Seismological Bulletin 1959

Uppsala: 59° 51.5′ N, 17° 37.6′ E
Kiruna: 67° 50.4′ N, 20° 25.0′ E
Skalstugan: 63° 34.8′ N, 12° 16.8′ E
Göteborg: 57° 41.9′ N, 11° 58.7′ E

By

Markus Båth

Seismological Bulletin 1959

By

Markus Båth

Uppsala (abbreviated Up in the bulletin)

Location and ground: 59°51.5′N, 17°37.6′E; 14 m above mean sea level; granite.

Instruments: Wiechert 1000 kg pendulum E,N; Benioff variable reluctance E,N,Z (long-period) and E′,N′,Z′ (short-period); Press-Ewing E,N,Z (ultralong-period).

Instrumental constants for 1959:

a) Wiechert

T_0=seismograph free period,
V =static magnification,
ε =damping ratio,
r =max. deviation due to friction.

Instrument	Date 1959	T_0 sec	V	ε	r mm
Wiechert E	Jan 10	10.8	191	4.5	1.1
	July 2	10.8	185	4.4	0.7
Wiechert N	Jan 10	9.5	190	4.0	1.2
	July 2	9.8	181	4.7	1.0

Concerning the method of determination, see Wiechert (1903).

b) Benioff

T_0 =seismometer free period,
T_g =galvanometer free period,
l_0 =recording distance (from galvanometer lense to record),
$2\,\sigma_g l_0$=transference factor, where σ_g=a quantity depending on the electrodynamic properties of the transducer and the galvanometer (Benioff, 1932; Chakrabarty, 1949; Båth, 1959).
V_{max}=maximum dynamic magnification.

Instrument	Date	T_0 sec	T_g sec	$2\sigma_g l_0$ sec^{-1}	V_{max}
Benioff E	Feb 7, 1956	1.0	87	2.509×10^4	2000
	Mar 19, 1959	1.0	74	3.538×10^4	2810
Benioff N	Feb 7, 1956	1.0	85	3.705×10^4	2940
	Mar 19, 1959	1.0	87	3.267×10^4	2600
Benioff Z	Feb 7, 1956	1.0	89	1.892×10^4	1520
	Mar 19, 1959	1.0	76	2.085×10^4	1660
Benioff E'	July 10, 1956	1.0	0.7	2.090×10^6	88310
Benioff N'	July 10, 1956	1.0	0.7	2.363×10^6	99840
Benioff Z'	July 17, 1956	1.0	0.7	1.316×10^6	55580

Damping is critical both for seismometers and galvanometers. The test-weight method for determination of magnification curves for short-period instruments is not very reliable, and a comparison of parallel records of Benioff Z' and Grenet-Coulomb Z' suggests that the last value given above for V_{max} should be reduced to about 40000 (Båth, 1959). Similar reductions apply to E' and N'.

c) Press-Ewing E,N,Z (ultralong-period). The following constants were determined in January, 1958 (T_o, T_g), March, 1959 (T_g) and in March, 1962 (V_{max}):

Instrument	T_0 sec	T_g sec Jan 1958	T_g sec Mar 1959	V_{max}
Press-Ewing E	15.0	87	91	2500
Press-Ewing N	15.0	81	86	2700
Press-Ewing Z	15.0	85	118	2200

The seismometers are overdamped by a factor of 2—3 and the galvanometers are overdamped by a factor of 6.

This installation is on loan from the Lamont Geological Observatory, Columbia University, New York, under IGY arrangements.

In the bulletin only the readings from Benioff E, N, Z, Z' are reported as a rule. Readings from other records are included as supplements to those mentioned, when this seems necessary.

Kiruna (abbreviated Ki)

Location and ground: 67° 50.4'N, 20° 25.0'E; 390 m above mean sea level; porphyry.

Instruments: Grenet-Coulomb Z', Galitzin E, N, Z.
Instrumental constants for 1959:

a) Grenet-Coulomb

In addition to the notation already given, we introduce the following:

k_g = transference factor,
L = reduced pendulum length.

Instrument	Date	T_0 sec	T_g sec	k_g sec^{-1}	L cm	l_0 cm	V_{max}
Grenet-Coulomb Z'	Sep 28, 1957	1.4	0.7	13936	12.2	100.6	11150

Damping is critical for seismometer and galvanometer.
Reference is made to Grenet (1946), Galitzin (1914), and Byerly (1942).

b) Galitzin
In addition to the notation above we introduce
μ^2 = seismometer damping (Galitzin, 1914).

Instrument	Date	T_0 sec	T_g sec	μ^2	k_g sec^{-1}	L cm	l_0 cm	V_{max}
Galitzin E	Sep 27, 1957	11.8	11.8	+0.11	72.6	16.0	135.6	780
Galitzin N	Sep 28, 1957	12.8	11.9	+0.38	67.2	15.2	136.1	910
Galitzin Z	Sep 27, 1957	9.6	11.6	−0.37	234.2	41.0	135.3	740

Galvanometer damping is critical.

In February, 1959, the earlier pendulum clock was replaced by a quartz clock. This provides both the minute marks and controlled frequency for the drum motors, and has thus increased the accuracy of time readings.

Readings from all Kiruna records are reported in the bulletin.

Skalstugan (abbreviated Sk)

Location and ground: 63° 34.8′N, 12° 16.8′E; 580 m above mean sea level; gneiss.

Instrument: Grenet-Coulomb Z′.

Instrumental constants for 1959:

Instrument	Date	T_0 sec	T_g sec	k_g sec^{-1}	L cm	l_0 cm	V_{max}
Grenet-Coulomb Z′	Nov 21, 1955	1.4	0.8	~16000	~12	~100	~12000

Seismometer and galvanometer damping is critical.

The constants were checked on October 1, 1957.

Göteborg (abbreviated Gb)

Location and ground: 57° 41.9′N, 11° 58.7′E; 66 m above mean sea level; gneiss.

Instrument: Grenet-Coulomb Z′.

The instrument is operated with the same constants as when it was installed at Uppsala (1951—1957).

Instrument	Date	T_0 sec	T_g sec	k_g sec^{-1}	L cm	l_0 cm	V_{max}
Grenet-Coulomb Z′	Jan 19, 1952	1.4	0.5	16900	11.8	100	10530

Both seismometer and galvanometer damping is critical.

General remarks

In the presentation of the material we have followed the same principles as introduced in our bulletin for 1956.

All correspondence concerning our stations or records etc should be addressed to the central station: Seismological Institute, Uppsala, Sweden.

For notation of phases, see "Observations séismographiques" for Uppsala or Kiruna 1955. Concerning channel waves, see a review by Båth (1958).

The time used is Greenwich Mean Time (GMT).

C=compression,

D=dilatation,

μ=amplitude in microns, $1\mu=10^{-3}$ mm,

s=period in seconds,

$\triangle$=epicentral distance,

h=depth of hypocenter,

Magn.=magnitude, determined in the Gutenberg-Richter scale (M) by applying our station corrections (Båth, 1956).

Amplitudes are given only for Uppsala and Kiruna. The geographical names indicate only the region where the epicenter in located.

In the analysis of the records, use has been made of all available bulletins, especially those from Bureau Central International de Séismologie (BCIS), Strasbourg, and from United States Coast and Geodetic Survey (USCGS), Washington, D.C. The tables and methods of Jeffreys and Bullen (1940), Gutenberg and Richter (1937), Båth (1943 and 1947), Gutenberg (1951) have been used.

In preparing this bulletin the author has in different parts been assisted by Mrs. I. Pettersson and Mrs. I. Cederlund. Mr. S. Lindell at the Geophysical Observatory at Kiruna was in charge of the daily routine work at the Kiruna seismograph station. Mr. S. Persson and Mr. G. Tidefors were in charge of the daily routine work at Skalstugan and Göteborg respectively. The Swedish Natural Science Research Council has supported the work by giving funds for salaries to one assistant at Uppsala and for the printing of this volume.

References

Båth M., Sur une méthode pour calculer les tremblements de terre à foyer profond à l'aide des phases d'une seule station séismographique, Kungl. Svenska Vet.-akad:s Handl., 3:e ser., Bd 20, No. 4, 22 pp., 1943.

— Travel times of the principal earthquake waves for Uppsala, Bull. Geol. Inst. Uppsala, Vol. 32, pp. 105—129, 1947.

— The problem of earthquake magnitude determination, Publ. Bur. Centr. Séism. Int., Sér. A, Trav. Sci., Fasc. 19, pp. 5—93, 1956.

— Channel waves, Journ. Geophys. Res., Vol. 63, No. 3, pp. 583—587, 1958.

Båth M., Development of instrumental seismology in Sweden in 1949—1958, Geof. pura e appl., Vol. 43, No. 2, pp. 108—130, 1959.

Benioff H., A new vertical seismograph, Bull. Seism. Soc. Amer., Vol. 22, pp. 155—169, 1932.

Byerly P., Seismology, Prentice-Hall, New York, 256 pp., 1942.

Chakrabarty S. K., Response characteristics of electromagnetic seismographs and their dependence on the instrumental constants, Bull. Seism. Soc. Amer., Vol. 39, pp. 205—218, 1949.

Galitzin B., Vorlesungen über Seismometrie, Teubner, Leipzig u. Berlin, 538 pp., 1914.

Grenet G., L'étalonnage des séismographes électromagnétiques modernes, Ann. Géophys., Vol. 2, pp. 329—338, 1946.

Gutenberg B., PKKP, P'P', and the earth's core, Trans. Amer. Geophys. Union, Vol. 32, No. 3, pp. 373—390, 1951.

Gutenberg B. and Richter C. F., Données relatives à l'étude des tremblements de terre à foyer profond, Publ. Bur. Centr. Séism. Int., Sér. A, Trav. Sci., Fasc. 15, 70 pp., 1937.

Jeffreys H. and Bullen K. E., Seismological tables, Brit. Ass. for the Advancement of Science, 48 pp., 1940.

Wiechert E., Theorie der automatischen Seismographen, Abh. d. K. Ges. d. Wiss. zu Göttingen, Math.-Phys. Kl., N.F., Bd II, No. 1, 128 pp., 1903.

Tables

1959

Jan 1	Up	iP		02	12	06
		iS		02	16	31
				μ	s	
		P	N	0.6	3	
		P	z	1.3	4	
		P	z'	2.0	3	
		S	N	1.9	10	
		M	E	0.9	17	
		M	N	1.1	20	
		M	z	1.9	18	
		△=2800 km=25°.				
	Ki	iP		02	10	38C
		iS		02	13	59
				μ	s	
		P	N	1.3	6	
		P	z	1.0	6	
		P	z'	1.2	1.5	
		S	N	1.6	4	
		M	E	1.5	16	
		M	N	1.9	16	
		M	z	3.2	16	
		△=1900 km=17°.				
	Sk	iP		02	11	26
		i		02	12	02
	Gb	i(P)		02	12	29

Off northeast coast of Greenland.
Magn.=5.9 (Up, Ki).

» 1	Ki	iP	07	54	39
	Sk	iP	07	54	14

Eastern Mediterranean.

» 1	Ki	iP	16	04	10

Eastern Mediterranean.

» 2	Up	iP		03	26	43C
				μ	s	
		P	z'	0.1	0.5	
	Ki	iP		03	25	50

Aleutian Islands.

» 2	Up	iP		05	23	42
		iS		05	26	47
		i		05	27	04
				μ	s	
		P	z'	0.1	0.6	
		△=1900 km=17°.				
	Ki	eP		05	24	51
		eRg		05	30	24

1959

Jan 2 (cont.)		M	E	0.8	14
		M	z	0.7	13
	Sk	iP		05 23	54C
		iRg		05 28	05
	Gb	iP		05 22	53
		iS		05 25	16
		△=1450 km=13°.			

Brittany, France.

» 2	Ki	iP	12	03	39

Eastern Mediterranean.

» 3	Up	eP		08	04	49
				μ	s	
		M	E	2.4	18	
		M	N	3.1	16	
		M	z	4.2	20	
	Ki	iP		08	05	51
				μ	s	
		M	E	0.9	17	
		M	N	0.8	17	
		M	z	1.2	17	
	Sk	eP		08	05	25

Turkey.

» 3	Ki	eL		12	11
				μ	s
		M	E	1.8	20
		M	N	0.6	16
		M	z	2.4	20

Peru.

» 4	Up	iP		04	07	20
		i		04	07	30
				μ	s	
		P	z'	0.1	0.7	
		M	N	1.6	18	
		M	z	1.6	18	
	Ki	iP		04	08	08
				μ	s	
		M	E	2.9	20	
		M	N	1.2	18	
		M	z	2.6	23	
	Sk	eP		04	08	02
		i		04	08	21

Arabian Sea. Magn.=5.6 (Up, Ki).

» 4	Up	iP	08	07	14
		ipP	08	07	40
	Ki	iP	08	06	27

Column 1

```
1959
Jan  4
(cont.)
            P      z'      0.1   0.8
                          μ     s
Kurile Islands. h=100 km (Up).

»  4  Up  iP      22  41  47
      Ki  iP      22  41  50
      Kashmir-Tibet.

»  4  Up      —
                          μ     s
          M    E         0.8   16
          M    N         1.8   15
          M    z         2.9   17
      Ki  iP      23  21  17
      Sk  eP      23  20  52
      Mediterranean Sea, near Crete.

»  5  Up  iP      00  49  02

»  5  Up  iP      01  48  15

»  5  Up  e(P)    02  42  28

»  5  Up  iP      04  58  46
          eS      05  02  25
      △=2150 km=19½°.
      Ki  eP      04  59  50
          i       05  00  02
      Sk  iP      04  59  54
      Turkey.

»  5  Sk  iP      05  06  20
      Baffin Bay.

»  5  Up  iP      08  26  30
      Ki  iP      08  27  07
                          μ     s
          P    z'        0.1   1.0
      Sk  iP      08  27  02
      Arabian Sea.

»  5  Up  iPKP    10  06  02
          i       10  06  09
          i(PKS)  10  09  34
                          μ     s
          M    N         1.6   25
          M    z         2.2   25
      △~15300 km~138°.
      Ki  iPKP    10  05  56
          i(PKS)  10  09  09
                          μ     s
          PKP   z'        0.3   1.6
          (PKS) z'        0.2   1.6
          M    E         1.5   20
          M    N         1.4   20
          M    z         1.3   19
      △~14550 km~131°.
      Sk  iPKP    10  06  00
          i(PKS)  10  09  30
      Loyalty Islands.
      Magn.=5.9 (Up, Ki).
```

Column 2

```
1959
Jan  6  Ki  iP      01  36  14
            i       01  36  26
                          μ     s
            P    z'        0.1   1.0
      Aleutian Islands.

»  6  Ki  iP      04  12  41
      Turkey.

»  6  Up  iP      10  50  30
                          μ     s
          P    z'        0.1   0.5
      Ki  iP      10  49  58
      Sk  iP      10  50  27
      Bonin Islands (h~450 km).

»  6  Up  iP      12  16  45
      Ki  iP      12  15  53
          i       12  16  05
      Sk  iP      12  16  22
      Aleutian Islands.

»  6  Up  iP      12  40  41 C
                          μ     s
          P    z'        0.1   0.6
      Ki  iP      12  39  52
      Sk  iP      12  40  28 D
      Kurile Islands.

»  6  Ki  iP      14  35  00 C
      Turkey.

»  6  Ki  iP      15  01  29
      Java.

»  7  Up  iP      05  20  52 C
          iPP     05  22  16
                          μ     s
          P    z'        0.1   0.5
      △=4450 km=40°.
      Ki  iP      05  21  28 C
                          μ     s
          P    z'        0.3   1.0
      Sk  iP      05  21  27
      Gb  iP      05  21  07
      Iran. Magn.=6.3 (Up, Ki).

»  7  Up  iP      22  27  16
                          μ     s
          M    E         1.7   16
          M    N         1.6   14
          M    z         1.8   17
      Ki  iP      22  28  21
                          μ     s
          M    E         1.0   12
          M    N         0.5   16
      Gb  iP      22  27  19
      Turkey.

»  8  Up  iP      01  45  03
          i       01  45  16
```

Column 3

```
1959
Jan  8
(cont.)     iS      01  54  09
            i       01  54  49
                          μ     s
          P    z'        0.2   1.0
          S    N         2.5    5
          M    E         1.6   20
          M    N         1.8   17
          M    z         1.6   18
      △=7900 km=71°.
      Ki  iP      01  45  11
          i       01  46  04
          iS      01  54  27
                          μ     s
          P    z'        0.4   1.0
          S    E         2.0    9
          S    N         2.6    9
          M    E         1.2   18
          M    N         1.0   19
      △=8100 km=73°.
      Sk  iP      01  44  50
          i       01  45  46
      Gb  iP      01  44  48
          i       01  45  43
      Windward Islands (h~100 km).
      Magn.=6.6 (Up, Ki). The phase
      nearly 1 min after P (Ki, Sk, Gb)
      could be the P of another shock
      in about the same location.

»  8  Up  iP      08  32  07 C

»  8  Ki  eL      23  30
                          μ     s
          M    E         1.1   20
          M    N         0.6   19
          M    z         1.3   19
      New Guinea.

»  9  Up  iP      02  00  17
          i       02  00  25
                          μ     s
          P    z'        0.1   0.5
          M    E         2.7   16
          M    N         1.4   16
          M    z         1.3   15
      Ki  iP      02  01  31
          iLi     02  10  19
                          μ     s
          M    E         3.0   17
          M    N         1.0   17
          M    z         1.3   14
      Sk  iP      02  00  56
          i       02  01  04
      Gb  iP      02  00  08
          i       02  00  19
      Greece.

»  9  Up  iP      02  15  43
      Ki  iP      02  15  15
```

Column 4

```
1959
Jan  9
(cont.)                   μ     s
          P    z'        0.1   1.0
      Mariana Islands.

»  9  Ki  iP      18  15  16
      Turkey.

» 10  Up      —
                          μ     s
          M    E         0.7   17
          M    N         0.9   17
          M    z         1.2   17
      Ki  iP      01  42  30 C
      Rhodes Island.

» 10  Up  iP      02  52  12

» 10  Ki  eP      05  36  00

» 10  Up  iPKP    09  37  22 D
      Ki  iPKP    09  37  04
      Kermadec Islands.

» 10  Ki  i(P)    21  14  16
          iL      21  14  20
                          μ     s
          L    z'        0.2   0.8
      Local blast?

» 10  Ki  iP      22  04  52
      Mindanao.

» 11  Up  iP      04  32  46
      Ki  iP      04  33  50
                          μ     s
          P    z'        0.1   1.0
          M    E         1.1   11
          M    N         0.5   16
          M    z         0.7   15
      Sk  iP      04  33  27
      Gb  iP      04  32  40
      Turkey.

» 11  Up  iP      07  35  02
          ipP     07  35  53
          iPP     07  38  27
                          μ     s
          P    z'        0.1   0.6
          pP   z'        0.2   1.0
      Ki  iP      07  34  52
          ipP     07  35  42
          iPP     07  38  08
          eS      07  45  02
          e       07  46  27
                          μ     s
          pP   z'        0.6   1.5
          PP   z'        0.2   1.0
          S    E         1.0   10
          M    E         1.0   19
          M    N         0.6   20
      Sk  iP      07  34  45
```

Column 1

```
1959
Jan 11
(cont.)      ipP        07  35  36
             iPP        07  37  53
      Gb   iP           07  34  50
             ipP        07  35  40
      Guatemala. h=210 km (Up, Ki, Sk,
      Gb). Magn.=6.2 (Up, Ki).

» 11  Ki   iP           08  47  49
      Honshu, Japan.

» 11  Up   iP           16  52  02
           i            16  52  06
      Ki   iP           16  52  00
      Sk   iP           16  52  28
      Sinkiang Province, China.

» 12  Up   iP           06  11  57
           i(Sg)        06  12  38

» 12  Up   iP           14  27  22
           i            14  27  33
      Ki   iP           14  26  37
      Sk   eP           14  27  16
      Gb   eP           14  27  43
      Hokkaido, Japan (h~100 km).

» 13  Up          —
                      μ     s
           M    E    2.5   19
           M    N    1.9   18
           M    z    3.5   17
      Ki   iP           01  28  29
                      μ     s
           M    E    2.4   18
           M    N    2.1   20
           M    z    3.2   17
      Mariana Islands. Magn.=5.8 (Up, Ki).

» 13  Up   iP           07  31  55
                      μ     s
           P    z'   0.1   1.0
      Ki   iP           07  31  01
                      μ     s
           P    z'   0.1   1.0
      Sk   iP           07  31  33
      Gb   iP           07  32  10
      Aleutian Islands. Magn.=5.7 (Up, Ki).

» 13  Ki   iP           07  46  26
                      μ     s
           P    z'   0.1   1.0
           M    N    0.9   19
      Sk   eP           07  46  40
      Sumatra (h~150 km).

» 13  Up   iP           08  46  58
                      μ     s
           P    z'   0.1   0.8
           M    E    1.3   17
```

Column 2

```
1959
Jan 13
(cont.)    M    N    1.2   22
           M    z    1.6   18
      Ki   iP           08  46  54
                      μ     s
           M    E    1.6   17
           M    N    0.6   17
           M    z    1.2   17
      Sk   iP           08  46  42
      Costa Rica (h~100 km).

» 13  Up   i(P)         09  17  03

» 13  Up   iP           09  49  27
      Ki   iP           09  49  47
                      μ     s
           P    z'   0.1   1.2
      Sk   eP           09  49  46
      Gb   iP           09  49  45
      Chagos Islands.

» 13  Up   iP           14  43  01
           i            14  43  16
                      μ     s
           P    z'   0.1   0.5
      Ki   eP           14  42  13
      Sk   iP           14  42  51
      Kurile Islands.

» 14  Ki   iP           04  33  27
      Turkey.

» 14  Ki   iPKP         13  35  43
      Gb   iPKP         13  36  02
      Fiji Islands (h~650 km).

» 15  Up   iSg          15  29  31
           △=440 km=4.0°.
      Sk   eSg          15  29  49
           △=510 km=4.6°.
      Gb   iPg          15  27  53
           iSg          15  28  17
           △=200 km=1.8°.
      South Norway, 59.3° N, 10.0° E.
      Origin time=15 27 17.

» 15  Up   iP           15  51  06
                      μ     s
           P    z'   0.1   0.6
      Ki   iP           15  50  38
                      μ     s
           P    z'   0.1   1.3
      Sk   iP           15  51  07 D
      Gb   iP           15  51  25
      Ryukyu Islands. Magn.=5.9 (Up, Ki).

» 15  Up   iPKP         21  39  05 D
           i            21  39  26
           i            21  40  09
           iSKP         21  42  01
           iPP          21  42  19
```

Column 3

```
1959
Jan 15
(cont.)               μ     s
           PKP   z'   0.9   0.6
           △~15900 km~143°.
      Ki   ePKP         21  38  47
           iSKP         21  41  41
           i            21  41  59
                      μ     s
           SKP   z'   0.5   0.9
           △~15000 km~135°.
      Sk   iPKP         21  39  00
           i            21  39  57
           iSKP         21  41  56
      Gb   iPKP         21  39  09
           ipPKP        21  41  14
      Fiji Islands (h~500 km).

» 16  Up   iP           01  42  22C
                      μ     s
           P    z'   0.3   1.2
           M    E    1.4   18
           M    N    2.0   19
           M    z    2.4   20
      Ki   iP           01  41  30
                      μ     s
           P    z'   0.4   1.4
           M    E    3.0   18
           M    N    1.3   19
           M    z    3.9   19
      Sk   iP           01  42  00
           iPcP         01  42  34
      Aleutian Islands (h~60 km). Magn.=
      6.2 (Up, Ki).

» 16  Up   iP           17  01  29
           i            17  01  32
           i            17  01  42
                      μ     s
           M    E    1.5   17
           M    N    2.0   20
           M    z    2.0   17
      Ki          —
                      μ     s
           M    E    1.6   16
           M    N    1.3   16
           M    z    3.8   23
      Sk   iP           17  01  02
      Queen Charlotte Islands.

» 17  Ki   iP           08  00  33
      Rhodes Island.

» 17  Up   iP           09  37  37
      Ki   iP           09  37  18
      Sk   iP           09  37  41
      Mindanao.

» 17  Up   iP           10  28  26
      Ki   iP           10  27  38
      Kurile Islands.

» 18  Up   iP           07  42  59
      Atlantic Ocean.
```

Column 4

```
1959
Jan 18  Ki   iP         15  58  23
      Aleutian Islands.

» 18  Up   ePKP         22  41  40
           iPKP         22  41  53
           iSKP         22  44  41
           i            22  45  52
           △~15200 km~137°.
      Ki   iPKP         22  41  37
           iSKP         22  44  15
                      μ     s
           SKP   z'   0.2   1.0
           △~14450 km~130°.
      Sk   iPKP         22  41  47
           iSKP         22  44  35
      Gb   iPKP         22  41  40
           iSKP         22  44  52
      Fiji Islands (h~450 km).

» 19  Up   iP           08  24  32
      Kyushu, Japan.

» 19  Up   iP           20  33  47

» 20  Ki   iP           11  21  42
      Turkey.

» 20  Ki   iP           20  47  13C
      Turkey.

» 21  Up   iP           11  20  19
           i            11  20  30
                      μ     s
           P    z'   0.1   0.8
      Ki   iP           11  20  01
                      μ     s
           M    E    1.5   13
           M    z    1.5   14
      Luzon.

» 21  Up   iP           14  06  46
                      μ     s
           P    z'   0.1   0.8
           M    E    1.5   19
           M    N    2.5   20
      Ki   iP           14  07  25
           i            14  07  34
                      μ     s
           P    z'   0.1   1.3
           M    E    1.5   18
           M    N    1.3   15
           M    z    1.0   15
      Sk   iP           14  07  17
      Socotra Island. Magn.=5.6 (Up, Ki).

» 21  Up   iSn          15  22  49
           iSg          15  23  12
           △=420 km=3.8°.
      Sk   eSg          15  23  21
      Gb   iPg          15  21  40
           iSg          15  22  02
           △=190 km=1.7°.
```

1959
Jan 21
(cont.)   South coast of Norway, 59¼°N, 10½°E. Origin time=15 21 06.

```
»  21  Up   iPg        15  31  31
            iSg        15  32  19
            i          15  33  30
            △=410 km=3.7°.
       Sk   e(Sg)      15  32  57
            e          15  34  00
       Gb   iPg        15  30  49
            i          15  30  57
            iSg        15  31  10
            i          15  31  16
            △=180 km=1.6°.
       South coast of Norway, 59¼°N,
       10½°E. Origin time=15 30 17.

»  21  Up   iPg        15  39  58
            iSg        15  40  46
            △=410 km=3.7°.
       Sk   eSg        15  41  18
            △=520 km=4.7°.
       Gb   iPg        15  39  16
            iSg        15  39  36
            △=180 km=1.6°.
       South coast of Norway, 59.2°N,
       10.6°E. Origin time=15 38 43.

»  22  Ki   iP         04  43  33
       Sk   eP         04  43  09
       Aegean Sea.

»  22  Up   iP         05  21  56C
            i          05  22  09
            i          05  23  55
            iPcS       05  26  15
            iS         05  31  18
            iSS        05  36  15
                          μ    s
            P     E    9.3   17
            P     N    11    17
            P     z    37    17
            P     z'   0.5   1.0
            S     E    45    21
            S     N    31    19
            M     E    210   18
            M     N    210   18
            M     z    360   18
            △=8100 km=73°.
       Ki   iP         05  21  16C
            i          05  21  30
            i          05  23  19
            iPP        05  23  34
            iS         05  29  56
                          μ    s
            P     E    9.8   16
            P     N    4.3   14
```

1959
Jan 22
```
(cont.)     P     z    16  14
            P     z'   0.9 1.5
            PP    E    7.3 15
            PP    z    13  14
            S     E    28  13
            S     N    37  18
            M     E    200 19
            M     N    140 19
            M     z    220 18
            △=7350 km=66°.
       Sk   iP         05  21  49C
            i          05  22  24
            iPP        05  24  22
            iPcS       05  26  12
            △=7900 km=71°.
       Gb   iP         05  22  15
            iPP        05  25  08
            △=8450 km=76°.
       Honshu, Japan. Magn.=7.2 (Up, Ki).

»  22  Ki   iP         05  49  30
       Halmahera.

»  22  Up   iP         07  44  17
            i          07  44  20
                          μ    s
            P     z'   0.1   1.0
       Ki   eP         07  43  33
       Sk   iP         07  44  08
       Hokkaido, Japan.

»  22  Up   iP         09  58  05D
            iPcP       09  58  21
                          μ    s
            P     z'   0.1   1.0
            M     E    1.6   18
            M     N    0.9   17
            M     z    1.6   18
       Ki   iP         09  57  25
            iPP        10  00  00
                          μ    s
            P     z'   0.1   1.0
            M     E    1.1   17
            M     N    0.8   16
            M     z    1.8   17
       Sk   iP         09  57  58
            i          09  58  08
       Honshu, Japan. Magn.=5.7 (Up, Ki).

»  22  Up   iP         12  02  10
       Ki   iP         12  01  17
       Kamchatka.

»  23  Ki   iP         00  00  58
       Kamchatka.

»  23  Ki   iP         03  21  21C
       Spitsbergen.
```

1959
```
Jan 23 Ki   iP         07  10  46
       Honshu, Japan.

»  23  Up   iP         07  29  53
       Ki   iP         07  29  00
       Aleutian Islands.

»  23  Ki   iP         19  01  59
       Alaska.

»  24  Up   iP         05  19  55C
            ipP        05  20  18
            i          05  22  04
            iS         05  29  13
                          μ    s
            P     z    0.6   2
            P     z'   0.4   1.0
            M     E    1.8   22
            M     N    1.6   22
            M     z    2.4   20
       Ki   iP         05  19  17
            i          05  19  24
            ipP        05  19  40
            iPP        05  21  44
            iS         05  28  00
                          μ    s
            P     z    0.7   7
            P     z'   0.4   1.1
            PP    z'   0.3   1.4
            S     E    1.7   6
            M     E    1.8   16
            M     N    2.6   22
            M     z    1.9   20
       Sk   iP         05  19  50
            ipP        05  20  13
            iPP        05  22  22
       Gb   iP         05  20  21
       Honshu, Japan. h=90 km (Up, Ki,
       Sk). Magn.=6.4 (Up, Ki).

»  24  Ki   iP         08  04  09
       Borneo.

»  24  Up   iP         10  29  36

»  24  Up   ePKP       11  09  01
       North Island, New Zealand (h~170
       km).

»  24  Up   iP         15  07  02D
       Sk   iP         15  07  46D
       Greece.

»  24  Ki   iP         16  00  36
       Rhodes Island.

»  24  Sk   iP         19  54  44
       Mexico—Guatemala.

»  24  Up   iP         20  02  08
            ePP        20  03  25
```

1959
Jan 24
```
(cont.)     iS         20  07  36
                          μ    s
            P     z'   0.5   1.4
            PP    E    2.7   13
            PP    z    1.6   5
            S     E    5.7   13
            S     N    2.3   10
            M     E    11    16
            M     N    10    15
            M     z    15    18
            △=3900 km=35°.
       Ki                  —
                          μ    s
            P     z'   1.2   2.1
            M     E    13    13
            M     N    6.5   13
            M     z    10    13
       Sk   iP         20  02  04
       Gb   iP         20  01  41
       Azores Islands. Magn.=6.4 (Up, Ki).

»  26  Up   iP         11  43  55C
                          μ    s
            P     z'   0.1   1.1
       Ki   iP         11  45  00
                          μ    s
            P     z'   0.1   1.0
       Gb   iP         11  43  51
       Turkey. Magn.=5.5 (Up, Ki).

»  26  Ki   iP         16  21  55
       Turkey.

»  26  Up   iP         21  55  04
                          μ    s
            P     z'   0.1   0.8
       Ki   iP         21  54  34
       Sk   iP         21  55  05
       Gb   iP         21  55  27C
       Ryukyu Islands.

»  27  Ki   iP         00  31  45
       Eastern Dominican Republic (h~100
       km).

»  27  Up   iP         03  38  49
            i          03  39  00
            iS         03  41  50
                          μ    s
            P     z'   0.1   0.7
            M     E    2.9   20
            M     N    2.2   18
            M     z    2.8   16
            △=1550 km=14°.
       Ki   iP         03  37  33
            i          03  37  41
            eT         03  43  55
            e          03  44  35
                          μ    s
            P     z'   1.0   1.0
            M     E    6.0   14
```

Column 1

```
1959
Jan 27    M       N      1.7   10
(cont.)   M       z      5.8   13
     Sk   iP           03  37  50
          i            03  38  07
          iS           03  39  32
     △=1050 km=9½°.
     Gb   iP           03  39  07
          i            03  39  15
     Northeast of Jan Mayen.

» 27 Up   iP           06  56  29C
     Aleutian Islands.

» 27 Ki   iP           21  18  19C
     Celebes Sea (h~200 km).

» 27 Up   iP           23  43  32C
                      μ     s
          P    z'     0.1   1.0
     Gb   iP           23  43  56C
     Kamchatka.

» 28 Up   iP           01  32  41
     Honshu, Japan.

» 28 Up   iP           14  11  05C
          P    z'     0.2   0.5
     Sk   iP           14  11  03C
     Gb   iP           14  11  24
     Honshu, Japan (h~550 km).

» 28 Sk   e(P)         16  08  45
          e(Sg)        16  08  59

» 29 Up   iP           20  32  32
          iPcP         20  32  56
                      μ     s
          M    E      1.1   17
          M    N      2.4   22
          M    z      1.8   21
     Ki   eP           20  31  39
                      μ     s
          M    E      1.8   20
          M    N      1.6   22
          M    z      2.1   21
     Aleutian Islands.

» 29 Up   iP           21  09  20C
          i            21  09  29
                      μ     s
          P    z'     0.1   0.5
          M    N      1.2   22
          M    z      1.0   20
     Ki   iP           21  08  29
          i            21  09  06
     Aleutian Islands.

» 29 Up   iP           23  27  19D
          i            23  27  22
          iS           23  29  28
```

Column 2

```
1959
Jan 29    i            23  30  05
(cont.)   i!           23  30  15
                      μ     s
          P    z'     1.1   0.8
          S    z'     0.7   0.5
          M    E      17    6
          M    N      27    10
          M    z      35    10
     △=1300 km=11½°.
     Ki   iP           23  25  56
          iS           23  27  04
          iS*          23  27  22
          i            23  35  58
                      μ     s
          P    E      3.4   9
          P    N      3.7   9
          P    z      5.2   9
          P    z'     2.0   1.0
          S    E      14    9
          S    N      18    9
          S    z      9.9   8
          M    E      72    10
          M    N      61    10
          M    z      75    8
     △=600 km=5½°.
     Sk   iP           23  26  21
          iS           23  27  46
     △=850 km=7½°.
     Gb   iP           23  27  40
          iS           23  30  05
          i            23  30  40
          i            23  30  51
     △=1450 km=13°.
     Off coast of Norway.

» 30 Up   eL           01  13
                      μ     s
          M    E      1.1   21
          M    N      1.4   20
          M    z      1.7   20
     Ki   eL           01  17
                      μ     s
          M    E      2.0   21
          M    N      1.8   19
          M    z      2.3   18
     Solomon Islands.

» 30 Up   iP           05  25  43
     Ki   iP           05  25  08
     Hudson Bay.

» 30 Up   iP           13  52  16
     Pamir (h~150 km).

» 30 Up   iP           15  10  26

» 30 Up   iPKP         18  28  42
          iPKP         18  28  46D
          i            18  28  53
          i!           18  30  46
```

Column 3

```
1959
Jan 30                μ     s
(cont.)   PKP  z'     0.5   0.5
     Ki   iPKP         18  28  24C
          i            18  28  31
          i!           18  31  18
                      μ     s
          PKP  z'     0.2   0.7
     Sk   iPKP         18  28  40
          i            18  29  05
          i!           18  31  32
     Gb   iPKP         18  28  47
          iPKP         18  28  55
          iPKP2        18  29  07
          i            18  30  59
     Kermadec Islands. PKP is multiple,
     the first phase with very small am-
     plitude; this feature is most pronounc-
     ed at Up and Gb.

» 30 Up   iP           20  49  59
          i            20  50  01
          eS           20  58  56
                      μ     s
          P    N      0.2   2
          P    z      0.8   2
          P    z'     0.4   1.0
          S    E      1.3   7
          S    N      0.7   6
          M    E      19    18
          M    N      15    21
          M    z      14    18
     △=7550 km=68°.
     Ki   iP           20  49  13
          i            20  49  17
          iS           20  57  39
                      μ     s
          P    z'     0.7   2.0
          S    N      1.5   10
          M    E      38    17
          M    N      21    17
          M    z      14    19
     △=6900 km=62°.
     Sk   iP           20  49  50
     Gb   iP           20  50  23
          i            20  50  25
     Hokkaido, Japan. Magn.=6.4 (Up,
     Ki).

» 30 Up   iP           22  27  49
          i            22  27  51
          iS           22  36  49
                      μ     s
          P    z      0.6   2
          P    z'     0.3   1.0
          M    E      37    17
          M    N      31    20
          M    z      23    19
     △=7600 km=68½°.
     Ki   iP           22  27  05
          i            22  27  17
          iS           22  35  28
```

Column 4

```
1959
Jan 30                μ     s
(cont.)   P    z'     0.3   1.0
          S    E      1.5   8
          S    N      1.3   8
          M    E      60    17
          M    N      31    17
          M    z      26    20
     △=6900 km=62°.
     Sk   iP           22  27  41C
     Gb   iP           22  28  18
          i            22  28  20
     Hokkaido, Japan. Magn.=6.5
     (Up, Ki).

» 30 Up   iP           22  51  39
     Hokkaido, Japan.

» 31 Up   iPKP         06  04  44
     Ki   iPKP         06  04  36
     Gb   iPKP         06  04  48
     Fiji Islands (h~450 km).

» 31 Up   iP           22  09  49D
     Kurile Islands.

Feb 1 Up  iP           03  20  55C
                      μ     s
          P    z'     0.5   0.6
     Ki   iP           03  21  02
                      μ     s
          P    z'     0.5   0.7
     Sk   iP           03  21  21C
     Gb   iP           03  21  17C
     Hindu Kush (h~250 km). Magn.=6.4
     (Up, Ki).

»  1 Ki   iP           04  28  15
     Ascension Island.

»  1 Up   iP           06  41  09
     Ki   iP           06  40  15
     Sk   iP           06  40  45
     Gb   iP           06  41  24
     Aleutian Islands.

»  2 Up   iPKP         03  39  31
                      μ     s
          PKP  z'     0.1   0.9
     Gb   iPKP         03  39  44
     Fiji Islands (h~350 km).

»  2 Ki   iP           04  09  56
     Banda Sea (h~150 km).

»  2 Up   iP           19  26  07
          i            19  26  20
     Ki   iP           19  27  14
     Sk   iP           19  26  45D
     Gb   iP           19  25  54
     Crete.
```

1959

Feb 3	Ki	iP	10	44	01

Outer Mongolia.

» 3	Ki	ePKP	23	42	46

North Island, New Zealand (h ~ 100 km).

» 4	Up	iP	00	17	37
		i	00	17	49

Aleutian Islands.

» 4	Gb	iPKP	08	54	48 C

Fiji Islands.

» 5	Up	iP	01	15	11 C

		μ	s
P	z'	0.5	1.0

	Ki	iP	01	14	16 C

		μ	s
P	z'	0.9	1.0

	Sk	iP	01	14	44
	Gb	iP	01	15	27 C

Alaska (h ~ 100 km). Magn. = 6.6 (Up, Ki).

» 5	Up	iP	10	17	15

		μ	s
P	z'	0.1	0.7

	Ki	iP	10	16	36 C

		μ	s
P	z'	0.1	1.0

	Gb	iP	10	17	37 D

Honshu, Japan. Magn. = 5.9 (Up, Ki)

» 6	Up	iP	05	29	37

Molucca Passage.

» 6	Up	iP	07	30	31

Hokkaido, Japan.

» 6	Up	iP	14	44	01
		i	14	44	04
		iP'P'	15	12	28

		μ	s
P	z'	0.1	0.7
P'P'	z'	0.4	2.0
M	N	4.8	22
M	z	7.4	21

	Ki	iP	14	43	10

		μ	s
M	E	3.3	19
M	N	2.0	20
M	z	5.3	21

	Gb	iP	14	44	19

Aleutian Islands (h ~ 60 km). Magn. = 5.8 (Up, Ki).

» 7	Up	iP	03	30	27
	Ki	iP	03	30	30

» 7	Up	iP	09	50	29 C
		i	09	54	11

1959

Feb 7 (cont.)	iPP	09	54	24
	iSKS	10	01	02
	iPS	10	03	18
	iPKKP	10	07	04

		μ	s
P	E	2.8	18
P	z	14	18
P	z'	0.3	1.2
PP	E	3.0	9
PP	z	6.8	10
PP	z'	1.8	2.7
SKS	E	5.8	9
M	E	45	22
M	N	17	20
M	z	80	23

△ = 10900 km = 98°.

Ki	iP	09	50	30 C
	i	09	54	00
	iPP	09	54	26
	i	09	57	02
	iSKS	10	01	07
	iPS	10	03	22
	iPKKP	10	07	04

		μ	s
P	E	2.5	12
P	z	6.6	10
P	z'	2.3	2.5
PP	E	3.5	11
PP	z	4.8	9
PP	z'	0.9	1.8
SKS	E	16	10
SKS	N	4.6	10
M	E	38	22
M	N	19	21
M	z	38	22

△ = 10900 km = 98°.

Sk	iP	09	50	17 C
	i	09	53	11
	iPP	09	54	03
	iPKKP	10	07	16
Gb	iP	09	50	19
	i	09	53	56
	iPP	09	54	23

Peru. Magn. = 7.1 (Up, Ki).

» 7	Up	iP	10	24	55
	Ki	iP	10	24	28

Mariana Islands.

» 7	Up	iP	11	03	49
	Ki	iP	11	04	06

Atlantic Ocean.

» 7	Up	iP	15	10	05 D

» 7	Up	iP	20	13	17
		i	20	13	25
		i	20	14	17
		iS	20	17	19

1959

Feb 7 (cont.)

		μ	s
P	z'	0.2	0.7
M	N	0.8	15
M	z	0.8	10

△ = 2500 km = 22½°.

Ki	eP	20	14	36

		μ	s
M	E	1.4	17
M	N	0.9	20

Sk	iP	20	13	56
Gb	iP	20	13	01
	i	20	13	07

Greece.

» 8	Up	iP	01	08	19
		eS	01	12	58

		μ	s
P	z	0.3	3
P	z'	0.7	1.0
S	E	1.4	10
M	E	5.2	18
M	N	4.5	17
M	z	7.0	17

△ = 3100 km = 28°.

Ki	iP	01	08	41
	i	01	08	46
	eS	01	13	41

		μ	s
P	z	1.2	4
P	z'	1.2	2.5
S	N	0.6	10
M	E	3.0	18
M	N	2.0	15
M	z	2.9	20

△ = 3400 km = 30½°.

Sk	iP	01	08	04
Gb	iP	01	07	50 D

North Atlantic Ocean. Magn. = 5.6 (Up, Ki).

» 8	Up	iP	05	56	41

Honshu, Japan.

» 8	Up	iPKP	06	04	38
		i	06	04	41
	Ki	iPKP	06	04	31
		iSKP	06	07	08
	Sk	iPKP	06	04	40
		i	06	05	18
		iSKP	06	07	20
	Gb	iPKP	06	04	46

South of Fiji Islands (h ~ 600 km).

» 8	Up	iP	16	12	32
		i	16	12	42
	Ki	iP	16	11	39
	Gb	iP	16	12	56

Kamchatka.

» 8	Up	iPKP	16	13	50
		i	16	13	56
	Gb	iPKP	16	14	01

Kermadec Islands (h ~ 100 km).

1959

Feb 9	Up	iP	04	53	46 D
		eS	05	02	52

		value	value
P	z	2.1	6
P	z'	0.2	0.5
S	N	1.1	9
M	E	3.2	20
M	N	2.3	21
M	z	3.5	20

△ = 7800 km = 70°.

Ki	iP	04	52	54
	i	04	53	05

		μ	s
P	z'	0.3	1.0
M	E	2.2	20
M	N	2.5	22
M	z	2.9	22

Sk	iP	04	53	26
Gb	iP	04	53	59

Aleutian Islands. Magn. = 6.3 (Up, Ki).

» 9	Up	i(pPKP)	21	32	24
	Gb	e(pPKP)	21	32	23

(Solomon Islands; h ~ 100 km).

» 10	Up	iP	23	09	02
	Gb	eP	23	09	29

India-Burma.

» 11	Up	eP	03	56	52
	Ki	eP	03	56	37

Mindanao.

» 11	Up	iP	14	05	08
		i	14	05	14
	Sk	iP	14	04	50

Oaxaca, Mexico.

» 11	Up	e(P*)	17	09	16
		iPg	17	09	29
		i(S*)	17	11	18
		i	17	11	22
		i	17	11	28
		i	17	11	36
		eSg	17	12	01

△ = 1150 km = 10.3°.

Ki	iPg	17	07	51 C
	iSg	17	08	52

		μ	s
Sg	z'	0.2	0.5

△ = 510 km = 4.6°.

Sk	iPg	17	08	20
	i	17	09	35
	iSg	17	09	39

△ = 680 km = 6.1°.

Gb	eSg	17	12	46

△ = 1300 km = 11.7°.

Atlantic Ocean off northern coast of Norway, 69.6°N, 8.8°E. Origin time = 17 06 19.

1959

Feb 11 Ki   e   20 41 15
       eSg   20 41 22
     Kiantajärvi, Finland (after E. Penttilä, Univ. of Helsinki, Publ. in Seismology, 40, 1960).

» 12 Gb   iPKP   00 20 40
     (Fiji Islands).

» 12 Up   iP   09 27 07
     Ki   eP   09 26 15
     Aleutian Islands.

» 12 Up   iP   18 09 54
     Ki   iP   18 09 38
              μ s
       P   z'   0.1   1.0
     Mindanao.

» 13 Up   iPKP   02 04 12 C
       i   02 04 31
              μ s
       PKP   z'   0.2   0.5
     Gb   iPKP   02 04 26
     Southwest of Tonga Islands.

» 13 Up   i(P)   16 16 27

» 14 Up   eL   05 24
              μ s
       M   N   1.0   18
     Ki   eL   05 21
              μ s
       M   N   2.3   27
     Flores Sea.

» 14 Up   i(P)   11 12 05

» 14 Ki   i(Pg)   12 45 11
     Kiantajärvi, Finland (after E. Penttilä, Univ. of Helsinki, Publ. in Seismology, 40, 1960).

» 14 Up   iP   22 20 59
       i   22 21 08
              μ s
       P   z'   0.2   0.8
     Ki   iP   22 20 48 C
              μ s
       P   z'   0.1   1.0
     Sk   iP   22 21 14
     Gb   iP   22 21 15
     India-Burma. Magn.=6.1 (Up, Ki).

» 14 Up   iP   22 36 05 C
       i!   22 36 10
              μ s
       P   z'   0.9   1.0
     Ki   iP   22 35 55
              μ s
       P   z'   0.4   1.0

1959

Feb 14 Sk   iP   22 36 19 C
(cont.) Gb   iP   22 36 20
     India-Burma. Magn.=6.6 (Up, Ki).

» 14 Up   iP   22 58 42
     Ki   eP   22 58 32
     India-Burma.

» 15 Up   iP   04 10 14 D
       i   04 10 20
       iLgl   04 24 05
       i   04 24 35
              μ s
       P   z'   0.2   0.7
     Ki   eP   04 10 01
       i   04 10 10
     Sk   iP   04 10 30
       i   04 10 36
     Sinkiang Province, China.

» 15 Up   iPKP   04 18 23
              μ s
       M   E   7.5   19
       M   N   6.0   21
       M   z   6.6   19
     Ki
              μ s
       M   E   6.2   17
       M   N   8.7   17
       M   z   12   17
     Sandwich Islands. Magn.=6.5 (Up, Ki).

» 15 Up   iPKP   05 01 32
       i   05 01 42
       i   05 01 52
              μ s
       PKP   z'   0.1   0.8
       M   E   13   19
       M   N   15   21
       M   z   15   20
     Ki   iPKP   05 01 49
              μ s
       M   E   15   18
       M   N   18   17
       M   z   26   17
     Sandwich Islands. Magn.=6.8 (Up, Ki).

» 15 Up   iP   05 53 31 C
       i   05 53 34
              μ s
       P   z'   0.1   0.6
     Ki   iP   05 54 29
       i   05 54 34
     Gb   iP   05 53 25
     Turkey.

» 15 Up   eP   20 06 20
     Ki   iP   20 06 24

» 16 Up   iPKP   08 13 04 D
       i   08 13 22

1959

Feb 16   PKP   z' μ s
(cont.)   0.2   0.6
     Ki   iSKP   08 15 38
     Gb   iPKP   08 13 08
     South of Fiji Islands (h ~ 500 km).

» 16 Up   iP   18 07 00
     Nicaragua.

» 17 Up   iP   12 14 12
       i   12 14 16
       iP'P'   12 42 16
       i   12 42 19
              μ s
       P   N   0.4   2
       P   z   1.2   2
       P   z'   0.7   1.2
       M   E   5.3   22
     Ki   iP   12 13 20 D
              μ s
       P   z'   0.4   1.1
     Sk   iP   12 13 50
     Aleutian Islands. Magn.=6.4 (Up, Ki).

» 17 Up   iP   13 01 12 C
       i   13 01 29
       i(pP)   13 01 32
              μ s
       P   z'   0.1   0.5
     Ki   iP   13 00 38
       i(pP)   13 00 59
              μ s
       P   z'   0.1   1.0
     Sk   iP   13 01 08
       i(pP)   13 01 28
     Honshu, Japan. Magn.=6.0 (Up, Ki).

» 17 Up   iP   16 01 06
     Ki   iP   16 00 12
     Alaska.

» 17 Ki   eP   20 20 09
     Canada.

» 18 Up   iPKP   02 15 56
       iSKP   02 18 53
     Gb   iPKP   02 16 08
     South of Fiji Islands (h ~ 500 km).

» 18 Up   iP   06 15 05
     Aleutian Islands.

» 18 Up   iP   12 16 30
     Ki   iP   12 15 47
     Hokkaido, Japan.

» 19 Up   iP   19 14 21

» 19 Up   i(P)   20 38 48

1959

Feb 19   (P)   z' μ s
(cont.)   0.1   0.5
» 19 Ki   eP   21 22 05
     Alaska.

» 20 Up   iP   03 25 57 C
     Kurile Islands.

» 20 Up   iP   04 37 25
     Kurile Islands.

» 20 Up   iP   07 17 31
     Corfu Island.

» 20 Up   iP   18 28 52
              μ s
       P   z'   0.2   1.0
     Ki   iP   18 28 42
              μ s
       P   z'   0.4   1.3
     Guatemala (h ~ 150 km). Magn.=6.2 (Up, Ki).

» 20 Ki   iP   18 49 20

» 20 Ki   i(P)   21 12 12
       i(L)   21 12 17
              μ s
       (L)   z'   0.2   1.3
     Seismic?

» 21 Up   iP   08 39 49
       i   08 40 25
              μ s
       P   z'   0.1   0.6
     Ki   iP   08 39 32 D
     Luzon.

» 22 Up   iP   03 40 37 C
     Tibet.

» 22 Ki   iP   09 02 07
     West Pakistan.

» 22 Ki   iP   10 40 06
     Banda Sea.

» 23 Up   iP   00 07 09 D
     Ki   iP   00 06 23
     Kurile Islands.

