



Matsushiro Seismological Observatory, Japan

SEISMOLOGICAL BULLETIN
OF
MATSUSHIRO
MATSUSHIRO

Latitude 36° 22' 00"
Longitude 138° 12' 00"
Elevation 460 m

Instrumental Constants

SEPTEMBER, OCTOBER

1969

Instrument	Comp.	Gain	Time Constant	Damping ratio	Magnification	
Small Seismograph	N	$D = 1.0$	$T_1 = 0.23$	$b_1 = 0.63$	$b_2 = 1.7$	20 cm (max)
(Short Period)	E	$D = 1.0$	$T_1 = 0.22$	$b_1 = 0.62$	$b_2 = 1.6$	20 cm (max)
	Z	$D = 1.0$	$T_1 = 0.21$	$b_1 = 0.61$	$b_2 = 1.5$	20 cm (max)
Small Seismograph	N	$D = 1.0$	$T_1 = 80$	$b_1 = 0.63$	$b_2 = 2.5$	3,700 (max)
(Long Period)	E	$D = 1.0$	$T_1 = 90$	$b_1 = 0.64$	$b_2 = 2.5$	4,700 (max)
	Z	$D = 1.0$	$T_1 = 66$	$b_1 = 0.67$	$b_2 = 2.7$	3,500 (max)
WSS Seismograph	N	$D = 1.0$	$T_1 = 0.75$			100,000
(Short Period)	E	$D = 1.0$	$T_1 = 0.75$			100,000
	Z	$D = 1.0$	$T_1 = 0.75$			100,000
WSS Seismograph	N	$D = 15$	$T_1 = 100$			3,000
(Long Period)	E	$D = 15$	$T_1 = 100$			3,000
	Z	$D = 15$	$T_1 = 100$			3,000
Short Period Vertical Seismograph	Z	$D = 1.0$	$T_1 = 2.22$	$b_1 = 1.4$	$b_2 = 1.3$	32,000 (max)
Hand-Addressed Seismograph	N		$T_1 = 0.8$	$b_1 = 0.8$		1,200
	E		$T_1 = 0.8$	$b_1 = 0.8$		1,200

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

September, 1963

Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
1.	P	Z	05 28 16	2.	P	Z	05 28 16
	S	E	05 30 18		S	E	05 30 18
1.	P	N	05 33 50		P	N	05 33 50
	S	E	05 35 50		S	E	05 35 50
			20.5 S., 174.4 W.				
			Tonga Is.				
			h: N.				
			H= 05 22 25.				

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 = 0.63 h ₂ = 1.7	46,000 (max)
	E	T ₁ = 1.0 T ₂ = 0.22	h ₁ = 0.64 h ₂ = 1.6	46,000 (max)
	Z	T ₁ = 1.0 T ₂ = 0.21	h ₁ = 0.67 h ₂ = 1.2	57,000 (max)
Benioff Seismograph (Long Period)	N	T ₁ = 1.0 T ₂ = 89	h ₁ = 0.63 h ₂ = 2.5	3,200 (max)
	E	T ₁ = 1.0 T ₂ = 55	h ₁ = 0.64 h ₂ = 2.5	4,700 (max)
	Z	T ₁ = 1.0 T ₂ = 64	h ₁ = 0.67 h ₂ = 2.7	3,500 (max)
WWSS Seismograph (Short Period)	N	T ₁ = 1.0 T ₂ = 0.75		100,000
	E	T ₁ = 1.0 T ₂ = 0.75		100,000
	Z	T ₁ = 1.0 T ₂ = 0.75		100,000
WWSS Seismograph (Long Period)	N	T ₁ = 15 T ₂ = 100		3,000
	E	T ₁ = 15 T ₂ = 100		3,000
	Z	T ₁ = 15 T ₂ = 100		3,000
Short Period Vertical Seismograph	Z	T ₁ = 1.0 T ₂ = 2.82	h ₁ = 1.4 h ₂ = 1.2	32,000 (max)
Wood-Anderson Seismograph	N	T = 0.8	h = 0.8	1,300
	E	T = 0.8	h = 0.8	1,200

September, 1969

Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
1.	P S	Z Z	02 28 10 26	2.	P	Z	01 28 58
1.	P eLq	N N	05 33 50 52.0	2.	ePKP 1 PKP 2 pPKP SKKS eX eX sSS SSS G	Z Z Z E E E N N N	04 06 45 07 18 08 00 17 28 21 52 29 55 31 43 37 38 51.5
			20.5 S., 174.4 W. Tonga Is. h: N. H= 05 22 25.9				27.7 S., 66.5 W. Ctamarca Province, Argentina. h: 174 km. H= 03 47 09.1
			USCGS				USCGS
1.	P S	Z E	06 29 16 30 18	2.	P iX	EZ Z	07 18 59 19 36
1.	eP ePP S eSS eLq Lr	Z Z N N N E	08 28 09 32 06 39 36 45 40 52 30 55 48	2.	P iX	EZ Z	07 18 59 19 36
			58.9 S., 149.1 E. West of Macquarie I. h: N. H= 08 14 55.1				36.4 N., 141.2 E. Near Honshu, Japan. h: 30 km. H= 07 18 19.0
			USCGS				JMA
1.	P	E	08 53 11	2.	iP iX X S	NEZ Z N E	07 24 56.8 25 07 41 26 34
1.	P	Z	09 17 38				P: N, E, C 30.3 N., 131.0 E. Kyushu, Japan. h: 15 km. H= 07 22 49.4
1.	P S	NE N	09 47 24 48 14				USCGS
			40.5 N., 143.8 E. Off east coast of Honshu, Japan. h: N. H= 09 45 57.6	2.	iP	NEZ	12 07 25.8
			USCGS				P: N, E, C 36.2 N., 137.7 E. Honshu, Japan. h: 0 km. H= 12 07 13.9
1.	P	NE	09 52 10				JMA
			43.1 N., 147.6 E. Kurile Is. h: N. H= 09 49 52.0	2.	iP S	Z E	12 38 49.5 40 09
			USCGS				P: D 29.8 N., 137.3 E. South of Honshu, Japan. h: 486 km. H= 12 37 05.9
1.	eP	Z	11 21 53				USCGS
1.	iP eS	EZ E	12 45 55.5 46 16	2.	P S Lq Lr	Z N E Z	12 45 25 50 54 53 30 55 20
			P: N, E, D				2.9 N., 126.7 E. Mblucca Passage. h: 47 km. H= 12 38 36.7
1.	P	Z	17 32 47				USCGS
1.	iP S X	Z Z E	18 49 20.9 50 31 43				
			P: D 41.4 N., 142.7 E. Hokkaido, Japan region. h: 43 km. H= 18 47 52.7				USCGS

September, 1969

Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
2.	P	Z	15 22 20	3.	P	Z	06 58 57
			43.4 N., 147.3 E.		eS	N	07 00 47
			Kurile Is.				43.4 N., 147.5 E.
			h: N.				Kurile Is.
			H= 15 20 02.8				h: N.
			USCGS				H= 06 56 36.6
							USCGS
2.	eP	Z	16 55 21	3.	P	Z	07 33 21
	iX	Z	24.4	3.	iP	NEZ	07 59 53.2
	P: C				S	N	08 00 13
2.	P	Z	19 28 24				P: S, E, D
	X	N	38				36.1 N., 139.9 E.
3.	P	Z	00 58 48				Honshu, Japan.
			17.5 S., 167.9 E.				h: 40 km.
			New Hebrides Is.				H= 07 59 28.6
			h: 28 km.				JMA
			H= 00 48 38.9	3.	eP	Z	12 52 15
			USCGS	3.	iP	NEZ	16 21 43.6
3.	P	Z	00 59 43		S	Z	22 55
	S	N	01 00 02				P: N, W, C
3.	P	Z	01 38 33				31.5 N., 140.2 E.
	S	E	43 50				South of Honshu, Japan.
	Lq	E	45 44				h: 16 km.
	iX	N	46 42				H= 16 20 21.5
			4.4 N., 128.4 E.				USCGS
			North of Halmahera.	3.	eP	Z	16 48 05
			h: 58 km.	3.	iP	Z	18 38 04.0
			H= 01 32 00.8		iX	Z	14
			USCGS				P: D
3.	eP	Z	01 51 05				35.4 N., 140.3 E.
			3.7 N., 127.8 E.				Honshu, Japan.
			Talau Is.				h: 80 km.
			h: 65 km.				H= 18 37 28.9
			H= 01 44 34.9				JMA
			USCGS	3.	eP	Z	21 37 25
3.	P	Z	02 39 45				42.5 N., 147.0 E.
	S	NE	40 11				Off coast of Hokkaido, Japan.
3.	iP	NEZ	04 19 20.0				h: 69 km.
	S	NE	47				H= 21 35 15.2
			P: N, W, C				USCGS
3.	P	Z	04 21 39	3.	iP	Z	22 03 52.5
			43.3 N., 146.5 E.		S	N	05 40
			Kurile Is.				P: C
			h: N.				43.1 N., 147.5 E.
			H= 04 19 26.8				Kurile Is.
			USCGS				h: N.
							H= 22 01 31.4
							USCGS
3.	P	Z	05 05 26	3.	P	NEZ	22 11 02
3.	eP	Z	05 31 40		S	E	12 15
3.	eP	Z	06 20 34				32.9 N., 131.2 E.
			53.1 N., 169.9 W.				Kyushu, Japan.
			Fox Is.				h: 98 km.
			h: 52 km.				H= 22 09 23.1
			H= 06 13 09.3				USCGS
			USCGS	3.	P	NEZ	22 52 45

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
1.	P	Z	02 38 10	1.	P	Z	02 38 10
	S	Z	26				
1.	P	N	05 33 30	1.	P	N	05 33 30
			50.5 S., 174.4 W.				Tonga Is.
			h: N.				h: N.
			H= 05 22 25.3				H= 05 22 25.3
			USCGS				USCGS
1.	P	Z	08 28 16	1.	P	Z	08 28 16
	S	E	30 18				
1.	eP	Z	08 28 00	1.	eP	Z	08 28 00
	eP	Z	32 06				
	S	N	30 36				
	eS	N	42 40				
	eP	N	52 30				
	Lr	E	52 48				
			28.9 S., 149.1 E.				West of Macarrie I.
			h: N.				h: N.
			H= 08 14 52.1				H= 08 14 52.1
			USCGS				USCGS
1.	P	E	08 23 11	1.	P	E	08 23 11
1.	P	Z	09 17 38	1.	P	Z	09 17 38
1.	P	NE	09 47 24	1.	P	NE	09 47 24
	S	N	48 14				
			40.2 N., 143.8 E.				Off east coast of Honshu,
			h: 15 km.				Japan.
			H= 07 22 43.4				h: N.
			USCGS				H= 07 22 43.4
							USCGS
1.	P	NE	09 22 10	1.	P	NE	09 22 10
			43.1 N., 147.6 E.				43.1 N., 147.6 E.
			h: N.				h: N.
			H= 09 49 22.0				H= 09 49 22.0
			USCGS				USCGS
1.	eP	Z	11 21 23	1.	eP	Z	11 21 23
1.	iP	EZ	12 42 22.2	1.	iP	EZ	12 42 22.2
	S	E	46 16				
			P: N, E, D				
			h: 486 km.				h: 486 km.
			H= 12 37 02.3				H= 12 37 02.3
			USCGS				USCGS
1.	P	Z	17 32 47	1.	P	Z	17 32 47
1.	iP	Z	18 43 20.3	1.	iP	Z	18 43 20.3
	S	Z	20 31				
	Lr	E	43				
			P: D				
			41.4 N., 143.7 E.				41.4 N., 143.7 E.
			h: 47 km.				h: 47 km.
			H= 12 28 36.5				H= 12 28 36.5
			USCGS				USCGS

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
4.	P S	Z N	03 12 22 15 12	5.	F	Z	00 37 16
							18.1 S., 173.2 W. Tonga Is. h: N. H=00 25 58.9
							USCGS
				5.	eP	Z	05 18 30
4.	iP P: C	Z	03 57 07.0	5.	eP iX	Z Z	07 18 58 19 05
							46.4 N., 153.7 E. Kurile Is. h: N. H= 07 15 22.6
							USCGS
				5.	P	Z	11 17 37
4.	P S	Z E	04 32 33 34 15				44.4 N., 148.3 E. Kurile Is. h: N. H= 11 15 03.1
							USCGS
				5.	P S Lq Lr	Z N NE Z	11 46 45 50 22 51 20 53 35
4.	eP iX	Z Z	04 38 23 30				22.7 N., 121.7 E. Taiwan region. h: 33 km. H= 11 42 14.0
							USCGS
				5.	eP	Z	12 08 07
4.	iP P: C	Z	11 36 14.3				13.2 N., 145.0 E. Mariana Is. h: 55 km. H= 12 05 55.1
							USCGS
				5.	P	Z	12 27 54
4.	P pP	NZ Z	16 36 53 37 28	5.	iP S	Z E	15 46 25.6 47 37
							P: C 31.1 N., 140.6 E. South of Honshu, Japan. h: 143 km. H= 15 44 57.1
							USCGS
4.	P	Z	17 12 25	5.	P	Z	16 14 58
4.	iP S	Z N	21 14 59.8 16 41				5.3 S., 154.0 E. Solomon Is. h: 180 km. H= 16 07 06.4
							USCGS
				5.	P eX	EZ E	16 30 06 51
4.	P S	Z E	23 48 58 50 41	5.	P X S	NZ Z N	17 05 03 03.5 40
							37.2 N., 142.0 E. (cont.)
							USCGS

