

SEISMOLOGICAL BULLETIN

1958

INSTITUTE OF SEISMOLOGY
UNIVERSITY OF HELSINKI

Registration of earthquakes
at Helsinki, Nurmijärvi and Sodankylä

By

U.Luosto, M.T.Porkka, E.Penttilä,
Aili Huovila and Henni Pynnä

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Introduction

The seismograph stations at Helsinki and Sodankylä have been in operation throughout the year. The seismogram data, especially that of Helsinki station, is imperfect because of experimental and constructional work. All the instrumental constants are only approximately known.

The site of the Helsinki station proved to be too disturbed for modern sensitive short period seismographs. Hence it was necessary to look for a new location for the main station. In the latter part of 1958 a third seismograph station was established at Nurmijärvi, about 40 km from Helsinki. The station is located in the Geophysical Observatory of the Finnish Meteorological Office. The director of the Observatory, Mr. Matti Kivinen, M.A., has been in charge of the seismic observations. For the most part, only trials have been conducted at the new station. Earthquakes recorded during December at Nurmijärvi are included in this Bulletin.

Stations:

Helsinki (HEL)

Location: 60°10'32.3"N
24°57'25.2"E
h: 19.9 m
Ground: Migmatite

Nurmijärvi (NUR)

Location: 60°30'32.3"N
24°39'18.1"E
h: 102 m
Ground: Pyroxene gneiss

Sodankylä (SOD)

Location: 67°22'16.2"N
26°37'44.7"E
h: 181 m
Ground: About 20 gravel overlying the
Precambrian metamorphic shists

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Approximate instrumental constants:

Seismometer	Period		Damp. ratio	Max.magn.	Recording
	Seism.	Galv.			
HEL					
Mainka N	10	-	3:1	150	Mechanical on
Mainka E	10	-	3:1	150	smoked paper
Nurmia Z	0.7	0.2	3:1	50 000	Photographic
Nurmia N	0.5	1.5	3:1	35 000	"
Nurmia E	0.5	1.5	3:1	35 000	"
NUR					
Nurmia Z	0.7	0.2	3:1	50 000	Photographic
SOD					
Benioff Z	1	0.2	17:1	70 000	Photographic
Nurmia N	0.5	1.5	3:1	35 000	"
Nurmia E	0.5	1.5	3:1	35 000	"

January

1 SOD eP 15 16 16
Fox Islands

2 HEL iP 02 13 26
i 30
i 38
SOD iP 02 14 34
i 48
i 52
iPP 15 28
eS 19 36
iPcS 21 15
Greece

2 SOD iP 15 52 17
iPP 53 39
Iran

2 SOD iP 21 22 11
Kurile Islands

3 SOD iP 02 06 34
ipP 45
iPcP 51
i 07 15
Honshu, Japan

3 SOD iP 06 33 45
N Atlantic Ocean

3 SOD iP 06 59 15
N Atlantic Ocean

3 SOD iP 07 11 27
i 39
N Atlantic Ocean

3 SOD iP 09 35 01
N Atlantic Ocean

3 HEL iP 18 00 06
SOD eP 18 00 30
Mascarene Islands

3 HEL e 22 13 10
SOD iP 22 12 06
iPP 13 34
Lake Baikal

4 SOD iP 06 49 00
N Atlantic Ocean

January

4 SOD iP 08 15 07
Guerrero, Mexico

4 SOD iP 08 37 34
India-Tibet border

5 SOD iP 08 17 17
epP 19 08
Celebes Sea

5 HEL iP 11 39 12
iPP 41 00
SOD iP 11 38 33
ePP 40 10
eS 44 55
Stanovoi Mountains

6 HEL iP 02 01 44
i 02 04
ePP 03 19
SOD iP 02 02 01
Hindu Kush

6 SOD iP 08 22 46

6 SOD iP 09 17 38
i 48
Unimak Island

6 SOD iP 10 04 54
Iran

6 HEL iP 11 34 14
SOD iP 11 34 12
i 55
iPP 36 18
Burma

7 HEL iP 06 12 08
ePP 13 13
SOD eP 06 12 40
Tadzhik

8 SOD iP 08 58 04

9 SOD iP 17 46 41
Sinkiang, China

10 SOD iP 23 07 18
Kurile Islands

January

13 HEL iP 00 12 56
i 13 21
SOD iP 00 12 11
i 34
i 41
eS 20 06
eP'P' 41 48
Rat Islands

13 HEL ePKP 03 13 27
Santa Cruz Islands

13 HEL iP 20 25 43
SOD iP 20 25 44
i 51
Andaman Islands

13 HEL iP 20 35 52
SOD eP 20 36 02
Pamir

14 HEL ePKP 06 14 29
Tonga Islands

14 HEL ePKP 07 39 38
Kermadec Islands

14 HEL iP 13 40 01
Turkey

15 HEL iP 04 21 15
Siberia

15 SOD iP 13 21 49
i 22 02
Caspian Sea

15 SOD eP 19 29 01
e(PKP) 32 33
e 33 01
ePP 15
eSKS 39 21
Southern Peru

15 SOD iPn 20 52 01
iPb 10
iPg 1
iSg 4
Kola, USSR

January				January				January				
15	SOD	iPKP	22 34 43	21	SOD	iP	19 46 24	24	SOD	iP	23 26 41	
		New Hebrides				Kurile Islands			i		58	
									iPcP	27	53	
16	SOD	iP	02 11 16	22	HEL	iP	18 40 25					
		Northern Iran				SOD	iP	18 40 09			Kenai Peninsula	
						Formosa						
16	SOD	iP	04 24 07	22	SOD	iP	21 52 42	25	SOD	iP	08 45 16	
		Aegean Sea				Andaman Islands		25	HEL	eP	09 12 35	
17	SOD	ePn	09 43 19	22	SOD	eP	23 41 23		SOD	iP	09 11 18	
		ePb	23			Komandorskie Is.			iPP		28	
		iPg	27						iS	12	56	
		iSn	59	23	HEL	iP	02 44 38		iSS	13	08	
		eSb	44 02			SOD	iP	02 43 59			Jan Mayen	
		iSg	07			Kurile Islands		26	HEL	eP	00 54 36	
		Kola, USSR							SOD	iP	00 54 37	
19	SOD	iPg	01 52 35	23	HEL	iP	13 37 24				Nicobar Islands	
		iSg	50			iPP	32	26	SOD	iP	01 06 48	
		Finnish-Swedish border				iS	39 08					
19	SOD	eP	03 58 23			iSS	25	26	SOD	iP	07 38 27	
		Jugoslavia				SOD	iP	13 37 05			Kurile Islands	
						eS	38 32					
19	SOD	iP	09 22 06			W coast of Norway		28	SOD	iP	17 22 08	
		Formosa							ePP	23	26	
19	SOD	iP	14 20 47	24	SOD	iP	04 43 31				Iran	
		i	49			iPP	45 05					
		i	21 12			Lake Baikal		29	HEL	iP	00 27 46	
		ePP	24 37	24	HEL	iP	06 04 02		SOD	iP	00 27 14	
		Ecuador				iPcP	51				Honshu, Japan	
19	SOD	iP	14 56 49			SOD	iP	06 03 14	30	SOD	iP	19 19 50
		ePP	15 00 33			i	20				Dodecanese Islands	
		Ecuador				iP	36					
19	SOD	iP	17 02 25			iPcP	04 22					
		i	41			ePP	05 15					
		Sumatra				Kamchatka		30	SOD	iSKP	23 02 20	
19	SOD	iPn	19 45 40	24	SOD	iP	06 20 19				Tonga Islands	
		iPg	41			iPcP	21 28					
		iSn	46 04			Kamchatka		31	SOD	iPKP	06 52 21	
		iSg	07	24	SOD	iP	18 13 14			i	31	
		Nilivara				i	25			i	45	
20	HEL	iP	07 25 00			Komandorskie Is.					New Zealand	
	SOD	iP	07 24 55	24	SOD	eP	23 08 44	31	HEL	iP	23 29 43	
		Luzon				e	48		SOD	iP	23 29 43	
						Near Islands					Sikang, China	

