



Documents sismològics antics

Condicions d'ús:

L'original d'aquest document és propietat de l'*Observatori Fabra*. Aquesta versió digitalitzada és de lliure consulta i la còpia privada està permesa amb finalitat d'estudi o recerca sense ànim de lucre, citant les fonts de les institucions responsables: [Observatori Fabra](#) - [Reial Acadèmia de Ciències i Arts de Barcelona \(RACAB\)](#) i [Institut Cartogràfic i Geològic de Catalunya \(ICGC\)](#). La seva distribució no està permesa sense autorització expressa per escrit d'aquestes institucions. Per a ús públic i/o comercial el sol·licitant serà el responsable de tramitar i obtenir els permisos necessaris. La citació correcta d'aquest document es troba a la taula des d'on s'ha obtingut.

Documentos sismológicos antiguos

Condiciones de uso:

El original de este documento es propiedad del *Observatorio Fabra*. Esta versión digitalizada es de libre consulta y la copia privada está permitida para finalidades de estudio o investigación sin ánimo de lucro, citando las fuentes de las instituciones responsables: [Observatorio Fabra](#) - [Real Academia de Ciencias y Artes de Barcelona \(RACAB\)](#) y [Institut Cartogràfic i Geològic de Catalunya \(ICGC\)](#). Su distribución no está permitida sin autorización expresa por escrito de éstas instituciones. Para uso público y/o comercial el solicitante será el responsable de tramitar y obtener los permisos necesarios. La citación correcta de este documento se encuentra en la tabla desde donde se ha obtenido.

Old seismologic reports

Terms of use:

The original document is property of *Fabra Observatory*. This digitized version is for free consult and private copies are allowed for non-lucrative study or investigation purposes as long as responsible institutions are properly cited: [Fabra Observatory](#) - [Royal Academy of Sciences and Arts of Barcelona \(RACAB\)](#) and [Cartographic and Geological Institute of Catalonia \(ICGC\)](#). Its distribution is not allowed unless express written authorisation from these institutions. For public or commercial use the solicitor will be responsible for processing and obtaining all required permits in advance. The correct citation for this document can be found at the table from where it has been obtained.

SEISMIC OBSERVATIONS
AT FABRA OBSERVATORY IN 1980

by JAVIER PAVIA SEGURA
and M.^a TERESA SUSAGNA VIDAL

The Observatory has now the following seismographs:

- One short period "Hiller-Stuttgart" seismograph, vertical component, with photographic recording.
- Two long period "Mainka" seismographs, horizontal components, with mechanic recording.
- One short period "Vicentini" seismograph, vertical component, with mechanic recording.

We symbolize by ZH the Z component of Hiller-Stuttgart set, 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 (FBR), together with "Laboratori d'Estudis Geofísics Eduard Fontseré" of "Institut d'Estudis Catalans" (IEC) or provided by the United States Geological Survey (GS), by the Centre Seismologique Europeo-Mediterranean (CSEM), by the "Sección de Sismología e Ingeniería Sísmica" (S.S.I.S.) of "Instituto Geográfico Nacional" (I.G.N.), by the Laboratoire de Détection et de Géophysique (LDG) or by P. Stahl (PS).

The average instrumental constants have been:

1.º) Seismograph with photographic recording:

Type	Component	Period (s)		Maximum Amplification V_m	Damping
		T_p	T_g		
Hiller-Stuttgart	Z(ZH)	1,61	1,3	7,326	Critical

2.º) Seismographs with mechanic recording:

Type	Component	Mass Kg.	Period (s) T_0	Damping ϵ	Friction $r/T \sigma^2$	Amplification V
Mainka	N-S (NM)	141	9,5	2,09	0,050	36,41
Mainka	E-W (EM)	144	8,0	3,84	0,016	56,90
Vicentini	Z (ZV)	56	0,9	—	—	125



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
1 Jan	ZH	iP	16	47	45	2550	Ep.: 38,8 N; 27,8 W; H = 16 42 40 h = 10 km; M = 6,0 (GS) Azores Islands.
3	ZH	iP	18	23	13		Ep.: 0,0 N; 67,2 E; H = 18 11 51,4 h = 10 km; M = 5,7 (GS) Carlsberg Ridge.
5	ZH	eP	14	33	46	585	Ep.: 45,0 N; 7,4 E; H = 14 32 26,2 h = 12 km; M = 4,8 (GS) Northern Italy.
	ZH	iS	14	35	44		
7	ZH	iSg	12	56	51,5		Ep.: Local
7	ZH	iP	20	19	20		Ep.: 51,3 N; 156,7 E; H = 20 06 57,1 h = 112 km; M = 5,6 (GS) Kamchatka.
	ZH	i	20	19	21,5		
13 Feb	ZH	iP	22	19	07	6280	Ep.: 36,5 N; 76,9 E; H = 22 09 29,6 h = 63 km; M = 6,1 (GS) Kashmin-Sinkiang Border Region.
	ZH	i	22	19	45		
16	ZH	eP	02	07	59		Ep.: 0,3 N; 67,0 E; H = 01 56 36,6 h = 10 km; M = 5,2 (GS) Carlsberg Ridge.
18	ZH	iP	09	56	46,5		Ep.: 14,9 S; 168,0 E; H = 09 36 55,4 h = 33 km; M = 5,5 (GS) New Hebrides Islands.
18	ZH	iPg	14	32	20,5		Ep.: Local.
	ZH	iSg	14	32	22		
22	ZH	eP	21	35	11		Ep.: 10,7S; 161,6 E; H = 21 15 42,1 h = 68 km; M = 5,9 (GS) Salomon Islands.
23	ZH	iP	06	03	59	9930	Ep.: 43,5 N; 146,7E; H = 05 51 03,2 h = 44 Km; M = 6,3 (GS) Kuril Islands.
	ZH	iPP	06	04	48		
	ZH	ePS	06	16	24		
27	ZH	iP	12	57	11,8		Ep.: 43,3 N; 146,8 E; H = 12 44 26,7 h = 42 km; M = 5,9 (GS) Kuril Islands.
27	ZH	eP	21	36	35,8		Ep.: 6,0S; 150,2E; H = 21 17 20,2 h = 53 km; M = 5,8 (GS) New Britain Region.
29	ZH	ePKP	11	31	57,4	12305	Ep.: 6,3 N; 126,9 E; H = 11 13 26,7 h = 104 km; M = 6,1 (GS), Mindanao, Philippine Islands.
	ZH	i	11	32	29,4		



