SEISMOLOGICAL BULLETIN
OF
MATSUSHIRO

JANUARY , FEBRUARY
1965

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= 0.68	h_2= 1.7	103,000 (max)
Seismograph	E	T_1= 1.0	T_2= 0.22	h_1= 0.70	h_2= 1.6	106,000 (max)
(Short Period)	Z	T_1= 1.0	T_2= 0.21	h_1= 0.72	h_2= 1.2	131,000 (max)
Benioff	N	T_1= 1.0	T_2= 70	h_1= 0.68	h_2= 5.9	7,330 (max)
Seismograph	E	T_1= 1.0	T_2= 62	h_1= 0.70	h_2= 5.6	9,640 (max)
(Long Period)	Z	T_1= 1.0	T_2= 84	h_1= 0.72	h_2= 7.3	7,590 (max)
Short Period Seismograph	Z	T_1= 1.0	T_2= 2.82	h_1= 1.4	h_2= 1.2	32,000 (max)
Galitzin	N	T_1= 15	T_2= 100	h_1= 1	h_2= 1.2	1,350 (max)
Seismograph	E	T_1= 15	T_2= 100	h_1= 1	h_2= 1.1	1,640 (max)
	Z	T_1= 7.5	T_2= 100	h_1= 0.76	h_2= 0.37	860 (max)
Wood-Anderson	N	0.8		0.8		1,050
Seismograph	E	0.8		0.8		1,200
1000 kg Long Period	N	33.0		0.60		100
Seismograph	E	30.0		0.62		100

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Date	Phase	Comp.	Time(GMT) h m s	
1.	iP	NEZ	04 15 09.5	
	iS	NEZ	30.8	
	P: N, E, C			
	35.4 N., 136.9 E.			
	Honshu, Japan.			
	h: 10 km ca.			JMA
1.	P	NEZ	04 24 02	
	i	E	10.5	
	i	N	11.4	
1.	eP	Z	12 51 11	
	eL	N	56 04	
	23.5 N., 121.2 E.			
	Taiwan.			
	h: 33 km ca.			
	H= 12 46 43.4			USCGS
1.	P	Z	13 03 00	
	iS	NE	05.0	
1.	eP	Z	13 39 35	
	19.9 N., 121.6 E.			
	Philippine Is. region.			
	h: 23 km ca.			
	H= 13 34 40			USCGS
1.	iP Z, P NE		15 49 28.5	
	P: C			
1.	iP	Z	19 46 15.0	
	S	N	40	
	i	E	42	
	P: C			
1.	iP NZ, P E		21 54 18.3	
	S	NEZ	23	
	P: N, C			
1.	e	E	22 17 48	
	L	N	26 38	
	L	E	27 18	
	Mag. 5¾-6 (Mat.)			
	35.7 N., 4 .4 E.			
	Algeria.			
	h: 10 km ca.			
	H= 21 38 29.2			USCGS
1.	iP	Z	23 51 30.5	
	S	NE	54	
	P: D			
2.	P	Z	00 56 23	
2.	iP	EZ	03 50 33.5	
	eS	N	50	
	P: E, D			
2.	P	Z	07 27 24	
	S	NE	44	

Date	Phase	Comp.	Time(GMT) h m s	
2.	P	Z	10 15 30	
	25.5 N., 122.5 E.			
	Taiwan region.			
	h: 136 km ca.			
	H= 10 11 35.1			USCGS
2.	iP Z, P N		13 48 25.4	
	i	E	25.9	
	i	Z	27.1	
	S	NE	51 43	
	i	Z	49	
	L	N	52 41	
	L	E	50	
	P: C			
	Mag. 6.4 (Mat.)			
	19.1 N., 145.4 E.			
	Mariana Is.			
	h: 142 km ca.			
	H= 13 44 18.9			USCGS
2.	iP	Z	13 56 09.1	
	P: C			
2.	iP	Z	18 14 21.3	
	P: C			
	19.1 N., 145.4 E.			
	Mariana Is.			
	h: 145 km ca.			
	H= 18 10 15.5			USCGS
2.	P	NEZ	18 17 47	
3.	iP	EZ	00 38 08.9	
	S	E	14.9	
	P: N, W, D			
3.	iP	Z	02 46 46.2	
	S	NE	47 27.4	
	P: C			
3.	iP Z, P NE		11 02 48.0	
	pP	E	03 05.0	
	SP	E	15.0	
	eL	E	11 30	
	eL	N	12 40	
	P: D			
	0.3 S., 124.9 E.			
	Molucca Sea.			
	h: 39 km ca.			
	H= 10 55 28.0			USCGS
3.	iP	Z	15 42 11.0	
	i	N	11.5	
	i	E	12.3	
	i	E	13.8	
	S	N	43 35	
	P: C			
	29.3 N., 141.7 E.			
	South of Honshu, Japan.			
	h: 42 km ca.			
	H= 15 40 18.3			USCGS

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Date	Phase	Comp.	Time(GMT) h m s
3.	P	Z	17 22 06.5
	S	NEZ	33
3.	P	NZ	19 20 20
	S	NE	48
3.	P	Z	20 41 58
	S	E	42 20
3.	P	Z	21 55 41
	i	E	58
	S	NE	57 29.5
	i	E	44
	i	NZ	45
	30.7 N., 129.5 E.		
	Kyushu, Japan.		
	h: 259 km ca.		
	H= 21 53 30.2		USCGS
4.	P	EZ	05 29 55
	e	N	39 04
	e	E	33
	7.3 S., 127.9 E.		
	Banda Sea.		
	h: 148 km ca.		
	H= 05 21 55.7		USCGS
4.	P	NZ	06 07 34
4.	iP	Z	07 09 26.5
	i	N	27.0
	S	NE	58.9
	P: D		
4.	iP	Z	07 17 43.0
	P: D		
	19.1 S., 177.5 W.		
	Fiji Is. region.		
	h: 570 km ca.		
	H= 07 07 31.1		USCGS
4.	iP	Z	09 10 52.2
	S	NE	11 18
	P: C		
4.	P	NEZ	09 24 27.5
	S	NE	44
	i	Z	45.0
4.	iP	NEZ	11 36 42.2
	PcP	Z	39 09.0
	e	N	44 22
	P: S, W, D		
	1.8 N., 127.2 E.		
	Halmahera.		
	h: 84 km ca.		
	H= 11 29 48.2		USCGS
4.	P	NZ	16 08 55.5
	eS	N	09 22

Date	Phase	Comp.	Time(GMT) h m s
4.	P	Z	19 37 49
	i	NEZ	50.8
	S	N	38 25
4.	iP	NZ	19 40 31.4
	i	E	32.2
	i	N	32.6
	S	E	41 03
	P: N, C		
	34.6 N., 138.6 E.		
	Near south coast of Honshu, Japan.		
	h: 86 km ca.		
	H= 19 39 59.3		USCGS
4.	P	NZ	21 23 08
	i	N	11.0
	eS	N	51
4.	P	NEZ	22 28 51
	eS	E	32 30
	eL	E	33 03
	20.0 N., 143.9 E.		
	Mariana Is. region.		
	h: 59 km ca.		
	H= 22 24 54.7		USCGS
4.	iP	NZ	23 21 01.8
	i	E	02.1
	S	E	47
	P: C		
5.	iP	Z	01 00 34.0
	pP	Z	52.5
	P: C		
	7.3 S., 106.7 E.		
	Java.		
	h: 89 km ca.		
	H= 00 51 33.6		USCGS
5.	iP	Z	01 27 26.8
	i	Z	29.0
	i	E	37.0
	i	E	28 13
	S	N	14.5
	i	E	22.5
	P: C		
5.	P	Z	03 01 54
5.	iP	NZ	03 31 28.3
	i	E	28.5
	S	NEZ	48.2
	P: N, C		
5.	P	Z	12 40 01
	i	NE	02.5
	S	NE	21.7
	i	E	34

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Date	Phase	Comp.	Time(GMT) h m s	
5.	iP	NEZ	13 02 10.3	
	iS	EZ	30.0	
	P: S, W, C			
	Mag. 5.0 (Mat.)			
	38.0 N., 138.8 E.			
	Near west coast of Honshu, Japan.			
	h: 33 km ca.			
	H= 13 01 46			USCGS
5.	P	Z	15 52 10	
5.	iP NZ, P E		18 17 24.5	
	S	NE	26 52	
	eSS	N	31 44	
	eSSS	N	35 05	
	L	E	36 06	
	L	N	11	
	P: N, C			
	Mag. 6¼ (Mat.)			
	20.3 S., 174.1 W.			
	Tonga Is.			
	h: 33 km ca.			
	H= 18 05 58.6			USCGS
5.	P	Z	20 10 45	
	S	NEZ	11 12	
5.	iP	Z	20 25 30.6	
	i	E	31.0	
	i	N	32.3	
	P: D			
5.	iP	NEZ	20 45 49.8	
	i	E	51.0	
	iS	NEZ	46 17.0	
	P: S, E, D			
	Mag. 4.7 (Mat.)			
	34.7 N., 139.2 E.			
	Near south coast of Honshu, Japan.			
	h: 0 km ca.			JMA
5.	P	N	20 46 44	
	S	NE	47 09	
	Mag. 4.7 (Mat.)			
	34.6 N., 138.8 E.			
	Near south coast of Honshu, Japan.			
	h: 363 km ca.			
	H= 20 45 50.6			USCGS
5.	P	Z	22 12 23	
	S	NE	47	
6.	P	Z	00 33 46	
	S	NE	34 13	
6.	iP	NEZ	01 03 01.3	

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	PcP	Z	01 04 27.6	
	ScP	Z	07 29	
	S	NE	09 04	
	i	Z	05	
	P: S, W			
	7.0 S., 122.9 E.			
	Flores Sea.			
	h: 546 km ca.			
	H= 00 55 27.4			USCGS
6.	iP	EZ	04 41 29.3	
	S	N	42 04	
	P: E, D			
6.	P	Z	08 21 57	
6.	P	NEZ	08 22 14.5	
	eS	NE	23 22	
	33.9 N., 137.4 E.			
	Near south coast of Honshu, Japan.			
	h: 33 km ca.			
	H= 08 21 14.9			USCGS
6.	P	Z	09 38 38	
	eS	N	39 40	
6.	P	NZ	10 24 14	
	S	E	41	
6.	P	NEZ	12 01 07	
	S	NE	29.5	
6.	P	Z	18 36 20	
	pP	E	42	
	PP	Z	38 02	
	60.0 N., 151.8 W.			
	Kenai Peninsula, Alaska.			
	h: 53 km ca.			
	H= 18 27 34.0			USCGS
6.	iP Z, P NE		18 50 54.6	
	S	N	51 49	
	i	E	50.5	
	P: C			
6.	iP	EZ	20 59 44.0	
	S	N	21 00 11	
	P: W, C			
7.	iP	Z	03 13 24.0	
	e	N	14 03	
	i	Z	39	
	P: C			
7.	iP Z, P NE		11 02 51.5	
	i	EZ	03 14.5	
	P: C			

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Date	Phase	Comp.	Time(GMT) h m s
7.	iP Z, P N		11 46 48.6
	i	Z	53.6
	S	E	59.7
	P: C		
7.	P	NZ	12 58 17
	i	E	26.8
	S	NE	13 01 41
	19.3 N., 145.5 E.		
	Mariana Is.		
	h: 120 km ca.		
	H= 12 54 09.4		USCGS
7.	P	Z	18 54 41
	i	N	45
	i	E	54
	S	E	58 56
	eL	E	19 00 22
	Mag. $4\frac{3}{4}$-5 (Mat.)		
	18.6 N., 120.9 E.		
	Luzon, P. I.		
	h: 33 km ca.		
	H= 18 49 35.0		USCGS
7.	iP	NZ	20 02 39.4
	S	N	03 06.0
	P: N, D		
7.	P	Z	22 26 13
	i	N	18.0
	S	NEZ	35
8.	iP	Z	00 10 58.5
	S	NE	11 09
	P: D		
8.	iP	EZ	03 46 23.0
	P: W, D		
8.	iP Z, P NE		10 12 59
	iS	NE	13 28.0
8.	iP	NEZ	11 41 55.2
	S	NE	42 55
	P: N, W, D		
8.	P	Z	11 55 22
	S	N	39
8.	P	Z	12 34 49
	S	NE	35 04.5
8.	eP	Z	13 25 36
	eS	NE	26 10
8.	P	Z	16 33 53
	eL	E	38 46
	44.6 N., 149.5 E.		
	Kuril Is.		
	h: 36 km ca.		
	H= 16 31 10.6		USCGS

Date	Phase	Comp.	Time(GMT) h m s
8.	iP	NEZ	18 09 58.2
	S	NEZ	10 21
	P: S, W, C		
8.	eP	Z	19 09 42
8.	ePKP	Z	20 09 52
	59.4 S., 24.0 W.		
	South Sandwich Is. region.		
	h: 39 km ca.		
	H= 18 49 46.0		USCGS
8.	eSS	E	21 43 34
	eL	E	22 00 15
	13.2 S., 112.0 W.		
	Northern Easter I. region.		
	h: 33 km ca.		
	H= 21 08 06.0		USCGS
9.	iP	NEZ	00 43 39.0
	S	E	42.5
	P: N, W, D		
9.	eP	Z	03 33 10
	46.4 N., 153.1 E.		
	Kurile Is.		
	h: 28 km ca.		
	H= 03 29 42.6		USCGS
9.	iP	Z	06 58 08.5
	i	Z	15
	P: D		
	18.0 S., 175.4 W.		
	Tonga Is.		
	h: 229 km ca.		
	H= 06 47 21.9		USCGS
9.	eP	Z	11 20 32
	eS	N	21 29
9.	iP Z, P N		12 55 05.5
	eS	NEZ	31
	P: D		
9.	P	NZ	13 38 26
	i	N	41
	Lq	E	43 17
	Lr1	E	44 33
	Lr2	E	49 10
	Mag. $5\frac{3}{4}$-6 (Mat.)		
	11.9 N., 126.2 E.		
	Philippine Is. region.		
	h: 5 km ca.		
	H= 13 32 46.4		USCGS
9.	eP	Z	13 41 50
9.	P	Z	19 11 49
	i	Z	12 19

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Date	Phase	Comp.	Time(GMT) h m s
10.	P	Z	00 12 35
	i	NE	13 00
10.	eP	Z	00 35 16
	eS	Z	36
10.	P	Z	03 04 07
	45.8 N., 26.6 E.		
	Rumania.		
	h: 128 km ca.		
	H= 02 52 23.9		USCGS
10.	eP	Z	04 19 28
10.	iP	NEZ	07 45 24.7
	pP	Z	50.0
	PP	Z	47 12.5
	ScP	Z	50 52.3
	eS	E	52 09
	L	E	55 05
	P: N, W, C		
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)		
	5.8 S., 147.3 E.		
	East New Guinea region.		
	h: 113 km ca.		
	H= 07 37 35.1		USCGS
10.	P	Z	12 47 59
	i	NZ	48 07.5
10.	P	Z	13 37 51
	S	NEZ	38 18
10.	iP	NEZ	13 46 10.3
	i	Z	14.2
	sP	E	54
	PcP	E	47 21
	PP	N	48 16
	sPP	N	49
	S	NE	54 00
	sS	E	48
	ScS	E	56 04
	L	E	14 00 20
	Lr	Z	02 47
	Lr	N	50
	Lr	E	53
	P: N, W, C		
	Mag. $6\frac{3}{4}$-7 (Mat.)		
	13.5 S., 166.6 E.		
	New Hebrides Is.		
	h: 32 km ca.		
	H= 13 36 30.7		USCGS
10.	eP	Z	14 58 50
	35.2 N., 111.3 E.		
	Eastern China.		
	h: 33 km ca.		
	H= 14 54 01.0		USCGS

Date	Phase	Comp.	Time(GMT) h m s
10.	P	Z	16 46 39
	S	Z	47 04
10.	P	Z	17 37 48
	i	Z	55.3
	eL	E	47 00
	3.2 S., 146.7 E.		
	Bismarck Sea.		
	h: 64 km ca.		
	H= 17 30 12		USCGS
10.	eP	Z	18 08 18
	eL	E	17 20
	3.4 S., 146.2 E.		
	Bismarck Sea.		
	h: 39 km ca.		
	H= 18 00 41.1		USCGS
10.	P	Z	18 12 49
	S	NE	13 05
10.	eP	Z	18 41 25
	S	NEZ	48
10.	iP	EZ	21 25 46.3
	i	E	53.2
	eS	N	26 12
	P: W, C		
10.	iP	Z	21 27 46.0
	i	E	53.0
	eS	N	28 11
	P: C		
11.	P	Z	01 53 48
	i	E	50
	S	N	54 06
	i	N	10
11.	iP	Z	07 56 33.5
	i	Z	50.8
	P: N, W, C		
11.	iP	Z	09 17 03.6
	P: C		
	6.0 S., 130.5 E.		
	Banda Sea.		
	h: 129 km ca.		
	H= 09 09 16		USCGS
11.	eP	Z	09 47 13
	i	EZ	22
	i	N	33
	30.0 N., 130.0 E.		
	Kyushu, Japan.		
	h: 33 km ca.		
	H= 09 44 58		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
11.	iP Z, P E		12 09 24.5
	i	N	11 03
	i	E	05
	P: W, C		
11.	P	Z	16 17 49
	i	NZ	50
	S	Z	18 21
	i	E	23
11.	P	Z	17 06 14
	i	N	23
	61.1 N., 151.0 W.		
	Southern Alaska.		
	h: 59 km ca.		
	H= 16 57 27.0		USCGS
11.	iP NZ, P E		20 16 08.4
	iS	E	17 21.3
	eL	E	38
	P: N, D		
	43.0 N., 139.2 E.		
	Eastern Sea of Japan.		
	h: 189 km ca.		
	H= 20 14 33.5		USCGS
11.	P	Z	22 50 53.0
	i	NE	54.5
	eS	N	54 19
	P: D		
	48.8 N., 153.5 E.		
	Kurile Is.		
	h: 102.km ca.		
	H= 22 47 06.3		USCGS
12.	iP Z, P NE		00 43 33.0
	S	N	51.7
	P: C		
12.	iP	Z	04 52 34.5
	P: D		
	21.1 S., 174.7 W.		
	Tonga Is.		
	h: 123 km ca.		
	H= 04 41 18		USCGS
12.	iP	EZ	13 40 24.5
	i	N	25
	i	Z	42 15
	eS	E	47 27
	eL	E	50.0
	eL	N	56.8
	P: E, C		
	Mag. $5\frac{1}{4}$- $5\frac{1}{2}$ (Mat.)		
	27.6 N., 88.0 E.		
	Nepal.		
	h: 23 km ca.		
	H= 13 32 24.0		USCGS
12.	iPKP	Z	13 57 17.3