February

1 SOD iP 02 51 19
Alaska

1 SOD iP 16 23 38
Ecuador

1 HEL iP 18 16 06
SOD iP 18 16 01
Ecuador

1 HEL iP 20 59 13
SOD iP 20 59 08
Ecuador

2 HEL iP 08 22 30
SOD iP 08 21 48
Kurile Islands

4 SOD iP 19 55 27
i 36
Unimak Island

4 SOD iP 23 48 42
Honshu, Japan

5 HEL iP 03 20 56
i 21 07
iPP 33
iPPP 46
SOD iP 03 21 34
i 48
iPP 22 04
Turkmen, USSR

5 HEL iP 08 18 56
SOD iP 08 18 15
i 48
Kurile Islands

5 SOD iP 15 28 07

6 SOD iP 01 53 21
Formosa

7 HEL iP 00 44 24
ePP 47 24
SOD iP 00 44 33
iPcP 42
i 45 20
Sumatra

February

7 HEL iPcP 01 30 08
i 12
i 31 13
SOD iPcP 01 29 54
Kermadec Islands

7 SOD iP 06 56 06

7 SOD iP 16 07 43
Honshu, Japan

7 SOD iP 23 33 16
iPcP 34 11
Szechwan, China

9 SOD iP 04 28 04
i 12
Panama

9 SOD iP 09 40 56
i 41 07
E.Pakistan-India

9 SOD eP 21 44 36
i 46
i 57
Alaska

9 HEL iP 22 41 46
iPcP 51
SOD iP 22 41 35
iPcP 40
i 51
Philippine Islands

10 SOD iP 14 54 18
Volcano Islands

11 SOD iP 00 59 30
S coast of Java

12 HEL iP 18 28 51
i 29 47
SOD iP 18 28 58
i 29 56
Nicobar Islands

12 HEL iP 23 42 11
SOD iP 23 41 34
i 53
iPP 43 47
Hokkaido, Japan

February

12 HEL iP 23 54 43
iPcP 55 11
SOD iP 23 53 55
Andreanof Islands

13 HEL iP 00 21 12
i 20
SOD iP 00 21 13
e 23 33
Northern Assam

13 HEL iP 09 42 10
SOD iP 09 41 37
Sea of Japan

14 SOD iP 09 17 32
Luzon

14 SOD iP 19 40 14
Honshu, Japan

15 SOD iP 01 56 52
i 57 54
i 58 46
i 59 42
Kurile Islands

15 SOD iSg 15 17 00
Northern Sweden

16 SOD iP 06 14 38
i 15 18
iPP 17 01
Honshu, Japan

16 SOD iP 23 05 50
i 06 00
Iceland

17 SOD iP 02 35 25
i 36
Kamchatka

17 HEL iP 05 25 30
iS 31 05
SOD iP 05 25 54
ePPP 27 50
iS 31 43
eSS 34 33
Hindu Kush

February

18 SOD iP 19 04 10
Batan Islands

18 SOD iP 19 19 41
i 53
i 20 11
Formosa

18 SOD iP 20 00 12
i 34
Batan Islands

19 SOD iP 03 30 00
Tadzhik, USSR

19 SOD iP 03 47 25
Tadzhik, USSR

19 SOD iP 10 40 29
ePP 41 53
Sinkiang, China

19 SOD iP 14 33 54
Alaska

19 SOD iP 19 38 40
i 51
i 40 30
ePP 42 31
iSKS 49 06
Java

19 SOD iP 19 58 05
i 18
Java

20 SOD iP 04 09 10
i 18
Batan Islands

20 SOD iP 04 16 36
i 44
Batan Islands

20 SOD iP 04 50 02
i 10
Batan Islands

20 SOD iP 14 43 51

February

21 SOD iP 12 03 33
Honshu, Japan

22 SOD iP 11 00 40
i 05 52
iS 09 03
Andreanof Islands

22 SOD eP 13 32 04
e 14
ePcP 45
Andreanof Islands

22 HEL iP 17 15 59
i 16 26
Andreanof Islands

23 HEL iP 00 46 55
Andreanof Islands

23 HEL iPcP 08 32 21
ePP 33 18
SOD ePKP 08 32 26
ePP 33 33
Argentina

23 SOD iP 09 14 31
eS 16 31
Novaya Zemlya

23 HEL iP 09 23 31
iS 32 39
iScS 33 00
SOD iP 09 23 05
i 16
Bonin Islands

23 HEL iP 10 18 06
SOD eP 10 17 52
i 18 02
Batan Islands

23 HEL iP 11 00 01
iS 10 00
SOD iP 10 59 36
i 41
i 11 01 19
ePP 02 26
iS 09 17
Volcano Islands

February

23 HEL iP 14 26 28
i 31
SOD iP 14 26 01
Honshu, Japan

24 HEL iP 12 35 21
ePP 37 06
SOD iP 12 35 08
ePP 36 50
ePPP 37 20
i 42 22
Outer Mongolia

24 HEL iPn 14 42 42
iSn 44 15
i 33
iSg 45 05
SOD ePn 14 42 04
iPb 15
iPg 24
eSn 43 07
eSb 25
eSg 37
i 40
Norway

25 HEL iP 02 07 33
SOD iP 02 06 47
Rat Islands

25 SOD iP 07 37 26
Fox Islands

25 HEL iSg 09 20 07
SOD eSb 09 21 23
eSg 37
Bothnian Bay

25 SOD iP 15 08 18
Northern Sumatra

26 SOD i(Sg) 11 06 49

26 SOD iP 11 46 46
i 57
Honshu, Japan

26 HEL iP 17 01 16
SOD iP 17 00 33
i 56
Kurile Islands

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February			March			March			
26	HEL	iP 17 29 53	3	SOD	iP 13 55 53	8	HEL	iPKP 20 29 09	
	SOD	iP 17 29 18			Iran		SOD	iPKP 20 29 13	
	i	26						Central Chile	
	Hokkaido, Japan		3	HEL	iP 16 28 29	9	SOD	iP 08 17 40	
26	SOD	iP 21 34 36		SOD	iP 16 27 43		i	18 26	
					iPcP 28 47		Andreanof Islands		
				Komandorskie Is.					
27	SOD	iP 08 02 00	3	HEL	iP 17 02 43	9	HEL	iPKP 10 42 12	
	i	27		SOD	iP 17 03 04		SOD	iPKP 10 41 58	
	iS	03 51		Hindu Kush			i	42 27	
	i	04 40		3	SOD	iP 17 20 19		i	43 10
	Novaya Zemlya				iPcP 21 25		eSKP	45 31	
27	HEL	iP 23 39 32		Komandorskie Is.			Kermadec Islands		
	eS	49 20		3	SOD	iP 17 25 52	10	SOD	iP 06 15 12
	SOD	iP 23 39 17		Colombia			Hokkaido, Japan		
	i	21		3	HEL	iP 17 42 59	10	SOD	iP 08 08 09
	i	50			SOD	iP 17 42 12		Fox Islands	
	Batan Islands				iPcP 43 17	10	HEL	iP 17 38 59	
28	SOD	iP 10 04 49			ePP 44 10		SOD	iP 17 38 37	
	Mid-Atlantic Ocean			Komandorskie Is.			Ryukyu Islands		
28	SOD	iP 19 22 29	4	HEL	iP 11 37 22	11	HEL	iP 00 37 23	
	Molucca Passage			Turkey			i	40	
				6	HEL	iP 08 19 42		iS	46 53
				Cyprus			eP'P'	01 05 15	
				6	HEL	iP 12 09 22		SOD	iP 00 37 05
				Mindanao			iS	46 26	
1	HEL	iP 09 34 12		7	HEL	iP 07 02 27		iPS	42
	iPP	35 39			ePP	03 53		eScS	47 09
	iS	40 03			iPcP	04 40		e	48 10
	SOD	iP 09 34 52			SOD	iP 07 02 46		eP'P'	01 05 08
	i	35 02			ePP	04 16		eSKSP'	14 05
	ePP	36 29			i	06 09		Ryukyu Islands	
	Southern Iran				Hindu Kush		11	HEL	iPKP 14 18 11
1	HEL	iP 19 37 03					i	21	
2	SOD	iP 02 45 11					SOD	iPKP 14 17 57	
	Batan Islands						New Hebrides		
2	SOD	iP 18 21 59	7	HEL	iP 08 34 12	11	SOD	iP 19 38 35	
	Siberia			i	30		Mariana Islands		
				SOD	iP 08 34 02				
3	HEL	iP 07 34 16			iPcP 06	12	SOD	iP 14 48 57	
	SOD	iP 07 34 01			i	42	Mariana Islands		
	Formosa			Mindanao					

March

12 SOD iP 18 27 36
 i 43
 Bonin Islands
 14 SOD iP 00 01 39
 i 45
 Philippine Islands
 14 SOD iP 00 19 44
 Northern Burma
 15 HEL iP 00 35 37
 SOD iP 00 35 22
 i 25
 Formosa
 15 SOD iPb 04 51 50
 iPg 53
 iSn 52 19
 iSb 23
 iSg 26
 Kola, USSR
 15 HEL iP 06 31 37
 i 44
 iS 35 00
 SOD iP 06 32 49
 i 53
 iPP 33 38
 i 34 09
 iS 37 19
 Albania-Greece
 16 HEL iP 02 12 59
 SOD iP 02 12 24
 i 32
 Hokkaido, Japan
 16 SOD iP 10 15 01
 Siberia
 16 SOD iP 16 33 05
 Honshu, Japan
 17 SOD eP 00 06 47
 Philippine Islands
 17 SOD iP 21 19 03
 iPcP 19
 Nicobar Islands

March

18 HEL iP 22 31 10
 i 32
 SOD iP 22 30 22
 i 40
 iPcP 31 03
 Fox Islands
 19 SOD eP 16 08 52
 Yugoslavia
 20 HEL iP 01 49 10
 i 20
 iS 58 13
 iP'P' 02 17 13
 SOD iP 01 48 23
 iS 56 47
 iPS 57 00
 eP'P' 02 17 34
 Fox Islands
 21 SOD iP 18 44 01
 i 11
 Andaman Islands
 22 HEL iP 10 21 32
 SOD iP 10 21 35
 i 39
 i 22 09
 Burma-Pakistan
 22 HEL iP 11 15 00
 ePcP 17 22
 SOD iP 11 15 22
 ePP 16 56
 Afghanistan
 23 HEL iP 00 32 49
 SOD eP 00 33 14
 Afghanistan
 23 HEL iP 10 26 35
 SOD iP 10 26 25
 Luzon
 23 HEL iP 16 01 29
 South of Crete
 23 SOD eP 19 06 19
 Kurile Islands

March

24 HEL iP 15 04 45
 SOD iP 15 04 05
 i 16
 Hokkaido, Japan
 25 HEL iP 09 03 58
 iS 07 03
 SOD iP 09 03 46
 eS 06 42
 Ural
 26 HEL iP 00 03 19
 i 47
 SOD iP 00 03 25
 i 29
 Malaya
 26 HEL iP 00 38 25
 Philippine Islands
 27 HEL iP 00 50 17
 SOD iP 00 50 00
 Formosa
 27 HEL iP 06 45 30
 SOD iP 06 44 43
 Kamchatka
 27 HEL iP 17 23 30
 iS 26 00
 SOD iP 17 25 01
 iS 29 06
 Carpathians
 28 HEL iP 04 16 30
 ipP 17 18
 iPP 54
 eS 22 00
 i 13
 SOD iP 04 16 48
 i 17 36
 iPP 18 18
 iS 22 29
 Hindu Kush
 28 HEL iP 12 13 22
 iS 18 56
 i 19 10
 SOD iP 12 13 40
 ePP 15 10
 iScP 18 59
 Hindu Kush

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March

28 HEL iP 18 57 52
SOD iP 18 57 21
Honshu, Japan

28 HEL iP 20 31 03
i 08
SOD iP 20 30 28
i 47
Hokkaido, Japan

29 HEL iP 10 42 17
SOD iP 10 42 02
e 31
China

30 HEL i 06 44 35
iSg 42
SOD iPg 06 41 07
i 12
iSg 39
Kola, USSR

31 SOD iP 10 43 27
Chiapas, Mexico

31 SOD iP 15 11 42
Fox Islands

31 SOD eP 15 57 12
Alaska

31 HEL iP 16 51 19
Ionian Sea

31 HEL iP 21 50 43
Kermadec Islands

April

1 HEL eP 14 18 14
SOD iP 14 17 41
ipP 59
isP 18 05
Honshu, Japan

2 SOD iP 00 07 43
Philippine Islands

April

2 SOD eP 08 28 38
Caucasus

2 SOD iP 11 17 11

3 HEL iP 02 28 09
eS 31 46
SOD iP 02 29 22
i 26
i 29
Albania

3 HEL iP 07 24 02
SOD iP 07 25 07
ePPP 26 26
eS 30 15
Near Crete

4 HEL iP 04 08 45
Albania

4 HEL iP 09 23 16
SOD iP 09 24 28
Albania

4 SOD iP 13 54 08
eS 56 03
Arctic Ocean

5 SOD iP 05 21 07
Aleutian Islands

7 HEL iP 00 06 34
SOD eP 00 06 20
Philippine Islands

7 SOD eP 14 31 10
N Atlantic Ocean

7 HEL iP 15 40 08
iS 47 50
SOD iP 15 39 13
iS 46 05
iPS 10
Alaska

7 HEL iP 16 15 38
SOD iP 16 14 42
Alaska

April

7 HEL iP 16 29 01
SOD iP 16 28 06
i 42

7 HEL iP 16 48 03
SOD iP 16 47 08
i 44
Alaska

7 HEL iP 18 16 13
iPP 18 44
SOD iP 18 15 39
Honshu, Japan

7 HEL iP 18 41 25
SOD iP 18 40 51
Honshu, Japan

7 HEL iP 18 47 50
SOD iP 18 47 17
i 27
i 48 10
Honshu, Japan

7 HEL iP 18 49 30
SOD iP 18 48 56
Honshu, Japan

7 HEL iP 18 58 24
SOD iP 18 57 51
Honshu, Japan

7 HEL iP 19 00 54
SOD iP 19 00 20
i 29
Honshu, Japan

7 HEL iP 19 21 36
iPP 23 20
eS 28 16
SOD iP 19 21 21
ePP 22 59
e 24 20
eS 27 52
i 28 40
Outer Mongolia

7 HEL iP 23 28 59
SOD iP 23 28 25

April

8 HEL iP 00 23 44
 SOD iP 00 22 50
 i 53
 Alaska
 8 SOD iP 01 03 31
 Mongolia
 8 SOD iP 04 48 11
 Colombia
 8 HEL iP 07 21 51
 SOD iP 07 21 18
 i 26
 Honshu, Japan
 8 HEL iP 10 06 49
 iPP 08 18
 SOD iP 10 07 10
 iPP 08 44
 Afghanistan
 8 HEL iP 10 12 30
 SOD iP 10 11 56
 Honshu, Japan
 8 SOD ePKP 13 40 17
 ipPP 43 17
 Tonga Islands
 8 SOD eP 15 37 13
 Honshu, Japan
 8 HEL iP 20 05 34
 SOD iP 20 05 01
 i 09
 Honshu, Japan
 9 HEL iP 04 43 34
 SOD iP 04 44 18
 ePP 45 58
 SW coast of Iran
 9 HEL iP 06 25 43
 SOD iP 06 24 55
 i 25 01
 i 05
 Gulf of Alaska

April

9 HEL eP 18 11 23
 SOD eP 18 11 16
 Molucca Passage
 10 HEL iP 01 15 16
 SOD iP 01 14 55
 Ryukyu Islands
 10 HEL iP 01 54 54
 ipP 55 06
 SOD iP 01 54 08
 ipP 19
 isP 25
 ePcP 55 03
 Kamchatka
 10 SOD eP 09 52 09
 10 HEL iP 11 03 09
 SOD iP 11 02 47
 Outer Mongolia
 10 HEL iP 12 01 14
 SOD iP 12 00 41
 ipP 50
 i 56
 Honshu, Japan
 10 HEL iPcP 19 29 13
 Tonga Islands
 10 HEL iP 23 18 13
 SOD iP 23 17 19
 Alaska
 11 HEL iP 01 09 22
 SOD iP 01 08 49
 Honshu, Japan
 11 HEL iP 17 37 57
 SOD iP 17 37 11
 Andreanof Islands
 11 SOD iP 18 04 55
 Andreanof Islands
 11 SOD eP 18 18 56
 Aleutian Islands

