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PAKISTAN METEOROLOGICAL SERVICE

GEOPHYSICAL INSTITUTE

QUETTA

Pakistan Meteorological Service

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Meteorological Service

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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
Quetta (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 "	—	—
Lahore				
Sprengnether	Z	1.8 "	Critical	4,900
"	N	1.7 "	"	4,200
"	E	1.6 "	"	4,100
Karachi				
Sprengnether	Z	1.8 sec.	Critical	5,890
"	N	1.6 "	"	4,700
"	E	1.4 "	"	4,700
Chittagong				
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 "	—	—
Warsak				
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.
Se=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
X1	Lh	ePZ	04	43	01			ePKSZNE			43
	Qt	ePZ			12 d			eSKSNE			37 20
		eSNE		44	28			eSKKSN			40 08
		H 04 41 31						Mu Sec			
		Hindukush region						PPZ 1.5		2.5	
X1	Qt	ePZ	10	24	13 c			Δ = 142°·0			
		USCGS H 10 11 44·6						✓Wr ePKPZ			09 30 19
		5·7 S 145·9 E						✓Ch ePKP ₂ Z			54
		Near coast of New Guinea						USCGS H 09 10 41·0			
		depth about 45 km						24·5 S 69·9 W			
X2	Ch	ePZ	04	14	29			Near coast of Chile			
	Qt	ePZ		15	10 c			depth about 37 km			
		USCGS H 04 02 42·0						Mag 6 3/4-7 (Pal),			
		52·6 N 168·2 W						7-7 1/2 (Berk), 6·9 (Qt)			
		Fox Islands						2 ✓Kr ePKPZ			09 57 04 d
		Aleutian Islands						ePPZ			10 00 08
		depth about 70 km						✓Qt ePKPZ			09 57 05 d
X2	Ch	ePZ	04	48	20			eXZ			11
	Qt	ePZ		50	25			ePPZE			10 00 11
		epPZ			31			e!PKSE			46
		USCGS H 04 37 28·2						Mu Sec			
		6·6 S 152·5 E						PPZ 1·4		2·0	
		New Britain region						Δ = 142°·0			
		depth about 33 km						✓Wr ePKPZ			09 57 15
								✓Ch ePKP ₂ Z			40
2	✓Kr	ePKPZ	09	30	10			USCGS H 09 37 38·6			
		ePPZ		33	26			24·3 S 69·8 W			
		ePKPZ		30	11			Near coast of Chile			
		epPKPZ			23			depth about 64 km			
		ePPZNE		33	21			Mag 6 3/4 (Pas), 6·8 (Qt)			

Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
	Qt	ePZ	13	52	13			ePPPZNE	32	14	
× 2	Wr	ePZ	17	52	05			eXE	35	20	
	Qt	ePZ			38			e(S)NE	36	12	
	USCGS H 17 43 18.2							eLNE	38	2	
	25.7 N 129.2 E							Mu	Sec		
	Ryukyu Islands							PZ	1.9	1.7	
	depth about 81 km							Δ = 33°.6			
× 2	Qt	ePZ	19	36	29	✓ Kr		ePZ	04	31	17
	USCGS H 19 31 26.2							H	04	24	18
	38.5 N 40.3 E							42 ³ / ₄ N 105 E			
	Eastern Turkey							Outer Mongolia			
	depth about 127 km							USCGS H	04	24	17.5
× 2	Kr	ePZ	19	52	15			42.8 N 104.5 E			
	Qt	ePZ			44 c			Outer Mongolia			
	USCGS H 19 41 06.3							depth about 45 km			
	41.6 S 88.3 E							Mag 7 (Pas), 7 (Berk),			
	South Indian Ocean							6 ¹ / ₂ -6 ³ / ₄ (Pal), 6.7 (Qt)			
	depth about 35 km										
3	✓ Ch	ePZ	04	29	25 c	3	✓ Ch	ePZ	07	19	09
		ipPZN*			40			ePcPZ			23
		esPZ			48			epPZ			37
		iPPZN*			30 05			ePPZ			21 58
		ePPPZN*			15			eSN*			28 31
		eSZN*			33 37			eScSZN*			29 06
		esSZN*			58		✓ Wr	ePZ			19 16
		eSSZ			34 30		✓ Qt	ePZ			49 d
	✓ Lh	ePZ			29 54			ePcPZ			57
	✓ Wr	ePZ			30 01			epPZ			20 06
	✓ Qt	ePZ			48 c			ePPZ			22 53
		ePPZE			31 58			eSNE			29 41



Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		USCGS H	07	07	42.7			USCGS H	13	27	48.5
		52.5 N 177.3 W						5.3 S 148.8 E			
		Andreanof Islands						New Britain region			
		Aleutian Islands						depth about 48 km			
		depth about 79 km				× 4	Lh	ePZ	15	56	42
× 3	Qt	ePZ	09	21	08		Qt	ePZ			57 19
		ePPZ			23 04			eSN*			16 05 24
		USCGS H	09	12	19.0			USCGS H	15	47	23.0
		21.1 N 121.1 E						1.1 N 120.6 E			
		Off south coast of						Northern Celebes			
		Formosa						depth about 46 km			
		depth about 35 km				4	✓ Lh	ePZ	16	30	11
× 3	Ch	ePZ	18	01	05		✓ Wr	ePZ			21
	Lh	ePZ			02 06		✓ Qt	ePZ			54 c
	Wr	ePZ			13			epPZ			31 09
	Qt	ePZ			03 00			ePPZ			33 11
3	✓ Wr	ePZ	20	29	56			eSNE			39 21
	✓ Lh	ePZ			30 12			USCGS H	16	20	36.1
	✓ Qt	ePZ			33 d			32.5 N 141.6 E			
× 3	Lh	ePZ	21	59	31			Off coast of Honshu			
	Qt	ePZ			22 00 00			Japan			
× 4	Wr	ePN	06	01	47			depth about 106 km			
		iSN			02 25	× 5	Qt	ePZ	00	13	26
	Qt	ePZ			51	5	✓ Ch	ePZ	08	43	55 c
		eSNE			04 17			ePP			44 35
		H	05	00	59			eSE			48 13
		Afghanistan					✓ Wr	iPZ			44 27
× 4	Ch	ePZ	13	38	15		✓ Qt	ePZ			45 17 c
								eLN*			52.7

Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		H 08 38 33				×6	Ch	ePZ	03	40	39
	44 N	105½ E						eSN*			44 56
	Outer Mongolia						Qt	ePZ	42	00	c
	USCGS H 08 38 49.5							USCGS H 03 35 30.6			
	43.0 N	104.3 E						42.9 N 104.5 E			
	Outer Mongolia							Outer Mongolia			
	depth about 59 km							depth about 55 km			
×5	Qt	ePZ	12	20	03	×6	Ch	ePZ	04	04	57
×5	Qt	ePZ	18	00	45		Qt	ePZ			06 20
5	✓Ch	ePZ	18	17	38			USCGS H 03 59 52.6			
	✓Wr	ePZ			55			42.9 N 104.1 E			
	✓Qt	ePZ	18	32				Outer Mongolia			
5	✓Qt	ePZ	21	31	57			depth about 68 km			
		epPZ	32	09		×6	Qt	ePZ	06	19	14
		eSNE	40	07		×6	Qt	ePZ	08	28	31
	✓Wr	ePZ	32	09		6	✓Qt	ePKPZ	09	15	24
	✓Kr	ePZ			12			USCGS H 08 56 16.5			
		epPZ			27			8.5 N 82.7 W			
	✓Lh	ePZ			29			Near coast of Panama			
		epPZ			41			depth about 116 km			
		USCGS H 21 21 51.7						Mag 5½ (Pal)			
		35.7 N 6.5 W				6	✓Kr	ePKPZ	09	15	39
		Straits of Gibraltar						eXZ			53
		depth about 66 km						ePPZ	18	47	
×5	Ch	ePZ	23	51	35			ePKPZ	15	39	c
	Qt	ePZ			52 59			eXZ			56
		USCGS H 23 46 29.8						ePPZE	18	57	
		43.2 N 103.8 E						ePKSZNE	19	15	
		Outer Mongolia						Mu Sec			
		depth about 61 km						PPZ 1.1 2.0			
								Δ = 143° 0			

Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
	✓Wr	ePKPZ	09	15	43	×6	Qt	ePZ	18	56	41
	✓Lh	ePKPZ			51 c	6	✓Ch	ePZ	21	38	54
		eXZ	16	06			✓Lh	ePZ	21	42	05
		ePKSZ	19	16			✓Wr	ePZ			33
	✓Ch	ePKPZ	15	54			✓Qt	ePZ			34
		USCGS H 08 56 07.6						ePPZ	44	24	
		21.4 S 69.0 W						eSN*	49	20	
		Northern Chile						eSSN*	52	46	
		depth about 25 km						USCGS H 21 34 09.3			
		Mag 6 (Pal), 6.7 (Qt)						2.6 S 101.5 E			
×6	Qt	ePZ	10	27	21			Sumatra			
×6	Qt	ePnZ	16	47	32			depth about 54 km			
		ePgZNE			37						
		iSnNE	48	04		×7	Ch	ePZ	07	54	39
		iSgNE			10			USCGS H 07 42 42.5			
	Wr	ePnZ	47	58				62.5 150.4 W			
	Lh	ePnZ	48	00	±			Alaska			
		eSnZ			54			depth about 64 km			
	Kr	ePZ			20						
		eSnE	49	25		×7	Ch	ePZ	16	26	03
		H 16 46 49					Lh	ePZ			28 32
		30 N 70 E					Wr	ePZ			54
		Near Fort Munro					Qt	ePZ			29 11
		West Pakistan						USCGS H 16 19 09.2			
×6	Lh	ePZ	18	28	39			1.2 N 121.8 E			
	Wr	ePZ			29 00			Celebes Sea			-
	Qt	ePZ			23			depth about 40 km			
		USCGS H 18 19 33.6				×7	Qt	ePZ	17	38	53
		11.5 N 125.5 E						eSNN*			41 14
		Samar, Philippine				×7	Wr	ePZ	18	25	53
		Island						eSZ			27 03
		depth about 25 km									

Major Shocks

Date	Station	Phase	h	m	s
	Qt	ePZ			01
		eSZNE		29	07
		H 18 24 18			
		Kirghiz, S. S. R			
8	Qt	ePKPZ	01	42	02
		ePPZ		43	33
		USCGS H 01 24 18.9			
		21.8 S 179.4 W			
		Fiji Islands region			
		depth about 685 km			
×8	Wr	iPZ	02	57	40d
		iSZ		58	13
	Qt	ePZ			37
		eSNE		59	54
		H 02 56 56			
		Afghanistan			
×8	Qt	ePZ	10	11	13
		USCGS H 10 00 59.7			
		7.8 N 127.2 E			
		Mindanao,			
		Philippine Islands			
		depth about 25 km			
8	Qt	ePKPZ	11	39	28
	Wr	ePKP ₂ Z			39
	Lh	ePKP ₂ Z			46
		USCGS H 11 20 07.8			
		31.6 S 68.9 W			
		San Juan Province			
		Argentina			
		depth about 140 km			



Major Shocks

Date	Station	Phase	h	m	s
×9	Qt	ePZ	21	34	30
	Lh	ePZ			37
		USCGS H 21 24 57			
		72.0 N 1.6 W			
		Jan Mayen Islands region			
		depth about 60 km			
×9	Wr	ePZ	23	06	38
		eSZ			07 15
	Qt	ePZ			42
		eSZN			09 10
		H 23 05 47			
		Northern Afghanistan			
×10	Qt	ePZ	05	48	22
×10	Qt	ePZ	06	38	16
		USCGS H 06 29 33.1			
		19.0 N 119.5 E			
		Near north coast of			
		Luzon			
		Philippine Islands			
		depth about 60 km			
×10	Wr	iPZ	13	42	17d
		iSZ			45
	Qt	ePZ			43 22d
		eSNE			44 40
		H 13 41 40			
		36 N 70 E			
		Hindukush			
10	Ch	ePN*	14	02	11
		epPN*			03 14
		ePPN*			51

