Seismological Institute
Uppsala

SEISMOLOGICAL BULLETIN

UPPSALA, KIRUNA, SKALSTUGAN, GÖTEBORG, UMEÅ and KARLSKRONA

Uppsala	(Up):	59°51.5'N,	17°37.6'E;	h = 14 m
Kiruna	(Ki):	67°50.4'N,	20°25.0'E;	h = 390 m
Skalstugan	(Sk):	63°34.8'N,	12°16.8'E;	h = 580 m
Göteborg	(Gb):	57°41.9'N,	11°58.7'E;	h = 66 m
Umeå	(Um):	63°48.9'N,	20°14.2'E;	h = 16 m
Karlskrona	(Ka):	56°09.9'N,	15°35.5'E;	h = 11 m

JANUARY 1 - 31, 1964

1964
Jan. 1 Um iP 05 25 32.4
i 05 25 42.4
Japan (h = 30 km).

" 1 Ki iP 12 35 46.0
Um eP 12 35 50
Banda Sea (h = 100 km).

" 1 Ki iPKP 16 08 50.5
Sandwich Islands
(h = 30 km).

" 1 Up iP 17 37 41.2 C
eS 17 46 44

		microns	sec
P	Z'	0.1	0.8
S	E	2.5	15
S	N	1.9	12
M	E	11	17
M	N	7.5	17
M	Z	7.1	20

D = 7550 km = 68°.

Ki iP 17 36 54.9 C
iS 17 45 10
iScS 17 46 43

		microns	sec
P	Z	2.7	10
P	Z'	0.4	0.8
S	E	3.2	13
S	N	1.9	12
M	E	21	18
M	N	8.4	16
M	Z	20	20

D = 6800 km = 61°.

Sk iP 17 37 32.5 C
Gb iP 17 38 03.4
Um iP 17 37 16.3 C
ipP 17 37 29.6
iPa 17 41 19

1964
Jan. 1 Um iS 17 45 57
cont. iSS 17 50 20
Ka eP 17 38 05
Kurile Islands. h = 50 km
(Um).
Magn. = 6.3 (Up,Ki).

" 1 Ki iP 21 14 40.6
Um iP 21 15 02.1
Kurile Islands (h = 40 km).

" 1 Um e 22 10 22
i(Sg) 22 10 34.0

" 1 Up iP 22 53 24.9
Ki iP 22 52 38.1

		microns	sec
P	Z'	0.1	1.0

Sk iP 22 53 14.0
Um iP 22 52 59.9
Kurile Islands (h = 50 km).

" 1 Up iP 23 51 41.7 D
ipP 23 51 53.9
Ki iP 23 50 54.5
ipP 23 51 06.9

		microns	sec
P	Z'	0.1	1.0

Um iP 23 51 15.9
ipP 23 51 28.2
Kurile Islands. h = 50 km
(Up,Ki,Um).

" 2 Up iP 05 12 20.0 C

		microns	sec
P	Z'	0.1	0.5

Ki iP 05 11 26.7 C
Sk iP 05 12 03.8
Gb iP 05 12 41.0

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Jan. cont.	2	Um	iP	05 11 51.8	C
		Ka	iP	05 12 44.5	
		Kamchatka (h = 40 km).			
"	2	Up	eP	05 31 20	
			i	05 31 26.1	
		Ki	iP	05 30 25.7	
		Sk	iP	05 31 02.8	C
		Gb	iP	05 31 40.4	
		Um	iP	05 30 51.4	
			i	05 30 56.7	
		Ka	iP	05 31 44.8	C
		Kamchatka (h = 30 km).			
"	2	Up	iP	17 35 57.9	
		Ki	iP	17 36 06.6	
		Sk	iP	17 36 23.2	
		Um	iP	17 35 56.6	
		Hindu Kush (h = 230 km).			
"	3	Ki	iPKP	05 39 02.0	
			i	05 39 05.9	
		Chile (h = 60 km).			
"	3	Up	iP	16 44 56.6	
			i	16 44 58.1	
		Ki	iP	16 45 05.2	
		Um	iP	16 44 54.9	C
		Ka	iP	16 45 01.3	
		Hindu Kush (h = 120 km).			
"	3	Up	iP	17 31 37.2	D
			microns	sec	
			P Z'	0.2 0.9	
		Ki	iP	17 30 44.1	
			microns	sec	
			P Z'	0.1 1.0	
		Sk	iP	17 31 18.2	
		Gb	iP	17 31 55.8	
		Um	iP	17 31 09.8	
		Ka	eP	17 32 01	
		Aleutian Islands (h = 30 km).			
"	3	Um	iP	18 31 22.7	
"	3	Up	iPKP	21 43 13.2	
			iSKP	21 46 04.1	
			microns	sec	
			PKP Z'	0.1 0.6	
		Ki	eSKP	21 45 41	
		Gb	iPKP	21 43 23.0	
		Um	iPKP	21 43 07.8	C
			i	21 43 13.8	
		Ka	iPKP	21 43 25.4	
		Fiji Islands (h = 520 km).			
1964 Jan.	4	Up	iP	10 50 59.5	C
		Ki	iP	10 50 34.5	
		Um	eP	10 50 43	
		Formosa (h = 30 km).			
"	4	Ki	eP	12 51 25	
			i	12 51 31.7	
"	4	Up	iP	16 28 19.0	
			ipP	16 28 33.1	
		Um	iP	16 27 54.2	
			ipP	16 28 08.3	
		Kurile Islands. h = 60 km (Up,Um).			
"	4	Up	iP	16 56 14.9	C
		Formosa (h = 30 km).			
"	5	Um	iP	00 40 27.6	
"	5	Um	iP	09 08 56.0	C
		Japan (h = 30 km).			
"	5	Up	iPKP	10 31 28.5	D
			i	10 31 40.5	
			iX	10 31 53.5	
			i	10 32 01.9	
			microns	sec	
			PKP Z'	0.4 1.0	
		Ki	i(PKP)	10 31 26.2	
		Gb	iPKP	10 31 37.6	
			i	10 31 49.4	
			iX	10 32 02.5	
		Um	iPKP	10 31 15.8	D
			i	10 31 30.2	
		Ka	iPKP	10 31 39.5	D
			i	10 31 51.4	
			iX	10 32 04.1	
		Kermadec Islands (h = 30 km). The phase X appearing 25 sec after PKP (Up,Gb,Ka) could be pPKP or PKP of another shock in the same area.			
"	5	Up	iP	12 10 50.6	
		Ki	iP	12 09 56.9	
		Sk	e(P)	12 10 27	
		Um	iP	12 10 23.8	
		Ka	iP	12 11 13.5	
		Aleutian Islands (h = 60 km).			
"	5	Up	eP	15 04 49	

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Jan. 5 Up eL 17 50
microns sec
M E 1.5 20
M N 1.9 19
M Z 3.0 23
Macquarie Island
(h = 30 km).

" 5 Up iP 18 01 44.8 C
Aleutian Islands
(h = 30 km).

" 5 Up iP 18 47 14.2
ipP 18 47 52.9
microns sec
P Z' 0.1 1.2
Ki iP 18 47 20.7 C
Sk iP 18 47 05.2
Gb iP 18 47 01.0 C
Um iP 18 47 20.9
Peru. h = 150 km (Up).

" 6 Up ePKP 00 04 50
i(PP) 00 05 26.3
ePS 00 15 04
iPKKP 00 15 55.4
microns sec
(PP) Z 1.5 6
M E 4.1 18
M N 5.0 22
M Z 5.8 22
Ki e(PKP) 00 04 57
iPKP 00 05 04.9
i(PKKP) 00 15 18.3
ePS 00 16 16
microns sec
M E 6.1 18
M N 5.0 18
M Z 5.4 17
Sk ePKP 00 04 58
i 00 05 07.4
i(PKKP) 00 15 32.1
Gb i 00 05 18.8
i 00 05 32
Um iPKP 00 05 01.7
iPP 00 05 56.4
iSKKS 00 12 51
e 00 13 37
i(PKKP) 00 15 36.4
iPS 00 15 39
iSS 00 22 12
Ka i(PKP) 00 04 55.7
Prince Edward Islands
(h = 30 km).
Magn. = 6.6 (Up,Ki).

1964
Jan. 6 Up iP 06 06 17.8
microns sec
P Z' 0.2 0.8
Ki iP 06 05 50.7 C
microns sec
P Z' 0.1 1.3
Sk iP 06 06 20.0 C
Gb iP 06 06 39.1 C
Um iP 06 06 00.9
i 06 06 17.1
iS 06 15 18
Ryukyu Islands (h = 110 km).
Magn. = 5.8 (Up,Ki).

" 6 Up ePKP 14 50 05
Sk ePKP 14 49 55
e 14 50 05
Um iPKP 14 49 48.5

" 6 Up iP 15 14 50.5
i 15 14 56.1
microns sec
P Z' 0.1 0.8
Ki iP 15 14 38.5
i 15 14 44.4
Sk iP 15 15 07.6
Um iP 15 14 37.8 C
i 15 14 43.6
Ka iP 15 15 09.6
Sinkiang, China (h = 30 km).

" 6 Up iP 23 55 59.6 C
i 23 56 16
eS 00 04 36
microns sec
P Z' 0,1 0.5
S N 0.8 13
M E 7.6 23
M N 14 22
M Z 14 22
D = 7150 km = 64½°.
Ki iP 23 55 08.4 C
microns sec
M E 11 21
M N 7.9 23
M Z 13 22
Sk iP 23 55 46.3
Gb iP 23 56 21.5
i 23 57 25.5
Um iP 23 55 33.9 C
iPcP 23 56 15.6
iPa 23 59 38
iS 00 03 36
Ka eP 23 56 24
Kamchatka (h = 30 km).
Magn. = 6.0 (Up,Ki).

" 7 Up iP 00 58 35.8
i 00 58 56.9

" 7 Up iP 03 02 55.3 C

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Jan. cont.	7	Sk	eP	03 02 55	
		Um	iP	03 02 38.2	C
"	7	Um	eP	03 48 33	
"	7	Up	iP	05 00 42.0	
		Sk	eP	05 00 59	
		Tibet (h = 50 km).			
"	7	Up	iP	08 57 29.7	
		Ki	iP	08 56 36.3	
			microns	sec	
			P Z'	0.1 1.0	
		Um	iP	08 57 03.4	C
		Aleutian Islands (h = 80 km).			
"	7	Ki	iP	20 12 13.5	C
		Tadzhik SSR (h = 30 km).			
"	7	Up	eP	21 05 04	
		Ki	iP	21 05 03.3	C
		Um	iP	21 05 01.3	
		Sumatra (h = 90 km).			
"	8	Up	iP	10 13 58.2	C
		Ontario-Quebec (h = 30 km).			
"	8	Up	iPKP	12 17 55.5	
		Tonga Islands (h = 30 km).			
"	8	Up	eP	13 53 28	
		Ki	iP	13 52 35.2	
		Sk	iP	13 53 09.6	
		Aleutian Islands (h = 30 km).			
"	8	Up	iP	20 08 54.8	
"	8	Up	iP	20 39 22.2	C
"	8	Up	iP	20 46 18.2	
"	8	Up	iP	22 44 22.1	
		Ki	eP	22 44 12	
		Celebes (h = 90 km).			
"	9	Up	iP	00 00 20.2	
"	9	Up	eP	02 29 19	
			i	02 29 22.0	
"	9	Up	iP	02 32 58.0	
			i	02 33 02.4	
			microns	sec	
			P Z'	0.1 0.5	

1964 Jan.	9	Gb	eP	03 03 13	
"	9	Up	iP	03 10 23.4	
			i	03 10 42.2	
		Ki	iP	03 09 40.6	
			microns	sec	
			P Z'	0.1 1.3	
		Um	iP	03 09 58.0	
			ipP	03 10 13.6	
		Japan. h = 60 km (Um).			
"	9	Up	iP	18 42 49.9	
			iS	18 51 42	
			iScS	18 52 43	
			microns	sec	
			P Z'	0.1 0.5	
			M E	12 19	
			M N	24 20	
			M Z	23 19	
		D = 7550 km = 68°.			
		Ki	iP	18 42 02.7	
			eScS	18 52 07	
			microns	sec	
			P Z'	0.1 1.0	
			M E	17 17	
			M N	22 19	
			M Z	34 19	
		Sk	iP	18 42 41.0	
		Gb	iP	18 43 10.3	C
		Um	iP	18 42 24.6	C
			ipP	18 42 34.9	
			ePa	18 46 16	
			eS	18 50 51	
		Ka	iP	18 43 11.1	
		Kurile Islands, h = 40 km (Um). Magn. = 6.2 (Up,Ki).			
"	9	Up	iP	19 09 26.1	D
"	10	Up	eP	00 19 28	
"	10	Up	iP	03 39 16.3	
		Greece (h = 15 km).			
"	10	Up	iP	05 01 56.3	C
			e(S)	05 11 18	
			microns	sec	
			P Z'	0.3 0.8	
			(S) E	1.2 6	
			M E	6.1 21	
			M N	10 22	
			M Z	9.1 23	
		Ki	iP	05 01 13.4	C
			iS	05 09 40	
			microns	sec	
			P Z'	0.6 0.9	
			S N	1.3 9	

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Jan. 10 cont.

Ki
microns sec
M E 10 19
M N 8,8 19
M Z 9.7 18
D = 6900 km = 62°.
Sk iP 05 01 48.1 C
Gb iP 05 02 17.6 C
i 05 02 32.1
Um iP 05 01 32.5 C
i(pP) 05 01 42.9
iS 05 10 12
Ka iP 05 02 15.9
Japan (h = 30 km).
Magn. = 6.2 (Up,Ki).

" 10 Ka iP 07 45 38.9

" 10 Up iP 11 03 44.7
Um iP 11 03 19.2
Kurile Islands (h = 30 km).

" 10 Up iP 12 07 34.1
Kurile Islands (h = 60 km).

" 10 Up iP 17 08 20.8
microns sec
M E 1.5 20
M N 3.1 19
M Z 3.4 18
Ki iP 17 07 35.8
Gb iP 17 08 42.3
i 17 09 28.5
Um eP 17 07 58
i 17 08 16.8
Ka iP 17 08 44.7
Kurile Islands (h = 50 km).

" 11 Up i(P) 11 56 25.3

" 11 Up iP 14 20 52.7
Japan (h = 110 km).

" 12 Up iP 06 11 05.1
iS 06 19 54
iScS 06 20 57
microns sec
P Z' 0.1 0.6
M E 2.5 25
M N 2.8 20
M Z 1.9 20
D = 7450 km = 67°.
Ki iP 06 10 11.9 D
microns sec
P Z' 0.1 1.1
Sk eP 06 10 42
Gb iP 06 11 19.2 D
Um iP 06 10 38.8

1964 Jan. 12 cont.

Um iS 06 19 00
Ka iP 06 11 27.4
Aleutian Islands
(h = 30 km).
Magn. = 5.8 (Up,Ki).

" 12 Up i(P) 06 39 32.1

" 12 Up iP 08 54 57.0

" 12 Up iP 12 52 40.4
microns sec
P Z' 0.1 0.7
Ki iP 12 53 20.8 C
Gb iP 12 52 50.0
Um iP 12 52 56.2
i(pP) 12 53 09.6
Ka iP 12 52 28.8 C
Iran (h = 70 km).

" 13 Up iP 02 07 17.3 D

" 13 Up iPKP 06 24 27.0
Kermadec Islands
(h = 30 km).

" 14 Up iP 01 21 38.8
Gb iP 01 21 59.7
Kamchatka (h = 50 km).
Our two P waves arrive about
15 seconds too early as
compared with the USCGS
solution.

" 14 Up iPKP 04 37 24.3
Kermadec Islands
(h = 90 km).

" 14 Ka ePg 06 46 21
iSg 06 46 28.3
D = 70 km = 0.6°.
Explosion?

" 14 Up iP 09 02 51.7
microns sec
P Z' 0.1 0.5
Ki eP 09 02 05
Um iP 09 02 26.4
Okhotsk Sea (h = 570 km).

" 14 Up iPKP 10 39 26.7
Sk iPKP 10 39 19.6
Kermadec Islands
(h = 200 km).

" 14 Up iSg 12 49 51.9

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Jan. cont.	14	Ka	iPg	12 47 52.6	
			iSg	12 47 57.8	
			iL	12 48 00.2	
			D = 40 km = 0.4°.		
"	14	Up	iP	15 19 05.6	C
			microns sec		
			P Z' 0.1 0.6		
		Ki	iP	15 18 47.8	
		Um	iP	15 18 54.1	
		Mindoro (h = 40 km).			
"	14	Um	iP	15 39 12.6	
"	14	Um	ePKP	15 56 30	
			eSKS	16 02 47	
		New Britain (h = 170 km).			
"	14	Um	iP	16 52 30.5	
"	14	Um	iP	18 29 20.7	
"	14	Um	iP	19 03 33.4	
			i	19 03 41.2	
"	14	Um	iP	19 51 56.2	
"	15	Up	iP	01 03 55.5	
"	15	Up	i(P)	01 06 38.2	
"	15	Up	iP	02 34 47.1	
		Kurile Islands (h = 50 km).			
"	15	Ki	iP	10 08 38.8	
"	15	Up	iP	18 39 39.4	
"	15	Up	iPKP	19 05 49.1	C
			ipPKP	19 06 46.5	
			microns sec		
			PKP Z' 0.1 0.5		
		Sk	iPKP	19 05 41.9	C
		Gb	iPKP	19 05 57.7	
		Um	iPKP	19 05 37.0	
			i	19 07 11.1	
		Kermadec Islands (h = 210 km).			
"	15	Ki	iP	21 36 40.8	
		Sk	iP	21 36 09.3	C
		Um	iP	21 36 34.5	
		North Atlantic Ocean (h = 30 km).			
"	15	Up	iP	21 48 06.8	C

1964 Jan. cont.	15	Up	iS	21 58 02	
			microns sec		
			P E 1.1 2		
			P N 1.3 2		
			P Z 4.3 2		
			P Z' 0.9 0.7		
			S E 3.2 4		
			M E 6.5 19		
			M N 8.1 21		
			M Z 7.2 22		
			D = 8800 km = 79°.		
		Ki	iP	21 47 33.5	C
			iS	21 56 59	
			i	21 57 19	
			microns sec		
			P E 0.9 6		
			P N 0.6 6		
			P Z 2.6 4		
			P Z' 1.5 0.8		
			S E 9.2 7		
			S Z 2.6 7		
			M E 16 18		
			M N 11 17		
			M Z 26 18		
			D = 8100 km = 73°.		
		Sk	iP	21 48 03.2	C
			eS	21 57 57	
		Gb	iP	21 48 25.5	C
			iS	21 58 41.6	
			iPS	21 59 31.1	
		Um	iP	21 47 47.8	C
			ePP	21 50 55	
			iS	21 57 23	
		Ka	iP	21 48 24.0	C
		Japan (h = 70 km).			
		Magn. = 6.9 (Up,Ki).			
"	15	Um	iP	23 47 31.4	
"	16	Up	iP	02 16 34.3	
"	16	Um	i(P)	03 21 10.2	
"	16	Ki	e(P)	05 32 53	
			iSg	05 33 48.1	
"	16	Up	iP	11 00 50.9	
		Ki	iP	11 00 01.1	
		Um	iP	11 00 24.6	
		Kurile Islands (h = 200 km).			
"	16	Ka	iP	13 59 45.3	
"	16	Up	eP	16 11 49	
		Ki	eP	16 11 15	
		Um	iP	16 11 34.4	

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Jan. cont. 16 Nevada. Underground nuclear explosion.

" 16 Up iP 17 03 21.6
microns sec
P Z' 0.1 0.5

" 16 Um iP 23 20 47.5
Sea of Japan (h = 380 km).

" 17 Up iP 03 05 19.6 C
microns sec
P Z' 0.2 1.0
M E 0.3 17
M N 1.2 20
M Z 0.8 17
Ki iP 03 04 32.7 C
microns sec
P Z' 0.2 1.0
M E 1.0 16
M N 0.7 16
M Z 2.5 20
Sk iP 03 05 08.0
Gb iP 03 05 40.5
Um iP 03 04 54.3
i 03 06 21.0
eS 03 13 29
e 03 17 03
Ka iP 03 05 42.2
Kurile Islands (h = 60 km).
Magn. = 6.1 (Up,Ki).

" 17 Up iPKP 03 13 47.5
Um ePKP 03 13 40
Loyalty Islands
(h = 30 km).

" 17 Up ---
microns sec
M E 0.4 22
M N 1.0 20
M Z 1.0 20
Ki ---
microns sec
M E 1.2 18
M N 1.1 21
M Z 1.5 18
Sk iPKP 03 32 30.8
Um iPKP 03 32 26.3 D
Santa Cruz Islands
(h = 230 km).

" 17 Up iP 03 32 34.8
ipP 03 32 56.6
ePP 03 34 11
microns sec
pP Z' 0.2 1.0

1964 Jan. cont. 17 Ki iP 03 32 43.3 D
iPP 03 34 28.6
microns sec
P Z' 0.1 1.0
Sk iP 03 33 00.5
ipP 03 33 22.3
iPP 03 34 46.6
Gb iP 03 32 57.2
ipP 03 33 19.2
ePP 03 34 38
Um iP 03 32 33.1
iPP 03 34 11.7
Ka iP 03 32 40.5 D
ipP 03 33 01.5
Hindu Kush. h = 100 km
(Up,Sk,Gb,Ka).
At several of our stations the P waves may be complicated by the PKP waves from the preceding shock.

" 17 Up eSg 09 02 47
microns sec
Sg Z' 0.1 0.5
Sk eSg 09 04 45
Um iSg 09 05 00.3
Ka iPg 09 00 43.2
iSg 09 00 48.7
iL 09 00 51.1
D = 40 km = 0.4°.
South coast of Sweden,
56.1°N, 14.9°E.
Origin time = 09 00 36.
Explosion?

" 17 Ka e(P) 09 03 51
i 09 04 00.0

" 18 Um iPKP 07 29 31.5
Easter Island (h = 30 km).

" 18 Up iP 12 12 30.5

" 18 Up iP 12 16 28.1 C
iS 12 26 13
microns sec
P E 0.9 3
P N 0.5 3
P Z 4.2 3
P Z' 1.2 1.0
S E 4.1 8
S N 9.3 11
M E 52 18
M N 99 17
M Z 41 14
D = 8500 km = 76½°.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Jan. cont.

18 Ki iP 12 16 05.4 C
iS 12 25 30
microns sec
P E 2.2 7
P N 0.6 7
P Z 5.6 7
P Z' 0.8 1.5
S E 8.8 10
S N 10 12
M E 64 13
M N 47 15
M Z 53 12
D = 8050 km = 72½°.
Sk iP 12 16 32.1 C
Gb iP 12 16 47.3 C
Um iP 12 16 12.2 C
iPP 12 19 02.2
iPa 12 20 41
iS 12 25 45
Ka iP 12 16 39.8
Formosa (h = 30 km).
Magn. = 7.0 (Up,Ki).

" 18 Up iP 12 44 28.6
Ki iP 12 44 04.4
i 12 44 17.0
Gb iP 12 44 48.4
Um iP 12 44 12.9 C
Formosa (h = 30 km).

" 18 Up iP 14 57 45.4 D
Ki iP 14 57 23.8
Um iP 14 57 30.8
Batan Islands (h = 20 km).

" 18 Up iP 15 22 19.5 C

" 18 Up iPKP 19 03 34.0
microns sec
PKP Z' 0.1 1.0
Gb ePKP 19 03 45
Kermadec Islands
(h = 30 km).

" 18 Up iP 22 47 34.8
microns sec
P Z' 0.1 1.2
Ki iP 22 47 37.2 C
microns sec
P Z' 0.1 1.0
Sk iP 22 47 19.0
Gb i(pP) 22 47 44.9
Um iP 22 47 39.7
i 22 48 05.7
Ka i(pP) 22 47 58.3
Dominican Republic
(h = 100 km).

1964 Jan. cont.

18 Magn. = 5.8 (Up,Ki).

" 19 Up iPKP 07 08 48.8
Ki ePKP 07 09 11
Um iPKP 07 08 56.8 C
Sandwich Islands
(h = 30 km).

" 19 Up iP 08 59 08.7
microns sec
M E 1.2 16
M N 1.3 16
M Z 1.1 18
Ki iP 08 58 46.7 D
microns sec
M E 1.9 17
M N 1.4 16
M Z 3.5 21
Formosa (h = 20 km).
Magn. = 5.6 (Up,Ki).

" 19 Ki iP 09 22 12.7 C
microns sec
P Z' 0.3 0.9
Sk iP 09 22 11.3
Um iP 09 21 50.4 C
i 09 22 17.5
iPP 09 23 32.4
Ka iP 09 21 27.3
Iran (h = 30 km).

" 19 Up iP 10 05 19.4

" 19 Ki iPn 12 53 29.3
iSn 12 54 17.9
iSg 12 54 32.2
D = 410 km = 3.7°.
Sk eSg 12 57 28
Um eSn 12 55 27
iSg 12 56 01.0
Northwest Russia,
69.1°N, 30.0°E.
Origin time = 12 52 31.
Explosion?

" 19 Up iP 16 24 38.2
Formosa (h = 30 km).

" 19 Up iP 18 23 53.8

" 19 Um iPKP 23 41 20.2 D
Fiji Islands (h = 50 km).

" 20 Up iPKP 00 35 29.2
Sk iPKP 00 35 22.5
Um iPKP 00 35 17.2
Kermadec Islands (h = 40 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Jan. 20 Up iP 04 59 58.2
Ki iP 04 59 40.4
Um eP 04 59 47
Mindanao (h = 110 km).

" 20 Up eP 12 40 20
microns sec
P Z' 0.1 0.5

" 20 Um i(P) 15 09 42.7

" 20 Up eP 15 51 30
Formosa (h = 50 km).

" 20 Up iP 16 52 08.0 C

" 20 Up e(PKP) 17 27 35
iPKP 17 27 41.0
iSKP 17 30 58.7
iPKS 17 31 11
microns sec
PKP Z' 0.2 1.0
SKP Z 0.8 3
SKP Z' 0.2 1.0
PKS N 2.0 5
M E 1.7 28
M N 5.5 26
M Z 5.0 25
(D = 15350 km = 138°).
Ki iPKP 17 27 28.4 D
iSKP 17 30 37.1
i 17 31 28
i 17 49 17
microns sec
PKP Z' 0.7 1.1
SKP Z 3.1 3
SKP Z' 1.3 2.0
M E 2.0 19
M N 3.1 23
M Z 3.5 23
(D = 14550 km = 131°).
Sk i(PKP) 17 27 34.3
iPKP 17 27 38.1
iSKP 17 30 55.2
Gb iPKP 17 27 42.6
iSKP 17 31 09.9
Um i(PKP) 17 27 24.8
iPKP 17 27 33.3
ePP 17 30 14
iSKP 17 30 47.6
e 17 36 40
iSKSP 17 39 46
i 17 42 54
Ka e(PKP) 17 27 42
iPKP 17 27 48.1
iSKP 17 31 10.2

1964
Jan. cont. 20 Loyalty Islands
(h = 140 km).
(PKP) are small-amplitude forerunners, compared to the large amplitude PKP (see G. Payo Subiza and M. Båth, Geophys. Journ., 8:496-513, 1964).

" 20 Ka iP 19 31 29.5

" 20 Up iP 20 37 27.2

" 20 Up iP 20 50 22.5
Ki iP 20 50 02.9
Um iP 20 50 09.6
Luzon (h = 50 km).

" 20 Up iP 21 52 45.7

" 20 Up iPKP 23 26 06.2 C
microns sec
PKP Z' 0.1 0.7
Sk iPKP 23 25 59.5 C
Gb ePKP 23 26 18
Um iPKP 23 25 54.0 C
Ka ePKP 23 26 15
Kermadec Islands
(h = 40 km).

" 21 Up iP 11 40 35.1 D

" 21 Up iP 20 34 58.8 D

" 22 Ki e 04 12 44
i(Sg) 04 13 04.4
i(Sg) 04 13 45.4
Probably a near shock.

" 22 Up iPKP 07 06 10.1
Um iPKP 07 05 52.3 D
Kermadec Islands
(h = 170 km).

" 22 Up eP 09 36 16

" 22 Up iP 12 21 09.7
microns sec
P Z' 0.1 0.6

" 22 Up iP 16 09 11.4 D
microns sec
P Z' 0.9 0.8
M N 1.7 17
Ki iP 16 09 07.4 D
microns sec
P Z' 0.7 1.0

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Jan. cont.	22	Sk	iP	16 09 27.3	D
		Gb	iP	16 09 31.2	D
			ipP	16 09 52.5	
		Um	iP	16 09 04.7	
			iS	16 17 33	
		Ka	iP	16 09 19.4	D
			i	16 09 34.8	
		Burma. h = 80 km (Gb).			
		Magn. = 6.9 (Up,Ki).			
"	22	Up	iP	20 41 24.8	
"	22	Up	eP	22 36 37	
"	23	Up	ePKS	00 22 04	
				microns sec	
			PKS E	1.0 6	
			PKS N	1.4 7	
			M E	1.5 20	
			M N	3.7 20	
			M Z	3.2 20	
		Ki	iPKP	00 18 34.1	
			iPP	00 20 08	
				microns sec	
			M E	2.6 20	
			M N	1.7 20	
			M Z	2.8 19	
		Sk	iPKP	00 18 44.9	
		Gb	iPKP	00 18 59.0	
		Um	iPKP	00 18 39.6	
			i	00 18 51.4	
			ePP	00 20 29	
			i	00 28 27	
			iPS	00 30 17	
			iScSP	00 30 34	
		New Hebrides Islands (h = 30 km).			
		Magn. = 6.2 (Up,Ki).			
"	23	Up	iP	03 38 33.9	
		Um	iP	03 38 15.5	C
"	23	Up	iP	05 28 30.5	C
		Um	iP	05 28 11.6	C
		Japan (h = 480 km).			
"	23	Ki	iP	09 22 27.6	D
		Kamchatka (h = 30 km).			
"	23	Up	iP	13 55 10.3	
				microns sec	
			P	Z' 0.1 0.5	
		Um	iP	13 54 51.2	
		Bonin Islands (h = 420 km).			
"	23	Up	iP	15 27 12.6	C
1964 Jan. cont.	23	Ki	iP	15 27 21.2	
		Um	iP	15 27 09.7	
		Ka	iP	15 27 18.0	C
		Hindu Kush (h = 30 km).			
"	23	Up	iP	20 28 51.9	
"	24	Up	i(P)	00 44 25.2	C
"	24	Up	eP	05 39 50	
"	24	Up	iP	13 58 17.4	
				microns sec	
			P	Z' 0.2 0.8	
"	24	Up	iP	17 27 44.1	D
			ipP	17 29 41.6	
			eS	17 35 51	
				microns sec	
			P	Z' 0.5 0.8	
			pP	Z' 0.6 1.6	
		Ki	iP	17 27 09.1	D
			ipP	17 29 03.5	
				microns sec	
			P	Z' 0.5 0.9	
			pP	Z' 0.4 1.5	
		Sk	iP	17 27 41.8	D
			ipP	17 29 39.0	
		Gb	iP	17 28 06.1	D
			ipP	17 30 04.7	
		Um	iP	17 27 22.7	
			ipP	17 29 19.7	
		Ka	iP	17 28 03.0	
			ipP	17 30 03.1	
		Sea of Japan. h = 600 km (Up,Ki,Sk,Gb,Um,Ka).			
		Magn. = 6.0 (Up,Ki).			
"	24	Up	iP	21 42 27.2	
				microns sec	
			P	Z' 0.1 0.9	
		Ki	iP	21 41 40.0	
		Kurile Islands (h = 30 km).			
"	24	Up	iP	22 01 32.1	
"	24	Up	iP	22 57 16.5	
		Ki	iP	22 57 12.3	
		Java (h = 90 km).			
"	25	Up	iPKP	12 28 48.8	
		Kermadec Islands (h = 15 km).			
"	25	Up	iP	13 15 01.9	C

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Jan.	25	Up	iP	19 00 22.9	
"	25	Um	iP	22 59 57.8	D
"	25	Um	iP	23 57 56.3	
"	26	Um	iP	05 25 27.4	
"	26	Ki	i(Sg)	05 40 32.3	
		Um	i(Sg)	05 41 22.5	
"	26	Up	iP	09 23 23.0	
			iPKP	09 27 28.7	
			e	09 27 40	
			iSKS	09 33 50	
			i	09 36 34	
				microns sec	
			PKP Z'	0.1 1.4	
			SKS E	1.7 6	
			M E	1.9 20	
			M N	2.0 20	
			M Z	2.9 18	
		Ki	e	09 26 24	
			i	09 27 53	
			iSKS	09 34 06	
				microns sec	
			SKS E	3.0 10	
		Gb	iP	09 23 09.1	C
		Um	iPP	09 27 50.5	C
			iSKS	09 34 00	
			iS	09 35 17	
			eSP	09 36 50	
			iPKKP	09 39 09.5	
		Ka	iP	09 23 16.3	
		Peru (h = 120 km).			
"	26	Up	iP	10 14 02.4	
				microns sec	
			P Z'	0.1 1.0	
		Ki	iP	10 13 40.0	
		Um	iP	10 13 47.8	
			i	10 13 52.1	
		Formosa (h = 40 km).			
"	26	Um	iP	12 16 24.4	
		Japan (h = 160 km).			
"	27	Up	eP	01 23 07	
				microns sec	
			M E	1.9 20	
			M N	4.0 27	
			M Z	2.6 20	
		Ki	iP	01 24 07.1	D
		Sk	iP	01 23 17.0	
		Um	iP	01 23 36.5	D
			eS	01 32 31	
1964 Jan. cont.	27	Um	i	01 36 32	
		Atlantic Ocean (h = 30 km).			
"	27	Up	iP	13 45 11.0	
			i	13 46 06.2	
"	27	Up	iP	15 02 00.2	
		Gb	i(P)	15 01 04.4	
"	27	Up	iPKP	15 55 53.8	C
		Santa Cruz Islands (h = 170 km).			
"	27	Ki	iP	18 01 25.7	
		Kamchatka (h = 30 km).			
"	27	Up	iP	20 36 50.5	
"	28	Up	iP	09 08 43.5	
"	28	Up	iP	09 21 58.1	
"	28	Up	iP	14 16 40.9	C
			ipP	14 17 21	
			isP	14 17 44	
			isPP	14 19 16	
			iS	14 22 39	
			isS	14 23 45	
				microns sec	
			P E	2.4 2	
			P N	1.4 2	
			P Z'	1.0 0.5	
			pP E	3.8 3	
			S E	4.6 4	
			S N	4.3 3	
			M E	26 14	
			M N	33 12	
			M Z	38 14	
		D = 4600 km = 41½°.			
		Ki	iP	14 16 50.0	C
			ipP	14 17 32	
			iX	14 17 45	
			isP	14 17 55	
			ipPP	14 19 01	
			iPPP	14 19 18	
			iS	14 22 55	
			isS	14 24 00	
			i	14 24 17	
				microns sec	
			P E	6.0 6	
			P N	2.1 6	
			P Z	9.0 6	
			P Z'	1.5 0.8	
			pP E	7.0 5	
			pP Z	8.4 5	

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Jan. 28 Ki
cont.

		microns	sec
S	E	13	10
S	N	10	9
M	E	35	10
M	N	28	11
M	Z	58	15

D = 4800 km = 43°.

Sk	iP	14 17 06.6	
Gb	iP	14 17 02.3	C
	ipP	14 17 45.5	
Um	iP	14 16 39.6	C
	ipP	14 17 19.0	
	iX	14 17 33	
	ipPP	14 18 54	
	isPP	14 19 06	
	iS	14 22 29	
Ka	iP	14 16 45.6	C
	ipP	14 17 27.9	

Hindu Kush. h = 200 km
(Up,Ki,Gb,Um,Ka).
Magn. = 6.9 (Up,Ki).
The time difference between the unidentified phase X (Ki,Um) and pP is 13-14 sec, approximately the time required for a P to traverse the crust twice.

"	28	Up	iP	18 14 44.2	D
"	29	Um	iP	07 53 39.7	
"	29	Up	iP	09 00 43.9	
		Ki	iP	09 00 28.2	

		microns	sec
P	Z'	0.1	1.0

Um	iP	09 00 33.6	C

Celebes Sea (h = 130 km).

"	29	Um	iP	12 52 57.2	D
"	30	Ki	iP	09 18 26.8	
		Um	iP	09 18 36.6	

Sulu Sea (h = 30 km).

"	30	Up	iP	16 34 58.0	D
"	30	Um	iP	17 32 33.8	D

Volcano Islands (h = 30 km).

"	30	Up	iP	17 51 05.4	
			iS	17 55 31	

		microns	sec
P	N	0.4	3
P	Z'	0.1	0.8
S	E	2.0	10

1964 Jan. 30 Up
cont.

		microns	sec
S	N	3.2	9
M	E	2.4	13
M	N	5.4	11
M	Z	5.6	10

D = 2650 km = 24°.

Ki	iP	17 52 09.8	
	eLi	18 00 42	

		microns	sec
P	Z'	0.2	1.1
M	E	5.5	8
M	N	1.5	14
M	Z	3.5	10

Sk	eP	17 51 47
Gb	eP	17 51 02
	i	17 51 10.2
Um	iP	17 51 34.5
	iS	17 56 08
	iSn	17 56 31
Ka	iP	17 50 34.8

Turkey (h = 40 km).
Magn. = 5.5 (Up,Ki).

"	30	Up	iP	20 38 30.5	
"	31	Ki	iP	04 26 12.4	
		Um	iP	04 26 41.9	

Alaska (h = 30 km).

"	31	Up	iP	09 28 15.3	
		Sk	eP	09 28 56	
		Um	iP	09 28 49.9	
			i(pP)	09 29 09.2	
		Ka	eP	09 27 39	

Greece (h = 80 km).

"	31	Up	iP	12 17 53.7	

Markus Båth
November 28, 1964

Seismological Institute
Uppsala

S E I S M O L O G I C A L B U L L E T I N

U P P S A L A, K I R U N A, S K A L S T U G A N, G Ö T E B O R G, U M E Å and K A R L S K R O N A

Uppsala	(Up):	59°51.5'N,	17°37.6'E;	h = 14 m
Kiruna	(Ki):	67°50.4'N,	20°25.0'E;	h = 390 m
Skalstugan	(Sk):	63°34.8'N,	12°16.8'E;	h = 580 m
Göteborg	(Gb):	57°41.9'N,	11°58.7'E;	h = 66 m
Umeå	(Um):	63°48.9'N,	20°14.2'E;	h = 16 m
Karlskrona	(Ka):	56°09.9'N,	15°35.5'E;	h = 11 m

F E B R U A R Y 1 - 29, 1964

1964 Feb.	1	Up	iP	01 58 52.3	
		Ki	iP	01 57 58.8	
				microns	sec
			P Z'	0.1	1.0
		Sk	eP	01 58 29	
		Um	iP	01 58 26.0	
			ipP	01 58 36.0	
		Aleutian Islands.			
		h = 40 km (Um).			
"	1	Up	iP	02 45 19.7	
		Um	iP	02 44 57.0	
		Japan (h = 30 km).			
"	1	Up	eSg	04 16 31	
			i	04 16 49.8	
		Ki	ePn	04 12 56	
			i	04 13 20.8	
			iSn	04 13 41.6	
			iSg	04 13 58.8	
			D = 430 km = 3.9°.		
		Sk	iPg	04 13 13.2	
			iSg	04 13 57.0	
			D = 430 km = 3.9°.		
		Um	iPn	04 13 23.8	C
			i(Sn)	04 14 27.8	
			iS*	04 14 52.5	
			iSg	04 15 10.5	
			D = 670 km = 6.0°.		
		Atlantic Ocean, off Norwegian coast, 67.7°N, 10.0°E (± 0.2°).			
		Origin time = 04 11 52.			
"	1	Up	iP	09 32 15.3	
		Ki	iP	09 31 42.4	
		Um	iP	09 31 56.3	
		Bonin Islands (h = 70 km).			
1964 Feb.	1	Up	iP	11 38 02.4	
		Um	iP	11 37 55.8	
		Nepal (h = 30 km).			
"	1	Up	iP	11 51 32.7	C
"	2	Um	iP	03 55 38.6	
"	2	Um	iP	05 38 01.5	
			i	05 38 16.1	
"	2	Up	iP	06 32 23.4	
		Ki	iP	06 33 20.0	
		Um	iP	06 32 51.8	
"	2	Um	iP	06 44 59.6	
		Panama (h = 40 km).			
"	2	Up	iP	09 06 36.2	
				microns	sec
			M E	6.4	17
			M N	5.4	18
			M Z	9.2	18
		Ki	iP	09 06 12.8	
				microns	sec
			M E	2.7	19
			M N	3.4	16
			M Z	3.6	15
		Sk	iP	09 06 42.9	
		Gb	iP	09 07 00.1	
		Um	iP	09 06 20.5	
		Formosa (h = 30 km).			
		Magn. = 6.0 (Up,Ki).			
"	2	Um	iP	09 24 11.9	
"	2	Um	iP	23 12 25.1	
"	2	Um	iP	23 51 11.5	

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Feb.	3	Um	iP	01 16 58.7	
"	3	Um	iP	01 34 40.3	
"	3	Um	iP	04 46 56.6	
"	3	Um	iP	04 54 13.9	
"	3	Ki	iSn	05 45 37.8	
			iSg	05 46 00.4	
			D = 530 km = 4.8°.		
		Um	iSn	05 46 23.7	
			iSg	05 47 10.3	
			D = 740 km = 6.7°.		
		Northwest Russia, 68.1°N, 33.0°E. Origin time = 05 43 25. Explosion?			
"	3	Sk	iP	15 13 05.1	
"	3	Up	iP	19 05 19.3	
		Ki	iP	19 04 42.1	
		Kurile Islands (h = 30 km).			
"	3	Up	iP	19 05 50.9	
		Kurile Islands (h = 40 km). Agreement with the USCGS solution not quite satisfactory in this and the preceding case.			
"	3	Gb	iPKP	20 24 23.8 C	
		South of Fiji Islands (h = 510 km).			
"	3	Ki	iP	21 15 14.0	
		Um	iP	21 15 29.4	
		Japan (h = 50 km).			
"	4	Up	eP	01 04 14	
"	4	Up	iP	10 13 09.2	
		Ki	iP	10 12 20.2	
		Um	iP	10 12 42.4	
		Kurile Islands (h = 40 km).			
"	4	Up	iP	20 35 46.1	
				microns sec	
			P	Z' 0.1 0.6	
"	5	Up	iP	11 41 43.9	
				microns sec	
			P	Z 4.1 5	
			P	Z' 0.1 0.8	
			M	E 6.1 20	

1964 Feb. cont.	5	Up		microns sec	
			M	N 5.8 18	
			M	Z 7.5 18	
		Ki	iP	11 41 04.4	
				microns sec	
			P	Z' 0.1 1.2	
			M	E 12 18	
			M	N 8.3 20	
			M	Z 15 18	
		Sk	eP	11 41 40	
		Gb	iP	11 42 04.6	
		Um	iP	11 41 21.2	
		Japan (h = 50 km). Magn. = 6.1 (Up,Ki).			
"	5	Ki	i(PP)	11 56 18.3	
				microns sec	
			(PP)	Z' 0.1 1.0	
		Fiji Islands (h = 410 km).			
"	5	Up	i(P)	13 09 35.8	
				microns sec	
			(P)	Z' 0.1 1.0	
"	5	Ki	i(Pg)	16 24 09.3	
			iSg	16 24 58.0	
		Um	iSg	16 26 41.6	
		Probably northwest Russia.			
"	6	Up	iP	04 48 13.6	
		Ki	iP	04 48 18.2	
		Colombia (h = 140 km).			
"	6	Ki	iP	07 53 45.3	
		Aleutian Islands (h = 30 km).			
"	6	Up	iP	13 18 00.1 C	
			i	13 18 03.3	
			iS	13 26 39	
			i	13 26 43	
				microns sec	
			P	N 6.8 6	
			P	Z 9.4 6	
			P	Z' 1.8 1.5	
			S	E 26 15	
			S	N 39 15	
			M	E 42 20	
			M	N 110 23	
			M	Z 96 22	
		D = 7150 km = 64½°.			
		Ki	iP	13 17 06.9 C	
			i	13 17 09.9	
			i	13 17 49	
			iPa	13 20 27	
			i	13 21 09	

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Feb. cont.	6	Ki	iS	13 24 56		
			i	13 25 00		
				microns	sec	
			P	N 6.7	7	
			P	Z 13	5	
			P	Z' 1.9	1.1	
			S	E 40	15	
			S	N 9.3	10	
			S	Z 20	13	
			M	E 87	18	
			M	N 100	21	
			M	Z 170	21	
			D = 6300 km = 56½°.			
		Sk	iP	13 17 34.6		
			i	13 17 37.2		
		Gb	iP	13 18 13.0 C		
			i	13 18 15.9		
		Um	iP	13 17 34.5 C		
			i	13 17 37.4		
			iS	13 25 52		
		Ka	iP	13 18 23.6		
			i	13 18 26.3		
		Kodiak Island (h = 30 km).				
		Magn. = 7.1 (Up,Ki).				
		P and S phases are multiple with a small-amplitude P followed within an average of 3 sec by a large-amplitude P (Up,Ki,Sk,Gb, Um,Ka), the corresponding interval for S being 4 sec (Up,Ki).				
"	6	Up	iP	13 24 20.5 C		
				microns	sec	
			P	Z' 0.2	1.0	
		Ki	iP	13 23 27.0 C		
				microns	sec	
			P	Z' 0.5	1.1	
		Sk	iP	13 23 54.3 C		
		Gb	iP	13 24 33.1 C		
		Um	iP	13 23 54.3 C		
		Kodiak Island (h = 30 km).				
"	6	Up	iP	19 20 56.7		
				microns	sec	
			M	E 1.6	17	
			M	N 2.2	16	
			M	Z 2.0	13	
		Ki	iP	19 20 30.6		
				microns	sec	
			M	E 1.4	11	
			M	N 1.5	14	
			M	Z 1.8	11	
		Um	iP	19 20 40.5 D		
		Ryukyu Islands (h = 30 km).				
		Magn. = 5.6 (Up,Ki).				

1964 Feb.	6	Up	iP	19 23 42.3		
		Um	iP	19 23 26.5		
		Ryukyu Islands.				
		Origin time = 19 11 43.				
"	6	Up	iPKP	20 52 51.1		
		Sk	iPKP	20 52 37.0		
		Um	iPKP	20 52 32.3		
		Kermadec Islands (h = 30 km).				
"	7	Ki	iP	00 20 21.6		
		Kodiak Island (h = 30 km).				
"	7	Ki	iP	01 57 25.3		
			iS	01 59 13.7		
		Um	iP	01 58 23.2		
			iS	02 01 04.0		
			i	02 01 20.3		
			i	02 02 41.7		
		Svalbard region (by combination with readings from Finland, Norway and Greenland).				
		Origin time = 01 55 08.				
		Agreement between data not quite satisfactory.				
"	7	Up	iP	08 46 16.1 C		
		Sk	iP	08 46 18.3		
		Ryukyu Islands (h = 50 km).				
"	7	Up	iP	13 10 07.0 C		
				microns	sec	
			P	Z' 0.2	1.1	
			M	E 1.8	19	
			M	N 2.4	20	
			M	Z 3.4	21	
		Ki	iP	13 09 25.6		
			ipP	13 09 36.8		
				microns	sec	
			P	Z' 0.2	1.0	
			M	E 3.0	20	
			M	N 2.5	16	
			M	Z 6.1	16	
		Sk	iP	13 09 59.4 C		
		Gb	iP	13 10 27.6 C		
		Um	iP	13 09 43.8 C		
			ipP	13 09 55.6		
		Japan. h = 50 km (Ki,Um).				
		Magn. = 5.8 (Up,Ki).				
"	7	Up	iP	13 30 54.7		
"	7	Ki	iP	14 44 06.8		
"	7	Up	iP	19 04 10.3 D		

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Feb.	7	Up	iP	20 35 10.5	D
"	7	Up	iP	21 50 20.2	
		Ki	eP	21 49 53	
		Um	iP	21 50 04.0	
		Ryukyu Islands (h = 50 km).			
"	8	Up	iP	06 34 43.5	
			iPP	06 35 33.1	
		Ki	iP	06 35 19.6	
			iPP	06 36 30.3	
		Um	iP	06 34 55.8	
		Iran (h = 30 km).			
"	8	Up	iP	06 39 06.2	
		Kurile Islands (h = 30 km).			
"	8	Up	eP	10 09 01	
		Ki	iP	10 08 41.5	
		Mindanao (h = 60 km).			
"	8	Up	iP	11 28 32.4	D
				microns sec	
			P	Z' 0.3 0.5	
		Ki	iP	11 27 38.7	D
				microns sec	
			P	Z' 0.4 1.0	
		Sk	iP	11 28 12.5	D
		Gb	iP	11 28 49.9	D
		Um	iP	11 28 04.6	D
		Ka	iP	11 28 56.3	
		Aleutian Islands (h = 60 km). Magn. = 6.5 (Up,Ki).			
"	8	Up	iP	12 03 37.5	C
			i	12 03 42.6	
		Kamchatka (h = 30 km).			
"	8	Up	iSn	20 14 53.6	
			iSg	20 15 40.3	
			D = 800 km = 7.2°.		
		Ki	eP*	20 12 54	
			iSn	20 13 38.4	
			iSg	20 13 55.3	
			D = 470 km = 4.2°.		
		Sk	i(Pn)	20 12 20.2	
			iSn	20 12 59.0	
			iSg	20 13 16.0	
			D = 300 km = 2.7°.		
		Um	eP*	20 13 11	
			iPg	20 13 19.8	
			iSg	20 14 19.5	
			i	20 14 33.7	
			D = 560 km = 5.0°.		
		Atlantic Ocean, off Norwegian coast, 66.4°N, 10.2°E.			
1964 Feb. cont.	8	Origin time = 20 11 40.			
"	8	Up	ePKP	21 39 10	
		Um	iPKP	21 38 57.1	
"	8	Um	iP	22 26 38.5	
		Kurile Islands (h = 50 km).			
"	9	Up	i(PKP)	02 18 18.2	
			iPKP	02 18 31.3	
			iSKP	02 21 15.5	
				microns sec	
			SKP Z'	0.1 1.0	
		Ki	iPKP	02 18 15.7	C
			iSKP	02 20 47.9	
		Sk	eSKP	02 21 08	
		Gb	iSKP	02 21 24.5	
		Um	i(PKP)	02 18 12.0	
			iPKP	02 18 21.7	
			iSKP	02 21 01.6	
		Ka	i(PKP)	02 18 30.5	
		Fiji Islands (h = 480 km). At Up and Um, PKP has much larger amplitude than (PKP).			
"	9	Um	e(P)	05 10 01	
			i	05 10 09.8	
"	9	Um	iP	06 15 01.6	
		Red Sea (h = 30 km).			
"	9	Up	iP	16 20 16.5	
		Ki	iP	16 20 18.3	C
		Sk	iP	16 20 32.4	
		Gb	iP	16 20 31.6	
		Um	iP	16 20 13.9	C
		Sumatra (h = 30 km).			
"	9	Up	i(P)	19 05 08.2	
"	10	Up	iP	03 55 26.7	
		Um	iP	03 55 25.2	D
		Hindu Kush (h = 250 km).			
"	10	Up	i(P)	13 45 19.5	
"	10	Up	iP	17 41 12.0	
		Ki	iP	17 41 11.0	
		Um	iP	17 41 09.2	
			i	17 41 22.5	
		Sumatra (h = 30 km).			
"	10	Sk	iP	22 20 01.4	
		Tadzhik SSR (h = 50 km).			
"	11	Up	iP	06 45 20.4	

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Feb. cont. 11 Kurile Islands (h = 130 km).
" 11 Up iP 10 40 15.9 C
" 11 Up iP 11 01 25.3 D
" 11 Ka iPg 14 35 28.0
iSg 14 35 29.5
D = 10 km = 0.1°.
Local explosion?
" 11 Up iP 15 07 50.0
" 11 Um iP 20 22 29.0
" 11 Up iP 20 41 29.5
" 11 Um iPKP 21 48 30.5
Solomon Islands
(h = 100 km).
" 12 Ki eP 08 26 08
Sk ePP 08 27 15
Turkmen SSR (h = 30 km).
" 12 Um iP 08 53 16.4
" 12 Um iP 18 01 49.4
Kurile Islands (h = 30 km).
" 12 Up ---

		microns	sec
M	E	7.9	19
M	N	5.7	19
M	Z	12	19

Ki ePS 20 59 43

		microns	sec
M	E	4.9	21
M	N	6.3	20
M	Z	4.1	18

Um iPS 21 00 09
i 21 04 47
eSS 21 05 58
i 21 09 54
Admiralty Islands
(h = 30 km).
Magn. = 6.5 (Up,Ki).
" 12 Up i(P) 21 14 40.9
" 12 Um iP 21 41 01.7
" 12 Up iPKS 22 56 42

		microns	sec
PKS	N	0.8	5
M	E	1.1	19

1964 Feb. cont. 12 Up

		microns	sec
M	N	2.3	22
M	Z	2.3	23

Ki ---

		microns	sec
M	E	1.2	21
M	N	0.9	19
M	Z	1.0	18

Um iSS 23 12 47
Samoa Islands (h = 30 km).
Magn. = 6.0 (Up,Ki).
" 12 Up iP 23 59 31.7 D

		microns	sec
P	Z'	0.1	1.3

" 13 Um iP 01 53 52.1
Ryukyu Islands (h = 130 km).
" 13 Up eP 02 16 05
i(pP) 02 16 19.6
i 02 16 48.4
Ki eP 02 15 39
Gb eP 02 16 40
Um iP 02 15 48.3
i(pP) 02 16 03.5
Ryukyu Islands. h = 60 km
(Up,Um).
" 13 Um eP 05 10 05
i 05 10 17.0
" 13 Um iP 05 18 39.2
Hindu Kush (h = 70 km).
" 13 Ki iPn 05 50 40.1
iSn 05 51 35.2
iSg 05 51 58.6
D = 510 km = 4.6°.
Sk eSg 05 54 32
Um iSn 05 52 20.6
iSg 05 53 01.0
D = 710 km = 6.4°.
Northwest Russia, 67.8°N,
32.5°E.
Origin time = 05 49 28.
Explosion?
" 13 Up iP 08 11 21.6
" 13 Up eP 10 14 29

		microns	sec
M	E	1.3	17
M	N	1.5	15
M	Z	1.0	20

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Feb. cont.	13	Ki	iP		10 14 11.8	C
				microns	sec	
			M	E	0.9	15
			M	N	2.0	20
			M	Z	1.1	13
		Um	eP		10 14 14	
		Yunnan Province, China (h = 30 km). Magn. = 5.5 (Up,Ki).				
"	13	Up	iP		14 00 49.6	
			iPP		14 02 23.1	
				microns	sec	
			P	Z'	0.1	1.0
			M	E	1.2	16
			M	N	2.2	11
			M	Z	2.0	18
		Ki	iP		14 00 52.5	
			iPP		14 02 27.9	
				microns	sec	
			P	Z'	0.1	1.0
			M	E	1.0	11
			M	N	3.4	13
		Sk	iP		14 01 13.3	
			iPP		14 02 56.0	
		Gb	eP		14 01 13	
			iPP		14 02 55.0	
		Um	iP		14 00 44.6	
			i		14 00 50.8	
			isP		14 01 58.1	
			i		14 10 57	
		Ka	iP		14 00 59.4	
			iPP		14 02 33.5	
		Tadzhik SSR (h = 140 km). Magn. = 5.7 (Up,Ki).				
"	14	Ki	eP		07 06 59	
		Sk	iP		07 07 37.4	
		Gb	iP		07 07 50.4	
		Um	iP		07 07 07.9	C
			i(pP)		07 07 20.6	
		Japan (h = 30 km).				
"	14	Up	iP		08 34 30.2	
		Hindu Kush (h = 200 km).				
"	14	Up	iPg		10 26 59.6	
			iSg		10 27 52.0	
			D = 440 km = 4.0°.			
		Sk	eSg		10 28 41	
		Gb	iPg		10 26 00.8	
			iSg		10 26 09.6	
			iL		10 26 13.2	
			D = 80 km = 0.7°.			
		Um	iSg		10 29 34.9	
		Ka	iSg		10 27 27.3	

1964 Feb. cont.	14	Off west coast of Sweden, 58.2°N, 11.1°E (± 0.1°). Origin time = 10 25 44. Explosion?				
"	14	Up	iSg		10 35 35.8	
				microns	sec	
			Sg	Z'	0.1	0.5
		Sk	eSg		10 36 27	
		Gb	iPg		10 33 44.8	
			iSg		10 33 53.4	
			iL		10 33 57.0	
			D = 80 km = 0.7°.			
		Um	iSg		10 37 21.2	
		Ka	iSg		10 35 14.2	
		Off west coast of Sweden, 58.2°N, 11.1°E. Origin time = 10 33 29. Explosion?				
"	14	Up	iSg		10 43 47.4	
		Sk	eSg		10 44 39	
		Gb	iPg		10 41 58.4	
			iSg		10 42 07.1	
			iL		10 42 09.9	
			D = 80 km = 0.7°.			
		Off west coast of Sweden, 58.2°N, 11.1°E. Origin time = 10 41 41. Explosion?				
"	14	Up	iP		15 58 38.7	
		Ki	eP		15 59 14	
		Sk	eP		15 59 14	
		Gb	eP		15 58 51	
		Um	eP		15 58 51	
		Ka	iP		15 58 30.0	
		Iran (h = 50 km).				
"	14	Um	iP		16 32 15.2	C
"	14	Up	iPKP		16 48 19.7	
			ePS		16 59 08	
				microns	sec	
			M	E	5.5	22
			M	N	7.6	23
			M	Z	9.8	23
		Ki	ePKP		16 48 08	
				microns	sec	
			M	E	8.4	23
			M	N	10	24
			M	Z	11	23
		Sk	iPKP		16 48 20.7	
		Gb	iPKP		16 48 27.5	
		Um	iP		16 44 25	D
			iPKP		16 48 14.7	

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Feb. cont.	14	Um	iPP	16 48 56	
			eSKS	16 55 07	
			i	16 57 44	
			iPS	16 58 45	
			ePKKP	16 59 08	
			iSS	17 04 33	
			(D = 12450 km = 112°).		
		Ka	ePKP	16 48 27	
		New Britain (h = 60 km).			
"	14	Um	eP	20 10 30	
"	15	Ki	ePn	05 34 53	
			iSn	05 35 39.0	
			iSg	05 35 57.6	
			D = 420 km = 3.8°.		
		Sk	eSg	05 38 33	
		Um	iSn	05 36 22.5	
			iSg	05 37 03.3	
		Northwest Russia, 67.9°N, 30.5°E.			
		Origin time = 05 33 52.			
		Explosion?			
"	15	Up	i(P)	12 13 23.8 C	
"	15	Up	eP	13 18 17	
		Ki	iP	13 17 26.2	
				microns sec	
			P	Z' 0.1 1.0	
		Gb	iP	13 18 33.7	
		Um	iP	13 17 52.7	
			iPcP	13 18 29.4	
		Ka	iP	13 18 42.6	
		Aleutian Islands (h = 50 km).			
"	15	Up	iP	13 20 30.3	
		Sk	iP	13 20 04.5	
		Um	iP	13 20 03.1	
		Aleutian Islands.			
"	15	Um	iPKP	22 20 37.7	
		Solomon Islands (h = 50 km).			
"	16	Up	iP	00 24 25.1 C	
			i	00 24 44.8	
				microns sec	
			P	Z' 0.1 0.6	
		Ki	iP	00 25 03.9 C	
			iPP	00 26 41.3	
				microns sec	
			P	Z' 0.1 0.9	
		Sk	iP	00 25 00.7 C	
			e	00 26 14	

1964 Feb. cont.	16	Gb	iP	00 24 36.2	
		Um	iP	00 24 39.3 C	
			iPcP	00 26 49.7	
		Ka	iP	00 24 14.0 C	
		Iran (h = 40 km).			
		Magn. = 5.9 (Up,Ki).			
"	16	Um	iPKP	01 56 15.6	
		New Hebrides Islands (h = 110 km).			
"	16	Ki	eSn	04 57 02	
			iSg	04 57 23.4	
		Sk	eSg	04 59 50	
		Um	eS*	04 57 58	
			iSg	04 58 15.6	
		Northwest Russia, 67.4°N, 31.4°E.			
		Origin time = 04 55 04.			
		Explosion?			
"	16	Up	iP	05 14 30.1	
		Um	iP	05 14 11.4 D	
		Japan (h = 420 km).			
"	16	Up	iP	21 12 16.8	
		Ki	eP	21 11 32	
		Um	eP	21 11 51	
		Kurile Islands (h = 80 km).			
"	16	Um	iPKP	21 53 08.0	
		New Britain (h = 50 km).			
"	17	Um	iP	03 16 44.8	
"	17	Up	iP	06 02 29.7	
		Ki	eP	06 02 02	
				microns sec	
			M	E 0.5 13	
			M	N 0.3 13	
			M	Z 0.5 12	
		Um	eP	06 02 14	
			i(pP)	06 02 27.6	
		Formosa (h = 30 km).			
"	17	Ki	iP	12 23 51.6	
		Um	iP	12 23 13.0	
		Switzerland (h = 30 km).			
"	17	Up	iP	15 18 39.4	
		Um	iP	15 18 22.8	
		Japan (h = 70 km).			
"	17	Um	iSKP	17 04 04.2	
		Fiji Islands (h = 550 km).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Feb. 18 Um ePKP 01 50 18
New Hebrides Islands
(h = 80 km).

" 18 Up iP 03 58 30.3 C
i 03 58 35.6
microns sec
P Z' 0.2 0.5
Ki iP 03 58 24.6
Sk iP 03 58 47.0 C
Gb iP 03 58 50.9 C
Um iP 03 58 22.5 C
i 03 58 28.2
Ka iP 03 58 39.2
Bhutan (h = 30 km).

" 18 Up iP 04 58 58.7
Um iP 04 58 42.1 C
Mariana Islands (h = 80 km).

" 18 Up iPKP 05 01 32.9
Ki iPKP 05 01 18.2 D
Sk iPKP 05 01 27.0
Um ePKP 05 01 25
Tonga Islands (h = 290 km).

" 18 Up iP 06 50 44.5
Kurile Islands (h = 30 km).

" 18 Ki iP 12 26 51.2 C
microns sec
P Z' 0.1 1.1
Um eP 12 26 38
Azores (h = 30 km).

" 18 Up iP 17 15 32.7
microns sec
P Z' 0.1 0.8
Ki iP 17 15 41.6
Sk iP 17 15 58.2
Um iP 17 15 30.9
Hindu Kush (h = 220 km).

" 18 Up iP 22 54 52.3
i 22 55 01.4
Um eP 22 54 27
Kurile Islands (h = 40 km).

" 19 Ki iP 06 41 07.8
Azores (h = 30 km).

" 19 Ki iP 09 29 00.9
Java (h = 50 km).

" 19 Up iPKP 10 17 06.7
Fiji Islands (h = 600 km).

1964
Feb. 19 Um e 13 00 35
iSg 13 01 03.6

" 20 Up iP 00 48 01.8 D

" 20 Up iP 02 58 08.2
Aleutian Islands
(h = 30 km).

" 20 Up iP 03 37 52.3 C
Gb iP 03 38 09.3
Um iP 03 37 24.7
Aleutian Islands
(h = 30 km).

" 20 Up iP 03 41 36.3
Um iP 03 41 08.5
(Aleutian Islands).

" 20 Up iP 04 02 34.6
Um iP 04 02 07.5 C
Aleutian Islands
(h = 30 km).

" 20 Up iP 08 46 28.0
microns sec
P Z' 0.1 0.5
Ki iP 08 45 41.2 C
Sk eP 08 46 17 C
Gb iP 08 46 49.4 C
Um iP 08 46 03.1 C
iPcP 08 46 39.3
Ka iP 08 46 51.2 C
Kurile Islands (h = 50 km).

" 20 Up iP 10 04 50.5
microns sec
P Z' 0.1 0.5
M E 1.9 20
M N 2.2 18
M Z 2.7 17
Ki iP 10 04 03.7
microns sec
M E 2.1 18
M N 1.9 18
M Z 2.4 16
Sk iP 10 04 40.1
Gb iP 10 05 12.3
i(pP) 10 05 21.8
Um iP 10 04 24.4
iS 10 12 57
iScS 10 14 21
Ka iP 10 05 13.3
Kurile Islands (h = 50 km).

" 21 Um iP 00 17 23.1

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Feb. cont.	21	Um	i	00 17 38.3	
		Bonin Islands (h = 30 km).			
"	21	Ki	iP	17 22 18.1	
		Um	eP	17 22 05	
		Azores (h = 30 km).			
"	22	Up	iPKP	02 07 16.6	
				microns	sec
			PKP Z'	0.1	0.7
		Ki	iPKP	02 06 45.9	
				microns	sec
			PKP Z'	0.1	1.0
		Sk	iPKP	02 06 59.2	
		Gb	iPKP	02 07 31.7	
		Um	iPKP	02 06 53.5	
		Ka	iPKP	02 07 31.7	
		New Zealand (h = 200 km).			
"	22	Up	iP	08 36 33.3	
"	22	Up	iPKP	09 10 16.9	C
				microns	sec
			PKP Z'	0.3	0.9
		Ki	ePKP	09 09 55	
		Sk	iPKP	09 10 09.8	C
		Gb	iPKP	09 10 25.5	
		Um	iPKP	09 10 03.8	
		Ka	iPKP	09 10 26.5	C
		Kermadec Islands (h = 30 km).			
"	22	Up	iP	16 15 50.9	D
		Ki	iP	16 15 18.1	
		Um	iP	16 15 31.6	
			ipP	16 17 07.4	
		Japan. h = 430 km (Um).			
"	22	Up	iP	18 01 42.3	
		Um	eP	18 01 14	
		Kurile Islands (h = 60 km).			
"	22	Up	iP	21 28 15.4	
		Ki	eP	21 27 50	
		Sk	iP	21 28 18.8	
		Gb	iP	21 28 35.4	
		Um	iP	21 27 59.9	
		Ka	iP	21 28 32.6	
		Ryukyu Islands (h = 50 km).			
"	23	Um	iP	02 03 16.9	
"	23	Ki	e(Sg)	05 03 52	
		Sk	e(Sg)	05 06 27	
		Um	i	05 04 41.2	
			iSg	05 04 56.9	

1964 Feb. cont.	23	Northwest Russia. Explosion?			
"	23	Up	iP	07 14 50.8	
"	23	Ki	eP	19 48 20	
		Azores (h = 30 km).			
"	23	Up	iP	22 45 47.6	C
			iS	22 49 37	
			iLg2	22 52 41	
				microns	sec
			P Z'	0.1	0.5
			S E	0.6	6
			S N	1.3	8
			M E	8.0	14
			M N	4.5	10
			M Z	4.5	16
		D = 2350 km = 21°.			
		Ki	iP	22 47 01.3	
			iPP	22 47 43.9	
			e(Sn)	22 52 10	
			iLg2	22 56 39	
				microns	sec
			M E	6.2	15
			M N	2.5	12
			M Z	3.1	12
		Sk	iP	22 46 31.3	
		Gb	iP	22 45 39.4	
		Um	iP	22 46 25.2	C
			iS	22 50 48	
			i	22 52 18	
		Ka	iP	22 45 11.6	
		Aegean Sea (h = 30 km).			
		Magn. = 5.4 (Up,Ki).			
"	24	Up	iPKP	05 21 05.4	
		South of Fiji Islands (h = 290 km).			
"	24	Um	eP	08 03 14	
"	24	Up	iP	10 04 14.1	
			i	10 04 20.5	
				microns	sec
			P Z'	0.2	1.3
		Ki	iP	10 04 38.5	
			i	10 04 43.4	
				microns	sec
			P Z'	0.1	1.3
		Gb	iP	10 04 32.2	
		Um	eP	10 04 22	
			i	10 04 29.2	
		Chagos Islands (h = 30 km).			
		Magn. = 5.7 (Up,Ki).			
		P is multiple, the first			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Feb. cont. 24 small-amplitude phase being followed within 6 sec (as average) by a larger-amplitude phase (Up,Ki,Um).

" 24 Up iP 11 37 21.0
iPP 11 37 50.4
Ki iP 11 38 26.2 C
microns sec
P Z' 0.1 1.0
Um iP 11 37 55.1
Turkey (h = 30 km).

" 24 Up iPKP 16 37 38.2
i 16 37 44.8
microns sec
PKP Z' 0.1 0.5
Sk iPKP 16 37 35.6
Um iPKP 16 37 27.4
Kermadec Islands
(h = 380 km).

" 24 Um ePKP 19 03 13 D
New Hebrides Islands
(h = 170 km).

" 24 Um iPKP 20 18 14.8
New Hebrides Islands
(h = 240 km).

" 24 Up iP 21 07 47.4 C
Um iP 21 07 28.8
South of Japan
(h = 500 km).

" 24 Sk iP 23 12 22.2
Aegean Sea (h = 60 km).

" 24 Sk iP 23 26 50.2
Um eP 23 26 45
(Aegean Sea).

" 24 Up iP 23 35 08.4
microns sec
M E 2.1 16
M N 0.9 11
M Z 0.9 10
Ki ---
microns sec
M E 1.3 12
M N 0.9 14
M Z 1.4 13
Sk iP 23 35 51.4
Um iP 23 35 46.6 D
iPP 23 36 37

1964 Feb. cont. 24 Um iS 23 40 15
iLi 23 42 50
Aegean Sea (h = 15 km).

" 25 Um eSS 01 08 56
Prince Edward Island
(h = 30 km).

" 25 Um iPKP 03 27 53.2
South of Australia
(h = 30 km).

" 25 Up iP 04 15 36.2 D
microns sec
P Z' 0.2 0.6
Ki iP 04 15 02.4 D
microns sec
P Z' 0.1 0.9
Sk iP 04 15 33.3 D
iPP 04 18 26.2
Gb iP 04 15 55.8 D
Um iP 04 15 16.7 D
Ka iP 04 15 53.9
South of Japan (h = 370 km).

" 25 Ki iPn 05 50 18.6
iSn 05 51 14.2
iSg 05 51 31.1
D = 470 km = 4.2°.
Sk e 05 53 33
eSg 05 54 12
Um iSn 05 51 59.3
iSg 05 52 42.7
Northwest Russia, 68.0°N, 31.7°E. Origin time = 05 49 14. Explosion?

" 25 Up iP 10 15 35.5 D
Ki iP 10 14 48.3
Um eP 10 15 08
Kurile Islands (h = 50 km).

" 25 Up i(P) 15 07 07.7

" 25 Um iP 16 20 19.6

" 25 Up iP 19 02 34.4

" 25 Up iP 19 07 55.5

" 25 Up iP 20 39 45.9 C
microns sec
P Z' 0.1 0.5

" 25 Up i(P) 20 42 03.0

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Feb.	25	Up	iP	23 15 15.7	D
"	25	Up	iPKP	23 43 12.8	
			i	23 43 17.0	
				microns sec	
			PKP	Z' 0.1 0.6	
		Sk	iPKP	23 43 05.9	
		Gb	ePKP	23 43 25	
		Um	iPKP	23 43 00.0	
		Kermadec Islands (h = 50 km).			
"	25	Up	iPKP	23 50 23.2	
		Kermadec Islands (h = 300 km).			
"	26	Ki	iP	07 33 36.2	D
			iS	07 35 16.2	
				microns sec	
			S	Z' 0.1 0.7	
			D = 1000 km = 9°.		
		Sk	eS	07 37 38	
			e	07 38 33	
		Um	eP	07 34 30	
			eS	07 36 48	
		Svalbard (h = 30 km).			
"	26	Um	iPKP	09 11 21.4	
			i	09 11 33.1	
		Macquarie Island (h = 30 km).			
"	26	Ki	iP	09 19 00.3	
		Kodiak Island (h = 30 km).			
"	26	Up	iP	09 24 38.5	
		Ki	iP	09 25 12.7	
		Sk	iP	09 25 12.2	
		Um	iP	09 24 50.8	
		Iran (h = 30 km).			
"	26	Up	eP	18 27 51	
		Ki	iP	18 27 31.5	
				microns sec	
			P	Z' 0.1 1.0	
		Sk	iP	18 27 52.8	
		Um	iP	18 27 37.4	
		Talaud Islands (h = 130 km).			
"	26	Up	iP	19 19 31.8	C
"	26	Um	iPKP	21 36 30.9	
		Tonga Islands (h = 30 km).			
"	26	Um	eP	23 03 32	

1964 Feb.	27	Up	iP	01 16 45.4	
"	27	Sk	iP	01 42 58.6	
		(Greece).			
"	27	Up	iP	02 43 38.3	
		Ki	eP	02 44 21	
		Um	iP	02 43 50.1	
			i	02 43 58.6	
		Tanganyika (h = 30 km).			
"	27	Up	iP	09 09 50.5	
			eLgl	09 23 11	
		Ki	iP	09 09 41.8	
				microns sec	
			M	N 1.3 12	
			M	Z 0.8 12	
		Sk	iP	09 10 09.2	C
		Um	eP	09 09 40	
			ePP	09 11 02	
		Kazakh SSR (h = 30 km).			
"	27	Ki	iP	11 48 03.8	D
				microns sec	
			P	Z' 0.1 1.0	
		Sk	iP	11 48 02.3	
		Um	eP	11 48 14	
		Mexico (h = 30 km).			
"	27	Um	iP	13 49 46.9	
"	27	Up	iP	14 21 35.0	
		Ki	eP	14 21 13	
"	27	Up	iP	15 21 18.5	D
			ipP	15 21 42	
			iS	15 29 50	
			isS	15 30 31	
			i	15 31 05	
				microns sec	
			P	Z' 0.6 0.6	
			S	E 1.7 6	
			S	N 1.2 5	
			M	E 2.2 19	
			M	N 5.9 22	
			M	Z 3.9 20	
			D = 7100 km = 64°.		
		Ki	iP	15 21 13.8	
			ipP	15 21 37.5	
			iS	15 29 42	
			eP'P'	15 50 06	
				microns sec	
			P	Z' 0.4 0.9	
			pP	Z 0.6 7	
			pP	Z' 0.7 1.0	
			S	E 2.3 8	

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Feb. 27 cont. Ki

		microns	sec	
S	N	3.7	8	
P'P'	Z'	0.1	1.7	
M	E	5.5	15	
M	N	6.7	20	
M	Z	8.1	18	

D = 7050 km = 63 ½°.

Sk	iP	15 21 34.2	D
	ipP	15 21 58.4	
Gb	iP	15 21 37.9	
	ipP	15 22 03.1	
Um	iP	15 21 11.2	D
	ipP	15 21 35.7	
	iPa	15 25 15	
	iS	15 29 31	
Ka	iP	15 21 25.9	D
	ipP	15 21 49.8	

Burma. h = 100 km (Up,Ki, Sk,Gb,Um,Ka). Magn. = 6.5 (Up,Ki).
The S waves recorded by Um E and N are remarkable, as both show sharp onsets, but 7 sec apart (E 15 29 31, N 15 29 38). As the epicenter is almost due east of Um, E records almost pure SV and N almost pure SH. It could be that the early onset on Um E is due to transformation of S into P.

"	28	Ki	iP	00 06 25.6
		Um	iP	00 06 53.5

Alaska (h = 170 km).

"	28	Um	iP	02 34 06.2 C
"	28	Ki	i(Sg)	03 41 12.0
"	28	Um	iP	17 08 47.6
"	28	Up	iP	17 58 00.7
			i	17 58 08.0

	microns	sec	
P	Z'	0.1	0.6
M	E	1.1	27
M	N	3.1	25
M	Z	1.4	27

Ki	iP	17 57 57.7
	iS	18 06 50

	microns	sec	
P	Z'	0.2	1.1
S	N	0.5	9
M	E	1.1	17

1964 Feb. 28 cont. Ki

	microns	sec	
M	N	1.7	20
M	Z	0.9	17

D = 7450 km = 67°.

Sk	iP	17 58 16.6	
Gb	iP	17 58 19.5	
	i	17 58 33.1	
Um	iP	17 57 54.6	
	i	17 58 12.1	
	iS	18 06 44	
Ka	iP	17 58 07.7	D
	i	17 58 17.4	

Burma (h = 40 km). Magn. = 5.9 (Up,Ki).

"	28	Up	iP	20 43 59.8

	microns	sec	
P	Z'	0.1	0.6

"	28	Um	iP	20 49 22.8
"	28	Um	iP	20 59 06.3

Mariana Islands (h = 30 km).

"	29	Up	iP	04 39 04.1
			i	04 39 09.2
		Um	iP	04 38 42.2 D

Siberia (h = 30 km).

"	29	Up	iP	07 14 59.9
			ipP	07 15 27.0
		Ki	iP	07 14 12.3
		Gb	iP	07 15 20.8
		Um	iP	07 14 34.1 D

Kurile Islands. h = 110 km (Up).

"	29	Ki	iP	09 05 03.4
"	29	Um	iP	13 34 05.6
"	29	Um	iP	14 16 17.0
"	29	Up	iP	15 31 52.9 D
			iS	15 41 28

	microns	sec	
P	Z'	0.1	1.2
M	E	1.8	19
M	N	1.7	17
M	Z	2.4	15

D = 8350 km = 75°.

Ki	iP	15 31 15.2	
	iS	15 40 17	

	microns	sec	
S	E	0.9	10
S	N	0.3	10

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964						
Feb.	29	Ki		microns	sec	
cont.			M	E	5.0	14
			M	N	4.3	17
			M	Z	7.3	16
			D = 7650 km = 69°.			
		Sk	eP		15 31 46	
		Gb	iP		15 32 12.4	
		Um	iP		15 31 31.4	D
			iS		15 40 44	
			iPS		15 41 32	
		Ka	iP		15 32 11.8	
		Japan (h = 30 km). Magn. = 5.9 (Up,Ki).				
"	29	Up	iP		19 54 10.6	
		Ki	iP		19 53 37.3	
		Sk	iP		19 54 07.1	
		Gb	iP		19 54 29.0	
		Um	iP		19 53 51.1	
		South of Japan (h = 320 km).				

Markus Båth
December 5, 1964

Seismological Institute
Uppsala

S E I S M O L O G I C A L B U L L E T I N

U P P S A L A, K I R U N A, S K A L S T U G A N, G Ö T E B O R G,

U M E Å and K A R L S K R O N A

Uppsala (Up):	59°51.5'N,	17°37.6'E;	h = 14 m
Kiruna (Ki):	67°50.4'N,	20°25.0'E;	h = 390 m
Skalstugan (Sk):	63°34.8'N,	12°16.8'E;	h = 580 m
Göteborg (Gb):	57°41.9'N,	11°58.7'E;	h = 66 m
Umeå (Um):	63°48.9'N,	20°14.2'E;	h = 16 m
Karlskrona (Ka):	56°09.9'N,	15°35.5'E;	h = 11 m

M A R C H 1 - 31, 1964

1964					
Mar.	1	Up	iP	00 03 17.4	
			iPP	00 07 19.3	
			iSKS	00 13 41	
			iPKKP	00 19 36.6	
				microns sec	
			SKS E	0.8 6	
		Ki	eP	00 03 14	
			iPP	00 07 17.1	
			iSKS	00 13 35	
			iPKKP	00 19 39.4	
				microns sec	
			SKS E	2.1 7	
			M E	0.5 14	
			M N	0.5 16	
			M Z	0.9 15	
		Sk	iP	00 03 28.4	
			e	00 07 23	
			iPP	00 07 42.5	
		Gb	iPP	00 07 38.5	
		Um	iP	00 03 11.5	
			i	00 03 45.0	
			iPP	00 07 08.4	
			iSKS	00 13 35	
			i	00 15 52	
			e	00 19 34	
			iPKKP	00 19 39.8	
			iSS	00 21 26	
		Ka	ePP	00 07 32	
			iPKKP	00 19 34.0	
		Java (h = 70 km).			
"	1	Up	eP	01 34 23	
"	1	Ki	iPKP	02 58 45.8	
		Um	iPKP	02 58 51.5	
		Solomon Islands (h = 100 km).			

1964				
Mar.	1	Up	iP	08 14 09.1
		Um	iP	08 13 57.3
		Luzon (h = 50 km).		
"	1	Up	iP	11 33 21.9
		Um	iP	11 32 57.1
		Kurile Islands (h = 30 km).		
"	1	Up	iP	13 07 37.3
		Um	iP	13 07 26.9
		Mindanao (h = 30 km).		
"	2	Up	iP	12 51 54.4
			ipP	12 52 24.8
		Um	eS	13 02 01
		Guatemala. h = 120 km (Up).		
"	2	Up	iP	18 50 42.6
		Ki	iP	18 49 37.8
		Um	iP	18 49 56.3 C
		Japan (h = 30 km).		
"	2	Up	ePKP	19 51 46
		Ki	ePKP	19 51 39
			iPP	19 53 50.6
			iSKP	19 54 52.0
				microns sec
			SKP Z'	0.6 2.0
		Gb	ePKP	19 51 55
		Um	e(PKP)	19 51 36
			i	19 51 45.7
			iPKP	19 51 50.4
			iSKP	19 55 03
			i(sPKS)	19 56 03
			e	20 00 57
			eSKSP	20 04 12
		Ka	ePKP	19 51 59
		Tonga Islands (h = 110 km).		

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar.	3	Up	iPKP	04 16 31.0	
		Sk	iPKP	04 16 26.5	
		Um	iPKP	04 16 21.1	
		Kermadec Islands (h = 130 km).			
"	3	Up	iP	07 14 55.3	
"	3	Um	iP	09 11 18.3	
		Japan (h = 30 km).			
"	3	Ki	e(P)	10 57 54	
			e	10 58 52	
"	3	Gb	iPg	12 33 18.1	
			iSg	12 33 23.5	
			D = 40 km = 0.4°.		
		Explosion?			
"	3	Ki	e(Sg)	14 20 06	
"	3	Up	iPKP	15 31 57.2	
			i	15 32 04.9	
				microns sec	
			PKP Z'	0.1 0.7	
		Sk	ePKP	15 31 50	
		Gb	iPKP	15 32 04.7	
		Um	iPKP	15 31 44.6	
		Ka	iPKP	15 32 10.7	
		Kermadec Islands (h = 30 km).			
"	3	Up	iP	16 19 49.3 C	
"	3	Up	iP	17 14 59.0	
		Ki	iP	17 14 11.7	
		Um	iP	17 14 32.9	
		Kurile Islands (h = 30 km).			
"	3	Um	iP	19 48 04.4	
		Japan (h = 80 km).			
"	3	Um	eP	21 50 06	
			i	21 50 16.4	
"	3	Up	iP	21 52 44.7	
		Ki	iP	21 52 28.3	
				microns sec	
			P Z'	0.1 1.0	
		Sk	eP	21 52 49	
		Um	iP	21 52 33.5	
		Celebes Sea (h = 80 km).			
"	4	Up	iS	02 28 36.1	
		Ki	iP	02 24 52.0 C	

cont.

1964 Mar. cont.	4	Sk	iP	02 24 57.6	
			iS	02 26 47.2	
			D = 1100 km = 10°.		
		Um	eP	02 25 26	
			iS	02 27 37.9	
			iSS	02 27 56.4	
			D = 1350 km = 12°.		
		Jan Mayen (h = 30 km).			
"	4	Ki	eP	03 05 27	
		Azores (h = 30 km).			
"	4	Um	iP	04 20 20.6	
		Banda Sea (h = 120 km).			
"	4	Up	iP	05 41 56.1	
"	4	Ki	eSn	06 03 43	
			iSg	06 04 08.8	
		Sk	eSg	06 06 46	
		Um	e(Sn)	06 04 26	
			iSg	06 05 19.6	
		Northwest Russia, 68.2°N, 31.5°E. Origin time = 06 01 54. Explosion?			
"	4	Up	iPKP	06 28 46.6	
		Sk	ePKP	06 28 40	
		Um	ePKP	06 28 32	
			i	06 28 34.5	
		Kermadec Islands (h = 50 km).			
"	4	Um	iP	08 29 57.9	
"	4	Um	iP	13 06 04.6	
		Azores (h = 30 km).			
"	4	Um	eP	16 23 14	
		Azores (h = 30 km).			
"	4	Up	iP	17 38 56.7	
			iPP	17 39 38.2	
			iS	17 43 22.0	
			iLi	17 45 34	
			iLg2	17 46 28	
				microns sec	
			M E	0.4 10	
			M N	0.6 15	
			M Z	0.6 10	
			D = 2700 km = 24 1/2°.		
		Ki	eP	17 39 25	
			i	17 39 33.2	
			eLi	17 47 51	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. 4 cont.

Ki — microns sec
M E 0.3 8
M N 0.3 8
M Z 0.4 8
Sk eP 17 39 35
iLgl 17 48 21.0
Gb eP 17 39 12
Um iP 17 39 03.7
iSn 17 44 09.0
iLgl 17 47 00
iRg 17 49 06
Ka iP 17 38 02.8
iLi 17 42 45.7
Caucasus (h = 60 km).

" 4 Up iP 21 37 13.9
Ki iP 21 38 23.6
Sk iP 21 37 53.0
Gb iP 21 37 04.5
Um iP 21 37 54.8
Crete (h = 40 km).

" 5 Um iP 00 05 50.9
Leyte, Philippine Islands (h = 90 km).

" 5 Um eP 00 14 00
i 00 14 11.9
Leyte (h = 40 km).

" 5 Ki iP 02 33 33.4
Kamchatka (h = 60 km).

" 5 Up ——
microns sec
M E 0.9 23
M N 1.1 21
Ki ——
microns sec
M E 0.9 22
M N 0.5 19
M Z 1.3 20
Sk iPKP 06 19 44.5
Um iPKP 06 19 39.4
i 06 38 05
eSS 06 38 26
Indian Ocean (h = 40 km).

" 5 Up iP 07 53 55.7 C
Um iP 07 53 46.5
Japan (h = 90 km).

" 5 Ki iSg 09 02 38.3
Sk eSg 09 03 33

cont.

1964 Mar. 5 cont.

Um iSg 09 03 45.5
Coast region of northwest Norway, near Bodö.

" 5 Ki i(Sg) 10 23 03.9
i 10 23 20.1

" 5 Ki i(PKP) 10 24 12.5
Sk iPKP 10 24 30.9
Um iPKP 10 24 25.2
eSS 10 42 37
Solomon Islands (h = 40 km).

" 5 Um eP 15 08 47

" 5 Up iP 20 47 00.9 C

" 5 Ki iP 22 37 23.3
Um iP 22 37 49.7
Aleutian Islands (h = 30 km).

" 6 Ki i(P) 00 02 16.4

" 6 Up iP 02 47 43.7
Ki iP 02 47 01.4
Sk eP 02 47 36
Gb ePcP 02 48 27
Um iP 02 47 20.0 C
Japan (h = 30 km).

" 6 Ki iPg 06 51 44.4
iSg 06 52 45.2
microns sec
Sg Z' 0.1 0.7
D = 520 km = 4.7°.
Sk eX 06 53 05
Um i 06 52 19.1
iPg 06 52 25.2
iS 06 53 35.8
iSg 06 53 49.1
iX 06 54 10.9
D = 740 km = 6.7°.
Atlantic Ocean, off Norwegian coast, 68.3°N, 8.0°E (by combination with Tromsö data). Origin time = 06 50 10. The phase X (Sk, Um) has a group velocity of 3.07-3.08 km/sec, possibly Rg. Agreement between data not quite satisfactory.

" 6 Up iP 15 23 52.0 C

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Mar. 6 Up ePP 19 16 59
microns sec
M E 1.1 22
M N 1.0 19
M Z 1.0 20
Ki ---
microns sec
M E 1.8 22
M N 1.4 22
M Z 4.8 24
Um ePP 19 16 35
iSP 19 25 59
New Britain (h = 70 km).
Magn. = 5.8 (Up,Ki).

" 6 Up iP 21 01 38.9

" 7 Ka iPKP 02 04 47.3
Fiji Islands (h = 590 km).

" 7 Ki iPn 05 50 43.7
iSn 05 51 25.1
iSg 05 51 42.6
D = 390 km = 3.5°.
Um iSn 05 52 10.4
iSg 05 52 47.3
Northwest Russia-Finland border region, 67 1/2°N, 29 1/2°E. Origin time = 05 49 47. Explosion?

" 7 Up iP 07 37 14.5
Ki iP 07 37 16.4 C
Sk eP 07 37 30
Um iP 07 37 11.0 C
Sumatra (h = 80 km).

" 7 Up iP 07 47 25.9 C
Ki iP 07 46 11.2 C
i 07 46 12.8
iPP 07 46 21.0
microns sec
PP Z' 0.3 1.5
M E 0.9 18
M N 0.9 14
M Z 1.1 13
Sk iP 07 46 26.7
Gb eP 07 47 39
Um iP 07 46 48.6
Ka iP 07 48 05.4
Jan Mayen (h = 30 km).

" 7 Ki iP 07 50 06.3
Sk iP 07 50 21.7

cont.

1964
Mar. 7 Um iP 07 50 44.1 C
cont. Jan Mayen. Origin time = 07 48 03.

" 7 Ki eP 10 00 51
Um iP 10 01 20.0
Jan Mayen (h = 30 km).

" 7 Up iP 13 20 48.7
Um iP 13 20 32.4
Ryukyu Islands (h = 160 km).

" 7 Ki iPn 14 58 44.3 D
iSn 14 59 32.7
iSg 14 59 48.3
D = 410 km = 3.7°.
Um eSn 15 00 42
iSg 15 01 21.9
D = 720 km = 6.5°.
Northwest Russia, 69.2°N, 29.8°E (by combination with Tromsö data). Origin time = 14 57 46. Explosion?

" 7 Ki iP 15 17 02.3

" 8 Up e(PKP) 01 56 07
iPKP 01 56 13.9
microns sec
PKP Z' 0.1 1.2
Ki iPKP 01 55 37.2
microns sec
PKP Z' 0.4 1.5
Gb ePKP 01 56 27
Um iPKP 01 55 42.2
i 01 55 49.1
e 02 18 55
New Zealand (h = 30 km).

" 9 Up iP 10 35 08.5
Ki iP 10 35 16.2
Um iP 10 35 06.4
Ka iP 10 35 12.9
Hindu Kush (h = 130 km).

" 9 Up iP 19 48 26.9
Ki iP 19 48 35.8
Sk iP 19 48 52.7
Gb iP 19 48 48.2
Um iP 19 48 25.2
ipP 19 49 04.9
Ka iP 19 48 31.4
Hindu Kush. h = 190 km (Um).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar.	10	Ki	iP	12 20 32.0	
"	10	Up	eP	14 13 20	
			ipP	14 13 54.8	
		Ki	iP	14 13 01.4	D
			ipP	14 13 33.9	
				microns sec	
			P	Z' 0.2 1.5	
		Um	iP	14 13 07.2	
			iSKS	14 23 32	
		Molucca Passage. h = 130 km (Up,Ki).			
"	10	Up	iP	14 38 05.9	
		Um	iP	14 38 36.0	
"	10	Up	iP	15 40 27.6	
"	11	Up	iP	00 14 16.6	
			i	00 14 23.6	
			iSn	00 19 10	
			iLgl	00 22 00	
				microns sec	
			P	Z' 0.1 0.7	
			M	E 0.6 12	
		Ki	iP	00 14 57.4	
				microns sec	
			P	Z' 0.1 1.0	
			M	E 1.8 16	
			M	N 0.9 13	
			M	Z 1.6 14	
		Sk	eP	00 15 11	
			i	00 15 30.0	
		Gb	eP	00 14 28	
			i	00 14 34.0	
		Um	iP	00 14 30.9	C
			eSn	00 19 19	
			eLi	00 21 36	
			eLgl	00 22 30	
		Ka	iP	00 14 09.4	
		Caucasus (h = 30 km). Magn. = 5.5 (Up,Ki).			
"	11	Up	iP	01 19 32.9	
		Ki	eP	01 19 16	
		Um	iP	01 19 19.6	
			iSKS	01 29 48	
		Molucca Passage (h = 60 km).			
"	11	Up	iP	06 49 56.3	
"	11	Up	iP	12 55 34.4	
"	11	Up	iP	14 31 16.2	

1964 Mar.	11	Up	iP	15 38 59.9	
"	11	Ki	eP	18 34 23	
		Japan (h = 30 km).			
"	11	Up	iP	19 22 41.2	
			i	19 26 22.9	
		Switzerland (h = 30 km).			
"	11	Up	iP	23 42 10.0	C
			iPP	23 43 50.3	
		Ki	iP	23 42 39.5	
			iPP	23 44 35.3	
				microns sec	
			M	E 0.7 15	
			M	N 0.4 12	
			M	Z 1.0 14	
		Sk	iP	23 42 42.0	
		Um	iP	23 42 19.3	
			iS	23 48 40	
			iSS	23 51 53	
		D = 4800 km = 43°.			
		Ka	iP	23 42 14.5	
		Iran (h = 40 km).			
"	12	Up	iP	04 07 03.0	D
			iS	04 16 42	
				microns sec	
			P	Z' 0.1 0.9	
			M	E 0.8 18	
			M	N 0.7 18	
			M	Z 1.4 18	
		D = 8450 km = 76°.			
		Ki	iP	04 06 39.7	
				microns sec	
			M	E 0.7 15	
			M	N 0.3 15	
			M	Z 0.7 15	
		Sk	iP	04 07 06.6	
		Gb	iP	04 07 22.4	
		Um	iP	04 06 47.8	D
			iPa	04 11 38	
			iS	04 16 16	
			eSKS	04 16 42	
		D = 8200 km = 74°.			
		Formosa (h = 30 km).			
"	12	Gb	iPKP	04 49 10.5	
		Ka	iPKP	04 49 12.7	
		Fiji Islands (h = 380 km).			
"	12	Ki	iSn	08 50 44.2	
			iSg	08 50 58.9	
		D = 410 km = 3.7°.			

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. cont.	12	Um	iSg	08 52 39.7	
			Norway-Northwest Russia border region, 69.7°N, 29.5°E (by combination with Tromsö data). Origin time = 08 48 57. Explosion?		
"	12	Um	iP	19 43 22.1	
			Japan (h = 90 km).		
"	12	Up	iP	20 48 58.6	D
				microns	sec
			P	Z' 0.1	0.6
"	12	Up	iP	22 45 34.3	
			e	22 55 38	
			eS	22 56 06	
				microns	sec
			P	Z' 0.1	0.6
			S	N 0.4	6
			M	E 2.7	20
			M	N 2.4	20
			M	Z 3.4	21
			D = 9550 km = 86°.		
		Ki	iP	22 45 15.7	
			i	22 45 20.6	
			eS	22 55 29	
			i	22 57 08	
				microns	sec
			P	Z' 0.2	1.0
			S	E 0.4	5
			S	N 0.6	8
			M	E 1.8	16
			M	N 2.3	17
			M	Z 2.5	18
			D = 9100 km = 82°.		
		Sk	eP	22 45 41	
		Um	iP	22 45 21.9	
			iS	22 55 40	
			i	22 56 25	
			Luzon (h = 30 km).		
			Magn. = 5.9 (Up,Ki).		
"	12	Um	iP	23 30 22.3	
"	13	Um	iP	02 53 38.0	
"	13	Um	iP	03 59 07.9	
			Volcano Islands (h = 30 km).		
"	13	Up	iP	04 52 29.7	
"	13	Up	iP	06 02 29.4	
				microns	sec
			P	Z' 0.1	1.0

cont.

1964 Mar. cont.	13	Ki	iP	06 01 36.5	C
				microns	sec
			P	Z' 0.1	0.9
		Sk	iP	06 02 07.1	
		Gb	iP	06 02 43.9	
		Um	iP	06 02 03.1	C
			Aleutian Islands (h = 30 km).		
			Magn. = 5.8 (Up,Ki).		
"	13	Um	iP	09 34 00.1	
"	13	Ki	ePn	12 31 19	
			iSn	12 32 03.1	
			iSg	12 32 19.8	
			D = 400 km = 3.6°.		
		Um	iPn	12 31 42.1	
			iSn	12 32 44.0	
			iSg	12 33 12.6	
			D = 580 km = 5.2°.		
			Northwest Russia, 67.3°N, 29.7°E. Origin time = 12 30 21. Explosion?		
"	13	Up	iP	15 19 15.5	
"	13	Um	iP	21 20 45.5	
			Guatemala (h = 30 km).		
"	14	Up	iP	02 40 41.5	
			eS	02 43 37	
			i(Li)	02 44 32	
			iLg1	02 44 50	
			iLg2	02 45 04.8	
				microns	sec
			P	Z' 0.1	1.2
			M	E 2.8	9
			M	N 2.5	7
			M	Z 1.7	9
			D = 1550 km = 14°.		
		Ki	iP	02 42 14.4	
			eLg1	02 48 41	
			iLg2	02 49 10.3	
				microns	sec
			M	E 2.2	10
			M	N 1.4	9
			M	Z 1.3	9
		Sk	iP	02 41 25.7	
			i	02 45 07.5	
			iLg1	02 46 26.3	
		Gb	eP	02 39 59	
			e	02 40 29	
			iS	02 41 57.6	
			iLg2	02 43 29.5	
		Um	iP	02 41 32.7	
			iS	02 44 52	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. cont.	14	Um	eLgl	02 46 46	
			i	02 47 04	
			iLg2	02 47 11.6	
		Ka	e	02 40 21	
			iS	02 42 17.5	
			i	02 42 43.5	
		Switzerland (h = 30 km). Well developed higher mode surface waves. At Up, Ki, Um is Lgl best shown by long-period records, whereas Lg2 is best shown by short-period (vertical) records.			
"	14	Up	iP	07 03 48.0	
		Ki	iP	07 03 51.1	C
		Sk	iP	07 04 04.5	
		Um	iP	07 03 45.9	C
		Andaman Islands (h = 30 km).			
"	14	Ki	iP	11 00 28.4	
		Um	iP	11 00 15.5	
			i	11 00 40.7	
			e	11 00 54	
"	14	Up	iP	11 36 28.8	C
		Ki	iP	11 35 22.9	
		Um	iP	11 35 50.9	
		Aleutian Islands (h = 30 km).			
"	14	Up	iPKP	12 03 09.3	
		Ki	iPKP	12 03 00.7	
		Um	iPKP	12 03 02.6	
		Ka	iPKP	12 03 20.6	
		Fiji Islands (h = 560 km).			
"	14	Up	iP	12 18 11.7	D
			microns	sec	
			P Z' 0.1	0.5	
"	14	Up	iP	15 23 35.5	
		Ki	iP	15 23 42.0	
			microns	sec	
			P Z' 0.1	0.8	
			M E 1.2	18	
			M N 0.6	17	
			M Z 2.0	18	
		Sk	iP	15 23 22.8	
		Um	iP	15 23 41.7	
			i	15 23 44.5	
			i	15 23 48.0	
			eSKS	15 33 41	
		Leeward Islands (h = 30 km).			