April

11 HEL iP 23 21 54
 iS 30 28
 iScS 31 39
 SOD iP 23 21 14
 i 18
 isP 52
 iPcP 22 07
 i 28
 ipPcP 30
 isPcP 44
 iPP 23 21
 eS 29 08
 Kurile Islands
 11 HEL iP 23 37 30
 SOD iP 23 37 20
 Molucca Passage
 12 HEL iP 11 59 50
 SOD eP 11 59 10
 i 20
 ePP 12 02 20
 Gulf of California
 12 HEL iP 13 37 00
 SOD iP 13 36 40
 i 40
 i 50
 Ryukyu Islands
 13 HEL eP 01 58 00
 SOD iP 01 57 10
 Alaska
 13 HEL iP 02 10 50
 SOD iP 02 10 10
 13 SOD iP 03 53 50
 13 HEL iP 04 17 00
 SOD iP 04 16 40
 ePP 18 30
 Outer Mongolia
 13 HEL iP 09 16 50
 SOD iP 09 16 00
 i 10
 i 30
 ePcP 17 30
 iS 22 50
 Alaska

April

13 HEL iP 12 39 28
 SOD iP 12 38 42
 i 53
 i 59
 iPcP 39 42
 i 54
 eS 46 36
 i 47 00
 Kamchatka

13 HEL iP 13 10 45
 SOD iP 13 09 58
 Kamchatka

14 HEL iP 03 00 25
 SOD iP 02 59 43
 i 46
 iPcP 03 00 32
 Kurile Islands

14 SOD iP 03 20 57
 Alaska

14 HEL iP 03 58 52
 SOD iP 03 58 30
 Ryukyu Islands

14 HEL iPcP 06 41 53
 New Zealand

14 HEL iP 16 35 08
 Outer Mongolia

14 HEL iP 18 19 01
 SOD iP 18 18 15
 e 28
 iPcP 19 15
 Kamchatka

14 HEL iP 21 46 00
 SOD iP 21 45 55
 ePP 49 48
 Ecuador

15 SOD eP 01 44 06
 Ecuador

15 SOD iP 02 37 03

15 SOD iP 02 53 14

April

15 HEL iP 04 05 55
 SOD eP 04 05 48
 ePP 09 20
 Costa Rica

15 HEL eP 10 11 56
 SOD iP 10 11 46
 i 12 28
 Luzon

15 SOD eP 11 10 03
 Fox Islands

16 HEL iP 06 40 10

16 HEL iP 12 48 24
 SOD iP 12 48 14
 ePP 51 08
 Luzon

16 SOD iP 21 41 09
 Honshu, Japan

17 HEL iP 02 57 41
 SOD iP 02 57 12
 Honshu, Japan

17 HEL iP 03 21 09

17 HEL iPcP 04 06 24
 SOD iPcP 04 06 08
 New Zealand

17 HEL iP 11 43 59
 SOD iP 11 43 27
 i 46
 iPcP 56
 Honshu, Japan

18 HEL iP 01 23 46

18 HEL eP 03 22 32
 SOD eP 03 21 49
 Kurile Islands

18 SOD iP 05 21 12
 Honshu, Japan

18 HEL ePKP 07 50 17
 SOD ePKP 07 50 09
 e 14
 eSKP 52 44
 Fiji Islands

April

18 SOD iP 14 30 16
 Kamchatka

18 SOD eP 19 17 17
 Kurile Islands

19 HEL iP 00 22 39
 SOD iP 00 22 11
 Honshu, Japan

19 HEL iPcP 01 17 00
 SOD ePKP 01 17 04
 Argentina

19 SOD iP 04 15 44
 iPcP 48
 Gulf of California

19 SOD iP 14 26 25
 i 30
 epP 27 10
 Volcano-Mariana Is.

19 SOD iP 22 51 56
 ePcP 52 52
 Kamchatka

20 SOD eP 06 21 50
 Aleutian Islands

20 SOD iP 13 08 09
 Luzon

20 HEL iPcP 21 34 01
 i 24
 SOD iPcP 21 34 13
 i 18
 eSKP 37 33
 Sandwich Islands

21 HEL eP 05 43 29
 SOD iP 05 43 13
 i 21
 i 28
 Formosa

21 SOD ePKP 20 33 57
 Samoa Islands

April				April				April			
21	HEL	iP	22 50 12	25	SOD	iP	06 31 38	29	HEL	iP	13 45 04
		iSKS	23 00 24			Aleutian Islands			SOD	iP	13 44 14
		eS	42							i	19
		isS	02 02							SE Alaska	
	SOD	iP	22 50 15	25	SOD	eP	08 45 22	30	HEL	iP	08 23 46
		i	17			ipP	33		SOD	iP	08 24 03
		ipP	51 02			Aleutian Islands				Hindu Kush	
		iSKS	23 00 27	25	SOD	eP	19 13 30	30	HEL	iP	14 04 00
		iS	52			ipP	43		SOD	iP	14 03 46
		isS	02 07			Andreanof Islands				i	50
	Sumatra			26	HEL	iP	01 20 15			Kansu, China	
22	SOD	iP	00 11 00			ipP	28	30	HEL	iP	14 14 44
	Banda Sea				SOD	iP	01 19 36		SOD	iP	14 15 19
22	SOD	iP	01 26 04			ipP	48			Portugal	
	Samar, Philippine Is.					i	20 14				
22	SOD	iP	09 21 22			Kurile Islands					
	Celebes			26	HEL	ePKP	09 44 52				
22	SOD	iP	10 08 58		SOD	ePKP	09 44 41				
	Southern Turkey					New Hebrides		May			
22	SOD	iP	11 21 38	27	SOD	iPKP	08 32 05	1	HEL	iPKP	00 47 56
23	HEL	iP	03 08 33			iSKP	35 26		SOD	iPKP	00 47 45
		i	09 08			Tonga Islands				i	48 00
	SOD	iP	03 07 52	27	HEL	iP	17 28 17			ePP	49 15
		i	08 00		SOD	iP	17 27 42			iPKKP	57 51
		ipP	07			Hokkaido, Japan				New Hebrides	
	Kurile Islands			27	HEL	iP	19 14 44	1	SOD	iP	07 23 48
23	HEL	eP	05 03 26		SOD	iP	19 13 56			Philippine Islands	
	SOD	iP	05 02 45			i	14 09	1	SOD	iP	09 44 51
		i	03 03			Fox Islands				Celebes	
		ePcP	36	28	SOD	eP	12 01 51	1	HEL	iP	12 44 58
	Kurile Islands					Peru			SOD	iP	12 44 34
23	SOD	eP	06 04 07	28	HEL	iP	18 19 52			i	45
	Ryukyu Islands				SOD	eP	18 20 41			Volcano Islands	
24	SOD	eP	09 57 52			Caucasus		1	HEL	iP	21 19 59
	N coast of Luzon			29	HEL	iP	05 10 42		SOD	iP	21 21 12
25	SOD	iP	08 45 22		SOD	iP	05 10 06			Albania	
		i	34	29	SOD	eP	05 15 39	2	HEL	iP	21 27 34
	Fox Islands					Outer Mongolia			SOD	iP	21 28 16
										Southern Iran	

May	May	May
3 SOD eP 07 19 42 Atlantic Ocean	6 HEL iP 09 16 48 Caucasus	10 HEL iP 23 22 56 SOD iP 23 22 02 Alaska
3 SOD eP 08 13 16 Atlantic Ocean	6 SOD eP 10 04 07	11 HEL iP 05 33 30 SOD iP 05 32 35 i 38 i 33 05 Central Alaska
3 HEL iP 20 23 33 iS 27 56 SOD iP 20 24 39 ePP 25 48 iPcP 27 31 Greece	6 SOD iP 14 13 03 i 12 Aleutian Islands	11 HEL iP 05 46 34 SOD iP 05 45 38 Alaska
4 SOD eP 10 58 10 French Alps	7 SOD iP 07 37 12 N Atlantic Ocean	11 SOD iP 09 17 23 Central Alaska
5 HEL iP 05 27 19 eS 32 06 ePcS 34 20 SOD iP 05 28 10 ePP 29 18 Iran-Iraq border	7 SOD iP 07 51 47 N Atlantic Ocean	11 SOD iP 12 18 14 Ryukyu Islands
5 HEL iP 06 42 51 i 43 00 iPP 45 24 i 40 SOD iP 06 43 34 i 44 Belgian Congo	7 HEL eP 22 07 38 ipP 50 SOD iP 22 06 55 ipP 07 06 Kamchatka	11 SOD iP 12 20 06 Central Alaska
5 SOD iP 13 42 54 Aleutian Islands	8 SOD iP 02 54 15 N Atlantic Ocean	11 SOD iP 14 06 40
5 HEL eSn 14 11 14 eSb 45 iSg 12 02 Norway	8 SOD iP 12 59 06 iPP 13 00 00 e 43 Argentina	11 HEL iP 21 22 40 Caucasus
6 HEL eP 00 03 50 SOD eP 00 03 01 Alaska	8 SOD iP 15 23 46	12 HEL iP 05 49 13 ipP 24 SOD iP 05 48 25 ipP 37 Aleutian Islands
6 HEL iP 04 20 41 eS 24 40 iSS 25 26 SOD iP 04 21 27 Caucasus	9 HEL iP 02 46 00 SOD iP 02 47 04 Dodecanese Islands	12 SOD iP 06 38 04 i 21 Sumatra
6 HEL iP 04 30 11 Caucasus	9 HEL iPcP 04 58 54 iSKP 05 02 12 SOD iPcP 04 58 58 iSKP 05 02 16 Argentina	12 HEL iP 14 23 17 SOD iP 14 24 22 E. Mediterranean
	10 HEL iP 23 04 13 ePcP 05 11 SOD iP 23 03 20 Central Alaska	12 HEL iP 17 01 34 iPP 04 18 iS 11 05 SOD iP 17 01 06 i 22 ePP 03 39 Honshu, Japan

May	May	May
12 HEL eP 18 47 16 SOD iP 18 47 08	17 HEL eP 08 36 36 SOD iP 08 36 40 Sumatra	23 HEL iP 20 56 19 eS 21 00 14 SOD eP 20 57 13 i 26 iS 21 02 16 Caucasus
12 SOD eP 22 26 05 Aleutian Islands	17 HEL eP 15 49 12 SOD eP 15 48 29 Andreanof Islands	23 HEL iP 23 51 53 i 52 01 SOD iP 23 51 30 i 41 Mariana Islands
13 SOD iP 03 32 06	17 SOD iP 16 53 40 i 48 Andaman Islands	24 HEL ePKP 07 49 34 SOD ePKP 07 49 37 SW of Tasmania
13 SOD iP 11 26 01 Alaska	19 HEL iSb 23 20 08 iSg 25 SOD eSn 23 19 46 iSg 20 53 W coast of Norway	24 SOD iP 10 52 24
14 HEL eP 12 46 52 SOD iP 12 47 00 i 07 Andaman Islands	20 HEL ePKP 06 03 12 iSKP 06 09 SOD iPKP 06 03 10 iSKP 05 50 Fiji Islands	24 SOD iP 16 47 22 New Guinea
15 HEL iP 04 35 46 iPcP 36 12 SOD iP 04 35 00 iPcP 45 Andreanof Islands	20 SOD eP 10 31 38 Sumatra	24 SOD iP 20 17 13
15 HEL ePKP 05 00 10 i 20 iSKP 03 09 SOD ePKP 05 00 05 iSKP 02 50 Tonga Islands	20 HEL iP 19 24 27 SOD iP 19 24 23	24 SOD iP 23 15 59 Cape Mendocino
15 SOD eP 15 35 55	21 SOD eP 04 56 38 Formosa	25 SOD eP 00 03 18 Gulf of Aden
15 SOD eP 18 58 19	21 HEL iP 10 17 36 SOD eP 10 18 46 Turkey	25 HEL iP 00 46 22 SOD iP 00 45 34 Andreanof Islands
16 SOD eP 02 14 17 iPcP 15 00 Aleutian Islands	22 HEL iP 02 37 49 SOD iP 02 36 58 i 37 12 Kenai Peninsula	25 SOD iP 03 03 32 Gulf of Aden
16 HEL iP 09 23 56 SOD eP 09 24 53 Caucasus	22 SOD iP 11 43 08 iPcP 50 Aleutian Islands	25 HEL iP 15 05 29 iPcP 55 SOD iP 15 04 41 i 05 04 iPcP 26 eScP 09 25 Andreanof Islands
16 HEL iP 16 30 35 SOD iP 16 30 39	22 HEL eP 22 20 54 SOD iP 22 20 05 Aleutian Islands	25 HEL eP 17 52 03 SOD iP 17 51 37 ePcP 52 07 Kyushu, Japan
16 HEL iP 18 24 52 SOD eP 18 24 51 Sinkiang, China		
17 SOD eP 05 32 42 i 33 13 Libya		

