

Seis. Bull. of Pakistan
Vol. 8 No. 8, August, 1962.



THE
SEISMOLOGICAL BULLETIN
OF
PAKISTAN

Vol 8

AUGUST 1962

No. 8



Issued under the authority of the Director, Meteorological Service
PAKISTAN METEOROLOGICAL SERVICE
GEOPHYSICAL INSTITUTE
QUETTA.



International
Seismological
Centre

SEISMOLOGICAL BULLETIN

of
PAKISTAN

Pakistan Meteorological Service, Geophysical Institute, Quetta.

Pakistan Meteorological Service

Director,
Meteorological Service

Deputy Director,
Geophysical Institute

Officer Incharge,
Seismological Section

Sibte Nabi Naqvi

Abdul Qadir Khan

.....

The Seismological Bulletin of Pakistan is a monthly publishing data of Seismological Stations of Pakistan.

All correspondence regarding the supply of this bulletin on exchange basis should be addressed to the Director, Meteorological Service, Secretariat Block No. 3, Frere Road, Karachi, Pakistan.

Vol. 8

August 1962

No. 8

CONTENTS

		Page
1.	Particulars of Stations and Instruments ...	1
2.	Major shocks ...	3
3.	Local and Minor shocks ...	21

Particulars of Stations and Instruments

(a) Stations

Station	Symbol	Latitude	Longitude	Height (a.s.l.)	Ground
Quetta	Qt	30° 11' N	66° 57' E	1721 meters	Cretaceous Limestone
Lahore	Lh	31° 33' N	74° 20' E	210 "	Alluvium
Karachi	Kr	24° 50' N	67° 02' E	30 "	Alluvium
Chittagong	Ch	22° 21' N	91° 49' E	15 "	Alluvium
Warsak	Wr	34° 09' N	71° 25' E	343 "	River Terrace

(b) Instruments

Instruments	Components	Period		Damping	Max. Magnification
		To	(Sec.) Tg		
Quetta					
Sprengnether	Z	1.9	1.9	Critical	5,500
"	N	15.8	15.8	"	15,000
Benioff	Z	1.0	0.77	"	2,00,000
"	N	1.0	0.76	"	2,00,000
"	E	1.0	0.77	"	2,00,000

(Contd.)

Instruments	Components	Period		Damping	Max. Magnification	Date	Station	Phase	h m s			Date	Station	Phase	h m s				
		To	(Sec.) Tg																
Sprengnether	Z	30.1	100.0	"	3,000	1	Wr	ePZ	02	46	55.9	1	Qt	ePZ	16	43	51.0		
"	N	30.3	100.0	"	3,000			iSZ			47 27.6		Wr	ePZ			44 15.4		
"	E	30.2	100.0	"	3,000		Lh	ePZ			36		USCGS H	16 38 56.4					
Willmore	Z	1.0	0.25	—	—			eSN			48 38		36.3 N	41.6 E					
Sprengnether	E	1.0	6.0	—	—		Qt	ePZ			47 42.0		Iraq						
Pen recorder								eSZ			48 59.4		depth about 33 km						
Lahore								H 02 46 15				2	Qt	ePZ			04 28 29.3		
Sprengther	Z	1.8	1.8	Critical	4,900			35.5 N 69.8 E					Wr	ePZ			29 41.4		
"	N	1.7	1.7	"	4,200			Hindukush				2	Wr	ePZ			15 32 52.5		
"	E	1.6	1.6	"	4,100			depth about 240 km					Lh	ePZ			57		
Benioff	Z	1.0	0.75	"	6,250	1	Ch	ePZ	04	46	40		Qt	ePZ			33 54.9		
"	N	1.0	0.75	"	6,250			ipPZ			52			eSZ			35 06.7		
"	E	1.0	0.75	"	6,250			ePPZ			48 46		Ch	ePZ			36 49		
Sprengnether	Z	30.0	100.0	"	750			eSE			54 40			eSE			40 25		
"	N	30.0	100.0	"	750			Mu Sec						H 15 32 21					
"	E	30.0	100.0	"	750			PZ 1.5 2.0						33.3 N 73.5 E					
Karachi								$\Delta = 57^\circ.0$						Near Rawalpindi, West Pakistan					
Sprengnether	Z	1.8	1.8	Critical	5,890		Lh	ePZ			48 35			Felt Rawalpindi					
"	N	1.8	1.8	"	4,700		Wr	ePZ			52.0			depth about 33 km					
"	E	1.4	1.4	"	4,700			eSN			58 45.0			USCGS H 15 32 20.9					
Chittagong								Qt	ePZ		49 08.6			33.4 N 73.5 E					
Sprengnether	Z	1.7	1.7	Critical	5,200			eSZ			59 15.8			West Pakistan					
"	N	1.8	1.8	"	5,700			USCGS H 04 36 57.6						depth about 33 km					
"	E	1.5	1.5	"	3,600			3.2 S 143.7 E					2	Wr	ePZ			18 48 21.7	
Warsak								Near north coast of New Guinea						eSZ			52.4		
Sprengnether	Z	1.95	1.95	Critical	8,000			depth about 33 km						Qt	ePZ			49 26.8	
"	N	1.8	1.8	"	4,000			Mag $6\frac{1}{2}$ - $6\frac{3}{4}$ (Pas), 7 (Brk),						eSZ			50 49.8		
								$6\frac{1}{2}$ (Pal) 6.7 (Ch)						H 18 47 40					
														Hindukush region					
							1	Lh	ePZ		15 52 32			3	Wr	ePKPZ			09 15 35.5
								Wr	ePZ		45.0				Qt	ePKPZ			37.0
								Qt	ePZ		53 33.1				Lh	ePKPZ			47
								USCGS H 15 47 45.5						Ch	iPKPZ			16 08 d	
								39.1 N 98.6 E							ePKPZ			30	
								Kansu province, China							iPKP ₂ Z			56	
								depth about 25 km											

