

P R E L I M I N A R Y

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 A N U A R Y 1 - 31, 1963

1963

Jan	1	Up	iP	04 17 43.2
		Sk	iP	04 17 31.0
		Um	iP	04 17 49.6
		Colombia (h = 150 km).		
"	1	Up	i(P)	18 07 20.1
"	1	Up	iP	23 49 34.1 C
		i		23 50 49
		iPcS		23 54 05.6
		iS		23 58 02
		iScS		23 59 19
		iP'P'		00 18 22.8
		i		00 18 28.8
		i		00 18 49.9
		microns sec		
		P	N	1.7 1
		P	Z	2.3 1
		P	Z'	0.5 0.5
		S	E	1.8 3
		P'P'	Z'	0.2 1.5
		M	E	4.7 22
		M	N	4.7 23
		M	Z	3.8 23
		D = 7050 km = 63½°.		
Ki		iP		23 48 39.7 C
		e		23 49 12
		iS		23 56 20
		eScS		23 58 24
		microns sec		
		P	Z	5.9 2
		P	Z'	4.4 0.9
		S	E	4.0 7
		S	Z'	0.7 1.5
		M	E	4.4 18

1963

Jan	1	Ki	M	N	1.9 20
		cont.	M	Z	5.2 20
		D = 6150 km = 55½°.			
		Sk	iP		23 49 08.0 C
		i			23 50 58.1
		Gb	iP		23 49 46.7 C
		iP'P'			00 18 22
		i			00 18 43.4
		Um	iP		23 49 07.7 C
		iPcP			23 49 54.1
		iS			23 57 13.6
		eScS			23 58 47
		iP'P'			00 18 37.6
		D = 6600 km = 59½°.			
		Alaska (h = 50 km)			
		Magn. = 7.1 (Up, Ki).			
"	2	Up			-
		microns sec			
		M	E	1.9 20	
		M	N	2.8 23	
		M	Z	3.0 19	
		Ki			-
		microns sec			
		M	E	2.0 19	
		Um	eSS		15 29 16
		New Guinea (h = 30 km).			
"	2	Gb	iPKP		16 15 37.2
		South Pacific Ocean			
		(h = 30 km).			
"	3	Up	iP		03 16 43.3 C
		i			03 16 51.6
		microns sec			
		P	Z'	0.1 1.0	

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

1963

Jan 3 Up M E 4.4 14
cont. M N 5.2 15
M Z 7.1 15
Ki iP 03 16 12
microns sec
M E 4.7 20
M N 2.6 19
Sk iP 03 16 43
Gb iP 03 17 03.8
Um iP 03 16 24.0
eS 03 25 51
Ryukyu Islands (h = 30 km).
Magn. = 5.9 (Up, Ki).

" 3 Ki i(P) 06 36 17
Local?

" 3 Ki iP 08 42 05.5

" 3 Gb i(P) 10 10 20

" 3 Up iP 12 25 02.0 C
Local?

" 3 Up i(P) 15 54 06.2

" 3 Up iP 19 03 46.9
i 19 09 24.3
Um iP 19 04 31.4
i 19 09 46.8

Greece region.

" 4 Up iP 00 34 53.4 C
i 00 35 00.2

microns sec

P Z' 0.1 1.0

Ki iP 00 35 31.1 C
Sk iP 00 35 02.6
Um iP 00 35 16.3
i 00 35 24.5

1500 km south of Cape Verde
Islands (h = 30 km).

" 4 Up i(P) 02 00 34.0

" 4 Up iP 05 54 42.3
i 05 54 53
Ki iP 05 54 07
Sk iP 05 54 38.1
Gb iP 05 55 09.1
i 05 55 36.3
Um iP 05 54 25.1
i 05 54 35.3

Bonin Islands region
(h = 30 km).

1963

Jan 4 Up iP 06 39 01.8
Gb iP 06 38 25.6

" 4 Up iPKP 07 03 38
Um iPKP 07 03 20.2
i 07 03 37

Kermadec Islands region
(h = 40 km).

" 5 Up iP 00 01 06.4
Ki iP 00 00 17.9
Sk iP 00 00 56.4
Gb iP 00 01 27.8
Um iP 00 00 41.4
Kurile Islands (h = 30 km).

" 5 Ki iP 00 33 23.0
Um iP 00 33 29.5
Halmahera region
(h = 30 km).

" 5 Um iP 00 46 34.5 C

" 5 Up iP 03 46 45.5
Ki iP 03 46 30.4
Sk iP 03 46 50
Um iP 03 46 36.4 C
Sangihe Islands
(h = 130 km).

" 5 Up iP 07 16 18.0
i 07 17 06.3
microns sec
P Z' 0.1 0.9
Ki iP 07 15 29.9
Sk eP 07 16 05
Gb iP 07 16 39.1
Um iP 07 15 53.8
i 07 16 42.4
Kurile Islands (h = 30 km).

" 5 Up -
microns sec
M E 1.9 20
Ki iPKP 13 23 47.2
Um iPKP 13 23 54.0
New Hebrides Islands
(h = 30 km).

" 5 Um eSKS 13 41 35
Timor (h = 30 km).

" 5 Up iP 15 15 33.7
Um eP 15 14 31
i 15 15 07.6
Kurile Islands region
(h = 30 km).

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1963				1963			
Jan	5	Sk iP	17 55 53.1 C	Jan	6	Um eS	21 39 54
		Western Brazil (h = 540 km).		cont.		D = 7050 km = 63 $\frac{1}{2}$ °.	
"	5	Up i(P)	20 44 13			Kurile Islands (h = 30 km).	
"	5	Um iP	21 39 29.5	"	6	Up iP	22 14 39.0
"	6	Um iP	04 53 56.9			Sk iP	22 15 17.2
"	6	Gb i(P)	05 31 55.3			Southeast of Crete	
"	6	Up iP	07 40 50.4 D	"	7	Up	-
			microns sec			M	E 2.3 20
		P	Z' 0.1 1.0			M	Z 3.8 21
		Ki iP	07 40 11.6			Ki iP	12 01 43.1
		Um iP	07 40 24.3				microns sec
		Kurile Islands (h = 30 km).				M	E 3.2 21
"	6	Um iP	12 46 10.9			M	N 1.8 21
"	6	Up iP	17 35 31.0 C			M	Z 3.5 20
		Ki iP	17 34 34.2 C			Um iP	12 01 46.0
			microns sec			eS	12 12 59
		P	Z' 0.1 0.8			D = 10650 km = 96°.	
		Sk iP	17 35 02.0			Halmahera region	
		Gb iP	17 35 43.5	"	7	Um iPKP	19 38 43.5
		Um iP	17 35 03.4 C			New Hebrides Islands	
		Alaska (h = 120 km).				(h = 20 km).	
"	6	Up iP	21 31 52.3 D	"	7	Up i(P)	22 57 58
		i	21 32 09.7	"	8	Um eP	10 56 14
		iS	21 40 50			i	10 58 04.9
			microns sec	"	8	Up iP	15 58 01.1 C
		P	Z' 0.1 0.9				microns sec
		M	E 0.8 20			P	Z' 0.3 0.6
		M	N 0.7 18			Ki iP	15 57 29.0 C
		M	Z 1.5 16				microns sec
		D = 7500 km = 67 $\frac{1}{2}$ °.				P	Z' 0.2 0.8
		Ki iP	21 31 03.0 D			Sk iP	15 57 59.1
		eS	21 39 16			Gb iP	15 58 20.7
			microns sec			Um iP	15 57 42.2 C
		P	N 0.3 5			Near south coast of Kyushu,	
		P	Z 0.6 5			Japan (h = 180 km).	
		P	Z' 0.2 0.8				
		S	E 0.7 5				
		M	E 1.2 16				
		M	N 0.6 17				
		M	Z 1.2 17				
		D = 6650 km = 60°.					
		Sk iP	21 31 38.7				
		Gb iP	21 32 12.6				
		i	21 32 18.0				
		Um iP	21 31 26.6				
		i	21 31 41.9				

*/ 8 Um e(Pn) 22 56 29 iSg 22 57 07.3
Explosion at Oulu, Finland.

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1963

Jan 9 Up iP 03 26 08.6
i 03 26 15.2
Ki iP 03 25 40.8
ipP 03 26 23.4
microns sec
P Z' 0.1 1.0
Sk iP 03 26 06.0
Gb eP 03 26 25
Um iP 03 25 51.8
ipP 03 26 41.2
Mariana Islands.
h = 190 km (Ki, Um).

" 9 Ki iP 18 08 04.4

" 9 Gb iP 18 32 54
iPcP 18 33 33
Um iP 18 33 26.0
Ka iP 18 32 43.9
Congo (h = 30 km).

" 10 Ki i(Sg) 05 11 58
Um i(P) 05 12 45.1
i(Sg) 05 13 22.6

" 10 Um iP 06 54 26.5
Hindu Kush (h = 190 km).

" 10 Ka i(P) 09 34 28.0

" 10 Ki iP 19 07 41.4
Um iP 19 07 51.4
Mariana Islands (h = 60 km).

" 11 Up iP 01 17 01.3 D
i 01 17 04.7
Ki iP 01 16 40.2
microns sec
M N 0.7 17
Sk iP 01 17 10.7
Um iP 01 16 44.6
Tsinghai Province, China
(h = 30 km).

" 11 Um iP 05 13 08.0

" 11 Up -
microns sec
M E 2.7 19
M N 1.1 19
M Z 3.7 19
Ki iPKP 12 31 28
ePKS 12 35 07
microns sec
PKS E 0.9 4

1963

Jan 11 Ki M E 1.3 19
cont. M N 1.3 18
M Z 2.2 18
Um iPKP 12 31 26.6
ePKS 12 34 51
e 12 45 34
Near coast of southern Chile
(h = 30 km).
Magn. = 6.1 (Up, Ki).

" 11 Up iPKP 17 24 59.4 D
i 17 25 34.7
microns sec
PKP Z' 0.2 0.6
Ki iPKP 17 24 41.3
Sk iPKP 17 24 52.2 D
Gb iPKP 17 25 07.2
Um iPKP 17 24 46.8 D
Ka iPKP 17 25 05.3
i 17 25 15.0
Kermadec Islands
(h = 230 km).

" 12 Ki iP 03 53 16.7 D
microns sec
P Z' 0.1 1.2
Ka iP 03 53 02.3
Gb iP 03 53 02.1
Um iP 03 53 18.7 D
Colombia (h = 100 km).

" 12 Up iP 06 27 45.6
iPP 06 29 21.4
Ki iP 06 27 55.8
Sk iP 06 28 12.3
Gb iP 06 28 05.7
iPP 06 29 45
Um iP 06 27 44.8
iPP 06 28 19.4
Ka iP 06 27 47.4
Hindu Kush (h = 100 km).

" 12 Um iP 19 19 25.6

" 14 Um iPKP 11 39 00.0
Loyalty Islands
(h = 30 km).

" 14 Ki eL 12 44
microns sec
M E 1.6 21
M N 1.3 20
M Z 3.1 21

" 14 Up iP 18 36 51.1 C

Up = Uppsala, Ki = Kiruna, Sk = Skanstugan, Gb = Göteborg, Um = Umeå
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1963

Jan 14 Up i 18 37 53.8
cont. iS 18 39 26
i(S) 18 39 46.5
iLg1 18 41 06
iLg2 18 41 34.9
microns sec
P Z' 0.1 0.5
S E 0.6 3
(D = 1650 km = 15°).
Ki iP 18 38 13.3
ipP 18 38 43.3
i 18 44 52.8 -
microns sec
P Z' 0.1 1.0
(D = 2550 km = 23°).
Sk iP 18 37 45.8
ipP 18 38 08.9
iS 18 41 32.4
i 18 43 34.5 -
(D = 2100 km = 19°).
Gb iP 18 36 53.2
iS 18 39 43.0
(D = 1650 km = 15°).
Um iP 18 37 31.5 C
iS 18 41 04.9
iLg1 18 42 53.1
(D = 2000 km = 18°).
Ka iP 18 36 28
i 18 36 43.4
i(S) 18 39 19.9
iLg2 18 40 32.0
(D = 1450 km = 13°).
Romania (h = 130 km).
Magn. = 5.3 (Up, Ki).

" 14 Up iP 20 34 32.8 C
microns sec
P Z' 0.1 0.7

" 15 Up iS 01 39 21
microns sec
S E 1.5 10
M E 2.1 15
M N 1.0 16
M Z 1.3 16
Ki eP 01 35 35
iPP 01 35 42.0
e 01 36 22
eSS 01 38 14
eSSS 01 38 31
microns sec
P E 0.4 8
M E 4.1 16
M N 2.7 16
M Z 7.2 16
D = 1500 km = 13½°.

1963

Jan 15 Sk iP 01 35 21
cont. Gb iP 01 36 24.7
Um iP 01 36 02.9
e 01 38 34
e(S) 01 38 43
Between Iceland and Jan
Mayen (h = 30 km).
" 15 Ki iP 02 45 36.1 D
Sk eP 02 46 00
Um iP 02 45 47.3 D
eSKS 02 56 22
Mariana Islands
(h = 40 km).

" 15 Up iP 05 27 11.6 C
i 05 27 48.4
iS 05 30 12
microns sec
P N 0.5 3
P Z' 0.1 1.0
S E 0.8 6
S N 1.5 10
M E 4.1 14
M N 3.6 21
M Z 2.6 20
D = 1950 km = 17½°.
Ki eP 05 26 16
ePP 05 26 25
i 05 26 32.3
eS 05 28 54
eSS 05 29 15

microns sec
PP E 0.6 8
PP N 0.4 6
PP Z 0.9 9
M E 7.2 16
M N 6.4 16
M Z 13 16
D = 1450 km = 13°.

Sk iP 05 26 11.7
Gb iP 05 27 11.2
Um iP 05 26 49.0
i 05 26 54.6
eS 05 29 26
eSS 05 29 48
D = 1700 km = 15½°.
Between Iceland and Jan
Mayen (h = 30 km).
Magn. = 5.3 (Up).

" 15 Up iP 12 32 06.5 ✓
Um iP 12 31 50.9
Tsinghai, China
(h = 30 km).

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

1963				1963			
Jan	15	Up	iP	15	09	23.5	
			i		15	09	39.7
		Ki	iP		15	10	33.6
		Sk	iP		15	10	03.9 C
		Gb	iP		15	09	13.8
			i		15	09	16.6
		Um	iP		15	09	57.7
		Ka	iP		15	08	47.4
		Mediterranean Sea					
		(h = 80 km).					
"	15	Up	iPKP		19	44	54.6
			i		19	45	11.2
			iPKS		19	48	38.8
			microns sec				
			PKP		Z'	0.2	1.0
		Ki	iPKP		19	44	33.8
			i!		19	44	47.5
		Sk	iPKP		19	44	46.1
			i		19	44	57.8
		Gb	iPKP		19	45	04.3
		Ka	iPKP		19	45	04.5
		Fiji Islands (h = 500 km).					
"	15	Sk	iP		21	30	31
		Greece.					
"	15	Um	eS		22	43	06
		South Atlantic Ocean					
		(h = 30 km).					
"	16	Up	iP		05	00	44.5 C
		Ki	iP		05	00	45.9 C
		Nicobar Islands (h = 70 km).					
"	16	Up	iP		05	55	50.4 C
			microns sec				
			P		Z'	0.2	0.7
		Ki	iP		05	54	57.9
			microns sec				
			P		Z'	0.1	0.8
		Sk	iP		05	55	29.6 C
		Gb	iP		05	56	07.2 C
		Andreanof Islands, Aleutian					
		Islands (h = 40 km).					
"	17	Um	iP		04	01	53.0
		Sea of Okhotsk (h = 450 km).					
"	17	Up	iP		06	09	04.4 C
			microns sec				
			P		Z'	0.1	0.5
		Sk	iP		06	09	09.7
		Gb	iP		06	09	21.6
		Um	iP		06	08	52.1
		Luzon (h = 210 km).					
Jan	17	Ki	i(P)		10	14	25.1
			i		10	14	30.9
"	17	Um	iP		16	15	29.2
"	17	Up	iP		20	52	50.7
			i		20	53	00.8
			microns sec				
			P		Z'	0.1	0.7
		Ki	iP		20	52	24.0 D
			microns sec				
			P		Z'	0.2	0.8
		Sk	iP		20	52	52.1 D
		Gb	iP		20	53	10.8 D
		Um	iP		20	52	33.9 D
		Ryukyu Islands (h = 140 km).					
"	17	Up	iP		21	37	39.6
"	18	Up	iP		03	22	58.8 C
		Ki	iP		03	22	25.1 C
			microns sec				
			P		Z'	0.1	0.8
		Sk	eP		03	22	55 C
		Gb	eP		03	23	18
		Um	iP		03	22	39.0 C
		South of Honshu, Japan					
		(h = 430 km).					
"	18	Um	iP		12	44	19.0
		Kurile Islands region					
		(h = 30 km).					
"	18	Up	iP		20	33	14.2
"	18	Up	iP		22	57	14.1
"	19	Up	e(P)		03	17	18
"	19	Ki	iP		07	32	49.3
		Um	iP		07	33	08.2 D
		South of Hokkaido, Japan					
		(h = 30 km).					
"	19	Up	iPg		19	54	29.8
			iSg		19	54	46.9
			iL		19	54	49.0 ✓
			microns sec				
		M	E		1.6	3	
		M	N		0.6	3	
		M	Z		1.8	3	
		D = 140 km = 1.3°.					
		Sk	iSg		19	56	15.2
		Gb	i(Sg)		19	55	25.2
			iL		19	55	38.6 ✓
		Um	iSg		19	56	31.6

Up = Uppsala, Ki = Kiruna, Sk = Skanstugan, Gb = Göteborg, Um = Umeå
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1963

Jan 19 Um iL 19 57 00.4 ✓
cont. Ka iSg 19 56 01.4
iL 19 56 09.9 ✓

South-central Sweden, 59.8°N, 15.1°E. Origin time = 19 54 04.8
Remarkably well developed surface waves (L) with normal dispersion; period range 3 - 1 sec.

" 20 Um iPKP 22 56 19.0 C
New Hebrides (h = 110 km).

" 21 Um iP 03 15 14.9 C

" 21 Um iP 04 47 13.4

" 21 Ki iP 05 31 09.9

" 21 Um iP 05 38 35.4
i 05 39 22.0

" 21 Um iPKP 07 19 59.4
Sandwich Islands region
(h = 30 km).

" 21 Gb iP 07 51 39.8
Panama-Costa Rica border
(h = 90 km).

" 21 Ki e 08 27 07
i(Sg) 08 27 25.5

" 21 Up iP 13 12 53.9 C

" 21 Ki iP 14 56 11.1
Um iP 14 57 02.5
Kenai Peninsula, Alaska
(h = 70 km).

" 21 Up i(P) 18 31 35.5

" 22 Up iP 05 04 41.2 C
microns sec
M E 0.3 15
M N 1.6 20
M Z 0.6 19

Ki -
microns sec
M E 0.8 17
M N 2.1 18
M Z 1.0 17

Sk iP 05 04 57.9 C

Um iP 05 04 32.6

eLg1 05 23 04

Tibet (h = 30 km).

1963

Jan 22 Gb iP 11 17 34.8

" 22 Um iP 11 33 55.8 D

" 22 Up iPKP 15 46 06.9
South of Fiji Islands
(h = 530 km).

" 22 Up iP 16 18 02.0

Ki iP 16 17 11.4

Gb eP 16 18 13

Um iP 16 17 35.0

Ka eP 16 18 18

Kurile Islands (h = 50 km).

" 22 Up iP 16 22 30.5

Ki iP 16 21 39.3

Kurile Islands (h = 50 km).

" 23 Up eP 03 17 49

i 03 17 51.0

microns sec

P Z' 0.2 1.5

" 23 Ki eP 07 46 16

" 23 Up iP 12 58 16.8 D

Ki iP 12 59 25

" 23 Gb iPKP 14 58 47.3

South of Fiji Islands

(h = 300 km).

" 24 Up eP 03 03 56

Ki iP 03 04 08.8

Sk eP 03 03 46

Um iP 03 04 08.9

Near coast of Venezuela

(h = 70 km).

" 24 Up iP 04 03 23.4

Sk iP 04 04 10.5

Gb i(P) 04 02 47

Um eP 04 04 13

Ka iP 04 02 48.6

Corfou Island.

" 24 Ki iP 09 41 46.1 C

Um iP 09 41 45.9

Java Sea (h = 490 km).

" 24 Um iPKP 12 28 24.1

i 12 28 32.4

Ka ePKP 12 28 37

Tonga Islands region

(h = 30 km).

Up = Uppsala, Ki = Kiruna, Sk = Skanstugan, Gb = Göteborg, Um = Umeå
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1963

Jan 24 Up iP 15 49 56.1
Ki iP 15 50 26
Sk iP 15 50 30.0 D
Gb iP 15 50 16.5
Um iP 15 50 07.1
Ka iP 15 49 45
Southern Iran (h = 100 km).

" 24 Up iP 22 04 45.5

" 24 Up iP 22 40 37.3
eSKS 22 51 14

microns sec

M E 2.5 18

M N 2.8 20

M Z 3.8 17

Ki iP 22 40 20.1

iSKS 22 50 54

microns sec

P Z' 0.2 1.3

SKS E 0.8 12

M E 3.6 18

M N 1.5 17

M Z 3.7 19

Sk iP 22 40 41.6 D

Gb iP 22 40 53.9

Um iP 22 40 26.6

ePP 22 44 04

eSKS 22 50 58

D = 9900 km = 89°.

Off east coast of Mindanao

(h = 70 km).

" 24 Ki iP 22 45 29.2

Um iP 22 45 35.2

(Mindanao).

" 24 Um iP 22 57 10.8

Near east coast of Mindanao

(h = 150 km).

" 24 Ki iP 23 34 52.6

Near east coast of Mindanao

(h = 150 km).

" 24 Um e(P) 23 55 50

" 25 Um iP 00 00 20.6

" 25 Um iPKP 00 35 02.4 C

Loyalty Islands region

(h = 140 km).

" 25 Up iP 13 02 06.9

ipP 13 02 58.9

1963

Jan 25 Up i 13 03 05.4
cont. Ki iP 13 01 37.9 C
ipP 13 02 30.6
Sk iP 13 02 04
ipP 13 02 59.9
Gb iP 13 02 23.6
Um iP 13 01 50.2 C
i 13 02 36.4
Ka iP 13 02 20.5

Mariana Islands region.

h = 220 km (Up, Ki, Sk).

" 25 Up iP 13 12 50.2
Rat Islands, Aleutian
Islands (h = 30 km).

" 25 Up iP 20 31 13.9

" 26 Up i 03 30 57.0

iSg 03 31 03.7

Ki iPg 03 28 16.9

i 03 28 30.1

iSg 03 29 00.7

D = 320 km = 2.9°.

Sk iPn 03 28 11.2

i 03 28 34.5

iSg 03 28 57.2

Um ePn 03 28 24

iPg 03 28 37.0

iSn 03 29 07.5

iS* 03 29 22.2

iSg 03 29 33.0

D = 430 km = 3.9°.

West coast of Norway, 66.6°N,

13.6°E. Origin time = 03 27 22.

" 26 Ki iP 04 00 36.7

Um iP 04 01 11.2

Jan Mayen Island region

(h = 30 km).

" 27 Up iP 01 18 47.5 D

ipP 01 19 00.5

microns sec

P Z' 0.1 0.6

M E 2.2 17

M N 2.4 20

M Z 2.9 18

Ki iP 01 18 19.6 D

ipP 01 18 32.7

Sk iP 01 18 48.3 D

ipP 01 19 01.5

Gb iP 01 19 06.7 D

ipP 01 19 22.1

Um iP 01 18 30.5 D

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

1963

Jan 27 Um iP 01 18 43.3
cont. Ka iP 01 19 03.7
iP 01 19 18.9
Ryukyu Islands. h = 60 km
(Up, Ki, Sk, Gb, Um, Ka).
" 27 Up iP 11 58 23.1
Ki iP 11 57 05.6
Gb iP 11 57 54.5
Um iP 11 57 12.9
iPcP 11 58 07.5
Gulf of Alaska (h = 90 km).
" 27 Gb iP 12 15 22.9
" 27 Up iP 15 35 50.5
Ki iP 15 35 12.1
Um iP 15 35 34.0
Idaho, U.S.A. (h = 30 km).
" 27 Up iP 15 49 58.8
Ryukyu Islands
(h = 110 km).
" 27 Up iP 19 40 56.6
i 19 41 17.2
eS 19 45 34
iSn 19 46 01.1
iLg1 19 49 03
eLg2 19 49 59
microns sec
P Z' 0.3 0.5
S N 2.1 6
M E 9.3 21
M N 4.7 18
M Z 15 22
D = 3000 km = 27.0
Ki iP 19 41 31.2
i 19 41 45.7
iS 19 46 33
iSn 19 47 30
e 19 47 43
e(SS) 19 48 19
microns sec
P Z' 0.7 1.0
S E 1.7 5
S N 1.6 8
M E 7.4 18
M N 4.5 18
M Z 14 18
D = 3450 km = 31.0
Sk iP 19 41 32.6
iPP 19 42 39.9
iSn 19 47 31
i 19 49 33.8
Gb iP 19 41 13.4

1963

Jan 27 Gb i 19 41 39.1
cont. iSn 19 46 45.7
Um iP 19 41 07.4
eS 19 45 48
iSn 19 46 38.1
iLg1 19 50 19
iLg2 19 50 48
D = 3150 km = 28.1
Ka iP 19 40 52.0
iSn 19 45 54.4
Caspian Sea (h = 30 km).
Magn. = 6.1 (Up, Ki).
The phase denoted Sn and preliminary interpreted in this way is an extremely clear phase in all short-period records, and to our knowledge observed at so large distances for the first time. Its velocity in km/sec is: 4.64 (Up), 4.69 (Ki), 4.72 (Sk), 4.65 (Gb), 4.63 (Um), 4.64 (Ka), i.e. in average 4.66 km/sec. The extremely homogeneous structure of the Russian platform may favour the propagation of Sn to large distances.

" 28 Up iP 04 16 32.8
microns sec
M E 2.4 18
M N 1.9 19
M Z 1.3 20
Ki iP 04 16 02.8 C
microns sec
M E 2.6 20
M N 1.4 19
M Z 1.4 18
Gb iP 04 16 53.3
Um iP 04 16 10
Near south coast of Hokkaido, Japan (h = 30 km).
Magn. = 5.6 (Up, Ki).

" 28 Up i(P) 06 46 02.5
" 28 Ki iP 09 32 06.6
" 28 Ki iP 11 26 43.6
" 28 Up ePP 12 31 30
iS 12 38 58.3
ePS 12 41 08
e 12 48 56

460
5

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

1963

Jan 28 Up eSSS 12 51 20
cont. (D = 12300 km = $110\frac{1}{2}^\circ$).

Ki ePP 12 30 59
microns sec
PP Z 1.8 5
Um iPKP 12 30 51.3
ePP 12 31 08
i 12 37 04
eSKS 12 37 20
iS 12 38 47
ePS 12 40 36
iSS 12 46 39
(D = 12000 km = 108°).
New Britain (h = 30 km).

" 28 Up iP 13 11 34.3 C
iP'P' 13 40 13
microns sec
P N 0.8 1
P Z 1.1 1
P Z' 1.2 0.8
M E 22 18
M N 59 26
M Z 57 26
Ki iP 13 10 40.1 C
microns sec
P N 2.6 5
P Z 3.7 5
P Z' 1.9 1.2
M E 20 20
M N 11 18
M Z 22 18
Sk iP 13 11 09.0 C
i 13 11 27.8
Gb iP 13 11 47.3 C
eP'P' 13 39 58
Um iP 13 11 07.5 C
iP'P' 13 40 20
Ka iP 13 11 57.4 C
e(P'P') 13 40 14
Alaska (h = 30 km).
Magn. = 6.9 (Up, Ki).

" 28 Up iPKP 14 08 38.5
Gb iSKP 14 11 35.8
Um iPKP 14 08 32.2
Fiji Islands (h = 590 km).

" 28 Ki i(P) 14 30 37.7

" 28 Up iP 15 01 11.1
microns sec
M E 1.9 20
M N 2.0 20
M Z 1.9 20

1963

Jan 28 Ki iP 15 01 43.8
cont. microns sec

M E 1.5 18
M N 1.9 20
M Z 3.7 19

" 28 Up iPKP 16 27 04.6
i 16 27 10.6
microns sec
PKP Z' 0.1 0.5
Ki iPKP 16 26 45
Sk iPKP 16 26 59.5 C
Gb iPKP 16 27 11.4
i 16 27 22
Um iPKP 16 26 52.5 C
Ka iPKP 16 27 13.1
Kermadec Islands (h = 30 km).

" 28 Up iPKP 17 24 39.6
Sk iPKP 17 24 29.1 C
Gb iPKP 17 24 43.0
Um iPKP 17 24 24.3 C
Kermadec Islands (h = 180 km).

" 29 Gb eP 07 39 40
Indian Ocean (h = 30 km).

" 29 Up iP 08 12 44.1
Um iP 08 12 20.3 D
i 08 12 32.9
Off coast of Honshu, Japan
(h = 25 km).

" 29 Up iP 09 31 44.2 C
iP 09 32 16.6
isS 09 40 57
microns sec
P Z 0.8 1
P Z' 0.3 0.5
M E 1.4 18
M N 2.5 18
M Z 2.3 18
(D = 7100 km = 64°).

Ki iP 09 30 53.2 C
microns sec
P Z' 0.5 0.6
M E 2.7 20
M N 1.6 20
M Z 3.5 20

Sk iP 09 31 29.7 C
Gb iP 09 32 04.8 C
i 09 32 29.2
i 09 35 06
Um iP 09 31 16.8 C
ePP 09 33 29
i 09 35 06

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

1963

Jan 29 Um iS 09 39 21
cont. (D = 6650 km = 60°).
Ka iP 09 32 08.4 C
Kurile Islands.
h = 140 km (Up).
Magn. = 6.4 (Up, Ki).

" 29 Um i(P) 12 04 13.2
" 30 Up iP 04 50 40.0 C
Ki iP 04 49 45.9 C
Sk iP 04 50 14.9 C
Gb iP 04 50 53.1 C
Um iP 04 50 13.3 C
i 04 50 21.7
Alaska (h = 30 km).

" 30 Up iP 09 39 54.5

" 30 Up iPKP 10 28 52.4
i 10 28 56.7
eSKS 10 35 52
iSKKS 10 37 22
ePKKP 10 38 57
iPS 10 40 21
eSS 10 46 41
microns sec
PKP Z' 0.1 0.7
SKS E 0.6 5
SKS N 2.5 10
M E 16 24
M N 45 21
M Z 27 21
(D = 13350 km = 120°).

Ki iPKP 10 29 06.6
e 10 32 25
eSKKS 10 38 00
iPS 10 41 29

microns sec
PKP Z' 0.6 1.4
M E 18 18
M N 10 18
M Z 24 18

Sk iPKP 10 28 58.4
Gb ePKP 10 28 48

iPP 10 30 09.5
Um iPKP 10 29 00.4

i 10 29 06.4
ePP 10 30 48

Ka iPKP 10 28 50.3
Sandwich Islands region
(h = 30 km).

Magn. = 7.1 (Up, Ki).

" 30 Up iP 10 42 58.9
i 10 43 07.5

1963

Jan 30 Ki iP 10 43 00.1
cont. Sk iP 10 43 21.3
Um iP 10 42 55.3
Ka iP 10 43 04.0
India-Nepal border
(h = 60 km).

" 30 Ki e(P) 10 59 08

" 30 Ki iP 11 04 17.7

" 30 Up iPKP 19 54 05.3
Sk iPKP 19 54 01.5
Um iPKP 19 53 54.6

" 30 Up iP 20 34 46.3 C
microns sec
P Z' 0.1 0.5

" 31 Ki iP 03 18 38.3
i 03 18 43.1
Sk iP 03 19 04.6
Um iP 03 19 08.4
Alaska (h = 60 km).

" 31 Ki e 04 47 19
eSn 04 47 38
iSg 04 47 55.2
D = 360 km = 3.2°.
Sk eSn 04 48 09
eSg 04 48 34
D = 490 km = 4.4°.
Um iPn 04 47 32.5
eSg 04 49 06
D = 600 km = 5.4°.
Off west coast of Norway,
near Lofoten, 68.2° N, 12.0° E.
Origin time = 04 46 08

" 31 Up iP 05 18 26.4
i(pP) 05 18 53
ePP 05 21 17
ePa 05 23 09
eS 05 28 05
eSa 05 37 16
e 05 39 39

microns sec

P Z 1.2 5

P Z' 0.1 1.0

S E 0.9 10

S N 0.7 12

M E 32 16

M N 23 20

M Z 49 18

D = 8350 km = 75°.

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

1963

Jan 31 Ki iP 05 17 59.5
cont. i(pP) 05 18 19.6
ePa 05 22 23
eS 05 27 18
microns sec
P E 0.7 7
P Z 1.8 8
S E 2.1 10
S N 0.6 7
M E 16 16
M N 10 15
M Z 20 16
D = 7900 km = 71°.
Sk eP 05 18 39
Gb iP 05 18 48.0
i(pP) 05 19 13.0
Um eP 05 18 09
i(pP) 05 18 30.8
ePa 05 22 32
eS 05 27 35
eSS 05 32 25
D = 8050 km = 72°.
Ka iPP 05 21 39.9
Ryukyu Islands. h = 90 km
(Up, Ki, Um, Gb)
Magn. = 6.1 (Up, Ki).
" 31 Ki iP 09 36 46.0
" 31 Ki i(P) 09 54 53.4
" 31 Up iP 11 38 13.9
Ki iP 11 37 19.5
Um iP 11 37 47.1
Alaska (h = 30 km).
" 31 Ki e(Sn) 13 21 02
i(Sg) 13 21 18.5
" 31 Up iP 15 12 14.3 C
iS 15 16 34.0
microns sec
P Z' 0.1 0.5
M E 0.3 18
M N 0.9 21
M Z 0.6 20
D = 2650 km = 24°.
Ki iP 15 13 25.5 C
microns sec
P Z' 0.1 1.0
M E 0.9 15
M N 0.4 15
M Z 0.8 15
Sk iP 15 12 52.3 C
Gb iP 15 12 02.0

1963

Jan 31 Um iP 15 12 49.7
cont. Ka iP 15 11 36.3 C
Ionian Sea (h = 30 km).
" 31 Up iP 17 11 45.9
i 17 12 03.3
iSn 17 16 56.6
iLg1 17 20 21
iLg2 17 20 59
D = 3000 km = 27°.
Ki iP 17 12 20.4 D
i 17 16 33.9
iSn 17 18 43.7
microns sec
P Z' 0.1 0.8
D = 3450 km = 31°.
Sk iP 17 12 21.3 D
Gb eP 17 11 55
i 17 12 28.8
Um iP 17 11 56.5 D
iSn 17 17 26.8
Ka iP 17 11 39.9
Caspian Sea (h = 30 km).
The phases denoted Sn have
the following velocities,
km/sec: 4.59 (Up), 4.54
(Ki), 4.64 (Um). They are
clearly recorded only by
short-period seismographs.
Compare remark to earthquake
on Jan. 27, 1963, 19 40.
" 31 Up iP 18 54 51
Ki iP 18 54 01.9
Um iP 18 54 28.7 C
Fox Islands, Aleutian Islands
(h = 30 km).
" 31 Up iP 19 20 42
Ki iP 19 19 55.6 C
Um iP 19 20 21.4
Bering Sea (h = 50 km).
" 31 Ki e(P) 20 10 24
" 31 Ki iP 20 34 38.1

Markus Bath
May 21, 1963

P R E L I M I N A R Y

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

NOTES: We are using the notation i and e in the same sense as we have always done, i.e. i = time error less than $\frac{1}{2}$ sec, e = time error greater than $\frac{1}{2}$ sec.

Geographical names indicate only the region of the epicenter.

F E B R U A R Y 1 - 28, 1963

1963				1963			
Feb				Feb			
1	Ki	eL	08 33	2	Up	iP	16 54 30.8 C
			microns sec				
	M	E	0.7 20	2	Up	iP	18 12 08.2
	M	N	0.3 19			Aleutian Islands	
	M	Z	0.6 19			(h = 30 km).	
"	1	Up	iPKP	"	2	Gb	iP
		i	09 08 57.4				18 43 54.2
			09 09 02.0	"	2	Up	iP
	Sk	iPKP	09 08 47.9				19 44 12.7
	Um	iPKP	09 08 42.8 D			Cayman Islands	(h = 70 km).
			Kermadec Islands	"	2	Um	eP
			(h = 50 km).				21 38 25
"	1	Ki	iP				Guatemala (h = 30 km).
			11 23 19.6 C	"	2	Up	i(P)
"	1	Up	iP				22 38 35.2 C
		Sk	eP	"	3	Gb	iPKP
		Um	iP				02 06 41.3
			13 47 49.8			Um	iSKP
			13 48 47				02 09 11.3
			13 47 00.5			Fiji Islands	(h = 500 km).
"	1	Ki	iP	"	3	Up	iP
			15 20 03.6 C				02 21 01.6
"	1	Ki	iP				(Greece).
			15 42 35.6 C	"	3	Up	iP
"	2	Up	iP				13 04 38.8
			04 41 17.5			Ki	iP
"	2	Ki	i(P)				13 04 42.8 C
			09 53 01.2			Sk	iP
"	2	Um	iP				13 04 25.8
			10 13 24.8			Um	iP
							13 04 43.8 C
						Venezuela-Colombia	
						(h = 30 km).	

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

1963						1963					
Feb	3	Up	iP	14 26 54.0		Feb	5	Um	iP	05 16 44.6	
"	3	Up	iP	14 30 35.6		cont.				Mariana Islands (h = 40 km).	
		Ki	iP	14 29 13.7		"	5	Up	iP	09 42 29.3	
		Um	eP	14 29 54				Ki	iP	09 42 26.5 D	
				Greenland (h = 30 km).				Sk	iP	09 41 59.2 D	
"	4	Ki	iPKP	01 35 30.8		"	5	Um	iP	11 53 16.0 C	
		Um	iPKP	01 35 35.5 C		"	5	Up	iP	12 19 10.5	
				New Britain (h = 40 km).				Ki	iP	12 18 16.3 C	
"	4	Up	iP	05 22 07.7				Sk	iP	12 18 46.7 C	
		Ki	eP	05 22 42				Gb	iP	12 19 24.5	
		Sk	iP	05 22 48				Um	iP	12 18 43.6 C	
		Um	iP	05 22 19.3						Aleutian Islands (h = 30 km).	
				Southern Iran (h = 30 km).		"	5	Up	iPKP	14 22 53	
"	4	Up	iP	07 25 47.1				Um	iPKP	14 22 36.7 D	
		Ki	iP	07 26 20.1 C						Kermadec Islands (h = 140 km).	
		Sk	iP	07 26 18.6		"	5	Up	iPKP	19 49 12.4 C	
		Um	eP	07 25 58				i		19 49 18.9	
				Southern Iran (h = 30 km).						microns sec	
"	4	Um	iP	13 04 50.3 C				PKP	Z'	0.1 0.8	
"	4	Ki	eP	15 45 43				Ki	ePKP	19 48 50	
								Sk	iPKP	19 49 05.5	
"	4	Ki	iP	16 26 39.0				Gb	ePKP	19 49 18	
		Um	iP	16 26 49.8				Um	iPKP	19 49 00.0 C	
				Ryukyu Islands (h = 30 km).						Kermadec Islands (h = 70 km).	
"	4	Up	iP	23 31 05.6		"	5	Up	iPKP	20 58 11.8	
		Ki	iP	23 30 33.4				e		21 11 04	
		Sk	iP	23 31 02.2				i		21 11 13	
		Um	iP	23 30 47.2				iSS		21 16 35	
"	4	Up	iP	23 31 51.1 C						microns sec	
		iPcP		23 32 23.4				M	E	8.0 20	
				microns sec				M	N	6.1 19	
		P	Z'	0.5 0.5				M	Z	11 20	
		Ki	iP	23 31 01.5 C				Ki	iPKP	20 58 20.1	
		iPcP		23 31 49.0				iPP		21 00 17	
				microns sec				e(SKP)		21 01 36	
		P	Z'	0.2 0.7				ePS		21 10 11	
		M	E	0.8 17				iSS		21 17 29	
		M	N	0.2 16						microns sec	
		Sk	iP	23 31 37.2				PP	Z	1.7 5	
		iPcP		23 32 14.8				(SKP)	E	0.8 9	
		Gb	iP	23 32 11.1				M	E	8.2 20	
		Um	iP	23 31 24.2 C				M	N	3.2 18	
		eS		23 39 46				M	Z	8.0 20	
		Ka	iP	23 32 18.9						(D = 14100 km = 127°).	
				Kurile Islands (h = 90 km).				Um	iPKP	20 58 17.4	
"	5	Um	iP	02 00 56.6				iPP		21 00 10	
				Celebes (h = 160 km).				i(SKP)		21 01 31	
"	5	Ki	eP	05 16 30				e		21 02 36	
								i		21 08 16	
										(D = 14000 km = 126°).	
										Chile (h = 40 km).	
										Magn. = 6.7 (Up, Ki).	

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

1963	Feb	6	Up	i	01 53 27		1963	Feb	6	Ki	iPKP	21 05 46.9
					microns sec						Sandwich Islands	
			M	E	3.4 20						(h = 30 km).	
			M	N	2.8 20							
			M	Z	3.9 20		"	6	Um	i(P)	21 48 31.0	
		Ki	eSS		01 59 31							
					microns sec		"	7	Um	iP	01 43 34.9	
			M	E	2.9 20							
			M	N	1.9 20		"	7	Up	eP	09 46 45	
			M	Z.	2.8 20							
		Um	ePKP		01 40 25		"	7	Up	iP	12 56 24.2	
			iPKKS		01 54 05							
			eSS		01 59 10		"	7	Ki	iP	16 54 27.3	
									Um	iP	16 54 11.0	
										Gulf of Aden (h = 30 km).		
					Chile (h = 30 km).							
					Magn. = 6.2 (Up, Ki).							
"		6	Up	iP	02 09 25.7		"	7	Up	iP	17 23 56.3	
			Ki	iP	02 09 16.3							
					Flores Sea (h = 310 km).		"	7	Gb	iPKP	17 28 06.7	
									Um	iPKP	17 27 46.7	
"		6	Up	iP	03 40 16.1						Kermadec Islands	
			Ki	iP	03 40 19.8						(h = 30 km).	
			Sk	eP	03 40 04							
			Um	iP	03 40 21.6 C		"	7	Ki	iP	17 48 34.1	
					Colombia-Venezuela				Um	iP	17 48 52.2	
					(h = 110 km).					Luzon (h = 150 km).		
"		6	Um	iPKP	06 12 10.3		"	7	Up	iP	17 57 55.6	
					Fiji Islands (h = 500 km).				i		17 58 00.2	
"		6	Ki	iP	07 14 32.7 C		"	7	Up	i(P)	19 50 02.6	
			Sk	iP	07 14 21.2							
			Um	iP	07 14 37.0		"	7	Up	i(P)	21 20 18.9	
					Panama (h = 60 km).							
"		6	Up		-		"	8	Up	iPKP	02 48 18.9	
					microns sec				Gb	iPKP	02 48 27.2	
			M	E	1.7 18					Kermadec Islands		
			M	N	1.1 18					(h = 190 km).		
			M	Z	2.9 18		"	8	Up	iP	03 18 18.0	
		Ki			-							
					microns sec		"	8	Up	iP	10 12 35.5	
			M	E	1.2 21				Ki	iP	10 11 41.6 D	
			M	N	0.6 16				Sk	iP	10 12 18.3	
			M	Z	1.9 19				Um	iP	10 12 06.9	
		Um	eSS		10 54 27					Kamchatka (h = 30 km).		
					Bismarck Sea (h = 30 km).		"	8	Um	iP	11 46 09.4	
"		6	Um	e(P)	15 56 40		"	8	Ki	e(P)	15 56 30	
"		6	Up	iP	18 27 29.4		"	8	Um	e(P)	18 06 39	
			Ki	iP	18 26 34.9							
			Sk	iP	18 27 23.8 C		"	8	Up	iSKP	18 38 30.8	
			Gb	iP	18 27 49.1 C					New Hebrides Islands		
			Um	eP	18 27 01					(h = 630 km).		
			Ka	iP	18 27 54.							
					Komandorskie Islands							
					(h = 30 km).							

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

1963

Feb 8 Up iP 22 41 21.8
i 22 41 42.9
Um iP 22 40 55.0
Kurile Islands (h = 60 km).

"	9	Up	iP	04 04 28.3	
			i	04 04 31.1	
			i	04 04 36.5	
				microns	sec
		M	E	1.3	17
		M	N	0.7	18
		M	Z	0.8	17
	Ki	iP		04 03 50.0	
				microns	sec
		M	E	1.3	15
		M	N	1.2	17
		M	Z	1.2	15
	Sk	iP		04 04 24.3	D
	Gb	iP		04 04 53	
	Um	iP		04 04 06.9	D
		eS		04 12 54	
	Japan (h = 30 km).				

