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**PAKISTAN METEOROLOGICAL SERVICE**

**GEOPHYSICAL INSTITUTE**

**QUETTA**

# Pakistan Meteorological Service

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Meteorological Service

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The Seismological Bulletin of Pakistan is a monthly publishing data of seismological stations in Pakistan.

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### Particulars of Stations and Instruments

#### (a) Stations

Station	Symbol	Latitude	Longitude	Height (a.s.l.)	Ground
Quetta	Qt	30° 11'·3 N	66° 57'·0 E	1719 meters	Cretaceous Limestone
Lahore	Lh	31° 33'·0 N	74° 20'·0 E	210 "	Alluvium
Karachi	Kr	24° 49'·8 N	67° 02'·2 E	30 "	Alluvium
Chittagong	Ch	22° 21'·5 N	91° 49'·0 E	15 "	Alluvium
Warsak	Wr	34° 09'·0 N	71° 25'·0 E	343 "	River Terrace

#### (b) Instruments

Instruments	Components	Period Seismo. & Galvo.	Damping	Max Magnification
<u>Quetta</u> (Central Station)				
Sprengnether	Z	1·9 sec.	Critical	5,500
"	N	1·95 "	"	4,500
"	E	1·95 "	"	5,800
"	N	15·8 "	"	15,000
"	E	16·5 "	"	16,000

(Contd).

Instruments	Components	Period Seismo. & Galvo.	Damping	Max. Magnification
Willmore	Z, N & E	{ Seismo = 1 sec. Galvo = 1/4 ..	—	—
Milne-Shaw	E	12.0 sec.	20:1	250
Sprengnether Pen recorder	E	1.0 "	—	—
<b>Lahore</b> Sprengnether	Z	1.8 "	Critical	4,900
"	N	1.7 "	"	4,200
"	E	1.6 "	"	4,100
<b>Karachi</b> Sprengnether	Z	1.8 sec.	Critical	5,890
"	N	1.6 "	"	4,700
"	E	1.4 "	"	4,700
<b>Chittagong</b> Sprengnether	Z	1.7 "	Critical	5,200
"	N	1.8 "	"	5,700
"	E	1.5 "	"	3,600
"	N	7.0 "	"	6,600
Willmore	Z	{ Seismo = 1 sec. Galvo = 1/4 ..	—	—
<b>Warsak</b> Sprengnether	N	2.0 sec.	Critical	4,000
Willmore (with Sprengnether galvo. & recorder)	Z	1.0 "	—	—

\* indicates long period seismographs, Sprengnether or Milne-Shaw.  
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) stand for seismological observatories Pasadena (U.S.A.),  
Berkley (U.S.A.), Uppsala (Sweden) and Kiruna (Sweden) respectively.  
All times are in Greenwich Mean Time.

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s	
1	Qt	ePKPZ	05	22	39 c	2	Qt	iPKPZ	06	17	45 d	
		eSKSN*		29	41			iPKP <sub>2</sub> Z			52	
		eSKSPN*		36	25			ePKSZNE		21	19	
		eSSN*		45	06			ePPPZNE		24	28	
	Wr	ePKP <sub>2</sub> N		22	53			eSKKSN*		28	01	
		USCGS H 05 02 56						eSKSPN*		31	24	
		38 S 73 W						ePPSN*		34	00	
		Chile						eSSN*		40	05	
1	Qt	ePZ	13	18	32		Lh	ePKPZ			52	
1	Qt	ePZ	14	15	32			ePKP <sub>2</sub> Z		18	00	
1	Qt	ePZ	14	26	29		Ch	ePKPZ		17	58	
1	Qt	ePZ	15	16	55			iXZ		18	05	
1	Qt	ePKPZ	21	32	35			ePKSZ		21	32	
	Lh	ePKPZ			44			ePPZ		22	02	
		USCGS H 21 12 50						eSKSZ		25	04	
		42 S 74 W					Wr	ePKP <sub>2</sub> N		17	59 ±	
		Near coast of Chile						USCGS H 05 58 03				
1	Qt	ePZ	21	42	46			46 1/2 S 74 W				
1	Qt	ePZ	23	53	46			Southern Chile				
2	Ch	ePZ	01	59	10			Mag 6 3/4 (Pas)				
		ePPZ	02	00	35		2	Qt	ePnZ	07	24	04
		ePPPZ			55			eP*Z			15	
		eSZ		04	54			ePgZNE			29	
	Lh	ePZ		01	24			eSnZNE		25	16	
	Wr	ePN			49			ePN			06	
	Qt	ePZ		02	05 d			USCGS H 07 22 30				
		ePcPZ			47			33 1/2 N 60 E				
		USCGS H 01 51 58						Iran				
		Near south coast of					2	Qt	ePKPZ	07	37	56
		Mindanao,						USCGS H 07 19 10				
		Philippine Islands						19 S 175 W				

Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		Tonga Islands				2	Qt	ePZ	17	11	03
		depth about 150 km				2	Qt	ePZ	18	32	52
2	Lh	ePZ	07	59	34		Lh	ePZ		33	07
	Wr	ePZ		49		2	Qt	ePKPZ	19	17	01
	Qt	ePZ	08	00	04 c			USCGS H 18 59 05			
		ePPZNE		03	32			20½ S 178½ W			
		ePPPZNE		05	29			Fiji Islands			
		eSN*		10	47			depth about 550 km			
		ePSN*		11	50	2	Qt	ePKPZ	20	06	24
		eSSN*		16	29			USCGS H 19 48 29			
		USCGS H 07 47 11						20½ S 178 W			
		5½ S 151½ E						Fiji Islands			
		New Britain						depth about 550 km			
		Mag 6½-6¾ (Pas)				2	Wr	ePN	20	46	40
2	Qt	ePKPZ	08	55	53			eSN		27	10
		USCGS H 08 36 10					Lh	ePZ			21
		40 S 74 W						esPZ			28 02
		Near coast of Chile						eSN			22
2	Qt	ePZ	12	46	25		Qt	ePZ	27	40	
		iXZ			27			eSNE	28	57	
		ePPZ			38			H 20 26 02			
		eSNEN*		49	25			36 N 71 E			
		eSSN*			46			Hindukush			
		eLN*		50	0			depth about 200 km			
	Wr	ePN		47	03	2	Qt	ePKPZ	21	50	43
	Lh	ePZ			31			eXZ		51	14
		H 12 42 35						USCGS H 21 30 58			
		33 N 48 E						38½ S 74 W			
		Western Iran						Near coast of Chile			
		USCGS H 12 42 38				2	Qt	ePZ	22	36	02
		33½ N 49 E				3	Qt	ePZ	07	51	08
		Iran									



Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		USCGS H 07 38 14				3	Qt	ePKPZ	13	32	25
		5½ S 151 E						USCGS H 13 14 38			
		New Britain						17½ S 179½ W			
		USCGS H 18 17 36						Fiji Islands			
		42½ S 75 W						depth about 600 km			
		Off coast of southern Chile						Mag 6 (Pas)			
		USCGS H 18 17 36				3	Qt	ePKPZ	13	41	24
3	Qt	ePKPZ	18	37	23			ePPZ		42	52
	Lh	ePKPZ			30			USCGS H 13 23 37			
		USCGS H 18 17 36						17½ S 179 W			
		42½ S 75 W						Fiji Islands			
		Off coast of southern Chile						depth about 600 km			
		USCGS H 18 17 36						Mag 6 (Pas)			
3	Qt	ePZ	20	15	28			ePN*	16	26	24
3	Qt	ePZ	22	08	34			ePPN*		28	07
4	Qt	ePKPZ	02	46	14 c			eSN*		33	02
		eXZNE			49 37			ePZ	27	24	
		USCGS H 02 27 06						ePZ	28	07	
		20 N 95½ W						epPZNE		33	
		Near coast of Jalisco, Mexico						esPE		44	
		Mag 6-6¼ (Pas)						ePPE		30	30
		USCGS H 03 22 36						epPPE		31	03
		USCGS H 03 02 49						ePPPE		32	10
		39 S 73½ W						eSN*		36	17
		Near coast of Chile						eScSE		37	33
		USCGS H 03 02 49						USCGS H 16 18 04			
		39 S 73½ W						41½ N 141½ E			
		Near coast of Chile						Near south coast of Hokkaido, Japan			
		USCGS H 03 02 49						depth about 100 km			
		39 S 73½ W									
		Near coast of Chile									
		USCGS H 11 05 10									
		39½ N 30½ W									
		Azores Islands region									
		USCGS H 11 05 10									
4	Qt	ePZ	11	52	36						
4	Qt	ePZ	20	45	09						
4	Qt	ePZ	21	55	29						
		eXZNE			51						
		e(S)NN*			56 49						

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s		
5	Qt	ePKPZ	19	49	40		45 $\frac{1}{2}$ S	73 $\frac{1}{2}$ W											
		USCGS H	19	30	30			Near coast of Chile											
		31 $\frac{1}{2}$ S						Mag 6 $\frac{3}{4}$ (Pas), 6 $\frac{3}{4}$ -7 (Berk)											
		Kermadec Islands																	
5	Qt	ePZ	20	47	27	6	Qt	ePZ	06	51	33								
6	Qt	eXZ	01	35	26	6	Qt	ePZ	07	04	45	7	Qt	ePKP	13	15	41		
		eSKSN*			43 00	6	Qt	ePZ	08	33	33								
		ePSN*			46 09	6	Wr	iPN	10	01	21								
		ePPSN*			47 19			iSN	11	24	05								
		USCGS H	01	17	48		Lh	ePZ			25								
		41 N						eSN			48								
		Off coast of northern					Qt	ePZ			25 40								
		California						eSE			09								
		Mag 5 $\frac{1}{2}$ -5 $\frac{3}{4}$ (Berk)									26 19								
6	Kr	iPZ	01	58	29			H 11 23 37											
	Qt	ePZ			59 25			Eastern Afghanistan											
6	Qt	ePKPZ	06	15	24 d	6	Qt	ePKPZ	17	35	15								
		iXZNE			16 12			USCGS H											
		ePPZNE			18 44			17 15 33											
		ePKSZNE			59			46 S											
		ePPPZN			22 02		7	Qt	ePZ										
		eSKSNE			35		7	Qt	ePZ										
		eSKKSNE			25 38														
		eSKSPNE			29 00			USCGS H											
		ePSE			33			05 25 11											
		ePPSNE			31 30		7	Qt	ePKPZ										
Wr		ePKPN			15 38			17 S											
Ch		ePKPZ			41			98 E											
		ePKSZ			19 13			Indian Ocean											
		ePPZ			53														
		eSKSZ			22 47														
		USCGS H	05	55	44														

Date	Station	Phase	h	m	s
9	Qt	ePPZ	11	42	51
		eSKSN*		49	02
		ePPSN*		53	20
		eSSN*		58	16
USCGS H 11 23 51 18 S 169 E New Hebrides Islands Mag $5\frac{3}{4}$ -6 (Berk), $6\frac{1}{4}$ (Pas)					
9	Qt	ePZ	17	59	22
		e!SN*	18	09	01
		ePPSN*			56
		eSSN*	13	54	
eLN* 19.0 USCGS H 17 47 41 38 N 26 W Azores Islands					
9	Qt	ePZ	23	02	34
10	Qt	ePKPZ	09	27	00
USCGS H 09 08 02 15½ S 174 W Samoa Islands region					
10	Wr	ePN	12	10	19
		ePZ			32 c
		eSN*		19	41
		eScSN*		20	27
Mu Sec PZ 0.2 1.3 USCGS H 11 59 06 6½ S 131 E Banda Sea Mag 6.1 (Qt)					
10	Qt	ePKPZ	14	49	30