» 23 Up   eL   02 53
              μ s
       M   E   1.6   20
       M   N   2.6   21
       M   z   3.5   20
     Ki   eL   02 56
              μ s
       M   E   1.8   20
       M   N   1.3   19

```
1959
Feb 23      M       z         2.4   20
(cont.)  New Britain. Magn.=6.0 (Up, Ki).

»  23  Up   iP            10   41   35 D
            i             10   41   43
            i             10   42   07
                             μ     s
            P      z'     0.2   0.6
Ki          iP            10   40   42 D
                             μ     s
            P      z'     0.2   1.0
Sk          iP            10   41   19 C
Gb          iP            10   41   56 D
            i             10   42   02
       Kamchatka (h∼100 km). Magn.=6.2
       (Up, Ki).

»  23  Up   iP            12   04   35 C
       Kurile Islands.

»  23  Up   iP            16   15   34 D
                             μ     s
            P      z'     0.1   0.8
            M      E      1.8   23
            M      N      2.2   18
            M      z      3.0   21
Ki          iP            16   14   43
                             μ     s
            P      z'     0.2   1.0
            M      E      2.2   20
            M      N      1.3   16
            M      z      1.9   16
Sk          iP            16   15   20
            i             16   15   32
Gb          iP            16   15   54
       Kurile Islands. Magn.=5.8 (Up, Ki).

»  23  Up   iPKP          22   40   43 D
            i             22   40   55
                             μ     s
            PKP    z'     0.2   0.8
Ki          iPKP          22   40   34
Sk          iPKP          22   40   36 D
Gb          iPKP          22   40   57 D
       Kermadec Islands.

»  24  Up   iP            12   58   25 D
Ki          iP            12   58   09 D
       Panay Island, Philippine Islands
       (h∼100 km).

»  25  Up   i(Sg)         10   57   50
                             μ     s
            (Sg)   z'     0.1   0.5

»  25  Up   iP            11   30   20 C
                             μ     s
            P      z'     0.1   0.5
Ki          iP            11   29   49
```

```
1959
Feb 25                       μ     s
(cont.)     P      z'     0.2   1.0
Sk          iP            11   30   18
            iPP           11   33   25
Gb          iP            11   30   38
       Honshu, Japan (h∼550 km). Magn.=
       5.5 (Up, Ki).

»  25  Up   i(Sg)         11   55   14

»  25  Up   i(Sg)         13   25   05

»  25  Up   i(Sg)         13   56   54
                             μ     s
            (Sg)   z'     0.1   0.5

»  25  Gb   iP            15   14   23
            i             15   14   25
       Local? Seismic?

»  25  Up   iP            15   41   31

»  25  Ki   iP            20   21   31 C
       Ceram Sea (h∼200 km).

»  26  Up   iP            01   54   23
       Ryukyu Islands.

»  26  Up   iP            14   23   14
Ki          iP            14   24   25
       Crete.

»  26  Up   iP            20   10   20

»  27  Gb   iPKP          15   40   03
       Tonga Islands.

»  27  Up   iP            21   08   22 C
                             μ     s
            P      z'     0.7   1.0
            M      E      6.1   21
            M      N      2.9   18
            M      z      8.7   20
Ki          iP            21   07   52 C
                             μ     s
            P      z'     0.4   0.9
            M      N      2.3   17
Sk          iP            21   08   22
            i(pP)         21   08   40
Gb          iP            21   08   44 C
            i(pP)         21   09   00
       Ryukyu Islands. Magn.=6.5 (Up, Ki).

»  28  Up   iP            01   43   22
Ki          iP            01   42   30
            i             01   42   40
                             μ     s
            P      z'     0.1   1.0
Sk          iP            01   42   59
Gb          iP            01   43   39
       Aleutian Islands.
```

```
1959
Feb 28  Up   ePKP         12   04   07
Ki           iPKP         12   04   04
       West of Macquarie Island.

»  28  Up   iPKP          13   44   45
            i             13   44   54
       South of Fiji Islands.

»  28  Up   iP            16   29   25
Sk          iP            16   30   08
       Albania.

Mar 1  Ki   eP            00   21   27
       Arctic Ocean.

»   1  Ki   iP            00   28   52

»   1  Up   iP            00   34   53
            i             00   35   20
            i(S)          00   38   02
                             μ     s
            M      E      8.4   21
            M      N      12    21
            M      z      16    22
            △∼1650 km∼15°.
Ki          iP            00   33   15
            i             00   33   19
            i             00   34   39
            iS            00   34   57
            i(T)          00   39   16
            i             00   39   54
                             μ     s
            P      z'     0.3   0.9
            S      E      3.2   7
            M      E      12    14
            M      N      10    17
            M      z      11    16
            △=900 km=8°.
Sk          eP            00   34   03
            i             00   34   06
            i             00   34   20
            e(T)          00   42   01
Gb          iP            00   35   26
       Arctic Ocean. The first P waves at Ki
       and Sk are of very low amplitudes, fol-
       lowed after 3—4 sec by waves of much
       larger amplitudes.

»   1  Up   iP            17   03   11
            i             17   03   22
            i             17   06   49
            iPP           17   07   32
            eSKS          17   13   46
                             μ     s
            P      z'     0.1   1.0
            PP     E      2.0   6
            PP     z      2.9   6
            PP     z'     1.4   2.5
            SKS    E      1.2   6
            SKS    N      1.2   5
```

```
1959
Mar 1        M      E      47   21
(cont.)      M      N      71   25
             M      z      70   24
            △∼11650 km∼105°.
Ki           iP           17   02   53
             e            17   14   36
             ePS          17   15   51
                             μ     s
             M     E      55   20
             M     N      29   20
             M     z      62   23
Gb           iP           17   03   34
             e            17   07   09
             iPP          17   08   07
       New Guinea (h∼100 km). Magn.=7.1
       (Up).

»   1  Up   iP            19   12   24

»   1  Up   eP            20   00   56
Ki          iP            20   02   03
Gb          eP            20   00   48
       Turkey.

»   1  Up   iP            21   07   03
            i             21   07   05
                             μ     s
            P      z'     0.1   0.5

»   1  Up   iP            21   20   26 C

»   1  Up   iP            22   54   15
Ki          eP            22   53   22
       Aleutian Islands.

»   2  Up   eP            01   51   00
            i             01   51   11
            iPP           01   54   51
Ki          iP            01   51   10
                             μ     s
            P      z'     0.3   1.5
       Sumatra.

»   2  Up   iP            02   00   03

»   2  Up   iP            09   41   25

»   2  Up   eP            11   29   25
Ki          iP            11   30   02
Sk          i             11   29   44
Gb          iP            11   29   33
       Iran.

»   2  Ki   i(P)          12   21   39

»   2  Up   iP            15   59   04 C
            i             15   59   13
            iPP           16   00   39
            i(sPP)        16   01   43
            iSS           16   07   57
```

1959
Mar 2
(cont.)

			μ	s
P	z	1.2	2
P	z'	0.4	0.5
PP	z'	0.4	1.0

Ki	iP	15	59	13C
	i	15	59	20

		μ	s
	P	z'	2.0	1.4

Sk	iP	15	59	29C
	iPP	16	01	14
Gb	iP	15	59	26C
	ipP	16	00	13
	isP	16	00	36
	iPP	16	01	11

△=4800 km=43°.
Hindu Kush. h=230 km(Gb).
Magn.=6.3 (Up, Ki).

» 2 Up iP   19 29 44

» 2 Ki iSg   20 18 22
Puolanka, Finland (after E. Penttilä, Univ. of Helsinki, Publ. of Seismology, 40, 1960).

» 3 Ki eP   21 37 45
      iPP   21 38 46
Caucasus.

» 4 Up iP   01 03 29C

		μ	s
	P	z'	0.2	1.0

Ki	iP	01	02	37

		μ	s
	P	z'	0.3	1.0

Sk	iP	01	03	13
Gb	iP	01	03	51C

Kamchatka. Magn.=6.2 (Up, Ki).

» 4 Up iP   20 09 25D
      i   20 09 37

		μ	s
	P	z'	0.3	0.8

Ki	iP	20	09	26D

		μ	s
	P	z'	0.1	1.0

Sk	iP	20	09	42D
	i	20	09	55
Gb	iP	20	09	41

Andaman Islands. Magn.=6.1 (Up, Ki).

» 4 Up iP   23 11 50D

		μ	s
	P	z'	0.1	1.0

Ki	iP	23	11	12D

		μ	s
	P	z'	0.1	1.0

Sk	iP	23	11	45D
	iPP	23	14	14

Honshu, Japan (h~200 km). Magn.=5.7 (Up, Ki).

1959
Mar 5 Up iP   00 25 34D
      iPcP   00 26 14

		μ	s
M	N	1.2	22
M	z	1.4	20

Ki	iP	00	24	40
Sk	iP	00	25	17
Gb	iP	00	25	59

Kamchatka.

» 5 Up iP   05 15 12
      i   05 15 20
Kurile Islands.

» 5 Up i(Sg)   05 55 52

» 5 Sk ePKP   06 02 56
Kermadec Islands.

» 5 Up iP   14 20 42D

		μ	s
	P	z'	0.1	0.5

Ki	iP	14	19	56
Sk	iP	14	20	31
Gb	iP	14	21	01

Kurile Islands (h~100 km).

» 5 Up iPKP   16 48 44D
Sk   iPKP   16 48 33
Kermadec Islands.

» 5 Up iP   23 07 58
      i   23 08 05
      i   23 08 11

		μ	s
	P	z'	0.1	0.5

Ki	iP	23	07	59
	i	23	08	10

		μ	s
	P	z'	0.2	1.0

Sk	iP	23	08	14
	i	23	08	27
Gb	eP	23	08	31
	i	23	08	46

Sumatra (h~100 km). Magn.=6.3 (Up, Ki).

» 6 Sk ePKP   21 00 52
Solomon Islands.

» 7 Ki iP   00 40 07
      iSg   00 41 15

» 7 Up iP   03 52 45
      i   03 53 14

» 7 Ki i(P)   08 55 01

» 7 Ki iP   09 25 27
Sk   iP   09 25 45
Sumatra (h~100 km).

1959
Mar 7 Up iP   15 53 13
Ki   iP   15 52 21
Gb   iP   15 53 28
Alaska.

» 8 Up iP   07 08 21

» 8 Up iP   11 21 42
Sk   iP   11 22 25
Gb   iP   11 21 33
Albania.

» 8 Up i(PP)   14 56 16
Ki   ePP   14 57 10
Gb   iPP   14 56 51
Iran (h~60 km).

» 9 Ki iP   07 22 43D
Aegean Sea.

» 9 Up iP   10 30 54
Ki   iP   10 30 35
Samar, Philippine Islands.

» 9 Up iP   18 55 31
      ipP   18 55 47

		μ	s
	pP	z'	0.3	1.5

Ki	iP	18	54	50C
	ipP	18	55	05
Sk	eP	18	55	24
	ipP	18	55	38
Gb	iP	18	55	54

Honshu, Japan. h=60 km (Up, Ki, Sk).

» 9 Up eP   22 15 26
      ipP   22 16 08

Sk	iP	22	15	06C
	ipP	22	15	48
Gb	iP	22	15	17
	ipP	22	16	01

Guatemala. h=170 km (Up, Sk, Gb).

» 10 Up iP   07 10 55
Honshu, Japan.

» 10 Up iP   13 17 22
       i   13 17 47

» 10 Up iPn   15 16 46
       iP*   15 16 50
       iPg   15 16 52
       iSn   15 17 15
       iS*   15 17 31
       iSg   15 17 36

		μ	s
Pg	z'	0.1	0.5
Sg	z'	0.1	0.5

△=330 km=3.0°

1959
Mar 10 Sk e(Sg)   15 19 48
(cont.) Near coast of Baltic States. Origin time=15 15 55. Seismic?

» 10 Up iP   18 00 08
       i   18 00 14
Ki   iP   18 00 50
Sk   iP   18 00 32
Gb   e(P)   18 00 15
Rhodesia-Mozambique.

» 11 Up iP   03 10 31
Ki   iP   03 10 16
Sk   iP   03 10 42
Szechwan Province, China.

» 11 Up i   07 21 43
      iSg   07 21 47
△=780 km=7.0°.
Ki   iPg   07 18 48
      iSg   07 19 23
△=290 km=2.6°.
Sk   ePn   07 18 47
      ePg   07 18 59
      iSg   07 19 40
△=360 km=3.2°.
Nordlands Fylke, Norway, 66.8°N, 14.3°E. Origin time=07 17 55.

» 11 Up iPn   13 23 06
      iPg   13 23 11
      iSg   13 23 58

		μ	s
Pg	z'	0.1	0.5
Sg	z'	0.1	0.5

△=360 km=3.2°.

Sk	e	13	26	02
	iSg	13	26	15
Gb	iSn	13	24	26
	iSg	13	24	51

△=530 km=4.8°.
Near coast of Baltic States, 57°N, 21°E. Origin time=13 22 12. Seismic?

» 12 Up iPP   01 47 15

		μ	s
M	E	3.6	19
M	N	3.7	17
M	z	3.9	20

Ki	eP	01	42	43
	e	01	55	07

		μ	s
M	E	2.0	16
M	N	2.0	20
M	z	2.3	18

Caroline Islands. Magn.=6.0 (Up, Ki).

1959

Mar 12 Up iP — 05 02 53
Ki iP — 05 04 00
Crete.

» 12 Up iP — 06 43 45 C
i — 06 53 21
P z' — μ 0.1 — s 0.7
Sk iP — 06 44 17
i! — 06 44 26
Ionian Islands.

» 12 Sk i(P) — 21 33 51

» 13 Up iP — 00 51 47
i — 00 52 08
Ki iP — 00 52 59
Sk iP — 00 52 28
Gb iP — 00 51 33
Greece.

» 13 Up iPKP — 01 02 08
i — 01 02 15
PKP z' — μ 0.1 — s 0.5
Ki iPKP — 01 01 53
Sk iPKP — 01 02 03
Kermadec Islands.

» 13 Up iP — 15 45 12
Ki eP — 15 45 12
Gb iP — 15 44 55
Haiti.

» 13 Up iPKP — 16 59 16
Gb iPKP — 16 59 24
Tonga Islands (h ~ 200 km).

» 13 Up iP — 19 13 40
M E — μ 0.8 — s 18
M z — 1.3 — 16
Ki iP — 19 14 47 C
M E — μ 0.5 — s 12
M N — 0.7 — 12
Sk iP — 19 14 19
Gb eP — 19 13 30
Mediterranean Sea, near Crete.

» 13 Up i(P) — 20 03 04 C

» 14 Up iP — 03 06 31 D
M E — μ 1.8 — s 19
M N — 1.1 — 22
M z — 1.1 — 23
Ki iP — 03 05 43
M E — μ 2.2 — s 17
M N — 1.2 — 17

1959

Mar 14 (cont.) M z — 1.3 21
Sk eP — 03 06 19
Gb iP — 03 06 53 D
Kurile Islands.

» 14 Up iSn — 03 34 24
iSg — 03 35 15
△=890 km=8.0°.
Ki e — 03 34 23
eSg — 03 34 34
△=730 km=6.6°.
Sk ePg — 03 32 11
iSg — 03 32 58
△=400 km=3.6°.
Gb eSg — 03 35 34
△=930 km=8.4°.
Atlantic Ocean, off coast of Norway, 65.5°N, 5.0°E. Origin time=03 30 55.

» 14 Ki iPKP — 07 15 26
Gb ePKP — 07 15 48
New Hebrides Islands (h ~ 500 km).

» 14 Up iP — 22 46 53

» 15 Up i(Sn) — 02 57 39
iSg — 02 58 08
△=680 km=6.1°.
Ki eSg — 02 59 17
△=910 km=8.2°.
Sk iPg — 02 55 55
iSg — 02 56 39
△=380 km=3.4°.
Gb iSg — 02 57 45
△=600 km=5.4°.
Near Ålesund on the coast of Norway, 62.2°N, 6.0°E. Origin time=02 54 47.

» 15 Sk eP — 04 55 14

» 16 Up iP — 01 47 48
Gb eP — 01 47 57
South of Unimak Island.

» 16 Up iP — 08 13 13
Sk iP — 08 13 07
Gb iP — 08 13 38
Kurile Islands.

» 16 Up iPKP — 22 27 53
i(pPKP) — 22 28 32
Gb iPKP — 22 28 04 C
Kermadec Islands (h ~ 100 km).

» 16 Up iP — 23 45 41 D
Ki iP — 23 44 48 D
Gb iP — 23 45 58
Aleutian Islands (h ~ 60 km).

1959

Mar 17 Up iP — 08 37 15 D
i! — 08 37 29
i — 08 37 39
P z' — μ 0.5 — s 1.0
Ki iP — 08 36 46
i! — 08 36 59
P z' — μ 0.4 — s 1.0
Sk iP — 08 37 16
i! — 08 37 30
Gb iP — 08 37 36 D
i! — 08 37 50
Ryukyu Islands. Magn.=6.5 (Up, Ki).

» 17 Up iP* — 12 23 04
iPg — 12 23 06
iS* — 12 23 45
iSg — 12 23 50
Pg z' — μ 0.1 — s 0.5
Sg z' — 0.1 — 0.5
△=380 km=3.4°.
Sk eSg — 12 26 12
Gb eSg — 12 24 45
Near coast of Baltic States, 57°N, 21°E. Origin time=12 22 00.
Seismic?

» 17 Up iPKP — 13 17 49
Ki iPKP — 13 18 06
i — 13 18 19
Sandwich Islands.

» 17 Up iP — 19 14 05
i — 19 14 21
Ki eP — 19 14 08
i — 19 14 17
Gb eP — 19 14 12
Sumatra.

» 17 Up iP — 22 03 35
Ki iP — 22 02 24
P z' — μ 0.3 — s 1.0
Sk iP — 22 02 35 D
Gb iP — 22 03 51
i — 22 03 58
Jan Mayen Island.

» 18 Up iP — 00 53 16 D
i — 00 53 28
iS — 01 03 04
P z' — μ 0.1 — s 1.0
M E — 3.2 — 21
M N — 5.7 — 23
M z — 5.4 — 17
△=8600 km=77½°.
Ki iP — 00 52 47

1959

Mar 18 (cont.) P z' — μ 0.1 — s 1.1
M E — 3.7 — 20
M N — 2.9 — 17
M z — 3.2 — 16
Sk iP — 00 53 17
i — 00 53 28
Gb iP — 00 53 39 D
Ryukyu Islands. Magn.=5.9 (Up, Ki).

» 18 Up iP — 07 38 08
Ki iP — 07 37 51
Gb iP — 07 38 32
Honshu, Japan (h ~ 100 km).

» 18 Up iP* — 07 44 50
iPg — 07 44 56
iSg — 07 45 41
Pg z' — μ 0.1 — s 0.5
Sg z' — 0.1 — 0.5
△=380 km=3.4°.
Ki eSn — 07 48 21
eSg — 07 49 34
△=1160 km=10.4°.
Sk e(Sn) — 07 47 20
eSg — 07 47 59
△=840 km=7.6°.
Gb eSg — 07 46 37
△=570 km=5.1°.
Near coast of Baltic States, 57.4°N, 21.3°E. Origin time=07 43 49.
Seismic?

» 18 Up iP — 13 37 54
P z' — μ 0.1 — s 0.7

» 19 Up iP — 01 52 49
P z' — μ 0.1 — s 0.5
Sk iP — 01 53 28
Gb iP — 01 52 39
Greece.

» 19 Up iP — 07 36 17 D
P z' — μ 0.1 — s 1.0
Gb iP — 07 36 37
Ryukyu Islands.

» 19 Up iP — 08 33 27
i — 08 33 30
i — 08 33 35
P z' — μ 0.2 — s 0.5
Ki iP — 08 33 55 D
Sk eP — 08 33 19
Gb iP — 08 33 04
North Atlantic Ocean.

Column 1

```
1959
Mar 19  Up  iP                      09  47  33
        Ki  iP                      09  46  37
        Sk  iP                      09  47  05
        Gb  iP                      09  47  46
Southern Alaska (h ~ 100 km).

»  19  Gb  iP                       14  26  52
Honshu, Japan.

»  20  Up  iP                       01  13  20C
               P    z'     μ     s
                          0.2   0.9
       Ki  iP                       01  12  28C
               P    z'     μ     s
                          0.3   1.0
       Sk  iP                       01  13  03
           i                        01  14  50
Kamchatka. Magn.=6.3 (Up, Ki).

»  20  Up  i(P)                     13  53  07

»  20  Up  iP                       15  55  58
               M    E     μ     s
                          1.0   17
               M    N     1.1   18
               M    z     0.9   18
       Ki
               M    E     1.8   20
               M    N     0.9   16
Honshu, Japan (h ~ 100 km).

»  20  Up  iP                       20  26  47
           i                        20  26  50

»  21  Ki  iP                       00  07  18C
Sumbawa Island.

»  21  Up  ePKP                     04  45  32
           iPKP                     04  45  36
           iSKP                     04  48  25
       Ki  iPKP                     04  45  29
       Sk  ePKP                     04  45  29
           iPKP                     04  45  38
Fiji Islands (h ~ 550 km).

»  21  Up  eP                       19  48  14
       Ki  iP                       19  47  10
       Sk  eP                       19  47  48
Unimak Island.

»  21  Up  iPKP                     20  05  11
           iPP                      20  07  57
       Ki  iPP                      20  07  35
               PP   z'     μ     s
                          0.3   1.3
       Sk  ePKP                     20  05  05
           iPP                      20  07  51
Fiji Islands.

»  22  Up  iP                       22  40  52
           i                        22  40  56
```

Column 2

```
1959
Mar 22      i                       22  41  06
(cont.) Sk  iP                      22  41  04C
            e                       22  45  02
            i(PcP)                  22  45  31
Near west coast of France.

»  23  Up  iP                       07  22  02
           iS                       07  31  40
               S    N     μ     s
                          0.7   7
               M    E     1.1   17
               M    N     1.2   17
               M    z     1.4   18
           △ ~ 8350 km ~ 75°.
       Sk  eP                       07  21  35
           i                        07  21  38
       Gb  iP                       07  22  05C
Nevada.

»  24  Ki  iP                       05  35  25
       Sk  i(P)                     05  35  55

»  24  Up  iP                       17  30  12D
               M    E     μ     s
                          1.4   15
               M    N     1.5   13
               M    z     1.3   14
       Ki
               M    E     μ     s
                          1.6   17
               M    N     1.0   15
               M    z     1.6   16
Honshu, Japan.

»  24  Up  iP                       20  14  19
       Sk  iP                       20  15  12
Rumania.

»  25  Up  iP                       06  47  58
       Gb  iP                       06  48  08
Iran.

»  25  Up  iP                       07  36  20

»  26  Up  iPKP                     02  42  56
           iPKKP                    02  53  13
               PKP  z'     μ     s
                          0.1   0.8
       Ki  iPKP                     02  42  44
       Sk  iPKP                     02  42  54
           ePKKP                    02  53  16
       Gb  iPKP                     02  43  05C
           iPKKP                    02  53  03
Solomon Islands (h ~ 60 km).

»  26  Up  iP                       05  04  28
       Ki  iP                       05  03  35C
Unimak Island.

»  26  Up  iP                       05  38  33
       Ki  eP                       05  38  17
Molucca Passage.
```

Column 3

```
1959
Mar 26  Up  iP                      11  12  07
            iPP                     11  13  33
               M    N     μ     s
                          2.2   14
       Ki  iP                       11  12  16
       Sk  eP                       11  12  32
           ePP                      11  14  05
Tadzhik-Pamir, USSR.

»  26  Up  i(P)                     11  55  00

»  26  Sk  eP                       12  02  43

»  26  Up  iPKP                     12  03  34
               PKP  z'     μ     s
                          0.1   0.5
South of Fiji Islands (h ~ 600 km?).

»  26  Up  i(Sg)                    12  07  14
               (Sg)  z'    μ     s
                          0.1   0.5
       Ki  e(Sg)                    12  09  35
       Sk  i(Sg)                    12  07  10

»  26  Up  i                        15  32  29
           iPg                      15  32  31
           iSg                      15  33  15
           △=380 km=3.4°.
       Ki  iSg                      15  37  07
           △=1160 km=10.4°.
       Sk  eSg                      15  35  35
           △=840 km=7.6°.
       Gb  eSg                      15  34  10
           △=570 km=5.1°.
Near coast of Baltic States, 57.4°N,
21.3°E. Origin time=15  31  23.
Seismic?

»  26  Up  iPg                      17  16  40
           iSg                      17  17  21
               Sg   z'     μ     s
                          0.1   0.5
           △=360 km=3.2°.
       Ki  e(S*)                    17  19  54
           iSg                      17  20  25
           △=980 km=8.8°.
       Sk  eSg                      17  19  19
           △=760 km=6.8°.
       Gb  iSg                      17  19  05
           △=710 km=6.4°.
Near coast of Esthonia, 59.4°N,
23.7°E. Origin time=17  15  35.
Seismic?

»  26  Up  iPg                      17  29  53
           iSg                      17  30  34
           △=360 km=3.2°.
       Ki  iS*                      17  32  58
           iSg                      17  33  24
           △=930 km=8.4°.
       Sk  e                        17  32  03
```

Column 4

```
1959
Mar 26          iSg                 17  32  36
(cont.)         △=770 km=6.9°.
Gulf of Finland, 59.6°N, 23.8°E. Ori-
gin time=17  28  48. Seismic?

»  26  Up  i(P)                     22  48  51

»  27  Up  i                        07  09  49
           iPg                      07  09  51
           iS*                      07  10  28
           iSg                      07  10  35
           △=380 km=3.4°.
       Gb  eSg                      07  11  29
           △=560 km=5.0°.
Near coast of Baltic States, 57°N,
21°E. Origin time=07  08  43.
Seismic?

»  27  Up  iP                       07  13  09D
               P    z'     μ     s
                          0.1   0.7
       Ki  iP                       07  13  16
               P    z'     μ     s
                          0.3   1.0
       Sk  iP                       07  12  55
           i                        07  13  08
       Gb  iP                       07  12  55D
Leeward Islands (h ~ 150 km).

»  28  Up  i(P*)                    07  46  47
           iPg                      07  46  50
           iSg                      07  47  34
           △=380 km=3.4°.
       Sk  eSg                      07  49  57
           △=860 km=7.7°.
Near coast of Baltic States, 57°N,
21°E. Origin time=07  45  42.
Seismic?

»  28  Up  iPg                      11  41  09
           iS*                      11  41  45
           iSg                      11  41  52
           △=370 km=3.3°.
       Gb  iSg                      11  42  47
           △=560 km=5.0°.
Near coast of Baltic States, 57°N,
21°E. Origin time=11  40  03.
Seismic?

»  28  Up  iPg                      12  17  03
           iSg                      12  17  45
           i                        12  17  51
           △=360 km=3.2°.
       Gb  e(Sg)                    12  18  33
Near coast of Baltic States, 57°N,
21°E. Origin time=12  15  59.
Seismic?

»  28  Up  iP                       17  23  14
       Ki  iP                       17  22  54
```

1959
Mar 28
(cont.)

			μ	s
	P	z′	0.1	1.0

Formosa.

» 28	Ki	i(PKP)	18	49	13
		e	18	49	53
	Sk	i(PKP)	18	49	30

» 28	Up	iP	18	50	17C
		i	18	50	39
	Ki	iP	18	50	25
	Sk	iP	18	50	42
		iPP	18	52	20
	Gb	iP	18	50	39

Hindu Kush (h ~ 200 km).

» 28	Up	i(PKP)	20	05	20
		iPKP	20	05	24
		iPKS	20	09	05

			μ	s
	Ki	iPKP	z′	0.1	0.7

	iPKP	20	05	15
	ipPKP	20	07	36
	iSKP	20	07	48
	iPKS	20	08	41

		μ	s
PKP	z′	1.8	3.0
SKP	z′	0.2	1.5
PKS	E	0.6	7
PKS	N	0.9	8

△ ~ 14450 km ~ 130°.

Sk	e(PKP)	20	05	14
	iPKP	20	05	25
Gb	iPKP	20	05	31
	i	20	05	50

Fiji Islands (h ~ 600 km).

» 28	Up	iP	21	20	21
	Sk	iP	21	20	27

Formosa.

» 29	Up	iP	19	19	37D
		i(PcP)	19	20	10

		μ	s
P	z′	0.1	0.9

Ki	iP	19	18	55D

		μ	s
P	z′	0.1	1.0

Sk	iP	19	19	31
Gb	iP	19	20	01

Sikhota Alin (h ~ 300 km). Magn.= =5.5 (Up, Ki).

» 29	Up	iP	23	12	18

		μ	s
M	E	1.0	18
M	N	1.2	12

Ki	iP	23	13	30

		μ	s
M	E	1.1	13

Sk	iP	23	12	59

1959
Mar 29 Gb iP 23 12 09
(cont.) Greece.

» 29	Up	iP	23	27	47
	Ki	eP	23	28	59
	Sk	iP	23	28	27
	Gb	iP	23	27	37

Greece.

» 30	Up	iP	03	28	22
		i	03	29	15

» 31	Up	iP	01	16	24
	Ki	iP	01	15	31
	Sk	iP	01	15	59

Aleutian Islands.

» 31	Up	eL	08	25

		μ	s
M	E	0.8	21
M	N	1.4	22
M	z	1.6	20

Ki	eL	08	24

		μ	s
M	E	1.5	18
M	N	1.2	19
M	z	1.9	19

Samoa Islands.

Apr 1	Up	iP	00	42	08
		i	00	42	24
		iS	00	48	21

		μ	s
P	z′	0.3	1.0
S	E	3.2	17
S	N	2.2	11
M	E	6.8	18
M	N	5.8	18
M	z	9.7	20

△=4600 km=41½°.

Ki	iP	00	42	54
	iPP	00	44	45
	eS	00	49	43

		μ	s
P	z′	0.7	1.3
PP	z′	0.5	1.9
S	E	3.0	18
S	N	1.6	13
M	E	6.6	19
M	N	2.0	19
M	z	5.1	16

△=5300 km=47½°.

Sk	iP	00	42	12C
	i	00	42	23
Gb	iP	00	41	34C

Canary Islands. Probably slightly deeper than normal. Magn.=6.2 (Up, Ki).

1959
Apr 1

Apr 1	Ki	iPKP	15	07	19
	Sk	iPKP	15	07	30

New Hebrides Islands (h ~ 200 km).

» 1	Ki	e	15	32	52
		eSg	15	33	08

Ristijärvi, Finland (after E. Penttilä, Univ. of Helsinki, Publ. of Seismology, 40, 1960).

» 1	Up	iP	18	30	14
	Ki	eP	18	29	33

California.

» 1	Up	iP	20	33	08

» 1	Ki	iP	22	43	32

Caspian Sea.

» 2	Up	iP	04	14	24

		μ	s
P	z′	0.2	1.7

Ki	iP	04	13	56

		μ	s
P	z′	0.1	1.0

Gb	iP	04	14	43

Ryukyu Islands. Magn.=5.9 (Up, Ki).

» 2	Up	iP	04	39	07
	Ki	iP	04	40	19
	Gb	iP	04	39	05

Turkey.

» 2	Up	iSg	05	28	14

△=720 km=6.5°.

Ki	ePg	05	25	46
	iSg	05	26	30

△=380 km=3.4°.
Origin time=05 24 38.

» 2	Up	i(Sn)	08	34	55
		iSg	08	35	27

		μ	s
Sg	z′	0.3	1.0

△ ~ 720 km ~ 6.5°.

Ki	iPg	08	33	04
	iSg	08	33	48

		μ	s
Sg	z′	0.2	0.5

△=380 km=3.4°.
Same epicenter as for the preceding earthquake. Origin time=08 31 56.

» 2	Up	iP	19	33	38D

		μ	s
M	E	1.3	14
M	N	1.0	16
M	z	2.3	16

Ki	iP	19	33	19

1959
Apr 2
(cont.)

			μ	s
	P	z′	0.2	1.7
	M	E	1.0	14
	M	N	0.9	15

	Gb	iP	19	34	01D

Batan Islands.

» 3	Up	iP	01	38	08

		μ	s
P	z′	0.1	1.0

Ki	iP	01	37	15C
Sk	iP	01	37	47

Aleutian Islands.

» 3	Up	i(P)	02	10	22

» 3	Ki	eP	05	59	54

Formosa (h ~ 200 km).

» 3	Gb	i(P)	11	59	58

» 3	Ki	iP	12	51	03

» 3	Up	iP	16	16	07
	Ki	iP	16	16	17C

		μ	s
P	z′	0.1	1.0

Gb	iP	16	16	32

Nicobar Islands.

» 4	Ki	e(Sg)	12	33	32

Utajärvi, Finland (after E. Penttilä, Univ. of Helsinki, Publ. of Seismology, 40, 1960).

» 4	Up	iP	19	15	28

		μ	s
P	z′	0.1	1.0

Ki	iP	19	14	35

		μ	s
P	z′	0.1	1.0

Sk	iP	19	15	11
Gb	iP	19	15	51

Kamchatka. Magn.=5.7 (Up, Ki).

» 5	Up	iP	05	20	53

» 5	Up	iP	05	48	20
	Ki	iP	05	47	27D
		i	05	50	33
	Sk	iP	05	47	58

Aleutian Islands.

» 5	Up	iP	10	51	49
		iS	10	55	07
		iLg2	10	57	12

		μ	s
P	z′	0.3	1.5
S	E	1.0	5
S	N	1.0	5
M	E	4.4	9

1959
Apr 5 (cont.)

	M	N	3.7	9	
	M	z	3.6	9	
	△=1900 km=17°.				
Ki	iP		10	53	16
			μ	s	
	P	z'	0.6	1.5	
	M	E	4.6	11	
	M	N	2.0	9	
	M	z	2.9	10	
Sk	iP		10	52	23
	i		10	53	08

Southeastern France. Magn.=5.5 (Up, Ki). Lg2 is extremely clear at Uppsala.

» 5 Sk	iP		15	26	24

Western Alps, France.

» 5 Sk	eP		18	17	33

Hungary-Croatia.

» 5 Up	iP		20	10	57
	iPcP		20	11	25
			μ	s	
	P	z'	0.1	0.6	
Ki	iP		20	10	10
Sk	eP		20	10	46

Kurile Islands.

» 5 Up	iPKP		21	24	53
Ki	iPKP		21	24	39
Sk	iPKP		21	24	50

New Hebrides Islands (h~150 km).

» 5 Up	iP		21	28	06
			μ	s	
	P	z'	0.1	0.5	
Sk	iP		21	28	01

» 5 Up	iPP		23	48	55
			μ	s	
	M	E	1.8	26	
	M	N	1.4	20	
	M	z	2.6	20	
Ki	ePP		23	48	24

New Guinea.

» 6 Up	iP		05	35	21
	i		05	35	32
			μ	s	
	P	z'	0.3	1.0	
Ki	iP		05	34	28
Sk	iP		05	34	59
	i		05	35	13
Gb	eP		05	35	40
	i		05	35	50

Aleutian Islands.

1959
Apr 6

Ki	ePg		12	31	44
	iSg		12	32	35

Taivalkoski, Finland (after E. Penttilä, Univ. of Helsinki, Publ. of Seismology, 40, 1960).

» 6 Ki	iP		14	05	33C
Sk	iP		14	05	16

Colombia.

» 6 Up	iP		14	26	48D
	i(PP)		14	30	56
			μ	s	
	P	z'	0.4	1.5	
	M	E	7.4	25	
	M	N	4.2	19	
	M	z	7.6	23	
Ki	iP		14	26	37C
	i(PP)		14	30	39
			μ	s	
	P	z'	0.3	1.5	
	M	E	6.2	20	
	M	N	4.0	20	
	M	z	6.3	21	
Sk	iP		14	26	57
	iPP		14	31	26

Sumba Island. Magn.=6.6 (Up, Ki).

» 6 Up	iPKP		22	42	16
Ki	iPKP		22	41	56C
			μ	s	
	PKP	z'	0.1	0.8	
Sk	iPKP		22	42	11

Kermadec Islands.

» 7 Ki	eP		00	12	06

Mariana Islands.

» 7 Up	iP		05	56	48
Ki	iP		05	56	19

Mariana Islands.

» 8 Up	iPKP		01	42	33
	i		01	42	40
	i		01	42	59
	ipPKP2		01	44	23
			μ	s	
	PKP	z'	1.2	1.0	
Ki	iPKP		01	42	12
			μ	s	
	PKP	z'	0.8	1.6	
Sk	i(PKP)		01	42	24
	iPKP		01	42	28
Gb	i(PKP)		01	42	37
	iPKP		01	42	45C
	i!		01	42	59
	ipPKP2		01	44	38

Kermadec Islands (h~400 km). At Sk and Gb, a small-amplitude phase

1959
Apr 7 (cont.) precedes the large-amplitude PKP. See G. Payo Subiza and M. Båth, Geophys. J., 8:496—513, 1964.

» 8 Ki	iPKP		07	59	58

Macquarie Islands.

» 8 Ki	iPKP		08	20	35
Gb	iPKP		08	20	50

Tonga Islands (h~100 km).

» 8 Up	iPKP		12	03	40
	iPP		12	07	04
			μ	s	
	PP	E	0.9	5	
	M	E	2.2	19	
	M	N	2.7	22	
	M	z	3.8	21	
Ki	iPKP		12	03	49
			μ	s	
	PKP	z'	1.0	2.5	
	M	E	1.8	20	
	M	N	0.9	20	
Gb	iPKP		12	03	34

Chile-Argentina.

» 8 Ki	i(Sn)		14	09	36
	i(Sg)		14	09	55

» 8 Ki	i(Sn)		14	26	01
	i(Sg)		14	26	20

» 8 Up	iP		19	07	37D
Sk	eP		19	08	17

Aegean Sea.

» 9 Sk	eP		03	33	31

Crete.

» 9 Up	i(SKP)		05	06	18D
	i		05	06	56
			μ	s	
	(SKP)	z'	0.1	1.0	

New Hebrides Islands (h~100 km).

» 9 Up	iSKS		06	43	40
			μ	s	
	SKS	E	0.5	5	
	M	E	1.9	18	
	M	N	2.4	20	
	M	z	2.9	18	
Ki	i		06	47	30
			μ	s	
	M	E	1.6	18	
	M	N	1.4	18	

Indian Ocean. Magn.=6.0 (Up, Ki).

» 9 Up	iP		12	35	20

Kurile Islands (h~60 km).

1959
Apr 9

Gb	i(P)		12	43	41
» 9 Up	iP		12	56	40C
	i		12	56	45
			μ	s	
	P	z'	0.1	0.7	
Ki	iP		12	55	47

Aleutian Islands.

» 9 Up	eP		17	18	50
	i		17	18	59
	i		17	19	07
Ki	iP		17	18	44
Sk	iP		17	19	07
	i		17	19	19
Gb	eP		17	19	21
	i		17	19	29

India-Burma.

» 9 Up	—				
			μ	s	
	M	E	1.8	19	
	M	N	2.7	22	
	M	z	4.0	24	
Ki	eP		17	49	06
	eSKS		17	59	32
	eS		17	59	51
	eSS		18	05	47
			μ	s	
	SKS	E	0.6	11	
	S	N	0.7	12	
	M	E	1.7	19	
	M	N	1.2	19	
	△=9900 km=89°.				
Sk	iP		17	48	52

Panama. Magn.=6.0 (Up, Ki).

» 9 Ki	iP		21	06	52

» 10 Up	iP		00	03	32C

Hokkaido, Japan.

» 10 Up	iPKP		06	06	03D
	iSKP		06	08	49
	i!		06	09	07
	i(SS)		06	27	11
	iSSS		06	32	39
			μ	s	
	PKP	N	0.8	1.0	
	PKP	z	3.6	1.0	
	PKP	z'	1.2	0.5	
	SKP	z	0.4	2	
	SKP	z'	0.3	1.1	
	△~15800 km~142°.				
Ki	iPKP		06	05	44
	i		06	05	52
	iSKP		06	08	28
			μ	s	
	PKP	z'	0.2	1.0	
	SKP	z'	1.2	1.5	

Column 1

```
1959
Apr 10
(cont.)    Sk    iPKP              06  05  56C
                 iSKP              06  08  42
           Gb    iPKP             06  06  11
                 ipPKP             06  08  28
           South of Fiji Islands (h ~ 600 km).

»  10  Up    i(P)                 18  35  32

»  11  Ki    iP                   07  04  23
           Caucasus.

»  11  Ki    iP                   11  42  32
             e                    11  53  06
                             μ     s
             M       E       1.2   21
             M       N       1.1   21
           Spice Islands.

»  11  Up    iP                   14  32  41D
                             μ     s
             P       z'      0.1   0.8
           Aleutian Islands.

»  11  Ki    eP                   14  59  02
           Sk    eP               14  58  49
           Colombia-Venezuela.

»  11  Sk    i(P)                 23  33  08

»  12  Up    e(P)                 05  16  04
             i                    05  16  35
             i                    05  16  50

»  12  Up    iP                   09  48  20
           Ki    i(P)             09  46  03

»  12  Up    iP                   10  07  25
             ipP                  10  07  51
             i(PP)                10  10  45
             eSKS                 10  17  34
             iS                   10  17  54
                             μ     s
             P       z'      0.1   0.6
             pP      z'      0.2   1.1
             SKS     E       1.0   9
             SKS     N       0.8   8
             S       E       2.7   7
             S       N       2.1   7
             M       E       0.8   18
             M       N       1.0   20
             M       z       1.6   20
                △=9850 km=88½°.
           Ki    iP               10  07  12C
                 ipP              10  07  37
                 iS               10  17  22
                 iPKKP            10  25  28
                             μ     s
             P       z       0.7   5
             P       z'      0.8   1.6
```

Column 2

```
1959
Apr 12           pP      E       0.8    6
(cont.)          pP      z       1.5    6
                 pP      z'      0.8    1.5
                 S       E       5.9    9
                 S       N       2.5    8
                 S       z       1.1    8
                 M       E       1.7    19
                 M       N       0.6    17
                 M       z       1.3    19
                     △=9400 km=84½°.
           Sk    iP               10  07  06C
                 i                10  07  12
                 ipP              10  07  33
                 iPKKP            10  25  30
           Gb    iP               10  07  16C
                 ipP              10  07  43
                 i(PP)            10  10  30
           Mexico. h=105 km (Up, Ki, Sk, Gb).
           Magn.=6.4 (Up, Ki).

»  12  Up    iP                   11  11  14
                             μ     s
             P       z'      0.1   1.0
             M       E       1.7   18
             M       N       1.1   18
             M       z       2.6   18
           Ki    iP               11  10  49
                             μ     s
             P       z'      0.1   1.2
             M       E       0.8   17
             M       N       0.7   16
             M       z       1.1   16
           Sk    iP               11  11  15
           Gb    iP               11  11  32
           Formosa. Magn.=5.8 (Up, Ki).

»  12  Up    iP                   11  17  54
           Ki    iP               11  17  29
           Formosa.

»  12  Up    e                    15  45  01
                             μ     s
             M       E       3.6   19
             M       N       4.5   20
             M       z       4.1   21
           Ki    iP               15  36  31
                 eSKS             15  47  03
                             μ     s
             SKS     E       0.3   6
             M       E       3.7   20
             M       N       2.3   18
             M       z       2.6   17
           New Guinea (h ~ 100 km).

»  12  Ki    iP                   16  02  02
           Kamchatka.

»  12  Ki    iPn                  18  30  15D
                 iSn              18  31  10
                 eSg              18  31  25
```

Column 3

```
1959
Apr 12  Ristijärvi, Finland (after E. Penttilä,
(cont.)  Univ. of Helsinki, Publ. of Seismol-
         ogy, 40, 1960).

»  12  Sk    eP                   20  52  46
           Gb    iP               20  52  45

»  12  Up    ePKP                 21  13  20
             i                    21  17  03
                             μ     s
             M       E       1.1   20
             M       N       3.3   23
             M       z       3.6   22
           Ki    iPKP             21  13  07
                 i                21  13  19
                 e                21  15  17
                 e                21  16  34
                 e                21  20  10
                             μ     s
             M       E       1.8   20
             M       N       1.4   20
             M       z       2.4   20
           Sk    ePKP             21  13  16
                 i                21  13  30
           Gb    iPKP             21  13  30
                 i                21  13  45
           Samoa Islands. Magn.=6.1 (Up, Ki).

»  12  Up    iP                   23  34  48
           Kurile Islands.

»  13  Up    i(P)                 01  26  53

»  13  Up    i(P)                 07  24  26
           Seismic?

»  13  Up    iP                   10  39  01
           Ki    iP               10  39  00

»  13  Up    iP                   18  42  31D
             i(PcP)               18  43  00
                             μ     s
             P       z'      0.1   0.5
           Ki    iP               18  42  28D
                             μ     s
             P       z'      0.1   1.0
           Sk    iP               18  42  48
           Gb    iP               18  42  51D
           India-Burma. Magn.=5.9 (Up, Ki)

»  13  Up    iP                   22  43  45
             i                    22  43  55
                             μ     s
             P       z'      0.2   0.7
           Ki    iP               22  42  52
           Sk    iP               22  43  25
           Aleutian Islands.

»  14  Ki    iP                   01  33  00
           Northeast of Socotra Island.
```

Column 4

```
1959
Apr 14  Ki    iP                  01  49  42
          Northeast of Socotra Island.

»  14  Up                         —
                             μ     s
             M       E       0.8   18
             M       N       1.5   24
             M       z       1.1   18
           Ki    eP               03  05  25
                             μ     s
             M       E       0.8   13
             M       N       0.7   13
             M       z       0.7   13
           Gulf of California.

»  14  Ki    iP                   06  57  29
           Gulf of California.

»  14  Up    iP                   07  30  48
             ipP                  07  31  05
                             μ     s
             P       z'      0.1   0.5
           Ki    iP               07  29  52
                 i                07  29  54
                 iS               07  37  25
                             μ     s
             P       z'      0.2   1.0
                △=6100 km=55°.
           Sk    iP               07  30  21
           Gb    iP               07  30  57
                 iPcP             07  31  34
           Alaska. h=70 km (Up). Magn.=6.0
           (Up, Ki).

»  14  Up    iP                   18  12  53
             i(pP)                18  13  10
           Ki    iP               18  12  21
                 i(pP)            18  12  38
           Sk    iP               18  12  50
                 i(pP)            18  13  06
           Sea of Japan.

»  15  Up    iP                   00  26  31C
             iS                   00  35  36
                             μ     s
             P       z       0.4   3
             P       z'      0.3   1.3
             S       E       0.6   5
             S       N       0.6   5
             M       E       4.0   21
             M       N       5.4   22
             M       z       4.4   21
                △=7700 km=69½°.
           Ki    iP               00  25  49
                 iS               00  34  17
                             μ     s
             P       z       0.4   4
             P       z'      0.2   1.4
             S       E       0.8   8
             S       N       0.8   9
             M       E       4.5   18
```

Column 1 (p. 36)

```
1959
Apr 15            M      N     4.2   18
(cont.)           M      z     3.9   17
         △=7000 km=63°.
     Sk   iP            00   26   24
          i             00   26   42
     Gb   iP            00   26   53C
     Hokkaido, Japan. Magn.=6.0 (Up, Ki).

» 15 Up   iP            17   13   51D
                              μ     s
          P       z'    0.1   0.7
     Ki   iP            17   12   57
          iPcP          17   13   41
     Aleutian Islands.

» 15 Up   iP            19   21   47C
                              μ     s
          P       z'    0.2   1.0
     Ki   iP            19   20   52
                              μ     s
          P       z'    0.1   1.0
     Sk   iP            19   21   30
     Gb   iP            19   22   11
     Kamchatka. Magn.=5.9 (Up, Ki).

» 16 Up   iPKP          00   11   04
     Gb   iPKP          00   11   19
     Fiji Islands (h~600 km).

» 16 Up   iPKP          07   45   56
     Ki   iPKP          07   45   35
          iSKP          07   48   25
     Sk   ePKP          07   45   51
     Gb   iPKP          07   46   07D
          iSKP          07   48   56
     South of Fiji Islands (h~550 km).

» 16 Up   iPg           10   05   41C
          iSg           10   05   58
          iL            10   06   07
                              μ     s
          Pg      z'    0.1   0.5
          Sg      z'    0.1   0.5
     △=140 km=1.3°.
     Explosion of 20 ton dynamite near
     Norrköping, Sweden, 58°38'N,
     16°14'E. Origin time=10 05 15.

» 16 Up   eP            11   04   54
     Rumania (h~150 km).

» 16 Ki   e(P)          11   11   01

» 16 Up   eP            16   27   16
          ipP           16   27   36
          iSKS          16   37   41
```

Column 2 (p. 36)

```
1959
Apr 16                        μ     s
(cont.)   SKS     E     0.5    3
          M       E     1.0   17
          M       N     1.1   19
          M       z     1.1   18
     △~10700 km~96½°.
     Ki   iP            16   26   49
          ipP           16   27   10
          eSKS          16   37   07
                              μ     s
          P       z'    0.1   1.5
          pP      z'    0.3   1.5
          SKS     E     0.5   13
          M       E     0.9   17
          M       N     0.6   18
     Gb   e(PP)         16   31   12
     Mariana Islands. h=80 km (Up, Ki).

» 17 Up   i(P)          07   43   12

» 17 Up   i             08   39   49
          iSg           08   40   33
     Ki   i             08   36   18
          iPn           08   36   26
          iSg           08   37   19
          i             08   37   32
                              μ     s
          Sg      z'    0.2   0.9
     △=360 km=3.2°.
     Sk   iPn           08   36   47
          iP*           08   36   57
          iSg           08   38   07
     △=510 km=4.6°.
     Gb   iSg           08   41   13
     Atlantic Ocean, off Lofoten, 68¼°N,
     12°E. Origin time=08 35 34. The
     solution is not completely satisfac-
     tory; it appears as if Up and Ki have
     recorded another shock at about the
     same time (the first phases for Up and
     Ki given above).

» 17 Up   iP            12   16   55D
     Ki   iP            12   16   11
     Gb   iP            12   17   17D
     Hokkaido, Japan.

» 18 Up   iP            03   47   20C
          i             03   47   30
     Ki   iP            03   48   30
     Sk   iP            03   48   00
          i             03   50   56
     Greece.

» 18 Sk   iPKP          06   36   37
     New Ireland.

» 18 Up   iP            09   23   36
```

Column 3 (p. 37)

```
1959
Apr 18 Ki  e(Pn)        12   33   14
           i(Sn)        12   34   10
           i(Sg)        12   34   33

» 18 Up   iP            15   13   19
     Sk   iP            15   13   16

» 18 Ki   iP            23   21   37
     Aleutian Islands.

» 19 Up   eL            08   29
                              μ     s
          M       E     0.8   21
     Pacific Ocean.

» 19 Up   iP            09   04   50
                              μ     s
          P       z'    0.1   1.2
     Ki   iP            09   05   34
                              μ     s
          M       E     0.5   13
          M       N     0.4   13
          M       z     0.7   13
     Turkey.

» 19 Ki   iP            15   03   05
     Volcano Islands.

» 19 Up   iP            15   13   50
                              μ     s
          P       z'    0.1   1.0
     Ki   iP            15   12   52
          i             15   13   01
          iS            15   20   26
                              μ     s
          P       z'    0.2   1.0
          S       N     0.6    9
          M       E     0.8   17
          M       N     1.8   22
          M       z     2.9   22
     △=6000 km=54°.
     Sk   iP            15   13   20
          i             15   13   28
     Kodiak Island. Magn.=5.8 (Up, Ki).

» 19 Up   iP            17   43   54
          i!            17   44   06
          iS            17   47   57
                              μ     s
          P       z'    0.1   0.5
          M       E     1.1   20
          M       N     2.3   13
          M       z     2.0   13
     △=2500 km=22½°.
     Ki   iP            17   45   07
                              μ     s
          M       E     0.9   13
          M       N     0.9   14
          M       z     1.3   14
     Sk   iP            17   44   33C
          iPP           17   45   04
     Greece.
```