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"      9      Ki      iPn      05 39 48
              iSn      05 40 42.1
              iSg      05 41 05.9
              D = 500 km = 4.5°
      Sk      eSg      05 43 35
      Um      iSn      05 41 28.1
              iS*      05 41 43.7
              iSg      05 42 03.0
              D = 700 km = 6.3°
      Northwest Russia, 68.2°N,
      31.6°E. Origin time = 05 38 37.
      Explosion?

```

"	9	Up	iP	08 10 51.4
				microns sec
		P	Z'	0.1 0.8
		Ki	iP	08 10 06.6
		Sk	eP	08 10 30
		Gb	iP	08 11 08.6
		Um	iP	08 10 25.2
		Aleutian Islands		
		(h = 30 km).		

" 9 Up iSKP 08 58 29.4
Um iPKP 08 55 12.7
New Hebrides Islands
(h = 130 km).

" 9 Up iP 12 01 14.2 C

"	9	Up	eP	16	13	50
		Ki	iP	16	13	41.4
		Sk	eP	16	14	09
		Um	iP	16	13	43

1963

Feb 9	Up	iP	16	16	12	
		iPcP	16	16	40.7	
	Ki	iP	16	15	27.2	C
		i	16	15	37.0	
	Sk	iP	16	16	02.2	
	Gb	iP	16	16	32.3	C
	Um	iP	16	15	45.7	
		i	16	15	58.5	
Kurile Islands						
(h = 30 km).						

" 9 Um ePKP 17 14 32
New Zealand (h = 170 km).

"	9	Up	iP	17	24	40.2
		Gb	iP	17	24	46.7
		Um	iP	17	25	12.9

" 9 Gb iPKP 17 26 34.1
South of Fiji Islands
(h = 550 km).

" 9 Um iPKP 23 20 33.0
Tonga Islands
(h = 70 km).

" 10	Up	iP	05	21	39.9
	Ki	eP	05	20	52
	Um	iP	05	21	14.2
	Aleutian Islands				
	(h = 30 km).				

"	10	Ki	iP	05	25	25.4
.		Um	i(P)	05	26	37.5

" 10	Up			
			microns	sec
	M	E	0.6	15
	M	N	0.3	14
	M	Z	0.3	10
Ki	eP		06 56	15
	i		06 58	19.0
			microns	sec
	M	E	0.5	14
	M	N	0.3	12
	M	Z	0.5	10

Um iP 06 56 33.8
Lake Baikal (h = 25 km).

" 10 Up iP 12 11 40.5 C
Um iP 12 11 16.5 C
Japan (h = 50 km).

" 10 Up eP 12 50 55

"	10	Up	iP	15	11	13.5
		Ki	iP	15.	11	20.9

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

1963
Feb 10 Sk iP 15 10 48.9 C
cont. Gb e(P) 15 10 54
Um iP 15 11 20.3
North Atlantic Ocean
(h = 40 km).
" 10 Ki iP 15 26 47.4
" 10 Um iP 16 46 40.1
" 10 Um iP 17 54 42.7
Hindu Kush (h = 120 km).
" 10 Up e(P) 21 15 36
" 10 Up iP 21 46 43.7 C
microns sec
P Z' 0.1 0.5
Ki iP 21 45 57.5
Sk iP 21 46 33.8
Gb iP 21 47 05
Um iP 21 46 18.8
Kurile Islands (h = 70 km).
" 11 Up iPKP 04 55 13.6
i 04 55 17.6
microns sec
PKP Z' 0.1 0.5
Sk iPKP 04 55 07.1
Gb iPKP 04 55 22.0
Um iPKP 04 55 01.9
Kermadec Islands
(h = 530 km).
" 11 Ki iP 06 28 26.5
Um iP 06 28 21.5
" 11 Um eP 08 25 06
i 08 25 17.1
" 11 Ki eP 12 57 17
" 11 Ki iP 14 34 22.5 C
Um iP 14 35 36.8 C
" 11 Um iP 15 14 24.5
Alaska (h = 30 km).
" 11 Up e(P) 21 30 25
Sk e(P) 21 30 10
" 12 Up iP 00 38 41.3 C
i 00 38 58.7
Ki iP 00 38 19.4 C
Gb eP 00 39 00

1963
Feb 12 Um eP 00 38 24
cont. Luzon (h = 30 km).
" 12 Um eP 04 53 08
" 12 Up i(P) 05 55 35.0
" 12 Ki iPn 06 29 51.7
iSn 06 30 45
D = 500 km = 4.5°
Um iSn 06 31 32.2
iSg 06 32 11.3
D = 710 km = 6.4°
Northwest Russia, 68.3°N,
31.6°E. Origin time =
06 28 40. Explosion?
" 12 Ki iP 09 35 47.7
iSg 09 36 23.2
" 12 Ki e(P) 14 04 18
" 12 Ki iP 21 45 13.0
Um eP 21 45 48
e 21 45 58
" 12 Up iPKP 23 25 33.3
Ki iPKP 23 25 30.0 C
Ki iSKP 23 27 57.6
Sk ePKP 23 25 33
iSKP 23 28 15.9
Gb iPKP 23 25 43.3
Um ePKP 23 25 28
e 23 25 37
eSKP 23 28 11
Ka iPKP 23 25 52
Fiji Islands (h = 580 km).
" 13 Ki iP 00 26 22.5
" 13 Sk iP 00 35 12.2
Um iP 00 35 27.4
Guatemala (h = 120 km).
" 13 Up iP 01 44 11.4
i 01 44 19.5
Ki iP 01 44 44.1
Sk iP 01 44 42.1
i 01 44 51.8
Gb iP 01 44 19.9
Um iP 01 44 24.4
i 01 44 34.7
eS 01 52 23
Ka iP 01 44 06.3
Arabian Sea (h = 30 km).

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

1963

Feb 13 Up iP 01 58 08.1
i 01 58 19.6

" 13 Up iP 03 14 19.7 D
Ki iP 03 14 54.4
Sk iP 03 14 54.0
Um iP 03 14 32.2
i 03 17 07.3
Ka iP 03 14 13.9
Southern Iran (h = 30 km).

" 13 Um eP 03 40 06

" 13 Ki i(P) 04 29 07.5

" 13 Ki i(P) 05 13 24.1

" 13 Ki iPn 05 43 14.1
iSn 05 44 09.1
D = 510 km = 4.6°.
Sk eSg 05 46 58
Um eSn 05 44 54
iSg 05 45 31.3
i 05 45 41.8
D = 710 km = 6.4°.
Northwest Russia, 68.2°N,
31.8°E. Origin time = 05 42 01.
Explosion?

" 13 Ki e 08 21 44
iSn 08 21 59.9
Um iSg 08 23 28.8
Same area as for preceding
event. Explosion?

" 13 Up iP 09 01 46.9 C
iPP 09 04 40
i 09 05 23.3
iPa 09 06 32.7
i 09 08 00
iS 09 11 25
microns sec
P E 4.7 5
P N 3.0 5
P Z 10 5
P Z' 0.4 0.5
PP E 1.3 4
PP Z 3.8 7
S N 12 10
M E 550 18
M N 330 18
M Z 560 18
D = 8450 km = 76°.
Ki iP 09 01 23.2 C
i(PP) 09 03 55
iPP 09 04 02.7

1963

Feb 13 Ki iPa 09 05 47
cont. iS 09 10 38
iScS 09 11 36
microns sec
P E 6.2 6
P N 1.2 7
P Z 15 7
P Z' 12 2.9
PP E 3.8 4
PP Z 6.6 8
PP Z' 2.5 2.4
S E 18 12
S N 8.2 10
M E 106 13
M N 130 19
M Z 200 20
D = 8000 km = 72°.
Sk iP 09 01 50.8 C
i 09 02 58.1
Gb iP 09 02 07.1 C
iPP 09 05 09.2
Um iP 09 01 31.9 C
iPP 09 04 08
iPa 09 06 01
iS 09 10 54
D = 8100 km = 73°.
Ka iP 09 01 57.9 C
Northern Formosa (h = 30 km).
Magn. = 7.4(Up.Ki).
Exceptionally clear and well
developed Pa.

" 13 Up iP 09 17 06.2

" 13 Up iP 09 21 14.3
i 09 21 44.4
Ki iP 09 20 50.1
i 09 20 57.0
Sk eP 09 21 18
Gb iP 09 21 34.4
Um iP 09 20 58.3
i 09 21 06.0
iPcP 09 21 14.4
Northern Formosa.

" 13 Up iP 09 42 17.8
i 09 42 22.4
microns sec
P Z' 0.2 1.2
Ki iP 09 41 56.7
Sk iP 09 42 23.5
Gb iP 09 42 38.4
Um iP 09 42 03.3
i 09 42 06.4
Ka iP 09 42 30.0
Northern Formosa (h = 30 km).

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

1963
Feb 13 Up iP 12 49 26.4
i 12 49 38.6
microns sec
M E 0.5 10
M N 0.8 11
M Z 0.8 10
Ki -
microns sec
M E 0.9 13
M N 0.7 10
M Z 1.3 10
Sk iP 12 50 16.3
Gb eP 12 49 21
Um iP 12 50 15.3
Italy.
" 13 Up iP 15 09 28.7
" 13 Up iPKP 18 32 50.3
i 18 34 20
microns sec
M E 6.4 22
M N 7.1 23
M Z 8.2 21
Ki iPKP 18 32 39.1
ePP 18 33 45
ePKKP 18 43 12
microns sec
PP E 1.3 3
PP N 0.6 5
PP Z 1.2 8
M E 13 20
M N 8.4 19
M Z 21 21
(D = 13000 km = 117°).
Sk iPKP 18 32 49.6
Gb iPKP 18 32 59.6
Um iPKP 18 32 41.2
i 18 32 45.3
iPP 18 34 01
Ka iPKP 18 32 57
Solomon Islands(h = 30 km).
Magn. = 6.8 (Up, Ki).
" 13 Up e(P) 18 45 03
i 18 46 02.2
" 13 Up eP 19 13 52
i 19 13 58.3
Ki iP 19 13 27.5
Sk eP 19 13 57
Um iP 19 13 36.2
Northern Formosa
(h = 30 km).
" 13 Up iP 20 05 18.3

1963
Feb 13 Ki eP 20 05 57
cont. Sk iP 20 05 45.9
Gb iP 20 05 26.5
Um iP 20 05 29.3 C
i 20 05 43.0
Ka eP 20 05 11
Socotra region (h = 30 km).
" 13 Up i(P) 20 52 32.7
" 13 Up i(P) 23 45 25.1
" 14 Up iP 01 40 44.3
" 14 Up iP 02 10 21.8
" 14 Ki iP 07 14 46.2 D
microns sec
P Z' 0.3 1.9
Sk iP 07 15 20.4
Um iP 07 15 14.8 D
" 14 Up iP 07 18 33.4
i 07 18 36.3
i 07 21 46.1
i 07 21 53.7
i(PKP) 07 22 45.2
e 07 25 21
ePS 07 32 27
e 07 33 12
microns sec
M E 4.0 21
M N 4.9 21
M Z 3.2 20
(D = 11900 km = 107°).
Ki iP 07 18 20.4 C
i 07 18 27.0
e 07 21 23
iPP 07 22 41.8
iSKS 07 28 42
iPS 07 31 47
iPKKP 07 34 22.0
eSS 07 37 19
microns sec
P Z' 0.2 1.4
SKS E 0.9 6
SKS Z 1.2 4
M E 5.5 20
M N 3.5 19
M Z 4.4 17
(D = 11550 km = 104°).
Sk iP 07 18 40.4
i 07 18 49.2
e 07 22 19
iPKP 07 22 34.7
i 07 22 55.5

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

1963

Feb 14
cont.

Sk iPKKP 07 33 59.6
(D = 12000 km = 108°).
Gb iP 07 18 51.2
i 07 22 21
iPP 07 23 32.2
(D = 12200 km = 110°).
Um iP 07 18 24.5 C
i 07 18 31.5
e 07 21 32
iPP 07 22 44.3
i 07 23 09.9
iSKS 07 28 59
iS 07 30 01
(D = 11650 km = 105°).
Ka iP 07 18 39
iPP 07 23 13
i 07 23 30.3
(D = 12100 km = 109°).
Banda Sea (h = 200 km).

" 14 Ki iP 07 29 09.0

" 14 Up i(P) 10 54 56.3

" 14 Um i(P) 10 58 06.7

" 14 Um i(P) 11 43 08.4

" 14 Up iP 12 20 16.0
i 12 20 25.8
eS 12 29 23
eScS 12 30 22

microns sec

P Z' 0.1 1.2

S N 0.3 5

M E 3.5 24

M N 1.8 18

M Z 3.7 19

D = 7650 km = 69°.

Ki iP 12 20 53.6

eSS 12 35 27

microns sec

P Z' 0.3 1.5

M E 2.2 20

M N 1.7 19

M Z 4.2 20

Sk iP 12 20 21.6

Gb iP 12 19 54.7

Um iP 12 20 37.1

eS 12 30 05

Ka iP 12 19 58.7

Mid-Atlantic Ocean

(h = 30 km).Magn. = 5.8(Up.Ki).

1963

Feb 14

Up iP 12 52 29.3
Sk eP 12 53 10
Um iP 12 53 11.8
Ka iP 12 51 48.8
Albania (h = 30 km).

" 14 Up iP 13 22 37.4
iLg1 13 27 29.8
eLg2 13 27 45
eRg 13 28 57

microns sec

Z' 0.2 0.5

Ki iP 13 24 05.2

eRg 13 33 37

microns sec

M E 0.5 10

M N 1.0 10

M Z 1.4 11

Sk iP 13 23 19.3 C

Gb iP 13 22 05.5

iLg2 13 26 21.0

Um iP 13 23 23.8 C

iS 13 27 11.7

Ka iP 13 21 44.6 C

i 13 25 34.5

Yugoslavia (h = 40 km).

" 14 Um iP 13 54 44.8

" 14 Up iP 14 21 51.6

i 14 22 04.4

i 14 22 14.8

Ka i(P) 14 23 12.1

" 14 Up iP 17 25 19.5

Ki iP 17 26 02.9

" 14 Um iP 18 03 09.4

i 18 03 16.3

" 14 Um iP 22 06 43.2

" 14 Up iPKP 22 26 22

iPP 22 27 25

eSP 22 36 32

microns sec

M E 2.8 22

M N 3.2 24

M Z 4.0 24

(D = 12550 km = 113°).

Ki eP 22 22 14

i(PKP) 22 26 24.4

eSKS 22 32 35

eSP 22 35 53

microns sec

SKS E 1.0 10

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

1963

Feb 14 Ki microns sec
cont. M E 4.0 21
M N 3.3 25
M Z 7.0 25
(D = 12000 km = 108°).
Sk iPKP 22 26 21.8
Gb ePKP 22 26 26
Um iPKP 22 26 15.8
iPP 22 26 44.7
iSKS 22 32 40
eSP 22 36 04
ePS 22 36 19
(D = 12200 km = 110°).
Ka iPP 22 27 45
Eastern New Guinea
(h = 80 km).

" 15 Up iPKP 01 08 37.7
microns sec
PKP Z' 0.1 0.6
Ki iPKP 01 08 18.9
Sk iPKP 01 08 32.9
Gb iPKP 01 08 46.4
Um iPKP 01 08 26.1
i 01 08 33.5
Ka ePKP 01 08 59
Kermadec Islands(h = 40 km).

" 15 Ki iPg 06 49 12.5
iSn 06 49 56.5
iSg 06 50 13.0
D = 500 km = 4.5°.
Um iSn 06 50 40.7
iSg 06 51 20.2
D = 710 km = 6.4°.
Northwest Russia, 68.3°N, 31.6°E.
Origin time = 06 47 48.
Explosion?

" 15 Sk iPKP 07 14 51.5 D
Um iPKP 07 14 47.0
Fiji Islands (h = 30 km).

" 15 Up iP 09 42 11.2

" 15 Up iP 10 22 51.2
microns sec
P Z' 0.1 0.9
M E 1.1 20
M N 1.4 18
M Z 1.6 20
Ki -
microns sec
M E 1.6 14
M N 0.7 13
M Z 2.4 14
Sk iP 10 23 34.7 C

1963

Feb 15 Gb iP 10 22 36.6
cont. Um iP 10 23 32.6 C
i 10 23 39.4
eS 10 27 48
Ka iP 10 22 07.1
Albania (h = 30 km).

" 15 Up iP 10 47 20.1
Sk iP 10 47 10.7
Um iP 10 47 03.5

" 15 Up i(P) 14 59 17
Local explosion?

" 15 Ki iP 15 30 35.6

" 15 Sk iP 15 58 01.6
Lake Baikal.

" 15 Up iP 16 41 29.4
i 16 41 43.7
Ki iP 16 41 30.6 C
Sk eP 16 41 44
Gb iP 16 41 44.0
Um iP 16 41 26.6
i 16 41 40.9
Ka iP 16 41 33 C
Sumatra (h = 30 km).

" 15 Up iP 20 44 24.7

" 15 Up iP 21 03 30.5
Ki iP 21 02 13.6

15 Um iP 22 49 05.1

" 16 Um i(P) 03 45 40.9
iSg 03 46 29.5

" 16 Up iP 04 18 14.4

" 16 Ki iP 05 02 29.1 C
Um iP 05 03 13.3

" 16 Ki eP 05 57 13
South of Mindanao
(h = 130 km).

" 16 Up iP 06 26 22.3
ipP 06 26 42.8
Ki iP 06 27 25.3
ipP 06 27 48.9
Sk eP 06 27 17
Gb eP 06 26 16
Um eP 06 27 09

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

1963					1963				
Feb	16	Ka	iP	06 26 05	Feb	17	Up	iP	05 45 42.3
cont.		Turkey. h = 110 km (Up,Ki).						ipP	05 46 26.7
"	16	Up	iP	06 33 29.5 C			Ki	iP	05 45 50.7
		Gb	iP	06 33 28.2			Sk	iP	05 46 07.3
		Um	iP	06 33 39.2			Um	iP	05 45 40.2
"	16	Up	iP	08 44 39.4				ipP	05 46 24.0
		Ki	iP	08 44 27.8			Ka	iP	05 45 46.4
		Um	iP	08 44 34.0			Hindu Kush. h = 220 km (Up,Um).		
		Negros, Philippine Islands			"	17	Up	iP	08 33 10.4 C
		(h = 30 km).					i		08 33 18.1
"	16	Um	iPKP	08 49 29.4 D			iS		08 37 01.2
		Fiji Islands (h = 530 km).					D = 2350 km = 21°		
"	16	Up	iPKP	11 03 08.6			Ki	iP	08 34 06.7 C
			iPP	11 03 23.7			i		08 34 23.6
		Ki	ipP	11 01 12.6			iSn		08 39 23.7
			ePKP	11 03 11			Sk	iP	08 33 55.6 C
		Um	esP	11 02 13			Gb	iP	08 33 19.7 C
			iPKP	11 03 13.3			Um	iP	08 33 35.3 C
		Flores Sea (h = 560 km).						iSn	08 38 13.3
"	16	Up	iP	12 26 52.2 C			Ka	iP	08 32 53.0 C
		eS		12 32 41			Black Sea (h = 30 km).		
				microns sec			Concerning Sn, see remark to		
		P	Z'	0.1 0.5			Jan.27,1963. 19 40		
		M	E	0.3 6	"	17	Up	iP	11 21 01.5
		M	N	0.6 7			Sk	iP	11 21 37.3 C
		M	Z	0.5 7			Gb	iP	11 20 40.0
		Ki	iP	12 27 02 C			Um	iP	11 21 41.0
				microns sec			Ka	i(P)	11 20 28.3
		P	Z'	0.4 1.3	"	17	Um	iP	13 36 56.1
		M	E	0.7 10	"	17	Up	iPKP	19 44 59.2
		M	N	0.5 14			Ki	ePKP	19 44 48
		Sk	iP	12 27 17.9 C			Gb	iPKP	19 45 09.6
			iPP	12 29 04.8			Um	iSKP	19 47 41.5
		Gb	iP	12 27 13.8			Fiji Islands (h = 520 km).		
			iPP	12 28 58.4	"	17	Up	iP	20 16 00.0
		Um	iP	12 26 51.0 C					microns sec
			isP	12 27 58.6			P		Z' 0.1 1.2
		Ka	iP	12 26 57.0 C			Ki	iP	20 17 27.3
			ipP	12 27 40.2					microns sec
		Hindu Kush. h = 210 km (Um,Ka).					P		Z' 0.1 1.3
		Magn. = 5.9 (Up,Ki).					Sk	iP	20 16 42.6
"	16	Sk	eSg	15 18 28			Gb	eP	20 15 41
"	17	Up	e(P)	01 04 13			Um	iP	20 16 45.0
"	17	Up	eP	02 43 28			Yugoslavia (h = 30 km).		
		Um	eP	02 43 21	"	17	Up	e(P)	22 11 29
		Ryukyu Islands (h = 30 km).			"	17	Um	iP	22 36 12.5
					"	18	Um	i(P)	03 28 31.1

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

1963

Feb 18 Up i(P) 04 32 09.5

" 18 Ki e(Sg) 05 20 30

Sk i(Sg) 05 21 50.4

" 18 Ki iPn 06 26 09.2

iSn 06 27 04.6

iSg 06 27 19.1

D = 460 km = 4.1°

Um iSn 06 27 49.7

iSg 06 28 29.9

D = 690 km = 6.2°

Northwest Russia, 68.6°N,

30.3°E. Origin time =

06 25 05. Explosion?

" 18 Um iP 09 12 40.4

" 18 Up iP 10 48 13.0

" 18 Um iP 11 08 15.4

" 18 Um iP 11 54 33.4

" 18 Um iP 14 31 19.7

" 18 Up iP 14 32 41.0 C

i 14 33 33.8

iSP 14 33 50.5

iPP 14 34 21.2

microns sec

P Z' 0.1 0.5

Ki iP 14 32 49.7 C

microns sec

P Z' 0.1 0.9

Sk iP 14 33 05.1

iPP 14 34 00.1

40 Gb iP 14 33 02.5

ipP 14 33 47

iPP 14 34 51.9

Um iP 14 32 39.3 C

iPP 14 34 23.1

eS 14 38 33

Ka iP 14 32 42.9

Hindu Kush. h = 220 km (Up, Gb).

Magn. = 5.7 (Up, Ki).

" 18 Sk iPKP 15 11 30

Um iPKP 15 11 09.3

Kermadec Islands (h = 30 km).

" 18 Um iP 15 14 36.1

1963

Feb 18 Up iP 15 44 30.8

" 18 Up iP 18 29 28.8 C

Ki iP 18 29 24.2

Sk iP 18 28 58.1 C

Um iP 18 29 29.0

North Atlantic Ocean

(h = 30 km).

" 18 Up iP 19 08 28.0

Ki eP 19 08 27

Sk iP 19 07 56.1 D

Gb eP 19 08 14

Um iP 19 08 26.8 D

North Atlantic Ocean

(h = 30 km).

" 18 Ki iP 22 04 26

Um iP 22 04 42.7 D

Japan (h = 320 km).

" 19 Up iP 01 06 44.7

Ki iP 01 06 45.9

Um iP 01 06 42.4 D

Sumatra (h = 90 km).

" 19 Up iP 03 21 28.0

" 19 Up iP 03 38 17.0

Ki eP 03 37 38

e 03 37 53

Gb iP 03 38 37.4

Um iP 03 38 03.7

" 19 Ki eP 12 23 13

Um iP 12 23 33.1 D

Japan (h = 30 km).

" 19 Um iP 13 03 33

" 19 Up iPKP 16 58 13.2

Ki i(PKP) 16 58 18.2

i 16 58 29.0

Um iPKP 16 58 21.5

Sandwich Islands (h = 30 km).

" 19 Up iP 18 30 51.7

i 18 31 00.4

" 19 Up iP 22 40 03.9

Sk iP 22 40 07.0

Gb iP 22 40 23.4

Formosa (h = 30 km).

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

1963
Feb 20 Ki iP 13 08 42.4 C
Um iP 13 08 50.1
" 20 Um iP 14 00 15.7
" 20 Up iP 14 11 54.0 D
" 20 Up iP 15 12 18.6 D
" 20 Um iP 15 34 18.4
" 20 Up iP 16 56 48.6
Ki iP 16 56 08.6
Sk iP 16 56 42.6
Um iP 16 56 26.1
Japan (h = 180 km).
" 20 Up iP 19 52 15.5 C
microns sec
M E 1.0 20
M N 2.4 20
Ki eP 19 51 52 C
Gb eP 19 52 36
i 19 52 51.4
Um iP 19 52 02.4
Formosa (h = 30 km).
" 21 Up iP 02 45 02.2
iPP 02 47 51.4
microns sec
P Z' 0.1 0.7
Ki iP 02 44 26.9 D
microns sec
P Z' 0.1 0.8
Sk iP 02 44 57.2
Gb iP 02 45 22.0
Um iP 02 44 41.9 D
i 02 44 58.9
Ka iP 02 45 22.1
Japan (h = 170 km).
Magn. = 5.7 (Up,Ki).
" 21 Um iP 08 00 23.3
Japan (h = 30 km).
" 21 Up iP 09 53 05.6 C
i 09 53 09.7
" 21 Ki iP 10 32 24.4
" 21 Up iP 10 33 34.5
i 10 33 57.8
Ki i(P) 10 35 26.5
Sk eP 10 34 25
Um iP 10 34 23
Greece.

1963
Feb 21 Up iP 13 14 07.7
Ki iP 13 13 39.4
Um iP 13 13 51.0
Ka iP 13 14 22.4
Mariana Islands (h = 90 km).
" 21 Gb iPKP 13 35 31.2
Um iPKP 13 35 21.8
Tonga Islands (h = 30 km).
" 21 Gb iPKP 14 47 58.7
Ka iPKP 14 48 10.3
Tonga Islands (h = 30 km).
" 21 Um i(P) 15 26 19.8
" 21 Up iP 17 20 17.3
i 17 20 19.9
eS 17 24 56
iSn 17 25 39
microns sec
P Z' 0.2 1.0
S E 0.2 4
S N 0.8 4
M E 6.5 20
M N 3.7 17
M Z 4.5 16
D = 3000 km = 27°.
Ki iP 17 21 28.3
i 17 21 32.3
iS 17 27 07
eSS 17 29 24
e 17 30 30
microns sec
P Z' 0.5 1.5
S N 1.5 11
M E 8.0 20
M N 2.0 14
M Z 3.1 14
D = 3900 km = 35°.
Sk iP 17 20 55.6
i 17 21 04.3
Gb iP 17 20 04.4
i 17 20 18.5
Um iP 17 20 51.9
iS 17 25 53
Ka iP 17 19 47.1
iS 17 24 08.9
Libya (h = 30 km).
Magn. = 5.6 (Up,Ki).
" 21 Up eP 17 30 26
Ka iP 17 29 52.8
i 17 30 39.5
Libya

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

1963

Feb 21 Up iP 18 38 48.9 D
Gb eP 18 38 35
Ka iP 18 38 19.3 D
Libya (h = 30 km).

" 21 Up iP 18 42 09
Ka iP 18 41 35.6
Libya.

" 21 Up iP 19 08 27.6 C

" 21 Up iP 20 32 28.4
Ki iP 20 33 38.7
Sk eP 20 33 06
Gb iP 20 32 13.9
Um iP 20 33 02.5
i 20 33 29.5
Ka iP 20 31 57.6
Libya (h = 30 km).

" 21 Ki iP 21 09 33.0

" 22 Up iP 01 42 06.6
Ki iP 01 42 04.0
Sk iP 01 42 25.4
Gb eP 01 42 28
Um iP 01 42 00.4
Nepal-Tibet (h = 30 km).

" 22 Up eP 02 53 03
Gb iP 02 52 49.3
Ka iP 02 52 32.7
Libya (h = 30 km).

" 22 Ki ePg 05 26 09
iSn 05 26 54.7
iSg 05 27 12.8
D = 500 km = 4.5°
Sk e 05 29 03
eSg 05 29 48
Um iSn 05 27 39.3
iSg 05 28 18.5
D = 710 km = 6.4°
Northwest Russia, 68.3°N,
31.6°E. Origin time =
05 24 47. Explosion?

" 22 Up iP 07 16 35.9 C
i 07 16 42.7
iS 07 21 33
microns sec
P Z' 0.2 1.4
M E 4.0 21
M N 2.7 19
M Z 2.9 18
D = 3350 km = 30°

1963

Feb 22 Ki iP 07 15 19.4
cont. i 07 15 25.0
iPP 07 15 51.2
iS 07 19 23
eLg1 07 21 46

microns sec

P E 0.9 6

P N 2.4 6

P Z 3.2 4

P Z' 0.3 1.5

PP Z 2.4 5

PP Z' 3.6 3.0

S E 9.7 12

S N 3.8 9

M E 7.9 19

M N 6.1 21

M Z 5.8 21

D = 2450 km = 22°

Sk iP 07 16 06.9 C

iPP 07 16 54.3

Gb iP 07 16 58.8 C

Um iP 07 15 57.9 C

i 07 16 28.8

iS 07 20 28

Ka iP 07 17 11.2 C

i 07 17 18.2

iPP 07 18 28.9

i 07 20 13.1

Arctic (h = 30 km).

Magn. = 5.8 (Up, Ki).

" 22 Ki iP 07 28 09.5 C

i 07 28 13.4

Sk iP 07 28 55.6 C

Gb iP 07 29 47.8

Um iP 07 28 46.9 C

Ka iP 07 29 59.5

Arctic (h = 30 km).

" 22 Um iP 08 05 12.4

" 22 Up iSKP 08 19 59.9

Ki iPKP 08 17 02.0

Sk iSKP 08 19 52.4

Gb iSKP 08 20 09.0

Um iPKP 08 17 08.4

iSKP 08 19 47.4

Ka iSKP 08 20 12.6

Fiji Islands (h = 550 km).

" 22 Up iPKP 11 25 14.9

i 11 25 18.6

microns sec

PKP Z' 0.1 0.5

Ki ePKP 11 25 01

Sk iPKP 11 25 08.6

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

1963

Feb 22

cont.

Gb iPKP 11 25 21.9

Um iPKP 11 25 01.9

Ka iPKP 11 25 23.5

Kermadec Islands (h = 110 km).

" 22 Up iP 14 17 19.9

eS 14 21 04

microns sec

M E 3.3 10

M N 3.7 15

M Z 3.3 15

D = 2150 km = 19.1°

Ki iP 14 18 38.0

microns sec

M E 9.0 16

M N 2.5 16

M Z 5.3 16

Sk iP 14 18 02.4 D

Gb iP 14 17 05.5

Um iP 14 18 00.4 D

iS 14 22 19.7

Ka iP 14 16 39.6 D

Albania-Greece (h = 30 km).

" 22 Up iP 18 48 39.6

" 22 Up iP 21 25 38.4

Ki iP 21 25 38.9

Gb iP 21 25 23.4

Um iP 21 25 41.9 C

Ka iP 21 25 33.3 C

Dominican Republic (h = 50 km).

" 22 Up iP 22 40 43.5

" 23 Up iPg 11 05 44.3

iSg 11 05 46.3

Local blast?

" 23 Up iP 14 09 11.1

" 23 Up iP 17 22 27.0

" 23 Up iP 17 23 33.6 D

i 17 23 46.8

microns sec

P Z' 0.1 0.9

Ki iP 17 22 43.0 C

Sk iP 17 23 19.8

Gb iP 17 23 54.8

Um iP 17 23 07.0 C

i 17 23 18.9

Ka iP 17 24 01.6 C

Kurile Islands (h = 50 km).

1963

Feb 24

Ki ePn 05 03 04

eSn 05 04 02

iSg 05 04 24.0

D = 510 km = 4.6°

Um eSn 05 04 43

iSg 05 05 13.3

D = 690 km = 6.2°

Northwest Russia, 67.9°N, 31.8°E. Origin time = 05 01 53.

" 24 Up iPKP 06 54 28.4 C

Um iP 06 54 18

Fiji Islands (h = 540 km).

" 24 Up iP 13 46 44.9 C

iPP 13 50 08.8

eS 13 57 14

microns sec

P Z' 0.1 1.0

S E 0.4 3

M Z 1.4 22

(D = 9650 km = 87°).

Ki iP 13 46 35.1 C

iPP 13 49 48.5

microns sec

P Z' 0.3 1.3

M E 9.0 16

M N 2.5 16

M Z 5.3 16

(D = 9450 km = 85°).

Sk iP 13 46 28.0 C

Gb iP 13 46 36.2 C

i 13 46 57.8

Um iP 13 46 42.9 C

ipP 13 47 15.4

iPP 13 50 03.0

eS 13 56 59

Ka iP 13 46 45.5 C

Guatemala. h = 130 km (Um).

Magn. = 5.9 (Up, Ki).

" 24 Um iP 14 44 39.0

" 24 Um eP 15 48 27

i 15 48 33.8

" 24 Up iPKP 17 54 53.5

i 17 54 58.5

Kermadec Islands (h = 30 km).

" 24 Up iP 22 26 11.1

i 22 26 24.6

Ki eP 22 27 41

Sk eP 22 27 03

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

1963						1963						
Feb	24	Um	eP	22 26 52		Feb	25	Up	iP	17 22 49.6	C	
cont.			i	22 27 03.0					iS	17 32 28		
		Ka	iP	22 25 44						microns sec		
		Greece.						P	Z'	0.1 0.5		
								M	E	1.5 20		
"	24	Up	iP	22 44 20.2				M	N	1.0 17		
		Ki	iP	22 44 40.4				M	Z	1.7 18		
		Gb	iP	22 43 59.5				D = 8500 km = 76½°				
		Um	iP	22 44 35.0			Ki	iP	17 22 25.4	C		
		North Atlantic Ocean						eS	17 31 40			
		(h = 30 km).							microns sec			
								P	Z'	0.1 1.0		
"	25	Um	iP	01 50 58				S	E	0.3 7		
								S	N	0.3 9		
"	25	Um	eP	04 15 30				M	E	1.8 18		
								M	N	0.8 18		
"	25	Up	iP	05 02 19.8				M	Z	0.9 14		
		i		05 02 32.2				D = 8000 km = 72°				
		Um	eP	05 02 06			Sk	iP	17 22 52.9	C		
		Luzon (h = 60 km).					Um	iP	17 22 34.5			
								eS	17 32 08			
"	25	Ki	iP	07 25 35.6			Ka	iP	17 23 00			
		iT		07 30 37.0				i	17 23 05.7			
		i		07 31 20.8			Formosa (h = 30 km).					
		Sk	iP	07 26 12.6			Magn. = 6.0(Up,Ki).					
		iS		07 27 57.9								
		D = 1050 km = 9½°					"	25	Up	iP	19 33 58.0	
		Um	iP	07 26 23.2				Um	iP	19 33 44.5		
		iS		07 28 32.5				Luzon (h = 30 km).				
		i		07 29 02.9			"	25	Up	iP	22 53 23.8	
		e(T)		07 33 12			"	25	Up	iP	23 57 42.9	
		D = 1150 km = 10½°							microns sec			
		Northeast of Jan Mayen						M	E	0.8 20		
		(h = 30 km).						M	N	2.7 22		
"	25	Up	iPg	08 51 53.7			Ki	iP	23 57 23.5			
		iSg		08 51 55.9					microns sec			
		Local blast?						M	E	0.7 13		
"	25	Ki	iP	09 23 55.0				M	N	0.9 19		
		Um	iP	09 23 59.5	D			M	Z	0.7 14		
		Panay, Philippine Islands					Sk	iP	23 57 46.5			
		(h = 50 km).					Um	iP	23 57 29.4			
"	25	Um	iP	10 54 41.2				eS	00 07 35			
							D = 9000 km = 81°					
"	25	Up	iPg	12 57 18.5			Ka	iP	23 57 57			
		iSg		12 57 20.7			Luzon (h = 30 km).					
		Local blast?					"	26	Ki	iP	02 25 04.9	C
"	25	Up	iPg	14 44 27.5				Luzon (h = 60 km).				
		iSg		14 44 29.5			"	26	Up	iP	03 09 55.4	
		Local blast?					"	26	Up	iP	05 56 39.4	C
"	25	Um	iP	15 34 45.0			"	26	Up	iPg	07 05 42.0	
									iSg	07 05 43.5		
								Local blast?				

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

1963

Feb 26 Up iPg 11 19 52.0
iSg 11 19 54.1
microns sec
Pg Z' 0.1 0.5
Sg Z' 0.2 0.5
Local blast?

" 26 Up iPg 15 21 11.6
iSg 15 21 13.5
microns sec
Pg,Sg Z' 0.1 0.5
Local blast?

" 26 Up iP 19 30 45.0

" 26 Up iP 19 38 41.1

" 26 Up iP 20 28 40.9
iPKP 20 32 29.0
ipPKP 20 33 15.4
iPP 20 33 28
ipPP 20 34 22
iSKS 20 38 58
i 20 40 11
iS 20 40 54
iSP 20 42 47
iPKKP 20 43 05.1
microns sec
P Z' 0.2 0.6
PKP Z 0.7 5
PKP Z' 0.1 0.9
PP E 1.6 4
PP N 2.5 5
PP Z 4.5 4
SKS E 1.5 6
SKS N 1.0 5
S E 5.7 9
S N 5.5 5
M E 16 20
M N 55 20
M Z 21 20
(D = 12900 km = 116°).
Ki iP 20 28 17.9 C
iPKP 20 32 20.2
iPP 20 32 48.6
i(P) 20 32 55
ipPP 20 33 44.5
iSKS 20 38 33
i(S) 20 39 55
i 20 42 16
iSS 20 48 06
microns sec
P Z' 0.6 1.2
PKP Z' 0.4 1.0
PP E 5.0 5
PP N 1.6 6

1963

Feb 26 Ki microns sec
cont. PP Z 11 3
PP Z' 10 3.5
SKS N 1.8 7
(S) N 15 9
M E 27 18
M N 23 19
M Z 19 21
(D = 12350 km = 111°).
Sk iP 20 28 41.7 C
i 20 31 49.7
iPKP 20 32 29.9
ipPKP 20 33 16.5
iSKS 20 38 56.5
iSP 20 43 05.9
i 20 43 59.5
Gb iP 20 28 58.3 C
iPKP 20 32 36.8
ipPKP 20 33 23.6
iPP 20 33 59.0
eSP 20 43 33
Um iP 20 28 27.0
iPKP 20 32 23.9
i 20 32 43
iPP 20 33 07.9
ipPKP 20 33 10
iSKS 20 38 41
iS 20 40 29
ipS 20 41 43
iSP 20 42 38
iPKKP 20 43 29.5
iSS 20 48 33
(D = 12550 km = 113°).
Ka iP 20 28 55.9 C
iPKP 20 32 37.2
iPP 20 33 52.7
Eastern New Guinea (h = 170 km).
Magn. = 7.7 (Up, Ki).

" 27 Up iPP 04 49 40
iPKS 04 52 12
microns sec
M E 15 19
M N 23 19
M Z 27 19
Ki ePKP 04 48 35
eSKS 04 55 13
ePS 04 58 22
microns sec
SKS E 2.2 16
M E 15 20
M N 14 21
M Z 29 23
(D = 12100 km = 109°).
Sk iPKP 04 48 47.8
Gb iPKP 04 48 53.3 C

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

1963
Feb 27 Um iPKP 04 48 33.1
cont. i 04 48 41.6
ePP 04 49 16
ePS 04 58 49
New Britain (h = 50 km).
" 27 Up eL 06 30
microns sec
M E 3.8 20
M N 3.0 21
M Z 6.5 20
Ki eL 06 30
microns sec
M E 2.4 18
M N 2.3 18
M Z 5.5 20
New Britain (h = 60 km).
" 27 Up iPg 07 38 04.9
iSg 07 38 07.2
microns sec
Pg,Sg Z' 0.1 0.5
Local blast?
" 27 Ki i(P) 07 55 49.4
Tonga Islands (h = 30 km).
" 27 Up iPg 11 54 25.4
iSg 11 54 27.4
microns sec
Pg,Sg Z' 0.1 0.5
Local blast?
" 27 Up iP 20 06 16.9
Um iP 20 06 13.9
" 27 Up iPKP 20 47 06.4 C
Gb iPKP 20 47 14.6 C
Um iPKP 20 47 00.8 C
Ka iPKP 20 47 07.3
New Britain (h = 100 km).
" 27 Ki iP 21 23 10.4
" 27 Up iP 23 47 02.8 C
Ki iP 23 46 09.2 C
Sk iP 23 46 37.8
Gb iP 23 47 16.6
Um iP 23 46 36.7
Ka iP 23 47 21.0
Alaska (h = 30 km).
" 28 Up iP 00 58 42.4
" 28 Up iP 01 43 47.5
Gb iP 01 43 52.4

1963
Feb 28 Um eS 01 54 41
cont. iSS 02 00 34
Ka iP 01 43 44.7
Indian Ocean (h = 30 km).
" 28 Um eP 06 26 05
Japan (h = 60 km).
" 28 Up iPg 07 06 14.1
iSg 07 06 16.1
microns sec
Pg,Sg Z' 0.1 0.5
Local blast?
" 28 Up e(P) 08 43 45.3
" 28 Ki iP 12 43 23
" 28 Ki iP 17 14 17.0
" 28 Ki iP 18 10 45.5
" 28 Ki iP 19 07 30
" 28 Up iP 19 21 49.3
Gb iP 19 21 36.4
Ka iP 19 21 16.0
(Greece).
" 28 Up i(P) 21 39 49.7

Markus Båth
June 13, 1963

P R E L I M I N A R Y

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, 1963
.....

1963					1963				
Mar	1	Up	iP	03 27 03.5	Mar	1	Sk	eP	10 57 08
			i	03 27 07.7	cont.		Gb	iP	10 57 23.7
			iPP	03 28 11.5			Um	iP	10 56 39.0
		Ki	iP	03 27 37.8				iPS	11 05 49
		Gb	iP	03 27 25.8					Japan (h = 40 km).
		Um	eP	03 27 07.5					Magn. = 5.6 (Up, Ki).
				Iran (h = 30 km).					
"	1	Um	iP	04 15 16.5	"	1	Up	iP	12 03 12.7
				Mexico (h = 30 km).			Ki	iP	12 03 04.0
"	1	Ki	iSn	05 47 56.0			Sk	iP	12 03 30.5
			iSg	05 48 14.1			Gb	iP	12 03 38.3
		Sk	eSg	05 50 49			Um	iP	12 03 02.6
		Um	iSn	05 48 41.4			Ka	eP	12 03 12
			iSg	05 49 19.4					Sinkiang Province,
				Northwest Russia,					China (h = 30 km).
				68.3° N, 31.6° E.	"	1	Um	iP	15 55 17.5 C
				Origin time = 05 45 48.	"	1	Up	iP	19 25 14.6
				Explosion?					microns sec
"	1	Up	iP	09 35 46.9			M	E	1.6 21
		Ki	iP	09 36 57.2			M	N	1.9 19
		Um	eP	09 36 21			M	Z	1.6 17
				South of Greece			Sk	eP	19 25 20
				(h = 160 km).			Gb	eP	19 25 03
"	1	Up	iP	10 57 02.5			Um	iP	19 25 37.9 C
				microns sec			Ka	iP	19 24 55.9
		P	Z'	0.1 0.9					Atlantic Ocean
		M	E	1.4 15					(h = 30 km).
		M	N	2.2 18	"	2	Up	iP	02 55 55.4
		M	Z	2.3 18			Um	iP	02 55 48.0
		Ki	iP	10 56 20.4			Ka	iP	02 56 02.9
				microns sec					East Pakistan - India
		M	E	2.9 17					(h = 40 km).
		M	N	2.3 19	"	2	Up	eP	07 47 52
		M	Z	3.9 17				i	07 48 05.3

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

1963					1963				
Mar	2	Up	iP	09 36 53.1	Mar	3	Up	iP	16 58 37.4
				microns sec			Um	iP	16 58 20.7 D
		M	E	1.0 17					
		M	N	1.5 19	"	3	Up	iP	17 12 34.0
		M	Z	1.7 18			Ki	iP	17 12 42.0
		Ki	iP	09 36 05.3				ipP	17 13 19.9
				microns sec			Sk	iP	17 12 59.5
		M	E	2.4 18			Um	iP	17 12 32.0
		M	N	1.5 18			Ka	iP	17 12 40
		M	Z	5.0 19			Hindu Kush		
		Um	iP	09 36 27.6 C			h = 180 km (Ki).		
		Kurile Islands.							
		Magn. = 5.4 (Up,Ki).			"	3	Up	iP	17 41 06.7
"	2	Up	iP	11 22 59.7 C			Ki	eP	17 40 41
		Ki	iP	11 22 12.3			Um	iP	17 40 54.6 C
		Um	iP	11 22 34.2 C			Missouri, U.S.A.		
		Kurile Islands			"	3	Up	iP	18 47 28.2
		(h = 30 km).					Um	iP	18 47 37.3
							Maldiv Islands.		
"	2	Ki	e(P)	12 17 05	"	3	Ki	iP	21 25 21.9
"	2	Up	iP	16 02 41.9	"	3	Up	iP	23 10 46.6 C
		Um	eP	16 03 25			i		23 10 52.9
		Greece.					iS		23 19 50.5
"	2	Up	iP	17 17 05.8			ipKKP		23 29 54.6
		Greece.					microns sec		
"	2	Um	ipKKP	22 35 22.2			P	Z'	0.1 0.5
		Tonga Islands					Ki	iP	23 10 14.0 C
		(h = 240 km).					microns sec		
"	2	Ki	i(Sn)	23 03 34.8			P	Z'	0.1 0.8
			iSg	23 03 54.0			Sk	iP	23 10 43.6
		Sk	e(Sg)	23 05 03			ipP		23 13 43.7
		Um	e	23 04 46			Um	iP	23 10 27.4 C
			i(Sg)	23 05 04.5			ipKKP		23 29 36.5
"	3	Up	iP	01 55 34.0			Ka	iP	23 11 02 C
		Ki	iP	01 55 42.0 C			Japan (h = 490 km).		
		Um	iP	01 55 31.8 C			Magn. = 5.5 (Up,Ki).		
		Ka	iP	01 55 41 C	"	4	Up	iP	07 47 02.9 C
		Hindu Kush (h = 210 km).					i		07 47 09.2
"	3	Up	iP	07 40 06.2			i		07 50 13
"	3	Um	iP	09 50 08.2			iS		07 51 01
		Aleutian Islands					microns sec		
		(h = 100 km).					P	N	2.0 5
"	3	Ki	iP	14 01 42.9			P	Z	1.4 5
"	3	Ki	iP	14 06 48.1			P	Z'	0.2 1.3
"	3	Um	iP	16 24 37.5 C			S	N	0.8 5
							M	E	2.2 19
							M	N	5.7 23
							M	Z	3.6 22
							D = 2650 km = 24°.		
							Ki	iP	07 45 37.7 D
							iS		07 48 47

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

1963

Mar 4 Ki microns sec
cont. P N 2.4 5
P Z 2.8 5
P Z' 1.4 1.4
S E 2.9 5
S N 1.8 6
M E 3.5 17
M N 8.9 23
M Z 17 22
D = 1850 km = $16\frac{1}{2}^{\circ}$.
Sk iP 07 46 21.8
i 07 46 35.7
Gb iP 07 47 20.4
Um iP 07 46 22.5 C
iS 07 50 19
Ka iP 07 47 29
iPcP 07 50 59
North Polar region
(h = 30 km).
Magn. = 5.7 (Up, Ki).
" 4 Up iP 12 48 21.0
Ki iP 12 47 32.5
Um iP 12 47 55.2
Kurile Islands
(h = 140 km).
" 4 Um iP 13 00 48.0 C
Kurile Islands
(h = 30 km).
" 4 Up iP 13 50 27.4
i 13 50 30.2
iS 14 00 11
eSa 14 09 01
microns sec
P Z' 0.4 1.4
S N 0.7 4
M E 12 20
M N 25 20
M Z 14 21
D = 8450 km = 76° .
Ki iP 13 50 05.4
i 13 50 40
iS 13 59 09
microns sec
P Z' 0.3 1.5
S E 1.2 8
M E 16 16
M N 12 18
M Z 12 14
D = 7950 km = $71\frac{1}{2}^{\circ}$.
Sk eP 13 50 32
Gb eP 13 50 46
i 13 50 50.2
Um iP 13 50 10.5
i 13 50 14.0

1963

Mar 4 Um eS 13 59 35
cont. iSS 14 04 17
D = 8150 km = $73\frac{1}{2}^{\circ}$.
Ka eP 13 50 35
i 13 50 40
i 13 50 52
Formosa (h = 30 km).
Magn. = 6.4 (Up, Ki).
" 4 Up iP 15 15 42.1 C
iS 15 20 04.9
microns sec
P Z' 0.1 0.8
S N 0.8 3
M E 4.3 22
M N 2.4 15
M Z 2.8 15
D = 2800 km = 25° .
Ki iP 15 16 49.6 C
microns sec
P Z' 0.2 1.0
M E 6.6 19
M Z 1.9 15
Sk iP 15 16 20.9
Gb iP 15 15 33.2 C
i 15 15 47.9
Um iP 15 16 13.6 C
i 15 16 16.3
iPP 15 16 55.5
iS 15 21 02.4
D = 3150 km = $28\frac{1}{2}^{\circ}$.
Ka iP 15 15 05 C
iS 15 19 07
Crete (h = 40 km).
Magn. = 5.5 (Up, Ki).
" 4 Gb i(P) 15 26 06.6 D
" 4 Up —
microns sec
M E 2.7 20
M N 2.3 22
M Z 4.3 22
Ki —
microns sec
M E 4.0 21
M N 4.0 22
M Z 5.1 22
Gb eP 15 56 28
Um iP 15 56 42.5
eSKS 16 07 16
Ka iP 15 56 34
Peru (h = 30 km).
Magn. = 6.1 (Up, Ki).
" 4 Um iP 20 45 14.2
" 4 Up iP 22 06 46.0
Um iP 22 06 27.6 C

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

1963

Mar	5	Gb	iP	02 04 00.1	
		Um	iP	02 05 04.5	
		Morocco (h = 30 km).			
"	5	Up	eP	02 44 14	
		Ki	iP	02 44 17.4	C
		Ka	eP	02 44 29	
		Nepal (h = 30 km).			
"	5	Up	i(P)	03 11 29.2	
"	5	Ki	eP	04 28 03	
"	5	Ki	ePn	05 52 28	
			iSn	05 53 23.5	
			iSg	05 53 41.0	
			D = 500 km = 4.5°		
		Sk	eSg	05 56 13	
		Um	iSn	05 54 08.4	
			iSg	05 54 45.6	
			D = 710 km = 6.4°		
		Northwest Russia,			
		68.3°N, 31.6°E.			
		Origin time = 05 51 15.			
		Explosion?			
"	5	Up	—		
			microns	sec	
		M	E	1.5	25
		M	Z	1.7	25
		Um	iP	07 18 40.6	
			eSKS	07 29 21	
		Peru (h = 30 km).			
"	5	Ki	eP	08 00 03	
		Gb	eP	07 58 47	
		Aegean Sea.			
		(h = 80 km) .			
"	5	Up	iP	13 19 20.9	
		Ki	iP	13 18 49.6	D
		Sk	eP	13 19 17	
		Um	iP	13 19 03.0	D
		Bonin Islands			
		(h = 500 km).			
"	5	Ki	i(P)	20 09 04.0	C
"	5	Um	iP	21 24 09.1	C
"	5	Um	iP	21 50 33.5	
"	6	Um	iP	04 12 18.1	C
			i	04 12 46.5	
"	6	Up	iP	04 41 27.2	C
		Um	iP	04 41 08.5	C

1963

Mar	6	Up	iP	04 49 29.8	
		Ki	eP	04 49 01	
		Sk	iP	04 49 29.0	
		Gb	iP	04 49 49.8	
		Um	iP	04 49 11.5	
		Ryukyu Islands (h = 60 km).			
"	6	Um	iP	07 05 38.8	
		Kamchatka (h = 30 km).			
"	6	Up	iP	08 43 08.4	C
		Ki	iP	08 43 18.2	C
		Sk	iP	08 43 34.0	
		Ka	iP	08 43 13.1	
		West Pakistan (h = 40 km).			
"	6	Um	iP	12 15 19.0	D
"	6	Ki	iPn	17 00 12.0	
			iSn	17 01 00.4	
			iSg	17 01 16.1	
			D = 420 km = 3.8 ⁰ .		
		Um	iSg	17 02 43.7	
		Northwest Russia, 68.8 ⁰ N, 30.4 ⁰ E. Origin time = 16 59 11. Explosion?			
"	6	Um	iPKP	18 11 59.0	D
		Santa Cruz Islands (h = 200 km).			
"	6	Ki	i(P)	21 12 28.1	
"	6	Up	iP	23 34 26.0	
		Um	iP	23 34 04.4	
		Japan (h = 70 km).			
"	6	Um	iP	23 43 27.6	
"	7	Up	i(S [*])	04 30 28.2	
			iSg	04 30 41.6	
		Ki	iS [*]	04 31 27.5	
			i	04 32 10.9	
		Sk	ePn	04 28 09	
			iSn	04 28 58.3	
			iSg	04 29 16.9	
			D = 450 km = 4.1 ⁰ .		
		Gb	iSn	04 29 22.5	
			iSg	04 29 59.1	
			D = 590 km = 5.3 ⁰ .		
		Um	i(P [*])	04 29 18.1	
			iSn	04 30 21.4	
			i	04 30 57.6	

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

1963						1963					
Mar	7	Um	iSg	04 31 10.5		Mar	7	Ka	ePKP	12 35 25	
cont.				D = 840 km = 7.6°.		cont.				Chile (h = 50 km).	
		Ka	e(Sn)	04 30 41						Magn. = 6.3 (Up, Ki).	
				West coast of Norway,							
				61.7°N, 4.8°E.							
				Origin time = 04 27 02.							
"	7	Ki	iP	05 24 32.4		"	7	Up	iP	13 54 01.3	
		Um	iP	05 24 53.6						microns sec	
				Kurile Islands				P		Z' 0.1 0.8	
				(h = 30 km).				Ki	iP	13 53 08.9	
								Um	iP	13 53 34.0 D	
										Aleutian Islands	
										(h = 30 km).	
"	7	Up	iPP	05 43 42.8		"	7	Up	iP	20 30 25.5 C	
			eSS	06 01 17							
				microns sec							
		M	E	3.1 23		"	7	Ki	i(P)	20 39 17.9	
		M	N	4.7 25							
		M	Z	5.3 23		"	7	Up	iP	21 57 00.4	
		Ki	ePKP	05 41 10				i		21 57 26.4	
			i(PP)	05 43 27.3				isP		21 58 00.4	
			iPKS	05 44 39						microns sec	
			e	05 46 45				P		Z' 0.2 0.8	
				microns sec				Ki	iP	21 57 09.0	
		M	E	3.8 18						microns sec	
		M	N	1.8 17				P		Z' 0.1 1.0	
		M	Z	4.9 17				Sk	iP	21 57 26.6	
				(D = 14700 km = 132°).				Gb	iP	21 57 22.6	
		Um	iPKP	05 41 19.1 C				Um	iP	21 56 58.5	
			iPP	05 43 45				Ka	iP	21 57 06.9	
			iPKS	05 44 50						Hindu Kush	
			i	06 00 40						(h = 200 km).	
				Easter Island						Magn. = 5.8 (Up, Ki).	
				(h = 30 km).							
				Magn. = 6.4 (Up, Ki).		"	8	Up	iP	00 04 50.6 C	
"	7	Ki	e(P)	10 26 47						Oregon, U.S.A.	
										(h = 30 km).	
"	7	Um	iP	12 28 34.0 C		"	8	Um	iP	00 20 59.6	
"	7	Up	iPKP	12 35 30.7		"	8	Up	iP	00 48 56.9	
				microns sec		"	8	Up	e(Lgl)	07 58 48	
		M	E	2.6 22				Ka	iPg	07 56 44.2	
		M	N	3.2 20					iL	07 56 53.0	
		M	Z	4.0 18						Explosion near	
		Ki	iPKP	12 35 39.0 C						Karlskrona.	
			iPKS	12 39 07							
				microns sec		"	8	Ka	iPg	08 03 01.3	
		PKP	Z'	0.6 2.0					iL	08 03 10.3	
		PKS	E	2.6 7						Local explosion.	
		M	E	5.9 23		"	8	Up	e(Lgl)	08 21 18	
		M	N	2.1 18				Ka	iPg	08 19 15.1	
		M	Z	6.7 23					iL	08 19 24.1	
		Sk	iPKP	12 35 30.7						Explosion near	
		Gb	iPKP	12 35 25.7 C						Karlskrona.	
		Um	iPKP	12 35 37.2		"	8	Up	i(Lgl)	08 29 45.9	
			iPKS	12 39 01							
			eSS	12 55 31							

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

1963					1963				
Mar	8	Ka	iPg	08 27 43.4	Mar	8	Mid-Atlantic Ocean		
cont.			iL	08 27 51.6	cont.		(h = 30 km).		
				Explosion near			Magn. = 5.5 (Up, Ki).		
				Karlskrona.					
"	8	Up	e(Lgl)	08 38 49	"	8	Um iPKP	16 23 57.4	
		Ka	iPg	08 36 43.5			Loyalty Islands		
			iL	08 36 51.7			(h = 110 km).		
				Explosion near	"	8	Um iP	22 39 20.1	
				Karlskrona.			Costa Rica		
"	8	Up	e(Lgl)	08 41 39			(h = 30 km).		
		Ka	iPg	08 39 34.0	"	8	Up eP	22 55 33	
			iL	08 39 41.4	"	9	Up iP	01 33 59.6	
				Explosion near	"	9	Ki i(P)	01 52 45.7	
				Karlskrona.	"	9	Up iP	02 26 25.6 C	
"	8	Up	e(Lgl)	09 08 45			Ki iP	02 26 52.9 C	
		Sk	e(Lgl)	09 10 48				microns sec	
		Gb	eRg	09 08 16			P	Z' 0.3 1.0	
		Ka	iPg	09 06 40.5			Sk iP	02 26 56.3 C	
			iSg	09 06 44.0			Gb iP	02 26 37.5 C	
			iL	09 06 48.4			Um iP	02 26 34.7 C	
				D = 30 km = 0.3°.			iPcP	02 27 52.5	
				Explosion near			iPP	02 28 31.5	
				Karlskrona, the			D = 5500 km = 49½°.		
				largest in the series			Ka iP	02 26 19.2 C	
				which started Mar. 8			Arabian Sea		
				at 07.56. T-phases			(h = 30 km).		
				are probably recorded					
				at Karlskrona.					
"	8	Up	iP	09 41 03.3	"	9	Up iPKP	03 08 02.4	
			i	09 41 10.1			Kermadec Islands		
		Um	iP	09 41 38.0			(h = 30 km).		
"	8	Up	i(P)	12 16 40.1	"	9	Up iP	03 25 43.3	
"	8	Um	e(P)	12 25 07	"	9	Up iP	06 55 05.3	
"	8	Up	eP	15 17 08			Ki eP	06 54 21	
				microns sec			Sk eP	06 54 55	
		M	E	1.7 18			Gb iP	06 55 26.9 C	
		M	N	1.4 18			Um iP	06 54 39.6 C	
		M	Z	1.7 18			Kurile Islands		
		Ki	iP	15 17 43.6			(h = 30 km).		
			eSS	15 32 12	"	9	Um iP	17 09 13.0 C	
				microns sec			Mindanao (h = 30 km).		
		P	Z'	0.2 2.0	"	9	Ki eL	17 20	
		M	E	0.8 17				microns sec	
		M	N	0.5 14			M	E 0.5 16	
		M	Z	1.9 23			M	Z 0.9 16	
		Sk	iP	15 17 12.2 C			New Britain		
		Gb	iP	15 16 45.7			(h = 30 km).		
		Um	iP	15 17 29.0 C					
			iS	15 26 58					

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

1963

Mar 9 Ki —
microns sec
M E 0.6 15
M N 0.6 20
Um eSS 19 30 05
New Britain
(h = 30 km).

" 9 Up iPKP 23 02 11.1
Ki ePKP 23 02 04
Gb iPKP 23 02 20.6 D
Um iPKP 23 02 05.0
i 23 02 11.0
Fiji Islands
(h = 530 km).

" 10 Up iP 01 36 36.4 C
microns sec
P Z' 0.2 0.7
Ki iP 01 35 42.2 C
microns sec
P Z' 0.5 1.0
Sk iP 01 36 09.5 C
Gb iP 01 36 48.4 C
i 01 37 00.0
Um iP 01 36 10.0 C
Ka iP 01 36 58.0 C
Alaska (h = 30 km).
Magn. = 6.4 (Up, Ki).

" 10 Up iPKP 01 38 30.9
Ki iPKP 01 38 18.0
Sk iPKP 01 38 28.3
Gb iPKP 01 38 39.2
Um iPKP 01 38 23.7 D
New Hebrides Islands
(h = 140 km).

" 10 Up iPKP 01 45 18.3 C
microns sec
PKP Z' 0.1 0.6
Gb iPKP 01 45 27.2 C
Um iPKP 01 45 06.5

" 10 Up iP 03 05 17.1 C
i 03 05 21.1
eSa 03 23 58
microns sec
P Z' 0.4 1.5
M E 6.5 20
M N 14 18
M Z 7.3 19
D = 8450 km = 76°.
Ki iP 03 04 55.0
iS 03 14 15
microns sec
P Z' 0.2 1.3

1963

Mar 10 Ki S E 0.9 8
cont. M E 3.7 15
M N 3.5 15
M Z 4.6 13
D = 8000 km = 72°.
Sk eP 03 05 23
Gb eP 03 05 39
Um iP 03 05 01.7
i 03 05 04.0
eS 03 14 25
Formosa (h = 30 km).
Magn. = 6.3 (Up, Ki).

" 10 Up iP 04 36 02.7 D
Kurile Islands
(h = 30 km).

" 10 Up e(P) 06 09 39

" 10 Sk iP 06 16 59.7
Um iP 06 17 15.4
El Salvador
(h = 30 km).

" 10 Um iPKP 09 57 40.6 C
New Hebrides Islands
(h = 280 km).

" 10 Up eSKSP 11 20 59
microns sec
M E 2.0 18
M N 2.0 20
M Z 2.3 18
Ki —
microns sec
M E 0.9 20
M N 0.8 18
M Z 1.9 21
Um eSKSP 11 21 16
Chile (h = 70 km).

" 10 Up eP 12 01 41
i 12 01 54.9
Ki eP 12 01 04
i 12 01 13.7
Gb iP 12 02 14.3
Um eP 12 01 15
i 12 01 31.7
Japan (h = 60 km).

" 10 Up iP 12 55 06.9
Um iP 12 54 48.6

" 10 Up iP 14 04 35.1
Ki iP 14 04 19.6 C
Um iP 14 04 24.1
Celebes Sea
(h = 40 km).

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

1963

Mar 11 Ki iPn 05 09 18.2
iPg 05 09 32.0
iSg 05 10 14.0
D = 370 km = 3.3°
Um iSn 05 10 58.2
iSg 05 11 33.4
D = 640 km = 5.8°
Northwest Russia,
68 $\frac{1}{2}$ °N, 29 1/4°E.
Origin time = 05 08 23.
Explosion?

" 11 Up iP 07 32 25.0
iS 07 36 40
iLgl 07 39 40
microns sec
P N 1.8 5
P Z 0.9 5
P Z' 0.3 1.2
S E 2.8 9
S N 2.8 7
M E 8.5 18
M N 8.3 15
M Z 5.3 14
D = 2550 km = 23°
Ki iP 07 33 31.7
i(PP) 07 34 23
i(PcP) 07 36 24.7
eS 07 38 29
e 07 39 18
e 07 41 41
iLgl 07 43 19
microns sec
P Z' 0.5 1.5
(PP) N 0.7 4
S N 1.2 14
M E 6.8 14
M N 4.1 12
M Z 8.1 12
D = 3400 km = 30 $\frac{1}{2}$ °
Sk iP 07 33 06.9
Gb iP 07 32 21.1
i 07 33 04.7
Um iP 07 32 56.7
iPcP 07 36 21.2
eS 07 37 31
Ka iP 07 31 53.0
i 07 32 47.2
Turkey (h = 30 km).
Magn. 5.7 (Up, Ki).

" 11 Up iP 10 35 08.1
Ki iP 10 35 16.8 C
Sk iP 10 35 33.5
Gb iPP 10 37 44.4
Um iP 10 35 06.4 C
ipP 10 35 58.0

1963

Mar 11 Ka iP 10 35 12.4
cont. Hindu Kush,
h = 250 km (Um).

" 11 Up iP 14 33 20.3
Ki iP 14 32 46.7 C
Um iP 14 33 00.7
Japan (h = 400 km).

" 11 Um iP 15 33 18.5

" 11 Um iP 15 42 55.1
Ka iP 15 43 07.5
Mexico (h = 30 km).

" 11 Um iP 15 58 43.6

" 11 Up iP 20 37 13.9
Ki eP 20 37 19

" 11 Um iP 21 26 14.1

" 11 Um iP 23 57 32.7

" 12 Gb iP 01 45 07.3

" 12 Um iP 03 35 02.0
i 03 35 14.3
i 03 35 27.1

" 12 Ki e(P) 06 46 08

" 12 Up iP 08 16 12.2
Ki iP 08 15 18.4
Sk iP 08 15 54.9
Gb iP 08 16 32.7
Um iP 08 15 44.2
Ka iP 08 16 35.0
Kamchatka (h = 30 km).

" 12 Up iP 09 06 38.2
Ki —
microns sec
M E 0.4 11
Sk iP 09 07 19.5
Um iP 09 07 18.7 D
Ka iP 09 05 56.4
Greece.

" 12 Up iP 12 44 13.2
Um iP 12 44 34.6
Ka iP 12 43 55.6
Turkey (h = 70 km).

" 12 Up iP 15 21 18.1
micron sec
P Z' 0.1 0.8

Year	Month	Day	Time	Lat	Long	Alt	Loc	Time	Lat	Long	Alt	Loc	
1963	Mar	12	Ki	iP	15 20 01.9			1963	Mar	14	Ki	eSa	08 30 16
cont.				i	15 20 10.9			cont.					microns sec
				P	Z' 0.3 1.0						S	E	0.8 10
				M	E 1.5 18						M	E	3.5 13
				M	N 0.7 15						M	N	1.3 14
				M	Z 1.6 15						M	Z	4.0 13
													D = 8450 km = 76°.
			Sk	iP	15 20 19.2						Sk	iP	08 12 25.7
				eS	15 22 04						Gb	eP	08 12 38
			Gb	iP	15 21 33.2						Um	iP	08 12 05.7
				i	15 21 40.7							i	08 12 15.8
			Um	iP	15 20 41.4							iS	08 21 50
			Ka	iP	15 21 53.2								Luzon (h = 50 km).
													Magn. = 5.8 (Up, Ki).
			Jan	Mayen	(h = 30 km).								
"		12	Um	iP	16 08 37.6			"		14	Sk	iP	09 39 35.6
"		12	Ki	e(P)	17 35 01			"		14	Um	iP	18 23 56.6
"		12	Ki	eP	19 24 22								Aleutian Islands
"		12	Up	iP	20 38 16.2								(h = 30 km).
"		12	Ki	iP	20 47 31.4			"		14	Up	iP	18 41 37.6
"		13	Um	iP	11 05 41.5 C							i	18 41 48.6
					Japan (h = 50 km).								microns sec
"		13	Um	iP	15 52 04.6							P	Z' 0.1 1.0
"		13	Up	iP	17 34 47.5						Ki	iP	18 40 50.1
			Um	iP	17 34 46.1						Sk	e(P)	18 41 25
					Hindu Kush						Gb	iP	18 41 59.0
					(h = 190 km).						Um	iP	18 41 11.9
"		13	Ki	i(P)	20 07 28.0								Kurile Islands
"		14	Up	iP	01 54 42.1								(h = 30 km).
			Sk	eP	01 55 25			"		14	Um	iP	20 12 02.5
			Um	iP	01 55 29.6 C			"		15	Ki	iP	00 17 21.6
					Greece.						Um	iP	00 17 26.0
"		14	Um	iPKP	02 16 31.2								Banda Sea
					Australia (h = 30 km).								(h = 300 km).
"		14	Up	iP	08 12 19.2			"		15	Up	iP	00 28 57.7
			i		08 12 29.1								microns sec
			iS		08 22 18						M	E	1.6 21
					microns sec						M	N	1.7 21
			P	Z' 0.1 0.7							M	Z	2.3 23
			M										

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

1963					1963				
Mar	15	Ka	iP	00 29 06	Mar	16	Up	iS	09 04 48
cont.		Mindanao			cont.			iSS	09 09 05
		(h = 120 km).						iP'P'	09 23 54.9
								iP'P'	09 24 08.4
"	15	Um	iSKP	03 56 09.2				microns sec	
		Fiji Islands					P	Z'	2.0 0.7
		(h = 570 km).					S	E	39 8
							S	N	85 18
"	15	Up	iPKP	04 21 31.7 C			P'P'	Z'	0.6 1.5
		Gb	iPKP	04 21 42.4			M	E	560 28
		Fiji Islands					M	N	430 29
		(h = 560 km).					M	Z	190 22
							D = 7550 km = 68°.		
"	15	Ki	iP	05 56 45.6		Ki	iP		08 54 59.4 C
		Sk	iP	05 56 15.1 D			i		08 55 01.9
		Um	iP	05 56 38.4			i		08 55 15
		North Atlantic Ocean					iS		09 03 18
		(h = 30 km).					iSS		09 07 20
							iP'P'		09 24 12.9
"	15	Up	iP	11 06 11.9			iP'P'		09 24 24.5
		Ki	iP	11 05 52.6			microns sec		
							P	E	12 5
			M	E 0.6 14			P	Z'	8.0 1.0
			M	Z 0.9 13			S	E	24 7
		Um	iP	11 05 58.8			S	N	32 11
		Ka	iP	11 06 24.6			S	Z	48 16
		Luzon (h = 30 km).					P'P'	Z'	1.3 2.0
							M	E	220 20
"	15	Sk	iP	14 05 30.8			M	N	200 22
							M	Z	370 20
"	15	Um	iP	15 12 36.9			D = 6800 km = 61°.		
"	15	Um	iP	19 01 10.8 C		Sk	iP		08 55 35.7
		Japan (h = 30 km).					i		08 55 37.7
"	15	Ki	iP	21 07 17.8			iS		09 04 29.8
		i(L)		21 07 22.0			iP'P'		09 24 06.5
		Possibly local					iP'P'		09 24 19.0
		explosion.				Gb	iP		08 56 08.4 C
							iPP		08 58 45.8
							eS		09 05 38
"	16	Ki	iP	02 35 30.0			eP'P'		09 23 52
		Um	iP	02 36 13.6 C			iP'P'		09 24 11.0
"	16	Up	iP	03 45 28.5 C		Um	iP		08 55 21.4 C
							i		08 55 26.6
							i		08 55 42
							iPP		08 57 53
							iS		09 03 38
							iP'P'		09 23 54.6
							iP'P'		09 24 09.9
							D = 7100 km = 64°.		
						Ka	iP		08 56 12 C
							i		08 56 21
							iS		09 05 41
							iP'P'		09 23 47
							iP'P'		09 24 05
"	16	Up	iP	08 55 47.1 C		Kurile Islands			
		i		08 55 52.2		(h = 25 km).			
		iPa		08 59 30		Magn. = 7.7 (Up,Ki).			

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

1963	Mar	16	Up	iP	13 26 48.0	1963	Mar	17	Up	M	N	1.2 15
"	"	16	Um	iP	18 37 06.9 D	cont.	"	"	Ki	iP	Z	1.4 15
"	"	16	Up	iP	22 36 21.8 C		"	"	"	i		14 23 14.4 D
					microns sec							14 23 25.9
			M	E	0.7 13					P	Z'	0.1 1.0
			M	N	0.9 15					M	E	1.0 12
			M	Z	1.0 13					M	N	0.7 13
		Ki	iP		22 36 27.2 C					M	Z	1.5 13
					microns sec				Sk	iP		14 22 40.5
			P	Z'	0.1 0.9				Gb	iP		14 21 44.1
			M	E	0.6 13				Um	iP		14 22 37.5 D
		Sk	iP		22 36 46.5 C					i		14 22 47.5
			iPP		22 38 22.9					eS		14 27 07
		Gb	iP		22 36 44.9 C				Ka	iP		14 21 21.8
		Um	iP		22 36 17.0 C				Greece (h = 80 km).			
		Ka	iP		22 36 31 C				Magn. = 5.6 (Up, Ki).			
					Tadzhik, U.S.S.R.	"	"	17	Up	iP		19 47 34.7
					(h = 70 km).				Ki	iP		19 47 15.0
"	17	Um	iP		04 02 52.5 C							Eastern Siberia
"	17	Ki	iSn		04 54 03.9							(h = 30 km).
			eSg		04 54 25	"	"	18	Up	iPKP		04 20 16.4 C
					D = 480 km = 4.3°.				Gb	iPKP		04 20 25.6
		Sk	eSg		04 56 53					i		04 20 35.2
		Um	iSn		04 54 44.0				Um	iPKP		04 20 04.0
			i		04 55 15.5							Kermadec Islands
			iSg		04 55 20.8							(h = 30 km).
					D = 670 km = 6.0°.	"	"	18	Up	iPKP		04 45 48.1
					Northwest Russia,				Um	ePKP		04 45 40
					67.5° N, 31.8° E.							Kermadec Islands
					Origin time = 04 52 03.							(h = 30 km).
					Explosion?	"	"	18	Up	iP		10 09 08.9
"	17	Up	iP		08 53 13.4				Ki	iP		10 10 15.2 C
		Ki	iP		08 52 27.3				Sk	iP		10 09 34.8
		Sk	eP		08 53 04				Um	iP		10 09 45.0 C
		Um	iP		08 52 48.0					i		10 09 51.1
			i		08 53 07.3							Southern Algeria
					Kurile Islands							(h = 0 km).
					(h = 40 km).							Underground nuclear
"	17	Um	i(Pg)		11 58 10.4							explosion.
			iSg		11 58 18.6	"	"	18	Sk	iP		11 47 45.8
"	17	Um	iP		13 19 26.9 D				Greece.			
			i		13 19 37.3	"	"	18	Ki	iP		12 18 24.8 D
					Kurile Islands	"	"	18	Um	iP		12 25 20.6
					(h = 30 km).	"	"	18	Um	iPKP		13 34 24.6
"	17	Up	iP		14 21 57.7				Gb	iPKP		13 34 34.3 C
			iPP		14 22 17.0							Fiji Islands
					microns sec							(h = 560 km).
			P	Z'	0.3 0.9							
			M	E	1.0 13							

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Ka = Karlskrona

1963					1963				
Mar	18	Um	iP	14 08 04.5	Mar	20	Gb	iPKP	05 01 24.4
"	18	Sk	iP	14 20 36.6				iSKP	05 04 07.2 D
		Um	iP	14 20 36.1			Um	iPKP	05 01 09.3
		Greece.						i	05 01 15.2
"	18	Um	iP	23 57 46.5				iSKP	05 03 46.6 D
"	19	Sk	iP	04 56 18.6			Ka	iPKP	05 01 27.4 C
		Um	iP	04 56 23.5 D				iSKP	05 04 03.5
		Arctic Ocean					Fiji Islands		
		(h = 30 km).					(h = 680 km).		
"	19	Up	iP	05 23 45.9	"	20	Up	iPKP	05 03 49.5
		Ki	iP	05 23 19.2				iSKP	05 06 33.0 C
		Sk	iP	05 23 44.0				i	05 06 42.6
		Um	iP	05 23 30.1				microns sec	
		Mariana Islands						SKP	Z' 0.1 1.0
		(h = 220 km).					Ki	iPKP	05 03 44.4
"	19	Um	iP	10 23 50.5 C				iSKP	05 06 08.5 C
"	19	Um	iPKP	13 32 32.6				microns sec	
		Loyalty Islands						SKP	Z' 0.2 1.3
		(h = 50 km).					Sk	iPKP	05 03 43.5
"	19	Um	iPKP	15 01 15.5				iSKP	05 06 25.9 C
		Loyalty Islands					Gb	iPKP	05 04 00.3
		(h = 30 km).						iSKP	05 06 42.0
"	19	Ki	iP	17 32 40.4			Um	iSKP	05 06 20.9 C
		Java (h = 90 km).					Ka	iSKP	05 06 43.8 C
"	19	Up	iP	19 21 05.7			Fiji Islands		
		Ki	iP	19 20 48.0 C			(h = 680 km).		
		Sk	iP	19 21 10.5			Note that SKP has an		
		Um	iP	19 20 53.7			initial motion opposite		
		Mindanao (h = 110 km).					to previous shock with the		
"	19	Ki	e(P)	19 47 04			same location.		
"	19	Up	iP	23 54 50.6	"	20	Um	i(P)	05 13 37.9
		i		23 55 02.6	"	20	Ki	ePn	05 24 34
"	20	Ki	iP	04 31 55.5 C				iSn	05 25 33.0
"	20	Up	iPKP	05 01 14.7				iSg	05 25 50.6
		iSKP		05 03 58.9				D = 500 km = 4.5°.	
		microns sec					Sk	eSg	05 28 22
		SKP	Z' 0.2 1.5				Um	iSn	05 26 17.0
		Ki	iPKP	05 01 09.4				iSg	05 26 56.5
		iSKP		05 03 33.9 D				D = 710 km = 6.4°.	
		microns sec					Northwest Russia,		
		SKP	Z' 0.3 1.6				68.3°N, 31.6°E.		
		Sk	iPKP	05 01 07.5			Origin time = 05 23 24.		
		iSKP		05 03 50.2			Explosion?		
					"	20	Up	iP	07 15 20.3 C
							Ki	iP	07 14 32.5 C
							microns sec		
							P	Z' 0.1 1.0	
							Sk	iP	07 15 09.3 C
							Um	iP	07 14 54.5
							i		07 15 14.6
							Kurile Islands (h = 15 km).		
					"	20	Um	iP	11 32 18.7

Up = Uppsala, Ki = Kiruna, Sk = Skalistugan, Gb = Göteborg, Um = Umeå
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1963						1963					
Mar	20	Sk	iP	14 11 17.4		Mar	21	Um	i(P)	10 59 47.7	
"	20	Up	iP	14 53 12.5					i	11 01 14.7	
			i	14 53 29.9					i	11 01 25.2	
		Ki	iP	14 53 13.8 D					Seismic?		
		Sk	iP	14 53 29.5		"	21	Up	iP	12 11 33.7	
		Gb	iP	14 53 23.9		"	21	Um	i(P)	13 24 57.1	
			i	14 53 28.9					Seismic?		
		Um	iP	14 53 09.3 D							
		Andaman Islands (h = 30 km).				"	21	Um	iP	14 21 46.4 C	
"	20	Um	iP	16 00 59.4					i	14 22 02.2	
"	20	Up	ePS	17 06 51		"	21	Sk	iPg	14 28 01.5	
				microns sec					iSg	14 28 31.1	
		M	E	1.2 21		"	21	Um	iP	18 03 50.6 C	
		M	N	1.7 21					Kurile Islands (h = 30 km).		
		M	Z	1.6 20		"	21	Up	iP	23 46 49.9 C	
		Ki	iP	16 52 48.2				Ki	iP	23 46 00.5 C	
			eS	17 04 25				Um	iP	23 46 24.0	
			ePS	17 06 03					i	23 46 26.8	
				microns sec					ipP	23 46 39.5	
		M	E	1.8 22					Kurile Islands (h = 70 km).		
		M	N	0.5 18		"	22	Um	iP	02 49 49.1 C	
		M	Z	1.7 20					Japan (h = 80 km).		
		D = 11350 km = 102°.				"	22	Up	iP	04 08 06.8 D	
		Um	iP	16 52 56.5				Gb	iP	04 08 40.8	
			ePP	16 57 15				Um	iP	04 07 41.5	
			eSKS	17 03 32					Kurile Islands (h = 120 km).		
			ePS	17 06 21		"	22	Gb	i(P)	12 22 34.3	
		New Guinea (h = 40 km).				"	22	Um	iP	16 30 03.0	
		Magn. = 5.8 (Up, Ki).				"	22	Up	iP	20 39 57.1	
"	21	Up	iP	04 11 38.5 C		"	22	Up	iP	22 32 06.5 C	
			ipP	04 11 51.7				Sk	iP	22 32 49.0 C	
			iPP	04 14 21.0				Ka	iP	22 31 32.6	
				microns sec				(Cyprus).			
		P	Z'	0.1 0.7		"	22	Up	iP	22 34 30.4	
		Ki	iP	04 10 59.4 C		"	22	Ki	iP	22 35 26.5 C	
			ipP	04 11 11.0				Um	iP	22 34 53.0	
			iPP	04 13 25.9				Cyprus (h = 30 km).			
				microns sec		"	22	Ki	iP	22 36 29.2 D	
		P	Z'	0.1 1.0				Um	iP	22 35 55.3	
		M	E	0.9 18				Cyprus.			
		M	N	0.5 20		"	22	Ki	iP	23 42 05.4	
		M	Z	1.0 17				Cyprus (h = 30 km).			
		Sk	iP	04 11 32.5 C							
			iPP	04 14 10.9							
		Gb	iP	04 11 58.4 C							
		Um	iP	04 11 16.7 C							
			ipP	04 11 29.0							
		Ka	iP	04 11 54.2 C							
		Japan (h = 50 km).									
"	21	Sk	iPg	09 16 37.8		"	22	Ki	iP	23 42 05.4	
			iSg	09 17 06.7				Cyprus (h = 30 km).			

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1963					1963				
Mar	22	Ki	ePKP	23 56 11	Mar	23	Ki	iSg	22 53 02.9
		Um	iPKP	23 56 09.1 C	cont.				microns sec
			SW of Tasmania (h = 30 km).					Sg	Z' 0.8 0.8
"	23	Ki	iP	00 39 13.9 C				D = 300 km = 2.7°.	
"	23	Up	iPKP	01 29 14.2		Sk	iPn	22 52 31.9	
		Um	iSKP	01 31 57.1			iPg	22 52 48.7	
			Fiji Islands (h = 560 km).			i	22 53 24.0		
"	23	Ki	iSn	05 24 23.9			iSg	22 53 28.7	
			iSg	05 24 41.1			D = 380 km = 3.4°.		
		Um	eSg	05 25 48		Gb	e	22 56 18	
			Northwest Russia,			iSg	22 56 33.3		
			68.3°N, 31.6°E.			D = 1010 km = 9.1°.			
			Origin time = 05 22 15.		Um	iPn	22 52 41.8 D		
			Explosion?			iPg	22 52 49.0		
"	23	Up	iP	05 56 37.1			iSn	22 53 29.6	
		Ki	iP	05 56 24.4			iSg	22 53 50.1	
		Sk	eP	05 56 53			D = 440 km = 4.0°.		
		Um	iP	05 56 24.9 C		Ka	e	22 56 27.5	
			Sinkiang Province, China			iSg	22 57 27.9		
			(h = 30 km).			D = 1190 km = 10.7°.			
"	23	Up	i(P)	08 15 18.5				West coast of Norway,	
"	23	Up	iP	11 39 53.1				67.0°N, 14.1°E.	
		Um	iP	11 39 43.0 C				Origin time = 22 51 35.	
"	23	Up	iP	12 16 30.7				The first motions observed	
			Tien-Shan, U.S.S.R.					could be explained by a	
"	23	Ki	iP	14 07 07.9	"	24	Up	iP	02 21 18.2
			i	14 07 13.9			i	02 21 25.2	
		Sk	eP	14 07 14			e	02 24 34	
			iS	14 09 05.7			iPKP	02 25 34.2	
			D = 1090 km = 9.8°.				iPP	02 25 51.6	
		Um	iP	14 07 44.3			iSKS	02 31 53	
			i	14 08 12.5				microns sec	
			iS	14 10 03.0			PP	Z' 0.1 1.0	
			i	14 10 37.9			M	E 6.7 23	
			D = 1350 km = 12°.				M	N 10 23	
			Jan Mayen, 71°N, 5°W.				M	Z 10 24	
			Origin time = 14 04 49.				D = 11700 km = 105½°.		
"	23	Up	iPn	22 53 24.2 D		Ki	iP	02 21 16.7	
			iSn	22 54 45.6			e	02 25 15	
			i	22 55 00.0			iSKS	02 31 43	
			iSg	22 55 33.0				microns sec	
			microns sec				P	Z' 0.1 1.1	
			Sg	Z' 0.1 0.5			SKS	E 1.6 10	
			D = 810 km = 7.3°.				M	E 8.0 22	
		Ki	iPn	22 52 19.9 D			M	N 8.3 21	
			iPg	22 52 26.5			M	Z 8.0 19	
			iSn	22 52 53.1			D = 11650 km = 105°.		
						Sk	e	02 25 18	
							iPP	02 26 01.7	

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

1963

Mar 24 Gb eP 02 21 36
cont. e 02 25 15
Um iP 02 21 13.1
i 02 21 17.5
e 02 25 07
iPKP 02 25 32.3
iSKS 02 31 46
Ka iP 02 21 33.1
e 02 24 47.2
iPKP 02 25 42.6
Sumba Island (h = 30 km).
Magn. = 6.5 (Up, Ki).
The phases arriving in the
24th minute (Up, Ka) and
the 25th minute (Ki, Sk, Gb,
Um) are remarkable in as
much they cannot be
explained by our travel
time tables (J.-B.).

" 24 Up iP 02 35 47.3
Ki iP 02 35 07.9
Gb eP 02 36 12
Um iP 02 35 21.1
Aleutian Islands
(h = 60 km).

" 24 Ki ePg 06 09 38
iSg 06 10 11.4
i 06 10 17.8
D = 300 km = 2.7°.
Sk eSg 06 10 40
Um iPn 06 09 50.6
iSn 06 10 37.6
iSg 06 10 58.5
D = 440 km = 4.0°.
West coast of Norway,
67.0°N, 14.1°E.
Origin time = 06 08 44.
Aftershock of Mar. 23
at 22 51 35.

" 24 Up iP 09 56 19.3
e(PP) 09 59 41
microns sec
P Z' 0.3 1.2
M E 0.6 16
M N 0.8 19
M Z 1.1 18
Ki iP 09 56 01.4
eS 10 06 46
microns sec
P Z' 0.2 1.2
M E 1.5 18
M N 0.6 20
M Z 2.1 20
Sk iP 09 56 23.7

1963

Mar 24 Gb iP 09 56 35.8
cont. Um iP 09 56 07.5
iS 10 06 50
Ka iP 09 56 27.7
Mindanao (h = 50 km).
Magn. = 6.1 (Up, Ki).

" 24 Up iP 11 06 17.5
Hindu Kush (h = 220 km).

" 24 Up iP 12 33 03.9

" 24 Up iP 12 50 29.2
i 12 50 41.9
iPP 12 51 26
i 12 51 42
iS 12 55 41
iSS 12 57 42

microns sec

P Z' 0.1 1.0

PP Z 0.8 5

S N 2.8 13

M E 7.8 15

M N 8.9 14

M Z 12 17

D = 3550 km = 32°.

Ki iP 12 51 12.0 D

iPP 12 52 31

iS 12 56 56

iSS 12 59 16

microns sec

P N 0.6 7

P Z 1.4 6

P Z' 0.4 1.0

PP E 0.9 6

PP N 1.1 6

PP Z 1.6 4

S E 1.4 8

S N 2.0 8

S Z 1.4 8

M E 5.1 10

M N 8.3 13

M Z 16 13

D = 4100 km = 37°.

Sk iP 12 51 06.9 D

Gb iP 12 50 40.7 D

i 12 51 09.5

i 12 51 36.2

iPP 12 51 52.9

Um iP 12 50 45.6 D

iPP 12 51 57

iS 12 56 07

iSS 12 57 55

iSSS 12 58 28

Ka iP 12 50 22.5 D

Iran (h = 30 km).

Magn. = 6.0 (Up, Ki).

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

1963						1963					
Mar	24	Up	iP	15 18 02.9		Mar	25	Ki	iPKP	20 37 03.8 C	
"	24	Up	iP	21 46 18.4 C		cont.		Um	iPKP	20 37 02.1	
			ipP	21 46 36.2						Macquarie Islands	
			eP'P'	22 14 28						(h = 40 km).	
				microns sec		"	25	Up	iP	22 58 43.3 D	
			P	Z' 0.3 0.5					ipP	22 58 54.0	
		Ki	iP	21 45 25.6 C						microns sec	
			ipP	21 45 40.9					P	Z' 0.3 0.8	
			eP'P'	22 14 48					M	E 0.8 14	
		Sk	iP	21 45 58.7 C					M	N 0.8 14	
			ipP	21 46 16.4					M	Z 1.3 14	
		Gb	iP	21 46 34.8				Ki	iP	22 58 45.1	
		Um	iP	21 45 51.5 C					ipP	22 58 56.0	
			ipP	21 46 06.4						microns sec	
			iP'P'	22 14 35.0					P	Z' 0.6 1.0	
			i	22 14 43.5					M	E 1.5 15	
		Ka	iP	21 46 46.5					M	N 1.3 15	
				Aleutian Islands. h = 60 km					M	Z 1.3 16	
				(Up, Ki, Sk, Um).				Sk	iP	22 58 58.6 D	
"	25	Up	iP	03 18 14.9					ipP	22 59 09.4	
"	25	Um	eP	03 23 29				Gb	iP	22 58 56.9 D	
			i	03 23 43.8					ipP	22 59 07.5	
"	25	Up	iP	04 07 37.7				Um	iP	22 58 40.9	
		Ki	iP	04 07 18.0					ipP	22 58 51.5	
		Um	iP	04 07 24.9					eS	23 08 56	
				Luzon (h = 30 km).				Ka	iP	22 58 44.1 D	
"	25	Ki	iPn	05 53 16.0					ipP	22 58 54.8	
			iSg	05 54 11.3						Sumatra. h = 40 km	
			i	05 54 24.9						(Up, Ki, Sk, Gb, Um, Ka).	
				D = 370 km = 3.3°.						Magn. = 6.5 (Up, Ki).	
		Um	iSn	05 54 56.9		"	26	Um	iP	05 53 35.1	
			eSg	05 55 32					i	05 54 59.1	
				D = 640 km = 5.8°.					i	05 55 05.0	
				Northwest Russia,		"	26	Up	i(P)	09 52 32.1	
				68 $\frac{1}{2}$ °N, 29 1/4°E.							
				Origin time = 05 52 21.		"	26	Um	iP	10 01 38.0	
				Explosion?		"	26	Up	eP	10 05 38	
"	25	Up	iP	08 21 14.8					iPKP	10 07 59.2 C	
				microns sec					i	10 08 06	
			P	Z' 0.1 0.5					iPP	10 11 34	
		Ki	iP	08 20 57.6					i	10 18 17.9	
		Um	iP	08 21 02.9						microns sec	
				Luzon (h = 40 km).					PKP	E 1.2 3	
"	25	Up	iP	19 44 00.5					PKP	N 1.9 3	
		Um	i(P)	19 43 51.0					PKP	Z' 1.1 0.5	
"	25	Um	iP	19 58 32.4					M	E 19 22	
"	25	Up	iPKP	20 37 02.3					M	N 47 23	
			i	20 37 17.0					M	Z 52 24	
										(D = 16650 km = 150°).	
								Ki	iPKP	10 07 39.4	
									i	10 07 44.9	
									i	10 10 45	
									iPP	10 10 58	

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

1963

Mar 26 Ki iPKS 10 11 25
cont. i 10 18 46.1
iSS 10 29 29
microns sec
PKP Z 3.8 5
PKP Z' 0.6 0.9
PKS E 3.7 7
PKS N 3.6 7
M E 32 21
M N 27 20
M Z 62 21
(D = 15800 km = 142°).
Sk iPKP 10 07 52.4 C
e 10 18 09
Gb iPKP 10 08 06.2 C
Um eP 10 05 30
iPKP 10 07 47.2 C
iPP 10 11 08
i 10 18 14.4
i 10 21 14
iSS 10 29 52
(D = 16100 km = 145°).
Ka iPKP 10 08 08.1
i 10 08 14.9
Kermadec Islands
(h = 50 km).
Magn. = 7.3 (Up, Ki).
The clear existence of
diffracted P waves
(especially on ultra-long-
period vertical records)
at the distances of 145°
(Um) and 150° (Up) is quite
remarkable. The periods of
diffracted P are 24-26 sec.
The phase arriving in the
18th minute and recorded by
short-period vertical
instruments, travels
probably over the greater
arc, but it has not been
able to identify it.

" 26 Up iP 10 53 04.1 D
Sk iP 10 52 54.0 D
Um iP 10 52 48.6

" 26 Up iPKP 12 05 42.6
i 12 05 45.8
microns sec
PKP Z' 0.1 0.7
Sk iPKP 12 05 35.7
i 12 05 49.3
Gb iPKP 12 05 48.8
Um iPKP 12 05 30.1
i 12 05 44.0
Kermadec Islands
(h = 50 km).

1963

Mar 26 Up iPKP 13 11 18.2
i 13 11 23.3
microns sec
PKP Z' 0.1 0.5
Sk iPKP 13 11 11.0 C
i 13 11 20.6
Gb iPKP 13 11 26.3
i 13 11 33.9
Um iPKP 13 11 06.1 C
i 13 11 13.5
Ka iPKP 13 11 28.7
Kermadec Islands
(h = 60 km).

" 26 Up iPKP 13 44 40.8
✓ i 13 44 42.8
e(PP) 13 48 12
i 13 55 06.7
microns sec
PKP Z' 0.9 0.5
M E 6.4 22
M N 19 23
M Z 18 24
Ki iPKP 13 44 20.4
i 13 44 29.7
i(PP) 13 47 24
iPKS 13 48 00
i 13 55 44.4

microns sec
PKP Z 1.6 7
PKP Z' 0.3 0.9
(PP) Z 1.6 9
PKS E 1.6 6
PKS N 2.1 10
M E 12 21
M N 13 21
M Z 19 20
Sk iPKP 13 44 34.5
Gb iPKP 13 44 46.6
i 13 44 51.0
Um iPKP 13 44 27.6
i 13 44 30.9
Ka iPKP 13 44 51.7

Kermadec Islands
(h = 40 km).
Magn. = 7.0 (Up, Ki).
Compare remark to
earthquake on Mar. 26,
09 48 19.7, concerning
phase arriving 10-11 min
after PKP (Up, Ki).

" 26 Um iPKP 14 53 22.7
New Hebrides Islands
(h = 30 km).

" 26 Up eP 18 38 23
Sk iP 18 38 16.9

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

1963					1963				
Mar	26	Um	eP	18 38 05	Mar	26	Um	iPP	21 48 08
cont.					cont.			iS	21 54 39
"	26	Up	iP	19 58 35.9			Ka	iP	21 46 14.9 C
			ipP	19 58 59.3					Japan (h = 30 km).
				microns sec					Magn. = 6.7 (Up, Ki).
			P	Z' 0.2 0.5	"	26	Up	iP	22 48 20.0 D
		Ki	iP	19 57 49.6				ipP	22 48 44.3
				microns sec			Ki	eP	22 47 43
			P	Z' 0.2 1.0			Sk	i(P)	22 48 15.4
		Sk	iP	19 58 25.5			Um	iP	22 47 59.2 D
		Gb	iP	19 58 56.8				ipP	22 48 23.0
		Um	iP	19 58 10.3					Japan. h = 100 km (Up, Um).
			isP	19 58 44.1					
		Ka	iP	19 58 54.5					
				Kurile Islands.	"	27	Up	e(P)	01 28 56
				h = 90 km (Up, Um).			Ka	iP	01 27 52.0 D
				Magn. = 6.2 (Up, Ki).				i	01 29 28.6
									Greece.
"	26	Um	iP	20 09 09.2	"	27	Um	iP	03 38 53.1
"	26	Up	iP	20 40 04.6	"	27	Um	iP	03 46 28.4
"	26	Um	iP	21 08 30.5					Hindu Kush (h = 190 km).
				Greece.	"	27	Up	iP	05 23 01.9
"	26	Up	iP	21 46 00.9 C			Ki	iP	05 22 17.0 C
			i	21 46 02.4					Kurile Islands (h = 30 km).
			iS	21 55 21	"	27	Um	iP	07 00 23.9
				microns sec					Japan (h = 30 km).
			P	E 0.8 5	"	27	Up	iP	09 01 36.9
			P	N 1.0 5			Sk	eP	09 01 28
			P	Z 2.0 5			Um	iP	09 01 26.4 C
			P	Z' 0.6 1.2	"	27	Up	iSg	11 26 21.7
			S	E 0.9 5			Gb	iPg	11 24 21.0
			S	N 2.4 8				iSg	11 24 27.0
			M	E 34 17				iL	11 24 29.5
			M	N 40 16					D = 60 km = 0.5°.
			M	Z 17 13					West coast of Sweden,
				D = 8000 km = 72°.					57 1/4°N, 12°E.
		Ki	iP	21 45 26.0 C					Origin time = 11 24 12.
			i	21 45 31.0					Explosion?
			iS	21 54 11	"	27	Sk	eSg	11 40 49
				microns sec			Gb	iPg	11 37 38.5
			P	E 2.1 7				iSg	11 37 44.5
			P	N 0.8 7				iL	11 37 47.2
			P	Z 4.6 7					D = 60 km = 0.5°.
			P	Z' 0.4 1.0					West coast of Sweden,
			S	E 1.9 8					57 1/4°N, 12°E.
			S	N 4.0 8					Origin time = 11 37 30.
			M	E 36 13					Explosion?
			M	N 30 13	"	27	Ki	iP	11 54 03.2 C
			M	Z 27 15					
				D = 7350 km = 66°.					
		Sk	iP	21 45 58.3 C					
		Gb	iP	21 46 23.3 C					
		Um	iP	21 45 40.0 C					
			i	21 45 41.2					

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

1963

Mar 27 Up iSg 11 57 39.1
Gb iPg 11 55 38.3
iSg 11 55 44.7
iL 11 55 46.8
D = 60 km = 0.5°.
Um i(Sg) 11 59 29.9
Ka iPn 11 56 11.0
eSg 11 56 49
D = 270 km = 2.4°.
West coast of Sweden,
57 1/4°N, 12°E.
Origin time = 11 55 29.
Explosion?

" 27 Up iSg 12 21 29.7
i 12 21 45.5
Gb iPg 12 19 30.8
iSg 12 19 38.0
iL 12 19 41.9
D = 70 km = 0.6°.
Um i(Sg) 12 23 22.6
Ka iPn 12 19 58.1
iSg 12 20 31.3
D = 240 km = 2.2°.
West coast of Sweden,
57.1°N, 12.0°E.
Origin time = 12 19 19.
Explosion?
The records have an
appearance which is
different from the three
preceding cases on the
west coast of Sweden.

" 27 Ki iP 12 44 09.7
Colombia (h = 180 km).

" 27 Up iP 13 55 30.2

" 27 Um iP 15 09 57.8

" 27 Up i(P) 15 45 51.9

" 27 Um iP 16 24 17.9
Japan.

" 27 Up iP 20 35 24.9

" 27 Up iP 21 59 13.6
i 21 59 28.2
Sk eP 21 59 04
Um iP 21 58 52.9
i 21 59 04.9
Ka e(P) 21 59 33

" 28 Up iP 00 19 55.3 C

1963

Mar 28 Up iS 00 23 13
cont. microns sec
P E 37 10
P N 33 10
P Z 36 9
P Z' 20 3.0
S E 230 21
S N 230 22
S Z 30 16
M E 240 15
M N 320 17
M Z 170 16
D = 1950 km = 17 1/2°.
Ki iP 00 19 27.1 C
iS 00 22 30
i 00 23 20
microns sec
P E 44 10
P N 17 10
P Z 58 10
P Z' 9.3 1.5
S E 34 7
S N 8.2 11
S Z 28 10
M E 240 13
M N 140 11
M Z 360 12
D = 1700 km = 15 1/2°.
Sk iP 00 19 01.9 C
i 00 19 07.1
iS 00 21 39.3
Gb iP 00 19 45.8
i 00 19 51.6
Um eP 00 19 42 C
iS 00 22 37
Ka eP 00 20 18 C
Iceland (h = 15 km).
Magn. = 7.0 (Up, Ki).
P(Z') has usually a
relatively long period in
shocks from this area.

" 28 Up i(P) 00 23 52.4

" 28 Up iP 00 30 34.2
Ki iP 00 30 05.8
i 00 30 09.5
i 00 30 14.3
microns sec
P Z' 0.5 1.2
Sk iP 00 29 47.5
Um iP 00 30 21.3 C
Ka iP 00 30 51.6
Iceland (h = 30 km).

" 28 Up iP 00 31 13.6 C

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

1963						1963					
Mar	28	Up	i	00 31 16.8		Mar	28	Sk	iP	14 37 11.1	
cont.				microns sec							
			P	Z' 0.3 1.0		"	28	Um	i(P)	15 23 19.4	
		Ki	iP	00 30 44.8							
			i(S)	00 33 56.5		"	28	Um	iP	17 20 41.0	
				microns sec					West Pakistan.		
			P	Z' 2.8 1.7							
		Sk	iP	00 30 20.6 C		"	28	Up	iPKP	23 48 51.9	
			i	00 32 49.1					microns sec		
		Gb	iP	00 31 03.7					PKP	Z' 0.2 1.0	
			i	00 31 07.3					M	E 0.8 18	
		Um	iP	00 31 00.4 C					M	N 1.1 19	
		Ka	iP	00 31 32.4					M	Z 0.9 18	
		Iceland.						Ki	iPKP	23 48 35.4 C	
		Origin time = 00 27 06.						Sk	iPKP	23 48 45.1	
"									i	23 48 53.8	
"	28	Up	iP	01 03 44.6				Gb	iPKP	23 49 00.8	
			e	01 07 37					i	23 49 08.5	
				microns sec				Um	iPKP	23 48 40.2 C	
			P	Z' 0.1 1.0					iPP	23 51 45.5	
		Ki	iP	01 03 16.8				Ka	iPKP	23 49 07.3 C	
			i	01 03 22.0					Kermadec Islands (h = 50 km).		
				microns sec		"	29	Um	iP	01 37 18.8	
			P	Z' 1.1 1.6					Italy.		
		Sk	iP	01 02 52.2							
		Gb	iP	01 03 35.1		"	29	Up	ePKP	01 59 57	
		Um	iP	01 03 32.0				Sk	iPKP	01 59 49.7	
		Ka	iP	01 04 05.4				Um	iPKP	01 59 44.7 D	
		Iceland (h = 30 km).							Kermadec Islands (h = 30 km).		
"	28	Ki	iP	01 32 22.9 C		"	29	Up	iP	03 13 46.8	
		Um	iP	01 32 35.4					i	03 13 50.2	
		Iceland (h = 30 km).							microns sec		
"	28	Up	iP	02 40 37.2 D					M	E 4.2 15	
			i	02 40 58.1					M	N 2.1 15	
"	28	Ki	iP	04 02 45.7			Ki	iP	03 15 03.3		
		Sk	eP	04 03 12					microns sec		
		Um	iP	04 02 40.8					M	E 2.7 12	
		Sinkiang Province, China.							M	N 1.0 11	
"	28	Up	iP	09 57 52.6					M	Z 1.2 11	
		Ki	iP	09 57 02.2 C			Sk	iP	03 14 32.1		
		Um	iP	09 57 25.5 C			Um	iP	03 14 23.0 C		
		Kurile Islands (h = 50 km).						i	03 14 28.0		
"	28	Up	iPKP	11 32 12.2 C			Ka	iP	03 13 17.4		
				microns sec					Turkey (h = 30 km).		
			PKP	Z' 0.2 0.5		"	29	Up	iP	06 00 47.9	
		Ki	ePKP	11 31 49				Sk	eP	06 00 46	
		Sk	iPKP	11 32 05.6 C				Um	iP	06 00 38.1 C	
			i	11 32 22.6		"	29		i	06 00 50.0	
		Gb	iPKP	11 32 20.4 C			Um	iP	06 43 37.8		
		Um	iPKP	11 31 59.9 C					Japan (h = 30 km).		
		Ka	iPKP	11 32 23.7 C		"	29	Um	eP	09 11 08	
		Kermadec Islands (h = 40 km).				"	29	Up	i(P)	13 29 29.3	

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

1963	1963
Mar 29 Um iP 13 56 44.5	Mar 30 Sk iPKP 02 12 16.6
" 29 Up iP 14 02 21.2	cont. i 02 12 25.3
" 29 Um iP 14 43 49.2 C	iSKP 02 15 36.9
" 29 Um iP 15 27 53.1	Gb iPKP 02 12 27.8
" 29 Um i(P) 16 07 48.2	i 02 12 36.7
" 29 Um iP 20 12 12.9 C	iSKP 02 15 52.4
Hindu Kush (h = 200 km).	Um iPKP 02 12 12.0
" 29 Ki e(P) 21 10 08	i 02 12 20.8
i 21 10 12.9	iSKP 02 15 28.6
" 29 Up iPKP 21 36 21.6 C	iPKS 02 15 44
microns sec	epPKS 02 16 21
PKP Z' 0.1 0.5	i 02 21 13
Ki eP 21 36 01	i 02 22 34
Sk iPKP 21 36 15.1 C	i(PS) 02 24 46.4
i 21 36 18.1	Ka iPKP 02 12 35.1
Gb iPKP 21 36 29.9 C	iSKP 02 15 53.3
Um iPKP 21 36 09.6 C	New Hebrides Islands
Ka iPKP 21 36 30.6	(h = 160 km).
Kermadec Islands (h = 60 km).	" 30 Um iP 07 05 33.1 D
" 29 Ki iP 21 58 31.1 C	Aleutian Islands
Dodecanese Islands	(h = 30 km).
(h = 30 km).	" 30 Up iP 11 47 38.0
" 30 Um iP 00 40 25.1 C	" 30 Up iPKP 11 57 12.1
" 30 Up iPKP 02 12 23.8	Um iPKP 11 56 57.5
i 02 12 29.0	Kermadec Islands
iSKP 02 15 41.7	(h = 30 km).
i 02 15 45.9	" 30 Up iP 12 01 05.6 C
iPKS 02 15 57	" 30 Um i(P) 16 56 50.5
epPKS 02 16 37	" 30 Up iP 17 02 55.7 C
i 02 21 37	i 17 02 57.7
microns sec	iS 17 11 52
SKP Z' 0.2 0.6	i 17 13 12
PKS N 0.4 3	eP'P' 17 30 28
M E 0.9 19	microns sec
M N 1.2 20	P N 0.4 3
(D = 14900 km = 134°).	P Z 1.0 3
Ki iPKP 02 12 14.0	P Z' 0.1 0.5
iSKP 02 15 17.0	M E 2.8 21
ePKS 02 15 29	M N 3.7 25
i 02 22 11	M Z 3.9 20
eSP 02 24 08	D = 7550 km = 68°.
microns sec	Ki iP 17 02 10.3 C
PKP Z' 0.4 1.1	iPcP 17 02 52.9
PKS N 0.4 7	eS 17 10 25
M E 1.2 18	eScS 17 12 03
M N 0.7 14	eP'P' 17 31 29
(D = 14100 km = 127°).	microns sec
	P Z' 0.3 1.2
	S E 0.7 10
	M E 7.3 20
	M N 3.9 20

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

1963				1963			
Mar	30	Ki	microns sec	Mar	31	Ki	iPS 05 12 53
cont.		M	Z 8.3 20 ⁰	cont.			microns sec
			D = 6800 km = 61 ⁰ .			Um	SKS E 0.5 7
		Sk	iP 17 02 45.8				ePP 05 03 51
			iPcP 17 03 15.4				iSKS 05 10 25
			i 17 04 28.8				eS 05 11 20
			eP'P' 17 31 08				ePS 05 12 49
		Gb	iP 17 03 17.7 C			Peru (h = 30 km).	
			iPcP 17 03 36.6				
		Um	iP 17 02 31.5 C	"	31	Um	iP 05 24 38.1
			iPcP 17 03 05.0				
			i 17 05 16.8	"	31	Up	iPKP 05 50 25.6
			ePa 17 06 43				i 05 50 29.2
			eS 17 11 04				i 05 50 35.1
		Ka	iP 17 03 19.5 C				ePKS 05 53 57
			iPcP 17 03 37.7				e 06 01 04
			Kurile Islands (h = 30 km).				microns sec
			Magn. = 6.1 (Up,Ki).				PKP Z 1.1 3
"	30	Ki	eP 17 38 11				PKP Z' 0.2 0.5
			Sinkiang Province, China.				M E 3.1 23
			(h = 30 km).				M N 7.1 23
"	30	Um	iP 21 03 02.6 C				M Z 7.2 24
"	31	Up	iP 02 33 54.4			Ki	iPKP 05 50 07.8
			i 02 35 00.2				ePP 05 53 10
			iPP 02 35 11.9				iPKS 05 53 47
			microns sec				microns sec
		M	N 0.7 14				PKP Z 1.2 8
		Ki	iP 02 34 20.4				PP Z 1.0 9
			i(P) 02 35 37.3				PKS E 0.6 8
			eLgl 02 46 35				PKS N 0.9 12
			microns sec				M E 4.4 20
		M	E 1.1 13				M N 4.8 20
		M	N 1.0 16				M Z 12 21
		M	Z 1.7 14			Sk	iPKP 05 50 21.5 C
		Sk	iP 02 34 27.4			Gb	iPKP 05 50 36.5 C
		Um	iP 02 34 00.9 C			Um	iPKP 05 50 16.4 C
			Iran (h = 30 km).				i 06 00 28.8
"	31	Ki	e(P) 02 44 38			Ka	iPKP 05 50 33.8
"	31	Ki	e(Pg) 04 59 18				i 05 50 37.0
			iSn 04 59 47.3				Kermadec Islands (h = 50 km).
			iSg 05 00 10.8				Magn. = 6.5 (Up,Ki).
			D = 490 km = 4.4 ⁰ .				Compare remark to earth-
		Sk	iSg 05 02 41.2				quake on Mar. 26, 09 48 19.7,
		Um	i 05 00 44.0				concerning phase arriving
			iSg 05 01 03.9				10-11 min after PKP (Up,Um).
			Northwest Russia,	"	31	Gb	iP 06 40 48.9 C
			67.5 ⁰ N, 31.9 ⁰ E.	"	31	Ki	iSn 06 53 17.2
			Origin time = 04 57 46.				iSg 06 53 38.0
			Explosion?				D = 460 km = 4.1 ⁰ .
"	31	Up	iPP 05 03 47			Um	iSg 06 54 28.9
			iSKS 05 10 20				Northwest Russia,
			ePS 05 12 47				67 1/4 ⁰ N, 31 ⁰ E.
		Ki	ePP 05 03 53				Origin time = 06 51 23.
			eSKS 05 10 21				Explosion?
				"	31	Up	—
							microns sec
						M	E 3.1 23

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

1963
Mar 31 Up microns sec
cont. M N 5.7 20
M Z 6.1 19
Ki —
microns sec
M E 6.0 25
M N 4.0 22
M Z 11 23
" 31 Sk ePKP 07 26 08
e 07 26 15
Um iPKP 07 26 06.0
i 07 26 51.1
New Britain (h = 60 km).
" 31 Um i(P) 08 00 24.9
" 31 Up iPKP 08 32 19.8
Sk iPKP 08 32 11.8
Gb i(PKP) 08 32 41.2
Kermadec Islands
(h = 60 km).
" 31 Up iPKP 09 27 00.1
i 09 27 03.6
microns sec
PKP Z' 0.2 0.6
Ki ePKP 09 26 39
Sk iPKP 09 26 53.2 C
Gb iPKP 09 27 07.7 C
Ka iPKP 09 27 10.6
Kermadec Islands
(h = 50 km).
" 31 Up eP 10 12 18
Um iP 10 12 07.3 C
" 31 Up eP 11 04 35
Sk iP 11 04 27.4
Um iP 11 04 22.4
" 31 Um iP 12 37 02.9
Japan (h = 30 km).
" 31 Um iP 15 04 43.9
i 15 04 53.2
Morocco (h = 30 km).
" 31 Up iP 17 41 19.7 D
i 17 41 29.5
microns sec
P Z' 0.1 0.5
Ki iP 17 41 21.9 D
i 17 41 31.4
eS 17 51 45
microns sec
P Z' 0.1 1.0
S E 0.5 8

1963
Mar 31 Ki microns sec
cont. M E 0.6 14
M N 0.5 15
M Z 0.6 15
D = 9350 km = 84°.
Sk iP 17 41 34.3
Gb iP 17 41 32.1
i 17 42 14.4
Um iP 17 41 17.4 D
i 17 41 26.9
eS 17 51 31
Nicobar Islands
(h = 30 km).
Magn. = 6.0 (Up, Ki).
" 31 Up iPKP 19 42 30.0
i 19 42 33.6 C
microns sec
PKP Z' 0.4 0.8
M E 1.4 24
M N 3.3 23
M Z 3.0 23
Ki iPKP 19 42 10.4
i 19 42 17.1
i 19 44 34.5
iPKS 19 45 49
microns sec
PKP Z 0.5 7
PKS E 0.5 7
PKS N 0.4 6
M E 1.6 21
M N 1.6 20
M Z 3.9 21
Sk iPKP 19 42 26.0 C
Gb ePKP 19 42 35
i 19 42 41.6
Um iPKP 19 42 20.8 C
e 19 45 31
eSS 20 04 43
Ka iPKP 19 42 37.7 C
Kermadec Islands
(h = 50 km).
Magn. = 6.2 (Up, Ki).
" 31 Up iPKP 19 48 08.5 D
Sk iPKP 19 47 58.1
Um iPKP 19 47 52.9 D
Kermadec Islands.

Markus Båth
August 23, 1963

Seismological Institute
Uppsala

P R E L I M I N A R Y

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 P R I L 1 - 30, 1963.
.....

1963

Apr 1 Ki eL 03 16
microns sec
M N 0.7 21
M Z 1.5 21
New Britain (h = 60 km).

" 1 Ki iPKP 04 10 16.3
Sk iPKP 04 10 26.5
Um iPKP 04 10 21.5
Santa Cruz Islands
(h = 210 km).

" 1 Up iP 04 39 03.9 D
iPcP 04 39 33.4
ipP 04 40 05.5
iS 04 47 26
iScS 04 48 30

microns sec
P Z' 0.1 0.7
S E 0.1 2
M E 0.6 15
M Z 1.1 17
(D = 7350 km = 66°).

Ki iP 04 38 19.9 D
iPcP 04 39 05.9
iS 04 46 04
iScS 04 47 42
eSa 04 52 51

microns sec
P Z' 0.1 1.0
S E 0.6 7
S N 0.5 8
(D = 6650 km = 60°).

Sk iP 04 38 54.9 D
i(PP) 04 41 09.5
Gb iP 04 39 25.9 D

1963

Apr 1 Um iP 04 38 39.0 D
cont. iPcP 04 39 16.9
iS 04 46 40
iScS 04 48 03
(D = 7000 km = 63°).

Ka iP 04 39 21.7 D
Japan. h = 270 km (Up).
Magn. = 5.7 (Up, Ki).

" 1 Up e(P) 04 47 01
Ki ePn 05 30 22
iSn 05 31 17.4
iSg 05 31 40.3
D = 510 km = 4.6°.
Sk eSg 05 34 14
Um eSn 05 32 03
iSg 05 32 40.3
D = 710 km = 6.4°.

Northwest Russia,
67.8°N, 32.5°E.
Origin time = 05 29 09.
Explosion?

" 1 Ki iP 06 49 31.4
Um iP 06 49 41.5

" 1 Up iPKP 08 50 20.1
i 08 50 26.4
Sk iPKP 08 50 08.9
Gb iPKP 08 50 32.1 C
Um iPKP 08 50 06.0
Kermadec Islands (h = 40 km).

" 1 Up iP 09 30 28.2
i(pP) 09 30 54.7
iPP 09 32 00.6

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

1963

Apr	1	Up	i	09 32 12.4
cont.			i	09 32 43.5
			iS	09 36 35
			e	09 39 06
				microns sec
		PP	E	0.4 5
		M	E	0.6 11
		M	N	1.7 12
		M	Z	0.9 15
		D = 4550 km = 41°.		
	Ki	iP		09 30 36.6
		i(pP)		09 31 31.5
		e(PP)		09 32 17
		i		09 33 31.4
				microns sec
		M	E	0.7 10
		M	N	0.4 13
		M	Z	0.6 10
	Sk	iP		09 30 54.2 C
	Gb	eP		09 30 37
		i		09 30 49.1
	Um	iP		09 30 27.4 C
		ePP		09 32 05
		iS		09 36 22
		i		09 39 20
	Ka	iP		09 30 22.2
		i		09 30 29.1
		i(pP)		09 31 04.2
	Hindu Kush (h = 100 km).			
"	1	Um	i(P)	10 55 42.9
		Local blast?		
"	1	Up	ePKP	11 36 34
		Sk	ePKP	11 36 25
		Um	ePKP	11 36 20
		Kermadec Islands (h = 30 km)		
"	1	Up	i(P)	13 34 28.8
		Local blast?		
"	1	Um	iP	14 16 14.3
"	1	Ka	iPg	14 49 14.4
			iSg	14 49 15.2
		Probably explosion, near K		
"	1	Um	iP	15 35 14.9
"	1	Up	iP	15 44 25.6
"	1	Up	i(P)	15 51 18.0 C
"	1	Ki	iP	16 39 01.9
		Sinkiang Province, China		
		(h = 200 km).		

1963

Apr	1	Up	iP	18 43 48.0	
		Um	iP	18 43 45.9	C
		Ka	eP	18 43 49	
		Hindu Kush (h = 240 km).			
"	1	Um	iPKP	20 15 22.2	D
		Santa Cruz Islands (h = 30 km).			
"	1	Up	iP	20 44 15.4	
"	1	Ki	iPg	22 34 40.0	
			iSg	22 35 08.5	
		D = 240 km = 2.2°.			
		Um	iSg	22 36 17.9	
		Possibly Northern Finland.			
		Origin time = 22 33 56.			
"	1	Up	i(PKP)	22 38 03.2	
		Sk	i(PKP)	22 37 55.6	
		Gb	e(PKP)	22 38 11	
		Um	i(PKP)	22 37 50.6	
		(Kermadec Islands).			
"	2	Up	ePKP	03 52 55	
		Um	iPKP	03 52 39.6	C
			i	03 52 48.1	
		Kermadec Islands (h = 30 km).			
"	2	Up	iP	04 17 11.3	
				microns sec	
		P	Z'	0.1 1.4	
		Ki	eP	04 16 15	
		Um	eP	04 16 41	
		Ka	iP	04 17 35.1	C
		Kamchatka (h = 30 km).			
"	2	Um	iP	04 22 41.0	
"	2	Up	iPKP	05 03 11.0	
		Sk	iPKP	05 03 04.7	
		Gb	iPKP	05 03 14.8	
		Um	iPKP	05 02 58.1	
		Ka	ePKP	05 03 17	
			i	05 03 34.8	
		Kermadec Islands (h = 50 km).			
"	2	Up	iPKP	05 24 48.1	
		Sk	ePKP	05 24 41	
		Um	iPKP	05 24 35.5	
		Kermadec Islands (h = 40 km)			
"	2	Up	ePKP	05 40 36	
		Sk	iPKP	05 40 33.8	
		20 Um	iPKP	05 40 21.5	
			i	05 40 29.0	
		Kermadec Islands (h = 30 km)			

1963				1963					
Apr				Apr					
2	Um	iP	08 02 40.6	2	Ka	eP'P'	16 57 47		
		i	08 02 41.8	cont.		Aleutian Islands. h = 160 km			
	Local blast?					(Up, Ki, Sk, Gb, Um, Ka).			
"	2	Ki	i(P)	11 13 27.9	"	2	Up	iP	20 43 23.2 C
		Um	iP	11 14 12.0 D					
"	2	Up	iPKP	11 45 12.9	"	3	Ki	iP	01 24 05.4
		Gb	iPKP	11 45 13.9			Um	iP	01 23 58.0
		Um	iPKP	11 44 58.0			North Atlantic Ocean		
		Kermadec Islands (h = 50 km).					(h = 30 km).		
"	2	Ki	iP	11 48 57.2 C	"	3	Um	i(P)	06 46 56.9
		Sumatra (h = 90 km).					Local blast?		
"	2	Um	iP	11 59 27.5 C	"	3	Ka	iPg	09 05 20.6 C
								iSg	09 05 21.3
"	2	Up	iP	12 45 38.7 C			Probably explosion, near Ka.		
							This record like all the		
"	2	Ka	iPg	14 49 37.9			others in the same series		
			iSg	14 49 38.8			exhibits Rayleigh surface		
		Probably explosion, near Ka.					waves of 0.5 sec period.		
"	2	Up	i(P)	15 12 34.5	"	3	Ka	iPg	09 45 27.8
		Local blast?						iSg	09 45 28.7
							Probably explosion, near Ka.		
"	2	Gb	i(P)	14 09 58.2	"	3	Ka	iPg	10 10 17.8 C
								iSg	10 10 18.6
"	2	Up	iP	16 29 34.4 D			Probably explosion, near Ka.		
			ipP	16 30 15.4					
			iS	16 38 15					
			eP'P'	16 57 47	"	3	Um	iP	10 23 27.4
			i	16 57 53.8					
					"	3	Up	iPKP	11 41 28.3 C
								i	11 41 33.4
							Ki	iPKP	11 41 14.6
							Sk	iPKP	11 41 21.4 C
							Gb	iPKP	11 41 36.2 C
							Um	iPKP	11 41 16.3 C
							Ka	iPKP	11 41 38.3
							Kermadec Islands (h = 50 km).		
					"	3	Um	iP	11 58 16.7
							Java (h = 160 km).		
					"	3	Up	eP	12 10 11
								i	12 10 19.5
							Ki	iP	12 09 50.2 C
							Sk	iP	12 10 15.7
							Um	iP	12 09 57.0
							Philippine Islands		
							(h = 70 km).		
					"	3	Ka	iPg	12 09 53.2 C
								iSg	12 09 54.0
							Probably explosion, near Ka.		

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

1963						1963					
Apr	3	Ka	iPg	12 45 42.7 C		Apr	4	Um	iP	09 57 54.3	
			iSg	12 45 43.5							
			Probably explosion, near Ka.			"	4	Up	i(P)	10 40 01.3	
									i	10 40 06.4	
"	3	Um	i(P)	13 15 36.7		"	4	Ki	eP	13 55 10	
"	3	Up	i(P)	14 52 28.3				Formosa (h = 20 km).			
"	3	Up	iP	14 59 56.9 C		"	4	Up	eP	14 03 37	
"	3	Um	e(PKP)	15 08 38					i(P)	14 04 31.3	
			i	15 08 47.4			Um	i(P)	14 01 25.9 C		
			i	15 20 07					i(P)	14 06 11.4	
		South-Pacific Ocean				"	4	Up	i(P)	16 35 00.7	
		(h = 30 km).				"	4	Up	ePKP	18 45 22	
"	3	Up	eP	16 04 39					i	18 45 30.5	
		Ki	iP	16 03 48.9			Sk	ePKP	18 45 20		
			i	16 03 57.0			Um	iPKP	18 45 15.0		
		Sk	iP	16 04 32.2			Kermadec Islands (h = 20 km).				
		Gb	iP	16 04 56.1		"	4	Up	eP	20 34 49	
		Um	iP	16 04 17.8					i	20 34 56.7	
			i	16 04 27.0		"	4	Ki	iP	20 54 09.7	
		Alaska (h = 80 km).				"	4	Up	iPKP	22 20 43.9	
"	3	Up	eL	16 06					i	22 20 48.6	
				microns sec			Ki	ePKP	22 20 24		
		M	E	0.7 18					i	22 20 31.2	
		M	N	1.6 20			Sk	iPKP	22 20 37.7		
		M	Z	1.8 19			Gb	iPKP	22 20 53.8		
		Ki	eL	16 08			Um	iPKP	22 20 32.5		
				microns sec			Ka	iPKP	22 20 53 D		
		M	E	2.2 20			Kermadec Islands (h = 40 km).				
		M	N	1.0 20		"	4	Up	iPKP	23 47 29.8	
		M	Z	3.7 19			Ki	i(PKP)	23 47 21.4		
		New Britain (h = 60 km).					Sk	iPKP	23 47 24.5		
"	3	Um	iP	18 33 11.5			Um	iPKP	23 47 19.1		
"	3	Up	iP	19 12 46.6			Kermadec Islands (h = 30 km)				
		Gb	iP	19 12 57.6		"	5	Up	iP	01 03 12.5 D	
		Um	iP	19 12 16.9						microns sec	
			i(PP)	19 15 30.1				P	Z'	0.1 0.8	
		Ka	iP	19 13 01			Ki	iP	01 02 32.0 D		
		Mariana Islands (h = 30 km).					Sk	iP	01 03 06.0		
"	3	Ki	i(P)	20 26 43.4 C			Um	iP	01 02 50.0 D		
		Um	iP	20 27 25.4			Japan (h = 50 km).				
"	3	Um	e(P)	23 45 46		"	5	Up	iPKP	02 45 51.6	
"	4	Ka	iPg	08 36 09.6					i	02 45 55.6	
			iSg	08 36 10.5					i	02 45 59.7	
		Probably explosion, near Ka.					Ki	ePKP	02 45 34		
"	4	Ka	iPg	09 01 12.7			Sk	iPKP	02 45 45.1		
			iSg	09 01 13.4			Um	iPKP	02 45 40.1		
		Probably explosion, near Ka.					Kermadec Islands (h = 30 km).				
"	4	Ka	iPg	09 01 12.7		"	5	Um	e(P)	03 34 13	
			iSg	09 01 13.4							
		Probably explosion, near Ka.									

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

1963					1963				
Apr	5	Ki	iP	07 02 27.5	Apr	6	Sk	ePKP	07 21 10
		Um	iP	07 02 23.8	cont.			iSKP	07 24 00.8
		Sumatra (h = 30 km).					Gb	iPKP	07 21 34.8
"	5	Up	eLgl	07 10 41			Um	iPKP	07 21 14.3
			i	07 10 49.9				iSKP	07 23 55.5
		Ki	iLgl	07 14 30.8			Fiji Islands (h = 530 km).		
			i	07 14 37.4	"	6	Up	iP	07 35 13.6
		Sk	eS	07 11 24				i	07 35 30.4
			iLgl	07 12 58.2	"	6	Um	iP	08 05 42.4
		Gb	iLgl	07 10 23.6	"	6	Up	iP	09 19 24.6
			iLg2	07 10 50.3				i	09 19 34.9
			iRg	07 11 43.4	"	6	Up	iP	09 51 44.0
		Um	iS	07 10 46.5				i	09 51 48.0
			iLgl	07 12 28.9	"	6	Sk	eP	09 52 25
			i	07 12 32.9			Um	iP	09 52 12.4
		Ka	eLi	07 09 12				i	09 52 25.0
			i	07 10 53			Greece.		
			i	07 11 39					
		Carpathians. Very well developed Lgl.							
"	5	Up	iPKP	11 09 48.2	"	6	Up	iP	11 29 02.8 C
		Um	ePKP	11 09 30				i	11 29 13.0
		Kermadec Islands (h = 40 km).							
"	5	Ki	eS	13 58 51					
		Sk	i(Lgl)	13 59 55.5			P		microns sec
		Um	iLgl	14 00 11.4			Z'	0.2	1.2
		Italy.							
"	5	Ki	eP	14 35 14			Ki	iP	11 28 05.9 C
			i	14 35 23.8				i	11 28 09.3
			eS	14 37 26					microns sec
			i	14 37 36.7			P		Z' 0.3 1.3
			D = 1300 km = $11 \frac{1}{2}^{\circ}$.				Sk	iP	11 28 33.7 C
		Um	eS	14 39 16			Gb	iP	11 29 15.1 C
			i	14 40 56.0				i	11 29 19.0
		Spitsbergen area (including Finnish and Norwegian observations).					Um	iP	11 28 35.4 C
								i	11 28 39.0
								iPa	11 31 37.0
							Ka	iP	11 29 26.6 C
								i	11 29 30.4
		Alaska (h = 40 km).					Magn. = 6.1 (Up, Ki).		
"	5	Up	iP	20 59 13.8 C	"	6	Up	iP	11 57 44.7 C
"	6	Up	iP	01 30 14.8	"	6	Up	iP	12 16 46.3
			i	01 30 21.5			Ki	iP	12 15 48.9 C
			i	01 31 23.7			Sk	iP	12 16 17.1 C
"	6	Up	iPKP	05 53 50.0			Gb	iP	12 16 58.5
		Sk	e(PKP)	05 53 49			Um	iP	12 16 19.0
		Um	iPKP	05 53 39.9			Ka	iP	12 17 11.9
		Kermadec Islands (h = 30 km).			"	6	Up	iPKP	15 29 25.0
"	6	Up	iSKP	07 24 08.8			Ki	iPKP	15 29 19.4 C
			i	07 24 15.9			Sk	iPKP	15 29 17.8
		Ki	iPKP	07 21 12.3			Um	iPKP	15 29 12.4 C
			iSKP	07 23 43.6			Kermadec Islands (h = 30 km).		

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

1963

Apr	6	Ki	iPn	15 48 56.6
			iSn	15 49 45.7
			iSg	15 50 01.4
			D = 420 km = 3.8°.	
		Um	iSg	15 51 31.0
			Northwest Russia,	
			68.9°N, 30.4°E.	
			Origin time = 15 47 57.	
			Explosion?	
"	6	Up	iP	16 27 32.0
"	6	Um	iP	16 36 41.1
			Japan (h = 80 km).	
"	6	Up	iP	17 57 40.1 C
			i	17 57 42.7
			microns sec	
		P	Z' 0.1	1.0
		Ki	iP	17 57 39.0
			microns sec	
		M	E 0.5	16
		M	N 0.9	17
		Sk	iP	17 58 01.9
		Um	iP	17 57 33.0
			ePa	18 00 33
			Tibet (h = 30 km).	
"	6	Up	iPKP	18 22 03.5 D
			i	18 22 10.9
		Ki	ePKP	18 21 50
			i	18 22 14.0
		Sk	iPKP	18 21 57.5
			i	18 22 11.5
		Um	iPKP	18 21 52.2
			Kermadec Islands	
			(h = 200 km).	
"	7	Up	iPKP	04 16 48.3
			isPKP	04 17 28.3
		Sk	i	04 17 55.7
		Gb	iPKP	04 16 58.0 C
			i	04 17 06.6
		Um	iPKP	04 16 46.5
			i	04 17 44.0
		Ka	iPKP	04 17 04
			Tonga Islands (h = 110 km)	
"	7	Up	iSg	05 13 03.7
		Ki	iPn	05 08 47.5
			iSn	05 09 43.9
			eSg	05 10 05
			D = 480 km = 4.3°.	
		Sk	eSg	05 12 40
		Um	iSn	05 10 25.8
			i	05 10 39.5

1963

Apr	7	Um	eSg	05 11 03
cont.			D = 670 km = 6.0°.	
			Northwest Russia,	
			67.5°N, 32.0°E.	
			Origin time = 05 07 43.	
			Explosion?	
"	7	Up	i(P)	07 49 17.8
"	7	Up	iP	08 28 42.6
"	7	Ki	eP	11 06 25
		Gb	eP	11 07 33
			Jan Mayen (h = 70 km).	
"	7	Up	iP	11 19 58.5
		Ki	iP	11 18 50.9
			microns sec	
		M	E	2.7 17
		M	N	1.2 14
		Sk	iP	11 19 00.7 C
		Gb	eP	11 20 06
		Um	iP	11 19 27.6 C
		Ka	iP	11 20 27.3 C
			Jan Mayen (h = 30 km).	
"	7	Up	iP	13 17 02.2
		Ki	iP	13 16 36.7 C
		Um	iP	13 16 46.5
			Ryukyu Islands (h = 120 km).	
"	7	Up	eP	14 38 18
"	7	Up	iP	15 19 25.5 C
		Ki	iP	15 18 57.9
			i	15 19 32.4
			i	15 19 48.5
		Sk	eP	15 19 27
		Gb	iP	15 19 51.2
		Um	iP	15 19 08.1 C
			iPcP	15 19 27.6
		Ka	iP	15 19 44.7
			i	15 19 58.0
			Ryukyu Islands (h = 30 km).	
"	7	Up	iP	15 38 31.9
			epP	15 39 15
		Ki	eP	15 37 38
			epP	15 38 25
		Sk	eP	15 38 10
		Gb	iP	15 38 57.0
			ipP	15 39 34.9
		Um	iP	15 38 05.9
			ipP	15 38 50.5
		Ka	iP	15 38 53.9
			ipP	15 39 42.3
			Aleutian Islands. h = 180 km	
			(Up, Ki, Gb, Um, Ka).	

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

1963						1963					
Apr	7	Um	iP	21 48 39.7 D		Apr	8	Ka	iP	11 30 43.5	
"	7	Up	iP	22 49 05.3 C		cont.		Kurile Islands	(h = 110 km).		
			iPP	22 52 44.3		"	8	Um	e(P)	11 37 06	
			eSKS	22 59 30		"	8	Up	iP	14 47 38.9	
			iS	22 59 52				iS	14 55 09		
			i	23 00 25				D = 5850 km = 52 $\frac{1}{2}$ ⁰ .			
				microns sec				Ki	iP	14 47 57.5	
			P	E 0.4 3				i	14 48 04.3		
			P	Z 0.9 2					microns sec		
			P	Z' 0.8 1.2				P	Z' 0.1 1.0		
			PP	E 0.4 2				Sk	iP	14 47 26.0	
			PP	Z 0.6 2				Gb	iP	14 47 13.1	
			PP	Z' 1.3 1.8				Um	iP	14 47 53.0	
			S	E 1.9 7				eS	14 55 37		
			M	E 3.4 20				Ka	iP	14 47 28	
			M	N 4.1 20				North Atlantic Ocean			
			M	Z 4.3 19				(h = 30 km).			
			D = 10300 km = 92 $\frac{1}{2}$ ⁰ .								
		Ki	iP	22 49 04.5 C		"	8	Um	iSKP	22 58 51.9	
			iPP	22 49 22.2				Fiji Islands	(h = 420 km).		
			iS	22 59 58		"	9	Up	iP	00 13 44.0	
				microns sec				Sk	iP	00 14 00.7	
			P	Z' 1.0 1.2				Um	iP	00 13 40.5 C	
			S	E 3.7 8				Ka	i(P)	00 14 06	
			M	E 7.9 19				India	(h = 30 km).		
			M	N 6.0 22							
			D = 10200 km = 92 ⁰ .			"	9	Up	---		
		Sk	iP	22 49 18.9					microns sec		
			iPP	22 53 09.6				M	N 1.0 16		
		Gb	iP	22 49 18.6 C				M	Z 1.0 16		
			iPP	22 53 07.7				Ki	e	01 44 56	
		Um	iP	22 49 02.4 C				Um	e	01 45 30	
			iPP	22 52 45.3				Ka	eS	01 46 46	
			i	22 52 58.5				Jan Mayen	(h = 20 km).		
			iS	22 59 48				The waves read at Ki and			
			i	23 00 18				Um have group velocities			
		Ka	iP	22 49 09 C				= 3.52 and 3.79 km/sec resp.,			
			i	22 52 41				agreeing with Lgl and Li			
			iPP	22 52 51				resp., which is remarkable,			
			i	22 53 06				considering the paths.			
		Sumatra	(h = 70 km).								
		Magn.	= 6.7 (Up, Ki).								
"	8	Ki	iP	06 50 37.5 C		"	9	Up	e(PKP)	02 20 32	
		Sk	iP	06 51 02.1				i	02 21 14.0		
		Um	eP	06 50 31				iSKP	02 23 24.1		
		Kirghiz, U.S.S.R.							microns sec		
		(h = 30 km).						SKP	Z' 0.1 1.0		
"	8	Up	iP	07 39 43.8				Ki	iPKP	02 20 29.5 C	
								iSKP	02 22 59.7		
									microns sec		
"	8	Up	iP	07 51 07.2				SKP	Z' 0.4 1.8		
			i	07 51 13.6				Sk	iPKP	02 20 39.3	
								iSKP	02 23 17.1		
"	8	Up	iP	11 30 22.1				Gb	iPKP	02 20 41.9	
		Um	iP	11 29 56.5 D				iSKP	02 23 33.5		

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

1963 Apr cont.	9	Um	iPKP	02 20 36.5	1963 Apr	10	Up	ePS	08 18 26
			iSKP	02 23 12.4					microns sec
		Ka	iPKP	02 21 00			M	N	2.1 21
			i	02 21 05			M	Z	1.9 20
			iSKP	02 23 51					Timor (h = 30 km).
			Fiji Islands	(h = 540 km).					
"	9	Um	e(P)	02 33 07	"	10	Ka	iPKP	12 46 06.0 C
									Fiji Islands (h = 560 km).
"	9	Up	eP	04 06 34	"	10	Up	iP	12 55 07.4
			i	04 06 40.8			Sk	eP	12 55 46
"	9	Up	i(P)	12 06 30.3	"	10	Um	iP	12 59 11.3
"	9	Um	iP	12 17 58.6 D	"	10	Up	i(P)	13 02 08.6 C
								i	13 02 13.7
"	9	Up	iSg	13 03 22.9	"	10	Up	iP	13 20 36.6
		Ki	iSg	13 01 22.4				i	13 20 39.9
		Sk	eSg	13 02 37					
		Um	iPg	13 00 44.6	"	10	Um	iP	14 17 55.6
			iSg	13 01 09.8					
			i(Rg)	13 01 23.0	"	10	Up	iP	23 23 15.1
			D = 220 km = 1.9°.				Sk	iP	23 22 55.9 C
			Luleå harbour, Sweden.				Gb	iP	23 23 06.3
			Underwater explosion of				Um	iP	23 23 10.4
			85 ton dynamite.						Mexico (h = 130 km).
			Origin time = 13 00 05.						
"	9	Up	i(Pg)	14 08 39.6	"	11	Um	iP	00 35 03.0 C
			iSg	14 09 29.8					
"	9	Ka	iP	17 16 46.9	"	11	Up	iP	00 41 33.8
							Gb	i(P)	00 42 35.6
"	9	Ki	iP	18 54 24.6 C	"	11	Ki	iPn	05 30 25.5
		Um	iP	18 54 29.0				iSn	05 31 20.8
			Philippine Islands					iSg	05 31 43.7
			(h = 60 km).					D = 530 km = 4.8°.	
"	9	Ki	i(Sg)	19 41 09.2			Sk	e	05 33 30
		Um	e(Sg)	19 42 39				eSg	05 34 19
"	9	Up	i(Pg)	21 01 38.1			Um	iPn	05 30 52.0
			iSg	21 02 25.7				iSn	05 32 05.1
"	9	Ki	iP	22 07 49.0				iSg	05 32 53.0
								D = 760 km = 6.8°.	
"	9	Up	i(P)	22 28 55.7				Northwest Russia,	
								68.1°N, 33.2°E.	
"	9	Up	i(P)	22 28 55.7				Origin time = 05 29 08.	
								Explosion?	
"	10	Up	i(P)	00 37 05.9	"	11	Up	iP	10 15 31.4
		Ka	iP	00 36 31.3			Ki	iP	10 14 42.7
			Greece.				Sk	iP	10 15 19.0
"	10	Ki	e(P)	01 34 34			Um	iP	10 15 05.4 D
								i	10 15 20.2
"	10	Up	i(P)	08 00 20.2					Kurile Islands (h = 80 km).

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

1963				1963			
Apr	11	Um iP	11 45 02.8	Apr	12	Ki iP	04 22 28.5 D
		Alaska (h = 70 km).				Um iP	04 22 57.9
"	11	Up iP	13 13 28.6	"	12	Up iPKP	09 01 48.0 C
		Um eP	13 12 53			i	09 02 01.8
		Aleutian Islands				Ki iPKP	09 01 26.2 C
		(h = 30 km).					microns sec
"	11	Ki iPg	13 15 55.1 C			PKP Z'	0.1 1.0
		iSg	13 16 03.7			Sk iPKP	09 01 39.3
		iRg	13 16 07.4			Um iPKP	09 01 34.0 C
		D = 80 km = 0.7°.				New Zealand (h = 110 km).	
		Sk iSg	13 18 19.7	"	12	Up iSg	13 39 40.8
		Um eSg	13 17 29			Ki iPg	13 36 43.2
		Gällivare, Sweden,				iSg	13 37 20.4
		67.1°N, 20.6°E.				D = 310 km = 2.8°.	
		Origin time = 13 15 41.				Sk e	13 37 11
		Probably explosion in the				eSg	13 37 36
		iron ore mines.				Um e(Pg)	13 37 05
"	11	Gb e(Pg)	13 31 38			i	13 37 32.4
		iSg	13 31 44.2			iSg	13 38 06.8
		iL	13 31 53.4			D = 470 km = 4.2°.	
"	11	Ki iP	14 22 10.0 C			West coast of Norway,	
		Sk iP	14 23 08.3			67.0°N, 13.6°E.	
		Um iP	14 23 02.9 C			Origin time = 13 35 47.	
		Svalbard (h = 15 km).		"	12	Up iP	13 49 02.8
"	11	Up ePKP	17 04 16			Ki iP	13 48 10.2 D
		Um iPKP	17 04 24.6			Sk iP	13 48 41.7
		Sandwich Islands				Gb iP	13 49 19.7
		(h = 30 km).				Um iP	13 48 36.1
"	12	Up iP	00 50 10.0 D			iPcP	13 49 10.8
		i	00 50 15.5			Aleutian Islands	
			microns sec			(h = 30 km).	
		P	Z' 0.1 0.7	"	12	Up iP	19 52 30.0
		Ki iP	00 50 13.4			iS	19 56 14
			microns sec				microns sec
		P	Z' 0.1 1.3			P	Z' 0.1 1.0
		M	E 0.8 14			D = 2300 km = 20½°.	
		M	N 1.3 15			Ki iP	19 50 52.5
		Sk iP	00 50 32.1 D				microns sec
		Gb iP	00 50 31.0			P	Z' 0.2 1.5
		Um iP	00 50 06.0 D			Sk iP	19 51 45.6
		Ka iP	00 50 15.2 D			Gb iP	19 52 48.0
		i	00 50 21.2			i	19 53 05.7
		India (h = 30 km).				Um iP	19 51 42.0
		Magn. = 5.8 (Up, Ki).				i	19 51 47.6
"	12	Um iP	02 14 35.4			Ka iP	19 53 09 C
"	12	Ki iP	03 20 38.0 C	"	13	Up iP	00 04 06.7 C
			microns sec			Ki eP	00 05 42
		P	Z' 0.1 0.7			Sk iP	00 04 45.8

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

1963

Apr 13 Um iP 00 04 43.8
cont. i 00 04 54.8
Ka iP 00 03 34 C
iPP 00 03 54
Ionian Sea (h = 30 km).

" 13 Up iP 02 11 10.6
Ka iP 02 10 36 C
(Ionian Sea).

