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Old seismologic reports

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SEISMIC OBSERVATIONS
AT FABRA OBSERVATORY IN 1991

by M^a TERESA SUSAGNA VIDAL

The Observatory has the following seismographs:

Station FONT (Coordinates 41°45,7'N, 2°26,1'E)

— Three short period «Teledyne Geotech» seismograph, 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» seismograph, horizontal components, with mechanic recording.

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

We symbolize by ZT Teledyne Geotech vertical components, by NT and ET the Teledyne Geotech horizontal components, by ZH the Hiller-Stuttgart vertical component, 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» (I.G.N.) or by the Laboratoire de Détection et de Géophysique (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 Geotech	Z (ZT)	5	1	7.200	0,7
	N-S (NT)	5	1	7.200	0,7
	E-W (ET)	5	1	7.200	0,7
Mark-Lennartz	Z (ZL)	1	1	510	0,7
	N-S (NL)	1	1	510	0,7
	E-W (EL)	1	1	510	0,7

2) Mechanical seismographs (recording on smoke paper):

Type	Component	Mass (kg)	Period(s) To	Damping E	Friction $r/T o^2$	Amplification V
Mainka	N-S (NM)	141	7,0	3,00	0,015	37,9
	E-W (EM)	144	6,2	3,91	0,013	58,9
Vicentini	Z (ZV)	56	0,9	—	—	125



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
3 Jan	ZT	P	13	37		14.910	Ep.: 7,20 S; 148,54 E; H = 13:18:49.2 h = 14 km; M = 6,0 (GS) East Papua New Guinea region
5	ZT	P	15	09		8.570	Ep.: 23,61 N; 95,90 E; H = 14:57:11,5 h = 20 km; M = 6,2 (GS)
5	ZT	Pg	20	27	31,5		Ep.: See pag. 103
	ZT	Sg	20	27	59,0		
8	ZT	P	22	24		17.335	Ep.: 18,06 S; 173,53 W; H = 22:04:09,4 h = 33 km; M = 6,1 (GS) Tonga islands
11	ZT	Pg	18	48	43,7		Ep.: See pag. 103
	ET	Sg	18	48	46,7		
18	ZT	Pn	07	45	33,1		Ep.: 43,4 N; 0,6 W; H = 07:44:46,3 h = 15 km; M = 3,4 (LDG) Pau, F.
18	ZT	P	11	05		16.590	Ep.: 23,75 N; 121,29 E; H = 10:49:56,9 h = 9 km; M = 5,0 (GS) Taiwan
22	ZT	Pn	03	50	24,0		Ep.: 43,4 N; 0,6 W; H = 02:49:37,1
	ET	Sn	03	51	00,0		h = 9 km; M = 3,4 (LDG) Pau, F.
31	ZT	P	23	12		5.765	Ep.: 35,99 N; 70,42 E; H = 23:03:33,6
	ZL	P	23	12			h = 142 km; M = 6,4 (GS) Hindu Kush region
5 Feb	ZT	Pn	00	00	04,0		Ep.: 37,9 N; 2,9 E; H = 23:58:57,5 h = - km; M = 3,5 (LDG)
8	ZT	Pn	18	36	41,0		Ep.: 43,3 N; 0,7 W; H = 18:35:56,8
	ZL	Sg	18	37	21,5		h = 13 km; M = 3,7 (GS) Pau, F.
9	ZT	Pn	14	34	33,7		Ep.: 42,8 N; 4,2 E; H = 14:34:04,7 h = 2 km; M = 3,0 (LDG) S. Marseille, F.
11	ZT	Pg	05	01	34,1		Ep.: See pag. 103
	ZT	Sg	05	01	49,1		
13	ZT	Pn	12	55	51,3		Ep.: 44,9 N; 6,8 E; H = 12:54:44,4 h = 2 km; M = 3,6 (LDG) Gap, F.
13	ZT	Pn	15	50	47,7		Ep.: 44,9 N; 6,8 E; H = 15:49:40,8 h = 2 km; M = 3,8 (LDG) Gap, F.



