

SEISMOLOGICAL BULLETIN

OF

MATSUSHIRO

JANUARY , FEBRUARY

1964

Instrument	Comp.	Period (sec)		Damping ratio		Magnification
Short 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)
Bentley Seismograph (Long Period)	N	$T_1=1.0$	$T_2=70$	$h_1=0.68$	$h_2=5.3$	7,330 (max)
	E	$T_1=1.0$	$T_2=62$	$h_1=0.70$	$h_2=5.6$	7,640 (max)
	Z	$T_1=1.0$	$T_2=56$	$h_1=0.72$	$h_2=6.0$	7,990 (max)
Short Period Seismograph	Z	$T_1=1.0$	$T_2=2.82$	$h_1=1.4$	$h_2=1.7$	32,000 (max)
Cathode Seismograph	N	$T_1=1.0$	$T_2=100$	$h_1=1$	$h_2=1.2$	1,350 (max)
	E	$T_1=1.0$	$T_2=100$	$h_1=1$	$h_2=1.2$	1,540 (max)
	Z	$T_1=1.0$	$T_2=100$	$h_1=1$	$h_2=1.2$	850 (max)
Wood-Anderson Seismograph	N	$T_1=1.0$	$T_2=100$	$h_1=1$	$h_2=1.2$	1,050 (max)
Long Period Seismograph	N	$T_1=30.0$	$T_2=30.0$	$h_1=0.60$	$h_2=0.60$	100
	E	$T_1=30.0$	$T_2=30.0$	$h_1=0.62$	$h_2=0.62$	100

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

January, 1965
Date Time Comp. Type
1. 01 02 24.3
1. 05 15 35.2
1. 15 27
P:W,C
Mag. 4.6 (Max)
37.4 N., 142.7 E.
Off east coast of
Hanshu, Japan.
h: 33 km ca.
H- 21 04 29.5

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 = 64	h ₁ = 0.72	h ₂ = 7.3	7,590 (max)
Short Period Seismograph	Z	T ₁ = 1.0	T ₂ = 2.32	h ₁ = 1.4	h ₂ = 1.2	32,000 (max)
Galitzin Seismograph	N	T ₁ = 15	T ₂ = 100	h ₁ = 1	h ₂ = 1.2	1,350 (max)
	E	T ₁ = 15	T ₂ = 100	h ₁ = 1	h ₂ = 1.1	1,640 (max)
	Z	T ₁ = 7.5	T ₂ = 100	h ₁ = 0.76	h ₂ = 0.87	860 (max)
Wood-Anderson Seismograph	N	0.8		0.8		1,050
	E	0.8		0.8		1,200
1000 kg Long Period Seismograph	N	33.0		0.60		100
	E	30.0		0.62		100



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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
1.	e	E	02 24 32				
1.	iP	EZ	05 15 25.2				
	i	N	25.3				
	e	NEZ	16 23				
	P:W,C Mag. 4.6 (Mat) 37.4 N., 142.7 E. Off east coast of Honshu, Japan. h; 33 km ca. H= 05 14 26 USCGRS						
1.	iP	Z	06 29 33.3				
	i	Z	53				
	e	EZ	23 04				
	P:C 45.5 N., 151.7 E. Kurile Is. h: 45 km ca. H= 22 42 27.0 USCGRS						
1.	iP	NZ, P E	08 58 05.6				
	P:S,C						
1.	iP	NZ	12 29 52.8				
	i	E	53.0				
	e	Z	35 20				
	eS	E	36 12				
	e	E	39 04				
	Lq	E	40 27				
	P:N,C Mag. 5 1/2 (Mat) 6.3 S., 123.3 E. Banda Sea. h: 36 km ca. H= 12 21 55.4 USCGRS						
1.	eP	Z	14 15 19				
	eS	NE	16 09				
1.	iP	NZ	17 23 49.3				
	i	NE	49.9				
	e	E	32 26				
	L	NZ	33 12				
	P:D Mag. 5.4 (Mat) 45.4 N., 151.9 E. Kurile Is. h: 45 km ca. PH= 17 26 43.5 USCGRS						
1.	iP	NZ, P EZ	19 15 35.3				
	i	N	35.7				
	i	Z	44.4				
1.	iP	E	12 16 20.3				
	S	N	30.6				
	P:W,D 54.6 N., 161.5 E. Kamchatka. h: 33 km ca. H= 05 21 00.5 USCGRS						
1.	iP	Z	20 10 01.2				
	L	E	18 44				
	L	E	21 30				
	Mag. 5 1/2 - 5 3/4 (Mat) 3.2 S., 133.7 E. Banda Sea. h: 36 km ca. H= 12 21 55.4 USCGRS						

International
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Centre

Mitsubishi Seismological Observatory, Japan

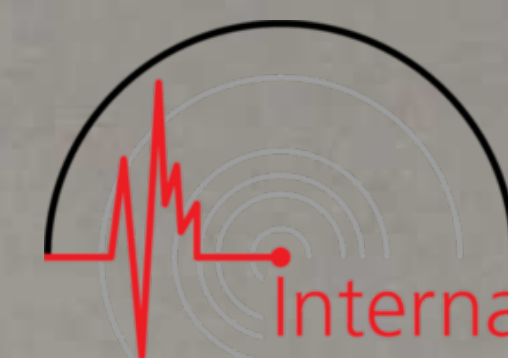
Seismological Bureau

Latitude 36° 32' 30"N
Longitude 138° 13' 30"E
Elevation 440 m

Instrumental Constants

Magnification	Damping ratio	Period (sec)	Comp.	Instruments
100,000 (max)	h=1.7	T=1.0	N	Benioff
100,000 (max)	h=1.6	T=1.0	E	Seismograph
131,000 (max)	h=1.3	T=1.0	Z	(Short Period)
7,300 (max)	h=2.3	T=1.0	N	Benioff
3,650 (max)	h=2.6	T=1.0	E	Seismograph
7,300 (max)	h=2.3	T=1.0	Z	(Long Period)
32,000 (max)	h=1.3	T=1.0	Z	Short Period
4,350 (max)	h=1.3	T=1.0	N	Galvan
1,650 (max)	h=1.1	T=1.0	E	Seismograph
800 (max)	h=0.87	T=1.0	Z	Seismograph
1,400	0.8	0.8	N	Wood-Anderson
1,200	0.8	0.8	E	Seismograph
100	0.60	33.0	N	1000 Hz
100	0.60	30.0	E	Long Period

(cont.)



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Seismological
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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
	i e	Z E	23 45 30.6 43 52				
4.	iP i P:C	Z LZ	01 35 05.7 23.9				
4.	iP i e P:D	Z NE EZ N	02 35 45.4 45.6 57 53				
4.	e	E	03 36 14				
4.	eP e	Z NZ	03 44 01 21.6				
4.	e e	E L	03 55 26 53 50				
4.	eP	Z	05 03 50				
4.	eP eS?	EZ NE	05 12 42 13 10				
4.	eP	Z	06 53 52				
4.	iP i i S P:S,D	NZ E Z E	07 31 03.5 03.6 10 42				
4.	iP S P:N,L,C	NEZ NEZ	09 53 48.7 55				
4.	iP S i P:C	NEZ Z N	10 00 00.7 15 16				
4.	P S eL	Z E E	10 43 36 47 30 48.3				
			Mag. 5-5½ (Mat) 21.6 N., 121.8 E. Off south coast of Taiwan. h: 33 km ca. H= 10 33 53.3 USCGS				
4.	P e e	Z L L	14 20 22 24 24 27 14				
4.	P e i eL	NLZ N Z E	16 20 10 22 30 35 23 24 (cont.)				
			44.4 N., 150.9 E. Kurile Is. h: 50 km ca. H= 16 17 16.5 USCGS				
4.	iP i P:E,D	NEZ E	16 32 59.7 33 24				
4.	P e eS eL	Z L E L	16 43 54.5 51 24 52 47 55.3				
			21.7 N., 121.8 E. Off south coast of Taiwan. h: 33 km ca. H= 16 44 16.9 USCGS				
4.	P	NEZ	17 00 02				
4.	P i	Z EZ	17 48 16 17.5				
			5.5 S., 150.0 E. New Britain. h: 117 km ca. H= 17 40 23.3 USCGS				
4.	iP i e P:W,D	EZ, P N NEZ NEZ	20 51 42.3 43.6 53				
4.	P	Z	23 56 02.5				
5.	eP	Z	00 33 02				
5.	iP i P:N,E,D	NEZ NE	01 56 21.7 47.0				
5.	iP S? P:C	Z NZ	02 59 43.3 44				
5.	P	Z	03 15 53.0				
			20.6 S., 179.0 W. Tiji Is. h: 650 km ca. H= 03 05 44.1 USCGS				
5.	eP	Z	07 15 00				
			54.6 N., 161.2 W., Alaska Peninsula, h: 33 km ca. H= 07 06 40.2 USCGS				
5.	iP i	Z NE	03 53 36.6 36.9 (cont.)				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
6.	iP i S L P:D	Z NE N NE	08 07 15.2 15.3 53 08 06		P:D		19.0 S., 178.0 W. Fiji Is. h: 593 km ca. H= 02 15 00.6
6.	iP S P:N,E,C	NEZ NEZ	15 12 06.8 15	7.	eP S P:N,E,C	Z	04 57 10 29.3 N., 98.7 E. Eastern Tibet. h: 46 km ca. H= 04 50 37
6.	iP i S i P:N,C	NZ E EZ Z	16 03 11.2 11.5 09 25 27	7.	e e L	E E E	05 40.0 56 36 53 34
				7.	P P:C	Z	06 03 54.5
6.	P	Z	16 32 38	7.	iP P:C	Z	08 54 33.1 54.0 N., 165.5 W. Fox Is. h: 30 km ca. H= 03 46 43.0
				7.	P i eS	NEZ NZ E	09 13 35 39.5 14 21
6.	P i i P:D	Z N Z	17 47 58.0 58.5 49 20.5	7.	eP	Z	10 19 46
6.	iP i i i P:N,E,C	NEZ E Z Z	21 34 49.4 56.5 35 02 13	7.	eL eL	E E	10 57 00 59 45 3.0 S., 139.0 E. Western New Guinea. h: 47 km ca. H= 10 40 42.9
6.	iP P:N,D	NZ	22 02 33.6	7.	P P	Z	11 16 33 13.6 N., 155.3 W. South of Hawaii I., Hawaii. h: 33 km ca. H= 11 06 21
6.	P	Z	23 43 25	7.	iP e P:C	NZ NE	11 24 44.3 25 10
6.	iP S i L L L P:S,C	NZ NE NEZ NE E Z	23 49 53.2 53 35 42 54.5 55 40 45	7.	P e i	Z NE Z	12 55 23 29 44.7
				7.	e	E	13 16 43
				7.	P S	Z N	13 21 43.5 22 07
7.	e	E	01 50 35	7.	e	E	13 32 40
7.	iP i	Z NE	02 25 04.7 04.3				