* indicates long period seismographs.

c=compression, d=dilatation, X=unidentified phase.

Mu=Actual ground motion of the indicated phase in microns.

Sec=Period of the indicated phase in seconds.

(Pas), (Berk), (Up), (Ki), (Pal), stand for seismological observatories Pasadena (U.S.A.), Berkly (U. S. A.), Uppsala (Sweden), Kiruna (Sweden) & Palisade (U. S. A.) respectively.

All times are in Greenwich Mean Time.

Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		eSPKP ₂ Z	17	30		6	Qt	ePZ	00	12	52.1
		i!PPZ	20	40		6	Qt	ePZ	01	48	21.5
		epPPZ	21	03				ePPZ	51	44.0	
		eSKKSE	27	11				eSKSN*	58	47.0	
		eSKSPZ	30	51				eSN*	59	04.0	
		USCGS H 08 56 12.1				Wr		ePZ	48	23.4	
		23.2 S 67.5 W						USCGS H 01 35 30.5			
		Northern Chile - Argentina border						32.0 N 40.8 W			
		depth about 71 km						North Atlantic Ocean			
		Mag 7-7½ (Pas), 6.8 (Berk)						depth about 48 km			
3	Wr	ePZ	11	05	46.0	6	Wr	iPZ	17	58	37.5 d
	Lh	ePZ	06	20				iSZ	59	07.8	
	Qt	ePZ	51	5		Lh		ePZ	22		
		e(S) Z	08	47.0		Qt		ePZ	25	9	
	Ch	ePZ	09	21				H 17 57 58			
		USCGS H 11 04 03.6						35.7 N 69.6 E			
		40.9 N 73.3 E						Hindukush			
		Kirghiz, S. S. R.						depth about 190 km			
		depth about 25 km				6	Ch	ePZ	21	05	18
3	Wr	iPZ	18	03	28.8	Lh		ePKPZ	10	44.9	
		iSN	04	00.5		Wr		ePKPZ	48		
	Lh	ePZ	09			Qt		ePKPZ	52	2	
	Qt	ePZ	28	4				USCGS H 20 51 56.8			
		eSZ	05	47.0				26.9 S 177.1 W			
		H 18 02 44						Kermadec Islands region			
		36.5 N 71.2 E						depth about 50 km			
		Hindukush						Mag 6 (Berk), 5½ (Pal)			
		depth about 200 km				7	Wr	ePZ	15	58	33.0
		USCGS H 18 02 45.8				Qt		ePZ	59	35.1	
		36.6 N 71.1 E						H 11 07 00			
		Hindukush				8	Lh	ePZ	11	07	00
		depth about 209 km				Qt		ePZ	24	5	
3	Lh	ePZ	22	51	46			USCGS H 10 54 56.3			
	Wr	ePZ	52	17.6				52.1 N 120.5 W			
	Qt	ePZ	23	2				Fox Islands, Aleutian Islands			
5	Qt	ePZ	10	07	22.4			depth about 40 km			