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
21 Feb	ZT	P	02	47		8.870	Ep.: 58,43 N; 175,45 W; H = 02:35:34,0 h = 20 km; M = 6,2 (GS) Bering sea
21	ZT	Pn	21	07	42,1	390	Ep.: 40,39 N; 1,84 W; H = 21:06:48,1 h = - km; M = 2,6 (IGN) Sierra de Tragacete, Cu.
23	ZT	P	12	42		5.770	Ep.: 36,27 N; 70,65 E; H = 12:33:23,7 h = 155 km; M = 4,9 (GS) Hindu Kush region
25	ZT	Sg	11	30	20,0		Ep.: 43,9 N; 7,8 E; H = 11:30:12,1 h = 2 km; M = 3,3 (LDG) Nice, F.
25	ZT	P	14	40		6.200	Ep.: 40,39 N; 78,96 E; H = 14:30:27,6 h = 21 km; M = 5,5 (GS) Southern Winjiang, China
26	ZT	P	07	27		970	Ep.: 40,19 N; 13,82 E; H = 07:25:47,2 h = 401 km; M = 5,5 (GS) Tyrrhenian sea
1 Mar	ZT	P	17	42		8.970	Ep.: 10,04 N; 84,64 E; H = 17:30:26,0 h = 197 km; M = 6,1 (GS) Costa Rica
3	ZT	P	15	40		17.775	Ep.: 21,87 S; 175,06 W; H = 15:20:24,7 h = 16 km; M = 6,0 (GS) Tonga islands
4	ZT ET	Pn Sn	22 22	48 48	27,7 37,2		Ep.: See pag. 103
4	ZT	Pn	23	12	12,0		Ep.: 42,7 N; 4,4 E; H = 23:11:45,1 h = - km; M = 2,5 (LDG) S. Marseille, F.
5	ZT ZT	Pg Sg	04 04	30 30	51,4 57,4		Ep.: See pag. 103
8	ZT ZT	Pg Pg	02 02	32 32	05,4 09,0		Ep.: See pag. 103
8	ZT	P	11	48		8.520	Ep.: 60,90 N; 167,02 E; H = 11:36:28,4 h = 13 km; M = 6,4 (GS) Eastern Siberia
8	ZT	P	12	06		8.520	Ep.: 60,83 N; 167,06 E; H = 11:54:57,8 h = 10 km; M = 5,9 (GS) Eastern Siberia
11	ZT	P	18	38		2.495	Ep.: 37,01 N; 30,99 E; H = 18:33:43,1 h = 113 km; M = 5,1 (GS) Turkey



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
11 Feb	ZT	P	21	29		10.620	Ep.: 51,15 S; 29,26 E; H = 21:15:56,4 h = 10 km; M = 5,8 (GS) South of Africa
	NM	L	22	08			
	EM	L	22	08			
15	ZT	P	03	28		2.240	Ep.: 34,34 N; 26,39 E; H = 03:34:09,0 h = 7 km; M = 5,2 (GS) Crete
15	ZT	Pn	11	20	58,7		Ep.: 42,13 N; 0,44 E; H = 11:20:29,6 h = - km; M = 2,8 (IGN) Benabarre, Hu
19	ZT	P	12	13		2.210	Ep.: 34,83 N; 26,33 E; H = 12:09:24,8 h = 23 km; M = 5,4 (GS) Crete
19	ZT	P	21	34		2.220	Ep.: 34,83 N; 26,38 E; H = 21:29:26,5 h = 22 km; M = 4,8 (GS) Crete
28	ZT	P	22	56		1.300	Ep.: 36,57 N; 12,18 W; H = 22:53:28,2 h = 33 km; M = 4,3 (GS) North Atlantic ocean
29	ZT	Pg	07	50	29,3		Ep.: See pag. 103
	ET	Pg	07	50	43,3		
1 Apr	ZT	Pn	23	28	33,5		Ep.: 43,1 N ; 0,9 W; H = 23:47:47,0 h = 12 km; M = 4,2 (LDG) Pau, F.
4	ZT	P	03	34		8.700	Ep.: 1,02 N; 78,15 W; H = 03:22:57,9 h = 33 km; M = 6,1 (GS) Panama
4	ZT	P	15	36		9.590	Ep.: 6,04 S; 77,13 W; H = 15:23:20,7 h = 21 km; M = 6,0 (GS) Northern Peru
5	ZT	P	04	32		9.580	Ep.: 5,98 S; 77,09 W; H = 04:19:49,5 h = 20 km; M = 6,5 (GS) Northern Peru
	NM	L	05	02			
	EM	L	05	02			
9	ZT	P	06	14		9.690	Ep.: 9,79 S; 74,70 W; H = 06:02:24,5 h = 124 km; M = 5,9 (GS) Peru
10	ZT	Pn	09	26	48,3	435	Ep.: 43,0 N; 2,3 W; H = 09:25:53,4 h = - km; M = 3,0 (LDG) Bilbao, E.
11	ZT	P	18	10		16.255	Ep.: 11,04 N; 166,79 E; H = 17:51:18,6 h = 47 km; M = 5,3 (GS) Santa Cruz islands



