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Old seismologic reports

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SEISMIC OBSERVATIONS
AT FABRA OBSERVATORY IN 1993

by M^a TERESA SUSAGNA VIDAL

The Observatori has now the following seismographs:

Station FONT (Coordinates 41° 45,7'N, 2° 26,0'E).

— Three short period «Teledyne Geotech» seismographs, vertical and horizontal components, with ink recording.

Station FBR (Coordinates 41° 25,0'N, 2° 07,5'E).

— Three short period «Mark-Lennartz» seismographs, vertical and horizontal components, with ink recording.

— Two long period «Mainka» seismographs, horizontal components, with mechanic recording.

— One short period «Vicentini» seismograph, vertical component, with mechanic recording.

We symbolize by ZT Teledyne Geotech vertical component, by NT and ET the Teledyne Geotech horizontal components, by ZL Mark-Lennartz vertical component, by NL and EL the Mark Lennartz horizontal components, by NM and EM the Mainka horizontal components and by ZV the Vicentini vertical component.

For the most outstanding earthquakes, we describe their epicentral characteristics, calculated by the Seismic Section of this Observatory, together with «Servei Geològic de Catalunya» (SGC) or provided by the United States Geological Survey (GS), by the «Centre Seismologique Europeo-Mediterranean» (CSEM), by the «Instituto Geográfico Nacional» (IGN) or by the «Laboratoire de Détection et de Déophysique» (LDG).

The average instrumental constants have been:

1) Electromagnetic seismograph (electronic and ink recording):

Type	Component	Mass (kg)	Period(s) To	Amplification m/ms^{-1}	Damping
Teledyne	Z (ZT)	5	1	7200	0,7
Geotech	N-S (NT)	5	1	7200	0,7
	E-W (ET)	5	1	7200	0,7
Mark-	Z (ZL)	1	1	510	0,7
Lennartz	N-S (NL)	1	1	510	0,7
	E-W (EL)	1	1	510	0,7

2) Mechanical seismographs (recording on smoked paper):

Type	Component	Mass (kg)	Period(s) To	Damping	Friction	Amplification
Mainka	N-S (NM)	141	6,7	2	0,044	43,0
	E-W (EM)	144	6,4	2	0,043	59,2
Vicentini	Z (ZV)	56	0,9	—	—	125



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1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
1 Jan	ZT	Pn	21	00	47,3		Ep.: 43,5 N; 4,6 E; H = 21:00:11,8 h = 16 Km; H = 3,6 (LDG) Artes, France
4	ZT	Pg	19	34	09,5		Ep.: Local
	NT	Sg	19	34	12,5		
	ET	Sg	19	34	12,5		
5	ZT	Pg	09	38	43,9		Ep.: See pag. 104
	ZT	Sg	09	39	00,0		
6	ZT	Pn	04	11	03,1		Ep.: 43,2 N; 0,6 W; H = 04:10:31,6 h = 18 Km; M = 3,0 (LDG) Oloron-Ste. Marie, France
	NT	Sn	04	11	52,3		
6	ZT	Pg	19	25	38,3		Ep.: See pag. 104
	ZT	Sg	19	25	50,8		
6	ZT	P	22	59			Ep.: 29,0 N; 52,1 E; H = 22:51:44,6 h = 24 km; H = 5,3 (GS) Southern Iran
7	ZT	P	07	50		5.020	Ep.: 0,1 N; 17,0 W; H = 07:42 h = 10 km; M = 5,7 (GS) North of Ascencion
7	ZT	Pg	15	57	43,3		Ep.: See pag. 104
	NT	Sg	15	57	57,7		
	EY	Sg	15	57	57,7		
8	ZT	Pg	04	03	02,5		Ep.: Local
9	ZT	Pg	13	54	56,3		Ep. See pag. 104
	NT	Sg	13	55	10,7		
	ET	Sg	13	55	10,7		
13	ZT	p	19	10		16.610	Ep.: 50,8 S; 139,5 E; H = 18:50:42,5 h = 10 km; M = 6,3 (GS) South of Australia
14	ZT	Pg	00	14	37,1		Ep.: Local
15	ZT	P	11	18		9.790	Ep.: 43,3 N; 143,7 E; H = 11:06:05,9 h = 102 km; M = 6,9 (GS) Hokkaido, Japan region
	ZL	P	11	18			
17	ZT	Pg	15	56	46,0		Ep.: See pag. 104
	ZT	Sg	15	56	49,5		
19	ZT	Pg	08	02	44,5		Ep.: Local
	ZT	Sg	08	02	47,9		



