SEISMOLOGICAL BULLETIN
OF
MATSUSHIRO

MARCH , APRIL
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 Seismograph (Short Period)	N	T_1= 1.0	T_2= 0.23	h_1= 0.68	h_2= 1.7	103,000 (max)
	E	T_1= 1.0	T_2= 0.22	h_1= 0.70	h_2= 1.6	106,000 (max)
	Z	T_1= 1.0	T_2= 0.21	h_1= 0.72	h_2= 1.2	131,000 (max)
Benioff Seismograph (Long Period)	N	T_1= 1.0	T_2= 70	h_1= 0.68	h_2= 5.9	7,330 (max)
	E	T_1= 1.0	T_2= 62	h_1= 0.70	h_2= 5.6	9,640 (max)
	Z	T_1= 1.0	T_2= 84	h_1= 0.72	h_2= 7.3	7,590 (max)
Short Period Seismograph	Z	T_1= 1.0	T_2= 2.02	h_1= 1.4	h_2= 1.2	32,000 (max)
Galitzin Seismograph	N	T_1= 15	T_2= 100	h_1= 1	h_2= 1.2	1,350 (max)
	E	T_1= 15	T_2= 100	h_1= 1	h_2= 1.1	1,640 (max)
	Z	T_1= 7.5	T_2= 100	h_1= 0.76	h_2= 0.87	860 (max)
Wood-Anderson Seismograph	N	0.8		0.3		1,050
	E	0.8		0.8		1,200
1000 kg Long Period Seismograph	N	33.0		0.60		100
	E	30.0		0.62		100

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Date	Phase	Comp.	Time(GMT) h m s
1.	P	Z	00 51 12
	i	N	15
	i	Z	22
	i	E	27
	S	NEZ	36
1.	iP Z P E		03 16 43.3
	i	N	44.0
	S	EZ	17 08
	i	N	10
	P: C		
1.	iP	EZ	07 08 19.7
	i	N	21.4
	iS	N	24.6
	iS	EZ	25.0
	P: W, D		
1.	P	NZ	07 28 55
	i	E	57
	PcP	Z	30 45
	iPcP	E	48.8
	i	N	51
	i	E	31 32
	i	N	34 31
	S	E	35 10
	Lq	N	38 33
	Lq	E	39 27
	Lr	N	41 48
	Lr	Z	42 06
	Lr	E	45
	Mag. 6-6¼ (Mat.)		
	5.5 S., 152.1 E.		
	New Britain region.		
	h: 35 km ca.		
	H= 07 20 55.3		USCGS
1.	P	Z	07 55 03
	5.2 S., 152.1 E.		
	New Btitain region.		
	h: 33 km ca.		
	H= 07 46 57.5		USCGS
1.	P	N	08 18 16.0
	P	EZ	16.3
	iS	E	25.0
	P: N		
1.	P	E	08 23 42.5
	P	Z	43.5
	i	N	45
	S	N	27 38
	S	E	40
	Lq	E	28 22
	Lr	EZ	30 27
	Mag. 5½-5¾ (Mat.)		
	21.1 N., 121.2 E.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Taiwan region.		
	h: 42 km ca.		
	H= 08 18 56.4		USCGS
1.	P	Z	09 16 48
	i	N	50
	i	E	53
	S	N	23 20
	eLq	E	27 13
	Lr	N	29 37
	eLr	Z	30 21
	Mag. 5½-5¾ (Mat.)		
	5.4 S., 152.0 E.		
	New Britain region.		
	h: 29 km ca.		
	H= 09 08 45.0		USCGS
1.	P	Z	09 18 36
	S	NE	25 11
1.	iP	Z	10 07 18.2
	P	N	18.5
	S	E	08 17.0
	S N eS Z		18
	P: D		
1.	P	Z	13 25 40.6
	P	E	42.0
	i	N	45.0
	i	Z	27 25
	S N eS EZ		29 31
	L	E	31 47
	L	N	32 27
	L	Z	56
	Mag. 5½-5½ (Mat.)		
	21.2 N., 121.2 E.		
	Taiwan region.		
	h: 42 km ca.		
	H= 13 20 56.7		USCGS
1.	PKP	Z	16 14 00
	PKP	N	05
	PKP	E	06
	41.4 S., 85.6 W.		
	West Chile Rise.		
	h: 33 km ca.		
	H= 15 54 24.5		USCGS
1.	iP	NEZ	16 15 24.7
	i	NZ	32
	S	E	50
	S	N	51
	P: S, W, C		
1.	P	Z	19 28 06.6
	P	NE	07

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	i	N	19 28 19
	i	Z	19.2
	i	N	30 40
	i	Z	31 09
	S	E	32 57
	S	N	33 00

52.2 N., 173.9 E.
Rat Is., Aleutian Is.
h: 30 km ca.
H= 19 22 01.6 USCGS

Date	Phase	Comp.	Time(GMT) h m s
1.	P	Z	20 12 25.8
	P	NE	26

P: C
12.3 S., 166.7 E.
Santa Cruz Is.
h: 190 km ca.
H= 20 03 09.8 USCGS

Date	Phase	Comp.	Time(GMT) h m s
1.	SKS	NE	21 58 36
	SS	NE	22 06 25
	Lq	E	16 32
	Lq	N	17 22
	Lr	E	23 27
	Lr	N	24 00
	Lr	Z	22

Mag. 6 (Mat.)
15.4 N., 92.5 W.
Mexico-Guatemala border region.
h: 93 km ca.
H= 21 32 11.8 USCGS

Date	Phase	Comp.	Time(GMT) h m s
1.	iP	Z	22 02 28.6
	P	NE	29.5

P: C
23.5 S., 179.0 E.
South of Fiji Is.
h: 541 km ca.
H= 21 52 04.4 US CGS

Date	Phase	Comp.	Time(GMT) h m s
1.	P	NZ	23 47 17.5
	P	E	18
	i	Z	27.5
	i	Z	34
	S	NEZ	42
	i	N	52
	i	E	53

Date	Phase	Comp.	Time(GMT) h m s
2.	i	E	00 19 03
	Lr	E	26 16
	Lr	N	27 28
	eLr	Z	28 00

Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)
27.3 S., 177.9 W.
Kermadec Is.
h: 33 km ca.
H= 23 52 32.1 USCGS

Date	Phase	Comp.	Time(GMT) h m s
2.	Lr	N	03 25 26
	Lr	E	44

Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)
27.4 S., 177.7 W.
Kermadec Is.
h: 33 km ca.
H= 02 50 35.5 USCGS

Date	Phase	Comp.	Time(GMT) h m s
2.	P	Z	06 09 25
	S	N	19 08
	S	E	11
	SS	NE	23 51
	Lq	E	28 52
	Lq	N	29 02
	Lr	E	32 48
	Lr	N	57
	Lr	Z	33 00

Mag. $5\frac{3}{4}$-6 (Mat.)
27.3 S., 177.5 W.
Kermadec Is.
h: 33 km ca.
H= 05 57 36.8 USCGS

Date	Phase	Comp.	Time(GMT) h m s
2.	L	E	07 16 42
	eL	N	22 32

61.0 S., 154.8 E.
West of Macquarie I.
h: 33 km ca.
H= 06 34 48 USCGS

Date	Phase	Comp.	Time(GMT) h m s
2.	P	EZ	09 31 23.5
	P	N	25
	S	NE	41 04
	SS	N	45 56
	SS	E	46 03
	Lq	E	51 53
	Lr	Z	54 30
	Lr	NE	35

Mag. 6-$6\frac{1}{2}$ (Mat.)
27.2 S., 177.9 W.
Kermadec Is.
h: 39 km ca.
H= 09 19 41.6 USCGS

Date	Phase	Comp.	Time(GMT) h m s
2.	P	Z	10 35 22

26.9 S., 177.7 W.
South of Fiji Is.
h: 33 km ca.
H= 10 23 33 USCGS

Date	Phase	Comp.	Time(GMT) h m s
2.	iPn	Z	11 33 32.5
	iPn	N	32.7
	Pg	EZ	35.2
	Sn	NE	41.9
	Sn	Z	42
	Sg	E	52.0

P: S, D

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Date	Phase	Comp.	Time(GMT) h m s
2.	iP	NEZ	11 38 02.2
	S	E	04.0
	i	Z	05.0
	P: N, W, D		
2.	iP	NEZ	11 42 47.1
	iS	EZ	50.0
	P: W, D		
2.	iP	NEZ	11 44 31.4
	iS	E	34.2
	P: W, D		
2.	iP	NZ	12 12 27.2
	iS	EZ	30.0
	i	N	31
	P: N, D		
2.	iP	NEZ	12 55 34.7
	iS	E	37.5
	i	E	44.2
	P: N, W, D		
2.	iP	NEZ	13 08 26.7
	iS	EZ	29.3
	P: N, W, D		
2.	iP	EZ	14 11 24.6
	i	N	25.0
	S	N	41.5
	i	Z	42
	i	E	43
	P: E, C		
2.	P	Z	14 34 57
	eS	E	45 12
	SS	NE	49 36
	Lr	NE	58 31
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)		
	27.3 S., 177.7 W.		
	Kermadec Is.		
	h: 34 km ca.		
	H= 14 23 08.6		USCGS
2.	P	NE	15 29 47
	30.5 S., 138.4 E.		
	South Australia.		
	h: 33 km ca.		
	H= 15 18 53.2		USCGS
2.	P	Z	16 46 09
	eS?	E	56 24
	SS	NE	17 00 23
	eLq	E	05 18
	eLq	N	06 07
	Lr	N	09 40
	Lr	E	50
	Lr	Z	11 00

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Mag. $5\frac{3}{4}$ (Mat.)		
	27.0 S., 177.7 W.		
	South of Fiji Is.		
	h: 70 km ca.		
	H= 16 34 26.9		USCGS
2.	iP	Z	18 11 27.8
	F	N	28
	i	N	48
2.	P	Z	20 02 46
	eS	E	13 06
	SS	NE	17 20
	Lr	NE	26 20
	Mag. $5\frac{3}{4}$ (Mat.)		
	27.2 S., 177.9 W.		
	Kermadec Is.		
	h: 33 km ca.		
	H= 19 51 01.0		USCGS
2.	P	Z	21 34 14
	26.7 S., 177.9 W.		
	South of Fiji Is.		
	h: 33 km ca.		
	H= 21 22 30		USCGS
2.	iP	NEZ	21 38 40.3
	i	Z	40 10
	S	NE	15
	i	Z	19
	i	Z	26
	P: N, W, C		
	Mag. 6.1 (Mat.)		
	28.2 N., 139.3 E.		
	Bonin Is. region.		
	h: 495 km ca.		
	H= 21 36 38.4		USCGS
2.	P	Z	21 46 58
2.	P	Z	21 50 32
2.	P	Z	22 12 19
	eS	E	22 28
	S	N	37
	SS	E	27 50
	L	E	40 00
	38.6 N., 28.3 E.		
	Turkey.		
	h: 45 km ca.		
	H= 22 00 07.8		USCGS
2.	iP	NEZ	23 17 42.5
	i	Z	55
	P: S, E, C		
2.	eP	Z	23 42 20
	26.7 S., 178.0 W.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	South of Fiji Is.		
	h: 109 km ca.		
	H= 23 30 42.8		USCGS
2.	eP	Z	23 45 22
	e	E	52 00
	e	E	56 33
	i	E	00 01 31
	Lr	E	05 46
	Lr	N	06 36
	Mag. 5¾-6 (Mat.)		
	27.0 S., 177.7 W.		
	Kermadec Is.		
	h: 33 km ca.		
	H= 23 33 39		USCGS
3.	P	NEZ	00 12 08
	iS	NE	25.5
3.	iP	EZ	00 19 17.4
	i	N	35
	P: W, C		
3.	iP	NZ	03 34 13.6
	i	E	14.1
	i	Z	49
	6.0 S., 128.3 E.		
	Banda Sea.		
	h: 340 km ca.		
	H= 03 26 43.9		USCGS
3.	S	E	03 38 34
	SS	E	43 12
	G	E	48 30
	Lr	EZ	52 30
	Mag. 6-6¼ (Mat.)		
	27.2 S., 177.6 W.		
	Kermadec Is.		
	h: 33 km ca.		
	H= 03 17 04.1		USCGS
3.	P	Z	06 23 11
	49.8 N., 78.1 E.		
	Eastern Kazakh SSR.		
	h: 0 km ca.		
	H= 06 14 57.0		USCGS
3.	Lr	E	06 28 13
	Mag. 5½-5¾ (Mat.)		
	27.2 S., 177.6 W.		
	Kermadec Is.		
	h: 33 km ca.		
	H= 05 52 57.4		USCGS
3.	P	Z	07 02 22
	i	NZ	31
	eS	NE	03 15

Date	Phase	Comp.	Time(GMT) h m s
3.	eP	Z	07 26 37
	e	E	33 18
	L	NE	34 46
	44.6 N., 101.7 E.		
	Mongolia.		
	h: 33 km ca.		
	H= 07 20 44.2		USCGS
3.	P	NZ	09 15 24
	i	E	26
	i	Z	38
	i	E	44
	S?	NE	16 22
3.	iP	NEZ	09 37 38.5
	S	NE	38 03
	i	Z	06.3
	P: N, W, C		
3.	L	E	09 42 00
3.	P	Z	10 48 47
	L	E	56 00
	51.7 N., 175.3 E.		
	Rat Is., Aleutian Is.		
	h: 44 km ca.		
	H= 10 42 34.4		USCGS
3.	P	Z	11 48 14
	SS	NE	12 02 55
	Lr	NEZ	11 40
	Mag. 5¾-6 (Mat.)		
	27.2 S., 177.6 W.		
	Kermadec Is.		
	h: 33 km ca.		
	H= 11 36 28.3		USCGS
3.	P Z eP N		14 50 46
	i	E	51
	S	E	15 00 26
	SS	NE	05 20
	Lq	NEZ	10 40
	Lr	NEZ	14 30
	Mag. 5¾-6 (Mat.)		
	27.0 S., 177.8 W.		
	Kermadec Is.		
	h: 43 km ca.		
	H= 14 39 05.0		USCGS
3.	iP	NEZ	15 20 24.1
	S	NE	28
	P: N, W, D		
3.	P	Z	15 22 08
	i	E	11
	i	N	12

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Date	Phase	Comp.	Time(GMT) h m s	
	PP	Z	15 23 51	
	S	NEZ	28 50	
	Lq	E	31 48	
	Lq	N	32 12	
	Lr	N	35 14	
	Lr	Z	18	
	Lr	E	36 00	
	Mag. 7¼-7½ (Mat.)			
	5.5 S., 151.9 E.			
	New Britain region.			
	h: 44 km ca.			
	H= 15 14 09.7			USCGS
3.	P	Z	15 27 45	
	i	N	50	
	i	EZ	28 02	
	S	E	32 05	
	i	N	23	
3.	iP	NEZ	16 53 20.5	
	P: S, C			
	53.1 N., 171.2 E.			
	Rat Is., Aleutian Is.			
	h: 23 km ca.			
	H= 16 47 25.7			USCGS
3.	iP	Z	17 34 48.5	
	P: D			
3.	P	Z	17 47 30	
	i	Z	49	
	5.6 S., 103.3 E.			
	Southern Sumatra.			
	h: 233 km ca.			
	H= 17 38 26.3			USCGS
3.	iP	EZ	18 56 43.3	
	i	N	44.1	
	i	N	57 15	
	P: E, D			
3.	iP	Z	19 25 08.0	
	i	E	09	
3.	iP	EZ	19 27 50.5	
	i	N	52.7	
	S	N	28 14	
	i	Z	17	
	P: W, D			
3.	P	NZ	19 32 20.0	
	i	E	21.0	
	i	NEZ	30.0	
	S	NE	34 48	
	L	N	35 33	
	L	Z	36 26	
	P: C			

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Date	Phase	Comp.	Time(GMT) h m s	
	Mag. 5-5¼ (Mat.)			
	45.7 N., 150.9 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 19 29 16.1			USCGS
3.	P	Z	21 24 04	
	eS	E	33 28	
	eSS	E	38 37	
	Lq	E	43 38	
	Lr	NE	47 30	
	Mag. 5½-5¾ (Mat.)			
	27.2 S., 177.7 W.			
	Kermadec Is.			
	h: 33 km ca.			
	H= 21 12 16.5			USCGS
3.	Pn	Z	22 16 58	
	Pg	Z	17 05	
	i	Z	11	
	Sn	N	20	
	Sg	N	32	
3.	P	Z	22 17 31.5	
	5.3 S., 152.1 E.			
	New Britain region.			
	h: 56 km ca.			
	H= 22 09 32			USCGS
4.	P	Z	00 55 08.5	
	i	NZ	10.7	
	i	NE	11.2	
	iS E S N		35.0	
	S	Z	36	
4.	eP	Z	01 32 00	
	12.4 N., 141.5 E.			
	South of Mariana Is.			
	h: 120 km ca.			
	H= 01 27 32			USCGS
4.	iP	Z	01 49 04.0	
	P: D			
	51.4 N., 176.7 E.			
	Rat Is., Aleutian Is.			
	h: 48 km ca.			
	H= 01 42 48.8			USCGS
4.	iP	Z	01 56 32.8	
	iP	E	33.5	
	i	Z	57 18	
	S?	N	02 02 38	
	i	N	04 08	
	Lq	N	06 35	
	Lq	EZ	50	
	Lr	Z	09 00	
	Lr	E	34	

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Date	Phase	Comp.	Time(GMT) h m s
	P: D		
	Mag. 6-6¼ (Mat.)		
	5.4 S., 147.0 E.		
	East New Guinea region.		
	h: 191 km ca.		
	H= 01 48 54.1		USCGS
4.	P	Z	02 01 51.0
4.	P	Z	02 07 44.0
	51.5 N., 176.3 E.		
	Rat Is., Aleutian Is.		
	h: 25 km ca.		
	H= 02 01 27.1		USCGS
4.	P	Z	02 28 06.9
	P	N	08.6
	P	E	09.0
	PPP	Z	29 13
	P: D		
	52.4 N., 160.5 E.		
	Off east coast of Kamchatka.		
	h: 33 km ca.		
	H= 02 23 11		USCGS
4.	iP	NEZ	04 15 03.0
	i	Z	04.8
	P: N, W, D		
4.	P EZ eP N		06 17 28
	i	Z	30.0
	i	Z	43
	i	E	18 08
	S	NE	34
4.	eL	E	06 30 00
	14.7 S., 173.3 W.		
	Samoa Is. region.		
	h: 33 km ca.		
	H= 05 58 43.2		USCGS
4.	iP	Z	06 36 25.5
	eS	E	41 22
	eL	E	44 22
	52.0 N., 175.0 E.		
	Rat Is., Aleutian Is.		
	h: 40 km ca.		
	H= 06 30 16.2		USCGS
4.	iP Z P NE		07 17 24.7
	i	Z	27.0
	eS?	N	18 30
	39.9 N., 142.2 E.		
	Off coast of Iwate Pref., Japan.		
	h: 60 km ca.		JMA
4.	L	E	08 59 40

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Date	Phase	Comp.	Time(GMT) h m s
	27.3 S., 177.6 W.		
	Kermadec Is.		
	h: 33 km ca.		
	H= 08 24 19		USCGS
4.	iP	NEZ	13 44 23.2
	i	Z	32
	S	EZ	50
	P: S, W, C		
4.	P	Z	14 21 13
	i	N	19.5
	i	Z	19.9
	i	E	35.5
	i	Z	37.5
	i	E	49.5
	i	Z	50.5
4.	iP	Z	19 29 49.2
	i	NE	49.4
	i	Z	56
	S	N	30 10
	i	E	13
	i	Z	14
	P: C		
4.	eP	Z	23 45 01
	i	N	04
	i	E	06.5
	S	N	27
	i	E	28.6
5.	iP	EZ	01 02 58.8
	i	N	03 00
	S	N	27.5
	iS	E	28.5
	P: E, C		
5.	iP	NE	01 03 48.0
	P	Z	48.5
	S	N	04 07
	i	E	10
	P: N, E		
5.	P	Z	02 03 42
	i	N	46
5.	P	Z	02 36 07.5
	S	NE	32
5.	iP	NEZ	04 11 12.5
	i	E	20
	i	Z	21
	i	N	29
	i	E	31
	i	N	51