```

"      13 Up    iP      02 34 18.1 D
              i        02 34 34
              ePP      02 38 16
              eSKS     02 44 41
              iS       02 45 39
              ipS      02 46 20

```

	microns	sec
P	Z 0.5	2
P	Z' 0.5	1.3
PP	Z' 0.2	1.8
S	E 1.2	7
M	E 1.7	22
M	N 2.3	22
M	Z 2.2	22

$$(D = 10900 \text{ km} = 98^\circ).$$

Ki	iP	02 34	22.4	D
	iPP	02 38	18.8	
	iSKS	02 44	49	
	iS	02 45	49	
	ipS	02 46	37	

		microns	sec
P	Z'	0.4	1.7
PP	Z'	0.3	1.7
SKS	E	0.9	5
S	E	2.1	7
M	E	4.4	20
M	N	2.3	20

$$(D = 11000 \text{ km} = 99^\circ).$$

Sk iP 02 34 07.4 D

Gb iP 02 34 05.2 D

i	02	34	17.1
i PB	02	37	51.7

	IPP	02	37	51.7
UIm	iP	02	34	23.0 D

0m	IF	02 34	23.0	D
	iPP	02 38	22.3	

i	02 38 30.3
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i	02	41	12
7	00	17	14

eS	02	45	44
inS	03	46	34

1pS	02	46	34
i	02	47	55

Ka iP 02 34 15 D

iPP 02 38 07

Peru ($h = 130 \text{ km}$).

" 13 Up iP 02 38 40.2

Ki iP 02 38 40.2 C

	microns	sec
P	Z' 0.1	0.9

1963

Apr 13 Sk iP 02 38 53.9
cont. These P-phases arrive during
the preceding record, but
could be clearly distinguished
e.g. from PP of the previous
shock, by their significantly
higher frequency.

" 13 Um iP 11 35 11.4
Japan (h = 110 km).

"	13	Up	iP	14	45	32.9
			i	14	45	45.7
			iPKP	14	49	36.4
			iPP	14	50	14.7

		microns	sec
M	E	2.7	20
M	N	2.6	21
M	Z	5.8	22

Ki	iP	14	45	14.4
	i	14	45	27.1
	ePP	14	49	24
	i	14	49	47.9
	iSKS	14	55	53

		microns	sec
P	Z'	0.2	1.2
M	E	2.3	19
M	N	0.9	19

Sk	iPP	14	50	14.4
Um	iP	14	45	21.4
	iPP	14	49	37.2
	i	14	49	54.9
	iSKS	14	55	57
	ePS	14	58	46

New Guinea (h = 30 km).
Magn. = 6.0 (Up, Ki).

"	13	Up	iP	14	57	12.4
		Ki	iP	14	57	22.0
		Sk	iP	14	57	38.3
		Um	iP	14	57	10.6
		Ka	iP	14	57	18.4

" 13 Ki iP 15 53 16.9 C
(New Guinea).

" 13 Um eP 18 56 36
Ka iP 18 55 16 D

"	13	Up	iP	19 56 08.0
		Ki	eP	19 55 37
		Um	iP	19 55 50.5

Volcano Islands
($h = 110 \text{ km}$).

"	13	Up	iPKP	22 26	54.8
		Ki	iPKP	22 26	39.9
		Sk	iPKP	22 26	50.0

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

1963

Apr 13 Gb iPKP 22 27 02.7 C
cont. Um iPKP 22 26 44.3 C
Kermadec Islands
(h = 420 km).

" 14 Up iPKP 05 52 18.6
i 05 52 25.0
microns sec
PKP Z' 0.1 0.5
Ki iPKP 05 52 04.4
i 05 52 24.2
Sk iPKP 05 52 13.0
Gb iPKP 05 52 26.7
Um iPKP 05 52 07.9 C
Ka iPKP 05 52 27 C
Kermadec Islands
(h = 30 km).

" 14 Um eP 07 36 08
Japan (h = 30 km).

" 14 Up iP 15 14 41.3
Sk eP 15 14 37
Um iP 15 14 49.5 C

" 14 Up iP 19 10 26.7
Ki iP 19 09 52.4 D
Sk iP 19 10 22.2
Um iP 19 10 07.0
Japan (h = 110 km).

" 14 Ki iP 20 48 06.9
Um iP 20 48 21.3
Japan (h = 110 km).

" 15 Ki iP 07 41 59.4
Um iP 07 42 28.4
Alaska (h = 60 km).

" 15 Um iP 12 20 56.7

" 15 Um iP 17 50 35.2 C
i 17 51 33.6

" 15 Um iP 18 39 25.9

" 15 Ki iP 20 32 51.5 C
Halmahera (h = 30 km).

" 15 Ki iPKP 23 58 34.7
Sk iPKP 23 58 46.5 C
Um iPKP 23 58 36.8 C
Tonga Islands (h = 30 km).

" 16 Up iP 01 43 12.9
i 01 43 22.0
i 01 44 40

1963

Apr 16 Up i 01 47 12
cont. i(PP) 01 47 39
i 01 47 56
i 01 48 07.8
iSKS 01 53 54
i 01 54 16
iPS 01 56 28
microns sec
(PP) Z 3.5 15
SKS E 5.9 10
M E 73 17
M N 130 19
M Z 100 18
(D = 11350 km = 102°).

Ki iP 01 42 51.0
i 01 43 07.4
i 01 44 23
iX 01 46 15.6
iPP 01 46 53
iSKS 01 53 28
microns sec
PP E 1.4 6
SKS E 7.4 10
M E 110 17
M N 66 16
(D = 10900 km = 98°).

Sk eP 01 43 19
i 01 43 29.2
iX 01 46 48.8
i 01 47 04.8
iPP 01 47 43.7
Gb i(X) 01 47 40.0
iPP 01 48 05.9
Um iP 01 42 55.3
e 01 43 36
iX 01 46 33.4
ePP 01 46 58
i 01 47 45
iSKS 01 53 36
iS 01 54 12
Ka iP 01 43 16.6
iX 01 46 49.6
iPP 01 47 39.3
Halmahera (h = 30 km).
Magn. = 6.6 according to PP
(Up, Ki), but = 7.6 according
to surface waves (Up, Ki).
Many phases are left unex-
plained. For instance, the
phase denoted X (Ki, Sk, Um,
Ka) appears 3.25-3.38 after
P, and could possibly
correspond to PKP.

" 16 Up i(PP) 01 55 28
microns sec
(PP) N 9.0 12

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

1963

Apr 16 Ki iP 01 50 32.2
cont. iPP 01 54 35
i(PKP) 01 55 14
microns sec
PP N 1.9 8
(PKP) N 4.1 11
Sk eP 01 50 56
Um iP 01 50 37.2
i 01 50 43.9
Ka iX 01 54 31.9
Halmahera (h = 30 km).

" 16 Up eP 02 09 12
i 02 09 34.7
iPP 02 13 35.8
microns sec
PP Z' 0.3 1.1
Ki e(P) 02 08 41
i 02 09 00.5
i 02 13 11.4
Sk iP 02 09 22.0
eX 02 12 49
Gb e 02 12 22
iPP 02 13 48.7
Um iP 02 08 58.0
Ka iX 02 12 46.5
iPP 02 13 29.9
Halmahera (h = 30 km).

" 16 Ki iP 02 19 34.2
microns sec
P Z' 0.3 1.8
Um iP 02 19 33.7
Halmahera (h = 30 km).

" 16 Ki iP 02 25 38.7
Um iP 02 25 35.0
(Halmahera).

" 16 Ki iP 04 17 37.5
Halmahera (h = 30 km).

" 16 Up i(P) 10 36 55.6

" 16 Ki iP 12 17 11.9 C
microns sec
P Z' 0.1 1.5
Halmahera (h = 30 km).

" 16 Ki iP 18 35 36.1 D

" 16 Up iP 18 53 08.4 C
i 18 59 40
microns sec
M E 1.7 18
M N 2.5 18
M Z 1.4 22

1963

Apr 16 Ki iP 18 53 54.1 C
cont. microns sec
P Z' 0.1 0.8
M E 2.6 15
M N 1.7 15
M Z 3.1 13
Sk iP 18 53 48.0 C
Gb iP 18 53 18.1
Ka iP 18 52 57.5
Iraq (h = 100 km).

" 16 Ki iP 20 14 25.4
Halmahera (h = 30 km).

" 17 Up iP 01 39 40.2
microns sec
M E 1.1 20
M N 1.4 18
M Z 2.6 20
Ki e 01 42 04
microns sec
M E 2.2 20
M N 0.7 17
M Z 2.5 19

" 17 Up ePKP 02 30 42
ePP 02 33 30
iPKS 02 34 19
microns sec
PP Z 1.0 8
PKS N 1.2 7
M E 2.1 22
M N 4.7 23
M Z 5.3 23
(D = 15450 km = 139°).

Ki ePKP 02 30 31
iPP 02 32 44
iPKS 02 33 52
ePPS 02 44 41

microns sec
PKP Z' 0.2 1.8
PP Z 1.0 9
PKS E 1.0 8
PKS N 1.2 8
M E 2.3 19
M N 2.0 19
M Z 2.8 18
(D = 14550 km = 131°).

Sk ePKP 02 30 33
i 02 30 44.9
Gb ePKP 02 30 50
i 02 30 53.9
Ka iPKP 02 30 51.9
i 02 31 00.2
Fiji Islands (h = 30 km).
Magn. = 6.3 (Up, Ki).

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

1963				1963					
Apr	17	Up	iP	10 52 54.5	Apr	18	Up	iP	20 50 53.1
			ipP	10 53 19.5					
		Ki	ipP	10 53 22.5	"	18	Ki	eP	22 23 29
			iPP	10 55 08.2			Um	iP	22 23 35.0
		Sk	epP	10 53 28			Halmahera (h = 60 km).		
			isP	10 53 39.4	"	18	Um	iP	22 44 43.5 C
		Ka	iP	10 52 59.4	"	19	Ki	iSn	06 29 04.0
		Hindu Kush. h = 120 km (Up).						iSg	06 29 21.4
"	17	Up	iP	13 15 59.8			(Northwest Russia).		
"	17	Sk	iP	17 33 33.7	"	19	Up	eP	07 35 38
		Um	iP	17 34 07.0			Ki	iP	07 36 46.4 C
		North Atlantic Ocean					Sk	eP	07 36 20
"	17	Up	iP	17 54 54.6			Gb	eP	07 35 29
		Sk	iP	17 54 23.2			Um	iP	07 36 11.0
		North Atlantic Ocean					Crete (h = 50 km).		
		(h = 30 km).			"	19	Up	iP	07 44 49.4 C
"	17	Up	eP	18 00 26				iPP	07 46 57
		Sk	eP	17 59 56				iS	07 52 33
		Um	iP	18 00 27.4 C				iSa	07 56 50
		North Atlantic Ocean						i	07 58 44
		(h = 30 km).						iLgl	08 04 07
"	17	Um	eP	18 07 33					microns sec
"	17	Ki	eL	19 27			P	E	2.3 4
				microns sec			P	N	0.5 3
		M	E	1.2 18			P	Z	3.7 3
		M	N	0.5 18			P	Z'	1.0 0.7
		M	Z	1.2 19			PP	E	2.3 4
		Sandwich Islands					PP	Z	2.7 5
		(h = 25 km).					S	E	9.5 8
"	17	Up	iP	20 41 33.3 C			S	N	11 10
"	18	Up	e(PKP)	02 10 12			M	E	33 11
		Sk	ePKP	02 10 15			M	N	60 15
		Gb	iPKP	02 10 21.3			M	Z	41 12
		Um	ePKP	02 10 12			D = 6050 km = 54 $\frac{1}{2}$ ⁰ .		
		Ka	iPKP	02 10 25.8		Ki	iP	07 44 33.1 C	
		Fiji Islands (h = 530 km).					iPP	07 46 43.4	
"	18	Ki	iSn	05 19 24.0			iS	07 52 01	
			iSg	05 19 41.3				microns sec	
		D = 460 km = 4.1 ⁰ .					P	E	3.5 5
		Um	iSn	05 20 08.4			P	Z	5.8 5
			iSg	05 20 45.4			P	Z'	1.1 1.2
		D = 670 km = 6.0 ⁰ .					PP	E	2.2 8
		Northwest Russia,					PP	Z	3.4 7
		67.8 ⁰ N, 31.2 ⁰ E.					PP	Z'	1.9 2.0
		Origin time = 05 17 28.					S	E	9.3 9
		Explosion?					S	N	13 8
"	18	Um	iP	09 03 07.4			M	E	68 14
							M	N	94 17
							M	Z	83 14
							D = 5800 km = 52 ⁰ .		
						Sk	iP	07 45 01.3 C	
							iPa	07 48 25.7	

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

1963					1963				
Apr	19	Gb	iP	07 45 13.4	Apr	20	Up	iP	01 00 46.2
cont.			iPa	07 48 39.8				i	01 01 13.8
		Um	iP	07 44 36.0 C			Ki	iP	01 00 00.0
			i	07 44 41			Gb	iP	01 01 07.6
			iPP	07 46 39			Um	iP	01 00 20.6
			iS	07 52 04					
		Ka	iP	07 45 04.5 C	"	20	Ki	iP	01 21 33.1 C
			iPa	07 48 06.9			Halmahera (h = 30 km).		
		Tsinghai Province, China			"	20	Um	iP	01 41 33.9 D
		(h = 30 km).			"	20	Up	i	02 50 26.1
		Magn. = 6.9 (Up, Ki).					iSg		02 50 35.8
"	19	Up	iP	10 46 47.3			Ki	iPg	02 46 06.7 D
		Ki	eP	10 46 19			iSg		02 46 34.1
		Sk	iP	10 46 33.5			microns sec		
		Um	iP	10 46 28.7 C			Sg	Z' 0.6	0.5
"	19	Ki	eP	12 30 05			D = 220 km = 2.0°.		
		Um	iP	12 29 48.5			Sk	e	02 47 55
"	19	Up	iPKP	16 36 38.2 C			i		02 48 17.5
			i	16 36 51.8			eSg		02 48 45
		microns sec					Gb	e	02 51 37
		PKP	Z' 0.1	0.7			iSg		02 51 48.2
		Ki	ePKP	16 36 51			Um	ePn	02 46 58
		Sk	ePKP	16 36 43 C			i		02 47 47.3
		Um	iPKP	16 36 46.4			iSn		02 48 06.3
		Ka	iPKP	16 36 26.0 C			iSg		02 48 30.1
		Sandwich Islands					D = 620 km = 5.6°.		
		(h = 100 km).					Northern Norway (h = 40 km).		
"	19	Ki	eP	16 42 26			This earthquake demonstrates		
			i	16 42 31.8			that in near shocks, like		
		Um	iP	16 42 31.6			this one, Sg is by far the		
		Halmahera (h = 30 km).					most trustworthy phase		
"	19	Um	iP	17 50 04.1			(compare A. Ben-Menahem &		
"	19	Ki	ePg	21 04 42			M. Båth: A method for		
			iRg	21 04 49.2			determination of epicenters		
"	19	Up	iPKP	23 03 56.5	"	20	Up	iP	07 14 17.5 C
			i	23 04 00.6			microns sec		
		microns sec					P	Z' 0.1	0.5
		PKP	Z' 0.1	0.6			Ki	iP	07 13 25.0 C
		Sk	iPKP	23 03 49.9			Sk	iP	07 14 01.7
		Gb	iPKP	23 04 05.1			Gb	iP	07 14 38.0 C
		Um	iPKP	23 03 45.2 C			Um	iP	07 13 49.6 C
		Ka	iPKP	23 04 04			Ka	iP	07 14 40 C
		Kermadec Islands (h = 40 km).					Kamchatka (h = 30 km).		
"	20	Up	iP	00 48 41.3	"	20	Up	iP	08 18 43.5 C
		Sk	eP	00 49 23	"	20	Up	iP	10 07 48.4
		Um	iP	00 49 21.2	"	20	Um	e(P)	12 32 02
		Ka	iP	00 48 02			i		12 32 26.5
		Greece (h = 50 km).							

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

1963

Apr 20 Um i(P) 15 40 47.6
" 20 Um eP 16 43 21
" 20 Ki e(P) 16 59 27
" 20 Up iP 20 42 47.7 C
microns sec
P Z' 0.1 0.6
M E 1.2 21
M N 0.8 20
M Z 1.4 21
Ki iP 20 41 55.2
Sk iP 20 42 32.9
Gb iP 20 43 09.7
Um iP 20 42 19.9
Ka iP 20 43 13 C
Kamchatka (h = 30 km).
Origin time = 20 32 15.3.
" 20 Up i(P) 21 10 24.4
" 21 Up iP 04 50 08.1 C
iSa 05 09 03
microns sec
P Z' 0.1 0.9
M E 8.5 18
M N 4.5 22
M Z 11 18
Ki iP 04 49 44.0 C
eS 04 59 02
microns sec
P Z' 0.1 1.0
M E 2.3 19
M N 2.8 17
D = 8000 km = 72°.
Sk iP 04 50 11.9 C
Gb iP 04 50 27.8
Um iP 04 49 52.7 C
eS 04 59 21
Ka iP 04 50 25
Formosa (h = 30 km).
Magn. = 6.0 (Up, Ki).
" 21 Ki e(P) 05 28 00
Um iP 05 27 32.9
" 21 Up iP 09 28 56.1 C
microns sec
P Z' 0.1 0.8
M E 1.0 13
M N 0.6 16
M Z 1.3 14
Ki iP 09 28 27.9 C
microns sec
P Z' 0.1 1.2
M E 0.4 15
M N 0.5 14

1963

Apr 21 Sk iP 09 28 56.8
cont. Gb iP 09 29 16.0 C
Um iP 09 28 38.5 C
Ka iP 09 29 11 C
Ryukyu Islands (h = 30 km).
Magn. = 5.9 (Up, Ki).
" 21 Up ---
microns sec
M Z 0.6 19
Ki ---
microns sec
M E 0.9 18
M N 0.6 19
Um eSS 11 12 54
Bismarck Sea (h = 30 km).
" 21 Up iP 11 52 11.9
" 21 Ki iP 13 13 30.4
Um iP 13 13 46.1
Japan (h = 50 km).
" 21 Gb iP 15 58 03.5
" 22 Up iP 00 59 34.5
Ki iP 00 59 43.3
Sk iP 00 59 59.2
Um iP 00 59 33.0
Ka iP 00 59 38 C
West Pakistan (h = 40 km).
" 22 Um iP 02 01 58.7
Banda Sea (h = 140 km).
" 22 Up iPKP 07 45 11.5 C
i 07 45 15.8
microns sec
PKP Z' 0.2 0.5
Ki iPKP 07 44 48.7
Sk iPKP 07 45 05.3 C
i 07 45 20.8
Gb iPKP 07 45 20.1 C
i 07 45 28.0
Um iPKP 07 45 00.0 C
Ka iPKP 07 45 18 C
Kermadec Islands
(h = 30 km).
" 22 Um iP 11 50 54.8 C
" 22 Up iSg 14 09 30.0
i 14 09 56.5
Sk eSg 14 11 20
Gb iSg 14 08 32.3
Um iSg 14 11 36.7

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

1963					1963				
Apr	22	Ka	iPg	14 06 46.2	Apr	23	Ka	iP	03 00 25.0
cont.			iSg	14 07 12.5	cont.				Outer Mongolia (h = 30 km).
			iL	14 07 39.9					Magn. = 6.0 (Up, Ki).
				D = 220 km = 2.0°.					There is a small P-phase
				Near Baltic coast of Poland,					preceding a much larger one
				54°N, 16½°E. Origin time =					by about 6 sec at Ki, Sk,
				14 06 06. Explosion?					Um. Both phases are given
"	22	Up	iP	15 21 06.4 C					here. For the other stations,
				microns sec					the P-phases given refer to
			P	Z' 0.1 0.7					the later large-amplitude
"	22	Up	iP	15 43 19.3 D	"	23	Sk	iPKP	07 38 45.7
			iS	15 47 26			Um	iPKP	07 38 48.5 C
				microns sec					Sandwich Islands
			P	Z' 0.2 1.0					(h = 30 km).
				D = 2550 km = 23°.	"	23	Um	iP	09 19 09.0
		Ki	iP	15 44 12.4 D					
			iPP	15 44 56.1	"	23	Up	iP	10 05 39.9 C
		Sk	eP	15 43 52				eS	10 14 10
			iPP	15 44 23.9					microns sec
		Gb	iP	15 43 29.1				P	Z' 0.1 0.7
			i	15 43 36.8				M	E 0.8 14
		Um	iP	15 43 41.5				M	N 2.5 18
			eS	15 48 15				M	Z 1.0 16
				D = 2850 km = 25½°.			Ki	iP	10 05 28.2 C
		Ka	iP	15 42 59.2					microns sec
				Black Sea (h = 30 km).				M	E 1.1 13
"	23	Up	iP	03 00 08.8				M	N 0.7 14
			iS	03 07 06			Sk	iP	10 05 52.7
			iLg2	03 19 08			Gb	e(P)	10 05 52
				microns sec			Um	iP	10 05 29.1
			P	Z' 0.2 1.5				e	10 20 43
			M	E 2.0 15			Ka	iP	10 05 48.7
			M	N 1.7 12					China.
			M	Z 3.0 16	"	23	Um	iP	11 49 41.1
				D = 5500 km = 49½°.					Philippine Islands
		Ki	iP	02 59 32.6					(h = 30 km).
			i	02 59 38.6	"	23	Sk	iP	13 08 19.2
			iLg1	03 15 37					Vancouver Island
			eLg2	03 15 59					(h = 40 km).
			i	03 17 32	"	23	Up	iP	14 06 59.8
				microns sec				i	14 07 06.6
			P	Z' 0.3 1.4				i	14 07 54.0
			M	E 2.7 17					microns sec
			M	N 0.7 13				P	Z' 0.1 0.7
		Sk	eP	03 00 09 C			Ki	iP	14 08 21.4
			i	03 00 14.5				i	14 08 44.3
		Gb	eP	03 00 35			Sk	iP	14 07 44.1 C
			iPP	03 02 37.5			Gb	iP	14 06 53.3
		Um	iP	02 59 42.6			Um	iP	14 07 42.1
			i	02 59 48.8				i	14 07 51.2
			eS	03 06 31					
			eSS	03 10 10					
			iLg2	03 17 14					
				D = 5150 km = 46½°.					

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

1963					1963				
Apr	23	Ka	iP	14 06 18.5 C	Apr	24	Up	iP	20 38 44.1
cont.							Sk	iP	20 39 09.5
							Um	eP	20 38 42 C
									Hindu Kush (h = 120 km).
"	23	Ki	iP	14 10 35.1	"	24	Sk	iPKP	21 07 50.5
		Sk	iP	14 10 00.8			Um	iPKP	21 07 45.0
		Um	iP	14 10 02.0					Kermadec Islands
		Ka	iP	14 08 35.5					(h = 30 km).
				Yugoslavia-Albania.					
"	23	Um	iP	14 19 16.2	"	24	Up	iPKP	22 00 58.5
"	23	Um	iP	15 58 21.2 C				iSKP	22 03 46.5
"	23	Ki	iP	22 33 41.1				i	22 03 57.9
"	24	Um	iP	03 18 24.4					microns sec
"	24	Ki	iP	06 05 13.1				SKP	Z' 0.1 0.8
"	24	Um	iP	06 05 18.5			Ki	iPKP	22 00 52.3
				Halmahera (h = 30 km).				iSKP	22 03 23.3
"	24	Up	iP	07 36 57.1					microns sec
"	24	Up	i(P)	07 52 19.9				SKP	Z' 0.4 1.5
"	24	Up	i(P)	08 07 11.2			Sk	iPKP	22 00 51.9
"	24	Up	eP	13 30 33				iSKP	22 03 39.7
		i		13 30 45.7			Gb	iPKP	22 01 09.7 D
"	24	Up	iP	13 44 02.5				iSKP	22 03 54.7
		i(pP)		13 44 14.6			Um	iPKP	22 00 47.9
				microns sec				i	22 00 53.8
		(pP)		Z' 0.1 0.6				iSKP	22 03 34.9
		M	E	1.2 13			Ka	iPKP	22 01 12.3 D
		M	N	0.8 14				iSKP	22 03 56.1
		M	Z	1.8 14					Fiji Islands (h = 600 km).
		Ki	iP	13 43 33.8	"	25	Ki	eP	01 58 30
		i(pP)		13 43 44.8	"	25	Up	e(P)	03 02 00
				microns sec	"	25	Up	iP	04 43 44.3
		(pP)		Z' 0.1 1.0			Ki	iP	04 44 13.9
		M	E	0.5 16				i	04 44 19.9
		M	N	0.6 15					microns sec
		Sk	iP	13 44 03.3				P	Z' 0.1 1.5
		i(pP)		13 44 14.3			Sk	eP	04 44 13
		Gb	iP	13 44 17.4			Um	eP	04 43 57
		i(pP)		13 44 30.0				i	04 44 02.5
		Um	iP	13 43 45.2 D	"	25	Up	eP	06 09 43
		i(pP)		13 43 56.6			Sk	iP	06 10 18.6
				Ryukyu Islands.			Gb	iP	06 09 28.4
"	24	Up	iP	16 01 35.7			Um	iP	06 10 17.2
		i		16 01 44.9				i	06 10 30.4
"	24	Up	iP	20 37 04.0			Ka	iP	06 08 52.4
									Yugoslavia-Albania
									(h = 40 km).
"	24	Up	i(P)	08 15 23.1	"	25	Up	i(P)	08 15 23.1
		Ki	eP	08 16 45			Ki	eP	08 16 45
"	24	Up	iP	08 25 08.1	"	25	Up	iP	08 25 08.1
		i		08 28 49.0				i	08 28 49.0

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

1963 Apr cont.	25	Up	iPP	08 29 07.1 microns sec	1963 Apr cont.	25	Um	iP eSKS	16 49 36.2 17 00 14
		Ki	iP	08 24 54.3 C microns sec				Halmahera (h = 30 km).	
		P		Z' 0.1 1.1	"	25	Up	iPKP	18 09 02.6 D
		Sk	iP	08 25 14.7			Ki	iPKP	18 08 54.0
		Gb	iP	08 25 24.3 C			Sk	e(PKP)	18 09 04
		Um	iP	08 24 58.0			Gb	iPKP	18 09 11.3 D
				Celebes Sea (h = 610 km).			Um	e(PKP)	18 08 50
"	25	Um	iP	09 52 29.2				iPKP	18 09 02.0
"	25	Ki	iP	11 12 20.0	"	26	Ka	iPKP	18 09 14.2 D
		Um	iP	11 12 02.7 C				Fiji Islands (h = 380 km).	
"	25	Up	eP	11 20 07	"	26	Um	iP	14 03 48.0
		Ki	iP	11 20 35.5	"	26	Up	i(P)	14 34 30.5
		Sk	iP	11 20 34.7	"	26	Up	iP	15 32 12.4
		Gb	iP	11 20 14.7			Ki	iP	15 31 15.4
		Um	iP	11 20 17.6			Sk	eP	15 31 41
				Maldiv Islands			Um	iP	15 31 42.0 C
				(h = 30 km).				Alaska (h = 140 km).	
"	25	Up	iP	11 31 10.0	"	26	Up	i(P)	15 41 38.5
		Ki	eP	11 30 33	"	26	Up	i(P)	20 41 00.2
		Sk	iP	11 31 06.0	"	26	Up	iP	23 56 49.1
		Um	iP	11 30 48.7				microns sec	
				Japan (h = 50 km).				M E 0.9 16	
"	25	Um	eP	12 06 51				M N 1.0 17	
				Japan (h = 30 km).				M Z 1.1 17	
"	25	Up	i(P)	12 21 03.8			Ki	iP	23 56 25.0
		Ki	iP	12 20 49.2				microns sec	
"	25	Up	iP	13 40 03.2				M E 0.7 13	
		Ki	iP	13 41 16.0				M N 0.4 15	
		Sk	iP	13 40 34.6 D				M Z 1.2 19	
		Um	iP	13 40 50.1			Sk	iP	23 56 52.7
				France (h = 30 km).			Gb	iP	23 57 09.0 D
"	25	Ka	i(Pg)	15 22 55.5			Um	iP	23 56 33.6 D
			iL	15 23 10.0			Ka	iP	23 57 06
"	25	Up	iSKS	17 00 24				Formosa (h = 30 km).	
			iPS	17 02 58	"	27	Up	iP	02 48 37.0
		Ki	iP	16 49 31.0	"	27	Up	eP	03 46 38
			i	16 49 36.4				i	03 46 45.8
			iPP	16 53 36				microns sec	
			iSKS	17 00 08				M N 0.5 13	
				microns sec			Ki	iP	03 46 08.9
		M	E	0.8 21				i	03 46 14.4
		M	N	0.6 20				eS	03 49 18
		M	Z	1.2 19				microns sec	
				D = 10900 km = 98°.			P	Z' 0.2 1.0	

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

1963

Apr 27 Ki microns sec
cont. M E 0.9 15
M N 0.3 14
M Z 1.7 18
D = 1800 km = 16°.
Sk eP 03 45 51
i 03 46 00.1
Um iP 03 46 27.4
Ka iP 03 47 01 C
Iceland (h = 30 km).
The first P-phase (Up, Ki,
Sk) is less definite and
of smaller amplitude than
the one arriving 6-9 sec
later.

" 27 Up iP 05 30 28.3

" 27 Um iP 06 20 27.6

" 27 Ki iSn 06 25 03.4
iSg 06 25 18.0
D = 390 km = 3.5°.
Um iSn 06 25 49.5
iSg 06 26 22.2
D = 600 km = 5.4°.
Northwest Russia - Finland
border, 67.6°N, 29.6°E.
Origin time = 06 23 23.
Explosion?

" 27 Up e 09 00 30
eS 09 08 23
microns sec
M E 1.3 23
M N 2.8 23
M Z 1.5 23
Ki eP 08 56 29
iSKS 09 07 18
microns sec
SKS E 0.4 6
M E 2.9 20
M N 2.2 21
M Z 3.1 21
Um iP 08 56 34.8
eSKS 09 07 18
e(ScS) 09 08 13
Halmahera (h = 30 km).
Magn. = 6.1 (Up, Ki).

" 27 Up iP 12 43 18.3 C

" 27 Up iP 12 48 08.9 C
i 12 48 15.5
Gb i(P) 12 47 35.9

" 27 Up iP 13 39 48.7

1963

Apr 27 Up iP 15 20 08.4
Ki iP 15 19 06.4
Sk iP 15 19 44.2
Um iP 15 19 43.1
Alaska (h = 40 km).

" 28 Up iP 00 46 35.8
microns sec
M E 1.3 17
M N 1.0 17
M Z 0.8 9
Ki ---
microns sec
M E 1.4 10
M N 0.6 11
M Z 1.0 11
Gb iP 00 46 31.5
Um iP 00 47 12.7 C
e 00 51 45
Turkey (h = 160 km).

" 28 Up iP 04 16 37.2
Ki iP 04 16 05.0
Sk iP 04 16 37.1
Um iP 04 16 18.4 D
Japan (h = 60 km).

" 28 Up iP 19 57 44.5 C
microns sec
P Z' 0.1 0.6
Ki iP 19 57 52.9 C
Sk iP 19 58 09.9 C
Gb iP 19 58 05.9 C
ePP 19 59 51
Um iP 19 57 42.5 C
Ka iP 19 57 53.0 C
iPP 19 59 36.7
Hindu Kush (h = 150 km).

" 28 Um i(P) 20 05 36.8

" 29 Ki iP 01 16 14.0

" 29 Up e(P) 05 15 08
Ki iP 05 14 51.2
Um iP 05 15 06.0
i 05 15 18.3
Luzon (h = 120 km).

" 29 Ki iPn 05 26 24.5
iSn 05 27 19.1
iSg 05 27 37.2
D = 480 km = 4.3°.
Sk eSg 05 30 18
Um eSn 05 28 04
iS[±] 05 28 21.4

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

1963

Apr
cont.

29 Um eSg 05 28 42
D = 690 km = 6.2⁰.
Northwest Russia,
67.9⁰N, 31.8⁰E.
Origin time = 05 25 16.
Explosion?

"	29	Ki	e(P)	12 48 35
"	29	Ki	iP	12 50 06.0
"	29	Ki	i(P)	13 03 08.5
"	29	Ka	iP	15 11 45.0
"	29	Up	iPKP	15 12 36.0 C
		Ki	iPKP	15 12 39.8 C

		microns sec		
	PKP	Z'	0.1	1.0
Sk	iPKP	15	12	51.2
Gb	iPKP	15	12	40.9
Um	iPKP	15	12	35.9
	i	15	16	19
Ka	iPKP	15	12	26.8
Antarctic.				

"	29	Up	iP	20	38	50.7
"	29	Up	iP	20	48	14.6
		Ki	iP	20	48	03.5 C

		microns sec	
	P	Z'	0.2 1.5
Sk	iP	20	47 56.2
Um	iP	20	48 11.5
Ka	iP	20	48 18.6
Mexico (h = 25 km).			

"	29	Up	iP	21	55	10.5	C
			iS	22	04	07	
			iPS	22	04	46	
			eP'P'	22	23	40	

		microns	sec
	P	Z	0.8 5
	P	Z'	0.2 1.0
	S	E	0.5 5
	M	E	5.7 20
	M	N	9.3 20
	M	Z	7.8 20
	D = 7500 km	=	67 $\frac{1}{2}$ ⁰ .
Ki	iP	21 54	19.6 C
	ePa	21 57	58
	eS	22 02	20
	eP'P'	22 23	49
		microns	sec
	P	N	0.7 7
	P	Z	1.8 8
	P	Z'	0.1 1.0

1963

Apr
cont.

29	Ki		microns	sec	
		S	E	1.4	14
		S	N	0.9	19
		M	E	9.2	19
		M	N	4.5	20
		M	Z	12	23
		D = 6600 km = 59 $\frac{1}{2}$ ¹⁰ .			
	Sk	iP		21 54	51.8
	Gb	iP		21 55	28.5
	Um	iP		21 54	45.0 C
		iPcP		21 55	32.7
		e		21 56	39
		iS		22 03	15
		eP'P'		22 23	40
		i		22 23	48.1
	Ka	iP		21 55	32.2
		i		21 55	35.7

Aleutian Islands
(h = 60 km).
Magn. = 6.0 (Up, Ki).

"	29	Up	iP	22 09 45.2
		Ki	iP	22 09 23.0
		Um	iP	22 09 30.6

```
" 30 Up iP 01 12 13.7
    iSKS 01 22 44
    e 01 25 09
```

		microns	sec
	SKS	E 1.0	9
	M	E 7.4	25
	M	N 9.4	21
	M	Z 8.4	20
Ki	iP	01 11	51.0
	i	01 11	57.7
	iPP	01 15	52
	ePKS	01 20	02
	iSKS	01 22	43
	eS	01 23	17

		microns	sec
P	Z'	0.2	1.1
PP	Z	1.5	10
PKS	E	0.8	10
SKS	E	1.1	12
S	N	1.0	11
M	E	9.9	20
M	N	15	23
M	Z	12	21
D = 10900 km = 98°.			
Sk	iP	01 12	18.5 C
	iPP	01 16	35.2
Gb	i	01 15	35.0
Um	eP	01 11	55
	i	01 12	03.3
	ePP	01 15	56
	e	01 22	27
	eSKS	01 22	48

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

1963					1963				
Apr	30	Ka	eP	01 12 24	Apr	30	Um	i(P)	13 55 26.7
cont.			e	01 15 34					
			iPP	01 16 39.7	"	30	Up	eP	18 33 13
			Halmahera (h = 30 km).				Sk	iP	18 33 06.8
			Magn. = 6.5 (Up, Ki).				Um	iP	18 33 01.8
							i		18 33 11.1
"	30	Ki	iP	01 41 20.5	"	30	Up	i(P)	22 08 21.4
"	30	Up	eP	02 47 53	"	30	Ki	iSn	23 33 16.8
		Um	iP	02 47 51.2				iSg	23 33 37.1
			Mindanao (h = 30 km).					D = 440 km = 4.0°.	
"	30	Up	iP	03 29 46.8			Sk	eSg	23 36 06
			Aleutian Islands				Um	i	23 34 13.1
			(h = 50 km).					iSg	23 34 35.5
"	30	Up	iP	03 36 59.4				Northwest Russia,	
			microns sec					67.6°N, 30.8°E.	
		P	Z' 0.1 1.0					Origin time = 23 31 25.	
		Ki	iP	03 36 07.0				Explosion?	
		Sk	eP	03 36 41					
		Um	iP	03 36 33.3					
		Ka	iP	03 37 24.0					
			Aleutian Islands						
			(h = 50 km).						
"	30	Up	iP	05 25 21.0				Markus Bath	
		Ki	iP	05 26 37.4				October 12, 1963	
		Sk	iP	05 26 02.9					
		Um	iP	05 26 02.9					
		Ka	iP	05 24 43.1					
			Albania - Greece						
			(h = 30 km).						
"	30	Up	iP	07 18 49.0					
			microns sec						
		P	Z' 0.1 0.7						
		Ki	iP	07 17 57.1					
			microns sec						
		M	E 2.2 20						
		M	N 1.4 20						
		Sk	iP	07 18 30.6					
		Um	iP	07 18 23.4					
			iPcP	07 18 58.2					
		Ka	iP	07 19 13.3					
			Aleutian Islands						
			(h = 60 km).						
"	30	Up	iP	09 57 44.1					
"	30	Ki	iP	10 32 27.5					
		Um	iP	10 32 30.6					
			Andaman Islands						
			(h = 30 km).						
"	30	Up	i(P)	12 04 53.8					

Seismological Institute
Uppsala

P R E L I M I N A R Y

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 Y 1 - 31, 1963.
.....

1963

May 1 Up iP 01 16 08.4 D
i 01 16 10.9
Ki iP 01 15 15.6
ipP 01 15 32.9
Sk eP 01 15 49
Um iP 01 15 41.9
Aleutian Islands.
h = 70 km (Ki).

" 1 Um iP 02 37 27.8
Indian Ocean.

" 1 Up i(PKP) 10 22 13.1
✓ iPKP 10 22 22.5
ipPKP 10 22 59
i(SKP) 10 25 28
iSKP 10 25 35.9
i 10 25 40.3
ipPKS 10 26 27
ispKS 10 26 44
microns sec
PKP Z' 0.1 1.0
(SKP) E 0.7 5
(SKP) N 1.2 6
(SKP) Z 2.4 6
SKP Z' 0.2 0.8
M E 3.4 22
M N 6.3 25
M Z 9.2 25
(D = 15000 km = 135°).
Ki iPKP 10 22 06.9
ipPKP 10 22 44.1
iPP 10 24 40
epPKS 10 26 00
microns sec
PKP Z' 0.4 1.3
PP E 0.9 8

1963

May 1 Ki microns sec
cont. PP N 1.5 7
PP Z 4.1 8
M E 7.4 23
M N 3.2 21
M Z 7.7 22
(D = 14200 km = 128°).
Sk i(PKP) 10 22 11
iPKP 10 22 20
iSKP 10 25 31
ipPKS 10 26 28
Gb iPKP 10 22 28.3
ispPKP 10 23 15.6
iSKP 10 25 47.6
Um e(PKP) 10 22 07
iPKP 10 22 14.4
ipPKP 10 22 51.4
i 10 25 00
iSKP 10 25 22.7
ipPKS 10 26 12
ispKS 10 26 31.7
(D = 14450 km = 130°).
Ka i(PKP) 10 22 20.7
iPKP 10 22 28.8
ipPKP 10 23 03.2
iSKP 10 25 48.1
ispKS 10 27 02.6
New Hebrides Islands.
h = 140 km (Up, Ki, Um, Ka).
Magn. = 6.6 (Ki).
This earthquake is another
example of early core phases,
described in detail in a
paper by G. Payo Subiza and
M. Båth: Core phases and the
inner core boundary, Geophys.
Journ. (in press).

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

1963					1963				
May	1	Up	iP	10 34 18.4	May	4	Ki	iP	06 06 05.4
		Ki	iP	10 34 19.8	cont.			ipP	06 06 20.1
		Um	eP	10 34 24					microns sec
"	1	Ka	i(P)	11 00 54.4				pP	Z' 0.1 1.0
"	1	Up	iP	19 59 58.1			Sk	eP	06 06 37
		Ki	iP	19 59 58.4			Gb	iP	06 07 14.2
		Sk	iP	20 00 21			Um	iP	06 06 31.0
		Um	iP	19 59 51.4				ipP	06 06 46.4
		Sinkiang Province, China					Ka	eP	06 07 41
		(h = 150 km).					Aleutian Islands.		
							h = 60 km (Ki,Um).		
"	2	Up	iP	02 05 57.6	"	4	Up	i(P)	14 53 26.4
		Ki	iP	02 06 32.7	"	4	Up	iP	16 32 03.6
		Um	iP	02 06 10.9			Ki	iP	16 31 54.1
		Iran (h = 50 km).					Sk	iP	16 31 46.8
"	2	Up	iPKP	09 38 43.5			Um	iP	16 32 00.9
			i	09 38 47.4			Guatemala (h = 160 km).		
		Gb	iPKP	09 38 53.5	"	4	Ki	iP	16 36 05.9
		Fiji Islands (h = 30 km).					Um	iP	16 36 33.2
"	2	Up	i(P)	10 49 52.8	"	4	Up	iP	16 51 48.5
			i	10 50 00.0				i	16 58 02
"	2	Up	iP	23 22 50.4			Sk	iP	16 52 45.3
		Ki	iP	23 21 50.6			Um	iP	16 52 33.0
		Um	iP	23 22 20.0			Ka	eP	16 51 08
		Alaska (h = 80 km).			"	4	Ki	iPKP	18 43 57.1
"	3	Ki	eP	10 52 13			Um	iPKP	18 43 56.3
			iPP	10 54 05.2			South of Australia		
		Um	iP	10 51 44.0			(h = 30 km).		
			iPP	10 53 20.3	"	4	Ki	iPKP	19 20 43.9
		Iran (h = 25 km).					Sandwich Islands (h = 30 km).		
"	3	Ki	eL	12 00	"	4	Ki	eP	19 40 33
				microns sec			Um	iP	19 40 10.7
		M	E	0.8 21	"	4	Up	iP	22 20 54.5 C
		M	N	0.4 18				i	22 21 04.2
		M	Z	1.2 21			Ki	iP	22 20 33.9
		Tonga Islands (h = 30 km).					Um	iP	22 20 34.3
"	3	Ki	iP	16 19 20.3			Japan (h = 170 km).		
"	3	Up	iP	23 25 34.7	"	5	Up	iP	07 43 36.6
"	4	Up	iP	04 11 37.6			Sk	e	07 45 48
		Ki	iP	04 11 05.9	"	5	Up	iP	11 15 49.7 C
		Sk	iP	04 11 34.8			Um	iP	11 15 28.8
		Um	iP	04 11 19.2			Japan (h = 130 km).		
		Ka	iP	04 12 00.0	"	5	Sk	iP	14 45 56.8
"	4	Up	iP	06 06 59.0 D	"	5	Gb	iP	19 01 49.7
				microns sec					
		P		Z' 0.1 1.2					

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

1963						1963					
May	6	Up	i(P)	02 05 23.0		May	7	Up	e(P)	03 02 58	
"	6	Um	iP	08 52 06.4 C		"	7	Gb	i(P)	03 02 37.0	
			Java (h = 80 km).								
"	6	Up	i	09 33 22.5		"	7	Up	iP	03 24 01.8 C	
			i	09 33 28.6				Ki	iP	03 24 10.5 C	
		Ka	iPg	09 31 07.8 D				Um	iP	03 24 00.3 C	
			iSg	09 31 33.8				Ka	iP	03 24 09.1 C	
									Hindu Kush (h = 230 km).		
"	6	Up	i	13 07 06.8		"	7	Up	iP	04 58 07.3	
			i	13 07 28.8				Ka	iP	04 58 13.1 D	
		Ka	iPg	13 06 04.2					Hindu Kush (h = 180 km).		
			iSg	13 06 30.4		"	7	Ki	iP	05 24 56.2	
"	6	Up	iP	15 23 51.2				Um	iP	05 25 26.5	
									Alaska (h = 30 km).		
"	6	Up	iP	19 35 05.8 C		"	7	Um	iP	15 39 14.9	
			i	19 35 10.8		"	7	Um	iP	17 37 10.2 D	
				microns sec		"	7	Up	i(P)	20 37 11.8	
		M	E	0.7 10		"	8	Up	iP	09 01 30.9	
		M	N	0.7 11					eP'P'	09 30 05	
		M	Z	0.7 11				Ki	iP	09 00 37.0 D	
		Ki	iP	19 36 30.6 C					ipP	09 01 03.8	
				microns sec				Sk	iP	09 01 07.1	
		M	E	1.7 15				Um	iP	09 01 03.9	
		M	N	0.7 12					iP'P'	09 30 14.0	
		M	Z	0.9 13					Aleutian Islands.		
		Sk	iP	19 35 48.4					h = 110 km (Ki).		
		Gb	iP	19 35 03.0 C		"	8	Up	iP	10 33 37.8 C	
		Um	iP	19 35 47.1					ipP	10 33 50.4	
			iPP	19 36 22.3					iPP	10 36 21.6	
		Ka	iP	19 34 30.5					eS	10 43 02	
			Greece-Albania (h = 30 km).						i	10 43 25	
"	6	Up	iP	20 11 25.1						microns sec	
"	6	Up	iP	20 53 28.3				P	Z	1.0 4	
"	7	Up	iP	00 51 35.2 C				P	Z'	0.3 1.0	
"	7	Up	iP	02 26 09.3				pP	Z'	0.4 1.1	
				microns sec				S	N	1.2 6	
		M	E	0.8 15				M	E	8.5 23	
		M	N	1.2 20				M	N	14 22	
		M	Z	1.5 19				M	Z	12 19	
		Ki	iP	02 26 02.4					D = 8100 km = 73°.		
				microns sec				Ki	iP	10 32 58.6 C	
		M	E	1.1 12					i	10 34 23.6	
		M	N	0.8 18					iS	10 41 52	
		M	Z	1.4 12					eSS	10 46 27	
		Sk	iP	02 26 22.2						microns sec	
		Gb	iP	02 26 18.0				P	Z'	0.2 1.1	
		Um	iP	02 25 59.5 C				S	N	1.9 6	
			Sinkiang Province, China					M	E	21 17	
			(h = 30 km).								

Up = Uppsala, Ki = Kiruna, Sk = Skalistugan, Gb = Göteborg, Um = Umeå
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1963				1963			
May	8	Ki	microns sec	May	9	Up	iP
cont.		M	N 17 23			Ki	iP
		M	Z 24 18			Um	iP
		D = 7400 km = $66\frac{1}{2}^{\circ}$.				Japan (h = 30 km).	
		Sk	iP 10 33 31.8 C				
			ipP 10 33 45.4	"	9	Up	iP
			iPP 10 36 07.7			i	13 06 27.5
		Gb	iP 10 33 57.8				
			i 10 36 24.1	"	9	Ki	eP
		Um	iP 10 33 15.9 C			Sk	eP
			ipP 10 33 27.4			Um	iP
			iS 10 42 22			Nicaragua (h = 30 km).	
		Ka	iP 10 33 56 C				
			ipP 10 34 08	"	9	Ki	iP
			ePP 10 36 42			Um	iP
		Japan. h = 50 km				Ka	iP
		(Up, Sk, Um, Ka).				i	15 20 04
		Magn. = 6.4 (Up, Ki).				Nicaragua (h = 30 km).	
"	8	Up	iP 15 37 25.9	"	9	Up	iP
		Ki	iP 15 37 06.8 C				15 21 05.6
			microns sec				
		M	E 2.0 19			M	E 0.7 18
		M	N 1.1 21			M	N 0.7 18
		Sk	eP 15 37 30			M	Z 0.9 18
		Um	iP 15 37 13.9			Ki	iP
		Mindanao (h = 70 km).					15 20 55.9
"	8	Up	iP 21 38 45.1				microns sec
		Um	iP 21 38 25.3			P	Z' 0.1 1.5
		Japan (h = 40 km).				M	E 1.1 17
"	9	Up	iP 03 22 51.5			M	N 0.5 16
"	9	Up	iP 04 50 35.3			M	Z 1.0 15
		Um	iP 04 50 22.9			Sk	eP
		Ka	i(P) 04 50 51			Gb	iP
"	9	Ki	ePn 04 51 09			Um	iP
			iSn 04 51 57.1			i	15 21 05.5
			iSg 04 52 19.1			Ka	iP
		D = 460 km = 4.1° .				Nicaragua (h = 30 km).	
		Um	iSn 04 52 41.4	"	9	Up	iP
			iSg 04 53 17.4			Ka	e(P)
		D = 660 km = 5.9° .					15 54 26.9
		Northwest Russia,					15 55 11
		67.7° N, 31.2° E.		"	9	Up	iP
		Origin time = 04 50 03.				i	16 01 39.1
		Explosion?					16 01 45.8
"	9	Up	iPKP 07 45 02.9	"	9	Ki	e(P)
		Sk	iPKP 07 44 55.8				18 34 01
		Um	iPKP 07 44 50.2	"	9	Up	iP
		Kermadec Islands				Ki	iP
		(h = 270 km).				Sk	iP
						Um	iP
						Aleutian Islands (h = 30 km).	
"	9	Up	iPKP 07 45 02.9	"	10	Up	iP
		Sk	iPKP 07 44 55.8			Ki	iP
		Um	iPKP 07 44 50.2				02 01 03.7
		Kermadec Islands					02 00 33.7
		(h = 270 km).					microns sec
						M	E 0.4 14

Up = Uppsala, Ki = Kiruna, Sk = Skalistugan, Gb = Göteborg, Um = Umeå
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1963						1963					
May	10	Sk	iP	02 01 04.4		May	10	Ki		microns	sec
cont.		Um	iP	02 00 46.2		cont.			SKS	E	1.2 8
		Japan (h = 30 km).							S	N	1.2
"	10	Up	i(P)	03 02 20.5					M	E	7.3 20
"	10	Ki	iPKP	04 47 44.9					M	N	4.8 20
		Sk	ePKP	04 47 56					M	Z	7.6 20
		Um	iPKP	04 47 51.4 C					D = 10600 km = 95 $\frac{1}{2}$ °.		
		i		04 48 05.4		Sk	iP		22 35	55.1	C
		Loyalty Islands (h = 30 km).				Gb	iP		22 35	47.1	
						Um	iP		22 36	03.9	
							i		22 46	17	
							iSKS		22 46	47	
"	10	Up	iP	11 02 52.4		Ka	iP		22 35	54.9	
		i		11 03 03.4		Ecuador (h = 30 km).					
		epP		11 03 17		Magn. = 6.3 (Up, Ki).					
		Ki	iP	11 03 37.6		A long train of oscillatory					
		i		11 03 52.7		motion without pronounced					
		i		11 04 25.0		phases follows the P wave					
		eSn		11 10 10		on all our short-period					
		Sk	ipP	11 04 04.2		records.					
		Gb	epP	11 03 46		"	10	Up	iP		22 57 16.8
		Um	iP	11 03 10.4		"	11	Up	eP		01 16 29
			ipP	11 03 40.9				Ki	iP		01 17 45.5
			iS	11 08 15.9				Sk	iP		01 17 11.8
			(D = 3200 km = 29°).					Um	eP		01 17 09
		Ka	iP	11 02 56.8 C				Libya (h = 30 km).			
		Azerbaijan, U.S.S.R.				"	11	Ki	iPKP		05 02 36.4
		h = 140 km (Up, Um).						Um	iPKP		05 02 43.0
		Concerning Sn at Ki, see							iSKP		05 05 33.5
		remark to Caspian Sea						Fiji Islands (h = 400 km).			
		earthquake on Jan. 27, 1963,				"	11	Up	i(P)		05 10 59.1
		at 19 35 14.3.				"	11	Up	iP		18 01 29.0 C
"	10	Up	iP	11 21 49.3 C				i		18 02	13.0
		Ki	iP	11 22 05.8 C				i		18 02	29.5
		Indian Ocean (h = 30 km).						iS		18 11	10
"	10	Um	iP	15 32 24.0						microns	sec
"	10	Up	i(P)	20 25 58.5					M	E	4.5 19
"	10	Up	iP	22 36 01.7 C					M	N	4.7 21
			e(SKS)	22 46 29					M	Z	7.3 19
			eS	22 47 10					D = 8450 km = 76°.		

Up = Uppsala, Ki = Kiruna, Sk = Skalistugan, Gb = Göteborg, Um = Umeå
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1963

May 11 Ki ePn 19 54 16
iSn 19 54 51.6
iSg 19 55 06.5
D = 330 km = 3.0⁰.
Um ePn 19 55 02.8
iSn 19 56 16.6
iSg 19 57 03.2
D = 720 km = 6.5⁰.
Off northwest coast of
Norway, 70⁰N, 14⁰E.
Origin time = 19 53 26.

" 12 Um iP 01 17 36.3
Sea of Japan (h = 310 km).

" 12 Um iP 03 08 22.7 C
Japan (h = 30 km).

" 12 Up e(P) 04 00 38
i 04 00 46.9

" 12 Um iP 05 14 06.0

" 12 Up ePKP 10 02 48
iPKP2 10 03 32.1
microns sec
PKP2 Z' 0.1 1.3
Ki iPKP2 10 03 26.5 C
microns sec
PKP2 Z' 0.2 1.3
Sk ePKP2 10 03 43
Um iPKP 10 02 48.6
iPKP2 10 03 28.6
Ka ePKP 10 02 43
iPKP2 10 03 32.6
Macquarie Islands
(h = 40 km).

" 12 Up iP 20 19 02.3 D
ipP 20 19 13
iS 20 27 24
isS 20 27 47
microns sec
P N 1.0 3
P Z 2.0 3
P Z' 0.4 0.8
S E 2.1 3
S N 2.7 4
M E 1.7 18
M N 3.6 22
M Z 3.6 22
D = 7000 km = 63⁰.
Ki iP 20 18 07.5 D
iS 20 25 48
iScS 20 27 54
microns sec

1963

May 12 Ki microns sec
cont. P Z 1.2 4
P Z' 1.1 1.0
S E 2.2 7
S N 1.6 7
M E 2.7 20
M N 2.6 20
M Z 3.8 20
D = 6150 km = 55¹/₂⁰.
Sk iP 20 18 35.4 D
ipP 20 18 46.4
Gb iP 20 19 14.7 D
ipP 20 19 25.6
Um iP 20 18 35.9 D
ipP 20 18 46.6
eS 20 26 34
i(S) 20 26 40
eScS 20 28 23
Ka iP 20 19 24 D
i 20 19 32
i 20 19 36
eS 20 28 14
Alaska. h = 40 km (Up, Sk, Gb,
Um). Magn. = 6.6 (Up, Ki).

" 12 Up iP 20 47 26.5 C
ipP 20 47 46
iPcP 20 48 03.2
microns sec
P Z' 0.4 1.8
Ki iP 20 46 30.9 C
microns sec
P Z' 0.4 2.0
Sk iP 20 47 08.1 C
Gb iP 20 47 46.5 C
Um iP 20 46 57.0 C
iPcP 20 47 51.6
Ka iP 20 47 49 C
ipP 20 48 08
Kamchatka. h = 80 km (Up, Ka).
Magn. = 6.0 (Up, Ki).

" 12 Up iP 20 56 00.0

" 13 Up iP 01 15 20.7
i 01 15 29.5
Um iP 01 15 13.4
i 01 15 22.4
Ka iP 01 15 33
i 01 15 41

" 13 Up iPKP 07 29 18.1 C
Ka iPKP 07 29 34
Fiji Islands (h = 450 km).

" 13 Up eP 09 55 21

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

1963					1963				
May	13	Ki	iP	09 54 39.7	May	14	Um	iP	15 21 58.5
cont.			ipP	09 54 52.8			Banda Sea (h = 410 km).		
		Um	iP	09 54 58.0					
			ipP	09 55 11.2	"	14	Up	i(P)	17 42 17.6
		Japan. h = 50 km (Ki,Um).			"	14	Up	ePKP	18 16 01
"	13	Ki	iP	10 36 27.0 D			Sk	ePKP	18 15 50
		Um	iP	10 36 34.2			Um	iPKP	18 15 45.6
"	13	Up	iP	12 56 44.0			Kermadec Islands (h = 30 km).		
			i	12 57 29.6	"	15	Ki	eP	06 43 12
			microns sec				Sk	eP	06 43 16
		M	E	1.9 20			Um	iP	06 43 03.6
		M	N	1.2 20			Hindu Kush (h = 30 km).		
		M	Z	2.7 21	"	15	Up	iP	11 19 51.0
		Ki	iP	12 56 32.9				i	11 20 02.3
			microns sec				Ki	iP	11 21 11.5
		P	Z'	0.1 1.5			Sk	iP	11 20 35.5 D
		M	E	2.0 21			Gb	eP	11 19 37
		M	N	0.9 17			Um	iP	11 20 33.4
		M	Z	2.1 20				i	11 20 38.5
		Gb	eP	12 56 34			Ka	iP	11 19 08.2
		Um	iP	12 56 41.5				i	11 19 11.3
		Ka	iP	12 56 48.4				i	11 19 57.8
			i	12 57 41.1			Albania (h = 30 km).		
		Mexico - Guatemala			"	15	Ki	i(Sg)	11 59 08.1
		(h = 60 km).					Um	eSg	12 00 44
"	13	Up	iSKP	14 30 01.3	"	15	Up	iP	12 15 01.7 D
			i	14 30 05.8				i	12 15 09.2
			microns sec					microns sec	
		SKP	Z'	0.1 0.9			P	Z'	0.2 1.3
		Ki	iPKP	14 26 32.5			M	E	0.8 15
			eSKP	14 29 38			M	Z	1.0 13
		Sk	eSKP	14 29 50			Ki	iP	12 15 37.1
		Gb	iSKP	14 30 11.4				i	12 16 27.7
		Um	iPKP	14 26 39.4 C				microns sec	
			iSKP	14 29 47.7			P	Z'	0.2 1.2
		Ka	iSKP	14 30 18.0			M	E	1.3 20
		New Hebrides Islands					M	N	1.2 19
		(h = 160 km).					M	Z	2.1 20
"	13	Sk	i(P)	14 48 12.7			Sk	iP	12 14 56.0
"	13	Ki	iP	17 59 34.0			Gb	iP	12 14 32.1
		Alaska (h = 90 km).					Um	iP	12 15 23.6 D
"	14	Ki	iP	08 17 27.9			Ka	iP	12 14 44.1 D
		Venezuela (h = 50 km).						i	12 14 51.0
"	14	Ki	iP	14 00 10.7 C			Azores (h = 30 km).		
			i	14 00 22.1			Magn. 5.8 (Up,Ki).		
		Sk	eP	14 00 39	"	15	Up	iP	13 59 07.0
		Um	iP	14 00 39.0 C			Ki	iP	13 59 42.1
		Alaska (h = 40 km).					Um	iP	13 59 29.1 C
							Azores.		

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

1963					1963				
May	15	Up	iP	15 44 00.0	May	16	Up	iP	23 48 27.3
		Ki	iP	15 43 35.4 C			Um	iP	23 48 02.9 C
		Sk	iP	15 44 03.1 C			Kurile Islands (h = 30 km).		
		Gb	iP	15 44 20.0					
		Um	iP	15 43 44.0	"	17	Up	iP	04 17 35.0 C
		Formosa (h = 30 km).					iPcP	04 17 59.0	
"	15	Ki	eP	23 47 53				microns sec	
							P	Z' 0.2 0.8	
"	16	Um	iP	01 48 35.0		Ki	iP	04 16 48.3 C	
								microns sec	
"	16	Ki	eSn	05 27 11			P	Z' 0.1 1.0	
			eSg	05 27 34		Sk	iP	04 17 24.6	
		Um	iSg	05 28 42.4		Gb	iP	04 17 56.1 C	
		Northwest Russia,				iPcP	04 18 13.2		
		68°N, 32°E.				Um	iP	04 17 09.6 C	
		Origin time = 05 25 07.				Ka	iP	04 18 01 C	
		Explosion?				Kurile Islands (h = 30 km).			
						Magn. = 6.0 (Up, Ki).			
"	16	Ki	i(P)	08 26 27.6	"	17	Up	iP	06 21 33.9 D
							iS	06 31 41	
"	16	Um	iPKP	09 20 53.5				microns sec	
		Kermadec Islands					P	Z' 0.3 1.2	
		(h = 50 km).					S	E 0.4 5	
"	16	Ki	i(P)	09 36 03.7			S	N 1.0 6	
							M	E 1.0 18	
"	16	Up	iPg	11 49 56.4			M	N 1.6 20	
			i	11 49 59.4			M	Z 1.1 17	
			iSg	11 50 12.4			D = 9200 km = 83°.		
			iSn	11 50 14.3		Ki	iP	06 21 16.0 D	
							eS	06 31 05	
							eSa	06 42 27	
								microns sec	
			Pg	Z' 0.1 0.3			P	Z' 0.4 1.4	
			Sg	Z' 0.1 0.3			S	E 0.6 7	
			D = 130 km = 1.2°.				S	N 1.1 6	
		Um	eSg	11 52 06			M	E 1.0 16	
		Ka	ePg	11 50 35			M	N 2.8 22	
			iSg	11 51 22.3			M	Z 2.1 20	
			D = 370 km = 3.3°.				D = 8850 km = 79½°.		
		Central Baltic,				Sk	iP	06 21 39.5	
		59°N, 19°E.				Gb	iP	06 21 51.5 D	
		Origin time = 11 49 33.					iSP	06 22 20.6	
		Underwater explosion.				Um	iP	06 21 21.4 D	
"	16	Ki	iP	16 05 47.7			ipP	06 21 40.0	
							iS	06 31 15	
						Ka	iP	06 21 49 D	
						Luzon. h = 80 km (Gb, Um).			
						Magn. = 6.2 (Up, Ki).			
"	16	Ki	iP	16 14 34.3 D		The dilatation of P at Umeå			
						is preceded by a very small			
"	16	Up	i(P)	16 26 07.0		compression.			
			i	16 26 11.4		The same could be true for			
			i	16 26 26.6		the other stations.			
"	16	Ki	iP	16 31 31.8 C	"	17	Up	iPKP	07 52 21.2 D
		Halmahera (h = 30 km).							

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

1963						1963					
May	17	Up	i	07 52 26.8		May	18	Up		microns sec	
cont.				microns sec		cont.		M	E	1.8 19	
			PKP	Z' 0.1 1.0				M	N	1.4 17	
		Sk	iPKP	07 52 15.4 D				M	Z	2.3 18	
		Gb	iPKP	07 52 29.4				Argentina (h = 30 km).			
		Um	iPKP	07 52 09.8		"	18	Up	eL	13 10	
		Ka	iPKP	07 52 33						microns sec	
		i		07 52 46				M	E	1.8 19	
		Kermadec Islands						M	N	3.0 24	
		(h = 360 km).						M	Z	1.9 20	
"	17	Up	iP	12 20 06.4				Ki	eL	13 10	
				microns sec						microns sec	
			M	E 1.2 21				M	E	1.8 18	
			M	N 2.6 21				M	N	1.0 18	
			M	Z 2.6 20				M	Z	1.9 19	
		Ki	iP	12 19 24.8				Bali (h = 40 km).			
			e	12 28 20		"	18	Up	eP	16 55 28	
				microns sec				Ki	iP	16 55 10.7	
			M	E 1.3 19				Um	iP	16 55 21.9	
			M	N 1.0 18				Luzon (h = 50 km).			
			M	Z 2.0 17		"	18	Ki	iP	23 26 39.6	
		Sk	iP	12 20 01.1				Um	iP	23 26 58.1 C	
			i	12 20 53.8				Japan (h = 50 km).			
		Um	eP	12 19 44		"	18	Up	iP	23 57 56.2	
			eS	12 28 20				Kurile Islands			
			D = 7200 km = 65°.					(h = 70 km).			
		Japan (h = 50 km).				"	19	Um	iP	00 06 37.0	
"	17	Ki	iP	17 28 58.7				Hindu Kush.			
		Um	iP	17 29 02.9		"	19	Ka	iP	00 21 53 C	
		Celebes.				"	19	Up	ePKP	01 22 12	
"	17	Up	iPKP	22 59 28.0				iPP	01 24 25.3		
				microns sec				iSKP	01 25 17		
			PKP	Z' 0.2 0.9				iPKS	01 25 30		
		Ki	iPKP	22 59 10.2				iSP	01 34 19		
			iSKP	23 02 37.9					microns sec		
		Sk	ePKP	22 59 21				PKP	Z' 0.3 1.6		
		Gb	iPKP	22 59 38.1				PP	Z 1.5 6		
		Um	iPKP	22 59 16.5				SKP	N 0.6 5		
			iSKP	23 02 48.7				PKS	E 3.1 6		
		Ka	iPKP	22 59 40				M	E 4.6 20		
		Tonga Islands (h = 70 km).						M	N 9.0 22		
"	17	Ki	i(P)	23 07 06.2				M	Z 9.4 22		
				microns sec				Ki	iPKP	01 22 17.2	
			(P)	Z' 1.1 0.5				iPP	01 24 52		
		Local explosion?						iPKS	01 25 44		
"	17	Ki	iP	23 17 30.9 C				eSP	01 34 51		
		Mariana Islands							microns sec		
		(h = 160 km).						PKP	Z 2.3 6		
"	18	Up	eL	06 34				PKP	Z' 0.4 1.5		

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1963

May 19 Ki microns sec
cont. PP E 1.1 5
PP Z 2.8 6
PP Z' 0.3 2.0
PKS E 5.1 7
PKS N 0.8 10
M E 9.9 20
M N 4.0 22
M Z 8.6 22
Sk ePKP 01 22 03
i 01 22 09.6
Gb e(PKP) 01 22 06
Um ePKP 01 22 15
iPP 01 24 43.5
iPKS 01 25 42
i 01 31 43
iSP 01 34 48
iPPS 01 36 48
Ka iPKP 01 22 06
Chile (h = 30 km).
Magn. = 6.8 (Up,Ki).
Our readings rather
favour a location about
3° to the north and at
greater depth (around
100 km) than the solution
given by USCGS, provided
their origin time is
assumed to be correct.

" 19 Sk e(P) 03 26 31
" 19 Ki i(Sg) 05 12 34.3
" 19 Up i(P) 09 51 41.4 C
Ki iP 09 51 42.7 D
Ka iP 09 50 38
" 19 Ki iP 10 01 21.7
Sumatra (h = 100 km).
" 19 Up iP 10 03 21.0
i 10 03 29.7
iSS 10 06 20.5
iLg1 10 07 31.4
iLg2 10 07 46
microns sec
P Z' 0.1 0.9
M E 1.9 5
M N 3.0 10
M Z 1.9 9
D = 1550 km = 14°.
Ki iP 10 04 58.4
e(Li) 10 11 19
iLg1 10 11 43

1963

May 19 Ki microns sec
cont. P Z' 0.1 1.2
M E 1.2 6
M N 2.1 10
M Z 2.8 10
D = 2450 km = 22°.
Sk iP 10 04 07.5
Gb iP 10 02 54.3
eLg2 10 06 32
Um iP 10 04 12.5
i 10 08 18.0
iLg1 10 09 44
Ka iP 10 02 32
iLg2 10 05 46
Yugoslavia (h = 30 km).
" 19 Um i(P) 10 18 52.7
" 19 Ki iP 19 34 25.8 C
Um iP 19 34 30.5
Halmahera (h = 170 km).
" 19 Up iP 21 45 29.1 C
iS 21 53 21
i 21 53 30
microns sec
P E 0.6 3
P Z 1.2 3
P Z' 1.1 1.7
S E 20 20
S N 16 22
M E 39 23
M N 23 17
M Z 62 23
D = 6300 km = 56½°.
Ki iP 21 45 49.5 C
i 21 45 59.7
iS 21 53 57
iPS 21 54 14
eP'P' 22 15 21
microns sec
P E 0.9 6
P Z 1.7 4
P Z' 0.6 1.8
S E 1.4 9
S N 3.1 12
M E 16 17
M N 11 15
M Z 15 16
D = 6550 km = 59°.
Sk iP 21 45 19.3 C
Gb iP 21 45 06.2 C
Um iP 21 45 43.0 C
eS 21 53 39
i 21 53 49
eP'P' 22 15 25

Up = Uppsala, Ki = Kiruna, Sk = Skanstugan, Gb = Göteborg, Um = Umeå
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1963		1963	
May	19	May	20
cont.		cont.	
	Ka	Ki	
	iP		microns sec
	21 45 14 C		PKS N 2.4 8
	North Atlantic Ocean		M E 13 22
	(h = 30 km).		M N 9.3 21
	Magn. = 6.4 (Up,Ki).		M Z 27 22
	An exceptionally large G-		(D = 15900 km = 143°).
	wave has been recorded on		
	long-period instruments		
	(N comp.), especially at		
	Uppsala and Umeå.		
"	20	Sk	iPKP 11 57 37.0 C
	Um	Gb	i(PKP) 11 57 46.1 C
	Panama - Costa Rica		iPKP 11 57 52.1
	(h = 30 km).	Um	iPKP 11 57 32.4 C
			ePP 12 00 51
			iPKS 12 01 14.8
			iSKKS 12 07 52.6
"	20	Ka	i(PKP) 11 57 46.0
	Ki		iPKP 11 57 54.0
	ePn 05 14 58		i 11 58 11.8
	iSn 05 15 54.0		Kermadec Islands (h = 30 km).
	iSg 05 16 19.2		Magn. = 6.9 (Up,Ki).
	D = 510 km = 4.6°.		Complicated beginning, with
	Um iSn 05 16 38.9		PKP of much larger amplitude
	iSg 05 17 18.1		than (PKP), except at Umeå
	D = 710 km = 6.4°.		and Skanstugan with simple
	Northwest Russia,		large-amplitude beginning.
	67.9°N, 32.6°E.		
	Origin time = 05 13 47.		
	Explosion?		
"	20	"	20
	Ki	Ki	iP
	iP		14 04 04.7 C
	09 19 49.6		North Atlantic Ocean
	Luzon (h = 50 km).		(h = 30 km).
"	20	"	20
	Up	Ki	iP
	i(PKP) 11 57 34.9		17 08 04.9 C
	i 11 57 40.4		Yakutsk, U.S.S.R.
	iPKP 11 57 44.4		(h = 30 km).
	iPKS 12 01 11		
	iSKKS 12 08 00	"	20
	eSKSP 12 11 23	Up	e(PKP) 19 36 05
			iPKP 19 36 12.8
			Kermadec Islands
			(h = 30 km).
		"	20
		Up	i(P) 19 50 18.5
		"	20
		Up	iP
		Sk	iP
			21 18 18.9
			21 18 23.0
			Halmahera (h = 150 km).
		"	21
		Up	iP
			16 34 05.0
			i 16 34 17.5
		Ki	iP
			16 33 14.1
			Kamchatka (h = 30 km).
		"	21
		Ki	i(P) 16 42 29.2
		"	21
		Um	iP
			17 21 51.9
			Japan (h = 30 km).
		"	21
		Ki	i(P) 17 30 21.5
		Sk	i(P) 17 30 34.7

Up = Uppsala, Ki = Kiruna, Sk = Skanstugan, Gb = Göteborg, Um = Umeå
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1963				1963			
May	21	Up	iP	17 32 54.9	May	22	Up
				microns sec	cont.		microns sec
		P	Z'	0.1 0.6		M	N 18 22
"	21	Up		---		M	Z 17 23
				microns sec		D = 7400 km = 66 $\frac{1}{2}$ °.	
		M	E	1.3 22	Ki	iP	14 06 40.8 C
		M	N	1.1 18		i	14 06 43.5
		M	Z	1.6 20		e	14 07 07
		Ki	e	18 02 07		iPa	14 10 24
				microns sec		eS	14 14 38
		M	E	0.9 18		iScS	14 16 25
		M	N	0.7 19		eP'P'	14 36 09
		M	Z	1.9 19			microns sec
		Solomon Islands			P	Z	0.9 10
		(h = 30 km).			P	Z'	0.3 1.2
"	21	Sk	iPKP	18 29 54.6		S	E 2.6 12
		Um	ePKP	18 29 43		M	E 18 21
		Kermadec Islands			M	N	16 22
		(h = 80 km).			M	Z	25 19
"	21	Um	iP	21 26 06.9		D = 6550 km = 59°.	
"	22	Ki	eL	03 28	Sk	iP	14 07 19.4
				microns sec		e(P'P')	14 36 13
		M	N	0.3 18	Gb	iP	14 07 53.8 D
		M	Z	0.9 19		eP'P'	14 35 55
		Solomon Islands			Um	iP	14 07 06.5 C
		(h = 60 km).				i	14 07 09.0
"	22	Ki	eL	05 06		iPa	14 11 20
				microns sec		eS	14 15 23
		M	E	0.7 18	Ka	iP	14 07 54.5
		M	N	0.4 19		i	14 07 56.2
		M	Z	1.0 17		i	14 08 37.5
		Mexico (h = 30 km).				eP'P'	14 35 56
"	22	Ki	iP	05 52 32.8	Kurile Islands (h = 20 km).		
		Kurile Islands			Magn. = 6.3 (Up,Ki).		
		(h = 90 km).			The P-phase is multiple,		
"	22	Um	i(P)	07 45 31.5		the second phase denoted i	
"	22	Up	iP	14 07 30.6 C		above, appearing between	
		i		14 07 33.7		1.7 and 3.1 sec after the	
		iPa		14 11 48		first, has a much larger	
		iS		14 16 14		amplitude than the first.	
		iScS		14 17 22	"	22	Um
		iSa		14 24 12			iP
		eP'P'		14 35 55			15 55 15.1
				microns sec	"	22	Up
		P	Z'	0.4 1.1			iP
		S	E	3.1 10			15 56 10.1 C
		S	N	1.9 12			ipP
		M	E	7.7 22			15 56 27.9
							i
							15 59 33.5
							ePP
							16 00 12
							microns sec
						pP	Z' 0.1 1.4
						M	E 1.1 22
						M	N 1.4 22
						M	Z 1.7 21
					Ki	iP	15 55 53.3 C
						ipP	15 56 07.7
						eSKS	16 06 18
						iS	16 06 48

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

1963				1963			
May	22	Ki	microns sec	May	22	Up	iP 22 10 59.6
cont.		P	Z' 0.3 1.4			i	22 11 08.0
		SKS	E 0.4 8			Sk	eP 22 10 54
		S	E 0.8 5			Um	eP 22 10 43
		S	N 0.3 5			ePP	22 13 01
		M	E 2.4 21			Ka	eP 22 11 10
		M	N 1.0 20			Kurile Islands (h = 30 km).	
		M	Z 2.7 21				
		D = 10100 km = 91°.		"	23	Ki	iP 01 05 00.4
		Sk	iP 15 56 15.0			Molucca Passage (h = 30 km).	
			ipP 15 56 32.0				
		Um	iP 15 55 59.7	"	23	Up	ePKP 03 52 05
			ipP 15 56 17.4			iSKP	03 55 06.7
			eSKS 16 06 29			microns sec	
		Ka	eP 15 56 22			M	E 0.9 19
		Molucca Passage.				M	N 1.5 24
		h = 70 km (Up,Ki,Sk,Um).				M	Z 1.8 26
"	22	Up	iP 16 36 36.1			Ki	iPKP 03 51 50.0
			microns sec			ePS	04 05 14
		P	Z' 0.1 1.0			microns sec	
		Ki	iP 16 35 43.2			M	E 0.9 20
			microns sec			M	N 0.8 20
		P	Z' 0.1 1.0			M	Z 1.0 17
		Sk	iP 16 36 13.0			Sk	ePKP 03 52 00
		Gb	iP 16 36 49.8			iSKP	03 54 56.0
		Um	iP 16 36 09.9			Gb	iPKP 03 52 11.2
			i 16 36 20.4			Um	iPKP 03 51 57.5
		Ka	iP 16 37 01 C			iSKP	03 54 53.1
		Aleutian Islands				Fiji Islands (h = 280 km).	
		(h = 30 km).		"	23	Up	iP 07 10 03.9
"	22	Up	i(P) 16 46 45.3			Ki	iP 07 09 36.4 D
						Um	iP 07 09 48.1
"	22	Up	eSKS 22 17 23			Mariana Islands	
			ePS 22 20 03			(h = 480 km).	
			eSS 22 25 37	"	23	Up	iS 08 04 10
			e 22 30 43			microns sec	
			microns sec			M	E 1.1 20
		SKS	E 0.9 12			M	Z 1.6 20
		M	E 1.7 18			Ki	e(P) 07 55 13
		M	N 4.2 25			microns sec	
		M	Z 2.6 20			M	E 0.6 18
		Ki	eP 22 06 46			M	N 0.2 17
			iSKS 22 17 15			M	Z 0.6 18
			e(PS) 22 19 48			Um	i(P) 07 55 42.9
			microns sec			Leeward Islands	
		SKS	E 1.2 12			(h = 60 km).	
		M	E 2.2 20	"	23	Up	iP 10 20 06.9
		M	N 1.7 19			i	10 20 32.3
		M	Z 3.9 21			Ki	iP 10 21 12.2 C
		Um	iSKS 22 17 17			Gb	iP 10 20 18.1
			eS 22 18 09			Turkey (h = 230 km).	
			iPS 22 19 39	"	23	Up	iP 15 25 14.0 C
		Java Sea (h = 30 km).					
		Magn. = 6.0 (Up,Ki).					

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1963					1963				
May	23	Up	microns sec		May	25	Up	iP	01 47 34.6
cont.		P	Z' 0.1 1.0				Ki	iP	01 47 10.2
		Ki	iP 15 24 57.7 C				Um	iP	01 47 19.1 D
			microns sec						Formosa (h = 30 km).
		P	Z' 0.2 1.0		"	25	Ki	---	
		Sk	eP 15 25 18						microns sec
		Gb	iP 15 25 29.6				M	E	0.4 22
		Um	iP 15 25 02.3				M	N	0.5 18
		Ka	iP 15 25 23				Um	iP	02 48 56.7
		Mindanao	(h = 90 km).						Japan (h = 80 km).
"	23	Up	iP 16 38 35.0 C		"	25	Ki	iP	04 32 30.3
		iPcP	16 39 01.3				Um	iP	04 32 57.4
			microns sec						Aleutian Islands (h = 70 km).
		P	Z' 0.1 0.8		"	25	Up	iP	07 45 54.0
		Ki	iP 16 37 47.4 C						microns sec
			microns sec				P	Z' 0.1 0.8	
		M	N 0.3 18				Ki	iP	07 45 01.1
		M	Z 0.6 19				Um	iP	07 45 26.4
		Sk	iP 16 38 22.7 C						Aleutian Islands (h = 80 km).
		Gb	iP 16 38 55.5 C		"	25	Up	iP	08 52 06.7 C
		Um	iP 16 38 09.4 C				ipP	08 52 23.8	
		i	16 39 14.3						microns sec
		Ka	iP 16 38 58 C				P	Z' 0.3 0.7	
		Kurile Islands	(h = 50 km).				Ki	iP	08 51 22.9 C
"	23	Up	iP 18 34 33.1				ipP	08 53 32.3	
		Mexico	(h = 30 km).						microns sec
"	23	Um	iPKP 21 56 04.9				P	Z' 0.4 1.2	
		i	21 56 14.4				Sk	iP	08 51 57.7 C
		Kermadec Islands	(h = 30 km).				ipP	08 54 24.1	
"	24	Sk	iP 07 06 47.6				Gb	iP	08 52 27.7 C
		Um	iP 07 06 32.5				Um	iP	08 51 42.1 C
		i	07 06 40.0				Ka	iP	08 52 29 C
"	24	Up	i(P) 10 31 40.4						Japan. h = 70 km (Up).
"	24	Up	i(P) 10 33 29.8		"	25	Ki	iP	10 25 27.4
									Banda Sea (h = 100 km).
"	24	Gb	i(P) 15 21 32.4 C		"	25	Up	iP	10 50 09.8
"	24	Ki	i(P) 17 44 11.4		"	25	Up	iPKP	16 26 48.6
"	24	Up	iP 20 37 46.5 C				e(PPP)	16 31 18	
			microns sec				e	16 33 36	
		P	Z' 0.1 0.7						microns sec
"	24	Up	iP 21 11 50.3				M	E	2.9 19
		i	21 12 02.0				M	N	3.8 19
		Ki	iP 21 11 11.5				M	Z	5.5 19
		Um	iP 21 11 28.9				Ki	ePKP	16 27 04
		Japan	(h = 50 km).				ePKS	16 30 27	
									microns sec
							PKP	Z' 0.1 1.5	
							PKS	Z 1.0 11	

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1963						1963					
May	25	Ki		microns sec		May	26	Ki	eP	05 02 10	
cont.			M	E 2.7 17		cont.				microns sec	
			M	N 1.9 18					M	E 1.1 15	
			M	Z 3.0 17					M	N 0.8 18	
		Um	e(PKP)	16 27 03					M	Z 1.5 16	
			e	16 27 24				Gb	eP	05 03 23	
				Sandwich Islands				Um	iP	05 02 34 C	
				(h = 30 km).					eS	05 10 45	
				Magn. = 6.2 (Up,Ki).				Ka	eP	05 03 33	
										Kamchatka (h = 30 km).	
"	25	Up	eP	16 57 56		"	26	Ki	eP	18 45 07	
		Ki	eP	16 57 24						Volcano Islands (h = 30 km).	
		Um	iP	16 57 35.5							
				Formosa (h = 30 km).							
"	25	Up	iP	20 09 11.5		"	26	Up	iP	19 36 25.4	
			i	20 09 21.0				Ki	iP	19 37 06.7	
		Ki	iP	20 08 39.6				Sk	eP	19 36 50	
			eS	20 17 54				Um	iP	19 36 45.8	
				microns sec						Mozambique (h = 30 km).	
			M	E 0.4 14		"	26	Ki	iP	21 07 26.8	
			M	N 0.5 18				Sk	e(P)	21 07 16	
			M	Z 0.6 15				Um	iP	21 07 54.0	
				D = 8000 km = 72°.		"	26	Up	iP	21 09 17.4	
		Um	iP	20 08 54.1 C					i	21 09 20.7	
				Japan (h = 110 km).					i	21 09 32.3	
"	25	Ki	iPKP	22 37 54.8					iS	21 14 05.9	
		Sk	ePKP	22 38 11					iSn	21 14 20.6	
		Um	iPKP	22 38 03.4 D						D = 2950 km = 26½°.	
				New Zealand (h = 30 km).				Ki	iP	21 09 52.4	
"	26	Um	iPKP	00 19 13.3				Sk	i(P)	21 10 21.6	
			i	00 19 24.5				Gb	iP	21 09 34.1	
				Tonga Islands (h = 30 km).				Um	eP	21 09 32	
"	26	Ki	iPKP	01 01 21.8					eS	21 14 33	
		Um	iPKP	01 01 27.5				Ka	iP	21 09 06.7	
				Solomon Islands					i	21 09 08.9	
				(h = 90 km).						Caspian Sea (h = 30 km).	
"	26	Up	iP	04 53 36.8						Our arrival times of P are	
		Ki	iP	04 52 43.5						too early by 14 sec in	
		Sk	iP	04 53 21.2						average as compared to the	
		Um	iP	04 53 08.9						USCGS solution (Up,Ki,Gb,	
				Kamchatka (h = 30 km).						Um,Ka). Concerning Sn, read	
										at Up, see remark to	
										Caspian Sea earthquake on	
										Jan. 27, 1963, at 19 35 14.3.	
"	26	Up	iP	05 03 00.8		"	26	Sk	eP	22 02 40	
			i	05 03 11.0				Um	iP	22 03 17.5	
			eS	05 11 42							
				microns sec		"	26	Up	iP	23 17 07.3 D	
			M	E 0.6 17					iPP	23 19 27.9	
			M	N 1.5 15					iPa	23 20 45	
			M	Z 1.0 16					eS	23 25 25	
				D = 7200 km = 65°.					iSS	23 29 45	

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

1963 May cont.	26	Up		microns	sec	1963 May cont.	27	Up		microns	sec
		P	Z'	0.2	1.2			M	N	3.8	19
		PP	N	0.4	6			M	Z	3.6	22
		PP	Z	0.6	6			D = 6800 km = 61°.			
		S	E	0.5	9		Ki	iP		04 08 03.9	D
		S	N	0.8	8			ePP		04 10 05	
		M	E	2.5	18			eS		04 15 39	
		M	N	4.3	18			i		04 15 52	
		M	Z	4.3	22					microns	sec
		D = 6800 km = 61°.						P	N	0.3	6
	Ki	iP		23 16	12.8	D		P	Z	0.9	6
		iS		23 23	51			P	Z'	0.4	1.5
				microns	sec			PP	Z	0.5	6
		P	N	0.4	7			S	N	0.4	7
		P	Z	1.0	7			M	E	2.7	18
		P	Z'	0.1	1.5			M	N	3.1	18
		S	E	0.5	7			M	Z	3.9	17
		S	N	0.8	8			D = 5900 km = 53°.			
		M	E	4.4	20		Sk	iP		04 08 42.0	
		M	N	4.3	19			iPP		04 10 52.5	
		M	Z	5.9	17		Gb	iP		04 09 20.2	
		D = 5950 km = 53½°.						ePP		04 11 36	
	Sk	iP		23 16	50.7		Um	iP		04 08 29.8	D
		iPP		23 19	06.1			iPP		04 10 38.1	
	Gb	iP		23 17	29.3			iPa		04 12 00	
	Um	iP		23 16	38.9	D		eS		04 16 26	
		ePP		23 18	48			D = 6350 km = 57°.			
		ePa		23 20	05		Ka	iP		04 09 23.9	D
		iS		23 24	38			Kamchatka (h = 50 km).			
	Ka	iP		23 17	31.5			Magn. = 6.3 (Up, Ki).			
		Kamchatka (h = 50 km).						Very clear Pa (Up, Um).			
		Magn. = 5.9 (Up, Ki).									
		Very clear Pa (Up, Um).				"	27	Um	iP		06 20 12.5
"	26	Um	iP		23 46 32.1	"	27	Up	iP		14 08 29.0
"	27	Up	i(P)		00 42 43.5					microns	sec
"	27	Ki	eSn		01 21 53	"	27	Ki	eP		16 33 43
		iSg		01 22 14.1				Halmahera (h = 30 km).			
		Sk	eSg		01 21 58	"	27	Up	iP		16 37 35.0
		Um	iSg		01 22 34.5			e		16 37 43	
		Off west coast of Norway,				"	27	Up	iSg		20 03 02.5
		67°N, 11½°E.					Ki	ePg		20 00 23	
		Origin time = 01 20 12.						eSn		20 00 50	
"	27	Up	iP		04 08 58.8	D		iSg		20 01 12.5	
		ePP		04 11 13				D = 400 km = 3.6°.			
		iPa		04 12 45			Sk	ePg		20 00 17	
		eS		04 17 21				iSg		20 00 55.7	
		iSS		04 21 24				D = 370 km = 3.3°.			
				microns	sec		Gb	eSg		20 04 09	
		P	Z'	0.8	1.5			Off west coast of Norway,			
		PP	Z	0.6	6			67°N, 11½°E.			
		S	E	0.4	5			Origin time = 19 59 10.			
		S	N	0.6	8						
		M	E	2.2	17						

Up = Uppsala, Ki = Kiruna, Sk = Skalistugan, Gb = Göteborg, Um = Umeå
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1963					1963				
May	27	Up	eP	21 22 38	May	29	Ki	iP	01 01 26.8
"	28	Up	iP	00 19 46.3 D	"	29	Ka	iP	01 19 14
				microns sec					
			P	Z' 0.1 0.6	"	29	Ki	iPn	04 57 46.4
		Ki	iP	00 18 53.3 D				iSn	04 58 42.4
		Sk	iP	00 19 26.5 D				iSg	04 59 05.2
		Gb	iP	00 20 03.5 D					Northwest Russia.
		Ka	iP	00 20 12 D					Origin time = 04 56 34.
				Aleutian Islands					Explosion?
				(h = 60 km).					
"	28	Up	iP	01 27 37.3	"	29	Up	iP	05 00 40.3
				Japan (h = 70 km).			i		05 00 48.9
"	28	Up	iP	01 35 00			Ki	iP	04 59 44.3
				Ryukyu Islands			Sk	eP	05 00 13
				(h = 30 km).			Gb	iP	05 00 51.2
"	28	Ki	iP	10 39 51.5			Ka	eP	05 01 04
				Iran (h = 30 km).			i		05 01 11
"	28	Up	i(P)	13 10 46.8	"	29	Up	iP	08 43 02.4
"	28	Up	iP	21 14 50.5 C			i		08 43 20.6
		i		21 15 17.8			iPP		08 44 47
				microns sec			i		08 45 03.3
			P	Z' 0.3 0.7			iS		08 49 25
		Ki	iP	21 14 01.6 C			eScS		08 53 00
				microns sec					microns sec
			P	Z' 0.1 0.7			P	Z' 0.1 1.1	
		Sk	iP	21 14 37.9			M	E 0.6 16	
		Gb	iP	21 15 11.4 C			M	N 0.9 15	
		Ka	iP	21 15 16 C			M	Z 1.1 14	
				Kurile Islands (h = 120 km).			D = 4800 km = 43°.		
				Magn. = 6.1 (Up,Ki).		Ki	iP	08 43 31.1	
"	28	Up	iP	22 09 53.5			i	08 43 47.3	
		Ki	iP	22 09 15.7 C			eS	08 50 25	
		Sk	iP	22 09 48.1			eSS	08 53 53	
		Gb	iP	22 10 13.5 C					microns sec
				Japan (h = 80 km).			P	Z' 0.4 1.3	
"	29	Up	iP	00 55 16.4 C			M	E 1.6 15	
		i		00 55 21.0			M	N 1.1 15	
				microns sec			D = 5200 km = 47°.		
			P	Z' 0.1 1.0		Sk	iP	08 43 34.8	
		Ki	iP	00 55 53.8 C			i	08 43 52.7	
				microns sec		Gb	iP	08 43 16.8	
			P	Z' 0.1 1.0			i	08 43 33.7	
		Sk	iP	00 55 51.3 C		Ka	iP	08 42 57	
		i		00 55 55.8			i	08 43 14	
		Gb	iP	00 55 27.2 C			iPP	08 44 49	
		Ka	iP	00 55 09 C					Iran.
				Iran (h = 50 km).					The phase appearing on the
				Magn. = 5.8 (Up,Ki).					average 17 sec after P at
									all stations, with about
									twice the amplitude of P,
									could either be pP, which
									would mean a focal depth of
									75 km (instead of 33, given

Up = Uppsala, Ki = Kiruna, Sk = Skanstugan, Gb = Göteborg, Um = Umeå
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1963	1963
May	May
29	30
cont.	Sk
	i(Sg)
	07 14 53.1
	"
	30
	Up
	iPKP
	07 15 56.4
	microns sec
"	M
29	E
Ki	1.0 20
i	M
09 17 34.9	N
09 18 21.4	1.0 20
iSg	M
09 18 32.9	Z
	2.9 22
"	Ki
29	iPKP
Up	07 15 59.7
iP	microns sec
10 08 25.7	M
	E
"	1.8 20
29	M
Ki	N
i(SKP)	0.8 20
11 19 40.1	Sk
Fiji Islands (h = 550 km).	ePKP
	07 16 11
"	Gb
29	ePKP
Gb	07 16 07
iP	Ka
17 56 25.8 C	ePKP
	07 15 58
"	i
29	07 16 16.5
Ki	South of Australia
i(Sg)	(h = 30 km).
20 23 23.6	
Sk	
e(Sg)	
20 23 28	
"	"
29	30
Up	Ki
iP	iP
20 39 07.7 D	17 49 41.7
	Aleutian Islands
"	(h = 80 km).
29	
Ki	
i(P)	
20 53 10.8	
"	"
30	30
Up	Up
iP	iP
03 55 32.1	18 43 38.6 C
Ki	
iP	
03 54 40.8	
Sk	"
iP	30
03 55 17.9	Ka
Gb	iP
iP	20 13 08.8
03 55 52.8	
Ka	"
iP	30
03 56 01.1	Gb
Kurile Islands (h = 50 km).	iPKP
	20 49 56.8
"	Tonga Islands (h = 60 km).
30	
Up	"
iPKP	31
05 53 30.4 D	Up
microns sec	iP
PKP Z' 0.1 0.5	02 33 49.1
Gb	"
iPKP	31
05 53 40.2	Up
i	iP
05 53 44.0	03 58 50.0 C
Ka	"
iPKP	31
05 53 44.1	Ki
i	iP
05 53 48.5	05 38 46.6
ipPKP	Kamchatka (h = 60 km).
05 56 02.0	"
i	31
05 56 07.8	Sk
Fiji Islands (h = 610 km).	iPKP
	06 22 47.0
"	Tonga Islands (h = 30 km).
30	
Ki	"
iPn	31
06 50 14.9	Ki
iSn	e
06 51 09.3	07 11 23
iSg	microns sec
06 51 32.9	M
D = 500 km = 4.5°.	E
Sk	0.9 20
iSg	M
06 54 03.2	N
i	0.6 20
06 54 10.5	"
Northwest Russia,	31
67 $\frac{1}{2}$ °N, 32 1/4°E.	Ki
Origin time = 06 49 04.	i(P)
Explosion?	09 03 59.3
"	"
30	31
Sk	Ki
ePg	i(P)
07 11 48	11 50 57.0
iSg	"
07 12 07.4	31
"	Up
30	iP
Sk	13 59 42.6 C
e(Sg)	"
07 13 37	31
	Up
	iPKP
	14 27 46.8
	Ki
	iPKP
	14 27 29.4
	Sk
	iPKP
	14 27 36.6 C
	Gb
	iPKP
	14 27 51.1 C
	Um
	iPKP
	14 27 31.3
	Kermadec Islands (h = 60 km).

Up = Uppsala, Ki = Kiruna, Sk = Skanstugan, Gb = Göteborg, Um = Umeå
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1963

May	31	Gb	iPg	15 09 48.9 C
			iSg	15 09 50.9

"	31	Up	eL	18 01
				microns sec
		M	E	0.4 16
		M	Z	0.5 15

Markus Båth
January 20, 1964

Seismological Institute
Uppsala

P R E L I M I N A R Y

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, 1963
.....

1963	June	1	Up	ePKS	00 21 37	1963	June	1	Up	microns sec
					microns sec					
				M	E 0.6 20				P	Z' 0.2 0.7
				M	N 1.1 21				PP	E 0.2 3
				M	Z 1.3 20				PP	Z' 0.1 0.9
									D = 4600 km = 41 $\frac{1}{2}$ °.	
			Ki	eSS	00 36 50				Ki	iP 10 57 43.7 C
					microns sec				i	10 58 18.5
				M	E 1.2 21				iPP	10 59 22.5
				M	N 0.7 19				eLi	11 10 37
				M	Z 1.7 20					microns sec
			Um	ePKP	00 17 57				P	Z' 0.2 1.0
				iPKS	00 21 21				M	E 0.3 9
				iSS	00 37 36				M	N 0.4 10
									D = 4800 km = 43°.	
					Samoa Islands (h = 30 km).				Sk	iP 10 58 00.6 C
"	1		Um	iP	00 28 19.4				iPP	10 59 44.2
				i	00 28 30.7				Gb	iP 10 57 56.6
"	1		Up	iP	02 18 32.6 C				iPP	10 59 43.6
			Ki	iP	02 17 44.9 C				Um	iP 10 57 33.2 C
			Sk	iP	02 18 20.3				ePP	10 59 11
			Um	iP	02 18 06.5				Ka	iP 10 57 39.9 C
					Kurile Islands (h = 30 km).				i	10 58 03.7
"	1		Um	i(P)	06 21 12.7				iPP	10 59 24.7
"	1		Um	i(P)	08 38 13.5				Hindu Kush (h = 70 km).	
				i	08 38 16.5	"	1		Magn. = 6.0 (Up, Ki).	
"	1		Um	iP	08 52 20.0				Ki	ePKP 12 49 57
"	1		Um	i(P)	10 11 12.3					Tonga Islands (h = 30 km).
"	1		Up	iP	10 57 34.9 C	"	1		Up	---
				iPP	10 59 09.0					microns sec
				i	11 01 21.2				M	E 0.5 13
				eSa	11 07 05				M	N 0.7 14
									M	Z 0.6 12
									Ki	iP 18 32 20.8
										microns sec
									M	E 0.6 18
									M	N 0.9 19

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

1963 June cont.	1	Sk	iP	18 32 57.4	1963 June cont.	1	Um	iSS	21 52 37
		Um	iP	18 32 30.0 C				(D = 14450 km = 130°).	
		Lake Baikal, U.S.S.R.					Samoa Islands (h = 30 km).		
		(h = 30 km).					Magn. = 5.9 (Up, Ki).		
"	1	Up	iP	20 20 57.7	"	1	Up	iP	22 29 08.4 C
		Ki	eP	20 20 39			Ki	iP	22 28 37.1 C
		Sk	iP	20 21 04.3			Sk	iP	22 29 05.4
		Um	iP	20 20 45.5			Um	iP	22 28 50.3 C
		Ka	iP	20 21 08			Japan (h = 520 km).		
		Luzon (h = 30 km).							
"	1	Up	iP	20 40 30.9 D	"	2	Up	iP	01 28 51.7
				microns sec			Ki	iP	01 28 38.5
			P	Z' 0.1 0.7			Sk	iP	01 28 32.4
		Ki	iP	20 41 44.8				ipP	01 29 08.9
				microns sec			Um	iP	01 29 24.6 D
			P	Z' 0.1 1.0			Mexico, h = 150 km (Sk).		
		Sk	iP	20 41 05.4	"	2	Um	iP	04 52 22.8
		Gb	iP	20 40 09.9	"	2	Up	iP	07 17 53.3
		Um	iP	20 41 09.2 D			Ki	iP	07 17 44.3
			i	20 41 57.5			Sk	iP	07 18 08.5
		Ka	iP	20 39 51 D			Um	iP	07 17 44.1
			i	20 39 57			Assam (h = 140 km).		
		Mediterranean Sea			"	2	Up	eP	07 39 42
		(h = 290 km).			"	2	Up	---	
"	1	Um	iPKP	21 27 30.6 C				microns sec	
		Loyalty Islands (h = 40 km).					M	E	0.8 20
"	1	Up	iPKS	21 36 38			M	N	0.9 18
			iSKKS	21 42 34			M	Z	0.9 19
				microns sec			Ki	ePS	10 29 03
			PKS	Z 0.7 7				microns sec	
			M	E 0.8 20			M	E	1.2 21
			M	N 1.4 22			M	N	0.8 20
			M	Z 1.4 22			M	Z	1.0 17
		Ki	iPKP	21 32 53.6			Solomon Islands (h = 50 km).		
			ePP	21 34 49	"	2	Up	iP	18 08 58.0
			e	21 36 07			Ki	iP	18 08 04.4
			eSKKS	21 41 46			Sk	eP	18 08 34
				microns sec			Um	iP	18 08 31.6
			PP	N 0.2 6			Alaska (h = 40 km).		
			M	E 1.6 21	"	2	Up	ePKP	21 23 15
			M	N 0.8 20			e	21 24 36	
			M	Z 2.1 20			e	21 34 10	
			(D = 14150 km = 127½°).				eSKKS	21 40 59	
		Sk	ePKP	21 33 02				microns sec	
			ePKS	21 36 31			M	E	1.8 19
		Gb	ePKP	21 33 13			M	N	2.7 19
			ePP	21 36 04			M	Z	3.0 19
		Um	iPKP	21 33 03.2			(D = 13800 km = 124°).		
			iPP	21 35 12.3					
			iPKS	21 36 25					
			eSKKS	21 42 05					

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

1963
June 2 Ki iPKP 21 23 24.9 C
cont. i 21 23 38.6
ePP 21 25 38
microns sec
M E 2.6 20
M N 2.4 20
M Z 6.0 22
(D = 14350 km = 129°).
Sk iPKP 21 23 15.6
Um ePKP 21 23 17
iPP 21 25 17.3
e 21 33 20
ePS 21 35 08
e 21 41 46
iSS 21 42 28
Ka i 21 24 12.5
Sandwich Islands
(h = 50 km).
Magn. = 6.2 (Up, Ki).

" 2 Up iPKP 21 26 56.8
Ki iPKP 21 26 41.8
Sk iPKP 21 26 51.1 C
Gb iPKP 21 27 04.1 C
Um iPKP 21 26 45.9
Kermadec Islands
(h = 60 km).

" 2 Up iP 22 08 37.8
Sk eP 22 08 24
Um iP 22 08 22.6 C
i 22 08 26.6

" 2 Ki iP 22 34 29.2
microns sec
M E 0.5 19
M N 0.6 20
M Z 1.7 20
Sk iP 22 34 21.4
Um iP 22 34 38.3
Guatemala (h = 70 km).

" 2 Up iP 22 38 48.8
Ki iP 22 38 50.6
Sk iP 22 38 35.2
Um iP 22 38 52.6
Colombia (h = 40 km).

" 3 Up iP 07 31 24.2 C
Ki iP 07 30 42.9 C
Gb iP 07 31 45.0
Um iP 07 31 01.2 C
Japan (h = 25 km).

" 3 Up iP 07 47 29.5
i 07 47 36.3

1963
June 3 Up iS 07 57 01
cont. microns sec
P Z' 0.1 1.2
S N 0.4 5
M E 3.7 18
M N 4.5 22
M Z 1.3 16
D = 8300 km = 74½°.
Ki iP 07 46 53.4
i 07 46 59.9
iS 07 55 43
e 07 56 05
microns sec
P Z' 0.3 1.5
S N 0.5 6
M E 4.9 19
M N 6.3 19
M Z 4.3 19
D = 7550 km = 68°.
Sk iP 07 47 27.2
i 07 47 32.0
Gb iP 07 47 50.2
i 07 47 56.5
Um iP 07 47 08.0
iPP 07 49 48.1
iS 07 56 24
eSS 08 00 47
Ka iP 07 47 54.0
Japan (h = 40 km).
Magn. = 5.9 (Up, Ki).
The phase (i) arriving about
6 sec after iP has a much
larger amplitude than this
phase (Up, Ki, Sk, Gb).

" 3 Up eP 11 44 40
e 11 45 01
e 11 54 34
microns sec
M E 1.3 23
M N 1.2 23
M Z 2.3 23
Ki i(P) 11 44 24.4
eSKS 11 54 54
microns sec
SKS E 0.8 14
M E 2.2 22
M N 0.9 21
M Z 3.7 24
Sk eP 11 44 21
i 11 44 53.3
i 11 45 09.2
Gb e 11 44 47
i 11 45 08.7
Um eP 11 44 51

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

1963

June 3 Um i(SKS) 11 54 52
cont. Colombia (h = 20 km).
Magn. = 5.7 (Up,Ki).

"	3	Up	iP	12 42 03.4	D
		Ki	eP	12 42 12	
		Sk	ePP	12 44 01	
		Gb	iP	12 42 26.3	
			iPP	12 44 03.4	
		Um	iP	12 42 00.5	D
		Ka	iP	12 42 10.8	
		Tadzhik, U.S.S.R.			
		(h = 30 km).			