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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
7.	P S Lq eLr	Z E E Z	03 14 44 21 44 27 00 28,6	7.	P X	Z N	14 06 03 07 24
			Mag. 5 $\frac{1}{2}$ (Mat.) 6.9 S., 157.7 E. Solomon Is. h: N. H= 03 06 02.2				30.5 N., 141.9 E. South of Honshu, Japan. h: N. H= 14 04 21.9
7.	eP	Z	04 26 47	7.	P S	Z N	18 46 05 48 26
							43.4 N., 148.1 E. Kurile Is. region. h: N. H= 18 43 37.8
7.	P eX	Z N	06 36 52 44 21	7.	eP S	Z N	19 21 21 56
7.	P X	Z Z	06 43 01 13	8.	eP	Z	02 40 15
			43.1 N., 147.7 E. Kurile Is. h: N. H= 06 40 38.4				43.1 N., 147.3 E. Kurile Is. h: N. H= 02 37 59.2
7.	iP iX	Z Z	06 54 59.4 55 21.0	8.	P eX	NZ N	02 45 41 47 33
			P: D 38.6 N., 142.0 E. Near Honshu, Japan. h: 50 km. H= 06 54 01.3				41.7 N., 142.1 E. Hokkaido, Japan region. h: N. H= 02 44 07.0
7.	iP NZ, P E iX	Z Z	08 40 35.0 48	8.	P eX	Z N	05 53 22 59 34
			P: S, C				
7.	P S sS SS sSS	Z N E E E	08 48 41 55 06 56 06 59 28 09 00 52	8.	P PP S Lq Lr	Z Z N E Z	12 53 36 55 24 13 00 00 03 28 07 24
			6.6 S., 155.8 E. Solomon Is. h: 173 km. H= 08 40 34.3				5.1 S., 153.4 E. New Ireland region. h: 47 km. H= 12 45 34.6
7.	P S X	Z N NE	12 36 06 37 56 38 14	8.	P eS	Z N	21 00 12 01 54
			43.0 N., 146.8 E. Kurile Is. h: N. H= 12 33 51.1				43.6 N., 147.9 E. Kurile Is. h: N. H= 20 57 36.7
7.	eP	Z	13 50 00	8.	P	Z	22 04 23
			30.5 N., 141.0 E. South of Honshu, Japan. h: 97 km. H= 13 48 20.3				
				9.	iP X	NZ N	00 59 48.5 01 00 12
							P: S, C

September , 1969

Date	Phase	Comp.	Time(GMT)			Date	Phase	Comp.	Time(GMT)		
			h	m	s				h	m	s
9.	P X	Z Z	03	28	36 43	10.	P X	Z NEZ NE	04	31	17 07 49 24 51 58
											44.0 N., 143.1 E. Kurile Is. h: 73 km. H= 03 25 03.5 USCGS
9.	iP E, Z S	P N N	03	34	48.6 35 57	10.	P X	Z NEZ NE	03	43	25 12 25 23 34 46 39 47 43 15 46 36
											P: W, D 33.3 N., 131.9 E. Near Shikoku, Japan. h: 60 km. H= 03 33 18.8 JMA
9.	iP	NEZ	05	15	53.0	10.	P X S S Lr	Z NEZ N E N	05	15	53.0
											P: N, E, C Mag. 6.6 (JMA) 35.7 N., 137.0 E. Honshu, Japan. h: 29 km. H= 05 15 37.7 USCGS
9.	iP	Z	11	03	57.0	11.	P X S S	Z NEZ N E	03	20	08 20 22 35 40
											19.4 N., 145.4 E. Mariana Is. h: 93 km. H= 10 59 45.7 USCGS
9.	eP	Z	11	07	24	11.	iP S P: S, W, C	NEZ N NEZ N	06	21	30.0 22 07
											P: S, W, C 38.2 N., 141.7 E. Near east coast of Honshu, Japan. h: 94 km. H= 06 20 39.7 USCGS
9.	PS SS L Lr	Z E N E	15	52	08 58 07 16 09 18 14 20	11.	eP X X	Z NEZ NZ	08	39	24 09 34 15 21 35 02
											4.4 S., 105.9 W. Northern Easter I. Cordillera. h: N. H= 15 23 10.8 USCGS
9.	iP S P: D	Z E	17	53	37.6 57	11.	P eS X	Z N NZ	12	55	26 56 51 57 02
											18 16 31.9 56 P: C
9.	iP Z, P S	NE E	18	30	03.2 24	11.	P P P P S	Z Z NEZ NEZ NEZ	16	45	51 18 47 03 19 30 06 23 19 48 20 11
											P: C 35.6 N., 139.8 E. Near Honshu, Japan. h: 90 km. H= 18 29 34.4 JMA
10.	P eS	Z N	04	23	21 51						

September, 1961

Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
12.	eP	Z	01 21 21				
					Andreanof Is. h: 55 km. H= 08 06 08.8 USCGS		
12.	P	Z	01 22 21				
	S	N	23 13				
	X	EZ	26	12.	P	EZ	08 16 01
					51.1 N., 179.2 W. Andreanof Is. h: 46 km. H= 08 09 24.4 USCGS		
12.	iP	NEZ	01 33 26.2				
	S	NE	33				
	P: N, W, D			12.	iP	EZ, P N	09 03 43.8
					X	Z	06 27
12.	iP	NZ, P E	02 17 42.7		S	N	09 06
	S	E	19 27		X	Z	10 09
	X	N	35		L	NEZ	11.0
	P: N, D 43.4 N., 146.4 E. Kurile Is. h: 62 km. H= 02 15 32.1 USCGS				X	E	14 13
					P: S, W, C Mag. 7 (Mat.) 51.2 N., 179.2 W. Andreanof Is. h: 48 km. H= 08 57 07.3 USCGS		
12.	iP	Z	03 25 46.8				
	P: S, D 18.6 S., 174.9 W. Tonga Is. h: 135 km. H= 03 14 44.9 USCGS			12.	P	NEZ	11 50 03
					X	E	51 51
12.	P	Z	04 30 00		43.3 N., 147.8 E. Kurile Is. h: N. H= 11 47 39.9 USCGS		
12.	iP	Z, P NE	05 44 35.4				
	iS	NEZ	50.0				
	P: C			12.	P	NEZ	13 28 38
12.	P	EZ	07 22 26				
	L	N	29.8	12.	eP	Z	14 17 15
	L	EZ	30.0		S	N	56
	51.3 N., 179.2 W. Andreanof Is. h: 44 km. H= 07 15 50.0 USCGS				38.0 N., 142.1 E. Near east coast of Honshu, Japan. h: 40 km. H= 14 16 21.0 JMA		
12.	P	Z	07 49 20				
	X	N	57 24	12.	iP	Z, P NE	15 06 55.3
	51.1 N., 179.1 W. Andreanof Is. h: 48 km. H= 07 42 43.7 USCGS				PcP	Z	09 35
					S	E	12 14
12.	P	EZ	08 06 53		X	Z	30
	S	E	12 10		X	N	40
	Lq	N	14 00		L	EZ	14 30
	Lr	Z	16.0		L	N	40
	51.1 N., 179.3 W. Andreanof Is. h: 49 km. H= 08 00 16.8 USCGS				P: C Mag. 5½- 5¼ (Mat.) 51.3 N., 179.2 W. Andreanof Is. h: 53 km. H= 15 00 18.8 USCGS		
12.	P	Z	08 12 44	12.	P	NEZ	18 47 45
	51.1 N., 179.2 W. (cont.)			13.	P	NEZ	00 45 07
				13.	P	Z	01 29 06

September, 1969

Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
12	eP	Z	01 21 21	12	P	Z	01 21 21
12	P	Z	01 22 21	12	S	Z	01 22 21
12	X	NEZ	01 23 21	12	X	NEZ	01 23 21
12	P	NEZ	01 24 21	12	P	NEZ	01 24 21
12	P	NEZ	01 25 21	12	P	NEZ	01 25 21
12	P	NEZ	01 26 21	12	P	NEZ	01 26 21
12	P	NEZ	01 27 21	12	P	NEZ	01 27 21
12	P	NEZ	01 28 21	12	P	NEZ	01 28 21
12	P	NEZ	01 29 21	12	P	NEZ	01 29 21
12	P	NEZ	01 30 21	12	P	NEZ	01 30 21
12	P	NEZ	01 31 21	12	P	NEZ	01 31 21
12	P	NEZ	01 32 21	12	P	NEZ	01 32 21
12	P	NEZ	01 33 21	12	P	NEZ	01 33 21
12	P	NEZ	01 34 21	12	P	NEZ	01 34 21
12	P	NEZ	01 35 21	12	P	NEZ	01 35 21
12	P	NEZ	01 36 21	12	P	NEZ	01 36 21
12	P	NEZ	01 37 21	12	P	NEZ	01 37 21
12	P	NEZ	01 38 21	12	P	NEZ	01 38 21
12	P	NEZ	01 39 21	12	P	NEZ	01 39 21
12	P	NEZ	01 40 21	12	P	NEZ	01 40 21
12	P	NEZ	01 41 21	12	P	NEZ	01 41 21
12	P	NEZ	01 42 21	12	P	NEZ	01 42 21
12	P	NEZ	01 43 21	12	P	NEZ	01 43 21
12	P	NEZ	01 44 21	12	P	NEZ	01 44 21
12	P	NEZ	01 45 21	12	P	NEZ	01 45 21
12	P	NEZ	01 46 21	12	P	NEZ	01 46 21
12	P	NEZ	01 47 21	12	P	NEZ	01 47 21
12	P	NEZ	01 48 21	12	P	NEZ	01 48 21
12	P	NEZ	01 49 21	12	P	NEZ	01 49 21
12	P	NEZ	01 50 21	12	P	NEZ	01 50 21
12	P	NEZ	01 51 21	12	P	NEZ	01 51 21
12	P	NEZ	01 52 21	12	P	NEZ	01 52 21
12	P	NEZ	01 53 21	12	P	NEZ	01 53 21
12	P	NEZ	01 54 21	12	P	NEZ	01 54 21
12	P	NEZ	01 55 21	12	P	NEZ	01 55 21
12	P	NEZ	01 56 21	12	P	NEZ	01 56 21
12	P	NEZ	01 57 21	12	P	NEZ	01 57 21
12	P	NEZ	01 58 21	12	P	NEZ	01 58 21
12	P	NEZ	01 59 21	12	P	NEZ	01 59 21
12	P	NEZ	01 59 21	12	P	NEZ	01 59 21

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Date	Phase	Comp.	Time(GMT)
			h m s
13	eP	Z	02 12 11
13	P	NEZ	04 11 49
			34.2 N., 135.1 E.
			Honshu, Japan.
			h: 10 km.
			H= 04 10 39.7 JMA
13	P	Z	11 12 38
			22.9 S., 68.4 W.
			Northern Chile.
			h: 106 km.
			H= 10 52 58.0 USCGS
13	iP	NEZ	11 20 02.0
			33.8 N., 141.6 E.
			Near east coast of Honshu,
			Japan.
			h: 35 km.
			H= 11 19 03.0 USCGS
13	iP	NEZ	11 54 32.0
			43.5 N., 147.6 E.
			Kurile Is.
			h: 52 km.
			H= 11 52 15.3 USCGS
13	iP	NEZ	13 56 25.8
			41.6 N., 143.7 E.
			Hokkaido, Japan. region.
			h: 52 km.
			H= 20 00 28.3 USCGS
14	P	Z	01 19 02
			47.0 N., 153.6 E.
			Kurile Is.
			h: N.
			H= 01 15 22.8 USCGS
14	P	Z	04 33 19
			39.7 N., 74.9 E.
			Southern Sinkiang Province,
			China.
			h: N.
			H= 16 15 24.8 USCGS
14	P	E	06 07 31
			31.5
			45.0
			48.5
14	P	NEZ	06 14 13
			16 06
			(cont.)

Date	Phase	Comp.	Time(GMT)
			h m s
13	eL	NE	06 16 30
			55
			43.5 N., 147.7 E.
			Kurile Is.
			h: N.
			H= 06 11 55.8 USCGS
14	P	Z	06 32 44
14	P	Z	07 54 55
			55 19.3
14	eP	Z	10 03 46
			14 07
			10
			16 10
			15
			20
			20 15
			55
			6.3 N., 125.3 E.
			Mindanao, P. I.
			h: 35 km.
			H= 10 02 20.2 USCGS
14	iP	Z, P	12 51 30.0
			47
			53 20
			43.5 N., 147.6 E.
			Kurile Is.
			h: 53 km.
			H= 12 49 12.2 USCGS
14	P	Z	14 55 06
			18
			39.6 N., 74.9 E.
			Southern Sinkiang Province,
			China.
			h: N.
			H= 14 46 21.1 USCGS
14	P	EZ	16 24 09
			31 18
			35 00
			37 40
			42 00
			Mag. 6 1/2 (Mat.)
			39.7 N., 74.9 E.
			Southern Sinkiang Province,
			China.
			h: N.
			H= 16 15 24.8 USCGS
14	P	NEZ	18 05 02
			44
14	iP	NZ	18 19 10.3
			20.0
			P: N, C

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
14.	iP S P: S, W, D	NEZ NEZ	19 51 40.8 55	15.	P iX S S	NZ Z E N	17 01 25 26.0 02 45 47
14.	P eX eS X	EZ E E NE	23 05 48 07 34 47 08 18	15.	P eS L	Z N N	18 50 49 53 26 54 00
17.			42.7 N., 148.1 E. Off coast of Hokkaido, Japan. h: N. H= 23 03 32.0	15.			45.5 N., 151.6 E. Kurile Is. h: 44 km. H= 18 47 41.3
15.	P	NZ	04 27 50	16.	P eS eS	NEZ N EZ	01 20 20 22 45 50
17.			2.2 N., 126.5 E. Molucca Passage. h: N. H= 04 20 53.0	16.			45.6 N., 151.6 E. Kurile Is. h: 60 km. H= 01 17 14.6
15.	iPKP1 PKP2 PKP:	Z, PKP1 Z E, D	07 33 58.1 34 30	16.	P X	Z NEZ	02 25 45 58
17.			18.6 S., 69.0 W. Northern Chile. h: 177 km. H= 07 14 25.8	16.			45.7 N., 151.6 E. Kurile Is. h: N. H= 02 22 36.4
15.	iP P: D	Z	08 31 35.8	16.	eP	Z	03 30 54
15.	iP S P: S, W, C	NEZ NZ	14 11 22.5 12 31	16.	iP P: N, E, C	NEZ N, E, C	07 38 17.0
17.			39.5 N., 141.4 E. North of Honshu, Japan. h: 90 km. H= 14 10 23.3	16.	P S	Z NE	08 03 39 06 27
15.	eP eS X L L	Z NE Z N Z	14 32 52 35 15 40 36 05 10	16.			27.2 N., 127.3 E. Ryukyu Is. h: 94 km. H= 08 00 35.8
18.			45.4 N., 151.4 E. Kurile Is. h: 22 km. H= 14 29 41.2	16.	P	Z	14 35 22
15.	iP iX pP S X ScP L P: W, C	EZ N Z E E Z N	14 51 51.5 51.8 52 00 56 52 58 00 58 29 43	16.			41.4 N., 142.3 E. Near east coast of Honshu, Japan. h: 0 km. H= 14 33 50.4
18.			51.9 N., 175.5 E. Rat Is. h: 50 km. H= 14 45 42.0	16.	iP X eX S SSS eLq eLr P: S, W, C	NEZ Z Z E E N EZ	14 42 07.0 45 04 51 57 52 09 15 00 48 04.0 06.5
							Mag. 5 $\frac{1}{2}$ (Mat.)