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Date	Phase	Comp.	Time(GMT) h m s
5.	P	Z	06 21 32.5
	i	E	35.0
	i	N	37
	S	E	26 54
	L	N	28 50
	L	E	54
	eL	Z	29 00
	Lr	Z	30 20
	Lr	E	31 40
	Mag. $5\frac{3}{4}$ (Mat.)		
	51.2 N., 179.3 E.		
	Rat Is., Aleutian Is.		
	h: 25 km ca.		
	H= 06 15 01.1		USCGS
5.	P	EZ	06 24 05
5.	P	Z	10 11 19
	i	Z	13 18
	eS?	E	18 03
	L	E	21 00
	L	N	24 21
	5.1 S., 134.4 E.		
	Aroe Is. region.		
	h: 33 km ca.		
	H= 10 03 34.2		USCGS
5.	eL	E	11 39.0
	26.3 S., 178.4 W.		
	South of Fiji Is.		
	h: 276 km ca.		
	H= 11 04 20.2		USCGS
5.	iP	NEZ	13 48 53.7
	S	NE	53 52
	Lq	E	55 07
	ScP	Z	31
	Lq	N	55 42
	Lr	Z	56 46
	Lr	E	50
	P: S, W, C		
	52.3 N., 174.9 E.		
	Rat Is., Aleutian Is.		
	h: 35 km ca.		
	H= 13 42 44.1		USCGS
5.	PKP1	Z	14 51 12
	PKP2	NEZ	55.4
	SS	N	15 14 42
	i	E	15 37
	i	E	19 24
	27.0 S., 63.3 W.		
	Santiago Del Estero Province, Argentina.		
	h: 573 km ca.		
	H= 14 32 19.2		USCGS
5.	eP?	Z	14 54 00

Date	Phase	Comp.	Time(GMT) h m s
5.	iP	Z	15 26 34.0
	P	N	35
	S	N	56
	i	NE	27 07.5
	P: C		
5.	iP	NEZ	16 22 25.4
	i	NEZ	28.0
	i	N	36
	S	NE	56
	P: S, W, D		
	35.5 N., 135.8 E.		
	Southern Honshu, Japan.		
	h: 33 km ca.		
	H= 16 21 51		USCGS
5.	iP	NEZ	18 05 20.0
	S	E	10 15
	Lr	NE	12 20
	eLr	Z	28
	P: S, W, C		
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)		
	52.3 N., 174.2 E.		
	Rat Is., Aleutian Is.		
	h: 35 km ca.		
	H= 17 59 13.5		USCGS
5.	P	Z	19 48 35
	eS	N	58 14
	eS	E	15
	eSS	E	20 02 55
	Lq	NE	08 16
	Lr	NE	13 28
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)		
	27.5 S., 177.0 W.		
	Kermadec Is.		
	h: 33 km ca.		
	H= 19 36 43		USCGS
5.	iP	NEZ	20 52 07.0
	iS	NE	34.7
	iS	Z	35.5
	P: S, W, D		
5.	iP	EZ	21 20 15.0
	i	E	35
	i	N	36
	e	E	31 32
	L	E	35 00
	eL	N	36 00
5.	iP	Z	23 04 41.2
	P: D		
5.	eP	Z	23 35 15
	i	E	23
	i	N	24

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	i	E	23 35 49
	eS	E	40 00
	L	E	42 09
	L	N	22
	53.0 N., 171.1 E.		
	Rat Is., Aleutian Is.		
	h: 45 km ca.		
	H= 23 29 23.2		USCGS
6.	P	Z	04 18 36
	eS	E	28 14
	Lq	NE	38 00
	Lr	NE	45 00
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)		
	26.7 S., 177.3 W.		
	South of Fiji Is.		
	h: 24 km ca.		
	H= 04 06 48.5		USCGS
6.	iP	Z	05 16 29.5
	iP	N	30.0
	i	E	31.0
	eL	E	27.0
	3.0 S., 138.8 E.		
	West New Guinea.		
	h: 88 km ca.		
	H= 05 09 07.3		USCGS
6.	iP	EZ	05 25 32.5
	P: W, D		
6.	P	Z	05 58 54.0
	P	N	54.5
	i	Z	59 04
	eS?	E	06 03 32
	L	E	04 48
	L	N	50
	52.3 N., 172.4 E.		
	Near Is., Aleutian Is.		
	h: 44 km ca.		
	H= 05 52 58.9		USCGS
6.	P	Z	06 11 51
6.	iP	NZ	07 10 29.5
	iP	E	30.0
	iS	NE	45.5
	S	Z	46
6.	P	Z	08 25 37
	P	N	38
	eS	NE	30 33
	eLq	E	31 11
	L	N	32 17
	Lr	Z	33 26
	Lr	E	33
	52.4 N., 174.2 E.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Rat Is., Aleutian Is.		
	h: 25 km ca.		
	H= 08 19 30.5		USCGS
6.	iP	Z	13 47 28.5
	i	N	30
	S	E	52 26
	e	N	53 30
	Lr	N	54 38
	eLr	Z	13 55 24
	Mag. $5\frac{1}{2}$ (Mat.)		P: D
	52.1 N., 175.4 E.		
	Rat Is., Aleutian Is.		
	h: 35 km ca.		
	H= 13 41 17.0		USCGS
6.	iP Z P E		17 54 37.3
	i	Z	45.3
	i	N	50
	i	Z	52
	i	Z	55 23.6
	i	NE	25.8
	i	E	50
	i	N	54
	P: C		
6.	iP	NEZ	18 08 52.5
	i	E	09 14
	S	E	24
	i	E	25
	P: S, W, C		
6.	P	Z	18 48 52
	7.4 S., 128.5 E.		
	Banda Sea.		
	h: 129 km ca.		
	H= 18 40 52.7		USCGS
6.	P	Z	20 28 47
	P	E	48.2
	P	N	48.5
	i	E	55
	i	Z	56
	i	N	29 05
	S	E	32 40
	i	N	48
	L	E	35 23
	L	Z	35
	L	N	36 10
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)		
	20.1 N., 121.3 E.		
	Philippine Is. region.		
	h: 8 km ca.		
	H= 20 23 49.5		USCGS
6.	iP NZ P E		22 00 37.0
	S?	NE	59
	P: S, D		

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Date	Phase	Comp.	Time(GMT) h m s
7.	iP	NZ	01 03 11.1
	i	E	11.7
	i	E	04 30
	P: N, D		
7.	iP EZ P N		01 40 10.1
	i	NE	12.0
	i	Z	12.5
	i	Z	21.0
	S?	E	41 56
	P: E, D		
	46.1 N., 137.1 E.		
	Near east coast of eastern Russia.		
	h: 328 km ca.		
	H= 01 37 55.6		USCGS
7.	P	NZ	01 55 04
	i	E	07
	S N eS E		02 04 26
	i	NE	05 46
	i	Z	06 02
	SS	E	10 15
	Lq	E	15 32
	Lr	NEZ	19 30
	Mag. 6-6¼ (Mat.)		
	30.3 S., 177.9 W.		
	Kermadec Is. region.		
	h: 60 km ca.		
	H= 01 43 11.4		USCGS
7.	P	Z	03 35 42
	i	N	45
	i	Z	49
	i	E	36 05
	S	N	42
	i	Z	44
	i	Z	38 29
	L	N	39 50
7.	P	Z	06 00 47
7.	iP EZ P N		07 01 39.6
	S	E	52
	i	N	52.5
	i	Z	53
	P: E, D		
7.	P	NZ	07 29 09
7.	P	Z	07 45 09
	i	NZ	13
	i	E	20
	12.1 N., 46.3 E.		
	Western Gulf of Aden.		
	h: 38 km ca.		
	H= 07 32 38.1		USCGS

Date	Phase	Comp.	Time(GMT) h m s
7.	P	EZ	07 55 02
	i	N	04
	i	N	07 55 22
	eS	N	08 05 07
	e	E	50
	e	N	08 11
	e	E	22
	L	E	17 38
	12.1 N., 46.3 E.		
	Western Gulf of Aden.		
	h: 33 km ca.		
	H= 07 42 31.2		USCGS
7.	iP	NEZ	11 10 55.0
	i	Z	13 49
	eS?	E	16 02
	L	N	17 46
	L	E	18 13
	P: S, W, C		
	51.8 N., 176.4 E.		
	Rat Is., Aleutian Is.		
	h: 35 km ca.		
	H= 11 04 39.3		USCGS
7.	iP	EZ	16 17 56.5
	i	N	57.6
	i	Z	18 09
	P: W, D		
7.	eL	E	16 44 33
	27.5 S., 177.6 W.		
	Kermadec Is.		
	h: 33 km ca.		
	H= 16 08 56		USCGS
7.	iP	NEZ	19 42 37.6
	S	N	54
	S	EZ	55
	P: N, E, D		
7.	P	NZ	20 58 38
7.	eP	Z	22 58 52
	S	E	59 14
	S	N	15
8.	iP	Z	04 18 25.9
	P: C		
8.	P	Z	06 41 55.5
	i	E	42 18
	i	N	27
8.	L	E	09 37 46
	L	N	38 22

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Date	Phase	Comp.	Time(GMT) h m s
8.	iP	NEZ	12 30 17.5
	S	E	34 25
	i	N	12 34 35
	L	E	36 53
	L	N	37 38
	L	Z	41 44
	P: S, W, D		
	20.0 N., 121.3 E.		
	Philippine Is. region.		
	h: 64 km ca.		
	H= 12 25 25.3		USCGS
8.	iPn	NZ	14 24 46.2
	Pn	E	46.5
	iPg	NEZ	51.3
	Sn	N	25 08
	iSn	EZ	09.0
	iSg	NEZ	20.0
	P: N, C		
8.	P	NZ	15 14 16.7
	P	E	17.0
	P: S, D		
	17.7 S., 178.9 W.		
	Fiji Is. region.		
	h: 589 km ca.		
	H= 15 04 16.2		USCGS
8.	P	Z	15 50 16.5
	P	NE	18
	i	E	55
8.	iP	NEZ	19 33 21.9
	i	Z	33
	pP	Z	55.6
	P: N, C		
	22.3 S., 171.4 E.		
	Loyalty Is. region.		
	h: 125 km ca.		
	H= 19 22 45.6		USCGS
8.	iP	NEZ	22 05 54.0
	S	Z	06 03
	P: N, E, D		
8.	P	NEZ	22 57 41.2
	i	N	45.0
	i	Z	50
	i	N	56
	P: N, E		
8.	PKP1	Z	23 31 03
	i	Z	15
	iPKP2	NEZ	32.5
	pPKP2	Z	32 17.0
	24.6 S., 67.1 W.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Chile-Argentina border region.		
	h: 168 km ca.		
	H= 23 11 31.7		USCGS
9.	P	Z	00 39 13
	i	NE	14.5
	i	NZ	21
	iS Z S N		44.6
	S	E	46
9.	iP	Z	01 47 04.0
	iP	NE	04.5
	i	E	56 25
	P: D		
	17.0 S., 177.4 W.		
	Fiji Is. region.		
	h: 386 km ca.		
	H= 01 36 45.4		USCGS
9.	P	EZ	02 16 41.5
	i	Z	47
	i	NE	57
9.	iP Z P N		02 43 15.5
	iP	E	16.5
	i	Z	27
	S	NE	39
	S	Z	40
	i	Z	52
9.	iP	NEZ	08 17 06.0
	S	N	28
	iS	E	29.0
	P: S, W, D		
9.	P	EZ	08 27 09.0
	i	N	27
	S?	NE	46
9.	iP	Z	12 57 18.9
	i	NE	19.5
	i	N	57
	i	E	58 08
	iS?	N	30
	i	E	59
	P: C		
	42.3 N., 142.1 E.		
	Hokkaido, Japan region.		
	h: 23 km ca.		
	H= 12 55 42.1		USCGS
9.	P	NEZ	15 18 56
	iS E S N		19 17.5
	S	Z	19

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Date	Phase	Comp.	Time(GMT) h m s
9.	P	Z	17 38 48
	11.7 S., 166.5 E.		
	Santa Cruz Is.		
	h: 125 km ca.		
	H= 17 29 29.1		USCGS
9.	P	NEZ	18 10 21.0
	i	Z	12 00
	i	NE	04
	S	NE	20 40
	i	E	24 52
	i	E	28 52
	i	NE	32 21
	Lr	N	42 20
	Lr	E	24
	Lr	Z	30
	P: D		
	Mag. 7-7¼ (Mat.)		
	39.4 N., 24.0 E.		
	Aegean Sea.		
	h: 18 km ca.		
	H= 17 57 53.7		USCGS
9.	iP	Z	22 50 07.8
	P	N	08
	i	E	09.5
	S	NE	35
	P: C		
10.	iP	Z	02 21 52.5
	P	N	53.8
	P: C		
	4.1 S., 143.5 E.		
	New Guinea.		
	h: 122 km ca.		
	H= 02 14 22		USCGS
10.	P	Z	05 55 52.5
	eS	E	06 05 00
	eL	E	24 06
	32.8 N., 49.2 E.		
	Western Iran.		
	h: 33 km ca.		
	H= 05 44 47.8		USCGS
10.	iP	NEZ	12 49 12.8
	i	Z	18.0
	S	NEZ	29
	P: N, E, D		
10.	iP	Z	13 32 21.0
	i	E	24
	S	NE	52
	P: C		
10.	iP	NEZ	16 03 55.5
	P: S, E, D		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	21.9 S., 179.6 W.		
	South of Fiji Is.		
	h: 547 km ca.		
	H= 15 53 37.8		USCGS
10.	P	Z	21 39 50
	S	E	40 15
	S	N	16
10.	P	NZ	22 01 30
	eL	E	15 31
	56.3 N., 155.6 W.		
	Alaska Peninsula.		
	h: 33 km ca.		
	H= 21 52 57.6		USCGS
11.	P	Z	03 28 45
	S	NEZ	29 17
11.	eP	Z	06 12 42
	3.2 S., 101.1 E.		
	Southern Sumatra.		
	h: 57 km ca.		
	H= 06 03 31.5		USCGS
11.	iP	NEZ	08 34 01.8
	i	Z	17
	e	N	36 36
	P: E, D		
	45.3 N., 150.4 E.		
	Kurile Is.		
	h: 49 km ca.		
	H= 08 31 01.3		USCGS
11.	iP	NZ	08 39 48.0
	P: C		
	45.1 N., 150.8 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 08 36 45.8		USCGS
11.	P	Z	10 10 02
	ePcP	Z	12 23
	0.9 S., 132.8 E.		
	West New Guinea region.		
	h: 20 km ca.		
	H= 10 02 51.7		USCGS
11.	P	Z	12 13 35
	e	Z	14 22
	53.2 N., 171.1 E.		
	Rat Is., Aleutian Is.		
	h: 27 km ca.		
	H= 12 07 42.2		USCGS
11.	iP	Z	14 14 06.0
	P: C		

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	53.1 N., 161.9 W.		
	South of Alaska.		
	h: 12 km ca.		
	H= 14 05 54.5		USCGS
11.	iP	NEZ	14 31 47.3
	S	E	50.4
	P: S, E, D		
11.	iPKP	Z	15 14 47.0
	P: C		
	18.2 S., 71.2 W.		
	Off coast of northern Chile.		
	h: 59 km ca.		
	H= 14 55 04		USCGS
11.	iP	Z	17 07 43.4
	e	Z	53
	P: C		
11.	iPKP	EZ	17 26 42.0
	i	Z	45
	P: C		
	54.7 S., 0.7 E.		
	Bouvet I. region.		
	h: 33 km ca.		
	H= 17 07 06		USCGS
11.	eP	EZ	17 29 45
	S	N	30 19.4
	i	E	20.1
11.	iP Z P NE		19 18 04.0
	i	E	17
	S	NE	19 26
	P: S, W, C		
	42.5 N., 142.8 E.		
	Hokkaido, Japan.		
	h: 37 km ca.		
	H= 19 16 21.6		USCGS
11.	iP	Z	21 26 09.5
	P: C		
	52.6 N., 173.0 E.		
	Near Is., Aleutian Is.		
	h: 35 km ca.		
	H= 21 19 56.1		USCGS
11.	P	Z	22 10 54.3
	S	N	11 13
11.	P	Z	22 34 16
	S	N	39
11.	P	Z	23 34 07
	45.3 N., 151.3 E.		
	Kurile Is.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	h: 47 km ca.		
	H= 23 31 02.7		USCGS
12.	iP	NE	00 21 59.5
	P: S, W		
12.	iP	NEZ	00 54 06.7
	i	NE	27
	eS	N	46
	P: N, E		
12.	P	Z	07 00 21
	55.7 N., 155.6 W.		
	South of Alaska.		
	h: 16 km ca.		
	H= 06 51 40		USCGS
12.	eL	N	10 24 37
12.	e	N	10 36 34
12.	P	Z	12 48 59
	i	N	49 14.5
	i	NEZ	23.0
12.	P	Z	16 08 43.9
	iS	NEZ	44.5
	P: D		
12.	P	Z	16 40 01
12.	iP	Z	17 42 47.1
	P: D		
	26.8 S., 176.5 W.		
	South of Fiji Is.		
	h: 48 km ca.		
	H= 17 31 02.2		USCGS
12.	P	Z	18 25 53
	eL	N	35 49
	e	N	39.8
	4.6 S., 121.3 E.		
	Celebes.		
	h: 33 km ca.		
	H= 18 17 47.0		USCGS
13.	iPKP	EZ	01 43 28.0
	P: W, C		
	27.1 S., 69.6 W.		
	Northern Chile.		
	h: 75 km ca.		
	H= 01 23 26		USCGS
13.	eP	Z	04 22 07
	39.0 N., 23.4 E.		
	Aegean Sea.		
	h: 33 km ca.		
	H= 04 09 38.5		USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
13.	P	Z	04 46 01	
	eS	N	53 39	
	eSS	N	57.6	
	L	N	05 02.0	
	11.2 S., 111.6 E.			
	South of Java.			
	h: 33 km ca.			
	H= 04 36 43			USCGS
13.	iP	N	06 58 53.3	
	i	Z	53.8	
	i	Z	59 03.2	
	P: N			
	~~46.8 N., 152.5 E.~~			
	~~Kurile Is.~~			
	46.8 N., 152.5 E.			
	Kurile Is.			
	h: 44 km ca.			
	H= 06 55 29			USCGS
13.	iP	Z	07 41 29.8	
	eL	E	54 40	
	P: D			
	53.1 N., 162.2 W.			
	South of Alaska.			
	h: 37 km ca.			
	H= 07 33 23.0			USCGS
13.	P	Z	09 07 21	
	eL	E	27.7	
	e	E	32.6	
	26.8 S., 176.3 W.			
	South of Fiji Is.			
	h: 31 km ca.			
	H= 08 55 34.7			USCGS
13.	P	Z	11 47 04	
	i	Z	07.5	
13.	iP	Z	11 51 50.7	
	e	Z	53 44	
	P: D			
13.	iP	Z	14 04 59.0	
	i	NE	59.5	
	P: D			
	20.4 S., 177.6 W.			
	Fiji Is. region.			
	h: 470 km ca.			
	H= 13 54 33.0			USCGS
13.	P	NEZ	15 32 00	
	51.3 N., 178.0 E.			
	Rat Is., Aleutian Is.			
	h: 53 km ca.			
	H= 15 26 03.2			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
13.	iP	Z	16 17 36.3	
	i	NE	36.5	
	P: D			
	54.0 N., 160.9 E.			
	Near east coast of Kamchatka.			
	h: 33 km ca.			
	H= 16 12 30			USCGS
13.	P	Z	17 10 10	
	i	Z	16	
	S	NE	37	
13.	iP	EZ	18 31 18.5	
	eS	N	45	
	P: E, D			
13.	iP	Z	20 06 24.2	
	P: C			
13.	eP	Z	20 27 18	
	S	NE	41	
13.	P	Z	20 28 15	
13.	P	EZ	20 57 03.0	
	i	N	03.3	
	S	N	46	
	P: E, D			
	38.7 N., 141.9 E.			
	Near east coast of Honshu, Japan.			
	h: 33 km ca.			
	H= 20 56 06			USCGS
14.	P	NZ	01 18 48	
	S	E	19 13	
14.	iP Z P E		04 39 50.9	
	e	N	40 20	
	P: C			
14.	iP	NEZ	04 47 05.9	
	S	NEZ	20	
	P: N, C			
14.	P	EZ	08 06 15	
	S	NE	41	
14.	P	EZ	08 25 15	
14.	iP	NEZ	12 04 53.6	
	i	EZ	05 00	
	S	E	27	
	P: N, E, D			

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s	
	37.5 N., 140.8 E.			
	Honshu, Japan.			
	h: 73 km ca.			
	H= 12 04 18			USCGS
14.	iP	Z	12 58 43.2	
	P: C			
	31.9 S., 138.8 E.			
	South Australia.			
	h: 26 km ca.			
	H= 12 47 42.2			USCGS
14.	iP Z P NE		16 02 03.1	
	iPcP	Z	03 12	
	ePP	E	04 00	
	pPP	Z	05 20	
	i	E	27	
	i	Z	06 37	
	ScP	Z	45	
	S	NEZ	09 11	
	sS	NE	10 43	
	ScS	N	11 30	
	ScS	E	31	
	SS	E	13 04	
	G	NE	14 40	
	P'P'	Z	32 09	
	P: S, E, C			
	Mag. 7-7¼ (Mat.)			
	36.3 N., 70.7 E.			
	Hindu Kush region.			
	h: 219 km ca.			
	H= 15 53 06.6			USCGS
14.	P	Z	16 39 26	
14.	eP	N	18 00 19	
14.	P	E	21 09 51	
	i	NE	54.0	
14.	P	Z	21 51 41	
15.	P	Z	02 06 45	
	i	N	07 01	
	i	NE	53.5	
	i	Z	08 15.6	
	i	NE	16.6	
	eS	E	10 34	
	eL	E	11.6	
	eL	E	14 02	
	Mag. 5¼-5½ (Mat.)			
	22.4 N., 121.4 E.			
	Taiwan region.			
	h: 33 km ca.			
	H= 02 02 08.9			USCGS
15.	eP	Z	03 12 06	