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
8	Wr	ePZ	14	02	39.2	9	Qt	Mag 4.6 (Qt)			
		eSZ	03	18.0				ePZ	10	53	00.0
	Lh	ePZ	16					USCGS H 10 44 00.5			
		eSN	04	20				30.1 N 129.0 E			
	Qt	ePZ	03	44.0				Ryukuyu Islands			
		eSE	05	16.0				depth about 198 km			
		H 14 01 47				9	Qt	ePKPZ	17	44	29.0
		37.3 N 71.8 E				Lh		ePKPZ	38		
		Hindukush				Wr		ePKPZ	42	9	
		depth about 240 km						USCGS H 17 24 48.5			
9	Qt	ePKPZ	04	40	41.0			44.5 S 73.4 W			
	Wr	ePKPZ	42	0				Near coast of southern Chile			
		USCGS H 04 21 55.4						depth about 33 km			
		6.7 N 73.1 W				9	Wr	ePZ	18	11	57.1
		Columbia						eSZ	12	29.3	
		depth about 180 km					Qt	ePZ	55	0	
9	Qt	ePKPZ	06	39	03.5			eSE	14	15.0	
		ePPZ	42	25.2				H 18 11 14			
	Wr	ePKPZ	39	09.4				Hindukush Region			
		USCGS H 06 19 51.4				9	Qt	iPZ	22	43	51.5 c
		24.1 S 66.5 W						iSE	45	15.0	
		Salta Province, Argentina						Mu Sec			
		depth about 128 km						PZ 0.01 0.5			
9	Wr	iPZ	08	13	48.0 d			Δ = 7° 4			
		iSZ	14	23.6				Mag 4.3 (Qt)			
	Lh	ePZ	29			10	Qt	ePZ	00	50	52.0
		eSN	15	24		10	Qt	ePZ	01	56	29.5
	Qt	iPZ	14	39.4 d		10	Qt	ePZ	16	55	09.0
		iSE	15	53.5		10	Wr	ePZ	21	15	13.1
		Mu Sec					Qt	iPZ	15	0	
		PZ 0.02 0.5						epPZZ*	25	0	
		Δ = 6° 5						ePcPZ	33	0	
		H 08 13 04						ePPZ	18	00	0
		36.1 N 70.3 E						eSN*E*	24	35	0
		Hindukush						esSE*	53		
		depth about 300 km						eScSE*	25	11	0



Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s	
		Mu Sec						ipPZ			56			USCGS H	10	09	24.9	
0.09.26.61	MH	0.7	20					ePPN			22 26			14.6 N		93.0 W		
		$\Delta = 72^\circ.4$						iPPPZ			44							
	Lh	ePZ		15	33			iPcPZ			24 38							
	Ch	ePZ		17	04			iSNE			26 12							
		ePPZ		20	38			isSNE			27 02							
		eSE		28	02			eSSNE			43							
		USCGS H	21	03	59.2			e!PcSZ			28 06							
		49.4 N		27.9 W				iScSNE			31 57							
		North Atlantic Ocean						Mu Sec										
		depth about 33 km						PZ	3.2	2.5								
		Mag $4\frac{1}{2}$ (Pal), 5.3 (Qt)						$\Delta = 28^\circ.5$										
10	Qt	i!PZ		23	42	54.0d	Lh	ePZ			23 33 d							
		i!SN		43	22.0		Wr	iPZ			51.6d							
	Wr	iPZ		18.1c				iSN			30 23.9							
	Lh	ePZ		45			Qt	i!PZ			24 24.5d							
		eSN		44	51			epPZ			54.0							
		H	23	42	16			isPZ*			25 09.0							
		32.3 N		67.1 E				iPcPZ			43.0							
		Eastern Afghanistan						iPPZ*			26 22.0							
		depth about 33 km						iPPPZ*			27 08.0							
11	Wr	iPZ		03	44	18.7d		i!SNN*E*			31 24.0							
		eSZ		58.0				iPSE*			46.0							
	Qt	ePZ		45	23.0			isSN*			32 20.0							
		eSE		46	56.0			eScSE*			36 46.0							
		H	00	43	24			Mu Sec										
		Hindukush region						PZ	1.0	2.0								
11	Wr	ePKPZ		02	05	14.8		PPZ	0.3	2.0								
	Qt	ePKPZ		22.0				PH	0.4	2.0								
		ePKSE*		08	04.0			$\Delta = 49^\circ.5$										
		eSKSE*		11	29.0			USCGS H	08	15	43.7							
		USCGS H	01	47	39.6			25.2 N		123.3 E								
		20.0 S		178.8 W				Off NE coast of Formosa										
		Fiji Islands						depth about 140 km										
		depth about 638 km						Mag 6 (Pas), 5-5 $\frac{1}{2}$ (Pal),										
11	Ch	i!PZ		08	21	32 d		6.5 (Ch), 6.3 (Qt)										

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
18	Qt	ePZ	07	26	05.2	18	Qt	ePZ	57	13.1	
18	Qt	ePZ	09	20	47.5			eSNE	59	02.0	
		USCGS H	09	11	23.8			Mu Sec			
		10.7 N	121.6 E					PZ	0.01	0.5	
		Panay region, Philippine Islands						$\Delta = 9^\circ.7$			
		depth about 44 km				18	Qt	ePZ	23	02	54.0
18	Wr	ePZ	16	55	48.1			USCGS H	22	49	47.5
	Qt	ePZ	56	16.5d				7.3 S	156.1 E		
		eSN*	17	06	29.0			Solomon Islands			
		Mu Sec						depth about 60 km			
		MH	1.6	20		19	Qt	ePKPZ	00	42	02.0
		$\Delta = 82^\circ.4$						USCGS H	00	23	03.9
		USCGS H	16	43	54.3			19.9 S	66.9 W		
		62.3 N	152.5 W					Bolivia			
		Central Alaska						depth about 240 km			
		depth about 32 km				19	Qt	ePZ	06	52	08.0
		Mag 6-6½ (Pas), 5½-5½ (Pal) 5.7 (Qt)						USCGS H	06	42	29.1
18	Wr	ePZ	17	58	07.8			34.8 N	134.8 E		
	Qt	ePZ	35.5					Honshu, Japan			
		eSE*	18	08	51.0			depth about 49 km			
		Mu Sec				19	Wr	iPZ	08	15	50.4d
		MH	3.8	20				iSZ	16	23.7	
		$\Delta = 83^\circ.0$						Qt	ePZ	44.5	
		USCGS H	17	46	14.9			eSE	18	02.5	
		62.3 N	152.5 W					H	08	15	05
		Central Alaska						Hindukush region			
		depth about 32 km				19	Qt	ePZ	12	26	49.3
		Mag 6-6½ (Pas), 5½-5½ (Pal), 6.0 (Qt)				19	Wr	iPZ	15	42	53.5c
18	Wr	ePZ	21	11	49.6			iSZ	43	25.8	
		iSZ	13	26.4				Lh	ePZ	35	
	Qt	ePZ	00.1					Qt	ePZ	52.5c	
		eSN	15	30.5				iSE	45	10.3	
18	Wr	ePZ	21	56	03.8			Mu Sec			
		iSZ	55.8					PZ	0.01	0.5	
								$\Delta = 7^\circ.0$			