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
19 Jan	ZT	Pg	14	08	54,3		Ep.: See pag. 104
	ZT	Sg	14	09	06,0		
19	ZT	P	14	51		9.785	Ep.: 38,4 N; 133,5 E; H = 14:39:26,1 h = 448 Km; M = 6,0 (GS) See of Japan
20	ZT	P	02	53		10.200	Ep.: 3,1 N; 97,6 E; H = 20:30:54,7 h = 68 km; M = 6,2 (GS) Northern Sumatera, Indonesia
20	ZT	P	14	54			Ep.: 38,5 N; 29,3 N; H = 14:49:12,3 h = 10 km; M = 5,0 (GS) Azores Islands
20	ZT	P	17	30			Ep.: 7,2 S; 128,6 E; H = 17:31:15,5 h = 33 km; M = 62 (GS) Banda Sea
23	ZT	Pn	12	38	10,5		Ep.: 40,2 N; 4,1 E; H = 12:37:39,8 h = -; M = 2,7 (LDG) Ne Palma
	NT	Sn	12	38	34,9		
26	ZT	Pn	12	57	59,3		Ep.: 43,1 N; 2,3 W; H = 12:57:04,6 h = 23 km; M = 3,3 (IGN) Zumarraga Spain
	NT	Sn	12	58	53,7		
27	ZT	Pg	23	09	20,0		Ep.: See pag. 104
	NT	Sg	23	09	34,7		
	ET	Sg	23	09	34,7		
30	ZT	Pg	17	15	-		Ep.: Local.
7 Feb	ZT	P	13	40		10.060	Ep.: 37,6 N; 137,2 E; H = 13:27:42,0 h = 11 km; M = 6,3 (GS) Near West coast of Honshu
9	ZT	Pg	08	46	38,9		Ep.: See pag. 104
	NT	Sg	08	46	42,9		
	ET	Sg	08	46	42,9		
	ZL	Pg	08	46	35,7		
	ZL	Sg	08	46	37,7		
12	ZT	Pg	00	29	04,7		Ep.: Local.
	NT	Sg	00	29	08,1		
	CT	Sg	00	29	08,1		
12	ZT	Pn	15	40	42,3		Ep.: 36,7 N; 2,6 E; H = 15:39:28,9 h = 19 km; M = 3,3 (IGN) NW Cherchell Algeria
12	ZT	Pg	19	16	33,0		Ep.: Local.
	NT	Sg	19	16	34,5		



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
12 Feb	ZT	Pn	19	47	36,3		Ep.: 41,7 N; 5,6 E; H = 19:47:03,9 h = -; M = 2,9 (LDG) S Toulon
	NT	Sg	19	48	01,0		
15	ZT	P	09	14			Ep.: 12,55; 166,4 E; H = 08:55:26,3 h = 129 km; M = 5,5 (GS) Santa Cruz islands
16	ZT	P	03	16	34,3	1.100	Ep.: 36,6 N; 8,5 W; H = 03:11:13,4 h = 66 km; M = 4,4 (IGN) West of Gibraltar
16	ZT	Pg	03	52	59,7		Ep.: See pag. 104
	ZT	Sg	03	53	20,0		
16	ZT	Pg	22	23	20,9		Ep.: See pag. 105
19	ZT	Pn	00	58	41,3		Ep.: 43,1 N; 0,3 W; H = 00:58:00,0 h = 2 km; M = 2,8 (LDG) NW Angeles-Gazost
	ZT	Sn	00	59	16,0		
24	ZT	Pn	05	57	21,5		Ep.: See pag. 105
	ZT	Sn	05	57	55,9		
28	ZT	Pg	18	42	54,3		Ep.: Local.
1 Mar	ZT	Pg	01	18	58,0		Ep. Local
	NT	Sg	01	19	01,8		
2	ZT	Pn	23	49	31,3		Ep.: See Pag. 105
	NT	Sn	23	50	06,0		
5	ZT	Pn	09	50	21,7		Ep.: 40,2 N; 6,2 E; H = 09:39:37,1 h = 10 km; H = 3,9 (LDG) W Sassari
6	ZT	P	03	25		16.140	Ep.: 11,0 S; 164,2 E; H = 03:05:49,8 h = 20 km; M = 6,1 (GS) Santa Cruz islands region
6	ZT	P	16	46			Ep.: 11,1 S; 163,4 E; H = 16:26:56,9 h = 25 km; H = 5,7 (GS) Solomon islands
6	ZT	Pn	18	44	23,7		Ep.: See pag. 105
	NT	Sn	18	44	53,9		
7	ZT	Pn	03	18	44,3		Ep.: 35,9 N; 1,9 E; H = 03:17:17,1 h = 5 km; M = 3,5 (IGN) NW Teniet-el-Haad, Algeria
7	ZT	Pn	03	32	56,7		Ep.: 36,1 N; 2,0 E; H = 03:31:35,0 h = -; M = 3,9 (LDG)