Date	Station	Phase	h	m	s
		ePKP <sub>2</sub> E			40
		eXZN*		52	52
		USCGS H 14 29 47			
		37 S 75 W Near coast of Chile			
10	Qt	ePKPZ	21	31	06
USCGS H 21 12 05 15½ S 174 W Samoa Islands region Mag 5½ (Berk)					
11	Qt	ePZ	00	48	55
11	Qt	ePKPZ	00	53	34
eXZN 43 epPKPZ 54 54 esPKPZ 55 23 iXZN 56 50 ePKSN* 57 03 epPPZ 16 epPKSN* 58 20 ePKPN 53 53±					
USCGS H 00 34 48 21 S 64½ W Southern Bolivia depth about 300 km Mag 6¼ (Pas)					
11	Ch	ePZN*	15	25	07
		ePcPZ			33
		ePPZN*		27	40
		ePPPZN*		29	27
		eSN*		34	07
		ePSN*			30
		ePPSN*			43
		eSSN*		38	33

Date	Station	Phase	h	m	s
	Lh	ePZ	26	45	
		Wr	ePN	27	01
		Kr	ePZ		09
		Qt	ePZ		14
e!XZNE 46 ePPZ 30 49 ePPPZ 32 48 eSKSN 37 47 eSKKSE 54 eSN* 38 07 ePSNEN* 39 20 e!PPSE 44 eSSN* 44 15					
USCGS H 15 14 07 9 S 152½ E D'Entrecasteaux Islands Mag 6 (Berk), 6½-6¾ (Pas)					
11	Ch	ePZ	16	48	44
		ePcPZ		49	10
		ePPZN*		51	15
		ePPPZN*		53	04
eSN* 57 44 ePSN* 58 09 ePPSN* 18 eSSN* 17 02 09					
12	Lh	ePZ	16	50	20
		eSN		17	00 52
		Wr	ePN	16	50 34
		Qt	ePZ		47
ePPNE 54 22 eSKSNE 17 01 24 eSKKSE 34					

Date	Station	Phase	h	m	s		
		eSEN*			41		
		eScSN			53		
		ePSE		02	52		
		ePPSNE		03	27		
USCGS H 16 37 40 9½ S 152½ E D'Entrecasteaux Islands							
11	Ch	ePN*	17	18	50		
		eSN*		27	51		
		Lh	ePZ		20 31		
	Qt	ePZ			59		
		USCGS H 17 07 52 D'Entrecasteaux Islands					
		11	Qt	ePZ	18	41	07
12	Qt	ePKPZ	00	22	36		
USCGS H 00 02 55 37 S 75 W Off coast of Chile							
12	Qt	ePKPZ	04	14	32		
		USCGS H 03 56 44 22½ S 179 E South of Fiji Islands depth about 600 km					
		12	Qt	ePZ	05	07 58 c	
12	Wr	ePN		05	15 23		
		Qt	ePZ		16 21 d		
eSNE 17 43 H 05 14 33 Northern Afghanistan							
12	Qt	ePKPZ	07	16	44		

					Major Shocks						
Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
	USCGS H 06 58 12						Near coast of southern Chile				
	29½ S 179 W										
	Kermadec Islands					14	Qt	ePZ	04	37	3
	depth about 250 km						USCGS H 04 27 00				
12	Qt	ePKPZ	07	39	57±		44½ N 149 E				
		ePKP <sub>2</sub> Z		40	51		Kurile Islands				
		ePKSZNE		43	20	14	Qt	ePZ	10	07	25
		ePPPN*		48	38	14	Qt	ePZ	15	20	11
		eSSN*	08	05	20	14	Qt	ePZ	15	34	14
	USCGS H 07 19 43					14	Qt	ePZ	19	42	57
	36 S 98 W					14	Ch	ePZN*	23	49	15
	South Pacific Ocean						Qt	ePZ	51	19	
	Mag 6½ (Berk), 6¼ (Pas)						USCGS H 23 38 13				
12	Qt	ePKPZ	15	24	41 c		9 S 152½ E				
		ePKP <sub>2</sub> Z			52		D'Entrecasteaux Islands				
	USCGS H 15 04 57					15	Qt	ePZ	04	33	34
	Southern Chile					15	Qt	ePZ	10	00	22
12	Qt	ePZ	16	34	37	15	Qt	ePZ	11	37	49
12	Qt	ePZ	21	24	13	15	Qt	ePZ	13	57	04
13	Qt	ePKPZ	06	06	51 d	15	Qt	ePZ	15	19	05
		ePKP <sub>2</sub> Z		07	01	15	Ch	ePZ	15	45	16 c
		ePK3ZE		10	23			ePcPZ	46	55	
	USCGS H 05 47 05							ePPZ	47	04	
	44½ S 76½ W							ePPPZN*	45		
	Off coast of southern Chile							eSN*	51	59	
13	Qt	ePZ	19	46	22			ePSN*	52	05	
13	Qt	ePZ	23	51	34			eSSN*	55	10	
14	Qt	ePKPZ	03	13	58		Wr	iPN	46	26	
	USCGS H 02 54 13							eSN	54	07	
	43 S 73 W						Qt	ePZE	47	04 c	
								eXZNE	33		
								ePcPZNE	47		