Column 4 (p. 37)

```
1959
Apr 19 Ki  iP           20   30   24
     Persian Gulf.

» 19 Ki   iP            20   40   40
     Persian Gulf.

» 20 Up   e(PS)         03   57   14
                              μ     s
          M       E     2.3   20
          M       N     2.8   20
          M       z     3.9   20
     Ki   ePKP          03   46   19
          e             03   48   48
          e             03   55   40
                              μ     s
          M       E     2.5   23
          M       N     2.6   22
          M       z     5.1   23
     Sk   iPP           03   47   28
     New Britain (h~100 km).

» 20 Up   iP            04   34   02
                              μ     s
          M       E     0.9   19
          M       z     1.4   18
     Ki   eP            04   33   59
                              μ     s
          M       E     0.7   16
          M       N     0.6   17
          M       z     1.4   17
     Costa Rica.

» 21 Ki   iPKP          01   45   56
     Gb   iPKP          01   46   21D
     South of Fiji Islands (h~550 km).

» 21 Up   iP            10   13   39
          i             10   13   49
     Ki   eP            10   12   53
          i             10   13   09
     Sk   e(P)          10   13   44
     Kurile Islands.

» 21 Up   iP            11   09   26C
     Ki   iP            11   08   49
     Sk   iP            11   09   21
     Honshu, Japan.

» 21 Ki   iP            11   28   29
     Aleutian Islands.

» 21 Ki   iP            12   52   32
     Bristol Bay.

» 21 Gb   iPg           16   36   05C
          iSg           16   36   06
     Local blast?

» 22 Up   iP            03   44   22
          i             03   44   26
```

```
1959
Apr 22
(cont.)  Ki   ipP              03  46  02
         Sk   iP               03  44  37
              iP               03  44  48 D
              epP              03  46  29
         Gb   iP               03  44  44
              iPP              03  46  37
Hindu Kush. h = 200 km (Up, Sk).

»  22   Ki   iP                07  43  37
                         μ     s
              P      z'  0.1   1.0
        Sk   iP                07  43  53
        Gb   iP                07  43  54 C
Sumatra (h ~ 200 km).

»  22   Up   iP                11  05  57 C
             i                 11  06  04
             iPcP              11  06  24
             iS                11  14  43
                         μ     s
              P      z'  0.2   0.7
        △ ~ 7450 km ~ 67°.
        Ki   iP                11  05  03 C
             iPcP              11  05  57
                         μ     s
              P      z'  0.3   1.0
              PcP    z'  0.3   1.1
        Sk   iP                11  05  33 C
             iPcP              11  06  10
        Gb   iP                11  06  11 C
             iPcP              11  06  35
Aleutian Islands. Deeper than nor-
mal. Magn. = 6.3 (Up, Ki).

»  22   Up   iP                12  08  46

»  22   Up   iP                17  36  36
        Ki   iP                17  36  40 C
        Sk   iP                17  36  23
Venezuela-Colombia.

»  22   Up   iP                19  08  08
        Ki   iP                19  07  43
        Sk   iP                19  08  15
Northern China.

»  22   Up
                         μ     s
              M      E   0.8   21
              M      N   0.6   19
              M      z   0.6   20
        Ki   iP                19  14  20
                         μ     s
              M      E   1.5   17
              M      N   0.5   16
              M      z   1.9   18
        Sk   iP                19  14  11
             i                 19  14  44
Nicaragua.

»  22   Up   iPKS              20  49  36
```

```
1959
Apr 22
(cont.)
                         μ     s
              M      E   0.8   20
              M      N   1.0   20
              M      z   1.0   20
        Ki   ePKP              20  46  12
                         μ     s
              M      E   1.0   19
              M      N   0.6   19
              M      z   1.3   19
        Sk   ePKP              20  46  07
        Gb   ePKP              20  46  05
Pacific Ocean.

»  22   Sk   iP                21  51  11
Aegean Sea.

»  23   Ki   i(P)              15  16  45 C

»  23   Up   iPg               16  32  07
             i                 16  32  11
             iSg               16  32  12
                         μ     s
              Sg     z'  0.3   0.5
Local blast?

»  23   Sk   iPKP              19  29  06 D
New Hebrides Islands.

»  23   Up   iP                22  51  31

»  24   Up
                         μ     s
              M      E   1.1   22
              M      N   0.9   18
              M      z   1.7   21
        Ki   eP                09  44  11
                         μ     s
              M      E   2.1   18
              M      N   0.6   17
              M      z   1.9   18
Nicaragua.

»  24   Up   iPKP              18  17  46 C
             i                 18  17  51 C
             iPP               18  21  22
                         μ     s
              PKP    E   0.3   4
              PKP    N   0.6   5
              PKP    z   2.6   4
              PKP    z'  0.8   1.0
              PP     E   0.4   7
              PP     N   1.1   7
              PP     z   1.5   8
              M      E   3.8   20
              M      N   6.8   21
              M      z   6.8   21
        △ ~ 16550 km ~ 149°.
        Ki   iPKP              18  17  30
             i                 18  17  36
             iPP               18  20  34
```

```
1959
Apr 24
(cont.)      iPKS              18  21  10
             eSKSP             18  30  46
                         μ     s
              PKP    N   0.3   7
              PKP    z   1.5   7
              PKP    z'  0.3   1.1
              PP     z   1.5   8
              PKS    E   1.0   7
              PKS    N   0.9   7
              SKSP   N   0.8   7
              M      E   4.5   21
              M      N   3.1   20
              M      z   4.8   20
        △ ~ 15650 km ~ 141°.
        Sk   iPKP              18  17  43 C
        Gb   iPKP              18  17  52 C
             i                 18  18  00
Kermadec Islands. Magn. = 6.6 (Up,
Ki). The second PKP (Up, Ki, Gb)
has a much larger amplitude than the
first PKP.

»  25   Up   iP                00  31  54
             iS                00  36  15
                         μ     s
              P      E   1.2   5
              P      N   4.2   6
              P      z   3.9   5
              P      z'  0.3   1.0
              S      E   3.2   11
              S      N   15    11
              S      z   4.8   14
              M      E   44    16
              M      N   24    17
              M      z   14    13
        △ = 2650 km = 24°.
        Ki   iP                00  33  02 D
             i                 00  33  45
             eS                00  38  09
             iLgl              00  42  27
                         μ     s
              P      N   1.2   5
              P      z   1.2   5
              P      z'  0.7   1.2
              S      N   3.8   19
              M      E   11    13
              M      N   11    17
              M      z   12    16
        △ = 3450 km = 31°.
        Sk   iP                00  32  36 D
        Gb   iP                00  31  52 D
             eS                00  36  18
Turkey. Magn. = 6.3 (Up, Ki).

»  25   Up   iP                01  10  55
             i                 01  11  17
             eS                01  15  10
                         μ     s
              P      z'  0.1   0.8
              S      E   1.0   11
```

```
1959
Apr 25
(cont.)       S      N   3.0   10
              M      E   6.9   16
              M      N   4.0   18
              M      z   2.0   13
        △ = 2650 km = 24°.
        Ki   iP                01  12  02 D
             i(Lgl)            01  21  28
                         μ     s
              P      z'  0.3   1.0
              M      E   3.7   10
              M      N   1.9   17
              M      z   2.1   17
        Sk   iP                01  11  36
        Gb   iP                01  10  54
             i                 01  11  03
Turkey. Magn. = 5.6 (Up, Ki).

»  25   Up   iP                09  35  41
        Sk   eP                09  36  15
             i                 09  36  25
Greece.

»  25   Gb   iPg               11  30  49
             iSg               11  30  52
Local blast?

»  25   Up   eP                23  00  49
             i                 23  01  30
        Ki   iP                23  00  15
        Sk   iP                23  00  49
Honshu, Japan.

»  26   Ki   iPKP              06  06  38
        Sk   iPKP              06  06  48
New Hebrides Islands.

»  26   Ki   iP                12  11  51 C
Mindanao, Philippine Islands.

»  26   Up   iP                12  45  35
             i                 12  45  41
        Ki   iP                12  45  24 C
                         μ     s
              M      E   1.2   21
              M      N   1.4   20
              M      z   0.6   18
        Sk   eP                12  45  48
China-Burma.

»  26   Up   iP                14  48  32
             i                 14  48  42
             iS                14  51  16
             iLg2              14  52  46
                         μ     s
              P      z'  0.1   0.5
              M      N   2.6   10
              M      z   1.9   10
        △ = 1500 km = 13½°.
        Ki   iP                14  50  11
             i(Lg1)            14  57  05
```

Column 1

1959
Apr 26 (cont.)

Sta.	Phase	comp.	h	m	s
	P	z′		μ 0.3	s 1.2
	M	E		0.7	10
	M	N		0.8	10
	M	z		1.0	10
Sk	iP		14	49	17
	i		14	49	26
	eLg2		14	54	38
Gb	iP		14	48	05
	iLg1		14	51	16

Italy-Austria.

Sta.	Phase	comp.	h	m	s
» 26 Up	iP		20	52	11C
	ipP		20	52	44
	iPP		20	55	06
	i!		20	56	55
	iS		21	01	36
	i		21	01	44
	iSKPP′		21	22	57
	P	E		μ 19	s 13
	P	N		7.3	8
	P	z		52	12
	P	z′		2.2	0.8
	PP	E		9.5	8
	PP	z		13	7
	S	E		42	13
	S	N		75	15
	SKPP′	z′		0.2	1.7
	M	E		120	23
	M	N		190	21
	M	z		92	23

△=8450 km=76°.

Sta.	Phase	comp.	h	m	s
Ki	P		20	51	47C
	ipP		20	52	18
	iPP		20	54	24
	i!		20	56	15
	i(S)		21	00	57
	iP′P′		21	19	31
	iSKPP′		21	22	51
	P	E		μ 13	s 7
	P	N		4.4	9
	P	z		33	8
	P	z′		3.8	1.0
	pP	z′		4.3	1.4
	PP	z		15	9
	(S)	E		24	8
	(S)	N		52	10
	SKPP′	z′		0.3	2.0
	M	E		110	19
	M	N		66	16
	M	z		51	14

△~7900 km~71°.

Sta.	Phase	h	m	s
Sk	iP	20	52	15C
	i(ScS)	21	01	53
Gb	iP	20	52	30
	ipP	20	53	07
	iPP	20	55	36

Column 2

1959
Apr 26 (cont.) Formosa. h=150 km (Up, Ki, Gb). Magn.=7.5 (Up, Ki).

Sta.	Phase	h	m	s
» 27 Sk	iP	05	23	51

Kyushu, Japan (h~60 km).

Sta.	Phase	comp.	h	m	s
» 27 Ki	iP		10	02	12
	i(SKS)		10	12	35
	iPKKP		10	18	02
	eSS		10	21	06
	P	z′		μ 0.1	s 1.0
	(SKS)	E		1.2	8
	M	E		1.3	22
	M	N		0.9	21
	M	z		1.6	21
Sk	iP		10	02	33
	iPKP		10	06	38

Banda Sea.

Sta.	Phase	h	m	s
» 27 Ki	iP	13	00	29D

Celebes (h~200 km).

Sta.	Phase	comp.	h	m	s
» 27 Up	i(Sn)		13	13	20
	iSg		13	13	39
	i		13	14	05
	Sg	z′		μ 0.1	s 0.5

△=370 km=3.3°.

Sta.	Phase	h	m	s
Ki	iSg	13	17	02

△=1040 km=9.4°.

Sta.	Phase	h	m	s
Sk	ePg	13	13	18
	iSg	13	14	16

△=490 km=4.4°.
South Norway, 59.2°N, 11.4°E. Origin time=13 11 51.

Sta.	Phase	comp.	h	m	s
» 27 Up	iP		13	18	52
	M	E		μ 3.9	s 15
	M	N		4.6	13
	M	z		4.2	15
Ki	iP		13	18	44
	eS		13	26	11
	M	E		μ 3.2	s 12
	M	N		5.1	20
	M	z		3.7	13

△=5900 km=53°.

Sta.	Phase	h	m	s
Sk	iP	13	19	07

Tsinghai Province, China.

Sta.	Phase	comp.	h	m	s
» 28 Up	iP		11	22	18C
	i		11	23	01
	i(PP)		11	26	01
	iSKS		11	32	40
	P	E		μ 1.3	s 12
	P	z		4.1	12
	P	z′		0.1	0.8
	SKS	E		4.6	11

Column 3

1959
Apr 28 (cont.)

Sta.	Phase	comp.	h	m	s
	SKS	N		2.7	15
	SKS	z		5.2	20
	M	E		15	20
	M	N		9.7	20
	M	z		20	20

△~9650 km~87°.

Sta.	Phase	comp.	h	m	s
Ki	iP		11	22	05C
	i		11	22	31
	iSKS		11	32	26
	P	E		μ 2.0	s 15
	P	N		0.8	14
	P	z		4.7	11
	P	z′		0.3	1.5
	SKS	E		12	17
	SKS	N		3.4	15
	M	E		18	20
	M	N		11	18
	M	z		23	22

△~9350 km~84°.

Sta.	Phase	h	m	s
Gb	iP	11	22	07

Mexico-Guatemala. Magn.=6.5 (Up, Ki).

Sta.	Phase	h	m	s
» 28 Up	iP	14	29	12
	i(pP)	14	29	40
Ki	iP	14	28	22
	i(pP)	14	28	45

Aleutian Islands.

Sta.	Phase	h	m	s
» 28 Sk	i(P)	15	02	58

Sta.	Phase	h	m	s
» 28 Ki	iSg	16	33	01

Kiantajärvi, Finland (after E. Penttilä, Univ. of Helsinki, Publ. of Seismology, 40, 1960).

Sta.	Phase	h	m	s
» 28 Up	iP	17	22	18
	i(pP)	17	22	43
Ki	e(pP)	17	21	35

Aleutian Islands.

Sta.	Phase	comp.	h	m	s
» 28 Up	i(P)		19	07	28
	(P)	z′		μ 0.1	s 0.5

Sta.	Phase	h	m	s
» 28 Ki	eP	22	11	56
	e	22	12	16
Sk	i(PcP)	22	12	51

Honshu, Japan.

Sta.	Phase	comp.	h	m	s
» 29 Up	iP		00	31	33
	i		00	31	37
	P	z′		μ 0.1	s 0.8
Ki	iP		00	32	09C
Sk	iP		00	32	07

Iran.

Column 4

1959

Sta.	Phase	h	m	s
Apr 29 Up	iP	01	38	58
	i	01	39	15
Ki	iP	01	40	21
	e	01	45	17
Sk	iP	01	39	51
	iPcP	01	44	09
Gb	iP	01	39	03

Rumania (h~150 km).

Sta.	Phase	h	m	s
» 29 Up	ePKP	18	15	08
Sk	iPKP	18	15	05

New Hebrides Islands.

Sta.	Phase	h	m	s
» 29 Up	iP	19	55	59
Ki	eP	19	54	57
	i	19	55	09
Sk	iP	19	55	45

Kurile Islands.

Sta.	Phase	h	m	s
» 30 Up	iP	07	14	28
Gb	iP	07	14	46

Ryukyu Islands.

Sta.	Phase	comp.	h	m	s
» 30 Up	iPKP		13	44	28
	PKP	z′		μ 0.1	s 0.8
Ki	iPKP		13	44	43D
	i!		13	45	10
	i!		13	47	51
	PKP	z′		μ 0.3	s 1.0
Sk	iPKP		13	44	32

Sandwich Islands.

Sta.	Phase	comp.	h	m	s
» 30 Ki	iP		22	43	14C
	P	z′		μ 0.2	s 1.5
	M	E		0.3	15
	M	N		0.3	12
	M	z		0.5	20
Sk	iP		22	44	03
Gb	iP		22	45	09
	i		22	45	17

Arctic Ocean, west of Spitsbergen.

Sta.	Phase	comp.	h	m	s
May 1 Up	iP		06	02	27C
	M	N		μ 0.6	s 13
Ki	iP		06	01	59C
	M	E		μ 0.5	s 14
	M	N		0.3	13
	M	z		0.4	11
Sk	iP		06	02	33

Outer Mongolia.

Sta.	Phase	comp.	h	m	s
» 1 Up	eL		08	04	
	M	E		μ 1.0	s 21
	M	N		1.1	22
	M	z		1.4	21

Column 1

1959
May 1 Ki   eL   08   12
(cont.)
                            μ   s
           M   E   0.9   20
           M   N   0.4   20
           M   Z   1.0   18
       New Guinea.

» 1 Up   i(P)   08   19   33C

» 1 Up   iP   08   30   25
           i   08   30   29
           iPP   08   31   24
           iS   08   35   29
           i!   08   36   24
                            μ   s
           P   z'   0.1   0.9
           PP   z'   0.1   0.9
           S   E   0.9   10
           S   N   0.7   7
           M   E   2.3   20
           M   N   3.1   19
           M   Z   2.3   20
           △=3550 km=32°.
       Ki iP   08   31   00
           iS   08   36   38
           iSa   08   38   34
           iSS   08   39   00
                            μ   s
           P   z'   0.3   1.6
           S   E   0.8   11
           S   N   0.5   10
           M   E   1.1   20
           M   N   1.7   18
           M   Z   1.9   18
           △=4000 km=36°.
       Sk iP   08   31   06
           iPP   08   32   17
       Gb iP   08   30   40
           iPP   08   31   37
       Iran. Magn.=5.5 (Up, Ki).

» 1 Ki   iP   23   12   57
       Palaos Islands.

» 2 Up   i   06   40   34
           i   06   43   24
       Austria-Yugoslavia.

» 2 Up   iP   11   46   46
       (Ryukyu Islands).

» 3 Ki   iP   04   53   54
       Sk iP   04   53   44
       Nicaragua-El Salvador (h~100 km).

» 3 Ki   eP   07   37   02
       Honshu, Japan (h~100 km).

» 3 Up   iP   08   35   01
                            μ   s
           P   z'   0.1   1.2

Column 2

1959
May 3 Ki   iP   18   46   17
       Sunda Strait.

» 4 Up   iP   03   29   31
           i   03   29   44
       Ki iP   03   29   07
           i   03   29   19
       Formosa.

» 4 Up   iP   07   26   09C
           iS   07   34   31
           i(P'P')   07   54   50
                            μ   s
           P   N   57   8
           P   Z   59   7
           P   z'   1.4   0.6
           S   Z   200   23
           M   E   330   22
           M   N   470   23
           M   Z   590   23
           △=7050 km=63½°.
       Ki iP   07   25   16C
           i   07   25   58
           i   07   27   44
           i   07   28   59
           iS   07   32   46
           i   07   54   42
           i(P'P')   07   55   11
                            μ   s
           P   E   8.7   6
           P   N   18   6
           P   Z   32   6
           P   z'   5.6   1.0
           S   z'   13   2.5
           (P'P') z'   0.7   2.0
           M   E   240   19
           M   N   320   22
           M   Z   320   22
           △=6200 km=56°.
       Sk iP   07   25   53
           i   07   54   56
           iP'P'   07   55   07
       Gb iP   07   26   28
       Kamchatka (h~60 km). Magn.=7.8
       (Up,Ki).

» 4 Up   eP   08   03   14
       Ki iP   08   02   33
       Sk iP   08   03   13

» 4 Up   iP   11   33   33
       Ki iP   11   32   39
       Kamchatka.

» 4 Ki   iP   13   00   00
       Kamchatka.

» 4 Up   iP   17   28   25C
       Ki iP   17   28   19
       Tibet-Himalaya.

Column 3

1959
May 4 Ki   i(P)   18   24   02

» 5 Up   iP   11   48   10
           i(pP)   11   48   32
       Ki iP   11   48   18
       Sk iP   11   48   35
           i(pP)   11   48   57
           i   11   49   10
       Afghanistan.

» 5 Up   i(P)   16   56   09

» 5 Up   iP   19   14   43C
           i   19   14   58
           eS   19   23   09
                            μ   s
           P   Z   0.4   4
           P   z'   0.2   1.0
           S   E   0.9   10
           S   N   1.1   11
           M   E   21   20
           M   N   16   20
           M   Z   6.7   17
           △=7000 km=63°.
       Ki iP   19   13   51
           eS   19   21   27
                            μ   s
           P   z'   0.1   1.0
           S   E   0.8   11
           S   N   0.7   12
           M   E   21   21
           M   N   10   21
           M   Z   8.7   22
           △=6100 km=55°.
       Sk eP   19   14   27
       Gb iP   19   15   07
           i   19   15   09
       Kamchatka. Magn.=6.0 (Up, Ki).

» 6 Up   iP   07   55   31
           i   07   55   55
       Ki iP   07   54   38
           i   07   54   58
       Aleutian Islands.

» 6 Ki   iPKP   17   47   29
           ipPKP   17   49   54
           i   17   50   33
       Fiji Islands (h~600 km).

» 6 Up   iP   19   04   43
           i   19   04   52
       Ki iP   19   04   00
       Japan.

» 6 Ki   iP   19   06   07
                            μ   s
           M   E   0.7   17
           M   N   0.3   16
           M   Z   0.9   17
       Ceram Island.

Column 4

1959
May 7 Up   e   00   43   26
                            μ   s
           M   E   3.1   23
           M   N   4.5   22
           M   Z   3.0   19
       Ki   —
                            μ   s
           M   E   3.7   20
           M   N   2.6   20
           M   Z   4.3   19
       Bismarck Sea. Magn.=6.2 (Up, Ki).

» 8 Up   iP   05   27   08
                            μ   s
           P   z'   0.1   0.6
       Ki iP   05   26   39
                            μ   s
           P   z'   0.1   0.8
       Sk iP   05   27   09C
       Gb iP   05   27   28
       Ryukyu Islands. Magn.=6.0 (Up, Ki).

» 8 Up   eL   07   19
                            μ   s
           M   E   1.0   20
           M   N   1.1   21
       Ki eL   07   13
                            μ   s
           M   E   0.7   17
           M   N   0.6   18
       Kamchatka.

» 8 Up   iP   11   45   13C
           eS   11   53   37
                            μ   s
           P   N   0.8   1
           P   Z   1.2   1
           P   z'   0.8   0.7
           S   E   0.6   8
           S   N   0.8   8
           M   E   2.8   21
           M   N   5.0   22
           M   Z   4.9   23
           △=6950 km=62½°.
       Ki iP   11   44   20
           i   11   47   33
                            μ   s
           P   z'   0.9   1.0
           M   E   2.2   18
           M   N   2.9   18
           M   Z   2.3   18
       Sk iP   11   44   56C
           i   11   45   19
       Gb iP   11   45   31
       Kamchatka (h~60 km). Magn.=6.9
       according to P, but=5.8 according to
       S and M (Up, Ki).

» 8 Sk   iP   14   14   34

Column 1 (p. 44)

```
1959
May  8 Up  iSg        14 36 11
           i          14 36 28
        △=380 km=3.4°.
     Ki  e(Sn)        14 38 13
         eSg          14 39 00
         i            14 39 12
        △=950 km=8.5°.
     Sk  eS*          14 37 48
         iSg          14 38 10
        △=770 km=6.9°.
     Gb  eSg          14 37 55
        △=730 km=6.6°.
     Gulf of Finland, off the coast of Estho-
     nia, 59.5°N, 24.0°E. Origin time=
     14 34 19. Seismic?

»    8 Up  iPg         15 25 04
           iSg         15 25 45
        △=360 km=3.2°.
     Ki  eSg          15 28 25
        △=890 km=8.0°.
     Sk  e(Sn)        15 27 05
         iS*          15 27 24
         iSg          15 27 41
        △=740 km=6.7°.
     Southwest coast of Finland, 60.0°N,
     24.0°E. Origin time=15 24 00.
     Seismic?

»    8 Ki  eP          15 39 15
     Kurile Islands.

»    8 Up  iP          22 24 53
           i           22 25 04
                     μ    s
           P    z'   0.1  0.6
     Gb  iP           22 25 06
          i           22 25 18
     Aleutian Islands.

»    9 Up  iP          00 08 59 C
     Ki  iP            00 08 35
     Formosa.

»    9 Up  iP          08 28 16 C
     Ki  iP            08 28 01

»    9 Up  iP          12 57 21
     Ki  iP            12 56 29
                     μ    s
           P    z'   0.1  1.0
     Sk  iP            12 56 58
     Gb  iP            12 57 35
     Aleutian Islands.

»    9 Up  iP          13 48 04 C

»    9 Ki  iP          18 43 30
     Aleutian Islands.
```

Column 2 (p. 44)

```
1959
May 10 Up  iP          00 08 07
                     μ    s
           M    E    0.9  19
           M    N    1.1  19
           M    z    1.5  19
     Ki  eP            00 07 20
                     μ    s
           M    E    0.9  20
           M    N    0.6  18
           M    z    0.7  17
     Sk  eP            00 07 58
     Kurile Islands.

» 10 Up  iP            01 44 02
     Ki  iP            01 43 31
     Sk  iP            01 44 00
     Japan.

» 10 Up  iP            09 54 00
     Sea of Okhotsk (h~400 km).

» 10 Up  iP            11 00 09
         iPcP          11 00 37
     Kurile Islands.

» 10 Ki  iP            16 59 19

» 11 Up  iP            08 46 09
     Ki  iP            08 47 09
     Sk  eP            08 46 48
     Ionian Islands.

» 11 Up  iP            16 39 17 C
         iPcP          16 39 50
                     μ    s
           P    z'   0.1  0.5
     Ki  iP            16 38 23 C
                     μ    s
           P    z'   0.1  0.9
     Sk  iP            16 39 00 C
         iPcP          16 39 44
     Gb  iP            16 39 40 C
          i            16 39 53
         iPcP          16 40 09
     Kamchatka. Magn.=5.9 (Up, Ki).

» 11 Up  iPg           17 04 45
         iSg           17 04 50
                     μ    s
           Sg   z'   0.4  0.6
     Probably local blast.

» 12 Up  iP            00 44 30
                     μ    s
           P    z'   0.1  0.8
           M    E    0.8  20
           M    N    0.9  17
           M    z    0.8  16
     Ki  iP            00 44 33
                     μ    s
           M    E    0.7  15
```

Column 3 (p. 45)

```
1959
May 12          M    N    0.4  13
(cont.)  Sk  iP            00 44 53
         Gb  iP            00 44 54
     Tibet-India.

» 12 Up  iP            01 06 34

» 12 Up  iP            01 34 24
     Aleutian Islands.

» 12 Up  eP            03 55 28
     Ki  iP            03 55 30
          i            03 55 40
                     μ    s
           P    z'   0.2  1.5
     Sk  iP            03 55 15
     Panama-Colombia.

» 12 Up  iP            05 08 06 D
          i            05 08 17
          iS           05 16 35
                     μ    s
           P    N    1.1  8
           P    z    2.0  8
           P    z'   0.3  1.5
           S    E    4.4  10
           S    N    2.5  9
           M    E    8.6  20
           M    N    14   20
           M    z    11   20
        △=7050 km=63½°.
     Ki  iP            05 07 11 D
         ePa           05 10 04
         iS            05 14 52
                     μ    s
           P    N    1.0  8
           P    z    2.1  8
           P    z'   0.4  1.5
           S    E    4.0  10
           S    N    3.4  13
           M    E    11   18
           M    N    10   21
           M    z    13   22
        △=6150 km=55½°.
     Sk  iP            05 07 46 D
     Gb  iP            05 08 27 D
     Komandorskie Islands. Magn.=6.3
     (Up, Ki).

» 12 Up  iP            09 13 47
     Sk  iP            09 14 31
     Aegean Sea.

» 12 Up  ePKP          10 05 15
         iSKS          10 11 46
         eS            10 13 02
         e             10 14 36
         iPKKP         10 16 59
                     μ    s
         SKS   E     0.9  8
         S     N     3.1  14
```

Column 4 (p. 45)

```
1959
May 12          M    E    12   19
(cont.)         M    N    7.7  19
                M    z    16   19
        △~11800 km~106°.
     Ki  ePP           10 05 54
         eSKS          10 11 49
         iS            10 13 28
         iPS           10 15 25
         iPKKP         10 16 42
         iSS           10 21 18
                     μ    s
         PP    E     1.4  7
         PP    z     1.8  7
         S     N     1.3  11
         PKKP  z'    0.1  1.3
         M     E     8.1  17
         M     N     4.0  18
         M     z     7.0  17
        △~12000 km~108°.
     Sk  ePP           10 05 26
         i(PKKP)       10 17 04
     Gb  iPP           10 05 05
     Salta Province, Argentina. Magn.=6.8
     (Up, Ki).

» 12 Sk  iP            13 14 31
     Ionian Islands.

» 12 Up  iP            21 42 26
     Sk  iP            21 42 25

» 12 Up  iP            21 45 01
     Sk  iP            21 45 45
     Ionian Islands.

» 12 Up  iP            21 51 27 D
          i            21 51 44
          i            21 54 24
         eP'P'         22 19 39
                     μ    s
           P    z'   0.1  0.5
           M    E    1.0  18
           M    N    1.3  18
           M    z    1.7  21
     Ki  eP            21 50 34
         iPcP          21 51 19
                     μ    s
           P    z'   0.1  1.3
           M    E    1.8  19
           M    N    1.5  17
           M    z    1.4  17
     Sk  iP            21 51 07
         iPcP          21 51 39
     Gb  iP            21 51 48
     Aleutian Islands. Magn.=5.8 (Up, Ki).

» 12 Up  iP            22 11 01 C
          i            22 11 03
         i(pP)         22 11 15
```

```
1959
May 12
(cont.)         P    z'    0.3    1.0
                M    E     1.4    21
                M    N     3.2    21
                M    z     2.6    18
        Ki  iP         22   10    08
            i          22   10    41
            iPcP       22   10    53
                M    E     3.2    17
                M    N     2.3    18
                M    z     2.9    18
        Sk  iP         22   10    41
            iPcP       22   11    13
        Gb  iP         22   11    23
            i(pP)      22   11    37
        Aleutian Islands.

»  12   Ki  iP         22   44    49
        Honshu, Japan.

»  13   Gb  iPKP       01   07    32 D
        South of Fiji Islands (h ~ 550 km).

»  13   Up  iP         12   15    55 D

»  13   Ki  iP         13   46    21
        Sk  iP         13   46    39

»  13   Up  iP         18   26    00
            i          18   26    03
        Sk  iP         18   25    53

»  14   Up  iP         01   00    31
                M    E     1.0    10
                M    N     0.9    10
                M    z     0.8    10
        Ki
                M    E     0.9    12
                M    N     0.5    11
                M    z     0.7    11
        Sk  iP         01   01    15 C
        Gb  iP         01   00    22
        Aegean Sea.

»  14   Up  iP         01   01    22
            i          01   01    32
        Ki  iP         01   01    23
                P    z'    0.2    1.5
                M    E     0.7    19
                M    N     0.4    20
                M    z     0.9    22
        Sumatra.

»  14   Up  iP         05   36    39
        Ki  iP         05   35    43 C
        Sk  iP         05   36    10
        Alaska.
```

```
1959
May 14  Up  eP         06   32    27
            i          06   32    40
        Ki  iP         06   33    35
        Sk  iP         06   33    05
        Gb  eP         06   32    13
        Crete.

»  14   Up  iP         06   42    19 D
            i          06   42    25
            iS         06   46    40
            i          06   46    47
                P    N     2.4    6
                P    z     3.5    7
                P    z'    0.6    0.8
                S    E     19     12
                S    N     6.0    6
                S    z     3.2    6
                M    E     41     14
                M    N     27     13
                M    z     21     12
        △ = 2800 km = 25°.
        Ki  iP         06   43    29
            i          06   43    37
            i(PPP)     06   44    46
            iS         06   48    41
                P    N     0.5    7
                P    z'    0.7    0.9
                S    E     4.3    10
                S    N     2.1    10
                S    z     1.2    8
                M    E     32     12
                M    N     24     13
                M    z     35     14
        △ = 3650 km = 33°.
        Sk  iP         06   42    59
            i          06   43    03
        Gb  iP         06   42    08 D
        Crete. Magn. = 6.2 (Up, Ki). P and S
        are multiple, the later phases having
        the largest amplitudes.

»  14   Sk  iPKP       11   01    07
        New Hebrides Islands (h ~ 100 km).

»  14   Ki  iP         11   32    59
        Sk  iP         11   32    30
        Gb  eP         11   31    42
        Crete.

»  14   Ki  iPKP       12   08    20
        Sk  ePKP       12   08    30
        New Hebrides Islands (h ~ 100 km).

»  14   Ki  iPKP       13   38    25
        Sk  iPKP       13   38    37
        New Hebrides Islands (h ~ 150 km).
```

```
1959
May 14  Up  i(P)       15   15    25
        Gb  i(P)       15   12    58

»  14   Up  iP         17   21    54
        Sk  iP         17   21    51

»  14   Up  iP         17   43    06
            i          17   43    20
        Sk  eP         17   43    04
            i          17   43    19
        Gb  iP         17   43    30
        Ryukyu Islands.

»  14   Up  iP         19   26    55
            eS         19   30    41
            iRg        19   34    11
                S    E     0.2    6
                S    N     0.4    8
                M    E     1.3    12
                M    N     1.5    10
                M    z     1.9    9
        △ = 2200 km = 20°.
        Ki  iP         19   28    09
            eS         19   33    04
            eLg2       19   38    03
                M    E     1.5    12
                M    N     0.7    11
                M    z     1.0    12
        △ = 3100 km = 28°.
        Sk  iP         19   27    39 C
        Gb  eP         19   26    44
        Aegean Sea.

»  14   Sk  iP         21   13    36

»  14   Ki  eL         21   28
                M    E     0.8    12
                M    N     0.9    16
                M    z     0.6    14
        Iran.

»  15   Up  iP         01   41    00
            i          01   41    02
        Gb  iP         01   41    23
        Kamchatka.

»  15   Up  i(P)       07   56    16

»  15   Sk  eP         08   01    55
            i          08   02    06
        Guatemala (h ~ 100 km).

»  15   Up  iP         14   55    37
            i          14   55    48
        Sk  iP         14   55    20 D
            i          14   55    30
        Mexico.
```

```
1959
May 15  Up  iP         22   32    46 D
        Kurile Islands.

»  16   Ki  iP         05   06    57
        Alaska.

»  16   Up  iPKP       06   35    09
            i          06   35    35
            i          06   36    37
                M    E     4.3    22
                M    N     4.5    22
                M    z     4.1    21
        △ ~ 12800 km ~ 115°.
        Ki                          —
                M    E     4.1    21
                M    N     6.8    24
        Sk  ePKP       06   35    05
            iPP        06   36    20
        Gb  ePKP       06   35    15
            iPP        06   36    31
        New Britain (h ~ 60 km).

»  16   Ki  eP         08   25    00
        Sk  iP         08   24    21
        Gb  eP         08   23    33
        Crete.

»  16   Up  iP         12   05    56
            i          12   06    08
        Gb  iP         12   06    14
        (Kamchatka).

»  17   Up  iP         07   26    35

»  17   Up  iP         09   48    32
            i          09   48    54

»  17   Up  iP         19   26    10
        Ki  eP         19   25    16
        Kamchatka.

»  18   Up  iP         07   35    00 C
            i          07   35    11
                P    z'    0.1    0.5
        Ki  iP         07   34    06 C
            i          07   34    17
                P    z'    0.2    0.9
        Sk  iP         07   34    40 C
        Aleutian Islands. Magn. = 6.1 (Up, Ki).

»  18   Up  iPKP       19   20    31
            iPKP2      19   20    46
        Ki  iPKP       19   20    14
        Sk  iPKP       19   20    28 D
        New Zealand.
```

Column 1 (p. 48)

```
1959
May 19 Up  iP                    03 31 48
                            μ    s
           P      z'       0.1  0.5
»  19  Up  iP                    08 03 19
                            μ    s
           M      E        0.3  17
           M      N        0.8  19
       Ki  eP                    08 03 04
                            μ    s
           M      E        0.9  17
           M      z        0.7  17
       Sk  iP                    08 03 28
Mindoro, Philippine Islands.

»  19  Up  iP               15 25 38
           iPP              15 27 18
           eS               15 32 02
           iLg2             15 41 23
                            μ    s
           P      z'       0.1  0.6
           PP     E        0.4  3
           PP     z        0.3  3
           S      E        0.3  7
           S      N        0.5  6
           M      E        6.5  20
           M      N        16   20
           M      z        8.1  17
       △=4800 km=43°.
       Ki  iP               15 25 53
           iPP              15 27 37
           eS               15 32 26
                            μ    s
           S      E        0.4  12
           S      N        0.3  9
           M      E        3.1  15
           M      N        1.8  13
           M      z        2.1  9
       △=4950 km=44½°.
       Sk  iP               15 26 06
           i                15 26 10
Afghanistan. Magn.=5.8 (Up, Ki).

»  19  Up  iP               19 04 08
       Ki  iP               19 03 38
Volcano Islands.

»  20  Ki  eL               01 57
                            μ    s
           M      E        0.4  20
           M      z        0.4  19
South Pacific Ocean.

»  20  Up  i(P)             08 51 02

»  20  Up  iPg              09 59 29
           iSg              09 59 46
           i                09 59 50
           iL               09 59 55
                            μ    s
           L      z'       0.3  0.9
```

Column 2 (p. 48)

```
1959
May 20        △=140 km=1.3°.
(cont.) Sk  i(Sg)          10 01 48
Explosion of 56 ton dynamite near
Norrköping, Sweden, 58°38'N,
16°14'E. Origin time=09 59 03.

»  20  Up  iP              10 22 03
       Ki  iP              10 21 10
Aleutian Islands.

»  20  Up  iP              11 37 27C
                            μ    s
           P      z'       0.1  0.6
       Ki  iP              11 36 53C
                            μ    s
           P      z'       0.1  1.0
       Sk  iP              11 37 24
Japan (h~450 km). Magn.=5.6 (Up,
Ki).

»  20  Ki  e(P)            12 53 11

»  20  Up  iP              16 42 06
           eS              16 46 20
                            μ    s
           S      N        0.6  7
           M      E        0.6  10
           M      N        1.5  10
           M      z        1.6  10
       △=2650 km=24°.
       Ki  iP              16 43 13
                            μ    s
           M      E        0.4  11
           M      N        0.4  11
           M      z        0.5  11
       Sk  iP              16 42 47
Dodecanese Islands.

»  20  Up  iP              19 46 08
                            μ    s
           P      z'       0.1  0.5
           M      E        1.7  20
           M      N        1.6  20
           M      z        3.0  19
       Ki  iP              19 45 22
                            μ    s
           M      E        3.7  20
           M      N        1.8  19
           M      z        2.3  18
       Sk  iP              19 45 57
Kurile Islands. Magn.=5.7 (Up, Ki).

»  20  Up  iP              19 54 24D
           iS              19 58 35
           iLg2            20 02 07
                            μ    s
           P      z'       0.3  1.0
           S      E        2.4  13
           S      N        3.2  9
```

Column 3 (p. 49)

```
1959
May 20      M      E        3.8  17
(cont.)     M      N        4.5  15
            M      z        6.1  15
       △=2600 km=23½°.
       Ki  iP              19 55 11D
           i               19 55 35
           eS              19 59 57
           eLg1            20 03 44
           i(Lg2)          20 04 22
                            μ    s
           P      E        0.4  8
           P      N        0.3  9
           P      z'       0.2  1.0
           S      N        0.3  8
           M      E        5.1  15
           M      N        3.1  13
           M      z        5.8  14
       △=3150 km=28½°.
       Sk  iP              19 55 04
           i               19 55 32
Georgia, U.S.S.R.  Magn.=5.7 (Up,
Ki). Extremely clear Lg2.

»  20  Up  iP              22 16 44
Kurile Islands.

»  21  Up  iP              02 35 09
           i               02 35 22
       Ki  iP              02 34 49
Luzon, Philippine Islands.

»  21  Ki  iP              03 49 37
Kodiak Island, Alaska.

»  21  Ki  iP              07 01 45D
           iPcP            07 02 31
                            μ    s
           P      z'       0.2  0.6
       Sk  iP              07 02 15C
           iPcP            07 02 50
Aleutian Islands.

»  21  Up  e               12 03 20
                            μ    s
           M      E        2.0  21
           M      N        1.6  22
           M      z        3.2  22
       Ki  i(PKP)          11 53 21
           i               11 54 13
           e               12 02 19
           e               12 03 48
           e               12 04 17
                            μ    s
           M      E        1.3  22
           M      N        0.9  19
           M      z        1.6  23
       Sk  e(PKP)          11 53 41
Chile-Argentina (h~60 km).

»  21  Ki  iP              22 41 56
Aleutian Islands.
```

Column 4 (p. 49)

```
1959
May 22 Up  iP              04 28 49
       Ki  eP              04 28 56

»  22  Up  iP              04 52 39
       Ki  iP              04 51 45
                            μ    s
           M      E        0.4  17
           M      N        0.2  17
           M      z        0.3  16
Kamchatka.

»  22  Up  iPKP            07 17 15
           i               07 17 24
       Ki  iPKP            07 16 51
           i               07 16 56
           i               07 17 09
                            μ    s
           PKP    z'       0.1  0.9
       Sk  iPKP            07 17 09
           i               07 17 20
New Zealand.

»  22  Up  iP              08 41 33
                            μ    s
           P      z'       0.1  0.8
       Ki  iP              08 41 25
       Sk  iP              08 41 48
Burma.

»  23  Up  iP              10 07 18
       Sk  iP              10 07 06
Venezuela.

»  24  Up  iP              00 20 39
       Ki  iP              00 20 45
       Sk  eP              00 20 23
Puerto Rico.

»  24  Up  iPKP            04 57 33
       Ki  iPKP            04 57 27
       Sk  iPKP            04 57 25
       Gb  iPKP            04 57 42
Fiji Islands (h~700 km).

»  24  Up  iP              11 38 21
           i               11 38 29
                            μ    s
           P      z'       0.1  0.6
           M      E        0.5  17
           M      N        0.9  17
           M      z        0.9  19
       Ki  iP              11 38 17
           i               11 38 26
           iS              11 46 31
                            μ    s
           S      N        0.4  7
           M      E        0.4  18
           M      N        0.8  19
           M      z        0.5  17
       △=6600 km=59½°.
       Sk  iP              11 38 36
```

```
1959
May 24   i            11  38  46
(cont.) Gb  iP        11  38  40
         i            11  38  49
Bhutan-India.

» 24 Up  iP           13  24  58
         iS           13  29  28
                      μ    s
         S    N      0.3    7
         M    E      0.7   18
         M    N      0.9   17
         M    z      0.8   17
△ = 2850 km = 25½°.
     Ki  iP           13  26  09
                      μ    s
         M    E      1.3   16
         M    N      0.6   15
         M    z      0.6   13
     Sk  iP           13  25  26
     Gb  iP           13  24  29
Algeria.

» 24 Up  iP           19  30  17 D
         ipP          19  30  40
         iPP          19  33  41
         ipPP         19  34  02
         iS           19  40  37
         iPKKP        19  48  33
         eP'P'        19  56  17
         eP'P'P'      20  16  57
                      μ    s
         P    E      1.9    6
         P    N      1.9    6
         P    z      7.6    7
         P    z'     0.6   0.9
         pP   E      2.8    6
         pP   N      2.7    5
         pP   z      9.4    6
         PP   z'     0.2   1.1
         S    E      17     9
         S    N      11     8
         M    E      18    25
         M    N      15    23
         M    z      25    24
△ ~ 9600 km ~ 86½°.
     Ki  iP           19  30  03 D
         ipP          19  30  25
         i(PP)        19  33  38
         iS           19  40  19
         iPKKP        19  48  22
         i            19  48  40
         iP'P'        19  56  26
         eP'P'P'      20  16  52
                      μ    s
         P    E      5.9    6
         P    N      3.2    6
         P    z      14     6
         P    z'     12    3.0
         pP   z      22     6
         pP   z'     14    3.0
         (PP) z      4.6    6
```

```
1959
May 24
(cont.)
         S    E      38    11
         S    N      12    10
         S    z      6.1   10
         M    E      20    23
         M    N      12    23
         M    z      22    22
△ ~ 9350 km ~ 84°.
     Sk  iP           19  29  59 D
         ipP          19  30  20
         iPKKP        19  48  24
         i            19  48  42
         eP'P'        19  56  20
         iP'P'P'      20  16  46
     Gb  iP           19  30  10 D
         ipP          19  30  32
         iP'P'        19  56  20
         iP'P'P'      20  16  53
```
Oaxaca, Mexico. h=90 km (Up, Ki, Sk, Gb). Magn.=7.2 (Up, Ki); the average magn. for Up is 6.9, for Ki 7.6. This earthquake has given records which could be very useful in a study of core phases, and is the only case known so far with P'P'P' recorded at Swedish stations.

```
» 25 Up  iP           19  31  00 D
                      μ    s
         P    z'     0.2   0.6
     Ki  iP           19  30  54
     Sk  iP           19  31  16
     Gb  iP           19  31  22
Assam.

» 26 Up  iP           04  24  41 C
                      μ    s
         P    z'     1.1   0.8
         M    E      2.2   17
         M    N      2.6   21
         M    z      1.7   15
     Ki  iP           04  24  12
         ipP          04  24  32
                      μ    s
         P    z'     0.6   1.0
         M    E      0.9   15
         M    z      1.5   19
     Sk  iP           04  24  42
     Gb  iP           04  25  01
```
Ryukyu Islands. h=80 km (Ki). Magn.=6.7 (Up, Ki).

```
» 26 Up  iP           05  38  53 C
                      μ    s
         P    z'     0.1   1.0
     Ki  iP           05  39  02
                      μ    s
         P    z'     0.2   0.8
     Sk  iP           05  38  39 D
Leeward Islands.
```

```
1959
May 26 Up  iP         06  43  36 C
                      μ    s
           P    z'   0.3   0.7
           M    E    2.6   17
           M    z    2.7   17
       Ki  iP         06  43  45 C
           iLg1       06  57  17
           eLg2       06  58  14
                      μ    s
           M    E    3.8   11
           M    N    2.8   16
           M    z    3.6   10
       Sk  iP         06  44  02 C
           iPP        06  45  45
       Gb  iP         06  43  58
Afghanistan-Tadzhik.

» 26 Ki  eP           13  30  58
     Sk  iP           13  31  12
         iS           13  32  59
△ = 1100 km = 10°.
Jan Mayen.

» 26 Up  iP           18  06  01
         iPP          18  06  21
     Sk  iP           18  06  44 D
Greece.

» 27 Up  iP           10  19  49
                      μ    s
         P    z'     0.1   0.6
     Sk  iP           10  20  29
     Gb  iP           10  19  33 D
Ionian Islands.

» 27 Up  iP           14  01  38
     Ki  iP           14  01  15
Formosa.

» 27 Up  iP           20  41  50
         i            20  41  58
         e            20  43  32
         i            20  44  56
         iLg2         20  46  09
         e            20  46  35
         iRg          20  47  00
                      μ    s
         M    E      2.6    9
         M    N      1.8    9
         M    z      1.0   11
     Ki  iP           20  43  30
         eS           20  47  38
         e(Lg1)       20  50  39
                      μ    s
         P    z'     0.1   1.0
         M    E      8.4   13
         M    N      1.2   12
         M    z      1.6   13
△ = 2550 km = 23°.
     Sk  iP           20  42  43
         i            20  42  46
```

```
1959
May 27       i        20  42  53
(cont.)      iLg2     20  48  36
         Gb  iP       20  41  36
             i        20  46  12
Hungary-Rumania. Clear Lg2 phases
(Up, Sk).

» 28 Ki  iP           04  19  14
     Sk  eP           04  18  58
Colombia.

» 28 Up  iP           15  27  18
     Ki  iP           15  27  03
Luzon, Philippine Islands.

» 28 Sk  iP           19  20  15
     Gb  iP           19  19  21
Algeria.

» 29 Ki  eP           01  04  13
Mariana Islands (h ~ 100 km).

» 29 Up  iPKP         11  01  56
         i            11  02  01
         ipPKP        11  02  25
         i            11  04  53
         iSKP         11  05  21
         iPKS         11  05  29
         isSKP        11  06  05
         i            11  11  15
         e            11  16  45
                      μ    s
         SKP  z'     0.1   0.7
         M    E      1.2   21
         M    N      1.7   21
         M    z      1.8   22
△ ~ 14900 km ~ 134°.
     Ki  iPKP         11  01  45
         ePP          11  03  44
         e            11  04  09
         iPKS         11  05  11
         e            11  10  29
         i            11  18  28
                      μ    s
         PKP  z'     0.3   1.1
         M    E      2.1   25
         M    N      0.7   20
         M    z      1.9   23
△ ~ 14100 km ~ 127°.
     Sk  ePKP         11  01  48
         i            11  01  57
         eSKP         11  05  13
     Gb  iPKP         11  02  06
         ipPKP        11  02  35
         iSKP         11  05  24
New Hebrides Islands. h=120 km
(Up, Gb).

» 29 Ki  eP           12  40  33
Mariana Islands.
```

1959
May 29 Up iP   18 40 11
            i   18 40 22
            i   18 39 20
        Ki iP   18 39 56
        Sk eP
        Kamchatka.

» 29 Sk i(P)   22 43 43

» 29 Up iP   23 53 44
           i(PP)   23 55 10
       Ki iP   23 54 27
           iPP   23 55 51
           iPP   23 53 55C
       Gb iP   23 55 16
           i(PP)
       Iran.

           e   03 18 52
» 30 Up iSg   03 18 55
       Δ=830 km=7.5°.
       Ki iPg   03 15 40
           iS*   03 16 11
           eSg   03 16 16
       Δ=300 km=2.7°.
       Sk ePg   03 16 01
           iSg   03 16 48
       Δ=400 km=3.6°.
   Off coast of central Norway, 67.3°N,
   13.4°E. Origin time=03 14 48.

» 30 Up iP   12 30 27
       Ki iP   12 30 34

» 30 Ki iPKP   17 28 36
   New Zealand.

» 31 Up iP   05 48 33
       Ki iP   05 48 19
       Sk eP   05 48 02
   Cayman Islands.

» 31 Ki i(P)   07 47 30

» 31 Up
                    μ   s
           M   E   1.0   18
           M   N   1.4   18
           M   Z   1.5   19
                          09 56 54
       Ki e(PS)
                    μ   s
           M   E   1.8   18
           M   N   0.8   19
           M   Z   1.9   20
   Solomon Islands.

» 31 Up iP   12 19 17
           i   12 19 24
           iS   12 21 57
           iLg2   12 23 42
                    μ   s
           P   z' 0.4   0.5

1959
May 31
(cont.)
           S   z' 0.2   0.5
           M   E   2.4   13
           M   N   4.3   12
           M   Z   3.7   14
       Δ=1600 km=14½°.
       Ki iP   12 20 43
           i   12 20 54
           i   12 21 10
           iPP   12 24 44
           iS   12 24 58
           i   12 27 26
           eLg1
                    μ   s
           P   z' 0.3   1.0
           M   E   2.9   7
           M   N   2.3   14
           M   Z   2.6   14
       Δ=2450 km=22°.
                          12 20 15
       Sk iP   12 20 20
           i   12 24 22
           i   12 25 49
           iLg1   12 26 09
           iLg2   12 19 23
       Gb iP   12 22 17
           iS   12 23 56
           iLg2
       Δ=1650 km=15°.
   Rumania. Extremely clear channel
   waves.

» 31 Up eP   13 07 55
           i   13 08 36
                    μ   s
           M   E   0.5   17
           M   N   0.6   19
                          13 08 34
       Ki iP
                    μ   s
           M   E   0.7   16
           M   N   0.6   18
                          13 08 33
       Sk iP   13 08 09D
       Gb iP
   Iran.

» 31 Up eP   13 14 00
       Ki iP   13 14 34
   Iran.

June 1 Ki iP   09 03 05
        Sk iP   09 02 34
   Crete.