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
	$\Delta = 15^{\circ} \cdot 6$					x 11	Wr	ePZ	16	21	00
	H 01 07 42						Qt	ePZ	22	04	
	36 $\frac{1}{2}$ N 84 $\frac{1}{2}$ E							eSNE	23	20	
	Sinkiang Province							H 16 20 16			
	China							Northern Afghanistan			
	USCGS H 01 07 52.8					11	/ Ch	ePZ	19	05	27
	36.8 N 84.5 E							epPZN*	06	00	
	Sinkiang Province China							ePPN*	08	50	
	depth about 77 km							ePPP*	10	40	
	Mag 5.4 (Qt)							eSN*	15	40	
11	/ Lh	ePZ	03	28	00			ePSN*	16	50	
	/ Kr	ePZ		28			/ Qt	ePZ	07	10	
	/ Qt	ePZ		38				USCGS H 18 53 09.2			
	USCGS H 03 18 10.9							15.7 S 166.9 E			
	1.6 N 126.4 E							New Hebrides			
	Molucca Passage							Islands region			
	depth about 52 km							depth about 133 km			
x 11	Qt	ePZ	04	07	51 c			Mag 6 $\frac{1}{4}$ -6 $\frac{1}{2}$ (Pas)			
		eP*ZNE		55		x 12	Qt	ePZ	18	40	04
		ePgZ	08	00		x 13	Qt	ePZ	00	21	11
		eSNE		26		13	/ Ch	ePZ	07	49	51
		eSgZNE		35			/ Qt	ePKPZ	54	40	
	Lh	ePZ		36				ePPZNE	55	10	
	H 04 07 05							eXZNE	56	40	
	Eastern Baluchistan							USCGS H 07 36 13.8			
x 11	Wr	ePZ	07	39	50			52.1 S 160.9 E			
		eSZ		40	27			Macquarie Islands			
	Qt	ePZ		55 c				depth about 29 km			
		iSZNE	42	24				Mag 7 $\frac{1}{2}$ (Pas), 7 (Pal)			
	H 07 38 59					x 13	Qt	ePZ	08	05	50
	Northern Afghanistan										



Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
13	/ Ch	ePZ	10	13	52						
		eSN*	20	31							
	/ Wr	ePZ	15	33		x 14	Qt	ePZ	04	11	33
	/ Qt	ePZ	16	05 c							
		epPZ	13								
		eSNE	24	48							
		USCGS H 10 05 24.3				x 14	Qt	ePZ	04	15	44
		27.7 N 142.4 E				x 14	Qt	ePZ	10	45	17
		Bonin Islands region				x 14	Qt	ePZ	21	30	55
		depth about 28 km				14	/ Ch	iPZ	23	58	49 c
x 13	Qt	ePZ	11	06	35						
x 13	Qt	iPnZ	18	23	44.5						
		iSnZNE	24	05.3							
	Kr	ePZ	39								
		eSE	25	43							
	Wr	ePZ	01								
		H 18 23 16									
		24 $\frac{3}{4}$ N 65 E									
		Afghanistan-Baluchistan									
		border									
x 14	/ Qt	e(P)Z	01	11	36						
		ePPZ	15	36							
		eSKSN*	21	55							
		e!XN*	22	04							
		eSN*	23	05							
		eXN*	29	09							
		eSSN*	30	13							
		USCGS H 00 57 25.0									
		10.8 S 165.4 E									
		Santa Cruz Islands									

Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
	Mu	Sec						USCGS H	01 20	02.2	
	PZ	0.7	1.6					51.1 N	170.6 W		
	$\Delta = 62^\circ.1$							Fox Islands			
	USCGS H	23 51	28.6					Aleutian Islands			
	2.9 N	126.5 E						depth about 32 km			
	Molucca Passage					$\times 16$	Ch	ePZ	05 18	00	
	depth about 77 km							epPZ		50	
	Mag $6\frac{3}{4}$ (Pas, Berk),							ePPZ	20 07		
	6.6 (Qt)							ePPPZ	21 22		
$\times 15$	Qt	ePZ	12 18	56				eSN*	25 23		
	USCGS H	12 09	54.9				Wr	ePZ	20 15		
	13.6 N	120.7 E					Qt	ePZ		32	
	Luzon, Philippine							USCGS H	05 08	50.6	
	Islands							4.2 S	139.9 E		
	depth about 149 km							New Guinea			
$\times 15$	Wr	ePZ	14 04	36				depth about 194 km			
		eSN		05 26							
	Qt	ePZ		27		$\times 16$	Kr	ePZ	16 54	41	
		eSZNE		07 00			Qt	ePZ		55 02	
	H	14 03	26					epPZNE		08	
	Tadzhik, S. S. R.							ePPZN		54	
$\times 15$	Qt	ePKPZ	23 43	45				ePPPZN		56 07	
	USCGS H	23 24	35.8					e!SNEN*		59 50	
	12.2 N	87.8 W					Wr	ePZ		55 49	
	Near coast of						Lh	ePZ		56	
	Nicaragua							USCGS H	16 49	07.9	
	depth about 39 km							13.6 N	42.3 E		
$\times 16$	Qt	ePZ	01 32	36				Near coast of Eritrea			
		esPZN		50				depth about 25 km			
		ePPZ		35 51							



Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
$\times 16$	Lh	ePZ	17 53	42				ipPZNE	47 18		
	Qt	ePZ		54 23				esPZN		51	
16	Qt	ePZ	18 33	07 d				ePPZN	48 23		
	Wr	ePZ		08				ePPPN	49 43		
	Lh	ePZ		25				e!XN	50 51		
	USGGS H	18 21	31.7					iSNEN*	53 30		
	43.8 N	28.9 W						esSN*	55 23		
	North Atlantic Ocean							USCGS H	10 37	14.1	
	depth about 21 km							6.4 S	109.3 E		
$\times 17$	Qt	ePZ	02 16	49				Java Sea			
		epPZ		17 24				depth about 295 km			
		eSN		27 03		$\times 17$	Qt	ePZ	13 25	54	
	USCGS H	02 04	35.4					USCGS H	13 14	16.8	
	50.6 N	175.3 W						43.2 N	28.9 W		
	Andreanof Islands							North of Azores			
	Aleutian Islands							depth about 25 km			
	depth about 92 km					$\times 17$	Ch	ePZ	13 34	03	
17	Ch	ePZ	10 43	32			Qt	ePZ		36 30	
		epPN*		44 37				USCGS H	13 25	09.1	
		ePPN*		45 02				11.1 N	141.3 E		
		ePPPN*		24				Mariana Islands region			
		iSN*		48 35				depth about 25 km			
		esSN*		50 25		17	Lh	ePZ	16 54	58 c	
		eSSN*		51 09				epPZ		55 10	
	Lh	ePZ		45 36			Qt	ePZ		37 c	
	Kr	ePE		46 03				esPZNE		49	
	Wr	iPZ		13 c				USCGS H	16 44	45.4	
		ipPZ		47 15				47.3 N	153.6 E		
		eSZ		53 25				Kurile Islands			
	Qt	ePZ		46 16 c				depth about 15 km			

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
X17	Qt	ePZ	18	00	14			New Britain region			
X17	Qt	ePZ	18	49	53			depth about 62 km			
X18	Ch	ePZ	05	23	32	X19	Wr	ePZ	00	02	18d
		USCGS H	05	11	21.9			iSN			45
		14.8 S	167.6	E			Lh	ePZ			57d
		New Hebrides Islands						eSZ			03 55
		depth about 93 km					Qt	ePZ			22d
X18	Ch	ePZ	07	44	08			iSN			04 41
	Qt	ePZ			46 15			H	00	01	41
		USCGS H	07	35	59.8			36 N	71.4	E	
		37.3 N	143.4	E				Hindukush			
		Off east coast of						depth about 200 km			
		Honshu, Japan						USCGS H	00	01	30.5
		depth about 72 km						36.4 N	71.5	E	
18	Lh	ePZ	18	29	57			Hindukush			
	Wr	ePZ			30 22			depth about 25 km			
		eSN			38 13	X19	Qt	ePZ	12	10	38
	Qt	ePZ			30 43	X19	Ch	ePZ	13	12	20
		epPZE			55			USCGS H	13	00	09.8
		eSNEN*			38 50			10.7 S	166.9	E	
		eSSN*			42 51			Santa Cruz Islands			
		eLN*			45.6			depth about 96 km			
		USCGS H	18	20	43.3	X19	Lh	ePKP ₂	13	41	52
		8.5 N	125.9	E				USCGS H	13	22	01.3
		Mindanao						24.3 S	69.6	W	
		Philippine Islands						Northern Chile			
		depth about 36 km						depth about 17 km			
X18	Qt	ePZ	21	07	28	X19	Qt	ePZ	14	59	06
		USCGS H	20	54	34.4	X19	Qt	ePZ	19	10	56
		5.4 S	152.7	E							

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		USCGS H	18	59	40.8			Qt	ePZ		31 50
		11.3 N	141.2	E				eSN			32 55
		Mariana Islands						H	10	30	23
		depth about 77 km						Pakistan-Afghanistan			
X19	Ch	ePZ	22	26	10			border			
		USCGS H	22	13	58.8	21	Wr	ePZ	14	51	48
		12.6 S	166.8	E			Lh	ePZ			57
		Santa Cruz Islands					Ch	ePZ			52 07
		depth about 66 km						epPZ			53
X20	Wr	ePZ	05	18	53			eSN*			15 02 09
	Qt	ePZ			19 13			esSN*			03 15
X20	Wr	iPZ	07	18	51 c			Qt	ePZ	14	52 13
		iSZ			19 17			epPZN			45
	Qt	ePZ			50 d			ePPZN			55 24
		eSNE			21 02			eSNEN*			15 02 20
		H	07	18	16			esSN*			03 18
		Hindukush						eSSN*			07 46
X20	Qt	ePKPZ	11	59	48			USCGS H	14	40	01.6
		USCGS H	11	42	04.9			61.6 N	152.3	W	
		21.1 S	179.1	W				Alaska			
		Fiji Islands						depth about 169 km			
		depth about 662 km						Mag 5.3 (Pas)			
X21	Wr	ePZ	00	03	34	X21	Ch	ePZ	21	02	34
	Qt	ePZ			39		Lh	ePZ			04 24
		USCGS H	23	55	07.0		Wr	ePZ			41
		3.8 S	103.1	E			Qt	ePZ			05 06
		Southwestern Sumatra						USCGS H	20	53	51.8
		depth about 164 km						11.2 N	141.3	E	
X21	Wr	iPgZ	10	30	40			Mariana Islands region			
		iSgZ			51			depth about 72 km			