```

"      3      Up      iPKP      19 08 32.7 C
              i          19 08 37.9
                        microns sec
              PKP      Z' 0.1 0.8
      Ki      ePKP      19 08 12
      Sk      iPKP      19 08 26.1 C
      Gb      iPKP      19 08 40.8 C
      Um      iPKP      19 08 20.5 C
      Ka      iPKP      19 08 41.7 C
      Kermadec Islands
      (h = 50 km).

```

" 3 Up iPKP 21 49 06.1
Um iPKP 21 49 14.1
Sandwich Islands
(h = 50 km).

" 4 Um iP 11 16 02.3

"	4	Up	iPKP	12 13	51.9
			i	12 13	56.9
				microns	sec
			PKP	Z' 0.1	0.6
			M	N 0.9	21
			M	Z 1.2	24
		Ki	iPKP	12 13	30.6
		Sk	iPKP	12 13	44.3
			i	12 13	53.7
			i	12 14	39.0
		Gb	iPKP	12 13	57.7
		Um	iPKP	12 13	38.5
		Ka	iPKP	12 14	00.1
			i	12 14	17.3
		Kermadec Islands			
		(h = 30 km).			

"	4	Up	iPKP	13	25	34.3	
			i	13	25	50.5	
		Sk	iPKP	13	25	31.8	C
		Gb	iPKP	13	25	46.9	
		Um	iPKP	13	25	26.5	C

1963

June 4 Ka iPKP 13 25 48.6
cont. Kermadec Islands
(h = 30 km).

"	4	Up	iP	19	34	48.1	D
			ipP	19	35	13.2	
			iPP	19	38	14.3	
			i	19	38	24.6	
						microns	sec
		P	Z'	0.1	0.5		
		Ki	iP	19	34	20.2	
			ipP	19	34	44.8	
						microns	sec
		P	Z'	0.5	1.0		
		Sk	iP	19	34	45.2	D
			ipP	19	35	09.6	
			i	19	37	38.9	
			iPP	19	38	09.7	
		Gb	iP	19	35	05.3	
			ipP	19	35	28.8	
		Um	iP	19	34	32.0	D
			iPP	19	38	00.0	
		Ka	iP	19	35	05	D
			iPP	19	38	54	
		Mariana Islands.					
		h = 100 km (Up,Ki,Sk,Gb).					

" 4 Up iP 20 41 22.1 D
microns sec
P Z' 0.1 0.5
Um iP 20 41 35.1
Mexico (h = 150 km).

"	4	Up	iP	21	18	34.9
		✓	i	21	19	02.8
			i	21	21	30.9
			i	21	21	57.7
			iPP	21	22	41.0
			eSKS	21	29	03
				microns	sec	
			PP	Z	0.5	5
			SKS	E	0.5	11
			M	E	1.9	20
			M	N	2.4	20
			M	Z	4.2	25
		Ki	iP	21	18	12.2
			iPP	21	22	16.3
			iSKS	21	28	49
			iS	21	29	34
			iSS	21	36	20
				microns	sec	
			P	Z'	0.1	1.0
			PP	E	0.5	6
			PP	Z	0.8	6
			PP	Z'	0.1	1.3

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

Year	Month	Day	Station	Frequency	Time	Duration	Remarks
1963	June	4	Ki				
					microns	sec	
			SKS	E	0.7	8	
			S	N	0.3	8	
			M	E	2.7	17	
			M	N	2.1	17	
			M	Z	2.5	17	
			D = 10800 km = 97°.				
			Sk	iP	21 18	39.9	
				e	21 21	39	
				ePP	21 22	38	
			Gb	iPP	21 23	11.1	
			Um	eP	21 18	16	
				i	21 21	42.4	
				iPP	21 22	21.4	
				iSKS	21 28	51	
				eS	21 29	35	
			D = 10900 km = 98°.				
			Ka	e	21 22	05	
				iPP	21 22	56	
			Halmahera (h = 30 km).				
			Magn. = 6.2 (Up, Ki).				
			Pronounced G-waves recorded (Up, Um). Our stations cover the distance range of about 97-105° and clearly demonstrate the gradual disappearance of the P-wave due to the shadow zone.				
"		4	Up	iP	22 16	13.5 C	
					microns	sec	
				P	Z' 0.2	0.7	
			Ki	iP	22 17	28.9 C	
					microns	sec	
				P	Z' 0.1	1.0	
			Sk	iP	22 16	54.6 C	
			Gb	iP	22 15	59.6	
				iPP	22 16	23.6	
			Um	iP	22 16	52.7 C	
			Ka	iP	22 15	36	
			Greece (h = 30 km).				
"		5	Up	iP	00 00	19.6 C	
"		5	Up	iPKP	05 26	42.6	
				i	05 26	50.7	
				iX	05 27	58.6	
			Sk	iPKP	05 26	36.1	
				iX	05 27	50.5	
				i	05 28	14.5	
			Gb	i(PKP)	05 26	58.6	
			Um	iPKP	05 26	30.9 D	
				iX	05 27	34.7	
			Ka	iPKP	05 26	53	
			Kermadec Islands (h = 70 km).				

1963						
June cont.	5	The phase marked X above has no explanation, unless it belongs to another shock.				
"	5	Ki	iP iSg	09 17 09 18	56.2 34.3	
"	5	Ki	iP	09 21	27.7	
"	5	Up	iP	09 23	49.2	
		Ki	iP	09 23	09.2	
			i	09 23	34.2	
		Sk	iP	09 23	44.7	
		Um	iP	09 23	29.2	
			i	09 23	42.1	
		Japan ($h = 30$ km).				
"	5	Up	i	10 34	41.4	
		Ki	iPKP	10 31	00.8	
		Sk	ePKP	10 31	12	
		Um	iPKP	10 31	06.6	
		New Hebrides Islands ($h = 40$ km).				
"	5	Ki	iP	12 18	16.2	
"	5	Up	iPKP	15 06	39.7	
		Sk	iPKP	15 06	32.7	
		Um	iPKP	15 06	27.1	
		Kermadec Islands ($h = 190$ km).				
"	5	Up	iPP iSKS	23 12 23 18	09 40	
				microns sec		
		M	E	0.8	18	
		M	N	1.6	20	
		M	Z	1.1	18	
		Ki		---		
				microns sec		
		M	E	1.8	20	
		M	N	0.9	19	
		M	Z	1.4	18	
		Um	e	23 20	35	
		Celebes ($h = 80$ km).				
"	6	Ki	i(Pg) iSn iSg	05 01 05 02 05 02	57.2 34.2 48.7	
			D = 410 km	=	3.7°	
		Sk	eSg	05 05	15	
		Um	iSn	05 03	16.7	
			iSg	05 03	47.2	
			D = 600 km	=	5.4°	

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

1963

June 6 Northwest Russia,
cont. 67.4°N, 30.0°E. Origin time
= 05 00 49. Explosion?

" 6 Up iP 05 30 57.8 D
i 05 31 42.3
iS 05 40 56
microns sec
P Z' 0.7 1.0
S E 1.5 7
S N 0.7 7
M E 4.9 14
M N 3.2 20
M Z 5.7 14
D = 8800 km = 79°.
Ki iP 05 30 37.2 D
iS 05 40 16
microns sec
P E 0.6 7
P Z 2.1 4
P Z' 0.9 1.8
S E 1.6 6
S N 0.6 10
M E 4.4 18
M N 4.0 19
M Z 4.4 18
D = 8400 km = 75½°.
Sk iP 05 31 02.4 D
Gb iP 05 31 16.5 D
iPP 05 34 20.4
Um iP 05 30 44.2 D
iPcP 05 31 00.0
iS 05 40 30
Ka iP 05 31 11 D
iPcP 05 31 22
Luzon (h = 30 km).
Magn. = 6.4 (Up, Ki).
Pronounced Airy-phase on
long-period E and Z
component records (Up, Um).

" 6 Up iP 06 19 24.9 D
microns sec
P Z' 0.2 1.4
Sk eP 06 19 36
Gb iP 06 19 44.1
Um iP 06 19 11.2
Ka iP 06 19 38
Luzon (h = 30 km).

" 6 Up iP 08 33 06.6
i 08 33 27.4
Ki iP 08 33 08.3 D
i 08 33 28.9
Sk iP 08 33 22.7 D
i 08 33 43.9

1963

June 6 Gb eP 08 33 31
e 08 33 40
Um iP 08 33 03.9
i 08 33 24.6
Ka iP 08 33 07

Nicobar Islands
(h = 30 km).
The phase appearing in the
average 20.8 sec after P
is either pP, which would
mean a focal depth of 80
km, or the P of a new shock
with the same epicenter.

" 6 Up e(P) 11 28 35
Um i(P) 11 26 37.5

" 6 Up iPKP 11 44 52.0
Sk iPKP 11 44 45.2
Um iPKP 11 44 40.2

Kermadec Islands
(h = 110 km).

" 6 Ki eL 13 03
microns sec
M N 0.6 20
M Z 1.4 20

Kerguelen Islands
(h = 30 km).

" 6 Up iPKP 18 01 37.4
iSKP 18 04 47.7
Sk iPKP 18 01 34.2 C
Gb iPKP 18 01 45.2 C
Um iPKP 18 01 29.5
Ka iPKP 18 01 47 C
iSKP 18 05 03

New Hebrides Islands
(h = 160 km).

" 7 Up iPKP 00 02 03.2
Gb iPKP 00 02 12.7
Ka iPKP 00 02 14
Fiji Islands (h = 370 km).

" 7 Um iPP 00 39 53.5
Argentina (h = 210 km).

" 7 Gb iP 08 27 54.9 C

" 7 Up iPKP 15 54 17.8
Fiji Islands (h = 30 km).

" 7 Up iP 16 02 07.5 C
i 16 02 12.5
iS 16 12 09

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

1963					1963				
June	7	Up	microns sec		June	7	Up	ePKS	23 00 11
cont.		P	Z' 0.2 1.2					microns sec	
		M	E 1.1 20				PKS	N 0.5 9	
		M	N 1.6 20				M	E 0.7 18	
		M	Z 1.3 20				M	N 1.4 23	
			D = 8950 km = $80\frac{1}{2}^{\circ}$.				M	Z 1.3 20	
		Ki	iP 16 01 46.9			Ki	ePP	22 58 25	
			i 16 01 51.2				ePKS	22 59 48	
			eS 16 11 31				eSS	23 15 20	
			microns sec				microns sec		
		P	Z' 0.2 1.0				PKS	N 0.3 9	
		S	E 0.4 9				M	E 1.8 20	
		M	E 1.2 16				M	N 1.4 19	
		M	N 1.8 21				M	Z 2.5 19	
		M	Z 1.3 16			Um	iPP	22 58 53	
			D = 8550 km = 77° .				ePKS	23 00 02	
		Sk	iP 16 02 10.5				e	23 06 47	
			i 16 02 49.1				eSS	23 16 22	
		Gb	iP 16 02 26.8				Samoa Islands (h = 30 km).		
			i 16 02 33.7						
			ePP 16 05 45			"	8	Up	---
		Um	iP 16 01 54.1 C					microns sec	
			i 16 01 58.3					M E 0.4 20	
			iS 16 11 42					M N 0.9 22	
		Ka	iP 16 02 20.2 C					M Z 0.6 20	
			Luzon (h = 30 km).			Ki	eS	04 47 25	
			Magn. = 5.7 (Up, Ki).				microns sec		
			The phase arriving about 5				M E 0.6 15		
			sec after the first P has				M N 0.5 18		
			a much larger amplitude				M Z 0.5 17		
			than this phase.			Um	eS	04 46 47	
							ePS	04 48 28	
							e	04 52 41	
							South Atlantic Ocean		
							(h = 30 km).		
x	"	7	Up	---		"	8	Um	iP 21 06 27.2
			microns sec					i(P)	21 06 39.7
			M E 3.0 22			"	8	Um	eP 21 59 12
			M N 2.0 24			"	9	Up	iP 01 04 43.4 C
			M Z 3.2 20				Um	iP	01 04 24.0
		Ki	eS 19 54 58			"	9	Gb	iPKP 01 50 07.5
			e 19 56 03					Ka	iPKP 01 50 12
			eSS 20 01 22					Tonga Islands (h = 30 km).	
			microns sec			"	9	Ki	iPg 05 48 37.1
			M E 2.1 18					iSg	05 49 20.2
			M N 1.4 21					D = 390 km = 3.5° .	
			M Z 2.2 16				Um	eSn	05 49 41
		Um	eSKS 19 54 39					i	05 50 02.8
			e 19 56 24					iSg	05 50 09.0
			ePS 19 56 50					D = 540 km = 4.9° .	
			Clipperton Island						
			(h = 30 km).						
			Magn. = 5.9 (Up, Ki).						
"	7	Up	iP 20 35 27.3						
"	7	Um	ePKS 22 54 29						
			Samoa Islands (h = 30 km).						

1963 June cont.	9	Northwest Russia, 67.0°N, 29.3°E. Origin time = 05 47 26. Explosion?	1963 June cont.	9	Um eP 20 48 46 i 20 48 53.7 Ka iP 20 48 20.0 Mid-Atlantic Ocean (h = 30 km).
"	9	Ki eSn 05 57 23 iSg 05 57 44.0 D = 460 km = 4.1°. Sk eSg 06 00 11 Um e(S*) 05 58 17 iSg 05 58 35.2 D = 620 km = 5.6°. Northwest Russia, 67.3°N, 31.0°E. Origin time = 05 55 29. Explosion?	"	9	Up iSg 21 26 30.9 Ki e 21 24 15 iSg 21 24 38.0 Sk ePn 21 23 43 iSg 21 24 22.4 D = 290 km = 2.6°. Um iPg 21 24 06.5 iSg 21 24 58.6 D = 410 km = 3.7°. Central Norway, 66.2°N, 13.7°E. Origin time = 21 22 56. Foreshock to the following earthquake.
"	9	Up iP 07 20 24.9 Ki eP 07 19 30 Aleutian Islands (h = 70 km).	"	9	Up iSg 21 34 35.7 Ki iPn 21 31 55.3 iSn 21 32 36.2 iSg 21 32 44.6 D = 350 km = 3.1°. Sk iPn 21 31 50.2 iSg 21 32 29.0 D = 290 km = 2.6°. Gb eSg 21 35 37 Um iPg 21 32 12.5 i 21 32 37.5 iSn 21 32 47.8 iSg 21 33 04.7 D = 410 km = 3.7°. Ka eS* 21 36 02 eSg 21 36 30 Central Norway, 66.2°N, 13.7°E Origin time = 21 31 03.
"	9	Ki iP 09 15 12.5 Mindanao (h = 110 km).	"	9	Ki e 23 49 52 eSg 23 49 59 Sk eSg 23 49 42 Um iSg 23 50 18.7 Central Norway, 66.2°N, 13.7°E. Origin time = 23 48 17. Aftershock of preceding earthquake.
"	9	Ki iP 09 41 38.7 Sk iP 09 42 37.1 Um iP 09 42 44.0 Ka iP 09 44 01 Svalbard (h = 60 km).	"	9	Up iP 23 55 35.4 C Ki iP 23 54 43.1 Um iP 23 55 09.3
"	9	Gb iP 10 18 39.0	"	10	Up ePKP 04 36 25 iPKP 04 36 30.9 C e(PP) 04 40 26
"	9	Up i(P) 19 12 36.3 i 19 12 45.2			
"	9	Up iP 19 47 21.1			
"	9	Up iP 20 48 32.7 C eS 20 57 23 microns sec M E 0.4 22 M N 1.1 22 M Z 0.7 22 D = 7300 km = 65.1°. Ki iP 20 49 00.4 eS 20 58 16 microns sec S N 0.2 7 M E 0.5 17 M N 0.3 20 M Z 0.6 18 D = 7800 km = 70°. Sk iP 20 48 32.5 Gb iP 20 48 10.3			

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

1963
June 10 Up
cont.

			microns	sec
	PKP	Z'	0.3	1.5
	M	E	1.9	20
	M	N	2.0	20
	M	Z	3.6	22
	(D = 17650 km = 159°).			
Ki	iPKP		04 36	31.1 C
			microns	sec
	PKP	Z	0.7	8
	PKP	Z'	0.5	1.5
	M	E	2.9	20
	M	N	1.6	20
	M	Z	4.2	20
	(D = 17200 km = 155°).			
Sk	ePKP		04 36	33
	iPKP		04 36	37.5
	e(PP)		04 40	36
Gb	iPKP		04 36	30.7
	i(PP)		04 40	38.1
Um	ePKP		04 36	25
	iPKP		04 36	30.3 C
	i		04 36	33.7
	e		04 46	58
	iSS		04 59	53
Ka	iPKP		04 36	29.2
	iPKP		04 36	34.5
	i(PP)		04 40	30.8

West of Macquarie Islands
(h = 30 km).
Magn. = 6.1 (Up,Ki).
The second PKP phase,
following the first by 5.5
sec in average, has a much
larger amplitude than the
first PKP (Up,Sk,Um,Ka).

" 10 Up iPKP 05 34 09.3 C
i 05 34 20.7
Ki iPKP 05 34 07.6

			microns	sec
	PKP	Z'	0.1	1.0

Sk ePKP 05 34 17
Um iPKP 05 34 03.1
iPKP 05 34 07.3
Ka iPKP 05 34 09.2
West of Macquarie Islands
(h = 30 km).

" 10 Up iPKP 06 58 57.9
iPKS 07 02 36.7
e 07 09 30
e 07 21 55

			microns	sec
	PKP	Z	1.0	4
	PKP	Z'	0.4	1.5
	M	E	3.2	21

1963
June 10 Up
cont.

			microns	sec
	M	N	4.5	20
	M	Z	4.5	20
	(D = 17650 km = 159°).			
Ki	iPKP		06 58	50.4
	iPKP		06 58	57.0
	i		07 09	29
			microns	sec
	PKP	Z	0.9	8
	PKP	Z'	0.8	1.5
	M	E	8.2	19
	M	N	5.4	21
	M	Z	12	20
	(D = 17200 km = 155°).			
Sk	ePKP		06 58	54
	iPKP		06 59	04.9
	i		06 59	23.1
	i(PP)		07 03	05.7
Gb	iPKP		06 58	54.3
	iPKP		06 59	04.8
	i(PP)		07 02	58.2
Um	iPKP		06 58	48.5
	iPKP		06 58	57.1
	iPKS		07 02	42
	e		07 22	04
Ka	iPKP		06 58	47.7
	iPKP		06 58	55.5
	i(PP)		07 02	42.4

West of Macquarie Islands
(h = 20 km).
Magn. = 6.5 (Up,Ki).
The second PKP with much
larger amplitude arrives in
this case on the average 9
sec after the first; compare
remark to the earthquake
just before the preceding
one.

" 10 Up iP 08 05 26.3
Ki iP 08 04 33.2
iPcP 08 05 17.2
Aleutian Islands.

" 10 Up iP 10 57 35.0
i 10 57 39.1
iS 11 06 22

			microns	sec
	P	Z'	0.1	1.3
	S	E	0.4	5
	S	N	0.4	5
	M	E	1.2	21
	M	N	1.1	22
	M	Z	1.2	24
	D = 7200 km = 65°.			

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

1963

June
cont.

10	Ki	iP	10 56 47.0
		iS	11 04 46
			microns sec
	P	N	0.3 6
	P	Z	0.6 5
	P	Z'	0.1 1.5
	S	E	0.5 8
	S	N	0.3 8
	M	E	2.2 22
	M	N	1.6 22
	M	Z	0.9 16
			D = 6450 km = 58°.
	Sk	iP	10 57 23.3
	Gb	iP	10 57 58.9
		iPP	11 00 29.5
	Um	iP	10 57 11.3
		eS	11 05 31
	Ka	iP	10 58 01.1
		i	10 58 17.1
			Kamchatka (h = 30 km).
			Magn. = 5.7 (Up,Ki).
"	10	Um	iPKP 12 38 24.4
			New Britain.
"	10	Ka	i(P) 16 21 59.6
"	11	Up	iPKP 00 17 19.6
		Um	iPKP 00 17 11.6
		i	00 17 28.4
		ePP	00 18 08
		e	00 23 48
		eSKS	00 24 46
		e	00 27 08
	Ka	iPKP	00 17 41.1
			New Britain (h = 70 km).
"	11	Up	iP 03 33 14.2 C
		iPP	03 34 48.4
		i	03 35 42.0
		eSS	03 42 05
			microns sec
		P	Z' 0.1 0.6
		PP	Z' 0.1 1.0
		M	E 0.9 16
		M	N 1.2 12
		M	Z 1.3 17
	Ki	iP	03 33 23.5 C
		eSS	03 42 26
		eLi	03 46 50
			microns sec
		P	Z' 0.1 1.4
		M	E 1.4 10
		M	N 0.6 10
		M	Z 1.7 10

1963

June
cont.

11	Sk	iP	03 33 40.3 C
		iPP	03 35 23.1
	Gb	iP	03 33 36.0 C
		i	03 33 40.0
		iPP	03 35 16.3
		i	03 35 26.5
	Um	iP	03 33 12.2 C
		iS	03 39 16
		eSa	03 41 40
		eSS	03 42 05
			D = 4450 km = 40°.
	Ka	iP	03 33 20.7 C
		i	03 33 30.4
			Hindu Kush (h = 40 km).
			Magn. = 5.8 (Up,Ki).
"	11	Ki	i(P) 04 25 28.9
		Ka	iP 04 26 17.8
			Alaska (h = 50 km).
"	11	Up	i(P) 12 26 11.3
		i	12 26 36.4
			Seismic?
"	11	Up	iP 13 18 19.0
		Ki	iP 13 17 17.0
		Sk	iP 13 17 45.4
		Gb	iP 13 18 27.7
		Um	iP 13 17 48.1
		Ka	iP 13 18 37.8
		i	13 18 50.7
			Alaska (h = 30 km).
"	11	Ki	iP 15 35 26.4
		Sk	eP 15 35 32
		Um	iP 15 35 44.1
		Ka	iP 15 36 08.8
			Baja California (h = 30 km).
"	11	Up	iP 18 16 42.1
		i	18 16 44.1
			microns sec
		M	E 0.3 17
		M	N 0.7 14
		M	Z 0.5 17
	Ki	iP	18 16 42.5
			microns sec
		M	E 0.3 10
		M	N 0.8 14
		M	Z 0.2 10
	Sk	iP	18 17 02.2
	Gb	iP	18 17 05.7
		i	18 17 36.8
	Um	iP	18 16 36.4 C
	Ka	iP	18 16 54.1
		i	18 17 00.5
			Tibet (h = 30 km).

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

1963					
June	11	Up	iP	18 41	34.5
		Ki	iP	18 41	43.6
		Sk	iP	18 42	00.5
		Um	iP	18 41	32.1
		Ka	iP	18 41	41.0
		Hindu Kush ($h = 200 \text{ km}$).			
"	11	Ki	iP	18 47	21.5
		i		18 47	30.3
		P	Z'	0.1	1.3
		Sk	iP	18 47	15.8
		Gb	iP	18 47	16.1
		Colombia ($h = 30 \text{ km}$).			
"	12	Um	iP	03 02	38.5
		Japan ($h = 30 \text{ km}$).			
"	12	Up	i(P)	20 34	08.7
		i		20 34	28.3
		i		20 34	39.0
"	13	Ki	i(P)	00 54	34.3
"	13	Ki	iSn	05 46	37.9
		iSg		05 46	45.9
		Sk	iSg	05 46	28.6
		Um	iSg	05 47	05.1
		Central Norway, 66.2°N, 13.7°E. Origin time = 05 45 04. Aftershock of June 9, 21 31 03.			
"	13	Up	iP	08 42	28.8
		eS		08 46	22
		D =	2400 km =	21 $\frac{1}{2}$	°.
		Ki	iP	08 43	41.4
				microns sec	
		P	Z'	0.1	1.5
		M	N	0.3	13
		M	Z	0.6	13
		Sk	iP	08 42	53.8
		i		08 43	01.4
		i		08 43	24.0
		Gb	iP	08 42	04.4 C
		Um	iP	08 43	06.5
		e(S)		08 47	46
		Ka	iP	08 41	47.9
		Sicily ($h = 30 \text{ km}$).			
"	13	Ki	iP	10 48	33.6 C
		Banda Sea ($h = 150 \text{ km}$).			
"	13	Up	eP	22 35	45
		i		22 35	52.3

1963							
June cont.	13	Ki	eP	22	36	08	
		Indian Ocean (h = 30 km).					
"	14	Sk	iP	07	35	24.5	
		(Mexico; h = 30 km).					
"	14	Ki	iP	15	38	58.4	
			iLg1	15	41	07.1	
			i	15	42	35	
			i	15	42	43.7	
				microns sec			
		M	E	0.4	7		
		M	N	0.2	7		
		Sk	iP	15	40	06.0	
			eLg2	15	44	48	
			iPcP	15	45	33.0	
		Um	iP	15	39	49.8	
			iLi	15	43	12.5	
			eRg	15	44	42	
		Svalbard (h = 30 km). The paths are inside the continental border and channel phases are recorded, as distinct from the Svalbard earthquake of June 9, 1963, 09 39 06.9.					
"	15	Up	iP	13	03	06.3	
		Aleutian Islands (h = 30 km).					
"	15	Ki	ePKP	15	50	02	
				microns sec			
		M	E	0.7	18		
		M	N	0.5	20		
		M	Z	0.9	19		
		Um	ePKP	15	50	03	
			ePKS	15	53	22	
			e	16	04	28	
		SE Pacific (h = 30 km).					
"	16	Um	iP	03	02	52.8 C	
		Japan (h = 440 km).					
"	16	Um	iP	04	54	18.9	
		Japan (h = 80 km).					
"	17	Ka	iP	14	27	10.5	
"	17	Up	iP	18	42	10.8 C	
			iS	18	50	16	
				microns sec			
		P	Z'	0.3	0.8		
		S	N	0.4	5		
		M	E	0.7	13		
		M	N	1.4	14		

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

1963
June
cont.

17 Up microns sec
M Z 1.5 16
D = 6500 km = $58\frac{1}{2}^{\circ}$.
Ki iP 18 41 16.2 C
 i 18 52 19.8
 e 19 02 56
 microns sec
 P Z' 0.9 1.0
 M E 1.5 18
 M N 1.2 17
 M Z 1.1 16
Sk iP 18 41 41.2 C
Gb iP 18 42 21.1 C
 iPcP 18 43 06.0
Um iP 18 41 45.0 C
 eS 18 49 25
 i 18 56 46.
 D = 6100 km = 55° .
Ka iP 18 42 27.8 C
Yukon (h = 30 km).

" 17 Up eL 19 41
 microns sec
 M E 1.8 19
 M N 2.5 18
 M Z 3.0 19
Ki eL 19 41
 microns sec
 M E 5.4 23
 M N 1.7 19
 M Z 5.1 22
Scott Island (h = 30 km).
Magn. = 6.2 (Up, Ki).

" 17 Up iP 23 15 03.0 C
 iPP 23 18 41.9
 iSKS 23 25 26
 i 23 26 26
 microns sec
 P Z' 0.1 0.6
 PP Z' 0.2 1.5
 D = 10100 km = 91° .
Ki iP 23 15 02.7 C
 microns sec
 P Z' 0.6 1.0
Sk iP 23 15 16.3 C
 e 23 18 40
Um iP 23 14 59.9 C
 eSKS 23 25 19
 iS 23 25 45
 iSS 23 31 46
Ka iP 23 15 03.2 C
 i 23 19 01.5
 e 23 26 29
 i 23 28 22.2
Sumatra (h = 70 km).
Magn. = 6.2 (Up, Ki).

1963
June

18 Um iP 03 23 38.1 D
" 18 Up iP 04 14 13.4 C
 microns sec
 P Z' 0.1 0.8
 M E 1.6 17
 M N 1.8 13
 M Z 2.4 15
Ki iP 04 13 43.3
 iPP 04 16 18.6
 microns sec
 P Z' 0.1 1.0
 M E 1.6 19
 M N 1.0 20
 M Z 3.1 19
Sk iP 04 14 12.8 C
Gb iP 04 14 33.7 C
Um iP 04 13 55.0 C
Ka iP 04 14 32.5
Ryukyu Islands (h = 30 km).
Magn. = 5.7 (Up, Ki).

" 18 Up iP 08 45 19.8
Ki iP 08 45 29.9
Sk eP 08 45 46
Hindu Kush (h = 220 km).

" 18 Up iPg 09 08 13.5
 i 09 08 23.1
 iSg 09 08 30.9
 i 09 08 38.0
 microns sec
 Sg Z' 0.1 0.5
 D = 140 km = 1.3° .
Sk eSg 09 10 49
Um iS~~g~~ 09 10 30.1
 iSg 09 10 44.6
Ka iSg 09 09 08.9
 i 09 09 22.9
Central Baltic,
 58.6°N , 17.5°E .
Origin time = 09 07 48.
Probably explosion.
Possibly two subsequent
events, which complicate
the records.

" 18 Up iPg 09 14 36.6
 iSg 09 14 54.1
 i 09 15 12.4
 microns sec
 Sg Z' 0.1 0.5
 D = 140 km = 1.3° .
Sk eS~~g~~ 09 17 03
 iSg 09 17 16.0
Um iS~~g~~ 09 16 54.9

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

1963 June cont.	18	Ka	iSg	09 15 37.6	1963 June cont.	19	Up		microns sec
			Central Baltic,				M	N	0.9 21
			58.6°N, 17.5°E.				M	Z	1.3 20
			Origin time = 09 14 11.			Ki	iP		10 57 28.9 C
			Probably explosion.				eS		11 05 45
"	18	Ka	iPg	13 42 02.9					microns sec
			iSg	13 42 29.2			P	Z	0.6 4
"	18	Gb	i(P)	14 30 25.8			P	Z'	0.3 1.0
"	18	Ki	eP	16 04 08			S	E	0.4 8
"	18	Up	iP	23 27 09.8			M	E	4.0 21
			i	23 27 15.4			M	N	0.7 17
		Ki	iP	23 26 52.2			M	Z	4.2 20
			Luzon (h = 15 km).						D = 6650 km = 60°.
"	19	Up	iP	09 22 20.0 C		Gb	iP		10 57 54.2 C
			iSKS	09 32 49		Um	iP		10 57 26.9 C
			iS	09 33 26			iS		11 05 35
				microns sec		Ka	iP		10 57 42.4 C
			P	Z' 0.3 0.8			ipP		10 57 54.5
			SKS	E 0.5 4					Assam. h = 50 km (Up, Ka).
			M	E 3.4 22					Magn. = 6.2 (Up, Ki).
			M	N 3.4 19	"	19	Up	iPKP	12 17 45.8
			M	Z 5.0 22			Ki	iPKP	12 17 33.2 D
			D = 10650 km = 96°.						microns sec
	Ki	iP	09 22 03.3 C				M	E	0.5 17
		ePP	09 25 40				M	N	0.2 17
		iSKS	09 32 28			Gb	iPKP		12 17 52.8
		iS	09 32 55			Um	iPKP		12 17 38.5
			microns sec						Solomon Islands (h = 30 km).
			P	Z 0.7 12	"	19	Up	iPg	17 01 42.8
			P	Z' 0.4 1.0				iSg	17 02 45.8
			PP	E 0.3 10					D = 500 km = 4.5°.
			PP	Z 0.8 13		Sk	eS		17 03 48
			SKS	E 1.2 6			iSg		17 04 06.2
			S	N 1.0 5					D = 790 km = 7.1°.
			M	E 4.5 22		Gb	iPg		17 00 46.0
			M	N 1.4 16			i		17 00 47.7
			M	Z 3.9 21			iSg		17 01 03.9
			D = 10200 km = 92°.						D = 140 km = 1.3°.
	Gb	iP	09 22 35.9 C			Ka	iPg		17 00 59.1
	Um	iP	09 22 08.5 C				iSg		17 01 28.1
		ePP	09 25 47				i		17 01 43.9
		iSKS	09 32 36						D = 240 km = 2.2°.
	Ka	iP	09 22 32.0 C						Kattegatt, between Sweden
			Taland Islands (h = 80 km).						and Denmark,
			Magn. = 6.3 (Up, Ki).						56.5°N, 11.7°E.
"	19	Up	iP	10 57 34.2 C					Origin time = 17 00 14.
			ipP	10 57 46.3	"	19	Um	i(P)	18 41 45.1
			microns sec		"	19	Up	iP	23 13 44.3
			P	Z' 0.2 0.6				iS	23 23 25
			M	E 1.2 21				iSKS	23 23 37
									microns sec
							P	Z'	0.2 1.5

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

1963									
June cont.	19	Up			microns	sec			
			SKS	E	0.5	5			
			SKS	N	0.7	7			
			M	E	1.9	17			
			M	N	3.7	20			
			M	Z	3.6	22			
			D =	8550 km =	77°				
		Sk	iP		23 13	40.4		D	
		Gb	eP		23 14	01			
		Um	iP		23 13	24.6		D	
			iPP		23 16	11			
			eS		23 22	51			
			eSS		23 27	44			
		Ka	iP		23 14	10.3			
		Japan	(h = 40 km).						
		Magn.	= 5.8 (Up).						
"	20	Up	iP		01 07	42.4			
					microns	sec			
			P	Z'	0.1	1.2			
		Sk	iP		01 07	34.7			
		Um	iP		01 07	19.8		D	
		Japan	(h = 30 km).						
"	20	Up	iP		19 53	26.2			
					microns	sec			
			M	E	0.8	15			
			M	N	1.0	17			
			M	Z	0.5	16			
		Sk	iP		19 53	43.1			
			i		19 53	50.8			
		Gb	iP		19 52	56.3			
		Um	iP		19 54	01.0		C	
			i		19 54	13.1			
			e(Sa)		19 59	10			
		Western Mediterranean							
		(h = 50 km).							
"	20	Up	iPKP		23 05	54.1		C	
			i		23 07	07.8			
			i		23 08	22.1			
					microns	sec			
			PKP	Z'	0.2	0.6			
			M	E	0.8	20			
			M	Z	0.6	20			
		Sk	iPKP		23 05	46.4			
		Gb	iPKP		23 06	03.5		C	
		Um	iPKP		23 05	42.5		C	
			i		23 05	48.7			
			ePP		23 08	49			
			eSS		23 27	32			
		Ka	iPKP		23 06	12.6			
			i		23 06	35.8			
		Kermadec Islands							
		(h = 40 km).							

1963					
June	21	Up	ePKP	00 28 08	
			i	00 28 19.1	
		Sk	iPKP	00 28 01.9	C
		Gb	iPKP	00 28 17.0	
		Um	iPKP	00 27 57.0	C
		Kermadec Islands.			
"	21	Up		---	
				microns sec	
		M	N	0.4	9
		M	Z	0.5	8
		Um	iP	06 07 24.1	
		Yugoslavia.			
"	21	Up	iP	13 54 30.2	
			eS	14 02 32	
				microns sec	
		M	E	2.4	18
		M	N	2.4	17
		M	Z	0.9	12
		D =	6650 km = 60°.		
		Ki	iP	13 53 42.5	C
			eSa	14 05 35	
			eLg2	14 13 37	
				microns sec	
		P	Z'	0.1	1.1
		M	E	2.9	17
		M	N	2.0	15
		M	Z	1.8	16
		Sk	iP	13 54 19.8	C
		Um	iP	13 54 00.9	C
			eLi	14 12 16	
		Manchuria (h = 30 km).			
		Magn. = 5.6 (Up,Ki).			
"	21	Up	iP	15 36 38.9	C
				microns sec	
		P	Z'	0.2	0.5
		Ki	iP	15 36 33.9	C
				microns sec	
		P	Z'	0.2	1.0
		M	E	1.6	21
		M	N	0.6	19
		M	Z	1.2	19
		Sk	iP	15 36 55.4	C
			i	15 37 04.5	
		Gb	iP	15 36 59.0	C
		Um	iP	15 36 31.0	C
		Ka	iP	15 36 47.8	C
		India (h = 60 km).			
		Magn. = 6.4 (Up,Ki).			
"	21	Ki	iSn	17 10 31.9	
			iSg	17 10 53.8	
		D = 480 km = 4.3°.			

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

1963						1963					
June	21	Um	i	17 12 05.6		June	22	Sk	iP	16 24 57.7	
cont.			iSg	17 12 17.2		cont.				Java Sea (h = 600 km).	
				Northwest Russia.							
				Origin time = 17 08 32.		"	22	Up	iP	21 01 03.8	
				Explosion?					iLgl	21 19 21	
				Location is very close to						microns sec	
				or coinciding with the				M	E	1.0 18	
				following event.				M	N	1.4 18	
								M	Z	0.9 15	
"	21	Ki	iSn	17 19 45.4			Ki	iP		21 00 19.0	
			iSg	17 20 08.1				e		21 12 49	
				D = 490 km = 4.4°.						microns sec	
		Sk	eSg	17 22 53				M	E	0.9 15	
		Um	eSg	17 21 25				M	N	0.9 13	
				Northwest Russia,				M	Z	0.9 13	
				68.6°N, 32.3°E.			Sk	iP		21 00 58.6	
				Origin time = 17 17 43.			Um	iP		21 00 39.9	
				Explosion?				eSS		21 11 19	
										Manchuria (h = 30 km).	
"	21	Up	iPKP	18 02 13.5 C		"	22	Up	iPKP	21 47 40.5	
			i	18 02 33.6				Sk	iPKP	21 47 33.7	
		Sk	ePKP	18 02 03					i	21 47 56.8	
		Gb	iPKP	18 02 28.2				Um	iPKP	21 47 29.2	
				Kermadec Islands						Kermadec Islands	
				(h = 30 km).						(h = 30 km).	
"	21	Up	iP	21 37 32.8 D		"	23	Um	iP	01 27 46.0 D	
		Um	iP	21 36 33.7							
"	21	Up	iPKP	22 01 41.5		"	23	Up	iPKP	04 09 12.1 C	
			i	22 01 52.0					i	04 09 17.6	
		Sk	iPKP	22 01 33.8						microns sec	
		Gb	iPKP	22 01 49.8				PKP	Z'	0.2 0.5	
		Um	iPKP	22 01 28.5				M	N	0.9 22	
				Kermadec Islands			Ki	iPKP		04 08 52.4	
				(h = 40 km).						microns sec	
								PKP	Z'	0.1 1.0	
"	21	Up	iP	22 08 00.8				M	E	0.4 20	
		Sk	iP	22 07 48.5				M	N	0.3 20	
		Um	iP	22 07 43.9				M	Z	0.8 21	
"	22	Ki	e(Pn)	00 51 57			Sk	iPKP		04 09 05.6 C	
			eSn	00 52 55			Gb	iPKP		04 09 20.1 C	
			iSg	00 53 18.3			Um	iPKP		04 08 53.0 C	
				D = 490 km = 4.4°.				eSS		04 31 19	
		Sk	eSg	00 55 58			Ka	ePKP		04 09 27 C	
		Um	iSn	00 53 56.6						Kermadec Islands	
			iSg	00 54 37.9						(h = 60 km).	
				D = 740 km = 6.7°.		"	23	Ki	e(Pn)	04 39 06	
				Northwest Russia,					eSn	04 39 58	
				68.5°N, 32.0°E.					eSg	04 40 14	
				Origin time = 00 50 55.						D = 500 km = 4.5°.	
				Explosion?				Sk	eSg	04 42 53	
"	22	Up	iP	16 24 47.2			Um	e(Pn)		04 39 34	
		Ki	iP	16 24 40.6				iSn		04 40 45.4	
								iSg		04 41 24.7	
										D = 730 km = 6.6°.	

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

1963						1963					
June	23	Northwest Russia,				June	24	Sk	eS	04 44 14	
cont.		68.3°N, 32.4°E.				cont.			eP'P'	05 06 18	
		Origin time = 04 37 47.					Gb	iP		04 36 57.5	D
		Explosion?					Um	iP		04 36 17.3	D
"	23	Up	e(P)	06 51 33					iP'P'	05 06 17.8	
"	23	Um	e(P)	07 41 27			Ka	iP		04 37 09	D
"	23	Ki	iP	09 14 33.4					iS	04 45 35	
		Sk	iP	09 15 06.4					Alaska (h = 50 km).		
		Um	iP	09 14 50.8					Magn. = 6.6 (Up,Ki).		
		Japan (h = 40 km).				"	24	Ki	iSn	04 58 58.3	
"	23	Up	iP	09 37 24.0					iS*	04 59 12.8	
		Sk	iP	09 38 04.0					iSg	04 59 21.3	
		Um	eP	09 38 04					D = 490 km = 4.4°.		
			i	09 38 09.2			Um	iSn	04 59 44.0		
		Yugoslavia (h = 30 km).							iSg	05 00 20.8	
"	23	Ki	iP	18 40 05.8					D = 690 km = 6.2°.		
		Mariana Islands							Northwest Russia,		
		(h = 40 km).							67.7°N, 32.1°E.		
"	23	Up	iP	21 12 22.7					Origin time = 04 56 56.		
"	24	Up	iP	04 36 44.9	D				Explosion?		
			iS	04 44 58			"	24	Ki	iP	05 52 59.5
			iScS	04 46 32						microns sec	
			eP'P'	05 06 10					M	E	0.8 17
									M	N	0.7 15
									M	Z	1.0 15
							Sk	iP			05 53 27.2
							Um	eP			05 53 26
									i		05 53 31.9
									Alaska (h = 60 km).		
							"	24	Ki	eL	07 01
										microns sec	
									M	E	0.9 18
									M	N	0.6 19
									M	Z	1.7 20
									Alaska (h = 40 km).		
							"	24	Up	iP	10 27 38.0
									Sk	iP	10 27 09.4
									Queen Charlotte Islands		
									(h = 40 km).		
							"	24	Up	iPKP	13 37 16.5
										microns sec	
									PKP	Z'	0.1 0.9
							Ki	e(PKP)			13 37 19
							Gb	iPKP			13 37 25.5
									i		13 37 41.4
							Um	iPKP			13 37 06.3
							Ka	iPKP			13 37 29.4
									Tonga Islands (h = 240 km).		
							"	24	Sk	iP	14 28 01.7
									Alaska (h = 30 km).		

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

1963						1963					
June	24	Ki	iPKP	15 19 58.8		June	26	Up		microns sec	
		Um	iPKP	15 20 06.7		cont.		M	N	0.5 12	
			Fiji Islands (h = 410 km).					Um	iP	05 53 45.5	
"	24	Up	iP	16 28 12.7					Bulgaria.		
			eS	16 37 01		"	26	Um	iP	08 08 48.5	
				microns sec					Mariana Islands (h = 50 km).		
			P	Z' 0.1 1.0		"	26	Um	iP	08 44 13.9	
			S	N 0.5 16					Japan (h = 30 km).		
			M	E 1.0 18		"	26	Up	iP	09 54 52.3	
			M	N 3.6 22						microns sec	
			M	Z 3.0 23					M	E 0.6 14	
			D = 7550 km = 68°.						M	N 0.7 15	
		Ki	iP	16 27 19.2					M	Z 0.6 12	
			iS	16 35 28				Sk	eP	09 54 57	
			ePS	16 35 42				Gb	eP	09 55 02	
				microns sec				Um	iP	09 54 42.0 D	
			P	Z' 0.1 1.3					Mindanao (h = 30 km).		
			S	N 0.3 9		"	26	Up	iP	10 32 51.1	
			M	E 2.2 18				Sk	eP	10 33 10	
			M	N 1.6 20				Gb	iP	10 32 21.3	
			M	Z 2.5 19				Um	iP	10 33 26.5 D	
			D = 6650 km = 60°.						Western Mediterranean		
		Sk	iP	16 27 49.8					(h = 30 km).		
			iPcP	16 28 24.2		"	26	Up	iP	14 17 18.7	
		Gb	iP	16 28 27.8						microns sec	
		Um	iP	16 27 45.7				Ki	iP	14 17 21.0	
			eS	16 36 13				iS		14 23 52.8	
		Ka	iP	16 28 39.2						microns sec	
			Aleutian Islands						P	Z' 0.2 0.6	
			(h = 30 km).							D = 4900 km = 44°.	
			Magn. = 5.6 (Up,Ki).					Sk	iP	14 17 40.7	
			Although not very clear,					Gb	iP	14 17 40.9	
			the first motion exhibits					Um	iP	14 17 13.2	
			a small dilatation followed					i		14 17 49.4	
			by a much larger compression.					Ka	iP	14 17 29.7	
"	25	Sk	iP	11 56 14.1 C				i		14 17 57.5	
		Um	iP	11 56 28.0					Sinkiang (h = 30 km).		
			Panama - Costa Rica			"	26	Ki	eP	14 35 28	
			(h = 40 km).						Colombia (h = 30 km).		
"	25	Um	e(P)	13 35 44		"	26	Up	iP	17 32 18.1	
			i	13 35 52.8				Ki	iP	17 32 11.3 C	
"	25	Up	i(P)	16 01 36.0 C				Sk	iP	17 32 33.1	
"	25	Um	iPKP	16 23 09.4				i		17 33 00.4	
			Tonga Islands (h = 250 km).					Um	iP	17 32 10.1 C	
"	25	Up	iP	19 51 18.9					Burma (h = 80 km).		
		Um	eP	19 51 32		"	26	Up	iP	17 55 33.3 C	
			i	19 53 34.4				iS		18 06 20	
"	26	Up	---								
				microns sec							
		M	E	0.6 12							

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

1963					1963				
June	26	Up		microns sec	June	27	Um	iSg	07 52 01.2
cont.			P	Z' 0.1 0.7	cont.			D = 400 km = 3.6°.	
			S	E 0.7 12				Central Norway,	
			S	N 1.2 12				66.5°N, 14.5°E.	
			M	E 1.7 18				Origin time = 07 50 02.	
			M	N 3.3 23					
			M	Z 4.0 24		"	27	Ki	eP 10 49 23
				D = 9900 km = 89°.				i	10 49 31.6
		Ki	iP	17 55 31.4					
			i	17 55 41.5		"	27	Up	iPKP 12 41 05.3
			ePP	17 58 57					microns sec
			eS	18 06 03				PKP	Z' 0.1 0.9
				microns sec			Ki	ePKP	12 40 43
			P	Z 0.5 6			Sk	iPKP	12 40 59.1 C
			P	Z' 0.4 1.6			Um	iPKP	12 40 53.8 C
			S	E 1.2 12					Kermadec Islands
			S	N 0.6 11					(h = 40 km).
			M	E 2.9 20		"	27	Um	iP 14 31 03.4
			M	N 1.3 18		"	27	Up	iP 15 44 06.9 C
			M	Z 1.8 19					microns sec
				D = 9800 km = 88°.				P	Z' 0.1 0.6
		Sk	iP	17 55 19.3 C			Ki	iP	15 44 06.4 C
			i	17 55 30.9					microns sec
			iPP	17 58 37.6				P	Z' 0.1 0.6
		Gb	iP	17 55 22.7			Sk	iP	15 44 23.1 C
		Um	iP	17 55 35.1			Gb	iP	15 44 23.9
			iPP	17 59 06.1			Um	iP	15 44 02.5 C
			eS	18 06 08				eS	15 53 09
				Panama (h = 20 km).			Ka	iP	15 44 14
				Magn. = 6.1 (Up, Ki).					Andaman Islands (h = 30 km).
"	26	Up	i(P)	20 45 17.5					
"	27	Ki	iP	02 04 24.7	"	27	Ki	iP	16 43 35.3
"	27	Up	iP	07 17 58.3 C	"	27	Up	iP	23 35 41.0
				microns sec			Ki	iP	23 34 51.7 C
			P	Z' 0.3 1.3			Um	iP	23 35 14.1 C
		Ki	iP	07 17 04.0 C					Kurile Islands (h = 110 km).
				microns sec		"	28	Ki	iP 02 42 37.5
			P	Z' 0.5 1.1				iPP	02 46 45.9
		Sk	iP	07 17 28.7 C				i	02 46 54.1
		Gb	iP	07 18 08.8				eSS	03 01 12
			i	07 18 23.9					microns sec
		Um	iP	07 17 32.7 C				PP	N 0.3 5
			iS	07 25 25				PP	Z 0.6 5
		Ka	iP	07 18 23				PP	Z' 0.2 2.0
				Yukon (h = 30 km).				M	E 0.9 20
"	27	Ki	e	07 51 08				M	N 0.6 20
			eSg	07 51 32				M	Z 1.1 18
		Sk	ePg	07 50 59					(D = 11200 km = 101°).
			iSg	07 51 38.2			Sk	iPP	02 46 39.4
			D = 320 km = 2.9°.				Um	iP	02 42 23.7 C
		Um	iPg	07 51 13.3				ePS	02 55 18
			iSn	07 51 47.2				eSS	03 00 27

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

1963					1963				
June	28	Indian Ocean (h = 30 km).			June	28	Ki	iP	20 35 08.6
cont.		Magn. = 6.3 (Ki).							
"	28	Ki	i(P)	04 19 33.2 C	"	28	Up	iP	22 06 35.9 C
"	28	Ki	iP	06 09 56.9 C				iS	22 15 31
		Um	iP	06 10 04.1				i	22 15 46.5
"	28	Ki	iP	08 32 27.4					microns sec
"	28	Ki	eP	11 22 21				P	N 6.4 12
"	28	Up	iP	14 00 11.7				P	Z 11 10
			iS	14 10 31				P	Z' 0.7 0.8
				microns sec				S	E 9.2 15
			M	E 0.7 16				S	N 10 14
			M	N 2.1 21				M	E 43 18
			M	Z 1.2 15				M	N 58 17
			D = 9200 km = 83°.					M	Z 47 20
		Ki	iP	14 00 14.0			Ki	iP	22 05 48.0 C
			eS	14 10 32				eS	22 13 54
				microns sec				iPS	22 14 12
			P	Z' 0.1 1.0					microns sec
			S	E 0.5 8				P	E 2.5 8
			S	N 0.6 15				P	N 3.2 8
			M	E 1.2 16				P	Z 11 8
			M	N 0.6 16				P	Z' 1.1 1.0
			M	Z 1.2 15				S	N 6.6 10
			D = 9300 km = 83½°.					M	E 86 18
		Sk	iP	14 00 28.5 D				M	N 88 19
		Gb	iP	14 00 28.1				M	Z 180 18
			i	14 01 10.7				D = 6700 km = 60½°.	
		Um	iP	14 00 10.0			Sk	iP	22 06 23.4 C
			i	14 00 26.1				iS	22 15 12.3
			iPP	14 03 26			Gb	iP	22 06 56.9 C
			iS	14 10 28				i	22 07 11.8
		Sumatra (h = 50 km).						iS	22 16 26.4
		Magn. = 5.7 (Up,Ki).					Um	iP	22 06 10.0 C
"	28	Um	iP	15 18 58.1				ePa	22 10 04
		Iceland (h = 30 km).						eS	22 14 31
"	28	Ki	iP	16 04 56.0				i!	22 14 44
				microns sec				iP'P'	22 35 11.0
			M	E 0.4 15				Kurile Islands (h = 30 km).	
			M	N 0.2 15				Magn. = 6.9 (Up,Ki).	
			M	Z 0.7 14					
		Um	iP	16 05 13.8					
		Iceland (h = 30 km).			"	28	Um	iP	22 15 19.5
"	28	Ki	iP	17 28 32.0	"	28	Up	iP	22 26 25.2
		Um	iP	17 28 49.1			Ki	iP	22 25 36.9 C
		Ka	iP	17 29 33.4 D			Gb	eP	22 26 46
"	28	Um	iP	19 50 14.0			Um	iP	22 25 58.7 C
								Kurile Islands (h = 30 km).	
					"	28	Up	iP	22 32 59.2
							Ki	iP	22 32 11.2
							Um	iP	22 32 33.1
								Kurile Islands (h = 30 km).	
"	28	Um	iP	19 50 14.0	"	28	Up	iP	22 36 00.8

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

1963				1963			
June				June			
cont.	28	Up	microns sec	cont.	29	Ki	microns sec
		P	Z' 0.4 1.5			P	Z' 0.7 1.7
		Ki	iP 22 35 12.8 C			Sk	iP 00 04 40.4 C
			microns sec			i	00 04 52.1
		P	Z' 0.5 2.0			Gb	iP 00 05 14.0 C
		Sk	eP 22 35 46			Um	iP 00 04 27.1 C
		Gb	iP 22 36 21.1			i	00 04 38.0
		Um	iP 22 35 34.8 C			Ka	iP 00 05 19.9 C
		Ka	iP 22 36 28.7			i	00 05 32.1
		Kurile Islands (h = 30 km).				Kurile Islands (h = 30 km).	
		Magn. = 6.3 (Up,Ki).				Magn. = 6.5 (Up,Ki).	
"	28	Um	iP 22 54 06.5 C			The second phase (Up,Ki,Sk, Um,Ka) is either pP, which would mean a focal depth of 50 km or it is the P of a new shock in about the same location.	
"	28	Up	iP 23 00 30.2				
		Ki	iP 22 59 42.5				
		Gb	iP 23 00 51.1				
		Um	iP 23 00 04.3 C				
		Kurile Islands (h = 30 km).		"	29	Up	iP 00 07 42.4
"	28	Up	iP 23 08 00.8 C			Ki	iP 00 06 53.7
		i	23 08 02.3			Kurile Islands.	
			microns sec	"	29	Um	iP 02 00 30.1
		P	Z' 0.2 1.0	"	29	Up	iP 02 32 44.5
		Ki	iP 23 07 12.5				microns sec
			microns sec			P	Z' 0.1 1.0
		P	Z' 0.5 1.5			Ki	iP 02 31 56.0 C
		Sk	iP 23 07 48.6				microns sec
		Gb	iP 23 08 23.0			P	Z' 0.1 1.1
			iPcP 23 08 45.7			M	E 0.5 15
		Um	iP 23 07 34.2			M	N 0.5 17
		Ka	iP 23 08 28.8			M	Z 0.9 16
		Kurile Islands (h = 30 km).				Sk	eP 02 32 22
		Magn. = 6.2 (Up,Ki).				Gb	iP 02 33 04.8
"	28	Um	iP 23 26 18.2			Um	iP 02 32 18.2 C
"	28	Ki	e(Pn) 23 55 58			Kurile Islands (h = 30 km).	
		iSn	23 56 50.0			Magn. = 5.8 (Up,Ki).	
		iSg	23 57 07.0	"	29	Ki	iP 02 34 51.1
		D = 400 km = 3.6°.				Um	iP 02 34 11.2 C
		Sk	iSg 23 59 44.0				
		Um	iSn 23 57 46.6	"	29	Up	eP 04 18 09
			iSg 23 58 21.5			Ki	iP 04 17 21.9 C
		D = 640 km = 5.8°.					microns sec
		Northwest Russia,				P	Z' 0.1 1.2
		68.0°N, 30.0°E.				Um	iP 04 17 43.9 C
		Origin time = 23 55 09.				Kurile Islands (h = 30 km).	
		Explosion?		"	29	Up	iP 05 49 54.1 C
"	29	Up	iP 00 04 53.3 C				microns sec
		i	00 05 04.8			P	Z' 0.1 1.3
			microns sec			Ki	iP 05 49 05.5
		P	Z' 0.5 1.1				microns sec
		Ki	iP 00 04 04.9 C			P	Z' 0.2 2.0
		i	00 04 18.5			Sk	iP 05 49 41.6

[illegible]

1963						
June	30	Ki	i(P)	18 26	38.3	
		Um	iP	18 26	53.9	
"	30	Ka	iP	18 46	01.7	
"	30	Up	iP	22 15	49.9	G
			eS	22 24	45	
				microns	sec	
		P	Z'	0.4	1.0	
		M	E	1.0	17	
		M	N	1.4	18	
		M	Z	1.3	20	
		D =	7550 km	=	68°.	
		Ki	iP	22 15	01.0	C
			eS	22 23	18	
				microns	sec	
		P	Z'	0.2	0.8	
		S	N	0.3	9	
		M	E	1.9	17	
		M	N	1.8	18	
		M	Z	5.5	18	
		D =	6700 km	=	60 $\frac{1}{2}$ °.	
		Sk	iP	22 15	36.8	C
		Gb	iP	22 16	10.2	C
		Um	iP	22 15	23.7	C
			eS	22 23	58	
		Ka	iP	22 16	14.7	C
		Kurile Islands (h = 30 km).				
		Magn. = 6.2 (Up,Ki).				
"	30	Up	iP	23 30	08.1	
		Sk	iP	23 29	56.5	
		Gb	eP	23 30	13	
		Um	iP	23 29	51.4	

Markus Båth
February 1, 1964

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

1963					1963				
July	2	Gb	eP	00 23 45	July	3	Ki	iSg	17 48 08.9
cont.		Um	iP	00 23 02.0	cont.			D = 330 km = 3.0°.	
		Sinkiang Province, China					Sk	eSg	17 50 52
		(h = 40 km).					Um	iSn	17 49 11.1
"	2	Up	iP	01 50 27.3				eSg	17 49 54
		Um	i(P)	01 49 50.4				D = 680 km = 6.1°.	
		i		01 50 03.0			Northern Finland,		
		Kurile Islands (h = 30 km).					69°N, 28°E.		
"	2	Gb	iP	03 50 55.5			Origin time = 17 46 30.		
"	2	Up	iP	06 12 49.3	"	3	Ki	e(P)	18 15 15
		Gb	iP	06 13 09.0	"	3	Gb	iPKP	18 56 06.1
		Um	iP	06 12 21.5			Tonga Islands (h = 30 km).		
		Kamchatka (h = 30 km).			"	3	Ki	eP	20 51 05
"	2	Gb	i(P)	07 53 21.3				i	20 51 10.4
"	2	Ki	i(P)	12 45 12.0	"	4	Ki	iP	01 05 41.0
		Oregon, U.S.A.					Kurile Islands (h = 50 km).		
"	2	Gb	iP	12 59 28.7 C	"	4	Up	iP	03 14 26.6
		Local explosion with a train					Sk	iP	03 15 07.4
		of Rayleigh-waves in the			"	4	Ki	e(Sg)	05 21 06
		period range 1.7-0.8 sec.			"	4	Ki	iP	07 06 37.7
"	2	Gb	i(P)	15 15 29.5			Um	eP	07 06 47
"	2	Um	eP	18 18 15			Formosa (h = 60 km).		
		Panama - Costa Rica			"	4	Ki	iP	07 35 23.5
		(h = 60 km).			"	4	Up	iPKP	11 17 29.9 D
"	3	Gb	iP	12 04 05.4				ipPKP	11 18 15
"	3	Up	iS [≠]	13 51 56.7				iSKP	11 20 47.9
			iSg	13 52 10.6				i	11 26 25.7
			D = 650 km = 5.9°.					iSKKP	11 28 55.1
		Ki	eS [≠]	13 52 28				microns: sec	
			iSg	13 52 47.5			PKP	E	0.7 2
			D = 780 km = 7.0°.				PKP	N	2.4 2
		Sk	eSg	13 53 15			PKP	Z	7.9 2
			i	13 53 27.2			PKP	Z'	0.7 0.6
		Um	ePn	13 50 14			SKP	N	1.0 3
			eSn	13 51 08			SKP	Z	3.2 4
			iSg	13 51 27.5			SKP	Z'	1.3 1.6
			D = 500 km = 4.5°.				M	E	1.6 21
		Southeast Finland,					M	N	3.1 25
		61 3/4°N, 29°E.					M	Z	1.9 20
		Origin time = 13 48 57.					(D = 16200 km = 146°).		
		Explosion?					Ki	ipPKP	11 17 08.5
"	3	Gb	iP	15 10 32.6				i!	11 19 58.1
"	3	Ki	iPn	17 47 19.9				iPP	11 20 09
			iSn	17 47 57.8				iSKP	11 20 34.3
								iPKS	11 20 49

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

1963
July
cont.

4

Ki

microns sec

PKP Z 1.7 6

PKP Z' 0.4 1.2

SKP Z 3.1 6

SKP Z' 1.0- 1.8

PKS E 1.8 7

PKS N 2.3 7

M E 1.8 20

M N 2.8 22

M Z 3.5 20

(D = 15350 km = 138°).

Sk iPKP 11 17 21.4

i 11 20 31.7

Gb iPKP 11 17 35.6 D

ipPKP 11 18 24.0

Um iPKP 11 17 12 D

i 11 20 22.1

i! 11 25 59.2

Ka iPKP 11 17 38.0 D

ipPKP 11 18 26.5

iSKP 11 21 09.1

Tonga Islands. h = 180 km

(Up, Gb, Ka).

"

4

Gb

iPKP 14 36 25.1

i 14 36 37.6

Tonga Islands (h = 30 km).

"

4

Up

iP 20 33 47.8 D

i 20 33 54.1

"

4

Um

iP 21 58 43.7

Celebes (h = 60 km).

"

4

Up

eP 23 08 33 D

eS 23 18 50

microns sec

P Z' 0.2 1.7

M E 0.6 16

M N 1.6 20

M Z 1.7 21

D = 9100 km = 82°.

Ki iS 23 20 10

microns sec

M E 1.3 17

M N 1.4 19

M Z 2.8 20

Sk iP 23 08 45.6 D

Gb eP 23 08 17

Um iP 23 08 54.5 D

eS 23 19 21

eSS 23 25 03

Ka iP 23 08 15.8

St. Helena (h = 30 km).

Magn. = 5.6 (Up, Ki).

"

5

Gb

iP 01 35 20.0

1963
July

5

Ki

iP 03 36 48.3 D

Sk eP 03 37 23

Um iP 03 36 54.9

Outer Mongolia (h = 30 km).

"

5

Ki

iSn 04 58 10.1

iSg 04 58 31.1

D = 480 km = 4.3°.

Sk eSg 05 01 04

Um iSn 04 58 55.3

iSg 04 59 31.9

D = 680 km = 6.1°.

Northwest Russia,

67.7°N, 31.8°E.

Origin time = 04 56 10.

Explosion?

"

5

Um

iPKP 06 06 22.7

Peru (h = 60 km).

"

5

Um

iP 08 46 58.5

Japan (h = 30 km).

"

5

Up

i(P) 11 59 53.2

"

5

Um

iP 12 38 20.6 C

"

5

Up

iP 13 19 14.8

microns sec

M N 0.9 15

Ki iP 13 19 19.6

microns sec

M N 0.5 14

Sk iP 13 19 38.6

iPP 13 21 20.6

Um iP 13 19 10.7

Ka iP 13 19 19.3

Hindu Kush (h = 110 km).

"

5

Up

eP 14 26 13

iS 14 30 05

microns sec

M E 0.8 15

M N 0.6 15

M Z 0.6 10

D = 2350 km = 21°.

Ki iP 14 27 14.0

microns sec

M E 1.0 14

M N 0.3 10

M Z 0.7 11

Sk iP 14 26 53.3

Um iP 14 26 51.5

iS 14 31 22

D = 2800 km = 25°.

Ka e(P) 14 25 33

Greece (h = 30 km).

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

1963						1963					
July	5	Up	iP	14 53 25.0		July	6	Up	i	12 15 43.2	
		El Salvador	(h = 90 km).					i(Sg)		12 16 00.1	
"	5	Up	iP	15 21 32.6			Ka	i		12 15 04.4	
		Sk	iP	15 22 14.3				i(Sg)		12 15 11.6	
		Um	iP	15 22 10.8				Origin in the same area as for the following event.			
"	5	Ki	e(P)	15 30 17				Explosion?			
"	5	Up	eSg	16 46 29		"	6	Up	i	12 16 49.1	
		Ki	iPg	16 43 09.0 C				eSg		12 17 14	
			iSn	16 43 33.3			Sk	eSg		12 19 32	
			iSg	16 43 39.1				i		12 19 44.4	
				microns sec			Gb	eSg		12 17 04	
			Sg	Z' 0.2 0.5			Um	e(Sg)		12 19 17	
			D = 240 km = 2.2°.				Ka	i		12 15 46.3	
		Sk	ePn	16 43 28				iSg		12 15 56.8	
			iSn	16 44 15.2				Near Öland, Sweden.			
			iSg	16 44 30.5				Origin time = 12 15 31.			
			D = 420 km = 3.8°.					Explosion?			
		Um	iPn	16 43 32.8 C		"	6	Up	iP	13 41 57.6	
			iS*	16 44 31.3				Ki	iP	13 42 17.8	
			iSg	16 44 43.6				Sk	iP	13 42 19.2	
			D = 470 km = 4.2°.					Iran (h = 80 km).			
		West coast of Norway,				"	6	Ki	iP	22 33 07.9 D	
		67.4°N, 14.9°E.						Sk	eP	22 33 41	
		Origin time = 16 42 26.						Um	iP	22 33 24.7	
"	5	Sk	eP	18 12 52				Japan (h = 30 km).			
"	5	Sk	eP	18 27 28		"	6	Up	iP	22 44 33.5 D	
"	6	Up	iP	01 11 36.9				Sk	iP	22 44 57.5	
		Ki	iP	01 11 22.6 C				Um	iP	22 44 49.9	
		Sk	iP	01 11 48.9				Mozambique (h = 30 km).			
		Sikang Province, China				"	7	Um	iP	00 15 58.9	
		(h = 30 km).						Indian Ocean (h = 30 km).			
"	6	Um	iP	01 48 56.8		"	7	Ki	iP	04 34 07.5	
"	6	Up	iPKP	05 40 54.0		"	7	Ki	iSn	05 18 13.7	
			i	05 40 58.6				iSg		05 18 33.5	
		Ki	ePKP	05 40 28				D = 490 km = 4.5°.			
		Sk	iPKP	05 40 43.3			Um	eSn		05 18 56	
		Um	iPKP	05 40 37.7 C				i		05 19 07.2	
		Kermadec Islands						iSg		05 19 30.7	
		(h = 30 km).						D = 680 km = 6.2°.			
"	6	Ki	iP	10 31 33.6 D				Northwest Russia,			
"	6	Up	i(Sg)	12 11 48.8				67½°N, 32°E.			
		Ka	e(Sg)	12 11 02				Origin time = 05 16 09.			
		Probable origin not far from				"	7	Um	iP	06 29 09.4	
		the following two events.				"	7	Ki	iP	09 40 31.9 C	
		Explosion?									

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

[illegible]

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

1963
July
cont.

9 Ki

microns sec

P Z 0.4 5

P Z' 0.2 1.5

M E 0.6 15

M N 0.7 17

M Z 1.3 16

D = 6700 km = 60 $\frac{1}{2}$ °.

Sk iP 03 15 22.2

Gb iP 03 15 47.0

ipP 03 15 56.9

Um iP 03 15 09.5 C

ipP 03 15 20.5

iS 03 23 45

Kurile Islands. h = 40 km
(Up,Ki,Gb,Um).
Magn. = 6.0 (Up,Ki).

" 9 Up iP 04 33 37.5

Ki iP 04 33 24.7 C

Sk iP 04 33 18.4

Um iP 04 33 33.9

Mexico - Guatemala
(h = 30 km).

" 9 Ki iP 06 29 53.8

Um iP 06 29 57.1

Celebes (h = 140 km).

" 9 Ki eP 07 00 19

" 9 Up iP 09 37 20.8

eS 09 47 59

microns sec

S E 0.7 8

S N 0.7 8

M E 2.3 20

M N 1.5 19

M Z 3.0 19

D = 9800 km = 88°.

Ki iP 09 37 17.4

ePP 09 40 44

eS 09 47 45

microns sec

P Z 0.5 5

P Z' 0.2 1.7

PP Z 0.5 9

S E 1.5 9

S N 0.4 9

M E 2.4 18

M N 2.1 18

M Z 5.0 18

D = 9650 km = 87°.

Sk iP 09 37 05.2 D

Um iP 09 37 22.0 D

eS 09 47 49

Costa Rica - Panama (h = 30 km).
Magn. = 6.1 (Up,Ki).

1963
July

9 Ki

i 11 56 25.0

i(Sg) 11 56 41.9

" 9 Up

iP 17 46 20.3

microns sec

M E 0.7 18

M N 0.5 17

M Z 1.1 18

Ki iP 17 45 55.8

microns sec

M E 0.4 17

M N 0.1 13

M Z 0.5 14

Sk eP 17 46 29

Gb iP 17 46 40.2

Um iP 17 46 05.0

Formosa (h = 30 km).

" 10 Up iP 02 19 43.9

ipP 02 20 07.7

Ki iP 02 19 50.0

ipP 02 20 24.0

microns sec

M N 0.3 9

Sk epP 02 20 29

Um iP 02 19 40.1

ipP 02 20 03.9

Ka ipP 02 20 24.9

Hindu Kush. h = 130 km
(Up,Ki,Um).

" 10 Up iP 03 25 39.3 C

microns sec

P Z' 0.1 0.8

M E 0.7 15

M N 1.1 18

M Z 1.1 18

50 Ki iP 03 24 50.9

eS 03 33 06

microns sec

P Z 0.5 6

P Z' 0.1 0.9

S N 0.3 9

M E 1.9 16

M N 1.4 16

M Z 3.4 17

D = 6700 km = 60 $\frac{1}{2}$ °.

Sk iP 03 25 26.4

Gb iP 03 25 59.4

Um iP 03 25 13.0 C

iS 03 33 48

Ka eP 03 25 57

i 03 25 59.9

Kurile Islands (h = 30 km).
Magn. = 5.7 (Up,Ki).

" 10 Up iPKP 04 49 07.7

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

1963						1963					
July	10	Up	i	04 49 14.2		July	10	Up	iP	07 24 09.8	
cont.		Sk	iPKP	04 49 00.0						microns sec	
		Um	iPKP	04 48 54.9				M	E	0.9 16	
								M	N	0.9 11	
								M	Z	1.0 16	
							Sk	iP		07 24 52.4	
							Um	iP		07 24 48.1	
											Aegean Sea (h = 130 km).
"	10	Ki	ePn	04 55 17		"	10	Up	iP	10 00 05.5	
			iSn	04 56 11.6				Ki	iP	10 00 28.5	
			iSg	04 56 29.2					i	10 00 35.6	
				D = 520 km = 4.7°.							microns sec
		Sk	eSg	04 58 58				P	Z'	0.2 1.0	
		Um	iSn	04 56 56.0				M	E	1.1 20	
			iSg	04 57 35.0			Sk	iP		09 59 59.5	
				D = 730 km = 6.6°.			Um	iP		10 00 20.8	
				Northwest Russia,			Ka	iP		09 59 53.2	
				67.8°N, 32.6°E.							North Atlantic Ocean
				Origin time = 04 53 59.							(h = 40 km).
				Explosion?							
"	10	Up	iP	05 33 53.8							
			iS	05 42 54							
				microns sec		"	10	Up	iP	10 05 03.8 C	
		P	N	0.7 2				Um	iP	10 04 36.9	
		P	Z	1.4 2		"	10	Ki	eP	14 04 36	
		P	Z'	2.3 1.5				Um	iP	14 04 54.3	
		S	E	1.3 12							Kurile Islands (h = 30 km).
		S	N	1.4 10		"	10	Gb	iPg	15 11 39.4 C	
		M	E	8.0 17					iSg	15 11 41.5	
		M	N	11 18							Probably local explosion.
		M	Z	7.3 19		"	10	Gb	iPg	15 36 09.7	
				D = 7550 km = 68°.					iSg	15 36 11.0	
		Ki	iP	05 33 05.9							Probably local explosion.
			i	05 34 07.3		"	10	Up	iP	16 08 00.9	
			iPa	05 36 50		"	10	Up	iPKP	17 08 25.3	
			eS	05 41 23					i	17 08 32.3	
				microns sec					i	17 08 41.6	
		P	E	0.9 6			Sk	iPKP		17 08 17.8	
		P	N	0.9 7			Gb	iPKP		17 08 32.4	
		P	Z	2.6 7			Um	iPKP		17 08 12.6	
		P	Z'	0.7 1.3							Kermadec Islands
		S	E	2.6 11							(h = 25 km).
		S	N	1.6 10		"	10	Ki	iP	17 35 49.0 C	
		M	E	16 17							microns sec
		M	N	15 17				P	Z'	0.1 1.2	
		M	Z	39 18		"	10	Up	iP	20 05 01.5 D	
				D = 6700 km = 60 ¹⁰ / ₂ °.					i	20 05 07.9	
		Sk	iP	05 33 42.8 C					iPP	20 08 38.5	
			i	05 33 44.6							microns sec
		Gb	iP	05 34 15.5							Z' 0.3 0.7
		Um	iP	05 33 27.5 C							
			ePa	05 37 25							
			eS	05 42 00							
		Ka	iP	05 34 21.2 C							
				Kurile Islands (h = 30 km).							
				Magn. = 6.6 (Up, Ki).							

Up = Uppsala, Ki = Kiruna, Sk = Skanstugan, Gb = Göteborg, Um = Umeå
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1963				1963			
July cont.				July			
10	Ki	iP	20 04 33.6 D	12	Ki	eSn	05 05 05
			microns sec			eSg	05 05 24
		P	Z' 0.5 1.1			Probably northwest Russia.	
	Sk	iP	20 04 58.6 D			Explosion?	
	Gb	iP	20 05 18.1	"	12	Ki	iP 05 51 15.5
	Um	iP	20 04 44.9 D			Sk	eP 05 51 30
	Ka	iP	20 05 17.7			Java (h = 130 km).	
	Mariana Islands (h = 170 km).			"	12	Gb	i(P) 06 38 23.1
	Magn. = 6.5 (Up, Ki).			"	12	Ki	iPP 08 15 30.9
"	10	Ki	e(P) 21 16 46			Fiji Islands (h = 550 km).	
"	11	Up	iP 00 51 14.1	"	12	Gb	iPg 12 30 12.9
"	11	Ka	e 05 05 34			iSg	12 30 14.9
		i(Sg)	05 06 11.5			Probably local explosion.	
"	11	Ka	e 05 19 56	"	12	Ki	iP 14 13 35.6
		i(Sg)	05 20 17.9			i	14 13 42.1
"	11	Um	iP 05 20 06.6			Sk	eP 14 13 59
"	11	Ka	i(P) 05 45 05.0			Vancouver Island (h = 30 km).	
		i	05 45 30.8	"	12	Up	iP 15 39 03.6 C
"	11	Ka	e 05 50 14			i	15 39 15.9
		i(Sg)	05 51 02.6			i	15 39 59.5
"	11	Ka	e(P) 05 58 50			eS	15 48 01
		e	05 59 47			microns sec	
		i(Sg)	06 00 20.8			P	Z' 0.2 1.0
"	11	Ka	e 06 02 47			S	N 0.3 5
		i(Sg)	06 03 19.6			M	E 0.9 16
"	11	Ka	e 06 15 39			M	N 2.2 16
		i(Sg)	06 16 12.0			M	Z 1.6 17
	The series of events recorded					D = 7500 km = 67 $\frac{1}{2}$ ⁰ .	
	at Karlskrona since July 11					Ki	iP 15 38 15.6 C
	at 05 05, are probably					iS	15 46 32
	explosions.					microns sec	
"	11	Up	eSg 13 26 14			P	E 0.3 5
		Ki	eS ² 13 26 34			P	N 0.3 6
		iSg	13 26 52.1			P	Z 0.9 5
		Sk	eSg 13 27 24			P	Z' 0.2 1.2
		Um	iSg 13 25 34.1			S	E 0.5 10
	Lake Ladoga,					S	N 0.5 8
	61 $\frac{1}{2}$ ⁰ N, 31 ⁰ E.					M	E 2.5 22
	Origin time = 13 22 33.					M	N 2.3 18
	Explosion?					M	Z 3.7 17
"	11	Up	i 18 11 53.4			D = 6650 km = 60 ⁰ .	
		i	18 12 28.2			Sk	iP 15 38 51.4 C
		Sk	iPKP 18 07 53.7 D			Gb	iP 15 39 25.0
	Santa Cruz Islands					Um	iP 15 38 36.3 C
	(h = 140 km).					i	15 38 37.6
						ePa	15 42 43
						iS	15 47 12
						Ka	iP 15 39 25.4
						Kurile Islands (h = 30 km).	
						Magn. = 5.9 (Up, Ki).	

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1963
July 12 Up iP 20 44 28.4
i 20 44 46.7
i 20 45 19.3

" 12-13 Up ---
microns sec
M E 0.7 15
M N 0.8 13
M Z 1.3 16
Ki eS 00 02 14
microns sec
M E 1.4 16
M N 0.6 15
M Z 2.0 17
Um iP 23 53 32.3
eS 00 02 41
Japan (h = 70 km).

" 13 Gb iP 01 03 20.1

" 13 Up iP 07 43 42.5
microns sec
P Z' 0.1 0.6
Sk iP 07 44 26.1
Gb iP 07 43 29.2
Um eP 07 44 29
Ka eP 07 43 04
Greece.

" 13 Up iP 08 31 35.9 C
i 08 33 56.6
microns sec
P Z' 0.1 1.2
Ki iP 08 32 15.7
iPP 08 33 55.2
Sk iP 08 32 11.6 C
Gb eP 08 31 47
Ka iP 08 31 25.0 C
Iran (h = 40 km).

" 13 Ki iP 13 46 03.1

" 13 Up iP 14 09 27.6
microns sec
P Z' 0.1 0.5
Ki iP 14 08 42.8 C
Sk iP 14 09 17.1 C
Gb iP 14 09 48.9
Um iP 14 09 02.7
Ka iP 14 09 49.7
Kurile Islands (h = 30 km).

" 13 Up iP 14 18 11.5
iS 14 27 55
microns sec
M E 1.7 18

1963
July 13 Up microns sec
M N 2.2 18
M Z 2.7 17
D = 8500 km = $76\frac{1}{2}^{\circ}$.
Ki iP 14 17 46.7 C
microns sec
P Z' 0.1 1.0
M E 1.3 15
M N 0.9 15
M Z 1.9 15
Sk eP 14 18 14
i 14 18 49.8
Gb iP 14 18 30.8 C
Um iP 14 17 56 C
Formosa (h = 30 km).

" 13 Up iP 19 17 38.0
Ki eP 19 17 50
Gb eP 19 17 49
West Pakistan (h = 30 km).

" 13 Sk ePg 23 33 45
eSn 23 34 15
iSg 23 34 34.2
D = 440 km = 4.0° .
Probably west coast of
Norway.
Origin time = 23 32 23.

" 14 Up iPKP 00 22 06.1
eSS 00 44 53
microns sec
PKP Z' 0.1 1.0
M E 0.5 18
M N 1.0 20
M Z 0.9 19
Ki iPKP 00 21 53.3
ePKS 00 25 31
iSS 00 43 21

microns sec
M E 0.9 20
M N 1.0 20
M Z 2.1 20
Sk iPKP 00 21 59.5
iPKP2 00 22 22.4
Gb iPKP 00 22 13.7
Um iPKP 00 21 54.2
ePP 00 25 13
iSS 00 44 03
Ka iPKP 00 22 15.1
i 00 22 27.4

Kermadec Islands (h = 30 km).
Magn. = 5.8 (Up, Ki).
SS is a very pronounced
phase in several shocks
from this region.

1963 July cont.	14	Sk	eP	07 54 11	
				Persian Gulf (h = 30 km).	
"	14	Up	iP	10 59 15.5	
				microns sec	
			P	Z' 0.1	0.5
		Ki	iP	10 59 25.5	C
			ipP	10 59 53.6	
			iPP	11 01 10.0	
				microns sec	
			PP	Z' 0.1	1.5
		Sk	iP	10 59 41.6	C
			iPP	11 01 22.8	
		Gb	iP	10 59 36.7	
		Um	iP	10 59 14.5	C
			i	10 59 16.3	
		Ka	iP	10 59 18.7	
				Hindu Kush. h = 140 km (Ki).	
"	14	Up	ePKP	14 48 02	
			i	14 48 24.2	
		Sk	iPKP	14 47 57.5	D
			i	14 48 07.9	
		Gb	ePKP	14 48 11	
			i	14 48 21.4	
		Um	iPKP	14 47 52.2	D
				Kermadec Islands (h = 40 km).	
"	14	Up	iPKP	17 26 19.2	
			i	17 26 33.0	
			iPP	17 30 06.5	
		Ki	iPKP	17 26 00.7	C
			i	17 27 30.8	
				microns sec	
			PKP	Z' 0.1	1.0
		Sk	iPKP	17 26 13.4	C
			i	17 26 28.5	
			i(pPKP)	17 27 11.4	
		Gb	iPKP	17 26 36.1	C
			i	17 26 38.8	
			i	17 26 49.2	
		Um	iPKP	17 26 07.9	C
			i	17 26 18.0	
			i	17 26 47.2	
				New Zealand (h = 190 km).	
"	14	Sk	iP	17 33 40.2	C
"	15	Up	i(PKP)	01 24 04.2	C
		Sk	i(PKP)	01 23 58.3	
		Um	i(PKP)	01 23 52.7	C
"	15	Ki	iP	05 32 52.9	
		Um	eP	05 32 58	
				Halmahera (h = 30 km).	

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

1963						1963					
July	15	Ki	eP	06 38 25		July	16	Ka	iP	18 32 02.0 C	
				Aleutian Islands (h = 30 km).		cont.			iS	18 35 56.8	
"	15	Up	iP	08 51 19.0 C						Georgia, U.S.S.R.	
				microns sec						(h = 30 km).	
			P	Z' 0.1 1.0						Magn. = 6.8 (Up,Ki).	
		Ki	iP	08 50 24.5 C						An outstanding case of higher	
				microns sec						mode surface waves recorded	
			P	Z' 0.1 1.0						at the Swedish stations.	
		Sk	iP	08 51 01.8						The existence of Sn to such	
			i	08 51 30.9						large distance (or of short-	
		Gb	iP	08 51 40.0 C						period Sa) is noteworthy;	
			i	08 52 03.8						compare remark to Jan. 27,	
		Um	iP	08 50 50.7 C						1963, 19 40.	
		Ka	iP	08 51 44.0 C		"	16	Up	iPKP	19 28 11.8	
				Kamchatka (h = 60 km).					i	19 28 16.8	
									iPKP2	19 28 31.2	
"	15	Up	iP	17 07 40.9						microns sec	
"	16	Up	i(P)	16 47 21.6						PKP2 Z' 0.1 0.7	
"	16	Up	iP	18 32 11.5 C						Ki ePKP	19 27 49
			iS	18 36 13						i	19 28 07.8
				microns sec						Sk iPKP	19 28 04.5
			P	E 19 7						Gb iPKP	19 28 19.3
			P	N 19 7						Um iPKP	19 27 55.2
			P	Z 29 7						Ka iPKP	19 28 23.5
			P	Z' 0.7 0.5						i	19 28 36.3
			S	E 34 8		"	16	Up	iP	22 16 18.0 C	
			S	N 30 7					iPP	22 16 38.5	
			S	Z' 2.8 1.7					iS	22 20 24.0	
			M	E 120 15						microns sec	
			M	N 160 16						PP Z' 0.1 0.5	
			M	Z 200 16						D = 2450 km = 22°.	
				D = 2450 km = 22°.						Ki iP	22 17 06.0
		Ki	iP	18 32 59.4 C						eLgl	22 25 28
			iPP	18 33 42						microns sec	
			iS	18 37 33						P Z' 0.1 1.2	
			iSn	18 38 00						M E 0.3 10	
				microns sec						M N 0.2 10	
			P	E 2.7 9						M Z 0.4 10	
			P	N 2.8 8						Sk eP	22 17 07
			P	Z 7.1 8						Gb eP	22 16 41
			P	Z' 2.8 1.6						Um iP	22 16 37.3
			PP	E 3.7 8						Ka iP	22 16 07.6
			S	E 88 10						Georgia, U.S.S.R.	
			S	N 27 11						(h = 20 km).	
			M	E 120 14		"	17	Up	iP	00 08 47.0	
			M	N 100 13		"	17	Ki	iP	07 15 18.8 C	
			M	Z 180 13						Java (h = 40 km).	
				D = 3000 km = 27°.		"	17	Up	iP	12 02 00.4 C	
		Sk	iP	18 32 52.7 C					iS	12 06 00.8	
			iLgl	18 40 55.3					i	12 06 02.7	
		Gb	iP	18 32 26.4					iLg2	12 09 07	
			iS	18 36 47.0							
		Um	iP	18 32 30.8 C							
			iS	18 36 35							

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

1963						1963					
July	17	Up		microns	sec	July	18	Ki		microns	sec
cont.			P	N	0.3 3	cont.			PKS	N	0.3 6
			P	Z'	0.2 1.0				M	E	0.8 17
			S	E	0.5 5				M	N	0.7 17
			S	N	1.1 7				M	Z	1.0 17
			M	E	1.8 16		Sk	iPKP		05 17 07.3	
			M	N	3.0 15			i		05 17 12.1	
			M	Z	3.3 15		Um	iPKP		05 17 10.9 C	
			D = 2450 km = 22°.					e		05 20 25	
	Ki	iP		12 02	47.9 C			e		05 27 38	
		eS		12 07	29			e(SS)		05 36 19	
		eSn		12 07	42			Sandwich Islands			
		iLgl		12 11	06			(h = 30 km).			
				microns	sec						
			P	Z'	0.2 1.0	"	19	Up	iP	05 49 31.1 C	
			S	N	0.3 10			iS		05 52 52	
			M	E	2.2 16			iSS		05 53 06.8	
			M	N	1.5 15					microns	sec
			M	Z	2.4 14			P	N	1.0 5	
			D = 3000 km = 27°.					P	Z	0.6 4	
	Sk	iP		12 02	50.5 C			P	Z'	0.2 0.5	
		i		12 09	18.7			D = 1950 km = 17½°.			
		iLgl		12 11	17.4		Ki	iP		05 50 51.9 C	
	Gb	iP		12 02	15.8					microns	sec
		i		12 02	22.3			P	E	0.3 6	
	Um	iP		12 02	19.5 C			P	N	0.6 6	
		eS		12 06	37			P	Z	1.2 5	