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
			37.3 N., 116.5 W. Southern Nevada. h: 0 km. H= 14 30 00.0		eS	E	11 56 35
					eS	N	38
							43.3 N., 146.9 E. Kurile Is. h: 50 km. H= 11 52 37.6
16.	P	EZ	17 35 30				USCGS
17.	iP	NEZ	02 20 19.2	18.	P	Z	12 05 01
			P: N, E, D		X	Z	16
			53.1 N., 160.1 E. Near east coast of Kamchatka. h: 22 km. H= 02 15 20.1		X	N	19
					S	N	11 15
					Lq	E	14 16
					eLr	NZ	16.0
							3.2 S., 136.4 E. West New Guinea. h: 50 km. H= 11 57 33.0
17.	P	EZ	02 30 42				USCGS
17.	eP	Z	07 33 34				
17.	eP	Z	17 16 29	18.	P Z, eP	NE	15 15 47
	X	NE	30		X	EZ	16 09
	S	NE	17 12		S	N	17
			34.2 N., 135.3 E. Honshu, Japan. h: 10 km. H= 17 15 23.3				
							01 36 00.0
					PP	NEZ	37 10
					S	Z	41 06
					S	NE	07
					ScP	Z	42 21
					eScP	NE	22
					eL	N	43.0
					ScS	NE	46 22
							P: S, D
							Mag. 5 $\frac{1}{2}$ -6 (Mat.)
							6.1 N., 125.4 E. Mindanao, P. I. h: 95 km. H= 01 29 37.4
							USCGS
17.	iP	Z	18 53 02.2	19.	PKP	Z	05 20 37
	eS	E	44 25				24.7 S., 70.0 W. Near coast of northern Chile. h: 55 km. H= 05 00 17.2
			P: S, W, D				USCGS
			Mag. 6.2 (Mat.)				
			31.1 N., 131.3 E. Kyushu, Japan. h: 8 km. H= 18 40 45.8				
17.	iP	Z	18 53 02.2				
	S	NZ	55 27				
			Mag. 5.9 (Mat.)				
			31.2 N., 131.4 E. Kyushu, Japan. h: 23 km. H= 18 51 07.8				
18.	P	NEZ	01 43 42	19.	P	NEZ	06 00 52.2
					S	NEZ	01 30
							P: S, W, D
18.	iP	NZ	02 30 14.2	19.	P	EZ	09 01 29
	S	EZ	31 30		S	NEZ	54
			P: N, C				
18.	P	NEZ	05 18 12	19.	P	Z	12 02 51
			25.3 S., 179.6 E. South of Fiji Is. h: 525 km. H= 05 07 36.1		iX	NZ	53.0
							40.9 N., 141.5 E. Near east coast of Honshu, Japan. h: 90 km. H= 12 01 36.4
							JMA
18.	P	Z	07 31 21				
18.	P	NEZ	11 54 50				
	X	Z	55 00				

(cont.)

Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
			37.3 N., 116.5 W. Southern Nevada. h: 0 km. H= 14 30 00.0		eS	E	11 56 35
					eS	N	38
							43.3 N., 146.9 E. Kurile Is. h: 50 km. H= 11 52 37.6
16.	P	EZ	17 35 30				USCGS
17.	iP	NEZ	02 20 19.2	18.	P	Z	12 05 01
			P: N, E, D		X	Z	16
			53.1 N., 160.1 E. Near east coast of Kamchatka. h: 22 km. H= 02 15 20.1		X	N	19
					S	N	11 15
					Lq	E	14 16
					eLr	NZ	16.0
							3.2 S., 136.4 E. West New Guinea. h: 50 km. H= 11 57 33.0
17.	P	EZ	02 30 42				USCGS
17.	eP	Z	07 33 34				
17.	eP	Z	17 16 29	18.	P Z, eP	NE	15 15 47
	X	NE	30		X	EZ	16 09
	S	NE	17 12		S	N	17
			34.2 N., 135.3 E. Honshu, Japan. h: 10 km. H= 17 15 23.3				
							01 36 00.0
					PP	NEZ	37 10
					S	Z	41 06
					S	NE	07
					ScP	Z	42 21
					eScP	NE	22
					eL	N	43.0
					ScS	NE	46 22
							P: S, D
							Mag. 5 $\frac{1}{2}$ -6 (Mat.)
							6.1 N., 125.4 E. Mindanao, P. I. h: 95 km. H= 01 29 37.4
							USCGS
17.	iP	Z	18 53 02.2	19.	PKP	Z	05 20 37
	eS	E	44 25				24.7 S., 70.0 W. Near coast of northern Chile. h: 55 km. H= 05 00 17.2
			P: S, W, D				USCGS
			Mag. 6.2 (Mat.)				
			31.1 N., 131.3 E. Kyushu, Japan. h: 8 km. H= 18 40 45.8				
17.	iP	Z	18 53 02.2				
	S	NZ	55 27				
			Mag. 5.9 (Mat.)				
			31.2 N., 131.4 E. Kyushu, Japan. h: 23 km. H= 18 51 07.8				
18.	P	NEZ	01 43 42	19.	P	NEZ	06 00 52.2
					S	NEZ	01 30
							P: S, W, D
18.	iP	NZ	02 30 14.2	19.	P	EZ	09 01 29
	S	EZ	31 30		S	NEZ	54
			P: N, C				
18.	P	NEZ	05 18 12	19.	P	Z	12 02 51
			25.3 S., 179.6 E. South of Fiji Is. h: 525 km. H= 05 07 36.1		iX	NZ	53.0
							40.9 N., 141.5 E. Near east coast of Honshu, Japan. h: 90 km. H= 12 01 36.4
							JMA
18.	P	Z	07 31 21				
18.	P	NEZ	11 54 50				
	X	Z	55 00				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
21.	iP eS P: S, W, C	NEZ N	03 59 35.4 04 00 42				
					Hokkaido, Japan. h: 50 km. H= 03 16 24.2 USC GS		
21.	eP	Z	05 16 12	22.	P PcP S L P: E, C	Z Z N EZ	04 01 41 02 56 03 25 12 48
21.	iP eS P: S, W, C	NEZ E	06 02 13.5 03 23		Mag. $6\frac{1}{2}$ - $6\frac{3}{4}$ (Mat.) 2.9 N., 15.9 E. Off west coast of northern Sumatra. h: N. H= 03 52 37.4 USC GS		
21.	iP pPP P: N, W, C	NEZ N	07 22 40.0 26 16				
					17.5 S., 174.7 W. Tonga Is. h: 235 km. H= 07 11 53.6 USC GS		
21.	ePKP	Z	11 47 45	22.	eP	Z	05 30 06
					13.1 N., 144.3 E. Mariana Is. h: 49 km. H= 05 24 51.7 USC GS		
21.	iP iX P: D	EZ N	12 09 32.3 11 09	22.	iP S P: N, W, C	NEZ NEZ	03 19 37.0 55
21.	P L	Z E	16 15 43 21 00	22.	eP	Z	11 46 04
					17.3 N., 145.6 E. Mariana Is. h: 153 km. H= 11 41 42.5 USC GS		
21.	eP eS	Z N	16 28 00 29 44	22.	L	Z	14 51.5
21.	X X	E E	21 23.7 35.0		5.0 N., 32.6 W. Central Mid-Atlantic Ridge. h: N. H= 13 47 52.2 USC GS		
22.	P PPP S SS L P: N, E, C	Z Z E Z N	01 55 16 53 23 02 02 34 06 08 08 12	22.	X L L	Z E Z	22 43 53 53 32 23 07 40
					Mag. $6\frac{1}{2}$ - $6\frac{3}{4}$ (Mat.) 2.9 N., 15.9 E. Off west coast of northern Sumatra. h: N. H= 01 46 13.5 USC GS		
22.	eP eS	NEZ N	02 38 03 40 04	23.	iP S P: S, D	NZ NE	00 42 50.7 43 05
					Mag. 6 (Mat.) 27.3 S., 113.4 W. Easter I. region. h: N. H= 01 22 03.3 USC GS		
22.	P	Z	03 18 03	23.	iP S P: S	NEZ Z	02 06 24.2 28
					42.3 N., 142.7 E.		

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
23.	iP iX P: C	Z Z	02 26 53.0 27 04.5		S P: D	N	02 21 45
	45.5 N., 152.0 E. Kurile Is. region. h: 45 km. H= 02 23 39.3 USCGS				30.6 N., 141.6 E. South of Honshu, Japan. h: N. H= 02 13 50.8 USCGS		
23.	iP	Z	04 46 05.5	24.	eP L	N N	04 22 23 37 10
	P: D 44.0 N., 146.9 E. Kurile Is. h: N. H= 04 43 46.6 USCGS			24.	ePP SSS L Lq	Z Z E Z	18 22 24 41 40 56 05 19 02 50
					Mag. 7 (Mat.) 15.2 N., 45.8 W. Northern Atlantic Ridge. h: N. H= 13 03 19.0 USCGS		
23.	eP S	Z N	05 24 39 25 41	24.	iP P: C	Z	20 31 28.3
					13.2 S., 178.0 W. Fiji Is. region. h: 475 km. H= 20 21 14.6 USCGS		
23.	iP iS P: W, C	EZ N	09 57 06.5 24.0				
23.	P eS	Z NE	19 26 00 27 05				
23.	eP SKS X X SS Lq L	Z E N E NE N Z	22 51 01 23 01 24 02 22 03 50 08 15 09 08 16 20 20 25	25.	eP	Z	01 46 49
	Mag. 6 $\frac{1}{2}$ -6 $\frac{3}{4}$ (Mat.) 18.7 N., 107.1 W. Off coast of Jalisco, Mexico. h: N. H= 22 37 22.6 USCGS			25.	P	Z	05 25 29
				25.	iP S P: S, E, C	NEZ NE	06 13 27.1 42
				25.	P	Z	17 21 20
				25.	P X	Z Z	21 40 50 33 25
	7.7 N., 135.9 E. West Caroline Is. h: 18 km. H= 00 26 37.3 USCGS				52.2 N., 169.4 W. Fox Is. h: 5 km. H= 21 33 16.9 USCGS		
24.	eP X S P: S, W, C	Z Z E	00 32 46 33 25 29	25.	iP S P: N, E, D	NEZ N	22 15 32.3 16 51
	37.4 N., 140.8 E. Honshu, Japan. h: 80 km. H= 01 36 42.5 JMA				16.4 N., 41.0 E. Red Sea. h: 25 km. H= 04 54 35.7 USCGS		
24.	iP S	Z E	02 20 28.5 21 43 (cont.)	26.	eP X	Z N	05 07 17 36 00
					45.9 N., 42.5 E. Southwestern Russia. h: 0 km. H= 06 59 55.8 USCGS		

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
26.	iP	NEZ	08 33 27.6	27.	iP	NEZ	14 23 19.5
	P: N, W, C				S	E	24 29
		1.0 N., 123.8 E.			P: N, W, D		
		Northern Celebes.					
		h: 257 km.					
		H= 08 26 34.4	USCGS				
26.	iP	NZ	11 33 54.1	27.	iP	NEZ	18 47 17.5
	P: S, C				L	E	50 45
		60.1 N., 153.0 W.			P: N, W, C		
		Southern Alaska.				18.0 N., 144.8 E.	
		h: 97 km.				Mariana Is.	
		H= 11 25 17.7	USCGS			h: 28 km.	
						H= 18 42 51.5	USCGS
26.	iP	EZ	18 29 03.6	27.	P	Z	19 23 08
	S	NE	24				9.4 S., 107.8 E.
	P: W, C						South of Java.
		35.6 N., 140.5 E.					h: N.
		Near Honshu, Japan.					H= 19 13 48.6
		h: 70 km.					USCGS
		H= 18 28 27.7	JMA	27.	iP	EZ	20 56 51.0
					S	NE	57 09
					P: W, D		
26.	P	Z	20 06 24	28.	eP	Z	02 52 56
	S	E	07 10				
26.	P	Z	20 56 48	28.	P	Z	07 23 24
					iX	Z	29
					S	NE	26 13
27.	P	Z	00 12 44				23.3 N., 144.2 E.
	S	NE	58				Volcano Is. region.
							h: 183 km.
27.	iP	Z	04 04 37.7				H= 07 20 09.1
	iX	Z	52	28.	iP	NEZ	07 50 37.2
	S	N	06 27		iX	NZ	47
	P: D				P: s, W, C		
		43.9 N., 147.0 E.					
		Kurile Is.					
		h: 47 km.					
		H= 04 02 16.3	USCGS	28.	iP	NEZ	10 28 33.6
					P: N, W, C		
27.	iP	Z	03 54 49.4				23.8 N., 176.7 W.
	P: D						South Of Fiji Is.
		49.6 N., 156.0 E.					h: 78 km.
		Kurile Is.					H= 10 17 08.3
		h: 50 km.					USCGS
		H= 03 50 38.4	USCGS	28.	ePKP	Z	12 12 22
							12.1 S., 74.3 W.
							Peru.
27.	ePKP	Z	09 24 00				h: 45 km.
	X	Z	14				H= 11 52 59.1
							USCGS
29.	PSPS	Z	49 00	28.	iP	NZ	18 05 42.2
	Lq	E	10 06 06		PcP	Z	08 09.4
	L	Z	16 12		S	E	11 11
	L	E	28.0		Lq	E	13 40
					L	Z	16 30
					P: N, C		
		Mag. 6½ (Mat.)					Mag. 5½ (Mat.)
		60.9 S., 56.0 W.					1.9 N., 126.4 W.
		South Shetland Is.					Molucca Passage.
		h: N.					h: N.
		H= 09 04 02.8	USCGS				H= 17 58 41.7
							USCGS