» 1 Up iSg   10 26 25
      Δ=710 km=6.4°.
      Ki ePg   10 24 01
          iSg   10 24 46
      Δ=380 km=3.4°.
      Sk iPg   10 23 44C
          iSg   10 24 16
      Δ=280 km=2.5°.
   Nordlands Fylke, Central Norway.
   66°N, 13½°E. Origin time=
   10 22 54.

1959
June 1 Up iP   11 51 22

» 1 Up iPKP   12 50 28
          i   12 50 30
      Ki iPKP   12 50 17
      Sk iPKP   12 50 28
      Gb iPKP   12 50 37
   Solomon Islands (h ~ 400 km).

» 1 Up iP   15 08 11
      Ki eP   15 08 27

» 1 Up iP   16 00 36
      Sk i(P)   16 00 54

» 1 Up iP   17 19 34
                    μ   s
          P   z'   0.1   0.5

» 1 Up iPP   17 27 19
                    μ   s
          PP z   0.7   7
          M   E   0.4   14
          M   N   0.8   19
          M   Z   0.6   19
      Δ ~ 13100 km ~ 118°.
      Ki ePP   17 26 39
          ePS   17 36 03
                    μ   s
          PP z   0.4   6
          M   E   0.8   19
          M   N   0.3   17
          M   Z   0.9   19
      Δ ~ 12350 km ~ 111°.
   Solomon Islands (h ~ 100 km).

» 1 Up iPg   18 13 07D
          iSg   18 13 23
                    μ   s
          Pg z'   0.1   0.5
      Δ=130 km=1.2°.
      Sk eSg   18 15 44
      Δ=610 km=5.5°.
   The Baltic Sea, 59.8°N, 20.0°E. Origin
   time=18 12 43. Explosion?

» 1 Up iPg   18 17 12D
          iSg   18 17 28
                    μ   s
          Pg z'   0.1   0.5
          Sg z'   0.1   0.5
      Δ=130 km=1.2°.
      Ki eSg   18 21 14
          e   18 22 08
      Δ=900 km=8.1°.
      Sk eSg   18 19 46
      Δ=600 km=5.4°.
   The Baltic Sea, 59.8°N, 20.0°E. Origin
   time=18 16 48. Explosion?

1959
June 1 Up iPg   18 28 27D
            iSg   18 28 42
                    μ   s
          Pg z'   0.2   0.5
          Sg z'   0.1   0.5
      Δ=130 km=1.2°.
      Ki e   18 32 43
      Sk eSg   18 31 00
      Δ=600 km=5.4°.
   The Baltic Sea, 59.8°N, 20.0°E. Origin
   time=18 28 02. Explosion? In the
   last three records there were also clear
   surface waves of short period recorded
   by Benioff z' at Uppsala.

» 1 Ki iP   20 35 03
      Sk iP   20 35 40
   Kamchatka.

» 1 Ki eP   22 59 10
      Sk eP   22 59 41
   Mariana Islands.

» 2 Up iP   00 58 54
          i   00 59 02
                    μ   s
          M   E   1.7   18
          M   N   1.0   17
          M   Z   1.4   18
      Ki iP   00 58 21
          i   00 58 35
          eLi   01 21 09
          eLg1   01 22 39
          eLg2   01 24 40
                    μ   s
          M   E   2.4   18
          M   N   1.3   21
          M   Z   2.4   20
      Sk eP   00 58 52
   Kyushu, Japan. Magn.=5.6 (Up, Ki).

» 2 Ki iP   02 09 33
   North Celebes (h ~ 200 km).

» 2 Up eP   02 49 47
          i   02 49 55
          eS   02 59 43
                    μ   s
          P   z'   0.1   1.0
          M   E   1.8   19
          M   N   3.1   19
          M   Z   3.9   20
      Δ=8700 km=78½°.
      Ki iP   02 49 27
          i   02 49 36
          ePP   02 52 15
          eS   02 59 03
                    μ   s
          P   z'   0.2   1.1

Page 54, column 1

```
1959
June 2
(cont.)      S      E    1.3   12
             S      N    0.5   12
             M      E    3.6   22
             M      N    3.5   22
             M      z    1.9   19
         △=8350 km=75°.
         Sk   eP              02  50  00
         Batan Islands. Magn.=5.9 (Up, Ki).

»  2 Ki  iP                   03  20  46

»  2 Up  iPKP                 03  42  49
         i                    03  43  02
                           μ     s
             PKP    z'    0.2   0.9
             PKP             03  42  38
         Ki  ePKP
         Tonga Islands.

»  2 Up  iPKP                 03  51  31 C
         i                    03  51  44
                           μ     s
             PKP    z'    0.2   0.7
             M      E    0.4   20
             M      N    1.1   21
             M      z    1.0   20
         Ki  iPKP             03  51  19
             ePP              03  53  58
                           μ     s
             M      E    0.7   19
             M      N    0.9   20
             M      z    1.3   21
         Sk  iPKP             03  51  31
         Tonga Islands.

»  2 Up  iPKP                 04  07  51
         Tonga Islands.

»  2 Up  iPKP                 04  11  43 C
         i                    04  12  57
                           μ     s
             PKP    z'    0.2   0.7
         Ki  ePKP             04  11  30
         Sk  ePKP             04  11  41
         Tonga Islands.

»  2 Up  eP                   05  09  23
         i                    05  09  30
         iS                   05  19  18
                           μ     s
             S      E    2.0   10
             S      N    1.4   10
             S      E    9.8   15
             M      N    22    15
             M      z    15    19
         △=8700 km=78½°.
         Ki  iP               05  08  59
             i                05  09  03
             e                05  13  38
             eS               05  18  33
```

Page 54, column 2

```
1959
June 2
(cont.)
                           μ     s
             P      z'    0.1   1.0
             S      E    2.1   11
             S      N    1.1   11
             M      E    19    23
             M      N    13    21
             M      z    5.8   22
         △=8350 km=75°.
         Sk  iP               05  09  29
             i                05  09  34
         Batan Islands. Magn.=6.4 (Up, Ki).

»  2 Up  eP                   05  54  39
                           μ     s
             M      E    3.3   16
             M      N    4.5   15
             M      z    3.8   16
         Ki  iP               05  54  15
             i                05  54  19
                           μ     s
             P      z'    0.1   1.0
         Sk  eP               05  54  45
         Batan Islands. Magn.=6.0 (Up, Ki).

»  2 Up  iPKP                 06  01  18
                           μ     s
             PKP    z'    0.1   1.5
             M      E    1.8   19
             M      N    1.1   18
             M      z    1.7   18
         Ki  iPKP             06  01  26
                           μ     s
             PKP    z'    0.3   1.6
             M      E    0.7   18
             M      N    0.5   17
             M      z    0.9   17
         Sk  iPKP             06  01  16
         Chile-Argentina (h~150 km).

»  2 Up  iPg                  15  22  17
         i                    15  22  20
         iSg                  15  22  33
         △=130 km=1.2°.
         Sk  eSg              15  24  49
         The Baltic Sea, 59.8°N, 20.0°E. Origin
         time=15  21  53. Explosion?

»  2 Up  iPKP                 17  38  03
         Sk  iPKP             17  37  43
         North Island, New Zealand (h~200
         km).

»  2 Sk  iP                   17  46  44

»  2 Ki  eP                   19  25  14
         Formosa.
```

Page 55, column 1

```
1959
June 3 Up  i                  04  07  00
           eSKS               04  07  14
       Ki  eP                 03  56  43
       Sk  iP                 03  56  27
       Colombia.

»  3 Up  iP                   04  08  27
   Ki    eP                   04  08  12

»  3 Up  iP                   05  54  28
                           μ     s
             P      z'    0.1   1.0
   Ki    iP                   05  53  34
                           μ     s
             P      z'    0.3   1.3
   Sk    iP                   05  54  05 D
   Gb    iP                   05  54  (39)
         Aleutian Islands.

»  3 Up  iP                   08  46  25
   Ki    iP                   08  45  30
         i(pP)                08  45  44
         Kamchatka.

»  3 Ki  iP                   11  51  09
         Honshu, Japan (h~360 km).

»  4 Sk  eP                   00  01  39

»  4 Up  eP                   02  10  38
   Ki    eP                   02  10  36
                           μ     s
             P      z'    0.2   2.0
   Sk    eP                   02  10  25
         Costa Rica.

»  4 Up  iP                   12  41  57
         i(sP)                12  42  36
   Ki    iP                   12  41  01
         isP                  12  41  46
   Sk    iP                   12  41  29 D
         i                    12  42  26
   Gb    iP                   12  42  10 D
         Cook Inlet, Alaska (h~100 km).

»  4 Up  i(P)                 15  52  11

»  4 Up  iPg                  16  48  30
         iSg                  16  48  33
         iL                   16  48  42
                           μ     s
             Sg     z'    0.2   0.5
         △=30 km=0.3°.
         Probably explosion.

»  4 Up  iP                   16  52  56

»  4 Up  iP                   18  23  01

»  4 Up  iP                   19  30  49
```

Page 55, column 2

```
1959
June 4 Up  iPKP               21  53  36
       Gb  iPKP               21  53  46
       Tonga Islands.

»  4 Ki  iP                   21  56  00

»  5 Ki  iP                   09  44  55
   Sk    i(P)                 09  44  45

»  5 Up  i(P)                 12  26  31

»  5 Sk  iP                   20  15  47
         Crete.

»  5 Ki                       —
                           μ     s
             M      E    0.8   19
             M      N    0.3   18
             M      z    1.2   20
   Sk    eP                   20  49  37
         Nicaragua (h~100 km).

»  6 Up  iPKP                 11  36  01
         i                    11  36  07
   Sk    iPKP                 11  35  55
         Kermadec Islands.

»  7 Up  iP                   08  43  34 D
   Ki    eP                   08  44  55

»  7 Up  iP                   08  47  34 D
   Ki    iP                   08  47  17
   Sk    eP                   08  47  52
         Samar, Philippine Islands.

»  7 Up  eP                   09  12  58
         i                    09  13  07
   Ki    eP                   09  13  35
   Sk    iP                   09  13  33
         Socotra Island.

»  7 Up  iP                   10  25  57

»  7 Up  iP                   13  50  25
         i                    13  50  36
         iS                   13  59  08
                           μ     s
             S      E    0.7   10
             S      N    0.9   9
             M      E    2.0   21
             M      N    2.1   21
             M      z    1.7   18
         △=7350 km=66°.
   Ki    iP                   13  51  08
         i                    13  51  18
         iS                   14  00  36
                           μ     s
             P      z'    0.4   2.0
             S      E    0.7   9
             S      N    0.7   10
             M      E    1.2   18
```

1959
June 7 (cont.)

	M	N	1.6	20	
	M	z	2.9	21	

△=8150 km=73½°.

Sk	iP	13	50	36
	i	13	50	49
Gb	iP	13	50	05

Atlantic Ocean. Magn.=6.1 (Up, Ki).

» 7 Gb iP 14 04 55

» 7 Sk iP 14 23 09
Greece.

» 9 Ki iP 04 43 26
Rhodes Island.

» 9 Up —

		μ	s
M	E	0.9	16
M	N	1.5	15
M	z	1.3	14

Ki	iP	11	27	39

		μ	s
M	E	0.6	11
M	N	0.4	11
M	z	0.5	10

Turkey.

» 9 Up

	iPKP	15	13	20
	i	15	13	29
Ki	ePKP	15	13	02
Sk	iPKP	15	13	15

Kermadec Islands.

» 9 Ki iPKP 23 29 51
Southwest of Bouvet Island.

» 10 Up

	iP	04	21	23 D
	i	04	21	34
	iS	04	25	45

		μ	s
P	z	0.6	4
P	z'	0.1	0.5
S	E	1.3	8
S	N	2.4	8
M	E	1.5	10
M	N	2.4	12
M	z	2.8	13

△=2700 km=24½°.

Ki	iP	04	22	33
	i	04	22	36
	e(Lg2)	04	33	48

		μ	s
P	z'	0.3	0.8
M	E	3.6	14
M	N	2.0	13
M	z	2.1	13

Sk	iP	04	22	02 D
Gb	iP	04	21	14 D

Crete. Magn.=5.7 (Up, Ki).

1959

June 10	Up	iP	04	35	04
		i	04	35	10

		μ	s
M	N	0.9	18

Ki	iP	04	34	59

		μ	s
M	N	0.6	17

Sk	iP	04	35	21

Tibet.

» 10 Ki iP 06 48 37
Turkey.

» 10 Up iP 10 02 21
  Ki iP 10 02 04
Mindoro, Philippine Islands (h~100 km).

» 10 Sk i(P) 13 16 35

» 11 Up iPKP 00 14 12 D

		μ	s
PKP	z'	0.1	0.5

Ki	ePKP	00	13	59
	iPP	00	16	44
Gb	iPKP	00	14	24 D

Tonga Islands.

» 11

Up	iPKP	01	29	03
Ki	ePKP	01	28	54
Gb	iPKP	01	29	15

Tonga Islands.

» 11 Ki eP 08 31 31
Pamir.

» 11 Ki iP 18 21 07
Turkey.

» 11 Up iP 19 48 30

» 11 Up iP 21 14 30

		μ	s
P	z'	0.1	0.6

Sk	iP	21	15	09
Gb	iP	21	14	12

Ionian Sea.

» 12

Up	iP	00	57	02
Ki	iP	00	56	09
Gb	iP	00	57	15 C

Aleutian Islands.

» 12

Up	iPKP	12	04	15
Sk	iPKP	12	04	07 C

Kermadec Islands.

» 12

Up	iP	13	23	24
	iPcP	13	23	56
Ki	iP	13	22	33

Okhotsk Sea. Deep.

1959

June 13	Up	iP	07	24	36

» 13 Up iP 12 07 33

		μ	s
P	z'	0.1	0.5

Ki	iP	12	08	34

		μ	s
P	z'	0.3	1.0

Sk	iP	12	08	11
Gb	iP	12	07	31

Turkey.

» 13 Up

	iPKP	13	17	53 D
	i	13	17	58
Sk	iPKP	13	17	47

Kermadec Islands.

» 13 Up iSg 14 10 55
△=780 km=7.0°.

Sk	eSn	14	09	21
	iSg	14	09	50

△=560 km=5.0°.

Gb	i	14	09	54
	iSg	14	10	00

△=590 km=5.3°.
Off southwest coast of Norway, 60.9°N, 3.7°E. Origin time= 14 07 04.

» 13 Up iP 16 13 49
    i 16 13 52
China.

» 13 Up

	iP	21	59	59
	i	22	00	03
	i	22	00	09
	iS	22	02	32
	iLg2	22	04	20

		μ	s
M	E	2.2	10
M	N	1.3	6

△=1550 km=14°.

Ki	iP	22	01	37

		μ	s
P	z'	0.1	1.2

Sk	iP	22	00	47
Gb	e(P)	21	59	33
	i	22	03	27

Austria-Italy. Very clear Lg2 at Uppsala.

» 14 Up

	i(P)	00	26	23
	iPP	00	30	27
	i	00	31	30
	iSKS	00	36	28
	isSKS	00	37	16
	esS	00	38	38
	iSP	00	39	26
	isPS	00	40	17
	i	00	42	29
	i	00	43	06

1959
June 14 (cont.)

		μ	s
PP	E	3.2	7
PP	z	7.7	8
PP	z'	1.2	2.0
SKS	E	21	12
SKS	N	5.5	10
M	E	24	19
M	N	19	20
M	z	29	22

△~11800 km~106°.

Ki	i(P)	00	26	33
	iPP	00	30	45
	ipPP	00	31	04
	iSKS	00	36	47
	isSKS	00	37	41
	iS	00	38	15
	i!	00	39	09
	iSP	00	39	57
	isPS	00	40	42
	eSS	00	45	46
	ePKKP	00	41	33
	i!	00	42	18

		μ	s
PP	z	3.1	10
SKS	E	16	12
S	N	9.4	12
M	E	23	19
M	N	7.7	20
M	z	23	19

△~12000 km~108°.

Sk	i(P)	00	26	12
	iPKKP	00	41	47
Gb	eP	00	25	52
	ipP	00	26	08
	iPP	00	29	58
	i	00	30	03

Southwestern Bolivia (h~100 km). Magn.=7.5 (Up, Ki). The P-phase is 20—23 sec later than the computed arrival time for Up, Ki, and Sk; the measured (P)-phases agree better with the calculated arrival times of pP.

» 14 Ki

	iPg	09	43	34
	iSg	09	43	53

△=160 km=1.4°.

» 14 Ki iP 16 26 40 C
Honshu, Japan.

» 14 Up iP 19 02 04

» 14 Ki eP 20 57 18
    i 20 57 30
Alaska.

» 14 Up iPKP 21 21 25
Tonga Islands (h~300 km).

1959

June 15	Up	iP	02	50	36
		i(pP)	02	51	05
	Ki	iP	02	50	11
		i(pP)	02	50	41

μ s

	P	z'	0.1	1.2

	Sk	iP	02	50	40
		i(pP)	02	51	10

Formosa. (pP) could instead be the P-phase of another shock in the same location.

» 15 Ki eP 06 54 40

» 15 Ki iP 07 45 45
Aleutian Islands.

» 16 Up iP 00 36 30
Ki eP 00 37 50

μ s

	M	E	0.5	13
	M	N	0.7	11
	M	z	0.8	11

Sk iP 00 37 18
i 00 37 33
Bulgaria.

» 16 Up —

μ s

M E 0.7 12
Ki iP 03 33 58

μ s

	P	z'	0.1	1.4
	M	E	0.5	11
	M	N	0.4	9
	M	z	0.6	11

Sk iP 03 33 37
Yugoslavia.

» 16 Up i(P) 05 07 18
i 05 07 42

» 16 Ki iP 08 14 35

μ s

P z' 0.2 1.5
Chiapas, Mexico.

» 16 Ki iP 14 19 30
Hokkaido, Japan (h ~ 40 km).

» 16 Up iP 14 54 50C
Aleutian Islands.

» 16 Ki iPg 15 37 51
i 15 38 21
iSg 15 38 23

μ s

Sg z' 0.2 0.6
△=280 km=2.5°.
Sk eSg 15 40 01
△=600 km=5.4°.

1959

June 16 Off coast of Norway, 69°N, 14°E.
(cont.) Origin time=15 37 01.

» 17 Ki eRg 12 48 43

μ s

M E 0.3 10
Sk iP 12 36 53
Albania-Yugoslavia.

» 17 Up iLg1 19 51 18
Ki eSn 19 49 23
iSg 19 49 39
△=400 km=3.6°.
Sk iPg 19 48 37
iSg 19 49 13
△=310 km=2.8°.
Off coast of Norway, 66.5°N, 12.0°E.
Origin time=19 47 40.

» 17 Ki e 20 39 39
iSg 20 39 51
Sk ePg 20 38 52
iSg 20 39 27
Off coast of Norway (same location as for preceding shock). Origin time= =20 37 54.

» 17 Up iPKP 21 04 48
Ki iPKP 21 04 34
Sk iPKP 21 04 45C
Santa Cruz Islands (h ~ 200 km).

» 18 Up e(P) 02 04 03

» 18 Up eL 08 13

μ s

M E 1.2 18
M N 1.0 20
M z 2.6 20
Ki eL 08 13

μ s

M E 0.7 18
M z 1.2 20
Pacific Ocean.

» 18 Up iP 15 41 53
ipP 15 42 06
eS 15 50 15

μ s

P z' 0.4 1.3
pP z' 1.1 1.6
S E 6.6 12
M E 120 23
M N 110 21
M z 79 23
△=6950 km=62½°.
Ki iP 15 40 59
ipP 15 41 12
iS 15 48 43

1959

June 18   P z' 0.5 1.5 (μ s)
(cont.)   pP z' 0.5 1.5
S E 5.2 14
S N 3.1 14
M E 110 20
M N 49 18
M z 82 17
△=6100 km=55°.
Sk iP 15 41 38
ipP 15 41 51
iPP 15 43 49
Gb iP 15 42 17
Kamchatka. h=50 km (Up, Ki, Sk).
Magn.=6.7 (Up, Ki). Abnormally large surface waves.

» 18 Up iP 16 09 06

μ s

P z' 0.1 1.0
Ki iP 16 08 10
Sk iP 16 08 48
iPcP 16 09 32
Kamchatka.

» 19 Up iP 12 09 06
Ki iP 12 09 53
Sk eP 12 09 30
Lake Edward, Central Africa.

» 19 Up iP 14 05 58
i 14 06 02
Ki eP 14 04 54

» 20 Up iP 03 34 33C

» 20 Ki iPP 10 24 46
Fiji Islands.

» 20 Up eP 14 24 20
i 14 25 27
iPP 14 25 39
Ki eP 14 24 25
iPP 14 25 52

μ s

M E 0.5 11
M N 0.5 14
Sk eP 14 24 46
i 14 26 07
Pamir.

» 20 Up iP 16 50 57

μ s

P z' 0.2 1.8
Ki iP 16 51 20

μ s

P z' 0.4 1.7
Sk iP 16 50 50
Atlantic Ocean.

» 21 Up iP 16 17 05
i 16 17 16

1959

June 21 Ki iP 16 16 27
(cont.) Sk eP 16 16 59
Honshu, Japan.

» 21 Up iPKP 23 45 27
i 23 45 31

μ s

PKP z' 0.1 0.7
Ki iPKP 23 45 14
Sk iPKP 23 45 21
Gb iPKP 23 45 38 D
Kermadec Islands.

» 22 Up iP 21 17 19

» 23 Up eP 10 53 00
iLg1 11 07 17

μ s

M E 0.4 9
M N 1.0 19
M z 0.5 8
Ki iP 10 52 46
eLg1 11 05 58

μ s

M E 0.7 12
M N 0.2 9
M z 0.7 12
Sk iP 10 53 13
i 10 53 18
Sinkiang Province, China.

» 23 Up iP 14 46 45

μ s

P z' 0.2 1.0
M E 0.6 17
M N 0.9 17
M z 1.4 18
Ki iP 14 46 09 D
eS 14 55 14

μ s

P z' 0.2 1.0
S E 0.3 7
S N 0.2 6
M E 0.7 18
M N 0.7 17
M z 0.8 16
△=7700 km=69½°.
Sk iP 14 46 19 D
Gb iP 14 46 45
Nevada. Magn.=6.0 (Up, Ki).

» 23 Ki eP 15 15 42
Sk iP 15 15 52
Nevada.

» 23 Sk iP 15 25 08

» 23 Up i(Sg) 16 15 14
i 16 15 18
Sk e(Sg) 16 17 14

```
1959
June 23  Up   e(P)              16   29   54

 »  24   Ki   iP                03   04   57
              i                 03   04   59
                          μ    s
              P     z'    0.4   0.6

 »  24   Up   iP                04   34   48
         Ki   iP                04   33   53
         Sk   iP                04   34   31
         Kamchatka.

 »  24   Up   iP                04   37   23
                          μ    s
              M     E     0.6   20
              M     N     0.6   20
              M     z     0.6   20
         Ki   iP                04   36   30
                          μ    s
              M     E     0.7   22
              M     N     0.3   20
              M     z     1.0   20
         Sk   iP                04   37   06
         Gb   iP                04   37   47
         Kamchatka.

 »  24   Up   iP                07   27   22
         Ki   iP                07   26   43
                          μ    s
              M     E     0.3   18
              M     N     0.2   14
              M     z     0.4   18
         Sk   iP                07   27   16
         Honshu, Japan.

 »  24   Up   iP                16   09   41
         Iran.

 »  24   Up   iP                23   34   54C
         Ki   iP                23   34   20

 »  25   Up   eP                01   16   14
              i                 01   16   17
         Sk   iP                01   16   05

 »  25   Ki   iP                01   45   27

 »  25   Up   iP                03   20   21
              i                 03   20   26
              i                 03   23   09
                          μ    s
              P     z'    0.1   0.5
         Ki   iP                03   20   29D
              i                 03   20   31
                          μ    s
              P     z'    0.1   0.5
         Sk   iP                03   20   47
              iPP               03   22   34
         Gb   iP                03   20   42
         Hindu Kush. Magn.=6.0 (Up, Ki).
```

```
1959
June 25  Up   iP                06   49   40
         Sk   eP                06   49   00
         South of Iceland.

 »  25   Up   iP                06   51   43C
              i                 06   51   45
              iS                06   55   45
                          μ    s
              P     E     0.4   3
              P     z     0.3   3
              P     z'    0.1   1.0
              S     E     1.6   5
              S     N     1.8   6
              S     z     1.3   5
              M     E     4.7   19
              M     N     3.7   20
              M     z     6.7   19
         △=2450 km=22°.
         Ki   iP                06   51   36C
              i                 06   51   38
              iS                06   55   40
                          μ    s
              P     E     1.0   7
              P     z     1.1   8
              P     z'    1.0   2.3
              S     E     3.2   5
              S     N     2.9   7
              S     z     1.5   6
              M     E     5.6   13
              M     N     3.0   13
              M     z     5.8   13
         △=2400 km=21½°.
         Sk   iP                06   51   06
              i                 06   51   09
         Gb   iP                06   51   29
         South of Iceland. Magn.=5.7 (Up, Ki).
         The multiple P waves, as evidenced by
         this earthquake, are quite typical on
         our records of Icelandic and North
         Atlantic earthquakes.

 »  25   Up   iP                07   21   23D
         Sk   iP                07   20   41
         South of Iceland.

 »  25   Up   iP                10   01   54
         Ki   iP                10   01   01
                          μ    s
              P     z'    0.1   1.1
         Sk   iP                10   01   31
         Gb   iP                10   02   10
         Aleutian Islands.

 »  25   Up   iP                13   48   53
                          μ    s
              M     E     0.8   17
              M     N     0.8   16
              M     z     0.8   17
         Ki   iP                13   48   22D
```

```
1959
June 25
(cont.)
                          μ    s
              M     E     1.2   19
              M     N     0.5   18
              M     z     1.9   20
         Sk   iP                13   48   53
         Ryukyu Islands.

 »  25   Up   eL                16   03
                          μ    s
              M     E     0.3   18
              M     N     0.2   20
              M     z     0.3   18
         Ki   eL                16   01
                          μ    s
              M     E     0.3   19
              M     N     0.3   20
              M     z     0.5   20
         (New Britain).

 »  25   Sk   ePKP              16   49   55
         New Zealand.

 »  26   Up   iP                00   16   53
         Aleutian Islands.

 »  26   Up   iP                00   17   31
         Ki   iP                00   16   38
         Sk   eP                00   17   11
         Aleutian Islands.

 »  26   Ki   eL                01   41
                          μ    s
              M     E     0.3   19
              M     N     0.3   20
              M     z     0.6   19

 »  26   Ki   iP                02   17   32

 »  26   Up   iPKP              04   36   28
         Sk   iPKP              04   36   22
              i                 04   36   30
         Gb   ePKP              04   36   (35)
              i                 04   36   (44)
         Kermadec Islands.

 »  26   Up   eL                04   50
                          μ    s
              M     E     0.4   22
              M     z     0.7   21
         Ki   eL                04   51
                          μ    s
              M     E     0.3   17
              M     N     0.3   20
              M     z     0.6   19
         Pacific Ocean, southwest of Galapagos
         Islands.

 »  26   Up   iP                05   14   15C
              iPcP              05   14   44
         Ki   iP                05   13   31
         Sk   iP                05   14   06
```

```
1959
June 26                  iPcP              05   14   39
(cont.)  Gb   iP                05   14   (35)
         Hokkaido, Japan.

 »  26   Up   iPKP              05   21   14
         Sk   iPKP              05   21   07
         Gb   ePKP              05   21   (20)
         Kermadec Islands.

 »  26   Up   iPKP              05   43   59C
              i                 05   44   07
                          μ    s
              PKP   z'    0.1   0.6
         Ki   ePKP              05   43   41
         Sk   iPKP              05   43   52
              i                 05   44   00
         Gb   iPKP              05   44   05
              i                 05   44   13
         Kermadec Islands.

 »  26   Up   iP                07   25   04
         Seismic?

 »  26   Up   iP                08   47   05
         Ki   iP                08   46   32D
                          μ    s
              P     z'    0.1   0.8
         Sk   iP                08   47   02
         Gb   iP                08   47   (22)
         South of Honshu, Japan (h~450 km).

 »  26   Up   iP                13   48   10
              i                 13   48   23
              iS                13   50   51
              iLg1              13   52   35
                          μ    s
              P     z'    0.2   0.6
         Ki   iP                13   49   34
              i                 13   49   59
         Sk   iP                13   49   04
              i                 13   49   08
              i                 13   49   22
              iLg1              13   54   54
         Gb   iP                13   48   07
         Rumania (h~100 km).

 »  26   Ki   iP                20   23   43
         Pamir-Tadzhik.

 »  27   Up   iP                19   19   15C
              i                 19   19   21
              iPP               19   20   55
              iSS               19   28   45
              iLg1              19   32   58
              i                 19   33   19
              i                 19   33   25
                          μ    s
              P     z'    0.6   0.8
              M     E     11    8
              M     N     25    16
```

Column 1

1959

Date	Station	Phase	comp	h	m	s
June 27		M	z		12	8
(cont.)	Ki	iP		19	19	07C
		i		19	19	13
		ePP		19	20	50
		i		19	30	33
		iLg1		19	33	04

		μ	s
P	z'	1.3	1.0
M	E	20	14
M	N	18	13
M	z	23	14

Station	Phase	h	m	s
Sk	iP	19	19	34C
	i	19	19	39

China-USSR. Magn.=6.7 (Up, Ki).
Very clear Lg1 (Up, Ki).

Date	Station	Phase	h	m	s
» 27	Up	iPKP	19	24	05
		i	19	24	13
		iPKP2	19	24	27

		μ	s
PKP	N	0.7	2
PKP	z	3.0	2
PKP	z'	1.8	0.7
M	E	1.9	24
M	N	1.5	21
M	z	2.6	23

Station	Phase	h	m	s
Ki	iPKP	19	23	51
	iPP	19	27	07

		μ	s
PKP	N	0.6	9
PKP	z	2.9	9
PKP	z'	1.1	1.3
PP	N	0.7	7
M	E	1.6	20
M	N	1.4	20
M	z	2.1	20

Station	Phase	h	m	s
Sk	iPKP	19	24	03

Kermadec Islands (h ~ 100 km).

Date	Station	Phase	h	m	s
» 28	Up	iP	00	15	30C
	Ki	iP	00	15	06

» 28	Up	iP	02	33	50
	Ki	iP	02	33	16

Bonin Islands.

Date	Station	Phase	h	m	s
» 28	Up	iP	04	27	41
		iS	04	31	01

		μ	s
S	N	0.3	6
M	E	0.2	12
M	N	0.7	15

△=2000 km=18°.

Station	Phase	h	m	s
Ki	iP	04	27	26
	eS	04	30	43

		μ	s
S	N	0.3	6
M	E	0.7	14
M	N	0.5	15
M	z	0.9	17

△=1900 km=17°.

Column 2

1959

Date	Station	Phase	h	m	s
June 28	Sk	iP	04	26	59

(cont.) Near south coast of Iceland.

Date	Station	Phase	h	m	s
» 28	Up	iP	06	07	08
		iS	06	11	10

△=2450 km=22°.

Station	Phase	h	m	s
Ki	iP	06	08	23
Sk	iP	06	07	50

Greece.

» 28	Up	iP	09	18	16

» 28	Up	iP	18	57	52

» 28	Ki	eL	19	07	

		μ	s
M	E	0.3	18
M	N	0.2	17
M	z	0.4	18

Gulf of California.

Date	Station	Phase	h	m	s
» 28	Up	iP	19	57	35
		iPP	20	01	53
		iSKS	20	08	07
		eS	20	09	18
		iPS	20	11	00
		iPPS	20	11	59

		μ	s
P	z'	0.1	0.7
PP	E	0.2	8
PP	z	0.5	8
PP	z'	0.1	1.3
SKS	E	0.3	4
S	N	1.3	12
M	E	3.1	24
M	N	2.7	22
M	z	4.0	24

△=11700 km=105½°.

Station	Phase	h	m	s
Ki	iP	19	57	24
	i	20	00	38
	ePP	20	01	30
	iSKS	20	07	56
	eS	20	08	57
	ePPS	20	11	25

		μ	s
P	z'	0.1	1.5
SKS	E	1.3	8
S	N	0.8	10
M	E	2.0	21
M	N	1.3	19
M	z	2.6	21

△=11450 km=103°.

Station	Phase	h	m	s
Sk	eP	19	57	43
	i	20	01	13
Gb	iP	19	57	49
	iPP	20	02	23

Sawoe Sea. Magn.=6.4 (Up, Ki).

» 29	Up				

		μ	s
M	E	0.9	19

Column 3

1959

Date	Station	Phase	comp	h	m	s
June 29		M	N		0.8	16
(cont.)		M	z		1.2	19
	Ki	e		07	42	06
		e(SKKS)		07	42	31
		ePS		07	44	54

		μ	s
M	E	1.5	20
M	N	0.9	20
M	z	1.4	20

Solomon Islands.

Date	Station	Phase	h	m	s
» 29	Up	iP	09	32	28
	Ki	iP	09	31	34

Aleutian Islands.

» 29	Up	iP	13	32	54
	Ki	iP	13	32	36

		μ	s
P	z'	0.1	1.0

Station	Phase	h	m	s
Sk	iP	13	32	58

Mindanao (h ~ 150 km).

» 29	Up	iP	15	10	17

» 30	Up	i(P)	03	27	35

» 30	Up	iP	07	30	00
		i	07	30	13

		μ	s
P	z'	0.1	0.6

Station	Phase	h	m	s
Ki	iP	07	31	24
Sk	iP	07	30	57C
Gb	iP	07	30	00

Rumania (h ~ 150 km).

» 30	Up	iPKP	10	43	18
		i	10	43	28

		μ	s
PKP	z'	0.1	0.7

Station	Phase	h	m	s
Ki	iPKP	10	42	54 D
	i	10	43	07

		μ	s
PKP	z'	0.2	1.4

Station	Phase	h	m	s
Sk	iPKP	10	43	08
Gb	e(PKP)	10	43	29

Kermadec Islands.

» 30	Up	iP	13	11	11 D

» 30	Up	iP	13	34	29 D
		i	13	34	39
	Ki	iP	13	33	58
	Sk	iP	13	34	28

Ryukyu Islands.

» 30	Ki	iP	22	54	25
	Sk	eP	22	54	09

Venezuela.

July 1	Up	iP	02	39	02 D
		i	02	39	46

Column 4

1959

Date	Station	Phase	h	m	s
July 1		i(pP)	02	41	06
(cont.)		iS	02	48	21
		isS	02	51	42

		μ	s
P	z'	0.4	0.5
S	E	2.1	4
S	N	3.5	5
S	z	0.8	4
M	E	1.0	21
M	N	1.1	18
M	z	1.1	17

△=9000 km=81°.

Station	Phase	h	m	s
Ki	iP	02	38	31
	ipP	02	40	23
	iS	02	47	22
	esS	02	50	34
	i(sS)	02	50	41

		μ	s
P	z'	0.5	1.0
S	E	1.9	7
S	N	3.3	7
S	z	1.1	7
M	E	1.1	17
M	N	0.6	19
M	z	1.2	17

△=8350 km=75°.

Station	Phase	h	m	s
Sk	iP	02	39	00
	iS	02	48	17
Gb	iP	02	39	21
	ipP	02	41	11

Bonin Islands. h=540 km (Up, Ki).
Magn.=6.5 (Up, Ki).

Date	Station	Phase	h	m	s
» 1	Sk	iP	04	02	14

Greece.

» 1	Sk	iP	05	41	01

» 1	Up	iP	07	30	56

» 1	Up	iP	08	22	37

» 1	Ki	eP	11	22	59
	Sk	iP	11	22	28

(Greece).

» 2	Up	iP	05	14	55
	Ki	iP	05	14	02
	Sk	iP	05	14	35

Aleutian Islands.

» 2	Ki	eP	07	18	04

» 2	Up	iSg	08	24	44

△=700 km=6.3°.

Station	Phase	h	m	s
Ki	eSg	08	25	59

△=960 km=8.6°.

Station	Phase	h	m	s
Sk	ePg	08	22	31
	iSg	08	23	21
	i	08	23	24

△=420 km=3.8°.

1959

July 2 Gb   eSg   08   24   12
(cont.)   △=600 km=5.4°.
West coast of Norway, 62°N, 5½°E.
Origin time=08 21 15.

» 2 Up   iSKP   11   48   43
   Ki   iPKP   11   45   50
      iSKP   11   48   19
Fiji Islands (h~650 km).

» 2 Up   iSKP   11   55   18
   Ki   iPKP   11   52   24
      iSKP   11   54   54
   Sk   iPKP   11   52   33
   Gb   iPKP   11   52   41 D
Fiji Islands (h~650 km).

» 3 Up   iP   05   31   32 D

			μ	s
	P	z'	0.1	1.0

   Ki   iP   05   30   37
      i   05   30   48

			μ	s
	P	z'	0.1	1.0

   Sk   iP   05   31   04 D
Kodiak Island. Magn.=5.7 (Up, Ki).

» 3 Up   i(P)   08   14   07

» 3 Up   ePKP   18   14   24
      iPKS   18   17   54

			μ	s
	PKP	z	0.3	4
	PKS	E	0.7	5
	PKS	N	1.6	5

   Ki   iPKP   18   14   13

			μ	s
	PKP	z'	0.2	1.5

   Sk   iPKP   18   14   23
   Gb   iPKP   18   14   32
New Hebrides Islands.

» 3 Up   iPKP   18   15   09
      iPKS   18   18   36

			μ	s
	PKP	z'	0.6	2
	M	E	9.4	23
	M	N	10	23
	M	z	9.5	23

   Ki   iPKP   18   14   55
      ePP   18   16   43

			μ	s
	PKP	z'	0.3	1.5
	M	E	16	22
	M	N	12	23
	M	z	28	22

   Sk   iPKP   18   15   06
   Gb   iPKP   18   15   14
New Hebrides Islands. Magn.=6.8 (Up, Ki).

1959

July 4 Up   iP   04   38   43

» 4 Up   iPKP   05   13   37

			μ	s
	PKP	z'	0.1	0.7

   Ki   ePKP   05   13   22
   Sk   ePKP   05   13   31
   Gb   iPKP   05   13   52 D
      ipPKP   05   14   27
Tonga Islands. h=140 km (Gb).

» 4 Up   iP   07   41   25 C

» 4 Up   iP   07   44   05
      i   07   44   14
      iPcP   07   49   26

			μ	s
	M	E	0.9	19
	M	N	0.8	16
	M	z	1.3	17

△=1550 km=14°.
   Ki   iP   07   42   50
      i   07   43   01
      iS   07   44   22
      e(T)   07   49   25
      i   07   50   02

			μ	s
	S	N	0.5	9
	M	E	2.7	17
	M	N	1.2	14
	M	z	3.2	16

△=890 km=8.0°.
   Sk   iP   07   43   06 D
      eS   07   44   52
△=1020 km=9.2°.
North Atlantic between Jan Mayen and Spitsbergen, 72¼°N, 1¾°E.
Origin time=07 40 51.

» 4 Ki   iP   09   00   57
      i   09   01   07
      i(L)   09   01   10
Local. Probably explosion.

» 5 Up   iP   05   43   39
   Ki   eP   05   42   47
Kamchatka.

» 6 Up   iP   09   23   39
      iPP   09   28   12
      ipPP   09   30   12
      iSKS   09   33   15
      i!   09   34   10
      iSP   09   36   33
      epS   09   37   49
      i   09   38   53
      iPKKP   09   39   06

			μ	s
	PP	z'	0.3	1.5
	SKS	E	2.6	10

1959

July 6   SKS   N   0.9   8
(cont.)   PKKP   z'   0.1   0.7
      M   E   1.9   20
      M   N   1.9   19
      M   z   1.8   19
△~12000 km~108°.
   Ki   iPKP   09   27   49 D
      iPP   09   28   43
      epPP   09   30   42
      iSKS   09   33   34
      i   09   34   37
      iS   09   35   19
      iSP   09   37   13
      iPS   09   38   27
      i   09   38   42
      iPKKP   09   38   52

			μ	s
	PKP	z'	0.4	2.0
	SKS	E	2.1	10
	SKS	N	0.6	6
	S	N	1.7	9
	PKKP	z'	0.4	1.4
	M	E	4.2	18
	M	N	1.2	19
	M	z	1.6	18

△~12350 km~111°.
   Sk   eP   09   23   40
      ipP   09   25   54
      iPP   09   28   01
      iPKKP   09   39   00
△~11900 km~107°.
   Gb   iP   09   23   23
      ipP   09   25   40
      iPKP   09   27   37
      i   09   31   32
△~11650 km~105°.
Chaco Province, Argentina. h=630 km (Ki, Sk, Gb). Magn.=6.6 (Up, Ki).

» 6 Up   iPP   09   41   24
      ipPP   09   43   21
      iSKS   09   46   27
      i!   09   47   21
      iS   09   47   59
      iSP   09   49   43

			μ	s
	PP	z'	0.5	1.5
	SKS	E	4.9	9
	SKS	N	1.7	8
	S	E	0.5	3
	S	N	1.0	5

△~12000 km~108°.
   Ki   iPKP   09   40   59
      iPP   09   41   53
      ipPP   09   43   51
      iSKS   09   46   45
      i!   09   47   49
      iSP   09   50   22
      iPS   09   51   38
      i   09   51   53

1959

July 6   iPKKP   09   52   04
(cont.)

			μ	s
	PP	z	0.8	5
	PP	z'	0.7	2.0
	SKS	E	4.3	6
	SKS	N	1.5	6

△~12350 km~111°.
   Sk   iPP   09   41   19
      ipPP   09   43   16
      iPKKP   09   52   08
△~11900 km~107°.
   Gb   ipP   09   38   47
      i   09   39   28
△~11650 km~105°.
Chaco Province, Argentina. h=610 km (Up, Ki, Sk). Magn.=6.6 (Up, Ki).

» 6 Sk   eP   13   37   17
      i   13   37   23

» 7 Up   iP   07   56   53

» 7 Ki   eL   08   01

			μ	s
	M	E	0.3	19
	M	N	0.3	19
	M	z	0.4	18

Kurile Islands.

» 7 Up   iPg   08   44   09
      iSg   08   44   32

			μ	s
	Pg	z'	0.1	0.5
	Sg	z'	0.1	0.5

△=200 km=1.8°.

» 7 Ki   iP   14   51   30
Honshu, Japan.

» 8 Sk   iP   00   44   51

» 8 Up   iP   02   08   16
   Ki   eP   02   07   25

			μ	s
	P	E	0.2	10
	P	N	0.2	10
	P	z'	0.1	1.3
	M	E	0.5	16
	M	N	0.5	14

   Sk   iP   02   07   21
   Gb   iP   02   08   11
Near east coast of Greenland.

» 8 Up   iP   04   11   32 D

			μ	s
	P	z'	0.1	0.7

   Ki   iP   04   10   46

			μ	s
	P	z'	0.1	1.0

   Sk   iP   04   11   22

Column 1

```
1959
July 8 Gb   iP          04  11  52
(cont.)  Kurile Islands (h ~ 100 km).

»  8 Ki     iP          08  33  52
         Hokkaido, Japan (h ~ 120 km).

»  9 Up     i(P)        15  35  24
                         μ    s
            (P)   z'    0.1  0.8

»  9 Up     i(P)        16  19  33
            e(sP)       16  19  53
            iPKP        16  23  22
            iPP         16  23  42
            ipPP        16  24  14
            isPP        16  24  25
            iSKS        16  29  49
            i(sSKS)     16  30  35
            eSP         16  32  36
            iPKKP       16  35  17
                         μ    s
            PP    E     0.7   6
            PP    z     0.9   6
            PP    z'    0.3  1.7
            SKS   E     2.0  10
            SKS   N     0.5   8
            M     E     2.4  18
            M     N     1.2  20
            M     z     2.4  19
            △ ~ 11650 km ~ 105°.
       Ki   e(sP)       16  20  11
            iPP         16  24  03
            ipPP        16  24  34
            eSKS        16  30  02
            i!          16  30  58
            eSP         16  33  16
            ePKKP       16  34  50
            iPKKP       16  35  05
            i!          16  35  34
                         μ    s
            PP    z     0.3   6
            PP    z'    0.1  1.5
            SKS   E     2.5  12
            PKKP  z'    0.1  1.0
            M     E     1.8  18
            M     N     1.1  20
            M     z     2.4  20
            △ ~ 12000 km ~ 108°.
       Sk   i(P)        16  19  28
            ipP         16  19  47
            i           16  24  17
            iPKKP       16  35  03
            △ ~ 11550 km ~ 104°.
       Gb   i(sP)       16  19  37
            iPP         16  23  15
            i           16  24  11
            △ ~ 11350 km ~ 102°.
       Chile-Bolivia (h ~ 100 km). Magn.=6.5
       (Up, Ki).

»  9 Up     iP          20  08  43 D
       Ki   iP          20  08  51
```

Column 2

```
1959
July 9 Sk   iP          20  09  08
(cont.)  Hindu Kush.

» 10 Up     iPKP        02  33  06 C
                         μ    s
            PKP   z'    0.1  0.7
       Sk   iPKP        02  32  58
       Gb   iPKP        02  33  12
       Kermadec Islands.

» 10 Ki     eL          05  01
                         μ    s
            M     E     0.4  22
            M     N     0.2  15
            M     z     0.3  16
       Chile-Bolivia.

» 10 Up     iP          12  26  30
       Ki   iP          12  26  04
       Formosa. Origin time = 12 14 39.

» 10 Up     iP          16  47  35

» 10 Up     eP          17  48  18
            iLgl        18  01  43
                         μ    s
            M     E     0.2  13
       Ki   iP          17  48  16
            eLgl        18  01  05
                         μ    s
            M     E     0.6  14
            M     N     0.5  12
            M     z     0.6  14
       Sk   iP          17  48  38
       Kirghiz, USSR.

» 10 Up     iP          20  33  05
            iPP         20  33  33
       Ki   iP          20  34  01
                         μ    s
            M     E     0.2  15
            M     N     0.2  15
       Sk   eP          20  33  41
       Cyprus.

» 10 Ki     iP          21  02  25
       Sk   eP          21  02  42
       Kodiak Island.

» 11 Up                 —
                         μ    s
            M     E     0.6  20
            M     N     0.8  20
            M     z     1.0  20
       Ki   iPKP        05  10  36
                         μ    s
            M     E     0.7  22
            M     N     0.6  21
            M     z     1.2  22
       Sk   ePKP        05  10  47
       New Hebrides Islands.
```

Column 3

```
1959
July 11 Up  e           12  20  54
            eS          12  28  15
                         μ    s
            M     E     5.1  22
            M     N     4.3  23
            M     z     4.8  21
       Ki   ePP         12  21  01
            iPPS        12  31  48
            i!          12  32  39
                         μ    s
            PP    z     0.3   7
            M     E     2.6  19
            M     N     2.5  17
            M     z     3.9  18
       Indian Ocean. Magn.=6.3 (Up, Ki).

» 11 Up     iP          18  34  05 C
            i           18  34  11
                         μ    s
            P     z'    0.2  0.9
            M     E     0.4  21
            M     N     0.6  21
            M     z     0.6  19
       Ki   iP          18  33  18
                         μ    s
            M     E     0.5  19
            M     N     0.4  17
            M     z     0.9  17
       Sk   iP          18  33  54 C
       Kurile Islands.

» 11 Up     iP          19  01  30

» 12 Up     iPKP        00  42  58
                         μ    s
            PKP   z'    0.1  1.0
       Ki   iPKP        00  42  51
            iSKP        00  45  40
                         μ    s
            SKP   z'    0.3  1.8
       Sk   ePKP        00  42  52
            iSKP        00  45  57
       Fiji Islands (h ~ 400 km).

» 12 Up     i(P)        04  00  51
            i           04  01  04

» 12 Up     iP          16  57  43 D
                         μ    s
            P     z'    0.1  0.7
       Ki   iP          16  58  51 C
                         μ    s
            P     z'    0.1  0.6
       Sk   iP          16  58  21 C
       Aegean Sea.

» 12 Up     iP          19  29  17
            eLgl        19  42  19
```

Column 4

```
1959
July 12
(cont.)                  μ    s
            M     E     0.8  10
            M     z     0.8  10
       Ki   iP          19  29  18
            eLgl        19  42  05
                         μ    s
            M     E     1.0  14
            M     N     0.7  12
            M     z     0.8  13
       Sk   iP          19  29  40 C
       Kirghiz, USSR.

» 13 Up     iP          01  42  49
            e           01  46  05
            i           01  46  18
       Ki   eP          01  41  40
                         μ    s
            M     E     0.3  11
            M     N     0.3  12
            M     z     0.3  13
       Sk   iP          01  41  49
            iS          01  43  43
            △ = 1100 km = 10°.
       Jan Mayen.

» 13 Up     iP          02  43  18
                         μ    s
            P     z'    0.1  1.0
       Ki   iP          02  43  43

» 13 Up     iP          12  39  48
            iS          12  48  47
            iP'P'       13  07  59
                         μ    s
            P     z'    0.5  1.0
            P'P'  z'    0.1  1.2
            M     E     3.5  17
            M     N     3.1  17
            M     z     3.2  18
            △ = 7600 km = 68½°.
       Ki   iP          12  38  55
            iPcP        12  39  41
            iS          12  47  05
            iP'P'       13  08  21
                         μ    s
            P     N     0.4   5
            P     z     0.3   5
            P     z'    0.7  1.4
            S     E     1.7  12
            S     N     0.6  14
            M     E     3.3  19
            M     N     1.9  17
            M     z     2.8  17
            △ = 6700 km = 60½°.
       Sk   iP          12  39  26 D
            iPcP        12  39  58
            iP'P'       13  08  09
       Aleutian Islands. Slightly deeper than
       normal. Magn.=6.2 (Up, Ki).
```

Column 1

1959
July 13   Up   iPKP   15 43 24C
    Ki   iSKP   15 46 02
Kermadec Islands (h ~ 500 km).

» 14   Up   eP   00 11 13
    Ki   iP   00 10 21
Aleutian Islands.

» 14   Up   iPKP   06 20 02
Kermadec Islands. Deep?

» 14   Up   iP   08 52 00
    Ki   eP   08 50 58
      μ   s
    M   N   0.2   17
    M   z   0.4   18
Aleutian Islands.

» 14   Up   iP   11 44 19C
      μ   s
    P   z'   0.1   0.8
    Ki   iP   11 43 24C
      μ   s
    P   z'   0.4   1.0
    Sk   iP   11 43 53C
      iPcP   11 44 39
Alaska (h ~ 60 km).

» 14   Ki   iPKP   13 19 20
New Hebrides Islands (h ~ 100 km).

» 14   Up   iP   20 29 46
      μ   s
    P   z'   0.1   0.6
    Sk   iP   20 30 29
Greece.

» 14   Ki   eL   23 29
      μ   s
    M   E   0.6   18
    M   z   0.6   19
Celebes.

» 15   Up   iP   16 49 53
Hindu Kush.

» 15   Up   i(P)   18 17 55

» 15   Ki   iP   23 31 29
Italy.

» 16   Up   iP   07 11 00
    Sk   iP   07 10 24
      i   07 10 36
Alaska.

» 16   Sk   iP   10 49 16

» 16   Up   iP   15 28 36D
      i   15 28 50

Column 2

1959
July 16   iP'P'   15 56 39
(cont.)
      μ   s
    P   z'   0.3   1.0
    Ki   e(S)   15 36 04
      μ   s
    (S)   N   0.2   8
    M   E   0.4   18
    M   N   0.2   17
    M   z   0.4   17
    Sk   iP   15 28 14
Aleutian Islands.

» 16   Up   iP   16 37 19
Mexico.

» 16   Sk   iPKP   19 33 13
Loyalty Islands.

» 17   Up   iP   19 42 48
    Ki   iP   19 43 53
Turkey.

» 17   Up   i(P)   21 08 29
      μ   s
    (P)   z'   0.1   0.6
Seismic?

