

SEISMOLOGICAL BULLETIN OF SYOWA STATION, ANTARCTICA, 2000

Noritsune Seo¹ and Masaki Kanao²

¹ Hydrographic Department, Maritime Safety Agency,
3-1, Tsukiji 5-chome, Chuo-ku, Tokyo 104-0045

² National Institute of Polar Research,
9-10, Kaga 1-chome, Itabashi-ku, Tokyo 173-8515

1. Introduction

Seismic observations at Syowa Station (69.0°S, 39.6°E), East Antarctica were started using a short-period seismometer with 1.0 s natural period in 1959 (Eto, 1962). A long-period seismograph was installed and phase readings of the teleseismic events have been reported currently to the United States Geological Survey (USGS), and to the International Seismological Centre (ISC) since 1967 (Kaminuma *et al.*, 1968). A three-component broadband seismometer (STS-1; Wielandt and Steim, 1986) was installed in 1989, for a contribution to the Federation of Digital broadband Seismograph Networks (FDSN; <http://www.fdsn.org/>) as an important key station in the Japanese PACIFIC21 network (<http://pacific21.eri.u-tokyo.ac.jp>). A distribution of FDSN stations in Antarctic continent and the distribution of PACIFIC21 stations in 2001 at present are shown in Figs. 1 and 2, respectively.

All of the observation systems at Syowa Station were maintained in 2000 by one of the authors (N.Seo) throughout the wintering season of the 41st Japanese Antarctic

Research Expedition (JARE-41). He also scaled the arrival times for seismic events and reported to ISC and USGS through that wintering season.

In this data report, we introduce the seismic observations at present in 2000, scaled read-out data and detected earthquake list, in addition to the procedures for public use by Internet service. Furthermore, the additional read-out data in 1999 season are described in Chapter 3.3 and APPENDIX.

2. Observations

The seismic observation systems at Syowa Station were all replaced to the current ones by one of the authors in 1997 (Kanao, 1999). The block diagram of the new recording system is illustrated in Fig. 3.

2.1. Seismographic hut and seismographs

Seismic observations at Syowa Station had been carried out mainly by two types of seismometers, one called a short-period (HES) with 1.0 s natural period of the pendulum and it had been operated since 1967 (Kaminuma *et al.*, 1968). The overall frequency responses and the magnifications of the HES are shown in Fig. 4. A three-component broadband seismometer (Streckeisen STS-1) with the digital recording system has been operating since 1990 (Nagasaka *et al.*, 1992). The amplitude and phase responses for the velocity output (Broadband; BRB) are shown in Fig. 5 (after Streckeisen and Messegeraete, 1987).

The new seismographic hut was constructed in 1996 and the whole sensors were moved inside it in 1997. The new hut is located about 200 m north from the old vault, with geodetic coordinates of 69°00'24.0"S, 39°35'06.0"E and the elevation is 20 m above mean sea level. Since the broadband seismographs are largely affected by a change of temperature and atmospheric conditions, the sensor room was covered doubly by adiabatic walls, with a surface covered by titanium to keep constant temperature in the room.

Seismic signals of the HES and STS-1 seismometers are transmitted to the Earth Science Laboratory (ESL) via analog cables of 600 m in length. The cables were mounted on racks, which connect the main buildings of Syowa Station, and laid parallel with the other electric power cables of the Station.

2.2. Acquisition system at Earth Science Laboratory

A three-component analogue output by HES is digitized at 200 Hz over sampling by a 24-bit analog-to-digital (A/D) converter, generating triggered signals of 80, 20 and 1 Hz re-sampling data. A three-component broadband signals of STS-1 are also digitized to create the triggered output of 80 Hz re-sampling data and the continuous outputs of 20, 1, 0.1 and 0.01 Hz data, respectively. The all data have a Mini_SEED volume, which is a standard format for data exchange in the global seismology. The digitized data are automatically transmitted from A/D converter to the workstation via TCP/IP protocol (DP/UX software). All kinds of the data are stored in 10 GB hard-disk of the workstation, then copied into DAT or 8 mm tape in every five months interval. A recording condition of A/D converter has been continuously monitored by a personal computer via RS-232C serial port (kermit software).

A remote-centering operation for the STS-1 sensors can also be carried out by keyboard commands from the computer. A reference clock for the new system has also been calibrated to the Coordinated Universal Time (UTC) from Global Positioning System (GPS). Two sets of thermal pen-recorders for HES and BRB output of STS-1, however, have now been operated for monitoring at ESL. Boom-position (POS) output of STS-1, which is proportional to the offset of the null position of the pendulum, has been monitored by RD2212 type recorder. A temperature in the sensor room is also recorded continuously by the same recorder.

2.3. Data transmission via INMARSAT

The digital waveform of broadband seismographs has been transmitted via the INMARSAT telecommunication link from Syowa Station to National Institute of Polar

Research (NIPR) since 1993. The UUCP protocol has been used for the file transfer. In addition, phase read-out data are sent directly from Syowa to USGS/NEIC regularly by email with time delay of a day, in order to make a contribution to the Quick Earthquake Determination (QED) email services and to the Preliminary Determination for Epicenters (PDE) weekly / monthly bulletins by NEIC.

3. Data

Since there is a delay time of 1-2 years between the publication of this report and the observing wintering period, the Preliminary Determination of Epicenters (PDE) reports by NEIC are referred to and only the seismograms of teleseismic events are edited. The arrival-time data and the corresponding hypocentral data of teleseismic events are presented in this report.

3.1. Phase read-out data

The phase arrival-time of teleseismic events was detected on the short-period monitoring seismograms. Most phases were scaled on the vertical component, and only clear phases of shear waves were scaled on the horizontal components. These phases were identified by comparing the observed travel time with the calculated one which is within 3 s time difference. The phases which identified as *P*- and *S*- waves are listed in Table 1. The phase *K* denotes the *PKP* phase, which can be identified within 3 s difference by comparing the observed travel time with that of calculated one. While *X* denotes the clear phase whose wave type can be identified but the travel time was within 3-10 s difference in observed and calculated times. Symbols *E* and *I* in the phase column denote emergent and sharp onsets, respectively. The initial ground motion is denoted by + for upward and - for downward direction. Arrival time is given in UTC and the accuracy of the read-out data is limited to 0.2 s. The teleseismic events identified in the

PDE are labeled by the serial numbers (#-xxx) in the table. These serial numbers correspond to those in Table 2. The events without serial numbers are teleseisms whose locations have not been determined by NEIC.

3.2. Teleseismic events

The list of hypocentral parameters of the teleseismic events is shown in Table 2, together with the same serial numbers as given in the remarks of Table 1. Figure 6 shows the hypocenters of 701 teleseismic events whose initial phases were detected at Syowa Station.

Figure 7 indicates the relationship between the annual mean number of detected teleseismic events and body-wave magnitude (M_b) in bars of 0.1 magnitude. The events were divided into three groups (1) all events (solid circles), (2) shallow events with depths less than 50 km (open squares), (3) intermediate and deep events larger than 50 km depths (crosses). The peak number of all events for magnitude exists around 5.0, where the number of earthquakes per year is about 62. Detection capability of teleseismic events has been evaluated by ISC from global seismic networks for the ten years (Ringdal, 1986). It is pointed out that the magnitude threshold of earthquake detection gradually increases with increasing southern latitude. The bias problem of network magnitude determination is significant at small and middle magnitudes, particularly in the southern high latitude.

3.3. Phase read-out data in 1999 (addition)

Though the phase arrival-times for teleseismic events in 1999 are already published (Nakanishi and Kanao, 2000), the additional data were re-scaled (APPENDIX; Table 3). All the hypocenters were not determined by NEIC, however, related phases were identified on the short-period monitoring seismograms at Syowa. Reading procedures and notations in Table 3 are the same as in Table 1.

4. Publication

The person maintained the seismic equipment through the year is basically given priority for using any data obtained at Syowa Station with time limit of two years. These data are transmitted to NIPR and then to be stored in the file server, and can be obtained upon request by Internet service and/or UNIX media (*i.e.*, CD-R, DAT, 8 mm-tape, *etc.*) with a permission of the NIPR members. If anybody wish to use the two-year period data, please contact to *kanao@nipr.ac.jp* concerning the availability.

Hypocenters, arrival-times detected at Syowa Station, and digital waveforms for recent several years are available from Internet services upon request. They are stored in the directories under /pub/HYPO, /pub/ATIME and /pub/STS of UNIX workstation (133.57.3.2), and accessible by use of 'anonymous ftp' command. Data access by use of WWW servers is also supplied by the ftp address; *ftp://geoipx.nipr.ac.jp/pub*.

Archived data after two years from the JARE-period are stored and freely available from both the ftp sites in NIPR and the PACIFIC21 center of the Earthquake Research Institute (ERI), the University of Tokyo. Any questions concerning data availability from ERI should be directed to *watada@eri.u-tokyo.ac.jp*.

5. Data Processing Staff

The seismic observation system at Syowa Station was designed by M. Kanao and K. Shibuya of the National Institute of Polar Research. Ms. A. Ibaraki has kindly assisted preparing this data report. Readers can refer to the URL sites below for finding data directory or access; *http://geoipx.nipr.ac.jp/~kanao/seismic_obs*.

References

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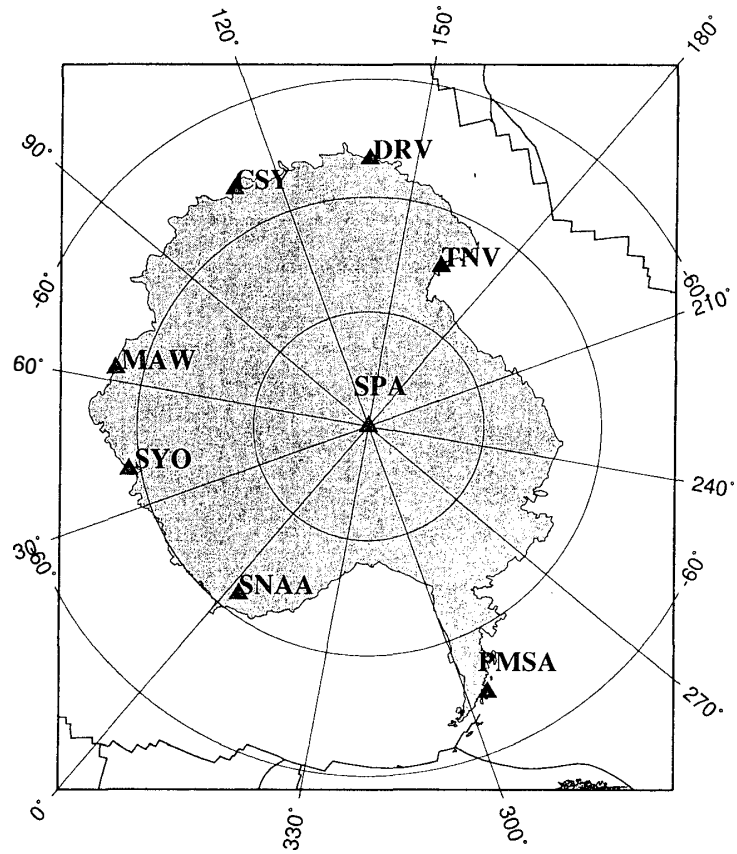


Fig. 1. A distribution of FDSN stations in Antarctic continent. Syowa (SYO), Mawson (MAW), Casey (CSY), Dumont d'Urville (DRV), Terra Nova Bay (TNV), South Pole (SPA), Palmer (PMSA), Sanae (SNAA).

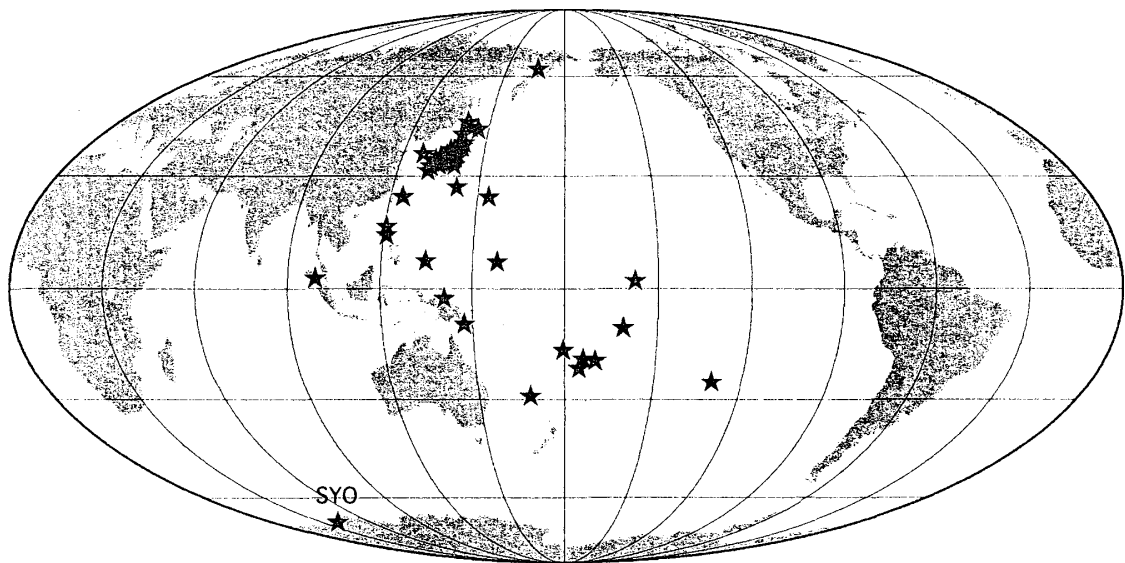


Fig. 2. PACIFIC21 station map in 2001 (<http://pacific21.eri.u-tokyo.ac.jp>).

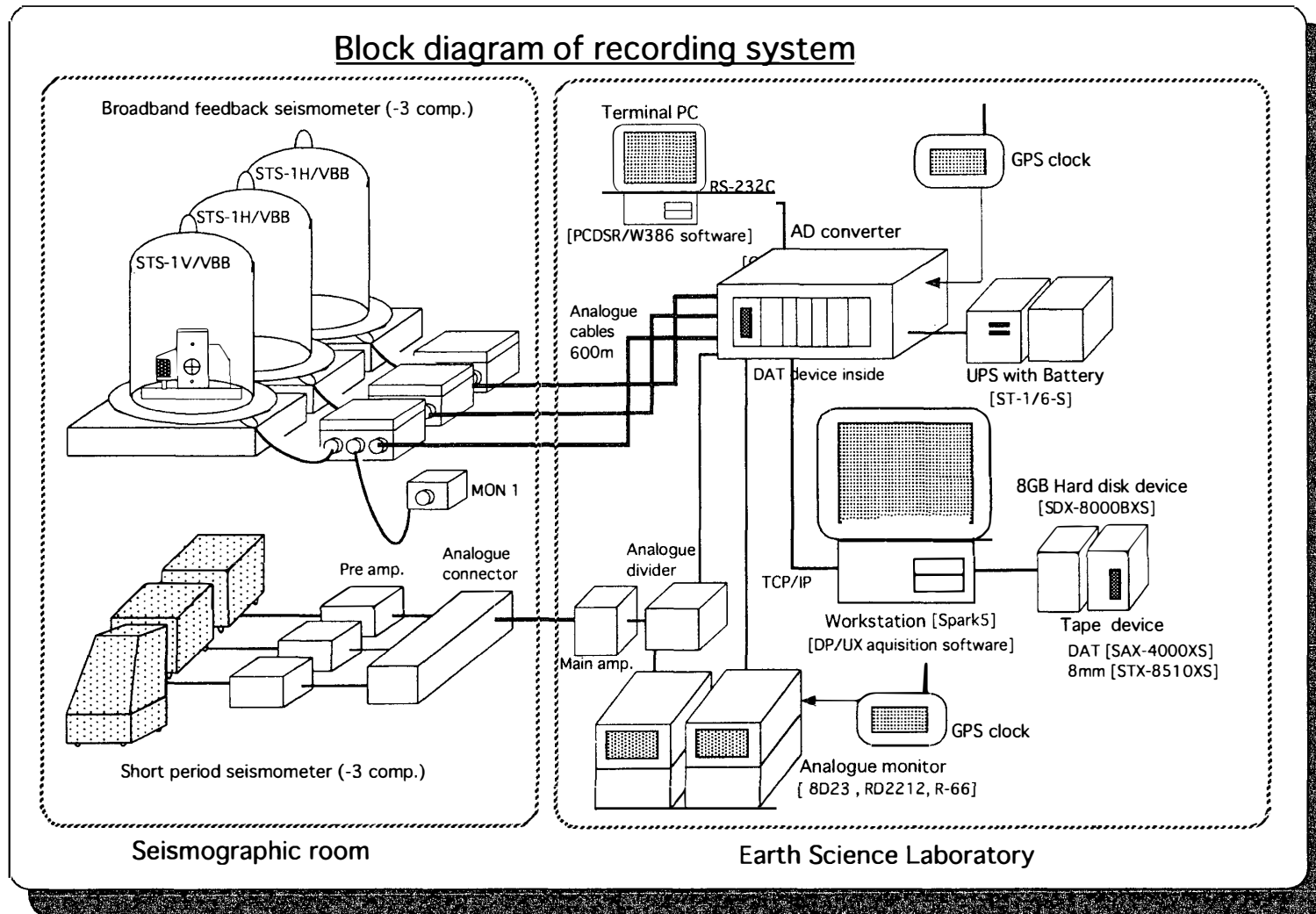


Fig. 3. Block diagram of new recording system for the STS and HES seismographs at Syowa Station. Left figure: Seismographic room; Right figure: Earth Science Laboratory.