June

6	HEL	iP	09 24 32
		ePP	28 11
		eSKS	34 53
		ePS	36 51
		ePPS	37 24
		eSSS	45 29
	SOD	iP	09 24 21
		ePP	28 02
	Costa Rica		
7	SOD	iP	09 25 43
	Sumatra		
7	HEL	iPKP	13 14 43
	SOD	iPKP	13 14 45
	South of Tasmania		
7	HEL	iP	19 43 24
	SOD	iP	19 43 12
8	SOD	iP	00 48 57
		i	49 12
		iPcP	44
	Fox Islands		
8	HEL	iP	00 58 00
	SOD	iP	00 58 07
	Nicobar Islands		
8	SOD	iP	21 21 01
	Atlantic Ocean		
9	SOD	eP	10 15 16
9	HEL	iP	16 10 02
	SOD	iP	16 09 12
	Fox Islands		
9	SOD	iP	18 51 54
	Romania		
10	HEL	iP	00 21 24
	SOD	iP	00 20 36
		i	47
	Fox Islands		
10	HEL	iP	00 37 06
	SOD	iP	00 36 18
	Aleutian Islands		

June

10	HEL	iPKP	04 19 48
	Kermadec Islands		
10	HEL	iP	05 04 44
	SOD	iP	05 04 19
	Bonin Islands		
10	HEL	iP	07 10 54
	SOD	iP	07 11 44
		ePP	13 19
	Western Iran		
10	HEL	iP	08 33 16
	Albania		
10	SOD	iP	20 17 15
	Western Iran		
11	HEL	iPKP	04 02 57
	Kermadec Islands		
12	SOD	iP	02 53 33
12	SOD	eP	12 07 13
	Costa Rica		
12	HEL	iP	21 03 51
		i	56
		iS	12 45
		eSS	17 06
	SOD	iP	21 03 03
		i	07
		iPcP	55
		iS	11 19
		eP'P'	32 35
	Fox Islands		
12	HEL	iP	21 44 17
	SOD	iP	21 43 31
		iPcP	44 17
	Fox Islands		
12	SOD	iP	22 28 12
	Aleutian Islands		
13	SOD	iP	10 23 15
	Japan Sea		
13	SOD	ePKP	11 18 09
	South of Australia		

June

15	HEL	iP	02 00 33
	SOD	iP	01 59 54
	Kurile Islands		
15	HEL	ePKP	02 59 24
		iSKP	03 02 15
		i	22
	SOD	ePKP	02 59 18
		iSKP	03 01 53
	Fiji Islands		
15	HEL	ePKP	15 12 41
		i	55
		iSKP	15 35
		iPKS	16 24
		epPP	17 43
		epPKS	18 31
		eSKS	19 28
		i	21 31
	SOD	iPKP	15 12 42
		iSKP	15 12
		iPKS	16 02
	Fiji Islands		
15	SOD	iP	16 17 10
	Aleutian Islands		
16	HEL	iP	02 05 56
		eS	10 20
	SOD	eP	02 07 00
	Crete		
16	SOD	iP	09 21 32
16	HEL	ePKP	19 11 02
		iSKP	13 41
	SOD	iSKP	19 13 20
	Fiji Islands		
17	HEL	iP	00 37 41
	SOD	iP	00 37 05
	Hokkaido, Japan		
17	HEL	iP	15 19 32
		i	53
	SOD	iP	15 19 06
		i	28
	Bonin Islands		

June	June	June
17 HEL iP 17 01 11	19 SOD iP 04 13 41	24 HEL iP 04 55 39
SOD iP 17 01 52	Guatemala	iPP 57 06
i 02 42		eS 05 01 35
i 51	19 HEL iP 05 28 31	eSS 04 11
iPP 03 09	SOD iP 05 27 47	SOD iP 04 55 44
Iran	Kurile Islands	i 48
		iPP 57 14
17 HEL iP 19 18 56	19 HEL ePKP 13 53 28	iPPP 36
i 19 29	SOD iPKP 13 53 29	Sinkiang, China
ePP 22 05	iPKP ₂ 36	
iS 28 59	South of Tasmania	24 HEL iP 06 11 32
SOD iP 19 18 31		SOD iP 06 12 39
i 38	19 HEL iPKP 18 21 54	Italy
i 53	SOD iPKP 18 21 56	
ePP 21 18	iPKP ₂ 22 02	24 SOD iP 10 41 43
Volcano Islands	South of Tasmania	Volcano Islands
17 SOD iP 21 50 09	20 SOD ePKP 17 50 40	25 HEL iP 01 20 12
Aleutian Islands	Fiji Islands	i 27
		SOD iP 01 20 53
18 HEL iP 01 19 31	20 HEL iP 19 28 24	i 21 40
i 33	SOD iP 19 28 00	iPPP 22 27
eS 23 10	East China Sea	Northern Iran
SOD iP 01 18 46		
i 51	22 HEL iP 05 08 28	25 HEL iP 02 00 24
iS 22 00	i 44	SOD iP 01 59 59
North of Iceland	SOD iP 05 07 50	Kyushu, Japan
	i 08 11	
	Kurile Islands	
18 HEL iP 02 27 56		25 HEL iP 07 25 28
SOD eP 02 27 10	22 SOD iP 05 39 20	i 33
i 17	Sea of Japan	eS 28 15
Iceland		SOD iP 07 26 51
		Romania
18 HEL iP 02 59 07	23 HEL eP 05 18 11	
SOD eP 02 58 21	ePP 19 54	25 HEL ePKP 09 47 04
i 26	SOD iP 05 17 50	i 16
Iceland	i 52	SOD ePKP 09 47 03
	i 58	iSKP 49 38
18 HEL iP 04 38 32	iPP 19 22	Fiji Islands
SOD iP 04 37 50	Outer Mongolia	
Iceland		
	23 HEL iPKP 19 35 53	25 HEL ePP 09 55 20
18 SOD ePg 14 07 35	Fiji Islands	SOD eP 09 50 42
iSn 08 18		ePP 54 47
iSg 49	24 HEL iP 00 22 25	New Guinea
W coast of Norway	i 40	
	SOD eP 00 22 26	
	S coast of Java	
18 SOD iP 19 48 03	24 SOD iP 04 04 20	25 HEL iPKP 23 20 06
North of Iceland	Southern Iran	SOD ePKP 23 20 10
		Southern Chile

June			June			July						
25	HEL	iP	23 33 31	30	HEL	iP	08 47 48	2	HEL	iP	22 20 42	
		e	34 11			i	48 10		SOD	iP	22 21 26	
	SOD	iP	23 32 47			iS	51 56		Iran			
	Sea of Okhotsk					i	54 02					
						iScP	56	3	HEL	iP	05 57 45	
26	SOD	iP	03 56 48			iScS	58 41		SOD	eP	05 58 16	
					SOD	iP	08 48 51		Mascarene Islands			
26	HEL	iP	04 48 22			iS	53 56					
		iPcP	49 06		Dodecanese Islands				3	HEL	iPKP	06 46 36
		iS	56 24						SOD	iPKP	06 46 20	
		isS	57 21	30	SOD	iP	11 30 55				iSKP	49 24
		i	58						Kermadec Islands			
		i	58 58	30	SOD	iP	14 08 12					
	SOD	iP	04 47 34		Baffin Bay				3	HEL	iP	12 57 46
		i	48 05						SOD	iP	12 57 05	
		iPcP	40	30	HEL	iP	18 38 04				eP	58 36
		iScP	52 25			iS	47 44		Sea of Okhotsk			
		i	57 12		SOD	iP	18 37 35					
	Kamchatka					ePP	40 10		4	HEL	eP	01 04 25
					Honshu, Japan				Atlantic Ocean			
26	HEL	iP	07 51 02						4	HEL	iP	02 35 26
	SOD	iP	07 50 43	30	SOD	iP	21 02 14		Indian Ocean			
		i	52									
	Ryukyu Islands								4	HEL	iP	18 47 05
26	HEL	iP	16 03 33								iS	57 50
	SOD	iP	16 02 58		July				Mindanao			
	Hokkaido, Japan			1	HEL	iP	01 02 00					
26	HEL	iP	20 08 24		SOD	iP	01 01 18		5	HEL	iP	01 29 45
	SOD	iP	20 07 36								ipP	30 17
	Aleutian Islands			1	HEL	iP	06 04 03			SOD	iP	01 29 51
						eS	12 57				ipP	30 23
					SOD	iP	06 03 17		Sumatra			
						iPcS	08 01					
					Andreanof Islands				5	HEL	iP	02 10 35
26	HEL	iP	23 41 20						SOD	iP	02 11 31	
		iS	50 58	1	SOD	iP	06 56 52		Caucasus			
		eScS	51 30		Unimak Island							
	SOD	iP	23 40 52						5	SOD	iSKP	14 13 47
	Honshu, Japan								Fiji Islands			
27	SOD	eP	05 57 11	2	HEL	iP	00 54 53					
		i	06 00 37			ipcP	55 33					
	El Salvador				SOD	iP	00 54 07		6	SOD	iP	16 11 50
						ipcP	55 07				i	12 29
					Kamchatka				Central Alaska			
28	SOD	iP	10 43 22						6	SOD	eP	20 00 56
	Marshall Islands			2	SOD	iP	04 33 44		Formosa			
					Sea of Okhotsk							
29	HEL	iP	23 28 17	2	SOD	ePKP	05 06 31					
	SOD	iP	23 28 05			iSKP	09 20		6	SOD	eP	23 45 32
	Molucca Passage				Fiji Islands				Honshu, Japan			

July	July	July
7 SOD iP 05 26 19 Andreanof Islands	10 SOD iP 08 45 14	13 HEL iP 23 14 47 SOD iP 23 13 57 Komandorskie Is.
7 SOD iP 13 48 13 Andreanof Islands	10 SOD eP 08 47 54	14 SOD iP 03 03 25 SE Alaska
7 SOD iP 14 35 46 Philippine Islands	10 SOD iP 09 05 23 SE Alaska	14 SOD eP 05 37 40 California
8 SOD iP 03 48 36 i 49 08	10 SOD iP 10 15 02 SE Alaska	15 SOD iP 06 08 47 SE Alaska
8 HEL iLi 05 07 20 iRg 09 00 SOD iP 05 06 43 eSS 10 33 iLi 11 32 iLg ₁ 12 11 Thüringerwald .	10 SOD iP 10 25 45 SE Alaska	15 SOD iP 08 05 44 iPP 06 58 W coast of Crete
8 SOD iP 06 38 00	10 SOD iP 15 11 09 i 23 SE Alaska	16 SOD eP 01 57 31 Aleutian Islands
8 SOD iP 17 20 50 i 21 00 Honshu, Japan	10 HEL iSg 15 27 36 SOD iSg 15 29 43 S coast of Norway	16 SOD eP 04 02 51 Aleutian Islands
9 SOD ePKP 14 12 35 iSKP 15 08 Fiji Islands	10 SOD iP 15 27 36 SOD iSg 15 29 43 S coast of Norway	16 SOD iP 22 10 25 Congo-Rhodesia
9 SOD iP 15 30 59 Guatemala	11 SOD eP 07 53 19 Andreanof Islands	17 HEL iP 05 41 33 SOD iP 05 42 49 i 52 Northern Greece
10 HEL iP 06 26 09 ePPP 29 57 iS 34 24 SOD iP 06 25 17 ePS 33 13 i 39 SE Alaska	11 SOD iP 09 45 18	17 SOD iP 13 58 15 SE Alaska
10 SOD eP 07 18 21	11 HEL iPS 19 39 04 SOD iPKP 19 29 15 ePP 30 00 Northern Chile	17 SOD eP 19 12 23 Andreanof Islands
10 SOD iP 07 54 07 SE Alaska	11 SOD iP 19 59 41 SE Alaska	17 SOD eP 19 39 47 iPcP 40 30 Andreanof Islands
10 SOD iP 08 07 24 iPcP 08 34 SE Alaska	13 HEL iP 08 20 20 SOD iP 08 19 31 SE Alaska	17 SOD iP 21 09 32 iPcP 10 17 eP'P' 39 06 Andreanof Islands
	13 HEL iP 15 38 01 SOD iP 15 38 03 India-Burma	18 SOD iP 00 49 30 iPcP 50 14 Andreanof Islands