					Major Shocks							
Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s	
		ePPZN	49	18				ePKPZ	23	50	28	
		ePPPE	50	39				ePPZ	52	21		
		eSNEN*	55	17			USCGS H 23 32 35					
		ePPSN*	39				26 S 178½ E					
		iXN*	57	12			South of Fiji Islands					
		eLN*	16	01.5			depth about 600 km					
		Mu			Sec			ePnZN	01	21	36.8c	
		PZ	0.6		1.5			ePgZE			38.7	
		Δ = 60°·5						iSnZNE			59.0	
	USCGS H 15 36 51						H 01 21 07					
	41 N 142½ E						Eastern Baluchistan					
	Near north coast of Honshu, Japan						West Pakistan					
	Mag 6.4 (Qt)					16	Qt	ePZ	03	15	34	
		ePKPZ	23	08	43		Ch	ePZ	03	33	32	
15	Qt						Qt	ePZ	36	02		
	USCGS H 22 49 39							epPZN			31	
	32 S 177½ W							USCGS H 03 24 42				
	Kermadec Islands							12 N 143½ E				
15	Wr	ePN	23	38	35			Mariana Islands				
		ePZE			55 c			depth about 150 km				
		ePcPNE	39	19					ePN	06	47	12
		e!XZE			50			Qt	ePZ			34 d
		ePPZ	41	35					ePcPZN	48	34	
		eSN*	48	01					ePPZE	49	38	
		e!ScSN*	49	03					eSNE	55	17	
		eLN*	56.3						Mu		Sec	
		Mu			Sec				PZ	0.4	2.0	
		PZ	0.5		2.0				USCGS H 06 37 48			
		Δ = 69°·3							12½ N 125 E			
	USCGS H 23 27 40								Near coast of Samar			
	½ S 133 E								Philippine Islands			
	Western New Guinea								Mag 6.2 (Qt)			
	Mag 6.4 (Qt), 6¼-6½ (Pas)											

				Major Shocks			
Date	Station	Phase	h m s	Date	Station	Phase	h m s
16	Qt	ePZ	10 06 55 d	16	Wr	ePN	21 08 23
		USCGS H 09 55 28			Qt	ePZ	09 20
		11½ N 144 E				eSNE	10 49
		Mariana Islands				H 21 07 24	
16	Qt	ePZ	10 26 36 c			Northern Afghanistan	
		ePPPZ	27 53	17	Qt	ePKPZ	05 20 25
		eXN*	31 44			USCGS H 05 02 34	
		iSNN*	54			18 S 178 W	
		eSSN*	33 43			Fiji Islands	
		eLN*	35.3			depth about 600 km	
	Wr	ePN	27 10	17	Qt	ePgZ	10 51 18.1c
		USCGS H 10 20 04				iXZE	22.6
		2 S 69 E				iSgNEN*	28.6
		Indian Ocean			Wr	ePnN	52 23
16	Qt	ePZ	11 41 05			H 10 51 00	
		eSN*	44 26			Baluchistan	
		eLN*	50.3			West Pakistan	
16	Qt	ePZ	11 48 54	17	Ch	iPZN*	16 47 23 c
16	Wr	ePN	16 10 23			ePcPZN*	36
		iSN	11 13			ePPZ	50 14
	Qt	ePZ	31			ePPPZN*	51 59
		eSNE	13 16			eSN*	57 04
		H 16 09 15				eSKSN*	21
		Tadzhikistan, S.S.R.				eScSN*	33
16	Kr	ePnZ	18 58 51		Wr	ePN	47 31
		iSnE	59 13		Qt	iPZNE	48 02 c
	Qt	ePnZ	19			ePPZNE	51 17
		ePgZNE	34			eSNEN*	58 18
		eSnNE	19 00 09			eScSN*	34
		eSgZNE	22			ePSN*	59 18
		H 18 58 19				eSSN*	17 03 49
		Eastern Baluchistan				eLN*	10.0
		West Pakistan					



				Major Shocks			
Date	Station	Phase	h m s	Date	Station	Phase	h m s
		Mu Sec				Near south coast of	
		PZ 0.7 1.3				Sumatra	
		$\Delta = 82^\circ.2$		19	Qt	ePZ	02 27 42
	Kr	i!PZ	16 48 24			USCGS H 02 21 18	
		USCGS H 16 35 32				Andaman Islands	
		52½ N 173½ W		19	Wr	ePN	02 33 39
		Andreanof Islands				Qt	ePZN 53
		Aleutian Islands		19	Qt	ePZ	02 59 35
		Mag 6-6½ (Pas), 6.6 (Qt)		19	Qt	ePZ	05 44 57
17	Qt	ePZ	17 28 50 c	19	Qt	ePZ	08 04 29
17	Qt	ePZ	18 10 32	19	Qt	ePZ	10 37 08
17	Qt	ePZ	18 15 29	19	Qt	ePZ	12 33 26
17	Qt	ePZ	20 48 35 d	19	Qt	ePZ	12 45 14
18	Ch	ePZ	03 30 08			USCGS H 12 34 34	
	Qt	ePZ	32 13			44½ N 149 E	
		USCGS H 03 19 04				Kurile Islands	
		9½ S 151½ E		19	Wr	iPN	13 21 24
		D' Entrecasteaux Islands				iSN	54
18	Qt	iPgZ	02 24 24.6c		Qt	ePZ	22 17
		iSgNE	38.4			eSNE	23 28
	Kr	ePnZ	25 35			H 13 20 44	
		eSnZ	26 38			Hindukush	
	Wr	ePnN	25 42	19	Qt	ePZNE	17 28 09 c
		eSnN	26 53			ePcPZN	39
		H 08 24 08				eScSN*	38 00
		30¼ N 66 E				eLN*	44.3
		Pakistan-Afghanistan				USCGS H 17 17 25	
		border				28 N 142½ E	
18	Ch	ePZ	23 38 52±			Bonin Islands	
	Qt	ePZ	41 20	19	Qt	ePZ	22 02 30
		eScSN*	51 13	20	Qt	ePKPZ	02 20 45
		USCGS H 23 32 39				iXZ	21 04



Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
	Qt	ePKP <sub>1</sub> ZN	20	52	c			ePPPN*	28	30	
		ePKSZNE	24	15				eSKKSN*	31	19	
		eSKSPN	34	27				eSKKSN*	32	14	
		eSSN*	43	27				eSKSPN*	34	58	
	Wr	ePKP <sub>2</sub> N	21	06				eSSN*	45	03	
	Ch	ePKP <sub>1</sub> Z	12					USCGS H 12 59 40			
		ePKSZ	24	43				39½ S 73 W			
		ePPZ	25	49				Chile			
		eSKSZ	28	16				Mag 6¾ (Pas), 7 (Berk)			
		USCGS H 02 01 08				20	Qt	ePZ	13	43	52
		38 S 73½ W				20	Qt	ePKPZ	14	43	15
		Near coast of Chile						ePKP <sub>2</sub> Z			27
		Mag 7 (Pas), 7½ (Berk)						USCGS H 14 23 30			
20	Qt	ePZN	03	32	34			Near coast of southern			
20	Qt	ePZE	12	16	11			Chile			
		USCGS H 12 05 09				20	Qt	ePZ	17	09	08
		3 S 129 E						USCGS H 16 56 25			
		Ceram Island						57 N 154½ W			
20	Kr	ePKP'Z	13	19	17			Kodiak Islands, Alaska			
		eXZ			34	20	Qt	ePKP <sub>1</sub> Z	17	19	19
	Qt	iPKP <sub>1</sub> Z			24 c			ePKP <sub>2</sub> ZN			27
		ePKP <sub>2</sub> Z			36			eXZN			46
		eXZ	21	42				USCGS H 16 59 35			
		ePKSZEN*	22	49				38½ S 74 W			
		eSKSN*	26	27				Off coast of Chile			
		ePPSN*	35	41		20	Ch	ePZN*	23	04	57
		eSSN*	41	58			Qt	ePZ			06 59
	Wr	ePKP <sub>2</sub> N	19	39				USCGS H 22 56 49			
	Ch	ePKP <sub>1</sub> Z			46			36½ N 139½ E			
		ePKSN*			23 18			Honshu, Japan			
		ePPN*			24 31	21	Qt	ePKPZ	08	54	41
		eSKSN*			26 52						



Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		USCGS H 08 34 39				22	Qt	ePZ	09	17	01
		4½ S 105 W				22	Kr	ePZ	16	15	45
		Pacific Ocean southwest					Qt	iPZ	16	41	c
		of Galapagos Island						ePPZ	17	03	
21	Ch	ePN*	12	51	00			eXEN*	18	59	
		ePPN*			52 33			eSEN*	20	27	
		ePPPN*			55			eLN*	22	0	
		eSN*			56 59			Mu Sec			
	Qt	ePZ			54 00			PZ	1.0	1.5	
		ePcPZ			40			PN	0.9	1.5	
		ePPZ			56 19			PE	1.0	1.5	
		USCGS H 12 43 31						Δ = 20°.6			
		3 N 126½ E					Wr	iPN	16	1	36
		Molucca Passage						USCGS H 16 12 00			
21	Qt	ePKPZE	21	52	30			12 N 57½ E			
		ePPZ			53 01			Arabian Sea			
		e!XN*			59 20			Mag 5.9 (Qt)			
		USCGS H 21 33 45				22	Wr	ePN	19	45	47
		61 S 21 W						iSN	46	39	
		Sandwich Islands region					Qt	ePZ			54
22	Qt	ePZ	05	27	23			eSNE	48	41	
22	Qt	ePKP <sub>1</sub> ZE	06	59	55 d			H 19 44 35			
		ePKP <sub>2</sub> Z			07 00 05			Tadzhikistan S.S.R.			
		ePKSZ			03 28	22	Qt	ePKPZ	20	33	01
		USCGS H 06 40 10						USCGS H 20 13 18			
		Near coast of Chile						38½ S 73½ W			
22	Qt	ePKPZNE	08	31	35			Near coast of Chile			
		ePKP <sub>2</sub> ZNE			42	22	Qt	ePZ	22	06	37
	Wr	ePKP <sub>2</sub> N			55	22	Ch	ePZ	23	40	36
		USCGS H 08 11 50						ePcPZ			50
		Near coast of southern						ePPZN*	43	27	
		Chile						ePPPN*	45	14	