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
10 Mar	ZT	P	22	08			Ep.: 48,4 N; 153,0 E; H = 21:56:27,8 h = 141 km; M = 5,5 (GS) Kuril islands
13	ZT	Pn	11	37	53,7		Ep.: 47,4 N; 2,3 W; H = 11:36:17,3 h = 7 km; M = 4,6 (LDG) NW Saint-Nazaire, France
14	ZT	Pg	23	33	15,3		Ep.: See pag. 105
	NT	Sg	23	33	31,5		
	ET	Sg	23	33	81,5		
15	ZT	Pn	23	45	36,7		Ep.: 44,3 N; 7,4 W; H = 23:43:29,9 h = 3 km; M = 4,0 (LDG) Gap, France
16	ET	P	23	08			Ep.: 11,6 N; 42,0 E; H = 22:59:45,8 h = 16 km; M = 5,6 (GS) Ethiopia
18	ZT	P	15	50		1.715	Ep.: 38,3 N; 22,2 E; H = 15:47:00,4 h = 59 km; M = 5,7 (GS) Greece
20	ZT	P	15	02			Ep.: 29,1 N; 87,3 E; H = 14:51:59,7 h = 12 km; M = 5,8 (GS) Xizang
21	ZT	P	05	23		17.360	Ep.: 18,1 S; 178,5 W; H = 05:04:59,1 h = 589 km; M = 6,1 (GS) Fiji islands region
22	ZT	P	11	09			Ep.: 34,7 N; 34,4 E; H = 11:03:43,5 h = 32 km; M = 5,4 (GS) Cyprus region
29	ZT	Pg	10	39	16,0		Ep.: See pag. 105
	ZT	Sg	10	39	22,7		
	ZL	Sg	10	39	10,0		
30	ZT	Pn	07	01	39,0		Ep.: 42,6 N; 1,7 W; H = 07:00:44,6 h = -; M = 3,1 (LDG) Luz, France
31	ZT	Pg	12	47	16,9		Ep.: See pag. 105
	ZL	Pg	12	47	12,2		
1 Abr.	ZT	Pg	09	46			Ep.: 43,4 N; 5,5 E; H = 09:45:21,3 h = 9 km; M = - (GS) Near South coast of France
9	ZT	Pg	18	36	16,7		Ep. Local
	NT	Sg	18	36	23,3		
	ET	Sg	18	36	23,1		



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
10 Abr	ZT	Pn	02	07	55,1		Ep.: 43,2 N; 0,7 W; H = 02:07:11,1 h = 13 km; M = 2,8 (LDG) Pau, France
	ZT	Pg	02	08	00,0		
	NT	Sn	02	08	34,3		
10	ZT	Pn	18	47	49,0		Ep.: 43,0 N; 1,9 W; H = 18:46:56,0 h = 2; M = 3,2 (IGN) Navarra, Spain
13	ZT	Pg	16	21	00,0		Ep.: See pag. 106
	NT	Sg	16	21	22,3		
	ET	Sg	16	21	22,3		
15	ZT	P	10	42			Ep.: 16,4 S; 14,3 W; H = 10:32:31, 2 h = 10 km; M = 5,6 (GS) Southern mid-Atlantic ridge
2 May	ZT	P	02	19			Ep.: 17,4 S; 14,5 W; N = 02:09:25,8 h = 10 km; M = 5,6 (GS) Southern Mid-Atlantic ridge
6	ZT	P	13	14			Ep.: 8,5 S; 71,5 W; H = 13:03:18,1 h = 573 km; M = 5,8 (GS) western Brazil
7	ZT	P	15	12			Ep.: 11,7 S; 14,3 W; H = 15:02:21,6 h = 10 km; M = 4,9 (GS) Ascension island region
10	ZT	Pn	13	53	41,3		Ep.: 44,1 N; 7,0 W; H = 23:51:55,7 h = 9 km; M = 3,5 (IGN) Cantabrico
11	ZT	Pg	09	50	29,0		Ep.: Local.
11	ZT	P	18	45		12.150	Ep.: 7,2 N; 126,6 E; H = 18:26:51,3 h = 59 km; M = 6,1 (GS) Mindanao, Philippine islands
12	ZT	Pg	16	10	32,3		Ep.: Local.
12	ZT	Pg	20	17	16,3		Ep.: Local.
13	ZT	P	10	36		8.150	Ep.: 62,0 N; 147,0 W; H = 10:24:40,4 h = 59 km; M = 5,3 (GS) Southern Alaska
13	ZT	P	12	12			Ep.: 55,2 N; 160,5 W; H = 11:59:49,2 h = 32 km; M = 6,4 (GS) Alaska peninsula
13	ZT	P	23	53			Ep.: 55,0 N; 160,2 W; H = 23:41:38,4 h = 33 km; M = 5,3 (GS) Alaska peninsula
14	ZT	Pg	11	49	49,5		Ep.: See pag. 106
	NT	Sg	11	49	53,1		