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July	July	July
18 SOD iP 00 49 57 iPcP 50 41 iPcS 54 41 eP'P' 01 19 37	22 SOD iP 20 42 07 Philippine Islands	27 HEL iP 02 25 20 Andreanof Islands
18 SOD iP 02 01 00 Ecuador-Peru	22 SOD iP 22 55 52 Gulf of Alaska	27 HEL iP 03 32 35 SOD iP 03 31 56 Kurile Islands
18 SOD iP 17 13 23 SE Alaska	23 SOD iP 10 38 38 eS 47 51 Honshu, Japan	27 HEL iP 14 55 07 i 19 SOD eP 14 56 09 i 21 Cyprus
18 SOD iP 18 51 59	23 SOD iP 12 35 01 Bonin Islands	27 HEL iPcP 17 20 08 New Hebrides
18 SOD iP 21 49 14 i 52 Ryukyu Islands	23 SOD iP 20 48 38	27 HEL eP 18 36 56 SOD iP 18 36 46 N Atlantic Ocean
19 SOD iP 06 44 00 ipP 37 i 47 57 iPP 48 17 New Guinea	24 SOD eSn 02 47 09 Norway	27 HEL iP 20 01 34 SOD iP 20 00 45
19 SOD iP 15 07 45 Hokkaido, Japan	24 HEL eP 13 19 01 SOD iP 13 18 13 Fox Islands	28 SOD iP 09 18 23
19 SOD iP 17 33 31 iPcP 34 16 Andreanof Islands	26 HEL iP 15 59 48 SOD iP 16 00 32 Iran	28 SOD eP 16 00 45 N Atlantic Ocean
19 SOD iP 17 50 57 Celebes Sea	26 HEL iP 17 50 11 ePP 54 28 iSKS 59 50 esSKS 18 04 03 eP'P' 14 21 i 16 21 e 32 14 SOD iP 17 50 18 epP 52 30 iPP 54 29 i 41 iSKS 59 55 iS 18 01 27 isSKS 04 05 iPKKP 06 04 iP'P' 14 17 i 16 58 e 32 17 i 37 Peru-Bolivia	28 SOD iP 16 03 40 iPP 04 54 N Atlantic Ocean
19 SOD iP 18 30 18 Spice Islands	28 SOD ePKP 17 42 55 iSKP 45 35 Fiji Islands	28 SOD ePKP 18 53 03 W of Easter Island
21 SOD iP 07 35 07 Kurile Islands	28 SOD iP 21 43 53 Fiji Islands	29 SOD iP 15 59 28
21 SOD iP 14 47 26 iPcP 48 11 iP'P' 15 16 46 Andreanof Islands	27 HEL ePKP 00 40 25 i 43 iSKP 43 35 iPKS 44 26 SOD ePKP 00 40 40 Fiji Islands	29 HEL iP 21 48 29 eS 57 34 SOD iP 21 48 56 Atlantic Ocean
21 SOD iPn 15 54 23 iSn 55 42 Norway		
22 SOD eP 05 18 51 Andreanof Islands		

July	August	August
30 HEL iP 02 58 05 e 03 07 32 SOD eP 02 57 24 Kurile Islands	2 SOD iP 04 58 13 Oaxaca, Mexico	8 HEL iP 00 46 27 SOD iP 00 45 40 Komandorskie Is.
30 SOD iP 04 58 44 ePP 05 02 52 New Guinea	2 HEL iP 11 35 11 SOD iP 11 34 26	8 SOD eP 05 35 22 France-Spain
30 HEL iP 07 44 17 SOD iP 07 43 48 Honshu, Japan	3 HEL iP 01 24 48 iSKP 27 31 iPKS 28 24 SOD ePKP 01 24 35 iSKP 27 11 Fiji Islands	8 HEL iP 12 59 05 isP 13 00 10 eS 04 48 SOD iP 12 59 22 Hindu Kush
31 HEL iP 02 14 44 iPcP 15 12 SOD iP 02 13 56 iPcP 14 40 Andreanof Islands	4 HEL eSKS 04 37 24 eS 38 24 SOD iP 04 26 54 e 27 42 e(PP) 31 44 Banda Sea	8 HEL iP 20 42 33 SOD iP 20 43 27 France-Spain
31 HEL iP 02 37 21 iPcP 49 SOD iP 02 36 33 iPcP 37 17 Andreanof Islands	4 SOD eP 06 34 59 NE Greece	9 HEL eP 07 34 24 SOD iP 07 34 32 NW of Sumatra
31 HEL iP 15 58 29 SOD iP 15 57 36 Southern Alaska	4 HEL iP 17 58 49 SOD iP 17 58 10 Kurile Islands	9 SOD ePP 13 08 07 Sandwich Islands
31 HEL iP 18 17 25	4 HEL iP 20 55 10 SOD iP 20 55 26 Pamir	9 HEL iP 13 44 21 SOD iP 13 43 45 Hokkaido, Japan
August	6 HEL iPn 17 18 27 iSn 20 09 iLg 21 06 SOD iPn 17 19 00 i 11 iSn 21 10 Norway	9 SOD iP 19 48 41 Andreanof Islands
1 HEL ePKP 05 56 19 SOD iP 05 56 08 Fiji Islands	6 HEL iP 21 28 31 iPKS 32 02 SOD iP 21 28 17 Tonga Islands	10 HEL iP 20 00 21
1 SOD eP 12 26 09	6 HEL iP 22 09 47 iPKP 22 09 47 Santa Cruz Islands	10 HEL iP 23 53 57 ipP 54 28 isP 45 SOD iP 23 53 34 ipP 54 04 Mariana Islands
1 HEL eP 12 40 32 i 56 SOD iP 12 40 20 i 44 Luzon	6 HEL iP 23 40 07 SOD iP 23 39 19	11 HEL iP 08 12 26 SOD ePKP 08 12 12 New Hebrides
1 SOD eSKP 14 48 26 Fiji Islands	6 HEL iP 23 40 07 SOD iP 23 39 19	11 HEL iPn 16 09 07 iSn 10 47 Poland

August				
11	HEL	iP	20 22 42	
	SOD	eP	20 23 01	
11	HEL	iP	20 39 01	
		eSKS	49 23	
	SOD	iP	20 39 08	
		Sumatra		
11	HEL	iPKP	22 35 38	
		i	49	
	SOD	ePKP	22 35 26	
		North Island		
12	SOD	iP	08 26 08	
		Andreanof Islands		
12	HEL	iP	12 32 34	
		Nepal- Tibet		
12	HEL	eP	12 48 38	
		Nepal-Tibet		
12	HEL	iP	15 21 02	
		SE Alaska		
12	HEL	iP	15 48 48	
	SOD	eP	15 48 23	
		Oaxaca, Mexico		
12	SOD	eP	16 35 59	
		Gulf of California		
12	HEL	iP	19 38 33	
		e	42 11	
		iPP	39	
		eSKS	49 13	
		iSKKS	51	
		ePKKP	55 29	
	SOD	eP	19 38 23	
		ePP	42 14	
		ePKKP	55 33	
		Molucca Passage		
13	HEL	iP	04 04 00	
		eSKS	14 29	
		iSKKS	15 19	
	SOD	iP	04 03 51	
		Molucca Passage		

August				
13	HEL	iP	07 40 32	
		i	41 33	
		ePP	55	
		eS	46 09	
	SOD	iP	07 40 55	
		e	42 12	
		iPP	24	
		Afghanistan		
13	HEL	iP	10 57 42	
		ePcP	58 10	
	SOD	eP	10 56 54	
		Andreanof Islands		
13	HEL	iSKP	17 13 09	
	SOD	iSKP	17 12 50	
		S of Fiji Islands		
13	HEL	iP	17 40 28	
	SOD	eP	17 40 54	
		Pakistan		
13	HEL	iP	20 24 01	
		i	12	
		iS	33 00	
		iScS	34 00	
	SOD	eP	20 23 15	
		i	27	
		Andreanof Islands		
14	HEL	eP	02 41 15	
	SOD	iP	02 40 51	
		Mariana Islands		
14	HEL	iP	11 33 10	
		ePP	34 03	
		eS	38 05	
	SOD	eP	11 33 58	
		e	35 03	
		ePP	13	
		Iran		
14	HEL	iP	15 06 08	
		iPcP	35	
		ePPP	10 27	
		iS	15 01	
		eScS	16 05	
		eSS	19 47	
		cont.		

August				
	SOD	eP	15 05 20	
		i	36	
		iPcP	06 06	
		iScP	10 08	
		i	28	
		Andreanof Islands		
14	SOD	eP	15 28 20	
		Andreanof Islands		
14	HEL	iP	15 32 31	
	SOD	iP	15 33 18	
		e	34 26	
		Iran		
14	HEL	iP	23 34 26	
		ipP	49	
		ePP	36 00	
		iS	40 29	
	SOD	iP	23 34 56	
		ipP	35 21	
		ePP	36 42	
		Pakistan		
15	HEL	iP	06 33 26	
	SOD	iP	06 33 22	
		ipP	34 02	
		Northern Columbia		
15	HEL	iP	13 31 18	
	SOD	eP	13 30 22	
		South of Alaska		
15	HEL	iP	16 08 54	
	SOD	eP	16 09 04	
		West of Nepal		
15	HEL	iP	20 05 53	
		e	10 11	
		iS	14 11	
		i	41	
		eScS	16 11	
		eP'P'	35 03	
	SOD	iP	20 05 06	
		eP'P'	35 10	
		Kamchatka		

August				August				August			
20	HEL	ePKP	03 59 16	22	SOD	eP	22 30 52	27	SOD	iP	14 14 41
	SOD	ePKP	03 59 01				New Britain				
		iPP	04 00 33	22	SOD	iPKP	23 37 53	27	HEL	iP	15 21 36
			New Hebrides				Pacific Ocean			iS	25 43
20	HEL	eP	08 57 37	24	SOD	eP	08 09 32		SOD	iP	15 22 44
		iScS	09 07 43				Iran				Greece
	SOD	iP	08 57 19	24	HEL	iP	17 06 26	27	HEL	iP	16 07 39
			Formosa			isP	07 07		SOD	eP	16 08 44
20	SOD	eP	09 29 41			iS	16 23				Greece
		iPcP	30 43		SOD	iP	17 06 16	27	HEL	iP	17 12 22
			Kamchatka			iP	48		SOD	eP	17 13 30
20	SOD	eP	22 32 48			isP	58				Greece
			Hindu Kush				Luzon	27	HEL	iP	18 53 59
21	SOD	ePKP	01 28 20	25	SOD	iP	04 11 43		SOD	iP	18 53 21
		ePP	30 50			iPP	12 54				Sea of Okhotsk
		ePKS	31 49				Iran	28	HEL	eP	04 17 06
			Tonga Islands	25	SOD	iP	13 35 27		SOD	iP	04 16 35
21	SOD	iP	12 05 23			i	36			i	52
			Bonin Islands								Central Honshu
21	SOD	iP	12 29 05	26	HEL	iP	05 11 43	28	HEL	iP	18 26 44
		i	22		SOD	iP	05 11 11			ePcP	27 12
		ePcP	51			i	23		SOD	iP	18 25 55
			Fox Islands			ePP	13 32				Fox Islands
21	HEL	iPKP	21 17 57				Honshu, Japan	28	HEL	iPn	23 13 43
		i	18 03	26	SOD	ePKP	13 03 54			iSn	14 52
		iPKP	19 08				New Hebrides			iSb	15 08
		iSKP	21 18	26	HEL	iPKP	18 14 41			iSg	22
		iPKS	35		SOD	iPKP	18 14 29		SOD	iPb	23 12 53
		e	22 31				New Hebrides			iPg	55
	SOD	ePKP	21 17 41	26	HEL	iPKP	23 50 43			iSg	13 25
		i	51			iSKP	54 17				Sweden
		ePP	19 49		SOD	ePKP	23 50 31	29	SOD	ePKP	12 43 07
		eSKP	20 55				New Hebrides				New Hebrides
			Fiji Islands	27	HEL	iPKP	00 04 17	29	SOD	eSn	15 21 04
22	SOD	iP	17 11 31			i	45			eLi	22 05
							New Hebrides			eLg	31
22	SOD	iP	19 36 36	27	HEL	iP	13 19 19				North Sea
			Aleutian Islands			iPcP	20 00	30	HEL	eP	07 40 47
22	HEL	iP	20 44 39		SOD	iP	13 18 33		SOD	iP	07 41 54
	SOD	iP	20 43 52			i	47			i	42 52
			Andeanof Islands			iPcP	19 35				Ionian Sea
							Kamchatka				