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		eSN*	50	17				eXZ	18	19	
		eScSN*	44					USCGS H 13 53 37			
Wr		ePN	40	49				6½ N 72½ W			
Qt		ePZ	41	15	c			Columbia			
		ePcPZN	21			25	Qt	ePKPZ	15	00	51
		eSNE	51	32				eXZ	02	00	
		eScSN*	42					ePPZE	03	00	
		USCGS H 23 28 50						eSKSN*	07	55	
		52 N 173 W						eSKSPN*	12	53	
		Andreasof Islands						eSSN*	20	18	
		Aleutian Islands						USCGS H 14 41 42			
23	Qt	ePZ	12	19	24			30½ S 177 W			
		USCGS H 12 08 13						Kermadec Islands			
		7 S 127½ E						Mag 6½-6¾ (Pas), 5¾ (Berk)			
		Timor Island region				25	Qt	ePKPZ	19	54	49
24	Qt	ePZ	07	43	09			ePKSZNE	58	22	
24	Qt	ePZE	21	41	17		Lh	ePKPZ	55	05±	
24	Qt	ePKPZ	22	53	47			USCGS H 19 35 27			
		USCGS H 22 34 43						28 S 68 W			
		30 S 177½ W						Gatamarca Province			
		Kermadec Islands						Argentina			
24	Qt	ePZE	23	10	15	25	Qt	ePZ	20	01	29
25	Qt	ePE	00	10	08	25	Qt	ePZ	22	57	28
		USCGS H 00 00 38				26	Qt	ePZ	06	36	36
		8 S 118 E				26	Qt	ePZ	09	53	52 <sup>c</sup>
		Sumbawa Islands region				26	Qt	ePZ	16	58	24
25	Qt	ePKPZ	02	21	39			eXZ	30		
		USCGS H 02 03 35						ePcPZ	59	23	
		30½ S 177 W						USCGS H 16 48 40			
		Kermadec Islands						26 S 71 E			
25	Qt	ePKPZ	14	12	44			Indian Ocean			

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
27	Qt	ePZ	00	35	36			Qt	ePZ	08	47 <sup>c</sup>
27	Qt	ePZ	03	30	43			Ch	ePZ	09	18
27	Qt	ePZ	06	28	18	29	Qt	ePZ	01	36	42
27	Wr	ePN	15	41	53	29	Qt	ePZ	01	37	46
						29	Qt	ePKPZ	02	16	58
								ePKP <sub>2</sub> ZNE	17	05	
								eXZ	19	29	
								e(PKS)ZN	20	22	
								eXN*	32	18	
								eSSN*	39	36	
								ePKP <sub>2</sub> N	17	21	
								USCGS H 01 57 14			
								Southern Chile			
								ePKPZ	04	48	18
						29	Qt	ePPZ	50	17	
								USCGS H 04 29 12			
								30 S 177½ W			
								Kermadec Islands			
						29	Ch	ePZ	05	22	13
								epPZ	23	52	
								ePPZN*	24	06	
								eSZN*	28	06	
								esSN	31	03	
								ePZ	24	27 <sup>d</sup>	
								USCGS H 05 14 56			
								30 N 139 E			
								South of Honshu, Japan			
								depth about 500 km			
						29	Qt	ePZ	10	34	24
								ePcPZ	38		
								ePPZ	37	00	

Date	Station	Phase	h	m	s
		USCGS H 10 23 02 47½ N 27 W Atlantic Ocean			
29	Qt	ePZ	13	45	32 d
29	Ch	ePZ	17	18	59
	Lh	ePZ	19	10	c
	Qt	ePZ		35	c
		ePPZE	22	49	
		iSNEN*	30	00	
		eScSN*		16	
		ePPSE	31	20	
		Mu Sec			
		PZ 0.3 1.6			
		Δ = 84° 3			
		USCGS H 17 07 00 53 N 168½ W Fox Islands, Aleutian Islands Mag 6.3 (Qt)			
30	Qt	ePnZ	07	05	14
		ePgZNE		18	
		iSnZNE		43	
	Wr	ePN		37	
	Lh	ePZ		55	
		eSN	06	48	
		H 07 04 39 31¾ N 68½ E Afghanistan			
30	Lh	ePZ	20	10	59 d
	Qt	ePZ		11	07 d
		ePPZ	14	23	
	Ch	ePZ	11	09	±

Date	Phase	h	m	s	Date	Phase	h	m	s
	<b>Quetta.</b>								
1	ePgZ	01	25	42.0	5	ePgZ	07	43	58.0
	eSgNE		57.6			iSgE		44	01.3
1	ePZ	01	55	10	5	eXZ	09	15	
1	ePZ	11	25	00	5	ePZ	10	10	37
1	ePZ	12	12	11	5	eXZ	12	08	
1	ePZ	12	42	58	5	ePZ	13	36	12
1	ePZ	14	13	06	5	ePE	14	26	33
1	ePZ	20	34	27	5	ePZ	14	39	42
1	ePZ	22	51	27	5	ePZ	16	39	48
2	ePZ	02	58	42	5	ePZ	20	35	53
2	ePZ	08	28	58	5	ePZ	20	47	27
2	ePZ	09	46	43	5	ePZ	20	47	27
	e(S)N		47	03	5	ePZ	21	28	20
	eSNE		05		5	eXZ	23	52.5	
2	ePZ	09	52	04	6	ePZ	03	03	02
2	ePZ	11	01	51	6	ePgE	05	08	07
2	ePZ	13	50	27	6	eSgNE		18	
2	ePZ	14	21	05	6	ePZ	06	38	02
	eXN		33			ePZ	07	21	52
	eSE		41		6	ePZ	07	21	52
2	eXE	14	59	06	6	eXZ	07	50	16
2	ePZ	19	29	25	6	ePZ	11	00	30
2	eXZ	20	06	24	6	eXZ	11	24	28
2	ePZ	22	05	06	6	eXZ	11	52.5	
4	eXE	07	46.0		6	ePZ	11	59	29
4	eXZ	08	00	41	6	ePgZ	15	54	50.5
4	eXZ	08	25	50		eSgN		54.5	
5	ePZ	03	47	32	6	ePZ	16	16	36
5	ePZ	05	17	02	6	ePZ	16	31	30
5	ePZ	06	01	00		eSE		33	39
5	eXE	06	45	00	6	ePZ	16	45	02