1964 Mar.	14	Up	iPKP	15 23 56.0	
			iSKP	15 26 26.5	
			microns	sec	
			PKP Z' 0.1	0.7	
			SKP Z' 0.1	0.5	
		SK	iPKP	15 23 53.5	
		Gb	iPKP	15 24 03.2	
		New Hebrides Islands (h = 610 km).			
"	14	Up	iP	16 47 42.7	
		Ki	iP	16 48 22.4	
			microns	sec	
			M E 0.6	15	
			M N 0.7	16	
			M Z 1.4	17	
		Sk	iP	16 47 50.7	
		Um	iP	16 48 02.0	C
		Atlantic Ocean (h = 30 km).			
"	14	Um	iP	18 54 34.9	
		Atlantic Ocean (h = 30 km).			
"	14	Ki	iP	19 01 48.7	
		Um	eP	19 02 11	
			i	19 02 37.3	
"	14	Up	iP	21 10 11.7	
"	14	Um	eP	23 08 01	
		Turkey.			
"	15	Um	iP	07 36 21.3	
"	15	Up	iP	07 57 54.9	C
"	15	Up	iP	08 06 53.2	C
			iPP	08 07 59.5	
			microns	sec	
			P Z' 0.1	0.5	
			PP Z' 0.1	0.5	
		Ki	iP	08 06 37.6	C
			microns	sec	
			P Z' 0.3	0.6	
		Sk	iP	08 07 08.7	C
			iPP	08 08 26.4	
		Gb	iP	08 07 21.5	
			iPP	08 08 47.4	
		Um	iP	08 06 38.2	C
		Ka	iP	08 07 09.6	
		Kazakh SSR. Magn. = 6.2 (Up,Ki). Underground explosion.			
"	15	Ki	iP	09 58 59.4	
		Um	iP	09 59 24.2	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. 15 cont.

Um ipP 10 00 11.6
Kamchatka. h = 200 km (Um).

" 15 Up iP 12 44 51.7
Um iP 12 44 59.3 C
Caucasus.

" 15 Ki e(Sg) 15 29 11
Sk iPg 15 27 20.0
i 15 27 40.1
iSg 15 27 42.7
D = 200 km = 1.8°.
Um iPg 15 28 01.8
i(Sn) 15 28 41.1
iSg 15 28 53.9
D = 440 km = 4.0°.
West coast of Norway,
65.5°N, 12.0°E.
Origin time = 15 26 43.

" 15 Up iP 19 46 06.4
Um iP 19 46 19.9 D
Caucasus (h = 30 km).

" 15 Ki iP 21 00 49.3
Um iP 21 00 08.2 C
Turkey.

" 15 Up iP 21 29 56.8 C
Ki iP 21 29 37.4
Sk eP 21 30 02
Um iP 21 29 44.0
Luzon (h = 30 km).

" 15 Up iP 22 36 22.5 C
i 22 40 12
i 22 40 57
i(S) 22 41 27
iSn 22 42 18.4

		microns	sec
P	E	1.5	4
P	N	2.7	5
P	Z	4.4	5
P	Z'	1.0	1.0
M	E	320	17
M	N	260	17
M	Z	210	17

D = 3200 km = 29°.
Ki iP 22 37 21.7 C
i 22 37 33.1
iPP 22 38 41
iS 22 42 55
i 22 46 12

		microns	sec
P	E	3.4	7
P	N	3.8	8
P	Z	6.4	7

cont.

1964 Mar. 15 cont.

Ki

		microns	sec
P	Z'	1.6	1.7
PP	E	2.6	7
PP	Z	2.3	6
S	E	5.6	9
S	N	5.8	8
M	E	150	18
M	N	120	19
M	Z	160	20

D = 3950 km = 35 1/2°.
Sk iP 22 36 34.3 C
Gb iP 22 35 50.8 C
iSn 22 40 30.0
Um iP 22 36 55.5 C
iS 22 42 04
iSn 22 43 23.9
Ka iP 22 35 52.8 C
iSn 22 40 42.6
West of Gibraltar (h = 25 km).
Magn. = 6.7 (Up,Ki).
Clear higher mode surface waves recorded. Of special interest is that the short-period vertical-component records at Up, Gb, Um, Ka show the Sn-phase, with very sharp beginning and an average group velocity of 4.61 km/sec, similar to what we have found earlier for shocks in the Caspian Sea region (see our bulletin for Jan. 27, 1963). The absence of any clear Sn at Ki and Sk is probably due to significant differences in the path properties as compared to our other, more easterly stations.

" 16 Up iP 01 14 33.4 C
eLgl 01 33 30

		microns	sec
P	Z'	0.8	0.8
M	E	4.7	18
M	N	3.2	16
M	Z	5.2	18

Ki iP 01 14 16.4 C
iPcP 01 15 32.6

		microns	sec
P	Z'	0.7	1.1
M	E	3.7	14
M	N	2.8	13
M	Z	3.5	14

Sk iP 01 14 45.5 C
Gb iP 01 14 57.2 C
Um iP 01 14 19.4 C

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. 16 cont.

Ka iP 01 14 46.5 C
Tsinghai, China (h = 30 km). Magn. = 6.7 (Up,Ki) from P-waves but only 5.7 (Up, Ki) from surface waves, possibly suggesting somewhat greater depth than normal.

" 16 Up iPg 01 59 22.1
i! 01 59 33.6
iSn 01 59 48.9
iS* 01 59 59.7
iSg 02 00 13.5
microns sec
Sg Z' 0.8 1.0
D = 400 km = 3.6°.
Ki eSn 02 01 38
iSg 02 02 26.5
Sk iPn 01 58 58.1
iPg 01 59 04.4
i! 01 59 11.5
iSn 01 59 28.5
iSg 01 59 39.2
D = 310 km = 2.8°.
Gb eSn 01 59 48
iSg 02 00 09.1
Um eP* 01 59 40
iPg 01 59 50.8
iSn 02 00 29.6
iSg 02 00 58.7
D = 580 km = 5.2°.
Ka eS* 02 00 58
iSg 02 01 14.6
i 02 01 23.5
Norway, 61.2°N, 10.7°E. Origin time = 01 58 09. Felt at Lillehammer and Ringebu. i! denotes a significant but unexplained phase (Up,Sk).

" 16 Up iP 03 35 41.3
iPP 03 37 20.8
microns sec
P Z' 0.2 1.0
PP Z' 0.1 1.0
Ki iP 03 35 46.1
microns sec
P Z' 0.1 1.0
Sk iP 03 36 05.5
Gb iP 03 36 03.7 C
Um iP 03 35 37.4
iPP 03 37 10.5
Ka iP 03 35 47.6
Tadzhik SSR (h = 130 km). Magn. = 5.8 (Up,Ki).

1964 Mar. 16

Ki iPn 06 54 44.5
iSn 06 55 40.1
iSg 06 56 02.6
D = 490 km = 4.4°.
Sk eSg 05 58 33
Um iS* 05 56 41.0
iSg 05 57 02.6
Northwest Russia, 67.6°N, 32.0°E. Origin time = 06 53 37. Explosion?

" 16 Up iP 08 55 16.1 C
microns sec
P Z' 0.3 0.7
Sk iP 08 55 05.7 C
iPP 08 57 27.9
Gb iP 08 55 37.5 C
Um iP 08 54 50.3 C
Ka iP 08 55 38.1 C
Kurile Islands (h = 140 km). The P-phases on the short-period vertical-component records are followed by an oscillatoric wave train of very regular appearance, lasting 3-5 min and slightly decreasing in amplitude especially clear at Sk, Um, Up.

" 16 Up iP 09 25 56.3

" 16 Ki iPn 15 33 45 D
iSn 15 34 33
iSg 15 34 47
D = 410 km = 3.7°.
Sk eSg 15 37 38
Um iSn 15 35 43.5
iSg 15 36 20.8
Northwest Russia, 69.1°N, 30.0°E. Origin time = 15 32 46. Explosion?
In the few cases where the first motion of Pn at Ki can be read for these events in Northwest Russia, it has been a clear dilatation (this case and Mar 7, 1964, 14 48 and Mar 21, 1964, 15 16) - indicating a certain directivity of the (probably) explosive source.

" 16 Sk i(Sg) 18 15 20
Presumably aftershock to the earthquake in Norway, Mar.16, 1964, 01 58 09. Felt at Ringebu.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar.	16	Um	iP	18 47 09.0	
"	16	Um	iP	20 02 51.3	
		Central Asia.			
"	16	Um	iP	20 52 04.0	
		Puerto Rico (h = 30 km).			
"	16	Up	iPKP	21 57 56.3	
		Sk	iPKP	21 57 54	
		Gb	iPKP	21 58 04.9	
		Um	iPKP	21 57 43.1	
			iSKP	22 00 31.7	
		Ka	iPKP	21 58 07.3	
		Fiji Islands (h = 580 km).			
"	17	Um	iP	02 15 01.2	
		Kamchatka (h = 20 km).			
"	17	Up	iP	05 21 26.8	
"	17	Up	iP	12 12 53.3	
		Ki	iP	12 13 28.6	
		Sk	iP	12 13 41	
		Um	iP	12 13 05.4	
		Iran (h = 30 km).			
"	17	Ki	i(P)	17 40 02.2	
"	17	Up	iP	20 41 17.8	
"	18	Up	iP	02 51 07.0	
		Um	iP	02 50 47.1	
"	18	Up	iP	04 47 06.3 D	
			iPcP	04 47 40.4	
			ipP	04 48 37	
			iS	04 54 59	
			i	04 57 41	
			iP'P'	05 15 44.2	
			microns	sec	
			P N	1.0 2	
			P Z'	1.0 0.7	
			pP N	1.2 4	
			pP Z	1.9 4	
			S E	1.0 4	
			S N	1.0 4	
			M E	1.9 17	
			M N	2.7 17	
			M Z	2.2 17	
			D = 7100 km = 64°.		
		Ki	iP	04 46 14.6 D	
			ipP	04 47 39	
			iS	04 53 16	
			iScS	04 55 15	
			isS	04 56 04	

cont.

1964 Mar. cont.	18	Ki		microns	sec
			P E	1.0	6
			P N	1.8	6
			P Z	3.7	6
			P Z'	1.1	0.9
			S E	3.3	6
			S N	1.2	7
			M E	2.3	13
			M N	1.9	13
			M Z	2.3	11
			D = 6200 km = 56°.		
		Sk	iP	04 46 51.6	
			ipP	04 48 22.0	
			eS	04 54 46	
		Gb	iP	04 47 27.0	
			ipP	04 48 58.9	
		Um	iP	04 46 37.9 D	
			ipP	04 48 02.6	
			isP	04 48 44	
			i	04 50 14	
			ipPP	04 50 28	
			iS	04 54 08	
			iScS	04 55 41	
			i	04 56 24	
			iP'P'	05 15 52.1	
		Ka	iP	04 47 30.2	
			ipP	04 49 02.1	
		Okhotsk Sea. h = 430 km (Up, Ki,Sk,Gb,Um,Ka).			
		Magn. = 6.4 (Up,Ki).			
"	18	Ki	ePg	05 21 50	
			iSn	05 22 25.0	
			iSg	05 22 48.8	
			D = 490 km = 4.4°.		
		Um	eSg	05 23 46	
		Northwest Russia, 67.6°N, 32.0°E. Origin time = 05 20 23. Explosion?			
"	18	Up	iP	16 46 47.8	
		Sk	iP	16 47 32.7	
		Um	iP	16 47 36.7	
		Yugoslavia (h = 30 km).			
"	18	Up	iP	19 01 20.6	
"	19	Um	iP	02 35 09.8	
"	19	Um	e	03 20 28	
			i(Sg)	03 20 39.0	
"	19	Ki	iSn	04 42 17.9	
			iSg	04 42 36.0	
		Sk	eSg	04 45 08	
		Um	iSn	04 43 03.5	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. cont.	19	Um	iSg	04 43 41.3	
			i	04 43 52.0	
		Northwest Russia, 67.6°N, 30.1°E. Origin time = 04 40 34. Explosion?			
"	19	Up	iPKP	05 04 03.8	
		Ki	iPKP	05 03 56.3	
		Gb	iPKP	05 04 13.4	
		Um	iPKP	05 04 01.8	
		Ka	iPKP	05 04 15.8	
		Fiji Islands (h = 610 km). The amplitudes of PKP at Gb and Ka are 10-15 times those of the other stations (caustic effect).			
"	19	Um	iP	08 15 54.1	
		Arabian Sea.			
"	19	Um	iP	08 30 35.1	
"	19	Um	iPKP	09 01 53.8	
		Fiji Islands (h = 500 km).			
"	19	Up	iP	09 51 52.3	
			eS	09 59 25	
			i(PS)	09 59 37	
				microns sec	
			M E	2.4 21	
			M N	2.0 20	
			M Z	3.8 23	
			D = 5900 km = 53°.		
		Ki	iP	09 52 26.4	
			i(PS)	10 00 42	
				microns sec	
			P Z'	0.2 1.3	
			M E	3.9 17	
			M N	1.8 19	
			M Z	4.1 17	
		Um	iP	09 52 05.1	
			i	09 55 51.7	
			eS	09 59 48	
		Arabian Sea (h = 30 km). Magn. = 5.7 (Up,Ki).			
"	19	Um	iP	11 15 31.1 C	
		Japan (h = 370 km).			
"	19	Up	iP	12 02 16.6	
				microns sec	
			P Z'	0.1 0.8	
		Ki	iP	12 01 44.2 D	
		Gb	iP	12 02 34.4	
		Um	iP	12 01 58.2 D	
		Bonin Islands (h = 450 km).			
1964 Mar.	19	Up		---	
				microns sec	
			M E	0.7 18	
			M N	1.3 21	
			M Z	1.1 17	
		Ki	ePKP	22 03 07	
				microns sec	
			M E	0.8 19	
			M N	0.6 15	
		Sk	ePKP	22 03 17	
		Um	e(PKP)	22 03 01	
			iPKP	22 03 13.9	
			iPKS	22 06 32	
			i	22 08 50.1	
			eSS	22 23 03	
		Samoa Islands (h = 30 km).			
"	20	Ki	eP	03 23 56	
		Iran (h = 40 km).			
"	20	Um	iP	06 09 21.7	
"	20	Ki	iP	07 08 46.1	
			ipP	07 09 07.1	
		Um	iP	07 08 48.3	
		Ecuador. h = 80 km (Ki).			
"	20	Ki	eP	07 34 10	
"	20	Um	iP	08 08 31.0	
"	20	Up	iP	12 54 25.8 C	
"	20	Gb	iPg	15 15 06.3	
			iSg	15 15 08.5	
			D = 20 km = 0.2°.		
		Probably explosion.			
"	20	Up	iP	19 11 13.9 D	
				microns sec	
			P Z'	0.1 0.6	
			M N	1.6 20	
		Ki	iP	19 11 08.2	
		Sk	iP	19 11 29.8	
		Um	iP	19 11 06.5 D	
		Ka	iP	19 11 22.6	
		Burma (h = 90 km).			
"	21	Up	iP	03 55 49.2	
			i	03 59 31.0	
			iPKP	03 59 45	
			iPP	04 00 19.2	
			epPP	04 01 31	
			iX	04 02 06	
			iSKS	04 05 52	
			i	04 06 38	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. 21 cont.

Up eSP 04 08 26
i(sPS) 04 11 21
microns sec
PP Z' 0.2 1.0
M E 3.8 20
M N 6.5 20
M Z 3.2 20
(D = 11800 km = 106°).

Ki iP 03 55 35.3
i 03 55 38.9
ipP 03 57 01.7
iPP 03 59 54.1
iSKS 04 05 38
iS 04 06 40
iSP 04 08 16
microns sec
P Z' 0.2 1.0
PP Z' 0.1 1.1
SKS E 5.9 11
SKS N 1.0 8
SKS Z' 0.1 1.6
S N 2.2 11
M E 5.8 18
M N 7.6 19
M Z 4.5 16
(D = 11450 km = 103°).

Sk iP 03 55 55.5
iPKP 04 00 04.1

Gb iPP 04 00 47.9
i 04 03 07.9

Um iP 03 55 39.2
ipP 03 57 05.5
ePP 04 00 00
iX 04 01 54
iSKS 04 05 38
iS 04 06 49
iSP 04 08 13
i' 04 10 54
iPKKP 04 11 31.2
iSS 04 14 03

Banda Sea. h = 350 km (Ki, Um). Magn. = 6.6 (Up,Ki).

" 21 Ki iP 04 14 40.7 C
microns sec
P Z' 0.1 1.5

" 21 Up iSg 08 43 20.3
Ki ePg 08 39 34
eSg 08 39 44
iL 08 39 46.1
microns sec
L Z' 1.6 1.8
D = 90 km = 0.8°.

Sk iSg 08 42 01.6

cont.

1964 Mar. 21 cont.

Um iSn 08 40 53.0
iSg 08 41 11.9
Gällivare, North Sweden, 67.2°N, 21.1°E. Origin time = 08 39 18. Explosion of 30.5 ton dynamite in the iron ore mine at Gällivare-Malmberget.

" 21 Up iP 10 33 14.8
Ki iP 10 33 50.8
Um iP 10 33 27.9
Iran (h = 30 km).

" 21 Up iP 12 07 23.9

" 21 Um iP 12 47 48.8

" 21 Up iPn 15 19 02.1
Ki iPn 15 17 29.0 D
iP 15 17 38.2
iSn 15 18 17.4
iSg 15 18 33.2
D = 420 km = 3.8°.
Um eSn 15 19 23
iSg 15 20 06.5
Northwest Russia, 69.0°N, 30.4°E. Origin time = 15 16 29. Explosion?

" 21 Up iP 15 20 57.2
microns sec
P Z' 0.1 1.0
M E 1.3 17
M N 1.4 17
M Z 2.2 17
Ki iP 15 20 39.8
eS 15 31 04
microns sec
P Z' 0.1 1.3
M E 2.2 17
M N 1.5 17
M Z 3.1 18
D = 9450 km = 85°.
Sk eP 15 20 38
Gb iP 15 20 53.4
Um iP 15 20 51.0
eS 15 31 24
iPS 15 32 34
Mexico (h = 80 km).
Magn. = 6.0 (Up,Ki).

" 21 Up iPKP 16 46 47.6 C
microns sec
PKP Z' 0.6 0.9

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. cont.	21	Ki	iPKP	16 46 28.0	
		Sk	iPKP	16 46 39.9	
		Gb	iPKP	16 46 56.4	C
		Um	iPKP	16 46 34.2	
		Ka	iPKP	16 46 58.2	C
		Kermadec Islands (h = 30 km).			
"	22	Up	iP	01 03 02.1	
		Ki	iP	01 02 08.3	
		Sk	iP	01 02 45.4	
		Gb	iP	01 03 22.5	
		Um	iP	01 02 33.5	
		Ka	iP	01 03 26.7	
		Kamchatka (h = 30 km).			
"	22	Ki	iSn	05 29 23.9	
			iSg	05 29 49.5	
		Sk	eSg	05 32 13	
			e	05 32 21	
		Um	eSn	05 30 05	
			iSg	05 30 39.2	
		Northwest Russia, 67.4°N, 32.4°E. Origin time = 05 27 18. Explosion?			
"	22	Um	iP	05 45 49.4	
		Ceram Sea (h = 30 km).			
"	22	Ki	iP	06 31 10.6	
			microns	sec	
		P	Z'	0.1	1.0
		Um	iP	06 31 39.8	
		Alaska (h = 60 km).			
"	22	Up	iP	07 18 55.8	
		Peru (h = 150 km).			
"	22	Um	eP	08 46 32	
"	22	Up		---	
			microns	sec	
		M	E	1.4	19
		M	N	0.9	18
		M	Z	1.4	18
		Ki		---	
			microns	sec	
		M	E	1.0	19
		M	N	0.7	18
		M	Z	1.1	17
		Um	iPKP	08 53 58.3	
			iPP	08 55 36	
			ePS	09 05 38	
			iSS	09 12 17	
		Chile (h = 30 km).			
		Magn. = 5.8 (Up,Ki).			

1964 Mar.	22	Um	iP	10 25 16.6	
"	22	Um	i(P)	12 28 48.8	
		Mariana Islands (h = 530 km).			
"	22	Up	iP	13 51 22.8	
		Ki	iP	13 51 24.2	
		Sk	iP	13 51 38.1	
		Um	iP	13 51 19.6	
		Sumatra (h = 30 km).			
"	22	Sk	iP	16 56 15.8	
"	23	Um	iP	01 32 30.3	
"	23	Um	eP	07 43 53	
		Hindu Kush (h = 140 km).			
"	23	Um	iP	08 08 31.0	
"	23	Sk	iPKP	09 36 35.5	
		Um	iPKP	09 36 30.5	
		Kermadec Islands (h = 460 km).			
"	23	Ki	eP	09 53 55	
		Um	iP	09 54 16.0	
		Kurile Islands (h = 30 km).			
"	23	Up	iP	13 47 57.8	D
			iPP	13 49 34	
			iSa	13 56 12	
			i(Sa)	13 57 48	
			microns	sec	
		P	Z'	0.1	0.5
		PP	E	0.3	3
		PP	Z'	0.1	1.0
		Ki	iP	13 48 01.7	D
			isP	13 48 49.8	
			i	13 50 26	
			eS	13 54 05	
			eSa	13 57 08	
			microns	sec	
		P	Z'	0.3	0.9
		S	N	0.3	6
		M	E	0.5	7
		M	N	0.6	15
		M	Z	0.4	7
		Sk	iP	13 48 21.7	D
			iPP	13 50 04.2	
		Gb	iP	13 48 20.6	D
		Um	iP	13 47 53.5	D
			iPP	13 49 29	
			iS	13 53 51	
			iSa	13 56 11	
			iSS	13 56 55	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. cont.	23	Ka	iP	13 48 04.5	D
			iPP	13 49 49.6	
		Hindu Kush (h = 130 km).			
		Magn. = 6.0 (Up,Ki).			
		Well developed higher mode surface waves.			
"	23	Ki	eP	22 40 31	
		Um	iP	22 40 38.3	
		Luzon (h = 30 km).			
"	23	Um	ePKP	22 59 49	
			iPP	23 00 40.2	
		Australia (h = 30 km).			
"	24	Up	iP	02 10 50.1	D
		Ki	iP	02 10 19.3	
		Sk	iP	02 10 47.5	
		Um	iP	02 10 32.4	D
		Volcano Islands (h = 180 km).			
"	24	Sk	iP	08 39 24.3	
		Puerto Rico (h = 60 km).			
"	24	Up	iP	07 16 44.4	
"	24	Up	i(P)	11 04 04.0	
"	24	Ki	eP	14 55 02	
		Mariana Islands (h = 50 km).			
"	24	Up	iP	20 44 17.2	
		Ki	iP	20 43 30.4	D
		Um	iP	20 43 51.9	D
		Kurile Islands (h = 30 km).			
"	24	Um	iP	22 31 34.6	
			i(pP)	22 31 45.0	
		Japan (h = 50 km).			
"	25	Up	iP	02 54 49.9	C
				microns	sec
			P Z'	0.1	0.8
		Ki	iP	02 54 11.2	C
		Sk	iP	02 54 44.2	C
		Gb	iP	02 55 10.7	
		Um	iP	02 54 28.1	C
		Japan (h = 70 km).			
"	25	Ki	i(P)	03 16 00.6	
"	25	Um	iP	04 38 25.2	
"	25	Up	iP	05 03 35.7	C
				microns	sec
			P Z'	0.1	0.8

cont.

1964 Mar. cont.	25	Ki	iP	05 02 56.7	C
		Sk	iP	05 03 29.4	
		Gb	iP	05 03 55.8	
		Um	iP	05 03 13.1	
		Japan (h = 60 km).			
"	25	Ki	iSn	06 01 44.1	
			iSg	06 02 07.6	
		Sk	eSg	06 04 46	
		Um	iSn	06 02 38.4	
			iSg	06 03 18.4	
		Northwest Russia, 68.1°N, 32.4°E. Origin time = 05 59 43. Explosion?			
"	25	Ki	iP	10 20 39.7	
		Sk	iP	10 20 24.0	
		Um	iP	10 20 41.4	
		Colombia (h = 50 km).			
"	25	Ki	iPKP	15 51 29.3	
		Um	iPKP	15 51 35.9	
		Loyalty Islands (h = 30 km).			
"	25	Up	iP	20 30 36.4	
		Ki	eP	20 30 35	
		Um	iP	20 30 33.7	
		Sumatra (h = 30 km).			
"	26	Ki	iP	01 28 40.5	
			i	01 28 50.9	
		Um	iP	01 28 45.4	
		Panay (h = 50 km).			
"	26	Up		---	
				microns	sec
			M E	2.5	19
			M N	2.5	18
			M Z	4.3	19
		Ki	eP	02 17 21	
			eSKS	02 27 51	
				microns	sec
			SKS E	1.0	6
			SKS N	0.5	7
			M E	2.8	17
			M N	2.0	17
			M Z	4.0	19
		Um	iP	02 17 29.9	
			i	02 17 59.8	
			iSKS	02 28 02	
			ePS	02 29 47	
			iSS	02 34 46	
			i	02 38 46	
		Mariana Islands (h = 30 km).			
		Magn. = 5.9 (Up,Ki).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. 26 Ki iP 05 38 58.5
Um iP 05 39 05.1
Peru (h = 100 km).

" 26 Up iP 06 43 12.9
i(sP) 06 43 52.9
microns sec
P Z' 0.1 0.8
Ki iP 06 42 55.3
microns sec
P Z' 0.2 1.8
Sk iP 06 43 18.7
Um iP 06 43 00.2
Luzon (h = 120 km).
Magn. = 5.8 (Up,Ki).

" 26 Um iP 07 23 08.7
Okhotsk Sea (h = 180 km).

" 26 Up iP 07 49 33.4
i 07 49 40.1
Gb iP 07 49 14.5
Um iP 07 49 52.2
West of Portugal
(h = 30 km).

" 26 Up iP 09 28 37.0 D
Ki iP 09 28 22.6
microns sec
P Z' 0.1 1.0
Sk eP 09 28 43
Um iP 09 28 26.4
Mindanao (h = 60 km).
P is preceded by small-
amplitude motion, especially
clear at Um, where this
starts at 09 28 13.

" 26 Ki iP 12 29 29.6
Um iP 12 29 34.5 C
Banda Sea (h = 160 km).

" 26 Up ---
microns sec
M E 0.7 18
M N 0.7 18
M Z 0.9 18
Ki ---
M E 1.1 20
M N 0.9 19
M Z 1.8 18
Um iPS 13 58 22
eSS 14 04 27
Southwest of Galapagos
Islands (h = 30 km).
Magn. = 5.5 (Up,Ki).

1964 Mar. 26 Ki i(P) 15 44 01.8
e(Sg) 15 44 49
Um i(Sg) 15 46 36.0

" 26 Up eP 19 13 30

" 26 Up iP 19 48 47.0
Ki iP 19 48 05.7
Sk iP 19 48 39.1
Um iP 19 48 23.9
Japan (h = 30 km).

" 26 Up iP 20 23 56.1

" 26 Up iP 20 49 08.8

" 26 Up iP 21 40 13.7 C
ipP 21 40 27.7
Ki iP 21 40 15.1
Sk iP 21 40 29.6 C
ipP 21 40 43.3
Um iP 21 40 10.9 C
ipP 21 40 25.2
Sumatra. h = 60 km
(Up,Sk,Um).

" 27 Up e(P) 00 03 09

" 27 Up iP 02 27 26.7

" 27 Up iP 04 40 45.5 C
ipP 04 41 13.6
microns sec
P Z' 0.1 0.5
pP Z' 0.1 0.5
Ki iP 04 40 36.9
ipP 04 41 04.6
isP 04 41 18.7
Sk iP 04 41 00.1
ipP 04 41 27.4
Gb eP 04 41 07
i 04 41 14.5
Um iP 04 40 36.7 C
Ka eP 04 40 55
ipP 04 41 22.5
Burma. h = 110 km
(Up,Ki,Sk,Ka).
The amplitude of pP is
approximately twice the
amplitude of P at all
stations; at Up the
amplitudes are 0.05 and
0.11 microns resp. of P
and pP on Z'.

" 27 Um eP 17 25 23
Costa Rica (h = 30 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Mar. 27 Up iP 17 40 20.7
Um iP 17 40 21.9
Costa Rica (h = 30 km).

" 27 Um iP 19 20 12.2
Hindu Kush (h = 210 km).

" 27 Up iPKP 20 40 37.7
iSKP 20 43 32.1
microns sec
PKP Z' 0.2 0.9
Ki i(PKP) 20 40 18.9
iPKP 20 40 27.8
iSKP 20 43 10.5
microns sec
SKP Z' 0.1 1.3
Sk e(PKP) 20 40 33
iPKP 20 40 37.9
iSKP 20 43 25.4
Gb iPKP 20 40 47.8 C
epPKP 20 42 46
iSKP 20 43 39.1
Um i(PKP) 20 40 26.4 C
iPKP 20 40 31.8
iSKP 20 43 19.9
iPKS 20 44 10
e 20 46 10
i 20 48 41.7
Ka iPKP 20 40 50.2 C
ipPKP 20 42 55.3
iSKP 20 43 41.1
South of Fiji Islands.
h = 500 km (Gb,Ka).
As our stations are distributed around the caustic at around 143°, the records display a number of interesting features, summarized in the following table:

Station	D	PKP-(PKP) sec	pPKP	SKP/PKP ampl.ratio
Ki	134°	8.9	no	2.5
Um	139	5.4	no	2.2
Sk	141	5	no	2.3
Up	144	no	no	0.25
Gb	146	no	weak	0.27
Ka	147	no	strong	0.28

The double PKP-phase with (PKP) much weaker than PKP, is observed only within the shadow zone, (PKP) being identical with P''_0 at Ki and with P''_1 at Um, Sk (G. Payo Subiza & M. Båth, Geophys. J., 8:496-513, 1964). pPKP emerges gradually beyond the shadow zone. The variation of the amplitude ratio SKP/PKP by a factor of 8 from within to outside the shadow zone is exclusively due to the amplitude variation of PKP, whereas SKP has practically constant amplitude over this distance range.

cont.

1964
Mar. cont. 27 " Up iP 23 13 30.6
ipP 23 13 38.5
microns sec
pP Z' 0.1 0.7
Ki iP 23 13 27.3
Sk iP 23 13 48.6
Um iP 23 13 23.9
ipP 23 13 32.5
Ka iP 23 13 38.2
Bhutan. h = 30 km (Up,Um).

" 28 Up iP 03 46 10.9 C
i 03 46 16
iS 03 54 21
microns sec
P E 38 16
P N 190 14
S E 430 16
S N 260 11
M E 2260 22
D = 6550 km = 59°.
Ki iP 03 45 15.3 C
microns sec
P E 37 12
P N 50 15
Sk iP 03 45 42.0 C
Gb iP 03 46 22.5 C
Um iP 03 45 44.1 C
Ka iP 03 46 34.2 C
Alaska (h = 20 km).
Magn. = 8.5 (Up,Ki).
The amplitudes given for Up refer in this case to Wiechert. These amplitudes should be multiplied by a factor about 2 to be converted to amplitudes on long-period Benioff (Båth, Geofisica pura e appl., 43:108-130, 1959). Well developed mantle Rayleigh and especially Love waves were recorded.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. 28 Up iP 05 27 21.8
Gb iP 05 27 32.9
Alaska. This is the first aftershock which could be read reliably. Before that the traces are too entangled to permit reliable readings. - As we found a very large number of Alaska aftershocks, which were not reported by USCGS, we used other bulletins for some of the identification.

" 28 Ki iP 05 28 54.3 C
Alaska.

" 28 Ka iP 05 30 44.7 C
Alaska.

" 28 Up iP 05 33 42.8 C
Alaska.

" 28 Up iP 05 41 23.6 D
Ki iP 05 40 29.1
Sk iP 05 41 02.5
Um iP 05 41 01.8
Alaska (h = 30 km).

" 28 Ka iP 05 42 45.4

" 28 Up iP 05 43 56.6 C
microns sec
P Z' 0.1 1.0
Ki iP 05 43 00.9
microns sec
P Z' 0.4 1.5
Sk iP 05 43 27.7 C
Gb iP 05 44 08.0 C
Um iP 05 43 30.3 C
Ka iP 05 44 20.2
Alaska (h = 20 km).
Magn. = 6.0 (Up,Ki).

" 28 Up iP 05 46 03.3
microns sec
P Z' 0.2 1.0
Ki iP 05 45 00.2
microns sec
P Z' 0.8 1.3
Sk iP 05 45 35.8 D
Gb iP 05 46 15.0 D
i 05 46 17.9
Um iP 05 45 36.9 D
Ka iP 05 46 26.3
Alaska (h = 30 km).
Magn. = 6.4 (Up,Ki).

1964 Mar. 28 Um iP 05 46 47.3

" 28 Ki iP 05 46 49.3 C

" 28 Ki iP 05 47 22.0
microns sec
P Z' 0.1 1.0
Gb iP 05 48 28.4 C
Alaska.

" 28 Um iP 05 49 41.5 D

" 28 Up iP 05 51 38.1
Ki iP 05 50 43.3
ipP 05 50 49.4
microns sec
P Z' 0.1 1.0
Sk iP 05 51 10.6
i(pP) 05 51 14.8
Gb iP 05 51 50.0
Um iP 05 51 11.6 D
Alaska.

" 28 Up iP 05 52 37.9
Ki iP 05 51 43.3
ipP 05 51 49.4
microns sec
pP Z' 0.1 1.0
Sk iP 05 52 10.5
ipP 05 52 16.2
Gb iP 05 52 49.8
Um iP 05 52 09.3
Alaska.

" 28 Ki iP 05 52 54.4
Um iP 05 53 25.0 C
Alaska.

" 28 Um iP 05 54 22.5
Alaska.

" 28 Up iP 05 54 58.1
Ki iP 05 54 02.9 C
Gb iP 05 55 09.6
Um iP 05 54 30.9
ipP 05 54 37.7
Alaska (h = 30 km).

" 28 Sk iP 05 55 28.2

" 28 Um iP 05 55 46.1
Alaska.

" 28 Up eP 05 56 49
Ki iP 05 55 55.0

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. 28 Ki microns sec P Z' 0.1 1.0
Gb iP 05 57 01.8
Um iP 05 56 23.5
iPcP 05 57 20.5
Alaska.

" 28 Um iP 05 56 03.3

" 28 Um iP 05 59 21.8

" 28 Up iP 06 00 06.3
ipP 06 00 13.9
Ki iP 05 59 11.5 C
ipP 05 59 19.3
microns sec
P Z' 0.1 0.6
pP Z' 0.2 1.0
Sk iP 05 59 39.2 C
ipP 05 59 46.8
Gb iP 06 00 17.7
ipP 06 00 25.4
Um iP 05 59 39.2 C
ipP 05 59 47.1
iPcP 06 00 37.0
Ka iP 06 00 29.7
ipP 06 00 36.2
Alaska. h = 30 km (Up,Ki,Sk, Gb,Um,Ka). pP has larger amplitudes than P at all stations. This may sometimes lead to difficulties in phase identification, especially when the weaker P is missing and the record starts with the stronger pP. At Ki and Um, P starts with longer periods (1.0 sec), followed after 1.5-2 sec by shorter periods (0.6 sec).

" 28 Ki iP 05 59 38.0

" 28 Um iP 06 02 04.9
ipP 06 02 11.1
(Alaska).

" 28 Up iP 06 03 31.1 C
ipP 06 03 36.8
Ki iP 06 02 36.3
ipP 06 02 43.3
Gb iP 06 03 42.8
Um iP 06 03 04.8
ipP 06 03 11.4
Alaska. h = 25 km (Up,Ki,Um).

1964 Mar. 28 Ki iP 06 03 25.1 D
Sk iP 06 03 52.1
Um iP 06 03 53.1 D
Alaska.

" 28 Ki iP 06 05 38.7
Alaska.

" 28 Um iP 06 06 41.1

" 28 Ki iP 06 07 43.5
Um iP 06 08 12.0
Alaska.

" 28 Ki iP 06 08 44.3
Um iP 06 09 12.2
ipP 06 09 19.8
Alaska. h = 30 km (Um).

" 28 Up iP 06 13 13.2
Ki iP 06 12 11.7
Sk eP 06 12 40
Um iP 06 12 40.7 D
Alaska.

" 28 Ki iP 06 12 54.0
Um iP 06 13 22.8
Alaska.

" 28 Ki iP 06 13 17.8

" 28 Gb eP 06 15 02

" 28 Up iP 06 15 04.8
Gb iP 06 16 12.1
Alaska.

" 28 Ki iP 06 15 05.2
microns sec
P Z' 0.1 1.1
Um iP 06 15 33.8
Alaska.

" 28 Um iP 06 15 14.6

" 28 Up iP 06 18 49.2 C
microns sec
P Z' 0.2 1.0
Ki iP 06 17 53.5 C
ipP 06 17 59.0
microns sec
P Z' 0.2 1.0
Sk iP 06 18 20.3 C
Gb iP 06 19 00.6 C
Um iP 06 18 22.6 C

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. 28 Ka iP 06 19 12.4 C
Alaska. h = 20 km (Ki).
Magn. = 6.1 (Up,Ki).

" 28 Up iP 06 19 34.8
Sk iP 06 19 19.6 C
Um iP 06 19 20.0
Alaska. Up may have recorded a different shock.

" 28 Up iP 06 20 12.0 C

" 28 Up iP 06 22 47.8 D
Um iP 06 22 14.5
ipP 06 22 21.3
Alaska. h = 30 km (Um).

" 28 Um i(P) 06 23 08.8

" 28 Up i(pP) 06 26 05.0
Ki iP 06 25 00.2
ipP 06 25 06.7
microns sec
P Z' 0.1 1.2
Um iP 06 25 28.4
Alaska. h = 25 km (Ki).

" 28 Ki iP 06 31 45.9
Alaska.

" 28 Ki iP 06 33 32.0
Gb iP 06 34 37.6
Um iP 06 34 00.6 C
Alaska (h = 15 km).

" 28 Ki iP 06 38 38.3

" 28 Up iP 06 39 40.4
ipP 06 39 46.5
microns sec
pP Z' 0.1 1.0
Ki iP 06 38 45.9
ipP 06 38 52.4
microns sec
pP Z' 0.1 1.0
M E 73 17
M N 56 18
M Z 100 17
Sk eP 06 39 06
ipP 06 39 12.8
Gb iP 06 39 51.4
ipP 06 39 59.0
Um iP 06 39 14.1
ipP 06 39 20.4
Alaska. h = 25 km (Up,Ki, Sk,Gb,Um). It is not quite

cont.

1964 Mar. cont. 28 certain whether the maxima (M ENZ) listed for Ki belong to this shock or not.

" 28 Sk iP 06 39 31.7

" 28 Up iP 06 42 41.5
Ki iP 06 41 44.4 C
i 06 41 45.8
microns sec
P Z' 0.2 1.0
Sk iP 06 42 12.9
Gb iP 06 42 53.1
Um iP 06 42 14.3 C
Ka iP 06 43 05.2 C
Alaska (h = 30 km).

" 28 Ki iP 06 42 18.3 C
Gb eP 06 43 24
Alaska.

" 28 Um iP 06 42 26.4

" 28 Sk iP 06 43 11.3
Um iP 06 43 12.2
Alaska.

" 28 Ka iP 06 45 38.0 C

" 28 Ki iP 06 45 51.0

" 28 Up iP 06 47 15.4
ipP 06 47 26.8
microns sec
P Z' 0.1 1.0
Ki iP 06 46 21.1
microns sec
P Z' 0.1 1.0
Sk iP 06 46 47.3
Gb iP 06 47 27.5
Um iP 06 46 49.2
Ka iP 06 47 38.8
ipP 06 47 47.8
Alaska. h = 40 km (Up,Ka).
Magn. = 5.8 (Up,Ki).

" 28 Um iP 06 48 57.7

" 28 Um iP 06 49 58.6
ipP 06 50 03.1
Alaska. h = 20 km (Um).

" 28 Um iP 06 50 23.0

" 28 Ka iP 06 50 24.9

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. 28 Up iP 06 51 33.9
Sk iP 06 51 05.9
Gb iP 06 51 45.9
ipP 06 51 50.2
Um iP 06 51 07.9
ipP 06 51 12.6
Ka iP 06 51 57.8
ipP 06 52 02.4
Alaska. h = 20 km (Gb,Um,Ka).

" 28 Um iP 06 51 21.8

" 28 Sk iP 06 51 34.3
Um iP 06 51 32.7
Ka iP 06 52 19.2
i 06 52 33.7
Alaska.

" 28 Sk iP 06 52 04.2
Um iP 06 52 04.9
ipP 06 52 09.7
Alaska. h = 20 km (Um).

" 28 Sk iP 06 52 49.2
Gb iP 06 53 28.5
Um iP 06 52 50.5 D
Alaska.

" 28 Ki iP 06 52 53.4
Sk iP 06 53 21.2
Alaska.

" 28 Up iP 06 54 15.5
microns sec
P Z' 0.9 1.5
Ki iP 06 53 20.7 D
microns sec
P Z' 1.0 1.5
Sk iP 06 53 47.9 D
Gb iP 06 54 27.5 D
Um iP 06 53 49.2
Ka iP 06 54 39.1
Alaska (h = 25 km).
Magn. = 6.7 (Up,Ki).

" 28 Ka iP 06 53 56.1

" 28 Gb iP 06 54 02.9

" 28 Um iP 06 54 54.5

" 28 Um iP 06 55 17.8

" 28 Ki iP 06 56 28.6
microns sec
P Z' 0.1 1.0

cont.

1964 Mar. cont. 28 Ka iP 06 57 42.5
Alaska.

" 28 Ki iP 06 57 12.7

" 28 Ka iP 07 00 33.2

" 28 Up iP 07 01 15.0
Ki iP 07 00 16.3
Sk iP 07 00 47.7
Gb iP 07 01 26.4
ipP 07 01 31.5
Um iP 07 00 48.6
Ka iP 07 01 37.8
ipP 07 01 43.8
Alaska. h = 25 km (Gb,Ka).

" 28 Up iP 07 01 27.4
microns sec
P Z' 0.2 1.0
Ki iP 07 00 26.5
ipP 07 00 32.8
microns sec
pP Z' 0.3 1.2
Sk iP 07 01 00.4
Gb iP 07 01 39.4
Um iP 07 00 57.9
Ka iP 07 01 50.0
Alaska. h = 25 km (Ki).
Magn. = 6.2 (Up,Ki).

" 28 Sk iP 07 02 08.8
Gb iP 07 02 49.9
Alaska.

" 28 Up iP 07 03 50.0
ipP 07 03 56.1
microns sec
P Z' 0.1 0.9
Ki iP 07 02 54.7
ipP 07 03 01.0
microns sec
P Z' 0.2 1.4
Sk iP 07 03 21.8
ipP 07 03 27.8
Gb iP 07 04 01.9
ipP 07 04 07.9
Um iP 07 03 23.8
ipP 07 03 30.1
Ka iP 07 04 13.4
ipP 07 04 19.7
Alaska. h = 25 km (Up,Ki,Sk, Gb,Um,Ka). Magn. = 5.9 (Up,Ki).

" 28 Sk iP 07 03 36.3

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar.	28	Sk	iP	07 04 06.3	
			ipP	07 04 16.0	
		(Alaska).			
"	28	Um	iP	07 04 43.2	
"	28	Um	iP	07 05 08.5	
		Ka	iP	07 05 58.0	
		Alaska.			
"	28	Ki	iP	07 06 35.7 C	
"	28	Up	iP	07 10 22.4 C	
			ipP	07 10 30.3	
		Ki	iP	07 09 28.6	
			ipP	07 09 36.7	
		Sk	iP	07 09 55.6 C	
			ipP	07 10 03.7	
		Gb	i(P)	07 10 27.2	
		Um	iP	07 09 56.5	
		Ka	i(P)	07 10 52.6	
		Alaska. h = 30 km (Up,Ki,Sk).			
"	28	Ki	iP	07 09 53.8	
"	28	Up	iP	07 12 46.2	
		Ki	iP	07 11 51.8	
		Sk	iP	07 12 17.7	
		Gb	iP	07 12 58.3	
		Um	iP	07 12 20.4	
		Alaska.			
"	28	Up	iP	07 14 27.9	
		Ki	eP	07 13 34	
		Sk	iP	07 14 01.1 C	
		Gb	iP	07 14 40.1	
		Um	iP	07 14 02.3 C	
		Alaska.			
"	28	Ki	iP	07 13 47.9	
		Gb	iP	07 14 53.6	
		Alaska.			
"	28	Sk	iP	07 16 54.7	
		Alaska.			
"	28	Ki	iP	07 17 00.2	
"	28	Up	iP	07 19 15.6	
		Ki	iP	07 18 20.4	
				microns sec	
			P	Z' 0.1 1.0	
		Sk	iP	07 18 46.8	
		Gb	iP	07 19 27.5	
		Um	iP	07 18 48.7	
		Ka	iP	07 19 34.2 C	

cont.

1964 Mar. cont.	28	Ka	ipP	07 19 39.2	
		Alaska. h = 20 km (Ka).			
"	28	Up	iP	07 20 35.8 D	
				microns sec	
			P	Z' 0.2 0.6	
			M	E 9.7 19	
			M	N 18 18	
			M	Z 19 18	
		Ki	iP	07 19 41.1 D	
			ipP	07 19 46.6	
				microns sec	
			P	Z' 0.7 1.5	
			pP	Z' 1.3 1.5	
		Sk	iP	07 20 07.4 D	
			ipP	07 20 14.6	
		Gb	iP	07 20 47.6 D	
			iP'P'	07 49 47.7	
		Um	iP	07 20 09.9 D	
			ipP	07 20 16.6	
			eP'P'	07 49 57	
		Ka	iP	07 20 59.2	
			ipP	07 21 06.2	
		Alaska. h = 25 km (Ki,Sk,Um, Ka). Magn. = 6.4 (Up,Ki).			
"	28	Um	iP	07 20 49.2	
"	28	Sk	i(P)	07 21 01.3	
"	28	Sk	iP	07 21 40.4	
"	28	Um	iP	07 24 49.5	
		Alaska.			
"	28	Up	iP	07 26 35.0	
		Ki	iP	07 25 40.8	
				microns sec	
			P	Z' 0.2 1.0	
		Sk	iP	07 26 07.8 C	
		Gb	iP	07 26 47.4	
		Um	iP	07 26 09.7	
		Ka	iP	07 26 58.9	
		Alaska. The period of P on Z' is slightly greater than usual, around 1.8-2.0 sec, especially clear at Up and Ka.			
"	28	Up	iP	07 30 28.6	
		Um	iP	07 30 54.2	
		Alaska.			
"	28	Up	iP	07 33 08.4	
"	28	Sk	iP	07 33 18.2	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. cont.	28	Um	iP	07 33 15.0	
		(Alaska).			
"	28	Up	iP	07 34 32.6	
		Ki	eP	07 33 37	
			ipP	07 33 44.5	
		Sk	ipP	07 34 14.3	
		Um	iP	07 34 07.1	
		Ka	iP	07 35 03.3	
		Alaska. h = 30 km (Ki).			
"	28	Sk	i(P)	07 35 01.7	
"	28	Um	iP	07 36 26.4	C
		Alaska.			
"	28	Ki	iP	07 37 47.5	
		Sk	eP	07 38 15	
			ipP	07 38 21.5	
		Um	iP	07 38 16.0	
			ipP	07 38 22.5	
		Alaska. h = 25 km (Sk,Um).			
"	28	Up	iP	07 40 53.0	
		Ki	iP	07 39 59.2	
		Sk	iP	07 40 26.0	
		Um	iP	07 40 27.3	
		Alaska.			
"	28	Up	iP	07 40 55.9	
			microns	sec	
			P	Z' 0.2	1.0
		Ki	iP	07 40 01.8	
			microns	sec	
			P	Z' 0.7	1.5
		Sk	iP	07 40 28.1	
		Gb	iP	07 41 07.2	D
		Um	iP	07 40 29.6	
		Ka	iP	07 41 18.4	
		Alaska (h = 15 km).			
		Magn. = 6.4 (Up,Ki).			
"	28	Um	iP	07 45 51.4	
"	28	Ki	iP	07 48 18.9	
		Sk	eP	07 48 45	
		Um	eP	07 48 47	
		Alaska.			
"	28	Up	iP	07 49 48.7	
			ipP	07 49 54.8	
			microns	sec	
			pP	Z' 0.2	1.3
		(Alaska).			
"	28	Sk	iP	07 50 03.3	D
cont.					

1964 Mar. cont.	28	Sk	ipP	07 50 10.1	
		Um	iP	07 50 01.4	
			ipP	07 50 10.5	
		Alaska. h = 30 km (Sk,Um).			
"	28	Um	iP	07 52 00.9	
		Alaska.			
"	28	Up	iP	07 54 11.1	C
		Ki	iP	07 53 16.7	
		Sk	iP	07 53 42.8	C
		Gb	iP	07 54 23.0	
		Um	iP	07 53 43.6	
		Ka	iP	07 54 34.5	
		Alaska.			
"	28	Ki	i(P)	07 53 37.8	
"	28	Up	iP	07 58 10.4	
		Ki	iP	07 57 09.4	
			ipP	07 57 16.4	
		Sk	iP	07 57 36.1	
		Um	iP	07 57 37.4	
			ipP	07 57 44.2	
		Alaska. h = 30 km (Ki,Um).			
"	28	Up	i(P)	07 58 59.2	
"	28	Up	iP	07 59 17.1	C
		Ki	iP	07 58 22.8	
		Sk	iP	07 58 50.0	C
		Gb	iP	07 59 29.0	
		Um	iP	07 58 50.9	
		Ka	iP	07 59 40.6	
		Alaska (h = 15 km).			
"	28	Ki	iP	07 59 58.3	
		Sk	iP	08 00 25.0	
		Um	iP	08 00 25.9	
		Alaska.			
"	28	Up	iP	08 00 29.4	
"	28	Up	iP	08 02 37.5	
		Ki	iP	08 01 43.8	
		Sk	iP	08 02 11.2	
		Um	iP	08 02 12.0	
		Alaska (h = 30 km).			
"	28	Ki	iP	08 04 31.1	
			ipP	08 04 38.5	
		Sk	iP	08 04 57.6	
			ipP	08 05 04.8	
		Um	iP	08 05 00.2	
			ipP	08 05 06.3	
		Alaska. h = 30 km (Ki,Sk, Um).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar.	28	Up	eP	08 09 57	
		Ki	iP	08 09 06.7	
		Um	iP	08 09 34.8	C
		Alaska (h = 25 km).			
"	28	Up	iP	08 10 57.0	
		Um	iP	08 10 06.9	
		Could be two different shocks.			
"	28	Um	iP	08 11 03.0	
			ipP	08 11 09.2	
		(Alaska).			
"	28	Up	iP	08 15 23.8	
		Ki	iP	08 14 27.3	
		Um	iP	08 14 56.4	
		Alaska.			
"	28	Up	iP	08 15 39.6	
		Ki	iP	08 14 42.7	
		Um	iP	08 15 10.9	
		Alaska. An alternative interpretation would be that these phases are pP of the preceding shock, which would mean a focal depth of 60 km.			
"	28	Ki	iP	08 17 35.1	
		Um	eP	08 18 03	
		Alaska.			
"	28	Um	eP	08 22 53	
		Alaska (h = 30 km).			
"	28	Ki	iP	08 24 13.7	
		Um	iP	08 24 42.3	
		Alaska.			
"	28	Um	iP	08 25 20.2	
		Alaska.			
"	28	Up	iP	08 37 39.5	
		Ki	iP	08 36 37.5	
		Alaska.			
"	28	Up	iP	08 38 32.7	
"	28	Ki	iP	08 39 16.1	
		Um	iP	08 39 44.8	
		Alaska (h = 30 km).			
"	28	Up	iP	08 42 31.3	C
		Ki	iP	08 41 36.0	
		Sk	iP	08 42 01.7	
cont.					

1964 Mar. cont.	28	Ka	iP	08 42 54.7	
		Alaska (h = 15 km).			
"	28	Up	iP	08 44 06.4	
			ipP	08 44 12.6	
				microns sec	
			pP	Z' 0.3 1.2	
		Ki	iP	08 43 11.7	
			ipP	08 43 17.4	
				microns sec	
			P	Z' 0.1 1.2	
			pP	Z' 0.4 1.2	
		Sk	iP	08 43 38.5	
			ipP	08 43 44.6	
		Gb	iP	08 44 18.0	
			ipP	08 44 23.9	
		Ka	iP	08 44 30.4	
			ipP	08 44 36.3	
		Alaska. h = 25 km (Up,Ki, Sk,Gb,Ka).			
"	28	Up	iP	08 47 29.4	
		Ki	iP	08 46 24.1	
		Sk	eP	08 46 50	
		Um	iP	08 46 52.4	
		Alaska.			
"	28	Ki	iP	08 46 38.8	
		Sk	eP	08 47 05	
		Alaska.			
"	28	Up	iP	08 49 38.3	
		Alaska.			
"	28	Up	iP	08 50 19.5	
				microns sec	
			P	Z' 0.1 0.9	
		Ki	iP	08 49 24.9	D
				microns sec	
			P	Z' 0.2 1.0	
		Sk	iP	08 49 51.7	D
		Gb	iP	08 50 30.7	D
			ipP	08 50 36.9	
		Um	iP	08 49 53.2	D
		Ka	iP	08 50 42.7	D
		Alaska. h = 25 km (Gb). Magn. = 5.9 (Up,Ki).			
"	28	Ki	iP	08 50 25.9	
"	28	Sk	iP	08 50 41.4	
		Um	iP	08 50 42.0	
		Alaska.			
"	28	Up	iP	08 50 57.9	

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar.	28	Ki	iP	08 52 10.7	
		Alaska.			
"	28	Up	iP	08 57 13.3	
		Ki	iP	08 56 20.0	
		Sk	iP	08 56 47.1	
		Gb	iP	08 57 26.1	
		Um	iP	08 56 47.9	
		Alaska (h = 30 km).			
"	28	Um	iP	08 58 29.4	
"	28	Um	iP	08 59 12.3	
"	28	Ki	iP	09 02 22.0	
		Alaska.			
"	28	Up	iP	09 05 30.9	
		Ki	iP	09 04 35.9	
		Um	iP	09 05 04.4	
		Alaska (h = 20 km).			
"	28	Up	iP	09 05 52.3	
			microns	sec	
		P	Z'	0.1	1.0
		Ki	iP	09 04 58.0	
			ipP	09 05 06.8	
			microns	sec	
		P	Z'	0.3	1.5
		Sk	iP	09 05 24.4 C	
		Gb	iP	09 06 04.1	
			ipP	09 06 11.7	
		Um	iP	09 05 25.9 C	
		Ka	iP	09 06 14.4 C	
		Alaska. h = 30 km (Ki,Gb).			
		Magn. = 5.9 (Up,Ki).			
"	28	Ki	iP	09 05 31.5	
"	28	Up	iP	09 09 27.2	
			iP	09 09 32.8	
		Ki	iP	09 08 32.8	
			ipP	09 08 39.2	
		Sk	iP	09 08 59.4	
			ipP	09 09 05.6	
		Gb	iP	09 09 39.0	
		Um	iP	09 09 00.4	
			ipP	09 09 06.9	
		Ka	i(P)	09 09 56.3	
		Alaska. h = 25 km (Up,Ki, Sk,Um).			
"	28	Um	iP	09 09 21.6	
"	28	Up	iP	09 11 30.9 C	
			ipP	09 11 39.1	

cont.

1964 Mar. cont.	28	Up	eS	09 20 04	
			microns	sec	
		P	N	1.1	3
		P	Z	1.4	3
		P	Z'	0.6	1.1
		S	E	0.9	6
		S	N	1.0	6
		M	E	2.3	20
		M	N	5.3	20
		M	Z	5.2	20
		D = 7050 km = 63 1/2°.			
		Ki	iP	09 10 36.9 C	
			i	09 10 49	
			microns	sec	
		P	N	1.2	6
		P	Z	1.5	3
		P	Z'	1.3	1.5
		M	E	3.9	17
		M	N	5.0	20
		M	Z	5.6	18
		Sk	iP	09 11 03.2	
		Gb	iP	09 11 42.8	
			ipP	09 11 50.6	
		Um	iP	09 11 04.8 C	
		Ka	iP	09 11 53.8 C	
			ipP	09 12 01.4	
		Alaska. h = 30 km (Up,Gb,Ka). Magn. = 6.5 (Up,Ki) from body waves. The relatively small surface waves (M = 5.9 (Up,Ki) from surface waves only) suggest either greater depth (around 60 km, contradicted by pP) or more likely some other reason.			
"	28	Up	iP	09 16 26.6 C	
			ipP	09 16 33.9	
			microns	sec	
		P	Z'	0.1	0.6
		Ki	iP	09 15 32.0 C	
			ipP	09 15 39.8	
			microns	sec	
		P	Z'	0.2	1.0
		Sk	iP	09 15 59.0 C	
		Gb	iP	09 16 38.5 C	
			ipP	09 16 46.2	
		Um	iP	09 16 00.3 C	
		Ka	iP	09 16 49.5 C	
		Alaska. h = 30 km (Up,Ki,Gb). Magn. = 6.0 (Up,Ki).			
"	28	Up	iP	09 24 05.4 D	
			ipP	09 24 17.2	
		Ki	iP	09 23 10.3	
			ipP	09 23 21.0	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. 28 cont.

Ki
P Z' 0.1 1.0 microns sec
Sk iP 09 23 37.6
ipP 09 23 48.7
Gb iP 09 24 17.4
ipP 09 24 29.4
Um iP 09 23 38.6 D
ipP 09 23 50.1
Ka iP 09 24 28.9
epP 09 24 39
Alaska. h = 40 km (Up,Ki, Sk,Gb,Um,Ka).

" 28 Um iP 09 27 26.7

" 28 Up iP 09 28 17.0
Ki iP 09 27 23.3
Sk iP 09 27 50.1 C
Gb iP 09 28 29.2
Um iP 09 27 51.5 C
Ka iP 09 28 40.5
Alaska (h = 25 km).

" 28 Ki iP 09 28 11.3
Um iP 09 28 39.6
Alaska.

" 28 Ki iP 09 29 39.5
Um iP 09 30 07.9
ipP 09 30 14.7
Alaska. h = 30 km (Um).

" 28 Ki iP 09 30 22.8

" 28 Um iP 09 33 23.3
Alaska.

" 28 Ki eP 09 35 17
Um iP 09 35 45.0
Alaska (h = 30 km).

" 28 Ki iP 09 41 11.2
Alaska.

" 28 Up iP 09 44 30.4
Ki iP 09 43 36.4
P Z' 0.1 1.0 microns sec
Sk iP 09 44 03.4 C
Gb iP 09 44 42.8 C
Um iP 09 44 04.4 C
Ka iP 09 44 54.8
Alaska (h = 20 km).

" 28 Ki iP 09 44 29.8
Sk iP 09 44 57.2

cont.

1964 Mar. 28 cont.

Um iP 09 44 57.7
Alaska.

" 28 Um iP 09 51 23.2
(Alaska).

" 28 Um iP 09 53 45.7

" 28 Up iP 09 55 20.0
Ki iP 09 54 24.3 C
P Z' 0.1 1.0 microns sec
Sk iP 09 54 51.5 C
Gb iP 09 55 31.5
Um iP 09 54 53.0 C
Ka iP 09 55 43.4
Alaska (h = 30 km).

" 28 Up iP 09 56 26.5
i 09 56 31.4
Sk iP 09 55 46.6

" 28 Up iP 10 03 00.5
eS 10 11 12
P N 0.6 4 microns sec
P Z 0.9 5
S N 0.6 6
M E 3.2 19
M N 5.0 19
M Z 5.4 17
D = 6650 km = 60°.
Ki iP 10 02 05.1
iS 10 09 36
P Z' 0.4 2.2 microns sec
S N 1.6 7
M E 4.4 17
M N 7.5 23
M Z 11 23
D = 5850 km = 52 1/2°.
Sk iP 10 02 31.9 C
Gb iP 10 03 12.2
ipP 10 03 20.7
Um iP 10 02 34.1
Ka iP 10 03 24.3
ipP 10 03 32.6
Alaska. h = 30 km (Gb,Ka).
Magn. = 6.0 (Up,Ki).
P and pP have unusually long periods on Z', around 2 sec.

" 28 Up iP 10 07 41.2
Ki iP 10 06 45.6
Sk eP 10 07 13

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. cont.	28	Um	iP	10 07 13.6	
		Alaska.			
"	28	Um	iP	10 07 37.6	
"	28	Um	iP	10 08 06.6	
		(Alaska).			
"	28	Up	iP	10 08 53.1	
		Ki	iP	10 07 59.6	
		Sk	iP	10 08 26.0	D
		Gb	iP	10 09 05.9	
		Um	iP	10 08 27.7	
		Alaska (h = 20 km).			
"	28	Up	iP	10 19 29.5	
		Ki	iP	10 18 58.1	
		Um	iP	10 19 17.0	
		Nebraska-South Dakota (h = 15 km).			
"	28	Ki	iP	10 21 38.8	
		Sk	iP	10 22 02.7	
		Um	iP	10 22 06.6	
		Alaska.			
"	28	Ki	iP	10 24 55.8	
		Um	iP	10 25 25.1	
		Alaska (h = 20 km).			
"	28	Up	iP	10 28 20.3	C
			microns	sec	
		P	Z' 0.1	1.0	
		Ki	iP	10 27 25.8	C
			microns	sec	
		P	Z' 0.1	1.0	
		Sk	iP	10 27 52.7	C
		Gb	iP	10 28 31.6	
		Um	iP	10 27 54.0	C
		Ka	iP	10 28 42.1	
		Alaska (h = 15 km).			
		Magn. = 5.8 (Up,Ki).			
"	28	Ki	iP	10 29 56.5	
		Um	iP	10 30 24.2	
		Alaska (h = 30 km).			
"	28	Um	i(P)	10 31 24.0	
"	28	Up	iP	10 32 32.0	
"	28	Um	eP	10 32 35	
"	28	Up	iP	10 35 47.5	
			ipP	10 35 52.6	
		Ki	iP	10 34 52.5	

cont.

1964 Mar. cont.	28	Ki	epP	10 34 58	
		Gb	iP	10 35 59.0	
		Um	iP	10 35 21.2	
		Alaska. h = 20 km (Up,Ki).			
"	28	Um	iP	10 37 06.2	
		Alaska.			
"	28	Um	iP	10 42 28.5	
"	28	Up	iP	10 43 20.7	
			microns	sec	
		P	Z' 0.1	0.8	
		Ki	iP	10 42 26.3	
		Sk	iP	10 42 53.5	
		Gb	iP	10 43 32.9	
		Um	iP	10 42 54.6	D
		Ka	iP	10 43 43.5	
		Alaska (h = 40 km).			
"	28	Up	iP	10 45 27.7	
			ipP	10 45 34.4	
		Ki	iP	10 44 33.1	
		Sk	iP	10 44 58.0	C
		Gb	iP	10 45 38.5	
		Um	iP	10 45 00.9	
		Alaska. h = 25 km (Up).			
"	28	Up	iP	10 46 02.9	D
			iS	10 54 28	
			iP'P'	11 15 03.9	
			microns	sec	
		P	N 0.9	4	
		P	Z 1.9	4	
		P	Z' 0.4	0.7	
		S	E 2.4	5	
		S	N 3.2	7	
		P'P'	Z 1.1	5	
		P'P'	Z' 0.1	0.9	
		M	E 3.1	18	
		M	N 6.1	19	
		M	Z 6.5	20	
		D = 7000 km = 63°.			
		Ki	iP	10 45 09.2	D
			iS	10 52 51	
			eP'P'	11 15 23	
			microns	sec	
		P	N 1.5	8	
		P	Z 2.4	7	
		P	Z' 1.0	1.3	
		S	E 3.9	9	
		S	N 2.8	11	
		M	E 7.8	17	
		M	N 12	20	
		M	Z 15	19	
		D = 6100 km = 55°.			

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar.	28	Sk	iP	22 39 30.2	
			ipP	22 39 37.0	
		(Alaska).			
"	28	Ki	iP	22 55 59.0	
		Sk	iP	22 56 25.1	C
		Gb	iP	22 57 05.5	
		Um	iP	22 56 27.8	C
		Alaska (h = 30 km).			
"	28	Um	iP	23 07 48.7	
"	28	Ki	iP	23 08 14.8	
		Alaska.			
"	28	Up	i(P)	23 25 29.5	
		Ki	iP	23 24 21.1	
		Um	iP	23 24 49.0	
		Alaska (h = 30 km).			
"	28	Ki	iP	23 25 46.9	
			ipP	23 25 52.4	
		Sk	iP	23 26 19.0	
		Um	iP	23 26 21.3	
		Alaska. h = 20 km (Ki).			
"	28	Up	iP	23 34 59.1	
		Ki	iP	23 34 03.9	
		Um	iP	23 34 32.7	
		Alaska (h = 30 km).			
"	28	Ki	iP	23 53 50.6	
"	28	Ki	iP	23 55 30.5	
		Sk	eP	23 55 58	
		Um	iP	23 55 58.4	
		Alaska.			
"	28	Up	iP	23 56 43.9	
			ipP	23 56 49.6	
		Ki	iP	23 55 50.0	
			ipP	23 55 55.4	
		Sk	iP	23 56 17.0	
		Gb	iP	23 56 54.9	
		Um	iP	23 56 18.2	
			ipP	23 56 23.6	
		Alaska. h = 20 km (Up,Ki,Um).			
"	28	Ki	iP	23 56 49.8	
"	29	Um	iP	00 07 36.0	
		Alaska.			
"	29	Um	iP	00 20 40.3	
		Alaska.			

1964 Mar.	29	Up	iP	00 22 55.0	
"	29	Up	iP	00 23 04.1	
		Ki	eP	00 22 11	
		Sk	iP	00 22 33.6	
		Gb	iP	00 23 16.2	
		Um	iP	00 22 34.8	
			ipP	00 22 38.0	
		Alaska. h = 15 km (Um).			
"	29	Ki	eP	00 24 22	
			ipP	00 24 28.5	
		Um	iP	00 24 52.3	
		Alaska. h = 25 km (Ki).			
"	29	Ki	iP	00 24 53.3	
		Sk	iP	00 25 20.7	
		Um	iP	00 25 21.0	
		Alaska.			
"	29	Ki	iP	00 30 25.2	
		Um	iP	00 30 53.3	
		Alaska (h = 30 km).			
"	29	Um	iP	00 35 56.2	
		Alaska.			
"	29	Um	iP	00 53 23.6	
"	29	Ki	iP	01 00 15.0	
		Um	eP	01 00 42	
			ipP	01 00 47.4	
		Alaska. h = 20 km (Um).			
"	29	Um	iP	01 01 25.9	
		Alaska (h = 30 km).			
"	29	Up	iP	01 03 30.0	
			ipP	01 03 40.7	
		Ki	iP	01 02 35.8	C
		Sk	iP	01 03 02.4	
		Um	iP	01 03 03.3	
			ipP	01 03 13.8	
		Alaska. h = 40 km (Up,Um).			
"	29	Ki	iP	01 05 09.7	
		Um	iP	01 05 38.0	
		Alaska.			
"	29	Ki	iP	01 16 42.8	
		Um	iP	01 17 11.4	D
		Alaska.			
"	29	Up	iP	01 19 44.0	D
				microns	sec
			P	Z' 0.2	0.7

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar.	29	Up	iP	04 25 33.5	
"	29	Up	eP	04 51 27	
		Ki	iP	04 51 07.3	
		Um	eP	04 51 19	
"	29	Up	iP	05 02 19.9	
		Ki	iP	05 01 25.9	
			i	05 01 31.4	
		Sk	iP	05 01 52.8	
			ipP	05 02 03.9	
		Gb	eP	05 02 32	
		Um	iP	05 01 53.9 D	
		Alaska. h = 40 km (Sk).			
"	29	Ki	iP	05 09 35.4	
		Um	eP	05 10 04	
		Alaska (h = 40 km).			
"	29	Up	iP	05 18 56.1	
		Ki	iP	05 18 01.7	
			i	05 18 14.3	
		Sk	iP	05 18 28.9	
		Um	iP	05 18 29.9	
		Alaska (h = 20 km).			
"	29	Up	iP	05 31 33.2	
			ipP	05 31 42.0	
		Ki	e(pP)	05 30 44	
		Sk	e(pP)	05 31 09	
		Um	eP	05 31 03	
			ipP	05 31 12.2	
		Alaska. h = 40 km (Up,Um).			
"	29	Up	i	05 39 36.0	
			iSg	05 40 25.8	
		Ki	iPn	05 36 11.3	
			iSn	05 37 08.8	
			iSg	05 37 28.9	
			D = 500 km = 4.5°.		
		Sk	eSn	05 39 03	
			i	05 39 58.0	
			iSg	05 40 05.7	
			D = 1020 km = 9.2°.		
		Um	ePn	05 36 35	
			iSn	05 37 50.4	
			iSg	05 38 24.1	
			D = 690 km = 6.2°.		
		Northwest Russia, 67.4°N, 32.3°E. Origin time = 05 35 01. Explosion?			
"	29	Ki	i(P)	05 37 36.4	
		Um	iP	05 38 03.8	
			i	05 38 17.6	
		(Alaska).			

1964 Mar.	29	Up	iP	05 42 39.0	
"	29	Up	iP	05 48 15.8	
		Ki	iP	05 47 21.5	
			ipP	05 47 28.4	
				microns sec	
			pP	Z' 0.1 0.8	
		Sk	iP	05 47 48.7 C	
		Gb	iP	05 48 28.2	
		Um	iP	05 47 49.9	
			ipP	05 47 56.8	
		Alaska. h = 30 km (Ki,Um).			
"	29	Ki	eP	05 58 55	
			ipP	05 59 03.2	
		Um	iP	05 59 24.0	
			ipP	05 59 31.5	
		Alaska. h = 30 km (Ki,Um).			
"	29	Ki	iP	06 01 22.9	
		Sk	iP	06 01 55.5	
		Um	iP	06 01 52.3	
			ipP	06 01 56.9	
		Alaska. h = 20 km (Um).			
"	29	Ki	iP	06 01 56.1	
		Sk	iP	06 02 28.7	
		Alaska.			
"	29	Up	iP	06 15 16.9 C	
			i	06 15 19.4	
			i(pP)	06 15 24	
			iS	06 23 52	
				microns sec	
			P	N 0.5 4	
			P	Z 0.8 4	
			P	Z' 0.6 1.7	
			S	E 0.7 5	
			S	N 1.2 6	
			M	E 2.7 18	
			M	N 6.5 18	
			M	Z 5.8 20	
			D = 7100 km = 64°.		
		Ki	iP	06 14 22.9 C	
			iS	06 22 12	
				microns sec	
			P	N 0.9 6	
			P	Z 1.7 6	
			P	Z' 0.4 1.0	
			S	E 4.2 17	
			S	N 2.3 10	
			S	Z 1.8 11	
			M	E 7.6 16	
			M	N 5.0 20	
			M	Z 9.5 20	
			D = 6200 km = 56°.		

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. cont.	29	Sk	iP	06 14 50.4	C
		Gb	iP	06 15 28.6	
			ipP	06 15 38.3	
		Um	iP	06 14 50.6	C
			iS	06 23 04	
		Ka	iP	06 15 39.2	
			ipP	06 15 48.2	
		Alaska. h = 40 km (Gb,Ka). Magn. = 6.3 (Up,Ki). At all our stations the P(Z') spectrum is dominated by two periods (averages 2.1 and 0.6 sec), the longer period starting on the average 2.5 sec before the short period motion. Compare similar remark to Mar. 28, 06 00.			
"	29	Up	iP	06 22 50.3	
		Ki	iP	06 21 55.8	
		Sk	iP	06 22 23.2	
		Um	iP	06 22 24.0	
		Alaska.			
"	29	Up	iP	06 39 57.1	
		Sk	iP	06 39 28.7	
		Gb	iP	06 40 08.4	
			ipP	06 40 14.7	
		Um	iP	06 39 30.1	
			ipP	06 39 37.0	
		Alaska. h = 25 km (Gb,Um).			
"	29	Um	iP	06 44 32.7	
"	29	Ki	iP	06 45 38.9	
		Alaska.			
"	29	Ki	iP	06 47 28.7	
		Um	iP	06 47 56.8	
		Alaska (h = 20 km).			
"	29	Ki	iP	06 48 02.9	
"	29	Ki	iP	06 50 43.5	
		Um	iP	06 51 11.5	
		Alaska.			
"	29	Ki	iP	06 58 15.5	
			ipP	06 58 22.6	
		Um	iP	06 58 43.9	
			ipP	06 58 50.5	
		Alaska. h = 30 km (Ki,Um).			
"	29	Up	iP	07 03 52.2	
cont.					

1964 Mar. cont.	29	Ki	iP	07 02 58.3	C
			ipP	07 03 06.6	
				microns sec	
			P	Z' 0.4 1.0	
		Sk	iP	07 03 25.9	
		Gb	iP	07 04 04.9	
		Um	iP	07 03 26.5	C
		Alaska. h = 30 km (Ki).			
"	29	Ki	iP	07 12 20.8	
"	29	Up	iP	07 15 30.0	
			ipP	07 15 38.7	
		Ki	iP	07 14 34.8	
			ipP	07 14 42.4	
		Sk	iP	07 15 01.8	
			ipP	07 15 10.5	
		Gb	iP	07 15 41.6	
			ipP	07 15 50.5	
		Um	iP	07 15 03.3	
			ipP	07 15 11.7	
		Alaska. h = 30 km (Up,Ki,Sk, Gb,Um).			
"	29	Ki	iP	07 18 46.5	
		Um	iP	07 19 15.2	
		Alaska.			
"	29	Up	iP	07 28 35.1	
		Ki	iP	07 27 40.6	
		Sk	iP	07 28 07.9	
		Gb	iP	07 28 46.9	
		Um	iP	07 28 08.9	
		Alaska (h = 25 km).			
"	29	Ki	iSn	07 46 11.6	
			iSg	07 46 29.7	
		Um	eSn	07 46 50	
			iSg	07 47 24.9	
		Northwest Russia. Explosion?			
"	29	Up	iP	07 47 55.7	
		Ki	iP	07 47 02.9	
			ipP	07 47 10.1	
		Alaska. h = 30 km (Ki).			
"	29	Up	iP	07 49 24.1	
"	29	Um	iP	07 49 42.2	
		Alaska (h = 20 km).			
"	29	Ki	e	07 50 47	
			i	07 51 27.3	
			i(Sg)	07 51 35.3	
		Um	iSg	07 52 25.6	
		Probably northwest Russia. Explosion?			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar.	29	Sk	iP	07 59 46.3	
"	29	Up	iP	08 03 20	C
		Ki	iP	08 02 25.8	C
				microns sec	
			P	Z' 0.4 1.0	
			M	E 0.9 15	
			M	N 0.6 15	
			M	Z 0.6 13	
		Sk	iP	08 02 53.4	C
		Gb	iP	08 03 31.9	
		Um	iP	08 02 53.8	
		Ka	eP	08 03 42	
		Alaska (h = 25 km).			
"	29	Up	iP	08 06 21.4	
			i	08 06 35.5	
"	29	Um	eP	08 11 10	
"	29	Ki	iP	08 15 39.6	
		Sk	iP	08 16 06.5	
		Um	iP	08 16 07.6	
		Alaska (h = 25 km).			
"	29	Up	iP	08 18 24.0	
		Ki	iP	08 17 29.9	
		Sk	iP	08 17 56.7	
		Um	iP	08 17 57.7	
		Alaska (h = 20 km).			
"	29	Um	iP	08 24 35.3	
		Alaska.			
"	29	Up	iP	08 41 35.1	
		Ki	iP	08 40 39.9	
		Um	iP	08 41 08.6	
		Alaska (h = 15 km).			
"	29	Um	iP	08 47 39.5	
		Alaska.			
"	29	Ki	iP	08 59 37.9	
		Sk	iP	09 00 04.9	
		Um	iP	09 00 05.7	
		Alaska (h = 30 km).			
"	29	Um	iP	09 09 46.7	
		Alaska (h = 20 km).			
"	29	Up	iP	09 17 16.7	
		Ki	iP	09 16 22.2	
		Sk	iP	09 16 49.5	
		Um	iP	09 16 50.1	
		Alaska (h = 15 km).			

1964 Mar.	29	Up	eP	09 26 15	
		Ki	iP	09 25 19.3	C
				microns sec	
			P	Z' 0.2 1.0	
		Sk	iP	09 25 46.0	C
		Gb	iP	09 26 25.4	
		Um	iP	09 25 47.5	C
		Alaska (h = 15 km).			
"	29	Up	i(P)	09 26 34.1	
"	29	Ki	iP	09 31 21.6	
		Um	iP	09 31 44.4	
		Alaska (h = 30 km).			
"	29	Ki	iP	09 50 19.7	
		Sk	iP	09 50 45.8	
		Um	iP	09 50 48.4	
		Alaska.			
"	29	Up	iP	09 55 14.7	
		Ki	iP	09 54 20.1	
		Sk	iP	09 54 47.9	
		Um	iP	09 54 48.1	
		Alaska.			
"	29	Up	iP	10 18 08.0	C
			i	10 18 10.2	
			iPcP	10 18 56.4	
				microns sec	
			P	Z' 0.2 1.0	
		Ki	iP	10 17 12.7	C
			i	10 17 14.8	
			iS	10 24 38	
				microns sec	
			P	Z' 0.4 1.3	
			S	N 0.7 7	
			M	N 0.7 18	
			M	Z 1.4 19	
		D = 5850 km = 52 1/2°.			
		Sk	eP	10 17 40	
			i	10 17 41.5	
			iPcP	10 18 39.9	
		Gb	iP	10 18 20.1	
		Um	iP	10 17 41.5	
			iPcP	10 18 41.6	
			iS	10 25 31	
			eP'P'	10 47 44	
		Ka	iP	10 18 34.0	
		Alaska (h = 20 km). Magn. = 6.3 (Up,Ki).			
		Exceptionally small surface waves at Ki.			
		At Up, Ki, Sk, Gb, Um, the P(Z') phase starts with a			

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar. cont.	29			small compressional motion, followed after 2.1 sec on the average by a much larger dilatational motion. Compare similar ramark to Mar. 28, 12 30.	
"	29	Ki	iP	10 22 54.7	
		Um	iP	10 23 23.5	
		Alaska (h = 15 km).			
"	29	Ki	eP	10 27 36	
"	29	Up	iP	10 49 40.2	
"	29	Ki	eP	10 52 08	
		Um	iP	10 52 35.5	
			ipP	10 52 42.3	
		Alaska. h = 30 km (Um).			
"	29	Up	iP	10 59 58.7	C
			ipP	11 00 05.9	
			i	11 00 16.4	
			iPcP	11 00 38.9	
		Ki	iP	10 59 04.3	
			iPcP	11 00 08.5	
			microns	sec	
			P Z'	0.1 1.0	
		Sk	iP	10 59 30.3	
			iPcP	11 00 23.3	
		Um	iP	10 59 32.6	C
		Alaska. h = 30 km (Up).			
"	29	Ki	iP	11 21 22.1	
		Um	iP	11 21 49.9	
		Alaska (h = 30 km).			
"	29	Um	eP	11 29 18	
"	29	Ki	eP	11 41 02	
		Um	iP	11 41 31.9	
		Alaska (h = 20 km).			
"	29	Up	iP	11 54 09.3	C
			ipP	11 54 15.7	
			microns	sec	
			M N	0.9 18	
			M Z	0.9 18	
		Ki	iP	11 53 13.9	C
			microns	sec	
			P Z'	0.1 1.0	
		Sk	iP	11 53 40.8	
			iPcP	11 54 39.6	
		Gb	iP	11 54 21.2	
		Um	iP	11 53 42.5	

cont.

1964 Mar. cont.	29	Um	ipP	11 53 50.9	
			iPcP	11 54 40.1	
		Alaska. h = 30 km (Up,Um).			
"	29	Ki	eP	12 04 05	
		Um	iP	12 04 37.9	
			i	12 05 02.2	
		Alaska (h = 25 km).			
"	29	Ki	iP	12 04 43.3	
		Um	iP	12 05 17.4	
			eS	12 13 06	
		Alaska.			
"	29	Up	iP	12 07 01.4	
		Ki	iP	12 05 59.8	
			ipP	12 06 06.2	
			microns	sec	
			pP Z'	0.1 1.0	
		Um	iP	12 06 27.9	
			ipP	12 06 34.6	
		Alaska. h = 25 km (Ki,Um).			
"	29	Um	iP	12 09 36.2	D
"	29	Sk	iP	12 12 31.4	
			ipP	12 12 37.2	
		Um	eP	12 12 31	
			ipP	12 12 35.5	
		Alaska. h = 20 km (Sk,Um).			
"	29	Um	iP	12 14 49.6	
"	29	Um	iP	12 22 08.7	
			ipP	12 22 15.0	
		Alaska. h = 25 km (Um).			
"	29	Um	iP	12 42 59.1	
		Alaska (h = 20 km).			
"	29	Um	iP	12 45 14.0	
			i	12 45 39.6	
		Alaska.			
"	29	Sk	iP	12 57 41.3	
		Alaska (h = 25 km).			
"	29	Sk	iP	13 17 23.6	
		Alaska (h = 30 km).			
"	29	Up	iP	14 34 39.8	
		Sk	iP	14 34 12.2	
		Um	iP	14 34 13.3	
		Alaska (h = 25 km).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964					
Mar.	29	Sk	iP	15 01 07.5	
		Um	iP	15 01 09.3	
		Alaska (h = 20 km).			
"	29	Up	iP	15 18 00.2	C
		Sk	iP	15 17 34.8	
		Gb	iP	15 18 12.8	
			ipP	15 18 22.6	
		Um	iP	15 17 34.2	
		Alaska. h = 40 km (Gb).			
"	29	Ki	iP	15 40 04.6	
		Sk	iP	15 40 31.5	
		Um	iP	15 40 32.7	
		Alaska (h = 30 km).			
"	29	Ki	iP	15 40 31.4	
		Um	iP	15 40 59.7	
		Alaska.			
"	29	Ki	iP	15 49 16.9	
		Sk	iP	15 49 35.2	
		Alaska (h = 25 km).			
"	29	Ki	iP	16 18 23.6	
		Sk	iP	16 18 49.7	
		Gb	iP	16 19 30.1	
			ipP	16 19 33.4	
		Um	iP	16 18 52.3	
		Alaska. h = 15 km (Gb).			
"	29	Up	iP	16 26 35.6	
			ipP	16 26 44.1	
		Ki	iP	16 25 41.6	
			ipP	16 25 48.4	
		Sk	iP	16 26 07.6	
			ipP	16 26 15.4	
		Um	iP	16 26 09.6	
			ipP	16 26 16.5	
		Alaska. h = 30 km (Up,Ki, Sk,Um).			
"	29	Up	iP	16 28 32.1	
		Ki	iP	16 27 36.6	C
				microns	sec
			P	Z' 0.1	1.0
		Sk	iP	16 28 01.6	
		Gb	iP	16 28 43.4	
		Um	iP	16 28 05.7	
		Alaska (h = 15 km).			
"	29	Up	iP	16 43 51.6	
		Ki	iP	16 42 58.2	
		Sk	iP	16 43 24.1	
		Um	iP	16 43 26.0	
		Alaska (h = 30 km).			

1964					
Mar.	29	Up	iP	16 51 06.1	
			e	16 58 59	
				microns	sec
			P N	0.5	4
			P Z	0.8	4
			P Z'	0.6	1.8
			M E	1.9	20
			M N	4.1	17
			M Z	3.4	21
		Ki	iP	16 50 11.4	D
			iS	16 57 38	
				microns	sec
			P N	0.5	7
			P Z	1.1	6
			P Z'	0.5	1.8
			S E	1.1	8
			S N	1.8	7
			M E	4.5	22
			M N	3.3	18
			M Z	4.1	16
			D = 5900 km = 53°.		
		Sk	iP	16 50 36.4	
		Gb	iP	16 51 17.4	D
			i	16 51 51.5	
		Um	iP	16 50 39.8	
			i	16 58 13	
			iS	16 58 31	
		Ka	iP	16 51 29.2	
		Alaska (h = 15 km). Magn. = 6.1 (Up,Ki).			
		The period of P(Z') is relatively large at all our stations, 1.8 sec in average. Compare similar remarks to Mar. 28, 07 25, 10 02 and Mar. 29, 06 14.			
"	29	Up	iP	16 55 36.9	
		Ki	iP	16 54 44.8	
		Sk	iP	16 55 10.8	
		Gb	iP	16 55 50.7	
		Um	iP	16 55 13.3	
		Alaska (h = 20 km).			
"	29	Up	iP	17 03 29.2	C
			ipP	17 03 33.5	
				microns	sec
			pP	Z' 0.1	1.1
		Ki	iP	17 02 34.5	C
			ipP	17 02 38.6	
				microns	sec
			p	Z' 0.2	1.0
		Sk	iP	17 03 00.5	C
			ipP	17 03 04.6	
		Gb	iP	17 03 40.7	C
			ipP	17 03 45.8	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Mar.	31	Up	iP	16 53 51.5	
			i(PcP)	16 54 32.9	
		Ki	iP	16 52 56.6	
			ipP	16 53 02.1	
		Sk	epP	16 53 29	
		Gb	iP	16 54 03.8	
		Um	iP	16 53 25.2	
			ipP	16 53 30.5	
		Alaska. h = 20 km (Ki,Um).			
"	31	Up	iSKP	17 25 41.3	
		Sk	iSKP	17 25 36.4	
		Um	eSKP	17 25 28	
		Fiji Islands (h = 540 km).			
"	31	Um	iP	18 30 32.6	
		Alaska (h = 30 km).			
"	31	Ki	iP	18 39 44.1	
		Alaska (h = 30 km).			
"	31	Up	iP	18 47 36.1	
		Ki	iP	18 46 41.6	
				microns sec	
			P	Z' 0.2 1.5	
		Sk	iP	18 47 07.6	
		Gb	iP	18 47 48.4	
		Um	iP	18 47 10.0	
			iPcP	18 48 08.5	
		Ka	iP	18 48 00.3	
		Alaska (h = 30 km).			
"	31	Um	eP	20 39 38	
		Alaska (h = 30 km).			
"	31	Um	iP	21 11 25.1	
		Alaska.			
"	31	Up	iP	21 14 19.5	
		Ki	iP	21 13 25.5	
				microns sec	
			P	Z' 0.1 1.0	
		Sk	iP	21 13 51.8	
		Gb	iP	21 14 31.0	
		Um	iP	21 13 53.4	
		Alaska (h = 20 km).			
"	31	Ki	iP	21 21 52.9	
			ipP	21 21 57.3	
		Sk	iP	21 22 19.6	
		Um	iP	21 22 20.9	
		Alaska (h = 30 km).			
"	31	Ki	eP	21 30 15	
		Sk	iP	21 30 45.2	
		Um	iP	21 30 45.4	
		Alaska (h = 15 km).			
1964 Mar.	31	Um	iP	21 43 39.8	
"	31	Ki	iP	23 00 07.9	
		Sk	iP	23 00 35.6	
		Um	iP	23 00 35.9	
		Alaska (h = 30 km).			
"	31	Up	iP	23 46 59.3	
		Ki	iP	23 46 04.2	
		Sk	iP	23 46 30.5	C
		Gb	iP	23 47 10.6	
		Um	iP	23 46 33.1	
			iPcP	23 47 30.2	
		Alaska (h = 30 km).			

Markus Båth
February 13, 1965

15 epicenters from UPP

Seismological Institute
Uppsala

S E I S M O L O G I C A L B U L L E T I N

U P P S A L A, K I R U N A, S K A L S T U G A N, G Ö T E B O R G,

U M E Å and K A R L S K R O N A

UPP	Uppsala	(Up):	59°51.5'N,	17°37.6'E;	h = 14 m
KIR	Kiruna	(Ki):	67°50.4'N,	20°25.0'E;	h = 390 m
SKA	Skalstugan	(Sk):	63°34.8'N,	12°16.8'E;	h = 580 m
GOT	Göteborg	(Gb):	57°41.9'N,	11°58.7'E;	h = 66 m
UME	Umeå	(Um):	63°48.9'N,	20°14.2'E;	h = 16 m
KLS	Karlskrona	(Ka):	56°09.9'N,	15°35.5'E;	h = 11 m

UPP

A P R I L 1 - 30, 1964

1964
Apr. 1 Up iP 00 11 13.9 C
Ki iP 00 10 19.0
ipP 00 10 27.0
microns sec
P Z' 0.1 1.0
Sk iP 00 10 45.4 C
Gb iP 00 11 25.3 C
Um iP 00 10 47.3
Alaska. h = 30 km (Ki).

" 1 Ki iP 00 45 56.3
Sk iP 00 46 24.9
Um eP 00 46 25
Alaska.

" 1 Up iP 01 31 06.1
Ki iP 01 30 10.6
Um iP 01 30 39.5
Alaska.

" 1 Up iP 02 04 18.5
Ki eP 02 03 22
Um iP 02 03 46.8
ipP 02 03 52.3
Alaska. h = 20 km (Um).

" 1 Up iP 03 15 53.9
Ki iP 03 14 58.6 C
Sk iP 03 15 25.5
Um iP 03 15 27.5 C
Alaska.

" 1 Up iP 03 33 45.1
ipP 03 33 49.7
iS 03 42 09
microns sec
S E 0.3 6
M E 0.8 20
M N 1.0 16

cont.

1964
Apr. 1 cont.
Up microns sec
M Z 0.8 17
D = 7000 km = 63°.
Ki eP 03 32 49
ipP 03 32 55.9
eS 03 40 29
microns sec
pP Z' 0.1 1.0
S E 0.5 11
M E 0.8 19
M N 1.3 20
M Z 1.6 20
D = 6100 km = 55°.
Sk eP 03 33 16
ipP 03 33 23.6
Gb eP 03 33 56
ipP 03 34 02.6
Um iP 03 33 16.3
ipP 03 33 24.8
iS 03 41 20
iPS 03 41 37
Ka ipP 03 34 14.1
Alaska. h = 30 km
(Up,Ki,Sk,Gb,Um)
Magn. = 5.5 (Up,Ki).
The second phase, interpreted as pP, has an amplitude which is 5-7 times the amplitude of P at our stations. In such cases there is naturally a great risk that pP may be misread as P at less sensitive stations.

" 1 Gb e(P) 04 28 28

" 1 Ki iP 04 42 00.8
ipP 04 42 07.1

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Apr. 1 cont.
Sk iP 04 42 27.7
Gb iP 04 43 07.7
Um iP 04 42 29.5
ipP 04 42 35.7
Alaska. h = 25 km (Ki,Um).

" 1 Up ipP 04 59 58.2
Ki eP 04 58 57
ipP 04 59 02.5
Sk e(P) 04 59 26
ipP 04 59 30.1
Um iP 04 59 24.7
ipP 04 59 31.1
Alaska. h = 25 km (Ki,Um).

" 1 KiR ePn 05 17 41
i(Sn) 05 18 37.7
iSg 05 18 50.8
~~D = 460 km = 4.1°.~~
SKA eSg 05 21 31
UME eSn 05 19 21
iSg 05 19 57.1
D = 680 km = 6.1°.
Northwest Russia,
68.0°N, 31.4°E.
Origin time = 05 16 36.
Explosion?

" 1 Up iP 05 43 10.4
Ki eP 05 42 14
microns sec
P Z' 0.1 1.5
Sk eP 05 42 40
Um iP 05 42 43.1
Alaska (h = 15 km).

" 1 Up iP 05 56 35.4 D

" 1 Ki iP 06 25 34.6
Sk eP 06 26 00
Um iP 06 26 03.0
Alaska (h = 15 km).

" 1 Up iP 06 49 51.9
Ki iP 06 48 57.2
microns sec
P Z' 0.1 1.3
Sk iP 06 49 23.3
Gb iP 06 50 03.6
Um iP 06 49 26.2
Alaska (h = 10 km).

" 1 Ki eP 08 18 36
Sk iP 08 19 03.0
Um iP 08 19 04.3 C
Alaska (h = 25 km).

1964
Apr. 1 Ki iP 09 09 57.6
Um iP 09 10 11.5 D
South of Japan (h = 470 km).

" 1 Ki eP 11 10 32
microns sec
P Z' 0.1 1.7
Sk eP 11 11 00
Um iP 11 11 02.2
Alaska (h = 10 km).

" 1 Um iP 11 36 54.4
i(pP) 11 36 58.2

" 1 Up iP 13 43 34.3
Ki eP 13 42 35
Um iP 13 43 07.6
Alaska (h = 20 km).

" 1 Ki iP 14 04 01.4
Sk iP 14 04 28.5
iPcP 14 05 15.6
Um iP 14 04 29.6
Alaska (h = 20 km).

" 1 Ki iP 14 35 12.9
Sk eP 14 35 26
Um iP 14 35 50.6
Gb iPg 15 00 12.8
iSg 15 00 14.6
D = 16 km = 0.14°.
Local blast.

" 1 Up i(P) 15 01 33.6

" 1 Up iP 15 33 08.6
Ki iP 15 32 10.2 C
microns sec
P Z' 0.1 1.0
Sk iP 15 32 37.7 C
Um iP 15 32 39.0
Alaska (h = 15 km).

" 1 Up eP 16 24 22

" 1 Up iP 16 39 16.4
Ki iP 16 38 22.3 D
Sk eP 16 38 48
Gb iP 16 39 28.5
Um iP 16 38 50.0
Ka iP 16 39 40.2
Alaska (h = 15 km).

" 1 Um iP 17 11 04.7
ipP 17 11 11.4

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Apr. 1 Ki iP 17 32 52.9 C
Sk iP 17 33 20.5
Um iP 17 33 20.7 C
Alaska (h = 20 km).

" 1 Ki iP 18 57 39.3
Alaska (h = 30 km).

" 1 Ki iP 20 16 59.2
Sk iP 20 17 26.1
Um iP 20 17 26.8
Alaska (h = 30 km).

" 1 Up iP 20 23 25.7
Ki iP 20 22 31.5 C

		microns	sec
P	Z'	0.1	1.4
M	E	0.5	15
M	N	0.3	16

Sk iP 20 22 58.1
Gb iP 20 23 36.5
i(pP) 20 23 45.1
Um iP 20 22 59.2
Alaska (h = 20 km).

" 1 Um iP 22 10 45.4
Alaska (h = 20 km).

" 2 Up iP 01 23 44.3 D
iS 01 33 28
iScS 01 33 37
iSKS 01 33 46

		microns	sec
P	E	0.5	5
P	Z	1.1	5
P	Z'	0.2	0.8
S	N	11	20
SKS	E	0.9	5
M	E	61	20
M	N	52	20
M	Z	71	18

(D = 8650 km = 78°).
Ki iP 01 23 45.6 D
iScS 01 33 43
iSKS 01 33 46

		microns	sec
P	E	1.1	5
P	N	0.3	5
P	Z	2.0	5
P	Z'	0.9	2.0
SKS	E	3.9	10
M	E	67	17
M	N	61	19
M	Z	72	16

Sk eP 01 24 00 D
ipP 01 24 18.0

cont.

1964
Apr. 2 Gb iP 01 23 59.5
cont. iPP 01 27 02.6
Um iP 01 23 41.1 D
ipP 01 23 59.0
iScS 01 33 26
iSKS 01 33 35
Ka iP 01 23 47.7
Sumatra. h = 70 km (Sk,Um).
Magn. = 6.5 (Up,Ki).
The period of S at Up is remarkably long.
Exceptionally large surface waves in relation to the body waves, considering the focal depth.

" 2 Um iP 02 25 12.8
Alaska (h = 30 km).

" 2 Up iP 03 21 40.4 C
Ki eP 03 21 41
Um iP 03 21 36.7
Sumatra (h = 110 km).

" 2 Um iP 04 00 30.9
Alaska (h = 30 km).

" 2 Up iP 04 56 14.4
Sk iP 04 56 22.3
Gb iP 04 56 02.5
Um eP 04 56 35
South Atlantic Ocean
(h = 30 km).

" 2 Um iP 07 51 42.8
Celebes (h = 80 km).

" 2 Um i(P) 08 35 30.0

" 2 Ki ipP 09 14 20.7
Sk ipP 09 14 48.0
Um iP 09 14 41.7
ipP 09 14 48.7
Alaska. h = 30 km (Um).

" 2 Up iP 10 08 25.6 C

		microns	sec
P	Z'	0.1	1.0

Ki iP 10 07 31.6 C

		microns	sec
P	Z'	0.2	1.1
M	E	0.6	15
M	N	0.4	14

Sk iP 10 07 58.3 C
i 10 08 59.2
Gb iP 10 08 37.8 C

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå, Ka = Karlskrona

1964 Apr. cont.	2	Um	iP	10 07 59.2	C
			iS	10 16 11	
		Ka	iP	10 08 48.6	C
		Alaska (h = 20 km).			
"	2	Um	i(P)	10 24 00.1	
"	2	Up	eP	11 08 27	
		Um	eP	11 07 54	
		Alaska (h = 25 km).			
"	2	Up	iP	11 51 24.6	
				microns sec	
			P	Z' 0.1 1.0	
		Ki	iP	11 50 30.5	
				microns sec	
			P	Z' 0.2 1.5	
			M	E 0.6 17	
			M	N 0.7 20	
		Sk	iP	11 50 56.5	
		Gb	iP	11 51 36.6	
		Um	iP	11 50 58.5	
			iS	11 59 01	
		Ka	iP	11 51 48.3	
		Alaska (h = 20 km).			
"	2	Sk	iP	12 20 54.6	
"	2	Sk	iP	12 29 11.7	
		Um	iP	12 29 13.8	
		Alaska (h = 30 km).			
"	2	Sk	iP	12 33 39.1	
"	2	Ki	iP	13 37 52.9	
		Um	iP	13 38 21.3	
		Alaska (h = 20 km).			
"	2	Up	iP	16 09 49.1	
			i	16 09 54.2	
				microns sec	
			P	Z' 0.1 0.9	
			M	E 0.9 23	
			M	N 1.0 17	
			M	Z 0.8 17	
		Ki	iP	16 09 33.4	
			i	16 09 37.8	
			eS	16 20 02	
			i	16 20 18	
				microns sec	
			P	Z' 0.4 1.1	
			M	E 1.4 22	
			M	N 0.8 15	
			M	Z 0.7 13	
		Sk	iP	16 09 54.6	
			i	16 09 58.7	
1964 Apr. cont.	2	Gb	iP	16 10 10.1	
		Um	iP	16 09 38.2	
			i	16 09 42.8	
			iSKS	16 19 51	
			i	16 20 27	
		Ka	iP	16 10 04.3	
		Mindanao (h = 180 km).			
		Magn. = 6.2 (Up,Ki).			
		P is multiple, with a small-amplitude phase followed after 4.6 sec on the average by an 8 times larger P, the latter amplitude given above. At Gb and Ka only the larger-amplitude P could be read.			
"	2	Um	iP	18 27 31.0	
		Alaska (h = 30 km).			
"	2	Up	iP	18 35 28.0	
		Ki	iP	18 34 33.0	
				microns sec	
			P	Z' 0.1 1.2	
		Sk	iP	18 34 58.9	
		Gb	iP	18 35 39.1	
		Um	iP	18 35 01.3	
		Alaska (h = 40 km).			
"	2	Ki	iP	19 47 29.5	
		Sk	eP	19 47 56	
		Um	iP	19 47 58.5	
		Alaska (h = 15 km).			
"	2	Up	iP	19 50 26.7	
		Ki	iP	19 49 31.0	
		Sk	iP	19 49 57.2	
		Gb	eP	19 50 37	
		Um	iP	19 50 00.3	C
			ipP	19 50 04.9	
		Alaska. h = 20 km (Um).			
"	2	Ki	iPn	20 14 38.6	
			iSg	20 15 15.5	
			D = 260 km = 2.3°.		
		Ska	e(Sn)	20 15 32	
			iS	20 15 48.8	
			iSg	20 15 58.1	
			D = 400 km = 3.6°.		
		Ume	i(Pn)	20 15 06.1	
			iSn	20 15 49.6	
			iSg	20 16 11.3	
			D = 460 km = 4.1°.		