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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
23.	P	Z	19 02 19	29.	P	Z	20 16 41
					iX	Z	52
23.	P	Z	19 11 18		x	N	17 09
	S	N	45		eS	E	18 34
23.	iP	NZ	19 55 23.4	29.	ePKP	Z	20 22 41
	P: N, C				PP	Z	24 54
	13.1 N., 143.7 E.				SS	NE	42.0
	South of Mariana Is.				Lq	N	56 59
	h: 150 km.				L	Z	21 05.0
	H= 19 50 23.6	USCGS			Mag. 7-7½ (Mat.)		
					32.9 S., 19.7 E.		
23.	P	Z	21 39 44		Republic of South Africa.		
					h: N.		
	2.5 N., 124.3 E.				H= 20 03 32.8	USCGS	
	Celebes Sea.						
	h: 229 km.						
	H= 21 33 01.5	USCGS		29.	iP	NEZ	21 11 47.0
					S	NE	12 17
28.	P	Z	21 56 12		P: N, E, D		
					36.4 N., 141.1 E.		
28.	iP	Z	23 06 46.5		Near Honshu, Japan.		
	X	Z	10 26		h: 50 km.		
	S	E	17 11		H= 21 11 08.7	JMA	
	L	E	35 50				
	P: C			30.	iP	NEZ	01 10 14.0
	Mag. 5½-6 (Mat.)				X	N	28
	34.3 N., 25.1 E.				P: S, E, D		
	Crete.				35.8 N., 140.1 E.		
	h: 19 km.				Near east coast of Honshu,		
	H= 22 54 06.6	USCGS			Japan.		
					h: 63 km.		
29.	L	E	03 59 55		H= 01 09 45.3	USCGS	
29.	P	NEZ	09 42 11	30.	iP	E	03 01 47.1
	S	N	43 27		S	NE	02 09
29.	L	E	12 14.2		P: E		
29.	iP	NEZ	16 27 57.4		35.6 N., 139.9 E.		
	iScP	Z	33 20		Honshu, Japan.		
	S	N	34 20		h: 100 km.		
	iScS	NZ	37 46		H= 03 01 17.7	JMA	
	P: N, W, C			30.	P	Z	04 22 24
	7.2 S., 128.8 E.				X	Z	23 20
	Banda Sea.				S	Z	32 40
	h: 125 km.				31.9 S., 177.9 W.		
	H= 16 20 00.4	USCGS			Kermadec Is.		
					h: N.		
29.	iP	NEZ	18 01 01.0		H= 04 11 16.1	USCGS	
	X	NE	02 20	30.	iP	Z	07 22 22.6
	P: N, E, D				L	NZ	24 02
	Mag. 5½-6 (Mat.)				P: C		
	43.4 N., 147.7 E.			30.	iP	NEZ	09 10 41.4
	Kueile Is.				L	Z	12 20
	h: 32 km.				P: N, E, D		
	H= 17 58 38.8	USCGS		30.	iP	EZ	12 40 48.0
29.	iX	NZ	18 06 11		S	N	41 18
29.	P	Z	18 24 51				(cont.)

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
Aftershocks for West of Nagano				2.	P	Z	04 57 05
Pref. Honshu, Japan.				2.	iP	Z	05 46 53.8
1.	iP	NEZ	01 25 27.7	2.	iP	Z	05 59 19.7
1.	iP	NEZ	02 14 53.5	2.	P	Z	08 13 55
1.	iP	NEZ	02 19 39.0	2.	iP	NEZ	08 45 09.0
1.	eP	Z	02 32 14	2.	P	Z	08 57 44
1.	eP	Z	02 34 30	2.	iP	Z	12 12 42.5
1.	P	Z	02 49 53	2.	iP	NEZ	12 21 36.7
1.	P	Z	03 11 11	2.	iP	Z	12 25 07.8
1.	iP	NEZ	03 12 45.0	2.	iP	NE	12 30 17.5
1.	eP	Z	03 15 52	2.	iP	NEZ	12 31 12.0
1.	iP	N	03 20 56.0	2.	iP	NEZ	12 33 16.5
1.	P	N	03 54 39	2.	P	Z	12 36 19
1.	iP	Z	04 13 34.5	2.	iP	NE	12 41 03.2
1.	P	Z	04 29 54	2.	iP	NEZ	12 42 50.4
1.	iP	EZ	07 13 58.3	2.	iP	Z	12 45 42.8
1.	iP	N	09 32 49.5	2.	P	Z	12 48 44
1.	eP	N	15 58 02	2.	P	Z	12 49 48
1.	P	Z	18 33 44	2.	iP	NEZ	12 50 38.9
1.	iP	NEZ	18 38 07.5	2.	P	Z	12 53 26
1.	iP	NEZ	19 30 48.2	2.	iP	NEZ	13 08 11.6
1.	P	Z	20 25 10	2.	P	Z	13 15 44
1.	iP	NEZ	21 32 32.7	2.	P	Z	13 18 32
1.	iP	Z	22 06 51.8	2.	P	Z	13 19 51
1.	iP	Z	22 55 25.4	2.	iP	NEZ	13 26 47.6
2.	iP	Z	00 31 20.5	2.	iP	Z	13 29 55.7
2.	iP	NEZ	01 02 23.1	2.	iP	NZ	13 32 45.1
2.	iP	Z	01 05 17.5	2.	iP	Z	13 35 15.0
2.	iP	Z	02 19 03.5	2.	P	Z	13 40 08
2.	iP	Z	04 13 32.8	2.	iP	Z	13 41 44.5



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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
2.	P	Z	13 45 57	3.	P	Z	02 16 54
2.	iP	NEZ	13 50 37.5	3.	iP	Z	03 04 01.7
2.	P	Z	13 51 49	3.	iP	NEZ	03 34 32.0
2.	iP	NEZ	14 03 15.6	3.	iP	Z	04 04 15.2
2.	P	Z	14 03 39	3.	iP	Z	04 47 32.2
2.	iP	Z	14 05 35.5	3.	eP	Z	04 54 24
2.	iP	NZ	14 27 22.3	3.	iP	Z	05 02 57.4
2.	P	Z	14 27 53	3.	iP	Z	05 30 34.5
2.	eP	Z	14 42 36	3.	iP	Z	05 54 20.5
2.	iP	Z	14 57 23.5	3.	iP	Z	06 21 41.4
2.	P	Z	15 00 37	3.	iP	Z	11 58 59.5
2.	iP	Z	16 06 18.5	3.	iP	NEZ	12 10 05.4
2.	P	Z	16 48 16	3.	iP	NEZ	16 50 18.3
2.	P	Z	17 04 12	3.	iP	NEZ	19 18 53.2
2.	iP	Z	17 28 21.0	3.	iP	NEZ	21 10 38.0
2.	iP	NZ	17 56 40.6	3.	iP	NEZ	22 30 43.9
2.	iP	Z	18 07 11.9	4.	iP	Z	00 33 37.2
2.	P	Z	19 01 21	4.	iP	NEZ	11 27 16.0
2.	iP	Z	19 09 18.6	4.	iP	NEZ	12 18 49.2
2.	iP	NEZ	19 15 07.8	4.	iP	NEZ	13 51 10.6
2.	iP	NEZ	19 46 47.0	4.	iP	Z	14 48 49.4
2.	iP	NEZ	20 32 03.0	4.	eP	Z	15 54 48
2.	P	Z	20 40 19	4.	iP	Z	17 58 03.6
2.	P	Z	20 43 10.5	4.	iP	Z	19 29 11.2
2.	iP	NEZ	21 55 43.5	4.	P	Z	22 55 50
2.	iP	EZ	21 56 27.4	4.	iP	Z	22 56 13.7
2.	P	Z	23 38 51	4.	P	Z	22 57 29
3.	P	Z	00 11 35	5.	P	Z	02 56 33
3.	eP	Z	02 08 21	5.	iP	NZ	04 08 40.5
3.	P	Z	02 12 06	5.	iP	NEZ	04 19 25.0

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Aftershocks for West of Nagano
Pref. Honshu, Japan.

Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
1.	iP	NEZ	01 25 27.7	2.	P	Z	04 57 02
1.	iP	NEZ	02 14 23.2	2.	iP	Z	05 46 23.8
1.	iP	NEZ	02 19 30.0	2.	iP	Z	05 59 19.7
1.	eP	Z	02 32 14	2.	P	Z	08 13 22
1.	eP	Z	02 34 30	2.	iP	NEZ	08 42 04.0
1.	P	Z	02 49 23	2.	P	Z	08 57 44
1.	P	Z	03 11 11	2.	iP	Z	12 12 43.2
1.	iP	NEZ	03 12 42.0	2.	iP	NEZ	12 21 36.7
1.	eP	Z	03 12 52	2.	iP	Z	12 22 07.8
1.	iP	N	03 20 26.0	2.	iP	NE	12 30 17.2
1.	P	N	03 24 39	2.	iP	NEZ	12 31 12.0
1.	iP	Z	04 13 34.2	2.	iP	NEZ	12 33 16.2
1.	P	Z	04 23 24	2.	P	Z	12 36 19
1.	iP	EZ	07 13 28.3	2.	iP	NE	12 41 03.2
1.	iP	N	09 32 49.2	2.	iP	NEZ	12 42 20.4
1.	eP	N	12 28 02	2.	P	Z	12 42 42.8
1.	P	Z	18 33 44	2.	P	Z	12 48 44
1.	iP	NEZ	18 38 07.2	2.	P	Z	12 49 48
1.	iP	NEZ	19 30 48.2	2.	iP	NEZ	12 50 38.2
1.	P	Z	20 22 10	2.	P	Z	12 53 26
1.	iP	NEZ	21 32 35.7	2.	iP	NEZ	13 08 11.6
1.	iP	Z	22 06 21.8	2.	P	Z	13 12 44
1.	iP	Z	22 22 22.4	2.	P	Z	13 18 32
2.	iP	Z	00 31 20.2	2.	P	Z	13 19 21
2.	iP	NEZ	01 02 23.1	2.	iP	NEZ	13 26 47.6
2.	P	Z	01 02 17.2	2.	iP	Z	13 29 22.7
2.	P	Z	02 19 03.2	2.	iP	NZ	13 32 42.1
2.	iP	Z	04 13 22.8	2.	P	Z	13 32 12.0
				2.	P	Z	13 40 08
				2.	iP	Z	13 41 44.2

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
5.	iP	Z	06 13 59.6	11.	iP NZ, P E		23 31 42.2
5.	P	Z	10 27 48	13.	iP	NEZ	02 58 00.5
5.	P	Z	13 09 09	13.	iP	NEZ	03 14 40.8
5.	iP	NEZ	20 21 08.0	13.	iP	NEZ	05 08 15.4
5.	iP	NEZ	23 53 25.3	14.	iP	NEZ	01 14 08.0
6.	iP	NEZ	03 15 47.0	16.	iP	NEZ	17 15 07.2
6.	iP	Z	03 25 59.5	18.	iP	NEZ	19 09 37.0
6.	iP	Z	04 40 51.3	25.	iP	NEZ	06 44 55.2
6.	P	Z	07 13 41	27.	iP	NEZ	13 46 24.7
6.	iP	Z	09 30 15.0	28.	iP	NEZ	05 39 33.8
6.	iP	NEZ	17 20 41.2	28.	iP	NEZ	05 50 48.0
6.	iP	NEZ	19 51 29.0	28.	iP	NEZ	06 24 55.8
6.	iP	NEZ	21 45 28.4	29.	iP	NEZ	13 12 32.9
7.	iP	Z	00 48 35.7				
7.	iS	N	00 49 00.0				
7.	iP	Z	01 11 12.8				
7.	iP	Z	02 41 07.2				
8.	P	N	09 37 30				
8.	iP	Z	09 39 34.6				
8.	iP	Z	12 02 46.2				
8.	iP	NEZ	12 04 12.9				
10.	iP	NEZ	17 24 07.4				
10.	iP	Z	17 45 36.8				
10.	iP	Z	01 36 55.6				
10.	iP	Z	03 35 23.2				
11.	iP	NEZ	00 12 03.4				
11.	iP	NEZ	01 14 33.4				
11.	iP	NEZ	07 16 41.6				
11.	iP	NEZ	09 36 38.5				
11.	iP Z, P NE		14 12 17.6				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
3.	P	Z	13 45 57	3.	P	Z	02 16 54
3.	iP	NEZ	13 50 37.5	3.	iP	Z	03 04 07.7
3.	P	Z	13 51 43	3.	iP	NEZ	03 34 32.0
3.	iP	NEZ	14 03 15.6	3.	iP	Z	04 04 12.5
3.	P	Z	14 03 33	3.	iP	Z	04 47 32.8
3.	iP	Z	14 05 32.2	3.	iP	Z	04 54 24
3.	iP	NEZ	14 27 25.3	3.	iP	Z	05 02 27.4
3.	P	Z	14 27 53	3.	iP	Z	05 30 34.5
3.	iP	Z	14 42 38	3.	iP	Z	05 54 20.5
3.	iP	Z	14 57 23.2	3.	iP	Z	06 21 41.4
3.	P	Z	15 00 37	3.	iP	Z	11 28 29.2
3.	iP	Z	16 06 18.5	3.	iP	NEZ	12 10 02.4
3.	P	Z	16 49 16	3.	iP	NEZ	16 50 18.3
3.	P	Z	17 04 18	3.	iP	NEZ	19 18 23.8
3.	iP	Z	17 28 21.0	3.	iP	NEZ	21 10 38.0
3.	iP	NEZ	17 56 40.6	3.	iP	NEZ	22 30 43.9
3.	iP	Z	18 07 11.9	4.	iP	Z	00 39 37.5
3.	P	Z	19 01 21	4.	iP	NEZ	11 27 16.0
3.	iP	Z	19 09 18.6	4.	iP	NEZ	12 18 43.5
3.	iP	NEZ	19 12 07.8	4.	iP	NEZ	13 21 10.6
3.	iP	NEZ	19 46 47.0	4.	iP	Z	14 48 49.4
3.	iP	NEZ	20 32 03.0	4.	iP	Z	15 54 48
3.	P	Z	20 40 13	4.	iP	Z	17 28 07.6
3.	iP	Z	20 43 10.8	4.	iP	Z	19 29 11.5
3.	iP	NEZ	21 22 43.5	4.	P	Z	22 22 20
3.	iP	NEZ	21 26 27.4	4.	iP	Z	22 26 13.7
3.	P	Z	22 38 21	4.	P	Z	22 27 23
3.	P	Z	00 11 35	5.	P	Z	02 26 33
3.	iP	Z	02 08 21	5.	iP	NEZ	04 08 40.5
3.	P	Z	02 15 06	5.	iP	NEZ	04 19 22.0