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	eS	E	03 21 33	
	eLr	E	31 49	
	15.0 S., 173.9 W.			
	Tonga Is.			
	h: 33 km ca.			
	H= 03 01 13			USCGS
15.	e	E	03 49 39	
15.	iP	Z	04 57 52.0	
	P: D			
	4.2 N., 126.4 E.			
	Talaud Is.			
	h: 102 km ca.			
	H= 04 50 09.5			USCGS
15.	P	Z	07 32 51.7	
	i	NZ	58.3	
15.	P	Z	08 31 57	
	S	E	36 51	
	L	N	38 37	
	51.3 N., 174.1 E.			
	Near Is., Aleutian Is.			
	h: 33 km ca.			
	H= 08 25 54.5			USCGS
15.	P	Z	12 36 01.5	
	i	N	23	
15.	P	Z	12 47 40	
15.	eP	Z	13 03 22	
	e	E	07 52	
15.	P	NZ	14 10 56	
	eL	E	22 39	
	6.5 S., 153.2 E.			
	New Britain region.			
	h: 38 km ca.			
	H= 14 02 42.1			USCGS
15.	P	Z	15 52 31	
15.	iP	Z	16 35 27.0	
	P: C			
15.	iP	NEZ	19 51 05.1	
	S	Z	15	
	P: N, W, C			
15.	P	Z	23 17 47	
	i	NEZ	48.7	
	S	NE	18 17	
	i	Z	17.5	

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Date	Phase	Comp.	Time(GMT) h m s
16.	iP	NEZ	01 13 31.5
	S	NE	34
	P: N, W, D		
16.	iP	NEZ	02 28 25.5
	S	NEZ	29
	P: N, W, D		
16.	PKP	Z	02 31 13
	23.1 S., 13.5 W.		
	South Atlantic Ocean.		
	h: 32 km ca.		
	H= 02 11 18.9		USCGS
16.	iP	NZ	03 00 36.4
	S	NE	01 01
	e	E	14
	e	N	15
	P: N, D		
16.	P	Z	04 14 34
	e	NE	36
	49.7 N., 155.2 E.		
	Kurile Is.		
	h: 52 km ca.		
	H= 04 10 21		USCGS
16.	iP	NZ	09 20 12.6
	S	NE	59
	i	Z	21 02.5
	P: S, D		
16.	iP Z P NE		10 50 05.5
	P: D		
	23.7 S., 179.9 E.		
	South of Fiji Is.		
	h: 580 km ca.		
	H= 10 39 40.5		USCGS
16.	iP	NEZ	13 05 47.6
	i	Z	56.0
	i	Z	06 13
	eS	Z	07 06
	L	N	10
	P: S, W, C		
	40.0 N., 143.2 E.		
	Off east coast of Honshu, Japan.		
	h: 41 km ca.		
	H= 13 04 29		USCGS
16.	iP	NEZ	13 57 18.5
	i	Z	32
	P: N, E, D		
16.	iP	NEZ	15 25 01

Date	Phase	Comp.	Time(GMT) h m s
16.	iP	NEZ	16 47 39.3
	i	E	50
	S	NE	48 55
	e	NE	49 04
	L	N	12
	P: S, W, C		
	Mag. 6.1 (Mat.)		
	40.8 N., 142.9 E.		
	Near east coast of Honshu, Japan.		
	h: 34 km ca.		
	H= 16 46 15.5		USCGS
16.	iP	NZ	17 36 49.9
	e	E	38 10
	P: S, D		
16.	P	NEZ	18 22 40
	e	N	23 02
16.	iP	Z	18 30 25.2
	P: C		
	52.1 N., 175.0 E.		
	Rat Is., Aleutian Is.		
	h: 36 km ca.		
	H= 18 24 15.2		USCGS
16.	P	NEZ	19 55 01
16.	iP	NEZ	21 34 27.9
	S	E	35 36
	i	Z	46
	L	E	36 04
	P: S, W, C		
	40.1 N., 143.2 E.		
	Off east coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 21 33 08		USCGS
16.	P	NEZ	22 04 29
17.	iP	NEZ	02 22 04.9
	eS?	E	23 25
	P: N, E, D		
17.	iP	Z	03 32 13.0
	e	N	42
	P: D		
17.	P	Z	12 37 01.7
	49.6 N., 155.2 E.		
	Kurile Is.		
	h: 60 km ca.		
	H= 12 32 47		USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
17.	iP	Z	12 48 10.0	
	P: C			
	1.2 N., 126.8 E.			
	Molucca Passage.			
	h: 68 km ca.			
	H= 12 41 08.8			USCGS
17.	P	Z	13 23 30	
	41.1 N., 69.7 E.			
	Kirgiz SSR.			
	h: 33 km ca.			
	H= 13 14 20.2			USCGS
17.	iP	NEZ	14 33 09.6	
	S	E	38 00	
	L	N	39 10	
	L	N	40 15	
	P: S, W, C			
	52.8 N., 171.9 E.			
	Near Is., Aleutian Is.			
	h: 23 km ca.			
	H= 14 27 12.4			USCGS
17.	iP	NEZ	17 42 04.4	
	S	NE	19.8	
	P: S, W, D			
17.	iP	NEZ	18 59 08.5	
	i	Z	31	
	eS	N	43	
	i	E	19 00 08	
	P: N, D			
	37.7 N., 142.0 E.			
	Off coast of Fukushima Prefecture., Japan.			
	h: 20 km ca			JMA
17.	P	Z	20 40 52	
	18.2 N., 148.2 E.			
	Mariana Is. region.			
	h: 40 km ca.			
	H= 20 36 18			USCGS
18.	iP	NEZ	01 30 50.9	
	i	E	31 18.4	
	i	NZ	19.7	
	P: S, E, D			
18.	P	Z	04 24 42	
	S	N	25 06	
	i	EZ	07	
18.	iP	NEZ	04 50 52.0	
	i	Z	51 03	
	e	Z	52 27	
	P: S, W, C			
	40.1 N., 143.3 E.			
	Off east coast of Honshu, Japan.			
	h: 43 km ca.			
	H= 04 49 32.6			USCGS
18.	iP	Z	06 32 04.6	
	i	E	05.3	
	P: C			
18.	iP	NEZ	06 33 04.5	
	epP	Z	34 00	
	esS	E	27	
	eS	NE	42 00	
	eScS	E	53	
	esSS	E	48 05	
	G	E	50 02	
	e	E	51 20	
	P: S, E, D			
	Mag. $5\frac{3}{4}$-6 (Mat.)			
	19.9 S., 176.1 W.			
	Fiji Is. region.			
	h: 151 km ca.			
	H= 06 22 02.9			USCGS
18.	P	Z	09 42 54	
	i	Z	43 12	
18.	PKP	Z	13 00 57	
	55.8 S., 26.7 W.			
	South Sandwich Is. region.			
	h: 92 km ca.			
	H= 12 40 49.3			USCGS
18.	iP	NEZ	16 26 01.8	
	P: N, W, C			
	17.7 S., 178.9 W.			
	Fiji Is. region.			
	h: 507 km ca.			
	H= 16 15 56.1			USCGS
18.	P	Z	18 39 58	
	52.7 N., 156.5 E.			
	Kamchatka.			
	h: 162 km ca.			
	H= 18 35 29.3			USCGS
18.	P	Z	20 44 48	
18.	P	Z	21 10 07	
19.	P	Z	00 19 17	
19.	P	Z	00 38 37	
	e	E	44	
	S	NE	39 07	

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Date	Phase	Comp.	Time(GMT) h m s
19.	iP	Z	07 39 50.4
	i	Z	40 29
	P: C		
19.	iP	NZ	08 30 41.0
	S	NE	50
	P: N, C		
19.	eP	NZ	09 31 17
	i	NZ	23
	i	E	41.7
19.	iP	NEZ	11 17 42.0
	P: N, W, D		
19.	P	NEZ	11 37 41
	e	E	38 14
19.	iP	NZ	11 54 20.9
	eS	E	55 30
	L	NE	55
	P: S, C		
	40.8 N., 143.0 E.		
	Near east coast of Honshu, Japan.		
	h: 25 km ca.		
	H= 11 52 55.8		USCGS
19.	iP	NEZ	12 29 17.3
	S	N	36.5
	i	EZ	37
	P: S, E, D		
19.	P	Z	12 57 46
19.	iP	NEZ	15 05 03.2
	S	N	06 04
	S	E	05
	P: S, W, D		
19.	P	Z	16 28 36.5
	S	NE	34 55
	Lq	NE	38 04
	Lr	Z	40 04
	P: C		
	Mag. 6¼ (Mat.)		
	2.0 S., 119.8 E.		
	Celebes.		
	h: 46 km ca.		
	H= 16 20 51.4		USCGS
19.	iP NZ P E		17 47 26.4
	P: S, E, D		
	19.7 S., 178.7 W.		
	Fiji Is. region.		
	h: 617 km ca.		
	H= 17 37 18.6		USCGS

Date	Phase	Comp.	Time(GMT) h m s
19.	P	Z	17 56 37
	iS?	E	59
19.	P	Z	18 59 40
19.	iP Z P NE		19 06 25.0
	i	NE	30
	i	Z	55
	P: C		
19.	P	Z	20 57 59
	S	E	58 17
19.	eP	Z	21 06 32
	S	N	57
19.	P	Z	21 35 00
19.	iP	Z	22 36 33.9
	P: C		
19.	iP	NEZ	23 05 43.5
	iPcP	Z	07 53.5
	iS	E	11 26.5
	i	Z	28.0
	P: N, E, C		
	0.0., 123.4 E.		
	Northern Celebes.		
	h: 173 km ca.		
	H= 22 58 34.9		USCGS
20.	iP	Z	00 20 36.0
	P: C		
20.	iP Z P E		06 17 55.4
	eS	N	18 26
	P: D		
20.	P	Z	06 30 31
20.	iP	NEZ	06 31 49
	S	E	32 17
	L	NE	33
	P: E, C		
	34.7 N., 138.0 E.		
	Near south coast of Honshu, Japan.		
	h: 119 km ca.		
	H= 06 31 18		USCGS
20.	iP	Z	06 58 10.7
	P: C		
	13.2 N., 143.6 E.		
	South of Mariana Is.		
	h: 148 km ca.		
	H= 06 53 11.0		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
20.	iP	Z	17 12 43.0
	i	E	13 17
	P: C		
20.	P	Z	19 27 31
	1.4 S., 126.4 E.		
	Molucca Sea.		
	h: 33 km ca.		
	H= 19 20 04		USCGS
21.	iP	EZ	00 23 48.4
	i	E	24 17
	P: E, D		
21.	iP	N	01 46 27.5
	P	Z	28.0
	i	Z	40.5
	P: N		
	44.7 N., 147.1 E.		
	Kurile Is.		
	h: 135 km ca.		
	H= 01 43 29		USCGS
21.	iP	NZ	03 03 02.0
	eS	NEZ	46
	P: N		
21.	P	NZ	04 00 39
	iP	E	40.0
21.	iP Z P N		04 02 25.5
	S	NE	48.5
	P: D		
21.	iP	Z	07 21 57.7
	iP	N	58.2
	P: C		
	0.2 N., 123.4 E.		
	Northern Celebes.		
	h: 241 km ca.		
	H= 07 14 55		USCGS
21.	iP	NZ	09 24 57.0
	iP	E	57.5
	S	E	25 25
	S	N	26
	P: N, D		
21.	P	NZ	11 15 42
	i	E	42.7
	i	NE	48
	i	Z	54.5
	PP	Z	17 35
	S	Z	21 44
	iS	NE	50

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	L	N	11 24 34
	iL	E	45
	iL	Z	52
	P: D		
	Mag. 6¾-7 (Mat.)		
	1.5 S., 126.5 E.		
	Molucca Sea.		
	h: 33 km ca.		
	H= 11 08 16.2		USCGS
21.	iP	Z	12 32 30.0
	iP	NE	30.5
	iPcP	Z	34 40.8
	P: D		
	1.4 S., 126.5 E.		
	Molucca Sea.		
	h: 111 km ca.		
	H= 12 25 12.4		USCGS
21.	iP	Z	12 42 27.2
	iP	NEZ	28.0
	iS	NEZ	57.4
	P: C		
	Mag. 5.8 (Mat.)		
	36.2 N., 136.6 E.		
	Near west coast of Honshu, Japan.		
	h: 270 km ca.		
	H= 12 41 47.5		USCGS
21.	P	Z	13 23 03
	e	Z	25 12
	3.6 S., 124.4 E.		
	Ceram Sea.		
	h: 36 km ca.		
	H= 13 15 24		USCGS
21.	iP	Z	14 31 42.2
	P	NE	43
	P: C		
	45.1 N., 146.6 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 14 29 08.7		USCGS
21.	iP	Z	19 05 37.9
	i	N	50.6
	e	N	08 29
	eL	NE	52
	P: C		
	45.4 N., 150.6 E.		
	Kurile Is.		
	h: 14 km ca.		
	H= 19 02 32.9		USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
21.	P	Z	22 04 49	
	6.8 S., 128.2 E.			
	Banda Sea.			
	h: 283 km ca.			
	H= 21 57 11			USCGS
21.	eP	Z	22 08 05	
	1.3 S., 126.3 E.			
	Molucca Sea.			
	h: 52 km ca.			
	H= 22 00 41.3			USCGS
22.	P	NZ	02 55 50	
	i	NEZ	51	
	iS E S NZ		03 04 55	
	Lq	E	12 36	
	Lr	E	15 25	
	Lr	Z	16 05	
	Lr	N	26	
	Mag. $6\frac{3}{4}$-7 (Mat.)			
	15.3 S., 173.4 W.			
	Tonga Is.			
	h: 51 km ca.			
	H= 02 44 47.5			USCGS
22.	iPKP1NZ,PKP1 E		03 25 15.0	
	iPKP2	NEZ	32.5	
	P: N, D			
	23.8 S., 66.7 W.			
	Jujuy Province, Argentina.			
	h: 176 km ca.			
	H= 03 05 33.3			USCGS
22.	iP	EZ	04 20 18.8	
	iP	N	19.0	
	P: E, D			
22.	eP	NEZ	06 17 58	
	e	Z	18 29	
22.	P	Z	10 00 55	
	i	Z	56.0	
	PcP	Z	03 13.3	
	e	E	07 36	
	eL	E	10 03	
	1.5 S., 126.3 E.			
	Molucca Sea.			
	h: 33 km ca.			
	H= 09 53 28.1			USCGS
22.	iP	NEZ	10 35 03.0	
	iS EZ S N		12.0	
	P: S, W, C			
22.	iP Z P E		11 34 39.5	

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Date	Phase	Comp.	Time(GMT) h m s	
	iP	N	11 34 39.9	
	S	N	37 23	
	i	Z	26	
	P: W, C			
	21.7 N., 142.9 E.			
	Molucca Sea.			
	h: 309 km ca.			
	H= 11 31 16			USCGS
22.	e	E	13 23 29	
22.	iP	NZ	13 33 28.0	
	P: N, D			
22.	eL	E	14 21 31	
	14.4 S., 173.0 W.			
	Samoa Is. region.			
	h: 33 km ca.			
	H= 13 48 05			USCGS
22.	P	Z	14 40 52	
	iS	N	41 08.4	
	iS	E	09.0	
22.	e	E	16 01 00	
22.	e	E	17 18 39	
22.	iP Z P N		17 37 03.7	
	iP	E	04.2	
	epP	Z	43	
	P: D			
	7.5 S., 128.5 E.			
	Banda Sea.			
	h: 153 km ca.			
	H= 17 29 07			USCGS
22.	iP	Z	18 46 27.0	
	i	N	47 01	
	P: D			
22.	iP	NEZ	20 15 49.9	
	iS	NEZ	52.3	
	P: W			
22.	iPKP1	Z	21 06 02.0	
	PKP1	E	02.5	
	e	Z	39	
	P: D			
	22.4 S., 68.1 W.			
	Northern Chile.			
	h: 110 km ca.			
	H= 20 46 16.2			USCGS
22.	P	Z	22 08 33	
	e	E	24 19	

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Date	Phase	Comp.	Time(GMT) h m s	
	51.9 N., 174.9 E.			
	Near Is., Aleutian Is.			
	h: 33 km ca.			
	H= 22 02 24			USCGS
22.	iPKP1	Z	23 16 14.0	
	i	N	28	
	i	Z	29.3	
	PP	EZ	20 27	
	SKKS	E	27 00	
	i	EZ	29 28	
	Lr	Z	00 07 51	
	i	Z	10 00	
	i	E	13	
	P: C			
	Mag. 6½ (Mat.)			
	31.9 S., 71.5 W.			
	Near coast of central Clile.			
	h: 46 km ca.			
	H= 22 56 26.5			USCGS
23.	iP	Z	00 22 37.0	
	iP	NE	37.3	
	P: D			
23.	iP	E	00 24 17.5	
	iP	Z	18.0	
	i	E	19.7	
	i	N	21.8	
	i	NE	23.6	
	i	Z	24.0	
	i	E	46.5	
	i	E	58.7	
	P: E			
23.	iP	EZ	06 39 00.2	
	iP	N	00.4	
	iS	NE	16.7	
	P: E			
23.	iP	E	09 00 19.5	
	iP	Z	19.8	
	i	E	41	
	P: E			
23.	iP	NEZ	09 35 19.2	
	iS	NEZ	37.2	
	P: S, W, C			
23.	P	EZ	10 50 15	
	22.3 N., 143.3 E.			
	Volcano Is. region.			
	h: 179 km ca.			
	H= 10 46 52.9			USCGS
23.	P	Z	11 06 43	

Date	Phase	Comp.	Time(GMT) h m s	
23.	iP	Z	12 06 51.2	
	iP	E	51.5	
	i	N	52	
	i	N	55	
	S	N	07 24	
	P: D			
23.	eP	Z	12 51 20	
	eS	E	56 22	
	eLq	N	58 04	
	eLq	E	32	
	Lr	N	59 01	
	eLr	E	10	
	51.2 N., 177.8 E.			
	Rat Is,, Aleutian Is.			
	h: 45 km ca.			
	H= 12 44 59.6			USCGS
23.	e	E	13 47 26	
	e	N	49 05	
	e	E	50 24	
	e	E	53 05	
	51.3 N., 177.9 E.			
	Rat Is., Aleutian Is.			
	h: 49 km ca.			
	H= 13 35 49.1			USCGS
23.	P	Z	15 05 57	
23.	eP	Z	15 10 39	
23.	P	Z	18 27 07	
	e	N	09	
	e	Z	19	
	i	E	20	
	S	N	36 10	
	S	E	14	
	Lq	NE	44 21	
	Lr	E	46 55	
	Lr	N	47 57	
	Mag. 5¾-6 (Mat.)			
	15.2 S., 173.5 W.			
	Tonga Is.			
	h: 75 km ca.			
	H= 18 16 08.4			USCGS
24.	eP	Z	00 05 07	
	i	Z	08.6	
	i	E	09	
	i	N	12	
	i	NEZ	16	
	S	NE	14 10	
	i	N	27	
	eLq	N	21 32	
	Lq	E	52	

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Date	Phase	Comp.	Time(GMT) h m s	
	Lq	N	00 22 08	
	Lr	Z	25 18	
	Lr	NE	36	
	Mag. 6½-6¾ (Mat.)			
	15.2 S., 173.5 W.			
	Tonga Is.			
	h: 130 km ca.			
	H= 23 54 14.7			USCGS
24.	iP	Z	00 30 23.3	
	i	N	24	
24.	eP	NZ	01 38 55	
	0.6 N., 123.8 E.			
	Northern Celebes.			
	h: 272 km ca.			
	H= 01 32 03.3			USCGS
24.	iP Z P N		04 28 33.5	
	P	E	34	
	i	N	37.0	
	P: C			
24.	P	Z	06 39 23	
	i	N	25	
	S	EZ	26	
	i	N	28	
24.	eP	Z	07 16 35	
	e	E	22 12	
	e	E	24 04	
	eLq	E	27 47	
	eLq	N	28 43	
	eLr	E	30 20	
	eLr	N	31 37	
	56.6 N., 152.4 W.			
	Kodiak I. region.			
	h: 20 km ca.			
	H= 07 07 45.4			USCGS
24.	iP	NZ	08 09 23.5	
	i	E	24.5	
	i	Z	26.5	
	S	N	17 09	
	S	E	20	
	P: S, D			
	16.3 S., 167.9 E.			
	New Hebrides Is.			
	h: 189 km ca.			
	H= 07 59 39.0			USCGS
24.	P	Z	08 16 53	
	i	E	56	
	i	N	58	
	S	NE	24 04	
	e	E	27 07	