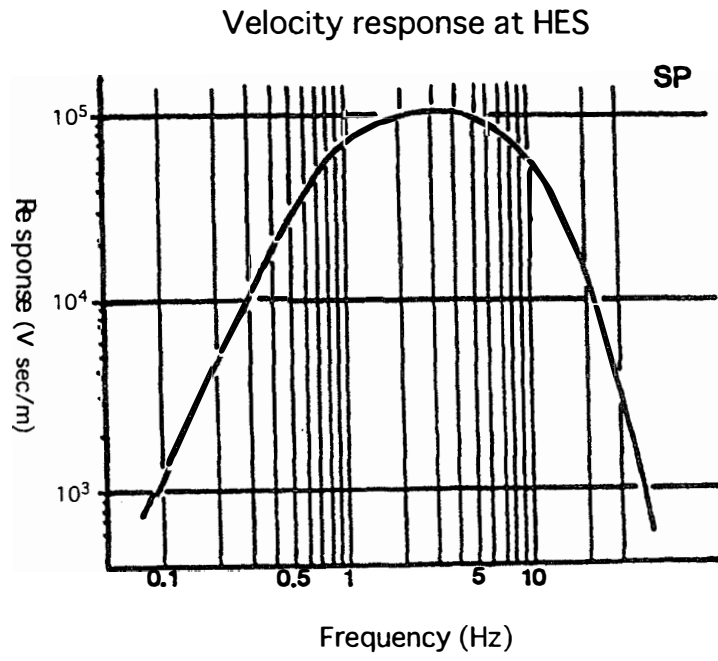


Fig. 4. Over-all frequency responses of the HES seismographs.

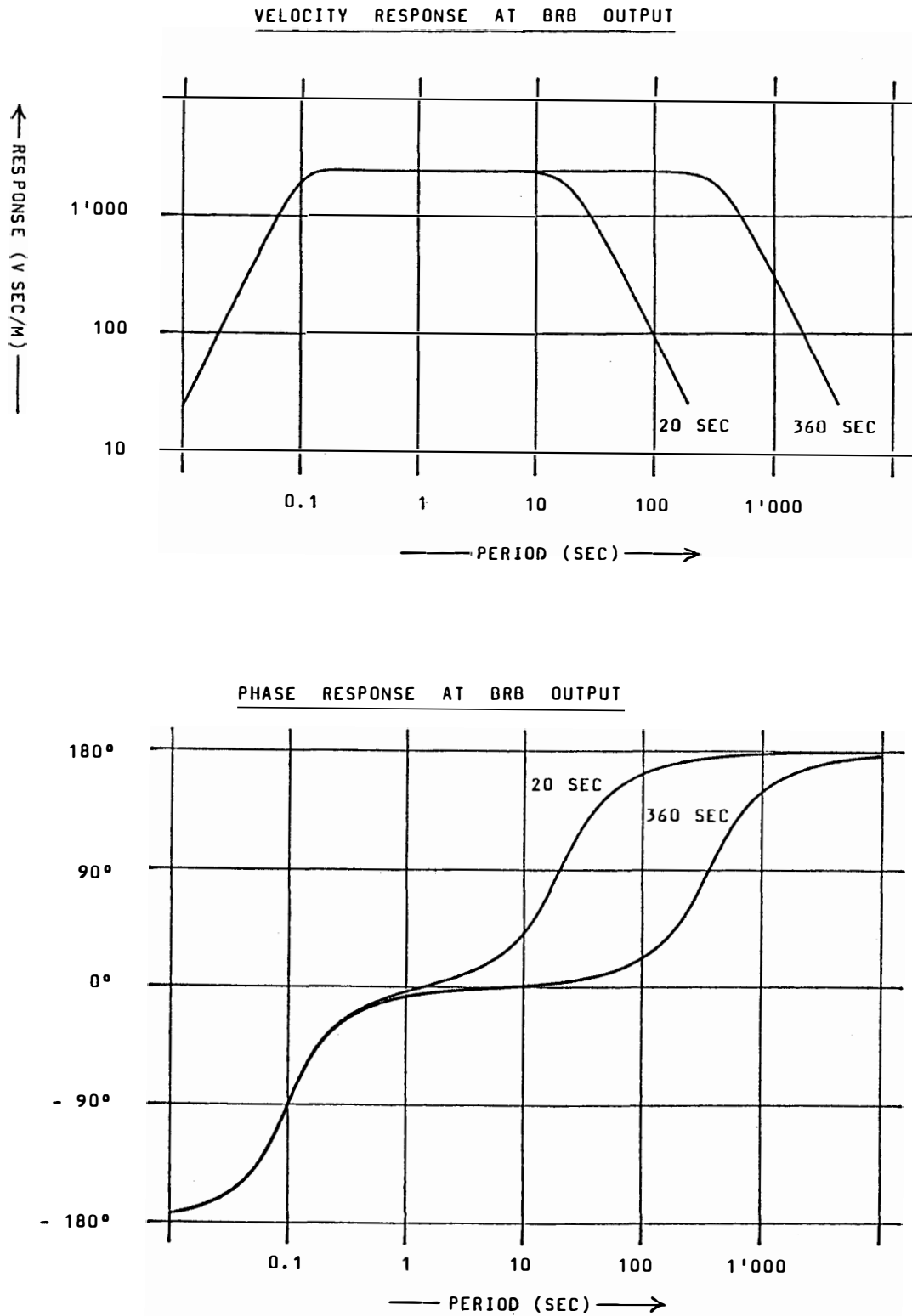


Fig. 5. Amplitude responses (upper figure) and phase responses (lower figure) for the velocity (BRB) output of the broadband seismograph (STS) in the two distinct signal modes of 20-s and 360-s (after Streckeisen and Messergeraete, 1987).

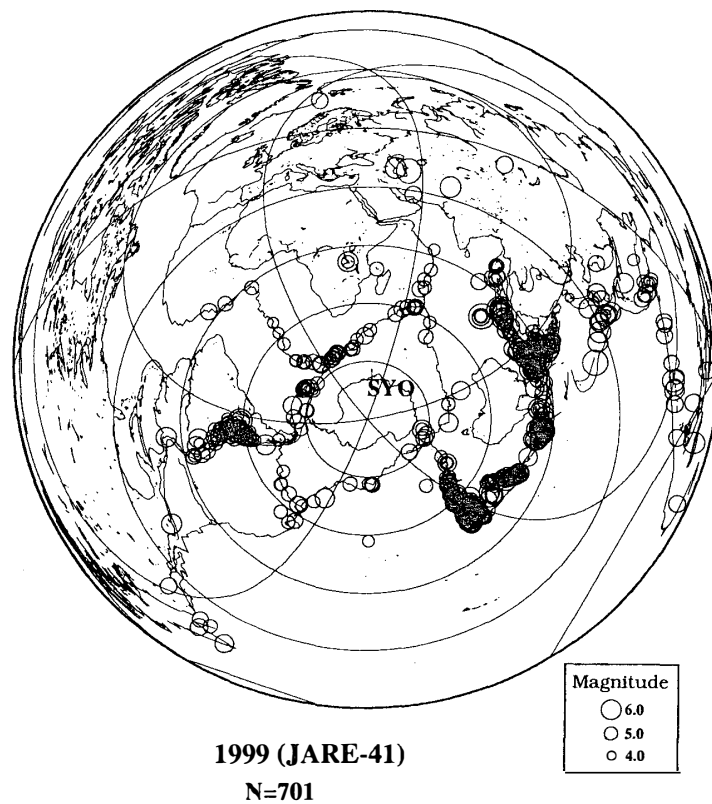
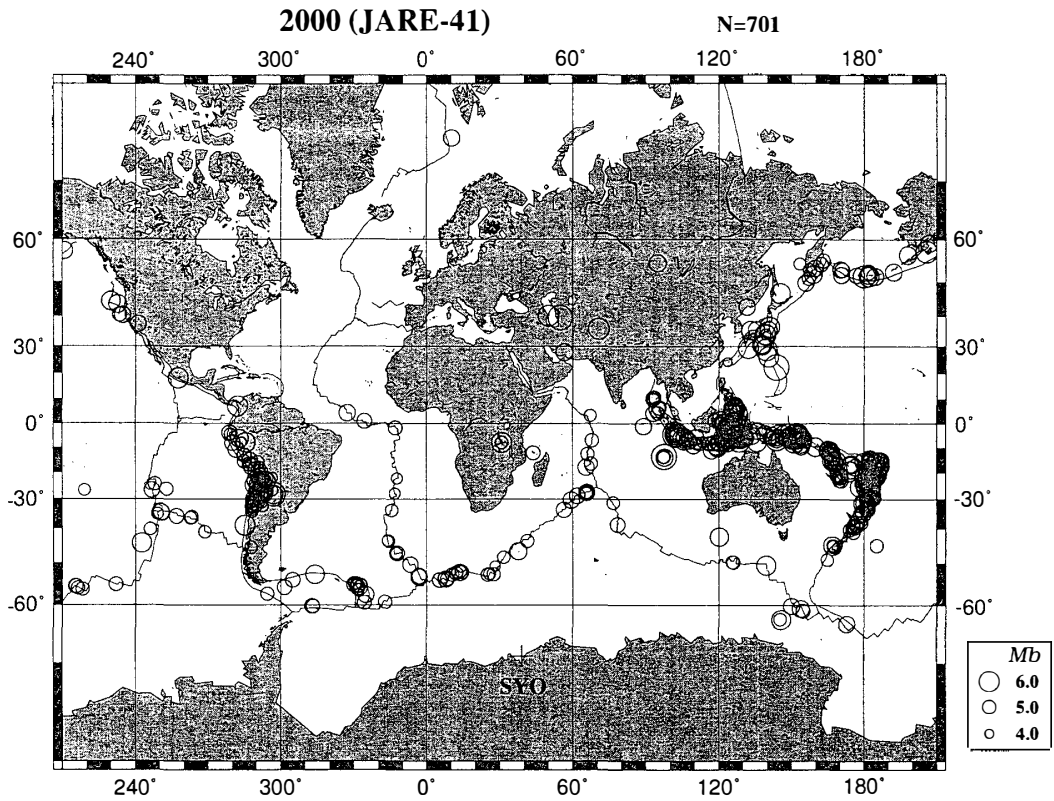


Fig. 6. Epicenters of the 701 earthquakes recorded at Syowa Station. The sizes of earthquake circles are proportional to the body-wave magnitude (M_b) determined by the National Earthquake Information Center (NEIC) (upper: Mercator Projection, lower: Azimuthal Equidistant Projection).

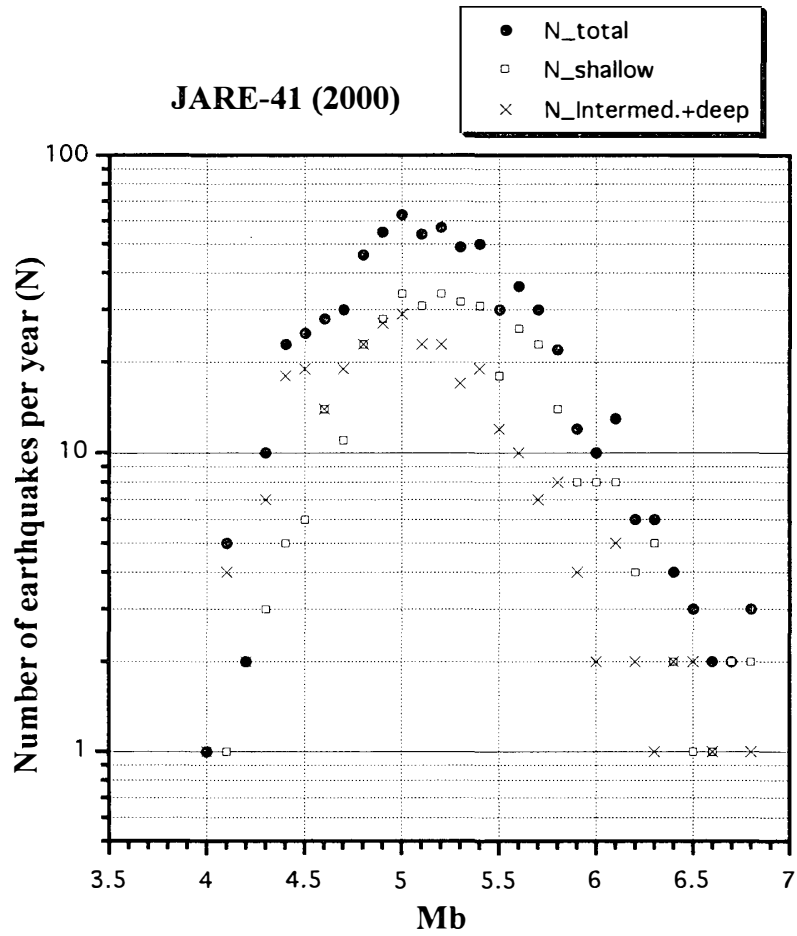


Fig. 7. Annual mean number of total detected earthquakes in 2000 against body-wave magnitude (Mb). The number of events for each group are marked with an increment of 0.1 Mb (solid circles (N-total), 701 total events; open squares (N-shallow), shallow events of focal depth less than 50 km; crosses (N-Intermed.+deep), intermediate depth and deep events of focal depth larger than 50 km).

Table 1. List of phase arrival-time data in 2000.

Date	Phase	UTC time		Remarks	Date	Phase	UTC time		Remarks		
		h	m	s			h	m	s		
Jan. 1	+ipz	0001	45.3			-exz	2157	25.9	#-21		
	+epz	0004	39.3			+epz	2258	24.8			
	+epz	0224	49.5			+epz	2345	14.6	#-22		
	-epz	0441	25.5	#-1	8	-ipz	0026	24.0			
	-epz	0606	14.4	#-2		-epz	0132	51.0	#-23		
	+epz	0632	28.6			-epz	0209	05.0	#-24		
	+epz	1510	07.0			-ePKPbc	0237	22.4	#-25		
	-epz	1605	01.2			-epz	0255	06.4			
	-epz	1612	55.6	#-3		+epz	0356	31.0	#-26		
	-epz	1807	13.2			+epz	0638	10.3	#-27		
	-epz	1940	34.5			-epz	1154	52.8	#-28		
	2	-epz	1121	42.4			-epz	1211	01.2	#-29	
		+epz	1131	14.1			-epz	1523	13.4		
		-epz	1217	41.0			+epz	1700	03.3	#-30	
+ipz		1226	33.6	#-4		+epz	1922	34.0			
+ePKPdf		1318	31.8	#-5		+epz	2223	07.5			
+epz		1529	14.9	#-6		+epz	2252	50.5			
4	esh	1539	54.0		9	+epz	1204	42.9			
	+epz	2014	04.3			+ipz	1458	27.1			
4	-epz	0655	57.4		-epz	2207	21.7	#-31			
	-epz	0926	57.6	#-7	10	+exz	1248	33.7	#-32		
5	+epz	0715	12.7	#-8		+epz	2026	20.4			
	-epz	0745	02.6	#-9	11	+epz	1156	54.7	#-33		
	-epz	0753	45.1	#-10		+epz	1511	48.5			
	-epz	0854	43.2	#-11		+epz	1803	46.6			
	+epz	0911	51.5	#-12		-epz	2039	54.4			
	-epz	1225	10.6	#-13		-epz	2355	35.4			
	-epz	1719	54.7	#-14		12	-epz	0120	30.1		
	-exz	1803	07.5	#-15			+epz	0332	35.6		
	-epz	1837	42.3	#-16		+ipz	0948	15.5			
	6	+epz	0443	52.1		#-17	-epz	1836	15.1		
		-epz	0804	26.0			13	-epz	1109	15.6	#-34
		-epz	0931	28.4				-epz	1215	50.9	#-35
		+epz	0941	38.6				+epz	1722	09.0	
		+epz	1955	14.2				+epz	2019	14.6	#-36
+ipz		2133	14.4			+epz		2105	14.2	#-37	
-epz	0119	14.4	#-18	-epz	2114	32.7		#-38			
7	+epz	0313	28.3	#-19	14	-epz	1149	56.0	#-39		
	+epz	0524	44.2			-ipz	1637	39.9			
	-epz	0617	29.0	#-20	15	+epz	0216	56.9	#-40		
	+epz	1135	18.5			+ipz	1301	19.4	#-41		
	+ipz	1237	45.2			+epz	2010	20.3			

Date	Phase	UTC time		Remarks	Date	Phase	UTC time		Remarks
		h	m	s			h	m	s
	+epz	2205	25.4	#-42		-epz	1740	25.7	#-66
16	-epz	0126	46.0			-epz	2200	49.5	
	+epz	0326	41.5		23	+epz	0212	06.4	
	+epz	0453	09.3			+epz	0314	03.4	
	-ipz	1512	32.8	#-43		+epz	0442	33.7	
	+epz	1712	21.3			-epz	0605	40.7	#-67
	-epz	1852	34.4			-epz	0620	28.3	#-68
	-epz	2332	44.2	#-44		-epz	0815	05.2	#-69
17	-epz	0017	03.6	#-45		-epz	0902	27.8	#-70
	+ipz	1339	21.9			-epz	1013	29.5	#-71
	+isz	1339	27.4			+epz	1732	42.9	
	+epz	1614	21.6	#-46		-epz	1832	27.6	#-72
	+epz	1806	51.7	#-47		+ipz	1950	43.4	
	-epz	1836	22.7	#-48	24	+epz	0017	53.3	
	+epz	1841	29.7	#-49		+ipz	0108	17.5	
	+epz	2131	13.3	#-50		-ish	0108	19.9	
18	-epz	0144	47.0	#-51		+epz	0645	15.5	
	-epz	0651	38.0	#-52		+epz	1112	54.1	
	+epz	0805	20.9			+epz	2154	42.7	
	-epz	1723	13.8	#-53		+epz	2221	06.5	
19	-epz	0033	32.0	#-54	25	+epz	1403	42.0	
	-epz	0047	36.4			+epz	1515	53.3	#-73
	-epz	0842	29.2	#-55	26	+epz	0245	10.8	#-74
	+epz	1407	25.8			+epz	1937	28.5	
	-ipz	1612	15.4			+epz	2259	49.2	
	-ipz	1612	20.5			-epz	2345	14.8	#-75
20	-epz	0111	28.7	#-56	27	-epz	0024	00.6	#-76
	+epz	0607	34.4	#-57		+epz	2128	34.5	
	+ePKPab	0633	33.1	#-58	28	+epz	1301	00.7	
	+epz	0757	31.3	#-59		-epz	1329	06.8	#-77
	+ePKPab	1001	53.9	#-60		+epz	1439	29.7	
	+epz	1439	47.5	#-61		-epz	1440	09.0	
	-epz	1831	33.9	#-62		+epz	1657	30.7	
	+epz	2002	34.8			+epz	1708	26.7	
	+ePKPbc	2020	33.9	#-63		+epz	1723	39.8	
21	+ipz	0124	04.3			+epz	2222	44.7	
	+ipz	0311	56.3			+epz	2254	10.0	#-78
	-epz	0509	42.0	#-64		+epz	2309	38.0	#-79
	+epz	0755	44.0		29	-epz	0306	59.7	#-80
	+ipz	1015	41.7		30	-epz	1231	11.1	
	+epz	2305	46.8			+ipz	1530	24.6	
22	-epz	0042	41.1	#-65		+epz	1754	01.0	