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	PKP : D		
	9.7 S., 75.0 W.		
	Peru.		
	h: 48 km ca.		
	H= 13 36 51.0		USCGS
12.	P	Z	14 03 21
	27.3 N., 87.7 E.		
	Nepal.		
	h: 33 km ca.		
	H= 13 55 20.0		USCGS
12.	iP	NZ	14 36 20.8
	i	E	21.0
	iS	NE	40.5
	P: S, C		
12.	iP	Z	14 57 22.7
	P: D		
12.	P	Z	16 23 07
	S	E	26 54
	eL	E	28 22
	Mag. $5\frac{1}{4}$-$5\frac{1}{2}$ (Mat.)		
	34.7 N., 111.8 E.		
	Eastern China.		
	h: 33 km ca.		
	H= 16 18 11		USCGS
12.	iP Z, P N		18 04 08.7
	i	N	11
	i	Z	15
	iS	NE	35.5
	P: C		
12.	iP	Z	20 27 10.0
	i	NE	11
	iS	E	34.0
	i	N	35.7
12.	P	Z	20 59 29
	5.5 S., 102.5 E.		
	Southern Sumatra.		
	h: 33 km ca.		
	H= 20 50 12.3		USCGS
12.	iP	Z	21 21 08.2
	i	NE	08.5
	S	N	28.0
	i	E	28.5
	P: C		
13.	iP	Z	00 21 13.5
	i	Z	35.0
	44.7 N., 149.3 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 00 18 30		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
13.	iP	Z	08 41 47.8
	i	E	48.5
	i	E	51
	i	E	57
	S	N	42 32
	i	E	43
	Mag. 4.8 (Mat.)		
	39.0 N., 140.7 E.		
	Honshu, Japan.		
	h: 19 km ca.		
	H= 08 40 57.0		USCGS
13.	iP	Z	10 32 34.3
	i	NE	34.5
	i	N	38.5
	S	N	53
	i	E	56.5
	P: D		
13.	iP	Z	13 13 34.3
	P: D		
13.	iP	EZ	13 59 20.2
	S	N	50.5
	P: E, C		
13.	iP	Z	18 19 05.5
	eS	E	35
	P: D		
13.	P	N	22 22 35.9
	i	NEZ	36.5
	eL	E	31 19
	P: N		
	0.0 ., 123.9 E.		
	Northern Celebes.		
	h: 127 km ca.		
	H= 22 15 24.6		USCGS
14.	P	Z	01 14 46
	i	N	48
	i	E	51
	48.6 N., 154.3 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 01 10 42		USCGS
14.	iP	E	01 35 35.0
	i	N	35.5
	i	E	38
	i	N	47
	eS	E	37 20
	i	N	24.5
	P: E		
	30.2 N., 129.0 E.		
	Kyushu, Japan.		
	h: 140 km ca.		
	H= 01 33 14.6		USCGS

Date	Phase	Comp.	Time(GMT) h m s
14.	P	Z	08 36 46
	i	NE	47
	eS	NE	43 17
	L	E	47 20
	Lr	N	50 04
	Lr	Z	31
	Mag. 5½ (Mat.)		
	6.2 S., 149.9 E.		
	New Britain region.		
	h: 63 km ca.		
	H= 08 28 45.3		USCGS
14.	PKP	Z	08 44 32
	L	N	09 45 47
	5.5 S., 81.3 W.		
	Near coast of northern Peru.		
	h: 32 km ca.		
	H= 08 25 17.5		USCGS
14.	P	Z	10 07 46
	i	N	48
14.	P	NZ	17 28 04
	i	E	06
	eSS	E	36 14
	2.3 N., 126.9 E.		
	Molucca Passage.		
	h: 94 km ca.		
	H= 17 21 17.6		USCGS
14.	iP	Z	23 40 21.5
	S	N	44.5
	P: C		
15.	iP	Z	00 03 48.3
	i	Z	04 13
	eS	N	05 20
	P: C		
15.	eP	Z	00 43 52
	i	Z	44 06
	36.5 N., 71.0 E.		
	Afghanistan-USSR border region.		
	h: 245 km ca.		
	H= 00 34 15.2		USCGS
15.	P	Z	01 24 00
	eS	N	29
15.	iP NZ, P E		03 40 38.5
	e	E	52 40
	P: S, E, D		
	20.9 S., 177.8 W.		
	Fiji Is. region.		
	h: 597 km ca.		
	H= 03 30 22.2		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
15.	P	N	03 56 15.3
	i	Z	15.8
	i	E	25.6
	eS	NE	59 38
	P: N		
	18.5 N., 145.6 E.		
	Mariana Is.		
	h: 204 km ca.		
	H= 03 52 06.3		USCGS
15.	iP Z, P NE		06 08 07.5
	S	NE	09 16
15.	iP	NEZ	06 32 32.7
	iS	NE	58.5
	P: S, W		
15.	eP	NZ	13 59 02
	i	EZ	14 01 17
	i	N	36
15.	eP	Z	15 30 51
	46.3 N., 139.7 E.		
	Near east coast of Eastern Russia.		
	h: 471 km ca.		
	H= 15 28 35		USCGS
15.	P	Z	15 32 11
	eS	E	36 36
	eL	N	38 24
	35.1 N., 111.7 E.		
	Eastern China.		
	h: 58 km ca.		
	H= 15 27 22		USCGS
15.	P	Z	16 58 48
	i	N	59 04
	S	NE	35
15.	iP Z, P NE		18 38 31.5
	eS	E	42 10
	eL	E	43 33
	L	N	44 14
	L	Z	38
	P: C		
	Mag. 4¾-5 (Mat.)		
	23.6 N., 121.7 E.		
	Taiwan.		
	h: 33 km ca.		
	H= 18 34 07.6		USCGS
15.	iP	NZ	19 20 28.7
	e	E	21 13
	P: S, C		
15.	iP	NZ	19 45 51.9
	i	N	57

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	S	E	19 46 15
	i	NE	17.3
	P: S, C		
15.	iP	NZ	20 23 25.0
	18.6 S., 178.7 W.		
	Fiji Is. region.		
	h: 685 km ca.		
	H= 20 13 27.8		USCGS
15.	eP	Z	21 17 09
	13.3 S., 166.4 E.		
	New Hebrides Is.		
	h: 85 km ca.		
	H= 21 07 35.1		USCGS
15.	P	Z	23 27 20
	S	N	35 04
	i	E	09
	eL	E	40 41
	Mag. 5¾-6 (Mat.)		
	13.3 S., 166.3 E.		
	New Hebrides Is.		
	h: 8 km ca.		
	H= 23 17 36.0		USCGS
16.	eP	Z	01 43 52
	eS	N	48 28
16.	eP	Z	06 42 17
	e	E	51 42
	e	E	56 42
	5.7 S., 151.3 E.		
	New Britain region.		
	h: 60 km ca.		
	H= 06 34 16.6		USCGS
16.	ePKP1	Z	11 52 52
	ePKP2	Z	53 32
	56.6 S., 27.4 W.		
	South Sandwich Is. region.		
	h: 101 km ca.		
	H= 11 32 37.4		USCGS
16.	P	NZ	13 02 11
	25.6 S., 180.0		
	South of Fiji Is.		
	h: 445 km ca.		
	H= 12 51 29		USCGS
16.	P	Z	14 57 01
16.	P	Z	22 53 08.0
	eL	E	23 02 30
	eL	E	03 16
	eL	Z	05 00
	P: C		
	Mag. 5¼-5½ (Mat.)		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	4.4 S., 133.0 E.		
	West New Guinea region.		
	h: 33 km ca.		
	H= 22 45 29.4		USCGS
17.	iP	Z	02 22 12.9
	P: C		
	58.3 N., 151.8 W.		
	Kodiak I. region.		
	h: 33 km ca.		
	H= 02 13 28.6		USCGS
17.	iP	NE	05 49 07.8
17.	P	NEZ	07 25 13
	S	NE	47
17.	iP	Z	08 30 47.0
	eS	E	39 52
	L	E	51 06
	P: D		
	Mag. $5\frac{1}{4}$-$5\frac{1}{2}$ (Mat.)		
	15.1 S., 173.7 W.		
	Tonga Is.		
	h: 33 km ca.		
	H= 08 19 44.5		USCGS
17.	P	Z	09 12 02
	16.4 S., 174.3 W.		
	Tonga Is.		
	h: 123 km ca.		
	H= 09 01 07.2		USCGS
17.	iP	Z	10 53 42.3
	i	NE	43
	pP	Z	55 38
	i	NEZ	43
	S	E	11 02 19
	sS	E	05 41
	P: C		
	24.5 S., 178.4 E.		
	South of Fiji Is.		
	h: 563 km ca.		
	H= 10 43 17.5		USCGS
17.	P	Z	11 16 49
	i	N	17 08
	eS	N	18 36
	e	E	19 15
17.	eP	E	12 49 03
	S	NE	29
17.	iP NZ, P	E	21 06 19.2
	pP	NEZ	07 10
	ScP	Z	11 07.5
	PcS	E	11
	S	N	13 15
	i	E	19
	sS	NE	14 48

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	ScS	NE	21 15 48
	SS	E	17 34
	P: S, W, D		
	6.8 S., 109.1 E.		
	Java.		
	h: 242 km ca.		
	H= 20 57 41.3		USCGS
17.	eP	Z	21 51 29
	i	NE	36
	i	NE	40
	S	N	52 16
18.	iP NZ, P	E	00 21 38.5
	i	E	39.0
	S	N	22 56
	P: N, C		
	30.1 N., 138.6 E.		
	South of Honshu, Japan.		
	h: 415 km ca.		
	H= 00 19 59.8		USCGS
18.	P	Z	00 38 42
	i	N	39 15
	e	E	39
18.	P	N	02 22 22
	i	EZ	25
	e	NE	51
18.	eP	Z	03 02 24
	i	Z	40
18.	P	NZ	03 04 41
	i	NZ	47
	i	E	56
18.	iP	NZ	03 52 14.5
	i	E	14.8
	iS	NE	28.5
	P: N, C		
18.	iP EZ. P	N	09 33 41.0
	S	NE	59.0
	P: W, C		
18.	iP EZ, P	N	09 59 56.3
	i	NE	10 00 13
	P: W, D		
18.	iP	NEZ	16 15 57.0
	i	EZ	16 13
	i	N	16
	S	NEZ	22
	P: S, E, D		
18.	eP	NZ	19 31 55
	S	NE	32 23

Date	Phase	Comp.	Time(GMT) h m s
18.	iP EZ, P	N	22 15 49.5
	i	E	53.0
	S	NE	16 08.5
	P: E, D		
18.	eP	Z	23 32 11
	i	NE	20
	i	N	33
	eS	NE	33 05
19.	P	NZ	01 00 00
	S	E	23.0
	i	NZ	24.5
	P: C		
19.	P	Z	06 29 00
	S	NE	25
19.	iP	Z	07 33 28.3
	iS	NEZ	32.0
	P: C		
19.	ePKP	Z	15 38 53
	28.1 S., 66.8 W.		
	Catamarca Province,		
	Argentina.		
	h: 146 km ca.		
	H= 15 18 41.6		USCGS
19.	eL	E	21 44.1
	32.2 S., 178.2 W.		
	South of Kermadec Is.		
	h: 33 km ca.		
	H= 21 04 44.4		USCGS
20.	eP	Z	02 13 49
	4.9 S., 142.3 E.		
	New Guinea.		
	h: 96 km ca.		
	H= 02 06 09.6		USCGS
20.	iP NZ, P	E	06 39 23.5
	S	NE	47
	i	NE	56
	P: N, E, D		
20.	eL	E	09 44.2
	18.4 S., 167.6 E.		
	New Hebrides Is.		
	h: 10 km ca.		
	H= 09 18 34.9		USCGS
20.	eP	EZ	09 51 25
	eS	NE	48
	i	N	52 11
20.	iP	NEZ	11 52 22.8
	i	N	27
	S	E	49.0
	P: N, E		

Date	Phase	Comp.	Time(GMT) h m s
20.	iP Z, P	NE	12 58 39.7
	e	E	13 06 20
	e	N	42
	P: C		
	2.6 N., 128.3 E.		
	Halmahera.		
	h: 98 km ca.		
	H= 12 51 56.4		USCGS
20.	eP	Z	13 46 57
20.	iP	NEZ	15 30 22.3
	S	NZ	23.7
	P: W		
20.	P	Z	16 51 57
	60.0 N., 146.8 W.		
	Gulf of Alaska.		
	h: 33 km ca.		
	H= 16 42 50.9		USCGS
20.	P	NE	18 20 11
	S	NEZ	16
20.	iP	NEZ	20 30 27.9
	eS	N	33 05
	e	E	13
	eL	E	35 48
	P: S, W, C		
	46.3 N., 152.3 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 20 27 05.5		USCGS
21.	P	Z	02 41 55.0
	i	NEZ	56.1
	i	EZ	42 02.0
	i	Z	09
	S	E	32
	i	N	34
	i	NEZ	45
	P: S, W, D		
	Mag. 4.6 (Mat.)		
	33.6 N., 136.1 E.		
	Near south coast of southern		
	Honshu, Japan.		
	h: 13 km ca.		
	H= 02 41 01.6		USCGS
21.	P	Z	06 22 07
	eS	E	32 43
	e	E	36 52
	eL	NE	47 37
	Mag.5½ (Mat.)		
	34.2 S., 179.8 E.		
	South of Kermadec Is.		
	h: 33 km ca.		
	H= 06 09 58		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
21.	iP EZ, P N		07 14 49.4
	iS NE, S Z		59.8
	P: E, D		
21.	P	Z	09 31 31
	i	NZ	38.5
	i	E	40
	iS	E	57.1
	i	N	57.5
21.	e	N	13 48 50
	L	NE	51 07
	L	Z	55 51
	Mag. 5-5¼ (Mat.)		
	34.6 N., 86.9 E.		
	Tibet.		
	h: 33 km ca.		
	H= 13 31 29.4		USCGS
21.	iP	NZ	15 06 17.5
	i	E	17.6
	i	NE	29
	iS	NE	42.7
	i	Z	43
	P: S, C		
21.	iP EZ, P N		16 30 37.5
	iS	NEZ	40.0
	P: S, E		
21.	P	NEZ	16 42 09
	i	E	31
	L	E	49 22
	56.2 N., 163.1 E.		
	Near east coast of Kamchatka.		
	h: 119 km ca.		
	H= 16 36 46.2		USCGS
21.	iP	NEZ	17 07 36.9
	i	N	37.6
	i	Z	41.0
	S	NE	08 09
	i	N	16
	P: S, W, D		
21.	iP	Z	20 55 26.4
	i	NE	27
	eS	E	43
	i	N	45.3
	P: C		
21.	iP	Z	21 46 16.2
	12.8 S., 169.0 E.		
	Santa Cruz Is. region.		
	h: 639 km ca.		
	H= 21 37 26.2		USCGS
21,	iP	EZ	22 59 59.5
	i	N	23 00 00

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	S	NE	23 00 26
	P: E, D		
22.	P	NEZ	03 23 43
	i	N	43.7
	iS E, S N		24 07.9
22.	P	E	05 29 22
	i	NZ	22.5
	19.7 S., 176.1 W.		
	Fiji Is. region.		
	h: 210 km ca.		
	H= 05 18 27.9		USCGS
22.	iP	EZ	09 55 42.1
	i	N	42.5
	S?	Z	57 10
	e	E	12
	P: W, C		
22.	iP	NEZ	10 52 09.1
	i	E	15
	iS E, S N		34.0
	P: S, W, C		
	Mag. 4.7 (Mat.)		
	38.5 N., 138.5 E.		
	Near west coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 10 51 37.1		USCGS
22.	iP	Z	10 59 00.7
	i	N	11 00 01.0
	S	N	26
	i	Z	27.5
22.	P	NEZ	11 55 32
	i	Z	46
	eS	NE?	56 00
	i	Z	10
22.	P	Z	15 14 43
	46.9 N., 152.5 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 15 11 14		USCGS
22.	P	NZ	20 55 42
22.	P	Z	22 06 37
	44.2 N., 151.0 E.		
	Kurile Is. region.		
	h: 33 km ca.		
	H= 22 03 40		USCGS
22.	iP	NEZ	22 30 33.1
	i	NE	42.5
	i	N	31 19
	S	NE	24.5
	P: N, W, C		

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Date	Phase	Comp.	Time(GMT) h m s
23.	P	NZ	04 52 16
	i	Z	23
	iS NE, S	Z	31.5
23.	iP	NZ	15 34 28.9
	i	E	30
	S	E	35 39
	i	NZ	42.5
	P: S, D		
23.	P	Z	16 25 20.0
	i	NE	20.4
	S	NEZ	43
	P: D		
23.	iP	NEZ	21 51 49.0
	i	NEZ	52 02.0
	i	N	12
	iS	N	15.0
	i	Z	18
	i	E	34
	P: S, E, D		
	Mag. 5.1 (Mat.)		
	36.5 N., 141.1 E.		
	Near east coast of Honshu, Japan.		
	h: 40 km ca.		JMA
23.	eP	NZ	22 39 04
	i	E	05.0
23.	e	E	22 49 04
	eL	E	54 35
	13.7 N., 119.9 E.		
	Philippine Is. region.		
	h: 53 km ca.		
	H= 22 38 25.8		USCGS
23.	P	NEZ	23 30 06.3
	i	Z	32 38
	iS NE, S	Z	34 32.0
	P: N, C		
	7.4 N., 123.9 E.		
	Mindanao, P. I.		
	h: 627 km ca.		
	H= 23 24 29.6		USCGS
23.	iP	Z	23 35 24.5
	P: D		
24.	iP	Z	00 18 50.1
	i	N	50.6
	i	E	52
	i	E	19 06
	PP	E	20 34
	S E, eS N		25 08
	Lq	E	28 16
	eL	E	31.0
	PKP1PKP1	Z	51 15
	PKP2PKP2	Z	52 32

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	P: C		
	Mag. 7.3 (Mat.)		
	2.4 S., 126.0 E.		
	Ceram Sea.		
	h: 6 km ca.		
	H= 00 11 12.1		USCGS
24.	P	NZ	00 39 55
	e	E	56
24.	P	NEZ	00 41 00
24.	P	Z	00 42 00
24.	P	NEZ	00 45 31
24.	iP	Z	00 56 21.0
	i	N	27
	P: D		
24.	P	NEZ	00 59 54
24.	iP	Z	01 05 08.5
	i	N	09.5
	i	E	10.0
	i	N	06 17.5
	P: D		
24.	P	NZ	01 07 38
	i	Z	49
	i	E	54
24.	P	Z	02 38 58
	i	E	39 00
	i	N	04
	i	Z	08
	2.7 S., 126.1 E.		
	Ceram Sea.		
	h: 23 km ca.		
	H= 02 31 19		USCGS
24.	eP	Z	02 49 22
	2.2 S., 126.0 E.		
	Ceram Sea.		
	h: 29 km ca.		
	H= 02 41 43		USCGS
24.	iP	NEZ	05 42 58.9
	iS	NE	43 01.5
	P: N, D		
24.	P	Z	06 22 11.1
	4.3 S., 132.8 E.		
	West New Guinea region.		
	h: 11 km ca.		
	H= 06 14 28		USCGS
24.	iP	EZ	09 19 50.9
	i	N	20 51

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	i	EZ	09 21 09
	S	N	13
	P: W, C		
24.	iP	Z	18 23 45.0
	i	NE	45.5
	P: C		
24.	eP	Z	18 27 37
	eS	NE	28 17
24.	P	NZ	20 49 32
	eS	NE	53
24.	eL	E	21 54.0
25.	iP	Z	04 14 45.3
	i	NE	45.6
	iS	Z	15 05.5
	i	NE	06.1
	i	E	20
	P: C		
	Mag. 5.1 (Mat.)		
	37.9 N., 138.9 E.		
	Near west coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 04 14 21.2		USCGS
25.	iP	Z	04 36 14.2
	i	E	14.5
	i	N	15
	i	E	21
	i	N	30
	S	E	42.6
	i	N	44
	i	Z	45
	P: D		
25.	iP	NEZ	05 14 33.5
	iS	Z	53.0
	P: S, W, C		
25.	iP	NEZ	07 24 27.2
	i	Z	33
	S	E	46
	i	NZ	47.0
25.	eP	Z	09 46 47
	i	EZ	50
	i	N	50.3
	S	N	47 11
	i	EZ	15.5
25.	P	NZ	10 44 21
	i	NZ	29
	i	E	36
	S	N	45 06.5
25.	iP	EZ	10 53 53.5

