 N., 177.3 W.		
	Andreanof Is.		
	h: 7 km ca.		
	H= 03 49 25.0		USCGS
10.	eP	Z	07 23 28
	ePP	Z	26 53
	eS	N	33 48
	eL	N	45 35
	eL	Z	50 14
	36.3 S., 179.4 E.		
	Off east coast of North Island, New Zealand.		
	h: 76 km ca.		
	H= 07 11 22.1		USCGS
10.	iP	Z	10 39 04.4
	S	NE	34
	P: D		
10.	iP	EZ	13 01 37.0
	i	N	37.3
	S	Z	55
	iS	NE	56.4
	P: W,D		
	35.9 N., 136.9 E.		
	Southern Honshu, Japan.		
	h: 33 km ca.		
	H= 13 01 16.2		USCGS
10.	P	Z	19 59 29
11.	eP	Z	01 12 44
	e	NE	13 15
	i	Z	22

Date	Phase	Comp.	Time(GMT) h m s
11.	eP	Z	01 30 19
	S	N	40
11.	P	NZ	03 00 59
	S	E	01 19
11.	iP Z, eP	NE	05 35 44.0
	iS	E	57.5
	P: C		
11.	iP Z, P	N	08 37 28.3
	i	E	28.5
	S	EZ	46 26
	SS	E	51 00
	Lq	E	53 14
	Lr	E	58 02
	Lr	Z	10
	P: S,D		
	Mag. 6½ - 6 3/4 (PAS.)		
	16.2 S., 173.9 W.		
	Tonga Is.		
	h: 112 km ca.		
	H= 08 26 32.8		USCGS
11.	iP EZ, P	N	10 58 02.3
	i	N	03.8
	P: S,D		
	35.8 N., 141.5 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 10 57 19		USCGS
11.	P	Z	16 55 51
	i	Z	56 13.8
	S	N	38
11.	P	Z	18 31 31.5
	i	N	32 45
	P: D		
	52.1 N., 178.2 E.		
	Rat Is.		
	h: 121 km ca.		
	H= 18 25 13.3		USCGS
12.	eP	Z	05 49 10
	19.4 N., 144.5 E.		
	Mariana Is.		
	h: 121 km ca.		
	H= 05 45 05.8		USCGS
12.	eP	Z	06 42 55
	22.6 N., 143.4 E.		
	Volcano Is. region.		
	h: 5 km ca.		
	H= 06 39 20.9		USCGS
12.	iP	NEZ	09 23 41.6

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	S	NEZ	09 24 00
	P: S,W,D		
12.	iP Z, P	NE	13 29 18.8
	i	N	30 07
	P: D		
12.	iP Z, P	E	13 38 12.0
	iS	NE	31.4
	P: S,E,C		
12.	iP	NEZ	20 47 33.0
	eS	N	50
	P: S,E,D		
12.	P	Z	20 52 20
	S	N	54
12.	eP	NZ	21 32 30
	6.1 S., 150.3 E.		
	New Britain region.		
	h: 47 km ca.		
	H= 21 24 27.1		USCGS
12.	iP	NEZ	23 20 47.7
	iS	NE	21 00.5
	P: S,E,C		
12.	iP	NEZ	23 22 05.8
	P: N		
13.	iP	Z	04 25 54.0
	e	Z	26 09
	i	E	24
	e	Z	37
	P: C		
13.	iP	NZ	10 30 42.0
	i	E	43
	S E, eS	Z	32 19
	S	N	20
	P: N,C		
13.	P	Z	11 02 17
13.	P	Z	14 31 18
	51.7 N., 175.4 W.		
	Andreanof Is.		
	h: 54 km ca.		
	H= 14 24 23.4		USCGS
13.	P	Z	18 11 50
	e	Z	53
	S	N	12 27
13.	eP	Z	20 13 28
13.	iP	NZ	20 35 53.5
	P: S,D		(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	20.5 S., 178.1 W.		
	Fiji Is. region.		
	h: 520 km ca.		
	H= 20 25 32.1		USCGS
13.	P	EZ, eP N	22 48 02
	42.4 N., 66.5 E.		
	Central Kazakh SSR.		
	h: 33 km ca.		
	H= 22 38 38.9		USCGS
13.	iP	NEZ	23 29 36.3
	e	NE	30 20
	P: N,W,D		
14.	iP Z, P	E	02 18 00.0
	i	Z	05
	P: E,C		
	42.3 N., 66.5 E.		
	Central Kazakh SSR.		
	h: 33 km ca.		
	H= 02 08 36.6		USCGS
14.	iP	Z	04 12 34.7
	eS	E	45
	i	N	48
	P: D		
14.	iP Z, P	E	10 45 45.0
	i	N	46.5
	i	Z	46 09
	e	N	16
	P: D		
14.	P	EZ	12 05 55
	eS	N	06 26
	P: C		
14.	iP	EZ	13 59 23.3
	eS	N	43
	P: E,D		
14.	iP Z, P	N	17 49 30.0
	S	N	50 18
	P: D		
14.	P	NEZ	18 57 02
	i	Z	15.0
	e	Z	58 40
15.	P	Z	04 31 38
	i	Z	45
15.	P	NZ	07 22 22
	eS	N	24 28
	P: D		
	44.4 N., 149.0 E.		
	Kurile Is.		
	h: 53 km ca.		
	H= 07 19 40		USCGS

Date	Phase	Comp.	Time(GMT) h m s
15.	P	Z	09 45 44
	21.3 S., 169.5 E.		
	Loyalty Is. region.		
	h: 50 km ca.		
	H= 09 35 10.5		USCGS
15.	eP	NZ	12 13 58
	eS	N	14 44
15.	iP	NZ	13 27 04.3
	i	E	04.6
	iS	NEZ	38.3
	P: N,C		
15.	P	Z	13 32 12
	e	N	28
	i	Z	33
15.	eP	Z	16 36 49
15.	P	Z	17 45 22
	eS	N	46 49
	29.4 N., 141.4 E.		
	South of Honshu, Japan.		
	h: 11 km ca.		
	H= 17 43 27		USCGS
16.	iP	Z	01 08 29.5
	e	Z	36
	S	N	09 09
	P: D		
16.	iP	NEZ	02 07 48.8
	iS N, S EZ		08 27.4
	P: N,C		
	34.0 N., 137.8 E.		
	Near south coast of Honshu, Japan.		
	h: 307 km ca.		
	H= 02 06 58		USCGS
16.	iP	NEZ	03 59 30.1
	S	Z	44
	P: S,W,C		
17.	iP Z, P NE		00 34 32.1
	i	Z	54.2
	P: C		
17.	eP	Z	01 11 49
	i	Z	54.5
17.	P	EZ	02 09 36
17.	iP	Z	04 12 16.3
	i	Z	26.7
	P: D		

Date	Phase	Comp.	Time(GMT) h m s
17.	iP	EZ	07 00 17.0
	S	NEZ	32
	P: S,W,C		
17.	iP NZ, P E		12 36 50.0
	iS E, S N		37 21.5
	P: N,C		
17.	P	NZ	13 56 48
	55.1 N., 161.7 E.		
	Near east coast of Kamchatka.		
	h: 22 km ca.		
	H= 13 51 29		USCGS
17.	P	NEZ	20 21 15
	i	Z	22 37.0
	3.4 N., 128.1 E.		
	North of Halmahera.		
	h: 62 km ca.		
	H= 20 14 32.8		USCGS
17.	iP	EZ	23 56 32.4
	S	Z	57 06
	P: W,C		
18.	iP	NEZ	00 44 56.5
	S	N	45 22
	S	EZ	23
	P: S,E,D		
18.	iP Z, P E		04 50 17.0
	i	Z	39
	S	N	42
	P: E,D		
18.	eP	Z	07 33 31
	e	Z	35 28
	23.2 S., 179.8 W.		
	South of Fiji Is.		
	h: 522 km ca.		
	H= 07 23 02.6		USCGS
18.	iP NZ, P E		18 13 50.1
	i	Z	57.5
	S	N	14 19
	P: S,D		
18.	P	NEZ	18 23 34
	P: D		
19.	eP	Z	01 47 04
	S	NEZ	56 14
	e	Z	02 04 40
	Lr	Z	08 36
19.	P	Z	03 34 13
	i	Z	23
	i	NE	26

Date	Phase	Comp.	Time(GMT) h m s
19.	eP	NZ	09 26 10
	S	NE	51
19.	iP Z, P NE		11 31 13.5
	P: W,D		
19.	P	Z	13 29 32
	i	Z	38
	i	NE	39
19.	iP	NEZ	15 57 51.0
	S	NZ	58 02
	P: S,E,C		
19.	eP	Z	19 29 30
19.	eP	Z	23 35 48
20.	iP NZ, P E		01 38 38.1
	iS	N	49.4
	iS	EZ	49.6
	P: S,C		
20.	iP	NEZ	02 22 16.5
	S	NZ	23 00
	P: N,W,C		
20.	eP	Z	04 13 32
	27.6 N., 129.8 E.		
	Ryukyu Is.		
	h: 33 km ca.		
	H= 04 10 43.9		USCGS
20.	iP Z, eP NE		06 40 19.0
	P: C		
	20.3 S., 70.0 W.		
	Near coast of northern Chile.		
	h: 47 km ca.		
	H= 06 20 30.8		USCGS
20.	eP	Z	08 03 17
	i	Z	23
	40.9 N., 75.1 E.		
	Kirgiz-Sinkiang border region.		
	h: 60 km ca.		
	H= 07 54 40.4		USCGS
20.	iP Z, P N		08 23 37.3
	S	N	24 02
20.	P	NEZ	11 37 35
	i	N	39 53
	44.3 N., 148.3 E.		
	Kurile Is.		
	h: 23 km ca.		
	H= 11 34 56.3		USCGS
20.	iP	Z	12 19 28.4
	P: D		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	51.4 N., 177.7 E.		
	Rat Is.		
	h: 45 km ca.		
	H= 12 13 03.4		USCGS
20.	P	Z	13 05 02
	15.1 S., 173.4 W.		
	Tonga Is.		
	h: 33 km ca.		
	H= 12 53 59.8		USCGS
21.	iP	E	00 41 30.7
	i	NZ	31.0
	S	N	52
	e	NZ	42 04
	P: E		
	36.0 N., 140.4 E.		
	Near east coast of Honshu, Japan.		
	h: 64 km ca.		
	H= 00 40 59.1		USCGS
21.	P	NEZ	01 09 01
	e	N	42
	14.0 N., 143.9 E.		
	Mariana Is. region.		
	h: 137 km ca.		
	H= 01 04 01.7		USCGS
21.	iP	Z	02 04 15.7
	iP	NE	16.2
	S	N	35
	P: D		
21.	iP	NEZ	08 19 04.0
	e	N	23
	e	N	33
	P: N,W,D		
21.	iP	EZ	12 05 30.5
	e	N	54
	P: E,D		
21.	iP	Z	16 15 54.3
	S	N	16 42
	S	E	46
22.	PKP	Z	02 15 27
	i	Z	54.8
	20.4 S., 69.0 W.		
	Northern Chile.		
	h: 96 km ca.		
	H= 01 55 43.5		USCGS
22.	iPKP	Z	04 35 35.0
	PKP: C		
	22.3 S., 67.9 W.		
	Chile-Bolivia border region.		
	h: 146 km ca.		
	H= 04 15 52.0		USCGS

Date	Phase	Comp.	Time(GMT) h	m	s
22.	iP	NEZ	09	20	23.6
	iS	N		24	45.9
	L	N		25	20
	L	N		42	00

P: N,E,D
13.1 N., 145.5 E.
Mariana Is.
h: 50 km ca.
H= 09 15 12.3 USCGS

22.	iP	Z	15	12	07.4
	i	NE			07.7

P: C

22.	iPKP	Z	18	59	13.4

PKP: D
20.9 S., 68.5 W.
Chile-Bolivia border region.
h: 138 km ca.
H= 18 39 32.7 USCGS

22.	P	EZ	20	35	40.4
	i	NZ			41.9
	S	N		36	22

P: E
37.4 N., 142.4 E.
Off east coast of Honshu, Japan.
h: 18 km ca.
H= 20 34 45.3 USCGS

23.	iP	NZ	12	48	17.4
	i	NE			18.6
	S	NE			42

P: S,D

23.	P	Z	14	11	34

21.8 N., 144.8 E.
Mariana Is. region.
h: 33 km ca.
H= 14 07 53 USCGS

23.	eP	Z	14	14	07

23.	eSS	N	17	53	46
	eL	N		59	30
	L	N	18	10	50

39.8 N., 25.5 E.
Aegean Sea.
h: 33 km ca.
H= 17 25 53.2 USCGS

24.	iP	NZ	11	16	01.5
	e	E		17	17
	i	Z			22.1

P: N,C

24.	iP	EZ	12	29	10.8
	S	N			29.6
	i	E			31.0

P: W,D

Date	Phase	Comp.	Time(GMT) h	m	s
24.	iP	NEZ	16	00	45.0
	S	NZ		02	24
	L	N		03	00

P: N,E,C
32.1 N., 130.6 E.
Kyushu, Japan.
h: 4 km ca.
H= 15 58 49.0 USCGS

24.	P	NZ	16	22	54
	S	NZ		24	40

32.1 N., 130.7 E.
Kyushu, Japan.
h: 33 km ca.
H= 16 21 05 USCGS

24.	iP	Z	17	11	44.2
	S	NZ		12	13

P: D

25.	P	Z	01	39	30
	S	E		40	37

25.	P	Z	03	07	06
	S	N		15	36
	L	N		23	20
	L	N		25	00

20.0 S., 168.0 E.
Loyalty Is.
h: 21 km ca.
H= 02 56 37.1 USCGS

25.	L	N	04	41	50

25.	iP	NZ	20	43	55.5

P: N,C
6.3 S., 130.0 E.
Banda Sea.
h: 81 km ca.
H= 20 41 00.7 USCGS

25.	P	Z	22	06	13
	S	N		07	45.5

29.3 N., 139.7 E.
South of Honshu, Japan.
h: 479 km ca.
H= 22 04 23 USCGS

26.	iP	NEZ	00	11	09.8
	S	E			42

P: S,E,D
34.4 N., 140.2 E.
Near east coast of Honshu, Japan.
h: 81 km ca.
H= 00 10 26.7 USCGS

26.	iP	NEZ	00	49	46.8
	iPcP	EZ		51	06.5

(cont.)

Date	Phase	Comp.	Time(GMT) h	m	s
	iPP	NZ	00	51	35
	isPP	Z		54	08.0
	S	NEZ		55	58
	esS	N		58	30
	i	N	01	02	06
	P: S,W,D				
	6.6 S., 116.1 E.				
	Bali Sea.				
	h: 520 km ca.				
	H= 00 41 56.9		USCGS		
26.	iP	NEZ	04	03	49.0
	P: S,E,D				
26.	iP	NEZ	10	43	09.0
	S	N		44	06
	P: N,W,C				
	32.6 N., 141.6 E.				
	South of Honshu, Japan.				
	h: 46 km ca.				
	H= 01 41 56.6		USCGS		
26.	iP	Z	19	46	46.0
	i	NEZ		47	07.0
	S	NE		51	36
	L	N		53	20
	L	N		54	46
	P: C				
	8.1 N., 126.3 E.				
	Mindanao, P.I.				
	h: 33 km ca.				
	H= 19 40 42.1		USCGS		
26.	iP NZ, P E ,		22	38	15.0
	S	NE		39	12
	P: N,W,C				
27.	iP	Z	00	59	40.5
	S	E			57
	P: C				
27.	P	NZ	01	29	28
	49.6 N., 152.8 E.				
	Northwest of Kurile Is.				
	h: 228 km ca.				
	H= 01 25 45		USCGS		
27.	iP	NEZ	01	56	16.5
	iS	NEZ			37.0
	P: S,W,D				
27.	iP	NZ	03	39	23.3
	eS	L		40	22
	P: N,C				
	32.4 N., 141.7 E.				
	South of Honshu, Japan.				
	h: 33 km ca.				
	H= 03 38 08		USCGS		

Date	Phase	Comp.	Time(GMT) h	m	s
27.	iP	NZ	04	56	30.5
	i	E			31.5
	S	N		59	40
	L	E	05	00	24
	P: N,D				
	47.9 N., 154.0 E.				
	Kurile Is.				
	h: 24 km ca.				
	H= 04 52 42.9		USCGS		
27.	P	Z	17	06	47
	i	N			48.0
	eS	N		07	28
	34.0 N., 141.3 E.				
	Off east coast of Honshu, Japan.				
	h: 33 km ca.				
	H= 17 05 58		USCGS		
27.	iP	NZ	18	54	36.4
	S	N		55	25
	P: N,D				
	40.9 N., 138.0 E.				
	Eastern Sea of Japan.				
	h: 27 km ca.				
	H= 18 53 31.5		USCGS		
27.	iP	NZ	21	21	37.5
	P: S,D				
	25.5 S., 179.6 E.				
	South of Fiji Is.				
	h: 525 km ca.				
	H= 21 11 00.9		USCGS		
27.	eP	Z	22	44	17
	i	NZ			25.2
	S	E		50	30
	L	E		53	30
	4.3 S., 133.3 E.				
	West New Guinea region.				
	h: 33 km ca.				
	H= 22 36 43.3		USCGS		
28.	iP	NEZ	02	35	53.2
	S	E		36	01
	S	N			02
	P: N,E,C				
28.	P	NZ	05	54	36
	i	NZ			40.0
	eS	N	06	01	50
	L	N		09	20
28.	P	Z	06	53	24
	e	N		55	35
28.	P	Z	07	52	39
	S	N	08	03	10
	SS	N		09	25

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	L	N	08 19 56
	L	N	21 30
	37.9 N., 20.9 E.		
	Ionian Sea.		
	h: 6 km ca.		
	H= 07 39 57.1		USCGS
28.	PKP 1	Z	13 57 26
	PKP 2	Z	58 01
	34.9 S., 69.4 W.		
	Chile-Argentina border region.		
	h: 171 km ca.		
	H= 13 37 50.2		USCGS
28.	P	Z	16 50 22
	e	N	17 13 40
	e	N	20 20
28.	iP	Z	20 38 39.5
	S	NEZ	55
	P: D		
29.	P	EZ	10 57 25
29.	P	N	13 07 54
29.	iP	NEZ	14 31 39.0
	S	N	32 48
	P: E,D		
	40.3 N., 144.7 E.		
	Off east coast of Honshu, Japan.		
	h: 41 km ca.		
	H= 14 30 05.1		USCGS
29.	iP	EZ	17 48 23.0
	S	NE	44
	P: W,D		
29.	iP	NE	19 05 27.0
	i	Z	31
	S	NE	06 20
	P: S,W		
	34.1 N., 135.1 E.		
	Near south coast of southern Honshu.		
	h: 6 km ca.		
	H= 19 04 30.6		USCGS
29.	P	Z	19 10 35
29.	iP	NEZ	20 05 43.0
	S	Z	59
	P: S,D		
29.	iP	NEZ	20 41 36.2
	S	N	47
	P: S,W,D		
30.	P	Z	01 14 00
	S	N	44

Date	Phase	Comp.	Time(GMT) h m s
30.	iP	NEZ	03 02 32.8
	S	NEZ	40.0
	P: N,E,D		
30.	iP	Z	19 05 53.7
	S	NE	06 40
	P: C		
	33.4 N., 141.5 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 19 04 50		USCGS
30.	eP	Z	19 30 11
	21.2 S., 172.4 W.		
	Tonga Is.		
	h: 70 km ca.		
	H= 19 13 47.5		USCGS
31.	iP	NZ	01 30 17.0
	S	NE	25
	P: N,D		
31.	P	Z	03 21 51
	S	N	23 12
31.	eP	Z	08 25 16
31.	P	Z	13 29 05
	S	N	54
31.	iP	Z	14 21 29.8
	S	N	22 27
	P: D		

Mineo Takehana

Director

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Date	Phase	Comp.	Time(GMT) h m s	
1.	P	EZ	00 43 36.5	
	P	N	36.7	
	e	NE	44 48	
	S	NE	56	
	P: S,W,D			
	Mag. 7½ - 7 3/4 (Pas.)			
	32.5 N., 132.2 E.			
	Shikoku, Japan.			
	h: 33 km ca.			
	H= 00 42 04.2			(USCGS)
1.	P	NE	02 05 14	
	iP	Z	14.3	
	eS	E	06 50	
	P: C			
	43.3 N., 144.1 E.			
	Hokkaido, Japan.			
	h: 60 km ca.			
	H= 02 03 15.1			USCGS
1.	iP	Z	05 26 42.5	
	i	N	45	
	i	NEZ	49	
	eS?	N	28 26	
	P: C			
	32.7 N., 132.8 E.			
	Shikoku, Japan.			
	h: 33 km ca.			
	H= 05 25 15			USCGS
1.	P	Z	06 43 13	
	2.9 S., 133.9 E.			
	West New Guinea region.			
	h: 33 km ca.			
	H= 06 35 48.0			USCGS
1.	eP	Z	07 14 52	
	P	NE	53	
	i	NE	15 28	
	S	NE	16 10	
	32.3 N., 132.1 E.			
	Shikoku, Japan.			
	h: 32 km ca.			
	H= 07 13 17.6			USCGS
1.	eP	EZ	07 57 04	
	i	N	28	
	eS	E	58 46	
	e	N	55	
1.	P	NEZ	09 09 45	
	24.7 N., 118.1 E.			
	Near southeastern coast of China.			
	h: 67 km ca.			
	H= 09 05 05.3			USCGS
1.	eS	NE	12 52 16	

Date	Phase	Comp.	Time(GMT) h m s	
1.	eS	NE	14 36 24	
	64.8 N., 147.2 W.			
	Central Alaska.			
	h: 8 km ca.			
	H= 14 22 41			USCGS
1.	eL	NE	15 25 00	
1.	i	NE	16 24 40	
1.	e	N	17 59 00	
1.	eP	NE	17 41 23	
	i	NEZ	30	
	eS	NE	53	
	i	E	42 06	
1.	iP	EZ	21 42 24.1	
	iP	N	25.0	
	S	NE	57	
	P: N,W,C			
1.	eS?	NE	22 29 00	
1.	iP	E	23 30 51.5	
	iP	N	52.5	
	iP	Z	52.7	
	S	E	31 50	
	S	N	52	
	P: N,E,D			
2.	e	N	00 28 00	
2.	iP	Z	05 39 30.0	
	P: D			
2.	eL	N	08 48 00	
	45.1 S., 166.8 E.			
	Off coast of South Island, New Zealand.			
	h: 15 km ca.			
	H= 08 12 44.2			USCGS
2.	eP	NEZ	09 46 05	
2.	iP	Z	10 50 56.1	
	P: C			
	14.3 S., 167.3 E.			
	New Hebrides Is.			
	h: 198 km ca.			
	H= 10 41 26.0			USCGS
2.	iP	Z	11 49 45.0	
	iP	N	45.3	
	iP	E	45.5	
	S	NEZ	50 12.5	
	i	Z	27.7	
	P: N,W,D			

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Date	Phase	Comp.	Time(GMT) h m s
	37.8 N., 140.3 E.		
	Honshu, Japan.		
	h: 33 km ca.		
	H= 11 49 13		USCGS
2.	P	NZ	12 25 44
	P	E	45
	S	NE	26 29
2.	i	Z	12 49 34
	i	NE	44
2.	P	Z	15 08 27
	12.3 S., 167.3E.		
	Santa Cruz Is.		
	h: 268 km ca.		
	H= 14 59 18.4		USCGS
2.	iP	EZ	17 55 52.4
	i	N	52.5
	P,W,C		
	41.3 N., 141.6 E.		
	Hokkaido, Japan.		
	h: 66 km.		
	H= 17 54 27.8		USCGS
2.	eL	N	18 51.0
	45.2 S., 166.7 E.		
	Off W. coast of South Island,		
	New Zealand.		
	h:8 km.		
	H= 18 01 19.0		USCGS
2.	iP Z, P N		21 48 19.6
	P	E	20
	i	NZ	29
	P:C		
	42.6 N., 142.5 E.		
	Hokkaido, Japan.		
	h: 33 km.		
	H= 21 46 36.4		USCGS
3.	i	N	03 36 00
3.	P	Z	08 01 33
	22.8 N., 121.2 E.		
	Taiwan.		
	h: 47 km.		
	H=07 57 00		USCGS
3.	P	NEZ	16 30 49.9
	i	Z	56
	S	NE	35 44
	Lq	NE	37 00
	Lq	Z	38 00
	P: N.,E.,D		
	51.7 N., 174.2 E.		
	Near Is. , Aleutian Is.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	h: 38 km.		
	H= 16 24 45.7		USCGS
3.	iP Z, PE		17 56 04.0
	P	N	04
	S	NEZ	57 52
	P: E.,D		
3.	P	E	18 39 25
	iP	Z	25.4
	i	N	27.0
	i	EZ	32
	S	N	40 14
	P: C		
3.	iP Z, P E		21 44 11.5
	P	N	12
	iS	NE	45.0
4.	eL	N	02 14 00
	24.6 N., 66.0 E.		
	West Pakistan.		
	h: 33 km.		
	H= 01 44 26.4		USCGS
4.	iP	NZ	05 19 42.5
	iP	E	43.0
	S	NE	20 05
	P: N., E., D		
4.	eS	N	08 22 38
4.	P	Z	08 58 10
	P	N	11
	e	N	59 32
4.	iP	Z	13 42 17.4
	iP	N	17.7
	P	E	18
	P: N., D		
	6.4 S., 129.0 E.		
	Banda Sea.		
	h: 208 km.		
	H= 13 34 32.5		USCGS
4.	iP	Z	23 14 07.6
	iP	N	07.8
	P	E	08.3
	S	NE	15 01.5
	P: N., W., C		
	32.9N., 138.3E.		
	South of Honshu,Japan.		
	h: 342 km.		
	H= 23 13 02		USCGS
5.	eP	Z	02 11 06
	eP	NE	07
	eS	N	20 03

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Date	Phase	Comp.	Time(GMT) h m s	
	L	N	02 30 44	
	16.0S., 179.8 W.			
	Fiji Is. region.			
	h: 33 km.			
	H= 02 00 25.4			USCGS
5.	eP	NEZ	08 06 00	
	eS?	N	07 09	
5.	eP	NEZ	16 11 50	
	S	N	12 43	
	S	E	44	
	i	Z	47	
5.	eP	NZ	16 56 27	
	i	E	31	
	47.0 N., 154.1 E.			
	Kurile Is.			
	h: 50 km.			
	H= 16 52 51.1			USCGS
5.	iP Z,	PE	17 21 17.0	
	P	N	17	
	S	N	53	
	P: C			
5.	iP	NZ	18 07 19.5	
	iP	E	20.4	
	i	NE	08 02	
	i	Z	04	
	P: N., E., C			
	33.4 N., 138.4 E.			
	Southof Honshu, Japan.			
	h: 293 km.			
	H= 18 06 23			USCGS
5.	eS?	N	18 58 38	
5.	iP	NZ	22 07 29.0	
	iP	E	29.5	
	i	EZ	08 50	
	i	N	53.5	
	i	Z	58	
	P: S ., W., D			
	30.2 N., 137.0 E.			
	South of Honshu, Japan.			
	h; 498 km.			
	H= 22 05 47			USCGS
6.	i	N	05 35 32	
	i	Z	39 32	
6.	L	N	06 10 30	
	L	Z	44	
	2.9 S ., 133.8 E.			
	West New Guinea.			
	h: 38 km.			
	H= 05 52 20.8			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
6.	iP	Z	14 29 34.7	
	iP	NE	35.0	
	eS	NE	31 04	
	eL	N	32 00	
	P:C			
	28.9 N., 141.9 E.			
	Bonin Is. region.			
	h: 35 km.			
	H= 14 27 33.5			USCGS
6.	iP	NEZ	18 28 45.0	
	i	Z	55	
	i	EZ	29 04,7	
	P: S ., W., C			
	37.7 N., 140.8 E.			
	Honshu, Japan.			
	h:100 km.,			
	H= 18 28 05.4			USCGS
6.	P	EZ	19 41 20.0	
	P	N	20	
	i	Z	47	
	S	NE	42 14	
	S	Z	15	
	P:W.,D			
6.	P	Z	21 47 41.8	
	S	NZ	52 44	
	Lq	N	54 44	
	Lr	NZ	57 04	
	7.4 N., 124.3 E.			
	Mindanao, Philippine Is,			
	h: 17 km.			
	H= 21 41 17.9			USCGS
6.	iP	EZ	22 54 21.5	
	S?	N	23 00 32	
	eL	N	02 00	
	P: E.,D			
	51.4 N., 176.6 E.			
	Rat Is., Aleutian Is.			
	h: 43 km.			
	H= 22 48 06.8			USCGS
6.	iP	EZ	23 36 06.0	
	P	N	06	
	i	Z	18	
	S	NZ	32	
	P:W.,C			
7.	PZ, ePN		01 42 53	
	L	N	59 40	
	eL	Z	02 00 30	
	16.9 S., 177.2 W.			
	Fiji Is. region.			
	h: 33 km.			
	H= 01 31 57.0			USCGS

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Date	Phase	Comp	Time(GMT) h m s
7	iP	Z	02 48 34.2
	iP	Ne	34.5
	i	NZ	37
	i	N	53
	S	N	49 19
	i	NEZ	27
	P: N,E,D		
	38.5 N., 141.8 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 02 47 40.2		USCGS
7	iP	Z	04 46 34.5
	P	NE	34.7
	i	N	49 25
	S	N	51 40
	Lr	Z	53 00
	Lr	N	40
	P:N.,E.,D		
	51.5 N., 176.5 E		
	Rat Is., Aleutian Is.		
	h:33km.		
	H=04 40 19.3		USCGS
7	iP	EZ	11 00 04.3
	iP	N	04.6
	iS	Z	18.0
	SE, eSN		19
	P: N,E,D		
	36.7 N., 140.6 E.		
	Near E. coast of Honshu, Japan.		
	h: 33 km.		
	H= 10 59 31		USCGS
7.	iP	NEZ	22 18 21.5
	SZ,	eSE	39
	S	N	40
	P:W.,C		
8.	S?	N	00 54 54
	9.4 S., 158.6 E.		
	Solomon Is.		
	h:33 km.		
	H= 00 37 49.1		USCGS
8.	eP	Z	12 58 26
	eP	NE	27
	i	Z	50
	i	N	56
8.	P	NEZ	13 29 11
8.	P	Z	13 58 11.5
	P	N	11.6
	iP	E	12.4

(cont.)