Date	Phase	UTC time		Remarks	Date	Phase	UTC time		Remarks
		h	m				h	m	
	-epz	1842	08.7	#-81		-epz	0841	56.7	
31	+epz	0211	14.8		18	+epz	0330	36.5	
	+epz	0854	15.8		19	+epz	1914	43.0	#-98
Feb. 1	+epz	1111	12.5			-epz	1951	05.8	#-99
	-ipz	1338	08.1			+epz	2339	10.7	
	+epz	2312	42.5		21	-epz	0049	29.5	#-100
2	-epz	0150	32.7			+epz	1000	47.9	
	-epz	0930	15.4			-exz	1447	32.9	#-101
	+epz	1256	27.5			+epz	2159	17.6	
3	+epz	1612	49.6	#-82		+epz	2237	34.5	
4	+epz	0811	32.3		23	+epz	0019	02.5	
	+epz	1156	10.2			-epz	0411	04.5	#-102
5	-epz	0122	33.5			+epz	0538	23.2	
6	-epz	0204	44.4			+ipz	1347	47.5	
	+epz	0619	14.5		24	+epz	1538	55.2	#-103
	esh	1157	53.6		25	-epz	0156	34.8	#-104
	-epz	1146	58.1	#-83		-epz	0516	14.6	#-105
	-epz	1204	15.6			+epz	0927	48.8	
	+epz	2302	39.5	#-84	26	+ipz	1351	09.5	
8	+epz	1813	46.7	#-85	28	-epz	0957	46.5	#-106
	-epz	2118	49.6			-epz	2227	19.4	#-107
	+epz	2351	11.7			-epz	2227	26.4	#-108
9	+ipz	0602	23.3	#-86	29	+ipz	0748	11.8	
	-epz	0945	40.1	#-87		+epz	1138	56.8	#-109
10	-epz	1426	50.6	#-88		+epz	1815	04.0	
	-epz	2309	07.5	#-89	Mar. 1	+epz	0137	17.6	
11	+epz	0303	31.2	#-90		-epz	0432	41.0	#-110
	+epz	0635	41.0			+epz	0458	09.6	#-111
	+epz	1216	39.4	#-91		+epz	0852	40.4	#-112
	-epz	2250	10.4	#-92	2	+epz	0938	45.1	
	+ipz	2338	33.8		3	+epz	1050	20.0	
12	-epz	0027	28.8			-ipz	2221	23.8	#-113
	-epz	1052	37.3	#-93		-epz	2235	34.6	#-114
	-epz	1642	28.0	#-94	4	+epz	0232	11.3	#-115
	-epz	1755	53.9			-epz	1421	13.8	#-116
13	-epz	0112	09.2	#-95	5	-epz	0953	37.9	#-117
	-epz	0317	51.2	#-96		+epz	2209	23.5	#-118
	-epz	1032	47.0		6	-epz	0004	25.5	#-119
	-epz	1832	47.0	#-97		+epz	0158	39.6	
14	+ipz	0740	49.8		7	-exz	0558	01.9	#-120
	+ipz	2156	10.2		8	-epz	2148	32.4	#-121
15	+epz	0233	31.8		10	-epz	0419	50.7	#-122

Date	Phase	UTC time		Remarks
		h	m s	
11	-epz	0428	11.0	#-123
12	+epz	0528	15.8	
	-epz	0851	58.2	#-124
	+epz	0954	39.9	
	+ipz	2210	20.9	
	+ish	2210	23.4	
13	+epz	0027	35.5	
	+epz	1712	17.5	
	+epz	1736	46.5	
14	+epz	0157	50.5	#-125
	+epz	0202	30.1	
	-epz	0226	47.0	
	-epz	0629	49.8	#-126
	-ipz	1850	36.8	
15	+epz	0645	50.7	#-127
	-epz	1221	13.8	#-128
16	+epz	1344	38.1	#-129
	+epz	1539	48.3	#-130
	-epz	1620	29.6	#-131
17	+epz	0707	32.3	#-132
	+epz	0755	17.2	
	-ixz	0755	21.0	
	+epz	0903	30.0	
	-epz	1155	19.0	#-133
	+epz	1430	12.4	
	-epz	2345	01.6	
18	+epz	0550	34.9	
	+epz	0855	20.2	
	-epz	2334	17.3	#-134
19	+epz	0707	32.3	
	+epz	1935	05.0	#-135
20	+exz	0853	02.0	#-136
21	+epz	0539	08.7	#-137
	-epz	1138	09.8	
	+epz	1353	54.9	
22	-epz	0110	24.5	
	+epz	0827	58.2	
	+epz	1343	02.3	
	+epz	1826	00.8	
	-epz	2345	01.6	#-138
23	-epz	1435	07.0	#-139
	-epz	2310	00.0	

Date	Phase	UTC time		Remarks
		h	m s	
24	+epz	0315	56.5	
	+epz	1704	57.5	
25	+epz	0813	15.6	
	+epz	1053	44.0	
	+epz	1606	57.5	
	-epz	1933	54.8	#-140
	-ipz	2310	00.0	#-141
26	+epz	0343	26.5	#-142
	-epz	1339	23.0	
	+epz	1436	57.0	
28	+epz	1115	07.5	#-143
	+epz	2350	18.2	
29	+epz	0011	12.0	
	+epz	0726	00.8	#-144
	+epz	0759	10.1	#-145
	+epz	1441	37.5	#-146
30	+epz	2109	44.7	#-147
31	+epz	0718	21.5	
Apr. 1	+epz	1006	42.1	#-148
	+epz	1222	41.1	#-149
	+epz	1225	20.0	#-150
	-epz	1627	31.7	#-151
2	+epz	0209	02.0	
	+epz	0448	38.4	
	+epz	0610	21.3	#-152
3	-epz	0907	26.7	#-153
	-epz	1532	56.6	#-154
	+ipz	1707	22.6	#-155
4	-ipz	0204	29.8	
	+ipz	0246	45.5	
	+epz	1949	24.6	
5	-epz	0946	04.7	#-156
7	+epz	0607	57.0	#-157
	-epz	1854	57.5	#-158
	-epz	1917	50.1	#-159
8	-epz	0818	35.4	
10	-epz	0702	33.4	#-160
11	-epz	0653	10.2	#-161
	-epz	1415	38.6	#-162
13	+epz	1510	07.2	
16	-epz	1338	37.9	#-163
17	+epz	0436	58.5	#-164

Date	Phase	UTC time		Remarks	Date	Phase	UTC time		Remarks
		h	m s				h	m s	
	esh	0446	38.5			+epz	0753	36.6	
	-epz	1808	10.6			-epz	0947	39.6	#-186
18	-epz	0016	46.2	#-165		-exz	1010	56.3	#-187
	-epz	1740	32.9	#-166	3	-epz	0302	57.0	#-188
	esh	1750	50.5			+epz	1551	53.3	
	+epz	1908	45.3	#-167		+epz	2307	24.5	
	-epz	1949	25.5		4	-epz	0433	58.5	#-189
19	-epz	1049	18.0			+epz	0503	32.4	#-190
	-epz	1306	44.0	#-168		+epz	0537	07.8	
	-epz	1937	55.8	#-169		-epz	2048	32.2	#-191
	+epz	2322	16.2	#-170		+epz	2135	34.2	
20	+epz	0035	54.7	#-171	5	+epz	0506	42.6	
	-epz	0057	39.8	#-172		+epz	1302	19.1	
	+epz	0555	13.1			+epz	1316	55.8	
	-epz	0803	07.1	#-173		+epz	2108	19.0	
	+epz	1509	20.9		6	+epz	0419	22.0	
21	+exz	0455	05.6	#-174		+epz	1357	20.5	#-192
	+epz	0805	15.1		7	-epz	0721	36.8	
	-exz	1121	35.4	#-175		+epz	0900	47.8	#-193
22	-epz	2147	35.8	#-176		+epz	1232	43.6	
	-epz	2148	07.3			+epz	1733	46.7	#-194
23	-epz	0937	23.2	#-177		+epz	2052	15.3	
	+epz	1711	18.5	#-178		+epz	2302	11.1	
25	-epz	0035	47.8	#-179	8	+ipz	0933	50.0	
	-epz	0436	24.3	#-180		+epz	1040	44.5	#-195
	+epz	0605	18.5			+epz	1231	16.0	
	+epz	0927	26.6			+epz	1357	20.5	
26	+epz	0020	00.0			+epz	2146	48.4	#-196
	-epz	1505	39.6	#-181	9	-epz	0057	01.9	#-197
	+epz	2201	18.8			+epz	0802	21.0	
27	+ipz	0925	14.7	#-182	10	-epz	0028	33.6	#-198
	+epz	0943	33.0			+epz	0256	08.6	
29	-ipz	0252	04.0			-epz	0322	55.0	
	+epz	2005	23.1	#-183		-epz	0740	03.7	#-199
	+epz	2246	22.3			+epz	1101	06.1	#-200
30	+epz	0031	20.5		11	+epz	1415	41.2	
	-epz	0542	37.9	#-184		+epz	2209	56.8	
	+ipz	0650	11.8		12	-ipz	1854	28.1	#-201
	-ipz	0656	49.4			-exz	2324	38.0	#-202
	-epz	2121	49.7	#-185	13	+epz	0724	27.6	
May 1	+epz	2122	20.8		14	-epz	1100	22.8	#-203
2	+epz	0146	32.8			+epz	1116	08.0	

Date	Phase	UTC time h m s		Remarks
	esh	1116	14.1	
	-epz	1322	26.0	#-204
	+ipz	1457	29.5	
	+epz	1600	29.0	
	-epz	2021	00.4	#-205
	+epz	2113	33.4	#-206
15	-ipz	0153	02.8	
	+epz	0233	39.3	#-207
	+epz	0953	41.7	
16	-epz	0714	02.6	#-208
18	+epz	2315	36.0	
19	+ipz	0459	11.9	
	+epz	0845	15.8	
	+ipz	1102	10.2	
	+epz	1625	48.5	
	-exz	2054	42.6	#-209
20	-epz	0957	20.4	#-210
	-epz	1011	03.9	#-211
21	+exz	0308	33.8	#-212
22	+epz	1135	26.0	
	-epz	1328	37.4	#-213
23	+epz	1103	34.0	#-214
	+epz	1617	08.3	#-215
24	+exz	1601	34.4	#-216
	-exz	1759	21.4	#-217
25	+epz	0914	17.4	
	+epz	2342	45.5	
27	-epz	0056	56.6	#-218
28	-epz	0115	18.6	
	+epz	0815	16.0	
	+epz	2109	30.0	#-219
29	+epz	1704	05.0	
30	-epz	0647	05.0	#-220
	+epz	1539	14.4	
31	-epz	0335	38.0	#-221
	+epz	1227	49.8	
Jun. 1	+epz	0649	34.0	
	+epz	1214	12.5	
	+ipz	1702	58.1	
2	+epz	0318	55.7	
	-exz	1133	43.2	#-222
	+epz	2034	28.9	

Date	Phase	UTC time h m s		Remarks
3	+ipz	0137	22.1	
	-exz	0414	19.5	#-223
	-exz	0913	46.0	#-224
	+epz	1742	31.4	
	-epz	1857	31.8	#-225
	+ipz	1943	56.3	
	+epz	2022	28.0	
	+epz	2044	05.6	
4	+ixz	1640	14.9	#-226
	+ipz	1842	51.9	
5	+ipz	0609	31.8	
	+ipz	2101	33.4	
6	-exz	0007	44.6	#-227
	+epz	0248	47.8	#-228
	-epz	1009	50.4	#-229
7	+ipz	0242	27.3	
	-epz	2357	10.1	#-230
9	+epz	0137	40.7	#-231
	+epz	0140	26.8	#-232
	-epz	0217	58.3	#-233
	+epz	0547	32.9	#-234
	-epz	0639	08.4	#-235
	+epz	0812	03.5	#-236
	+epz	2126	46.1	
	+epz	2218	51.8	#-237
	+ixz	2253	11.3	#-238
	+ixz	2349	41.5	#-239
10	+epz	0216	47.7	#-240
	+epz	0236	33.1	
	+epz	0902	48.6	#-241
	+exz	1425	12.4	#-242
11	+ixz	0341	31.0	#-243
	-epz	1203	47.0	#-244
14	+epz	0028	27.0	
	+epz	0226	38.5	#-245
	+ipz	0330	29.5	#-246
	+epz	1014	31.8	#-247
	-epz	1713	55.6	#-248
	-epz	2314	03.2	#-249
15	-exz	1129	33.4	#-250
	-ipz	1429	52.3	
	+epz	1924	43.5	

Date	Phase	UTC time h m s	Remarks	Date	Phase	UTC time h m s	Remarks
	+epz	2252 10.3			+epz	0708 41.5	#-264
16	+epz	0121 14.5	#-251	7	+epz	0337 48.1	
17	+epz	2316 43.0			+epz	0537 35.5	#-265
18	-epz	1454 57.6	#-252		-exz	1606 31.2	#-266
19	+epz	0108 57.0		8	+epz	0504 36.7	#-267
	+epz	0343 48.1	#-253		+epz	1229 40.0	
	+ipz	0547 49.8			+epz	1356 14.9	
	-ipz	1449 16.3			-isz	1356 32.8	
	+ipz	1930 33.7			+epz	1916 43.4	
20	-epz	0623 23.5	#-254		+epz	2041 22.8	
	-epz	1144 44.9	#-255		+isz	2041 34.2	
	+epz	2315 42.0		10	+epz	0402 49.7	
24	+epz	1558 16.6			+exz	1016 50.4	#-268
26	+epz	1235 53.1			-epz	1020 01.1	
	+epz	1842 46.6			-epz	1051 19.6	#-269
	-epz	2302 22.9	#-256		+epz	2237 47.5	
27	+epz	1148 34.4	#-257	11	+epz	0152 26.0	#-270
	+epz	1616 28.4			+epz	1617 04.7	#-271
	+epz	1639 44.9			-epz	2341 14.3	#-272
	+epz	2142 15.0		12	-epz	0122 26.8	#-273
28	+epz	1034 41.0			+exz	0537 34.6	#-274
	+epz	2253 29.5			+epz	0635 57.6	
29	+epz	0506 42.2			-epz	1349 10.0	#-275
	+epz	1635 01.5	#-258		+ipz	2212 39.0	
	-epz	2109 44.6	#-259		+epz	2212 46.1	
30	+epz	1844 23.5		13	-epz	0419 04.3	#-276
	+ipz	2034 55.0			-epz	0537 34.0	#-277
	+epz	2214 50.5			-epz	0635 57.4	#-278
Jul. 1	+epz	0010 44.5			+epz	0720 37.0	
	+epz	0053 42.4			-epz	1609 58.2	
	-epz	0459 53.9	#-260	14	+epz	0203 06.8	
	esh	0508 58.8			-epz	1944 18.7	#-279
	+epz	0624 14.2		15	-epz	0402 51.9	#-280
	-exz	0720 55.4	#-261		+epz	0725 47.7	#-281
3	+epz	0648 01.8			esh	0735 44.6	
	+epz	1610 37.7			+epz	1030 29.7	#-282
4	+ipz	2219 18.3		16	+epz	0146 48.9	#-283
5	-epz	0021 44.9	#-262		+epz	0410 46.7	#-284
	+epz	0552 03.8			-exz	1151 18.3	#-285
	+ipz	0644 22.7			-epz	1738 23.1	#-286
	+epz	2312 08.5		17	+epz	0050 30.3	
6	-exz	0635 20.0	#-263		+ipz	0236 01.8	

Date	Phase	UTC time		Remarks
		h	m s	
	+epz	0805	24.1	
	+epz	1645	42.0	
18	+epz	0516	39.0	
	+epz	0641	19.0	
19	-epz	0129	09.2	#-287
	-epz	0452	31.8	
	-epz	1653	47.9	
20	+epz	0056	29.4	
	+epz	1245	01.4	
	+epz	1325	06.2	#-288
	-exz	1858	18.5	#-289
21	-epz	0229	42.3	#-290
	-epz	0632	31.5	#-291
	-epz	1151	18.3	
	+epz	2158	47.1	
	-epz	2218	22.8	#-292
22	-epz	0920	05.1	#-293
23	-epz	1923	11.7	
	-epz	2112	00.5	
24	-epz	0950	06.7	#-294
	-epz	1229	07.0	#-295
	+epz	1557	57.8	#-296
25	+epz	0006	14.1	
	+epz	0319	53.8	#-297
26	+epz	0056	50.5	
	+epz	0722	30.0	
27	-epz	1104	01.0	#-298
	+epz	1400	26.5	
28	+epz	0553	30.1	#-299
	-epz	1251	32.4	#-300
29	+exz	1014	50.3	#-301
	-epz	1205	35.4	#-302
30	-epz	0009	17.7	#-303
	+epz	0616	37.3	#-304
	-exz	1244	46.0	#-305
31	+epz	1212	09.3	#-306
	+epz	2257	23.4	#-307
	-epz	2313	51.2	#-308
Aug. 1	+epz	0202	31.9	
	+epz	0607	46.3	#-309
	+exz	0934	30.6	#-310
	+epz	1031	15.5	#-311