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	N	10 53 54
	i	NE	54 15
	S	NE	26
	i	Z	28
	P: C		
25.	eP	Z	12 10 29
	i	Z	37.5
	i	NE	39
	2.6 S., 126.1 E.		
	Ceram Sea.		
	h: 33 km ca.		
	H= 12 02 51.4		USCGS
25.	iP	Z	13 57 19.3
	i	NEZ	30.0
	P: C		
25.	iP Z, P E		15 53 26.4
	iS	NEZ	29.2
	P: D		
25.	P	Z	16 49 16.3
	i	E	17.0
	i	Z	53
	S NE, eS Z		53 26
	L	E	54 45
	L	N	56 54
	P: S, D		
	13.7 N., 144.3 E.		
	Mariana Is.		
	h: 139 km ca.		
	H= 16 44 18.7		USCGS
26.	iP	NEZ	01 54 33.9
	i	Z	55 11.0
	iS	NZ	20.0
	i	E	22.0
	P: S, W, D		
	Mag. 5.0 (Mat.)		
	34.6 N., 135.2 E.		
	Near south coast of southern Honshu, Japan.		
	h: 357 km ca.		
	H= 01 53 31.9		USCGS
26.	P	Z	02 31 28.5
	i	Z	30
	i	E	30.5
	S	E	33 23
	L	N	34 00
	28.4 N., 131.1 E.		
	Ryukyu Is. region.		
	h: 33 km ca.		
	H= 02 29 02		USCGS
26.	P	Z	05 05 23.1
	P: C		
	23.4 S., 179.8 W.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	South of Fiji Is.		
	h: 474 km ca.		
	H= 04 54 51.6		USCGS
26.	P	Z	06 34 31
	2.9 S., 102.4 E.		
	Southern Sumatra.		
	h: 89 km ca.		
	H= 06 25 32		USCGS
26.	iP	Z	10 52 41.5
	17.5 S., 178.7 W.		
	Fiji Is. region.		
	h: 504 km ca.		
	H= 10 42 35.4		USCGS
26.	iP Z, P N		10 57 10.0
	i	E	28
	eS	E	11 03 16
	eL	E	06 11
	eL	N	08 48
	P: D		
	2.4 S., 126.0 E.		
	Ceram Sea.		
	h: 33 km ca.		
	H= 10 49 33.5		USCGS
26.	P	NE	12 41 28.0
	i	N	59
	i	E	42 05
26.	P	Z	13 09 45.8
26.	P	NE	16 25 27
	i	E	33
	S E, eS N		57
26.	iP	NEZ	17 10 19.0
	i	N	38.5
	S	E	11 36
	i	N	12 11
	P: S, W, C		
	42.7 N., 141.2 E.		
	Hokkaido, Japan region.		
	h: 33 km ca.		
	H= 17 08 42		USCGS
26.	P	EZ	18 22 20.0
	eS	N	28 34
	e	E	31 30
	L	NE	37 50
	eL	Z	38 38
	P: C		
	2.4 S., 125.7 E.		
	Ceram Sea.		
	h: 33 km ca.		
	H= 18 14 44.1		USCGS
26.	iP	NEZ	23 24 10.1

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	Z	23 24 23
	S	N	25 35
	i	E	36
	L	E	50
	L	N	26 42
	P: S, E, D		
	29.6 N., 142.0 E.		
	South of Honshu, Japan.		
	h: 33 km ca.		
	H= 23 22 18.4		USCGS
26.	P	NEZ	23 43 02.5
	i	Z	10.0
	S	N	38
26.	iP	NEZ	23 48 01.0
	i	N	09
	S	N	20.0
	P: S, E, D		
	Mag. 5.8 (Mat.)		
	36.1 N., 139.5 E.		
	Honshu, Japan.		
	h: 104 km ca.		
	H= 23 47 38.2		USCGS
27.	eP	Z	00 55 47
	S?	NZ	56 04
27.	iP	NEZ	01 33 49.0
	iS NE, S Z		34 07.6
	P: N, E , D		
27.	iP	NEZ	08 56 16.5
	S	E	31.0
	i	Z	32.5
	P: N, W, C		
	36.2 N., 139.7 E.		
	Honshu, Japan.		
	h: 95 km ca.		JMA
27.	P	Z	09 05 54.1
	i	NE	55.0
	i	E	06 22
	i	Z	27
	i	E	29
	P: C		
27.	P	Z	12 23 57.0
	i	E	57.2
	i	N	57.5
	eS	N	25 27
	P: C		
	33.9 N., 132.1 E.		
	Honshu, Japan.		
	h: 0 km ca.		JMA
27.	iP	NEZ	15 31 51.5
	S	NE	32 10
	i	Z	24

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	P: S, E, D		
	Mag. 4.3 (Mat.)		
	36.7 N., 139.6 E.		
	Honshu, Japan.		
	h: 89 km ca.		
	H= 15 31 30		USCGS
27.	eP	Z	19 05 00
	i	NZ	13.0
	48.8 N., 154.8 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 19 01 00		USCGS
27.	iP	NZ	19 26 23.0
	i	E	23.9
	eS	NZ	27 27
	P: N, C		
	30.5 N., 138.7 E.		
	South of Honshu, Japan.		
	h: 399 km ca.		
	H= 19 24 50		USCGS
27.	L	E	20 13.0
27.	P	Z	20 23 57
	22.0 S., 179.5 W.		
	Fiji Is. region.		
	h: 563 km ca.		
	H= 20 13 39		USCGS
27.	P	Z	23 17 17
28.	eP	Z	01 31 06
	eS	E	42
28.	P	Z	02 35 49.4
	i	NE	50.0
	S	NEZ	36 15
28.	iP	Z	02 43 06.0
	i	NE	06.4
	i	Z	44 19.2
	i	E	19.5
	i	N	20
	P: C		
	2.5 S., 102.5 E.		
	Southern Sumatra.		
	h: 33 km ca.		
	H= 02 34 03.0		USCGS
28.	P	Z	05 27 40.0
	S	NE	28 21
28.	P	NEZ	06 39 36
	i	NEZ	44.5
	i	N	40 03.9
	i	NE	06.5
	i	N	10.0

Date	Phase	Comp.	Time(GMT) h m s
28.	eP	Z	09 45 04
	i	N	05
	i	NEZ	10
	i	NZ	24
	eS	E	46 28
	e	N	44
28.	iP	NZ	11 34 03.6
	i	E	03.7
	iS	N	12.5
	i	E	13.3
	P: N, C		
28.	iP	NEZ	12 03 22.0
	S	NE	30
	P: N, E, D		
28.	iP	NZ	13 07 21.5
	i	E	23
	i	Z	24
	i	Z	38.5
	S	E	55
	i	N	56.5
	P: S, D		
28.	iP	EZ	16 11 35.2
	i	N	36
	i	E	39.3
	i	N	43
	iS	N	53.1
	P: W, D		
28.	L	E	17 07 34
	L	N	10 10
	Mag. 5¾-6 (Mat.)		
	4.0 S., 104.2 W.		
	Northern Easter I.,		
	Cordillera.		
	h: 33 km ca.		
	H= 16 15 35.0		USCGS
29.	iP	EZ	01 23 33.5
	i	N	33.9
	i	E	36
	i	E	24 00
	S	E	03
	P: E, D		
	Mag. 4.3 (Mat.)		
	36.1 N., 140.3 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 01 22 57.0		USCGS
29.	P	Z	03 38 37
	21.2 S., 178.9 W.		
	Fiji Is. region.		
	h: 550 km ca.		
	H= 03 28 18.0		USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
29.	iP	NEZ	09 40 42.7	
	PPP	E	41 38	
	PPP	Z	40	
	S	NE	44 56	
	Lq	E	46 17	
	Lq	N	30	
	Lr	Z	48 36	
	P: S, W, C			
	Mag. 5½-5½ (Mat.)			
	54.8 N., 161.7 E.			
	Near east coast of Kamchatka.			
	h: 33 km ca.			
	H= 09 35 25.7			USCGS
29.	eP	Z	11 28 43	
	2.9 S., 126.3 E.			
	Ceram Sea.			
	h: 51 km ca.			
	H= 11 21 04.3			USCGS
29.	P	Z	15 46 20.5	
	i	NE	21.0	
	i	Z	29.0	
	iS	EZ	47.0	
	P: C			
29.	P	Z	16 42 03.0	
	i	N	03.1	
	i	E	04	
	S	NEZ	29	
29.	eP	NZ	19 15 30	
	e	E	50	
	e	Z	16 12	
	e	N	13	
	35.6 N., 73.6 E.			
	Northwestern Kashmir.			
	h: 33 km ca.			
	H= 20 06 02.4			USCGS
29.	eP	Z	20 15 06	
29.	iP	Z	22 38 36.7	
	i	E	37	
	i	Z	41 15	
	P: D			
	51.3 N., 179.0 W.			
	Andreanof Is.			
	h: 33 km ca.			
	H= 22 31 56.3			USCGS
30.	P	Z	01 12 54.3	
	i	N	55.5	
	i	Z	13 11	
	i	N	14	
30.	eP	Z	02 55 35	

Date	Phase	Comp.	Time(GMT) h m s	
30.	iP	NZ	04 43 51.5	
	P: N, D			
	51.6 N., 179.8 E.			
	Andreanof Is.			
	h: 33 km ca.			
	H= 04 37 15.1			USCGS
30.	iP	NEZ	07 23 55.0	
	S	NE	24 19	
	i	Z	22	
	P: S, E, C			
30.	iP	Z	09 28 34.7	
	i	N	35	
	i	Z	42.5	
	i	N	54	
	P: D			
30.	eP	Z	10 42 04	
	i	N	05	
	i	Z	32	
	S	N	58	
30.	iP	NZ	11 44 33.8	
	i	N	45	
	i	Z	46	
	S	EZ	57	
	P: S, D			
30.	iP	Z	12 23 39.7	
	i	Z	24 32	
	P: C			
	5.9 S., 129.9 E.			
	Banda Sea.			
	h: 149 km ca.			
	H= 12 15 54			USCGS
30.	iP	NZ	15 53 56.0	
	i	E	56.4	
	eS	E	57 40	
	L	E	59 26	
	L	N	16 00 28	
	P: N, D			
	Mag. 5-5¼ (Mat.)			
	50.0 N., 157.9 E.			
	Kurile Is. region.			
	h: 33 km ca.			
	H= 15 49 28.9			USCGS
30.	iP	NEZ	17 51 02.5	
	iPcP	Z	48.0	
	P: N, W, C			
	13.0 S., 169.4 E.			
	Santa Cruz Is. region.			
	h: 647 km ca.			
	H= 17 42 12.3			USCGS
30.	iP	Z	18 15 11.5	
	i	NE	12	

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
	PcP	Z	18 15 57				
	P: D						
	12.9 S., 169.5 E.						
	Santa Cruz Is. region.						
	h: 649 km ca.						
	H= 18 06 21.2						
31.	P	Z	01 14 45				
	eL	E	57.0				
31.	P	Z	05 10 25.5				
	P: C						
31.	P	Z	12 05 20				
	47.1 N., 153.2 E.						
	Kurile Is.						
	h: 33 km ca.						
	H= 12 01 44		USCGS				
31.	iPKP1	Z	13 17 18.5				
	iPKP1	N	19.0				
	iPKP1	E	20.0				
	PKP2	Z	18 03				
	PKP2	N	06				
	PKP1: D						
	21.2 S., 67.8 W.						
	Chile-Bolivia border region.						
	h: 71 km ca.						
	H= 12 57 29.1		USCGS				
31.	eP	NZ	14 10 02				
	i	Z	11.5				
31.	iP EZ, P	N	15 16 48.0				
	i	Z	55.6				
	S	E	17 06				
	i	Z	13				
	P: S, E, D						
31.	P	Z	23 42 39				
	i	Z	52				
	i	E	53				
	eS	N	47 49				
	L	NE	49 40				
	51.2 N., 178.6 E.						
	Rat Is.						
	h: 33 km ca.						
	H= 23 36 13.4		USCGS				

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Date	Phase	Comp.	Time(GMT) h m s
1.	P	Z	02 15 24
	i	E	25.6
	i	N	27.7
	e	N	54
1.	P	Z	05 37 20
	i	NE	22.4
	S	E	45 47
	esS	E	48 52
	esSS	E	53 14
	18.6 S., 178.1 W.		
	Fiji Is. region.		
	h: 472 km ca.		
	H= 05 27 04.5		USCGS
1.	e	N	10 32.3
	e	E	33.1
1.	iP E, P Z		14 11 37.4
	i	NZ	12 15
1.	iP	NEZ	17 25 52.3
	S	NEZ	26 06
	P: N, E, C		
1.	iP Z, P NE		18 36 00.4
	S	NEZ	23
	P: C		
1.	P	NEZ	19 33 44
	S	NE	34 08
	i	EZ	29
	P: D		
1.	P	Z	19 35 06
	e	Z	30
	e	E	37
	eS	E	41 20
	i	N	29
	5.8 S., 147.4 E.		
	East New Guinea region.		
	h: 80 km ca.		
	H= 19 27 12		USCGS
1.	P	Z	19 48 46
	i	E	53
	S	N	49 27
1.	P	Z	21 50 32
	S	NZ	55
	i	E	56
1.	iP	Z	23 59 16.8
	P: C		
	10.3 S., 161.6 E.		
	Solomon Is.		
	h: 64 km ca.		
	H= 23 50 19.4		USCGS
2.	eP	NZ	02 49 27

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	e	N	02 49 45
	S	Z	50.7
	i	E	56
	e	Z	59
	e	N	50 00
2.	eP	Z	02 56 27
	5.5 S., 147.0 E.		
	East New Guinea region.		
	h: 217 km ca.		
	H= 02 48 51		USCGS
2.	iP	NEZ	04 14 32.8
	i	E	43
	eS?	E	15 20
	i	N	26
	P: N, E, D		
	38.0 N., 142.1 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 04 13 41.1		USCGS
2.	P	Z	04 54 32
	i	Z	40
	e	N	55 25
2.	eP	Z	06 47 36
	e	NZ	43
	eS	N	48 25
2.	P	Z	06 57 02.8
	iS	NEZ	06.1
2.	eP?	Z	08 05 39
	ePcP	Z	07 52
	eS	N	11 24
	L	E	14 26
	Mag. 5½ (Mat.)		
	2.1 S., 133.9 E.		
	West New Guinea.		
	h: 12 km ca.		
	H= 07 58 15.6		USCGS
2.	P	Z	09 18 39.8
	i	Z	41.7
	i	N	41.9
	S	NEZ	52
2.	iP	NEZ	09 40 50.7
	iS	NE	56.2
	P: S, E, D		
2.	P	NZ	10 09 22
	21.4 S., 176.2 W.		
	Fiji Is. region.		
	h: 171 km ca.		
	H= 09 58 17.7		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
2.	P	Z	11 59 12.5
	i	E	26.0
	eS	N	40
2.	P	Z	16 05 50
	i	N	52.6
	i	EZ	55
	S	E	13 09
	i	E	17 04
	eL	E	21 44
	eL	N	22 11
	L	E	24 09
	Mag. 6¼-6½ (Mat.)		
	37.5 N., 73.4 E.		
	Tadzhik, SSR.		
	h: 33 km ca.		
	H= 15 56 51.0		USCGS
2.	P	EZ	16 58 46
	eS	N	59 21
3.	P	EZ	00 38 55
3.	iP	NEZ	04 52 00.8
	i	EZ	04
	eS	NEZ	19
	P: E, D		
3.	eP	Z	05 10 29
	iS	NZ	34.5
3.	eP	Z	12 24 27
	e	N	56
3.	eP	Z	12 49 32
3.	P	Z	15 47 45
	eS	N	48 11
	i	NZ	16
	i	E	21
3.	iP	NEZ	17 21 42.4
	iS	E	53.7
	i	N	54.0
	P: W, C		
3.	P	Z	18 35 15.9
	i	E	16.5
	esS	E	46 13
	14.2 S., 172.7 E.		
	New Hebrides Is. region.		
	h: 634 km ca.		
	H= 18 26 05.3		USCGS
3.	P	Z	23 58 05
	eS	NE	26
4.	P	EZ	00 05 57
	i	NZ	58.5
	i	E	06 00
	i	NE	29

Date	Phase	Comp.	Time(GMT) h m s
4.	eP	Z	00 24 27
	S	NZ	48
4.	P	Z	03 37 50
	i	Z	38 24
	S	E	48 37
	SS	E	54 11
	L	E	04 00 17
	51.3 S., 139.7 E.		
	South of Australia.		
	h: 33 km ca.		
	H= 03 25 00.8		USCGS
4.	iP EZ, P N		04 07 27.3
	i	NE	48
	S	EZ	08 02
	P: S, W, C		
4.	P	Z	04 39 47
	eL	NE	47 40
	eL	E	50 36
	3.9 N., 128.7 E.		
	North of Halmahera.		
	h: 41 km ca.		
	H= 04 33 09.5		USCGS
4.	eP	Z	05 00 21
	eS	E	05 41
	51.1 N., 178.4 E.		
	Rat Is., Aleutian Is.		
	h: 40 km ca.		
	H= 04 53 57.7		USCGS
4.	iP	NZ	05 07 45.0
	i	E	09 47
	eS	E	12 38
	i	E	13 32
	[illegible]	N	14 36
	L	N	15 20
	L	E	18 06
	P: S, C		
	Mag. 7.4 (Mat.)		
	51.3 N., 178.6 E.		
	Rat Is., Aleutian Is.		
	h: 40 km ca.		
	H= 05 01 21.8		USCGS
4.	[illegible]	Z	05 25 31
	50.1 N., 173.1 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 05 19 17		USCGS
4.	[illegible]	Z	05 53 21
4.	[illegible]	Z	05 54 57
4.	[illegible]	NZ	05 55 39
4.	[illegible]	Z	06 01 49

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Date	Phase	Comp.	Time(GMT) h m s	
4.	e	Z	06 05 26	
4.	eP	Z	06 08 12	
4.	P	Z	06 11 06	
	51.7 N., 174.9 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 06 04 58			USCGS
4.	e	Z	06 13 10	
4.	P	Z	06 15 59	
4.	P	Z	06 20 38	
4.	eP	Z	06 22 19	
	52.2 N., 172.3 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 06 16 22			USCGS
4.	eP	Z	06 28 05	
4.	P	NEZ	06 31 16	
4.	P	Z	06 35 12	
4.	P	Z	06 40 13	
	52.2 N., 177.1 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 06 34 17.0			USCGS
4.	P	NEZ	06 43 00	
	52.6 N., 172.0 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 06 37 05.4			USCGS
4.	P	Z	06 45 42	
	i	NE	43	
	51.7 N., 175.8 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 06 39 30.1			USCGS
4.	eP	Z	06 47 53	
4.	iP	Z	06 58 52.4	
	P: D			
4.	iP	Z	07 02 23.2	
	i	Z	27.8	
	P: C			
4.	e	Z	07 14 21	
4.	e	Z	07 16 15	

Date	Phase	Comp.	Time(GMT) h m s	
4.	eP	Z	07 17 43	
	i	NEZ	46	
	51.1 N., 177.7 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 07 11 22.7			USCGS
4.	i	Z	07 21 02.5	
	i	N	03.2	
	iPP	Z	22 03.4	
	52.0 N., 173.9 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 07 14 58.7			USCGS
4.	P	NZ	07 23 11	
	51.9 N., 173.2 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 07 23 12.3			USCGS
4.	P	Z	07 30 39	
	50.6 N., 176.9 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 07 31 58.9			USCGS
4.	iP	Z	07 47 20.1	
	P: C			
4.	P	Z	07 43 41	
	52.7 N., 172.9 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 07 43 43.2			USCGS
4.	P	Z	08 02 40	
	51.6 N., 174.9 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 07 56 31			USCGS
4.	P	Z	08 10 09	
	52.1 N., 172.8 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 08 04 09.4			USCGS
4.	P	Z	08 12 21	
	i	EZ	37	
	51.9 N., 174.3 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 08 06 16.6			USCGS
4.	eP	Z	08 16 11	
	e	Z	23	
	52.1 N., 173.3 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 08 10 09.6			USCGS