Date	Phase	Comp	Time(GMT) h m s
	i	Z	45
	S	N	53
	S	E	54
	P:E		
8.	P	Z	23 09 47.4
	S	Z	10 09
	S	NE	10
9.	eP	NZ	02 19 19
	P	E	20
	S	NZ	40
	i	E	43
9.	P	NE	02 41 19
	iP	Z	19.2
	i	Z	42
	PP	Z	44 28
	S	NZ	51 28
	S	E	30
	Lq	N	03 02 35
	Lq	E	03 06
	Lr	Z	06 46
	P: C		
	Mag. 6.5 (PAS.)		
	33.1 N., 116.1 W.		
	Southern California.		
	h: 20 km.		
	H= 02 28 58.9		USCGS
9.	P	Z	03 16 15
	33.2 N., 116.0 W.		
	Southern California.		
	h: 15 km.		
	H= 03 03 55.4		USCGS
9.	iP	EZ	10 18 10.5
	P	N	10.9
	e	N	19 38
	P: W,D		
9.	iP	NEZ	11 37 37.0
	P: S,E,D		
	17.8 S., 178.2 W.		
	Fiji Is. region.		
	h: 650 km.		
	H= 11 27 39.0		USCGS
9.	P	Z	16 56 17
	P	E	19
	S	Z	46
	S	E	48
	S	N	49
9.	P	NEZ	19 41 38
	i	NZ	45
	iS	N	42 08.5

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	S	Z	09
	S	E	09.0
9.	P	Z	21 19 04
	i	NE	07
	32.4 N., 141.2 E.		
	South of Honshu, Japan.		
	h: 63 km .		
	H= 21 17 51		USCGS
10.	P	NZ	13 29 09
	P	E	10
	22.8 N., 121.2 E.		
	Taiwan region.		
	h: 59 km .		
	H= 13 24 39.5		USCGS
10.	iP Z, P NE		18 05 39.5
	i	Z	06 02
	S	NZ	10
	P: S,E,D		
	35.7 N., 140.7 E.		
	Near east coast of Honshu, Japan.		
	h: 35 km .		
	H= 18 05 05		USCGS
10.	iP	EZ	18 18 03.5
	iP	N	03.8
	S NZ, eS E		32
	P: N,E,D		
10.	iP	NEZ	18 28 40.4
	S N, eS E		29 04
	P: N,E,C		
10.	P	NZ	18 42 55
	P	E	57
	i	Z	43 24
	S	N	51 52
	S	E	56
	S	Z	52 00
	L	NE	59 20
	L	Z	19 02 20
	22.6 S., 171.5 E.		
	Loyalty Is. region.		
	h: 60 km .		
	H= 18 32 09.6		USCGS
10.	P	Z	22 59 30
	i	N	33.5
	i	E	34
11.	iP	N	00 27 34.3
	iP	Z	35.0
	i	E	36.5
	PP	Z	29 32
	eS	NE	35 12

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	eL	NZ	00 39 00
	P: N,C		
	4.0 S., 127.6 E.		
	Banda Sea.		
	h: 56 km.		
	H= 00 19 52.4		USCGS
11.	P	Z	01 38 45
	i	E	46
	i	N	48
	i	Z	39 16
	S	N	42 16
	18.0 N., 145.7 E.		
	Mariana Is.		
	h: 185 km.		
	H= 01 34 28.9		USCGS
11.	iP Z, P N		05 59 30.7
	i	E	32
	S	NE	06 01 06
	P: D		
	28.2 N., 140.3 E.		
	Bonin Is. region.		
	h: 361 km .		
	H= 05 57 30.2		USCGS
11.	iP	NEZ	06 48 27.0
	iS	N	49 58.5
	i	E	50 02.5
	P: N,W,D		
	42.5 N., 131.0 E.		
	East Russia - North east China border region.		
	h: 511 km .		
	H= 06 46 27.4		USCGS
11.	iP N, P Z		13 48 55.0
	eS	E	49 36
	P: S		
	34.1 N., 139.5 E.		
	Near south coast of Honshu, Japan.		
	h: 33 km.		
	H= 13 48 12		USCGS
12.	iP	NZ	04 32 10.2
	P: N,C		
12.	P	NZ	08 42 05
	e	NZ	14
12.	iP	NZ	10 01 58.5
	S	N	02 09
	P: N		
12.	iP	Z	10 45 46.2
	iS	N	46 14.3
	P: C		

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Date	Phase	Comp.	Time(GMT) h m s
12.	eP	Z	13 05 45
	i	Z	58.7
	L	NE	14 16
	L	Z	16 15
	1.7 N., 122.6 E.		
	Northern Celebes.		
	h: 40 km .		
	H= 12 58 34.7		USCGS
12.	P	Z	15 42 57
	S	N	43 56
12.	iP	NZ	16 11 44.0
	S	N	53.5
	P:N		
12.	iP	NZ	17 27 08.2
	S	N	12.0
12.	eP	Z	19 52 02
12.	iP	NZ	23 45 02.0
	iS	N	10.7
	P: N		
13.	P	Z	03 20 56
	S	EZ	21 18
13..	iP	NZ	17 40 45.5
	i	E	46.3
	eS	NE	46 48
	P: N,C		
	5.4 S., 146.9 E.		
	East New Guinea region.		
	h: 225 km.		
	H= 17 33 11.0		USCGS
13.	P	Z	18 34 41
	7.3 N., 126.6 E.		
	Mindanao, P.I.		
	h: 123 km .		
	H= 18 28 34		USCGS
13.	iP	NEZ	20 37 25.4
	S	E	44
	iS	N	45.6
	P: S,E,D		
13.	P	Z	21 23 51
	i	N	51.6
	i	E	53
	e	N	24 15
	e	E	20
	5.1 S., 144.1 E.		
	New Guinea.		
	h: 94 km. .		
	H= 21 16 10.7		USCGS

Date	Phase	Comp.	Time(GMT) h m s
13.	iP	NEZ	21 29 10.0
	P: N,E,D		
14.	P	Z	08 38 13
	i	N	14.0
	S	E	39 07
	33.4 N., 141.4 E.		
	Off coast of Honshu, Japan.		
	h: 44 km .		
	H= 08 37 12.2		USCGS
14.	iP EZ, P N		09 26 18.3
	S	EZ	37
	S	N	38
	P: W,D		
14.	iP	Z	19 34 57.5
	i	N	35 00
	S	E	48
	P: D		
14.	P	Z	11 00 01
	S	N	49
	S	EZ	50
14.	iP	NEZ	13 06 09.2
	S	E	07 02
	i	NZ	09 08
	P: N,E,C		
	33.4 N., 141.4 E.		
	Off east coast of Honshu, Japan.		
	h: 41 km . .		
	H=13 05 08.0		USCGS
14.	iP	EZ	14 57 17.0
	P: E,D		
	17.5 S., 178.3 W.		
	Fiji Is. region.		
	h: 550 km.		
	H= 14 47 14.9		USCGS
14.	P	Z	15 24 06
14.	P	EZ	18 15 03
	i	N	08
	eS	Z	47
	S	NE	48
14.	iP	NEZ	20 11 12.7
	iS	NE	36.5
	P: S,W,C		
15.	P	Z	03 16 34
15.	eP	Z	05 13 08
	S	N	14 30

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Date	Phase	Comp.	Time(GMT) h m s
15.	P	Z	13 27 47
	S E, eS	NZ	28 33
15.	iP	NEZ	17 30 06.0
	eS	NE	34.1
	P: N,E,D		
	53.5 N., 159.7 E.		
	Near east coast of Kamchatka.		
	h: 33 km . .		
	H= 17 25 07.8		USCGS
15.	iP	N	21 32 55.0
	i	Z	55.9
16.	iP NZ, P	E	06 37 16.2
	iS	NE	32.7
	S	Z	33
	P: N,C		
16.	iP	NEZ	12 58 15.3
	iS	NZ	34.8
	i	E	49.4
	i	N	59 00
	P: N,E,D		
16.	iP	NEZ	15 57 53.4
	S	NE	58 10.0
	P: N,W,C		
16.	iP	NZ	17 22 42.7
	P: N,D		
16.	iP	Z	21 27 53.2
	S	NEZ	58.0
	P: D		
17.	P	Z	09 59 46
	e	Z	10 03 40
	eL	N	08 36
	36.3 N., 71.4 E.		
	Afghanistan - USSR border region.		
	h: 94 km . .		
	H= 09 50 39.1		USCGS
17.	P	Z	12 20 50
	e	N	23 24
	L	Z	28 28
17.	iP	Z	12 55 15.5
	i	NE	15.8
	P: C		
17.	iP	NZ	13 10 12.2
	i	E	12.4
	i	NZ	11 37
	S	E	49
	P: N,C		(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	28.4 N., 139.2 E.		
	Bonin Is. region.		
	h: 529 km.		
	H= 13 08 13.1		USCGS
17.	iP	Z	13 20 30.3
	i	Z	42
	i	Z	21 30
	P: D		
	36.4 N., 71.5 E.		
	Afghanistan - USSR border region.		
	h: 113 km.		
	H= 13 11 26.2		USCGS
17.	iP Z, P N		13 49 32.6
	i	E	33.9
	eS	N	50 16
	P: S,D		
17.	eP	Z	15 17 30
	e	N	18 08
	eS	N	22 28
	13.1 N., 120.7 E.		
	Mindanao, P.I.		
	h: 55 km .		
	H= 15 11 40.5		USCGS
17.	iP Z, P NE		19 19 03.9
	P: N,E,D		
17.	eP	Z	20 11 10
	eS	E	14 10
	e	N	36
	eL	Z	18 52
17.	iP	EZ	20 11 51.5
	P	N	52
	iS	NE	59.0
	P: W,D		
17.	iP	Z	23 57 26.7
	S	N	51.5
	S	EZ	53
	P: C		
18.	eP	Z	04 10 36
	e	NE	42
	e	E	22 32
18.	P	Z	10 10 06
	25.5 S., 177.9 W.		
	South of Fiji Is.		
	h: 230 km .		
	H= 09 58 53		USCGS
18.	iP NZ, P E		12 11 54.4
	S	NE	12 21
	P: N,C		

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Date	Phase	Comp.	Time(GMT) h m s
18.	iP	Z	14 17 08.9
	P: D		
18.	eP	Z	14 49 25
18.	eP	Z	20 39 56
	6.9 S., 156.6 E.		
	Solomon Is.		
	h: 39 km.		
	H= 20 31 32.7		USCGS
19.	eP	Z	05 43 12
	25.9 N., 128.4 E.		
	Ryukyu Is.		
	h: 33km.		
	H= 05 39 42		USCGS
19.	ePKP	Z	08 28 53
	42.7 S., 16.0 W.		
	South Atlantic Ridge.		
	h: 33 km.		
	H= 08 08 22.2		USCGS
19.	ePKP	Z	09 23 40
	e	Z	24 21
	i	Z	25 02
	42.6 S., 16.0 W.		
	South Atlantic Ridge.		
	h: 33 km.		
	H= 09 04 27.3		USCGS
19.	P	NZ	23 31 05
	i	E	09
	i	Z	35
	S	N	35 28
	L	Z	38 06
	L	N	10
	12.2 N., 143.8 E.		
	South of Mariana Is.		
	h: 17 km.		
	H= 23 25 43.9		USCGS
19.	P	Z	23 44 41
	i	E	43
	i	N	48
	20.7 N., 144.4 E.		
	Mariana Is.		
	h: 39 km.		
	H= 23 40 48		USCGS
20.	ePKP	Z	01 21 22
	i	Z	42
	56.1 S., 27.4 W.		
	South of Sandwich Is. region.		
	h: 186 km.		
	H= 01 01 31.2		USCGS
20.	eP	Z	01 35 45
	i	EZ	53

Date	Phase	Comp.	Time(GMT) h m s
20.	iP	Z	07 41 55.5
	i	NE	57
	eL	NZ	50 44
	P: C		
	1.2 S., 128.8 E.		
	Halmahera.		
	h: 33 km.		
	H= 07 34 36.7		USCGS
20.	P	Z	09 24 14
	i	NE	17
	S	NEZ	52
20.	eS	NE	09 52 35
20.	iP Z, P E		11 05 10.7
	i	N	12.5
	S	NEZ	30
	i	N	42
	P: D		
20.	P	NZ	12 36 13
	i	E	19
	S	NEZ	45 26.0
	Lq	NZ	53 20
	Lq	E	30
	Lr	Z	57 00
	Lr	N	10
	Mag. 6 (Pas.)		
	15.7 S., 172.6 W.		
	Samoa Is. region.		
	h: 30 km.		
	H= 12 25 10.1		USCGS
20.	iP	Z	12 41 12.0
20.	eP	Z	14 35 06
	i	N	33
20.	iP	EZ	14 36 16.7
	i	Z	50
	S	E	38 13
	S	Z	14
	P: W,D		
20.	PKP	Z	20 10 16
	i	N	18
	i	EZ	21
	19.9 S., 11.8 W.		
	South Atlantic Ridge.		
	h: 33km.		
	H= 19 50 31		USCGS
20.	ePKP	Z	22 11 33
	19.3 S., 11.8 W.		
	South Atlantic Ridge.		
	h: 33 km.		
	H= 21 51 43		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
20.	P	NZ	22 12 44
	i	E	45
	i	Z	13 35
	14.7 N., 146.8 E.		
	Mariana Is.		
	h: 52 km .		
	H= 22 07 45		USCGS
21.	iP	NEZ	01 22 39.0
	i	EZ	40.5
	i	N	43
	i	Z	52
	S	Z	23 12
21.	iP	NEZ	08 35 10.0
	S	NE	36 04
	i	N	15
	P: S,W,C		
	38.6 N., 143.0 E.		
	Off coast of Honshu, Japan.		
	h: 42 km.		
	H= 08 34 03.5		USCGS
21.	iP EZ, P N		09 05 51.0
	eS	E	06 50
	P: C		
21.	iPKP Z, PKP NE		09 44 27.5
	P: C		
	23.4 S., 70.5 W.		
	Near coast of Northern Chile.		
	h: 41 km.		
	H= 09 24 35.5		USCGS
21.	P	Z	09 48 49
	S?	NE	49 58
21.	P	EZ	12 36 12.0
	i	NEZ	13.2
	i	N	32
	S	NE	37 08
	L	N	36
	L	Z	44
21.	iP	EZ	13 41 18.8
	i	N	19.4
	i	E	42 10
	S	NE	24
	i	Z	32
21.	iP NZ, P E		14 49 22.5
	i	NEZ	52 05
	P: S,W,C		
	54.9 N., 161.5 E.		
	Near east coast of Kamchatka.		
	h: 28 km .		
	H= 14 44 06		USCGS

Date	Phase	Comp.	Time(GMT) h m s
21.	iP EZ, P N		16 49 25.2
	i	NEZ	26.2
	S	NE	50 32
	P: W,C		
21.	P	Z	16 56 34
	SKS	N	17 07 05
	S	E	52
	SS	E	14 15
	SSS	E	18 08
	eL	NZ	29 04
	56.4 N., 158.0 E.		
	Macquarie Is. region.		
	h: 27 km.		
	H= 16 43 17.2		USCGS
21.	P	NEZ	16 07 29
21.	iP EZ, P N		17 43 03.3
	i	Z	13
	S	NE	52
	i	Z	44 13
	L	NZ	32
	P: S,W,C		
	38.6 N., 143.1 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 17 41 56		USCGS
21.	P	Z	18 07 39
21.	eP	NZ	18 18 28
	S	NEZ	52
21.	iP	NEZ	19 37 09.0
	i	EZ	31
	S	NE	38 04
	P: N,E,D		
21.	P	NEZ	21 43 23.6
21.	P	NEZ	21 43 35
	eS	Z	44 25
21.	iPKP Z, PKP NE		22 30 21.3
	i	Z	30
	P: C		
	17.4 S., 72.4 W.		
	Near coast of Peru.		
	h: 43 km.		
	H= 22 10 41		USCGS
21.	eP	Z	22 47 27
	L	NE	23 10 25
	L	Z	36 30

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ate	Phase	Comp.	Time(GMT) h m s
22.	P	Z	05 08 06
22.	eP	Z	08 56 20
	i	Z	22.5
22.	iP Z, P NE		09 45 21.2
	iS	NEZ	39
	P: N,C		
22.	iP	NZ	09 49 00.0
	S	NE	16
	P: N,C		
22.	P	EZ	10 53 40
22.	P	NEZ	14 29 05
	PcP	Z	31 45.5
	Lq 1	NZ	36 44
	Lr 1	NZ	37 48
	4.4 N., 127.8 E.		
	Talaud Is.		
	h: 94 km.		
	H= 14 22 34.5		USCGS
22.	iP	Z	18 55 29.8
	i	N	30.0
	i	NE	56 10.5
	P: C		
22.	iP NZ, P E		20 49 21.5
	i	NE	50 09
	P: S,D		
22.	eP	Z	21 33 41
	i	N	34 09
22.	iP	NEZ	21 41 15.6
	S	N	43
	P: S,E,D		
22.	P	NEZ	21 50 32
22.	P	NEZ	23 16 18
	S	NE	17 11
23.	iP NE, P Z		01 56 47.5
	S	NE	57 40
	i	Z	58 05
	P: N,E		
23.	P	NEZ	02 20 33
23.	P	NZ	06 54 17
	36.3 N., 71.2 E.		
	Afghanistan - USSR region.		
	h: 114 km.		
	H= 06 45 11.5		USCGS

Date	Phase	Comp.	Time(GMT) h m s
23.	P	NEZ	07 26 58
	eS	E	28 05
23.	eP	Z	08 32 11
	eS	NE	33 15
23.	iP Z, P NE		08 53 09.0
	S	N	54 07
	P: D		
23.	P	Z	10 05 39
23.	eP	NEZ	11 51 17
	S	NEZ	52 14
23.	P	NZ	12 50 40
	i	Z	51 30
	L	N	13 14 08
	27.7 N., 56.7 E.		
	Southern Iran.		
	h: 52 km.		
	H= 12 39 47.3		USCGS
23.	iP	NEZ	16 01 15.8
	P: S,E,D		
	14.1 N., 145.0 E.		
	Mariana Is.		
	h: 126 km.		
	H= 15 56 19.8		USCGS
23.	P	NEZ	19 12 21
	i	NEZ	21.3
	eS	NE	13 13
	i	N	44
	i	Z	50
23.	P	NEZ	19 23 19
	0.4 S., 127.6 E.		
	Halmahera.		
	h: 89 km .		
	H= 19 16 07.9		USCGS
23.	iP Z, P NE		20 26 54.6
	P: E,D		
23.	iP	NEZ	20 38 12.0
	S	NE	45 24
	Lq 1	E	49 16
	Lq 1	N	26
	Lq 2?	E	57 20
	P: N,E,D		
	Mag. 6 - 6½ (Pas.)		
	58.7 N., 150.0 W.		
	Gulf of Alaska.		
	h: 23 km.		
	H= 20 39 14.5		USCGS

Date	Phase	Comp.	Time(GMT) h m s	
23.	iP	Z	21 36 01.2	
	S	N	37 00	
	e	N	06	
	P: N,E,D			
24.	iP	Z	01 30 15.0	
	S	NE	24	
24.	P	Z	03 16 12	
	e	Z	46	
	L	Z	43 48	
	5.1 S., 68.3 E.			
	Chagos Archipelago region.			
	h: 33 km.			
	H= 03 04 17.3			
24.	P	NZ	08 13 06	
24.	iP Z, P NE		08 30 26.8	
	eS	N	41 00	
	e	N	52 50	
	Lr	NE	09 02 40	
	P: C			
	39.3 N., 24.9 E.			
	Aegean Sea.			
	h: 17 km.			
	H= 08 18 02.5			USCGS
24.	iP	NEZ	12 54 35.5	
	S	NE	55 02	
	P: S,E,D			
24.	iP	NEZ	14 06 19.8	
	i	E	20.3	
	PP	Z	08 01	
	i	Z	10 57.0	
	S	NE	12 00	
	P: S,E,D			
	4.6 S., 149.4 E.			
	Bismarck Sea.			
	h: 565 km.			
	H= 13 59 14.5			USCGS
24.	P	Z	16 32 11	
	S	NEZ	38	
24.	iP	NEZ	17 32 51.2	
	S	NE	33 17	
	P: N,E,D			
24.	P	Z	18 59 31	
24.	P	NEZ	19 43 40	
	L	E	20 09 00	
	5.0 S., 68.4 E.			
	Chagos Archipelago region.			
	h: 33 km.			
	H= 19 31 49.5			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
24.	iP	Z	22 46 02.5	
	20.9 S., 179.2 W.			
	Fiji Is. region.			
	h: 640 km.			
	H= 22 35 53.3			USCGS
24.	P	NEZ	23 38 06	
	e	NZ	34	
	eS	N	39 32	
	30.0 N., 140.7 E.			
	South of Honshu, Japan.			
	h: 190 km.			
	H= 23 36 26			USCGS
24.	P	NEZ	23 52 49	
	e	Z	53 56	
	S	NE	59 28	
	eL	EZ	00 03 36	
	Lr 1	NZ	06 08	
	6.9 S., 129.2 E.			
	Banda Sea.			
	h: 52 km.			
	H= 23 44 46.2			USCGS
25.	eP	NZ	02 34 23	
	S	N	38.5	
25.	P	Z	02 59 55	
	i	NZ	56.7	
25.	iP	NZ	14 32 33.5	
	iS	NE	33 22.5	
	P: D			
25.	iP	NZ	17 22 17.4	
	S	NEZ	28 34	
	P: S,D			
	7.1 S., 156.2 E.			
	Solomon Is.			
	h: 419 km.			
	H= 17 14 27.7			USCGS
25.	P	Z	17 46 12	
25.	iP Z, P NE		17 48 18.7	
	eS	N	49 00	
	P: D			
25.	P	NEZ	17 49 31.0	
	4.5 S., 155.1 E.			
	Solomon Is.			
	h: 476 km.			
	H= 17 42 08.7			USCGS
25.	P	EZ	21 36 40	
	i	NZ	41.5	
	eS	NE	45 52	
	G	N	53 32	
	G	EZ	44	

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Date	Phase	Comp.	Time(GMT) h m s
	Lr	EZ	21 57 00
	Lr	N	28
	L	N	22 07 28
	15.2 S., 173.1 W.		
	Tonga Is.		
	h: 33 km.		
	H= 21 25 36.1		USCGS
25.	P Z, eP NE		22 21 35
	i	NE	53
	S	NE	22 11
26.	iP	NEZ	00 31 20.0
	i	Z	34
	P: S,W,D		
	40.8 N., 143.3 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 00 29 52.9		USCGS
26.	iP	Z	00 53 39.4
	i	NE	40.6
	S	NEZ	01 02 52
	G	N	10 20
	Lr 1	E	13 56
	eL	E	26 54
	eLr 2	E	30 52
	P: C		
	15.3 S., 173.1 W.		
	Tonga Is.		
	h: 33 km.		
	H= 00 42 34.9		USCGS
26.	P	NEZ	02 59 58
	S	NE	03 00 32.5
26.	P	NEZ	03 09 25
26.	P	NEZ	04 05 12
	iS	NEZ	33.5
26.	eP	Z	04 17 36
	iS	NE	57.8
26.	P	EZ	06 24 44
	S	N	25 08
	i	N	21
26.	P	Z	06 32 44
	i	Z	33 16
26.	P	NEZ	07 54 06
	S	NE	49
26.	P	NEZ	10 16 25
	i	E	27