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
Aftershocks for middle of Gifu Pref., Honshu, Japan.							
9.	P	Z	06 57 26	9.	P	Z	07 04 40
9.	eP	Z	05 24 32	9.	P	Z	07 21 22
9.	P	Z	05 25 39	9.	P	Z	07 25 47
9.	P	Z	05 29 23	9.	iP	NEZ	07 29 37.7
9.	P	N	05 30 09	9.	P	Z	07 30 46
9.	P	Z	05 31 45	9.	P	Z	07 33 31
9.	P	N	05 36 35	9.	P	Z	07 40 37
9.	P	Z	05 37 35	9.	P	Z	07 46 50
9.	P	N	05 39 57	9.	iP	Z	07 54 19.8
9.	iP	NEZ	05 43 09.8	9.	P	Z	08 01 21
9.	P	Z	05 45 32	9.	P	Z	08 01 56
9.	P	Z	05 47 17	9.	iP	NEZ	08 03 40.4
9.	iP	NEZ	05 48 43.0	9.	P	Z	08 23 50
9.	P	Z	05 52 16	9.	iP	Z	08 44 02.0
9.	P	Z	05 53 47	9.	P	Z	08 45 45
9.	P	Z	05 58 27	9.	P	Z	08 55 21
9.	P	Z	06 03 06	9.	P	Z	09 09 48
9.	P	Z	06 04 02	9.	P	Z	09 11 50
9.	P	Z	06 04 35	9.	P	Z	09 16 50
9.	P	Z	06 07 04	9.	P	Z	09 32 26
9.	P	Z	06 07 57	9.	P	Z	09 54 39
9.	P	Z	06 11 20	9.	P	Z	10 10 11
9.	P	Z	06 12 22	9.	P	Z	10 13 17
9.	P	Z	06 12 55	9.	P	Z	10 17 10
9.	iP	NEZ	06 17 49.7	9.	iP	Z	10 27 04.2
9.	P	Z	06 23 11	9.	P	Z	10 28 45
9.	P	Z	06 33 13	9.	iP	Z	10 36 05.5
9.	P	Z	06 41 48	9.	iP	NZ	10 48 04.1
9.	iP	Z	06 55 59.3	9.	P	Z	10 54 42

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
11.	P	Z	06 13 51.6	11.	P	Z	06 13 51.6
13.	P	Z	10 27 48	13.	P	Z	10 27 48
13.	P	Z	13 09 07	13.	P	Z	13 09 07
13.	P	NEZ	30 21 08.0	13.	P	NEZ	30 21 08.0
14.	P	NEZ	23 29 25.3	14.	P	NEZ	23 29 25.3
16.	P	NEZ	03 12 27.0	16.	P	NEZ	03 12 27.0
18.	P	Z	03 25 20.2	18.	P	Z	03 25 20.2
22.	P	Z	04 40 21.2	22.	P	Z	04 40 21.2
27.	P	Z	07 13 21	27.	P	Z	07 13 21
28.	P	Z	07 30 15.0	28.	P	Z	07 30 15.0
28.	P	NEZ	17 20 41.2	28.	P	NEZ	17 20 41.2
28.	P	NEZ	19 21 23.0	28.	P	NEZ	19 21 23.0
29.	P	NEZ	21 42 28.4	29.	P	NEZ	21 42 28.4
7.	P	Z	00 42 22.7	7.	P	Z	00 42 22.7
7.	P	N	00 43 00.0	7.	P	N	00 43 00.0
7.	P	Z	07 11 12.8	7.	P	Z	07 11 12.8
7.	P	Z	02 41 07.2	7.	P	Z	02 41 07.2
8.	P	N	03 27 30	8.	P	N	03 27 30
8.	P	Z	03 33 34.6	8.	P	Z	03 33 34.6
8.	P	Z	12 02 40.2	8.	P	Z	12 02 40.2
8.	P	NEZ	12 04 12.9	8.	P	NEZ	12 04 12.9
10.	P	NEZ	17 24 07.4	10.	P	NEZ	17 24 07.4
10.	P	Z	17 42 36.8	10.	P	Z	17 42 36.8
10.	P	Z	01 36 28.8	10.	P	Z	01 36 28.8
10.	P	Z	03 22 23.2	10.	P	Z	03 22 23.2
11.	P	NEZ	00 12 02.2	11.	P	NEZ	00 12 02.2
11.	P	NEZ	01 14 33.2	11.	P	NEZ	01 14 33.2
11.	P	NEZ	07 16 41.6	11.	P	NEZ	07 16 41.6
11.	P	NEZ	09 28 28.2	11.	P	NEZ	09 28 28.2
11.	P	Z	14 12 17.8	11.	P	Z	14 12 17.8

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
9.	P	Z	11 03 04	10.	P	Z	06 54 43
9.	iP	Z	11 29 39.4	10.	iP	Z	07 05 52.7
9.	P	Z	12 37 35	10.	P	Z	07 36 53
9.	P	Z	13 09 05	10.	P	Z	07 39 31
9.	P	Z	13 48 52	10.	iP	Z	10 17 37.0
9.	P	Z	14 17 18	10.	iP	Z	11 43 53.8
9.	S	Z	14 17 50	10.	P	Z	11 59 03
9.	iP	Z	15 00 30.2	10.	P	Z	11 59 03
9.	iP	Z	15 04 52.0	10.	iP	NEZ	12 03 38.5
9.	P	Z	16 25 07	10.	P	Z	12 06 19
9.	iP	Z	17 15 48.9	10.	P	Z	12 27 54
9.	iP	Z	17 20 02.0	10.	P	Z	13 35 39
9.	iP	Z	18 13 40.6	10.	iP	NEZ	15 21 10.6
9.	P	Z	18 20 16	10.	iP	NEZ	15 51 50.9
9.	P	Z	18 45 40	10.	iP	Z	16 03 11.2
9.	iP	NEZ	20 15 09.7	10.	iP	Z	16 47 35.0
9.	iP	NEZ	20 32 20.9	10.	iP	NEZ	18 19 04.3
9.	P	Z	20 52 44	10.	iP	NEZ	18 23 13.2
9.	iP	Z	20 57 31.5	10.	P	Z	18 25 26
9.	P	Z	23 41 25	10.	P	Z	18 29 41
10.	P	Z	00 58 20	10.	iP	NEZ	19 01 48.2
10.	iP	NZ	01 00 32.8	10.	iP	NEZ	19 24 55.9
10.	iP	Z	01 18 23.8	10.	P	Z	19 42 12
10.	iP	NEZ	01 40 56.4	10.	iP	Z	20 51 14.5
10.	iP	NEZ	01 50 20.7	10.	P	Z	20 52 40
10.	iP	NEZ	01 55 19.0	10.	iP	Z	20 59 25.2
10.	P	Z	02 04 55	10.	P	Z	21 22 58
10.	P	Z	02 14 58	11.	iP	EZ	00 16 01.0
10.	iP	NEZ	02 56 29.8	11.	iP	Z	01 02 43.0
10.	iP	NEZ	04 15 02.9	11.	iP	NZ	01 06 00.2
10.	P	Z	04 31 44	11.	iP	NEZ	01 09 19.3
				11.	iP	NEZ	02 09 28.2

September, 1961

Date Phase Comp. Time(GMT)

Aftershocks for middle of Gifu Pref. Honshu, Japan.

Date	Phase	Comp.	Time(GMT) h m s
06 27 26	Z	P	
07 04 40	Z	P	
07 21 22	Z	P	
07 25 21	Z	P	
07 25 37.1	NEZ	iP	
07 30 26	Z	P	
07 33 31	Z	P	
07 40 27	Z	P	
07 45 30	Z	P	
07 54 19.9	Z	iP	
08 01 21	Z	P	
08 07 26	Z	P	
08 08 20.4	NEZ	iP	
08 22 30	Z	P	
08 24 03.0	Z	iP	
08 25 25	Z	P	
08 25 27	Z	P	
08 03 40	Z	P	
08 11 30	Z	P	
08 16 30	Z	P	
08 24 26	Z	P	
08 24 33	Z	P	
08 10 11	Z	P	
08 13 12	Z	P	
08 12 16	Z	P	
08 27 24.2	Z	iP	
08 28 25	Z	P	
08 33 11	Z	P	
08 33 13	Z	P	
08 41 28	Z	P	
08 52 38.9	Z	iP	

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
11.	iP	Z	03 02 52.2	13.	P	NEZ	20 33 20
11.	iP	NEZ	05 16 00.0	14.	P	E	06 07 31
11.	iP	NEZ	07 19 53.0	14.	iP NZ, P E		11 05 10.2
11.	iP	NEZ	09 09 14.8	14.	iP	NEZ	13 01 21.4
11.	iP	NEZ	09 09 52.3	14.	iP	NEZ	14 31 37.2
11.	iP	NEZ	14 07 50.3	14.	iP	NEZ	14 39 14.0
11.	iP	NEZ	15 02 16.5	14.	iP	EZ	23 50 07.8
11.	iP	Z	15 20 34.7	15.	iP Z, P NE		05 17 44.3
11.	P	Z	15 36 20	15.	iP	EZ	14 01 14.3
11.	P	NEZ	16 09 20	15.	iP	EZ	22 23 10.7
11.	iP	NEZ	16 21 15.0	16.	P	NEZ	03 38 10
11.	iP	Z	17 11 03.8	16.	iP	Z	09 29 22.6
11.	iP	EZ	17 11 57.3	16.	iP	NEZ	11 13 08.0
11.	iP	Z	17 30 21.0	16.	iP Z, P N		14 32 27.0
11.	iP NZ, P E		17 58 46.6	16.	iP	NEZ	14 40 11.6
11.	iP	NEZ	18 38 56.0	16.	iP	NEZ	20 07 54.7
11.	iP	Z	19 14 08.9	16.	iP	NEZ	21 28 58.8
11.	iP	NEZ	22 11 56.6	17.	iP	NEZ	11 41 13.7
12.	iP	NEZ	00 02 12.2	17.	iP	NEZ	14 03 20.7
12.	iP	Z	08 00 19.3	17.	iP	NEZ	16 05 33.1
12.	iP	NEZ	09 54 13.0	18.	iP EZ, P N		02 12 41.7
12.	iP	NEZ	11 24 22.0	19.	P	NEZ	13 10 30
12.	iP Z, P NE		12 22 13.6	19.	iP	NEZ	19 00 03.7
12.	iP	NEZ	13 42 01.0	20.	iP	NEZ	23 41 52.6
12.	iP Z, P NE		13 51 02.7	22.	iP	NEZ	06 52 33.4
12.	iP NEZ		16 24 10.0				
12.	iP	NEZ	21 10 35.2				
12.	iP	NEZ	22 02 41.0				
13.	iP	NEZ	03 47 57.7				
13.	iP Z, P NE		08 59 36.0				

Mineo Takehana

Director

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
10.	P	Z	11 03 04	10.	P	Z	11 03 04
10.	P	Z	11 23 31.4	10.	P	Z	11 23 31.4
10.	P	Z	12 37 35	10.	P	Z	12 37 35
10.	P	Z	13 03 05	10.	P	Z	13 03 05
10.	P	Z	13 28 32	10.	P	Z	13 28 32
10.	P	Z	14 17 10	10.	P	Z	14 17 10
10.	P	Z	14 17 30	10.	P	Z	14 17 30
10.	P	Z	15 00 30.5	10.	P	Z	15 00 30.5
10.	P	Z	15 08 25.0	10.	P	Z	15 08 25.0
10.	P	Z	16 25 07	10.	P	Z	16 25 07
10.	P	Z	17 15 48.9	10.	P	Z	17 15 48.9
10.	P	Z	17 20 05.6	10.	P	Z	17 20 05.6
10.	P	Z	18 13 40.6	10.	P	Z	18 13 40.6
10.	P	Z	18 20 16	10.	P	Z	18 20 16
10.	P	Z	18 43 40	10.	P	Z	18 43 40
10.	P	Z	20 15 03.7	10.	P	Z	20 15 03.7
10.	P	Z	20 32 20.9	10.	P	Z	20 32 20.9
10.	P	Z	20 32 44	10.	P	Z	20 32 44
10.	P	Z	20 27 31.2	10.	P	Z	20 27 31.2
10.	P	Z	23 41 25	10.	P	Z	23 41 25
10.	P	Z	23 28 20	10.	P	Z	23 28 20
10.	P	Z	01 00 38.8	10.	P	Z	01 00 38.8
10.	P	Z	01 18 29.8	10.	P	Z	01 18 29.8
10.	P	Z	01 40 26.4	10.	P	Z	01 40 26.4
10.	P	Z	01 50 20.7	10.	P	Z	01 50 20.7
10.	P	Z	01 52 19.0	10.	P	Z	01 52 19.0
10.	P	Z	02 06 25	10.	P	Z	02 06 25
11.	P	Z	02 14 29	11.	P	Z	02 14 29
11.	P	Z	02 26 29.8	11.	P	Z	02 26 29.8
11.	P	Z	02 15 03.9	11.	P	Z	02 15 03.9
11.	P	Z	02 31 44	11.	P	Z	02 31 44

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
1.	eP	Z	00 04 43	1.	eP P	EZ N	17 44 24 25
1.	PKP iX iX PS PS SS PSPS G Lr	Z E N EZ N N EZ N EZ	05 25 11 15 20 40 20 41 00 46 40 48 04 06 05 00 12 00	1.	PKP Z _e X iX iX SS PSPS SSS SSS G Lr	PKP NE E Z N N EZ NE Z NE Z	20 13 09 20 26 28 40 36 18 37 14 41 40 42 44 54 10 21 05 00
Mag. 6½ - 7 (Mat.) 11.9 S., 75.1 W. Peru. h: 4 km. H= 05 05 43.2 USCGS				Mag. 6½ - 6½ (Mat.) 60.8 S., 19.7 W. Southwestern Atlantic Ocean. h: N. H= 19 53 15.7 USCGS			
1.	P	Z	06 17 40	1.	iP L	Z NE	20 42 10.2 21 20.0
1.	iP P	Z NE	06 35 45.7 46	1.	iP L	Z NE	20 42 10.2 21 20.0
P: C 11.8 S., 167.5 E. Santa Cruz Is. h: 345 km. H= 06 26 44.8 USCGS				P: C 27.3 S., 176.5 W. Kermadec Is. h: N. H= 20 30 22.5 USCGS			
1.	iP S NZ, eS P: S, C	NZ E	08 29 46.2 30 15	1.	iP iX iX iS iX	NZ NZ Z N Z	20 48 36.6 50 49 00 42.4 48
1.	PKP L L	NZ Z NE	08 47 41 09 34 47 35 00	P: N, D 31.3 N., 142.6 E. South of Honshu, Japan. h: 27 km. H= 20 47 00.6 USCGS			
11.8 S., 75.0 W. Peru. h: 3 km. H= 03 28 14.0 USCGS				2.			
1.	iP iS iS P: S, E, C	NEZ NZ E	15 42 02.5 17.2 17.4	2.	iP Z, P N iX P: D	E	04 10 34.4 34.6
P: S, E, C				21.8 S., 179.4 W. Fiji Is. region. h: 599 km. H= 04 00 17.7 USCGS			
1.	iPKP PP PS PSPS Lq Lq Lr Lr	Z Z NEZ NEZ N E Z NE	17 29 55.2 31 46 43 20 49 00 18 03 00 04 20 09.0 14.0	2.	eP	Z	04 32 43
P: C Mag. 6½ (Mat.) 0.8 N., 85.0 W. Off coast of Ecuador. h: N. H= 17 10 56.5 USCGS				2.	iP iS P: N, W, C	NEZ NEZ	04 49 43.3 59.2
2.				2.	L	Z	05 31.0
38.5 N., 122.7 W. Northern California. h: 2 km. H= 04 56 45.5 USCGS							