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Date	Phase	Comp.	Time(GMT) h m s
4.	P	EZ	08 20 55
4.	iP P: C	Z	08 22 47.1
4.	P?	Z	08 27 06
	i	Z	13
4.	P	Z	08 30 15
	e	Z	23
4.	iP P: N, E, D 51.9 N., 174.0 E. Rat Is. h: 30 km ca. H= 08 33 40.9	NEZ USCGS	08 39 44.9
4.	eP	Z	08 43 20
	i	Z	30
	51.7 N., 174.6 E. Rat Is. h: 35 km ca. H= 08 37 14.5	 USCGS	
4.	P 51.2 N., 179.3 E. Rat Is. h: 25 km ca. H= 08 39 22.6	Z USCGS	08 45 51
4.	eP	E	08 47 09
	i	Z	11
	i	E	16
	i	N	17
	eS	NE	52 38
	eL	E	54 34
	L	Z	42
	eL	N	54.9
	Mag. 6.7 (Mat.) 51.3 N., 179.5 E. Rat Is. h: 40 km ca. H= 08 40 40.9	 USCGS	
4.	P	Z	08 53 43
4.	P	Z	09 00 03
	i	Z	11
	52.0 N., 172.5 E. Rat Is. h: 30 km ca. H= 08 54 04.3	 USCGS	
4.	iP P: N, E, D 52.4 N., 173.7 E. Rat Is. h: 25 km ca. H= 08 59 17.9	NEZ USCGS	09 05 23.0

Date	Phase	Comp.	Time(GMT) h m s
4.	P 51.2 N., 177.4 E. Rat Is. h: 40 km ca. H= 09 06 27	Z USCGS	09 12 45
4.	eP	Z	09 22 32
4.	P 51.6 N., 176.3 E. Rat Is. h: 35 km ca. H= 09 20 02.0	Z USCGS	09 26 18
4.	P	Z	09 31 12
4.	iP 51.8 N., 176.6 E. Rat Is. h: 30 km ca. H= 09 35 20.3	Z USCGS	09 41 37.5
4.	eP 51.8 N., 176.3 E. Rat Is. h: 25 km ca. H= 09 37 28.4	Z USCGS	09 43 46
4.	P 51.8 N., 174.6 E. Rat Is. h: 15 km ca. H= 09 42 51.6	Z USCGS	09 49 01
4.	eP	Z	09 54 37
	i	Z	52
	51.8 N., 175.4 E. Rat Is. h: 25 km ca. H= 09 48 25.9	 USCGS	
4.	iP	Z	09 58 15.0
	i	N	30
	P: C 51.5 N., 175.9 E. Rat Is. h: 30 km ca. H= 09 52 02.9	 USCGS	
4.	eP 51.7 N., 174.7 E. Rat Is. h: 33 km ca. H= 10 01 01.5	Z USCGS	10 07 08
4.	P? 52.0 N., 173.2 E. Near Is., Aleutian Is. h: 40 km ca. H= 10 04 30.1	Z USCGS	10 10 49

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Date	Phase	Comp.	Time(GMT) h m s	
4.	P	Z	10 20 30	
	e	Z	41	
	51.8 N., 172.7 E.			
	Rat Is.			
	h: 20 km ca.			
	H= 10 14 24.2			USCGS
4.	iP	Z	10 32 36.2	
	P: C			
	51.3 N., 171.9 E.			
	Rat Is.			
	h: 15 km ca.			
	H= 10 26 21.1			USCGS
4.	eP	Z	10 36 41	
	51.8 N., 173.3 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 10 30 40.8			USCGS
4.	eP	Z	10 45 30	
	52.2 N., 172,9 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 10 39 32			USCGS
4.	P	EZ	10 47 49	
	i	N	50	
	e	Z	48 00	
	i	E	04	
	51.5 N., 176.5 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 10 41 33.9			USCGS
4.	P	Z	11 06 43	
	51.5 N., 176.5 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 1100 27.6			USCGS
4.	eP	Z	11 15 04	
	51.4 N., 176.1 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 11 08 46.0			USCGS
4.	P	Z	11 21 40	
	51.6 N., 175.4 E.			
	Rat Is.			
	h: 20 km ca.			
	H= 11 15 30.8			USCGS
4.	iP	Z	11 24 52.4	
	P: C			
	51.6 N., 175.0 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 11 18 42.9			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
4.	P	Z	11 26 45	
	52.3 N., 173.0 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 11 20 47.8			USCGS
4.	P	Z	11 29 12	
	52.1 N., 172.9 E.			
	Rat Is.			
	h: 15 km ca.			
	H= 11 23 10.7			USCGS
4.	eP	Z	11 33 29	
	51.5 N., 174.9 E.			
	Rat Is.			
	h: 20 km ca.			
	H= 11 27 22.0			USCGS
4.	P	NZ	11 45 06	
	i	Z	15	
	eS	N	29	
	i	E	39	
4.	eP	N	11 54 41	
	e	Z	53	
	51.2 N., 177.2 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 11 48 23.9			USCGS
4.	P	Z	11 55 42	
4.	iP	Z	12 04 21.2	
	i	Z	34.5	
	P: C			
	51.6 N., 176.3 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 11 58 06.9			USCGS
4.	iP	Z	12 09 42.3	
	P: C			
4.	iP	NEZ	12 12 00.5	
	i	E	18.5	
	e	Z	42	
	eS	E	16 41	
	i	NE	50	
	i	N	17 43	
	eL	Z	19.3	
	L	E	19 47	
	P: N, E, D			
	Mag. 6.3 (Mat.)			
	52.6 N., 172.1 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 12 06 04.3			USCGS
4.	P	Z	12 21 19	

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Date	Phase	Comp.	Time(GMT) h m s
4.	eP	Z	12 23 01
4.	eP	Z	12 40 12
4.	P	Z	12 48 36
	51.6 N., 177.0 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 12 42 14.4		USCGS
4.	iP	NEZ	12 57 05.5
	i	Z	12.5
	i	Z	23.7
	P: S, W, C		
	51.6 N., 174.8 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 12 50 57.5		USCGS
4.	eP	Z	12 59 15
	52.1 N., 174.2 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 12 53 07.7		USCGS
4.	iP	Z	13 00 38.7
	e	Z	51
	P: C		
4.	eP	Z	13 30 08
	51.4 N., 176.3 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 13 23 42		USCGS
4.	eP	Z	13 36 02
	51.6 N., 174.7 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 13 29 54.6		USCGS
4.	eP	Z	13 39 18
	i	Z	28.9
	51.8 N., 174.6 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 13 33 12.9		USCGS
4.	iP	Z	13 51 23.2
	P: C		
	50.7 N., 179.1 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 13 45 08		USCGS
4.	P	Z	13 58 10
	51.7 N., 174.4 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 13 52 04		USCGS

Date	Phase	Comp.	Time(GMT) h m s
4.	e	Z	14 11 45
4.	P	Z	14 19 26
	e	Z	38
	52.1 N., 173.1 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 14 13 23.9		USCGS
4.	iP	Z	14 22 53.2
	e	Z	23 05
	P: C		
4.	iP	NZ	14 24 19.8
	i	NEZ	25
	i	Z	25 06
	i	Z	10.0
	S	E	29 05
	i	Z	10
	i	Z	47
	e	N	53
	eL	E	30 19
	P: S, C		
	Mag. 6.1 (Mat.)		
	53.0 N., 171.0 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 14 18 27.9		USCGS
4.	eP	Z	14 31 13
4.	eP?	Z	14 33 00
	e	Z	11
4.	iP	Z	14 36 01.4
	51.4 N., 176.6 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 14 29 44.7		USCGS
4.	P	Z	14 36 42
	i	Z	37 19
	51.3 N., 176.3 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 14 30 26.6		USCGS
4.	eP	Z	14 49 29
	51.2 N., 179.3 E.		
	Rat Is.		
	h: 31 km ca.		
	H= 14 42 59.2		USCGS
4.	eP	Z	14 55 01
	51.6 N., 173.9 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 14 48 53.4		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
4.	iP	Z	14 58 57.5
	i	Z	59.1
	iS	N	59 29.1
	i	Z	29.4
	P: C		
4.	eP	Z	15 09 43
	51.4 N., 175.7 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 15 03 33.8		USCGS
4.	eP	Z	15 10 33
4.	P	NZ	15 12 17
	i	NEZ	18.4
	S	NEZ	49
4.	iP NZ, P E		15 57 15.7
	i	Z	27.4
	eS	E	16 01 59
	eL	E	03.1
	eL	N	03.9
	e	Z	04 07
	P: S, C		
	Mag. 5.9 (Mat.)		
	53.1 N., 170.8 E.		
	Rat Is.		
	h: 40 km ca.		
	H= 15 51 25.5		USCGS
4.	iP	Z	16 03 30.8
	P: C		
4.	P	Z	16 05 20
	52.1 N., 172.2 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 15 59 32.3		USCGS
4.	eP	Z	16 09 56
	50.6 N., 177.6 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 16 03 35.8		USCGS
4.	P	Z	16 34 31
	eL	N	41 40
	eL	E	58
	51.5 N., 176.4 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 16 28 14.6		USCGS
4.	eP	EZ	16 33 36
	i	NZ	43.9
	e	Z	39 11
	e	E	44 26
	52.0 N., 173.1 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 16 32 36.0		USCGS

Date	Phase	Comp.	Time(GMT) h m s
4.	eP	Z	16 57 52
	51.8 N., 176.4 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 16 51 33.9		USCGS
4.	iP	Z	17 03 40.7
	P: D		
	52.8 N., 171.8 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 17 03 43.8		USCGS
4.	P	Z	17 10 55
	i	E	12 21
	i	Z	29
	eL	E	17.0
	eL	N	18 36
	51.3 N., 176.9 E.		
	Rat Is.		
	h: 20 km ca.		
	H= 17 04 35.4		USCGS
4.	P	Z	17 23 35
	51.7 N., 174.9 E.		
	Rat Is.		
	h: 40 km ca.		
	H= 17 17 29.4		USCGS
4.	P	Z	17 56 55
	51.9 N., 175.2 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 17 50 43.4		USCGS
4.	eP	Z	18 13 13
	i	Z	27.9
	e	E	20 20
	e	N	20.5
	50.9 N., 175.5 E.		
	Rat Is.		
	h: 20 km ca.		
	H= 18 06 57		USCGS
4.	iP	Z	18 19 52.7
	P: C		
	51.9 N., 173.3 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 18 13 50.9		USCGS
4.	P	Z	18 40 18
	eL	E	46 24
	Mag. 5¾-6 (Mat.)		
	51.2 N., 176.7 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 18 34 07.3		USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
4.	P	Z	18 45 55	
	i	Z	46 05	
	51.5 N., 174.8 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 18 39 47.2			USCGS
4.	iP	Z	18 50 06.3	
	i	EZ	16	
	P: D			
	51.3 N., 177.3 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 18 43 45.9			USCGS
4.	P	Z	18 54 21	
	52.0 N., 174.9 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 18 48 11.0			USCGS
4.	iP	Z	18 57 44.8	
	i	Z	56	
	52.2 N., 171.9 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 18 51 49.0			USCGS
4.	P	Z	19 03 24.5	
	i	E	32.5	
	S	N	57	
4.	eP	Z	19 04 20	
	52.1 N., 173.0 E.			
	Rat Is.			
	h: 42 km ca.			
	H= 18 58 12.6			USCGS
4.	P	Z	19 07 27	
	e	Z	52	
	e	Z	08 33	
	eS	E	12 16	
	e	E	13 10	
	e	N	26	
	52.7 N., 170.8 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 19 01 36.2			USCGS
4.	P	Z	19 18 13.6	
	i	Z	25.5	
	P: C			
	51.3 N., 175.1 E.			
	Rat Is.			
	h: 36 km ca.			
	H=19 12 06.7			USCGS
4.	eP	Z	19 44 19	
	51.5 N., 174.6 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Rat Is.			
	h: 33 km ca.			
	H= 19 38 13.0			USCGS
4.	P	Z	20 00 49	
	i	Z	01 16	
	51.6 N., 175.3 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 19 54 37.1			USCGS
4.	eP	Z	20 03 17	
	eS	N	07 52	
	e	E	08 06	
4.	iP	Z	20 03 57.8	
	i	Z	04 06.5	
	P: D			
	51.6 N., 174.7 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 19 57 49.1			USCGS
4.	P	Z	20 11 59	
	e	Z	12 10	
	51.6 N., 176.4 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 20 05 42.2			USCGS
4.	P	NEZ	20 38 41	
	e	E	40 57	
	eL	E	45 08	
	eL	N	46 04	
	Mag. $5\frac{1}{4}$-$5\frac{1}{2}$ (Mat.)			
	51.6 N., 176.6 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 20 32 25.1			USCGS
4.	P	NZ	20 50 14.9	
	i	N	22	
	S	N	39	
	i	E	40	
	P: D			
4.	iP	Z	20 53 22.5	
	i	Z	31.5	
	i	Z	37.8	
	P: C			
	51.5 N., 175.4 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 20 47 12.1			USCGS
4.	eP	Z	21 30 12	
	51.6 N., 174.5 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 21 24 05.7			USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
4.	eP	Z	21 33 44	
	e	E	38 53	
4.	iP	Z	21 35 44.5	
	P: D			
	52.4 N., 174.7 E.			
	Rat Is.			
	h: 15 km ca.			
	H= 21 29 38.9			USCGS
4.	eP	Z	21 45 07	
	51.1 N., 177.3 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 21 38 47.0			USCGS
4.	eP	Z	22 20 01	
	eS	E	25 09	
	eL	N	26 23	
	51.8 N., 173.9 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 22 14 04.0			USCGS
4.	eP	Z	22 34 43	
	S	N	35 11	
4.	P	EZ	22 36 10	
	eS	N	41 05	
	e	E	07	
	eL	N	43 02	
	51.8 N., 174.2 E.			
	Rat Is.			
	h: 31 km ca.			
	H= 22 30 05.1			USCGS
4.	P	Z	22 38 22	
	S	NZ	45	
4.	eP	Z	23 32 48	
	e	E	39 56	
	e	N	40 30ca.	
	51.3 N., 177.5 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 23 26 22.5			USCGS
5.	P	Z	00 37 48.0	
	52.0 N., 176.6 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 00 31 35.5			USCGS
5.	eP	EZ	00 38 01	
	i	Z	13	
	eS	E	43 07	
5.	P	Z	00 48 19	
	i	Z	30	
	52.2 N., 172.4 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Rat Is.			
	h: 35 km ca.			
	H= 00 42 22.2			USCGS
5.	P	Z	01 12 18	
	i	NZ	24	
	52.0 N., 173.5 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 01 06 14			USCGS
5.	iP	Z	01 37 56.6	
	P: C			
5.	iP	Z	01 40 45.7	
	P: D			
5.	P	Z	02 34 40	
	i	E	40 30	
	52.0 N., 173.1 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 02 28 29.2			USCGS
5.	P	Z	02 39 39	
	i	Z	50	
	52.0 N., 173.1 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 02 33 39.5			USCGS
5.	P	Z	03 04 34	
	51.5 N., 174.9 E.			
	Rat Is.			
	h: 36 km ca.			
	H= 02 58 28.5			USCGS
5.	eP	Z	03 08 59	
	e	E	12 08	
	51.7 N., 176.2 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 03 02 46			USCGS
5.	P	NEZ	03 54 08	
	S	NE	30	
5.	eP	Z	04 07 58	
	eL	E	14 05	
	51.7 N., 175.1 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 04 01 40.8			USCGS
5.	iP	Z	04 20 03.2	
	P: C			
5.	eP	Z	04 52 48	
	eL	E	59 11	

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Date	Phase	Comp.	Time(GMT) h m s	
			51.4 N., 174.9 E. Rat Is. h: 33 km ca. H= 04 46 45.6	USCGS
5.	eP e	Z E	05 12 56 23 45	
			51.4 N., 176.8 E. Rat Is. h: 46 km ca. H= 05 06 50	USCGS
5.	eP e	Z E	05 46 09 51 15	
5.	iP	Z	06 05 41.9	
			P: C 52.0 N., 173.3 E. Rat Is. h: 35 km ca. H= 05 59 40.9	USCGS
5.	P e e eL	Z Z E N	06 31 24 33 37 40 38 11	
			51.8 N., 177.0 E. Rat Is. h: 40 km ca. H= 06 25 23.1	USCGS
5.	eP	Z	06 39 33	
5.	P S L	Z E NE	06 45 56.6 50 58 53 20	
			P: C Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.) 51.8 N., 175.1 E. Rat Is. h: 25 km ca. H= 06 39 49.6	USCGS
5.	P S	NEZ NEZ	06 50 10 38	
5.	eP	Z	07 14 11	
			51.6 N., 175.9 E. Rat Is. h: 40 km ca. H= 07 07 59.7	USCGS
5.	P	Z	07 25 30	
			51.7 N., 174.7 E. Rat Is. h: 40 km ca. H= 07 19 15.0	USCGS
5.	P	Z	07 37 46	
			51.6 N., 176.1 E. Rat Is. h: 33 km ca. H= 07 31 32.4	USCGS
5.	iP i e	Z E E	08 57 32.5 33.1 09 02 36	
			P: C 52.2 N., 175.1 E. Rat Is. h: 35 km ca. H= 08 51 23.0	USCGS
5.	iP i S L L	EZ N E N Z	09 38 14.3 14.5 43 03 44 30 34	
			P: W, C Mag. 6-$6\frac{1}{2}$ (Mat.) 52.3 N., 174.3 E. Rat Is. h: 41 km ca. H= 09 32 09.3	USCGS
5.	P e	Z Z	09 44 54 45 17	
5.	eP i S	Z NE E	10 02 20 24 54	
5.	iP e	Z Z	10 11 02.1 12	
			P: C 52.4 N., 172.6 E. Rat Is. h: 35 km ca. H= 10 05 06.1	USCGS
5.	eP eS	NEZ E	10 12 26 56	
5.	iP eS i	Z NE Z	10 24 26.9 44 48	
			P: D	
5.	i	E	10 54 57	
5.	iP i i i e	Z E N Z N	10 56 22.7 23.5 23.7 34.5 55	
			P: C 52.3 N., 172.4 E. Rat Is. h: 40 km ca. H= 10 50 27.2	USCGS

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s	
5.	eP?	Z	11 51 37	
	52.6 N., 175.5 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 11 45 46			USCGS
5.	P	NZ	12 08 34	
	S	NEZ	52	
5.	iP	Z	13 33 01.4	
	e	N	40 13	
	e	E	47	
	P: C			
	51.2 N., 175.3 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 13 26 43.9			USCGS
5.	iP	Z	13 44 49.5	
	eS	N	49 39	
	i	E	47	
	eL	N	51 03	
	P: C			
	52.0 N., 174.0 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 13 38 46.7			USCGS
5.	P	Z	13 57 48	
	i	Z	58.9	
	e	N	14 03 05	
	eL	E	57	
	52.1 N., 173.3 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 13 51 48.6			USCGS
5.	P	Z	14 00 54	
	i	Z	01 05	
5.	iP EZ, P	N	14 12 15.6	
	iS	Z	22.5	
	P: W, D			
5.	P	Z	14 14 13	
	i	Z	38	
	e	E	45	
	eL	N	20 41	
	eL	E	47	
	51.6 N., 174.4 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 14 08 22.7			USCGS
5.	P	Z	14 34 47	
	e	E	40 11	
	eL	N	41 25	
	51.8 N., 174.5 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 14 28 42.2			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
5.	iP	Z	14 44 17.5	
	P: D			
	51.7 N., 174.7 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 14 38 14.5			USCGS
5.	e	Z	15 00 42	
	51.1 N., 177.9 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 14 54 10			USCGS
5.	P	Z	16 01 01	
	e	E	03 04	
	52.2 N., 173.1 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 15 55 02.4			USCGS
5.	P	Z	16 26 53.5	
	e	E	33 00ca.	
5.	P	Z	16 45 56	
	eL	E	51 58	
	52.1 N., 172.5 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 16 39 57.0			USCGS
5.	P	Z	17 27 06	
5.	P	Z	18 22 10	
	e	E	27 40	
	eL	N	29 34	
	51.9 N., 173.7 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 18 16 07.6			USCGS
5.	eP	Z	18 30 13	
	eS	E	35 11	
	e	N	13	
	eL	N	37 31	
	51.6 N., 174.0 E.			
	Rat Is.			
	h: 34 km ca.			
	H= 18 24 02.8			USCGS
5.	iP	Z	18 47 20.4	
	e	E	52 28	
	eL	E	53 40	
	eL	N	54.1	
	P: C			
5.	P	Z	18 50 17	
5.	P	Z	19 06 44	
	i	Z	51.1	
	e	E	11 42	