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Date	Phase	Comp.	Time(GMT) h m s	
	eLq	E	08 27 47	
	eLq	N	49	
	eLr	E	30 26	
	Lr	N	39	
	i	N	32 02	
	eLr	Z	33 15	
	Mag. 6-6¼ (Mat.)			
	56.6 N., 152.4 W.			
	Kodiak I. region.			
	h: 30 km ca.			
	H= 08 08 05.2			USCGS
24.	iP	Z	09 50 53.5	
	P: C			
	13.4 S., 167.1 E.			
	New Hebrides Is.			
	h: 210 km ca.			
	H= 09 41 30.4			USCGS
24.	P	Z	10 19 09	
	i	E	11.5	
	eS	N	28 40	
	e	E	29 26	
	eL	E	37.5	
	eL	E	47 17	
	20.1 S., 174.1 W.			
	Tonga Is.			
	h: 33 km ca.			
	H= 10 07 43			USCGS
24.	ePKP1	Z	11 36 43	
	iPKP2	Z	37 09	
	18.5 S., 68.5 W.			
	Chile-Bolivia border region.			
	h: 33 km ca.			
	H= 11 16 51			USCGS
24.	iP	Z	13 39 09.3	
	i	Z	40 24	
	P: C			
	57.8 N., 148.6 W.			
	Gulf of Alaska.			
	h: 13 km ca.			
	H= 13 30 04.5			USCGS
24.	iP	EZ	16 19 25.2	
	P	N	26	
	S	N	54	
	e	E	20 06	
	P: E, C			
24.	iP	Z	18 12 01.7	
24.	iP N P EZ		18 12 12.0	
	i	N	35.2	

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	S	N	18 13 00
	i	E	05
	P: S		
24.	P	Z	18 22 00
	i	E	02.2
	i	Z	14
	i	N	15.0
	eS	E	24 39
	eL	N	26 12
	eL	E	20
24.	eL	E	19 27 48
	23.6 S., 115.3 W.		
	Easter I. Cordillera.		
	h: 33 km ca.		
	H= 18 35 21		USCGS
24.	eP	Z	19 43 05
	i	EZ	07
	e	Z	44 05
	e	E	07
	e	N	10
	8.8 S., 121.4 E.		
	Flores Is. region.		
	h: 154 km ca.		
	H= 19 34 42		USCGS
24.	iP	Z	22 48 14.0
	i	E	15.0
	i	N	15.2
	PP	E	49 12
	PP	Z	16
	S	NE	53 05
	Lq	E	54 24
	Lq	N	56
	Lr	N	57 02
	eLr	Z	58 06
	eLr	E	16
	P: C		
	8.4 N., 126.6 E.		
	Mindanao, P. I.		
	h: 51 km ca.		
	H= 22 42 09.6		USCGS
25.	iP Z P N		02 24 32.8
	i	EZ	43
	i	N	51
	P: C		
25.	iP Z P E		03 26 39.5
	i	N	50.1
	i	EZ	50.5
	i	N	27 06
	P: D		

Date	Phase	Comp.	Time(GMT) h m s
	46.4 N., 152.1 E.		
	Kurile Is.		
	h: 35 km ca.		
	H= 03 23 21		USCGS
25.	P	Z	04 07 33.5
25.	P	NZ	05 27 15
	P: C		
	52.9 N., 171.9 E.		
	Near Is., Aleutian Is.		
	h: 15 km ca.		
	H= 05 21 17.4		USCGS
25.	iP Z P E		06 35 33.0
	i	N	36 05
	S	E	18
	i	N	19.5
	P: D		
25.	P	Z	07 07 54
	i	E	55.8
	i	Z	56.4
	i	Z	08 29
	i	N	50
25.	iP	Z	07 20 47.6
	i	N	50.5
	i	EZ	52
	P: C		
25.	iP NZ P E		07 26 50.6
	i	Z	27 43
	P: N, C		
	14.3 S., 167.4 E.		
	New Hebrides Is.		
	h: 205 km ca.		
	H= 07 17 21.4		USCGS
25.	P	Z	08 59 11
	i	NZ	13
	i	Z	22
	i	N	23
	S	NE	09 04 05
	Lq	E	38
	Lq	N	05 00
	Lr	Z	23
	Lr	N	06 15
	Mag. $5\frac{3}{4}$ (Mat.)		
	52.3 N., 172.6 E.		
	Near Is., Aleutian Is.		
	h: 31 km ca.		
	H= 08 53 13.6		USCGS

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s	
25.	eP	Z	09 35 54	
	52.1 N., 172.6 E.			
	Near Is., Aleutian Is.			
	h: 30 km ca.			
	H= 09 29 55.6			USCGS
25.	iP	Z	11 46 47.4	
	i	E	48.0	
	i	N	48.1	
	iS	E	47 19.3	
	P: C			
25.	iP	Z	15 14 18.5	
	iP	E	18.6	
	i	NE	47	
	P: D			
25.	eP	Z	18 41 05	
	i	N	08.5	
	eL	E	53 25	
	7.4 S., 153.9 E.			
	New Britain region.			
	h: 96 km ca.			
	H= 18 32 50.5			USCGS
25.	iP NZ P E		19 15 33.4	
	S	NEZ	52	
	P: N, D			
25.	P	Z	21 17 06	
	20.4 S., 174.1 W.			
	Tonga Is.			
	h: 33 km ca.			
	H= 21 05 40.7			USCGS
25.	ePKP	Z	22 40 19	
	14.4 S., 13.4 W.			
	South of Atlantic Ridge.			
	h: 33 km ca.			
	H= 22 20 42.5			USCGS
26.	iP	NZ	00 31 10.6	
	iP	E	10.8	
	P: S			
	20.0 S., 178.1 W.			
	Fiji Is. region.			
	h: 567 km ca.			
	H= 00 20 56.3			USCGS
26.	iP	NE	01 33 43.4	
	iS	NE	45.3	
26.	P	Z	02 23 11	
	i	Z	23	
	eS	NE	26 35	

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	45.5 N., 151.4 E.			
	Kurile Is.			
	h: 33 km ca.			
	H= 02 20 01.6			USCGS
26.	iP	EZ	06 19 42.3	
	eL	E	23 16	
	eL	E	25 28	
	P: W			
	28.5 N., 130.9 E.			
	Ryukyu Is.			
	h: 33 km ca.			
	H= 06 17 18			USCGS
26.	e	E	09 07 13	
26.	P	NZ	09 38 32	
	iS	N	53.5	
26.	P	NEZ	14 24 53	
	S	N	25 11	
	i	E	13	
26.	P	Z	15 46 16	
26.	iP	Z	16 18 58.5	
	P: D			
	51.9 N., 176.4 E.			
	Rat Is., Aleutian Is.			
	h: 50 km ca.			
	H= 16 12 43.6			USCGS
26.	P	Z	16 24 08	
	22.2 S., 175.0 W.			
	Tonga Is. region.			
	h: 33 km ca.			
	H= 16 12 36.8			USCGS
26.	P	NEZ	17 25 27	
	iS	Z	31	
26.	P	Z	17 56 08.5	
	iS	N	12.2	
	iS	E	12.4	
26.	P?	Z	17 57 16	
	i	Z	17	
	iS	N	20.2	
	iS	E	20.4	
26.	P	N	18 06 31.5	
	iS	N	34.5	
	iS	E	34.7	

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Date	Phase	Comp.	Time(GMT) h m s
26.	eP	Z	19 40 11
	i	Z	41.5
	e	Z	42 05
	e	Z	13
26.	iP	Z	21 25 36.7
	iS	NE	40.5
26.	iP Z P NE		21 39 52.8
	eS	E	44 40
	Lr	E	47 05
	P: C		
	52.0 N., 171.4 E.		
	Near Is., Aleutian Is.		
	h: 30 km ca.		
	H= 21 34 03.4		USCGS
26.	eP	Z	23 03 39
	52.2 N., 171.5 E.		
	Near Is., Aleutian Is.		
	h: 33 km ca.		
	H= 22 57 50.9		USCGS
27.	P	NZ	06 45 56
	i	E	57.8
	i	N	58.3
	i	NEZ	46 03
	i	N	35
	i	E	39
27.	e	E	13 06 34
27.	iP	NZ	14 20 40.5
	iP	E	40.8
	i	Z	21 16.0
	i	E	23
	i	N	25
	i	Z	32
	i	NE	46
	P: S, C		
	40.4 N., 138.3 E.		
	Eastern Sea of Japan.		
	h : 25 km ca.		
	H= 14 19 42		USCGS
27.	e	E	15 06 22
27.	P	NEZ	17 12 41.0
	i	N	50
	P: N, C		
27.	e	E	18 31 10
27.	iP	EZ	18 41 53.8
	i	N	42 06.5
	iS	NE	14.5
	P: E, C		

Date	Phase	Comp.	Time(GMT) h m s
28.	iP NZ P E		00 04 35.5
	S	E	10 43
	L	E	13 13
	L	N	46
	P: N, E, C		
	2.6 S., 126.2 E.		
	Ceram Sea.		
	h: 33 km ca.		
	H= 23 56 57.3		USCGS
28.	P	NZ	00 11 28
	i	E	31
	i	N	12 29
	P: S, D		
	2.6 S., 126.0 E.		
	Ceram Sea.		
	h: 33 km ca.		
	H= 00 03 50.0		USCGS
28.	eL	E	01 30 00
	eL	N	48
28.	eP	Z	02 37 50
	i	E	53
	eS	N	38 26
28.	e	E	02 42 29
28.	iP	EZ	02 54 08.1
	i	Z	12
	i	Z	17
	P: W, C		
	52.0 N., 171.4 E.		
	Near Is., Aleutian Is.		
	h: 55 km ca.		
	H= 02 48 21.0		USCGS
28.	iPKP	Z	05 49 52.0
	i	NE	52.7
	P: D		
	15.0 S., 72.3 W.		
	Peru.		
	h: 108 km ca.		
	H= 05 30 25.4		USCGS
28.	iP	E	08 42 54.0
	i	E	43 06
	e	E	44 00
	S	N	40
	P: E		
	32.3 N., 131.4 E.		
	Kyushu , Japan.		
	h: 33 km ca.		
	H= 08 41 11		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
28.	iP Z P NE		09 33 19.5
	i	N	21.7
	iS	EZ	37.3
	P: C		
28.	iPKP	Z	10 19 29.1
	Lr	E	11 07 21
	eLr	N	09 20
	P: D		
	Mag. $5\frac{3}{4}$ (Mat.)		
	15.7 S., 74.1 W.		
	Near coast of Peru.		
	h: 45 km ca.		
	H= 09 59 58.0		USCGS
28.	iP	Z	13 28 18.8
	iP	NE	19.3
	i	Z	31 55
	S	EZ	32 43
	S	N	44
	i	N	33 40
	Lq	E	34 20
	Lq	N	29
	Lr	N	35 06
	eLr	E	12
	Lr	Z	36 07
	P: C		
	Mag. 6-$6\frac{1}{4}$ (Mat.)		
	55.1N., 162.1 E.		
	Near east coast of Kamchatka.		
	h: 33 km ca.		
	H= 13 22 57.6		USCGS
28.	iP Z P N		14 05 37.4
	P: C		
	55.3 N., 161.9 E.		
	Near east coast of Kamchatka.		
	h: 33 km ca.		
	H= 14 00 17		USCGS
28.	iP Z P N		15 05 13.0
	P: D		
28.	iPKP1	Z	16 53 01.0
	i	N	02.1
	i	N	15
	iPKP2	Z	27.3
	iPKP2	E	28.6
	iPP	Z	57 01
	iPP	E	05
	iPP	N	15
	iSKKS	E	17 03 45
	i	N	04 20
	i	Z	05 44
	SKSP	E	07 33

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	E	17 12 11
	eLr	N	43 03
	eLr	Z	27
	P: D		
	Mag. $7\frac{3}{4}$ (Mat.)		
	32.4 S., 71.2 W.		
	Near coast of central Chile.		
	h: 61 km ca.		
	H= 16 33 14.6		USCGS
28.	iP	Z	18 23 52.2
	P: D		
	13.4 N., 145.8 E.		
	Mariana Is.		
	h: 43 km ca.		
	H= 18 18 40		USCGS
28.	iP Z P NE		21 32 26.1
	P: D		
	13.4 N., 144.3 E.		
	Mariana Is.		
	h: 135 km ca.		
	H= 21 27 25.3		USCGS
28.	iP	NEZ	21 47 09.5
	P: N, E, D		
	52.4 N., 159.3 E.		
	Off east coast of Kamchatka.		
	h: 33 km ca.		
	H= 21 42 17.6		USCGS
29.	iP	Z	00 10 35.5
	i	NE	36.4
	e	E	12 18
	S	E	14 45
	Lq	E	15 34
	Lr	E	16 19
	P: C		
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)		
	14.7 N., 146.6 E.		
	Mariana Is.		
	h: 61 km ca.		
	H= 00 05 36.3		USCGS
29.	iP	NEZ	01 06 38.8
	iS	EZ	41.0
	P: S, E, D		
29.	e	E	02 34 53
29.	L	E	02 55 30
	L	N	41
29.	e	E	04 36 28

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Date	Phase	Comp.	Time(GMT) h m s
29.	P	E	04 37 58
	3.1 S., 129.6 E.		
	Ceram.		
	h: 33 km ca.		
	H= 04 29 46		USCGS
29.	e	E	05 44 22
29.	e	E	06 40 55
29.	e	E	06 54 33
29.	e	E	07 19 11
29.	i	E	08 03 10
29.	e	E	08 49 00
29.	e	E	09 22 22
29.	e	E	09 27 49
29.	e	E	09 34 31
29.	P	Z	10 35 46
	53.0 N., 168.4 W.		
	Fox Is., Aleutian Is.		
	h: 33 km ca.		
	H= 10 28 10.6		USCGS
29.	iP	NEZ	10 49 01.0
	S	E	50 16
	i	N	35
	P: S, W, C		
	Mag. 6.3 (Mat.)		
	40.8 N., 142.8 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 10 47 37.6		USCGS
29.	P	Z	10 57 11
29.	iP NZ P E		11 17 29.3
	i	Z	34
	i	E	35
	P: N, D		
	40.5 N., 141.2 E.		
	Near east coast of Honshu, Japan.		
	h: 208 km ca.		
	H= 11 16 18.5		USCGS
29.	iP	Z	13 09 07.5
	iP	NE	08.1
	P: C		

Date	Phase	Comp.	Time(GMT) h m s
29.	iP	Z	14 38 52.0
	P	NE	52.2
	i	EZ	59
	i	Z	39 04
	S	E	43 48
	S	N	50
	Lq	N	44 44
	Lq	E	59
	Lr	N	45 43
	Mag. $5\frac{3}{4}$ (Mat.)		
	52.2 N., 175.4 E.		
	Rat Is., Aleutian Is.		
	h: 34 km ca.		
	H= 14 32 41.2		USCGS
29.	iP	NEZ	15 58 40.3
	iS	NE	50.2
	P: N, E, D		
29.	e	E	16 31 56
	e	E	36 29
29.	e	E	19 02 45
29.	e	E	19 25 49
29.	e	E	19 51 35
	eL	E	20 00 10
29.	iP	EZ	21 29 07.0
	iP	N	07.2
	S	E	18.8
	iS	Z	19.3
	iS	N	19.5
	P: W		
29.	e	E	21 54 41
	e	E	57 33
	e	N	48
29.	e	E	22 40 36
	e	E	50 14
	e	E	54 38
29.	e	E	23 27 52
29.	e	E	23 45 29
30.	e	E	00 01 14
	e	E	04 55
30.	iP Z P N		00 08 59.5
	i	E	09 00.5
	pP	Z	56
	pP	N	59

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	S	E	00 18 18
	L	E	29 12
	L	N	32
	P: D		
	28.7 S., 178.4 W.		
	Kermadec Is.		
	h: 228 km ca.		
	H= 23 57 33.5		USCGS
30.	P	Z	00 32 24.0
	i	NE	26.5
	i	Z	31
	S	N	41 45
	i	E	42 17
	i	N	20
	i	E	54
	e	E	50 12
	Lq	NE	51 08
	Lr	E	54 27
	P: C		
	20.0 S., 173.9 W.		
	Tonga Is.		
	h: 33 km ca.		
	H= 00 21 00.2		USCGS
30.	P	Z	02 33 24
	i	E	25
	i	EZ	29
	PP	E	34 30
	PPP	E	51
	PcP	Z	36 21
	iS E S N		38 34
	Lq	N	39 39
	Lr	E	40 50
	Lr	N	54
	i	E	42 48
	P: D		
	Mag. 7.1 (Mat.)		
	50.6 N., 177.9 E.		
	Rat Is., Aleutian Is.		
	h: 51 km ca.		
	H= 02 27 07.2		USCGS
30.	P	NEZ	02 53 23
	S	Z	33
30.	P?	Z	03 31 30
	i	Z	44
30.	P	Z	03 36 10
	P: C		
30.	P	NEZ	05 30 33
30.	eP	Z	06 02 18

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Date	Phase	Comp.	Time(GMT) h m s
	e	Z	06 02 29
	6.6 S., 148.1 E.		
	New Britain region.		
	h: 56 km ca.		
	H= 05 54 15.6		USCGS
30.	eP	Z	07 17 14
	50.2 N., 177.8 E.		
	Rat Is., Aleutian Is.		
	h: 35 km ca.		
	H= 07 10 53.4		USCGS
30.	P	Z	07 27 31
	i	Z	34
	50.2 N., 177.7 E.		
	Rat Is., Aleutian Is.		
	h: 33 km ca.		
	H= 07 21 10.6		USCGS
30.	iP Z P NE		08 22 19.0
	iS	NEZ	21.5
30.	e	NE	08 40 51
30.	e	E	09 49 43
	e	N	50 06
30.	iP	Z	11 48 37.0
	P: D		
	51.6 N., 174.7 E.		
	Near Is., Aleutian Is.		
	h: 20 km ca.		
	H= 11 42 26.9		USCGS
30.	iP	EZ	12 11 24.9
	i	N	26
	S	NE	12 08
	S	Z	09
	P: S, W, D		
	Mag. 5.4 (Mat.)		
	35.8 N., 135.2 E.		
	Southern Honshu, Japan.		
	h: 341 km ca.		
	H= 12 10 29.5		USCGS
30.	iP	Z	12 44 32.2
	e	N	51 39
	e	E	52 07
	P: D		
30.	iP	NEZ	13 51 46.0
	e	E	52 54
	i	E	53 07
	i	N	17.7
	P: N, E, C		

Date	Phase	Comp.	Time(GMT) h m s	
30.	iP	Z	13 55 20.5	
	i	Z	29.6	
	P: C			
30.	iP NZ P E		16 00 57.9	
	S	NE	02 05	
	i	Z	16	
	iL	N	24	
	iL	E	33	
	eL	Z	54	
	P: S, W, C			
	Mag. 5.1 (Mat.)			
	41.0 N., 142.7 E.			
	Near east coast of Honshu, Japan.			
	h: 32 km ca.			
	H= 15 59 34.1			USCGS
30.	iP	Z	16 16 52.5	
	iP	N	52.7	
	i	Z	17 56	
	P: C			
	53.7 N., 165.6 W.			
	Fox Is., Aleutian Is.			
	h: 30 km ca.			
	H= 16 09 02.4			USCGS
30.	iP	NZ	17 21 04.5	
	P	E	04.7	
	e	E	22 39	
	S	N	45	
	S	Z	46	
	P: N, D			
	43.3 N., 145.7 E.			
	Hokkaido, Japan region.			
	h: 33 km ca.			
	H= 17 18 56			USCGS
30.	iP EZ P N		19 06 04.7	
	i	E	16	
	S	NE	09 54	
	P: N, E, D			
	50.2 N., 159.4 E.			
	Kurile Is. region.			
	h: 33 km ca.			
	H= 19 01 27.6			USCGS
30.	P	Z	21 55 39	
	S	NEZ	57	
30.	iP	Z	22 20 17.5	
	iP	N	17.7	
	i	Z	28	
	i	N	29	
	P: C			