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
2.	eP eL	Z Z	05 31 37 51.0				
							Near east coast of Kamchatka. h: 91 km. H= 01 51 55.4 USCGS
							38.5 N., 122.7 W. Northern California. h: 2 km. H= 06 19 56.0 USCGS
2.	eP eX eX	Z E NZ	07 48 22 49 10 16				
							3. eP Z 07 37 35 eX NE 46 S NE 39 32 31.0 N., 131.6 E. Kyushu, Japan. h: 60 km. H= 07 35 41.7 JMA
2.	eP	Z	22 11 41				
							3. P Z 09 04 29 eS N 05 55 9.8 N., 126.8 E. Mindanao, P.I. h: 68 km. H= 22 05 40.6 USCGS
2.	iP iPP eX S L L	NEZ Z N E NZ E	22 12 32.1 13 17.0 16 16 17 28 18 34 21 18				
							3. P Z 09 07 44 eS E 08 52 iX Z 57 iX N 58 31.7 N., 142.3 E. South of Honshu, Japan. h: 64 km. H= 09 06 16.0 USCGS
3.	P S S	NEZ NEZ NEZ	12 03 50.3 04 14				
							3. iP NEZ 12 03 50.3 S NEZ 04 14 P: N, W, C 35.3 N., 140.1 E. Near east coast of Honshu, Japan. h: 40 km. H= 12 03 18.6 JMA
3.	iP iS L L L	NEZ NEZ E N Z	13 51 20.7 31.5				
							3. iP NEZ 13 51 20.7 iS NZ 31.5 P: N, W, C 36.3 N., 139.1 E. Honshu, Japan. h: 90 km. H= 13 51 02.5 JMA
3.	eP iX S eX L	Z Z ZE N NEZ	01 45 28 50 55 20 28 02 07.0				
							3. P Z 15 10 18 S N, eS E 17 24 L E 21 00 L N 22 00 L Z 26 54 56.6 N., 152.3 W. Kodiak Is. region. h: N. H= 15 01 32.4 USCGS
3.	iP S S Lq Lq Lr	NEZ E E N E Z	01 56 30.4 02 00 08 16 01 00 12 02 24				
							3. eP Z 15 30 04 eL E 56.0 3. iP Z 15 43 47.8 iX Z 49 59 eS NE 56 00 eL Z 16 02.0 (cont.)

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
1.	ep	Z	00 04 43				
1.	PKP IX IX PS PS SS PSPS G Lr	Z E N E N E N E E	05 25 11 12 20 20 01 00 46 40 05 04 00 05 00 12 00				
							Mag. 6.7 (Mat.) 11.9 S., 152.1 W. Peru. h: 4 km. H= 05 05 43.2 USCGS
1.	P	Z	06 17 40				
1.	iP P P P: C	Z ME ME E	06 32 45.7 48				
							11.8 S., 167.2 E. Santa Cruz Is. h: 345 km. H= 06 32 44.8 USCGS
1.	iP IX IX IX IX	NZ E E N E	08 23 46.2 30 15 43 00 43.4 48				
							P: S, W, C Mag. 5.2 (Mat.) 51.4 N., 179.2 E. Rat Is., Aleutian Is. h: 1 km. H= 22 06 00.0 USCGS
1.	P IX IX IX IX	NZ E E N E	09 47 41 05 34 47 35 00				
							35.5 N., 136.4 E. Honshu, Japan. h: 20 km. H= 01 10 33 JMA
2.	iP IX IX IX IX	NEZ E E N E	15 43 03.2 17.2 17.4				
							3. eP Z 01 45 28 iX Z 50 S ZE 55 20 eX N 28 L NEZ 02 07.0 Mag. 5.2 - 5.4 (Mat.) 32.9 S., 178.0 W. South of Kermadec Is. h: 26 km. H= 01 33 19.8 USCGS
2.	ep	Z	04 32 43				
2.	iP IX IX IX IX	NEZ E E N E	04 43 43.3 39.2				
							3. iP NEZ 01 56 30.4 S E 02 00 08 S NZ 16 Lq N 01 00 Lq E 12 Lr Z 02 24 P: N, E, D 51.9 N., 157.8 E. (cont.)
2.	iP IX IX IX IX	NEZ E E N E	06 04 31.0 31.0 31.0 31.0 31.0				
							3. iP Z 15 43 47.8 iX Z 49 59 eS NE 56 00 eL Z 16 02.0 (cont.)

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
	P: C			4.	eP	NEZ	14 23 43
					eX	Z	56
					eS	E	31 32
					eL	Z	43.0
							5.9 S., 103.9 E., Southern Sumatra. h: 95 km. H= 15 39 43.5 USCGS
3.	P	NZ	16 17 05				
	S	N	18				
	iX	N	22				
							5.9 S., 103.9 E., Southern Sumatra. h: 172 km. H= 14 14 41.0 USCGS
3.	L	NE	17 51 00	4.	P	Z	14 27 27
	L	Z	53 50		P	N	28
					P	E	29
				4.	iP NZ, P E		19 55 39.5
					S	NZ	54
					S	E	56
					P: N, C		
4.	eP	Z	01 36 40	4.	P	NEZ	23 55 39
	S	NEZ	58		S	NEZ	55
4.	eP	Z	04 01 22	5.	P	NEZ	03 01 01
	iX	NEZ	27		iX	EZ	10
	iX	Z	55		iX	E	22
					S	N	30
							35.4 N., 140.5 E. Near east coast of Honshu, Japan. h: 60 km. H= 03 00 25.6 JMA
4.	iP	EZ	07 18 45.0	4.	iP	EZ	07 18 45.0
	S	E	19 13		S	N	14
	S	N	14				35.7 N., 141.0 E. Central Honshu, Japan. h: 40 km. H= 07 13 06.3 JMA
				5.	iP	EZ	03 03 44.7
					P	N	45
					X	E	04 06
					P: E, D		
4.	iP	NEZ	09 30 27.5	5.	P	NEZ	06 11 16
	S	Z	35		X	N	31
				5.	P	Z	07 36 58
					iX	NEZ	37 08
					eS	E	38 46
					eS	N	47
4.	iP	Z	10 08 07.7	5.	P	Z	09 13 16
	iX	NE	08.4		P	NE	17
	iX	NZ	13		S	NEZ	41
	S	NE	56				
	L	E	09 04	5.	P Z, eP E		16 40 40
	L	Z	13		eS	E	45 35
	L	N	13		L	E	47 40
					L	N	48 00
					L	Z	26
				5.			7.1 N., 123.7 E. Mindanao ; P.I. h: 33 km. H= 16 34 15.8 USCGS
4.	iP	NZ	10 50 17.6				
	P	E	18				
	iS	EZ	32.6				
	S	N	33				
	P: S, C						

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
5.	P S S	NEZ E N	17 52 37 54 17 18	6.	iP iP iX S	EZ N Z NEZ	07 33 18.2 18.5 29 39
43.5 N., 145.7 E. Near east coast of Hokkaido, Japan. h: 120 km. H= 17 50 29.1 JMA				P: N, W, C 35.5 N., 140.0 E. Central Honshu, Japan. h: 70 km. H= 07 32 47.7 JMA			
5.	iP iP	Z NE	20 57 06.2 06.4	6.	iP P eX PcP S L L	Z N E Z NEZ N Z	12 53 40.0 41 43 57 04 58 08 59 48 13 01 22
P: N, W, C 21.8 S., 170.7 E. Loyalty Is. region. h: 107 km. H= 20 46 32.5 USCGS				P: D 15.0 N., 120.1 E. Luzon, P.I. h: 59 km. H= 12 48 05.0 USCGS			
5.	eP eX	NZ E	22 06 44 52	6.	eX eX L	N E NZ	18 03 10 05 48 10.0
5.	iP Z, P N eS P: D	N N	23 04 50.2 06 07	6.	iP P S	NZ E NE	20 23 15.8 16 25 30
32.5 N., 141.2 E. South of Honshu, Japan. h: 43 km. H= 23 05 26.7 USCGS				P: S, C 43.8 N., 148.2 E. Kurile Is. region. h: N. H= 20 20 42.9 USCGS			
6.	iP S iX	NEZ NE NEZ	01 41 30.7 45 50	6.	P eX eS L eL	Z NE N E Z	21 52 57 53 00 59 18 22 00 10 02.0
P: N, W, C 35.9 N., 139.3 E. Honshu, Japan. h: 30 km. H= 01 41 09.5 JMA				7.2 N., 123.7 E. Mindanao, P.I. h: N. H= 21 46 32.7 USCGS			
6.	iP iP S S	Z NE N E	01 43 52.5 53.0 44 17 18	6.	iP eX	Z N	07 33 14.2 43
P: S, W, D				P: C			
6.	P eS?	NE NE	01 54 08 20	7.	iP NZ, P E eL eL	E N EZ	03 57 10.4 04 13.0 16.0
15.4 S., 172.9 W. Samoa Is. region. h: 43 km. H= 03 46 30.0 USCGS				P: S, D 6.1 S., 104.2 E. Sunda Strait. h: 15 km. H= 03 47 51.8 USCGS			

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
7.	iP eL P: D	Z NEZ	05 21 26.8 47.0	8.	PKP 1 PKP 2 eX X PSKS	Z Z E N E	03 03 04 36 45 49 17.0
							20.0 S., 68.9 W. Chile-Bolivia border region, h: 120 km. H= 02 43 24.7 USCGRS
7.	iP P S L P: S,C	NZ E NE N	13 35 12.8 13 36 32 55	8.	iP Z, P E P S iX iX P: D	N N E Z	04 09 13.4 14 24 28 33
							31.1 N., 142.3 E. South of Honshu, Japan, h: 14 km. H= 04 07 36.4 USCGRS
7.	iP iX S S P: E,D	EZ N N EZ	15 17 20.3 20.8 50 52	8.	iP S P: S,W,C	NEZ NE	06 16 12.0 38
							37.2 N., 140.8 E. East coast of Honshu, Japan, h: 90 km. H= 06 15 35.4 JMA
7.	iP eX eX P: S,C	NZ E N	15 38 41.9 39 33 39	8.	iP P S L P: C	Z NE NEZ NZ	06 37 32.0 33 42 04 44 00
							12.0 N., 143.7 E. South of Mariana Is. h: 18 km. H= 06 32 03.9 USCGRS
7.	P P S eL L eL	Z NE NE E N Z	16 03 43 44 08 04 09 00 30 10 06	8.	iP Z, P N iX P: C	E	14 42 07.3 07.7
							37.3 N., 116.4 W. Southern Nevada, h: 0 km. H= 14 30 00.0 USCGRS
7.	eP eS eX	Z NE Z	16 40 39 42 08 23	8.	eP eS eL	Z N NZ	14 52 01 56 32 58 30
							11.0 N., 142.8 E. South of Mariana Is. h: 19 km. H= 14 46 27.6 USCGRS
7.	iP S P: N,E,C	NEZ NEZ	17 29 52.5 30 01	8.	eP iX	Z NE	15 04 34 39
7.	iP P: C	Z	22 19 13.7				
8.	iP P: S,W,D	NEZ	02 28 23.4				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
10.	eP iX eS	Z N NZ	07 23 06 08 24	11.	eP S S	NEZ N E	21 13 31 15 30 34
10.	iP iX iX eX eX L	NEZ E N N E Z	17 12 21.0 30 39 13 28 44 15 00				44.3 N., 147.4 E. Kurile Is. h: N. H= 21 10 59.1 USCGS
			29.2 N., 130.9 E. P:D Ryukyu Is. h: 0 km. H= 17 09 57.7 JMA	11.	iP Z, P NE S NE		21 58 06.0 53
10.	eP X X L L L	NZ E N N E Z	17 48 03 49 41 50 08 16 28 44	12.	iP NZ, P E iX Z iX N eX E		03 38 21.5 59.6 40 32.5 41 20
			42.9 N., 147.7 E. Off east coast of Hokkaido, Japan. h: 60 km. H= 17 45 42.3 JMA				P: N,C 0.1 N., 123.7 E. Northern Celebes, h: 166 km. H= 03 31 12.8 USCGS
10.	iP iS	NEZ NZ	22 44 09.0 15.3	12.	P N, eP EZ		05 55 21
			P: N,E,C				21.0 S., 174.6 W. Tonga Is. h: N. H= 05 43 55.0 USCGS
11.	iP EZ, P N iX S	Z Z NE	03 22 35.1 50.0 23 02	12.	eP X eS	NZ NEZ N	06 32 40 45 33 25
			P: W,C	12.	eP	NZ	09 53 01
11.	eP	E	05 19 25	12.	P Z, eP N		13 46 51
11.	iP Z, P NE P: C		07 17 20.7				39.7 N., 20.4 E. Greece-Albania border region. h: 14 km. H= 13 34 15.8 USCGS
11.	P Z, eP N eS eG eG	NE NE Z	11 24 15 34 08 44 14 40	12.	eX eX eL	E Z NZ	14 20 00 22 50 27 40
			27.0 S., 176.5 W. Kermadec Is. h: 83 km. H= 11 12 34.9 USCGS	12.	iP NZ, P E iX E iX NZ		14 27 27.6 35.0 37.3
11.	iP iS	NZ NZ	12 18 41.4 47.9				P: N,D 55.2 N., 161.9 E. Near east coast of Kamchatka. h: 69 km. H= 14 22 11.6 USCGS
			P: N,C	11.	iP NZ, P E iS NEZ		19 55 25.1 59.7
			P: S,C	11.	X	E	20 00 00
11.	X	E	20 00 00	12.	iP NZ, P E		16 13 30.8

Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
12.	iX	Z	16 14 45	13.	P	NEZ	12 59 22
	P: C				X	Z	31
	5.9 S., 112.0 E. Java Sea. h: 595 km. H= 16 05 37.5 USCGS			13.	P	Z	13 17 07
					eS	NZ	30
12.	iP Z, P	NE	20 16 23.8	13.	P	EZ	16 27 06
	S	NE	49		iX	NEZ	14
	P: C			13.	eP	NZ	20 05 37
13.	iP	NEZ	01 15 04.0	14.	iP	NEZ	02 30 49.8
	iX	Z	55		iX	N	31 17
	eS	E	25 32		eS	NE	58
	eS	N	34		iX	NE	32 19
	SS	E	36 38		P: S, W, C 40.4 N., 143.3 E. Off east coast of Honshu, Japan. h: 54 km. H= 02 29 26.5 USCGS		
	X	N	55	14.	P	Z	04 15 31
	X	Z	37 20		eP	NE	32
	eL	N	49 38		S	NE	16 11
	eL	E	50		27.3 S., 176.6 W. Kermadec Is. h: 132 km. H= 04 03 55.1 USCGS		
	X	Z	56 00	14.	P	NZ	04 19 39
	P: N, W, D 39.9 N., 20.6 E. Greece-Albania border region. h: 8 km. H= 01 02 28.5 USCGS			14.	iP	NEZ	07 09 29.5
13.	P Z, eP	NE	03 37 12		iX	Z	10 36
					eS	N	17 05
	39.1 N., 28.6 E. Turkey. h: 18 km. H= 03 24 27.0 USCGS				eL?	Z	31 28
					P: S, E, C 73.4 N., 54.3 E. Novaya Zemlya. h: 00 km. H= 07 00 06.2 USCGS		
13.	iP	NZ	07 06 00.2	14.	P	Z	09 21 39
	iX	NZ	07 30		eP	NE	40
	iS	NEZ	14 11		iX	Z	57
	iX	Z	17 57		X	N	22 22
	iL	E	21 22		S	NE	23 25
	iL	N	23	14.	P Z, eP	NE	11 44 05
	P: S, C Mag. 6.5 (Pas.) 18.9 S., 169.3 E. New Hebrides Is. h: 246 km. H= 06 56 01.6 USCGS						
13.	P	NZ	07 15 40	14.	P	Z	19 34 00
13.	P	Z	07 35 00		eS	N	39 47
	X	N	28	14.	iP	NEZ	20 40 12.0
13.	P	Z	09 39 54		eS	N	41 00
	eP	N	55		18.8 S., 173.4 W. Tonga Is. h: 33 km. H= 09 28 33.0 USCGS		
	eS	N	49 18				(cont.)
	eL	N	57 10				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
	X	Z	20 41 06	15.	P	Z	13 34 26
	X	E	56		X	N	35 40
	X	Z	42 12	15.	eP	Z	16 26 20
	P: N, W, D				eX	NE	28 45
	37.9 N., 135.1 E. Sea of Japan. h: 371 km. H= 20 39 11.6 USCGS			16.	iP	NEZ	04 57 10.8
14.	iP Z, P NE		20 59 58.6		iS	NEZ	25.5
	S	NE	21 01 27	16.	iP	NEZ	04 59 58.5
	P: C				iS	NEZ	05 00 13.0
14.	iP EZ, P N		22 54 11.2	16.	eP	NEZ	07 04 06
	P: E, D				iX	Z	09.4
	52.6 N., 162.7 W. South of Alaska. h: 15 km. H= 22 46 04.8 USCGS			16.	iP	EZ	10 26 14.6
14.	iP	Z	23 13 11.5		X	NE	42
	iX	NE	12.0	16.	P: W, C		
	P: D			16.	eL	N	15 26.6
	52.4 N., 171.5 W. Fox Is., Aleutian Is. h: 80 km. H= 23 05 56.6 USCGS				eL	E	28 54
15.	iP	NEZ	00 11 09.5	17.	35.5 S., 53.5 E. Atlantic-Indian Rise. h: N. H= 14 40 50.6 USCGS		
	X	E	21 24	16.	iP	Z	20 56 30.2
	27.0 S., 176.5 W. Kermadec Is. h: 61 km. H= 23 59 26.0 USCGS				X	Z	53
15.	iP NZ, P E		01 20 00.0	16.	P: C		
	P: S, D				19.7 S., 174.6 W. Tonga Is. h: N. H= 20 45 09.8 USCGS		
	27.2 S., 176.5 W. Kermadec Is. h: 58 km. H= 01 08 14.9 USCGS			16.	iP	Z	21 09 28.6
15.	P	NEZ	01 38 24		eScS	N	18 30
	X	NZ	32		eScS	E	45
15.	iP	NEZ	04 32 16.7	16.	P: D		
	iS	NEZ	32.0		62.5 N., 151.3 W. Central Alaska. h: 94 km. H= 21 00 46.5 USCGS		
	P: N, E, C			16.	P	Z	23 00 37
15.	P Z, eP NE		05 48 06	17.	iP NZ, P E		00 11 03.0
	S	N	53 28		X	EZ	16
	L	N	55 24		iS	NE	25
	L	Z	42	17.	P: N, C		
	4.2 N., 126.3 E. Talaud Is. h: 22 km. H= 05 41 25.5 USCGS			17.	iP	EZ	01 32 31.8
15.	iP	Z	10 04 42.5		X	N	33
	P: C				X	Z	58
					PP	E	34 18
					iX	N	25
					ScP	Z	38 12
					iS	Z	23

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
	S	NE	08 54 50				
	X	E	55 10				
	Lq1	N	56 16				
	Lr1	Z	57 50				
	X	E	09 00 08				
	P: S, W, C						
	52.5 N., 173.5 E.						
	Near Is., Aleutian Is.						
	h: 24 km.						
	H= 08 44 00.0						
	USCGS						
18.	iP	NZ	09 00 05.1	19.	iP	NEZ	16 16 25.0
	P: S, D				iS	NEZ	30.0
					P: N, E, C		
18.	eL	N	17 30 40	19.	iP Z, P NE		18 14 44.7
	eL	E	31 16		S	NE	49
	eL	Z	32 36		P: C		
18.	eP	Z	19 24 54	19.	iP	NEZ	19 58 04.8
	X	Z	25 16		iS	NE	10.5
	eX	Z	44		P: N, E, C		
18.	iP NZ, P E		20 42 53.2	19.	iP	EZ	22 48 29.5
	S	NEZ	43 27		X	NE	49
	P: N, D				P: E, D		
18.	iP	NEZ	20 53 05.7	20.	iP	NZ	00 05 15.1
	S	NE	20		iS	NEZ	20.5
	eS	Z	21		P: S, D		
	P: S, W, D			20.	P	NEZ	00 39 02
					S	NE	18
18.	iP Z, P NE		22 09 17.6	20.	eP	NZ	01 20 27
	S	NEZ	38		eS	NE	26 54
	P: C				X	E	30 16
					Lr	Z	33 16
					iL	N	44
					5.6 S., 153.1 E.		
					New Ireland. region,		
					h: 50 km.		
					H= 01 12 23.4		
					USCGS		
18.	P	NEZ	23 39 24	20.	iP	NZ	04 12 25.7
	X	E	39		X	Z	50
	X	Z	41		eS	N	13 56
19.	eP	Z	07 39 33		42.7 N., 145.3 E.		
	eX	N	41 44		Hokkaido, Japan.		
	eX	E	42 10		h: 118 km.		
	eX	Z	38		H= 04 10 26.6		
					USCGS		
19.	P	Z	09 11 54	20.	iP	NZ	04 54 21.2
	eL	E	19 42		S	NE	44
	eL	N	50		P: S, D		
	eL	Z	21 25	20.	iP NZ, P E		13 05 25.1
	51.3 N., 178.5 W.				iS NZ, S E		40.0
	Andreanof Is.				P: S, C		
	h: 41 km.						
	H= 09 05 13.2						
	USCGS						
19.	iP	NEZ	12 30 16.8	20.	iP	NEZ	13 16 10.7
	iX	Z	41		iS	NEZ	16.5
	S	N	54		P: N, E, D		
	P: S, W, C			20.	eP	Z	13 30 31
	39.7 N., 139.3 E.				eL	E	48 56
	(cont.)				(cont.)		

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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
	eL	N	13 49 06	22.	iP	NEZ	00 34 23.4
	eLr	N	14 04 40		iS	N	30.4
	eLr	EZ	05 20		P: N, E, C		
20.	P	NEZ	20 32 21	22.	iP NZ, P E		02 59 35.5
	iS	NEZ	25.5		S	EZ	40.4
	P: N, C						
21.	iP	NEZ	01 42 16.4	22.	eP	Z	03 18 00
	eS	E	43 47		52.3 N., 169.4 W.		
	P: S, W, C				Fox Is., Aleutian Is.		
	42.9 N., 145.6 E.				h: 24 km.		
	East coast of Hokkaido,				H= 03 10 30.0		USCGS
	Japan.						
	h: 40 km.			22.	iP	NEZ	05 26 20.9
	H= 01 40 14.6		JMA		S	E	43
21.	P	Z	05 21 34		P: S, E, D		
	eL	E	36.7		35.5 N., 140.2 E.		
	9.1 S., 125.2 E.				Central Honshu, Japan.		
	Timor.				h: 80 km.		
	h: 2 km.				H= 05 25 48.7		JMA
	H= 05 12 59.0		USCGS				
21.	eP	Z	09 25 45	22.	iP NZ, P E		20 06 19.4
	X	NE	50		PcP	NEZ	07 59
	eS	E	27 00		P: N, C		
	4.9 S., 154.2 E.				Solomon Is.		
21.	iP Z, P NE		09 41 45.6		h: 390 km.		
	S	NE	42 01		H= 05 58 43.8		USCGS
	P: D						
21.	eP	Z	13 03 27	22.	P	Z	06 47 24
	eX	E	06 06		eS	N	48 31
21.	iP NZ, P E		14 48 52.5	22.	eP	NZ	07 20 00
	P: S, D				4.8 S., 152.5 E.		
	4.2 S., 150.2 E.				New Britain.		
	New Britain.				h: 71 km.		
	H= 14 41 46.2		USCGS		H= 07 12 07.7		USCGS
21.	iP	NEZ	21 00 24.3	22.	P	Z	07 21 51
	X	Z	03 04		eL	E	30 28
	S	E	05 44		L	Z	32 50
	X	Z	06 46	22.	P	Z	07 39 55
	L	N	07 35		S	N	41 17
	eL	Z	48		39.1 N., 142.7 E.		
	eL	E	56		East coast of Honshu,		
	Lr	Z	09 55		Japan.		
	P: S, W, C				h: 0 km.		
	Mag. 6 (Mat.)				H= 07 38 42.5		JMA
	51.3 N., 179.2 W.			22.	iP	NEZ	09 20 35.8
	Andreanof Is., Aleutian Is.				P: S, W, C		
	h: 48 km.				52.6 N., 158.9 E.		
	H= 20 53 47.5		USCGS		Near east coast of Kamchatka.		
					h: 63 km.		
21.	P	Z	21 22 00		H= 09 15 48.3		USCGS
	S	NE	26				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
22.	iPKP Z, PKP N eL	Z	10 41 37.6 11 31 08		P; C 39.1 N., 142.5 E. East coast of Honshu, Japan. h: 10 km. H= 16 50 40.1	JMA	
22.	P X L L L Lr	EZ N E N Z E	12 18 50 52 27 56 28 00 33 12 18	24.	iP Z, P NE P: D		00 37 33.4
					25.2 S., 178.4 E. South of Fiji Is. h: 620 km. H= 00 27 08.8	USCGS	
22.	iPKP1 iPKP2 L L L	Z Z N Z E	13 11 21.2 41.5 52.0 54.0 54.5	24.	iP iX L L	Z Z NE Z	00 53 48.0 54 01 01 02 40 03 40
					P: C 52.5 N., 168.6 W. Fox Is., Aleutian Is. h: N. H= 00 46 14.6	USCGS	
22.	iPKP1 iPKP2 L L L	Z Z N Z E	13 11 21.2 41.5 52.0 54.0 54.5	24.	P S	NZ N	04 19 17 35
					10.9 N., 62.6 W. Near coast of Venezuela. h: 79 km. H= 12 52 22.0	USCGS	
22.	iP EZ, P N S L L	Z E N Z	23 03 29.5 13 18 22 40 27 00	24.	iP X eS P: W, C	EZ N NE	04 48 10.3 12 37
					P: N, E, D		
22.	iP eL eL	Z E E	08 41 23.0 49.8 09 07.0	24.	iP eX eL P: C	Z E Z	08 41 23.0 49.8 09 07.0
					33.3 N., 119.2 W. Southern California, h: 10 km. H= 08 29 12.1	USCGS	
23.	P	Z	03 02 45	24.	P iX	EZ N	09 14 37 39
					14.9 S., 166.8 E. New Hebrides Is. h: 28 km. H= 02 52 54.7	USCGS	
23.	iP NZ P E iX	E N	10 24 02.9 08.8	24.	eP iX	Z N	11 41 59 42 09
					18.9 N., 144.9 E. Mariana Is. h: 375 km. H= 10 20 10.0	USCGS	
23.	iP iX eS	Z NE E	16 51 48.8 49.0 52 44	24.	eP eL	Z N	11 55 41 21 12.0
					24.8 N., 72.4 E. Northern India, h: 15 km. H= 11 45 52.7	USCGS	