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	Z	10 16 29
	i	E	17 21.5
	S	E	34
26.	iP Z, P N		11 13 57.7
	i	NEZ	14 06
	i	EZ	19
	S	N	15 51
	P: D		
26.	P	NEZ	12 00 10
	S	NE	01 06
	i	E	18
	i	N	48
26.	iPKP Z, PKP NE		12 14 04.5
	pPKP	Z	58
	SPKP	Z	15 20
	P: C		
	14.4 S., 70.5 W.		
	Peru.		
	h: 212 km.		
	H= 11 54 47.7		USCGS
26.	iP	NEZ	13 21 55.7
	S	N	22 31
	P: N,E,D		
	37.4 N., 141.4 E.		
	Near east coast of Honshu, Japan.		
	h: 67 km.		
	H= 13 21 13.0		USCGS
26.	iP	NEZ	15 12 07.0
	i	N	33.5
	PP	Z	15 04.0
	S	NE	22 08
	eL	E	31 00
	Lr	Z	36 44
	eL	E	44 18
	eL	E	50 54
	P: S,W,C		
	Mag. 6.3 (CGS)		
	37.3 N., 116.5 W.		
	Southern Nevada.		
	h: 0 km.		
	H= 15 00 00.1		USCGS
26.	P	Z	15 44 26
26.	iP	Z	17 27 49.7
	S	NE	28 15
26.	P	Z	18 01 43
	i	Z	05 32
	SKS?	N	13 16
	L	Z	34 48

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	L	Z	18 38 18
	L	E	49 12
	18.7 N., 103.3 W.		
	Near coast of Mexico.		
	h: 65 km.		
	H= 17 48 02.3		USCGS
26.	iP	NZ	18 26 57.5
	S	NE	27 07
	P: S,C		
26.	P	Z	19 00 13
26.	P	Z	21 25 40
26.	P	Z	23 36 50
	i	Z	52.0
	i	NE	53
27.	iP	NZ	01 24 42.5
	i	E	43.0
	iS	NEZ	55
	P: N,C		
27.	iP NZ, P E		03 01 34.8
	P: N,D		
27.	P	NZ	04 32 17
	S	N	33 26
27.	P	Z	06 49 13
	S	NE	40
	i	NEZ	42.5
27.	iP	Z	11 07 33.1
	i	N	33.5
	PcP	Z	08 41
	P: C		
	10.5 S., 165.1 E.		
	Santa Cruz Is.		
	h: 75 km.		
	H= 10 58 21.5		USCGS
27.	iP Z, P NE		14 07 59.2
	P: D		
	21.2 S., 179.2 W.		
	Fiji Is. region.		
	h: 670 km.		
	H= 13 57 50.1		USCGS
27.	iP Z, P NE		14 48 13.5
	i	N	33
	i	N	49 13
	S	N	21
	P: C		
27.	iP Z, P N		20 53 30.0
	eS	N	54 33
	P: D		

Date	Phase	Comp.	Time(GMT) h m s
27.	iP	Z	23 30 53.0
	i	N	53.5
	iS	NZ	31 13.0
	P: D		
28.	P	NEZ	02 57 44
	7.4 S., 128.4 E.		
	Banda Sea.		
	h: 39 km.		
	H= 02 49 32		USCGS
28.	iP Z, P NE		03 13 49.0
	eS	N	14 30
	P: D		
28.	P	EZ	04 24 10
	i	N	11.5
	i	Z	51
	i	Z	27 19.5
	S	NE	29 00
	L	Z	31 20
28.	iP	NEZ	09 51 38.4
	S	NEZ	53
	P: N,W,C		
28.	P	NEZ	10 08 19
	e	E	28
	eS	NE	09 29
	42.0 N., 142.6 E.		
	Hokkaido, Japan.		
	h: 33 km.		
	H= 10 06 44		USCGS
29.	iP	Z	00 33 14.0
	i	Z	22.1
	P: D		
	39.5 N., 122.1 W.		
	Northern California.		
	h: 15 km.		
	H= 00 21 36.6		USCGS
29.	iP	NEZ	00 48 06.0
	S	E	52 00
	L	EZ	53 05
	P: S,E,D		
	14.0 N., 144.7 E.		
	Mariana Is.		
	h: 164 km.		
	H= 00 43 14.2		USCGS
29.	P	NEZ	06 06 14.2
	S	NE	07 28
	P: N,E,D		
29.	iP	NZ	08 11 30.5
	i	Z	39
	P: N,D		

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Date	Phase	Comp.	Time(GMT) h m s
29.	iP	EZ	08 20 32.6
	i	E	41
	P: W,C		
29.	iP	NZ	09 43 07.8
	PcP	NZ	19.2
	P: N,W,D		
	21.3 S., 179.5 W.		
	Fiji Is. region.		
	h: 640 km .		
	H= 09 32 56.8		USCGS
29.	P	Z	13 45 00
	S	NE	28
29.	iP	NZ	14 32 30.6
	P: N,D		
29.	iP	NEZ	16 31 07.0
	iS	Z	37.4
	P: N,W,D		
29.	P	NZ	17 13 11
	S	NE	22 28
	SSS	NE	30 36
	L	NE	33 36
	L	Z	37 24
	L	Z	45 40
	39.2 N., 44.3 E.		
	Northwest Iran - USSR border region.		
	h: 34 km.		
	H= 17 01 57.6		USCGS
29.	eP	NEZ	17 53 22
	S	N	50
30.	P	NE	00 33 21
	i	NEZ	37.6
30.	iP EZ, P N		01 10 46.5
	S	NEZ	11 23
	P: W,D		
30.	iP	NEZ	01 47 54.3
	S	N	51 52
	P: N,E,D		
	54.3 N., 159.5 E.		
	Near east coast of Kamchatka.		
	h: 118 km.		
	H= 01 42 58.7		USCGS
30.	P	Z	05 58 35
	3.2 S., 135.0 E.		
	West New Guinea region.		
	h: 51 km .		
	H= 05 51 07.2		USCGS

Date	Phase	Comp.	Time(GMT) h m s
30.	P	NEZ	13 19 31
	S	NE	20 11
30.	P	NEZ	13 30 17
	e	N	53
30.	P	NEZ	13 55 42
	eS	N	58 11
	e	N	22
	23.6 N., 143.1 E.		
	Volcano Is. region.		
	h: 50 km.		
	H= 13 52 31.7		USCGS
30.	iP	NEZ	17 56 37.3
	S	NE	50
	P: S,W,C		
30.	iP	NEZ	18 01 06.2
	S	NE	19
	i	Z	36
	P: S,W,C		
30.	iP	NEZ	19 47 41.1
	S	NEZ	48 39
	P: N,W,C		

Mineo Takehana

Director

SEISMOLOGICAL BULLETIN
OF
MATSUSHIRO

MAY , JUNE
1968

Matsushiro Seismological Observatory
Matsushiro-machi, Nagano-shi,
Nagano-ken, Japan

Matsushiro Seismological Observatory , Japan

Seismological Bulletin

Latitude 36° 32′ 30″ N. 18 VSCGSN

Longitude 138° 12′ 32″ E.

Elevation 440 M.

Instrumental Constants

Instruments	Comp.	Period (sec)	Damping ratio	Magnification
Benioff	N	T_1= 1.0 T_2= 0.23	h_1= 0.63 h_2= 1.7	46,000(max)
Seismograph	E	T_1= 1.0 T_2= 0.22	h_1= 0.64 h_2= 1.6	46,000(max)
(Short Period)	Z	T_1= 1.0 T_2= 0.21	h_1= 0.67 h_2= 1.2	57,000(max)
Benioff	N	T_1= 1.0 T_2= 89	h_1= 0.63 h_2= 2.5	3,200 (max)
Seismogrph	E	T_1= 1.0 T_2= 55	h_1= 0.64 h_2= 2.5	4,700 (max)
(Long Period)	Z	T_1= 1.0 T_2= 64	h_1= 0.67 h_2= 2.7	3,500 (max)
WWSS	N	T_1= 1.0 T_2= 0.75		100,000
Seismograph	E	T_1= 1.0 T_2= 0.75		100,000
(Short Period)	Z	T_1= 1.0 T_2= 0.75		100,000
WWSS	N	T_1= 15 T_2= 100		3,000
Seismograph	E	T_1= 15 T_2= 100		3,000
(Long Period)	Z	T_1= 15 T_2= 100		3,000
Short Period Vertical Seismograph	Z	T_1= 1.0 T_2= 2.82	h_1= 1.4 h_2= 1.2	32,000 (max)
Wood-Anderson	N	T = 0.8	h = 0.8	1,300
Seismograph	E	T = 0.8	h = 0.8	1,200

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Date	Phase	Comp.	Time(GMT) h m s
1.	PKP1	Z	00 11 08
	i	Z	40.0
	38.4 S., 71.1 W.		
	South of Chile-Argentina		
	border region.		
	h: 40 km.		
	H= 23 51 17.9		USCGS
1.	P	Z	03 08 02
	6.8 S., 129.5 E.		
	Banda Sea.		
	h: 31 km.		
	H= 02 59 59		USCGS
1.	P	Z	04 38 38
	i	NZ	45
	PP	E	40 08
	PPP	E	45
	S	N	44 52
	eL	N	47 56
	L	NZ	50 32
	Mag. 5¾ - 6 (Mat.)		
	2.9 S., 128.0 E.		
	Ceram Sea.		
	h: 26 km.		
	H= 04 31 09.7		USCGS
1.	eP	Z	06 01 52
	i	Z	59
	i	Z	02 43
	1.6 N., 127.7 E.		
	Halmahera.		
	h: 191 km.		
	H= 05 55 10		USCGS
1.	eP	Z	06 07 20
1.	eP	Z	08 38 46
	e	N	39 40
1.	iP	NEZ	08 44 54.8
	S	NZ	45 48
	P: S,W,C		
	Mag. 5.6 (Mat.)		
	38.6 N., 143.1 E.		
	Off east coast of Honshu, Japan.		
	h: 36 km.		
	H= 08 43 47.4		USCGS
1.	P	NEZ	09 32 07
	i	N	33 14
1.	P	EZ	09 38 25
	i	N	39 32
1.	eP	Z	11 03 20

Date	Phase	Comp.	Time(GMT) h m s
1.	iP	EZ	12 56 30.1
	S	Z	58 34
	P: E,C		
1.	P	NZ	14 23 41
	S	E	24 13
1.	P	NEZ	14 43 00
	0.3 S., 122.8 E.		
	Northern Celebes.		
	h: 176 km.		
	H= 14 35 50.3		USCGS
1.	P	NEZ	14 45 42
1.	P	Z	18 28 14
	eS	NZ	29 00
1.	P	NEZ	18 49 05
	S	NE	23
1.	P	NEZ	19 14 17
	i	NEZ	18.5
	S	NEZ	15 24
	40.9 N., 142.5 E.		
	Near east coast of Honshu, Japan.		
	h: 18 km.		
	H= 19 12 53.4		USCGS
1.	P	NEZ	19 41 01
	27.5 N., 128.3 E.		
	Ryukyu Is.		
	h: 35 km.		
	H= 19 37 53.8		USCGS
1.	P	NEZ	19 52 38
1.	iP	NEZ	20 02 09.8
	S	NE	28
	P: S,E,D		
1.	P	NEZ	21 17 36
	S	NE	51
1.	P	Z	22 54 19
2.	P	Z	00 33 35
	i	Z	46
	26.2 N., 92.2 E.		
	Eastern India.		
	h: 53 km.		
	H= 00 26 02.9		USCGS
2.	eP	Z	01 41 19
	i	NEZ	21.5
	S	Z	56

Date	Phase	Comp.	Time(GMT) h m s
2.	eP	Z	02 59 30
	48.2 N., 154.0 E.		
	Kurile Is.		
	h: 43 km.		
	H= 02 55 41		USCGS
2.	iP	NZ	03 20 52.6
	S	NE	21 48
	P: S,D		
2.	P	Z	04 53 59
	S	E	54 21
2.	iP	NZ	05 40 12.2
	S	N	41 52
	P: N,D		
	40.7 N., 142.8 E.		
	Near east coast of Honshu, Japan.		
	h: 43 km.		
	H= 05 38 48.8		USCGS
2.	ePKP	Z	05 48 17
	i	Z	41
	PP	Z	49 39
	eSKSP	Z	59 16
	eSS	N	06 06 20
	eLr	N	23 32
	eL	Z	26 20
	Mag. 5½ (Mat.)		
	18.6 N., 69.6 W.		
	Dominican Republic region.		
	h: 62 km.		
	H= 05 29 38.2		USCGS
2.	eP	Z	07 46 38
2.	iP	NEZ	09 07 15.5
	P: N,E,D		
2.	P	Z	13 56 14
	S	E	25
2.	P	NEZ	14 51 59
2.	P	NEZ	16 19 02
	i	N	20 35
	i	N	21 08
2.	P	Z	23 33 53
	i	NEZ	54.0
	sP	Z	34 24
	S	NE	40 07
	eS	N	42
	ScS	E	43 40
	6.4 S., 129.9 E.		
	Banda Sea.		
	h: 120 km.		
	H= 23 26 03.6		USCGS

Date	Phase	Comp.	Time(GMT) h m s
3.	P	Z	00 49 30
3.	P	Z	01 01 18
	15.7 S., 173.2 W.		
	Tonga Is.		
	h: 119 km.		
	H= 00 50 20.1		USCGS
3.	iP	Z	01 51 04.0
	P: D		
	6.9 S., 129.4 E.		
	Banda Sea.		
	h: 13 km.		
	H= 01 42 57		USCGS
3.	P	Z	03 40 50
	eS	Z	41 01
3.	P	NEZ	05 36 29
	i	NEZ	31
	S	NEZ	39 36
	PcP	Z	41 12
	Mag. 5.5 (Mat.)		
	25.1 N., 124.6 E.		
	Northeast of Taiwan.		
	h: 98 km.		
	H= 05 32 45.7		USCGS
3.	iP	Z	09 48 34.1
	S	E	49 03
	P: C		
3.	P	Z	10 43 25
3.	iP	NEZ	12 31 42.6
	i	N	55.5
	i	N	32 05
	P: S,E,D		
3.	iP	Z	16 21 41.8
	i	NE	42
	P: D		
	54.2 N., 163.3 W.		
	Unimak I. region.		
	h: 17km.		
	H= 16 13 40.0		USCGS
3.	iP	Z	18 35 55.5
	S	N	36 40
	P: C		
3.	P	NEZ	18 56 42
4.	iP	NEZ	00 27 53.0
	S	E	28 15
	P: D		
4.	eP	Z	03 16 17
	i	Z	19

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	6.9 S., 129.4 E.			
	Banda Sea.			
	h: 18 km.			
	H= 03 08 10.6			USCGS
4.	iP	NEZ	03 23 11.7	
	S	NE	24 32	
	P: S,W,D			
	29.7 N., 133.0 E.			
	South of Honshu, Japan.			
	h: 484 km.			
	H= 03 21 26.3			USCGS
4.	iP	NEZ	04 34 46.8	
	S	NE	35 03	
	P: S,W,C			
4.	iP	NEZ	14 15 42.5	
	S	N	16 10	
	P: S,E,D			
4.	eP	Z	14 55 18	
	eS	N	54	
4.	P	NEZ	16 38 03	
	i	E	28	
4.	iP	NEZ	17 31 17.2	
	i	N	46	
	P: S,W,D			
	38.4 N., 140.8 E.			
	Honshu, Japan.			
	h: 45 km.			
	H= 17 38 34			USCGS
4.	P	Z	22 18 40	
4.	iP	Z	22 57 04.4	
	i	NE	05	
	S	E	58 43	
	i	N	45	
	P: C			
	27.5 N., 139.8 E.			
	Bonin Is. region.			
	h: 479 km.			
	H= 22 54 58.8			USCGS
5.	P	Z	03 11 10	
	5.9 N., 127.7 E.			
	Philippine Is. region.			
	h: 16 km.			
	H= 03 04 43.5			USCGS
5.	P	Z	07 22 05	
	i	NE	06	
	i	N	14	
	i	Z	52	
	S	N	23 06	
	33.0 N., 135.5 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Near south coast of Southern Honshu, Japan.			
	h: 33 km.			
	H= 07 21 04.1			USCGS
5.	iP	Z	09 17 54.6	
	i	NE	55	
	P: C			
	39.3 S., 174.7 E.			
	North Island, New Zealand.			
	h: 225 km.			
	H= 09 05 56.3			USCGS
5.	P	Z	10 57 43	
	16.6 S., 175.7 E.			
	Fiji Is. region.			
	h: 37 km.			
	H= 10 47 15.5			USCGS
5.	P	NEZ	15 14 32	
	eS	E	15 22	
5.	P	Z	16 16 48	
	i	NEZ	49	
	i	NE	17 08	
5.	eP	Z	22 53 52	
5.	eP	Z	23 29 38	
	i	E	48	
	eS	E	30 30	
6.	eP	Z	09 57 43	
	e	N	58 40	
6.	eP	Z	10 37 08	
	e	E	35	
6.	iP	NEZ	10 54 18.0	
	i	NZ	26.0	
	i	E	47	
	i	Z	50	
	P: S,E,C			
6.	P	Z	11 19 09	
	i	Z	21	
	51.7 N., 173.4 W.			
	Andreanof Is., Aleutian Is.			
	h: 32 km.			
	H= 11 12 00.2			USCGS
7.	P	EZ	03 56 26	
	S	NE	50	
7.	iP	Z	05 25 34.0	
	S	NE	58	
	P: C			
7.	eP	Z	09 19 13	

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	Z	09 19 59
	6.7 N., 73.0 W.		
	Northern Colombia.		
	h: 168 km.		
	H= 09 00 29.0		USCGS
7.	P	NZ	11 53 47
	19.2 S., 177.6 W.		
	Fiji Is. region.		
	h: 533 km.		
	H= 11 43 31.6		USCGS
7.	iP	NEZ	13 55 57.6
	S	NZ	56 18
	P: S,E,D		
	36.0 N., 140.0 E.		
	Near east coast of Honshu, Japan.		
	h: 74 km.		
	H= 13 55 30.1		USCGS
7.	iP	Z	18 04 08.7
	P: D		
	18.8 S., 178.1 W.		
	Fiji Is. region.		
	h: 500 km.		
	H= 17 53 54.5		USCGS
7.	P	Z	18 37 59
	6.8 S., 129.5 E.		
	Banda Sea.		
	h: 50 km.		
	H= 18 29 56		USCGS
8.	iP	NZ	00 03 28.8
	i	NE	33
	P: N		
8.	P	Z	02 51 58
	S	N	52 29
8.	eP	Z	11 13 31
	ePP	Z	17 20
	ePS	Z	26 08
	eSS	N	31 14
	eL	Z	46 00
	Mag. $5\frac{3}{4}$ - 6 (Mat.)		
	58.0 S., 157.7 E.		
	Macquarie Is. region.		
	h: 33 km.		
	H= 11 00 07.4		USCGS
8.	iP	NZ	12 28 13.5
	PP	Z	30 36
	S	NZ	37 16
	SS	N	41 30
	SSS or L	NE	44 40
	L	N	46 00
	P: C		(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Mag. $6\frac{1}{2}$ (Mat.)		
	43.6 N., 127.9 W.		
	Off coast of Oregon.		
	h: 33 km.		
	H= 12 17 13.4		USCGS
8.	eP	Z	22 04 05
	e	Z	48
	eS	E	13 48
	eL	E	24 52
	Mag. $5\frac{3}{4}$ - 6 (Mat.)		
	43.9 N., 128.2 W.		
	Off coast of Oregon.		
	h: 33 km.		
	H= 21 53 02.9		USCGS
8.	iP	EZ	22 54 02.5
	pP	Z	37
	P: E,C		
	37.1 N., 71.9 E.		
	Afghanistan-USSR border region.		
	h: 160 km.		
	H= 22 45 08.3		USCGS
8.	P	Z	23 27 08
	i	NE	10
	i	N	28 16
	38.4 N., 143.3 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 23 26 01		USCGS
8.	eP	EZ	23 57 32
	i	Z	34
	26.6 S., 176.3 W.		
	South of Fiji Is.		
	h: 33 km.		
	H= 23 45 48.8		USCGS
9.	iP	NEZ	01 23 35.0
	eS	N	24 50
	P: N,E,D		
9.	P	Z	03 14 04
	i	Z	10.5
	S	N	23 16
	eL	N	30 40
	43.4 N., 127.0 W.		
	Off coast of Oregon.		
	h: 33 km.		
	H= 03 03 01.8		USCGS
9.	iP	Z	04 54 48.1
	S	N	55 14
	P: D		

Date	Phase	Comp.	Time(GMT) h m s
9.	iP	NEZ	05 36 48.1
	S	N	37 12
	P: S,E,D		
9.	P	NEZ	05 46 22
9.	P	Z	07 31 58
	31.8 S., 178.7 W.		
	Kermadec Is.		
	h: 12 km.		
	H= 07 19 55.0		USCGS
9.	iP	NEZ	09 55 51.5
	S	Z	56 46
	i	NE	56 50
	P: N,E,C		
9.	iP	Z	14 22 51.0
	i	NEZ	51.2
	i	E	57
	S	NE	23 28
	i	NE	31
	P: C		
	Mag. 5.4 (Mat.)		
	34.2 N., 136.8 E.		
	Southern Honshu, Japan.		
	h: 18 km.		
	H= 14 22 08.7		USCGS
9.	eP	EZ	14 37 40
	eS	NE	38 23
9.	iP	NEZ	15 04 08.6
	i	NEZ	13.5
	S	NE	46
	P: N,E,C		
	34.7 N., 136.4 E.		
	Southern Honshu, Japan.		
	h: 33 km.		
	H= 15 03 32.7		USCGS
9.	P	Z	18 47 52
	S	N	48 24
9.	iPKP	Z	18 52 10.0
	pPKP	Z	45.5
	PKP: D		
	18.4 S., 69.4 W.		
	Northern Chile.		
	h: 125 km.		
	H= 18 32 33.3		USCGS
9.	iP	EZ	19 22 30.0
	i	N	23 26
	P: E,D		
9.	eP	Z	23 04 46
	i	NEZ	50
	eS	NE	05 26
9.	iP	Z	23 22 32.5
	eS	N	55
	P: C		
10.	P	Z	00 13 29
	i	Z	14 07
	5.3 S., 146.5 E.		
	East New Guinea region.		
	h: 162 km.		
	H= 00 05 49.7		USCGS
10.	P	NZ	04 18 04
	i	E	09
10.	iP	NEZ	06 08 44.2
	P: N,C		
	22.3 S., 171.6 E.		
	Loyalty Is. region.		
	h: 123 km.		
	H= 14 58 07.2		USCGS
10.	P	Z	06 25 03
10.	P	Z	09 27 50
	S	NEZ	31 20
	L	E	32 32
	L	N	40
	L	Z	33 52
	24.3 N., 121.8 E.		
	Taiwan.		
	h: 21 km.		
	H= 09 23 31.5		USCGS
10.	eP	Z	09 35 53
10.	P	NZ	10 21 45
	eS?	E	23 40
	43.6 N., 145.8 E.		
	Hokkaido, Japan.		
	h: 60 km.		
	H= 10 19 32		USCGS
10.	P	Z	13 36 08
	28.3 S., 175.9 W.		
	Kermadec Is.		
	h: 60 km.		
	H= 13 24 16.0		USCGS
10.	eP	Z	15 13 38
	i	E	41
	S	NEZ	17 08
	L	E	18 16
	L	N	32
	L	Z	19 40
	Mag. 5¾ (Mat.)		
	24.3 N., 121.9 E.		
	Taiwan.		
	h: 26 km.		
	H= 15 09 20.6		USCGS

Date	Phase	Comp.	Time(GMT) h m s	
10.	eP	Z	17 16 06	
	e	N	17 08	
10.	P	Z	19 02 44	
10.	P	NEZ	20 18 15	
	S	NE	41	
10.	P	Z	20 37 30	
	S	NEZ	41 00	
	L	N	42 06	
	L	E	12	
	L	Z	43 32	
	Mag. 5¾ (Mat.)			
	24.3 N., 122.0 E.			
	Taiwan.			
	h: 20 km.			
	H= 20 33 13.2			USCGS
10.	iP	NEZ	22 59 37.0	
	i	Z	23 00 23	
	P: S,E,D			
	21.2 S., 176.6 W.			
	Fiji Is. region.			
	h: 203 km.			
	H= 22 48 36.7			USCGS
11.	iP	Z	06 54 10.3	
	eS	N	37	
	P: C			
11.	iP	Z	14 21 14.5	
	S	E	31	
	P: D			
11.	iP	Z	15 41 38.0	
	i	Z	50.6	
	i	Z	47 12	
	i	Z	44	
	S	N	52	
	S	E	48 02	
	L	N	51 16	
	Lr	N	54 40	
	P: C			
	Mag. 6 (Mat.)			
	6.4 S., 147.3 E.			
	East New Guinea region.			
	h: 76 km.			
	H= 15 33 41.2			USCGS
12.	iP	NZ	03 13 52.3	
	P: S,D			
12.	P	Z	04 00 12	
12.	iP EZ, P N		06 33 20.0	
	eS	Z	38	
	P: E,D			
	35.7 N., 140.9 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Near east coast of Honshu, Japan.			
	h: 23 km.			
	H= 06 32 43			USCGS
12.	iP	NEZ	03 16 07.0	
	P: S,E,C			
12.	P	Z	13 15 58	
12.	iP Z, P NE		17 59 15.5	
	P: D			
12.	iP EZ, P N		18 49 36.5	
	P: W,C			
	19.0 S., 169.8 E.			
	New Hebrides Is.			
	h: 16 km.			
	H= 18 39 10.8			USCGS
12.	iP	Z	19 06 50.0	
	P: C			
	19.0 S., 169.7 E.			
	New Hebrides Is.			
	h: 5 km.			
	H= 18 56 22.8			USCGS
12.	P	Z	21 43 17	
12.	P	Z	21 45 16	
	S	N	46 03	
13.	P NZ, eP E		04 06 35	
	19.0 S., 169.6 E.			
	New Hebrides Is.			
	h: 13 km.			
	H= 03 56 09.2			USCGS
13.	eP	Z	08 11 13	
	1.3 S., 128.9 E.			
	Halmahera.			
	h: 33 km.			
	H= 08 03 53			USCGS
13.	iP	Z	13 16 34.5	
	P: C			
	52.2 N., 178.5 W.			
	Andreanof Is., Aleutian Is.			
	h: 139 km.			
	H= 13 10 02			USCGS
13.	iP	EZ	15 53 52.6	
	P: E,C			
13.	iP	EZ	20 23 50.0	
	i	N	50.3	
	P: C			
	51.5 N., 158.6 E.			
	Near east coast of Kamchatka.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	h: 34 km.			
	H= 20 24 08.5			USCGS
13.	P	Z	22 52 08	
	eS	E	53 38	
14.	iP	Z	05 43 25.0	
	P: C			
	23.8 S., 176.9 W.			
	South of Fiji Is.			
	h: 122 km.			
	H= 05 37 05.3			USCGS
14.	iP	NEZ	14 07 24.5	
	S	N	09 12	
	L	N	11 08	
	L	Z	12	
	ScS	E	20 13	
	P: S,W,D			
	Mag. 6.0 (Mat.)			
	29.9 N., 129.4 E.			
	Ryukyu Is.			
	h: 168 km.			
	H= 14 05 06.0			USCGS
14.	P	Z	19 18 42	
14.	eP	Z	19 51 21	
	37.3 N., 114.8 E.			
	Northeastern China.			
	h: 33 km.			
	H= 19 47 04			USCGS
15.	eP	Z	00 31 40	
	37.4 N., 114.8 E.			
	Northeastern China.			
	h: 33 km.			
	H= 00 27 24.6			USCGS
15.	eP	Z	08 20 29	
	eL	Z	49 00	
15.	iP	NEZ	09 55 03.7	
	iS	E	13.8	
	P: S,W,C			
15.	P	Z	10 56 55	
15.	eP	Z	15 12 18	
	pP	Z	15 08	
	S	EZ	22 16	
	SS	E	26 44	
	SS	N	52	
	L	NE	32 36	
	Mag. 6¾ - 7 (Mat.)			
	29.8 S., 179.0 W.			
	Kermadec Is.			
	h: 33 km.			
	H= 15 00 29.9			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
15.	iP NZ, P E		20 08 47.0	
	eS	NZ	09 28	
	P: N,D			
	36.0 N., 141.1 E.			
	Near east coast of Honshu, Japan.			
	h: 19 km.			
	H= 20 08 08			USCGS
16.	iP	NEZ	00 50 26.0	
	P: S,W,C			
	Mag. 7.8 (Mat.)			
	40.8 N., 143.2 E.			
	Off east coast of Honshu, Japan.			
	h: 7 km.			
	H= 00 48 55.4			USCGS
16.	eP	N	01 17 20	
	S	N	18 32	
16.	eP	N	01 23 08	
	S	N	29 18	
	40.6 N., 143.9 E.			
	Off east coast of Honshu, Japan.			
	h: 28 km.			
	H= 01 27 49			USCGS
16.	eP	N	01 33 50	
	40.1 N., 143.8 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 01 32 25			USCGS
16.	eP	N	01 53 27	
16.	P	N	02 02 37	
	eS	N	04 04	
16.	P	Z	03 46 58	
	P: C			
	40.1 N., 143.9 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 03 45 31.3			USCGS
16.	P	Z	03 37 34	
16.	P	Z	04 07 26	
16.	P	Z	04 17 08.0	
	eS	N	18 44	
	P: D			
	40.6 N., 143.0 E.			
	Off east coast of Honshu, Japan.			
	h: 34 km.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	H= 04 15 44.7			USCGS
16.	P	Z	04 34 38	
16.	P	Z	04 36 32	
	P: C			
	41.5 N., 143.1 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 04 35 04.0			USCGS
16.	P	Z	04 43 20	
	P: C			
16.	P	Z	04 59 33	
	S	N	05 00 54	
	40.5 N., 143.1 E.			
	Off east coast of Honshu, Japan.			
	h: 27 km.			
	H= 04 58 07.8			USCGS
16.	P	NEZ	05 13 00	
	eS	Z	14 22	
	40.4 N., 143.5 E.			
	Off east coast of Honshu, Japan.			
	h: 15 km.			
	H= 05 11 34.9			USCGS
16.	P	Z	05 16 35	
	S	N	17 58	
	40.6 N., 143.1 E.			
	Off east coast of Honshu, Japan.			
	h: 19 km.			
	H= 05 15 07.4			USCGS
16.	P	NEZ	05 33 10	
	eS	N	34 16	
	P: C			
	40.4 N., 143.1 E.			
	Off east coast of Honshu, Japan.			
	h: 15 km.			
	H= 05 31 46.1			USCGS
16.	P	NEZ	05 46 07	
	S	Z	47 14	
	i	NE	24	
	P: C			
	40.6 N., 143.7 E.			
	Off east coast of Honshu, Japan.			
	h: 25 km.			
	H= 05 44 40			USCGS
16.	P	Z	05 59 34	
	P: C			