Date	Phase	Comp.	Time(GMT) h m s	
	21.0 S., 173.6 W.			
	Tonga Is.			
	h: 33 km ca.			
	H= 22 08 51			USCGS
31.	iP	Z	03 08 38.5	
	P: C			
31.	P	Z	07 40 52	
	iP	E	52.9	
	i	Z	53.3	
	i	N	53.9	
	S	E	41 07	
	S	N	08	
31.	P	Z	08 27 48	
	L	N	35 32	
	L	E	42	
	51.4 N., 178.3 E.			
	Rat Is., Aleutian Is.			
	h: 44 km ca.			
	H= 08 21 28.5			USCGS
31.	iP	Z	09 59 56.2	
	iP	N	56.5	
	i	E	57.5	
	i	NE	59.4	
	PP	E	10 03 28	
	S	N	10 14	
	iS	E	16	
	sS	EZ	11 25	
	sSS	NE	16 56	
	eLq	E	24.2	
	Lr	E	28 28	
	Lr	N	35	
	Lr	Z	50	
	SKPP'	E	29 23	
	P: C			
	Mag. 7 (Mat.)			
	38.6 N., 22.4 E.			
	Greece.			
	h: 78 km ca.			
	H= 09 47 30.7			USCGS
31.	iP NZ P E		10 34 15.7	
	P: N			
31.	iP EZ P N		10 52 32.0	
	P: W, C			
	50.3 N., 178.2 E.			
	Rat Is., Aleutian Is.			
	h: 30 km ca.			
	H= 10 46 08.6			USCGS

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Date	Phase	Comp.	Time(GMT) h m s
31.	e	Z	11 06 04
	e	E	05
	i	NE	11
	e	N	41
31.	iP	EZ	11 53 03.0
	i	N	06
	iS	NEZ	15.5
	P: W, C		
31.	P	Z	13 29 46
	L	N	37 23
	50.2 N., 177.9 E.		
	Rat Is., Aleutian Is.		
	h: 35 km ca.		
	H= 13 23 25.5		USCGS
31.	e	N	15 34 17
	e	N	40 07
	i	N	47 23
	i	N	53 06
31.	P	Z	17 15 30
	i	N	39
	i	EZ	40
	L	N	21 45
	51.7 N., 174.6 E.		
	Near Is., Aleutian Is.		
	h: 39 km ca.		
	H= 17 09 24.4		USCGS
31.	P	Z	19 54 53
	eL	N	20 02 07
	50.3 N., 178.0 E.		
	Rat Is., Aleutian Is.		
	h: 25 km ca.		
	H= 19 48 29.7		USCGS
31.	PKP1	Z	20 43 01
	PKP2	Z	22
	e	N	54 22
	23.9 S., 70.6 W.		
	Near coast of northern Chile.		
	h: 33 km ca.		
	H= 20 22 56		USCGS
31.	eL	N	21 26 11
	L	N	27 00
	50.2 N., 177.9 E.		
	Rat Is., Aleutian Is.		
	h: 30 km ca.		
	H= 21 13 30.1		USCGS
31.	iP	Z	22 38 50.0
	eS	N	44 17

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	iL	N	22 46 30
	P: D		
	50.4 N., 177.5 E.		
	Rat Is., Aleutian Is.		
	h: 30 km ca.		
	H= 22 32 31.9		USCGS
31.	eP	Z	22 46 22
	S	NE	49
31.	iP	Z	22 51 20.3
	iS N S EZ		44.0
31.	S	N	22 52 09
	S	EZ	11
31.	P	N	22 58 49
	iS	N	59 11.9
	iS	E	12.6
31.	P	NZ	23 01 20
	i	E	22.4
31.	iP	NZ	23 01 30.7
	iS	N	55
	iS Z S E		56
	i	E	57
	P: N, C		
31.	S	E	23 02 36
	S	NZ	37
31.	iP	NZ	23 05 22.5
	S	NEZ	48
	i	Z	50
	P: N, C		
31.	iP Z P N		23 08 27.1
	i	E	28.0
	S	NE	52
	S	Z	53
	i	Z	55
	P: N, C		
31.	P	Z	23 13 25
	S	NEZ	49
	L	N	14 26
31.	P	NZ	23 14 04
	i	Z	08
	iS	NEZ	29
31.	P	NZ	23 17 03
	iS	NEZ	28
	P: N		
31.	P	NZ	23 19 15
	S	NE	38
	P: N		

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
31.	iP	Z	23 21 46.5				
	i	N	46.8				
	i	E	50				
	S	NE	22 11				
31.	P	Z	23 24 32				
	iS	NE	57.5				
31.	P	Z	23 37 03				
	S	EZ	28				
	i	N	30				
31.	iP	NZ	23 40 42.8				
	iP	E	43.6				
	S	NEZ	41 07.8				
	i	NE	09				
31.	iP EZ P N		23 54 39.5				
	iS	NE	55 04.0				
	P: E, D						
31.	eP	Z	23 56 16				
	iS	N	40.7				
	iS	E	41.2				
31.	iP	Z	23 59 55.5				
	iP N P E		55.8				
	S	NE	00 00 20				
	i	Z	22.5				
	L	N	02 29				
	P: D						

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Director

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Date	Phase	Comp.	Time(GMT) h m s	
1.	P	NZ	00 03 10	
	iS	NE	34.6	
1.	P	Z	00 28 35	
	i	Z	37	
	i	E	40	
	S	NE	29 00	
	i	Z	02	
1.	P	Z	04 20 23	
	iS N, S E		42.3	
1.	P	Z	06 14 46	
1.	iP	Z	07 14 29.5	
	P: C			
	9.9 N., 125.8 E.			
	Mindanao, P. I.			
	h: 91 km ca.			
	H= 07 08 38.3			USCGS
1.	iP	Z	08 01 51.0	
	eS	NE	02 59	
	P: D			
	31.4 N., 142.0 E.			
	South of Honshu, Japan.			
	h: 33 km ca.			
	H= 08 00 22			USCGS
1.	iP	Z	11 01 16.7	
	P: D			
	7.0 S., 127.0 E.			
	Banda Sea.			
	h: 290 km ca.			
	H= 10 53 21			USCGS
1.	P	Z	12 28 33	
	22.2 N., 146.7 E.			
	North Pacific Ocean.			
	h: 94 km ca.			
	H= 12 24 50.8			USCGS
1.	iP NZ, P E		13 29 04.3	
	eS	E	30 09	
	L	E	42	
	P: N			
	31.2 N., 142.0 E.			
	South of Honshu, Japan.			
	h: 9 km ca.			
	H= 13 27 30.8			USCGS
1.	iP	Z	13 56 17.5	
	i	E	17.7	
	i	N	18.5	
	iS E, S N		40.5	
	P: C			

Date	Phase	Comp.	Time(GMT) h m s	
1.	iP	Z	16 39 50.0	
	S	NE	41 23	
	P: D			
1.	P	NEZ	17 57 58	
	54.8 N., 161.8 E.			
	Near east coast of Kamchatka.			
	h: 25 km ca.			
	H= 17 52 40.6			USCGS
1.	iP	Z	18 01 19.8	
	iS	E	45	
	i	N	47.8	
	P: D			
1.	e	E	21 50 20	
	eSS	E	59 23	
	e	E	22 02 10	
	e	E	07 10	
	e	E	10 33	
	L	E	19 44	
	L	N	20 00	
	Mag. $6\frac{1}{4}$-$6\frac{1}{2}$ (Mat.)			
	50.0 S., 114.1 W.			
	Easter Is. Cordillera.			
	h: 33 km ca.			
	H= 21 20 43.8			USCGS
1.	iP	NZ	22 21 04.3	
	i	E	05.7	
	S	E	22 13	
	P: S			
	31.2 N., 141.9 E.			
	South of Honshu, Japan.			
	h: 33 km ca.			
	H= 22 19 33			USCGS
1.	iP Z, P N		22 26 15.0	
	i	E	16.5	
	eS	E	27 26	
	P: C			
	31.5 N., 141.9 E.			
	South of Honshu, Japan.			
	h: 59 km ca.			
	H= 22 24 48			USCGS
2.	eP	Z	01 30 03	
	i	Z	10	
	e	E	31 43	
2.	eP	Z	01 53 36	
	e	E	55 24	

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Date	Phase	Comp.	Time(GMT) h m s
2.	iP	Z	07 33 05.0
	S	E	23
	P: C		
2.	P	NEZ	09 41 34
	eS	E	42 10
2.	eP	Z	10 18 15
	eS	N	19 41
2.	eP	Z	13 09 46
	eS	E	14 34
	eL	E	15 47
	eL	N	16 10
	Mag. 5¼-5½ (Mat.)		
	12.5 N., 123.5 E.		
	Luzon, P. I.		
	h: 33 km ca.		
	H= 13 04 01.8		USCGS
2.	P Z, iP N		15 55 01.5
	P: S		
	27.1 S., 179.2 W.		
	Kermadec Is.		
	h: 382 km ca.		
	H= 15 44 01.0		USCGS
2.	P	Z	16 40 58
	i	Z	41 11.6
	eS	Z	44
2.	eP	Z	18 59 23
	e	N	19 01 33
	44.3 N., 147.8 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 18 56 42.0		USCGS
2.	P	Z	19 37 28
	S	NE	40
2.	iP	NEZ	22 11 31.7
	S	E	51
	P: N, E, D		
2.	iP	NEZ	22 23 51.6
	eS	E	25 07
	i	NE	10
	P: S, E, D		
	30.0 N., 138.1 E.		
	South of Honshu, Japan.		
	h: 450 km ca.		
	H= 22 22 11		USCGS
2.	iP	Z	22 49 53.6

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	E	22 50 03.0
	S	NE	48
	P: C		
3.	P	Z	02 44 08
	eS	E	49 26
	51.6 N., 175.8 E.		
	Rat Is.		
	h: 38 km ca.		
	H= 02 37 56.1		USCGS
3.	P	Z	03 41 15
	26.4 S., 176.4 W.		
	South of Fiji Is.		
	h: 33 km ca.		
	H= 03 29 29		USCGS
3.	eP	Z	03 44 13
	i	E	26
	i	N	41
3.	eP	Z	05 11 27
	S	NE	49
3.	iP	NZ	06 42 10.7
	i	E	12.0
	P: N, D		
3.	P	Z	08 51 21
	eL	E	09 20 37ca.
	26.8 S., 176.4 W.		
	South of Fiji Is.		
	h: 109 km ca.		
	H= 08 39 40.8		USCGS
3.	P	Z	08 59 44
	eS	N	59
3.	eSS	E	11 54 16
	eSSS	E	57 11
	eL	E	12 12 07
	eL	E	20 13
	Mag. 6-6¼ (Mat.)		
	16.0 N., 97.9 W.		
	Near coast of Oaxaca, Mexico.		
	h: 16 km ca.		
	H= 11 20 43.5		USCGS
3.	eP	Z	18 43 26
	26.5 S., 176.3 W.		

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	South of Fiji Is.		
	h: 33 km ca.		
	H= 18 31 40.0		USCGS
3.	iP	NZ	22 06 26.8
	S	N	40.7
	i	E	42
	P: N, C		
3.	P	EZ	22 45 52
	i	N	53.0
	S	E	46 08.5
3.	eP	Z	22 57 13
	i	Z	31.5
	e	E	23 02 45
	eL	E	08 23
	13.6 N., 119.7 E.		
	Philippine Is. region.		
	h: 90 km ca.		
	H= 22 51 36.2		USCGS
4.	P	Z	03 43 04.0
	i	Z	05.0
	S	E	29.2
4.	iP	NEZ	09 18 23.5
	S	E	45.5
	P: N, E		
4.	iP	NEZ	10 24 45.5
	S	E	25 08.2
	P: N, E, D		
4.	P	NEZ	13 36 47
	i	Z	55.6
	PP	Z	37 35
	PcP	Z	39 47.7
	i	Z	56.0
	S	NE	41 47
	L	N	44 14
	L	E	22
	Mag. $6\frac{1}{4}$-$6\frac{1}{2}$ (Mat.)		
	51.9 N., 175.2 E.		
	Rat Is.		
	h: 40 km ca.		
	H= 13 30 37.8		USCGS
4.	P	Z	13 54 24
	i	Z	32.5
	46.6 N., 152.7 E.		
	Kurile Is.		
	h: 59 km ca.		
	H= 13 50 59		USCGS
4.	iP	NEZ	15 47 59.5

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	S	N	15 57 47
	S	E	50
	ScS	E	58 22
	SS	N	16 02 43
	SSS	N	08 13
	SSS	E	16
	L	E	12 40
	L	N	13 06
	P: S, E, D		
	Mag. 6 (Mat.)		
	26.9 S., 176.1 W.		
	South of Fiji Is.		
	h: 33 km ca.		
	H= 15 36 11.9		USCGS
4.	P	Z	15 53 35
4.	P	Z	16 04 35
	i	N	36.4
	26.9 S., 176.1 W.		
	South of Fiji Is.		
	h: 29 km ca.		
	H= 15 52 47.7		USCGS
4.	P	NEZ	16 21 56
	27.1 S., 176.0 W.		
	Kermadec Is.		
	h: 28 km ca.		
	H= 16 10 08.3		USCGS
4.	P	Z	16 44 32
	26.9 S., 176.0 W.		
	South of Tonga Is.		
	h: 12 km ca.		
	H= 16 32 41.9		USCGS
4.	P	Z	16 49 06
4.	P	Z	17 18 10
4.	iP	Z	17 48 51.7
	P: D		
4.	P	Z	20 28 33
	i	Z	29 24
4.	P	Z	20 32 15
	i	Z	33 21
5.	iP	NEZ	00 39 30.0
	S	N	40 16.0
	P: N, E, D		
5.	iP Z, P NE		02 14 16.0

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	i	E	02 14 32.5
	S	E	15 25
	P: D		
	40.2 N., 140.7 E.		
	Honshu, Japan.		
	h: 48 km ca.		
	H= 02 13 13.8		USCGS
5.	P	Z	03 25 29
	i	NE	31.3
	S	NE	35 50
	e	E	42 49
	i	E	44 50
	L	E	47 56
	L	N	48 12
	L	E	56 16
	Mag. $6\frac{1}{2}$-$6\frac{3}{4}$ (Mat.)		
	37.7 N., 21.8 E.		
	Southern Greece.		
	h: 34 km ca.		
	H= 03 12 54.2		USCGS
5.	P	Z	06 29 14
	PPP	Z	31 21.7
	S	E	35 10
	S	N	13
	L	E	38 28
	Lr	N	41 12
	Mag. 6 (Mat.)		
	3.2 S., 148.4 E.		
	Bismarck Sea.		
	h: 10 km ca.		
	H= 06 21 34.2		USCGS
5.	iP	Z	07 30 49.3
	S	Z	31 42
	P: D		
5.	P	Z	07 36 59
	eS	NE	39 08
5.	iP	NZ	10 55 19.0
	S	NE	43
	i	NE	53.7
	P: N, D		
5.	P	Z	12 57 16
	eS	N	45
	i	E	48.5
5.	iP	NEZ	13 55 06.5
	S	NE	57 20
	L	E	33
	L	N	40
	Lr	NE	55
	P: N, E, D		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Mag. 5.8 (Mat.)		
	44.6 N., 151.1 E.		
	Kurile Is. region.		
	h: 81 km ca.		
	H= 13 52 13.4		USCGS
5.	iP	Z	14 45 23.0
	i	Z	35.8
	P: D		
	26.7 S., 176.3 W.		
	Southern of Fiji Is.		
	h: 45 km ca.		
	H= 14 33 39.0		USCGS
5.	e	E	18 18 20ca.
	51.2 N., 178.6 E.		
	Rat Is.		
	h: 36 km ca.		
	H= 18 03 51.6		USCGS
6.	iP	Z	03 25 03.0
	i	Z	13.0
	e	E	30 46
	P: D		
6.	P	Z	03 47 39
	i	Z	49.5
6.	iP	Z	04 31 02.3
	i	N	15.5
	i	Z	25.4
	e	E	39 16
	eL	E	51 26
	P: D		
	27.2 S., 176.4 W.		
	Kermadec Is.		
	h: 47 km ca.		
	H= 04 19 16.3		USCGS
6.	iP	NEZ	05 32 22.5
	S	N	40.3
	P: S, E, D		
	Mag. 6.1 (Mat.)		
	36.1 N., 139.6 E.		
	Honshu, Japan.		
	h: 69 km ca.		
	H= 05 31 59.7		USCGS
6.	iP	NEZ	07 02 06.5
	S	E	12.5
	i	Z	13.2
	P: N, E, D		
6.	iP Z, P NE		07 13 44.2

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Date	Phase	Comp.	Time(GMT) h m s
6.	iP	NEZ	07 55 38.4
	i	E	50.9
	P: S, W, C		
6.	P	NEZ	08 12 06
	eS	E	13 27
	41.8 N., 141.5 E.		
	Hokkaido, Japan region.		
	h: 86 km ca.		
	H= 08 10 41		USCGS
6.	iP	NEZ	09 50 03.9
	PP	Z	51 41
	PPP	Z	52 10
	S	N	56 06
	S	E	13
	L	NE	59 12
	L	Z	14
	P: N, E, C		
	Mag. $6\frac{1}{2}$-$6\frac{3}{4}$ (Mat.)		
	0.5 S., 119.9 E.		
	Northern Celebes.		
	h: 33 km ca.		
	H= 09 42 28.2		USCGS
6.	iP	NEZ	10 00 11.4
	i	Z	34.9
	S	E	56.2
	P: E, C		
	34.6 N., 136.0 E.		
	Honshu, Japan.		
	h: 65 km ca.		JMA
6.	P	Z	11 33 36
	i	Z	42.4
6.	iP EZ, P N		13 07 16.7
	i	Z	17.2
	i	Z	34.1
	P: W, C		
6.	iP	Z	13 25 35.9
	eS	E	31 14
	L	E	34 23
	P: C		
	51.3 N., 179.8 W.		
	Andreanof Is.		
	h: 46 km ca.		
	H= 13 19 02.2		USCGS
6.	iP	Z	13 37 06.9
	P: C		
	50.2 N., 178.3 E.		
	Rat Is.		
	h: 40 km ca.		
	H= 13 30 45.1		USCGS

Date	Phase	Comp.	Time(GMT) h m s
6.	eP	Z	16 26 31
	i	Z	36.9
6.	iP Z, P N		17 38 32.9
	i	Z	37.5
	P: C		
	27.1 S., 176.3 W.		
	Kermadec Is.		
	h: 38 km ca.		
	H= 17 26 46.7		USCGS
6.	iP Z, P E		17 46 28.4
	i	N	29.9
	S	N	51.4
	P: D		
6.	iP Z, P E		21 53 21.7
	i	N	22.3
	i	E	42.0
	eS	E	55 32ca.
	P: C		
	45.4 N., 149.9 E.		
	Kurile Is.		
	h: 16 km ca.		
	H= 21 50 21.9		USCGS
7.	iP Z, P N		02 13 45.4
	i	EZ	48.2
	eS	N	14 57
	P: D		
7.	iP	NZ	02 39 03.3
	i	E	04.5
	S	E	25
	P: S, C		
7.	P	NEZ	03 31 21
	22.5 N., 143.4 E.		
	Volcano Is. region.		
	h: 201 km ca.		
	H= 03 27 52		USCGS
7.	P	E	03 34 06
	i	NZ	08
7.	iP	NZ	05 32 54.0
	i	E	55.0
	i	E	33 26.5
	P: S, D		
7.	P	EZ	05 33 58.7
	S	NE	34 13.8
7.	iP	NEZ	07 34 12.5
	iS	NE	33.5
	P: S, E, D		

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Date	Phase	Comp.	Time(GMT) h m s
7.	iP NZ, P	E	08 22 41.0
	i	N	42.5
	P: D		
	16.7 S., 178.2 W.		
	Fiji Is. region.		
	h: 407 km ca.		
	H= 08 12 28		USCGS
7.	iP	E	08 47 17.5
	iS	NEZ	19.8
	P: E		
7.	iP NZ, P	E	09 50 14.6
	eS	E	51 34
	P: N, D		
7.	iP NEZ		11 16 06.8
	iS	N	32.5
	i	E	33.5
	P: N, E, C		
7.	P	NEZ	14 23 52
	iS	NE	24 14.3
	i	Z	15.5
7.	iP NZ, P	E	15 41 22.5
	i	NZ	25.0
	S	Z	42 24
	P: N, D		
	39.7 N., 140.8 E.		
	Honshu, Japan.		
	h: 79 km ca.		
	H= 15 40 25		USCGS
7.	iP	NEZ	17 59 16.6
	P: S, E, D		
	21.0 S., 178.8 W.		
	Fiji Is. region.		
	h: 568 km ca.		
	H= 17 48 59.7		USCGS
7.	iP	Z	19 21 41.5
	P: D		
7.	e	E	21 48 25
	eL	E	22 02 15
8.	iP	Z	02 04 12.7
	i	Z	26
	P: C		
	50.2 N., 178.5 E.		
	Rat Is.		
	h: 29 km ca.		
	H= 01 57 53.8		USCGS