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		H	15	42	11		Lh	ePZ	34	08	02
		36.4 N	70.7 E				Qt	iPZ	25.9c		
		Hindukush						iSE	35	44.5	
		depth about 200 km						Mu Sec			
		Mag 4.3 (Qt)						PZ	0.01	0.5	
19	Qt	ePZ	17	59	34.5			$\Delta = 7^\circ.1$			
		eSN	18	00	01.9			H	22	32	43
	Wr	ePZ	24.4					36.5 N	70.8 E		
		eSZ	01	27.8				Hindukush			
19	Wr	ePZ	18	29	43.3			depth about 230 km			
	Lh	ePZ	57c					Mag 4.3 Qt			
	Qt	iPZ	30	51.3c		19	Qt	ePKPZ	23	32	15.9
		ePPZ	31	08.0				Wr	ePKPZ	24.7	
		eSN*	34	17.0				Lh	ePKPZ	32	
		eSSN*	35.0c					USCGS H	23	12	50.4
		Mu Sec						26.6 S	69.8 W		
		PZ	0.4	1.0				Near coast of northern Chile			
		$\Delta = 18^\circ.9$						depth about 51 km			
	Ch	iPZ	31	50c		20	Qt	ePZ	06	03	12.5
		iSE	36	09		20	Qt	eLN*	09	28.5	
		H	18	26	31			USCGS H	09	02	14.5
		44.7 N	81.7 E					74.7 N	51.2 E		
		Northwest Sinkiang province China						Novaya Zemlya			
		depth about 33 km						depth about 0 km			
		USCGS H	18	26	38.6	20	Qt	ePKPZ	11	40	25.9c
		44.6 N	81.7 E					USCGS H	11	22	39.8
		Northwest Sinkiang province China						20.9 S	178.8 W		
		depth about 33 km						Tonga Islands region			
		Mag 5½-6 (Pal), 5.6 (Qt)						depth about 605 km			
19	Qt	ePZ	21	29	00.8	20	Ch	ePZ	13	06	24
		USCGS H	21	19	54.6			Wr	ePZ	08	24.9
		4.5 N	123.2 E					Qt	ePZ	28.3	
		Celebes Sea						USCGS H	12	58	24.1
		depth about 552 km						12.4 S	112.1 E		
19	Wr	ePZ	22	33	27.2			340 miles South of Java			
		eSZ	59.5					depth about 87 km			

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
20 50	Qt	ePZ	15	26	34.0			ePKPPKPZ	58	21.5	
	USCGS H 15 15 15.6							Mu Sec			
	1.7 S 133.8 E							PZ 0.1 1.5			
	Western New Guinea							$\Delta = 41^\circ.4$			
	depth about 33 km						Wr	ePZ	27	44.0	
21	Qt	ePZ	04	37	10.0			eSZ	34	21.9	
	USCGS H 04 28 26.1						Lh	ePZ	28	08	
	23.9 N 121.7 E						Ch	ePZ	30	23	
	Near east coast of Formosa							epPZ		36	
	depth about 25 km						USCGS H 18 19 33.3				
21	Qt	ePKPZ	16	29	05.0			41.4 N 15.5 E			
	USCGS H 16 10 08.7							Italy			
	28.2 S 176.7 W							depth about 34 km			
	Kermadec Islands region							Mag 5.3 (Qt)			
	depth about 57 km						21 28	Qt	ePZ	18	52 54.5
21	Ch	ePZ	17	42	27			Wr	ePZ	53	07.5
	USCGS H 17 30 14.0							Lh	ePZ		33
	64.4 N 152.6 W							USCGS H 18 44 56.4			
	Central Alaska							41.2 N 15.2 E			
	depth about 42 km							Italy			
21	Qt	ePZ	18	17	04.2			depth about 31 km			
	eSN*E*						21	Qt	ePKPZ	21	24 56.1
	Mu Sec							USCGS H 21 06 00.1			
	PZ 0.2 2.0							28.7 S 176.8 W			
	$\Delta = 43^\circ.4$							Kermadec Islands			
	Wr	ePZ	17	17.2				depth about 55 km			
	Lh	ePZ		43			21	Lh	ePZ	21	29 54
	Ch	ePZ		19 52				Wr	ePZ		59.8
	USCGS H 18 09 06.8							Qt	ePZ		30 00.0
	41.5 N 15.4 E						22	Ch	ePZ	04	40 49
	Italy							Wr	ePZ		42 42.5
	depth about 36 km							Qt	ePZ		43 12.8d
	Mag 5.6 (Qt)							USCGS H 04 32 29.1			
21	Qt	ePZ	18	27	29.1			26.1 N 142.5 E			
	eSN*							Volcano Islands region			
								depth about 29 km			



Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
22	Wr	ePZ	21	17	38.8						
	Qt	ePZ			57.5						
	USCGS H 21 08 22.9										
	8.3 N 123.8 E										
	Mindanao, Philippine Islands										
	depth about 125 km										
23	Wr	ePZ	02	15	01.6						
	Qt	ePZ			31.5						
23	Qt	ePZ	02	23	35.0						
23	Qt	ePZ	10	15	10.5						
	e(S)N				17 06.0						
	Wr	ePZ			41.9						
23	Lh	ePZ	15	37	44						
	Wr	ePZ			58.8						
	Qt	ePZ			33 29.1						
	USCGS H 15 29 46.6										
	22.9 N 120.8 E										
	Near south coast of Formosa										
	depth about 17 km										
23	Qt	ePKPZ	21	11	34.0						
	Lh	ePKPZ			43						
	USCGS H 20 52 51.8										
	56.1 S 26.6 W										
	Sandwich Islands										
	depth about 33 km										
23	Qt	ePZ	22	31	57.9						
24	Qt	ePZ	01	56	33.0						
	USCGS H 01 45 35.9										
	52.3 N 160.6 E										
	Off east coast of Kamchatka										
	depth about 33 km										
24	Qt	iPKPZ	07	05	01.0c						
	iPPZ				07 44.7						
	iSKSN				11 09.2						
	USCGS H 06 47 08.1										
	24.5 S 178.8 E										

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
	Lh	ePZ			15			iSKSNE			54 07
		eSNE			58 17			eSN			55
	H 14 55 59					Lh	ePKPZ				49 26
	31.3 N 68.3 E					Wr	ePKPZ				30.6
	Western Baluchistan					Qt	iPKPZ				38.5
	Mag 3.5 (Qt)						ePPZZ*				51 15.0
24	Qt	ePnZ	15	07	52.0		iSKSE*				55 49.0
		iPgZ			57.0		Mu Sec				
		eSnN			08 19.0		PPZ 0.1 1.5				
		iSgN			23.5		$\Delta = 122^\circ.3$				
	Wr	ePZ			23.0		USCGS H 08 31 48.7				
	H 15 07 25						20.5 S 178.5 W				
	Western Baluchistan, West Pakistan						Fiji Islands				
24	Qt	ePZ	18	10	12.5		depth about 561 km				
25	Qt	ePZ	00	39	32.5		Mag 5.9 (Qt)				
	USCGS H 00 29 04.9					25	Qt	ePZ	15	40	07.5
	44.4 N 148.7 E					25	Qt	ePZ	15	56	25.0
	Kurile Islands						USCGS H 15 46 31.5				
	depth about 80 km						35.1 N 138.7 E				
25	Qt	ePZ	01	00	09.2		Honshu, Japan				
25	Ch	ePZ	05	44	42		depth about 113 km				
	Wr	ePZ			45 39.5	25	Wr	ePZ	16	15	57.1
	Qt	ePZ			46 10.4		eSZ				16 24.5
25	Wr	iPZ	07	40	44.2d		Qt	ePZ			17 02.5
		iSZ			41 11.6			iSNE			18 26.5
	Qt	ePZ			42.6		H 16 15 13				
		eSE			42 56.7		Hindukush				
	Mu Sec					25	Qt	ePZ	18	35	24.5
	PZ 0.01 0.5					25	Qt	ePZ	20	08	10.0
	$\Delta = 6^\circ.5$						Lh	ePZ			45
	H 07 40 07						USCGS H 12 58 47.8				
	Hindukush region						36.7 N 1.6 E				
	Mag 4.3 (Qt)						Near coast of Algeria				
25	Ch	ePZ	08	44	23		depth about 33 km				
		epPZ			46 24	26	Ch	ePZ	06	56	57
		ePPZ			48 28		epPZ				57 07



Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		ePPZ			58 41						
		ePcPZ			46						
		eSN			07 03 22						
	Wr	ePZ	06	58	29.1	26	Ch	iPZ	23	40	00.0
	Qt	ePZ			59 03.5			epPZ			12
		ePPZ*			07 01 21.5			iPcPN			41 08
		eSN*			07 18.5			ePPZ			42 05
		Mu Sec						ePcSE			44 50
	MH 8.4				20		Lh	ePZ			41 57
	$\Delta = 61^\circ.1$						Qt	iPZ			42 30.80
	USCGS H 06 48 57.1							epPZ			45.5
	34.0 N 139.2 E							eSNN*			52 22.0
	Near east coast of Honshu							eSKSNN*			89.5
	Japan							USCGS H 23 30 38.0			
	depth about 38 km							3.7 S 140.1 E			
	Mag 6.1 (Qt)							New Guinea			
26	Ch	ePZ	08	05	55			depth about 50 km			
		eSN			10 44						
	Qt	ePZ			08 24.0d	27	Lh	ePZ			02 27 35
	USCGS H 07 58 37.6						Wr	ePZ			44.4
	0.1 N 121.3 E						Qt	ePZ			28 21.0d
	Northern Celebes							eSN*			35 57.2
	depth about 185 km							USCGS H 02 18 58.8			
26	Qt	ePnZ	15	27	28.0			40.2 N 137.8 E			
		ePgZ			45.5			Sea of Japan			
		eSnN*			28 18.5			depth about 274 km			
		eSgN			41.5	27	Qt	eLZ*N*E*			09 22.0
		ePZ			20.0			USCGS H 09 00 50.9			
26	Qt	ePZ	16	40	11.5			74.7 N 50.3 E			
	USCGS H 16 30 47.0							Novaya Zemlya			
	36.5 N 1.6 E							depth about 0 km			
	Near coast of Algeria										
	depth about 15 km										
26	Qt	ePZ	22	45	16.0						
	USCGS H 22 35 13.9										
	34.3 N 139.3 E										

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
28	Ch	ePZ	18	40		29	Qt	ePZ	18	42	53.3
28	Wr	ePZ	19	01.6				USCGS H	18	32	49.3
		USCGS H	09	12	00.4			34.2 N	139.5 E		
		1.9 S	67.9 E					Near east coast of Honshu			
		Northwest of Chagos Islands region						Japan			
		depth about 33 km						depth about 38 km			
		Mag 5.3 (Qt)				29	Qt	ePZ	20	30	26.5
29	Lh	ePZ	11	31	33			eSN*		38	24.0
	Wr	ePZ	32	11.2				Mu	Sec		
	Qt	ePZ	33	00.8				MH	1.7	20	
		iSN	34	49.0				$\Delta=58^\circ.2$			
		Mu	Sec					USCGS H	20	20	20.5
	PZ	0.01	0.7					34.0 N	139.3 E		
		$\Delta=9^\circ.6$						Near east coast of Honshu			
		H 11 30 42						Japan			
		31.3 N 78.3 E						depth about 33 km			
		Himalayas range				29	Ch	ePZ	22	44	54
		depth about 33 km						epPZ		45	05
		USCGS H	11	30	39.3			ePPZ		46	36
		30.9 N	78.3 E					ePcPZ		44	
		Northern India						eSE		51	20
		depth about 36 km						Lh		46	24
		Mag 5.2 (Qt)						Wr		30.1	
29	Qt	ePZ	15	21	30.0			Qt		47	00.6d
		USCGS H	15	14	27.5			ePZ		42.0	
		34.5 N	139.8 E					ePcPZ*		49	15.0
		Near east coast of Honshu						ePPZ*		55	13.5
		Japan						eSN*		56	41.0
		depth about 33 km						eScSN*		59	10.0
29	Qt	ePZ	16	57	44.5			iSSN*			
29	Qt	ePZ	17	49	09.5			Mu	Sec		
		USCGS H	17	39	06.0			MH	8.4	20	
		34.3 N	139.5 E					$\Delta=60^\circ.7$			
		Near east coast of Honshu						USCGS H	22	36	53.9
		Japan						34.1 N	139.1 E		
		depth about 33 km						Near east coast of Honshu			

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		Japan						ePPZ		38	21
		depth about 33 km						eSN		44	06
		Mag 6.1 (Qt)					Wr	ePZ		36	29.7
30	Qt	ePZ	06	39	30.5		Qt	ePZ		37	04.9c
	Wr	ePZ	40	05.2				USCGS H	16	26	05.9
30	Qt	ePZ	11	31	56.2 c			52.5 N	160.6 E		
		USCGS H	11	21	55.1			Near east coast of Kamchatka			
		35.1 N	140.4 E					depth about 63 km			
		Near east coast of Honshu				31	Ch	iPZ		17	14 07.0
		Japan						ipPZ		13	
		depth about 33 km						iPcPZ		25	
30	Qt	ePKPZ	11	55	50.2			ePPZ		16	42
	Wr	ePKPZ	56	02.8				eSNE		23	22
	Lh	ePKPZ	05					esSNE		40	
		USCGS H	11	36	11.3			eScSE		50	
		40.2 S	72.6 W					ePSE		24	03
		Southern Chile						ePPSNE		17	
		depth about 37 km						ePKPPKZ		41	58
								Mu	Sec		
30	Qt	ePZ	13	56	17.0			PZ	0.8	1.8	
30	Wr	ePKPZ	17	36	42.6			PPZ	0.6	2.8	
	Qt	ePKPZ	50.5					$\Delta=72^\circ.0$			
		USCGS H	17	17	51.9			Wr		14	22.0c
		21.2 S	174.4 W					Lh		23	0
		Tonga Islands						Qt		24	01
		depth about 33 km								14	52.0c
		Mag 5½ (Berk)						iPZ		57.5	
30	Qt	ePZ	19	21	40.6			ipPZ		15	01.5
		USCGS H	19	09	15.9 E			isPZ		05.0	
		47.7 S	32.6 E					iPPZ		17	53.0
		Prince Edward Island region						ipPPZ		18	03.5
		depth about 33 km						ePPPZ		19	46.5
31	Qt	ePZ	00	04	55.3			iSNEN*		24	55.5
31	Qt	ePZ	08	19	48.0d			iScSN*		25	09.0
31	Ch	ePZ	16	36	07 c			ePSN		46.0	
		epPZ	18					ePPSE*		26	03.0
		ePcPZ	37	01							