Date	Phase	Comp.	Time(GMT) h m s	
16.	P	NEZ	06 06 22.5	
	P: S,W,C			
16.	P	Z	06 18 39	
	P: C			
16.	P	Z	06 20 23	
	P: C			
	40.4 N., 143.5 E.			
	Off east coast of Honshu, Japan.			
	h: 40 km.			
	H= 06 18 56			USCGS
16.	iP	NEZ	06 31 50.0	
	S	Z	33 12	
	P: S,W,C			
	40.5 N., 143.6 E.			
	Off east coast of Honshu, Japan.			
	h: 14 km.			
	H= 06 30 20.7			USCGS
16.	iP	Z	06 38 19.0	
	S	N	39 40	
	P: D			
	Mag. 5.7 (Mat.)			
	41.1 N., 143.0 E.			
	Hokkaido, Japan.			
	h: 35 km.			
	H= 06 36 51.0			USCGS
16.	eP	Z	06 52 37	
	41.1 N., 142.8 E.			
	Hokkaido, Japan.			
	h: 45 km.			
	H= 06 51 09			USCGS
16.	P	Z	07 08 37	
	40.1 N., 143.0 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 07 07 18			USCGS
16.	P	Z	07 17 49	
	eS	N	19 20	
	P: D			
16.	P	Z	07 23 18	
	P: D			
16.	iP	NZ	07 29 26.0	
	S	N	30 53	
	P: N,D			
16.	iP	Z	07 43 51.5	
	S	Z	45 01	
	P: C			

Date	Phase	Comp.	Time(GMT) h m s	
16.	iP	NEZ	07 50 30.7	
	S	Z	51 53	
	P: S,W,C			
	41.3 N., 142.6 E.			
	Hokkaido, Japan.			
	h: 38 km.			
	H= 07 49 01.5			USCGS
16.	P	NEZ	08 04 00	
	41.1 N., 142.8 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 08 02 31			USCGS
16.	iP	Z	08 17 46.5	
	P: D			
	41.7 N., 142.4 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 09 15 28.8			USCGS
16.	iP	NEZ	08 21 25.0	
	S	NZ	22 44	
	P: S,W,C			
	41.1 N., 142.8 E.			
	Hokkaido, Japan.			
	h: 22 km.			
	H= 08 19 56.7			USCGS
16.	P	NEZ	08 48 08	
	S	E	49 21	
	P: S,W,C			
	40.9 N., 143.0 E.			
	Off east coast of Honshu, Japan.			
	h: 28 km.			
	H= 08 46 39.9			USCGS
16.	iP	NEZ	08 59 44.0	
	S	Z	09 01 09	
	P: N,E,D			
	Mag. 5.8 (Mat.)			
	41.2 N., 143.2 E.			
	Hokkaido, Japan.			
	h: 15 km.			
	H= 08 58 11.1			USCGS
16.	P	NEZ	09 17 02	
16.	iP	NEZ	09 36 40.0	
	S	E	38 09	
	P: S,W,C			
	40.3 N., 143.2 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 09 35 17			USCGS
16.	iP	NEZ	09 43 43.5	
	P: N,E,D			

Date	Phase	Comp.	Time(GMT) h m s	
16.	iP	NEZ	10 14 03.2	
	S	Z	15 31	
	P: S,W,C			
	40.5 N., 143.5 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 10 12 35.7			USCGS
16.	P	NEZ	10 40 32	
	eS	E	41 48	
	Mag. 7.0 (Mat.)			
	41.5 N., 142.7 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 10 39 01.6			USCGS
16.	eP	Z	11 59 04	
	41.2 N., 143.2 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 11 57 25.2			USCGS
16.	P	Z	12 11 00	
	eS	Z	12 26	
	41.1 N., 143.0 E.			
	Hokkaido, Japan.			
	h: 24 km.			
	H= 12 09 31.9			USCGS
16.	iP	Z	12 35 59.0	
	P: C			
	41.7 N., 142.6 E.			
	Hokkaido, Japan.			
	h: 26 km.			
	H= 12 34 24.9			USCGS
16.	eP	Z	12 39 38	
	41.5 N., 142.6 E.			
	Hokkaido, Japan.			
	h: 40 km.			
	H= 12 38 05			USCGS
16.	iP	Z	12 47 08.0	
	S	N	48 36	
	P: D			
16.	iP	Z	13 11 57.0	
	P: D			
16.	iP	NZ	13 18 26.0	
	P: S,C			
	41.5 N., 141.7 E.			
	Hokkaido, Japan.			
	h: 31 km.			
	H= 13 16 59.0			USCGS
16.	P	Z	13 21 33	

Date	Phase	Comp.	Time(GMT) h m s	
16.	iP	Z	13 27 25.0	
	eS	Z	28 51	
	P: C			
	41.4 N., 142.9 E.			
	Hokkaido, Japan.			
	h: 37 km.			
	H= 13 25 52.8			USCGS
16.	iP	NEZ	13 50 56.0	
	S	E	52 10	
	P: S,W,C			
16.	iP	NZ	14 04 10.0	
	S	N	05 47	
	P: N,E,D			
	41.4 N., 142.3 E.			
	Hokkaido, Japan.			
	h: 37 km.			
	H= 14 02 40.7			USCGS
16.	iP	Z	14 17 49.5	
	P: C			
	41.5 N., 142.6 E.			
	Hokkaido, Japan.			
	h: 28 km.			
	H= 14 16 18			USCGS
16.	iP	Z	14 54 06.0	
	P: C			
	41.4 N., 143.5 E.			
	Hokkaido, Japan.			
	h: 36 km.			
	H= 14 52 32.0			USCGS
16.	P	Z	14 57 22	
	40.7 N., 143.3 E.			
	Off east coast of Honshu, Japan.			
	h: 23 km.			
	H= 14 55 51.7			USCGS
16.	iP	Z	15 21 59.0	
	S	E	23 31	
	P: C			
	41.4 N., 143.0 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 15 20 25.6			USCGS
16.	P	Z	15 30 06.0	
	P: D			
16.	P	Z	15 46 19	
	41.5 N., 142.3 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 15 44 50			USCGS
16.	P	Z	15 54 00	
	S	E	55 29	

Date	Phase	Comp.	Time(GMT) h m s	
16.	P	Z	16 06 32.0	
	S	E	07 57	
	P: C			
16.	iP	NEZ	16 15 06.0	
	S	N	16 11	
	P: S,W,C			
	Mag. 6.0 (Mat.)			
	40.0 N., 143.5 E.			
	Off east coast of Honshu, Japan.			
	h: 29 km.			
	H= 16 13 45.1			USCGS
16.	eP	Z	16 23 14	
	39.7 N., 143.6 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 16 21 53.4			USCGS
16.	P	Z	16 50 50	
	41.5 N., 142.4 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 16 49 20.0			USCGS
16.	P	Z	17 23 15	
	41.1 N., 142.6 E.			
	Hokkaido, Japan.			
	h: 38 km.			
	H= 17 21 50.9			USCGS
16.	iP	NEZ	17 29 45.0	
	S	N	31 16	
	P: N,E,D			
	41.4 N., 143.0 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 17 28 13.0			USCGS
16.	P	Z	17 42 48	
	S	E	44 18	
16.	P	Z	17 55 43	
	eS	N	56 48	
	P: D			
16.	iP	Z	18 29 05.0	
	S	Z	30 27	
	P: C			
	39.8 N., 143.4 E.			
	Off east coast of Honshu, Japan.			
	h: 40 km.			
	H= 18 27 46.3			USCGS
16.	iP	NEZ	18 44 39.6	
	S	N	46 03	
	P: N,E,D			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Mag. 5.8 (Mat.)			
	40.7 N., 142.1 E.			
	Near east coast of Honshu, Japan.			
	h: 59 km.			
	H= 18 43 21.0			USCGS
16.	iP	Z	18 54 34.2	
	S	Z	55 58	
	P: S,W,C			
16.	iP	NEZ	19 18 14.8	
	S	N	19 40	
	P: N,E,D			
	Mag. 6.0 (Mat.)			
	41.3 N., 142.4 E.			
	Hokkaido, Japan.			
	h: 42 km.			
	H= 19 16 47.2			USCGS
16.	P	NEZ	19 37 37.5	
	S	Z	38 31	
	P: N,W,C			
16.	iP	NEZ	19 45 29.0	
	P: S,W,C			
	41.7 N., 142.6 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 19 43 56.3			USCGS
16.	iP	NEZ	20 05 17.5	
	P: N,E,D			
	41.6 N., 142.7 E.			
	Hokkaido, Japan.			
	h: 46 km.			
	H= 20 03 45.6			USCGS
16.	iP	NEZ	20 23 44.0	
	S	Z	25 08	
	P: N,E,D			
	Mag. 5.9 (Mat.)			
	41.4 N., 142.6 E.			
	Hokkaido, Japan.			
	h: 39 km.			
	H= 20 22 14.9			USCGS
16.	P	Z	20 42 26	
16.	iP	NEZ	21 04 52.0	
	S	N	06 22	
	P: N,E,D			
	41.2 N., 142.4 E.			
	Hokkaido, Japan.			
	h: 33km.			
	H= 21 03 24.3			USCGS
16.	iP	Z	21 24 25.0	
	P: C			

Date	Phase	Comp.	Time(GMT) h m s	
16.	iP	Z	21 27 24.0	
	S	N	28 40	
	P: C			
	40.9 N., 143.0 E.			
	Off east coast of Honshu, Japan.			
	h: 30 km.			
	H= 21 25 56.4			USCGS
16.	iP	NEZ	22 27 44.0	
	S	N	29 12	
	P: S,W,C			
	40.3 N., 143.1 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 21 23 03			USCGS
16.	iP	NEZ	22 58 17.0	
	S	N	59 44	
	P: S,W,C			
	39.9 N., 143.5 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 22 56 57			USCGS
16.	iP	NEZ	23 04 15.0	
	S	E	05 20	
	P: S,W,C			
16.	iP	NZ	23 06 11.0	
	S	E	07 28	
	P: S,C			
	Mag. 6.5 (Mat.)			
	39.7 N., 143.5 E.			
	Off east coast of Honshu, Japan.			
	h: 37 km.			
	H= 23 04 54.7			USCGS
16.	P	Z	23 39 34	
	39.7 N., 143.2 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 23 38 15.6			USCGS
16.	iP	Z	23 51 14.5	
	P: C			
16.	P	Z	23 52 52	
16.	iP	NEZ	23 57 52.0	
	S	Z	59 02	
	P: S,W,C			
	39.6 N., 143.4 E.			
	Off east coast of Honshu, Japan.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
			h: 33 km.	
			H= 23 56 35.3	USCGS
17.	P	Z	00 06 40	
			41.9 N., 142.2 E.	
			Hokkaido, Japan.	
			h: 33 km.	
			H= 00 05 07.9	USCGS
17.	iP	NEZ	00 25 45.0	
	S	N	27 13	
	P: S,W,C			
			40.3 N., 143.0 E.	
			Off east coast of Honshu, Japan.	
			h: 33 km.	
			H= 00 24 25.1	USCGS
17.	iP	Z	00 57 59.8	
	P: D			
17.	eP	Z	01 00 42	
17.	iP	NEZ	01 27 12.0	
	S	N	28 23	
	P: S,W,C			
17.	iP	NEZ	02 29 57.0	
	S	E	31 28	
	P: S,W,C			
			41.5 N., 142.2 E.	
			Hokkaido, Japan.	
			h: 50 km.	
			H= 02 28 28.3	USCGS
17.	P	NEZ	02 44 10	
	S	E	45 30	
			40.3 N., 143.3 E.	
			Off east coast of Honshu, Japan.	
			h: 33 km.	
			H= 02 42 50	USCGS
17.	iP	NEZ	02 47 07.5	
	S	E	48 34	
	P: S,W,C			
			40.2 N., 143.3 E.	
			Off east coast of Honshu, Japan.	
			h: 33 km.	
			H= 02 46 45	USCGS
17.	P	Z	02 50 41	
17.	iP	NEZ	02 55 37.5	
	eS	N	56 53	
	P: S,W,C			
17.	iP	NEZ	04 02 09.3	
			(cont.)	

Date	Phase	Comp.	Time(GMT) h m s	
	P: S,W,C			
			41.0 N., 143.0 E.	
			Hokkaido, Japan.	
			h: 50 km.	
			H= 04 00 42	USCGS
17.	P	Z	04 04 49	
			41.4 N., 142.2 E.	
			Hokkaido, Japan.	
			h: 33 km.	
			H= 04 03 19	USCGS
17.	P	NEZ	04 08 54	
	P: S,W,C			
			41.1 N., 143.0 E.	
			Hokkaido, Japan.	
			h: 33 km.	
			H= 04 07 25.3	USCGS
17.	iP	NEZ	04 19 00.2	
	S	N	20 12	
	P: N,E,D			
17.	iP	NEZ	04 37 42.5	
	S	N	38 58	
	P: S,W,C			
			39.1 N., 143.6 E.	
			Off east coast of Honshu, Japan.	
			h: 33 km.	
			H= 04 36 27.4	USCGS
17.	P	NEZ	05 05 02	
	eS	Z	06 14	
17.	P	NEZ	05 03 35	
	eS	E	10 10	
	P: S,W,C			
17.	iP	NEZ	05 20 52.3	
	S	Z	22 00	
	P: S,W,C			
			39.6 N., 143.4 E.	
			Off east coast of Honshu, Japan.	
			h: 33 km.	
			H= 05 19 34.9	USCGS
17.	iP	NEZ	06 25 50.0	
	S	Z	27 09	
	P: S,W,C			
			39.3 N., 143.4 E.	
			Off east coast of Honshu, Japan.	
			h: 40 km.	
			H= 06 24 35.2	USCGS
17.	iP EZ, P N		07 14 03.5	
	eS	E	15 47	
			(cont.)	

Date	Phase	Comp.	Time(GMT) h m s	
	P: W,C			
	41.7 N., 142.2 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 07 12 36			USCGS
17.	iP	Z	07 38 11.0	
	S	N	39 25	
	P: D			
17.	P	Z	08 08 05	
	i	N	17	
	22.7 N., 173.0 E.			
	Loyalty Is. region.			
	h: 91 km.			
	H= 07 57 18			USCGS
17.	iP	NEZ	09 03 23.5	
	S	E	04 58	
	P: S,W,C			
	41.3 N., 142.7 E.			
	Hokkaido, Japan.			
	h: 34 km.			
	H= 09 01 54.9			USCGS
17.	P	Z	09 30 21	
17.	P	Z	10 09 48	
	S	N	11 00	
	40.7 N., 143.1 E.			
	Off east coast of Honshu,			
	Japan.			
	h: 33km.			
	H= 10 08 24			USCGS
17.	P	Z	10 18 26	
	41.7 N., 142.5 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 10 16 54.1			USCGS
17.	iP	NEZ	10 44 03.3	
	S	NZ	45 11	
	P: S,W,C			
	Mag. 5.7 (Mat.)			
	39.6 N., 143.4 E.			
	Off east coast of Honshu,			
	Japan.			
	h: 33 km.			
	H= 10 42 45.9			USCGS
17.	P	Z	12 14 53.6	
	P: C			
	41.6 N., 143.0 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 12 13 20			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
17.	iP	NEZ	12 44 53.5	
	P: S,W,C			
	41.3 N., 143.1 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 12 43 21.2			USCGS
17.	iP	NEZ	13 04 08.0	
	S	N	05 28	
	P: S,W,C			
	Mag. 5.7 (Mat.)			
	41.5 N., 142.8 E.			
	Hokkaido, Japan.			
	h: 45 km.			
	H= 13 02 37.3			USCGS
17.	P	Z	13 14 24	
	22.8 S., 173.3 E.			
	Loyalty Is. region.			
	h: 55 km.			
	H= 13 03 32.3			USCGS
17.	iP	Z	13 16 14.8	
	P: D			
17.	iP	NEZ	14 01 15.0	
	S	E	02 40	
	P: S,W,C			
	40.3 N., 143.2 E.			
	Off east coast of Honshu,			
	Japan.			
	h: 25 km.			
	H= 13 59 52.1			USCGS
17.	iP	NEZ	14 54 00.6	
	S	Z	55 40	
	P: S,W,C			
	39.6 N., 143.6 E.			
	Off east coast of Honshu,			
	Japan.			
	h: 33 km.			
	H= 14 53 11.0			USCGS
17.	iP	NEZ	15 18 49.5	
	P: S,W,C			
	40.2 N., 143.7 E.			
	Off east coast of Honshu,			
	Japan.			
	h: 33 km.			
	H= 15 17 23			USCGS
17.	iP	NEZ	15 27 03.3	
	S	E	28 30	
	P: S,W,C			
	39.8 N., 143.1 E.			
	Off east coast of Honshu,			
	Japan.			
	h: 33 km.			
	H= 15 25 51			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
17.	iP	NEZ	16 03 54.0	
	S	E	05 36	
	P: S,W,C			
	40.6 N., 144.0 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 16 02 24.0			USCGS
17.	iP	Z	16 15 33.0	
	P: N,E,D			
	40.6 N., 143.4 E.			
	Off east coast of Honshu, Japan.			
	h: 30 km.			
	H= 16 14 05.8			USCGS
17.	iP	NEZ	17 29 28.5	
	P: S,W,C			
	41.3 N., 142.8 E.			
	Hokkaido, Japan.			
	h: 37 km.			
	H= 17 27 59.2			USCGS
17.	P	Z	13 05 04	
	40.0 N., 143.3 E.			
	Off east coast of Honshu, Japan.			
	h: 15 km.			
	H= 18 03 41.5			USCGS
17.	iP	NEZ	18 18 22.5	
	S	Z	19 30	
	P: S,W,C			
	Mag. 5.5 (Mat.)			
	39.6 N., 143.0 E.			
	Off east coast of Honshu, Japan.			
	h: 32 km.			
	H= 18 17 07.3			USCGS
17.	iP	NEZ	18 43 38.0	
	S	N	44 42	
	P: S,W,C			
	40.1 N., 143.7 E.			
	Off east coast of Honshu, Japan. h: 34 km.			
	H= 18 42 13.9			USCGS
17.	iP	NEZ	19 03 40.0	
	eS	E	04 48	
	P: S,W,C			
17.	iP	NEZ	19 15 17.0	
	eS	E	16 53	
	P: S,W,C			
	39.5 N., 143.4 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 19 14 00			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
17.	iP	NEZ	19 35 27.5	
	P: S,W,C			
17.	P	NEZ	19 45 33.0	
	P: S,W,C			
17.	iP	NEZ	19 50 13.5	
	S	E	51 27	
	P: S,W,C			
	39.6 N., 143.1 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 19 48 57.7			USCGS
17.	iP	Z	20 15 33.0	
	P: C			
	41.1 N., 142.8 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 20 14 10			USCGS
17.	iP	Z	20 57 44.0	
	S	N	59 12	
	P: D			
	40.5 N., 144.0 E.			
	Off east coast of Honshu, Japan.			
	h: 34 km.			
	H= 20 56 13.8			USCGS
17.	iP	NEZ	22 37 43.5	
	S	N	38 58	
	P: S,W,C			
	40.6 N., 143.7 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 22 36 14.6			USCGS
17.	P	Z	23 10 37	
	41.1 N., 143.0 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 23 09 07.5			USCGS
17.	iP	NEZ	23 18 34.5	
	S	E	19 52	
	P: N,E,D			
	40.2 N., 143.3 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 23 17 12.4			USCGS
18.	iP	Z	01 25 18.3	
	i	NE	25 19.0	
	P: C			

Date	Phase	Comp.	Time(GMT) h m s	
18.	iP	NEZ	02 11 51	
	P: S,W,D			
18.	iP	Z	02 59 56.5	
	P: D			
18.	iP	NEZ	03 03 56.0	
	P: S,W,C			
18.	iP	NEZ	04 52 37.0	
	eS	Z	53 41	
	P: S,W,C			
	41.6 N., 142.4 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 04 51 08			USCGS
18.	P	Z	04 57 31	
	41.7 N., 142.1 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 04 55 59			USCGS
18.	iP	NEZ	05 46 03.4	
	P: N,E,D			
	41.4 N., 142.4 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 05 44 34.5			USCGS
18.	iP	NZ	06 52 23.5	
	P: E,D			
	41.4 N., 142.3 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 06 50 55			USCGS
18.	iP	NEZ	07 05 54.7	
	P: N,E,D			
	41.3 N., 142.3 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 07 04 27			USCGS
18.	iP	Z	07 12 34.0	
	P: D			
18.	iP	NZ	08 10 41.0	
	P: S,C			
18.	iP	Z	08 32 06.3	
	P: D			
18.	iP	Z	09 03 26.3	
	P: C			
18.	iP	Z	09 09 12.0	
	S	Z	10 35	
	P: C			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	40.5 N., 143.4 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 09 07 47.3			USCGS
18.	iP Z, P NE		09 30 24.6	
	P: C			
18.	iP	NEZ	10 10 46.2	
	P: S,W,C			
18.	iP	NEZ	10 25 17.3	
	P: N,E,D			
18.	P	Z	10 43 16	
	39.9 N., 141.2 E.			
	Honshu, Japan.			
	h: 33 km.			
	H= 10 41 29			USCGS
18.	iP	NEZ	12 56 58.0	
	P: S,W,C			
	41.7 N., 142.5 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 12 55 24.5			USCGS
18.	iP	NEZ	14 09 22.0	
	S	Z	10 48	
	P: S,W,C			
	41.6 N., 142.6 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 14 07 50.3			USCGS
18.	iP NZ, P E		15 35 10.2	
	S	Z	36 32	
	P: N,D			
	40.8 N., 143.2 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 15 33 44.3			USCGS
18.	P	NEZ	16 57 40	
	eS	N	59 13	
	41.4 N., 142.1 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 16 56 11			USCGS
18.	iP	NEZ	17 29 04.2	
	S	Z	30 41	
	P: S,W,C			
	41.4 N., 142.6 E.			
	Hokkaido, Japan.			
	h: 39 km.			
	H= 17 27 35			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
18.	iP	NEZ	19 18 36.7	
	S	Z	20 17	
	P: N,E,D			
	41.3 N., 142.4 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 19 17 09.6			USCGS
18.	iP	Z	19 35 34.5	
	P: D			
18.	iP	NEZ	20 45 38.4	
	P: S,E,C			
19.	iP	Z	00 04 09.2	
	P: D			
19.	iP	NEZ	00 22 11.0	
	P: N,D			
19.	iP	NEZ	00 29 23.5	
	eS	E	30 43	
	P: S,W,C			
	41.5 N., 142.0 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 00 27 55			USCGS
19.	iP	NEZ	00 50 09.8	
	S	N	51 27	
	P: N,E,D			
19.	iP	NEZ	01 19 33.2	
	P: S,W,C			
	39.8 N., 143.7 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 01 18 11.9			USCGS
19.	P	NEZ	02 14 43	
	41.7 N., 142.0 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 02 13 12			USCGS
19.	iP	Z	02 18 58.8	
	P: D			
19.	iP	NEZ	02 58 49.4	
	P: N,W,C			
19.	iP	Z	03 21 11.6	
	eS	N	22 26	
	P: N,E,D			
19.	iP	NEZ	03 27 26.4	
	P: S,W,C			
	40.6 N., 143.7 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 03 25 57			USCGS
19.	P	NEZ	03 33 11	
	S	N	31	
19.	iP	NEZ	04 13 27.0	
	S	N	14 03	
	P: N,W,C			
	Mag. 5.3 (Mat.)			
	35.6 N., 141.7 E.			
	Near east coast of Honshu, Japan.			
	h: 46 km.			
	H= 04 12 40.3			USCGS
19.	iP Z, P NE		04 24 04.5	
	P: C			
19.	iP	NEZ	04 46 05.8	
	S	N	47 19	
	P: N,E,D			
19.	iP	Z	04 52 37	
	eS	N	54 10	
	P: D			
19.	iP	NEZ	05 54 58.0	
	S	E	55 34	
	P: N,W,C			
	35.6 N., 141.9 E.			
	Near east coast of Honshu, Japan.			
	h: 25 km.			
	H= 05 54 08.4			USCGS
19.	iP	NEZ	06 46 45.5	
	i	Z	55.0	
	P: S,W,C			
	40.2 N., 144.0 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 06 45 17			USCGS
19.	P	Z	07 18 51	
	11.3 N., 144.8 E.			
	South of Mariana Is.			
	h: 33 km.			
	H= 07 13 22.3			USCGS
19.	P	Z	07 53 18	
	S	N	34	
19.	iP NZ, P E		10 09 34.3	
	P: S,C			
	41.6 N., 142.7 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Hokkaido, Japan. h: 33 km. H= 10 08 02.1			USCGS
19.	iP eS	Z E	11 23 48.0 25 05	
19.	iP P: D	Z	11 38 58.6	
19.	iP P: N,D	NE	11 39 55.0	
19.	iP P: S,W,C 40.3 N., 143.7 E. Off east coast of Honshu, Japan. h: 33 km. H= 12 59 09.6	NEZ	13 00 34.8	USCGS
19.	iP S P: S,W,C 41.3 N., 142.5 E. Hokkaido, Japan. h: 33 km. H= 13 03 26.0	NEZ Z	13 04 55.5 06 07	USCGS
19.	iP i P: S,C 41.5 N., 142.3 E. Hokkaido, Japan. h: 22 km. H= 13 11 08.5	NZ E	13 12 38.5 39.0	USCGS
19.	P 41.6 N., 142.1 E. Hokkaido, Japan. h: 38 km. H= 14 08 22.9	Z	14 09 41	USCGS
19.	iP S P: S,W,C 40.2 N., 143.8 E. Off east coast of Honshu, Japan. h: 33 km. H= 15 04 15.9	NEZ Z	15 05 41.0 07 09	USCGS
19.	iP S P: N,E,D 36.9 N., 141.6 E. Near east coast of Hor shu, Japan. h: 33 km. H= 16 19 30	NEZ N	16 20 14.4 34	USCGS
19.	iP P: D	Z	13 59 19.5	
19.	P 6.8 S., 129.5 E. Banda Sea. h: 43 km. H= 21 35 01.2	NZ	21 43 04	USCGS
19.	iP S P: S,W,C 40.9 N., 143.2 E. Off east coast of Honshu, Japan. h: 18 km. H= 22 16 44.8	NEZ Z	22 18 14.0 19 40	USCGS
19.	iP S P: N,E,D	NEZ E	22 27 34.0 28 33	
19.	P 41.3 N., 142.3 E. Hokkaido, Japan. h: 33 km. H= 23 02 45.8	NEZ	23 04 14	USCGS
20.	iP S P: S,W,C 40.4 N., 143.8 E. Off east coast of Honshu, Japan. h: 33 km. H= 00 46 37	NEZ E	00 48 06.0 49 44	USCGS
20.	P 40.5 N., 143.5 E. Off east coast of Honshu, Japan. h: 33 km. H= 01 56 21	NEZ	01 57 48	USCGS
20.	iP P: C 41.4 N., 142.2 E. Hokkaido, Japan. h: 33 km. H= 02 09 26	Z	02 10 53.5	USCGS
20.	iP S P: S,W,C 40.4 N., 142.3 E. Near east coast of Honshu, Japan. h: 44 km. H= 02 31 45.0	NEZ E	02 32 59.5 34 00	USCGS