Date	Phase	Comp.	Time(GMT) h m s
8.	eP	Z	05 12 13ca.
	eL	E	31 20ca.
8.	iP EZ, P	N	09 23 53.8
	S	N	24 47
	i	NE	25 08
	P: E, D		
	39.0 N., 143.0 E.		
	Off east coast of Honshu, Japan.		
	h: 28 km ca.		
	H= 09 22 46		USCGS
8.	iP	Z	10 29 41.5
	i	N	42.0
	i	E	45.4
	iS	N	30 03.0
	P: D		
8.	iP	NEZ	11 39 04.0
	S	EZ	24.3
	P: S, W		
8.	iP	Z	13 01 28.6
	iP	NE	29.0
	PcP	Z	52.5
	i	Z	02 24
	pP	Z	03 26
	P: D		
	17.6 S., 178.7 W.		
	Fiji Is. region.		
	h: 575 km ca.		
	H= 12 51 27.8		USCGS
8.	iP	Z	13 49 51.8
	i	NEZ	52.5
	i	NE	56.5
	i	Z	58.0
	pP	Z	50 20.2
	S	NE	54 44
	L	E	55 35
	L	N	47
	ScP	Z	56 41
	P: C		
	Mag. $6\frac{1}{2}$-$6\frac{3}{4}$ (Mat.)		
	52.2 N., 173.5 E.		
	Near Is., Aleutian Is.		
	h: 46 km ca.		
	H= 13 43 52.8		USCGS
8.	iP NZ, P	E	14 37 12.0
	pP	E	43.0
	PcP	Z	40 22.5
	P: S, C		

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	52.0 N., 173.4 E.		
	Near Is., Aleutian Is.		
	h: 34 km ca.		
	H= 14 31 10.9		USCGS
8.	iP	Z	14 56 23.5
	i	N	24.0
	pP	N	56
	sP	Z	57 22.6
	P: D		
	5.8 S., 154.6 E.		
	Solomon Is.		
	h: 125 km ca.		
	H= 14 48 21.8		USCGS
8.	P	Z	18 02 14
	iS	NE	39.0
8.	iP	Z	19 05 10.4
	P: D		
	53.0 N., 171.6 E.		
	Near Is., Aleutian Is.		
	h: 33 km ca.		
	H= 18 59 16.7		USCGS
8.	e	E	20 13 50
	eL	E	19 38
8.	e	E	20 45 52
	e	E	49 10
	e	E	21 07 26
8.	P	NZ	22 07 44
	i	E	45.4
	eS	N	08 18
8.	iP	EZ	22 39 12.4
	P: E, D		
9.	P	Z	03 09 08
	eS	E	14 12
	L	N	16 17
	Mag. 5-5¼ (Mat.)		
	51.7 N., 176.3 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 03 02 53.0		USCGS
9.	P	Z	05 18 15
	eS	Z	34
9.	eP	Z	05 54 56
	eL	E	06 00 44
	52.3 N., 171.9 E.		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Near Is., Aleutian Is.		
	h: 38 km ca.		
	H= 05 49 02.0		USCGS
9.	iP	Z	07 32 39.6
	S	E	33 17.5
	i	NE	34 04.3
	P: C		
9.	iP	NEZ	08 29 27.2
	i	Z	36.2
	S	NE	50
	P: N, E, C		
	35.4 N., 136.0 E.		
	Southern Honshu, Japan.		
	h: 33 km ca.		
	H= 08 28 54		USCGS
9.	P	Z	10 57 32
	pP	Z	58 27
	S	N	11 07 36
	SS	N	12 45
	SSS	N	16 19
	L	E	23 00
	L	N	11
	Mag. 6¼ (Mat.)		
	32.6 S., 178.3 W.		
	South of Kermadec Is.		
	h: 52 km ca.		
	H= 10 45 29.4		USCGS
9.	P	Z	13 04 01
	e	E	09 42
9.	iP	NEZ	14 33 20.5
	iS	NE	34 07.0
	i	Z	11
	P: S, E, D		
	33.5 N., 137.6 E.		
	Near south coast of Honshu, Japan.		
	h: 332 km ca.		
	H= 14 32 21.1		USCGS
9.	eP	Z	15 50 37
9.	eP	Z	17 42 57
	eS	E	50 29
	e	E	52 41
	eL	E	18 04 14
	59.6 N., 144.9 W.		
	Gulf of Alaska.		
	h: 52 km ca.		
	H= 17 33 45.3		USCGS

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Date	Phase	Comp.	Time(GMT) h m s
9.	iP	Z	17 50 17.4
	iS	NEZ	35.6
	P: D		
9.	iP	NEZ	19 24 47.4
	iS	NEZ	25 04.2
	P: N, W, C		
9.	iP	Z	23 00 00.5
	PP	E	01 44
	PcP	Z	02 07.0
	PPP	E	20
	S	E	06 11
	i	N	17
	L	E	09 12
	i	E	46
	L	N	50
	P: C		
	Mag. $6\frac{1}{4}$-$6\frac{1}{2}$ (Mat.)		
	4.2 S., 134.1 E.		
	West New Guinea region.		
	h: 33 km ca.		
	H= 22 52 24.3		USCGS
9.	iP	Z	23 54 48.5
	eS	E	00 00 42
	L	E	04 09
	L	N	17
	i	E	37
	P: D		
	Mag. 6-$6\frac{1}{4}$ (Mat.)		
	4.0 S., 134.2 E.		
	West New Guinea region.		
	h: 33 km ca.		
	H= 23 47 12.5		USCGS
10.	iP	Z	00 09 38.0
	i	EZ	39.0
	i	N	40.3
	i	N	10 24
	pP	N	45
	sP	Z	11 25
	i	E	59
	S	NE	20 06
	L	N	36 50
	L	E	37 13
	P: C		
	Mag. $6\frac{1}{4}$-$6\frac{1}{2}$ (Mat.)		
	35.1 N., 24.3 E.		
	Crete.		
	h: 51 km ca.		
	H= 23 57 03.2		USCGS
10.	iP	Z	00 19 29.5

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	50.8 N., 175.8 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 00 12 44		USCGS
10.	eP	Z	01 49 33
	eS	N	50 08.5
10.	iP	Z	08 37 11.7
	i	N	14.5
	S	N	25.4
	P: C		
10.	iP	NZ	09 15 05.7
	S	NE	29
	i	N	31.4
	P: S, D		
10.	P	Z	11 48 32
10.	iP	NZ	14 20 21.5
	i	E	33.6
	e	E	31 38
	L	E	38 30
	P: N, D		
	Mag. $5\frac{3}{4}$-6 (Mat.)		
	37.6 N., 73.4 E.		
	Tadzhik SSR.		
	h: 33 km ca.		
	H= 14 11 22.0		USCGS
10.	iP	Z	14 58 16.5
	i	N	19.0
	P: D		
	20.2 S., 173.7 W.		
	Tonga Is.		
	h: 33 km ca.		
	H= 14 46 50.7		USCGS
10.	iP	Z	16 08 04.5
	P: D		
10.	P	Z	17 00 50
	S	E	05 37
	eL	E	06 18
	L	N	46
	Mag. $5\frac{1}{4}$-$5\frac{1}{2}$ (Mat.)		
	53.1 N., 170.9 E.		
	Near Is., Aleutian Is.		
	h: 8 km ca.		
	H= 16 54 55.8		USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
10.	P	Z	18 59 07	
	S	N	23	
10.	eP	Z	19 54 33	
	eL	E	20 15 48ca.	
	15.8 S., 172.0 W.			
	Samoa Is. region.			
	h: 43 km ca.			
	H= 19 43 23.2			USCGS
10.	iP	EZ	22 42 49.0	
	i	N	50.2	
	PP	Z	45 40	
	S	E	51 08	
	ScS	N	52 05	
	SS	E	55 26	
	L	E	58 22	
	L	N	59 00	
	P: W, C			
	Mag. 6-6¼ (Mat.)			
	17.8 S., 178.8 W.			
	Fiji Is. region.			
	h: 543 km ca.			
	H= 22 32 46.6			USCGS
10.	P	NEZ	23 02 00	
	pP	Z	03 59	
	sP	Z	04 48	
	S	E	09 17	
	ScS	E	10 54	
	sS	E	12 50	
	SS	N	13 00	
	SSS	N	16 18	
	SSS	E	25	
	eL	E	19 30ca.	
	Mag. 6¼ (Mat.)			
	13.4 S., 170.3 E.			
	New Hebrides Is. region.			
	h: 644 km ca.			
	H= 22 53 04.8			USCGS
10.	P	Z	23 15 31	
	i	N	32.2	
	i	E	32.7	
	S	NE	55	
11.	P	Z	00 23 46	
	i	NZ	57	
	e	E	32 00	
	eS	E	34 42	
	L	E	47 43	
	Mag. 5¾-6 (Mat.)			
	42.7 S., 173.9 E.			
	South Is., New Zealand.			
	h: 7 km ca.			
	H= 00 11 08.8			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
11.	P	Z	00 34 15	
	S	E	33	
11.	e	E	05 37.7	
	19.8 N., 109.2 W.			
	Revilla Gigedo Is. region.			
	h: 33 km ca.			
	H= 04 59 39.3			USCGS
11.	P	Z	13 23 13	
	i	N	16	
	S	N	44	
11.	P	Z	14 13 14	
	e	E	39.0	
11.	P	Z	16 23 15	
	i	N	21	
11.	iP	Z	17 15 39.5	
	eL	E	19.6	
	P: C			
11.	iP	Z	19 02 10.0	
	i	NE	10.5	
	pP	Z	04 10	
	eS	N	10 53	
	eScS	E	11 26	
	26.2 S., 178.5 E.			
	South of Fiji Is.			
	h: 581 km ca.			
	H= 18 51 38.1			USCGS
11.	iP	Z	21 35 35.5	
	S	E	57	
	P: C			
11.	eP	Z	22 40 22	
	eL	E	54.0	
	26.7 N., 92.3 E.			
	Eastern India.			
	h: 70 km ca.			
	H= 22 33 05.9			USCGS
12.	e	E	00 25 33	
	eL	E	27 45	
12.	P	EZ	00 32 33	
	eS	N	51	
12.	iP	NEZ	01 00 38.3	
	S	N	58	
	P: N, W, D			

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Date	Phase	Comp.	Time(GMT) h m s	
12.	eL	E	01 56 30	
	51.2 N., 175.7 E.			
	Rat Is.			
	h: 30 km ca.			
	H= 01 44 55			USCGS
12.	P	Z	02 30 17	
	eS	NE	31 15	
	i	E	22	
	e	E	36.0	
12.	P	Z	04 08 26	
	S	NE	15 38	
	L	N	18 15	
	L	E	19 20	
	Mag. 5¼ (Mat.)			
	56.6 N., 152.7 W.			
	Kodiak I. region.			
	h: 33 km ca.			
	H= 03 59 40.2			USCGS
12.	P	Z	04 43 54	
	L	N	54 55	
	52.7 N., 167.4 W.			
	Fox Is.			
	h: 16 km ca.			
	H= 04 36 11.6			USCGS
12.	iP	Z	04 50 51.5	
	P: C			
	52.7 N., 167.5 W.			
	Fox Is.			
	h: 22 km ca.			
	H= 04 43 10.0			USCGS
12.	L	E	08 12 31	
	L	N	13 15	
12.	eP	Z	09 03 19	
	ePP	E	06 44	
	ePPP	N	08 16	
	eS	E	13 12	
	SS	E	19 08	
	L	E	30 34	
	Mag. 5½-5¾ (Mat.)			
	32.5 S., 178.1 W.			
	South of Kermadec Is.			
	h: 22 km ca.			
	H= 08 51 16.7			USCGS
12.	iP	Z	09 19 44.0	
	P: C			
	53.5 N., 167.4 W.			
	Unimak I. region.			
	h: 35 km ca.			
	H= 09 11 49.5			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
12.	P	Z	09 39 30	
	S	NE	39	
12.	iP	EZ	11 22 38.6	
	i	N	39.1	
	S	Z	23 08	
	P: E, D			
	Mag. 4.6 (Mat.)			
	36.4 N., 141.1 E.			
	Near east coast of Japan.			
	h: 20 km ca.			JMA
12.	iP	NEZ	11 35 19.3	
	S	N	47	
	P: S, W, C			
12.	iP	EZ	11 49 27.8	
	S	E	58	
	i	E	50 04	
	P: E, D			
12.	eP	Z	13 38 07	
	e	E	40 00	
	eL	E	46 07	
12.	eL	E	15 03 53	
12.	P	Z	15 44 45	
	e	N	45 30	
	e	NE	44	
12.	iP	NEZ	15 51 02.0	
	iS	E	20.0	
	P: S, E, D			
	Mag. 4.6 (Mat.)			
	36.0 N., 139.5 E.			
	Honshu, Japan.			
	h: 77 km ca.			
	H= 15 50 39.8			USCGS
12.	iP	Z	17 31 39.4	
	i	Z	44	
	eS	E	59	
	P: N, D			
12.	eS	NE	17 46 47	
	L	E	57 30	
	L	NZ	52	
	Mag. 5¾ (Mat.)			
	15.2 S., 175.7 W.			
	Tonga Is.			
	h: 118 km ca.			
	H= 17 28 57.8			USCGS

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Date	Phase	Comp.	Time(GMT) h m s
12.	eP	Z	19 56 27
	i	Z	35
	i	Z	48.5
	26.5 S., 70.8 W.		
	Near coast of Northern Chile.		
	h: 52 km ca.		
	H= 19 36 41.7		USCGS
12.	P	Z	20 38 05
	e	N	41 35
	32.3 S., 178.5 W.		
	South of Kermadec Is.		
	h: 167 km ca.		
	H= 20 26 15.3		USCGS
12.	iP	NZ	20 42 53.5
	i	E	53.7
	iS	EZ	44 08
	i	N	09
	P: S, D		
	Mag. 6.0(Mat.)		
	30.2 N., 138.5 E.		
	South of Honshu, Japan.		
	h: 421 km ca.		
	H= 20 41 16.3		USCGS
12.	eP	Z	20 51 50
	eL	N	21 04 53
12.	iP	NEZ	21 28 45.0
	i	N	29 22
	S	N	30 01
	P: S, W		
	42.4 N., 141.9 E.		
	Near Hokkaido, Japan.		
	h: 110 km ca.		JMA
12.	P	Z	21 40 04
	e	E	50 28
12.	iP	NEZ	22 59 25.5
	iS	E	39.5
	P: S, E, D		
13.	eP	Z	00 13 09
	e	E	18 22
13.	eL	E	01 50 25
13.	e	E	03 06 35
	eL	E	15.0
13.	iP	EZ	03 50 46.0

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	i	NE	03 50 47.3
	i	NZ	59
	S	NEZ	51 07
	i	N	11
	i	E	13
	P: E, D		
	Mag. 4.4 (Mat.)		
	36.5 N., 139.5 E.		
	Honshu, Japan.		
	h: 76 km ca.		
	H= 03 50 25.8		USCGS
13.	iP	NZ	09 48 46.2
	S	E	49 42
	P: N, C		
13.	P	EZ	10 10 04
	S	NE	32
13.	L	E	10 26 25
13.	iP	Z	12 05 17.3
	iS N, S E		30.5
	i	NE	33.5
	P: C		
13.	iP	Z	15 23 16.7
	iS	E	31.3
	P: D		
13.	eP	Z	15 28 59
	i	Z	29 10
	eS	E	33 44
	eL	N	34 49
	51.5 N., 172.1 E.		
	Near Is., Aleutian Is.		
	h: 35 km ca.		
	H= 15 23 06.0		USCGS
13.	iP	EZ	16 37 57.3
	i	NE	38 13.7
	P: C		
13.	P	Z	17 34 25
	eS	E	43 49
	i	N	44 12
	e	NE	45 11
	26.8 S., 175.9 W.		
	South of Tonga Is.		
	h: 33 km ca.		
	H= 17 22 38.6		USCGS
13.	iP	NEZ	17 50 13.1
	i	N	51 56

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Date	Phase	Comp.	Time(GMT) h m s
	eS	E	17 54 17
	L	E	56 22
	eL	Z	57 17
	P: S, W, C		
	Mag. 5 (Mat.)		
	51.6 N., 159.4 E.		
	Off east coast of Kamchatka.		
	h: 33 km ca.		
	H= 17 45 27.2		USCGS
13.	iP	NZ	20 11 09.6
	i	E	11.7
	e	E	12 48
	e	NE	13 15
	P: S, D		
13.	P	Z	21 02 51
	i	Z	58
	eS	E	03 52
13.	P	Z	23 30 56
	e	E	40 55
	eL	E	44 08
	54.2 N., 163.4 W.		
	Unimak I. region.		
	h: 36 km ca.		
	H= 23 22 57.2		USCGS
14.	iP	Z	00 46 38.0
	eL	E	01 04 45
	P: D		
14.	eL	E	02 06 36
14.	iP	NZ	02 49 39.4
	eL	E	53 34
	P: S, C		
	46.3 N., 152.6 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 02 46 14.7		USCGS
14.	eL	E	06 36 14
14.	eL	E	07 14 27
14.	iP	Z	07 44 24.7
	e	E	49 51
	eS	E	51 44
	L	NE	55 28
	P: C		
	Mag. $5\frac{1}{4}$-$5\frac{1}{2}$ (Mat.)		
	56.3 N., 153.5 W.		
	Kodiak I. region.		
	h: 27 km ca.		
	H= 07 35 39.4		USCGS

Date	Phase	Comp.	Time(GMT) h m s
14.	P	NEZ	10 59 51
	eS	E	11 03 58
	eL	NE	06 07
	51.6 N., 159.5 E.		
	Off east coast of Kamchatka.		
	h: 24 km ca.		
	H= 10 55 04.2		USCGS
14.	iP	Z	11 36 41.0
	i	E	46
	S	EZ	37 24
	P: D		
14.	P	Z	12 09 30
	S	EZ	10 05
	i	N	07
14.	P	Z	12 23 07
	i	E	09
	S	NE	40
14.	L	NE	13 15 16
14.	P	NEZ	14 05 10
	i	Z	06 09
	eL	E	14.0
	1.6 S., 126.6 E.		
	Molucca Sea.		
	h: 33 km ca.		
	H= 13 57 42.4		USCGS
14.	P	Z	14 07 19
14.	eL	E	16 02 37
14.	iP NZ, P E		17 09 38.5
	P: S, C		
14.	P	Z	21 18 50
	i	NE	56
	i	Z	19 00
	S	NE	34
14.	iP	NZ	23 02 44.4
	e	Z	03 18
	P: N, C		
	15.4 S., 167.5 E.		
	New Hebrides Is.		
	h: 126 km ca.		
	H= 22 53 00.2		USCGS
15.	iP	EZ	00 41 12.0
	i	N	12.4
	S	NE	38
	P: E, D		

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Date	Phase	Comp.	Time(GMT) h m s	
15.	eL	E	01 28 12	
15.	eP	Z	03 58 05	
	e	Z	59 07	
	L	E	04 02 32	
	L	E	07 53	
15.	P	NEZ	05 13 41	
	i	E	51	
	e	E	14 21	
	eS	NE	17 06	
	24.9 N., 122.6 E.			
	Taiwan region.			
	h: 190 km ca.			
	H= 05 09 51.1			USCGS
15.	eP	Z	05 16 30	
15.	P	EZ	07 02 17	
	S	NE	35	
15.	eL	E	08 20 40	
15.	eP	Z	09 17 11	
	S	EZ	37	
15.	iP	EZ	11 39 18.2	
	i	N	18.7	
	S	E	30.5	
	P: E, D			
15.	iP	NEZ	12 27 09.7	
	iS	NE	50.8	
	P: N, E, C			
15.	eP	Z	15 06 50	
	e	E	10 09	
	eL	NE	11 15	
15.	eL	E	19 57 40	
15.	iP	Z	20 21 03.7	
	34.1 N., 117.5 W.			
	Southern California.			
	h: 15 km ca.			
	H= 20 08 31.8			USCGS
15.	eP	Z	22 22 43	
	S	E	33 28	
	L	E	46 07	
	Mag. 5½ (Mat.)			
	50.2 S., 113.4 E.			
	Southeast Indian Rise.			
	h: 33 km ca.			
	H= 22 09 52			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
15.	eP	Z	23 50 40	
	e	Z	51 09	
	S	E	00 00 24	
	eL	E	13 54	
	17.6 S., 173.4 W.			
	Tonga Is.			
	h: 45 km ca.			
	H= 23 39 55			USCGS
16.	iP	NEZ	00 00 25.5	
	S	E	32.5	
	P: S, E			
16.	P	Z	00 27 12	
	L	E	46 46	
	Mag. 5¾-6 (Mat.)			
	22.3 S., 175.5 W.			
	Tonga Is. region.			
	h: 120 km ca.			
	H= 00 15 52.3			USCGS
16.	P	Z	01 23 47	
	eL	E	55 23	
16.	P	NZ	02 31 51	
	i	E	57	
	S	NZ	32 15	
16.	P	Z	03 01 47	
	e	E	56	
16.	iP	Z	03 18 04.7	
	i	NE	05.2	
	S	NE	40.0	
	P: C			
16.	P	NZ	04 00 44.3	
	i	E	52	
	S	N	01 15	
	P: S, D			
16.	eP	Z	06 09 20	
	i	E	25	
16.	P	Z	06 41 55	
	L	E	45 42	
16.	P	Z	07 42 59	
	i	NE	43 02	
16.	P	Z	10 09 30	
	eL	E	49 56	