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
24.	P iX iX S	Z Z N NZ	14 28 35 52 29 10 30 01	25.	iP Z, P N iX S P: C	E NEZ	13 02 46.0 46.6 03 01
				25.	P P S P: C	Z NE NE	14 42 57.0 58 44 01
				25.	P iX S P: C	Z NE	16 44 00 07.6
							63.3 N., 145.0 W. Central Alaska. h: 34 km. H= 14 35 08.5 USCGS
24.	P eL eL	EZ NE Z	21 52 07 22 03.0	25.	P S	NZ NE	17 17 10 18
				25.	P S P: N	NE NE	17 17 44.0 13 00
				25.	iP S S P: S, W, D	NEZ E	18 19 19.7 20 06
				26.	iP iX S L L P: C	Z NE N NE Z	03 56 37.6 38.6 04 06 25 16 39 20 35
							27.0 S., 176.5 W. Kermadec Is. h: 30 km. H= 03 44 50.4 USCGS
24.	P eL eL	Z NE Z	22 42 28 23 01.2 03.6	26.	P X	NZ NEZ	04 26 29 30
							21.7 S., 169.9 E. Loyalty Is. region. h: N. H= 04 15 49.7 USCGS
				26.	P iX eS eL eL eL	Z N NE N E Z	05 30 40 44.0 40 30 49.9 50 44 55 05
							27.1 S., 176.4 W. Kermadec Is. h: N. H= 05 18 52.7 USCGS
24.	P eL eL	Z NE Z	22 42 28 23 01.2 03.6	26.	iP N, P EZ iS P: N	NE	06 20 15.4 51.5
25.	iPZ, P N iX S P: D	N E	04 29 59.4 30 05.4 56				
25.	iP NZ, P E iS P: S, D	NEZ	04 49 56.5 50 11.5				
25.	P eL P: D	Z Z	05 24 11.9 35 12				
							0.9 N., 125.7 E. Molucca Passage. h: 82 km. H= 05 17 07.4 USCGS
25.	P S	Z NE	06 21 16 31				
25.	P S	Z NE	10 22 55				
							27.2 S., 176.2 W. Kermadec Is. h: 60 km. H= 10 11 10.4 USCGS
25.	P iX X S S S L	Z NE N E N NE	12 06 16 17 07 52 08 10 12 44				
							43.7 N., 148.3 E. East off Hokkaido. h: 60 km. H= 12 03 43.3 JMA

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Date	Phase	Comp.	Time(GMT)			
			h	m	s	
26.	eP	Z	06	48	56	
	iX	NEZ		49	00	
	PP	Z		51	29	
	S	E		57	50	
	X	Z	07	06	00	
	Lq	NE			20	
	Lr	Z		09	28	
	Lr	NE			44	
	Mag. 5-6 $\frac{1}{2}$ (Mat.) 16.2 S., 173.9 W. Tonga Is. h: 127 km. H= 06 38 03.4 USCGS					
	26.	P	NEZ	11	27	40
eX		NE		29	40	
L		Z		30	40	
26.	iP Z, P NE		11	29	27.4	
	iSEZ, S N				41.9	
	P: C					
26.	P	Z	11	30	27	
26.	iP Z, P NE		12	26	22.8	
	S	NE			55	
	P: C					
26.	eL	E	12	28	40	
	X	Z			29.1	
26.	P	NEZ	14	44	20	
	eX	N		45	16	
	eL	Z		46	48	
26.	P	NEZ	15	22	05	
	eS	N		23	05	
	X	E			08	
26.	eP	NZ	15	49	21	
	S	NE		59	36	
	L	E	16	10	35	
	L	N			40	
	L	Z		16	30	
	Mag. 6 $\frac{1}{2}$ -7 (Mat.) 44.9 N., 17.3 E. Yugoslavia. h: N. H= 15 36 51.8 USCGS					
	26.	P	Z	18	53	59
	26.	P	NZ	19	18	16
		PP	Z			35
		iS	NE	20	10	2
L		NE			40	
43.0 N., 148.3 E. East off Hokkaido, Japan. h: 70 km. H= 19 15 49.1 JMA						

Date	Phase	Comp.	Time(GMT)			
			h	m	s	
26.	P	Z	21	32	21	
	27.2 S., 176.4 W. Kermadec Is. h: N. H= 21 20 34.6 USCGS					
26.	P	NZ	21	37	18	
	S	N		47	12	
	L	NE		57	24	
	L	Z			58 00	
	27.1 S., 176.6 W. Kermadec Is. h: 44 km. H= 21 25 32.2 USCGS					
26.	ePKP	Z	21	53	27	
	eX	Z		22	00 40	
	X	E			02 08	
	L	NEZ			13 44	
	L	E			33 50	
	L	NE			35 20	
	L	Z			42 00	
	Mag. 6 $\frac{1}{2}$ (Mat.) 53.4 S., 23.5 E. South of Africa. h: N. H= 21 39 20.8 USCGS					
	26.	P	Z	23	44	21
		S	NE		45	32
27.	eX	E	03	35	22	
	eL	E		38	10	
	45.0 N., 17.0 E. Yugoslavia. h: N. H= 02 55 35.4 USCGS					
27.	P	Z	07	46	53	
	eS	N		48	05	
27.	eP	Z	08	23	23	
	S	NE		33	42	
	L	E		44	10	
	L	N			20	
	L	Z			30	
	Lr	Z			48 04	
	Mag. 7 $\frac{1}{2}$ (Mat.) 44.9 N., 17.2 E. Yugoslavia. h: N. H= 08 10 58.3 USCGS					
27.	iP Z, P N		11	41	58.4	
	S	N			43 01	
	P: N, C 31.9 N., 140.5 E. South of Honshu, Japan. h: 95 km. H= 11 40 44.6 USCGS					

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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
27.	P iX S	NEZ NE NE	12 33 04 45 57	28.	iP Z, P E S P: C	NEZ	23 43 14.5 24
27.	iP S iX P: N, E, D	NEZ NEZ NEZ	18 48 55.4 49 16 23	29.	P iX S	NZ NEZ NE	03 11 46 49 12 07
			37.9 N., 139.1 E. Honshu, Japan. h: 10 km. H= 18 48 28.5	29.	P S X	EZ N Z	04 39 13 22 43
			JMA	29.	eL eL eL	E Z N	07 28 50 23 16 25
28.	iP eS P: N, D	NZ EZ	01 45 10.6 31				15.4 S., 173.6 W. Tonga Is. h: 50 km. H= 06 57 34.3
				29.	eP S	Z N	12 25 33 38
28.	iP EZ, P N X S P: E, D	N Z N	02 53 22.2 37 41	29.	P X S X	NEZ NZ E Z	13 11 10 21 35 45
			16.3 N., 122.2 E. Luzon. Philippine Is. h: 60 km. H= 07 19 08.5				41.5 N., 142.9 E. Hokkaido, Japan. h: 30 km. H= 13 09 36.9
			USCGS	29.	P eL	NEZ EZ	16 47 06 57 36
28.	eP X L L L	Z N E Z N	11 57 40 12 03 50 07 20 09 16 20				1.5 N., 126.2 E. Molucca Passage. h: 93 km. H= 07 40 07.3
			3.9 S., 151.6 E. New Ireland. h: 19 km. H= 11 49 46.7	29.	P S X	NZ NE N	17 26 10 18 26
			USCGS	29.	P iX S	Z NZ E	18 14 25 29.8 16 08
28.	P X L L	Z Z	18 54 05 08				27.5 N., 140.0 E. Bonin Is. h: 453 km. H= 18 12 15.9
			36.5 N., 70.9 E. Hindu, Kush. h: 229 km. H= 18 45 10.6	29.	eL eL eL	E N Z	18 52 20 26 53 30
			USCGS	29.	iP S P: S, E, D	NEZ NEZ	19 05 35.3 54
28.	eP S L	NZ N Z	19 26 56 28 50 29 36				
			43.7 N., 146.9 E. Kurile Is. h: 55 km. H= 19 24 41.3				
			USCGS				
28.	L L E, eL N	Z	20 06 32 40				

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Date Phase Comp. Time(GMT)
h m s

36.1 N., 140.0 E.
Honshu, Japan.
h: 70 km.
H= 19 05 09.1 JMA

29. P Z 20 12 09
37.1 N., 116.1 W.
Southern Nevada.
h: 0 km.
H= 20 00 00 USCGS

29. iP Z 22 13 59.4
iP NE 14 00.0
P: C
37.1 N., 116.1 W.
Southern Nevada.
h: 0 km.
H= 22 01 51.4 USCGS

30. iP NEZ 00 06 14.4
S NE 40
P: S, W, C
37.5 N., 140.2 E.
Honshu, Japan.
h: 160 km.
H= 00 05 38.6 JMA

30. iP EZ, P N 00 52 34.0
eX NEZ 57.4
eL Z 59.5
P: E, D
22.4 N., 121.4 E.
Taiwan.
h: 48 km.
H= 00 47 59.8 USCGS

30. iP Z, P NE 01 30 45.9
iS E, S N 31 26
X E 32
P: S, W, D

30. P NEZ 02 06 48
S N 07 14
X Z 17
X NEZ 08 54

30. P Z 04 10 50

30. iP NEZ 07 53 18.7
iX E 22
iX E 33.5
iX Z 54 05.5
S NE 32
P: S, W, C

41.7 N., 142.1 E.
Near south coast of Hokkaido,
Japan.
h: 100 km.
H= 07 51 48.7 JMA

Date Phase Comp. Time(GMT)
h m s

30. eX E 12 32 10
eL Z 34 44
eL E 56
eL N 35 18
52.3 N., 95.8 E.
Central Russia.
h: N.
H= 03 17 22.3 USCGS

30. iP Z 13 20 34.7
S N 59
P: D

30. iP EZ 13 23 00.6
iP N 01.0
iX NEZ 07
S N 26
X E 33
P: N, E, D

36.9 N., 141.2 E.
Near east coast of Honshu,
Japan.
h: 50 km.
H= 13 22 20.6 JMA

30. P Z 13 56 34
eP E 35
S N 52
X Z 57 12

30. P Z 17 23 34
15.0 S., 166.9 E.
New Hebrides Is.
h: 38 km.
H= 17 13 44.0 USCGS

30. P NZ 18 45 48
eP E 49
X N 43 42
S NE 52 40
eL E 55 10
eLr Z 57 30
2.5 S., 143.5 E.
New Guinea.

h: N.
H= 18 39 23.0 USCGS

31. P NEZ 01 29 44

31. eP NZ 02 13 59
S N 14 47

31. eP Z 04 37 10
eL E 46 06
eL Z 48 08

2.5 S., 143.5 E.
New Guinea.
h: 19 km.
H= 04 29 48.9 USCGS

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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
31.	iP X S	NEZ EZ E	06 46 27.7 40 48 48	31.	eP	Z	12 05 10
	P: N, E, D			31.	iP X P: D	Z E	12 30 57.2 31 04
	44.3 N., 150.8 E. South of Kurile Is. h: 60 km. H= 06 43 29.9		JMA	31.	P	Z	13 49 09
31.	iP EZ, P N S	NZ	07 01 03.4 52	31.	eP X eS	Z N NE	22 42 30 43 05 46 55
	P: E, D 37.0 N., 142.5 E. Near east coast of Honshu, Japan. h: 60 km. H= 07 00 09.0		JMA	31.	eP	Z	23 23 52
31.	P Z, eP NE X S L	Z E Z	07 38 21 28 46 30 56 54				
	17.3 S., 174.2 E. Fiji Is. h: 56 km. H= 07 27 55.9		USCGS				
31.	eP	Z	07 44 39				
	17.3 S., 174.3 E. Fiji Is. h: 57 km. H= 07 34 15.9		USCGS				
31.	eP	Z	10 51 39				
	33.4 N., 119.1 W. Southern California. h: 7 km. H= 10 39 29.0		USCGS				
31.	P PP S X L L L X ScS Lr	NZ Z NEZ Z N Z E NE NE Z	11 39 42 40 51 45 05 46 05 47 00 12 20 50 07 21 59 20				
	Mag. $6\frac{2}{3}$ -7 (Mat.) 51.3 N., 179.0 W. Andreanof Is., Aleutian Is. h: 49 km. H= 11 33 04.8		USCGS				
31.	P	Z	11 54 10				
	51.2 N., 179.0 W. Andreanof Is., Aleutian Is. h: 48 km. H= 11 47 32.1		USCGS				

Mineo Takehana

Director

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Date	Phase	Comp.	Time(GMT)
			h m s
30.	P S X L L X ScS Lr	NEZ Z NEZ Z N Z E NE NE Z	07 23 19.7 22 33.5 24 08.5 32
	41.7 N., 143.1 E. Near south coast of Hokkaido, Japan. h: 100 km. H= 07 21 48.7		JMA
30.	P S X L L X ScS Lr	NEZ Z NEZ Z N Z E NE NE Z	07 23 19.7 22 33.5 24 08.5 32
	41.7 N., 143.1 E. Near south coast of Hokkaido, Japan. h: 100 km. H= 07 21 48.7		JMA
30.	P S X L L X ScS Lr	NEZ Z NEZ Z N Z E NE NE Z	07 23 19.7 22 33.5 24 08.5 32
	41.7 N., 143.1 E. Near south coast of Hokkaido, Japan. h: 100 km. H= 07 21 48.7		JMA
30.	P S X L L X ScS Lr	NEZ Z NEZ Z N Z E NE NE Z	07 23 19.7 22 33.5 24 08.5 32
	41.7 N., 143.1 E. Near south coast of Hokkaido, Japan. h: 100 km. H= 07 21 48.7		JMA
30.	P S X L L X ScS Lr	NEZ Z NEZ Z N Z E NE NE Z	07 23 19.7 22 33.5 24 08.5 32
	41.7 N., 143.1 E. Near south coast of Hokkaido, Japan. h: 100 km. H= 07 21 48.7		JMA
30.	P S X L L X ScS Lr	NEZ Z NEZ Z N Z E NE NE Z	07 23 19.7 22 33.5 24 08.5 32
	41.7 N., 143.1 E. Near south coast of Hokkaido, Japan. h: 100 km. H= 07 21 48.7		JMA
30.	P S X L L X ScS Lr	NEZ Z NEZ Z N Z E NE NE Z	07 23 19.7 22 33.5 24 08.5 32
	41.7 N., 143.1 E. Near south coast of Hokkaido, Japan. h: 100 km. H= 07 21 48.7		JMA
30.	P S X L L X ScS Lr	NEZ Z NEZ Z N Z E NE NE Z	07 23 19.7 22 33.5 24 08.5 32
	41.7 N., 143.1 E. Near south coast of Hokkaido, Japan. h: 100 km. H= 07 21 48.7		JMA
30.	P S X L L X ScS Lr	NEZ Z NEZ Z N Z E NE NE Z	07 23 19.7 22 33.5 24 08.5 32
	41.7 N., 143.1 E. Near south coast of Hokkaido, Japan. h: 100 km. H= 07 21 48.7		JMA
30.	P S X L L X ScS Lr	NEZ Z NEZ Z N Z E NE NE Z	07 23 19.7 22 33.5 24 08.5 32
	41.7 N., 143.1 E. Near south coast of Hokkaido, Japan. h: 100 km. H= 07 21 48.7		JMA