Date	Phase	Comp.	Time(GMT) h m s	
20.	iP	NEZ	03 17 46.0	
	S	N	18 48	
	P: N,E,D			
	40.6 N., 143.6 E.			
	Off east coast of Honshu, Japan.			
	h: 31 km.			
	H= 03 16 19.6			USCGS
20.	P	Z	03 28 23	
20.	iP	NZ	04 16 16.6	
	P: N,D			
	41.4 N., 143.2 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 04 14 42.3			USCGS
20.	iP	NZ	04 26 13.6	
	P: N,D			
	40.7 N., 143.3 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 04 24 46			USCGS
20.	iP	NZ	04 38 52.6	
	S	E	40 10	
	P: S,C			
	40.1 N., 143.9 E.			
	Off east coast of Honshu, Japan.			
	h: 30 km.			
	H= 04 37 26.7			USCGS
20.	iP Z, P N		05 19 50.0	
	P: D			
20.	iP	NZ	05 36 54.5	
	S	Z	38 08	
	P: S,C			
	39.2 N., 143.2 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 05 35 41.2			USCGS
20.	iP	NZ	06 16 39.8	
	P: S,C			
	40.6 N., 142.3 E.			
	Near east coast of Honshu, Japan.			
	h: 33 km.			
	H= 06 15 17			USCGS
20.	iP	NZ	06 55 01.8	
	S	NZ	56 25	
	P: S,C			
	40.3 N., 143.7 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 06 53 35.2			USCGS
20.	P	Z	07 24 57	
	i	Z	25 02.8	
	Mag. 6.0 (CGS)			
	30.9 S., 178.3 W.			
	Kermadec Is. region.			
	h: 22 km.			
	H= 07 13 03.0			USCGS
20.	iP	NZ	07 28 37.0	
	P: S,C			
	40.5 N., 143.1 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 07 27 15			USCGS
20.	P	Z	07 44 50	
20.	iP	Z	08 12 49.0	
	P: D			
20.	iP	Z	08 18 34.3	
	P: C			
20.	iP	NZ	09 01 32.5	
	P: S,C			
20.	P	Z	09 34 22	
20.	iP	Z	09 43 03.5	
	P: D			
20.	P	Z	09 56 45	
20.	P	Z	10 38 14	
	i	N	15	
	S	E	41 37	
	L	E	43 50	
	P: C			
	Mag. 6 - 6½ (Mat.)			
	48.8 N., 154.7 E.			
	Kurile Is.			
	h: 40 km.			
	H= 10 34 16.8			USCGS
20.	P	NZ	11 21 00	
	3.1 N., 128.3 E.			
	North of Halmahera.			
	h: 115 km.			
	H= 11 13 31			USCGS
20.	iP	NEZ	11 58 36.6	
	P: S,W,C			
	51.9 N., 158.5 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Near east coast of Kamchatka.			
	h: 55 km.			
	H= 11 53 55.5			USCGS
20.	P	Z	12 22 52	
20.	iP	NEZ	14 33 09.3	
	eS	E	34 20	
	P: S,W,C			
	40.5 N., 142.7 E.			
	Near east coast of Honshu, Japan.			
	h: 58 km.			
	H= 14 31 48.8			USCGS
20.	P	NZ	14 52 02	
	41.3 N., 142.7 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 14 50 34			USCGS
20.	iP	Z	15 36 19.3	
	eS	N	37 28	
	P: C			
20.	P	NZ	16 14 26	
20.	iP	NEZ	16 27 51.0	
	eS	N	29 16	
	P: S,W,C			
	41.3 N., 142.6 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 16 26 22.1			USCGS
20.	P	Z	17 25 17	
	P: C			
	41.3 N., 142.4 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 17 23 48			USCGS
20.	P	NEZ	18 14 18	
20.	iP	NEZ	19 37 31.8	
	S	Z	38 36	
	P: S,W,C			
20.	iP Z, P NE		19 52 42.0	
	eS	N	54 19	
	P: C			
20.	iP	NEZ	20 17 45.4	
	S	NEZ	27 40	
	SS	E	33 13	
	L	N	38 05	
	L	E	57	
	P: N,W,C			
	Mag. $7\frac{1}{4}$ - $7\frac{1}{2}$ (Mat.)			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	30.7 S., 178.4 W.			
	Kermadec Is. region.			
	h: 46 km.			
	H= 20 05 49.1			USCGS
20.	iP	NEZ	20 22 42.0	
	P: S,W,C			
20.	iP	Z	20 32 18.0	
	P: D			
	31.0 S., 178.1 W.			
	Kermadec Is.			
	h: 59 km.			
	H= 20 20 23			USCGS
20.	iP	NEZ	21 12 36.5	
	i	NE	38.5	
	eS	N	14 36	
	P: S,W,C			
	Mag. 6.0 (Mat.)			
	44.8 N., 154.7 E.			
	Kurile Is. region.			
	h: 38 km.			
	H= 21 09 44.8			USCGS
20.	P	Z	22 32 47	
	20.1 N., 121.9 E.			
	Philippine Is. region.			
	h: 33 km.			
	H= 22 27 58			USCGS
20.	iP	Z	23 10 21.0	
	eS	N	11 18	
	P: C			
20.	P	Z	23 27 19	
	45.0 N., 150.5 E.			
	Kurile Is.			
	h: 52 km.			
	H= 23 24 26.9			USCGS
20.	iP	NEZ	23 58 55.3	
	S	Z	00 00 15	
	P: S,W,C			
	40.2 N., 142.5 E.			
	Near east coast of Honshu, Japan.			
	h: 33 km.			
	H= 23 57 38.3			USCGS
21.	eP	Z	00 07 40	
	43.9 N., 150.3 E.			
	Kurile Is. region.			
	h: 45 km.			
	H= 00 05 06			USCGS
21.	P	NEZ	00 22 23	
	44.8 N., 150.2 E.			
	Kurile Is. region.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	h: 45 km.		
	H= 00 19 34.8		USCGS
21.	iP	NEZ	00 46 28.0
	S	N	55
	P: N,E,D		
21.	P	Z	02 00 30
21.	iP	Z	02 19 51.2
	e	N	21 27
	P: C		
	41.4 N., 142.7 E.		
	Hokkaido, Japan.		
	h: 27 km.		
	H= 02 18 19.4		USCGS
21.	P	Z	02 31 36
	i	Z	37.3
	i	N	37.5
	41.5 N., 142.5 E.		
	Hokkaido, Japan.		
	h: 27 km.		
	H= 02 30 05.1		USCGS
21.	iP	NZ	02 47 35.7
	P: S,C		
21.	iP	NEZ	03 01 34.1
	eS	E	03 03
	P: S,W,C		
	40.2 N., 143.7 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 03 00 08.9		USCGS
21.	eP	Z	03 11 32
	e	Z	55
	e	NE	12 05
	i	Z	12
	14.1 N., 144.9 E.		
	Mariana Is.		
	h: 120 km.		
	H= 03 06 35		USCGS
21.	iP	Z	03 35 08.9
	eS	N	36 22
	P: D		
21.	iP	Z	03 49 21.6
	eS	NE	50 39
21.	iP	Z	04 08 53.6
	i	EZ	54.0
	i	N	54.5
	P: C		
	38.9 N., 65.2 E.		
	Southeastern Uzbek , USSR.		
			(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	h: 13 km.		
	H= 03 59 11.5		USCGS
21.	iP Z, P N		04 12 56.6
	i	Z	13 02.3
	i	Z	06.5
	S	EZ	14 08
	P: C		
	41.1 N., 143.5 E.		
	Hokkaido, Japan.		
	h: 33 km.		
	H= 04 11 24.7		USCGS
21.	e	Z	04 19 53
	e	N	20 41
	e	E	45
	i	E	21 07
21.	eP	Z	04 46 00
	e	Z	08
	i	EZ	14
	41.2 N., 143.2 E.		
	Hokkaido, Japan.		
	h: 35 km.		
	H= 04 44 29		USCGS
21.	P	Z	05 13 13
	i	Z	22
	eS	NE	56
	i	Z	58
21.	iP	NE	05 23 37.7
	P: S,C		
	41.4 N., 143.5 E.		
	Hokkaido, Japan.		
	h: 40 km.		
	H= 05 22 04.1		USCGS
21.	iP	Z	05 44 27.8
	e	N	52
	eS	N	57
	P: D		
21.	iP	Z	05 47 43.6
	S	N	48 22
	S	E	23
	P: C		
21.	P	Z	05 56 50
21.	P	NZ	06 38 27
	i	Z	32.0
	41.7 N., 142.5 E.		
	Hokkaido, Japan.		
	h: 33 km.		
	H= 06 36 55		USCGS
21.	P	NEZ	08 05 57
	eS	E	07 16

Date	Phase	Comp.	Time(GMT) h m s
21.	iP	NEZ	08 22 52.7
	i	E	24 13
	S	N	25 11
	P: S,W,C		
	Mag. 6.1 (Mat.)		
	44.9 N., 150.2 E.		
	Kurile Is. region.		
	h: 33 km.		
	H= 08 20 00.9		USCGS
21.	P	Z	10 09 21
21.	P	Z	10 57 08
	S	N	11 01 06
	i	E	12
	L	N	04 40
	L	Z	05 00
	i	E	08.7
	20.2 N., 122.0 E.		
	Philippine Is. region.		
	h: 30 km.		
	H= 10 52 16.6		USCGS
21.	P	Z	11 02 39
	e	E	03 38
21.	eP	Z	11 03 43
	44.7 N., 150.2 E.		
	Kurile Is. region.		
	h: 33 km.		
	H= 11 00 44.6		USCGS
21.	eP	Z	11 05 48
	e	Z	06 43
	45.0 N., 150.1 E.		
	Kurile Is.		
	h: 48 km.		
	H= 11 03 57.5		USCGS
21.	iP	EZ	12 13 59.5
	P: W,C		
	41.5 N., 142.7 E.		
	Hokkaido, Japan.		
	h: 33 km.		
	H= 12 12 27		USCGS
21.	eP	Z	12 23 52
21.	eP	Z	13 11 32
	44.7 N., 150.0 E.		
	Kurile Is. region.		
	h: 40 km.		
	H= 13 08 40		USCGS
21.	e	Z	13 13 48
21.	P	Z	13 43 38
	i	NEZ	48

Date	Phase	Comp.	Time(GMT) h m s
21.	iP	NEZ	15 11 46.6
	S	E	12 57
	P: N,E,D		
	41.5 N., 142.9 E.		
	Hokkaido, Japan.		
	h: 26 km.		
	H= 15 10 13.4		USCGS
21.	iP	NEZ	15 29 31.0
	eS	E	30 35
	P: S,W,C		
	41.2 N., 143.4 E.		
	Hokkaido, Japan.		
	h: 33 km.		
	H= 15 27 59.0		USCGS
21.	iP	Z	15 56 14.9
	eS	E	57 31
	P: C		
	41.4 N., 142.5 E.		
	Hokkaido, Japan.		
	h: 33 km.		
	H= 15 54 46		USCGS
21.	P	NZ	15 58 19
	eS	E	59 29
21.	iP	NZ	16 05 54.0
	eS	E	07 29
	P: S,C		
	41.7 N., 141.9 E.		
	Hokkaido, Japan.		
	h: 28 km.		
	H= 16 04 21		USCGS
21.	eP	Z	17 50 15
21.	iP	EZ	18 20 18.2
	eS	NE	21 00
	i	Z	21 05
	P: W,D		
21.	P	NEZ	18 50 22
	eS	E	52 34
	e	N	37
	44.8 N., 150.3 E.		
	Kurile Is. region.		
	h: 51 km.		
	H= 18 47 30.5		USCGS
21.	P	NEZ	21 06 59
	eS	E	08 24
21.	eP	Z	22 22 09
22.	P	Z	02 10 51
	eS	N	12 05
	i	E	08

Date	Phase	Comp.	Time(GMT) h m s	
22.	P	NZ	04 17 47	
	e	N	19 23	
	41.9 N., 141.8 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 04 16 14			USCGS
22.	P	NEZ	04 28 00	
	S	E	29 08	
	40.4 N., 143.9 E.			
	Off east coast of Honshu, Japan.			
	h: 27 km.			
	H= 04 26 31			USCGS
22.	P	EZ	05 04 52.4	
	41.6 N., 142.5 E.			
	Hokkaido, Japan.			
	h: 35 km.			
	H= 05 03 20.1			USCGS
22.	eP	Z	05 30 10	
	44.6 N., 150.7 E.			
	Kurile Is. region.			
	h: 45 km.			
	H= 05 27 19			USCGS
22.	iP	EZ	05 50 32.1	
	i	N	32.3	
	P: E,D			
22.	iP	NZ	06 38 10.7	
	i	Z	17.4	
	eS	N	39 39	
	P: S,C			
22.	iP	NZ	06 46 13.9	
	S	NE	52	
	P: S,C			
22.	P	Z	07 27 31	
22.	iP	NEZ	08 11 16.9	
	S	NEZ	27	
	P: N,E,C			
22.	P	NEZ	08 21 24	
22.	iP	NZ	10 53 24.6	
	i	E	24.8	
	eS	E	54 33	
	i	N	44	
	i	Z	55 00	
	P: S,C			
	Mag. 6.0 (Mat.)			
	41.5 N., 142.3 E.			
	Hokkaido, Japan.			
	h: 40 km.			
	H= 10 51 53.3			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
22.	iP	NEZ	11 25 07.0	
	i	E	26 49	
	P: N,E,D			
	41.4 N., 142.5 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 11 23 37			USCGS
22.	P	Z	13 39 02	
22.	iP	NEZ	14 49 23.4	
	P: N,E,D			
22.	iP	Z	14 51 39.3	
	P: C			
	41.4 N., 142.9 E.			
	Hokkaido, Japan.			
	h: 40 km.			
	H= 14 50 07.8			USCGS
22.	iP	Z	15 50 55.9	
	P: C			
	41.2 N., 143.0 E.			
	Hokkaido, Japan.			
	h: 31 km.			
	H= 15 49 25.9			USCGS
22.	P	NZ	17 43 18	
22.	iP	Z	17 53 13.2	
	i	N	13.4	
	P: D			
22.	eP	NEZ	18 39 10	
	44.5 N., 150.3 E.			
	Kurile Is. region.			
	h: 35 km.			
	H= 18 36 16.6			USCGS
22.	P	NZ	19 08 46	
	S	Z	10 02	
	S	NE	03	
	30.5 N., 142.5 E.			
	South of Honshu, Japan.			
	h: 33 km.			
	H= 19 07 03.9			USCGS
22.	iP	Z	19 30 41.2	
	i	NEZ	41.9	
	S	NE	31 39	
	P: D			
	Mag. 5.0 (Mat.)			
	40.2 N., 142.3 E.			
	Near east coast of Honshu, Japan.			
	h: 40 km.			
	H= 19 29 25.7			USCGS

Date	Phase	Comp.	Time(GMT) h m s
22.	P	Z	20 04 04
	i	Z	17.6
	44.8 N., 150.2 E.		
	Kurile Is. region.		
	h: 46 km.		
	H= 20 01 13.3		USCGS
22.	P	NEZ	20 11 01
22.	iP	NZ	21 17 33.4
	L	N	27 15
	P: S,D		
	2.9 N., 126.5 E.		
	Molucca Passage.		
	h: 58 km.		
	H= 21 10 45.3		USCGS
22.	P	NE	21 29 02
	31.5 N., 139.8 E.		
	South of Honshu, Japan.		
	h: 33 km.		
	H= 21 27 41		USCGS
22.	P	Z	21 36 52
	P	NE	53
	31.5 N., 140 .0 E.		
	South of Honshu, Japan.		
	h: 33 km.		
	H= 21 35 32		USCGS
22.	P	NEZ	21 50 03
22.	iP	Z	22 32 44.3
	i	N	44.5
	i	E	45.3
	eS	NEZ	33 54
	P: D		
	31.5 N., 139.8 E.		
	South of Honshu, Japan.		
	h: 33 km.		
	H= 22 31 23.3		USCGS
22.	P	EZ	22 42 35
	i	NZ	44
22.	P	Z	23 20 15
	i	N	17.5
	eS	E	21 33
	e	N	42
	42.2 N., 141.4 E.		
	Hokkaido, Japan.		
	h: 26 km.		
	H= 23 18 44		USCGS
23.	P	EZ	00 10 13
	40.8 N., 144.1 E.		
	Off east coast of Honshu, Japan.		
	h: 19 km.		
	H= 00 08 42		USCGS

Date	Phase	Comp.	Time(GMT) h m s
23.	P	NEZ	01 21 46
23.	P	Z	02 59 06
	41.6 N., 142.5 E.		
	Hokkaido, Japan.		
	h: 25 km.		
	H= 02 57 34		USCGS
23.	P	NEZ	06 23 57
	eS	E	25 14
23.	P	Z	07 45 20
	44.7 N., 150.5 E.		
	Kurile Is. region.		
	h: 50 km.		
	H= 07 42 28		USCGS
23.	iP	EZ	07 51 05.3
	e	E	52 36
	P: W,C		
23.	iP	Z	08 17 13.3
	i	E	13.7
	eS	N	18 36
	P: C		
23.	P	NZ	09 43 17
	S	E	49
	S	NZ	50
23.	P	Z	11 42 55
	eS	N	43 27
	e	Z	38
23.	P	NEZ	13 32 53
	eS	N	33 57
	e	E	34 04
	41.2 N., 143.4 E.		
	Hokkaido, Japan.		
	h: 33 km.		
	H= 13 31 21		USCGS
23.	P	NEZ	14 22 00
	eS	N	23 20
	e	E	44
23.	iP	NEZ	14 26 51.0
	S	E	28 08
	P: S,W,C		
	40.3 N., 143.7 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 14 25 27		USCGS
23.	P	NEZ	15 10 39
	e	N	11 59
	40.0 N., 144.4 E.		
	Off east coast of Honshu, Japan.		(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	h: 33 km.			
	H= 15 09 10			USCGS
23.	P	NZ	17 36 44	
	S	N	47 11	
	SS	N	52 35	
	SS	E	39	
	Lq	N	59 52	
	Lq	E	18 00 10	
	Lr	N	05 54	
	P: N,C			
	Mag. 7½ - 7¾ (Mat.)			
	41.7 S., 171.9 E.			
	South Island, New Zealand.			
	h: 21 km.			
	H= 17 24 15.7			USCGS
23.	P	NEZ	18 32 26	
	eS	E	33 38	
	41.2 N., 143.3 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 18 30 54			USCGS
23.	iP	Z	18 35 51.8	
	i	Z	36 04	
	i	E	05	
	i	N	37 07.5	
	e	NE	38 15	
	P: C			
	44.9 N., 150.2 E.			
	Kurile Is. region.			
	h: 33 km.			
	H= 18 33 01			USCGS
23.	iP	Z	18 44 46.8	
	e	Z	57	
	P: C			
23.	eP	Z	18 54 55	
	30.6 S., 177.7 W.			
	Kermadec Is. region.			
	h: 70 km.			
	H= 18 43 01			USCGS
23.	iP	Z	19 21 09.7	
	P: C			
	19.8 N., 122.0 E.			
	Philippine Is. region.			
	h: 71 km.			
	H= 19 16 21			USCGS
23.	iP	NEZ	19 54 56.5	
	eS	N	56 12	
	P: N,E,D			
23.	P	EZ	21 09 07	
	41.5 N., 142.2 E.			
	Hokkaido, Japan.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	h: 35 km.			
	H= 21 07 41			USCGS
23.	P	NEZ	21 18 10	
23.	iP	NEZ	21 58 45.4	
	iS	NEZ	52.4	
	P: S,W,C			
23.	P	NEZ	23 33 59	
	eS	E	40 09	
23.	iP	NEZ	23 57 49.0	
	eS	E	58 57	
	P: S,W,C			
	40.3 N., 143.6 E.			
	Off east coast of Honshu, Japan.			
	h: 38 km.			
	H= 23 56 24.7			USCGS
24.	iP	Z	01 31 13.6	
	P: C			
24.	P	NZ	03 37 50	
24.	iP	NZ	10 26 31.2	
	P: S,C			
24.	eP	Z	11 25 01	
	53.2 N., 163.1 W.			
	Unimak I. region.			
	h: 33 km.			
	H= 11 17 02.5			USCGS
24.	iP	NZ	11 29 44.5	
	P: N,C			
24.	iP	NZ	11 56 14.1	
	S	N	30	
	P: S,D			
24.	iP	Z	12 42 49.8	
	P: C			
	41.2 N., 143.1 E.			
	Hokkaido, Japan.			
	h: 38 km.			
	H= 12 41 18			USCGS
24.	P	NEZ	13 00 55	
24.	iP	NEZ	13 56 09.0	
	i	N	16.2	
	eS	N	57 24	
	i	E	36	
	P: S,W,C			
	40.8 N., 143.2 E.			
	Off east coast of Honshu, Japan.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	h: 34 km.		
	H= 13 54 42		USCGS
24.	iP	NEZ	14 07 50.5
	S	E	08 59
	i	N	09 02
	P: S,W,C		
	Mag. 5.9 (Mat.)		
	40.9 N., 143.0 E.		
	Off east coast of Honshu, Japan.		
	h: 38 km.		
	H= 14 06 24.2		USCGS
24.	iP	Z	14 33 09.5
	i	NE	09.8
	P: C		
	40.5 N., 144.3 E.		
	Off east coast of Honshu, Japan.		
	h: 35 km.		
	H= 14 31 37		USCGS
24.	eP	Z	14 35 09
24.	e	Z	14 37 26
24.	iP	NEZ	15 30 25.4
	iS	NZ	31 10.1
	P: N,E,D		
24.	iP	NEZ	15 50 14.8
	P: N,E,D		
24.	iP	Z	15 51 31.3
	epP	Z	52 46
	i	E	53
	ScP	NEZ	55 49
	S	NEZ	57 34
	ScS	NE	16 00 19
	P: D		
	Mag. 6.7 (Mat.)		
	6.8 S., 118.9 E.		
	Flores Sea.		
	h: 609 km.		
	H= 15 43 54.2		USCGS
24.	P	NEZ	17 03 10
	S	NE	54
24.	iP	EZ	17 45 11.9
	S	N	38
	i	N	47
	i	E	49
	P: E,D		
24.	eP	Z	17 53 22
	41.9 S., 171.8 E.		
	South Island, New Zealand.		
	h: 27 km.		
	H= 17 40 54		USCGS

Date	Phase	Comp.	Time(GMT) h m s
24.	iP	NZ	18 11 45.3
	i	E	45.7
	i	N	12 11
	P: S,C		
24.	iP	NEZ	19 48 59.7
	eS	E	50 19
	P: S,W,C		
24.	P	NZ	21 09 56
	41.8 S., 172.0 E.		
	South Island, New Zealand.		
	h: 33 km.		
	H= 20 57 27.3		USCGS
24.	iP	NEZ	21 35 56.1
	i	Z	36 20.6
	eS	N	37 10
	e	E	16
	P: S,W,C		
24.	iP	NEZ	21 43 03.6
	P: S,W,C		
24.	iP	NEZ	21 46 02.5
	P: S,W,C		
24.	iP	NZ	23 39 03.7
	P: S,C		
25.	iP	Z	00 26 24.1
	i	Z	32
	e	N	27 26
	P: D		
25.	P	Z	03 30 16
25.	iP	Z	04 51 20.6
	i	N	27.5
	i	Z	30.2
	e	N	52 00
	P: C		
25.	P	Z	06 51 01
25.	iP	Z	06 52 53.8
	P: C		
25.	P	NEZ	07 26 05
	e	E	27 24
25.	P	Z	09 14 12
25.	P	NZ	09 47 08
25.	iP	NEZ	10 25 11.9
	i	Z	21.7
	P: S,W,C		