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Date	Phase	Comp.	Time(GMT) h m s
	L	E	10 56 16
	20.1 S., 169.2 E.		
	New Hebrides Is.		
	h: 62 km ca.		
	H= 09 59 06.2		USCGS
16.	PKP1	Z	13 11 33
	PKP2	Z	12 08
	sPKP	Z	17.5
	21.7 S., 68.1 W.		
	Chile-Bolivia border region.		
	h: 127 km ca.		
	H= 12 51 48.7		USCGS
16.	P	Z	14 40 10
	e	E	43 20
	eS?	N	45 36
	eL	N	47 16
	50.6 N., 177.3 E.		
	Rat Is.		
	h: 38 km ca.		
	H= 14 33 51.9		USCGS
16.	iP	NEZ	15 54 52.3
	i	N	55 16.5
	eL	N	16 10 21
	P: S, W		
16.	iP	NEZ	16 41 30.0
	e	NE	42 53
	P: N, E, D		
16.	P	Z	17 04 02
	i	E	03
	S	N	36.4
16.	P	Z	18 55 44.5
	i	NEZ	46.0
	i	E	56 10
	iS	NEZ	12.5
16.	iP	EZ	21 22 06.8
	iS	N	18.7
	P: E, D		
16.	iP NZ, P	E	23 03 19.5
	S	E	43
	P: N, D		
16.	iP Z, P	NE	23 30 40.0
	i	E	41.4
	S	E	37 25
	i	N	37
	Lq	N	40 49
	Lr	E	43 56

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Lr	N	22 44 10
	Lr	Z	54
	P: D		
	Mag. 6½ (Mat.)		
	64.7 N., 160.1 W.		
	Central Alaska.		
	h: 5 km ca.		
	H= 23 22 18.6		USCGS
17.	iP Z, P NE		00 06 30.4
	P: C		
	52.6 N., 173.1 E.		
	Near Is., Aleutian Is.		
	h: 43 km ca.		
	H= 00 00 29.7		USCGS
17.	P	NZ	01 28 29
	i	E	30
	i	NE	37
	S	E	29 11
17.	eP	Z	02 57 05
	i	Z	13
	e	E	03 03 23
	e	N	05 44
	eS	E	07 06
	eL	E	23 07
	L	N	26 06
	L	E	45
	7.2 S., 67.9 E.		
	Mid-Indian Rise.		
	h: 33 km ca.		
	H= 02 45 04.8		USCGS
17.	iP	Z	03 38 31.0
	iS	NE	39 45.0
	P: C		
	31.3 N., 137.4 E.		
	South of Honshu, Japan.		
	h: 491 km ca.		
	H= 03 37 01.7		USCGS
17.	iP	NE	04 30 12.7
	i	E	31 32
	S	NE	41
	P: N, W		
	30.0 N., 143.6 E.		
	South of Honshu, Japan.		
	h: 37 km ca.		
	H= 04 28 17.5		USCGS
17.	P	Z	06 15 17
	52.3 N., 174.2 E.		
	Near Is., Aleutian Is.		
	h: 48 km ca.		
	H= 06 09 11.9		USCGS

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Date	Phase	Comp.	Time(GMT) h m s	
17.	iP	NE	11 09 07.2	
	S	NE	28	
	i	E	32	
	P: S, E, D			
	36.2 N., 140.2 E.			
	Honshu, Japan.			
	h: 70 km ca.			JMA
17.	eP	NE	11 12 45	
	e	N	13 33	
17.	iP	N	11 25 35.7	
	i	N	51.5	
	P: S			
17.	P	EZ	12 30 26	
	52.6 N., 174.2 W.			
	Andreanof Is.			
	h: 35 km ca.			
	H= 12 23 23.4			USCGS
17.	P	NE	12 31 57	
	i	NE	32 23	
17.	P	N	13 00 25	
17.	P	N	13 01 24	
	S	NE	47	
17.	P	N	13 48 19	
	S	NE	43	
17.	eP	Z	15 41 34	
	e	Z	42 10	
	eL	E	16 07 30	
17.	eP	Z	19 36 12	
17.	iP	NZ	22 12 54.4	
	S	E	13 23.5	
	P: S, C			
17.	eP	Z	22 22 45	
17.	iP	NZ	23 54 14.9	
	S	E	49	
	P: N, C			
18.	P	Z	01 20 25	
	i	Z	31	
18.	P	NEZ	03 41 41.8	
	eS	N	42 41	
	P: N, E, D			
18.	eL	E	04 10 32	

Date	Phase	Comp.	Time(GMT) h m s	
18.	eL	NE	04 18 10	
18.	L	E	04 43 05	
	L	N	20	
18.	P	Z	06 45 08	
	S	NE	54 23	
	L	N	07 03 22	
	Lr	Z	06 00	
	Mag. 6 (Mat.)			
	41.5 N., 127.1 W.			
	Off coast of northern California.			
	h: 20 km ca.			
	H= 06 33 58.8			USCGS
18.	iP	EZ	08 14 24.5	
	P: E, D			
	4.7 S., 151.7 E			
	New Britain region.			
	h: 142 km ca.			
	H= 08 06 39.5			USCGS
18.	eP	Z	08 19 52	
18.	eP	EZ	09 39 08	
	i	NEZ	11	
18.	PKP	Z	09 59 08	
	i	Z	18	
	e	N	10 02 15	
	ePP	Z	03 01	
	ePP	E	15	
	PPS	N	17 19	
	SS	EZ	23 50	
	ePSPS	N	24 18	
	Lr	Z	57 56	
	L	E	11 03 40	
	Mag. $6\frac{3}{4}$ (Mat.)			
	59.8 S., 26.8 W.			
	South Sandwich Is. region.			
	h: 29 km ca.			
	H= 09 39 18.7			USCGS
18.	iPKP	Z	13 01 45.8	
	i	Z	53.9	
	e	N	05 24	
	i	Z	37	
	PP	Z	43	
	eSKSP	N	15 49	
	SS	E	26 00	
	L	Z	14 03 09	
	PKP: D			
	Mag. $6\frac{1}{2}$-$6\frac{3}{4}$ (Mat.)			

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Date	Phase	Comp.	Time(GMT) h m s	
				59.7 S., 26.4 W. South Sandwich Is. region. h: 25 km ca. H= 12 41 54.9 USCGS
18.	P	Z	13 18 45	11.8 N., 89.8 W. Off coast of central America. h: 33 km ca. H= 13 03 06 USCGS
18.	P	Z	14 19 48	
	i	NE	52	26.9 S., 176.1 W. South of Fiji Is. h: 33 km ca. H= 14 08 01.4 USCGS
18.	P	Z	18 16 22	
	i	E	28	
	eS	E	20 16	
	eL	N	23 58	20.1 N., 121.2 E. Philippine Is. region. h: 39 km ca. H= 18 11 26.5 USCGS
18.	iP	EZ	18 52 06.6	
	i	N	07.5	
	S	Z	15.0	
	P: W, D			
18.	P	Z	22 44 58	
	eS	NE	45 31	
19.	P	Z	03 33 58	
	i	Z	59.8	
	S	N	34 23	
	i	E	25	
19.	iP	NEZ	04 47 07.4	
	P: N, E, D			40.3 N., 141.4 E. Honshu, Japan. h: 80 km ca. JMA
19.	eL	E	05 38 24	2.9 S., 147.6 E. Admiralty Is. region. h: 5 km ca. H= 05 21 30.3 USCGS
19.	eP	Z	06 00 45	
	e	E	13 37	
	eL	E	27 14	

Date	Phase	Comp.	Time(GMT) h m s	
19.	P	Z	08 14 51	
	eL	E	32 27	1.8 N., 98.5 E. Northern Sumatra. h: 55 km ca. H= 08 06 00 USCGS
19.	iP NZ, P E		09 14 08.7	
	eS	E	45	
	P: S, C			
19.	eL	E	11 09 42	
19.	iP	EZ	14 08 49.4	
	i	N	49.9	
	S	N	09 26	
	P: E, C			
19.	iP	Z	17 10 06.9	
	P	NE	07.0	
	P: D			13.5 S., 170.3 E. New Hebrides Is. region. h: 647 km ca. H= 17 01 10.5 USCGS
19.	iP	NZ	18 29 05.1	
	P: N, C			17.5 S., 179.0 W. Fiji Is. region. h: 502 km ca. H= 18 18 59.9 USCGS
19.	iP Z, P NE		20 13 23.5	
	P: C			
19.	eP	Z	20 55 52	
19.	P	Z	20 56 46	
	i	Z	53	
	i	N	57 00	
	i	E	01	
19.	iP	EZ	21 43 38.8	
	i	N	39.5	
	S	N	44 15	
	P: E, D			
19.	iP	Z	23 09 02.3	
	i	NEZ	05.5	
	S	N	29	
	i	E	30	
	i	Z	31	
	P: D			

Date	Phase	Comp.	Time(GMT) h m s
19.	iP	NEZ	23 42 27.5
	S	E	50
	P: S, E, D		
	Mag. 6.4 (Mat.)		
	34.9 N., 138.0 E.		
	Near south coast of Honshu, Japan.		
	h: 36 km ca.		
	H= 23 41 58.8		USCGS
20.	iP	NZ	01 18 05.2
	S	E	28
	P: N		
20.	P	Z	06 02 48
	S	Z	03 10
20.	iP	Z	06 32 06.0
	i	E	16
	S	E	28
	P: D		
20.	P	Z	06 49 04
	i	Z	16
	eS	E	53 45
	L	N	54 42
	52.4 N., 172.0 E.		
	Near Is., Aleutian Is.		
	h: 35 km ca.		
	H= 06 43 08.8		USCGS
20.	iP	NEZ	06 55 22.5
	i	NZ	30.0
	i	E	31
	S	E	51
	i	Z	57
	i	N	59
	P: S, W, C		
	Mag. 5.1 (Mat.)		
	38.9 N., 138.8 E.		
	Near west coast of Honshu, Japan.		
	h: 44 km ca.		
	H= 06 54 45.0		USCGS
20.	P	Z	08 54 50
20.	iP	EZ	09 40 49.2
	i	N	49.9
	S	N	41 26
	P: E, C		
20.	iP	NEZ	11 41 49.8
	i	NEZ	42 09.5
	P: C		

Date	Phase	Comp.	Time(GMT) h m s
20.	P	Z	12 49 26
	eS	N	47
20.	iP	Z	15 44 44.3
	P: C		
20.	iP	Z	16 45 13.7
	S	E	46.5
	i	N	47.5
	P: N, C		
20.	iP	Z	17 20 18.5
	i	NE	20
	e	E	24 36
	L	E	26 19
	P: C		
	14.8 N., 146.9 E.		
	Mariana Is.		
	h: 60 km ca.		
	H= 17 15 19.4		USCGS
20.	iP Z, P NE		18 45 07.5
	S	NE	45
	P: C		
20.	eP	Z	19 01 12
	i	Z	22
20.	eP	Z	22 27 03
	e	Z	21
	0.1 N., 123.6 E.		
	Northern Celebes.		
	h: 33 km ca.		
	H= 22 19 40		USCGS
20.	P	EZ	22 53 22
	i	NEZ	31.5
	i	NE	47
20.	iP	NZ	23 18 20.0
	i	E	21
	S	E	41
	P: C		
21.	eP	Z	00 04 03
	eS	E	07 15
	24.2 N., 124.6 E.		
	Southwestern Ryukyu Is.		
	h: 101 km ca.		
	H= 00 00 12.0		USCGS
21.	iP	NZ	00 38 53.5
	i	NZ	58

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s
	S	NE	00 39 16.5
	P: N, C		
21.	iP Z, P E		01 37 50.3
	i	E	38 10.0
	P: D		
21.	iP	NZ	02 32 39.8
	i	E	41
	S	NZ	33 05
	i	NZ	15
	P: S, D		
21.	P	EZ	04 02 56
	eS	E	03 25
21.	e	E	05 19 32
	e	E	31 47
21.	P	NZ	06 09 44
	ePPP	E	14 08
	eL	E	40 18
	20.4 S., 174.7 W.		
	Tonga Is.		
	h: 33 km ca.		
	H= 05 58 19.3		USCGS
21.	iP	Z	06 44 58.3
	i	NE	45 00
	P: C		
21.	iP	EZ	08 00 06.0
	eS	N	40
	P: W, C		
21.	P	Z	08 11 14
	eS	Z	35
21.	P	Z	08 35 40
	20.9 S., 174.6 W.		
	Tonga Is.		
	h: 33 km ca.		
	H= 08 24 13		USCGS
21.	P	Z	10 38 19
	S	E	45
21.	P	Z	10 42 05
	e	E	11 12 31
	20.4 S., 174.6 W.		
	Tonga Is.		
	h: 33 km ca.		
	H= 10 30 39.5		USCGS

Date	Phase	Comp.	Time(GMT) h m s
21.	iP	EZ	11 52 16.5
	e	N	37
	P: W, C		
21.	eP	Z	13 21 08
	i	Z	18
21.	iP	Z	13 56 47.7
	i	NZ	52.0
	iS	NZ	57 21.5
	P: D		
21.	eP	Z	18 43 00
	S	NE	23
21.	eP	Z	20 30 40
	i	Z	43
	S	Z	31 16
	i	N	19
21.	eP	Z	20 39 36
	S	NE	40 01.5
21.	iP	Z	21 28 56.1
	eS	E	31 13
	eL	E	32 32
	P: D		
	44.6 N., 149.2 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 21 26 11.5		USCGS
21.	iP	NZ	21 46 08.1
	i	E	09
	S	NE	30
	P: S, D		
21.	iP	NEZ	22 53 35.5
	i	Z	52.5
	i	E	55
	S	NZ	54 15
	P: N, E, D		
	38.1 N., 141.5 E.		
	Near east coast of Honshu, Japan.		
	h: 74 km ca.		
	H= 22 52 48.4		USCGS
22.	iP	Z	01 07 47.0
	S	Z	08 03
	P: D		
22.	iP	Z	01 15 18.5
	i	N	19

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s	
	i	E	01 15 19.5	
	eS	E	23 09	
	eL	E	32 26	
	P: C			
	14.3 S., 167.3 E.			
	New Hebrides Is.			
	h: 204 km ca.			
	H= 01 05 50.2			USCGS
22.	eP	Z	03 24 58	
	S	NE	25 15	
22.	eP	Z	08 14 58	
	51.6 N., 161.0 E.			
	Off east coast of Kamchatka.			
	h: 33 km ca.			
	H= 08 10 03.5			USCGS
22.	e	E	13 22 06	
22.	eP	Z	15 01 38	
	14.6 S., 167.3 E.			
	New Hebrides Is.			
	h: 167 km ca.			
	H= 14 52 04.9			USCGS
22.	P	Z	15 17 00	
	S	E	30.5	
22.	e	E	15 59 24	
22.	iP	NZ	16 12 23.5	
	i	E	31	
	i	N	32	
	S	NE	51	
	i	E	57	
	P: S, C			
22.	P	Z	17 56 39.5	
22.	iP	NEZ	18 11 05.5	
	S	NE	07.6	
	P: N, D			
22.	iP	Z	18 42 14.8	
	e	E	45 42	
	S	N	47 16	
	S	E	20	
	eL	N	49 35	
	eL	E	46	
	P: C			
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)			
	51.8 N., 176.1 E.			
	Rat Is.			
	h: 37 km ca.			
	H= 18 36 01.2			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
22.	P	Z	19 56 02	
	i	NZ	04	
	i	Z	17	
	eS	N	20 00 22	
	eS	E	30	
	eL	E	03 10	
	12.5 N., 144.6 E.			
	South of Mariana Is.			
	h: 40 km ca.			
	H= 19 50 45.8			USCGS
22.	iP	NZ	20 02 07.0	
	i	NE	40	
	P: S, D			
22.	iP Z, P E		20 30 36.0	
	i	E	31 09	
	P: D			
22.	iP	NZ	21 03 18.0	
	i	E	18.8	
	P: N, D			
22.	P	Z	21 07 05	
22.	iP	NEZ	22 21 27.4	
	eS	E	22 55	
	eL	E	24 00	
	P: S, W, C			
22.	ePKP	Z	22 33 10	
	5.6 S., 78.6 W.			
	Northern Peru.			
	h: 18 km ca.			
	H= 22 13 54.7			USCGS
22.	P	Z	23 29 14	
	i	Z	29	
23.	eP	Z	00 41 14	
23.	eP	Z	03 16 12	
	i	Z	21	
	55.3 N., 165.5 E.			
	Komandorsky Is. region.			
	h: 33 km ca.			
	H= 03 10 35.8			USCGS
23.	P	Z	03 36 24	
	i	N	24.5	
	S	N	50	
23.	P	Z	06 28 59	
	i	EZ	29 03	

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Date	Phase	Comp.	Time(GMT) h m s
23.	P	Z	06 48 52
	i	EZ	56
	eS	N	49 56
	i	E	50 02
23.	eP	Z	13 50 47
	i	Z	50.5
23.	iP	Z	14 07 25.0
	i	NEZ	26.5
	S	NEZ	58
	P: D		
23.	iP	Z	14 14 48.5
	P: C		
23.	P	NEZ	14 41 59
	S	NE	42 31
23.	P	NZ	14 45 20
	S	Z	47
23.	P	NZ	14 46 56
	S	E	47 28
23.	P	Z	15 01 37
	i	Z	38.5
23.	P	Z	15 02 40
23.	P	Z	15 05 42
23.	iP	NZ	15 31 05.8
	i	EZ	29
	P: S, D		
23.	P	Z	15 32 39
23.	iP	NEZ	15 33 21.9
	S	N	55
	e	N	34 10
	P: S, E, D		
23.	iP	NZ	15 38 05.8
	S	NE	39
	P: S, C		
23.	iP	NZ	16 15 40.9
	i	NE	41.5
	eS	E	16 15
	P: S, D		
23.	P	NEZ	16 21 00
	i	Z	09

Date	Phase	Comp.	Time(GMT) h m s
23.	e	E	16 53 25
	e	N	31
23.	P	NZ	18 37 52
24.	P	Z	00 16 37
	eS	N	26 41
	e	E	27 06
	eL	E	37 52
	eL	E	44 50
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)		
	32.8 S., 178.4 W.		
	South of Kermadec Is.		
	h: 33 km ca.		
	H= 00 04 33		USCGS
24.	iP	Z	01 08 35.3
	i	E	09 10
	P: C		
24.	eP	EZ	02 11 35
	i	N	51
24.	iP	Z	02 51 07.4
	S	NE	30
24.	e	E	03 00 00
	e	E	04 40
	e	E	13 35
24.	iP Z, P N		03 12 07.4
	eS	E	16 52
	eL	E	19 18
	eL	N	20 20
	P: C		
	Mag. 5-$5\frac{1}{4}$ (Mat.)		
	7.3 N., 126.6 E.		
	Mindanao, P. I.		
	h: 95 km ca.		
	H= 03 06 00.3		USCGS
24.	P	Z	03 16 38
	51.8 N., 175.9 W.		
	Andreanof Is.		
	h: 79 km ca.		
	H= 03 09 45.6		USCGS
24.	P	Z	08 07 27
	S	E	11 36
	eL	E	13 53
	Mag. 5-$5\frac{1}{4}$ (Mat.)		
	19.2 N., 121.2 E.		
	Philippine Is. region.		
	h: 43 km ca.		
	H= 08 02 26.3		USCGS