(cont.)

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Date	Phase	Comp.	Time(GMT)		
			h	m	s
			h: 50 km ca. H= 16 57 26.5 USCGRS		
10.	iP i eL	NZ E E	22 00	44.6 45.1 10.6	
			P:N,C 6.9 S., 129.4 E. Banda Sea. h: 117 km ca. H= 21 52 47.6 USCGRS		
11.	P	Z	01 24	56	
11.	P eS i i	Z N E Z	05 49 50	39 19 21.2 23.7	
11.	eL	E	07 11	25	
			15.1 S., 172.9 W. Samoa Is. h: 33 km ca. H= 06 39 55 USCGRS		
11.	eP? e e i eL	Z Z N Z E	09 45	36 46 43 57 51 44	
11.	P i i	N Z E	10 24	41.0 42.2 42.7	
11.	eP	Z	10 33	59	
			11.4 S., 90.9 E. Indian Ocean, about 600km west of Cocos Is. h: 33 km ca. H= 10 23 10.9 USCGRS		
11.	eP i i i i eS e i	Z N Z Z E N E E	14 10	32 35.3 35.9 55.2 57.8 11 35 37 44	
			32.3 N., 142.0 E. South of Honshu, Japan. h: 109 km ca. H= 14 09 17 USCGRS		
11.	iP P:C	Z	15 36	11.9	
11.	eP i	Z NZ	22 10	28 31.3	

(cont.)

Date	Phase	Comp.	Time(GMT)		
			h	m	s
			eS E 22 17 05 e N 23 eL E 21 33 8.6 S., 123.4 E. Flores Sea. h: 70 km ca. H= 22 02 03 USCGRS		
11.	P i i eS i	Z E N N E	23 00	34 34.7 35.5 01 15 28	
11.	iP i i	NZ E E	23 17	41.7 45.1 48.7	
			P:S,C		
11.	i	Z	23 29	36.7	
11.	e i	Z E	23 46	43 47 41	
12.	eP	Z	00 11	05	
12.	eP? eS e	Z Z N	00 41	40 42 46 47	
12.	P e e	Z Z Z	01 02	22 33 42	
12.	iP S i	EZ NE Z	04 31	46.2 32 10 11	
			P:E,C		
12.	iP i S i	NZ E EZ N	05 12	05.2 05.3 26 29	
			P:S,D Mag. 4.5 (Mat) 35.2 N., 139.2 E. Near Honshu, Japan. h: 15 km ca. JMA		
12.	iP i ipP i PcP S eLq eLr eLr	EZ N Z Z Z E NE E Z	06 07	58.8 59.2 03 18 09 55.6 10 06 14 12 17 30 20 03 20 07	
			P:W,C Mag. 6.4 (Mat)		

(cont.)

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
		h: 50 km ca. H= 01 11 12.6	USCGS			h: 45 km ca. H= 02 23 47.4	USCGS
14.	eP	NZ	01 56 37	15.	P	NZ	07 43 26
					i	Z	39.0
14.	P	Z	04 29 37.5		eS	N	44 31
	i	NE	39.0		e	Z	35
	i	Z	54.7		i	E	33.4
	eL	E	57 52	15.	P	Z	03 14 40
	eL	N	05 02.7		i	N	52.5
		28.3 S., 176.2 W. Kermadec Is.			eL	E	13 36
		h: 89 km ca. H= 04 17 50.5	USCGS			21.3 N., 143.4 E. Mariana Is. region.	
14.	iP	Z	03 55 54.1			h: 25 km ca. H= 03 10 57.2	USCGS
	i	NE	54.5	15.	P	Z	11 46 50
		P:C			i	N	47 06
		47.9 N., 145.6 E. Sea of Okhotsk.		15.	eP	Z	12 32 39
		h: 565 km ca. H= 03 53 09.3	USCGS		e	N	41
14.	eP	Z	10 40 59		i	Z	41.6
					eS	E	44
14.	P	NZ	15 45 59		i	E	46.5
	pP	NZ	46 34.7	15.	iP	Z	13 06 37.0
	PP	N	47 38		i	N	38.4
	e	Z	42		e	N	07 09
	iScP	Z	51 22.2		S	NE	21
	eS	NE	52 12		P:C		
	eL	Z	55 22	15.	iP	EZ, PN	17 24 35.0
	eL	N	27		S	N	51
	eL	E	40		i	E	52
		Mag. 6½ (Mat)				P:E,C	
		5.2 S., 150.3 E. Near north coast of New Britain.		15.	iP	Z, PE	13 36 43.3
		h: 169 km ca. H= 15 38 13.3	USCGS		S	E	37 02.1
14.	iP	Z, PE	13 53 37.3		i	N	03.3
		P:E,D			P:C		
15.	iP	NEZ	00 39 42.0	15.	P	NZ	13 59 01
	eS	Z	58		i	N	02.5
	i	N	40 00		i	E	02.7
		P:S,E,D			pP	Z	56
15.	iP	NZ	02 26 43.3			23.4 S., 178.4 W. Kermadec Is.	
	i	E	49.4			h: 211 km ca. H= 13 46 32.9	USCGS
	i	Z	27 01	15.	iP	NEZ	21 15 01.7
	i	E	03			P:N,E,D	
	eS	NE	29 34	15.	eP	Z	21 35 34
	eL	N	30 11		i	N	35.9
	eL	Z	33		i	E	36.2
	eL	E	46	15.	iP	NZ	21 37 55.5
		P:S,C			i	E	56.5
		45.3 N., 150.6 E. Kurile Is.					(cont.)