Date	Phase	Comp.	Time(GMT) h m s
25.	iP	NZ	10 59 25.7
	P: S,C		
25.	iP	NEZ	11 54 17.1
	S	E	55 16
	i	N	21
	e	Z	32
	i	N	36
	P: S,W,C		
	40.1 N., 143.1 E.		
	Off east coast of Honshu, Japan.		
	h: 37 km.		
	H= 11 52 57.4		USCGS
25.	iP	NEZ	13 39 11.0
	i	E	21
	e	E	40 50
	P: S,W,C		
	39.2 N., 142.9 E.		
	Near east coast of Honshu, Japan.		
	h: 42 km.		
	H= 13 37 59.3		USCGS
25.	P	NEZ	13 42 30
	eS	N	43 50
	40.9 N., 143.1 E.		
	Off east coast of Honshu, Japan.		
	h: 30 km.		
	H= 13 41 01.5		USCGS
25.	iP	NZ	13 55 30.8
	P: N,D		
25.	iP	NEZ	14 19 59.5
	i	NZ	20 28
	i	N	21 48
	e	E	57
	P: N,E,D		
	38.9 N., 143.0 E.		
	Off east coast of Honshu, Japan.		
	h: 30 km.		
	H= 14 18 52		USCGS
25.	P	EZ	19 08 07
	eS	E	44
	i	N	49
25.	iP	NEZ	19 10 14.2
	eS	NE	59
	P: N,W,D		
25.	iP	EZ	19 36 06.4
	e	N	39
	e	N	55
	P: W,C		

Date	Phase	Comp.	Time(GMT) h m s
25.	iP	NEZ	20 10 58.2
	P: S,W,C		
25.	iP	NZ	21 11 32.5
	i	E	32.8
	eS	E	12 37
	P: S,C		
26.	eP	NEZ	03 07 35
	S	N	03 15
	i	EZ	21
26.	P	NEZ	04 09 14
	i	NZ	17
	i	E	18
	0.4 S., 124.0 E.		
	Molucca Sea.		
	h: 106 km.		
	H= 04 01 57.8		USCGS
26.	eP	NEZ	06 41 14
26.	iP	NEZ	07 19 48.0
	S	NZ	20 20
	S	E	21
	P: N,E,C		
26.	eP	Z	14 00 00
	i	NEZ	10
26.	iP	NEZ	14 05 34.0
	e	NE	07 00
	P: S,W,C		
	40.0 N., 142.7 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 14 04 16.7		USCGS
26.	e	N	15 06 32
	eSS	E	14 52
	eL	NE	24.4
	Mag. 6 - 6½ (Mat.)		
	63.3 S., 170.7 E.		
	Balleny Is. region.		
	h: 9 km.		
	H= 14 41 52		USCGS
26.	P	Z	15 12 18
26.	iP	NEZ	17 42 54.4
	eS	NE	44 00
	S	Z	01
	P: S,W,C		
	40.1 N., 142.3 E.		
	Near east coast of Honshu, Japan.		
	h: 49 km.		
	H= 17 41 40.1		USCGS

Date	Phase	Comp,	Time(GMT) h m s
26.	iP	NEZ	18 35 51.7
	P: N,E,D		
	41.3 N., 142.5,E.		
	Hokkaido, Japan.		
	h: 44 km.		
	H= 18 34 25.0		USCGS
26.	iP	NEZ	20 54 57.0
	P: S,W,C		
26.	iP	NEZ	21 54 39.0
	S	E	52
	i	N	54
	P: S,W,D		
26.	P	EZ	22 41 38
	i	E	42
	eS	NE	42 05
26.	P	NEZ	23 00 41
	i	Z	56
	eS	N	01 50
	i	Z	02 09
	i	N	32
	40.7 N., 143.2 E.		
	Off east coast of Honshu, Japan.		
	h: 40 km.		
	H= 22 59 14.2		USCGS
27.	P	Z	00 32 26
27.	iP	Z	02 00 55.3
	eS	N	02 23
	P: C		
27.	P	Z	02 28 37
	6.9 S., 129.5 E.		
	Banda Sea.		
	h: 37 km.		
	H= 02 20 34.7		USCGS
27.	iP	Z	06 19 09.3
	i	NEZ	10.3
	eS	N	20 32
	P: C		
	40.4 N., 141.8 E.		
	Near east coast of Honshu, Japan.		
	h: 50 km.		
	H= 06 17 54		USCGS
27.	iP	NEZ	10 39 24.6
	eS	E	40 25
	i	N	52
	P: S,W,C		
	39.6 N., 143.2 E.		
	Off east coast of Honshu, Japan.		
	h: 38 km.		(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	H= 10 38 08		USCGS
27.	P	NEZ	13 06 59
	eS	N	08 10
27.	P	Z	15 33 40
	i	N	58.1
	iS	N	34 25.3
27.	P	EZ	19 01 27
	i	Z	54.3
27.	P	EZ	19 14 10
	21.3 S., 174.5 W.		
	Tonga Is.		
	h: 100 km.		
	H= 19 02 50.0		USCGS
27.	iP	Z	22 15 27.0
	P: C		
28.	eP	Z	01 54 10
28.	iP	Z	03 59 38.6
	S	NE	04 00 00
	P: D		
28.	P	EZ	04 08 10
	e	E	24
	e	E	35
	e	NE	47
	i	N	09 58.0
	32.3 N., 132.8 E.		
	Shikoku, Japan.		
	h: 47 km.		
	H= 04 06 40		USCGS
28.	iP	Z	05 10 34.4
	e	E	12 01
	P: C		
28.	iP	Z	07 33 47.1
	eS	N	35 01
	P: C		
28.	P	NEZ	09 18 30
	S	E	28 28
	i	N	32
	SS	E	33 52
	L	E	39 46
	Mag. 6 - 6½ (Mat.)		
	30.9 S., 177.8 W.		
	Kermadec Is. region.		
	h: 33 km.		
	H= 09 06 29.9		USCGS
28.	eP	Z	10 49 22
	e	N	56
28.	P	Z	11 46 12

Date	Phase	Comp.	Time(GMT) h m s
28.	iP	Z	12 22 49.0
	eS	Z	24 03
	P: D		
	41.6 N., 142.5 E.		
	Hokkaido, Japan.		
	h: 18 km.		
	H= 12 21 18		USCGS
28.	iP	NEZ	13 10 23.5
	eS	N	11 41
	P: S,W,C		
28.	iP	Z	13 23 42.5
	i	Z	52
	P: C		
28.	iP	Z	13 34 42.0
	i	NE	42.7
	i	Z	36 47
	S	NEZ	40 36
	e	E	43 00
	eL	N	18
	eL	Z	28
	L	E	52
	L	N	45 43
	P: C		
	Mag. $7\frac{1}{2}$ - $7\frac{3}{4}$ (Mat.)		
	2.9 S., 139.3 E.		
	Near south coast of west New Guinea.		
	h: 65 km.		
	H= 13 27 18.7		USCGS
28.	iP	NEZ	14 31 47.1
	i	N	32 09
	eS	N	33 04
	P: S,W,C		
	41.0 N., 143.0 E.		
	Hokkaido, Japan.		
	h: 40 km.		
	H= 14 30 19.9		USCGS
28.	P	Z	17 01 51
28.	iP	EZ	17 34 49.5
	i	N	49.7
	S	Z	35 04
	S	NE	05
	P: W,C		
28.	iP	NZ	19 22 31.7
	P: N,D		
28.	iP	NEZ	20 35 41.2
	S	E	36 31
	S	NZ	33
	P: N,E,D		
28.	iP	Z	22 35 57.4
	S	NE	40 48
			(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	L	N	22 42 46
	P: C		
	52.2 N., 172.8 E.		
	Near Is., Aleutian Is.		
	h: 15 km.		
	H= 22 29 56.8		USCGS
28.	P	NEZ	23 02 00
	eS?	E	03 09
	i	N	18
	40.9 N., 142.0 E.		
	Near east coast of Honshu, Japan.		
	h: 60 km.		
	H= 23 00 39		USCGS
29.	iP	NEZ	08 56 42.4
	eS	N	58 09
	e	E	30
	P: S,W,C		
29.	P	N	09 18 14
	e	Z	27
	S	N	49
	i	Z	53
29.	iP	EZ	10 04 20.2
	i	NEZ	21.1
	iS	N	46.0
	P: E,D		
29.	P	Z	14 57 49
	eS	Z	15 02 08
	eS	NE	12
	eL	E	03 30
	eL	N	04 00
	12.6 N., 144.9 E.		
	South of Mariana Is.		
	h: 52 km.		
	H= 14 52 35.0		USCGS
29.	eP	Z	15 59 02
29.	P	Z	16 11 54
29.	iP	Z	17 31 52.7
	P: C		
	18.6 S., 169.0 E.		
	New Hebrides Is.		
	h: 214 km.		
	H= 17 21 52.9		USCGS
29.	iP	NEZ	17 37 40.6
	e	N	39 04
	P: S,W,C		
29.	P	NZ	18 19 03
	i	NZ	14
29.	eP	EZ	19 07 39

Date	Phase	Comp.	Time(GMT) h	m	s
29.	iP	NEZ	20	12	26.4
	e	Z		13	35
	e	N		14	00
	P: N,E,D				
30.	P	Z	01	21	38
	27.8 N., 54.0 E.				
	Southern Honshu				
	h: 27 km.				
	H= 01 10 30.0		USCGS		
30.	P	Z	04	15	32
	i	Z			41
30.	iP	NZ	05	26	37.6
	i	Z			51
	eS	E		28	43
	i	N			56
	L	N		29	20
	L	E			24
	L	Z			32
	P: S,C				
	Mag. 6.1 (Mat.)				
	44.7 N., 150.3 E.				
	Kurile Is. region.				
	h: 49 km.				
	H= 05 23 48.9		USCGS		
30.	iP	Z	06	25	51.5
	e	N		27	25
	P: D				
	42.1 N., 141.6 E.				
	Hokkaido, Japan.				
	h: 33 km.				
	H= 06 24 22		USCGS		
30.	iP	NEZ	09	05	39.8
	eS	E		06	59
	e	N		07	13
	P: S,W,C				
	40.7 N., 142.3 E.				
	Near east coast of Honshu,				
	Japan.				
	h: 66 km.				
	H= 09 04 20.9		USCGS		
30.	iP	Z	10	03	35.0
	S	E		10	03
	S	Z			05
	eL	E		13	14
	eL	Z		14	0
	eL	N		14	43
	P: D				
	6.7 S., 129.5 E.				
	Banda Sea.				
	h: 33 km.				
	H= 09 55 32.0		USCGS		

Date	Phase	Comp.	Time(GMT) h	m	s
30.	iP	NEZ	10	50	11.0
	S	NEZ			29
	P: N,E,C				
30.	iP	NEZ	11	03	23.0
	iS	EZ			27.0
	P: N,W,D				
30.	iP	NZ	12	20	17.5
	eS	E		21	26
	P: S,D				
30.	iP	Z	16	14	14.7
	i	Z			26.6
	P: C				
	10.3 S., 161.6 E.				
	Solomon Is.				
	h: 41 km.				
	H= 16 03 12.7		USCGS		
30.	iP	NEZ	16	37	40.5
	S	NE		38	10
	P: S,W,D				
30.	P	Z	17	52	53
	i	N			58.6
	S	E	18	03	12
	S	NZ			13
	eSSS	NE		12	40
	eL	NE		21	16
	35.5 N., 28.0 E.				
	Eastern Mediterranean Sea.				
	h: 21 km.				
	H= 17 40 24.4		USCGS		
30.	P Z, eP NE		18	01	23
30.	P	Z	18	05	06
	e	Z		06	30
	i	Z		07	51.6
30.	iP	Z	18	32	19.4
	P: C				
30.	eP	Z	18	53	42
30.	eP	EZ	19	16	52
	i	NEZ		17	01
30.	iP	Z	19	54	24.3
	e	E	20	03	30
	S	N		04	24
	eSS	N		09	11
	i	E			56
	L	N		15	12
	L	Z			38
	L	E		22	43
	P: N,W,C				

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Mag. 6½ - 6 3/4 (Mat.)		
	31.0 S., 177.6 W.		
	Kermadec Is.		
	h: 42 km.		
	H= 19 42 25.1		USCGS
30.	iP	NEZ	21 33 55.0
	eS	N	35 02
	P: N,E,D		
31.	P	NEZ	01 19 32
	41.6 N., 142.8 E.		
	Hokkaido, Japan.		
	h: 12 km.		
	H= 01 17 56		USCGS
31.	P	NZ	04 21 01
31.	iP	NEZ	05 50 50.4
	eS	N	51 53
	P: S,W,C		
31.	eP	Z	07 03 35
31.	iP	Z	07 13 35
	P: C		
31.	iP	EZ	08 30 50.6
	P: W,C		
31.	iP	NEZ	09 00 41.8
	S	NE	01 03
	P: S,E,D		
31.	iP	NZ	10 03 15.5
	i	NEZ	21
	e	N	04 41
	P: S,C		
31.	P	Z	13 55 12
31.	iP	NEZ	14 01 43.2
	eS	E	03 06
	P: S,W,C		
31.	P	NEZ	17 34 08
	eS	N	40 40
	6.9 S., 129.5 E.		
	Banda Sea.		
	h: 20 km.		
	H= 17 26 02.3		USCGS
31.	P	Z	17 57 48.4
	i	NEZ	48.7
	e	N	58 55
31.	iP	NEZ	18 30 07.9
	e	N	31 23
			(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	P: N,W,C		
	13.6 S., 167.2 E.		
	New Hebrides Is.		
	h: 205 km.		
	H= 18 20 42.7		USCGS
31.	iP	NEZ	19 53 29.6
	eS	Z	54 41
	P: S,W,C		
	41.4 N., 142.6 E.		
	Hokkaido, Japan.		
	h: 33 km.		
	H= 19 51 58.5		USCGS
31.	P	NEZ	20 35 31
31.	P	Z	20 59 53
	i	Z	21 00 25.6

Mineo Takehana

Director

June , 1968

Date	Phase	Comp.	Time(GMT) h m s
1.	P	Z	00 51 32
1.	P	Z	00 57 28
	i	NEZ	28.9
	41.3 N., 142.3 E.		
	Hokkaido Japan region.		
	h: 33 km.		
	H= 00 55 59.9		USCGS
1.	eP	Z	03 22 55
	40.9 N., 142.0 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 03 21 33		USCGS
1.	iP Z, P NE		03 59 05.7
	i	Z	28
	P: N,E,D		
	38.2 N., 141.8 E.		
	Near east coast of Honshu, Japan.		
	h: 77 km.		
	H= 03 58 14		USCGS
1.	P	Z	09 57 32.4
1.	iP NZ, P E		10 33 03.0
	S	E	34 22
	P: S,W,C		
	40.2 N., 142.3 E.		
	Near east coast of Honshu, Japan.		
	h: 50 km.		
	H= 10 31 49.3		USCGS
1.	P	Z	11 34 36
	31.0 S., 177.7 W.		
	Kermadec Is.		
	h: 33 km.		
	H= 11 22 35.1		USCGS
1.	P	NEZ	12 33 57
1.	iP Z, P NE		13 48 02.2
	P: D		
1.	iP Z, P NE		13 54 54.0
	41.6 N., 142.6 E.		
	Hokkaido, Japan region.		
	h: 34 km.		
	H= 13 53 21		USCGS
1.	P	N	15 46 20
1.	P	NEZ	16 44 14.6
	P: S,C		

Date	Phase	Comp.	Time(GMT) h m s
1.	iP Z, P NE		17 21 06.6
	P: D		
1.	iP	NEZ	19 47 16.0
	S	NEZ	38
	i	Z	53
	P: S,E,D		
1.	iP	NZ	21 13 39.2
	eS	N	14 52
	P: N,D		
1.	iP	NEZ	22 16 58.8
	eS	N	18 19
	P: S,W,C		
	40.7 N., 144.5 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 22 15 23		USCGS
2.	iP Z, P NE		00 50 55.7
	P: C		
2.	iP	Z	04 33 15.9
	P: C		
2.	P	Z	04 45 08
	6.8 S., 129.6 E.		
	Banda Sea.		
	h: 38 km.		
	H= 04 37 06		USCGS
2.	eP	Z	05 24 42
	8.9 S., 120.6 E.		
	Flores I. region.		
	h: 19 km.		
	H= 05 16 01.0		USCGS
2.	iP NZ, P E		06 30 40.9
	P: S,C		
2.	iP	NEZ	08 01 31.5
	S	Z	02 46
	P: S,W,C		
	41.2 N., 143.4 E.		
	Hokkaido, Japan region.		
	h: 33 km.		
	H= 07 59 58.8		USCGS
2.	iP	Z	08 27 16.3
	i	Z	21.0
	i	Z	36
	S	NEZ	34 12
	Lq	E	38 00
	Lr	E	41 07
	Lr	Z	43
	P: D		

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	Mag. 5¾ (Mat.)		
	8.1 S., 158.6 E.		
	Fiji Is. region.		
	h: 35 km.		
	H= 08 18 36.2		USCGS
2.	P	Z	08 35 59
2.	P	Z	09 59 01
2.	iP EZ, P N		10 07 53.5
	eS	E	09 04
	P: E,C		
2.	iP Z, P NE		10 17 30.3
	iS	NE	50.5
	P: D		
2.	iP Z, P NE		13 17 25.5
	eS	E	18 04
	P: D		
2.	iP	NZ	23 14 17.3
	S	N	15 37
	P: S,C		
3.	iP Z, P NE		02 14 03.5
	P: D		
	41.5 N., 142.4 E.		
	Hokkaido, Japan region.		
	h: 57 km.		
	H= 02 12 32.7		USCGS
3.	iP	NEZ	05 32 38.9
	eS	E	33 24
	P: N,E,D		
	36.0 N., 141.2 E.		
	Near east coast of Honshu, Japan.		
	h: 57 km.		
	H= 05 31 58.4		USCGS
3.	iP	NEZ	05 49 08.6
	P: N,E,D		
	41.4 N., 142.4 E.		
	Hokkaido, Japan region.		
	h: 33 km.		
	H= 05 47 38.8		USCGS
3.	eP	Z	06 36 12
	S	N	49
3.	iP	NEZ	08 32 41.8
	S	NEZ	33 19
	P: N,E,D		
	35.9 N., 141.3 E.		
	Near east coast of Honshu, Japan.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	h: 56 km.		
	H= 08 32 00.9		USCGS
3.	iP	Z	08 55 53.3
	P: D		
	28.1 N., 138.9 E.		
	Bonin Is. region.		
	h: 521 km.		
	H= 08 53 50		USCGS
3.	iP Z, P NE		09 25 24.3
	sP	Z	26 03
	ScP	Z	30 44
	S	NE	31 30
	e	E	34 42
	e	E	35 44
	P: D		
	Mag. 5½ (Mat.)		
	5.4 S., 147.0 E.		
	East New Guinea region.		
	h: 190 km.		
	H= 09 17 46.2		USCGS
3.	P	Z	12 31 38
	i	NZ	44
	i	NEZ	48
	S	E	32 47
3.	iP	Z	13 21 59.6
	i	Z	22 06
	e	E	23 40
	P: C		
3.	eP	Z	13 46 35
3.	P	NEZ	14 19 02
	S	E	21 10
	45.7 N., 148.3 E.		
	Kurile Is.		
	h: 160 km.		
	H= 14 16 20.0		USCGS
3.	P	Z	16 59 33
	S	Z	17 00 11
3.	iP Z, P E		21 04 53.6
	S	N	05 31
	P: D		
4.	P	Z	02 32 23
	S	E	33 34
4.	iP	Z	02 54 21.0
	eS	N	55 47
	P: D		
4.	iP	EZ	05 44 46.3
	P: W,C		

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Date	Phase	Comp.	Time(GMT) h m s
4.	P	NEZ	10 07 10
4.	iP Z, P E		10 28 17.2
	P: D		
4.	iP	Z	10 35 19.2
	P: C		
4.	iP	NZ	13 22 33.1
	i	E	35.6
	eS	E	24 14
	iS	N	16.3
	P: N,C		
	27.6 N., 139.7 E.		
	Bonin Is. region.		
	h: 479 km.		
	H= 13 20 27.6		USCGS
4.	eP	Z	15 03 35
	eS	Z	07 40
	Lq	N	09 24
	Lr	Z	10 28
4.	iP	NZ	15 11 45.0
	P: N,D		
	41.9 N., 142.5 E.		
	Hokkaido, Japan region.		
	h: 33 km.		
	H= 15 10 10.6		USCGS
4.	iP	NEZ	15 32 19.8
	P: S,W,C		
	41.4 N., 142.6 E.		
	Hokkaido, Japan region.		
	h: 48 km.		
	H= 15 30 50.2		USCGS
4.	iP EZ, P N		17 17 24.2
	S	N	19 00
	P: S,W,C		
4.	iP	Z	17 19 45.0
	S	E	23 32
	P: C		
	22.5 N., 121.4 E.		
	Taiwan region.		
	h: 47 km.		
	H= 17 15 09.8		USCGS
4.	iP	NZ	18 24 17.0
	P: N,D		
4.	P	NZ	18 33 00
	eS	N	34 34
	41.8 N., 142.6 E.		
	Hokkaido, Japan region.		
	h: 33 km.		
	H= 18 31 25		USCGS

Date	Phase	Comp.	Time(GMT) h m s
4.	P	Z	18 58 10
4.	iP	NEZ	19 41 55.2
	eS	N	43 07
	i	E	16
	P: N,E,D		
4.	P	NEZ	21 21 56
	eS	E	23 22
5.	iP Z, P NE		03 12 05.6
	S	N	13 40
	P: S,W,C		
5.	iP Z, P NE		04 47 25.6
	P: C		
5.	iP	NEZ	07 17 27.5
	S	NE	18 26
	P: S,W,C		
5.	P	Z	09 14 04
5.	iP Z, P NE		09 24 35.2
	S	E	25 37
	P: E,D		
	41.3 N., 142.5 E.		
	Hokkaido, Japan region.		
	h: 33 km.		
	H= 09 23 07.3		USCGS
5.	iP Z, P N		15 15 08.2
	i	E	08.8
	S	NE	20 14
	iScP	Z	21 09.8
	P: N,C		
	5.0 N., 125.1 E.		
	Mindanao, P.I.		
	h: 142 km.		
	H= 15 08 39		USCGS
5.	eP	Z	15 26 02
	S	N	39
5.	iP NZ, P E		16 56 14.8
	eS	E	57 25
	P: S,C		
5.	iP Z, P E		21 43 48.4
	P: C		
5.	P	NEZ	23 11 43
	e	E	17 25
	P: C		
	52.2 N., 174.3 E.		
	Near Is., Aleutian Is.		
	h: 41 km.		
	H= 23 05 36.8		USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
6.	iP	NEZ	04 31 51.5	
	P: S,W,C			
6.	iP Z, P NE		07 16 40.5	
	P: S,W,C			
6.	eP	Z	07 41 30	
6.	eL	NE	12 28 30	
	19.7 S., 173.4 W.			
	Tonga Is.			
	h: 60 km.			
	H= 11 58 39			USCGS
6.	P	Z	15 06 00	
6.	P	NZ	15 13 46	
6.	iP	NEZ	16 33 40.7	
	S	NEZ	34 00	
	P: N,E,D			
6.	P	Z	16 52 58	
	i	Z	53 21	
	7.0 S., 129.4 E.			
	Banda Sea.			
	h: 75 km.			
	H= 16 44 57			USCGS
6.	iP	NEZ	18 22 43.0	
	S	E	23 37	
	P: N,E,D			
	40.6 N., 142.3 E.			
	Near east coast of Honshu, Japan.			
	h: 81 km.			
	H= 18 21 26			USCGS
6.	P	NEZ	18 43 40	
	40.9 N., 143.1 E.			
	Off east coast of Honshu, Japan.			
	h: 36 km.			
	H= 18 42 13			USCGS
6.	P	Z	19 49 41	
	i	Z	53 05	
	S	NE	54 32	
	14.9 N., 119.9 E.			
	Luzon, P.I.			
	h: 80 km.			
	H= 19 44 07.9			USCGS
6.	iP	NEZ	21 18 42.7	
	S	Z	19 50	
	P: S,W,C			
	41.3 N., 142.6 E.			
	Hokkaido, Japan region.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	h: 37 km.			
	H= 21 17 14.4			USCGS
6.	iP	NEZ	22 52 59.3	
	P: S,W,C			
6.	iP	EZ	22 54 36.1	
	P: C			
	44.5 N., 148.1 E.			
	Kurile Is.			
	h: 57 km.			
	H= 22 52 00.4			USCGS
7.	iP Z, P NE		00 03 16.5	
	S	E	52	
	P: D			
	34.7 N., 140.8 E.			
	Near east coast of Honshu, Japan.			
	h: 54 km.			
	H= 00 02 33			USCGS
7.	iP NZ, P E		03 17 15.2	
	S	E	28	
	P: N,E,D			
7.	e	N	04 35	
7.	e	N	05 55	
7.	iP	EZ	07 38 07.6	
	P: E,C			
7.	iP	Z	11 33 37.2	
	P: D			
	41.1 N., 143.3 E.			
	Hokkaido, Japan region.			
	h: 33 km.			
	H= 11 32 07			USCGS
7.	iP	Z	11 56 12.6	
	i	Z	58 08	
	P: C			
7.	iP	Z	12 05 16.2	
	i	NEZ	18	
	e	N	10 27	
	eS	E	11 33	
	eLq	E	14 40	
	eLr	Z	17 22	
	P: C			
	Mag. 7.0 (Mat.)			
	1.8 S., 120.1 E.			
	Celebes.			
	h: 20 km.			
	H= 11 57 29.4			USCGS
7.	P	Z	12 18 03	