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		eSSE*	30	13	0			Rat Islands, Aleutian Islands			
		ePKPPKPZ	41	41	0			depth about 33 km			
		Mu See									
		PZ 1.0 1.5									
		PPZ 0.2 1.5									
		PH 0.7 1.5									
		MH 31.7 20									
		$\Delta = -8^\circ.6$									
31	Kr	ePZ	15	20							
		USCGS H 17 02 43.4									
		51.3 N 179.7 W									
		Rat Islands, Aleutian Islands									
		depth about 26 km									
		Mag $6\frac{1}{2}$ (Pas), $6-6\frac{1}{2}$ (Pal,)									
		6.4 (Ch), 6.7 (Qt)									
31	Ch	ePZ	18	07	30 c						
		epPZ			39						
		ePoPZ			50						
		ePPZ	10	02							
		eSNE	16	44							
	Wr	ePZ	07	44.8							
	Lh	ePZ			51						
	Qt	iPZ	08	16.5c							
		iPPZ	11	16.0							
		iSNE	18	20.5							
		Mu See									
		PZ 0.3 1.5									
		$\Delta = 80^\circ.6$									
		USCGS H 17 56 08.6									
		51.2 N 179.9 W									
		Rat Islands, Aleutian Islands									
		depth about 43 km									
		Mag 6.1 (Qt)									
31	Qt	ePZ	21	35	21.5						
		USCGS H 21 23 14.4									
		51.4 N 179.8 W									



Date	Phase	h	m	s	Date	Phase	h	m	s
	Quetta					eSgZ			03.6
3	ePZ	20	30	27.7	18	ePZ	07	33	45.5
6	ePgZ	03	47	36.1		eSN			34 07.6
	eSgZ			40.9	18	ePZ	19	29	24.5
8	ePZ	16	48	58.6		eXNE			33 23.2
9	ePZ	12	40	27	19	ePZ	01	18	13.5
10	eXZ	00	19	54		ePZ			14.2
	ePZ	00	20	03.5		eSN			41.0
10	ePZ	07	36	35	20	ePZ	04	48	28.4
10	ePZ	14	41	11.5c		eSE			59.0
	e(S)N			42 03.0	20	ePZ	06	51	47.3
10	ePZ	17	11	51.0	20	ePZ	11	18	03.6
	eSN			12 37.0		eSNE			30.4
10	ePZ	18	37	49.0	21	ePZ	07	08	57.0
	esE			38 41.0	21	ePZ	20	03	33.1
11	ePZ	01	30	40.9	22	ePZ	19	15	09.9 \pm
	iSZ			44.0	23	eXZ	06	47	23.6
11	ePZ	09	57	18	23	eXZ	06	53	04.7
	eSZ			46	23	ePZ	19	12	05.2
12	ePZ	08	24	51		eXN			14 08.6
13	ePZ	10	07	27	24	ePZ	09	09	52.3
14	ePZ	02	06	17	24	ePZ	12	38	48.5
14	ePZ	22	12	18	24	ePZ	12	55	56.0
15	ePZ	15	45	36 \pm	24	ePZ	19	18	03.5
	eS			51	24	ePZ	21	22	10.1
16	ePZ	14	45	02		eSE			20.6
16	ePZ	15	09	41	25	ePZ	03	10	28.1
	eXZ			10 36	25	ePZ	11	13	15.9
16	ePZ	17	38	32		eSN			34.9
	eSN			53	25	ePZ	18	25	35.0
16	ePgZ	20	23	42.3		e(S)N			26 30.0
	eSgZ			51.0	25	ePZ	20	13	34.3
17	ePZ	00	09	55		eXZ			14 05.5
	eXN			10 04	25	ePZ	23	27	08.6
17	ePZ	21	25	46 \pm		eSNE			24.5
18	ePgZ	05	33	00.1	26	ePZ	09	52	10.7