Date	Phase	UTC time		Remarks
		h	m s	
	+epz	1106	19.9	#-312
	+epz	1829	53.3	#-313
	-epz	1901	55.0	#-314
2	+epz	0412	24.9	
	+epz	1054	15.0	
	-epz	1305	03.9	
	+epz	2246	51.2	
3	-epz	0122	38.6	#-315
	+epz	0905	55.4	#-316
	-epz	1130	47.0	#-317
	-epz	1934	24.4	#-318
	-epz	2130	53.8	#-319
	+epz	2148	28.6	
	-epz	2309	04.3	#-320
4	-epz	0220	01.5	#-321
	+epz	0318	56.8	#-322
	+epz	0321	49.3	#-323
	+epz	0517	31.6	#-324
	+epz	0800	27.0	#-325
	+epz	0921	20.0	
	+epz	1655	11.7	
	+epz	2116	04.5	
	-epz	2346	02.8	#-326
5	-epz	0307	14.9	#-327
	+epz	0515	21.0	#-328
	+epz	0626	06.5	#-329
	-epz	0842	27.4	#-330
	+epz	1917	23.7	
	+epz	1955	24.6	#-331
	esh	2005	28.8	
6	+exz	0745	16.6	#-332
	+epz	0940	26.4	
	+epz	1651	35.5	
	-epz	1801	06.8	#-333
	+ipz	2057	30.7	
	-epz	2338	16.8	#-334
7	-epz	0352	21.5	#-335
	-epz	1445	06.6	#-336
	esh	1454	23.5	
	+epz	1542	51.8	#-337
8	-epz	0140	24.8	#-338
	+epz	1042	06.5	#-339

Date	Phase	UTC time		Remarks	Date	Phase	UTC time		Remarks
		h	m s				h	m s	
	+epz	1815	37.7	#-340		+epz	2226	53.0	
	-ipz	1854	42.8		20	-epz	0808	56.7	#-361
9	-epz	0021	28.6	#-341		-epz	2251	10.8	#-362
	esh	0032	11.8		21	-epz	0021	25.2	
	+epz	0450	06.0	#-342		+epz	0924	05.4	#-363
	+exz	1200	41.2	#-343		+epz	1604	02.8	#-364
	+epz	1235	44.5			-epz	1927	24.8	
	-epz	2308	48.4	#-344	22	-epz	1404	34.9	#-365
10	+epz	2350	21.1			+epz	2050	09.0	
11	+epz	0811	20.0			+epz	2106	03.2	#-366
	-epz	1655	29.6		23	-epz	0119	54.4	
12	+epz	0633	38.0	#-345		+epz	1627	01.4	#-367
	-epz	1039	11.2	#-346	24	-ipz	0006	35.3	
	+epz	1130	13.0			+epz	1126	37.3	#-368
	+epz	1250	30.1			-epz	1148	24.7	#-369
	+epz	1646	46.2			+epz	1620	09.3	
	-ipz	2311	17.8	#-347	25	+epz	0654	42.5	#-370
13	+epz	0950	29.5	#-348		+ipz	1206	03.9	
	+epz	1818	22.0		26	+epz	0628	04.8	#-371
	+epz	1910	02.2			-epz	0922	52.4	
14	+epz	0114	45.5			+epz	1645	07.4	
	-epz	0218	30.2		27	+epz	1020	23.2	
	+epz	2224	15.2	#-349	28	-epz	0350	08.1	#-372
15	-epz	0331	18.4	#-350		+ipz	0504	24.5	
	+epz	0416	47.0	#-351		-epz	1011	04.0	#-373
	-epz	0441	14.0	#-352		-epz	1518	24.3	#-374
	esh	0450	21.7			+epz	1550	47.3	#-375
	-epz	1744	39.4			-epz	1941	59.1	#-376
16	+epz	0334	54.7			esh	1952	39.4	
	-epz	2224	56.0			-ipz	2031	53.8	#-377
17	+epz	0017	06.8	#-353	29	+epz	0644	25.2	#-378
	-epz	0317	02.8	#-354		+ipz	1908	14.3	#-379
	+epz	1413	04.1	#-355	30	-exz	0111	13.7	#-380
	-epz	1852	32.9	#-356		-epz	0552	27.9	#-381
18	-epz	0012	52.3			+exz	1315	15.0	#-382
	-epz	0211	21.3			+epz	1527	02.3	#-383
	+epz	0745	53.6		31	-epz	0717	35.2	
	+epz	1333	00.2	#-357	Sep. 2	+epz	0038	31.5	#-384
19	-epz	0719	04.8	#-358		+epz	0314	29.0	
	-epz	0931	10.5	#-359		-epz	1031	07.2	#-385
	+epz	1821	49.9	#-360		+epz	1641	29.5	
	+epz	2105	22.9			-epz	1713	55.0	#-386

Date	Phase	UTC time		Remarks	Date	Phase	UTC time		Remarks
		h	m s				h	m s	
	+epz	1954	47.6	#-387		+epz	1730	50.1	#-416
3	-epz	0619	50.0			esh	1741	43.4	
	-epz	0651	17.3	#-388		+ipz	1955	00.0	#-417
	-exz	0833	22.0	#-389	12	+epz	1639	04.0	#-418
	esh	0843	31.0			+ipz	1754	04.3	
	+epz	1532	05.4			+ipz	1934	42.8	
	+epz	1653	31.8	#-390	13	+ipz	0025	04.3	#-419
	+ipz	1957	09.2			+epz	0221	13.2	
4	-epz	1738	19.5	#-391		+epz	0256	22.6	
5	-epz	0032	26.7	#-392		-epz	2238	57.4	
	+epz	0035	14.0	#-393	14	+epz	1458	57.5	
	+ipz	0309	34.6	#-394		+epz	1512	58.0	#-420
	+epz	0855	38.0	#-395		-exz	2225	38.2	#-421
	+epz	1556	11.0	#-396	15	+epz	0642	13.9	#-422
	+epz	1808	13.9	#-397		+epz	2044	46.0	
	-epz	1844	42.8	#-398	16	+epz	0208	39.8	
	-epz	2236	30.5			+epz	0712	11.6	
6	-epz	2024	44.5	#-399		+epz	1115	45.0	#-423
7	+epz	0234	04.8	#-400		-epz	1610	24.0	
	+epz	1110	26.2	#-401		-epz	1738	12.5	#-424
	-ipz	1306	20.9	#-402	17	+epz	0448	35.1	
	+epz	1342	20.1			-exz	2309	59.9	#-425
	+epz	2359	38.4		18	+epz	0252	20.6	
8	+epz	0029	51.0			+epz	0340	45.5	
	-epz	0117	42.9	#-403		-epz	1140	50.7	#-426
	+epz	0140	44.8			+epz	2132	29.9	
	+epz	0759	15.4	#-404	19	-epz	1126	32.9	#-427
	+epz	1039	49.9	#-405		+epz	2234	59.8	#-428
9	+epz	0614	02.0	#-406	20	+epz	0250	30.0	
	+epz	0742	49.6			-epz	0728	26.8	#-429
	+epz	1013	06.5	#-407		+epz	1819	23.3	
	+epz	1229	34.0	#-408		+epz	2151	24.5	
	-epz	1443	46.6		21	-epz	1149	28.9	
	-epz	1508	00.3			+epz	1332	43.5	
10	+epz	0204	29.1			+epz	1444	16.3	#-430
	+ipz	1023	41.4	#-409		esh	1453	21.5	
	+exz	1721	13.8	#-410		-epz	1755	21.2	#-431
	+epz	1919	06.7	#-411	22	+epz	0525	15.7	#-432
	-epz	1957	55.9	#-412		+epz	0747	27.0	#-433
	+epz	2055	31.6	#-413		-epz	0806	44.0	#-434
	+exz	2149	32.0	#-414		-epz	1334	10.8	#-435
11	-epz	1009	16.1	#-415		-epz	1833	45.8	#-436

Date	Phase	UTC time		Remarks	Date	Phase	UTC time		Remarks
		h	m s				h	m s	
23	+epz	0230	33.5	#-437		+epz	1815	09.7	#-463
	+ipz	0836	36.0			-epz	2036	05.0	#-464
	-epz	1505	38.9		4	-epz	0342	36.5	
	-epz	1653	14.7	#-438		-epz	0408	46.3	#-465
	+epz	1957	38.9	#-439		-epz	0551	46.4	
	+ixz	2343	14.6			-epz	1400	32.0	#-466
24	+epz	0106	56.6	#-440		-epz	1711	32.5	#-467
	+epz	1537	02.6	#-441		esh	1722	06.5	
	+epz	1905	06.5			-epz	2101	14.4	#-468
25	-epz	0405	39.7	#-442	5	+epz	0327	39.6	
	+epz	1353	20.8	#-443		+epz	1314	49.5	
	+ipz	1859	02.5			-epz	2019	29.3	#-469
	-epz	1925	29.4			-epz	2124	04.4	#-470
26	-epz	0303	54.6		6	+epz	0449	16.9	#-471
	+epz	0539	53.4			-epz	1300	27.9	
	-epz	0630	49.0	#-444		-epz	1313	13.0	#-472
	+epz	0723	25.5	#-445		+epz	1604	26.4	
	+epz	1226	04.2	#-446		+epz	1810	48.8	
	-epz	1702	18.8	#-447	7	+ipz	0017	52.7	
	-epz	2026	43.3			+epz	0149	22.5	#-473
27	-epz	0515	05.6	#-448		+epz	0728	24.9	#-474
	+exz	1340	14.5	#-449		+epz	1104	01.7	#-475
28	+epz	0753	32.4			-epz	1209	31.8	#-476
	+epz	1245	30.8			+epz	1244	47.6	
	+epz	1512	43.5	#-450		-epz	1313	49.2	#-477
	+epz	1808	50.0	#-451		+epz	2243	17.9	#-478
29	+epz	0106	51.3	#-452	8	+epz	1439	16.8	
	+epz	1140	44.4	#-453		-epz	1800	38.9	#-479
	+epz	1612	29.6		9	+epz	0151	43.7	#-480
	+epz	1707	47.8	#-454		-epz	0526	02.5	#-481
	+epz	1722	58.1	#-455		+epz	1304	49.0	#-482
30	+epz	0509	26.3			+epz	1458	25.8	
	+epz	1000	43.8	#-456	10	+epz	0427	30.3	
Oct. 1	+epz	0213	03.4			-epz	0536	12.4	#-483
	-epz	0815	50.4	#-457		-epz	1129	25.6	#-484
	+epz	1916	03.2	#-458	11	+epz	0425	26.1	#-485
2	-epz	0235	45.2	#-459		+epz	0447	11.6	#-486
	-ipz	0342	37.2	#-460		+epz	0822	53.6	
	-epz	1246	13.8			+ipz	2032	29.3	
	-epz	1352	21.3	#-461	12	-epz	0235	07.6	#-487
3	+ipz	0702	17.8			-epz	0454	36.0	#-488
	+epz	1259	30.0	#-462		+epz	0931	03.6	#-489

Date	Phase	UTC time		Remarks	Date	Phase	UTC time		Remarks
		h	m s				h	m s	
	+epz	1013	22.0	#-490		+epz	1911	55.2	#-519
	+epz	2023	23.8		26	-epz	0907	15.3	#-520
	+epz	2102	46.1	#-491		-epz	1420	15.3	#-521
13	-epz	1712	15.7			-epz	2122	15.0	#-522
	+epz	1908	20.3			+epz	2256	16.8	#-523
14	+epz	0444	51.9	#-492	27	-epz	0027	58.9	#-524
	+epz	1526	44.0	#-493		-epz	0439	52.9	#-525
	+epz	1718	40.2	#-494	28	+epz	0439	49.3	
	esh	1728	24.4			-epz	1458	32.5	#-526
	-epz	2045	50.4	#-495	29	+epz	0850	07.6	#-527
	-epz	2213	13.2	#-496		+exz	1343	32.7	#-528
	-epz	2327	35.7	#-497	30	+exz	0115	55.6	#-529
15	+epz	0527	19.3			+epz	1213	22.0	#-530
	-epz	1435	55.6		31	+epz	1010	31.2	#-531
	-epz	1819	38.6	#-498		-epz	1822	30.2	#-532
16	-epz	2227	40.0	#-499		-epz	1856	15.2	#-533
17	-epz	1044	44.5	#-500	Nov. 1	+epz	0103	34.3	#-534
	+epz	1201	56.7	#-501		-epz	0440	33.2	#-535
18	-epz	1649	24.8	#-502		-epz	1045	58.7	#-536
	-epz	2342	28.8	#-503		-epz	1220	01.3	#-537
19	+epz	0943	30.8			+epz	1801	19.4	
	-epz	1741	14.7	#-504		-epz	1839	32.8	#-538
	+epz	2156	16.8	#-505		+epz	2215	40.1	#-539
20	+epz	0537	44.1	#-506		+epz	2335	55.7	#-540
	-epz	0637	04.0		2	+epz	0731	55.6	#-541
21	+epz	0537	44.1	#-507		+epz	1245	38.0	
	+epz	0602	45.2	#-508		+epz	1453	45.5	
	+epz	1142	39.5	#-509		+epz	1502	35.5	
	-epz	1751	54.0	#-510		+epz	2344	42.4	
	+epz	1808	09.5		3	+epz	0632	12.0	#-542
23	+epz	2316	47.0	#-511		+epz	0840	45.5	
24	-ipz	0216	13.2	#-512		+ipz	2115	18.4	
	-epz	0337	40.9	#-513		-ipz	2335	33.4	
	-epz	0647	16.3	#-514	4	-epz	1251	45.1	#-543
	+epz	0724	03.0			+epz	1734	24.4	
	+epz	1121	30.5	#-515		+epz	1814	03.6	
	+ipz	2302	41.5		5	+epz	1259	48.5	#-544
25	-epz	0213	04.3			-ipz	2042	14.0	
	+epz	0538	15.6	#-516	6	+epz	0054	50.7	
	+epz	0944	04.0	#-517		+epz	0345	31.4	
	esh	0953	38.2		7	-exz	0025	37.4	#-545
	+epz	1754	03.7	#-518		-epz	0114	57.2	#-546

Date	Phase	UTC time		Remarks	Date	Phase	UTC time		Remarks
		h	m	s			h	m	s
	+epz	0544	09.2			+ipz	1248	24.5	#-570
	+epz	0742	08.5	#-547		+epz	1940	05.2	#-571
	-epz	0803	14.7	#-548		+epz	2001	49.1	
	+ipz	0833	33.5		16	+epz	0420	33.6	#-572
	+epz	1051	51.8	#-549		+exz	0508	16.0	#-573
8	+epz	0138	35.5			-epz	0653	31.0	#-574
	+epz	0718	17.7	#-550		-epz	0755	29.5	#-575
	-epz	1424	25.8			+epz	0907	40.0	#-576
	-epz	1554	31.4	#-551		-epz	0936	25.6	#-577
	-epz	1631	57.6			-epz	1118	52.0	#-578
	-epz	1740	05.0			+epz	1239	34.6	#-579
9	-epz	0159	58.0	#-552		+epz	1317	56.7	#-580
	+epz	0559	1.8	#-553		+epz	1336	09.0	#-581
	+epz	1002	13.5	#-554		+epz	1607	53.7	#-582
	+epz	1442	47.2			-epz	1719	21.2	#-583
	-epz	2127	10.3	#-555		+epz	1750	57.4	#-584
	-epz	2332	57.8			+epz	1943	24.2	
	-epz	2339	39.4			+epz	1951	14.0	
10	+epz	0421	06.6			-epz	2014	18.1	#-585
	-epz	2010	11.0	#-556		-epz	2317	16.9	#-586
	+epz	2044	29.2	#-557	17	-epz	0150	16.6	#-587
	-epz	2243	08.8			-epz	0207	15.6	#-588
11	+epz	0650	37.5			+epz	0436	03.5	#-589
	-epz	1114	32.7			-epz	0643	24.7	#-590
	+epz	2047	39.6			-ipz	1625	16.4	
12	-exz	0336	29.8	#-558		-epz	2026	17.5	#-591
	-exz	1159	17.6	#-559		+epz	2115	06.0	#-592
	+epz	1410	13.2	#-560	18	+epz	0219	01.4	#-593
13	+epz	0051	26.0	#-561		-epz	0342	51.3	#-594
	+epz	0110	52.4	#-562		-epz	0708	08.6	#-595
	-epz	0616	10.0	#-563		esh	0719	07.0	
	-epz	0659	19.6	#-564		-epz	1517	29.9	#-596
	+epz	0849	00.4			-epz	1604	53.1	#-597
	-epz	1111	10.7			+exz	1918	02.3	#-598
	-exz	1616	35.7	#-565		+epz	2318	51.7	#-599
	-epz	1702	06.0	#-566	19	-exz	0052	50.4	#-600
	+epz	1921	09.8			-epz	0258	35.1	#-601
	-exz	2359	02.7	#-567		esh	0309	33.2	
14	+epz	0551	34.8	#-568		-epz	0542	35.5	#-602
	+epz	1353	22.7			+exz	0548	27.4	#-603
	-epz	1736	38.1	#-569		-epz	1635	28.4	#-604
15	+epz	0909	39.4		20	+epz	0514	41.5	