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
X21 16	Qt	ePKPZ	22	48	49		USCGS H	03 02 29.2			
		USCGS H	22	29	54.9			9.8 N 94.2 E			
		62.5 S		167.1	E			Nicobar Islands			
		North of Balleny Islands						depth about 60 km			
		depth about 29 km						Mag 6.0 (Qt)			
X22 13	Qt	ePKPZ	02	43	47	22	Qt	ePKPZ	04	06	42
		epPKPZ		45	18		Lh	ePKPZ			53
		USCGS H	02	25	29.3			USCGS H	03	47	21.7
		29.8 S		179.6	W			16.1 S 72.9 W			
		Kermadec Islands region						Near coast of southern			
		depth about 379 km						Peru			
22	Ch	ePZ	03	05	34			depth about 147 km			
		ePPZ			48	22	Wr	ePKPZ	06	50	15
		ePPPZ			54		Qt	ePKPZ			22
		esPZ			06 01			USCGS H	06	31	21.5
		eSZN*			07 58			30.8 S 177.1 W			
		eSSN*			08 17			Kermadec Islands region			
	Lh	ePZ			19			depth about 46 km			
	Wr	ePZ			51	X22	Qt	ePKPZ	12	40	58
	Qt	ePZ			57 c		Wr	ePKPZ			41 08
		eXZ			09 05			USCGS H	12	21	33.0
		epPZ			11			30.5 S 71.5 W			
		esPZ			21			Near coast of Chile			
		iSNN*			14 23			depth about 110 km			
		eLN*			18.6	X22	Qt	ePKPZN	14	31	17
		Mu						USCGS H	14	12	18.7
		PZ	0.3		1.4			27.8 S 176.1 W			
		$\Delta = 35^\circ$						Kermadec Islands region			
		H	03 02 09 (Quetta)					depth about 60 km			



Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
X22	Qt	ePZ	14	40	11 d						
		USCGS H	14	27	40.3						depth about 469 km
		53.7 N		168.1	W						Mag 5.5 (Pal)
		Fox Islands				23	Ch	ePZ			09 47 26
		Aleutian Islands						ePPZ			48 18
		depth about 57 km						ePPPZ*			28
								eSN*			52 01
22	Ch	ePZ	21	13	00		Lh	ePZ			49 49
		ePcPZ			23		Wr	iPZ			50 10 d
		epPZ			14 44			eSN			56 54
		ePPZ			15 45		Qt	ePZ			50 14
		eSN*			21 31			esPZ			51 02
		eScSN*			22 17			ePPZNE			52 03
		esSN*			24 30			eSNEN*			56 55
	Lh	ePZ			14 35 d			USCGS H	09	41	48.4
		eSKSZ			24 15			3.3 S			101.9 E
		eSZ			32			Near coast of Sumatra			
	Wr	iPZ			14 49 d			depth about 134 km			
	Kr	ePZ			15 02 d	23	Ch	ePZ			10 54 58
		eSKSE			24 52			ePZ			57 10
		ePZ			15 04 d			ePZ			35
	Qt	esPE			17 40			ePZ			51
		ePPNN*			18 56			ePZ			56
		eSKSNEN*			24 58			epPZNE			58 09
		eSKKSN*			25 10			esPZNE			18
		iSN*			28			eSNN*			11 06 00
		e!PSN*			27 50			esSN*			22
		iSSN*			31 48			eLN*			13.7
		USCGS H	21	02	41.1			USCGS H	10	47	57.9
		6.8 S		155.3	E			8.2 N			125.7 E
		Solomon Islands						Mindanao			

Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		Philippine Islands depth about 67 km						Mag 6.0 (Qt)			
×23	Lh	ePZ	15	56	06	×24	Qt	ePZ	04	04	02
	Qt	ePZ			54			eSN*			10 49
		USCGS H 15 47 04.9						USCGS H 03 55 33.7			
		8.8 N 125.7 E						17.6 S 66.6 E			
		Mindanao						Indian Ocean			
		Philippine Islands				×24	Qt	ePZ	21	55	29
		depth about 120 km					Lh	ePZ			46
×23	Qt	ePKPZ	19	25	42	25	✓Ch	ePZ	05	29	11
		USCGS H 19 07 06.1					✓Wr	ePZ			31 06
		27.8 S 177.2 W					✓Qt	ePZ			38
		Kermadec Islands region						esPZNE			55
		depth about 261 km						USCGS H 05 21 03.1			
×23	Wr	ePZ	19	39	24			29.0 N 142.8 E			
	Qt	ePZ			50 c			Bonin Islands			
		epPZNE	40	01		×25	Wr	iPZ	11	19	06 d
		esPZE			14		Qt	ePZ			28 d
		ePPZN	41	47		×25	Qt	ePZ	11	28	57
		eSN	47	13			Wr	ePZ			29 06
		Mu Sec				×25	Qt	ePZ	15	28	34
		PZ 0.3 1.6				×25	Qt	ePZ	15	40	07
		Δ=53°				25	✓Qt	ePZ	20	38	35
		USCGS H 19 30 41.6						USCGS H 20 27 34.1			
		15.6 N 121.7 E						54.6 N 161.6 E			
		Near east coast of Luzon						Near east coast of Kamchatka			
		Philippine Islands						depth about 37 km			
		depth about 49 km				×26	Qt	ePKPZ	01	15	12



Major Shocks

Date	Station	Phase	h	m	s	Date	Station	Phase	h	m	s
		USCGS H 00 56 16.6						H 02 28 26			
		23.7 S 176.9 W						32.4 N 77 E			
		Tonga Islands region						Himalaya range			
		depth about 59 km				26	✓Qt	ePKPZ	04	51	18
×26	Lh	ePZ	01	53	40			e(SKS)NEN*			57 57
	Wr	ePZ			58		✓Wr	ePKPZ			51 23
	Qt	ePZ			54 33			USCGS H 04 32 30.1			
	Kr	ePZ			59			57.4 S 26.2 W			
26	✓Ch	ePZ	01	52	35±			Sandwich Islands			
		eSN*			58 38			depth about 25 km			
	✓Qt	ePZ			54 46 c			Mag 5.4 (Pal)			
		epPZE			55 10	×26	Wr	ePZ	20	44	17
		ePcPZ			39		Lh	ePZ			45 01
		ePPNE			57 03		Qt	ePZ			14
		eSNEN*	02	02	47			eSNE			46 54
		esSN*			03 37			H 20 43 05			
		eScSN*			04 15			38.4 N 70 E			
		Mu Sec						Tadzhikistan S.S.R.			
		PZ 0.4 1.6						depth about 100 km			
		Δ=60°									
		USCGS H 01 44 48.7				27	✓Qt	ePPZ	10	54	18
		33.8 N 136.2 E						ePSN*			11 03 37
		Near south coast of						USCGS H 10 35 28.0			
		Honshu, Japan						41.3 N 124.9 W			
		depth about 109 km						Off coast of northern California			
×26	Lh	ePZ	02	29	06			depth about 30 km			
		eSN			35			Mag 5-5.4 (Berk),			
	Wr	ePZ			43			5.4-6 (Pal)			
	Qt	ePZ			30 34	×27	Qt	ePZ			11 57 25