Nordlands Fylke, Norway, 67.2°N, 14.8°E. Origin time = 20 13 58.

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Apr. 2 Um iP 20 19 23.5
Alaska (h = 10 km).

" 2 Ki iP 21 11 50.9

" 2 Um iP 22 17 02.4
Alaska (h = 10 km).

" 2 Up eP 22 44 37
eS 22 52 48
microns sec
S E 0.6 6
M E 0.6 16
M N 0.9 22
D = 6650 km = 60°.
Ki eP 22 43 47
iS 22 51 06
microns sec
S E 1.2 8
S N 0.4 7
M E 0.9 15
M N 1.0 20
M Z 1.9 20
D = 5900 km = 53°.
Sk eP 22 44 08
Gb eP 22 44 50
Um iP 22 44 11.3
eS 22 51 53
iScS 22 53 56
Alaska (h = 20 km).
Magn. = 5.4 (Up,Ki).

" 2 Ki eP 23 39 06
Um iP 23 39 35.6
Alaska (h = 15 km).

" 2 Ki iPKP 23 46 54.9
Sandwich Islands
(h = 30 km).

" 3 Up iP 00 47 54.4
Ki iP 00 46 59.9
ipP 00 47 09.3
Gb iP 00 48 05.8
Um iP 00 47 28.1 C
ipP 00 47 37.8
Alaska. h = 40 km (Ki,Um).

" 3 Um iP 01 24 21.7
Alaska (h = 30 km).

" 3 Ki e(Sg) 02 59 43
Um i(P) 02 59 33.3
iSg 03 00 17.3

" 3 Um iP 03 35 53.0

1964
Apr. 3 Up iP 04 24 49.5 D
iS 04 34 51
microns sec
P Z' 0.2 0.5
S E 0.3 3
S N 0.4 3
M E 0.7 18
M N 0.9 18
M Z 1.3 25
(D = 9000 km = 81°).
Ki iP 04 24 50.8 D
ipP 04 25 06.9
iS 04 34 55
microns sec
P Z' 0.8 1.5
S E 2.2 10
S N 1.7 7
M E 2.3 22
M N 0.7 18
M Z 2.6 23
Sk iP 04 25 05.3 D
ipP 04 25 21.3
Gb iP 04 25 04.4
ipP 04 25 20.2
Um iP 04 24 46.9 D
ipP 04 25 02.5
iS 04 34 45
iSS 04 39 48
Ka iP 04 24 54.0
ipP 04 25 09.1
Sumatra. h = 60 km
(Ki,Sk,Gb,Um,Ka).
Magn. = 6.3 (Up,Ki).

" 3 Up iP 05 01 54.4
Alaska (h = 30 km).

" 3 Um iP 05 05 18.2
Japan (h = 30 km).

" 3 Um iP 06 05 34.1

" 3 Ki iP 06 32 19.2
Um iP 06 32 47.7
Alaska (h = 30 km).

" 3 Up iP 08 48 50.1 D
iS 08 56 54
microns sec
P Z' 0.4 1.5
S N 0.5 9
M E 0.5 19
M N 0.9 18
M Z 0.9 18
D = 6650 km = 60°.
Ki iP 08 47 56.3

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Apr. 3 **Ki** ePP 08 50 03
cont. iS 08 55 23

		microns	sec
P	Z'	0.3	1.5
S	N	0.4	9
M	E	0.7	15
M	N	0.8	20
M	Z	1.4	15

D = 5900 km = 53°.

Sk iP 08 48 22.1
Gb iP 08 49 01.9
Um iP 08 48 23.4
iS 08 56 11
Ka iP 08 49 14.5
Alaska (h = 10 km).
This case demonstrates striking differences in the magnitudes calculated from different waves: 6.1 from PZ' (Up,Ki), 5.4 from S (Up,Ki) and 5.1 from surface waves (Up,Ki).

" 3 Up iP 08 56 50.4
ipP 08 57 03.4
Ki iP 08 55 52.7 D
Sk iP 08 56 18.0
Gb iP 08 56 56.3
ipP 08 57 07.6
Um iP 08 56 20.3
Ka iP 08 57 12.9
Alaska. h = 50 km (Up,Gb).

" 3 Up ePKP 09 07 04
Kermadec Islands
(h = 30 km).

" 3 Sk iP 12 41 12.9

" 3 Ki iP 13 02 48.6
Alaska (h = 15 km).

" 3 KiR iPn 14 37 53.6 D
iSg 14 38 26.7
D = 240 km = 2.2°.
~~Sk eSg 14 39 23~~
UME iPn 14 38 21.3
eSn 14 39 10
eSg 14 39 32
D = 470 km = 4.2°.
Nordlands Fylke, Norway,
67.3°N, 14.9°E.
Origin time = 14 37 15.

" 3 Up iSKP 19 30 28.1
New Hebrides Islands
(h = 100 km).

1964
Apr. 3 Up iP 20 07 57.6
Ki iP 20 07 02.9
ipP 20 07 08.0
Gb iP 20 08 10.0
ipP 20 08 15.2
Um iP 20 07 31.9 C
ipP 20 07 37.0
Alaska. h = 20 km
(Ki,Gb,Um).

" 3 Up iP 20 33 49.5
Sk iP 20 33 21.6
Um iP 20 33 24.7
Alaska (h = 25 km).

" 3 Ki eP 20 56 26
ipP 20 56 33.6
Um iP 20 56 58.7
Alaska. h = 30 km (Ki).

" 3 Up eP 22 26 15
i(pP) 22 26 23.2
Ki iP 22 25 19.2
Sk eP 22 25 56
i(pP) 22 26 05.9
Um iP 22 25 49.0
Alaska (h = 15 km).
Possibly complication from two different shocks.

" 3 Up iP 22 43 33.6 D
iS 22 51 30
iScS 22 53 16
eP'P' 23 13 32

		microns	sec
P	Z'	0.7	0.9
S	E	1.8	9
S	N	1.2	9
M	E	1.9	20
M	N	3.2	20
M	Z	2.7	21

D = 6450 km = 58°.
Ki iP 22 42 37.4 D
i 22 42 55.5
e(S) 22 49 40
iS 22 49 50

		microns	sec
P	N	0.5	6
P	Z	1.1	5
P	Z'	1.3	1.0
S	E	4.3	9
S	N	1.9	9
S	Z	1.6	10
M	E	1.8	18
M	N	2.1	19
M	Z	3.1	18

D = 5550 km = 50°.

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Apr. 3 cont.

Sk	iP	22 43 05.1	
Gb	iP	22 43 45.1	
Um	iP	22 43 06.5	D
	iPP	22 45 14	
	iS	22 50 39	
	i	22 51 04.0	
	iP'P'	23 13 41.4	
Ka	iP	22 43 58.1	

Alaska (h = 40 km).
Magn. = 6.3 (Up,Ki).
The Galitzin records at Ki exhibit a multiple S-phase on the N-component with a smaller and less definite arrival about 10 sec before a definite S. As the epicenter is due north of Ki, this could be due to a partial transformation of SV into P at the base of the crust below Ki. Similar observations are made at Up and Um. Compare a similar remark in our bulletin for Feb. 27, 1964, 15 21.

" 4 Up iP 01 46 07.8 C

" 4 Um eP 02 08 23
Alaska (h = 30 km).

" 4

Up	iP	02 45 59.4	
Um	iP	02 45 34.2	C

Kurile Islands (h = 60 km).

" 4

Up	iP	04 45 02.3	D
Ki	iP	04 44 06.9	
		microns	sec
	P Z'	0.1	0.8
Sk	iP	04 44 33.4	
Gb	iP	04 45 12.8	
Um	iP	04 44 35.9	D
Ka	iP	04 45 25.8	

Alaska (h = 5 km).

" 4

Up	iP	05 04 02.6	C
	iPP	05 06 23.9	
	iS	05 12 10	
	eP'P'	05 33 32	
		microns	sec
	P N	0.7	5
	P Z	1.3	6
	P Z'	0.8	2.2
	S E	0.4	6
	S N	1.1	11
	M E	1.6	17

cont.

1964
Apr. 4 cont.

Up		microns	sec
	M N	3.6	22
	M Z	3.6	22

D = 6600 km = $59\frac{1}{2}^{\circ}$.

Ki	iP	05 03 07.5	C
	eS	05 10 31	
		microns	sec
	P E	0.3	6
	P N	1.0	6
	P Z	1.6	7
	P Z'	0.8	2.0
	S E	1.1	8
	S N	1.1	10
	M E	3.4	18
	M N	2.5	17
	M Z	5.1	20

D = 5800 km = 52°.

Sk	iP	05 03 34.1	
Gb	iP	05 04 14.2	
Um	iP	05 03 36.4	C
	iPP	05 05 48	
	iS	05 11 24	
	eP'P'	05 33 41	
Ka	iP	05 04 27.3	

Alaska (h = 40 km).
Magn. = 6.2 (Up,Ki).
PZ' has an unusually long period at all our stations, the average being 2.0 sec.

" 4

Up	iP	05 21 02.1	
	ipP	05 21 09.5	
Ki	eP	05 20 04	
	ipP	05 20 15.4	
Sk	iP	05 20 32.3	
	ipP	05 20 41.6	
Gb	eP	05 21 11	
	ipP	05 21 20.9	
Um	iP	05 20 33.6	
	ipP	05 20 43.7	

Alaska. h = 40 km
(Up,Ki,Sk,Gb,Um).
The phase interpreted as pP has an amplitude roughly 5 times the amplitude of P.

" 4

KIR	iPn	06 04 25.8	D
	iSn	06 05 21.2	
	iSg	06 05 44.1	

D = 500 km = 4.5°.

SKA	~~e~~	~~06 08 00~~	
	eSg	06 08 14	
	~~i~~	~~06 08 23.7~~	
UME	iSn	06 06 06.2	
	iSg	06 06 46.3	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont. 4 Um D = 700 km = 6.3°.
Northwest Russia,
67.8°N, 32.3°E.
Origin time = 06 03 16.
Explosion?

" 4 Up iP 07 00 51.4 C

" 4 Up iP 07 03 28.7
Ki iP 07 02 33.4 C
eS 07 09 55

		microns	sec
P	Z'	0.1	1.0
M	N	0.4	18
M	Z	0.5	15

D = 5800 km = 52°.
Sk iP 07 02 59.4
Gb iP 07 03 39.6 C
Um iP 07 03 02.1
Alaska (h = 15 km).

" 4 Up iP 07 09 00.1
Ki iP 07 09 01.7
Sumatra (h = 160 km).

" 4 Up iP 08 51 02.1
iS 08 59 37

		microns	sec
P	N	0.4	4
P	Z	0.6	4
P	Z'	0.1	0.6
S	E	1.8	8
S	N	1.0	6
M	E	2.8	21
M	N	3.4	21
M	Z	3.4	21

D = 7100 km = 64°.
Ki iP 08 50 06.8 C
eS 08 57 53

		microns	sec
P	N	0.6	6
P	Z	0.9	6
P	Z'	0.2	0.8
S	E	4.6	14
S	N	1.0	9
M	E	3.7	20
M	N	5.9	21
M	Z	7.8	21

D = 6200 km = 56°.
Sk iP 08 50 34.0
Gb iP 08 51 13.9
ipP 08 51 19.1
Um iP 08 50 35.1 C
iS 08 58 45
iP'P' 09 20 05.1
Ka iP 08 51 25.8

cont.

1964 Apr. cont. 4 Alaska. h = 20 km (Gb).
Magn. = 6.0 (Up,Ki).

" 4 Ki iP 08 58 12.9
Sk iP 08 58 39.9
Alaska.

" 4 Up iP 09 21 24.5 C
iS 09 29 56
eP'P' 09 50 19

		microns	sec
P	N	0.4	2
P	Z	0.8	3
P	Z'	0.3	0.7
S	E	1.5	8
S	N	0.8	5
M	E	1.8	19
M	N	5.0	19
M	Z	4.5	20

D = 7050 km = 63½°.
Ki iP 09 20 30.2 C
ipP 09 20 36.6
iS 09 28 14

		microns	sec
P	Z'	0.4	0.8
pP	Z'	0.7	1.5
S	E	1.1	9
S	N	2.5	12
M	E	4.5	20
M	N	5.9	21
M	Z	9.9	21

D = 6150 km = 55½°.
Sk iP 09 20 57.2 C
ipP 09 21 03.9
Gb iP 09 21 35.8 C
ipP 09 21 43.1
Um iP 09 20 58.3 C
ipP 09 21 05.1
iP'P' 09 50 31.4
i 09 50 44.9
Ka iP 09 21 47.4 C
ipP 09 21 54.9
Alaska. h = 30 km
(Ki,Sk,Gb,Um,Ka).
Magn. = 6.2 (Up,Ki).
This is a clear case when P and pP have the same phase at our stations (the focal mechanism being such that the resp. waves leave the focus with opposite phase).

" 4 Sk iP 09 59 27.2
Alaska (h = 30 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr.	4	Ki	iP	10 46 51.2	
		Um	iP	10 47 19.9	
		Alaska (h = 10 km).			
"	4	Um	e(P)	11 21 32.8	
			i	11 21 57.2	
"	4	Um	iP	11 35 40.0	
"	4	Ki	iP	12 14 19.7	
		Alaska (h = 30 km).			
"	4	KIR	iPn	12 30 39.1	
			iP^{x}	12 30 47.4	
			iSn	12 31 24.2	
			iSg	12 31 40.6	
			D = 420 km = 3.8°.		
		SKA	iSg	12 34 06.2	
		UME	iSn	12 32 05.1	
			iSg	12 32 33.5	
			D = 600 km = 5.4°.		
		Northwest Russia, 67.3°N, 30.2°E. Origin time = 12 29 37. Explosion?			
"	4	Up	iP	15 11 01.1	
			i	15 11 12.8	
				microns	sec
			P Z'	0.1	0.6
"	4	Ki	iP	15 17 28.8	
		Um	iP	15 17 53.8	
		Alaska (h = 15 km).			
"	4	Up	iP	17 56 41.6	C
			e(S)	18 05 11	
			iS	18 05 16	
			iPS	18 05 36	
			iP'P'	18 25 40.8	
				microns	sec
			P N	3.5	7
			P Z	5.4	7
			P Z'	0.5	0.8
			S E	2.4	6
			(S) N	3.9	6
			P'P' Z'	0.2	1.5
			M E	18	19
			M N	29	19
			M Z	27	21
			D = 7100 km = 64°.		
		Ki	iP	17 55 47.3	C
			iS	18 03 35	
				microns	sec
			P N	2.8	7
			P Z	5.6	7

cont.

1964 Apr. 4 cont.

Ki		microns	sec	
	P Z'	1.2	1.0	
	S E	10	14	
	S N	6.6	14	
	S Z	4.8	14	
	M E	32	18	
	M N	39	20	
	M Z	56	20	
	D = 6200 km = 56°.			
Sk	iP	17 56 14.5	C	
	iS	18 04 28.8		
	eP'P'	18 25 38		
Gb	iP	17 56 53.6	C	
	iPcP	17 57 23.8		
	iS	18 05 41.0		
	eP'P'	18 25 37		
Um	iP	17 56 15.2	C	
	ipP	17 56 22.8		
	i(S)	18 04 17		
	iS	18 04 28		
	iP'P'	18 25 38.5		
Ka	iP	17 57 04.1	C	
	ipP	17 57 10.2		
	iS	18 06 03.2		

Alaska. h = 30 km (Um,Ka). Magn. = 6.7 (Up,Ki). (S) is an early small S-phase, appearing on N- and Z-components, probably being a conversion of SV into P at the base of the crust beneath the resp. stations. Compare remark to Apr. 3, 1964, 22 42. - In the Alaskan aftershock sequence the rule $M - M_1 = 1.2$ (see Richter, Elementary Seismology, p. 69) has not shown up so clearly as in many other cases. There is in this case not one shock which can definitely be called the largest aftershock (M_1), but there are 4-5 shocks of similar magnitude (Mar. 28, 06 53, magn. = 6.7; Mar. 28, 12 30, magn. = 6.7; Mar. 28, 20 38, magn. = 6.8, Apr. 4, 17 56, magn. = 6.7; and possibly Apr. 4, 18 10, magn. = 6.5). Together these 5 shocks yielded the same energy as one shock of magn. = 7.2 would do. If

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. 4 cont. this is taken as M_1, then $M - M_1 = 8.5 - 7.2 = 1.3$. If this will prove to have more general validity, this would mean a significant generalization of this rule. See also remark next shock.

" 4 Up iP 18 10 14.9 C
iS 18 18 46
eP'P' 18 39 14

		microns	sec
P	Z	2.2	7
P	Z'	0.2	0.8
S	E	4.8	9
S	N	3.6	5
M	N	25	18
M	Z	21	17

D = 7100 km = 64°.

Ki iP 18 09 20.8 C
iS 18 17 07

		microns	sec
P	Z	2.9	7
P	Z'	0.6	1.0
S	E	4.9	10
M	N	19	16
M	Z	31	16

D = 6200 km = 56°.

Sk iP 18 09 48.2 C
eP'P' 18 39 24

Gb iP 18 10 27.2 C
iS 18 19 12.7

Um iP 18 09 48.8 C
iP'P' 18 39 23.0

Ka iP 18 10 37.8 C
iS 18 19 36.2

Alaska (h = 25 km).
Magn. = 6.5 (Up,Ki).
The marked increase in seismic activity in Alaska one week after the main shock on Mar. 28, has a striking similarity to the pattern exhibited by the Kurile Islands earthquakes in Oct. 1963 (with largest activities concentrated to Oct. 13 and Oct. 20, 1963), a mere coincidence or not?

" 4 Up iP 18 26 25.2

		microns	sec
P	Z'	0.1	0.6

Ki iP 18 25 31.6 C

cont.

1964 Apr. 4 cont.

Ki

		microns	sec
P	Z'	0.2	0.9

Sk iP 18 25 58.6
ipP 18 26 05.6
Gb iP 18 26 37.8 C
Um iP 18 25 59.2
ipP 18 26 06.2
Ka iP 18 26 48.5
i(pP) 18 26 57.8
Alaska. h = 30 km (Sk,Um).

" 4 Up iP 18 51 58.3
Ki iP 18 51 03.6
Sk iP 18 51 31.2
Um iP 18 51 32.3
Alaska (h = 30 km).

" 4 Up ---

		microns	sec
M	E	0.8	18
M	N	1.4	18
M	Z	1.1	17

Ki eP 20 10 54
ipP 20 10 59.3

		microns	sec
M	E	0.9	20
M	N	1.5	19
M	Z	1.4	17

Um iP 20 11 27.8
Alaska. h = 20 km (Ki).

" 4 Up iP 21 51 07.9
Ki iP 21 50 46.1
eS 22 01 14

		microns	sec
P	Z'	0.2	1.5
S	N	0.6	11
M	N	1.5	19

D = 9450 km = 85°.

Um iP 21 50 50.4
Negros, Philippine Islands (h = 30 km).

" 4 Up iP 22 27 04.6
iS 22 35 18

		microns	sec
S	N	1.0	10
M	E	0.8	18
M	N	1.0	17
M	Z	1.1	18

D = 6700 km = 60½°.

Ki iP 22 26 10.5
i(S) 22 33 30
iS 22 33 37

		microns	sec
P	Z	0.5	7

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Apr. 4 Ki microns sec
cont. P Z' 0.1 1.0
S E 0.8 11
S N 1.2 8
M E 0.9 12
M N 0.6 14
M Z 1.9 20
D = 5900 km = 53°.
Sk iP 22 26 35.5
Gb iP 22 27 15.8
Um iP 22 26 38.8
eS 22 34 27
Alaska (h = 10 km).
Magn. = 5.8 (Up,Ki).
Again, S is definitely earlier on N than on E, (S) and S, especially clear at Ki. Compare remarks to Apr. 3, 1964, 22 42, and Apr. 4, 1964, 17 55.

" 4 Ki iP 23 47 38.8 D
Sk iP 23 48 05.3
ipP 23 48 13.5
Um iP 23 48 06.4
ipP 23 48 14.5
Alaska. h = 30 km (Sk,Um).

" 5 Um iP 01 22 41.9
i 01 22 54.1

" 5 Up iP 01 32 45.4 C
iS 01 41 16
i 01 41 22
eP'P' 02 01 45
microns sec
P N 0.3 3
P Z 0.6 4
P Z' 0.3 1.0
S E 3.9 16
S N 2.4 8
P'P' Z' 0.1 1.5
M E 3.6 19
M N 6.9 18
M Z 3.2 20
D = 7100 km = 64°.
Ki iP 01 31 52.1 C
ipP 01 31 59.9
iS 01 39 40
microns sec
P N 0.6 7
P Z' 0.3 0.8
pP Z' 0.7 1.0
S E 2.2 10
S N 2.1 10

cont.

1964
Apr. 5 Ki microns sec
cont. M E 7.4 23
M N 6.6 21
M Z 13 22
D = 6200 km = 56°.
Sk iP 01 32 18.7
ipP 01 32 26.9
eP'P' 02 01 55
i 02 01 59.1
Gb iP 01 32 58.0 C
ipP 01 33 05.2
iP'P' 02 01 42.8
Um iP 01 32 19.5 C
ipP 01 32 28.5
i 01 32 31.8
iS 01 40 32
iP'P' 02 01 48.3
i 02 01 55.6
Ka iP 01 33 09.2 C
ipP 01 33 16.7
Alaska. h = 30 km (Ki,Sk,Gb,Um,Ka).
Magn. = 6.1 (Up,Ki).

" 5 Up iP 01 52 16.1 C
eS 02 00 52
i 02 01 11
iP'P' 02 21 08.2
microns sec
P Z' 0.1 0.6
M E 3.1 18
M N 4.7 18
D = 7100 km = 64°.
Ki iP 01 51 22.2 C
ipP 01 51 30.7
microns sec
P Z' 0.2 0.8
pP Z' 0.3 1.0
M E 3.1 17
M N 3.3 18
M Z 3.8 18
Sk iP 01 51 49.5
Gb iP 01 52 28.0 C
ipP 01 52 34.7
eP'P' 02 21 02
Um iP 01 51 49.8 C
ipP 01 51 56.7
iP'P' 02 21 13.9
i 02 21 24.3
Ka iP 01 52 39.0
ipP 01 52 46.9
Alaska. h = 30 km (Ki,Gb,Um,Ka).
Magn. = 5.9(Up,Ki).

" 5 Up iP 01 56 13.8
cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont.	5	Sk	iP	01 56 08.0		
		Um	iP	01 55 51.9		
		Japan (h = 70 km).				
"	5	Up	iP	02 46 14.9		
		Ki	iP	02 45 20.5		
		Sk	eP	02 45 46		
		Gb	iP	02 46 26.5		
		Um	iP	02 45 48.7		
		Alaska (h = 15 km).				
"	5	Ki	eP	03 57 31		
				microns	sec	
			M	N 0.5	17	
		Sk	iP	03 57 58.0		
		Um	iP	03 57 59.6		
		Alaska (h = 25 km).				
"	5	Ki	eP	04 21 00		
		Um	iP	04 21 28.5		
		Alaska (h = 15 km).				
"	5	Up	iP	07 23 56.0	C	
		Ki	iP	07 23 01.8	C	
		Sk	iP	07 23 29.0	C	
		Gb	iP	07 24 08.5		
		Um	iP	07 23 30.1		
		Alaska (h = 25 km).				
"	5	Ki	iP	07 38 15.0	C	
		Sk	iP	07 38 41.4		
		Um	iP	07 38 41.4		
		Alaska (h = 15 km).				
"	5	Up	iP	08 23 36.1		
		Ki	iP	08 22 42.1		
		Sk	iP	08 23 09.5		
		Gb	iP	08 23 49.3		
		Um	iP	08 23 09.7		
		Alaska (h = 15 km).				
"	5	Up	iP	09 09 36.6		
			ipP	09 09 42.9		
		Ki	iP	09 08 43.1		
		Sk	iP	09 09 10.5		
		Gb	iP	09 09 44.8		
		Um	iP	09 09 10.5		
		Alaska (h = 15 km).				
"	5	Up	iSg	11 36 42.2		
		Ki	eSg	11 38 26		
		Sk	iSg	11 38 30.1		
		Um	eSn	11 36 18		
			iSg	11 36 42.8		
		Possibly Gulf of Finland.				

1964 Apr.	5	Ki	ePKP	11 37 51		
		Sk	iPKP	11 37 44.6	D	
		Um	iPKP	11 37 50.7	D	
		Off coast of Chile.				
"	5	Sk	eP	13 54 21		
		Alaska (h = 30 km).				
"	5	Up	iP	15 31 45.4		
		Ki	iP	15 30 50.7		
		Um	iP	15 31 19.2		
		Alaska (h = 30 km).				
"	5	Up	iP	15 55 33.4		
"	5	Um	iP	16 59 00.6		
		Alaska (h = 20 km).				
"	5	Ki	iP	17 50 23.5		
		Sk	iP	17 50 49.8		
		Um	iP	17 50 50.8		
		Alaska (h = 10 km).				
"	5	Up	iP	17 52 14.4		
		Ki	iP	17 51 20.9		
		Sk	iP	17 51 46.3		
		Gb	iP	17 52 25.1		
		Um	iP	17 51 49.1		
		Ka	iP	17 52 38.3		
		Alaska (h = 15 km).				
"	5	Up	iP	19 38 22.2	C	
			eS	19 46 28		
				microns	sec	
			P	Z' 0.3	1.5	
			M	E 0.7	19	
			M	N 0.9	17	
			M	Z 0.9	18	
			D = 6650 km = 60°.			
		Ki	iP	19 37 27.3	C	
			iS	19 44 48		
			e	19 49 10		
				microns	sec	
			P	Z' 0.5	1.5	
			S	E 0.4	7	
			S	N 0.5	6	
			M	E 0.6	15	
			M	N 0.6	17	
			M	Z 1.3	14	
			D = 5800 km = 52°.			
		Sk	iP	19 37 53.2	C	
		Gb	iP	19 38 33.3	C	
		Um	iP	19 37 55.7	C	
			i(S)	19 45 31		
			iS	19 45 43		

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont.	5	Ka	iP	19 38 45.8 C	Alaska (h = 15 km). Magn. = 6.2 (Up,Ki). The relatively weak surface waves could be due to somewhat greater focal depth or to weak radiation in our direction, depending on focal mechanism.
"	5	Up	iP	20 01 08.9	
		Sk	iP	20 00 41.9	
			ipP	20 00 48.0	
		Um	iP	20 00 42.9 C	
			ipP	20 00 48.8	Alaska. h = 25 km (Sk,Um).
"	5	Up	iPKP	22 42 24.7	Kermadec Islands (h = 30 km).
"	5	Um	i(P)	23 09 22.0	
"	5	Ki	iP	23 55 53.6	
"	6	Um	iP	03 14 27.0	
"	6	Um	iP	05 07 33.9	Alaska (h = 30 km).
"	6	Up	iP	08 31 52.2 C	
		Ki	iP	08 30 57.4	
		Sk	iP	08 31 24.5	
		Um	iP	08 31 25.6	Alaska (h = 5 km).
"	6	Um	iP	09 27 02.8	Kurile Islands (h = 30 km).
"	6	Ki	eP	10 51 48	
		Um	eP	10 52 19	
		Gb	eP	10 52 56	Alaska (h = 15 km).
"	6	Ki	iP	11 08 42.9	
		Sk	iP	11 09 09.9	
		Gb	iP	11 09 48.8	Alaska (h = 30 km).
"	6	Up	eP	13 55 53	
		Ki	eP	13 55 02	
		Um	iP	13 55 29.5	Aleutian Islands (h = 120 km).
"	6	Um	i(P)	16 19 43.8	

1964 Apr.	6	Up	iP	16 21 51.5	
				microns sec	
			P	Z' 0.1 0.5	
		Ki	iP	16 21 05.4 D	
		Sk	iP	16 21 40.1	
		Gb	iP	16 22 12.5	
		Um	iP	16 21 25.7	
		Ka	iP	16 22 14.2	Kurile Islands (h = 30 km).
"	6	Um	iP	17 19 40.7	
"	6	Up	ipP	17 46 02.3	
		Ki	iP	17 45 02.3	
			ipP	17 45 06.9	
				microns sec	
			pP	Z' 0.1 1.0	
		Sk	eP	17 45 28	
			ipP	17 45 34.1	
		Gb	iP	17 46 09.5	
			ipP	17 46 14.1	
		Um	iP	17 45 31.2	
			ipP	17 45 36.1	Alaska. h = 20 km (Ki,Sk,Gb,Um). In this case the P-amplitude is much smaller than pP at our stations and P may easily be overlooked and pP misread as P.
"	6	Up	eP	18 14 28	
		Ki	iP	18 13 34.6	
		Sk	iP	18 14 01.3 C	
		Gb	iP	18 14 40.1	
		Um	iP	18 14 02.4	Alaska (h = 20 km).
"	6	Ki	iP	19 50 24.9	
		Sk	eP	19 50 50	
		Um	iP	19 50 51.7	Alaska (h = 25 km).
"	6	Um	e(P)	20 32 15	
"	6	Ki	iP	23 07 27.0	
		Um	iP	23 07 54.4	
			ipP	23 08 04.4	Alaska. h = 40 km (Um).
"	7	Up		---	
				microns sec	
			M	N 0.8 20	
		Ki	iP	01 52 51.3	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Apr. 7 cont.

Ki		microns	sec	
	M	E	0.9	20
	M	N	0.5	17
	M	Z	1.0	18
Um	eP		01 53 17	
	eS		02 01 19	

Alaska (h = 30 km).

" 7

Ki	eP	04 02 54
Um	iP	04 03 25.4
	ipP	04 03 36.1

Alaska. h = 40 km (Um).

" 7

Up	iP	04 45 36.4
Ki	iP	04 44 41.5
Um	iP	04 45 10.8
	ipP	04 45 16.7

Alaska. h = 25 km (Um).

" 7

Up	iP	05 05 02.3
Ki	iP	05 04 07.4
Sk	iP	05 04 36.0 C
Gb	iP	05 05 15.6
Um	iP	05 04 35.7

Alaska (h = 30 km).

" 7 Sk iP 07 44 22.9

" 7 Ki iP 08 12 37.7
Alaska (h = 30 km).

" 7 Sk iP 08 39 46.9

" 7 Um iPKP 09 15 33.3
New Hebrides Islands
(h = 260 km).

" 7 Ki iP 09 47 09.5

" 7

Ki	e(P)	10 14 12
	e(Sg)	10 15 06

" 7 Um i(P) 13 23 02.8

" 7

Up	iP		13 31 36.0 C	
	ePP		13 35 31	
Ki	iP		13 31 23.0 C	
		microns	sec	
	P	Z'	0.2	1.0
	M	E	0.4	17
	M	N	0.7	21
Sk	iP		13 31 43.0 C	
Um	iP		13 31 26.8 C	
	iPP		13 35 21.7	
Ka	iP		13 31 45.7 C	

Celebes (h = 150 km).

1964
Apr. 7

Um	iP	13 57 14.2

" 7

Kk	iPn	14 55 59.8
	iSg	14 56 32.5
	D = 220 km = 2.0°.	
~~Sk~~	~~ePn~~	~~14 56 35~~
	iSg	14 57 49.3
	~~D = 490 km = 4.4°.~~	
UME	iPn	14 56 36.9
	iSg	14 57 51.1
	D = 490 km = 4.4°.	

Nordlands Fylke, Norway,
67.8°N, 15.5°E.
Origin time = 14 55 26.

" 7

Sk	iP	16 29 39.4
Um	iP	16 29 45.1

Alaska (h = 30 km).

" 7

Ki	eP	16 37 48
Sk	iP	16 38 14.8

Alaska (h = 30 km).

" 7

Up	i(pP)	18 12 55.4
Ki	iP	18 11 55.6 C
Sk	eP	18 12 22
	ipP	18 12 29.3
Gb	i(pP)	18 13 08.9
Um	iP	18 12 23.0
	ipP	18 12 30.9
Ka	i(pP)	18 13 20.2

Alaska. h = 30 km (Sk,Um).
In this case the amplitude ratio P/pP exhibits a fairly clear decrease with increasing epicentral distance over the range covered by our stations (the focal mechanism probably being the main reason for this).

" 7

Ki	eP	18 26 54
Um	iP	18 27 22.2 D

Alaska (h = 30 km).

" 7

Up	iP		19 39 01.0 D	
	ipP		19 39 10.2	
		microns	sec	
	P	Z'	0.1	0.7
Ki	iP		19 38 07.8 D	
		microns	sec	
	P	Z'	0.2	1.0
Sk	iP		19 38 34.4	
	ipP		19 38 43.7	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont.	7	Gb	iP	19 39 13.0	D
			ipP	19 39 22.2	
		Um	iP	19 38 35.7	
		Ka	iP	19 39 24.5	
			ipP	19 39 33.3	
		Alaska. h = 40 km (Up,Sk,Gb,Ka). Magn. = 6.0 (Up,Ki).			
"	7	Up	iP	20 01 10.4	C
		Ki	iP	20 01 17.0	C
		Um	iP	20 01 07.3	
		Ka	iP	20 01 16.3	C
		Pamir.			
"	7	Ki	iP	23 35 49.9	C
		Um	iP	23 36 15.6	
		Aleutian Islands (h = 50 km).			
"	8	Sk	eP	00 23 30	
		Alaska (h = 30 km).			
"	8	Um	iP	00 27 26.8	
"	8	Up	iP	00 46 47.3	C
		Ki	iP	00 45 52.8	
		Sk	eP	00 46 20	
			ipP	00 46 26.0	
		Gb	i(pP)	00 47 05.2	
		Um	iP	00 46 20.5	
		Alaska. h = 25 km (Sk).			
"	8	Um	iP	00 59 06.1	
"	8	Um	iP	01 24 06.6	
"	8	Up	iP	02 15 04.5	C
			microns	sec	
			P Z' 0.1	0.8	
		Ki	iP	02 14 16.5	
		Sk	iP	02 14 51.9	C
		Gb	iP	02 15 25.2	
		Um	iP	02 14 38.2	C
		Ka	iP	02 15 27.3	
		Kurile Islands (h = 40 km).			
"	8	Up	iP	02 21 33.7	C
		Ki	iP	02 20 45.5	
		Um	iP	02 21 07.7	
		Kurile Islands (h = 40 km).			
"	8	Um	iP	04 09 38.7	
		Alaska (h = 30 km).			
"	8	KiR	iPn	05 49 13.6	
			iSn	05 50 08.4	

cont.

1964 Apr. cont.	8	Ki	iSg	05 50 26.5	
			D = 470 km = 4.2°.		
		SKA	eSg	05 55 00	
		UME	iSn	05 50 53.8	
			iSg	05 51 31.3	
			D = 680 km = 6.1°.		
		Northwest Russia, 67.9°N, 31.5°E. Origin time = 05 48 09. Explosion?			
"	8	Um	iP	06 56 54.5	
		Japan (h = 30 km).			
"	8	Up	iP	08 20 06.2	
			i	08 20 09.8	
			microns	sec	
			P Z'	0.1 1.0	
			M N	0.5 18	
			M Z	1.4 21	
		Ki	iP	08 20 29.0	D
			eS	08 30 39	
			microns	sec	
			P Z'	0.1 1.2	
			S E	0.3 6	
			S N	0.5 10	
			M E	0.8 19	
			M N	1.0 20	
			M Z	1.3 18	
			D = 9100 km = 82°.		
		Sk	eP	08 20 32	
		Gb	iP	08 20 15.1	
		Um	iP	08 20 14.6	D
		Ka	iP	08 20 01.1	
		Chagos Islands (h = 30 km). Magn. = 5.9 (Up,Ki).			
"	8	Ki	iP	10 03 20.4	
		Sk	iP	10 03 45.1	
			ipP	10 03 52.8	
		Um	iP	10 03 49.0	
		Alaska. h = 30 km (Sk).			
"	8	Up	iP	11 09 05.0	
			iScS	11 18 57	
			i	11 19 16	
			microns	sec	
			P Z	0.9 6	
			M E	5.3 21	
			M N	13 23	
			M Z	13 25	
		Ki	iP	11 08 18.4	
			ePa	11 12 04	
			iS	11 16 28	
			microns	sec	
			P E	0.4 7	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. 8 cont.	Ki			microns	sec	
		P	N	0.4	7	
		P	Z	1.2	8	
		P	Z'	0.1	1.1	
		S	E	1.0	11	
		S	N	0.8	10	
		M	E	8.3	18	
		M	N	15	19	
		M	Z	22	19	
		D = 6700 km = 60½°.				
	Sk	eP		11 08 55		
	Gb	iP		11 09 25.1		
	Um	iP		11 08 39.3		
		i(PP)		11 11 16		
		iPa		11 12 31		
		iS		11 17 01		
	Ka	iP		11 09 29.1		
	Kurile Islands (h = 40 km).					
	Magn. = 6.1 (Up,Ki).					
" 8	Up	iP		11 12 50.2		
" 8	Up	iP		14 17 48.4 C		
		iS		14 22 11		
				microns	sec	
		P	Z'	0.2	0.7	
		M	E	0.8	18	
		M	N	1.0	13	
		M	Z	1.0	11	
		D = 2700 km = 24½°.				
	Ki	iP		14 18 57.3 C		
		eLgl		14 29 40		
				microns	sec	
		P	Z'	0.2	0.6	
		M	E	0.5	12	
		M	N	2.1	14	
		M	Z	2.6	14	
	Sk	iP		14 18 27.4 C		
	Gb	iP		14 17 39.1 C		
	Um	iP		14 18 21.2 C		
		iS		14 23 15		
	Ka	iP		14 17 15.5		
		i		14 17 24.2		
		iS		14 21 15.2		
	Crete (h = 70 km).					
	Magn. = 5.9 (Up,Ki).					
" 8	Up	iP		19 09 24.6 C		
				microns	sec	
		P	Z'	0.1	1.2	
	Ki	iP		19 08 22.0		
		ipP		19 08 30.5		
				microns	sec	
		pP	Z'	0.1	1.0	
	Sk	iP		19 08 47.5		
		ipP		19 08 57.0		

cont.

1964 Apr. 8 cont.	Um	iP	19 08 49.9
		ipP	19 08 58.5
	Ka	iP	19 09 47.9
	Alaska. h = 40 km (Ki,Sk,Um).		
	Magn. = 5.8 (Up,Ki).		
" 8	Up	iP	19 43 27.4
	Ki	iP	19 42 32.1
		eS	19 50 05
		microns	sec
		S N	0.5 8
	Sk	iP	19 42 59.2
	Gb	iP	19 43 39.1
	Um	iP	19 43 01.2
		iS	19 51 05
	Ka	iP	19 43 50.9
	Alaska (h = 15 km).		
" 8	Up	iP	20 00 20.3 C
		ipP	20 00 24.4
		microns	sec
		pP Z'	0.2 1.1
		M E	0.5 17
		M N	1.0 19
		M Z	0.9 18
	Ki	iP	19 59 25.3 C
		eS	20 06 38
		microns	sec
		P Z'	0.3 1.0
		S E	0.8 11
		M E	0.8 18
		M N	1.5 19
		M Z	2.3 22
		D = 5800 km = 52°.	
	Sk	iP	19 59 51.4 C
		ipP	19 59 55.9
	Gb	iP	20 00 31.3 C
		ipP	20 00 35.4
	Um	iP	19 59 53.6 C
		ipP	19 59 58.8
	Ka	iP	20 00 43.4 C
	Alaska. h = 20 km (Up,Sk,Gb,Um).		
" 9	Um	iP	01 29 44.7
" 9	Up	iP	12 09 37.4
" 9	Up	iP	12 43 32.3
	Ki	iP	12 42 37.8
	Gb	iP	12 43 44.4
	Alaska (h = 20 km).		
" 9	Up	iP	13 16 28.3
	Ki	eP	13 15 31
		iPcP	13 16 48

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont.	9	Ki			microns	sec
			M	E	0.5	16
			M	N	0.5	13
			M	Z	0.9	15
		Sk	iP		13 15 54.5	
			ipP		13 16 03.6	
		Gb	iP		13 16 34.5	
		Ka	iP		13 16 47.3	D
		Alaska. h = 40 km (Sk).				
"	9	Ki	eP		13 32 01	
		Gb	eP		13 33 06	
		Alaska (h = 30 km).				
"	9	Ki	iP		16 20 54.1	
		Sk	eP		16 21 23	
		Um	iP		16 21 24.4	
		Alaska (h = 30 km).				
"	9	Um	iP		17 24 19.7	
		Alaska (h = 30 km).				
"	9	Up	iP		18 28 30.9	
		Sk	eP		18 28 24	
		Um	iP		18 28 18.2	C
		Ka	iP		18 28 40.2	
"	9	Up	iP		20 57 29.1	
"	9	Um	iP		21 57 52.4	
		Central Asia.				
"	10	Up	iP		01 18 18.8	D
			eP'P'		01 47 30	
					microns	sec
			P	N	0.3	5
			P	Z'	0.2	1.1
			M	E	0.5	17
			M	N	0.9	17
		Ki	iP		01 17 24.2	
					microns	sec
			P	Z'	0.4	1.2
			M	E	0.6	16
			M	N	0.9	19
			M	Z	1.1	17
		Sk	iP		01 17 51.1	
		Gb	iP		01 18 30.3	
			ipP		01 18 36.0	
			i(P'P')		01 47 03.5	
			i		01 47 35.7	
		Um	iP		01 17 52.4	
			ipP		01 17 58.9	
			eS		01 25 57	
			iP'P'		01 47 41.6	
		Ka	iP		01 18 42.2	

cont.

1964 Apr. cont.	10	Alaska. h = 25 km (Gb,Um). Magn. = 6.0 (Up,Ki).				
"	10	Um	eP		03 21 16	
"	10	Ki	eP		12 15 43	
		Alaska (h = 25 km).				
"	10	Um	iP		18 05 00.1	
		Alaska (h = 30 km).				
"	10	Up	iP		19 16 01.7	
		Ki	iP		19 15 04.5	
					microns	sec
			P	Z'	0.1	1.2
		Sk	eP		19 15 32	
		Gb	iP		19 16 12.8	C
		Um	eP		19 15 34	C
			iS		19 23 26	
		Alaska (h = 15 km).				
"	10	Up	iP		21 54 16.1	D
			ipP		21 54 20.6	
			iS		22 02 30	
					microns	sec
			P	N	0.3	3
			pP	Z'	0.2	1.0
			M	E	0.7	18
			M	N	1.4	18
			M	Z	1.1	18
			D = 6700 km = $60\frac{1}{2}^{o}$.			
		Ki	iP		21 53 19.9	D
			ipP		21 53 24.4	
					microns	sec
			pP	Z'	0.4	1.0
			M	E	0.8	17
			M	N	1.2	19
			M	Z	2.3	19
		Sk	iP		21 53 47.9	D
			ipP		21 53 52.4	
		Gb	iP		21 54 28.4	D
			ipP		21 54 32.6	
		Um	iP		21 53 48.9	D
			ipP		21 53 53.4	
			iS		22 01 38	
			iScS		22 03 34	
		Ka	iP		21 54 39.8	D
			ipP		21 54 44.4	
		Alaska. h = 20 km (Up,Ki,Sk,Gb,Um,Ka). Magn. = 6.1 (Up,Ki).				
"	11	Up	iPKP		01 23 34.0	C

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont.	11	Up	i	01 23 36.8 D	
				microns sec	
			PKP	Z' 0.7 0.7	
		Ki	iPKP	01 23 15.5	
		Sk	iPKP	01 23 29.7 D	
			i	01 23 37.9	
		Gb	iPKP	01 23 45.2 D	
			i	01 23 52.3	
		Um	iPKP	01 23 24.2 D	
		Ka	iPKP	01 23 46.7 D	
			i	01 23 55.1	
		Kermadec Islands (h = 300 km). As our stations cover the distance range 138° - 150°, they clearly exhibit the caustic effects.			
"	11	Up	iP	06 22 45.0 C	
		Ki	iP	06 21 50.9	
		Um	iP	06 22 28.3	
		Ryukyu Islands (h = 70 km).			
"	11	Gb	eP	07 44 09	
		Alaska (h = 30 km).			
"	11	Up	e(P)	08 53 08	
				microns sec	
			(P)	Z' 0.1 1.0	
		Um	i(P)	08 54 48.8	
"	11	Up	iP	09 34 20.9	
			ipP	09 34 27.8	
		Ki	iP	09 33 30.4 C	
				microns sec	
			P	Z' 0.1 1.2	
		Sk	iP	09 33 53.6	
			ipP	09 34 00.4	
		Gb	iP	09 34 32.6	
		Um	iP	09 33 55.0	
		Ka	iP	09 34 43.8	
			ipP	09 34 50.8	
		Alaska. h = 30 km (Up,Sk,Ka).			
"	11	Up	iP	11 46 03.3 C	
		Ki	iP	11 45 08.1	
			ipP	11 45 13.4	
				microns sec	
			P	Z' 0.1 1.0	
		Sk	iP	11 45 34.5 C	
		Gb	iP	11 46 14.5 C	
		Um	iP	11 45 36.9	
		Ka	iP	11 46 26.9	
		Alaska. h = 20 km (Ki).			
"	11	Up	iP	12 05 50.9	
				microns sec	
			P	Z' 0.1 0.5	
"	11	Up	iP	12 27 16.6 C	
		Ki	iP	12 26 22.5	
			ipP	12 26 30.5	
cont.					

1964 Apr. cont.	11	Ki		microns sec	
			pP	Z' 0.2 1.5	
		Sk	iP	12 26 50.2	
		Um	eP	12 26 50	
			ipP	12 26 58.7	
		Ka	iP	12 27 43.2	
		Alaska. h = 30 km (Ki,Um).			
"	11	Up	eP	12 35 50	
		Ki	iP	12 36 10.1	
"	11	Up	iP	16 05 13.1 C	
			eS	16 08 51	
			iL(3.22)	16 12 14	
				microns sec	
			P N	0.8 3	
			P Z	0.7 3	
			P Z'	0.4 1.7	
			S E	2.4 12	
			M E	19 11	
			M N	10 10	
			M Z	9.7 12	
		D = 2200 km = 20°.			
		Ki	iP	16 06 30.0	
			eS	16 11 11	
			e	16 11 36	
			i	16 12 56	
			iLgl	16 15 48	
				microns sec	
			P Z'	0.1 1.5	
			S E	1.0 13	
			M E	33 13	
			M N	14 13	
			M Z	23 14	
		D = 3100 km = 28°.			
		Sk	iP	16 05 58.8	
			i	16 06 00.4	
		Gb	iP	16 05 04.1	
			i	16 05 11.3	
		Um	iP	16 05 52.7 C	
			iS	16 09 59	
		Ka	iP	16 04 39.6	
		Aegean Sea (h = 30 km). Magn. = 5.5 (Up,Ki). Well developed higher mode surface waves.			
"	11	Ki	iP	16 19 53.2	
		Um	iP	16 20 22.1	
		Alaska (h = 20 km).			
"	11	Ki	iP	22 11 45.5	
		Um	iP	22 12 14.4	
			ipP	22 12 19.3	
		Alaska. h = 20 km (Um).			
"	11	Up	iP	23 21 26.7	
		Ki	iP	23 20 30.4	
		Gb	iP	23 21 37.8	
		Um	iP	23 20 59.7 C	
		Ka	iP	23 21 49.6	
		Alaska (h = 20 km).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. 12 Up iP 01 22 24.7
Kamchatka (h = 30 km).

" 12 Up iP 01 35 01.2 C
iS 01 43 36
iP'P' 02 03 52.3

		microns	sec
P	N	1.1	5
P	Z	1.4	3
P	Z'	0.7	1.0
S	E	1.8	8
S	N	1.7	6
M	E	6.1	19
M	N	8.1	20
M	Z	9.5	21

D = 7100 km = 64°.

Ki iP 01 34 07.1 C
eS 01 41 48

		microns	sec
P	N	1.6	6
P	Z	3.1	6
P	Z'	1.8	1.8
S	E	3.7	10
S	N	2.6	9
M	E	6.1	18
M	N	14	20
M	Z	20	21

D = 6200 km = 56°.

Sk iP 01 34 33.9 C
Gb iP 01 35 13.1
Um iP 01 34 35.2 C
iS 01 42 43
iP'P' 02 04 09.4
Ka iP 01 35 24.0 C
Alaska (h = 20 km).
Magn. = 6.5 (Up,Ki).
PZ' is multiple with a small phase followed after 2 sec by a much larger one.

" 12 Up iP 01 35 57.6

		microns	sec
P	Z'	0.8	1.7

Ki iP 01 35 05.8

		microns	sec
P	Z'	0.7	1.8

Sk iP 01 35 32.9
Gb iP 01 36 11.7
Um iP 01 35 32.4
Ka iP 01 36 21.3
Alaska. Magn. = 6.5 (Up,Ki).
This shock, which occurred approx. 58 sec after the previous one and was of the same magnitude, has not been reported by USCGS.

1964 Apr. 12 Up eP 02 16 27
Alaska (h = 20 km).

" 12 Ki iPKP 06 19 35,5
Sk iPKP 06 19 47.5
Um iPKP 06 19 42.3
New Hebrides Islands
(h = 30 km).

" 12 Up iP 07 43 29.4
Alaska (h = 25 km).

" 12 Up iP 09 45 13.7

		microns	sec
P	Z'	0.1	1.0

Ki iP 09 44 20.6 D

		microns	sec
P	Z'	0.1	1.0

Sk iP 09 44 47.2 D
Gb iP 09 45 26.0 D
Um iP 09 44 47.5
iS 09 52 59
Ka iP 09 45 37.3
Alaska (h = 20 km).
Magn. = 5.8 (Up,Ki).

" 12 Up iPKP 11 30 36.2 D

		microns	sec
PKP	Z'	0.2	0.6

Ki iPKP 11 30 16.3
iSKP 11 33 46.5

		microns	sec
PKP	Z'	0.2	1.4

Sk iPKP 11 30 31,5
Gb iPKP 11 30 43.8
Um iPKP 11 30 23.7
i 11 30 26.6
iSS 11 52 36
Ka ePKP 11 30 47
i 11 31 04.5
Kermadec Islands
(h = 90 km).

" 12 Up iP 12 11 15.4 C
i 12 11 22.0
iLg1 12 18 50
iLg2 12 19 07

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Apr. 12 Up microns sec
cont. P Z' 0.1 1.0
M E 0.7 13
M N 0.8 14
M Z 1.0 13
Ki iP 12 11 55.7 C
iX 12 18 23.6
microns sec
P Z' 0.1 0.9
M E 1.5 16
M N 1.1 16
M Z 2.2 15
Sk iP 12 11 52.9
Gb iP 12 11 28.4
Um iP 12 11 29.4 C
iX 12 17 12.4
Ka iP 12 11 06.8 C
Caucasus (h = 30 km).
Magn. = 5.4 (Up,Ki).
The phase marked X (on Ki and Um Z') has a group velocity of 4.25 km/sec.

" 12 Up iP 12 46 52.6
Ki iP 12 45 58.2
Sk iP 12 46 24.7
Um iP 12 46 26.2
Ka iP 12 47 15.5
Alaska (h = 39 km).

" 12 Up iP 12 58 30.1
microns sec
M E 0.5 14
M N 1.5 19
M Z 1.1 17
Ki iP 12 57 37.0
microns sec
P Z' 0.1 1.0
M E 0.8 14
M N 1.4 18
M Z 2.3 14
Sk eP 12 58 04
ipP 12 58 09.0
Um iP 12 58 03.9
Alaska. h = 20 km (Sk).

" 12 Up iP 14 45 36.2
Ki iP 14 44 40.0
microns sec
P Z' 0.1 1.0
Sk iP 14 45 08.2
Gb iP 14 45 49.0
Um iP 14 45 09.4
Ka iP 14 46 00.5
Alaska (h = 30 km).

1964
Apr. 12 Ki iP 15 17 09.7 C
Alaska (h = 20 km).

" 12 Up iP 17 32 05.3
Ki iP 17 31 09.9
microns sec
P Z' 0.1 1.1
Sk iP 17 31 35.8
Gb iP 17 32 15.9
Um iP 17 31 38.9
eS 17 39 21
Ka iP 17 32 28.2
Alaska (h = 20 km).

" 12 Um iP 20 38 47.3
Alaska (h = 30 km).

" 12 Ki eP 21 11 49
Alaska (h = 30 km).

" 13 Up iP 01 20 19.8
Ki iP 01 20 52.1
Sk iP 01 20 55.7
Gb iP 01 20 37.7
Um iP 01 20 29.8
iSn 01 27 05.6
i 01 27 20.4
Caspian Sea (h = 30 km).

" 13 Up iPKP 03 21 30.0
Gb iPKP 03 21 39.8
Um iPKP 03 21 29.3
iSKP 03 24 23.4
South of Fiji Islands
(h = 360 km).

" 13 Up iP 03 29 52.4 C
microns sec
P Z' 0.2 0.5
Ki iP 03 29 47.5 C
microns sec
P Z' 0.1 1.0
Sk iP 03 30 09.7
Um iP 03 29 44.9 C
Ka iP 03 30 01.0
Bhutan (h = 50 km).
Magn. = 6.0 (Up,Ki).

" 13 Up iP 07 31 40.5

" 13 Up iP 08 33 27.6
iS 08 36 08
iLg2 08 38 00
i(PcP) 08 38 40
microns sec
P N 1.3 3

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. 13 cont.

Up microns sec
P Z 0.8 3
P Z' 0.1 0.5
S E 1.2 5
S Z 2.5 8
M E 66 16
M N 59 13
M Z 59 10
D = 1600 km = 14 1/2°.

Ki iP 08 35 03.8
iS 08 39 11
iLg1 08 41 46
iLg2 08 42 22
microns sec
P N 1.9 9
P Z 1.7 8
P Z' 0.4 1.5
S E 4.5 10
S N 4.5 8
S Z 7.4 10
M E 27 6
M N 26 11
M Z 34 11
D = 2500 km = 22 1/2°.

Sk iP 08 34 18.7
Gb iP 08 33 11.0
iLg2 08 37 24.5
Ka iP 08 32 40.2
Yugoslavia (h = 30 km).
Magn. = 6.0 (Ki).
Well developed higher mode surface waves.

" 13 Um iP 08 57 16.2 C
ipP 08 58 30.1
Bonin Islands.
h = 310 km (Um).

" 13 Up iP 11 37 23.7
i 11 37 35.1

" 13 Ki iP 11 39 37.9
Um iP 11 39 44.7
Mindanao (h = 110 km).

" 13 Up eP 12 35 43
Ki eP 12 34 53
microns sec
P Z' 0.2 1.5
Sk eP 12 35 13
ipP 12 35 18.0
Gb iP 12 35 59.3
Um iP 12 35 16.8
iS 12 43 14
Alaska. h = 20 km (Sk).

1964 Apr. 13 Up iP 12 36 02.1
eS 12 44 22
microns sec
S E 0.5 7
S N 1.1 6
M E 1.1 19
M N 2.4 20
M Z 1.9 20
Ki iP 12 35 16.9
eS 12 42 38
microns sec
S N 1.0 9
M E 1.3 16
M N 2.3 20
M Z 6.3 22
Sk iP 12 35 37.9
Um iP 12 35 42 C
iS 12 43 33
Alaska. Magn. = 5.8 (Up,Ki)

" 13 Up eP 14 15 24
Ki iP 14 14 28.9
microns sec
P Z' 0.2 1.2
Sk iP 14 14 55.5
Gb iP 14 15 34.7
Um iP 14 14 56.2
Ka iP 14 15 46.8 C
Alaska (h = 25 km).

" 13 Up iP 16 24 36.6 C
microns sec
M E 0.6 16
M N 0.8 20
M Z 0.8 17
Ki iP 16 23 42.5
microns sec
M E 0.8 17
M N 0.8 18
M Z 1.5 18
Sk eP 16 24 09
Um iP 16 24 08.8 C
ipP 16 24 15.9
iS 16 32 28
Alaska. h = 30 km (Um).

" 13 Ki iP 17 52 30.3
Um iP 17 52 59.6
Alaska (h = 40 km).

" 13 Um eP 18 24 04
Alaska (h = 20 km).

" 13 Up iP 19 27 17.3 C
Ki iP 19 26 20.0

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. 13 cont.

Ki ipP 19 26 27.5
microns sec
P Z' 0.1 1.0
Sk iP 19 26 47.3 C
Gb iP 19 27 26.3
Um iP 19 26 47.8
ipP 19 26 55.1
Ka iP 19 27 37.3
Alaska. h = 30 km (Ki,Um).

" 13 Up iP 20 49 33.9

" 13 Up iP 21 35 56.9 D
ipP 21 36 07.3
microns sec
P Z' 0.1 0.7
Ki iP 21 35 01.8 D
microns sec
P Z' 0.2 1.0
Sk iP 21 35 29.7 D
Gb iP 21 36 09.0 D
ipP 21 36 20.3
Um iP 21 35 30.4 D
Ka iP 21 36 19.8
ipP 21 36 30.4
Alaska. h = 40 km (Up,Ki,Ka).
Magn. = 6.0 (Up,Ki).

" 13 Up eP 21 53 22
microns sec
M E 0.3 16
M N 0.9 23
M Z 1.0 20
Ki iP 21 52 27.3
microns sec
M N 0.9 19
M Z 1.4 19
Sk iP 21 52 52.3
Um iP 21 52 57.6 C
Ka iP 21 53 44.9
Alaska (h = 30 km).

" 14 Up eP 01 15 09
microns sec
M N 0.9 23
M Z 1.1 23
Ki iP 01 14 18.4
Um iP 01 14 40.0
Kurile Islands (h = 60 km).

" 14 Um e(P) 04 06 49
iSg 04 07 10.7

" 14 Um iP 04 51 45.7

1964 Apr. 14

Up iP 06 39 49.3
Ki iP 06 41 02.4
Sk iP 06 40 23.0
Gb iP 06 39 27.0
Um iP 06 40 27.0
Ka iP 06 39 09.9 D
Tyrrhenian Sea (h = 310 km).

" 14 Sk iP 07 23 43.9

" 14 Ki iP 08 08 32.0
microns sec
P Z' 0.1 1.2
Sk eP 08 08 58
Um iP 08 09 01.2
Alaska (h = 30 km).

" 14 Um iPKP 09 17 57.6
New Hebrides Islands
(h = 30 km).

" 14 Um iP 09 28 10.8

" 14 Um iP 09 58 28.1
Alaska (h = 25 km).

" 14 Up iP 16 05 05.3
ipP 16 05 14.4
microns sec
pP Z' 0.1 0.5
Ki iP 16 04 09.8
ipP 16 04 18.3
microns sec
pP Z' 0.4 1.3
Sk iP 16 04 36.4
ipP 16 04 45.6
Gb iP 16 05 17.2
ipP 16 05 25.0
Um iP 16 04 38.9
Ka iP 16 05 29.9
ipP 16 05 38.6
Alaska. h = 30 km (Up,Ki, Sk,Gb,Ka).
The amplitude of pP is about 5 times the amplitude of P (on our Z' records).

" 14 Ka iP 16 16 10.4
Alaska (h = 30 km).

" 14 Up eP 17 09 25
Ki iP 17 08 28.3
Sk eP 17 09 04
Gb iP 17 09 37.2
Ka iP 17 09 48.8
Alaska (h = 40 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr.	14	Ki	iP	21 42 37.0	
		Alaska (h = 40 km).			
"	14	Up	iP	22 39 37.4	
		Ki	eP	22 38 40	
		Sk	iP	22 39 08.3	
		Gb	iP	22 39 48.7	
		Ka	iP	22 40 00.4	
		Alaska (h = 25 km).			
"	14	Up	iP	23 05 51.1	C
			eP'P'	23 34 57	
			microns	sec	
		P	Z'	0.1	0.6
		M	E	1.1	20
		M	N	3.2	20
		M	Z	2.3	18
		Ki	iP	23 04 55.7	
			eS	23 12 38	
			microns	sec	
		P	Z'	0.2	1.0
		S	N	0.8	9
		M	E	1.2	18
		M	N	2.7	20
		M	Z	7.1	21
		Sk	iP	23 05 23.9	
		Gb	iP	23 06 03.3	
			ipP	23 06 08.2	
		Um	iP	23 05 25.0	
			iS	23 13 22	
		Ka	iP	23 06 14.4	
		Alaska. h = 20 km (Gb).			
		Magn. = 5.8 (Up,Ki).			
"	15	Ki	i(Sn)	05 13 08.8	
			iSg	05 13 27.4	
"	15	Up	iP	08 33 49.5	
		Ki	iP	08 32 57.8	
			microns	sec	
		P	Z'	0.1	1.0
		Sk	iP	08 33 24.3	
		Gb	eP	08 34 03	
		Ka	iP	08 34 15.2	
		Alaska (h = 15 km).			
"	15	Up	iP	09 51 56.6	
"	15	Ki	iP	12 23 59.3	
"	15	Ki	iPKP	15 22 16.4	
		Um	iPKP	15 22 21.3	C
		New Zealand (h = 30 km).			
"	15	Up	iP	15 41 16.3	C

cont.

1964 Apr. cont.	15	Up	eS	15 49 50	
			iPS	15 50 03	
			eP'P'	16 10 12	
			microns	sec	
		P	N	0.8	5
		P	Z	1.6	5
		P	Z'	0.4	1.0
		S	N	1.7	7
		M	E	2.3	20
		M	N	5.0	19
		M	Z	3.9	20
		D = 7050 km = 63 1/2°.			
		Ki	iP	15 40 22.2	C
			ipP	15 40 32.0	
			iS	15 48 08	
			microns	sec	
		P	Z	2.1	6
		P	Z'	0.8	1.1
		S	E	2.0	8
		M	E	2.8	18
		M	N	4.4	21
		M	Z	7.0	20
		D = 6150 km = 55 1/2°.			
		Sk	iP	15 40 49.4	C
		Gb	iP	15 41 28.4	C
			ipP	15 41 39.7	
		Um	iP	15 40 50.0	C
			iS	15 49 00	
			iP'P'	16 10 13.5	
			i	16 10 28.0	
		Ka	iP	15 41 39.2	C
			ipP	15 41 50.7	
		Alaska. h = 40 km (Ki,Gb,Ka).			
		Magn. = 6.3 (Up,Ki).			
"	15	KiR	iPn	15 49 36.6	
			iSn	15 50 25.5	
			iSg	15 50 40.6	
		D = 420 km = 3.8°.			
		~~Sk~~	~~e(Sg)~~	~~15 53 19~~	
		UME	iSn	15 51 38.4	
			iSg	15 52 09.1	
		Northwest Russia, 69°N, 30°E.			
		Origin time = 15 48 37.			
		Explosion?			
"	15	Up	iP	16 46 12.8	
			ipP	16 46 19.2	
			isP	16 46 22.4	
			microns	sec	
		pP	Z'	0.3	0.8
		Ki	iP	16 46 13.2	
			isP	16 46 22.9	
			microns	sec	
		sP	Z'	0.1	1.0
		M	N	3.0	20

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont.	15	Sk	iP	16 46 31.6	
			isP	16 46 41.1	
		Gb	eP	16 46 37	
			i	16 46 40.9	
		Um	iP	16 46 08.4	C
			ipP	16 46 14.8	
			isP	16 46 18.0	
		Ka	iP	16 46 18.2	
			isP	16 46 27.8	
		India - East Pakistan.			
		h = 25 km (Up,Ki,Sk,Um,Ka).			
		In this interpretation the amplitude ratios of sP:pP:P are about 4.5:2:1. In USCGS' interpretation sP has obviously been taken to be pP.			
"	15	Up	iPKP	17 12 33.9	C
		Ki	iPKP	17 12 02.3	
		Sk	ePKP	17 12 16	
		Um	iPKP	17 12 10.8	C
		New Zealand (h = 40 km).			
"	15	Up	iP	20 41 06.2	C
		Ki	iP	20 40 11.5	C
			ipP	20 40 20.3	
			microns	sec	
			P Z'	0.1 1.0	
		Sk	iP	20 40 39.3	C
		Gb	iP	20 41 18.2	
		Um	iP	20 40 39.8	C
		Ka	iP	20 41 29.5	
		Alaska. h = 40 km (Ki).			
"	15	Up	iP	20 59 08.2	D
		Ki	eP	21 00 22	
			i	21 00 33.0	
		Sk	iP	20 59 51.6	D
		Gb	eP	20 58 58	
		Um	iP	20 59 46.3	
		Ka	iP	20 58 31.8	
		Aegean Sea (h = 120 km).			
"	15	Um	iP	22 45 03.9	
		Yugoslavia (h = 30 km).			
"	16	Ki	eP	00 14 47	
		Alaska (h = 20 km).			
"	16	Up	iP	01 16 04.0	C
			eS	01 25 30	
			microns	sec	
			S E	1.0 11	
			M E	3.2 17	
			M N	2.3 19	
			M Z	3.2 17	
			D = 8100 km = 73°.		

cont.

1964 Apr. cont.	16	Ki	eP	01 15 23	
			iS	01 24 19	
			microns	sec	
			S N	0.7 10	
			M E	4.8 16	
			M N	3.4 16	
			M Z	9.4 15	
			D = 7400 km = 66 1/2°.		
		Gb	eP	01 16 24	
		Um	iP	01 15 41.6	C
			iS	01 24 49	
			iSS	01 29 12	
		Ka	iP	01 16 23.5	C
		Japan (h = 40 km).			
"	16	Up	eSKP	02 58 21	
		Ki	iSKP	02 57 57.1	
		Sk	ePKP	02 54 53	
			iSKP	02 58 15.1	
		Um	iPKP	02 54 52.1	
			iSKP	02 58 08.7	
		Loyalty Islands (h = 110 km).			
"	16	Up	iP	03 30 12.6	
		Ki	iP	03 29 17.9	
		Sk	eP	03 29 46	
		Um	iP	03 29 46.8	
		Ka	eP	03 30 37	
		Alaska (h = 10 km).			
"	16	Up	iP	06 32 32.9	
		Ki	iP	06 31 46.5	
			microns	sec	
			P Z'	0.1 0.9	
		Sk	iP	06 32 22.3	
		Gb	iP	06 32 53.7	
		Um	iP	06 32 07.8	C
		Ka	iP	06 32 55.4	
		Kurile Islands (h = 30 km).			
"	16	Um	i	07 14 57.6	
			i(Sg)	07 15 41.3	
"	16	Ki	iP	07 46 58.4	
			ipP	07 47 04.2	
		Alaska. h = 25 km (Ki).			
"	16	Up	iP	09 13 22.7	C
"	16	Um	i(P)	10 26 52.2	
"	16	Ki	iP	12 05 25.9	
		Um	iP	12 05 54.9	
		Alaska (h = 30 km).			
"	16	Up	iP	12 21 32.3	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964					
Apr.	16	Ki	iP	12 20 38.7	
cont.		Sk	iP	12 21 05.8	
		Um	iP	12 21 06.9	
		Ka	iP	12 21 56.9	
		Alaska (h = 30 km).			
"	16	Sk	i(P)	12 47 41.8	
"	16	Up	iP	13 54 06.0	
				microns	sec
			P	Z' 0.2	1.0
			M	E 1.0	17
			M	N 0.8	20
			M	Z 1.3	20
		Ki	iP	13 53 13.4	C
				microns	sec
			P	Z' 0.3	1.0
			M	E 0.8	17
			M	N 0.9	19
			M	Z 1.5	18
		Sk	iP	13 53 43.3	
			ipP	13 53 53.0	
		Gb	iP	13 54 21.6	
			ipP	13 54 32.9	
		Um	iP	13 53 40.1	C
		Ka	iP	13 54 29.4	
			ipP	13 54 40.9	
		Aleutian Islands.			
		h = 40 km (Sk,Gb,Ka).			
"	16	Ki	eP	14 22 42	
		Um	iP	14 23 09.8	
		Alaska (h = 40 km).			
"	16	Ki	iP	14 31 03.3	C
		Um	iP	14 31 31.0	
		Alaska (h = 30 km).			
"	16	Ki	eP	14 40 12	
		Alaska (h = 30 km).			
"	16	Up	iPg	14 48 47.8	
			i	14 49 02.1	
			iSg	14 49 09.0	
				microns	sec
			Sg	Z' 0.1	0.5
		Sk	eSg	14 51 23	
		Um	iSg	14 51 01.8	
		Possibly Baltic explosion.			
"	16	Up	iPg	15 12 55.5	
			i	15 13 10.4	
			iSg	15 13 17.0	
				microns	sec
			Sg	Z' 0.1	0.5

cont.

1964					
Apr.	16	Sk	eSg	15 15 28	
cont.		Um	iSg	15 15 09.3	
		Possibly Baltic explosion. No unique solution was possible in this and the preceding case.			
"	16	Up	iP	16 06 06.1	
				microns	sec
			P	Z' 0.1	0.5
"	16	Up	iP	19 37 27.7	C
			iS	19 46 03	
			e(P'P')	20 06 33	
				microns	sec
			P	N 1.2	6
			P	Z 1.0	4
			P	Z' 0.3	0.7
			S	E 3.9	8
			S	N 4.1	8
			M	E 7.1	18
			M	N 9.8	18
			M	Z 9.8	18
			D = 7100 km = 64°.		
		Ki	iP	19 36 33.6	C
			iS	19 44 21	
				microns	sec
			P	N 1.2	7
			P	Z 1.8	7
			P	Z' 0.5	0.7
			S	E 4.3	9
			S	N 4.8	9
			M	E 12	20
			M	N 12	22
			M	Z 16	20
		S	D = 6200 km = 56°.		
		Sk	iP	19 37 00.7	
		Gb	iP	19 37 39.7	C
		Um	iP	19 37 01.3	C
			iS	19 45 10	
			e(P'P')	20 06 23	
		Ka	iP	19 37 50.2	C
			e(P'P')	20 05 49	
		Alaska (h = 30 km).			
		Magn. = 6.5 (Up,Ki).			
"	16	Ki	iP	20 22 11.4	
		Sk	iP	20 22 37.8	
		Um	iP	20 22 38.9	
		Alaska (h = 30 km).			
"	16	Up	iP	22 44 37.6	C
"	17	Up	iP	03 09 50.0	
		Ki	iP	03 09 11.5	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont.	17	Sk	iP	03 09 44.9	
		Um	iP	03 09 28.2	C
		Japan (h = 70 km).			
"	17	Up	eP	04 14 03	
		Ki	iP	04 13 08.7	
		Sk	eP	04 13 33	
		Gb	iP	04 14 13.5	
		Um	iP	04 13 36.4	
		Ka	iP	04 14 26.5	
		Alaska (h = 20 km).			
"	17	Up	iP	04 27 04.9	C
		Ki	iP	04 26 10.1	C
		Sk	iP	04 26 35.8	C
		Gb	iP	04 27 15.5	
		Um	iP	04 26 38.5	C
		Ka	iP	04 27 27.7	C
		Alaska (h = 30 km).			
"	17	Up	eP	04 57 12	
		Um	iP	04 57 32.3	
		Ka	iP	04 56 51.9	
		South Atlantic Ocean (h = 30 km).			
"	17	Up	iP	05 00 00.4	C
			i	05 00 01.4	
			iS	05 08 38	
				microns	sec
			P N	0.7	4
			P Z	0.9	3
			P Z'	0.2	0.6
			S E	0.7	5
			S N	2.4	8
			M E	1.9	20
			M N	2.3	19
			M Z	2.3	18
			D = 7100 km = 64°.		
		Ki	iP	04 59 05.9	
			i	04 59 07.8	
			iS	05 06 55	
				microns	sec
			P N	0.9	5
			P Z	2.0	6
			P Z'	0.7	1.0
			S E	1.5	6
			S N	2.2	8
			M E	3.7	20
			M N	3.3	20
			M Z	3.1	18
			D = 6200 km = 56°.		
		Sk	iP	04 59 32.7	
			i	04 59 34.8	
		Gb	iP	05 00 13.7	
			i	05 00 16.0	

cont.

1964 Apr. cont.	17	Um	iP	04 59 34.0	
			i	04 59 38.3	
			iS	05 07 42	
			eP'P'	05 29 04	
		Ka	iP	05 00 24.2	
			i	05 00 27.0	
		Alaska (h = 25 km).			
		Magn. = 6.4 (Up,Ki).			
		Surface waves underdeveloped. P appears as a multiple phase, with a small precursor followed by a much larger amplitude; the times of both onsets are given here.			
"	17	Up	i(PKP)	06 18 37.2	
			iPKP	06 18 39.7	
			iPKKP	06 28 58.9	
		Ki	iPKP	06 18 28.0	
				microns	sec
			M E	1.6	21
			M N	0.7	18
			M Z	1.8	21
		Sk	iPKP	06 18 38.8	
		Um	e(PKP)	06 18 30	
			iPKP	06 18 33.6	
		Ka	iPKP	06 18 46.6	
		Solomon Islands (h = 90 km).			
"	17	Upp	iPg	08 48 39.7	
			i	08 48 45.5	
			iSg	08 49 01.6	
			D = 190 km = 1.7°.		
		SkA	eSg	08 51 14	
		KaS	ePg	08 48 49	
			iSg	08 49 20.0	
			D = 250 km = 2.2°.		
		Probably east coast of Sweden, 58.3°N, 16,8°E. Origin time = 08 48 05. Explosion?			
"	17	Up	iP	09 19 30.7	D
				microns	sec
			P Z'	0.1	1.0
			M E	0.5	17
			M N	0.9	18
			M Z	1.0	16
		Ki	iP	09 18 35.5	
				microns	sec
			P Z'	0.3	1.0
			M E	0.7	17
				microns	sec
			M N	1.0	20
			M Z	1.9	20

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont.	17	Sk	iP	09 19 02.9	D
			eP'P'	09 48 48	
		Gb	iP	09 19 42.7	
			ipP	09 19 48.9	
		Um	iP	09 19 04.0	
			iS	09 27 16	
			iP'P'	09 48 45.5	
		Ka	iP	09 19 53.7	
			ipP	09 20 00.3	
		Alaska. h = 25 km (Gb,Ka).			
"	17	Ki	iP	09 20 24.9	
		Sk	iP	09 20 51.8	
		Um	iP	09 20 52.0	
		Alaska.			
"	17	Ki	iP	10 08 58.4	
				microns sec	
			P	Z' 0.1 1.0	
		Sk	iP	10 09 24.9	
		Um	iP	10 09 27.6	D
		Ka	iP	10 10 17.4	
		Alaska (h = 20 km).			
"	17	Up	iP	11 58 44.3	
		Alaska (h = 30 km).			
"	17	Sk	iP	15 00 53.0	
"	17	Up	iSKP	15 06 47.9	
		Sk	ePKP	15 03 22	
		Um	iPKP	15 03 16.5	
			i	15 03 31.5	
		New Hebrides Islands (h = 70 km).			
"	17	Up	iP	16 47 21.6	
			iS	16 50 50.2	
		Ki	eP	16 47 56	
		Sk	eP	16 47 55	
			iLgl	16 55 44.4	
		Gb	eLgl	16 54 06	
		Um	iP	16 47 24.3	
			iS	16 51 38.7	
		Caucasus.			
"	17	Up	eP	18 16 30	
		Ki		---	
				microns sec	
			M	E 0.8 16	
		Sk	iP	18 17 08.8	
		Um	iP	18 17 17.7	
		Greece (h = 50 km).			
" cont.	18	Ki	eP	00 22 35	
1964 Apr. cont.	18	Sk	iP	00 23 00.6	
		Alaska (h = 30 km).			
"	18	Up	iP	01 42 48.6	
		Ki	iP	01 41 54.2	
		Sk	iP	01 42 21.8	
		Um	iP	01 42 22.6	
		Alaska (h = 30 km).			
"	18	Ki	iP	03 16 17.3	
		Um	iP	03 16 44.8	
		Alaska (h = 30 km).			
"	18	Up	iP	05 38 42.0	
			i	05 38 45.8	
				microns sec	
			P	Z' 0.2 0.8	
			M	E 1.4 19	
			M	N 1.6 20	
			M	Z 1.4 18	
		Ki	iP	05 37 55.5	
			i	05 37 59.0	
				microns sec	
			P	Z' 0.2 0.9	
		Sk	iP	05 38 31.6	
			i	05 38 34.7	
		Gb	eP	05 39 04	
			i	05 39 07.2	
		Um	iP	05 38 16.7	
			i	05 38 20.6	
			iPa	05 42 35	
			eS	05 46 59	
		Ka	iP	05 39 05.0	
			i	05 39 08.2	
		Kurile Islands (h = 30 km). Magn. = 6.2 (Up,Ki). P is multiple, with a small forerunner followed after 3.5 sec on the average by a much larger amplitude.			
"	18	Up	iP	06 06 40.4	
		Sk	iP	06 06 28.3	
		Um	iP	06 06 14.3	
		Kurile Islands (h = 30 km).			
"	18	Ki	iP	06 37 12.6	
		Um	iP	06 37 34.4	
		Kurile Islands (h = 50 km).			
"	18	Um	iP	07 20 28.4	
		Alaska (h = 30 km).			
"	18	Um	eP	07 26 21	
		Alaska (h = 30 km).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. 18 Ki iP 07 55 23.1
Sk iP 07 55 50.8
Um eP 07 55 51
Alaska (h = 30 km).

" 18 Up iP 07 57 26.0
Ki iP 07 56 31.6 C
microns sec
P Z' 0.1 1.0
Sk iP 07 56 57.7 C
Gb iP 07 57 37.4
Um iP 07 56 59.7 C
ipP 07 57 09.7
Ka iP 07 57 48.9 C
Alaska. h = 40 km (Um).

" 18 Up iP 08 10 04.7
microns sec
M E 0.8 15
M N 0.8 14
M Z 2.0 16
Ki eP 08 09 33
microns sec
M E 1.0 19
M N 0.8 17
M Z 1.5 18
Sk iP 08 10 04.1
Um iP 08 09 45.9
Ryukyu Islands (h = 30 km).

" 18 Gb iPg 11 22 37.1
iSg 11 22 38.5
D = 10 km = 0.1°.
Local blast?

" 18 Up iP 12 05 20.6
microns sec
P Z' 0.1 0.6

" 18 Um iP 12 08 19.6
Kurile Islands (h = 30 km).

" 18 Um iP 13 20 48.1

" 18 Um iP 13 52 57.6

" 18 Ki eP 15 24 11
ipP 15 24 18.5
Sk epP 15 24 46
Um iP 15 24 39.7
ipP 15 24 46.8
Alaska. h = 30 km (Ki,Um).

" 18 Ki iP 16 30 56.8
Sk iP 16 31 22.6

cont.

1964 Apr. cont. 18 Um iP 16 31 09.0
Mariana Islands
(h = 300 km).

" 18 Sk iP 17 42 14.6
Alaska (h = 30 km).

" 18 Ki iP 19 34 40.1
Um iP 19 35 08.0
Alaska (h = 30 km).

" 18 Um iP 19 59 25.2

" 18 Up iP 20 18 54.6
Ki iP 20 18 00.6
microns sec
P Z' 0.1 1.0
Sk iP 20 18 28.5
Gb iP 20 19 06.7
Um iP 20 18 28.7 C
Ka iP 20 19 17.8
Alaska (h = 15 km).

" 18 Up iP 20 19 31.7
Um iP 20 19 05.8
Alaska.

" 18 Up iP 20 26 48.7
ipP 20 26 58.9
iPcP 20 27 33
iS 20 35 25
microns sec
S E 0.3 6
S N 0.8 8
M E 1.4 19
M N 1.5 19
M Z 1.7 18
D = 7100 km = 64°.
Ki iP 20 25 54.4
eS 20 33 41
microns sec
P N 0.4 8
P Z' 0.1 1.0
S E 0.7 8
S N 1.1 8
M E 1.4 19
M N 2.0 22
M Z 3.1 22
D = 6200 km = 56°.
Sk iP 20 26 21.9
ipP 20 26 32.4
Gb iP 20 27 01.2
Um iP 20 26 22.6
ipP 20 26 33.0
iS 20 34 36

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Apr. 18 Ka iP 20 27 11.9
cont. i(pP) 20 27 19.6
Alaska. h = 40 km (Up,Sk, Um,Ka). Magn. = 5.9 (Up,Ki).

" 18 Um iP 21 58 04.5

" 18 KIR iPn 22 07 55.0
iSn 22 08 21.7
iSg 22 08 23.8
D = 210 km = 1.9°.
~~Sk iSg 22 09 27.5~~
UME iSg 22 09 34.2
Nordlands Fylke, Norway, 67.3°N, 15.6°E.
Origin time = 22 07 21.

" 18 Um iP 23 47 46.1
Alaska (h = 20 km).

" 19 Um iPKP$_2$ 04 05 37.5
South Pacific Ocean (h = 30 km).

" 19 Up ---

		microns	sec
M	E	0.5	18
M	Z	0.9	18

Um iPKP 04 15 40.0
Tonga Islands (h = 50 km).

" 19 KIR eSn 04 21 35
iSg 04 21 55.8
D = 460 km = 4.1°.
SKA eSg 04 24 23
UME eP 04 21 22
eSn 04 22 18
iSg 04 22 57.1
D = 640 km = 5.8°.
Northwest Russia, 67.5°N, 31.0°E.
Origin time = 04 19 41.
Explosion?

" 19 KIR iSn 04 36 09.9
iSg 04 36 31.1
D = 460 km = 4.1°.
SKA iSg 04 39 01.4
UME e 04 37 05
iSg 04 37 23.7
Northwest Russia, 67.4°N, 31.0°E.
Origin time = 04 34 16.
Explosion?

1964
Apr. 19 Up ---

		microns	sec
M	E	1.0	20
M	N	1.1	21
M	Z	1.6	20

Ki ePKP 05 32 14
iPKS 05 35 48

		microns	sec
PKP	Z'	0.4	1.8
PKS	E	0.4	8
M	E	1.6	21
M	N	1.3	23
M	Z	1.6	20

Sk ePKP 05 32 06
Gb ePKP 05 32 05
Um iPKP 05 32 13.8
iPKS 05 35 39
eSS 05 52 30
Ka e(PKP) 05 32 06
Off coast of Chile (h = 30 km).

" 19 Ki eP 06 43 27
Alaska (h = 15 km).

" 19 Um iP 10 39 39.9

" 19 Um iP 11 16 20.6
Colombia (h = 110 km).

" 19 Sk e 11 38 38
i(Sg) 11 38 50.5
Um i(Sg) 11 38 34.2

" 19 Up iPKP 14 31 35.2

		microns	sec
M	E	1.1	20
M	N	1.0	20
M	Z	1.7	21

Ki ePKP 14 31 44
iPKS 14 35 28
eSS 14 53 06

		microns	sec
PKS	N	0.3	9
PKS	Z	0.5	6
M	E	3.3	24
M	N	1.1	21
M	Z	4.3	23

Sk ePKP 14 31 40
Gb ePKP 14 31 29
Um iPKP 14 31 44
e 14 34 20
iPKS 14 35 26
iSS 14 52 22
Ka ePKP 14 31 29
South Shetland Islands (h = 30 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr.	19	Ki	eP	19 00 18	
			epP	19 00 25	
				microns sec	
			pP	Z' 0.1	1.0
		Sk	epP	19 00 54	
		Um	iP	19 00 46.1	
			ipP	19 00 56.2	
		Alaska. h = 40 km (Um).			
"	20	Up	iP	03 44 50.1	C
		Ki	iP	03 43 55.4	
		Sk	iP	03 44 20.9	
		Gb	iP	03 45 00.5	
		Um	iP	03 44 23.7	
			ipP	03 44 28.1	
			iS	03 52 11	
		Ka	iP	03 45 13.1	
			ipP	03 45 17.9	
		Alaska. h = 20 km (Um,Ka).			
"	20	Up	iP	12 06 35.4	D
			ipP	12 06 46.9	
			iS	12 14 32	
				microns sec	
			P N	1.0	3
			P Z	1.6	3
			P Z'	0.7	1.2
			S E	0.7	6
			S N	0.6	6
			D = 6450 km = 58°.		
		Ki	iP	12 05 38.7	D
			ipP	12 05 48.3	
			iPP	12 07 40	
			iS	12 12 50	
				microns sec	
			P N	1.1	6
			P Z	2.3	5
			P Z'	1.4	1.2
			S E	2.0	8
			S N	1.2	8
			D = 5600 km = 50 1/2°.		
		Sk	iP	12 06 06.3	
		Gb	iP	12 06 47.0	
		Um	iP	12 06 08.4	D
			ipP	12 06 19.3	
			iS	12 13 43	
		Ka	iP	12 06 59.3	D
			ipP	12 07 09.0	
		Alaska. h = 40 km (Up,Ki, Um,Ka). Magn. = 6.4 (Up,Ki).			
"	20	Up	iP	12 06 51.0	C
			iS	12 14 50	
			eP'P'	12 36 31	
				microns sec	
			P N	1.5	3

cont.

1964 Apr. cont.	20	Up		microns sec	
			P Z	1.9	2
			P Z'	0.4	0.5
			S E	0.8	6
			M E	1.1	19
			M N	3.2	22
			M Z	3.4	21
		Ki	iP	12 05 53	
			iS	12 13 06	
				microns sec	
			P E	0.7	5
			P N	1.8	3
			P Z	2.4	4
			S E	2.3	8
			S N	2.0	8
			M E	2.1	18
			M N	4.8	23
			M Z	12	24
		Sk	iP	12 06 20.7	
		Gb	iP	12 07 01.3	
			eP'P'	12 36 14	
		Um	iP	12 06 24.0	
			eP'P'	12 36 27	
		Alaska. Magn. = 6.7 (Up,Ki). The records of this and the preceding shock are tangled up and have generally not been distinguished as due to two separate shocks. A detailed analysis of both long- and short-period records demonstrates that these really are two shocks, with a time difference close to 15 sec. The second shock is slightly larger than the first one. USCGS reports only the preceding shock.			
"	20	Up	eP	15 50 22	
			ipP	15 50 30.8	
		Ki	iP	15 49 24.8	
				microns sec	
			P Z'	0.1	1.0
		Sk	eP	15 49 52	
			epP	15 50 02	
		Gb	ipP	15 50 42.4	
		Um	iP	15 49 53.6	
		Ka	eP	15 50 43	
			ipP	15 50 55.1	
		Alaska. h = 40 km (Up,Sk,Ka).			
"	20	Up	iP	16 28 25.9	C
		Ki	iP	16 27 30.6	C
				microns sec	
			P Z'	0.1	1.2

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Apr. 20 Ki microns sec
cont. M E 0.8 18
M N 0.8 20
M Z 1.3 20
Sk iP 16 27 56.6 C
Gb iP 16 28 37.2
Um iP 16 27 59.4 C
iS 16 35 42
Ka iP 16 28 49.2 C
Alaska (h = 15 km).

" 20 Um iP 17 20 41.2

" 20 Up iP 18 42 49.2
Ki iP 18 43 59.8
Sk eP 18 43 33
Gb eP 18 42 43
Um iP 18 43 24.5
Ka eP 18 42 21
Crete (h = 80 km).

" 20 Ki iP 22 43 38.8
microns sec
P Z' 0.1 1.0
Sk eP 22 43 49
Um iP 22 43 36.6
Sumatra (h = 30 km).

" 21 Up eP 03 09 50

" 21 Ki iP 04 51 26.9
Um iP 04 51 15.2
Mexico (h = 70 km).

" 21 Up iP 05 11 28.6 D
iS 05 19 28
microns sec
P Z' 0.1 1.0
S N 0.4 6
M N 1.1 22
M Z 1.5 23
D = 6450 km = 58°.
Ki iP 05 10 32.0
eS 05 17 44
microns sec
P Z' 0.3 1.0
S E 0.5 8
S N 0.8 9
M E 0.8 18
M N 1.1 21
M Z 2.1 21
D = 5600 km = 50 1/2°.
Sk iP 05 10 59.4
Gb iP 05 11 40.3
i(sP) 05 11 56.2

cont.

1964
Apr. 21 Um iP 05 11 00.9
cont. iS 05 18 35
iScS 05 20 38
Ka iP 05 11 52.1
i(sP) 05 12 08.3
Alaska (h = 40 km).
Magn. = 5.7 (Up,Ki).

" 21 Ki i(P) 08 12 16.3
iSg 08 12 46.8

" 21 Up i(P) 15 13 22.9
Ki e(P) 15 12 38

" 21 Ki iP 19 10 30.6
Ka iP 19 11 48.2
Kamchatka (h = 30 km).

" 21 KIR iPn 20 18 10.9
iSn 20 18 59.8
iSg 20 19 15.4
D = 420 km = 3.8°.
SKA eSg 20 21 29
UME iPn 20 18 48.9
iSn 20 20 07.4
iS^x 20 20 22.1
iSg 20 20 42.6
D = 710 km = 6.4°.
Northwest Russia, 68.8°N, 30.4°E.
Origin time = 20 17 11.
Explosion?

" 22 Up eP 09 52 40
Ki eP 09 52 42
eS 09 57 22
D = 3100 km = 28°.
Sk eP 09 52 08
Gb iP 09 52 17.5
Um iP 09 52 42.4
iS 09 57 28
North Atlantic Ocean
(h = 30 km).

" 22 Up eP 09 53 17
microns sec
M E 0.7 16
M N 0.9 17
M Z 1.0 16
Ki eS 09 57 57
microns sec
M E 1.8 15
M N 0.5 13
M Z 2.5 15
Sk eP 09 52 44

cont.

North Atlantic Ocean, 56.1 N 34.9 W, h = 30 km
Origine time = 09 47 29

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont.	22	Gb	iP	09 52 53.2	
		Um	iP	09 53 13.3	
		North Atlantic Ocean. There are two shocks about 35 sec apart, and not one, in about the same position in the North Atlantic. USCGS reported only the preceding shock, but not this one, which is slightly larger.			
"	22	Um	i(P)	14 17 33.6	
"	22	Up	iP	15 08 23.6	
			ipP	15 08 31.9	
		Sk	eP	15 08 48	
		Gb	iP	15 08 40.2	
		Um	iP	15 08 19.8	C
		Ka	iP	15 08 27.9	
			ipP	15 08 36.7	
		Andaman Islands. h = 30 km (Up,Ka).			
"	22	Up	iPKP	20 19 18.7	C
			iSKP	20 22 32.0	
			microns	sec	
			PKP Z'	0.1 0.5	
			SKP Z'	0.1 0.8	
		Ki	iPKP	20 19 05.4	C
			microns	sec	
			PKP Z'	0.2 0.7	
		Sk	iPKP	20 19 16.1	C
		Gb	iPKP	20 19 25.4	C
		Um	i(PKP)	20 19 02.8	
			iPKP	20 19 11.6	
		Ka	iPKP	20 19 25.7	
			iSKP	20 22 45.9	
		New Hebrides Islands (h = 120 km).			
"	22	Ki	iP	20 38 39.9	
			microns	sec	
			P Z'	0.1 1.0	
		Gb	iP	20 39 46.1	
		Um	iP	20 39 08.4	D
		Ka	iP	20 39 58.0	
		Alaska (h = 30 km).			
"	22	Ki	iPKP	23 22 40.8	D
		Sk	iPKP	23 22 51.6	
		Um	iPKP	23 22 46.9	D
		New Hebrides Islands (h = 220 km).			
"	23	Up	iP	02 03 01.1	
cont.					

1964 Apr. cont.	23	Ki	eP	02 02 20	
			microns	sec	
			M E	1.2 21	
			M N	0.6 18	
			M Z	0.6 16	
		Gb	iP	02 03 19.6	
		Um	iP	02 02 36.4	
		South of Japan (h = 30 km).			
"	23	Up	iP	03 23 51.3	
		Ki	iP	03 22 59.5	
		Gb	iP	03 24 02.4	
		Um	iP	03 23 24.8	
		Alaska (h = 40 km).			
"	23	Up	iP	03 47 08.1	
			i	03 47 25.4	
			i	03 47 46.7	
			iPKP	03 51 25.1	
			iPP	03 51 52	
			ePKKP	04 02 30	
			i	04 02 45.5	
			microns	sec	
			PP E	1.4 6	
			PP N	0.7 7	
			PP Z	5.6 9	
			M E	12 23	
			M N	15 19	
			M Z	13 19	
		(D = 11800 km = 106°).			
		Ki	iP	03 46 50.9	C
			i	03 50 44.9	
			ePKP	03 51 13	
			iPP	03 51 25	
			i	03 53 13	
			i	03 53 34	
			iSKS	03 57 23	
			iS	03 58 32	
			iPKKP	04 02 44.0	
			iSS	04 05 34	
			microns	sec	
			P E	0.8 6	
			P Z	2.4 7	
			P Z'	0.2 1.5	
			PP E	6.2 8	
			PP N	1.7 8	
			PP Z	11 8	
			SKS E	4.1 6	
			SKS N	1.2 6	
			S N	2.2 8	
			PKKP Z'	0.1 1.0	
			M E	16 20	
			M N	15 19	
			M Z	20 21	
		(D = 11500 km = 103 1/2°).			

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont.	23	Sk	i	03 47 26.0	
			iPKKP	04 02 31.5	
			i	04 02 42.0	
		Gb	eP	03 47 27	
			e	03 50 11	
			i	03 51 26.7	
			ePKKP	04 02 21	
		Um	iP	03 46 56.6	C
			i	03 47 08.3	
			iPKP	03 51 11	
			iPP	03 51 20.9	
			i	03 55 32	
			i	03 57 07	
			iSKS	03 57 28	
			iS	03 58 26	
			iPKKP	04 02 37.2	
		Ka	i(P)	03 47 34.5	
		Aru Islands (h = 30 km).			
		Magn. = 7.2 (Up,Ki).			
"	23	Up	iP	05 39 58.5	
"	23	Up	iP	10 33 00.2	
"	23	Um	iPKP	10 51 20.8	
		Solomon Islands (h = 60 km).			
"	23	Um	iP	12 19 19.3	
"	23	Up	iP	14 29 10.1	
			i	14 29 17.2	
			e(S)	14 33 48	
			microns sec		
			M E	0.8 15	
			M N	1.0 19	
			M Z	1.4 22	
		Ki	eP	14 30 09	
			microns sec		
			M E	1.2 18	
			M N	0.8 17	
			M Z	1.0 18	
		Gb	eP	14 29 18	
			i	14 29 25.8	
		Um	iP	14 29 39.5	
			eS	14 34 27	
			i	14 34 44	
		Ka	iP	14 28 54.2	
		Turkey (h = 60 km).			
"	23	Up	iP	15 06 56.2	
			microns sec		
			P Z'	0.2 1.2	
		Ki	iP	15 06 01.4	
			microns sec		
			P Z'	0.1 1.3	

cont.

1964 Apr. cont.	23	Sk	iP	15 06 28.7	
			ipP	15 06 35.7	
		Gb	iP	15 07 07.8	D
		Um	iP	15 06 29.7	D
		Ka	iP	15 07 19.2	
		Alaska. h = 30 km (Sk).			
		Magn. = 5.8 (Up,Ki).			
"	23	Um	iP	16 51 21.7	
"	23	Up	iP	20 57 59.3	
			i	20 58 07.5	
		Luzon (h = 50 km).			
"	23	Up	iP	21 19 12.8	
			microns sec		
		M	E	0.7 18	
		M	N	0.6 15	
		M	Z	0.9 18	
		Ki	iP	21 18 19.8	
			microns sec		
		M	E	0.9 20	
		M	N	1.3 17	
		M	Z	1.4 17	
		Sk	iP	21 18 55.5	
		Gb	iP	21 19 32.9	
		Um	iP	21 18 45.2	D
			eS	21 26 52	
		Ka	iP	21 19 37.3	
		Kamchatka (h = 30 km).			
"	24	Up	iP	00 53 05.0	
		Ki	iP	00 52 11.9	C
			microns sec		
			P Z'	0.1 1.0	
		Sk	eP	00 52 48	
		Gb	iP	00 53 25.2	
		Um	iP	00 52 37.0	
		Ka	eP	00 53 29 0	
		Kamchatka (h = 30 km).			
"	24	Up	iP	03 54 47.2	
		Gb	iP	03 54 30.1	
		Ka	iP	03 54 05.8	
		Greece (h = 90 km).			
"	24	Up	iP	04 01 10.3	
			eS	04 09 21	
			microns sec		
			S N	0.9 11	
			M N	0.8 19	
			M Z	1.0 21	
			D = 6650 km = 60°.		
		Ki	iP	04 00 16.6	
			iS	04 07 46	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Apr. 24 Ki microns sec
cont. S N 0.6 9
M E 0.8 17
M N 0.9 19
M Z 1.4 21
D = 5850 km = 52 1/2°.
Gb iP 04 01 21.7
Um iP 04 00 44.7
ePa 04 04 26
iS 04 08 42
Ka iP 04 01 33.0 C
Alaska (h = 30 km).

" 24 Ki eP 04 32 43
Um iP 04 33 10.2
Alaska (h = 20 km).