Minor Shocks

Date	Phase	h m s	Date	Phase	h m s
6	ePgE	18 48 08.6	8	ePZ	21 41 52
	eSgE	12.0	9	ePZ	00 00 55
6	ePZ	19 59 02	9	eXZ	05 03.0
6	eXZ	21 09 00	9	ePZ	10 24 43
6	ePZ	21 33 00	9	eXZ	10 30
6	ePZ	22 54 25	9	ePgZ	10 38 39
7	eXZ	01 16.5		eSgNE	50
7	ePZ	01 45 54	9	eXZ	10 41.3
7	ePZ	02 37 30	9	ePZ	17 43 59
7	ePZ	02 55 06	9	ePZ	21 35 14
7	ePE	06 36 36	9	ePZ	22 24 26.2
7	eXZ	11 46 28		eXE	34
7	ePZ	14 14 02±		eSNE	43.6
7	eXE	15 51.0	9	iPgZ	22 38 14.2
7	eXE	17 38 37		iSgNE	16.0
7	eXZ	18 57 58	9	ePZ	22 47 09
7	eXE	20 17 06		eSN	27
7	eXZE	21 37 47	9	ePZ	23 28 02
7	eXE	22 13 15	9	eXZ	23 32 08
8	eXZ	06 02 30		ePgZ	23 52 17
8	ePZ	07 20 56		eSgNE	32
8	ePZ	07 28 43	10	ePZ	00 01 15.5
8	ePZ	12 10 04	10	eXZ	01 53.4
8	ePZ	13 47 30	10	ePZ	03 30 16
8	eXZ	16 56 25	10	ePZ	07 22 50
8	ePZ	18 00 47		eSEN	23 04
8	ePZ	19 59 35	10	ePZ	08 26 59.0
8	ePZ	21 25 33		SZ	27 06.1
			10	ePE	12 05 51.4
				eSEN	53.7

Minor Shocks

Date	Phase	h m s	Date	Phase	h m s
11	ePZ	04 17 16	13	ePZE	00 51 47
11	eXZ	05 55.3	13	ePZ	12 04 21
11	ePgZ	06 20 15.4	13	ePZ	12 13 23
	eSgNE	19.5	13	eXZ	12 40.0
11	ePZ	06 23 20	13	ePgZ	17 18 59
11	ePZ	06 38 12		eSgZN	19 11
11	iPgZ	15 16 34 c	13	ePZ	18 30 05
	eSgZNE	50		eSNE	30
11	ePZ	16 41 41	13	e(P)Z	22 33 43
11	ePgZ	18 10 09		ePZ	47
	eSgNE	21	14	ePN	04 44 03.5
11	ePZ	19 25 41		eSZN	19.7
11	ePZ	20 40 45	14	ePZ	05 48 58
	e(S)E	41 15	14	ePZ	06 51 19
11	ePZ	21 08 03	14	ePZ	15 43 42
11	ePZ	21 13 57	14	ePZE	19 03 12
11	ePZ	21 35 21	14	ePZ	22 14 17
12	eXZ	00 12.0	14	ePgZE	23 45 14.0
12	ePZ	07 14 46		eSgE	14.5
	e(S)NE	17 07	15	eXZ	02 28 27
12	ePZ	07 25 52	15	ePZ	05 32 34
12	eXZ	07 59 29	15	eXZN	05 56.5
12	ePZ	08 13 50	15	eXZ	15 42 49
	e(S)E	14 23	15	ePZ	23 00 35
12	ePZ	11 50 54	16	ePZ	01 08 12
12	eXZ	13 41.5		eSNE	10 16
12	ePZE	23 09 37	16	ePZ	02 06 18
				eSE	42
			16	ePZ	04 22 25±

Date	Phase	b m s	Date	Phase	h m s
16	ePZ	04 54 17		eSgE	54
16	ePZ	05 49 47 c	17	ePgEN	20 42 46
	eSE	50 13		eSgN	58
16	ePZ	15 41 54	17	ePZ	23 13 01
16	ePZ	16 36 48		eSgN	12
16	ePZ	17 16 37	18	ePgZ	07 22 59
16	ePgZ	18 59 19		eSgN	23 13
	eSgZNE	34	18	ePZ	09 55 39
16	ePZ	22 55 25		iSNE	56 03
17	ePZ	00 39 18	18	ePgZ	13 40 17
17	eXZ	02 50		eSgNE	20
17	ePZ	04 25 28	18	ePZ	14 35 42
17	ePgZ	10 09 06	18	eXZ	16 29 04
	eSgN	15		ePgZNE	09
17	ePZ	10 45 03.5		eSE	21
17	ePgZ	10 55 12.6	18	eSgZNE	22
	eSgN	24.1	19	ePZ	19 23 22
17	ePgZ	10 57 12.7	19	eXZ	02 32
	eSgN	16.0	19	ePgN	03 07 40
17	ePZ	12 35 53		eSgNE	47
17	ePZ	14 03 17	19	ePgE	05 39 37
17	ePZ	14 40 57		eSgE	45
17	ePZ	16 47 53	19	eXZ	06 23 14
17	ePZ	18 21 32	19	ePgZ	06 39 32
17	iPgZ	14 45 09.0d		eSgN	39
	iSgNE	22.0	19	ePgN	06 41 34
17	ePgN	19 59 41.3		eSgN	41
			19	ePgNE	08 56 37
				eSgNE	45
			19	ePZ	09 24 00