Date	Station	Phase	h	m	s
27	✓Qt	ePKPZ	18	29	07
		eXZ		32	12
		ePKSZNE		44	
	✓Wr	ePKPZ	29	12	
	✓Lh	ePKP ₂ Z		22	
		USCGS H	18 09	41.6	
			13.7 S	74.3 W	
			Near coast of Peru		
			depth about 82 km		
×28	Qt	ePZ	05	46	57
	Ch	ePZ		49	20
		USCGS H	05 39	43.7	
			34.9 N	22.5 E	
			Near coast of Greece		
			depth about 67 km		
×28	Ch	ePZ	19	57	26
		USCGS H	19 45	19.0	
			58.0 N	155.3 W	
			Kodiak Island		
			Alaska		
			depth about 32 km		
29	✓Qt	ePKPZ	06	21	06
		USCGS H	06 02	13.9	
			18.4 S	174.7 W	
			Tonga Islands		
			depth about 104 km		
29	✓Qt	ePKPZ	10	56	22 d
		ePKP ₂ Z		29	
		epPKPZNE		35	
		ePKSZE	11	00	06

Date	Station	Phase	h	m	s
		eSKKSN*	06	49	
		eSKSPN*	10	14	
		eSSN*	19	07	
	✓Wr	ePKP ₂ Z	10	56	35
	✓Lh	eXZ		37	
		ePPNE	11	00	38
	✓Ch	ePKPZ	10	56	35
		USCGS H	10 36	40.0	
			44.8 S	75.6 W	
			Near coast of southern Chile		
			depth about 30 km		
			Mag 6½-6¾ (Pas),		
			5¼-6 (Berk), (Pal)		
×29	Ch	ePZ	13	52	34
	Qt	ePZ		55	01
		epPZ		21	
		USCGS H	13 42	34.6	
			5.5 S	146.1 E	
			Near north coast of New Guinea		
			depth about 57 km		
×29	Qt	ePZ	14	14	11
29	✓Qt	ePZ	18	26	53
		USCGS H	18 19	41.6	
			35.3 N	22.6 E	
			Near Crete		
			Mediterranean Sea		
			depth about 54 km		
29	✓Qt	ePKPZ	19	21	07

Date	Station	Phase	h	m	s
		esPKPZ		25	
	✓Lh	ePKPZ		19	
		esPKPZ		37	
		USCGS H	19 01	38.1	
			18.8 S	69.4 W	
			Northern Chile		
			depth about 39 km		
×29	Qt	ePZ	20	01	46
×29	Qt	ePZ	20	52	03
×29	Qt	ePZ	21	51	55
×30	Ch	ePZ	05	37	22
	Qt	ePZ		40	14 c
		USCGS H	05 29	28.6	
			9.6 S	121.0 E	
			Sawoe Sea		
			depth about 53 km		
×30	Wr	iPZ	21	34	07 d
		iSN		38	
	Qt	ePZ		35	04 d
		esPZN		50	
		iSZNE		36	22
		H	21 33	24	
			Hindukush		
			depth about 200 km		
×31	Qt	ePZ	09	00	10
×31	Qt	ePZ	11	37	23
×31	Wr	ePZ	16	15	53±
	Qt	ePZ		59	
		epPZ		16	09

Date	Station	Phase	h	m	s
		USCGS H	16 05	22.1	
			7.8 S	120.1 E	
			Flores Sea		
			depth about 25 km		
31	✓Kr	ePKPZ	18	27	42
	✓Qt	ePKPZ		49	
		ePKP ₂ ZNEN*	28	04	
		epPKPZNE		16	
		esPKPN		26	
		ePPE	31	26	
		ePKSZNE		36	
		ePPPN	34	52	
		eSKSZNEN*		45	
		ePKP ₂ Z	28	04	
	✓Lh	ePKPZ	27	56	
		ePPZ	31	53	
	✓Ch	ePKPZ	28	01	
		USCGS H	18 08	12.3	
			43.9 S	75.0 W	
			Near coast of southern Chile		
			depth about 92 km		
			Mag 6½-6¾ (Pas),		
			5¼-5½ (Pal)		
×31	Wr	ePZ	20	10	04
	Qt	ePZ		16	
		USCGS H	19 59	08.3	
			6.6 S	129.1 E	
			Banda Sea		
			depth about 112 km		

Minor Shocks

Date	Phase	h m s	Date	Phase	h m s
	Quetta				
1	ePZ	00 04 11.5	9	eXZ	08 22
	eSN	33.1	9	ePZ	08 38 04
1	eXZ	03 44 48		eSN	33
1	ePZ	09 49 33	9	ePZ	10 35 45
	eSN	50 06		eSN	37 06
2	ePZ	02 51 57	9	ePZ	11 04 50
2	eXZ	07 15 41		eXN	05 21
2	eXZ	10 33 24	9	ePZ	11 47 07
3	ePZ	16 46 39	10	eXZ	05 32 11
3	ePgZ	17 26 00.1	10	eXZ	07 05
	eSgNE	11.5	10	eXZ	07 07
3	eXZ	22 19 07	10	ePZ	10 42 42.1
4	ePgZ	05 30 26.0		eSNE	43 20
	eSgN	31.3	10	ePZ	12 52 51
4	ePZ	13 19 14	10	eSN	53 09
	eSN	20 25		ePZ	21 43 45
4	eXZ	16 27 09		eSN	47
5	ePZ	05 34 04	11	eXZ	03 57
	eSN	34 25	11	ePgZ	06 57 11.1
6	ePZ	05 49 59		iSgN	23.8
6	ePgZ	21 54 59.1	11	ePZ	16 26 59
	e(Sg)N	55 10		eSN	28 17
7	e(P)Z	03 18 30	11	eXZ	17 14 18
7	eXZ	05 08 18.5	12	eXZ	02 09
7	eXZ	06 01 20.6	12	eXZ	11 35
7	ePZ	21 45 54.8	13	ePgZN	00 38 46.8
8	ePZ	02 29 55		eSgZN	48.6
	eSNE	30 06	13	ePgZ	01 11 39
8	eXZ	19 58 51		eSgZN	49
			13	eXZ	07 47 33