" 24 Up iP 06 10 42.1
ePKP 06 14 36
iPP 06 15 23.5
iS 06 22 47
iSP 06 24 43
iPKKP 06 25 28.3
microns sec
PP N 0.4 4
PP Z 1.2 4
PP Z' 0.4 1.5
S N 3.3 11
M E 17 23
M N 21 19
M Z 24 23
(D = 12450 km = 112°).
Ki eP 06 10 15
i 06 11 17.4
iPKP 06 14 24.4
iPP 06 14 39
ipPP 06 15 06
iSKS 06 20 44
i 06 24 26
iS 06 22 05
iSS 06 29 38
microns sec
P Z' 0.1 1.0
SKS E 2.3 6
S N 4.1 10
M E 20 22
M N 22 22
M Z 16 23
(D = 11900 km = 107°).
Sk ePKP 06 14 34
Gb iPKP 06 14 40.7
iPP 06 15 40.0
Um iP 06 10 23.5 C
iPKP 06 14 18.2
iPP 06 14 53

cont.

1964
Apr. 24 Um i 06 20 23
cont. iS 06 22 17
i(SP) 06 24 04
iPS 06 24 31
i 06 28 03
iSS 06 30 05
Ka ePKP 06 14 40
i 06 15 27.8
iPP 06 15 42.7
New Guinea (h = 110 km).
Magn. = 6.9 (Up,Ki).

" 24 Up iP 09 18 33.8 D

" 24 Up iP 14 52 55.9
iS 15 03 15
Ki iP 14 52 47.1 C
microns sec
P Z' 0.2 1.4
Sk iP 14 52 38.4
Um iP 14 52 53.9
ipP 14 53 32.9
iS 15 03 04
isS 15 04 04
i 15 04 27
Ka iP 14 52 56.6
El Salvador. h = 150 km (Um).
On Um Press-Ewing records the Rayleigh waves are practically limited to one pulse with a period of about 50 sec.

" 24 Ki iPn 17 28 32.6
iSn 17 29 13.4
iSg 17 29 28.8
D = 370 km = 3.3°.
SKA eSg 17 32 13
UME iSg 17 31 01.4
Northwest Russia, 68.9°N, 28.9°E. Origin time = 17 27 39. Explosion?

" 24 Up iP 20 21 48.5 C

" 25 Up iP 01 16 50.3
Turkey (h = 40 km).

" 25 Up iP 02 26 42.2

" 25 Up iP 07 35 08.1 D

" 25 Up iP 09 53 33.9
Ki iP 09 52 39.3

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont.	25	Ki		microns sec	
			P	Z' 0.1	1.0
		Sk	iP	09 53 04.9	
		Gb	iP	09 53 44.9	C
		Um	iP	09 53 07.8	
			eS	10 00 43	
		Ka	iP	09 53 57.0	C
		Alaska (h = 30 km).			
"	25	Ki	iP	10 44 37.1	C
"	25	Up	eP	12 03 51	
"	25	Up	iP	12 49 36.1	
				microns sec	
			M	E 1.5	20
			M	N 1.0	20
			M	Z 1.2	15
		Ki	iP	12 50 42.3	
				microns sec	
			P	Z' 0.1	0.8
			M	E 0.9	12
		Sk	iP	12 50 15.3	
		Gb	iP	12 49 30.6	
		Um	iP	12 50 07.2	D
		Ka	iP	12 49 04.6	
		Dodecanese Islands (h = 30 km).			
"	25	Um	iP	12 56 58.4	C
"	25	Gb	iP	16 20 17.9	
		Alaska (h = 30 km).			
"	25	Up	iP	18 49 52.1	
			i	18 49 56.5	
			ipP	18 50 04.6	
				microns sec	
			pP	Z' 0.4	0.7
			M	E 1.6	17
			M	N 1.4	18
			M	Z 2.2	17
		Ki	iP	18 49 26.9	
			ipP	18 49 38.7	
				microns sec	
			pP	Z' 0.4	1.1
			M	E 2.1	18
			M	N 0.6	14
			M	Z 1.9	20
		Sk	e(P)	18 50 01	
			ipP	18 50 06.4	
		Gb	iP	18 50 11.8	
			ipP	18 50 24.3	
		Um	iP	18 49 36.3	
			ipP	18 49 48.2	

cont.

1964 Apr. cont.	25	Ka	eP	18 50 06	
			ipP	18 50 18.7	
		Ryukyu Islands. h = 50 km (Up,Ki,Gb,Um,Ka). In this case the amplitude of pP is 5-8 times the amplitude of P on our Z' records.			
"	26	Up	eP	01 37 27	
		Ki	eP	01 38 28	
		Sk	eP	01 38 06	
		Crete (h = 70 km).			
"	26	Up	iP	14 12 35.3	C
		Ki	iP	14 12 34.0	C
				microns sec	
			P	Z' 0.1	1.0
		Sk	iP	14 12 48.4	C
		Um	iP	14 12 32.0	C
		Sumatra (h = 90 km).			
"	26	Up	iPKP	15 10 32.2	
			iSKP	15 13 26.4	
		Ki	iPKP	15 10 23.6	
			iSKP	15 13 02.7	
		Sk	iSKP	15 13 19.7	
		Gb	iPKP	15 10 40.7	
			iSKP	15 13 34.9	
		Um	e(PKP)	15 10 21	
			iPKP	15 10 31.1	
			iSKP	15 13 14.7	
		Ka	iPKP	15 10 41.4	
			i	15 10 57.7	
			iSKP	15 13 36.7	
		Fiji Islands (h = 490 km).			
"	26	Up	iPKP	22 53 43.4	
		Um	iPKP	22 53 51.0	
		South of Sandwich Islands (h = 30 km).			
"	27	Up	iP	01 49 45.7	
		Ki	iP	01 49 45.6	D
			i	01 49 47.3	
			eS	02 00 17	
				microns sec	
			P	Z' 0.1	1.0
			M	E 0.9	18
			M	N 0.7	20
			M	Z 1.1	17
			D = 9450 km = 85°.		
		Sk	iP	01 50 01.0	
			i	01 50 16.5	
		Um	iP	01 49 43.3	
			iS	02 00 06	
		Sumatra (h = 30 km).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr.	27	Up	ePKP	07 04 47	
				microns	sec
			M	E 2.3	20
			M	N 2.8	20
			M	Z 4.3	19
		Ki	iPKP$_2$	07 04 50.9	
			iPP	07 08 38	
			eSS	07 28 28	
				microns	sec
			PKP$_2$	Z' 0.1	1.5
			M	E 6.3	22
			M	N 4.4	21
			M	Z 11	21
		Sk	e(PKP)	07 04 55	
			e	07 05 06	
		Um	iPKP	07 04 35.3	
			i	07 04 53.1	
		Balleny Islands (h = 30 km).			
"	27	Um	i(P)	10 58 21.0	
"	27	Um	iP	12 19 03.9	
		Atlantic Ocean (h = 30 km).			
"	27	Um	iP	13 56 40.8	
"	27	Gb	iP	14 53 45.8	
		Um	eP	14 52 04	
"	27	Ki	iP	20 34 15.3	
		Alaska (h = 30 km).			
"	28	Up	eP	00 51 09	
"	28	Up	iP	02 44 30.6	
		Sk	iP	02 44 21.1	
		Um	iP	02 44 14.6	
"	28	Up	eP	06 06 39	
		Um	iP	06 06 58.9	
		Ka	eP	06 06 16	
"	28	Up	iP	12 31 30.2	
			i	12 31 45.3	
		Ki	eP	12 30 37	
		Sk	eP	12 31 01	
		Alaska (h = 30 km).			
"	28	Sk	iP	13 40 07.5	
"	28	Ki	iP	13 43 44.9	
		Sk	eP	13 44 10	
			ePcP	13 45 00	
		Um	iP	13 44 12.7	
		Alaska (h = 30 km).			

1964 Apr.	28	Up	iP	18 34 28.6	C
		Ka	iP	18 34 37.4	C
		Pamir (h = 150 km).			
"	28	Up	i(P)	22 41 25.6	
"	28	Ki	iP	23 05 53.1	C
		Sk	iP	23 06 19.9	C
		Alaska (h = 30 km).			
"	29	Up		---	
				microns	sec
			M	E 1.1	19
			M	N 1.1	18
			M	Z 0.7	14
		Ki	iP	02 22 27.9	
			eLg2	02 48 28	
				microns	sec
			M	E 0.9	18
			M	N 0.6	15
			M	Z 0.9	13
		Sk	eP	02 23 00	
		Um	iP	02 22 39.8	
			i	02 22 44.7	
			eSS	02 36 17	
		Japan (h = 30 km).			
"	29	Up	iP	04 25 47.7	C
			iS	04 29 36	
			eLg2	04 32 43	
			i	04 33 25	
				microns	sec
			P	Z' 0.2	0.6
			S	E 1.4	6
			S	N 1.7	7
			S	Z 2.7	11
			M	E 12	13
			M	N 9.3	11
			M	Z 8.4	10
			D = 2350 km = 21°.		
		Ki	iP	04 27 01.2	
			i	04 27 27.3	
			iS	04 31 53	
			eSa	04 32 17	
			iLg2	04 36 41	
			iL(3.25)	04 37 21	
			iRg	04 38 23	
				microns	sec
			P	Z' 0.2	1.5
			S	N 0.7	10
			M	E 10	13
			M	N 6.8	12
			M	Z 7.2	10
			D = 3150 km = 28 1/2°.		
		Sk	iP	04 26 30.9	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Apr. cont.	29	Gb	iP	04 25 38.4	
		Um	iP	04 26 25.4	C
			iS	04 30 41	
		Ka	iP	04 25 10.0	C
			i	04 25 17.6	
			iS	04 28 38.4	
		Aegean Sea (h = 30 km).			
		Magn. = 5.5 (Up,Ki).			
		Well developed higher mode surface waves.			
"	29	Up	iP	17 04 44.9	C
			iPP	17 05 09.9	
			iS	17 08 37	
			i	17 12 22	
				microns	sec
			P	Z' 0.1	0.7
			M	E 3.6	15
			M	N 2.0	10
			M	Z 1.6	10
		D = 2350 km = 21°.			
		Ki	iP	17 05 58.5	
				microns	sec
			M	E 2.9	13
			M	N 1.3	9
			M	Z 1.3	9
		Sk	iP	17 05 28.0	
		Gb	iP	17 04 35.8	
		Um	iP	17 05 22.4	
			iS	17 09 42	
		Ka	iP	17 04 09.2	
		Aegean Sea (h = 30 km).			
"	29	Ki	iPKP	17 56 47.4	C
		Um	iPKP	17 56 39.5	
			i	17 56 49.4	
		East of Sandwich Islands (h = 30 km).			
"	29	Um	iP	19 10 03.3	
"	29	Um	iP	19 16 20.5	
			i	19 16 30.4	
"	29	Um	iP	19 28 12.5	
"	30	Sk	iP	00 35 58.4	
		Alaska (h = 30 km).			
"	30	Up	i(P)	03 20 06.6	
"	30	Ki	eP	03 59 12	
		Sk	iP	03 59 35.5	
		Um	iP	03 59 40.1	
		Alaska (h = 20 km).			

1964 Apr.	30	Ki	iP	04 10 35.0	
			ipP	04 10 43.8	
		Sk	iP	04 10 58.0	
			ipP	04 11 07.5	
		Um	ipP	04 11 09.4	
		Alaska. h = 40 km (Ki,Sk).			
"	30	Um	iP	04 23 25.1	
"	30	Ki	iP	05 41 25.0	
		Sk	iP	05 41 51.6	
		Um	iP	05 41 52.7	
		Alaska (h = 30 km).			
"	30	Ki	iP	11 59 45.5	
		Um	iP	12 00 13.6	
		Alaska (h = 30 km).			
"	30	Up	iP	15 06 04.7	C
		Ki	iP	15 05 43.3	
		Sk	iP	15 06 09.5	
		Um	iP	15 05 50.4	C
		Luzon (h = 50 km).			
"	30	Up	ePKP	16 22 04	
			iPP	16 23 03	
				microns	sec
			M	E 1.3	23
			M	N 2.3	22
			M	Z 1.8	22
		Ki	iPKP	16 21 57.8	
				microns	sec
			M	E 3.0	25
			M	N 1.6	22
			M	Z 6.4	27
		Sk	ePKP	16 22 08	
		Um	iPKP	16 21 58.1	
			i	16 22 01.4	
			iPP	16 22 41	
			iSP	16 32 07	
		New Ireland (h = 80 km).			
"	30	Ki	iP	17 35 44.3	
				microns	sec
			P	Z' 0.1	1.2
		Sk	iP	17 36 08.4	
		Um	iP	17 36 16.0	
		Alaska (h = 30 km).			
"	30	Up	iP	18 16 13.4	D
		Sk	iP	18 16 56.0	
		Um	iP	18 16 52.3	
		Aegean Sea (h = 120 km).			
"	30	Up	iP	20 17 34.0	C
				microns	sec
			P	Z' 0.1	0.5

Markus Båth
March 31, 1965

A second copy.

Seismological Institute
Uppsala

15 epicenters from UPP

S E I S M O L O G I C A L B U L L E T I N May 1964

U P P S A L A, K I R U N A, S K A L S T U G A N, G Ö T E B O R G, U M E Å and K A R L S K R O N A

UPP	Uppsala	(Up):	59°51.5'N,	17°37.6'E;	h = 14 m
KIR	Kiruna	(Ki):	67°50.4'N,	20°25.0'E;	h = 390 m
SKA	Skalstugan	(Sk):	63°34.8'N,	12°16.8'E;	h = 580 m
GOT	Göteborg	(Gb):	57°41.9'N,	11°58.7'E;	h = 66 m
UME	Umeå	(Um):	63°48.9'N,	20°14.2'E;	h = 16 m
KLS	Karlskrona	(Ka):	56°09.9'N,	15°35.5'E;	h = 11 m

M A Y 1 - 31, 1964

1964
May 1 Up iP 00 27 49.6
Ki iP 00 26 56.3 C
Sk ipP 00 27 31.7
Um iP 00 27 24.7 C
ipP 00 27 32.8
Alaska. h = 30 km (Um).

" 1 Um iP 01 22 06.2
Andaman Islands
(h = 30 km).

" 1 Up iP 03 23 26.1
Ki iP 03 22 31.7
Sk iP 03 22 58.2
Gb iP 03 23 37.6
Um iP 03 22 59.3
ipP 03 23 10.6
Alaska. h = 40 km (Um).

" 1 ~~Up~~ UPP eSg 05 31 10
~~Ki iPn 05 26 56.3~~
~~iSg 05 27 53.6~~
~~D = 390 km = 3.5°.~~
SKA eSg 05 30 41
UME iSn 05 28 35.3
iSg 05 29 06.4
D = 630 km = 5.7°.
Northwest Russia,
68.0°N, 29.7°E.
Origin time = 05 25 59.
Explosion?

" 1 Up iP 06 11 56.2 C
ipP 06 12 00.3
microns sec
pP Z' 0.1 1.0
Ki iP 06 11 00.8 C
eS 06 18 27

cont.

1964
May 1 cont. Ki
microns sec
P Z' 0.3 1.0
S N 0.6 9
M E 0.8 18
M N 1.0 20
M Z 1.9 20
D = 5800 km = 52°.
Sk iP 06 11 26.2 C
Gb iP 06 12 07.3 C
Um iP 06 11 29.9 C
ipP 06 11 33.7
iS 06 19 17
Ka iP 06 12 19.6 C
Alaska. h = 20 km (Up,Um).

" 1 Ki eP 07 17 41
Alaska (h = 20 km).

" 1 Up iP 07 54 55.6
ipP 07 55 05.3
Um iP 07 54 26.0
Alaska. h = 40 km (Up).

" 1 Up iP 11 34 11.7 C
Kurile Islands (h = 40 km).

" 1 Ki iP 21 58 40.9

" 2 Up iPKP 00 07 19.8 C
Um iPKP 00 07 09.1
Kermadec Islands
(h = 30 km).

" 2 Gb e(P) 04 07 56

" 2 Up iP 05 28 44.0 D
Ki iP 05 28 43.5 D
microns sec
P Z' 0.1 1.0

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May 2 cont.

Sk iP 05 28 57.1 D
Um iP 05 28 40.1
Sumatra (h = 110 km).

" 2 Um iP 08 51 04.2

" 2 Um i(PcP) 10 13 21.7
Alaska (h = 30 km).

" 2 Up iP 16 21 57.7 C
i 16 22 02.2
iPcP 16 22 25.8
iPa 16 26 38
i 16 30 29
iSKS 16 31 48
iP'P' 16 50 13.5

		microns	sec
P	Z'	0.2	0.5
SKS	E	3.7	10
SKS	N	3.9	10
M	E	13	20
M	N	38	19
M	Z	44	20

D = 7550 km = 68°.

Ki iP 16 21 10.7
iPcP 16 22 02.7
ePa 16 24 59
iS 16 29 24
eP'P' 16 50 26

		microns	sec
P	E	0.8	7
P	N	1.0	9
P	Z	2.6	8
P	Z'	0.3	1.4
S	E	3.3	16
S	N	1.3	11
M	E	26	17
M	N	29	19
M	Z	43	19

D = 6800 km = 61°.

Sk eP 16 21 48
Gb iP 16 22 18.7
iPcP 16 22 38.1
Um iP 16 21 33.3 C
iPa 16 25 41
i 16 29 35
iS 16 30 00
iPPS 16 30 49
iP'P' 16 50 25.3
Ka iP 16 22 20.2
Kurile Islands (h = 40 km).
Magn. = 6.5 (Up,Ki).

" 2 Up iP 16 49 14.6

" 2 Up iPKP 16 52 43.7 D
cont.

1964 May 2 cont.

Sk iPKP 16 52 35.9
Kermadec Islands
(h = 370 km).

" 2 Ki eP 17 18 06
Um eP 17 18 37
epP 17 18 42
Ka eP 17 19 25
Alaska. h = 20 km (Um).

" 2 Up iP 20 05 56.1
Um iP 20 05 56.7
Costa Rica (h = 40 km).

" 2 Sk e(Sg) 23 29 22

" 2 Up iP 23 45 00.5
Ki iP 23 44 47.9 C
Sk iP 23 45 12.3
Um iP 23 44 49.4
Yunnan, China (h = 30 km).

" 3 Up iP 02 05 40.6
Ki iP 02 04 59.3
Sk eP 02 05 34
Um iP 02 05 17.0
Japan (h = 60 km).

" 3 Up iP 07 43 27.0 C

		microns	sec
P	Z'	0.1	0.9

Ki iP 07 42 32.8 C
ipP 07 42 41.5

		microns	sec
P	Z'	0.1	1.0

Sk iP 07 42 59.8 C
Gb iP 07 43 39.1 C
Um iP 07 43 00.5 C
Ka iP 07 43 49.6 C
Alaska. h = 30 km (Ki).
Magn. = 5.7 (Up,Ki).

" 3 Um iP 08 08 36.7
Alaska (h = 30 km).

" 3 Um iP 15 39 19.8
Aleutian Islands
(h = 30 km).

" 3 Um iP 21 41 46.8
Alaska (h = 25 km).

" 4 Um iP 02 21 57.8

" 4 Um iP 05 57 41.4
e 05 58 42

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
May 4 Sk iP 09 25 42.1
Um iP 09 26 32.7
(Norwegian Sea).

" 4 Up iP 12 15 04.8 C
ipP 12 15 18.4
microns sec
P Z' 0.1 1.0
Ki iP 12 14 09.6 C
ipP 12 14 22.8
microns sec
P Z' 0.2 1.0
Sk iP 12 14 36.7
Gb iP 12 15 16.5 C
Um iP 12 14 38.2 C
Alaska. h = 50 km (Up,Ki).
Magn. = 5.8 (Up,Ki).

" 4 Um eP 17 19 09

" 4 Ki iPKP 17 24 18.3 C
Bouvet Island (h = 30 km).

" 5 Up iP 00 51 07.7 C

" 5 Ki iP 02 13 52.3
Sk iP 02 14 12.4
Um iP 02 14 22.2
Alaska (h = 30 km).

" 5 Ki eP 02 41 54
Alaska (h = 15 km).

" 5 Ki eP 05 34 08
i 05 34 12.7
Tien-Shan.

" 5 Up iP 08 12 45.8 D
microns sec
M E 1.1 20
M N 1.5 24
M Z 1.6 20
Ki eP 08 11 54
microns sec
M E 0.8 19
M N 1.2 19
M Z 1.5 18
Sk eP 08 12 34
ePcP 08 13 04
Um iP 08 12 20.7
Kurile Islands (h = 40 km).
Magn. = 5.3 (Up,Ki).

" 5 Up iP 14 46 20.7
i 14 46 27.1
Ki iP 14 45 59.6

cont.

1964
May 5 Sk iP 14 46 29.5
cont. Um iP 14 46 01.2
Sinkiang, China
(h = 30 km).

" 5 Up iP 16 24 08.6
Ki eP 16 23 10
Sk eP 16 23 35
Um iP 16 23 43.8
Alaska (h = 25 km).

" 5 Ki i(Sg) 17 54 17.2
Sk e 17 54 24
i(Sg) 17 56 13.6
Um i 17 57 03.4
e 17 57 20
(Norwegian Sea).

" 5 Up i(PKP2) 18 23 23.1
Um iPKP 18 22 57.9
New Zealand (h = 180 km).

" 5 Ki iP 22 50 43.8
Sk iP 22 51 21.6
Um iP 22 50 58.1
These readings, which seem reliable, do not agree with a USCGS solution, indicating an epicenter in Alaska.

" 6 Up iPKP 04 46 00.9
microns sec
M N 0.7 18
Ki ePKP 04 46 16
Sk ePKP 04 46 04
Um iPKP 04 46 06.7
i 04 46 15.7
Sandwich Islands
(h = 30 km).

" 6 Um iP 06 27 25.1

" 6 Um iP 06 58 55.7

" 6 Up ~~iP~~ ~~i~~ ~~07 13 10.9~~
iSg 07 13 13.8
~~microns sec~~
~~Sg Z' 0.1 0.5~~
Ki iSg 07 14 29.3
~~Sk iPn 07 10 58.7~~
~~iSn 07 11 28.8~~
~~iSg 07 11 45.8~~
~~D = 310 km = 2.8°.~~
~~Gb i(Lg1) 07 12 39.4~~
Um ~~i~~ ~~07 13 27.6~~
iSg 07 13 36.0

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May 6 cont.

Ka i 07 13 41.3
iLgl 07 13 58.3
Ålesund area, Norway,
62.2°N, 7.2°E.
Origin time = 07 10 12.

" 6 Up ---

		microns	sec
M	E	1.0	18
M	N	1.0	20
M	Z	1.1	18

Ki iPKP 08 29 30.0
ePS 08 40 29

		microns	sec
M	E	1.2	18
M	N	0.8	17
M	Z	1.5	18

Sk iPKP 08 29 40.8
Solomon Islands (h = 40 km).
Magn. = 5.7 (Up,Ki).

" 6 Up iSn 11 22 46.9
iS^x 11 22 54.0
iSg 11 23 02.8
~~D = 410 km = 3.7°.~~
Sk iSg 11 24 55.8
Ka eSg 11 24 18
Gulf of Finland,
59.6°N, 24.7°E.
Origin time = 11 21 00.
Explosion?

" 6 Ki iP 11 45 56.5
Hindu Kush (h = 250 km).

" 6 Up iP 15 37 07.1 C
iPa 15 40 52
iS 15 45 40

		microns	sec
P	N	0.5	5
P	Z	0.5	3
P	Z'	0.4	1.6
S	N	0.7	7
M	E	1.8	19
M	N	2.6	21
M	Z	1.7	18

D = 7100 km = 64°.
Ki iP 15 36 12.9 C
eS 15 44 02
iScS 15 46 02

		microns	sec
P	Z	0.9	5
P	Z'	0.3	1.5
M	E	2.7	22
M	N	3.3	21
M	Z	4.4	20

D = 6200 km = 56°.

cont.

1964 May 6 cont.

Sk iP 15 36 39.5 C
Gb iP 15 37 19.0 C
Ka iP 15 37 29.9 C
Alaska (h = 15 km).
Magn. = 6.0 (Up,Ki).

" 6 Up iP 17 22 18.7 C

		microns	sec
M	E	0.7	16
M	N	0.7	17

Ki iP 17 21 38.7

		microns	sec
M	E	1.1	20
M	N	0.6	16
M	Z	1.1	15

Sk eP 17 22 12
e(pP) 17 22 23
Japan (h = 30 km).

" 6 Up iP 20 51 26.8 C
i(pP) 20 51 33.9

		microns	sec
(pP)	Z'	0.1	1.0

Ki eP 20 51 05
Sk iP 20 51 20.8 C
Gb iP 20 51 35.8
i 20 51 48.6
Ka iP 20 51 37.0
i 20 51 49.0

" 6 Up iP 20 56 12.6 C
Ki iP 20 55 25.5

		microns	sec
P	Z'	0.1	0.9

Kurile Islands (h = 40 km).

" 7 Up iPKP 00 53 32.5
Ki iPKP 00 53 29.0
Ka iPKP 00 53 45.4
Fiji Islands (h = 300 km).

" 7 Up iP 04 13 28.2

		microns	sec
P	Z'	0.1	0.5

Ki iP 04 12 35.4
iPcP 04 13 20.7
Sk eP 04 13 09
Aleutian Islands.

" 7 Up iP 05 56 07.7 D
ipP 05 56 18
eS 06 04 44

		microns	sec
P	N	0.5	3
P	Z	1.6	3
P	Z'	1.0	1.5
S	E	6.5	14

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May 7 cont.

Up
microns sec
S N 3.0 10
M E 14 22
M N 18 19
M Z 25 18
D = 7200 km = 65°.

Ki iP 05 56 53.2 D
iPP 05 59 41
ePa 06 01 28
iS 06 06 15
microns sec
P E 0.9 4
P N 1.7 7
P Z 3.4 7
P Z' 2.1 1.7
PP N 0.9 8
PP Z 1.4 8
S E 3.4 10
S N 1.2 8
M E 18 18
M N 13 23
M Z 14 21
D = 8000 km = 72°.

Sk iP 05 56 35.7 D
Gb iP 05 56 02.5 D
Ka iP 05 55 46.7 D
ipP 05 55 57.3
Tanganyika. h = 40 km (Up,Ka).
Magn. = 6.7 (Up,Ki).
The average velocity of Pa to Ki is 8.35 km/sec, a typical continental value (see Båth and Lopez Arroyo, Geofis. pura e appl., 56:67-92, 1963).

" 7 Up iP 08 09 17.6 C
iPP 08 11 48
eS 08 18 20
e(P'P') 08 37 14
iP'P' 08 37 29.5
microns sec
P E 1.9 6
P N 3.0 6
P Z 5.8 5
P Z' 1.6 1.6
PP E 1.5 5
PP N 2.2 5
PP Z 3.4 6
S E 15 18
S N 8.3 12
P'P' Z' 0.3 1.7
M E 64 17
M N 92 18
M Z 78 17
D = 7650 km = 69°.

cont.

1964 May 7 cont.

Ki iP 08 08 36.8 C
e 08 10 26
iPa 08 12 44
iS 08 17 06
iPS 08 17 26
i! 08 36 34.0
iP'P' 08 37 46.4
microns sec
P E 4.0 6
P N 2.8 7
P Z 9.8 6
P Z' 3.5 2.5
S E 24 13
P'P' Z' 0.6 2.2
M E 110 15
M N 93 15
M Z 130 18
D = 7000 km = 63°.

Sk iP 08 09 10.7 C
iPP 08 11 41.4
iP'P' 08 37 32.1

Gb iP 08 09 39.1 C
iPP 08 12 16.4
iP'P' 08 37 24.5

Ka iP 08 09 38.3 C
e(P'P') 08 37 16
Japan (h = 30 km).
Magn. = 7.0 (Up,Ki).

" 7 Up iP 11 22 10.2 D
iS 11 31 17.7
microns sec
P Z' 0.4 0.5
S Z' 0.1 0.3

Ki iP 11 21 37.3 D
ipP 11 23 23.3
iS 11 30 17.2
microns sec
P Z' 0.4 0.9
S E 1.1 4
S N 1.2 7
S Z' 0.3 1.6

Sk eP 11 22 06
Gb iP 11 22 29.3 D
Ka iP 11 22 26.5 D
iS 11 31 35.0
iSKS 11 31 51.2
South of Japan. h = 500 km (Ki).
Magn. = 6.0 (Up,Ki).

" 7 Up iP 12 19 07.1 C
Ki iP 12 18 25.9
Sk iP 12 19 00.8
Gb iP 12 19 28.9
Japan (h = 30 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May 7 Up iP 12 23 10.2 D

" 7 Up iP 17 49 15.1 C
Ki iP 17 49 25.1
Sk iP 17 49 41.6
Hindu Kush (h = 110 km).

" 7 Ki eP 19 21 50
Alaska (h = 15 km).

" 7 Up iP 20 23 52.8 C
iPP 20 26 28.0
iS 20 32 59
eP'P' 20 52 04

		microns	sec
P	N	0.3	3
P	Z	1.5	3
P	Z'	0.9	1.6
PP	Z'	0.1	1.2
S	E	2.4	11
S	N	1.4	12
P'P'	Z'	0.2	2.0
M	E	16	18
M	N	16	17
M	Z	21	20

D = 7650 km = 69°.

Ki iP 20 23 11.9 C
iS 20 31 41
eP'P' 20 52 17

		microns	sec
P	E	1.2	7
P	N	0.8	9
P	Z	3.2	9
P	Z'	1.0	1.6
S	E	5.7	13
S	N	3.2	12
P'P'	Z'	0.3	2.0
M	E	30	14
M	N	30	16
M	Z	32	18

D = 6950 km = 62½°.

Sk iP 20 23 46.8
iPP 20 26 17.2
Gb iP 20 24 14.4 C
iPP 20 26 51.4
Ka iP 20 24 13.4 C
iPP 20 26 45.8
Japan (h = 30 km).
Magn. = 6.5 (Up,Ki).

" 7 Up iPKP 23 32 09.6 C
Ki iPKP 23 31 49.0
Sk iPKP 23 32 04.4
Gb iPKP 23 32 17.5
Kermadec Islands
(h = 30 km).

1964 May 8 Up iPKP 03 55 46.8
Kermadec Islands
(h = 40 km).

" 8 Up iPKP 04 17 35.6 D
Kermadec Islands
(h = 50 km).

" 8 Ki iP 09 32 47.8
Sk eP 09 33 17
Alaska (h = 20 km).

" 8 Ki iP 10 41 23.9

" 8 Up iP 16 32 19.7 C
iS 16 40 59

		microns	sec
P	Z'	0.1	0.8
S	E	0.8	7
M	E	1.7	18
M	N	1.9	19
M	Z	2.2	22

D = 7100 km = 64°.

Ki iP 16 31 25.9 C
iS 16 39 12

		microns	sec
P	N	0.4	7
P	Z	1.1	6
P	Z'	0.2	0.8
S	E	0.7	7
M	E	1.7	17
M	N	2.3	20
M	Z	2.8	19

D = 6200 km = 56°.

Sk iP 16 31 53.0 C
ipP 16 32 00.4
Gb iP 16 32 31.9
ipP 16 32 38.8
Ka iP 16 32 43.1 C
Alaska. h = 30 km (Sk,Gb).
Magn. = 5.9 (Up,Ki).

" 8 Up iP 21 44 36.4
i 21 44 39.9

		microns	sec
P	Z'	0.2	1.2
M	E	2.6	22
M	N	2.0	20
M	Z	1.8	19

Ki iP 21 43 40.7
i 21 43 44.9
iS 21 51 04

		microns	sec
P	Z'	0.3	1.2
S	E	0.9	4
M	E	2.3	16

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May 8 cont.

Ki microns sec
M N 2.6 14
M Z 3.2 17
D = 5650 km = 51°.
Sk iP 21 44 06.4
i 21 44 10.7
Gb iP 21 44 46.6
i 21 44 51.1
Ka iP 21 44 58.6
i 21 45 03.0
Alaska (h = 35 km).
Magn. = 5.8 (Up,Ki).
The P-phase is multiple, the second phase appearing on the average 4.2 sec after the first one, with similar pulse shape but with an amplitude which is on the average 2.5 times the first. If the second phase were a pP, then the focal depth would be only about 15 km.

" 8 Ki iP 21 59 07.3 C
Molucca Passage (h = 30 km).

" 8 Up iP 22 02 49.1
iS 22 05 21
i 22 05 58
microns sec
S Z' 0.1 0.5
D = 1600 km = 14½°.
Ki iP 22 01 43.9 D
i 22 01 52.5
iS 22 03 45.5
eT 22 09 26
i 22 09 40.6
i(PcS) 22 11 30.7
microns sec
P Z' 0.6 0.9
D = 1100 km = 10°.
Sk iP 22 01 49.0 D
iS 22 03 38.6
Ka iP 22 03 27.1 D
Jan Mayen (h = 25 km).
Due to the relative proximity of the source, the amplitudes of PZ' exhibit pronounced source effects, the amplitude ratio for Ki:Sk:Ka being about 4.7:1.8:1.

" 8 Up iP 23 51 44.2
i 23 51 46.1

cont.

1964 May 8 cont.

Up microns sec
P Z' 0.3 1.3
M E 1.7 18
M N 1.8 18
M Z 1.8 19
Ki iP 23 50 49.9
eS 23 59 09
iPS 23 59 21
microns sec
P Z' 0.3 1.1
S N 0.6 9
M E 2.8 18
M N 1.4 18
M Z 2.5 18
D = 6700 km = 60½°.
Sk iP 23 51 23.2 D
Gb iP 23 52 01.4
Ka iP 23 52 07.0
Aleutian Islands (h = 20 km).
Magn. = 5.9 (Up,Ki).

" 9 Up eP 00 04 30
Ki iP 00 03 49.5 C
Japan (h = 50 km).

" 9 Ki iP 00 25 32.4
Aleutian Islands (h = 30 km).

" 9 Up iP 02 13 27.7 C
iP'P' 02 41 40.8
microns sec
P Z' 0.2 1.0
M N 1.1 18
Ki iP 02 12 35.1 C
microns sec
P Z' 0.4 1.0
M E 1.2 18
M N 0.7 18
M Z 1.4 19
Sk iP 02 13 05.3
Gb iP 02 13 42.8
Ka iP 02 13 50.9
Aleutian Islands (h = 25 km).

" 9 Up iP 07 14 33.3 D

" 9 Up iP 07 54 18.8
Ki iP 07 54 57.1
Iran (h = 30 km).

" 9 Up iP 08 38 43.7

" 9 Up iP 14 01 10.9
Mindanao (h = 60 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May	9	Up	iP	15 21 15.3	
			i	15 21 20.8	
		Ki	iP	15 20 34.4	C
		Um	iP	15 20 52.4	
		Sea of Japan (h = 25 km).			
"	9	Up	iPKP	18 35 19.8	
		Ki	iPKP	18 35 05.7	
		Sk	iPKP	18 35 17.4	
		Um	iPKP	18 35 12.3	
		New Hebrides Islands (h = 40 km).			
"	9	Up	iP	20 03 22.0	
		Sk	iP	20 02 59.5	
		Um	eP	20 02 59	
		Alaska (h = 30 km).			
"	10	Up	iP	01 33 41.5	
		Um	iP	01 33 21.8	D
"	10	Up	iP	05 51 47.4	
			iPP	05 54 49.8	
		Ki	iP	05 51 12.9	
			microns	sec	
		M	E	1.0 19	
		M	N	0.9 19	
		M	Z	1.9 20	
		Sk	iP	05 51 43.7	
		Gb	iP	05 52 06.0	
		Um	iP	05 51 28.0	
			iS	06 01 09	
		Ka	iP	05 52 04.5	
		Bonin Islands (h = 60 km).			
"	10	Up	iP	06 40 12.5	
		Ki	iP	06 39 19.8	
			microns	sec	
		P	Z'	0.1 1.0	
		Um	iP	06 39 46.0	
		Aleutian Islands (h = 40 km).			
"	10	Um	iPKP	06 46 13.1	
		New Ireland (h = 80 km).			
"	10	Up	iP	10 57 02.8	C
		Sk	iP	10 56 56.9	
		Um	iP	10 56 32.8	
			ipP	10 56 39.8	
		Japan. h = 30 km (Um).			
"	10	Um	iP	11 49 42.1	
		Aleutian Islands (h = 40 km).			
"	10	Um	iP	14 56 55.7	
1964 May	11	Up	ePKP	00 29 28	
		Sk	ePKP	00 29 22	
		Um	iPKP	00 29 14.2	
"	11	Up	eP	02 26 57	
		Ki	iP	02 26 01.1	
			microns	sec	
		P	Z'	0.1 1.0	
		Sk	iP	02 26 28.5	
		Um	iP	02 26 31.0	
		Alaska (h = 30 km).			
"	11	Up	iPKP	05 47 46.8	
		Um	iSKP	05 50 30.0	
		Fiji Islands (h = 510 km).			
"	11	Up	iP	06 15 23.0	
			i	06 15 31.6	
		Ki	iP	06 15 54.2	
		Sk	iP	06 15 56.3	C
			i	06 16 10.2	
		Um	iP	06 15 33.4	C
			iPP	06 17 17.7	
			iPcP	06 17 27.0	
		Ka	iP	06 15 28.1	
		Iran (h = 60 km).			
"	11	Ki	iP	10 13 23.6	
		Um	iP	10 13 44.7	
			i	10 13 57.6	
		Kurile Islands (h = 30 km).			
"	11	Ki	e(Pn)	11 25 53	
			iSn	11 26 22.2	
			iSg	11 26 35.3	
"	11	Gb	iPKP	14 58 33.7	
		Ka	iPKP	14 58 36.6	C
		Tonga Islands (h = 50 km).			
"	11	Ki	iP	15 10 21.1	
		Talaud Islands (h = 60 km).			
"	11	Ki	iP	17 05 35.2	
		Um	iP	17 05 40.5	
		Celebes Sea (h = 570 km).			
"	11	Ki	iP	18 32 22.3	
		Alaska (h = 30 km).			
"	11	Ki	iP	20 19 47.7	
		Alaska (h = 30 km).			
"	12	Up	iPKP	01 56 24.1	
		Fiji Islands (h = 610 km).			
"	12	Ki	eP	02 13 49	
		Alaska (h = 25 km).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May 12 Up iP 11 27 44.4
Um iP 11 27 25.0 D
South of Japan
(h = 25 km).

" 12 Ki iP 11 56 41.8
ipP 11 56 47.6
microns sec
pP Z' 0.1 1.4
Um iP 11 57 10.2
ipP 11 57 15.8
Alaska. h = 25 km (Ki,Um).

" 12 Up iPg 14 51 23.4
iSg 14 51 38.7
iSn 14 51 41.5
~~microns sec~~
~~Sn Z' 0.1 0.5~~
~~D = 150 km = 1.2°.~~
~~eLgl 14 54 00~~
eSn 14 52 21
iSg 14 52 36.3
D = 320 km = 2.9°.
The Baltic Sea,
58.7°N, 18.3°E.
Origin time = 14 51 00.
Underwater explosion?

" 12 Up iP 15 13 55.0

" 12 Up iP 17 05 52.6
Ki iP 17 04 57.9
Sk iP 17 05 24.1
Gb iP 17 06 03.4
Um iP 17 05 26.6 C
Ka eP 17 06 19
Alaska (h = 30 km).

" 12 Up iP 18 27 13.5 C
Ki iP 18 26 19.6 C
Sk iP 18 26 46.1
Gb eP 18 27 25
Um iP 18 26 47.6 C
Ka eP 18 27 35
Alaska.

" 12 Up iP 18 27 16.4
ipP 18 27 23.0
iS 18 35 50
microns sec
P N 1.2 6
P Z 1.9 6
P Z' 0.2 1.0
S E 2.9 13
S N 1.1 6
M E 2.7 18

cont.

1964 May 12 cont. Up
microns sec
M N 3.4 19
M Z 6.5 22
Ki iP 18 26 21.8
ipP 18 26 29.1
eS 18 34 05
microns sec
P N 1.0 6
P Z 2.0 6
P Z' 0.4 1.0
S E 1.5 9
S N 3.3 17
M E 8.7 24
M N 11 21
M Z 13 22
Sk iP 18 26 48.3
ipP 18 26 55.5
Gb iP 18 27 28.2
ipP 18 27 34.9
Um iP 18 26 50.1
ipP 18 26 57.0
ePP 18 29 08
iS 18 35 00
Ka iP 18 27 39.3
ipP 18 27 45.9
Alaska. h = 30 km
(Up,Ki,Sk,Gb,Um,Ka).
Magn. = 6.3 (Up,Ki).
This interpretation differs from the one by USCGS, who instead assumed the P of this shock to be pP of the preceding one. The PZ'-amplitude of this shock is on the average 7 times the one of the preceding shock at our stations.

" 12 Up iP 18 32 52.6
Ki iP 18 31 58.4
microns sec
P Z' 0.2 1.0
Sk iP 18 32 25.0
Gb iP 18 33 04.0
Um iP 18 32 26.6
Ka iP 18 33 15.6
Alaska.

" 12 Ki iP 18 38 39.6
Sk iP 18 39 06.7
Alaska (h = 20 km).

" 12 Ki iP 23 47 04.1
Alaska (h = 20 km).

" 12 Um iP 23 52 02.9
Alaska (h = 25 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May	13	Ki	iP	00 17 19.7	
		Sk	iP	00 17 46.3	
		Um	iP	00 17 47.3	D
		Alaska (h = 30 km).			
"	13	Ki	iP	03 21 56.5	
			eT	03 29 30	
			e	03 30 01	
		Um	eP	03 22 45	
		Ka	iP	03 24 17.2	
		Svalbard (h = 30 km).			
"	13	Up	iPKP	05 45 14.3	
			i	05 45 19.5	
			eSKKS	05 55 38	
			eSS	06 07 50	
				microns sec	
			PKP Z	0.8 5	
			PKP Z'	0.3 1.0	
			M E	3.8 22	
			M N	7.7 21	
			M Z	7.5 21	
		Ki	ePKP	05 44 52	
				microns sec	
			PKP Z'	0.1 1.5	
			M E	4.7 19	
			M N	7.7 20	
			M Z	7.4 19	
		Sk	ePKP	05 45 08	
			i	05 45 11.5	
		Gb	iPKP	05 45 22.5	
			iPKP2	05 45 33.2	
		Um	iPKP	05 45 03.4	C
			iPP	05 48 49	
			iSKKS	05 55 15	
			iSS	06 07 25	
		Ka	ePKP	05 45 22	
			i	05 45 25.9	
			i	05 45 37.2	
		Kermadec Islands (h = 30 km). Magn. = 6.6 (Up,Ki).			
"	13	Up	iPKP	07 47 18.5	
		Sk	ePKP	07 47 14	
		Um	iPKP	07 47 08.3	
		(Kermadec Islands).			
"	13	Ki	iP	07 52 34.4	
		Alaska (h = 25 km).			
"	13	Ki	iP	10 21 16.8	
			ipP	10 21 24.3	
		Mariana Islands. h = 30 km (Ki).			
"	13	Up	iPKP	11 24 32.1	
cont.					

1964 May cont.	13	Gb	iPKP	11 24 42.4	D
		Ka	iPKP	11 24 44.4	
		West of Tonga Islands (h = 580 km).			
"	13	Ki	iP	13 56 32.8	
		Alaska (h = 30 km).			
"	13	Up	iP	14 47 53.4	
"	13	Up	eP	16 49 35	
"	13	Up	ePKP	17 02 33	
			i	17 02 36.8	
				microns sec	
			PKP Z'	0.1 0.7	
		Ki	iPKP	17 02 15.2	
		Sk	iPKP	17 02 31.0	C
		Gb	ePKP2	17 02 57	
		Um	iPKP	17 02 24.4	
			i	17 02 26.5	
		Ka	iPKP	17 02 38.7	
		Kermadec Islands (h = 30 km).			
"	13	Up	iPKP	17 10 19.3	
		Sk	iPKP	17 10 13.9	
		Um	iPKP	17 10 07.8	
			i	17 10 09.0	
			i	17 10 21.5	
		Ka	i	17 10 54.2	
		Kermadec Islands.			
"	13	Um	iP	17 12 26.0	
"	13	Up	iPKP	20 57 37.7	
			i	20 57 44.9	
				microns sec	
			PKP Z'	0.2 1.0	
		Ki	e(PKP)	20 57 23	
		Sk	iPKP	20 57 30.6	D
		Gb	iPKP	20 57 40.5	
		Um	iPKP	20 57 26.0	
		Ka	i	20 58 00.2	D
		Kermadec Islands (h = 70 km).			
"	13	Ki	iP	23 44 48.4	
		Um	iP	23 45 06.4	
			ipP	23 45 13.7	
		Sea of Japan. h = 30 km (Um).			
"	14	Um	iPKP	01 11 48.8	
		Kermadec Islands (h = 30 km).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May	14	Up	iPKP	01 25 05.5	
		Sk	iPKP	01 25 03.4	
		Um	iPKP	01 24 55.7	
		Kermadec Islands (h = 310 km).			
"	14	KIR	iPg	09 21 29.5	C
			iSn	09 21 52.6	
			iSg	09 22 02.6	
			D = 290 km = 2.6°.		
		SKA	eSg	09 24 44	
		UME	iSg	09 24 16.6	
		Off coast of northern Norway, 70.5°N, 21.0°E. Origin time = 09 20 37.			
"	14	Um	iP	12 43 44.1	
"	14	Up	iPKP	13 43 17.3	
		Um	iPKP	13 43 06.5	C
		Kermadec Islands (h = 30 km).			
"	14	Up	iP	17 05 15.4	C
		Sk	iP	17 05 55.8	
"	14	Gb	iPKP	20 19 23.1	
		Ka	iPKP	20 19 25.5	D
		Fiji Islands (h = 610 km).			
"	15	Up	iP	01 18 18.9	
		Sk	iP	01 19 01.2	
		Libya (h = 30 km).			
"	15	Up	iP	23 44 23.5	
"	16	Up	iP	06 07 52.5	C
			iPP	06 08 58.0	
			microns	sec	
			P Z'	0.1 0.6	
			PP Z'	0.1 0.5	
		Ki	iP	06 07 37.1	C
			microns	sec	
			P Z'	0.3 0.5	
		Sk	iP	06 08 08.0	C
			iPP	06 09 22.4	
			i	06 09 29.5	
		Gb	iP	06 08 21.1	
			iPP	06 09 46.0	
		Um	iP	06 07 37.6	
		Ka	iP	06 08 08.1	
			i	06 09 12.7	
		Kazakh SSR. Magn. = 6.2 (Up,Ki). Underground explosion.			
"	16	Up	iP	07 08 24.5	

1964 May cont.

"	16	Up		microns	sec
			P Z'	0.1 0.5	
"	16	Up	iP	08 11 40.3	
"	16	Up	iP	08 28 54.3	
"	16	Up	iP	08 46 29.8	C
			microns	sec	
			P Z'	0.4 1.0	
		Ki	iP	08 46 38.0	
			microns	sec	
			P Z'	0.2 1.0	
		Gb	iP	08 46 51.5	
			iPP	08 48 35.5	
		Um	iP	08 46 27.8	C
			iPP	08 47 57.7	
		Ka	iP	08 46 34.8	C
		Hindu Kush (h = 120 km). Magn. = 6.2 (Up,Ki).			
"	16	Up	iP	10 02 28.4	
		Ki	iP	10 01 34.4	
		Um	iP	10 02 01.6	
		Aleutian Islands (h = 30 km).			
"	16	Ki	iP	10 36 50.9	
		Alaska (h = 40 km).			
"	16	Ki	iP	14 54 22.1	
		Alaska (h = 30 km).			
"	16	Up	iPKP	16 27 35.2	
			microns	sec	
			PKP Z'	0.4 1.5	
			M E	1.4 18	
			M N	1.6 20	
			M Z	2.0 21	
		Ki	ePKP	16 27 24	
			microns	sec	
			M E	1.5 18	
			M N	2.0 20	
			M Z	2.3 19	
		Sk	ePKP	16 27 33	
		Gb	iPKP2	16 27 57.4	
		Um	iPKP	16 27 25.0	
			e	16 37 50	
			iSS	16 49 48	
		Ka	iPKP2	16 28 09.7	
		Kermadec Islands (h = 30 km). Magn. = 6.0 (Up,Ki).			
"	16	Up	iPKP	16 29 42.7	
		Um	iPKP	16 29 28.0	
		Kermadec Islands.			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May 16 Um iP 16 33 37.9
i 16 33 53.6

" 16 Um iP 17 36 04.9 D
Sea of Japan (h = 430 km).

" 16 Up iP 17 47 40.5

" 17 Up eP 01 00 23
eS 01 08 41

		microns	sec
S	N	1.2	10
M	E	2.0	18
M	N	5.1	21
M	Z	3.9	20

D = 6650 km = 60°.

Ki iP 00 59 27.7
eS 01 07 07

		microns	sec
P	Z'	0.2	1.7
S	E	1.2	10
S	N	1.0	7
M	E	2.9	21
M	N	6.0	22
M	Z	7.1	21

D = 5900 km = 53°.

Sk iP 00 59 53.6
Um iP 00 59 57
eS 01 07 52
iSS 01 11 53
Alaska (h = 40 km).
Magn. = 5.9 (Up,Ki).

" 17 Um iP 01 32 06.3

" 17 Up iP 04 52 35.0 D
Ki iP 04 51 42.0

		microns	sec
P	Z'	0.2	1.0

Sk iP 04 52 10.6
Gb iP 04 52 46.9
Um iP 04 52 09.1 D
Ka iP 04 52 57.2
South of Alaska
(h = 30 km).

" 17 Up e(P) 11 54 05
Um iP 11 53 40.9

" 17 Up iPKP 17 25 14.1
i 17 25 20.6
Ki ePKP 17 24 52
Sk ePKP 17 25 11
Um iPKP 17 25 02.4 C
Kermadec Islands
(h = 30 km).

1964 May 17 Up iPKP 18 45 44.9
i 18 45 51.1
Um iPKP 18 45 31.3
Kermadec Islands
(h = 60 km).

" 17 Up iP 19 21 49.5 C
Um iP 19 21 24.0
Kurile Islands
(h = 30 km).

" 17 Up iP 19 34 07.5
i 19 34 11.9
iX 19 34 20.2
iS 19 40 28

		microns	sec
P	E	0.5	4
P	Z'	0.3	1.0
S	E	6.0	16
S	N	5.7	16
M	E	11	21
M	N	11	16
M	Z	17	21

D = 4650 km = 42°.

Ki iP 19 34 38.1 D
iS 19 41 18
iSS 19 44 44

		microns	sec
P	E	0.7	5
P	Z	0.9	5
P	Z'	0.8	1.5
S	E	2.1	9
S	N	3.4	11
M	E	6.7	17
M	N	16	20
M	Z	6.5	16

D = 5050 km = 45½°.

Sk eP 19 34 02
i 19 34 08.4
Gb iP 19 33 45.8
Um iP 19 34 27.6 D
iS 19 40 59
iSS 19 43 58
Ka iP 19 33 58.8
iPP 19 35 25.5
North Atlantic Ocean
(h = 30 km).
Magn. = 6.3 (Up,Ki).
PZ' exhibits complicated beginnings, especially at Up, where the initial small-amplitude P is followed after 4.4 sec by a much larger P; the phase marked X (at Up) is a clear high-frequency onset

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
May 17 (period about 0.5 sec
cont. against 1.0 sec or more
for the preceding P),

" 17 Up iP 20 36 17.5
i 20 36 24.4

" 18 UPP eSg 05 34 59
KIR iPn 05 30 40.1 C
iSn 05 31 35.9
iSg 05 31 58.6
D = 510 km = 4.6°.
SKA eSn 05 33 31
iSg 05 34 29.2
D = 1010 km = 9.1°.
UME iSn 05 32 21.1
iSg 05 32 57.5
D = 710 km = 6.4°.
Northwest Russia,
67.7°N, 32.4°E.
Origin time = 05 29 28.
Explosion?

" 18 Um iP 07 16 11.7

" 18 Up iP 11 08 57.2
Ki iP 11 09 05.3
Sk iP 11 09 22.7
Gb iP 11 09 17.6
Um iP 11 08 55.2 C
Ka iP 11 09 01.7
Hindu Kush (h = 200 km).

" 18 Up i(P) 13 57 37.8
i 13 57 45.9
Ki eP 13 56 34
Sk eP 13 56 59
Gb iP 13 57 39.4
Um iP 13 57 02.8
iS 14 04 52
Ka iP 13 57 51.2
Alaska (h = 20 km).

" 18 Up ePKP 14 31 42
Ki eSKP 14 34 47
microns sec
SKP N 0.3 9
M E 0.4 17
M N 0.5 19
M Z 0.7 17
Gb iPKP 14 31 38.2
i 14 31 49.8
Um ePKP 14 31 33
i 14 31 42.0
Ka ePKP 14 31 40
i 14 31 53.3
Tonga Islands (h = 30 km).

1964
May 18 Ki iP 17 51 04.6
eS 18 01 32
microns sec
S E 0.4 11
S N 0.3 11
M E 0.6 17
M N 0.4 17
D = 9550 km = 86°.
Um iP 17 51 15.7
iSKS 18 01 39
Mariana Islands (h = 20 km).

" 18 Ki iP 18 24 04.0
Sk eP 18 24 24
Alaska (h = 30 km).

" 18 Um iP 19 22 04.0 C

" 18 Up eP 21 22 51
Ki eP 21 21 58
Sk iP 21 22 22.0
Um iP 21 22 26.5 D
Alaska (h = 25 km).

" 19 Ki eP 01 53 40
Um iP 01 54 08.8 C
Alaska (h = 15 km).

" 19 Up eP 02 33 44
ipP 02 33 52.8
Sk iP 02 33 23.8 D
Um eP 02 33 30
Alaska. h = 40 km (Up).

" 19 Um iP 04 30 33.4
Mexico (h = 30 km).

" 19 Up iP 06 13 12.6
iS 06 16 35
i 06 17 13
iLg1 06 18 41
iLg2 06 18 53
microns sec
M E 0.5 14
M N 1.4 18
M Z 1.4 18
D = 2000 km = 18°.
Ki iP 06 11 26.2 C
iS 06 13 12.7
iLg1 06 14 24
iLg2 06 14 43
i 06 18 17
microns sec
P Z' 0.1 1.0
S Z' 0.2 0.8
M E 2.9 11
M N 1.3 7

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
May 19 cont.

Ki microns sec
M Z 1.5 8
D = 1100 km = 10°.

Sk	iP	06 12 28.0
	i	06 12 36.9
	iLgl	06 16 38.1
Gb	eP	06 13 46
	iLi	06 19 27.6
	iLgl	06 20 02.6
Um	iP	06 12 19.5
	i	06 12 25.5
	eS	06 14 50
	i	06 15 13
Ka	iP	06 13 52.2
	iLgl	06 20 13.1
	iLg2	06 20 53.7

Svalbard (h = 30 km).
At Ki the phase at 06 18 17 marks the initiation of a very regular wave train lasting about 45 sec, with initial group velocity of nearly 2.0 km/sec and with nearly constant period = 3.8 sec and with typical Rayleigh-wave particle motion.

" 19 Up iP 10 50 22.0
iPcP 10 50 47.5
microns sec
M E 0.4 23
M N 1.1 19
M Z 1.6 20

Ki eP 10 49 36
microns sec
M E 0.8 19
M N 1.0 20
M Z 1.1 19

Sk eP 10 50 11
ePcP 10 50 37
Gb iP 10 50 42.8
Um iP 10 49 56.0
iPcP 10 50 29.4
Ka iP 10 50 44.3
Kurile Islands (h = 30 km).

" 19 Up iP 13 29 26.0
Alaska (h = 30 km).

" 19 Up eP 13 44 43

" 19 Sk iP 14 52 13.5
Um iP 14 52 15.2
Ka iP 14 53 06.1 C
Alaska (h = 30 km).

1964
May 19 Up iP 15 48 03.3 C
microns sec
P Z' 0.1 1.0

Ki iP 15 47 08.7
microns sec
P Z' 0.1 1.2

Sk iP 15 47 35.8 C
Gb iP 15 48 15.0
Um iP 15 47 35.4 C
eS 15 55 43
Ka iP 15 48 26.2 C
Alaska (h = 25 km).
Magn. = 5.7 (Up,Ki).

" 19 Um iP 23 03 43.3

" 19 Sk eP 23 15 15

" 19 Up eP 23 16 58
i 23 17 05.9
e(PP) 23 20 43
eSKS 23 27 24
eS 23 28 07
microns sec
SKS E 0.3 7
M E 1.7 18
M N 3.0 24
M Z 2.4 19

Ki iP 23 16 58.3
iPP 23 20 40
iSKS 23 27 33
microns sec
SKS E 1.1 7
M E 6.5 24
M N 3.4 24
M Z 6.7 24
D = 10450 km = 94°.

Sk eP 23 16 47
Gb eP 23 16 45
Um iP 23 16 59.3
i 23 19 35
iPP 23 20 43
iSKS 23 27 29
iS 23 28 14
iPS 23 29 34
Ka eP 23 16 49
Ecuador (h = 50 km).

" 19 Up iP 23 32 50.1
Sk eP 23 32 36
Gb iP 23 33 11.4
Um iP 23 32 22.0
Ka iP 23 33 13.7
Kurile Islands (h = 50 km).

" 20 cont. Up iP 02 51 05.8

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May cont.	20	Ki	iP	02 51 43.2	
		Um	iP	02 51 19.5	
			eS	02 58 56	
		Ka	eP	02 50 56	
		Arabian Sea.			
"	20	Up	iPKP	05 13 15.0	C
			microns	sec	
			PKP Z'	0.1 0.8	
		Ki	ePKP	05 12 54	
		Sk	iPKP	05 13 08.7	C
		Gb	iPKP	05 13 22.6	C
		Um	iPKP	05 13 02.5	C
		Ka	iPKP	05 13 23.7	C
		Kermadec Islands			
		(h = 30 km).			
"	20	Up	iP	05 42 33.7	
		Ki	iP	05 41 39.7	C
			microns	sec	
			P Z'	0.1 1.1	
		Sk	iP	05 42 06.2	C
		Gb	iP	05 42 44.9	
		Um	iP	05 42 07.3	
		Alaska (h = 20 km).			
"	20	Up	ePKP	05 54 27	
			i	05 54 33.0	
		Sk	ePKP	05 54 20	
		Um	iPKP	05 54 15.2	D
		Kermadec Islands.			
"	20	Up	iPP	06 20 00.3	
			microns	sec	
			PP Z	0.4 4	
			PP Z'	0.4 2.4	
			M E	1.2 21	
			M N	2.4 23	
			M Z	2.7 21	
		Ki	iPP	06 19 27.9	
			microns	sec	
			M E	1.4 19	
			M N	1.3 20	
			M Z	1.7 19	
		Sk	iPP	06 20 01.3	
		Gb	iPP	06 20 27.9	
		Um	iP	06 15 10.1	
			i	06 15 33.0	
			iPP	06 19 39.5	
			iSKS	06 25 47	
			i	06 26 25	
			iPS	06 28 45	
		New Guinea (h = 60 km).			
		Magn. = 6.6 (Up,Ki).			
" cont.	20	Up	i(PKP)	06 26 03.2	
1964 May cont.	20	Up	i	06 26 05.7	
			i	06 26 15.9	
		Ki	i(PKP)	06 25 44.0	C
			microns	sec	
			(PKP) Z	0.8 4	
			(PKP) Z'	0.1 1.0	
		Sk	i(PKP)	06 25 59.3	
		Um	i(PKP)	06 25 53.1	C
"	20	Ki	e(PKP)	06 38 04	
		Sk	e(PKP)	06 38 19	
		Um	i(PKP)	06 38 13.5	
"	20	Ki	ePn	07 28 18	
			iSn	07 28 47.8	
			eSg	07 29 06	
"	20	Ki	eSn	16 01 10	
			iSg	16 01 21.7	
"	20	Up	iP	21 14 15.9	
		Ki	iP	21 13 28.3	
		Um	iP	21 13 49.3	
		Kurile Islands			
		(h = 30 km).			
"	20	Up	iP	22 43 33.9	
		Ki	iP	22 43 03.7	
			microns	sec	
			P Z'	0.1 1.0	
		Sk	iP	22 43 18.4	
		Um	iP	22 43 12.5	C
"	21	Um	iP	00 07 49.5	C
		Sakhalin (h = 280 km).			
"	21	Up	iP	01 21 25.5	
		Ki	iP	01 20 30.8	
			microns	sec	
			P Z'	0.1 1.0	
		Sk	iP	01 20 56.8	C
		Gb	iP	01 21 36.9	
		Um	iP	01 20 58.2	
			ipP	01 21 02.7	
			eS	01 28 41	
		Ka	iP	01 21 49.5	
		Alaska. h = 20 km (Um).			
"	21	Um	iP	07 04 17.7	C
"	21	Up	ePKP	07 46 19	
		Ki	iPKP	07 45 49.1	C
			microns	sec	
			PKP Z'	0.1 1.0	
		Sk	iPKP	07 46 03.8	
		Um	iPKP	07 45 57.8	C

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May	21	Up	iP	11 51 51.5	D
		Ki	iP	11 51 07.9	D
		Sk	iP	11 51 43.1	
		Um	iP	11 51 26.3	D
		Ka	iP	11 52 12.5	
		Japan (h = 90 km).			
"	21	Ki	eP	13 41 00	
		Alaska (h = 30 km).			
"	21	Up	iP	15 46 18.1	
			eS	15 54 31	
				microns sec	
			M E	0.9 19	
			M N	1.2 20	
			M Z	1.0 20	
			D = 6850 km = 61½°.		
		Ki	iP	15 45 19.9	
			i	15 45 21.9	
			eS	15 52 43	
				microns sec	
			P Z'	0.1 1.0	
			M E	1.5 20	
			M N	1.2 22	
			M Z	2.2 23	
			D = 5950 km = 53½°.		
		Sk	eP	15 45 48	
			i	15 45 50.4	
		Gb	eP	15 46 29	
			i	15 46 31.8	
		Um	iP	15 45 50.9	
			iS	15 53 42	
		Ka	iP	15 46 42.9	
		Alaska (h = 15 km).			
		Magn. = 5.5 (Up,Ki).			
"	21	Up	iP	18 27 24.3	
"	21	Up	iP	22 40 18.3	
		Ki	iP	22 39 24.2	
		Alaska (h = 40 km).			
"	21	Up	iP	22 44 44.5	
		Ki	iP	22 44 37.2	
			iPP	22 47 36.2	
			eS	22 54 35	
				microns sec	
			P Z'	0.1 1.5	
			S E	0.4 8	
			M E	0.8 18	
			M N	0.4 18	
			M Z	0.8 18	
			D = 8800 km = 79°.		
		Sk	iP	22 44 25.9	
		Um	iP	22 44 43.8	
			iS	22 54 48	
			eSS	22 59 58	

cont.

1964 May cont.	21	Ka	iP	22 44 45.8	
		Caribbean Sea (h = 30 km).			
		Magn. = 5.5 (Ki).			
"	21	Up	iP	23 21 49.1	
		Sk	eP	23 21 39	
			iPcP	23 22 06.7	
		Um	iP	23 21 23.8	
		Ka	iP	23 22 11.6	
			iPcP	23 22 29.7	
		Kurile Islands			
		(h = 50 km).			
"	22	Up	iPKP	00 46 34.5	
		Ki	iPKP	00 46 14.6	C
				microns sec	
			PKP Z'	0.1 1.0	
		Sk	iPKP	00 46 29.5	C
		Um	iPKP	00 46 21.4	C
			i	00 46 24.8	
		Ka	i(PKP)	00 46 59.7	
		Kermadec Islands			
		(h = 60 km).			
"	22	Um	iP	00 51 37.4	
"	22	Ki	iP	02 45 42.9	
"	22	Sk	iPKP	05 18 52.2	
			eSKP	05 21 48	
		Um	iSKP	05 21 40.5	
		Loyalty Islands			
		(h = 140 km).			
"	22	Um	iP	05 20 28.0	
		Canary Islands			
		(h = 30 km).			
"	22	Sk	iP	05 46 14.7	
		Um	iP	05 46 36.5	
		Canary Islands			
		(h = 30 km).			
"	22	Up	iP	07 12 02.9	
"	22	Ki	iP	10 16 33.9	
		Celebes Sea (h = 200 km).			
"	22	Sk	iP	10 31 54.4	
"	22	Up	iP	---	
				microns sec	
			M E	0.9 16	
			M N	1.6 16	
			M Z	1.3 17	
		Ki	e	13 05 57	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May cont.	22	Ki		microns sec	
			M	E 1.4	17
			M	N 1.5	17
			M	Z 1.6	16
"	22	Sk	iP	14 20 12.7	
		Mindanao (h = 120 km).			
"	22	Up	iP	16 13 40.6	
		Ki	iP	16 13 39.6	
		Sk	eP	16 13 54	
		Um	iP	16 13 36.9	
"	23	Ki	iP	00 21 51.3	
		Ka	eP	00 20 59	
			i	00 21 06.0	
		Arabian Sea (h = 30 km).			
"	23	Up	iP	00 26 25.1 C	
			iS	00 34 01	
				microns sec	
			M	E 0.4	22
			M	N 0.6	19
			D = 5900 km = 53°.		
		Ki	iP	00 26 59.0	
			eS	00 35 02	
				microns sec	
			S	E 0.4	8
			S	N 0.3	7
			M	E 0.7	17
			M	N 0.4	18
			M	Z 1.0	18
			D = 6450 km = 58°.		
		Sk	iP	00 26 56.2	
		Gb	eP	00 26 33	
		Um	iP	00 26 37.9	
			ipP	00 26 44.2	
			iS	00 34 24	
		Ka	iP	00 26 13.4	
			ipP	00 26 19.7	
		Arabian Sea. h = 25 km (Um,Ka).			
"	23	Ki	iP	06 39 08.2	
		Alaska (h = 20 km).			
"	23	Sk	iP	07 00 32.3	
"	23	Ki	iSn	08 11 00.2	
			iSg	08 11 20.7	
		Possibly northwest Russia.			
"	23	Ki	eSn	09 25 39	
			iSg	09 25 58.1	
		Possibly northwest Russia.			
"	23	Um	iP	11 11 54.9	
1964 May	23	Um	iP	11 24 00.1	
"	23	Up	iP	11 33 57.8 D	
				microns sec	
			P	Z' 0.6	0.6
		Ki	iP	11 33 26.1 D	
				microns sec	
			P	Z' 0.4	0.8
		Sk	iP	11 33 54.5 D	
			iPP	11 36 59.7	
		Gb	iP	11 34 15.9 D	
		Um	iP	11 33 39.8 D	
			iS	11 42 48	
		Ka	iP	11 34 13.9 D	
			iPP	11 37 29.2	
		Bonin Islands (h = 410 km). Magn. = 6.4 (Up,Ki).			
"	23	Um	iP	12 38 27.9	
"	24	Up	iP	00 09 55.6 D	
		Ki	iP	00 09 56.8 D	
		Sk	iP	00 10 16.1	
		Gb	iP	00 10 16.4	
		Um	iP	00 09 51.0	
		Ka	iP	00 10 01.8	
		Nepal (h = 30 km).			
"	24	Ki	iP	00 49 36.2	
		Sk	iP	00 50 01.9	
		Gb	eP	00 50 39	
		Um	iP	00 50 04.5	
		Ka	iP	00 50 54.8	
			i	00 51 13.3	
		Alaska (h = 15 km).			
"	24	Up	iPKP	04 32 28.1	
			iPKS	04 36 10	
				microns sec	
			PKS N	0.4	4
		Ki	ePKP	04 32 23	
			i	04 32 39.8	
		Sk	ePKP	04 32 20	
			i	04 32 29.3	
		Gb	iPKP	04 32 37.7 D	
			ipPKP	04 32 47.8	
		Um	iPKP	04 32 25.6	
			iPKS	04 36 00	
		Ka	iPKP	04 32 40.5 D	
		Tonga Islands (h = 30 km).			
"	24	KIR	iPn	05 47 20.7 C	
			iSn	05 48 16.2	
			iSg	05 48 36.3	
			D = 490 km = 4.4°.		
		SKA	eSg	05 51 07	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May cont.

24 UME iSn 05 49 02.3
iSg 05 49 48.7
D = 710 km = 6.4°.
Northwest Russia,
68.0°N, 32.0°E.
Origin time = 05 46 12.
Explosion?

" 24 KIR iSn 06 01 56.4
iSg 06 02 22.9
SKA eSg 06 04 17
Northwest Russia,
68°N, 32°E.
Origin time = 05 59 55.
Explosion?

" 24 KIR eSn 06 05 43
iSg 06 06 06.2
SKA eSg 06 08 33
UME iSg 06 06 57.1
Northwest Russia,
68°N, 32°E.
Origin time = 06 03 40.
Explosion?

" 24 Ki iP 07 01 56.8 C
Gb iP 07 03 03.5
Um iP 07 02 24.8
Ka iP 07 03 14.8
Alaska (h = 20 km).

" 24 Ki iP 09 14 32.3
Sk iP 09 14 59.8
Alaska (h = 30 km).

" 24 Up iP 10 26 27.6
Ki eP 10 25 35
Sk eP 10 25 59
Gb eP 10 26 38
Ka iP 10 26 51.5
Alaska (h = 15 km).

" 24 Up iP 10 43 04.7 C
ipP 10 43 15.2
iS 10 52 40

		microns	sec
P	Z'	0.1	0.9
S	E	0.8	9
M	E	1.9	20
M	N	2.1	21
M	Z	2.0	16

D = 8350 km = 75°.

Ki iP 10 42 27.5 C
e 10 50 50
iS 10 51 30

		microns	sec
P	Z	0.5	4

cont.

1964 May cont.

24 Ki

		microns	sec
S	E	0.9	6
S	N	0.4	9
M	E	2.5	16
M	N	2.5	16
M	Z	3.6	15

D = 7650 km = 69°.

Sk iP 10 42 59.7
Gb iP 10 43 24.1 C
ipP 10 43 35.2
Um iP 10 42 43.8 C
ipP 10 42 54.2
iS 10 52 02
iSS 10 56 28
Ka iP 10 43 22.8
ipP 10 43 34.3
Japan. h = 40 km
(Up,Gb,Um,Ka).
Magn. = 5.9 (Up,Ki).

" 24 Up iP 14 44 51.1
Ki iP 14 44 15.2
Sk eP 14 44 47
Gb eP 14 45 12
Um iP 14 44 30.8
Japan (h = 30 km).

" 24 Up iP 16 43 37.7 C

		microns	sec
P	Z'	0.1	0.5

Ki iP 16 43 46.7 C
Sk iP 16 44 03.3
Um iP 16 43 36.1
Ka iP 16 43 42.2
Hindu Kush (h = 160 km).

" 24 Um iP 19 38 05.4
Japan (h = 100 km).

" 24 Ki iP 21 04 23.2
Um iP 21 04 49.7
Aleutian Islands
(h = 60 km).

" 24 Ki iPKP 21 16 33.6
Um iPKP 21 16 39.7 C
New Hebrides Islands
(h = 30 km).

" 24 Up e(PKP) 22 42 07
iPKP 22 42 19.5

		microns	sec
PKP	Z'	0.2	0.8

Ki iPKP 22 41 48.4

		microns	sec
PKP	Z'	0.1	1.2

Sk iPKP 22 42 01.7

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964						
May cont.	24	Gb	iPKP	22 42 34.6		
		Um	iPKP	22 41 56.6	C	
		Ka	iPKP	22 42 34.3		
		New Zealand (h = 150 km).				
"	25	UME	iP	01 44 54.5		
"	25	Up	iPKP	05 19 21.5		
		Sk	ePKP	05 19 15		
			i	05 19 28.6		
		Gb	iPKP	05 19 29.7		
		Um	iPKP	05 19 09.9	D	
		Kermadec Islands (h = 30 km).				
"	25	Sk	i(Sg)	11 03 08.7		
"	25	Ki	eP	11 08 52		
		Aleutian Islands (h = 30 km).				
"	25	Up	eP	14 04 17		
		Um	iP	14 05 13.3		
"	25	Um	iP	15 10 41.9		
"	25	Um	iP	18 00 00.1		
"	25	Up	iP	19 56 56.5		
			iSKS	20 07 21		
			iS	20 07 38		
			microns	sec		
			S N	0.6	6	
			M E	1.0	18	
			M N	2.8	23	
			M Z	1.8	19	
			D = 9850 km = 88½°			
		Ki	eP	19 57 05		
			eS	20 07 57		
			microns	sec		
			S N	0.9	8	
			M E	2.0	16	
			M N	3.3	18	
			M Z	2.0	18	
			D = 10000 km = 90°			
		Sk	eP	19 57 17		
			ipP	19 57 25.4		
		Gb	iP	19 57 07.6		
			ipP	19 57 16.2		
		Um	iP	19 56 59.5		
			iSKS	20 07 25		
			iS	20 07 44		
		Ka	eP	19 56 55		
			i	19 56 56.7		
		Indian Ocean.				
		h = 30 km (Sk,Gb).				
		Magn. = 6.0 (Up,Ki).				

1964						
May	25	Up	eP	20 28 21		
		Ki	iP	20 29 38.0		
		Sk	iP	20 28 59.8		
		Gb	eP	20 28 06		
		Um	iP	20 29 02.9		
		Ionian Sea (h = 80 km).				
"	25	Up	iP	20 36 08.0		
			i	20 36 14.6		
			microns	sec		
			P Z'	0.1	0.5	
"	26	Up	iP	05 43 45.7		
		Ki	iP	05 42 50.4		
		Sk	iP	05 43 16.3		
		Gb	iP	05 43 56.6		
		Um	iP	05 43 19.7		
		Ka	iP	05 44 08.9		
		Alaska (h = 30 km).				
"	26	Ki	iP	09 53 31.6		
		Um	iP	09 53 43.3		
		Mariana Islands (h = 90 km).				
"	26	Up	iP	11 14 29	C	
			e	11 14 39		
			e(PKP)	11 17 49		
			iPKP	11 17 51.5		
			iPP	11 19 22		
			ipPP	11 19 50		
			iSKP	11 21 15.4		
			iSKS	11 24 35		
			i	11 26 10		
			iPKKP	11 27 54.4		
			i(PS)	11 29 17		
			microns	sec		
			PKP Z	4.1	6	
			PKP Z'	0.4	0.6	
			PP E	1.1	6	
			PP N	1.2	5	
			PP Z'	0.7	1.2	
			SKP Z'	0.2	0.7	
			SKS E	7.9	12	
			SKS N	17	14	
			PKKP Z'	0.2	0.8	
			M E	46	23	
			M N	110	24	
			M Z	88	19	
			(D = 13550 km = 122°).			
		Ki	eP	11 15 02		
			i(PKP)	11 17 52.8		
			iPKP	11 18 06.8		
			ipPKP	11 18 40		
			iPP	11 20 45		
			iSKP	11 21 19		

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May 26 cont.

	Ki	iSKS	11 25 06	
		i	11 27 02	
			microns	sec
		PKP	E 1.3	6
		PKP	N 2.0	8
		PKP	Z 19	7
		PKP	Z' 6.7	1.5
		PP	E 5.6	9
		PP	N 8.2	10
		SKP	E 26	14
		SKP	N 27	13
		SKP	Z 42	8
		SKP	Z' 5.5	1.5
		SKS	N 16	10
		M	E 81	19
		M	N 83	18
		M	Z 140	18
		(D = 14450 km = 130°).		
	Sk	i(PKP)	11 17 52.1	
		iPKP	11 17 57.2	
		iPP	11 19 38.7	
		iPKS	11 21 27.0	
	Gb	ePKP	11 17 46	
		ipPKP	11 18 22.2	
		i	11 19 08.4	
		iPP	11 19 29.5	
		i	11 21 08.0	
	Um	iP	11 14 43 C	
		i	11 15 05.8	
		i(PKP)	11 17 54.8	
		iPKP	11 18 02.9 C	
		ipPKP	11 18 34.6	
		iPP	11 19 55.2	
		iPKS	11 21 26.1	
	Ka	eP	11 14 03	
		i	11 14 17.5	
		e(PKP)	11 17 41	
		iPKP	11 17 48.2	
		iPP	11 19 02.1	
		iSKP	11 21 12.6	
		iPKKP	11 28 17.0	

Sandwich Islands.
h = 130 km (Ki,Gb,Um).
Magn. = 7.3 (Up,Ki).
The surface waves are remarkably large, considering the focal depth. The diffracted P is very clear especially on long-period records and has a period about 26 sec. (PKP) is consistently of much smaller amplitude than PKP on the Z'-records. The shock is of pronounced long-period character,

cont.

1964 May 26 cont.

e.g. the surface waves have their largest amplitudes among very long periods. This earthquake is interesting also by the fact that it was followed by an aftershock sequence, unlike most shocks at intermediate or greater depths.

"	26	Um	iP	12 05 06.9
		Panama (h = 25 km).		
"	26	Ki	eP	13 32 12
		Tien-Shan.		
"	26	Up	iP	14 50 53.5
"	26	Ki	iPKP	16 01 30.7
		Sandwich Islands (h = 80 km).		
"	26	Up	iP	18 15 57.1
"	27	Ki	ePKP	00 02 21
		Sandwich Islands (h = 150 km).		
"	27	Up	iPKP	01 15 20.5
			iSKP	01 18 43.0
			iPKKP	01 25 25.5
			iSP	01 26 37
			microns	sec
			M E 0.9	19
			M N 0.9	18
			M Z 1.1	18
		Ki	iPKP	01 15 35.6 C
			iX	01 17 41.5
			i(SKP)	01 18 42.5
			iPKS	01 18 56
			microns	sec
			PKP Z' 0.8	1.5
			(SKP) Z' 0.2	1.8
			PKS E 0.7	6
			PKS N 0.6	7
			M E 1.4	19
			M N 1.5	19
		Sk	iPKP	01 15 26.0
			iPP	01 16 58.5
			iPKS	01 18 47.5
		Gb	iPKP	01 15 15.7
			e	01 16 23
		Um	iPKP	01 15 28.7 C
			iPP	01 17 19.9
			e	01 26 51

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
May 27 Um e 01 27 55
cont. iSS 01 34 04
Ka iPKP 01 15 08.6
iPP 01 16 24.5
Sandwich Islands
(h = 110 km).
Concerning the phase marked
X at Ki, see May 29, 09 23.

" 27 Sk iP 04 35 04.8
Mexico (h = 60 km).

" 27 Up iPKP 06 49 35.6
Ki iPKP 06 49 50.7 C
ipPKP 06 50 18.0
iSKP 06 52 59.2
microns sec
PKP Z' 0.1 0.9
SKP Z' 0.3 2.2
Sk iPKP 06 49 40.3
Um iPKP 06 49 43.6
Sandwich Islands.
h = 110 km (Ki).

" 27 Up iPKP 09 16 07.7
Fiji Islands (h = 270 km).

" 27 Up iPKP 10 08 46.9
Ki iPKP 10 09 01.9
Um iPKP 10 08 55.4
Sandwich Islands
(h = 50 km).

" 27 Ki iP 11 18 43.0
Sk iP 11 18 27.6
Colombia (h = 140 km).

" 27 Ki iPKP 19 20 59.9
Sandwich Islands
(h = 60 km).

" 28 Up iP 02 08 43.2 D
microns sec
P Z' 0.1 1.0
M E 0.9 19
M N 1.5 15
M Z 0.9 18
Ki iP 02 08 19.1
eS 02 17 37
microns sec
P Z' 0.1 1.0
S E 0.3 7
M E 1.5 18
M N 0.9 16
D = 7950 km = 71½°.
Gb eP 02 09 02

cont.

1964
May 28 Um iP 02 08 27.9 D
cont. ipP 02 08 34.5
eS 02 17 49
Ka eP 02 08 55
Formosa (h = 40 km).
Magn. = 5.7 (Up,Ki).

" 28 Up iSg 06 51 12.6
Got iPg 06 49 07.7
iSg 06 49 30.3
D = 190 km = 1.7°.
Skagerrack, 58.1°N, 9.0°E.
Origin time = 06 48 34.
Probably underwater
explosion.

" 28 Up eSg 07 51 23
Got iPg 07 49 15.4
iSg 07 49 37.5
D = 190 km = 1.7°.
Skagerrack, 58.1°N, 9.0°E.
Origin time = 07 48 42.
Probably underwater
explosion.

" 28 Got iPg 08 30 02.6
iSg 08 30 25.0
D = 190 km = 1.7°.
Ka S iSn 08 31 21.0
eSg 08 31 39
D = 440 km = 4.0°.
Skagerrack, 58.1°N, 9.0°E.
Origin time = 08 29 29.
Probably underwater
explosion.

" 28 Up iSg 09 07 17.1
Sk eSg 09 07 54
Got iPg 09 05 12.9
iSg 09 05 34.9
D = 190 km = 1.7°.
Ka S ePn 09 05 44
iSg 09 06 49.5
D = 440 km = 4.0°.
Skagerrack, 58.1°N, 9.0°E.
Origin time = 09 04 39.
Probably underwater
explosion.

" 28 Got iPg 10 13 05.6
iSg 10 13 34.7
D = 240 km = 2.2°.
Skagerrack.
Origin time = 10 12 22.
Probably underwater
explosion.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
May 28 Up iP 12 44 12.9
microns sec
M E 0.5 17
M N 0.7 18
M Z 0.9 18
Ki iP 12 44 52.1
eS 12 54 36
microns sec
S N 0.3 10
M E 0.6 15
M N 0.5 17
D = 8400 km = 75½°.
Um iP 12 44 35.7
iS 12 53 54
Ka eP 12 43 51
Atlantic Ocean
(h = 30 km).

" 28 Gb iPg 16 10 43.0
iSg 16 10 44.8
Local blast?

" 28 Up iP 16 28 23.0
Ki iP 16 27 28.2
ipP 16 27 34.7
microns sec
pP Z' 0.2 1.0
Sk iP 16 27 55.0 C
ipP 16 28 01.2
Gb iP 16 28 34.3 C
Um iP 16 27 56.8 C
ipP 16 28 03.0
Ka iP 16 27 46.0
Alaska. h = 25 km (Ki,Sk,Um).

" 28 Um iP 18 47 31.4

" 28 Ki iP 23 41 37.6
Molucca Passage
(h = 100 km).

" 29 Up iPKP 01 26 38.1 D
i 01 26 48.8
Ki iPKP 01 26 19.4
Sk iPKP 01 26 33.9
Um iPKP 01 26 28.6

" 29 Up eP 03 44 54
Ki iP 03 44 01.5
Sk eP 03 44 28
Gb iP 03 45 07.9
Um eP 03 44 36
Ka iP 03 45 20.0
Alaska (h = 15 km).

" 29 Up iP 05 19 01.3
cont.

1964
May 29 Ki iP 05 18 14.7
cont. Sk iP 05 18 50.3
Gb iP 05 19 22.6
Um iP 05 18 35.9
Ka iP 05 19 23.1
e 05 19 40
Kurile Islands
(h = 50 km).

" 29 Up iPKP 09 23 13.9
Ki iPKP 09 23 29.0
iX 09 25 35.2
microns sec
PKP Z' 0.1 1.1
Um iPKP 09 23 21.5
Sandwich Islands
(h = 30 km).
X at Ki is unidentified; it corresponds to X on May 27, 01 15, and is in both cases about 20 sec earlier than the computed PP.

" 29 Up iP 10 27 40.0 C
eS 10 36 03
microns sec
P N 0.3 3
P Z 0.3 3
M E 0.6 17
M N 0.9 18
M Z 0.9 19
Ki iP 10 26 44.9 C
eS 10 34 06
microns sec
P N 0.3 5
P Z 0.5 4
P Z' 0.2 1.5
S E 0.3 7
S N 0.3 7
M E 1.2 18
M N 1.6 22
M Z 2.8 21
D = 5700 km = 51½°.
Sk iP 10 27 11.1 C
Gb iP 10 27 51.5
Um iP 10 27 13.7 C
iS 10 34 58
Ka eP 10 28 00
i 10 28 03.0
Alaska (h = 5 km).
Magn. = 5.6 (Up,Ki).

" 29 Ki iPKP 15 04 35.6
Sandwich Islands
(h = 170 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 May	29	Up	iP	15 15 03.8	C
"	29	Gb	iPg	15 19 16.7	
			iSg	15 19 18.5	
		Local blast?			
"	29	Ki	iPKP	15 51 56.1	
			iSKP	15 55 02.5	
		Sandwich Islands (h = 120 km).			
"	29	Up	iPKP	18 53 27.1	D
				microns	sec
			PKP Z'	0.1	0.5
		Gb	iPKP	18 53 36.2	
			epPKP	18 55 54	
		Um	iPKP	18 53 14.5	
		Ka	iPKP	18 53 36.9	
			ipPKP	18 55 55.1	
			i	18 56 00.6	
		Fiji Islands (h = 610 km).			
"	29	Up	iPKP	19 00 44.7	D
				microns	sec
			PKP Z'	0.2	1.3
		Ki	iSKP	19 03 08.1	
		Um	iSKP	19 03 18.2	
		Fiji Islands (h = 610 km).			
"	29	Up	iPKP	19 20 21.4	
		Ki	iSKP	19 22 45.2	
		Fiji Islands (h = 610 km).			
"	29	Up	iP	21 07 22.4	
		Um	iP	21 07 03.4	
"	30	Up	iP	03 28 18.8	
		Ki	iP	03 27 23.3	
				microns	sec
			P Z'	0.1	1.0
		Sk	iP	03 27 50.1	
		Gb	iP	03 28 30.5	
		Um	iP	03 27 52.3	D
			iS	03 35 48	
		Ka	iP	03 28 42.6	D
		Alaska (h = 15 km).			
"	30	Up	iP	06 10 26.8	C
"	30	Up	iP	06 16 08.8	
"	30	Up	eP	07 19 54	
"	30	Up	iP	14 42 14.2	C
			ePP	14 44 59	
			iS	14 51 39	

cont.

1964 May cont.	30	Up	iPS	14 52 03	
				microns	sec
			P E	0.3	3
			P N	0.5	4
			P Z	1.5	3
			P Z'	0.3	0.5
			PP Z'	0.6	2.0
			S E	0.8	6
			S N	1.5	7
			M E	6.8	18
			M N	10	18
			M Z	9.4	22
			D = 8100 km = 73°.		
		Ki	iP	14 41 35.6	C
			iS	14 50 25	
			iPS	14 50 48	
				microns	sec
			P E	0.7	6
			P N	0.5	6
			P Z	1.8	7
			P Z'	1.3	2.0
			S E	1.1	6
			S N	2.7	8
			M E	18	17
			M N	9.8	17
			M Z	23	18
			D = 7450 km = 67°.		
		Sk	iP	14 42 08.8	C
			iX	14 42 32.7	
		Gb	iP	14 42 35.0	C
			iX	14 42 58.5	
			iPP	14 45 23.6	
		Um	iP	14 41 52.5	C
			iPP	14 44 25	
			iS	14 50 57	
		Ka	eP	14 42 33	C
			iX	14 42 57.6	
		Japan (h = 50 km).			
		Magn. = 6.5 (Up,Ki).			
		The phase marked X exists at all our stations but most clearly at Sk, Gb, Ka. It has the same pulse shape as P and also same phase. X could either be pP, which would mean a focal depth of about 100 km, or P of another shock in the same locality, 24 sec later.			
"	30	Ki	iP	17 30 57.5	
		Sk	eP	17 31 32	
		Um	iP	17 31 16.3	
		Japan (h = 60 km).			
"	30	Ki	iP	17 35 54.7	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
May 30 cont.
Sk iP 17 36 16.6
Mindanao (h = 90 km).

" 30 Up iP 22 45 05.3 C
Ki iP 22 44 11.0 C
microns sec
P Z' 0.1 1.0
Sk iP 22 44 38.0 C
Gb iP 22 45 17.2
ipP 22 45 23.7
Um iP 22 44 39.3
Ka iP 22 45 28.0 C
ipP 22 45 34.6
Alaska. h = 25 km (Gb,Ka).

" 31 Up iP 00 51 37.5 C
iS 01 00 35
iX 01 00 38.5
iP'P' 01 19 46.9
microns sec
P E 3.8 3
P N 7.1 3
P Z 16 3
P Z' 0.8 0.5
S E 18 14
S N 13 14
P'P' Z' 0.1 1.5
M E 34 20
M N 50 20
M Z 57 20
D = 7600 km = $68\frac{1}{2}^{o}$.
Ki iP 00 50 51.6 C
eS 00 59 00
iX 00 59 14.9
eP'P' 01 20 05
microns sec
P E 4.4 7
P N 4.3 8
P Z 13 9
P Z' 3.7 1.0
S E 18 11
S N 7.5 10
M E 41 17
M N 66 20
M Z 100 18
D = 6850 km = $61\frac{1}{2}^{o}$.
Sk iP 00 51 27.6 C
iX 01 00 17.9
iP'P' 01 19 52.3
Gb iP 00 51 58.8 C
eX 01 01 18
Um iP 00 51 11.7 C
iPP 00 53 36
iS 00 59 43
iX 00 59 52.1
e 01 19 24

cont.

1964
May 31 cont.
Um i(P'P') 01 19 44.4
Ka iP 00 51 59.3 C
iX 01 01 20.9
Kurile Islands
(h = 50 km).
Magn. = 7.4 (Up,Ki).
The S-wave spectrum is remarkable for at least two reasons: 1) the phase marked X appears clearly on all Z' records; it is probably an S, but definitely later than the long-period S, indicating a later onset of short-period components of S; 2) S on the long-period records is immediately followed by waves of long period, in the range of 30-60 sec.

" 31 Up iP 01 07 45.1 C
microns sec
P Z' 0.1 0.5
Ki iP 01 07 00.0
microns sec
P Z' 0.1 1.0
Um iP 01 07 20.5 C
Japan (h = 30 km).
Magn. = 5.9 (Up,Ki).

" 31 UPP iSg 07 43 27.4
KiR iPg 07 39 30.2
eSn 07 40 09
iSg 07 40 33.9
D = 520 km = 4.7°.
SKA iSg 07 43 00.7
UME eSn 07 40 48
iSg 07 41 21.8
D = 680 km = 6.1°.
Northwest Russia,
67.3°N, 32.5°E.
Origin time = 07 38 00.
Explosion?

" 31 Up iP 10 35 06.5 C
iPcP 10 35 40.7
microns sec
P Z' 0.1 1.2
Ki iP 10 34 12.9 C
Um iP 10 34 38.3 C
iPcP 10 35 26.9
Ka iP 10 35 30.8
Kamchatka (h = 110 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
May 31 Um iP 10 41 47.2
Dominican Republic
(h = 80 km).

" 31 Up iP 13 29 37.1 C
i 13 29 40.6
Ki iP 13 29 17.1
microns sec
M E 0.4 12
Um iP 13 29 21.9
Ka iP 13 29 51.3
Kansu, China (h = 30 km).

" 31 Up ---
microns sec
M E 1.8 23
M N 1.6 20
M Z 1.6 20
Ki ---
microns sec
M E 2.0 23
M N 1.3 20
M Z 3.5 23
Um iSS 17 53 32
New Hebrides Islands
(h = 70 km).

Markus Båth
April 23, 1965

Seismological Institute
Uppsala

13 epi. 4PP

S E I S M O L O G I C A L B U L L E T I N

U P P S A L A, K I R U N A, S K A L S T U G A N, G Ö T E B O R G, U M E Å and K A R L S K R O N A

Uppsala	(Up):	59°51.5'N,	17°37.6'E;	h = 14 m
Kiruna	(Ki):	67°50.4'N,	20°25.0'E;	h = 390 m
Skalstugan	(Sk):	63°34.8'N,	12°16.8'E;	h = 580 m
Göteborg	(Gb):	57°41.9'N,	11°58.7'E;	h = 66 m
Umeå	(Um):	63°48.9'N,	20°14.2'E;	h = 16 m
Karlskrona	(Ka):	56°09.9'N,	15°35.5'E;	h = 11 m

J U N E 1 - 30, 1964

1964 June	1	Um	e(Sg)	03 23 29	
"	1	Ki	iP	04 46 20.7	C
"	1	Ki	iPKP	06 23 42.4	
		Sk	iPKP	06 23 53.8	
		Um	iPKP	06 23 48.8	
		New Nebrides Islands (h = 180 km).			
"	1	Up	iP	11 26 31.2	C
"	1	Up	iP	11 33 04.7	C
		Ki	iP	11 32 19.3	
		Sk	eP	11 32 54	
		Um	iP	11 32 39.8	
		Ka	iP	11 33 26.9	
		Kurile Islands (h = 30 km).			
"	1	Um	iPKP	13 36 37.8	
		Tonga Islands (h = 40 km).			
"	1	Up	iP	16 15 51.2	C
"	1	Up	iP	18 42 16.3	D
			microns	sec	
			P Z' 0.1	0.6	
		Ki	iP	18 41 31.0	
		Sk	iP	18 42 06.7	D
		Gb	eP	18 42 41	D
		Um	iP	18 41 51.2	D
		Ka	iP	18 42 37.8	
		Japan (h = 30 km).			
		At Um (and perhaps Up) the clear dilatation seems to be preceded by a small compression, whereas at Sk and Gb only the dilatational motion can be seen. Such cases, which are quite frequent, can easily account for so-called "inconsistent" first P-wave motions.			
1964 June	1	cont.			
"	2	Up	iP	14 06 31.8	
"	2	Up	iP	16 19 30.5	
			iS	16 27 38	
			microns	sec	
			P Z' 0.1	1.0	
			D = 6650 km = 60°.		
		Ki	iP	16 18 35.7	
			eS	16 26 11	
			eSa	16 30 50	
			microns	sec	
			P Z' 0.1	1.0	
			S N 0.4	8	
			M E 0.6	17	
			M N 0.7	20	
			M Z 0.7	15	
			D = 5900 km = 53°.		
		Sk	iP	16 19 01.0	
		Um	iP	16 19 03.8	
			iS	16 26 53	
		Ka	eP	16 19 59	
		Alaska (h = 15 km).			
		Magn. = 5.6 (Up,Ki).			
"	2	Up	eP	16 39 48	
			ipP	16 39 52.0	
		Ki	eP	16 38 56	
			i	16 39 20.3	
		Sk	eP	16 39 20	
		Um	iP	16 39 25.9	C
		Alaska. h = 15 km (Up).			
"	2	Up	eP	20 55 44	
		Japan (h = 40 km).			

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
June 2 Ki iPKP 23 31 24.7
ipPKP 23 31 46.4
Um epPKP 23 31 53
New Hebrides Islands.
h = 90 km (Ki).

" 3 Up iP 02 59 26.3 D
microns sec
P Z' 0.2 0.6
Ki iP 02 59 17.6 D
iS 03 07 27
isS 03 08 15
microns sec
P Z' 0.1 1.0
S E 0.4 9
M E 0.6 17
M N 0.7 18
M Z 0.7 17
D = 6700 km = 60½°.
Sk iP 02 59 40.7 D
isP 03 00 21.8
Um iP 02 59 17.3 D
ipP 02 59 45
iS 03 07 22
isS 03 08 07
Ka iP 02 59 35.4 D
Burma. h = 110 km (Ki,Sk,Um).
Magn. = 5.9 (Up,Ki).

" 3 Ki iPg 10 46 00.5
iSg 10 46 36.3
D = 300 km = 2.7°.
This and the following four events are explosions (probably underwater) off the Norwegian coast, N-NNW of Kiruna.

" 3 Ki iPg 10 59 57.5
iSg 11 00 30.9
D = 290 km = 2.6°.

" 3 Ki iPg 11 00 54.9
iSg 11 01 26.7
D = 270 km = 2.4°.

" 3 Ki iPg 12 15 59.0
iSg 12 16 31.3
D = 280 km = 2.5°.

" 3 Ki iPg 12 24 59.0 C
iSg 12 25 30.7
D = 270 km = 2.4°.

" 3 Up iP 14 13 49.3
ipP 14 13 52.5
microns sec
pP Z' 0.1 1.0
Ki iP 14 12 53.4

cont.

1964
June 3 cont. Ki
microns sec
P Z' 0.1 1.5
Sk eP 14 13 18
ipP 14 13 23.6
Gb e(P) 14 14 05
i(pP) 14 14 09.0
Um iP 14 13 21.3
ipP 14 13 25.1
iS 14 21 12
Ka iP 14 14 11.3
ipP 14 14 15.7
Alaska. h = 20 km (Up,Sk, Gb,Um,Ka).

" 3 Um iP 17 56 18.4

" 3 Um iPKS 18 17 00
Tonga Islands (h = 30 km).

" 4 Sk iPKP 00 35 28.2
Um iPKP 00 35 19.0
i 00 35 22.0
Kermadec Islands (h = 30 km).

" 4 Ki iP 01 53 41.1 C
Formosa (h = 30 km).

" 4 Up iP 02 17 21.2

" 4 Up iP 03 04 42.8
iLgl 03 18 06
microns sec
P Z' 0.1 0.5
M E 1.3 17
M N 1.1 18
M Z 1.0 20
Ki iP 03 04 54.3
e 03 17 54
microns sec
M E 0.8 11
M N 0.7 13
M Z 1.1 11
Sk iP 03 05 09.9
Um iP 03 04 42.2 D
iS 03 10 47
iSS 03 13 27
iLgl 03 17 33
Ka iP 03 04 46.9
Hindu Kush (h = 30 km).

" 4 Up ---
microns sec
M E 0.6 21
M N 0.7 22
M Z 1.4 21
Ki iP 04 41 30.9
eS 04 52 04
microns sec
S E 0.7 9

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June 4 cont.

Ki microns sec
S N 0.3 7
M E 0.9 20
M N 0.6 16
M Z 0.8 16
D = 9500 km = 85½°.
Sk iP 04 41 28.4
Um iP 04 41 39.8 C
iS 04 52 13
eScS 04 52 35
Mexico (h = 20 km).

" 4 Sk iPg 10 28 14.6
iSg 10 28 33.7

" 4 Up ---
microns sec
M E 0.8 20
M N 0.8 20
M Z 1.3 20
Ki ePS 11 45 34
microns sec
M E 0.8 19
M N 0.8 20
M Z 1.3 20
New Britain (h = 50 km).

" 4 Up iP 19 47 00.2
Sk iP 19 47 43.9
Um iP 19 47 43.9 D
Greece.

" 5 Up iP 00 17 24.7
iS 00 21 48
iSa 00 22 06
microns sec
M E 0.9 22
M N 1.1 22
M Z 0.7 15
D = 2900 km = 26°.
Ki iP 00 18 08.5
eSa 00 24 10
microns sec
M E 0.8 11
M N 0.6 11
M Z 0.9 11
Sk eP 00 18 02
Um eP 00 17 41
i 00 18 12.2
eS 00 22 23
iSa 00 22 58
Ka iP 00 17 11.4
iPP 00 17 54.6
Turkey (h = 30 km).
The group velocities of Sa are 4.71 km/sec (Up), 4.67 km/sec (Ki), 4.67 km/sec (Um), i.e. somewhat higher than a typical continental

cont.

1964 June 5 cont.

value (see Båth & Lopez Arroyo, Geofis. pura e appl., 56:67-92, 1963).