Date	Phase	UTC time		Remarks	Date	Phase	UTC time		Remarks
		h	m	s			h	m	s
	-epz	0902	46.5	#-605		+ipz	1404	14.8	
	-epz	1403	27.5			+epz	2319	18.8	#-628
21	-exz	1746	48.7	#-606	30	-epz	0405	30.5	
	-exz	2134	18.6	#-607		+epz	1338	25.5	
22	+epz	0640	21.5	#-608		+ipz	1549	40.0	
	-epz	2347	52.3	#-609		+epz	2009	28.0	
23	+epz	0113	24.5		Dec. 1	+epz	2243	20.8	
	+epz	0203	36.0			-epz	0229	48.4	
	-epz	0509	50.1	#-610		+epz	0500	44.2	
	-epz	1856	30.1	#-611		+epz	0654	43.5	
	-epz	2323	49.7	#-612		+epz	0811	34.9	
24	+epz	0645	47.0	#-613		+epz	0913	27.7	#-629
	+epz	0703	09.8			+epz	1239	11.7	
	-epz	0840	41.8	#-614		+epz	1344	04.4	
	+epz	1037	28.7	#-615		-epz	1721	44.5	
	-ipz	1221	01.3			-epz	2308	48.7	#-630
	-epz	1318	12.8	#-616	2	+epz	0258	47.5	
	-epz	1739	55.3	#-617		-ipz	0310	26.5	
25	-epz	0224	12.4	#-618		-epz	0614	44.8	#-631
	+epz	0318	05.5	#-619		-epz	0720	04.9	
	+epz	0321	29.4	#-620		+epz	0913	35.3	#-632
	-epz	0330	11.5			-epz	1338	46.4	
	+epz	1108	34.4			+epz	2356	02.8	
	-epz	1211	36.5		3	+epz	1105	46.9	
	+epz	1227	26.0	#-621		+epz	1315	03.5	#-633
	+epz	1829	13.8	#-622		+ipz	2036	44.8	
26	+epz	0403	22.2		4	+epz	1029	13.4	
	+epz	0536	19.3	#-623		-epz	1037	16.0	#-634
	+exz	1153	25.0	#-624		-epz	1307	16.2	
	+epz	1432	17.2			-epz	2226	09.4	#-635
	+epz	1635	24.0		5	+epz	0043	18.6	
	+epz	2316	53.4	#-625		+epz	0220	40.5	#-636
27	+ipz	0810	25.0			+epz	1121	27.2	#-637
	-exz	1106	00.2	#-626		-epz	2231	42.0	#-638
	-epz	1721	39.2		6	-epz	0054	18.5	
	-epz	2312	41.3			+epz	0201	46.7	
28	+epz	0825	09.8			+epz	0330	47.5	
	+epz	1721	39.2			+epz	0610	07.8	
29	+epz	0723	13.1			-epz	0700	37.2	#-639
	+epz	1026	40.4			+epz	1505	22.2	
	+epz	1036	42.1	#-627		+epz	1725	31.9	#-640
	esh	1046	12.8			-epz	1804	33.5	

Date	Phase	UTC time h m s		Remarks	Date	Phase	UTC time h m s		Remarks
	-epz	2310	55.8	#-641		+epz	2135	05.5	
7	+epz	0212	07.9			+epz	2221	42.5	
	+ipz	0403	50.8			+epz	2350	03.8	#-659
	-epz	0645	47.0	#-642	14	-epz	0251	58.5	#-660
	-epz	0944	34.7	#-643		-epz	0723	38.2	
	+epz	1253	43.0			-epz	1713	09.2	#-661
	-epz	1512	41.8			+epz	2108	36.8	
	-epz	1926	48.3	#-644	15	+epz	1258	54.2	#-662
	-epz	2315	54.1	#-645		-epz	1308	01.4	#-663
	+epz	2331	36.4	#-646		+epz	2305	22.6	#-664
8	-epz	0018	19.6	#-647	16	+exz	1117	57.2	#-665
	+epz	0834	50.2			+epz	1243	08.8	
	+epz	0904	29.0			-exz	1633	02.7	#-666
	+epz	1714	40.3		17	-epz	0153	45.8	#-667
	-epz	1814	38.7	#-648		+epz	0743	27.8	#-668
9	+epz	0029	34.4			+epz	2237	01.4	#-669
	-epz	0230	21.6		18	-epz	0130	57.2	#-670
	+epz	0350	19.5			-epz	1152	43.0	#-671
	+epz	0428	16.0			+epz	2127	03.9	#-672
	-epz	0439	30.9			esh	2136	42.3	
	-epz	0749	54.8		20	-exz	0939	29.0	#-673
	-epz	1857	47.7			-epz	1040	03.0	#-674
	-epz	2350	13.0	#-649		+epz	1134	14.4	#-675
	esh	2359	50.5			-epz	1339	53.9	#-676
10	+epz	0331	04.2	#-650		-epz	1651	47.2	#-677
	+epz	1420	25.8			+ipz	2221	58.7	
	+epz	1911	16.2	#-651	21	-epz	0114	34.5	#-678
	+epz	2229	23.3			+epz	0253	56.5	#-679
11	+epz	0027	31.0	#-652		-epz	0318	04.5	#-680
	+epz	1310	39.1	#-653		+ipz	0423	48.5	
	-epz	1713	48.5	#-654		+epz	0704	19.6	
	-ipz	1838	30.5	#-655		+epz	2028	23.2	
12	-epz	1459	54.0			+ipz	2116	50.5	
	+epz	1512	37.0		22	+ipz	0111	24.8	
	-epz	1958	23.1			+ipz	1544	42.4	
	+epz	2318	01.6			+epz	1642	17.4	#-681
13	+epz	0324	07.0		23	-epz	0015	02.2	
	+epz	0623	36.0	#-656		+epz	0633	10.7	
	-epz	0659	19.1	#-657		+exz	0755	53.6	#-682
	-epz	0927	36.6			+ipz	1333	25.9	
	-ipz	1424	00.7			+epz	2128	08.4	
	+epz	1442	27.6	#-658		-ipz	2142	43.5	#-683

Date	Phase	UTC time h m s	Remarks
24	+epz	0033 32.5	
	+epz	0124 21.8	#-684
	-epz	0323 33.8	#-685
	-epz	0551 35.6	
	+epz	1004 14.0	
	+epz	1254 35.8	#-686
	+ipz	1506 03.2	
	+epz	1844 04.7	
25	-epz	0223 32.0	
	+epz	0502 53.8	
	-ipz	0523 31.1	#-687
	esh	0533 08.0	
	-epz	1129 03.7	#-688
	-epz	1333 01.0	#-689
	+epz	2312 45.2	#-690
26	+epz	0613 18.5	#-691
	-epz	1532 49.4	#-692
27	-epz	0242 49.6	#-693
	-epz	0739 47.3	#-694
28	+epz	0447 45.0	#-695
	-epz	1617 25.0	#-696
	+epz	1825 07.5	#-697
	-epz	2213 55.5	#-698
29	+epz	1536 50.5	
30	-epz	0755 24.7	#-699
31	-epz	0606 25.2	
	+ipz	0640 02.8	
	-exz	0716 01.7	#-700
	+epz	2207 52.8	#-701

Table 2. List of hypocenters of teleseismic events detected at Syowa Station. The total number of events is 701.

No.	Date	Origin time			Geographic Coordinates		Depth (km)	Epicentral distance (deg)	Magnitude		Region
		UTC			Latitude (deg)	Longitude (deg)			Mb	MsZ	
		h	m	s							
1	1 1	4	30	10.3	-26.012	-68.803	105	72.268	4.5	-	CHILE-ARGENTINA BORDER REGION
2	1 1	5	58	19.7	-60.722	153.670	10	42.260	5.6	5.6	WEST OF MACQUARIE ISLAND
3	1 1	16	1	13.5	-22.214	-70.191	67	76.253	4.4	-	NEAR COAST OF NORTHERN CHILE
4	1 2	12	14	39.0	-17.943	-178.476	582	89.106	5.0	-	FIJI ISLANDS REGION
5	1 2	12	58	42.3	51.447	-175.558	33	155.778	5.6	5.4	ANDREANOF ISLANDS, ALEUTIAN ISLAND
6	1 2	15	16	32.2	-20.771	-174.236	33	87.204	5.5	5.8	TONGA ISLANDS
7	1 4	9	14	51.3	-20.716	-177.613	336	86.595	5.0	-	FIJI ISLANDS REGION
8	1 5	7	2	29.0	-20.771	-174.214	33	87.208	5.0	5.1	TONGA ISLANDS
9	1 5	7	32	19.1	-20.964	-174.097	33	87.042	5.4	-	TONGA ISLANDS
10	1 5	7	40	40.7	-11.371	165.378	33	91.368	5.7	6.0	SANTA CRUZ ISLANDS
11	1 5	8	41	40.1	-11.462	165.413	33	91.292	5.1	-	SANTA CRUZ ISLANDS
12	1 5	8	58	59.7	-11.879	166.515	121	91.208	5.1	-	SANTA CRUZ ISLANDS
13	1 5	12	12	7.1	-11.513	165.477	33	91.262	5.2	5.0	SANTA CRUZ ISLANDS
14	1 5	17	6	51.2	-11.420	165.310	33	91.302	4.8	3.9	SANTA CRUZ ISLANDS
15	1 5	17	55	11.4	-56.103	-58.442	10	41.888	5.2	5.0	SCOTIA SEA
16	1 5	18	26	7.5	-9.195	109.592	33	74.350	5.5	5.5	SOUTH OF JAWA, INDONESIA
17	1 6	4	31	58.3	-8.293	116.071	33	77.465	4.9	-	SUMBAWA REGION, INDONESIA
18	1 7	1	8	19.2	-28.210	-67.351	144	69.758	4.8	-	LA RIOJA PROVINCE, ARGENTINA
19	1 7	3	7	24.6	-56.482	-28.152	184	31.589	4.5	-	SOUTH SANDWICH ISLANDS REGION
20	1 7	6	5	30.3	-22.056	-178.249	336	85.164	4.7	-	SOUTH OF FIJI ISLANDS
21	1 7	21	45	49.2	-20.820	-178.971	621	86.212	4.7	-	FIJI ISLANDS REGION
22	1 7	23	37	20.1	-54.326	-55.126	10	42.380	5.2	5.3	FALKLAND ISLANDS REGION
23	1 8	1	19	46.6	-9.805	159.811	33	91.198	5.8	6.4	SOLOMON ISLANDS
24	1 8	1	56	15.8	-14.942	166.846	33	88.385	5.2	-	VANUATU ISLANDS
25	1 8	2	17	31.4	40.503	-126.497	25	150.481	5.1	-	OFF COAST OF NORTHERN CALIFORNIA
26	1 8	3	44	54.3	-6.746	105.646	62	75.280	5.5	-	SUNDA STRAIT, INDONESIA
27	1 8	6	26	31.4	-11.398	116.998	33	74.918	5.4	4.9	SOUTH OF SUMBAWA, INDONESIA
28	1 8	11	43	58.1	-31.017	-71.339	73	68.420	4.4	-	NEAR COAST OF CENTRAL CHILE
29	1 8	11	59	21.8	-23.169	-70.122	36	75.340	5.8	5.9	NEAR COAST OF NORTHERN CHILE
30	1 8	16	47	20.5	-16.925	-174.248	183	90.949	6.5	6.6	TONGA ISLANDS
31	1 9	21	54	40.4	-18.823	174.370	33	86.630	5.6	6.4	FIJI ISLANDS REGION
32	1 10	12	35	23.8	-16.880	-174.271	33	90.989	4.4	-	TONGA ISLANDS
33	1 11	11	44	21.7	-22.815	-175.331	33	85.005	4.9	-	TONGA ISLANDS REGION
34	1 13	10	59	46.8	-45.786	-72.277	33	55.075	4.8	-	SOUTHERN CHILE
35	1 13	12	2	53.2	-5.410	153.920	171	93.464	4.4	-	NEW IRELAND REGION, P.N.G.
36	1 13	20	7	14.4	-17.610	-178.742	535	89.373	5.4	-	FIJI ISLANDS REGION
37	1 13	20	53	23.6	-18.759	-177.705	574	88.476	4.6	-	FIJI ISLANDS REGION
38	1 13	21	9	51.1	-52.244	13.789	10	20.754	4.7	-	SOUTHWEST OF AFRICA

39	1	14	11	37	2.0	-7.978	-76.173	118	91.519	4.3	-	NORTHERN PERU
40	1	15	2	4	0.8	-6.345	148.430	72	90.758	5.5	5.3	NEW BRITAIN REGION, P.N.G.
41	1	15	12	49	45.0	-21.216	-179.255	633	85.768	5.4	-	FIJI ISLANDS REGION
42	1	15	21	53	27.1	-28.598	-177.432	54	78.974	4.3	-	KERMADEC ISLANDS REGION
43	1	16	15	0	40.8	-30.238	-178.133	33	77.245	5.5	5.5	KERMADEC ISLANDS, NEW ZEALAND
44	1	16	23	19	42.6	-11.656	166.317	40	91.365	5.4	5.4	SANTA CRUZ ISLANDS
45	1	17	0	4	0.5	-11.593	166.301	33	91.420	5.1	5.5	SANTA CRUZ ISLANDS
46	1	17	16	3	6.1	-27.269	-70.937	84	71.780	4.3	-	NEAR COAST OF NORTHERN CHILE
47	1	17	17	53	43.4	-14.613	-177.525	33	92.537	4.9	4.9	FIJI ISLANDS REGION
48	1	17	18	23	18.5	-5.371	154.172	114	93.583	4.8	-	SOLOMON ISLANDS
49	1	17	18	28	24.4	-5.334	154.070	100	93.584	4.9	-	SOLOMON ISLANDS
50	1	17	21	18	4.9	-14.512	-177.596	33	92.620	5.6	5.7	FIJI ISLANDS REGION
51	1	18	1	31	36.1	-14.319	-177.675	33	92.791	4.9	5.1	FIJI ISLANDS REGION
52	1	18	6	38	36.5	-5.396	154.078	133	93.528	4.8	-	SOLOMON ISLANDS
53	1	18	17	12	18.3	-31.630	-71.451	42	67.885	4.9	4.4	NEAR COAST OF CENTRAL CHILE
54	1	19	0	21	28.3	-18.200	-178.307	461	88.893	4.6	-	FIJI ISLANDS REGION
55	1	19	8	30	1.0	-15.616	-75.132	33	84.011	5.0	4.9	NEAR COAST OF PERU
56	1	20	0	59	23.7	-28.227	-176.563	33	79.502	5.4	5.5	KERMADEC ISLANDS REGION
57	1	20	5	54	34.2	-6.261	147.555	33	90.539	5.2	4.8	EASTERN NEW GUINEA REG., P.N.G.
58	1	20	6	13	2.6	56.618	-161.869	221	164.304	5.7	-	ALASKA PENINSULA
59	1	20	7	46	54.4	-32.907	-70.119	110	66.287	4.4	-	CHILE-ARGENTINA BORDER REGION
60	1	20	9	41	47.3	43.649	-127.257	10	153.675	5.7	5.6	OFF COAST OF OREGON
61	1	20	14	26	43.9	-5.333	153.980	120	93.555	4.6	-	NEW IRELAND REGION, P.N.G.
62	1	20	18	18	54.9	-17.577	167.811	33	86.138	5.0	-	VANUATU ISLANDS
63	1	20	20	0	41.7	51.711	176.912	51	153.520	5.3	4.9	RAT ISLANDS, ALEUTIAN ISLANDS
64	1	21	5	4	10.6	-59.287	-17.224	10	25.604	5.0	-	EAST OF SOUTH SANDWICH ISLANDS
65	1	22	0	29	34.7	-6.251	152.048	35	92.059	5.1	4.6	NEW BRITAIN REGION, P.N.G.
66	1	22	17	28	28.4	-17.632	-178.351	550	89.434	4.3	-	FIJI ISLANDS REGION
67	1	23	5	53	43.7	-28.314	-176.663	80	79.399	4.8	-	KERMADEC ISLANDS REGION
68	1	23	6	8	24.9	-7.967	120.613	47	79.389	5.7	5.2	FLORES SEA
69	1	23	8	3	1.2	-7.973	120.646	46	79.395	5.7	5.6	FLORES SEA
70	1	23	8	42	24.0	57.527	-149.111	10	167.847	5.6	5.0	GULF OF ALASKA
71	1	23	10	0	33.3	-4.965	151.224	157	92.988	5.0	-	NEW BRITAIN REGION, P.N.G.
72	1	23	18	21	1.4	-24.900	179.561	514	81.949	5.1	-	SOUTH OF FIJI ISLANDS
73	1	25	15	4	18.1	-20.964	-179.054	633	86.055	4.8	-	FIJI ISLANDS REGION
74	1	26	2	33	41.8	-22.648	-68.391	112	75.263	4.4	-	NORTHERN CHILE
75	1	26	23	34	4.5	-23.722	-66.477	222	73.634	5.0	-	JUJUY PROVINCE, ARGENTINA
76	1	27	0	13	7.5	-31.131	-68.228	26	67.335	4.8	4.5	SAN JUAN PROVINCE, ARGENTINA
77	1	28	13	17	52.8	-7.485	122.678	575	80.577	5.2	-	FLORES SEA
78	1	28	22	42	26.2	-1.347	89.083	10	75.181	5.4	5.2	SOUTH INDIAN OCEAN
79	1	28	22	57	51.7	-9.691	118.764	83	77.130	5.4	-	SUMBAWA REGION, INDONESIA
80	1	29	2	53	54.8	4.857	126.259	100	93.301	5.1	-	TALAUD ISLANDS, INDONESIA
81	1	30	18	31	19.8	-30.616	-71.619	65	68.879	4.8	-	NEAR COAST OF CENTRAL CHILE