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Date	Phase	Comp.	Time(GMT) h m s
7.	eL	Z	14 29
7.	iP	Z	15 38 23.7
	P: C		
7.	eP	Z	17 03 02
7.	eP	Z	18 33 39
	eL	NE	50 12
	17.1 S., 176.5 W.		
	Fiji Is. region.		
	h: 72 km.		
	H= 18 22 47		USCGS
7.	eP	Z	20 04 10
7.	iP	NEZ	21 19 05.9
	P: S,W,C		
7.	P	NZ	21 38 38
	i	N	42
	i	E	46
	i	N	41 49
	S	E	44 27
	Lq	E	48 00
	Lr	Z	53 00
	Mag. $6\frac{1}{4}$ - $6\frac{1}{2}$ (Mat.)		
	2.1 S., 120.5 E.		
	Celebes.		
	h: 23 km.		
	H= 21 30 50.3		USCGS
7.	iP	Z	22 48 17.2
	i	N	18.0
	P: C		
	41.0 N., 142.1 E.		
	Hokkaido, Japan region.		
	h: 54 km.		
	H= 22 46 56		USCGS
7.	P	Z	23 16 24
	i	NE	27
	S	Z	17 10
8.	P	NEZ	00 25 20
	S	E	32 22
	eL	E	39 18
	8.8 S., 157.6 E.		
	Solomon Is.		
	h: 33 km.		
	H= 00 16 39.5		USCGS
8.	iP	NEZ	02 46 05.8
	S	NE	47 12
	P: S,W,C		
	40.6 N., 143.7 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	H= 02 44 37.3		USCGS
8.	P	NEZ	02 59 57
	S	E	03 00 16
8.	P	NEZ	03 21 16
	7.0 S., 129.4 E.		
	Banda Sea.		
	h: 109 km.		
	H= 03 13 17.7		USCGS
8.	eP	Z	03 55 16
	12.9 N., 145.1 E.		
	South of Mariana Is.		
	h: 33 km.		
	H= 03 50 07		USCGS
8.	iP	NEZ	05 32 05.2
	S	N	33 48
	L	NE	34 28
	P: S,W,C		
	43.4 N., 147.1 E.		
	Kurile Is.		
	h: 43 km.		
	H= 05 29 46.5		USCGS
8.	eP	Z	10 32 58
8.	P	NEZ	11 07 12
8.	P	NEZ	12 06 27
	eS	E	07 35
	40.6 N., 143.7 E.		
	Off east coast of Honshu, Japan.		
	h: 37 km.		
	H= 12 04 58.3		USCGS
8.	P	Z	12 26 57
	S	N	27 52
8.	iP	NEZ	12 34 05.0
	P: N,E,D		
8.	P	NEZ	14 15 53
8.	P	NEZ	15 07 23
	eS	N	09 52
8.	iP	Z	16 53 06.7
	P: C		
8.	P	NEZ	20 21 42
	41.0 N., 143.5 E.		
	Hokkaido, Japan region.		
	h: 33 km.		
	H= 20 20 10		USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
8.	P	Z	20 52 22	
	i	Z	43	
	26.3 N., 124.4 E.			
	Northeast of Taiwan.			
	h: 160 km.			
	H= 20 48 44			USCGS
8.	iP	NEZ	20 56 12.9	
	S	N	57 24	
	P: S,W,C			
	41.5 N., 142.3 E.			
	Hokkaido, Japan region.			
	h: 30 km.			
	H= 20 54 45.2			USCGS
8.	iP	Z	21 44 41.4	
	e	Z	47 20	
	P: C			
	28.4 N., 129.6 E.			
	Ryukyu Is.			
	h: 33 km.			
	H= 21 42 06.3			USCGS
8.	iP	NZ	23 05 10	
	P: D			
	41.0 N., 143.0 E.			
	Hokkaido, Japan region.			
	h: 33 km.			
	H= 23 03 43			USCGS
8.	ePKP 1	Z	23 43 04	
	PP	Z	45 07	
	SS	N	00 01 00	
	SS	E	22	
	Lq	N	16 40	
	Mag. $6\frac{1}{4}$ - $6\frac{1}{2}$ (Mat.)			
	48.8 S., 31.5 E.			
	South of Africa.			
	h: 33 km.			
	H= 23 24 05.2			USCGS
8.	P	Z	23 55 23	
	43.6 N., 146.8 E.			
	Kurile Is.			
	h: 33 km.			
	H= 23 53 04			USCGS
9.	P	Z	01 07 39	
	39.0 N., 46.0 E.			
	Northwest Iran-USSR			
	border region.			
	h: 50 km.			
	H= 00 56 33.9			
9.	eP	Z	04 21 59	
	S	N	29 08	
	eSS	N	32 49	
	L	N	34 55	

Date	Phase	Comp.	Time(GMT) h m s	
9.	iP EZ, P N		04 41 20.1	
	P: W,C			
9.	iP	NEZ	04 49 39.5	
	P: S,W,C			
	39.5 N., 143.4 E.			
	Off east coast of Honshu,			
	Japan.			
	h: 33 km.			
	H= 04 48 23			USCGS
9.	iP	Z	09 25 33.6	
	i	NE	34.0	
	S	N	50	
	P: D			
9.	P	NEZ	09 27 55	
	24.1 S., 178.5 E.			
	South of Fiji Is.			
	h: 580 km.			
	H= 09 17 31.7			USCGS
9.	eP	Z	10 58 09	
	S	N	59 18	
9.	eP	Z	11 06 30	
	e	Z	07 44	
9.	eP	Z	13 08 52	
	0.7 S., 132.7 E.			
	West New Guinea region.			
	h: 33 km.			
	H= 13 01 47.5			USCGS
9.	eP	Z	13 13 55	
	S	NEZ	17 27	
	L	Z	19 13	
	L	E	17	
9.	iP	NEZ	13 49 39.0	
	S	E	50 51	
	S	Z	55	
	P: S,W,C			
	39.9 N., 144.0 E.			
	Off east coast of Honshu,			
	Japan.			
	h: 67 km.			
	H= 13 48 14.5			USCGS
9.	P	Z	16 16 27	
	41.2 N., 143.2 E.			
	Hokkaido, Japan region.			
	h: 27 km.			
	H= 16 14 56			USCGS
9.	P	NEZ	18 00 44	
	L	Z	02 30	

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	L	N	18 02 34
	L	E	40
	41.4 N., 142.6 E.		
	Hokkaido, Japan region.		
	h: 21 km.		
	H= 17 59 13.2		USCGS
9.	P	NEZ	19 38 01
9.	P	Z	23 07 13
	i	E	32
	S	Z	09 19
10.	iP	NEZ	02 39 56.5
	S	NZ	40 52
	P: S,W,C		
	40.2 N., 142.3 E.		
	Near east coast of Honshu, Japan.		
	h: 49 km.		
	H= 02 38 42.6		USCGS
10.	iP	Z	02 49 30.2
	S	NE	50 33
	P: C		
10.	P	NEZ	03 40 24
10.	iP Z, P NE		04 23 36.6
	P: C		
	44.2 N., 148.7 E.		
	Kurile Is.		
	h: 43 km.		
	H= 04 20 56		USCGS
10.	iP	NEZ	11 12 03.9
	S	E	13 11
	P: S,W,C		
	39.5 N., 144.6 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 11 10 36		USCGS
10.	P	Z	12 48 59
	i	Z	49 07
	i	Z	39
	PP	Z	50 40
	56.3 N., 161.6 W.		
	Alaska Peninsula.		
	h: 182 km.		
	H= 12 41 05.7		USCGS
10.	iP	EZ	14 02 56.1
	P: W,C		
	39.9 N., 144.4 E.		
	Off east coast of Honshu, Japan.		
	h: 28 km.		(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	H= 14 01 28		USCGS
11.	iP	EZ	02 10 55.2
	eS	N	12 32
	P: E,D		
11.	iP NZ, P E		07 23 35.4
	i	E	51.6
	S	N	24 22
	P: S,D		
	38.1 N., 142.0 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 07 22 43		USCGS
11.	iP	Z	10 33 24.0
	P: C		
	5.8 S., 103.9 E.		
	Southern Sumatra.		
	h: 60 km.		
	H= 10 24 12.3		USCGS
11.	PKP	Z	11 58 43
	21.2 S., 69.6 W.		
	Northern Chile.		
	h: 22 km.		
	H= 11 38 50.0		USCGS
11.	iP	NEZ	15 20 43.5
	iS	N	57
	i	E	59.9
	P: N,E,D		
11.	iP	EZ	17 33 55.8
	i	N	56.5
	P: E,D		
11.	P	NZ	17 50 03
	S	NE	51 45
11.	P	Z	18 44 58
	44.9 N., 149.5 E.		
	Kurile Is.		
	h: 40 km.		
	H= 18 42 17		USCGS
11.	iP	NEZ	21 04 00.5
	e	N	05 50
	P: S,W,C		
	40.5 N., 143.7 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 21 02 31.6		USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
11.	iP	Z	22 27 39.0	
	i	NE	39.5	
	S	N	29 11	
	P: C			
11.	P	NZ	22 33 13	
	eS	NE	35 42	
	eL	NEZ	36.0	
	45.6 N., 150.9 E.			
	Kurile Is.			
	h: 60 km.			
	H= 22 30 15.5			USCGS
12.	iP	EZ	04 37 03.3	
	i	N	04.2	
	e	N	39 03	
	eL	N	49.0	
	eL	E	51.5	
	eL	Z	52.5	
	eL	N	54.0	
	P: E,C			
	24.9 N., 91.9 E.			
	India - East Pakistan border region.			
	h: 44 km.			
	H= 04 29 22.6			USCGS
12.	iP	N	06 40 02.2	
	i	E	03.2	
	S	NE	41 01	
	P: N			
12.	P	Z	08 41 35	
	S	Z	42 50	
12.	P	Z	08 44 51	
	S	E	45 49	
12.	iP	NEZ	10 33 22.2	
	eS	E	34 23	
	P: N,E,D			
12.	iP	NEZ	13 43 01.0	
	i	NE	07	
	i	N	25	
	S	N	44 13	
	P: S,W,C			
	Mag. 6.8 (Mat.)			
	39.5 N., 142.7 E.			
	Near east coast of Honshu, Japan.			
	h: 44 km.			
	H= 13 41 50.7			USCGS
12.	eP	N	13 50 57	
12.	P	N	13 59 48	

Date	Phase	Comp.	Time(GMT) h m s	
12.	iP	NEZ	14 18 37.5	
	P: S,W			
	39.2 N., 143.0 E.			
	Off east coast of Honshu, Japan.			
	h: 32 km.			
	H= 14 17 25.8			USCGS
12.	iP	NEZ	15 10 05.8	
	P: S,W,C			
	39.5 N., 143.0 E.			
	Off east coast of Honshu, Japan.			
	h: 23 km.			
	H= 15 08 52.2			USCGS
12.	iP	NEZ	15 40 23.6	
	P: S,W,C			
	39.4 N., 142.8 E.			
	Near east coast of Honshu, Japan.			
	h: 32 km.			
	H= 15 39 12			USCGS
12.	P	Z	15 50 12	
	S	E	51 20	
	P: S,W,C			
	39.3 N., 143.0 E.			
	Off east coast of Honshu, Japan.			
	h: 30 km.			
	H= 15 48 59.5			USCGS
12.	P	Z	16 24 34	
	S	E	25 40	
	P: D			
	39.5 N., 143.1 E.			
	Off east coast of Honshu, Japan.			
	h: 21 km.			
	H= 16 23 17.1			USCGS
12.	P	Z	16 30 26	
	S	NE	31 30	
	39.0 N., 143.5 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 16 29 13			USCGS
12.	P	NEZ	16 35 51.8	
	39.3 N., 142.7 E.			
	Near east coast of Honshu, Japan.			
	h: 33 km.			
	H= 16 34 38			USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
12.	P	Z	16 57 13	
	S	E	58 21	
	39.4 N., 142.5 E.			
	Near east coast of Honshu, Japan.			
	h: 33 km.			
	H= 16 56 02			USCGS
12.	P	NE	17 15 28	
12.	iP	NEZ	17 24 32.5	
	S	N	25 49	
	P: S,W,C			
	39.5 N., 143.1 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 17 23 18			USCGS
12.	iP Z, P NE		17 36 09.0	
	P: S,W,C			
12.	P	Z	17 40 07	
12.	iP	Z	17 45 32.6	
	S	NE	46 30	
	P: C			
12.	iP	Z	17 47 31.6	
	P: C			
12.	iP	NEZ	17 53 10.8	
	S	NE	54 23	
	P: N,E,D			
	39.1 N., 142.9 E.			
	Near east coast of Honshu, Japan.			
	h: 30 km.			
	H= 17 52 01.2			USCGS
12.	P	Z	18 16 16	
12.	P	NEZ	18 18 35	
	eS	N	42	
12.	iP	NEZ	18 50 04.3	
	eS	E	51 04	
	P: S,W,C			
	39.4 N., 142.8 E.			
	Near east coast of Honshu, Japan.			
	h: 33 km.			
	H= 18 48 53.4			USCGS
12.	iP	NEZ	18 57 03.2	
	S	E	58 08	
	P: S,W,C			
	39.6 N., 143.2 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Off east coast of Honshu, Japan.			
	h: 30 km.			
	H= 18 55 46.4			USCGS
12.	P	NE	19 13 04	
12.	P	NEZ	19 23 51	
12.	iP	Z	19 37 36.7	
	P: N,E,D			
	39.5 N., 143.0 E.			
	Off east coast of Honshu, Japan.			
	h: 55 km.			
	H= 19 36 24.7			USCGS
12.	P	NEZ	19 39 53	
	S	N	40 52	
	39.3 N., 142.7 E.			
	Near east coast of Honshu, Japan.			
	h: 40 km.			
	H= 19 38 43.5			USCGS
12.	iP	NEZ	19 49 40.4	
	S	NE	50 54	
	P: S,W,C			
	39.4 N., 142.8 E.			
	Near east coast of Honshu, Japan.			
	h: 32 km.			
	H= 19 48 28.7			USCGS
12.	iP	NEZ	20 14 27.3	
	S	N	15 27	
	P: S,W,C			
	39.3 N., 143.1 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 20 13 14.0			USCGS
12.	iP NZ, P E		20 21 31.2	
	S	N	22 22	
	P: S,W,C			
	39.2 N., 142.8 E.			
	Near east coast of Honshu, Japan.			
	h: 33 km.			
	H= 20 20 21			USCGS
12.	iP	NEZ	20 27 29.0	
	P: S,W,C			
12.	iP	NEZ	20 32 14.2	
	eS	Z	33 09	
	P: S,W,C			

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Date	Phase	Comp.	Time(GMT) h m s
12.	iP	Z	20 35 18.8
	P: C		
12.	iP	NEZ	21 17 52.5
	eS	NE	19 05
	P: N,E,D		
	39.6 N., 142.4 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 21 16 41		USCGS
12.	iP	NZ	21 41 05.5
	P: S,C		
12.	iP	NEZ	21 49 57.4
	i	E	50 08
	P: S,W,C		
12.	P	Z	21 53 32
12.	P	NE	21 55 01
12.	iP	NEZ	21 58 51.5
	S	NE	59 52
	P: S,W,C		
	Mag. 6.3 (Mat.)		
	39.3 N., 142.8 E.		
	Near east coast of Honshu, Japan.		
	h: 36 km.		
	H= 21 57 41.3		USCGS
12.	iP	NEZ	22 08 21.5
	P: N,E,D		
12.	P	Z	22 09 49
12.	iP	EZ	22 16 45.0
	P: E,D		
12.	P	Z	22 19 25
12.	P	Z	22 22 47
	eS	N	23 36
12.	iP	NEZ	22 34 38.5
	P: S,W,C		
12.	iP	NEZ	22 51 50.0
	P: N,E,D		
	41.5 N., 142.7 E.		
	Hokkaido, Japan region.		
	h: 38 km.		
	H= 22 50 18.8		USCGS
12.	P	Z	22 53 16

Date	Phase	Comp.	Time(GMT) h m s
12.	iP	EZ	23 22 01.0
	P: E,D		
12.	P	Z	23 32 04.5
	eS	N	56
12.	iP	Z	23 35 46.3
	P: D		
12.	iP	Z	23 44 56.7
	i	NE	57.0
	P: C		
13.	P	Z	00 02 33
13.	P	Z	00 03 23.0
	P: D		
13.	iP	NEZ	00 06 14.7
	i	N	24.0
	S	N	07 16
	i	E	18
	P: S,W,C		
	39.5 N., 143.0 E.		
	Off east coast of Honshu, Japan.		
	h: 24 km.		
	H= 00 05 00.7		USCGS
13.	iP	Z	00 43 24.4
	e	NE	25.0
	S	E	44 25
	P: C		
	39.3 N., 142.7 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 00 42 15.0		USCGS
13.	P	Z	00 52 29.0
	i	E	29.3
	i	N	29.5
	P: C		
13.	P	Z	00 53 37.0
13.	iP	NEZ	00 55 25.9
	P: S,W,C		
13.	iP	Z	01 05 05.8
	i	Z	13.4
	P: D		
13.	iP	NEZ	01 11 00.0
	i	N	57
13.	P	N	01 23 25.7

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Date	Phase	Comp.	Time(GMT) h m s
13.	iP	NEZ	01 44 03.7
	S	Z	45 05
	P: N,E,D		
	39.5 N., 143.0 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 01 42 54.9		USCGS
13.	iP	Z	02 06 55.0
	i	NE	55.4
	S	N	07 41
	P: C		
	39.4 N., 142.8 E.		
	Near east coast of Honshu, Japan.		
	h: 25 km.		
	H= 02 05 42.8		USCGS
13.	iP	Z	02 17 23.1
	i	NE	23.7
	P: C		
13.	iP	NEZ	02 20 42.6
	P: S,W,D		
13.	iP	Z	02 57 17.4
	i	NZ	19.5
13.	P	Z	03 09 32.3
	i	N	39.3
	P: C		
13.	iP	Z	03 18 14.3
	i	N	15.0
	i	E	15.2
	P: C		
13.	iP	EZ	03 23 33.0
	i	N	33.2
	e	E	24 38
	P: E,D		
13.	iP	NZ	03 31 16.0
	i	E	16.2
	P: S,C		
13.	iP	NE	03 34 24.5
	i	Z	24.7
	P: S,W		
	40.8 N., 143.4 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 03 32 55		USCGS
13.	iP	NE	04 31 30.1
	i	Z	30.3

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	38.8 N., 142.3 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 04 30 24		USCGS
13.	P Z, iP N		04 37 47.1
	P: S,D		
13.	iP	Z	05 05 55.6
13.	iP	Z	05 06 57.6
13.	iP	NEZ	05 35 04.6
	P: S,W,C		
13.	iP	Z	05 38 20.4
	i	NE	21.0
	P: C		
13.	iP	NZ	05 40 18.5
	eS	N	41 30
	P: N,E,D		
13.	iP	NEZ	05 46 02.6
	P: N,E,D		
	38.9 N., 142.9 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 05 44 54		USCGS
13.	iP	NEZ	05 52 57.4
	eS?	N	54 00
	P: S,W,C		
13.	iP	N	07 02 45.2
	i	N	47.4
	P: N		
13.	P	Z	07 10 13.7
13.	iP	EZ	07 21 31.0
	i	N	37.0
	P: W,C		
13.	iP	Z	08 00 12.2
	P: C		
13.	iP	EZ	08 02 23.2
	P: W,C		
13.	iP EZ, P N		08 07 19.0
	P: E,C		
13.	iP	NEZ	08 21 20,2
	P: S,W,C		

Date	Phase	Comp.	Time(GMT) h m s
13.	iP	NEZ	08 49 25.3
	S	N	50 36
	P: N,E,D		
	39.1 N., 143.2 E.		
	Off east coast of Honshu, Japan.		
	h: 28 km.		
	H= 08 48 12.8		USCGS
13.	iP	Z	08 55 15.7
	P: D		
13.	iP	NEZ	09 32 50.8
	P: S,W,C		
13.	P	Z	11 34 15.7
	i	N	16.0
	i	E	16.1
	P: D		
13.	iP	NEZ	11 57 34.7
	S	N	58 28
	P: N,E,D		
	39.2 N., 143.0 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 11 56 23.4		USCGS
13.	P	Z	12 29 21.8
	i	NE	22.0
	P: C		
13.	iP	NEZ	12 36 59.0
	P: S,W,C		
13.	P Z, iP N		13 39 23.7
	i	E	24.0
	i	N	40 05.8
	S	E	27
	e	Z	37
	P: N,C		
13.	iP	NEZ	14 57 29.0
	S	N	58 17
	S	E	18
	i	Z	31
	P: S,W,C		
	39.4 N., 142.9 E.		
	Near east coast of Honshu, Japan.		
	h: 20 km.		
	H= 14 56 15.1		USCGS
13.	P	N	15 11 23.5
	i	Z	23.7
13.	iP	NZ	15 34 41.2

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	E	15 34 41.4
	eS	N	35 53
	P: N,D		
13.	iP	Z	15 39 13.5
	e	NE	13.8
	P: D		
13.	iP	NEZ	16 11 34.9
	P: S,W,C		
13.	iP	NEZ	16 17 55.7
	P: S,W,C		
	39.6 N., 143.1 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 16 16 40.3		USCGS
13.	iP	NEZ	17 28 05.7
	P: S,W,C		
13.	iP	EZ	17 36 48.0
	i	N	48.4
	e	N	37 04
	P: E,D		
13.	iP	NEZ	18 38 31.2
	37.8 N., 140.9 E.		
	Honshu, Japan.		
	h: 33 km.		
	H= 18 37 50		USCGS
13.	iP	NEZ	18 39 18.8
	P: S,W,C		
13.	iP NE, P Z		18 54 09.0
	P: N,W		
13.	P	Z	19 15 08.8
	e	NE	09.2
	P: C		
13.	iP	NZ	19 32 29.8
	e	N	39
	P: S,D		
13.	iP	NZ	19 47 30.0
	i	E	30.5
	e	E	48 28
	P: N,D		
	39.5 N., 143.1 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 19 46 16		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
13.	iP	N	21 11 47.6
	i	Z	47.8
	i	E	47.9
	S	N	12 45
	P: N		
	39.4 N., 142.9 E.		
	Near east coast of Honshu, Japan.		
	h: 29 km.		
	H= 21 10 35.4		USCGS
13.	iP	Z	21 25 41.0
	i	NE	41.2
	P: C		
13.	eP	Z	22 23 58.0
	i	N	58.8
	e	E	58.5
	P: D		
13.	iP	NEZ	23 39 12.5
	S	N	40 09
	P: S,W,C		
13.	eP	Z	23 51 16
	e	Z	58
	eS	E	52 55
	e	N	56
14.	eP	Z	00 12 50
14.	iP E, P	NZ	00 19 12.6
	P: S,E,C		
14.	iP	NEZ	00 43 42.3
	P: S,W,C		
14.	iP	NEZ	00 47 20.0
	eS	E	48 22
	P: S,W,C		
	39.7 N., 142.5 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 00 46 08		USCGS
14.	iP	EZ	00 59 03.2
	i	N	03.6
	S	E	01 00 19
	P: W,C		
	38.6 N., 143.1 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 00 57 55		USCGS
14.	iP	Z	01 09 33.4
	i	NE	33.7
	P: C		

Date	Phase	Comp.	Time(GMT) h m s
14.	iP	NEZ	01 17 49.1
	iS	NE	19 18.0
	P: N,W,D		
	42.6 N., 132.7 E.		
	Near east coast of eastern Russia.		
	h: 436 km.		
	H= 01 15 55.5		USCGS
14.	iP	NEZ	01 37 51.0
	P: S,W,C		
	39.5 N., 142.9 E.		
	Near east coast of Honshu, Japan.		
	h: 30 km.		
	H= 01 36 37.7		USCGS
14.	iP	Z	02 25 47.0
	i	NE	47.2
	P: C		
	40.5 N., 143.8 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 02 24 18		USCGS
14.	iP	NZ	02 39 57.7
	i	E	58.2
	P: S,C		
	40.6 N., 142.0 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 02 38 41		USCGS
14.	iP	Z	03 19 26.9
	i	NE	28.2
	S	N	20 18
	P: D		
	39.4 N., 142.8 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 03 18 17.3		USCGS
14.	iP	E	04 11 07.5
	i	NZ	07.7
	P: W		
14.	iP	NEZ	04 36 31.3
	P: S,W,C		
	38.9 N., 143.2 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 04 35 23		USCGS
14.	iP	NEZ	04 57 38.0
	P: N,W,D		

Date	Phase	Comp.	Time(GMT) h m s
14.	iP	NEZ	05 18 39.7
	P: N,W,C		
14.	iP	EZ	06 06 13.5
	i	N	13.7
	eS	Z	07 09
	P: W,C		
	39.4 N., 142.9 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 06 05 03.3		USCGS
14.	iP	NEZ	07 53 37.7
	P: N,E,D		
14.	iP	NEZ	08 43 04.9
	eS	E	44 22
	P: S,W,C		
	39.4 N., 143.2 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 08 41 52		USCGS
14.	iP E, P Z		09 25 19.0
	i	Z	24.0
	P: W		
14.	P	Z	09 32 54.9
	13.6 N., 144.6 E.		
	Mariana Is.		
	h: 141 km.		
	H= 09 27 57.4		USCGS
14.	iP	NEZ	10 44 40.5
	P: N,E,C		
14.	iP	NEZ	11 21 29.9
	P: N,W,D		
14.	iP	NEZ	11 53 50.6
	eS	N	54 48
	P: S,W,C		
	39.3 N., 142.8 E.		
	Near east coast of Honshu, Japan.		
	h: 37 km.		
	H= 11 52 39.7		USCGS
14.	iP	NEZ	12 14 11.7
	P: S,W,C		
	39.1 N., 143.0 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 12 13 02		USCGS

Date	Phase	Comp.	Time(GMT) h m s
14.	P	N	12 20 45.3
	i	EZ	46.4
	i	NZ	50.3
	45.2 N., 153.5 E.		
	Kurile Is. region.		
	h: 41 km.		
	H= 12 17 27.7		USCGS
14.	iP	NEZ	12 47 04.0
	P: S,W,C		
14.	eP	Z	13 18 00
14.	iP	NZ	13 23 24.2
	P: S,W,C		
14.	P	Z	13 43 50.0
	i	N	50.5
14.	eP	Z	14 28 03
14.	eP	NZ	14 48 57
	i	E	57.4
14.	iP	NZ	15 23 48.3
	i	E	49.4
	P: S,C		
14.	iP	NZ	17 02 01.2
	i	E	01.6
	e	N	30
	S	E	32
	P: N,C		
14.	iP	NEZ	18 03 27.7
	P: S,W,C		
14.	iP	Z	18 10 01.6
	P: C		
14.	iP	EZ	18 23 43.5
	i	N	43.7
	P: W,C		
14.	iP	NEZ	19 20 15.4
	P: S,W,C		
14.	iP	NZ	19 21 28.9
	P: S,C		
14.	iP	EZ	20 28 19.1
	P: E,D		
14.	iP	NEZ	20 53 57.8
	P: N,E,D		
	39.3 N., 143.6 E.		
	Off east coast of Honshu, Japan.		