" 5 Up iPKP 01 22 54.0 C
Kermadec Islands (h = 30 km).

" 5 Up iP 02 44 12.0 C
ipP 02 44 24.2
microns sec
P Z' 0.1 0.6
Ki iP 02 43 59.3 C
microns sec
P Z' 0.1 1.2
Sk iP 02 44 28.0
Um iP 02 43 59.4 C
iPP 02 45 33.5
iLgl 02 58 17
Ka iP 02 44 25.0
Sinkiang, China.
h = 60 km (Up).
Magn. = 5.8 (Up,Ki).

" 5 Up iP 04 11 54.7
Ki iP 04 11 23.3
Sk iP 04 11 52.0
Um iP 04 11 36.8
ipP 04 11 46.6
Bonin Islands.
h = 40 km (Um).

" 5 Ki iP 04 51 07.4
North Atlantic Ocean
(h = 30 km).

" 5 Um iP 08 48 25.9
Kurile Islands (h = 30 km).

" 5 Up iP 10 00 37.7 C
ipP 10 00 42.2
eS 10 08 38
microns sec
pP Z' 0.1 1.1
M E 0.4 20
M N 0.5 18
M Z 0.6 19
D = 6600 km = 59½°.
Ki iP 09 59 42.8 C
eS 10 07 03
microns sec
P Z' 0.2 1.0
S E 0.4 11
S N 0.4 9
M E 0.6 17
M N 0.8 20
M Z 1.4 19
D = 5800 km = 52°.
Sk iP 10 00 09.0 C
ipP 10 00 13.5

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June cont.	5	Um	iP	10 00 11.5	C
			ipP	10 00 16.5	
			i	10 00 33.9	
			iS	10 07 58	
		Ka	iP	10 01 01.3	C
			ipP	10 01 06.5	
		Alaska. h = 20 km (Up,Sk,Um, Ka). Magn. = 5.8 (Ki).			
"	5	Ka	iPg	11 07 16.5	
			iSg	11 07 44.0	
			D = 230 km = 2.1°.		
		Southern Baltic. Probably explosion.			
"	5	Up	iP	13 06 40.0	
			i	13 06 47.7	
			i(Sn)	13 11 38.4	
		Ki	iP	13 07 19.9	
			iPP	13 07 55.0	
		Sk	eP	13 07 18	
			iPP	13 07 51.1	
		Um	iP	13 06 53.1	C
			iLgl	13 14 56	
			i	13 15 10.7	
		Ka	iP	13 06 34.8	
		Caucasus (h = 30 km).			
"	5	Ka	iPg	14 06 20.2	
			iSg	14 06 48.6	
			D = 240 km = 2.2°.		
		Southern Baltic. Probably explosion.			
"	5	Ki	iP	16 23 22.7	
"	5	Sk	e(P)	18 10 42	
			eSg	18 11 05	
"	5	Up	iP	22 17 14.4	C
			ipP	22 17 18.2	
			eS	22 25 33	
			iScS	22 27 05	
			microns	sec	
			P N 0.2	3	
			P Z 0.4	3	
			pP Z' 0.3	1.0	
			M E 0.5	18	
			M N 1.1	21	
			M Z 0.6	19	
			D = 6900 km = 62°.		
		Ki	iP	22 16 19.7	C
			ipP	22 16 23.2	
			eS	22 23 57	
			eScS	22 26 08	
			microns	sec	
			P Z' 0.2	1.0	
			pP Z' 0.4	1.0	
			S N 0.3	8	

cont.

1964 June cont.	5	Ki		microns	sec
			M E 0.6	17	
			M N 0.9	19	
			M Z 1.4	19	
			D = 6050 km = 54½°.		
		Sk	iP	22 16 46.9	C
			ipP	22 16 51.0	
		Um	iP	22 16 48.1	C
			iS	22 24 44	
			iScS	22 26 34	
		Ka	iP	22 17 37.9	C
		Alaska. h = 15 km (Up,Ki, Sk). Magn. = 5.8 (Up,Ki).			
"	6	Up	iP	08 13 25.0	C
			i	08 14 20.3	
			iS	08 19 27.0	
			microns	sec	
			P Z' 0.1	0.5	
			S Z' 0.1	0.5	
		Ki	iP	08 13 31.8	C
		Sk	iP	08 13 49.6	
		Um	iP	08 13 21.3	
			i	08 13 27.4	
		Ka	iP	08 13 30.4	C
			i	08 13 35.1	
		Hindu Kush (h = 170 km).			
"	6	Up	iPP	19 29 24	
			ePKS	19 30 27	
			microns	sec	
			PP N 0.2	3	
			PKS E 0.3	4	
			M E 1.2	25	
			M N 1.4	22	
			M Z 1.7	25	
		Ki	iPKP	19 26 59.5	
			iPKS	19 30 26	
			microns	sec	
			PKP Z' 0.1	1.5	
			PKS E 0.8	7	
			PKS N 0.5	7	
			M E 1.4	19	
			M N 0.8	18	
			M Z 2.0	18	
		Um	iPP	19 29 28	
			iPKS	19 30 30	
			iPPS	19 41 20	
		Easter Island (h = 30 km).			
"	7	Ki	ePn	05 36 36	
			iSn	05 37 23.2	
			iSg	05 37 41.8	
			D = 420 km = 3.8°.		
		Probably northwest Russia. Origin time = 05 35 36. Explosion?			
"	7	Up	iP	15 01 00.7	D

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June cont.	7	Up	ipP	15 01 13.1	
		Ki	iP	15 00 22.5	
			ipP	15 00 34.7	
		Sk	iP	15 00 54.9	
		Gb	eP	15 01 25	
			epP	15 01 36	
		Um	iP	15 00 39.0	
			ipP	15 00 50.5	
		Ka	iP	15 01 19.8	
			ipP	15 01 33.8	
		Japan. h = 50 km (Up,Ki, Gb,Um,Ka).			
"	7	Up	iP	20 41 54.4	
			i	20 41 55.2	
				microns sec	
			P	Z' 0.1 1.0	
			M	E 1.3 23	
			M	N 1.3 21	
			M	Z 1.3 20	
		Ki	iP	20 41 07.6	
			e	20 46 17	
				microns sec	
			M	E 0.9 15	
			M	N 0.8 17	
			M	Z 1.6 16	
		Um	iP	20 41 29.8	
			iPa	20 45 55	
		Kurile Islands (h = 30 km).			
"	8	Up	iPKP	02 45 00.5 D	
		Gb	ePKP	02 45 15	
		Ka	iPKP	02 45 13.8	
		Tonga Islands (h = 550 km).			
"	8	Up	iP	04 33 30.8	
		Ki	iP	04 32 37.7	
		Aleutian Islands (h = 25 km).			
"	8	Ki	iP	16 55 23.2 C	
		Turkey.			
"	8	Ki	iP	18 20 47.5	
"	8	Up	iP	19 11 28.5	
"	8	Up	iP	23 06 11.2	
		Ki	iP	23 05 43.0	
			ipP	23 06 36.2	
		Um	iP	23 05 55.1	
			ipP	23 06 51.3	
		Mariana Islands. h = 220 km (Ki,Um).			
"	9	Ki	---		
			microns sec		
			M	E 0.8 14	
			M	N 0.7 13	
			M	Z 1.1 13	

cont.

1964 June cont.	9	Gb	eP	02 38 37	
		Um	iP	02 39 39.8	
			eS	02 44 32	
			e	02 45 02	
			D = 3300 km = 29½°.		
		Spain (h = 30 km).			
"	9	Ki	eP	09 33 28	
		Um	iP	09 33 56.9	
			ipP	09 34 09.1	
		Alaska. h = 50 km (Um).			
"	9	Up	iPKP	21 26 30.2	
		Um	iPKP	21 26 19.4	
"	10	Up	iPKP	09 13 48.6	
			i	09 13 54.4	
				microns sec	
			PKP	Z' 0.1 0.6	
		Sk	iPKP	09 13 43.0	
		Gb	ePKP	09 13 58	
		Ka	iPKP	09 13 59.1	
"	10	Up	iP	18 05 15.5 C	
				microns sec	
			P	Z' 0.1 1.0	
		Ki	iP	18 05 04.9 C	
				microns sec	
			P	Z' 0.1 1.0	
		Sk	iP	18 05 29.7	
		Um	iP	18 05 04.6	
			i	18 05 10.1	
		Ka	iP	18 05 25.9	
		Tibet (h = 70 km). Magn. = 5.7 (Up,Ki).			
"	10	Ki	iPKP	19 32 48.7	
		Sk	iPKP	19 33 00.2	
		Um	iPKP	19 32 48.6	
			i	19 32 55.5	
		New Hebrides Islands (h = 50 km).			
"	10	Up	iP	20 01 40.5	
		Ki	iP	20 01 38.8	
				microns sec	
			P	Z' 0.1 0.8	
		Sk	iP	20 01 53.0	
		Um	iP	20 01 37.1	
		Java (h = 80 km).			
"	10	Up	iP	22 29 54.3 C	
			ipP	22 30 27.1	
			iPP	22 34 10	
			iSKS	22 40 18	
			iS	22 40 58	
			esS	22 42 14	
				microns sec	
			P	Z' 0.2 1.0	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June 10 Up

		microns	sec	
PP	Z	0.3	4	
SKS	E	1.1	4	
S	E	1.0	5	
S	N	0.4	4	
M	E	1.7	22	
M	N	1.9	23	
M	Z	2.2	17	

(D = 10650 km = 96°).

Ki	iP	22 29 36.3 C
	ipP	22 30 11.3
	ePP	22 33 31
	eSKS	22 39 56
	iS	22 40 22
	esS	22 41 39

		microns	sec	
P	Z	0.8	4	
P	Z'	0.3	1.0	
pP	Z'	0.6	1.1	
SKS	E	3.7	7	
SKS	N	1.0	6	
S	N	0.7	7	
M	E	3.3	21	
M	N	2.6	23	
M	Z	4.9	21	

(D = 10200 km = 92°).

Sk	iP	22 29 58.5 C
	i	22 30 25.3
Gb	eP	22 30 10 C
	ePP	22 34 19
Um	iP	22 29 42.3 C
	i	22 30 04.6
	iPP	22 33 29.2
	iSKS	22 40 06
	isS	22 41 45
Ka	iP	22 30 03.9
	i	22 30 28.6

Taland Islands.
h = 150 km (Up,Ki).
Magn. = 6.4 (Up,Ki).
pP-P from Up and Ki suggest a depth of 135 km, whereas sS-S from the same stations would give 170 km. The long-period records show between S and the fundamental surface waves trains of higher-mode surface waves (or shear-coupled waves), which are of interest considering the path, although they appear as more or less discontinuous patches of wave trains.

" 10 Up iP 23 35 22.7
Ki iP 23 34 26.3

cont.

1964 June 10 cont. Ki

		microns	sec	
M	E	0.4	14	
M	N	0.5	16	
M	Z	0.5	15	

Sk	eP	23 34 56
	i	23 35 36.1
Um	iP	23 34 54.3
Ka	iP	23 35 58.4

Alaska (h = 30 km).

" 11 Ki iP 03 20 24.6

		microns	sec	
P	Z'	0.1	1.5	

Um	eP	03 20 54
Ka	iP	03 21 51.2

Bering Strait (h = 30 km).

" 11 Um iP 04 10 26.3
i 04 12 41.2

" 11 Ki iPKP 11 14 07.5
Sandwich Islands
(h = 30 km).

" 11 Up ePS 17 29 55

		microns	sec	
M	E	1.9	20	
M	N	2.6	21	
M	Z	3.2	20	

Ki	e	17 19 53
	eSKS	17 26 23

		microns	sec	
SKS	E	0.5	8	
M	E	2.9	21	
M	N	1.1	21	
M	Z	3.2	20	

Um	iPP	17 20 22
	iSKS	17 26 35
	iPS	17 29 27
	i(SS)	17 35 30

New Guinea (h = 20 km).
Magn. = 6.1 (Up,Ki).

" 11 Ki iP 17 36 38.2
Alaska (h = 30 km).

" 11 Up iP 18 04 47.4 D
Indian Ocean (h = 30 km).

" 11 Up iP 18 43 24.9 D
Ki iP 18 42 50.0 D
Sk iP 18 43 21.0
Um iP 18 43 04.8 D
Japan (h = 330 km).

" 11 Up iP 19 12 03.7

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June	11	Up	iPKP	21 46 44.0	
		Ki	iPKP	21 46 58.9	C
			ipPKP	21 47 31.2	
				microns sec	
			PKP Z'	0.2 1.0	
		Sk	iPKP	21 46 48.9	
		Um	iPKP	21 46 51.7	
			e	21 59 26	
			iSS	22 05 21	
		Sandwich Islands.			
		h = 130 km (Ki).			
"	11	Up	iP	22 30 09.5	
		Ki	iP	22 29 26.5	
			i(pP)	22 29 30.2	
		Sk	iP	22 29 39.7	C
		Gb	iP	22 30 15.6	C
		Um	iP	22 29 51.9	
		Off northern California			
		(h = 30 km).			
"	12	Up	eP	03 27 31	
"	12	Up	eS	07 55 53	
				microns sec	
			M E	0.3 7	
			M N	0.7 11	
			M Z	0.9 11	
		Ki		---	
				microns sec	
			M E	0.5 8	
			M N	0.3 13	
			M Z	0.3 11	
		Um	iS	07 56 57	
			iLgl	08 00 46	
		Turkey (h = 30 km).			
"	12	Up	ePS	11 18 08	
				microns sec	
			M E	1.1 20	
			M N	2.4 20	
			M Z	3.2 20	
		Ki		---	
				microns sec	
			M E	1.9 20	
			M N	1.7 20	
			M Z	2.5 20	
		Um	iPP	11 08 41	
			iSKS	11 14 51	
			iPS	11 17 39	
			iSS	11 23 44	
		New Guinea (h = 30 km).			
		Magn. = 5.9 (Up,Ki).			
"	12	Up	iP	16 08 54.2	
			i	16 08 56.1	

cont.

1964 June cont.	12	Ki	iP	16 08 37.4	C
			iS	16 18 48	
			epS	16 19 49	
			e	16 20 53	
				microns sec	
			P Z	0.4 6	
			S E	0.3 7	
			M E	0.5 15	
			M N	0.3 16	
			M Z	0.7 15	
		Sk	iP	16 08 59.4	
		Um	iP	16 08 42.2	
			i	16 08 44.1	
			iPP	16 12 10.2	
			iS	16 18 59	
			epS	16 19 54	
			isS	16 20 20	
		Ka	iP	16 09 04.2	
		Philippine Islands.			
		h = 180 km (Ki,Um).			
		Magn. = 5.7 (Ki).			
"	12	Up	iPKP	18 30 42.6	
			i(SKKP)	18 41 34.0	
				microns sec	
			PKP Z'	1.2 0.6	
		Ki	iPKP	18 30 21.1	
			iSKP	18 33 08.0	
				microns sec	
			SKP Z'	0.1 1.2	
		Sk	iPKP	18 30 36.1	
			iSKP	18 33 21.8	
		Gb	ePKP	18 30 46	
			e	18 30 50	
			e	18 30 54	
		Um	iPKP	18 30 29.8	
			i	18 31 50.4	
			iSKP	18 33 17.1	
		Ka	iPKP	18 30 50.3	
			i	18 30 53.6	
			i	18 30 59.6	
		South of Fiji Islands			
		(h = 650 km).			
"	12	Ka	iP	22 22 34.8	C
"	13	Ka	iP	01 24 08.6	
		Alaska (h = 30 km).			
"	13	Up	iP	02 23 35.3	
"	13	Up	eP	03 30 16	
			iLgl	03 37 47	
		Ki	eP	03 30 55	
			i	03 31 28.1	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June 13 cont.

Ki
microns sec
M E 0.3 8
M N 0.2 9
M Z 0.4 10
Um iP 03 30 28.7 C
iLgl 03 38 17
i 03 39 31
Ka iP 03 30 08.3
Caucasus.

" 13 Up iP 04 31 30.9
i 04 31 40.2
microns sec
M E 0.6 22
M N 1.0 20
M Z 0.9 18
Ki iP 04 30 37.4
eS 04 38 29
microns sec
M E 1.1 20
M N 0.8 20
M Z 1.8 21
D = 6350 km = 57°.
Sk eP 04 31 14
Gb eP 04 31 52
e 04 32 00
e 04 32 05
Um iP 04 31 05.2
i 04 31 11.1
eS 04 39 22
Ka iP 04 31 55.3 C
Aleutian Islands (h = 30 km).

" 13 Up eL 06 01
microns sec
M E 0.4 20
M N 0.8 20
M Z 1.0 20
Ki eL 06 01
microns sec
M E 0.6 20
M N 0.5 20
M Z 1.3 20
New Guinea (h = 30 km).

" 13 KIR iPn 07 20 04.3 D
i(Sn) 07 20 59.8
iSg 07 21 14.0
~~D = 460 km = 4.1°.~~
SKA eSn 07 22 55
iSg 07 23 52.4
~~D = 980 km = 8.8°.~~
UME iSn 07 21 44.8
iSg 07 22 24.4
~~D = 690 km = 6.2°.~~
Northwest Russia,

cont.

1964 June 13 cont.

68.1°N, 31.3°E.
Origin time = 07 19 00.
Explosion?

" 13 Up iP 08 35 18.8
iPcP 08 35 36.7
microns sec
M E 1.1 22
M N 1.4 22
M Z 1.4 21
Ki iP 08 35 20.7
i(PcP) 08 35 43.0
microns sec
M E 1.2 18
M N 0.8 19
M Z 2.3 19
Sk eP 08 35 54
Um iP 08 35 15.5
iPcP 08 35 34.2
Ka iP 08 35 23.4
iPcP 08 35 40.5
Andaman Islands (h = 30 km).

" 13 Up iP 08 38 30.1 C
iPcP 08 38 58.0
Ki iP 08 37 42.4
Sk eP 08 38 18
Um iP 08 38 03.5
i(PcP) 08 38 32.0
Kurile Islands (h = 30 km).

" 13 Up iP 08 39 35.9 C
microns sec
P Z' 0.1 0.8
Ki iP 08 38 48.2 C
microns sec
P Z' 0.1 0.8
Sk iP 08 39 24.1
Gb eP 08 39 57 C
Um iP 08 39 10.4 C
Ka iP 08 39 58.4 C
Kurile Islands (h = 30 km).
Magn. = 5.8 (Up,Ki).

" 13 ~~UPP iLgl 10 14 06.2~~
GOT iPg 10 12 05.6
KAS e(P*) 10 12 47
~~iLgl 10 13 42.4~~
Skagerrack, 58 1/4 N, 9 E.
Origin time = 10 11 34.
This is the first in a series of five events on June 13, probably underwater explosions. The agreement between the readings is not quite

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June 13 cont. satisfactory. At Gb the largest amplitudes are to be found in Pg.

" 13 Up i 10 44 17.8
iLgl 10 44 21.6
SKA ePg 10 43 31
~~eLgl 10 44 34~~
GOT iPg 10 42 20.7
~~iLgl 10 42 43.8~~
Ka iLgl 10 43 56.8
Skagerrack, 58 1/4°N, 9°E.
Origin time = 10 41 49.

" 13 Up e 11 17 27
iLgl 11 17 35.7
GOT iPg 11 15 33.6
~~iLgl 11 15 55.1~~
KAS e(P*) 11 16 16
eLgl 11 17 09
Skagerrack, 58 1/4°N, 9°E.
Origin time = 11 15 02.

" 13 Up iPKP 11 34 00.4
i 11 34 06.0
Gb ePKP 11 34 10
Ka iPKP 11 34 09.9
Kermadec Islands (h = 30 km).

" 13 Up iLgl 13 11 29.8
GOT iPg 13 09 35.1
iLgl 13 09 56.4
Um iLgl 13 13 12.6
Ka iLgl 13 11 13.2
Skagerrack, 58 1/4°N, 9°E.
Origin time = 13 09 02.

" 13 Sk ePP 14 20 29
Um iPP 14 20 09.0
Solomon Islands
(h = 470 km).

" 13 Up e 14 30 33
iLgl 14 30 39.1
GOT iPg 14 28 36.9
Ka iLgl 14 30 14.9
Skagerrack, 58 1/4°N, 9°E.
Origin time = 14 28 06.

" Up iP 17 46 22.5
i 17 46 27.7
ipP 17 46 39.6
microns sec
P Z' 0.1 0.6
pP Z' 0.2 0.7
Ki eP 17 46 18

cont.

1964 June 13 cont.

Ki i 17 46 20.8
ipP 17 46 34.8
microns sec
pP Z' 0.1 1.3
Sk eP 17 46 41
ipP 17 46 56.1
Gb eP 17 46 45
ipP 17 46 59.4
Um iP 17 46 16.2
ipP 17 46 32.5
eS 17 54 35
Ka iP 17 46 31.7
i 17 46 36.0
ipP 17 46 48.1
Burma. h = 60 km (Up,Ki, Sk,Gb,Um,Ka).
Complicated P phases on Z'. The phase interpreted as pP has an amplitude which is 2-7 times the P amplitude on Z'.

" 13 Up iP 20 53 12.7 D
Ki iP 20 52 24.8 D
Sk eP 20 53 01
Um iP 20 52 46.6
Kurile Islands (h = 50 km).

" 13 Up ePKP 22 51 20
microns sec
M N 0.9 23
M Z 0.7 21
Ki ---
microns sec
M E 0.3 18
M N 1.0 22
M Z 1.4 19
Sk ePKP 22 51 14
Gb ePKP 22 51 32
Um ePKP 22 51 09
i 22 51 21.4
iSS 23 12 55
Ka iPKP 22 51 31.8
Kermadec Islands
(h = 90 km).

" 13 Up iP 23 33 07.0
Um iP 23 32 42.2
Alaska (h = 30 km).

" 14 Up eP 01 07 43
Ki iP 01 06 55.7
Um iP 01 07 18.1
Kurile Islands (h = 40 km).

" 14 Up iPKP 01 39 31.5
Kermadec Islands (h = 30 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June	14	Up	iP	09 14 14.0	
"	14	Up	iP	12 21 01.5	D
			iS	12 25 28	
			i	12 25 33	
				microns	sec
			P E	0.6	4
			P N	1.4	6
			P Z	2.2	7
			P Z'	0.2	0.6
			S E	6.6	8
			S N	8.7	8
			M E	5.1	17
			M N	7.5	17
			M Z	5.7	15
			D = 2850 km = 25½°.		
		Ki	iP	12 21 55.4	D
			iS	12 27 02	
			iSa	12 27 55	
			i	12 29 32	
				microns	sec
			P N	0.4	4
			P Z	0.4	7
			P Z'	0.2	1.0
			S E	3.4	8
			M E	11	17
			M N	6.8	15
			M Z	9.4	15
			D = 3500 km = 31½°.		
		Sk	iP	12 21 41.3	D
		Gb	iP	12 21 08.0	D
		Um	iP	12 21 23.9	
			i	12 21 59.2	
			i	12 25 51	
			iS	12 26 03	
			iSn	12 26 49.4	
		Ka	iP	12 20 43.8	
		Turkey (h = 10 km).			
		Magn. = 5.8 (Up,Ki).			
		Well developed higher-mode surface waves.			
"	14	Up	iP	12 43 29.5	
			i	12 43 32.7	
		Ki	iP	12 44 23.8	
			i	12 44 41.8	
		Ka	iP	12 43 11.7	
		Turkey (h = 30 km).			
"	14	Up	iP	16 33 02.8	
			i	16 33 26.7	
"	14	Up	iP	16 47 02.9	
"	14	Ki	iP	17 29 53.1	
		Alaska (h = 30 km).			

1964 June	15	Ki	iPKP	00 15 31.7	C
		Sandwich Islands (h = 30 km).			
"	15	Up	iP	00 17 38.6	
			eS	00 27 35	
				microns	sec
			P Z	0.7	7
			P Z'	0.1	1.0
			S E	0.4	8
			S N	0.6	10
			M E	6.1	20
			M N	11	19
			M Z	7.5	21
			D = 8900 km = 80°.		
		Ki	iP	00 17 37.9	
			ePa	00 23 54	
			iS	00 27 40	
				microns	sec
			P E	0.7	7
			P N	0.2	7
			P Z	1.4	8
			P Z'	0.2	1.5
			S E	1.7	13
			S N	0.9	11
			M E	18	22
			M N	11	21
			M Z	23	23
			D = 8900 km = 80°.		
		Sk	eP	00 17 54	
		Gb	eP	00 17 53	
			i	00 19 19.6	
		Um	iP	00 17 32.2	C
			i	00 17 52	
			iS	00 27 30	
		Ka	iP	00 17 43.9	
			i	00 18 12.5	
		Sumatra (h = 30 km).			
		Magn. = 6.0 (Up,Ki).			
"	15	Ki	iP	01 19 12.1	
			i	01 20 35.8	
		Indonesia.			
"	15	Up	iP	04 31 00.0	
"	15	Ki	iP	09 37 35.1	
		Alaska (h = 30 km).			
"	15	Up	iP	11 04 13.8	
		Ki	iP	11 03 33.9	C
				microns	sec
			P Z'	0.1	1.0
			M E	0.4	14
			M N	0.3	13
			M Z	0.4	13
		Sk	iP	11 04 08.4	C

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
June 15 Um iP 11 03 49.6
cont. i 11 03 51.4
Sea of Japan (h = 15 km).

" 15 Um iP 13 56 02.6

" 15 KIR eSn 16 55 19
eSg 16 56 04
SKA iPn 16 52 49.1
i(Pg) 16 53 10.7
iSn 16 53 31.7
iSg 16 53 55.3
UME iSn 16 54 49.2
iSg 16 55 34.7
Atlantic Ocean, off coast of Norway, 64°N, 4°E.
Origin time = 16 51 45.
Agreement between data not quite satisfactory.

" 15 Up iP 19 24 49.3

" 16 Up iP 04 12 55.7 C
i1 04 12 57.9
i2 04 13 02
iPcP 04 13 16.5
iPP 04 15 38
iPcP 04 17 24
iPa 04 17 58
iS 04 22 10
iPS 04 22 22
iScS 04 22 57

		microns	sec
P	E	2.9	4
P	N	3.2	3
P	Z	6.1	3
P	Z'	0.9	0.8
PP	E	3.0	9
PP	N	6.5	9
S	E	76	20
M	E	160	18
M	N	370	20
M	Z	270	17

D = 7850 km = 70½°.

Ki iP 04 12 16.1
i1 04 12 17.9
i2 04 12 21.1
i 04 12 30.2
i 04 14 06
iPP 04 14 53.1
iPa 04 16 23
iS 04 21 01
iPS 04 21 29
iP'P' 04 41 05.6
i 04 41 24.8

		microns	sec
P	E	4.7	6

cont.

1964
June 16 Ki

		microns	sec
P	N	5.8	9
P	Z	19	9
P	Z'	1.0	1.5
PP	Z'	2.5	1.5
S	E	61	12
S	N	8.5	9
P'P'	Z'	0.7	2.0
M	E	190	15
M	N	260	14
M	Z	280	15

D = 7150 km = 64½°.

Sk iP 04 12 50.4
i2 04 12 55.2
iPcP 04 13 09.6
iPcS 04 17 15.4
i(PS) 04 22 14.1
iP'P' 04 41 03.4
i 04 41 13.6
Gb iP 04 13 17.6
i2 04 13 21.7
i 04 15 49.3
i 04 23 04.3
Um iP 04 12 33.4 C
i1 04 12 35.4
iP'P' 04 41 01.7
Ka iP 04 13 17.3 C
iPP 04 16 13.9
Japan (h = 60 km).
Magn. = 7.4 (Up,Ki).
The P waves are complicated with several onsets with successively increasing amplitudes; corresponding phases at the different stations have been marked with 1 and 2 above.
Pa has a remarkably long period, about 24 sec (Up,Ki).

" 16 Up iP 04 25 52.1 C
Um iP 04 25 30.1
Japan.
Origin time = 04 14 40.

Approximate origin times of aftershocks are given only in case USCGS has no report.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June 16 Up iP 04 28 53.6 C
microns sec
P Z' 0.1 0.9
Ki iP 04 28 14.0 C
microns sec
P Z' 0.1 1.0
Sk iP 04 28 47.8 C
Gb iP 04 29 14.0
Um iP 04 28 30.7 C
Ka iP 04 29 13.9 C
Japan (h = 15 km).
Magn. = 5.7 (Up,Ki).

" 16 Ki iP 04 34 20.0
Japan. Origin time =
04 23 48.

" 16 Up iP 04 43 07.1
Sk iP 04 43 01.7
Japan. Origin time =
04 31 55.

" 16 Up eP 04 46 44
Ki iP 04 46 08.7
Japan (h = 30 km).

" 16 Um iP 04 47 16.5
Japan. Origin time =
04 36 28.

" 16 Up iP 04 52 01.0
Um eP 04 51 39
Japan (h = 30 km).

" 16 Up iP 04 57 50.2
Ki iP 04 57 10.1
Japan (h = 30 km).

" 16 Up iP 05 01 49.9
i 05 01 54.9
Japan (h = 30 km).

" 16 Up iP 05 04 25.9
Um iP 05 04 03.4 D
Japan (h = 20 km).

" 16 Um iP 05 06 41.3
Japan (h = 20 km).

" 16 Ki iP 05 09 20.1
Japan (h = 30 km).

" 16 Ka iP 05 13 01.3 C

" 16 Um iP 05 22 24.9
Japan (h = 30 km).

1964 June 16 Up iP 05 33 25.7
Ki iP 05 32 45.9
Um iP 05 33 03.1 C
Japan (h = 15 km).

" 16 Up iP 05 46 53.4
microns sec
P Z' 0.1 0.5

" 16 Ki iP 05 48 05.5

" 16 Up iP 05 50 37.0
Um iP 05 50 14.7 D
Japan (h = 40 km).

" 16 Up iP 05 57 52.4
Ki iP 05 57 12.6 C
Um iP 05 57 30.2
Japan (h = 30 km).

" 16 Up iP 06 28 23.6
Ki iP 06 27 44.2
Um iP 06 28 00.9
Japan (h = 30 km).

" 16 Up iP 07 04 21.4
iS 07 13 26
microns sec
P Z' 0.4 1.5
M E 8.1 16
M N 5.7 16
M Z 8.6 16
D = 7900 km = 71°.
Ki iP 07 03 41.8
iS 07 12 18
microns sec
P Z 1.1 5
P Z' 0.1 1.1
S E 1.6 6
S N 0.9 8
M E 15 15
M N 8.9 15
M Z 21 16
D = 7150 km = 64 1/2°.
Sk iP 07 04 14.2
Gb iP 07 04 39.1
Um iP 07 03 57.8
Ka eP 07 04 41
Japan (h = 15 km).
Magn. = 6.2 (Up,Ki).

" 16 Up iP 07 20 15.9 C
Ki iP 07 19 35.9
Sk eP 07 20 10
Um iP 07 19 53.7
Japan (h = 30 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June	16	Up	iP	07 26 14.4 C	
				microns sec	
			P	Z' 0.3 0.8	
		Ki	iP	07 25 34.5 C	
				microns sec	
			P	Z' 0.3 1.0	
		Sk	iP	07 26 08.4	
		Gb	iP	07 26 33.3	
		Um	iP	07 25 51.9 C	
		Ka	iP	07 26 35.2	
		Japan (h = 15 km).			
		Magn. = 6.3 (Up,Ki).			
		This is the largest aftershock in this sequence; the magnitude difference $M-M_1$ = 7.4 - 6.3 = 1.1 is in good agreement with the so-called Båth's law (see Richter: Elementary Seismology, p. 69).			
"	16	Up	iP	07 28 34.9	
		Sk	iP	07 28 29.0	
		Um	iP	07 28 12.5	
		Ka	eP	07 28 53	
		Japan (h = 20 km).			
"	16	Ki	eP	08 25 51	
		Japan (h = 15 km).			
"	16	Ki	eP	10 32 37	
		Alaska (h = 40 km).			
"	16	Up		---	
				microns sec	
			M	E 0.7 19	
			M	N 1.0 20	
			M	Z 1.3 20	
		Ki	ePS	11 43 52	
				microns sec	
			M	E 1.1 20	
			M	N 0.9 23	
			M	Z 1.6 20	
		New Guinea (h = 15 km).			
"	16	Up	iP	22 33 36.0	
"	17	Up	iP	02 20 41.2	
"	17	Up	iP	06 50 38.7	
		Um	iP	06 50 20.3	
"	17	Up	eP	13 41 42	
		Rumania (h = 150 km).			
"	17	Up	iP	15 21 58.5	

cont.

1964 June cont.	17	Ki	iP	15 21 17.2	
		Um	iP	15 21 36.0	
		Japan (h = 25 km).			
"	18	Up	iP	18 12 40.4 C	
			ipP	18 12 52.4	
			eS	18 21 34	
				microns sec	
			P	Z' 0.2 1.0	
			M	E 1.3 17	
			M	N 2.2 16	
			M	Z 2.7 17	
			D = 7450 km = 67°.		
		Ki	iP	18 11 51.4	
			eS	18 20 06	
				microns sec	
			P	Z' 0.1 1.0	
			S	E 0.9 12	
			M	E 3.1 18	
			M	N 20 17	
			M	Z 3.2 17	
			D = 6650 km = 60°.		
		Sk	iP	18 12 27.6	
		Gb	eP	18 13 00	
			epP	18 13 12	
		Um	iP	18 12 14.5 C	
			ipP	18 12 25.4	
			ePa	18 16 25	
			iS	18 20 49	
		Ka	iP	18 13 04.0	
			ipP	18 13 13.5	
		Kurile Islands. h = 40 km (Up,Gb,Um,Ka).			
		Magn. = 5.9 (Up,Ki).			
"	18	Ki	iP	20 54 25.5 D	
"	19	Up	iP	00 55 11.3	
			i	00 55 13.7	
			iS	00 59 03.3	
			D = 2400 km = 21 1/2°.		
		Ki	iP	00 56 16.5	
			iPP	00 57 13.9	
			eLg2	01 05 58	
				microns sec	
			P	Z' 0.1 1.0	
			M	E 0.8 13	
			M	N 0.6 14	
			M	Z 0.7 15	
			D = 3150 km = 28 1/2°.		
		Sk	iP	00 55 55.8	
		Gb	eP	00 55 19	
			e	00 55 22	
			eS	00 59 19	
		Um	iP	00 55 40.1	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June cont.	19	Um	eS	01 00 02
		Ka	iP	00 54 42.8
			iPP	00 55 04.4
			eS	00 58 11
		Turkey (h = 30 km).		
"	19	Up	iP	03 17 28.2 D
			i	03 17 31.4
"	19	Up	iP	07 15 23.0 C
			i	07 15 26.4
"	19	Up	iP	10 16 49.8 C
			microns	sec
			P Z' 0.1	1.0
		Ki	eP	10 16 09 C
			microns	sec
			P Z' 0.1	1.0
			M E 1.1	15
			M N 1.0	15
			M Z 1.1	15
		Sk	iP	10 16 44.3
		Gb	eP	10 17 15
		Um	iP	10 16 27.3 C
			iS	10 25 16
			eSS	10 29 40
		Japan (h = 30 km).		
		Magn. = 5.7 (Up,Ki).		
"	19	Up	iP	10 46 25.5
			i	10 46 30.4
			eS	10 56 10
			microns	sec
			P Z' 0.2	1.4
			S E 0.4	8
			M E 1.0	13
			M N 1.2	15
			M Z 1.8	14
			D = 8550 km = 77°.	
		Ki	eP	10 46 01
			eS	10 55 29
			microns	sec
			S E 0.7	8
			M E 1.9	14
			M N 1.1	12
			M Z 2.3	12
			D = 8100 km = 73°.	
		Sk	eP	10 46 32
		Gb	iP	10 46 50.4
		Um	iP	10 46 12.7
			iS	10 55 36
		Formosa (h = 30 km).		
		Magn. = 5.7 (Up,Ki).		
"	19	Gb	iP	11 52 27.6 C
1964 June	19	Um	iP	21 18 13.9
		Japan (h = 30 km).		
"	20	Ki	iP	11 01 58.4
"	20	Um	iP	11 45 18.9
		Japan (h = 30 km).		
"	20	Up	iP	11 48 29.4
"	20	Up	iP	11 52 34.9
"	20	Up	iP	17 10 19.7 C
		Ki	iP	17 09 38.3 C
		Um	iP	17 09 56.3 C
			i	17 10 10.7
		Japan (h = 40 km).		
"	21	Up	iP	01 43 45.3 C
			i	01 43 47.1
			microns	sec
			P Z' 0.1	0.5
			M E 0.6	22
			M N 1.2	23
			M Z 1.0	20
		Ki	iP	01 42 53.8
			i	01 42 55.2
			microns	sec
			M E 1.0	21
			M N 0.7	21
			M Z 1.2	22
		Sk	iP	01 43 30.5
		Gb	eP	01 44 10
			e	01 44 11
			ePcP	01 44 35
		Um	eP	01 43 18 C
			i	01 43 55.9
			iPcP	01 44 04.7
			iPa	01 47 05
			i	01 47 24
		Ka	iP	01 44 09.2
		Kamchatka (h = 50 km).		
"	21	Up	iPKP	03 51 57.4 C
			i	03 52 03.5
		Sk	iPKP	03 51 51.5
		Um	iPKP	03 51 46.3 D
"	22	Ki	e	00 38 35
			eSS	00 54 46
			microns	sec
			M E 0.6	18
			M N 0.7	18
			M Z 1.0	18
		Um	ePP	00 37 54
			iPKS	00 38 59
		Samoa Islands (h = 30 km).		

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964					
June	22	Up	iP	02 32 00.2	
		Ki	iP	02 31 22.0	
		Sk	iP	02 31 54.8	
		Gb	eP	02 32 22	
		Um	iP	02 31 39.2	C
			ipP	02 31 53.4	
		Japan. h = 60 km (Um).			
"	22	Up	---		
			microns	sec	
			M E	0.7 19	
			M N	1.4 23	
			M Z	2.0 24	
		Ki	ePS	03 33 11	
			microns	sec	
			M E	2.3 22	
			M N	1.7 20	
			M Z	2.8 21	
		Sk	ePKP	03 22 24	
		Um	ePKP	03 22 18	
			ePP	03 23 51	
			iSKS	03 29 09	
			iSKKS	03 30 37	
			ePS	03 33 19	
		Solomon Islands (h = 70 km).			
"	22	Sk	iP	04 38 55.3	
"	22	Up	iP	07 23 29.0	
"	22	Gb	ePKP	08 01 34	
		Fiji Islands (h = 80 km).			
"	22	Ka	iPKP	08 40 46.5	
		Chile (h = 30 km).			
"	22	Up	iPKP	13 59 18.7	C
			microns	sec	
			PKP Z'	0.1 1.0	
		Gb	iPKP	13 59 27.4	C
			i	13 59 32.7	
		Um	iSKP	14 02 31.8	
		Ka	iPKP	13 59 30.6	
		Fiji Islands (h = 120 km).			
"	22	Sk	iPKP	14 36 21.0	
		Um	iPKP	14 36 16.3	
		Santa Cruz Islands (h = 140 km).			
"	22	Ka	iP	16 18 37.0	
"	22	Um	iP	19 20 51.8	
		Hindu Kush (h = 210 km).			

1964					
June	22	Up	iP	21 36 02.1	
			ipP	21 36 15.3	
			microns	sec	
			P Z'	0.2 0.6	
			pP Z'	0.2 0.6	
		Ki	iP	21 35 44.1	C
			ipP	21 35 57.9	
			microns	sec	
			pP Z'	0.1 0.9	
			M E	0.9 22	
			M N	0.5 16	
			M Z	1.8 21	
		Sk	iP	21 36 07.4	
			ipP	21 36 20.9	
		Gb	eP	21 36 20	
			epP	21 36 33	
		Um	iP	21 35 50.5	
			ipP	21 36 03.7	
			iS	21 45 57	
		Luzon. h = 50 km (Up,Ki,Sk, Gb,Um).			
"	22	Ki	eP	22 14 12	
		Hindu Kush.			
"	23	Up	iP	01 37 34.7	C
			iPa	01 41 53	
			iS	01 46 30	
			iScS	01 47 24	
			iP'P'	02 05 43.8	
			microns	sec	
			P E	3.2 3	
			P N	8.3 3	
			P Z	17 3	
			P Z'	0.8 0.5	
			S E	3.5 4	
			S N	6.4 3	
			P'P' Z'	0.9 2.5	
			M E	2.3 18	
			M N	40 25	
			M Z	37 18	
			D = 7650 km = 69°.		
		Ki	iP	01 36 49.1	C
			iS	01 45 06	
			isS	01 45 31	
			iP'P'	02 06 08.5	
			microns	sec	
			P E	4.7 6	
			P N	4.6 6	
			P Z	13 6	
			P Z'	4.6 1.0	
			S E	21 11	
			S N	3.4 9	
			P'P' Z'	0.7 2.5	
			M E	53 20	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June 23 cont.

Ki microns sec
M N 35 18
M Z 110 22
D = 6900 km = 62°.

Sk	iP	01 37 24.9	C
	i	01 44 59.3	
	iS	01 46 15.1	
	eP'P'	02 05 44	
Gb	eP	01 38 00	C
	eS	01 47 16	
Um	iP	01 37 09.6	C
	i	01 45 14	
	eS	01 45 38	
	e	02 05 40	
	iP'P'	02 05 56.1	
Ka	iP	01 37 55.8	C
	iS	01 47 10.2	

Kurile Islands (h = 80 km).
Magn. = 7.6 (Up,Ki).
On the long-period records, S initiates a wave train with periods about 40 sec and lasting 3-4 min.

" 23

Sk	iP	02 14 15.3	
Um	iP	02 14 01.7	

Kurile Islands.
Origin time = 02 03 28.

" 23

Ki	iP	02 29 04.5	
Sk	iP	02 29 34.8	
Gb	eP	02 30 18	
Um	iP	02 29 32.3	

Unimak Island (h = 30 km).

" 23

Up	iP	04 43 39.9	D
Ki	iP	04 43 39.7	
Sk	iP	04 43 56.4	
Um	iP	04 43 36.1	D

Andaman Sea (h = 30 km).

" 23

Up	iP	05 36 21.8	D
Ki	iP	05 35 27.1	
Sk	iP	05 35 57.9	
Gb	eP	05 36 38	D
Um	iP	05 35 55.3	
	i(pP)	05 36 06.9	
	i	05 37 13.9	
Ka	iP	05 36 44.5	

Unimak Island (h = 60 km).

" 23

Sk	iP	06 43 21.2	
Um	iP	06 43 24.7	

Adriatic Sea.

1964 June

23 Ki iP 08 51 56.3
Alaska (h = 30 km).

" 23

~~Up~~ PP	eSn	11 22 31	
	~~iLgl~~	~~11 22 48.6~~	
~~Sk~~	~~eLgl~~	~~11 24 33~~	
~~Um~~ E	~~iLgl~~	~~11 23 14.0~~	
	iSg	11 23 21.9	
	e	11 23 53	

Gulf of Finland, 60°N, 25°E.
Origin time = 11 20 55.
Probably underwater explosion.

" 23

Ki	iP	19 23 23.6	
Sk	eP	19 23 40	
Um	eP	19 23 29	

Talaud Islands (h = 30 km).

" 24 Um iP 05 30 41.0

" 24

Up	~~iLgl~~	~~12 21 32.9~~	
~~Sk~~	iLgl	12 22 39.9	
GOT	iPg	12 19 33.2	
	iSg	12 19 39.3	
	~~iT~~	~~12 19 56.6~~	
	~~D = 50 km = 0.5°.~~		
Ka S	ePg	12 20 13	
	iSg	12 20 46.5	
	D = 290 km = 2.6°.		

Kattegatt, off west coast of Sweden, 57.3°N, 11.4°E.
Origin time = 12 19 22.
Underwater explosion?
The T-phase at Gb is of remarkable strength and this is the first time such a phase has been observed at Gb.

" 24 Up

---
microns sec

M	E	0.9	19
M	Z	1.0	21

Ki

---
microns sec

M	E	0.6	16
M	N	0.4	15
M	Z	0.8	14

Um e 13 21 06

" 24 Up iP 14 33 35.5

" 24

KIR	iPn	17 05 47.7	C
	iSn	17 06 36.5	
	iSg	17 06 51.6	
	D = 420 km = 3.8°.		

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June cont.

24 SKA eSg 17 09 35
UME iSn 17 07 44.2
eSg 17 08 20
Northwest Russia, 68.8°N, 30.3°E. Origin time = 17 04 47. Explosion?

" 24 Ki eP 23 54 04
i 23 54 06

" 25 Ki iP 11 32 11.0
microns sec
P Z' 0.1 1.0
Um iP 11 32 39.8
Alaska (h = 70 km).

" 25 UPP iSg 13 50 14.5
KIR e ~~13 50 16~~
iSg 13 50 48.0
SKA iSg 13 51 23.8
UME eS* 13 49 20
iSg ~~13 49 34.0~~
Lake Ladoga, USSR, 61.6°N, 30.8°E. Origin time = 13 46 37. Explosion?

" 26 Ki iPKP 01 51 49.7
Sandwich Islands (h = 60 km).

" 26 Ki iP 04 56 32.9
Sk iP 04 57 06.8
Um iP 04 56 50.1
Japan (h = 20 km).

" 26 Ki eSn 05 23 16
eSg 05 23 35
Possibly northwest Russia.

" 26 Ki iP 05 37 39.7
Alaska (h = 30 km).

" 26 UPP iSn 07 13 24.1
i 07 13 31.1
iSg 07 14 06.2
~~D = 830 km = 7.5°.~~
KIR ePn 07 10 44
iPg 07 10 47.8
iSn 07 11 16.0
iSg 07 11 23.5
~~D = 280 km = 2.5°.~~
SKA iPg 07 11 10.9 C
iSg 07 12 02.9
~~D = 410 km = 3.7°.~~
UME iPn 07 11 08.9
iP* 07 11 13.9

cont.

1964 June cont.

26 UME i 07 11 48.9
iSn 07 12 00.0
iSg 07 12 16.8
D = 480 km = 4.3°.
Coast of Norway, near Bodö, 67.4°N, 14.2°E.
Origin time = 07 10 00.
This solution, based only on our station data, is in good agreement with Norwegian and Finnish data (only with a slight revision of their phase interpretation).

" 26 Up iLgl 07 39 11.5
KLS ePg 07 37 00
iSg 07 37 11.4
D = 100 km = 0.9°.
South Baltic, 55.3°N, 15.5°E.
Origin time = 07 36 42.
Explosion?
Solution obtained by combination with readings at Kongsberg. It is remarkable that in this and some other similar cases (e.g. June 23, 11 20, June 24, 12 19 and the series of five explosions on June 13) the largest amplitudes at greater distances are to be found in Lgl.

" 26 Sk iPKP 13 28 19.6
Um iPKP 13 28 15.4
New Hebrides Islands
(h = 650 km).

" 26 Ki iPKP 13 51 32.1
Solomon Islands (h = 15 km).

" 27 Up iP 02 36 41.0
ipP 02 36 48.0
iSa 02 45 32
iLgl 02 50 34
microns sec
P Z' 0.1 1.5
pP Z' 0.2 1.4
M E 1.4 18
M Z 2.0 16
Ki iP 02 36 38.0
ipP 02 36 46.0
e 02 47 52
eLgl 02 50 44
microns sec
pP Z' 0.1 0.8
M E 2.5 17

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June 27 cont.

Ki			microns	sec
	M	N	1.0	15
	M	Z	2.8	16
Sk	iP		02 37 09.2	
Gb	eP		02 37 06	
Um	iP		02 36 32.6	C
	i(pP)		02 36 43.5	
	ePP		02 38 07	
	eS		02 42 46	
	iLgl		02 49 54	
Ka	iP		02 36 57.4	

Sinkiang, China.
h = 30 km (Up,Ki,Um).
Magn. = 5.5 (Up,Ki).

" 27 Um iP 09 02 52.2
Honduras (h = 30 km).

" 27 Ka iPKP 12 02 43.3
Tonga Islands (h = 600 km).

" 27

Up	eP		16 55 38	
Ki	iP		16 56 16.8	C
		microns	sec	
	M	E	0.9	20
	M	N	1.2	22
Um	iS		17 05 54	
Ka	iP		16 55 22.2	

Ascension Island (h = 30 km).

" 27 Up iP 19 44 37.1

" 27 Um iP 22 06 09.0
Kurile Islands (h = 30 km).

" 28

Ki	ePg		04 37 45	
	iSg		04 38 11.9	
Um	iSn		04 38 43.2	
	iSg		04 39 02.8	

Probably northern Finland.

" 28

Up	iP		11 20 56.6	
	i		11 21 00.6	
Ki	iP		11 21 57.7	
		microns	sec	
	P	Z'	0.1	1.0
Sk	iP		11 21 36.5	
Gb	iP		11 20 54.5	
Um	iP		11 21 24.0	
Ka	iP		11 20 30.9	

Cyprus (h = 80 km).

" 28

Up	---			
		microns	sec	
	M	E	2.2	19

cont.

1964 June 28 cont.

Up			microns	sec
	M	N	5.3	20
	M	Z	4.3	19
Ki	eSKS		13 16 23	
		microns	sec	
	M	E	5.4	22
	M	N	2.3	17
	M	Z	7.0	20
Um	iPP		13 10 30	
	iSKS		13 16 37	
	ePS		13 19 41	
	iPPS		13 20 49	
	iSS		13 25 36	

New Ireland (h = 5 km).
Magn. = 6.3 (Up,Ki).

" 28

Up	iPKP		15 10 49.8	
	iSKP		15 13 56.3	
		microns	sec	
	PKP	Z'	0.1	0.5
Ki	iPKP		15 10 36.0	
		microns	sec	
	PKP	Z'	0.1	1.0
Sk	iPKP		15 10 46.2	
Gb	iPKP		15 10 59.6	
Um	iPKP		15 10 41.9	
Ka	iPKP		15 10 56.5	
	iSKP		15 14 04.8	

New Hebrides Islands
(h = 220 km).

" 28 Gb eP 15 18 28

" 28

Up	iP		15 28 53.3	
		microns	sec	
	P	Z'	0.1	0.5
Ki	eP		15 29 45	
Um	eP		15 29 23	

Southwest of Portugal
(h = 30 km).

" 28

Up	iP		17 18 08.5	
Ki	iP		17 18 36.5	

North Atlantic Ocean
(h = 30 km).

" 28

Up	iP		17 38 53.0	
		microns	sec	
	P	Z'	0.1	1.0
	M	E	0.8	17
	M	N	1.1	21
	M	Z	1.6	17
Ki	iP		17 39 33.6	
		microns	sec	
	P	Z'	0.2	1.5

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 June 28 cont.

Ki — microns sec
M E 2.5 23
M N 1.8 23
M Z 1.1 19
Gb eP 17 38 37
Um iP 17 39 13.5
Ka iP 17 38 34.0
ipP 17 38 40.7
North Atlantic Ocean.
h = 25 km (Ka).
Magn. = 5.7 (Up,Ki).

" 28 Up iP 18 33 38.4 C
Ki iP 18 32 45.6 C
Sk iP 18 33 13.7
Um iP 18 33 12.5
ipP 18 33 24.8
Unimak Island.
h = 50 km (Um).

" 28 Up iP 19 19 23.3
Ki iP 19 18 28.2
ipP 19 18 35.5
microns sec
Pm Z' 0.1 1.0
M N 0.6 15
Sk iP 19 18 55.0
Gb iP 19 19 34.7
Um iP 19 18 56.7
ipP 19 19 04.0
Ka iP 19 19 46.2
Alaska. h = 30 km (Ki,Um).

" 28 Up iP 19 43 26.9 D

" 29 Up ePKP 00 05 21
Um iPKP 00 05 08.6 C
Kermadec Islands (h = 30 km).

" 29 Up iP 07 31 20.0
i 07 31 55.8
microns sec
P Z' 0.1 0.6
Ki iP 07 30 23.0
microns sec
P Z' 0.1 1.0
Sk iP 07 30 51.0 C
Gb iP 07 31 30.6
Um iP 07 30 52.0
epP 07 31 04
Ka iP 07 31 44.2
Alaska. h = 50 km (Um).
Magn. = 5.8 (Up,Ki).

1964 June 29 Ki iP 10 52 19.5
ipP 10 52 28.1
Um iP 10 52 47.9
Alaska. h = 30 km (Ki).

" 29 Up iP 20 49 21.1

" 30 Up ePKP 05 46 47
i 05 46 51.6
Sk iPKP 05 46 40.4
Um iPKP 05 46 33.5
ipPKP 05 47 42.0
Kermadec Islands (h = 210 km).

" 30 Ki iP 05 56 10.0
Alaska (h = 30 km).

" 30 Up iP 10 28 55.1
i 10 29 08.0
Ki iP 10 28 08.6 C
Um iP 10 28 30.3
Ka eP 10 29 17
Kurile Islands (h = 30 km).

" 30 Up iP 12 32 55.1
iLi 12 35 45.7
iLg2 12 36 43
Ki eP 12 34 36
iLg2 12 40 59
iRg 12 41 58
microns sec
M E 0.7 10
M N 0.7 13
M Z 0.5 10
Sk iP 12 33 43.1
iLi 12 37 36.2
iLg2 12 38 37.3
Gb iP 12 34 08.2
i 12 35 36.0
i 12 36 07.1
Um iP 12 33 48.4 D
Ka iP 12 32 05.6
iLg2 12 34 37.7
Austria (h = 30 km).

" 30 Up e(P) 14 00 01
iPP 14 03 45.9
iSKS 14 10 28
eS 14 11 06
iSS 14 18 09
microns sec
PP E 0.9 8
PP N 0.6 6
PP Z 1.7 7
SKS E 0.9 7

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Kalrskrona

1964 June 30 cont.

Up

		microns	sec
S	N	6.6	15
M	E	10	19
M	N	16	21
M	Z	18	21

(D = 10800 km = 98°).

Ki	iP	13 59 43.2
	iPP	14 03 29
	e	14 04 28
	iSKS	14 10 20
	iS	14 10 51
	iPS	14 12 22
	iSS	14 17 27

		microns	sec
P	Z	1.1	6
P	Z'	0.3	1.5
PP	E	1.5	8
PP	Z	1.5	6
SKS	E	2.0	7
S	N	5.3	14
M	E	24	20
M	N	18	20
M	Z	31	23

D = 10550 km = 95°.

Sk	e(P)	14 00 21
	iPP	14 04 14.3
Gb	iPP	14 04 25.2
	i	14 04 53.0
Um	iP	13 59 46.9
	iPP	14 03 35
	iSKS	14 10 24
	iS	14 10 48
	iSS	14 17 38
Ka	iP	14 00 07.3
	iPP	14 04 22.7

Celebes (h = 40 km).
Magn. = 6.6 (Up,Ki).

" 30 Up iP 15 58 43.0

		microns	sec
P	Z'	0.1	1.0

Ki	iP	15 57 56.5
Gb	iP	15 59 02.5
Um	iP	15 58 17.5 C
Ka	iP	15 59 05.9

Kurile Islands (h = 30 km).

" 30 Up iP 15 59 39.4 C
iScS 16 09 35

		microns	sec
P	Z'	0.2	1.0
M	E	2.3	20
M	N	5.1	18
M	Z	2.9	18

cont.

1964 June 30 cont.

Ki

iP	15 58 52.5 C	
iScS	16 08 41	

		microns	sec
P	Z'	0.2	1.0
M	E	3.0	16
M	N	3.6	18
M	Z	6.8	17

Sk	iP	15 59 27.8
Gb	iP	15 59 58.5 C
	ipP	16 00 10.5
Um	iP	15 59 13.6 C
Ka	iP	16 00 01.0 C
	ipP	16 00 14.5

Kurile Islands. h = 50 km (Gb,Ka).
Magn. = 6.0 (Up,Ki).
This is the largest aftershock after the main shock on June 23. The magnitude difference $M - M_1$ = 7.6 - 6.0 = 1.6, i.e. slightly greater than average. A possible reason is that $M - M_1$ increases with focal depth. The average value 1.2 should then apply only to shallow shocks.

" 30 Up iP 18 58 21.7
Ki iP 18 57 35.4
Kurile Islands (h = 30 km).

" 30 Ki iP 20 00 43.5
Um iP 20 00 49.2 C
Celebes (h = 30 km).

" 30 Up iP 20 18 31.5 C
iPcP 20 19 00.5
ipP 20 19 54.7
iS 20 26 35.0

		microns	sec
P	Z'	0.4	0.8

(D = 7300 km = 65 1/2°).

Ki	iP	20 17 46.2 C
	ipP	20 19 06.3
	eS	20 25 21
	eScS	20 27 00

		microns	sec
P	Z'	0.5	1.0
S	E	0.7	12
M	E	0.8	19
M	N	0.8	18

(D = 6650 km = 60°).

Sk	iP	20 18 21.7 C
	iPP	20 20 46.4
Gb	iP	20 18 49.5 C
	i	20 19 58.7
	esP	20 21 08

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964						
June	30	Um	iP	20	18	06.6 C
cont.			i	20	18	08.5
			i	20	20	07
			iS	20	25	58
			iScS	20	27	20
		Ka	iP	20	18	53.5 C
			ipP	20	20	19.6
			isP	20	21	16.6

Sea of Okhotsk. h = 380 km
(Up,Ki,Gb,Ka).
Magn. = 6.2 (Up,Ki).

Markus Båth
April 27, 1965

Seismological Institute
Uppsala

SEISMOLOGICAL BULLETIN

UPPSALA, KIRUNA, SKALSTUGAN, GÖTEBORG, UMEÅ and KARLSKRONA

UPP	Uppsala	(Up):	59°51.5'N,	17°37.6'E;	h = 14 m
KIR	Kiruna	(Ki):	67°50.4'N,	20°25.0'E;	h = 390 m
SKA	Skalstugan	(Sk):	63°34.8'N,	12°16.8'E;	h = 580 m
GOT	Göteborg	(Gb):	57°41.9'N,	11°58.7'E;	h = 66 m
UME	Umeå	(Um):	63°48.9'N,	20°14.2'E;	h = 16 m
KLS	Karlskrona	(Ka):	56°09.9'N,	15°35.5'E;	h = 11 m

JULY 1 - 31, 1964

1964 July 1 Ki eL 00 02
microns sec
M E 0.5 16
M N 0.4 15
Celebes (h = 60 km).

" 1 Up iP 02 58 20.5 C
iPP 03 00 46.4
microns sec
P Z' 0.1 1.2
M E 0.6 16
M N 0.9 18
M Z 0.9 14
Ki iP 02 57 33.9 C
iS 03 05 49
microns sec
P Z' 0.1 1.3
M E 0.7 17
M N 0.5 17
M Z 1.1 17
D = 6600 km = 59½°.
Sk eP 02 58 09
iPP 03 00 31.6
Um iP 02 57 55.4
iS 03 06 20
Ka iP 02 58 43.1
Kurile Islands (h = 30 km).
Magn. = 5.6 (Up,Ki).

" 1 Um iP 06 11 16.9

" 1 Ki iP 06 14 59.5
Sk iP 06 15 26.4
Um iP 06 15 28.9
Alaska (h = 20 km).

" 1 Um iP 07 27 36.5
Japan (h = 70 km).

1964 July 1 Um iP 08 10 48.5

" 1 Up iLgl 08 45 48.5
SKA eSn 75 08 46 06
iLgl 80 08 46 57.7
~~D = 1020 km = 9.2°.~~
UME iSn 75 08 44 48.4
iS^x 71 08 45 02.5
iLgl 80 08 45 12.1
D = 650 km = 5.9°.
Lake Ladoga, USSR,
61.4°N, 31.8°E.
Origin time = 08 42 10.
Explosion?

" 1 Up iP 09 57 44.1
microns sec
M E 1.5 20
M N 2.5 18
M Z 2.3 18
Ki iP 09 56 57.5
e(S) 10 05 29
microns sec
M E 1.8 18
M N 2.0 20
M Z 2.8 19
Sk eP 09 57 34
Um iP 09 57 18.6 C
iS 10 06 00
Ka iP 09 58 06.5
Kurile Islands
(h = 80 km).

" 1 Up iP 10 03 34.1
Ki iP 10 02 47.4 C
Sk eP 10 03 23
Um iP 10 03 08.6
ipP 10 03 21.1

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July cont.

1 Ka iP 10 03 56.2
ipP 10 04 09.1
Kurile Islands.
h = 50 km (Um,Ka).

" 1 Up eP 12 12 38

" 1 Up iP 13 42 01.3
Ki iP 13 41 08.1 C
microns sec
P Z' 0.1 1.0
Sk iP 13 41 38.7
iPcP 13 42 13.5
Um iP 13 41 35.2
ipP 13 41 45.3
Aleutian Islands.
h = 40 km (Um).

" 1 Ki iP 13 46 27.9
Molucca Passage
(h = 30 km).

" 1 Up iPKP 16 24 10.7
Um iPKP 16 23 57.5
Ka ePKP 16 24 22
Kermadec Islands
(h = 30 km).

" 1 Um iP 18 21 05.0

" 1 Ki eP 20 18 33
microns sec
P Z' 0.1 1.5
Um iS 20 25 42
iSS 20 29 15
North Atlantic Ocean
(h = 30 km).

" 1 UPP iSn 75 21 40 02.5
iLgl 80 21 40 35.6
~~D = 790 km = 7.1°.~~
KIR ePn 74 21 39 08
iPg 72 21 39 46.4
iS^X 71 21 40 56.9
iLgl 80 21 41 12.9
~~D = 900 km = 8.1°.~~
SKA iPn 74 21 39 20.5
eSn 75 21 41 01
iLgl 80 21 41 47.0
~~D = 1020 km = 9.2°.~~
~~GOT eLgl 21 42 26~~
UME iP^X 70 21 38 37.0
iSn 75 21 39 38.0
iLgl 90 21 39 59.1
~~D = 650 km = 5.9°.~~
KAS ePn 74 21 39 26

cont.

1964 July cont.

1 Ka eLgl 21 42 06
D = 1090 km = 9.8°.
Lake Ladoga, USSR,
61.4°N, 31.8°E.
Origin time = 21 36 58.
Explosion?
It appears to be quite a general rule that, at a few hundred kilometers distance, the most prominent phase is Lgl if the source is an (underwater) explosion.
Compare remark to June 26, 1964, 07 39.

" 1 Up iP 22 57 59.0 D
ePP 23 00 53
microns sec
P Z' 0.2 1.0
Ki iP 22 57 24.6 D
iPP 23 00 00.0
microns sec
P Z' 0.1 1.0
Sk iP 22 57 55.8
iPP 23 00 46.2
Gb iP 22 58 18.3
Um iP 22 57 39.4 D
ipP 22 58 19.0
iPP 23 00 25.2
eS 23 07 02
Ka iP 22 58 16.8 D
iPP 23 01 23.1
South of Japan.
h = 160 km (Um).
Magn. = 5.7 (Up,Ki).

" 1 Um iSKS 23 13 47
ipS 23 15 41
eSP 23 16 39
Peru (h = 140 km).

" 1 Um i(SKP) 23 26 24.3
New Guinea (h = 180 km).

" 2 Up iP 01 29 07.0
ipP 01 29 12.5
Ki iP 01 28 12.0 C
Sk iP 01 28 39.0
ipP 01 28 43.2
Gb iP 01 29 18.5
ipP 01 29 23.9
Um iP 01 28 41.1
ipP 01 28 46.0
eS 01 36 22
iPS 01 36 37
Ka iP 01 29 30.5

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July 2 cont.

Ka ipP 01 29 35.5
Alaska. h = 20 km
(Up,Sk,Gb,Um,Ka).

" 2 KiR eP* 70 04 19 27
eSn 75 04 20 05
eSg 73 04 20 24
~~D = 390 km = 3.5°.~~
UmE iPg 72 04 19 14.9
iSg 73 04 19 46.4
D = 270 km = 2.4°.
Coast of Finland,
near Oulu, 65.0°N, 25.2°E.
Origin time = 04 18 27.

" 2 Ki e 05 05 17
i(Sn) 05 06 14.7
eSg 05 06 28

" 2 Ki iP 05 16 30.6
i 05 16 36.1
Ka iP 05 16 55.1
Macassar Strait
(h = 130 km).

" 2 Up iPg 11 21 17.6
iLgl 11 21 29.9
iSg 11 21 36.2
microns sec
Sg Z' 0.1 0.5
D = 120 km = 1.1°.
Sk eLgl 11 23 50
UmE iP* 70 11 22 26.7
iLgl 11 23 31.0
~~D = 550 km = 5.0°.~~
KaS eP* 70 11 21 52
iLgl 80 11 22 30.9
D = 340 km = 3.1°.
Baltic Sea, off coast of
Sweden, 58.9°N, 18.3°E.
Origin time = 11 20 57.
Probably underwater
explosion.
Compare remark to July 1,
21 40. Comparing amplitudes
on Z' we find for Up that
Sg > Lgl whereas at the
other more distant stations
Lgl > Sg, indicating
different attenuation for
Lgl and Sg.

" 2 Ki iP 12 24 23.5
Molucca Sea (h = 160 km).

" 2 Up iP 17 14 45.9
cont.

1964 July 2 cont.

Up iS 17 23 55
microns sec
M E 0.7 24
M N 1.1 18
M Z 2.0 16
D = 7650 km = 69°.
Ki eS 17 22 33
microns sec
S E 0.3 8
S N 0.4 11
M E 0.8 14
M N 1.0 17
M Z 1.1 17
Um iS 17 23 18
Off coast of Washington
State, USA (h = 30 km).

" 2 Up iP 17 28 43.6
microns sec
M N 1.0 17
M Z 1.4 18
Sk eP 17 28 21
Off coast of Washington
(h = 15 km).

" 2 Up iP 17 51 16.4

" 3 Ki iP 05 17 56.5
Sk iP 05 17 55.7 C
Mexico (h = 100 km).

" 3 Ki iP 08 27 10.0
Um iP 08 27 26.9
Japan (h = 30 km).

" 3 Ki iP 14 18 46.7 C
Sk iP 14 19 05.1
Kashmir (h = 90 km).

" 3 Ki iP 19 28 22.4 C
Um iP 19 27 56.2 C
i 19 28 00.1
Ethiopia (h = 60 km).

" 3 Um eP 20 35 16

" 3 Ki iP 22 37 00.2

" 4 Up iP 04 43 03.7 C
microns sec
P Z' 0.1 0.6

" 4 Up iP 11 02 57.3
iSKS 11 13 32
microns sec
M E 0.4 16
cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
July 4 Up microns sec
cont. M N 1.2 20
M Z 1.4 21
Ki iP 11 02 31.5
eSKS 11 13 05
eS 11 13 23
microns sec
P Z' 0.2 1.0
S E 0.9 7
S N 0.5 8
M E 1.2 21
M N 0.8 18
M Z 1.3 20
D = 10100 km = 91°.
Sk iP 11 02 55.6
Um iP 11 02 41.6
iSKS 11 13 10
i 11 15 01
Mariana Islands
(h = 30 km).
Magn. = 6.0 (Up,Ki).

" 4 Up eP 11 15 33
eS 11 19 00
microns sec
S E 0.3 7
M E 2.2 12
N N 1.2 12
M Z 1.2 8
D = 2050 km = 18½°.
Ki iP 11 16 54.6
microns sec
M E 3.3 17
M N 1.0 13
Sk iP 11 16 20.7
Um iP 11 16 12.8
iS 11 20 12
Ka iP 11 14 57.7 C
Bulgaria (h = 10 km).

" 4 KiR iSg 73 14 00 15.7
~~Sk eSg 14 00 19~~
UmE iSg 73 14 00 40.9
Nordlands Fylke, Norway,
66.3°N, 14.6°E.
Origin time = 13 58 48.

" 4 Um iP 15 07 34.2

" 4 Up iP 15 50 47.2

" 4 Um iP 19 27 05.0

" 4 KiR iPn 74 23 03 38.2
iPg 72 23 03 47.2
iSn 75 23 04 26.6
iSg 73 23 04 42.0
~~D = 420 km = 3.8°.~~
SkA eSg 73 23 07 29
UmE iPn 74 23 04 15.8

cont.

1964
July 4 Um iSn 75 23 05 34.4
cont. i(Sx) 71 23 05 49.2
iSg 73 23 06 10.5
D = 720 km = 6.5°.
Northwest Russia,
69.0°N, 30.2°E.
Origin time = 23 02 36.
Explosion?
This event, like the other similar events in northwest Russia, produce the largest amplitudes in the Sg phase at our stations. The evidence is that the assumption of Lgl instead of Sg gives no satisfactory solution. Combining this result with statements made under June 26, 07 39, July 1, 21 40 and July 2, 11 21, we arrive at the following tentative rule: At a few hundred kilometers distance, explosions on land produce the largest amplitudes in Sg, whereas underwater explosions have the largest amplitudes in Lgl. However, there are clear exceptions, and the matter remains to be clarified.

" 5 Um iP 00 24 42.7

" 5 Up iP 03 23 28.1

" 5 Up iP 03 24 30.1
eS 03 32 33
D = 6550 km = 59°.
Ki iP 03 23 34.7
eS 03 30 54
microns sec
S E 0.4 7
M E 0.6 17
M N 0.4 21
M Z 0.8 22
D = 5650 km = 51°.
Sk eP 03 24 04
Gb iP 03 24 41.2
Um iP 03 24 03.4
ipP 03 24 11.9
iS 03 31 45
Ka iP 03 24 53.9
Alaska. h = 30 km (Um).

" 5 Up iP 04 58 15.5 D

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July 5 cont.

Up
microns sec
M N 0.8 13
M Z 0.8 13

Ki
---
microns sec
M E 0.6 15
M N 0.5 16
M Z 0.9 17

Sk iP 04 58 54.5 D
Um iP 04 59 05.7
Ka iP 04 57 38.1
Ionian Sea.

" 5 Up iP 12 47 24.9
Ki iP 12 46 32.7
Aleutian Islands
(h = 30 km).

" 5 Up iP 16 57 28.6

" 5 Ki iP 18 08 07.1
Sk iP 18 08 35.1
Um iP 18 08 36.7
Alaska (h = 25 km).

" 5 Up eP 19 20 34
i 19 20 40.1
ePP 19 23 47
iS 19 30 56
iSS 19 36 23
microns sec
P N 0.3 6
P Z 0.6 5
P Z' 0.4 1.7
S E 1.6 10
S N 6.6 12
M E 9.9 17
M N 12 20
M Z 16 19
D = 9500 km = 85½°.

Ki eP 19 20 04
ipP 19 20 14
i 19 20 22.6
eS 19 29 56
iSKS 19 30 12
microns sec
P Z' 0.4 1.8
pP E 0.3 6
pP N 0.3 5
pP Z 0.9 6
S E 2.4 12
SKS N 2.5 11
M E 25 16
M N 19 17
M Z 30 18
D = 8850 km = 79½°.

cont.

1964 July 5 cont.

Sk iP 19 20 10.1
ipP 19 20 21.2
Gb eP 19 20 20
epP 19 20 30
Um iP 19 20 18.9 D
iS 19 30 35
iSS 19 35 41
Ka iP 19 20 39.7
ipP 19 20 50.5
Gulf of California.
h = 40 km (Ki,Sk,Gb,Ka).
Magn. = 6.3 (Up,Ki).
On Z' the amplitude ratio pP/P varies between 1 and 5 with a systematic relation between this value and the direction from the source: the smallest value in the south and the largest in the north.

" 5 Up iP 23 46 58.3 C
eS 23 55 59
i 23 57 09
microns sec
P Z 1.3 5
P Z' 0.2 0.6
M E 14 20
M N 21 17
M Z 22 19
D = 7550 km = 68°.

Ki iP 23 46 12.2 C
ePa 23 50 14
iS 23 54 28
iScS 23 55 59
microns sec
P E 0.4 8
P N 0.6 8
P Z 1.5 6
P Z' 0.1 1.2
S E 3.9 17
S N 1.2 15
M E 29 16
M N 15 16
M Z 34 18
D = 6700 km = 60½°.

Sk iP 23 46 48.1
iPcP 23 47 28.0
i 23 47 44.6
Gb iP 23 47 20.4 C
Um iP 23 46 33.6 C
iPP 23 49 10
iPa 23 50 27
iS 23 55 11
iPS 23 55 32
Ka iP 23 47 21.2
Kurile Islands (h = 50 km).
Magn. = 6.3 (Up,Ki).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
July 5 Up iP 23 50 08.6
microns sec
P Z' 0.2 0.8
Ki iP 23 49 21.1
Gb iP 23 50 28.4
Um iP 23 49 43.6
Ka iP 23 50 30.3
ipP 23 50 44.7
Kurile Islands.
h = 60 km (Ka).

" 5 Up iP 23 50 48.1 C
microns sec
P Z' 0.1 0.7

" 6 Um iP 02 20 42.3
Gulf of California
(h = 30 km).

" 6 Up iP 02 27 08.7
i 02 27 13
i 02 27 27.8
iPP 02 30 19.8
iS 02 37 29
iSS 02 43 01
microns sec
P Z' 0.4 1.5
S E 3.4 11
S N 14 11
M E 13 19
M N 32 16
M Z 24 17
D = 9450 km = 85°.
Ki iP 02 26 44.8
i 02 27 02.0
iS 02 36 42
microns sec
P E 0.4 5
P Z 1.3 4
P Z' 0.4 1.3
S E 3.7 10
S N 6.3 11
M E 77 16
M N 51 17
M Z 98 16
D = 8900 km = 80°.
Sk iP 02 26 46.8
i 02 26 48.8
i 02 26 55.5
Gb iP 02 27 08.1
Um iP 02 26 59.6
iPa 02 33 27
iSKS 02 37 07
iS 02 37 13
Ka iP 02 27 18.2
Gulf of California
(h = 30 km).

cont.

1964
July 6 Magn. = 6.6 (Up,Ki).
cont. On Z' the P phases are characterized by relatively long periods and gradual amplitude increase with several successive onsets. The period increases along the P wave train (over an interval about 20 sec long).

" 6 Up iP 02 38 08.1
Ki iP 02 37 41.7
Sk iP 02 37 52.6
Um iP 02 37 56.1
ipP 02 38 04.0
Ka iP 02 37 19.9
Gulf of California.
h = 30 km (Um).

" 6 Up iP 03 21 14.4
Ki iP 03 20 19.0
Sk eP 03 20 47
Um iP 03 20 47.0
(Alaska).

" 6 Up iP 03 31 28.4 C
Ki iP 03 30 34.1
Sk iP 03 31 01.2
Gb iP 03 31 40.0
Um iP 03 31 02.4 C
ipP 03 31 08.9
Ka iP 03 31 50.9
Alaska, h = 25 km (Um).

" 6 Up iP 07 34 49.3 D
ipP 07 35 14
iS 07 45 16
iP'P'P' 08 21 23.8
microns sec
P E 0.9 5
P N 2.0 6
P Z 4.7 6
P Z' 0.6 1.0
S E 13 8
S N 13 8
M E 43 22
M N 50 23
M Z 81 23
D = 9650 km = 87°.
Ki iP 07 34 33.7 D
ipP 07 34 58
iS 07 44 53
eP'P' 08 00 47
eP'P'P' 08 21 27
microns sec
P E 7.2 6
P N 3.8 6

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July cont.	6	Ki		microns	sec	
			P	Z 19	6	
			P	Z' 3.6	1.5	
			S	E 36	9	
			S	N 32	9	
			M	E 81	23	
			M	N 28	19	
			M	Z 80	22	
			D = 9350 km = 84°.			
		Sk	iP	07 34 31.5		D
		Gb	iP	07 34 44.2		D
			ipP	07 35 09.7		
			epS	07 45 21		
		Um	iP	07 34 44.3		D
			iPP	07 38 11		
			i	07 44 39		
			iSKS	07 44 55		
			iS	07 45 09		
			ipS	07 45 22.5		
			eP'P'P'	08 21 33		
		Ka	iP	07 34 55.5		D
			ipS	07 45 48.0		
			eP'P'P'	08 21 38		
		Mexico. h = 100 km (Up,Ki,Gb). Magn. = 7.3 (Up,Ki). The records are of long-period character, both among surface waves and between P and S. This is the second time good records of P'P'P' have been obtained at Swedish stations (the earlier case was May 24, 1959, at 19 30, also for an earthquake in Mexico). Our distances are just outside the shadow-zone for P'P'P' and therefore favourable, but inside the shadow-zone for P'P'.				
"	6	Ki	iP	07 52 45.0		
"	6	Ki	iP	07 53 05.5		
"	6	Up	iP	10 21 17.4		D
			ipP	10 21 40		
			iPP	10 22 54		
				microns	sec	
			P	Z' 0.1	0.6	
		Ki	iP	10 21 25.0		
			ipP	10 21 48.3		
			eLi	10 33 49		
			eLgl	10 35 22		
			i	10 35 51		

cont.

1964 July cont.	6	Ki		microns	sec	
			pP	Z' 0.2	1.0	
		Sk	iP	10 21 43.1		
			iPP	10 23 28.6		
		Gb	iP	10 21 39.6		
			ipP	10 22 02.7		
			isP	10 22 16.0		
			iPP	10 23 25.2		
		Um	iP	10 21 14.3		
			i	10 21 21.4		
			ipP	10 21 38.1		
		Ka	iP	10 21 22.7		D
			ipP	10 21 45.9		
			isP	10 21 58.6		
			iPP	10 23 03.6		
		Hindu Kush. h = 110 km (Up,Ki,Gb,Um,Ka).				
"	6	Ki	iP	10 51 01.1		
		Sk	iP	10 50 57.9		
			i	10 51 12.9		
		Um	iP	10 51 10.9		
			i	10 51 31.9		
		Mexico (h = 110 km).				
"	6	Ki	iP	14 33 35.7		
			iPP	14 37 54.7		
		Sk	iPP	14 38 04.0		
		Um	iP	14 33 40.6		C
			ePP	14 37 56		
		Banda Sea (h = 100 km).				
"	6	Um	iP	14 49 25.6		
"	6	Ki	eP	20 11 19		
			iS	20 12 44.0		
			eT	20 16 20		
			i	20 16 53.4		
		Norwegian Sea, 73½°N, 9°E. Origin time = 20 09 34. Solution obtained by combination with Norwegian data.				
"	6	Ki	eT	20 30 01		
			i	20 30 35.2		
		Norwegian Sea, 73½°N, 9°E. Origin time = 20 23 20. Solution obtained by combination with Finnish data.				
"	6	Ki	iP	20 49 00.5		
			eS	20 50 26		
			eT	20 53 54		
			i	20 54 27.7		

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July 6 cont.

SKA eP 20 49 39
iS 20 51 26.1
Norwegian Sea, 73½°N, 9°E.
Origin time = 20 47 18.
Solution obtained by combination with Finnish and Norwegian data.

" 6 Ki iP 23 15 19.2
eT 23 20 24
i 23 20 45.2
SKA iP 23 16 01.1
eS 23 17 47
Norwegian Sea, 73½°N, 9°E.
Origin time = 23 13 40.
Solution obtained by combination with Finnish and Norwegian data. In this series of shocks in the Norwegian Sea, the T phases are better developed at Ki than the P phases.

" 7 Up iP 01 39 33.5
Kurile Islands
(h = 30 km).

" 7 Ki eP 04 07 11
eT 04 12 02
i 04 12 48.7
SKA iP 04 07 50.2
eS 04 09 37
eT 04 14 53
Um iP 04 08 04.9
eS 04 10 25
i 04 10 37
iT 04 14 51.4
Norwegian Sea (h = 30 km).
The T phases are remarkably strong at Ki and Um but much weaker at Sk.

" 7 Ki eP 04 48 49
iT 04 53 57.9
i 04 54 26.7
Norwegian Sea.

" 7 KiR iPn 74 06 31 16.3
iPg 72 06 31 28.2
iSn 75 06 32 11.9
iSg 73 06 32 30.8
~~D = 490 km = 4.4°.~~
SKA eSg 73 06 35 05
UmE iSn 75 06 32 57.5
iSg 73 06 33 47.2
Northwest Russia,

cont.

1964 July 7 cont.

68.3°N, 31.8°E.
Origin time = 06 30 06.
Explosion?

" 7 Ki eT 06 50 18
i 06 50 50.8
Um i 06 51 43.6
i 06 51 52.9
eT 06 53 02
Norwegian Sea.

" 7 Up iPKP 07 57 35.7 C
microns sec
PKP Z' 0.1 0.8
Ki iPKP 07 57 25.5 C
iSKP 08 00 07.2
microns sec
SKP Z' 0.2 1.5
Sk ePKP 07 57 27
i 07 57 36.0
iSKP 08 00 22.4
Gb iPKP 07 57 46.2 C
Um iPKP 07 57 29.8
iSKP 08 00 17.3
Ka iPKP 07 57 48.0 C
Fiji Islands (h = 460 km).

" 7 Um iP 08 19 03.4 C

" 7 Up i(P) 10 53 38.8 D
microns sec
(P) Z' 0.1 0.6
Ka i(P) 10 53 50.9

" 7 Up iP 13 56 19.9
Ki iP 13 55 34.2
ipP 13 55 37.7
Sk eP 13 55 52
Um iP 13 56 01.4
Off coast of Oregon.
h = 15 km (Ki).

" 7 Um iP 14 03 04.2
e 14 05 07
Yugoslavia (h = 40 km).

" 7 Ki i(PKP) 15 16 09.8
Sk i(PKP) 15 16 25.0
Um i(PKP) 15 16 20.0

" 7 Up iP 15 26 07.2 C
Sk i(P) 15 24 48.2

" 7 Up iP 21 20 31.1
Ki iP 21 20 37.7
Sk iP 21 20 56.7

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July cont.	7	Um	iP	21 20 28.2	
		Ka	iP	21 20 36.7	
		Hindu Kush (h = 20 km).			
"	8	Ka	iP	01 37 42.6	
		Crete (h = 20 km).			
"	8	Ki	i(Sg)	01 45 19.8	
		Um	e(Sg)	01 44 57	
"	8	Um	iP	05 48 11.3	
			i	05 48 29.6	
"	8	Up	iP	07 19 23.8	
			ipP	07 19 34.5	
		Ki	iP	07 19 03.3	
		Um	iP	07 19 10.0	
		Luzon. h = 40 km (Up).			
"	8	Up	iP	07 59 06.9	
				microns sec	
			M E	1.0 25	
			M N	1.5 24	
			M Z	0.8 25	
		Ki	eP	07 58 59	
				microns sec	
			M E	1.1 22	
			M N	0.6 18	
			M Z	1.7 23	
		Um	e	07 59 33	
		Molucca Passage (h = 50 km).			
"	8	Um	iP	12 08 30.8	
"	8	Up	iP	12 09 30.3 C	
			i	12 12 47.2	
			iPP	12 13 49.1	
			i(sPP)	12 15 04	
			iSKS	12 19 53	
			iS	12 21 18	
				microns sec	
			P Z'	0.1 0.8	
			PP E	0.6 4	
			PP Z'	0.1 0.8	
			SKS E	1.5 7	
			S E	3.4 11	
			M E	4.1 18	
			M N	9.4 21	
			M Z	9.4 22	
			(D = 11550 km = 104°).		
		Ki	iP	12 09 14.2	
			i(pP)	12 10 04.1	
			iPP	12 13 31.6	
			iSKS	12 19 36	
			iS	12 21 00	

cont.

1964 July cont.	8	Ki	i	12 23 36	
				microns sec	
			P Z	1.3 4	
			P Z'	0.4 1.0	
			PP E	2.3 8	
			PP N	0.5 9	
			PP Z	4.6 8	
			PP Z'	1.3 2.0	
			SKS E	7.0 7	
			SKS N	2.3 7	
			S E	8.0 11	
			M E	10 21	
			M N	5.3 20	
			M Z	16 21	
			(D = 11350 km = 102°).		
		Sk	iP	12 09 36.1	
			iPP	12 13 46.2	
		Gb	i	12 13 25.5	
			iPKP	12 13 54.1	
			iPP	12 14 26.5	
		Um	iP	12 09 20.1 C	
			i(pP)	12 10 08.8	
			isP	12 10 19	
			iPP	12 13 38.7	
			iSKS	12 19 42.5	
			iS	12 21 06	
			i(sS)	12 22 03	
			i	12 23 47	
			iPKKP	12 25 13.5	
		Ka	iP	12 09 42.9	
			iPP	12 13 51.4	
		Banda Sea (h = 170 km).			
		Magn. = 7.1 (Up,Ki).			
"	8	Up	iP	15 14 40.8 D	
"	8	Um	iP	19 32 25.0	
"	9	Ki	iP	00 30 31.1	
		Alaska (h = 15 km).			
"	9	Up	iP	03 45 29.5	
			i	03 45 32.9	
			iPP	03 46 48.1	
		Ki	iP	03 46 06.5	
		Sk	iP	03 46 05.1	
		Um	iP	03 45 44.6	
		Iran (h = 60 km).			
"	9	Up	iP	05 59 28.3	
			i(pP)	05 59 36.1	
				microns sec	
			M E	0.9 23	
			M N	1.0 20	
			M Z	0.8 16	
		Ki	iP	05 59 10.5 C	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July cont.	9	Ki			microns	sec
			P	Z'	0.1	1.0
			M	E	1.0	19
			M	N	0.8	18
			M	Z	1.5	18
		Sk	iP		05 59 35.3	
		Um	iP		05 59 16.0	C
			eS		06 09 15	
		Ka	iP		05 59 40.2	C
			ipP		05 59 51.3	
		Luzon. h = 40 km (Ka).				
"	9	Up	iP		10 48 17.5	D
"	9	Up	i(PKP)		11 41 27.5	
			iPKP		11 41 30.2	
			iPKS		11 45 11	
					microns	sec
			PKP	Z'	0.2	0.6
			M	E	2.2	23
			M	N	8.1	23
			M	Z	6.5	22
		Ki	e(PKP)		11 41 11	
			iPKP		11 41 19.0	
			iPP		11 43 52	
			iPKS		11 44 49	
					microns	sec
			PKP	Z'	0.1	1.0
			PKS	E	0.8	7
			PKS	N	1.0	9
			M	E	4.5	22
			M	N	2.3	20
			M	Z	6.1	23
		Sk	iPKP		11 41 23.2	
		Gb	i(PKP)		11 41 36.9	
			iPKP		11 41 39.0	
		Um	i(PKP)		11 41 17.7	
			iPKP		11 41 26.2	
			iPP		11 44 15	
			iPKS		11 44 57	
		Ka	i(PKP)		11 41 39.1	
			iPKP		11 41 42.1	
		Tonga Islands (h = 40 km).				
		Magn. = 6.5 (Up,Ki).				
		Multiple PKP phases, (PKP) being of much smaller amplitude than PKP. The time difference PKP-(PKP) has a tendency to decrease with distance over our range of stations.				
"	9	Up	iP		12 13 50.8	
					microns	sec
			P	Z'	0.1	0.6
		Ki	iP		12 13 13.7	

cont.

1964 July cont.	9	Ki			microns	sec
			P	Z'	0.1	1.0
		Sk	iP		12 13 45.8	
		Gb	iP		12 14 13.0	
		Um	iP		12 13 30.0	
		Ka	iP		12 14 10.1	
		Japan (h = 50 km).				
		Magn. = 5.9 (Up,Ki).				
"	9	Up	eP		12 41 20	
"	9	Up	e(P)		15 16 19	
			i		15 17 19.4	
			i(Sg)		15 17 22.3	
					microns	sec
			(Sg)	Z'	0.2	0.5
"	9	Up	eP		16 55 40	
			e(PKP)		16 58 36	
			iPKP		16 58 45.8	
			iSKP		17 02 00.2	
			iPKS		17 02 12	
			ipPKS		17 02 42	
			iX		17 11 06.8	
					microns	sec
			PKP	N	1.1	4
			PKP	Z	3.6	3
			PKP	Z'	0.3	0.5
			SKP	E	2.9	5
			SKP	N	5.2	4
			SKP	Z	19	5
			SKP	Z'	0.4	0.5
			PKS	E	11	5
			PKS	N	21	5
			M	E	6.5	20
			M	N	22	21
			M	Z	28	24
		(D = 14550 km = 131°).				
		Ki	iP		16 55 07	C
			i(PKP)		16 58 30.7	
			iPKP		16 58 34.7	C
			iPP		17 00 15	
			eSKS		17 05 20	
			i		17 07 01	
			iS		17 08 06	
			iPKKP		17 08 22.2	
			iSP		17 10 02	
			i		17 15 45	
					microns	sec
			P	Z	0.5	5
			PKP	E	0.6	4
			PKP	Z	6.2	5
			PKP	Z'	2.6	1.5
			PP	E	2.0	7
			PP	Z	6.0	8
			SKS	E	4.0	8

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July	9	Ki		microns	sec	
cont.			S	N 6.2	10	
			M	E 20	21	
			M	N 15	20	
			M	Z 34	22	
			(D = 13900 km = 125°).			
		Sk	i(PKP)	16 58 36.6		
			i	16 58 42.9		
			iPKP	16 58 45.7		
			iSKP	17 01 54.2		
			iSKKP	17 11 46.8		
		Gb	i(PKP)	16 58 46.8		
			iPKP	16 58 54.0		
			iSKP	17 02 12.3		
		Um	iP	16 55 17.6		
			i(PKP)	16 58 30.1		
			iPKP	16 58 37.9	C	
			iPP	17 00 25		
			e	17 01 46		
			eSP	17 10 23		
			iX	17 11 09.8		
			i	17 11 14.3		
		Ka	i(PKP)	16 58 43.6		
			iPKP	16 58 53.8		
			iSKP	17 02 12.2		
			eX	17 11 03		
		New Hebrides Islands				
		(h = 120 km).				
		Magn. = 6.8 (Ki).				
		The time difference between the small-amplitude precursor (PKP) and the large-amplitude PKP increases with distance over the range of our stations (compare G. Payo Subiza and M. Båth, Geophys. J., 8:496-513, 1964). - The phase X (Up,Um,Ka) could not be reliably identified; if it is not due to another shock, it seems to have passed over the greater arc to the resp. stations.				
"	9	Up	iP	18 56 01.3	C	
			ipP	18 56 31.1		
		Ki	iP	18 55 10.3		
			isP	18 55 51.3		
		Um	iP	18 55 34.9		
		Ka	iP	18 56 24.6	C	
		Sea of Okhotsk.				
		h = 120 km (Up,Ki).				
"	9	Up	iP	22 07 52.2		
cont.						
1964 July	9	Ki	iP	22 07 05.0		
cont.				microns	sec	
			M	E 0.9	20	
			M	N 0.8	22	
			M	Z 1.3	20	
		Kurile Islands				
		(h = 30 km).				
"	10	Up	iP	01 28 39.7		
		Um	eS	01 38 20		
		Atlantic Ocean (h = 30 km).				
"	10	Ki	iP	06 57 13.4		
"	10	Ki	e	10 03 35		
			e	10 04 35		
			i(Sg)	10 04 52.3		
"	10	Up	iP	17 19 46.1		
		Kurile Islands				
		(h = 80 km).				
"	10	Up	iP	20 31 12.8		
			i	20 31 19.2		
				microns	sec	
			P	Z' 0.1	0.5	
"	11	Up	iP	04 56 31.8		
		Ki	iP	04 55 49.2		
		Sk	iP	04 56 23.7		
		Um	iP	04 56 07.8	C	
		Japan (h = 50 km).				
"	11	Up	iP	08 40 56.3	C	
				microns	sec	
			P	Z' 0.1	1.0	
		Ki	iP	08 40 33.3	C	
			i	08 40 39.2		
				microns	sec	
			P	Z' 0.1	1.0	
		Sk	iP	08 40 59.8		
		Gb	iP	08 41 15.7		
		Um	iP	08 40 41.2		
		Formosa (h = 120 km).				
		Magn. = 5.7 (Up,Ki).				
"	11	Up	iP	09 54 18.0		
		Ki	iP	09 53 28.3		
		Sk	iP	09 53 54.3		
		Gb	iP	09 54 34.1		
		Ka	iP	09 54 45.9		
		Alaska (h = 30 km).				
"	11	Ka	eP	11 54 46		
"	11	Up	iP	12 03 27.6		
cont.						

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July cont. 11 Ki eP 12 04 10
microns sec
M E 0.3 16
Ka iP 12 03 10.4
Atlantic Ocean
(h = 30 km).

" 11 Ki iP 15 48 37.4
Mindanao (h = 150 km).

" 11 Up iP 17 48 39.1 C
i 17 52 37.6
microns sec
M E 0.4 15
M N 1.0 19
M Z 0.9 14
Ki iP 17 48 10.4 C
iS 17 50 58.0
eSS 17 51 13
microns sec
P Z' 0.4 1.3
M E 2.0 19
M N 0.7 16
M Z 2.8 19
D = 1700 km = 15½°.
Sk iP 17 47 46.6
iS 17 50 28.7
iSS 17 50 47.7
Um iP 17 48 27.3 C
eS 17 51 30
Ka iP 17 48 57.0 C
Iceland (h = 20 km).

" 11 Um iP 19 06 27.7
Mariana Islands
(h = 60 km).

" 11 Up iP 20 35 44.1 C
iS 20 44 02
microns sec
M E 0.6 17
M N 1.4 18
M Z 1.1 17
D = 6650 km = 60°.
Ki iP 20 34 49.3 C
eS 20 42 17
microns sec
P Z 0.4 4
P Z' 0.1 1.2
S E 0.4 10
S N 0.4 8
M E 1.1 17
M N 1.8 21
M Z 3.9 22
D = 5800 km = 52°.
Sk iP 20 35 15.3 C

cont.

1964 July cont. 11 Gb iP 20 35 55.5 C
Um iP 20 35 18.0
iS 20 43 07
Ka iP 20 36 07.0 C
Alaska (h = 40 km).
Magn. = 5.7 (Ki).

" 11 Ki iP 20 35 37.2
Sk iP 20 36 04.9
Gb iP 20 36 45.9
Alaska.

" 12 Up iP 01 00 41.9
Ki iP 01 01 22.8 C
Um iP 01 01 02.4

" 12 Up iP 01 56 43.1 C
iPP 01 59 20.6
iS 02 05 55
microns sec
P E 0.2 3
P Z 0.6 4
P Z' 0.2 1.0
PP Z' 0.1 1.4
S E 1.0 9
M E 1.9 20
M N 2.9 18
M Z 2.6 14
D = 7900 km = 71°.
Ki iP 01 56 03.2 C
iS 02 04 43
microns sec
P E 0.4 5
P N 0.3 5
P Z 1.1 5
P Z' 0.1 1.0
S E 2.1 8
S N 0.7 10
M E 5.8 14
M N 5.7 13
M Z 5.1 15
D = 7200 km = 65°.
Sk eP 01 56 37 C
ipP 01 56 40.8
Gb eP 01 57 05
Um iP 01 56 20.7 C
ipP 01 56 24.3
iS 02 05 12
Ka iP 01 57 02.7 C
ipP 01 57 06.3
Japan. h = 15 km (Sk,Um,Ka).
Magn. = 6.1 (Up,Ki).

" 12 Um iP 09 10 25.1
Alaska (h = 30 km).

" 12 Up iP 13 52 49.5 D
cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July cont.

" 12 Sk iP 13 52 42.5
Ka iP 13 52 23.2

" 12 Up iP 20 07 44.6
Ki iP 20 07 19.2
i(pP) 20 07 27.3
microns sec
M E 0.6 13
M Z 0.7 13
Sk iP 20 07 55.7
Siberia (h = 20 km).

" 12 Up iP 20 26 09.1 C
ipP 20 26 44.5
iS 20 34 24
microns sec
P Z' 0.2 0.7
M N 1.1 22
Ki iP 20 26 01.5 C
ipP 20 26 36.8
iS 20 34 11
esS 20 35 07
microns sec
P Z' 0.3 1.1
S E 0.4 5
M E 0.6 17
M N 0.4 12
M Z 0.3 13
Sk iP 20 26 24.3 C
ipP 20 27 00.0
Gb iP 20 26 29.0
Um iP 20 26 01.0
iS 20 34 10
isS 20 35 08
Ka iP 20 26 17.5 C
Burma. h = 140 km
(Up,Ki,Sk,Um).
Magn. = 6.0 (Up,Ki).

" 12 Up iPKP 21 27 28.0
Ki iPKP 21 27 43.3
microns sec
PKP Z' 0.1 1.0
Sandwich Islands
(h = 140 km).

" 13 Ki iPKP 01 32 39.6
iSKP 01 35 12.1
Gb iPKP 01 32 55.8
Ka iPKP 01 32 59.1 C
Fiji Islands (h = 580 km).

" 13 Up iP 11 09 06.4 C
ipP 11 09 32
iS 11 17 28

cont.

1964 July cont.

13 Up microns sec
P Z' 0.1 0.5
M N 0.6 15
D = 7000 km = 63°.
Ki iP 11 09 00.3 C
ipP 11 09 26.2
iS 11 17 20
esS 11 18 11
microns sec
P Z' 0.1 1.2
S E 0.6 9
M E 0.5 14
M N 1.0 20
M Z 0.7 15
D = 6900 km = 62°.
Sk iP 11 09 22.1 C
ipP 11 09 48.4
Gb iP 11 09 26.3
ipP 11 09 51.6
Um iP 11 08 59.1 C
ipP 11 09 25.4
iS 11 17 18
isS 11 18 04
Ka iP 11 09 14.7 C
ipP 11 09 38.8
isP 11 09 50.4
Burma. h = 110 km
(Up,Ki,Sk,Gb,Um,Ka).
Magn. = 5.7 (Ki).

" 13 Up iP 12 06 23.0
Ki iP 12 05 42.9
Sk iP 12 05 55.2
Gb iP 12 06 26.7
Ka iP 12 06 40.1
Oregon (h = 30 km).

" 13 Ki iP 16 01 42.1
Sk eP 16 02 11
Alaska (h = 25 km).

" 13 Um eS 16 33 24
North Atlantic Ocean
(h = 30 km).

" 13 Up iP 17 25 00.4
Ki iP 17 24 43.0
Sk iP 17 25 04.0
Mindanao (h = 100 km).

" 13 Up eP 21 13 12
eS 21 21 58
microns sec
P Z' 0.1 1.3
M E 0.7 19

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July 13 cont.

Up — microns sec
M N 0.7 17
M Z 0.9 18
D = 7200 km = 65°.
Ki iP 21 13 45.4
eS 21 23 03
microns sec
P Z' 0.1 1.0
M E 0.6 17
M N 0.4 15
M Z 1.6 22
D = 7850 km = 70½°.
Sk iP 21 13 12.3
Gb iP 21 12 48.7
Um iP 21 13 31.9
iS 21 22 35
iSS 21 26 38
Ka iP 21 12 53.9
i 21 12 56.0
North Atlantic Ocean (h = 30 km).
Magn. = 5.6 (Up,Ki).

" 13 Um iP 22 07 14.1
Ka iP 22 07 22.5
Hindu Kush (h = 120 km).