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Date	Phase	Comp.	Time(GMT) h m s
	eL	E	19 12 49
	52.0 N., 173.2 E.		
	Rat Is.		
	h: 27 km ca.		
	H= 19 00 41.9		USCGS
5.	eP	EZ	19 38 39
	eS	NEZ	39 03
5.	eP	Z	20 45 29
	51.2 N., 176.6 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 20 39 09.4		USCGS
5.	eP	Z	20 53 16
	i	EZ	18.2
	i	N	18.4
	S	E	58 04
	L	NE	59 28
	Mag. $6\frac{1}{2}$-$6\frac{3}{4}$ (Mat.)		
	51.9 N., 174.6 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 20 47 13.3		USCGS
5.	eP	Z	20 56 21
5.	P	EZ	21 05 22
	e	N	06 01
5.	P	Z	21 50 17
	i	Z	34
	51.3 N., 176.7 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 21 43 59.7		USCGS
5.	P	Z	21 54 52
	51.1 N., 178.3 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 21 48 25.8		USCGS
5.	eP	Z	22 20 08
	52.4 N., 172.0 E.		
	Near Is., Aleutian Is.		
	h: 30 km ca.		
	H= 22 14 09		USCGS
5.	iP	NZ	22 22 17.5
	i	Z	23 21
	eS	E	27 33
	eL	N	29.0
	eL	E	29 25
	P: S, C		
	51.5 N., 176.7 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 22 15 59.5		USCGS

Date	Phase	Comp.	Time(GMT) h m s
5.	P	Z	22 48 47
	52.4 N., 174.0 E.		
	Near Is., Aleutian Is.		
	h: 33 km ca.		
	H= 22 42 43.4		USCGS
5.	eP	Z	23 20 20
	51.3 N., 173.0 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 23 14 14		USCGS
6.	P	Z	00 14 25
	eL	E	21.0
	51.8 N., 174.8 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 00 08 17.0		USCGS
6.	P	Z	01 21 32
	i	E	47
	eS	E	26 10
	eL	E	28 04
	52.6 N., 171.2 E.		
	Rat Is.		
	h: 20 km ca.		
	H= 01 15 39.9		USCGS
6.	iP	NEZ	01 48 40.5
	PcP	Z	50 25.0
	iS	NE	55 15
	L	NE	58 40
	eScS	E	46
	P: N, E, D		
	Mag. $6\frac{3}{4}$ (Mat.)		
	53.2 N., 161.9 W.		
	South of Alaska.		
	h: 33 km ca.		
	H= 01 40 33.2		USCGS
6.	iP	NZ	01 51 51.1
	i	E	52.3
	S	N	52 23
	P: S, D		
6.	eP	Z	02 15 33
	51.5 N., 174.2 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 02 09 15		USCGS
6.	iP	NZ	02 27 40.6
	eS	N	28 11
	P: S, D		
6.	eP	NEZ	02 47 24
	e	N	59

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Date	Phase	Comp.	Time(GMT) h m s
6.	eP	Z	03 28 30
	51.3 N., 173.9 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 03 22 27		USCGS
6.	eP	Z	03 45 26
	i	Z	33
	51.5 N., 175.3 E.		
	Rat Is.		
	h: 31 km ca.		
	H= 03 39 15.5		USCGS
6.	eP	Z	04 00 24
	35.1 N., 26.9 E.		
	Crete.		
	h: 50 km ca.		
	H= 03 47 54.1		USCGS
6.	iP	Z	04 09 03.6
	i	NE	03.8
	iS	E	14 04
	eL	E	15ca.
	P: C		
	Mag. $6\frac{1}{4}$-$6\frac{1}{2}$ (Mat.)		
	52.1 N., 175.7 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 04 02 53		USCGS
6.	iP	Z	04 57 11.6
	P: C		
	51.1 N., 177.4 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 04 50 51.8		USCGS
6.	iP	Z	05 38 26.0
	eS	E	43 42
	eL	E	45 24
	P: D		
	51.5 N., 175.8 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 05 32 12.2		USCGS
6.	iP Z, P E		06 26 03.4
	eS	E	19
	e	NZ	20
	P: E, D		
6.	P	Z	06 29 39
	eS	NE	34 35
	L?	E	35 24
	L	N	32
	52.0 N., 173.2 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 06 23 39.0		USCGS

Date	Phase	Comp.	Time(GMT) h m s
6.	eP	Z	06 34 09
6.	eP	Z	06 34 31
	51.2 N., 177.6 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 06 28 06.3		USCGS
6.	eP	Z	06 36 49
	eS	E	37 23
6.	eP	NZ	06 55 12
	eS?	E	46
6.	eP	Z	07 13 54
	51.5 N., 172.6 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 07 07 50		USCGS
6.	P	Z	07 20 43
	L	N	27 52
	52.1 N., 173.0 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 07 14 45.1		USCGS
6.	eP?	Z	07 23 51
6.	P	Z	07 33 19
	52.4 N., 172.4 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 07 27 24.1		USCGS
6.	eP	Z	08 03 30
	e	E	03 53
	51.9 N., 172.9 E.		
	Rat Is.		
	h: 20 km ca.		
	H= 07 57 22		USCGS
6.	P	Z	08 52 55
	eS	N	57 20
	e	E	23
	eL	N	53 05
	Mag. $5\frac{3}{4}$-6 (Mat.)		
	51.9 N., 174.0 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 08 46 51.2		USCGS
6.	P	Z	09 00 51
	52.1 N., 175.4 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 08 54 38.9		USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
6.	P	Z	11 38 24	
	eS	E	43 20	
	eL	N	45 27	
	51.5 N., 174.9 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 11 32 15.8			USCGS
6.	iP	Z	12 28 34.9	
	i	N	35.3	
	eS	N	33 14	
	i	E	39	
	P: D			
	51.8 N., 175.3 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 12 22 26.2			USCGS
6.	iP	NZ	12 44 08.8	
	P: N, D			
6.	eP	Z	12 57 54	
	51.8 N., 176.4 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 12 51 38.1			USCGS
6.	eP	Z	13 40 58	
	eL	E	48 39	
	eL	N	44	
	51.6 N., 176.5 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 13 34 42.9			USCGS
6.	eP	Z	14 17 13	
	i	Z	23	
	S	E	22 10	
	L	E	23 21	
	L	N	25	
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)			
	51.7 N., 174.2 E.			
	Rat Is.			
	h: 38 km ca.			
	H= 14 11 10.1			USCGS
6.	iP	Z	14 42 32.4	
	P: C			
	53.9 N., 160.9 W.			
	South of Alaska.			
	h: 35 km ca.			
	H= 14 34 32			USCGS
6.	eL	E	15 43 47	
	eL	N	44 07	
6.	P	NZ	16 58 35	
	i	EZ	37.9	
	i	N	38.5	

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	i	N	16 58 52	
	PcP	Z	17 00 35	
	S	E	04 54	
	i	N	05 06	
	i	Z	13	
	i	E	28	
	eL	Z	08 27	
	L	E	32	
	L	N	37	
	P: N, D			
	Mag. $6\frac{1}{2}$-$6\frac{3}{4}$ (Mat.)			
	53.3 N., 161.8 W.			
	South of Alaska.			
	h: 33 km ca.			
	H= 16 50 29			USCGS
6.	iP	Z	17 19 41.3	
	iS	EZ	46.8	
	P: D			
6.	iP	NZ	17 55 57.0	
	eS	NE	56 42	
	P: S, D			
6.	eP	Z	18 13 42	
	51.3 N., 176.5 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 18 07 24.7			USCGS
6.	iP	Z	18 16 44.2	
	eL	N	23 08	
	eL	E	43	
	L	N	58	
	L	E	24 37	
	P: C			
	51.5 N., 176.5 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 18 10 28.8			USCGS
6.	P	Z	18 48 50	
	e	E	56 05	
	e	N	23	
	eL	E	58 25	
	51.3 N., 176.2 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 18 42 29.2			USCGS
6.	iP	NEZ	19 27 10.0	
	eS	NZ	30	
	P: S, E, D			
6.	eP	Z	20 25 00	
	e	N	30 44	
	eL	E	56	
	52.1 N., 174.6 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 20 18 52.0			USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
6.	iP	Z	21 08 58.1	
	eL	E	15 13	
	eL	N	53	
	P: C			
	52.8 N., 172.0 E.			
	Rat Is.			
	h: 20 km ca.			
	H= 21 02 59.6			USCGS
6.	eP	Z	22 32 29	
	e	Z	40	
	eL	E	39 48	
	eL	N	55	
	51.9 N., 178.5 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 22 26 10.5			USCGS
6.	iP	Z	23 29 56.5	
	e	Z	30 08	
	i	E	35 02	
	eL	N	36 07	
	P: D			
	51.5 N., 176.5 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 23 23 40.4			USCGS
6.	eP	Z	23 54 18	
	e	E	55 11	
	51.9 N., 173.4 E.			
	Rat Is.			
	h: 31 km ca.			
	H= 23 48 16.9			USCGS
7.	P	NZ	00 12 24	
	i	NZ	26	
	i	E	27	
	eS	NE	53	
	i	NE	56	
7.	iP	Z	00 29 57.0	
	S	NE	30 31	
	P: C			
7.	eP	Z	01 06 01	
	e	Z	15	
	e	E	11 00ca.	
	52.2 N., 172.1 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 01 00 12.5			USCGS
7.	iP	EZ	01 16 34.4	
	eS	N	53	
	i	NEZ	17 03	
	P: W, C			
7.	e	E	01 53 19	

Date	Phase	Comp.	Time(GMT) h m s	
7.	iP	NEZ	02 23 07.4	
	S	E	28 00	
	e	E	29 11	
	L	N	47	
	P: S, W, C			
	Mag. $6\frac{1}{4}$-$6\frac{1}{2}$ (Mat.)			
	51.4 N., 173.4 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 02 17 09.2			USCGS
7.	P	Z	02 25 18	
	i	Z	36	
7.	P	Z	02 26 13	
7.	iP	NEZ	02 36 36.9	
	S	NEZ	53	
	P: S, E, D			
7.	P	Z	04 17 30	
	i	EZ	32.0	
	S	E	22 34	
	eL	E	23 43	
	Mag. $5\frac{3}{4}$-6 (Mat.)			
	51.9 N., 175.3 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 04 11 19.3			USCGS
7.	e	Z	05 19 21	
7.	eL	E	05 54 12	
7.	iP	Z	06 05 03.6	
	eL	E	11 23	
	P: C			
	51.7 N., 174.9 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 05 58 54.3			USCGS
7.	iP	NEZ	07 54 49.2	
	P: N, E, D			
7.	P	EZ	08 46 12	
	i	Z	22	
	eS	E	51 13	
	eL	N	52 26	
	51.8 N., 174.7 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 08 40 05.3			USCGS
7.	iP	Z	09 32 20.6	
	i	E	21.0	
	i	N	22.9	
	PP	EZ	33 27	

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	PcP	Z	09 35 08
	eS	E	37 28
	L	N	39 32
	eL	Z	43
	P: C		
	Mag. 6-6¼ (Mat.)		
	51.4 N., 179.1 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 09 25 51.1		USCGS
7.	P	Z	09 38 50
7.	P	Z	09 50 51
	51.4 N., 176.8 E.		
	Rat Is.		
	h: 15 km ca.		
	H= 09 44 16.9		USCGS
7.	iP	Z	11 29 10.5
	i	Z	18
	eS	NE	34 00ca.
	eL	NE	35.1
	P: C		
	Mag. 5¾-6 (Mat.)		
	52.2 N., 172.4 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 11 23 14.8		USCGS
7.	iP	Z	11 38 51.6
	e	Z	39 02
	P: C		
	53.3 N., 161.9 W.		
	South of Alaska.		
	h: 10 km ca.		
	H= 11 30 40.3		USCGS
7.	iP	Z	11 52 13.0
	e	Z	23
	P: C		
	51.2 N., 177.3 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 11 45 52.8		USCGS
7.	P	Z	12 27 18
	eL	N	33 00
	eL	E	31
	53.0 N., 171.7 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 12 21 21.1		USCGS
7.	P	Z	13 26 58
	e	E	32 00ca.
	51.1 N., 175.8 E.		
	Rat Is.		
	h: 40 km ca.		
	H= 13 20 46.3		USCGS

Date	Phase	Comp.	Time(GMT) h m s
7.	iP	NEZ	13 27 04.8
	S	N	17
	i	E	21
	P: N, W, D		
7.	iP	Z	14 53 17.5
	i	Z	27
	e	E	58 28
	L	N	15 00 50
	P: C		
	51.7 N., 174.6 E.		
	Near Is., Aleutian Is.		
	h: 33 km ca.		
	H= 14 47 11.6		USCGS
7.	iP	Z	16 10 21.7
	i	E	22.2
	e	E	16 11
	eL	N	18 08
	P: C		
	51.3 N., 179.0 E.		
	Rat Is.		
	h: 40 km ca.		
	H= 16 03 52.3		USCGS
7.	P	Z	17 19 09
	eS	E	24 03
	eL	N	25 20
	52.2 N., 173.1 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 17 13 08.2		USCGS
7.	P	NZ	19 35 02
	i	E	03
	i	NZ	13
	e	E	16
	eS	N	39 36
	i	E	37
	eL	E	40 40
	P: N, D		
	Mag. 5½-5¾ (Mat.)		
	55.2 N., 165.2 E.		
	Komandorsky Is. region.		
	h: 20 km ca.		
	H= 19 29 23.9		USCGS
7.	eP	Z	20 16 53
	51.2 N., 178.2 E.		
	Rat Is.		
	h: 40 km ca.		
	H= 20 10 33.7		USCGS
7.	P	Z	21 06 48.8
	i	NZ	51.0
	eS	N	07 39
7.	P	Z	21 35 16
	e	E	40 38

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	52.5 N., 172.4 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 21 29 19		USCGS
7.	iP	NZ	22 59 54.0
	i	E	54.2
	S	NZ	23 00 07
	i	E	08
	P: N, D		
7.	iP	NZ	23 04 53.1
	epP	Z	05 21
	P: N, C		
	5.8 S., 148.6 E.		
	New Britain region.		
	h: 125 km ca.		
	H= 22 57 02.0		USCGS
7.	P	Z	23 46 23.1
	P: D		
7.	eP	Z	23 51 18
	54.0 N., 174.9 E.		
	Rat Is.		
	h: 20 km ca.		
	H= 23 45 34		USCGS
8.	P	NEZ	00 44 02
	i	E	35
	eS	NEZ	45 31
8.	e	Z	00 48 14
8.	eP	Z	01 47 36
	e	E	50 18
	51.7 N., 174.2 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 01 41 31.1		USCGS
8.	eP	Z	02 18 12
	51.9 N., 173.8 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 02 12 19		USCGS
8.	P	Z	02 33 12
	eL	E	43 16
	51.3 N., 179.3 E.		
	Rat Is.		
	h: 40 km ca.		
	H= 02 26 41.5		USCGS
8.	e	E	04 24 09
	e	N	51
8.	P	Z	05 13 49
	eS	E	18 49
			(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	e	N	05 19 41
	eL	E	50
	52.3 N., 173.4 E.		
	Rat Is.		
	h: 40 km ca.		
	H= 05 07 48.5		USCGS
8.	iP	EZ	06 30 55.5
	S	NE	31 31
	P: E, D		
8.	P	Z	06 35 04.0
	i	E	04.3
	i	NZ	04.5
	i	N	09.0
	S	N	36 38
	i	EZ	43
	P: C		
	18.6 N., 145.6 E.		
	Mariana Is.		
	h: 116 km ca.		
	H= 06 30 49.0		USCGS
8.	e	Z	06 53 22
	51.7 N., 174.7 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 06 47 03		USCGS
8.	eP	Z	07 20 34
	51.5 N., 175.9 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 07 14 14.5		USCGS
8.	P	NEZ	07 29 15
	e	E	33 37
	L	E	35 28
	51.8 N., 174.6 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 07 23 08.8		USCGS
8.	iP EZ, P N		07 40 15.6
	eS	N	43
	i	N	49
	P: E, D		
8.	P	Z	07 56 06
	50.7 N., 178.0 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 07 49 24		USCGS
8.	P	Z	08 03 42
	51.3 N., 179.5 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 07 57 14		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
8.	eP	NZ	09 35 44
	eS	E	40 50
	eL	E	42 35
	eL	N	47
	52.1 N., 176.7 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 09 29 25		USCGS
8.	eP	Z	09 44 03
	52.2 N., 177.6 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 09 37 51		USCGS
8.	iP EZ, P N		10 15 27.7
	eS	E	20 22
	L	N	21 53
	P: S, W, C		
	51.7 N., 175.0 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 10 09 18.4		USCGS
8.	P	NEZ	13 40 42
	eS	E	46 03
	eL	NE	47 00ca.
	51.4 N., 176.6 E.		
	Rat Is.		
	h: 20 km ca.		
	H= 13 34 23.3		USCGS
8.	iP	Z	14 12 38.2
	i	Z	41.5
	P: C		
	36.4 N., 73.0 E.		
	Afghanistan-USSR border region.		
	h: 220 km ca.		
	H= 14 03 52.8		USCGS
8.	P	NZ	15 42 45
	e	E	47 33
	50.0 N., 165.2 E.		
	Komandorsky Is. region.		
	h: 33 km ca.		
	H= 15 37 03		USCGS
8.	iP	Z	15 47 16.1
	i	Z	30
	e	Z	54
	P: C		
	52.5 N., 172.0 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 15 41 19.7		USCGS
8.	iP	Z	15 52 23.8
	i	NE	25.0

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	NE	15 52 31
	S	NEZ	57 00
	L	E	59 20
	L	N	16 00 00ca.
	P: C		
	Mag. 6-6½ (Mat.)		
	55.1 N., 165.7 E.		
	Komandorsky Is. region.		
	h: 40 km ca.		
	H= 15 46 49.9		USCGS
8.	eP	Z	16 26 02
	i	Z	12
	50.9 N., 174.8 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 16 19 58.6		USCGS
8.	P	N	17 03 58
	55.1 N., 165.3 E.		
	Komandorsky Is. region.		
	h: 33 km ca.		
	H= 17 03 17		USCGS
8.	P	NZ	17 13 28
	e	NZ	38
8.	iP	NEZ	17 42 59.8
	e	E	47 49
	i	N	52
	P: S, W, C		
	55.2 N., 165.3 E.		
	Komandorsky Is. region.		
	h: 30 km ca.		
	H= 17 37 24.6		USCGS
8.	eP	Z	18 00 38
	i	NZ	58
	55.0 N., 164.6 E.		
	Komandorsky Is. region.		
	h: 33 km ca.		
	H= 17 55 00		USCGS
8.	iP Z, P N		18 07 12.6
	S	NEZ	37
	P: D		
8.	eP	Z	19 15 11
	e	E	16 51
	50.5 N., 177.5 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 19 09 28		USCGS
8.	iP	Z	20 52 35.6
	e	E	21 01 29
	P: D		