Date	Phase	h m s	Date	Phase	h m s
26	iPZ	17 25 36.2		eSZ	43 25.9
	iSNE	48.5	6	ePZ	06 28 01.1
28	ePZ	22 03 51.6		eSZ	43 25.7
	eXN	04 31.5	6	ePZ	07 35 26.7
28	iPZ	23 14 50.0		eSZ	47.9
	iSNE	15 16.1	6	ePZ	09 03 06.0
29	ePZ	08 21 06.3±	6	iPZ	10 51 13.0
	eXE	32.5		iSZ	42.2
	eXN	36.0	6	iPZ	11 53 18.6
	eXE	42.5		eSZ	42.3
29	ePZ	17 01 37.0	6	ePZ	23 30 27.0
	eSN	02 04.9		iSZ	31 01.8
30	ePZ	03 33 55.0	7	ePZ	03 07 58.1
	e(S)NE	19 33.3	7	iPZ	06 07 53.3
31	ePZ	00 40 56.5	7	iPZ	08 54 47.8
	iPZ	57.3	7	iPZ	11 22 21.0
	iSZNE	41 18		eSZ	50.7
31	ePZ	08 45 27.5	7	eSE	15 59 35.6
	Warsak		7	ePZ	16 37 22.8
2	ePZ	05 04 11.3		eSZ	38 12.4
	eSZ	40.5	8	ePZ	11 32 07.3
2	ePZ	09 05 08.2	8	ePZ	13 07 14.6
2	iPZ	19 06 54.6		eSZ	44.9
	iSZ	07 19.3	8	ePZ	18 43 57.6
3	ePZ	10 38 28.7	9	ePZ	09 52 35.8
	eSZ	51.0		eSZ	53 06.4
4	ePZ	07 10 06.6	10	ePZ	08 37 54.1
5	ePZ	10 25 54.2		eSZ	38 37.8
5	iPZ	15 15 54.2	11	ePZ	01 40 35.6
5	ePZ	18 27 14.7		eSZ	41 37.7
	eSZ	54 54.9	11	ePZ	07 25 01.7
5	ePZ	21 32 33.3	11	iPZ	12 40 47.7
6	ePZ	01 41 52.1	12	eSZ	41 23.0
6	ePZ	02 19 39.2	13	ePZ	23 36 06.6
6	ePZ	03 42 54.1	13	ePZ	06 55 22.0
			13	ePZ	13 02 35.8



Date	Phase	h m s	Date	Phase	h m s
14	iPZ	11 54 41.1		eSZ	17 42.5
	iSZ	55 19.8	29	ePZ	05 38 31.0
14	ePZ	22 11 35.3	29	ePZ	08 20 31.8
	iSZ	12 37.5		eSZ	21 15.5
15	iPZ	04 25 11.5	30	ePZ	23 31 37.6
	eSZ	44.0		eSZ	32 12.8
15	ePZ	05 20 38.7		Lahore	
	iSZ	21 01.9	3	eSN	18 05 08
15	ePZ	20 33 42.1	3	(eS)N	18 00 26
16	ePZ	06 30 50.8	14	ePZ	12 33 25
16	ePZ	07 31 48.1	14	ePZ	22 11 04
17	ePZ	16 16 42.7		eSN	33
	iSZ	17 27.5	15	ePZ	09 25 46
19	eZZ	16 28 32.5		eSN	26 20
	iSZ	29 09.1	16	ePZ	13 13 24
20	ePZ	06 00 44.3	29	eSN	11 32 23
	iSZ	01 17.8		Karachi	
20	ePZ	14 26 00.7	25	ePZ	18 24 35.2
20	ePZ	22 36 55.0		eSZ	41.4
	eSZ	37 47.2		Chittagong	
20	ePZ	22 41 15.5		iPZ	10 43 50d
	eSZ	42 00.3	1	iSZNE	44 20
21	ePZ	08 58 51.8	1	eXZ	23 57 28
	eSZ	59 23.0	6	eXZ	12 07 14
22	ePgZ	14 03 39.2	7	eXZ	03 04 29
	iSgZ	49.5		eSNE	06 10
22	ePgZ	19 13 02.0	8	eXE	18 42 50
	eSgZ	11.6	9	ePZ	23 16 56
23	ePZ	04 30 52.8		eSNE	17 16
	iSZ	31 23.4	10	ePZ	20 18 30
23	ePZ	19 09 02.0		iSNE	41
23	ePZ	21 27 46.6	14	ePgN	22 15 47
24	ePZ	02 28 22.3		eSgNE	51
25	ePZ	05 02 27.5	14	iPgZNE	23 57 03
28	eSN	02 53 56.8		iSgNE	07
28	ePZ	17 16 48.1			



Date	Phase	h	m	s	Date	Phase	h	m	s
15	iPgZNE	22	38	51.5					
21	eXZ	18	31	04					
24	eXE	07	09	25					
25	eXZ		10	04.8					
26	iPgZNE	07	44	58.0c					
	iSgZNE		45	02.4					
26	iXNE		07	54.0					
28	iXZ	05	29	27					
28	eXZ	10	20	14					
30	ePZ	23	19	33					
	eXZ			37					
	iSNE			50					