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
29 Feb	ZH	iP	20	41	32,1	286	Ep.: 43,1 N; 0,5 W; H = 20 40 50,5 h = 10 km; M = 5,0 (LDG) Tarbes, France.
1 Mar	ZH	iPg	10	24	40,5		Ep.: Local.
	ZH	iSg	10	24	43,8		
1	ZH	ePn	15	04	23,6		Ep.: 43,1 N; 0,4 W; H = 15 03 39,9 h = 5 km; M = 3,9 (LDG) Tarbes, France.
	ZH	eSn	15	04	58,6		
1	ZH	iPn	22	06	39,3	235	Ep.: 43,1 N; 0,4 W; H = 22 05 55,6 h = 5 km; M = 4,0 (LDG) Tarbes, France.
	ZH	iSn	22	07	14,3		
2	ZH	iPn	02	23	13,9		Ep.: 43,1 N; 0,3 W; H = 02 22 32,6 h = 5 km; M = 3,9 (SSIS) Tarbes, France.
	ZH	iSn	02	23	48,9		
2	ZH	ePn	22	46	59,2		Ep.: 43,1 N; 0,4 W; H = 22 46 14,2 h = 5 km; M = 3,6 (LDG) Arudy, France.
	ZH	eSn	22	47	30,2		
3	ZH	iPn	00	33	54,8	287	Ep.: 43,2 N; 0,4 W; H = 00 33 13,3 M = 4,6 (LDG) Pyrenees.
	ZH	iSn	00	34	29,8		
3	ZH	ePn	00	40	18,3		Ep.: 43,1 N; 0,4 W; H = 00 39 34,4 M = 3,6 (LDG) Arudy, France.
	ZH	eSn	00	40	53,3		
3	ZH	ePg	12	58	22,6		Ep.: Local.
	ZH	iSg	12	58	24,4		
3	ZH	iPn	13	22	14,1		Ep.: 43,9 N; 0,3 W; H = 13 21 31,7 h = 5 km; M = 3,7 (SSIS) Bagneres de Bigore, France.
	ZH	eSn	13	22	49,1		
4	ZH	iPn	04	40	09,5		Ep.: 43,2 N; 0,3 W; H = 04 39 27,5 h = 5 km; M = 3,7 (SSIS) Pau, France.
	ZH	iSn	04	40	44,3		
4	ZH	iPg	12	29	25,8		Ep.: Local.
5	ZH	iPn	08	08	25,7	286	Ep.: 43,1 N; 0,5 W; H = 08 07 40,0 h = 10 km; M = 4,0 (LDG) Pau, France.
	ZH	iSn	08	08	59,7		
10	ZH	iPn	09	25	07		Ep.: 43,2 N; 0,3 W; H = 09 24 37,9 h = 5 km; M = 3,7 (SSIS) Pau, France.
	ZH	i	09	25	54,5		



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
10 Mar	ZH	iPg	12	59	05,1		Ep.: Local.
	ZH	iSg	12	59	07,8		
10	ZH	iPg	17	46	10,2		Ep.: Local.
	ZH	iSg	17	46	13,2		
11	ZH	iPn	14	16	16,4		See page 63.
	ZH	iPb	14	16	17,6		
	ZH	iPg	14	16	18,2		
	ZH	iSn	14	16	39,2		
12	ZH	iPg	15	38	50,4		Ep.: Local.
	ZH	iSg	15	38	53,2		
13	ZH	iPg	11	57	02,5		Ep.: Local.
	ZH	iSg	11	57	04		
13	ZH	iPg	14	06	36,6		Ep.: Local.
14	ZH	iSg	11	41	58		Ep.: Local.
14	ZH	ePg	11	42	28,2		Ep.: Local.
	ZH	iSg	11	42	30		
18	ZH	ePn	01	20	10,7		Ep.: 43,2 N; 0,2 W; H = 01 19 28,7 h = 20 km; M = 3,2 (SSIS) Tarbes, France.
	ZH	iSn	01	20	44,2		
22	ZH	iP	10	39	53,1		Ep.: 55,7 N; 161,5 E; H = 10 27 40,1 h = 69 km; M = 5,7 (GS) Near East. Coast of Kamchatka.
22	ZH	iP	16	46	53,5		Ep.: Local
24	ZH	iPKP	04	12	28	9510	Ep.: 52,6 N; 167,4 W; H = 04 02 19,3 h = 33 km; M = 6,1 (GS) Fox Islands, Aleutian Islands.
	ZH	iPP	04	14	58		
	EM	i	04	23	21		
26	ZH	iP	20	51	41,3	4800	Ep.: 23,9 N; 45,6 W; H = 20 43 37,9 h = 10 km; M = 5,9 (GS) North. Atlantic Ridge.
	EM	e	20	52	02		
	EM	eS	20	58	31		
28	ZH	iPg	15	05	44		Ep.: Local.