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
14 May	ZT	Pg	12	01	18,8		Ep.: Local.
14	ZT	Pg	11	54	11,6		Ep.: Local.
15	ZT	P	03	22		9.640	Ep.: 16,7 N; 98,4 W; H = 03:12:32,7 h = 21 km; M = 6,1 (GS) Near coast of Guerrero, México
15	ZT	P	22	05			Ep.: 51,4 N; 178,7 W; H = 21:52:25,3 h = 32 km; M = 6,2 (GS) Andranof islands
16	ZT	P	22	04		17.040	Ep.: 15,4 S; 173,3 W; H = 21:44:48,9 h = 21 km; M = 6,1 (GS) Tonga islands
17	ZT	Pg	02	29	30,0		Ep.: See pag. 106
	ZT	Sg	02	29	41,6		
17	ZT	P	06	18			Ep.: 55,0 N; 160,0 W; H = 06:06:12,9 h = 33 km; M = 5,5 (GS) Alaska Peninsula
17	ZT	P	23	33		9.340	Ep.: 37,2 N; 117,8 W; H = 23:20:49,2 h = 7 km; M = 6,0 (GS) California - Nevada border region
18	ZT	P	10	32		10.790	Ep.: 19,9 N; 122,5 E; H = 10:19:33,7 h = 169 km; M = 6,4 (GS) Philippine islands region
20	ZT	Pg	00	49	31,9		Ep.: See pag. 106
	ZT	Sg	00	49	40,8		
20	ZT	Pn	23	50	10,6		Ep.: 43,1 N; 0,7 W; H = 23:49:27,1 H = 14 KM; M = 3,1 (LDG) Oloron-ste-Marie, France
22	ZT	Pg	22	36	41,6		Ep.: Local.
23	ZT	P	07	49			Ep.: 16,2 S; 167,9 E; H = 06:59:54,1 h = 178 km; M = 5,4 (GS) Vanuatu islands
23	ZT	P	07	42	45,0	830	Ep.: 35,2 N; 2,5 W; H = 07:40:56,6 h = 14 km; M = 4,4 (IGN) strait of Gibraltar
25	ZT	P	00	03		10.060	Ep.: 22,7 S; 66,5 W; H = 23:51:28,2 h = 221 km; M = 6,6 (GS) Jujuy province Argentina
25	ZT	P	02	23			Ep.: 13,5 S; 167,1 E; H = 02:13:45,8 h = 190 km; M = 5,6 (GS) Vanuatu islands
25	ZT	Pn	07	08	05,3		Ep.: 39,4 N; 0,8 W; H = 07:07:13,1 h = 1 km; M = 3,5 (IGN) Buñol, Spain
25	ZT	P	23	29			Ep.: 55,0 N; 160,5 W; H = 23:16:43,4 h = 37 km; M = 5,8 (GS) Alaska peninsula



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
27 May	ZT	Pn	06	12	46,1		Ep.: See pag. 107
	ZT	Sn	06	13	15,2		
27	ZT	Pn	20	14	46,4		Ep.: See pag. 107
	ZT	Sn	20	15	16,0		
29	ZT	P	06	56			Ep.: 19,1 N; 26,5 W; H = 06:50:13,4 h = 12 km; M = 5,9 (GS) North Atlantic ocean
30	ZT	P	14	31			Ep.: 3,7 S; 142,7 E; H = 12:12:20,0 h = 6 km; M = 5,9 (GS) Nearth coast of New Guinea
30	ZT	P	17	27		12.670	Ep.: 1,5 N; 127,2 E; H = 17:08:53,9 h = 81 km; M = 6.,0 (GS) Halmahera
1 Jun	ZT	P	09	50			Ep.: 34,3 N; 26,2 E; H = 09:45:29,5 h = 47 km; M = 4,9 (GS) Crete
1	ZT	P	19	53		1.220	Ep.: 46,2 N; 16,5 E; H = 19:51:10,9 h = 30 km; M = 4,9 (GS) Northwestern Balkan region
2	ZT	Pg	07	26	45,7		Ep.: Local.
	ZT	Sg	07	26	48,7		
3	ZT	Pg	09	44	29,3		Ep.: Local.
	NT	Sg	09	44	33,3		
3	ZT	Pg	09	46	02,3		Ep.: Local.
	NT	Sg	09	46	06,7		
3	ZT	P	09	58			Ep.: 14,8 S; 167,3 E; H = 09:38:25,6 h = 152 km; M = 5,9 (GS) Vanuatu islans
3	ZT	Pg	11	35	04,9		Ep.: See pag. 107
4	ZT	P	01	38			Ep.: 19,0 N; 26,4 W; H = 01:32:11,1 h = 10 km; M = 5,2 (GS) North Atlantic ocean
5	ZT	P	19	18			Ep.: 43,1 N; 2,7 E; H = 19:16:16,8 h = 8 km; M = 4,9 (GS) <i>Central Italy</i>
6	ZT	Pn	01	51	46,8		Ep.: See pag. 107
	ZT	Sn	01	52	03,3		
7	ZT	P	07	20			Ep.: 43,5 N; 0,6 W; H = 07:19:31,5 h = 9 km; M = 3,6 (LDG) NW Pau, France