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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
	eS	E	21 39 24	16.	iP	Z	17 53 51.2
	eL	E	54ca.		e	E	59 04
	eL	N	40 03		eL	E	18 06.1
	iScS	N	51 31.0		P:C		
	iScS	E	31.6				55.3 N., 160.1 E.
	P:S,D						Kamchatka.
	Mag. 6.5 (Mat)						h: 33 km ca.
	29.1 N., 140.8 E						H= 17 53 39.7
	South of Honshu, Japan.						USCGS
	h: 70 km ca.			16.	P	NEZ	13 53 01
	H= 21 36 05.0				iS	N	20.1
					i	EZ	20.6
15.	eP	Z	21 44 33	16.	iP	NEZ	23 11 35.2
15.	eP	Z	22 53 00		eS	NEZ	12 24
	i	N	09		P:N,W,D		
	e	EZ	16				37.3 N., 134.8 E.
	14.6 S., 166.8 E.						Sea of Japan.
	New Hebrides Is.						h: 380 km ca.
	h: 55 km ca.						H= 23 10 34.4
	H= 22 43 14.3						USCGS
15.	iP	NZ	23 14 54.7	17.	iP	NEZ	00 05 02.0
	i	E	55.1		iS	Z	07.2
	P:S,D				P:N,E		
	17.4 S., 179.7 E.			17.	eP	Z	01 51 23
	Fiji Is. region.			17.	iP	E	02 57 26.5
	h: 599 km ca.				i	Z	26.7
	H= 23 05 02				i	N	27.0
					i	N	59 07
16.	iP	NEZ	10 54 33.1		e	N	29
	P:N,E,D				eS	EZ	51
	50.5 N., 154.0 E.				L	E	03 00 38
	Kurile Is. region.				L	N	42
	h: 203 km ca.				P:W		
	H= 10 50 36				Mag. 5.5 (Mat)		
					45.4 N., 151.3 E.		
16.	eP	Z	11 43 35		Kurile Is.		
	e	N	44 19		h: 55 km ca.		
					H= 02 54 22.6		
16.	iP	Z	11 54 57.7				USCGS
	i	NE	57.9	17.	iP	Z, P N	03 05 05.9
	P:D				i	E	06,2
16.	PKP?	Z	14 57 55		e	Z	25
	i	Z	59.8		eS	E	13 37
	30.4 S., 69.5 W.				eL	N	20 08
	San Juan Province, Argentina.				eL	E	21.1ca.
	h: 33 km ca.				P:N,C		
	H= 14 37 37.3				Mag. 5½ - 6 (Mat)		
					21.6 S., 169.9 E.		
16.	iP	NEZ	16 12 08.8		Loyalty Is. region.		
	P:N,E,D				h: 33 km ca.		
					H= 02 54 26.8		
							USCGS
16.	iP	Z	17 15 49.7	17.	iP	Z	03 23 09.0
	P:D				P:C		
	52.5 N., 162.9 E.				12.3 S., 167.1 E.		
	Off east coast of Kamchatka.				Santa Cruz Is.		
	h: 33 km ca.				h: 230 km ca.		
	H= 17 10 41				H= 03 13 56.3		
							USCGS

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
17.	eP e	NZ N	03 34 06 57		e	E	13 47 45
							23.1 N., 120.8 E. Southwestern Taiwan. h: 31 km ca. H= 13 43 05.6 USCGS
17.	eP eS i	Z N E	05 01 51 02 19 20	13.	eP i eL eL	Z E N N	14 50 29 32.3 59 30 15 04 55
							20.6 N., 122.1 E. Batan Is. h: 13 km ca. H= 14 45 39.4 USCGS
17.	iP Z, P i eS i	E N E N	11 41 00.3 00.6 33 40	13.	eP	Z	15 00 10
17.	P eS	Z NE	13 30 48.9 31 31	13.	iP eS? i e	E N N N	13 24 14.3 25 09 19 27.0
13.	iP iS i	NE E N	04 52 14.9 33.7 39.2	13.	eP i eS e	NE NE EZ N	23 06 54 57.9 07 31 34
13.	iP i S i	NEZ N E N	09 12 48.5 49.8 13 21 22	19.	eP i S i	NZ E NE Z	00 14 33 34.9 55 56
13.	eP	E	11 01 02	19.	eP i	Z Z	07 06 50 09 27
							9.2 S., 153.2 E. Solomon Is. h: 32 km ca. H= 07 00 03.3 USCGS
13.	P i e eS i i L L L	NEZ Z Z N Z E N Z	12 09 13 20 49 13 04 07 10 14 00ca. 42 15 57	19.	P e eL	Z Z N	03 51 56 52 15 09 01 03
							21.8 N., 120.9 E. Near south coast of Taiwan. h: 13 km ca. H= 03 47 10 USCGS
18.	eP eS	NEZ N	12 36 50 40 21	19.	eP	Z	09 25 03
							26.9 N., 54.0 E. Near coast of southern Iran. h: 33 km ca. H= 09 13 53.5 USCGS
18.	eP? e	Z Z	13 1 02 55	19.	P e eL	E ZE N	09 32 56 33 13 53 21
13.	eP	Z	13 47 31				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
19.	eP e i e i	Z Z N Z N E	12 06 23 57 57.9 07 11 25 53	20.	iP i i P:S,E	NE Z Z	02 04 51.1 51.4 05 09
19.	iP P:S,W,C	NEZ	13 42 57.6	20.	P	NEZ	04 52 59.8 8.2 N., 126.6 E. Near east coast of Mindanao, P.I. h: 110 km ca. H= 04 46 59.7 USCGS
19.	eP eL	Z N	16 17 22 22 56	20.	iP i i P:E,D	EZ Z Z	06 04 57.2 05 05.1 06 38
			23.0 N., 120.4 E. Taiwan. h: 33 km ca. H= 16 12 50.0 USCGS				
19.	P i i eS eL eL	NZ EZ N N N E	17 03 23.3 25.0 25.6 05 13 47 06 00ca	20.	iP S i P:C	Z NZ E	11 19 33.1 52 53
			45.2 N., 141.4 E. Northern Hokkaido, Japan. h: 136 km ca. H= 17 01 16 USCGS	20.	P i eL	Z Z E	13 53 18.0 15 44 16 31.4 50 49
			23.2 N., 120.3 E. Taiwan. h: 49 km ca. H= 15 39 41.5 USCGS				
19.	P i S e eL	NEZ Z N N E	17 12 59 14 22.9 15 11 25 39	20.	iP i pP? PP PP iS eScS eSS e e ePKPPKPFZ i i	NZ E Z N Z NE NE N Z E E N	17 18 58.5 59.0 19 32.9 21 24 27.2 27 25 28 45 31 26ca 34 44 55 47 40 50.4 52.4
			44.1 N., 145.0 E. Near east coast of Hokkaido, Japan. h: 33 km ca. H= 17 10 46.1 USCGS				
19.	eP i iS i	Z NEZ Z E	19 28 43 49.2 29 10.7 11.2				
			45.9 N., 149.9 E. Kurile Is. h: 50 km ca. H= 23 05 38 USCGS				
19.	iP P:D	Z	23 08 34.3	20.	P i i i eS i eL	Z Z N E N E	20 43 21 29.0 30.3 41 47 34 40 49.0
			18.3 S., 176.9 W. Fiji Is. h: 48 km ca. H= 23 22 19.1 USCGS				
			Mag. 6.6 (Mat) 20.7 S., 169.9 E. Loyalty Is. region. h: 141 km ca. H= 17 03 37.4 USCGS				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
22.	iF Z, P S	NE NE	11 33 02.9 05				
					Mariana Is. region. h: 39 km ca. H= 17 58 16.3 USCGS		
22.	P S	NEZ NE	11 57 30 32.6	22.	iF i e P:E,D	EZ E Z	13 27 52.6 29 15 30 12
22.	i	EZ	11 58 30	22.	iF eScP e P:C	Z Z E	13 54 32.4 19 00 26 01 52
22.	iF i P:W,C	EZ N	12 11 31.1 57				
22.	P 47.7 N., 152.8 E. Kurile Is. h: 33 km ca. H= 13 44 20	Z	13 47 35.7				
					7.6 N., 126.9 E. Near east coast of Mindanao, P.I. h: 144 km ca. H= 13 48 30.9 USCGS		
22.	iF S P:S,W,D	NEZ NE	14 02 47.6 50.3	22.	iF i S i	Z NE N E	19 12 37.7 38 13 03 04
22.	iP EZ, F S	N NEZ	14 10 42.8 45	22.	P eS?	Z Z	19 15 10.7 34
22.	iF iS P:S,W,D	NEZ NE	14 24 09.9 12.3	22.	iF P:C	Z	20 18 13.8
22.	P S	Z NEZ	14 46 42.6 45	22.	iF P:C	Z	22 30 13.2
22.	iF S P:E,C	EZ NEZ	15 18 30.9 33.2				
					15.3 S., 175.1 W. Fiji Is. region. h: 307 km ca. H= 22 19 44.1 USCGS		
22.	iF i ePF i S eSS eL eL P:E,C Mag. 5 $\frac{1}{2}$ -6 (Mat) 22.4 N., 93.6 E. Burma. h: 38 km ca. H= 15 58.46.5	EZ N E Z NEZ N E Z	16 06 20.7 22.1 08 20 12 04 29 15 27 19 53 20.0	22.	iF i i P:D	Z N Z	22 47 07.0 41 43 42
				23.	iF i i i S SS L L Lr P:D Mag. 6 $\frac{1}{4}$ - 6 $\frac{1}{2}$ (Mat) 13.7 S., 165.7 E. New Hebrides. Is. h: 33 km ca. H= 23 59 43.6	Z N NE E N N E Z Z	00 09 22.2 22.7 10 15 12 06 17 06 20 51 23 20 34 29 22
22.	eP i i eS eL Mag. 5-5 $\frac{1}{2}$ (Mat) 20.2 N., 147.1 E.	Z Z Z E E	18 02 25 27 40 04 19 05 33	23.	iF	Z	03 29 02.7
							(cont.)