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
29 Mar	ZH	iP	04	28	54,7		Ep.: 4,6 S; 154,9 E; H = 04 07 41,7 h = 495 km; M = 5,8 (GS) Salomon Islands.
29	ZH	iPg	22	27	48,5		See page 63.
	ZH	iPn	22	27	50		
	ZH	iSg	22	28	02		
	ZH	iSn	22	28	04,2		
1 Apr	ZH	iPg	16	16	30		Ep.: Local.
8	ZH	iPg	12	13	17,6		Ep.: Local.
	ZH	iSg	12	13	20		
9	ZH	iSg	11	43	52		Ep.: Local.
10	ZH	ePn	16	44	31,5	148	Ep.: 41,1 N; 0,4E; H = 16 44 06,7 h = 5 km; M = 3,1 (SSIS) Benabarre. (Huesca), Spain.
	ZH	eSn	16	44	52,5		
	ZH	i	16	45	14		
11	ZH	ePKP	22	15	57,8		Ep.: 22,9 S; 171,2 E; H = 21 55 50,9 h = 33 km; M = 5,4 (GS) Loyalty Islands Region.
12	ZH	eP	11	35	27,6		Ep.: 38,7 N; 20,3 E; H = 11 32 11,6 h = 10 km; M = 4,9 (GS) Grece.
13	ZH	ePKP	18	24	25,2	18025	Ep.: 23,5 S; 177,3 W; H = 18 04 31,9 h = 79 km; M = 6,7 (GS) South of Fiji Islands.
	ZH	ePKKP	18	25	12,2		
	ZH	iPP	18	29	00,2		
	ZH	ePPP	18	31	40,2		
	EM	eSKS	18	31	43,2		
	EM	iSS	18	49	07,2		
16	ZH	ePn	13	10	57,5	284	Ep.: 43,2 N; 0,35 W; H = 13 10 17,1 h = 5 km; M = 4,3 (SSIS) Pau, France.
	ZH	iSn	13	11	33,5		
18	ZH	iPg	10	18	08,5		Ep.: Local.
18	ZH	iPg	16	03	09,5		Ep.: Local.
26	ZH	iP	13	05	48		Ep.: 22,5 N; 45,1 W; H = 12 58 47,4 h = 10 km; M = 5,0 (GS) North Atlantic Ridge.
	ZH	e	13	06	54		
26	ZH	i	22	55	31		Ep.: 14,9 S; 167,2 E; H = 22 35 49,3 h = 114 km; M = 5,4 (GS) New Hebrides Islands.
	ZH	e	22	55	57		



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
2 May	ZH	eP	05	35	54,5		Ep.: 35,6 N; 29,8 E; H = 05 30 58,1 h = 32 km; M = 5,1 (GS) Easter Mediterranean Sean.
	ZH	i	05	36	05		
2	ZH	iSg	12	11	23,3		Ep.: Local.
3	ZH	iP	03	39	34		Ep.: 10,0 N; 43,1E; H = 03 30 55,6 h = 10 km; M = 5,3 (GS) North Western Somalia
	ZH	iPP	03	41	30		
3	ZH	iP	09	42	54		Ep.: 51,2 N; 173,7 E; H = 09 30 08,5 h = 33 km; M = 5,8 (GS) Near Islands, Aleutian Islands.
6	ZH	iPg	10	16	27		Ep.: Local.
7	ZH	ePg	11	31	31		Ep.: Local.
9	ZH	ePn	09	22	57,5		Ep.: 35,8N; 1,2E; H=09 21 35,6 h= 10km; M= 3,9 (SSIS) Algeria
9	ZH	ePKP	22	52	40		Ep.: 55,8 S; 147,2 E; H = 22 32 42,7 h = 10 km; M = 5,7 (GS) West of Macquarie Islands.
12	ZH	eSg	11	55	28		Ep.: Local.
12	ZH	iPKP	16	57	15,5		Ep.: 14,5 S; 167,9 E; H = 16 37 34,9 h = 20 km; M = 5,9 (GS) New Hebrides Islands.
17	EM	e	01	14	45		Ep.: 42,5 N; 2,1 E; H = 01 14 22,3 h = 5 km; M = 3,2 (SSIS) Prades, France.
	EM	i	01	14	51		
18	EM	iP	20	06	15	1540	Ep.: 43,3 N; 20,8 E; H = 20 02 51,5 h = 9 km; M = 5,7 (GS) Jogoeslavia.
	EM	eS	20	11	13		
26	EM	eP	18	53	34	9960	Ep.: 19,3 S; 69,2 W; H = 18 41 42,9 h = 114 km; M = 6,1 (GS) Northern Chile.
	EM	eS	19	04	49		
2 Jun	ZH	ePg	12	20	06,5		Ep.: Local.
	ZH	eSg	12	20	07		
4	ZH	iSg	15	47	23,7		Ep.: Local.
5	ZH	i	13	04	13,4		Ep.: Local.