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
8 Jun	ZT	P	13	16		9.400	Ep.: 51,2 N; 157,8 E; H = 13:03:36,4 h = 71 km; M = 6,4 (GS) Near coast of Kamcratka
8	ZT	P	23	31		10.950	Ep.: 31,6 S; 69,2 W; H = 23:17:41,4 h = 113 km; M = 6,5 (GS) San Juan province
10	ZT	Pn	11	33	13,7		Ep.: 36,5 N; 3,8 E; H = 11:31:56,6 h = 22 km; M = 3,0 (IGN) E Theina, Algeria
10	ZT	Pg	12	38	28,1		Ep.: Local.
	ZT	Sg	12	38	31,7		
14	ZT	Pg	20	37	35,5		Ep.: Local.
	ZT	Sg	20	37	38,5		
15	ZT	Pg	02	21	50,8		Ep.: See pag. 107
	ZT	Sg	02	21	57,3		
15	ZT	Pg	06	22	32,8		Ep.: See pag. 107
	ZT	Sg	06	22	42,7		
15	ZT	Pg	12	26	28,4		Ep.: See pag. 107
	ZT	Sg	12	26	55,3		
17	ZT	P	20	54			Ep.: 36,2 N; 71,2 E; H = 20:44:52,9 h = 104 km; M = 5,2 (GS) Afghanistan Tajikistan border region
18	ZT	Pg	14	44	06,8		Ep.: Local.
	NT	Sg	14	44	10,5		
18	ZT	P	18	17			Ep.: 28,7 S; 176,9 W; H = 17:57:46,6 h = 11 km; M = 5,9 (GS) Kermader islands region
18	ZT	P	20	07			Ep.: 36,5 N; 70,3 E; H = 19:59:00,7 h = 210 km; M = 5,1 (GS) Hindu Kush region
20	ZT	P	17	45			Ep.: 6,9 S; 155,8 E; H = 17:26:30,6 h = 38 km; M = 5,5 (GS) Solomon islands
25	ZT	Pg	12	30	05,9		Ep.: See pag. 107
28	ZT	Pn	03	27	06,7		Ep.: 42,9 N; 4,9 W; H = 03:25:41,3 h = 4 km; M = 3,2 (IGN) Prioro Spain
28	ZT	Pn	09	40	58,7		Ep.: 43,9 N; 6,9 W; H = 09:39:16,0 h = 23 km; M = 3,3 (IGN) Cantabrico



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
28 Jun	ZT	Pg	18	09	00,3		Ep.: Local.
29	ZT	P	04	41			Ep.: 35,1 N; 27,1 E; H = 04:37:10,8 h = 24 km; M = 4,9 (GS) Dobecanese islands
30	ZT	Pg	22	33	40,5		Ep.: See pag. 107
	ZT	Sg	22	33	44,3		
12 Jul	ZL	P	13	30			Ep.: 42,8 N; 189,2 E; H = 13:17:11,9 h = 17 K h = 17 km; M = 6,6 (GS) Ho Kkaido, Japan
16	ZT	Pg	01	43	01,7		Ep.: See pag. 108
	NT	Sg	01	43	06,7		
16	ZT	Pg	09	35	04,0		Ep.: Local.
	NT	Sg	09	35	12,7		
17	ZT	Pg	05	00	36,5		Ep.: Local.
	NT	Sg	05	00	39,2		
17	ZT	Pn	05	47	19,7		Ep.: 04,1 N; 84 E; H = 05:46:05,8 h = 10 km; M = 3,9 (LDG) S. Savone
17	ZT	Pn	06	27	51,5		Ep.: 44,1 N; 8,4 E; H = 06:26:36,9 h = 2 km; M = 3,8 (LDG) S. Savone
17	ZT	Pn	10	36	14,7		Ep.: 44,1 N; 8,4 E; H = 10:35:01,0 h = 6 km; M = 4,1 (LDG) S. Savone
19	ZL	Pg	02	43	53,5		Ep.: Local
	ZL	Sg	02	43	55,0		
	ZT	Pg	02	43	58,7		
	NT	Sg	02	44	04,0		
21	ZT	Pn	04	25	37,6		Ep.: See pag. 108
	NT	Sn	04	25	55,7		
	ZT	Sn	04	25	55,7		
	ZL	Pn	04	25	40,2		
	ZL	Sn	04	25	56,5		
21	ZT	P	00	38			Ep.: 0,1 S; 16,7 W; H = 00:33:16,9 h = 10 km; M = 5,5 (GS) North of Ascension region
22	ZT	Pg	03	53	01,3		Ep.: See pag. 108
	ZT	Sg	03	53	13,3		