August

September

September

30 SOD eP 13 52 49
 30 HEL eP 18 51 01
 eS 19 01 26
 SOD iP 18 50 36
 Gulf of California
 30 HEL iP 23 40 01
 SOD iP 23 39 16
 SE of Kamchatka
 31 SOD iP 02 06 49
 Kamchatka
 31 SOD iP 02 07 31
 Kamchatka
 31 SOD iP 02 10 27
 31 HEL iP 02 48 46
 SOD iP 02 48 12
 Sea of Japan
 31 SOD iP 03 28 34
 SE of Kamchatka
 31 SOD eP 06 47 27
 Kamchatka
 31 HEL iP 09 25 58
 SOD iP 09 26 30
 Iran-Pakistan
 31 HEL iP 15 34 27
 i 31
 SOD iP 15 33 33
 i 37
 iPcP 34 53
 Central Alaska
 31 SOD iP 20 19 18
 i 20 22
 31 HEL iP 22 26 00
 SOD iP 22 25 23
 31 HEL iP 23 10 00
 iPcP 58
 iS 17 59
 iScS 19 57
 SOD iP 23 09 08
 i 10 12
 iS 16 16
 Central Alaska

1 HEL ePKP 01 16 38
 SOD ePKP 01 16 34
 Tonga Islands
 1 HEL iP 08 44 40
 i 45 03
 SOD iP 08 45 12
 i 28
 Baluchistan
 1 SOD iP 15 29 41
 SE of Hokkaido
 1 SOD iP 15 39 13
 ipP 40 37
 ipPP 42 47
 eS 47 04
 iScS 48 20
 Sea of Japan
 2 HEL iP 01 18 26
 eS 22 30
 SOD eP 01 19 34
 Ionian Sea
 2 HEL eP 01 33 49
 Ionian Sea
 2 HEL eP 02 11 07
 SOD eP 02 12 15
 Ionian Sea
 2 HEL iP 03 13 35
 SOD iP 03 14 40
 Crete
 2 SOD eP 04 51 06
 Ionian Sea
 2 HEL iP 12 49 51
 SOD eP 12 50 40
 Caucasus
 2 SOD eP 14 39 50
 ePP 44 15
 New Guinea
 2 HEL eSKS 20 30 39
 SOD iP 20 19 49
 Oaxaca, Mexico
 2 HEL iP 22 30 23
 North Island

3 HEL iP 01 40 19
 eS 45 39
 SOD iP 01 41 07
 Iran
 3 HEL iP 01 47 26
 SOD iP 01 47 34
 3 HEL iP 03 03 37
 SW of Turkey
 3 HEL iP 03 55 28
 iS 04 04 31
 iScS 05 31
 SOD iP 03 56 02
 iS 04 05 38
 Atlantic Ocean
 3 SOD eP 04 30 39
 Coast of Guatemala
 3 HEL iP 08 21 20
 ePP 23 46
 iS 30 13
 eScS 31 13
 e(SS) 34 21
 SOD iP 08 20 45
 iS 28 49
 ePS 29 07
 Honshu, Japan
 4 HEL iP 00 08 09
 eS 12 23
 Dodecanese Islands
 4 HEL eP 02 56 09
 Dodecanese Islands
 4 HEL eP 03 52 20
 Greece
 4 HEL eP 07 09 46
 SOD iP 07 08 59
 Rat Islands
 4 HEL iP 22 10 04
 ePP 11 35
 ePKKP 20 12
 ePS 21 23
 SOD iP 22 10 09
 iPP 11 53
 Chile-Argentina

September

4 HEL ePKP 22 11 20
 SOD ePKP 22 11 25

4 HEL ePKP 22 14 06
 ePP 15 35
 SOD ePKP 22 14 07

4 SOD eSn 23 37 02
 eSb 21
 eSg 31

5 SOD iP 13 14 51
 Sumatra

5 HEL iP 13 20 57
 i 21 05
 SOD iP 13 21 01
 i 09
 Sumatra

5 SOD iP 14 27 15
 Sumatra

7 HEL iP 03 23 07
 SOD eP 03 23 56
 Caucasus

7 SOD iP 10 18 15
 Ryukyu Islands

8 HEL iP 05 35 52
 SOD iP 05 35 04
 iPcP 36 06
 Kamchatka

8 HEL iP 15 04 15
 SOD iP 15 03 49
 i 04 11
 iPcP 26
 Kyushu, Japan

9 HEL iP 11 42 49
 SOD iP 11 42 08
 i 10
 iPcP 56
 Kurile Islands

9 HEL iP 22 34 06
 eS 42 32
 SOD iP 22 33 19
 iPcP 34 17
 Near Islands

September

10 SOD eP 03 56 35
 Iran

11 SOD eP 07 08 19
 Gobi

11 HEL iP 18 14 43
 SOD iP 18 14 32
 Mindanao

12 SOD eP 13 58 52
 Java

13 HEL iP 04 43 57
 eS 47 02
 eLg 48 51
 SOD eP 04 43 55
 eS 46 58
 eLg 48 53

14 HEL iP 14 30 04
 SOD iP 14 29 24
 ePP 30 56
 eS 35 26
 Stanovoi Mountains

14 HEL eP 19 53 37
 Kyushu, Japan

14 HEL iP 21 43 40
 SOD iP 21 44 07
 Chagos Islands

15 HEL iPcP 17 07 57
 SOD ePKP 17 07 40
 Kermadec Islands

15 HEL iP 18 30 01
 Pacific Ocean

15 HEL iP 19 11 55
 ePcP 12 35
 SOD eP 19 11 08
 ePcP 12 06
 Kamchatka

September

15 HEL iP 19 57 42
 eSKS 20 07 05
 eS 35
 eSP 08 57
 ePKKP 15 04
 SOD iP 19 57 35
 epP 59 55
 iSKS 20 07 01
 iS 25
 isS 10 57
 ePKKP 15 03
 Celebes Sea