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
12 Apr	ZT	Pg	08	24	32,3		Ep.: See pag. 103
	ET	Sg	08	24	44,9		
14	ZT	Pg	10	24	13,8		Ep.: See pag. 103
	ET	Sg	10	24	16,2		
21	ZT	Pn	11	30	28,7		Ep.: 43,1 N; 0,4 W; H = 11:29:45,7 h = 2 km; M = 2,9 (LDG) Pau, F.
21	ZT	P	23	23		8.060	Ep.: 18,29 S; 46,42 E; H = 23:12:22,5 h = 19 km; M = 5,8 (GS) Malagasay republic
22	ZT	P	22	09		8.915	Ep.: 9,68 N; 83,07 W; H = 21:56:51,8 h = 10 km; M = 6,3 (GS) Costa Rica
23	ZT	P	03	07		11.400	Ep.: 13,09; N; 123,24 E; H = 02:50:22,6 h = 40 km; M = 5,2 (GS) Luzon, Philippine islands
28	ZT	Pn	05	22	09,0		Ep.: 42,95 N; 1,93 W; H = 05:21:16,4 h = - km; M = 3,1 (IGN) Oderiz, Na.
28	ZT	Pn	17	44	18,8		Ep.: 43,1 N; 0,6 W; H = 17:43:34,1 h = 8 km; M = 3,3 (LDG) Pau, F.
29	ZT	P	09	18		3.360	Ep.: 42,45 N; 43,67 E; H = 09:12:48,1 h = 17 km; M = 6,2 (GS) Western Caucasus
29	ZT	Pn	10	21	05,5		Ep.: 42,28 N; 0,73 E; H = 10:20:32,6 h = - km; M = 3,0 (IGN) Aren, Hu
29	ZT	P	18	36		3.385	Ep.: 42,50 N; 43,90 E; H = 18:30:41,5 h = 14 km; M = 5,9 (GS) Western Caucasus
1 May	ZT	P	07	30		8.180	Ep.: 62,48 N; 151,41 W; H = 07:18:43,9 h = 114 km; M = 6,1 (GS) Central Alaska
2	ZT	P	07	14			Ep.: 9,39 N; 77,28 W; H = 07:01:57,2 h = 36 km; M = 5,7 (GS) Near north coast of Colombia
12	ZT	Pn	03	02	06,4		Ep.: 43,4 N; 0,6 E; H = 03:01:20,1 h = 12 km; M = 3,2 (LDG) Pau, F.
17	ZT	Pg	10	22	41,1		Ep.: See pag. 104
	ET	Sg	10	22	57,3		



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
21 May	ZT	P	11	20		13.350	Ep.: 7,52 S; 126,54 E; H = 11:00:19,0 h = 18 km; M = 6,2 (GS) Banda sea
22	ZT	P	16	57		5.050	Ep.: 27,41 N; 55,79 E; H = 16:29:02,3 h = 25 km; M = 5,7 (GS) Southern Iran
24	ZT	P	21	03		9.885	Ep.: 16,51 S; 70,70 W; H = 20:50:55,8 h = 128 km; M = 6,3 (GS) Southern Peru
28	ZT ET	Pn Sn	20	20	41,1		Ep.: See pag. 104
29	ZT	P	20	26	01,0	590	Ep.: 45,0 N; 8,2 E; H = 20:24:42,5 h = - km; M = 3,7 (LDG) Genova, I.
30	ZT	P	13	30		9.200	Ep.: 54,47 N; 161,61 W; H = 13:17:41,9 h = 28 km; M = 6,3 (GS) Alaska peninsula
31	ZT	P	05	46		13.545	Ep.: 6,05 S; 130,60 E; H = 05:28:02,6 h = 33 km; M = 6,0 (GS) Banda sea
3 Jun	ZT ET	Pg Sg	12	44	27,5		Ep.: See pag. 104
6	ZT	Pg	08	04	52,3		Ep.: 43,1 N; 0,7 W; H = 08:04:07,1 h = 2 km; M = 2,8 (LDG) Pau, F.
6	ZT ET	Pg Sg	04	09	39,7		Ep.: See pag. 104
7	ZT	P	12	09		13.010	Ep.: 7,20 S; 122,53 E; H = 11:51:25,9 h = 536 km; M = 6,2 (GS) Flores sea
9	ZT	Pn	00	35	17,8		Ep.: 46,3 N; 1,8 E; H = 00:34:03,3 h = 5 km; M = 3,5 (LDG) Poitiers, F.
9	ZT	Pn	05	27	27,8		Ep.: 39,6 N; 6,3 E; H = 05:26:36,3 h = 10 km; M = 3,3 (LDG)
9	ZT	P	08	04		17.600	Ep.: 20,25 S; 176,22 W; H = 07:45:02,1 h = 266 km; M = 6,1 (GS) Fiji islands region
10	ZT	P	17	43		4.820	Ep.: 23,77 N; 45,37 W; H = 17:35:49,4 h = 10 km; M = 6,5 (GS) North Atlantic ridge