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Date	Phase	Comp.	Time(GMT) h m s	
8.	iP	NEZ	21 33 07.6	
	S	Z	34 45	
	i	N	46	
	eL	N	35 12	
	eL	E	14	
	P: S, E, D			
	28.7 N., 142.2 E.			
	Bonin Is. region.			
	h: 40 km ca.			
	H= 21 31 02.5			USCGS
8.	eP	Z	22 27 06	
8.	P	Z	22 44 51	
	31.6 S., 178.4 W.			
	Kermadec Is.			
	h: 54 km ca.			
	H= 22 32 51			USCGS
8.	eP	Z	23 31 26	
	i	Z	34	
	55.1 N., 165.2 E.			
	Komandorsky Is. region.			
	h: 40 km ca.			
	H= 23 25 52.6			USCGS
9.	eP	Z	01 31 14	
	52.3 N., 172.0 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 01 25 18.6			USCGS
9.	eP	Z	01 50 01	
	1.3 N., 127.2 E.			
	Halmahera.			
	h: 102 km ca.			
	H= 01 43 02			USCGS
9.	P	EZ	04 07 27	
	eS	N	08 04	
	e	E	06	
9.	P	Z	04 41 40	
	51.6 N., 179.0 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 04 34 55.1			USCGS
9.	P	Z	04 44 15	
9.	iP	Z	05 52 06.7	
	i	E	07.2	
	eS	E	06 00 11	
	e	N	20	
	P: C			
	18.8 S., 169.2 E.			
	New Hebrides Is.			
	h: 223 km ca.			
	H= 05 42 06.8			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
9.	iP	NZ	06 41 33.0	
	eS	N	42 01	
	i	EZ	02	
	P: S, C			
9.	P	Z	07 12 28	
	i	Z	13 24	
9.	P	Z	07 21 58.2	
	iS	N	22 18.7	
	i	EZ	19.1	
9.	eP	Z	07 44 47	
	51.3 N., 179.5 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 07 38 16			USCGS
9.	i	Z	07 51 29	
9.	iP Z, P E		08 15 42.2	
	S	N	17 17	
	i	EZ	19	
	eL	NE	56	
	P: W, C			
	28.6 N., 142.4 E.			
	Bonin Is. region.			
	h: 33 km ca.			
	H= 08 13 37			USCGS
9.	iP	Z	09 14 54.8	
	e	Z	15 06	
	P: C			
	52.2 N., 172.5 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 09 08 57.8			USCGS
9.	eP	Z	10 00 33	
	S	EZ	59	
	i	N	01 00	
9.	eP	Z	10 02 46	
	S	NEZ	03 11	
9.	iP	NEZ	11 18 30.5	
	S	Z	43	
	i	NE	44	
	P: S, W			
9.	iPKP	Z	12 12 45.0	
	P: C			
	17.0 S., 68.4 W.			
	Peru-Bolivia border region.			
	h: 61 km ca.			
	H= 11 53 00.5			USCGS
9.	P	NZ	12 26 31	
	eL	E	32 45	

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	13.3 N., 144.2 E.			
	Mariana Is.			
	h: 123 km ca.			
	H= 12 21 29.1			USCGS
9.	eP	Z	14 35 46	
9.	eP	NZ	14 57 47	
	eS	N	58 18	
9.	i	N	14 59 44	
9.	eP	Z	15 00 09	
	i	N	24	
	S	EZ	44	
	i	E	01 04	
	i	N	15	
9.	iP	NZ	16 00 50.8	
	P: S, D			
	6.7 S., 130.0 E.			
	Banda Sea.			
	h: 91 km ca.			
	H= 15 52 52			USCGS
9.	iP	NZ	17 04 13.3	
	P: N, C			
	22.2 S., 170.6 E.			
	Loyalty Is. region.			
	h: 29 km ca.			
	H= 16 53 28.8			USCGS
9.	iP	NEZ	17 12 09.3	
	iS	NZ	27	
	i	E	29	
	P: N, E, D			
9.	iP	Z	17 24 08.3	
	i	N	08.7	
	i	N	14.7	
	S	NE	25 05	
	P: D			
9.	P	NEZ	17 37 58	
	e	N	38 55	
9.	iP	NEZ	17 43 10.2	
	S	E	47 59	
	eL	Z	48 50	
	P: N, E, D			
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)			
	52.8 N., 171.9 E.			
	Rat Is.			
	h: 41 km ca.			
	H= 17 37 15.9			USCGS
9.	eP	EZ	18 04 01	
9.	iP	Z	18 24 28.0	
			(cont.)	

Date	Phase	Comp.	Time(GMT) h m s	
	e	Z	18 24 43	
	P: C			
	51.8 N., 173.9 E.			
	Rat Is.			
	h: 10 km ca.			
	H= 18 18 21.2			USCGS
9.	eP	Z	19 00 09	
	50.7 N., 175.2 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 18 53 57			USCGS
9.	iP	NEZ	19 02 55.5	
	iS	Z	58.3	
	P: N, W, D			
9.	eP	Z	19 40 59	
	iS	NEZ	41 18.0	
9.	P	Z	20 04 35.6	
	53.8 N., 164.7 W.			
	Unimak I. region.			
	h: 33 km ca.			
	H= 19 56 23			USCGS
9.	eL	E	21 25 55	
	eL	N	26 41	
	37.7 N., 20.3 E.			
	Ionian Sea.			
	h: 51 km ca.			
	H= 20 38 45.3			USCGS
9.	P	Z	23 17 28.4	
	eS	E	22 19	
	i	N	22	
	eL	N	23 27	
	eL	Z	24 40	
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)			
	52.2 N., 173.3 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 23 11 26.7			USCGS
10.	P	Z	00 44 06	
	e	Z	15	
	eS	E	49 05	
	eL	E	50 13	
	eL	N	22	
	Mag. 5-$5\frac{1}{4}$ (Mat.)			
	52.4 N., 173.5 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 00 38 06.1			USCGS
10.	iP	NZ	01 25 43.2	
	e	Z	27 16	
	e	N	31	
	P: N, C			

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Date	Phase	Comp.	Time(GMT) h m s	
10.	iP NZ, P	E	01 34 54.1	
	i	Z	35 04.0	
	epP?	Z	32	
	i	NE	33	
	P: N, C			
	12.2 S., 167.2 E.			
	Santa Cruz Is.			
	h: 268 km ca.			
	H= 01 25 46.5			USCGS
10.	P	Z	01 55 02	
	53.3 N., 172.4 W.			
	Andreanof Is.			
	h: 33 km ca.			
	H= 01 47 40			USCGS
10.	iP	Z	02 14 31.4	
	eS	E	19 26	
	eL	N	20 36	
	P: C			
	Mag. $5\frac{1}{4}$-$5\frac{1}{2}$ (Mat.)			
	52.2 N., 172.9 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 02 08 32.9			USCGS
10.	eP	NZ	02 15 04	
	eS	E	28	
	e	N	40	
10.	eL	E	02 56 03	
	51.0 N., 176.9 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 02 43 11			USCGS
10.	P	Z	04 22 40	
	6.0 S., 106.1 E.			
	Java.			
	h: 152 km ca.			
	H= 04 13 46.4			USCGS
10.	eP	Z	05 56 10	
	i	N	15	
	i	Z	18	
	eS	E	25	
	i	N	27	
10.	iP	Z	06 47 35.4	
	i	Z	37	
	P: C			
	14.7 S., 167.2 E.			
	New Hebrides Is.			
	h: 156 km ca.			
	H= 06 37 58.0			USCGS
10.	P	Z	08 03 46	
	i	Z	57	
	52.1 N., 172.7 E.			

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	Rat Is.			
	h: 30 km ca.			
	H= 07 57 48			USCGS
10.	eP	Z	08 18 03	
	i	Z	10	
	eS	E	23 02	
	e	N	24 06	
	eL	E	25 13	
	51.4 N., 175.2 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 08 12 00.1			USCGS
10.	eP	NEZ	09 25 00	
	eS?	E	26 08	
10.	P	EZ	11 09 00.7	
	e	E	22 14	
	P: E			
10.	P	Z	11 34 23	
	50.7 N., 175.1 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 11 28 14.7			USCGS
10.	P	Z	14 23 19.0	
	e	N	24 39	
	P: C			
10.	iP	EZ	14 41 06.1	
	S	EZ	24	
	P: E, D			
10.	P	Z	15 23 06	
	52.2 N., 175.3 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 15 16 50			USCGS
10.	eL	N	16 45 44	
	eL	E	50	
	eL	N	48 14	
	eL	E	40	
	37.6 N., 47.1 E.			
	Northwestern Iran.			
	h: 52 km ca.			
	H= 16 09 54.1			USCGS
10.	P	Z	18 34 09	
	51.0 N., 176.7 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 18 27 53.6			USCGS
10.	eP	Z	20 16 13	
	55.2 N., 164.7 E.			
	Komandorsky Is. region.			
	h: 33 km ca.			
	H= 20 10 37			USCGS

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Date	Phase	Comp.	Time(GMT) h m s
11.	P	NEZ	01 12 47
	iS	E	13 19.6
11.	eL	E	01 21 46
	51.8 N., 173.8 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 01 10 30		USCGS
11.	iP	Z	02 44 34.4
	e	E	53 46
	eL	E	54 37
	P: C		
	Mag. 5¼-5½ (Mat.)		
	21.8 S., 176.4 W.		
	Fiji Is. region.		
	h: 174 km ca.		
	H= 02 33 29.3		USCGS
11.	iP	Z	03 00 15.6
	i	Z	25
	i	N	28
	P: C		
11.	iP	N	03 25 17.5
	i	E	18.0
	i	Z	18.1
	P: N		
11.	eL	E	03 41 51
11.	iP	Z	05 01 53.5
	i	E	54.0
	i	N	54.7
	S	E	02 38
	e	N	41
	P: C		
11.	eP	Z	05 20 16
	eL	E	44 50
	eL	E	51 41
11.	P	Z	06 31 53
	51.2 N., 177.1 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 06 25 34.3		USCGS
11.	P	Z	06 44 56
	eL	E	48 58
	52.2 N., 171.2 E.		
	Rat Is.		
	h: 40 km ca.		
	H= 06 39 06.1		USCGS
11.	P	Z	06 51 36
	S E, eS N		51
11.	iP	NZ	07 13 24.7
	P: S, C		

Date	Phase	Comp.	Time(GMT) h m s
11.	P	Z	08 13 37
	e	N	14 02
11.	e	E	09 01 16
	eL	E	03 38
	Mag. 4¾-5 (Mat.)		
	24.0 N., 122.5 E.		
	Taiwan region.		
	h: 38 km ca.		
	H= 08 53 21.8		USCGS
11.	iP	NEZ	11 04 04.6
	i	E	13
	S	NEZ	19
	P: S, E, D		
11.	P	Z	12 29 58
	e	E	30 25
	S?	N	40
	i	E	41
11.	e	E	13 07 12
11.	eP	EZ	13 11 07
	e	E	16 09
	eL	E	18 32
	51.0 N., 175.9 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 13 04 54.8		USCGS
11.	ePKP	Z	14 36 01
	i	Z	16
	23.8 S., 67.7 W.		
	Chili-Argentina border region.		
	h: 101 km ca.		
	H= 14 16 11.5		USCGS
11.	eP	Z	15 34 18
	e	E	39 37
	eL	E	41.0
	Mag. 5-5¼ (Mat.)		
	51.3 N., 176.1 E.		
	Rat Is.		
	h: 34 km ca.		
	H= 15 27 49.5		USCGS
11.	ePKP	Z	16 30 08
	1.4 S., 77.8 W.		
	Ecuador.		
	h: 190 km ca.		
	H= 16 10 30.4		USCGS
11.	eP	Z	17 08 39
	e	E	49
	e	NZ	50

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Date	Phase	Comp.	Time(GMT) h m s	
11.	iP	EZ	17 41 24.2	
	i	N	25.0	
	e	E	42 40	
	S	N	42	
	P: W, C			
11.	eP	Z	22 04 41	
	31.6 N., 113.9 W.			
	Gulf of California.			
	h: 33 km ca.			
	H= 21 52 17			USCGS
11.	e	E	23 21 20	
	3.5 S., 145.4 E.			
	Near north coast of New Guinea.			
	h: 33 km ca.			
	H= 23 03 50			USCGS
12.	P	Z	00 10 46	
12.	P	Z	00 11 43	
	i	N	43.7	
	S	NE	12 07	
12.	iP Z, P E		00 49 29.2	
	iS	E	54 33	
	e	E	58 28	
	P: E, D			
	Mag. $5\frac{3}{4}$ (Mat.)			
	51.5 N., 175.8 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 00 43 17.1			USCGS
12.	iP	Z	01 01 05.7	
	i	E	02 00	
	e	Z	03 19	
	eS	E	06 08	
	L	E	53	
	L	N	08 03	
	L	Z	42	
	P: D			
	Mag. $6\frac{1}{4}$-$6\frac{1}{2}$ (Mat.)			
	52.2 N., 172.8 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 00 55 06.2			USCGS
12.	P	Z	01 09 33	
	51.3 N., 176.2 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 01 03 18.0			USCGS
12.	P	Z	01 24 21	
	52.0 N., 173.0 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 01 18 21.5			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
12.	eP	Z	01 41 55	
	52.1 N., 172.8 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 01 35 53.6			USCGS
12.	e	E	05 29 22	
	51.9 N., 172.9 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 05 17 23.0			USCGS
12.	eP	Z	12 17 48	
	i	Z	59	
	e	E	22 40	
	eL	E	24 48	
	L	E	33 00	
	52.2 N., 171.3 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 12 11 58.0			USCGS
12.	iP	Z	12 42 09.5	
	i	N	09.7	
	iS N, S E		26	
	P: C			
12.	eL	E	13 12 29	
12.	eP	Z	13 19 16	
	eL	E	27 00	
12.	iP	EZ	14 16 12.0	
	e	N	29	
	P: W, C			
12.	P	Z	15 01 30	
	i	NE	31.6	
	i	E	34.7	
	S	NE	02 42	
	31.4 N., 138.0 E.			
	South of Honshu, Japan.			
	h: 426 km ca.			
	H= 15 00 05			USCGS
12.	P	Z	15 25 36	
12.	eP	Z	16 39 15	
	e	E	45 20	
	e	N	44	
	eL	E	46 26	
	51.7 N., 174.7 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 16 32 57.0			USCGS
12.	P	Z	17 24 51	
	S	N	25 16	
	i	EZ	17	

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Date	Phase	Comp.	Time(GMT) h m s	
12.	P	NZ	18 54 37	
	S E, eS N		55 00	
	i	Z	01	
12.	e	E	19 30 58	
	9.7 N., 126.2 E.			
	Mindanao, P. I.			
	h: 81 km ca.			
	H= 19 13 35.8			USCGS
12.	iP NZ, P E		21 47 33.8	
	S	NE	48 00	
	P: S, E, C			
12.	eP	Z	23 25 07	
	e	E	32 30	
	52.2 N., 174.8 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 23 19 02.8			USCGS
13.	iP	Z	00 00 03.5	
	e	E	01 48	
	e	E	02 24	
13.	iP	Z	02 41 21.8	
	P: C			
13.	P	Z	02 46 13	
13.	iP	NEZ	03 52 42.1	
	S?	E	44	
	P: N, E, D			
13.	e	E	04 01 14	
13.	e	E	04 56 50	
	51.3 N., 174.1 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 04 45 32.7			USCGS
13.	eP	Z	07 06 32	
	i	NEZ	35	
	S	E	07 00	
13.	P	EZ	08 45 56	
	i	N	46 24	
	i	E	26	
13.	e	E	09 34 22	
	50.9 N., 176.5 E.			
	Rat Is.			
	h: 25 km ca.			
	H= 09 19 33			USCGS
13.	P	EZ	12 28 13	
	S	NE	18	
13.	P	Z	14 53 38	

Date	Phase	Comp.	Time(GMT) h m s	
13.	P	NEZ	14 54 18	
13.	iP	Z	15 24 23.4	
	e	E	34 40	
	eL	E	39 05	
	P: D			
	6.9 S., 129.6 E.			
	Banda Sea.			
	h: 128 km ca.			
	H= 15 16 28.8			USCGS
13.	eP	Z	17 21 48	
13.	P	Z	18 14 42	
	52.0 N., 173.2 E.			
	Rat Is.			
	h: 33 km ca.			
	H= 18 08 41.6			USCGS
13.	eP	Z	18 23 05	
	51.3 N., 178.0 E.			
	Rat Is.			
	h: 27 km ca.			
	H= 18 16 39.3			USCGS
13.	iP	NEZ	20 34 47.3	
	eS	N	35 36	
	P: S, W, C			
13.	P	Z	22 56 26	
	eS	E	23 00 36	
	eL	E	03 44	
	eL	N	50	
	19.2 N., 121.4 E.			
	Philippine Is. region.			
	h: 33 km ca.			
	H= 22 51 22.3			USCGS
14.	P	Z	00 34 01	
14.	P	Z	09 05 47	
	51.9 N., 172.0 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 08 59 53.5			USCGS
14.	P	NZ	10 24 37	
	i	E	38	
	S	N	25 01	
	i	E	02	
14.	P	Z	10 44 06	
	i	Z	16	
	eL	E	50 08	
	L	N	51 18	
	52.3 N., 172.6 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 10 38 07.3			USCGS

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Date	Phase	Comp.	Time(GMT) h m s
14.	P	Z	10 55 34
	S	E	51
	i	N	52
14.	iP	NEZ	12 22 13.0
	iS	NE	14.1
	P: N, W		
14.	P	Z	13 50 13
	i	Z	13.7
	i	NE	13.9
	i	E	31
	S	E	34
14.	P	Z	15 28 18
	S	E	42
	i	N	43
14.	iP	NEZ	16 18 49.1
	S	NEZ	19 04
	P: S, W, C		
14.	P	Z	16 32 08
	S	NE	32
14.	P	Z	16 33 32
	eS	NE	55
14.	P	Z	17 06 51
	e	E	14 37
	eL	E	17 42
	55.1 N., 165.6 E.		
	Komandorsky Is. region.		
	h: 20 km ca.		
	H= 17 01 13.9		USCGS
14.	P	Z	17 11 15
	S	EZ	40
14.	P	Z	17 34 02
	S	NEZ	23
14.	ePKP	Z	19 06 39
	42.6 S., 80.0 W.		
	Off coast of southern Chile.		
	h: 33 km ca.		
	H= 18 47 03		USCGS
14.	e	E	20 09 30
	eL	E	15 38
14.	P	Z	21 23 48
	e	E	28 33
	eL	E	30 50
	Mag. 5 (Mat.)		
	52.4 N., 173.9 E.		
	Rat Is.		
	h: 39 km ca.		
	H= 21 17 34.4		USCGS

Date	Phase	Comp.	Time(GMT) h m s
14.	P	Z	22 13 23
	S	NE	48
14.	P	Z	22 21 05
	eS	NE	29
15.	P	Z	01 05 24
	S	NEZ	48
15.	eP	Z	01 06 36
	S	N	07 00
15.	eP	Z	01 27 01
	eS	Z	24
15.	P	Z	01 31 37
	S	E	36 50
	L	E	39 16
	L	N	33
	Mag. $6\frac{1}{4}$-$6\frac{1}{2}$ (Mat.)		
	51.4 N., 179.4 E.		
	Rat Is.		
	h: 42 km ca.		
	H= 01 25 08.8		USCGS
15.	eP	Z	01 53 52
	eS	NEZ	54 15
15.	iP	Z	02 00 21.6
15.	iP	Z	03 54 07.1
	S	NEZ	31
15.	P	Z	04 23 56
	S	NE	24 21
15.	eP	Z	04 25 36
	S	EZ	58
15.	P	Z	05 07 25
	e	E	11 50
	eL	E	12 51
	eL	N	13 14
	Mag. $5\frac{1}{2}$ (Mat.)		
	52.2 N., 172.7 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 05 01 27.2		USCGS
15.	eP	Z	05 31 08
15.	P	Z	06 10 56
	eL	E	16 34
	eL	N	17 11
	52.3 N., 172.6 E.		
	Rat Is.		
	h: 26 km ca.		
	H= 06 04 57.5		USCGS