» 17   Up   iP   23 04 40
    Ki   iP   23 04 44C
    Sk   iP   23 04 27C
Colombia-Venezuela.

» 17   Up   iP   23 31 22
      ipP   23 31 53
    Ki   iP   23 30 26
      ipP   23 30 55
    Sk   iP   23 30 54
Alaska. h = 130 km (Up, Ki).

» 18   Up   iP   03 59 09
      i   03 59 14
    Ki   iP   03 59 48
    Sk   eP   03 59 48
Persian Gulf.

» 18   Up   iPKP   07 18 55
    Ki   iPKP   07 18 48
      iSKP   07 21 21
    Sk   iSKP   07 21 36
Fiji Islands (h ~ 600 km).

» 18   Up   iP   20 07 09D
      ipP   20 07 59
      iPP   20 10 14
      iS   20 17 12
      iPKPPKS   20 36 47
      μ   s
    P   E   2.4   5
    P   N   1.2   4
    P   z   8.2   5
    P   z'   1.7   0.8

Column 3

1959
July 18   PP   z'   0.4   1.3
(cont.)   S   E   9.8   9
    S   N   51   13
    PKPPKS   z'   0.1   1.5
    M   E   10   18
    M   N   28   20
    M   z   11   18
△=9100 km=82°.
    Ki   iP   20 06 52D
      iPP   20 09 56
      iS   20 16 37
      iPKKP   20 25 42
      eP'P'   20 33 37
      iPKPPKS   20 37 00
      μ   s
    P   E   4.9   7
    P   N   0.7   8
    P   z   11   8
    P   z'   2.6   1.0
    PP   E   2.1   8
    PP   z   2.8   8
    S   E   4.1   11
    S   N   30   15
    S   z   5.9   14
    S   z'   0.8   2.0
    M   E   19   19
    M   N   19   22
    M   z   11   17
△=8800 km=79°.
    Sk   iP   20 07 15D
      iS   20 17 26
      iPKKP   20 25 30
      eP'P'   20 33 35
      iPKPPKS   20 36 45
△=9350 km=84°.
Luzon. h=200 km (Up). Magn.=7.1 (Up, Ki). Records of this earthquake will certainly prove useful both for the study of core phases and for the application of methods for fault plane determinations, including the use of S phases.

» 19   Up   iP   03 55 26
      i   03 55 29
      iPP   03 59 11
      μ   s
    P   z'   0.1   0.6
    M   E   1.1   22
    M   N   1.2   20
    M   z   1.0   21
    Ki   iP   03 55 24C
      eSKS   04 05 53
      μ   s
    P   z   0.4   7
    P   z'   0.2   1.0
    M   E   1.7   23
    M   N   1.1   22
    M   z   1.8   21

Column 4

1959
July 19   Sk   iP   03 55 39C
(cont.)   Sunda Strait. Magn.=5.9 (Up, Ki).

» 19   Up   iPKP   14 03 20
    Ki   iSKP   14 05 52
Fiji Islands (h ~ 550 km).

» 19   Up   eP   15 19 46
      ipP   15 20 43
      iPP   15 23 57
      ipPP   15 24 45
      iSKS   15 30 03
      isS   15 32 38
      iPS   15 33 10
      iPKKP   15 35 48
      i   15 36 11
      μ   s
    PP   E   1.8   6
    PP   z   3.3   7
    PP   z'   1.4   2.5
    SKS   E   18   10
    SKS   N   3.2   9
    SKS   z   3.1   9
    M   E   8.5   21
    M   N   6.4   21
    M   z   12   21
△~11450 km~103°.
    Ki   iP   15 19 56
      ipP   15 20 46
      i   15 23 28
      iPP   15 24 14
      iSKS   15 30 12
      iS   15 31 25
      iPS   15 33 34
      iPKKP   15 35 41
      i   15 36 01
      iP'P'   15 44 00
      μ   s
    P   z   0.5   8
    PP   E   2.2   9
    PP   z   3.7   9
    PP   z'   1.0   2.5
    SKS   E   19   10
    SKS   N   1.4   8
    S   E   3.6   9
    P'P'   z'   0.2   2.0
    M   E   8.1   20
    M   N   6.6   23
    M   z   19   22
△=11500 km=103½°.
    Sk   iP   15 19 38
      iPKKP   15 35 55
      eP'P'   15 44 04
Peru. h=210 km (Ki). Magn.=7.0 (Up, Ki).

» 19   Ki   iP   17 07 24
    Sk   iP   17 07 35

» 19   Ki   iP   19 08 34

1959
July 19 (cont.)

```
          P      z'   0.2   0.6
                            μ    s
» 20 Up   iP          02  53  44 D
          ipP         02  55  38
          iPP         02  57  40
          iSKS        03  03  29
          i(SKKS)     03  03  57
          iS          03  04  17
          eSP         03  05  40
          i(PKKP)     03  10  58
          P      z'   0.1   0.9
          pP     z'   0.3   2.0
          SKS    E    1.3   6
          SKS    N    0.4   4
          S      E    1.1   4
          S      N    1.0   4
          M      E    0.7   18
          M      N    1.0   19
          M      z    0.8   25
          △=10650 km=96°.
   Ki   iP          02  53  38 D
        ipP         02  55  32
        epPP        02  59  16
        iSKS        03  03  23
        iSKKS       03  03  46
        eSP         03  05  31
        i(PKKP)     03  11  02
        P      z'   0.1   1.0
        pP     z'   0.2   2.0
        SKS    E    2.7   10
        SKS    N    0.6   5
        M      E    1.0   18
        M      N    0.8   18
        M      z    1.4   20
        △~10550 km~95°.
   Sk   iP          02  53  55 D
        ipP         02  55  49
        iPP         02  58  02
        ipPP        02  59  46
        iSKS        03  03  43
        i(PKKP)     03  10  18
        △=10800 km=97°.
```
Java Sea. h=510 km (Up, Ki, Sk).
Origin time=02 41 10. Magn.=6.0 (Up, Ki).

```
» 20 Up   iPKP        17  12  02
     Ki   ePKP        17  11  52
          iSKP        17  14  30
     Sk   iPKP        17  11  58
```
Fiji Islands (h~600 km).

```
» 21 Up   ePKP        08  02  21
          iPP         08  04  26
          iPKS        08  05  44
                            μ    s
          PP     z'   0.1   2.0
          PKS    E    0.2   5
```

1959
July 21 (cont.)

```
          PKS    N    0.3   4
          M      E    0.4   20
          M      N    0.5   23
          M      z    0.8   23
   Ki   ePKP        08  02  10
        ePP         08  03  52
                            μ    s
        PP     z    0.3   5
        M      E    0.7   20
        M      N    0.3   18
        M      z    1.2   20
   Sk   iPKP        08  02  20 D
```
New Hebrides Islands. Magn.=6.1 (Up, Ki).

```
» 21 Up   iP          09  29  26
          i(S)        09  38  30
                            μ    s
          M      E    1.3   22
          M      N    0.5   23
          M      z    1.8   22
   Ki   eP          09  29  15
        i           09  29  29
        iS          09  38  36
                            μ    s
        S      E    0.4   8
        S      N    0.3   7
        M      E    0.8   21
        M      N    0.3   20
        M      z    1.3   21
        △=8000 km=72°.
   Sk   eP          09  28  57
        i           09  29  17
```
Dominican Republic.

```
» 21 Up   iPKP        10  28  04
```
Tonga Islands.

```
» 21 Up   iP          12  42  02
          ePP         12  45  26
          eSKS        12  52  27
          e(S)        12  52  34
                            μ    s
          PP     E    0.4   9
          PP     z    0.7   8
          SKS    E    0.4   7
          (S)    N    0.3   7
          M      E    0.9   19
          M      N    0.5   16
          M      z    0.9   18
          △=9800 km=88°.
   Ki   iP          12  41  52
        ePP         12  45  02
        eSKS        12  52  12
        iS          12  52  26
                            μ    s
        P      E    0.3   6
        P      z    0.6   9
        PP     N    0.3   9
        PP     z    0.6   9
        SKS    E    0.8   9
```

1959
July 21 (cont.)

```
   Sk   SKS    N    0.8   9
        S      z    0.5   9
        M      E    2.2   22
        M      N    0.7   20
        M      z    2.6   21
        △=9550 km=86°.
   Sk   iP          12  41  44
```
Oaxaca, Mexico. Magn.=6.3 (Up, Ki).

```
» 21 Up   iP          13  16  24
     Ki   iP          13  16  10
     Sk   iP          13  16  05
```
Oaxaca, Mexico.

```
» 21 Up   iP          17  51  17
     Ki   iP          17  50  39
          i           17  50  44
     Sk   eP          17  50  50
```
Utah-Arizona, USA.

```
» 22 Up   iP          03  04  51
```
Rumania (h~150 km).

```
» 22 Ki   eS          05  14  53
                            μ    s
          S      E    0.5   9
          M      É    0.4   22
```
Oaxaca, Mexico.

```
» 22 Up   iPg         07  44  54
          iS*         07  45  17
          iSg         07  45  18
                            μ    s
          Sg     z'   0.2   0.5
          △=200 km=1.8°.
   Sk   iSg         07  46  48
        △=510 km=4.6°.
```
The Baltic, 61.1°N, 20.3°E. Origin time=07 44 18. Underwater explosion?

```
» 22 Up   iP          11  29  06 C
          eSKS        11  39  38
                            μ    s
          P      z'   0.1   0.7
          M      E    0.5   26
          M      N    0.9   27
          M      z    0.9   26
   Ki   iP          11  28  50
        eSKS        11  39  16
        eS          11  39  47
                            μ    s
        P      z'   0.2   1.0
        SKS    E    0.3   8
        S      E    0.3   7
        M      E    0.4   22
        M      N    0.4   23
        △=10400 km=93½°.
   Sk   iP          11  29  11
```
Molucca Passage. Magn.=5.9 (Up, Ki).

1959
July 22 Ki

```
          iS          16  17  13
                            μ    s
          S      E    0.4   9
          M      E    0.4   21
```
Oaxaca, Mexico.

```
» 22 Up   iPKP        16  56  25
     Ki   ePKP        16  56  04
     Sk   iPKP        16  56  19 C
```
Kermadec Islands.

```
» 22 Up   i(P)        18  51  22
```
Local blast?

```
» 22 Up   iP          19  33  38 D
          iPcP        19  34  10
          ipP         19  35  41
          isP         19  36  44
          iS          19  41  12
          e           20  02  10
          iP'P'       20  02  28
                            μ    s
          P      z    0.4   2
          P      N    0.8   2
          P      z    2.3   2
          P      z'   0.7   0.6
          S      E    0.8   4
          S      N    1.5   5
          M      E    1.8   16
          M      N    1.1   16
          M      z    1.1   18
          △=7000 km=63°.
   Ki   iP          19  32  47 D
        i(ScP)      19  36  35
        iS          19  39  36
        eP'P'       20  02  32
                            μ    s
        P      E    0.4   6
        P      N    0.6   6
        P      z'   1.6   0.8
        S      E    1.0   7
        S      N    2.2   7
        M      E    2.7   17
        M      N    0.8   16
   Sk   iP          19  33  24 D
        i(pP)       19  35  42
        iS          19  40  48
```
Sea of Okhotsk. h=650 km (Up). Magn.=6.1 (Up, Ki).

```
» 22 Up   iP          19  42  49
                            μ    s
          P      z'   0.1   1.0
   Ki   iP          19  42  00
                            μ    s
          P      z'   0.2   1.5
   Sk   iP          19  42  39
```
(Kamchatka). Magn.=5.8 (Up, Ki).

```
» 22 Up   eP          22  01  12
     Ki               —
```

```
1959
July 22                         μ    s
(cont.)        M        N      0.2  16
      Formosa.

»  22  Up   eP              22  36  23
       Ki   iP              22  36  04

»  22  Up   iPKP            23  21  08
            iPP             23  22  06
            iSKS            23  27  53
                            μ    s
            PP      E      0.4   6
            PP      N      0.5   6
            PP      z      0.9   6
            SKS     E      0.3   4
            SKS     N      0.4   4
            M       E      7.3  20
            M       N      6.5  20
            M       z      9.7  20
            △ ~ 12800 km ~ 115°.
       Ki   iP              23  16  54
            ePKP            23  20  58
            ePP             23  21  26
            iSKS            23  27  29
                            μ    s
            PP      E      0.3   7
            PP      N      0.3   8
            SKS     E      0.7   6
            SKS     N      0.4   5
            M       E      6.5  21
            M       N      6.2  23
            △ ~ 12100 km ~ 109°.
       Sk   iPKP            23  21  08
       New Britain (h ~ 60 km). Magn.=6.6
       (Up, Ki).

»  23  Up   e(P)            02  42  20
            e               02  43  05

»  23  Ki   iP              04  01  08
       Sk   iP              04  00  54
       Colombia (h ~ 60 km).

»  23  Up   iP              08  26  31
            i               08  26  41
       Sk   iP              08  26  04
       Oregon, USA.

»  23  Up   iP              13  56  42
       Ki   iP              13  56  02
       Sk   iP              13  56  35
       Honshu, Japan.

»  23  Up   iPKP            15  16  13C
            i!              15  16  44
            iPKS            15  19  53
                            μ    s
            PKP     z      0.4   4
            PKP     z'     0.3   0.8
            PKS     N      0.2   4
            M       E      0.4  22
```

```
1959
July 23        M        N      1.1  22
(cont.)        M        z      1.8  22
       Ki   ePKP            15  15  57
            ePKS            15  19  30
                            μ    s
            PKS     N      0.3   9
            M       E      0.9  25
            M       N      0.9  25
            M       z      1.6  21
       Sk   iPKP            15  16  05
       Tonga Islands (h ~ 60 km).

»  23  Ki   iP              17  20  00
       Sk   iP              17  19  27
       Mid-Atlantic Ridge.

»  23  Up   iP              21  37  35
            i(pP)           21  37  59
                            μ    s
            M       E      0.8  17
            M       N      0.4  18
            M       z      0.8  17
       Ki   iP              21  37  07
            i(pP)           21  37  33
                            μ    s
            M       E      0.5  19
            M       N      0.3  19
            M       z      0.6  19
       Sk   iP              21  37  36
       Ryukyu Islands. (pP) could instead be
       P of a new shock in the same locality.

»  24  Up   iP              01  34  53
            eS              01  44  30
                            μ    s
            P      z'     0.1   1.0
            S      E      1.2   13
            S      N      1.8   14
            M      E      4.3   19
            M      N      7.1   17
            M      z      6.5   20
            △=8400 km=75½°.
       Ki   iP              01  34  13
            iPP             01  36  44
            eS              01  43  08
            i               01  43  23
                            μ    s
            P      N      0.3   6
            P      z      0.4   6
            P      z'     0.2   1.5
            S      N      1.5   11
            M      E      6.5   22
            M      N      4.0   21
            M      z      7.8   22
            △=7550 km=68°.
       Sk   iP              01  34  25
       Northern California. Magn.=6.0
       (Up, Ki).
```

```
1959
July 24  Up   iP            02  55  46C
         Ki   iP            02  55  02
                            μ    s
              P     z'     0.1   1.2
         Sk   iP            02  55  37
       Hokkaido, Japan (h ~ 110 km).

»  24  Up   iP              07  26  48
       Ki   iP              07  27  31
            iPP             07  29  11
       Sk   iP              07  27  24
       Iran.

»  24  Ki   e(Sg)           08  45  00
       Sk   e(Sg)           08  44  49

»  24  Up   iP              16  28  00C
            ipP             16  28  36
            iS              16  36  17
            i               16  37  37
                            μ    s
            P      z'     0.5   0.6
            △=7100 km=64°.
       Ki   iP              16  27  53C
            ipP             16  28  30
            eS              16  36  06
            esS             16  37  11
                            μ    s
            P      z'     0.5   0.9
            S      E      0.4   8
            △=7000 km=63°.
       Sk   iP              16  28  15C
            ipP             16  28  52
       India-Burma. h=160 km (Up, Ki, Sk).
       Magn.=6.1 (Up, Ki).

»  24  Up   iP              16  47  31C
                            μ    s
            P      z'     0.1   0.6
»  24  Up   iP              18  49  49
       Seismic?

»  24  Up   iPKP            23  21  58
            i               23  22  02
            iX              23  22  25
            iPKKP           23  32  00
       Ki   iPKP            23  22  13
            iX              23  22  40
            i(PP)           23  24  48
            i               23  25  23
                            μ    s
            PKP    z'     0.1   1.0
            M      E      0.2   23
            M      N      0.2   18
            M      z      0.4   19
       Sk   iPKP            23  22  03
            i               23  25  28
       Sandwich Islands. The phase X appear-
       ing 27 sec after PKP at Up and Ki is
```

```
1959
July 24   either pPKP or PKP of a new shock
(cont.)   in the same locality.

»  25  Up   eP              11  01  13
       Ki   eP              11  02  07
       Turkey.

»  25  Up   iP              16  09  08
       Ki   iP              16  08  20
       Sk   iP              16  08  58
       Sakhalin.

»  25  Ki   iP              18  17  15
       Sk   iP              18  16  47
       Gb   iP              18  16  38
       Mid-Atlantic Ridge.

»  25  Up   iP              19  34  14
                            μ    s
            M      E      0.3   18
            M      N      0.3   15
       Ki   iP              19  33  27
                            μ    s
            M      E      0.9   16
            M      N      0.5   18
            M      z      0.6   18
       Sk   iP              19  34  06
       Sakhalin.

»  25  Up   iP              21  31  54D
            ipP             21  32  16
                            μ    s
            P      z'     0.1   0.6
       Ki   iP              21  31  15D
            isP             21  31  46
       Sk   iP              21  31  48
       Gb   iP              21  32  (16)D
            isP             21  32  (46)
       Honshu, Japan. h=80 km (Up, Ki,
       Gb).

»  26  Ki   eP              05  24  13
            i               05  24  35

»  26  Ki   iP              09  48  11
       Sk   iP              09  47  50
       Venezuela.

»  26  Up   iP              17  11  38
            i               17  11  46
            eS              17  15  31
            iLg1            17  17  48
                            μ    s
            P      z'     0.1   1.0
            S      E      0.4   5
            S      N      0.3   5
            M      E      12    18
            M      N      5.8   18
            M      z      2.8   16
            △=2300 km=20½°.
       Ki   iP              17  12  49
       Sk   iP              17  12  23
```

```
1959
July 26     i(Lg1)          17  19  45
(cont.)     Turkey. Magn.=5.1 (Up).

»  26  Up  iP        19  48  11
       Ki  eP        19  47  16
       Sk  iP        19  47  53
       Kamchatka.

»  27  Ki  iP        00  55  50
       Sk  iP        00  55  53
           iS        00  57  55
       Jan Mayen.

»  27  Up  iPg       15  47  58
           iSg       15  48  50
                    μ     s
           Sg   z'  0.1   0.5
           △=440 km=4.0°.
       Sk  eSn       15  49  17
           iSg       15  49  49
           i         15  50  02
           △=640 km=5.8°.
       Gb  iPg       15  47  01
           i         15  47  10
           iSg       15  47  16
           △=130 km=1.2°.
       Skagerack, 58.6°N, 10.4°E (Up, Gb).
       Origin time=15 46 37. The loca-
       tion is not so well satisfied by Sk. The
       epicenter is close to that of the big
       earthquake (magn.=6.5) of October
       23, 1904.

»  27  Up  iPg       16  07  26
           iSg       16  08  21
                    μ     s
           Sg   z'  0.2   0.6
           △=460 km=4.1°.
       Ki  i         16  10  24
           e(Sn)     16  10  55
           iSg       16  12  02
           △=1200 km=10.8°.
       Sk  ePg       16  08  01
           eS*       16  08  56
           iSg       16  09  13
           △=630 km=5.7°.
       Gb  iPg       16  06  31
           iSg       16  06  47
           △=130 km=1.2°.
       Skagerack, 58.6°N, 10.3°E (Up, Gb).
       Origin time=16 06 06. The same
       remarks as for the preceding shock are
       valid here, including Ki.

»  27  Up  iP        16  12  14

»  28  Up  iP        00  37  06
```

```
1959
July 28  Up  iPn       09  32  17
             i(Pg)     09  32  28
             eSg       09  33  26
             i         09  33  33
             △=440 km=4.0°.
         Sk  e(S*)     09  34  13
             △=650 km=5.9°.
         Gb  iPg       09  31  21
             iSg       09  31  25
             △=40 km=0.4°.
         Kattegatt, 57.8°N, 11.2°E. Origin time
         =09 31 13.

»  28  Up  iPn       09  42  58
           iP*       09  43  07
           iSg       09  44  08
           △=440 km=4.0°.
       Sk  e(S*)     09  44  54
           △=650 km=5.9°.
       Gb  iPg       09  42  02
           iSg       09  42  08
           △=40 km=0.4°.
       Kattegatt, 57.8°N, 11.2°E. Origin
       time=09 41 55.

»  28  Ki  iP        11  13  08

»  28  Ki  iP        17  28  10

»  29  Up  iP        11  33  39

»  30  Up  iPg       10  11  24
           i         10  11  27
           i         10  11  35
           iSg       10  11  39
                    μ     s
           Sg   z'  0.2   0.6
           △=130 km=1.2°.
       Ki  eSg       10  16  09
       Probably central Baltic. Origin time=
       =10 11 00. Explosion?

»  30  Up  iPKP      13  13  50D
       Ki  ePKP      13  13  36
       Sk  iPKP      13  13  44
       Gb  iPKP      13  13  55
           iPKP2     13  14  12
       Kermadec Islands.

»  30  Up  i(Sg)     13  39  20
                    μ     s
           (Sg)  z'  0.2   0.9

»  30  Up  iP        15  38  26
                    μ     s
           P    z'  0.1   0.6
       Gb  iP        15  38  55

»  30  Up  iP        16  53  24C
       Ki  iP        16  53  33
       Sk  iP        16  53  49
       Hindu Kush (h~200 km).
```

```
1959
July 30  Up  iP        17  13  29C
         Honshu, Japan (h~60 km).

»  30  Up  eSn       18  35  42
           iSg       18  36  18
           △=670 km=6.0°.
       Ki  eSn       18  36  13
           eLg1      18  36  45
           △=800 km=7.2°.
       Sk  iPn       18  35  01
           iSg       18  37  22
           △=880 km=7.9°.
       Finland, 61.8°N, 29.0°E. Origin time
       =18 33 00.

»  31  Up  ePg       08  51  05
           iSg       08  51  20
                    μ     s
           Sg   z'  0.1   0.6
           △=130 km=1.2°.
       Probably the same origin as for the
       shock on July 30 at 10 11 00.
       Origin time=08 50 41.

»  31  Up  iSn       10  06  56
           iS*       10  07  15
           iSg       10  07  31
           △=670 km=6.0°.
       Ki  ePn       10  06  00
           eSn       10  07  27
           i         10  07  40
           △=790 km=7.1°.
       Sk  iPn       10  06  13
           eSg       10  08  35
           △=880 km=7.9°.
       Finland, 61.8°N, 29.0°E. Origin time
       =10 04 13.

»  31  Up  eP        10  34  02
                    μ     s
           M    E   0.6   17
           M    z   0.9   18
       Ki  iP        10  34  40
           iSn       10  41  35
           eSS       10  42  07
                    μ     s
           M    E   0.7   17
           M    N   0.4   14
           M    z   0.6   18
       Sk  iP        10  34  39
       Caspian Sea.

»  31  Up  iP        14  32  54
       Sk  iP        14  33  33D
       Greece.

»  31  Up  iP        18  32  01
       Sk  iP        18  32  09
       Outer Mongolia.

»  31  Up  iP        19  25  38
```

```
1959
July 31  Up  iP        20  00  31
             i         20  00  33
             iPP       20  01  56
             i!        20  08  33
                      μ     s
             P    z'  0.1   0.8
             PP   E   0.4   3
             PP   z   0.2   2
             M    E   1.7   13
             M    z   2.6   14
             △=4400 km=39½°.
         Ki  eS        20  06  39
             eSa       20  08  52
             eSS       20  09  34
                      μ     s
             M    E   2.6   12
             M    N   3.8   13
             M    z   1.5   13
         Sk  iP        20  00  56
             iPP       20  02  34
             iScS      20  10  54
         Gb  iP        20  00  59
             iPP       20  02  37
         Tadzhik, USSR. Magn.=5.9 (Up).

»  31  Up  iPKP2     21  00  30D
                    μ     s
           PKP2 z'  0.1   0.7
       Sk  iPKP2     21  00  27
       Gb  iPKP2     21  00  48
       North Island, New Zealand (h~200
       km).

Aug 1  Up  iPn       09  26  20
           iSn       09  27  31
           iS*       09  27  51
           iSg       09  28  05
                    μ     s
           Sg   z'  0.1   0.5
           △=670 km=6.0°.
       Ki  eSn       09  28  00
           iLg1      09  28  33
           △=800 km=7.2°.
       Sk  iSg       09  29  12
           △=890 km=8.0°.
       Finland, 61.7°N, 29.0°E. Origin time=
       =09 24 48.

»   1  Up  iPn       12  15  45
           iSn       12  16  58
           iS*       12  17  17
           iSg       12  17  31
                    μ     s
           Sg   z'  0.1   0.5
           △=670 km=6.0°.
       Ki  iPn       12  16  03
           eSn       12  17  27
           iLg1      12  17  59
           △=800 km=7.2°.
       Finland, 61.7°N, 29.0°E. Origin time
       =12 14 14.
```

1959

Aug 1 Up e(P) 12 31 23

» 1 Up iP 17 52 45
Ki iP 17 51 52
Sk iP 17 52 29
Gb iP 17 52 59
Kamchatka.

» 1 Ki iP 23 28 52
Kamchatka.

» 2 Up iP 03 36 29
i! 03 36 42
iS 03 39 16
i 03 39 30

		μ	s
P	z'	0.1	0.5

△=1700 km=15°.
Ki eP 03 37 59
Sk iP 03 37 27
eS 03 41 11
△=2200 km=20°.
Rumania (h~150 km).

» 2 Up iP 12 00 25

» 2 Up —

		μ	s
M	E	0.4	19
M	z	0.6	20

Ki ePKP 20 30 25
ePKS 20 34 08

		μ	s
PKP	z'	0.2	2.2
M	E	0.6	21
M	N	0.1	18
M	z	0.5	20

Sk iPKP 20 30 17
Off coast of Chile.

» 2 Ki iP 20 41 22
Sk iP 20 41 05
Puerto Rico.

» 3 Up iP 18 32 21

		μ	s
P	z'	0.1	0.5

» 4 Up ePKP 01 00 34
Kermadec Islands.

» 4 Up iPKP 08 20 32P$_0$"
i 08 20 34P$_1$"
iSKP 08 23 25

		μ	s
PKP	z'	0.1	0.7

Ki e(PKP) 08 20 14P$_0$"
iPKP 08 20 26 P"
iSKP 08 23 00

		μ	s
SKP	z'	0.4	2.3

1959

Aug 4 Sk i(PKP) 08 10 26P$_0$"
(cont.) iPKP 08 20 37 P"
iSKP 08 23 16
Gb iPKP 08 20 45P"C
iSKP 08 23 35

Fiji Islands (h~600 km). Multiple PKP phases; see G. Payo Subiza and M. Båth, Geophys. Journal, 8:496—513, 1964. The notations of that paper are given above to the right of the resp. times.

» 5 Up iP 05 29 31
iS 05 40 10

		μ	s
S	E	0.2	4

△=9800 km=88°.
Ki iP 05 29 13
iS 05 39 34

		μ	s
P	z'	0.1	1.0
S	E	0.7	5
S	N	0.8	6
M	E	0.5	20
M	N	0.4	19
M	z	0.6	18

△=9400 km=84½°.
Samar, Philippine Islands. Magn.=6.0 (Ki).

» 5 Up iPKP 11 03 49
Ki ePKP 11 03 29
Sk iPKP 11 03 43
Kermadec Islands.

» 5 Up iP 11 56 03D
Rumania (h~150 km).

» 5 Sk e(Sg) 13 37 43

» 5 Ki iP 14 01 47
Mindanao, Philippine Islands.

» 5 Up iP 17 36 56

» 6 Up i(P) 02 40 46
Ki eP 02 38 59

» 6 Ki e(P) 12 13 45
Sk iP 12 13 18
Turkey.

» 6 Sk iP 16 26 50
Greece. It is a remarkable fact that Skalstugan very often has greater sensitivity to shocks in the Greek area than any other Swedish station, whereas its over-all sensitivity is lower than for Uppsala and Kiruna.

1959

Aug 7 Up i(Pg) 07 47 21
iSg 07 47 44
Sk e(Sg) 07 49 44

» 7 Up iP 10 54 06C
iS 11 02 41

		μ	s
P	z	0.6	4
P	z'	0.1	1.0
S	E	0.5	5
M	E	0.7	18
M	z	1.1	18

△=7100 km=64°.
Ki iP 10 53 12C
iS 11 01 00

		μ	s
P	N	0.4	5
P	z	0.6	4
P	z'	0.2	1.0
S	E	0.5	9
S	N	0.4	9
M	E	0.6	15
M	N	0.7	18
M	z	1.2	18

△=6200 km=56°.
Sk iP 10 53 39
Gb iP 10 54 15
Kodiak Island. Magn.=5.9 (Up, Ki).

» 7 Ki iP 10 56 09
Sk iP 10 56 35
Kodiak Island.

» 7 Sk iP 10 58 30

» 7 Up iP 10 59 08
Ki iP 10 58 14C

		μ	s
P	z'	0.2	1.3

Sk iP 10 58 41
Kodiak Island.

» 7 Ki iP 11 00 17D
Sk iP 11 00 43C
Kodiak Island.

» 7 Up iP 19 49 22

		μ	s
P	z'	0.1	0.5

» 7 Up iP 21 56 01C
iS 22 04 34

		μ	s
P	z	0.6	4
P	z'	0.2	0.7
S	E	0.3	6
M	E	0.8	17
M	z	1.4	18

△=7100 km=64°.
Ki iP 21 55 07C
iS 22 02 52

1959

Aug 7 (cont.)

		μ	s
P	N	0.4	5
P	z	0.5	5
P	z'	0.6	0.9
S	E	0.7	15
S	N	0.5	10
M	E	0.7	18
M	N	0.8	19
M	z	2.0	22

△=6200 km=56°.
Sk iP 21 55 34C
Gb iP 21 56 19
i 21 56 26
Kodiak Island. Magn.=6.0 (Up, Ki).

» 8 Up iP 00 58 00C

		μ	s
P	z'	0.2	1.0
M	E	4.1	17
M	z	4.3	18

Ki iP 00 57 06C
i 00 57 19
iS 01 04 43

		μ	s
P	z'	0.2	0.9
S	E	1.4	9
S	N	1.0	8
M	E	6.0	18
M	N	5.1	20
M	z	3.9	19

△=6000 km=54°.
Sk iP 00 57 43C
iPcP 00 58 29
△=6650 km=60°.
Gb iP 00 58 24C
i 00 58 33
Kamchatka. Magn.=6.0 (Up, Ki).

» 8 Ki e(P) 07 56 48

» 8 Ki iP 12 32 44

» 8 Up iP 13 51 56
Ki iP 13 51 56

		μ	s
M	E	0.2	15
M	N	0.3	16
M	z	0.5	17

Tadzhik, USSR.

» 8 Ki iP 19 59 00
Tadzhik, USSR.

» 8 Up iP 22 08 16

» 9 Ki iP 02 48 02
Halmahera.

» 9 Up e 05 09 04

		μ	s
M	E	0.4	21

Column 1

```
1959
Aug  9                 M     z       0.7  21
(cont.) Ki  iP                 05  00  12
        eSKS               05  10  17
                          μ    s
        SKS    N       0.2  10
        M      E       1.7  19
        M      N       0.8  17
        M      z       1.5  19
        Indian Ocean.

»  9  Up  iP              07  23  22
      (Greece).

»  9  Up  iP              09  23  06
      Ki  iP              09  22  38C
      Mariana Islands.

»  9  Up  i(P)            11  26  33
      Ki  iP              11  27  50
          i               11  29  43
      Lake Edward, Central Africa.

»  9  Up                    —
                          μ    s
        M      E       0.8  20
        M      z       0.7  22
      Ki  e               21  01  21
                          μ    s
        M      E       0.8  21
        M      N       0.6  20
        M      z       1.4  20
      Solomon Islands.

» 10  Up  iP              00  42  19
          i               00  42  41
                          μ    s
        M      E       0.6  17
      Ki  iP              00  43  17
                          μ    s
        M      E       0.5  16
      Sk  eP              00  42  51
      Crete.

» 10  Ki  iPKP            00  56  30
                          μ    s
        M      E       0.4  20
        M      z       1.0  23
      Sk  ePKP2          00  56  56
      Indian Ocean, south of Australia.

» 10  Ki  i(P)            14  06  04

» 10  Ki  i(Sg)           14  11  25
      Sk  e(Sg)           14  12  59

» 10  Sk  iP              17  50  48
      Greece.

» 10  Up  iP              21  52  24
      Ki  iP              21  51  31
      Sk  iP              21  52  01
      Aleutian Islands.
```

Column 2

```
1959
Aug 10  Up  iP            23  17  48
            i             23  17  53
                          μ    s
        M      E       0.6  14
        M      N       0.9  18
        M      z       1.0  21
        Ki  iP            23  17  24
                          μ    s
        M      E       1.0  19
        M      N       0.6  21
        M      z       1.7  19
        Sk  iP            23  17  54
        Shansi Province, China.

» 11  Up  iP              00  49  53
      Ki  iP              00  49  24
      Sk  iP              00  49  51
      Volcano Islands.

» 11  Ki  i(Sg)           08  13  10

» 11  Up                    —
                          μ    s
        M      N       0.3  15
      Ki  eP              13  44  25
                          μ    s
        M      E       0.3  15
        M      N       0.3  13
        M      z       0.4  15
      (Jan Mayen).

» 11  Up  iP              14  23  57
                          μ    s
        M      N       0.3  14
      Ki  eP              14  22  51
                          μ    s
        M      E       0.5  16
        M      N       0.3  15
        M      z       0.9  17
      Sk  eP              14  22  53
      Gb  iP              14  24  00
      Jan Mayen. Origin time=14  20  13.

» 11  Sk  eP              14  34  28

» 11  Ki  eP              15  06  30
                          μ    s
        M      E       0.3  15
        M      N       0.2  14
        M      z       0.4  14
      Sk  eP              15  06  35
      Gb  iP              15  07  50
      Jan Mayen.

» 11  Up  iP              15  35  33C
      Sk  iP              15  35  24
      Kurile Islands.

» 11  Up  iP              16  15  59
                          μ    s
        P      z'      0.1  0.5
      Ki  iP              16  14  39
```

Column 3

```
1959
Aug 11                    μ    s
(cont.) M      E       0.4  16
        M      N       0.3  15
        M      z       0.5  16
        Sk  iP            16  14  44
        eS                16  16  49
        △=1200 km=11°.
        Jan Mayen.

» 11  Up  iP              16  49  00
      Ki  iP              16  49  01
      Nicobar Islands.

» 11  Up  i(P)            17  50  02

» 11  Sk  iP              18  14  23

» 11  Up  iP              18  18  54
                          μ    s
        M      E       0.5  19
        M      N       0.7  15
        M      z       1.0  16
      Ki  iP              18  17  48
                          μ    s
        M      E       1.2  16
        M      N       0.9  15
        M      z       1.9  17
      Sk  iP              18  17  56C
          iS              18  19  59
      △=1200 km=11°.
      Gb  eP              18  18  57
      Jan Mayen. Origin time=18  15  11.

» 11  Up                    —
                          μ    s
        M      E       0.4  21
        M      N       0.9  23
        M      z       0.8  23
      Ki  iPKP            22  08  32
                          μ    s
        M      E       0.7  22
        M      N       0.6  23
        M      z       0.7  20
      Sk  iPKP            22  08  43
      Solomon Islands.

» 11  Up  iP              23  32  26
          i               23  39  13
                          μ    s
        M      N       0.5  11
      Ki  iP              23  33  44
                          μ    s
        M      N       0.3  13
        M      z       0.5  13
      Sk  iP              23  33  11
          i               23  33  20
      Macedonia-Yugoslavia.

» 12  Up  eL              01  20
                          μ    s
        M      E       0.4  19
```

Column 4

```
1959
Aug 12            M     z       0.6  19
(cont.) Ki  eL              01  20
                          μ    s
        M      E       0.9  18
        M      z       1.4  17
      Nicaragua.

» 12  Up  eP              01  35  59
      Ki  iP              01  34  52
                          μ    s
        M      E       0.6  16
        M      N       0.4  13
        M      z       0.9  15
      Sk  iP              01  35  01
      Gb  iP              01  36  03
      Jan Mayen. Origin time=01  32  16.

» 12  Up  iP              04  17  04C
                          μ    s
        P      z'      0.1  0.5
        M      E       0.6  21
        M      N       0.7  18
      Ki  iP              04  17  47C
                          μ    s
        P      z'      0.1  1.0
        M      N       0.3  17
        M      z       0.5  16
      Sk  iP              04  17  28C
      Rhodesia.

» 12  Up  iP              09  06  21C
      Ki  iP              09  05  55C
      (Mongolia).

» 12  Up  iPKP            10  17  48
          e               10  20  54
          i               10  21  05
          iPKS            10  21  19
                          μ    s
        M      E       4.5  19
        M      N       9.5  22
        M      z       9.4  22
      Ki  iPKP            10  17  33
          i(PP)           10  19  16
          i!              10  25  01
                          μ    s
        PKP    z'      0.1  1.7
        (PP)   z       0.4   5
        M      E       5.4  23
        M      N       9.4  20
        M      z        19  21
      Sk  iPKP            10  17  43
      Fiji Islands. Magn.=6.5 (Up, Ki).

» 12  Up  eP              19  08  37
      Ki  iP              19  08  24
      Sk  iP              19  08  51
      China.

» 12  Ki  iP              23  53  27
```

Column 1 (p. 80)

1959

Aug 13 Up	iP	00	38	59
	i	00	39	18
	i	00	39	39
	eS	00	43	53

		μ	s
P	z'	0.1	0.6
S	E	0.1	3
M	E	1.0	15
M	N	1.0	13
M	z	1.2	15

$\triangle=3100$ km$=28°$.

Ki	iP	00	39	36 D
	iS	00	44	46
	iSn	00	45	42
	ePcS	00	46	02
	i!	00	47	11

		μ	s
P	z'	0.2	1.0
M	E	0.9	15
M	N	0.9	16
M	z	0.9	16

$\triangle=3550$ km$=32°$.

Sk	iP	00	39	35 D
	i	00	39	46

Caspian Sea. Magn.=5.8 (Up, Ki). Sn, which is very clear on the short-period vertical record at Kiruna, has a group velocity of 4.73 km/sec.

» 13 Up	iP	00	53	26

» 13 Ki	e(P)	13	40	46
Sk	iP	13	41	43

Local?

» 13 Up	iP	15	41	46
Ki	iP	15	40	53
	iPcP	15	41	37

Aleutian Islands.

» 14 Up	iPKP	01	19	39 C
Sk	iPKP	01	19	33 C

South Pacific.

» 14 Up	ePKP	04	07	28

Kermadec Islands.

» 14 Up	iP	04	52	49
	i	04	52	59
	i	04	56	22
	iPP	04	56	55

$\triangle=11050$ km$=99\frac{1}{2}°$.

Ki	iP	04	52	34 C

		μ	s
P	z'	0.1	1.4

Sk	iP	04	52	55
Gb	iP	04	53	11 D

Molucca Passage.

Column 2 (p. 80)

1959

Aug 14 Up	iPKP	23	51	21
	i	23	51	26
Sk	iPKP	23	51	16

Kermadec Islands.

» 15 Up	iP	00	57	45
Ki	iP	00	57	53
Sk	iP	00	58	10

Hindu Kush (h ~ 150 km).

» 15 Up	iP	06	34	09
Sk	eP	06	33	45

Unimak Island.

» 15 Gb	iP	09	05	07

» 15 Up	iP	09	08	59 C
	iPP	09	12	06
	iPa	09	13	44
	iS	09	18	46

		μ	s
P	E	10	18
P	N	5.4	18
P	z	32	18
P	z'	0.6	0.7
PP	E	6.4	17
S	E	36	16
S	N	33	16
S	z	32	27
M	E	170	19
M	N	190	20
M	z	200	18

$\triangle=8550$ km$=77°$.

Ki	iP	09	08	36 C
	i	09	08	41
	iPa	09	13	10
	i	09	14	43
	iS	09	18	04

		μ	s
P	E	10	18
P	N	2.1	16
P	z	25	18
P	z'	1.6	1.0
S	E	29	15
S	N	14	13
S	z	17	18
M	E	150	17
M	N	100	15
M	z	230	17

$\triangle=8150$ km$=73\frac{1}{2}°$.

Sk	iP	09	09	03
	iPP	09	12	03
	iS	09	19	00
	i	09	19	43
Gb	iP	09	09	20

Formosa. Magn.=7.2 (Up, Ki). The average velocity of Pa is about 8.5 km/sec; see M. Båth and A. Lopez Arroyo, Geofis. pura e appl., 56:67—92, 1963.

Column 3 (p. 81)

1959

Aug 15 Up	i(P)	09	15	21
» 15 Gb	i(P)	09	20	04

» 15 Up	i(PKP)	13	34	45
	i	13	34	58
Ki	i(PKP)	13	34	25
	i	13	34	40

(Tonga Islands). The (PKP) phases are remarkably late; may be confusion from another earthquake.

» 15 Up	iP	18	52	18

		μ	s
P	z'	0.1	1.0
M	E	0.4	16
M	N	0.5	16
M	z	0.5	17

Ki	iP	18	51	24 D
	i	18	51	36

		μ	s
P	z'	0.1	1.0
M	E	0.6	15
M	N	0.5	17

Sk	iP	18	52	01
Gb	iP	18	52	38 D

Kamchatka. Magn.=5.7 (Up, Ki).

» 15 Ki	iP	23	08	53
Sk	eP	23	08	42

Costa Rica (h ~ 200 km).

» 16 Up	ePKS	01	14	39

		μ	s
PKS	N	0.3	6

Ki	iPKP	01	10	39
	ePP	01	13	02
	iPKS	01	14	11

		μ	s
PP	N	0.3	8
PKS	E	0.5	7

Sk	ePKP	01	11	04

Loyalty Islands. The surface waves of this earthquake are mixed with those of the following earthquake.

» 16 Up	iP	01	33	02
	iS	01	42	51

		μ	s
P	z'	0.1	1.0
S	E	0.9	10
S	N	0.8	10

$\triangle=8600$ km$=77\frac{1}{2}°$.

Ki	iP	01	32	39 D
	iS	01	42	10

		μ	s
P	z'	0.1	1.0
S	E	1.1	10

$\triangle=8150$ km$=73\frac{1}{2}°$.

Column 4 (p. 81)

1959

Aug 16 Sk	iP	01	33	07
(cont.) Gb	iP	01	33	19

Formosa. Magn.=5.9 (Up, Ki).

» 16 Ki	iP	07	19	55

		μ	s
M	E	0.2	12
M	N	0.4	13

Caspian Sea.

» 16 Up	iP	13	40	00
Ki	iP	13	40	46 C

Arabia.

» 16 Up	eP	18	04	33

		μ	s
M	E	0.6	15
M	z	0.8	16

Ki	—

		μ	s
M	E	0.3	14
M	N	0.3	12

(China).

» 16 Up	iP	18	47	02
	i	18	47	09
	iS	18	51	04

		μ	s
P	N	0.3	3
P	z	0.4	3
P	z'	0.2	1.0
S	E	0.3	3
S	N	0.7	5
M	E	1.7	18
M	N	1.6	16
M	z	1.9	15

$\triangle=2550$ km$=23°$.

Ki	iP	18	48	15

		μ	s
P	z'	0.1	1.5
M	E	1.1	15
M	N	0.7	17

Sk	iP	18	47	41
	i	18	47	48
Gb	iP	18	46	48
	i	18	46	52

Greece. Magn.=5.5 (Up, Ki). The wave arriving 4—7 sec after the first onset has much larger amplitudes than the first P wave. This is typical for earthquakes in this area, at least as recorded by Swedish stations.

» 17 Up	iP	01	14	32
Ki	iP	01	14	09

		μ	s
P	z'	0.1	1.3

Sk	iP	01	14	42
Gb	eP	01	14	59

Formosa.

Column 1 (page 82)

1959					
Aug 17	Up	iPKP	01	20	51
	Gb	iPKP	01	20	59
	Fiji Islands.				

» 17	Up	iP	01	37	36 C
		i	01	37	48
		iS	01	41	01
		i!	01	44	10

			μ	s
P	N	2.3	5
P	Z	2.0	5
P	z′	0.3	0.5
S	E	13	15
S	z′	0.6	2.0
M	E	23	13
M	N	24	15
M	z	24	16

△ = 2100 km = 19°.

Ki	iP	01	38	56 C
	i	01	39	08
	iS	01	43	31
	iLg2	01	47	59
	iRg	01	50	03

		μ	s
P	N	0.6	8
P	z	0.5	10
P	z′	0.4	1.5
S	E	2.4	14
S	N	1.6	10
M	E	21	12
M	N	25	13
M	z	37	13

△ = 3000 km = 27°.

Sk	iP	01	38	21
	i	01	38	34
	iS	01	42	33
	i(Rg)	01	48	25
Gb	iP	01	37	18
	i	01	37	28

Albania. Magn. = 5.8 (Up, Ki). The wave arriving 10—13 sec after the first onset has much larger amplitudes than the first P. Compare the remark to the earthquake in Greece, August 16, 1959, at 18 47.

» 17	Up	iP	04	33	23
		i	04	33	25
		iS	04	36	50

		μ	s
P	N	0.2	4
S	E	0.9	14
M	E	1.8	12
M	N	2.1	15
M	z	2.5	16

△ = 2100 km = 19°.

| Ki | iP | 04 | 34 | 43 |

		μ	s
M	E	1.3	12
M	N	1.9	14

Column 2 (page 82)

1959					
Aug 17		M	z	2.8	14
(cont.)	Sk	iP	04	34	08
	Gb	eP	04	33	06
		i	04	33	18
	Albania.				

» 17	Up	iP	04	39	16
	Ki	iP	04	38	53
	Sk	eP	04	39	17
	Formosa.				

| » 17 | Ki | iP | 05 | 08 | 01 D |

		μ	s
M	E	0.8	12
M	N	0.3	11
M	z	0.7	12

Aleutian Islands.

» 17	Up	iP	08	09	59
	Ki	eP	08	09	37
	Formosa.				

| » 17 | Up | iP | 08 | 37 | 11 |

		μ	s
M	E	0.7	13
M	N	0.9	17
M	z	1.2	15

| Ki | iP | 08 | 36 | 48 |

		μ	s
M	E	1.4	13
M	N	0.7	12
M	z	1.1	12

| Sk | iP | 08 | 37 | 20 |
| Formosa. | | | | |

| » 17 | Up | | — | |

		μ	s
M	E	1.6	17
M	N	0.7	15
M	z	1.4	15

| Ki | e | 09 | 04 | 35 |

		μ	s
M	E	2.2	12
M	N	0.8	12
M	z	2.3	12

» 17	Up	iP	09	23	16
	Ki	iP	09	22	51
	Hindu Kush.				

» 17	Up	iP	11	07	55
	Ki	iP	11	07	07
	Honshu, Japan.				

| » 17 | Ki | iP | 12 | 50 | 32 |
| | Formosa. | | | | |

| » 17 | Ki | eL | 13 | 25 | |

		μ	s
M	E	0.5	13
M	N	0.2	12

Column 3 (page 83)

1959					
Aug 17		M	z	0.3	13
(cont.)	Chile.				

| » 17 | Ki | e(P) | 14 | 00 | 34 |
| | | e(Sg) | 14 | 00 | 49 |

| » 17 | Ki | e(Sg) | 15 | 05 | 26 |

» 17	Up	iSg	16	50	48
		△ = 720 km = 6.5°.			
	Ki	iSn	16	51	05
		iSg	16	52	04
		△ = 980 km = 8.8°.			
	Sk	ePg	16	48	34
		i	16	49	22
		iSg	16	49	27
		△ = 440 km = 4.0°.			
	Gb	eSg	16	50	19
		△ = 620 km = 5.6°.			

West coast of Norway, 62.0°N, 5.0°E. Origin time = 16 47 14.

| » 17 | Up | iP | 21 | 21 | 56 |

		μ	s
P	z′	0.1	0.8

| Ki | iP | 21 | 21 | 35 |

		μ	s
P	z′	0.5	1.0

| Sk | iP | 21 | 22 | 02 D |
| Gb | iP | 21 | 22 | 24 |

» 17	Up	iPKP	21	23	36
		iPP	21	24	43
		iPKKP	21	33	49
		i	21	36	10

		μ	s
PP	E	0.7	5
PP	N	0.5	5
PP	z	1.2	5
PP	z′	0.5	2.0
PKKP	z′	0.4	2.2
M	E	50	18
M	N	44	18
M	z	56	20

△ ~ 13100 km ~ 118°.

Ki	ePKP	21	23	21
	iPP	21	24	09
	iSKSP	21	33	47
	i	21	34	54

		μ	s
PP	E	0.4	5
PP	N	0.3	5
PP	z	1.0	5
SKSP	E	5.7	10
SKSP	N	3.1	9
SKSP	z	3.2	9
M	E	46	19
M	N	29	17
M	z	61	21

△ ~ 12450 km ~ 112°.

Column 4 (page 83)

1959					
Aug 17	Sk	iPP	21	24	30
(cont.)		iPKKP	21	33	56
		iPcPPKP	21	37	51
	Gb	iPKP	21	23	48
		iPP	21	25	23
	Solomon Islands. Magn. = 7.0 (Up, Ki).				

| » 17 | Up | iP | 22 | 46 | 08 |
| | Ki | iP | 22 | 45 | 46 |

| » 18 | Ki | iP | 00 | 43 | 02 |

		μ	s
P	z′	0.1	1.3

| Sk | iP | 00 | 43 | 21 |

Celebes (h ~ 200 km).

» 18	Up	iP	00	45	40 D
		ipP	00	46	28
		iS	00	55	18
		isS	00	56	34

		μ	s
P	E	0.7	2
P	z	2.3	2
P	z′	0.7	0.8
S	E	0.6	3
M	E	2.3	20
M	N	2.3	19
M	z	2.3	20

△ = 8500 km = 76½°.

Ki	iP	00	45	18 D
	ipP	00	46	05
	iS	00	54	37

		μ	s
P	E	0.7	5
P	z	1.0	5
P	z′	1.1	1.0
S	E	1.5	9
S	N	0.5	10
M	E	1.3	18
M	N	0.8	16
M	z	1.3	14

△ = 8100 km = 73°.

Sk	iP	00	45	45 D
	i(pP)	00	46	22
Gb	iP	00	46	00 D
	i(pP)	00	46	38
	iPP	00	49	08

Formosa. h = 190 km (Up, Ki). Magn = = 6.8 (Up, Ki).

» 18	Up	iP	05	25	07
	Gb	iP	05	25	08
	Oregon, USA.				

» 18	Up	iP	06	48	12 D
		i	06	48	19
		iPP	06	50	42
		i(Pa)	06	52	19
		iS	06	57	13
		iP′P′	07	16	34

Column 1

1959
Aug 18
(cont.)

Sta	Phase	comp	h/μ	m/s	s
	P	E	12	16	
	P	N	24	16	
	P	z	57	18	
	P	z'	1.7	1.0	
	PP	E	8.0	17	
	PP	N	15	17	
	PP	z	23	18	

△=7550 km=68°.