		iLgl		12 09	45			P	Z'	1.4 1.4	
	Ka	iP		12 01	49.3		Sk	iP		05 50 03.1 C	
	Georgia, U.S.S.R.							i		05 50 05.1	
	(h = 30 km).						Gb	eP		05 48 53	
	Magn. = 5.6 (Up,Ki).						Um	iP		05 50 15.3 C	
"	17	Up	iP		14 20 27.8			iS		05 54 12	
		Ki	iP		14 19 38.3		Ka	iP		05 48 41.1 C	
		Um	iP		14 20 01.3			Ligurian Sea (h = 30 km).			
		Sea of Okhotsk (h = 370 km).						Magn. = 5.7 (Up,Ki).			
"	17	Up	iP		21 02 54.0 C		"	19	Up	iP	05 50 08.7
		Ki	iP		21 02 34.3				iS		05 53 24
		Um	iP		21 02 42.8				iSS		05 53 41.5
"	17	Ki	iP		22 58 34.5					microns	sec
"	18	Up	e(P)		04 04 55			P	E	0.8 4	
		i		04 05	20.6			P	N	2.5 5	
"	18	Up	ePKP		05 17 02			P	Z	3.2 4	
		i		05 17	15.8			P	Z'	0.4 0.5	
				microns	sec			S	E	3.9 8	
		M	E	0.7	18			M	E	30 13	
		M	N	0.9	17			M	N	43 11	
		M	Z	0.8	16			M	Z	38 10	
	Ki	iPKP		05 17	18.1			D = 1950 km = 17½°.			
		iPKS		05 20	46		Ki	iP		05 51 29.4 C	
		e(SS)		05 37	08			iS		05 55 50	
								iLg2		05 59 46	
										microns	sec
								P	E	0.9 6	
								P	N	1.7 6	

Up = Uppsala, Ki = Kiruna, Sk = Skalistugan, Gb = Göteborg, Um = Umeå
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1963						1963					
July	19	Ki		microns	sec	July	19	Up	i(P)	15	12 56.1
cont.			P	Z	2.6 5						
			P	Z'	2.4 1.5	"	19	Up	e(P)	19	24 57
			S	E	5.7 8						
			M	E	27 12	"	20	Up	iP	00	20 52.1
			M	N	19 10					microns	sec
			M	Z	25 10				P	Z'	0.1 0.8
					D = 2800 km = 25°.			Ki	iP	00	19 55.7
		Sk	iP		05 50 39.9 C					microns	sec
		Gb	eP		05 49 35				P	Z'	0.1 1.0
		Um	iP		05 50 51.3			Sk	iP	00	20 22.1
			iS		05 54 49			Um	iP	00	20 24.4
		Ka	iP		05 49 25.9				eS	00	27 33
					Ligurian Sea (h = 30 km).						Yukon (h = 30 km).
					Magn. = 6.0 (Up,Ki).						Magn. = 5.8 (Up,Ki).
"	19	Ki	iP		06 37 14.1	"	20	Up	iP	00	56 46.8
		Sk	eP		06 36 26				iPP	00	57 07.8
		Um	iP		06 36 35.4				iS	01	00 46
					(Ligurian Sea).				iLg2	01	03 58
										microns	sec
"	19	Ki	iP		07 07 04.0				P	Z'	0.1 1.5
		Sk	iP		07 06 16.1				M	E	0.3 15
		Um	iP		07 06 24.9				M	N	0.6 15
					France - Italy (h = 30 km).				M	Z	0.7 15
											D = 2450 km = 22°.
"	19	Ki	iP		07 09 58.5			Ki	iP	00	57 34.9
		Sk	iP		07 09 11.3				eS	01	02 19
		Um	iP		07 09 19.0				iLgl	01	06 06
					(Ligurian Sea).					microns	sec
"	19	Ki	e(Sn)		07 55 13				P	Z'	0.1 1.3
			iSg		07 55 33.4				M	E	0.6 15
									M	N	0.4 13
"	19	Up	iP		09 12 11.6 C				M	Z	0.9 14
			iS		09 21 39						D = 3000 km = 27°.
				microns	sec			Sk	eP	00	57 42
			P	Z'	0.1 0.7			Gb	eP	00	57 04
			M	E	0.7 18			Um	iP	00	57 06.3
			M	N	1.2 20				eS	01	01 21
			M	Z	1.0 16				e(Sn)	01	02 14
					D = 8100 km = 73°.			Ka	iP	00	56 36.9
		Ki	iP		09 11 32.7 C				iLgl	01	02 38
				microns	sec						Georgia, U.S.S.R.
			P	Z'	0.1 1.0						(h = 30 km).
			M	E	1.8 18						Magn. = 5.3 (Up,Ki).
			M	N	0.7 17	"	20	Up	iP	02	24 27.9
			M	Z	2.0 17				ipP	02	24 54.0
		Sk	iP		09 12 05.8 C			Ki	iP	02	23 40.1
		Gb	iP		09 12 32.1 C			Um	iP	02	24 02.4 C
		Um	iP		09 11 50.2 C						Kurile Islands. h = 110 km
		Ka	iP		09 12 33.2 C						(Up).
					Japan (h = 70 km).	"	20	Up	ePKP	06	56 13
					Magn. = 5.9 (Up,Ki).				i	06	56 35.1
"	19	Um	iP		10 13 19.7				eX	06	58 14

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

1963 July cont.	20	Up	e	07 03 36		1963 July cont.	20	Ki		microns sec	
			PKP	Z' 0.2 1.8					M	N 0.5 12	
			M	E 3.1 18					M	Z 0.4 12	
			M	N 3.9 21					D = 1000 km = 9°.		
			M	Z 5.8 20				Sk	iP	15 10 00.0	
			(D = 17800 km = 160°).						iS	15 11 30.7	
		Ki	ePKP	06 56 08				Um	iP	15 10 32.3	
			i	06 56 19.3					iS	15 12 30.6	
			eX	06 58 10					i	15 12 55.7	
			i	06 58 56				Jan Mayen (h = 50 km).			
			ePP	07 00 15		"	20	Up	iP	18 27 16.4	
				microns sec					i	18 27 39.1	
			PKP	Z' 0.4 2.4							
			M	E 7.2 22		"	21	Up	iP	06 11 14.3 C	
			M	N 3.9 20				Ki	iP	06 11 46.2 C	
			M	Z 6.9 21				Um	iP	06 11 37.1	
			(D = 17650 km = 159°).						eS	06 19 23	
		Sk	ePKP	06 56 44				Arabian Sea (h = 30 km).			
		Um	ePKP	06 56 04		"	21	Up	eP	09 10 39	
			i	06 56 29.5						microns sec	
			iX	06 58 12				P	Z' 0.1 1.0		
		Ka	iPKP	06 56 19.5		"	21	Up	iP	11 12 29.9	
		Macquarie Island								microns sec	
		(h = 30 km).						P	Z' 0.1 1.3		
		Magn. = 6.4 (Up, Ki).						Ki	iP	11 13 54.8	
		The phase denoted X above								microns sec	
		occurring in the average						M	E 0.6 15		
		2 min 4 sec after PKP has no						Sk	iP	11 13 06.6	
		explanation. It could be PKP						Um	iP	11 13 14.3	
		of another shock in the same						Italy.			
		area, but remarkably enough,									
		it is recorded only by long-									
		period instruments (E and Z									
		components), unlike PKP.									
"	20	Up	iP	07 50 29.8 C		"	21	Ki	iP	12 55 52.9	
		Ki	iP	07 49 53.5				Japan (h = 30 km).			
		Sk	eP	07 50 26		"	21	Up	iP	12 58 44.8 C	
		Um	iP	07 50 09.3						microns sec	
		Japan (h = 120 km).						P	Z' 0.1 1.1		
"	20	Up	iP	15 11 07.0		"	21	Up	iP	14 57 56.5 C	
			i	15 13 16.3				Ki	eP	14 57 40	
			iS	15 13 49.1				Negros, Philippine Islands			
				microns sec				(h = 50 km).			
			S	Z' 0.1 0.6		"	22	Up		----	
			D = 1500 km = 13½°.							microns sec	
		Ki	iP	15 10 10.1				M	E 1.1 19		
			i	15 10 19.0				M	N 1.6 20		
			iS	15 11 51.5				M	Z 1.9 20		
			i	15 12 06.6				Ki		----	
				microns sec						microns sec	
			P	Z' 0.3 0.8				M	E 2.0 23		
			S	Z' 0.4 1.0				M	N 1.8 23		
			M	E 0.5 12				M	Z 3.8 23		

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

1963 July cont.	22	Um	iPP	00 48 40	1963 July	24	Um	iP	06 25 29.1
			New Britain (h = 60 km).		"	24	Up	iP	07 04 10.9 C
"	22	Ki	iP	05 05 46.3			Sk	eP	07 04 00
							Um	iP	07 03 53.0
"	22	Up	iP	14 29 07.4 D	"	24	Up	iP	09 01 35.3
		Ki	eP	14 29 15			Um	iP	09 01 15.6 C
"	22	Um	iP	16 17 36.0 D			Japan (h = 300 km).		
"	22	Gb	e(P)	18 12 33	"	24	Up	iP	11 44 02.3 C
							iS		11 53 41
"	23	Um	iP	03 32 10.7 C					microns sec
			Sakhalin (h = 30 km).				P	Z'	0.3 1.1
							M	E	8.5 18
"	23	Ki	e	05 44 24			M	N	12 21
			iSg	05 44 37.8			M	Z	12 17
		Um	i	05 45 25.1			D = 8450 km = 76°.		
			iSg	05 45 48.9	Ki	iP			11 43 38.0 C
			Possibly northwest Russia.						microns sec
			Explosion?				P	Z'	0.3 1.5
							M	E	7.7 17
"	23	Up	iP	06 28 49.9			M	N	6.4 20
			ipP	06 29 08.3			M	Z	4.9 13
		Ki	iP	06 28 07.5	Sk	iP			11 44 06.1
		Sk	eP	06 28 43	Gb	iP			11 44 22.5
		Gb	iP	06 29 11.4 C	Um	iP			11 43 46.6 C
		Um	iP	06 28 25.7			iS		11 53 12
		Ka	iP	06 29 10.9 C	Ka	eP			11 44 18
			Japan, h = 70 km (Up).						Formosa (h = 30 km).
"	23	Up	iPg	11 44 19.1					Magn. = 6.3 (Up, Ki).
			iSg	11 44 22.0	"	24	Um	iP	12 01 32.3
			Seismic?				Japan (h = 30 km).		
"	23	Up	iP	12 52 01.6	"	25	Ki	eS*	02 09 55
		Ki	iP	12 51 16.7				iSg	02 10 11.6
		Um	iP	12 51 36.9			Sk	eSg	02 13 03
			Kurile Islands (h = 30 km).				Um	iSg	02 11 40.6
"	23	Um	iP	13 04 47.5 D					Probably Arctic Ocean,
									off north coast of Kola
"	23	Up	iP	22 02 20.6					Peninsula.
		Ki	iP	22 01 26.9	"	25	Up	eP	03 44 16
		Gb	eP	22 02 36			Ki	iP	03 45 41.6
		Um	iP	22 01 53.5 C			Sk	iP	03 44 54.5 C
			Aleutian Islands				i		03 44 57.5
			(h = 80 km).				Um	eP	03 45 00
"	24	Ka	iPKP	05 41 25.8	"	25	Up	iP	07 16 38.5
			Fiji Islands (h = 530 km).				Ki	iP	07 16 41.7
"	24	Up	iP	06 21 12.3					microns sec
		Ki	iP	06 21 27.7 C			P	Z'	0.2 1.2
		Um	iP	06 21 20.2 C			Sk	iP	07 16 25.4
							Um	iP	07 16 43.2

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

1963					1963				
July	25	Ka	iP	07 16 35.0	July	26	Up	iPg	07 58 26.1
cont.			Colombia (h = 150 km).					iSg	07 58 49.8
"	25	Ki	iP	20 44 35.8				D = 210 km = 1.9°.	
			Ecuador (h = 30 km).			Sk	e(Sg)	08 00 20	
"	26	Up	iP	04 21 22 C		Um	iPg	07 58 45.1	
			iS	04 24 44			iSg	07 59 24.9	
			iLg1	04 26 55			D = 320 km = 2.9°.		
			iLg2	04 27 11			Gulf of Bothnia,		
			iRg	04 28 37			60.9°N, 20.8°E.		
							Origin time = 07 57 48.		
							Explosion?		
				microns sec	"	26	Up	iP	08 16 08.9
		P	N	2.3 3					
		P	Z	1.3 3		26	Up	iPg	08 20 18.3
		P	Z'	0.2 0.6				iSg	08 20 41.1
		S	E	3.9 6				D = 210 km = 1.9°.	
		S	N	3.0 5				Near the same location as	
		M	E	45 15				for July 26, 07 58.	
		M	N	34 10				Explosion?	
		M	Z	25 9					
				D = 2000 km = 18°.	"	26	Up	iP	09 30 58.5
		Ki	iP	04 22 46.0			Um	iP	09 31 37.1
			iS	04 27 17			Ka	iP	09 30 18.0
			iLg1	04 30 57				Mediterranean Sea	
			iRg	04 33 59				(h = 340 km).	
				microns sec	"	26	Ki	iP	16 18 15.2
		P	N	1.4 6					
		P	Z'	0.4 1.2		26	Up	eP	19 51 44
		S	E	3.8 8			Ki	iP	19 52 51.7 C
		S	N	13 16				microns sec	
		S	Z	18 14				P	Z' 0.1 1.0
		M	E	68 12				Dodecanese Islands	
		M	N	16 9				(h = 30 km).	
		M	Z	28 9					
				D = 2900 km = 26°.	"	27	Up	iP	06 02 25.1
		Sk	iP	04 22 10.1				i	06 02 35.9
			i	04 22 11.2					
		Gb	iP	04 21 10.6 C			Ki	iP	06 03 47.6 D
		Um	iP	04 22 05.9 C				microns sec	
			i	04 22 10				P	Z' 0.3 1.1
			iS	04 26 06			Sk	iP	06 02 58.3 D
		Ka	iP	04 20 39.3			Um	iP	06 03 09.8
				Skopje, Yugoslavia				i	06 03 29.0
				(h = 30 km).				Ligurian Sea (h = 30 km).	
				Magn. = 6.0 (Up, Ki).	"	27	Up	iP	06 49 18.4
				P exhibits two dominating					
				periods on the short-period	"	27	Up	iP	13 50 02.3
				records: one between 0.5 and			Sk	eP	13 50 39
				1.4 sec, the other between			Gb	iP	13 49 50.1
				3 and 4.5 sec.			Ka	iP	13 49 28.1 D
"	26	Sk	iP	04 58 09.1				Crete (h = 30 km).	
		Um	iP	04 58 05.1					
				Yugoslavia (h = 30 km).	"	27	Um	iPKP	17 06 27.6
"	26	Up	iP	05 53 58.0				Easter Island (h = 30 km).	

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

1963
July

27

Up

iP

21 38 33.7

Um

iP

21 38 13.7

Japan (h = 100 km).

"

27

Up

iPKP

22 40 34.3

Fiji Islands (h = 30 km).

"

28

Up

iP

04 28 49.9 D

Gb

eP

04 29 04

Um

iP

04 28 22.7

Aleutian Islands (h = 30 km).

"

28

Up

iPKP

07 32 00.1

i

07 32 12.5

microns sec

PKP

Z'

0.1 1.0

Sk

iPKP

07 31 52.6 C

Gb

iPKP

07 32 07.5 C

i

07 32 20.5

Um

iPKP

07 31 47.9 C

i

07 32 01.1

Ka

iPKP

07 32 08.0 C

Kermadec Islands (h = 30 km).

"

28

Up

iP

08 09 15.5

Ki

iP

08 09 11.9

microns sec

M

E

0.9 15

M

N

0.4 15

M

Z

1.2 17

Um

iP

08 09 11.1

Java (h = 20 km).

"

28

Up

iP

10 04 36.2

microns sec

P

Z'

0.1 1.5

"

28

Um

e(P)

10 36 26

i

10 36 33.1

"

28

Up

iP

12 21 56.7

Gb

iP

12 22 16.8 C

Um

iP

12 21 28.0

Kamchatka (h = 30 km).

"

28

Up

iP

13 28 35.2

microns sec

M

E

1.1 20

M

N

2.7 17

M

Z

3.0 19

Ki

eP

13 27 17

iPP

13 27 25.0

i(S)

13 29 29

iT

13 33 57.7

i

13 34 37.7

microns sec

P

E

0.6 8

1963
July
cont.

28

Ki

microns sec

P

N

0.3 7

M

E

5.6 15

M

N

2.5 13

M

Z

8.3 14

Sk

iP

13 27 36.4

iS

13 29 19.2

D = 1050 km = $9\frac{1}{2}^{\circ}$.

Gb

eP

13 28 55

Um

iP

13 27 58.6

iS

13 30 20

D = 1300 km = $11\frac{1}{2}^{\circ}$.

Ka

iP

13 29 16.6

Jan Mayen (h = 30 km).

"

28

Up

iP

14 53 39.6 C

Ki

iP

14 52 49.8

Aleutian Islands (h = 30 km).

"

28

Up

iP

14 59 07.5 C

Aleutian Islands (h = 30 km).

"

28

Um

iPKP

16 50 54.9

New Ireland (h = 70 km).

"

28

Up

iP

19 02 32.5 C

microns sec

P

Z'

0.3 1.1

M

E

0.8 17

M

N

1.1 18

M

Z

1.1 18

Ki

iP

19 01 44.8 C

microns sec

P

Z'

0.1 1.0

M

E

1.3 17

M

N

1.3 18

M

Z

3.3 18

Sk

iP

19 02 20.1 C

Gb

iP

19 02 53.1

Um

iP

19 02 07.0 C

i

19 02 20.8

eS

19 10 39

Ka

iP

19 02 55.5 C

Kurile Islands (h = 30 km).

Magn. = 6.0 (Up, Ki).

"

29

Up

iPKP

05 08 31.7 C

i

05 08 36.3

Sk

iPKP

05 08 25.3

Gb

iPKP

05 08 39.8 C

Um

iPKP

05 08 20.2 C

Ka

iPKP

05 08 44.2

Kermadec Islands (h = 30 km).

"

29

Up

iP

06 18 04.7 C

microns sec

P

Z'

0.2 1.1

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

1963					1963				
July					July				
cont.					cont.				
	29	Ki	iP	06 18 38.0 C		29	Ki		microns sec
			P	Z' 0.4 1.3				PKP	Z 1.2 6
			M	E 0.5 12				M	E 6.6 20
			M	N 0.7 12				M	N 5.8 20
			M	Z 1.2 13				M	Z 13 20
		Sk	iP	06 18 38.2 C			Sk	iPKP	20 36 11.4
		Gb	iP	06 18 16.8 C			Gb	ePKP	20 36 22
			iPP	06 19 59.6				i	20 36 28.7
		Um	iP	06 18 16.1			Um	iPKP	20 36 07.2
			eSa	06 27 27				iPP	20 39 35
		Ka	iP	06 17 57.7 C				iSS	20 58 14
		Iran (h = 40 km).					Ka	ePKP	20 36 30
							Kermadec Islands (h = 30 km).		
							Magn. = 6.4 (Up, Ki).		
"	29	Up	iP	12 47 48.9	"	29	Up	iP	23 07 01.2 C
		Ki	iP	12 46 13.0			Sk	eP	23 06 49
		Sk	iP	12 46 58.8 C			Venezuela (h = 40 km).		
		Gb	iP	12 48 05.7	"	29	Up	iPKP	23 38 24.3
		Um	iP	12 47 03.1			Sk	iPKP	23 38 17.5
		Ka	iP	12 48 21.6 C			Gb	iPKP	23 38 32.1
		Svalbard (h = 30 km).						i	23 38 41.7
"	29	Up	e(P)	16 30 10			Um	iPKP	23 38 12.4
							Kermadec Islands (h = 50 km).		
"	29	Sk	eP	17 01 25	"	29	Um	eP	23 53 57
		Um	iP	17 01 08.6 D			Banda Sea (h = 30 km).		
		Java Sea (h = 530 km).							
"	29	Up	iPKP	20 33 49.4 C	"	30	Up	iP	02 16 40.1
			i	20 33 55.2			Ki	iP	02 16 22.1
			eSS	20 56 26			Um	iP	02 16 27.6
				microns sec	"	30	Up	iPKP	02 38 31.8
			PKP	Z 2.2 9			Sk	ePKP	02 38 19
			PKP	Z' 0.3 1.5			Gb	ePKP	02 38 32
		Ki	ePKP	20 33 30			Um	iPKP	02 38 12.9
			iPKS	20 37 11			Kermadec Islands (h = 40 km).		
				microns sec	"	30	Up	iPKP	03 17 17.8 C
			PKS	E 0.5 6			Sk	ePKP	03 17 05
			PKS	N 0.4 7			Um	iPKP	03 17 00.4 C
		Sk	iPKP	20 33 42.5 C			Kermadec Islands (h = 40 km).		
		Gb	ePKP	20 33 53	"	30	Up	iP	04 27 26.8
			i	20 33 57.5			Ki	iPP	04 29 21.6
		Um	iPKP	20 33 37.6 C			Um	iPP	04 28 46.6
			eSS	20 55 37			Turkey (h = 30 km).		
		Ka	iPKP	20 33 59.5					
		Kermadec Islands (h = 40 km).							
"	29	Up	iPKP	20 36 18.7	"	30	Up	iPKP	04 47 16.9
				microns sec			Sk	iPKP	04 47 03.3 D
			PKP	Z 2.2 9				i	04 47 14.4
			PKP	Z' 0.1 0.6			Gb	iPKP	04 47 27.0
			M	E 1.4 19			Um	iPKP	04 46 56.9
			M	N 4.9 20				i	04 46 58.8
			M	Z 4.5 20			Kermadec Islands (h = 20 km).		
		Ki	ePKP	20 36 01					
			i	20 36 22.4					

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

1963					1963				
July	30	Up	iPKP	06 05 34.3 C	July	30	Ki	i	14 14 12.6
			eSS	06 28 17	cont.				
				microns sec					microns sec
			PKP	Z 3.7 10				(PKP)	Z' 0.2 1.5
			PKP	Z' 0.3 1.0				PKP	Z' 0.3 1.1
			M	E 1.0 18				M	E 1.3 22
			M	N 4.9 20				M	N 0.8 20
			M	Z 3.2 20				M	Z 1.7 20
		Ki	ePKP	06 05 13			Sk	e(PKP)	14 10 50
			i	06 05 20.9				iPKP	14 11 04.8
			eSS	06 26 49				i	14 12 26.8
				microns sec			Um	i(PKP)	14 10 52.9
			PKP	Z 0.8 7				iPKP	14 11 07.9
			PKP	Z' 0.1 1.0				i	14 12 39.2
			M	E 3.3 20				i	14 14 21.9
			M	N 2.9 20				Sandwich Islands (h = 30 km).	
			M	Z 6.2 20				Magn. = 5.8 (Up,Ki).	
		Sk	iPKP	06 05 27.2 C				PKP is multiple, with (PKP)	
		Gb	iPKP	06 05 42.4 C				preceding PKP by 15 sec. In	
		Um	iPKP	06 05 21.9 C				the light of a recent study	
			i	06 05 36.5				of multiple PKP phases (G.	
			iSS	06 27 26				Payo Subiza & M. Båth: Core	
		Ka	iPKP	06 05 44.4 C				phases and the inner core	
			i	06 06 07.7				boundary, Geophys. J., in	
			iPP	06 09 23.4				press) it appears more likely	
		Kermadec Islands (h = 30 km).						that there have been two	
		Magn. = 6.3 (Up,Ki).						shocks in the present case.	
"	30	Up	iP	07 02 56.4	"	30	Up	iPKP	14 42 55.6 D
		Ki	iP	07 02 04.6					microns sec
		Sk	iP	07 02 40.5				PKP	Z' 0.1 0.8
		Gb	iP	07 03 16.6			Ki	iPKP	14 42 40.9
		Um	iP	07 02 29.2			Sk	iPKP	14 42 48.3 D
		Ka	iP	07 03 20.6				i	14 43 02.8
		Kamchatka (h = 30 km).					Gb	iPKP	14 43 03.6
"	30	Up	iPKP	08 15 23.7				i	14 43 13.2
		Sk	iPKP	08 15 16.7			Um	iPKP	14 42 43.5
		Kermadec Islands (h = 30 km).						i	14 43 07.7
"	30	Sk	eP	08 18 24			Ka	iPKP	14 43 07.5 D
"	30	Um	iP	08 39 05.9				i	14 43 17.1
		Japan (h = 150 km).					Kermadec Islands (h = 30 km).		
"	30	Up	iP	10 00 48.1	"	30	Up	iPKP	15 24 17.0 C
"	30	Up	i(PKP)	14 10 45.0				i	15 24 21.2
			iPKP	14 11 00.3					microns sec
			i	14 12 09.3				M	E 0.5 19
				microns sec				M	N 1.0 20
			M	E 0.9 22				M	Z 1.3 20
			M	N 0.8 20			Ki	eSS	15 45 30
			M	Z 0.9 18					microns sec
		Ki	i(PKP)	14 11 00.4 C				M	E 0.7 19
			iPKP	14 11 15.6				M	N 1.0 20
								M	Z 1.9 19
							Sk	iPKP	15 24 09.4 C
							Gb	iPKP	15 24 24.6 C
								i	15 24 33.3
							Um	iP	15 24 04.4 C

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

1963						1963					
July	30	Ka	iPKP	15 24 30.8		July	31	Gb	iP	11 40 44.4	
cont.			Kermadec Islands (h = 80 km).			cont.		Um	iP	11 39 59.6	
			Magn. = 5.7 (Up,Ki).						Japan (h = 30 km).		
"	30	Sk	eP	15 38 03		"	31	Ki	iP	15 19 56.5 C	
"	30	Up	iP	17 48 20.2				Sk	iP	15 20 31.5	
		Ki	iP	17 47 24.6				Um	iP	15 20 15.7 C	
		Sk	eP	17 47 51					Japan (h = 30 km).		
		Um	iP	17 47 53.2 D		"	31	Ki	eP	15 59 40	
		Kenai Peninsula (h = 30 km).						Um	eP	16 00 25	
"	30	Um	iP	19 19 00.8					i	16 00 33.0	
"	31	Up	iPKP	02 03 57.7		"	31	Up	iP	22 01 13.0 C	
			i	02 04 03.6				Ki	iP	22 00 57.4 C	
		Ki		---				Sk	iP	22 01 27.0 C	
				microns sec				Um	iP	22 00 59.2 C	
		M	E	0.7 20					Sinkiang (h = 50 km).		
		M	N	0.6 20							
		M	Z	1.0 20							
		Sk	iPKP	02 03 52.8 C							
			i	02 03 56.2							
		Gb	ePKP	02 04 08							
			i	02 04 16.2							
		Um	iPKP	02 03 46.0							
			i	02 03 56.2							
			i	02 04 37							
			e	02 17 11							
		Ka	iPKP	02 04 09.4							
			Kermadec Islands (h = 70 km).								
"	31	Ki	iSn	06 14 25.7							
			iSg	06 14 48.1							
			D = 470 km = 4.2°.								
		Sk	eSg	06 17 18							
		Um	iSg	06 15 51.2							
			Northwest Russia,								
			67.9°N, 31.5°E.								
			Origin time = 06 12 29.								
			Explosion?								
"	31	Ki	iP	07 18 05.9							
"	31	Ki	iP	08 34 43.4							
		Sk	eP	08 34 49							
			i	08 34 53.5							
			eS	08 36 46							
			i	08 36 52.2							
			D = 1200 km = 11°.								
		Um	iP	08 35 18.4							
			Jan Mayen (h = 30 km).								
"	31	Up	iP	11 40 22.5							
		Ki	iP	11 39 40.6							
		Sk	iP	11 40 15.3							

Markus Båth
March 7, 1964

P R E L I M I N A R Y

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, 1963
.....

1963	Aug.	1	Up	i(P)	02 10 35.8	1963	Aug.	1	Ki	ePn	16 03 45		
"	"	1	Up	iP	10 55 16.9 C	cont.				iSn	16 04 55.1		
					microns sec					iLgl	16 05 21.1		
			P	Z' 0.1 1.2						D = 640 km = 5.8°.			
			Ki	iP	10 54 22.9 C				Sk	iPn	16 04 03.6		
					microns sec					i	16 05 13.2		
			P	Z' 0.1 1.2						iSn	16 05 19.8		
			Sk	iP	10 54 59.7 C					iLgl	16 05 51.9		
			Gb	iP	10 55 37.9 C					D = 770 km = 6.9°.			
			Um	iP	10 54 49.0				Gb	i	16 06 36.0		
					Kamchatka (h = 50 km).					iLgl	16 06 55.0		
					Magn. = 5.8 (Up, Ki).				Um	ePn	16 03 12		
										iSn	16 03 51.1		
										iLgl	16 04 01.9		
"	"	1	Ki	iP	14 56 01.2					D = 370 km = 3.3°.			
			Sk	iP	14 56 28.1				Ka	iSn	16 06 14		
					Kodiak Island (h = 40 km).					iLgl	16 06 50		
"	"	1	Up	iPKP	15 40 36.3					Finland, 62.7°N, 27.0°E.			
					microns sec					Origin time = 16 02 17.			
				PKP	Z' 0.1 1.0					Felt.			
			Ki	iPKP	15 40 16.2					This earthquake is			
			Sk	iPKP	15 40 30.9					remarkable by the strong			
				ipPKP	15 40 42.0					excitation of Lgl, whereas			
			Gb	iPKP	15 40 44.7					Sg is hardly noticeable,			
				ipPKP	15 40 55.3					contrary to what is usually			
			Um	iPKP	15 40 22.7					the case for near shocks in			
			Ka	iPKP	15 41 00					continental areas.			
					Kermadec Islands				"	1	Up	iP	17 19 07.1
					(h = 60 km).						Ki	iP	17 18 42.3 C
"	"	1	Up	iPn	16 03 38.4						Gb	iP	17 19 15.7
				iSn	16 04 36.8						Um	iP	17 18 55.6
				iLi	16 04 53.4				"	1	Ki	iP	18 33 12.7 C
					microns sec						Um	iP	18 33 31.2 C
			Pn	Z' 0.1 0.5							Japan (h = 25 km).		
					D = 580 km = 5.2°.				"	1	Up	iP	20 07 07.3

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

1963 Aug. cont.	1	Ki	iP	20 06 41.7	1963 Aug.	2	Ki	e(Pn) i(Sn) iSg	15 40 19 15 41 07.8 15 41 22.2
		Um	iP	20 06 43.5					
		Sinkiang (h = 30 km).							
"	1	Ki	e(P)	20 49 23	"	3	Up	iPKP	04 06 08.2
"	1	Up	iP	21 53 51.7			Ki	iPKP	04 05 56.8
		Ki	iP	21 52 58.1 C			Sk	iPKP	04 06 07.7
		Um	iP	21 53 24.0			Gb	iPKP	04 06 16.0 D
		Aleutian Islands (h = 90 km).					Um	iPKP	04 06 01.6
							Ka	iPKP	04 06 17.2 D
		Solomon Islands (h = 400 km).							
"	2	Up	iP	03 17 47.6	"	3	Up	iP	05 32 57.0
"	2	Ki	iP	05 32 26.2	"	3	Up	iP	10 32 18.3 C
"	2	Ki		---			iS		10 41 05
				microns sec					microns sec
		M	E	0.9 15			P	E	0.9 3
		M	Z	1.2 15			P	N	0.7 3
		Sk	iP	09 12 31.4 C			P	Z	2.2 3
		Gb	eP	09 12 40			P	Z'	8.2 2.5
		Um	eP	09 13 00			S	E	5.1 7
		North Atlantic Ocean (h = 40 km).					S	N	27 15
							M	E	63 18
							M	N	63 16
							M	Z	130 19
"	2	Up	iP	09 19 42.6					D = 7300 km = 65 $\frac{1}{2}$ ⁰ .
				microns sec		Ki	iP		10 32 50.4 C
		M	E	0.8 20			iS		10 42 07
		M	N	0.7 18					microns sec
		M	Z	0.9 19			P	E	1.6 6
		Ki	iP	09 19 28.8			P	N	0.8 6
				microns sec			P	Z	2.9 4
		M	E	1.1 15			P	Z'	4.5 2.5
		M	N	0.4 15			S	E	8.9 10
		M	Z	1.6 15			S	N	20 11
		Sk	eP	09 19 00			M	E	61 17
		Gb	eP	09 19 11			M	N	28 17
		Um	iP	09 19 32.2			M	Z	130 24
		North Atlantic Ocean (h = 30 km).							D = 7850 km = 70 $\frac{1}{2}$ ⁰ .
"	2	Ki	eP	10 32 18		Sk	iP		10 32 18.9 C
		Sk	iP	10 32 47.2			eP'P'		11 01 03
		Um	iP	10 32 32.4		Gb	iP		10 31 55.3 C
		Mariana Islands (h = 110 km).				Um	iP		10 32 38.0 C
							iPP		10 35 04
							iS		10 41 32
							i		10 41 41
"	2	Ki	iP	10 56 32.4		Ka	iP		10 32 04.3 C
		Morocco (h = 30 km).					eP'P'		11 01 00
"	2	Sk	eP	12 54 30		Mid-Atlantic Ocean (h = 30 km).			
		Um	eP	12 55 05		Magn. = 7.0 (Up, Ki).			
		North Atlantic Ocean (h = 30 km).				P has an unusually long period, being equal to 2.5 sec on all short-period records.			

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

1963					1963				
Aug.	4	Ki	eP	18 43 01	Aug.	6	Up	iP	13 42 17.1 C
			i	18 43 15.7				iS	13 46 44
			iS	18 44 44.0					microns sec
			D = 1000 km = 9°.				P	Z'	0.2 1.5
		Sk	eLgl	18 47 33			S	E	0.4 6
		Um	iS	18 46 18.7			M	E	1.1 19
			iLgl	18 47 04.8			M	N	1.7 17
			Arctic Ocean, between				M	Z	1.7 18
			Spitsbergen and Novaya				D = 3000 km = 27°.		
			Zemlya, near 75°N, 38°E.			Ki	eP	13 42 09 C	
							eS	13 46 47	
"	5	Up	i(PKP)	00 12 24.4			iSa	13 47 01	
			iSKP	00 15 19.6				microns sec	
		Ki	iPKP	00 12 21.2			P	E	0.4 6
			iPKS	00 15 44.6			P	Z	0.4 7
			microns sec				P	Z'	0.1 2.0
			PKP Z'	0.1 1.2			S	E	0.5 9
		Sk	iPKP	00 12 31.4			M	E	1.3 17
			eSKP	00 15 10			M	N	0.7 12
		Gb	iPKP	00 12 44.2			M	Z	2.5 17
		Um	iPKP	00 12 28.1			D = 2950 km = 26½°.		
			iSKP	00 15 06.5			Sk	iP	13 41 41.4
			Fiji Islands (h = 520 km).			Gb	iP	13 41 49.8	
"	5	Um	iP	00 58 29.2			Um	iP	13 42 13.6
"	5	Um	iP	03 21 31.0				eS	13 46 51
"	5	Up	iPKP	08 01 14.9				eSa	13 47 09
			Kermadec Islands				North Atlantic Ocean		
			(h = 30 km).				(h = 30 km).		
"	5	Up	---				Magn. = 5.2 (Up, Ki).		
			microns sec				Like the Mid-Atlantic shock		
		M	E	0.7 18			on Aug. 3, 10 21, the P has		
		M	N	1.1 18			remarkably long period,		
		M	Z	1.1 18			usually 2 sec on the short-		
		Ki	iPKP2	15 59 43.1			period records.		
			e(SS)	16 23 23			The phase termed Sa is		
			microns sec				followed by a remarkably		
			M	E	1.1 20		regular wave train, lasting		
			M	N	0.8 20		approx. 1 min, with normal		
			M	Z	2.1 20		dispersion, the period		
		Um	i(SS)	16 23 21			decreasing from 8 to 5 sec;		
			Macquarie Island				this is especially clear on		
			(h = 30 km).				Kiruna Galitzin E; otherwise		
"	5	Up	iP	20 14 22.3 C	"	7	Um	iP	00 09 24.8 C
			i	20 14 27.3	"	7	Up	iP	04 43 34.7 C
		Ki	iP	20 14 05.2 C				microns sec	
		Sk	iP	20 14 34.3 C			P	Z'	0.1 0.6
		Um	iP	20 14 08.0			M	E	0.3 15
			Tsinghai (h = 30 km).				M	N	0.9 17
"	5	Up	iP	20 33 27.4			M	Z	0.9 15
						Ki	iP	04 42 43.2 C	
							microns sec		
							M	E	0.7 16

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

1963					1963				
Aug.	7	Ki	microns sec		Aug.	8	Ki	ipP	02 24 43.2
cont.		M	N	0.4 13	cont.			ePa	02 28 00
		M	Z	1.4 14				iS	02 32 11
		Sk	eP	04 43 21				microns sec	
		Gb	iP	04 43 58.3 C			P	N	0.5 6
		Um	iP	04 43 06.7 C			P	Z	0.9 5
			iPcP	04 44 09.4			P	Z'	1.0 1.4
		Ka	iP	04 44 01 C			S	E	1.1 8
		Sakhalin (h = 30 km).					S	N	0.4 12
"	7	Up	iPKP	04 45 23.2			M	E	1.7 15
		Loyalty Islands					M	N	3.9 20
		(h = 110 km).					M	Z	7.6 20
"	7	Ki	iP	07 28 36.7			D = 6200 km = 56°.		
		Um	eP	07 28 23		Sk	iP	02 25 06.0 C	
		Atlantic Ocean (h = 30 km).					ipP	02 25 19.6	
"	7	Ki	iSKP	11 35 40.6			eS	02 33 22	
			microns sec			Gb	iP	02 25 44.3 C	
			SKP	Z' 0.1 1.3			ipP	02 25 57.9	
		Gb	iSKP	11 36 13.8		Um	iP	02 24 56.6 C	
		Um	iSKP	11 35 53.4			ipP	02 25 09.7	
		Ka	iSKP	11 36 14.7			iPa	02 28 42	
		Fiji Islands (h = 600 km).					iS	02 33 04	
"	7	Ki	iSKP	11 37 22.2		Ka	iP	02 25 50.6 C	
		Fiji Islands (h = 600 km).					ipP	02 26 03.9	
"	7	Ki	iPKP	17 32 20.6		Aleutian Islands. h = 50 km			
		Sandwich Islands				(Up, Ki, Sk, Gb, Um, Ka).			
		(h = 30 km).				Magn. = 6.2 (Up, Ki).			
"	7		---		"	8	Um	iPKP	11 17 48.3
			microns sec				i	11 18 00.8	
		M	E	0.7 20			Easter Island (h = 30 km).		
		M	N	0.4 19	"	8	Up	---	
		M	Z	1.2 19				microns sec	
		Sk	eP	18 49 09			M	E	1.5 20
		Um	iP	18 49 24.3			M	N	1.6 20
		Guatemala (h = 70 km).					M	Z	1.9 20
"	8	Up	iP	02 25 24.9 C		Ki	ePP	11 35 12	
			ipP	02 25 38.4			e(PS)	11 44 27	
			iS	02 33 57			microns sec		
			i	02 34 11			M	E	2.2 22
			microns sec				M	N	1.7 19
		P	N	0.3 2			M	Z	4.3 22
		P	Z	0.5 2		Um	ePKP	11 34 42	
		P	Z'	0.7 1.3			ePP	11 35 29	
		S	E	0.5 4		New Britain (h = 50 km).			
		M	E	2.0 18	"	8	Up	iP	11 53 13.6
		M	N	3.6 22			i	11 53 23.0	
		M	Z	2.6 20		Ki	iP	11 52 43.2	
		D = 7100 km = 64°.				Sk	eP	11 52 55	
		Ki	iP	02 24 30.7 C			ipP	11 53 13.8	
						Gb	iP	11 53 32.9	
						Um	iP	11 52 55.9	
						Ryukyu Islands.			
						h = 80 km (Sk).			

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

1963					1963				
Aug.	8	Up	iP	14 06 00.1 D	Aug.	9	Up	iPKS	14 59 28
				microns sec					microns sec
			P	Z' 0.1 0.6			M	E	1.1 20
		Ki	iP	14 05 32.7 D			M	N	2.2 20
				microns sec			M	Z	2.0 21
			P	Z' 0.2 1.0		Ki	iSS		15 14 50
		Sk	iP	14 05 57.4					microns sec
			e(PP)	14 09 28			M	E	1.8 20
		Um	iP	14 05 43.8 D			M	N	0.9 19
				Mariana Islands			M	Z	3.5 20
				(h = 420 km).		Sk	ePKP		14 56 03
				Magn. = 5.8 (Up,Ki).		Um	iPKP		14 56 00.5
							ePKS		14 59 14
"	8	Um	iP	19 22 37.7			eSS		15 15 29
				Japan (h = 80 km).					Fiji Islands (h = 30 km).
									Magn. = 6.0 (Up,Ki).
"	9	Up	iP	06 09 13.0	"	9	Up	iP	22 00 03.1
			i	06 09 16.3 C			Sk	iP	21 59 54.3
			i(π g)	06 10 53.6			Gb	iP	22 00 19.1
			iS	06 12 19			Um	iP	21 59 47.6
			iLi	06 13 29					
			iLg2	06 14 24		"	10	Up	iPKP
				microns sec				ipPKP	03 54 04.3 C
			P	Z' 0.3 0.8					Kermadec Islands.
			M	E 1.7 13					h = 110 km (Up).
			M	N 4.2 14					
			M	Z 4.4 14		"	10	Up	iP
				D = 1800 km = 16°				eSS	04 35 03.7 C
		Ki	iP	06 10 43.4					microns sec
			i	06 10 50.2				P	Z' 0.1 1.0
			eLg1	06 18 23				M	N 0.8 20
				microns sec				M	Z 0.8 17
			P	Z' 0.2 1.0		Ki	iP		04 35 40.4 C
			M	E 2.6 15					microns sec
			M	N 1.7 14				M	E 0.8 12
			M	Z 2.4 13				M	N 0.3 10
		Sk	iP	06 09 53.1 C				M	Z 0.8 12
			iL(3.21)	06 16 29.3		Sk	iP		04 35 42.6
		Gb	eP	06 08 50		Gb	iP		04 35 19.0
			iLg2	06 13 10.7		Um	iP		04 35 17.3
		Um	iP	06 10 01.4 C			eSS		04 44 31
			i π g	06 11 39.4		Ka	iP		04 34 58.6
			eS	06 13 44					Iran (h = 50 km).
			eLi	06 15 34					
			iLg1	06 16 07.5	"	10	Up	i(P)	09 46 29.3
				D = 2200 km = 20°	"	10	Up	iP	12 18 21.1 D
		Ka	iP	06 08 23.9	"	10	Up	iP	13 30 17.0
			iLi	06 11 18.3			Ki	iP	13 29 46.7
			iL(3.27)	06 12 19.3			Sk	iP	13 30 14.1
				Italy (h = 30 km).					Volcano Islands
"	9	Up	iP	12 30 57.5					(h = 30 km).
				Aleutian Islands					
				(h = 30 km).					

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

1963	Aug.	10	Up	iP	18 50 33.2 C	1963	Aug.	12	Gb	iP	07 27 41.0
					Panama - Costa Rica		cont.		Um	iP	07 27 43.0 C
					(h = 30 km).						Iran (h = 30 km).
"		11	Ki		---	"		12	Ki	iP	12 15 18.6
					microns sec						
			M	E	0.4 15	"		12	Up	iP	18 38 11.3 C
			M	N	0.3 13					eS	18 45 06
			Um	iP	02 02 13.1						microns sec
"		11	Up		---					M	E 0.8 17
					microns sec					M	N 0.9 15
			M	E	0.3 18					M	Z 1.4 18
			M	N	0.8 20						D = 5200 km = 47°.
			M	Z	0.8 25				Ki	iP	18 38 29.7
			Ki	iPKP	01 54 25.1					i	18 38 38.7
				iPKP2	01 55 11.3						microns sec
					microns sec					P	Z' 0.1 1.3
			M	E	0.9 20					M	E 1.4 14
			M	N	0.7 21					M	N 0.9 15
			M	Z	1.7 20					M	Z 2.3 15
					Balleny Islands				Sk	eP	18 38 34 C
					(h = 30 km).					i	18 38 44.2
"		11	Ki	iPn	05 11 34.5				Um	iP	18 38 11.0
				iSn	05 12 29.8					ePP	18 40 06
				iSg	05 12 53.2					eSa	18 48 51
				D = 500 km = 4.5°.							West Pakistan (h = 30 km).
			Sk	eSg	05 15 24	"		12	Gb	iPKP	21 18 39.3
			Um	iSg	05 13 52.1						Tonga Islands (h = 30 km).
					Northwest Russia,	"		12	Gb	iPKP	21 32 49.0
					67.8°N, 32.3°E.						Sandwich Islands
					Origin time = 05 10 24.						(h = 30 km).
					Explosion?	"		13	Up	iP	03 11 09.4
"		11	Up	iP	07 48 35.8 C				Ki	iP	03 10 52.4
			Ki	iP	07 47 55.4						Mindoro, Philippine Islands
			Sk	iP	07 48 29.0 C						(h = 30 km).
			Um	iP	07 48 13.0	"		13	Up	eP	03 37 32
					Japan (h = 50 km).				Ki	iP	03 36 33.2
"		11	Up	iP	19 48 24.9						microns sec
			Ki	iP	19 48 33.2					P	Z' 0.1 1.1
			Sk	eP	19 48 50				Sk	iP	03 37 00.8
					Hindu Kush (h = 150 km).				Gb	iP	03 37 51.3
"		12	Up	iP	03 10 21.6 D				Um	iP	03 37 03.7
			Ki	iP	03 10 09.6 D					i	03 37 10.9
			Sk	iP	03 10 36.9					eS	03 45 23
			Um	iP	03 10 09.9 D						Kodiak Island (h = 30 km).
					Sinkiang (h = 30 km).	"		13	Ki	eP	04 23 44
"		12	Up	iP	07 27 29.5 C	"		13	Ki	eP	05 06 49
			Ki	iP	07 28 06.5					i	05 06 53.9
				iPP	07 29 48.6						Banda Sea (h = 540 km).
			Sk	iP	07 28 04.8						

Up = Uppsala, Ki = Kiruna, Sk = Skalistugan, Gb = Göteborg, Um = Umeå
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1963					1963				
Aug.	13	Up	iPKP	06 47 34.8 D	Aug.	13	Um	iPKP	22 11 53 C
		Sk	ePKP	06 47 27	cont.			iPP	22 14 25
			iSKP	06 50 16.7				iPKS	22 15 24
		Gb	iPKP	06 47 43.5				eSS	22 32 15
		Ka	iPKP	06 47 46				Tonga Islands (h = 30 km).	
		Fiji Islands (h = 560 km).							
"	13	Up	iP	07 11 11.0	"	13	Up	iP	23 11 52.7 D
				microns sec				isP	23 14 19.9
			P	Z' 0.1 0.7					microns sec
		Ki	iP	07 11 19.1 D			Ki	iP	23 11 21.7 D
			i(pP)	07 12 23.1					microns sec
				microns sec				P	Z' 0.2 0.9
			P	Z' 0.1 1.0			Sk	iP	23 11 50.0 D
		Sk	iP	07 11 35.9 D				iPP	23 15 00.1
			isP	07 12 58.4			Gb	iP	23 12 10.5 D
		Gb	iP	07 11 32.9			Um	iP	23 11 35.4 D
			ipP	07 12 26.5				ipP	23 13 29.6
		Um	iP	07 11 08.9 D				isP	23 14 08.2
		Ka	iP	07 11 15			Ka	iP	23 12 13.6
			ipP	07 12 09			Bonin Islands (h = 450 km).		
		Hindu Kush. h = 260 km					Magn. = 5.9 (Up, Ki).		
		(Sk, Gb, Ka).							
		Magn. = 5.4 (Up, Ki).			"	14	Up	iP	00 26 58.2 C
"	13	Up	iP	11 46 00.9 C			Um	iP	00 27 18.9
							Rhodesia (h = 30 km).		
"	13	Up	iP	13 31 58.9	"	14	Ki		---
		Ki	iP	13 30 17.5					microns sec
			i	13 30 20.1			M	E	0.9 22
			eT	13 38 55			M	N	0.7 23
			i	13 39 07.5			M	Z	1.4 23
				microns sec			Um	e(PP)	03 51 43
			P	N 0.3 8			New Britain (h = 60 km).		
			P	Z' 0.1 1.0					
			M	E 1.2 21	"	14	Ki	iP	13 44 17.8
			M	N 0.7 17					
			M	Z 1.7 18	"	14	Ki	iP	13 49 54.4
		Sk	iP	13 31 09.0			Sk	eP	13 50 42
		Gb	eP	13 32 27			Um	iP	13 50 40.5
		Um	iP	13 31 11.4 C			Svalbard (h = 30 km).		
			e(T)	13 38 45					
			i	13 39 18.1	"	14	Sk	eP	16 30 11
		Svalbard (h = 30 km).						i	16 30 51.1
"	13	Up	ePKS	22 15 34			Um	eP	16 29 52
				microns sec			Formosa (h = 30 km).		
			M	E 0.3 16	"	14	Up		---
			M	N 0.9 21					microns sec
			M	Z 0.6 20			M	E	0.6 17
		Ki	ePKS	22 15 09			M	N	0.9 18
			eSS	22 31 31			M	Z	1.3 17
				microns sec			Ki	eP	16 42 13
			PKS	N 0.3 8				i	16 42 15.4
			M	E 0.5 16					microns sec
			M	N 0.6 19			M	E	0.5 14
			M	Z 1.0 17			M	N	0.4 15

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1963 Aug. cont.	14	Ki		microns	sec		1963 Aug. cont.	15	Up		microns	sec
			M	Z	0.5	12				P	N	1.2 5
		Sk	iP		16 43	03.8				P	Z	3.2 4
		Um	iP		16 42	58.9				P	Z'	0.6 1.2
"	14	Up	iP		18 58	07.3 C				PP	N	0.7 6
			i		18 58	21.3				S	E	0.6 7
			i		19 04	07.3				S	N	3.0 7
					microns	sec				M	E	14 16
			P	Z'	0.1	0.9				M	N	24 19
		Ki	iP		18 57	48.5 C				M	Z	28 18
					microns	sec						D = 8000 km = 72°
			P	Z'	0.1	0.8			Ki	iP		06 22 15.1 C
			M	E	0.5	20				ipP		06 22 27.6
			M	N	0.3	20				iS		06 30 59
			M	Z	1.5	21				i		06 32 31
		Sk	eP		18 58	11				eP'P'		06 50 53
			ePKP		19 02	20					microns	sec
		Um	iP		18 57	55.4				P	E	1.6 7
			i		18 58	08.1				P	N	1.2 7
			iPKP		19 02	13.6				P	Z	5.4 7
										P	Z'	1.3 2.2
										S	E	4.1 6
										S	N	4.8 10
										P'P'	Z'	0.3 2.1
										M	E	36 16
										M	N	22 18
										M	Z	65 17
												D = 7300 km = 65½°
									Sk	iP		06 22 48.5 C
										iPP		06 25 26.8
									Gb	iP		06 23 15.7 C
										iPP		06 26 06.2
										iPS		06 33 19.0
									Um	iP		06 22 32.7 C
										i(PP)		06 24 48
										iS		06 31 32
										iP'P'		06 50 51.0
									Ka	iP		06 23 20 C
										ipP		06 23 33
												Japan. h = 50 km (Ki,Ka).
												Magn. = 6.7 (Up,Ki).
"	15	Ki	i		05 33	43.8	"	15	Up	iP		08 13 17.3
			iSg		05 34	10.1			Ki	iP		08 13 00.3
"	15	Ki	iSn		06 04	14.2			Um	iP		08 13 06.0
			iSg		06 04	36.2	"	15	Sk	e(Pg)		09 27 48
		Um	iSg		06 06	00.1				i(S*)		09 28 40.6
										iSg		09 28 54.7
									Um	iSg		09 30 36.9
												Probably southwest coast of Norway.
"	15	Up	iP		06 22	54.9 C	"	15	Gb	iP		13 03 26.3
			iPP		06 25	37						
			iS		06 32	11	"	15	Up	iPKP		15 16 41.5
			i		06 32	39						Fiji Islands (h = 300 km).
					microns	sec						
			P	E	0.7	6						

Year	Month	Day	Station	Phase	Time (h m s)
1963	Aug.	15	Gb	i(P)	17 37 40.9
	cont.			iP	17 37 55.5
				iPP	17 41 46.0
				iPKKP	17 54 36.8
				iP'P'	18 02 44.8
			Um	i(P)	17 38 04.8
				iP	17 38 20.0
				epP	17 40 20
				iPP	17 42 32
				ipPP	17 44 26.5
				iSKS	17 48 03
				i	17 53 52.1
				iPKKP	17 54 22.5
				i	17 54 29.5
				iP'P'	18 02 38.1
			Ka	i(P)	17 37 50.6
				iP	17 38 04.9
				i	17 52 45.5
				iPKKP	17 54 17.0
				i	17 54 31.5
				iP'P'	18 02 44.5
Peru - Bolivia. h = 550 km (Ki, Sk, Um).					
Magn. = 7.4 (Up, Ki).					
(P) precedes P by 15.0 sec on the average, is of much smaller amplitude than P, and can only be interpreted as due to a foreshock.					
"	15	Up	iP	18 20 13.0	
			e	18 22 49	
		Ki	iP	18 20 25.0	
		Sk	eP	18 19 53	
			i	18 23 41.8	
		Gb	eP	18 20 00 C	
			e	18 23 02	
		Um	iP	18 20 23.0	
		Ka	eP	18 20 05	
Probably of the same origin as the preceding shock.					
"	15	Sk	eP	19 50 25	
(Greece).					
"	15	Up	iP	20 38 53.4	
"	15	Gb	iPKP	22 48 08.2	
		Um	iSKP	22 50 32.5	
Fiji Islands (h = 600 km).					
"	15-16	Up	iP	23 59 34.3	
			iS	00 01 29.1	
microns sec					
		P	Z'	0.1 0.7	
D = 1150 km = 10 ¹⁰ .					

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1963

Aug. 15-16 Ki iP 23 58 12.5 D
cont. iS 23 59 14.6

microns sec
P Z' 0.3 0.5
S Z' 0.3 0.8
M E 1.0 9
M N 0.7 10
M Z 1.6 9
D = 550 km = 5°.

Sk iP 23 58 38.9 D

iS 23 59 51.4

Gb eP 23 59 58

iS 00 02 11.1

i(Li) 00 02 51.7

Um iP 23 58 53.5

iS 00 00 13.5

Ka eP 00 00 25

iS 00 03 17.0

Arctic Ocean (h = 30 km).

" 16 Up iP 14 04 20.2

microns sec
P Z' 0.1 0.8

" 16 Up i(P) 21 51 44.9

microns sec
(P) Z' 0.1 1.2

" 16 Um iP 22 39 06.0

Japan (h = 80 km).

" 16 Up iP 23 18 21.8 C

Ki iP 23 18 55.5

Sk iP 23 18 27.2

Um iP 23 18 38.1

i 23 18 44.1

eS 23 28 50

South Atlantic Ocean
(h = 30 km).

" 16 Ki ePKP 23 38 53

microns sec
M E 0.9 20
M N 0.3 21
M Z 1.3 22

Sk ePKP 23 38 55

Um iPKP 23 38 48.5

South of Australia
(h = 30 km).

" 17 Up iP 06 28 33.5

Ki iP 06 27 40.0

Sk iP 06 28 09.6

Um iP 06 28 06.6

Aleutian Islands
(h = 30 km).

1963

Aug. 17 Up iPKP 09 54 37.1 C
Sk iPKP 09 54 33.1 C
Um iPKP 09 54 28.7 C
i 09 54 42.5

Kermadec Islands
(h = 370 km).

" 17 Up iP 11 24 17.1 C
iS 11 33 47

microns sec

P E 0.4 5

P N 0.6 5

P Z 1.7 5

P Z' 0.2 0.7

M E 31 18

M N 42 18

M Z 64 18

D = 8200 km = 74°.

Ki iP 11 23 45.3 C

iPa 11 27 50

iS 11 32 49

microns sec

P E 1.1 7

P N 0.4 6

P Z 2.6 5

P Z' 1.7 2.5

S E 2.0 8

M E 67 18

M N 45 17

M Z 140 18

D = 7650 km = 69°.

Sk eP 11 24 16 C

Gb iP 11 24 37.8 C

Um iP 11 23 58.0 C

iPP 11 26 37

iS 11 33 14

Ka eP 11 24 31

i 11 24 36.3

Ryukyu Islands (h = 30 km).
Magn. = 6.6 (Up, Ki).

A remarkable case of
extremely well developed
higher-mode surface waves.
Pa is followed by an
unusually regular wave
train lasting nearly 2 min
and of constant period =
7-8 sec, especially clear
on Kiruna Galitzin E.

" 17 Up iP 11 46 43.3

microns sec

P Z' 0.1 0.7

Ki iP 11 46 29.9

ipP 11 47 12.2

Sk iP 11 46 23.9

Up = Uppsala, Ki = Kiruna, Sk = Skalistugan, Gb = Göteborg, Um = Umeå
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1963 Aug. cont.	19	Sandwich Islands (h = 30 km).			1963 Aug.	20	Ki	e(P)	13 00 19
"	19	Ki	ePn	12 04 02	"	20	Up	iPg	13 46 24.6
			iP*	12 04 12.0				i	13 46 27.4
			iSn	12 04 54.4				iSg	13 46 40.3
			D = 430 km = 3.9°.					Central Baltic. Explosion?	
		Sk	ePn	12 05 15	"	20	Up	iPg	14 02 21.2
			eSg	12 07 54				i	14 02 24.2
			D = 990 km = 8.9°.					iSg	14 02 37.1
		Um	iSg	12 06 44.5			Um	iSg	14 04 37.2
		Northwest Russia, 69.3°N, 30.3°E. Origin time = 12 03 02. Explosion?						Central Baltic. Explosion?	
"	19	Ki	ePn	13 08 14	"	20	Up	iP	15 59 17.9 C
			iP*	13 08 23.1				iPcP	15 59 39.4
			iSn	13 09 03.8				eS	16 08 21
			iSg	13 09 16.8					microns sec
			D = 430 km = 3.9°.					P	Z' 0.1 1.2
		Sk	ePn	13 09 26				M	E 1.0 21
			eSg	13 12 02				M	N 1.7 21
			D = 990 km = 8.9°.					M	Z 1.6 20
		Um	iPn	13 08 56.6				D = 7700 km = 69.1°.	
			i	13 10 32.1		Ki	iP	15 58 34.8 C	
			iSg	13 10 56.1			eS	16 07 03	
			D = 760 km = 6.8°.						microns sec
		Northwest Russia, 69.3°N, 30.3°E. Origin time = 13 07 12. Explosion? In this record, like the preceding one, P* at Kiruna has a much shorter period than all other waves, around 0.2 sec.						P	Z' 0.1 1.3
								S	E 0.5 9
								S	N 0.3 7
								M	E 1.8 20
								M	N 1.7 19
								M	Z 2.8 18
								D = 7000 km = 63°.	
						Sk	iP	15 59 09.1 C	
						Um	iP	15 58 53.4 C	
							iS	16 07 37	
						Japan (h = 50 km). Magn. = 5.8 (Up, Ki).			
"	19	Ki	iP	15 09 11.7	"	20	Up	eP	16 07 15
		Um	iP	15 09 50.0					microns sec
		Japan (h = 120 km).						P	Z' 0.1 0.9
"	19	Up	iP	20 37 05.9	"	20	Up	ePKP	20 03 42
"	19	Up	iP	21 41 07.6			Sk	iPKP	20 03 31.0
							Um	iPKP	20 03 25.9 D
"	20	Ki	ePn	04 31 36			Kermadec Islands (h = 40 km).		
			iP*	04 31 44.8	"	20	Up	iP	20 50 12.6 C
			iSn	04 32 26.4					
			iSg	04 32 42.3					
			D = 430 km = 3.9°.		"	20	Ki	ePn	22 26 38
		Sk	ePn	04 32 51				eSn	22 27 26
			eSg	04 35 24				iSg	22 27 49.3
			D = 1000 km = 9.0°.					D = 470 km = 4.2°.	
		Northwest Russia, 69.3°N, 30.3°E. Origin time = 04 30 35. Explosion?				Sk	eSg	22 30 44	
						Um	iSn	22 28 50.8	
							iSg	22 29 38.3	
								D = 830 km = 7.5°.	

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1963 Aug. cont.	20	North Norway, 70.5°N, 30.0°E. Origin time = 22 25 30.			1963 Aug.	22	Ki	iSn	05 47 16.9	
								iSg	05 47 34.4	
								Probably northwest Russia. Explosion?		
"	21	Up	iP	02 26 48.1	"	22	Ki	eP	09 38 05	
"	21	Up	eP	03 51 36					microns sec	
		Ki	eP	03 51 20				M	E 0.4 15	
		Sk	iP	03 51 06.9				M	Z 0.4 15	
		Um	iP	03 51 22.8				Oregon (h = 30 km).		
		Caribbean Sea (h = 30 km).			"	22	Up	iP	15 10 26.8	
"	21	Ki	iPn	04 29 43.7	"	22	Ki	iP	20 04 34.2 D	
			iSg	04 30 49.0	"	22	Up	ePKP	20 11 19	
			D = 420 km = 3.8°.					ePP	20 12 51	
		Sk	eSg	04 33 33				eSS	20 29 26	
			i	04 33 47.9					microns sec	
		Um	iSg	04 32 13.2				PP	Z' 0.2 1.7	
			i	04 32 35.2				M	E 4.0 21	
		Northwest Russia, 68.9°N, 30.3°E. Origin time = 04 28 43. Explosion?						M	N 7.7 20	
"	21	Sk	iP	10 30 24.5				M	Z 8.9 21	
		Java (h = 230 km).						(D = 13450 km = 121°).		
"	21	Up	iP	18 13 31.9			Ki	ePKP	20 11 06	
			i	18 13 36.1				ePP	20 12 12	
		Ki	eP	18 12 45				i	20 12 32.8	
			eS	18 20 54				eSKKS	20 19 08	
				microns sec				ePS	20 21 48	
			M	E 0.4 15					microns sec	
			M	N 0.2 17				PP	Z 0.5 5	
			M	Z 0.4 15				M	E 9.1 20	
			D = 6600 km = 59½°.					M	N 6.8 20	
		Sk	eP	18 13 26				M	Z 17 20	
		Um	iP	18 13 07.7				(D = 12700 km = 114½°).		
			eS	18 21 37			Sk	ePKP	20 11 17	
		Kurile Islands (h = 30 km).						iPP	20 12 49.7	
"	21	Ki	iP	22 51 01.7 C			Gb	ePKP	20 11 25	
"	21	Up	iP	22 56 29.4				ePP	20 13 16	
"	21	Up	iP	22 59 11.1 D			Um	iPKP	20 11 09.8	
"	22	Up	iP	04 08 16.9				ePP	20 12 20	
		Ki	iP	04 07 19.6				i	20 12 26.0	
		Sk	eP	04 07 48				eSKS	20 18 05	
			i	04 07 50.7				eSKKS	20 19 21	
		Um	iP	04 07 51.0			Ka	iPKP	20 11 27 C	
			i	04 08 09.7				iPP	20 13 13	
		Alaska (h = 100 km).						Solomon Islands (h = 30 km). Magn. = 6.6 (Up, Ki).		
"	22	Um	iP	05 43 40.8 C	"	22	Up	iP	21 06 12.2	
					"	22	Up	iP	23 33 02.5 C	
							Sk	iP	23 32 50.2	
							Um	iP	23 33 06.0	
							Colombia (h = 100 km).			

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1963					1963				
Aug.	23	Up	iP	03 56 00.8	Aug.	24	Gb	iPKP	03 37 59.0 C
		Ki	iP	03 55 15.3	cont.		Um	iPKP	03 37 39.8
		Um	iP	03 55 35.4			Ka	iPKP	03 38 03.2 C
		Ka	iP	03 56 25			i		03 38 16.6
		Kurile Islands (h = 140 km).					Kermadec Islands (h = 40 km).		
"	23	Ki	iP	05 13 55.0	"	24	Up	iP	11 09 26.6
"	23	Up	iP	13 19 56.3 C			Ki	iP	11 08 34.3
			iS	13 28 32			Aleutian Islands (h = 30 km).		
				microns sec					
		P	Z'	0.1 0.5	"	24	Up	iPKP	13 10 26.8
		M	E	1.1 23			Ki	iPKP	13 10 09.9 C
		M	N	1.4 23			Sk	iPKP	13 10 23.7
		M	Z	1.4 21			Um	iPKP	13 10 18.7 C
		D = 7100 km = 64°.					New Zealand (h = 40 km).		
		Ki	iP	13 19 04.6	"	24	Up	iP	22 51 06.4
				microns sec	"	25	Up	iP	02 30 38.7
		P	Z'	0.1 1.0			Um	iP	02 30 06.7
		M	E	1.2 18			Sea of Okhotsk (h = 130 km).		
		M	N	0.7 17	"	25	Up	iP	05 32 18.1
		M	Z	1.2 17			Kurile Islands (h = 30 km).		
		Sk	iP	13 19 40.8	"	25	Up	eP	06 17 01
		Gb	iP	13 20 18.0			eS		06 21 21
		Um	iP	13 19 28.3 C			iSa		06 21 34
			i	13 19 29.8					microns sec
		Ka	iP	13 20 19.3			P	Z'	0.3 1.0
		Kamchatka (h = 30 km).					M	E	1.0 11
		Magn. = 5.8 (Up, Ki).					M	N	1.1 14
"	23	Ka	i(P)	16 48 53.3 C			M	Z	0.9 15
"	23	Up	iP	16 52 19.8			D = 2700 km = 24½°.		
"	23	Up	iP	16 53 01.5 C			Ki	iP	06 17 55.9
				microns sec			iSa		06 23 53
		P	Z'	0.1 0.5					microns sec
		Gb	iP	16 53 22.7			P	Z'	0.1 0.8
		Um	iP	16 52 33.9 C			M	E	1.6 13
			ipP	16 52 47.4			M	N	0.7 12
		Kamchatka. h = 50 km (Um).					M	Z	1.2 13
"	23	Up	iP	23 34 21.1			Sk	iP	06 17 42.3
		Sk	eP	23 34 30			i		06 17 45.3
		Um	iP	23 34 08.3			Gb	iP	06 17 10.1
		Bonin Islands (h = 50 km).					i		06 17 16.7
"	24	Ki	iPKP	02 30 50.6 C			Um	iP	06 17 24.5
		Bouvet Island (h = 30 km).					i		06 17 28.4
"	24	Up	iPKP	03 37 50.9 C			eS		06 22 05
			i	03 37 55.7			eSa		06 22 20
				microns sec			D = 3000 km = 27°.		
				Z' 0.1 0.5			Ka	iP	06 16 47
		PKP					Turkey (h = 30 km).		
		Ki	ePKP	03 37 29			Magn. = 5.8 (Up, Ki).		
		Sk	iPKP	03 37 44.8 C	"	25	Up	iP	08 01 15.8 C
			i	03 37 50.5					

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

1963 Aug.	25	Up	i(PKP) i iPKP iSKP iPKS ipPKS isPKS iSS	12 36 18.3 12 36 22.5 12 36 36.3 12 39 09.6 12 40 03 12 42 18 12 43 13 12 56 35	1963 Aug. cont.	25	G. Payo Subiza and M. Bath (Core phases and the inner core boundary, Geophys. Journ., in press) being indicated above to the right of the resp. times.
			microns sec			26	Up iPKP 02 46 43.7 Fiji Islands (h = 550 km).
			PKP Z' 0.2 0.5			26	Up iP 05 56 05.4 Ki iP 05 55 57.4 Java (h = 30 km).
			SKP Z' 0.3 1.0			26	Up iP 20 46 14.6
			PKS N 1.1 3			26	Up iP 21 23 00.8
			M E 2.9 19			27	Ki eP 03 17 25 i 03 17 34.3 iS 03 18 57.8 eT 03 23 13 Sk eP 03 17 55 i(S) 03 19 33.9 Um eP 03 18 09 Arctic Ocean (h = 30 km).
			M N 3.7 20			27	Up --- microns sec M E 1.7 18 M N 1.7 21 M Z 2.4 19
			M Z 3.4 21			Ki	iPKS 03 46 31 e 03 57 22 microns sec M E 1.6 19 M N 0.7 17 M Z 1.5 17
			(D = 15100 km = 136°).			Um	i 03 57 09 Chile (h = 30 km).
Ki			ePKP 12 36 04 PO"			27	Ki iP 20 53 08.4 Mariana Islands (h = 80 km).
			iPKP 12 36 15.5 P"			27	Up iP 22 14 23.2 Japan (h = 60 km).
			ePP 12 38 34			28	Ki iPn 05 18 06.7 iSn 05 19 01.3 iSg 05 19 24.4 D = 500 km = 4.5°.
			iSKP 12 38 44.3			Sk	e(Sg) 05 21 49
			iPKS 12 39 36			Um	i(Sg) 05 20 35.7
			isPKS 12 42 47				Northwest Russia. Origin time = 05 16 56. Explosion?
			eSPP 12 49 31				
			microns sec				
			PKP Z' 0.4 1.1				
			PP Z 1.6 9				
			SKP Z' 0.4 1.1				
			PKS E 0.9 5				
			PKS N 1.1 8				
			M E 5.6 19				
			M N 2.9 20				
			M Z 4.2 20				
			(D = 14350 km = 129°).				
Sk			i(PKP) 12 36 13.7 PO"				
			iPKP 12 36 25.2 P"				
			iSKP 12 38 56.5				
Gb			iPKP 12 36 25.2				
			ipPKP 12 38 48.5				
Um			i(PKP) 12 36 06.2 PO"				
			i 12 36 16.7 P1"				
			iPKP 12 36 22.1 P"				
			ipPKP 12 38 37.2				
			ePP 12 38 49				
			iSKP 12 38 56.4				
			iPKS 12 39 49				
			isPKS 12 42 56				
			iSPP 12 49 57				
Ka			iPKP 12 36 31.5				
			ipPKP 12 38 58.3				
			i 12 39 14.4				
			iSKP 12 39 26.5				
Fiji Islands. h = 570 km (Gb,Um,Ka).							
This is a good example of multiple PKP-phases, the notation according to							

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

1963
Aug. 28 Up iP 07 49 28.2
iS 07 52 20.4
D = 1730 km = 15.6°.
Ki iP 07 48 21.9
iS 07 50 25.0
microns sec
P Z' 0.1 0.7
S Z' 0.1 1.0
M E 0.5 15
M N 0.7 14
M Z 0.8 15
D = 1220 km = 11.0°.
Sk iP 07 48 27.2
i 07 48 34.5
iS 07 50 16.7
Um iP 07 48 55.9
iS 07 51 21.0
i 07 51 37.0
D = 1460 km = 13.1°.
Ka iP 07 50 05
Jan Mayen, 71°N, 10°W.
Origin time = 07 45 48.

" 28 Up iPg 14 12 42.3
i 14 12 52.6
iSg 14 13 02.6
Sk e(Sg) 14 15 13
Um iSg 14 14 55.2
Ka eSg 14 13 51
i 14 14 06.7
Central Baltic, near
Gotska Sandön.
Probably explosion.

" 28 Ki eL 14 15
microns sec
M E 0.7 20
M N 0.5 18
M Z 0.7 20
Balleny Islands
(h = 30 km).

" 28 Up iP 16 03 09.1
microns sec
P Z' 0.3 0.5
Ki iP 16 02 36.2
microns sec
P Z' 0.1 0.9
Sk iP 16 03 05.6
iPP 16 06 07.2
Um iP 16 02 50.2
i 16 03 18.0
Ka iP 16 03 28
Bonin Islands (h = 100 km).

" 28 Up iP 18 46 45.6

1963
Aug. 29 Up iP 09 01 23.3 C
iPP 09 02 56.3
iS 09 07 29
iSa 09 09 59
iSS 09 10 22
iLi 09 12 53
microns sec
P E 1.9 5
P Z 3.6 5
P Z' 0.7 0.8
PP E 2.4 3
PP Z 2.3 2
PP Z' 2.9 2.0
S E 4.1 13
S N 3.5 5
M E 18 8
M N 61 14
M Z 46 14
D = 4450 km = 40°.
Ki iP 09 01 24.8 C
iPP 09 02 56
iS 09 07 29
iSS 09 10 29
iLi 09 13 41
iLgl 09 14 42
microns sec
P E 3.3 6
P N 1.0 6
P Z 4.0 5
P Z' 1.4 1.0
PP E 3.6 9
PP Z 4.1 9
S E 5.3 11
S N 1.9 7
M E 44 14
M N 25 8
M Z 57 12
D = 4500 km = 40°.
Sk iP 09 01 46.4 C
iPP 09 03 27.2
Um iP 09 01 17.7 C
iPP 09 02 50
iS 09 07 14
iSa 09 09 38
iSS 09 10 05
Ka iP 09 01 30 C
iPP 09 03 11
Sinkiang (h = 30 km).
Magn. = 6.7 (Up, Ki).
An excellent example of
higher-mode surface waves
(or channel waves).

" 29 Up iP 15 44 19.8
iPP 15 48 24
iSKS 15 54 56

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

1963				1963			
Aug.	29	Up	microns sec	Aug.	29	Ki	microns sec
cont.				cont.			
		P	Z 1.3 7			M	Z 2.1 20
		PP	E 1.5 7			Tonga Islands (h = 30 km).	
		PP	Z 4.0 8				
		SKS	E 4.2 12	"	30	Up	iP 00 30 12.9
		M	E 11 24			Ki	iP 00 30 07.8
		M	N 11 25				i! 00 30 23.9
		M	Z 20 23			Sk	eP 00 30 27
		D = 11220 km = 101°.					i 00 30 39.0
		Ki	iP 15 44 20.9			Um	eP 00 30 07
			iPP 15 48 26				i! 00 30 23.1
			iSKS 15 54 55			Java (h = 30 km).	
			iPS 15 57 33				
			iPKKP 16 00 32.9	"	30	Up	iP 04 53 53.8
							iPP 04 55 33.5
			microns sec				iLi 05 05 14
		P	E 0.7 7				iLgl 05 07 12
		P	Z 2.3 8				
		P	Z' 0.1 1.0				microns sec
		PP	E 2.7 7			M	E 1.2 11
		PP	Z 5.3 8			M	N 2.3 7
		SKS	E 7.4 11			M	Z 1.9 10
		PKKP	Z' 0.1 1.2			Ki	iP 04 53 42.5
		M	E 31 26				iS 04 59 17.0
		M	N 19 25				microns sec
		M	Z 39 24			P	Z' 0.1 0.7
		D = 11220 km = 101°.				M	E 1.5 11
		Sk	eP 15 44 08			M	N 0.9 11
			iPKKP 16 00 41.1			M	Z 2.2 12
		Um	iP 15 44 22.7 D			D = 4150 km = 37½°.	
			i 15 48 06.0			Sk	iP 04 54 10.1
			iPP 15 48 30				ePP 04 55 47
			iSKS 15 55 00				i 04 59 46.5
		Ka	iP 15 44 09				eLgl 05 07 47
			i 15 44 24			Um	iPP 04 55 08.1
			ePP 15 48 09				eS 04 59 29
		Peru (h = 25 km).				Ka	eP 04 54 06
		Magn. = 7.0 (Up,Ki).				China - Kazakh (h = 30 km).	
		Pronounced G-wave recorded;		"	30	Ki	iP 07 18 21.1 D
		SS (at Um) exhibits SV-					i 07 18 29.6
		motion as a very significant					i(S) 07 20 23.7
		pulse-like wave. The shock					microns sec
		mechanism has thus permitted				P	Z' 0.1 0.7
		the recording both of strong				Sk	iP 07 18 25.9 D
		SH- and SV-motion at our					iS 07 20 14.2
		stations.				D = 1100 km = 10°.	
"	29	Up	iP 20 44 08.1 C			Um	iP 07 18 55.8
"	29	Up	eL 22 05				iS 07 21 05.6
			microns sec			D = 1350 km = 12°.	
		M	N 1.2 24			Jan Mayen (h = 30 km).	
		M	Z 1.1 23	"	30	Ka	iPKP 14 11 31
		Ki	eL 22 02			Tonga Islands (h = 30 km).	
			microns sec	"	31	Up	iP 00 57 48.5 D
		M	E 1.5 20				
		M	N 0.8 20				

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1963

Aug.	31	Up	i(Sg)	06 16 21.7
		Ki	e(Sg)	06 17 54
		Sk	e(Sg)	06 16 40
"	31	Ki	iP	08 42 08.7
		Sk	eP	08 42 32
			iPP	08 44 05.5
		Um	iP	08 42 10.1
		Ka	iP	08 42 19
		Tien - Shan.		
"	31	Up	iP	12 58 55.8
		Um	iP	12 58 36.1
		Ryukyu Islands (h = 30 km).		
"	31	Up	iP	16 40 36.7
			iPcP	16 41 06.7
		Ki	iP	16 39 50.0
		Um	iP	16 40 10.7
		Sakhalin (h = 70 km).		
"	31	Up	iPKP	21 44 28.5
		Ki	iSKP	21 46 55.4
		Um	iSKP	21 47 06.6
		Ka	iPKP	21 44 42.3 C
		Fiji Islands (h = 540 km).		

Markus Båth
March 14, 1964

Seismological Institute
Uppsala

P R E L I M I N A R Y

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, 1963
.....

1963	Sep. 1	Up	iPKP	11 49 30.5	1963	Sep. 2	Um	iP	19 45 30.0
		Chile	(h = 30 km).				Japan	(h = 30 km).	
"	2	Up	iP	01 42 42.2	"	2	Up	iP	22 35 43.8
			i	01 42 47.3			India	(h = 220 km).	
		Ki	iP	01 42 50.1 C					
			i	01 42 56.2	"	2	Ki	iPKP	22 57 05.4
			iPP	01 44 43.9			Um	iPKP	22 57 13.7
				microns sec			New Zealand	(h = 30 km).	
			P	Z' 0.2 1.0					
			M	N 1.3 18	"	2	Up	eP	23 55 59
		Sk	iP	01 43 09.6 C					microns sec
		Um	eP	01 42 40			M	E	0.6 17
			e	01 42 54			M	N	1.4 17
		Ka	iP	01 42 54			M	Z	1.2 19
		India	(h = 40 km).				Ki	iP	23 55 12.3
"	2	Ki	iP	05 50 08.9				iPcP	23 55 56.8
									microns sec
"	2	Ki	iP	11 54 13.0 C			M	E	1.2 14
		Um	iP	11 54 33.2 C			M	N	1.0 20
		Kurile Islands	(h = 30 km).				M	Z	1.9 15
"	2	Up	iS	14 33 43			Sk	eP	23 55 48
				microns sec			Um	iP	23 55 33.2
			M	E 0.8 18			Ka	iP	23 56 16.3
			M	N 0.9 17			Kurile Islands	(h = 30 km).	
			M	Z 1.4 18	"	3	Ki	iP	05 08 10.4 C
		Ki		----			Um	iP	05 08 31.9
				microns sec			Kurile Islands	(h = 30 km).	
			M	E 1.3 15	"	3	Um	iP	05 14 33.4
			M	N 0.6 15			Japan	(h = 30 km).	
			M	Z 1.9 15	"	3	Up	iP	05 40 38.3
		Um	iP	14 23 09.7				i	05 40 42.7
			eS	14 33 25			Ki	iP	05 39 52.2
		Gulf of California					Sk	iP	05 40 26.7
		(h = 30 km).							

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

1963						1963						
Sep. cont.	3	Um	iP	05 40 12.7		Sep. cont.	4	Ki		microns sec		
		Ka	iP	05 41 00.3				S	N	0.6 7		
		Kurile Islands (h = 30 km).						M	E	7.1 15		
"	3	Ki	eP	09 16 11				M	N	3.7 15		
		Um	eP	09 16 18				M	Z	4.4 18		
		(Iceland).						D = 3600 km = 32 $\frac{1}{2}$ ⁰ .				
"	3	Up	iP	09 18 11.6			Sk	iP	05 12 32.8	D		
				microns sec			Um	iP	05 12 45.2	D		
		M	E	0.4 19				e	05 13 25			
		M	N	0.4 15				iS	05 17 35			
		M	Z	0.6 19			Ka	iP	05 11 32.0	D		
		Ki	iP	09 17 58.0				i	05 13 17.8			
				microns sec			Algeria (h = 40 km).					
		P	Z'	0.1 2.0			Magn. = 5.7 (Up,Ki).					
		M	E	0.7 16		"	4	Up	eP	08 43 01		
		M	N	0.4 14				Algeria (h = 30 km).				
		M	Z	1.0 14		"	4	Up	iP	13 39 05.4	D	
		Sk	eP	09 17 29				iS	13 44 39			
		Um	iP	09 18 06.5 C				microns sec				
		Iceland (h = 30 km).						P	E	0.8 3		
"	3	Up	i(P)	15 18 26.4				P	N	2.2 3		
"	3	Up	iP	18 25 35.9				P	Z'	2.7 2.0		
		Ki	iP	18 26 50.5				S	E	1.3 7		
		Sk	eP	18 26 16				S	N	5.8 8		
		Um	iP	18 26 15.5 D				M	E	12 22		
		Ka	iP	18 24 56.9 D				M	N	25 20		
		Greece.						M	Z	26 20		
"	3	Ki	iP	18 50 02.4 C				D = 3950 km = 35 $\frac{1}{2}$ ⁰ .				
		Sk	iP	18 49 46.7			Ki	iP	13 38 16.3	D		
		Colombia (h = 140 km).						iS	13 43 10			
"	4	Up	iP	05 12 07.8 D				microns sec				
		i		05 12 09.5				P	E	2.3 5		
		i		05 12 27.1				P	N	2.2 5		
		iS		05 16 35				P	Z	4.6 5		
				microns sec				P	Z'	3.4 2.2		
		P	N	0.5 4				S	E	8.9 18		
		P	Z'	0.2 0.8				S	N	6.8 11		
		S	E	0.4 3				M	E	21 16		
		S	N	0.8 4				M	N	14 17		
		M	E	2.9 17				M	Z	31 15		
		M	N	2.6 16				D = 3300 km = 29 $\frac{1}{2}$ ⁰ .				
		M	Z	2.6 14			Sk	iP	13 38 27.1			
		D = 2800 km = 25 ⁰ .					Um	iP	13 38 43.2	D		
		Ki	iP	05 13 17.5 D				iS	13 43 59			
		iS		05 18 34			Ka	iP	13 39 25.0			
				microns sec				i	13 39 27.1			
		P	N	0.3 6				iPP	13 40 54.0			
		P	Z	0.5 5			Baffin Island (h = 30 km).					
		P	Z'	0.2 1.2			Magn. = 6.5 (Up,Ki).					
		S	E	0.7 5			P is exceptionally long-					
							period, 2.0-2.5 sec on the					
							short-period records. S is					
							very pronounced and of					
							simple appearance on long-					
							period records, and					

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

1963

Sep. 7 Up
cont.

microns sec

P Z' 0.3 1.5

M E 3.2 17

M N 4.7 14

M Z 5.4 17

D = 7650 km = 69°.

Ki i(P) 01 27 23.7

iP 01 27 26.1

i 01 27 33.6

ePa 01 31 27

eSS 01 40 10

microns sec

P Z' 0.3 1.1

M E 5.0 15

M N 4.1 12

M Z 7.9 13

Sk i(P) 01 27 57.2

iP 01 27 59.5