Minor Shocks

Date	Phase	h m s	Date	Phase	h m s
13	ePZ	09 21 47	17	ePZ	12 36 33
	e(S)Z	22 02	17	ePgZ	15 06 39.6
13	ePZ	15 47 16		eSgNE	49.2
13	ePZ	17 34 09	17	ePZ	23 17 05.3
	eSNE	35 28		eSN	36.6
13	ePZ	20 31 37	18	ePZ	01 06 24±
	eSNE	32 54	18	eXZ	01 18
14	ePZ	15 55 02	18	ePZ	07 32 49.1
	eSZNE	24		eSNE	33 10.6
14	ePZ	18 09 50	18	ePZ	10 26 26
	e(S)N	11 35		eSZNE	27 43
14	ePZ	20 56 59	18	ePZ	16 00 43
	eSN	58 19		eSNE	01 22
15	eXZ	04 45 09	18	ePZ	20 08 56
15	eXZ	12 28 41		eSNE	09 39
15	eXZ	12 46 18	19	ePZ	03 33 53
16	ePgN	01 56 25	19	ePZ	04 50 48.1
	eSgN	36		eSN	51 04.7
16	ePZ	02 17 02	19	ePZ	06 47 37
16	ePZ	08 07 52	19	ePZ	08 37 37.0
16	ePZ	11 43 07	19	ePZ	08 58 16
	eSZN	44 29	19	eXZ	10 43
16	ePZ	20 51 50	19	ePZ	14 13 07
	eSZN	52 11	19	e(P)Z	14 20 31
16	ePgZ	22 59 06	19	ePZ	14 27 39
	eSgN	19	19	ePZE	23 00 29
17	eXZ	08 54.0	20	ePZ	00 02 11
17	ePZ	11 15 54	20	eXZ	03 20
17	ePZ	12 28 37	20	ePZ	03 36 44
	eSZN	53		eSN	37 55

Minor Shocks

Date	Phase	h m s	Date	Phase	h m s
20	ePZ	08 41 35		eSgN	54.2
20	ePZ	09 33 54	23	ePZ	23 46 18
20	ePZ	14 19 42		eSN	43
21	ePgZ	06 01 50	24	ePgZ	01 32 31
	eSgNE	02 04		eSgN	42
21	eXZ	12 14.7	24	ePZ	08 16 09
21	ePZ	14 03 13		e(S)NE	55
21	ePZ	18 08 26	24	eXZ	10 59
	eSNE	44	24	ePZ	11 31 39
21	ePZ	19 32 28	24	ePZ	19 56 51
21	ePZ	19 51 29		eSN	58 43
	eXZ	37	25	ePZ	09 17 51
21	ePZ	23 56 05	25	eXZ	13 57 41
	eSNE	46	25	eXZN	20 33 31
22	eXZ	03 21 14	25	ePZ	23 14 51
22	ePZ	12 22 58		eSNE	15 13
	eSN	24 18	26	ePZ	12 14 02
22	ePZ	12 27 45	28	eXZ	05 18
	eSN	29 00	28	eXZ	17 35
22	eXZ	12 36.2	29	ePgZ	16 34 16.7 d
22	eXZ	14 31.5		eSgN	30.9
22	ePZ	15 58 12 d	29	eXZ	19 32 30
	eSNE	35	30	ePZ	02 15 32
22	ePZ	16 40 39	30	ePZ	11 49 28
22	ePZ	19 05 05	30	eXZ	19 25 31.8
	eSN	31		ePgZ	35
23	eXZ	20 12.7		eSgNE	47
23	ePgZ	22 13 07.4	31	ePZ	04 22 28.6
	eSgN	09.3		eSN	45.3
23	ePgZ	23 16 51.2	31	ePZ	05 18 33



Minor Shocks

Date	Phase	h m s	Date	Phase	h m s
31	eXZ	07 47 11		iSZ	47 12
	ePZ	23	6	ePZ	03 41 56
31	eXZ	08 43	6	ePZ	05 09 59
31	ePZ	09 25 07		iSZ	10 30
	eSNE	31	6	ePZ	21 17 30
31	ePZ	20 10 16		eSZ	59
	Warsak		7	iPZ	06 00 21 d
			7	ePZ	21 46 32
1	ePN	03 44 04	8	ePZ	13 26 16
	iSN	32		iSZ	59
1	ePN	04 42 46	9	iPZ	10 34 43 d
	eSN	43 20		iSZ	35 19
1	ePZ	09 49 22	9	ePZ	10 59 22
1	iPZ	10 27 57 c		iSZ	55
1	ePZ	12 02 05	9	iPZ	16 29 52 c
1	ePZ	12 29 38		iSZ	30 24
	iSZ	53	11	ePZ	03 28 04
2	ePZ	09 19 38	11	ePZ	06 47 30
2	iPZ	19 07 21 d		iSZ	48 07
	iSZ	56	11	iPZ	09 52 26 d
2	ePZ	19 52 58		iSZ	53
3	ePZ	20 57 40	11	iPZ	11 03 53 d
	eSZ	58 08		iSZ	04 30
4	ePN	13 18 15	12	ePN	02 07 57
	iSN	41		eSN	08 51
4	ePN	15 57 13	12	ePZ	16 34 26
	ePZ	05 33 01		eSZ	35 01
5	iSZ	31	12	iPZ	16 37 55 d
	iPZ	15 46 36		iSZ	38 25
5			13	ePZ	07 55 27