82	2	3	15	53	12.9	75.271	10.195	10	145.232	5.5	5.0	SVALBARD REGION
83	2	6	11	33	52.2	-5.844	150.876	33	92.050	6.6	6.8	NEW BRITAIN REGION, P.N.G.
84	2	6	22	51	58.5	-31.618	-68.667	117	67.024	4.0	-	SAN JUAN PROVINCE, ARGENTINA
85	2	8	18	1	27.1	-21.936	170.068	33	82.570	5.1	5.1	SOUTHEAST OF LOYALTY ISLANDS
86	2	9	5	52	10.3	-27.094	-63.317	567	69.461	4.4	-	SANTIAGO DEL ESTERO PROV., ARG.
87	2	9	9	33	54.0	-30.105	-178.113	57	77.378	5.0	-	KERMADEC ISLANDS, NEW ZEALAND
88	2	10	14	18	41.2	-27.585	65.728	10	44.210	5.4	5.2	INDIAN OCEAN TRIPLE JUNCTION
89	2	10	23	0	57.5	-27.582	65.781	10	44.223	5.5	5.1	INDIAN OCEAN TRIPLE JUNCTION
90	2	11	2	55	25.0	-27.913	65.713	10	43.889	4.7	-	INDIAN OCEAN TRIPLE JUNCTION
91	2	11	12	5	2.4	-35.123	-110.964	10	73.914	4.6	4.7	SOUTHERN EAST PACIFIC RISE
92	2	11	22	41	59.5	-27.643	65.683	10	44.144	4.8	-	INDIAN OCEAN TRIPLE JUNCTION
93	2	12	10	39	54.5	-15.893	-174.803	227	91.847	5.2	4.9	TONGA ISLANDS
94	2	12	16	29	20.2	-6.573	155.009	33	92.726	5.6	5.7	SOLOMON ISLANDS
95	2	13	0	59	21.8	-15.644	167.983	34	88.028	5.3	4.9	VANUATU ISLANDS
96	2	13	2	57	8.7	42.853	131.572	514	129.889	5.4	-	E. RUSSIA-N.E. CHINA BORDER REGION
97	2	13	18	19	42.3	5.694	127.068	141	94.367	5.8	-	PHILIPPINE ISLANDS REGION
98	2	19	19	1	55.1	1.263	120.836	33	88.028	5.6	4.9	MINAHASSA PENINSULA, SULAWESI
99	2	19	19	31	37.3	49.656	155.859	48	144.351	5.4	4.9	KURIL ISLANDS
100	2	21	0	36	21.8	-6.279	154.758	55	92.921	5.6	5.3	SOLOMON ISLANDS
101	2	21	14	36	22.4	-29.807	-71.461	33	69.583	5.1	4.9	NEAR COAST OF CENTRAL CHILE
102	2	23	3	57	58.9	-5.322	154.160	99	93.625	5.1	-	SOLOMON ISLANDS
103	2	24	15	27	7.9	-20.166	-177.838	552	87.083	4.9	-	FIJI ISLANDS REGION
104	2	25	1	43	58.6	-19.528	173.818	33	85.818	6.1	7.1	VANUATU ISLANDS REGION
105	2	25	5	3	9.4	-5.278	154.064	98	93.635	4.8	-	SOLOMON ISLANDS
106	2	28	9	45	8.2	-21.762	-175.290	33	86.038	5.4	5.3	TONGA ISLANDS
107	2	28	22	15	20.1	-17.588	-178.984	538	89.342	4.9	-	FIJI ISLANDS REGION
108	2	28	22	15	27.1	-17.368	-179.035	541	89.544	4.8	-	FIJI ISLANDS REGION
109	2	29	11	30	32.5	-33.943	-14.575	10	46.067	4.8	4.5	SOUTHERN MID-ATLANTIC RIDGE
110	3	1	4	21	1.3	-19.005	-179.361	675	87.888	5.3	-	FIJI ISLANDS REGION
111	3	1	4	46	29.5	-19.103	-179.361	672	87.793	5.2	-	FIJI ISLANDS REGION
112	3	1	8	48	0.6	-52.306	14.510	10	20.503	5.0	4.6	SOUTHWEST OF AFRICA
113	3	3	22	9	13.7	-7.321	128.491	142	82.822	6.4	5.8	BANDA SEA
114	3	3	22	22	40.7	-6.817	143.807	10	88.732	6.3	6.7	NEW GUINEA, PAPUA NEW GUINEA
115	3	4	2	24	22.4	-60.167	149.868	10	41.804	5.5	6.2	WEST OF MACQUARIE ISLAND
116	3	4	14	9	50.4	-34.317	179.131	33	72.747	5.2	5.6	SOUTH OF KERMADEC ISLANDS
117	3	5	9	40	6.0	27.946	56.467	33	97.460	5.6	5.3	SOUTHERN IRAN
118	3	5	21	56	32.6	-6.810	143.812	39	88.740	4.7	4.6	NEW GUINEA, PAPUA NEW GUINEA
119	3	5	23	57	3.1	-62.902	145.637	10	38.402	5.9	6.1	SOUTH OF AUSTRALIA
120	3	7	5	48	19.1	-49.162	164.669	10	55.404	4.8	5.1	AUCKLAND ISLANDS, N.Z. REGION
121	3	8	21	37	17.7	-23.908	-67.040	184	73.647	4.9	-	CHILE-ARGENTINA BORDER REGION
122	3	10	4	0	18.4	50.822	157.105	55	145.766	5.0	-	KURIL ISLANDS
123	3	11	4	16	36.5	-23.045	-69.348	92	75.205	4.4	-	NORTHERN CHILE
124	3	12	8	42	23.5	-16.619	67.400	10	55.201	4.9	4.3	MID-INDIAN RIDGE

125	3	14	1	46	10.0	-21.013	-178.715	584	86.079	4.7	-	FIJI ISLANDS REGION
126	3	14	6	18	36.9	-36.273	-96.888	10	70.223	5.0	4.8	WEST CHILE RISE
127	3	15	6	35	5.2	-44.396	-117.435	10	65.633	5.9	5.5	SOUTH PACIFIC OCEAN
128	3	15	12	4	35.5	-23.893	-179.909	508	83.037	4.5	-	SOUTH OF FIJI ISLANDS
129	3	16	13	33	8.5	-33.728	-179.585	33	73.574	4.7	-	SOUTH OF KERMADEC ISLANDS
130	3	16	15	19	56.0	40.386	-125.279	8	150.196	5.4	5.6	OFF COAST OF NORTHERN CALIFORNIA
131	3	16	16	8	40.9	-30.341	-178.967	33	76.980	5.2	-	KERMADEC ISLANDS, NEW ZEALAND
132	3	17	6	56	26.8	-40.158	-113.900	10	69.383	4.8	4.6	SOUTHERN EAST PACIFIC RISE
133	3	17	11	51	17.5	-52.964	25.013	10	17.494	5.0	5.2	SOUTH OF AFRICA
134	3	18	23	22	52.9	-24.362	178.983	552	82.346	5.1	-	SOUTH OF FIJI ISLANDS
135	3	19	19	22	14.1	-6.836	143.846	35	88.727	5.3	4.9	NEW GUINEA, PAPUA NEW GUINEA
136	3	20	8	42	13.7	-36.510	-97.230	10	70.068	4.8	4.8	WEST CHILE RISE
137	3	21	5	26	7.7	3.155	128.034	103	92.362	6.1	5.3	NORTH OF HALMAHERA, INDONESIA
138	3	22	23	32	26.4	-14.558	167.273	169	88.869	5.0	-	VANUATU ISLANDS
139	3	23	14	15	17.6	51.821	170.724	33	151.463	5.4	4.5	NEAR ISLANDS, ALEUTIAN ISLANDS
140	3	25	19	23	16.8	-41.112	-91.260	10	64.345	4.8	-	SOUTHEAST OF EASTER ISLAND
141	3	25	22	58	5.9	-16.115	-69.526	220	81.727	5.0	-	PERU-BOLIVIA BORDER REGION
142	3	26	3	32	36.9	-32.684	-71.841	37	67.026	5.1	4.7	NEAR COAST OF CENTRAL CHILE
143	3	28	11	0	22.5	22.338	143.730	127	115.721	6.8	7.6	VOLCANO ISLANDS, JAPAN REGION
144	3	29	7	13	53.0	-28.127	-176.309	10	79.648	5.1	5.9	KERMADEC ISLANDS REGION
145	3	29	7	47	1.2	-27.958	-176.458	10	79.784	5.0	5.2	KERMADEC ISLANDS REGION
146	3	29	14	30	57.8	-41.029	175.462	33	65.522	5.0	5.0	NORTH ISLAND, NEW ZEALAND
147	3	30	20	58	21.2	-23.486	-179.968	620	83.418	4.3	-	SOUTH OF FIJI ISLANDS
148	4	1	9	55	48.5	-27.884	-66.661	169	69.835	4.8	-	CATAMARCA PROVINCE, ARGENTINA
149	4	1	12	10	49.8	-17.899	-178.645	608	89.113	4.9	-	FIJI ISLANDS REGION
150	4	1	12	13	24.0	-17.756	-178.754	556	89.228	5.2	-	FIJI ISLANDS REGION
151	4	1	16	15	31.8	-8.156	118.963	33	78.623	5.0	4.1	SUMBAWA REGION, INDONESIA
152	4	2	5	57	24.1	-15.861	-174.137	105	92.007	5.0	4.7	TONGA ISLANDS
153	4	3	8	55	0.1	0.267	122.051	187	87.537	5.6	-	MINAHASSA PENINSULA, SULAWESI
154	4	3	15	20	1.9	4.082	125.610	150	92.350	5.9	-	TALAUD ISLANDS, INDONESIA
155	4	3	17	3	19.1	-52.764	25.755	10	17.553	4.6	-	SOUTH OF AFRICA
156	4	5	9	33	42.5	-6.056	130.711	118	84.792	5.7	-	BANDA SEA
157	4	7	5	55	46.5	-7.206	129.193	153	83.181	4.9	-	BANDA SEA
158	4	7	18	42	23.6	-18.271	-175.272	208	89.440	5.4	-	TONGA ISLANDS
159	4	7	19	8	27.8	-18.045	65.517	10	53.451	5.5	5.9	MAURITIUS - REUNION REGION
160	4	10	6	42	44.1	55.201	163.146	45	151.461	5.1	4.9	OFF EAST COAST OF KAMCHATKA
161	4	11	6	41	26.1	-27.944	-178.386	201	79.422	5.6	-	KERMADEC ISLANDS REGION
162	4	11	14	4	6.9	-22.179	-179.629	602	84.756	4.5	-	SOUTH OF FIJI ISLANDS
163	4	16	13	25	48.0	-18.702	-173.686	65	89.324	5.3	5.2	TONGA ISLANDS
164	4	17	4	25	20.5	-22.169	-179.353	539	84.824	4.9	-	SOUTH OF FIJI ISLANDS
165	4	18	0	12	5.7	-52.455	13.544	10	20.631	5.4	5.3	SOUTHWEST OF AFRICA
166	4	18	17	28	12.3	-20.664	-176.469	221	86.876	5.6	-	FIJI ISLANDS REGION
167	4	18	18	57	12.5	-33.808	-178.615	33	73.686	4.8	4.6	SOUTH OF KERMADEC ISLANDS

168	4	19	12	54	35.3	-25.668	-177.170	97	81.873	5.2	-	SOUTH OF FIJI ISLANDS
169	4	19	19	25	41.4	-6.702	129.949	151	83.920	5.0	-	BANDA SEA
170	4	19	23	17	30.4	-52.955	10.270	10	21.125	4.9	-	SOUTHWEST OF AFRICA
171	4	20	0	24	13.1	-31.886	-178.567	33	75.560	4.9	4.6	KERMADEC ISLANDS REGION
172	4	20	0	46	4.3	-32.990	-178.643	33	74.474	4.9	-	SOUTH OF KERMADEC ISLANDS
173	4	20	7	50	47.7	-21.186	169.429	62	83.122	5.0	-	SOUTHEAST OF LOYALTY ISLANDS
174	4	21	4	35	17.6	51.422	-178.137	33	154.928	6.0	5.7	ANDREANOF ISLANDS, ALEUTIAN ISLAND
175	4	21	11	6	16.0	35.667	135.486	347	124.864	5.4	-	WESTERN HONSHU, JAPAN
176	4	22	21	36	28.4	-27.052	-69.050	121	71.381	4.8	-	NORTHERN CHILE
177	4	23	9	27	23.3	-28.307	-62.990	609	68.233	6.6	-	SANTIAGO DEL ESTERO PROV., ARG.
178	4	23	17	1	17.4	-28.384	-62.943	610	68.146	5.8	-	SANTIAGO DEL ESTERO PROV., ARG.
179	4	25	0	23	18.0	-13.267	-74.960	108	86.161	5.1	-	CENTRAL PERU
180	4	25	4	26	29.9	-45.350	167.279	91	59.596	5.0	-	SOUTH ISLAND, NEW ZEALAND
181	4	26	14	54	7.8	-33.619	-179.012	33	73.792	5.1	5.4	SOUTH OF KERMADEC ISLANDS
182	4	27	9	14	44.8	-40.234	173.992	142	65.972	4.9	-	COOK STRAIT, NEW ZEALAND
183	4	29	19	52	21.6	-6.407	-77.057	125	93.279	5.7	-	NORTHERN PERU
184	4	30	5	31	25.8	-27.018	-66.035	36	70.432	5.1	4.6	CATAMARCA PROVINCE, ARGENTINA
185	4	30	21	8	35.8	-3.986	146.556	10	92.319	5.3	5.7	BISMARCK SEA
186	5	2	9	36	9.1	-33.019	-179.356	64	74.306	4.7	-	SOUTH OF KERMADEC ISLANDS
187	5	2	9	58	34.2	-15.540	-177.521	401	91.638	5.3	-	FIJI ISLANDS REGION
188	5	3	2	51	26.8	-23.955	179.826	513	82.920	4.9	-	SOUTH OF FIJI ISLANDS
189	5	4	4	21	16.2	-1.105	123.573	26	86.810	6.7	7.5	SULAWESI, INDONESIA
190	5	4	4	50	52.9	-1.656	123.492	33	86.270	5.4	-	SULAWESI, INDONESIA
191	5	4	20	36	32.4	-17.914	-178.522	516	89.125	5.6	-	FIJI ISLANDS REGION
192	5	6	13	44	13.8	-11.295	165.432	12	91.456	6.0	6.3	SANTA CRUZ ISLANDS
193	5	7	8	47	39.6	-15.227	-173.614	33	92.725	5.3	5.5	TONGA ISLANDS
194	5	7	17	21	12.9	-2.540	122.551	31	85.113	5.3	4.9	SULAWESI, INDONESIA
195	5	8	10	28	25.2	-4.457	150.004	502	93.054	5.7	-	NEW BRITAIN REGION, P.N.G.
196	5	8	21	35	42.8	-31.319	179.839	383	75.792	5.4	-	KERMADEC ISLANDS REGION
197	5	9	0	45	40.0	-25.964	-69.912	57	72.669	5.2	-	NORTHERN CHILE
198	5	10	0	16	28.6	-25.423	-177.442	135	82.057	4.7	-	SOUTH OF FIJI ISLANDS
199	5	10	7	27	36.3	-23.711	-175.906	33	84.022	4.9	4.2	TONGA ISLANDS REGION
200	5	10	10	48	39.5	-23.708	-175.844	33	84.037	5.1	5.1	TONGA ISLANDS REGION
201	5	12	18	43	18.1	-23.548	-66.452	225	73.788	6.2	-	JUJUY PROVINCE, ARGENTINA
202	5	12	23	10	29.9	35.975	70.657	108	107.171	6.2	-	HINDU KUSH REGION, AFGHANISTAN
203	5	14	10	47	43.2	-1.420	123.354	33	86.440	5.6	5.2	SULAWESI, INDONESIA
204	5	14	13	10	21.5	-6.712	129.300	227	83.677	5.4	-	BANDA SEA
205	5	14	20	8	34.3	-4.296	123.164	33	83.706	5.9	5.9	BANDA SEA
206	5	14	21	1	6.5	-4.359	123.274	33	83.687	4.7	-	BANDA SEA
207	5	15	2	20	57.3	-3.413	152.095	355	94.732	5.1	-	NEW IRELAND REGION, P.N.G.
208	5	16	7	3	26.0	-40.044	174.670	111	66.300	4.4	-	COOK STRAIT, NEW ZEALAND
209	5	19	20	34	26.0	59.204	-153.139	80	168.728	5.6	-	SOUTHERN ALASKA
210	5	20	9	49	15.5	-49.795	125.988	10	43.521	5.0	5.1	WESTERN INDIAN-ANTARCTIC RIDGE