" 14 Um ePS 00 12 39
Prince Edward Islands (h = 30 km).

" 14 Up iP 01 12 19.1
Sk iP 01 12 34.3
Um iP 01 12 08.4

" 14 Ki iP 02 05 52.9
Iran.

" 14 Ki eP 04 14 13
Aleutian Islands.

" 14 Up eP 05 32 20
Ki eP 05 31 27
Sk iP 05 31 52.0
Um iP 05 31 55.2
Ka iP 05 32 43.9
Alaska (h = 10 km).

" 14 Up iPn 05 35 26.4 C
i 05 35 34
iSn 05 36 30.2
i 05 36 33
iLgl 05 37 09

cont.

1964 July 14 cont.

Up — microns sec
Pn Z' 0.3 0.5
Sn Z' 0.3 0.5
D = 680 km = 6.1°.
Ki iPn 05 36 49.2
iLgl 05 40 19.3
Sk ePn 05 35 38
iPg 05 36 09.6
iSn 05 36 53.4
iLgl 05 37 32.8
Gb iP^{x} 05 34 38.4 C
iPg 05 34 46.0
eSg 05 35 24
Um iPn 05 36 08.4
i 05 36 16.3
iSn 05 37 45.2
eLgl 05 38 43
e 05 38 11
iRg 05 39 34
Ka iPn 05 35 07.3 C
iP^{x} 05 35 14.6
i 05 35 22.1
iS^{x} 05 36 10.2
iLgl 05 36 25.1
iSg 05 36 31.7
North Sea, between Denmark and Norway (h = 40 km).
At the shortest distance (Gb, 290 km) Sg has the largest amplitudes; at the next distance (Ka, 520 km) Sg and Lgl are about equal, and at all larger distances, Lgl dominates.

" 14 Up iP 10 06 36.4
microns sec
M E 0.6 20
M Z 1.2 19
Ki iP 10 06 41.6
microns sec
M E 0.7 23
M Z 0.9 23
Um iP 10 06 42.1
eS 10 16 02
Ka eP 10 06 33
Puerto Rico (h = 50 km).

" 14 Um iP 12 57 46.3

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July	14	Up	iP	12 59 01.3	
		Ki	eP	12 58 22	
		Sk	eP	12 58 35	
		Um	iP	12 58 44.0	
		Off northern California (h = 30 km).			
"	14	Up	iP	14 08 53.5	C
			microns	sec	
			P Z' 0.1	0.6	
		Ki	iP	14 07 59.6	
			iPcP	14 08 59.6	
			microns	sec	
			P Z' 0.1	1.0	
		Sk	iP	14 08 36.5	
			iPcP	14 09 20.6	
		Gb	iP	14 09 14.2	C
		Um	iP	14 08 25.0	C
			iPcP	14 09 13.6	
		Ka	iP	14 09 17.7	C
			i	14 09 38.3	
		Kamchatka (h = 40 km). Magn. = 5.9 (Up,Ki).			
"	14	Um	iP	15 50 53.4	
"	14	Up	iP	17 30 21.7	D
		Um	iP	17 29 56.3	
		Kurile Islands (h = 30 km).			
"	14	Up	ePKP	18 58 17	
		Ki	ePKP	18 58 14	
		Sk	ePKP	18 58 30	
		West of Macquarie Island (h = 40 km).			
" cont.	14	Up	iP	23 09 17.0	

1964 July cont.	14	Up	iS	23 17 31	
		D = 6700 km = $60\frac{1}{2}^{\circ}$.			
		Ki	iP	23 08 22.8	
			eS	23 15 47	
			microns	sec	
			P Z'	0.1 1.5	
			S N	0.3 9	
			M E	0.3 13	
			M N	0.4 14	
		D = 5900 km = 53°.			
		Sk	iP	23 08 47.9	C
			ipP	23 08 52.9	
		Gb	iP	23 09 28.1	C
			ipP	23 09 32.6	
		Um	iP	23 08 51.0	C
			i	23 09 02.0	
			iS	23 16 42	
		Ka	iP	23 09 39.8	
			ipP	23 09 45.9	
		Alaska. h = 20 km (Sk,Gb,Ka).			
"	14	Um	iPKP	23 31 45.6	
		Kermadec Islands (h = 80 km).			
"	15	Um	iP	03 17 06.5	
"	15	Um	iP	06 41 21.6	
"	15	Um	iP	07 12 24.8	
			e	07 14 00	
"	15	Up	iP	07 36 59.7	
			microns	sec	
			P Z'	0.1 1.0	
cont.					

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July cont. 15 Ki iP 07 36 06.7 C
microns sec
P Z' 0.3 1.1
Sk iP 07 36 37.1 C
Gb iP 07 37 14.4 C
Um iP 07 36 33.2 C
Ka iP 07 37 22.8 C
Aleutian Islands
(h = 30 km).

" 15 Sk iPKP 08 43 41.1
Um iPKP 08 43 36.3
Santa Cruz Islands
(h = 130 km).

" 15 Up iP 09 54 36.3
eS 09 59 08
microns sec
S N 0.3 5
M E 0.4 13
M N 0.5 16
D = 2900 km = 26°.
Ki ---
microns sec
M E 0.8 16
M N 0.3 13
M Z 0.6 13
Sk eP 09 54 58
Gb eP 09 54 09
Um iP 09 55 19.8
Ka iP 09 54 04.2 C
Algeria (h = 40 km).

" 15 Um iP 13 03 41.7

" 15 Up i(P) 14 59 55.8

" 15 Up iP 19 07 27.6 C
microns sec
P Z' 0.1 0.5
Sk iP 19 07 17.5
Gb iP 19 07 48.4 C
Um iP 19 07 02.9
Ka iP 19 07 49.6 C
Kurile Islands (h = 30 km).

" 16 Up iSKP 05 13 46.9
New Hebrides Islands
(h = 120 km).

1964 July 16 Ki iPn 05 28 58.8
iSn 05 29 55.1
iSg 05 30 11.7
D = 430 km = 3.9°.
SKA eSg 73 05 32 44
UME eSn 75 05 30 45
iSg 73 05 31 27.8
Northwest Russia, 68.4 N, 30.6°E. Origin time = = 05 28 00. Explosion?

" 16 Up iP 09 30 56.5
Um iP 09 30 37.4
South of Japan (h = 460 km).

" 16 Up iP 10 48 23.2
Ka iP 10 48 46.6 C
Kurile Islands (h = 30 km).

" 16 Up eP 16 18 32
Ki ---
microns sec
M E 0.6 20
M Z 0.7 17
Um iP 16 18 38.4
Ka iP 16 18 21.5
Indian Ocean (h = 30 km).

" 16 Up iP 17 45 22.3 C
i 17 45 23.3
microns sec
M E 0.4 15
M N 0.5 12
M Z 0.7 14
Ki iP 17 46 24.4
microns sec
P Z' 0.1 1.0
Gb eP 17 45 19
Um iP 17 45 49.4
Ka iP 17 45 07.8
Turkey (h = 60 km).

" 16 Up eSg 18 44 22
Ka eP 18 42 22
iSg 18 42 50.0
eL 18 44 07
A remarkable train (L) of surface waves of low velocity at Ka, possibly a T phase.

" 17 Up iP 02 39 09.6 C
ipP 02 39 43
iS 02 43 00.7
i(pS) 02 43 45

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July cont.	17	Up		microns	sec	
			P	Z'	0.6	0.6
			S	E	3.5	5
			S	N	10	8
			S	Z	3.3	5
			M	E	4.9	10
			M	N	5.5	7
			M	Z	4.8	7
		Ki	iP	02 40 20.5 C		
			isP	02 41 13		
			iS	02 45 05		
			isS	02 46 03		
			i	02 46 34		
			iLi	02 49 39		
			iLgl	02 50 24		
				microns	sec	
			P	Z'	0.3	1.0
			S	N	2.2	9
			M	E	13	16
			M	N	6.2	15
			M	Z	6.9	16
		Sk	iP	02 39 49.8 C		
			ipP	02 40 21.8		
		Gb	iP	02 38 59.2 C		
			iS	02 42 45.0		
		Um	iP	02 39 44.3		
			ipP	02 40 17.8		
			iS	02 43 57		
			isS	02 44 55		
		Ka	iP	02 38 35.1 C		
			iS	02 41 58.2		

Greece. h = 170 km (Up,Ki, Sk,Um). Magn. = 6.2 (Up,Ki). sS at Um has a remarkably large amplitude on all three long-period components, compared to the other phases.

"	17	Up	iP	02 46 22.5 D		
			iS	02 50 04.6		
				microns	sec	
			P	Z'	0.3	0.8
			S	E	5.2	7
		Ki	iP	02 46 44.9		
			iS	02 50 40.0		
				microns	sec	
			S	Z'	0.8	2.0
		Sk	iP	02 46 34.9		
		Gb	iP	02 46 20.1 D		
		Um	iP	02 46 32.0		
		Ka	iP	02 46 14.2		
"	17	Up	iP	04 51 51.1 D		
			iX	04 51 55.5		
			iY	04 52 07.3		

cont.

1964 July cont.	17	Up		microns	sec	
			P	Z'	0.2	0.7
			M	N	1.0	20
			M	Z	1.3	20
		Ki	iP	04 50 59.7 D		
			iX	04 51 04.7		
			iY	04 51 16.1		
				microns	sec	
			P	Z'	0.4	1.0
			M	E	1.6	21
			M	N	0.7	18
			M	Z	1.7	19
		Sk	iP	04 51 35.9 D		
			iX	04 51 42.0		
			iY	04 51 52.3		
		Gb	iP	04 52 11.0 D		
			iX	04 52 16.8		
			iY	04 52 27.8		
		Um	iP	04 51 24.1 D		
			iX	04 51 28.3		
			iY	04 51 38.6		
		Ka	iP	04 52 14.1 D		
			iX	04 52 20.1		
			iY	04 52 31.4		

Kurile Islands. Magn. = 6.3 (Up,Ki). There are three very distinct phases, P, X, Y, on all our Z'-records, roughly of equal amplitude, the average time differences being X - P = 5.3 sec and Y - X = 11.0 sec. One interpretation would be that P is a foreshock, and that X is P of a new shock with Y as pP. This gives a focal depth of about 40 km.

"	17	Up	iPKP	05 13 29.6
		Gb	iPKP	05 13 40.3
		Um	iSKP	05 16 12.8
		Ka	iPKP	05 13 42.3

South of Fiji Islands (h = 500 km).

"	17	Um	iP	15 27 26.6
"	17	Gb	iPKP	19 28 44.6

Tonga Islands (h = 90 km).

"	17	Up	iP	22 01 00.0
			i	22 01 04.5
			i	22 01 14.1
		Um	iP	22 00 35.0

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July cont.	17	Um	i	22 00 49.5		
		Kurile Islands (h = 40 km). Remarkably enough, Up Z' exhibits the same sequence of arrivals as for the shock July 17, 04 51.				
"	17	Up	iP	23 05 41.6		
			ipP	23 05 48.0		
				microns	sec	
			P	Z' 0.2	1.0	
			M	E 0.5	18	
			M	N 0.7	18	
			M	Z 0.9	18	
		Ki	iP	23 04 56.3		
				microns	sec	
			P	Z' 0.1	1.2	
			M	E 0.6	18	
			M	N 0.5	17	
			M	Z 1.1	17	
		Sk	iP	23 05 32.0		
		Gb	iP	23 06 03.7		
		Um	iP	23 05 17.3		
			ePS	23 14 21		
		Ka	iP	23 06 04.6 C		
			i	23 06 28.8		
		Kurile Islands. h = 25 km (Up). Magn. = 5.8 (Up,Ki).				
"	18	Ki	i	00 20 39.6		
			iSg	00 21 08.0		
		Um	iSg	00 22 04.4		
"	18	Um	iP	00 46 38.8		
"	18	Ki	ePn	01 06 41		
			eSn	01 08 11		
			iSg	01 08 55.6		
			D = 820 km = 7.4°.			
"	18	Ki	eP	03 21 23		
		Alaska (h = 30 km).				
"	18	Up	iP	03 45 28.7		
			ipP	03 45 43.8		
			isP	03 45 54.6		
			iS	03 49 37		
			iScP	03 52 34.7		
			iScS	03 56 20		
				microns	sec	
			sP	Z' 0.1	0.6	
			S	E 0.6	4	
			S	N 0.7	4	
			M	E 0.4	8	
			M	N 0.8	10	
			M	Z 0.8	10	

cont.

1964 July cont.	18	Up	D = 2650 km = 24°.			
		Ki	iP	03 46 36.2		
			iS	03 51 38		
			ePcS	03 53 06		
			i	03 53 21.4		
				microns	sec	
			P	Z' 0.1	0.6	
			S	E 0.6	5	
			M	E 4.3	24	
			M	N 0.4	9	
			M	Z 0.6	12	
		Sk	iP	03 46 07.7		
			i(sP)	03 46 47.2		
		Gb	iP	03 45 20.8		
			isP	03 45 51.1		
		Um	iP	03 46 00.5		
			iPP	03 46 46		
			eS	03 50 31		
		Ka	iP	03 44 56.4 C		
			ipP	03 45 12.8		
			isP	03 45 24.8		
			iS	03 48 43.5		
			i	03 51 59.0		
		Dodecanese Islands. h = 100 km (Up,Gb,Ka). Magn. = 5.7 (Up,Ki).				
"	18	Up	iP	12 59 12.3		
		Ki	eP	12 58 58		
		Um	iP	12 59 02.8 C		
			isP	12 59 37.8		
		Celebes (h = 100 km).				
"	18	Up	iP	17 41 12.6		
		Gb	iP	17 41 33.7		
		Kamchatka (h = 100 km).				
"	18	Up	iP	18 32 04.8 C		
"	18	Up	iP	20 16 13.8		
		Kurile Islands (h = 30 km).				
"	18	Up	iP	23 46 22.5		
		Ki	iP	23 45 27.8		
		Sk	iP	23 45 53.3		
		Gb	iP	23 46 33.1 C		
		Um	iP	23 45 56.9		
			iS	23 53 56		
		Ka	iP	23 46 45.5 C		
		Alaska (h = 30 km).				
"	19	Up	iP	03 57 17.4		
"	19	Up	iP	06 06 53.3 C		
			i!	06 07 13.8		
			iPn	06 07 58.8		

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July cont.	19	Up	iPP	06 08 11.6	
			eLgl	06 18 18	
				microns sec	
			PP	Z' 0.1 0.8	
		Ki	iP	06 06 38.3	C
			iPn	06 07 30.9	
			iSn	06 13 38.2	
				microns sec	
			P	Z' 0.2 0.7	
		Sk	iP	06 07 09.0	C
			iPP	06 08 31.2	
		Gb	iP	06 07 22.2	
			iPP	06 08 47.5	
		Um	iP	06 06 38.4	C
			iPn	06 07 37.4	
			iPP	06 07 51.2	
			i(Sn)	06 14 07.3	
		Ka	iP	06 07 09.2	C
			iPP	06 08 32.1	
		Kazakh SSR.			
		Magn. = 6.0 (Up,Ki).			
		Underground explosion.			
		The explosion has evidently			
		produced Pn and Sn propagated			
		to great distances, as well			
		as higher mode waves.			
"	19	Um	iP	06 41 45.4	
"	19	Up	iPKP	07 09 03.4	
		Ki	iPKP	07 08 49.4	C
		Sk	iPKP	07 09 00.4	
		Um	iPKP	07 08 55.8	
		New Hebrides Islands			
		(h = 230 km).			
"	19	Up	iP	12 41 40.7	
		Um	iP	12 41 16.7	D
		Kurile Islands (h = 30 km).			
"	19	Um	i(SKP)	14 02 36	
		Tonga Islands (h = 30 km).			
"	19	Ki		---	
				microns sec	
			M	E 0.2 13	
			M	N 0.2 16	
			M	Z 0.4 15	
		Um	iP	18 23 35.1	
			eS	18 34 11	
		Mindanao (h = 50 km).			
"	20	Ki	i(PKP)	09 55 39.9	
			i	09 55 45.0	
		South Pacific Ocean			
		(h = 30 km).			

1964 July	20	Up	ePKP	10 42 37	
			i	10 42 47.9	
		Ki	iPKP	10 42 17.7	C
			i	10 42 30.3	
				microns sec	
			PKP	Z' 0.2 1.0	
		Sk	iPKP	10 42 32.5	
		Um	iPKP	10 42 26.8	
		New Zealand (h = 110 km).			
"	20	Um	iP	12 55 52.3	
"	20	Up	iP	13 40 25.2	
			ipP	13 40 31.7	
		Ki	eP	13 41 01	
		Um	iP	13 40 40.7	
		Gulf of Aden.			
		h = 25 km (Up).			
"	20	Up	eS	19 13 35	
				microns sec	
			M	E 0.3 18	
			M	N 0.6 15	
			M	Z 0.6 18	
		Ki	iP	19 02 17.5	
			ipP	19 02 25.0	
			eS	19 12 51	
				microns sec	
			S	E 0.3 6	
			S	N 0.6 7	
			M	E 0.6 16	
			M	N 0.9 19	
			M	Z 1.5 18	
			D = 9450 km = 85°.		
		Um	eSKS	19 12 55	
			iS	19 13 17	
			eSS	19 18 54	
		Revilla Gigedo Islands.			
		h = 30 km (Ki).			
"	20	Up	i(P)	21 58 14.5	
			i	21 59 53.4	
"	20	Up	iP	22 48 22.4	
			ipP	22 48 35.8	
		Aleutian Islands.			
		h = 50 km (Up).			
"	20	Up	iPKP	23 02 45.2	C
			i	23 02 56.4	
		Ki	iPKP	23 02 26.4	C
			i	23 02 35.9	
				microns sec	
			PKP	Z' 0.5 1.2	
		Sk	iPKP	23 02 41.1	C
		Um	iPKP	23 02 35.8	C
		New Zealand (h = 220 km).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July	20	KIR	iSg	73	23 07 29.9	
		~~Sk~~	~~eSg~~		~~23 07 34~~	
		UME	iSn	75	23 07 43.0	
			iSg	73	~~23 07 56.8~~	
		Nordlands Fylke, Norway, 66.4°N, 14.7°E. Origin time = 23 06 01.				
"	20	Um	iPKP		23 15 26.9	
			i		23 15 34.2	
		New Zealand (h = 160 km).				
"	21	Up	eS		01 33 10	
				microns	sec	
			M	E 0.7	18	
			M	N 1.4	22	
			M	Z 1.8	22	
		Ki	eP		01 22 06	
			eSKS		01 32 21	
			iS		01 32 32	
				microns	sec	
			SKS	E 0.3	8	
			S	N 0.6	9	
			M	E 1.1	17	
			M	N 1.2	19	
			M	Z 3.4	19	
			D = 9550 km = 86°.			
		Um	iSKS		01 32 38	
			iS		01 32 57	
			iSS		01 38 33	
		Revilla Gigedo Islands (h = 30 km).				
"	21	Up	iPKP		03 06 44.7	
			i		03 06 50.7	
		Ki	ePKP		03 06 23	
		Sk	iPKP		03 06 39.1	
		Um	iPKP		03 06 34.0	
		Kermadec Islands (h = 430 km).				
"	21	Up	iPKP		04 08 07.5 D	
			iSKP		04 11 24.6	
			e		04 17 55	
				microns	sec	
			PKP	Z' 0.6	0.7	
			SKP	Z' 0.8	2.0	
		Ki	e(PKP)		04 07 46	
			iPKP		04 07 55.2	
			e		04 10 35	
			iPP		04 11 09.5	
			i		04 17 12	
				microns	sec	
			PP	Z 1.1	5	
		Sk	iPKP		04 08 01.0	
			iPP		04 11 23.9	
		Gb	iPKP		04 08 17.5	

cont.

1964 July cont.	21	Gb	ipPKP		04 09 08.5	
		Um	iPKP		04 07 56.0 D	
			i		04 10 55	
			iPP		04 11 19.6	
			iSKP		04 11 32.0	
			i		04 17 28	
			iSKSP		04 20 39	
			ePSKS		04 20 58	
			iSS		04 29 03	
		Ka	e(PKP)		04 08 16	
			iPKP		04 08 19.5	
			ipPKP		04 09 11.2	
			iSKP		04 11 44.3	
		Fiji Islands. h = 210 km (Gb,Ka).				
"	21	Ki	eP		07 14 27	
			ipP		07 14 47.7	
		Sk	iP		07 14 39.7	
		Um	iP		07 14 58.9	
		El Salvador. h = 80 km (Ki).				
"	21	Up	iP		07 47 10.9	
			i		07 47 12.4	
"	21	Up	iP		10 03 52.7 D	
			e		10 14 10	
				microns	sec	
			P	Z' 0.1	0.6	
			M	E 1.5	20	
			M	N 1.8	18	
			M	Z 1.7	18	
		Ki	iP		10 02 48.3 D	
			eS		10 08 05	
				microns	sec	
			P	Z' 0.2	1.0	
			S	E 0.3	8	
			M	E 3.0	20	
			M	N 0.9	16	
			M	Z 3.9	22	
			D = 3600 km = 32 1/2°.			
		Sk	iP		10 03 34.5 D	
		Gb	iP		10 04 18.8 D	
		Um	iP		10 03 18.1 D	
			iS		10 08 59	
			iSS		10 11 05	
			iSa		10 11 36	
			iLgl		10 15 12	
		Ka	iP		10 04 23.5	
		Laptev Sea (h = 30 km). Magn. = 5.5 (Up,Ki).				
"	21	Ki	iP		11 55 10.8	
		Sk	iP		11 55 11.7	
		Um	iP		11 54 59.4	
		Iran (h = 50 km).				

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
July 21 Up eP 13 25 49
i(pP) 13 25 59.4
eSKS 13 36 00
microns sec
M E 0.8 18
M N 1.5 19
M Z 1.1 17
Ki iP 13 25 26.4 C
eSKS 13 35 44
microns sec
P Z' 0.2 1.3
SKS E 0.4 9
SKS N 0.3 9
M E 3.1 18
M N 2.6 21
M Z 4.1 18
Sk eP 13 25 52
Um iP 13 25 31.7
iSKS 13 35 53
eSS 13 41 36
Ka eP 13 25 56
Panay (h = 30 km).
Magn. = 6.1 (Ki).

" 21 Um iP 20 43 52.3

" 21 Up iPKP 21 20 26.1 C
Ki iP 21 16 10.3
e 21 19 43
microns sec
M E 0.8 21
M N 0.7 23
M Z 1.0 20
Sk iPKP 21 20 23.7
Gb iPKP 21 20 33.5
Um iP 21 16 21.7
iPKP 21 20 18.2
e 21 21 00
eSKS 21 27 11
i 21 30 28
Ka iPKP 21 20 32.3
New Britain (h = 60 km).

" 22 Ki iPKP 01 25 50.6
Um iPKP 01 25 48.2
Chile (h = 30 km).

" 22 Ki eP 01 59 14

" 22 Up iP 04 49 28.6
Ki iP 04 50 07.3 C
Sk iP 04 50 07.1
Um iP 04 49 45.4
Ka iP 04 49 28.3
Iran (h = 60 km).

1964
July 22 Ki eP 10 45 49
Gulf of California
(h = 30 km).

" 22 Ki iP 18 00 27.6
Alaska (h = 30 km).

" 22 Um iP 20 46 19.8

" 22 Ki iP^x 70 21 09 16.3
iSn 75 21 09 54.7
iSg 73 21 10 03.7
~~D = 370 km = 3.3°~~.
Ska eSg 73 21 11 25
Ume iPg 72 21 09 03.9
iSg 73 21 09 35.7
D = 270 km = 2.4°.
Gulf of Bothnia, near Finnish coast, 65.2°N, 25.0°E. Origin time = = 21 08 17.

" 23 Um i(P) 02 15 15.8 D

" 23 Um iP 05 10 27.1 D
Costa Rica (h = 110 km).

" 23 Um iP 06 47 24.8
i 06 47 30.7

" 23 Um eP 09 33 34
i(S) 09 42 40

" 23 Ki eP 09 51 57
eS 10 01 21
microns sec
M E 0.6 17
M N 0.5 20
M Z 0.7 17
D = 8100 km = 73°.
Sk iP 09 51 23.7
Um iP 09 51 36.2
Atlantic Ocean (h = 30 km).

" 23 Um iP 13 25 34.9

" 23 Um iP 13 28 16.1

" 23 Ki iP 14 28 34.6
Um iP 14 29 02.7
ipP 14 29 11.1
Alaska. h = 30 km (Um).

" 23 Um iP 15 36 49.2
i 15 37 06.2

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July 23 Ki iP 16 05 33.0
Alaska (h = 20 km).

" 23 Um iP 16 59 33.8

" 23 Up iP 19 18 09.6 D
microns sec
P Z' 0.1 0.5
Ki iP 19 17 14.0 D
ipP 19 17 21.4
microns sec
P Z' 0.2 1.0
Sk iP 19 17 41.2 D
Gb iP 19 18 21.4 D
ipP 19 18 28.1
Um iP 19 17 42.8 D
iPcP 19 18 39.6
Ka iP 19 18 33.2 D
ipP 19 18 40.4
Alaska. h = 30 km (Ki,Gb,Ka).
Magn. = 6.0 (Up,Ki).

" 23 Up i(PKP) 19 36 47.9
Argentina (h = 130 km).

" 23 Ki iP 20 53 19.4

" 24 Um iP 01 38 35.1

" 24 Sk iP 01 52 00.3
Um eP 01 52 15
Guatemala (h = 70 km).

" 24 Um iP 03 30 15.7 D

" 24 Up iP 07 01 47.7 C
ePa 07 06 07
i 07 10 25
eS 07 10 41
microns sec
P N 0.9 2
P Z 1.9 2
P Z' 1.5 1.0
S E 1.6 9
S N 2.2 10
M E 15 26
M N 11 19
M Z 10 19
D = 7500 km = 67 1/2°.
Ki iP 07 00 58.6 C
iS 07 09 15
microns sec
P E 0.8 6
P N 1.5 7
P Z 3.2 7
P Z' 0.8 1.5

cont.

1964 July cont. 24 Ki
microns sec
S E 4.4 12
S N 2.2 10
M E 16 21
M N 16 17
M Z 26 18
D = 6650 km = 60°.
Sk iP 07 01 34.8 C
Gb eP 07 02 09 C
Um iP 07 01 21.6 C
iPa 07 05 12
iS 07 09 51
ePS 07 10 15
Ka iP 07 02 10.3 C
Kurile Islands (h = 30 km).
Magn. = 6.7 (Up,Ki).
The phase appearing on Up N 16 sec before S is worth noting. A similar case is observed below, July 24, 13 36.

" 24 Sk iP 07 08 49.9
Um iP 07 08 36.8
Kurile Islands.
Origin time = 06 58 08.
Approximate origin times in this sequence are given only when USCGS has no report.

" 24 Up iP 07 14 43.6 D

" 24 Up iP 07 23 56.9
Ki eP 07 23 06
Sk iP 07 23 44.0
Um iP 07 23 30.6
Kurile Islands (h = 30 km).

" 24 Ki iP 07 45 25.8
Alaska (h = 25 km).

" 24 Up iP 08 23 33.2 C
ePa 08 27 42
iS 08 32 25
microns sec
P E 1.7 7
P N 5.5 9
P Z 11 9
P Z' 1.0 1.0
S E 9.3 14
S N 8.5 10
M E 35 18
M N 75 17
M Z 71 17
D = 7450 km = 67°.

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July 24 cont.

Ki iP 08 22 44.4 C
iPa 08 26 19
iS 08 30 54
i 08 31 07

		microns	sec
P	E	4.0	8
P	N	6.2	8
P	Z	17	9
P	Z'	0.5	0.7
S	N	9.3	10
S	Z	5.2	10
M	E	72	18
M	N	71	18
M	Z	140	18

D = 6650 km = 60°.

Sk iP 08 23 20.4 C
Gb iP 08 23 54.0 C
iS 08 33 20.3
Um iP 08 23 07.3 C
Ka iP 08 23 55.8 C
i 08 23 57.4
i 08 25 55.1
iS 08 33 25.1
Kurile Islands (h = 30 km).
Magn. = 7.0 (Up,Ki).
In this series of Kurile Islands shocks, PZ' at our stations is characterized by a small, slow beginning followed within less than 2 sec by a sharper and much larger onset.

" 24 Up iP 08 28 00.4

" 24 Up iP 08 28 12.6 C
i(pP) 08 28 22.0

		microns	sec
P	Z'	0.1	0.6

Ka iP 08 28 34.1
Kurile Islands.
Origin time = 08 17 18.

" 24 Up iP 08 40 45.4 C

		microns	sec
P	Z'	0.1	0.6

Ki iP 08 39 56.5
Sk iP 08 40 32.3
Um iP 08 40 19.3
Kurile Islands (h = 20 km).

" 24 Up iP 09 11 26.0 D
ipP 09 11 36.5
Ki iP 09 10 37.1
Sk iP 09 11 12.3
Um iP 09 10 59.4
Kurile Islands.
h = 40 km (Up).
Origin time = 09 00 30.

" 24 Up iP 09 12 49.9 C
Sk iP 09 12 36.8
Um iP 09 12 23.7
Kurile Islands.
Origin time = 09 01 55.

" 24 Ka iP 09 16 40.6

" 24 Up iP 09 18 00.9 C

" 24 Up iP 09 18 25.8
Ki iP 09 17 37.1
Sk eP 09 18 13
Gb iP 09 18 46.9
Um iP 09 17 59.5
Kurile Islands (h = 30 km).

" 24 Up iP 09 27 56.5
ipP 09 28 08.0

		microns	sec
P	Z'	0.2	1.0
pP	Z'	0.3	1.2

Ki iP 09 27 07.9

		microns	sec
P	Z'	0.1	1.0

Sk iP 09 27 43.8 C
Gb iP 09 28 18.0
ipP 09 28 27.8
Um iP 09 27 30.8 C
Ka iP 09 28 20.7
Kurile Islands.
h = 40 km (Up.Gb).
Magn. = 5.9 (Up,Ki).

" 24 Up iP 09 46 09.6 C

" 24 Up iP 09 46 15.1
Ki iP 09 45 26.2
e 09 45 43
Sk eP 09 46 02
Um iP 09 45 48.7
Kurile Islands (h = 30 km).

" 24 Up iP 10 13 12.0 C

		microns	sec
P	Z'	0.1	0.7

Ki iP 10 12 23.4
Sk iP 10 12 59.1 C
Gb iP 10 13 32.5 C
Um iP 10 12 46.3 C
Kurile Islands (h = 30 km).

" 24 Up iP 11 03 33.4

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July	24	Um	iP	11 07 42.8	
"	24	Up	iP	11 08 14.0	
				microns	sec
			P	Z' 0.1	1.0
		Ki	iP	11 07 47.5	C
				microns	sec
			P	Z' 0.2	1.0
		Sk	iP	11 08 11.7	C
		Um	iP	11 07 58.7	C
		Mariana Islands (h = 40 km).			
		Magn. = 6.1 (Up,Ki).			
"	24	Up	iP	12 20 22.9	
			ipP	12 20 27.8	
				microns	sec
			P	Z' 0.1	0.6
		Ki	iP	12 19 34.0	
		Sk	iP	12 20 09.8	
			ipP	12 20 14.7	
		Gb	iP	12 20 43.9	
		Um	iP	12 19 56.1	
		Kurile Islands.			
		h = 20 km (Up,Sk).			
"	24	Up	iP	12 46 54.6	
				microns	sec
			P	Z' 0.2	0.7
			M	E 1.0	26
			M	N 1.1	18
			M	Z 1.1	18
		Ki	iP	12 46 06.2	
				microns	sec
			M	E 0.6	15
			M	N 0.8	18
			M	Z 1.6	20
		Sk	iP	12 46 42.5	D
		Gb	iP	12 47 14.9	
		Um	iP	12 46 28.9	
		Ka	iP	12 47 18.4	D
		Kurile Islands (h = 30 km).			
"	24	Up	iP	12 47 15.9	
				microns	sec
			P	Z' 0.1	0.8
		Gb	iP	12 47 36.5	
		Um	iP	12 46 49.8	
		Kurile Islands.			
		Origin time = 12 36 21.			
"	24	Up	iP	12 47 44.1	
				microns	sec
			P	Z' 0.1	1.0
		Sk	iP	12 47 31.1	
		Gb	eP	12 48 05	

cont.

1964 July cont.	24	Um	iP	12 47 18.5	
		Kurile Islands.			
		Origin time = 12 36 49.			
"	24	Up	iP	13 36 12.9	C
			e	13 44 49	
			eS	13 45 03	
				microns	sec
			P	N 0.5	4
			P	Z 1.0	4
			P	Z' 0.4	0.7
			S	E 0.2	5
			S	N 0.9	9
			M	E 3.6	26
			M	N 3.4	19
			M	Z 2.6	20
			D = 7500 km = 67 1/2°.		
		Ki	iP	13 35 24.0	C
			iS	13 43 40	
				microns	sec
			P	E 0.5	7
			P	N 0.6	7
			P	Z 1.2	6
			P	Z' 0.9	2.2
			S	E 1.1	11
			S	N 0.6	9
			M	E 4.5	20
			M	N 3.6	22
			M	Z 9.2	21
			D = 6650 km = 60°.		
		Sk	iP	13 36 00.3	C
		Gb	iP	13 36 33.4	C
		Um	iP	13 35 46.6	C
			iPa	13 39 48	
			eS	13 44 11	
		Ka	iP	13 36 35.7	C
		Kurile Islands (h = 30 km).			
		Magn. = 6.2 (Up.Ki).			
"	24	Um	iPKP	14 06 22.6	
		Solomon Islands (h = 60 km).			
"	24	Um	iP	14 23 41.4	
"	24	Up	iP	14 36 54.4	
				microns	sec
			P	Z' 0.1	1.0
		Ki	iP	14 36 05.4	
		Sk	iP	14 36 41.3	
		Gb	iP	14 37 15.2	
		Um	iP	14 36 28.0	
			ipP	14 36 33.5	
		Kurile Islands.			
		h = 20 km(Um).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July	24	Up	iP	14 58 38.8	
			i	14 58 43.3	
		Ki	iP	14 57 49.9	
		Sk	iP	14 58 25.4	C
		Um	iP	14 58 12.3	
			i	14 58 21.7	
		Kurile Islands (h = 30 km).			
"	24	Up	iP	15 42 33.2	
"	24	Up	iP	16 33 03.0	C
"	24	Up	iP	16 45 22.6	C
				microns	sec
			P	Z' 0.1	0.6
		Ki	iP	16 44 33.8	
				microns	sec
			M	E 0.4	14
			M	N 0.5	17
		Sk	iP	16 45 09.7	C
		Gb	iP	16 45 43.5	
		Um	iP	16 44 56.5	C
			iS	16 53 29	
		Ka	iP	16 45 46.6	
		Kurile Islands (h = 30 km).			
"	24	Up	iP	17 13 42.6	C
			iS	17 22 32	
			iScS	17 23 36	
				microns	sec
			P	N 1.2	4
			P	Z 2.0	4
			P	Z' 0.9	0.9
			S	E 0.4	4
			S	N 2.8	10
			M	E 16	25
			M	N 13	19
			M	Z 19	17
			D = 7500 km = 67 1/2°.		
		Ki	iP	17 12 54.2	C
			iS	17 21 08	
				microns	sec
			P	E 1.1	4
			P	N 1.2	8
			P	Z 3.4	8
			P	Z' 1.4	2.5
			S	E 2.9	13
			S	N 2.2	11
			M	E 23	22
			M	N 17	22
			M	Z 37	21
			D = 6650 km = 60°.		
		Sk	iP	17 13 29.9	C
		Gb	iP	17 14 03.0	C
			i	17 14 04.3	
		Um	iP	17 13 17.0	C

cont.

1964 July cont.	24	Um	iPa	17 17 22	
			iS	17 21 41	
		Ka	iP	17 14 05.1	C
		Kurile Islands (h = 30 km).			
		Magn. = 6.6 (Up,Ki).			
"	24	Up	iP	17 16 29.9	
"	24	Up	iP	17 16 55.9	
				microns	sec
			P	Z' 0.2	1.0
		Sk	iP	17 16 43.3	
		Gb	iP	17 17 16.8	
		Um	iP	17 16 30.0	
		Ka	iP	17 17 17.7	C
		Kurile Islands.			
		Origin time = 17 06 01.			
"	24	Um	iP	17 20 10.8	
"	24	Up	iP	17 28 27.5	D
		Kurile Islands (h = 30 km).			
"	24	Up	iP	18 01 37.3	C
				microns	sec
			P	Z' 0.1	0.6
		Ki	iP	18 00 48.5	
		Sk	iP	18 01 24.5	
		Gb	iP	18 01 58.4	
		Kurile Islands.			
		Origin time = 17 50 42.			
"	24	Um	iP	18 58 54.4	
"	24	Up	iP	19 00 58.5	C
				microns	sec
			P	Z' 0.1	1.0
		Ki	iP	19 00 09.8	C
		Sk	iP	19 00 45.8	C
		Gb	iP	19 01 19.5	
		Um	iP	19 00 32.0	C
		Ka	eP	19 01 22	
		Kurile Islands (h = 30 km).			
"	24	Up	iP	19 02 58.6	
				microns	sec
			P	Z' 0.1	1.0
		Ki	iP	19 02 09.9	
		Sk	iP	19 02 45.9	
		Gb	iP	19 03 19.1	
		Um	iP	19 02 32.6	C
		Kurile Islands (h = 30 km).			
"	24	Up	iP	19 06 10.1	C
			ipP	19 06 21.0	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July cont.	24	Up		microns sec	
			P	Z' 0.1	0.8
		Ki	iP	19 05 21.3	
		Sk	iP	19 05 56.8	
		Gb	iP	19 06 31.0	
		Um	iP	19 05 44.1	C
		Kurile Islands.			
		h = 40 km (Up).			
"	24	Um	iP	19 46 49.5	
		East of Japan (h = 70 km).			
"	24	Up	iP	19 57 08.0	C
"	24	Um	iP	20 29 40.3	
			i	20 29 47.8	
"	24	Ki	iP	20 33 21.0	
			eS	20 36 53	
				microns sec	
			M	E 0.3	13
			M	N 0.3	15
			M	Z 0.8	16
		Sk	iP	20 34 09.6	
		Um	iP	20 34 05.2	C
		Svalbard (h = 30 km).			
"	24	Up	eP	22 05 19	
		Ki	iP	22 04 23.9	
		Sk	iP	22 04 51.9	
		Um	iP	22 04 52.7	
		Alaska (h = 10 km).			
"	24	Up	iP	22 22 33.1	
				microns sec	
			P	Z' 0.1	0.9
		Ki	iP	22 21 44.5	
		Sk	iP	22 22 19.8	
		Gb	iP	22 22 53.9	
		Um	iP	22 22 06.7	
		Ka	iP	22 22 55.9	
		Kurile Islands (h = 30 km).			
"	25	Up	iP	01 43 45.1	
		Ki	iP	01 42 52.5	
		Gb	iP	01 44 05.4	
		Um	iP	01 43 16.7	
		Kamchatka (h = 70 km).			
"	25	Up	iP	02 26 58.8	
			i(pP)	02 27 12.0	
		Ki	iP	02 26 10.5	
		Sk	iP	02 26 45.9	C
		Um	iP	02 26 33.1	
		Kurile Islands (h = 30 km).			
"	25	Up	iP	04 06 47.9	C

1964 July	25	Ki	eP	04 35 35	
"	25	Up	iP	07 23 46.7	
"	25	Up	ePKP	12 39 15	
			i	12 39 26.4	
		Ki	iPKP	12 39 09.3	
			i	12 39 17.9	
			iSKP	12 42 11.4	
				microns sec	
			SKP	Z' 0.1	1.8
		Um	ePKP	12 39 16	
			iSKP	12 42 24.8	
		Ka	ePKP	12 39 24	
		Tonga Islands (h = 210 km).			
"	25	Up	iP	18 15 06.9	
			ipP	18 15 18.6	
				microns sec	
			P	Z' 0.1	1.0
		Ki	iP	18 14 18.7	
		Sk	iP	18 14 54.5	
			ipP	18 15 05.5	
		Gb	eP	18 15 28	
		Um	iP	18 14 40.6	
			i	18 14 46.5	
		Ka	eP	18 15 31	
		Kurile Islands.			
		h = 50 km (Up,Sk).			
"	25	Up	eP	19 45 51	
			ePP	19 50 34	
			eSKKS	19 57 30	
			ePS	20 00 06	
				microns sec	
			M	E 3.1	20
			M	N 5.0	22
			M	Z 6.8	21
		Ki	ePKP	19 49 49	
			iPP	19 50 53	
			eSKS	19 56 41	
			eS	19 58 41	
			ePS	20 00 34	
				microns sec	
			PP	Z 0.9	8
			SKS	E 0.7	10
			S	N 0.3	9
			M	E 4.8	20
			M	N 2.1	19
			M	Z 7.8	23
			(D = 13000 km = 117°).		
		Um	iP	19 46 00	
			ePKP	19 49 45	
			i	19 50 18	
			iPP	19 50 48.9	
			iPS	20 00 25	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
July 25 Ka ePP 19 50 17
cont. Chile (h = 25 km).
Magn. = 6.4 (Up,Ki).

" 25 Up eSKS 21 53 35
microns sec
M E 1.1 22
M N 1.1 22
M Z 1.9 23
Ki eP 21 42 49
i(pP) 21 43 02.8
iSKS 21 53 20
microns sec
(pP) Z' 0.2 1.5
M E 2.1 21
M N 1.8 23
M Z 3.1 22
Halmahera (h = 20 km).
Magn. = 5.8 (Up,Ki).

" 26 KIR iSn 75 04 27 44.6
iSg 73 04 28 05.3
SKA eSg 73 04 30 36
UME iSg 73 04 29 00.5
Northwest Russia,
67.5°N, 30.4°E.
Origin time = 04 26 00.
Explosion?

" 26 Ki iSn 75 04 57 48.0
eSg 73 04 58 08
SKA eSg : 05 00 39
UME eSg : 04 59 03
Northwest Russia,
67.5°N, 30.4°E.
Origin time = 04 56 00.
Explosion?

" 26 KIR iSn 75 05 33 45.3
iSg 73 05 34 08.8
UME iSn 75 05 34 26.0
iSg 73 05 35 01.4
Northwest Russia,
67.5°N, 30.4°E.
Origin time = 05 32 00.
Explosion?

" 26 Gb iPKP 06 47 06.3
Fiji Islands (h = 560 km).

" 26 Um iP 09 33 05.8
i 09 33 17.1

" 26 Up iP 11 55 31.9 D
Ki iP 11 54 40.1

1964
July 26 Up iP 11 55 56.9
Ki iP 11 55 03.0
Um iP 11 55 29.4
Aleutian Islands
(h = 100 km).

" 26 Um iP 13 54 49.1

" 26 Ki iP 14 08 38.6
Sk iP 14 08 24.8
Gb iP 14 08 25.1
Um iP 14 08 40.9
Ecuador (h = 40 km).

" 26 Up iP 18 45 30.8 C
i 18 45 43.4
microns sec
P Z' 0.2 0.7
Ki iP 18 44 42.7 C
microns sec
P Z' 0.1 0.9
M E 0.4 14
M N 0.4 18
M Z 0.7 17
Sk iP 18 45 18.2
Gb iP 18 45 51.5
Um iP 18 45 04.8 C
i 18 45 09.3
Ka iP 18 45 53.5
Kurile Islands (h = 30 km).
Magn. = 6.0 (Up.Ki).

" 26 Ki iP 18 45 27.0
Gb iP 18 46 40.6 C
(Alaska).

" 26 Up iP 19 55 06.8 C
microns sec
P Z' 0.1 0.8
Um iP 19 54 41.4
Ka iP 19 55 28.5 C
Kurile Islands (h = 30 km).

" 26 Up iP 20 37 37.4
Ki iP 20 37 20.5
Talaud Islands (h = 30 km).

" 27 Up iP 00 25 25.9 C
Gb iP 00 25 47.2
Ka iP 00 25 53.9 C
Kamchatka (h = 10 km).

" 27 KIR iPn 74 05 54 05.0
iSn 75 05 55 01.5
iSg 73 05 55 23.4

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 July cont. 27 ~~Ki D = 500 km = 4.5°.~~

SKA iSg 73 05 57 53.9
UME iSn 75 05 55 45.7
iSg 05 56 23.2
Northwest Russia,
67.8°N, 32.0°E.
Origin time = 05 52 55.
Explosion?
In this as well as some similar events, the agreement between the phases at Ki is not quite satisfactory, using Jeffreys-Bullen's travel-time tables. A better agreement between the phases at Ki is achieved by assuming them to be Pn, Sn and Lgl with resp. velocities of 8.3, 4.5 and 3.54 km/sec. However, this interpretation is in conflict with readings at Um and Sk.

" 27 Up iP 15 44 53.8
microns sec
P Z' 0.1 1.0
Ka iP 15 45 16.3
Kurile Islands (h = 30 km).

" 27 Up iP 18 34 44.0
Kurile Islands (h = 30 km).

" 27 Up iP 19 42 12.7
Ki iP 19 41 24.3
Um iP 19 41 46.8
Kurile Islands (h = 30 km).

" 27 Gb iPKP 21 19 47.2
Ka iPKP 21 19 58.3
Tonga Islands (h = 160 km).

" 27 Up iP 23 11 32.3 C
iS 23 20 35
microns sec
P Z 0.4 3
P Z' 0.1 0.9
M E 0.6 16
M N 1.4 17
M Z 1.3 16
D = 7550 km = 68°.
Ki iP 23 10 44.0
eS 23 19 03
microns sec
P Z 0.5 7
P Z' 0.1 1.0
S E 0.5 11
M E 1.5 18

cont.

1964 July cont. 27 Ki
microns sec
M N 1.7 18
M Z 3.2 20
D = 6700 km = 60 1/2°.
Sk iP 23 11 20.8
Gb iP 23 11 52.8
Um iP 23 11 06.0 C
iS 23 19 39
Ka iP 23 11 55.1 C
Kurile Islands (h = 30 km).
Magn. = 5.8 (Up,Ki).

" 28 Up iP 00 36 17.6
Um iP 00 35 51.4
Kurile Islands (h = 30 km).

" 28 Um iP 02 04 32.6

" 28 Up iP 02 06 44.1
Ki iP 02 07 42.9
Gb iP 02 06 39.9
Cyprus.

" 28 Ki e(Pg) 05 20 56
i(Pn) 05 21 00.5
i(Sg) 05 21 09.6
i(Sn) 05 21 13.5

" 28 Up iP 06 30 29.5
Ki iP 06 29 42.9 C
Gb iP 06 30 50.2 C
Um iP 06 30 04.3
Kurile Islands (h = 30 km).

" 28 Up iP 08 31 26.3
Chile-Bolivia (h = 160 km).

" 28 Ki iPKP 12 42 21.2
Sk iPKP 12 42 31.6
Ka iPKP 12 42 27.6 D
Southwest of Tasmania
(h = 30 km).

" 28 Up iP 18 34 59.2
Um iP 18 34 33.3
Kurile Islands (h = 30 km).

" 28 Up iPKP 18 59 40.3
i 18 59 45.7
i 18 59 50.7
microns sec
PKP Z' 0.4 1.5
M E 1.7 18
M N 3.4 19
M Z 4.5 20
Ki ePKP 18 59 43

cont.

Seismological Institute
Uppsala

S E I S M O L O G I C A L B U L L E T I N

U P P S A L A, K I R U N A, S K A L S T U G A N, G Ö T E B O R G,

U M E Å and K A R L S K R O N A

Uppsala	(Up):	59°51.5'N,	17°37.6'E;	h = 14 m
Kiruna	(Ki):	67°50.4'N,	20°25.0'E;	h = 390 m
Skalstugan	(Sk):	63°34.8'N,	12°16.8'E;	h = 580 m
Göteborg	(Gb):	57°41.9'N,	11°58.7'E;	h = 66 m
Umeå	(Um):	63°48.9'N,	20°14.2'E;	h = 16 m
Karlskrona	(Ka):	56°09.9'N,	15°35.5'E;	h = 11 m

A U G U S T 1 - 31, 1964

1964 Aug.	1	Ki	iP	00 07 30.1	
			iS	00 08 45.1	
			eT	00 12 37	
			i	00 13 14.5	
			D = 800 km = 7°.		
		Sk	iP	00 08 06.0	
		Um	iP	00 08 17.4	
		Norwegian Sea (h = 30 km).			
"	1	Ki	iP	00 54 43.5	C
		Sk	iP	00 54 59.5	
		Um	iP	00 54 32.3	
		Ka	iP	00 54 38.9	C
		Hindu Kush (h = 150 km).			
"	1	Ki	iP	01 02 33.1	D
			iS	01 03 49.0	
			eT	01 07 36	
			i	01 08 18.0	
			D = 800 km = 7°.		
		Sk	iP	01 03 08.8	
			eS	01 04 51	
			D = 1050 km = 9½°.		
		Um	iP	01 03 20.3	
		Norwegian Sea (h = 30 km).			
"	1	Ki	ePn	05 12 05	
			iSn	05 13 00.3	
			iSg	05 13 22.7	
			D = 500 km = 4.5°.		
		Um	iSg	05 14 45.1	
		Northwest Russia.			
		Orgin time = 05 10 54.			
		Explosion?			
"	2	Ki	iP	00 25 12.9	
		Kamchatka (h = 30 km).			

1964 Aug.	2	Up	iP	00 50 47.1	
"	2	Ki	iPKP	02 39 14.5	
		Sandwich Islands			
		(h = 90 km).			
"	2	Up	iP	03 14 50.6	
		Ki	iP	03 13 56.1	
				microns	sec
			P	Z' 0.1	1.0
		Sk	iP	03 14 24.1	
		Alaska (h = 30 km).			
"	2	Ki	ePn	05 05 50	
			iSn	05 06 45.6	
			eSg	05 07 05	
		Probably northwest Russia.			
		Explosion?			
"	2	Up	iPP	18 32 46.7	
				microns	sec
			PP	Z' 0.1	1.0
		Peru-Bolivia (h = 5 km).			
"	2	Up	iS	08 55 23	
				microns	sec
			S	E 0.3	5
			M	E 0.8	18
			M	N 1.0	17
			M	Z 1.1	18
		Ki	iP	08 45 54.0	
			iS	08 53 41	
				microns	sec
			P	Z' 0.1	1.0
			S	E 1.1	13
			M	E 1.5	20
			M	N 1.2	19
			M	Z 2.3	19
			D = 6200 km = 56°.		

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. cont.	2	Sk	iP	08 46 19.9	
		Gb	iP	08 46 58.7	
		Um	eP	08 46 22	
			iS	08 54 32	
			iScS	08 56 10	
		Ka	iP	08 47 10.4	
		Alaska (h = 30 km).			
		Magn. = 5.6 (Up,Ki).			
"	2	Up	iP	10 44 23.9	
			microns	sec	
			P Z' 0.1	1.0	
		Ki	iP	10 45 50.2	
		Sk	iP	10 45 02.4	
		Gb	eP	10 43 48	
		Um	iP	10 45 09.3 C	
		Italy (h = 30 km).			
"	2	Ki	iP	16 27 58.7	
"	3	Up	iS	02 09 12	
			microns	sec	
			S E 0.2	5	
			M E 0.5	18	
			M N 1.1	19	
			M Z 0.9	18	
		Ki	eP	01 59 52	
			iS	02 09 14	
			microns	sec	
			S E 0.9	10	
			M E 1.8	18	
			M N 0.9	19	
			M Z 3.2	20	
			D = 8050 km = 72½°.		
		Sk	eP	01 59 37	
		Um	iP	01 59 54.6	
			i	01 59 59.0	
			i	02 09 07	
			iS	02 09 19	
			i	02 09 23	
		Dominican Republic (h = 5 km).			
		Magn. = 5.7 (Up,Ki).			
"	3	Up	iP	04 16 03.2	
		Ki	iP	04 15 14.3 D	
		Kurile Islands (h = 30 km).			
"	3	Up	iP	07 56 36.8 C	
			ipP	07 56 48.7	
			iS	08 06 21	
			microns	sec	
			P Z' 0.2	0.9	
			S E 0.2	5	
			S N 0.3	5	

cont.

1964 Aug. cont.	3	Up		microns	sec
			M	E 1.4	19
			M	N 7.5	24
			M	Z 4.6	18
			D = 8550 km = 77°.		
		Ki	iP	07 56 14.1 C	
			ipP	07 56 25.9	
			eS	08 05 40	
			microns	sec	
			P Z	0.6	5
			P Z'	0.2	1.0
			S N	0.4	11
			M E	2.6	20
			M N	3.0	18
			M Z	2.3	19
			D = 8150 km = 73½°.		
		Sk	iP	07 56 40.9 C	
		Gb	iP	07 56 56.1 C	
		Um	iP	07 56 22.1 C	
			ipP	07 56 32.1	
			iPP	07 59 11	
			iPa	08 00 47	
			eS	08 05 53	
		Formosa. h = 40 km (Up,Ki,Um).			
		Magn. = 6.0 (Up,Ki).			
"	3	Ki	eP	10 54 14	
		Sk	iP	10 53 57.4	
		Um	iP	10 53 45.4	
		Ethiopia.			
"	3	Um	i(P)	12 22 47.2	
			i	12 23 04.8	
"	3	Um	e(P)	14 24 24	
"	3	Ki	iP	17 05 54.1	
		Alaska (h = 20 km).			
"	3	Up PP	iSg	19 10 22.6	
		Sk	i	19 09 44.6	
			iSg	19 10 58.5	
		Gb	iPg	19 08 35.0	
			iSg	19 08 54.0	
		Ka	eSg	19 10 11	
		Skagerack, 58.6°N, 10.1°E.			
		Origin time = 19 08 09.			
"	3	Up PP	i(Sg)	19 11 45.8	
		Sk A	iSg	19 12 12.2	
		Gb	iPg	19 09 47.8	
			iSg	19 10 06.9	
		Ka	iSg	19 11 24.5	
		Skagerack, 58.6°N, 10.1°E.			
		Origin time = 19 09 22.			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. 4 Up iPg 02 42 48.1
iSg 02 43 22.8
microns sec
Sg Z' 0.1 0.5
D = 300 km = 2.7°.
Ki eLgl 02 46 48
iSg 02 47 01.4
Sk e(Lgl) 02 45 37
Um iSg 02 44 49.0
Ka ePg 02 43 18
iSg 02 44 13.6
D = 470 km = 4.2°.
Island of Ösel, the Baltic Sea, 58.5°N, 22.1°E.
Origin time = 02 41 54.
Explosion?
Lgl begins to emerge at distances between 750 and 800 km but is not observed at shorter distances.

" 4 Up e(P) 08 43 57

" 4 Up iP 17 35 14.4 D
ipP 17 35 24.9
eS 17 43 58
iScS 17 45 01
i 17 45 39
microns sec
P N 0.4 3
P Z' 0.3 1.0
S E 0.2 3
M E 0.9 24
M N 1.6 20
M Z 1.9 23
D = 7350 km = 66°.
Ki iP 17 34 26.6 D
ipP 17 34 38.8
ePa 17 38 06
iS 17 42 32
iScS 17 44 07
microns sec
P Z 0.8 4
P Z' 0.1 1.0
S E 1.0 9
M E 2.3 22
M N 1.8 19
M Z 3.8 20
D = 6550 km = 59°.
Sk eP 17 35 03
ipP 17 35 12.5
Gb iP 17 35 35.0
ipP 17 35 46.5
Um iP 17 34 48.2 D
ipP 17 35 00.1

cont.

1964 Aug. 4 cont. Um iS 17 43 11
iScS 17 44 32
Ka iP 17 35 38.2
Kurile Islands. h = 40 km (Up,Ki,Sk,Gb,Um).
Magn. = 6.0 (Up,Ki).
The USCGS depth of 101 km is not confirmed by our observations.

" 4 Um eP 18 03 33

" 4 Up iP 20 48 22.2

" 4 Up iP 23 25 11.3
Ki iP 23 25 56.0
microns sec
P Z' 0.1 0.9
M E 0.9 22
M N 0.7 23
M Z 1.6 22
Um eP 23 25 33
e 23 33 22
Ka iP 23 25 00.8
i 23 25 09.2
Iran-Iraq (h = 30 km).

" 5 Up iP 04 36 25.8
microns sec
P Z' 0.2 0.9
Ki iP 04 35 56.7 C
Sk iP 04 36 26.1
Gb iP 04 36 45.9
Um iP 04 36 08.2
Ryukyu Islands
(h = 140 km).

" 5 Ki iP 05 19 53.7
Philippine Islands
(h = 20 km).

" 5 Ki ePn 05 30 15
iSn 05 31 16.4
iSg 05 31 33.7
D = 500 km = 4.5°.
Sk e 05 33 17
iSg 05 34 08.8
Um iSn 05 32 00
iSg 05 32 39.4
D = 720 km = 6.5°.
Northwest Russia, 68.0°N, 32.3°E.
Origin time = 05 29 05.
Explosion?

" 5 Up iPKP 11 25 19.8 C

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. 5 cont.

Up	i	11 25 24.9	
	i(pPKP)	11 26 34	
	i	11 35 22.0	
	i	11 35 38.5	
		microns	sec
	PKP N	0.5	3
	PKP Z	1.8	3
	PKP Z'	0.5	0.5
	M E	1.7	22
	M N	2.1	25
	M Z	1.5	23
	(D = 16650 km = 150°).		
Ki	iPKP	11 25 03.0	
	iPP	11 28 20.5	
	iSKP	11 28 41	
	e(SKKS)	11 34 38	
		microns	sec
	PKP Z	1.1	5
	PKP Z'	0.3	1.7
	PP Z'	0.2	1.4
	SKP E	0.9	4
	SKP N	0.4	9
	M E	0.8	16
	M N	0.9	21
	M Z	1.7	23
	(D = 16000 km = 144°).		
Sk	iPKP	11 25 16.8	
	i	11 25 31.8	
	ipPKP	11 26 15.5	
	e	11 35 23	

1964 Aug. 5 cont.

Gb	iPKP	11 25 25.3 D
	i	11 25 33.3
	i	11 25 45.1
	i(pPKP)	11 26 34.7
Um	iPKP	11 25 13.8
	ipPKP	11 26 08
	iPP	11 28 28.6
	i	11 34 56
	iSS	11 47 07
Ka	iPKP	11 25 25.6 D
	i	11 25 33.9
	i	11 25 46.2
	i	11 26 47.6

South of Kermadec Islands (h = 240 km).
PKP exhibits an interesting multiplicity on the Z' records in the way that over the range of our stations (144°-154°) a long-period component (period = 2.0 sec) gradually emerges and precedes more short-period components (period = 0.5-1.5 sec) at the more distant stations, as summarized in the following table:

cont.

Station	Distance deg	Long period sec	Short period sec	Interval sec
Ki	144	no separation observable		
Um	146	" "	"	
Sk	149	2.0	(1.5)	2.6
Up	150	2.0	0.5	5.1
Gb	154	2.0	0.8	8.0
Ka	154	2.0	1.5	8.3

The long-period PKP may be related to the P''_L phase, reported by G. Payo Subiza and M. Båth (Geophys. J., 8:496-513, 1964), but here observed for a different distance range.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. 5 Up iPKP 22 42 06.3
i 22 42 09.7
i 22 42 18.4
iPP 22 44 01
microns sec
PKP Z' 0.2 1.4
M E 3.6 21
M N 3.4 21
M Z 7.5 21
(D = 14100 km = 127°).

Ki iPKP 22 42 18.2
i 22 42 27.0
iPP 22 44 25
iPKS 22 45 41
microns sec
PKP Z 1.2 5
PKP Z' 0.7 1.4
PP E 1.5 6
PP N 0.4 6
PP Z 2.3 6
PKS E 2.7 6
PKS N 0.7 6
M E 7.0 24
M N 1.5 19
M Z 7.8 23
(D = 14450 km = 130°).

Sk iPKP 22 42 09.1
Gb iPKP 22 42 04.6
Um iPKP 22 42 16.3 D
iPP 22 44 13
iPKS 22 45 33
iSKKS 22 51 13
iSKSP 22 54 21
iSS 23 01 38
Chile (h = 30 km).
Magn. = 6.7 (Up,Ki).

" 6 Up iP 02 44 50.9 C
microns sec
P Z' 0.2 0.8

Ki iP 02 44 19.1 C
microns sec
P Z' 0.1 1.0

Sk iP 02 44 50.2 C
Gb iP 02 45 11.0 C
Um iP 02 44 32.4
ipP 02 45 19.9
Ka iP 02 45 07.9
Japan. h = 190 km (Um).
Magn. = 5.8 (Up,Ki).

" 6 Ki iP 13 20 35.5
Alaska (h = 30 km).

1964 Aug. 6 Ki iP 16 06 15.4
eS 16 07 56
eT 16 13 49
i 16 14 36.9
D = 1000 km = 9°.

Sk eP 16 07 08
Gb iP 16 08 22.7
Um iP 16 07 07.2
Svalbard (h = 30 km).

" 6 Up iPKP 17 21 53.6
Ki iPKP 17 21 45.7
eSKP 17 24 21
Gb iPKP 17 22 03.6
Um iPKP 17 21 47.9
i 17 21 53.3
iSKP 17 24 32.0
Ka iPKP 17 22 05.8
South of Fiji Islands
(h = 500 km).

" 6 Up iP 18 35 17.6 C
ipP 18 35 27.1
iS 18 43 50
ePS 18 44 04
microns sec
P Z' 0.1 1.0
M E 0.8 17
M N 1.1 18
M Z 1.2 19

Ki iP 18 34 22.9
eS 18 42 08
microns sec
P Z' 0.1 0.9
S E 0.8 9
S N 0.7 8
M E 1.5 20
M N 1.5 17
M Z 1.8 18
D = 6150 km = 55½°.

Sk iP 18 34 50.1 C
Gb iP 18 35 29.1 C
Um iP 18 34 51.3 C
iS 18 43 01
eScS 18 44 37
Ka iP 18 35 39.9 C
Alaska. h = 40 km (Up).
Magn. = 5.6 (Up,Ki).
PZ' is multiple at all our stations, the first P (times given above) being followed after 1.6 sec by a generally greater onset.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. 7 Up iP 05 47 53.0
Ki iP 05 46 59.4 C
microns sec
P Z' 0.1 1.0
Sk iP 05 47 26.2 C
ipP 05 47 33.1
Gb iP 05 48 05.5 C
ipP 05 48 12.3
Um iP 05 47 27.5 C
Ka iP 05 48 16.5
Alaska. h = 30 km (Sk,Gb).

" 7 Ki iP 08 15 44.6 C
Sk iP 08 16 18.0
Um iP 08 16 02.0 C
ipP 08 16 10.3
Japan. h = 30 km (Um).

" 7 Up iPg 10 23 05.6
iSg 10 23 27.1
microns sec
Sg Z' 0.1 0.5
D = 180 km = 1.6°.
Sk e(Lgl) 10 25 48
Um iSg 10 25 24.8
Ka iSn 10 24 03.1
iSg 10 24 13.5
D = 340 km = 3.1°.
The Baltic Sea, 58.5°N, 19.3°E. Origin time = = 10 22 34. Underwater explosion? Indication of Lgl begins to emerge at 600-700 km distance.

" 7 Up iPg 10 23 47.5
iSg 10 24 08.1
microns sec
Sg Z' 0.1 0.5
D = 180 km = 1.6°.
Um iSg 10 26 05.2
Ka iSn 10 24 44.9
iSg 10 24 54.8
D = 340 km = 3.1°.
The Baltic Sea, 58.5°N, 19.3°E. Origin time = 10 23 15. Underwater explosion?

" 7 Up iP 13 50 00.5

" 7 Ki iP 15 43 47.6
microns sec
M E 0.6 15
M N 0.4 15
M Z 0.7 15

cont.

1964 Aug. cont. 7 Sk iP 15 43 40.8
Gb iP 15 43 49.4
Um iP 15 43 55.1
Guatemala (h = 90 km).

" 7 Ki eP 17 26 17
Sk iP 17 27 04.7
Greenland Sea (h = 30 km).

" 7 Up iP 19 06 55.9

" 8 Up iP 09 59 03.2
Ki iP 09 58 09.2
Sk iP 09 58 36.6
Alaska (h = 30 km).

" 8 Up iP 13 20 11.9
i 13 20 24.4
i 13 24 56.0
Ki eP 13 21 49
Sk e 13 27 07
Um eP 13 21 23
e 13 26 30

" 8 Up iP 14 58 31.1
Ki iP 14 58 19.7 C
ipP 14 58 28.3
Sk iP 14 58 47.7
Gb iP 14 58 56.8
Um iP 14 58 19.1
Ka iP 14 58 43.6 C
Sinkiang, China.
h = 30 km (Ki).

" 8 Up iP 15 11 24.6 D
i 15 11 33.5
ipP 15 11 50.4
microns sec
P Z' 0.7 0.8
Ki iP 15 10 49.6 D
e 15 20 37
microns sec
P Z 0.6 4
P Z' 0.5 1.1
M E 0.4 17
M N 0.7 20
M Z 0.7 17
Sk iP 15 11 20.6 D
iPP 15 14 09.5
Gb iP 15 11 43.8 D
ipP 15 12 11.5
Um iP 15 11 04.8 D
iPP 15 13 46.1
iPa 15 15 26
i 15 21 12
Ka iP 15 11 41.7 D

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. cont.	8	Ka	ipP	15 12 09.2
			iPP	15 14 45.1
		South of Japan.		
		h = 110 km (Up, Gb, Ka).		
		Magn. = 6.4 (Up,Ki).		
"	8	Up	eP	15 57 47
			iPP	16 01 12.4
		Ki	iP	15 57 40.6
			i	15 58 07.0
			eSKS	16 07 56
			microns	sec
			P Z' 0.1	1.5
			M E 0.5	18
			M N 0.7	20
			M Z 0.7	17
		Sk	eP	15 57 31
			ePP	16 00 46
		Um	iP	15 57 46.5
			i	15 58 09.7
			i	16 00 23.0
			iSKS	16 08 07
		Ka	iP	15 58 10.9
		Nicaragua (h = 60 km).		
"	8	Up	eP	20 18 44
		Ki	iP	20 18 42.6
			microns	sec
			P Z' 0.1	1.6
		Sk	eP	20 18 22
		Gb	iP	20 18 29.3 C
		Um	iP	20 18 46.4
		Ka	iP	20 18 41.1
		Haiti (h = 10 km).		
"	9	Up	iP	05 30 01.2 D
		Ki	iP	05 29 10.4 D
		Gb	eP	05 30 22
		Um	iP	05 29 33.9
		Sea of Okhotsk (h = 510 km).		
"	9	Um	iP	14 30 44.7
"	9	Ki	iP	20 19 55.8
			microns	sec
			M E 0.5	18
			M Z 0.8	18
		Um	eSKS	20 30 32
		Molucca Sea (h = 60 km).		
"	10	Up	iP	01 21 28.8
			eS	01 30 42
			microns	sec
			M E 0.5	18
			M N 0.7	18
			M Z 1.1	18

cont.

1964 Aug. cont.	10	Up	D = 7900 km = 71°.	
		Ki	iP	01 21 32.4
			eS	01 30 48
			microns	sec
			P Z' 0.1	1.5
			S E 0.4	12
			S N 0.3	10
			M E 0.6	21
			M N 0.4	18
			M Z 1.6	22
			D = 7950 km = 71½°.	
		Sk	iP	01 21 12.6
			iP'P'	01 49 25.9
		Gb	eP	01 21 13
		Um	iP	01 21 34.0
			i	01 21 40.3
			iS	01 30 54
		Ka	iP	01 21 24.2
		Mona Passage (h = 30 km).		
"	10	Sk	iP	07 50 25.7
"	10	Up	iP	17 10 32.2
		Ki	iP	17 10 43.2 D
			microns	sec
			P Z' 0.1	0.9
		Sk	iP	17 10 21.2 D
		Gb	eP	17 10 12
		Um	iP	17 10 40.6
			i	17 11 04.7
		Ka	iP	17 10 24.6
		Venezuela (h = 50 km).		
"	10	Up	iP	18 03 00.5 C
			iPcP	18 03 26.3
		Ki	eP	18 02 11
			microns	sec
			M E 0.4	17
			M N 0.4	15
			M Z 0.3	14
		Sk	iP	18 02 49.4
		Gb	iP	18 03 21.2
		Um	iP	18 02 34.8 C
		Ka	iP	18 03 22.5 C
		Kurile Islands (h = 40 km).		
"	10	Sk	eP	18 26 48
		Um	iP	18 26 18.5
		Iran (h = 15 km).		
"	10	Up	iP	18 34 39.9 C
		Gb	eP	18 35 02
"	10	Up	iP	20 27 55.8
		Ki	iP	20 27 08.6
		Sk	eP	20 27 45

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. cont.	10	Gb	iP	20 28 16.6	C
		Um	iP	20 27 29.3	
		Ka	iP	20 28 17.7	
		Kurile Islands (h = 30 km).			
"	10	Up	iP	20 50 29.7	
"	10	Um	iPKP	21 58 37.4	
		Solomon Islands (h = 110 km).			
"	11	Up	iPKP	02 13 21.0	
		Gb	iPKP	02 13 27.3	
		Um	iPKP	02 13 15.0	
		Ka	iPKP	02 13 27.4	
		Solomon Islands (h = 430 km).			
"	11	Ki	eSn	05 25 03	
			iSg	05 25 20.4	
		Um	eSg	05 26 27	
		Northwest Russia.			
		Origin time = 05 22 52.			
		Explosion?			
"	11	Ki	iP	13 47 15.1	
		Nicobar Islands (h = 30 km).			
"	12	Up	iP	02 42 10.3	
		Ki	eP	02 42 45	
		Iran (h = 40 km).			
"	12	Up	iP	06 02 11.1	
		Gb	i(P)	06 02 42.8	
"	12	Up	iP	07 02 22.4	C
			ipP	07 02 53.8	
			microns	sec	
			P Z'	0.3 0.6	
		Ki	iP	07 01 32.8	C
			microns	sec	
			P Z'	0.1 0.5	
		Sk	iP	07 02 09.5	
			iPP	07 04 26.1	
		Gb	iP	07 02 43.1	C
			isP	07 03 22.6	
		Um	iP	07 01 55.8	C
			isP	07 02 35.9	
			eS	07 10 07	
		Ka	iP	07 02 45.8	C
		Kurile Islands.			
		h = 120 km (Up,Gb,Um).			
		Magn. = 6.2 (Up,Ki).			
"	12	Ki	e	16 35 30	
			iSg	16 35 52.8	

1964 Aug.	12	Up	iP	19 33 25.3	
			eS	19 38 54	
			microns	sec	
			M E	0.8 20	
			M N	0.9 18	
			M Z	0.7 15	
			D = 4000 km = 36°.		
		Ki	iP	19 34 05.7	
			eS	19 40 13	
			eSS	19 43 22	
			microns	sec	
			S E	0.3 6	
			M E	0.7 15	
			M N	0.6 14	
			M Z	0.6 12	
			D = 4550 km = 41°.		
		Sk	iP	19 34 01.7	
		Gb	iP	19 33 36.2	
		Um	iP	19 33 40.8	
			i(pP)	19 33 52.7	
			iPP	19 35 06	
			iS	19 39 29	
			iSS	19 42 11	
		Ka	iP	19 33 14.4	
		Iran (h = 30 km).			
"	13	Up	iP	00 45 30	
			epP	00 46 59	
			ePKP	00 49 13	
			iPP	00 50 21.8	
			iPKKP	00 59 43.3	
			iSKKP	01 02 53.4	
			eSS	01 05 58	
			microns	sec	
			PKP Z'	0.1 0.5	
			PP E	0.6 6	
			PP N	1.0 5	
			PP Z	3.5 7	
			PP Z'	0.2 1.3	
			PKKP Z'	0.1 0.6	
			M E	1.7 18	
			M N	4.0 18	
			M Z	3.9 20	
			(D = 12800 km = 115°).		
		Ki	iP	00 45 02.6	
			iPKP	00 49 04.4	
			iPP	00 49 37	
			i(PP)	00 49 47.1	
			epS	00 58 33	
			iPKKP	01 00 01.7	
			i	01 00 15.8	
			microns	sec	
			PP E	1.1 6	
			PP N	0.6 7	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Aug. 13 Ki microns sec
cont. PP Z 2.1 7
(PP) Z' 0.7 1.8
M E 4.8 20
M N 2.7 20
M Z 5.1 18
(D = 12200 km = 110°).
Sk eP 00 45 28
iPKP 00 49 11.9
iPP 00 50 23.3
iPKKP 00 59 45.1
Gb ePKP 00 49 19
i 00 49 21.7
i 00 49 47.3
iPP 00 50 33.9
ePKKP 00 59 29
i 00 59 33.2
Um eP 00 45 16
i 00 45 23.5
ipP 00 46 38
iPKP 00 49 06.2
iPP 00 49 50
i(PP) 00 50 00.3
ipS 00 58 52
ePKKP 00 59 46
i 00 59 53.3
iSS 01 04 53
Ka iPKP 00 49 19.6
iPP 00 50 39.5
Solomon Islands (h = 380 km).
Magn. = 6.8 (Up,Ki).
At Ki and Um, PPZ' shows a clear onset 10 sec after PP on the long-period records.

" 13 Ki iP 04 42 07.7 C
iPP 04 46 26.7
Banda Sea (h = 130 km).

" 13 Up iP 06 04 23.5

" 13 Um iP 10 06 09.8

" 13 Um iP 10 25 44.4

" 13 Ki eP 10 44 49
microns sec
M E 0.3 15
M N 0.5 12
M Z 0.8 12
Sk iP 10 44 17.3
Um eP 10 44 10
Crete (h = 30 km).

1964
Aug. 13 Up iP 18 38 06.2
Ki eS 18 49 09
microns sec
M E 0.6 20
M N 0.3 16
M Z 0.6 16
Um iP 18 38 29.4
Ascension Island
(h = 30 km).

" 14 Um iP 03 24 44.4

" 14 Um e(Sg) 15 00 27.6

" 14 Ka iP 15 55 32.5

" 14 Up e(P) 17 00 11
i 17 04 46.0

" 14 Up iP 20 45 52.0

" 14 Up iP 21 38 28.3
eS 21 47 15
microns sec
S N 0.7 14
M E 1.4 24
M N 2.0 20
M Z 2.5 22
D = 7350 km = 66°.
Ki iP 21 39 01.4
microns sec
M E 1.1 20
M N 0.5 17
M Z 1.5 18
Sk iP 21 38 29.4
Gb iP 21 38 05.6
Um eP 21 38 50
iS 21 47 55
iSS 21 52 19
Ka iP 21 38 20.2
Atlantic Ocean (h = 30 km).

" 15 KIR iSn 05 09 51.7
iSg 05 10 09.4
~~D = 500 km = 4.5°.~~
UME iSn 05 10 35.9
iSg 11 16
cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. cont. 15 Um iSg 05 11 15.6
D = 720 km = 6.5°.
Northwest Russia,
68.0°N, 32.3°E.
Origin time = 05 07 41.
Explosion?

" 16 Ki eP 11 51 26
Um iP 11 51 33.1
i 11 51 46.0
Japan
(h = 70 km).

" 16 Ki iP 12 47 10.2
Alaska
(h = 60 km).

" 16 Up iP 16 00 14.1
Iran
(h = 30 km).

" 16 Up iP 21 34 53.3 C
i 21 37 10.5
iSn 21 40 29.4
Ki iP 21 35 24.6 C
iPn 21 36 24.3
eSn 21 42 12
Sk iP 21 35 27.7
iPP 21 36 39.4
Gb iP 21 35 10.2 C
Um iP 21 35 01.9
i 21 35 13.1
iSn 21 41 16.4
i 21 42 07.2
Ka iP 21 34 48.6 C
Caspian Sea
(h = 30 km).
Clear Sn waves are recorded on Z', especially at Up, Ki, Um, in the distance range of about 29°-33°, the average group velocity of the first onset being 4.60 km/sec. Ki Z' in addition has a clear Pn, velocity = 8.09 km/sec.

1964 Aug. 17 Up eP 00 23 09
i 00 23 23.2
microns sec
M E 0.6 12
M N 0.6 13
M Z 0.5 15
Ki iP 00 24 14.8
microns sec
M E 1.7 19
M N 0.7 11
M Z 0.7 11
Sk iP 00 23 46.4
Um eP 00 23 45
eS 00 28 51
Ka iP 00 22 26.9
i 00 22 34.6
Crete
(h = 20 km).

" 17 Ki ---
microns sec
M E 0.5 14
M N 0.2 10
M Z 0.5 14
Sk iP 09 12 23.7
Um iS 09 17 42
North Atlantic Ocean
(h = 40 km).

" 17 Up iP 12 02 16.4
Ki iP 12 01 29.0
microns sec
M E 0.3 18
M N 0.5 20
M Z 0.9 19
Gb iP 12 02 36.9
Um iP 12 01 50.1
Ka iP 12 02 38.7 C
Kurile Islands
(h = 30 km).

" cont. 17 Ki iPKP 12 02 56.7

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. 17 cont.

Ki	iSKP	12 05 21.0	
Um	iPKP	12 03 03.1	
	iSKP	12 05 33.2	
Ka	iPKP	12 03 11.7	

Fiji Islands
(h = 650 km).

" 17 Up	iP	14 53 02.9	C
Ki	iP	14 52 56.7	C
Sk	iP	14 53 18.7	
Um	iP	14 52 55.0	
Ka	iP	14 53 10.9	C

Burma-India
(h = 180 km).

" 17 Up	iP	15 05 02.0		C
		microns	sec	
	P	Z' 0.1	0.9	
Ki	iP	15 04 18.4		C
		microns	sec	
	P	Z' 0.1	1.0	
Sk	iP	15 04 53.4		
Gb	iP	15 05 23.1		C
Um	iP	15 04 36.8		
	eS	15 13 13		
Ka	iP	15 05 23.0		C

Japan
(h = 30 km).
Magn. = 5.7 (Up,Ki).

" 17 Up	iP	15 18 35.0		C
	iS	15 21 31		
	i	15 21 57		
		microns	sec	
	P	N 0.6	3	
	P	Z' 0.2	1.0	

cont.

1964 Aug. 17 cont.

Up

	microns	sec	
M	E 1.5	20	
M	N 4.9	20	
M	Z 5.5	21	

D = 1550 km = 14°.

Ki	iP	15 17 12.3	C
	i	15 17 22.4	
	iS	15 18 37.9	
	i	15 18 45	
	iT	15 22 32.5	
	i	15 23 06.8	
	i	15 23 28.4	
	microns	sec	
P	E 1.1	9	
P	N 1.1	10	
P	Z 0.9	9	
P	Z' 0.1	0.7	
S	E 1.7	9	
S	Z' 0.3	0.9	
M	E 11	17	
M	N 6.3	20	
M	Z 16	18	

D = 830 km = 7.5°.

Sk	iP	15 17 25.4	
	eS	15 19 16	
	i(T)	15 27 25.8	
Gb	iP	15 18 53.1	
	i	15 18 59.5	
	iS	15 22 09.9	
Um	iP	15 17 54.8	
	iS	15 19 50.4	
Ka	iP	15 19 16.1	C
	iS	15 22 35.7	

Norwegian Sea
(h = 30 km).

" 17 Ki	eP	16 40 53		
		microns	sec	
	M	E 0.6	17	
	M	Z 0.8	18	
Sk	iP	16 41 18.1		

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964					
Aug. cont.	17	Um	iP	16 41 36.8	
		Jan Mayen (h = 30 km).			
"	17	Up	iP	16 49 40.1	C
			microns	sec	
			P Z' 0.1	0.8	
		Ki	iP	16 48 47.1	C
			microns	sec	
			P Z' 0.1	0.7	
		Sk	iP	16 49 20.6	
		Gb	iP	16 49 57.1	
		Um	iP	16 49 12.6	
		Ka	iP	16 50 03.5	
		Aleutian Islands (h = 40 km).			
		Magn. = 5.8 (Up,Ki).			
"	17	Ki	eP	21 43 17	
			iS	21 44 39.0	
			eT	21 49 10	
			microns	sec	
			M E 0.5	16	
			M Z 0.6	16	
		Sk	iP	21 43 39.5	
			iS	21 45 22.6	
		Um	iP	21 43 59.7	
		Ka	iP	21 45 22.3	
		Norwegian Sea (h = 30 km).			
"	17	Ki	iP	21 51 55.1	
		Um	iP	21 52 21.4	
			ipP	21 52 30.8	
		Aleutian Islands.			
		h = 40 km (Um).			
"	17	Up	iPKP	22 22 00.6	
		Gb	iPKP	22 22 10.5	
		South of Fiji Islands			
		(h = 30 km).			
"	17	Up	iP	22 35 36.2	D
		Ki	eP	22 36 44	
		Gb	iP	22 35 47.7	
		Crete.			
"	17	Up	eP	22 53 14	
		Ki	eP	22 53 34	
			microns	sec	
			M E 0.4	14	
			M N 0.2	12	
			M Z 0.5	14	
		Sk	iP	22 52 53.5	
		Gb	iP	22 52 49.8	
		North Atlantic Ocean			
		(h = 40 km).			

1964					
Aug.	18	Um	iP	00 38 33.7	
		Yugoslavia (h = 30 km).			
"	18	Ki	iP	00 40 14.2	C
			ipP	00 40 52.6	
		Peru-Brazil.			
		h = 150 km (Ki).			
"	18	Up	iP	04 46 47.9	
		Ki	eP	04 46 04	
		Japan (h = 30 km).			
"	18	Up	i	05 01 46	
			iPP	05 04 19	
			iSKS	05 10 13	
			iPKKP	05 13 50	
			microns	sec	
			M E 1.5	20	
			M N 2.0	20	
			M Z 4.5	23	
		Ki	iPKP	05 03 40.5	
			iPP	05 04 38.6	
			iSKS	05 10 28	
			iS	05 12 26	
			iPKKP	05 14 15.9	
			microns	sec	
			PP Z 0.6	5	
			SKS E 0.5	7	
			S N 0.3	8	
			M E 2.5	21	
			M N 1.5	19	
			M Z 3.5	21	
		(D = 12800 km = 115°).			
		Sk	iPKKP	05 14 30.6	
		Um	iPP	05 04 33	
			iSKS	05 10 23	
			eS	05 12 20	
			ePKKP	05 14 03	
			iSS	05 20 27	
		Chile (h = 10 km).			
		Magn. = 6.2 (Up,Ki).			
"	18	Um	e(P)	05 18 33	
			iSg	05 18 54.9	
"	18	Up	eP	11 20 56	
		Ki	iP	11 21 19.8	C
		Sk	eP	11 21 19	
		Um	iP	11 21 04.0	
		Indian Ocean (h = 30 km).			
"	18	Up	iP	15 36 30.1	
		Ki	iP	15 37 02.3	
			microns	sec	
			P Z' 0.1	1.2	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964					
Aug.	18	Sk	eP	15 37 18	
cont.		Um	iP	15 36 43.5	
		Indian Ocean (h = 30 km).			
"	18	Ki	iP	15 41 11.9	
"	18	Up	iP	16 16 21.2	D
				microns sec	
			P	Z' 0.1 0.5	
"	19	Ki	eP	03 44 49	
		Sk	eP	03 45 13	
			iS	03 46 52.9	
		Um	iP	03 45 32.9	
		Norwegian Sea.			
"	19	Up	iP	09 40 36.9	
			ipP	09 40 46.6	
			eS	09 46 35	
			iSa	09 49 08	
			eSS	09 49 23	
				microns sec	
			P	Z' 0.1 0.6	
			S	E 0.5 11	
			M	E 1.1 20	
			M	N 2.4 20	
			M	Z 4.5 23	
			D = 4350 km = 39°.		
		Ki	iP	09 41 14.3	C
			iPP	09 43 05.7	
			iS	09 47 46	
			eSS	09 50 52	
			iScS	09 51 15.3	
				microns sec	
			P	E 0.4 5	
			P	N 0.3 7	
			P	Z 0.6 4	
			P	Z' 0.1 1.0	
			PP	N 0.5 5	
			PP	Z 0.5 5	
			PP	Z' 0.1 1.0	
			S	E 0.7 10	
			S	N 0.4 6	
			S	Z 0.7 9	
			M	E 4.0 16	
			M	N 2.2 13	
			M	Z 6.1 18	
			D = 4900 km = 44°.		
		Sk	iP	09 41 12.0	C
		Gb	iP	09 40 47.8	C
		Um	iP	09 40 50.4	C
			iPP	09 42 28	
			iS	09 47 00	
			iSS	09 50 00	
		Ka	eP	09 40 26	

cont.

1964					
Aug.	19	Iran. h = 50 km (Up).			
cont.		Magn. = 5.8 (Up,Ki).			
		Well developed higher mode surface waves. At Um and Ki, SS may be mixed up with Sa and no clear separation is possible.			
"	19	Up	iP	15 27 41.2	C
			ePP	15 29 16	
			e(SS)	15 36 38	
				microns sec	
			P	Z' 0.1 0.6	
			M	E 1.3 17	
			M	N 3.2 20	
			M	Z 2.9 22	
		Ki	iP	15 28 18.7	C
			ePP	15 30 07	
			eS	15 34 49	
			eSS	15 37 57	
				microns sec	
			P	E 0.3 7	
			P	N 0.3 7	
			P	Z 0.4 7	
			PP	N 0.4 7	
			PP	Z 0.4 8	
			S	N 0.3 7	
				microns sec	
			M	E 4.7 19	
			M	N 2.3 20	
			M	Z 2.8 16	
			D = 4900 km = 44°.		
		Sk	iP	15 28 16.5	C
		Gb	iP	15 27 52.3	C
			i(pP)	15 28 06.9	
		Um	iP	15 27 55.1	C
			iPP	15 29 30	
			ePcS	15 33 45	
			eS	15 34 05	
			iSS	15 37 07	
		Ka	iP	15 27 30.8	C
		Iran (h = 50 km).			
		Magn. = 5.7 (Up,Ki).			
"	19	Up	iP	22 47 43.1	
		Ki	iP	22 48 21.1	
				microns sec	
			M	E 0.6 18	
			M	N 0.4 14	
			M	Z 0.7 17	
		Sk	eP	22 48 18	
		Gb	iP	22 47 54.0	
		Um	iP	22 47 59.2	
			iS	22 54 07	
			iSS	22 57 03	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Aug. 19 Ka iP 22 47 32.6 C
cont. Iran (h = 60 km).

" 20 Up iP 02 11 30.8
iPP 02 11 45.3
iS 02 14 29
microns sec
P N 0.2 3
M E 0.7 19
M N 2.7 19
M Z 2.6 20
D = 1550 km = 14°.
Ki iP 02 10 09.2
iPP 02 10 18.2
iS 02 11 35.5
iSS 02 11 48
eT 02 15 41
i 02 16 43.9
microns sec
P E 0.6 10
P N 0.5 10
P Z 0.5 10
PP Z' 0.3 1.2
M E 5.6 17
M N 1.8 16
M Z 8.1 18
D = 830 km = 7.5°.
Sk iP 02 10 32.8
iS 02 12 14.8
Gb iP 02 11 57.0
i 02 12 02.5
Um iP 02 10 52.3 C
iS 02 12 47.3
iT 02 16 28.5
Ka iP 02 12 13.2
Norwegian Sea (h = 30 km).

" 20 Up eP 04 00 42
iS 04 04 11
i 04 05 32
microns sec
P E 0.2 4
S E 0.2 4
S N 1.9 13
M E 1.2 21
M N 2.8 20
M Z 2.1 19
D = 2050 km = 18 1/2°.
Ki iP 04 00 23.1
e 04 01 11
iS 04 03 41
microns sec
P Z' 1.0 2.5
S E 1.3 8
S N 0.6 8

cont.

1964
Aug. 20 Ki microns sec
cont. S Z 1.0 7
M E 2.1 18
M N 1.9 15
M Z 3.1 18
D = 1900 km = 17°.
Sk eP 03 59 57
Gb iP 04 00 24.8
i 04 00 29.5
Um eP 04 00 33
i 04 00 40.3
iS 04 03 53
Ka eP 04 00 54
Iceland (h = 30 km).
Magn. = 5.1 (Up,Ki).
The doubling of the P phases (on Z') is quite typical for Icelandic earthquakes, at least as recorded at our stations. In this case this feature is particularly clear at Gb and Um (a small forerunner followed by a larger phase after about 5-7 sec).

" 20 Up iP 04 30 03.1
i 04 30 19.7
Ki iP 04 30 04.4
Sk eP 04 30 21
Um iP 04 30 00.4
Sumatra (h = 90 km).

" 20 Up iP 05 16 18.5 C
microns sec
M N 0.8 20
M Z 0.8 23
Ki iP 05 16 55.5 C
iPP 05 18 38.6
microns sec
M E 1.0 19
M N 0.5 17
M Z 1.0 18
Sk iP 05 16 53.0 C
Gb iP 05 16 29.2 C
Um iP 05 16 31.9 C
iS 05 22 43
iSS 05 25 46
i 05 27 29
Ka iP 05 16 07.9 C
Iran (h = 50 km).

" 20 Up iP 05 47 14.6 C
microns sec
P Z' 0.1 0.6

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. 20 cont.

Up
microns sec
M E 0.7 18
M N 1.2 20
M Z 1.5 23

Ki iP 05 47 52.0 C
iPP 05 49 38.0
eSS 05 57 43
e 05 59 31
microns sec
P Z 0.4 5
P Z' 0.3 1.5
PP Z 0.4 4
M E 0.9 15
M N 1.7 15
M Z 2.5 18

Sk iP 05 47 49.6 C
iPcP 05 49 45.7

Gb iP 05 47 25.4 C

Um iP 05 47 28.3
eS 05 53 35
eSS 05 56 26

Ka iP 05 47 04.3 C
iPP 05 48 49.8

Iran (h = 50 km).
Magn. = 5.8 (Up,Ki).

" 20 Up ---
microns sec
M N 0.5 18

Ki iP 10 33 07.5 C
eT 10 39 28
microns sec
M E 0.7 17
M N 0.4 17
M Z 1.1 17

Sk iP 10 33 22.2
iS 10 35 00.5

Um iP 10 33 42.5

Norwegian Sea (h = 30 km).

" 20 Um iPS 13 17 27
Indian Ocean (h = 30 km).

" 20 Up iP 16 33 14.5
microns sec
P Z' 0.1 1.0
M E 0.4 19
M N 1.0 17
M Z 1.4 18

Ki iP 16 31 51.7 D
eS 16 33 14
eT 16 37 38
i 16 38 37.0
microns sec
P E 0.3 8
P N 0.3 9

cont.

1964 Aug. 20 cont.

Ki
microns sec
P Z' 0.1 1.2
M E 2.5 16
M N 0.9 16
M Z 2.8 16
D = 830 km = 7.5°.

Sk iP 16 32 15.6
iS 16 33 57.5

Gb eP 16 33 38

Um iP 16 32 35.6 D
i 16 34 05.6

Ka iP 16 33 55.8 C

Norwegian Sea (h = 30 km).

" 20 Up iP 21 04 43.9
microns sec
P Z' 0.1 0.5

" 20 Ki iP 23 02 47.7
Iran (h = 80 km).

" 21 Up eP 08 06 46
iPP 08 08 14
eS 08 12 43
microns sec
M E 0.5 18
M N 0.9 21
M Z 1.0 21
D = 4400 km = 39 1/2°.

Ki iP 08 07 20.0 C
eSS 08 17 03
microns sec
M E 1.9 20
M N 0.8 18
M Z 0.9 17

Sk iP 08 07 17.7

Um iP 08 06 56.8
iS 08 13 07
iSS 08 16 09

Ka iP 08 06 36.6
i 08 06 46.2

Iran (h = 50 km).

" 21 Um iP 16 30 55.6

" 21 Up eP 16 54 29
i 16 54 42.2
microns sec
M N 0.7 18

Ki eP 16 55 21

Sk eP 16 55 32

Gb iP 16 54 40.8
e 16 54 52
i(PP) 16 55 09.8

Um iP 16 54 47.0
iPP 16 55 26.8

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. cont.	21	Um	eS	16 59 26	
		Ka	iP	16 54 16.8	C
			iPP	16 54 46.4	
		Turkey (h = 40 km).			
"	21	Ki	e(P)	19 22 29	
"	21	Sk	eP	23 34 36	
		Um	eP	23 34 48	
			i	23 37 38.1	
"	22	Ki	iP	03 15 04.6	
			microns	sec	
			M E	0.6 14	
			M N	0.3 13	
			M Z	0.6 13	
		Sk	iP	03 15 10.7	
		Um	iP	03 15 23.0	
		Gulf of California (h = 15 km).			
"	22	Up	iP	17 10 14.0	
		Ki	iP	17 10 37.5	
			microns	sec	
			M E	0.3 13	
		Sk	iP	17 09 52.3	
		Gb	iP	17 09 49.6	
		Ka	iP	17 10 08.9	
			i	17 10 12.5	
		North Atlantic Ocean (h = 30 km).			
"	22	Ki	i	17 33 54	
			microns	sec	
			M E	0.9 18	
			M N	0.7 18	
			M Z	1.0 18	
		Sk	eP	17 29 04	
		Um	eP	17 29 37	
			i	17 30 18.9	
"	22	Up	eP	18 15 33	
"	23	Ki	eP	03 01 21	
		Sk	eP	03 00 53	
		Um	iP	03 01 23.8	C
		North Atlantic Ocean (h = 30 km).			
"	23	Ki	eP	04 52 54	D
		Sk	iP	04 52 25.9	
		Um	iP	04 52 56.3	
		North Atlantic Ocean (h = 30 km).			

1964 Aug.	23	Up		---	
			microns	sec	
			M E	2.3 20	
			M N	3.6 22	
			M Z	5.2 20	
		Ki	iPP	15 42 54	
			ePS	15 52 11	
			microns	sec	
			M E	5.1 19	
			M N	2.1 19	
			M Z	6.3 20	
		Um	iPP	15 43 13	
			iPPP	15 45 40	
			eSKS	15 49 30	
			iPS	15 52 47	
		New Britain (h = 60 km).			
"	23	Um	iP	22 35 27.5	
"	24	Ki	iP	08 42 17.9	
		Um	iP	08 42 19.7	
		Mona Passage (h = 180 km).			
"	24	Um	iP	10 50 26.6	
		Ecuador (h = 170 km).			
"	24	Um	iP	13 51 43.6	
"	24	Ki	iP	17 39 22.3	C
		Sk	iP	17 39 42.6	
		Um	iP	17 39 26.4	C
		Celebes (h = 130 km).			
"	24	Up	iP	20 06 33.9	
		Ki	eP	20 06 16	
		Sk	iP	20 06 40.7	
		Mindoro (h = 30 km).			
"	24	Ki	iP	21 29 21.9	
		Um	iP	21 30 04.3	
		Arctic Ocean (h = 10 km).			
"	24	Sk	iP	21 47 53.6	
		Um	eP	21 47 49	
		Ionian Sea.			
"	24	Up	iP	22 07 12.0	C
			microns	sec	
			M E	0.5 19	
			M N	1.0 17	
			M Z	0.8 17	
		Ki	iP	22 06 16.4	C
			microns	sec	
			P Z'	0.3 1.5	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Aug. 24 Ki microns sec
cont. M E 0.8 16
M N 1.3 20
M Z 2.8 21
Sk iP 22 06 43.6
Gb iP 22 07 24.0 C
Um iP 22 06 45.6 C
ipP 22 06 53.5
iS 22 14 45
Ka iP 22 07 35.8 C
Alaska. h = 30 km (Um).

" 25 Ki iP 07 14 46.1
Dodecanese Islands
(h = 10 km).

" 25 Up ---
microns sec
M E 0.6 17
M N 1.0 17
M Z 0.9 18
Ki iP 08 11 30.6 D
microns sec
M E 0.6 17
Dodecanese Islands
(h = 50 km).

" 25 Up iP 11 17 14.9
iPP 11 17 43
eS 11 21 35
microns sec
PP N 0.4 4
S N 1.1 9
M E 7.2 19
M N 5.7 19
M Z 11 15
D = 2800 km = 25°.
Ki iP 11 18 18.1 D
eS 11 23 33
eLi 11 27 30
iLg2 11 29 22
microns sec
P Z' 0.1 1.0
S E 0.7 10
S N 0.6 8
M E 5.8 18
M N 2.5 14
M Z 3.8 12
D = 3550 km = 32°.
Sk eP 11 17 50
i 11 17 58.0
Gb iP 11 17 09.9
i(pP) 11 17 24.4
Um eP 11 17 43
iPP 11 18 25.7

cont.

1964
Aug. 25 Um i 11 21 50
cont. iS 11 22 29
Ka eP 11 16 49
Dodecanese Islands
(h = 50 km).
Magn. = 5.3 (Up,Ki).

" 25 Ki iP 11 49 29.9 C
Dodecanese Islands
(h = 40 km).

" 25 Up iP 13 54 15.6 D
iPa 13 55 22
iPP 13 55 34
i 13 58 52
iS 13 59 53
iSS 14 02 16
microns sec
P N 2.6 3
P Z 2.8 3
P Z' 0.6 1.0
PP Z 4.7 5
S E 2.7 5
S N 7.5 6
M E 63 23
M N 63 23
M Z 30 16
D = 3950 km = 35 1/2°.
Ki iP 13 53 06.9
iPa 13 53 35
iS 13 57 52
microns sec
P E 2.0 9
P N 3.6 10
P Z 6.8 10
P Z' 1.3 1.0
S E 18 11
S N 20 12
M E 52 11
M N 56 15
M Z 63 13
D = 3050 km = 27 1/2°.
Sk iP 13 53 52.7
Gb iP 13 54 40.3
iPP 13 56 19.1
Um iP 13 53 39.1 D
iPP 13 54 28.2
Ka eP 13 54 48
i(PP) 13 56 15.1
Arctic Ocean (h = 50 km).
Magn. = 6.6 (Up,Ki).
Well developed higher mode
surface waves.

" 25 SKA eSg 14 04 48
cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. 25 cont.

Up ME iPg 14 02 50.3 D
iSg 14 03 00.7
iRg 14 03 06.0
D = 90 km = 0.8°.
Gulf of Bothnia, 64,3°N, 21.7°E. Origin time = 14 02 35. Probably underwater explosion.

" 25
Sk A eSg 14 07 02
Up ME iPg 14 05 02.8 D
iSg 14 05 13.1
iRg 14 05 18.4
D = 90 km = 0.8°.
Gulf of Bothnia, 64.3°N, 21.7°E. Origin time = 14 04 47. Probably underwater explosion.

" 25
Ki R eSg 14 31 26
Sk A eSg 14 31 39
Up ME iPg 14 29 40.5 D
iSg 14 29 50.6
iRg 14 29 55.1
D = 90 km = 0.8°.
Gulf of Bothnia, 64.3°N, 21.7°E. Origin time = 14 29 25. Probably underwater explosion.