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
7 Jun	ZH	iPg	09	02	54		Ep.: Local.
7	ZH	eP	18	37	41,5		Ep.: 44,1 N; 10,7 E; H = 18 35 01,8 h = 16 km; M = 4,6 (GS) Northern Italy.
9	ZH	eP	03	41	06,3		Ep.: 32,2 N; 114,9 W; H = 03 28 18,9 h = 5 km; M = 5,6 (GS) California México Borden Region.
9	ZH	iSg	11	53	58,2		Ep.: Local.
11	ZH	eP	14	35	26,4		Ep.: 32,7 S; 71,6 W; H = 14 21 18,9 h = 33 km; M = 5,5 (GS) Near Coast of Central Chile.
16	ZH	ePg	12	43	04		Ep.: Local.
16	ZH	iSg	13	35	39		Ep.: Local.
18	ZH	eP	09	38	40,3		Ep.: 5,2 S; 152,1 E; H = 09 18 32 h = 61 km; M = 6,0 (GS) New Britain Region.
	ZH	ePP	09	41	10,3		
18	ZH	eP	11	08	55,3		Ep.: 15,3 S; 173,6 W; H = 10 49 10 h = 43 km; M = 5,9 (GS) Tonga Islands.
	ZH	e	11	12	54,3		
18	ZH	iP	17	33	37,3		Ep.: 9,5 N; 126,7 E; H = 17 14 54,5 h = 54 km; M = 5,8 (GS) Mindanao, Philippine Islands.
19	ZH	iP	08	51	38,9	18735	Ep.: 29,9 S; 178,0 W; H = 08 31 38,7 h = 51 km; M = 6,1 (GS) Kermadec Islands
	ZH	i	08	52	49		
19	ZH	iPg	10	54	36		Ep.: Local.
19	ZH	iSg	12	02	24,5		Ep.: Local.
22	ZH	iP	14	49	31,8		Ep.: 30,1 N; 81,8 E; H = 14 38 53,7 h = 33 km; M = 5,1 (GS) Tibet.
22	ZH	iPn	23	20	36,3	880	Ep.: 36,0 N; 5,3 W; H = 23 18 34,5 h = 42 km; M = 4,4 (SSIS) Strait of Gibraltar.
	ZH	iSn	23	21	48,3		
25	ZH	eP	12	16	39,2		Ep.: 4,4 N; 75,8 W; H = 12 04 56,9 h = 162 km; M = 5,7 (GS) Colombia.
	ZH	i	12	17	30,2		



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
25 Jun	ZH	eP	23	37	39	14990	Ep.: 15,2 S; 151,7 E; H = 23 18 20,4 h = 49 km; M = 6,2 (GS) New Britain Region.
	ZH	ePP	23	41	04,2		
29	ZH	eP	07	33	31		Ep.: 34,8 N; 139,2 E; H = 07 20 05,5 h = 15 km; M = 5,8 (GS) Near S. Coast of Honsthu, Japan.
	ZH	ePP	07	37	20		
4 Jul	ZH	iSg	15	59	47,4		Ep.: Local.
5	ZH	iP	20	34	52,8		Ep.: 41,8 N; 77,5 E; H = 20 25 25,7 h = 28 km; M = 5,4 (GS) Kirghiz-Sinkiang Border Region.
	ZH	i	20	34	57,1		
	ZH	i	20	35	55,3		
6	ZH	iP	12	45	33,7		Ep.: 51,0 S; 139,4 E; H = 12 25 42 h = 10 km; M = 5,4 (GS) South of Australia
6	ZH	eP	19	28	55,2		Ep.: 5,5 N; 61,5 E; H = 14 18 21 h = 10 km; M = 5,0 (GS) Carlsberg Ridge
6	ZH	eP	14	30	51,2		Ep.: 5,5 N; 61,8 E; H = 14 20 28,1 h = 10 km; M = 5,1 (GS) Carlsberg Ridge
6	ZH	eP	18	57	40,7		Ep.: 56,5 N; 154,2 W; H = 18 45 30,8 h = 26 km; M = 5,2 (GS) Kodiak Islands
7	ZH	iSg	11	23	43,6		Ep.: Local
7	ZH	iSg	11	50	38,1		Ep.: Local
8	ZH	eP	04	57	55		Ep.: 6,6 N; 125,8 E; H = 04 39 28,7 h = 178 km; M = 5,9 (GS) Mindanao, Philippine Islands
8	ZH	iPKP	23	39	04		Ep.: 12,4 S; 166,4 e; h = 23 19 19,8 h = 33 km; M = 5,9 (GS) Santa Cruz Islands.
	ZH	ePP	23	43	36,5		
9	ZH	iP	00	12	54		Ep.: 12,7 S; 165,6 E; H = 23 53 12,4 h = 33 km; M = 5,6 (GS) Santa Cruz Islands.
9	ZH	iP	01	16	11,5		Ep.: 12,6 S; 165,6 E; H = 00 56 27,8 h = 33 km; M = 5,3 (GS) Santa Cruz Islands.
9	ZH	iP	02	14	04		Ep.: 39,2 N; 22,9 E; H = 02 10 16,5 h = 10 km; M = 5,1 (GS) Greece.