211	5	20	9	59	35.2	-23.775	179.956	548	83.122	5.0	-	SOUTH OF FIJI ISLANDS
212	5	21	2	58	42.6	-12.206	43.666	10	56.815	5.1	5.0	NORTHWEST OF MADAGASCAR
213	5	22	13	15	8.9	-4.096	-81.096	33	96.733	5.3	5.4	NEAR COAST OF NORTHERN PERU
214	5	23	10	50	58.6	-15.706	-175.084	290	91.973	4.9	-	TONGA ISLANDS
215	5	23	16	5	57.3	-24.457	-66.936	186	73.103	5.0	-	SALTA PROVINCE, ARGENTINA
216	5	24	15	42	56.9	54.553	153.396	591	147.450	4.6	-	SEA OF OKHOTSK
217	5	24	17	47	38.6	-31.080	-178.212	91	76.412	4.9	-	KERMADEC ISLANDS REGION
218	5	27	0	44	16.6	-14.934	167.381	114	88.540	5.0	-	VANUATU ISLANDS
219	5	28	20	56	26.6	-15.271	-173.510	79	92.702	5.0	-	TONGA ISLANDS
220	5	30	6	39	0.2	-63.622	172.741	10	43.571	5.4	5.6	BALLENY ISLANDS REGION
221	5	31	3	23	39.4	-6.735	128.605	268	83.405	4.6	-	BANDA SEA
222	6	2	11	13	49.3	44.513	-130.081	10	154.870	5.8	6.0	OFF COAST OF OREGON
223	6	3	3	54	45.6	51.923	158.932	76	147.327	5.7	-	NEAR EAST COAST OF KAMCHATKA
224	6	3	8	54	49.2	35.552	140.464	62	126.541	5.6	5.6	NEAR EAST COAST OF HONSHU, JAPAN
225	6	3	18	45	26.4	-28.272	-176.492	33	79.472	4.9	5.3	KERMADEC ISLANDS REGION
226	6	4	16	28	26.1	-4.721	102.087	33	75.989	6.8	8.0	SOUTHERN SUMATERA, INDONESIA
227	6	5	23	55	42.9	-4.141	102.011	33	76.508	5.5	5.1	SOUTHERN SUMATERA, INDONESIA
228	6	6	2	37	1.0	-4.405	102.129	33	76.299	5.3	4.9	SOUTHERN SUMATERA, INDONESIA
229	6	6	9	58	6.7	-5.093	102.699	33	75.842	5.8	6.1	SOUTHERN SUMATERA, INDONESIA
230	6	7	23	45	26.6	-4.612	101.905	33	76.032	6.1	6.7	SOUTHERN SUMATERA, INDONESIA
231	6	9	1	28	5.7	-55.830	-144.322	10	55.435	5.1	-	PACIFIC-ANTARCTIC RIDGE
232	6	9	1	27	15.1	-5.071	152.495	33	93.312	5.4	6.3	NEW BRITAIN REGION, P.N.G.
233	6	9	2	8	23.6	-55.790	-144.455	10	55.473	5.2	5.0	PACIFIC-ANTARCTIC RIDGE
234	6	9	5	35	50.5	-5.330	102.754	33	75.638	5.4	5.1	SOUTHERN SUMATERA, INDONESIA
235	6	9	6	27	26.3	-5.365	102.762	33	75.608	5.2	5.2	SOUTHERN SUMATERA, INDONESIA
236	6	9	8	0	24.1	-5.549	102.679	33	75.408	5.8	5.8	SOUTHERN SUMATERA, INDONESIA
237	6	9	22	7	5.9	-4.478	102.052	33	76.206	5.1	4.8	SOUTHERN SUMATERA, INDONESIA
238	6	9	22	35	13.7	30.472	137.682	473	120.962	5.4	-	SOUTH EAST OF HONSHU, JAPAN
239	6	9	23	31	45.2	30.491	137.730	485	120.997	5.9	-	SOUTH EAST OF HONSHU, JAPAN
240	6	10	2	4	37.2	-21.614	-177.392	261	85.768	4.9	-	FIJI ISLANDS REGION
241	6	10	8	49	47.6	-17.565	-172.615	33	90.632	5.0	5.4	TONGA ISLANDS REGION
242	6	10	14	11	59.3	-4.695	153.134	77	93.876	5.2	-	NEW IRELAND REGION, P.N.G.
243	6	11	3	29	49.5	-30.757	-178.347	144	76.699	5.2	-	KERMADEC ISLANDS, NEW ZEALAND
244	6	11	11	55	12.3	-50.579	139.550	10	47.240	5.9	6.4	WESTERN INDIAN-ANTARCTIC RIDGE
245	6	14	2	15	25.8	-25.516	178.046	605	81.027	5.9	-	SOUTH OF FIJI ISLANDS
246	6	14	3	19	18.1	-24.032	-66.747	197	73.436	5.3	-	SALTA PROVINCE, ARGENTINA
247	6	14	10	3	6.6	-24.099	-68.702	105	74.014	4.9	-	CHILE-ARGENTINA BORDER REGION
248	6	14	17	0	48.4	4.542	127.722	90	93.535	6.1	5.6	TALAUD ISLANDS, INDONESIA
249	6	14	23	1	14.5	-17.902	176.212	33	87.957	5.5	5.7	FIJI ISLANDS REGION
250	6	15	11	10	46.2	29.368	132.082	10	117.957	6.0	5.6	SOUTH EAST OF SHIKOKU, JAPAN
251	6	16	1	8	31.3	1.115	118.360	33	87.011	4.9	4.7	BORNEO
252	6	18	14	44	13.3	-13.802	97.453	10	65.962	6.8	7.8	SOUTH INDIAN OCEAN
253	6	19	3	32	55.0	-29.338	-67.812	115	68.862	4.7	-	LA RIOJA PROVINCE, ARGENTINA

254	6	20	6	12	38.5	-13.839	97.320	10	65.884	4.6	-	SOUTH INDIAN OCEAN
255	6	20	11	34	0.0	-14.104	97.577	10	65.719	5.6	5.6	SOUTH INDIAN OCEAN
256	6	26	22	50	2.1	-6.333	130.056	111	84.300	5.0	-	BANDA SEA
257	6	27	11	37	5.8	-7.096	125.906	496	82.099	5.3	-	BANDA SEA
258	6	29	16	23	47.4	-7.330	123.689	600	81.084	4.7	-	BANDA SEA
259	6	29	21	3	19.4	-55.758	-28.470	33	32.265	4.9	-	SOUTH SANDWICH ISLANDS REGION
260	7	1	4	48	54.9	-35.226	178.605	241	71.761	5.2	-	OFF E. COAST OF N. ISLAND, N. Z.
261	7	1	7	1	55.5	34.221	139.131	10	124.868	6.0	6.1	NEAR S COAST OF HONSHU, JAPAN
262	7	5	0	10	0.5	-4.627	101.968	33	76.038	5.4	4.9	SOUTHERN SUMATERA, INDONESIA
263	7	6	6	15	28.6	53.203	170.368	33	152.465	5.4	4.5	NEAR ISLANDS, ALEUTIAN ISLANDS
264	7	6	6	56	4.9	-15.393	-175.587	301	92.178	5.3	-	TONGA ISLANDS
265	7	7	5	26	43.1	-28.011	-66.613	174	69.702	5.0	-	CATAMARCA PROVINCE, ARGENTINA
266	7	7	15	46	44.5	51.411	179.978	31	154.298	6.4	5.5	RAT ISLANDS, ALEUTIAN ISLANDS
267	7	8	4	52	55.4	-5.408	102.700	33	75.547	5.7	5.7	SOUTHERN SUMATERA, INDONESIA
268	7	10	9	58	18.9	46.828	145.422	360	138.216	6.1	-	SEA OF OKHOTSK
269	7	10	10	39	39.0	-4.473	103.758	105	76.773	5.8	-	SOUTHERN SUMATERA, INDONESIA
270	7	11	1	32	28.5	57.369	-154.206	44	166.814	6.3	6.2	KODIAK ISLAND REGION, ALASKA
271	7	11	16	3	53.1	6.006	126.216	85	94.350	5.4	-	MINDANAO, PHILIPPINES
272	7	11	23	35	46.8	-43.804	41.321	10	25.285	4.9	4.5	PRINCE EDWARD ISLANDS REGION
273	7	12	1	10	42.6	-6.675	106.845	33	75.753	5.2	5.0	JAWA, INDONESIA
274	7	12	5	21	46.0	34.243	139.218	10	124.919	4.4	-	NEAR S. COAST OF HONSHU, JAPAN
275	7	12	13	36	55.9	-23.215	170.538	35	81.466	4.9	4.7	SOUTHEAST OF LOYALTY ISLANDS
276	7	13	4	5	57.4	-6.294	154.866	59	92.942	5.1	-	SOLOMON ISLANDS
277	7	13	5	25	18.7	-16.751	-71.661	38	81.832	5.0	4.2	SOUTHERN PERU
278	7	13	6	25	17.5	-34.286	-71.955	40	65.574	4.8	4.2	NEAR COAST OF CENTRAL CHILE
279	7	14	19	31	11.5	-5.325	151.460	52	92.730	5.3	-	NEW BRITAIN REGION, P. N. G.
280	7	15	3	58	10.4	-54.104	7.939	10	20.846	5.4	5.3	BOUVET ISLAND REGION
281	7	15	7	13	44.6	-7.027	128.931	218	83.253	5.6	-	BANDA SEA
282	7	15	10	22	40.9	-61.194	154.600	33	42.068	5.1	5.0	BALLENY ISLANDS REGION
283	7	16	1	34	51.2	-17.592	-178.863	544	89.364	4.5	-	FIJI ISLANDS REGION
284	7	16	3	57	45.5	-7.747	150.917	10	90.282	6.3	6.4	NEW BRITAIN REGION, P. N. G.
285	7	16	11	38	18.1	-4.193	138.912	33	89.453	5.5	5.4	IRIAN JAYA, INDONESIA
286	7	16	17	25	23.0	-12.404	166.509	33	90.707	5.3	5.8	SANTA CRUZ ISLANDS
287	7	19	1	16	51.9	-20.738	-176.747	243	86.749	4.8	-	FIJI ISLANDS REGION
288	7	20	13	13	15.9	-18.237	-177.996	600	88.922	4.4	-	FIJI ISLANDS REGION
289	7	20	18	39	18.8	36.510	140.983	47	127.584	6.1	5.4	NEAR EAST COAST OF HONSHU, JAPAN
290	7	21	2	18	7.3	-5.551	105.804	140	76.450	5.5	-	SUNDA STRAIT, INDONESIA
291	7	21	6	21	9.1	-26.021	179.661	491	80.885	5.1	-	SOUTH OF FIJI ISLANDS
292	7	21	22	5	28.1	-5.516	145.888	84	90.663	4.8	-	EASTERN NEW GUINEA REG., P. N. G.
293	7	22	9	9	5.7	-31.088	-72.091	33	68.587	4.7	-	OFF COAST OF CENTRAL CHILE
294	7	24	9	37	56.6	-23.486	-177.344	177	83.959	5.0	-	SOUTH OF FIJI ISLANDS
295	7	24	12	17	26.5	-5.561	102.886	33	75.465	5.4	5.2	SOUTHERN SUMATERA, INDONESIA
296	7	24	15	47	11.7	-38.360	176.680	179	68.342	-	-	NORTH ISLAND, NEW ZEALAND

297	7	25	3	14	29.7	-53.553	-3.169	10	24.983	5.6	5.7	SOUTHERN MID-ATLANTIC RIDGE
298	7	27	10	58	36.3	-53.484	-3.211	10	25.054	5.2	4.9	SOUTHERN MID-ATLANTIC RIDGE
299	7	28	5	48	42.5	-54.377	5.299	10	21.458	5.2	4.7	BOUVET ISLAND REGION
300	7	28	12	38	33.2	-12.360	166.490	37	90.743	5.0	5.4	SANTA CRUZ ISLANDS
301	7	29	9	54	42.2	52.996	157.521	168	147.687	5.0	-	KAMCHATKA PENINSULA, RUSSIA
302	7	29	11	54	48.0	-13.784	97.346	10	65.944	4.9	4.9	SOUTH INDIAN OCEAN
303	7	29	23	56	38.4	3.305	124.968	243	91.399	4.5	-	CELEBES SEA
304	7	30	6	3	32.8	-10.935	165.934	46	91.942	5.1	5.2	SANTA CRUZ ISLANDS
305	7	30	12	25	45.5	33.901	139.376	10	124.668	6.0	6.5	SOUTH EAST OF HONSHU, JAPAN,
306	7	31	11	59	34.1	-14.455	167.282	179	88.969	4.9	-	VANUATU ISLANDS
307	7	31	22	44	30.4	-16.697	174.542	10	88.716	5.7	5.6	FIJI ISLANDS REGION
308	7	31	23	1	49.3	-29.279	-176.350	10	78.519	5.5	5.9	KERMADEC ISLANDS REGION
309	8	1	5	54	41.6	-6.093	151.619	48	92.064	5.2	-	NEW BRITAIN REGION, P.N.G.
310	8	1	9	21	37.1	-16.817	174.361	33	88.556	5.3	5.3	FIJI ISLANDS REGION
311	8	1	10	18	59.9	4.079	93.268	33	81.548	5.3	5.0	OFF W COAST OF NORTHERN SUMATERA
312	8	1	11	1	30.1	-53.762	6.760	10	21.507	4.4	-	BOUVET ISLAND REGION
313	8	1	18	17	31.5	-21.433	169.720	33	82.961	5.0	-	SOUTHEAST OF LOYALTY ISLANDS
314	8	1	18	54	46.0	-38.765	78.419	10	36.762	5.2	5.6	MID-INDIAN RIDGE
315	8	3	1	9	38.9	-12.037	166.448	33	91.039	5.7	6.5	SANTA CRUZ ISLANDS
316	8	3	8	53	19.6	0.482	121.286	101	87.464	5.2	-	MINAHASSA PENINSULA, SULAWESI
317	8	3	11	20	19.9	-45.087	-174.891	33	63.384	5.0	-	CHATHAM ISLANDS, N.Z. REGION
318	8	3	19	22	11.2	-17.684	-71.968	33	81.059	5.6	5.5	NEAR COAST OF PERU
319	8	3	21	19	12.7	3.193	67.286	10	74.518	4.7	4.1	CARLSBERG RIDGE
320	8	3	22	56	32.1	-6.323	131.006	33	84.651	5.3	-	TANIMBAR ISLANDS REG, INDONESIA
321	8	4	2	8	16.0	-29.850	-178.287	102	77.591	5.2	-	KERMADEC ISLANDS, NEW ZEALAND
322	8	4	3	7	29.5	-22.062	-179.751	662	84.844	4.3	-	SOUTH OF FIJI ISLANDS
323	8	4	3	11	49.9	-12.723	66.171	10	58.765	5.0	-	MID-INDIAN RIDGE
324	8	4	5	5	17.5	-22.976	169.752	33	81.495	5.0	4.4	SOUTHEAST OF LOYALTY ISLANDS
325	8	4	7	47	44.0	0.152	126.438	115	89.005	5.4	-	NORTHERN MOLUCCA SEA
326	8	4	23	34	18.1	-31.454	-178.550	33	75.983	5.3	-	KERMADEC ISLANDS REGION*
327	8	5	2	55	0.3	-7.234	128.489	100	82.902	5.2	-	BANDA SEA
328	8	5	5	2	27.3	5.491	125.282	201	93.538	4.5	-	MINDANAO, PHILIPPINES
329	8	5	6	13	32.5	-24.380	-112.031	10	84.615	5.0	4.7	EASTER ISLAND REGION
330	8	5	8	30	10.4	-6.377	130.209	141	84.314	5.4	-	BANDA SEA
331	8	5	19	43	7.9	-5.845	130.309	171	84.843	5.4	-	BANDA SEA
332	8	6	7	27	12.9	28.856	139.556	395	120.170	6.3	-	BONIN ISLANDS, JAPAN REGION
333	8	6	17	48	6.5	-16.580	-173.660	33	91.398	4.1	-	TONGA ISLANDS
334	8	6	23	26	0.9	-7.029	129.503	116	83.457	4.7	-	BANDA SEA
335	8	7	3	39	20.6	-12.013	166.419	33	91.054	5.0	5.0	SANTA CRUZ ISLANDS
336	8	7	14	33	55.9	-7.018	123.357	649	81.253	6.5	-	BANDA SEA
337	8	7	15	29	49.6	-11.864	166.135	33	91.115	5.3	5.4	SANTA CRUZ ISLANDS
338	8	8	1	28	57.0	-24.737	179.894	497	82.177	4.7	-	SOUTH OF FIJI ISLANDS
339	8	8	10	31	17.0	-39.245	176.309	64	67.413	5.3	-	NORTH ISLAND, NEW ZEALAND

340	8	8	18	3	43.4	-26.251	-177.900	200	81.162	4.4	-	SOUTH OF FIJI ISLANDS
341	8	9	0	8	41.8	-15.693	167.986	33	87.982	6.3	6.0	VANUATU ISLANDS
342	8	9	4	38	55.6	-24.083	-66.678	210	73.366	4.1	-	SALTA PROVINCE, ARGENTINA
343	8	9	11	41	47.9	18.198	-102.480	46	124.037	6.1	6.5	MICHOACAN, MEXICO
344	8	9	22	55	59.4	-16.797	174.332	33	88.568	5.7	6.3	FIJI ISLANDS REGION
345	8	12	6	22	54.7	-38.786	175.908	131	67.771	4.5	-	NORTH ISLAND, NEW ZEALAND
346	8	12	10	26	15.8	-3.072	136.112	33	89.496	5.6	5.7	IRIAN JAYA, INDONESIA
347	8	12	22	59	47.8	-22.409	179.373	603	84.320	4.5	-	SOUTH OF FIJI ISLANDS
348	8	13	9	38	54.9	-22.038	-68.686	113	75.927	4.1	-	NORTHERN CHILE
349	8	14	22	11	16.1	-9.377	153.854	10	89.720	5.7	6.0	D'ENTRECASTEAUX ISLANDS REGION
350	8	15	3	18	19.4	-9.289	153.817	10	89.790	5.2	4.7	D'ENTRECASTEAUX ISLANDS REGION
351	8	15	4	3	48.5	-9.311	153.875	10	89.788	5.1	-	D'ENTRECASTEAUX ISLANDS REGION
352	8	15	4	30	8.8	-31.511	179.725	358	75.583	6.0	-	KERMADEC ISLANDS REGION
353	8	17	0	4	29.1	-21.901	-174.771	33	86.002	5.4	5.8	TONGA ISLANDS
354	8	17	3	5	38.4	-24.040	179.661	575	82.803	4.6	-	SOUTH OF FIJI ISLANDS
355	8	17	13	59	59.6	-16.887	-172.659	33	91.285	5.0	5.3	SAMOA ISLANDS REGION
356	8	17	18	40	9.8	5.772	94.753	68	83.592	5.5	5.1	NORTHERN SUMATERA, INDONESIA
357	8	18	13	21	3.2	-19.167	-70.132	70	79.077	5.4	-	NEAR COAST OF NORTHERN CHILE
358	8	19	7	14	20.7	-48.392	31.445	10	21.070	4.8	-	SOUTH OF AFRICA
359	8	19	9	20	13.4	-36.970	178.020	146	69.958	-	-	OFF E. COAST OF N. ISLAND, N. Z.
360	8	19	18	10	3.5	-7.168	126.702	345	82.319	4.3	-	BANDA SEA
361	8	20	7	55	49.3	7.427	126.549	174	95.786	5.5	-	MINDANAO, PHILIPPINES
362	8	20	22	38	30.2	-1.397	123.134	33	86.382	5.3	4.9	SULAWESI, INDONESIA
363	8	21	9	16	25.4	-53.020	-45.966	10	40.515	5.8	5.9	SOUTH ATLANTIC OCEAN
364	8	21	15	51	9.2	-14.141	167.542	33	89.340	4.9	4.5	VANUATU ISLANDS
365	8	22	13	51	29.8	-6.274	154.664	70	92.895	5.5	-	SOLOMON ISLANDS
366	8	22	20	53	26.3	-1.573	123.215	62	86.248	4.9	-	SULAWESI, INDONESIA
367	8	23	16	15	31.7	-22.633	-68.276	118	75.239	5.2	-	NORTHERN CHILE
368	8	24	11	17	31.9	-28.010	-13.230	10	51.075	4.5	4.8	SOUTHERN MID-ATLANTIC RIDGE
369	8	24	11	36	45.3	-6.026	102.687	33	74.963	5.7	5.9	SOUTHWEST OF SUMATERA, INDONESIA
370	8	25	6	42	22.6	-24.740	-177.017	33	82.805	4.9	4.8	SOUTH OF FIJI ISLANDS
371	8	26	6	17	21.7	-22.205	-63.650	526	74.096	4.5	-	SALTA PROVINCE, ARGENTINA
372	8	28	3	37	2.6	4.352	126.579	88	92.948	5.8	-	TALAUD ISLANDS, INDONESIA
373	8	28	9	58	6.6	-17.448	-173.622	47	90.559	4.6	4.3	TONGA ISLANDS
374	8	28	15	5	47.9	-4.110	127.394	16	85.400	6.5	6.8	BANDA SEA
375	8	28	15	38	6.3	-3.986	127.325	10	85.490	5.8	5.8	SERAM, INDONESIA
376	8	28	19	29	24.5	-4.163	127.311	33	85.321	6.0	-	BANDA SEA
377	8	28	20	18	39.9	5.531	127.016	33	94.198	-	-	PHILIPPINE ISLANDS REGION
378	8	29	6	32	52.0	-22.783	-68.836	104	75.282	4.4	-	NORTHERN CHILE
379	8	29	18	57	13.7	-27.579	-67.617	135	70.429	5.0	-	CATAMARCA PROVINCE, ARGENTINA
380	8	30	0	59	28.3	-29.381	-177.472	47	78.206	5.3	-	KERMADEC ISLANDS, NEW ZEALAND
381	8	30	5	39	47.9	10.539	93.470	95	87.745	4.8	-	ANDAMAN ISLANDS, INDIA REGION
382	8	30	13	3	30.9	-32.661	-178.901	33	74.743	4.6	-	SOUTH OF KERMADEC ISLANDS