Ki	iP		06	47	36
	i		06	47	40
	iPP		06	49	59
	iPa		06	51	31
	iS		06	56	00
	iP'P'		07	16	55
	P	E	11	15	
	P	N	13	16	
	P	z	43	16	
	P	z'	5.3	1.6	
	PP	z	17	16	
	P'P'	z'	1.9	2.0	
	M	E	340	18	
	M	N	260	17	
	M	z	370	17	

△=6900 km=62°.

Sk	iP		06	47	48 D
	i		06	48	01
	iP'P'		07	16	51
Gb	iP		06	48	16 D
	i		06	48	18
	i		06	48	29
	iP'P'		07	16	34

Montana, USA. Magn.=7.5 (Up, Ki).

» 18 Up iP 06 55 28 D
    P z' 0.4 1.3
    Ki iP 06 54 56
    P z' 0.5 1.5

» 18 Up iP 08 05 28 C
    Ki iP 08 04 51
    Montana.

» 18 Up iP 08 07 14
    i 08 07 16
    iPcP 08 07 42
    P z' 0.4 1.5
    Ki iP 08 06 38
    P z' 0.3 1.5
    Sk iP 08 06 46
    Gb iP 08 07 14
    Montana. Magn.=6.2 (Up, Ki).

» 18 Up iP 08 52 45
    Ki iP 08 52 09

Column 2

1959
Aug 18
(cont.)

    P z' 0.1 1.5
    Sk iP 08 52 23
    Montana.

» 18 Up iP 11 14 46
	M	E	1.4	21
	M	N	1.7	23
	M	z	2.9	25
Ki	iP		11	14	09
	M	E	1.2	16
	M	N	1.8	18
	M	z	3.2	16

Montana. Magn.=5.5 (Up, Ki).

» 18 Up iP 15 37 04 D
    eS 15 45 56

	P	N	0.5	4
	P	z	1.0	4
	P	z'	1.0	2.0
	S	E	3.6	13
	S	N	6.4	13
	S	z	1.6	10
	M	E	18	22
	M	N	22	23
	M	z	29	24

△=7500 km=67½°.

Ki	iP		15	36	27 D
	ePa		15	40	11
	iS		15	44	49
	i		15	45	38
	i		15	53	37
	i		15	54	35
	iP'P'		16	05	41
	P	E	0.8	7
	P	N	0.8	10
	P	z	2.2	10
	P	z'	0.9	2.0
	S	E	2.3	11
	S	N	4.0	11
	S	z	2.1	11
	P'P'	z'	0.4	2.0
	M	E	11	15
	M	N	15	17
	M	z	23	16

△=6900 km=62°.

Sk	iP		15	36	35 D
	i		15	36	58
Gb	iP		15	37	04
	iPP		15	39	46

Montana. Magn.=6.5 (Up, Ki). This is the largest aftershock in the Montana sequence. As an average of determinations at 9 stations, its magnitude is 1.1 lower than for the main shock

Column 3

1959
Aug 18 (compare Richter: Elementary Seis-
(cont.) mology, 1958, p. 69).

» 18 Up iP 15 46 41
    i 15 46 46
    P z' 0.1 0.7
    Ki iP 15 46 09
    P z' 0.2 1.3
    Sk iP 15 46 17 C
    Montana. Magn.=6.0 (Up, Ki).

» 18 Up iPg 16 29 38 C
    iSg 16 30 29
    △=420 km=3.8°.
    Sk eSg 16 31 30
    △=620 km=5.6°.
    Gb iPg 16 28 36
    iSg 16 28 43
    △=60 km=0.5°.
Off the west coast of Sweden (Bohus-län), 58.1°N, 11.3°E. Origin time= =16 28 24.

» 18 Up iP 22 08 27
    i 22 08 30
    eS 22 11 56

	S	E	0.4	6
	S	N	0.3	5
	M	E	1.1	17
	M	N	1.2	15
	M	z	1.3	17

△=2100 km=19°.

Ki	iP		22	09	44
	M	E	1.0	16
	M	N	1.2	14
	M	z	2.0	14

    Sk iP 22 09 11
    Gb i(P) 22 08 30
    Albania.

» 19 Up iP 04 15 03
    iS 04 24 00

	P	z'	0.1	1.0
	S	E	0.4	7
	M	E	2.3	19
	M	N	4.0	18
	M	z	3.1	21

△=7550 km=68°.

Ki	iP		04	14	25
	iS		04	22	51
	P	z'	0.2	1.5
	S	E	0.7	7
	S	N	0.4	11
	M	E	4.1	16

Column 4

1959
Aug 19
(cont.)

| | M | N | 2.5 | 18 |
| | M | z | 5.8 | 16 |

△=6950 km=62½°.

    Sk iP 04 14 33
    Gb iP 04 14 57
    Montana. Magn.=5.8 (Up, Ki).

» 19 Up i(P) 07 16 46

» 19 Up iP 07 20 25
	M	E	0.9	16
	M	N	0.8	20
	M	z	1.3	16
Ki	iP		07	20	03
	P	z'	0.1	1.0
	M	E	0.8	15
	M	N	0.5	14
	M	z	0.6	13

    Sk eP 07 20 18
    Formosa.

» 19 Up eP 14 22 08

» 19 Sk eP 14 36 08
    Honshu, Japan.

» 19 Up iP 15 35 24 C
    i! 15 35 38
    iS 15 38 16
    i 15 39 44
	P	N	0.2	2
	P	z'	0.1	0.6
	i!	z'	0.3	1.0
Ki	iP		15	36	47
	i		15	36	53
	P	z'	0.1	1.0
Sk	iP		15	36	17
	i		15	36	34
Gb	iP		15	35	27 C

Rumania (h ~ 150 km).

» 19 Up iP 18 39 26 C
    P z' 0.1 0.5

» 19 Up iP 19 17 26 C
    Ki iP 19 16 49
    Montana.

» 20 Up eL 13 15
	M	E	0.6	20
	M	N	0.6	21
	M	z	0.6	19
Ki	eL		13	15	

1959
Aug 20
(cont.)

```
                              μ    s
              M      E      0.7   17
              M      N      0.3   17
        Indian Ocean.

»  20  Up  eP            19  22  25
       Ki  iP            19  21  48
       Montana.

»  20  Up  iP            21  19  05
           i(pP)         21  19  28
       Ki  iP            21  19  17
       Sk  iP            21  19  31
           ePP           21  21  18
       Hindu Kush.

»  21  Up  iP            07  23  00C
                              μ    s
           P      z'     0.1   0.5
           M      E      0.4   16
           M      N      0.9   15
           M      z      0.5   15
       Ki  eP            07  22  36
                              μ    s
           M      E      0.7   12
           M      N      0.9   15
       Sk  eP            07  23  09
       Gb  eP            07  23  24
       Kansu Province, China.

»  21  Up  iPKP          08  22  58
                              μ    s
           PKP    z      0.5   6
           PKP    z'     0.1   1.3
       Ki  iPKP          08  22  57C
           e             08  23  20
                              μ    s
           PKP    z'     0.5   1.5
       Sk  iPKP          08  23  05C
       Gb  iPKP          08  23  07
           i             08  23  17
           i             08  23  42
       Indian Ocean, south of Australia.
       Origin time=08  03  15.

»  21  Up  iPKP          08  25  16C
           i(SKKS)       08  35  30
                              μ    s
           PKP    z      0.7   4
           PKP    z'     0.1   1.0
           M      E      1.4   21
           M      N      2.0   20
           M      z      2.6   20
       Ki  iPKP          08  25  14
                              μ    s
           PKP    E      0.3   9
           PKP    z'     0.9   2.0
           M      E      2.2   19
           M      N      1.5   19
       Sk  iPKP          08  25  24C
       Gb  iPKP          08  25  25
```

1959
Aug 21
(cont.)   Indian Ocean, south of Australia.
Origin time=08 05 33. Magn.=6.0 (Up, Ki).

```
»  21  Up  iPKP          09  57  33
           i             09  57  41
                              μ    s
           PKP    z      0.6   4
           PKP    z'     0.1   1.1
           M      E      0.8   20
           M      N      1.3   21
           M      z      0.9   19
       Ki  iPKP          09  57  32
           i             09  57  39
                              μ    s
           PKP    z'     0.7   1.7
           M      E      0.8   19
           M      N      0.9   18
       Sk  iPKP          09  57  39
           i             09  57  41
           i             09  57  48
       Gb  iPKP          09  57  40
           i             09  57  49
       Indian Ocean, south of Australia.

»  21  Up  iPg           13  24  52
           iS*           13  25  35
           iSg           13  25  43
           △=430 km=3.9°.
       Ki  eS*           13  27  52
           iSg           13  28  23
           △=970 km=8.7°.
       Sk  e             13  26  59
           iSg           13  27  35
           △=810 km=7.3°.
       North coast of Esthonia, 59.6°N,
       25.0°E. Origin time=13  23  34.
       Seismic?

»  21  Up  iP            15  12  02C

»  21  Up  iPKP          16  59  59
       Gb  iPKP          17  00  10
       Tonga Islands.

»  22  Up  iP            09  49  57D

»  22  Up  iP            23  56  17
       Ki  iP            23  56  41C
       Sk  iP            23  56  48D
       Gb  iP            23  56  30D
       Afghanistan-Pakistan.

»  23  Up  iP            03  27  25
           i             03  30  01
                              μ    s
           P      z'     0.1   0.7
       Ki  iP            03  27  41
       Sk  iP            03  27  53C
       West Pakistan.
```

1959
Aug 23

```
       Up  iP            05  48  09
       Sk  iP            05  48  36
       West Pakistan.

»  23  Up  iP            22  27  17
           i             22  27  23
           eS            22  32  21
                              μ    s
           P      z'     0.3   1.5
           S      E      0.9   11
           S      N      1.5   13
           M      E      2.1   16
           M      N      2.0   20
           M      z      1.4   18
           △~3100 km~28°.
       Ki  iP            22  28  23
           i             22  28  27
           eS            22  34  01
                              μ    s
           P      z'     0.8   1.7
           M      E      4.2   15
           M      N      2.1   16
           M      z      2.1   12
           △=3950 km=35½°.
       Sk  iP            22  27  35C
           i             22  27  40
       Gb  iP            22  26  51
       Mediterranean Sea, north of Spanish
       Morocco. Magn.=5.5 (Up, Ki).

»  23  Up  iP            22  30  35

»  24  Ki  eP            00  39  01

»  24  Up  iP            01  36  48
       Ki  iP            01  37  33
       Sk  e(P)          01  37  23
       Tanganyika.

»  24  Up  iP            08  23  50
           i(pP)         08  24  15
       Ki  iP            08  23  37
           i(pP)         08  24  03
       Sk  iP            08  24  28D
       Burma.

»  24  Up  iP            12  39  49
                              μ    s
           P      z'     0.1   0.5
       Ki  iP            12  38  56
       Sk  iP            12  39  34
       Kamchatka.

»  24  Ki  eL            16  45
                              μ    s
           M      N      0.3   18
       Solomon Islands.

»  24  Up  iP            16  50  22
```

1959
Aug 24

```
       Up  iP            20  51  11C
»  24  Up  iPP           21  51  38
           i             21  52  31
           i             21  58  29
                              μ    s
           PP     z      2.0   16
           M      E      17    21
           M      N      19    22
           M      z      28    23
           △~13650 km~123°.
       Ki  iPKP          21  49  45
           ePP           21  50  50
           i             21  51  23
           e(PS)         22  00  30
           i             22  00  53
                              μ    s
           M      E      18    18
           M      N      21    20
           M      z      19    20
           △~12900 km~116°.
       Sk  ePKP          21  49  49
       Solomon Islands. Magn.=6.8 (Up, Ki).

»  25  Up  i(P)          00  58  46

»  25  Up  iP            07  19  14

»  25  Sk  iP            12  02  53
       Gb  iP            12  01  53
       Albania.

»  25  Up  i(P)          22  43  28
           i             22  43  55

»  26  Up  iP            08  38  09C
           i(pP)         08  38  19
           iPP           08  41  25
           iS            08  48  36
           i             08  49  59
                              μ    s
           P      E      1.2   5
           P      z      3.8   4
           P      z'     0.8   0.7
           PP     z      1.0   4
           S      E      7.5   18
           S      N      7.2   15
           M      E      11    22
           M      N      5.6   21
           M      z      15    23
           △=9500 km=85½°.
       Ki  iP            08  37  55C
           i(pP)         08  38  06
           iS            08  48  10
                              μ    s
           P      E      2.8   5
           P      N      1.5   4
           P      z      5.2   4
           P      z'     3.7   2.0
           S      E      4.4   15
           S      N      2.6   12
```

Column 1

1959
Aug 26
(cont.)

M	E		19	24
M	N		9.4	24
M	z		19	24

△=9150 km=82½°.

Sk	iP		08 37	49C
	i(pP)		08 38	00
Gb	iP		08 37	59C
	i		08 39	10

Vera Cruz, Mexico. Magn.=6.9 (Up, Ki).

» 26 Up

	iP		10 38	33
	iS		10 47	29
	iScS		10 48	35

		μ	s
P	N	0.6	4
P	z	1.1	6
P	z'	0.7	1.5
S	N	3.5	16
M	E	11	22
M	N	22	22
M	z	27	23

△=7500 km=67½°.

Ki	iP		10 37	47
	i		10 37	57
	iS		10 46	01

		μ	s
P	z	1.5	5
P	z'	0.9	2.0
S	E	3.1	10
S	N	2.0	9
M	E	21	19
M	N	22	21
M	z	33	23

△=6650 km=60°.

Sk	iP		10 38	08C
Gb	iP		10 38	42C

Queen Charlotte Islands. Magn.=6.5 (Up, Ki).

» 26 Ki i(P)   14 09 39

» 27 Up iP   04 39 34

» 27 Up iP   15 02 43
    iPcP   15 03 14
Okhotsk Sea (h ~ 200 km).

» 27 Up iP   18 35 34

		μ	s
P	z'	0.1	0.6

» 28 Up iP   00 03 39

		μ	s
P	z'	0.2	0.5
M	N	1.9	19

Ki	iP		00 03	31
	i(pP)		00 03	44
	i		00 03	59

		μ	s
P	z'	0.1	1.0

Column 2

1959
Aug 28
(cont.)

M	E		1.5	18
M	N		1.0	16
Sk	iP		00 03	55
	i(pP)		00 04	07
Gb	iP		00 04	08

Burma. Magn.=6.1 (Up, Ki).

» 29 Up iP   02 07 49
    Ki iP   02 07 00
Kurile Islands.

» 28 Ki iP   08 00 40
Venezuela.

» 28 Up iPg   08 25 26
    iSg   08 25 43

		μ	s
Pg	z'	0.2	0.5
Sg	z'	0.1	0.5

△=140 km=1.3°.
Sk eSg   08 28 01
△=670 km=6.0°.
Central Baltic, 58¾°N, 19°E. Origin time=08 24 43. Probably explosion.

» 28 Up iPg   08 30 58
    iSg   08 31 14
    iL   08 31 24

		μ	s
L	z'	0.1	0.6

△=140 km=1.3°.
Central Baltic. Origin time==08 30 13. Probably explosion.

» 28 Up iPg   08 34 36
    iSg   08 34 52
    iL   08 35 00

		μ	s
Pg	z'	0.1	0.5
Sg	z'	0.1	0.5
L	z'	0.2	0.8

△=130 km=1.2°.
Central Baltic. Origin time==08 33 56. Probably explosion.

» 28 Up iPg   08 40 19
    iSg   08 40 35

		μ	s
Pg	z'	0.1	0.5
Sg	z'	0.1	0.5

△=130 km=1.2°.
Central Baltic. Origin time==08 39 39. Probably explosion.

» 28 Up iPg   09 12 34
    iSg   09 12 50
    iL   09 12 56

		μ	s
L	z'	0.1	0.7

Column 3

1959
Aug 28
(cont.)

△=130 km=1.2°.
Central Baltic. Origin time==09 11 54. Probably explosion.

» 28 Up iP   12 17 26C

		μ	s
P	z'	0.1	0.7

Ki iP   12 16 29C

		μ	s
P	z'	0.3	1.5

Sk	iP		12 16	57
Gb	iP		12 17	38

Alaska. Magn.=6.0 (Up, Ki).

» 28 Ki e   13 57 48
    Sk e(Sg)   13 57 20

» 28 Ki iPKP   16 11 15
New Hebrides Islands.

» 28 Up i(P)   16 44 34C

		μ	s
(P)	z'	0.1	0.6

» 29 Ki iP   05 39 28
Sinkiang Province, China.

» 29 Ki eP   10 46 34
Turkey.

» 29 Ki iP   13 58 56
Mediterranean Sea, north of Spanish Morocco.

» 29 Up

	iP		17 11	40
	iPP		17 13	33
	iS		17 18	26

		μ	s
P	E	0.9	7
P	N	1.0	7
P	z	3.3	7
P	z'	1.5	1.8
PP	E	2.4	6
S	E	17	22
S	N	9.9	22
M	E	60	17
M	N	60	15
M	z	78	15

△=5150 km=46½°.

Ki	iP		17 11	01
	i		17 11	05
	iPP		17 12	43
	iS		17 17	19
	iSS		17 20	19
	iSa		17 20	44

		μ	s
P	E	1.9	7
P	z'	1.8	2.0
PP	E	5.2	6
PP	N	1.7	7
PP	z'	5.2	3.0

Column 4

1959
Aug 29
(cont.)

S	E		20	20
S	N		4.1	19
M	E		42	10
M	N		26	10

△=4650 km=42°.

Sk	iP		17 11	41
Gb	iP		17 12	11
	i		17 14	51
	i		17 19	40

Lake Baikal, USSR. Magn.=6.7 (Up, Ki).

» 29 Ki iPKP   21 39 32
New Hebrides Islands.

» 30 Up eS   03 35 53

		μ	s
S	E	0.4	11
S	N	0.5	11
M	E	0.8	14
M	N	1.0	15
M	z	0.6	10

Ki	iP		03 31	47
	i		03 31	52

		μ	s
P	z'	0.2	1.5
M	E	2.2	15
M	N	1.3	15

Sk	iP		03 31	00
Gb	iP		03 30	22D

Mediterranean Sea, north of Spanish Morocco.

» 30 Up iPKP   11 42 16C
    Gb iPKP   11 42 25D
Tonga Islands.

» 30 Ki iP   13 52 54C
    Sk iP   13 53 23
Alaska.

» 30 Up   —

		μ	s
M	E	0.8	20
M	z	1.0	20

Ki	iP		14 47	14
	i		14 47	23

		μ	s
M	E	0.7	17
M	N	0.4	13

Sk	eP		14 47	54
	i		14 48	32

Lake Baikal, USSR.

» 30 Sk eP   20 29 19

» 30 Up   —

		μ	s
M	E	1.0	18
M	N	1.2	20
M	z	1.4	18

1959

```
Aug 30 Ki   e              22  11  47
(cont.)
                     μ      s
            M    E   1.7    19
            M    N   0.9    17
        Indian Ocean.

»  30 Up    iP             23  04  34
            iPP            23  06  24
                     μ      s
            M    E   2.1    15
            M    N   4.3    18
            M    z   3.1    15
            △~4550 km~41°.
      Ki    iP             23  04  45
            iPP            23  06  28
                     μ      s
            PP   z'  0.1    1.1
            M    E   2.3    11
            M    N   2.3    10
            △~4650 km~42°.
      Sk    iP             23  05  03
            iPP            23  06  49
      Gb    eP             23  05  08
            i              23  05  42
            iPP            23  06  56
        Afghanistan-Tadzhik.

»  30 Up    iP             23  45  11
            eLg1           00  00  16
                     μ      s
            M    E   0.7    15
            M    N   0.5    11
            M    z   0.7    11
      Ki    iP             23  44  31
            eLg1           23  57  48
                     μ      s
            M    E   0.6    10
            M    N   0.4    11
      Sk    iP             23  45  11
        Lake Baikal, USSR.

»  31 Up    iP             09  16  56
                     μ      s
            P    z'  0.1    1.0
      Ki    iP             09  16  03C
                     μ      s
            P    z'  0.1    0.8
      Sk    iP             09  16  33C
      Gb    iP             09  17  04
        Aleutian Islands. Magn.=5.8 (Up, Ki).

»  31 Ki    e(P)           12  45  25
            i(Sg)          12  45  41

»  31 Ki    iP             12  48  44

»  31 Sk    e(P)           17  38  46

»  31 Ki    i(P)           19  21  26
            i(Sg)          19  21  53
```

1959

```
Sep  1 Up   i(P)           00  44  09

»  1 Up     i(P)           01  11  17
            i              01  11  27
      Ki    iP             01  11  14
      Sk    iP             01  11  34

»  1 Ki     eP             05  48  33

»  1 Up                     —
                     μ      s
            M    E   1.1    19
            M    N   0.8    20
            M    z   0.8    16
      Ki    iP             07  34  27
                     μ      s
            M    E   0.7    18
            M    N   0.3    13
            M    z   0.7    17
      Sk    iP             07  33  58
        Mid-Atlantic Ridge.

»  1 Up     iP             11  00  57
            eS             11  10  03
                     μ      s
            S    N   0.3    6
            M    E   0.8    17
            M    z   1.1    17
            △=7850 km=70½°.
      Ki    iP             11  01  01
            i(pP)          11  01  13
            eS             11  10  13
                     μ      s
            S    E   0.3    7
            S    N   0.4    6
            M    E   0.4    16
            M    N   0.3    15
            △=7900 km=71°.
      Sk    iP             11  00  41
            i(pP)          11  00  52
      Gb    iP             11  00  39
            iPcP           11  01  04
        Puerto Rico.

»  1 Up     iP             11  42  04
            i              11  42  13
            iS             11  45  35
            i(Lg2)         11  47  49
                     μ      s
            P    N   6.0    15
            P    z   4.4    14
            P    z'  0.3    0.6
            S    E   17     14
            M    E   33     12
            M    N   47     16
            M    z   41     13
            △=2100 km=19°.
      Ki    iP             11  43  21
            iS             11  48  02
            iLg1           11  51  51
            i(ScS)         11  54  24
```

1959

```
Sep  1
(cont.)
                     μ      s
            P    N   0.7    10
            P    z   0.9    11
            P    z'  0.3    1.1
            S    E   4.5    12
            S    N   3.9    11
            M    E   43     13
            M    N   41     12
            M    z   57     12
            △=3000 km=27°.
      Sk    iP             11  42  48
            i              11  43  02
      Gb    iP             11  41  46
            i              11  41  59
        Albania. Magn.=5.9 (Up, Ki). Clear
        channel waves.

»  1 Ki     e(Sg)          12  21  16

»  1 Up     iP             13  11  24

»  2 Up     iP             08  13  07
            i(pP)          08  13  22
      Ki    iP             08  12  11
            i(pP)          08  12  25
      Sk    eP             08  12  39
            i(pP)          08  12  53
            i              08  13  07
        Alaska. h=70 km (Up, Ki, Sk).

»  2 Ki     iP             09  42  53
      Sk    iP             09  42  32
        Puerto Rico.

»  2 Ki     iP             13  01  47
      Sk    eP             13  02  24
      Gb    eP             13  02  55
        Kamchatka.

»  2 Sk     i(P)           14  41  09

»  2 Up     iP             15  46  39

»  3 Up     iP             04  06  28
            eS             04  10  08
                     μ      s
            S    E   0.3    7
            M    E   1.0    17
            M    N   0.7    12
            M    z   1.0    13
            △=2150 km=19½°.
      Ki    iP             04  07  46
            e(Lg2)         04  16  41
                     μ      s
            M    E   1.0    14
            M    N   0.9    14
            M    z   1.3    14
      Sk    iP             04  07  10
      Gb    iP             04  06  13
        Albania.
```

1959

```
Sep  3 Up   iP             06  41  24
            eSKS           06  51  54
            ePS            06  54  31
                     μ      s
            SKS  E   0.6    6
            M    E   2.9    17
            M    N   3.6    23
            M    z   4.8    20
            △~11150 km~100½°.
      Ki    iP             06  41  11
            iPP            06  45  18
            iSKS           06  51  49
            eS             06  52  40
                     μ      s
            PP   E   0.4    9
            PP   z   0.5    9
            SKS  E   1.5    9
            S    N   0.4    9
            M    E   3.7    23
            M    N   9.0    24
            M    z   4.4    22
            △=11000 km=99°.
      Sk    iP             06  41  32
            iPP            06  45  49
      Gb    iP             06  41  45
        Celebes. Magn.=6.2 (Up, Ki).

»  3 Ki     iP             07  53  31
            i              07  55  23
      Sk    eP             07  53  22

»  3 Ki     e(Sg)          08  32  56
      Sk    e(Sg)          08  34  31

»  3 Up     iP             18  01  30C
                     μ      s
            P    z'  0.1    0.7

»  3 Ki     eP             19  02  17

»  4 Up     i(P)           00  19  48
                     μ      s
            M    N   0.7    18
      Ki    e(P)           00  19  38
                     μ      s
            M    N   1.0    18
            M    z   0.5    12
      Sk    eP             00  20  04
        (China).

»  4 Ki     iP             08  56  07
        Luzon, Philippine Islands.

»  4 Ki                     —
                     μ      s
            M    E   1.0    15
            M    N   0.2    13
      Sk    iP             11  03  38
            i              11  04  32
        Albania.
```

Column 1

```
1959
Sep 4 Up  i(P)        12 00 22
       Gb  iP          12 00 14

»   4 Sk  iPKP        12 49 46
      Kermadec Islands.

»   4 Sk  iP          16 21 21
      Albania.

»   4 Up  iP          17 59 41
       Ki  iP          17 59 11
       Sk  iP          17 59 38
      Mariana Islands (h ~ 250 km).

»   4 Up  iP          18 37 48
                      μ    s
              P   z'  0.1  0.7
       Ki  eP          18 38 23
                      μ    s
              P   z'  0.5  2.0
       Sk  iP          18 37 55 C
       Gb  iP          18 37 28
      Atlantic Ocean. Magn.=6.1 (Up, Ki).

»   4 Ki  iP          19 32 38
      Aleutian Islands.

»   5 Up  eL          00 25
                      μ    s
              M   E   0.6  20
              M   N   0.4  21
              M   z   0.6  19
      Chile.

»   5 Up  iP          05 43 23
       Sk  iP          05 43 40

»   5 Up  iP          06 21 29
           iSKS        06 32 11
           iS          06 33 00
                      μ    s
              SKS  E  0.4  5
              S    N  0.4  6
              M    E  1.3  19
              M    N  1.8  18
              M    z  3.4  21
           △ ~ 11100 km ~ 100°.
       Ki  iP          06 21 09
           i(SKS)      06 31 55
           i(S)        06 32 17
                      μ    s
              P    z' 0.1  1.4
              (SKS) E 0.4  8
              (S)   N 0.4  9
              M    E  3.0  21
              M    N  2.2  19
              M    z  2.4  20
       Sk  eP          06 21 31
           i           06 21 38
           ePP         06 25 41
```

Column 2

```
1959
Sep   5 Gb  eP         06 21 58
(cont.) Halmahera Island. Magn.=6.1 (Up, Ki).

»   5 Up            —
                      μ    s
              M   E   0.5  18
              M   N   0.7  22
              M   z   0.6  20
       Ki  ePKP2       07 21 05
                      μ    s
              M   E   0.4  18
              M   N   0.7  18
              M   z   0.9  19
      Balleny Islands.

»   5 Up  iP          15 48 36
                      μ    s
              M   E   1.0  20
              M   N   1.0  20
              M   z   1.4  21
       Ki  iP          15 48 14
           ePS         16 01 01
                      μ    s
              M   E   1.4  21
              M   N   1.4  20
              M   z   1.4  20
      Halmahera Island.

»   5 Up  iP          21 23 04
                      μ    s
              P   z'  0.1  1.0
       Ki  iP          21 22 11
       Sk  iP          21 22 43
       Gb  eP          21 23 28
      Aleutian Islands.

»   5 Up  iP          21 39 44
                      μ    s
              P   z'  0.1  1.0
              M   E   0.5  19
              M   N   0.7  18
              M   z   0.7  21
       Ki  iP          21 38 50 C
                      μ    s
              P   z'  0.1  1.0
              M   E   1.0  18
              M   N   1.0  17
              M   z   1.1  17
       Sk  iP          21 39 23
       Gb  iP          21 40 07
      Aleutian Islands. Magn.=5.8 (Up, Ki).

»   5 Up  iP          21 47 20
       Gb  iP          21 47 44
      (Aleutian Islands).

»   5 Up  iP          22 04 23
           i           22 05 24
       Ki  iP          22 03 30
```

Column 3

```
1959
Sep   5 Ki  iP         22 04 02
(cont.) Gb  iP          22 04 46
      Aleutian Islands.

»   5 Up  iPKP        23 23 12 D
           i           23 23 21
           iSKP        23 26 04
                      μ    s
              SKP  z' 0.1  1.0
       Ki  iPKP        23 23 08
           iSKP        23 25 39
                      μ    s
              SKP  z' 0.2  1.3
       Sk  iPKP        23 23 07
           iSKP        23 25 57
       Gb  iPKP        23 23 29
           iSKP        23 26 20
      Fiji Islands (h ~ 550 km).

»   6 Up  iP          00 41 21 D
       Ki  iP          00 41 04
       Sk  iP          00 41 30
       Gb  eP          00 41 39
      Mindanao, Philippine Islands.

»   6 Up  iP          00 45 14
       Gb  eP          00 46 34

»   6 Up  iP          04 02 08 D
       Ki  iP          04 01 15
       Sk  eP          04 01 47
       Gb  eP          04 02 25
      Aleutian Islands.

»   6 Up  iP          06 37 28 C

»   6 Up  iP          13 30 54
           i           13 30 59
       Ki  eP          13 30 37
           i           13 30 45
      Luzon, Philippine Islands.

»   6 Up  iPKP        18 25 06
       Gb  iPKP        18 25 17
      Fiji Islands.

»   7 Gb  iP          00 01 47 D

»   7 Up  iP          04 14 26
       Sk  iP          04 14 33
      Atlantic Ocean.

»   8 Up  iP          09 00 13 C
           i           09 00 41
                      μ    s
              M   E   0.4  16
       Ki  iP          09 01 18
       Sk  iP          09 00 52
      Rhodes Island.
```

Column 4

```
1959
Sep   8 Up  iP         10 14 54 C
           ipP         10 15 09
           iPP         10 17 37
                      μ    s
              P   z'  0.2  0.7
           △=7900 km=71°.
       Ki  iP          10 14 16 C
                      μ    s
              P   z'  0.2  1.0
       Sk  iP          10 14 49 C
       Gb  iP          10 15 13 C
      Honshu, Japan. h=60 km (Up).

»   8 Sk  iP          11 26 13 C
      Lake Baikal.

»   8 Up  ePS         13 41 17
                      μ    s
              M   N   0.9  23
              M   z   1.1  22
       Ki  iPKP        13 31 05
                      μ    s
              M   N   0.6  19
              M   z   1.5  22
      South Atlantic Ocean.

»   8 Up  iP          16 17 18
      Kyushu, Japan.

»   8 Up  iP          19 30 35 C
           ipP         19 30 58
                      μ    s
              P   z'  0.1  1.0
              M   E   1.0  21
              M   N   0.9  23
              M   z   1.2  24
       Ki  iP          19 29 52
           i           19 31 09
           i(S)        19 38 14
                      μ    s
              (S)  N  0.4  8
              M   E   1.5  20
              M   N   0.8  19
              M   z   0.8  18
       Gb  eP          19 30 59
           ipP         19 31 22
      Hokkaido, Japan. h=90 km (Up, Gb).

»   8 Up  iPKP        20 37 33
       Ki  iPKP        20 37 49
      Sandwich Islands.

»   9 Up  iP          02 00 34 D
       Ki  iP          01 59 40
       Gb  iP          02 00 54
      Kamchatka.

»   9 Up  iP          05 52 07
           ePP         05 53 41
```

1959

Sep 9 (cont.)

```
            P      z'        μ    s
                            0.1  0.8
       Ki   iP     05  52  16
            P      z'        μ    s
                            0.1  1.0
       Gb   iP     05  52  28
            iPa    05  55  03
```
Hindu Kush (h ~ 200 km). Magn. = 5.7 (Up, Ki).

```
»  9   Up   i(Sg)  10  11  05
»  10  Sk   eP     03  59  26
```
Rhodes Island.

```
»  10  Ki   e       04  20  34
            e(Sg)   04  21  01
»  10  Up   iP      05  41  01
»  10  Gb   iP      09  06  17
»  10  Up   iP      14  04  42
            P      z'    μ    s
                        0.1  0.8
       Ki   iP      14  05  31 D
            P      z'    μ    s
                        0.2  1.2
       Gb   eP      14  05  05
```
Turkey. Magn. = 5.6 (Up, Ki).

```
»  10  Ki   e(P)    15  16  20
»  10  Up   iP      15  54  30
```
Kurile Islands.

```
»  10  Up   iP      20  44  48
       Ki   iP      20  43  03
»  10  Up   eP      23  07  19
            iPcP    23  07  57
       Ki   iP      23  06  43
            P      z'    μ    s
                        0.1  1.0
       Gb   eP      23  07  40
```
Kurile Islands.

```
»  11  Up   iP      10  16  36 D
»  11  Ki   iP      14  25  12 C
```
Azores Islands.

```
»  12  Up   iP      00  35  16
       Ki   iP      00  35  13
```
Java (h ~ 100 km).

```
»  12  Up   —
            M   E   μ 4.9   s 23
            M   N     6.8     25
            M   z     4.8     24
```

1959

Sep 12 (cont.)

```
       Ki   ePS     02  21  33
                    μ    s
            M   E   6.4  23
            M   N   3.5  21
            M   z   8.9  23
```
Bismarck Sea. Magn. = 6.5 (Up, Ki).

```
»  12  Ki   i(P)    04  24  16
»  12  Up   eL      07  50
                    μ    s
            M   E   1.3  19
            M   N   0.9  18
            M   z   1.9  20
       Ki   eL      07  52
                    μ    s
            M   E   1.0  18
            M   N   0.8  19
            M   z   1.2  18
```
Bismarck Sea.

```
»  12  Up   iP      08  28  41 D
       Ki   iP      08  27  48
```
Aleutian Islands.

```
»  12  Up   iP      09  07  38
            i       09  07  43
»  12  Up   —
                    μ    s
            M   E   1.8  21
            M   N   1.5  19
            M   z   1.6  20
       Ki   iPKP    11  43  11
                    μ    s
            M   E   1.8  20
            M   N   1.5  19
            M   z   2.9  22
```
Solomon Islands. Magn. = 6.0 (Up, Ki).

```
»  12  Up   iP      21  27  26 C
            ipP     21  28  10
            iPP     21  29  10
            P      z'   μ 0.3  s 0.5
            PP     z'     0.1    1.0
       Ki   iP      21  27  35 C
            P      z'   μ 0.4  s 0.5
            M   E      0.4    11
       Sk   iP      21  27  52 C
       Gb   iP      21  27  52 C
            iPa     21  30  17
```
Hindu Kush. h = 210 km (Up).

```
»  13  Up   i(P)    00  51  50
»  13  Up   eP      19  23  35
```

1959

Sep 13 (cont.)

```
                    μ    s
            M   E   0.4  15
            M   N   1.3  18
            M   z   0.5  16
       Ki   iP      19  23  35
            P      z'   μ 0.1  s 1.0
            M   E      0.8    13
            M   N      1.3    12
            M   z      1.0    14
       Sk   eP      19  23  56
            i       19  24  03
```
Kirghiz, USSR—China.

```
»  13  Up   —
                    μ    s
            M   E   0.6  20
            M   N   0.5  22
            M   z   0.8  24
       Ki   iP      22  54  10
                    μ    s
            M   E   0.8  17
            M   N   0.5  16
            M   z   0.6  16
```
Halmahera Island.

```
»  14  Up   iP      01  43  57 C
       Ki   iP      01  43  58
       Sk   iP      01  44  12
```
Central Asia.

```
»  14  Ki   eL      10  07
                    μ    s
            M   E   0.5  16
            M   N   0.4  16
            M   z   0.8  16
```
Montana, USA.

```
»  14  Up   iPKP    13  35  25
            i       13  35  59
       Ki   iPKP    13  35  10
                    μ    s
            M   E   1.6  21
            M   N   1.8  22
            M   z   3.2  22
       Gb   iPKP    13  35  31
            i       13  35  38
```
Tonga Islands.

```
»  14  Up   iPKP    14  29  24 C
            iX      14  29  47
            i(PP)   14  32  56
            i       14  33  18
            i(PKKS) 14  40  40
                    μ    s
            PKP  E  7.2  13
            PKP  N  8.5  10
            PKP  z  36   11
            PKP  z' 0.7  0.7
            (PP) z' 0.2  1.1
            M   E   37   20
```

1959

Sep 14 (cont.)

```
            M   N   60  20
            M   z   69  23
```
△ ~ 16200 km ~ 146°.

```
       Ki   iPKP    14  29  03
            i       14  29  12
            iX      14  29  24
            i!      14  32  21
            iPKS    14  32  36
            i!      14  33  01
            i       14  40  47
            ePS     14  42  35
                    μ    s
            PKP  N  0.9  11
            PKP  z  11   10
            PKP  z' 0.1  1.0
            M   E   44   18
            M   N   52   20
            M   z   88   20
```
△ ~ 15350 km ~ 138°.

```
       Sk   iPKP    14  29  16 C
       Gb   iPKP    14  29  29
            i       14  29  32
            iX      14  29  50
            i       14  40  35
```
Kermadec Islands. Magn. = 7.5 (Up, Ki). There are several well pronounced but unidentified phases.

```
»  14  Up   iPKP    15  18  25 C
            PKP  z' μ 0.1  s 1.0
       Ki   iPKP    15  18  10
       Sk   iPKP    15  18  18
       Gb   iPKP    15  18  35 C
```
Kermadec Islands.

```
»  14  Up   iP      16  08  40 D
       Sk   iP      16  08  29
       Gb   i(P)    16  08  56
»  14  Up   iP      16  15  49
»  14  Up   iPKP    16  41  46
       Sk   iPKP    16  41  38
       Gb   ePKP    16  41  53
```
Kermadec Islands.

```
»  14  Up   iPKP    17  15  59
       Sk   iPKP    17  15  56
       Gb   ePKP    17  16  07
```
Kermadec Islands.

```
»  14  Up   iPKP    17  25  59 C
            iPP     17  29  24
            eSS     17  48  09
                    μ    s
            PKP  N  1.8  15
            PKP  z  6.1  15
            PKP  z' 0.5  0.7
            PP   z' 0.4  2.0
```

Column 1

1959
Sep 14
(cont.)

Sta	Phase	Comp		h	m	s
	M	E			3.1	20
	M	N			4.1	20
	M	z			3.9	20

△ ~ 16200 km ~ 146°.

	Ki	iPKP		17	25	42
		iPP		17	28	38
		ePKS		17	29	21

				μ	s
	PKP	z	1.6	10
	PP	N	0.7	9
	PP	z	1.4	9
	PKS	E	1.5	15
	M	E	3.2	21
	M	N	4.0	20
	M	z	8.1	20

△ ~ 15350 km ~ 138°.

	Sk	iPKP	17	25	51 C
		i	17	26	04
	Gb	iPKP	17	26	04
		i	17	26	08
		i	17	26	17

Kermadec Islands. Magn.=6.6 (Up, Ki).

» 14 Up iP   17 33 26 C
    iPcP   17 33 55

			μ	s
	P	z′	0.2	0.8

Ki iP   17 32 38

			μ	s
	P	z′	0.2	0.9

Sk iP   17 33 14
Gb iP   17 33 47

Kurile Islands. Magn.=6.2 (Up, Ki).

» 14 Up iPKP   17 57 42
Sk iPKP   17 57 33 D
Gb iPKP   17 57 50 C

Kermadec Islands.

» 14 Up iP   19 12 08

» 14 Up iPKP   19 29 23
Sk iPKP   19 29 16

Kermadec Islands.

» 14 Up iP   19 34 22

» 14 Sk iPKP   19 54 41

Gb ePKP   19 54 56

Kermadec Islands.

» 14 Up iPKP   20 47 01
Sk ePKP   20 46 54
Gb ePKP   20 47 05

Kermadec Islands.

» 14 Up iPKP   22 43 37 C
eSKSP   22 57 14
eSS   23 06 03

Column 2

1959
Sep 14
(cont.)

			μ	s
	PKP	z	1.9	10
	PKP	z′	0.5	0.8

			μ	s
	M	E	1.3	20
	M	N	1.6	20
	M	z	2.4	19

△ ~ 16200 km ~ 146°.

Ki	iPKP		22	43	19
	ePP		22	46	16
	i		22	47	14
	e(PS)		22	56	26
	e(SS)		23	04	39

			μ	s
	PKP	z	0.5	9
	PP	N	0.3	9
	PP	z	0.6	9
	M	E	1.6	20
	M	N	1.7	20
	M	z	3.6	20

△ ~ 15350 km ~ 138°.

Sk	iPKP		22	43	29 C
	i		22	43	39
Gb	iPKP		22	43	52 C
	i		22	44	07
	i		22	44	26

Kermadec Islands. Magn.=6.2 (Up, Ki).

» 14 Up i(PKP)   23 17 16
Kermadec Islands.

» 14 Up iPKP   23 28 02
Sk iPKP   23 27 55
Kermadec Islands.

» 15 Up iPKP   01 50 44
i   01 50 52
Sk iPKP   01 50 36
Gb iPKP   01 50 56 C
Kermadec Islands.

» 15 Up iPKP   02 43 59
Sk iPKP   02 43 51
Kermadec Islands.

» 15 Sk iPKP   04 36 15
Kermadec Islands.

» 15 Up iP   06 08 18
Ki iP   06 08 10

» 15 Up iPKP   06 17 56

			μ	s
	PKP	z′	0.1	0.7

Sk iPKP   06 17 48
Gb iPKP   06 18 06
Kermadec Islands.

» 15 Up iPKP   06 19 24 C
i   06 19 38
iPP   06 22 48

Column 3

1959
Sep 15
(cont.)

	e			06	32	45
	iSS			06	41	52

			μ	s
	PKP	E	2.7	16
	PKP	N	4.7	14
	PKP	z	16	10
	PKP	z′	0.4	0.6
	PP	z	6.1	9
	PP	z′	0.8	2.0
	M	E	7.7	22
	M	N	19	20
	M	z	18	20

△ ~ 16200 km ~ 146°.

Ki	iPKP		06	19	05 C
	iPP		06	22	01
	iPKS		06	22	46
	iSS		06	40	24

			μ	s
	PKP	z	2.2	9
	PKP	z′	0.1	1.3
	PP	N	2.2	8
	PP	z	4.6	9
	PP	z′	0.6	2.2
	PKS	E	2.2	9
	PKS	N	2.2	9
	M	E	16	20
	M	N	16	20
	M	z	28	20

△ ~ 15350 km ~ 138°.

Sk	iPKP		06	19	16
Gb	iPKP		06	19	33

Kermadec Islands. Magn.=7.0 (Up, Ki).

» 15 Up iPKP   06 23 19
i   06 23 23
Sk iPKP   06 23 08
Kermadec Islands.

» 15 Up iPKP   06 28 19
i   06 28 26

			μ	s
	PKP	z′	0.1	0.6

Sk iPKP   06 28 12
i   06 28 21
Gb iPKP   06 28 31
Kermadec Islands.

» 15 Up iPKP   06 37 14
i   06 37 18

			μ	s
	PKP	z′	0.1	0.6

Ki ePKP   06 36 57
Sk iPKP   06 37 05
Gb iPKP   06 37 21
Kermadec Islands.

» 15 Up iPKP   07 00 41
i   07 00 46
Sk iPKP   07 00 34
Gb iPKP   07 00 52
Kermadec Islands.

Column 4

1959
Sep 15 Up iP   07 04 21 C

» 15 Up iP   07 57 23

» 15 Up iPKP   08 20 09 C

			μ	s
	PKP	z′	0.1	0.6

Ki ePKP   08 19 51
Sk iPKP   08 20 01
Gb iPKP   08 20 20 C
Kermadec Islands.

» 15 Up iP   09 17 25

» 15 Up iPKP   11 08 26
i   11 08 34
i   11 08 44
Sk ePKP   11 08 19
Kermadec Islands.

» 15 Up iPKP   11 23 52
iSKP   11 26 38
iPP   11 27 01
iSKKP   11 35 12
iSS   11 44 26
esSS   11 48 09

			μ	s
	PKP	z′	0.2	0.5
	SKP	z	1.6	5
	SKP	z′	0.2	1.0
	PP	N	1.0	3
	PP	z	1.6	3
	SKKP	z′	0.3	1.4
	M	E	0.9	23
	M	N	1.4	26
	M	z	1.9	20

△ ~ 15550 km ~ 140°.

Ki	i(PKP)		11	23	32
	iPKP		11	23	44
	iSKP		11	26	15
	i		11	30	32
	i		11	32	10

			μ	s
	PKP	z′	0.2	1.0
	SKP	N	0.9	7
	SKP	z	4.4	6
	SKP	z′	1.3	1.5

△ ~ 14650 km ~ 132°.

Sk	iPKP		11	23	44
	i		11	23	54
	iSKP		11	26	32
Gb	iPKP		11	24	01 D
	iSKP		11	26	48
	iSKKP		11	35	00

Fiji Islands (h ~ 600 km). Magn.=7.1 (Up).

» 15 Up iPKP   12 20 05
i   12 20 13
Sk iPKP   12 19 57
i   12 20 08

1959

Sep 15 Gb iPKP 12 20 13
(cont.) Kermadec Islands.

» 15 Up iPKP 12 28 46
  Sk iPKP 12 28 40
  Gb ePKP 12 28 53
  Kermadec Islands.

» 15 Gb iPKP 13 13 52 D
  Tonga Islands.

» 15 Up iPKP 13 35 07
  Sk iPKP 13 34 59
  Gb ePKP 13 35 15
  Kermadec Islands.

» 15 Up iP 13 49 12
      μ s
   P z' 0.1 0.6
  Ki iP 13 48 19
  Aleutian Islands.

» 15 Up iPKP 14 06 03 C
  i 14 06 15
      μ s
   PKP z' 0.2 0.8
  Ki ePKP 14 05 44
  Sk iPKP 14 05 55 C
  i 14 06 08
  Gb iPKP 14 06 09
  Kermadec Islands.

» 15 Up iPKP 14 23 24
      μ s
   PKP z' 0.1 0.8
  Sk iPKP 14 23 16 D
  i 14 23 29
  Gb iPKP 14 23 31
  Kermadec Islands.

» 15 Up ePKP 15 08 10
  Sk ePKP 15 07 53
  Kermadec Islands.

» 15 Up iP 15 19 25 C
      μ s
   P z' 0.2 0.8
  Ki iP 15 18 38
      μ s
   P z' 0.1 1.0
  Sk iP 15 19 15 C
  Gb iP 15 19 46 C
  Hokkaido, Japan (h ~ 100 km). Magn.= =6.0 (Up, Ki).

» 15 Up iPKP 22 54 31
  Sk ePKP 22 54 19
  Kermadec Islands.

» 16 Sk iPKP 01 48 18
  Kermadec Islands.

1959

Sep 16 Up iPKP 02 23 21
  Sk iPKP 02 23 11
  Kermadec Islands.

» 16 Up iPKP 02 55 45
  i 02 55 47
  i 02 55 57
      μ s
   PKP z' 0.1 0.6
  Sk iPKP 02 55 37
  Gb e(PKP) 02 56 00
  Kermadec Islands.

» 16 Up iP 03 36 58 C

» 16 Up iP 05 19 18
      μ s
   P z' 0.7 0.8
  Ki iP 05 20 25 C
      μ s
   P z' 0.9 0.7
  Sk iP 05 19 57 C
  Gb iP 05 19 11 C
  Crete. Magn.=6.5 (Up, Ki).

» 16 Sk iPKP 08 40 06
  Kermadec Islands.

» 16 Up iPKP 10 27 35
      μ s
   PKP z' 0.1 0.8
  Sk iPKP 10 27 24
  Kermadec Islands.

» 16 Up iPKP 16 16 48
  eSS 16 39 17
      μ s
   PKP z 0.8 5
   PKP z' 0.1 0.6
   M N 2.9 19
   M z 2.7 19
  Ki eSS 16 37 48
      μ s
   M E 1.5 17
   M N 2.3 20
   M z 3.3 20
  Sk iPKP 16 16 40
  Gb iPKP 16 17 02 C
  Kermadec Islands. Magn.=6.2 (Up, Ki).

» 17 Sk iPKP 03 59 11
  Kermadec Islands.

» 17 Sk iPKP 04 23 38
  Kermadec Islands.

» 17 Up iPKP 05 48 20
  Sk ePKP 05 47 59
  Kermadec Islands.

1959

Sep 17 Up iPKP 07 30 16
  i 07 30 28
      μ s
   PKP z' 0.1 0.9
  Sk iPKP 07 30 06 D
  i 07 30 15
  Gb iPKP 07 30 34
  Kermadec Islands.

» 17 Up iPKP 08 58 56
  Sk iPKP 08 58 54
  Kermadec Islands.

» 17 Sk iPKP 10 57 23
  Kermadec Islands.

» 17 Up iPKP 14 27 39
  Sk iPKP 14 27 32
  i 14 27 44
  Gb iPKP 14 27 53 C
  i 14 28 06
  Kermadec Islands.

» 17 Up iPKP 14 55 56
  i 14 56 09
  i 14 56 16
  eSS 15 18 19
      μ s
   PKP z 0.6 4
   M E 0.9 19
   M N 1.0 20
   M z 1.6 20
  Ki iPKP 14 55 37
  e(SS) 15 17 00
      μ s
   M E 0.8 17
   M N 0.9 19
   M z 1.2 20
  Sk iPKP 14 55 48 C
  Gb iPKP 14 56 11 C
  Kermadec Islands. Magn.=5.8 (Up, Ki).

» 17 Up iPKP 15 11 26
  Sk iPKP 15 11 18
  i 15 11 28
  Kermadec Islands.

» 17 Sk iPKP 17 32 56
  i 17 33 07
  Gb iPKP 17 33 23
  i 17 33 33
  Kermadec Islands.

» 17 Ki iP 21 36 57
  ipP 21 37 12
      μ s
   P z' 0.1 1.5
  Sk iP 21 36 48
  i 21 37 10
  El Salvador. h=60 km (Ki).

1959

Sep 17 Ki iP 21 55 54
  Mediterranean Sea, north of Spanish Morocco.

» 17 Ki iP 22 26 33
  Gulf of California.

» 18 Up e(Lgl) 02 19 29
  Ki —
      μ s
   M E 1.2 16
   M N 0.4 15
  Mediterranean Sea, north of Spanish Morocco.

» 18 Sk iPKP 03 24 21
  Kermadec Islands.

» 18 Up iPKP 09 44 21
  Sk iPKP 09 44 13 C
  Kermadec Islands.

» 18 Gb iPKP 11 03 13
  Kermadec Islands.

» 18 Up iPKP 12 20 06
  i 12 20 19
      μ s
   M E 1.3 20
   M N 1.8 20
   M z 1.7 21
  Ki iPKP 12 20 22
      μ s
   PKP z' 0.4 1.5
   M E 0.9 20
   M N 1.0 19
   M z 1.2 18
  Sk iPKP 12 20 11
  Sandwich Islands. Magn.=5.8 (Up, Ki).

» 18 Ki i(P) 15 59 50

» 19 Up iP 04 22 25 C
      μ s
   P z' 0.1 1.0
  Ki iP 04 21 45 C
  Honshu, Japan (h ~ 60 km).

» 19 Ki iP 16 10 13
  Persian Gulf.

» 19 Up ePKP 19 51 20
  i 19 51 25
  Kermadec Islands.

» 20 Ki e(Sg) 07 27 25

» 21 Up iP 05 39 29

1959
Sep 21 Up eP   12 27 09
        Ki iP   12 27 10
        Sk iP   12 27 34
        Kirghiz, USSR—China.

» 21 Ki eP   16 25 18
      Alaska.