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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
	S	NZ	16 53 24	25.	eP	Z	04 13 16
	i	N	26				20.2 N., 143.9 E.
	P:D						Mariana Is. region.
							h: 33 km ca.
							H= 04 09 13 USC&S
24.	iP	NEZ	17 19 37.0	25.	iP	Z	06 23 30.6
	i	EZ	20 16		iS	NEZ	32.7
	iS	NEZ	21 07.6		P:D		
	ScP	Z	27 52.2	25.	P	Z	07 14 52
	ScS	NE	31 25				22.6 S., 179.7 W.
	P:N,W,D						Fiji Is.
	Mag. 6.6 (Mat)						h: 600 km ca.
	38.7 N., 129.4 E.						H= 07 04 32.8 USC&S
	Near east coast of Korea.						
	h: 542 km ca.						
	H= 17 17 45.5 USC&S						
24.	iP	Z	20 03 26.8	25.	iP	EZ	07 29 47.6
	P:D				i	Z	30 02
	17.8 S., 178.5 W.				i	NE	04
	Fiji Is.				P:E,C		
	h: 534 km ca.			25.	iP	NEZ	08 19 24.1
	H= 19 53 25.7 USC&S				P:N,W,D		
24.	iP	NEZ	21 23 46.7	25.	P	Z	12 21 02
	P:N,W,C						28.3 S., 176.5 W.
	21.7 S., 176.2 W.						Kernadec Is.
	Tonga Is.						h: 17 km ca.
	h: 32 km ca.						H= 12 09 08.8 USC&S
	H= 21 12 23.2 USC&S						
24.	P	NEZ	21 34 16	25.	iP	Z	13 26 15.4
	i	Z	32		S	NEZ	33
	eS	N	35 22		P:D		
	eL	E	37 06	25.	P	Z	15 12 51
	eL	N	23		iS	NEZ	53.2
	Mag. 5.3 (Mat)			25.	P	Z	15 42 21
	44.5 N., 150.3 E.				S	NE	27
	Kurile Is.			25.	P	Z	17 00 51.4
	h: 33 km ca.				iS	NEZ	53.5
	H= 21 31 24.2 USC&S			25.	iP	Z	17 35 24.9
24.	P	Z	21 55 13		S	EZ	52.6
	23.6 S., 179.9 E.				i	N	53.5
	Fiji Is.				P:C		
	h: 535 km ca.			25.	P	Z	17 52 14
	H= 21 44 46 USC&S				i	N	20
24.	iP	Z	22 53 05.7	25.	P	EZ	20 59 59
	PcP	Z	54 17.0		i	N	21 00 20
	P:C			25.	P	EZ	21 00 20
	7.1 S., 106.0 E.						
	Off south coast of Java.			25.	iP	Z	21 46 57.6
	h: 94 km ca.				P:D		
	H= 22 44 01 USC&S						52.7 N., 157.3 E
24.	eP	Z	23 14 27				Kamchatka.
	S?	NE	15 12				h: 33 km ca.
24.	eP	Z	23 45 41				H= 21 41 59.9 USC&S
	i	N	46 09				



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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
		Mid-Atlantic Ocean. h: 33 km ca. H= 01 12 23.5				52.5 N., 160.3 E. Near east coast of Kamchatka. h: 33 km ca. H= 17 51 47.3	
							USCGS
27.	iP iS P:W,D	NEZ NEZ	04 27 17.1 19.0	27.	P S	NEZ N	19 43 45 47
27.	P i i	Z EZ Z	06 22 41. 50.0 23 53	27.	eP iS	Z NEZ	19 52 25 27.1
		47.3 N., 152.1 E. Kurile Is. h: 33 km ca. H= 06 19 19		27.	iP P:E,D	NEZ	23 43 35.1
							USCGS
27.	iP i P:D	Z E	06 32 43.1 33 03.6	28.	iP i i i S	NEZ Z Z Z E	00 03 42.2 54 04 14 22 33
27.	eP i i	Z N Z	08 37 47 39 04 00			P:N,D 41.0 N., 141.5 E. Off east coast of Honshu, Japan. h: 33 km ca. H= 00 02 25.7	USCGS
27.	iP S	NEZ EZ	09 02 36.8 38	23.	iP i i	Z N E	04 14 47.1 15 07 10
27.	P i	Z Z	11 46 36 53	23.	iP i i PcP i S i i eLq eL Lr	NZ Z NE Z N E N E N Z	05 51 25.6 39 40 53 13.5 57 00 43 53 10 06 01 07 02 11 30 04 40
27.	P i i	E Z NEZ	12 51 15 30 52 10			P:N,C Mag. 5 $\frac{1}{2}$ -5 $\frac{3}{4}$ (Mat) 6.3 S., 143.7 E. New Britain region. h: 33 km ca. H= 05 43 22.1	USCGS
27.	iP S P:D	Z NEZ	13 44 44.1 45 08	27.	P i i	EZ NZ E	09 05 26 33 09 20
27.	P i i	Z Z E	14 08 46 09 26 34	27.	P i eL	EZ NZ E	11 59 09 14.4
27.	eP i S	Z Z NE	15 35 46 46.6 36 04	27.	iP Z, P i i S P:C	NE NZ E NE	16 24 32.3 25 05 21 41
27.	P eL	NZ E	17 56 45 18 04 46 (cont.)	28.	P S	Z NEZ	11 59 09 14.4

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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
1.	iP iS	Z NEZ	00 31 25.1 27.5	2.	eP i NZ, e E S N, eS EZ	Z	10 35 00 09 54
1.	eP S	Z N	01 26 40 27 11	2.	iP i S i P:W,C	EZ N NE E	13 18 12.6 13.2 46 19 17
1.	P i i eS eL	Z NE Z E E	01 55 14 17 51 02 01 22 04 12	2.	iP S i P:S,E,D	NEZ NE Z	17 04 08.8 30 33
			Mag. 5 $\frac{1}{2}$ -6 (Mat) 51.8 N., 170.8 W. Fox Is. h: 34 km ca. H= 01 47 52.1 USCGS	2.	P i eS?	Z E N	19 17 22 23 53
14	iP Z, P E i S	N N	02 35 45.0 45.1 37 05.0	3.	P S	EZ N	00 19 58 20 25
			P:W,C 40.7 N., 145.0 E. South of Hokkaido, Japan. h: 34 km ca. H= 02 34 06.0 USCGS	3.	iP NZ, P E iS N, S EZ P:N,D		01 39 40.7 46.9
1.	eP	Z	05 21 12	3.	iP i i i P:W,D	EZ N Z N E	03 54 51.2 51.5 55 48 56 15 16.7
1.	iP i P:C	Z Z	06 16 08.5 39	3.	eP 31.5 N., 114.2 W. Gulf of California. h: 14 km ca. H= 08 43 36.3 USCGS	Z	08 56 08
1.	eP i S i	EZ Z E Z	09 22 19 41 23 59 24 07	3.	P i i S E, eS N i	Z N Z Z	11 17 38 39 41.7 18 18 20
			27.5 N., 141.4 E. Bonin Is. region. h: 69 km ca. H= 09 20 04.3 USCGS	3.	P e i i	Z Z N E	18 42 41.6 43 13 14 15
1.	iPKP	Z	12 06 48.6	3.	iP eS eL P:S,W,C	NEZ E E	18 59 05.6 19 02 49 05 27
			3.5 S., 78.0 W. Peru-Ecuador border. h: 33 km ca. H= 11 47 28.3 USCGS				49.6 N., 156.7 E. Kurile Is. h: 40 km ca. H= 18 54 49 USCGS
1.	i	Z	13 44 05.4				
2.	P Z, eP E i S i i L L	N NE Z N E N	08 59 03 07 09 02 28 32 43 03 20 38				
			Mag. 5 $\frac{3}{4}$ (Mat) 24.2 N., 122.6 E. Near east coast of Taiwan. h: 28 km ca. H= 08 54 48.3 USCGS				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
3.	P	Z	20 16 16.0		P:D		
			23.2 S., 179.8 W. South of Fiji Is. h: 509 km ca. H= 20 05 47.6				19.7 S., 179.8 W. Fiji Is. region. h: 414 km ca. H= 11 35 18.6
			USCGS				USCGS
3.	iP	NEZ	21 04 49.4	5.	eP	Z	11 47 22
	i	NEZ	05 02.1				
	S	NE	19	5.	iP	Z	11 50 50.8
	i	NZ	30		S	NE	51 28
			P:N,E,C Mag. 5.4 (Mat) 34.2 N., 136.7 E. Near south coast of Honshu, Japan. h: 60 km ca.		P:D		
			JMA				
4.	P	NEZ	00 13 55	5.	eP	Z	15 27 11
					i	E	14
4.	P	NEZ	10 06 12		S	NE	30 16
	eS	N	09 18		L	N	32 48
	L	E	50		eL	E	33 14
	eL	N	10 48		i	Z	46
			Mag. 5-5½ (Mat) 48.2 N., 154.4 E. Kurile Is. h: 40 km ca. H= 10 02 21.4				23.8 N., 126.4 E. Ryukyu Is. region. h: 45 km ca. H= 15 23 24
			USCGS				USCGS
4.	P	Z	10 19 08	5.	P	Z	15 33 24.3
4.	P	Z	10 20 43.3		i	NE	24.5
4.	P	Z	12 48 12		i	E	34 15
4.	P	Z	14 24 13.9				P:C
	i	NE	14.0	5.	eP	Z	16 22 41
	iS	EZ, S N	25.1	5.	P	Z	16 24 37
4.	iP Z, P E		17 08 09.5		eL	E	34 40
	iS E, S NZ		20.6				3.8 S., 141.3 E. New Guinea. h: 110 km ca. H= 16 15 08
			P:C				USCGS
5.	iP Z, P N		07 52 59.0	5.	eP	Z	16 29 29
	i	N	53 16				3.7 S., 140.0 E. Western New Guinea, h: 55 km ca. H= 16 21 50.3
	iS	NEZ	21.5				USCGS
5.	iP	NEZ	11 30 51.5	5.	iPKP	Z	21 33 21
	S	E	31 18		i	Z	54
			P:S,E,D Mag. 5.5 (Mat) 36.3 N., 140.9 E. Near east coast of Honshu, Japan. h: 60 km ca.				23.7 S., 68.8 W. Northern Chile. h: 90 km ca. H= 21 13 19.0
			JMA				USCGS
5.	eP	NZ	11 42 29	5.	P	EZ	22 25 34.4
					i	N	35
5.	P	Z	11 45 38.7	5.	iP N, P EZ		22 26 15.0
	i	NE	39	6.	P	Z	02 16 44
			(cont.)	6.	P EZ, eP N		02 17 57
					eS	E	24 22
					L	E	26 37
					eL	N	29.0