" 25
Ki R eSg 14 33 30
Sk A eSg 14 33 39
Up ME iPg 14 31 41.0
iSg 14 31 51.3
iRg 14 31 55.7
D = 90 km = 0.8°.
Gulf of Bothnia, 64.3°N, 21.7°E. Origin time = 14 31 25. Probably underwater explosion.

" 25 Up iP 14 43 00.7
microns sec
M E 8.5 18
M N 11 15
Ki iP 14 44 02.0
iLg2 14 55 16
microns sec
P Z' 0.1 0.8
Sk eP 14 43 39
i 14 44 04.2
Gb iP 14 42 55.7 C
i(PP) 14 43 44.4
Um iP 14 43 28.3
Ka iP 14 42 35.9
iPP 14 43 03.5
Dodecanese Islands (h = 25 km).

1964 Aug. 25 cont.
" 25 Sk i(P) 17 53 44.3
" 25 Up ---
microns sec
M E 0.9 16
M N 1.0 17
M Z 0.9 14
Ki iP 18 02 05.8
microns sec
M E 0.8 17

" 25 Ki eP 19 27 01
Eastern Mediterranean Sea (h = 130 km).

" 25 Ki eP 21 00 12
Dodecanese Islands (h = 70 km).

" 26 Up eP 03 24 26 C
microns sec
P Z' 0.1 1.2
M E 0.6 16
M N 0.7 17
M Z 1.1 17
Ki eP 03 24 42
microns sec
M E 0.7 15
M N 0.3 12
M Z 0.8 14
Sk iP 03 24 04.8
Gb eP 03 24 02
Ka iP 03 24 20.3
North Atlantic Ocean (h = 30 km).

" 26 Up iP 05 50 41.8
iPcP 05 51 10.1
Ki iP 05 49 54.8
microns sec
P Z' 0.1 1.1
Um iP 05 50 15.9
Sea of Okhotsk (h = 310 km).

" 26 Ka i(P) 23 18 45.0

" 26 Ki iP 23 54 36.5
Alaska (h = 20 km).

" 27 Up iP 01 47 02.6
Ki iP 01 46 32.3 C
ipP 01 46 43.5
microns sec
P Z' 0.1 0.9
M E 0.4 16

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. cont.	27	Ki		microns	sec	
			M	N 0.5	16	
			M	Z 0.5	17	
		Sk	iP	01 46 58.8		C
			ipP	01 47 10.5		
		Um	iP	01 46 45.2		C
			ipP	01 46 56.3		
		Volcano Islands. h = 45 km (Ki,Sk,Um).				
"	27	Ka	i(P)	05 46 54.1		
"	27	Ki	iP	10 02 11.1		
		Um	iP	10 02 41.0		
		Yukon (h = 30 km).				
"	27	Ki	iP	10 40 28.0		C
		Alaska (h = 110 km).				
"	27	Up	iP	12 06 16.6		
		Ki	iP	12 06 50.8		C
				microns	sec	
			P	Z' 0.1	1.0	
		Sk	iP	12 06 51.2		
		Gb	iP	12 06 29.8		
		Um	iP	12 06 28.7		
		Ka	eP	12 06 08		
		Iran (h = 70 km).				
"	27	Up	iP	13 04 31.4		
				microns	sec	
			M	E 0.4	15	
			M	N 0.7	12	
		Ki	iP	13 05 04.7		
				microns	sec	
			P	Z' 0.1	0.9	
			M	E 0.8	14	
			M	N 0.6	15	
			M	Z 1.1	15	
		Sk	iP	13 05 04.9		
		Gb	iP	13 04 43.5		
		Um	iP	13 04 42.3		
			eS	13 11 00		
			iSS	13 14 03		
		Ka	iP	13 04 22.5		
			i	13 04 37.9		
		Iran (h = 30 km).				
"	27	Ki	iP	15 50 07.2		
		Sumatra (h = 510 km).				
"	27	Up	iP	19 37 28.3		
			i	19 37 47.6		
			e	19 41 28		
			iS	19 41 52		

cont.

1964 Aug. cont.	27	Up		microns	sec	
			S	E 0.2	5	
			S	N 0.9	9	
			M	E 7.3	17	
			M	N 5.8	17	
			M	Z 7.4	14	
		D = 2900 km = 26°.				
		Ki	iP	19 38 28.1		C
			i	19 38 30.1		
			iS	19 43 45		
			i	19 46 36		
			iScS	19 48 57		
				microns	sec	
			P	Z' 0.1	0.8	
			S	E 0.7	7	
			S	N 0.6	8	
			M	E 4.5	10	
			M	N 1.6	10	
			M	Z 2.5	10	
		D = 3600 km = 32 1/2°.				
		Sk	eP	19 38 05		
			i	19 38 15.1		
		Gb	eP	19 37 24		
		Um	iP	19 38 04.5		
			iPP	19 38 46		
			i	19 42 41		
		Ka	iP	19 37 02.6		
		Dodecanese Islands (h = 30 km).				
		Magn. = 5.3 (Up,Ki).				
"	28	Um	iP	01 21 55.6		C
"	28	Ka	iP	04 41 06.7		C
"	28	Up	iPKP	04 53 40.0		
			iSKP	04 56 30.6		
		Ki	ePKP	04 53 30		
			i	04 53 35.3		
			iSKP	04 56 05.9		
				microns	sec	
			SKP	Z' 0.3	1.5	
		Sk	ePKP	04 53 35		
			iSKP	04 56 22.9		
		Gb	iPKP	04 53 49.7		
			iSKP	04 56 39.0		
		Um	iPKP	04 53 33.6		
			i	04 53 41.5		
			iSKP	04 56 18.0		
		Ka	iPKP	04 53 52.0		C
			iSKP	04 56 39.9		
		Fiji Islands (h = 580 km).				
"	28	Up	iP	12 11 07.3		
			i	12 11 15.0		
			eS	12 15 07		

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Aug. 28 cont.

Up
microns sec
M E 0.4 10
M N 0.5 10
M Z 0.5 10
D = 2400 km = 21 1/2°.

Ki eP 12 12 21
microns sec
M E 1.4 17
M N 0.5 17
M Z 1.0 12

Sk iP 12 11 47.5
Um iP 12 11 47.4
Ka eP 12 10 30
i 12 10 38.6
Ionian Sea (h = 60 km).

" 28 Ka iP 13 06 41.4 C

" 28 Up iP 13 33 06.8
Ki iP 13 33 08.4 C
Um iP 13 33 03.4
Nicobar Islands
(h = 30 km).

" 28 Up iP 13 33 59.3
Ki iP 13 33 57.4
Sk iP 13 34 15.1 D
Um iP 13 33 55.8
Ka iP 13 34 01.5
Nicobar Islands
(h = 30 km).

" 28 Um iSKP 15 03 27.7
South of Fiji Islands
(h = 550 km).

" 28 Up iP 18 28 56.8
microns sec
M E 0.7 18
M N 0.9 18
M Z 0.9 19

Ki iP 18 28 32.5
microns sec
M E 0.8 17
M N 1.1 16
M Z 1.0 14
Formosa (h = 10 km).

" 28 Up iP 20 47 54.1
microns sec
P Z' 0.1 0.6

" 29 Um iP 00 27 11.5

" 29 Sk eP 02 50 22
Pyreneans.

1964 Aug. 29 Up iP 04 18 19.2
Ki iP 04 17 24.3
Sk iP 04 17 53.0
Gb iP 04 18 32.2 C
Um iP 04 17 52.8 C
Alaska (h = 80 km).

" 29 Ki iP 05 22 31.1
microns sec
P Z' 0.1 1.0
M E 0.6 14
M N 0.8 14
M Z 1.6 16

Sk iP 05 22 42.3
eS 05 24 31
Gb iP 05 24 01.1
i 05 24 05.2
Um iP 05 23 07.5
Ka iP 05 24 23.0
Jan Mayen (h = 30 km).

" 29 Ki iP 06 57 40.3
Sk iP 06 57 51.4
eS 06 59 37
Um iP 06 58 17.7
Jan Mayen (h = 30 km).

" 29 Up iP 11 52 44.0 C

" 29 Up iP 19 43 27.3
Ki iP 19 44 25.8 C
Dodecanese Islands
(h = 60 km).

" 30 Up iP 02 44 53.2
microns sec
P Z' 0.1 1.0
M N 1.3 16

Ki iP 02 44 52.2 D
microns sec
M E 0.5 16
M N 0.9 16
M Z 0.9 19

Sk iP 02 45 10.2
Tibet (h = 20 km).

" 30 Ki iP 04 55 31.6 D
microns sec
M E 0.5 14
M N 0.3 15
M Z 1.0 16

Sk iP 04 55 43.3
Jan Mayen (h = 30 km).

" 30 Ki eP 05 36 20

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964

Aug.	30	Ki	iSKP	22 06 41.9	
		Um	iPKP	22 03 45.8	
		Fiji Islands (h = 250 km).			
"	31	Ki	iP	02 51 30.9	
		Kamchatka (h = 30 km).			
"	31	Up	iP	05 42 23.5	
		Ki	iP	05 41 55.3	
		Ryukyu Islands (h = 90 km).			
"	31	Up	iP	19 40 55.5	C
		Sk	iP	19 41 30.4	C
		Ionian Islands.			
"	31	Up	iP	23 31 15.3	C
				microns	sec
			P	Z' 0.1	0.5
		Ki	iP	23 30 22.0	C
				microns	sec
			P	Z' 0.2	0.5
		Sk	iP	23 30 52.3	
			iPcP	23 31 27.1	
		Gb	iP	23 31 31.3	
			iPcP	23 31 51.4	
		Um	iP	23 30 48.6	C
			iPcP	23 31 24.8	
		Ka	iP	23 31 38.3	
		Aleutian Islands (h = 30 km).			

Markus Båth
June 15, 1965

Seismological Institute
Uppsala

S E I S M O L O G I C A L B U L L E T I N

U P P S A L A, K I R U N A, S K A L S T U G A N, G Ö T E B O R G,

U M E Å and K A R L S K R O N A

Uppsala	(Up):	59°51.5'N,	17°37.6'E; h = 14 m
Kiruna	(Ki):	67°50.4'N,	20°25.0'E; h = 390 m
Skalstugan	(Sk):	63°34.8'N,	12°16.8'E; h = 580 m
Göteborg	(Gb):	57°41.9'N,	11°58.7'E; h = 66 m
Umeå	(Um):	63°48.9'N,	20°14.2'E; h = 16 m
Karlskrona	(Ka):	56°09.9'N,	15°35.5'E; h = 11 m

S E P T E M B E R 1 - 30, 1964

1964 Sep. 1 Up i(P) 11 13 41.9 C
microns sec
(P) Z' 0.1 0.5
Um e(P) 11 12 03

" 1 Gb iPg 12 25 57.6 C
iSg 12 25 59.4
D = 15 km = 0.14°.
Local blast.

" 1 Up iP 13 32 36.1 C
iS 13 40 43
iScS 13 42 28
microns sec
P Z' 0.3 0.8
M E 3.1 15
M N 2.4 15
M Z 5.2 15
D = 6550 km = 59°.
Ki iP 13 32 29.9 C
i 13 32 33.0
eS 13 40 33
eScS 13 42 15
microns sec
P Z 0.6 6
P Z' 0.3 0.8
S E 0.8 8
S N 0.4 10
M E 8.5 15
M N 3.5 12
M Z 8.7 14
D = 6450 km = 58°.
Sk iP 13 32 52.6
i 13 32 55.5
Gb iP 13 32 57.3 C
i 13 33 00.1
Um eP 13 32 28
i 13 32 31.2
ipP 13 32 37.9

cont.

1964 Sep. 1 cont. Um iS 13 40 22
i 13 40 31
Ka iP 13 32 45.2 C
i 13 32 48.1
India-China. h = 40 km (Um).
Magn. = 6.0 (Up,Ki).
PZ' is multiple at our stations with a small onset followed after 3.0 sec in average by a much larger phase.

" 1 Um e(P) 16 47 32
i 16 47 41.6

" 1 Up iP 17 27 46.2 D
microns sec
P Z' 0.2 1.0
Ki iP 17 26 54.1
ipP 17 27 07.6
eS 17 35 08
microns sec
P Z' 0.2 1.0
S N 0.4 9
M E 0.7 19
M N 0.4 18
D = 6800 km = 61°.
Sk iP 17 27 23.9
Gb iP 17 28 00.9 D
ipP 17 28 15.0
Um iP 17 27 19.9
ipP 17 27 33.7
iS 17 36 01
Ka iP 17 28 08.2
ipP 17 28 23.2
Aleutian Islands.
h = 60 km (Ki,Gb,Um,Ka).
Magn. = 6.1 (Up.Ki).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Sep. 2 Ki eP 18 24 39
Sk iP 18 24 33.2
Colombia (h = 110 km).

" 3 Um iP 01 49 53.2

" 3 Ki i(Sn) 05 23 10.0
iSg 05 23 31.7

" 3 Up iP 05 42 05.0
Vancouver Island
(h = 30 km).

" 3 Ka iP 12 42 31.0
Alaska (h = 40 km).

" 3 Gb iSKP 13 18 51.3
Fiji Islands (h = 570 km).

" 3 Um iP 13 58 03.2

" 3 Um iPKP 15 56 17.2
Kermadec Islands
(h = 30 km).

" 3 Um eP 17 06 46

" 3 Gb iP 21 14 27.3 C
Ka iP 21 14 39.8
Alaska (h = 30 km).

" 3 Up ---
microns sec
M E 0.3 17
M N 0.7 18
M Z 0.8 17
Ki iP 21 26 55.7
microns sec
M E 0.4 14
M N 0.5 16
M Z 0.8 18
Um iP 21 27 07.8
Gulf of California
(h = 30 km).

" 4 Up iP 03 39 21.2 D
eS 03 48 05
microns sec
P Z' 0.1 1.0
S E 0.3 5
S N 0.3 5
M E 0.7 19
M N 1.7 17
M Z 1.3 20
D = 7400 km = 66 1/2°.
Ki iP 03 39 51.7
iS 03 49 10

cont.

1964
Sep. 4 Ki microns sec
cont. P Z' 0.1 1.0
M E 1.7 19
M N 0.5 15
M Z 0.6 12
D = 7950 km = 71 1/2°.
Sk eP 03 39 19 D
Gb iP 03 38 57.6 D
Um eP 03 39 39
iS 03 48 46
Ka iP 03 39 03.5 D
Atlantic Ocean (h = 20 km).
Magn. = 5.6 (Up,Ki).

" 4 Up iP 03 44 54.6
Ki iP 03 45 48.1
microns sec
P Z' 0.1 1.0
Sk iP 03 45 33.8
Gb iP 03 45 04.1
i 03 45 08.0
Um iP 03 45 17.2
Ka iP 03 44 39.5
Turkey (h = 30 km).

" 4 Ki ePg 08 15 07
iSg 08 15 28.2
D = 140 km = 1.3°.
Sk eSg 08 17 12
UME iSg 08 17 03.3
Sweden-Norway border region,
67.9°N, 17.1°E.
Origin time = 08 14 43.

" 4 Um iP 10 02 37.3
Gulf of California (h = 30 km).

" 4 Up ePP 10 52 41
eS 11 00 03
microns sec
M E 1.6 21
M N 3.3 23
M Z 3.8 23
Ki eP 10 48 02
iPP 10 52 14
iSKS 10 58 39
microns sec
PP Z 0.9 9
SKS E 1.0 11
M E 3.0 20
M N 3.2 22
M Z 5.6 21
D = 11300 km = 101 1/2°.
Sk eP 10 48 25
ePKKP 11 04 15
Um iP 10 48 06.8 C
iPP 10 52 20

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Sep. cont.	4	Um	i	10 52 32.6	
			iSKS	10 58 45	
			iS	10 59 48	
			iPKKP	11 04 11.2	
		New Guinea (h = 30 km).			
		Magn. = 6.2 (Up,Ki).			
"	4	Ki	iPKP	15 08 45.8	
		Gb	iPKP	15 09 12.2	
		Um	iSKP	15 11 39.9	
		South of Fiji Islands			
		(h = 550 km).			
"	4	Um	eP	17 19 04	
"	5	Up	iPKP	02 36 15.7	
			i	02 36 22.9	
				microns sec	
			PKP Z'	0.1 0.6	
		Ki	iPKP	02 35 55.1	
		Sk	iPKP	02 36 10.4	
			i	02 36 14.0	
		Gb	iPKP	02 36 23.5	
			i	02 36 36.5	
			e(SKP)	02 39 53	
		Um	iPKP	02 36 05.0 D	
		Ka	iPKP	02 36 38.3	
		South of Kermadec Islands			
		(h = 400 km).			
"	5	Up	iP	03 08 44	
			ePKP	03 12 31	
			iPP	03 13 36	
			ePKKP	03 22 54	
			ePKKS	03 26 41	
				microns sec	
			PP Z	1.1 9	
			M E	3.8 22	
			M N	8.5 24	
			M Z	6.4 24	
		(D = 13000 km = 117°).			
		Ki	eP	03 08 17	
			ePKP	03 12 22	
			i	03 12 44.4	
			iPP	03 12 56	
			iPS	03 22 15	
			i	03 22 43	
			iPKKP	03 23 16.0	
				microns sec	
			PP E	0.3 8	
			PP Z	0.5 5	
			M E	7.4 21	
			M N	6.4 22	
			M Z	11 21	
		(D = 12450 km = 112°).			
		Sk	ePKP	03 12 38	

cont.

1964 Sep. cont.	5	Sk	e	03 14 33	
			ePKKP	03 22 58	
		Gb	ePKP	03 12 49	
			i	03 13 02.5	
			i	03 14 35.6	
			ePKKP	03 22 44	
			i	03 22 53.9	
		Um	iP	03 08 26	
			iPKP	03 12 25.0	
			iPP	03 13 07.5	
			iPS	03 22 42	
			iPKKP	03 23 06.7	
			iSS	03 29 06	
		Ka	ePKP	03 12 39	
			i	03 13 01.6	
			ePKKP	03 22 40	
		Solomon Islands (h = 70 km).			
		Magn. = 6.5 (Up,Ki).			
"	5	Up	iP	06 47 29.5	
			i	06 47 31.8	
		Ki	eP	06 47 16	
		Sk	eP	06 47 41	
		Gb	iP	06 47 54.0	
		Um	iP	06 47 16.0	
			i	06 47 20.5	
		Yunnan, China (h = 30 km).			
"	5	Up	iP	07 59 37.3	
		Ki	iP	07 59 13.6 C	
		Sk	eP	07 59 44	
		Um	iP	07 59 20.9	
		Ka	iP	07 59 52.4	
"	5	Ki	iPKP	12 15 26.1	
		West of Macquarie Island			
		(h = 30 km).			
"	5	Up	eP	12 38 19	
			eS	12 47 10	
				microns sec	
			S N	1.0 16	
			M E	1.4 19	
			M N	2.3 19	
			M Z	2.2 22	
		D = 7550 km = 68°.			
		Ki	eP	12 38 59	
			eS	12 48 31	
				microns sec	
			S N	0.8 12	
			M E	1.0 16	
			M N	1.3 20	
			M Z	2.3 17	
		D = 8300 km = 74 1/2°.			
		Sk	eP	12 38 26	
		Um	iP	12 38 40 C	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Sep. cont.	5	Um	ePP	12 41 13	
			iS	12 47 58	
		Ka	iP	12 37 52.9	
		Atlantic Ocean (h = 30 km).			
		Magn. = 5.6 (Up,Ki).			
"	5	Up	ePg	13 21 40	
			eSg	13 22 31	
			~~D = 430 km = 3.8°.~~		
		~~Ki~~	~~e~~	~~13 24 36~~	
			~~iSg~~	~~13 25 12.6~~	
		Um	iSg	13 23 01.4	
			i	13 23 13.3	
		Ka	iPg	13 22 30.5	
			eS[x]	13 23 36	
			iSg	13 23 53.0	
			D = 680 km = 6.1°.		
		North coast of Esthonia, 59 1/2°N, 25°E. Origin time = 13 20 27. Explosion?			
"	5	Up	eP	21 12 37	
		Ki	eP	21 14 04	
		Sk	eP	21 13 15	
		Um	eP	21 13 21	
			iS	21 17 18	
		Italy (h = 40 km).			
"	5	Up	iP	21 14 07.6	
			ePcP	21 19 11	
				microns sec	
			M E	0.3 9	
			M N	0.3 8	
			M Z	0.4 9	
		Ki	eP	21 15 35	
				microns sec	
			M E	0.4 9	
			M N	0.3 9	
			M Z	0.4 9	
		Sk	iP	21 14 45.0	
		Um	iP	21 14 55.9	
			iS	21 18 50	
		Ka	iP	21 13 45.6	
		Italy. This shock occurred 01 32 after the preceding (i.e. origin time = 21 10 21) and is slightly larger than that one.			
"	6	Up	iPKP	09 39 30.8	
			iSKP	09 42 14.9	
		Ki	iSKP	09 41 51.0	
		Sk	iSKP	09 42 07.7	
		Gb	eSKP	09 42 23	
		Um	iSKP	09 42 02.8	
		Ka	iPKP	09 39 41.4	
			iSKP	09 42 25.0	
		Fiji Islands (h = 620 km).			

1964 Sep.	6	Up	i	09 57 27.1	
			iSn	09 57 44.3	
			i	09 58 39.8	
		Sk	e	09 58 00	
			iSg	09 58 51.6	
		Gb	iPg	09 56 03.0	
			iSg	09 56 29.2	
		Um	eSg	09 59 59	
		Ka	ePn	09 56 25	
			eSg	09 57 36	
		Skagerack. No satisfactory agreement between the data.			
"	6	Up	iP	10 40 39.9	
		Ki	iP	10 39 46.7	
		Um	iP	10 40 13.7	
		Alaska (h = 30 km).			
"	6	Ki	eP	16 07 35	
		Alaska (h = 30 km).			
"	6	Up	iP	17 46 24.9	
		Ki	iP	17 45 26.1	
		Sk	eP	17 45 53	
		Um	eP	17 45 56	
		Ka	iP	17 46 50.5	
		Alaska (h = 30 km).			
"	6	Up	eP	18 54 39	
				microns sec	
			M E	1.0 17	
			M N	1.7 17	
			M Z	1.1 17	
		Ki	iP	18 54 04.7	
			eSKS	19 04 38	
				microns sec	
			M E	2.1 21	
			M N	1.7 20	
			M Z	2.5 18	
		Um	iP	18 54 14.6	
			iSS	19 11 59	
		Caroline Islands (h = 30 km).			
"	6	Up	eP	19 02 38	
		Ki	iP	19 03 12.7	
		Sk	iP	19 02 32.6	
		Um	iP	19 02 54.9	
		Azores Islands (h = 30 km).			
"	6	Up	iP	19 09 08.6 D	
			ipP	19 09 22.8	
				microns sec	
			P	Z' 0.1 0.6	
		Ki	iP	19 09 11.0 D	
				microns sec	
			P	Z' 0.1 1.0	
		Sk	iP	19 09 25.4	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Sep. cont.	6	Sk	i(pP)	19 09 42.3	
		Gb	iP	19 09 23.6	
		Um	iP	19 09 06.0	
			ipP	19 09 19.7	
		Ka	iP	19 09 11.4	
		Nicobar Islands.			
		h = 60 km (Up,Um).			
		Magn. = 5.9 (Up,Ki).			
"	6	Up	iP	19 34 23.8	
"	6	Ki	eL	21 58	
				microns sec	
			M E	0.6 17	
			M N	0.4 17	
			M Z	1.0 18	
		Easter Island (h = 30 km).			
"	7	Up	iP	03 51 00.6	
		Ki	eP	03 50 33	
		Philippine Islands (h = 30 km).			
"	7	Up	iP	04 04 41.3	
		Um	eP	04 04 15	
		Kurile Islands (h = 100 km).			
"	7	Ki	iP	07 51 24.3	
		Sk	iP	07 51 51.6	
		Alaska (h = 30 km).			
"	7	Up	iP	11 36 11.9	
			i	11 36 34.4	
				microns sec	
			M E	0.9 23	
			M N	2.3 22	
			M Z	2.2 22	
		Ki	iP	11 37 02.6	
			eS	11 44 54	
				microns sec	
			S N	0.5 7	
			M E	3.0 20	
			M N	1.7 20	
			M Z	3.9 22	
		D = 6400 km = 57 1/2°.			
		Um	eP	11 36 40	
		Ka	eP	11 36 03	
			i	11 36 15.6	
		Arabian Sea (h = 30 km).			
		Magn. = 5.6 (Up,Ki).			
"	7	Ki	iP	15 59 45.8	
		Ka	iP	15 59 50.3	
		Afghanistan-USSR (h = 170 km).			
"	7	Gb	i(P)	17 16 20.7	

1964 Sep.	8	Ki	i(Sn)	05 18 25.3	
			e(Sg)	05 18 48	
"	8	Ki	iP	08 07 39.1	D
		Um	iP	08 07 46.2	
		Mindanao (h = 180 km).			
"	8	Um	iP	11 05 05.1	
"	8	Up	iP	13 52 05.3	
		Ki	iP	13 51 31.5	
				microns sec	
			P Z'	0.1 1.0	
		Um	iP	13 51 45.8	
			i	13 51 53.7	
		South of Japan (h = 80 km).			
"	8	Gb	iPKP	14 01 02.2	
			i	14 01 19.6	
		Ka	iPKP	14 01 03.5	
			i	14 01 21.3	
		South of Fiji Islands (h = 170 km).			
"	8	Gb	iPKP	14 28 33.7	
			i	14 28 45.6	
		Ka	iPKP	14 28 34.9	
			i	14 28 47.7	
		South of Fiji Islands (h = 210 km).			
"	8	Gb	iPKP	14 31 57.2	
			i	14 32 02.8	
		Ka	iPKP	14 31 58.3	
			i	14 32 04.7	
		South of Fiji Islands (h = 180 km).			
		PKP is multiple in this and the two preceding cases, but the time difference between the two phases is different in the three cases, being in average for Gb and Ka 17.6 sec for the first shock, 12.9 sec for the second and 6.0 sec for this one.			
"	8	Um	eP	17 04 25	
		South of Japan (h = 30 km).			
"	8	Up	iPKP	17 23 40.5	
		Fiji Islands (h = 540 km).			
"	8	Ki	eP	20 35 48	C
				microns sec	
			P Z'	0.1 1.3	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Sep. cont.	8	Um	iP	20 35 55.7		
		Mindanao (h = 30 km).				
"	9	Um	iP	06 18 26.0		
		Bonin Islands (h = 30 km).				
"	9	Ki	iP	22 26 36.7		
		Iran-Iraq (h = 70 km).				
"	10	Um	iP	13 30 20.1		
"	10	Up	iPg	17 19 34.4		
			iSn	17 20 15.3		
			iLg1	17 20 35.3		
			D = 540 km = 4.8°.			
		Sk	eLg1	17 22 34		
		Gb	eSg	17 19 32		
		Ka	iPg	17 18 25.4 C		
			iSg	17 18 38.3		
			i(T)	17 19 17.3		
			D = 110 km = 1.0°.			
		Southern Baltic, 55.3°N, 14.7°E. Origin time = 17 18 02. Probably underwater explosion.				
"	11	Um	iP	03 25 06.2		
"	11	Um	iP	04 24 18.1		
"	11	Up	eP	20 00 23		
		Ki	eP	20 00 10		
		Gb	iP	20 00 14.3		
		Mexico (h = 130 km).				
"	12	Up	iSg	08 07 33.8		
		Ki	iPg	08 03 47.6		
			iSg	08 03 56.6		
			iRg	08 03 59.2		
				microns	sec	
			Rg	Z' 1.0	0.8	
			D = 80 km = 0.7°.			
		Sk	iSg	08 06 14.8		
		Um	iSg	08 05 24.2		
		Gällivare, North Sweden, 67.1°N, 20.7°E. Origin time = 08 03 34. Explosion? At Ki, the amplitude of Sg is remarkably large in comparison with Pg.				
"	12	Up	---			
				microns	sec	
			M	E 0.8	20	
			M	N 2.0	20	
			M	Z 1.5	23	

cont.

1964 Sep. cont.	12	Ki	iPS	13 11 04		
			eSS	13 16 43		
				microns	sec	
			M	E 1.4	22	
			M	N 4.0	30	
		New Guinea (h = 120 km).				
"	12	Up	iSKP	15 40 16.0		
		Ki	iPKP	15 37 24.1		
			iSKP	15 39 50.2		
		Sk	iSKP	15 40 07.9		
		Um	iPKP	15 37 31.8		
			iSKP	15 40 03.3		
		Fiji Islands (h = 560 km).				
"	12	Up	iP	16 06 09.7		
"	12	Up	iPKP	22 26 52 C		
			e(PKP2)	22 27 25		
			iPKP2	22 27 32.4		
			iPP	22 30 59		
				microns	sec	
			PKP	E 1.4	11	
			PKP	Z 10	12	
			PKP2	E 2.0	11	
			PKP2	Z 7.8	9	
			PKP2	Z' 0.2	0.9	
			PP	E 3.7	12	
			PP	Z 8.6	12	
			M	E 6.1	19	
			M	N 12	18	
			M	Z 21	18	
			(D = 17450 km = 157°).			
		Ki	iPKP	22 26 52.8 C		
			iPKP2	22 27 17.1		
			i	22 27 43.8		
			iPKS	22 30 32		
			iPP	22 30 47		
			iSKSP	22 41 00		
				microns	sec	
			PKP	E 3.0	10	
			PKP	N 1.3	9	
			PKP	Z 13	10	
			PKP	Z' 1.5	1.5	
			PKP2	Z' 1.3	1.2	
			PKS	E 3.0	10	
			PP	Z 16	10	
			M	E 16	21	
			M	N 15	18	
			M	Z 23	19	
			(D = 17100 km = 154°).			
		Sk	ePKP	22 26 54		
			iPKP2	22 27 37.6		
		Gb	iPKP2	22 27 46.1		
			i	22 27 49.4		
		Um	ePKP	22 26 52 C		
			iPKP2	22 27 23.7		

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Sep. cont.	12	Um	iPP	22 30 58	
		Ka	iPKP	22 27 03.3	
		Auckland Islands (h = 30 km).			
		Magn. = 7.1 (Up,Ki).			
		The records offer some opportunity for comparison of PKP2 with PKP1, PKP2 usually having slightly shorter period and larger trace amplitude at our stations in this case.			
"	13	Ki	iPKP	00 41 04.6	C
		Auckland Islands (h = 30 km).			
"	13	Um	iP	15 33 12.7	C
			i	15 33 16.5	
"	13	Sk	iP	22 58 27.3	
		Um	iP	22 58 21.5	
		Ka	iP	22 57 01	
		Yugoslavia-Albania.			
"	13	Sk	eP	23 05 53	
		North Atlantic Ocean (h = 30 km).			
"	13	Sk	iP	23 28 22.1	
		North Atlantic Ocean (h = 25 km).			
"	14	Sk	iP	06 24 35.0	
		North Atlantic Ocean (h = 30 km).			
"	14	Sk	iP	06 39 23.3	
		North Atlantic Ocean (h = 30 km).			
"	14	Up	iP	10 28 12.8	
		Ki	iP	10 27 19.3	C
			ipP	10 27 34.3	
				microns sec	
			P	Z' 0.1 1.0	
		Sk	iP	10 27 47.7	C
			ipP	10 28 03.6	
		Um	iP	10 27 46.8	
			ipP	10 28 02.5	
		Ka	iP	10 28 37.1	
			ipP	10 28 53.0	
		Alaska.			
		h = 60 km (Ki,Sk,Um,Ka).			
"	14	Sk	eP	13 41 54	
			i	13 41 57.2	
"	14	Sk	e(P)	13 42 50	

cont.

1964 Sep. cont.	14	Sk	i	13 42 53.7	
			i	13 42 59.8	
"	14	Up		---	
				microns sec	
			M	E 0.7 19	
			M	N 1.0 17	
			M	Z 1.3 20	
		Ki	iP	13 46 02.6	
				microns sec	
			M	E 2.1 21	
			M	N 0.8 18	
			M	Z 2.8 21	
		Sk	iP	13 45 57.3	D
		Mexico (h = 60 km).			
"	14	SKA	eP	14 25 54	
		North Atlantic Ocean, 59°N, 32°W. Origin time = 14 21 13.			
"	14	UPP	iP	14 27 58.0	
		KIR	iP	14 27 54.6	
		SKA	iP	14 27 24.3	
		North Atlantic Ocean, 59°N, 32°W. Origin time = 14 22 43.			
		The determination in this and the preceding case made by combination with readings at Sodankylä, Kevo, Akureyri, Nord and Strasbourg.			
"	14	Up	iP	15 28 51.2	C
				microns sec	
			P	Z' 0.1 1.0	
		Ki	iP	15 29 23.3	
				microns sec	
			P	Z' 0.1 1.0	
			M	N 0.5 12	
		Sk	eP	15 29 24	
			i	15 29 26.0	
		Gb	iP	15 29 04.0	
		Um	iP	15 29 02.5	
			i	15 29 13.1	
		Ka	iP	15 28 44.3	
		Iran (h = 30 km).			
		Magn. = 5.7 (Up,Ki).			
"	14	Ki	iP	15 57 55.3	
		Sk	iP	15 57 43.9	
		Guatemala (h = 40 km).			
"	15	Ki	eP	05 51 06	
				microns sec	
			M	E 0.9 18	
			M	N 1.0 22	
			M	Z 1.1 17	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Sep. cont.	15	Um	iP	05 51 10.2	C
		Molucca Sea (h = 30 km).			
"	15	Ki	iPKP	09 16 58.1	
		Sandwich Islands (h = 30 km).			
"	15	Um	eP	14 10 10	
"	15	Up	iP	15 41 11.3	C
			iS	15 50 34	
			eSKS	15 51 11	
			i	15 51 39	
			microns	sec	
			P E	0.7 5	
			P Z	3.0 3	
			P Z'	0.9 0.7	
			S E	2.8 7	
			S N	5.2 5	
			SKS E	5.7 6	
			SKS N	11 6	
			SKS Z	3.6 9	
			M E	6.9 20	
			M N	18 23	
			M Z	12 22	
			D = 8300 km = 74 1/2°.		
		Ki	iP	15 41 13.2	C
			iPcP	15 41 32	
			iS	15 50 46	
			iSKS	15 51 12	
			i	15 51 56	
			microns	sec	
			P E	2.7 6	
			P Z	6.8 5	
			P Z'	1.3 1.0	
			S E	7.6 10	
			S N	11 9	
			S Z	2.9 8	
			SKS E	12 10	
			SKS N	9.8 7	
			SKS Z	5.6 10	
			M E	18 22	
			M N	12 20	
			M Z	19 24	
			D = 8350 km = 75°.		
		Sk	iP	15 41 28.1	C
			iPcP	15 41 51.1	
		Gb	iP	15 41 26.6	C
			iPcP	15 41 46.1	
			i(PP)	15 44 14.2	
		Um	iP	15 41 08.3	C
			iPcP	15 41 31.3	
			iPP	15 43 46	
			iS	15 50 29	
		Ka	iP	15 41 14.1	C
			iPcP	15 41 35.0	
		Nicobar Islands (h = 40 km).			
		Magn. = 6.9 (Up,Ki).			
1964 Sep.	15	Up	i(P)	17 21 16.4	C
"	16	Up	iP	01 37 55.5	
			ipP	01 38 08.9	
			iS	01 47 18	
			microns	sec	
			P Z'	0.3 1.0	
			S N	1.0 5	
			M E	2.4 21	
			M N	7.3 21	
			M Z	3.2 17	
			D = 8100 km = 73°.		
		Ki	iP	01 37 56.6	C
			iPcP	01 38 23.1	
			iS	01 47 26	
			eSKS	01 48 05	
			microns	sec	
			P Z'	0.2 1.0	
			S N	1.5 9	
			SKS E	1.0 12	
			M E	4.7 17	
			M N	6.8 15	
			M Z	4.1 18	
			D = 8100 km = 73°.		
		Sk	iP	01 38 12.2	C
		Gb	iP	01 38 10.4	
			ipP	01 38 26.5	
		Um	iP	01 37 52.2	C
			iPa	01 42 22	
			iS	01 47 15	
			iSKS	01 48 02	
		Ka	iP	01 37 58.9	C
			ipP	01 38 14.9	
		Andaman Islands.			
		h = 60 km (Up,Gb,Ka).			
		Magn. = 6.3 (Up,Ki).			
"	16	Up	iP	02 00 38.2	C
		Ki	iP	01 59 43.1	C
			microns	sec	
			P Z'	0.3 1.5	
		Sk	eP	02 00 09	
		Gb	iP	02 00 47.9	
			ipP	02 00 55.7	
		Um	iP	02 00 11.3	
		Ka	iP	02 01 02.0	
			i	02 01 05.4	
		Alaska. h = 30 km (Gb).			
"	16	Gb	iPg	12 32 23.0	
			iSg	12 32 25.2	
			D = 20 km = 0.2°.		
		Local blast.			
"	16	Up	iP	13 10 10.0	

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Sep.	16	Ki	iP	15 22 45.5	
		Um	iP	15 23 04.3	
		Japan (h = 170 km).			
"	16	Ki	e	20 14 33	
			i(Sg)	20 14 47.8	
"	16	Up	iP	21 44 48.7	C
"	16	Up	iP	22 33 18.7	
			iS	22 41 06	
		D = 6300 km = 56 1/2°.			
		Ki	iP	22 33 40.2	C
			microns	sec	
			P Z'	0.2 1.4	
		Sk	iP	22 33 09.1	C
		Gb	iP	22 32 56.7	
			i	22 33 01.4	
		Um	iP	22 33 33.5	
		Ka	iP	22 33 07.1	
		North Atlantic Ocean (h = 30 km).			
"	16	Up	eP	22 47 38	
		Ki	iP	22 46 42.5	
		Kamchatka (h = 30 km).			
"	17	Ki	e(Sn)	05 33 04	
			i(Sg)	05 33 23.8	
"	17	Up	iPKP	07 19 12.2	
		South of Fiji Islands (h = 30 km).			
"	17	Up	iP	15 08 33.4	
			microns	sec	
			P Z'	0.1 0.8	
			M E	0.8 15	
			M N	1.4 17	
			M Z	1.5 16	
		Ki	iP	15 08 56.8	
			i	15 09 02.8	
			eS	15 14 37	
			microns	sec	
			P Z'	0.2 1.3	
			M E	2.8 17	
			M N	0.9 13	
			M Z	2.2 15	
		D = 3950 km = 35 1/2°.			
		Sk	iP	15 08 18.7	
		Gb	iP	15 08 08.4	C
		Um	iP	15 08 49.0	
			iS	15 14 23	
		Ka	iP	15 08 21.9	
		North Atlantic Ocean (h = 25 km).			
1964 Sep.	17	Gb	iP	19 50 32.2	
"	18	Up	iP	00 14 12.6	
			i	00 14 30.7	
			eS	00 18 37	
			microns	sec	
			S N	0.9 9	
			M E	7.7 17	
			M N	5.4 18	
			M Z	8.3 14	
		D = 2900 km = 26°.			
		Ki	iP	00 15 12.6	C
			eS	00 20 30	
			iLg1	00 25 45	
			iLg2	00 26 28	
			microns	sec	
			S E	0.8 5	
			S N	0.4 10	
			M E	4.2 17	
			M N	1.4 16	
			M Z	2.1 10	
		D = 3600 km = 32 1/2°.			
		Gb	eP	00 14 12	
		Um	iP	00 14 29.4	
			i(S)	00 19 30	
		Ka	eP	00 13 50	
			iPP	00 14 30.5	
		Eastern Mediterranean Sea (h = 20 km).			
		Magn. = 5.3 (Up,Ki).			
"	18	Up	iP	00 14 42.7	
			microns	sec	
			P Z'	0.1 1.0	
		Ki	iP	00 15 44.0	
			microns	sec	
			P Z'	0.1 0.8	
		Sk	eP	00 14 59	
		Eastern Mediterranean Sea. Remarkably enough, the P of this shock is stronger than P for the preceding shock at Up, Ki, Sk, but not at the other stations where the second P was not clearly observed.			
"	18	Sk	eP	01 50 31	
		Greece.			
"	18	Up	iP	08 04 28.4	
		Ki	iP	08 02 57.1	
			iS	08 05 07.7	
		D = 1400 km = 12 1/2°.			
		Sk	iP	08 04 06.1	
			iS	08 07 22.5	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Sep. cont.	18	Um	iP	08 03 43.7	C
			i(S)	08 07 04.9	
		Novaya Zemlya.			
		Underground explosion.			
"	18	Ki	i(Sg)	09 48 00.6	
"	18	Up	eP	13 18 41	
"	18	Up	eP	13 19 39	
			iS	13 25 15	
			microns	sec	
		M	E	1.9 20	
		M	N	1.6 16	
		M	Z	3.8 17	
		D = 3950 km = 35 1/2°.			
		Ki	iP	13 20 08.7	D
			iS	13 26 14	
			microns	sec	
		P	Z'	0.5 1.5	
		S	N	0.6 6	
		M	E	2.6 20	
		M	N	1.2 15	
		M	Z	3.1 18	
		D = 4400 km = 39 1/2°.			
		Sk	iP	13 19 27.4	
			i	13 19 30.0	
			iPP	13 20 29.8	
		Gb	iP	13 19 09.0	
			iPP	13 20 32.4	
		Um	iP	13 19 57.3	
			iPP	13 21 26	
			iS	13 25 49	
		Ka	iP	13 19 20.5	
		Azores Islands (h = 20 km).			
		It is characteristic for Atlantic earthquakes to have relatively long periods of PZ' at our stations, the periods in this case being 1.5-1.6 sec at all our stations.			
"	18	Ki	iPn	14 46 03.8	
			iSn	14 46 53.5	
			iSg	14 47 08.0	
		Sk	iPn	14 46 51.8	
			eSn	14 48 19	
		Um	iSn	14 48 19.4	
			iSg	14 49 04.7	
		Norwegian Sea, 71°N, 14°E.			
		Origin time = 14 45 00.			
"	18	Ki	iP	19 18 30.2	C
		Alaska (h = 50 km).			
"	18	Ki	iP	22 10 06.3	

1964 Sep.	18	Ki	i(P)	23 47 18.4	
"	19	Up	iP	00 46 30.4	D
		Ki	iP	00 46 40.0	
		Hindu Kush (h = 210 km).			
"	19	Up	iP	05 21 00.8	C
			eSKS	05 31 28	
			e(S)	05 31 53	
			microns	sec	
		P	Z	0.6 6	
		SKS	E	0.7 12	
		(S)	N	0.9 9	
		M	E	1.9 20	
		M	N	1.7 17	
		M	Z	3.0 19	
		D = 9700 km = 87 1/2°.			
		Ki	iS	05 31 31	
			microns	sec	
		S	E	2.2 10	
		S	N	0.8 10	
		S	Z	0.6 10	
		M	E	2.6 20	
		M	N	1.0 17	
		M	Z	3.9 22	
		Sk	iP	05 20 42.8	
		Gb	eP	05 20 51	
		Um	iP	05 20 57	C
			ePP	05 24 15	
			iSKS	05 31 24	
		Mexico (h = 40 km).			
		Magn. = 5.9 (Up,Ki).			
"	19	Up	iSn	12 17 38.2	
		Ki	iPn	12 14 14.1	
			iP^x	12 14 21.2	
			iSn	12 14 58.5	
			iS^x	12 15 10.5	
		D = 410 km = 3.7°.			
		Sk	ePn	12 14 52	
			eSn	12 16 02	
		Um	iPn	12 15 01.0	
			iPg	12 15 25.9	
			iSn	12 16 15.2	
		Norwegian Sea (h = 30 km).			
"	19	Ki	---		
			microns	sec	
		M	E	0.5 16	
		M	N	0.5 20	
		Um	iP	19 18 55.1	
"	19	Up	iP	19 53 19.0	C
		Ki	iP	19 52 56.8	
		Sk	eP	19 53 24	
		Um	iP	19 53 05.8	
		Formosa (h = 30 km).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964					
Sep.	20	Ka	eP	01 37 32	
"	20	Up		---	
				microns sec	
			M	N 0.4 20	
		Ki	ePKP	04 53 17	
				microns sec	
			M	E 0.5 18	
			M	N 0.4 18	
			M	Z 1.0 20	
		Easter Island (h = 30 km).			
"	20	Up	iP	14 47 16.3	C
			ipP	14 49 03.1	
			iPP	14 50 21.4	
				microns sec	
			P	Z' 0.2 0.7	
			PP	Z' 0.1 1.0	
		Ki	iP	14 46 43.9	C
			ipP	14 48 28.4	
			iS	14 55 27	
				microns sec	
			P	Z' 0.2 1.0	
			S	N 0.3 8	
		Sk	iP	14 47 13.2	C
			ipP	14 48 59.6	
			iPP	14 50 15.6	
		Um	iP	14 46 57.5	C
			i	14 48 36.6	
			ipP	14 48 43.2	
			i	14 49 08.1	
			iPP	14 49 51.9	
		South of Japan.			
		h = 480 km (Up,Ki,Sk,Um).			
		Magn. = 5.9 (Up,Ki).			
"	20	Up	iPn	19 01 37.3	C
			i	19 01 45.7	
			i	19 02 47.8	
			iSn	19 03 00.9	
			iSg	19 03 35.8	
				microns sec	
			Sg	Z' 0.2 0.5	
			D = 760 km = 6.9°.		
		Ki	iPn	19 02 05.8	C
			eSn	19 03 41	
			i	19 04 07.3	
			iSg	19 04 54.5	
			D = 990 km = 8.9°.		
		Sk	ePn	19 00 59	
			iPg	19 01 17.4	
			iSn	19 01 43.3	
			iS^x	19 02 02.9	
			i(Sg)	19 02 18.6	
		Gb	iPn	19 01 20.4	
			iSn	19 02 21.5	

cont.

1964					
Sep.	20	Gb	iSg	19 03 04.5	
cont.		Um	ePn	19 01 46	
			iS^x	19 03 38.6	
			iSg	19 03 58.4	
		Ka	ePn	19 01 54	
			iSn	19 03 19.8	
			iSg	19 04 19.7	
		Off coast of Norway, near Ålesund.			
"	21	Up	iPKP	04 41 32.8	
			i	04 44 43.7	
				microns sec	
			PKP	Z' 0.1 0.5	
		Ki	ePKP	04 41 13	
			i	04 41 24.3	
			iSKP	04 43 57.5	
				microns sec	
			SKP	Z' 0.1 1.0	
		Sk	iPKP	04 41 26.4	
		Gb	iPKP	04 41 43.3	D
		Um	iPKP	04 41 20.8	
			i	04 41 32.8	
			iSKP	04 44 08.3	
		Ka	iPKP	04 41 45.1	D
			i(SKP)	04 44 29.1	
		Fiji Islands (h = 610 km).			
		The amplitudes of PKP Z' at Gb and Ka (just outside the shadow zone) are 15 times the corresponding amplitudes just inside the shadow zone (Ki, Um, Sk, Up).			
"	21	Up	iP	05 10 49.5	
		Sk	eP	05 11 28	
		Greece.			
"	21	Um	iP	05 51 41.6	
		Banda Sea (h = 120 km).			
"	21	Ki	iP	08 44 29.3	
		Ceram Sea (h = 40 km).			
"	21	Ki	iPKP	12 20 45.5	
		New Hebrides Islands (h = 30 km).			
"	21	Up	iP	14 43 39.6	
"	21	Up	iPKP	18 29 58.3	
			i	18 30 02.9	
				microns sec	
			PKP	Z' 0.2 0.5	
		Ki	iPKP	18 29 35.6	
			i	18 29 44.2	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Sep. 21 cont.

Sk	iPKP	18 29 51.1	
	ipPKP	18 31 23.3	
Gb	iPKP	18 30 06.0	
	i	18 30 15.7	
Um	iPKP	18 29 46.1	
Ka	iPKP	18 30 07.5	

Kermadec Islands (h = 320 km).

" 22	Ki	iP	09 17 50.5 C
	Gb	iP	09 18 56.8
	Um	iP	09 18 10.8 C
		i(pP)	09 18 21.4

Kurile Islands (h = 30 km).

" 22	Um	e	11 47 23
		i(Sg)	11 47 32.1
" 22	Um	i	14 37 11.9
		i(Sg)	14 37 30.1
" 22	Um	iP	21 30 20.8
" 23	Ki	iP	01 47 41.6 C

Cyprus (h = 60 km).

" 23	Up	iP	05 10 37.8 C
		ipP	05 10 48.1
		i	05 10 57
		iS	05 19 38

		microns	sec
P	N	0.4	4
P	Z	0.5	3
P	Z'	0.1	1.0
S	N	0.5	9
M	E	1.4	19
M	N	2.3	19
M	Z	3.4	21

D = 7450 km = 67°.

Ki	iP	05 09 44.1 C	
	e	05 10 10	
	iS	05 17 46	

		microns	sec
P	N	0.4	7
P	Z	0.8	7
P	Z'	0.2	1.1
S	E	0.5	12
S	N	0.6	8
M	E	2.2	17
M	N	3.2	16
M	Z	4.9	16

D = 6550 km = 59°.

Sk	iP	05 10 13.1 C	
Gb	iP	05 10 51.1	
Um	iP	05 10 11.3 C	
	iS	05 18 37	
Ka	iP	05 11 00.4 C	

cont.

1964
Sep. 23 cont.

Ka	i	05 11 19.7	

Alaska (h = 30 km).
Magn. = 5.9 (Up,Ki).

" 23	Ki	eP	06 28 47

Alaska (h = 15 km).

" 24	Up	iLgl	12 35 49.7
	Sk	eLgl	12 37 47
	Gb	iSg	12 34 55.1
	Ka	iPg	12 33 37.5
		iSg	12 33 50.8
		i(Rg)	12 33 58.4

D = 110 km = 1.0°.
Southern Baltic, 55.3°N, 14.7°E. Origin time = 12 33 18. Probably underwater explosion.
Comparing the Ka Z' record for this case with the related event on Sep. 10, 17 18, we find these records to be completely different: Sep. 10: Pg and Sg are of similar amplitude and there is no Rg; Sep. 24: Pg is very small compared to Sg and Rg has the largest amplitudes in the record. The probable reason for these differences is different source properties. On the other hand, the Ka Z' record for Sep. 24 is quite similar to Ki Z' for Sep. 12, 08 03.

" 24	Up	iP	14 11 08.8 C
	Ki	eP	14 10 27
	Sk	eP	14 10 39
		i	14 10 47.5
	Um	iP	14 10 49.5

Oregon (h = 15 km).

" 24	Up	i(Pg)	14 21 52.1
		iSg	14 22 05.2

Explosion?

" 24	Up	iP	14 47 24.7
	Ki	iP	14 46 55.2
	Um	iP	14 47 08.4

Mariana Islands (h = 150 km).

" 25	Up	iP	05 32 30.1

Aleutian Islands (h = 30 km).

" 25 cont.	Gb	iPg	12 17 35.3

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Sep. cont.	25	Gb	iSg	12 17 37.8	
			D = 20 km = 0.2°.		
			Local blast.		
"	25	Up	iP	15 53 20.3	C
			eS	16 02 22	
				microns sec	
			P	Z' 0.1 0.9	
			M	N 1.2 29	
			D = 7650 km = 69°.		
		Ki	iP	15 52 28.0	C
				microns sec	
			P	Z' 0.1 1.0	
		Sk	eP	15 53 01	
		Gb	iP	15 53 38.2	
		Um	iP	15 52 53.6	
			iS	16 01 35	
		Ka	iP	15 53 42.9	
			Aleutian Islands (h = 30 km).		
			Magn. = 5.7 (Up,Ki).		
"	25	Sk	iP	16 42 24.3	
			Alaska (h = 30 km).		
"	25	Um	iP	17 19 29.2	
"	25	Up	iP	17 35 34.2	D
		Ki	eP	17 34 39	
		Sk	iP	17 35 10.9	
		Gb	iP	17 35 48.1	
		Um	iP	17 35 08.0	
		Ka	iP	17 35 56.9	
			Alaska (h = 30 km).		
"	25	Up	iPKP	23 46 46.1	
			i	23 46 51.2	
			ipPKP	23 48 30.5	
				microns sec	
			PKP	Z' 0.1 0.8	
		Ki	ePKP	23 46 22	
			iSKP	23 49 26.4	
		Sk	iPKP	23 46 39.9	D
			ipPKP	23 48 24.4	
		Gb	iPKP	23 46 54.1	D
			i	23 47 04.4	
		Um	iPKP	23 46 34.8	D
		Ka	iPKP	23 46 55.6	
			i	23 47 06.5	
			ipPKP	23 48 40.9	
			Kermadec Islands.		
			h = 420 km (Up,Sk,Ka).		
"	26	Up	iP	00 55 00.8	C
			iS	01 02 14	
				microns sec	
			P	Z' 0.3 0.8	

cont.

1964 Sep. cont.	26	Up		microns sec	
			S	N 0.4 3	
			M	E 3.2 17	
			M	N 6.5 20	
			M	Z 5.4 17	
			D = 5600 km = 50 1/2°.		
		Ki	iP	00 55 03.7	
			eS	01 02 26	
				microns sec	
			P	Z' 0.5 0.7	
			S	E 0.7 12	
			S	N 0.9 5	
			M	E 4.3 16	
			M	N 6.7 13	
			M	Z 4.5 14	
			D = 5650 km = 51°.		
		Sk	iP	00 55 22.6	C
			ipP	00 55 28.6	
		Gb	iP	00 55 21.7	
			ipP	00 55 27.4	
			iPP	00 57 32.3	
		Um	iP	00 54 57.2	C
			ipP	00 55 03.0	
			iPP	00 56 55	
			iS	01 02 09	
			iScS	01 04 49	
		Ka	iP	00 55 07.4	
			Tibet-India. h = 25 km (Sk, Gb,Um). Magn. = 6.0 (Up,Ki).		
"	26	Ki	eP	06 32 22	
		Sk	eP	06 33 12	
		Um	iP	06 33 15.9	
			Arctic Ocean (h = 25 km).		
"	26	Up	iP	07 39 40.8	
		Ka	iP	07 39 51.9	D
			Tibet.		
"	26	Ki	iPKP2	08 10 27.4	
		Um	iPKP2	08 10 34.7	
		Ka	iPKP2	08 10 53.7	
			Auckland Islands (h = 30 km).		
"	27	Up	iP	03 51 58.7	C
		Gb	iP	03 52 20.1	
		Ka	iP	03 52 21.0	
			Kurile Islands (h = 40 km).		
"	27	KIR	ePg	05 38 41	
			iSg	05 39 08.7	
			~~D = 240 km = 2.2°.~~		
		~~Sk~~	~~eSg~~	~~05 41 29~~	
		~~Um~~ ME	iSg	05 40 04.7	
			Finland, 67.0°N, 25.5°E.		
			Origin time = 05 37 58.		

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Sep. 27 Up iP 16 01 24.5 C
e 16 09 38
eS 16 09 57
microns sec
P N 0.5 5
P Z 0.4 3
P Z' 0.1 1.0
M E 0.9 19
M N 1.6 20
M Z 1.4 18
D = 7050 km = 63 1/2°.
Ki iP 16 00 29.9 C
eS 16 08 13
microns sec
P N 0.3 5
P Z 0.5 5
P Z' 0.1 1.0
S E 0.6 11
S N 0.4 8
M E 0.8 16
M N 1.8 21
M Z 2.3 19
D = 6150 km = 55 1/2°.
Sk iP 16 00 56.9 C
Gb iP 16 01 35.9 C
ipP 16 01 42.5
Um iP 16 00 58.1 C
iS 16 09 04
Ka iP 16 01 47.2 C
Alaska. h = 25 km (Gb).
Magn. = 5.7 (Up,Ki).

" 28 Up iP 05 15 57.5
eS 05 24 59
eScS 05 26 03
microns sec
S E 0.3 9
M E 0.7 18
M N 1.2 20
M Z 1.5 19
D = 7650 km = 69°.
Ki iP 05 16 39.0
eS 05 26 21
microns sec
P Z' 0.3 2.0
S E 0.7 9
M E 1.1 20
M N 1.2 22
M Z 1.0 18
D = 8400 km = 75 1/2°.
Sk eP 05 16 02
i 05 16 21.4
Um iP 05 16 20.3 C
iS 05 25 46
Ka iP 05 15 38.3
Atlantic Ocean (h = 40 km).

1964 Sep. 28 Up iP 06 58 41.9
ipP 06 59 08.3
microns sec
P Z' 0.1 0.5
Ki iP 06 58 50.0
ipP 06 59 12.0
microns sec
M N 0.4 10
M Z 0.3 8
Sk eP 06 59 06
ipP 06 59 29.5
iPP 07 01 23.7
Gb i(sP) 06 59 35.6
Um iP 06 58 39.4
ipP 06 59 01.9
iPP 07 00 38.4
Ka iP 06 58 47.1
i(sP) 06 59 17.1
Hindu Kush.
h = 110 km (Up,Ki,Sk,Um).

" 28 Um iP 11 54 09.2

" 28 Up iP 16 37 32.8
microns sec
P Z' 0.1 0.8
Ki iP 16 36 55.5 C
Sk eP 16 37 27
Um iP 16 37 11.8 C
Japan (h = 80 km).

" 28 Up iP 20 37 59.9

" 29 Um iP 11 33 46.0

" 29 Um iP 13 58 50.5
Japan (h = 40 km).

" 29 Up ---
microns sec
M N 2.4 20
M Z 1.9 20
Ki ---
microns sec
M E 1.6 21
M N 1.0 20
M Z 3.5 21
Um iPKP 14 19 34.5 C
Tonga Islands (h = 30 km).

" 29 Up iP 20 45 18.7
Peru-Bolivia (h = 140 km).

" 29 Up iP 22 36 31.6
Crete (h = 30 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964

Sep.	30	Up	iP	04 45 10.4	
			iS	04 49 33	
				microns	sec
			P	Z' 0.1	0.5
			M	E 1.6	17
			M	N 2.9	18
			M	Z 2.2	17
			D = 2850 km = 25 1/2°.		
		Ki	iP	04 46 20.0	
				microns	sec
			P	Z' 0.1	1.0
			M	E 3.0	20
			M	N 1.3	14
			M	Z 1.9	14
		Sk	iP	04 45 50.3	C
		Gb	iP	04 45 01.2	
		Um	iP	04 45 50.1	
		Ka	iP	04 44 35.8	
		Crete (h = 40 km).			
		Magn. = 5.5 (Up,Ki).			
"	30	Up	iP	05 58 21.0	
"	30	Up	iP	06 11 31.9	
"	30	Gb	iPg	08 36 59.1	
			iSg	08 37 01.3	
			D = 20 km = 0.2°.		
		Local blast.			
"	30	Ki	iP	10 51 04.1	
		Sumatra (h = 30 km).			
"	30	Up	iP	18 32 24.9	
"	30	Um	iP	19 25 11.7	
		Japan (h = 80 km).			
"	30	Ki	iP	20 36 47.7	C
		Gb	iP	20 37 54.2	
		Um	iP	20 37 15.9	
		Alaska (h = 15 km).			

Markus Båth
July 3, 1965

Seismological Institute
Uppsala

SEISMOLOGICAL BULLETIN

UPPSALA, KIRUNA, SKALSTUGAN, GÖTEBORG, UMEÅ and KARLSKRONA

Uppsala	(Up):	59°51.5'N, 17°37.6'E;	h = 14 m
Kiruna	(Ki):	67°50.4'N, 20°25.0'E;	h = 390 m
Skalstugan	(Sk):	63°34.8'N, 12°16.8'E;	h = 580 m
Göteborg	(Gb):	57°41.9'N, 11°58.7'E;	h = 66 m
Umeå	(Um):	63°48.9'N, 20°14.2'E;	h = 16 m
Karlskrona	(Ka):	56°09.9'N, 15°35.5'E;	h = 11 m

OCTOBER 1 - 31, 1964

1964
Oct. 1 Up iPKP 09 17 13.3
Sandwich Islands
(h = 30 km).

" 2 Up iP 01 08 44.6 C
microns sec
P Z' 0.1 1.0
M E 1.9 13
M N 2.1 13
M Z 2.5 16
Ki iP 01 07 55.3 C
ipP 01 08 00.8
microns sec
P Z' 0.3 1.5
M E 5.8 18
M N 3.3 18
M Z 2.3 13
Gb iP 01 09 08.5
Um iP 01 08 17.6 C
Ka iP 01 09 08.8 C
ipP 01 09 14.4
Sakhalin. h = 20 km (Ki,Sk).
Magn. = 5.8 (Up,Ki).

" 2 Up iPKP 13 19 32.0
i 13 19 39.7
ePP 13 21 15
microns sec
M E 1.4 19
M N 3.4 19
M Z 2.9 18
Ki iPKP 13 19 19.4
eSKSP 13 30 22
microns sec
M E 5.3 21
M N 2.7 20
M Z 6.3 20

cont.

1964
Oct. 2 cont. Sk iPKP 13 19 29.9
Gb iPKP 13 19 38.9
Um iPKP 13 19 24.4
i 13 19 36.9
i 13 20 19
iPP 13 20 50.7
eSKSP 13 30 30
Ka iPKP 13 19 50.0
iPP 13 21 36.0
Solomon Islands (h = 70 km).

" 2 Up iP 22 33 38.1
Ki iP 22 32 43.8 C
Sk iP 22 33 17.4 C
Gb iP 22 33 49.0 C
Um iP 22 33 11.7
Ka iP 22 34 01.5
Alaska (h = 20 km).

" 3 Ka iPKP 02 13 28.6
Fiji Islands (h = 550 km).

" 3 Up iP 12 59 29.1
Ki iP 12 59 57.1 D

" 3 Up iP 13 49 33.2
ipP 13 49 40.4
Ki iP 13 48 36.3
ipP 13 48 44.6
microns sec
pP Z' 0.4 1.5
Sk iP 13 49 03.1
ipP 13 49 11.3
Gb iP 13 49 43.2
ipP 13 49 52.4
Um eP 13 49 07
ipP 13 49 13.7

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Oct. 3 cont.
Um iPcP 13 50 15.5
Ka iP 13 49 55.5
ipP 13 50 04.5
Alaska. h = 30 km (Up,Ki,Sk, Gb,Um,Ka).
The Z' amplitudes of pP are on the average 3.7 times those of P.

" 3 KiR eSg 16 31 12
~~Sk eSg 16 31 16~~
UmME eSg 16 31 38
Probably Nordlands Fylke, Norway, 66 1/2°N, 14 1/2°E.
Origin time = 16 29 42.

" 3 Up iPKP 23 00 03.4 C
Gb iPKP 23 00 09.7
Fiji Islands (h = 220 km).

" 4 Up iP 01 51 11.2
Ki iP 01 52 26.9
Sk iP 01 51 47.6
Gb iP 01 50 50.9
Um iP 01 51 50.8 C
i 01 51 54.0
Ka iP 01 50 32.0 C
i 01 50 40.2
Italy (h = 260 km).

" 4 Up iP 07 09 29.0 C
Ki iP 07 09 45.7 C
Um eP 07 09 32
India-West Pakistan (h = 15 km).

" 4 Up iLgl 13 06 43.9
KiR iPn 13 02 02.8
iSn 13 02 51.5
iLgl 13 03 06.9
D = 440 km = 4.0°.
Um iLgl 13 04 36.5
Northwest Russia, 69.5°N, 30.6°E.
Origin time = 13 01 00.
Explosion?

" 4 Up iP 13 48 57.0

" 4 Up iP 16 52 45.5

" 4 Up iP 21 06 12.7 C

" 4 Up iP 23 01 52.6
Sk eP 23 02 33

cont.

1964
Oct. 4 cont.
Gb iP 23 01 35.7
Um iP 23 02 30.9
Ka eP 23 01 14
Ionian Sea (h = 90 km).

" 5 Ka iP 00 15 20.5

" 5 Up iP 03 46 07.9
iPcP 03 46 32.2
microns sec
P Z' 0.2 0.9
Ki iP 03 45 25.4
microns sec
P Z' 0.1 0.9
Sk iP 03 45 59.6
Gb iP 03 46 29.1
Um iP 03 45 43.7 C
i 03 46 05.1
Ka iP 03 46 28.9
Japan (h = 40 km).
Magn. = 6.0 (Up,Ki).

" 5 Up i(P) 13 32 25.0
i 13 35 29.6

" 5 Gb e(PKP) 14 18 43
Ka iPKP 14 18 30.7
Tonga Islands (h = 30 km).

" 5 Up iP 20 45 42.5
microns sec
P Z' 0.1 0.5

" 5 Up iP 22 21 45.5
i 22 21 55.4
Sk eP 22 21 46
Um iP 22 21 24.0
ipP 22 21 38.3
i 22 25 30.5
Ka eP 22 21 59
Japan (h = 60 km).

" 6 Up iP 01 47 49.5
Sk iP 01 47 22.9
i 01 47 31.6
Alaska (h = 30 km).

" 6 Um iP 02 32 27.0
Mexico (h = 130 km).

" 6 Up iP 06 23 38.3
ipP 06 23 46.3
isP 06 23 50.1
microns sec
M E 1.1 15

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Oct. cont.	6	Up			microns	sec
			M	N	0.8	14
			M	Z	1.9	15
		Ki			---	
					microns	sec
			M	E	2.9	13
			M	N	0.9	13
			M	Z	2.9	13
		Sk	eP		06 23 47	
		Um	iP		06 23 26.2	C
			ipP		06 23 36.1	
			iS		06 33 16	
			iSS		06 38 25	
		Ka	iP		06 23 50.5	
		Philippine Islands.				
		h = 40 km (Up,Um).				
		The Um long-period E and Z components exhibit a very pronounced Airy phase.				
"	6	Up	iSg		07 30 15.1	
		Sk	eSn		07 30 49	
			iSg		07 31 09.0	
		Um	iSg		07 30 21.0	
		Probably Central Baltic.				
"	6	Ki			---	
					microns	sec
			M	E	1.4	19
			M	N	0.8	19
			M	Z	1.1	17
		Um	e(PKP)		07 37 06	
			iPKP		07 37 16.6	
			i		07 41 37	
			eSS		07 57 45	
		Ka	iPKP		07 37 11.3	
		Easter Island Rise (h = 30 km).				
"	6	Ka	iP		11 45 31.9	
"	6	Up	iPg		11 51 34.3	D
			iSg		11 51 50.1	
			iL		11 51 58.5	
		Probably Baltic underwater explosion.				
"	6	Up	iP		13 12 16.4	
		Ka	eP		13 12 22	
"	6	Up	iP		14 34 37.1	
					microns	sec
			P	Z'	0.1	0.6
		Ki	iP		14 35 48.5	
					microns	sec
			P	Z'	0.1	1.3

cont.

1964 Oct. cont.	6	Sk	iP		14 35 22.8	
		Gb	iP		14 34 34.2	C
		Um	iP		14 35 12.2	D
		Ka	iP		14 34 05.7	C
		Turkey (h = 10 km).				
		Magn. =5.4 (Up,Ki).				
"	6	Up	iP		14 36 00.2	D
			iS		14 39 43	
					microns	sec
			P	E	11	9
			P	N	49	10
			P	Z	61	14
			P	Z'	1.1	0.8
			S	E	52	14
			S	N	70	14
			S	Z	32	13
			M	E	280	15
			M	N	310	15
			M	Z	390	15
		D = 2300 km = 20 1/2°.				
		Ki	iP		14 37 11.4	D
			iS		14 42 02	
			i		14 42 27	
					microns	sec
			P	E	2.7	15
			P	N	14	14
			P	Z	17	12
			P	Z'	1.2	1.0
			S	E	63	17
			S	N	160	19
			M	E	250	16
			M	N	160	14
			M	Z	270	14
		D = 3100 km = 28°.				
		Sk	iP		14 36 45.6	
			i		14 36 54.3	
		Gb	iP		14 35 57.2	
			i		14 36 05.0	
		Um	iP		14 36 34.8	D
			iS		14 40 42	
		Ka	iP		14 35 26.6	
		Turkey (h = 10 km).				
		Magn. = 6.9 (Up,Ki).				
		PZ' is complicated with a succession of onsets with gradually increasing amplitudes.				
"	6	Um	eP		15 27 00	
"	6	Up	iP		18 28 22.4	
			iS		18 30 59.2	
			iSS		18 31 28.6	
					microns	sec
			M	E	0.8	17
			M	N	1.5	19

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Oct. 6 cont.	Up		microns	sec	
		M	Z	1.5	19
		D = 1600 km = 14 1/2°.			
	Ki	iP		18 27 15.2	C
		iS		18 29 12.8	
		eT		18 35 01	
			microns	sec	
		P	Z'	0.2	0.6
		M	E	1.2	18
		M	N	1.1	16
		M	Z	1.4	17
		D = 1100 km = 10°.			
	Sk	iP		18 27 19.9	
		i		18 27 33.8	
		iS		18 29 08.2	
		i		18 29 15.2	
	Gb	eP		18 28 33	
	Um	eP		18 27 44	
		i		18 27 49.6	
		iS		18 29 59.1	
		i(Li)		18 30 27.7	
	Ka	iP		18 28 59.1	
		i		18 33 02.1	
	Jan Mayen (h = 30 km).				
" 6	Ki	iPKP		19 31 08.7	C
	Sk	iPKP		19 31 20.4	
	Um	iPKP		19 31 15.7	
	New Hebrides Islands (h = 20 km).				
" 6	Up	iP		20 28 41.0	C
	Ki	iP		20 28 44.0	C
			microns	sec	
		M	N	0.8	20
	Sk	iP		20 29 02.4	C
	Gb	iP		20 29 01.0	
	Um	iP		20 28 37.0	C
	Ka	iP		20 28 46.6	C
		i		20 29 01.0	
	Nepal-India (h = 25 km).				
" 7	Um	iP		02 05 21.8	
" 7	Up	iP		05 52 31.3	
" 7	Ka	iP		14 45 52.1	C
" 7	Up	iP		23 12 31.6	
		i		23 12 38.7	
	Ki			---	
			microns	sec	
		M	E	0.6	14
	Sk	eP		23 13 14	
	Um	iP		23 13 10.3	
		i		23 13 21.9	

cont.

1964 Oct. 7 cont.	Um	i		23 13 37.3
		eS		23 17 26
	Turkey (h = 30 km).			
" 8	Ki	e(Sg)		05 38 58
" 8	Um	iP		17 03 51.2 D
	Aleutian Islands (h = 30 km).			
" 8	Up	iP		20 48 43.6
" 8	Up	iP		21 37 04.5
" 9	Up	iP		12 54 17.9
	Ki	iP		12 53 46.8 D
	Sk	iP		12 54 14.8
	Gb	iP		12 54 36.2
	Bonin Islands(h = 520 km).			
" 9	Ki	iP		15 06 31.7 C
	Alaska (h = 30 km).			
" 9	Up	iP		19 38 55.9
	Ki	iP		19 38 59.8
		microns	sec	
		P	Z'	0.1 0.9
	Sk	iP		19 38 43.6 D
	Um	iP		19 38 58.3
	Colombia (h = 160 km).			
" 9	Up	iP		20 06 03.3
	Ki	iP		20 05 09.5
		i		20 05 16.2
	Sk	iP		20 05 35.7
	Gb	iP		20 06 15.3 C
	Um	iP		20 05 36.1 C
	Alaska (h = 15 km).			
" 9	Up	iP		20 41 12.6
		microns	sec	
		P	Z'	0.1 0.5
" 9	Ki	iPg		22 34 19.7 C
	Um	eLgl		22 36 24
	Probably blast in Kiruna ore mines.			
" 10	Up	iP		04 57 02.9
	Sk	iP		04 57 20.6
	Gb	iP		04 57 25.0
	Tibet (h = 20 km).			
" 10	Up	iP		19 48 47.0
	Ki	iP		19 47 51.6 C
		microns	sec	
		P	Z'	0.1 1.0

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Oct. cont.	10	Sk	iP	19 48 18.0	
		Gb	iP	19 48 58.4	
		Um	iP	19 48 19.3	
		Alaska (h = 40 km).			
"	10	Up	iP	20 16 39.6	
			eS	20 24 41	
			D = 6550 km = 59°.		
		Ki	iP	20 15 44.6	
			eS	20 23 02	
				microns sec	
			P	Z' 0.2 1.0	
			S	E 0.4 9	
			S	N 0.4 9	
			M	E 0.6 14	
			M	N 0.6 15	
			M	Z 1.6 16	
			D = 5700 km = 51 1/2°.		
		Sk	iP	20 16 10.9	
			i(pP)	20 16 15.7	
		Gb	iP	20 16 50.9	
		Um	iP	20 16 12.0	
			eS	20 23 51	
		Ka	iP	20 17 02.8	
		Alaska (h = 30 km).			
		Magn. = 5.7 (Ki).			
"	11	Up	iP	00 54 21.0	
		Sk	iP	00 54 31.4	
		Atlantic Ocean (h = 30 km).			
"	11	Up	iP	03 12 37.6 C	
		Ki	iP	03 11 45.6 C	
		Kurile Islands (h = 30 km).			
"	11	Up	iP	10 20 22.9	
			ipP	10 20 32.0	
		Ki	eP	10 19 56	
		Hawaii. h = 40 km (Up).			
"	11	Ki	iPKP	11 29 19.2	
		Sk	iPKP	11 29 31.7	
		New Hebrides Islands (h = 70 km).			
"	11	Um	iP	14 32 03.3	
			i	14 32 16.6	
"	11	Up	eP	21 28 27	
			i	21 30 55.7	
			iPP	21 32 12.8	
			e	21 32 31	
			iPPP	21 34 16	
			eScS	21 39 57	
				microns sec	
			M	E 5.1 22	

cont.

1964 Oct. cont.	11	Up		microns sec	
			M	N 6.4 21	
			M	Z 5.8 20	
		Ki	iP	21 28 21.9 D	
			eX	21 31 55	
			iPP	21 32 09.8	
			eSKS	21 38 51	
			eS	21 39 26	
				microns sec	
			P	Z 1.0 4	
			P	Z' 0.4 2.0	
			PP	E 1.1 5	
			PP	N 0.3 6	
			PP	Z 1.4 4	
			SKS	E 2.1 14	
			S	N 1.2 7	
			M	E 9.0 21	
			M	N 17 22	
			M	Z 8.0 19	
			D = 10500 km = 94 1/2°.		
		Sk	iP	21 28 41.8	
		Gb	eP	21 28 53	
		Um	iP	21 28 25.9 D	
			iX	21 32 02	
			iPP	21 32 11.2	
			iSKS	21 38 58	
			iS	21 39 38	
			iSS	21 46 18	
		Ka	iP	21 28 43.4	
			iPP	21 32 49.4	
		Celebes (h = 30 km).			
		Magn. = 6.5 (Up,Ki).			
"	11	Up	iP	23 46 32.3	
		Ki	iP	23 46 11.8	
		Mindanao (h = 120 km).			
"	12	Um	iP	03 29 40.9	
"	12	Gb	iP	04 59 02.5	
"	12	Up		---	
				microns sec	
			M	E 0.8 18	
			M	N 0.6 16	
		Ki	iP	14 22 59.1	
				microns sec	
			M	E 0.3 8	
			M	N 0.2 10	
		Rhodes Island (h = 30 km).			
"	12	Up	iP	15 56 19.4	
			ipP	15 56 37.9	
			i	15 58 13.1	
				microns sec	
			M	E 1.0 18	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Oct. 12 Up

		microns	sec
M	N	1.9	23
M	Z	3.0	23
Ki iP		15 56 02.7	
isP		15 56 28.4	
iPP		15 59 50	
iSKS		16 06 26	
eS		16 07 08	
		microns	sec
SKS	E	0.7	7
S	N	0.3	8
M	E	2.6	20
M	N	2.1	19
M	Z	3.5	21

D = 10350 km = 93°.

Sk iP	15 56 24.4	
e	15 58 58	
ePP	16 00 20	
Gb iP	15 56 34.4	
Um iP	15 56 09.2	C
ipP	15 56 26.2	
eSKS	16 06 29	
i	16 07 01	
iS	16 07 20	

Talaud Islands.
h = 70 km (Up,Ki,Um).

" 12 Up iP 20 49 45.2

" 12 Up eSS 22 35 39

		microns	sec
M	E	1.0	18
M	N	1.1	18
M	Z	1.5	19
Ki ePKP		22 14 48	
ePP		22 17 17	
ePKS		22 18 15	
		microns	sec
PKP	Z'	0.1	1.7
PP	Z	0.4	5
PKS	E	0.3	8
PKS	N	0.2	8
M	E	2.6	20
M	N	1.6	22
M	Z	4.2	21
Um iPP		22 17 30	
ePKS		22 18 26	
iSKKS		22 24 26	
e		22 34 48	
eSS		22 35 10	

Easter Island (h = 25 km).
Magn. = 6.1 (Up,Ki).

" 13 Up iP 02 31 55.8 C
ipP 02 32 09.4

cont.

1964 Oct. 13 Up

		microns	sec
P	Z'	0.2	1.5
Ki iP		02 31 09.5	
ipP		02 31 22.8	
		microns	sec
P	Z'	0.1	0.9
Sk eP		02 31 44	
Um iP		02 31 30.9	
ipP		02 31 44.1	

Kurile Islands.
h = 50 km (Up,Ki,Um).
Magn. = 5.9 (Up,Ki).

" 13 Ki eP 05 44 55
Molucca Passage (h = 15 km).

" 13 Ki iP 07 04 45.7

" 13 Ki e(PPS) 11 07 53

		microns	sec
M	E	1.4	24
M	N	0.9	23
M	Z	1.1	21
Um iPP		10 57 59	
ePS		11 07 12	
eSS		11 13 09	

Bismarck Sea (h = 60 km).

" 13 Ki iP 14 09 33.5
Sk iP 14 10 00.0
Um iP 14 10 01.9
Alaska (h = 30 km).

" 13 Um iPKP 17 39 38.8
Kermadec Islands
(h = 120 km).

" 13 Up iP 23 10 03.4

		microns	sec
P	Z'	0.1	0.5
Ki iP		23 10 12.4	
		microns	sec
P	Z'	0.1	1.0
Sk iP		23 10 29.0	
Um iP		23 10 01.7	
Ka iP		23 10 07.5	

Hindu Kush (h = 120 km).
Magn. = 6.0 (Up,Ki).

" 14 Up iP 03 16 47.9
eS 03 26 25

		microns	sec
S	E	0.7	10
M	E	1.0	20
M	N	2.8	20
M	Z	3.0	16

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Oct. 14 Ki eP 03 16 08
cont. eS 03 25 16

		microns	sec
P	Z'	0.1	1.5
S	E	1.0	12
S	N	0.4	9
M	E	2.6	20
M	N	1.7	18
M	Z	3.6	16

D = 7700 km = 69 1/2°.

Sk eP 03 16 43
Um iP 03 16 27.3
iS 03 25 48
iSS 03 30 28
iSSS 03 34 06
Japan (h = 30 km).
Magn. = 5.7 (Up,Ki).

" 14 Ki eP 03 29 37
i 03 31 25.8

" 14 Gb iP 05 13 00.1

" 14 Up iSg 12 55 06.9
Ki eLgl 12 58 16
Sk iSg 12 55 39.2
Gb iPg 12 53 30.5
iSg 12 53 49.5
D = 160 km = 1.4°.
Oslo Fjord, 59.1°N, 10.7°E.
Origin time = 12 53 04.

" 14 Up iP 17 35 11.0
iS 17 42 42

		microns	sec
M	N	0.9	18
M	Z	1.1	18

Ki iP 17 35 49.9
eS 17 43 48

		microns	sec
S	E	0.4	10
S	N	0.3	10
M	E	1.4	19
M	N	1.2	19
M	Z	1.9	20

Sk eP 17 35 46
Um iS 17 43 01
iSS 17 47 16
Arabian Sea.
Magn. = 5.4 (Up,Ki).

" 14 Up iP 20 49 03.9
Ki iP 20 49 40.4 D
Arabian Sea (h = 10 km).

" 15 Ki i(P) 02 22 51.5

1964
Oct. 15 Um iPKP 11 23 59.5
Kermadec Islands
(h = 480 km).

" 15 Up iP 11 55 00.8

" 15 Up iP 20 37 52.2 C
eS 20 46 47

		microns	sec
P	Z'	0.2	1.0
S	E	1.7	15
S	N	1.6	16
M	E	8.0	20
M	N	18	19
M	Z	16	18

D = 7550 km = 68°.

Ki iP 20 37 06.2 C
iS 20 45 23
iScS 20 46 56

		microns	sec
P	N	0.4	7
P	Z	1.3	9
P	Z'	0.1	1.0
S	E	2.7	15
S	N	0.9	12
M	E	15	18
M	N	13	20
M	Z	16	18

D = 6800 km = 61°.

Sk iP 20 37 43.5
Gb iP 20 38 13.7 C
Um iP 20 37 27.6 C
iS 20 46 09
iSS 20 50 36
Ka iP 20 38 14.6 C
Kurile Islands (h = 50 km).
Magn. = 6.1 (Up,Ki).

" 15 Up iP 20 46 33.5
ipP 20 46 47.8
Ki eP 20 45 45
Ka iP 20 46 55.1
Kurile Islands.
h = 60 km (Up).

" 15 Up iP 21 16 56.9
Um iP 21 16 58.9
Costa Rica (h = 40 km).

" 15 Up iP 22 51 33.2
ipP 22 51 47.8
Ki eP 22 50 48

		microns	sec
M	E	0.9	18
M	N	0.6	18
M	Z	1.6	20

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Oct. 15 Um iP 22 51 06.9
cont. Kurile Islands.
h = 60 km (Up).

" 15 Up iP 23 10 11.0
Ki iP 23 09 16.6
Sk iP 23 09 43.8
ipP 23 09 50.3
Gb iP 23 10 26.1
i 23 10 29.3
Um eP 23 09 46
Ka eP 23 10 37
Alaska (h = 30 km).

" 15 Up iP 23 19 51.7 C
Ki iP 23 18 57.5 C
Sk iP 23 19 24.2 C
Gb iP 23 20 03.4 C
ipP 23 20 10.1
Um iP 23 19 25.8
Ka iP 23 20 13.8
Alaska (h = 30 km).

" 15 Um iP 23 57 34.4 C

" 16 Up iP 01 47 45.5
Kurile Islands (h = 40 km).

" 16 Ki eP 04 15 59
Alaska (h = 30 km).

" 16 Up iPKP 06 34 36.3
microns sec
PKP Z' 0.1 0.6
Ki iPKP 06 34 20.0
Sk iPKP 06 34 31.8
Gb iPKP 06 34 46.4
Um iPKP 06 34 25.3
Ka iPKP 06 34 48.9 C
South of Fiji Islands
(h = 180 km).

" 16 Up iP 07 10 39.9
i 07 10 41.1
iS 07 19 39
microns sec
P N 1.6 8
P Z 2.5 8
P Z' 0.6 1.0
S E 4.5 15
S N 4.7 12
M E 28 19
M N 42 18
M Z 41 18
D = 7600 km = 68 1/2°.

cont.

1964
Oct. 16 Ki iP 07 09 54.1 C
cont. i 07 09 59.3
eS 07 18 12
iScS 07 19 48
microns sec
P E 0.9 8
P N 1.1 8
P Z 3.6 8
P Z' 0.2 1.0
S E 8.2 13
S N 3.6 12
M E 50 18
M N 39 18
M Z 50 17
D = 6850 km = 61 1/2°.
Sk iP 07 10 31.5
Gb iP 07 11 02.2
Um iP 07 10 15.7 C
i 07 18 27
iS 07 18 46
Ka iP 07 11 02.9
Kurile Islands (h = 30 km).
Magn. = 6.6 (Up,Ki).

" 16 Um iPKP 07 19 13.8 C
Sandwich Islands (h = 30 km).

" 16 Up iP 07 28 08.1
ipP 07 28 20.7
Um iP 07 27 44.8
Kurile Islands.
h = 50 km (Up).

" 16 Up iP 07 32 46.1 D
ipP 07 33 00.0
microns sec
P Z' 0.2 0.8
Ki iP 07 32 00.7
Sk eP 07 32 37
Gb iP 07 33 07.2
Um eP 07 32 19
i 07 32 20.8
Ka iP 07 33 07.9
Kurile Islands.
h = 60 km (Up).

" 16 Up iP 07 35 25.7

" 16 Up iP 07 35 50.3 C
Gb eP 07 36 11
Sakhalin (h = 30 km).

" 16 Up iP 07 39 29.0
Ki iP 07 38 42.0
Sk eP 07 39 19

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Oct. 16 Gb iP 07 39 50.6
cont. Um eP 07 39 04
Kurile Islands (h = 50 km).

" 16 Up iP 07 48 20.1
microns sec
P Z' 0.1 0.9
Ki iP 07 47 36.4
Gb iP 07 48 43.0
Um iP 07 48 02.5
Ka iP 07 48 42.5
Kurile Islands
(h = 30 km).

" 16 Up iP 08 02 38.9
Kurile Islands
(h = 30 km).

" 16 Up iP 08 29 28.9 C
eS 08 38 19
iScS 08 39 38
microns sec
P Z 0.8 5
P Z' 0.5 0.8
S E 2.6 13
S N 2.2 14
M E 10 19
M N 23 19
M Z 19 18
D = 7600 km = 68 1/2°.
Ki iP 08 28 43.2 C
iScS 08 38 35
microns sec
P Z 1.5 8
P Z' 0.1 0.9
M E 21 18
M N 16 20
M Z 23 18
Sk iP 08 29 18.8 C
Gb iP 08 29 50.2
Um iP 08 29 03.4
Ka iP 08 29 50.8
Kurile Islands (h = 30 km).
Magn. = 6.3 (Up,Ki).

" 16 Up iP 08 34 01.2
i 08 34 06.8
ipP 08 34 14.0
microns sec
P Z' 0.2 0.7
Ki iP 08 33 15.1
Gb iP 08 34 22.0 C
Um iP 08 33 35.7
Ka iP 08 34 23.3
Kurile Islands.
h = 50 km (Up).

cont.

1964
Oct. 16 Two remarks about the present
cont. earthquake sequence in the
Kurile Islands:
1) This is a typical earthquake
swarm with no pronounced main
shock.
2) The focal depths are around
50-60 km in every case we have
been able to determine it, and
possibly the whole swarm is
located in that depth range.

" 16 Up iP 08 40 46.1

" 16 Up iP 08 44 31.8
ipP 08 44 45.5
microns sec
P Z' 0.1 0.5
Ki eP 08 43 47
Sk eP 08 44 22
Gb iP 08 44 54.2
Um iP 08 44 06.5
Ka iP 08 44 55.1 D
Kurile Islands.
h = 50 km (Up).

" 16 Up iP 08 45 50.0 C
Ki eP 08 45 03
Gb iP 08 46 10.8
Um iP 08 45 27.1
Kurile Islands (h = 30 km).

" 16 Ki iP 08 47 42.4
Kurile Islands (h = 30 km).

" 16 Up iP 08 58 26.5
Um iP 08 58 01.4
Kurile Islands (h = 30 km).

" 16 Up iP 09 09 52.3

" 16 Up iP 09 29 18.6 C
eS 09 38 26
microns sec
P Z' 0.3 0.7
S E 2.1 14
S N 4.1 17
M E 12 19
M N 19 18
M Z 15 18
Ki iP 09 28 33.0 C
ipP 09 28 45.2
microns sec
P Z' 0.1 1.0
M E 22 18
M N 16 20
M Z 25 17

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Oct. cont,	16	Sk	iP	09 29 09.2	
		Gb	iP	09 29 39.5	C
			ipP	09 29 52.8	
		Um	iP	09 28 54.0	C
		Ka	iP	09 29 40.9	C
			ipP	09 29 53.8	
		Kurile Islands.			
		h = 50 km (Ki,Gb,Ka).			
		Magn. = 6.3 (Up,Ki).			
"	16	Up	iP	09 30 24.7	
			ipP	09 30 37.3	
				microns sec	
			P	Z' 0.2 0.7	
		Gb	iP	09 30 44.9	
		Ka	iP	09 30 46.8	
		Kurile Islands.			
		h = 50 km (Up).			
		Origin time = 09 19 23.			
"	16	Up	iP	09 31 14.1	D
"	16	Up	iP	09 32 59.1	
"	16	Up	iP	09 37 26.0	
"	16	Up	iP	10 05 34.9	C
			ipP	10 05 47.4	
		Ki	iP	10 04 48.7	C
		Um	iP	10 05 09.8	
		Kurile Islands.			
		h = 50 km (Up).			
"	16	Um	eP	10 11 11	
"	16	Ka	iPg	10 34 13.9	
			iSg	10 34 15.9	
			D = 17 km = 0.15°		
		Blast?			
"	16	Up	iP	11 02 01.0	
			ipP	11 02 14.5	
		Ki	eP	11 01 15	
		Um	iP	11 01 36.8	
		Kurile Islands.			
		h = 50 km (Up).			
"	16	Up	iP	11 02 34.3	
		Um	iP	11 02 09.9	
		Kurile Islands.			
		Origin time = 10 51 32.			
"	16	Ki	iP	11 08 49.1	
		Um	eP	11 09 10	
		Kurile Islands (h = 25 km).			

1964 Oct. cont.	16	Up	iP	11 35 42.7	
		Ki		---	
				microns sec	
			M	E 0.6 18	
			M	N 0.4 18	
		Kurile Islands (h = 30 km).			
"	16	Up	iP	12 15 06.9	
			ipP	12 15 20.0	
				microns sec	
			P	Z' 0.1 0.6	
		Ki	iP	12 14 21.8	
		Um	iP	12 14 42.4	
		Ka	iP	12 15 29.4	
		Kurile Islands.			
		h = 50 km (Up).			
"	16	Up	iP	12 29 55.1	
		Um	iP	12 29 30.9	
		Kurile Islands (h = 30 km).			
"	16	Up	iP	12 48 28.9	
			ipP	12 48 41.9	
				microns sec	
			P	Z' 0.1 0.7	
			M	E 0.9 19	
			M	N 1.1 19	
			M	Z 1.1 18	
		Ki	iP	12 47 43.1	C
				microns sec	
			M	E 1.1 17	
			M	N 0.8 18	
			M	Z 1.4 17	
		Sk	eP	12 48 17	
		Gb	iP	12 48 50.8	
		Um	iP	12 48 04.9	
		Ka	iP	12 48 50.4	
		Kurile Islands.			
		h = 50 km (Up).			
		Magn. = 5.8 (Up,Ki).			
"	16	Up	iP	13 40 32.8	
				microns sec	
			P	Z' 0.1 0.5	
		Ki	eP	13 39 44	
		Um	iP	13 40 08.4	
		Kurile Islands (h = 30 km).			
"	16	Up	iP	14 04 09.4	
"	(16)	Ki	ePn	17 21 26	
			iSn	17 22 04.7	
			iSg	17 22 21.8	
			D = 370 km = 3.3°		

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Oct. cont.	16	SKA	eSg	17 25 11	
		UME	eSg	17 23 53	
		Northwest Russia, 68.9°N, 29.1°E. Origin time = 17 20 32. Explosion?			
"	16	Ki	iP	19 16 52.6	
			iS	19 18 42.5	
			D = 1100 km = 10°.		
		Um	iP	19 17 47.2	
			i(S)	19 20 30.5	
		Svalbard. Origin time = 19 14 35. Solution obtained by combination with Norwegian and Finnish data.			
"	16	Up	iP	20 44 09.8	
				microns	sec
			P	Z' 0.1	0.6
"	16	Up	i(P)	21 41 42.7	
"	16	Um	iP	23 53 24.5	
		Kurile Islands (h = 30 km).			
"	17	Up	iP	01 11 17.4	
			i	01 12 06.1	
		Ki	iP	01 10 40.0	
		Sk	eP	01 11 12	
		Um	iP	01 10 55.1	
			ipP	01 11 17.0	
		South of Japan. h = 90 km (Um).			
"	17	Up	iP	01 51 01.5	
"	17	Up	iPKP	01 57 28.7	
		Ki	ePKP	01 57 06	
			i	01 57 19.2	
		Sk	ePKP	01 57 18	
			i	01 57 28.5	
		Gb	iPKP	01 57 25.6	
		Um	iPKP	01 57 10.7	
			i	01 57 22.3	
		Ka	iPKP	01 57 23.9	
			i	01 57 36.0	
		Solomon Islands (h = 60 km). The amplitude of the second phase is larger, but it is not certain whether this is pPKP or a multiple PKP.			
"	17	Um	iP	02 07 53.8	

1964 Oct.	17	Up	iP	02 10 09.7	
		Ki	eP	02 09 13	
				microns	sec
			M	E	0.9 22
			M	N	0.6 19
			M	Z	1.3 20
		Sk	iP	02 09 40.7	C
		Gb	i(P)	02 10 27.3	
		Um	iP	02 09 43.4	
		Ka	iP	02 10 32.7	
		Alaska (h = 30 km).			
"	17	Um	iP	02 40 15.4	
		South of Japan (h = 20 km).			
"	17	Up	iP	02 52 31.5	
"	17	Up	eP	03 30 45	
		Ki	iP	03 30 33.9	C
			ipP	03 30 41.5	
				microns	sec
			P	Z' 0.2	1.1
		Sk	iP	03 30 52.9	
		Gb	iP	03 31 00.6	C
			ipP	03 31 08.7	
		Um	iP	03 30 36.8	C
		Ka	iP	03 30 53.8	
		Celebes. h = 30 km (Ki,Gb).			
"	17	Up	iP	08 33 26.3	
"	17	Up	iP	09 55 53.0	
			iPP	09 56 27.6	
			eS	10 00 25	
				microns	sec
			M	E	1.6 11
			M	N	1.4 12
			M	Z	1.4 11
			D = 2800 km = 25°.		
		Ki	iP	09 57 00.7	
				microns	sec
			P	Z' 0.1	1.0
			M	E	4.7 17
			M	N	1.6 11
			M	Z	2.3 11
		Sk	iP	09 56 31.7	
		Gb	eP	09 55 44	
		Um	iP	09 56 25.3	
			i	09 56 34.2	
			i(S)	10 01 33	
		Ka	iP	09 55 23.3	
			iPP	09 55 50.3	
			eS	09 59 23	
		Crete (h = 30 km).			

Up = Uppsala. Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Oct. 17 Up iP 10 25 03.7
Kurile Islands (h = 30 km).

" 17 Up iP 12 19 02.6
Ki iP 12 18 23.9
Sk iP 12 18 56.9
Um iP 12 18 41.0 C
Japan (h = 50 km).

" 17 Ki eP 14 57 49
Sk eP 14 57 18 C
North Atlantic Ocean
(h = 30 km).

" 17 Um iP 15 15 06.0
Banda Sea (h = 120 km).

" 18 Up iP 06 27 37.9 C
Ki ---

		microns	sec
M	E	0.5	13
M	N	0.3	12
M	Z	0.6	16

Um iP 06 27 13.0
eSS 06 40 22
Kurile Islands (h = 30 km).

" 18 Up iP 09 17 20.1
i 09 17 21.2
ipP 09 17 26.9
i 09 17 31.9
eS 09 26 13

		microns	sec
pP	Z'	0.6	1.6
S	E	0.5	10
M	E	1.0	18
M	N	1.0	17
M	Z	1.5	19

D = 7500 km = 67 1/2°.
Ki iP 09 17 45.5
ipP 09 17 51.3
i 09 17 57.2
iS 09 27 07

		microns	sec
P	Z	0.6	5
pP	Z'	0.6	1.9
S	E	0.7	9
M	E	2.9	21
M	N	1.7	20
M	Z	4.7	22

D = 7950 km = 71 1/2°.
Sk eP 09 17 46
ipP 09 17 52.5
i 09 17 57.4
Gb iP 09 17 28.5
ipP 09 17 34.7

cont.

1964
Oct. 18 Gb i 09 17 40.3
cont. iPP 09 19 54.9
i 09 20 08.8
Um iP 09 17 29.6
ipP 09 17 35.1
i 09 17 41.0
iS 09 26 34
Ka iP 09 17 18.3
ePP 09 19 49
Indian Ocean. h = 25 km
(Up,Ki,Sk,Gb,Um).
The Z' records are characterized by three clear phases: P is followed by a phase after 6.2 sec (interpreted as pP) and another after 11.6 sec. Other interpretations are possible, e.g. that the first two phases represent P of two different shocks.

" 18 Up iP 12 45 29.2 D
ipP 12 47 33.5
isP 12 48 24.2
iY 12 48 38
iPP 12 49 56.5
ipPP 12 51 50.3
iSKS 12 55 08
iS 12 56 24
iSP 12 58 04

		microns	sec
P	Z'	0.1	0.7
PP	Z'	0.2	0.8
SKS	N	0.8	5
M	E	3.4	22
M	N	7.3	20
M	Z	8.4	20

(D = 11550 km = 104°).
Ki iP 12 45 15.8 D
ipP 12 47 21
iX 12 47 30.8
iY 12 48 22
ePP 12 49 36
ipPP 12 51 26
iSKS 12 54 58
iSKKS 12 55 37
iS 12 55 59
ipS 12 58 36
iPKKP 13 01 21.3

		microns	sec
P	E	0.7	5
P	Z	1.2	6
P	Z'	0.6	1.0
PP	Z'	0.4	1.2
SKS	E	6.6	9
SKS	N	1.2	6

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Oct. 18 cont.

Ki

		microns	sec
S	E	4.3	6
S	N	3.5	8
PKKP	Z'	0.2	1.1
M	E	7.7	18
M	N	3.6	19
M	Z	11	18

(D = 11200 km = 101°).

Sk	iP	12 45	35.4
	iPKP	12 49	43.3
	ipPP	12 52	00.2
	iPKKP	13 01	07.4
	i	13 01	29.3
Gb	iP	12 45	42.8
	i	12 45	44.1
	ipP	12 47	56.4
	isP	12 48	59.4
	iPKP	12 49	47.2
	iPP	12 50	22.1
Um	iP	12 45	18.2 D
	ipP	12 47	24
	iX	12 47	33.1
	iPP	12 49	30.4
	ipPP	12 51	18
	isPP	12 52	24
	iSKS	12 54	54
	iS	12 55	58
	iSP	12 57	49
	ePKKP	13 01	17
Ka	iP	12 45	36.9
	ipP	12 47	48.6
	isP	12 48	54.4
	i(PKKP)	13 01	28.8

Banda Sea. h = 590 km (Up,Ki, Gb,Um,Ka).
Magn. = 7.0 (Up,Ki).

" 18

Up	iP	13 27	31.4
Ki	iP	13 28	09.6
	ePP	13 29	42
Sk	eP	13 28	07
Um	iP	13 27	46.8

Iran (h = 30 km).

" 18 Up iP 15 01 37.4

" 18

Up	iP	21 33	05.2
Ki	iP	21 33	39.6
Sk	eP	21 33	38
	i	21 33	41.6
Gb	iP	21 33	17.3
Um	iP	21 33	17.9
Ka	iP	21 33	00.3

Iran (h = 60 km).