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
12 Jun	ZT	P	00	58		9.465	Ep.: 2,85 S; 78,84 W; H = 00:45:40,0 h = 94 km; M = 5,7 (GS) Ecuador
12	ZT	P	08	04		3.200	Ep.: 44,40 N; 28,83 W; H = 07:59:35,9 h = 10 km; M = 4,9 (GS) North Atlantic ridge
12	ZT	P	20	24		9.830	Ep.: 42,79 N; 143,33 E; H = 20:11:35,0 h = 109 km; M = 5,7 (GS) Hokkaido, Japan region
13	ZT	Pn	00	22	14,9		Ep.: See pag. 104
	ZT	Sn	00	22	42,0		
13	ZT	Pn	04	04	09,7		Ep.: See pag. 104
15	ZT	P	01	05		3.390	Ep.: 42,46 N; 44,01 E; H = 00:59:20,3 h = 9 km; M = 6,1 (GS) Western Caucasus
15	ZT	P	17	30	06,7	1.300	Ep.: 36,14 N; 10,15 W; H = 17:27:24,1 h = - km; M = 4,4 (GS) SW cabo San Vicente
15	ZT	P	20	32		5.375	Ep.: 0,54 N; 25,45 W; H = 20:23:21,9 h = 10 km; M = 5,4 (GS) Central mid-Atlantic ridge
15	ZT	P	23	20		11.860	Ep.: 10,10 N; 125,86 E; H = 23:02:14,3 h = 71 km; M = 6,0 (GS) Leyte, Philippine islands
17	ZT	Pn	05	39	04,5		Ep.: See pag. 104
	ET	Sn	05	40	30,5		
18	ZT	P	18	03		2.460	Ep.: 38,17 N; 26,22 W; H = 17:58:18,0 h = 10 km; M = 4,9 (GS) Azores islands
20	ZT	P	05	37		12.365	Ep.: 1,20 N; 122,79 E; H = 05:18:52,5 h = 31 km; M = 6,2 (GS) Minahassa peninsula
21	ZT	Pn	20	37	22,3		Ep.: 43,2 N; 1,4 W; H = 20:36:35,7 h = 17 km; M = 2,6 (LDG) Pau, F.
23	ZT	P	08	38		16.210	Ep.: 11,00 S; 166,20 E; H = 08:19:33,5 h = 162 km; M = 5,1 (GS) Santa Cruz islands
23	ZT	P	21	34		10.180	Ep.: 26,80 S; 63,35 E; H = 21:22:28,9 h = 558 km; M = 6,4 (GS) Santiago del Estero, Argentina



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
23 Jun	ZT	P	23	26		10.185	Ep.: 26,94 S; 63,27 E; H = 23:14:34,5 h = 578 km; M = 5,6 (GS) Santiago del Estero, Argentina
24	ZT	P	05	50		8.260	Ep.: 58,32 N; 137,01 W; H = 04:59:04,3 h = 10 km; M = 5,6 Southern Alaska
28	ZT	Pg	13	32	22,3		Ep.: See pag. 104
	ZT	Sg	13	32	27,0		
30	ET	Pn	02	33	57,8		Ep.: See pag. 104
	ET	Sn	02	34	27,3		
30	ZT	P	03	18		6.460	Ep.: 14,37 S; 13,56 W; H = 03:08:14,2 h = 10 km; M = 5,3 (GS) South Atlantic ridge
2 Jul	ZT	P	21	30		3.510	Ep.: 72,96 N; 12,31 E; H = 21:24:03,8 h = 10 km; M = 5,4 (GS) Norwegian sea
5	ZT	P	11	10		9.410	Ep.: 47,90 N; 145,80 E; H = 10:58:28,5 h = 468 km; M = 5,6 (GS) Sea of Okhotsk
6	ZT	P	12	32		9.770	Ep.: 13,11 S; 72,19 W; H = 12:19:49,5 h = 105 km; M = 6,2 (GS) Peru
8	ZT	P	21	26		9.235	Ep.: 53,16 N; 159,88 E; H = 21:14:22,1 h = 42 km; M = 5,4 (GS) Neare east coast of Kamchatka
9	ZT	P	07	03		6.520	Ep.: 23,23 N; 65,52 W; H = 06:53:34,1 h = 10 km; M = 5,5 (GS)
13	ZT	Pn	00	01	10,7		Ep.: 36,51 N; 1,73 E; H = 23:59:52,6 h = — km; M = 3,0 (IGN) SW de Gouraya, Arg.
13	ZT	P	03	02		9.325	Ep.: 42,18 N; 152,64 W; H = 02:50:14,6 h = 11 km; M = 6,2 (GS) Off coast of Oregon
14	ZT	P	09	18		5.800	Ep.: 36,33 N; 71,12 E; H = 09:09:11,9 h = 213 km; M = 6,4 (GS) Afghanistan-USSR border region
18	ZT	P	12	00		1.640	Ep.: 44,89 N; 22,41 E; H = 11:56:30,6 h = 12 km; M = 5,7 (GS) Romania