Gb iP 01 28 26.2 C

Um i(P) 01 27 38.6

iP 01 27 41.0 C

eS 01 36 26

eSS 01 40 38

D = 7350 km = 66°.

Sea of Japan (h = 30 km).

Magn. = 6.0 (Up, Ki).

The first P-phase, denoted

(P), precedes P by about

2.4 sec and is of much

smaller amplitude, probably

a foreshock.

" 7 Ka iPKP 02 49 15.8 C
Tonga Islands (h = 30 km).

" 7 Ki eSn 05 23 15
iSg 05 23 32.6

D = 480 km = 4.3°.

Sk eSg 05 26 10

Um iSn 05 23 59.4

iSg 05 24 38.9

D = 690 km = 6.2°.

Northwest Russia,

67.8°N, 31.9°E.

Origin time = 05 21 14.

Explosion?

" 7 Up iP 07 24 38.6

microns sec

P Z' 0.1 0.8

M E 0.6 15

M N 1.4 18

M Z 1.2 19

Ki iP 07 23 52.8

iPcP 07 24 36.0

microns sec

P Z' 0.1 1.0

1963

Sep. 7 Ki
cont.

microns sec

M E 1.1 15

M N 0.8 18

M Z 1.9 15

Sk iP 07 24 28.2

Gb iP 07 25 00.1

Um iP 07 24 13.2 C

Ka iP 07 25 02.0

Kurile Islands (h = 30 km).

Magn. = 5.8 (Up, Ki).

" 7 Up iP 09 02 53.8
i(S) 09 12 20

microns sec

P Z' 0.1 1.3

M E 2.0 21

M N 1.9 23

M Z 3.8 25

Ki iP 09 03 24.5 C

eSKS 09 13 41

microns sec

SKS N 0.5 10

M E 3.0 19

M N 1.2 17

M Z 2.0 17

Sk eP 09 02 57

Gb eP 09 02 24

Um iP 09 03 01.8

iSKS 09 13 08

Ascension Island

(h = 30 km).

Magn. = 5.7 (Up, Ki).

" 7 Up iP 12 54 16.4 C

microns sec

P Z' 0.1 0.6

M E 0.6 21

M N 1.1 21

M Z 1.7 21

Ki iP 12 53 20.9

i 12 53 22.5

microns sec

P Z' 0.2 1.0

M E 0.8 19

M N 0.5 18

Sk iP 12 53 59.5

Gb iP 12 54 37.8

Um iP 12 53 47.3

Ka iP 12 54 41.7

i 12 55 23.1

Kamchatka (h = 110 km).

Magn. = 6.2 (Up, Ki).

" 7 Ki iP 18 26 36.8 D

" 7 Up iP 22 13 10.7 C

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

1963
Sep. 7 Up microns sec
cont. P Z' 0.2 0.8
Ki iP 22 12 37.8 C
microns sec
P Z' 0.1 0.8
Sk iP 22 13 07.0 C
iPP 22 16 08.9
Gb iP 22 13 29
Um iP 22 12 52.1 C
Ka iP 22 13 27 C
i 22 13 48
Bonin Islands (h = 50 km).
Magn. = 5.9 (Up, Ki).
" 8 Up iPKP 01 07 03.6 C
microns sec
PKP Z' 0.1 0.9
M N 1.0 20
M Z 1.3 20
Ki ePKP 01 06 50
eSS 01 28 07
microns sec
M E 0.5 16
M N 0.6 19
M Z 1.2 19
Sk iPKP 01 06 55.2 C
Gb iPKP 01 07 14 C
Um iPKP 01 06 53.9
iPKS 01 10 34
eSS 01 28 35
Ka iPKP 01 07 17
i 01 07 29
Kermadec Islands
(h = 60 km).
" 8 Ki eSn 04 53 10
iSg 04 53 31.0
Um iSg 04 54 25.9
Northwest Russia.
Explosion?
" 8 Up iSKP 05 55 09.8
Ka iPKP 05 51 42 D
Fiji Islands (h = 280 km).
" 8 Um iP 13 25 12.3
" 8 Up iPKP 13 26 11.2
Kermadec Islands
(h = 30 km).
" 8 Um iP 17 11 06.9 D
" 8 Up iPKP 20 08 54.3 PO"D
i 20 09 37.1
iSKP 20 11 46.6
iPKS 20 12 36

1963
Sep. 8 Up microns sec
cont. PKP Z' 0.4 0.7
SKP Z' 0.2 1.0
Ki e(PKP) 20 08 35 PO"
i 20 08 36.8 P1"
iPKP 20 08 45.6 P"
iSKP 20 11 24.7
microns sec
PKP Z' 0.1 0.9
SKP Z' 0.3 1.3
Sk i(PKP) 20 08 47.6 PO"D
iPKP 20 08 56.3 P"
iSKP 20 11 40.1
Gb iPKP 20 09 05.4 P"C
i 20 09 07.4
i 20 10 08.4
ipPKP 20 11 12.1
iSKP 20 11 56.1
Um iPKP 20 08 42.5 PO"
iSKP 20 11 35.0
iPKS 20 12 27
i 20 14 30
Ka iPKP 20 09 07.1 P"C
i 20 09 09.1
ipPKP 20 11 17.1
iSKP 20 11 57.3
Fiji Islands. h = 560 km
(Gb, Ka).
Another example of multiple
PKP-phases; the notation
after Payo Subiza & Båth
(Geophys. Journ., in press)
being indicated to the right
of resp. times. Note that
PO" seems to have dilatation,
but P" compression.
" 8 Up iPKP 23 45 43.4
Sk ePKP 23 45 39
Um iPKP 23 45 33.3
Kermadec Islands
(h = 310 km).
" 9 Up iPKP 03 04 23.2
iSKS 03 11 11
ePKKP 03 15 00
eSS 03 21 01
microns sec
M E 1.4 19
M N 3.3 18
M Z 2.9 18
(D = 12800 km = 115°).
Ki iPKP 03 04 13.8
i 03 07 34.7
ipKKP 03 15 22.0
i 03 15 30.4

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

1963

Sep.	9	Ki		meters	sec
cont.		M	E	3.7	20
		M	N	2.9	20
		M	Z	5.5	18
				(D = 12100 km = 109°).	
	Sk	iPKP		03 04	22.9
		iPKKP		03 15	04.5
	Gb	iPKP		03 04	35.4
	Um	iPKP		03 04	16.7
		iPP		03 04	58
		iPKKP		03 15	19.6
		eSS		03 20	35
	Ka	iPKP		03 04	34.6
		ePKKP		03 14	58
	New Britain			(h = 30 km).	
	Magn.	= 6.2	(Up, Ki).		

" 9 Ki iP 12 34 09.0
Mariana Islands
(h = 80 km).

" 9 Up ePKP 21 30 51
Um iPKP 21 30 39.3 C
Kermadec Islands
(h = 30 km).

"	9	Up	iP	21 50 03.3	C
		Ki	iP	21 50 13.0	
		Sk	eP	21 50 29	
		Um	iP	21 50 02.2	
		West Pakistan (h = 30 km).			

" 9 Sk e(P) 22 25 46

" 10 Ki iPKP 01 28 35.5
Sk ePKP 01 28 46
Um ePKP 01 28 44
New Hebrides Islands:
(h = 60 km).

" 10 Ki iPn 06 38 04.6
iSn 06 38 59.3
i 06 39 17.6
iSg 06 39 22.5
D = 490 km = 4.4°.

Sk	eSg	06 41 52
Um	iSn	06 39 45.4
	iSg	06 40 23.2
D = 700 km =		6.3°.

Northwest Russia,
67.9°N, 32.0°E.
Origin time = 06 36 56.
Explosion?

"	10	Up	iPKP	06 43 39.4
				microns sec
			PKP	Z' 0.1 0.8

1963

Sep. 10	Ki	iPKP	06 43 29.0
cont.	Sk	ePKP	06 43 33
	Gb	iPKP	06 43 48.0
	Ka	iPKP	06 43 49.2
	Fiji Islands (h = 520 km).		

" 10 Ki iP 11 38 51.0 C
Kenai Peninsula
(h = 30 km).

"	10	Up	iP	13 14	20.5
		Ki	iP	13 15	32.0
		Sk	iP	13 15	06.2 C
		Dodecanese Islands			
		(h = 50 km).			

"	10	Up	iP	17 11 56.7
		Ki	iP	17 11 04.0

		microns sec		
	P	Z'	0.1	1.1
Sk	iP	17	11	32.4
Gb	iP	17	12	07.8
Um	iP	17	11	25.1
	i	17	11	31.0
	i	17	11	42.5
Alaska (h = 30 km).				

"	10	Up			---
				microns	sec
		M	E	0.6	21
		M	N	2.0	24
		M	Z	2.1	25
	Ki	iPKP		19 33	30.4
		ePKS		19 36	51

		microns	sec
	PKS	N 0.3	9
	M	E 1.2	21
	M	N 1.0	22
	M	Z 2.4	23
Um	iPKP	19 33	37.5
	ePP	19 36	08
	iPKS	19 37	13
Tonga Islands	(h = 30 km).		
Magn.	= 5.9 (Up, Ki).		

" 11 Up iP 02.19 50.8
Ki iP 02.19 12.7
Idaho (h = 15 km).

"	11	Ki	i(P)	12 49	41.1
		Um	i(P)	12 51	39.8
			i	12 51	51.5

"	11	Ki	i(P)	17 16 19.6
		Um	e(P)	17 16 07
			i	17 16 19.3

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

1963					1963				
Sep.	11	Up	iPKP	22 40 17.0	Sep.	13	Up	iP	17 11 49.1 C
			i	22 40 25.6					microns sec
			i	22 41 09.5			P	Z' 0.2	0.8
		Ki	iPKP	22 39 56.5		Ki	iP	17 11 15.0 C	
		Sk	iPKP	22 40 12.6					microns sec
		Gb	iPKP2	22 40 44			P	Z' 0.3	1.0
		Um	iPKP	22 40 07.7 C		Sk	iP	17 11 22.8 C	
		Kermadec Islands				Gb	iP	17 11 48.6 C	
		(h = 20 km).				Um	iP	17 11 33.9 C	
"	12	Ki	iPKS	03 34 23.6		Ka	iP	17 12 01.6 C	
				microns sec		Nevada. Underground nuclear explosion.			
			PKS	Z' 0.1 1.2		This test would most likely provide the most reliable and complete check so far available of P-wave travel times to large distances.			
		Um	iPKP	03 31 00.6					
			iPKS	03 34 31.4					
		Loyalty Islands							
		(h = 50 km).							
"	12	Up	iP	08 24 33.8	"	13	Up	iP	19 05 33.7
			i	08 24 35.9					
			eS	08 29 13	"	13	Up	iPKP	21 29 42.4
				microns sec			Um	iPKP	21 29 32.2
			P	Z' 0.1 0.7		Kermadec Islands.			
			M	E 0.4 12					
			M	N 0.8 13	"	13	Up	iPKP	21 30 46.5
			M	Z 0.8 13		Sk	ePKP	21 30 43	
			D = 2950 km = 26 ¹⁰ / ₂ .			Um	iPKP	21 30 37.4	
		Ki	iP	08 25 34.1 C		Kermadec Islands (h = 30 km).			
				microns sec					
			P	Z' 0.1 1.0	"	13	Up	iP	23 12 37.7 C
			M	E 0.6 15					microns sec
			M	N 0.4 13			P	Z' 0.1	0.8
			M	Z 0.9 13		³ Ki	iP	23 11 44.5 C	
		Sk	iP	08 25 14.0 C					microns sec
		Gb	iP	08 24 33.7 C			P	Z' 0.1	1.2
		Um	iP	08 25 00.2 C		Sk	iP	23 12 16.2	
		Ka	iP	08 24 09 C		Gb	iP	23 12 51.8 C	
		Cyprus (h = 60 km).				Um	iP	23 12 10.6	
		Magn. = 5.6 (Up, Ki).				Aleutian Islands (h = 220 km).			
"	12	Up	iP	10 10 35.3 C		Magn. = 5.6 (Up, Ki).			
		Um	iP	10 10 09.9					
		Kurile Islands (h = 60 km).			"	13	Up	iPKP2	23 53 29.6
"	12	Up	iP	13 21 00.3			Um	iPKP	23 53 09.4 C
		Ki	iP	13 21 32.5		Kermadec Islands (h = 15 km).			
		Gb	iP	13 20 31.7					
		Um	iP	13 21 19.8	"	14	Up	ePKP2	00 57 56
		North Atlantic Ocean					Um	iPKP	00 57 35.0
		(h = 30 km).					i	00 57 45.1	
"	12	Up	iP	20 48 09.6 C		Kermadec Islands (h = 30 km).			
"	13	Ki	iP	11 03 45.4 C	"	14	Up	iP	02 25 29.7 C
		Mexico (h = 30 km).							

Up = Uppsala, Ki = Kiruna, Sk = Skalistugan, Gb = Göteborg, Um = Umeå
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1963				1963			
Sep.	14	Up	microns sec	Sep.	14	Ka	iSg 12 35 34.3
cont.		P	Z' 0.1 0.9	cont.			D = 330 km = 3.0°.
		Ki	iP 02 25 07.5 C				South coast of the Baltic,
			microns sec				near Kaliningrad,
		P	Z' 0.1 1.0				54.6°N, 20.1°E.
		Gb	iP 02 25 47.1 C				Origin time = 12 33 57.
		Um	iP 02 25 14.6 C				Explosion?
		Ka	iP 02 25 40.4 C				
		Formosa (h = 90 km).					
		Magn. = 5.6 (Up,Ki).					
"	14	Up	iPKP 04 12 05.6	"	14	Up	iPg 13 49 16.0
			microns sec				iSg 13 50 26.3
		PKP	Z' 0.1 1.0				D = 610 km = 5.5°.
		M	E 1.4 19			Ka	eP* 13 48 19
		M	N 3.9 21				iPg 13 48 25.4
		M	Z 3.4 21				iSn 13 48 50.9
		Ki	iPKP 04 11 47.3				iSg 13 49 04.2
			microns sec				D = 330 km = 3.0°.
		M	E 2.5 23				South coast of the Baltic,
		M	N 1.4 21				near Kaliningrad,
		M	Z 3.4 22				54.6°N, 20.1°E.
		Sk	iPKP 04 11 59.7 C				Origin time = 13 47 26.
		Gb	iPKP 04 12 10.6				Explosion?
		Um	iPKP 04 11 51.0				
			i 04 11 54.7				
		Ka	ePKP 04 12 15				
		Kermadec Islands					
		(h = 30 km).					
		Magn. = 6.2 (Up,Ki).					
"	14	Um	iP 06 55 43.1	"	14	Up	iPg 15 43 04.7
		Japan (h = 50 km).					iSg 15 44 16.3
							D = 610 km = 5.5°.
"	14	Up	iP 07 29 16.0			Ka	iP* 15 42 07
			microns sec				iPg 15 42 15
		P	Z' 0.1 0.7				iSn 15 42 43
		Ki	iP 07 28 48.8				iSg 15 42 54
			microns sec				D = 330 km = 3.0°.
		P	Z' 0.3 1.0				South coast of the Baltic,
		Sk	iP 07 29 13.4				near Kaliningrad,
		Um	iP 07 29 00.3				54.6°N, 20.1°E.
		Ka	iP 07 29 30.1				Origin time = 15 41 16.
		Mariana Islands					Explosion?
		(h = 610 km).					This and the two preceding
		Magn. = 6.2 (Up,Ki).					events are characterized
							by an unusual property: Pg
							has much larger amplitudes
							than Sg, which is probably
							due to source properties.
"	14	Um	iP 09 38 55.2 C	"	15	Up	iPKP 01 05 58.1
		Volcano Islands					iPP 01 07 40
		(h = 40 km).					iPKS 01 09 38
							iPPP 01 10 17
							iSKKS 01 14 37
							i 01 17 20
							iSKSP 01 17 41
							microns sec
							PKP Z' 0.2 1.3
							PP Z 5.4 7
							M E 47 21
							M N 110 23
							M Z 120 23
							(D = 13900 km = 125°).
"	14	Up	iPg 12 35 46.2				
			iSg 12 36 56.5				
			D = 610 km = 5.5°.				
		Ka	eP* 12 34 49				
			iPg 12 34 55.9				

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

1963

Sep. 15 Ki iPKP 01 05 42.2
cont. i 01 06 27
iPP 01 06 54
iPKS 01 09 18
iSKKS 01 13 55
iPKKP 01 16 04.8
iSKSP 01 16 35
i 01 16 44
microns sec
PKP Z' 0.1 1.2
PP Z 12 9
PKS Z 15 9
M E 70 22
M N 44 19
M Z 140 24
(D = 13100 km = 118°),
Sk iPKP 01 05 55.7
Gb iPKP 01 06 03
i 01 06 12
i 01 06 18
iPP 01 08 08
Um iPKP 01 05 45.4
i 01 05 50.9
i(PP) 01 07 12
iSKKS 01 14 15
i(PS) 01 16 59
Ka iPKP 01 06 13
Santa Cruz Islands
(h = 40 km).
Magn. = 7.5 (Up, Ki).
" 15 Um iPKP 02 21 40.8
Kermadec Islands
(h = 30 km).
" 15 Ki iP 22 12 26.7 D
Alaska (h = 120 km).
" 16 Up iP 00 18 41.3 C
Ki iP 00 18 24.3 C
Um iP 00 18 26.7 C
Formosa (h = 30 km).
" 16 Um iP 06 46 18.6
Sea of Okhotsk (h = 430 km).
" 16 Ki iP 16 17 30.4
i 16 18 33.9
iS 16 19 38.9
D = 1300 km = 113°.
Sk iP 16 18 24.9
Gb eP 16 19 33
Um iP 16 18 24.5
Svalbard (h = 30 km).
" 16 Up iSg 18 15 11.7

1963

Sep. 16 Ka iPg 18 12 58
cont. iSg 18 13 08
South Baltic. Explosion?
" 16 Um iPKP 20 24 18.1
Santa Cruz Islands
(h = 30 km).
" 16 Up iP 23 16 59.8
" 17 Up iPKP 19 39 08.6
iPP 19 40 48.4
i 19 50 25
iSKSP 19 50 49
microns sec
PKP Z 1.0 4
PKP Z' 0.8 2.0
PP E 1.5 10
PP N 2.4 6
PP Z 13 15
PP Z' 0.3 2.0
M E 67 21
M N 160 23
M Z 180 22
(D = 13900 km = 125°).
Ki eP 19 35 25
iPKP 19 38 57.6 C
iPP 19 40 03.5
iPKKP 19 49 24.1
iSKSP 19 49 53
microns sec
P Z 1.1 7
PKP Z 1.7 5
PKP Z' 0.5 2.0
PP E 2.9 8
PP N 2.4 7
PP Z 9.2 8
M E 100 23
M N 92 22
M Z 140 22
(D = 13100 km = 118°).
Sk iPKP 19 39 09.1
Gb iPKP 19 39 14.3
iPP 19 41 14.5
i 19 42 17.8
Um iP 19 35 36
iPKP 19 38 58.8
i 19 39 03.7
iPP 19 40 37.0
e 19 42 00
i(PS) 19 50 13
Ka iPKP 19 39 20.5
iPP 19 41 33.1
Santa Cruz Islands
(h = 15 km).
Magn. = 7.5 (Up, Ki).

1963				microns		sec	
Sep.	18	Up					
cont.			M	E	54	17	
			M	N	66	16	
			M	Z	60	16	
			D = 2200 km = 20°.				
		Ki	iP		17 03	57.3	
			i		17 06	09	
			iS		17 08	36	
			iSa		17 09	07	
			eLi		17 11	50	
			iLg1		17 12	27	
					microns		sec
			P	N	1.3	14	
			P	Z	2.4	13	
			P	Z'	0.4	1.2	
			S	E	3.1	11	
			S	N	23	20	
			M	E	67	13	
			M	N	43	17	
			M	Z	52	15	
			D = 3050 km = 27½°.				
		Sk	iP		17 03	33.1	
			i		17 03	44.2	
			iLg1		17 11	00.5	
		Gb	iP		17 02	45.7	
			i		17 02	55.3	
		Um	iP		17 03	21.5	C
			iS		17 07	33	
		Ka	iP		17 02	20	
			i		17 02	28	
			iLg2		17 08	14	
		Turkey (h = 30 km).					
		Magn. = 6.1 (Up, Ki).					
		The phase arriving 8-11 sec after P is of much larger amplitude than P (Sk, Gb, Ka).					
		This earthquake would probably provide a good opportunity to collate methods of fault-plane solutions based on P and on S, because the S-waves are of simple appearance and very well developed.					
"	19	Gb	iPKP		09 18	08.9	D
		Fiji Islands (h = 560 km).					
"	19	Up	iP		23 52	06.4	
		Sk	iP		23 52	50.2	C
		Um	iP		23 52	48.9	C
		Greece.					
"	20	Up	iP		03 07	29.8	

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

1963										1963									
Sep.	20	Ki								Sep.	22	Um	iP		03 36 24.7 C				
cont.										cont.		Ka	iP		03 36 34.4				
		M	E	2.7	24							Hindu Kush	(h = 150 km).						
		M	N	1.4	19					"	22	Up	iP		10 48 26.9 C				
		Sk	iP		03 06 38.4							Gb	iP		10 48 41.6				
		Gb	iP		03 07 54.3							Um	iP		10 48 40.2				
		Um	iP		03 06 41.7							Iran	(h = 30 km).						
		Ka	eP		03 08 09					"	22	Gb	iP		12 34 13.5				
		Svalbard	(h = 30 km).							"	22	Um	iPKP		19 41 08.5				
"	20	Um	iP		10 30 17.6							Tonga Islands	(h = 25 km).						
"	20	Um	iP		11 33 52.5					"	22	Up	iP		22 37 06.8 C				
"	20	Sk	e(P)		14 27 51							Sk	iP		22 37 46.4 C				
"	20	Sk	iP		19 15 48.0 C							Gb	iP		22 36 57.3 C				
		Molucca Sea	(h = 100 km).									Um	iP		22 37 44.5				
"	21	Up	iP		00 51 11.2							Ka	iP		22 36 28.9 C				
		i			00 51 15.2					"	23	Up	iP		00 04 38.3 D				
		Sk	iP		00 51 22.8 C							i			00 04 44.1				
		Tsinghai	(h = 30 km).							"	23	Up	ePKP		02 04 17				
"	21	Up	iP		03 21 56.3 C							Sk	iPKP		02 04 10.5 C				
"	21	Up	iP		18 35 32.4							Um	iPKP		02 04 04.5				
		i			18 35 35.6							(Kermadec Islands).							
		Gb	eP		18 35 47					"	23	Up	iP		06 52 25.6 D				
		i			18 35 55.1							Um	iP		06 52 46.2				
		Um	iP		18 35 18.8							Ka	iP		06 52 04.7				
		Ryukyu Islands	(h = 30 km).									Rhodesia	(h = 30 km).						
"	21	Up	eP		20 41 14					"	23	Up	iP		09 13 45.9 D				
"	22	Up	iP		02 59 48.9 D							eS			09 23 33				
		ipP			03 00 16.1														
		P	Z'	0.1	0.8														
		Gb	iP		03 00 04.5														
		Um	iP		02 59 22.2														
		Ka	iP		03 00 13.0														
		Aleutian Islands.																	
		h = 110 km	(Up).																
"	22	Up																	
		M	E	1.4	24														
		M	N	2.1	21														

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

1963					1963				
Sep.	23	Um	iP	09 18 49.7 C	Sep.	24	Up	iP	09 25 26.8
"	23	Um	iP	14 53 56.1				P	microns sec
				California (h = 15 km).			Sk	eP	Z' 0.1 1.0
"	23	Up	iP	15 14 12.8			Um	iP	09 25 48
		Sk	iP	15 14 41.2			Ka	iP	09 25 47.3
		Um	iP	15 14 33.1					09 25 05 C
		i		15 14 37.6					Rhodesia (h = 30 km).
				Rhodesia (h = 30 km).	"	24	Up	iP	09 41 15.0 C
"	23	Up	iP	17 13 34.8	"	24	Up	iP	16 44 05.6 C
				microns sec			i		16 47 38.7
		P		Z' 0.1 0.5			iSKS		16 54 34
		Sk	iP	17 13 15.3 D			iS		16 55 42
		Um	iP	17 13 08.9					microns sec
		Ka	iP	17 13 57 D			P		Z' 0.3 1.5
		i		17 14 05			SKS	E	2.7 10
				Aleutian Islands			S	N	1.4 9
				(h = 30 km).			M	E	4.0 23
"	23	Up	iP	18 40 59.1			M	N	7.2 22
		Ka	iP	18 40 45			M	Z	17 27
				Persian Gulf (h = 40 km).					(D = 11650 km = 105°).
"	23	Up	iP	22 35 27.1 D			Ki	ePKP	16 48 18
				microns sec			iSKS		16 54 44
		P		Z' 0.1 1.2			eS		16 55 49
		Um	iP	22 35 47.8 D			iSP		16 57 28
		Ka	iP	22 35 05					microns sec
				Rhodesia (h = 30 km).			PKP	E	0.7 7
"	23	Um	iP	22 48 23.9			PKP	Z	1.5 5
"	24	Up	iP	02 15 18.7 C			SKS	E	5.9 11
		iPP		02 15 41.0			SKS	N	1.0 9
		iS		02 19 00.5			S	N	1.0 7
		eSS		02 19 36			M	E	11 24
		iLg1		02 21 11			M	N	6.2 23
		iLg2		02 21 38			M	Z	12 23
				microns sec					(D = 11650 km = 105°).
		M	E	1.1 10			Sk	iP	16 43 54.9 C
		M	N	1.6 16			iPP		16 47 57.0
		M	Z	1.4 15			Gb	iP	16 43 50.4
				D = 2200 km = 20°.			i		16 43 53.3
Ki				---			Um	iP	16 44 10.2
				microns sec			iPKP		16 48 18.2
		M	E	1.9 16			eSKS		16 54 40
		M	N	1.3 18			Ka	iP	16 43 53.0
		M	Z	2.0 17			i		16 47 15.2
Sk	iP			02 16 06.3					Peru (h = 80 km).
Gb	iP			02 15 17.0 C					Magn. = 6.6 (Up, Ki).
Um	iP			02 15 53.4	"	24	Sk	eP	17 00 12
	iS			02 20 14.2	"	25	Um	iP	01 00 10.0
Ka	iP			02 14 48					Honduras (h = 30 km).
				Turkey (h = 30 km).	"	25	Up	iP	07 15 44.3 D
									microns sec
							P		Z' 0.1 0.5

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

1963				1963			
Sep.	25	Ki	----	Sep.	26	Up	iPg 10 42 14.6 C
cont.			microns sec				iSg 10 42 16.1
		M	E 1.2 18				Probably local explosion.
		M	N 0.4 13				The appearance of these
		M	Z 0.8 13				local explosions is quite
		Sk	eP 07 16 07				different from the two
		Um	iP 07 16 04.6 D				reported for Sep. 25. The
			eS 07 26 13				periods for the explosions
		Ka	iP 07 15 20.0				on Sep. 26 are shorter,
		Rhodesia	(h = 30 km).				around 0.4 sec.
"	25	Up	i(P) 12 09 48.9	"	26	Up	iP 22 40 01.8 C
			microns sec				
			(P) Z' 0.1 0.7				
			Probably local explosion.				
"	25	Up	i(P) 12 27 12.4	"	27	Up	eP 12 28 38
			microns sec				
			(P) Z' 0.1 0.7				
			Probably local explosion.				
"	25	Up	iP 21 37 08.7 C	"	27	Um	iP 16 37 49.4 D
							Japan (h = 80 km).
"	26	Up	iP 04 30 52.2	"	27	Sk	iP 17 18 14.7 C
		Sk	iP 04 30 25.4 D				West Pakistan (h = 90 km).
		Um	iP 04 30 27.3 D				
		Kodiak Island	(h = 30 km).				
"	26	Up	iP 05 39 14.8 D	"	28	Up	iPKP 07 17 07.2 D
		ipP	05 39 28.1				i 07 17 14.0
			microns sec				microns sec
		P	Z' 0.7 0.8				PKP Z' 0.1 0.5
		Sk	iP 05 38 53.9			Sk	iPKP 07 17 01.9
		Gb	iP 05 39 30.8			Gb	iPKP 07 17 15.3
			i 05 39 31.5			Um	iPKP 07 16 56.8
			ipP 05 39 43.5				Kermadec Islands
		Um	iP 05 38 46.1				(h = 460 km).
			ipP 05 39 00.7	"	28	Up	iP 18 55 24.9
			eS 05 47 32			Ki	iP 18 55 23.7
		Aleutian Islands.					Sumatra (h = 30 km).
		h = 50 km (Up,Gb,Um).		"	29	Ki	iPg 04 59 11.3
"	26	Um	iP 06 07 27.1				iSn 04 59 38.4
							iSg 04 59 50.8
"	26	Up	iP 06 51 13.2				D = 330 km = 3.0°.
		Sk	iP 06 50 46.2 C			Um	eSg 05 00 27
		Kodiak Island	(h = 30 km).				North Finland?
"	26	Um	iP 07 02 23.8	"	29	Ki	eSn 05 19 27
							iSg 05 19 48.7
"	26	Up	iPg 09 45 03.1 C			Um	eSg 05 20 37
			iSg 09 45 04.6				Northwest Russia. Explosion?
			Probably local explosion.	"	29	Up	iPKP 10 26 10.6 C
"	26	Up	iPg 10 04 49.7				Kermadec Islands
			iSg 10 04 51.2				(h = 120 km).
			Probably local explosion.	"	29	Up	iP 10 47 19.9 C

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

1963					1963				
Sep.	29	Ki	iP	10 47 29.1 C	Sep.	29	Um	iP	22 22 24.2
cont.		Um	iP	10 47 18.3 C	cont.			i	22 22 33.3
				Hindu Kush (h = 210 km).				iS	22 27 06
"	29	Up	iP	13 41 01.6					Ionian Sea (h = 50 km).
			iPP	13 41 27.0					Magn. = 5.6 (Up, Ki).
				microns sec	"	29	Sk	iP	22 56 25.0
		M	E	1.8 19			Um	iP	22 56 40.8
		M	N	1.8 18					Guatemala (h = 60 km).
		Ki	iP	13 42 08.0 D	"	30	Ki	iP	03 59 30.3
				microns sec					Colombia (h = 30 km).
		P	Z'	0.1 1.0					
		M	E	1.1 10					
		Sk	iP	13 41 45.9					
		Um	iP	13 41 28.1					
				Turkey (h = 30 km).					
"	29	Up	eP	14 21 44					Markus Båth
				microns sec					March 20, 1964
		P	Z'	0.1 1.3					
"	29	Up	iP	15 39 08.2					
		Ki	iP	15 39 15.3					
		Sk	iP	15 39 33.5 C					
		Um	iP	15 39 05.2 C					
			iPP	15 40 40.3					
				Hindu Kush (h = 150 km).					
"	29	Up	iP	19 40 51.5					
		Ki	iP	19 41 22.5					
				Arabian Sea (h = 30 km).					
"	29	Ki	iP	19 47 53.5					
				Mindanao (h = 120 km).					
"	29	Ki	iP	20 42 52.2					
		Um	iP	20 43 04.8					
				Volcano Islands					
				(h = 330 km).					
"	29	Up	iP	22 21 48.0 C					
			i	22 21 56					
			iS	22 26 07					
				microns sec					
		P	Z'	0.2 1.0					
		S	E	1.0 5					
		S	N	1.0 4					
		M	N	1.1 18					
		M	Z	1.4 18					
				D = 2650 km = 24°.					
		Ki	iP	22 23 00.2 C					
				microns sec					
		P	Z'	0.2 1.0					
		Sk	iP	22 22 23.5 C					
		Gb	iP	22 21 32.6					

P R E L I M I N A R Y

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

O C T O B E R 1 - 31, 1963
.....

1963					1963				
Oct.	1	Up	iP	05 12 39.3	Oct.	2	Up	iP	21 10 33.4 C
		Ki	eP	05 12 30					microns sec
		Sk	iP	05 12 31.6			P	Z'	0.1 0.5
		Mariana Islands (h = 230 km).					M	N	0.7 14
"	1	Ki	iP	05 13 42.5			M	Z	0.6 13
				microns sec		Ki	iP	21 11 42.7 C	
		P	Z'	0.2 2.0				microns sec	
		Um	iP	05 14 26.5			M	E	0.4 15
		Arctic Ocean (h = 30 km).					M	N	0.5 14
"	1	Up	iP	17 26 58.3			M	Z	1.0 14
		Ki	iP	17 28 12.2		Sk	iP	21 11 12.1 C	
		Sk	iP	17 27 37.0 C		Gb	iP	21 10 23.0 C	
		Greece (h = 110 km).				Um	iP	21 11 07.0	
"	1	Up	iP	20 36 59.9		Crete (h = 70 km).			
"	2	Up	iP	03 27 02.9	"	3	Up	iSg	02 08 19.3
"	2	Up		---		Ki	iPn	02 06 18.9	
				microns sec			iPg	02 06 27.1	
		M	E	0.8 20			iSg	02 07 07.1	
		M	N	1.2 20			D = 330 km = 3.0°.		
		M	Z	1.6 20		Sk	e	02 07 41	
		Ki	eSS	06 26 23			iSg	02 07 52.4	
				microns sec		Um	iPg	02 05 55.4 C	
		M	E	1.1 20			iSg	02 06 13.8	
		M	N	0.9 19			i	02 06 20.8	
		M	Z	2.1 20			D = 160 km = 1.4°.		
		Um	iPKP	06 06 45.2		Gulf of Bothnia,			
		ePKS		06 10 11		65.0°N, 22.2°E.			
		Tonga Islands (h = 30 km).				Origin time = 02 05 28.			
		Magn. = 5.7 (Up, Ki).			"	3	Up	iP	05 44 08.8
"	2	Um	iP	15 39 43.8 D		Ki	iP	05 43 46.0	
						Um	iP	05 43 54.0 C	
						Taiwan (h = 60 km).			
"	2	Um	i(P)	12 14 08.5 D	"	3	Um	i(P)	12 14 08.5 D

Up - Uppsala, Ki - Kiruna, Sk - Skalistugan, Gb - Göteborg, Um - Umeå
Ka - Karlskrona

1963
Oct. 3 Up iPKP 16 07 13.0 C
microns sec
M E 0.8 20
M N 1.9 19
M Z 2.0 21
Ki iPKP 16 07 25.1
iPKS 16 10 48
microns sec
PKS E 0.4 7
PKS N 0.3 6
M E 1.4 21
M N 1.3 20
M Z 2.3 21
Um ePKP 16 07 17
Sandwich Islands
(h = 50 km).
Magn. = 5.9 (Up, Ki).
" 3 Up iP 23 36 05.5 C
iS 23 45 32
i 23 46 02
iLi 00 00 20
i 00 02 02
iLgl 00 02 48
microns sec
P E 0.2 3
P N 0.3 3
P Z 0.7 3
P Z' 0.4 1.5
S E 1.1 6
M E 12 19
M N 25 19
M Z 27 17
D = 8150 km = 73¹⁰.
Ki iP 23 35 30.6 C
i(pP) 23 35 41.6
eS 23 44 26
iLi 23 58 24
eLgl 00 00 35
microns sec
P E 0.6 7
P N 0.3 5
P Z 1.4 8
P Z' 0.9 2.5
S E 1.5 6
S N 0.8 9
M E 30 18
M N 17 17
M Z 37 17
D = 7550 km = 68⁰.
Sk iP 23 36 03.9
Gb iP 23 36 25.7
i(pP) 23 36 37.8
Um eP 23 35 45 C
i(pP) 23 35 56.8
iPP 23 38 20
iPa 23 40 09

1963
Oct. 3 Ka iP 23 36 32
Japan (h = 30 km).
Magn. = 6.4 (Up, Ki).
The higher modes (or channel waves) are very well developed (Up, Ki). This demonstrates that the Korea Peninsula is a good transmitter of these waves, whereas they are usually blocked by the Japanese Sea. P(Z') exhibits unusually long periods; may be an interesting case for spectral analysis!
" 4 Ki iP 00 38 49.2
Japan (h = 20 km).
" 4 Up eL 04 01
microns sec
M N 1.0 20
M Z 1.0 20
Ki eL 03 58
microns sec
M E 0.7 19
M N 0.5 20
M Z 1.0 20
Tonga Islands (h = 30 km).
" 4 Ki i(Sg) 05 18 22.9
Um i(P) 05 19 57.0 C
" 4 Sk iP 08 47 20.9
Mexico (h = 40 km).
" 4 Up iP 13 38 49.7
Ki iP 13 39 19.3
microns sec
M E 0.6 15
M N 0.4 15
Sk iP 13 39 20.1
Um iP 13 39 00.3
Arabian Sea (h = 30 km).
" 4 Ki e 15 57 13
i 15 57 31.3
eSg 15 57 47
" 4 Up iP 17 06 46.3
i 17 07 05.1
Ki iP 17 07 54.4
Sk eP 17 07 23
Crete (h = 30 km).
" 4 Ki iP 21 17 32.8

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

1963					1963				
Oct.	4	Ki	i(P)	22 51 02.9	Oct.	5	Sk	iP	15 07 29.7
			Seismic?		cont.		Gb	eP	15 06 56
"	5	Ki	iPKP	02 14 31.7			Um	iP	15 07 08.4
			Tonga Islands (h = 80 km).				ePP	15 09 21	
"	5	Up	i(P)	03 14 11.0			eS	15 14 55	
"	5	Up	iP	04 33 22.8			French Somaliland		
		Um	eP	04 32 52			(h = 30 km).		
			Japan (h = 30 km).		"	5	Up	iP	17 06 51.4
"	5	Up	iP	04 45 24.7				microns sec	
		Ki	iP	04 46 34.2			M	E	0.6 14
		Sk	iP	04 46 02.1			M	N	0.7 14
		Ka	iP	04 44 52			M	Z	0.9 15
			Crete (h = 30 km).			Ki	iP	17 07 29.5	
"	5	Ki	ePg	06 52 18				microns sec	
			eSn	06 52 40			M	E	0.8 14
			iSg	06 52 56.3			M	N	0.4 14
		Sk	i	06 53 01.6			M	Z	1.2 15
"	5	Up	iP	07 43 37.7 C			Um	iP	17 07 09.3 C
		Ki	iP	07 43 05.6			Rhodesia (h = 30 km).		
		Um	iP	07 43 20.1 C					
			Japan (h = 450 km).		"	5	Up	e(P)	18 20 17
"	5	Up	iP	09 21 15.9					
			microns sec		"	5	Up	iP	20 30 48.0 C
		P	Z' 0.1 1.1				Ki	iP	20 30 00.6
"	5	Up	iP	09 23 32.0				ipP	20 30 27.6
"	5	Up	iP	14 15 56.5 D			Aleutian Islands.		
"	5	Up	iP	15 06 56.3 C			h = 110 km (Ki).		
		eS	15 14 13		"	6	Up	iP	00 01 42.2
			microns sec				Ki	eP	00 00 51
		P	Z' 0.1 1.3				Kurile Islands (h = 50 km).		
		S	N 3.8 16		"	6	Ki	iSn	04 36 07.1
		M	E 2.9 17					iSg	04 36 27.2
		M	N 2.6 17				Sk	eSg	04 39 01
		M	Z 3.6 22				Probably northwest Russia.		
			D = 5800 km = 52°.				Explosion?		
		Ki	iP	15 07 40.3	"	6	Ki	iPg	05 35 56.8 C
			iPa	15 11 14				iSg	05 36 52.0
			iS	15 15 41				D = 470 km = 4.2°.	
			ePS	15 15 55			Sk	e(Sg)	05 39 45
			microns sec				Um	iSn	05 37 38.2
		P	Z' 0.1 1.5					eSg	05 38 10
		S	E 0.6 12				Northwest Russia,		
		M	E 4.3 17				69°N, 31½°E.		
		M	N 5.2 19				Origin time = 05 34 33.		
		M	Z 5.8 15				Explosion?		
			D = 6450 km = 58°.		"	6	Up	iP	17 44 33.1 D
					"	7	Sk	eP	12 32 32
					"	7	Up	iPKP	13 32 48.5

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

1963

Oct. 7 Up iSKP 13 35 40.1
cont. microns sec
PKP Z' 0.1 0.8
Ki ePKP 13 32 30
iSKP 13 35 18.9
microns sec
SKP Z' 0.2 1.5
Sk ePKP 13 32 45
eSKP 13 35 33
Gb iPKP 13 32 59.1
ipPKP 13 35 08.1
iSKP 13 35 48.3
Um iPKP 13 32 37.6
ipPKP 13 34 50.1
iSKP 13 35 29.4
Fiji Islands (h = 550 km).
At Ki, Um and Sk the times
for PKP above refer to weak
arrivals, followed within a
few seconds by stronger
phases. These weak arrivals
are missing at Up and Gb.

" 7 Up iP 23 44 02.1
i 23 44 25.5
microns sec
M E 2.0 18
M N 5.7 20
M Z 1.0 13
Ki iP 23 43 31.2 C
eLgl 00 01 42
microns sec
M E 1.0 14
M N 1.0 14
M Z 1.0 14
Sk iP 23 44 05.8
Um iP 23 43 42.1
Mongolia (h = 30 km).

" 8 Up ePKP 00 36 14
i 00 36 18.1
iPKS 00 39 44
microns sec
PKS N 0.5 6
M E 1.1 22
M N 2.8 23
M Z 2.2 22
(D = 15100 km = 136°).
Ki iPKP 00 36 02.8
i 00 36 21.7
e(PP) 00 37 56
e(PKS) 00 39 18
microns sec
(PP) Z 0.5 7
(PKS) N 0.3 7

1963

Oct. 8 Ki microns sec
cont. M E 2.2 20
M N 1.6 20
M Z 2.1 20
(D = 14200 km = 128°).
Sk ePKP 00 36 13
Um i(PKP) 00 36 01.1
iPKP 00 36 10.6
i 00 36 29.6
i(PP) 00 38 20
iPKS 00 39 32
e(PS) 00 48 18
Samoa Islands (h = 30 km).
Magn. = 6.1 (Up, Ki).

" 8 Up iP 03 01 09.4 D
ipP 03 01 35.8 C
microns sec
P Z' 0.1 0.6
pP Z' 0.1 0.6
Ki iP 03 00 59.8
ipP 03 01 26.2
microns sec
P Z' 0.1 1.0
Sk iP 03 01 23.7
ipP 03 01 50.0
Gb iP 03 01 30.7
ipP 03 01 57.2
Um iP 03 00 59.4 D
ipP 03 01 25.9 C
Assam. h = 110 km (Up, Ki,
Sk, Gb, Um).
The second phase, appearing
26.4 sec after P, is most
likely pP and not P of a
new shock. It has about the
same amplitude as P and
exactly opposite phase.
This entails a focal depth
of 110 km rather than 24 km
as given by USCGS.

" 8 Up iP 05 45 11.0
i 05 45 16.0
microns sec
P Z' 0.1 0.8
Ki iP 05 46 25.8
Sk iP 05 45 51.0
i 05 45 58.7
Um iP 05 45 50.3
Greece (h = 30 km).

" 8 Ki iP 10 57 50.4
i 10 57 54.4
i(SS) 11 01 58.9

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

1963

Oct. 8 Ki microns sec
cont. P Z' 0.1 0.8
Sk iP 10 58 50.5
i 10 59 57.8
Um iP 10 58 24.7
i 10 58 27.6
Kara Sea (h = 25 km).
The second phase (i at Ki
and Um) is of considerably
larger amplitude than iP.

" 8 Up i(Sg) 11 03 25.7
Sk e 11 05 10
i(Sg) 11 05 31.9
Um i(Pg) 11 03 32.3
i(Sg) 11 04 14.2
Central Baltic, southwest
of Finland.
Explosion?

" 9 Up iP 04 42 21.4 C
Ki iP 04 42 54.4 C
Ka iP 04 41 57 C
Turkey (h = 40 km).

" 9 Ki iPKP 05 32 36.5
Tonga Islands (h = 30 km).

" 9 Up iP 06 15 44.4 C
i 06 16 29.6

" 9 Sk iP 08 01 00.7 C

" 9 Up iP 20 41 08.4

" 9 Up eL 21 48
✓ microns sec
M N 4.4 26
M Z 5.3 23
Ki eL 21 53
microns sec
M E 3.0 25
M N 1.8 23

Longarone, Italy.
Magn. = 5.0 (Up, Ki).
Avalanche of soil into the
lake at the Vajont dam. No
short-period records
obtained, only remarkably
long-period Rayleigh waves
of relatively short
duration.

" 11 Um iSKP 00 22 30.1
Fiji Islands (h = 440 km).

1963

Oct. 11 Ki eL 10 58
microns sec
M E 1.0 16
M N 1.3 18
M Z 1.6 15
Mexico (h = 30 km).

" 11 Um iP 14 50 26.2
i 14 50 35.0

" 11 Up ^{Pg}i 16 40 27
iSg 16 41 06.4

microns sec
Sg Z' 0.2 0.5
Sk eSn 16 41 56
iSg 16 42 21.0
D = 550 km = 4.9°.
Gb iPg 16 40 01.6
iSg 16 40 15.8
D = 120 km = 1.1°.

Um iSg 16 42 58.0
Lake Vener, Sweden,
58.8°N, 13.0°E.
Origin time = 16 39 39.
Felt.

" 12 Ki iP 10 35 38.4
Aleutian Islands (h = 30 km).

" 12 Up iP 11 37 56.6 D
iPa 11 42 32
iS 11 46 55
i(ScS) 11 48 16

microns sec
P N 1.5 4
P Z 3.1 5
P Z' 0.4 0.6
S E 15 23
M E 57 20
M N 98 19
M Z 110 19
D = 7550 km = 68°.
Ki iP 11 37 09.9
i 11 39 01
iS 11 45 42
i 11 47 24
i 11 49 58
iP'P' 12 06 31.9

microns sec
P E 4.3 16
P N 3.3 16
P Z 12 17
P Z' 0.7 1.5
S E 18 19
S N 26 26

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

1963

Oct. 12 Ki microns sec
cont. P'P' Z' 1.8 3
M E 150 19
M N 88 19
M Z 140 19
D = 6850 km = $61\frac{1}{2}^{\circ}$.
Sk iP 11 37 45.5 D
i 11 38 29.6
Gb iP 11 38 17.4 D
Um iP 11 37 31.1 D
ePa 11 41 39
iS 11 46 01
i 11 46 45
Kurile Islands (h = 40 km).
Magn. = 6.8 (Up,Ki).
" 12 Up iP 11 52 36.6
microns sec
P Z' 0.1 0.8
Um iP 11 52 12.4
Kurile Islands (h = 40 km).
" 12 Up iP 12 03 58.0
Um iP 12 03 32.4
Kurile Islands (h = 30 km).
" 12 Up iP 12 04 47.3
microns sec
P Z' 0.1 0.6
Kurile Islands.
" 12 Up iP 12 13 20.3
Kurile Islands (h = 40 km).
" 12 Up iP 12 43 38.2
Kurile Islands (h = 40 km).
" 12 Up iP 13 18 07.0
Ki eP 13 17 20
Um iP 13 17 42.0
Kurile Islands (h = 50 km).
" 12 Up iP 13 34 31.1
Kurile Islands (h = 50 km).
" 12 Up iP 13 40 35.8 C
Kurile Islands (h = 50 km).
" 12 Up iP 14 06 06.1
Kurile Islands (h = 40 km).
" 12 Up iP 16 22 53.5 C
microns sec
P Z' 0.1 0.5
Ki eP 16 22 10
Um iP 16 22 28.9
Kurile Islands (h = 60 km).
" 12 Up iP 16 39 07.9
Kurile Islands (h = 50 km).

1963

Oct. 12 Up iP 18 16 47.4
Kurile Islands (h = 50 km).
" 12 Up iP 18 59 32.7 C
Um iP 18 59 08.7
Kurile Islands (h = 50 km).
" 12 Up iP 20 08 00.1
Ki eP 20 07 13
Kurile Islands (h = 50 km).
" 12 Ki iP 21 29 09.5 C
Mariana Islands (h = 640 km).
" 12 Up iP 22 12 57.9
Ki iP 22 12 15.4
Kurile Islands (h = 50 km).
" 12 Up iP 22 18 29.3
Kurile Islands (h = 40 km).
" 13 Ki iP 00 43 56.4
" 13 Up iP 01 37 36.2 C
microns sec
P Z' 0.1 0.7
Ki iP 01 36 49.7
Gb iP 01 37 55.8
Um iP 01 37 10.4
Kurile Islands (h = 30 km).
" 13 Up iP 01 45 55.8
Um iP 01 45 31.5 D
Kurile Islands (h = 30 km).
" 13 Ki iP 02 22 36.8
Um i(P) 02 23 11.0 C
Kurile Islands (h = 50 km).
" 13 Up iP 04 16 51.4
Um eP 04 16 15
Kurile Islands (h = 30 km).
" 13 Up iP 05 22 52.1 C
Ki iP 05 22 48.1
Um iP 05 22 53.7
Costa Rica (h = 60 km).
" 13 Up iP 05 28 53.0 C
✓ ipP 05 29 06.2
i 05 37 21
iS 05 38 08
i(P'P') 05 57 59.2

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

1963

Oct. 13 Up
cont.

			microns	sec
	P	E	50	30
	P	N	68	30
	P	Z	23	10
	pP	Z'	1.2	0.9
	S	E	64	17
	(P'P')	Z'	2.0	2.2
	M	E	600	(20)
	M	N	950	(20)
	M	Z	1630	(20)
	D =	7550 km =	68°	
Ki	iP		05 28	06.9 C
	i		05 28	13.8
	iPcP		05 29	01
	iPa		05 32	35
	i		05 37	02
			microns	sec
	P	E	5.2	9
	P	N	6.6	10
	P	Z	19	9
	P	Z'	1.5	1.0
	M	E	480	(20)
	M	N	720	(20)
	M	Z	1450	(20)
	D =	6800 km =	61°	
Sk	iP		05 28	48.4
	iPcP		05 29	18.5
Gb	iP		05 29	15.2 C
	i		05 29	21.4
Um	iP		05 28	27.7 C
	i		05 28	34.6
Ka	eP		05 29	15
	i		05 29	22

Kurile Islands. h = 50 km
(Up). Magn. = 7.6 (Up,Ki).
The body waves give a
magnitude of only 7.4,
whereas the surface waves
give 8.1. The P-wave
spectrum contains some very
large periods, around 30 sec,
clearly exhibited on long-
period Benioff records at Up.
The P-wave shows multiplicity
and the wave arriving 6-7 sec
after iP (Ki,Gb,Um,Ka) has an
amplitude 7-8 times as large
as for the initial iP. Mantle
Rayleigh waves were recorded
for about 24 hours after the
main shock, especially on
Umeå long-period records.

" 13 Up iP 05 35 43.0

1963

Oct. 13
cont.

			microns	sec
	P	Z'	0.4	0.7
	(Kurile Islands).			
"	13	Up	iP	05 41 04.8 C
				microns sec
		P	Z'	0.1 0.7
		Kurile Islands (h = 40 km).		
"	13	Up	iP	05 43 25.6
"	13	Up	iP	05 47 38.1 C
				microns sec
		P	Z'	0.2 0.5
Ki	iP		05 46	50.8
				microns sec
		P	Z'	0.2 1.5
Gb	iP		05 47	59.1 C
Um	iP		05 47	10.4
	Kurile Islands.			
	Origin time = 05 36 36.			
	Magn. = 6.2 (Up,Ki).			
	Approximate origin times are given in the following sequence of Kurile Islands earthquakes only for cases which are not given in the USCGS determinations.			
"	13	Up	iP	05 52 01.3 C
				microns sec
		P	Z'	0.1 0.5
Ki	iP		05 51	43.3 C
"	13	Up	iP	05 53 01.3
				microns sec
		P	Z'	0.1 0.5
Ki	iP		05 52	18.0
	Kurile Islands (h = 60 km).			
"	13	Up	iP	05 54 52.1
				microns sec
		P	Z'	0.1 0.6
"	13	Ki	iP	05 56 30.5 C
"	13	Up	iP	05 59 59.2 C
"	13	Up	i(P)	06 00 12.4 C
"	13	Up	iP	06 01 03.2
				microns sec
		P	Z'	0.1 0.6

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

1963	Oct.	13	Up	i(P)	06 01 18.5	1963	Oct.	13	Up	iP	06 54 47.7
					microns sec				Um	iP	06 54 22.3
				(P)	Z' 0.1 0.6				Kurile Islands.		
									Origin time = 06 43 46.		
"		13	Up	iP	06 03 20.1	"		13	Up	iP	06 57 44.8
				i	06 03 23.6						microns sec
"		13	Ki	iP	06 07 19.5 C				P	Z' 0.2 1.0	
"		13	Ki	iP	06 13 14.0				Gb	iP	06 58 06.2
"		13	Ki	iP	06 15 37.8				ipP	06 58 19.3	
					microns sec				Um	iP	06 57 20.3
				P	Z' 0.3 0.8				Ka	iP	06 58 06
				Kurile Islands (h = 60 km).					Kurile Islands. h = 50 km (Gb).		
"		13	Ki	i(P)	06 15 53.1	"		13	Up	iP	06 59 24.3
					microns sec						microns sec
				(P)	Z' 0.4 1.0				P	Z' 0.1 0.8	
"		13	Up	iP	06 19 58.9 C				Ki	iP	06 58 37.1
					microns sec						microns sec
				P	Z' 0.2 0.7				P	Z' 0.3 1.0	
			Gb	iP	06 20 19.2 C				Gb	iP	06 59 46.6
				ipP	06 20 31.2				Um	iP	06 58 57.6
				Kurile Islands. h = 50 km (Gb).		"		13	Up	iP	07 07 05.0
"		13	Up	iP	06 23 18.6 C	"		13	Up	iP	07 09 22.0
				Kurile Islands (h = 40 km).		"		13	Up	iP	07 09 35.7
"		13	Up	iP	06 26 59.3 C				Um	iP	07 09 10.8
			Ki	iP	06 26 12.6 C				Kurile Islands.		
			Kurile Islands.						Origin time = 06 58 34.		
			Origin time = 06 15 58.		"		13	Up	iP	07 14 18.0	
"		13	Up	iP	06 32 02.5				Sk	eP	07 14 10
			Kurile Islands.						Um	iP	07 13 52.6
"		13	Up	iP	06 34 44.7				Kurile Islands.		
			Ki	iP	06 33 49.9 C				Origin time = 07 03 16.		
			Kurile Islands (h = 40 km).		"		13	Up	iP	07 14 21.0	
"		13	Up	iP	06 36 38.1						microns sec
"		13	Ki	iP	06 39 35.2				P	Z' 0.4 0.9	
			Um	iP	06 39 56.1 C				Ki	iP	07 13 31.2 D
			Kurile Islands.								microns sec
			Origin time = 06 29 20.						P	Z' 0.2 1.0	
"		13	Up	iP	06 39 47.6 C				Sk	iP	07 14 11.4
"		13	Up	iP	06 52 48.6				Gb	iP	07 14 42.3
			Ki	iP	06 52 03.0				Um	iP	07 13 57.1 D
			Um	iP	06 52 22.7 C				Ka	iP	07 14 43
			Kurile Islands.						Kurile Islands (h = 50 km).		
			Origin time = 06 41 47.						Magn. = 6.4 (Up,Ki).		
"		13	Up	iP	06 52 48.6	"		13	Up	iP	07 19 04.7
			Ki	iP	06 52 03.0				Ki	iP	07 18 17.7
			Um	iP	06 52 22.7 C				Um	iP	07 18 39.8
			Kurile Islands.						Kurile Islands.		
			Origin time = 06 41 47.						Origin time = 07 08 03.		

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

1963					1963				
Oct.	13	Up	iP	07 20 18.5 C	Oct.	13	Up	iP	07 47 45.1
"	13	Um	iP	07 22 39.0 C			Ki	iP	07 46 57.7
"	13	Up	iP	07 24 20.0			Um	iP	07 47 18.9
		Um	iP	07 23 54.0			Kurile Islands.		
		Kurile Islands.					Origin time = 07 36 43.		
		Origin time = 07 13 18.			"	13	Up	iP	07 56 52.3 D
"	13	Up	iP	07 27 40.5 D			Kurile Islands.		
		Um	iP	07 27 14.8 D	"	13	Up	iP	07 57 25.2
		Kurile Islands (h = 60 km).					Um	iP	07 56 59.6
"	13	Up	iP	07 27 59.1			Kurile Islands.		
		Ki	iP	07 27 10.9			Origin time = 07 46 23.		
		Um	iP	07 27 32.8	"	13	Up	iP	07 59 25.9
		Kurile Islands.					Kurile Islands (h = 30 km).		
		Origin time = 07 16 56.			"	13	Ki	iP	07 59 43.5
"	13	Up	iP	07 30 12.0	"	13	Up	iP	08 06 57.1
		Kurile Islands (h = 40 km).					Um	iP	08 06 31.8
"	13	Up	i(P)	07 30 26.2			Kurile Islands.		
		Could possibly be pP of					Origin time = 07 55 55.		
		preceding shock.			"	13	Up	iP	08 09 53.7
"	13	Up	iP	07 31 56.1	"	13	Up	iP	08 10 13.9
"	13	Up	iP	07 32 37.9	"	13	Up	iP	08 10 32.9
"	13	Up	iP	07 33 35.3 C	"	13	Ki	iP	08 12 20.2
"	13	Up	iP	07 36 32.7			Um	iP	08 12 41.6 C
"	13	Up	iP	07 37 48.7			Kurile Islands.		
"	13	Up	iP	07 39 30.0 D			Origin time = 08 02 05.		
		Ki	iP	07 38 43.0	"	13	Up	iP	08 13 25.1
		Um	iP	07 39 04.5 D			Kurile Islands.		
		Kurile Islands.			"	13	Up	i(P)	08 14 10.6
		Origin time = 07 28 28.			"	13	Up	iP	08 17 35.4
"	13	Um	iP	07 41 13.5			Ki	iP	08 16 51.8
"	13	Up	iP	07 42 52.6 D			Um	iP	08 17 10.1 C
		Ki	eP	07 42 09			Kurile Islands (h = 40 km).		
		Gb	iP	07 43 13.3	"	13	Up	iP	08 18 21.0
		Kurile Islands (h = 40 km).					Um	iP	08 17 54.4
"	13	Up	i(P)	07 43 06.4			Ka	iP	08 18 42 C
		Could possibly be pP of					Kurile Islands.		
		preceding shock,					Origin time = 08 07 19.		
"	13	Up	iP	07 46 35.9	"	13	Up	iP	08 19 48.0
		Ki	iP	07 45 49.8 C			Um	iP	08 19 22.2
		Um	iP	07 46 11.1			Kurile Islands.		
		Kurile Islands (h = 50 km).					Origin time = 08 08 46.		

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

1963

Oct. 13 Up iP 08 20 43.6
Um iP 08 20 18.1 C
Kurile Islands.
Origin time = 08 09 42.

" 13 Up iP 08 22 34.3
i 08 22 37.9
microns sec
P Z' 0.1 0.8
Ki iP 08 21 47.4 D
microns sec
P Z' 0.1 1.0
Sk iP 08 22 26.7 D
Gb iP 08 22 59.0 D
Kurile Islands (h = 60 km).
Magn. = 5.8 (Up,Ki).

" 13 Up i(P) 08 22 50.6
microns sec
(P) Z' 0.1 0.6
Ka i(P) 08 23 11
Kurile Islands.
Origin time = 08 11 49.
Could instead possibly be
pP of preceding shock.

" 13 Up iP 08 30 15.0
Ki iP 08 29 28.9
Um iP 08 29 50.2
Kurile Islands (h = 40 km).

" 13 Up iP 08 41 43.8
Ki iP 08 40 57.3
Um iP 08 41 18.8
Kurile Islands.
Origin time = 08 30 42.

" 13 Gb iP 08 48 29.2
Ka iP 08 48 30
Kurile Islands (h = 50 km).

" 13 Up iP 08 50 26.4
ipP 08 50 38.6
Um iP 08 50 01.0
Kurile Islands. h = 50 km (Up).
Origin time = 08 39 24.

" 13 Up iP 08 50 53.7
Kurile Islands (h = 40 km).

" 13 Up iP 08 53 33.7

" 13 Up iP 08 57 27.2

" 13 Up iP 08 58 38.4 C

1963

Oct. 13 Ki iP 08 57 51.4
cont. Um iP 08 58 14.0
Kurile Islands.
Origin time = 08 47 36.

" 13 Um iP 09 01 15.3

" 13 Up iP 09 01 19.7
ipP 09 01 33.6
Kurile Islands. h = 60 km
(Up).

" 13 Up iP 09 05 09.8
Kurile Islands.

" 13 Up iP 09 21 17.5
Um iP 09 20 52.8
Kurile Islands (h = 40 km).

" 13 Up iP 09 23 02.6 C
ipP 09 23 15.0
microns sec
P Z' 0.1 0.9
Ki iP 09 22 15.6
microns sec
P Z' 0.1 1.0
Um iP 09 22 37.2
ipP 09 22 49.3
Kurile Islands.
h = 50 km (Up,Um).
Magn. = 5.8 (Up,Ki).

" 13 Up iP 09 27 25.1 C
Ki iP 09 26 38.4
Sk eP 09 27 20
Um iP 09 26 59.6
Kurile Islands (h = 50 km).

" 13 Up iP 09 28 41.5 D
Ki iP 09 27 55.2
Um iP 09 28 15.9
Kurile Islands.
Origin time = 09 17 40.

" 13 Up iP 09 33 44.6
Ki iP 09 32 57.7
Um iP 09 33 19.0
Kurile Islands (h = 50 km).

" 13 Um iP 09 34 11.8

" 13 Up iP 09 38 19.4
Um iP 09 37 54.0
Kurile Islands (h = 40 km).

" 13 Up iP 09 42 17.0

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

1963					1963				
Oct.	13	Um	iP	09 54 19.9	Oct.	13	Up	iP	10 40 29.3 D
"	13	Up	iP	09 56 07.2			Kurile Islands.		
		Ki	iP	09 55 20.0	"	13	Up	eP	10 44 58
		Kurile Islands.					Ki	iP	10 44 13.3
		Origin time = 09 45 05.					Um	iP	10 44 34.1
"	13	Gb	iP	09 55 45.6			Kurile Islands (h = 50 km).		
"	13	Up	iP	09 55 53.6	"	13	Up	iP	10 58 13.2
		Kurile Islands (h = 50 km).					Ki	iP	10 57 27.5
"	13	Up	iP	10 02 08.0			Um	iP	10 57 47.0
		Ki	iP	10 01 21.0	"	13	Up	iP	11 26 39.4
		Um	iP	10 01 42.5			Ki	eP	11 25 54
		Kurile Islands.					Um	iP	11 26 15.0 C
		Origin time = 09 51 06.					Kurile Islands (h = 50 km).		
"	13	Up	iP	10 07 43.3	"	13	Up	iP	11 33 58.5
			ipP	10 07 55.4			Ki	iP	11 33 11.5
		Ki	iP	10 06 55.9			Um	iP	11 33 33.7
			ipP	10 07 08.8			Kurile Islands (h = 60 km).		
		Um	iP	10 07 16.6	"	13	Up	iP	11 46 18.5
			ipP	10 07 29.5			Ki	iP	11 45 35.0
		Kurile Islands.					Um	iP	11 45 52.8
		h = 50 km (Up,Ki,Um).					Kurile Islands (h = 25 km).		
"	13	Up	iP	10 12 14.8	"	13	Up	iP	11 46 38.4
		Ki	iP	10 11 28.9 C			Kurile Islands.		
		Um	iP	10 11 49.4 C	"	13	Up	iP	11 50 01.1 C
		Kurile Islands (h = 60 km).					Um	iP	11 49 35.9
"	13	Up	iP	10 17 28.1			Kurile Islands (h = 25 km).		
			ipP	10 17 38.7	"	13	Um	iP	11 58 36.5
			microns sec		"	13	Up	iP	12 08 20.1
		M	E	2.5 19			Kurile Islands (h = 50 km).		
		M	N	2.4 17	"	13	Up	iP	12 09 55.7
		M	Z	2.7 17	"	13	Up	iP	12 16 50.4
		Ki	iP	10 16 40.6			Ki	iP	12 16 04.8
			ipP	10 16 52.0			Um	iP	12 16 25.2
			microns sec					ipP	12 16 36.2
		M	E	3.0 15			Kurile Islands.		
		M	Z	1.7 14			h = 40 km (Um).		
		Um	iP	10 17 01.0	"	13	Up	iP	12 31 51.1
		Ka	i(P)	10 18 01			Kurile Islands (h = 50 km).		
		Kurile Islands.			"	13	Up	iP	12 40 37.0
		h = 40 km (Up,Ki).					microns sec		
		Magn. = 5.7 (Up,Ki).					P	Z'	0.1 0.6
"	13	Up	iP	10 18 44.4					
"	13	Up	iP	10 21 28.6					
		Ki	eP	10 20 44					
		Kurile Islands (h = 50 km).							

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

1963

Oct. 13 Ki iP 12 39 49.8
cont. microns sec
P Z' 0.2 1.0
Sk iP 12 40 25.6 C
Um iP 12 40 11.8
Kurile Islands (h = 30 km).

" 13 Up iP 12 45 19.5
Ki iP 12 44 35.4
Um iP 12 44 54.7
Kurile Islands (h = 25 km).

" 13 Up iP 12 51 39.5
Ki iP 12 50 52.7
Um iP 12 51 14.4 C
Kurile Islands (h = 50 km).

" 13 Up iP 12 53 12.4 C
microns sec
P Z' 0.3 0.8
M N 3.1 17
M Z 2.2 17
Ki iP 12 52 26.0
ipP 12 52 40.0
microns sec
P Z' 0.1 1.0
M E 3.2 17
M Z 1.8 16
Sk iP 12 53 02.5
Gb iP 12 53 33.0 C
Um iP 12 52 46.8
ipP 12 52 59.3
Ka iP 12 53 35.3 C
Kurile Islands.
h = 50 km (Ki,Um).
Magn. = 5.9 (Up,Ki).

" 13 Up iP 13 03 26.6
Kurile Islands (h = 30 km).

" 13 Up iP 13 04 59.0
Um iP 13 04 35.0
Kurile Islands (h = 25 km).

" 13 Up iP 13 09 19.3 C
microns sec
P Z' 0.2 0.6
M E 2.7 20
M N 7.5 17
M Z 4.5 20
Ki iP 13 08 32.5
ipP 13 08 47.7
microns sec
P Z' 0.1 1.0
pP Z' 0.2 1.0
M E 5.0 18
M Z 6.9 17

1963

Oct. 13 Sk iP 13 09 07.8
cont. ipP 13 09 22.8
Gb iP 13 09 42.4
ipP 13 09 57.1
Um iP 13 08 53.9
Ka iP 13 09 42.7
Kurile Islands.

h = 60 km (Ki,Sk,Gb).
Magn. = 6.0 (Up,Ki).

" 13 Ki iP 13 15 11.1
Kurile Islands (h = 30 km).

" 13 Up iP 13 16 23.6

" 13 Up iP 13 18 02.7

" 13 Up iP 13 31 58.3
microns sec
P Z' 0.1 0.6
Ki iP 13 31 12.0
Um iP 13 31 33.0 D
Ka iP 13 32 22.2
Kurile Islands (h = 60 km).

" 13 Up iP 13 52 43.8
Kurile Islands (h = 50 km).

" 13 Up iP 14 04 09.6
Kurile Islands (h = 40 km).

" 13 Up iP 14 05 26.1
ipP 14 05 38.9
Ki iP 14 04 39.2

microns sec
P Z' 0.1 1.0
M E 1.3 17
Um iP 14 05 00.8 C
Kurile Islands.
h = 50 km (Up).

" 13 Up iP 14 14 57.3
Ki iP 14 14 11.6 C
Um iP 14 14 32.5
Kurile Islands (h = 25 km).

" 13 Up iP 14 25 42.4
Kurile Islands (h = 40 km).

" 13 Up iP 14 37 11.7
microns sec
P Z' 0.1 1.0
M E 1.5 20
M N 2.6 16
M Z 1.6 17
Ki iP 14 36 25.2

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

1963

Oct. 13 Ki microns sec
cont. M E 2.0 19
M Z 2.0 17
Gb iP 14 37 33.1
Um iP 14 36 46.2
Ka iP 14 37 35.8
Kurile Islands (h = 50 km).
Magn. = 5.6 (Up,Ki).

" 13 Up iP 14 39 20.2 D
Kurile Islands.

" 13 Up iP 16 00 55.9
Kurile Islands (h = 50 km).

" 13 Up iP 16 10 48.2 C
i 16 20 42
e(Sa) 16 27 39

microns sec
P N 0.5 4
P Z' 0.3 0.7
M E 5.4 25
M N 13 19
M Z 14 19

Ki iP 16 10 01.7
iS 16 18 19

microns sec
P Z' 0.2 1.0
S E 0.9 13
M E 5.0 16
M Z 11 20

D = 6700 km = $60\frac{1}{2}^{\circ}$.

Sk iP 16 10 38.6 C

iPcP 16 11 07.5

Gb iP 16 11 10.4

Um iP 16 10 23.2 C

iPa 16 14 16

iS 16 18 50

i 16 19 22

Ka iP 16 11 13.6 C

Kurile Islands (h = 40 km).

Magn. = 6.3 (Up,Ki).

" 13 Sk iP 16 15 59.4 C

" 13 Ki iP 16 22 47.0
Kurile Islands (h = 30 km).

" 13 Up iP 16 39 57.1
Ki iP 16 39 11.1
Um iP 16 39 32.1
Kurile Islands (h = 40 km).

" 13 Up iP 16 43 40.0
Ki iP 16 42 54.7
Um iP 16 43 12.5
Kurile Islands (h = 40 km).

1963

Oct. 13 Ki iP 16 57 49.3
Sk iP 16 57 46.8 C
Um iP 16 57 59.6
Mexico (h = 50 km).

" 13 Up iP 17 00 42.5
Ki eP 16 59 56
Um iP 17 00 17.7
Kurile Islands (h = 40 km).

" 13 Um iP 17 28 58.7 D

" 13 Up iP 17 36 58.0 C
Ki iP 17 36 11.2
Um iP 17 36 32.6 C
Kurile Islands (h = 50 km).

" 13 Up iP 17 42 19.5

microns sec

M E 3.6 16

M N 5.4 18

M Z 6.5 17

Ki eP 17 41 31

iPa 17 44 44

microns sec

M E 3.7 15

M Z 8.4 17

Um iP 17 41 54.3 D

Kurile Islands (h = 50 km).

Magn. = 5.9 (Up,Ki).

" 13 Up iP 18 07 30.1
Kurile Islands (h = 50 km).

" 13 Up iP 18 21 59.0
Ki iP 18 21 13.2 D
Um iP 18 21 34.2
ipP 18 21 46.0

Kurile Islands.

h = 50 km (Um).

" 13 Up iP 18 22 44.3

" 13 Up iP 18 24 45.1 D

microns sec

P Z' 0.1 0.6

M E 2.4 18

M N 2.0 17

M Z 1.7 18

Ki iP 18 23 59.2

microns sec

M E 1.4 16

M Z 1.8 16

Gb iP 18 25 06.8

Um iP 18 24 19.8

ipP 18 24 33.9

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

1963				1963			
Oct.	13	Kurile Islands.		Oct.	13	Ki iP	20 05 11.3
cont.		h = 60 km (Um).				Kurile Islands (h = 40 km).	
		Magn. = 5.6 (Up,Ki).					
"	13	Up iP	18 25 56.8 C	"	13	Up iP	20 22 21.8 C
		Ki iP	18 25 14.2 C	"	13	Up iP	20 25 13.0
		Sk eP	18 25 45			Kurile Islands (h = 25 km).	
		Um iP	18 25 31.0	"	13	Up iP	20 38 37.5
		Kurile Islands (h = 50 km).				Ki iP	20 37 49.9
"	13	Up iP	18 45 29.2			Sk eP	20 38 24
		Kurile Islands (h = 30 km).				Um iP	20 38 12.5
"	13	Up iP	18 48 15.2			Kurile Islands (h = 30 km).	
"	13	Up iP	18 56 33.4	"	13	Up iP	20 46 50.2
		Kurile Islands.				Kurile Islands (h = 30 km).	
"	13	Up iP	19 22 21.8 C	"	13	Um iP	21 09 24.8
		Kurile Islands (h = 25 km).		"	13	Up iP	21 46 37.5
"	13	Up iP	19 37 02.6			ipP	21 46 50.4
		Ki iP	19 36 15.2 D			Ki iP	21 45 49.6
		Um iP	19 36 37.3			microns sec	
		Kurile Islands (h = 30 km).				P	Z' 0.1 1.0
"	13	Up iP	19 38 35.0			Um iP	21 46 11.5
		microns sec				ipP	21 46 24.3
		P	Z' 0.1 0.6			Kurile Islands.	
		M	N 2.1 21			h = 50 km (Up,Um).	
		M	Z 1.7 18	"	13	Up iP	21 59 02.3
		Ki iP	19 37 47.1 C			Kurile Islands (h = 50 km).	
		microns sec		"	13	Up iP	22 00 58.2
		P	Z' 0.2 1.0			Ki iP	22 00 11.1
		M	E 2.3 19			Um iP	22 00 32.0
		M	Z 2.2 18			Kurile Islands (h = 50 km).	
		Sk iP	19 38 23.6 C	"	13	Up iP	22 06 04.1 D
		Gb iP	19 38 56.1 C			microns sec	
		Um iP	19 38 09.0			P	Z' 0.3 0.9
		Ka iP	19 38 56			M	E 2.4 21
		Kurile Islands (h = 50 km).				M	N 2.1 21
		Magn. = 5.8 (Up,Ki).				M	Z 1.9 15
"	13	Ki iP	19 41 48.5			Ki iP	22 05 17.1
"	13	Up iP	19 52 19.2			microns sec	
		microns sec				P	Z' 0.4 1.0
		P	Z' 0.1 0.6			M	E 2.6 15
		Ki iP	19 51 32.0			M	Z 1.8 16
		microns sec				Sk iP	22 05 52.9
		P	Z' 0.1 1.0			Gb iP	22 06 24.6 D
		Um iP	19 51 53.8 C			Um iP	22 05 39.0 D
		Kurile Islands (h = 50 km).				i	22 05 42.7
		Magn. = 5.9 (Up,Ki).				Ka iP	22 06 27
						Kurile Islands (h = 50 km).	
						Magn. = 6.1 (Up,Ki).	

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

1963					1963				
Oct.	13	Up	iP	22 07 42.1	Oct.	14	Ki	iP	00 03 11.5 C
"	13	Up	iP	22 13 57.5					microns sec
			P	Z' 0.1 0.8				P	Z' 0.1 1.2
		Ki	iP	22 13 11.2 D			Sk	iP	00 03 55.4
		Sk	iP	22 13 46.3					(Kurile Islands).
		Gb	iP	22 14 18.6 D	"	14	Up	iP	00 14 03.8
		Um	iP	22 13 32.5			Ki	eP	00 13 15
				Kurile Islands (h = 50 km).			Um	iP	00 13 41.4
									Kurile Islands (h = 60 km).
"	13	Up	iP	22 36 37.6	"	14	Ki	iP	00 29 44.3
				Kurile Islands (h = 50 km).					Kurile Islands (h = 50 km).
"	13	Up	iP	22 40 51.2	"	14	Up	iP	01 02 56.2
		Um	iP	22 40 25.7			Ki	iP	01 02 10.2
				Kurile Islands (h = 40 km).				ipP	01 02 19.7
"	13	Ki	iP	23 15 44.9			Um	iP	01 02 31.2
				Kurile Islands (h = 30 km).					Kurile Islands.
"	13	Up	iP	23 19 50.6					h = 40 km (Ki).
				Kurile Islands (h = 50 km).	"	14	Ki	iP	01 19 39.8
"	13	Up	iP	23 26 38.5					microns sec
		Um	iP	23 26 13.0				M	E 1.2 14
				Kurile Islands.					Kurile Islands (h = 40 km).
				Origin time = 23 15 37.	"	14	Up	iP	01 30 18.7
"	13	Up	iP	23 36 03.3				i	01 30 22.7
				microns sec				i	01 30 35.1
			P	Z' 0.1 1.0					Kurile Islands (h = 60 km).
		Ki	iP	23 35 16.2	"	14	Up	iP	01 32 50.1 D
		Um	iP	23 35 37.5			Sk	iP	01 33 02.4
				Kurile Islands (h = 50 km).	"	14	Ki	iP	02 01 04.7
"	14	Up	iP	00 03 24.9 D					Kurile Islands (h = 50 km).
				microns sec	"	14	Up	iP	02 11 44.6
			P	Z' 0.1 0.5					microns sec
			M	E 6.6 16				P	Z' 0.1 0.5
			M	N 13 18			Sk	iP	02 12 00.4
			M	Z 9.8 18					Assam (h = 30 km).
		Ki	eP	00 02 39	"	14	Ki	iP	03 32 10.1
			eS	00 11 06					Kurile Islands (h = 50 km).
				microns sec	"	14	Up	iP	03 42 06.5
			P	Z 0.7 7			Ki	iP	03 41 19.8
			S	E 1.6 12			Um	eP	03 41 40
			S	Z 1.5 13					Kurile Islands (h = 25 km).
			M	E 9.1 15	"	14	Up	iP	04 17 00.3
			M	Z 11 16			Ki	iP	04 16 13.1
				D = 6900 km = 62°.			Um	iP	04 16 34.6
		Um	iP	00 02 58.6					Kurile Islands (h = 50 km).
			ipP	00 03 09.5					
			e	00 11 44					
				Kurile Islands. h = 40 km (Um).					
				Magn. = 6.1 (Up,Ki).					

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

1963

Oct. 14 Up iP 04 22 15.6 C
microns sec
M E 4.6 20
M N 6.5 18
M Z 5.2 18
Ki iP 04 21 28.9
ipP 04 21 40.7
microns sec
P Z 0.8 6
M E 6.6 20
M Z 3.0 17
Sk iP 04 22 04.1
Gb iP 04 22 35.9 C
Um iP 04 21 49.9 C
Kurile Islands.
h = 50 km (Ki).
Magn. = 6.1 (Up,Ki).

" 14 Up iP 04 24 03.7
microns sec
P Z' 0.1 0.5
Ki iP 04 23 17.0
Gb iP 04 24 25.6
Um iP 04 23 38.5 C
Kurile Islands (h = 40 km).

" 14 Up iP 05 35 14.1 C
Ki iP 05 34 28.0 C
ipP 05 34 42.0
microns sec
M E 1.1 15
Sk eP 05 35 04
Um iP 05 34 48.6
ipP 05 35 03.3
Kurile Islands.
h = 60 km (Ki,Um).

" 14 Ki iP 06 36 14.1 C
i 06 36 26.9
Sk iP 06 36 46.8
Um iP 06 36 33.4
i 06 36 40.7
ipP 06 36 53.3
Aleutian Islands.
h = 80 km (Um).

" 14 Up iP 06 40 03.4
Ki iP 06 39 16.0
Um iP 06 39 40.9
Kurile Islands (h = 40 km).

" 14 Up iP 07 09 36.9

" 14 Up iP 07 27 06.5
Ki iP 07 26 11.2
Kurile Islands (h = 50 km).

1963

Oct. 14 Up iP 08 05 36.0 C
ipP 08 05 50.2
microns sec
P Z' 0.1 0.5
Ki iP 08 04 48.8
Sk eP 08 05 24
Kurile Islands.
h = 70 km (Up).

" 14 Ki iP 09 39 18.8
Um iP 09 39 40.9
Kurile Islands (h = 40 km).

" 14 Ki iP 10 34 49.5
Kurile Islands (h = 40 km).

" 14 Ki eP 11 33 24
Um iP 11 33 50.8 C
Kurile Islands (h = 50 km).

" 14 Up iP 13 32 44.5 C
ipP 13 32 59
eS 13 41 42
microns sec
P Z' 0.5 0.5
S E 0.8 6
M E 3.8 20
M N 11 23
M Z 11 23
D = 7600 km = 68 $\frac{1}{2}$ °.
Ki iP 13 31 57.9 C
eS 13 40 14
microns sec
P Z' 0.5 1.0
S E 1.4 10
S N 0.9 9
M E 6.3 15
M N 6.7 17
M Z 9.3 17°.
D = 6800 km = 61°.

Sk iP 13 32 33.1 C
ipP 13 32 48.1
Gb iP 13 33 05.5 C
ipP 13 33 20.3
Um iP 13 32 19.3 C
iS 13 40 56
Ka iP 13 33 04
ipP 13 33 19
Kurile Islands.
h = 60 km (Up,Sk,Gb,Ka).
Magn. = 6.3 (Up,Ki).

" 14 Up iP 14 04 17.8
Ki iP 14 03 32.2
Kurile Islands (h = 30 km).

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

1963

Oct. 14 Up iP 15 33 14.7 C
" 14 Up iP 18 01 13.2 C
microns sec
P Z' 0.2 0.7
Ki iP 18 00 26.2 C
microns sec
P Z' 0.2 1.0
Sk iP 18 01 02.8
Gb iP 18 01 33.5 C
Um iP 18 00 47.9
ipP 18 01 01.3
Kurile Islands.
h = 50 km (Um).
Magn. = 6.3 (Up,Ki).
" 14 Up iP 18 07 18.8
Um iP 18 06 53.3
Kurile Islands (h = 30 km).
" 14 Up iP 18 36 07.0
i 18 36 32.0
" 14 Ki iP 18 45 11.1
Sumatra (h = 30 km).
" 14 Ki iP 19 48 11.1 D
" 14 Up iP 20 39 29.4
" 14 Up eP 20 46 26
" 14 Up iP 21 18 58.2
Kurile Islands (h = 50 km).
" 14 Up iP 21 20 08.5 D
microns sec
P Z' 0.1 0.5
Ki iP 21 20 15.1 D
microns sec
P Z' 0.1 1.0
Sk iP 21 20 33.1
iPP 21 22 16.1
Gb iP 21 20 30.0 D
Um iP 21 20 05.4 D
Pamir. Magn. = 6.0 (Up,Ki).
" 14 Up iP 22 46 41.3
i 22 46 45.4
Ki iP 22 45 46.7 C
ipP 22 45 58.7
Kurile Islands.
h = 50 km (Ki).
" 14 Ki iP 23 12 49.6 D
Sinkiang (h = 70 km).

1963

Oct. 15 Up iP 00 58 47.8 C
Kurile Islands (h = 40 km).
" 15 Up iP 01 00 02.6 C
i(PcP) 01 00 32.0
microns sec
P Z' 0.1 0.5
Ki iP 00 59 29.5 C
microns sec
P Z' 0.1 1.0
Sk iP 00 59 59.1
Um iP 00 59 42.6
" 15 Sk iP 01 03 00.2
" 15 Up iP 04 25 35.3
Ki iP 04 25 34.6
Um iP 04 25 32.1
Sumatra (h = 140 km).
" 15 Up iP 04 56 10.8
" 15 Up iP 05 07 26.7 D
Kurile Islands (h = 50 km).
" 15 Up eL 07 27
microns sec
M E 1.6 11
M N 3.6 18
M Z 4.3 17
Ki eL 07 23
microns sec
M E 4.4 13
M N 2.8 14
M Z 3.4 17
" 15 Up iP 08 11 12.4
microns sec
P Z' 0.1 1.0
Ki iP 08 10 26.2
microns sec
P Z' 0.1 1.0
Sk iP 08 11 01.1
Gb iP 08 11 33.2
Kurile Islands (h = 40 km).
Magn. = 5.8 (Up,Ki).
" 15 Up iP 09 13 06.2
microns sec
M E 1.3 17
M N 1.4 18
M Z 2.6 20
Ki eP 09 12 19
microns sec
M E 2.2 16

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

1963

Oct. 15 Ki microns sec
cont. M N 1.4 16
M Z 3.1 16
Sk eP 09 12 55
Kurile Islands
(h = 40 km).

" 15 Ki iP 09 40 14.4 C
microns sec
P Z' 0.2 1.0
Um iP 09 40 27.4

" 15 Up iP 09 43 06.8
iPcP 09 43 32.6
microns sec
P Z' 0.1 0.6
Ki iP 09 42 20.8
Sk eP 09 42 55
Um iP 09 42 41.9
Kurile Islands
(h = 40 km).

" 15 Up ✓ iP 10 03 30.2 C
iS 10 06 50
iX 10 07 07
microns sec
P E 1.2 6
P N 1.8 6
P Z 2.4 7
P Z' 0.4 1.5
S E 1.8 7
S N 2.1 7
M E 7.2 19
M N 12 12
M Z 9.2 17
D = 1950 km = $17\frac{1}{2}^\circ$.
Ki iP 10 02 58.2 C
eS 10 06 02
microns sec
P E 4.9 7
P Z 3.7 6
P Z' 1.4 1.5
S E 3.0 10
S N 12 18
M E 30 16
M N 15 14
M Z 22 14
D = 1650 km = 15° .
Sk iP 10 02 36.7
i(Lgl) 10 06 27.5
Gb iP 10 03 23.4
i 10 03 27.9
Um iP 10 03 15.1 C

1963

Oct. 15 Um i 10 03 19.8