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU				Remarks
			h	m	s	Δ km	
9 Jul	ZH	iP	02	15	36,5	1775	Ep.: 39,3 N; 23,0 E; H = 02 11 52,8 h = 14 km; M = 5,8 (GS) Aegean Sea.
9	ZH	eP	02	39	31,5	1740	Ep.: 39,3 N; 22,6 E; H = 02 35 50 h = 20 km; M = 6,3 (GS) Greece.
9	ZH	iP	11	20	03,5		Ep.: 12,8 S; 166,1 E; H = 11 00 18,9 h = 37 km; M = 5,3 (GS) Santa Cruz Islands.
9	ZH	iP	11	44	34,5		Ep.: 12,6 S; 166,0 E; H = 11 24 50,6 h = 33 km; M = 5,2 (GS) Santa Cruz Islands.
9	ZH	iP	13	43	58,5		Ep.: 12,8 S; 166,1 E; H = 13 24 14,5 h = 33 km; M = 5,2 (GS) Santa Cruz Islands.
9	ZH	iSg	13	45	23,5		Ep.: Local.
10	ZH	iP	19	42	46,5		Ep.: 39,3 N; 22,9 E; H = 19 39 00,6 h = 33 km; M = 5,2 (GS) Greece.
11	ZH	eP	03	22	24,5		Ep.: 13,1 S; 166,2 E; H = 03 02 40,2 h = 33 km; M = 5,2 (GS) Vanuatu Islands.
11	ZH	eP	03	34	02,5		Ep.: 13,4 S; 166,4 E; H = 03 14 17,7 h = 33 km; M = 5,2 (GS) Vanuatu Islands.
13	ZH	ePKP	22	33	47,5		Ep.: 15,3 S; 173,5 W; H = 22 13 35,4 h = 33 km; M = 5,4 (GS) Tonga Islands.
14	ZH	ePg	05	52	41		Ep.: Local.
14	ZH	i	12	31	16		Ep.: Local.
14	ZH	iPKP	16	35	06		Ep.: 29,3 S; 177,1 W; H = 16 15 01,7 h = 49 km; M = 5,8 (GS) Kermadec Islands.
14	ZH	iPKP	17	01	40,5		Ep.: 29,4 S; 177,0 W; H = 16 41 22,1 h = 33 km; M = 5,4 (GS) Kermadec Islands.
14	ZH	ePKP	21	44	16		Ep.: 57,3 S; 142,4 W; H = 21 24 09,6 h = 10 km; M = 4,9 (GS) South Pacific Cordillera.



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
15 Jul	ZH	ePg	12	19	46,5	815	Ep.: 47,7 N; 7,5 E; H = 12 17 20,1 h = 22 km; M = 4,2 (GS) Switzerland.
	ZH	iSn	12	20	35,8		
	ZH	eSg	12	21	14,5		
15	ZH	ePg	12	45	42,5		Ep.: Local.
	ZH	iSg	12	45	45,5		
16	ZH	iPKP	20	15	49,5	14400	Ep.: 4,5 S; 143,5 E; H = 19 56 46,7 h = 84 km; M = 6,5 (GS) Papua New Guinea.
	EM	i	20	18	04		
17	ZH	iPKP	10	56	32,5		Ep.: 12,5 S; 166,3 E; H = 10 36 49,5 h = 46 km; M = 5,3 (GS) Santa Cruz Islands.
17	ZH	iPKP	20	01	03		Ep.: 12,5 S; 165,9 E; H = 19 42 23,2 h = 33 km; M = 5,8 (GS) Santa Cruz Islands.
	NM	eL	21	08	23,5		
21	ZH	iPKP	21	40	03,5		Ep.: 12,3 S; 166,5 E; H = 21 20 24,7 h = 80 km; M = 5,9 (GS) Santa Cruz Islands.
22	ZH	iPKP	07	25	43		Ep.: 20,3 S; 169,6 E; H = 07 06 23,0 h = 122 km; M = 6,1 (GS) Vanuatu Islands.
29	ZH	ePKP	03	31	39		Ep.: 13,1 S; 166,3 E; H = 03 11 56,3 h = 48 km; M = 5,9 (GS) Vanuatu Islands.
29	ZH	iP	12	33	40		Ep.: 29,3 N; 81,3 E; H = 12 23 12,3 h = 34 km; M = 5,7 (GS) Nepal.
29	ZH	iP	15	09	10	7020	Ep.: 29,6 N; 81,09 E; H = 14 58 40,8 h = 18 km; M = 6,1 (GS) Nepal.
	ZH	eS	15	17	36		
2 Aug	ZH	iP	16	06	15,4		Ep.: 11,1 S; 165,4 E; H = 15 57 26,1 h = 33 km; M = 5,7 (GS) Santa Cruz Islands.
3	ZH	eP	07	25	21,5		Ep.: 52,0 N; 169,3 W; H = 07 11 43 h = 33 km; M = 4,8 (GS) Fox Islands, Aleutian Islands.
4	ZH	iPg	11	40	53,5		Ep.: Local.
5	ZH	ePg	12	20	16,5		Ep.: Local.
	ZH	iSg	12	20	17,5		