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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
6.	eP	NEZ	05 00 00		P:C		
6.	iP	EZ	05 56 34.5		Mag. 7 - 7½ (Mat)		
	i	N	35.0		55.7 N., 155.8 W.		
	S	NZ	57 13		Kodiak I. region.		
	i	E	15		h: 33 km ca.		
	i	EZ	34		H= 13 07 25.2		USCGS
	i	N	37				
	P:W,C			6.	iP Z, P NE		13 22 17.8
6.	eP	Z	07 51 02		P:S,W,C		
	i	NEZ	04		Mag. 6½ (Mat)		
	i	Z	12.5		55.3 N., 155.0 W.		
	e	E	58 28		Kodiak I. region.		
	eL	E	03 00 40		h: 33 km ca.		
					H= 13 13 45.2		USCGS
				6.	P	EZ	14 02 03.0
					iS	NEZ	23.5
					P:D		
				6.	iP Z, P E		14 41 32.4
					i	N	32.6
					iS	E	45.0
					i	N	45.2
					P:W,C		
6.	P	NZ	08 03 08	6.	P	Z	15 09 04.8
	i	E	09		56.1 N., 154.3 W.		
	S	N	05 10		Kodiak I. region.		
	i	E	11		h: 33 km ca.		
					H= 15 00 32.6		USCGS
				6.	P	EZ	15 23 26.4
					i	N	26.9
					P:E,C		
					10.5 S., 120.7 E.		
					Sumba I. region.		
					h: 43 km ca.		
					H= 15 19 38.1		USCGS
6.	eP?	Z	08 04 45	6.	P	NZ	19 12 45
6.	iP	EZ	09 00 30.5		i	E	48
	e	N	31		S	NE	15 52
	S	N	01 01				
	i	EZ	07.5		Mag. 5½ (Mat)		
	P:W,D				24.0 N., 126.4 E.		
					Ryukyu Is. region.		
					h: 33 km ca.		
					H= 19 08 57.8		USCGS
6.	P	EZ	09 43 57.0	6.	eP	Z	19 15 29
					i	NE	32
				6.	iP	NEZ	19 29 56.9
					S	NEZ	30 03
					P:S,E,D		
				6.	P	EZ	19 38 47.5
					i	N	48.0
					S	NE	59.5
					P:E,D		
6.	P Z, eP N		11 02 19				
	iS	NE	29.3				
	i	Z	30.1				
6.	iP	Z	13 15 58.2				
	i	E	58.9				
	i	N	59.0				
	iS	E	22 54.0				
	i	N	56.0				
	i	Z	23 09				
	ScS	E	25 54				
	SS	N	26 05				
	SS	E	17				
	Lr	N	28 44				
	Lr	Z	30 45				
	Lr	E	32.0				

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
9.	iP i iS P:C	Z NE NEZ	14 47 25.9 26.4 41.9	10.	iP eS? L P:S,W,D	NEZ N E	17 37 14.9 44 49 55 44
9.	P eL	Z E	16 18 17 36.0				Mag. 5 $\frac{1}{2}$ -5 $\frac{1}{2}$ (Mat) 6.1 S., 104.1 E. Near south coast of Sumatra. h: 33 km ca. H= 17 27 58 USCGS
9.	iP iS i P:N,W,D	NEZ N E	18 27 29.0 52.2 52.3	11.	iP i e P:D	Z N E	00 47 11.3 12.0 52 35
9.	P i S? i P:C	Z E N Z	20 33 37.1 37.9 34 05 07				10.9 N., 141.3 E. Mariana Is. h: 33 km ca. H= 00 41 42.6 USCGS
9.	iP Z, P NE P:S,W,C		20 56 56.1	11.	P Z, eP N		02 14 44
9.	iP i i P:S,E,D	NEZ N E	23 44 20.0 35.2 35.4	11.	eP P:C	Z	02 45 52
							19.5 S., 174.0W. Tonga Is. region. h: 33 km ca. H= 02 34 26.8 USCGS
10.	iP Z, P NE i P:D	NE N	01 00 35.0 01 40	11.	iP i i i e iS P:C	Z NE EZ E Z E	03 52 03.0 03.5 14.9 17 54 19 44
							27.9 N., 128.0 E. Ryukyu Is. h: 78 km ca. H= 03 49 10.6 USCGS
10.	eP i eS	Z N N	03 08 39 41 09 05				
10.	P S i	NEZ N E	04 55 10.5 29 30.5	11.	iP eS e P:S,W,C	NEZ N E	06 37 05.7 39 25 40.0
							44.8 N., 149.3 E. Kurile Is. h: 125 km ca. H= 06 34 31.3 USCGS
10.	iP i iS i P:C	Z N NZ E	10 07 01.6 03.4 52 19.9 21	11.	iP i i S i P:D	Z NZ E E N	13 43 35.5 36.7 37.0 56.5 58.0
							20.9 S., 178.6 W. Fiji Is. region. h: 575 km ca. H= 09 56 44.9 USCGS
10.	P P	Z Z	17 36 14	11.	iF e iS P:S,E	NEZ N E	19 54 16.0 22 22.5
							6.1 S., 104.1 E. Near west coast of Sumatra. h: 126 km ca. H= 17 27 07 USCGS