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
22 Jul	ZT	P	05	08		8.170	Ep.: 6,5 N; 71,2 W; H = 04:57:07,0 h = 20 km; M = 6,1 (GS) Northern Colombia
23	ZT	P	11	58			Ep.: 36,4 N; 70,4 E; H = 11:50:06,7 h = 272 km; M = 5,2 (GS) Hindu Kush region
24	ZT	Pn	00	14	01,0		Ep.: See pag. 108
	ZT	Pg	00	14	03,7		
	NT	Sn	00	14	28,6		
	ZT	Sg	00	14	30,0		
24	ZT	Pg	17	25	06,5		Ep.: Local.
	NT	Sg	17	25	08,7		
	ZT	Sg	17	25	08,7		
24	ZT	P	20	44			Ep.: 13,0 S; 167,1 E; H = 20:24:50,1 h = 194 km; M = 5,8 (GS) Vanuatu islands
26	ZT	Pn	04	58	55,3		Ep.: 44,2 N; 7,4 E; H = 04:57:49,1 h = 2 km; M = 3,3 (LDG) SW Curreo
26	ZT	Pg	16	28	34,1		Ep.: Local.
	NT	Sg	16	28	38,1		
	ZT	Sg	16	28	38,0		
28	ZT	P	07	25			Ep.: 10,9 S; 162,3 E; H = 07:05:48,3 h = 33 km; M = 5,3 (GS) Solomon islands
28	ZT	Pg	11	08	48,7		Ep.: Local.
	ZT	Sg	11	08	53,7		
28	ZT	Pg	16	32	55,0		Ep.: Local.
	ZT	Sg	16	33	00,3		
28	ZT	Pg	20	24	40,5		Ep.: See pag. 108
	ZT	Sn	20	24	56,7		
29	ZT	Pg	02	00	19,0		Ep.: Local.
	NT	Sg	02	00	24,1		
	ZT	Sg	02	00	24,1		
29	Zt	Pg	23	25	41,0		Ep.: Local.
	ZT	Sg	23	25	44,0		
30	ZT	P	13	55			Ep.: 13,6 S; 167,2 E; H = 13:33:49,7 h = 316 km; M = 4,6 (GS) Vanuatu islands



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
30 Jul	ZT	Pg	21	06	49,3		Ep.: Local.
	ZT	Sg	21	06	52,1		
31	ZT	Pg	13	33	54,4		Ep.: Local.
	ZT	Sg	13	33	59,3		
1 Ago	ZL	Pg	04	36	13,5		Ep.: See pag. 108
	ZT	Pn	04	36	19,7		
	NT	Sn	04	36	37,0		
	ET	Sn	04	36	37,0		
2	ZT	Pg	21	55	05,9		Ep.: See pag. 108
	NT	Sg	21	55	11,0		
	ET	Sg	21	55	11,0		
3	ZT	P	07	32			Ep.: 11,2 N; 130,8 W; H = 07:19:59,0 h = 10 km; M = 5,5 (GS) Queen Charlotte Islands region
3	ZT	P	16	39			Ep.: 28,8 N; 34,7 E; H = 16:33:20,7 h = 10 km; M = 3,6 (GS) Egypt
3	ZT	Pg	18	54	10,7		Ep.: Local.
	NT	Sg	18	54	13,7		
	ET	Sg	18	54	13,7		
4	NT	Pg	12	11	27,0		Ep.: Local.
	ET	Sg	12	11	81,7		
5	ZT	Pg	10	03	56,0		Ep.: Local.
	NT	Sg	10	03	59,3		
	ET	Sg	10	03	59,3		
6	ZT	Pn	07	53	23,7		Ep.: 43,3 N; 10,6 E; H = 07:51:53,2 h = -; M = 3,8 (LDG) SW Florence
7	ZT	P	00	13		10.430	Ep.: 56,6 N; 125,6 E; H = 00:00:37,0 h = 155 km; M = 6,0 (GS) Northeast of Taiwan
7	ZT	P	18	12			Ep.: 23,9 S; 180,0 E; H = 17:53:24,2 h = 523 km; M = 6,0 (GS) South of Fiji island
7	ZT	P	19	55			Ep.: 42,0 N; 139,8 E; H = 19:42:41,9 h = 14 km; M = 6,2 (GS) Hokkaido, Japan region