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
19 Jul	ZT	P	01	30		1.550	Ep.: 45,31 N; 21,05 E; H = 01:27:32,0 h = 10 km; M = 5,3 (GS) Romania
20	ZT	P	12	01		9.115	Ep.: 54,56 N; 161,65 W; H = 11:48:47,1 h = 33 km; M = 5,8 (GS) Alaska peninsula
21	ZT	P	23	17		12.640	Ep.: 3,01 N; 128,43 E; H = 22:59:09,6 h = 34 km; M = 5,9 (GS) North of Halmahera
23	ZT NT	Pg Sg	13	41	44,9		Ep.: See pag. 104
23	ZT	P	17	50		2.200	Ep.: 34,77 N; 26,09 E; H = 17:45:44,9 h = 25 km; M = 4,5 (GS) Crete
24	ZT ET	Pg Sg	22	48	15,6		Ep.: See pag. 104
25	ZT	Pn	06	48	02,7		Ep.: 43,0 N; 0,4 W; H = 06:47:19,7 h = 7 km; M = 3,0 (GS) Pau, F.
26	ZT ET	Pn Sn	22	54	27,0		Ep.: See pag. 104
27	ZT	P	11	43		2.380	Ep.: 37,29 N; 29,74 E; H = 11:38:12,7 h = 22 km; M = 4,7 (GS) Turkey
28	ZT	Pg	01	55	30,0		Ep.: 45,2 N; 3,2 E; H = 01:54:25,4 h = — km; M = 3,3 (LDG) Clermont, F.
31	ZT	P	15	46			Ep.: 42,92 N; 14,29 W; H = 15:43:35,8 h = 30 km; M = 4,0 (IGN) Atlantico
6 Aug	ZT	P	02	30		9.960	Ep.: 3,83 N; 95,37 E; H = 02:17:31,6 h = 18 km; M = 6,0 (GS) Off w coast of northern Sumaterra
6	ZT	P	15	02		10.415	Ep.: 35,73 N; 141,04 E; H = 14:49:30,5 h = 29 km; M = 5,9 (GS) Near east coast of Honshu, Japan
8	ZT	Pn	22	48	26,0		Ep.: 35,7 N; 11,2 E; H = 22:46:16,8 h = 10 km; M = 4,4 (LDG)



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
12 Aug	ZT	P	13	12		6.445	Ep.: 14,17 S; 14,26 W; H = 13:02:30,2 h = 10 km; M = 5,5 (GS) South Atlantic ridge
13	ZT	Pn	02	40	22,0		Ep.: See pag. 104
14	ZT	Pn	10	33	08,5		Ep.: 38,76 N; 0,96 W; H = 10:32:08,5 h = 2 km; M = 4,2 (IGN) Caudete, Ab
14	ZT	P	13	05		9.290	Ep.: 54,39 N; 169,30 W; H = 12:53:26,0 h = 275 km; M = 5,7 (GS) Fox islands, Aleutian islands
14	ZT	P	19	34		16.560	Ep.: 13,59 S; 167,61 E; H = 19:15:03,6 h = 14 km; M = 6,1 (GS) Vanuatu islands
15	ZT	P	13	55		16.830	Ep.: 16,06 S; 168,01 E; H = 13:35:59,4 h = 171 km; M = 5,9 (GS) Vanuatu islands
15	ZT	Pg	15	53	19,2		Ep.: See pag. 105
	ZT	Sg	15	53	26,3		
15	ZT	Pn	22	33	17,3		Ep.: See pag. 105
	ZT	Sn	22	33	35,0		
16	ZT	P	22	38		9.350	Ep.: 41,70 N; 125,38 W; H = 22:26:17,2 h = 10 km; M = 5,5 (GS) Off coast of northern California
17	ZT	P	06	29		7.800	Ep.: 10,05 N; 69,95 W; H = 06:18:34,0 h = 10 km; M = 5,5 (GS) Venezuela
17	ZT	P	19	42		9.430	Ep.: 40,24 N; 124,35 W; H = 19:29:40,0 h = 12 km; M = 6,0 (GS) Near coast of northern California
17	ZT	P	22	29		9.340	Ep.: 41,82 N; 125,40 W; H = 22:17:14,6 h = 14 km; M = 6,2 (GS) Off coast of northern California
17	ZT	Pg	23	46	33,7		Ep.: See pag. 105
	ZT	Sg	23	46	35,9		
18	ZT	Pn	06	17	23,1		Ep.: See pag. 105
18	ZT	Pn	00	33	32,7		Ep.: See pag. 105