16 HEL iP 04 01 37
 SOD iP 04 00 46
 Eastern Siberia

16 SOD iP 07 34 42
 Philippine Islands

16 HEL eP 14 29 15
 SOD eP 14 29 50
 e 31 03
 Eastern Iran

17 HEL iP 02 42 29
 SOD eP 02 43 42
 Turkey

17 SOD eSg 06 28 13
 Sweden

17 HEL eP 12 34 31
 SOD iP 12 33 46
 Kurile Islands

18 SOD iPcP 03 54 39
 Sandwich Islands

18 SOD iP 14 53 37
 Mid-Atlantic Ocean

18 HEL iP 21 00 04
 eS 05 41
 SOD iP 21 00 22
 iPcP 53
 esP 01 09
 e 28
 iPcP 02 38
 Hindu Kush

- 27 -

1958

September

September

September

19 SOD iP 08 25 43
Molucca Strait

19 HEL iP 17 29 34
SOD iP 17 28 45
Fox Islands

20 HEL eP 05 28 22
SOD iP 05 28 17
North Vietnam

20 SOD iP 09 17 29
Pakistan

20 HEL eP 10 44 56
SOD iP 10 45 09
Atlantic Ocean

20 HEL iPKP 17 28 08
iPKKP 38 46
SOD eP 17 23 54
ePKP 28 00
ePP 44
ePKKP 38 58
Solomon Islands

20 SOD iSKP 17 39 54
Fiji Islands

20 SOD eP 21 25 54

21 HEL iP 05 56 19
SOD iP 05 55 46
i 56 04
Honshu, Japan

21 SOD iP 07 44 34
Molucca Strait

21 HEL eP 16 24 32
SOD eP 16 25 19
Iran

21 SOD iP 22 37 28

22 SOD eP 07 12 29
N coast of Java

22 HEL iP 08 48 41
SOD iP 08 48 16
e 50 26
Bonin Islands

22 HEL iPKP 19 25 30
i 37 30
eSS 48 05
SOD iPKP 19 25 15
iPKS 28 55
e 30 43
Kermadec Islands

22 HEL iP 20 19 28
SOD iP 20 18 54
Hokkaido, Japan

24 HEL ePS 04 02 55
SOD iP 03 53 32
Gulf of Alaska

25 HEL iP 07 00 55
epP 01 37
SOD iP 07 01 14
Hindu Kush

25 HEL iP 07 31 24
ePP 34 13
SOD iP 07 31 34
i 40
iPP 34 22
Atlantic Ocean

25 HEL iPKP 15 35 26
SOD ePKP 15 35 14
Kermadec Islands

25 SOD ePKP 20 44 09
Pacific Ocean

25 HEL iPKP 21 15 42
SOD ePKP 21 15 35
Kermadec Islands

26 SOD iP 18 20 46
Andreanof Islands

26 SOD iP 18 36 51

27 HEL ePKP 14 14 07
ePKS 17 33
Samoa Islands

28 SOD iP 12 43 58

28 SOD eP 21 04 20
i 48
Honshu, Japan

29 SOD iP 14 27 41
Honshu, Japan

30 HEL eS 08 51 46
Austria

30 HEL iP 09 59 16
iS 10 02 34
Novaya Zemlya

October

1 HEL eP 05 32 54
Luzon

1 HEL ePKP 09 49 36
SOD ePKP 09 49 36
Macquarie Islands

1 HEL iP 12 13 08
Celebes Sea

1 HEL iP 16 47 21
iPP 34
iS 50 16
SOD iP 16 46 15
Jan Mayen

1 HEL iP 17 58 12
i 15
ePcP 39
SOD iP 17 57 23
Fox Islands

2 SOD ePKP 04 44 38
Sandwich Islands

October

2 SOD iP 14 32 34
iS 34 36
Jan Mayen

2 HEL iP 15 13 51
i 14 04
SOD iP 15 13 39
Mindanao

2 SOD eP 15 24 02
Jan Mayen

2 SOD iP 22 23 37
eS 25 36
Jan Mayen

3 HEL iP 00 45 24
SOD iP 00 45 13
Philippine Islands

3 SOD iP 19 18 25

4 HEL eSn 00 35 05
iSg 23
SOD iPg 00 34 11
iSn 41
iSg 57
Sweden

4 SOD iP 10 03 35
Mariana Islands

4 SOD iP 11 45 18
i 31
Mariana Islands

4 HEL iP 15 21 02
SOD iP 15 20 36
Mariana Islands

5 HEL eP 06 19 52
SOD iP 06 19 29
Mariana Islands

6 HEL iP 01 06 39
SOD iP 01 06 18
epPKP 07 11
e 09 05
eSKP 36
Kermadec Islands

October

6 HEL iP 09 35 29
i 50
e 41 05
SOD iP 09 36 07
i 58
iPP 37 10
Iran-Turkmen, USSR

6 HEL iP 19 02 50
ePP 05 02
SOD iP 19 02 01
i 27
Kamchatka

7 SOD iP 12 47 03
ePP 51 58
eSKS 57 38
ePKKP 13 02 37
New Britain

7 SOD iP 07 57 08
New Zealand

9 SOD eP 01 08 07

9 HEL ePKP 11 39 15
SOD iP 11 39 25
e 40 14
ePP 41 36
eSKP 42 45
Sandwich Islands

9 HEL iP 13 37 09
SOD iP 13 38 12
e 46
iPcP 41 02
e 36
Crete

10 SOD eP 04 18 28
Celebes Sea

10 HEL iP 08 40 35
SOD iP 08 39 48
iPcP 40 49
Kamchatka

October

10 HEL iP 09 26 14
SOD iP 09 26 14
Tibet-India

10 SOD iP 11 48 23
Mindanao

10 SOD eP 21 15 56
Near Islands

11 HEL iP 00 51 00
i 11
i 32
ePcP 52 07
SOD iP 00 50 06
i 17
Yukon Territory

11 HEL iP 02 10 55
iPcP 11 37
SOD iP 02 10 08
iPcP 11 10
Kamchatka

11 SOD iP 02 19 48

11 SOD eP 07 26 06
Honshu, Japan

11 HEL eP 09 17 45
SOD iP 09 17 08
Hokkaido, Japan

11 SOD iP 14 56 02
Argentina

12 SOD iP 07 56 16
i 30
iS 58 15
i 59 27
Novaya Zemlya

12 HEL iP 15 29 41
ePP 32 23
SOD iP 15 29 21
iPcP 45
i 30 24
East China Sea

October

28 HEL iPKP 23 28 56
Kermadec Islands

29 HEL iP 00 01 01
SOD iP 00 00 15
Andreanof Islands

29 HEL iP 07 55 03
SOD iP 07 54 16
eP'P' 08 23 52
Andreanof Islands

29 HEL iP 08 06 08
SOD iP 08 05 21
ePcP 06 08
Andreanof Islands

29 HEL iP 15 27 11
SOD iP 15 26 23
Kamchatka

30 SOD eP 02 37 22
India

30 SOD eP 11 45 29
Fox Islands

31 HEL iP 23 50 47
SOD iP 23 50 30
Formosa

November

1 HEL iP 09 25 21
SOD iP 09 25 27

1 HEL iPKP 12 35 48
iPP 38 17
iPKS 39 10
i 19
SOD ePKP 12 35 37
New Hebrides

1 SOD iP 15 13 43

1 HEL eP 20 59 03
SOD eP 20 58 49
Outer Mongolia

November

2 HEL iP 00 14 16
SOD iP 00 13 40
Baikal Sea

2 HEL iP 03 25 43
SOD iP 03 24 32

2 HEL iP 09 20 33
SOD iP 09 21 14
e 22 04
ePP 17
Iran

2 HEL iP 10 55 46
iPcP 56 13
SOD iP 10 54 58
ePcP 55 43
Andreanof Islands

3 HEL iPKP 04 20 18
Kermadec Islands

3 HEL iP 14 40 26
i 31
SOD iP 14 40 33
Tibet

4 HEL eP 08 40 26
iPP 43 30
SOD iP 08 40 00
Bonin Islands

4 HEL eP 08 42 56
SOD iP 08 42 31
Bonin Islands

4 SOD iP 09 29 17
Colombia

4 SOD eP 20 32 05

4 SOD ePKP 23 14 48
S Pacific Ocean

5 HEL iP 15 57 44
SOD iP 15 56 53
Kodiak Island

6 SOD iP 15 43 26
Banda Sea

November

6 HEL iP 21 19 11
SOD iP 21 20 13
Asia Minor

6 HEL iP 23 08 52
iPP 11 22
iS 17 38
SOD iP 23 08 12
iS 16 23
Kurile Islands

6 HEL iP 23 25 04
Kurile Islands

6 HEL iP 23 27 03
Kurile Islands

6 HEL iP 23 37 17
Kurile Islands

6 HEL iP 23 45 30
Kurile Islands

6 HEL iP 23 57 24
SOD iP 23 56 45
Kurile Islands

7 HEL iP 00 04 19
Kurile Islands

7 HEL iP 00 23 19
SOD iP 00 22 39
Kurile Islands

7 HEL iP 00 34 07
SOD iP 00 33 27
Kurile Islands

7 HEL iP 00 43 52
SOD iP 00 43 13
Kurile Islands

7 HEL iP 00 45 52
SOD iP 00 45 12

7 HEL iP 00 47 04
SOD iP 00 46 25
Kurile Islands

November

November

November

7 HEL iP 00 48 42
SOD iP 00 48 02
Kurile Islands

7 HEL iP 00 50 14
Kurile Islands

7 HEL iP 00 56 16
SOD iP 00 55 38

7 HEL iP 01 00 18
SOD iP 00 59 38

7 HEL iP 01 04 03
SOD iP 01 03 25
Kurile Islands

7 HEL iP 01 12 08
SOD iP 01 11 28

7 HEL iP 01 12 51
i 13 04
SOD iP 01 12 11
Kurile Islands

7 HEL iP 01 15 46
i 56
SOD iP 01 15 08
Kurile Islands

7 HEL iP 01 24 34
SOD iP 01 23 56
Kurile Islands

7 HEL iP 01 25 25
SOD iP 01 24 46
Kurile Islands

7 HEL iP 01 32 43
SOD iP 01 32 05

7 HEL iP 01 34 05
SOD iP 01 33 26
Kurile Islands

7 HEL iP 01 46 31
SOD iP 01 45 52
Kurile Islands

7 HEL iP 01 53 47
SOD iP 01 53 08
i 54 15
Kurile Islands

7 HEL iP 01 55 52
i 56 05
SOD iP 01 55 14
Kurile Islands

7 HEL iP 02 06 26
i 40
SOD iP 02 05 46
Kurile Islands

7 HEL iP 02 09 37
SOD iP 02 08 58
Kurile Islands

7 HEL iP 02 20 12
SOD iP 02 19 33
Kurile Islands

7 HEL iP 02 21 06
SOD iP 02 20 26
Kurile Islands

7 HEL iP 02 27 36
i 46
SOD iP 02 26 58
Kurile Islands

7 HEL iP 02 30 34
SOD iP 02 29 55

7 HEL iP 02 35 21
SOD iP 02 34 43
Kurile Islands

7 HEL iP 02 41 32
SOD iP 02 40 53

7 HEL iP 02 46 32

7 HEL iP 02 48 56
SOD iP 02 48 18
Kurile Islands

7 HEL iP 03 01 40
i 53
SOD iP 03 01 01
Kurile Islands

7 HEL iP 03 37 44
SOD iP 03 37 05
Kurile Islands

7 HEL iP 04 30 08
SOD iP 04 29 29
Kurile Islands

7 HEL iP 05 10 42
SOD iP 05 10 03
Kurile Islands

7 SOD iP 05 57 24
Kurile Islands

7 HEL iP 07 51 26
SOD iP 07 50 47
ePP 53 03
Kurile Islands

7 HEL iP 08 40 08
SOD iP 08 39 28
Kurile Islands

7 HEL iP 10 20 34
SOD iP 10 19 56
Kurile Islands

7 HEL iP 10 38 18
SOD iP 10 37 40
Kurile Islands

7 HEL iP 10 40 08
SOD iP 10 39 29
Kurile Islands

7 HEL iP 11 19 52
SOD iP 11 19 13
Kurile Islands

7 HEL iP 11 35 12
i 24
SOD iP 11 34 32
i 45
Kurile Islands

November

November

November

7 HEL iP 11 41 54
SOD iP 11 41 15
Kurile Islands

7 SOD iP 14 00 53
Kurile Islands

7 HEL iP 14 26 29
SOD iP 14 25 50
Kurile Islands

7 HEL iP 14 35 26
SOD iP 14 34 48
Kurile Islands

7 SOD iP 16 21 31

7 HEL iP 16 27 33
SOD iP 16 26 55
Kurile Islands

7 HEL iP 17 43 33
i 47
SOD iP 17 42 54
i 43 21
Kurile Islands

7 HEL iP 19 25 22
i 28
SOD iP 19 24 41
Kurile Islands

7 HEL iP 20 42 03
i 43
SOD iP 20 41 25
Kurile Islands

7 SOD iP 20 44 02
Kurile Islands

7 SOD iP 20 51 34
Kurile Islands

8 HEL iP 00 01 51
i 02 04
SOD iP 00 01 12
Kurile Islands

8 SOD iP 00 23 13
i 26
ePcP 56
Kurile Islands

8 HEL iP 09 33 20
iPP 35 33
SOD iP 09 32 34
eS 40 22
Kamchatka

8 SOD iP 09 42 40
Kurile Islands

8 HEL iP 11 27 29
SOD iP 11 26 51
Kurile Islands

8 HEL iP 12 19 23
SOD iP 12 18 43
Kurile Islands

8 HEL iP 13 06 31
i 43
SOD iP 13 05 51
i 06 04
Kurile Islands

8 HEL iP 13 27 30
SOD iP 13 26 51
Kurile Islands

8 HEL iP 13 36 08
SOD iP 13 35 29
Kurile Islands

8 SOD iP 14 56 02
Kamchatka

8 SOD iP 15 20 17
Kurile Islands

8 HEL iP 16 37 22
SOD iP 16 38 32

8 HEL iP 17 16 40
SOD iP 17 16 58
Hindu Kush

8 SOD iP 18 50 05
Kamchatka

8 HEL iP 19 47 59
SOD iP 19 48 06
Andaman Islands

9 SOD iP 00 35 29

9 HEL iP 03 25 39
SOD iP 03 25 01
Kurile Islands

9 HEL iP 08 15 58
SOD iP 08 15 11
Kamchatka

9 HEL iP 10 28 22
Kurile Islands

9 HEL iP 10 29 59
SOD iP 10 29 20
Kurile Islands

9 HEL iP 14 44 09
SOD iP 14 43 30
Kurile Islands

9 HEL iP 18 03 46
SOD iP 18 03 06
iPcP 51
Kurile Islands

9 SOD iP 21 15 17
Kurile Islands

10 SOD eP 03 44 34

11 SOD iP 13 55 50
Kurile Islands

11 HEL eP 23 10 32
iS 13 06
SOD iP 23 12 01
i 04
iS 15 56
Carpatians

November

12 HEL iP 04 10 13
SOD iP 04 10 00
i 07
Luzon

12 SOD iP 05 15 18

12 HEL iPKP 10 58 22
Solomon Islands

12 SOD iP 17 54 25
Kurile Islands

12 HEL iPKP 18 33 59
Kermadec Islands

12 HEL iP 19 27 17
i 28
SOD eP 19 26 39
Kurile Islands

12 HEL iP 20 34 17