Minor Shocks

Date	Phase	h m s	Date	Phase	h m s
13	iPZ	15 39 59 c		eSZ	37 40
	iSZ	40 22	17	iPZ	16 52 51 c
13	iPZ	17 33 06 d		iSZ	53 34
	iSZ	32	17	iPZ	17 52 46 d
13	iPZ	19 51 32 c		iSZ	53 24
	eSZ	42	18	iPZ	10 25 20 d
13	ePZ	20 30 43		iSZ	47
	iSZ	31 14	18	ePZ	12 34 29
14	ePZ	07 28 49		eSZ	58
14	ePZ	11 13 46	19	ePZ	08 36 52
	iSZ	14 13	19	ePZ	14 10 27
14	iPZ	14 00 20 c		eSZ	11 09
	iSZ	50	19	iPZ	16 12 39 d
14	ePZ	17 32 43		iSZ	13 07
14	ePZ	18 08 51	19	ePZ	17 19 12
14	iPZ	20 55 58 d		iSZ	43
	iSZ	56 29	19	ePZ	20 11 04
15	ePZ	10 07 53		iSZ	51
	iSZ	08 24	19	ePZ	22 06 05
15	iPZ	11 57 58 d		iSZ	37
	iSZ	58 40	20	ePZ	03 35 51
16	iPZ	08 59 51 c		eSN	36 20
16	ePZ	11 42 03	20	ePZ	11 06 42
	iSZ	29		eSZ	07 21
16	iPZ	12 36 05 c	20	iPZ	13 33 05 d
	iSZ	35		iSZ	43
17	ePZ	01 04 51	20	ePZ	20 32 21
	eSZ	05 24		iSZ	33 29
17	ePZ	02 16 51	21	ePZ	12 27 47
17	ePZ	03 36 45		eSZ	28 15

Minor Shocks

Date	Phase	h m s	Date	Phase	h m s
21	iPZ	14 02 14 c		eSZ	28 32
	iSZ	40	25	iPZ	20 31 16 d
21	ePZ	18 47 27	26	iPZ	14 32 46 d
21	iPZ	19 31 43 d		iSZ	33 16
	iSZ	32 25	26	ePZ	18 32 00
21	ePZ	19 50 37		iSZ	31
	eSZ	51 25	27	ePZ	10 12 39
22	ePZ	00 18 31	27	ePZ	14 39 48
22	iPZ	12 22 00 c	28	ePZ	11 46 31
	iSZ	32		iSZ	47 07
22	iPZ	12 26 41 d	29	iPZ	00 50 09 c
23	iPZ	20 27 51 d	29	iPZ	05 30 00 c
	iSZ	28 25		iSZ	34
23	ePZ	21 18 53	30	iPZ	14 14 52 c
	eSZ	19 44		iSZ	15 02
24	ePZ	05 54 29	30	ePZ	20 17 46
	iSZ	55		iSZ	18 21
24	ePZ	08 16 14	30	ePZ	20 57 16
	iSZ	17 00		iSZ	54
24	iPZ	10 57 40			
	iSZ	58 14			
24	iPZ	11 31 45	5	eXZ	17 59 14
	iSZ	32 31	5	ePZ	18 15 59
24	iPZ	13 38 13	6	ePZ	03 42 06
	iSZ	42	7	eXZ	18 27 45
24	ePZ	19 55 39	7	eXZ	21 46 37
	iSZ	56 36	7	eXZ	02 59 28
24	iPZ	21 00 18	8	eXZ	23 07 16
	iSZ	45	9	eXZ	13 42 56 d
25	ePZ	12 27 59	10	ePZ	

Lahore



Date	Phase	h	m	s	Date	Phase	h	m	s
	eSZ		43	56	19	ePZ	03	57	23
11	eXZ	07	40	24		eSE			27
	eSZ		41	29	23	ePZ	09	49	44
11	eXZ	16	22	15	23	ePZ	19	39	48
13	eXZ	17	33	49	26	ePZ	01	54	50
13	ePZ	20	32	27		Chittagong			
18	ePZ	21	00	56	1	eXN	21	14	17
19	eXZ	08	36	14	2	eXZ	17	50	17
21	ePZ	10	31	45	2	eXZ	19	52	06
	eSZ		32	42	3	eXZ	09	22	30
21	eXZ	19	32	49	3	eXZ	22	00	05
21	eXZ	19	51	34	4	eXZ	15	55	26
25	eXZ	11	18	47	5	eXZ	18	01	38
29	eXZ	13	54	50	9	eXZ	08	16	26
29	eXZ	18	27	42	11	eXN	04	03	19
29	eXZ	20	51	21	14	ePZ	00	19	13
29	eXZ	21	57	05	14	eXN	04	09	16
	Karachi				15	ePZ	22	07	55
1	eXE	06	00	26	16	eXZ	17	00	32
6	eXZ	09	18	36	17	ePZ	21	22	15
7	eXZ	08	07	15	19	eXZ	00	06	02
11	ePZ	01	19	27	20	eXN	07	27	12
11	eXZ	07	44	08	23	eXZ	15	55	33
12	ePZ	12	43	54	23	eXN	19	38	57
13	ePZ	07	56	08	23	ePZ	20	08	54
13	ePZ	10	15	17	24	eXZ	04	04	51
14	ePZ	08	46	58	25	eXZ	20	38	53
	eSE		47	32	26	eXZ	04	51	14
15	ePZ	05	34	25±	27	eXZ	18	31	25
	eSE		55		30	eXZ	21	40	22