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
8 Ago	ZT	P	08	53		12.800	Ep.: 13,0 N; 144,8 E; H = 08:34:24,9 h = 59 km; M = 7,1 (GS) South of Mariana islands
9	ZT ZL	P P	11 11	47 47			Ep.: 36,4 N; 70,7 E; H = 11:38:30,5 h = 204 km; M = 5,8 (GS) Hindu Kush region
9	ZT	P	12	51		5.780	Ep.: 36,4 N; 70,9 E; H = 12:42:48,1 h = 215 km; M = 6,2 (GS) Hindu Kush region
9	ZT NT ET	Pg Sg Sg	23 23 23	00 00 00	26,9 39,6 39,6		Ep.: See pag. 108
10	ZT	P	01	12			Ep.: 45,3 S; 166,9; H = 00:51:53,2 h = 58 km; M = 6,2 (GS) off W coast of S. Island
10	ZT	P	10	08		19.430	Ep.: 38,5 S; 177, 6 E; H = 09:46:35,3 h = 14 km; M = 6,0 (GS) New Zealand
10	ZT	Pn	10	41			Ep. Regional
10	ZT	P	19	44			Ep.: 83,1 N; 27,5 W; H = 19:36:20,7 h = 10 km; M = 5,4 (GS) Near North coast of Greenland
14	ZT NT ZT ZL	Pg Sg Pg Sg	20 20 20 20	18 18 18 19	48,3 53,7 53,5 04,0		Ep. See pag. 108
15	ZL	Pn	22	33		11,0	Ep.: 40,3 N; 1,1 W; H = 22:32:24,5 h = 34 km; M = 3,4 (IGN) Teruel, Spain
8 Oct	ZT NT ET	Pg Sg Sg	19 19 19	05 05 05	10,4 13,6 13,5		Ep. Local.
8	ZT NT ZL ZL	Pg Sg Pg Sg	22 22 22 22	09 09 09 10	48,5 57,1 54,3 07,5		Ep.: See pag. 110
8	ZT ZT	Pg Sg	22 22	33 33	26,3 35,0		Ep.: See pag. 110



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
8 Oct	ZT	Pg	23	21	51,6		Ep.: See pag. 110
	ZT	Sg	23	22	00,7		
8	ZT	Pg	23	24	53,0		Ep.: See pag. 110
	ZT	Sg	23	25	01,3		
8	ZT	Pg	23	52	55,9		Ep.: See pag. 110
	ZT	Sg	23	53	05,3		
9	ZT	Pg	00	05	49,0		Ep.: Local
9	ZT	Pg	12	28	23,5		Ep.: See pag. 110
	ZT	Sg	12	28	32,7		
9	ZT	Pg	14	56	45,7		Ep.: Local
10	ZT	Pg	05	49	40,0		Ep.: See pag. 110
	ZT	Sg	05	49	48,3		
10	ZT	Pn	11	32	27,1		Ep.: See pag. 110
	ZT	Sn	11	32	41,0		
11	ZT	P	16	07		10.620	Ep.: 32,0 N; 137,8 E; H = 15:54:21,2 h = 351 km; M = 6,4 (GS) South of Honshu, Japan
11	ZT	Pg	22	19	03,3		Ep.: See pag. 110
	ZL	Pg	22	19	08,9		
	ZL	Sg	22	19	15,1		
13	ZT	Pg	01	26	33,7		Ep.: See pag. 110
	ZL	Sg	01	26	53,2		
13	ZT	Pg	01	38	18,3		Ep.: See pag. 110
13	ZT	P	02	25		14.640	Ep.: 5,9 S; 146,0 E; H = 02:06:00,3 h = 25 km; M = 6,4 (GS) Eastern New Guinea region
13	ZT	Pg	03	53	19,2		Ep.: See pag. 110
	ZT	Sg	03	53	27,7		
13	ZT	Pg	15	49	13,7		Ep.: See pag. 110
	ZL	Pg	15	49	20,0		
	ZL	Sg	15	49	33,0		
15	ZT	Pn	08	39	09,2		Ep.: 36,8 N; 2,0 E; H = 08:37:57,3 h = 33 km; M = 44 (IGN) NW ChercHELL, Algeria
	ZN	Sn	08	40	01,3		



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
17 Oct	ZT	Pg	05	24	49,1		Ep.: See pag. 110
18	ZT	Pn	00	06	35,7		Ep.: See pag. 110
	ZT	Sn	00	06	50,8		
18	ZT	Pn	13	59	19,5		Ep.: See pag. 110
	ZT	Sn	13	59	34,7		
19	ZT	P	04	14			Ep.: 22,4 S; 66,0 W; H = 04:02:21,9 h = 272 km; M = 5,9 (GS) Jujuy province Argentina
23	ZT	Pg	20	15	09,3		Ep.: Local.
	NT	Pg	20	15	13,0		
24	ZT	P	08	15		8.660	Ep.: 16,7 N; 98,7 W; H = 07:52:15,6 h = 21 km; M = 6,3 (GS) Near coast of Guerrero, Mexico
24	ZT	Pg	18	20	30,5		Ep.: See pag. 111
	ZT	Sg	18	20	57,7		
25	ZT	Pn	00	06	56,7		Ep.: 40,6; 1,6 W; H = 00:16:05,8 h = 2 km; M = 3,2 (IGN) Orihuela de Tremedal, Spain
26	ZT	Pg	01	36	45,2		Ep.: Local.
28	ZT	Pg	13	58	42,1		Ep.: Local.
29	ZT	Pg	21	12	36,3		Ep.: Local.
	NT	Sg	21	12	49,3		
1 Nov	ZT	P	17	38			Ep.: 10,1 S; 161,2 E; H = 17:19:25,2 h = 118 km; M = 5,8 (GS) Solomon islands
3	ZT	Pg	13	55	40,5		Ep.: See pag. 111
	ZT	Sg	13	35	58,2		
5	ZT	Pg	08	39	36,7		Ep.: See pag. 111
9	ZT	Pn	22	02	30,0		Ep.: 36,5 N; 7,6 W; H = 22:01:17,4 h = 37 km; M = 4,1 (IGN) Cadiz, Spain
11	ZT	P	00	41		9.780	Ep.: 50,2 N; 177,4 W; H = 00:28:33,5 h = 19 km; M = 6,3 (GS) Andean of islands