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
19 Aug	ZT	P	06	15		6.295	Ep.: 46,94 N; 85,30 E; H = 06:05:51,3 h = 30 km; M = 5,5 (GS) Northern Xinjiang, China
20	ZT	P	08	55		5.810	Ep.: 37,65 N; 72,15 E; H = 08:46:40,5 h = 135 km; M = 5,2 (GS) Tajik SSR
23	ZT ET	Pn Sn	11 11	51 52	47,6 03,9		Ep.: See pag. 105
24	ZT	P	08	22		16.630	Ep.: 14,61 S; 166,87 E; H = 08:03:11,2 h = 84 km; M = 5,3 (GS) Vanuatu islands
26	ZT	P	10	13		8.070	Ep.: 18,96 N; 80,88 E; H = 10:01:59,7 h = 10 km; M = 5,3 (GS) Caribbean sea
26	ZT	P	15	13		9.940	Ep.: 42,10 N; 144,64 E; H = 14:59:44,9 h = 29 km; M = 5,8 (GS) Hokkaido, Japan region
26	ZT	P	20	55		9.660	Ep.: 6,94 N; 94,53; H = 20:42:31,8 h = 26 km; M = 5,6 (GS) Nicobar islands region
26	ZT	P	22	07		9.690	Ep.: 6,97 N; 94,66 E; H = 21:56:13,6 h = 33 km; M = 5,0 (GS) Nicobar islands region
26	ZT	P	23	12		16.650	Ep.: 14,60 S; 167,27 E; H = 22:52:36,8 h = 232 km; M = 5,0 (GS) Vanuatu islands
29	ZT	P	17	08		5.630	Ep.: 6,99 S; 12,68 W; H = 16:59:49,0 h = 10 km; M = 5,0 (GS) Ascension islands region
29	ZT ET	Pn Sn	23 23	56 56	27,8 53,5		Ep.: See pag. 105
30	ZT	Pn	00	48	13,9		Ep.: See pag. 105
2 Sep	ZT	Pn	23	03	46,5		Ep.: 43,1 N; 5,1 E; H = 23:03:07,0 h = 2 km; M = 2,9 (LDG) Marseille, F.
3	ZT	P	08	58			Ep.: 33,65 N; 138,78 E; H = 08:44:48,6 h = 27 km; M = 6,4 South of Honshu, Japan
3	ZT	P	09	24			Ep.: 17,91 S; 116,00 W; H = 09:05:28,3 h = 9 km; M = 6,0 (GS) Southern east Pacific rise



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
3 Sep	ZT	Pn	16	31	35,6		Ep.: See pag. 105
	ET	Sn	16	32	07,0		
5	ZT	Sg	21	14	22,0		Ep.: See pag. 105
	ZT	Sg	21	14	48,9		
6	ZT	Pg	01	59	55,5		Ep.: See pag. 105
	ZT	Sg	02	00	20,9		
8	ZT	Pg	23	29	38,3		Ep.: See pag. 105
	ZT	Sg	23	29	52,5		
10	ZT	Pn	18	18	56,3		Ep.: 53,46 N; 5,79 E; H = 18:17:15,8 h = 10 km; M = - (GS) Near south coast of France
12	ZT	Pg	19	33	23,7		Ep.: See pag. 105
	ZT	Sg	19	33	38,7		
16	ZT	P	22	38		16.500	Ep.: 13,25 S; 167,14 E; H = 22:19:08,0 h = 163 km; M = 5,4 (GS) Vanuatu islands
17	ZT	Pn	14	45	58,3		Ep.: See pag. 105
	ZT	Sn	14	46	17,3		
20	ZT	P	11	27			Ep.: 36,19 N; 100,06 E; H = 11:16:11,5 h = 13 km; M = 5,5 (GS) Quinghai, China
21	ZT	P	15	39			Ep.: 16,23 S; 173,00 W; H = 15:19:48,1 h = 17 km; M = 5,8 (GS) Tonga islands
22	ZT	P	05	51		5.880	Ep.: 30,16 N; 67,80 E; H = 05:42:27,8 h = 10 km; M = 4,9 (GS) Pakistan
22	ZT	Pg	09	00	57,3		Ep.: See pag. 105
	ZT	Sg	09	01	14,8		
26	ZT	Pg	00	45	36,0		Ep.: See pag. 105
	ZT	Sg	00	45	43,0		
26	NT	Pn	15	32	19,7		Ep.: See pag. 105
	NT	Sn	15	32	37,9		
2 Oct	ZT	Pn	16	58	32,0		Ep.: See pag. 105
	ZT	Sn	16	58	52,3		