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Date	Phase	Comp.	Time(GMT) h m s	
	h: 33km. H= 20 52 42			USCGS
14.	iP P: N,W,D	NEZ	21 43 53.5	
14.	iP P: N,W,D	NEZ	21 53 44.9	
14.	iP iP P: W	E NZ	22 46 35.3 35.5	
14.	iP i P: C	Z NE	23 07 50.0 50.3	
14.	iP P: S,E,D	NEZ	23 14 23.0	
15.	iP i P: W,C	EZ N	00 30 17.9 18.1	
15.	iP i P: W	E NZ	00 33 20.4 20.6	
	38.8 N., 143.8 E. Off east coast of Honshu, Japan. h: 33 km. H= 00 32 08			USCGS
15.	iP i i P: C	Z E N	00 48 30.3 30.8 31.0	
15.	e	Z	00 52 59	
15.	iP i eS P: E,D	EZ N E	02 14 23.0 23.2 15 32	
	37.3 N., 133.6 E. Near west coast of Honshu, Japan. h: 9 km. H= 02 14 08.5			USCGS
15.	P i i P: S	N EZ E	02 30 40.0 40.2 31 15.6	
	39.2 N., 142.9 E. Near east coast of Honshu, Japan. h: 33 km. H= 02 29 30			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
15.	iP i S P: N,D	NZ E NE	03 32 29.2 29.4 33 26	
	39.3 N., 142.8 E. Near east coast of Honshu, Japan. h: 25 km. H= 03 31 18.3			USCGS
15.	iP P: C	Z	04 20 06.4	
15.	e	Z	04 23 39	
15.	iP i e eS P: C	Z NE Z NEZ	06 02 11.0 11.5 43 05 00	
	27.0 N., 126.5 E. East China Sea. h: 88 km. H= 05 58 59.0			USCGS
15.	P i	N EZ	06 31 18.8 19.0	
15.	iP i i P: W	E N N	07 18 40.5 40.7 44.7	
15.	iP i i P: N	N EZ E	07 25 43.0 48.2 51.8	
15.	iP i P: C	Z E	07 50 32.0 32.4	
15.	iP eS eL P: S,W,C	N EZ NE	11 32 17.8 36 13 38 32	
	51.7 N., 159.4 E. Off east coast of Kamchatka. h: 39 km. H= 11 27 32.9			USCGS
15.	iP i P: W	NEZ NZ	11 45 22.6 29.5	
15.	iP P: S,W,C	NEZ	12 04 47.6	
	39.4 N., 142.8 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Near east coast of Honshu, Japan. h: 33 km. H= 12 03 37		USCGS
15.	eP	Z	13 44 31
	i	Z	47 13
	e	N	51 15
	eS	E	52 33
	L	NE	59 50
	Mag. 6½ - 6¾ (Mat.) 18.3 S., 167.9 E. New Hebrides Is. h: 11 km. H= 13 34 14.4		USCGS
15.	iP	NEZ	14 12 07.5
	P: S,W,C		
15.	iP	Z	15 36 37.0
	i	NE	37.2
	P: C		
15.	iP	NZ, P E	16 11 21.7
	P: S,C		
15.	eP	NEZ	17 15 04
15.	P	N	17 37 20.3
	i	NE	20.8
	i	NEZ	22.0
15.	iP	NEZ	19 54 44.2
	S	E	55 53
	P: N,C		
15.	iP	NEZ	19 59 49.1
	P: N,E.D		
15.	iP	NEZ	23 15 51.7
	i	E	57.2
	P: S,W,C 41.4 N., 142.5 E. Hokkaido, Japan region. h: 44 km. H= 23 14 23.3		USCGS
15.	P	EZ	23 26 05.5
	e	N	06
	e	Z	09
16.	P	Z	00 04 55.0
	i	Z	55.7
	i	E	56.0
	i	N	56.2
	P: D		
16.	eP	E	01 08 08.3

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	Z	01 08 09.2
	e	E	15
	i	Z	17.8
	e	N	18
	41.6 N., 143.2 E. Hokkaido, Japan region. h: 33 km. H= 01 06 34		USCGS
16.	iP	NZ	02 31 34.8
	i	N	35.8
	i	E	36.0
	i	Z	34 49.5
	eS	E	51
	P: D 18.6 N., 145.4 E. Mariana Is. h: 227 km. H= 02 27 29.6		USCGS
16.	iP	E	02 34 57.1
16.	iP	NEZ	03 00 08.9
	P: N,E,C		
16.	iP	NEZ	06 41 31.1
	P: S,W,C 41.4 N., 143.1 E. Hokkaido, Japan region. h: 36 km. H= 06 39 57		USCGS
16.	iP	NEZ	09 12 14.3
	P: N,E,D		
16.	iP	NZ	09 25 35.3
	i	E	35.9
	P: S,D 39.4 N., 142.9 E. Near east coast of Honshu, Japan. h: 33 km. H= 09 24 25		USCGS
16.	e	NZ	09 43 44
	e	E	45
16.	iP	NZ	10 47 26.7
	P: N,D		
16.	iP	NEZ	11 39 33.2
	e	N	42
	P: N,E,D		
16.	iP	NEZ	11 46 16.6
	P: N,E,C		

Date	Phase	Comp.	Time(GMT) h m s	
16.	iP	NE	12 06 02.2	
	P: N,E			
	40.4 N., 142.2 E.			
	Near east coast of Honshu, Japan.			
	h: 33 km.			
	H= 12 04 45			USCGS
16.	iP	NEZ	15 42 05.0	
	P: N,E,D			
16.	iP	Z	16 00 46.6	
	i	NE	46.8	
	S	N	01 45.2	
	P: C			
	39.3 N., 143.0 E.			
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 15 59 36			USCGS
16.	iP	Z	16 58 05.3	
	i	NE	05.5	
	P: D			
	40.3 N., 143.8 E.			
	Off east coast of Honshu, Japan.			
	h: 11 km.			
	H= 16 56 36.4			USCGS
16.	eP	NE	17 35 16	
	i	Z	16.3	
16.	iP	NZ	18 52 40.7	
	i	E	41.0	
	P: N,C			
	39.5 N., 141.9 E.			
	Honshu, Japan.			
	h: 33 km.			
	H= 18 51 32			USCGS
16.	iP	EZ	20 39 56.7	
	i	N	57.0	
	P: W,C			
	39.5 N., 142.5 E.			
	Near east coast of Honshu, Japan.			
	h: 27 km.			
	H= 20 38 45.2			USCGS
16.	P	Z	21 47 47.8	
	P: D			
16.	iP	Z	23 57 48.0	
	i	NEZ	48.6	
	i	Z	54.2	
	P: D			

Date	Phase	Comp.	Time(GMT) h m s	
17.	iP	Z	01 04 47.6	
	i	NE	48.2	
	P: C			
17.	P	Z	01 46 50.0	
	i	Z	51.2	
	i	E	52.0	
17.	iP	EZ	04 31 06.8	
	eS	N	34 46	
	P: S,W,D			
	22.4 N., 121.4 E.			
	Taiwan region.			
	h: 39 km.			
	H= 04 26 31.9			USCGS
17.	eP	Z	07 38 44	
	e	Z	41 46	
	29.1 N., 129.3 E.			
	Ryukyu Is.			
	h: 33 km.			
	H= 07 36 12			USCGS
17.	iP	Z	11 54 25.5	
	i	NE	26.5	
	eS	NE	55 40	
	P: C			
	Mag. 6.1 (Mat.)			
	41.0 N., 143.0 E.			
	Hokkaido, Japan region.			
	h: 48 km.			
	H= 11 53 00.4			USCGS
17.	iP	Z	13 53 20.9	
	P: D			
17.	iP	EZ	14 30 41.3	
	i	N	41.8	
	e	EZ	48	
17.	iP	EZ	16 44 04.5	
	P: W,D			
17.	iP	Z	16 46 14.5	
	i	NE	14.7	
	P: C			
17.	iP	NEZ	16 57 41.5	
	eS	E	58 56	
	P: S,W,C			
	40.1 N., 143.7 E.			
	Off east coast of Honshu, Japan.			
	h: 6 km.			
	H= 16 56 13.1			USCGS
17.	iP	Z	17 57 35.0	

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	E	17 57 35.6
	ScS	E	18 08 15
	P: D		
	6.3 S., 146.6 E.		
	East New Guinea region.		
	h: 110 km.		
	H= 17 49 43.6		USCGS
17.	iP	EZ	18 19 07.0
	eS	E	26 47
	eL	NE	35 18
	P: E,C		
	Mag. $6\frac{1}{2}$ - $6\frac{3}{4}$ (Mat.)		
	12.3 S., 166.7 E.		
	Santa Cruz Is.		
	h: 33 km.		
	H= 18 09 34.1		USCGS
17.	iP	EZ	18 51 46.5
	P: E,D		
	39.3 N., 143.3 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 18 50 31.7		USCGS
17.	P	Z	18 58 42
	eS	N	59 38
	Mag. 5.6 (Mat.)		
	38.7 N., 143.6 E.		
	Off east coast of Honshu, Japan.		
	h: 17 km.		
	H= 18 57 27.5		USCGS
17.	iP	NE	19 22 36.4
	i	Z	36.6
	i	Z	48.0
	i	N	48.6
	i	E	48.8
	P: N,E		
17.	iP	EZ	22 13 11.7
	e	N	12
	S?	N	36
	P: C		
17.	iP	NEZ	22 17 07.0
	P: S,W,C		
17.	iP	NEZ	22 18 28.7
	P: S,E,C		
18.	iP	EZ	02 33 08.6
	i	N	08.8
	P: E,C		
18.	iP	Z	02 51 28.8

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	E	02 51 29.6
	eS?	N	52 32
	P: D		
18.	eP	NEZ	06 23 01
18.	P	EZ	06 52 37.2
	i	NZ	37.8
	21.7 S., 179.6 W.		
	Fiji Is. region.		
	h: 600 km.		
	H= 06 42 21.9		USCGS
18.	iP	NEZ	07 19 52.1
	S	N	20 11.5
	P: S,E,D		
18.	P	N	07 39 44.0
	i	Z	44.3
	eS	N	41 19
	41.5 N., 142.9 E.		
	Hokkaido, Japan region.		
	h: 33 km.		
	H= 07 38 13		USCGS
18.	iP	NEZ	08 57 30.6
	eS	N	58 20
	P: S,W,C		
18.	iP	Z	09 50 57.8
	i	N	58.0
	P: D		
18.	iP	EZ	10 02 17.3
	P: E,C		
18.	eP	Z	10 13 03
	eS	E	44
18.	iP	NEZ	10 41 40.7
	P: S,W,C		
18.	iP	NEZ	13 39 11.0
	i	Z	17.1
	i	N	17.5
	P: N,E,D		
	39.5 N., 142.4 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 13 38 01		USCGS
18.	iP	NEZ	16 05 53.9
	P: S,W,C		
18.	iP	NEZ	17 12 11.0
	P: N,E,D		
	41.4 N., 142.5 E.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Hokkaido, Japan region.		
	h: 34 km.		
	H= 17 10 41.8		USCGS
18.	iP	NEZ	23 45 51.4
	P: N,E,C		
19.	iP	NEZ	01 39 30.2
	S	Z	40 27
	P: S,W,C		
	39.5 N., 142.9 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 01 38 17.4		USCGS
19.	iP	NEZ	02 00 00.8
	iS	Z	08.2
	P: S,E,C		
19.	iP	Z	03 18 46.9
	40.7 N., 144.0 E.		
	Off east coast of Honshu, Japan.		
	h: 23 km.		
	H= 03 17 13.7		USCGS
19.	iP	NEZ	04 18 30.2
	P: N,W,D		
19.	iP	N	04 54 49.3
	i	EZ	49.9
	P: N		
19.	eP	Z	06 20 35
19.	eP	N	07 02 57
19.	ePKP	Z	08 32 38
	pP	Z	55
	PP	Z	35 31.5
	i	E	36 27
	eLq	N	09 11 00
	Lr	Z	18 12
	Mag. $7\frac{1}{2}$ - $7\frac{3}{4}$ (Mat.)		
	5.6 S., 77.2 W.		
	Northern Peru.		
	h: 28 km.		
	H= 08 13 35.0		USCGS
19.	iP	EZ	11 03 32.2
	i	N	32.4
	P: W,C		
	40.3 N., 143.3 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 18 03 21.1		USCGS
19.	P	Z	14 02 26.8

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	NZ	14 02 27.4
	i	Z	36.3
	P: C		
19.	P	Z	14 10 46.5
	i	Z	56.5
	P: C		
19.	iP	Z	15 24 34.8
	i	NE	35.2
	eS	N	25 13
	P: D		
19.	iP	NEZ	17 27 32.5
	P: S,W,C		
19.	iP	Z	18 04 44.1
	i	NE	44.3
	P: C		
19.	iP	NEZ	19 14 23.7
	40.3 N., 143.3 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km.		
	H= 19 13 01		USCGS
19.	iP	NEZ	19 39 06.7
	P: N,E,D		
19.	PKP 1	Z	20 17 58.5
	i	Z	18 11.0
	P: D		
	Mag. 6 - $6\frac{1}{2}$ (Mat.)		
	43.9 S., 75.1 W.		
	Off coast of southern Chile.		
	h: 24 km.		
	H= 19 58 01.9		USCGS
20.	eP	Z	02 55 42
20.	eP	Z	02 57 54
20.	P	Z	05 35 30.0
	P: D		
20.	iP	N	08 02 38.9
	i	Z	39.1
	P: N		
20.	iP	NEZ	08 16 22.0
	S	E	17 27
	e	N	23
	P: S,W,C		
	40.2 N., 142.4 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km.		
	H= 08 15 06.5		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
20.	iP	NEZ	11 54 20.0
	P: N,W,D		
20.	iP	NEZ	13 17 47.4
	i	N	57.5
	e	Z	58
	P: N,W,C		
20.	P	Z	13 42 39.8
	i	N	40.0
	i	E	40.4
	P: C		
20.	eP	Z	14 12 09
	i	Z	14.5
20.	e	Z	18 04 44
20.	iP	Z	18 13 52.4
	i	NE	55.0
	eS	E	15 31
	41.4 N., 142.6 E.		
	Hokkaido, Japan region.		
	h: 50 km.		
	H= 18 12 25.3		USCGS
20.	iP	NZ	19 08 22.8
	i	Z	26.2
	P: N,D		
20.	eP	Z	20 24 13
	14.4 N., 146.7 E.		
	Mariana Is.		
	h: 33 km.		
	H= 20 19 09.7		USCGS
20.	P	Z	20 34 39.8
20.	eP	N	22 18 18
	i	Z	18.7
	e	E	19
	e	N	19 38
20.	iP	NZ	23 15 15.1
	i	E	15.8
	iS	E	38.5
	P: S,D		
20.	iP	Z	23 23 25.1
	P: D		
21.	iP	NEZ	04 23 40.0
	S	NEZ	24 14
	P: N,E,D		
21.	P	NEZ	05 28 48
21.	P	Z	07 36 37.6
	P: C		

Date	Phase	Comp.	Time(GMT) h m s
21.	iP	NEZ	13 51 00.7
	P: S,W,C		
	41.2 N., 142.4 E.		
	Hokkaido, Japan.		
	h: 33 km.		
	H= 13 49 32.6		USCGS
21.	iP	NEZ	15 38 12.5
	P: N,E,D		
21.	iP Z, P N		16 23 53.0
	i	Z	24 07.0
	S	NE	25 16
	P: N,D		
21.	P	Z	18 52 58
21.	iP	NZ	18 53 27.5
	S	NE	54 54
	29.9 N., 142.7 E.		
	South of Honshu, Japan.		
	h: 45 km.		
	H= 18 51 35.9		USCGS
21.	iP	NEZ	21 06 49.5
	S	NE	08 05
	P: N,E,C		
	31.1 N., 137.6 E.		
	South of Honshu, Japan.		
	h: 502 km.		
	H= 21 05 17		USCGS
21.	iP	NEZ	21 28 11.5
	P: N,E,D		
22.	iP	NEZ	01 13 59.3
	S	NE	15 10
	P: S,W,C		
	Mag. 5.6 (Mat.)		
	40.3 N., 143.7 E.		
	Off east coast of Honshu, Japan.		
	h: 15 km.		
	H= 01 12 30.9		USCGS
22.	iP	Z	01 22 39.7
	P	N	40
	P: C		
22.	P	NEZ	02 55 25
22.	P	Z	02 56 38
22.	iP	NZ	03 10 07.2
	P: S,C		
22.	iP	EZ	04 59 51.2
	P: E.D		

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Date	Phase	Comp.	Time(GMT) h m s	
22.	iP	EZ	09 09 17.7	
	i	N	19.3	
	S	E	19.5	
		E	10 20	
	39.5 N., 142.5 E. Near east coast of Honshu, Japan. h: 33 km. H= 09 08 09			USCGS
22.	iP	NEZ	09 56 46.7	
	P: S,C			
22.	iP	NZ	11 07 22.8	
	P: S,C			
	41.5 N., 142.9 E. Hokkaido, Japan. h: 38 km. H= 11 05 50.1			USCGS
22.	P	NEZ	11 08 57	
	S	N	09 48	
	34.7 N., 135.6 E. Near south coast of Southern Honshu, Japan. h: 379 km. H= 11 07 55			USCGS
22.	iP	EZ	22 14 53.9	
	P: E,D			
23.	iP	Z	00 42 26.8	
	P: D			
	5.9 S., 147.6 E. East New Guinea. h: 88 km. H= 00 34 33.1			USCGS
23.	iP	Z	02 02 33.6	
	i	NE	33.8	
	P: C			
	39.2 N., 143.0 E. Off east coast of Honshu, Japan. h: 36 km. H= 02 01 23			USCGS
23.	iP	NEZ	04 59 28.8	
	e	NE	05 01 10	
	P: N,E,D			
	41.6 N., 143.4 E. Hokkaido, Japan. h: 45 km. H= 04 57 52.2			USCGS
23.	iP	NEZ	05 21 47.0	
	S	N	22 45	
	P: N,E,D			
	39.1 N., 143.0 E. Off east coast of Honshu, Japan. h: 45 km. H= 05 20 38.0			USCGS
23.	P	Z	09 27 32	
	S	N	36 46	
	L	N	50 44	
	Mag. 6 (Mat.) 29.8 N., 51.2 E. Southern Iran. h: 34 km. H= 09 16 18.6			USCGS
23.	iP	NEZ	09 39 21.0	
	S	N	40 24	
	P: N,E,D			
23.	iP	Z	11 45 38.0	
	P: D			
	15.4 S., 70.4 W. Southern Peru. h: 215 km. H= 11 26 19			USCGS
23.	iP	Z	14 00 47.7	
23.	iP	Z	14 28 [illegible]	
	S	N	29 16	
	P: C			
	40.7 N., 143.4 E. Off east coast of Honshu, Japan. h: 33 km. H= 14 26 42			USCGS
23.	iP	Z	16 49 47.4	
	i	Z	51.3	
	S	NE	50 33	
23.	P	Z	17 02 38	
	e	Z	04 32	
	S	NE	09 48	
	L	N	13 20	
	Mag. 6 - 6¼ (Mat.) 56.7 N., 152.4 W. Kodiak I. region. h: 33 km. H= 16 53 50.2			USCGS
24.	iP	EZ	04 23 19.4	
	i	N	19.9	
	P: W,C			
24.	P	Z	05 12 55	
	S	NE	13 15	

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
24.	iP	NEZ	05 56 07.3
	i	Z	15
	P: S,W,C		
24.	iP	EZ	07 42 50.2
	S	N	43 27
	P: W,C		
24.	iP	NEZ	08 29 36.7
	P: S,W,C		
24.	P	NEZ	11 12 00
24.	iP	NEZ	12 29 38.4
	iS	EZ	57.0
	P: N,W,D		
24.	iP	EZ	15 13 10.6
	P: W,C		
	41.3 N., 142.6 E.		
	Hokkaido, Japan.		
	h: 20 km.		
	H= 15 11 41		USCGS
24.	iP	NEZ	18 57 26.5
	S	N	32
	P: S,W,C		
24.	P	Z	22 49 57
25.	iP	Z	04 07 20.5
	S	E	08 10
	P: C		
	32.9 N., 141.2 E.		
	South of Honshu, Japan.		
	h: 35 km.		
	H= 04 06 14.1		USCGS
25.	iP	NEZ	08 57 28.7
	S	NE	33.5
	P: S,W		
25.	P	Z	09 14 49
	e	N	16 13
25.	iP	Z	11 09 48.6
	S	E	10 48
	P: D		
25	iP	NEZ	23 23 05.3
	S	E	24 09
	P: S,W,C		
	39.5 N., 143.5 E.		
	Off east coast of Honshu, Japan.		
	h: 19 km.		
	H= 23 21 46.6		USCGS

Date	Phase	Comp.	Time(GMT) h m s
25.	iP	NEZ	23 34 37.5
	S	E	35 48
	P: S,W,C		
	39.6 N., 143.4 E.		
	Off east coast of Honshu, Japan.		
	h: 16 km.		
	H= 23 33 18.0		USCGS
26.	iP	Z	05 55 52.1
	P: C		
	41.2 N., 142.9 E.		
	Hokkaido, Japan.		
	h: 33 km.		
	H= 05 54 24		USCGS
26.	iP	NEZ	06 48 22.3
	i	N	50.2
	P: N,E,D		
26.	iP	NEZ	07 44 54.8
	S	N	45 16
	S	E	17
	P: N,D		
26.	iP	NEZ	10 25 25.7
	S	N	26 44
	P: N,E,D		
	Mag. 5.5 (Mat.)		
	42.1 N., 142.7 E.		
	Hokkaido, Japan.		
	h: 33 km.		
	H= 10 23 48.2		USCGS
26.	iP	NEZ	11 05 16.4
	P: S,W,C		
26.	iP	EZ	12 12 57.5
	S	N	13 16
	P: E		
26.	iP	Z	13 44 54.3
	S	NE	45 51
	P: C		
	32.3 N., 141.6 E.		
	South of Honshu, Japan.		
	h: 25 km.		
	H= 13 43 37.4		USCGS
26.	iP	Z	15 5[illegible] 10.7
	i	N	10.9
	i	E	11.0
	S	N	16 09 [illegible]
	Lq	N	07 16
	Lr	N	08 30
	P: C		
	Mag. 6 (Mat.)		
	22.2 S., 171.4 E.		(cont.)

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Date	Phase	Comp.	Time(GMT) h m s	
	Loyalty Is. h: 90 km. H= 15 40 31.1			USCGS
26.	iP	Z	18 22 52.2	
	i	NE	52.5	
	P: D			
26.	iP	NEZ	20 27 32.5	
	S	N	28 48	
	P: N,E,D			
	39.5 N., 143.0 E. Off east coast of Honshu, Japan. h: 34 km. H= 20 26 19.0			USCGS
27.	iP	Z	02 12 53.8	
	P: D			
	20.8 S., 179.0 W. Fiji Is. h: 605 km. H= 02 02 40.2			USCGS
27.	iP	Z	04 12 49.2	
	P: D			
27.	iP	Z	06 12 31.6	
27.	P	Z	09 34 40	
27.	P	Z	12 52 15	
	S	NE	47	
27.	P	Z	16 55 32	
	eS	E	17 00 10	
	54.4 N., 168.5 E. Komandorsky Is. h: 33 km. H= 16 49 46			USCGS
27.	iP	NEZ	17 13 11.4	
	S	E	14 15	
	P: S,W,C			
	40.3 N., 142.3 E. Near east coast of Honshu, Japan. h: 38 km. H= 17 11 56.0			USCGS
27.	P	Z	19 14 18	
27.	iP	NZ	21 30 49.4	
	P: N,D			
27.	iP	Z	21 55 38.7	
	S	N	57 10	
	P: C			
	40.1 N., 143.8 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Off east coast of Honshu, Japan. h: 33 km. H= 21 54 14.1			USCGS
27.	P	Z	22 16 44	
	L	NE	24 14	
	Mag. 5½ - 5¾ (Mat.) 6.1 N., 120.9 E. Mindanao, P.I. h: 60 km. H= 22 10 03.8			USCGS
27.	iP	Z	22 22 31.0	
	P: D			
	8.2 S., 119.7 E. Flores I. h: 86 km. H= 22 14 01.3			USCGS
27.	iP	Z	23 15 04.1	
	S	N	16 23	
	P: C			
	39.4 N., 142.9 E. Near east coast of Honshu, Japan. h: 33 km. H= 23 13 53			USCGS
27.	P	Z	23 42 34.0	
27.	iP	Z	23 53 48.3	
28.	P	Z	01 47 56	
	e	N	49 17	
28.	iP	NEZ	02 12 27.2	
	S	E	13 40	
	P: N,E,D			
	39.6 N., 143.1 E. Off east coast of Honshu, Japan. h: 33 km. H= 02 11 14			USCGS
28.	P	Z	03 00 27	
	S	NE	46	
28.	iP	NEZ	09 31 46.8	
	S	E	32 49	
	P: S,W,C			
	39.9 N., 143.0 E. Off east coast of Honshu, Japan. h: 33 km. H= 09 30 29.6			USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
28.	P	Z	09 45 17	
	S	E	46 16	
	P: D			
	39.3 N., 142.7 E.			
	Near east coast of Honshu, Japan.			
	h: 47 km.			
	H= 09 44 07.7			USCGS
28.	iP	NZ	11 04 52.3	
	S	E	06 00	
	P: S,C			
28.	iP	Z	12 34 07.0	
	P	NE	07.3	
	P: C			
28.	iP	NEZ	13 05 46.3	
	P: S,W,C			
	40.2 N., 143.2 E.			
	Off east coast of Honshu, Japan.			
	h: 57 km.			
	H= 11 03 30			USCGS
28.	P	Z	13 34 54	
28.	iP	NEZ	14 25 27.0	
	S	E	26 37	
	P: S,W,C			
	40.5 N., 143.4 E.			
	Off east coast of Honshu, Japan.			
	h: 20 km.			
	H= 14 24 00.1			USCGS
28.	iP	NEZ	16 11 30.3	
	S	NE	46	
	P: N,W,C			
28.	iP	Z	18 18 05.8	
	S	E.	19 40	
	P: C			
	41.6 N., 142.4 E.			
	Hokkaido, Japan.			
	h: 33 km.			
	H= 18 16 34.9			USCGS
29.	iP	Z	00 07 34.8	
	P: C			
	40.9 N., 143.3 E.			
	Off east coast of Honshu, Japan,			
	h: 33 km.			
	H= 00 06 07			USCGS
29.	iP	EZ	01 18 43.6	
	P: W,C			
	40.2 N., 143.6 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Off east coast of Honshu, Japan.			
	h: 33 km.			
	H= 01 17 18.1			USCGS
29.	iP	EZ	03 37 28.6	
	P: E,D			
29.	iP	Z	04 22 03.0	
	S	N	23 00	
	P: W,C			
	40.0 N., 142.8 E.			
	Near east coast of Honshu, Japan.			
	h: 52 km.			
	H= 04 20 46.9			USCGS
29.	P	Z	05 24 03	
29.	iP	NEZ	08 10 58.1	
	P: S,W,D			
29.	P	Z	10 29 28	
29.	iP	Z	10 33 34.3	
	S	N	57	
29.	iP	NEZ	20 22 13.4	
	S	N	23 27	
	P: S,W,C			
30.	iP	EZ	09 40 43.9	
	S	NE	45 00	
	Lq	NE	46 00	
	Lr	N	47 00	
	P: E,D			
	Mag. $6\frac{1}{4}$ - $6\frac{1}{2}$ (Mat.)			
	13.0 N., 145.2 E.			
	Mariana Is.			
	h: 38 km.			
	H= 09 35 29.4			USCGS
30.	iP	NEZ	11 04 07.8	
	S	NE	37	
	P: S,W,D			
	36.0 N., 137.2 E.			
	Honshu, Japan.			
	h: 267 km.			
	H= 11 03 30			USCGS
30.	iP	NEZ	11 47 57.8	
	S	NE	48 43	
	P: N,W,D			
	38.1 N., 135.0 E.			
	Sea of Japan.			
	h: 297 km.			
	H= 11 46 58			USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
30.	P	Z	13 18 16	
	12.8 N., 145.2 E.			
	South of Mariana Is.			
	h: 43 km.			
	H= 13 13 01.6			USCGS
30.	P	Z	13 41 12	
30.	iP	EZ	14 49 44.2	
	i	N	44.5	
	S	N	50 30	
	38.8 N., 142.7 E.			
	Near east coast of Honshu, Japan.			
	h: 10 km.			
	H= 14 48 35.9			USCGS
30.	P	Z	14 58 20	
30.	P	Z	17 05 36	

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