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
11 Nov	ZT	Pn	07	34	26,0		Ep.: 38,2 N; 0,0 E; H = 07:33:23,8 h = 5 km; M = 3,7 (IGN) Alicante
11	ZT	P	10	33			Ep.: 4,5 S; 153,1 E; H = 10:13:55,3 h = 46 km; M = 5,7 (GS) New Ireland region
11	ZT	Pg	23	28	18,2		Ep.: Local.
	NT	Sg	23	28	21,0		
13	ZT	P	01	50			Ep.: 51,9 N; 158 E; H = 01:18:14,1 h = 34 km; H = 6,5 (GS) Near East Coast of Kamchatka
14	ZT	P	02	12			Ep.: 22,6 S; 68,6 W; H = 01:59:20,2 h = 112 km; M = 5,8 (GS) Northern Chile
17	ZT	Pn	00	30	37,3		Ep.: 42,6 N; 10,7 E; H = 00:29:07,8 h = km; M = 3,9 (LDG) E. Bastia
17	ZT	P	11	30			Ep.: 51,8 N; 158,7 E; H = 11:18:51,6 h = 33 km; M = 6,1 (GS) Near east coast Kamchatka
17	ZT	Pn	17	51	32,7		Ep.: See pag. 111
	NZ	Sg	17	50	02,0		
19	ZT	P	01	55			Ep.: 54,3 N; 164,2 W; H = 01:43:23,7 h = 30 km; M = 6,1 (GS) Unimak islands region
19	ZT	Pg	07	33	31,0		Ep.: Local
20	ZT	P	19	36			Ep.: 60,0 N; 153,0 W; H = 19:24:53,8 h = 116 km; M = 5,6 (GS) Southern Alaska
23	ZT	Pg	01	14	20,0		Ep. Local.
	ZT	Sg	01	14	22,1		
23	ZT	Pg	02	18	23,5		Ep.: Local.
	ZT	Sg	02	18	25,9		
24	ZT	Pg	23	24	04,0		Ep.: Local.
	ZT	Sg	23	24	07,7		
27	ZT	P	13	29			Ep.: 38,9 N, 14,9 E; H = 13:26:45,0 h = 295 km; M = 4,8 (GS) Sicily
27	ZT	Pg	22	43	32,4		Ep.: See pag. 112
	ZT	Sg	22	43	49,0		



SEISMIC OBSERVATIONS

1993

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
11 Dec	ZT	Pn	02	52	15,0		Ep.: 38,0 N; 0,7 W; H = 02:51:09,4 h = 9 km; H = 34 (IGN) Mediterranean Sea
12	ZT	Pn	03	00	19,0		Ep.: 47,1 N; 0,4 W; H = 02:58:55,4 h = 2 km; M = 3,8 (LDG) N Bress??
16	ZT	Pn	10	58	00,6		Ep.: 43,4 N; 0,6 W; H = 10:57:15,5 h = -; M = 3,3 (LDG) Pau, France
17	ZT	Pg	15	26	26,3		Ep. Local.
18	ZT	Pn	16	17	17,4		Ep.: 36,4 N; 2,9 E; H = 16:15:59,4 h = 16 km; M = 4,7 (IGN) Blida, Algeria
19	ZT	Pg	13	12	12,0		Ep.: See pag. 112
	ZT	Sg	13	12	17,0		
21	ZT	Pg	22	39	11,8		Ep.: See pag. 112
	ZT	Sg	22	39	20,9		
22	ZT	Pg	17	58	05,8		Ep.: Local.
23	ET	P	14	24	09,7		Ep.: 36,8 N; 2,9 W; H = 14:22:34,5 h = 3 km; M = 5,0 (IGN) Adra, Spain
	ZL	P	14	24	03,2		
25	NT	Pn	10	44	11,7		Ep.: 44,2 N; 8,3 E; H = 10:43:58,0 h = 9 km; M = 3,7 (LDG) SW Savone
27	NT	Pg	03	13	49,7		Ep.: Local.
28	NT	Pg	05	05	10,0		Ep.: See pag. 112
	NT	Sg	05	05	24,0		
30	ZT	P	14	33		5.950	Ep.: 44,7 N; 78,8 E; H = 14:24:04,5 h = 15 km; M = 5,9 (GS) Eastern Kazat