» 21 Up iP   16 45 10

» 22 Ki iP   07 56 06
      Aleutian Islands.

» 22 Ki e(Sg) 18 14 31
      Sk i(Sg) 18 15 40

» 23 Ki e(P)   07 20 34

» 23 Ki eP   10 44 10
          eS   10 48 27

		μ	s
S	E	0.6	7
S	N	0.6	11
M	N	0.5	14

△=2650 km=24°.
        Sk eP   10 45 02
        Arctic Ocean.

» 23 Up iP   20 33 22

» 23 Up   —

		μ	s
M	E	1.3	19
M	N	1.3	19

        Ki iP   22 34 07

		μ	s
M	E	1.1	15
M	N	1.8	18
M	z	1.6	16

        Sk iP   22 34 37
        Honshu, Japan.

» 24 Ki iP   05 48 47
          i   05 48 55

		μ	s
P	z'	1.3	1.9

        Sk eP   05 49 35
            i   05 49 40
        Arctic Ocean.

» 24 Ki eP   10 55 42
      Mid-Atlantic Ridge.

» 24 Up iPKP   19 12 59
      Kermadec Islands.

» 24 Sk ePKP   20 04 07
      Kermadec Islands.

» 25 Up iPKP   01 58 56
          i   01 59 04

1959
Sep 25 Sk iPKP   01 58 45
(cont.)   i   01 58 57
        Gb ePKP   01 58 58
        Kermadec Islands.

» 25 Up iP   02 48 47C
          iPP   02 51 50
          iS   02 58 35

		μ	s
P	E	4.4	14
P	z	5.3	10
P	z'	1.1	0.8
S	E	5.1	16
S	N	4.9	10
M	E	34	19
M	N	30	16
M	z	50	18

△=8650 km=78°.
        Ki iP   02 48 25C
            iS   02 57 51
            i!   02 58 48
            i(Lg2) 03 17 23

		μ	s
P	E	2.4	13
P	z	4.3	10
P	z'	1.2	1.0
S	E	10	14
S	N	2.5	10
M	E	32	15
M	N	32	18
M	z	35	16

△=8300 km=74½°.
        Sk iP   02 48 51C
            i   02 49 17
        Gb iP   02 49 01C
            i(PP) 02 51 47
        Formosa. Magn.=6.8 (Up, Ki).

» 25 Up iP   07 23 17D
          i   07 23 22

		μ	s
P	z'	0.1	0.5

        Ki iP   07 24 09
        Sk eP   07 24 02
            i   07 24 09
            iSn 07 28 44
            iLi 07 30 56
        Gb iP   07 23 29D
            iPP 07 23 54
            eS   07 27 34
        Caucasus, USSR. The group velocity (epicenter to Skalstugan) of Sn is 4.58 km/sec. Sn has been observed repeatedly even for such large distances as here, around 25°, for paths traversing the Russian platform.

» 25 Up iPKP   23 54 40
      Sk ePKP   23 54 32
      Kermadec Islands.

1959
Sep 26 Up iPKP   01 38 45
        Sk iPKP   01 38 27
        Kermadec Islands.

» 26 Up iP   04 05 32
      Sk iP   04 06 12
      Greece.

» 26 Up iPKP   04 16 05
      Sk iPKP   04 15 59
      Kermadec Islands.

» 26 Up iP   08 32 26C
          i   08 32 31
          iS   08 41 54

		μ	s
P	z'	0.1	0.9
M	E	3.4	20
M	N	5.9	20
M	z	5.8	21

△=8150 km=73½°.
        Ki iP   08 31 47
            i   08 31 52
            eS   08 40 39

		μ	s
P	z'	0.5	1.6
S	E	1.3	10
S	N	1.3	9
M	E	4.8	18
M	N	4.0	17
M	z	8.8	17

△=7500 km=67½°.
        Sk iP   08 31 58C
            i   08 32 03
        Gb iP   08 32 32
        Oregon. Magn.=6.1 (Up, Ki).

» 26 Up iPg   10 07 59
          iSg   10 08 20
          iL   10 08 30
          △=180 km=1.6°.
      Sk eSg   10 09 15
          △=370 km=3.3°.
      Presumably explosion in the Baltic, 61½°N, 17½°E. Origin time=10 07 27.

» 26 Ki eP   12 39 07
      Greenland.

» 26 Up i(P)   16 05 10

» 26 Ki iP   20 02 40
      Persian Gulf.

» 27 Ki iP   10 34 19C
      Banda Sea.

» 27 Up iP   12 48 24
      Ki iP   12 48 35

1959
Sep 28 Up iP   01 16 21
        Ki iP   01 14 42
            iS   01 17 15
            △=1550 km=14°.
        Sk iP   01 15 42
            iPP   01 15 56
            e(S) 01 19 32
            △=2050 km=18½°.
        Svalbard region.

» 28 Up iP   04 32 23
          i(pP) 04 32 34

		μ	s
M	E	2.1	15
M	N	0.9	18
M	z	2.4	15

        Ki iP   04 31 54C
            i(pP) 04 32 04

		μ	s
M	E	0.9	13
M	N	0.6	14
M	z	0.8	14

        Sk eP   04 32 24
            i(pP) 04 32 34
        Gb eP   04 32 43
        Okinawa Islands.

» 28 Up iP   08 48 28
      Ki iP   08 47 46
      Hokkaido, Japan (h~60 km).

» 28 Ki iP   09 20 51

» 28 Up iP   10 21 41
          i   10 21 53

		μ	s
P	z'	0.1	0.8

        Ki iP   10 22 43
            i   10 22 53
        Sk iP   10 22 21
        Gb iP   10 21 37
        Turkey.

» 29 Up iP   02 59 58
      Ki iP   02 59 44
      Sk iP   03 00 11

» 29 Up iPg   13 25 30
          iSg   13 25 46

		μ	s
Sg	z'	0.2	0.5

△=130 km=1.2°.
        Ki e(Sg) 13 29 19
        Sk eSg   13 28 03
        △=600 km=5.4°.
        Baltic, 59¾°N, 20°E. Origin time= =13 25 06. Explosion?

» 29 Up iPKP   15 51 43C
          i   15 51 46

Column 1 (page 102)

1959
Sep 29 i   15 52 00
(cont.) iSS   16 14 12

         μ s
    PKP z 1.6 7
    PKP z′ 0.1 0.5
    M E 4.4 20
    M N 5.7 20
    M z 6.1 19
    △∼16200 km∼146°.
  Ki ePKP 15 51 22
    ePP 15 54 28
    iSS 16 12 43

         μ s
    PP N 0.7 10
    M E 4.5 18
    M N 5.1 20
    M z 7.2 20
    △∼15350 km∼138°.
  Sk iPKP 15 51 34
  Gb ePKP 15 51 48
    i   15 51 52
  Kermadec Islands. Magn.=6.5 (Up, Ki).

» 29 Up iPKP 16 01 09
  Sk iPKP 16 00 58
    i   16 01 17
  Gb iPKP 16 01 13
    iPKP2 16 01 34
  Kermadec Islands.

» 29 Up iPKP 16 33 37
  Sk iPKP 16 33 30
  Kermadec Islands.

» 29 Up iPKP 17 27 33
  Sk iPKP 17 27 25
  Kermadec Islands.

» 29 Up iPKP 17 58 05
    i   17 58 24
  Sk iPKP 17 57 54
    i   17 57 59
  Kermadec Islands.

» 30 Up eP 03 42 00
    i   03 42 13
  Ki iP 03 41 32
  Sk eP 03 42 06
  Gb iP 03 42 35
  Ryukyu Islands.

» 30 Ki iP 04 58 14
  Sumatra.

» 30 Up iPKP 05 16 05
  Sk iPKP 05 15 58C
  Gb e(PKP2) 05 16 26
  Kermadec Islands.

Column 2 (page 102)

1959
Sep 30 Up i(P) 10 31 25
  Ki iP 10 32 07
  Sk iP 10 32 03
  Gb e(P) 10 31 35

» 30 Up iPKP 13 51 15
    i   13 51 28

        μ s
    PKP z′ 0.1 1.0
  Sk iPKP 13 51 08 D
  Kermadec Islands.

» 30 Up iPKP 15 13 12
  Sk iPKP 15 13 01
  Kermadec Islands.

» 30 Up ePKP 16 50 11
  Sk iPKP 16 50 02
  Kermadec Islands.

» 30 Up
           —
        μ s
    M E 0.6 13
    M N 0.8 13
  Ki iP   17 04 30
        μ s
    M E 1.0 14
    M N 0.4 14
    M z 0.6 11
  Mediterranean Sea, north of Spanish Morocco.

» 30 Up iPKP 20 45 19
        μ s
    M E 1.2 21
    M N 3.0 24
    M z 2.0 21
  Ki iPKP 20 45 03
        μ s
    PKP z′ 0.2 1.0
    M E 2.7 22
    M N 1.4 20
    M z 2.6 21
  Sk iPKP 20 45 13
  Gb ePKP 20 45 19
    i   20 45 30
  New Hebrides Islands. Magn.=6.2 (Up, Ki).

Oct 1 Up iP 04 42 49
        μ s
    M E 0.6 14
  Ki iP 04 44 05
  Sk iP 04 43 29
  Gb iP 04 42 40
  Greece.

» 1 Up iP 07 29 47

Column 3 (page 103)

1959
Oct 1 Up iP 16 08 12
    i   16 08 24
    iS 16 10 48
        μ s
    P z′ 0.1 0.5
    S z′ 0.1 0.5
    △=1650 km=15°.
  Ki iP 16 09 40
    iS 16 13 40
    △=2450 km=22°.
  Sk iP 16 09 11
    iS 16 12 37
    i   16 12 49
  Gb eP 16 08 20
    iS 16 10 51
  Rumania (h∼160 km).

» 1 Gb iPg 17 16 21
    iSg 17 16 22
  Local blast?

» 2 Ki eP 12 43 48

» 2 Up i(P) 20 16 38

» 3 Up iP 16 08 07
  Sk iP 16 08 04

» 3 Up iP 20 13 54
    iPcP 20 14 18
  Ki iP 20 13 09
  Sk eP 20 13 44
  Gb eP 20 14 17
  Hokkaido, Japan.

» 4 Ki iP 16 32 31
  Arctic Ocean.

» 5 Sk iP 10 24 30
  Italy.

» 5 Up iP 11 45 03
  Ki iP 11 44 10
  Aleutian Islands.

» 5 Ki iP 18 01 35
    i   18 01 51
    eS 18 05 48
    e   18 13 47
        μ s
    P z′ 0.8 2.0
    S N 0.9 11
    M E 1.2 18
    M N 0.6 17
    M z 1.0 15
    △=2600 km=23½°.
  Gb iP 18 03 05
  Arctic Ocean.

» 5 Ki iP 18 16 38

Column 4 (page 103)

1959
Oct 5   μ s
(cont.) P z′ 0.8 2.0
  Sk eP 18 17 20
  Gb iP 18 18 08C
  Arctic Ocean.

» 5 Up iP 18 34 10
    iS 18 39 14
        μ s
    P z 0.5 5
    M E 4.4 20
    M N 5.4 19
    M z 4.7 22
    △=3500 km=31½°.
  Ki iP 18 33 01
    i   18 33 20
    iS 18 37 16
    i   18 45 04
        μ s
    P N 3.3 6
    P z 3.0 6
    P z′ 1.7 2.5
    S E 4.6 11
    S N 5.9 12
    M E 8.6 19
    M N 4.2 18
    M z 5.4 18
    △=2650 km=24°.
  Sk eP 18 33 45
  Gb eP 18 34 29
  Arctic Ocean. Magn.=5.9 (Up, Ki).

» 5 Ki eP 20 33 20
  Arctic Ocean.

» 5 Up iP 20 38 28 D
    iS 20 42 00
    i   20 42 12
        μ s
    P N 0.6 5
    P z′ 0.1 0.5
    S E 1.2 13
    M E 5.4 14
    M N 3.7 11
    M z 4.1 11
    △=2100 km=19°.
  Ki iP 20 39 47
        μ s
    M E 6.2 13
    M N 4.0 12
    M z 5.3 13
  Sk iP 20 39 11 D
  Gb iP 20 38 05
    i   20 38 15
  Albania. Magn.=5.5 (Up).

» 6 Up iP 10 41 05
  Sk iP 10 41 40
  Greece.

» 7 Up iP 08 35 02C
    iS 08 38 40

1959 Oct 7 (cont.)

			μ	s
P	N	0.8	3	
P	z'	0.3	0.6	
S	E	2.2	6	
S	N	1.2	8	
M	E	13	13	
M	N	13	16	
M	z	12	16	

△=2100 km=19°.

Ki	iP		08	36	23C
	i		08	36	37
	iS		08	41	10

			μ	s
P	z'	0.4	1.4	
S	E	1.0	12	
S	N	1.0	11	
M	E	12	12	
M	N	13	12	
M	z	16	12	

△=3000 km=27°.

Sk	iP		08	35	47C
Gb	iP		08	34	47
	i		08	34	58
	i		08	35	00

Albania. Magn.=5.9 (Up, Ki).

» 7 Sk iP 09 39 59
Albania.

» 7 Up iP 13 10 01

		μ	s
P	z'	0.1	0.7

Ki	iP		13	10	01
Sk	eP		13	10	22
Gb	eP		13	10	24

Kashmir-Tibet.

7 Ki eP 21 05 46

» 7 Ki iPg 21 16 55
    eSg 21 17 16
    eL   21 17 21
△=180 km=1.6°.
Blast?

» 7 Sk eP 21 24 05
Albania.

» 7 Ki i(Sg) 21 42 59

» 8 Ki iPKP 00 22 36
Sk iPKP 00 22 42
    i   00 23 01
Gb ePKP 00 22 57
New Hebrides Islands.

» 8 Up iP 02 46 23

		μ	s
P	z'	0.2	1.0

Ki iP 02 45 29C

1959 Oct 8 (cont.)

			μ	s
P	z'	0.4	1.0	

Sk	iP		02	46	00
Gb	iP		02	46	37

Aleutian Islands.

» 8 Up e(P) 06 00 26

» 8 Sk eP 07 25 58
Albania.

» 8 Ki iP 11 06 27C
Sk iP 11 06 34
    i   11 06 50

» 8 Up eP 14 22 43
Ki eP 14 22 04
Sk eP 14 22 39
Lake Baikal, USSR.

» 8 Up iP 20 08 52
Ki eP 20 08 28
    e   20 08 48

» 9 Up eP 03 37 29
Ki eP 03 38 03
Sk eP 03 37 59
Iran.

» 9 Up iPg 08 24 01
    i   08 24 04
    iS* 08 24 42
    iSg 08 24 47
△=390 km=3.5°.
Ki i(Sg) 08 28 27
Sk eSg   08 27 00
Near coast of the Baltic States. Explosion?

» 9 Up iPg 13 51 17
    i   13 51 19
    iSg 13 52 02
△=390 km=3.5°.
Sk eSg 13 54 17
Near coast of the Baltic States. Explosion?

» 9 Up i(Sg) 14 51 07
    i   14 51 12
Sk eSg 14 53 03

» 9 Sk iP 17 11 22

» 9 Up iP 22 46 48

» 10 Up i(P) 00 48 02

» 10 Sk eP 16 16 04
Albania.

» 10 Up iP 16 50 10D
Sk iP 16 50 07

1959 Oct 10 Up iP 19 07 14

» 10 Ki iP 20 11 08

» 11 Up iP   09 44 54C
    i(pP) 09 45 12

		μ	s
P	z'	0.1	1.0

Ki iP 09 44 12

		μ	s
P	z'	0.1	1.2

Sk iP 09 44 46C
Honshu, Japan. Magn.=5.7 (Up, Ki).

» 11 Up iSn 10 31 07
    iSg 10 31 44
△=690 km=6.2°.
Ki eSn   10 31 41
    e(S*) 10 32 15
    iSg   10 32 32
△=840 km=7.6°.
Sk eSg 10 32 50
△=910 km=8.2°.
Finland-USSR, 61½°N, 29½°E. Origin time=10 28 19.

» 11 Up iPKP 18 10 08
    i   18 10 19
Kermadec Islands.

» 11 Up iPKP 20 23 10

		μ	s
PKP	z'	0.1	1.0

Sk iPKP 20 23 02
Kermadec Islands.

» 11 Sk eP 21 52 44
Guatemala.

» 12 Sk iP 01 16 38
Mid-Atlantic Ridge.

» 12 Up eP 01 46 43
    i   01 46 46
Ki iP 01 46 51
Sk iP 01 47 10
Pamir.

» 12 Up iP 03 34 22C
    iS 03 44 34

			μ	s
P	z'	0.1	0.5	
S	E	0.3	5	
S	N	0.7	5	
M	E	1.9	20	
M	N	1.6	20	
M	z	1.9	20	

△=9200 km=83°.

Ki	iP		03	34	23C
	iS		03	44	39

1959 Oct 12 (cont.)

			μ	s
P	z	1.4	6	
P	z'	0.4	1.0	
S	E	0.7	9	
S	N	1.1	9	
M	E	4.0	20	
M	N	1.5	19	
M	z	4.8	20	

△=9250 km=83½°.

Sk	iP		03	34	37C
	i		03	34	52

Sumatra. Magn.=6.3 (Up, Ki).

» 12 Up iP 08 49 47
Ki iP 08 49 30
Sk iP 08 49 53
Mindanao, Philippine Islands.

» 12 Up iP 10 10 20
Honshu, Japan.

» 12 Sk ePKP 10 34 52
Kermadec Islands.

» 12 Up iP 16 18 08

» 12 Up iP   16 46 35D
    iS   16 49 17
Sk e(S)   16 51 19
    iLg1   16 53 28
Rumania. Probably intermediate depth.

» 12 Up iP 19 36 29

		μ	s
M	N	0.5	17

Ki iP 19 36 37

		μ	s
M	E	0.3	15
M	N	0.6	13

Sk iP 19 36 49
India.

» 12 Up i(P) 20 24 56

» 12 Up iP 21 40 17

» 13 Up iPg 10 25 26
    i   10 25 29
    iS* 10 26 08
    iSg 10 26 13
△=400 km=3.6°.
Sk eSg 10 28 25
Near coast of the Baltic States. Explosion?

» 13 Up i(S*) 11 26 42
    iSg 11 27 01
△=610 km=5.5°.
Ki iSn 11 26 55
    iSg 11 27 33

1959
Oct 13
(cont.)   Sk   eSg   11 28 00
△=800 km=7.2°.
Finland, 62.3°N, 27.6°E. Origin time=
=11 24 01.

» 13   Sk   i(P)   12 25 21

» 13   Up   iPg   13 32 27
      iS*   13 33 07
      iSg   13 33 13
△=390 km=3.5°.
    Sk   iSg   13 35 30
Near coast of the Baltic States. Explosion?

» 14   Up   iP   10 08 23
    Ki   iP   10 07 55
    Sk   iP   10 08 24
Ryukyu Islands.

» 15   Up   iP   06 29 04
      i   06 29 08
      iPP   06 33 01
      iSKS   06 39 36
      iS   06 40 17

		μ	s
P	z	1.0	4
P	z'	2.0	3.0
PP	E	1.5	8
PP	z	3.1	9
SKS	E	3.2	7
S	N	5.4	18
M	E	17	18
M	N	40	22
M	z	20	23

△=10700 km=96½°.
    Ki   iP   06 28 52C
      iPP   06 32 40
      iSKS   06 39 21

		μ	s
P	z	2.2	5
P	z'	4.3	3.0
PP	z'	0.6	2.0
SKS	E	4.9	7
M	E	30	21
M	N	25	19
M	z	32	21

△=10400 km=93½°.
    Sk   iP   06 29 08
      iPP   06 33 11
    Gb   iP   06 29 13C
      iPP   06 33 22
Celebes. Magn.=6.8 (Up, Ki). P(Z')
has a remarkably long period.

» 15   Up   iPg   07 33 54
      i   07 33 57
      iSg   07 34 40
△=390 km=3.5°.

1959
Oct 15   Near coast of the Baltic States. Ex-
(cont.)   plosion?

» 15   Up   iP   07 51 29
      P   z'   μ 0.3   s 0.5
    Ki   iP   07 50 43
      P   z'   μ 0.1   s 1.0
    Sk   iP   07 51 20
    Gb   iP   07 51 49C
Kurile Islands. Magn.=6.2 (Up, Ki).

» 15   Up   iPg   11 11 35
      i   11 11 38
      iS*   11 12 15
      iSg   11 12 21
△=390 km=3.5°.
Near coast of the Baltic States. Explosion?

» 15   Ki   e(Sg)   12 47 34

» 15   Ki   iPKP   14 13 11
Sandwich Islands.

» 15   Up   iPg   14 56 07
      i   14 56 10
      iS*   14 56 48
      iSg   14 56 54
△=400 km=3.6°.
Near coast of the Baltic States. Explosion?

» 15   Up   iPg   17 16 22
      i   17 16 24
      iS*   17 17 01
      iSg   17 17 08
△=390 km=3.5°.
Near coast of the Baltic States. Explosion?

» 15   Ki   iP   20 43 57
Aleutian Islands.

» 16   Up   iP   03 37 27
    Ki   iP   03 37 53

» 16   Ki   iP   08 23 25
Alaska.

» 17   Up   iP   02 43 54C
    Ki   iP   02 43 01
Aleutian Islands.

» 17   Ki   iP   07 32 27
Vladivostok, USSR.

» 17   Up   iPg   10 45 48
      i   10 45 50

1959
Oct 17   iS*   10 46 27
(cont.)   iSg   10 46 34
△=390 km=3.5°.
Near coast of the Baltic States. Explosion?

» 17   Up   iP   10 55 34
    Ki   eP   10 55 33
Kashmir-China.

» 17   Up   iP   12 54 52C
      P   z'   μ 0.1   s 0.5

» 17   Up   iPg   13 40 48
      iS*   13 41 28
      iSg   13 41 34
      Sg   z'   μ 0.1   s 0.5
△=390 km=3.5°.
    Sk   iSg   13 43 51
Near coast of the Baltic States. Explosion?

» 17   Up   iP   20 37 35C
    Ki   iP   20 36 41
    Sk   iP   20 37 06
Yukon-British Columbia.

» 18   Up   iP   07 35 28

» 18   Up   iPKP   12 36 47C
      iPKP2   12 37 00
Kermadec Islands.

» 18   Up   iPg   12 44 22
      i   12 44 25
      iS*   12 45 03
      iSg   12 45 09
△=400 km=3.6°
    Ki   eSg   12 49 03
    Sk   eSg   12 47 32
Near coast of the Baltic States. Explosion?

» 18   Up   iP*   15 14 23
      iPg   15 14 29
      iS*   15 15 09
      iSg   15 15 15
      Sg   z'   μ 0.1   s 0.5
△=390 km=3.5°.
    Ki   e(S*)   15 18 23
      eSg   15 19 02
    Sk   eSg   15 17 28
△=830 km=7.5°.
Near coast of the Baltic States. Origin
time=15 13 20. Explosion?

1959
Oct 18   Up   iP   17 16 59
      i   17 17 10
      iPcP   17 17 33
    Ki   iP   17 16 17
    Sk   iP   17 16 44
    Gb   iP   17 17 19C
Kamchatka.

» 18   Ki   iP   19 48 55
Mid-Atlantic Ridge.

» 18   Up   iP   23 38 19
    Ki   iP   23 38 18D
Sunda Strait (h ~ 150 km).

» 19   Up   iPKP   01 45 20
      i   01 45 24
    Sk   iPKP   01 45 14
Kermadec Islands (h ~ 60 km).

» 19   Up   iPKP   02 32 26
      P   z'   μ 0.2   s 0.6
    Ki   ePKP   02 32 14
    Gb   iPKP   02 32 37
South of Fiji Islands.

» 19   Up   iP   02 57 54C
      P   z'   μ 0.5   s 0.6
    Ki   iP   02 57 09
      i   02 57 17
      P   z'   μ 0.4   s 0.8
    Sk   iP   02 57 44
    Gb   iP   02 58 17C
Kurile Islands. Magn.=6.6 (Up, Ki).

» 19   Up   iPKP   08 47 03
      eSS   09 09 27

		μ	s
PKP	N	0.5	5
PKP	z	2.0	7
PKP	z'	0.2	1.0
M	E	1.1	19
M	N	1.4	20
M	z	1.6	20

    Ki   ePKP   08 46 48
      ePP   08 49 35
      ePKS   08 50 17
      e(SS)   09 08 02

		μ	s
PKP	z	0.4	9
PP	z	0.6	9
PKS	N	0.5	9
M	E	1.0	18
M	N	1.3	19
M	z	2.4	20

△~15400 km~138½°.
    Sk   iPKP   08 46 55

1959
Oct 19 Gb iPKP 08 47 14
(cont.) i 08 47 57
Kermadec Islands. Magn.=5.9 (Up, Ki).

» 19 Up iPKP 09 35 03
Sk iPKP 09 34 57
i 09 35 07
Gb iPKP 09 35 14
Kermadec Islands.

» 19 Up iPKP 14 10 58
Ki iPKP 14 10 51
Gb iPKP 14 11 08 D
Fiji Islands (h ~ 600 km).

» 19 Up iPKP 16 14 22
iPKKP 16 24 34
eSKSP 16 25 34

		μ	s
SKSP	E	2.5	19
SKSP	N	5.3	20
SKSP	z	1.7	18
M	E	4.5	22
M	N	7.7	21
M	z	5.5	21

Ki iPKP 16 14 38 C
ePP 16 16 38
e(PPS) 16 28 11

		μ	s
PKP	z	1.0	4
PKP	z'	0.3	1.2
M	E	3.7	20
M	N	3.8	19
M	z	6.2	19

Sk iPKP 16 14 28
Sandwich Islands. Magn.=6.4 (Up, Ki).

» 19 Ki iP 18 21 17

» 20 Up iP 08 11 34
Sk eP 08 11 26
Sea of Japan.

» 20 Gb iP 08 17 45

» 20 Up i(P) 16 17 59
Sk i(P) 16 17 57 C

» 20 Ki e(Sg) 16 47 19

» 21 Ki e(Sg) 10 13 52

» 21 Ki iPg 12 50 20
iSg 12 51 06
△=390 km=3.5°.
Sk iPg 12 50 03
iSg 12 50 36
△=290 km=2.6°.
Presumably off central part of the

1959
Oct 21 Norwegian coast, 66.4°N, 12.3°E.
(cont.) Origin time=12 49 11.

» 22 Up iP 10 00 21

» 22 Ki iP 19 37 16
Aleutian Islands.

» 23 Up iSn 03 57 08
i 03 57 31
iSg 03 57 34

		μ	s
Sg	z'	0.1	0.5

△=570 km=5.1°.
Ki eP* 03 55 59
iSg 03 57 06

		μ	s
Sg	z'	0.1	0.7

△=470 km=4.2°.
Sk iPg 03 55 11 D
iSg 03 55 26
△=130 km=1.2°.
Gb eSg 03 58 29
△=760 km=6.8°.
Sweden-Norway, 64½°N, 13¾°E.
Origin time=03 54 46.

» 23 Sk iP 13 32 28
Sicily.

» 23 Up iP 17 01 42 D

		μ	s
P	z'	0.1	1.0

Ki iP 17 02 09
Gb iP 17 01 55
Iran.

» 24 Up iP 23 47 44
iPP 23 49 01
iS 23 53 33
iSS 23 55 33
iScS 23 57 54
iLg1 23 59 23
i! 23 59 55
i! 00 00 10

		μ	s
P	z'	0.3	1.0
M	E	11	14
M	N	8.9	14
M	z	12	13

△=4050 km=36½°.
Ki iP 23 47 48 C
i 23 47 54
i 23 59 12
iLg1 23 59 37
i(Lg1) 23 59 45
i(Lg1) 23 59 52
i! 00 02 30

		μ	s
P	z'	0.4	1.0

1959
Oct 24
(cont.) M E 17 13
M N 9.0 10
M z 15 9
Sk iP 23 48 09
i(ScS) 23 58 26
i(Li) 23 59 43
i 00 00 06
Gb iP 23 48 05
i 23 48 11
iPP 23 49 38
Kirghiz, USSR. Magn.=6.0 (Up, Ki).

» 25 Ki iP 06 58 09 D
Atlantic Ocean, north of the Azores.

» 25 Up iP 16 03 23
i 16 03 26
iS 16 07 54

		μ	s
P	E	0.5	3
P	N	0.4	2
P	z'	0.6	1.2
S	N	1.0	5
M	E	1.4	15
M	N	2.2	16
M	z	1.5	16

△=2900 km=26°.
Ki iP 16 04 12
i 16 04 14
iPP 16 05 07

		μ	s
P	z'	0.4	1.0

△=3450 km=31°.
Gb iP 16 03 33
Turkey. Magn.=6.2 (Up, Ki).

» 26 Up iP 07 46 38 C
i(PP) 07 49 40
iS 07 56 05

		μ	s
P	E	1.1	6
P	N	1.4	7
P	z	3.3	7
P	z'	1.7	1.5
S	E	3.8	9
S	N	1.5	6
M	E	19	19
M	N	16	18
M	z	16	14

△=8000 km=72°.
Ki iP 07 45 58
iPP 07 48 24
iS 07 54 47
iScS 07 55 54

		μ	s
P	z	3.1	7
P	z'	1.8	2.0
PP	z'	0.7	2.0
S	E	5.0	10
S	N	2.2	9

1959
Oct 26 M E 39 16
(cont.) M N 17 15
M z 28 16
△=7400 km=66½°.
Sk iP 07 46 33 C
i 07 46 41
i 07 48 47
iPP 07 49 12
Gb iP 07 46 57
i 07 49 35
iPP 07 49 51
Honshu, Japan (h ~ 60 km). Magn.==6.8 (Up, Ki).

» 26 Up iP 10 39 30
i 10 39 41
ipP 10 40 03
Ki eP 10 38 40
Kamchatka. h=130 km (Up).

» 26 Up ePKP 12 26 21
Sk i(PKP) 12 26 30
Kermadec Islands.

» 26 Up iP 22 45 56

» 27 Ki iP 06 23 17
Oregon.

» 27 Up iP 07 03 44 C
i(PP) 07 05 59

		μ	s
P	N	5.4	18
P	z	10	21
M	E	28	22
M	N	67	24
M	z	74	24

Ki iP 07 02 54 C
e 07 06 47
iS 07 11 02
i 07 13 05

		μ	s
P	N	2.3	18
P	z	7.3	19
P	z'	0.8	1.0
S	E	7.3	15
S	N	4.7	16
M	E	41	17
M	N	64	20
M	z	74	20

Sk iP 07 03 33
Gb iP 07 04 03 C
Kurile Islands (h ~ 100 km). Magn.==6.7 (Up, Ki). Well developed surface waves in spite of the focal depth.

» 27 Up iP 13 29 53
Ki iP 13 29 06
Kurile Islands.

Column 1

1959
Oct 27 Ki eP   22 27 41
Honshu, Japan.

» 28 Up iP   00 10 01 D
Nepal.

» 28 Up iP   03 19 50
$$\qquad P \quad z' \quad \frac{\mu}{0.1} \quad \frac{s}{0.6}$$
Ki iP   03 19 25 C

» 28 Up iSg   10 43 48
△=710 km=6.4°.
Ki ePg   10 41 25
   eSg   10 42 10
△=380 km=3.4°.
Sk iPg   10 41 08 C
   iSg   10 41 40
△=280 km=2.5°.
Near west coast of Norway, 66.3°N, 12.8°E. Origin time=10 40 18.

» 29 Up iP   10 46 22
   iPcP   10 46 48
Ki iP   10 45 34
$$\qquad P \quad z' \quad \frac{\mu}{0.1} \quad \frac{s}{1.0}$$
Sk iP   10 46 11
Gb iP   10 46 43 C
Kurile Islands.

» 29 Up iPg   11 58 55
   i   11 58 58
   iSg   11 59 40
△=390 km=3.5°.
Near coast of the Baltic States. Explosion?

» 29 Up iP*   12 52 01
   iPg   12 52 08
   i   12 52 11
   iS*   12 52 45
   iSg   12 52 55
$$\qquad Sg \quad z' \quad \frac{\mu}{0.1} \quad \frac{s}{0.5}$$
△=400 km=3.6°.
Ki eSg   12 56 27
Near coast of the Baltic States. Origin time=12 50 56. Explosion?

» 29 Up iPKP   14 39 35
$$\qquad PKP \quad z' \quad \frac{\mu}{0.3} \quad \frac{s}{0.5}$$
   M E 1.7 22
   M N 1.7 23
   M z 4.0 24
Ki iPKP   14 39 21
$$\qquad\qquad\qquad \frac{\mu}{} \quad \frac{s}{}$$
   M E 2.2 22

Column 2

1959
Oct 29 (cont.)
   M N 1.6 21
   M z 3.7 21
Sk iPKP 14 39 28 D
Gb iPKP 14 39 40 C
Kermadec Islands. Magn.=6.0 (Up, Ki).

» 29 Up iP   14 40 06
   iPP   14 42 36
   iS   14 47 58
   iScS 14 48 58
$$\qquad P \quad z' \quad \frac{\mu}{0.3} \quad \frac{s}{0.5}$$
   PP N 0.6 4
   PP z' 0.3 1.0
   S   E 2.3 5
Ki iP   14 39 27
   iPP   14 41 44
   iS   14 46 46
   eSS   14 50 44
$$\qquad P \quad z' \quad \frac{\mu}{0.9} \quad \frac{s}{0.9}$$
   PP z' 0.5 1.7
   S   E 3.4 9
Sk iP   14 40 03
   ipP   14 41 53
   iS   14 47 51
Gb iP   14 40 25
   iS   14 48 38
China-Korea. h=550 km (Sk). Magn.==6.2 (Up, Ki).

» 29 Up iP   18 27 41
Ki eP   18 28 43
Cyprus.

» 29 Up iP   20 01 32
Ki iP   20 00 54
Sk iP   20 01 28
Honshu, Japan.

» 29 Ki e   20 27 15
   e(Sg) 20 27 25

» 30 Up   —
   M E 1.0 17
   M N 1.1 19
   M z 1.4 21
Ki eP   00 45 40
Caroline Islands.

» 30 Up iP   04 08 57
   i   04 09 02
$$\qquad P \quad z' \quad \frac{\mu}{0.2} \quad \frac{s}{1.0}$$
   M E 1.0 15
   M N 1.0 17
   M z 0.9 18
Ki iP   04 07 58 C

Column 3

1959
Oct 30 (cont.)
$$\qquad P \quad z' \quad \frac{\mu}{0.4} \quad \frac{s}{1.0}$$
   M E 2.2 22
Sk iP   04 08 42
   i   04 08 46
Gb iP   04 09 21
Yakutsk, USSR. Magn.=6.2 (Up, Ki).

» 30 Up iP*   07 55 37
   iPg   07 55 42
   i   07 55 44
   iS*   07 56 24
   iSg   07 56 29
△=400 km=3.6°.
Near coast of the Baltic States. Origin time=07 54 32. Explosion?

» 30 Up iPg   09 10 59
   i   09 11 02
   iS*   09 11 40
   iSg   09 11 47
$$\qquad Sg \quad z' \quad \frac{\mu}{0.1} \quad \frac{s}{0.5}$$
△=400 km=3.6°.
Sk eSg   09 14 09
Near coast of the Baltic States. Origin time=09 09 48. Explosion?

» 30 Up iPKP   11 46 30
Sandwich Islands.

» 30 Ki i(Pg)   12 50 05
   iSg   12 51 00
Sk e(Sg)   12 53 53

» 30 Up iP   13 38 17

» 30 Up ePKP   14 17 56
$$\qquad\qquad\qquad \frac{\mu}{} \quad \frac{s}{}$$
   M E 0.5 19
   M N 1.2 20
   M z 1.4 21
Ki
$$\qquad\qquad\qquad \frac{\mu}{} \quad \frac{s}{}$$
   M E 0.7 17
   M N 0.9 20
   M z 1.3 19
Gb iPKP   14 18 05
   i   14 18 19
Tonga Islands.

» 30 Up iP   14 56 14 D

» 31 Up ePKP   04 45 34
   i   04 45 58
   iSKP   04 48 37
   iSKKP   04 57 46
$$\qquad SKP \quad z' \quad \frac{\mu}{0.1} \quad \frac{s}{1.4}$$

Column 4

1959
Oct 31 Ki iPKP   04 45 28
(cont.) Sk iPKP   04 45 39 C
   i   04 48 28
Gb ePKP   04 45 45
   i   04 45 58
   iSKP   04 48 51
Fiji Islands (h~450 km).

» 31 Up iP   09 46 54 D

» 31 Ki eP   17 11 14
Japan Sea.

Nov 1 Ki eP   09 30 20
Greenland.

» 1 Ki iP   16 01 26
Rhodes Island.

» 2 Up iP   05 19 44
Assam.

» 2 Up iP   08 56 44
   i   08 56 55
   i   08 57 04
$$\qquad\qquad\qquad \frac{\mu}{} \quad \frac{s}{}$$
   M E 1.2 18
   M N 1.5 19
   M z 1.8 22
Ki iP   08 56 14
$$\qquad\qquad\qquad \frac{\mu}{} \quad \frac{s}{}$$
   M E 4.1 21
   M N 2.6 20
   M z 3.9 24
Sk iP   08 56 42
   iPP   09 00 03
Gb eP   08 57 02
   i   08 57 10
Mariana Islands. Magn.=5.8 (Up, Ki).

» 2 Ki iP   09 14 30
Mariana Islands (h~100 km).

» 2 Up i(P)   12 10 13
   iPP   12 11 48
Ki iP   12 10 15
Sk iP   12 10 38
Kirghiz-China.

» 2 Up iP   13 26 09
   i   13 26 10
$$\qquad P \quad z' \quad \frac{\mu}{0.1} \quad \frac{s}{0.6}$$
   M N 3.2 20
Ki iP   13 26 07
$$\qquad\qquad\qquad \frac{\mu}{} \quad \frac{s}{}$$
   M N 1.5 18
Sk iP   13 26 27 C
Gb iP   13 26 28 C
Pakistan-Burma (h~100 km).

Column 1 (p. 112)

```
1959
Nov  2  Ki  iP              13  39  58
        Alaska.

  »  2  Up  iPKP            20  22  09
            i               20  39  59
                             μ    s
            M      E        3.2   22
            M      N        4.3   21
            M      z        1.9   20
        Ki  iPKP            20  21  59
                             μ    s
            M      E        4.9   22
            M      N        2.6   20
            M      z        5.8   23
        Sk  iPKP            20  22  10
        Gb  iPKP            20  22  19 C
        New Britain (h ~ 60 km). Magn.=6.3
        (Up, Ki).

  »  2  Up  iP              21  21  57
        Ki  iP              21  21  04
        Gb  iP              21  22  21
            i               21  22  31
        Kamchatka.

  »  2  Up  iPKP            22  12  50
        Gb  iPKP            22  12  48
            i               22  13  02
        Tonga Islands.

  »  3  Ki  iP              00  45  37 C
        Molucca Passage.

  »  3  Up  iPg             07  39  17
            iSg             07  39  29
                             μ    s
            Sg     z'       0.3   0.5
            △=100 km=0.9°.
        Sk  i(Lg1)          07  41  14
        Gb  e(Lg1)          07  40  24
        Central Sweden. Macroseismic epi-
        center: 59.6°N, 15.8°E. Origin time=
        =07 38 59.

  »  3  Gb  iPKP            09  24  38
            i               09  24  53
        Tonga Islands.

  »  3  Up  iP              09  53  57
            i               09  57  19
            iPP             09  58  00
                             μ    s
            P      z'       0.1   1.0
            PP     z'       0.2   1.5
            M      E        2.7   23
            M      N        7.1   27
            M      z        4.5   23
            △~11200 km~101°.
        Ki  iP              09  53  53 D
```

Column 2 (p. 112)

```
1959
Nov  3
(cont.)
                             μ    s
            P      z'       0.3   1.5
            M      E        4.9   16
            M      N        3.8   19
            M      z        3.9   18
        Sk  iPP             09  58  26
        Gb  iPP             09  58  33
        South of Java. Magn.=6.4 (Up, Ki).

  »  3  Up  iP              16  37  46
        Ki  iP              16  37  53

  »  4  Ki  iP              06  51  01
            e               06  55  51
        Sk  iP              06  51  43
            i               06  53  28

  »  4  Up  iP              07  30  49 D

  »  4  Up  iPKP            18  41  54
        Tonga Islands.

  »  5  Up  iP              11  11  31
                             μ    s
            P      z'       0.1   0.6
        Ki  iP              11  11  54 C
        Sk  iP              11  11  55
        Chagos Islands, Indian Ocean.

  »  5  Up
                             μ    s
            M      E        1.3   20
            M      N        2.6   21
            M      z        2.4   21
        Ki  ePKP            12  09  05
                             μ    s
            M      E        0.9   18
            M      N        0.8   19
            M      z        1.2   18
        Sk  iPKP            12  09  14
        New Hebrides Islands (h ~ 100 km).

  »  5  Ki  e               14  25  17
            i(Sg)           14  25  20
        Sk  e               14  25  32
            e(Sg)           14  26  36

  »  5  Up  iP              15  10  49
                             μ    s
            P      z'       0.2   0.7
        Ki  iP              15  10  17 D
                             μ    s
            P      z'       0.1   1.0
        Sk  iP              15  10  48
        Ryukyu Islands (h ~ 250 km). Magn.=
        5.7 (Up, Ki).

  »  5  Up  i(P)            19  12  53
```

Column 3 (p. 113)

```
1959
Nov  6  Up  eL              02  09
                             μ    s
            M      E        0.9   19
            M      N        1.0   20
            M      z        1.0   20
        Ki  eL              02  07
                             μ    s
            M      E        0.9   18
            M      N        0.8   19
            M      z        1.4   20
        Solomon Islands.

  »  6  Up  eP              07  41  35
                             μ    s
            M      E        0.8   11
        Ki  iP              07  42  48
                             μ    s
            M      E        1.8   16
            M      N        0.5   11
        Sk  iP              07  42  14
        Gb  iP              07  41  13
        Yugoslavia.

  »  6  Up  iPKP            12  02  39 C
        Gb  iPKP            12  02  50
            i               12  03  09
        Tonga Islands.

  »  6  Up  e(P)            12  21  55

  »  6  Up  iP              20  40  51

  »  6  Ki  iP              21  15  27

  »  6  Up  iP              22  09  28

  »  6  Gb  iP              23  46  54
        Turkey.

  »  7  Up  iP              02  37  36
                             μ    s
            M      E        1.4   19
            M      N        1.5   13
            M      z        0.8   17
        Ki  eP              02  38  45
                             μ    s
            M      E        3.0   19
            M      N        1.2   18
            M      z        1.2   18
        Sk  iP              02  37  59
        Gb  iP              02  37  04
        Algeria.

  »  7  Up  iP              06  29  53
        Greece.

  »  7  Ki  iP              13  29  39

  »  7  Up  iP              15  29  52
        Chagos Islands, Indian Ocean.
```

Column 4 (p. 113)

```
1959
Nov  7  Up  ePKP            22  35  48
                             μ    s
            M      E        0.5   17
            M      N        1.4   20
            M      z        0.6   18
        Ki                       —
                             μ    s
            M      E        1.1   20
            M      N        1.3   20
            M      z        2.1   21
        Gb  iPKP            22  35  57
            i               22  36  09
            i               22  36  24
        Tonga Islands. Magn.=5.9 (Up, Ki).

  »  8  Gb  iPKP            02  37  16
        Kermadec Islands.

  »  8  Up  iP              14  05  48
            iPcP            14  06  25
            iP'P'           14  34  14
                             μ    s
            P      z'       0.3   1.5
            M      E        28    20
            M      N        26    16
            M      z        19    20
        Ki  iP              14  05  04
            i               14  05  34
            eS              14  13  15
            iScS            14  14  50
                             μ    s
            P      z'       0.3   1.5
            M      E        46    17
            M      N        27    17
            M      z        27    17
            △=6650 km=60°.
        Sk  eP              14  05  50
        Gb  iP              14  06  11 D
        Hokkaido, Japan. Magn.=6.4 (Up,
        Ki). Abnormally large surface waves.

  »  9  Up  iP              00  18  29
        Ki  eP              00  18  07
        Sk  iP              00  18  11
        Mexico.

  »  9  Ki  eP              02  24  41

  »  9  Ki  eP              02  53  00

  »  9  Ki  iP              12  23  44 C

  »  9  Up  iPKP            20  07  39
        Kermadec Islands.

  »  9  Up  i(P)            22  23  00
            i               22  23  23

  »  10 Up  i(P)            01  58  44
```

Column 1

```
1959
Nov 10  Up  iP              18  06  01 D
            i               18  06  12
                      μ    s
            P     z'  0.1  0.5
        Ki  iP              18  07  23
            i               18  07  49
        Sk  iP              18  06  54
            i               18  06  57
        Rumania (h ~ 160 km).

» 10    Up  iP              20  29  13
        Sk  iP              20  29  57
        Greece.

» 10    Up  iP              21  05  13 D
            iLg1            21  22  25
                      μ    s
            P     z'  0.1  0.5
            M     E   4.5   16
            M     N   24    20
            M     z   3.7   18
        Ki  iP              21  05  04
            iSa             21  16  12
            i               21  18  37
                      μ    s
            M     E   4.8   20
            M     N   11    21
            M     z   4.8   20
        Sk  iP              21  05  27
        Tibet. Magn.=6.1 (Up, Ki).

» 11    Up  iP              12  37  12
            i               12  37  22
            i               12  38  21

» 11    Ki  iP              17  37  10

» 12    Up  iP              07  19  45

» 12    Ki  i(Pg)          12  40  30
            iSg             12  41  26

» 12    Up  iP              12  53  56 D

» 13    Up  i(P)           07  46  03

» 13    Ki  iP              08  56  31
        Irak-Iran.

» 13    Ki  iP              09  27  58
        Irak-Iran.

» 13    Gb  i(P)           11  03  47 C
        Local blast?

» 13    Up  i(P)           12  10  19

» 13    Gb  iP              15  03  56

» 13    Up  iP              20  44  52

» 14    Ki  i(P)           07  38  53
```

Column 2

```
1959
Nov 14  Up  iPKP            12  08  44
            i               12  08  49
        Sk  iPKP            12  08  38
        Kermadec Islands.

» 14    Up  iP              12  13  08
                      μ    s
            P     z'  0.1  1.0

» 15    Ki  iP              04  14  08
        Aegean Sea.

» 15    Up  iP              09  59  42

» 15    Up  iP              10  32  59 C
            i               10  33  06
            iPP             10  34  38
            iS              10  39  12
            i               10  44  30
                      μ    s
            P     z'  0.6  0.7
            PP    E   0.8   3
            M     E   10    19
            M     N   8.8   17
            M     z   15    20
        △=4650 km=42°.
        Ki  iP              10  33  00
            ePcS            10  38  51
            iS              10  39  15
            iLg1            10  47  10
            i               10  47  31
                      μ    s
            P     E   0.7   6
            P     z   0.7   6
            P     z'  0.7  0.7
            S     E   1.4   9
            S     N   0.6   9
            M     E   5.8   11
            M     N   5.9   12
            M     z   5.4   12
        △=4650 km=42°.
        Sk  iP              10  33  22
            i               10  33  30
        Gb  iP              10  33  23 C
            i               10  33  37
            i               10  36  29
        Kashgar, China. Magn.=6.5 (Up, Ki).

» 15    Up  iP              17  13  40 C
            iS              17  17  40
                      μ    s
            P     E   6.7   14
            P     N   49    13
            P     z   75    13
            P     z'  1.1  0.5
            S     N   85    12
            M     N   360   18
            M     z   520   20
        △=2450 km=22°.
        Ki  iP              17  14  54 C
```

Column 3

```
1959
Nov 15      i               17  18  35
(cont.)     i               17  19  14
            iS              17  19  49
            i               17  22  53
                      μ    s
            P     N   5.3   12
            P     z   10    10
            P     z'  2.4  1.5
            S     E   35    13
            S     N   36    15
            M     E   210   15
            M     N   160   15
            M     z   180   15
        △=3350 km=30°.
        Sk  iP              17  14  20 C
        Gb  iP              17  13  20 C
        Ionian Sea. Magn.=6.9 (Up, Ki).

» 15    Up  iP              17  36  24 C
                      μ    s
            P     z'  0.1  0.5
        Ki  iP              17  37  40
        Sk  iP              17  37  04
        Ionian Sea.

» 15    Up  iP              17  51  49
        Sk  eP              17  52  28
            i               17  52  37
        Ionian Sea.

» 15    Up  iP              21  01  49 C
        Sk  eP              21  02  29
        Ionian Sea.

» 16    Up  iP              10  32  19 C
            eS              10  41  20
                      μ    s
            P     z   0.8   3
            P     z'  0.4  1.8
            S     N   1.4   13
            M     N   2.4   20
            M     z   3.2   20
        △=7550 km=68°.
        Ki  iP              10  32  57 C
            eS              10  42  27
                      μ    s
            P     z   1.5   4
            P     z'  0.9  2.0
            S     E   0.5   12
            S     N   0.8   12
            M     E   1.3   16
            M     N   1.2   18
            M     z   2.2   19
        △=8200 km=74°.
        Sk  iP              10  32  25 C
        Gb  iP              10  31  55
        Mid-Atlantic Ridge. Magn.=6.3 (Up, Ki).

» 16    Ki  iP              20  58  23
        Sk  iP              20  58  33 D

8*
```

Column 4

```
1959
Nov 16  Ki  iP              23  56  52
        Talaud Islands.

» 17    Ki  iP              00  03  16
        Mariana Islands.

» 17    Up  iP              02  44  55
                      μ    s
            P     z'  0.1  1.0
        Ki  iP              02  45  17
                      μ    s
            P     z'  0.1  1.5
        Indian Ocean. Magn.=5.6 (Up, Ki).

» 17    Up  iP              04  43  32

» 17    Ki  iP              19  18  28

» 17    Up  ePKP1          23  31  04
            iPKP2          23  31  33
        Ki  e(PKP)         23  30  42
        Sk  ePKP1          23  30  59
            iPKP2          23  31  19
        Off North Island, New Zealand.

» 18    Up  iP              00  04  53
                      μ    s
            P     z'  0.1  0.8
            M     N   1.1   19
        Ki  iP              00  04  42
                      μ    s
            M     N   0.6   19
        Sk  iP              00  05  07 D
        Gb  iP              00  05  13
        Sikang Province, China.

» 18    Up  eP              01  03  06

» 18    Up  i(P)           05  53  31
            i               05  53  50

» 18    Up  iP              13  44  39
        Ki  iP              13  44  11
        Sk  iP              13  44  37
        Mariana Islands (h ~ 200 km).

» 18    Ki  i(Pg)          21  07  09
            iSg             21  07  58

» 19    Up  iPKP            05  45  25
        Ki  ePKP            05  45  11
        Gb  iPKP            05  45  38
        Tonga Islands.

» 19    Up  i(P)           08  15  18 C

» 19    Up  e               11  27  35
            iPP             11  28  08
            i!              11  28  36
            e(SKSP)         11  37  47
```

1959 Nov 19 (cont.)

			h	m	s	
	ePPS		11	38	59	
				μ	s	
	PP	z'		0.2	1.3	
	M	E		11	20	
	M	N		22	20	
	M	z		9.4	22	

△=12600 km=113½°.

			h	m	s	
Ki	iP		11	22	56	
	iPKP		11	27	11	
	iPP		11	27	30	
	i!		11	28	05	
	iPS		11	36	51	
	iPKKP		11	38	17	
				μ	s	
	PP	E		0.5	8	
	PP	N		0.3	8	
	PP	z		1.1	8	
	PP	z'		1.1	2.2	
	M	E		15	24	
	M	N		5.7	20	
	M	z		9.6	23	

△=12000 km=108°.

			h	m	s	
Sk	ePKP		11	27	08	
	iPP		11	27	53	
	e		11	37	31	

New Guinea (h∼100 km). Magn.=6.9 (Up, Ki).