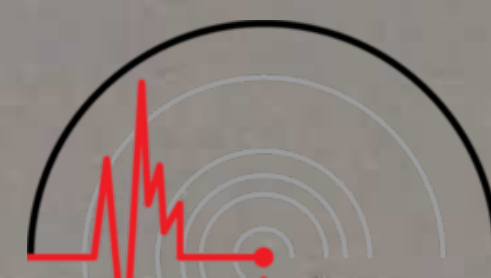
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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
11.	iP i P:D	Z E	21 14 34.8 35.0				
							3.5 S., 146.6 E. Admiralty Is. region. h: 33 km ca. H= 20 31 53.2 USCGS
11.	P	Z	21 38 47	12.	P	Z	21 03 53
				12.	iP i i P:S,D	NZ E N	21 56 35.5 36.0 57 25
				12.	eP S Lq Lq eLr Lr Lr	Z E E N Z E N	22 45 03 54 16 23 01 20 34 05 02 13 28
11.	iP iS E, S N P:N,W,C	NEZ	21 50 53.5 51 10.4				
							15.3 S., 174.4 W. Samoa Is. region. h: 33 km ca. H= 22 33 59.2 USCGS
12.	iP iS	Z NEZ	06 32 31.8 34.0	12.	eP i i	Z E N	06 52 21 23 24
12.	iP e iS i P:S,W,C	NEZ N Z NEZ	06 36 36.9 41 43.8 44.0	12.	P	EZ	06 52 15
12.	P	EZ	06 52 15	12.	eP i i	Z E N	06 52 21 23 24
12.	iP Z, P eS i P:C	NE N NE	08 05 11.5 06 03 06	12.	iP S e eL P:S,C	NZ N E E	17 53 32.9 55 23 32 56 53
							43.6 N., 147.2 E. Kurile Is. region. h: 33 km ca. H= 17 51 11.3 USCGS
12.	P i	Z NEZ	19 02 05 15.0	12.	P i i ePPP S i i iLq Lq Lr P:S	N Z E Z N N E E N Z	20 39 31 32.0 33.5 41 48 45 24 37 40 48 49.0 49 33 50 45
							Mag. 6 $\frac{1}{2}$ -7 (Mat)
							(cont.)
				13.	eP S L i	Z E E E	03 33 23 39 29 42 33 43 30
							Mag. 5 $\frac{1}{2}$ (Mat) 3.5 S., 146.6 E. Admiralty Is. region. h: 33 km ca. H= 03 25 45.1 USCGS
				13.	P i e	Z Z E	10 10 26 34 16 00
							(cont.)

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Date	Phase	Comp.	Time(GMT)	Date	Phase	Comp.	Time(GMT)
			h m s				h m s
	eL	E	10 21 05		S	N	06 57 30
	Mag. 5 $\frac{3}{4}$ -6 (Mat)				S	E	31
	26.1 N., 100.9 E.				P:E,D		
	Yunnan Province, China.				Mag. 5.5 (Mat)		
	h: 33 km ca.				36.9 N., 142.2 E.		
	H= 10 03 50.6				Near east coast of Honshu, Japan.		
	USCGS				h: 40 km ca. JMA		
13.	iP	NEZ	10 34 13.5	14.	iP	EZ	07 02 21.1
	i	N	54		i	N	21.6
	P:N,E,C				eS	N	03 00
13.	iP	EZ	10 52 43.9		P:E,D		
	iS?	E	53 06.1	14.	iP	EZ	12 13 20.3
	i	N	06.5		S	N	48
	P:E,D				P:W,C		
13.	P	Z	11 53 37	14.	P	NZ	15 47 53
	18.3S., 173.8W.				iS	E	48 29.3
	Tonga Is. region.				i	Z	33.6
	h: 33 km ca.						
	H=11 42 16.5				USCGS		
13.	iP	NZ	13 13 55.9	14.	iP	NEZ	16 37 42.0
	i	E	56.2		ScP	Z	43 23
	P:S,C				eS	NE	44 00
13.	iP Z, P E		13 24 24.0		i	E	35
	e	E	37		Lq	E	48 00
	iS	N	46.5		eLr	N	50 15
	P:D				Lr	Z	41
13.	P	Z	14 02 17		P:N,W,C		
	i	E	19.1		Mag. 6 $\frac{1}{2}$ -6 $\frac{3}{4}$ (Mat)		
	eL	E	19.0		5.1 S., 151.7 E.		
	39.4 N., 72.7 E.				New Britain.		
	Tadzhik S.S.R.				h: 55 km ca.		
	h: 144 km ca.				H= 16 29 45.0		
	H= 13 53 31.1				USCGS		
13.	iP	EZ	15 14 34.3	14.	P	Z	16 50 10.9
	iS	NEZ	36.6		iS	NEZ	47.1
	P:W,,D			14.	iP Z, P N		17 00 59.1
13.	P	EZ	18 56 38.4		P:D		
	i	EZ	38.9	14.	iP	Z	19 05 55.3
13.	iP	NZ	20 23 55.0		i	N	55.7
	P:N,C				i	E	56.1
14.	eP	NZ	06 34 10		i	N	06 08
	i	Z	12.9		i	Z	11
	49.5 N., 155.5 E.				S	NE	21
	Kurile Is.				P:D		
	h: 40 km ca.			14.	iP	EZ	22 17 50.3
	H= 06 30 01				i	N	50.6
	USCGS				eS	NE	18 10ca.
14.	iP	EZ	06 56 48.5		i	Z	13
	i	N	49.0		P:E,D		
	i	Z	57 23	15.	eP	Z	07 13 02
	(cont.)				i	E	02.6
					eS	N	43

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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
15.	P eS	Z N	07 32 07 47		i iS	NE N	22 06 22.0 51.4
15.	iP iS P:E,C	EZ, P N N	12 02 35.0 03 15.5		i i P:C	E Z	52.6 53.2
15.	iP i e P:C	Z NE E	13 14 58.8 59.0 30.4	15.	P i i L	Z N Z E	22 10 34 35 37 22 24
							Mag. 5 $\frac{1}{2}$ (Mat.) 0.7 S., 157.1 E. Solomon Is. h: 52 km ca. H= 22 01 53.4 USCGS
15.	iP P:C	Z	14 10 43.9	16.	P i	Z Z	00 28 29 38
							30.1 N., 51.2 E. Southwestern Iran. h: 37 km ca. H= 00 17 15.7 USCGS
15.	P i e e Lr	Z Z E E E	16 41 04 42 51.6 50 46 52 14 55 06	16.	P i i i i i	Z N N N Z E	01 47 03 13.9 S., 167.0 E. New Hebrides Is. h: 107 km ca. H= 01 37 28.0 USCGS
							Mag. 5 (Mat) 4.8 S., 152.4 E. New Britain. h: 71 km ca. H= 16 33 08.0 USCGS
15.	P iS iS	EZ EZ N	17 05 47.5 49.8 50.0	16.	iP i i i i	Z, P N E	05 04 55.7 06 16
							P:C 29.3 S., 133.7 E. Southern Honshu, Japan. h: 421 km ca. H= 05 03 13.5 USCGS
15.	P i e	Z E E	19 16 56 53.6 24.0	16.	iP i i iS i i	EZ Z N N E Z	06 13 17.7 13.9 19.2 47.0 43.4 43.9
							P:E,D
15.	P S	NEZ N	19 55 01 41	16.	P e	Z Z	11 22 50.5 23 01
							P:D
15.	P i i	Z N Z	22 03 36 37 41	16.	iP iS P:C	Z NEZ	11 38 55.0 57.3
15.	iP Z, P E		22 06 21.5 (cont.)				



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Date	Phase	Comp.	Time(GMT) h m s	Date	Phase	Comp.	Time(GMT) h m s
16.	iP	NZ	12 25 17.0	17.	iP	Z	05 55 17.7
	i	E	17.6		i	E	18.6
	i	NEZ	19.0		eS	E	53 33
	S	E	26 12		eL	E	59 10
	P:N,D				L	N	06 02 30
	40.1 N., 142.2 E. Near east coast of Honshu, Japan. h: 40 km ca. JMA				P:C Mag. 5 (Mat) 23.1 N., 120.6 E Southern Formosa. h: 33 km ca. H= 05 50 41.3 USCGRS		
16.	P	Z	12 40 43	17.	iP Z,P E		03 26 05.1
	50.1 N., 157.0 E. Southern Kamchatka region. h: 33 km ca. H= 12 36 20.5 USCGRS				i	N	05.3
	iP	EZ	13 23 24.5		i	N	39
	iS	NE	37.0		P:D		
	P:W,C			17.	iP	EZ	15 03 27.6
16.	P	Z	19 50 17.5		i	N	23.0
	i	Z	26.7		i	Z	29.3
	i	Z	51 45		i	E	09 07
	i	E	43		P:W,C 33.7 N., 142.4 E Near east coast of Honshu, Japan. h: 40 km ca. JMA		
	e	E	52 25	17.	iP	NEZ	15 11 34.6
	P:C				i	Z	36.1
16.	iP	NEZ	21 03 44.6		eS	E	12 20
	S	E	05 36		i	E	23
	P:N,E,D 44.0 N., 147.1 E. Kurile Is. region. h: 80 km ca. H= 21 01 22.0 USCGRS				i	N	23
	iP	Z	21 42 37		i	E	31
	i	Z	45.3		i	N	37
	iPcP	Z	44 21.5		P:S,W,C		
	pPP	Z	30	17.	eP	Z	16 53 26
	pPP	N	33		22.6 S., 179.3 E Fiji Is. h: 547 km ca. H= 16 43 06.9 USCGRS		
	iScP	Z	43 10.6	13.	P	NEZ	01 41 14
	eS	E	49 09		e	E	55.7
	e	E	51 46		16.2 S., 166.4 E New Hebrides Is. region. h: 77 km ca. H= 01 31 21.3 USCGRS		
	Lq	E	53 15	18.	iP	Z	03 26 29.3
	Lr	Z	56 23		i	E	29.7
	Lr	NE	40		iS	NEZ	45.5
	Mag. 5 1/2 (Mat) 5.6 S., 152.0 E. New Britain. h: 49 km ca. H= 21 34 32.3 USCGRS				P: N,D		
17.	PKP	Z	02 50 14	13.	P EZ, eP N		03 43 36
	19.1 S., 69.3 W. Northern Chile. h: 150 km ca. H= 02 30 41.3 USCGRS				e	N	49 34
	iP E, P Z		03 56 12.3	13.	i	Z	13.2
	i		14.3		i	N	14.3