cont. eS 10 06 06
iX 10 06 28
D = 1800 km = 16° .

Iceland
(h = 30 km).
Magn. = 5.8 (Up, Ki).
The phase marked X
(Up, Um) has a group
velocity of 4.26 km/sec.
There is a clear train
of higher mode Rayleigh
waves, about $\frac{1}{2}$ -1 min
in duration, especially
clear at Up and Um.
This is remarkable
considering the paths,
which cross over deep
ocean. Another interesting
feature is that the
particle motion is
progressive elliptic.
The fundamental mode
surface waves exhibit
the typical features
described by M. Bath
and A. Vogel, Geof. pura
e appl. 39:35-54,
1958.

" 15 Up iP 10 58 11.4
microns sec
P Z' 0.1 0.7
Ki iP 10 57 24.6 C
Sk iP 10 58 01.0
Gb iP 10 58 32.9 C
Um iP 10 57 46.9
Kurile Islands
(h = 50 km).

" 15 Up iP 12 04 46.4 D
ipP 12 04 58.4
microns sec
P Z' 0.1 0.9
M E 1.3 17
M N 1.4 18
M Z 1.7 18

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

1963

Oct. 15 Ki iP 12 03 58.8
cont. microns sec
 P Z' 0.3 1.0
 M E 2.1 17
 M N 0.9 17
 M Z 2.2 18
 Gb iP 12 05 07.1 D
 Um iP 12 04 20.8
 Kurile Islands.
 h = 50 km (Up).

" 15 Up eP 12 14 50
 Ki iP 12 14 02.7
 microns sec
 P Z' 0.3 1.0
 Sk eP 12 14 40
 Um iP 12 14 24.4
 iP 12 14 36.8
 Kurile Islands.
 h = 50 km (Um).

" 15 Ki iP 12 33 52.3

" 15 Ki iP 13 05 22.6

" 15 Um iP 15 17 20.5

" 15 Ki iP 16 09 33.7

" 15 Ki iP 16 40 54.7

" 15 Up iP 17 26 58.6
 Ki eP 17 26 12
 Um iP 17 26 33.1 C
 Kurile Islands (h = 50 km).

" 15 Up iP 18 05 05.6 D
 Ki eP 18 04 17
 Um iP 18 04 40.5 D
 Kurile Islands (h = 30 km).

" 15 Up iP 18 34 57.0
 microns sec
 P Z' 0.1 0.5
 M E 2.4 18
 M N 2.4 17
 M Z 2.7 17
 Ki iP 18 34 10.6
 microns sec
 M E 5.9 17
 M N 3.2 22
 M Z 2.3 15
 Sk iP 18 34 46.7
 Gb iP 18 35 18.1
 Um iP 18 34 32.3
 eS 18 43 17

1963

Oct. 15 Kurile Islands (h = 40 km).
cont. Magn. = 5.8 (Up,Ki).

" 15 Up iP 20 39 06.9 C
 microns sec
 P Z' 0.1 0.5

" 15 Up iP 20 52 27.3
 microns sec
 M E 1.2 16
 M N 1.8 18
 M Z 1.3 16
 Ki eP 20 51 43
 microns sec
 M E 1.6 17
 M N 1.6 20
 Gb iP 20 52 50.6 D
 Um iP 20 52 02.6
 Kurile Islands (h = 50 km).

" 15 Up ---
 microns sec
 M N 2.0 20
 Ki eP 21 58 41
 microns sec
 M E 1.8 18
 M N 2.0 22
 Um iP 21 58 47.3
 Ceram (h = 25 km).

" 15 Up iP 22 52 37.7
 Kurile Islands (h = 40 km).

" 15 Up iP 23 28 39.5

" 16 Up iP 00 57 04.0
 Kurile Islands (h = 50 km).

" 16 Up iP 01 36 01.1
 Ki iP 01 35 14.0
 Um iP 01 35 35.4
 Kurile Islands (h = 50 km).

" 16 Up iP 03 26 02.8
 Um iP 03 25 37.1
 Kurile Islands.
 Origin time = 03 15 01.

" 16 Up iP 05 26 37.6 C
 Ki iP 05 25 50.4 C
 Um iP 05 26 11.7
 Kurile Islands (h = 30 km).

" 16 Sk e 07 32 25
 eSg 07 32 58
 Um iSg 07 34 18.8

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

1963

Oct. 16 Up iP 08 44 41.3
Ki iP 08 43 53.2 D
microns sec
P Z' 0.1 1.0
Sk eP 08 44 32
Um iP 08 44 15.4
ipP 08 44 28.3
Kurile Islands.
h = 50 km (Um).
" 16 Ki iP 09 40 14.1
Um iP 09 40 36.3
Kurile Islands (h = 40 km).
" 16 Up iP 10 41 53.9
Ki iP 10 41 07.6
Um iP 10 41 28.8
Kurile Islands (h = 50 km).
" 16 Gb iPg 13 00 50.4 C
iSg 13 00 52.1
Local explosion.
" 16 Ki iP 13 01 17.0
Halmaheira (h = 30 km).
" 16 Ki iP 15 50 15.6
" 16 Up iP 15 50 36.3
i 15 50 40.2
iPa 15 52 00
iPP 15 52 13.8
eS 15 56 30
iSa 15 58 44
iSS 15 59 38
iLgl 16 04 28
microns sec
P E 1.1 4
P Z 1.4 3
P Z' 0.3 1.0
PP Z 4.0 8
PP Z' 0.5 1.1
S E 1.3 7
M E 27 17
M N 66 15
M Z 36 14
D = 4450 km = 40°.
Ki iP 15 50 41.7
eSS 15 59 46
microns sec
P Z' 0.6 1.0
M E 47 11
M N 40 12
M Z 50 13
Sk iP 15 51 01.7
i 15 51 04.7
iPP 15 52 43.1

1963

Oct. 16 Gb iP 15 51 04.0
cont. iPP 15 52 38.6
Um iP 15 50 31.2
i 15 50 36.7
iPP 15 52 03.7
iS 15 56 30
Tadzhik (h = 30 km).
Magn. = 6.4 (Up,Ki).
Well developed higher mode
surface waves on long-
period records.
" 16 Up iP 17 11 48.5 C
Ki iP 17 11 12.1 C
Sk iP 17 11 22.8
Um iP 17 11 34.0 C
Nevada. Underground nuclear
explosion.
" 16 Up iP 18 16 37.8
i 18 16 41.8
" 16 Up iP 19 10 08.3
Ki iP 19 10 38.5
Sk iP 19 10 41.5
Um iP 19 10 20.0
Iran (h = 30 km).
" 16 Ki iP 20 38 46.5
Um iP 20 38 45.5
Tadzhik (h = 70 km).
" 16 Up iP 21 41 52.2 C
i(PP) 21 44 18.1
microns sec
P Z' 0.2 0.5
Ki iP 21 41 05.5
microns sec
P Z' 0.3 1.0
Sk eP 21 41 39
Gb iP 21 42 12.5
Um iP 21 41 26.8 C
ipP 21 41 48.6
Kurile Islands.
h = 90 km (Um).
Magn. = 6.4 (Up,Ki).
" 17 Ki iP 03 17 36.6
" 17 Up iP 04 30 50.1
ipP 04 31 03.9
Ki iP 04 30 02.8
Um iP 04 30 24.0
ipP 04 30 38.5
Kurile Islands.
h = 60 km (Up,Um).

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

1963					1963				
Oct.					Oct.				
17	Up	iP	08 21	55.3	cont.	17	Up		
				Kurile Islands (h = 50 km).			M	N	13 18
							M	Z	11 18
"	17	Ki	iP	08 41 29.4 C		Ki	iP		23 34 46.7
			ipP	08 41 42.3			i		23 34 49.3
		Um	iP	08 41 51.8			i		23 47 33
			ipP	08 42 03.7					
				Kurile Islands.			M	E	13 18
				h = 50 km (Ki,Um).			M	N	8.5 18
							M	Z	15 19
"	17	Um	iP	09 10 15.4		Sk	eP		23 35 23
							i		23 35 24.7
"	17	Ki	iP	09 41 05.1 C		Gb	iP		23 35 54.5
		Sk	eP	09 41 25			i		23 35 57.4
		Um	eP	09 40 54		Um	iP		23 35 09.8
				Tadzhik (h = 40 km).			ePa		23 39 14
							eS		23 43 37
"	17	Up	iP	10 27 47.8					Kurile Islands (h = 50 km).
				Kurile Islands (h = 50 km).					Magn. = 6.1 (Up,Ki).
"	17	Um	iP	12 00 31.7	"	18	Up	iP	00 05 55.8
							Ki	iP	00 05 11.6
"	17	Um	iP	13 10 56.2			Sk	iP	00 05 46.4 C
			i	13 12 37.2			Gb	iP	00 06 17.8
							Um	iP	00 05 31.0 C
"	17	Up	iP	14 17 34.6 C					Kurile Islands (h = 50 km).
		Um	iP	14 17 09.5	"	18	Up	iP	02 10 38.6
				Kurile Islands (h = 40 km).			Ki	eP	02 09 51
"	17	Up	iP	14 27 00.2			Gb	iP	02 10 59.9
		Ki	iP	14 26 40.8			Um	iP	02 10 13.6
		Um	eP	14 26 48					Kurile Islands (h = 50 km).
				Mindanao (h = 30 km).	"	18	Up	iP	04 12 22.0
"	17	Ki	iP	14 32 22.8				ipP	04 12 34.4
		Um	iP	14 32 44.5			Ki	iP	04 11 35.4
				Kurile Islands (h = 50 km).			Gb	iP	04 12 44.3
							Um	iP	04 11 56.5
"	17	Up	iP	15 14 12.3					Kurile Islands.
				Kurile Islands (h = 60 km).					h = 50 km (Up).
"	17	Up	iP	20 40 53.4 C	"	18	Up	iP	05 27 05.2 C
							Ki	iP	05 26 22.2 C
"	17	Up	eP	22 46 40			Sk	iP	05 26 58.6
		Ki	iP	22 45 52.0 C			Gb	iP	05 27 26.8
		Um	iP	22 46 14.0			Um	iP	05 26 41.3
				Kurile Islands (h = 30 km).				i(PcP)	05 27 12.1
									Japan (h = 40 km).
"	17	Up	iP	23 35 32.0	"	18	Up	iP	05 37 15.2
			i	23 35 33.2			Ki	iP	05 36 28.6
			i	23 35 35.0			Um	iP	05 36 50.0
			i	23 38 42.7					Kurile Islands (h = 40 km).
			e	23 44 47					
			i	23 45 45	"	18	Up	iP	06 31 20.3
				microns sec					microns sec
		P	Z	0.8 5			P	Z'	0.1 0.5
		P	Z'	0.2 0.7			M	N	1.1 18
		M	E	5.1 18					

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

1963						1963					
Oct.	18	Ki	iP	06 30 33.8		Oct.	18	Um	iP	19 36 37.4	
cont.		Sk	eP	06 31 10							
		Um	iP	06 30 55.5 D		"	18	Up	iP	20 16 04.6	
		Kurile Islands (h = 60 km).						i		20 18 16.2	
"	18	Ki	iP	07 15 23.9						microns sec	
		Um	iP	07 15 45.0				M	E	0.6 17	
		Kurile Islands (h = 30 km).						M	N	2.0 20	
								M	Z	1.6 17	
"	18	Ki	iP	08 05 24.3			Ki	iP	20 15 17.6 D		
		Kurile Islands (h = 60 km).							microns sec		
								M	E	1.6 19	
"	18	Up	iP	09 04 32.8				M	N	1.5 18	
				microns sec				M	Z	1.5 17	
		M	E	1.8 19			Um	eP	20 15 37		
		M	N	4.0 18			Ka	iP	20 16 27.5		
		M	Z	3.2 17			Kurile Islands (h = 40 km).				
		Ki	iP	09 03 44.8		"	18	Up	i(P)	20 32 05.5	
				microns sec				Um	i(P)	20 33 47.5	
		P	Z'	0.1 1.0		"	18	Up	iP	21 33 51.8	
		M	E	2.2 15				ipP	21 34 03.5		
		M	N	1.4 16					microns sec		
		M	Z	3.5 16				P	Z'	0.1 0.5	
		Sk	eP	09 04 21			Ki	iP	21 33 05.4 C		
		Gb	iP	09 04 52.8					microns sec		
		Um	iP	09 04 05.7				P	Z'	0.1 1.0	
		eS		09 12 45			Sk	iP	21 33 40.5		
		Kurile Islands (h = 60 km).					Gb	iP	21 34 12.9 C		
		Magn. = 5.7 (Up, Ki).					Um	iP	21 33 26.8 C		
"	18	Ki	iP	10 14 34.4			Ka	iP	21 34 13.9		
		Um	iP	10 14 56.3				ipP	21 34 25.7		
		Kurile Islands (h = 30 km).					Kurile Islands.				
"	18	Ki	iP	12 01 14.1			h = 50 km (Up, Ka).				
							Magn. = 5.9 (Up, Ki).				
"	18	Up	iP	15 34 05.3		"	18	Up	iP	21 50 17.5	
		Um	iP	15 34 48.0 C				Sumatra (h = 30 km).			
"	18	Up	eP	17 06 41		"	18	Up	iP	23 03 47.7	
		Ki	iP	17 07 52.1 D				ipP	23 04 00.0		
		Gb	iP	17 06 13.5 D			Ki	iP	23 03 00.7		
		Um	iP	17 07 19.6			Kurile Islands (h = 40 km).				
		Ka	iP	17 06 03.5 D		"	18	Up	iP	23 54 34.7	
"	18	Up	iP	18 05 55.8				Kurile Islands (h = 50 km).			
		ipP		18 06 22.4		"	19	Up	iP	02 29 31.6	
				microns sec				eS	02 38 29		
		M	N	1.1 18					microns sec		
		M	Z	1.6 20			P	E	0.3 5		
		Ki	eP	18 05 10 D			P	N	0.3 3		
				microns sec			P	Z	0.7 3		
		M	N	1.0 20			P	Z'	0.3 0.8		
		Um	iP	18 05 31.4			S	N	0.7 11		
		Kurile Islands (h = 40 km).					M	E	3.0 25		
"	18	Up	iP	18 57 00.4			M	N	4.1 17		
		Kurile Islands (h = 50 km).					M	Z	2.3 18		

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

1963

Oct. 19 Up D = 7500 km = $67\frac{1}{2}^{\circ}$.
cont. Ki iP 02 28 44.7 D
iS 02 36 58
microns sec
P Z' 0.3 1.5
S E 1.0 6
S N 1.3 4
M E 2.8 15
M N 3.7 17
M Z 7.4 17
D = 6650 km = 60° .
Sk iP 02 29 20.7
ipP 02 29 33.5
iPcP 02 29 47.1
Gb iP 02 29 53.6 D
Um iP 02 29 05.8
ePa 02 33 08
iS 02 37 42
Ka iP 02 29 55.6 D
Kurile Islands.
h = 50 km (Sk).
Magn. = 6.2 (Up,Ki).

" 19 Up iP 03 13 39.4
Um iP 03 13 13.3
Kurile Islands (h = 30 km).

" 19 Up iP 03 25 58.0 C
ipP 03 26 10.3
microns sec
P Z' 0.1 0.9
Ki iP 03 25 09.7 C
Sk iP 03 25 45.8
i 03 26 08.8
Gb iP 03 26 19.2
Um iP 03 25 32.1 C
ipP 03 25 44.6
Ka eP 03 26 21
ipP 03 26 34.2
Kurile Islands.
h = 50 km (Up,Um,Ka).

" 19 Up iP 03 45 15.3
iS 03 54 09
microns sec
P Z 1.1 6
P Z' 0.3 0.9
S E 0.6 11
S N 1.0 10
M E 5.2 26
M N 5.8 17
M Z 3.4 18
D = 7500 km = $67\frac{1}{2}^{\circ}$.
Ki iP 03 44 28.2
i 03 44 55
eS 03 52 38
microns sec
P Z 1.7 5

1963

Oct. 19 Ki microns sec
cont. P Z' 0.2 1.0
S E 1.8 13
S N 1.0 9
M E 4.7 18
M N 6.2 17
M Z 7.4 19
D = 6700 km = $60\frac{1}{2}^{\circ}$.
Sk iP 03 45 03.8
i 03 45 25.0
Gb iP 03 45 38.4
Um iP 03 44 48.6
i 03 44 51.4
iS 03 53 23
Ka eP 03 45 38
Kurile Islands (h = 30 km).
Magn. = 6.1 (Up,Ki).

" 19 Up iP 03 58 04.6 C
ipP 03 58 16.2
microns sec
P Z' 0.4 1.0
Ki iP 03 57 16.7
ipP 03 57 31.3
microns sec
P Z' 0.2 1.0
Sk iP 03 57 51.8 C
Gb iP 03 58 25.5
Um iP 03 57 38.7
Ka iP 03 58 26.9 C
Kurile Islands.
h = 50 km (Up,Ki).

" 19 Up iP 04 18 30.6 D
ipP 04 18 42.3
Kurile Islands.
h = 50 km (Up).

" 19 Up iP 05 52 16.7
Kurile Islands (h = 40 km).

" 19 Ki iP 06 53 32.6
Um iP 06 53 21.4
Kirghiz (h = 30 km).

" 19 Up iP 08 07 25.2
ipP 08 07 37.2
Kurile Islands.
h = 50 km (Up).

" 19 Up iP 09 15 15.3
Ki iP 09 14 56.3
Gb iP 09 15 35.3 C
Leyte, Philippine Islands
(h = 90 km).

" 19 Up iP 15 53 35.9 C
Kurile Islands (h = 40 km).

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

1963

Oct. 19 Up iP 16 26 17.0 C
ipP 16 26 29.5
microns sec
P Z' 0.1 1.0
Ki iP 16 25 29.1 C
Gb iP 16 26 37.3
ipP 16 26 50.7
Um iP 16 25 51.1
ipP 16 26 03.9
Ka iP 16 26 39.0 C
ipP 16 26 51.9

Kurile Islands.
h = 50 km (Up, Gb, Um, Ka).
A focal depth of 120 km,
as given by USCGS, is not
confirmed by our observations.

" 19 Up iP 16 31 51.9 D
Gb iP 16 32 12.4
Um iP 16 31 26.9
Ka iP 16 32 13.7
Kurile Islands (h = 50 km).

" 19 Up iP 18 12 52.8
Ki iP 18 12 05.2 C
Um iP 18 12 27.7 C
ipP 18 12 40.3
Kurile Islands.
h = 50 km (Um).

" 19 Up iP 19 21 13.9
Ki iP 19 20 27.4
Um iP 19 20 48.5
Kurile Islands (h = 50 km).

" 19 Up eP 22 56 32

" 19 Up iP 23 22 41.8
microns sec
P Z' 0.1 0.5
Ki iP 23 21 52.8
Um iP 23 22 16.4
Ka iP 23 23 03.5
Kurile Islands (h = 30 km).

" 19 Up iP 23 55 31.4
ipP 23 55 45.7
Um iP 23 55 06.3
Kurile Islands.
h = 60 km (Up).

" 20 Up e(P) 00 14 54

" 20 Um i(P) 00 41 51.2
i 00 41 56.7

" 20 Up iP 00 53 43.1
Kurile Islands (h = 40 km).

1963

Oct. 20 Up iP 01 04 10.6
i 01 04 11.8
iX 01 04 15.9
iY 01 04 32.1
eS 01 13 21
iP'P' 01 32 29.8
i 01 32 54.1

microns sec

P E 2.9 13
P N 6.4 16
P Z 7.4 8
P Z' 0.7 1.2
S E 19 20
S N 28 20
P'P' Z' 0.6 2.0
M E 180 19
M N 250 21
M Z 250 20

D = 7650 km = 69°.

Ki iP 01 03 25.1
iX 01 03 30.5 D
i 01 04 38.9
iS 01 11 56
i 01 12 38

microns sec

P E 4.0 7
P N 3.6 10
P Z 14 11
P Z' 0.7 1.4
S E 19 12
S N 10 12
S Z 15 12
M E 240 20
M N 190 20
M Z 300 20

D = 6950 km = 62½°.

Sk iP 01 04 03.3

iY 01 04 26.1

Gb iP 01 04 31.7

iX 01 04 38.3

iY 01 04 52.8

Um iP 01 03 46.6

iX 01 03 50.8

iS 01 12 36

Ka iP 01 04 33.8

iX 01 04 39.9

Kurile Islands (h = 25 km).

Magn. = 7.0 (Up, Ki).

The magnitude calculated from
the body waves is 6.9, from
the surface waves 7.6,
similarly to the main shock
on Oct. 13. This is the
largest aftershock and the
magnitude is only 0.5-0.6
lower than for the main shock.
Pasadena magnitudes, on the
hand, give a difference of 1.4.

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

1963		1963	
Oct.	20	Oct.	20
cont.		Up	iP
Complicated beginning with phases X and Y arriving on the average 5.5 and 21.8 sec after P. The amplitude is increasing in the order P - X - Y. Amplitudes given above for P actually refer to X. A phase corresponding to Y was also found on Oct. 19, 03 25 and 03 45, at Sk (see above).			01 33 34.8 C
			microns sec
		P	Z' 0.2 0.7
		Ki	iP 01 32 40.4
		Sk	iP 01 33 22.1
		Gb	iP 01 33 55.2
		Um	iP 01 33 08.7 C
		Ka	iP 01 33 57.1
		Kurile Islands (h = 40 km).	
"	20	Up	iP 01 34 17.1
		i	01 34 23.7
		i	01 34 36.2
			microns sec
		P	Z' 0.1 0.7
		Gb	iP 01 34 44.3
		(Kurile Islands).	
"	20	Up	iP 01 37 54.3
"	20	Up	iP 01 39 16.5
"	20	Up	iP 01 42 39.4 D
		ipP	01 42 52.1
		Um	iP 01 42 14.7
		ipP	01 42 27.1
		Kurile Islands.	
		h = 50 km (Up,Um).	
		Origin time = 01 31 37.	
"	20	Up	iP 01 43 55.6 D
		Um	iP 01 43 30.4 D
		Kurile Islands.	
		Origin time = 01 32 53.	
"	20	Up	iP 01 48 19.3
		i(pP)	01 48 33.6
"	20	Up	iP 01 51 42.6
		ipP	01 51 53.9
		Kurile Islands.	
		h = 50 km (Up).	
"	20	Up	iP 01 52 12.9 C
			microns sec
		P	Z' 0.1 1.0
		Um	iP 01 51 48.6
		Ka	iP 01 52 34.9
		Kurile Islands.	
		Origin time = 01 41 12.	
"	20	Up	iP 01 25 05.5 C
		Ki	iP 01 24 18.6
		Um	iP 01 24 40.3 C
		Kurile Islands (h = 50 km).	
"	20	Up	iP 01 27 10.4
"	20	Up	iP 02 00 08.6 C

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

1963						1963					
Oct.	20	Up	iP	02 01 54.2 D		Oct.	20	Ka	iP	03 10 16.2 D	
"	20	Up	iP	02 17 14.0		cont.				Kurile Islands (h = 60 km).	
			i	02 17 23.5		"	20	Up	iP	03 11 27.8	
"	20	Up	iP	02 18 13.5 C		"	20	Up	iPKP	03 18 22.7 C	
"	20	Up	iP	02 20 28.3				Gb	iPKP	03 18 31.7	
				microns sec				Um	iPKP	03 18 16.7 C	
			P	Z' 0.1 0.5				Ka	iPKP	03 18 34.2	
		Ki	iP	02 19 42.3						Fiji Islands (h = 600 km).	
		Sk	iP	02 20 21.8		"	20	Up	iP	03 24 25.8	
		Um	iP	02 20 03.0 D						Kurile Islands (h = 40 km).	
				Kurile Islands (h = 50 km).		"	20	Up	iP	03 27 44.6	
"	20	Up	iP	02 23 41.4				Um	iP	03 27 18.8	
			ipP	02 23 55.2						Kurile Islands (h = 30 km).	
		Um	iP	02 23 15.6		"	20	Up	iP	03 41 44.1 C	
				Kurile Islands.		"	20	Up	iP	03 45 30.0	
				h = 60 km (Up).				ipP	03 45 41.5		
"	20	Up	i(P)	02 24 10.9				Ki	iP	03 44 41.9	
"	20	Up	iP	02 31 36.5 C				Um	iP	03 45 04.5	
				Kurile Islands (h = 40 km).				ipP	03 45 16.0		
"	20	Up	iP	02 32 46.7						Kurile Islands.	
			ipP	02 32 57.2						h = 50 km (Up,Um).	
				Kurile Islands.						Origin time = 03 34 28.	
				h = 40 km (Up).		"	20	Up	iP	03 46 48.8	
				Origin time = 02 21 45.				ipP	03 47 03.2		
"	20	Up	iP	02 35 03.6						Kurile Islands.	
"	20	Up	iP	02 38 14.0 C						h = 60 km (Up).	
"	20	Ki	iP	02 54 10.9						Origin time = 03 35 47.	
"	20	Up	eP	02 57 40		"	20	Um	iP	03 52 19.4	
			ipP	02 57 55.9						Kurile Islands (h = 50 km).	
				Kurile Islands.		"	20	Up	iP	04 06 26.4 D	
				h = 60 km (Up).						Kurile Islands (h = 60 km).	
				Origin time = 02 46 38.		"	20	Up	iP	04 08 21.3	
				A typical feature in many				ipP	04 08 33.6		
				of these Kurile Islands						microns sec	
				shocks is that pP has a				P	Z' 0.1 0.8		
				much larger amplitude				Ki	iP	04 07 36.0	
				than P.				ipP	04 07 48.9		
"	20	Up	iP	03 02 47.6				Gb	iP	04 08 42.6	
		Um	iP	03 02 23.0 C				Um	iP	04 07 56.9	
				Kurile Islands (h = 40 km).				Ka	iP	04 08 43.6 C	
"	20	Up	iP	03 09 53.9				ipP	04 08 55.6		
				microns sec						Kurile Islands.	
		P	Z' 0.1 0.8							h = 50 km (Up,Ki,Ka).	
		Ki	iP	03 09 08.7		"	20	Up	iP	04 10 09.5	
		Um	iP	03 09 27.0						Kurile Islands (h = 60 km).	

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

1963					1963				
Oct.	20	Up	iP	04 13 12.6	Oct.	20	Gb	iP	06 21 50.5
"	20	Up	iP	04 26 53.0 C	cont.		Um	iP	06 21 05.2
"	20	Up	iP	04 42 37.8				ipP	06 21 17.6
			ipP	04 42 48.8			Ka	iP	06 21 51.7
		Um	iP	04 42 13.1 D				ipP	06 22 05.0
		Kurile Islands.					Kurile Islands.		
		h = 40 km (Up).					h = 50 km (Up,Ki,Um,Ka).		
"	20	Up	iP	04 51 07.4 D	"	20	Up	iP	06 49 53.3 D
		Um	iP	04 50 40.2			Ki	iP	06 49 07.1
		Kurile Islands (h = 50 km).					Um	iP	06 49 28.9
							Kurile Islands (h = 50 km).		
"	20	Up	iP	04 57 58.7	"	20	Up	iP	07 17 08.3
			ipP	04 58 11.6				ipP	07 17 20.4
		Ki	ipP	04 57 23.7			Kurile Islands.		
		Um	iP	04 57 33.0			h = 50 km (Up).		
		Ka	ipP	04 58 32.6	"	20	Up	iP	07 31 20.3
		Kurile Islands.					Um	iP	07 30 55.1
		h = 50 km (Up).					Kurile Islands (h = 40 km).		
"	20	Up	iP	05 03 30.9	"	20	Up	iP	07 48 27.2
			ipP	05 03 44.1	"	20	Up	iP	08 37 14.3
		Kurile Islands.					Um	iP	08 36 49.6 C
		h = 50 km (Up).					Ka	eP	08 37 36
		Origin time = 04 52 29.					Kurile Islands (h = 30 km).		
"	20	Up	iP	05 09 54.7 C	"	20	Up	iP	09 21 45.7 D
		Um	iP	05 09 30.3					microns sec
		Kurile Islands (h = 50 km).					P	N	0.6 6
"	20	Up	iP	05 10 33.2 C			P	Z'	0.2 0.6
"	20	Up	iP	05 15 21.7			M	E	3.6 19
"	20	Up	iP	05 31 18.6			M	N	7.6 18
		Ki	iP	05 30 32.3			M	Z	6.3 18
		Um	iP	05 30 53.6 D		Ki	iP		09 20 59.0
		Kurile Islands (h = 50 km).					eS		09 29 20
"	20	Up	iP	05 36 27.8					microns sec
"	20	Up	iP	05 51 41.3 C			P	Z'	0.1 1.0
		Ki	iP	05 50 53.6			S	N	0.8 14
		Um	iP	05 51 16.0			M	E	5.6 18
		Kurile Islands (h = 60 km).					M	N	4.5 20
"	20	Up	iP	06 21 29.8 D			M	Z	7.7 18
			ipP	06 21 42.0			D = 6850 km = 61 $\frac{1}{2}$ °.		
			i(PcP)	06 21 52.2		Sk	iP		09 21 36.7
				microns sec		Gb	iP		09 22 06.9
		P	Z'	0.1 0.6			i(pP)		09 22 15.8
	Ki	iP		06 20 44.2		Um	iP		09 21 20.5 D
		ipP		06 20 56.8			iS		09 30 09
				microns sec		Ka	iP		09 22 07.7
		P	Z'	0.2 1.0			ipP		09 22 19.5
	Sk	eP		06 21 21			Kurile Islands.		
							h = 50 km (Ka).		
							Magn. = 6.1 (Up,Ki).		
"	20	Up	iP	11 12 56.5	"	20	Up	iP	11 12 56.5
			i	11 13 04.7					

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

1963
Oct. 20 Ka iP 11 12 32.8
cont. i 11 13 08.7
Indian Ocean (h = 30 km).
" 20 Up eP 11 19 59
ipP 11 20 11.1
Kurile Islands.
h = 50 km (Up).
" 20 Up iP 11 26 31.8
Kurile Islands (h = 40 km).
" 20 Up iP 11 46 51.3
Kurile Islands (h = 50 km).
" 20 Up iP 12 03 20.4 C
iS 12 12 25
microns sec
P Z 1.3 6
P Z' 0.2 1.0
M E 5.1 18
M N 9.6 16
M Z 9.2 17
D = 7600 km = $68\frac{1}{2}^\circ$.
Ki iP 12 02 33.6 C
i(S) 12 11 05
microns sec
P Z' 0.2 1.0
(S) E 1.6 12
M E 8.4 16
M N 8.6 21
M Z 12 16
Gb iP 12 03 41.5 C
Um iP 12 02 55.1 C
iS 12 11 39
iScS 12 12 44
i 12 16 47
Ka iP 12 03 42.6 C
Kurile Islands (h = 50 km).
Magn. = 6.1 (Up, Ki).
" 20 Up iP 12 14 41.0
Kamchatka (h = 50 km).
" 20 Up iP 12 20 27.9
Ki iP 12 19 41.2
Kurile Islands (h = 50 km).
" 20 Up iP 13 07 08.8 C
i 13 07 21.3
iPcP 13 09 30.4
microns sec
P Z' 0.1 0.8
Ki iP 13 08 14.6 C
i 13 08 20.5
microns sec
P Z' 0.3 1.0
Sk iP 13 07 34.2 C

1963
Oct. 20 Gb iP 13 06 44.6
cont. Um iP 13 07 44.5
Ka iP 13 06 35.5
Algeria (h = 0 km).
Underground nuclear
explosion.
" 20 Up iP 13 32 11.8 C
Ki iP 13 31 25.4
Sk iP 13 32 01.2
Gb iP 13 32 31.9
Ka iP 13 32 34.0 C
Kurile Islands (h = 50 km).
" 20 Up iP 14 13 36.8
Kurile Islands (h = 50 km).
" 20 Up iP 15 22 28.3
ipP 15 22 40.5
Ki iP 15 21 41.4
Sk eP 15 22 16
Kurile Islands.
h = 50 km (Up).
" 20 Up iP 15 40 11.6
Ki iP 15 39 26.0
Kurile Islands (h = 50 km).
" 20 Up iP 15 51 24.0
i 15 51 39.8
" 20 Up iP 15 55 28.5
Kurile Islands (h = 50 km).
" 20 Up iP 16 01 22.9
i(pP) 16 01 35.4
" 20 Up iP 16 04 30.5 C
Kurile Islands (h = 50 km).
" 20 Up iP 16 11 16.6
Ki iP 16 10 29.2
Kurile Islands (h = 50 km).
" 20 Up iP 17 52 28.8
microns sec
P Z' 0.1 0.7
Sk eP 17 52 20
Gb iP 17 52 49.7
Ka iP 17 52 51.4
Kurile Islands.
" 20 Up iP 17 52 36.8 C
microns sec
P Z' 0.2 0.7
M E 1.2 16
M N 2.7 17
M Z 1.6 17

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

1963

Oct. 20 Ki iP 17 51 51.3
cont. microns sec

M E 2.4 18
M N 1.2 16
M Z 3.4 17

Sk iP 17 52 28.1

Gb iP 17 52 59.1

ipP 17 53 11.2

Um iP 17 52 12.2

Ka iP 17 52 59.3

ipP 17 53 11.6

Kurile Islands.

h = 50 km (Gb,Ka).

Origin time = 17 41 35.

" 20 Up iP 18 05 19.4

" 20 Ki iP 18 08 43.1

" 20 Up iP 18 09 59.0
ipP 18 10 11.7

microns sec

P Z' 0.1 0.8

M E 1.3 17

M N 2.0 17

M Z 1.6 17

Ki iP 18 09 15.0

i 18 09 23.6

microns sec

M E 1.6 16

M N 1.2 17

M Z 2.5 17

Sk eP 18 09 49

Gb iP 18 10 20.9

ipP 18 10 32.5

Um iP 18 09 34.8

Ka iP 18 10 21.7 C

ipP 18 10 34.0

Kurile Islands.

h = 50 km (Up,Gb,Ka).

" 20 Up iP 19 58 15.3
Kurile Islands (h = 50 km).

" 20 Up iP 21 19 20.4 D
iPcP 21 19 48.4
Kurile Islands (h = 40 km).

" 20 Up iP 22 00 04.1 C
ipP 22 00 33.7
Ki iP 21 59 59.6
Sk iP 22 00 19.6
Um iP 21 59 57.2
Ka iP 22 00 11.9
Burma. h = 120 km (Up).

" 20 Up iP 22 51 03.9
Kurile Islands (h = 40 km).

1963

Oct. 20 Up iP 22 58 55.5
Kurile Islands (h = 40 km).

" 21 Up iP 02 27 37.4
Kurile Islands (h = 70 km).

" 21 Up iP 03 25 56.1
Kurile Islands (h = 30 km).

" 21 Up iP 03 59 36.0
i 04 00 15.4

" 21 Up iP 05 56 38.0

" 21 Up iP 10 18 50.2 D
Ki eP 10 18 04
Kurile Islands (h = 60 km).

" 21 Ki iP 10 19 42.5
Kurile Islands (h = 60 km).

" 21 Up iP 13 20 05.4 D
i(pP) 13 20 15.1

microns sec

P Z' 0.1 1.0

Ki iP 13 19 17.6 D

ipP 13 19 30.5

microns sec

P Z' 0.2 1.0

Sk iP 13 19 54.6

Gb iP 13 20 26.1 D

ipP 13 20 38.0

Um iP 13 19 39.6

ipP 13 19 51.5

Ka eP 13 20 27

Kurile Islands.

h = 50 km (Ki,Gb,Um).

" 21 Ki iP 14 56 51.3
Tadzhik (h = 80 km).

" 21 Up iP 15 49 16.8
iPcP 15 49 44.1

microns sec

P Z' 0.1 0.5

Ki iP 15 48 31.0

Sk iP 15 49 06.3

Um iP 15 48 53.5

Ka eP 15 49 39

Kurile Islands (h = 60 km).

" 21 Um i(P) 17 20 42.2

" 21 Up iP 17 31 47.9 C
ipP 17 32 03.4

microns sec

P Z' 0.1 0.5

pP Z' 0.2 0.7

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

1963											1963											
Oct.	21	Ki	iP	17 31	04.0	C					Oct.	22	Ki	iP	01 13	34.0						
cont.			ipP	17 31	17.1					cont.			Luzon (h = 15 km).									
				microns sec																		
			P	Z'	0.1	1.0					"	22	Up	iP	02 40	12.3	C					
		Sk	iP	17 31	39.9							Ki	iP	02 39	26.0							
		Gb	eP	17 32	08.7							Sk	eP	02 40	02							
			ipP	17 32	24.7							Um	iP	02 39	47.1							
		Um	iP	17 31	23.8	C							Kurile Islands (h = 50 km).									
			ipP	17 31	38.7																	
		Ka	eP	17 32	12							"	22	Up	iP	03 28	13.9					
			ipP	17 32	25.3									microns sec								
		Kurile Islands.												P	Z'	0.1	0.6					
		h = 60 km (Up,Ki,Gb,Um,Ka).												M	E	2.0	18					
		Magn. = 5.9 (Up,Ki).												M	N	3.5	16					
													M	Z	4.0	16						
"	21	Up	i(P)	20 07	38.2							Ki	iP	03 27	28.4							
				microns sec										microns sec								
"	21	Up	iP	20 50	42.9								M	E	3.9	15						
			ipP	20 50	57.0								M	N	1.4	16						
				microns sec										M	Z	4.8	16					
			pP	Z'	0.1	0.6							Sk	eP	03 28	06						
		Um	ipP	20 50	32.0							Um	iP	03 27	49.3							
		Kurile Islands.											Ka	iP	03 28	37.6						
		h = 60 km (Up).											Kurile Islands (h = 50 km).									
				Magn. = 5.8 (Up,Ki).																		
"	21	Up	iP	21 31	38.0							"	22	Up	iP	03 36	43.8	C				
			i	21 32	13.0									ipP	03 36	58.1						
				microns sec										microns sec								
"	21	Up	iP	23 29	44.4									P	Z'	0.1	0.6					
			ipP	23 29	59.6							Ki	iP	03 35	57.7							
				microns sec										ipP	03 36	12.2						
			P	Z'	0.1	0.7							Sk	iP	03 36	32.7						
		Ki	iP	23 28	59.8									ipP	03 36	46.4						
			ipP	23 29	13.7							Um	iP	03 36	18.6	C						
		Um	iP	23 29	20.0							Ka	iP	03 37	05.2							
		Kurile Islands.												ipP	03 37	20.9						
		h = 60 km (Up,Ki).											Kurile Islands.									
"	21	Up	iP	23 40	24.5									h = 60 km (Up,Ki,Sk,Ka).								
			ipP	23 40	39.2							"	22	Up	iP	04 40	09.9					
			iPcP	23 40	51.9									ipP	04 40	21.0						
				microns sec									Ki	iP	04 39	16.6						
			P	Z'	0.1	0.5								ipP	04 39	28.6						
		Ki	iP	23 39	38.8	C							Sk	iP	04 39	58.3						
		Sk	eP	23 40	16							Aleutian Islands.										
		Um	iP	23 39	59.5	C							h = 50 km (Up,Ki).									
			ipP	23 40	14.6							"	22	Up	iP	05 00	17.3					
		Ka	iP	23 40	46.4	C							Ka	iP	05 00	39.7	C					
		Kurile Islands.											Kurile Islands (h = 30 km).									
		h = 60 km (Up,Um).											"	22	Up	iP	05 28	44.6				
"	21	Up	iP	23 44	15.6							"	22	Up	iP	08 20	22.1	D				
		Ka	iP	23 44	38.8	D									Ka	i(P)	08 19	33.4				
		Kurile Islands (h = 60 km).											"	22	Up	iP	10 29	18.2				
"	22	Up	iP	00 53	25.1							"	22	Up	iP	10 29	18.2					
"	22	Up	iP	01 13	51.6	C							"	22	Up	iP	10 29	18.2				

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

1963						1963					
Oct.	22	Up	ipP	10 29 32.7		Oct.	23	Up	iP	08 26 15.4	
cont.				microns sec						Kurile Islands (h = 50 km).	
			P	Z' 0.1 0.5							
		Ki	iP	10 28 31.9		"	23	Up	iP	09 58 16.0	
			ipP	10 28 47.1				i		09 59 32.8	
		Um	iP	10 28 53.4 C						microns sec	
			ipP	10 29 07.8				P		Z' 0.1 0.9	
				Kurile Islands.				M		E 1.1 17	
				h = 60 km (Up,Ki,Um).				M		N 1.6 20	
								M		Z 1.4 18	
"	22	Ki	iP	10 36 32.4			Ki	iP		09 57 33.4	
				Kurile Islands (h = 50 km).						microns sec	
"	22	Um	iP	12 14 52.9				P		Z' 0.2 1.2	
								M		E 2.7 18	
"	22	Ki	iP	12 15 45.3				M		N 1.5 18	
			iPcP	12 16 30.8			Sk	iP		09 58 07.8	
				Kurile Islands (h = 30 km).			Gb	iP		09 58 37.7	
"	22	Gb	iPg	12 20 42.8 C			Um	iP		09 57 52.9	
			iSg	12 20 44.9				ipP		09 58 04.8	
				Local explosion.			Ka	iP		09 58 37.9	
										Japan. h = 50 km (Um).	
										Magn. = 5.8 (Up,Ki).	
"	22	Ki	iP	12 29 34.5		"	23	Um	iP	11 00 53.6 C	
			ipP	12 29 46.6						Kurile Islands (h = 50 km).	
		Um	iP	12 29 55.7		"	23	Up	iP	11 29 19.5 D	
				Kurile Islands.				i		11 29 37.9	
				h = 50 km (Ki).						Kurile Islands (h = 50 km).	
"	22	Ki	iP	12 59 41.9		"	23	Up	iP	18 45 39.4	
				Kurile Islands (h = 50 km).						Kurile Islands (h = 50 km).	
"	22	Up	iP	16 11 43.9		"	23	Up	i(P)	20 41 19.8	
				Kurile Islands (h = 110 km).		"	23	Up	iP	21 29 22.6	
"	22	Up	iP	16 52 41.5 C				Um	iP	21 28 58.4 C	
"	22	Up	iP	17 08 15.9						Kurile Islands (h = 40 km).	
		Ki	iP	17 09 25.1		"	23	Up	iP	22 22 23.3	
				Crete (h = 30 km).				Ki	eP	22 21 36	
"	22	Up	iP	19 37 21.6				Um	iP	22 21 58.5 C	
		Um	iP	19 36 57.0						Kurile Islands (h = 20 km).	
				Kurile Islands (h = 30 km).		"	24	Up	iP	01 17 27.2 C	
"	23	Up	iP	00 17 10.0						microns sec	
			i(PcP)	00 17 33.1				P		Z' 0.1 1.0	
		Ki	iP	00 16 23.0 D				M		E 2.4 18	
			i	00 16 49.3				M		N 5.8 18	
		Gb	iP	00 17 30.6				M		Z 5.8 20	
		Um	iP	00 16 44.1			Ki	iP		01 16 37.3	
				Kurile Islands (h = 20 km).						microns sec	
"	23	Up	iP	02 19 56.1				M		E 3.1 16	
								M		N 2.8 18	
"	23	Up	iP	05 43 33.6				M		Z 5.0 19	
		Um	iP	05 43 08.6 D			Gb	iP		01 17 47.7	
				Kurile Islands (h = 50 km).							

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1963
Oct. 24 Um iP 01 17 01.5
cont. Ka iP 01 17 49.6 C
Kurile Islands (h = 50 km).
Magn. = 5.8 (Up,Ki).
" 24 Up iP 03 44 16.9
" 24 Ki iP 07 09 06.9
Um iP 07 09 13.5
Babuyan Islands,
Philippines (h = 70 km).
" 24 Up iP 07 39 27.3 C
iPP 07 43 08.4
microns sec
P Z' 0.3 1.1
PP Z' 0.2 1.3
M E 1.7 18
M N 2.3 19
M Z 2.9 18
Ki iP 07 39 27.0
ipP 07 39 40.4
microns sec
P Z' 0.4 1.2
M E 3.3 19
M N 1.8 18
M Z 4.4 18
Sk iP 07 39 39.9 C
iPP 07 43 29.8
Gb iP 07 39 40.4
i 07 42 45.3
Um iP 07 39 24.3 C
iPP 07 43 03.8
Ka iPP 07 43 16.4
Sumatra. h = 50 km (Ki).
Magn. = 6.3 (Up,Ki).
" 24 Ki iP 08 14 02.3
Kurile Islands (h = 60 km).
" 24 Up iP 13 56 16.6
Ki iP 13 55 30.9
microns sec
P Z' 0.1 1.0
Um iP 13 55 51.8 D
Kurile Islands (h = 50 km).
" 24 Up iP 15 35 05.2
Kurile Islands (h = 50 km).
" 24 Up iP 20 14 57.7
" 24 Up iP 20 29 14.1 D

1963
Oct. 24 Up microns sec
cont. P Z' 0.1 0.5
Ki iP 20 28 28.8
iPcP 20 29 09.7
Um iP 20 28 49.1
Ka iP 20 29 36.8
Kurile Islands (h = 40 km).
" 25 Up iP 01 19 33.2
Kurile Islands (h = 50 km).
" 25 Up i(P) 01 49 17.2
" 25 Up iP 03 55 20.8
" 25 Ka iP 04 48 13.7
e(S) 04 50 04
South coast of England.
" 25 Up iP 06 12 53.4
Um iP 06 12 31.9 C
Ka iP 06 13 16.4
Aleutian Islands
(h = 70 km).
" 25 Up iP 10 28 54.3
Ki iP 10 28 08.6
Um eP 10 28 29
Ka iP 10 29 17.2
Kurile Islands (h = 40 km).
" 25 Up iP 10 31 28.4
" 25 Um iP 11 23 38.2
Kurile Islands (h = 50 km).
" 25 Up iP 12 08 52.3 C
Kurile Islands (h = 70 km).
" 25 Up iP 12 44 05.6
i(pP) 12 44 22.0
Um iP 12 43 41.8
Kurile Islands (h = 50 km).
" 25 Up iP 16 52 50.4 D
Kurile Islands (h = 20 km).
" 25 Up iP 19 12 56.5
i(P) 19 13 40.3
Um iP 19 12 25.5
Kurile Islands (h = 30 km).
" 25 Ki eP 20 12 08
Mariana Islands (h = 30 km).

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1963
Oct. 25 Up i(P) 20 43 13.6
" 25 Up iP 22 51 15.3 C
" 25 Up i 22 51 20.6
" 25 Sk iP 22 51 28.4
" 25 Sk i 22 51 32.8
" 25 Up iP 22 58 56.0
" 25 P microns sec Z' 0.1 0.6
" 25 Ki iP 22 58 39.2
" 25 Sk iP 22 59 08.9
" 25 i 22 59 13.9
" 25 Gb iP 22 59 25.6
" 25 Um iP 22 58 46.3
" 25 Ka eP 22 59 15
" 25 Tsinghai (h = 30 km).
" 26 Up iP 04 06 37.1 C
" 26 Up i 04 06 39.1
" 26 Up iPP 04 09 04.8
" 26 P microns sec Z' 0.1 0.5
" 26 M E 1.9 20
" 26 M N 5.7 19
" 26 M Z 5.5 19
" 26 Ki iP 04 05 52.3
" 26 M microns sec E 2.8 21
" 26 M N 2.9 20
" 26 M Z 3.9 18
" 26 Sk eP 04 06 30
" 26 Gb iP 04 07 00.8
" 26 Um iP 04 06 14.2
" 26 eSS 04 19 14
" 26 Ka iP 04 07 01.2 C
" 26 i 04 07 43.3
" 26 Kurile Islands (h = 60 km).
" 26 Magn. = 5.8 (Up,Ki).
" 26 Up iP 05 12 39.2
" 26 Ki i(pP) 05 12 05.1
" 26 Um iP 05 12 12.7 C
" 26 Kurile Islands (h = 40 km).
" 26 Up iP 06 10 43.1
" 26 Sk eP 06 10 33
" 26 Gb eP 06 11 01
" 26 Um iP 06 10 17.4
" 26 Ka iP 06 11 06.1
" 26 Kurile Islands (h = 60 km).
" 26 Up iP 06 36 02.3 D
" 26 Kurile Islands (h = 60 km).
" 26 Up iP 06 38 52.4 C
" 26 Kurile Islands (h = 60 km).

1963
Oct. 26 Up iP 07 06 50.1
" 26 Kurile Islands (h = 60 km).
" 26 Up iP 07 35 30.2
" 26 Aleutian Islands (h = 30 km).
" 26 Up iP 10 05 37.6 D
" 26 Up iP 11 06 07.5
" 26 Up iP 11 32 46.2
" 26 P microns sec Z' 0.1 0.5
" 26 M E 1.1 20
" 26 M N 2.7 19
" 26 M Z 2.4 19
" 26 Ki iP 11 31 59.7
" 26 P microns sec Z' 0.1 1.2
" 26 M E 2.1 17
" 26 M N 1.0 16
" 26 Sk iP 11 32 36.1
" 26 Gb iP 11 33 09.0
" 26 Um iP 11 32 21.0
" 26 Ka iP 11 33 08.9
" 26 Kurile Islands (h = 60 km).
" 26 Magn. = 5.8 (Up,Ki).
" 26 Up iP 11 42 52.0
" 26 P microns sec Z' 0.1 0.6
" 26 Ki iP 11 42 05.3
" 26 Um iP 11 42 26.9 C
" 26 Ka iP 11 43 15.0
" 26 Kurile Islands (h = 60 km).
" 26 Up iP 11 44 18.2
" 26 Um iP 11 43 53.8
" 26 Kurile Islands.
" 26 Origin time = 11 33 16.
" 26 Um iP 12 15 21.5
" 26 Um iP 14 55 22.5 C
" 26 Up iP 17 11 41.6
" 26 Ki iP 17 11 06.6 C
" 26 Ka iP 17 11 55.7
" 26 Nevada. Underground nuclear explosion.
" 26 Up iP 19 16 59.9 C
" 26 Kurile Islands (h = 50 km).
" 27 Up iP 00 10 05.0
" 27 Ki iP 00 09 19.5
" 27 P microns sec Z' 0.1 1.0
" 27 Kurile Islands (h = 30 km).

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

1963					
Oct.	27	Up	iP	06 00	14.2
			Kurile Islands	(h = 20 km).	
"	27	Up	i(P)	07 31	45.1
"	27	Up	eP	07 49	51
"	27	Gb	iPKP	10 58	21.4
			i(pPKP)	10 58	33.1
			Tonga Islands	(h = 40 km).	
"	27	Up	iP	13 10	53.1
			ipP	13 11	04.5
		Ki	iP	13 10	44.3
		Sk	iP	13 11	06.5
			i	13 11	14.4
		Um	eP	13 10	37
			Sinkiang.	h = 50 km (Up).	
"	27	Up	iPKP	18 44	10.3
		Gb	iPKP	18 44	20.1 C
		Ka	iPKP	18 44	22.2 C
			Tonga Islands	(h = 30 km).	
"	27	Up	iP	20 04	50.7
			Kurile Islands	(h = 70 km).	
"	27	Up	iP	20 16	37.5 C
			iPeP	20 17	02.6
				microns sec	
		P	Z'	0.1	0.5
		Ki	iP	20 15	51.0 C
		Sk	eP	20 16	27
		Um	iP	20 16	12.3
		Ka	iP	20 17	00.4 C
			Kurile Islands	(h = 50 km).	
"	28	Up	iP	05 09	41.3
		Ki	iP	05 08	54.9
		Um	iP	05 09	15.5
			Kurile Islands	(h = 50 km).	
"	28	Ki	e(Sn)	05 32	32
			i(Sg)	05 32	55.6
"	28	Um	iP	05 49	22.2
"	28	Up	iPKP	08 14	40.7
		Gb	iPKP	08 14	49.3 C
		Ka	iPKP	08 14	51.7 C
			Tonga Islands	(h = 30 km).	
"	28	Up	iP	08 40	15.4
"	28	Up	iP	10 29	10.6
		Ki	iP	10 28	24.9 C
			Kurile Islands	(h = 50 km).	

1963					
Oct.	28	Up	iP	12 13 49.2	
			iS	12 22 17	
				microns sec	
		P	N	0.3	2
		P	Z	0.5	2
		P	Z'	0.2	0.7
		S	E	0.5	2
		S	N	1.0	3
		M	E	1.6	21
		M	N	2.3	22
		M	Z	3.0	23
		D =	7050 km =	63 $\frac{1}{2}$ ^o .	
	Ki	iP		12 12 55.9	C
		iS		12 20 37	
				microns sec	
		P	Z'	0.2	1.0
		S	N	0.4	8
		M	E	3.0	23
		M	N	1.4	17
		M	Z	2.7	15 ^o .
		D =	6200 km =	56 ^o .	
	Sk	iP		12 13 32.9	
	Gb	iP		12 14 10.1	
	Um	iP		12 13 21.2	C
		iS		12 21 24	
	Ka	iP		12 14 13.0	C
		iS		12 23 06.8	
				Kamchatka (h = 30 km).	
				Magn. = 6.2 (Up,Ki).	
				The comparatively small surfacewaves may indicate a depth slightly greater than normal.	
"	28	Up	iP	14 24 30.1	
		Ki	iP	14 23 43.3	D
				Kurile Islands (h = 50 km).	
"	28	Up	iP	18 16 10.4	
		Ki	eP	18 15 23	
		Um	iP	18 15 44.2	
				Kurile Islands (h = 60 km).	
"	28	Up	iP	20 11 25.5	C
"	28	Up	iPKP	20 17 44.1	C
				microns sec	
		PKP	Z'	0.1	0.6
	Gb	iPKP		20 17 54.0	C
	Um	iSKP		20 20 26.5	
	Ka	iPKP		20 17 55.8	
				Fiji Islands (h = 530 km).	
"	28	Up	iP	20 42 49.8	
"	28	Up	iP	20 48 20.6	
				microns sec	
		M	E	0.6	17

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

1963						1963						
Oct.	28	Up		microns sec		Oct.	29	Up	i	20 41 50.2		
cont.		M	N	1.1 18		cont.				microns sec		
		M	Z	1.4 18				PKP	Z'	0.1 1.0		
		Ki	iP	20 47 09.8				Um	iPKP	20 41 46.7		
				microns sec				Kermadec Islands (h = 50 km).				
		M	E	1.2 18								
		M	N	0.7 17		"	29	Up	iP	22 31 56.2		
		Ka	iP	20 48 40.1				i		22 32 00.9		
		Kurile Islands (h = 50 km).						iLg1		22 47 06		
"	28	Up	iP	21 58 54.9				iLg2		22 47 56		
		Ki	iP	21 58 03.8						microns sec		
		Sk	eP	21 58 43				M	E	2.1 14		
		Kurile Islands (h = 110 km).						M	N	2.4 10		
"	29	Up	iP	02 34 56.1				M	Z	4.1 13		
		Kurile Islands (h = 50 km).					Ki	iP	22 31 35.6			
"	29	Up	iP	10 31 11.9						microns sec		
"	29	Gb	iPg	15 15 41.7 C				P	Z'	0.1 1.2		
			iSg	15 15 43.7				M	E	2.7 10		
		Local explosion.						M	N	3.9 17		
"	29	Up	iPKP	17 15 19.1 C				M	Z	3.0 10		
		Kermadec Islands					Sk	iP	22 32 09.7			
		(h = 70 km).					Gb	eP	22 32 28			
"	29	Up	iSg	18 31 45.4			Um	iP	22 31 37.3			
		Ki	iPg	18 29 07.6				i		22 31 42.2		
			iSg	18 29 33.3				eSS		22 40 48		
				microns sec				e		22 42 47		
			Sg	Z' 0.5 0.5			Ka	iP	22 32 21.9			
				D = 220 km = 2.0°			Mongolia.					
		Sk	iSg	18 30 54.9		"	29	Gb	iPKP	22 42 14.7		
		Um	iPg	18 29 09.7 C				Tonga Islands (h = 30 km).				
			iSg	18 29 37.0		"	29	Um	iP	22 45 50.2 D		
				D = 230 km = 2.1°				Yugoslavia.				
		Ka	i(Sg)	18 33 47.0		"	30	Up	iP	00 46 38.7		
		Boden, North Sweden,						Um	iP	00 46 13.5		
		65.8°N, 21.5°E.						Kurile Islands (h = 60 km).				
		Origin time = 18 28 28.					"	30	Um	iP	02 41 39.8	
		Felt. Foreshock to the					"	30	Um	i(P)	06 40 24.6	
		following.					"	30	Up	eSg	09 12 28	
"	29	Up	iSg	18 31 49.3				Ka	iPg	09 10 03.1		
		Ki	iPg	18 29 11.4					iSg	09 10 28.9		
		Sk	iSn	18 30 39.2						D = 220 km = 1.9°		
			iSg	18 30 58.4				South Baltic, 54.8°N, 13.3°E.				
		Um	iSg	18 29 40.8				Origin time = 09 09 26.				
		Ka	i(Sg)	18 33 51.5				Explosion.				
		Boden, North Sweden,						This is the first of a				
		65.8°N, 21.5°E.						series of explosions in				
		Origin time = 18 28 32.						South Baltic on Oct. 30.				
		Felt.						They can be arranged into				
"	29	Up	iP	20 37 16.5				three groups, I, II and III,				
"	29	Up	iPKP	20 41 45.8 D				with the following character-				
								istics.				
								I: average location 54.8°N,				
								13.3°E, duration 09.09-				
								10.37, 14 events at				

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1963

Oct. 30 regular intervals of 7 min.
cont. II: average location 54.6°N,
13.1°E (i.e. 28 km from
location I), duration 13.02-
13.54, 8 events at less
regular intervals.
III: average location
54.6°N, 13.1°E (same as
II), duration 15.00-15.54,
5 events.
This is all based on our
records, and no direct
information is available
to us. Similar series of
explosions in the South
Baltic, at a distance of
1.9° from Ka, took place
on Oct. 7, 8 and 17 (these
could not be reported because
of time signal failure at
Ka).

" 30 Up eSg 09 19 25
Gb eSg 09 18 05
Ka iPg 09 17 01.4
iSg 09 17 28.1
D = 220 km = 1.9°.
South Baltic, 54.8°N,
13.3°E.
Origin time = 09 16 25.
Explosion.

" 30 Up iSg 09 25 41.8
Gb iSg 09 24 32.5
Ka iPg 09 23 32.9
iSg 09 23 58.4
D = 220 km = 1.9°.
South Baltic, 54.8°N,
13.3°E.
Origin time = 09 22 55.
Explosion.

" 30 Up iS* 09 32 30.2
iSg 09 32 47.9
Gb iSg 09 31 28.2
Ka iPg 09 30 24.3
iSg 09 30 49.6
D = 220 km = 1.9°.
South Baltic, 54.8°N,
13.3°E.
Origin time = 09 29 47.
Explosion.

" 30 Up iSg 09 39 47.9
Gb iSg 09 38 19.2
Ka iPg 09 37 23.7
iSg 09 37 49.3
D = 220 km = 1.9°.
South Baltic, 54.8°N,

1963

Oct. 30 13.3°E.
cont. Origin time = 09 36 46.
Explosion.

" 30 Ka iPg 09 44 24.2
iSg 09 44 49.6
D = 220 km = 1.9°.
South Baltic, 54.8°N,
13.3°E.
Origin time = 09 43 47.
Explosion.

" 30 Up iS* 09 53 21.7
iSg 09 53 39.6
Ka iPg 09 51 13.2
iSg 09 51 38.8
D = 220 km = 1.9°.
South Baltic, 54.8°N,
13.3°E.
Origin time = 09 50 36.
Explosion.

" 30 Up iS* 10 00 28.5
iSg 10 00 43.3
Ka iPg 09 58 18.1
iSg 09 58 43.2
D = 220 km = 1.9°.
South Baltic, 54.8°N,
13.3°E.
Origin time = 09 57 40.
Explosion.

" 30 Up iSg 10 07 31.6
Ka iPg 10 05 05.1
iSg 10 05 30.4
D = 220 km = 1.9°.
South Baltic, 54.8°N,
13.3°E.
Origin time = 10 04 27.
Explosion.

" 30 Up iS* 10 14 00.6
iSg 10 14 15.8
Ka iPg 10 11 49.1
iSg 10 12 14.1
D = 220 km = 1.9°.
South Baltic, 54.8°N,
13.3°E.
Origin time = 10 11 11.
Explosion.

" 30 Up iSg 10 20 37.2
Ka iPg 10 18 25.4
iSg 10 18 50.1
D = 220 km = 1.9°.
South Baltic, 54.8°N,
13.3°E.
Origin time = 10 17 47.
Explosion.

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

1963				1963			
Oct.	30	Up	iSg 10 27 10.6	Oct.	30	Up	iSg 13 37 44.9
		Ka	iPg 10 24 47.1			Ka	iPg 13 35 23.2
			iSg 10 25 12.6				iSg 13 35 51.2
			D = 220 km = 1.9°				D = 230 km = 2.1°
			South Baltic, 54.8°N,				South Baltic, 54.6°N,
			13.3°E.				13.1°E.
			Origin time = 10 24 10.				Origin time = 13 34 42.
			Explosion.				Explosion.
"	30	Ka	iPg 10 31 02.1	"	30	Ka	iPg 13 41 50.5
			iSg 10 31 27.4				iSg 13 42 17.8
			D = 220 km = 1.9°				D = 230 km = 2.1°
			South Baltic, 54.8°N,				South Baltic, 54.6°N,
			13.3°E.				13.1°E.
			Origin time = 10 30 24.				Origin time = 13 41 09.
			Explosion.				Explosion.
"	30	Ka	iPg 10 37 20.6	"	30	Up	iSg 13 51 11.2
			iSg 10 37 46.0			Ka	iPg 13 48 44.1
			D = 220 km = 1.9°				iSg 13 49 10.1
			South Baltic, 54.8°N,				D = 230 km = 2.1°
			13.3°E.				South Baltic 54.6°N,
			Origin time = 10 36 43.				13.1°E.
			Explosion.				Origin time = 13 48 01.
"	30	Up	iSg 13 04 50.3	"	30	Ka	iPg 13 54 35.1
		Ka	iPg 13 02 20.3				iSg 13 55 03.6
			iSg 13 02 47.5				D = 230 km = 2.1°
			D = 230 km = 2.1°				South Baltic, 54.6°N,
			South Baltic, 54.6°N,				13.1°E.
			13.1°E.				Origin time = 13 53 55.
			Origin time = 13 01 39.				Explosion.
			Explosion.				
"	30	Up	iSg 13 13 20.8	"	30	Up	iSg 15 03 18.5
		Ka	iPg 13 10 55.1			Ka	iPg 15 00 53.8
			iSg 13 11 22.4				iSg 15 01 21.4
			D = 230 km = 2.1°				D = 230 km = 2.1°
			South Baltic, 54.6°N,				South Baltic, 54.6°N,
			13.1°E.				13.1°E.
			Origin time = 13 10 13.				Origin time = 15 00 12.
			Explosion.				Explosion.
"	30	Ka	iPg 13 17 05.0	"	30	Up	iSg 15 20 37.3
			iSg 13 17 32.6			Ka	iPg 15 18 06.1
			D = 230 km = 2.1°				iSg 15 18 33.7
			South Baltic, 54.6°N,				D = 230 km = 2.1°
			13.1°E.				South Baltic, 54.6°N,
			Origin time = 13 16 24.				13.1°E.
			Explosion.				Origin time = 15 17 25.
"	30	Up	iSg 13 25 43.9	"	30	Ka	iPg 15 25 48.4
		Ka	iPg 13 23 24.2				iSg 15 26 16.6
			iSg 13 23 51.9				D = 230 km = 2.1°
			D = 230 km = 2.1°				South Baltic, 54.6°N,
			South Baltic, 54.6°N,				13.1°E.
			13.1°E.				Origin time = 15 25 08.
			Origin time = 13 22 43.				Explosion.
			Explosion.				

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

1963

Oct. 30 Ki iP 15 31 20.3
Um iP 15 31 41.4
Kurile Islands (h = 50 km).

" 30 Up iSg 15 36 40.3
Ka iPg 15 34 09.1
iSg 15 34 36.6
D = 230 km = 2.1°.
South Baltic, 54.6°N,
13.1°E.
Origin time = 15 33 28.
Explosion.

" 30 Up iSg 15 57 04.0
Ka iPg 15 54 32.7
iSg 15 55 00.6
D = 230 km = 2.1°.
South Baltic, 54.6°N,
13.1°E.
Origin time = 15 53 52.
Explosion.

" 30 Ki eP 18 31 40
Sk iP 18 31 55.1
iS 18 33 39.9
D = 1080 km = 9.7°.
Um iP 18 32 17.9 C
N. Atlantic - Arctic Ocean
(h = 30 km).

" 30 Up iP 22 53 36.7
Um iP 22 53 11.8
Kurile Islands (h = 30 km).

" 31 Sk e 01 03 36
e(Sg) 01 03 56

" 31 Up e(PKP) 03 37 01
i 03 39 37.6
e 03 40 01
iPKS 03 40 46
iSKKS 03 47 12
microns sec
PKS N 0.7 5
M E 1.7 18
M N 2.8 20
M Z 2.4 19
(D = 15800 km = 142°).

Ki iPP 03 39 20
ePKS 03 40 22
iSS 03 57 09

microns sec
PP Z 1.0 9
PKS E 0.7 11
PKS N 0.8 8
PKS Z 1.4 11
M E 2.2 20
M N 1.6 20
M Z 2.8 18

(D = 14900 km = 134°).

1963

Oct. 31 Sk i(PKP) 03 37 17.8
cont. Gb iPKP 03 37 12.0
Um iPKP 03 37 09.9

i 03 39 33
ePP 03 39 45
ePKS 03 40 32
iSS 03 57 45
Ka iPKP 03 37 15.3 C
Tonga Islands (h = 30 km).
Magn. = 6.2 (Up, Ki).

It happens repeatedly that
distances calculated from
travel times in these
distance ranges are about
2° smaller than those
calculated from epicentral
coordinates (all data on
epicenter and origin time
and depth based on USCGS
determinations, and Jeffreys-
Bullen's tables used).

" 31 Up iPKP 04 44 10.0
Gb iPKP 04 44 20.6 C
Um iPKP 04 44 08.4
Fiji Islands (h = 460 km).

" 31 Up i(P) 05 03 55.5

" 31 Up eP 10 04 45
Ki iP 10 05 20.2
Sk iP 10 05 20.6
Um eP 10 04 58
Iran (h = 40 km).

" 31 Up i 20 20 39.5
microns sec
M E 0.4 14
M N 0.8 10
M Z 1.1 14

Ki ---
microns sec
M E 1.1 1.0
M N 0.5 11
M Z 1.3 10
Hindu Kush (h = 110 km).

" 31 Up iP 20 42 21.7
i 20 42 46.1
i 20 42 58.7

" 31 Sk e(P) 22 17 55

Markus Båth
September 2, 1964

Seismological Institute
Uppsala

P R E L I M I N A R Y

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

N O V E M B E R 1 - 30, 1963
.....

1963					1963				
Nov.	1	Up	iSn	00 31 37.1	Nov.	1	Up	iP	04 03 01.8 C
		Sk	ePn	00 29 25				ipP	04 03 12.2
			i	00 29 47.9					microns sec
			iSn	00 30 10.6			P	Z' 0.1 0.5	
			D = 420 km = 3.8°.			Ki	iP	04 02 09.3 C	
		Gb	e(Sn)	00 31 00			ipP	04 02 19.2	
		Um	e	00 31 59				microns sec	
			iS [±]	00 32 09.6			P	Z' 0.2 0.9	
			Off coast of Norway,			Sk	iP	04 02 45.0 C	
			62.9°N, 4.7°E.				ipP	04 02 55.5	
			Origin time = 00 28 26.			Gb	iP	04 03 21.6 C	
			Foreshock to the following				ipP	04 03 31.9	
			earthquake.			Um	iP	04 02 34.1 C	
"	1	Up	iPn	01 36 03.9			ipP	04 02 44.7	
			iSn	01 37 25.5			Ka	eP	04 03 26
			i(Sg)	01 38 03.9				Kamchatka, h = 40 km	
			microns sec					(Up, Ki, Sk, Gb, Um).	
			(Sg) Z' 0.1 0.5					Magn. = 6.2 (Up, Ki).	
			D = 780 km = 7.0°.	"	1	Ki	iSn	05 32 25.4	
		Ki	iPn	01 36 20.1 D			iSg	05 32 49.2	
			iSn	01 37 52.5				Possibly explosion in	
			D = 910 km = 8.2°.					Northwest Russia.	
		Sk	iPn	01 35 17.1					
			iSn	01 36 05.1	"	1	Up	eP	07 11 53
			D = 420 km = 3.8°.			Ki	iP	07 12 29.9	
		Gb	iSn	01 37 02.4			Sk	eP	07 12 24
			iSg	01 37 41.3			Um	iP	07 12 08.2 C
			i	01 38 22.2				Gulf of Aden (h = 30 km).	
			D = 680 km = 6.1°.						
		Um	iPn	01 36 05.8 D	"	1	Up	iPKP	21 18 42.4
			iSn	01 37 28.4			i	21 18 45.5	
			iS [±]	01 37 58.9			Ki	iPKP	21 18 35.8
			D = 790 km = 7.1°.			Sk	ePKP	21 18 35	
		Ka	iPn	01 36 24.6			i	21 18 44.7	
			Off coast of Norway,			Gb	iPKP	21 18 53.4 D	
			62.9°N, 4.7°E.			Um	iPKP	21 18 31.3	
			Origin time = 01 34 18.				i	21 18 39.5	
							iSKP	21 22 04.2	

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

1963					1963				
Nov.	1	Ka	iPKP	21 18 56.1 D	Nov.	3	Ka	i(Pg)	00 28 10.3 C
cont.				Tonga Islands (h = 70 km).	cont.			e(Sg)	00 29 05
				This case well illustrates		"	3	Up	eP
				the caustic effect at 143°				i	01 26 31
				on the amplitudes of PKP.				Ki	iP
				The amplitudes at Gb and Ka					01 25 39.8
				are 10-20 times those at					Kurile Islands (h = 50 km).
				the other four stations.					
"	1	Up	iP	22 52 17.5	"	3	Up	iP	01 48 02.3
			i	22 52 19.6					Kurile Islands (h = 30 km).
			iPcP	22 52 43.5	"	3	Up	iP	02 26 11.8
				microns sec			Sk	iP	02 26 14.8
			P	Z' 0.1 0.7					Formosa (h = 30 km).
		Ki	iP	22 51 34.4					
		Sk	iP	22 52 09.0	"	3	Up	iP	03 23 37.6
			iPcP	22 52 37.7				iPP	03 27 33.8
		Gb	iP	22 52 40.2 D				iSKS	03 34 10
		Um	iP	22 51 54.5 D				iS	03 34 50
		Ka	iP	22 52 41.0				eY	03 36 07
				Kurile Islands (h = 60 km).					microns sec
"	2	Up	iP	09 28 22.2				P	Z 0.9 10
			ipP	09 28 37.4				P	Z' 0.1 1.0
		Ki	iP	09 27 36.1				SKS	E 2.2 10
		Um	iP	09 27 57.4 C				S	N 0.8 5
				Kurile Islands. h = 60 km				M	E 13 21
				(Up).				M	N 11 20
"	2	Up	iP	10 24 03.7				M	Z 19 22
				Aleutian Islands					D = 10650 km = 96°.
				(h = 30 km).		Ki	iP	03 23 40.7	
"	2	Up	iP	18 04 31.7 D			iPP	03 27 35.0	
			ipP	18 04 45.0			iSKS	03 34 15	
		Ki	iP	18 03 46.1			eY	03 36 21	
				microns sec					microns sec
			P	Z' 0.2 1.5				P	Z' 0.6 2.0
		Sk	iP	18 04 20.8				SKS	E 4.4 10
			ipP	18 04 34.6				SKS	N 1.0 9
		Um	iP	18 04 06.8				M	E 6.1 21
			ipP	18 04 20.3				M	N 2.9 20
				Kurile Islands. h = 50 km				M	Z 9.4 22
				(Up, Sk, Um).					D = 10800 km = 97°.
"	2	Up	iS _n	22 57 05.9		Sk	iP	03 23 25.7	
			iSg	22 57 10.5 03.3			i	03 23 35.4	
		Sk	eIgl	22 58 18			iX	03 26 39.5	
		Gb	iPg	22 55 08.1			iPP	03 27 21.7	
			iSg	22 55 16.5		Gb	iP	03 23 25.3	
				D = 70 km = 0.6°			i	03 23 34.7	
				56 17.0		Um	iP	03 23 41.9	
				57 05.9			iX	03 26 57.4	
				57 10.5			iPP	03 27 34.5	
				58 18			eSKS	03 34 14	
				55 08.1			iY	03 36 20	
				55 16.5			Ka	iP	03 23 33.2
				56 0.6				i	03 27 54.9
		Ka	eS _n	22 56 00.2					Peru-Ecuador (h = 30 km).
			iSg	22 56 06.8					Magn. = 6.4 (Up, Ki).
				West coast of Sweden, near					First motion of P seems to
				Varberg, 57.2° N, 12.2° E.					be dilatation on short-
				Origin time = 22 54 57.					period records (Ki, Gb, Um),
"	3	Up	i(P)	00 30 37.6 D					
			i	00 30 53.8					

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

1963						1963					
Nov.	3	but compression on long-				Nov.	3	Up	iP	23 05 37.9	
cont.		period records (Up,Um).							i	23 05 40.2	
		X (at Sk,Um) and Y (at Up,							ipP	23 05 48.3	
		Ki,Um) are not identified,						Gb	i(P)	23 06 09.7	
		the latter probably being						Um	iP	23 05 12.8	
		PS.						Ka	iP	23 06 02.9	
								Kurile Islands.			
"	3	Sk	iP	03 40 34.5				h = 40 km (Up).			
"	3	Up	iP	14 13 52.2 C	"	4	Up	iP	01 31 14.9 C		
			i	14 13 56.9				i	01 31 18.4		
		Sk	eP	14 14 35				ipP	01 35 46		
		Um	eP	14 14 32				iPa	01 41 42		
		Greece. Origin time =						iSKS	01 42 00		
		14 09 11.						iPS	01 44 40		
								i	01 45 55.8		
"	3	Up	iP	14 18 21.1				microns sec			
		Sk	iP	14 19 09.0				P	E	4.5	16
		Greece.						P	N	2.2	16
"	3	Up	iP	14 36 22.0 C				P	Z	13	16
		Sk	iP	14 37 05.2				P	Z'	0.3	0.8
		Um	eP	14 37 03				PP	E	30	16
		Greece. Origin time =						PP	N	7.0	14
		14 31 42.						PP	Z	45	15
								PP	Z'	0.4	0.6
"	3	Up	iP	14 40 40.4 C				SKS	N	11	5
		microns sec						M	E	190	21
		P	Z'	0.1 0.6				M	N	400	22
		M	E	0.9 16				M	Z	280	24
		M	N	1.0 10				(D = 12000 km = 108°).			
		M	Z	0.9 10			Ki	iP	01 30 59.7		
		Ki	iP	14 41 55.5				ipP	01 31 17.0		
		microns sec						ipP	01 35 19.8		
		M	E	1.7 16				i	01 36 17		
		M	N	0.4 13				i	01 36 33		
		M	Z	0.6 13				iPa	01 41 17		
		Sk	iP	14 41 22.3				iSKS	01 41 32		
			i	14 41 45.3				ePKKP	01 46 57		
		Gb	iP	14 40 29.6				microns sec			
		Um	iP	14 41 19.6 C				P	E	3.6	10
		Ka	iP	14 40 02.4				P	N	1.1	15
		Greece (h = 30 km).						P	Z	7.4	8
"	3	Um	iPKP	14 50 52.0				P	Z'	0.9	1.0
		New Hebrides Islands						pP	Z'	1.9	1.0
		(h = 50 km).						PP	E	8.3	9
"	3	Up	iP	16 03 55.2				PP	N	2.2	9
		Ki	iP	16 04 55.9				PP	Z	15	8
		Sk	iP	16 04 30.5				PP	Z'	5.1	2.5
			i	16 04 37.5				SKS	N	26	7
		Um	eP	16 04 37				M	E	230	21
		Ka	iP	16 03 19.8				M	N	270	22
		Ionian Islands (h = 30 km).						M	Z	300	22
"	3	Up	iP	19 34 01.7				(D = 11650 km = 105°).			
		Kurile Islands (h = 50 km).					Sk	iP	01 31 21.6 C		
								i	01 31 25.9		
								i	01 35 29.4		
								iSKS	01 42 00.7		
								iPKKP	01 46 42.3		

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

1963
Nov.
cont.

4

Gb

iP

01 31 31.7

i

01 31 35.3

iPP

01 36 06.5

iPS

01 45 18.0

ePKKP

01 46 50

Um

iP

01 31 05.0 C

i

01 31 08.9

iPP

01 35 18.1

iPa

01 41 35.8

iSKS

01 41 54.1

iPS

01 44 34.1

i

01 46 02.0

Ka

iP

01 31 24.7

i

01 31 29.5

iPP

01 35 44.8

iSKS

01 42 06.7

iPS

01 45 02.3

Banda Sea, h = 70 km (Ki).

Magn. = 7.9 (Up, Ki).

Well developed G-waves on long-period N-components. Multiple P-phase with an average difference of 4.0 sec between the first and the second (larger) P.

"

4

Up

i(PKP)

01 34 49.8

microns sec

(PKP) Z' 0.2 0.6

Ki

i(PKP)

01 34 23.5

microns sec

(PKP) Z' 0.3 1.0

Sk

i(PKP)

01 34 55.7

Gb

i(PKP)

01 35 14.0

Um

i(PKP)

01 34 36

Ka

i(PKP)

01 35 00.1

These phases could not be interpreted as belonging to the preceding shock, and therefore they probably represent another shock. However, no agreement is found with the New Hebrides Islands earthquake either, reported by USCGS.

"

4

Up

i(P)

02 14 09.6

i

02 14 21.8

Sk

eP

02 14 27

Gb

eP

02 14 37

Um

eP

02 14 08

Ka

iP

02 14 23.1

Banda Sea.

Origin time = 02 00 13.

"

4

Um

eP

02 28 01

Banda Sea (h = 80 km).

1963
Nov.

4

Um

iP

02 50 32.7

Banda Sea (h = 130 km).

"

4

Ki

i(P)

06 19 07.5

"

4

Up

iP

08 17 20.1

Kurile Islands (h = 30 km).

"

4

Up

iP

08 47 04.5

Kurile Islands (h = 30 km).

"

4

Up

iP

10 44 52.4

"

4

Up

iP

15 49 34.5

i

15 49 41.0

Sk

iP

15 50 10.5

Um

iP

15 50 13.8

Italy (h = 15 km).

"

4

Gb

iPKP

18 42 15.5

Tonga Islands (h = 30 km).

"

4

Up

iP

21 19 42.5

Sk

iP

21 20 09.3

Um

iP

21 19 41.7

Hindu Kush (h = 150 km).

"

5

Ki

iP

08 57 22.0

Um

iP

08 57 26.4

Banda Sea (h = 110 km).

"

5

Up

iPKP

09 53 06.4

Kermadec Islands (h = 90 km).

"

5

Ki

i(Sn)

13 54 28.6

iSg

13 54 43.1

Sk

iSg

13 57 10.9

Um

eSg

13 55 40

Northwest Russia, 67,5°N, 31,8°E. Origin time = 13 52 21. Explosion?

"

5

Sk

iP

14 13 52.0

"

5

Up

iPKP

16 21 51.1

Fiji Islands (h = 60 km).

"

5

Up

iP

21 10 26.1 D

Kurile Islands (h = 30 km).

"

5

Up

i(P)

22 53 15.9

iP

22 53 28.0

"

6

Up

eP

00 06 30

Ki

iP

00 06 14.6

Um

iP

00 06 20.5

Molucca Passage (h = 30 km).

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

1963
Nov.

6

Up

eP

02 27 28

i

02 27 41.8

ePKP

02 31 54

iPP

02 32 03

eS

02 39 30

ePS

02 41 15

microns sec

PP N

0.6 6

PP Z

1.4 5

S N

1.4 18

M E

4.0 23

M N

10 24

M Z

10 22

(D = 12000 km = 108°).

Ki

iP

02 27 13.0

iPP

02 31 29

iS

02 38 54

iPS

02 40 24

microns sec

PP E

0.7 7

PP Z

1.5 7

S N

0.6 7

M E

9.5 18

M N

6.8 21

M Z

12 18

D = 11450 km = 103°.

Um

iP

02 27 20.6 C

iPP

02 31 44.9

iSKS

02 37 59

New Guinea (h = 30 km).

Magn. = 6.7 (Up, Ki).

"

6

Up

iP

03 14 17.8

microns sec

M E

0.6 17

M N

1.8 18

M Z

1.3 16

New Guinea (h = 40 km).

"

6

Ki

iPn

06 43 12.1

iSn

06 44 07.5

iSg

06 44 27.4

D = 490 km = 4.4°.

Sk

eSg

06 46 58

Um

iSn

06 44 52.5

iSg

06 45 26.0

D = 700 km = 6.3°.

Northwest Russia, 67.8°N,

32.0°E. Origin time =

06 42 02. Explosion?

"

6

Up

iPKP

06 47 51.7

i

06 47 57.8

microns sec

PKP Z'

0.1 0.5

Sk

iPKP

06 47 46.9 C

1963
Nov.

6

Gb

iPKP

06 48 00.8

Um

iPKP

06 47 41.0

ipPKP

06 49 29.6

Ka

iPKP

06 48 14.4 C

Kermadec Islands.

h = 440 km (Um).

"

6

Up

iP

09 35 49.2 C

i

09 35 51.0

i(PcP)

09 36 10.7

microns sec

P Z'

0.1 0.5

Ki

iP

09 35 01.5

microns sec

P Z'

0.3 1.2

M E

0.5 16

M N

0.4 16

M Z

1.0 20

Sk

iP

09 35 36.2

Gb

iP

09 36 13.8

iPcP

09 36 31.8

Um

iP

09 35 22.5

i

09 35 24.7

Ka

iP

09 36 17.5 C

iPcP

09 36 30.9

Kamchatka (h = 30 km).

Magn. = 6.2 (Up, Ki).

Multiple P-phase with a

difference of 2 sec between

the first small P and the

second larger one (Up, Um).

Such instances, which appear

frequently, tend to limit

the accuracy of epicenter

determinations, as less

sensitive stations will miss

the first weak signal.

"

6

Gb

iP

11 25 23.6 C

"

6

Ki

iSn

13 53 55.7

iLg2

13 55 55.7

Sk

eLg2

13 57 18

Um

eSn

13 53 36

iLg2

13 55 30.4

Eastern part of European

USSR, roughly at 58°N,

52½°E (by combination with

Finnish data).

"

6

Up

iP

15 05 16.6

"

6

Up

i(P)

18 40 10.3

"

6

Up

iPKP

18 43 40.8

Sk

iPKP

18 43 36.7 C

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

1963 Nov. cont.	6	Um	iPKP	18 43 31.6	1963 Nov. cont.	8	Sk	eP	10 11 29
			(Kermadec Islands).				Um	iP	10 11 33.9
"	6	Up	iP	20 47 18.0 C					Rhodesia (h = 30 km).