iS 43 02
iScS 44 06
eP'P' 21 02 53
SOD iP 20 33 38
iS 41 52
eScS 43 30
eSS 45 48
Kurile Islands

12 HEL iP 21 34 09
Kurile Islands

12 HEL iPKP 23 27 16
i 19
Kermadec Islands

12 HEL iP 23 10 25
SOD iP 23 09 46
Kurile Islands

12 HEL iP 23 42 51
SOD iP 23 42 13
Kurile Islands

13 HEL iP 03 07 19
SOD iP 03 06 39
i 57
Kurile Islands

November

13 HEL iP 04 15 27
SOD iP 04 14 48
Kurile Islands

13 HEL iP 06 10 23
i 31
SOD iP 06 09 48
i 55
Hokkaido, Japan

13 SOD iP 09 18 56
Venezuela

13 HEL iP 10 43 09
SOD iP 10 42 08
Jan Mayen

13 HEL eP 11 06 50
SOD eP 11 06 11
Kurile Islands

13 HEL iP 16 27 49
i 28 13
SOD iP 16 27 58
Nicobar Islands

13 SOD iP 18 44 35
Kurile Islands

13 SOD eP 23 28 52
Arabian Sea

14 SOD iPKP 05 23 58
S Pacific Ocean

14 HEL iP 05 45 44
SOD iP 05 45 05
i 18
Kurile Islands

14 SOD iP 05 59 07
i 24
Guatemala

14 SOD iP 14 02 14
i 51
Banda Sea

15 HEL iP 00 26 42
Kurile Islands

November

15 HEL iP 05 47 42
iS 51 41
SOD iP 05 48 50
iS 54 16

Southern Greece

15 HEL iP 09 11 36
SOD iP 09 10 57
Kurile Islands

15 HEL iP 09 21 25
Kurile Islands

15 SOD iP 10 03 16
Kurile Islands

15 HEL iP 23 31 11
i 22
SOD iP 23 30 33
Kurile Islands

16 HEL iP 04 58 22
i 35
SOD iP 04 57 43
i 55
Kurile Islands

16 HEL iP 05 02 26
Kurile Islands

16 HEL iP 05 51 38
SOD iP 05 50 58
Kurile Islands

16 HEL iP 06 26 19
i 32
SOD eP 06 25 38
Kurile Islands

16 SOD iP 20 32 39
Mongolia-China

16 HEL iP 21 23 13
SOD iP 21 22 34
Kurile Islands

16 HEL iP 21 57 07
SOD iP 21 56 42
Bonin Islands

November

17 HEL iP 15 45 16
 ipP 29
 SOD iP 15 44 35
 ipP 48
 Kurile Islands

17 SOD iP 16 29 09
 Samar

18 HEL iP 07 56 17
 SOD iP 07 55 30
 iPcP 56 17
 Andreanof Islands

18 HEL iP 18 43 55
 SOD iP 18 43 16
 Kurile Islands

19 HEL iPcP 01 52 40
 SOD iPcP 01 52 44
 Argentina

19 HEL iP 03 19 48
 SOD iP 03 19 07
 Kurile Islands

19 HEL iPcP 04 13 36
 SOD iPcP 04 13 17
 Kermadec Islands

19 HEL iP 05 29 44
 SOD iP 05 29 05
 Kurile Islands

19 HEL iP 05 36 01
 SOD iP 05 35 16

19 HEL iP 09 34 38
 ipP 51
 SOD iP 09 33 58
 Kurile Islands

19 HEL iP 12 45 37
 SOD iP 12 44 59
 Kurile Islands

19 HEL iP 15 12 17
 ipP 36
 iPcP 13 03
 SOD iP 15 11 25
 ipP 44
 iPcP 12 35
 Kenai Peninsula

November

19 SOD iP 18 48 28

20 HEL eSg 00 14 41
 SOD eSg 00 15 01
 South Norway

20 HEL iP 05 46 59
 i 48 41
 SOD iP 05 46 13
 i 47 54
 Kamchatka

20 HEL iP 06 42 17
 SOD iP 06 41 37
 Kurile Islands

20 HEL iP 06 45 24
 SOD iP 06 44 43
 Kurile Islands

20 HEL iP 14 28 48
 SOD iP 14 28 08
 iPcP 53
 Kurile Islands

20 HEL iP 17 52 04
 SOD iP 17 51 25
 Kurile Islands

21 HEL iP 01 51 32
 SOD iP 01 50 51
 Sakhalin

21 HEL iP 05 06 57
 SOD iP 05 07 14
 Hindu Kush

21 HEL iP 15 08 44
 SOD iP 15 08 05
 Kurile Islands

22 SOD eP 00 17 59
 South of Java

22 SOD iP 21 00 13
 Jan Mayen

23 HEL iPcP 03 07 48
 i 08 05
 Chatham Islands

November

23 HEL iP 13 12 12
 eS 15 42
 SOD eP 13 13 27
 Turkey

23 HEL iP 13 53 20
 SOD iP 13 52 38
 Kurile Islands

23 HEL iP 20 24 58
 SOD iP 20 25 04
 Southern Tibet

23 HEL iP 22 30 23
 SOD iP 22 29 36
 Andreanof Islands

23 HEL iP 23 48 30
 iPcP 57
 SOD iP 23 47 42
 Andreanof Islands

24 HEL iP 22 38 32
 Leeward Islands

24 HEL iP 17 55 16
 SOD iP 17 55 04
 Mindanao

24 SOD iPcP 07 08 24
 Drake Passage

25 HEL iP 02 29 15
 SOD iP 02 29 58
 Southern France

25 SOD iP 04 09 43
 Nepal

25 HEL iP 09 24 10
 SOD iP 09 23 39
 iPcP 24 09
 ePP 26 05
 Honshu, Japan

26 HEL iP 00 17 10
 SOD eP 00 18 12
 Georgia, USSR

- 35 -

1958

November

26 SOD iP 09 23 47
 Kurile Islands

26 SOD iP 22 10 59
 Arctic Ocean

29 HEL iP 03 45 39
 SOD iP 03 45 01
 Kurile Islands

29 HEL iP 05 06 12
 Kermadec Islands

29 HEL iP 11 45 36
 i 47 02

30 HEL iP 01 44 25
 i 38
 SOD iP 01 43 55
 Honshu, Japan

30 SOD iP 02 06 41
 i 54
 Honshu, Japan

30 HEL iP 09 48 09
 SOD iP 09 47 56
 Mongolia

December

1 SOD iP 07 31 16
 N Atlantic Ocean

1 SOD iP 12 00 45
 West of Sumatra

2 HEL iP 01 23 15
 i 20
 i 27
 i 24 07
 SOD iP 01 22 35
 Kurile Islands

2 SOD eP 09 21 57
 Southern Iran

December

2 SOD iP 20 26 59
 Honshu, Japan

2 HEL iP 23 11 39
 SOD iP 23 12 42
 Greece

3 HEL iP 00 43 30
 SOD iP 00 44 36
 Greece

3 SOD iP 02 33 04
 i 14
 Nepal

3 SOD iP 09 41 07
 i 23
 Honshu, Japan

3 HEL iP 10 00 19
 SOD iP 10 00 06
 i 13
 Luzon

3 SOD iP 10 11 58
 Kurile Islands

3 HEL iP 16 11 52
 SOD iP 16 11 27
 Honshu, Japan

3 SOD iP 21 41 36
 Hindu Kush

4 SOD eP 10 35 36
 Gulf of Aden

5 SOD iP 22 16 05

5 SOD eP 23 45 14
 Luzon

6 SOD iP 09 46 54
 Panama

6 SOD eP 11 16 41
 North of Iceland

December

6 SOD iP 15 35 38
 North of Iceland

6 SOD iP 15 37 26
 North of Iceland

6 SOD iP 22 46 47
 Honshu, Japan

7 SOD iP 00 15 46
 Komandorskie Is.

7 SOD iP 01 18 55
 i 19 06

7 SOD iP 01 20 46
 i 56
 S coast of Formosa

7 SOD iP 01 55 19
 i 29
 Formosa

7 NUR iP 02 59 06
 SOD iP 02 58 55
 Talaud Islands

7 SOD eP 09 02 47
 S coast of Formosa

7 SOD iP 22 36 18

8 SOD iP 03 28 47
 New Hebrides

8 SOD iP 07 26 07
 China

8 SOD iP 11 52 24
 Kurile Islands

8 SOD iP 12 18 32
 Kurile Islands

8 SOD iP 16 07 03
 iSg 18
 Finland-Sweden

December

8 SOD iP 18 49 42
 9 NUR iP 20 47 02
 SOD eP 20 48 02
 Dodecanese Islands
 10 NUR iP 03 50 52
 i 51 08
 iP 26
 iPP 52 18
 SOD iP 03 51 08
 i 22
 iP 39
 iPP 52 42
 iPPP 53 14
 iS 57 12
 i 59 41
 Hindu Kush
 10 NUR iPKP 07 22 13
 SOD iPKP 07 22 04
 North Island
 10 SOD iP 07 32 29
 iPcP 33 14
 Honshu, Japan
 10 NUR iP 14 51 44
 SOD iP 14 51 34
 iP 52 28
 ePP 55 19
 Mindanao
 10 SOD iP 22 01 50
 Gulf of California
 10 SOD iP 22 22 24
 Gulf of California
 10 SOD iP 23 27 07
 Gulf of California
 11 SOD eP 08 34 54
 Gulf of California
 11 SOD iP 10 03 54
 California

December

11 SOD eP 15 44 43
 Honshu, Japan
 11 SOD iP 18 49 29
 Honshu, Japan
 13 SOD iPKP 09 26 43
 Sandwich Islands
 13 SOD iP 14 38 43
 i 39 20
 Kurile Islands
 14 SOD iP 18 03 52
 Japan
 15 NUR iP 11 57 09
 i 15
 i 22
 i 34
 SOD iP 11 56 33
 i 45
 Kurile Islands
 15 NUR iPKP 13 00 11
 SOD ePKP 12 59 54
 Kermadec Islands
 15 SOD eP 17 55 59
 15 NUR iP 19 44 28
 Kurile Islands
 15 NUR iP 20 03 28
 Kurile Islands
 15 NUR eP 20 12 27
 Kurile Islands
 16 NUR iP 02 43 10
 SOD iP 02 42 35
 Kurile Islands
 16 NUR ePKP 03 38 03
 S of Fiji Islands
 16 NUR iP 12 15 00
 i 13
 Kurile Islands

December

16 NUR iP 21 46 45
 SOD iP 21 46 36
 Philippine Islands
 17 NUR iP 02 36 36
 SOD iP 02 35 50
 Alaska Peninsula
 17 NUR iP 09 07 55
 SOD iP 09 07 29
 Honshu, Japan
 17 NUR iP 15 45 43
 SOD iP 15 45 17
 Ryukyu Islands
 18 NUR iPKP 01 58 40
 Loyalty Islands
 18 NUR iP 07 38 10
 SOD iP 07 37 58
 Luzon
 18 NUR iP 07 40 50
 SOD iP 07 41 31
 ePP 43 10
 South of Iran
 18 NUR iPKP 19 43 13
 Tonga Islands
 18 NUR eP 23 12 12
 SOD iP 23 13 19
 South of Turkey
 19 NUR iPn 00 52 18
 iPb 33
 iPg 51
 iSn 53 43
 iSg 54 23
 SOD iPn 00 51 48
 iSn 52 48
 iSg 53 13
 Sweden-Norway
 19 NUR iP 03 32 32
 SOD iP 03 33 35
 Western Turkey

December

19 NUR iPn 07 58 06
 iSn 59 31
 iSg 08 00 11
 SOD iPn 07 57 36
 iSn 58 36
 iSg 59 01
 Sweden-Norway

19 NUR iP 18 47 18
 SOD iP 18 46 34
 Andreeanof Islands

19 NUR iP 19 30 32

20 NUR iP 19 32 06
 SOD iP 19 31 45
 Ryukyu Islands

21 NUR iP 04 25 43
 SOD eP 04 26 24
 S coast of Iran

21 NUR iP 05 53 33
 i 06 01 42
 i 02 44
 iLg₁ 05 08
 i 46
 SOD iP 05 53 32
 iPP 54 57
 eS 59 21
 iSa 06 01 59
 i 03 03
 iLg 05 41
 Sinkiang, China

22 SOD eP 02 49 57
 i 50 00
 i 05
 Central Alaska

22 NUR iP 03 21 30
 SOD eP 03 22 32
 East of Crete

22 NUR iPKP 19 40 39
 Kermadec Islands

December

23 NUR iP 07 15 43
 Fox Islands

23 NUR iP 10 30 58

23 NUR iPKP 19 35 49
 Kermadec Islands

23 NUR iPKP 19 40 23
 Kermadec Islands

23 NUR iPKP 19 54 42
 Kermadec Islands

23 NUR eSn 21 54 40
 eSg 55 19
 SOD ePb 21 52 24
 ePg 26
 eSn 51
 iSb 56
 iSg 53 00
 iRg 05
 i 11

Sweden, Gällivare

23 NUR eP 23 41 13
 Rhodes Island

24 NUR iP 05 14 11
 SOD eP 05 14 29
 Hindu Kush

24 NUR iP 07 22 38
 Turkey

24 NUR iPKP 20 34 24
 New Zealand

24 NUR iPKP 20 54 32
 New Hebrides

24 NUR ePKP 22 30 09
 New Hebrides

25 SOD eP 08 19 55
 ePP 24 11
 ePKKP 35 28
 New Britain

December

25 NUR iP 09 22 43
 SOD iP 09 22 00
 Andreeanof Islands

25 NUR iP 18 40 50
 SOD iP 18 41 32
 iPP 43 15
 South of Iran

26 NUR iPKP 01 54 25
 Kermadec Islands

26 NUR iPKP 06 09 14
 i 24
 iSKP 12 04
 SOD iPKP 06 09 15
 iSKP 11 48
 S of Fiji Islands

26 SOD iP 22 58 15

27 NUR iP 08 44 17
 NE of Siberia

27 NUR iPKP 11 11 28
 Kermadec Islands

27 NUR iP 13 46 10
 South of Alaska

28 NUR eP 05 25 46
 SOD iP 05 25 48
 Venezuela

28 NUR iP 05 43 11
 eS 50 02
 SOD iP 05 43 25
 iPcP 44 51
 iPP 45 19
 iScP 48 39
 iS 50 27
 Nepal-India border

28 SOD iP 08 33 39
 Algeria

December

28 NUR iP 08 34 45
SOD iP 08 34 59
Nepal-India

28 NUR iP 08 45 57
SOD iP 08 46 17

28 NUR iP 11 50 52
SOD iP 11 50 00
Jan Mayen

29 NUR eP 08 59 28

29 NUR iP 22 50 33
SOD iP 22 50 39
i 51
i 51 15
Northern Sumatra

December

30 NUR iPKP 08 57 30
SOD iPKP 08 57 24
S of Pacific Ocean

30 NUR iP 16 24 29
Rhodes Island

30 NUR iPKP 16 25 40
New Hebrides

31 NUR iPKP 02 04 29
iSKP 07 37
SOD iPKP 02 04 24
iSKP 07 22
Tonga Islands

December

31 NUR iP 03 53 52
SOD iP 03 54 03
iPP 56 00

Northern India

31 NUR eP 03 59 48

31 NUR iP 10 41 26
i 38
i 42 05
SOD iP 10 40 45
ipP 41 16

Kurile Islands

31 SOD iP 19 25 07