Date	Phase	Comp.	Time(GMT) h m s
24.	iP	Z	08 45 36.0
	i	NE	37
	eS	NE	46 51
	P: C		
24.	iP	Z	08 54 27.5
	i	E	32
	eS	E	55 13
	P: D		
24.	P	Z	09 44 55
	i	Z	45 00
24.	P	Z	10 00 40
	i	EZ	01 15
	S	NEZ	25
	i	EZ	59
24.	P	Z	10 29 29.7
	P: C		
	58.6 N., 153.2 W.		
	Kodiak I. region.		
	h: 58 km ca.		
	H= 10 20 50.2		USCGS
24.	iP	NZ	11 48 32.6
	S	NE	53.5
	P: N, C		
24.	iP	Z	12 18 06.5
	S	NEZ	34
	P: C		
24.	eP	Z	12 38 02
	i	Z	08.4
	S	NEZ	28
24.	iP	Z	13 55 09.4
	i	N	11
	P: C		
	20.4 S., 173.8 W.		
	Tonga Is.		
	h: 33 km ca.		
	H= 13 43 44.5		USCGS
24.	P	Z	14 38 25
	19.4 S., 168.7 E.		
	New Hebrides Is.		
	h: 37 km ca.		
	H= 14 28 02.9		USCGS
24.	iPKP1	Z	18 48 44.5
	e	NE	45
	iPKP2	Z	49 15
	PKP1: D		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	17.7 S., 69.6 W.		
	Peru-Bolivia border region.		
	h: 159 km ca.		
	H= 18 29 18.3		USCGS
24.	P	Z	20 18 35
	eS	E	22 31
	eL	E	24 36
	eL	N	42
	53.0 N., 171.0 E.		
	Near Is., Aleutian Is.		
	h: 25 km ca.		
	H= 20 12 42.8		USCGS
24.	P	NZ	21 55 08
24.	iP	Z	22 00 44.5
	PP	N	01 26
	S	NE	05 00
	L	E	06 21
	L	N	30
	Lr	N	09 18
	Lr	Z	26
	P: C		
	Mag. 5¾ (Mat.)		
	11.4 N., 140.1 E.		
	West Caroline Is.		
	h: 59 km ca.		
	H= 21 55 26.5		USCGS
25.	P	Z	00 22 50
	i	Z	23 09
	eS	E	25 03
	e	Z	08
	e	E	16
	eL	NE	58
	24.6 N., 142.5 E.		
	Volcano Is. region.		
	h: 78 km ca.		
	H= 00 19 55		USCGS
25.	P	Z	00 37 22
	32.5 S., 177.9 W.		
	South of Kermadec Is.		
	h: 33 km ca.		
	H= 00 25 14.8		USCGS
25.	iP	NEZ	01 03 13.5
	i	E	15.0
	i	N	17.5
	i	E	05 21
	S	NE	43
	L	EZ	06 14
	L	N	20
	P: S, E, D		

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Date	Phase	Comp.	Time(GMT) h m s
	Mag. 5.8 (Mat.)		
	24.5 N., 142.7 E.		
	Volcano Is. region.		
	h: 15 km ca.		
	H= 01 00 11.6		USCGS
25.	eP	Z	01 11 49
	i	Z	12 19
25.	iP	EZ	01 49 54.9
	i	E	50 08
	i	Z	09
	i	E	52 23
	i	N	24
	P: E, C		
	51.5 N., 178.8 E.		
	Rat Is.		
	h: 49 km ca.		
	H= 01 43 28		USCGS
25.	eP	Z	02 37 29
25.	iP	Z	02 57 47.1
	P: C		
	32.6 S., 178.0 W.		
	South of Kermadec Is.		
	h: 33 km ca.		
	H= 02 45 39.1		USCGS
25.	iP	Z	04 35 36.6
	e	Z	36 13
	P: C		
25.	eP	Z	04 57 24
	i	Z	29
25.	eP	Z	07 00 39
	e	N	07 00
	e	E	06
	eL	E	09 36
	eL	N	13 00
	Mag. $5\frac{1}{4}$-$5\frac{1}{2}$ (Mat.)		
	5.4 S., 151.8 E.		
	New Britain region.		
	h: 49 km ca.		
	H= 06 52 43.1		USCGS
25.	iP	EZ	07 39 32.4
	S	NE	34.3
	P: E, D		
25.	e	E	07 50 27
25.	iP	NEZ	08 45 45.3

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Date	Phase	Comp.	Time(GMT) h m s
	eL	N	08 53 30
	eL	E	54 28
	P: N, E, D		
	52.0 N., 175.9 E.		
	Rat Is.		
	h: 45 km ca.		
	H= 08 39 31.6		USCGS
25.	P	Z	08 52 10
25.	iP	EZ	11 26 03.5
	S	Z	23
	i	Z	25
	P: E, C		
25.	P	NEZ	11 39 00
	S	NE	32
25.	iP	Z	11 43 25
25.	iP	NZ	11 49 20.5
	i	E	21
	S	NE	51
	P: N, C		
25.	iP	Z	11 53 22.5
	i	E	23.5
	i	Z	57
	P: C		
25.	eP	Z	12 41 27
	eL	E	44 52
	eL	N	45 50
	24.5 N., 142.6 E.		
	Volcano Is. region.		
	h: 74 km ca.		
	H= 12 38 29		USCGS
25.	P	Z	14 08 14.0
	i	NEZ	15.4
	i	EZ	19.5
	i	E	09 02.5
	S	E	10 07
	i	N	44
	e	N	11 46
	P: D		
	27.3 N., 141.5 E.		
	Bonin Is. region.		
	h: 53 km ca.		
	H= 04 05 55.4		USCGS
25.	P	Z	14 35 07.5
	i	NEZ	17.4
	i	Z	30.7

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	46.6 N., 152.5 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 14 31 41.2		USCGS
25.	eP	Z	15 29 43
	eL	E	43 37
	51.4 N., 174.5 E.		
	Near Is., Aleutian Is.		
	h: 38 km ca.		
	H= 15 23 40.1		USCGS
25.	P	Z	16 51 00
	30.4 N., 50.6 E.		
	Iran.		
	h: 34 km ca.		
	H= 16 39 45.0		USCGS
25.	iP	EZ	21 22 25.0
	eS	N	27 54
	e	E	28 00
	L	E	30 29
	L	N	55
	P: W, C		
	Mag. 5¼-5½ (Mat.)		
	51.3 N., 176.4 W.		
	Andreanof Is.		
	h: 40 km ca.		
	H= 21 15 32.3		USCGS
25.	iP	EZ	21 30 57.0
	i	N	31 09.5
	i	E	11.5
	S	E	33 40
	i	N	49
	P: W, D		
	29.7 N., 130.7 E.		
	Ryukyu Is.		
	h: 28 km ca.		
	H= 21 28 40.5		USCGS
25.	eP	Z	21 36 33
	i	Z	46
25.	iP	Z	23 08 10.8
	i	Z	22.6
	e	E	09 25
	P: D		
26.	iP	Z	02 06 38.5
	e	E	15 32
	eSS	E	18 08
	eL	N	41
	P: C		

(cont.)

Date	Phase	Comp.	Time(GMT) h m s
	Mag. 5½-5½ (Mat.)		
	58.9 N., 142.7 W.		
	Gulf of Alaska.		
	h: 33 km ca.		
	H= 01 57 14.4		USCGS
26.	e	E	03 22 48
26.	eP	Z	05 08 54
	S	NE	09 14
26.	iP	NZ	09 54 55.0
	PP	NE	56 40
	PcP	Z	57 07.5
	S	NE	10 01 00
	eL	E	04 00
	eL	N	24
	eL	Z	06 40
	P: N, C		
	Mag. 5¾-6 (Mat.)		
	1.7 S., 126.6 E.		
	Molucca Sea.		
	h: 15 km ca.		
	H= 09 47 25.1		USCGS
26.	P	Z	13 27 02
26.	eP	Z	13 35 40
	i	Z	43.0
	11.2 N., 94.2 E.		
	Andaman Is. region.		
	h: 33 km ca.		
	H= 13 27 09.8		USCGS
26.	iP	Z	13 37 16.4
	eS	E	46 00
	eL	NE	51 21
	P: D		
26.	P	Z	13 44 19
	19.7 S., 174.1 W.		
	Tonga Is.		
	h: 33 km ca.		
	H= 13 32 54		USCGS
26.	iP	Z	17 21 35.9
	i	E	52
	i	Z	54
	P: C		
26.	eP	Z	17 31 50
26.	iP	NZ	17 38 10.0
	i	E	42
	P: C		

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Date	Phase	Comp.	Time(GMT) h m s
26.	iP	NEZ	19 25 49.5
	S	NE	57.5
	P: N, W, D		
26.	P	Z	19 31 03.5
	P: D		
	1.5 S., 126.6 E.		
	Molucca Sea.		
	h: 115 km ca.		
	H= 19 23 45		USCGS
26.	iP	Z	19 33 13.9
	e	E	40 10
	P: C		
26.	P	NEZ	20 37 09
	i	N	10.0
	eS	E	43 43
	L	N	48 05
	L	E	33
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)		
	54.5 N., 162.6 W.		
	Alaska Peninsula.		
	h: 53 km ca.		
	H= 20 29 07.4		USCGS
26.	eP	Z	21 41 08
	i	Z	20
	e	E	44 20
	e	E	22 01 19
	45.6 N., 151.4 E.		
	Kurile Is.		
	h: 33 km ca.		
	H= 21 38 00		USCGS
26.	iP	Z	22 20 30.5
	i	NE	31.4
	i	Z	54
	S	NEZ	24 30
	Lq	NE	26 00
	L	Z	21
	Lr	N	28 11
	Lr	Z	14
	Lr	E	35
	P: C		
	Mag. $6\frac{3}{4}$-7 (Mat.)		
	21.1 N., 120.7 E.		
	Taiwan region.		
	h: 33 km ca.		
	H= 22 15 42.5		USCGS
26.	P	NEZ	22 27 59
	21.5 N., 120.9 E.		
	Taiwan region.		
	h: 33 km ca.		
	H= 22 23 10.9		USCGS

Date	Phase	Comp.	Time(GMT) h m s
26.	eP	Z	22 39 10
	30.9 S., 177.4 W.		
	Kermadec Is. region.		
	h: 33 km ca.		
	H= 22 27 11		USCGS
26.	P	Z	23 04 41
	e	NE	42
	51.3 N., 179.0 E.		
	Rat Is.		
	h: 48 km ca.		
	H= 22 58 13.4		USCGS
26.	P	Z	23 43 12.5
	P: C		
	2.0 S., 126.5 E.		
	Molucca Sea.		
	h: 33 km ca.		
	H= 23 35 41		USCGS
27.	P	Z	01 59 57.5
	i	N	02 00 06
27.	iP	NEZ	02 19 19.5
	i	NEZ	21
	S	N	20 09
	P: S, W		
	38.8 N., 142.0 E.		
	Near east coast of Honshu, Japan.		
	h: 33 km ca.		
	H= 02 18 23		USCGS
27.	P	NZ	02 51 06
	i	Z	15
	eL	N	03 06 10
	eL	E	15
	54.5 N., 161.6 E.		
	Near east coast of Kamchatka.		
	h: 33 km ca.		
	H= 02 45 52		USCGS
27.	e	E	03 27 00
	e	E	39 23
	e	E	48 32
	e	N	50
27.	e	E	04 21 53
	e	E	30 42
27.	e	E	04 46 20
	e	E	48 31

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Date	Phase	Comp.	Time(GMT) h m s
27.	P	Z	05 48 13.8
	i	N	14
	S	E	49 30
	i	E	35
	i	N	37.5
	P: C		
	29.8 N., 140.4 E.		
	South of Honshu, Japan.		
	h: 155 km ca.		
	H= 05 46 33		USCGS
27.	eP	Z	07 14 56
	i	E	56.5
	i	N	57
	S	E	59
27.	P	Z	07 21 05
	i	E	06
	S	E	22 55
	e	E	23 33
27.	e	E	09 45 00ca.
	50.4 N., 178.2 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 08 57 51		USCGS
27.	eP	Z	09 50 18
	i	EZ	30
	e	E	10 00 00
27.	P	Z	10 16 40
	e	E	24 20
	eL	E	45 00
27.	iP	Z	11 02 30.1
	i	NE	30.6
	sP	Z	03 10
	PcP	Z	04 13
	PcS	Z	07 50
	S	NEZ	08 48
	e	E	11 46
	eScS	N	12 14
	e	N	16 40
	e	EZ	50
	P: C		
	Mag. $5\frac{1}{2}$-$5\frac{3}{4}$ (Mat.)		
	7.0 S., 129.5 E.		
	Banda Sea.		
	h: 67 km ca.		
	H= 10 54 28.0		USCGS
27.	P	Z	11 50 28.4
	P: C		

Date	Phase	Comp.	Time(GMT) h m s
27.	e	E	13 29 30
	51.2 N., 175.4 E.		
	Rat Is.		
	h: 33 km ca.		
	H= 13 18 51		USCGS
27.	iP	NZ	13 31 29.2
	eS	N	55
	P: N, C		
27.	P Z, eP NE		14 07 59
27.	eP	NEZ	14 20 57
27.	iP	NZ	14 21 43.2
	i	E	43.5
	S	NE	32 16
	eL	E	53 11
	eL	E	57 00
	P: N, D		
	Mag. $5\frac{3}{4}$-6 (Mat.)		
	35.7 N., 23.5 E.		
	Crete.		
	h: 50 km ca.		
	H= 14 09 07.1		USCGS
27.	iP	NZ	14 53 49.2
	P: S, C		
	48.3 N., 146.4 E.		
	Sea of Okhotsk.		
	h: 428 km ca.		
	H= 14 50 55		USCGS
27.	P	Z	14 58 17.6
	P: C		
	24.1 S., 179.5 W.		
	South of Fiji Is.		
	h: 405 km ca.		
	H= 14 47 35		USCGS
27.	eP	NEZ	15 17 32
	eS	E	18 15
27.	P	Z	16 11 27.5
	P: C		
27.	e	E	16 32 21
	e	N	33 10
27.	P	Z	18 23 29
27.	eSS	E	20 47 18
	eL	E	21 06 56

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	
	eL	N	21 07 40	
	Mag. 6 (Mat.)			
	1.5 N., 85.2 W.			
	Off coast of Ecuador.			
	h: 33 km ca.			
	H= 20 09 18			USCGS
27.	P	Z	21 13 05	
	53.5 N., 165.4 W.			
	Fox Is.			
	h: 33 km ca.			
	H= 21 04 46			USCGS
27.	e	E	22 19 10	
27.	iP	NEZ	23 59 22.0	
	i	Z	26	
	i	E	32	
	P: W, C			
28.	P	Z	01 26 53	
	i	NE	27 32	
28.	iP EZ, P N		01 32 37.8	
	eS	E	38 36	
	P: W, C			
	52.0 N., 176.1 W.			
	Andresnof Is.			
	h: 47 km ca.			
	H= 01 25 42.3			USCGS
28.	P	Z	01 35 05	
28.	e	NE	02 42 30	
	e	E	44 36	
	e	N	40	
28.	eP	Z	07 47 46	
	e	E	58 27	
	7.2 S., 155.0 E.			
	Solomon Is.			
	h: 143 km ca.			
	H= 07 39 34.0			USCGS
28.	P	NEZ	10 38 33	
	S	N	48 18	
	e	E	28	
	eSS	E	58 38	
	eSS	N	40	
	eL	N	11 02 42	
	eL	Z	03 22	
	Mag. 5½ (Mat.)			
	27.1 S., 176.5 W.			
	Kermadec Is.			
	h: 33 km ca.			
	H= 10 26 44			USCGS

Date	Phase	Comp.	Time(GMT) h m s	
28.	P	NZ	11 23 40	
	i	NE	24 11	
28.	P	EZ	12 10 52	
	eS	N	13 49	
	e	E	14 08	
	eL	N	15 24	
	eL	E	27	
	24.7 N., 127.0 E.			
	Ryukyu Is.			
	h: 33 km ca.			
	H= 12 07 14.5			USCGS
28.	iP Z, P NE		12 14 31.0	
	iS	NE	49.4	
	P: C			
28.	P	Z	13 19 56	
28.	eP	Z	14 12 11	
	e	N	54	
28.	P	Z	14 34 45	
	i	NZ	35 38	
	7.2 S., 128.9 E.			
	Banda Sea.			
	h: 157 km ca.			
	H= 14 26 50			USCGS
28.	iP Z, P N		14 43 06.0	
	S	NEZ	18.0	
	P: C			
28.	iP	NZ	16 34 16.5	
	i	E	16.9	
	S	N	35 25	
	P: S, C			
	40.7 N., 140.9 E.			
	Honshu, Japan.			
	h: 79 km ca.			
	H= 16 33 07			USCGS
28.	eP	Z	20 30 32	
	e	N	35 50	
	e	E	36 37	
28.	P	Z	23 00 36	
	i	Z	43	
	eS	E	06 32	
	eL	E	09 43	
	eL	N	50	
	eL	N	12 19	
	Mag. 5-5¼ (Mat.)			
	3.8 S., 136.0 E.			
	West New Guinea.			
	h: 33 km ca.			
	H= 22 53 01.7			

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Date	Phase	Comp.	Time(GMT) h m s
28.	eP	Z	23 32 41
	S	N	33 30
	i	E	40
	i	N	49
29.	eP	Z	00 41 18
29.	eP	Z	05 17 32
	e	NE	35
	eS	NE	18 15
	i	Z	19
29.	P	NZ	05 37 28
	i	E	38 00ca.
29.	iP	NZ	06 13 17.1
	i	Z	14 36
	P: S, C		
	52.1 N., 152.2 E.		
	Northwest of Kurile Is.		
	h: 451 km ca.		
	H= 06 09 31		USCGS
29.	iP	Z	07 25 17.2
	i	NE	17.9
	e	NE	26 40
	P: C		
	43.2 N., 142.9 E.		
	Hokkaido, Japan region.		
	h: 101 km ca.		
	H= 07 23 28		USCGS
29.	P	Z	08 08 38
	S	NEZ	09 00
29.	iP	Z	09 54 53.0
	P: C		
	22.1 S., 179.8 E.		
	South of Fiji Is.		
	h: 540 km ca.		
	H= 09 44 34.2		USCGS
29.	e	E	10 33 00ca.
	e	E	45 54
	37.0 N., 26.9 E.		
	Dodecanese Is.		
	h: 30 km ca.		
	H= 09 46 57.7		USCGS
29.	iP	Z	11 24 11.6
	i	NE	12.5
	i	Z	38
	e	E	28 24
	P: C		
	15.3 N., 145.6 E.		

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Date	Phase	Comp.	Time(GMT) h m s
	Mariana Is.		
	h: 134 km ca.		
	H= 11 19 25.6		USCGS
29.	eP	NZ	11 28 05
	i	N	13
29.	P	Z	11 40 18
	32.5 S., 179.1 W.		
	South of Kermadec Is.		
	h: 64 km ca.		
	H= 11 28 19.1		USCGS
29.	iP	Z	11 47 11.4
	i	NE	12
	S	NE	33
	P: C		
29.	eP	Z	13 05 10
29.	iP	NZ	14 10 43.0
	P: S, C		
	55.1 N., 165.8 E.		
	Bering Sea.		
	h: 33 km ca.		
	H= 14 05 06.9		USCGS
29.	iP	Z	15 39 48.3
	i	NE	49
	PcP?	Z	40 08
	PP	Z	42 14
	S	E	48 51
	i	N	56
	ScS	NE	49 44
	SS	NE	53 40
	L	Z	56 48
	L	E	54
	L	N	58 26
	L	EZ	16 01 36
	P: D		
	Mag. $6\frac{1}{2}$-$6\frac{3}{4}$ (Mat.)		
	47.4 N., 122.4 W.		
	Washington.		
	h: 57 km ca.		
	H= 15 28 43.3		USCGS
29.	iP	EZ	15 51 24.6
	eS	NE	52 03
	P: E, D		
29.	P	NEZ	15 57 00
	PcP	EZ	58 15
	pP	Z	48
	sPP	Z	16 01 17
	5.6 S., 110.2 E.		

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Date	Phase	Comp.	Time(GMT) h m s
	Java Sea. h: 504 km ca. H= 15 48 57.1		USCGS
29.	eP	Z	16 30 21
	S	NE	47
29.	iP EZ, P N		19 10 40.4
	S	E	55
	i	N	58
	P: W, C		
29.	P	Z	22 44 11
	32.6 S., 177.4 W. South of Kermadec Is. h: 33 km ca. H= 22 32 04.9		USCGS
30.	iP	Z	00 50 09.4
	S	NEZ	32
	P: C		
30.	iP Z, P NE		04 07 35.0
	S	NZ	48
	P: C		
30.	eP	Z	06 05 24
	S?	NE	41
30.	iP EZ, P N		09 44 52.2
	S	NE	45 17
	P: E, D		
30.	P	Z	11 53 06
30.	P	Z	12 04 26
	10.9 N., 62.4 W. Near coast of Venezuela. h: 86 km ca. H= 11 45 27.1		USCGS
30.	iP EZ, P N		15 32 02.5
	eS?	E	31
	P: W, C		
30.	P	Z	16 02 42
	i	Z	03 32
	i	NEZ	04 00ca.
30.	iP	Z	16 07 06.9
	i	EZ	12.5
	51.6 N., 175.0 E. Rat Is. h: 33 km ca. H= 16 00 57.5		USCGS
30.	P	Z	17 46 09.5
	i	NE	10.5
30.	P	NZ	18 11 00
	eS	E	22
	i	N	25.8
30.	iP	Z	19 31 48.8
	i	NE	49.0
	S	E	32 57
	e	E	33 00
	eL	N	29
	P: D		
	30.9 N., 142.0 E. South of Honshu, Japan. h: 38 km ca. H= 19 30 14.5		USCGS
30.	P	Z	20 44 17
	eS	E	45 22

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Director