"	6	Up	iP	21 13 14.4 C	"	8	Up	iP	11 33 32.7
		Sk	iP	21 13 54.3					Kurile Islands (h = 40 km).
				Greece (h = 100 km).	"	8	Up	iP	16 26 47.9
"	6	Up	iPKP	22 34 31.7 C			Ki	iP	16 26 30.8
			i	22 34 37.4					microns sec
		Sk	ePKP	22 34 26				P	Z' 0.1 1.0
		Um	iPKP	22 34 20.7			Um	iP	16 26 36.4
				(Kermadec Islands).					Molucca Passage
"	7	Up	iP	00 03 17.6					(h = 220 km).
"	7	Up	eP	03 35 58	"	8	Up	iP	23 55 16.9
				Kurile Islands (h = 40 km).	"	9	Up	i(P)	00 10 59.4
"	7	Ki	iSn	04 35 40.5	"	9	Up	eP	02 52 25
			iSg	04 35 59.2					microns sec
		Sk	eSg	04 38 30			M	E	1.1 20
		Um	iSg	04 36 53.5			M	N	1.9 23
				Northwest Russia, 67.4°N,			M	Z	1.8 19
				30.6°E. Origin time =		Ki	eP		02 52 20
				04 33 53. Explosion?			e(S)		02 57 21
"	7	Up	iP	09 33 57.2 C					microns sec
		Ki	iP	09 33 11.6			(S)	E	1.0 9
		Sk	eP	09 33 46			M	E	1.7 15
				Kurile Islands (h = 50 km).			M	N	0.8 14
"	7	Ki	iP	13 08 34.0 D			M	Z	2.3 15
		Um	iP	13 08 53.4		Sk	eP		02 51 56
				Mariana Islands (h = 50 km).		Um	eP		02 52 31
"	7	Gb	iPKP	16 13 18.2			eS		02 57 12
				Tonga Islands (h = 30 km).					South of Iceland
"	7	Gb	ePKP	17 54 31					(h = 30 km).
				Tonga Islands (h = 30 km).	"	9	Um	iP	05 51 55.9
"	7	Ki	iP	20 48 09.8	"	9	Up	iP	09 02 16.5
				microns sec			Ki	iP	09 01 32.5 C
			P	Z' 0.1 1.2					Kurile Islands (h = 30 km).
				Kurile Islands (h = 30 km).	"	9	Ki	iP	12 40 04.1 C
"	8	Up	iP	08 19 07.4	"	9	Ki	i(P)	13 00 36.0
		Ki	iP	08 18 21.7 C			i		13 00 39.4
		Ka	iP	08 19 30.3					Probably local explosion.
				Kurile Islands (h = 40 km).	"	9	Up	iP	21 28 01.5
"	8	Up	iP	10 11 13.7			i		21 28 04.9
		Ki	iP	10 11 55.0 C			ipP		21 30 06.5
				microns sec			i		21 30 15.4
			P	Z' 0.1 1.0			iPP		21 32 18.6
							iSKS		21 37 42
							iS		21 38 36
							iPKKP		21 44 28.2

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

1963	Nov.	cont.	9	Up	i	21 44 42.3	1963	Nov.	cont.	9	Gb	iP'P'	21 53 00.4	
					iP'P' <td>21 52 51.9</td> <td></td> <td></td> <td></td> <td></td> <td>Um<td>iP<td>21 28 08.9</td></td></td>	21 52 51.9					Um <td>iP<td>21 28 08.9</td></td>	iP <td>21 28 08.9</td>	21 28 08.9	
						microns sec						i <td>21 28 11.5</td>	21 28 11.5	
					P <td>Z 2.6 4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>i<td>21 28 23.4</td></td>	Z 2.6 4						i <td>21 28 23.4</td>	21 28 23.4	
					P <td>Z' 0.5 0.7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ipP<td>21 30 16.1</td></td>	Z' 0.5 0.7						ipP <td>21 30 16.1</td>	21 30 16.1	
					pP <td>Z' 0.8 1.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>i<td>21 30 24.0</td></td>	Z' 0.8 1.0						i <td>21 30 24.0</td>	21 30 24.0	
					PP <td>E 1.1 3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ipPP<td>21 34 15.0</td></td>	E 1.1 3						ipPP <td>21 34 15.0</td>	21 34 15.0	
					PP <td>Z 2.0 3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>isPP<td>21 35 13</td></td>	Z 2.0 3						isPP <td>21 35 13</td>	21 35 13	
					SKS <td>E 9.6 7</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>iSKS<td>21 37 53</td></td>	E 9.6 7						iSKS <td>21 37 53</td>	21 37 53	
					SKS <td>N 2.1 4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>iSP<td>21 40 18</td></td>	N 2.1 4						iSP <td>21 40 18</td>	21 40 18	
					S <td>E 5.7 6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>iPKKP<td>21 44 20.2</td></td>	E 5.7 6						iPKKP <td>21 44 20.2</td>	21 44 20.2	
					P'P' <td>Z' 1.9 2.5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>i<td>21 44 37.5</td></td>	Z' 1.9 2.5						i <td>21 44 37.5</td>	21 44 37.5	
					M <td>E 14 24</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>eP'P'<td>21 52 45</td></td>	E 14 24						eP'P' <td>21 52 45</td>	21 52 45	
					M <td>N 14 24</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>i<td>21 52 51.1</td></td>	N 14 24						i <td>21 52 51.1</td>	21 52 51.1	
					M <td>Z 19 23</td> <td></td> <td></td> <td></td> <td></td> <td>Ka</td> <td>iP<td>21 27 56.3</td></td>	Z 19 23					Ka	iP <td>21 27 56.3</td>	21 27 56.3	
					(D = 10950 km = 98 $\frac{1}{2}$ $^{\circ}$).							i <td>21 27 58.0</td>	21 27 58.0	
				Ki	iP <td>21 28 08.5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>i<td>21 28 07.6</td></td>	21 28 08.5						i <td>21 28 07.6</td>	21 28 07.6	
					i <td>21 28 11.2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>ipP<td>21 30 05.3</td></td>	21 28 11.2						ipP <td>21 30 05.3</td>	21 30 05.3	
					ipP <td>21 30 20.3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>i<td>21 30 10.8</td></td>	21 30 20.3						i <td>21 30 10.8</td>	21 30 10.8	
					i <td>21 30 25.6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>iPP<td>21 32 03.0</td></td>	21 30 25.6						iPP <td>21 32 03.0</td>	21 32 03.0	
					iPP <td>21 32 30</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>iPKKP<td>21 44 44.9</td></td>	21 32 30						iPKKP <td>21 44 44.9</td>	21 44 44.9	
					ipPP <td>21 34 23</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>iP'P'<td>21 52 57.7</td></td>	21 34 23						iP'P' <td>21 52 57.7</td>	21 52 57.7	
					i <td>21 36 41.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Western Brazil. h = 600 km</td>	21 36 41.0							Western Brazil. h = 600 km	
					iSKS <td>21 37 55</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>(Up, Ki, Sk, Gb, Um, Ka).</td>	21 37 55							(Up, Ki, Sk, Gb, Um, Ka).	
					iS <td>21 38 49</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>Magn. = 7.1 (Up, Ki).</td>	21 38 49							Magn. = 7.1 (Up, Ki).	
					eSP <td>21 40 25</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>The records are complicated</td>	21 40 25							The records are complicated	
					ipS <td>21 41 37</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>by multiple phases with</td>	21 41 37							by multiple phases with	
					iPKKP <td>21 44 35.2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>successively increasing</td>	21 44 35.2							successively increasing	
					iP'P' <td>21 52 46.9</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>amplitudes, especially for</td>	21 52 46.9							amplitudes, especially for	
						microns sec							P (average interval = 3.0	
					P <td>E 1.1 8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>sec between first and</td>	E 1.1 8							sec between first and	
					P <td>Z 3.9 9</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>second phase) and pP</td>	Z 3.9 9							second phase) and pP	
					P <td>Z' 1.6 1.3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>(average interval = 6.9 sec).</td>	Z' 1.6 1.3							(average interval = 6.9 sec).	
					PP <td>E 2.6 6</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	E 2.6 6								
					PP <td>Z 3.4 6</td> <td></td> <td></td> <td></td> <td>"</td> <td>9</td> <td>Um</td> <td>iP</td> <td>21 53 35.8</td>	Z 3.4 6				"	9	Um	iP	21 53 35.8
					SKS <td>E 16 9</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	E 16 9								
					SKS <td>N 2.3 8</td> <td></td> <td></td> <td></td> <td>"</td> <td>9</td> <td>Up</td> <td>iP</td> <td>21 55 11.4</td>	N 2.3 8				"	9	Up	iP	21 55 11.4
					S <td>N 11 17</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>microns sec</td>	N 11 17								microns sec
					PKKP <td>Z' 0.3 1.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>P</td> <td>Z' 0.2 1.5</td> <td></td>	Z' 0.3 1.0						P	Z' 0.2 1.5	
					P'P' <td>Z' 0.3 1.3</td> <td></td> <td></td> <td></td> <td></td> <td>Sk</td> <td>iP</td> <td>21 55 30.2</td> <td></td>	Z' 0.3 1.3					Sk	iP	21 55 30.2	
					M <td>E 15 21</td> <td></td> <td></td> <td></td> <td></td> <td>Um</td> <td>iP</td> <td>21 55 08.9</td> <td></td>	E 15 21					Um	iP	21 55 08.9	
					M <td>N 12 22</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	N 12 22								
					M <td>Z 27 25</td> <td></td> <td></td> <td></td> <td>"</td> <td>9</td> <td>Ki</td> <td>iP</td> <td>22 10 15.7 C</td>	Z 27 25				"	9	Ki	iP	22 10 15.7 C
					(D = 11100 km = 100 $^{\circ}$).							Sk	eP	22 09 57
				Sk	iP	21 27 52.1								
					i	21 27 55.8				"	10	Up	iP	01 13 10.1
					ipP	21 30 00.1							ipP	01 15 16.7
					i	21 30 0								

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

1963						1963					
Nov.	10	Ki	ePP	01 17 26		Nov.	10	Up	iScS	17 38 38	
cont.			iSKS	01 22 59		cont.				microns sec	
			iSP	01 25 36				P	Z	1.3 5	
			iPKKP	01 29 41.5				P	Z'	0.2 0.7	
				microns sec				S	E	1.1 12	
			P	Z	0.6 10			S	N	2.1 15	
			P	Z'	0.2 1.0			M	E	6.8 18	
			PP	E	0.8 5			M	N	15 18	
			PP	Z	0.9 10			M	Z	11 19	
			SKS	E	2.7 8			D	=	7550 km = 68°	
			(D = 11100 km = 100°).				Ki	iP		17 28 00.4	
		Sk	iP	01 13 00.7				eS		17 36 15	
			ipP	01 15 09.8					microns sec		
			ePKKP	01 29 52				P	Z	1.9 9	
		Gb	iP	01 12 56.8				P	Z'	0.1 1.0	
			ipP	01 15 04.9				S	E	1.6 12	
		Um	iP	01 13 17.5				S	N	0.6 13	
			ipP	01 15 24.5				M	E	14 16	
			iPP	01 17 18.6				M	N	11 17	
			ePKKP	01 29 39				M	Z	23 17	
		Ka	iP	01 13 02.2				D	=	6850 km = 61.1°	
			ipP	01 15 13.8			Sk	iP		17 28 34.7	
		Western Brazil.	h = 600 km				Gb	iP		17 29 04.9	
		(Up, Ki, Sk, Gb, Um, Ka).						i		17 29 19.5	
		Magn. = 6.4 (Up, Ki).					Um	iP		17 28 21.1 C	
								iPP		17 30 44	
								ePa		17 32 11	
							Ka	iP		17 29 05.6 C	
								i		17 29 09.7	
								Kurile Islands (h = 40 km).			
								Magn. = 6.3 (Up, Ki).			
"	10	Up	iP	05 08 55.2 C							
		Ki	iP	05 08 48.6 C							
		Sk	iP	05 09 10.8 C							
		Um	iP	05 08 46.8 C							
			i	05 08 58.8							
		Ka	iP	05 09 04.4 C							
		India (h = 70 km).									
"	10	Gb	iP	05 40 33.9 C							
"	10	Ki	iP	07 46 31.6							
"	10	Up	iP	09 01 05.8							
		Ki	eP	09 00 18							
		Kurile Islands (h = 50 km).									
"	10	Up	iP	11 23 41.7							
			i	11 24 30.8							
		Ki	iP	11 24 51.1 C							
		Aegean Sea (h = 30 km).									
"	10	Up	iP	14 55 24.8 C							
		Kurile Islands (h = 40 km).									
"	10	Up	iP	16 09 19.4							
		Kurile Islands (h = 40 km).									
"	10	Up	iP	17 28 41.1 C							
			i	17 28 44.8							
		eS		17 37 43							

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

1963					1963				
Nov.	11	Up	iP	05 17 04.2	Nov.	12	Ki	iP	15 37 29.8 C
				Kurile Islands (h = 40 km).			Sk	iP	15 37 49.2
									India (h = 30 km).
"	11	Up	iP	10 00 41.8	"	12	Up	iPKP	18 01 36.0
		Ki	iP	09 59 55.8			Sk	ePKP	18 01 26
		Sk	iP	10 00 30.6			Um	iPKP	18 01 19.4
		Gb	eP	10 01 04					Kermadec Islands
				Kurile Islands (h = 60 km).					(h = 60 km).
"	11	Ki	iP	10 15 32.3	"	12	Up	iP	20 44 59.4 D
			i	10 15 44.1	"	13	Um	eP	01 46 00
		Um	eP	10 15 53					Japan (h = 110 km).
				(Kurile Islands).	"	13	Um	iP	05 12 56.6 C
"	11	Ki	iPKP	11 47 51.3	"				Japan (h = 80 km).
				Tonga Islands (h = 190 km).	"	13	Up	iP	07 43 44.3
"	11	Um	iP	11 56 31.7 C	"				Kurile Islands (h = 40 km).
"	11	Ki	eSn	13 58 19	"	13	Ki	iSKP	11 39 27.9
			iSg	13 58 43.8			Um	iSKP	11 39 38.7
				Possibly northwest Russia.	"				Fiji Islands (h = 520 km).
"	11	Ki	iPKP	16 40 29.1	"	13	Up	iP	16 01 57.1
				Easter Island (h = 30 km).	"				Kurile Islands (h = 30 km).
"	11	Sk	iP	20 06 32.5 D	"	13	Ki	iP	20 15 21.4
				Western Brazil (h = 590 km).	"				Gulf of California
"	12	Up	iP	00 42 50.2	"				(h = 15 km).
				Kurile Islands (h = 30 km).	"	14	Up	iPKP	00 39 43.9
"	12	Up	iS	07 16 18	"		Sk	iPKP	00 39 37.2
		Ki	iP	07 12 59.0 C	"		Um	iPKP	00 39 31.9 D
					"				Kermadec Islands
				microns sec	"				(h = 40 km).
			P	Z' 0.3 0.7	"	14	Ki	iP	04 10 42.7
		Sk	iP	07 12 34.6	"		Um	iP	04 10 55.0 C
		Gb	iP	07 11 52.3	"			e	04 11 35
		Um	iP	07 12 24.5	"				Mariana Islands
			iPP	07 13 10.7	"				(h = 180 km).
		Ka	iP	07 11 27.0	"	14	Ki	iPKP	04 54 47.3
		i		07 12 04.9	"				microns sec
				Turkey (h = 70 km).	"				PKP Z' 0.1 1.0
"	12	Um	iP	07 17 31.7	"		Sk	iPKP	04 54 59.8 C
"	12	Up	iP	08 07 54.2	"		Um	iPKP	04 54 52.9
		Um	iP	08 07 29.9 D	"				New Hebrides Islands
				Kurile Islands (h = 50 km).	"				(h = 30 km).
"	12	Up	iP	08 44 15.9	"	14	Ki	iP	05 16 16.3
		Um	iP	08 43 49.5 C	"		Um	iP	05 16 45.6
				Kurile Islands (h = 50 km).	"				Kurile Islands (h = 15 km).
"	12	Up	iP	13 11 00.7	"	14	Up	iP	10 28 38.9
		Um	iP	13 10 35.3	"				
				Kurile Islands (h = 50 km).	"				

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

1963					1963				
Nov.	14	Ki	iP	10 28 06.9	Nov.	15	Up	microns sec	
cont.		Um	iP	10 28 21.0 D	cont.		S	E	0.9 10
		Japan (h = 440 km).					S	N	3.3 14
							M	E	21 17
"	14	Ki	iPn	10 52 23.2			M	N	37 18
			iSn	10 53 38.8			M	Z	31 19
			iSg	10 54 10.9			D = 7600 km = 68 $\frac{1}{2}$ ¹⁰ .		
			D = 680 km = 6.1 ⁰ .			Ki	iP	21 16 48.8	
		Um	iSg	10 55 36.3			eS	21 25 14	
		Arctic Ocean, off north coast of Kola Peninsula, 70.1°N, 36.3°E (by combination with Tromsø data).					microns sec		
		Origin time = 10 50 50.					P	N	0.8 6
		An event in nearly the same location was recorded on July 25, 1963, at 02 09.					P	Z	1.9 6
							P	Z'	0.3 1.0
							S	E	1.9 9
							S	N	1.4 12
							M	E	29 18
							M	N	21 18
							M	Z	34 17
							D = 6850 km = 61 $\frac{1}{2}$ ¹⁰ .		
"	14	Ki	iPKP	14 20 17.6		Sk	iP	21 17 23.7	
		New Hebrides Islands (h = 30 km).				Gb	iP	21 17 54.5 D	
						Um	iP	21 17 08.7	
"	14	Ki	iPKP	14 24 34.2 D			iPa	21 21 05	
			microns sec				iS	21 25 43	
			PKP	Z' 0.1 1.2			iPS	21 26 00	
		New Hebrides Islands (h = 30 km).				Ka	iP	21 17 56.4	
						Kurile Islands (h = 50 km).			
						Magn. = 6.5 (Up, Ki).			
"	14	Ki	iP	21 37 36.7	"	16	Up	iP	02 41 07.0 C
		Kurile Islands (h = 50 km).					ipP	02 41 22.3	
"	14	Ki	iP	23 42 21.3			microns sec		
							M	E	1.2 16
"	14	Ki	iPKP	23 56 49.7			M	N	2.2 18
		New Hebrides Islands (h = 30 km).					M	Z	1.6 17
						Ki	iP	02 40 21.8	
"	15	Up	iP	00 55 54.9			microns sec		
		Kurile Islands (h = 50 km).					M	E	1.9 16
"	15	Up	iP	06 45 07.5 D			M	N	1.4 16
		Ki	eP	06 44 19			M	Z	3.0 17
		Um	iP	06 44 41.3		Gb	iP	02 41 27.8	
		Kurile Islands (h = 30 km).				Kurile Islands, h = 60 km (Up).			
"	15	Ki	iP	15 27 07.4	"	16	Up	iP	06 39 01.2
		Um	iP	15 27 34.8		Sk	iP	06 39 42.6 D	
		Unimak Island (h = 30 km).			"	16	Up	iP	11 18 13.2 D
"	15	Up	iP	21 17 34.0 D			microns sec		
		eS	21 26 34				P	Z'	0.1 0.5
		iScS	21 27 46			Ki	eP	11 18 02	
		microns sec					microns sec		
		P	N	1.0 5			M	E	1.0 14
		P	Z	1.4 4		Sk	iP	11 18 27.3	
		P	Z'	0.4 0.6		Gb	iP	11 18 38.7 D	
						Burma (h = 30 km).			

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

1963					1963				
Nov.	16	Up	iP	11 49 41.7	Nov.	17	Ki		
				microns sec	cont.				microns sec
			P	Z' 0.1 0.5			P	Z	1.3 4
		Ki	iP	11 49 32.8 D			P	Z'	1.0 1.8
		Sk	iP	11 49 57.2 D			S	E	1.2 8
		Assam (h = 40 km).					S	N	4.9 11
"	16	Ki	i(P)	12 32 32.6			M	E	13 19
		Local explosion.					M	N	8.8 18
"	16	Sk	iP	18 06 13.3			M	Z	24 20
		Greece.					D = 7900 km = 71°.		
"	16	Up	iPP	23 06 18		Sk	iP		00 58 47.4 C
		e		23 12 47			i		00 58 52.1
		eSS		23 24 33		Gb	iP		00 58 26.4 C
				microns sec		Um	iP		00 59 08.0 C
		M	E	1.5 20			i		00 59 11.1
		M	N	3.2 22			iS		01 08 11
		M	Z	3.6 22			iSS		01 12 37
		Ki	iPKP	23 02 43.0			iSa		01 15 34
		iPKS		23 06 09		North Atlantic Ocean			
				microns sec		(h = 30 km).			
		PKS	N	0.6 7		Magn. = 6.6 (Up, Ki).			
		PKS	Z	1.2 6		The long-period N-component			
		M	E	2.6 19		at Umeå exhibits another			
		M	N	2.9 19		case of Sa followed by G,			
		M	Z	3.1 21		as described by Båth &			
		Sk	iPKP	23 02 51.6 C		Lopez Arroyo (Geofis. pura			
		Gb	iPKP	23 02 58.0		e appl., 56, 67-92, 1963).			
			i	23 03 12.1	"	17	Ki	iP	08 03 30.6 D
		Um	iPKP	23 02 49.4			Um	iP	08 03 37.2
		Tonga Islands (h = 30 km).					Mindanao (h = 30 km).		
		Magn. = 6.1 (Up, Ki).			"	17	Um	iP	17 21 56.9
"	16	Ki	---	---	"	18	Up	iP	01 55 41.1
				microns sec			iPcP		01 56 09.1
		M	N	0.7 16			Um	iP	01 55 15.7
		M	Z	1.1 16			Sea of Okhotsk (h = 320 km).		
		Gb	iPKP	23 59 30.7	"	18	Ki	iSg	06 58 10.5
		Tonga Islands (h = 30 km).					Um	iSn	06 58 52.3
"	17	Up	iP	00 58 49.3 C				iSg	06 59 33.9
		i		01 00 22.0		Northwest Russia.			
		iS		01 07 31		Explosion?			
				microns sec	"	18	Um	iP	13 32 19.6
		P	Z	1.3 3	"	18	Ki	iPKP	13 33 14.1
		P	Z'	1.5 1.7					microns sec
		S	E	5.6 15			PKP	Z'	0.2 1.5
		S	N	8.9 15		Sk	ePKP		13 33 28
		M	E	24 20		Um	iPKP		13 33 25.1
		M	N	23 18		Kermadec Islands			
		M	Z	49 22		(h = 50 km).			
		D = 7350 km = 66°.			"	18	Up	iP	14 50 53.1 C
		Ki	iP	00 59 20.4 C			iS		15 01 11
		iS		01 08 38					microns sec
		ePS		01 08 59			S	E	2.9 13

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

1963

Nov.
cont.

18 Up microns sec
S N 6.4 13
M E 11 20
M N 24 19
M Z 24 19
D = 9200 km = 83°.
Ki iP 14 50 23.1
 eS 15 00 19
 microns sec
P Z' 0.4 1.5
S N 2.8 9
M E 24 15
M N 23 17
M Z 34 15
D = 8600 km = 77½°.
Sk iP 14 50 31.3
Gb iP 14 50 49.0 C
Um iP 14 50 38.8 C
 iPP 14 53 41.1
 iS 15 00 48
Ka iP 14 50 58.1
 i 14 51 06.0
Gulf of California
(h = 15 km).
Magn. = 6.6 (Up,Ki).

" 18 Gb iPg 15 15 33.1 C
 iSg 15 15 34.8
 D = 10 km = 0.1°.
Local explosion?

" 19 Up iP 04 47 51.5 D
 Ki iP 04 47 16.0 D
 microns sec
P Z' 0.1 1.2
Sk iP 04 47 49.1
Gb iP 04 48 13.4 D
Um iP 04 47 30.9 D
Sea of Japan (h = 540 km).

" 19 Up iP 05 00 39.1
 Gb i(P) 04 59 48.5

" 19 Ki ePKP 11 04 58
 Gb iPKP 11 05 33.3
Loyalty Islands
(h = 40 km).

" 19 Up iP 11 11 55.9
 microns sec
P Z' 0.1 1.0
M E 1.2 16
M N 1.8 15
M Z 2.5 16
Ki iP 11 11 08.9 C
 microns sec
P Z' 0.1 1.3

1963

Nov.
cont.

19 Ki microns sec
M E 2.1 18
M N 1.8 18
M Z 3.4 17
Sk iP 11 11 45.6 C
Gb iP 11 12 17.1 C
Um iP 11 11 31.0
Kurile Islands (h = 30 km).
Magn. = 5.6 (Up,Ki).

" 19 Up iP 17 49 06.3
 i 17 49 24.8
 microns sec
P Z' 0.1 0.5
Ki iP 17 48 12.7
Sk iP 17 48 50.1
Gb iP 17 49 27.7
Um eP 17 48 38
Kamchatka (h = 40 km).

" 19 Ki eP 18 30 14
 i 18 30 43.2
Sk eP 18 30 36
 i 18 30 44.2
Sumatra (h = 40 km).

" 19 Up iP 18 34 58.8 C

" 20 Ki ----
 microns sec
M E 1.1 20
M N 0.6 18
Gb iPKP 12 19 30.6
Tonga Islands (h = 30 km).

" 20 Um iP 12 32 37.2
(Hindu Kush).

" 20 Up iPg 14 50 31.7
 iSn 14 51 09.1
 e(S[±]) 14 51 20
 iSg 14 51 22.8

 microns sec
Sg Z' 0.1 0.5
D = 450 km = 4.0°.
Ki i 14 54 56.6
 iSg 14 55 05.7
Sk eS[±] 14 51 57
 eSg 14 52 14
Gb iPg 14 49 27.6
 iSg 14 49 34.3
 i 14 49 44.2
 i 14 49 51.7
D = 90 km = 0.8°.
Um e 14 53 04
 iSg 14 53 08.8
Skagerrack, 58.1°N, 10.7°E.
Origin time = 14 49 12.

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

1963
Nov,

20

Up

iP

22 44 32.0

Kurile Islands (h = 50 km).

"

21

Up

iP

05 53 36.1

"

21

Up

i(P)

06 50 48.4 C

"

21

Up

iP

13 17 42.3 D

Ki

iP

13 16 55.6

Um

iP

13 17 17.6

Kurile Islands (h = 40 km).

"

21

Up

iP

18 54 40.2

i

18 54 46.5

Ki

iP

18 55 19.8 C

Ascension Islands
(h = 30 km).

"

21

Up

iP

19 07 12.5

"

21

Up

iP

20 09 25.8 C

Kurile Islands (h = 40 km).

"

21

Up

iP

21 12 24.9 C

iPcP

21 12 56.1

Ki

iP

21 11 34.1

Sk

eP

21 12 09

Kamchatka (h = 80 km).

"

22

Ki

iP

00 31 20.9 C

Java (h = 320 km).

"

22

Ki

iP

11 26 22.4 C

Sk

iP

11 26 21.0

Mexico (h = 120 km).

"

22

Up

iP

14 56 53.0

microns sec

P

Z'

0.1 0.5

M

E

3.7 18

M

N

5.8 17

M

Z

2.4 15

Ki

iP

14 56 06.7

microns sec

M

E

4.4 18

M

N

2.3 17

M

Z

7.7 18

Sk

eP

14 56 41

i

14 57 27.2

Gb

iP

14 57 15.3 C

i

14 57 29.0

Kurile Islands (h = 30 km).

Magn. = 5.8 (Up,Ki).

"

22

Up

iP

15 33 09.1

Kurile Islands (h = 40 km).

1963
Nov.

22

Up

iP

20 31 14.4 D

iS

20 35 36

Ki

iP

20 32 16.6 C

microns sec

P

Z'

0.1 1.5

Gb

iP

20 31 20.5 D

Turkey (h = 30 km).

"

22

Up

iP

21 46 46.9

Ki

iP

21 47 46.8 D

Turkey (h = 20 km).

"

22

Up

iP

22 06 34.4 C

i

22 06 39.9

"

23

Up

iS

08 13 23

microns sec

M

E

3.8 20

M

N

6.5 20

M

Z

6.7 19

Ki

iP

08 02 39.3

microns sec

M

E

5.9 14

M

N

3.8 14

M

Z

6.6 15

Gulf of California
(h = 15 km).

Magn. = 6.2 (Up,Ki).

"

23

Up

i(P)

11 45 47.4 C

"

23

Up

iP

12 11 29.3

microns sec

P

Z'

0.1 0.5

"

23

Up

iP

19 11 35.6

Ki

iP

19 10 48.9 C

microns sec

P

Z'

0.2 1.0

Sk

iP

19 11 23.6 C

Kurile Islands (h = 50 km).

"

23

Up

eP

22 38 38

Ki

iP

22 37 02.3

microns sec

P

Z'

0.1 1.0

Sk

iP

22 37 49.5

Gb

iP

22 38 59.0

Svalbard (h = 30 km).

"

24

Gb

iPKP

05 28 14.9

Tonga Islands (h = 30 km).

"

24

Gb

iPKP

05 32 55.0

Tonga Islands (h = 30 km).

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

1963					1963				
Nov.	24	Sk	ePKP	05 40 20	Nov.	25	Ki	microns sec	
		Tonga Islands (h = 30 km).			cont.		M	E	1.2 18
"	24	Up	iP	11 17 39.9 D			M	N	1.4 19
				microns sec			M	Z	1.5 17
		P	Z'	0.3 0.5		Sk	eP		10 13 15
		Ki	iP	11 17 07.3 D		Gb	iP		10 13 45.8 D
				microns sec		Um	iP		10 12 59.8
		P	Z'	0.3 0.7		Kurile Islands,			
		Sk	iP	11 17 36.1 D		h = 50 km (Up).			
			iPP	11 20 39.2	"	25	Up	iP	10 22 08.2 C
		Gb	iP	11 17 57.5 D			i		10 22 13.2
		Um	iP	11 17 20.8 D			ipP		10 22 21.0
		Ka	iP	11 17 56.6 D				microns sec	
		Japan (h = 260 km).					P	Z'	0.1 0.7
		Magn. = 6.1 (Up, Ki).				Ki	iP		10 21 21.8
"	24	Up	iP	12 04 33.7 C		Sk	eP		10 21 58
		Kurile Islands (h = 40 km).				Gb	iP		10 22 28.2 C
"	24	Up	iP	18 07 02.0		Um	iP		10 21 43.1
		Um	iP	18 06 36.5			ipP		10 21 55.2
		Kurile Islands (h = 50 km).				Kurile Islands,			
"	24	Up	iP	18 20 03.2 D		h = 50 km (Up, Um).			
		Kurile Islands (h = 40 km).			"	25	Up	iP	11 41 31.0 C
"	24	Ki	iP	19 33 25.1		Ki	iP		11 40 44.7
		Um	iP	19 33 45.9		Um	iP		11 41 06.2
		Kurile Islands (h = 30 km).				Kurile Islands (h = 50 km).			
"	25	Ki	iPg	04 31 03.7	"	25	Um	iP	16 42 40.1 C
			iSg	04 31 41.7	"	25	Up	iP	16 58 28.6
			D = 320 km = 2.9°.			Ki	iP		16 58 11.7
		Um	i(Sg)	04 33 16.1				microns sec	
		West coast of Norway, near				M	E	0.7 13	
		Lofoten (by combination				M	N	0.8 16	
		with Tromsø readings).				M	Z	0.9 13	
		Origin time = 04 30 06.				Formosa (h = 30 km).			
"	25	Up	iP	06 54 21.6	"	25	Um	iP	18 34 00.2
		Ki	iP	06 53 34.5	"	26	Up	iPKP	03 18 14.8
				microns sec		Gb	iPKP		03 18 19.4 D
		P	Z'	0.1 1.0		Kermadec Islands			
		Sk	iP	06 54 09.5		(h = 50 km).			
		Um	iP	06 53 55.7	"	26	Ki	e	09 14 41
		Kurile Islands (h = 50 km).					eSg		09 15 02
"	25	Up	iP	09 05 05.1	"	26	Ki	e(Pg)	09 30 15
		Kurile Islands (h = 30 km).					iSg		09 30 49.5
"	25	Up	iP	10 13 24.9	"	26	Up	iP	15 11 44.8
			ipP	10 13 37.3	"	26	Up	iP	16 25 34.9
				microns sec				microns sec	
		P	Z'	0.1 0.8		M	E	0.7 13	
		Ki	iP	10 12 37.9 D					

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

1963
Nov.
cont.

26 Up microns sec
M N 0.6 19
M Z 0.7 14
Ki iP 16 26 20.3
microns sec
M E 0.6 12
Sk eP 16 25 55
Crete (h = 30 km).

" 26 Up iP 20 32 50.8
Ka iP 20 32 43.0

" 26 Up eL 23 45
microns sec
M E 1.0 25
M N 0.7 18
Fiji Islands (h = 30 km).

" 27 Up
microns sec
M E 0.2 9
M N 1.3 13
Ki iP 08 02 45.9 C
Sk eP 08 03 09
Kazakh SSR (h = 30 km).

" 27 Up iP 09 32 51.5
Um iP 09 32 25.5
Kurile Islands (h = 50 km).

" 27 Up iP 14 12 34.4
Ki eP 14 12 11
Molucca Passage
(h = 30 km).

" 27 Up iP 20 28 58.9
Ki iP 20 28 11.4 C
microns sec
P Z' 0.1 0.8
Um iP 20 28 32.9 C
Kurile Islands (h = 40 km).

" 27 Up iP 21 19 30.0 C
Ki iP 21 19 33.9 C
Sk iP 21 19 52.3
Gb iP 21 19 50.5 C
Um iP 21 19 26.9
Ka iP 21 19 35.5 C
India (h = 30 km).

" 28 Up iP 05 22 45.6
Kurile Islands (h = 50 km).

" 28 Sk eP 08 13 52

" 28 Sk iP 08 41 32.7

1963
Nov.

28 Gb iPg 12 13 09.4
iSg 12 13 11.4
D = 20 km = 0.2°.
Local explosion?

" 28 Up iP 15 23 59.3
microns sec
P Z' 0.1 0.6
Ki iP 15 23 05.6 C
microns sec
P Z' 0.1 1.0
Sk iP 15 23 39.5
Gb iP 15 24 17.0 C
Um iP 15 23 31.7
Ka eP 15 24 23 C
Aleutian Islands
(h = 30 km).
Magn. = 5.9 (Up, Ki).

" 28 Up iPKP 18 32 49.3 D
Kermadec Islands
(h = 590 km).

" 28 Up iP 23 29 27.5 C
Kurile Islands (h = 30 km).

" 29 Up iP 03 23 43.0

" 29 Ki e(Sn) 05 30 36
e(Sg) 05 30 56

" 29 Up iSg 09 16 58.5
microns sec
Sg Z' 0.1 0.5
Ki eS 09 19 24
e(Sg) 09 19 53
Sk eSn 09 18 19
eSg 09 18 55
Um i(Pn) 09 16 46.9
iSg 09 17 50.5
Baltic Sea, 60.4°N, 21.0°E.
Origin time = 09 16 02.
Explosion?

" 29 Up iP 15 02 03.1 C
ipP 15 02 13.3
microns sec
pP Z' 0.1 1.0
Ki iP 15 01 29.8
Sk iP 15 01 59.9
ipP 15 02 10.0
Gb iP 15 02 20.1
ipP 15 02 30.3
Um iP 15 01 44.9 C
ipP 15 01 55.6
Ka iP 15 02 18.1

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

1963

Nov. 29 Ka ipP 15 02 28.6
cont. Bonin Islands, h = 40 km
(Up, Sk, Gb, Um, Ka).

" 29 Up iP 19 57 19.4
microns sec
P Z' 0.1 0.6
Ki iP 19 56 33.5
Gb iP 19 57 40.1
Um iP 19 56 54.4 D
Ka eP 19 57 41
Kurile Islands (h = 50 km).

" 29 Up iP 20 03 15.9

" 29 Up iP 22 32 22.4
Um iP 22 31 56.8
Kurile Islands (h = 30 km).

" 30 Ki iP 09 31 17.2

" 30 Um eP 10 01 23
Halmahera (h = 60 km).

" 30 Up iP 11 40 37.6
Sk eP 11 40 18
Um iP 11 40 10.1 C
Aleutian Islands
(h = 30 km).

" 30 Up eP 20 23 30

" 30 Up iP 21 52 13.7
ipP 21 52 24.3
Ki iP 21 52 15.4
microns sec
P Z' 0.2 0.7
Sk iP 21 52 30.4
ipP 21 52 41.4
Gb iP 21 52 41.2
Um iP 21 52 11.2
ipP 21 52 24.2
Nicobar Islands, h = 50 km
(Up, Sk, Um).

Markus Båth
October 24, 1964

P R E L I M I N A R Y

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

D E C E M B E R 1 - 31, 1963

1963					1963				
Dec.	1	Ki	iP	02 51 44.1 C	Dec.	2	Up		
		Sk	eP	02 52 35	cont.			microns sec	
							S	Z' 0.1 0.8	
							M	E 2.4 5	
"	1	Up	iP	04 34 33.9 D			M	N 1.4 6	
		Ki	iP	04 33 49.0 D			M	Z 1.3 7	
		Sk	iP	04 34 31.1 D			D = 1350 km = 12°.		
		Ka	iP	04 34 58.9		Ki	eP	06 53 41	
		Lake Baikal (h = 30 km).				iS	06 57 32.5		
						iLg1	06 59 44		
"	1	Up	iP	09 46 45.3 D		iLg2	06 59 53.0		
		Nicobar Islands					microns sec		
		(h = 25 km).				M	E 1.6 11		
						D = 2200 km = 20°.			
"	1	Up	iP	16 08 13.6		Sk	iP	06 52 48.8	
		Um	i(P)	16 07 58.7		i	06 52 52.9		
		Kurile Islands (h = 40 km).				iLi	06 56 52.8		
						iLg2	06 57 44.1		
"	1	Up	iP	16 26 43.8		i(PcP)	06 58 00.5		
		Ki	iP	16 26 14.9		Gb	i	06 53 01.7	
		Sk	iP	16 26 43.1		iS	06 53 20.1		
		Gb	eP	16 27 03		iLi	06 53 48.7		
		Um	iP	16 26 25.9		iLg2	06 54 32.9		
		Ryukyu Islands (h = 30 km).				Um	iP	06 52 51.6	
						i	06 56 18.2		
"	1	Um	iP	17 22 52.7		iLg1	06 57 37.4		
			iSg	17 23 30.6		Ka	eP	06 51 07	
						iLi	06 53 00.3		
"	1	Up	iP	17 55 36.6 D		iLg2	06 53 29.7		
		Kurile Islands (h = 40 km).				i	06 53 50.1		
						Austria (h = 40 km).			
"	1	Up	i(PKP)	23 43 21.4					
			i	23 43 25.4	"	2	Up	iP	11 56 26.6
		Sk	e(PKP)	23 43 15		Ki	iP	11 55 36.5	
		Um	i(PKP)	23 43 10.4		Gb	iP	11 56 46.8	
						Ka	iP	11 56 49.5	
"	2	Up	iP	06 51 58.6 C		Kurile Islands (h = 50 km).			
			iS	06 54 27.3					
			iLg2	06 55 40	"	2	Sk	eP	13 03 05
							i	13 03 08.0	

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1963

Dec. 2 Up iP 21 00 40.6
i 21 00 46.5
iS 21 04 34
microns sec
P N 1.6 3
P Z 1.1 3
P Z' 0.5 1.2
S E 5.6 15
S N 2.5 8
M E 1.9 17
M N 6.1 20
M Z 5.8 20
D = 2350 km = 21⁰.
Ki iP 20 59 09.4
iS 21 01 37.0
i 21 01 51
microns sec
P E 1.4 4
P N 5.2 5
P Z 3.8 5
P Z' 2.9 2.0
S E 7.5 12
M E 5.6 20
M N 8.3 20
M Z 12 20
D = 1500 km = 13¹⁰.
Sk iP 20 59 55.9
i 20 59 59.4
Gb iP 21 00 59.7
Um iP 20 59 58.7
i 21 00 09.0
iS 21 03 10
Ka iP 21 01 16.6
e 21 01 24
Svalbard (h = 30 km).
Magn. = 5.9 (Up).
The following two features
deserve to be mentioned: 1)
multiple P-phases (a common
property for North Atlantic
shocks); 2) existence of
higher mode surface waves
(part of the path is nearly
tangential to the
continental margin).
" 3 Up iP 00 03 38.2 D
iPcP 00 04 02.6
Ki iP 00 02 45.1
iPcP 00 03 29.7
Sk eP 00 03 16
iPcP 00 03 48.9
Gb iP 00 03 53.1
Um iPcP 00 03 45.5
Aleutian Islands
(h = 60 km).
The PcP-phases have larger

1963

Dec. 3 amplitudes than the
cont. P-phases, especially at the
nearer stations (Ki, Um, Sk).
" 3 Up iP 02 17 10.2 D
" 3 Up iP 03 55 38.1
Ki iP 03 54 51.1 C
microns sec
P Z' 0.1 1.0
Um iP 03 55 12.5
Kurile Islands (h = 50 km).
" 3 Up iP 04 30 59.2 C
Ki iP 04 30 58.5
Sumatra (h = 50 km).
" 3 Up iP 05 20 19.4 C
microns sec
P Z' 0.2 1.5
M E 0.4 15
M N 0.7 18
M Z 0.6 18
Ki iP 05 19 31.4
microns sec
P Z' 0.2 1.5
M E 1.0 17
M N 0.9 16
M Z 1.8 17
Sk eP 05 20 15
9 Um iP 05 19 52.9 C
Kurile Islands (h = 40 km).
Magn. = 5.5 (Up, Ki).
" 3 Up iP 08 50 04.8 C
Ki iP 08 49 16.9 C
Um iP 08 49 39.0 C
Kurile Islands (h = 50 km).
" 3 Um iP 10 46 57.6
" 3 Up iPKP 14 51 49.7
Fiji Islands (h = 620 km).
" 3 Ki iP 16 06 41.5
Um iP 16 06 37.6
India.
" 3 Up
microns sec
M E 0.8 21
M N 1.1 18
M Z 1.8 22
Ki
microns sec
M E 1.4 19
M N 0.9 21

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1963

Dec. 3 Um iPKP 21 34 08.5
cont. i 21 34 17.3
Santa Cruz Islands
(h = 30 km).
Magn. = 5.7 (Up, Ki).

" 3 Um iPKP 21 49 11.8
Santa Cruz Islands
(h = 40 km).

"	3	Up	---	
			microns	sec
		M	E 4.0	23
		M	N 1.3	21
		M	Z 5.8	22
	Ki	ePS	23 32	26
			microns	sec
		M	E 4.3	24
		M	N 1.0	20
		M	Z 6.1	23
	Um	iSS	23 38	09
	Chile	(h = 20 km),		
	Magn.	= 6.1 (Up,Ki).		

"	4	Up	iPKP	01 04 26.0
			i	01 04 35.7
			i	01 04 41.7
				microns sec
			PKP Z'	0.1 0.9
		Ki	iPKP	01 04 11.1
		Gb	ePKP	01 04 29
			i	01 04 33.5
		Um	iPKP	01 04 15.8
		Kermadec Islands		
		(h = 30 km).		

"	4	Up	iP	01 38 34.4
			ipP	01 38 47.1
				microns sec
			P	Z' 0.1 1.0
			pP	Z' 0.2 1.0
			M	E 1.9 17
			M	N 3.1 19
			M	Z 3.0 19
		Ki	iP	01 37 45.9
				microns sec
			P	Z' 0.6 2.3
			M	E 4.5 23
			M	N 3.9 18
			M	Z 5.6 18
		Gb	iP	01 38 55.2
			ipP	01 39 08.0
		Um	iP	01 38 08.3
			ipP	01 38 21.4
			iS	01 46 40
			iSS	01 51 06

1963

Dec. 4 Ka iP 01 38 57.0
cont. ipP 01 39 09.5
Kurile Islands. h = 50 km
(Up, Gb, Um, Ka).
Magn. = 5.9 (Up, Ki).

" 4 Ki iP 02 19 50.0

" 4 Ki eP 02 38 05
Ka iP 02 37 25.2
Iran (h = 50 km).

"	4	Up	iP	02 54 27.4	C
			ipP	02 54 40.2	
			iX	02 54 50.7	
				microns	sec
			pP	Z' 0.2	1.0
			M	E 1.4	19
			M	N 1.5	19
			M	Z 1.7	18
		Ki	iP	02 53 39.0	C
				microns	sec
			P	Z' 0.1	1.2
			M	E 1.8	18
			M	N 1.4	18
			M	Z 2.5	18
		Gb	iP	02 54 48.5	
			ipP	02 55 02.1	
			iX	02 55 11.3	
		Um	iP	02 54 02.1	C
			ipP	02 54 14.5	
		Ka	ipP	02 55 03.5	
			iX	02 55 13.5	
		Kurile Islands. h = 50 km			
		(Up,Gb,Um).			
		Magn. = 5.5 (Up,Ki).			
		The phase marked X (Up,Gb,			
		Ka) is possibly P of			
		another shock in the			
		Kurile Islands.			

" 4 Ki iP 03 07 33.5
Ceram (h = 30 km).

" 4 Up iP 04 49 20.9 C

"	4	Up	iP	08 35 14.8
				microns sec
		P	Z'	0.3 1.0
		M	E	0.9 19
		M	N	1.1 18
	Ki	iP		08 34 27.5 C
				microns sec
		P	Z'	0.1 1.0
		M	E	0.9 18
		M	N	1.1 18
		M	Z	1.9 20

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1963					1963				
Dec.	4	Gb	iP	08 35 35.8	Dec.	5	Um	iP	04 17 57.3
cont.		Ka	iP	08 35 37.8 C					India (h = 30 km).
				Kurile Islands (h = 30 km).		"	5	Um	iPKP 04 42 48.3 C
				Magn. = 6.0 (Up, Ki).					Easter Island (h = 30 km).
"	4	Up	iPg	13 16 02.8	"	5	Up	i(P)	08 27 26.3
			iSg	13 16 56.0	"	5	Ki	eP	11 42 35
			i	13 17 03.1			Um	eP	11 42 34
				D = 440 km = 4.0°.				i	11 42 43.0
		Gb	iPg	13 15 02.3				i	11 43 02.7
			iSg	13 15 13.3					Colombia (h = 30 km).
			i	13 15 19.4					
				D = 90 km = 0.8°.	"	5	Ki	iP	14 46 35.7
		Um	eSg	13 18 38	"	5	Um	iP	15 55 50.5
		Ka	ePg	13 15 48					Kurile Islands (h = 70 km).
			iSg	13 16 32.7					
				D = 380 km = 3.4°.	"	6	Sk	eP	03 11 44
				Skagerrack, 58.3°N, 10.8°E.	"	6	Up	iP	03 26 24.6 C
				Origin time = 13 14 44.			Ki	iP	03 25 43.0 C
"	4	Up	iP	15 55 50.2			Sk	iP	03 26 18.1
			ipP	15 56 03.1			Um	iP	03 26 01.0 D
				microns sec			Ka	iP	03 26 45.9 C
			P	Z' 0.1 1.0					Sikhota Alin, USSR
		Gb	iP	15 56 11.3					(h = 340 km).
		Um	iP	15 55 24.8 C	"	6	Um	iP	05 27 43.9
			ipP	15 55 37.1					Kurile Islands (h = 60 km).
		Ka	iP	15 56 12.9 C	"	6	Sk	eP	07 01 24
				Kurile Islands, h = 50 km	"	6	Up	iP	07 02 51.0
				(Up, Um).			Um	iP	07 02 24.9
"	4	Um	iP	16 00 16.4					Kurile Islands (h = 50 km).
				Kurile Islands (h = 30 km).	"	6	Up	iP	08 46 16.9
"	4	Up		---					California (h = 15 km).
				microns sec	"	6	Up	iP	07 02 51.0
			M	E 1.8 23			Um	iP	07 02 24.9
			M	N 1.4 18					Kurile Islands (h = 50 km).
			M	Z 2.9 22	"	6	Up	iP	08 46 16.9
		Ki		---					California (h = 15 km).
				microns sec	"	7	Up	iPKP	04 26 12.2
			M	E 2.7 19				i	04 26 19.4
			M	N 1.1 23				iSKP	04 29 01.1
			M	Z 1.5 18					microns sec
		Um	i(PKP)	16 19 27.0				PKP	Z' 0.1 0.5
			i	16 26 48			Ki	iPKP	04 26 04.0
			eSS	16 39 25				iSKP	04 28 41.1
		Ka	i(PKP)	16 19 18.5			Sk	ePKP	04 26 09
				Easter Island (h = 30 km).			Gb	iPKP	04 26 22.2
				Magn. = 6.0 (Up, Ki).			Um	ePKP	04 26 05
"	4	Up	iP	17 21 51.5				i	04 26 10.6
		Um	iP	17 21 47.9				iSKP	04 28 49.5
"	5	Um	i(P)	03 05 55.6			Ka	iPKP	04 26 25.2 C
			e	03 06 20					Fiji Islands (h = 550 km).
			i(Sg)	03 06 42.5					This case clearly
									illustrates the caustic at

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

1963 Dec. cont.	7	143° distance, the amplitudes of PKP at Gb and Ka being about 15 times those at Ki,Um,Sk and Up.	1963 Dec. cont.	9	Ki	iP	05 48 17.5	
						P	Z' 0.1 1.0	
					Sk	iP	05 48 45.0	
					Gb	eP	05 49 23	
					Um	iP	05 48 43.9	
							Alaska (h = 50 km).	
							Magn. = 5.8 (Up,Ki).	
"	7	Up eP 05 51 12	"	9	Up	iP	08 45 01.8	
"	7	Up iP 11 36 50.5				ipP	08 45 13.5	
		Kurile Islands (h = 60 km).			Ki	eP	08 44 17	
"	7	Up iP 15 14 03.5				ipP	08 44 30.8	
"	7	Up iP 17 13 56.7			Sk	eP	08 44 53	
		microns sec			Um	ipP	08 44 52.9	
		P Z' 0.1 0.5					Kurile Islands. h = 50 km	
"	7	Up iPKP 17 56 43.7					(Up,Ki).	
		microns sec	"	9	Up	iPKP	11 12 08.8	
		PKP Z' 0.1 0.9			Ki	iPKP	11 12 02.0	
		Sk iPKP 17 56 36.7				iSKP	11 14 46.5	
		Gb iPKP 17 56 52.1			Sk	ePKP	11 12 07	
		Um iPKP 17 56 31.2				iSKP	11 15 03.8	
		Kermadec Islands			Gb	iPKP	11 12 19.4 C	
		(h = 210 km).			Um	ePKP	11 12 03	
"	8	Up iP 08 04 14.3 D				i	11 12 09.4	
		microns sec				iSKP	11 14 59.1	
		P Z' 0.2 1.0			Ka	iPKP	11 12 21.3	
		Ki iP 08 03 26.2 D					Fiji Islands (h = 440 km).	
		Sk eP 08 04 01					The amplitude of PKP at Ka	
		Gb iP 08 04 35.0 D					(beyond the caustic at	
		Um iP 08 03 48.1 D					143°) is about 5 times	
		i 08 03 54.5					those at all the other	
		Kurile Islands (h = 20 km).					stations.	
"	8	Up iP 11 14 05.9	"	9	Ki	iP	11 35 07.9 C	
		Ki iP 11 14 40.4 D					Mindanao (h = 140 km).	
		Caucasus (not Turkmen SSR!).	"	9	Up	iP	12 33 40.9	
"	8	Up iP 20 42 45.0					microns sec	
		Ki iP 20 41 57.6			P	Z' 0.1 1.0		
		Um iP 20 42 19.5			Ki	iP	12 32 54.2	
		Kurile Islands (h = 40 km).					microns sec	
"	8	Up iP 20 50 37.4			P	Z' 0.1 1.0		
		Ki iP 20 49 50.5 D			M	E 0.6 16		
		Um iP 20 50 11.7			M	N 0.6 17		
		Kurile Islands (h = 50 km).			M	Z 0.8 18		
"	9	Up iP 02 35 04.5			Sk	eP	12 33 29	
		Ki iP 02 34 17.9			Gb	iP	12 34 01.5	
		Um iP 02 34 39.0			Um	iP	12 33 15.3	
		Kurile Islands (h = 60 km).					Kurile Islands (h = 50 km).	
"	9	Up iP 05 49 10.2 C					Magn. = 5.8 (Up,Ki).	
		microns sec	"	9	Up	iP	12 40 00.0	
		P Z' 0.1 0.8			Ki	iP	12 39 12.7	
					Um	iP	12 39 34.2	
							Kurile Islands (h = 50 km).	

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Year	Month	Day	Time	Location	Depth (km)	Magnitude	Notes
1963	Dec.	9	Ka iP	15 56 38.1			
"	9	Up iP	18 09 27.1				
		Ki eP	18 09 39				
		Sk eP	18 09 53				
		Um iP	18 09 25.5	D			
		Ka iP	18 09 33.0				
		Hindu Kush	(h = 160 km)				
"	9	Gb i(P)	19 01 18.5	D			
"	9	Up iPKP	19 36 20.3	D			
			microns sec				
		PKP Z'	0.1 0.5				
		Ka iPKP	19 36 32.0				
		Fiji Islands	(h = 530 km)				
"	9	Up iP	21 19 23.2				
		Kurile Islands	(h = 50 km)				
"	10	Up eP	00 42 51				
"	10	Up iP	00 51 10.0				
"	10	Up iP	03 44 49.8				
		iSKS	03 54 53				
			microns sec				
		M E	0.5 17				
		M N	1.4 23				
		Ki iP	03 44 36.1	C			
		iSKS	03 54 39				
			microns sec				
		SKS E	1.7 6				
		M E	0.8 19				
		M N	0.8 18				
		M Z	1.6 20				
		Sk eP	03 44 57				
		Um iP	03 44 40.7	C			
		iPP	03 49 02				
		iSKS	03 54 43				
		i	03 57 24				
		ipS	03 58 07				
		Banda Sea	(h = 370 km)				
"	10	Sk iP	06 30 43.1				
"	10	Up iPKP	06 49 36.3	D			
		Ki iPKP	06 49 51.7				
		iSKP	06 53 01.5				
			microns sec				
		PKP Z'	0.4 1.5				
		SKP Z'	0.5 1.8				
		Sk ePKP	06 49 41				
		Um iPKP	06 49 44.1				
		Sandwich Islands	(h = 110 km)				
"	10	Ki iP	09 23 09.2				
1963	Dec.	10	Ki iP	09 38 47.9			
		Kurile Islands	(h = 50 km)				
"	10	Up iP	10 23 59.3	C			
		Ki iP	10 25 25.6	C			
		Um iP	10 24 47.9				
		Italy					
"	10	Gb iPg	12 44 09.1				
		iSg	12 44 11.7				
			D = 20 km = 0.2°				
		Local explosion?					
"	10	Ki eP	20 14 27				
		Leeward Islands	(h = 30 km)				
"	11	Up iP	00 44 17.5				
"	11	Up	---				
			microns sec				
		M E	0.7 23				
		M N	1.8 22				
		M Z	1.6 20				
		Ki ePKP	01 06 50				
			microns sec				
</							

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1963					1963				
Dec.	11	Ki	iP	17 18 19.6 D	Dec.	11	Up	iP	19 39 01.7
cont.				microns sec			Ki	iP	19 38 08.5
			P	Z' 0.1 1.0			Aleutian Islands		
			M	E 1.4 17			(h = 30 km).		
			M	N 1.5 17					
			M	Z 2.5 18	"	11	Up	iP	20 36 12.5
		Sk	iP	17 18 51.7			Aleutian Islands		
		Gb	iP	17 19 28.1			(h = 30 km).		
			ipP	17 19 44.6					
		Um	iP	17 18 45.1	"	11	Up	iP	20 38 06.8
			eS	17 27 28			This P occurs 01 54 after		
			e	17 27 59			the preceding one (Aleutian		
		Ka	iP	17 19 35.8 D			Islands). A similar		
			ipP	17 19 51.6			interval, 01 52, was found		
		Aleutian Islands.					between the P at 17 23 45.3,		
		h = 60 km (Up,Gb,Ka).					Dec. 11, and its follower.		
		Magn. = 6.1 (Up,Ki).					The second phases cannot be		
"	11	Up	iP	17 23 45.3 C			interpreted as belonging to		
				microns sec			the first shocks (if they		
			P	Z' 0.1 0.7			were pP this would lead to		
		Ki	iP	17 22 52.5			a very large depth, unknown		
		Aleutian Islands					in the Aleutians). It may		
		(h = 30 km).					be a pure coincidence, but		
"	11	Up	iP	17 25 37.3 C	"	12	Ki	ePn	12 37 24
								iSn	12 38 10.0
"	11	Up	iP	17 36 11.8				iSg	12 38 22.8
				microns sec				D = 390 km = 3.5°.	
			P	Z' 0.1 0.6			Sk	eSg	12 40 52
		Ki	eP	17 35 18			Um	iSg	12 39 18.0
		Aleutian Islands					Northwest Russia, 67.2°N,		
		(h = 30 km).					29.6°E. Origin time =		
"	11	Up	iP	17 54 18.4			12 36 28. Explosion?		
		Aleutian Islands			"	12	Up	iP	23 35 22.3
		(h = 30 km).					Ki	iP	23 34 37.0
"	11	Up	iP	18 20 19.0 D			Sk	eP	23 35 11
		Ki	iP	18 19 25.4			Um	iP	23 34 56.7
		Aleutian Islands						i(pP)	23 35 23.3
		(h = 30 km).						i	23 35 55.6
"	11	Up	iP	18 39 47.9			Kurile Islands (h = 90 km).		
		Ki	iP	18 38 54.7	"	13	Up	iP	02 58 54.2
		Aleutian Islands					Um	iP	02 58 38.2
		(h = 30 km).					Ryukyu Islands (h = 110 km).		
"	11	Up	iP	19 23 56.6 D	"	13	Um	iP	06 41 40.7
				microns sec	"	13	Um	i(P)	15 17 12.7
			P	Z' 0.1 0.6	"	13	Um	iP	15 42 07.3
		Ki	iP	19 23 03.7 D	"	13	Ki	iP	21 39 32.7
		Sk	eP	19 23 44				i	21 40 00.6
		Gb	iP	19 24 12.4	"	13			
		Aleutian Islands			"	14	Up	iP	00 18 18.2
		(h = 50 km).							

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Ka = Karlskrona

1963				1963			
Dec.	14	Up	ipP 00 18 31.2	Dec.	15	Up	iSKS 19 56 28
cont.		Sk	eP 00 18 10	cont.			iPKKP 20 03 54.8
			ipP 00 18 24.1				microns sec
		Gb	iP 00 18 15.1			P	Z' 0.3 0.5
		Brazil. h = 50 km (Up,Sk).				PP	N 1.7 5
"	14	Up	iP 08 00 50.8			PP	Z 2.4 2
			microns sec			SKS	E 6.6 9
		P	Z' 0.1 0.6			M	E 6.8 22
		Ki	iP 07 59 50.1			M	N 7.5 17
		i	07 59 53.2			M	Z 6.3 18
			microns sec			(D = 10550 km = 95°).	
		P	Z' 0.3 0.8	Ki	iP	19 46 54.2 D	
		Sk	iP 08 00 21.8		ipP	19 49 16	
		Gb	iP 08 01 03.1 C		isP	19 50 17	
		Um	iP 08 00 23.5 C		isPP	19 54 07	
			ipP 08 00 45.1		iSKS	19 56 25	
		Ka	iP 08 01 15.3		i	20 00 50	
		Alaska. h = 100 km (Um).			iPKKP	20 03 57.1	
		Magn. = 6.2 (Up,Ki).				microns sec	
"	14	Up	iP 23 13 07.8 D		P	Z 5.8 7	
"	15	Up	iP 03 31 23.8		P	Z' 1.2 1.0	
		Kurile Islands (h = 15 km).			SKS	E 9.6 11	
"	15	Um	iP 03 50 18.8 C		M	E 19 21	
		Aleutian Islands			M	N 11 23	
		(h = 25 km).			M	Z 11 20	
"	15	Ki	eP 07 13 50		(D = 10450 km = 94°).		
		Ryukyu Islands (h = 30 km).		Sk	iP	19 47 09.5 D	
"	15	Up	iP 07 42 26.0		i	19 48 14.0	
		Ki	----		iPP	19 51 01.7	
			microns sec	Gb	iP	19 47 11.2	
		M	E 0.7 15		ipP	19 49 23.5	
		M	N 1.3 17		isP	19 50 34.7	
		M	Z 0.5 12		iPP	19 51 10.6	
		Sk	iP 07 42 42.0 D		i	19 51 22.2	
		Um	iP 07 42 15.4	Um	iP	19 46 53.3 D	
		Tibet (h = 30 km).			ipP	19 49 14.6	
"	15	Up	iP 10 33 55.5		i	19 49 39.2	
		Um	iP 10 33 31.7		isP	19 50 14	
		Kurile Islands (h = 50 km).			iPP	19 50 54.7	
"	15	Up	iP 15 05 00.2		ipS	19 59 57	
"	15	Up	iP 15 18 33.9		iPKKP	20 03 57.5	
		Sumatra (h = 70 km).		Ka	iP	19 47 01.8	
"	15	Up	iP 19 46 57.5 D		i	19 49 54.0	
		ipP	19 49 19		isP	19 50 23.3	
		iPP	19 50 52		i(PP)	19 50 53.8	
		ipPP	19 53 09		iPKKP	20 03 52.1	
		isPP	19 54 08		Java Sea. h = 660 km		
"	15	Sk	e(P) 21 06 16		(Up,Ki,Gb,Um).		
"	16	Up	iP 02 04 45.0		Magn. = 7.0 (Up,Ki).		
			microns sec		The surface waves are		
		P	Z' 0.1 0.7		remarkably large,		
					considering the focal depth.		

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

1963				1963			
Dec.	cont.			Dec.	cont.		
16	Up		microns sec	16	Sk	iP	13 53 38.1
	M	E	4.8 17			i	13 54 04.2
	M	N	9.6 19		Gb	iP	13 52 45.3
	M	Z	7.3 19		Um	iP	13 53 37.6
	Ki	iP	02 04 42.3			i	13 53 50.6
	i		02 04 48.0			iS	13 58 11
			microns sec			i	13 58 26
	P	Z'	0.7 1.0		Ka	iP	13 52 21.9
	M	E	18 19			eS	13 56 03
	M	N	21 23		Ionian Sea (h = 15 km).		
	M	Z	15 18		Magn. = 6.0 (Up, Ki).		
	Sk	eP	02 04 59				
	Gb	iP	02 05 08.9	"	16	Ki	ePKP 14 37 23
	Um	iP	02 04 41.5 C			Sk	ePKP 14 37 44
	i		02 04 47.5			Ka	iPKP 14 37 52.9
	eSKS		02 15 14		South of Australia		
	eS		02 15 44		(h = 30 km).		
	eSS		02 22 07				
	Sumatra (h = 60 km).			"	16	Ki	iP 16 19 49.9
	Magn. = 6.4 (Up, Ki).				Sumatra (h = 50 km).		
"	16	Up	iP 02 19 56.3 C	"	17	Up	iP 00 37 03.3
	Ki	iP	02 19 54.2 C	"	17	Up	iP 04 25 14.8 C
			microns sec		Volcano Islands		
	P	Z'	0.2 1.2		(h = 100 km).		
	Um	iP	02 20 00.9	"	17	Um	iPKP 08 52 32.0
	Sumatra (h = 30 km).				Kermadec Islands		
"	16	Up	iP 11 19 45.9		(h = 380 km).		
			microns sec	"	17	Um	eP 11 05 33
	P	Z'	0.1 0.7			Ka	iP 11 05 42.3
	Ki	iP	11 19 00.6		Hindu Kush (h = 200 km).		
	Um	iP	11 19 21.4 C	"	17	Um	eP 13 38 24
	Ka	iP	11 20 09.1	"	17	Ki	iP 14 02 01.6
	Sakhalin (h = 260 km).			"	17	Um	i(P) 16 15 59.8 C
"	16	Up	iP 13 52 59.3	"	17	Up	iP 23 33 06.7
		iS	13 57 13.9			Ki	iP 23 32 14.0
		iSn	13 57 47.0				i(pP) 23 32 26.7
			microns sec				microns sec
	P	N	3.6 5			P	Z' 0.1 1.0
	P	Z	2.4 5		Sk	iP	23 32 43.2
	P	Z'	0.2 0.5		Gb	iP	23 33 20.8
	S	E	2.5 9		Um	iP	23 32 40.8
	S	N	4.8 9		Aleutian Islands		
	M	E	13 14		(h = 30 km).		
	M	N	17 13	"	18	Up	eP 00 46 54
	M	Z	13 12				iPKP 00 49 29.0 C
	D = 2550 km = 23°.					i	00 52 40.6
	Ki	eP	13 54 12			iPP	00 52 52
	i		13 55 28.8				
			microns sec				
	P	Z'	0.5 1.5				
	M	E	24 17				
	M	N	8.6 13				
	M	Z	12 13				

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1963

Dec. 18 Up iPKS 00 53 20
cont. iSKKS 00 59 33
i(PcPPKP) 01 00 53.2
i 01 04 58
iSS 01 11 13
microns sec
PKP E 7.5 16
PKP N 12 15
PKP Z 46 16
PKP Z' 1.8 0.7
M E 43 25
M N 93 30
M Z 49 24
(D = 16000 km = 144°).
Ki e(P) 00 46 53
e(PKP) 00 49 06
iPKP 00 49 14.9
iY 00 49 56
iX 00 51 48.3
iPKS 00 52 47
i 00 53 32
iSKKS 00 58 41
i(PcPPKP) 01 01 24.4
e(SS) 01 09 28
microns sec
PKP N 1.8 16
PKP Z 2.4 5
PKP Z' 0.6 0.8
PKS E 18 16
PKS N 30 16
PKS Z 9.9 10
M E 19 20
M N 31 22
M Z 41 20
(D = 15100 km = 136°).
Sk iPKP 00 49 24.4
iX 00 51 45.1
Gb iPKP 00 49 37.5 C
i 00 49 39.2
Um iP 00 46 42 C
iPKP 00 49 16.5
i 00 49 18.0
iY 00 50 02.2
eX 00 52 00
iPP 00 52 37
iPKS 00 53 03.8
i 00 53 19.4
i(PcPPKP) 01 00 39.6
Ka iPKP 00 49 39.4
i(Y) 00 50 15.0
Tonga Islands (h = 50 km).
Magn. = 7.4 (Up, Ki).
The notations X (Ki, Sk, Um)
and Y (Ki, Um, Ka) denote
unidentified phases which
may or may not belong to
this earthquake, Up, Ki and

1963

Dec. 18 Um have recorded a clear
cont. diffracted P; its period
is around 30 sec and it
shows up only on the long-
period records.
" 18 Up iP 03 01 30.9
microns sec
P Z' 0.2 0.8
Ki iP 03 00 44.1
microns sec
P Z' 0.2 0.9
Sk eP 03 01 20
Gb iP 03 01 52.0
Um iP 03 01 05.7
Ka iP 03 01 53.4
Kurile Islands (h = 30 km).
Magn. = 6.2 (Up, Ki).
" 18 Up iP 03 20 02.1
Ki iP 03 19 14.4
Um iP 03 19 36.8 D
Kurile Islands (h = 50 km).
" 18 Up iP 06 48 02.6 C
iLgl 07 02 45
microns sec
P Z' 0.2 0.7
M E 2.4 10
M N 4.1 13
M Z 2.5 10
Ki iP 06 47 53.0 C
microns sec
P Z' 0.4 0.6
M E 3.5 12
M N 1.9 15
M Z 4.0 13
Sk iP 06 48 19.6 C
Gb iP 06 48 28.4
Um iP 06 47 51.3 C
Ka iP 06 48 14.6 C
Sinkiang, China (h = 30 km).
Magn. = 6.5 (Up, Ki) from
PZ' but only 5.5 from
surface waves (Up, Ki). This
could suggest a focal depth
of around 75 km (see M.
Bath: The problem of earth-
quake magnitude determina-
tions, BCIS, A 19, 1956,
p. 40).
" 18 Up iPKP 12 41 27.6
Kermadec Islands
(h = 130 km).
" 18 Up iP 18 24 39.7

1963				1963			
Dec.				Dec.			
cont.	18	Up	ipP 18 24 51.9	cont.	20	Ki	microns sec
		Um	iP 18 24 16.0			M	N 0.4 17
			ipP 18 24 31.3			M	Z 0.7 17
		Japan. h = 60 km (Up,Um).				Gb	iP 16 02 11.1
"	18	Ki	iP 19 40 16.2			Um	iP 16 02 15.5
		Kurile Islands (h = 30 km).					iSKS 16 12 37
"	18	Up	iP 20 07 31.2			Indian Ocean (h = 30 km).	
"	19	Ki	iP 17 18 14.4			Relatively long-period P	
		Peru (h = 60 km).				on all Z' records (average	
"	19	Up	iP 18 48 54.9 C			= 1.7 sec).	
		Ki	iP 18 50 02.5	"	20	Um	iP 16 36 20.7
		Sk	eP 18 49 35			Indian Ocean (h = 30 km).	
		Crete (h = 30 km).		"	20	Um	iP 16 58 31.5
"	19	Up	eP 22 46 00				i 16 58 41.8
		Ki	iP 22 45 06.0			Indian Ocean (h = 30 km).	
		Sk	eP 22 45 37	"	20	Up	eP 20 56 57
		Um	iP 22 45 32.8 D				i 20 57 28.4
			ipP 22 45 44.5	"	20	Ki	iP 21 53 25.1
		Aleutian Islands.					i 21 53 31.0
		h = 50 km (Um).		"	21	Up	iP 01 59 06.5 C
"	20	Up	iP 00 58 16.9	"	21	Ki	iP 04 58 03.1
		Um	iP 00 57 50.8			Um	iP 04 57 34.6
		Kurile Islands (h = 40 km).				Iran (h = 50 km).	
"	20	Up	i(P) 01 18 53.7	"	21	Up	iPKP 12 53 36.4
		i	01 19 10.2			Ki	iPKP 12 53 26.8
"	20	Ki	iP 01 28 21.4			Um	ePKP 12 53 31
		iSg	01 29 03.0				i 12 53 58.7
"	20	Um	i(P) 04 19 09.9			Ka	ePKP 12 53 46
"	20	Up	iP 08 17 46.9			Tonga Islands (h = 90 km).	
"	20	Ki	iP 09 11 06.5	"	21	Up	iP 13 21 26.1
		Um	iP 09 11 12.1				i 13 21 32.8
		Banda Sea (h = 100 km).					iS 13 31 32
"	20	Up	i(P) 10 09 40.5				microns sec
"	20	Up	iP 13 06 50.9			P	Z' 0.2 0.8
		Ki	iP 13 06 16.2			S	E 0.9 7
"	20	Up	eP 14 08 08			S	N 1.0 7
"	20	Ka	iP 14 57 40.3			M	E 1.8 19
"	20	Up	iP 16 02 06.0			M	N 3.2 20
		Ki	eP 16 02 22			M	Z 1.6 20
			microns sec			D = 9050 km = 81 $\frac{1}{2}$ °.	
		M	E 0.6 17			Ki	iP 13 21 07.5
							iS 13 31 03
							microns sec
						P	Z' 0.2 1.0
						S	E 1.1 7
						S	N 0.7 7
						M	E 2.7 19
						M	N 4.8 22
						M	Z 3.2 20
						D = 8650 km = 78°.	

1963 Dec. cont.	21	Sk	eP	13 21 27		1963 Dec.	24	Up	iP	02 36 59.7	
			i	13 21 47.1				Ki	iP	02 36 13.0	
		Gb	iP	13 21 43.3						microns sec	
			i	13 22 13.9				P	Z'	0.1 1.3	
		Um	iP	13 21 12.6						Kurile Islands (h = 50 km).	
			iS	13 31 08		"	24	Up	iP	03 11 55.4 C	
		Ka	iP	13 21 37.0					ipP	03 12 08.5	
		Luzon (h = 50 km).							i	03 14 46.3	
		Magn. = 6.1 (Up,Ki).								microns sec	
"	21	Up	iP	16 35 08.5					P	Z' 0.1 0.5	
		Um	iP	16 34 47.2 D				Ki	iP	03 11 08.1 C	
		Japan (h = 30 km).								microns sec	
"	21	Um	iP	19 01 48.2					P	Z' 0.1 1.0	
"	22	Ki	iP	01 32 49.8				Sk	eP	03 11 43	
		Mexico (h = 30 km).						Gb	iP	03 12 16.5	
"	22	Up	iP	04 33 06.5				Um	iP	03 11 29.5	
								Ka	iP	03 12 17.4	
"	22	Um	iP	10 50 34.7 C						Kurile Islands, h = 50 km	
"	22	Um	iPKP	13 55 11.7		"	24	Up	iP	03 38 21.2	
		New Zealand (h = 80 km).								microns sec	
"	22	Um	eP	15 50 22.8					P	Z' 0.1 0.6	
"	22	Up	iP	23 26 11.3 D				Ki	iP	03 37 33.3	
		Ki	iP	23 26 14.9						microns sec	
									P	Z' 0.1 1.0	
								Gb	iP	03 38 42.3	
								Um	iP	03 37 56.0	
										Kurile Islands (h = 50 km).	
										Magn. = 5.9 (Up,Ki).	
"	23	Up	iP	08 01 20.5		"	24	Up	iP	13 07 10.5	
"	23	Up	iP	13 53 29.9 C					ipP	13 07 27.3	
		Kurile Islands (h = 30 km).						Ki	iP	13 06 32.1	
"	23	Up	iPKP	18 17 58.1 C				Sk	iP	13 07 05.2	
			ipPKP	18 18 36.3				Um	iP	13 06 48.6	
		Gb	iPKP	18 18 07.4						Japan, h = 70 km (Up).	
		Ka	iPKP	18 18 07.7		"	24	Up	i(P)	23 40 43.1	
		Tonga Islands, h = 140 km									
		(Up).				"	25	Up	i(P)	01 53 16.9	
"	23	Up	iP	18 50 47.1 C							
						"	25	Um	iP	06 34 37.0 C	
						"	25	Up	iP	16 23 45.0 D	
										Tsinghai, China (h = 30 km).	
"	23	Up	iP	18 50 47.1 C		"	26	Ki	iP	01 43 56.3	
										Sumatra (h = 40 km).	
						"	26	Um	iP	06 26 55.6	
						"	26	Up	iP	08 02 11.1	
									ipP	08 02 20.5	
"	23	Up	i(P)	19 21 17.5					iS	08 05 07.9	

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

1963				1963			
Dec.	26	Up	iSS 08 05 40	Dec.	26	Up	iP 20 57 53.1 C
cont.			iLi 08 06 20			Ki	iP 20 58 02.0
			iLg1 08 06 55			Sk	eP 20 58 18
			i(PcP) 08 07 06			Um	iP 20 57 51.6
			iLg2 08 07 16			Ka	iP 20 57 58.0 C
			microns sec			Hindu Kush (h = 140 km).	
			P Z' 0.1 0.5				
			PP Z' 0.2 0.6	"	26	Up	iP 21 22 16.0
			S Z' 0.3 0.7			Ki	iP 21 21 23.4
			D = 1850 km = 16 $\frac{1}{2}$ °			Um	iP 21 21 49.9 C
		Ki	iP 08 00 24.3			Aleutian Islands	
			i 08 00 28.2			(h = 30 km).	
			iS 08 01 56.8				
			iLg2 08 02 59	"	26	Ki	eP 23 26 12
			microns sec			Arctic Ocean (h = 30 km).	
			P Z' 0.8 1.0				
			M E 3.7 7	"	27	Um	iP 12 59 15.9
			M N 3.5 8			Kurile Islands (h = 30 km).	
			M Z 4.3 6				
			D = 950 km = 8 $\frac{1}{2}$ °	"	27	Um	iP 19 56 35.7
		Sk	iP 08 01 29.1	"	28	Up	iP 01 51 25.6
			i 08 01 38.4			ipP	01 52 12.3
			iLg2 08 05 38.2			microns sec	
		Gb	iP 08 02 47.3			P Z' 0.1 0.5	
			iLg1 08 08 34.5			Ki	iP 01 51 34.7
		Um	iP 08 01 19.3			Sk	iP 01 51 51.2
			iS 08 03 31.0			Gb	iP 01 51 46.8
			eSS 08 03 47			Um	iP 01 51 23.8 C
			iLg1 08 04 56			ipP	01 52 09.7
		Ka	iP 08 02 57.2 D			Ka	iP 01 51 28.7
			i 08 03 03.3			Hindu Kush, h = 220 km	
			iS 08 06 41.7			(Up, Um).	
			eLg1 08 09 12				
		Svalbard (h = 30 km).		"	28	Um	i 06 12 04
		Clear channel waves (higher				ePS	06 14 10
		mode surface waves) are				iSS	06 20 15
		recorded at all our				eSSS	06 24 18
		stations, all paths being				New Ireland (h = 70 km).	
		on the continental side of					
		the margin.		"	28	Um	iP 07 39 16.8
"	26	Up	i(P) 08 42 10.0	"	28	Up	iPKP 09 23 34.4
"	26	Ki	eP 08 52 03			i	09 23 40.0 C
		Um	eS 08 55 25			microns sec	
		North of Iceland				PKP Z' 0.4 0.7	
		(h = 30 km).				M N 1.7 21	
						M Z 2.2 22	
"	26	Up	iP 10 57 32.3 D			Ki	iPKP 09 23 18.5
		Ki	iP 10 56 46.2			ipP	09 26 52.3
		Kurile Islands (h = 30 km).				microns sec	
						PKP Z' 0.1 1.0	
"	26	Um	iP 11 07 17.3			PP Z' 0.3 1.4	
"	26	Ki	eP 16 37 10			Sk	iPKP 09 23 31.0 C
		Molucca Sea (h = 70 km).				i	09 23 34.5
						ipP	09 27 04.4
						Gb	iP 09 23 47.9 C

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Ka = Karlskrona

1963					1963				
Dec.	28	Um	iPKP	09 23 26.9	Dec.	29	Um	eSg	14 22 27
cont.			i	09 23 29.9 C	cont.			Norway, $66\frac{1}{2}^{\circ}\text{N}$, $14\frac{1}{4}^{\circ}\text{E}$.	
			i	09 23 52.2				Origin time = 14 20 23.	
			iPP	09 26 59.6					
			iSS	09 45 44	"	30	Ki	iP	01 27 30.3
		Ka	iPKP	09 23 48.4 C			Um	iP	01 27 44.6
			iPKP2	09 24 24.5				Mariana Islands	
								(h = 120 km).	
					"	30	Up	iPKP	06 43 15.9
								Kermadec Islands	
								(h = 30 km).	
"	28	Gb	eP	17 49 35					
"	28	Up	ePKP	18 17 40	"	30	Up	iP	13 40 21.0
				microns sec				iPcP	13 40 47.6
		M	E	2.1 22					microns sec
		M	N	2.2 18			P	Z'	0.1 0.7
		M	Z	1.8 22			M	E	1.8 19
		Ki	ePKP	18 17 46			M	N	4.1 20
				microns sec			M	Z	3.9 20
		M	E	1.1 17		Ki	iP	13 39 34.5	
		M	N	0.9 19					microns sec
		M	Z	1.7 19			M	E	2.8 17
		Um	iPKP	18 17 46.1			M	N	3.3 19
			eSS	18 39 04			M	Z	6.1 18
						Sk	iP	13 40 11.1	
							iPcP	13 40 39.9	
						Um	iP	13 39 58.3	
							ipP	13 40 09.4	
							eS	13 48 27	
									Kurile Islands.
									h = 40 km (Um).
									Magn. = 5.8 (Up, Ki).
"	29	Up	iPKP	03 19 53.8	"	30	Up	iP	15 17 06.7 C
			i	03 20 02.8			Ki	iP	15 16 49.0 C
				microns sec					microns sec
			PKP	Z' 0.1 0.5			P	Z'	0.1 1.2
		Ki	i(PKP)	03 19 54.6			Sk	iP	15 17 11.0 C
		Sk	ePKP	03 19 48					Mindanao (h = 100 km).
			i	03 19 53.0	"	30	Up	iP	20 43 42.8 C
		Gb	i(PKP)	03 20 17.3				ipP	20 43 57.4
		Um	iPKP	03 19 41.9					Hokkaido, Japan.
			i	03 19 46.8					h = 60 km (Up).
			i	03 19 57.2					
		Ka	iPKP	03 20 07.9	"	30	Up	iP	22 17 56.8 C
			i	03 20 18.9					microns sec
							P	Z'	0.1 0.6
						Ki	iP	22 17 58.3 C	
									microns sec
							P	Z'	0.2 0.9
						Sk	iP	22 18 13.0	
						Um	iP	22 17 54.2	
									Nicobar Islands (h = 60 km).
"	29	Up	eP	07 52 35					Magn. = 6.1 (Up, Ki).
		Ki	eP	07 50 49	"	30	Up	iP	22 17 56.8 C
			iS	07 52 40.8					microns sec
				D = 1100 km = 10° .			P	Z'	0.1 0.6
		Um	iSS	07 55 01.1			Ki	iP	22 17 58.3 C
			iLgl	07 56 24.2					microns sec
							P	Z'	0.2 0.9
						Sk	iP	22 18 13.0	
"	29	Um	iP	11 41 58.6					

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Ka = Karlskrona

1963

Dec. 31 Up iP 10 56 17.3
Kurile Islands (h = 50 km).

" 31 Up iP 12 10 47.5

" 31 Ki iP 15 24 41.5
Iran (h = 30 km).

" 31 Um eP 17 15 49

" 31 Up iPKP 17 56 22.1
e(PS) 18 07 45
microns sec
M E 12 20
M N 12 18
M Z 12 18
Ki iPKP 17 56 36.3 D
iPKS 17 59 58
microns sec
PKP Z' 0.5 1.5
PKS N 3.1 6
M E 10 18
M N 12 20
M Z 21 21
Um iPKP 17 56 29.9
iPP 17 58 16
iSKS 18 03 18
i 18 06 13
i(PS) 18 08 16
iSS 18 15 03
Sandwich Islands
(h = 30 km).
Magn. = 6.8 (Up, Ki).

Markus Båth
October 29, 1964