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
6 Aug	ZH	iP	10	58	05,5		Ep.: 39,9 N; 21,9 E; H = 13 37 30,5 k = 10 km; M = 5,2 (GS) Kuril Islands.
9	ZH	iP	05	57	19,2		Ep.: 15,9 N; 88,5 W; H = 05 45 09,5 h = 22 km; M = 6,1 (GS) Honduras.
9	ZH	iPg	11	26	32,2		Ep.: Local.
	ZH	iSg	11	26	34,9		
10	ZH	ePKP	05	12	03,9		Ep.: 11,1 S; 165,4 E; H = 04 52 24,4 h = 33 km; M = 5,0 (GS) Santa Cruz Islands.
11	ZH	eP	09	19	37,5		Ep.: 39,3 N; 22,6 E; H = 09 15 58,3 h = 17 km; M = 5,1 (GS) Greece.
12	ZH	iP	12	17	16,1		Ep.: 64,7 N; 17,2 W; H = 12 11 44,4 h = 10 km; M = 5,2 (GS) Iceland.
	ZH	ePP	12	18	52,1		
12	ZH	iSg	13	06	40,3		Ep.: Local.
13	ZH	e	10	56	46,2		Ep.: 12,1 S; 166,0 E; H = 10 37 48,9 h = 33 km; M = 5,2 (GS) Santa Cruz Islands.
13	ZH	iP	20	55	15,2		Ep.: 8,8 N; 39,9 W; H = 20 46 22 h = 10 km; M = 5,1 (GS) Central Mid-Atlantic Ridge.
13	ZH	iPg	15	06	20,2		Ep.: Local.
18	ZH	ePn	03	46	36,7		Ep.: 35,6 N; 10,5 W; H = 03 43 54,5 h = 5 km; M = 4,9 (SSIS) North Atlantic Ocean.
	ZH	eSn	03	48	32,7		
18	ZH	iP	15	20	41,7		Ep.: 1,9 S; 80,0 W; H = 15 07 52,6 h = 55 km; M = 5,6 (GS) Near Coast of Ecuador.
20	ZH	iPg	14	06	52,4		Ep.: Local.
	ZH	iSg	14	06	53,6		
20	ZH	ePg	14	22	12,5		Ep.: Local.
	ZH	iSg	14	22	13,9		
21	ZH	eP	22	22	39,8		Ep.: 2,0 S; 68,1 E; H = 22 11 33 h = 10 km; M = 5,3 (GS) Carlsberg Ridge.



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
22 Aug	ZH	ePg	11	00	39,2		Ep.: Local.
24	ZH	iP	20	29	59		Ep.: 15,2 S; 173,7 W; H = 20 10 04,2 h = 39 km; M = 6,0 (GS) Tonga Islands.
	ZH	ePP	20	33	49		
28	ZH	ePg	12	21	17		Ep.: Local.
2 Sep	ZH	iPg	11	55	39,5		Ep.: Local.
2	ZH	iPg	16	11	16		Ep.: Local.
3	ZH	iP	22	24	47		Ep.: 3,2 N; 78,2 W; H = 22 12 39,1 h = 33 km; M = 5,7 (GS) South of Panama.
8	ZH	iPg	12	15	40		Ep.: Local.
12	ZH	iPg	12	01	36,3		Ep.: Local.
12	ZH	ePg	13	34	51		Ep.: Local.
13	ZH	iPg	11	49	28		Ep.: Local.
	ZH	iSg	11	49	31		
15	ZH	ePg	12	02	37		Ep.: Local.
24	ZH	ePg	11	25	04,1		Ep.: Local.
24	ZH	iP	18	07	35,5	10450	Ep.: 35,4 N; 139,9 E; H = 17 54 24,1 h = 73 km; M = 6,0 (GS) Near East Coast of Honshú, Japan.
	ZH	e	18	11	12,5		
25	ZH	iSg	13	39	42,5		Ep.: Local.
26	ZH	ePKP	15	39	41,7		Ep.: 3,2 S; 142,2 E; H = 15 20 37,1 h = 33 km; M = 5,9 (GS) Papua New Guinea.
	ZH	iPP	15	41	45,7		
26	ZH	iP	17	47	55,4		Ep.: 15,0 S; 167,3 E; H = 17 28 15,4 h = 116 km; M = 5,9 (GS) Vanuatu Islands.
29	ZH	iSg	13	15	40,3		Ep.: Local.