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
3 Oct	ZT	Pn	05	06	17,2		Ep.: 43,1 N; 0,4 W; H = 05:05:34,8 h = 2 km; M = 3,0 (LDG) Pau, F.
	ZT	Sn	05	06	53,7		
8	ZT	P	03	43		9.750	Ep.: 45,59 N; 149,05 E; H = 03:21:15,6 h = 146 km; M = 6,0 (GS) Kuril islands
8	ZT	Pn	13	01	30,6		Ep.: See pag. 106
	ZT	Sn	13	01	48,5		
12	ZT	P	16	46		16.525	Ep.: 13,74 S; 166,67 E; H = 16:26:24,8 h = 44 km; M = 5,9 (GS) Vanuati islands
13	ZT	Pn	06	05	36,1		Ep.: See pag. 106
	ET	Sn	06	05	53,2		
15	ZT	P	23	05		2.235	Ep.: 34,43 N; 26,24 E; H = 23:00:55,0 h = 21 km; M = 5,2 (GS) Crete
17	ZT	P	09	25			Ep.: 15,30 S; 173,56 W; H = 09:05:20,2 h = 36 km; M = 5,6 (GS) Tonga islands
17	ZT	Pn	11	33	51,0		Ep.: See pag. 106
	ZT	Sn	11	34	11,0		
18	ZT	P	14	09		2.355	Ep.: 35,92 N; 28,48 E; H = 14:04:54,9 h = 52 km; M = 5,3 (GS) Eastern Mediterranean sean
19	ZT	P	21	33		6.730	Ep.: 30,78 N; 78,77 E; H = 21:23:14,3 h = 10 km; M = 6,5 (GS) Northern India
25	ZT	Pg	20	22	22,4		Ep.: See pag. 106
	ET	Sg	20	22	27,7		
29	ZT	Pn	12	55	00,8		Ep.: See pag. 106
29	ZT	P	23	33			Ep.: 16,18 S; 167,99 E; H = 23:13:57,4 h = 177 km; M = 5,3 (GS) Vanuatu islands
30	ZT	Pg	04	49	25,1		Ep.: See pag. 106
	ET	Sg	04	49	30,3		
30	ZT	P	10	55		17.020	Ep.: 15,31 S; 173,19 W; H = 10:35:41,4 h = 18 km; M = 5,8 (GS) Tonga islands



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
31 Oct	ZT	P	02	38		5.740	Ep.: 40,15 N; 72,84 E; H = 02:29:02,5 h = 21 km; M = 5,2 (GS) Kyrgyzstan
31	ZT	Pn	15	04	26,5		Ep.: See pag. 106
1 Nov	ZT	P	16	43		18.700	Ep.: 30,26 S; 177,98 W; H = 16:23:22.3 h = 21 km; M = 6,4 (GS) Kermadec islands, New Zealand
2	ZT	Pg	05	42	47,3		Ep.: See pag. 106
	ZT	Sg	05	43	10,0		
16	ZT	Pn	01	28	31,7		Ep.: 45,8 N; 0,4 E; H = 01:27:13,0 h = 2 km; M = 3,5 (LDG) Limoges, F.
19	ZT	P	22	40		8.830	Ep.: 4,55 N; 77,44 W; H = 22:28:51,0 h = 21 km; M = 6,4 (GS) Near west coast of Colombia
20	ZT	Pn	01	56	03,3		Ep.: 46,8 N; 9,5 E; H = 01:54:20,6 h = 7 km; M = 5,1 (LDG) Locarno, CH.
21	ZT	Pn	01	38	46,0		Ep.: See pag. 106
24	ZT	Pn	21	14	42,4		Ep.: See pag. 106
26	ZT	P	19	53		9.870	Ep.: 42,05 N; 142,52 E; H = 19:40:48,5 h = 56 km; M = 6,1 (GS) Hokkaido, Japan region
28	ZT	P	17	27		4.040	Ep.: 36,92 N; 49,60 E; H = 17:19:55,5 h = 16 km; M = 5,6 (GS) Western Iran
28	ZT	Pn	21	10	13,3		Ep.: 43,1 N; 0,5 W; H = 21:09:31,4 h = 2 km; M = 3,3 (LDG) Pau, F.
5 Dec	ZT	P	20	26		2.600	Ep.: 36,13 N; 31,81 E; H = 23:21:55,3 h = 115 km; M = 5,2 (GS) Turkey
6	ZT	Pn	19	35	28,9		Ep.: 47,2 N; 0,2 E; H = 19:34:04,5 h = 4 km; M = 4,2 (LDG) Tours, F.
7	ZT	P	14	31		5.780	Ep.: 25,19 N; 62,97 E; H = 14:22:32,2 h = 30 km; M = 5,2 (GS) Southwestern Pakistan