1964 Oct. 18

Up	eP	22 42	57
Ki	iP	22 43	36.2
Sk	iP	22 43	32.1
Um	eP	22 43	16

Iran (h = 40 km).

" 19 Ki iP 00 05 40.1
Sunda Strait (h = 80 km).

" 19 Um iP 02 28 29.7

" 19

Gb	e	13 29	25
Ka	e(P)	13 27	41
	i	13 28	24.7

Indistinct record; probably near source.

" 19 Ki iP 16 38 57.7
Alaska (h = 50 km).

" 19 Up iP 20 30 43.8

" 19

Up	iP	21 49	32.3
Ka	iP	21 49	53.7

Kurile Islands (h = 30 km).

" 20 Ka iP 15 28 23.1

" 20 Um iP 23 15 47.6

" 21

UpPP	iSg	06 39	23.8
KiR	iPn	06 35	04.2
	iPg	06 35	18.4
	iSn	06 35	59.9
	iSg	06 36	17.3
	~~D = 460 km = 4.1°~~.		
SKA	iPn	06 36	10.6
	iSn	06 37	53.4
	iSg	06 38	50.2
	~~D = 980 km = 8.8°~~.		
UME	iPn	06 35	31.2
	iSn	06 36	45.0
	iSg	06 37	32.0
	D = 690 km = 6.2°.		

Northwest Russia, 68.0°N, 31.4°E. Origin time = 06 33 59. Explosion?
This is probably the strongest event we have ever had in this whole series.

" 21 Up iP 07 49 27.0

		microns	sec
M	E	0.8	18
M	N	1.5	19
M	Z	1.7	18

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Oct. 21 Ki iP 07 48 50.4
cont. microns sec
M E 1.5 16
M N 1.1 18
M Z 1.8 15
Hebgen Lake, USA (h = 30 km).
Magn. = 5.4 (Up,Ki).

" 21 Sk eP 14 42 46
Gb iP 14 43 25.5
Um iP 14 42 47.5
Alaska (h = 30 km).

" 21 Ki iP 17 31 13.4
Ka iP 17 31 09.8
Hindu Kush (h = 180 km).

" 21 Up iP 23 19 18.0 C
ipP 23 19 35
iS 23 27 22
iLi 23 38 26
microns sec
P Z' 0.3 0.7
S E 2.4 10
S N 7.2 13
M E 110 18
M N 37 22
M Z 180 19
D = 6550 km = 59°.
Ki iP 23 19 09.2 C
ePa 23 22 40
iS 23 27 10
iLi 23 37 31
iLgl 23 39 43
microns sec
P E 2.2 9
P Z 5.0 9
P Z' 2.6 2.0
S E 9.4 11
S N 4.7 12
S Z 6.2 10
M E 130 16
M N 40 12
M Z 150 15
D = 6450 km = 58°.
Sk iP 23 19 33.8 C
ipP 23 19 50.2
Gb iP 23 19 40.0
ipP 23 19 56.2
Um iP 23 19 09.5 C
ipP 23 19 25.7
iPP 23 21 15
iS 23 27 04
Ka iP 23 19 27.7 C
India-China. h = 70 km (Up,Sk, Gb,Um). Magn. = 6.9 (Up,Ki).

cont.

1964
Oct. 21 The long-period E and Z
cont. components show a very pronounced Airy phase of the fundamental-mode Rayleigh waves. Well developed higher-mode surface waves.

" 22 Up eP 01 52 20

" 22 Ki iP 03 12 39.4
Um iP 03 12 57.2
Sea of Japan (h = 30 km).

" 22 Up iP 10 06 03.5
ipP 10 06 16.6
Ki iP 10 05 25.1
Sk eP 10 05 57
Um iP 10 05 41.9 C
ipP 10 05 54.3
Ka iP 10 06 23.0
Japan. h = 50 km (Up,Um).

" 22 UpPP iSn 10 27 57.7
iSg 10 28 30.1
~~D = 640 km = 5.8°.~~
KiR eSn 10 28 23
iS* 10 28 49.4
iSg 10 29 05.2
SKA iPn 10 27 13.9
i(Sn) 10 28 51.0
iSg 10 29 32.9
UmE ePn 10 26 32
iSn 10 27 28.2
iSg 10 27 47.3
D = 500 km = 4.5°.
Eastern Finland, 61 3/4°N, 28 3/4°E. Origin time = 10 25 21. Explosion?

" 22 Up iP 12 50 14.7 C
Volcano Islands (h = 90 km).

" 22 Up iP 16 11 19.3
Ki iP 16 11 07.3
Mississippi, USA. Underground nuclear explosion ("Salmon event").

" 23 Up iP 02 06 41.6
ipP 02 06 48.8
eX 02 15 05
iS 02 15 20
isS 02 15 32
iScS 02 16 45

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Oct. 23 cont.

Up

		microns	sec
pP	E	1.4	5
pP	Z	3.1	5
pP	Z'	0.3	1.0
S	E	3.0	11
M	E	5.4	23
M	N	11	22
M	Z	10	20

D = 7200 km = 65°.

Ki iP 02 06 53.5
ipP 02 07 00.5
iX 02 15 33
iS 02 15 44
esS 02 15 57

		microns	sec
P	Z'	0.3	1.0
pP	Z	3.3	5
pP	Z'	1.2	1.0
S	E	5.4	8
M	E	15	20
M	N	9.3	20
M	Z	19	20

D = 7450 km = 67°.

Sk iP 02 06 28.8
ipP 02 06 35.9
Gb iP 02 06 21.3
ipP 02 06 27.7
Um iP 02 06 50.2 C
ipP 02 06 56
iS 02 15 34
Ka iP 02 06 32.9 C
ipP 02 06 40.0

North Atlantic Ocean.
h = 30 km (Up,Ki,Sk,Gb,Um,Ka).
Magn. = 6.5 (Up,Ki).
The amplitude ratios pP/P (short-period) are about 3.4 and sS/S (long-period) about 4. A very pronounced G-wave is recorded by the Press-Ewing N at Uppsala.

" 23 Up iPKP 09 58 39.3 D

		microns	sec
PKP	Z'	0.1	0.6

Sk iPKP 09 58 30.9
Kermadec Islands (h = 70 km).

" 23 Up iP 11 19 05.2 D
Ki iP 11 18 17.6
ipP 11 18 28.4

		microns	sec
P	Z'	0.2	0.9

Um iP 11 18 39.5
ipP 11 18 51.9
Kurile Islands.
h = 50 km (Ki,Um).

1964 Oct. 23 Sk e 16 11 14
iSg 16 11 34.0

" 23 Up iP 21 17 24.1

		microns	sec
P	Z'	0.1	0.8
M	E	1.3	22
M	N	1.8	18
M	Z	2.9	18

Ki iP 21 16 38.7

		microns	sec
P	Z'	0.1	0.9
M	E	1.8	18
M	N	1.5	19
M	Z	4.2	21

Sk iP 21 17 15.2
Gb iP 21 17 44.5
Um iP 21 17 00.1
Kurile Islands (h = 50 km).
Magn. = 5.6 (Up,Ki).

" 24 Up eP 00 51 13

		microns	sec
P	Z'	0.1	1.0

Ki iP 00 50 27.4
Gb iP 00 51 34.6
Kurile Islands (h = 30 km).

" 24 Up iP 01 40 32.4
Ki iP 01 40 41.1
Um iP 01 40 30.8
Hindu Kush.

" 24 Up iP 06 58 25.8
Ki iP 06 58 32.5
Um iP 06 58 22.7
Afghanistan-USSR (h = 60 km).

" 24 Ki iP 08 57 46.0
Formosa (h = 60 km).

" 24 Ki iP 18 46 07.0

		microns	sec
P	Z'	0.1	0.9

Eastern Siberia (h = 30 km).

" 25 Um iP 04 06 18.4 D

" 25 Up iP 08 04 26.4
iS 08 07 52.6

		microns	sec
P	Z'	0.1	0.5

D = 2100 km = 19°.

Ki iP 08 02 55.5 D
iS 08 05 08.8

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Oct. 25 Ki — microns sec
P Z' 0.1 1.0
S Z' 0.3 1.0
D = 1350 km = 12°.

Sk	iP	08 04 05.6
	iS	08 07 16.4
Gb	iP	08 05 02.9
Um	iP	08 03 34.0
	i	08 03 42.9
	i	08 07 14.3
Ka	iP	08 05 06.4
	iSS	08 09 55.0
	i(SSS)	08 10 26.4

X Novaya Zemlya. Explosion.
There is a general similarity between these records and those we obtained for the underwater explosion at Novaya Zemlya on Oct. 23, 1961, at 10 30 48.

" 25	Up	iPKP	12 27 05.1
		iSKP	12 29 50.9
		microns sec	
		SKP Z' 0.1	1.0
	Ki	iPKP	12 26 58.1
		iSKP	12 29 28.8
		microns sec	
		SKP Z' 0.2	1.2
	Gb	iPKP	12 27 15.7 D
		iSKP	12 29 59.9
	Um	i(PKP)	12 26 53.1
		iPKP	12 26 59.7
		i	12 27 05.6
		iSKP	12 29 39.9
	Ka	iPKP	12 27 17.9 D
		iSKP	12 30 00.4

Fiji Islands (h = 530 km).

" 25	Up	iP	23 03 34.6
		ipP	23 03 42.4
		iPP	23 04 59.0
	Ki	iP	23 03 41.8
		iPP	23 05 11.6
	Sk	eP	23 04 03
		i	23 05 13.5
		ePP	23 05 37
	Um	iP	23 03 30.8
		i(PP)	23 05 13.6
	Ka	iP	23 03 40.0
		ipP	23 03 50.5

Afghanistan-USSR.
h = 40 km (Up,Ka).

" 26	Um	iP	03 30 05.1

1964

Oct. 26	Up	iP	11 17 47.4
" 26	Um	iP	12 18 12.2
" 26	Ki	eP	14 36 10

Molucca Passage (h = 50 km).

" 26	Up	iP	14 43 18.9
	Ki	iP	14 42 23.9
	Sk	iP	14 42 51.7
	Gb	iP	14 43 30.0
	Um	iP	14 42 51.5

Alaska (h = 30 km).

" 26	Um	iPg	15 15 25.1
		iSn	15 15 45.9
		iSg	15 15 51.5

D = 230 km = 2.1°.
Origin time = 15 14 43.

" 26	Up	iP	15 25 24.1 C
		ipP	15 25 28.4
		microns sec	
		P Z' 0.1	0.6
	Ki	iP	15 25 03.2
		ipP	15 25 09.9
	Sk	iP	15 25 34.7
	Um	iP	15 25 07.5 C
		ipP	15 25 12.9
	Ka	eP	15 25 36

Sinkiang, China.
h = 20 km (Up,Ki,Um).

" 26	Up	iP	20 19 33.9

Ryukyu Islands (h = 30 km).

" 26	Up	iP	21 30 52.5
" 27	Up	iP	02 52 27.2
	Ki	iP	02 52 07.5

Luzon (h = 60 km).

" 27	Um	iPg	15 20 41.4
		iSg	15 20 59.9

D = 160 km = 1.4°.
Origin time = 15 20 14.

" 27	Up	iP	19 49 03.9 C
		iS	19 51 19.1
		iSS	19 51 43.7
		i(Lg1)	19 52 16
		iLg1	19 52 32
		iLg2	19 52 48
		microns sec	
		P Z' 0.1	0.6
		M E 1.4	6

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Oct. cont.	27	Up			microns sec	
			M	N	2.8	7
			M	Z	2.2	7
			D = 1350 km = 12°.			
		Ki	iP		19 50 46.6	
			iS		19 54 44.8	
			iLg1		19 56 56	
			iLg2		19 57 30	
					microns sec	
			P	Z'	0.2	1.7
			M	E	7.0	10
			M	N	2.8	9
			M	Z	1.5	9
			D = 2200 km = 20°.			
		Sk	iP		19 49 54.5 C	
			iS		19 53 05.4	
			iLg2		19 54 49.1	
		Gb	iP		19 48 39.3	
			eS		19 50 37	
			iLg1		19 51 40.3	
		Um	iP		19 49 56.3	
			iS		19 53 08.0	
			iSS		19 53 17	
			e		19 53 43	
			iLg1		19 54 47	
			iLg2		19 54 58.6	
		Ka	iP		19 48 12.8	
			i		19 48 15.6	
			i(S)		19 49 28.1	
			iLg2		19 50 51.8	
		Austria (h = 40 km).				
"	27	Up	iPKP		20 19 57.0	
		Ka	i(PKP)		20 20 15.2	
		Kermadec Islands (h = 170 km).				
"	27	Up			---	
					microns sec	
			M	E	1.4	18
			M	N	2.8	20
			M	Z	3.0	19
		Ki	iPKP		21 43 38.3	
					microns sec	
			M	E	3.3	21
			M	N	1.1	18
			M	Z	3.9	22
		Um	iPKP		21 43 28.3	
			eSS		22 02 06	
		Indian Ocean (h = 30 km).				
		Magn. = 6.2 (Up,Ki).				
"	28	Up	iP		05 53 33.4	
"	28	Um	e(P)		08 37 11	
			iSg		08 37 21.1	
1964 Oct.	28	Um	iP		08 39 44.3 D	
			iSg		08 40 08.5	
"	28	Um	e(P)		08 47 17	
			iSg		08 47 30.3	
"	28	Ka	iP		16 54 55.6	
"	28	Up	iP		19 07 46.3	
		Gb	eP		19 08 02	
		Kurile Islands (h = 20 km).				
"	28	Up	iP		19 42 51.0	
			i		19 42 52.6	
			iPP		19 44 28.5	
					microns sec	
			P	Z'	0.1	0.5
		Ki	iP		19 42 54.5	
		Sk	iP		19 43 17.2	
			ePP		19 45 02	
		Gb	iP		19 43 11.0	
		Um	iP		19 42 48.7	
			i		19 43 01.9	
		Ka	iP		19 42 55.6	
			i		19 43 33.9	
		Hindu Kush (h = 130 km).				
"	28	Gb	i(P)		23 03 44.4	
		Ka	i(P)		23 03 39.5	
"	29	Um	iP		01 25 20.2	
		Aleutian Islands (h = 30 km).				
"	29	Up	iP		04 39 58.8	
		Ki			---	
					microns sec	
			M	E	0.8	14
		Sk	iP		04 40 40.4	
		Um	iP		04 40 45.8	
		Yugoslavia (h = 30 km).				
"	29	Um	iPKP		07 10 42.3	
		New Hebrides Islands (h = 40 km).				
"	29	Up	iP		13 40 48.8	
		Ki	iP		13 40 38.8	
		Sk	iP		13 41 02.8	
		Um	iP		13 40 39.6	
		Burma (h = 170 km).				
"	29	Um	iP		13 47 39.4	
		North Atlantic Ocean (h = 30 km).				

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964

Oct.	29	Gb	iPg	15 25 40.1
			iSg	15 25 42.0
			D = 16 km = 0.14°.	
		Blast?		
"	29	Sk	eP	16 18 36
"	30	Um	eSS	02 50 55
		Easter Island (h = 30 km).		
"	30	Up	iP	03 05 54.5
		Indian Ocean (h = 30 km).		
"	30	Gb	iPg	15 10 40.3
			iSg	15 10 42.1
			D = 16 km = 0.14°.	
		Blast?		
"	30	Up	iP	17 23 43.4 C
			microns	sec
			P Z'	0.1 1.0
		Ki	iP	17 22 48.9 C
			microns	sec
			P Z'	0.1 1.2
		Sk	iP	17 23 15.7
		Gb	iP	17 23 55.0 C
		Um	iP	17 23 17.3 C
			ipP	17 23 22.1
		Alaska. h = 20 km (Um).		
		Magn. = 5.7 (Up,Ki).		
"	31	Up	iP	02 51 32.5
		Um	iP	02 51 12.1
		South of Japan (h = 40 km).		
"	31	Up	iP	04 25 21.4
"	31	Ki	iPn	14 44 27.2
			iSn	14 45 15.8
			iSg	14 45 31.3
			D = 410 km = 3.7°.	
		Probably northwest Russia.		
		Origin time = 14 43 29.		
		Explosion?		

Markus Båth
July 30, 1965

Seismological Institute
Uppsala

SEISMOLOGICAL BULLETIN

UPPSALA, KIRUNA, SKALSTUGAN, GÖTEBORG, UMEÅ and KARLSKRONA

Uppsala	(Up):	59°51.5'N,	17°37.6'E;	h = 14 m
Kiruna	(Ki):	67°50.4'N,	20°25.0'E;	h = 390 m
Skalstugan	(Sk):	63°34.8'N,	12°16.8'E;	h = 580 m
Göteborg	(Gb):	57°41.9'N,	11°58.7'E;	h = 66 m
Umeå	(Um):	63°48.9'N,	20°14.2'E;	h = 16 m
Karlskrona	(Ka):	56°09.9'N,	15°35.5'E;	h = 11 m

NOVEMBER 1 - 30, 1964

1964 Nov. 1 Up iPKP 03 15 18.7 C
Gb iPKP 03 15 28.5
Um iSKP 03 18 05.9
South of Fiji Islands
(h = 460 km).

" 1 Up iP 05 06 31.9
Sk eP 05 05 58
Queen Charlotte Islands
(h = 30 km).

" 1 Up iP 05 28 11.9 C
microns sec
P Z' 0.1 0.5
Ki iP 05 27 54.7
Sk iP 05 28 18.5
Gb eP 05 28 40
Um iP 05 28 00.3
Mindoro (h = 90 km).

" 1 Ki iSn 05 42 48.0
iSg 05 43 05.9
~~D = 420 km = 3.8°~~.
Sk iSg 05 45 41.4
Um iSn 05 43 32.8
iSg 05 44 11.9
D = 630 km = 5.7°.
Northwest Russia, 67.7°N, 30.5°E.
Origin time = 05 41 00.
Explosion?

" 1 Up iP 06 57 53.1
Ki iP 06 57 00.9
Aleutian Islands
(h = 20 km).

" 1 Sk iP 12 21 58.2 C

1964 Nov. 1 Up iP 12 39 32.3
i! 12 43 53.7
iSKS 12 50 03
eS 12 50 33
microns sec
S N 0.5 5
M E 1.7 22
M N 2.1 21
M Z 2.9 22
D = 10800 km = 97°.
Ki iP 12 39 15.2
ipP 12 39 36.0
iSKS 12 49 42
microns sec
P Z' 0.2 1.3
SKS E 1.2 7
M E 1.4 17
M N 1.8 21
M Z 2.5 18
D = 10350 km = 93°.
Sk iP 12 39 36.5
Um iP 12 39 21.4
ipP 12 39 44
i 12 40 25.5
iPP 12 43 21.9
iSKS 12 49 49
iS 12 50 21
Halmahera. h = 80 km (Ki,Um).
Magn. = 5.9 (Up,Ki).

" 1 Ka iP 13 53 38.1

" 1 Um iP 15 57 27.5

" 1 Up iPKP 17 02 36.4
Kermadec Islands
(h = 370 km).

" 2 Ka i(P) 06 30 38.4

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Nov.	2	Up	iP	07 04 14.6	
		Ki	iP	07 04 18.3	
			isP	07 04 48.8	
				microns sec	
			P	Z' 0.1 1.5	
		Sk	eP	07 04 02	
		Gb	iP	07 04 00.9	
		Um	iP	07 04 18.9	
			iS	07 15 41	
			isS	07 16 25	
		Ka	iP	07 04 10.9	
		Peru. h = 90 km (Ki,Um).			
"	2	Up	eP	23 03 22	
			i	23 03 30.7	
		Sk	eP	23 04 00	
		Italy (h = 30 km).			
"	3	Up	iP	00 27 18.0	
"	3	Up	iP	00 39 45.6 D	
		Ki	iP	00 38 59.1	
			iPcP	00 39 52.7	
		Um	iP	00 39 20.7	
		Sea of Okhotsk (h = 350 km).			
"	3	Up	iP	02 17 12.4 D	
		Ki	iP	02 16 33.8	
		Gb	iP	02 17 33.0	
		Um	iP	02 16 51.2	
		Japan (h = 90 km).			
"	3	Up	iP	02 33 03.0	
		Iran (h = 40 km).			
"	3	Up	iP	06 13 30.3	
		Sk	eP	06 13 56	
		Gb	iP	06 13 46.3	
		Um	iP	06 13 31.3	
		Ka	iP	06 13 28.9	
		Afghanistan (h = 40 km).			
"	3	Sk	eP	06 22 37	
		Iran (h = 30 km).			
"	3	Up	eP	11 21 19	
		Um	iP	11 20 53.4	
			ipP	11 20 59.7	
		Japan. h = 25 km (Um).			
"	3	Ki	iP	12 56 09.7	
		Celebes (h = 150 km).			
"	3	Up	iP	14 04 18.5	
		Kurile Islands (h = 30 km).			

1964 Nov.	3	Up	iP	15 06 43.1	
		Gb	iP	15 07 04.4	
		Kurile Islands (h = 20 km).			
"	3	Up	iP	17 42 31.6	
		Ki	iP	17 43 11.2	
				microns sec	
			P	Z' 0.2 1.1	
		Gb	iP	17 42 45.4	
		Um	iP	17 42 46.0	
		Iran (h = 30 km).			
"	3	Ki	iP	19 01 57.1 C	
"	4	Gb	iP	03 48 13.7	
		Kamchatka (h = 50 km).			
"	4	Up	iP	13 50 45.9	
				microns sec	
			P	Z' 0.1 0.7	
"	4	Up	iP	15 30 48.5	
		Burma (h = 40 km).			
"	4	Gb	iP	17 11 04.6	
"	4	Up	iP	19 53 29.6	
		Um	iP	19 53 24.6	
		Hindu Kush (h = 210 km).			
"	4	Up	iP	21 16 05.8	
		Ki	iP	21 15 46.7	
		Mindanao (h = 70 km).			
"	4	Up	iP	22 34 54.1	
			i	22 34 56.7	
				microns sec	
			P	Z' 0.1 0.6	
"	5	Up	i(P)	19 18 51.7	
"	5	Up	iP	21 01 09.2 C	
		Ki	iP	21 02 17.0 C	
		Sk	iP	21 01 47.2 C	
		Gb	iP	21 00 58.1	
		Um	iP	21 01 41.2	
		Ka	iP	21 00 34.3	
		Crete (h = 10 km).			
"	6	Up	iP	10 04 19.2 C	
				microns sec	
			P	Z' 0.1 0.9	
			M	E 3.6 19	
			M	N 5.6 21	
			M	Z 6.8 21	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Nov. 6 cont.

Ki iP 10 03 36.6
microns sec
M E 4.6 18
M N 5.0 20
M Z 7.6 18
Gb iP 10 04 41.1
Ka iP 10 04 42.3
Kurile Islands (h = 60 km).
Magn. = 5.8 (Up,Ki).

" 7 Up iP 01 02 37.4 D
Ki iP 01 02 36.8 D
Um iP 01 02 33.9 D
Sumatra (h = 30 km).

" 7 Up iP 12 15 14.2 C

" 7 Ki iP 14 59 23.7
Um iP 14 59 46.8
Kurile Islands
(h = 30 km).

" 7 Um iP 15 50 23.6

" 7 Up iP 18 50 12.3
microns sec
P Z' 0.1 0.6
M E 2.2 17
M N 2.7 22
M Z 2.7 17
Ki iP 18 50 11.5
microns sec
P Z' 0.2 1.0
M E 1.8 16
M N 2.2 23
M Z 3.2 17
Sk iP 18 50 27.8
Um iP 18 50 08.8
i 18 50 10.7
i(S) 19 00 38
Sumatra (h = 110 km).
Magn. = 5.9 (Up,Ki).

" 7 Up iP 22 14 10.7
microns sec
P Z' 0.1 0.5

" 8 Up iPKP 01 45 18.3
Um iPKP 01 45 07.5
Kermadec Islands (h = 30 km).

" 8 Up ---
microns sec
M E 3.1 23
M N 3.8 23
M Z 4.5 23

cont.

1964
Nov. 8 cont.

Ki iPKP 03 03 52.7
i 03 04 34.4
iPP 03 07 40
microns sec
M E 3.7 20
M N 2.8 22
M Z 4.6 19
Gb iPKP2 03 04 50.5 C
Um iPKP 03 03 48.6 C
iPKP2 03 04 17.5
iPP 03 07 51
i 03 13 47
iSS 03 27 11
Auckland Islands (h = 30 km).
Magn. = 6.4 (Up,Ki).

" 8 Um iP 09 15 26.0 C

" 8 Up iP 10 40 38.7
i 10 42 22.3
microns sec
P Z' 0.1 1.0
Ki iP 10 41 18.0 C
iPP 10 42 54.7
microns sec
P Z' 0.1 1.0
Sk iP 10 41 13.2
Gb iP 10 40 49.5
Um iP 10 40 55.3
iPP 10 42 21.1
iPcP 10 43 01.4
iSS 10 49 45
Ka iP 10 40 30.6
Iran (h = 40 km).
Magn. = 5.7 (Up,Ki).

" 8 Up iP 18 07 51.1
Ki iP 18 07 16.0
Sk eP 18 07 48
Um iP 18 07 30.2
Japan (h = 40 km).

" 9 Um iP 04 58 09.0
Banda Sea (h = 130 km).

" 9 Sk iP 06 50 04.6

" 9 Up iP 08 11 32.1
isP 08 11 52.8
i 08 13 34.7
Ki iP 08 12 09.9
ipP 08 12 25.0
iSn 08 18 32.0
microns sec
pP Z' 0.1 1.1

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Nov. cont.	9	Sk	iP	08 12 10.4
			i	08 12 43.8
		Um	eP	08 11 35
			iPP	08 12 15.5
			eSS	08 17 45
		Ka	iP	08 11 25.1 C
			ipP	08 11 40.2
		Caucasus.		
		h = 70 km (Up,Ki,Ka).		
"	9	Up	iP	16 22 13.4
			i	16 22 18.1
				microns sec
			P	Z' 0.1 0.6
		Ki	iP	16 22 12.9
			i	16 22 15.9
		Sk	iP	16 22 36.4
		Um	iP	16 22 11.6
		Ka	iP	16 22 22.7
			i	16 22 24.9
		Tibet (h = 30 km).		
"	9	Up	iP	18 55 46.2
		Ki	iP	18 55 25.9 C
				microns sec
			P	Z' 0.2 1.5
			M	N 0.6 14
		Um	iP	18 55 32.9
		Philippine Islands		
		(h = 30 km).		
"	9	Up	iP	20 38 31.2
"	9	Ka	iP	22 10 48.1
			i	22 10 57.1
"	10	Up	i(P)	04 39 06.2 C
"	10	Sk	iP	06 17 24.0
		Gb	iP	06 18 06.0
		Um	iP	06 17 26.8 C
		Alaska (h = 40 km).		
"	10	Ki	iP	12 56 24.6 C
		Japan (h = 170 km).		
"	10	Um	iP	13 46 36.0
"	10	Up	iP	15 54 34.3
		Ki	iP	15 55 13.1
		Um	iP	15 54 48.0
		Iran (h = 30 km).		
"	10	Gb	iPg	15 56 34.4
			iSg	15 56 35.9
			D = 13 km = 0.12°.	
			Blast?	

1964 Nov.	11	Gb	iPg	08 02 40.0
			iSg	08 02 41.5
			D = 13 km = 0.12°.	
			Blast?	
"	11	Up	iP	08 11 36.1 D
		Ki	iP	08 10 41.3 D
				microns sec
			P	Z' 0.2 1.5
		Gb	iP	08 11 46.6
		Um	iP	08 11 09.5
		Ka	iP	08 11 57.7
		Alaska (h = 10 km).		
"	11	Gb	iPKP	11 38 41.1
		South of Fiji Islands		
		(h = 330 km).		
"	11	Up	iP	13 27 44.7
		Gb	iP	13 28 03.2
		Kamchatka (h = 30 km).		
"	11	Gb	iPg	14 31 53.7
			iSg	14 31 55.4
			D = 14 km = 0.13°.	
			Blast?	
"	11	Gb	eP	15 50 45
		Kamchatka (h = 30 km).		
"	11	Gb	iP	17 07 53.4
		Kamchatka (h = 30 km).		
"	11	Gb	iP	17 22 59.9
"	11	Sk	eP	17 38 29
		Gb	iP	17 39 15.2
		Kamchatka (h = 30 km).		
"	11	Gb	iP	18 03 44.5
		Kamchatka (h = 30 km).		
		It is a remarkable fact that Göteborg (otherwise our least sensitive station) has the greatest sensitivity of all our stations for the present series of Kamchatka shocks. Part of the reason is due to microseisms, which on Nov. 11 are generally stronger at our other stations.		
"	11	Up	iP	19 17 04.3
		Kamchatka (h = 30 km).		

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964					
Nov.	11	Gb	iP	19 24 06.6	
		Kamchatka (h = 30 km).			
"	11	Ki	iP	21 30 59.7	
"	11	Up	iP	22 31 05.4	C
			microns	sec	
		P	Z' 0.1	0.5	
"	12	Up	iP	05 26 36.4	C
			microns	sec	
		P	Z' 0.1	0.5	
		Sk	iP	05 26 25.7	
		Um	iP	05 26 11.2	C
		Okhotsk Sea (h = 330 km).			
"	12	Ka	i(P)	10 20 12.9	
"	12	Um	iP	14 09 00.2	
		Japan (h = 40 km).			
"	12	Up	iP	15 13 37.8	
"	12	Up	iP	15 29 11.7	
"	12	Up	iP	20 08 35.0	
		Ki	iP	20 07 52.2	
		Sk	iP	20 08 27.7	
		Gb	iP	20 09 05.6	C
		Um	iP	20 08 07.5	C
			i	20 08 11.7	
		Japan (h = 70 km).			
"	13	Up	iP	07 55 58.7	C
			microns	sec	
		P	Z' 0.1	0.5	
"	13	Um	iP	14 17 29.6	C
"	13	Ka	iP	15 30 31.8	
			i	15 30 40.4	
"	13	Ki	iPn	15 52 02.7	D
			iSn	15 52 51.1	
			iSg	15 53 06.5	
			D = 430 km = 3.9°.		
		Um ME	ePg	15 53 12	
			eS*	15 54 19	
			iSg	15 54 40.3	
			D = 730 km = 6.6°.		
		Northwest Russia, 68.9°N, 30.9°E.			
		Origin time = 15 51 00.			
		Explosion?			
"	13	Up	iP	20 44 13.1	

1964					
Nov.	13	Up	iP	21 40 17.0	
"	13	Up	i(PKP)	22 16 52.3	
			iPKP	22 17 07.8	
			microns	sec	
			PKP Z'	0.1	1.3
		Sk	ePKP	22 16 59	
			i	22 17 00.9	
		Gb	iPKP	22 17 15.5	
		Ka	iPKP	22 17 17.5	
		Kermadec Islands (h = 80 km).			
"	13	Up	iP	22 19 01.3	
			microns	sec	
		P	Z' 0.1	0.6	
"	14	Sk	eP	03 49 43	
"	14	Up	iP	04 07 25.3	C
			ipP	04 07 39.7	
			iPcP	04 07 52.9	
			microns	sec	
		P	Z' 0.3	1.2	
		Ki	iP	04 06 51.8	
			microns	sec	
		P	Z' 0.2	0.9	
		Sk	iP	04 07 23.9	C
			isP	04 07 43.7	
		Gb	iP	04 07 46.0	
			isP	04 08 05.0	
			i	04 08 45.8	
		Um	iP	04 07 05.4	
			i(PP)	04 10 00.1	
			iS	04 16 06	
		Japan. h = 60 km (Up,Sk,Gb).			
		Magn. = 6.3 (Up,Ki).			
"	14	Up	iP	06 08 08.2	
			microns	sec	
		P	Z' 0.1	0.9	
		Sk	iP	06 08 03.1	
		Um	iP	06 07 46.2	
		Ka	iP	06 08 28.1	
		Japan (h = 90 km).			
"	14	Ki R	iPn	06 27 11.9	
			iSn	06 28 08.1	
			iSg	06 28 30.3	
			D = 510 km = 4.6°.		
		Sk KA	eSg	06 31 07	
		Um ME	e(Pn)	06 27 40	
			iSn	06 28 52.0	
			iSg	06 29 29.6	
			D = 710 km = 6.4°.		

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Nov. cont. 14 Northwest Russia, 67.7°N, 32.8°E.
Origin time = 06 26 00.
Explosion?

" 15 Up iP 01 06 59.9
Ki iP 01 06 21.9 C
Um iP 01 06 38.4
Japan (h = 70 km).

" 15 Ki iP 02 34 32.4

" 15 Ki eP 04 47 11
Mindanao (h = 60 km).

" 15 Up iP 06 39 32.9
Ki iP 06 40 17.5
microns sec
P Z' 0.1 0.9
Sk iP 06 40 11.9
Um iP 06 39 50.5
Ka iP 06 39 23.1
ipP 06 39 29.6
Iran-Iraq. h = 25 km (Ka).

" 15 Sk e(SKP) 07 43 28
Um i(SKP) 07 43 27.5
Fiji Islands
(h = 610 km).

" 15 Up iP 09 40 59.6
i 09 41 03.2
Ka iP 09 41 38.0 C
iPP 09 43 09.8
Iran (h = 30 km).

" 15 Up iP 16 04 07.7
microns sec
P Z' 0.2 1.2
M E 2.4 18
M N 2.8 20
M Z 3.4 18
Ki iP 16 03 43.8
microns sec
P Z' 0.1 1.0
M E 1.9 17
M N 1.0 17
M Z 2.3 17
Sk iP 16 04 11.7
Formosa (h = 40 km).
Magn. = 5.9 (Up,Ki).

" 15 Up iP 17 20 06.6
Ki iP 17 20 15.3
Sk iP 17 20 31.8
Um iP 17 20 04.4
Hindu Kush (h = 220 km).

1964 Nov. 15 Up iP 18 58 54.3

" 15 Up iP 20 09 52.6
Ki iP 20 10 54.0
i 20 11 04.4
microns sec
P Z' 0.1 1.0
Sk iP 20 10 07.9
Gb iP 20 09 21.3 C
Um iP 20 10 26.0
i 20 10 50.1
Morocco (h = 3 km).

" 16 Up iP 00 07 34.4 C
microns sec
P Z' 0.1 0.5
Ki iP 00 06 48.5
microns sec
P Z' 0.1 1.0
Sk iP 00 07 23.4
Um iP 00 07 08.9 C
Okhotsk Sea (h = 300 km).
Magn. = 5.6 (Up,Ki).

" 16 Up iP 04 54 48.8 C
ipP 04 55 34.9
microns sec
P Z' 0.1 0.8
Ki iP 04 54 58.1 C
i 04 57 39.3
microns sec
P Z' 0.2 1.0
Sk iP 04 55 14.1 C
Gb iP 04 55 09.8
Um iP 04 54 47.3 C
Ka iP 04 54 53.5
Hindu Kush. h = 230 km (Up).
Magn. = 5.7 (Up,Ki).

" 16 Up iP 05 32 49.8
i 05 33 05.8
microns sec
M E 1.6 17
M N 2.7 17
Ki iP 05 33 40.1 C
microns sec
P Z' 0.1 1.0
M E 2.0 19
M N 1.4 18
Sk eP 05 33 30
Gb iP 05 32 59.2
Um iP 05 33 09.8 C
Ka iP 05 32 34.4
i 05 32 38.6
Turkey (h = 40 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Nov. 16 Up iP 06 06 52.9 C
i 06 07 11.6
i 06 07 42.5
iPP 06 08 00.9
i 06 08 11.6
microns sec
P Z' 0.1 0.7
PP Z' 0.1 0.8
Ki iP 06 06 37.8 C
iPP 06 07 49.7
microns sec
P Z' 0.4 0.7
Sk iP 06 07 08.8 C
iPP 06 08 29.2
Gb iP 06 07 22.9
iPP 06 08 46.9
Um iP 06 06 37.9 C
i 06 07 20.7
i 06 08 16.5
Ka iP 06 07 09.6
iPP 06 08 32.4
Kazakh SSR.
Magn. = 6.1 (Up,Ki).
Underground explosion.

" 16 Up iP 12 27 14.6 D
Kurile Islands
(h = 30 km).

" 16 Up iP 12 49 22.6 C
microns sec
P Z' 0.4 0.8
Sk iP 12 49 08.8 C
Gb iP 12 49 42.8 C
Um iP 12 48 55.7
Ka iP 12 49 45.4
Kurile Islands
(h = 30 km).

" 16 Up iP 20 37 28.9

" 16 Um iP 22 15 13.6
Arctic Ocean (h = 30 km).

" 16 Ki ---
microns sec
M E 0.8 18
Um iP 22 53 54.1
Borneo (h = 30 km).

" 17 Up iP 01 34 06.4 C
Iran (h = 50 km).

" 17 Up iPKP 08 34 17.8 D
iPP 08 35 19
iPKKP 08 44 53.1
i 08 45 05

cont.

1964 Nov. 17 cont. Up microns sec
PKKP Z' 0.1 1.0
M E 23 22
M N 30 22
M Z 29 23
(D = 12900 km = 116°).
Ki e(P) 08 29 48
e(PKP) 08 33 54
iPKP 08 34 08.5
iPP 08 34 41
iS 08 41 51
e 08 43 26
e(PKKP) 08 44 53
microns sec
PKP Z' 0.1 1.0
PP Z 3.2 7
S E 2.4 8
M E 50 23
M N 18 21
M Z 60 25
(D = 12200 km = 110°).
Um iP 08 30 12 C
iPKP 08 34 11.4
i 08 34 38
iPP 08 34 58
iPKKP 08 45 04.8
New Britain (h = 50 km).
Magn. = 7.1 (Up,Ki).

" 17 Up iPKP 11 21 31.1
Ki iPKP 11 21 22.0
Gb iPKP 11 21 40.8
Um iPKP 11 21 29.7
eSKP 11 24 09
South of Fiji Islands
(h = 550 km).

" 17 Up ---
microns sec
M E 1.0 17
M Z 1.6 17
Ki eP 19 13 08
microns sec
P Z' 0.1 1.3
M E 1.2 18
M N 0.6 14
M Z 1.3 18
Um iP 19 13 19.0
Mariana Islands
(h = 40 km).

" 17 Up i(P) 20 38 44.3

" 17 Ki iP 22 57 18.5
Turkey (h = 40 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Nov. 18 Up iP 13 32 50.7
Ki iP 13 31 58.2 C
Aleutian Islands
(h = 10 km).

" 18 Up ---

		microns	sec
M	E	2.2	19
M	N	5.2	23
M	Z	6.7	25

Ki iPKP 14 53 44
iPP 14 54 09.9

		microns	sec
M	E	2.9	21
M	N	2.6	21
M	Z	4.9	21

Um iPP 14 54 06.5
i 15 03 30
iPS 15 03 51
iSS 15 09 43
New Britain (h = 50 km).
Magn. = 6.2 (Up,Ki).

" 19 Ki iPn 19 37 55.5
iSn 19 38 43.9
iSg 19 38 59.3
D = 400 km = 3.6°.
Sk eSg 19 41 47
Um iPn 19 38 34.1
iS* 19 40 00.8
iSg 19 40 26.4
D = 690 km = 6.2°.
Northwest Russia, 68.6°N, 30.0°E.
Origin time = 19 37 00.
Explosion?

" 19 Up iP 20 07 28.1

" 19 Up iP 22 37 44.7

" 19 Up eP 23 50 14
ePKP 23 53 52
ePP 23 54 50
iSKS 00 00 35
iPKKP 00 04 18.3
e 00 07 31

		microns	sec
PP	Z	1.7	7
SKS	E	1.7	7
SKS	N	2.1	7
M	E	19	21
M	N	41	22
M	Z	32	19

(D = 12900 km = 116°).

cont.

1964
Nov. 19 cont. Ki eP 23 49 35
iPKP 23 53 41.6 C
i 23 53 51.1
ePP 23 54 10
iSKS 00 00 10
i(SKS) 00 00 25
i 00 03 10

		microns	sec
PKP	Z'	0.1	1.0
(SKS)	E	4.0	7
(SKS)	N	2.6	11
M	E	32	20
M	N	23	21
M	Z	40	20

(D = 12200 km = 110°).
Sk iPKP 23 53 51.7 C
ePKKP 00 04 35
Gb iPKP 23 53 58.1
iPP 23 55 29.3
Um iP 23 49 48
iPKP 23 53 44.5
iPP 23 54 16
i(PP) 23 54 30
iPPP 23 56 59
iSKS 00 00 24
New Britain (h = 3 km).
Magn. = 7.1 (Up,Ki).

" 20 Ki e(P) 00 00 17

" 20 Ki iPKP 00 13 40.0
Um iPKP 00 13 45.3
New Britain (h = 30 km).

" 20 Ki eP 05 00 14
Alaska (h = 30 km).

" 20 Um iP 07 04 30.4 D

" 20 Up iP 10 00 57.7
Ki iP 10 01 41.2
Sk iP 10 01 08.4
Um iP 10 01 22.4
iPcP 10 01 47.9
Atlantic Ocean (h = 30 km).

" 20 Gb iPg 12 14 46.2 C
iSg 12 14 48.1
D = 17 km = 0.15°.
Blast?

" 20 Up iP 16 46 04.1
Ki iP 16 45 26.0
Sk eP 16 46 00
Um iP 16 45 43.1
Japan (h = 90 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Nov.	20	Up	iP	23 44 09.9	C
				microns sec	
			P	Z' 0.1 0.8	
			M	E 3.0 22	
			M	N 4.7 18	
			M	Z 4.6 18	
		Ki	iP	23 43 23.1	
			iPcP	23 44 05.8	
				microns sec	
			P	Z' 0.1 1.0	
			M	E 3.7 18	
			M	N 4.1 16	
			M	Z 5.4 17	
		Sk	eP	23 43 59	
		Gb	iP	23 44 31.2	
		Um	iP	23 43 44.6	
			eS	23 52 08	
			iPS	23 52 30	
		Ka	iP	23 44 31.2	
		Kurile Islands (h = 30 km).			
		Magn. = 5.8 (Up,Ki).			
"	21	Up	iP	00 02 36.1	
		Ki	eP	00 01 50	
		Gb	iP	00 02 58.9	
		Ka	iP	00 02 59.6	
		Kurile Islands (h = 30 km).			
"	21	Up	iP	02 29 48.9	
			ePP	02 33 34	
		Ki	iP	02 29 35.2	
		Sk	eP	02 29 58	
			ePP	02 33 59	
		Um	eP	02 29 40	
			ipP	02 30 37.7	
		Celebes. h = 240 km (Um).			
"	21	Up	iP	04 13 24.0	
			i	04 13 34.4	
		Ki	iP	04 13 25.1	C
				microns sec	
			P	Z' 0.1 1.0	
		Sk	eP	04 13 48	
		Um	iP	04 13 21.1	C
		Sumatra (h = 30 km).			
"	21	Ka	iP	08 55 51.9	
"	21	Up	iP	12 17 53.4	
"	21	Um	iP	13 39 27.1	
		Formosa (h = 60 km).			
"	21	Um	iP	14 44 22.2	
		Mariana Islands			
		(h = 60 km).			

1964 Nov.	21	Ki	iP	15 47 11.0	C
				microns sec	
			P	Z' 0.1 1.2	
		Sk	eP	15 47 35	
		Um	iP	15 47 21.6	
		Mariana Islands			
		(h = 40 km).			
"	21	Up	iP	16 01 08.8	
			i	16 01 18.5	
				microns sec	
			P	Z' 0.2 1.0	
"	21	Up	iP	22 53 18.7	
		Ki	iP	22 53 17.5	
		Sumatra (h = 30 km).			
"	22	Ki	iP	00 12 31.2	C
			i	00 12 41.0	
		Um	iP	00 12 34.8	
		North Atlantic Ocean			
		(h = 30 km).			
"	22	Ki	iP	02 34 54.2	
		Sk	eP	02 34 26	
		Crete (h = 30 km).			
"	22	Up	iP	08 28 24.0	
			i	08 28 29.6	
				microns sec	
			P	Z' 0.1 0.5	
"	22	Up	eP	14 42 57	
		Sk	iP	14 42 51.1	
"	22	Sk	iP	20 24 09.7	C
		Mexico (h = 120 km).			
"	22	Um	i(P)	21 59 36.8	
		Ka	i(P)	22 00 07.2	
"	23	Up	iP	07 06 07.5	D
		Ki	iP	07 05 56.3	
		Sk	iP	07 06 24.4	D
		Um	iP	07 05 58.2	
		Sinkiang, China (h = 30 km).			
"	23	Um	iP	19 06 36.4	D
			ipP	19 06 51.3	
		Japan. h = 60 km (Um).			
"	23	Up	iP	22 00 09.2	
				microns sec	
			P	Z' 0.1 0.5	

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Nov. 23 Ki eP 22 29 00
Um iP 22 29 08.0
Molucca Sea (h = 70 km).

" 24 Up iP 02 44 18.9
ipP 02 44 31.0
Um iP 02 44 03.2
Ryukyu Islands.
h = 50 km (Up).

" 24 Um iPKP 06 53 18.5
Fiji Islands (h = 660 km).

" 24 Ki iP 10 54 47.9 C
Java (h = 130 km).

" 24 Up iP 12 53 38.8 C
i 12 53 55
iS 13 04 15

		microns sec
P	Z'	0.3 0.7
S	N	5.1 8
M	E	11 21
M	N	22 18
M	Z	22 21

D = 9650 km = 87°.
Ki iP 12 53 17.4 C
iS 13 03 39

		microns sec
P	Z'	0.3 1.2
S	E	2.9 6
S	N	7.5 10
M	E	21 16
M	N	14 18
M	Z	23 17

D = 9150 km = 82 1/2°.
Sk iP 12 53 47.7
Gb iP 12 53 54.4
Um iP 12 53 25.6 C
iS 13 03 44
Ka iP 12 53 53.7
Luzon (h = 5 km).
Magn. = 6.7 (Up,Ki).

" 24 Up iP 13 03 15.6
e 13 03 47

		microns sec
P	Z'	0.1 1.0

Ki iP 13 02 57.3 C

		microns sec
P	Z'	0.2 1.0

Um iP 13 03 03.8 C
Luzon (h = 100 km).
Magn. = 5.9 (Up,Ki).

" 24 Um iP 13 07 12.0

1964
Nov. 24 Up iPg 14 05 25.8
iSg 14 05 42.0

		microns sec
Pg	Z'	0.1 0.5

D = 130 km = 1.2°.
Um iLgl 14 07 43.5
Central Baltic, 58.6°N, 18.4°E.
Origin time = 14 05 02.
Underwater explosion.

" 24 Up iPg 14 07 59.1
iSg 14 08 15.5

		microns sec
Pg	Z'	0.1 0.5

D = 130 km = 1.2°.
Sk eLgl 14 10 38
Um iLgl 14 10 17.5
Central Baltic, 58.6°N, 18.4°E.
Origin time = 14 07 36.
Underwater explosion.

" 24 Up iPg 14 14 22.2
iSg 14 14 38.5

		microns sec
Pg	Z'	0.1 0.5

D = 130 km = 1.2°.
Sk eLgl 14 16 59
Um iLgl 14 16 40.7
Central Baltic, 58.6°N, 18.4°E.
Origin time = 14 13 59.
Underwater explosion.
In this and the two preceding events the Pg Z' amplitudes at Up are about 1.5 times the amplitudes of Sg Z'.

" 24 Up eP 19 22 45

" 24 Um iP 23 23 01.8 D

" 25 Up iP 08 43 11.0

		microns sec
P	Z'	0.1 0.5

Sk eP 08 43 26
Um iP 08 43 02.5
Burma (h = 80 km).

" 25 Ki iP 21 47 59.9

		microns sec
P	Z'	0.1 1.0

" 26 Um iP 02 04 21.9

" 26 Um iP 02 53 41.7

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964					
Nov.	26	Up	iP	04 55 36.3	
		Iran (h = 30 km).			
"	26	Up	iP	05 54 19.4	C
"	26	Gb	iPg	08 00 52.1	
			iSg	08 00 53.2	
			D = 9 km = 0.08°.		
		Blast?			
"	26	Up	iP	10 32 50.1	
			eSa	10 51 33	
			iLgl	10 59 45	
				microns sec	
			P	Z' 0.4 1.5	
			M	E 16 18	
			M	N 16 23	
			M	Z 25 19	
		Ki	iP	10 32 25.3	
				microns sec	
			P	Z' 0.5 1.8	
			M	E 13 17	
			M	N 10 14	
			M	Z 9.0 15	
		Um	iP	10 32 33.5	
			iSS	10 46 41	
		Formosa (h = 30 km).			
		Magn. = 6.4 (Up,Ki).			
		As the epicenter is located on the eastern edge of the Asiatic continental structure, this is one of the longest continental paths with Lgl, ever observed (Up).			
"	26	Up	iP	12 01 36.0	C
"	26	Up	iP	16 40 32.3	D
"	26	Ki	eP	16 46 12	
		Alaska (h = 30 km).			
"	26	Ki	iPn	16 50 24.7	
			iSn	16 51 13.3	
			iSg	16 51 27.0	
			D = 390 km = 3.5°.		
		Um	eSg	16 52 59.	
		Northwest Russia.			
		Origin time 16 49 30.			
		Explosion?			
"	26	Um	iP	17 38 34.9	
"	26	Up	iP	23 42 30.6	C

1964					
Nov.	27	Gb	iP	00 40 29.1	
"	27	Um	iP	05 18 21.1	
"	27	Up	iP	05 47 01.1	C
			iPcP	05 47 25.2	
		Kurile Islands (h = 30 km).			
"	27	Up	iP	05 55 28.7	
"	27	Up	iP	07 56 46.1	
				microns sec	
			P	Z' 0.1 0.8	
		Ki	iP	07 55 49.3	C
				microns sec	
			P	Z' 0.1 0.8	
		Sk	iP	07 56 17.5	C
		Gb	iP	07 56 58.8	C
		Um	iP	07 56 18.8	
		Ka	iP	07 57 10.3	
		Alaska (h = 110 km).			
		Magn. = 5.9 (Up,Ki).			
"	27	Up	iP	11 11 10.9	
				microns sec	
			P	Z' 0.1 0.5	
		Ki	iP	11 11 20.1	D
				microns sec	
			P	Z' 0.2 1.5	
		Ka	iP	11 11 15.5	
		Hindu Kush (h = 220 km).			
		Magn. = 5.7 (Up,Ki).			
"	27	Up	iP	13 58 58.0	
				microns sec	
			P	Z' 0.3 1.0	
		Ki	iP	13 58 19.0	C
				microns sec	
			P	Z' 0.3 1.0	
			M	E 4.2 14	
			M	N 5.2 13	
			M	Z 3.8 12	
		Sk	iP	13 58 52.5	C
			i	13 58 54.1	
		Gb	iP	13 59 20.0	
		Um	iP	13 58 35.3	
		Japan (h = 40 km).			
		Magn. = 6.3 (Up,Ki).			
"	27	Up	iP	13 59 47.3	
				microns sec	
			P	Z' 0.5 1.4	
		Ki	iP	13 59 08.9	
				microns sec	
			P	Z' 0.3 1.2	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Nov. 27 cont.

	Sk	iP	13 59 42.8
	Gb	iP	14 00 08.7
	Um	iP	13 59 25.5

Japan (same epicenter as for preceding shock).
Origin time = 13 48 32.
Magn. = 6.3 (Up,Ki).
Although this shock is of the same magnitude as the preceding one, and although P waves of both shocks have been reported in many bulletins, it has almost nowhere been recognized that these really are two different shocks. A probable reason is that USCGS only reported the first shock.

39.7N 138.3E 36km 40km

"	28	Ki	iSg	05 39 49.4
"	28	Up	iP	07 49 51.7
"	28	Up	iP	13 02 36.7
		Sk	eP	13 02 31
		Gb	eP	13 02 51
		Um	iP	13 02 14.7 C

Japan (h = 70 km).

"	28	Up	iP	16 53 55.0
		Ki	iP	16 54 03.6
		Sk	iP	16 53 47.3 D
		Um	iP	16 54 02.8

Brazil (h = 630 km).

"	28	Up	eP	17 01 52
		Ki	iP	17 02 00.5 D
			microns	sec
			P	Z' 0.1 1.2
		Sk	iP	17 01 43.1 D
		Gb	iP	17 01 38.1
		Um	iP	17 01 59.5

Brazil (h = 660 km).

"	28	Up	iP	22 13 21.0
			i	22 13 24.4
			microns	sec
			P	Z' 0.1 0.5
"	29	Um	iP	01 31 12.1 C
"	29	Ki R	iSn	04 12 04.2
			eSg	04 12 24
		Sk KA	eSg	04 14 57
		Um ME	iSg	04 13 16.6

cont.

1964 Nov. cont.

29 Northwest Russia, 67 1/2°N, 32°E. Origin time = 04 10 00. Explosion?

"	29	Ki	iP	04 41 52.5 C

Tien-Shan.

"	29	Up	iP	09 23 20.7
		Ki	iP	09 23 23.7 D
		Sk	iP	09 23 08.2

Colombia (h = 170 km).

"	29	Up	iP	12 39 31.4

Colombia (h = 40 km).

"	29	Up	iP	14 52 01.6
			i	14 52 18.2
		Um	iP	14 52 49.9
"	29	Up	iP	21 08 36.4
		Ki	iP	21 08 01.5 C
			ipP	21 08 10.1
		Gb	iP	21 08 56.1
		Um	iP	21 08 17.3
		Ka	iP	21 08 54.8

South of Japan.
h = 30 km (Ki).

"	30	Um	iP	00 19 16.3 C
"	30	Ka	iP	02 26 57.4
"	30	Up	iP	04 15 03.7
		Ki	iP	04 13 52.5
			microns	sec
			P	Z' 0.1 1.0
			M	E 1.7 19
			M	N 1.4 15
			M	Z 1.8 15
		Sk	iP	04 14 04.6
			i	04 15 42.9
		Gb	iP	04 15 24.4
		Um	iP	04 14 29.4
		Ka	iP	04 15 45.3

Jan Mayen (h = 30 km).

"	30	Up	iP	06 37 26.5
		Ki	iP	06 37 09.8
		Sk	iP	06 37 32.7
		Um	iP	06 37 14.8

Mindoro (h = 200 km).

"	30	Ka	iP	09 36 02.7
"	30	Up	iP	12 36 07.3

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Nov. cont.	30	Up			microns	sec	
			P	Z'	0.1	1.0	
		Ki	iP		12	36	07.2 C
		Um	iP		12	36	03.6
		Ka	iP		12	36	09.0 C
		Nicobar Islands (h = 30 km).					
"	30	Up	iP		12	39	32.4
			i		12	39	34.4
			ipP		12	39	44
			iS		12	49	18
			i		12	49	26
				microns	sec		
			P	Z'	0.8	0.9	
			M	E	5.7	21	
			M	N	11	22	
			M	Z	9.5	21	
			D = 8550 km = 77°.				
		Ki	iP		12	39	30.9
			i		12	39	35.1
			eS		12	49	21
			i		12	50	35
				microns	sec		
			P	E	0.7	5	
			P	Z	1.4	6	
			P	Z'	0.9	1.0	
			S	E	4.8	6	
			S	N	2.6	9	
			M	E	7.8	17	
			M	N	13	22	
			M	Z	6.5	16	
			D = 8550 km = 77°.				
		Sk	iP		12	39	47.3
			ipP		12	40	01.5
		Gb	iP		12	39	49.0
			i		12	39	53.3
		Um	iP		12	39	27.0
			i		12	39	31.1
			iS		12	49	16
		Ka	iP		12	39	35.5
			ipP		12	39	48.6

Nicobar Islands.
h = 50 km (Up,Sk,Ka).
Magn. = 6.6 (Up,Ki).
Multiple P, with a small onset followed after 2-4 sec by a much larger phase: multiple shocks? A number of other stations have also reported multiple P, the average difference between the two phases being 4.3±1.2 sec (determined from 12 stations).

1964 Nov.	30	Gb	iPKP	16	26	10.1
		Ka	iPKP	16	26	11.7
		South of Fiji Islands (h = 480 km).				
"	30	Up	iPKP	19	11	35.9
		Ki	eSKP	19	14	06
		Gb	iPKP	19	11	46.7
		Um	iSKP	19	14	17.8
		Ka	iPKP	19	11	48.3 C
		South of Fiji Islands (h = 550 km).				
"	30	Ki	eP	22	51	03
		Um	iP	22	51	04.6
			ipP	22	51	25.6
		Aleutian Islands. h = 80 km (Um).				

Markus Båth
August 5, 1965

Seismological Institute
Uppsala

SEISMOLOGICAL BULLETIN

UPPSALA, KIRUNA, SKALSTUGAN, GÖTEBORG, UMEÅ and KARLSKRONA

Uppsala	(Up):	59°51.5'N,	17°37.6'E;	h = 14 m
Kiruna	(Ki):	67°50.4'N,	20°25.0'E;	h = 390 m
Skalstugan	(Sk):	63°34.8'N,	12°16.8'E;	h = 580 m
Göteborg	(Gb):	57°41,9'N,	11°58.7'E;	h = 66 m
Umeå	(Um):	63°48.9'N,	20°14.2'E;	h = 16 m
Karlskrona	(Ka):	56°09.9'N,	15°35.5'E;	h = 11 m

DECEMBER 1 - 31, 1964

1964					
Dec.	1	Um	iP	04 23 00.3	
"	1	Up	ePKP	05 12 15	
		Ki	iPKP	05 12 06.9	C
			iSKP	05 15 11.4	
				microns sec	
			PKP	Z' 0.1 1.5	
			SKP	Z' 0.2 1.7	
		Sk	ePKP	05 12 17	
		Um	ePKP	05 12 13	
		Ka	iPKP	05 12 23.0	
		Tonga Islands (h = 230 km).			
"	1	Up	iP	07 44 23.6	
			i	07 44 26.8	
				microns sec	
			P	Z' 0.1 1.0	
		Ki	iP	07 42 47.1	
			i	07 42 51.0	
				microns sec	
			P	Z' 0.1 1.0	
		Sk	iP	07 43 37.8	
		Gb	iP	07 44 44.9	
		Um	iP	07 43 36.6	
			i	07 43 41.4	
		Svalbard (h = 30 km).			
		Multiple P-phases: a small phase followed after about 4 sec by a much larger one (Up,Ki,Um).			
"	1	Ki	e(P)	08 29 56	
"	1	Up	iP	10 25 51.1	
		Sk	iP	10 26 31.7	
		Gb	iP	10 25 38.5	
		Greece.			
"	1	Up	iPKP	12 06 45.1	
			i	12 06 48.8	

cont.

1964					
Dec.	1	Up		microns sec	
cont.			PKP	Z' 0.1 0.7	
		Ki	ePKP	12 06 28	
		Sk	iPKP	12 06 38.5	C
		Gb	iPKP	12 06 53.2	
		Um	iPKP	12 06 33.0	C
		Ka	ePKP	12 06 53	
		Kermadec Islands (h = 30 km).			
"	1	Up	iP	22 22 31.5	
"	2	Um	eP	01 22 44	
"	2	Ki	eP	08 00 50	
			iS	08 02 35.7	
			D = 1100 km = 10°.		
		Svalbard (h = 30 km).			
"	2	Up	iP	08 29 30.2	
		North Atlantic Ocean (h = 30 km).			
"	2	Up	iP	08 30 53.6	
		Ki	iP	08 30 53.7	C
		Sk	iP	08 31 12.1	C
		Gb	iP	08 31 13.2	
		Um	iP	08 30 48.7	
		Ka	iP	08 30 56.5	
		Nepal (h = 25 km).			
"	2	Gb	iPg	12 00 05.5	
			iSg	12 00 07.1	
			D = 13 km = 0.12°.		
		Blast?			
"	2	Up	iPP	12 40 38.4	
		Ka	iP	12 39 16.8	
		Afghanistan-USSR (h = 30 km).			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Dec. 2 Up iP 13 29 17.6
i 13 29 22.2
ipP 13 29 28.1
microns sec
P Z' 0.1 0.7
Ki iP 13 28 24.6 C
iPcP 13 29 13.2
microns sec
P Z' 0.3 0.9
Sk iP 13 28 54.2
Gb iP 13 29 32.1 C
Um iP 13 28 51.8 C
Ka iP 13 29 40.9 C
Aleutian Islands.
h = 40 km (Up).

" 2 Up iP 15 33 27.2

" 3 Up iP 04 02 29.1
iSKS 04 12 56
microns sec
P Z 0.9 4
P Z' 0.4 1.5
M E 1.6 21
M N 2.7 22
M Z 2.3 23
Ki iP 04 02 52.2
eSKS 04 13 17
microns sec
M E 2.7 22
M N 1.1 18
M Z 3.5 21
Sk iP 04 02 48.9
Gb iP 04 02 31.5
Um iP 04 02 37.3
iSKS 04 13 14
iS 04 13 22
Indian Ocean (h = 50 km).
Magn. = 6.3 (Up,Ki).

" 3 Up PP iSg 12 28 41.9
Sk KA iSg 12 29 21.9
Gb iPg 12 26 52.0
iSg 12 27 08.0
D = 130 km = 1.2°.
Skagerack, 58.5°N, 10.4°E.
Origin time = 12 26 28.

" 3 Ki eP 22 39 49
Iran (h = 30 km).

" 4 Up i(P) 02 22 53.9
i 02 23 16.1

" 4 Ki iP 07 46 21.5 C
i 07 46 28.7

cont.

1964
Dec. 4 Ki microns sec
cont. P Z' 0.1 1.0
Sk iP 07 47 18.0
Gb eP 07 48 21
i 07 48 27.4
Um iP 07 47 16.4
i 07 47 21.4
i 07 47 29.9
Ka iP 07 48 51.7
Svalbard (h = 30 km).
Multiple P-phases (Ki,Gb,Um).
Compare remark to Dec. 1, 07 44.

" 4 Up i(P) 09 26 43.0

" 4 Gb iP 14 06 47.7

" 4 Um ePS 16 17 46
i(SS) 16 24 17
New Britain (h = 20 km).

" 5 Ki iP 02 20 56.0 C
Arctic Ocean (h = 30 km).

" 5 Ki eP 04 59 39
i 04 59 49.6
Gb eP 05 01 36
i 05 01 38.5
iPP 05 01 59.7
Svalbard (h = 30 km).

" 5 Up iP 09 37 11.3

" 5 Ki iP 13 04 08.6

" 5 Up iP 14 30 47.2 C
i 14 32 12.0

" 5 Ki iP 19 59 14.1
Sk iP 19 59 42.5
Alaska (h = 30 km).

" 5 Ki iP 22 41 13.8
Sk iP 22 41 50.5
Kamchatka (h = 40 km).

" 6 Up iP 00 02 03.8
Ki iP 00 01 09.2
ipP 00 01 20.1
Sk iP 00 01 45.6
Kamchatka.
h = 40 km (Ki).

" 6 Up iP 00 06 22.4
ipP 00 06 34.4

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Dec. 6 cont.

Ki iP 00 05 29.2
ipP 00 05 40.2
microns sec
M E 0.8 18
M N 0.4 15
Sk iP 00 06 05.4
Gb iP 00 06 43.5
ipP 00 06 54.6
Um iP 00 05 53.8
Kamchatka.
h = 40 km (Up,Ki,Gb).

" 6 Ki eL 05 20
microns sec
M E 0.9 20
M N 0.8 22
M Z 1.6 20
New Guinea.

" 6 Ki iSn 05 48 30.9
iSg 05 48 53.3
Sk eSg 05 51 20
Northwest Russia.
Explosion?

" 6 Ki eL 06 16
microns sec
M E 0.4 13
M N 0.5 12
Iran.

" 6 Ki eL 09 25
microns sec
M N 0.7 20
M Z 1.3 20
Sk eP 08 56 31

" 6 Up iP 18 43 02.4

" 7 Up iP 01 34 30.5
i 01 34 54.8

" 7 Ki iP 03 51 28.6 C
microns sec
P Z' 0.1 1.0
Um iP 03 51 34.1 C
Panay, Philippine Islands
(h = 40 km).

" 7 Up iPKP 09 17 18.6
microns sec
M E 1.3 23
M N 2.1 21
M Z 3.5 26
Ki iPKP 09 17 07.5

cont.

1964 Dec. 7 cont.

Ki microns sec
M E 3.0 25
M N 1.1 21
M Z 3.8 24
Sk iPKP 09 17 17.8
Um iPKP 09 17 12.4
iPP 09 17 57
iPS 09 27 26
i 09 27 41
New Britain (h = 50 km).
Magn. = 6.4 (Up,Ki).

" 7 Up iP 09 56 44.3

" 7 Up iP 10 24 46.1

" 7 Up iP 18 40 49.0
Ki iP 18 39 56.9
Kamchatka (h = 50 km).

" 7 Um iS 19 16 38
iPS 19 17 44
iSS 19 22 41
South of Panama
(h = 30 km).

" 7 Up iP 22 48 10.5 C

" 8 Up iP 18 01 21.4
microns sec
P Z' 0.1 1.0
M E 3.2 19
M N 3.0 21
M Z 2.7 21
Ki iP 18 00 45.2
microns sec
M E 11 18
M N 9.7 19
M Z 4.1 17
Sk eP 18 01 16
Um iP 18 01 00.7
i 18 01 07.3
eS 18 10 23
iSS 18 14 41
Japan (h = 30 km).
Magn. = 6.0 (Up,Ki).

" 9 Up eP 00 56 55

" 9 Up iP 06 53 32.8
microns sec
P Z' 0.1 0.6
Ki iP 06 52 48.7
Um iP 06 53 08.6
Japan (h = 40 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Dec.	9	Sk	e(P)	11 01 40	
			e(Sg)	11 02 34	
		Um	i(Sg)	11 03 03.9	
"	9	Ki	i	13 54 05.1	
			iPP	13 54 11.7	
			iPKKP	14 04 12.8	
				microns sec	
			PP Z'	0.2 1.2	
		Sk	ePKP	13 53 03	
		Um	iSP	14 02 48	
			isSP	14 06 29	
		Argentina (h = 590 km).			
"	9	Up	iP	18 32 57.0	
		Sk	iP	18 33 43.1	
		Um	eP	18 33 39	
		Ka	eP	18 32 19	
		Albania-Yugoslavia (h = 30 km).			
"	9	Up	iP	19 10 41.7	C
		Sk	iP	19 11 22.3	C
		Greece-Albania (h = 25 km).			
"	9	Up	iP	22 20 15.6	
				microns sec	
			P Z'	0.1 0.6	
"	10	Up	iP	09 04 28.4	D
"	10	Up	e	12 57 45	
			iSg	12 57 52.3	
		Ka	iPg	12 55 42.0	
			iSg	12 55 52.6	
			iL	12 56 14.3	
			D = 100 km = 0.9°.		
		Southern Baltic.			
		Origin time = 12 55 24.			
		Explosion?			
"	10	Up	iSg	13 02 45.1	
		Ka	ePg	13 00 38	
			iSg	13 00 51.4	
			iL	13 01 16.3	
			D = 110 km = 1.0°.		
		Southern Baltic.			
		Origin time = 13 00 18.			
		The wave marked L in this and the preceding case (Ka) has group velocities of 1.9-2.0 km/sec, which could be explained by a sedimentary layer on the sea bottom.			
		Explosion?			

cont.

1964 Dec.	10	Up	i(Sg)	13 28 50.6	
		Um	e	13 27 21	
			i(Sg)	13 27 28.7	
"	10	Up	iP	13 31 28.6	
"	10	Up	iP	15 22 08.7	
			ipP	15 22 23.6	
			isP	15 22 33	
			iS	15 31 15	
				microns sec	
			P Z'	0.2 1.0	
			pP N	1.1 4	
			pP Z'	1.1 1.5	
			S N	1.4 6	
			M E	12 16	
			M N	9.3 13	
			M Z	11 17	
			D = 7650 km = 69°.		
		Ki	iP	15 21 27.2	
			i	15 21 28.2	
			ipP	15 21 43.0	
			iS	15 29 54	
			iPS	15 30 22	
			i	15 30 37	
				microns sec	
			P Z'	0.4 1.0	
			pP Z'	0.4 1.3	
			S N	1.5 8	
			M E	28 15	
			M N	14 13	
			M Z	23 14	
			D = 6950 km = 62½°.		
		Sk	iP	15 22 01.0	
			i	15 22 02.5	
			ipP	15 22 17.6	
		Gb	iP	15 22 29.8	
			ipP	15 22 45.1	
			iPP	15 25 17.7	
		Um	iP	15 21 45.0	C
			ipP	15 22 00.8	
			iS	15 30 23	
		Ka	iP	15 22 29.2	
			ipP	15 22 43.7	
			isP	15 22 53.2	
		Sea of Japan. h = 60 km (Up,Ki,Sk,Gb,Um,Ka).			
		Magn. = 6.4 (Up,Ki).			
"	10	Ki	iPn	16 55 19.2	
			iSn	16 56 07.8	
			iSg	16 56 23.7	
			~~D = 420 km = 3.8°.~~		
		Um	iSg	16 58 07.2	
		Norway-USSR border region, 69.7°N, 29.7°E.			

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Dec. cont. 10 Origin time = 16 54 19. Explosion? Solution obtained by combination with Tromsö readings.

" 10 Up iP 19 54 32.0 C
Kurile Islands (h = 20 km).

" 10 Ki eP 23 41 18
microns sec
M E 1.7 17
M N 0.8 15
Sk eP 23 41 55
Um iP 23 41 31.7
i 23 41 35.0
Sea of Japan (h = 40 km).

" 11 Up i(P) 05 57 21.2
i 05 57 39.8

" 11 Gb iPg 10 44 14.2
iSg 10 44 15.7
D = 13 km = 0.12°.
Blast?

" 11 Um iP 14 15 14.4 C

" 11 Up iP 16 14 57.2 D
microns sec
P Z' 0.3 0.7
Ki iP 16 14 21.6 D
microns sec
P Z' 0.3 0.8
Sk iP 16 14 55.5 D
Gb iP 16 15 18.7 D
Um iP 16 14 36.3 D
ipP 16 16 28.9
Ka iP 16 15 15.8 D
Sea of Japan.
h = 570 km (Um).
Magn. = 5.9 (Up,Ki).

" 11 Up iP 22 09 45.6

" 11 Um i(PP) 23 01 46.8
Tanimbar Islands (h = 50 km).

" 12 Um iPKP 07 38 45.9
New Britain (h = 30 km).

" 12 Um iP 11 32 43.9

1964 Dec. 12 Up iP 13 17 06.7
Crete (h = 60 km).

" 12 Up iPKP 20 04 22.1
i 20 04 33.5
South of Tonga Islands (h = 90 km).

" 13 Ki iP 00 40 40.7 D
ipP 00 40 47.2
Alaska. h = 25 km (Ki).

" 13 Up iP 00 43 00.3
Ki iP 00 42 00.4
ipP 00 42 06.9
microns sec
P Z' 0.2 1.0
Um iP 00 42 30.1
Ka iP 00 43 26.3
Alaska. h = 25 km (Ki).

" 13 Up iP 13 27 56.7 D
microns sec
P Z' 0.3 1.3
Ki iP 13 27 35.1 D
microns sec
P Z' 0.4 1.5
Gb eP 13 28 19
i 13 28 22.0
Um iP 13 27 42.6
i(pP) 13 27 48.7
Philippine Islands (h = 30 km).
Magn. = 6.2 (Up,Ki).

" 14 Up ---
microns sec
M E 4.0 21
M N 5.0 24
M Z 4.3 22
Ki ---
microns sec
M E 1.7 19
M N 2.5 18
M Z 4.5 17
Um eSS 02 35 37
South Atlantic Ocean (h = 30 km).
Magn. = 6.2 (Up,Ki).

" 14 Up iP 03 42 54.1
Ki i(P) 03 42 54.3 C
Sinkiang, China (h = 30 km).

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Dec. 14 Ki iPn 05 27 56.8
iSn 05 28 51.1
iSg 05 29 14.0
D = 440 km = 4.0°.
Um eSn 05 29 35
eSg 05 30 04
Northwest Russia,
67½°N, 31°E.
Origin time = 05 27 00.
Explosion?

" 14 Up iP 06 53 24.6
microns sec
P Z' 0.1 0.6
Ki iP 06 52 52.2
Um iP 06 53 05.7 C
Bonin Islands (h = 120 km).

" 14 Ki iP 11 11 51.0
Kirghiz-Sinkiang
(h = 30 km).

" 15 Ki iP 03 52 40.7
Mexico (h = 30 km).

" 15 Um iP 04 04 17.5
Japan (h = 140 km).

" 15 Up iP 04 55 46.7

" 15 Ki iP 05 19 35.2
Molucca Passage
(h = 50 km).

" 15 Up iP 05 59 02.4

" 15 Ki iP 07 56 44.9
Um iP 07 57 41.5
Svalbard (h = 30 km).

" 15 Ki iP 08 01 02.9
Um iP 08 02 01.6
Svalbard (h = 30 km).

" 15 Up ---
microns sec
M E 3.0 29
M N 3.0 28
M Z 3.0 23
Ki iP 12 25 46.8
ipP 12 26 12.6
Sk eP 12 25 41
ipP 12 26 08.1
Gb iP 12 25 49.1
ipP 12 26 15.2

cont.

1964 Dec. 15 Guatemala.
cont. h = 100 km (Ki,Sk,Gb).
The maximum Rayleigh-wave amplitudes occur around 30 sec period, whereas the amplitudes around 20 sec and shorter are quite insignificant.

" 15 Up iP 21 07 58.2
Gb eP 21 07 53
i 21 07 57.5
Um iP 21 08 31.8
Ka eP 21 07 25
i 21 07 26.7
Turkey (h = 30 km).

" 15 Up iP 22 45 13.6 C
ipP 22 45 23.6
microns sec
P Z' 0.1 0.9
Ki iP 22 44 20.6 C
ipP 22 44 30.6
Gb iP 22 45 27.8
ipP 22 45 37.3
Um iP 22 44 47.0
Aleutian Islands.
h = 40 km (Up,Ki,Gb).

" 16 Ki iP 04 08 02.9
Mindanao (h = 120 km).

" 16 Um iP 04 46 07.4

" 16 Um iP 07 41 26.1 C

" 16 Ki iPg 11 01 25.1
iSg 11 01 52.0
D = 220 km = 2.0°.

" 16 Ki iPn 13 08 47.9
iSn 13 09 26.3
iSg 13 09 39.3
~~D = 330 km = 3.0°.~~
Sk eSg 13 12 28
Um iSn 13 10 40.7
iSg 13 11 13.6
i 13 11 22.7
~~D = 660 km = 5.9°.~~
Northwest Russia,
68.8°N, 28.4°E.
Origin time = 13 08 00.
Explosion?

" 16 Up i(P) 14 12 47.0

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Dec.	16	Ki	iPn	17 14 41.7	
			iSn	17 15 21.4	
			iSg	17 15 36.7	
			D = 370 km = 3.3°.		
		Sk	eSg	17 18 20	
		Um	iSg	17 17 05.7	
		Northwest Russia, 68.7°N, 29.1°E. Origin time = 17 13 47. Explosion?			
"	16	Up	iP	18 21 16.1	
		Philippine Islands (h = 20 km).			
"	16	Up	iP	19 40 30.7	
			i	19 40 40.8	
		Ki	iP	19 40 06.4	
		Um	iP	19 40 15.7	
		Formosa (h = 60 km).			
"	16	Up	iP	19 50 14.4	
"	16	Ki	i(P)	21 58 27.4	
"	16	Up	iP	22 20 47.0	
"	17	Up	i(P)	01 57 41.9	
"	17	Um	iP	02 39 17.6	
"	17	Um	iP	02 44 35.4	
		Japan (h = 80 km).			
"	17	Up	iP	03 53 31.2 C	
"	17	Up	iP	04 15 10.3 D	
				microns sec	
			P	Z' 0.1 0.6	
		Ki	iP	04 14 38.8 D	
		Sk	iP	04 15 07.1 D	
		Gb	iP	04 15 28.3	
		Um	iP	04 14 52.6	
		Bonin Islands (h = 470 km).			
"	17	Up	iP	05 29 33.6	
			i	05 29 50.1	
				microns sec	
			M	E 1.4 19	
			M	N 3.3 23	
			M	Z 2.7 21	
		Ki	eP	05 28 44	
			i	05 29 16.2	
				microns sec	
			M	E 1.4 17	
			M	N 1.4 18	
			M	Z 2.8 19	

cont.

1964 Dec. cont.	17	Sk	e(P)	05 29 49	
		Um	eP	05 29 10	
			i	05 30 16.3	
		Kurile Islands (h = 15 km). Magn. = 5.6 (Up,Ki).			
"	17	Up	iSn	09 56 26.9	
			iSg	09 56 50.2	
		Sk	eSn	09 57 59	
			iLgl	09 58 42.7	
		Gb	ePg	09 55 14	
			iSg	09 55 49.1	
			D = 300 km = 2.7°.		
		Um	iLgl	09 59 00.3	
		Ka	iPg	09 54 41.3	
			iSg	09 54 53.7	
			eT	09 55 32	
			D = 110 km = 1.0°.		
		Southern Baltic, 55.4°N, 14.5°E. Origin time = 09 54 20. Underwater explosion?			
"	17	Um	iP	14 12 06.8	
		Mexico (h = 40 km).			
"	17	Um	iP	17 26 10.2	
"	17	Um	eP	17 31 00	
"	17	Up	iP	18 59 12.7 D	
		Ki	iP	18 58 38.3	
		Gb	iP	18 59 32.0	
		Um	iP	18 58 53.2 D	
		South of Japan (h = 380 km).			
"	17	Up	iP	19 38 43.2	
"	17	Up	iP	22 33 25.7 D	
				microns sec	
			P	Z' 0.1 0.6	
"	17	Up	iP	23 55 42.2	
				microns sec	
			M	E 1.9 20	
			M	N 2.0 20	
			M	Z 2.0 21	
		Ki	iP	23 54 48.4	
			i	23 55 15.7	
				microns sec	
			M	E 1.5 18	
			M	N 0.9 19	
			M	Z 2.0 18	
		Sk	eP	23 55 24	

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Dec. cont.	17	Sk	epP	23 55 42	
			iPcP	23 55 53.7	
		Um	iP	23 55 15.6	
			ipP	23 55 30.3	
			iPcP	23 55 48.2	
		Aleutian Islands.			
		h = 60 km (Um).			
"	18	Ki	eP	00 43 27	
		Um	iP	00 43 05.6	C
		Iran (h = 30 km).			
"	18	Um	iP	02 33 47.3	
"	18	Um	iP	02 39 38.6	
		Alaska (h = 30 km).			
"	18	Ki	iP	06 16 06.7	
		Sk	iP	06 16 49.1	
		Um	iP	06 16 24.3	
		Japan (h = 30 km).			
"	18	Um	iP	07 01 19.9	
		Japan (h = 60 km).			
"	18	Gb	iPg	08 01 51.3	
			iSg	08 01 52.9	
			D = 13 km = 0.12°.		
		Blast?			
"	18	Um	iP	09 20 56.9	
		Kurile Islands (h = 30 km).			
"	18	Up	iP	10 14 17.3	
"	18	Ka	eP	10 38 11	
"	18	Gb	iPg	12 00 51.6	
			iSg	12 00 52.9	
			D = 11 km = 0.10°.		
		Blast?			
"	18	Gb	iPg	12 19 41.8	
			iSg	12 19 43.5	
			D = 14 km = 0.13°.		
		Blast?			
"	18	Um	eP	13 34 23	
			i	13 38 00.2	
"	18	Up	i(P)	15 29 40.4	
		Um	i(P)	15 29 17.0	
"	18	Up	iP	19 11 37.0	
		(Lower California; h = 30 km).			

1964 Dec.	18	Um	iP	20 25 13.2	
"	18	Um	iP	21 24 05.4	
"	19	Ki	iP	02 05 35.4	
		Rhodes Island (h = 50 km).			
"	19	Um	iP	02 37 50.6	
"	19	Um	iP	03 37 02.4	D
"	19	Um	iP	05 15 52.4	
"	19	Up	iPKP	07 01 08.1	
		Sk	iPKP	07 01 02.9	D
		Um	iPKP	07 00 57.5	
			i	07 01 29.2	
		South of Kermadec Islands (h = 200 km).			
"	19	Ka	iP	08 40 08.0	
"	19	Um	iP	12 30 27.3	D
"	19	Um	iP	13 01 15.8	
"	19	Um	eP	14 50 48	
			i	14 51 08.6	
"	20	Um	iP	01 33 16.9	D
"	20	Up	iP	03 40 42.2	
		Ki	iP	03 40 44.1	
		Sk	iP	03 41 03.3	
		Gb	iP	03 41 02.0	
		Nepal (h = 30 km).			
"	20	Ki R	e(Pn)	04 12 35	
			iSn	04 13 29.5	
			iSg	04 13 50.9	
			D = 480 km = 4.3°.		
		Sk KA	e(Sg)	04 16 19	
		Um ME	eSn	04 14 09	
			iS^x	04 14 41.3	
			iSg	04 14 55.7	
			D = 690 km = 6.2°.		
		Northwest Russia, 67.9°N, 31.8°E. Origin time = 04 11 30. Explosion?			
"	20	Up	i(P)	05 41 10.4	
				microns	sec
			(P)	Z' 0.1	1.5

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Dec.	20	Ki R	iPn	05 43 10.2		
			iSn	05 44 01.1		
			iSg	05 44 23.3		
			~~D = 490 km = 4.4°.~~			
		Sk KA	e(Sg)	05 47 04		
		Um ME	iSn	05 44 50.0		
			iS^x	05 45 05.9		
			iSg	05 45 27.9		
			D = 700 km = 6.3°.			
		Northwest Russia, 67.9°N, 32.1°E. Origin time = 05 42 00. Explosion?				
"	20	Up	iP	10 13 22.7		
"	20	Up	iPKP	11 44 57.7		
		Fiji Islands (h = 460 km).				
"	20	Up	iP	13 43 18.5		
			ipP	13 43 30.4		
		Ki	iP	13 42 38.8	C	
		Um	iP	13 42 56.2	C	
			ipP	13 43 08.7		
			iPcP	13 43 18.9		
		Japan. h = 50 km (Up,Um).				
"	20	Up	iP	23 26 07.9		
		Um	iP	23 25 45.9		
		Japan (h = 80 km).				
"	21	Up	iP	09 17 51.8	C	
			microns	sec		
			P Z'	0.1 0.5		
"	21	Up	iP	11 24 13.1	C	
"	21	Up	i(P)	12 00 50.5	C	
			i	12 01 20.4		
			microns	sec		
			(P) Z'	0.3 0.5		
		Local explosion?				
"	21	Up	iP	17 46 25.6		
		Ki	iP	17 45 31.4		
			microns	sec		
			P Z'	0.1 1.0		
		Gb	iP	17 46 38.6		
			i	17 46 44.3		
		Um	iP	17 46 01.1		
		Alaska (h = 40 km).				
"	21	Up	iP	18 17 21.1	C	
"	21	Ki	iP	18 40 39.4	C	
			microns	sec		
			P Z'	0.1 1.0		
		Alaska (h = 110 km).				

1964 Dec.	21	Ki	iP	21 49 06.6		
			iPP	21 51 23.3		
		Montana (h = 30 km).				
"	22	Sk	iP	00 37 10.7		
		Gb	iP	00 37 04.8		
		Peru-Brazil (h = 610 km).				
"	22	Gb	iPKP	01 04 49.9		
		Ka	iPKP	01 04 52.4	D	
		Fiji Islands (h = 660 km).				
"	22	Up	iP	04 44 18.8		
			iPP	04 46 01		
			iS	04 50 35		
			microns	sec		
			P Z'	0.1 0.7		
			D = 4600 km = 41½°.			
		Ki	iP	04 44 50.3		
			iScS	04 54 55		
			microns	sec		
			P Z'	0.2 1.0		
			M E	14 16		
			M N	10 15		
			M Z	21 16		
		Sk	iP	04 44 53.1	D	
			ipP	04 45 01.5		
		Gb	iP	04 44 30.6		
			ipP	04 44 39.8		
		Um	iP	04 44 28.9		
			ipP	04 44 36.3		
			iPP	04 46 12.4		
			iS	04 50 52		
		Ka	iP	04 44 10.7		
			ipP	04 44 19.2		
			i	04 44 37.9		
			iPP	04 45 49.1		
			i	04 46 03.7		
		Iran. h = 40 km (Sk,Gb,Um,Ka). Magn. = 6.1 (Up,Ki).				
"	22	Up	iP	08 12 29.6		
			ipP	08 12 56.6		
			i	08 13 23.7		
		Ki	iP	08 12 30.4	C	
			microns	sec		
			P Z'	0.4 1.8		
		Sk	iP	08 12 11.9		
			ipP	08 12 40.1		
		Gb	iP	08 12 11.9		
			i	08 12 30.6		
		Um	iP	08 12 32.9	C	
			ipP	08 13 00.5		
			iS	08 21 52		
		Ka	iP	08 12 25.9		
			ipP	08 12 51.3		
		Mona Passage. h = 110 km (Up,Sk,Um,Ka).				

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Dec. 22 Up iPg 09 41 28.4
iSg 09 41 42.6
i 09 42 33.0

" 22 Up iPKP 12 16 24.9
Gb iPKP 12 16 34.9
Um ePKP 12 16 13 Po"
i 12 16 19.3 P1"
i 12 16 25.2 P"
Ka iPKP 12 16 36.8
South of Fiji Islands
(h = 600 km).
Multiple PKP: notation
after Payo Subiza and
Båth (Geophys. J., 8:
496-513, 1964) indicated
for Um (to the right of
the times).

" 22 Gb iPg 14 02 30.6
iSg 14 02 32.5
D = 17 km = 0.15°.
Blast?

" 22 Up i(P) 20 52 48.6
microns sec
(P) Z' 0.1 0.5
Um i(P) 20 51 08.3 D

" 22 Up iP 21 07 00.4
microns sec
M E 3.9 20
M N 5.2 22
M Z 4.8 22
Ki ---
microns sec
M E 4.0 18
M N 1.9 17
M Z 3.6 17
Gb eP 21 06 55
i 21 07 00.7
Um iP 21 06 39.6
i 21 06 59.5
Ka iP 21 07 11.9
Lower California
(h = 15 km).
Magn. = 6.0 (Up,Ki).

" 23 Up iP 09 28 02.9
ipP 09 28 12.6
Sk iP 09 27 49.9
Um iP 09 27 37.2 C
Aleutian Islands.
h = 40 km (Up).

" 23 Up iP 12 44 00.2
microns sec
P Z' 0.1 0.5

1964
Dec. 23 Up iP 19 59 38.3
microns sec
P Z' 0.1 1.3
M E 1.9 17
M N 2.5 18
M Z 2.7 17
Ki ---
microns sec
M E 3.1 18
M N 2.2 18
M Z 6.6 18
Um iP 19 59 19.2 D
Japan (h = 30 km).
Magn. = 5.8 (Up,Ki).

" 23 Gb iP 20 38 30.9
i 20 38 41.4

" 24 Up iP 01 16 08.6
ipP 01 16 37.7
Ki iP 01 16 16.7
i 01 16 52.8
Sk iP 01 16 34.1
i(sP) 01 17 27.4
Gb iP 01 16 29.4
ipP 01 16 57.3
isP 01 17 14.9
Um iP 01 16 05.2
isP 01 16 51.8
Ka iP 01 16 13.0
i 01 16 30.6
ipP 01 16 43.8
isP 01 16 57.8
iPP 01 17 59.3
Hindu Kush. h = 140 km
(Up,Gb,Um,Ka).

" 24 Gb iP 03 50 56.9

" 24 Um i(P) 09 49 26.3

" 24 Up i(P) 18 57 03.2 C

" 24 Up iPKP 19 04 17.2 D
iPKKP 19 14 52.7
Ki iPKP 19 04 06.1
iPKKP 19 15 13.1
Um iPKP 19 04 10.5
iPKKP 19 15 03.2
Ka iPKP 19 04 23.6
New Ireland (h = 90 km).

" 24 Up iP 19 37 54.2
Ki iP 19 37 55.0
microns sec
P Z' 0.1 1.0

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964
Dec. 24 Um iP 19 37 51.2 C
cont Sumatra (h = 140 km).

" 24 Um iP 20 00 26.6
Aleutian Islands
(h = 40 km).

" 24 Up iP 20 06 29.7
Ki iP 20 05 59.8
Um iP 20 06 08.8
Japan (h = 70 km).

" 25 Um iP 14 01 52.8
Japan (h = 100 km).

" 25 Up iP 17 13 08.6
ipP 17 13 15.3
Ki iP 17 12 33.5 C
microns sec
M E 1.9 17
M N 2.8 18
Sk i(P) 17 13 12.1
i 17 13 26.5
Gb e(P) 17 13 37
Um iP 17 12 44.1
Japan. h = 25 km (Up).

" 26 Up iP 04 33 52.3 C

" 26 Up iP 11 08 22.2
Japan (h = 10 km).

" 26 Up iP 14 40 47.9
i 14 40 57.2
ipP 14 41 21.4
iS 14 49 08
isS 14 50 13
microns sec
P Z' 0.1 0.6
M E 3.0 29
M N 1.7 21
M Z 2.1 25
Ki eP 14 39 56
ipP 14 40 30.1
isS 14 48 35
microns sec
pP Z' 0.8 1.8
M E 2.7 14
Sk eP 14 40 35
i 14 40 48.3
ipP 14 41 14
Gb iP 14 41 08.0
ipP 14 41 43.2
i(sP) 14 42 03.1
Um iP 14 40 20.9 C
isP 14 41 06.6
iS 14 48 17

cont.

1964
Dec. 26 Ka iP 14 41 02.9 C
cont. i 14 41 11.8
ipP 14 41 33.3
Kamchatka. h = 140 km
(Up,Ki,Sk,Gb,Um,Ka).
This interpretation is
in agreement with USCGS,
but a phase
(unidentified) appearing
about 10 sec after P
(Up,Sk,Ka) and bigger
than P could call for
another interpretation.

" 26- Up iP 00 00 34.2
27 Ki eP 23 59 42
Um iP 00 00 09.6
Ka iP 00 00 59.8
Alaska (h = 40 km).

" 27 Up iP 01 23 48.3 C

" 27 Up iP 01 50 56.5

" 27 Um iP 04 23 29.4

" 27 Up iSg 04 56 34.1
i 04 56 40.5
Ki iSn 04 53 38.0
iSg 04 53 55.1
Sk eSg 04 56 00
Um eS 04 54 16
iSg 04 54 29.6
Finland-USSR border
region, 66.6°N, 28.7°E.
Origin time = 04 52 00.
Explosion?

" 27 Up iP 10 25 48.7
Aleutian Islands
(h = 30 km).

" 27 Gb eP 16 07 03

" 27 Up iP 17 56 06.5
iSKS 18 06 31
iS 18 06 45
microns sec
P Z' 0.1 1.3
SKS E 0.8 6
S E 0.6 4
S N 1.5 7
M E 1.5 16
M N 2.9 18
M Z 2.5 16
D = 9700 km = 87½°.

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Dec. 27 cont.

Ki	iP	17 55 48.1	
	i	17 56 23.7	
	iS	18 06 07	
		microns	sec
	P	Z' 0.4	1.2
	S	E 2.1	7
	S	N 3.0	8
	M	E 1.5	16
	M	N 1.8	17
	M	Z 3.2	14
	D = 9350 km = 84°.		
Um	iP	17 55 55.2	
	iSKS	18 06 13	
	iS	18 06 20	
Ka	eP	17 56 19	

Samar, Philippine Islands (h = 30 km).
Magn. = 6.2 (Up,Ki).

" 27 Ka	iP	18 00 08.3	
	i	18 00 24.2	
" 28 Um	iP	03 08 45.6	
" 28 Up	i(PKP)	16 34 24.4	
	iPKP	16 34 26.1	
	iSKP	16 37 12.9	
	iPP	16 37 37.0	
	iPKS	16 38 09	
	iSKKP	16 45 42.5	
		microns	sec
	PKP	Z' 0.3	0.5
	SKP	Z' 0.1	0.7
	PP	N 0.7	3
	PP	Z 1.7	3
	PP	Z' 0.9	1.5
	PKS	N 1.2	4
	M	E 2.2	23
	M	N 2.0	20
	M	Z 3.0	23
	(D = 15650 km = 141°).		
Ki	i(PKP)	16 34 05.4	
	iPKP	16 34 17.5	
	ipPKP	16 36 43.7	
	iSKP	16 36 50.1	
	i!	16 41 06	
	iSKKP	16 45 50	
		microns	sec
	PKP	Z' 0.3	1.0
	SKP	Z 5.6	7
	SKP	Z' 0.5	1.5
	M	E 3.0	16
	M	N 1.9	11
	M	Z 2.6	12
	(D = 14800 km = 133°).		
Sk	e(PKP)	16 34 16	

cont.

1964 Dec. 28 cont.

Sk	iPKP	16 34 19.4	
	iSKP	16 37 06.1	
Gb	iPKP	16 34 34.9	
	ipPKP	16 37 02.2	
	iSKP	16 37 21.1	
	iSKKP	16 45 31.0	
Um	i(PKP)	16 34 13.0	
	i	16 34 14.7	
	iPKP	16 34 26.7	
	iSKP	16 37 00.6	
	ipPKS	16 40 12	
	isPKS	16 41 15	
	iSKKP	16 46 04	
	iSS	16 54 14	
Ka	i(PKP)	16 34 36.4	
	iPKP	16 34 37.8	
	ipPKP	16 36 58.6	
	iSKP	16 37 22.4	
	i	16 37 39.4	
	isPKP	16 38 00.2	

South of Fiji Islands (h = 610 km).
Magn. = 6.9 (Up).

" 28 Up	iP	17 10 50.3	
	i	17 10 55.9	
Ki	iP	17 09 28.5	C
	iS	17 13 23	
		microns	sec
	P	N 2.5	6
	P	Z 1.9	4
	P	Z' 0.5	1.0
	S	E 3.6	6
	S	N 1.6	10
	D = 2200 km = 20°.		
Sk	iP	17 10 18.6	C
	i	17 10 25.2	
Gb	iP	17 11 09.9	
	i	17 11 17.0	
Um	iP	17 10 10.2	

Arctic Ocean (h = 30 km).
Magn. = 6.2 (Ki).
The P-phases exhibit the characteristic features for the Atlantic Ridge and Arctic shocks: multiple P-phases and relatively long periods.

" 28 Um	iP	19 49 32.9	
" 29 Up	iP	00 01 42.1	

Aleutian Islands (h = 30 km).

" 29 Up	iP	00 55 21.2	C

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964 Dec. cont.	29	Up	iPcP	00 55 47.3	
		Sk	iP	00 54 59.1	
		Aleutian Islands (h = 40 km).			
"	29	Up	iP	01 51 09.0	
			iPcP	01 51 35.3	
		Ki	iP	01 50 15.4	C
		Aleutian Islands (h = 40 km).			
"	29	Um	iP	02 16 42.3	
		Alaska (h = 30 km).			
"	29	Up	iP	06 46 04.8	
		Ki	iP	06 45 11.3	
		Gb	iP	06 46 20.4	D
		Um	iP	06 45 38.1	
			iPcP	06 46 12.5	
		Aleutian Islands (h = 20 km).			
"	29	Up	iP	06 50 07.7	
				microns sec	
			P	Z' 0.2 1.0	
		Ki	iP	06 49 15.0	
				microns sec	
			P	Z' 0.1 1.0	
		Sk	iP	06 49 46.2	
		Gb	iP	06 50 23.7	D
		Um	iP	06 49 41.1	D
			iPcP	06 50 16.0	
		Aleutian Islands (h = 30 km). Magn. = 5.9 (Up,Ki).			
"	29	Up	iP	10 20 37.2	
		Aleutian Islands (h = 80 km).			
"	29	Um	iP	13 01 26.6	C
			i	13 01 33.8	
		Sea of Japan (h = 15 km).			
"	30	Up	iP	00 19 21.6	C
"	30	Up	iP	06 34 43.5	
"	30	Up	iP	07 02 19.3	
				microns sec	
			P	Z' 0.1 0.5	
"	30	Up	i(P)	11 16 58.2	
"	30	Up	iP	15 38 51.7	D

cont.

1964 Dec. cont.	30	Up	iS	15 48 17.1	
				microns sec	
			P	Z' 0.9 0.6	
		Ki	iP	15 38 17.7	D
				microns sec	
			P	Z' 0.7 1.0	
		Sk	iP	15 38 48.1	D
		Gb	iP	15 39 11.4	
		Um	iP	15 38 32.2	
		Ka	iP	15 39 08.7	
			i	15 39 09.7	
			i	15 39 14.1	
		South of Japan (h = 260 km). Magn. = 6.5 (Up,Ki).			
"	30	Sk	eP	16 55 02	
"	30	Up	iPKP	21 49 23.0	
		Ki	iSKP	21 51 52.8	
		Um	iSKP	21 52 03.9	
		South of Fiji Islands (h = 550 km).			
"	30	Ki	iPn	23 02 00.2	
			iSn	23 02 48.2	
			iSg	23 03 07.6	
			D = 470 km = 4.2°.		
		Sk	iPn	23 02 41.2	
			iSn	23 04 05.0	
			D = 800 km = 7.2°.		
		Norwegian Sea, 71.0°N, 12.1°E. Origin time = 23 00 52. Solution obtained by combination with Tromsö readings.			
"	31	Up	iP	01 58 35.5	D
				microns sec	
			P	Z' 0.1 0.6	
		Ki	iP	01 58 03.4	D
		Sk	iP	01 58 32.1	D
		Um	iP	01 58 17.1	D
		Ka	iP	01 58 50.6	
		Bonin Islands (h = 430 km).			
"	31	Up	iP	16 23 14.0	
			i	16 23 21.6	
			iPcP	16 26 50.2	
			i(sPcP)	16 27 30.4	
			iScP	16 30 20.2	
				microns sec	
			P	Z' 0.1 0.5	
		Ki	iP	16 24 22.3	C

cont.

Up = Uppsala, Ki = Kiruna, Sk = Skalstugan, Gb = Göteborg, Um = Umeå
Ka = Karlskrona

1964					
Dec.	31	Sk	iP	16 23 53.1	C
cont.			iPcP	16 27 01.0	
		Gb	iP	16 23 06.3	
			ipP	16 23 38.0	
		Um	iP	16 23 47.3	
			i	16 23 48.3	
			isP	16 24 37.3	
			iPcP	16 26 59.5	
		Ka	iP	16 22 41.2	C
			ipP	16 23 08.5	
			iPP	16 23 28.5	
			iS	16 26 29.4	
		Crete. h = 150 km (Gb,Um,Ka).			
"	31	Up	iP	18 00 55.8	

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September 16, 1965