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
4 Oct	ZH	eP	15	16	50,5		Ep.: 36,9 N; 28,8 E; H = 15 12 03,8 h = 10 km; M = 4,9 (GS) Dodecanese Islands.
10	ZH	iPn	12	16	42	583	Ep.: 36,2 N; 1,3 E; H= 12 25 23,5 h = 10 km; M = 5,5 (SSIS) Algeria.
10	ZH	iPn	14	13	45		Ep.: 36,2 N; 1,5 E; H= 14 12 28,8 h= 16,4 Km; H=4,1 (SSIS) Algeria
10	ZH	iPn	14	46	09		Ep.: 36,4 N; 1,3 E; H = 14 44 55 h = 5 km; M = 5,1 (SSIS) Algeria.
10	ZH	ePn	15	26	55		Ep.: 36,0 N; 1,3 E; H = 15 25 37,0 h = 5 km; M = 4,2 (SSIS) Algeria.
	ZH	iSn	15	27	54		
10	ZN	iPn	15	38	08,5		Ep.: 36,4; 1,7 E; H = 15 36 55,2 h = 5 km; M = 4,0 (SSIS) Algeria.
10	NM	iPn	15	40	27		Ep.: 36,1 N; 1,7 E; H = 15 39 09,2 h = 5 km; M = 5,2 (SSIS) Algeria.
	NM	iSn	15	41	22		
10	ZH	ePn	17	16	33		Ep.: 36,4 N; 1,7 E; H = 17 15 18,7 h = 10 km; M = 3,5 (SSIS) Algeria.
10	ZH	iPn	17	33	53		Ep.: 36,0 N; 1,5 E; H = 17 32 59,9 h = 13,2 km; M = 4,7 (SSIS) Algeria.
10	ZH	iPn	19	08	52		Ep.: 36,4 N; 1,6 E; H= 19 08 02, 5 h= 5km; H=4,8 (SSIS) Algeria.
10	ZH	ePn	20	23	56		Ep.: 36,3 N; 1,7 E; H = 20 22 40,6 h = 5 km; M = 4,8 (SSIS) Algeria.
11	ZH	ePn	00	01	17		Ep.: 36,3 N; 1,3 E; H = 00 00 02,5 h = 10 km; M = 3,9 (SSIS) Algeria.
11	ZH	ePn	01	30	43		Ep.: 36,3 N; 1,4 E; H = 01 29 19,8 h = 5 km; M = 3,8 (SSIS) Algeria.
11	ZH	iPn	05	42	12		Ep.: 36,4 N; 1,5 E; H = 05 40 57,4 h = 5 km; M = 4,3 (SSIS) Algeria.
	ZH	Sn	05	43	09		
13	ZH	iPn	06	38	54,6		Ep.: 36,4 N; 1,7 E; H = 03 37 40,2 h = 5 km; M = 4,2 (SSIS) Algeria.
	NM	eSn	06	39	53,6		



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
14 Oct	ZH	iPn	17	36	15		Ep.: 36,5 N; 1,6 E; H = 17 35 00,6 h = 5 km; M = 4,3 (SSIS) Algeria.
	ZH	eSn	17	37	10		
15	ZH	iPn	03	18	37,3		Ep.: 36,4 N; 1,6 E; H = 03 17 24,9 h = 13,5 km; M = 3,8 (SSIS) Algeria.
	ZH	iSn	03	19	32,3		
20	ZH	eSg	14	19	42,3		Ep.: Local.
21	ZH	ePn	16	52	09		Ep.: 36,4 N; 1,5E; H = 16 50 56,7 h = 15 km; M = 3,9 (SSIS) Algeria.
	ZH	eSn	16	53	07		
22	ZH	iPn	16	24	30,2		Ep.: 36,5 N; 1,4 E; H = 16 23 16,7 h = 8 km; M = 4,8 (SSIS) Algeria.
	ZH	eSn	16	25	24,2		
23	ZH	ePg	13	18	41,5		Ep.: Local.
	ZH	iSg	13	18	59		
24	ZH	ePKP	03	45	05,6		Ep.: 22,0 S; 170,2 E; H = 03 25 34,4 h = 33 km; M = 5,8 (GS) Loyalty Islands.
	ZH	iPKKP	03	46	03,6		
24	ZH	iP	15	06	06,6	9505	Ep.: 18,2 N; 98,2 W; H = 14 53 35,1 h = 72 km; M = 6,4 (GS) Central Mexico.
24	ZH	ePg	16	31	30,6		Ep.: Local.
	ZH	iSg	16	31	33,3		
27	ZH	ePKP	08	55	22,3		Ep.: 0,1 S; 24,8 W; H = 08 46 40,8 h = 10 km; M = 5,5 (GS) Central Mid Atlantic Ridge.
	ZH	i	08	57	13,3		
27	ZH	eP	13	24	38,3		Ep.: 13,1 S; 166,1 E; H = 13 04 54,9 h = 33 km; M = 5,3 (GS) Vanuatu Islands.
	ZH	i	13	28	33,3		
28	ZH	eP	02	58	10,5		Ep.: 30,5 S; 177,9 W; H = 02 38 10 h = 33 km; M = 5,6 (GS) Kermadec Islands.
28	ZH	ePg	12	35	14,5		Ep.: Local.
28	ZH	eP	12	31	37,5		Ep.: 7,2 N; 74,8 W; H = 23 20 00,0 h = 72 km; M = 5,1 (GS) Northern Colombia.
29	ZH	ePn	01	31	24		Ep.: 36,6 N; 1,7 E; H = 01 30 13,8 h = 5 km; M = 3,5 (SSIS) Algeria.