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
9 Dec	ZT	P	01	13		7.030	Ep.: 29,54 N; 81,63 E; H = 01:02:46,5 h = 29 km; M = 5,6 (GS) Nepal
9	ZT	P	09	27		2.340	Ep.: 37,21 N; 24,35 W; H = 09:23:04,8 h = 10 km; M = 5,3 (GS) Azores islands region
12	ET	Pg	12	06	15,3		Ep.: See pag. 107
	ET	Sg	12	06	27,0		
13	ZT	P	00	31		13.490	Ep.: 7,27 S; 128,62 E; H = 00:12:56,5 h = 159 km; M = 5,6 (GS) Banda sea
13	ZT	P	02	46		9.830	Ep.: 45,58 N; 151,56 E; H = 02:33:51,8 h = 30 km; M = 6,1 (GS) Kuril islands
13	ZT	P	05	58		9.830	Ep.: 45,57 N; 151,53 E; H = 05:45:29,0 h = 26 km; M = 6,0 (GS) Kuril islands
13	ZT	P	19	12		9.825	Ep.: 45,52 N; 151,70 E; H = 18:59:06,5 h = 19 km; M = 6,1 (GS) Kuril islands
13	ZT	P	20	08		9.840	Ep.: 45,43 N; 151,27 E; H = 19:55:09,5 h = 48 km; M = 5,9 (GS) Kuril islands
13	ZT	P	20	11		9.840	Ep.: 45,44 N; 151,43 E; H = 19:58:18,5 h = 20 km; M = 6,1 (GS) Kuril islands
14	ZT	Pg	11	54	15,7		Ep.: See pag. 107
	ZT	Sg	11	54	22,1		
15	ZT	Pg	11	50	56,0		Ep.: See pag. 107
15	ZT	Pg	15	30	40,9		Ep.: See pag. 107
	ZT	Sg	15	30	49,9		
15	ZT	Pg	17	41	43,3		Ep.: See pag. 107
	ZT	Sg	17	41	53,7		
15	ZT	Pg	18	26	10,0		Ep.: See pag. 107
	ZT	Sg	18	26	20,3		
15	ZT	P	19	08		9.950	Ep.: 17,52 S; 70,42 W; H = 18:56:05,6 h = 104 km; M = 5,6 (GS) Near coast of Peru



SEISMIC OBSERVATIONS

1991

Date	Comp.	Phase	Time TU			Δ Km	Remarks
			h	m	s		
16 Dec	ZT	Pg	12	38	59,1	17.060	Ep.: See pag. 107
	ZT	Sg	12	39	09,3		
16	ZT	Pg	21	38	10,0	9.640	Ep.: See pag. 107
	ZT	Sg	21	38	20,0		
17	ZT	P	04	01		17.060	Ep.: 62,55 S; 155,05 E; H = 03:41:08,1 h = 10 km; M = 5,2 (GS) Balleny islands region
17	ZT	P	06	50		9.640	Ep.: 47,39 N; 151,50 E; H = 06:38:17,3 h = 157 km; M = 5,8 (GS) Kuril islands
17	ZT	P	01	46		9.855	Ep.: 45,25 N; 151,18 E; H = 06:38:17,3 h = 27 km; M = 6,0 (GS) Kuril islands
19	ZT	Pg	06	58	23,7		Ep.: See pag. 107
19	ZT	Pg	11	35	24,9		Ep.: See pag. 107
19	ZT	P	19	03		5.120	Ep.: 28,10 N; 57,30 E; H = 18:55:17,4 h = 27 km; M = 5,3 (GS) Southern Iran
21	ZT	Pn	05	09	27,3		Ep.: 39,32 N; 0,97 E; H = 05:08:27,3 h = 1 km; M = 3,5 (IGN) Buñol, V.
22	ZT	P	08	56		9.820	Ep.: 45,53 N; 151,02 E; H = 08:43:13,4 h = 25 km; M = 6,3 (GS) Kuril islands
23	ZT	P	13	22			Ep.: 45,83 N; 151,96 E; H = 13:10:04,9 h = 24 km; M = 6,0 (GS) Kuril islands
29	ZT	P	18	58		13.575	Ep.: 4,42 S; 132,73 E; H = 18:39:09,4 h = 37 km; M = 6,0 (GS) Rrian Jaya region, Indonesia
31	ZT	Pg	06	57	24,7		Ep.: See pag. 107
	ZT	Sg	06	57	26,7		