(cont)

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h: 33 km ca.
 H= 03 04 42.3
 USC GS

19. iP Z, P N 06 23 49.1
 iS NE 24 12.4
 P:D

19. iP NEZ 07 55 18.8
 iS NEZ 19.9
 P:N,E,D

19. iP Z 09 24 51.6
 eS E 32 49
 eLq E 37 37
 Lr E 41 24
 P:C
 Mag. 5-5½ (Mat)
 9.6 S., 107.3 E.
 Off south coast of Java.
 h: 48 km ca.
 H= 09 15 29.4 USC GS

19. P Z 10 09 11
 25.3 S., 179.2 E.
 Fiji Is. region.
 h: 600 km ca.
 H= 09 58 41 USC GS

19. iP Z 11 12 48.5
 i NE 49.2
 P:D

19. iPKP1 NEZ 15 45 43.5
 i E 43.7
 i Z 50.7
 PKP2 Z 46 01
 P:D
 21.4 S., 70.7 W.
 Near coast of northern Chile.
 h: 80 km ca.
 H= 15 25 58.9 USC GS

19. P Z 16 29 49.5
 i NZ 53.5
 i E 36 23

20. eP? Z 02 53 33
 e E 59 47

20. P Z 03 33 09.3
 L E 39 32
 L N 40 38
 Mag 4½-5 (Mat.)
 51.5 N., 175.8 E.
 Near Is., Aleutian Is.
 h: 33 km ca.
 H= 03 26 53.0 USC GS



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19. iP Z, P N 06 23 49.1
 iS NE 24 12.4
 P:D

19. iP NEZ 07 55 18.8
 iS NEZ 19.9
 P:N,E,D

19. iP Z 09 24 51.6
 eS E 32 49
 eLq E 37 37
 Lr E 41 24
 P:C
 Mag. 5-5½ (Mat)
 9.6 S., 107.3 E.
 Off south coast of Java.
 h: 48 km ca.
 H= 09 15 29.4 USC GS

19. P Z 10 09 11
 25.3 S., 179.2 E.
 Fiji Is. region.
 h: 600 km ca.
 H= 09 58 41 USC GS

19. iP Z 11 12 48.5
 i NE 49.2
 P:D

19. iPKP1 NEZ 15 45 43.5
 i E 43.7
 i Z 50.7
 PKP2 Z 46 01
 P:D
 21.4 S., 70.7 W.
 Near coast of northern Chile.
 h: 80 km ca.
 H= 15 25 58.9 USC GS

19. P Z 16 29 49.5
 i NZ 53.5
 i E 36 23

20. eP? Z 02 53 33
 e E 59 47

20. P Z 03 33 09.3
 L E 39 32
 L N 40 38
 Mag 4½-5 (Mat.)
 51.5 N., 175.8 E.
 Near Is., Aleutian Is.
 h: 33 km ca.
 H= 03 26 53.0 USC GS

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 h m s

20. iP NZ 05 13 17.3
 i E 18.6
 iS NZ 36.8
 P:N,D

20. iP NEZ 08 39 00.3
 i NZ 09.3
 i E 10.0
 eS E 41 53
 i N 42 00
 L E 43 18
 P:N,E,D
 Mag. 4½-4¾ (Mat)
 46.6 N., 152.5 E.
 Kurile Is.
 h: 50 km ca.
 H= 08 35 36.2 USC GS

20. P Z 09 16 56
 17.7 S., 178.8 W.
 Riji Is.
 h: 604 km ca.
 H= 09 06 59 USC GS

20. iP Z, P NE 09 56 36.0
 i NEZ 57 00
 i N 03.7
 eS NE 53 23
 Lq NE 59 19
 Lr Z 10 01 17
 iLr N 54
 P:S,W,C
 Mag. 5½-6 (Mat)
 44.6 N., 150.0 E.
 Kurile Is.
 h: 50 km ca.
 H= 09 53 51.1 USC GS

20. P Z 11 06 15

20. iP Z 11 18 38.4
 i E 33.5
 iS NZ, S E 46.5
 P:N,D

20. iP NEZ 14 21 52.2
 i E 22 05
 i E 12
 i Z 15
 i N 13
 i E 24
 i E 34
 P:S,E,D
 36.2 N., 139.9 E.
 Honshu Japan.
 h: 45 km ca. JMA

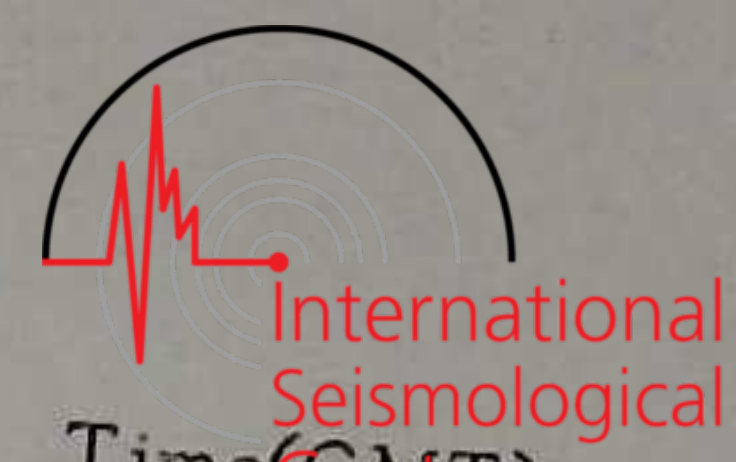
20. P Z 15 24 16.2



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			h	m	s				h	m	s	
20.	P	Z	15	42	09	21.	P	EZ	22	33	07	
20.	eP	NZ	17	19	05	22.	eP	Z	01	59	26	
	i	E			06							
	i	E			22							
	S	N			48							
20.	P	Z	18	32	14							
			17.2 S., 179.0 W.									
			Fiji Is.									
			h: 535 km ca.									
			H= 18 22 16								USCGS	
20.	P	Z	23	00	27	22.	eP	Z	04	32	19	
eS	N		01	04		i	Z				27.3	
						i	Z				34.3	
						i	NE				57	
21.	iP Z, P	NE	00	07	29.3	22.	iP NZ, P	E	09	02	31.7	
i	Z				43	e	E				13 25	
S	NE				09 00	L	E				28 04	
L	E				34							
	P:C											
			30.4 N., 142.9 E.									
			Bonin Is. region									
			h: 33 km ca.									
			H= 00 05 40									USCGS
21.	eP	Z	07	41	36	22.	P	Z	12	18	41.5	
e	E				46 20							
eL	E				48 20	22.	P	Z	14	19	01	
						e	E				27 44	
			45.1 N., 149.9 E.									
			Kurile Is.									
			h: 33 km ca.									
			H= 07 40 17									USCGS
21.	iP	NEZ	09	23	14.3	22.	iP	EZ	14	38	09.6	
iS	NEZ				23.3	i	N				29.5	
						i	Z				32.2	
	P:N,E,C						P:E,C					
21.	P	NEZ	12	21	34	22.	iP	NEZ	16	06	15.0	
eS	E				23 51	S	NEZ				07 32.0	
			42.9 N., 151.4 E.									
			Kurile Is.									
			h: 33 km ca.									
			H= 12 18 42									USCGS
21.	iP	NZ	13	34	48.6	22	iP	Z	17	49	58.5	
i	Z				50.8	i	N				50 13.8	
i	EZ				59.0							
i	N				35 29.2		P:C					
	P:N,D											
21.	iP	NZ	13	53	59.0	22.	P	NEZ	17	54	51	
i	E				59 29.4	eS	E				58 11	
						L	E				13 00 14	
	P:S,C											
			Mag. 5 - 5 1/2 (Mat.)									
			48.5 N., 154.9 E.									
			Kurile Is.									
			h: 60 km ca.									
			H= 17 50 56.2									USCGS