Date	Phase	Comp.	Time(GMT) h m s	
15.	PKP	Z	06 46 19	
	45.9 S., 76.0 W.			
	Off coast of southern Chile.			
	h: 33 km ca.			
	H= 06 26 16.3			USCGS
15.	P EZ, eP N		06 48 45	
	eL	E	57 55	
	51.4 N., 179.5 E.			
	Rat Is.			
	h: 28 km ca.			
	H= 06 42 11.2			USCGS
15.	P	Z	07 10 42	
	51.4 N., 171.4 E.			
	Rat Is.			
	h: 35 km ca.			
	H= 07 05 08			USCGS
15.	P	Z	07 35 16.5	
	S	NE	37	
15.	P	Z	07 44 12	
	i	Z	29	
15.	ePKP	Z	09 47 58	
	e	Z	50 27	
	e	E	10 07 28	
	e	E	22 03	
	e	E	38 08	
	eL	E	41 38	
15.	iP Z, P NE		10 50 13.2	
	eS?	E	55 38	
	ScP	Z	56 21	
	L	N	58 10	
	L	E	20	
	Lr	Z	59 53	
	Mag. 6-6½ (Mat.)			
	3.0 N., 125.9 E.			
	Talaud Is.			
	h: 33 km ca.			
	H= 10 43 19.8			USCGS
15.	L	E	10 51 56	
15.	iP	Z	10 57 01.8	
	iS	NE	02.6	
	P: C			
15.	P	Z	12 42 49	
	eL	E	57 16	
	53.6 N., 31.3 E.			
	Central Russia.			
	h: 11 km ca.			
	H= 12 34 54.8			USCGS
15.	P	Z	14 19 16	
	S	N	20 00	

Date	Phase	Comp.	Time(GMT) h m s	
15.	P	Z	14 49 54	
	10.2 S., 161.0 E.			
	Solomon Is.			
	h: 33 km ca.			
	H= 14 40 53.4			USCGS
15.	P	Z	15 33 03	
	i	Z	03.6	
15.	P	Z	18 58 41	
15.	iP	Z	19 20 34.0	
	P: C			
15.	eP	Z	20 33 51	
15.	P	Z	21 39 37	
15.	e	E	21 52 44	
	12.9 N., 125.9 E.			
	Samar, Philippine Is.			
	h: 63 km ca.			
	H= 21 41 02.5			USCGS
15.	P	Z	22 52 35	
	5.7 S., 131.0 E.			
	Banda Sea.			
	h: 33 km ca.			
	H= 22 44 41			USCGS
15.	eL	E	23 30 08	
	eL	N	31 46	
15.	P	NEZ	23 36 00	
	i	NE	22	
16.	eP	Z	01 00 37	
	e	E	07 54	
	e	E	08 36	
	eL	E	09 12	
	51.2 N., 177.5 E.			
	Rat Is.			
	h: 45 km ca.			
	H= 00 54 59.1			USCGS
16.	eP	Z	03 07 39	
	eL	E	20 40	
	eL	E	23 10	
	11.2 S., 162.5 E.			
	Solomon Is.			
	h: 25 km ca.			
	H= 02 58 26			USCGS
16.	iP	Z	07 29 35.5	
	i	N	37.7	
	P: D			
16.	iP	Z	10 39 59.2	

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Date	Phase	Comp.	Time(GMT) h m s
	i	N	10 39 59.8
	e	N	40 28
	i	N	41 26
	29.6 N., 140.7 E.		
	South of Honshu, Japan.		
	h: 101 km ca.		
	H= 10 38 15.0		USCGS
16.	iP Z, P N		11 05 24.0
	i	E	06 11
	i	N	11.5
	P: N, C		
16.	eP	Z	11 12 15
	26.4 N., 110.0 W.		
	Gulf of California.		
	h: 33 km ca.		
	H= 10 59 17.5		USCGS
16.	iP	Z	12 10 43.7
	iS N, S E		49.2
	P: C		
16.	iP	NEZ	12 25 08.0
	S	Z	55
	S	E	56
	i	N	58
	P: N, E, D		
	Mag. 5.5 (Mat.)		
	38.8 N., 142.1 E.		
	Off east coast of Honshu, Japan.		
	h: 40 km ca.		JMA
16.	iP	Z	14 17 47.2
	i	N	53
	S	E	18 12
	i	N	12.5
16.	P	Z	14 21 45
16.	P	Z	14 24 54
	51.1 N., 175.6 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 14 18 52		USCGS
16.	eP	N	15 44 08
	e	Z	12
	e	E	35
	i	Z	37
	i	N	38
16.	eP	NEZ	17 08 56
	S	NEZ	09 19
16.	P	Z	17 55 07
	7.9 N., 126.6 E.		
	Mindanao, P. I.		
	h: 102 km ca.		
	H= 17 49 02.9		USCGS

Date	Phase	Comp.	Time(GMT) h m s
16.	P	Z	20 22 29
	e	E	23 02
	e	N	03
16.	P	Z	20 56 25
	e	Z	44
	36.3 N., 70.8 E.		
	Hindu Kush region.		
	h: 190 km ca.		
	H= 20 46 37.4		USCGS
16.	iP	Z	21 08 06.2
	eS	NE	30
	P: C		
16.	P Z, eP	N	21 08 16
	S	E	40
	i	N	41
16.	iP Z, P	NE	21 16 01.0
	e	N	23 44
	e	E	24 17
	P: C		
	52.0 N., 175.8 E.		
	Rat Is.		
	h: 40 km ca.		
	H= 21 09 47.2		USCGS
16.	eP	Z	23 28 51
	i	NZ	54
	iS E, S N		29 17
	i	E	35
17.	eP	Z	00 08 08
	S	EZ	35
17.	iP	Z	00 11 06.1
	S	NEZ	30
17.	e	E	00 19 36
	51.9 N., 174.3 E.		
	Rat Is.		
	h: 45 km ca.		
	H= 00 07 12.4		USCGS
17.	P	Z	00 43 08
	e	E	36
	e	N	40
	e	E	41
17.	P	Z	02 24 22
	eS	E	30 29
	eL	E	33 34
	eL	E	35 15
17.	eP	Z	04 10 19
	57.1 N., 153.4 W.		
	Kodiak I. region.		
	h: 20 km ca.		
	H= 04 01 35.5		USCGS

Date	Phase	Comp.	Time(GMT) h m s
17.	eP	Z	05 01 47
	57.1 N., 152.9 W.		
	Kodiak I. region.		
	h: 33 km ca.		
	H= 04 53 06.0		USCGS
17.	eP	Z	06 35 32
	S	EZ	58
17.	P	Z	07 11 22
	S	NEZ	45
17.	eP	Z	07 38 02
	i	Z	05
	S	N	33
17.	eP	Z	08 48 11
17.	e	E	10 16 18
17.	P	Z	10 17 39
	e	E	24 56
17.	P	Z	10 19 17
	51.2 N., 178.3 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 10 11 13.7		USCGS
17.	iP Z, P	NE	10 25 07.0
	S	E	30 10
	L	E	32 33
	L	N	39
	Mag. $5\frac{3}{4}$-6 (Mat.)		
	51.8 N., 176.6 E.		
	Rat Is.		
	h: 44 km ca.		
	H= 10 18 51.3		USCGS
17.	eP	Z	10 46 15
17.	iP	Z	13 15 51.5
	P: C		
	19.9 S., 178.0 W.		
	Fiji Is. region.		
	h: 558 km ca.		
	H= 13 05 36		USCGS
17.	P	Z	14 49 49
17.	iP	NEZ	15 55 59.7
	i	Z	56 20
	S	E	32
	P: N, W, C		
17.	eP	Z	16 42 52
	e	NZ	43 39
	50.8 N., 173.5 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 16 37 07		USCGS

Date	Phase	Comp.	Time(GMT) h m s
17.	eP	Z	17 17 12
17.	P	Z	18 09 55
	S	NEZ	10 19
17.	iP	NEZ	18 27 16.6
	S	E	29 58
	L	E	32 15
	P: N, W, C		
	21.6 N., 142.8 E.		
	Mariana Is. region.		
	h: 290 km ca.		
	H= 18 23 51.7		USCGS
17.	P	Z	18 35 05
17.	P	Z	19 36 58
	S	NE	37 25
	i	N	32
17.	eS	NE	22 31 32
17.	S	N	22 32 25
	e	E	26
17.	eP	Z	22 47 36
	e	Z	49
	e	Z	48 26
18.	P	Z	04 33 58
	S	E	39 54
	e	E	43 34
	eL	E	48 46
	Mag. $5\frac{1}{2}$ (Mat.)		
	25.0 N., 94.3 E.		
	Burma-India border region.		
	h: 36 km ca.		
	H= 04 26 33.5		USCGS
18.	eP	Z	04 39 50
18.	eP	Z	07 33 02
	e	E	36 25
	eL	E	37 40
	51.9 N., 174.1 E.		
	Rat Is.		
	h: 36 km ca.		
	H= 07 26 57.8		USCGS
18.	P	NZ	08 05 17
	i	E	18
18.	iP Z, P	NE	08 40 24.5
	eL	E	47 43
	51.8 N., 176.4 E.		
	Rat Is.		
	h: 15 km ca.		
	H= 08 34 05.4		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
18.	eP	Z	09 41 02
	e	E	47 14
	51.6 N., 174.9 E.		
	Rat Is.		
	h: 20 km ca.		
	H= 09 34 52.4		USCGS
18.	iP	NZ	10 08 37.3
	iS	E	37.7
18.	P	Z	11 08 20
	S NZ, eS	E	42
18.	P NE, eP	Z	11 55 46
	i	Z	56 07
	i	NEZ	14
18.	eP	Z	12 10 38
	i	Z	11 23
	i	E	41
18.	P	Z	12 17 58
18.	iP Z, P NE		12 18 40.5
	i	NEZ	48
	P: C		
18.	iP	NEZ	13 20 26.2
	i	EZ	30
	i	N	45
	P: S, E, D		
18.	P	Z	13 23 54
	eS	NE	24 16
	e	N	19
	e	E	20
18.	eS	NE	13 25 03
18.	iP	Z	15 09 02.2
	i	NE	20
	i	E	31
	P: D		
18.	P	EZ	15 42 06
	S	E	10
	i	E	11
18.	iP	Z	15 58 28.5
	S	N	50
	i	E	51
	P: D		
18.	eP	Z	19 00 58
	e	Z	01 19
18.	P	Z	19 39 26
	e	E	49.7
	59.2 N., 147.5 W.		

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Date	Phase	Comp.	Time(GMT) h m s
	Gulf of Alaska.		
	h: 30 km ca.		
	H= 19 30 19.9		USCGS
18.	P	Z	20 08 04
	iS	N	26.3
	i	E	26.6
18.	eP	Z	20 35 17
	18.6 N., 120.0 E.		
	Luzon , P. I.		
	h: 36 km ca.		
	H= 20 30 03.1		USCGS
18.	eP	Z	22 13 09
18.	iP	Z	22 39 05.5
	i	N	05.9
	i	N	27.4
	P: D		
18.	iP	NZ	22 47 53.7
	S	NE	54 35
	e	E	57 59
	L	N	23 03 13
	L	E	20
	P: N, C		
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)		
	7.3 S., 126.9 E.		
	Banda Sea.		
	h: 33 km ca.		
	H= 22 39 45.8		USCGS
18.	iPKP	Z	22 50 44.5
	i	N	44.7
	i	E	45.1
	i	N	46.2
	9.9 S., 71.2 W.		
	Peru-Brazil border region.		
	h: 594 km ca.		
	H= 22 32 19.6		USCGS
18.	P	Z	23 20 08
	i	NEZ	08.3
	i	Z	21 10
	eS	E	24 46
	eL	E	27 48
	eLr	Z	28 52
	Mag. 6 (Mat.)		
	51.4 N., 179.1 E.		
	Rat Is.		
	h: 28 km ca.		
	H= 23 13 36.3		USCGS
18.	P	EZ	23 26 35
	P: C		
18.	iP	NZ	23 36 13.6
	i	E	37 06

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	P: N, D		
	41.3 N., 139.0 E.		
	Hokkaido, Japan.		
	h: 12 km ca.		
	H= 23 35 00.2		USCGS
19.	e	E	00 30 15
19.	eP	Z	03 02 29
19.	P Z, eP E		03 13 31
	52.8 N., 172.0 E.		
	Rat Is.		
	h: 10 km ca.		
	H= 03 07 32.0		USCGS
19.	P	Z	03 30 54
	eS	E	35 52
	eL	E	38 18
	eL	N	22
	51.6 N., 175.0 E.		
	Rat Is.		
	h: 23 km ca.		
	H= 03 24 43.1		USCGS
19.	eP	Z	04 35 47
	e	E	37 08
	i	N	09
19.	P	Z	05 05 47
	S	N	06 05
	i	NZ	07
19.	iP	Z	05 40 53.7
	S	NE	41 02
	P: C		
19.	eP	Z	06 28 47
	e	E	33 54
	L	N	36 34
	L	E	39
	51.2 N., 177.8 E.		
	Rat Is.		
	h: 40 km ca.		
	H= 06 22 23.4		USCGS
19.	P	Z	08 08 28
	S	N	51
19.	iP	EZ	08 30 24.5
	iS	E	43.2
19.	ePKP1	Z	09 55 35
	PKP2	Z	56 11
	17.4 S., 69.1 W.		
	Peru-Bolivia border region.		
	h: 136 km ca.		
	H= 09 36 02.5		USCGS

Date	Phase	Comp.	Time(GMT) h m s
19.	P	Z	10 07 42
	20.1 S., 177.7 W.		
	Fiji Is. region.		
	h: 478 km ca.		
	H= 09 57 17		USCGS
19.	eP	Z	10 15 58
	S	NEZ	16 22
19.	iP	Z	10 18 11.2
	i	N	11.5
	i	E	12
	i	Z	24
	i	NE	25
	e	E	26 05
	e	N	30
	eL	E	34 22
	eL	N	39 03
	P: C		
	12.4 S., 166.4 E.		
	Santa Cruz Is.		
	h: 65 km ca.		
	H= 10 08 41.6		USCGS
19.	P	Z	10 52 46.5
19.	iP	NZ	10 53 20.8
19.	iP	Z	12 33 58.7
	S	NE	34 24
	P: C		
19.	P	Z	14 53 58
	52.4 N., 174.8 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 14 47 48.1		USCGS
19.	P	Z	14 59 47
19.	iP	Z	15 53 27.1
	iS	E	51.4
	i	N	51.8
	P: D		
19.	P	Z	16 01 12
19.	P	Z	18 07 07
	i	EZ	11
	S	EZ	33
19.	eP	Z	18 15 20
	eS	E	46
	i	Z	48
	i	N	49
19.	iP Z, P NE		18 20 20.0
	e	E	22 49

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Date	Phase	Comp.	Time(GMT) h m s
	P: N, C		
	27.9 N., 139.7 E.		
	Bonin Is. region.		
	h: 480 km ca.		
	H= 18 18 15.0		USCGS
19.	iP	NZ	18 53 24.5
	S	N	46
19.	iP	Z	18 59 07.6
	eS	N	19 04 22
	L	N	06 34
	L	E	07 24
	P: C		
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)		
	51.1 N., 178.4 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 18 52 42.1		USCGS
19.	eP	EZ	23 24 57
	i	N	58
20.	eP	Z	00 45 05
	eS	NEZ	28
20.	P	Z	01 06 30
	S	NE	55
	i	N	56
	i	Z	57
20.	P	Z	01 11 34
	S	E	59
	i	N	12 01
20.	iP	Z	01 50 03.5
	iS E, S N		28.4
	P: C		
20.	eS	E	01 51 05
20.	iP	Z	01 55 26.5
	S	EZ	51
20.	P	EZ	01 58 26
	S	EZ	50
20.	eP	Z	02 00 52
	S	EZ	01 18
20.	eP	Z	02 02 48
	S	E	03 12
20.	eS	E	02 04 54
20.	eP	E	02 06 56
	eS	N	07 18
20.	eS	E	02 09 14

Date	Phase	Comp.	Time(GMT) h m s
20.	eS	E	02 09 36
20.	eS	E	02 11 37
20.	eP	Z	02 12 37
	eS	E	13 00
20.	iP	NZ	02 15 05.3
	i	E	06.0
	S	E	29
	P: S, D		
20.	iP	NEZ	02 18 19
	S	EZ	44
20.	eS	E	02 19 56
20.	iP	Z	02 22 21
	S	NE	45
	34.8 N., 139.3 E.		
	Near south coast of Honshu, Japan.		
	h: 19 km ca.		
	H= 02 21 47.6		USCGS
20.	iP	Z	02 32 18.8
	S	E	42.6
20.	eP	Z	02 35 10
	eS	N	34
20.	eP	Z	02 40 07
	S	E	33
20.	P	Z	02 42 32
	eS	NE	55
20.	iP	Z	02 43 53.0
	i	N	53.5
	S	E	44 18
20.	P	Z	02 46 26
	S	N	50
	i	E	52
20.	iP	Z	02 57 05.5
	S	NE	30
20.	iP	Z	03 01 19.5
	eS	E	44
	P: C		
20.	P	Z	03 13 58
	S	NE	14 22
20.	iP	Z	03 24 18.0
	i	NE	18.2
	S	NE	42
	P: D		

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Date	Phase	Comp.	Time(GMT) h m s
20.	eS	E	03 28 00
20.	eP	Z	03 28 49
	S	NZ	29 13
20.	eP	Z	03 38 00
	S	E	25
20.	P	Z	03 45 09
	S	E	34
	i	N	36
20.	P	Z	03 49 46
	S	E	50 09
	i	N	10
20.	iP	Z	03 58 17.7
	S	E	42
	i	N	43
	P: C		
20.	iP	Z	04 13 51.3
	S	NE	14 16
20.	eP	Z	04 17 55
	i	NZ	57.5
	S	NE	18 20
20.	e	E	05 03 26
	eL	E	14 41
20.	P	Z	05 25 10
20.	eP	Z	05 34 51
	e	Z	35 13
	eS	NE	15
20.	P	Z	06 05 52
	eS	NE	06 16
20.	P	Z	06 23 28
	15.2 S., 173.5 W.		
	Tonga Is.		
	h: 33 km ca.		
	H= 06 12 37.8		USCGS
20.	iP	Z	06 35 33.6
	S	N	58
	i	E	59
	P: C		
20.	P	Z	06 36 34
	P: D		
	1.7 N., 127.3 E.		
	Halmahera.		
	h: 186 km ca.		
	H= 06 29 50.3		USCGS
20.	i	E	07 46 24

Date	Phase	Comp.	Time(GMT) h m s
20.	iP	N	08 35 15.1
	i	Z	15.3
	i	E	16.1
	S	N	40.2
	i	E	40.5
	P: N		
20.	iP	Z	08 55 51
	S	E	56 15
	i	N	17
	i	Z	18
20.	eP	Z	10 01 11
	7.8 S., 117.8 E.		
	Bali Sea.		
	h: 33 km ca.		
	H= 09 52 24		USCGS
20.	iP	Z	10 29 09.7
	S	NE	21
	P: C		
20.	iP	NEZ	11 00 17.7
	i	Z	37
	S	NE	44
	P: S, E, D		
20.	P	Z	11 17 40
	S	NE	18 05
20.	iP Z, P N		11 32 40.5
	S	E	33 05
	i	N	07
	P: S, D		
20.	eP	Z	11 44 57
	eS	E	45 20
	i	N	40.5
20.	eS	N	11 46 13
	i	E	14
20.	eP	Z	11 47 21
	S	E	46
	i	N	48
20.	eP	Z	11 49 26
	eS	E	49
20.	P	Z	11 52 47
	S	E	53 10
	e	N	12
	e	N	17
20.	iP	Z	11 58 17.1
	i	N	17.5
	i	E	18.1
	i	Z	41
	S	NE	43
	i	Z	45
	P: D		