» 19

			h	m	s	
Up	iP		14	05	21	C
	i		14	05	33	
	iS		14	09	20	
				μ	s	
	P	z'		0.1	0.6	
	M	E		7.1	18	
	M	N		4.6	19	
	M	z		3.9	10	

△=2450 km=22°.

			h	m	s	
Ki	iP		14	06	32	D
	ePcS		14	13	15	
	eLg1		14	15	50	
				μ	s	
	P	z'		0.1	1.0	
	M	E		6.2	13	
	M	N		2.0	10	
	M	z		1.8	13	
Sk	iP		14	06	03	
	i		14	06	08	
Gb	iP		14	05	13	

Turkey. Magn.=5.4 (Up, Ki).

» 20 Up —

			h	m	s	
				μ	s	
	M	E		1.0	21	
	M	N		1.0	19	
Ki	iP		00	04	46	
	eS		00	13	37	
				μ	s	
	S	E		0.4	8	
	S	N		0.4	9	
	M	E		0.5	13	
	M	N		0.6	18	
	M	z		0.7	17	

1959 Nov 20 (cont.)

△=7450 km=67°.

			h	m	s	
Sk	iP		00	04	59	

Oregon.

» 20

			h	m	s	
Up	iPKP		00	40	29	
	i		00	40	33	
				μ	s	
	PKP	z'		0.1	0.5	
Ki	iPKP		00	40	12	
Sk	iPKP		00	40	22	
Gb	iPKP		00	40	39	

Kermadec Islands.

» 20

			h	m	s	
Up	iSg		13	18	06	
	i		13	18	11	
	i		13	18	18	
Sk	iSg		13	20	03	

South Sweden, 56.9°N, 14.7°E. Origin time=13 16 17. Explosion?

» 20

			h	m	s	
Up	iSg		13	25	13	
Sk	eSg		13	27	13	

South Sweden, 56.9°N, 14.7°E. Origin time=13 23 25. Explosion?

» 20

			h	m	s	
Up	iSg		13	40	30	
	i		13	40	32	
	i		13	40	37	

△=370 km=3.3°.

			h	m	s	
Sk	iSg		13	42	28	

△=760 km=6.8°.

			h	m	s	
Gb	iSg		13	39	36	

△=190 km=1.7°.

South Sweden, 56.9°N, 14.7°E. Origin time=13 38 41. Explosion?

» 20

			h	m	s	
Up	iSg		19	23	56	
Gb	eSg		19	23	02	

South Sweden, 56.9°N, 14.7°E. Origin time=19 22 07. Explosion?

» 20

			h	m	s	
Up	iSg		19	25	13	

Presumably same origin as preceding events.

» 20

			h	m	s	
Ki	iP		19	41	18	
Gb	iP		19	40	08	C

Mid-Atlantic Ridge.

» 20

			h	m	s	
Up	eSg		20	23	50	
Gb	eSg		20	22	52	

South Sweden, 56.9°N, 14.7°E. Origin time=20 21 59. Explosion?

» 21

			h	m	s	
Ki	e(P)		06	20	37	
	i		06	20	53	

1959 Nov 21 (cont.)

			h	m	s	
	iSg		06	21	37	
Sk	iSg		06	21	45	

» 21

			h	m	s	
Up	iP		12	25	28	

» 21

			h	m	s	
Up	i(P)		18	25	32	
	i		18	25	38	

» 22

			h	m	s	
Ki	e(P)		04	23	22	
	e(Sg)		04	24	34	

» 22

			h	m	s	
Up	iP		16	44	28	

» 22

			h	m	s	
Up	eL		17	40		
				μ	s	
	M	E		2.0	18	
	M	N		1.9	19	
	M	z		2.9	18	
Ki	eL		17	38		
				μ	s	
	M	E		1.2	16	
	M	N		1.4	20	
	M	z		1.1	17	

South Pacific Ocean.

» 22

			h	m	s	
Up	i(PKP)		19	52	57	P_1''
	iPKP		19	53	03	P''
				μ	s	
	PKP	z'		0.2	0.6	
Ki	e(PKP)		19	52	39	P_0''
	iPKP		19	52	50	$P''^{\frac{1}{2}}$
	iSKP		19	55	30	
				μ	s	
	SKP	z'		0.1	0.7	
Sk	e(PKP)		19	52	49	P_0''
	i		19	52	54	P_1''
	iPKP		19	53	01	P''
	iSKP		19	55	53	
Gb	iPKP		19	53	04	P_0''D

Fiji Islands (h∼550 km). The notation for the multiple PKP-phases after G. Payo Subiza and M. Båth (Geophys. J., 8:496—513, 1964) is given to the right of the resp. times.

» 23

			h	m	s	
Up	iP		12	13	39	
				μ	s	
	P	z'		0.1	0.5	

» 23

			h	m	s	
Up	iSn		13	23	33	
	i		13	23	43	
	iSg		13	23	46	
	i		13	23	51	

△=360 km=3.2°.

			h	m	s	
Sk	ePg		13	23	19	
	eSg		13	24	11	

△=440 km=4.0°.

			h	m	s	
Gb	e(Pg)		13	22	29	
	i		13	22	43	
	iSg		13	22	52	

1959 Nov 23 (cont.)

△=180 km=1.6°.

Norway-Sweden, 59½°N, 11½°E. Origin time=13 21 59.

» 23

			h	m	s	
Up	eSg		13	50	03	

△=390 km=3.5°.

			h	m	s	
Sk	eSg		13	50	33	

△=500 km=4.5°.

			h	m	s	
Gb	iSg		13	49	00	

△=180 km=1.6°.

Oslo Fjord, Norway, 59¼°N, 10¾°E. Origin time=13 48 06.

» 23

			h	m	s	
Up	iP		21	17	09	
				μ	s	
	P	z'		0.1	0.6	
Ki	iP		21	16	44	
				μ	s	
	P	z'		0.1	1.3	

Formosa. Magn.=6.0 (Up, Ki).

» 24

			h	m	s	
Up	iSg		09	53	17	
Sk	eSg		09	54	01	
Gb	i		09	51	33	
	iSg		09	51	50	

Oslo Fjord, 58½°N, 10¾°E. Origin time=09 51 12.

» 24

			h	m	s	
Up	iSg		10	37	14	
Sk	eSg		10	37	59	
Gb	i(Pg)		10	35	24	
	i		10	35	29	
	iSg		10	35	46	

Oslo Fjord, 58½°N, 10¾°E. Origin time=10 35 09.

» 24

			h	m	s	
Up	iP		15	09	33	D
Ki	iP		15	09	14	

Luzon, Philippine Islands.

» 24 Up —

			h	m	s	
				μ	s	
	M	E		1.2	21	
	M	N		1.9	19	
	M	z		2.0	21	
Ki	iP		20	18	04	

Mid-Atlantic Ridge.

» 25

			h	m	s	
Up	iP		03	36	41	

» 25

			h	m	s	
Ki	iP		19	17	24	D

South of Mindanao, Philippine Islands.

» 25

			h	m	s	
Up	iP		20	30	34	

» 26

			h	m	s	
Ki	e(PKP)		06	18	48	
	iPKP		06	19	25	

Sandwich Islands.

1959

Nov 26 Up iP   07 19 31
    i   07 19 37
    iPP   07 23 17
    e(S)   07 30 46

			μ	s
P	z'		0.1	0.8
(S)	N		12	30
M	E		9.1	21
M	N		10	23
M	z		8.6	22

    Ki iP   07 19 29
    i   07 19 45
    iS   07 30 26
    i   07 30 46

			μ	s
S	N		3.1	20
M	E		9.5	20
M	N		6.3	21
M	z		5.2	20

△=10300 km=92½°.
    Sk iP   07 19 45
    i   07 19 58
    iPP   07 23 43
    Gb i(PP)   07 23 39
Sumatra. Magn.=6.6 (Up, Ki).

» 26 Up iP   23 22 35
    e(SKS)   23 33 21
    iS   23 33 34

			μ	s
P	z'		0.2	1.0
S	N		16	21
M	E		22	19
M	N		22	23
M	z		23	19

△=10300 km=92½°.
    Ki iP   23 22 35
    i   23 22 54
    iSKS   23 33 02
    iS   23 33 32
    i   23 33 51

			μ	s
P	z		1.5	5
P	z'		0.4	1.5
SKS	E		1.4	10
S	N		7.1	20
M	E		23	19
M	N		17	19
M	z		18	18

△=10300 km=92½°.
    Sk iP   23 22 50 D
    i   23 23 07
Sumatra. Magn.=6.8 (Up, Ki).

» 26 Up iP   23 25 49

			μ	s
P	z'		0.1	1.0

    Ki iP   23 25 48

			μ	s
P	z'		0.2	1.0

1959

Nov 26 Sk iP   23 26 01
(cont.) Sumatra.

» 27 Up iP   00 27 20 C
    i   00 27 24
    i   00 28 52

			μ	s
P	z'		0.3	0.8

    Ki iP   00 28 33

			μ	s
P	z'		1.2	2.5

    Sk iP   00 28 00
    i   00 28 07
    Gb iP   00 27 06
    i   00 27 26
Greece. Magn.=6.1 (Up, Ki).

» 27 Up iP   00 31 08
    i   00 31 15

			μ	s
P	z'		0.3	0.7

    Ki iP   00 32 23

			μ	s
P	z'		0.2	1.5

    Sk iP   00 31 49
    i   00 31 55
    Gb iP   00 31 01
Greece. Magn.=6.0 (Up, Ki).

» 27 Up iP   00 57 39
    Sk iP   00 58 21
    Gb iP   00 57 20 C
Greece.

» 27 Up iP   05 49 51

» 27 Up iP   06 43 30
    Sk iP   06 44 09
Greece.

» 27 Up iP   14 12 11
    Gb iP   14 12 03

» 27 Ki iP   19 04 39
Sumatra.

» 28 Up iPKP   00 36 43
    Sk iPKP   00 36 39
Off North Island, New Zealand.

» 28 Up iP   03 18 55

» 28 Up iP   03 32 23
    i   03 32 32

			μ	s
M	E		2.0	21
M	N		2.0	20
M	z		2.5	22

    Ki iP   03 31 54
    i   03 32 21

1959

Nov 28

		μ	s
M	E	1.7	19
M	N	1.0	18
M	z	1.4	15

(cont.) Sk iP   03 32 23
Ryukyu Islands. Magn.=5.6 (Up, Ki).

» 28 Up iSg   08 03 05
△=340 km=3.0°.
    Ki eSn   08 05 31
    e   08 05 52
    iSg   08 06 37
△=1040 km=9.4°.
    Sk eS*   08 05 01
    iSg   08 05 24
    i   08 05 44
△=800 km=7.2°.
Near coast of the Baltic States (Island of Ösel), 58.5°N, 22.8°E. Origin time =08 01 25. Explosion?

» 28 Gb iP   10 30 11

» 28 Up iSKSP   13 04 07

			μ	s
SKSP	E		3.1	20
M	E		3.2	20
M	N		1.8	18
M	z		3.6	20

    Ki eSKS   13 00 44
    eSKSP   13 04 30

			μ	s
SKS	E		0.6	8
SKSP	E		1.5	18
M	E		1.8	18
M	N		1.2	18
M	z		1.1	17

Chile. Magn.=6.0 (Up, Ki).

» 28 Up iPKP   22 58 20 D
    Ki iPKP   22 58 06 C

			μ	s
PKP	z'		0.2	1.0

    Sk iPKP   22 58 17
    Gb iPKP   22 58 26 C
    i(SKP)   23 01 38
New Hebrides Islands.

» 29 Up iP   05 38 22

» 29 Up iPKP   06 06 04

			μ	s
PKP	z'		0.1	0.5

    Sk iPKP   06 05 59 D
    Gb iPKP   06 06 11 C
Kermadec Islands (h~300 km).

» 29 Up i(PKP)   11 04 36

1959

Nov 29 Up eL   20 30

		μ	s
M	E	0.7	18
M	N	0.8	19
M	z	1.6	20

    Ki eL   20 39

		μ	s
M	E	0.6	18
M	N	0.6	19
M	z	1.0	18

South Pacific Ocean.

» 29 Up iP   23 54 59
    i   23 55 10
    i   23 55 15

		μ	s
M	E	1.0	17
M	N	0.4	15

    Ki iP   23 56 10

		μ	s
M	E	0.6	14

    Sk eP   23 55 41
Greece.

» 30 Up iP   11 20 32
    i(PP)   11 22 02
    iPP   11 22 11
    iSS   11 29 46
    i!   11 31 28
    i!   11 33 26
    iLg1   11 33 45

			μ	s
P	z'		0.2	0.9
M	E		16	11
M	N		32	16
M	z		17	11

△=4550 km=41°.
    Ki iP   11 20 21
    i   11 20 29
    iPP   11 21 58
    eSS   11 29 00
    iLi   11 32 33
    iLg1   11 33 15

			μ	s
P	z'		0.3	0.8
PP	z'		0.5	2.0
M	E		11	13
M	N		7.2	10
M	z		8.8	12

△=4400 km=39½°.
    Sk iP   11 20 50
    i   11 20 59
    iPP   11 22 33
    iLg1   11 34 44
    Gb iP   11 21 09
    i   11 28 26
    i   11 30 50
    i   11 31 53
Sinkiang Province, China. Magn.=6.2 (Up, Ki). Extremely clear channel waves, especially Lg1.

1959

Nov 30	Up	iP	15	28	48 D
		i	15	28	52

			μ	s	
	P	z'	0.1	0.5	
	Ki	iP	15	27	52 D
		i	15	27	57

			μ	s	
	P	z'	0.2	1.0	
	Sk	iP	15	28	20
	Gb	iP	15	28	57
		i	15	29	01

Kenai Peninsula, Alaska. Magn.=6.1 (Up, Ki).

Dec 1	Up	iP	12	40	55
	Sk	eP	12	41	34

Greece.

» 1	Up	iP	12	43	43 C
		i	12	43	49
		iPP	12	44	11
		iS	12	47	48

			μ	s
	P	N	0.6	3
	P	z	1.0	4
	P	z'	0.5	1.0
	PP	N	0.8	3
	S	E	1.2	5
	S	N	1.3	5
	M	E	4.6	10
	M	N	4.9	11
	M	z	5.4	12

△=2450 km=22°.

	Ki	iP	12	44	57 C
		i	12	45	04

			μ	s
	P	z'	0.4	1.5
	M	E	6.4	10
	M	N	4.2	12
	M	z	5.4	12

	Sk	iP	12	44	22
	Gb	iP	12	43	28 C

Greece. Magn.=5.9 (Up, Ki).

» 1	Up	iP	12	51	15
	Sk	iP	12	51	57

(Greece).

» 1	Up	iP	12	56	56
		i	12	57	03
		iPP	12	57	19

			μ	s
	P	z'	0.2	0.7

	Ki	iP	12	58	10
	Sk	iP	12	57	35
	Gb	iP	12	56	40

Greece.

» 1	Up	e	15	45	14

			μ	s
	M	E	3.0	22

16:20:00

1959

Dec 1 (cont.)	M	N	2.2	20
	M	z	4.4	21
Ki	e(PKP2)		15	20	39
	e		15	44	42

			μ	s
	M	E	3.3	20
	M	N	2.4	21
	M	z	2.9	21

Balleny Islands. Magn.=6.3 (Up, Ki).

» 1	Up	iP	18	24	26
	Ki	iP	18	24	11

Mindanao (h~400 km).

» 2	Ki	iP	04	28	27 D

Kamchatka.

» 2	Gb	i(P)	07	06	05

» 2	Up	iP	07	43	01
	Ki	iP	07	43	01
	Sk	iP	07	43	15

Sumatra (h~150 km).

» 2	Up	iP	07	54	24
		ipP	07	54	48

			μ	s
	M	E	1.1	20
	M	N	1.5	24
	M	z	1.4	18

	Ki	iP	07	54	20

			μ	s
	P	E	0.4	10
	P	N	0.3	10
	M	E	0.9	18
	M	N	1.0	18
	M	z	1.0	18

	Sk	iP	07	54	40
		ipP	07	55	02

Burma. h=100 km (Up, Sk).

» 2	Up	i	09	51	31
		iPP	09	51	49
		iSKS	09	58	17
		iPS	10	00	40

			μ	s
	PP	z'	0.4	1.9
	M	E	7.2	22
	M	N	11	22
	M	z	11	22

	Ki	iP	09	47	29
		iPP	09	51	25
		i!	09	55	10
		iSKS	09	58	01
		eS	09	58	36
		ePS	10	00	18

			μ	s
	P	z	1.0	5
	P	z'	0.2	1.5
	PP	z	1.2	6

1959

Dec 2 (cont.)	SKS	E	2.4	9
	S	N	0.6	8
	M	E	8.5	22
	M	N	8.8	22
	M	z	8.6	20

△=10700 km=96½°.

	Sk	e(P)	09	48	00

Celebes. Magn.=6.5 (Up, Ki).

» 2	Up	i(P)	11	58	42

» 2	Up	i(P)	13	44	46
		i	13	45	18
		iSg	13	45	21

			μ	s
	Sg	z'	0.1	0.5

	Gb	iSg	13	43	47

» 2	Up	iP	13	48	15

» 2	Up	iP	18	23	50 C
	Ki	iP	18	25	17
	Sk	iP	18	24	30

Yugoslavia.

» 2	Up	i(P)	18	28	23

» 2	Up	iP	23	03	39
	Ki	iP	23	02	45

Aleutian Islands.

» 3	Ki	iPKP	02	14	29

Sandwich Islands.

» 3	Up	i(P)	03	28	37
		i	03	29	40

» 3	Up	iP	14	10	41
		i	14	11	09

Assam.

» 3	Up	e(P)	18	25	29

» 3	Ki	iP	21	01	20
		i	21	01	22

			μ	s
	i	z'	0.9	0.5

Local blast?

» 4	Up	iP	09	06	25
		i	09	06	39
	Ki	iP	09	07	32 C
	Sk	iP	09	07	01
	Gb	iP	09	05	51

Crete.

» 4	Gb	iPKP	09	42	30

Fiji Islands (h~650 km).

» 4	Up	iP	13	46	36

1959

Dec 4	Up	iPKP	18	29	04 D
	Ki	iPKP	18	28	45 D

Kermadec Islands.

» 5	Up	iP	16	08	09
	Sk	iP	16	08	48

Greece.

» 5	Up	i(P)	18	25	11
		i	18	25	35

» 6	Up	iP	14	59	27 D

» 6	Sk	i(P)	21	27	36

» 7	Up	iP	05	27	18

			μ	s
	P	z'	0.1	0.7

	Ki	iP	05	26	42 D

Honshu, Japan.

» 7	Up	iP	08	27	21 D

» 7	Up	iP	19	11	43

West Pakistan.

» 8	Up	iP	03	11	39
	Ki	iP	03	10	48
	Sk	iP	03	11	22

Honshu, Japan.

» 8	Ki	iP	08	11	52
		i	08	11	58

			μ	s
	P	z'	0.2	1.0
	M	E	1.8	16
	M	N	1.1	14
	M	z	1.7	15

	Sk	eP	08	11	37

Off north coast of Iceland.

» 8	Ki	iP	08	51	51

Caucasus.

» 8	Ki	iP	09	41	32

			μ	s
	P	z'	0.1	1.1

Turkey.

» 8	Ki	iP	12	28	49
	Sk	iP	12	29	08

Afghanistan-Tadzhik.

» 8	Ki	iP	12	58	46
		iPP	13	00	28

			μ	s
	P	z'	0.2	1.5
	M	E	1.9	17
	M	z	1.8	17

△=4800 km=43°.

Iran.

1959

Date	Stn	Phase	z'/comp	h/μ	m/s	s
Dec 8	Up	iP		13	39	20
		i		13	39	24
		iS		13	43	53
				μ	s	
		P	z'	0.5	1.0	
		S	N	1.9	6	
		M	E	10	15	
		M	N	27	17	
		M	z	18	16	
		△=2800 km=25°.				
	Ki	iP		13	40	04C
		i		13	40	25
		eSa		13	45	59
		iLg1		13	49	07
		iLg2		13	49	47
				μ	s	
		P	z'	0.4	1.4	
		M	E	19	13	
		M	N	12	13	
		M	z	14	11	
	Gb	iP		13	39	35D
		i		13	39	54
		Georgia, USSR. Magn.=5.9 (Up, Ki).				
» 8	Up	iP		23	33	02
» 9	Up	iP		03	57	07
		i		03	57	27
				μ	s	
		M	E	1.8	21	
		M	N	4.1	20	
	Ki	iP		03	57	50
				μ	s	
		M	E	1.8	15	
		M	N	1.1	16	
		Georgia, USSR.				
» 9	Ki	iPKP		13	08	15
		i		13	08	23
		Off North Island, New Zealand.				
» 9	Ki	iP		17	00	16
		Turkey.				
» 9	Up	iP		18	33	14C
	Ki	iP		18	33	12
		Tibet.				
» 10	Up	i(P)		01	18	55
		iSg		01	19	48
» 10	Up	iP		01	47	49
				μ	s	
		P	z'	0.1	1.0	
» 10	Up	iP		13	07	57
	Sk	eP		13	08	42
		Greece.				
» 10	Up	iP		18	48	32

1959

Date	Stn	Phase	z'/comp	h/μ	m/s	s
Dec 11	Ki	iP		00	45	38D
				μ	s	
		P	z'	0.1	1.2	
		Banda Sea.				
» 11	Ki	i(P)		01	15	27
» 11	Up	e		02	27	25
				μ	s	
		M	E	0.8	21	
		M	N	1.1	22	
		M	z	1.1	23	
	Ki	e		02	11	26
				μ	s	
		M	E	0.8	19	
		M	N	0.9	20	
		M	z	1.3	21	
	Gb	iPKP		01	58	26
		Tonga Islands.				
» 11	Up	iP		07	31	57
» 11	Up	iP		07	43	06C
» 11	Up	i		09	09	54
		iSg		09	10	14
	Ki	iSg		09	12	59
	Sk	i		09	12	02
		iSg		09	12	10
		Presumably southwest coast of Finland. Origin time=09 08 34. Explosion?				
» 11	Sk	eP		22	42	05
» 12	Ki	iP		10	59	30
» 12	Up	i(P)		12	05	07
				μ	s	
		(P)	z'	0.1	0.5	
» 12	Ki	iPg		13	09	35
		iSg		13	09	59
				μ	s	
		Sg	z'	0.2	0.8	
» 12	Ki	iP		20	06	53
		Algeria.				
» 13	Up	iP		00	49	11
» 13	Up	iP		01	04	19
» 13	Up	iP		02	13	10
		i		02	13	16
	Ki	iP		02	14	03
	Gb	eP		02	13	16
		Turkey.				
» 13	Ki	iPg		02	55	37
		iSg		02	56	01

1959

Date	Stn	Phase	z'/comp	h/μ	m/s	s
Dec 13 (cont.)		Sg	z'	μ 0.1	s 0.7	
		Probably same origin as for the shock on Dec. 12 at 13 09.				
» 13	Up	iSg		03	22	36
	Sk	i(S*)		03	21	48
		iSg		03	22	03
	Gb	eSg		03	21	33
		Southwest Norway, 60°N, 7°E. Origin time=03 19 34.				
» 13	Up	i(P)		05	40	54
» 13	Ki	iP		05	53	00C
		Java.				
» 13	Up	eP		13	13	32
	Sk	eP		13	14	14
		(Greece).				
» 13	Up	iP		23	32	38C
	Ki	iP		23	32	08D
	Sk	iP		23	32	36
	Gb	iP		23	32	54
		Mariana Islands.				
» 14	Up	eP		01	56	23
» 14	Ki	e		11	29	55
		e(Sg)		11	30	06
» 14	Up	iP		12	53	04
	Gb	iP		12	53	47
» 14	Up	ePKP		13	17	08
		Kermadec Islands.				
» 14	Up	iP		18	11	35
		iSKS		18	21	52
		iS		18	22	28
				μ	s	
		P	z'	0.1	1.0	
		M	E	1.7	22	
		M	N	2.2	18	
		M	z	1.6	20	
	Ki	iP		18	11	19
		i		18	11	32
		iSKS		18	21	35
		iS		18	22	02
				μ	s	
		P	z'	0.3	1.3	
		SKS	E	1.0	7	
		S	N	1.4	12	
		M	E	1.0	16	
		M	N	1.5	19	
		M	z	1.2	17	
	Sk	iP		18	11	41
	Gb	iP		18	11	50
		Mindanao (h~200 km). Magn.=6.2 (Up, Ki).				

1959

Date	Stn	Phase	z'/comp	h/μ	m/s	s
Dec 14	Up	iP		20	39	48
» 14	Ki	iP		22	02	34D
		i		22	02	42
				μ	s	
		P	z'	0.3	1.7	
		Celebes.				
» 14	Up	iP		22	11	53C
		iPcP		22	12	24
		iS		22	20	54
				μ	s	
		P	z'	0.6	1.0	
		S	N	1.8	7	
		M	E	4.7	18	
		M	N	7.1	20	
		M	z	8.4	20	
		△=7550 km=68°.				
	Ki	iP		22	10	57
		i		22	11	01
		iS		22	19	17
				μ	s	
		P	z'	1.1	1.0	
		S	E	1.7	11	
		S	N	1.7	9	
		M	E	7.6	19	
		M	N	3.7	18	
		M	z	4.7	18	
		△=6650 km=60°.				
	Sk	iP		22	11	29C
	Gb	iP		22	12	09C
		i		22	12	52
		Aleutian Islands. Magn.=6.5 (Up, Ki).				
» 14	Up	i(PKP)		22	39	16
» 14	Up	iPKP		23	40	57C
		iPP		23	42	37
		iPKS		23	44	28
		iSKKS		23	49	36
		iPKKP		23	50	50
		iSKSP		23	52	26
		e		23	54	10
		iPKKS		23	54	35
				μ	s	
		PKP	z	3.1	5	
		PKP	z'	0.8	0.7	
		PP	N	1.1	4	
		PP	z'	0.5	1.5	
		PKS	N	1.4	3	
		PKKS	z'	0.2	1.5	
		M	E	32	19	
		M	N	40	19	
		M	z	37	19	
		△~13850 km~124½°.				
	Ki	iPKP		23	41	11C
		iX		23	41	49
		iPP		23	43	32
		iPKS		23	44	38
		i		23	45	34

1959 Dec 14 (cont.)

Sta	Phase	Comp	μ/h	s/m	s
	PKP	N	1.6	4	
	PKP	z	8.4	4	
	PKP	z'	12	3.0	
	PP	z'	2.3	2.5	
	PKS	E	12	5	
	PKS	N	14	5	
	PKS	z	4.4	8	
	M	E	33	18	
	M	N	43	18	
	M	z	58	18	
Sk	iPKP		23	41	01
Gb	iPKP		23	40	51
	iX		23	41	27
	iPP		23	42	21
	iPKKP		23	51	00

Sandwich Islands. Magn.=7.2 (Up, Ki). Good records for the study of core phases.

» 15 Up iP — 00 04 39

» 15 Up iP — 00 10 16

» 15 Up iP — 05 17 29
	P	z'	0.1	1.2
Ki	iP		05	17	01
	P	z'	0.1	1.2

Mariana Islands.

» 15 Up iP — 10 55 22
	i		10	55	30
	P	z'	0.2	1.0
Ki	eP		10	55	32
Sk	iP		10	55	49
Gb	iP		10	55	51

Hindu Kush.

» 15 Up iP — 11 38 27
Ki iP — 11 37 58

Mariana Islands.

» 15 Up iPKP — 12 34 49C
Ki iPKS — 12 38 31

Sandwich Islands.

» 15 Ki ePKP — 15 09 10

New Zealand.

» 15 Up iP — 17 16 45
Ki eP — 17 15 53

Aleutian Islands.

» 15 Up iP — 23 05 48
Sk iP — 23 06 24C

Italy.

» 16 Up iP — 05 31 10

1959 Dec 17 Up iP — 00 51 31C

» 17 Up iP — 02 43 04
	i		02	43	07
	P	z'	0.3	0.8
	M	E	1.1	20
Ki	iP		02	42	41C
	P	z'	0.4	1.0
	M	E	0.9	20
Sk	iP		02	43	08
Gb	iP		02	43	23

Formosa. Magn.=6.4 (Up, Ki).

» 17 Up iP — 02 59 00
	P	z'	0.1	0.8
Ki	iP		02	58	37C
	P	z'	0.1	1.0

Formosa.

» 17 Gb iPKP — 03 15 32

Tonga Islands (h~100 km).

» 17 Ki iP — 05 15 20
| | i | | 05 | 15 | 32 |

Honshu, Japan.

» 17 Up iP — 06 07 01
	i		06	07	10
Ki	iP		06	07	02C
	i		06	07	16
	P	z'	0.1	1.3

Sumatra.

» 17 Ki e(P) — 06 13 14
| | i | | 06 | 13 | 27 |

» 17 Sk i(P) — 13 59 39

» 17 Sk eP — 20 16 05

Greece.

» 18 Up iPKP — 10 15 40
| | i | | 10 | 15 | 47 |
| Sk | iPKP | | 10 | 15 | 37 |

Fiji Islands (h~600 km).

» 18 Up iP — 16 35 50C
	i		16	35	56
	P	z'	0.3	1.0
	M	E	3.2	17
	M	N	5.4	18
	M	z	4.3	18
Ki	iP		16	34	57
	i		16	35	56

1959 Dec 18 (cont.)

	P	z'	0.5	1.0
	M	E	4.3	19
	M	N	3.0	16
	M	z	4.3	19
Sk	iP		16	35	27
Gb	iP		16	36	06C
	i		16	36	18

Aleutian Islands. Magn.=6.4 (Up, Ki).

» 18 Up iP — 18 17 30D
Sk iP — 18 17 55

Tibet.

» 19 Up eL — 15 46
	M	E	1.6	17
	M	N	2.0	17
	M	z	2.7	17
Ki	eL		15	45	
	M	E	1.8	18
	M	N	1.2	18
	M	z	1.9	18

Lower California. Magn.=5.8 (Up, Ki).

» 19 Up iP — 23 04 04
Sk iP — 23 04 44

Greece.

» 20 Up iP — 02 39 10D

(Greece).

» 20 Up iPKP — 08 25 29
	i		08	25	36
	PKP	z'	0.1	0.9
Ki	iPKP		08	25	15
Sk	ePKP		08	25	23
	i		08	25	38

Kermadec Islands.

» 20 Up iP — 13 06 42
Ki iP — 13 06 25
Sk iP — 13 06 46

Mindanao, Philippine Islands.

» 20 Up iP — 13 45 53D
Sk iP — 13 45 45

» 20 Ki iPg — 14 30 23
| | i | | 14 | 30 | 35 |
| | iSg | | 14 | 31 | 18 |

△=470 km=4.2.°
Sk e(Sg) — 14 34 11

» 21 Up iPKP — 10 40 16
| | i | | 10 | 40 | 18 |

1959 Dec 21 (cont.)

	PKP	z'	0.1	0.7
Ki	ePKP		10	40	05
Sk	iPKP		10	40	09C
Gb	iPKP		10	40	24

Kermadec Islands.

» 21 Up i(P) — 10 53 40

» 21 Up i(P) — 10 56 58
| | i | | 10 | 57 | 11 |

» 21 Up iP — 11 28 28
	i		11	28	35
	iPP		11	30	31
	iS		11	35	47
	P	z'	0.3	1.0

△=5800 km=52.°
Ki	iP		11	29	05
	i		11	29	08
	iPa		11	32	25
	iS		11	37	01
	P	E	1.4	8
	P	N	2.1	7
	P	z	3.7	8
	P	z'	4.4	2.8
	S	E	7.5	10
	S	N	5.2	10
	M	E	67	18
	M	N	75	15
	M	z	75	15

△=6350 km=57°.
Sk iP — 11 29 01
Gb iP — 11 28 35

Gulf of Aden. Magn.=6.9 (Ki).

» 21 Up iPKP — 11 33 57
| | PKP | z' | 0.4 | 1.5 |

Kermadec Islands.

» 21 Ki eP — 17 39 09

» 21 Ki iP — 22 22 34

Alaska.

» 22 Up iP — 00 18 53C
	P	z'	0.1	1.0
Ki	iP		00	19	31
	P	z'	0.4	1.8
	M	E	1.8	18
	M	N	1.4	16
	M	z	2.3	18

Gulf of Aden. Magn.=5.8 (Up, Ki).

1959					
Dec 22	Ki	i(P)	02	50	17
		i	02	50	19
	(California).				
» 22	Up	iP	03	57	34
	Ki	iP	03	58	13
» 22	Up	iP	17	31	46 C
		ipP	17	31	59
		iPP	17	34	26

			μ	s
	P	z'	0.1	0.8

	Ki	iP	17	31	06
		iPP	17	33	27
	Sk	iP	17	31	39
		ePP	17	34	09
	Gb	iP	17	32	09 C
		ipP	17	32	22
	Honshu, Japan. h=50 km (Up, Gb).				
» 22	Ki	eP	18	07	50
» 22	Up	iP	20	26	53 D
» 23	Ki	eP	03	47	40
		e(Sg)	03	49	09
» 23	Up	iP	03	59	36 C

			μ	s
	P	z'	0.1	0.7

	Ki	iP	03	58	41 C
		i(pP)	03	58	57

			μ	s
	P	z'	0.4	1.0

	Sk	iP	03	59	10
	Gb	iP	03	59	49
		i(pP)	04	00	05
	Alaska.				
» 23	Up	iPKP	04	50	42
	Kermadec Islands.				
» 23	Up	iP	09	33	54
		i(pP)	09	34	07

			μ	s
	(pP)	z'	0.1	1.0

	Ki	iP	09	35	10
		i(pP)	09	35	23

			μ	s
	(pP)	z'	0.3	1.5

	Sk	iP	09	34	29
		i(pP)	09	34	43
	Gb	iP	09	33	35
		i	09	33	40
		iPP	09	33	51
	Near north coast of Sicily.				
» 23	Ki	iP	12	47	21
	Arctic Ocean.				
» 23	Up	iP	13	58	05

1959					
Dec 23	Up	iPKP	14	18	42
		i	14	18	46
		i	14	19	00
	Sk	ePKP	14	18	42
	Kermadec Islands.				
» 23	Up	iP	21	44	25
		i	21	44	28
	Ki	iP	21	45	41
	Sk	iP	21	45	04
	Greece.				
» 24	Sk	eP	01	14	28
» 24	Ki	iP	02	22	44
	Aleutian Islands.				
» 24	Sk	iP	05	43	11
	Sicily.				
» 24	Up	iP	08	21	50
	Ki	iP	08	21	36
	Sk	iP	08	21	30
	Vera Cruz, Mexico (h ~ 200 km).				
» 24	Up	iPKP	09	34	06 D

			μ	s
	PKP	z'	0.1	1.0

	Sk	e(PKP)	09	34	10
	Gb	iPKP	09	34	15
	Kermadec Islands.				
» 24	Up	iP	13	21	44
	Ki	iP	13	21	23
	Sk	iP	13	21	46
		i	13	22	13
	Mindanao, Philippine Islands.				
» 24	Up	iP	16	34	02
» 24	Up	iP	17	18	08
	Sk	iP	17	18	47
	Greece.				
» 25	Up	eP	01	11	31
	Ki	i(P)	01	10	55
	Aleutian Islands.				
» 25	Up	iPKP	04	08	40
		i	04	08	48
		i	04	08	55
	Ki	iPKP	04	08	26
	Sk	ePKP	04	08	33
		i	04	08	55
	Gb	iPKP	04	08	46
	Kermadec Islands.				
» 25	Up	iPg	09	34	55
		iSg	09	35	41
	△=390 km=3.5°.				
	Ki	eSn	09	37	40

1959					
Dec 25		iS*	09	37	58
(cont.)		iSg	09	38	31
	△=960 km=8.6°.				
	Sk	i(Sn)	09	37	01
		i	09	37	28
		iSg	09	37	37
	△=780 km=7.0°.				
	Gb	eS*	09	37	08
		iSg	09	37	27
	△=750 km=6.7°.				

Off north coast of Esthonia, 59.6°N, 24.2°E. Origin time=09 33 45. Explosion?

» 25	Up	ePS	10	47	03

			μ	s
	M	E	0.5	18
	M	N	0.6	20
	M	z	0.9	19

	Gb	ePP	10	37	16
	Chile-Argentina (h ~ 100 km).				
» 26	Up	iP	04	48	03
» 26	Up	iPKP	16	34	57
	Kermadec Islands.				
» 26	Up	iP	18	29	20

			μ	s
	P	z'	0.8	2.0
	M	E	1.1	20
	M	N	1.4	18

	Ki	iP	18	28	23
		i	18	28	24

			μ	s
	P	z'	0.3	1.5
	M	E	1.2	18
	M	N	1.2	19
	M	z	1.5	19

	Sk	iP	18	28	52 D
	Gb	iP	18	29	33
		i	18	29	38

Kenai Peninsula, Alaska. Slightly deeper than normal. Magn.=6.2 (Up, Ki).

» 26	Up	iP	20	20	38 C
	Ki	iP	20	20	24 D
		i	20	20	33
	Sk	iP	20	20	53 D
	Tibet.				
» 26	Up	iP	22	01	48

			μ	s
	P	z'	0.2	1.5

	Ki	iP	22	00	56
	Kamchatka.				
» 26	Up	iP	22	13	08 C
		iS	22	21	44

1959			μ	s
Dec 26				
(cont.)	P	N	0.6	1.2
	P	z'	1.5	1.2
	S	E	0.6	4
	M	E	2.9	20
	M	N	4.3	21
	M	z	3.6	20

△=7050 km=63½°.

	Ki	iP	22	12	15 C
		i	22	12	20
		iPP	22	14	22

			μ	s
	P	z'	0.8	1.0
	M	E	3.7	20
	M	N	1.7	18
	M	z	3.6	15

	Sk	iP	22	12	52
		i	22	12	58
	Gb	iP	22	13	26
		i	22	13	36

Kamchatka. Slightly deeper than normal. Magn.=6.7 (Up, Ki).

» 26	Up	iP	22	37	25 C
		i	22	37	31
	Sk	iP	22	38	05
» 26	Up	iP	22	45	24
		ipP	22	45	33
	Ki	iP	22	44	30
	Kamchatka.				
» 26	Up	iP	22	46	52
		ipP	22	47	04

			μ	s
	P	z'	0.2	1.0

	Ki	iP	22	45	59

			μ	s
	P	z'	0.2	1.0

	Sk	iP	22	46	36
	Gb	iP	22	47	10
	Kamchatka.				
» 27	Up	iP	00	13	33
	Ki	iP	00	14	42
	Sk	iP	00	14	11
	Crete.				
» 27	Up	iP	01	34	37
	Ki	iP	01	33	43
	Sk	iP	01	34	20
	Kamchatka.				
» 27	Up	iP	02	01	41
» 27	Up	iP	04	58	22 C
		ipP	04	58	32
		eS	05	06	58

			μ	s
	P	N	0.2	2
	P	z	0.5	2

Column 1 (p. 128)

1959
Dec 27
(cont.)
```
         P      z'    0.2   0.7
         M      E     2.9   20
         M      N     3.5   20
         M      z     2.4   19
         △=7100 km=64°.
Ki   iP              04   57   29
     ipP             04   57   41
                    μ    s
         P      z'    0.4   1.5
         M      E     3.3   19
         M      N     2.3   18
         M      z     4.3   15
Sk   iP              04   58   06
Gb   iP              04   58   43
     ipP             04   58   54
```
Kamchatka. h=40 km (Up, Ki, Gb).
Magn.=6.2 (Up, Ki).

```
» 27 Up  iP          05   00   02
         i           05   01   01
         i           05   01   21
                    μ   s
         P      z'    0.1   0.6
Ki   iP              04   59   09 D
                    μ   s
         P      z'    0.1   1.0
Sk   iP              04   59   46
```
Kamchatka. Possibly more than one
shock (Up).

```
» 27 Up  iP          05   12   31
         ipP         05   12   44
                    μ   s
         P      z'    0.1   0.6
Ki   iP              05   11   38
     i               05   12   03
Sk   iP              05   12   15
Gb   iP              05   12   52
```
Kamchatka.

```
» 27 Up  iP          05   16   50 D
                    μ   s
         P      z'    0.1   0.5
Ki   iP              05   15   57 C
                    μ   s
         P      z'    0.1   1.0
Sk   iP              05   16   34
Gb   iP              05   17   10
```
Kamchatka. Magn.=5.9 (Up, Ki).

```
» 27 Up  iP          05   18   15 D
                    μ   s
         P      z'    0.1   0.5
Ki   iP              05   17   21
                    μ   s
         P      z'    0.1   1.0
Sk   iP              05   17   58
Gb   iP              05   18   35
```
Kamchatka. Magn.=5.9 (Up, Ki).

Column 2 (p. 128)

1959
```
Dec 27  Up   iP      05   28   08
        Ki   iP      05   29   15
        Sk   eP      05   28   47
        i            05   28   52
        Gb   eP      05   28   05
```
Crete.

```
» 27 Up  iP          06   28   44
                    μ   s
         P      z'    0.1   0.5
Ki   iP              06   27   50
Sk   iP              06   28   28
Gb   iP              06   29   03
```
Kamchatka.

```
» 27 Up  iP          06   55   11 C
Ki   iP              06   54   17
Sk   iP              06   54   54
Gb   iP              06   55   30
```
Kamchatka.

```
» 27 Up  iP          07   02   11 C
                    μ   s
         P      z'    0.4   1.0
         M      E     1.4   18
         M      N     1.6   20
         M      z     2.0   21
Ki   iP              07   01   17 C
     i               07   01   20
     i               07   01   39
                    μ   s
         P      z'    0.3   1.0
         M      E     1.8   20
         M      N     0.6   15
         M      z     1.6   16
Sk   iP              07   01   53
     ipP             07   02   04
Gb   iP              07   02   29
```
Kamchatka. Magn.=6.3 (Up, Ki).

```
» 27 Up  eP          07   32   48
```

```
» 27 Up  iP          07   56   01 D
Ki   iP              07   55   07
Sk   eP              07   55   44
Gb   iP              07   56   21
```
Kamchatka.

```
» 27 Up  iP          08   05   31 D
                     08   05   34
Ki   iP              08   04   38
Sk   iP              08   05   15
Gb   iP              08   05   50
```
Kamchatka.

```
» 27 Up  iP          08   16   07 D
Ki   iP              08   15   14
Sk   iP              08   15   51
Gb   iP              08   16   27
```
Kamchatka.

Column 3 (p. 129)

1959
```
Dec 27  Up   iP      08   16   46
             ipP     08   16   56
                    μ    s
         P      z'    0.1   0.9
Ki   iP              08   15   53
                    μ    s
         P      z'    0.2   1.3
Sk   iP              08   16   30
Gb   iP              08   17   05
```
Kamchatka. Magn.=5.8 (Up, Ki).

```
» 27 Up  iP          08   54   02
```

```
» 27 Up  iP          11   59   32
Ki   iP              11   58   38
     ipP             11   58   50
Gb   iP              11   59   52
```
Kamchatka.

```
» 27 Up  iP          12   05   25 C
         ipP         12   05   37
                    μ    s
         P      z'    0.5   1.3
         M      E     2.1   22
         M      N     2.0   22
         M      z     1.7   21
Ki   iP              12   04   32
     i               12   04   54
                    μ    s
         P      z'    0.5   1.5
         M      E     1.7   19
         M      N     1.2   18
         M      z     1.9   14
Sk   iP              12   05   09
Gb   iP              12   05   45 C
     ipP             12   05   57
```
Kamchatka. h=50 km (Up, Gb).
Magn.=6.3 (Up, Ki).

```
» 27 Up  iP          12   07   07 D
```

```
» 27 Up  iPKP        12   56   34
         i(PKKP)     13   07   55
Ki   iPKP            12   56   42 D
     iPP             12   57   43
Sk   iPKP            12   56   36
```
Argentina (h ~ 650 km).

```
» 27 Up  iP          16   03   11 C
         iPa         16   07   10
         iS          16   11   26
                    μ    s
         P      E     0.7   4
         P      N     1.4   4
         P      z     3.5   5
         P      z'    0.6   0.8
         S      E     10    14
         S      N     5.1   15
         M      E     54    20
         M      N     84    20
         M      z     96    21
```

Column 4 (p. 129)

1959
Dec 27
(cont.)   △=6850 km=61½°.
```
Ki   iP              16   02   16 C
     ipP             16   02   30
     iPP             16   04   23
     ePa             16   05   31
     iS              16   09   46
                    μ    s
         P      N     2.3   7
         P      z     4.1   5
         P      z'    1.1   1.0
         PP     z     2.8   7
         S      E     8.7   11
         S      N     3.9   8
         M      E     34    16
         M      N     50    18
         M      z     51    17
         △=5950 km=53½°.
Sk   iP              16   02   53
     i(PP)           16   05   17
Gb   iP              16   03   32
```
Kamchatka. Magn.=6.8 (Up, Ki).

```
» 27 Up  iP          19   38   18
Ki   iP              19   37   23 D
```
Kamchatka.

```
» 27 Up  iP          19   38   55
Ki   iP              19   38   00
                    μ    s
         P      z'    0.1   1.0
Sk   iP              19   38   37 D
Gb   iP              19   39   16
```
Kamchatka. The time interval between this and the preceding shock is 37 sec. The twin shocks at 08 16, Dec. 27, occurred with a time interval of 39 sec, i.e. almost the same. There is a possibility that we have recorded P and pP, i.e. pP — P ≈ 38 sec, corresponding to h=150 km.

```
» 27 Up  iP          21   06   57
Ki   iP              21   06   02
                    μ    s
         P      z'    0.1   1.2
Gb   iP              21   07   17
```
Kamchatka.

```
» 28 Up  iP          01   51   31
Ki   iP              01   50   37
Sk   iP              01   51   14
Gb   eP              01   51   50
```
Kamchatka.

```
» 28 Up  iP          01   54   01 D
                    μ    s
         P      z'    0.1   1.0
Ki   iP              01   53   08 D
                    μ    s
         P      z'    0.1   1.2
```

Column 1

```
1959
Dec 28  Sk   iP              01  53  44 D
(cont.) Kamchatka. Magn.=5.7 (Up, Ki).

»  28   Up   iP              02  19  41
                        μ     s
             P     z'   0.1   0.5
        Ki   iP              02  19  51 C
        Sk   iP              02  20  08
        Hindu Kush (h~200 km).

»  28   Up   iP              07  31  09 C
             i(pP)           07  31  24
             iPcP            07  31  40
             ePa             07  35  16
             iS              07  39  42
                        μ     s
             P     N    1.3   3
             P     z    2.2   3
             P     z'   3.6   2.0
             S     E    7.3   10
             S     N    4.3   11
             M     E    44    23
             M     N    37    22
             M     z    19    21
             △=7150 km=64½°.
        Ki   iP              07  30  16 C
             ipP             07  30  27
             iS              07  38  09
                        μ     s
             P     z    2.7   5
             P     z'   1.6   2.0
             S     E    4.2   12
             S     N    1.7   12
             M     E    23    18
             M     N    19    17
             M     z    18    17
             △=6350 km=57°.
        Sk   iP              07  30  52
        Gb   iP              07  31  29 C
             ipP             07  31  41
        Kamchatka. h=50 km (Up, Ki, Gb).
        Magn.=6.7 (Up, Ki).

»  28   Up   iP              07  37  11

»  28   Up   i(P)            07  39  48

»  28   Up   iP              07  51  58

»  28   Sk   iP              10  30  01
        Iceland.

»  28   Ki   iP              10  34  48

»  28   Up   iP              10  51  22
        Kamchatka.

»  28   Ki   iP              12  10  14 C
             ipP             12  10  24
        Gb   iP              12  11  27
        Kamchatka.
```

Column 2

```
1959
Dec 28  Up   iP              13  15  07
             ipP             13  15  19
             iS              13  23  43
                        μ     s
             P     N    0.5   2
             P     z    1.1   3
             P     z'   2.2   2.2
             M     E    4.0   25
             M     N    3.6   22
             M     z    2.4   19
             △=7150 km=64½°.
        Ki   iP              13  14  15 D
             ipP             13  14  26
                        μ     s
             P     z'   0.7   1.5
             M     E    3.7   20
             M     N    2.3   17
             M     z    2.5   17
        Gb   iP              13  15  27 D
             ipP             13  15  39
        Kamchatka. h=50 km (Up, Ki, Gb).
        Magn.=6.5 (Up, Ki).

»  28   Up   iP              13  20  40
        Ki   iP              13  19  47
        Gb   iP              13  20  59 D
        Kamchatka.

»  28   Up   iP              15  56  17
        Sk   iP              15  57  00
        Ionian Sea.

»  28   Up   iP              17  11  31

»  28   Up   iP              19  53  07
             ipP             19  53  17
        Ki   iP              19  52  14
        Gb   eP              19  53  27
        Kamchatka.

»  28   Up   iP              19  56  57
        Sk   eP              19  56  40
        Gb   iP              19  57  19
        Kamchatka.

»  28   Up   iP              20  38  12 D
                        μ     s
             P     z'   0.2   0.5

»  28   Ki   iP              21  39  12
        Kamchatka.

»  28   Ki   iP              23  41  06
        Gb   iP              23  42  20
        Kamchatka.

»  29   Up   eP              01  58  31

»  29   Up   iP              03  04  00
             ipP             03  04  11
```

Column 3

```
1959
Dec 29                  μ     s
(cont.) P     z'   0.1   1.0
        Ki   iP              03  03  07
        Sk   eP              03  03  44
        Gb   iP              03  04  19
        Kamchatka.

»  29   Gb   ePKP            17  34  19
             i               17  34  27
        Tonga Islands.

»  29   Up   iP              20  21  56
             i               20  21  59
        Ki   iP              20  21  09
        Sk   iP              20  21  50
        Gb   eP              20  22  17
        Lake Baikal, USSR.

»  29   Up   iP              20  47  40 C
             i               20  50  48
                        μ     s
             P     z'   0.2   1.0
        Ki   iP              20  47  13
             i               20  49  19
                        μ     s
             P     z'   0.4   1.0
        Sk   iP              20  47  36
             iPP             20  51  17
        Gb   iP              20  47  56
             iPP             20  51  54
        Mariana Islands (h~350 km).

»  29   Up   iP              21  41  24
        Ki   iP              21  41  14
        Flores Island.

»  30   Up   iPKP            00  18  32 C
        Ki   iPKP            00  18  00
        Gb   ePKP            00  18  35
        North Island, New Zealand.
```

Column 4

```
1959
Dec 30  Ki   iP              11  34  25
             i               11  34  30
        Honshu, Japan.

»  30   Ki   iPg             12  13  46
             iSg             12  14  41

»  30   Up   i(P)            12  59  55
        Gb   iP              13  00  59

»  30   Ki   iP              14  08  57
             ipP             14  09  22
        Sunda Strait (h~150 km).

»  30   Up   iP              14  27  47 D
        Ki   iP              14  26  54
        Kamchatka.    z'

»  30   Up   iPKP            23  49  32 D
             i               23  49  38
                        μ     s
             PKP   z'   0.1   0.5
        Ki   ePKP            23  49  10
        Sk   iPKP            23  49  27
        Kermadec Islands (h~400 km).

»  31   Up   i               00  39  38
             i(Sg)           00  40  47

»  31   Sk   iP              02  58  45 C
        Outer Mongolia-China.

»  31   Up   i(P)            05  50  45

»  31   Up   iP              07  48  39

»  31   Up   iP              20  59  58
        Ki   iP              21  00  35
                        μ     s
             P     z'   0.2   1.3
        Azores Islands.
```