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			h	m	s
22	P	Z	19	12	13
	i	Z			21.5
	i	N			13 10
22.	eP	Z	21	20	35
	eS	E			23 50
	L	E			26 10
			Mag. 4 $\frac{1}{2}$ - 5 (Mat.)		
			24.1 N., 123.2 E.		
			Ryukyu Is.		
			h: 48 km ca.		
			H= 21 16 27.5		
			USCGS		
22.	eP	Z	21	33	00
22.	iP	NZ	22	30	14.0
	S	NEZ			23
			P:N,E,C		
23.	P	NEZ	00	10	57
			48.6 N., 154.7 E.		
			Kurile Is.		
			h: 33 km ca.		
			H= 00 06 59.0		
			USCGS		
23.	eP	Z	00	17	39
	i	N			18 06
23.	P	Z	02	05	02.8
	iS	NEZ			05.4
23.	iP	Z	02	24	00.7
			P:C		
23.	P	Z	06	00	31
	i	N			46.5
	i	Z			50.4
23.	e	E	07	50	20ca
			59.9 N., 150.0 E.		
			Eastern Siberia, near Sea		
			of Okhotsk.		
			h: 33 km ca.		
			H= 07 39 43		
			USCGS		
23.	P	Z	12	11	45
23.	P	Z	13	25	00
	i	N			15
23.	iP	EZ	18	23	40.0
	iS	NE			53
			P:E,D		
23.	P	Z	22	53	34
	eS	E			23 03 47
	e	E			15 33
	L	E			23 42
			(cont.)		

Date	Phase	Comp.	Time(GMT)		
			h	m	s
	L	N	23	26	06
			Mag. 5 $\frac{1}{2}$ - 6 (Mat.)		
			39.2 N., 23.7 E.		
			Aegean Sea.		
			h: 33 km ca.		
			H= 22 41 06.3		
			USCGS		
24.	iP Z, P NE	N	05	43	29.4
	e				51.5
			P:D		
24.	eP	Z	10	04	21
	eL	E			30 30ca
			7.3 S., 67.8 E.		
			Chagos Archipelago region.		
			h: 33 km ca.		
			H= 09 52 18.7		
			USCGS		
24.	iP Z, P E	NE	10	36	50.5
	iS				37 33.0
			P:D		
24.	iP Z, P NE	E	13	40	53.5
	eS				42 50
			31.2 N., 131.3 E.		
			Near south coast of Kyushu,		
			Japan.		
			h: 33 km ca.		
			H= 13 39 00.6		
			USCGS		
24.	eP	Z	14	55	05
24.	iP	NEZ	16	39	32.0
	eS	N			56
			P:S,E,D		
24.	P	Z	20	09	34.0
			P:C		
			19.2 S., 169.4 E.		
			New Hebrides Is.		
			h: 244 km ca.		
			H= 19 59 33.7		
			USCGS		
24.	iP	Z	20	58	23.6
	i	N			23.8
	i	E			24.3
	i	Z			53.3
	iS	NEZ			59 41.2
			P:C		
			30.4 N., 137.1 E.		
			South of Honshu, Japan.		
			h: 504 km ca.		
			H= 20 56 44.5		
			USCGS		
25.	P	NEZ	01	24	50
	i	N			25 21
25.	e	E	01	29	23
			(cont.)		

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h m s

Date	Phase	Comp.	Time(GMT)
			h m s
	L	E	01 34 10
	Mag. 5 $\frac{1}{2}$ - 6 (Mat.) 44.7 S., 37.5 E. Prince Edward I. h: 33 km ca. H= 00 34 32.0 USCGS		
25.	iP	NEZ	02 16 41.0
	S	N	17 34
	P:N,W,C		
25.	P	Z	02 38 00
	eL	E	56 45
	9.1 S., 110.7 E. Off south coast of Java. h: 81 km ca. H= 02 28 55.5 USCGS		
25.	iP	NEZ	04 05 44.5
	iS	NE	06 42.0
	P:N,W,C 32.1 N., 139.2 E. Near south coast of Honshu, Japan. h: 350 km ca. JMA		
25.	iP	Z	05 35 04.0
	i	N	04.5
	S	E	28.5
	P:C		
25.	P	Z	10 07 42
	i	Z	52.5
	L	E	10 47
	45.4 N., 151.3 E. Kurile Is. h: 50 km ca. H= 10 04 37.5 USCGS		
25.	iP	EZ	10 57 20.5
	i	N	20.8
	S	NEZ	31.7
	P:E,D		
25.	iP	Z	15 34 09.8
	S	NE	34
	P:C		
25.	iP	Z	20 44 12.3
	iS	NE	22.5
	P:D		
25.	eP	Z	21 02 58
	eL	E	09 58
	Mag. 4 $\frac{1}{2}$ - 5 (Mat.) 11.5 N., 142.0 E. 400 km southwest of Guam. h: 16 km ca.		

(cont.)

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h m s
USCGS
H= 20 57 30.6

25.	eP	Z	23 33 58
	i	Z	35 27
26.	iP	NEZ	09 41 13.3
	iS	NE	25.0
	P:S,E,C		
26.	iP	Z	15 17 15.3
26.	eP	Z	18 03 47
26.	iP	Z, P N	18 21 07.0
	L	E	28 30
	P:D Mag. 5 $\frac{1}{2}$ (Mat.) 4.4 N., 126.2 E. Talaud Is. region. h: 132 km ca. H= 18 14 37.9 USCGS		
26.	P	Z	20 12 57.5
	i	Z	58.9
26.	eP	Z	20 44 24
	40.2 N., 124.6 W. Near coast of Humboldt County, California. h: 27 km ca. H= 20 32 53.6 USCGS		
26.	iP	Z, P N	21 28 34.0
	i	E	35.0
	i	E	29 44
	eS	E	38 09
	PS	E	43
	L	E	47 30
	L	E	57 20
	P:C Mag. 5 $\frac{1}{2}$ - 6 (Mat.) 20.7 S., 174.4 W. Tonga Is. h: 33 km ca. H= 21 17 08.1 USCGS		
26.	P	Z	23 55 32
	eS	NE	56 13
27.	P	EZ	01 46 21.5
	iS	NZ	49.5
27.	P	NEZ	03 12 51
	e	E	22 40ca
27.	P	Z	07 22 32
	i	Z	44.0
	iS	Z	23 25



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			h m s				h m s
28.	iP NZ, P E		20 51 12.6	29.	iP	NZ	19 44 22.2
	eS	E	55 53		i	E	22.7
	L	E	56 58		i	E	40.5
	P:N,C				S	NEZ	45 39
	Mag. 5 (Mat.)				P:N,C		
	13.3 N., 144.7 E.				29.9 N., 139.1 E.		
	Mariana Is.				South of Honshu, Japan.		
	h: 33 km ca.				h: 322 km ca.		
	H= 20 46 00.1	USCGS			H= 19 42 43.9	USCGS	
29.	L	E	04 49 00ca	29.	iP	Z	20 25 02.9
	53.5 N., 90.9 E.				P:D		
	Southern Siberia.				18.2 S., 172.8 W.		
	h: 33 km ca.				Tonga Is.		
	H= 04 31 41.4	USCGS			h: 33 km ca.		
					H= 20 13 41.6	USCGS	
29.	P	Z	07 07 32	29.	P	Z	20 48 00
	i	Z	35.5				
	L	E	11 52	29.	iP Z, P NE		21 03 32.5
	47.0 N., 150.9 E.				eS	E	04 48
	Kurile Is.				P:D		
	h: 110 km ca.			29.	P	Z	21 41 17
	H= 07 04 18.3	USCGS			i	NZ	13.8
29.	iP	Z	09 32 23.4		eS	NE	41
	eS	N	55	29.	iP	NEZ	23 53 35.0
	P:C				ePcP	E	59 41
29.	iP	Z	11 49 02.7		PP	N	00 00 30
	i	Z	36		iScP	Z	03 34.6
	P:C				S	NE	05 37
	35.1 N., 133.1 E.				L	E	10 00
	Honshu, Japan.				P:N,E,C		
	h: 40 km.	JMA			8.5 S., 112.7 E.		
					Near south coast of Java.		
29.	iP	NEZ	11 50 11.0		h: 73 km ca.		
	P:S,E,C				H= 23 49 40.8	USCGS	
29.	P	Z	11 51 53				
	iS	NEZ	52 09				
29.	iP	NEZ	12 40 23.8				
	e	N	41 46				
	P:S,W,C						
29.	iP	NEZ	14 40 49.3				
	S	N	41 32				
	P:S,W,C						
29.	iP	NEZ	15 21 05.0				
	i	N	45.0				
	S	NE	48				
	P:N,W,C						
	Mag. 5.5 (Mat.)						
	34.8 N., 141.7 E.						
	Off east coast of Honshu, Japan.						
	h: 34 km ca.						
	H= 15 20 12.8	USCGS					

Mineo Takehana
Director