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Date	Phase	Comp.	Time(GMT) h m s
20.	eP	NZ	12 02 11
	S	E	36
20.	eP	Z	12 13 39
	eS	Z	14 04
20.	P	Z	12 54 46
	i	NE	47
	S	E	55 11
	i	N	12
20.	P	NEZ	13 02 53
	S	E	03 17
20.	iP	EZ	13 38 41.1
	S	NE	57
	P: N, E, D		
20.	iP	NEZ	16 26 59.2
	S	Z	27 01
20.	eP	Z	17 21 17
	eS	E	31
20.	iP	NEZ	17 47 28.1
	S	E	54
	P: S, E, D		
20.	eP	Z	17 50 06
	eS	E	30
20.	P	Z	17 53 20
	eS	E	45
	i	E	48
	i	N	49
20.	iP	N	18 20 19.2
	i	EZ	19.5
	S	E	47
	P: N		
20.	eP	Z	20 26 42
	eS	E	27 06
	i	NE	07
20.	iPKP	Z	21 29 57.5
	i	N	59
	P: D		
	18.4 S., 72.4 W.		
	Off coast of northern Chile.		
	h: 33 km ca.		
	H= 21 10 14		USCGS
20.	eP	Z	22 13 02
	e	N	20 08
	50.4 N., 178.2 E.		
	Rat Is.		
	h: 32 km ca.		
	H= 22 06 38.3		USCGS

Date	Phase	Comp.	Time(GMT) h m s
20.	P	NZ	22 27 22
	51.4 N., 176.7 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 22 20 08.6		USCGS
21.	P	NEZ	01 53 35
	S	NE	51
21.	P	NZ	02 53 56.8
	eS	NE	54 13
	P: S, C		
21.	P	Z	03 46 18
	6.0 S., 149.5 E.		
	New Britain.		
	h: 33 km ca.		
	H= 03 38 14.3		USCGS
21.	iP	EZ	04 27 26.3
	i	N	30
	P: E, C		
21.	iP	NEZ	04 41 24.3
	S	E	43 28
	P: N, E, D		
	44.7 N., 148.1 E.		
	Kurile Is.		
	h: 61 km ca.		
	H= 04 38 46.3		USCGS
21.	eL	E	06 00 06
	eL	N	38
	51.1 N., 177.8 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 05 46 27.1		USCGS
21.	eP	Z	08 54 20
	eS	NE	44
21.	iP	Z	09 43 57.4
	S	NE	44 23.0
	P: D		
21.	P	Z	11 25 19
	S	E	34 25
	eLq	E	42 08
	eLq	N	18
	eLr	E	45 46
	eLr	N	46 30
	eLr	Z	47 00
	Mag. 5¼-6 (Mat.)		
	15.1 S., 173.2 W.		
	Tonga Is.		
	h: 33 km ca.		
	H= 11 14 15.1		USCGS
21.	iP	NZ	13 11 41.9

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	i	NE	13 12 04
	i	E	14
	P: S, C		
21.	eP	Z	13 59 33
	e	E	14 12 06
	eL	E	18 06
21.	iPKP	Z	14 29 04.5
	i	Z	16
	pPKP	Z	57
	22.6 S., 69.0 W.		
	Northern Chile.		
	h: 109 km ca.		
	H= 14 09 19.1		USCGS
21.	iP	NEZ	14 58 27.2
	S	NE	58
	P: N, W, C		
21.	P	Z	16 38 27
	i	NEZ	29
	S	NE	39 12
21.	iP	Z	17 17 49.1
	P: D		
	13.8 S., 166.0 E.		
	New Hebrides Is.		
	h: 20 km ca.		
	H= 17 08 07.2		USCGS
21.	iP	NEZ	22 28 56.5
	S	NEZ	29 18
	P: S, W, C		
	37.4 N., 139.5 E.		
	Honshu, Japan.		
	h: 145 km ca.		
	H= 22 28 28.4		USCGS
22.	P	EZ	02 17 38.1
	S	NE	18 38
	P: E, C		
22.	eP	Z	03 50 35
	eS	NE	59
22.	P	EZ	09 20 52
	eS	E	25 20
	e	E	50
	eL	E	26 52
	eL	N	27 18
	Mag. 5½ (Mat.)		
	51.9 N., 173.4 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 09 14 51.3		USCGS
22.	iP	Z	11 23 49.9
	i	NZ	58

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	P: C		
	51.9 N., 171.1 E.		
	Rat Is.		
	h: 25 km ca.		
	H= 11 17 58.8		USCGS
22.	P	Z	12 24 03
22.	P	Z	12 25 44
	i	Z	51.5
22.	iP	Z	13 08 59.0
	i	N	59.5
	i	NE	10 14
	P: C		
22.	P	NEZ	14 11 50
	i	Z	55
	eL	E	17 08
	55.4 N., 164.8 E.		
	Komandorsky Is. region.		
	h: 30 km ca.		
	H= 14 06 15.8		USCGS
22.	iP	NZ	15 24 30.7
	S	E	25 31
	i	N	33.4
	P: S, C		
22.	P	NZ	15 33 32
	i	E	33
	e	N	34 48
22.	eP	Z	16 30 56
	i	N	31 06
	e	N	34 38
	e	E	52
22.	iP	Z	17 48 38.0
	eS	NE	56
	P: D		
22.	eP	Z	21 48 42
	eS	E	57 18
	e	E	22 04 50
	eL	E	07 48
	eL	N	08 00
	Mag. 5¾ (Mat.)		
	16.8 S., 175.7 E.		
	Fiji Is. region.		
	h: 73 km ca.		
	H= 21 38 15.5		USCGS
22.	P	Z	22 15 36
	S	NE	59
23.	P	Z	02 36 28

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Date	Phase	Comp.	Time(GMT) h m s	
23.	P	Z	07 13 14	
	eL	E	19.4	
	52.6 N., 173.0 E.			
	Rat Is.			
	h: 40 km ca.			
	H= 07 07 13			USCGS
23.	eP	Z	07 14 42	
	e	N	15 10	
	S	E	16	
23.	P	Z	07 47 25	
	18.3 S., 168.2 E.			
	New Hebrides Is.			
	h: 33 km ca.			
	H= 07 37 11			USCGS
23.	eP	Z	08 15 14	
	eL	E	20 30	
	48.7 N., 154.2 E.			
	Kurile Is.			
	h: 30 km ca.			
	H= 08 11 23			USCGS
23.	P	Z	11 37 48	
23.	P	Z	13 29 53	
	eL	E	38 50	
	5.5 N., 128.7 E.			
	East of Philippine Is.			
	h: 67 km ca.			
	H= 13 23 34			USCGS
23.	iP	Z	13 49 01.4	
	i	Z	05	
	S	N	23	
	iS	E	23.5	
	i	NE	35.0	
	P: D			
23.	P	Z	16 04 37	
23.	iP	EZ	16 18 23.1	
	P	N	23.5	
	S	EZ	33.6	
	P: E, D			
23.	P	Z	16 44 00ca.	
	i	Z	15	
23.	PKP1	Z	22 31 33	
	i	Z	37	
	i	Z	42	
	PKP2	Z	53	
	i	NE	58	
	i	Z	32 13	
	PP	Z	35 25	
	PP	N	36	
	PP	E	45	

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	SKKS	E	22 42 12	
	SKSP	E	45 38	
	PPS	E	49 40	
	e	E	50 34	
	e	E	54 18	
	SS	E	55 40	
	Lq	E	23 13 26	
	Lr	Z	22 00	
	Lr	Z	13	
	Lr	E	20	
	Mag. 7¾ (Mat.)			
	25.7 S., 70.5 W.			
	Near coast of northern Chile.			
	h: 80 km ca.			
	H= 22 11 50.2			USCGS
24.	iP	NEZ	02 09 58.0	
	i	Z	10 02.9	
	S	E	18	
	i	NE	25	
	P: S, E, D			
24.	iP	EZ	05 56 18.1	
	i	N	18.5	
	S	NE	38	
	P: E, D			
24.	eP	Z	07 44 21	
	i	E	47	
24.	e	E	07 56 42	
24.	eL	E	08 17 24	
	e	E	34 40	
	9.5 N., 138.5 E.			
	West Caroline Is.			
	h: 33 km ca.			
	H= 08 05 16.6			USCGS
24.	P	Z	09 36 35	
	S	EZ	58	
24.	eP	Z	09 52 33	
	S	NE	56	
24.	iP	Z	11 11 05.1	
	eS	NE	24	
	P: D			
24.	eP	Z	14 40 40	
	S	E	41 06	
24.	iP	NZ	17 01 35.0	
	P: S, D			
	6.1 S., 130.2 E.			
	Banda Sea.			
	h: 128 km ca.			
	H= 16 53 46			USCGS

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Date	Phase	Comp.	Time(GMT) h m s
24.	iP	Z	17 45 42.0
	S	E	46 07
	i	EZ	09
	P: D		
24.	eP	E	20 28 57
	S	E	29 21
24.	eP	Z	21 00 00ca.
	eS	E	05 00
	52.2 N., 174.4 E.		
	Rat Is.		
	h: 34 km ca.		
	H= 20 53 52.4		USCGS
24.	eP	Z	21 29 39
	eS	E	34 53
	eL	N	37 26
	eL	E	35
	51.4 N., 178.2 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 21 23 16.5		USCGS
24.	P	Z	23 04 15
	i	Z	28
	eL	E	20 20
	10.8 S., 165.8 E.		
	Santa Cruz Is.		
	h: 91 km ca.		
	H= 22 54 59.5		USCGS
24.	eP	Z	23 05 38
	S	E	06 00
25.	P	Z	01 40 29.5
	eS	E	47 00
	eL	N	53 30
	P: D		
	5.4 S., 152.2 E.		
	New Britain region.		
	h: 38 km ca.		
	H= 01 32 23.8		USCGS
25.	P	NZ	01 43 14
	S	NE	38
25.	P	Z	01 48 36
25.	iP	NEZ	01 56 54.1
	i	E	58 10
	S	N	20
	P: S, W, C		
	40.1 N., 143.0 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 01 55 37.7		USCGS

Date	Phase	Comp.	Time(GMT) h m s
25.	P	Z	03 07 08
	42.9 N., 135.6 E.		
	Sea of Japan.		
	h: 435 km ca.		
	H= 03 05 45		USCGS
25.	P	Z	04 59 28
	i	Z	34
	ePP	N	05 01 28
	S	N	06 10
	S	E	15
	eL	E	08 54
	e	E	10 34
	L	N	12 34
	L	Z	36
	L	E	13 22
	Mag. 7 (Mat.)		
	5.5 S., 152.0 E.		
	New Britain region.		
	h: 35 km ca.		
	H= 04 51 27.8		USCGS
25.	P	Z	05 01 14
25.	P	Z	05 05 05
25.	P	NEZ	05 28 13
	i	Z	40
	eS	E	32 42
	e	E	33 56
	e	N	34 00
	L	NZ	35 10
	L	E	23
	Mag. 6¾ (Mat.)		
	52.1 N., 173.2 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 05 22 14.5		USCGS
25.	eP	Z	05 31 20
25.	eP	Z	05 40 03
25.	eP	Z	05 58 20
	S	NEZ	44
25.	eP	Z	06 45 29
	i	Z	59
25.	iP	Z	08 07 22.4
	P: C		
25.	P	Z	10 27 28
	PcP	Z	29 02
	eS	E	33 48
	eS	N	34 06
	eL	E	36 50

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	eLr	E	10 38 36
	eLr	N	40 18
	Mag. 5½ (Mat.)		
	5.5 S., 152.3 E.		
	New Britain region.		
	h: 31 km ca.		
	H= 10 19 11.0		USCGS
25.	P	Z	10 41 28
	i	NEZ	30
	i	Z	58
	eL	N	51 52
	eL	E	52 52
	eL	E	55 10
	23.8 N., 94.8 E.		
	Burma-India border region.		
	h: 87 km ca.		
	H= 10 34 06.1		USCGS
25.	P	Z	11 36 20
	i	Z	28
	S	N	45
25.	eP?	Z	12 34 15
	e	E	41 16
	e	N	42 08
	e	E	19
	51.1 N., 178.1 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 12 27 51.9		USCGS
25.	P	Z	13 26 52
	S	NEZ	27 10
25.	P	Z	16 04 42
	i	Z	43
	S	NE	05 07
25.	P	EZ	16 09 50
	S	N	14 00
	S	E	04
	eL	N	16 42
	eL	E	45
	Mag. 5¼ (Mat.)		
	19.2 N., 121.2 E.		
	Philippine Is. region.		
	h: 13 km ca.		
	H= 16 04 45.7		USCGS
25.	P	Z	17 00 01ca.
	26.2 S., 179.7 E.		
	South of Fiji Is.		
	h: 517 km ca.		
	H= 16 49 20.2		USCGS
25.	P	Z	17 35 01
	S	N	11
25.	iP	NEZ	18 20 20.6
	S	NEZ	31
	P: N, E, C		

Date	Phase	Comp.	Time(GMT) h m s
25.	iP NZ, P	E	19 32 53.1
	eS	E	40 27
	e	N	44
	eL	E	48 44
	eL	N	49 00
	P: S, E, D		
	11.4 S., 166.1 E.		
	Santa Cruz Is.		
	h: 86 km ca.		
	H= 19 23 33.0		USCGS
25.	iP	NZ	21 33 34.6
	S	NE	58.5
	P: N, D		
25.	P	NZ	21 52 12
	S	Z	36
	S	NE	37
26.	eP	Z	00 09 32
	S	N	55
26.	eP	Z	01 47 34
	e	E	02 10 45
	35.1 N., 57.6 E.		
	Iran.		
	h: 33 km ca.		
	H= 01 37 05.6		USCGS
26.	i	Z	04 48 59.5
26.	eP	Z	04 53 44
	eS?	E	05 03 15
	eL	E	18 37
	18.8 S., 176.1 W.		
	Fiji Is. region.		
	h: 33 km ca.		
	H= 04 42 28.3		USCGS
26.	P	Z	05 47 13
	eS	E	56 14
	eS	N	46
	eSS	E	06 00 38
	eLq	N	04 37
	eLq	E	44
	eLr	E	06 32
	eLr	N	07 34
	Mag. 5¾-6 (Mat.)		
	18.9 S., 176.3 W.		
	Fiji Is. region.		
	h: 61 km ca.		
	H= 05 36 01.1		USCGS
26.	P	EZ	06 44 06
	i	E	20
	i	N	25
	S	NE	45 22
	i	N	26
	i	E	28
	35.1 N., 133.0 E.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Sea of Japan.		
	h: 33 km ca.		
	H= 06 43 02		USCGS
26.	iP	NEZ	07 35 24.0
	S	NE	36 35
	P: S, W, C		
	Mag. 4.5 (Mat.)		
	36.9 N., 142.6 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 07 34 30		USCGS
26.	eP	Z	09 05 08
	ePPP	E	08 34
	e	N	50
	eS	N	12 40
	eS	E	48
	eSS?	N	16 44
	eSS?	E	50
	eL	E	21 26
	eL	Z	22 36
	Mag. 6-6½ (Mat.)		
	6.7 S., 102.7 E.		
	Southwest of Sumatra.		
	h: 33 km ca.		
	H= 08 55 42.2		USCGS
26.	P	NZ	17 14 03
	e	NE	15 24
	e	Z	30
26.	eP	Z	19 33 57
	S	NE	34 05.5
26.	P	Z	19 43 09
	e	NEZ	44 06
26.	P	Z	20 31 05
	52.0 N., 171.6 E.		
	Rat Is.		
	h: 30 km ca.		
	H= 20 25 18		USCGS
26.	P	NEZ	21 49 15
	S	NE	40
26.	iP	NEZ	22 19 20.2
	i	NZ	31
	e	E	50
	S	E	20 23
	e	N	26
	P: N, E, C		
	40.0 N., 142.7 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 22 18 06.3		USCGS

Date	Phase	Comp.	Time(GMT) h m s
26.	i	NZ	23 43 06
26.	PKP	Z	23 55 02
	pPKP	Z	44
	6.9 N., 73.0 W.		
	Northern Colombia.		
	h: 146 km ca.		
	H= 23 36 12.2		USCGS
26.	P	Z	23 58 12
27.	iP EZ, P N		02 04 57.7
	i	E	05 10
	S	E	08 06
	eL	E	09 30
	P: E, D		
	25.1 N., 128.2 E.		
	Ryukyu Is.		
	h: 33 km ca.		
	H= 02 01 36.3		USCGS
27.	P	Z	04 11 50
	i	NZ	52
	eL	E	16 18
	25.1 N., 128.2 E.		
	Ryukyu Is.		
	h: 33 km ca.		
	H= 04 08 22.5		USCGS
27.	eP	Z	07 59 13
	SKS	E	08 09 44
	SKS	N	46
	eLq	N	22 14
	eLq	E	36
	eLr	E	26 49
	L	E	31 15
	L	Z	20
	Mag. 6-6¼ (Mat.)		
	28.5 N., 112.1 W.		
	Gulf of California.		
	h: 33 km ca.		
	H= 07 46 29.1		USCGS
27.	eP	Z	10 58 22
	S	EZ	46
	i	N	55
27.	e	E	13 34 56
27.	e	E	14 23 53
	e	E	27 20
27.	P	Z	15 22 07
27.	P	Z	17 39 27
	eL	N	45 50
	eL	E	46 09

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Date	Phase	Comp.	Time(GMT) h m s
	eL	N	17 47 07
	51.4 N., 176.6 E.		
	Rat Is.		
	h: 35 km ca.		
	H= 17 33 10.7		USCGS
27.	eP	Z	18 39 24
	19.5 N., 120.6 E.		
	Philippine Is. region.		
	h: 121 km ca.		
	H= 18 34 22		USCGS
27.	iP	Z	20 00 56.6
	i	NE	56.9
	i	NE	01 17.5
	P: C		
27.	eP	NE	21 01 06
27.	P	NEZ	21 57 43
	eS	NE	58 02
	i	E	05
27.	eP	NEZ	23 46 28
28.	eP	NZ	00 17 15
	i	Z	21
	eS	NE	41
	i	NE	44.5
	i	E	55.5
28.	iP	Z	00 46 21.5
	e	E	55 14
	P: D		
	4.9 N., 128.1 E.		
	North of Halmahera.		
	h: 77 km ca.		
	H= 00 40 07		USCGS
28.	P	NZ	04 17 15
	S	N	34
	S	E	35
28.	eP	Z	04 46 45
	21.2 N., 121.3 E.		
	Taiwan region.		
	h: 33 km ca.		
	H= 04 40 55.1		USCGS
28.	P	EZ	05 40 01
28.	iP	Z	08 27 24.5
	P	NE	25
	eS	NE	28 05
	P: C		
28.	iP	NEZ	08 54 54.1
	S	NE	55.3
28.	eP	Z	09 40 22
	eS	NE	38

Date	Phase	Comp.	Time(GMT) h m s
28.	iP	NEZ	09 41 07.1
	i	Z	22
	P: N, E, D		
	53.3 N., 159.8 E.		
	Near east coast of Kamchatka.		
	h: 70 km ca.		
	H= 09 36 12		USCGS
28.	iP Z, P NE		09 58 10.7
	S	NE	28
	i	NE	31
	P: C		
28.	eP	Z	10 17 58
	i	Z	18 08
	i	N	09
	i	E	10
	i	N	35
28.	iP	Z	11 41 40.1
	i	E	43
	S	E	48
	P: N, C		
28.	P	NZ	14 49 26
	S	NE	51
28.	P	NEZ	15 29 00
	i	NEZ	10
	S	NE	30 05
28.	iP	NEZ	18 53 36.5
	i	NEZ	41
	eS	NE	54 06
	i	Z	10
	P: S, W, D		
28.	eP	Z	19 05 53
	i	NEZ	55.6
28.	iP	NZ	19 16 54.1
	i	E	55
	S	NE	17 22.5
	P: C		
28.	eP	Z	20 01 58
	i	Z	02 12
28.	PKP	Z	22 11 45
	i	N	12 10
	i	E	11
	35.4 S., 71.3 W.		
	Central Chile.		
	h: 94 km ca.		
	H= 21 51 58.0		USCGS
28.	iP EZ, P N		23 55 08.0
	eS	NE	56 16
	P: E, D		

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