Date	Phase	h m s	Date	Phase	h m s
19	ePE	09 28 04.6	21	ePE	18 21 02
	eSE	29 29	21	ePgE	18 36 59.5
19	ePgZ	14 39 24		eSgE	37 10.6
	eSgNE	35.4	21	ePE	22 02 51.3
19	eXE	15 36 24	22	ePZN	04 40 03
19	ePE	16 04 09	22	ePZ	08 20 52
19	ePgZ	18 53 27.4	22	ePZE	09 56 12
	eSgNE	34 9	22	ePZN	16 52 39
19	eXE	19 08		eSZNN*N	53 25
19	ePgN	20 03 06.0	23	eXZ	02 33 18
	eSgEN	18.8	23	eXZ	03 43 10
19	ePN	20 09 01	23	ePZ	05 26 20
19	ePEN	21 04 23	23	ePZ	05 40 57
19	ePZ	23 37 03		eXZ	12 26 43
20	ePgN	02 27 21.9d	24	ePgZE	01 48 59.4
	eSgN	29.6		eSgZE	49 07.0
20	ePZ	13 38 35	24	ePgE	12 08 05.9
20	eXZ	13 52 14		eSgE	09.4
20	ePZ	18 56 19	24	ePE	17 49 01
20	ePgZ	19 29 37.3	24	ePZE	18 15 13
	eSgNE	45.9	24	ePZ	19 23 28
20	eXZ	22 28 14	24	ePZ	19 33 43
21	ePZ	06 52 43			
21	ePZ	07 32 20			
21	eXZ	15 27 24			

			Minor Shocks		
Date	Phase	h m s	Date	Phase	h m s
24	ePgE	22 05 12.9		eSNE	23 07
	eSgE	24.1	29	eXZ	21 55 15
25	ePgZE	00 20 58.0	30	ePZ	06 13 55
	eSgNE	21 21.9	30	ePZ	08 30 52
25	ePgZE	00 38 26.6		iSNE	31 16
	eSgNE	36.2	30	ePgE	09 08 07
25	ePgE	05 27 41.0		iSgE	11
	eSgE	42.4	30	ePZ	12 05 47
25	ePE	10 40 51	30	ePE	16 00 19
	eSE	42 19	30	ePgZ	23 42 50
25	ePE	12 18 54.7		eSgNE	53
	eSE	19.0		<b>Warsak</b>	
26	ePgZ	08 03 49.6	1	ePN	14 12 01
	eSgE	04 01.5		iSN	38
26	ePZ	23 00 26.1	1	ePN	17 08 44
	eSE	48.5	1	ePN	18 14 40
27	ePZ	07 14 20.3	1	ePN	20 33 49
27	ePZ	11 33 30	1	iSN	34 18
29	eXZ	03 51 48	5	ePN	04 17 52
29	eXZ	09 33 18		eSN	18 20
29	ePgZ	11 22 45.7	6	ePN	10 04 46
	iSgNE	47.6	9	ePN	22 26 09
29	ePgZ	12 27 33.3	10	ePN	08 18 33
	iSgNE	35.0		iSN	19 00
29	eXZ	18 17 34	10	ePN	19 42 32
29	ePZ	19 47 00.3	11	ePN	15 37 35
	eSN	25.4	12	ePN	05 15 23
29	ePZ	20 22 38.1			

			Minor Shocks		
Date	Phase	h m s	Date	Phase	h m s
13	ePN	15 00 14	2	eXZ	07 26 02
	iSN	50	2	eXZ	07 27 22
14	ePN	05 47 21	3	eXZ	22 08 43
14	ePN	10 02 34	11	e(P)Z	05 51 31
14	ePN	15 35 34		e(S)N	53 14
16	ePN	08 09 10	11	eXZ	15 18 35
	iSN	35	11	ePZ	20 41 27
16	ePN	20 23 18	12	ePZ	07 40 15
17	ePN	12 23 19	23	eSN	12 27 09
	iSN	40	24	e(P)Z	15 00 40
17	iPN	12 34 39	25	eSN	20 00 36
	iSN	35 00	29	eXZ	01 38 00
18	ePN	21 42 20	29	eXZ	10 34 43
	iSN	41	29	ePZ	21 55 58
19	ePN	09 27 32			
19	ePN	20 09 31		<b>Karachi</b>	
21	ePN	07 16 46	2	eXZ	07 26 22
22	iPN	17 05 14	11	ePZ	15 17 20
23	ePN	02 17 29		eSE	18 07
	iSN	59	17	iXZ	10 52 56
25	ePN	04 17 43	22	eXZ	16 30 40
	iSN	58		eSE	31 00
25	ePN	10 39 54		<b>Chittogong</b>	
	iSN	40 24	1	eXZ	05 23 31
28	ePN	05 05 39	3	eXN	07 55 02
28	iPN	07 15 30	4	eXN	10 24 16
	iSN	16 09	6	eXN	01 41 32
28	iPN	11 59 28	6	eXN	02 11 23
	eSN	12 00 08	6	eXN	06 51 52
30	ePN	11 51 43	7	ePN	13 07 32
	eSN	52 21	7	eXN	15 49 04
	<b>Lahore</b>		8	eXN	16 37 37
1	eXZ	20 34 44			

Minor Shocks



Date	Phase	h m s	Date	Phase	h m s
9	eXN	11 36 50			
9	eXN	18 02 32			
10	ePE	12 08 12±			
10	eXN	14 49 42			
12	ePZ	00 22 48			
13	ePN	06 07 02			
14	ePZ	03 14 08			
14	ePZ	04 36 42±			
15	ePN	23 38 00			
16	eXN	10 29 59			
16	eXN	11 43 42			
17	eXN	11 00 21			
17	ePZ	17 28 28			
19	eXZ	02 25 55			
19	ePN	13 24 58±			
19	ePZ	23 38 52			
20	eXN	12 19 18			
20	ePN	14 43 59±			
20	eXN	17 10 48			
20	ePN	17 19 34			
22	eXN	11 01 14			
22	eXN	16 24 26			
23	ePZ	02 28 56			
24	eXZ	21 41 58			
25	ePN	13 46 18±			
25	eXZ	15 14 21			
28	eXZ	16 24 13			