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
29 Oct	ZH	iPg	16	36	24		Ep.: Local.
29	ZH	ePKP	18	03	48		Ep.: 21,5 S; 169,5 E; H = 17 44 14,0 h = 33 km; M = 5,5 (GS) Loyalty Islands.
	ZH	ePP	18	08	11		
30	ZH	ePKP	10	12	56,5		Ep.: 22,2 S; 169,5 E; H = 09 53 06,3 h = 33 km; M = 5,8 (GS) Loyalty Islands.
	ZH	ePP	10	17	16,5		
30	ZH	iPg	13	37	46,5		Ep.: Local.
	ZH	iSg	13	37	49,5		
30	ZH	iPn	23	39	28,5		Ep.: 36,3 N; 1,6 E; H = 23 38 13,1 h = 5 km; H = 4,5 (SSIS) Algeria.
	ZH	iSn	23	40	23		
1 Nov	ZH	eP	10	55	45,5	5350	Ep.: 0,2 N; 25,5 W; H = 10 48 03,5 h = 10 km; M = 5,2 (GS) Central Mid-Atlantic Ridge.
1	ZH	eP	16	09	02,5		Ep.: 3,2 S; 12,7 W; H = 16 00 45,8 h = 10 km; M = 5,2 (GS) North of Ascension Islands.
1	ZH	eP	23	05	28,5		Ep.: 18,9 N; 107,6 W; H = 22 52 19,6 h = 33 km; M = 5,5 (GS) Off Coast of Jalisco, Mexico.
8	ZH	iPn	02	08	14		Ep.: 36,5 N; 1,5 E; H = 02 07 00,3 h = 5 km; M = 4,3 (SSIS) Algeria.
	ZH	iSn	02	09	05		
	ZH	iSg	02	09	28		
8	ZH	iPn	07	55	38		Ep.: 36,2 N; 1,4 E; H = 07 54 20,1 h = 5 km; M = 4,9 (SSIS) Algeria.
	EM	iS	07	56	57,5		
8	ZH	iP	10	40	06		Ep.: 41,1 N; 124,2 W; H = 10 27 34,0 h = 19 km; M = 6,2 (GS) Near Coast of Northern California.
	ZH	eL	11	07	34		
11	ZH	eP	10	50	27,8	10640	Ep.: 51,4 S; 28,8 E; H = 10 36 58,2 h = 10 km; M = 6,2 (GS) South of Africa.
	ZH	ePP	10	54	18,8		
12	ZH	ePg	15	07	16,4		Ep.: Local.
	ZH	eSg	15	07	18,9		
19	ZH	iP	19	11	59,4		Ep.: 27,3 N; 88,7 E; H = 19 00 46,9 h = 17 km; M = 6,0 (GS) Sikkim.



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
20 Nov	ZH	ePg	15	52	09,7		Ep.: Local.
21	ZH	iSg	12	59	21		Ep.: Local.
23	ZH	iP	18	37	17,7	1100	Ep.: 40,9 N; 15,3 E; H = 18 34 53,8 h = 10 km, M = 6,0 (GS) Southern Italy.
	ZH	iS	18	40	27,7		
24	ZH	iL	11	06	19		Ep.: Local.
24	ZH	eSg	15	57	51		Ep.: Local.
25	ZH	eSg	13	02	22		Ep.: Local.
25	ZH	eP	17	09	12		Ep.: 40,7 N; 15,5 E; H = 17 06 44 h = 10 km; M = 4,6 (GS) Southern Italy.
25	ZH	eP	18	30	16		Ep.: 40,6 N; 15,4 E; H = 18 28 21,5 h = 10 km; M = 4,9 (GS) Southern Italy.
3 Dec	ZH	ePn	10	32	36,5		Ep.: 36,4 N; 1,6 E; H = 10 31 21,3 h = 5 km; M = 4,9 (SSIS) Algeria.
	ZH	eSn	10	33	32		
5	ZH	iPn	13	33	28		Ep.: 35,9 N; 1,4 E; H = 13 32 06,2 h = 10 km; M = 4,5 (SSIS) Algeria.
7	ZH	iP	17	38	31,3		Ep.: 35,9 N; 1,3 E; H = 17 37 10,5 h = 12,4 km; M = 4,9 (SSIS) Algeria.
14	ZV	iPg	19	06	11		See page 64.
	ZV	iSg	19	06	15		
15	ZH	iPKP	08	32	39	17320	Ep.: 17,6 S; 172,3 W; H = 08 12 45,4 h = 33 km; M = 6,1 (GS) Tonga Islands Region.
	ZH	iPKKP	08	33	05		
17	ZH	iSg	16	32	23		Ep.: Local.
17	ZH	eP	16	34	14		Ep.: 49,5 N; 129,5 W; H = 16 21 58,8 h = 10 km; M = 5,9 (GS) Vancouver Islands.
18	ZH	eP	12	40	58,7		Ep.: 36,0 N; 44,67 E; H = 12 34 15,6 h = 33 km; M = 5,4 (GS) Iran-Iraq Border Region.



SEISMIC OBSERVATIONS

1980

Date	Comp.	Phase	Time TU			Δ km	Remarks
			h	m	s		
18 Dec	ZH	iSn	13	13	02,7		Ep.: Local.
23	ZH	iPn	12	02	44		Ep.: 44,7 N; 9,9 E; H= 12 01 03,1 h = 10 km; M = 4,0 (GS) Northern Italy.
23	ZH	iSg	12	50	57		Ep.: Local.
24	ZH	iPn	12	48	57		Ep.: 35,9 N; 1,3 E; H = 12 47 32,6 h = 8 km; M = 3,9 (SSIS) Algeria.
	ZH	iSn	12	49	57		
24	ZH	iL	13	04	23		Ep.: Local.