383	8	30	15	15	50.7	-24.158	-66.954	191	73.387	4.5	-	SALTA PROVINCE, ARGENTINA
384	9	2	0	25	48.7	-5.053	133.611	33	86.763	5.6	5.0	ARU ISLANDS REGION, INDONESIA
385	9	2	10	19	13.2	-17.917	-178.325	588	89.163	5.1	-	FIJI ISLANDS REGION
386	9	2	17	2	19.5	-20.073	-179.135	688	86.902	5.5	-	FIJI ISLANDS REGION
387	9	2	19	41	58.1	-4.166	142.151	122	90.620	4.9	-	NEW GUINEA, PAPUA NEW GUINEA
388	9	3	6	38	12.0	-15.950	-174.040	33	91.939	4.8	-	TONGA ISLANDS
389	9	3	8	21	23.7	-20.547	-177.821	364	86.716	5.2	-	FIJI ISLANDS REGION
390	9	3	16	40	29.9	-12.017	166.438	33	91.055	4.4	-	SANTA CRUZ ISLANDS
391	9	4	17	25	59.9	4.170	94.924	33	82.124	4.9	4.7	OFF W COAST OF NORTHERN SUMATERA
392	9	5	0	20	56.8	-30.760	-178.314	200	76.703	4.6	-	KERMADEC ISLANDS, NEW ZEALAND
393	9	5	0	22	40.5	-0.080	122.946	142	87.536	4.5	-	MINAHASSA PENINSULA, SULAWESI
394	9	5	2	58	0.4	-8.474	112.137	137	75.908	4.9	-	JAWA, INDONESIA
395	9	5	8	42	59.8	-21.949	-174.569	33	85.993	5.3	5.0	TONGA ISLANDS
396	9	5	15	43	32.9	-21.898	-174.473	33	86.061	5.0	4.7	TONGA ISLANDS
397	9	5	18	6	52.9	37.480	-118.835	4	146.281	-	-	CALIFORNIA-NEVADA BORDER REGION
398	9	5	18	32	31.4	-7.417	128.439	120	82.714	4.7	-	BANDA SEA
399	9	6	20	13	1.3	-20.420	-178.409	573	86.718	4.2	-	FIJI ISLANDS REGION
400	9	7	2	24	22.2	-22.400	-12.408	10	56.032	4.5	-	SOUTHERN MID-ATLANTIC RIDGE
401	9	7	11	5	45.8	-52.560	12.487	10	20.832	4.5	-	SOUTHWEST OF AFRICA
402	9	7	13	0	5.0	-55.925	-27.901	103	31.933	4.7	-	SOUTH SANDWICH ISLANDS REGION
403	9	8	1	6	24.6	-27.311	-70.914	43	71.734	4.6	4.6	NEAR COAST OF NORTHERN CHILE
404	9	8	7	47	37.1	-20.887	-68.421	132	76.912	4.8	-	CHILE-BOLIVIA BORDER REGION
405	9	8	10	26	22.7	-4.479	-80.850	33	96.295	4.7	-	PERU-ECUADOR BORDER REGION
406	9	9	6	1	53.4	6.422	95.456	229	84.417	5.1	-	NICOBAR ISLANDS, INDIA REGION
407	9	9	10	0	33.6	-22.763	-175.345	33	85.053	5.1	5.3	TONGA ISLANDS REGION
408	9	9	12	18	10.2	-35.875	-103.064	10	71.844	5.2	5.2	SOUTHEAST OF EASTER ISLAND
409	9	10	10	12	32.5	-7.322	120.659	602	80.003	4.6	-	FLORES SEA
410	9	10	17	8	18.5	-1.190	129.292	33	88.789	5.2	5.1	HALMAHERA, INDONESIA
411	9	10	19	6	15.6	-1.112	129.332	33	88.876	5.9	6.0	HALMAHERA, INDONESIA
412	9	10	19	45	24.5	-5.619	130.611	63	85.161	5.5	-	BANDA SEA
413	9	10	20	42	57.8	-26.800	-140.811	10	84.473	4.6	4.8	SOUTH PACIFIC OCEAN
414	9	10	21	37	43.1	-1.924	-12.961	10	75.519	5.1	5.0	NORTH OF ASCENSION ISLAND
415	9	11	10	3	13.1	-57.727	-25.138	33	29.573	5.4	4.9	SOUTH SANDWICH ISLANDS REGION
416	9	11	17	17	53.4	-15.877	-173.691	115	92.077	6.0	-	TONGA ISLANDS
417	9	11	19	41	58.4	-12.085	166.518	33	91.013	5.1	4.8	SANTA CRUZ ISLANDS
418	9	12	16	27	24.5	-5.435	101.823	33	75.233	5.7	6.1	SOUTHWEST OF SUMATERA, INDONESIA
419	9	13	0	13	52.8	-23.943	-66.757	205	73.522	4.3	-	JUJUY PROVINCE, ARGENTINA
420	9	14	14	59	57.6	-15.740	179.801	33	90.866	5.7	6.2	FIJI ISLANDS
421	9	14	22	18	32.2	-33.813	56.343	10	36.490	5.3	4.9	SOUTHWEST INDIAN RIDGE
422	9	15	6	29	33.0	-17.934	-174.705	163	89.878	4.4	-	TONGA ISLANDS
423	9	16	11	3	20.1	0.253	122.073	211	87.532	5.4	-	MINAHASSA PENINSULA, SULAWESI
424	9	16	17	26	24.2	-30.256	-178.142	63	77.226	5.7	-	KERMADEC ISLANDS, NEW ZEALAND
425	9	17	22	50	3.8	52.565	-178.283	205	155.850	5.2	-	ANDREANOF ISLANDS, ALEUTIAN ISLAND

426	9	18	11	28	11.2	-0.455	122.811	71	87.140	5.0	-	MINAHASSA PENINSULA, SULAWESI
427	9	19	11	13	41.5	1.548	127.018	105	90.507	4.6	-	HALMAHERA, INDONESIA
428	9	19	22	23	1.4	-29.364	-176.384	33	78.430	5.4	5.1	KERMADEC ISLANDS REGION
429	9	20	7	15	29.4	-5.985	147.665	58	90.834	5.1	4.8	EASTERN NEW GUINEA REG., P.N.G.
430	9	21	14	33	15.5	-5.711	110.622	561	77.950	5.3	-	JAVA SEA
431	9	21	17	45	51.4	-56.510	-141.828	10	54.782	5.0	5.0	PACIFIC-ANTARCTIC RIDGE
432	9	22	5	12	53.4	-20.951	-176.465	184	86.598	5.1	-	FIJI ISLANDS REGION
433	9	22	7	34	28.6	-12.430	166.277	33	90.617	4.7	4.5	SANTA CRUZ ISLANDS
434	9	22	7	55	32.3	-22.810	-66.287	256	74.418	4.5	-	JUJUY PROVINCE, ARGENTINA
435	9	22	13	21	31.4	-29.847	-178.381	157	77.576	5.2	-	KERMADEC ISLANDS, NEW ZEALAND
436	9	22	18	22	3.1	-4.964	102.104	33	75.767	5.8	5.9	SOUTHERN SUMATERA, INDONESIA
437	9	23	2	17	43.9	4.276	-32.607	10	87.664	5.5	5.5	CENTRAL MID-ATLANTIC RIDGE
438	9	23	16	41	17.0	-19.580	-178.048	457	87.608	4.4	-	FIJI ISLANDS REGION
439	9	23	19	45	46.0	-18.202	-68.835	130	79.551	4.6	-	CHILE-BOLIVIA BORDER REGION
440	9	24	0	55	10.4	-6.647	107.881	33	76.133	5.0	-	JAWA, INDONESIA
441	9	24	15	26	20.1	-39.380	175.440	100	67.101	5.1	-	NORTH ISLAND, NEW ZEALAND
442	9	25	4	0	39.6	-46.806	37.590	10	22.290	5.6	5.6	PRINCE EDWARD ISLANDS REGION
443	9	25	13	40	49.4	0.058	123.367	174	87.815	4.9	-	MINAHASSA PENINSULA, SULAWESI
444	9	26	6	17	52.4	-17.178	-173.927	56	90.764	6.1	6.1	TONGA ISLANDS
445	9	26	7	10	26.4	-17.250	-174.109	33	90.659	5.0	-	TONGA ISLANDS
446	9	26	12	12	45.1	6.907	126.420	52	95.258	4.9	-	MINDANAO, PHILIPPINES
447	9	26	16	49	33.4	1.123	127.442	142	90.266	5.8	-	HALMAHERA, INDONESIA
448	9	27	5	2	47.6	-16.800	-73.058	44	82.238	5.1	4.2	NEAR COAST OF PERU
449	9	27	13	29	20.3	-27.950	-66.673	229	69.778	-	-	CATAMARCA PROVINCE, ARGENTINA
450	9	28	15	1	4.4	-32.300	-178.789	33	75.115	4.8	-	SOUTH OF KERMADEC ISLANDS
451	9	28	17	56	27.9	-21.130	168.375	33	82.899	4.6	-	LOYALTY ISLANDS
452	9	29	0	56	7.1	-31.177	-68.941	113	67.519	4.4	-	SAN JUAN PROVINCE, ARGENTINA
453	9	29	11	29	0.3	-23.302	-179.197	409	83.759	4.4	-	SOUTH OF FIJI ISLANDS
454	9	29	16	55	57.6	-20.589	-178.002	491	86.638	4.4	-	FIJI ISLANDS REGION
455	9	29	17	11	25.8	-7.880	113.446	178	76.920	4.5	-	JAWA, INDONESIA
456	9	30	9	52	33.7	-27.667	65.747	10	44.134	5.0	-	INDIAN OCEAN TRIPLE JUNCTION
457	10	1	8	3	12.1	-14.975	167.382	137	88.501	4.5	-	VANUATU ISLANDS
458	10	1	19	3	28.1	-4.046	127.334	33	85.438	5.7	5.4	BANDA SEA
459	10	2	2	25	31.3	-7.977	30.709	34	61.237	6.1	6.7	LAKE TANGANYIKA REGION
460	10	2	3	30	26.2	-7.297	128.770	137	82.945	4.9	-	BANDA SEA
461	10	2	13	46	29.2	-59.441	-25.841	33	28.549	5.1	4.7	SOUTH SANDWICH ISLANDS REGION
462	10	3	12	47	57.8	-33.341	-178.568	33	74.148	4.7	-	SOUTH OF KERMADEC ISLANDS
463	10	3	18	4	31.5	-7.032	67.951	10	64.649	4.9	-	MID-INDIAN RIDGE
464	10	3	20	24	28.9	-21.116	-179.120	600	85.894	4.1	-	FIJI ISLANDS REGION
465	10	4	3	59	12.0	-55.432	-128.081	10	55.539	5.1	5.1	PACIFIC-ANTARCTIC RIDGE
466	10	4	13	48	59.0	-33.416	-178.687	33	74.053	5.3	5.3	SOUTH OF KERMADEC ISLANDS
467	10	4	16	58	44.3	-15.421	166.910	23	87.946	6.1	6.9	VANUATU ISLANDS
468	10	4	20	48	27.9	-15.636	166.995	33	87.765	5.3	5.2	VANUATU ISLANDS

469	10	5	20	6	14.0	6.853	126.822	87	95.353	5.4	5.5	MINDANAO, PHILIPPINES
470	10	5	21	12	53.4	-24.026	-66.837	208	73.471	4.6	-	SALTA PROVINCE, ARGENTINA
471	10	6	4	30	19.1	35.456	133.134	10	123.840	5.8	6.8	WESTERN HONSHU, JAPAN
472	10	6	13	9	14.6	-52.892	27.329	10	17.169	4.9	4.6	SOUTH OF AFRICA
473	10	7	1	39	8.3	-7.995	30.680	33	61.221	4.8	4.2	LAKE TANGANYIKA REGION
474	10	7	7	16	18.4	-27.636	-176.444	33	80.100	4.4	-	KERMADEC ISLANDS REGION
475	10	7	10	53	32.1	-32.483	-67.500	147	65.853	4.7	-	MENDOZA PROVINCE, ARGENTINA
476	10	7	11	57	40.9	-9.974	119.378	33	77.088	5.8	5.6	SUMBA REGION, INDONESIA
477	10	7	13	2	1.7	-30.882	-178.217	33	76.603	4.8	-	KERMADEC ISLANDS, NEW ZEALAND
478	10	7	22	30	14.2	5.340	126.274	132	93.754	4.8	-	MINDANAO, PHILIPPINES
479	10	8	17	47	47.5	4.797	125.141	207	92.844	4.9	-	TALAUD ISLANDS, INDONESIA
480	10	9	1	45	2.1	-47.291	-12.574	10	33.511	4.6	-	SOUTHERN MID-ATLANTIC RIDGE
481	10	9	5	14	15.8	-30.747	-178.041	42	76.769	5.0	4.7	KERMADEC ISLANDS, NEW ZEALAND
482	10	9	12	53	20.4	-23.124	-67.707	112	74.595	4.8	-	CHILE-ARGENTINA BORDER REGION
483	10	10	5	23	9.8	-6.276	154.627	100	92.881	5.3	-	SOLOMON ISLANDS
484	10	10	11	21	51.1	-30.458	59.379	10	40.248	-	-	SOUTHWEST INDIAN RIDGE
485	10	11	4	13	35.5	-20.645	-177.985	489	86.587	4.9	-	FIJI ISLANDS REGION
486	10	11	4	34	32.1	-1.577	123.305	33	86.276	5.1	5.1	SULAWESI, INDONESIA
487	10	12	2	22	9.7	-17.685	-173.010	33	90.442	5.2	5.4	TONGA ISLANDS
488	10	12	4	47	18.7	-43.756	-16.122	10	37.819	4.5	-	SOUTHERN MID-ATLANTIC RIDGE
489	10	12	9	23	46.5	-43.836	-15.891	10	37.668	4.8	-	SOUTHERN MID-ATLANTIC RIDGE
490	10	12	10	0	37.7	9.845	92.962	33	86.940	4.7	4.3	NICOBAR ISLANDS, INDIA REGION
491	10	12	20	54	51.2	-28.874	61.895	10	42.226	5.3	4.8	SOUTHWEST INDIAN RIDGE
492	10	14	4	33	10.3	-20.509	-178.543	576	86.604	4.7	-	FIJI ISLANDS REGION
493	10	14	15	14	57.5	-18.754	-177.783	627	88.465	4.6	-	FIJI ISLANDS REGION
494	10	14	17	7	0.4	-20.836	-178.803	584	86.232	4.7	-	FIJI ISLANDS REGION
495	10	14	20	38	56.6	-60.191	-46.810	10	34.980	5.0	-	SCOTIA SEA
496	10	14	22	0	13.0	-6.293	154.519	117	92.830	5.0	-	SOLOMON ISLANDS
497	10	14	23	15	18.8	-25.511	-176.098	33	82.234	5.0	-	SOUTH OF FIJI ISLANDS
498	10	15	18	7	30.4	-6.859	129.300	186	83.541	4.9	-	BANDA SEA
499	10	16	22	14	42.2	3.489	125.833	100	91.880	4.8	-	TALAUD ISLANDS, INDONESIA
500	10	17	10	32	58.5	-30.534	-178.331	60	76.919	5.5	-	KERMADEC ISLANDS, NEW ZEALAND
501	10	17	11	50	36.0	-7.113	124.826	559	81.694	4.8	-	BANDA SEA
502	10	18	16	37	41.4	-19.279	-68.238	153	78.350	5.0	-	CHILE-BOLIVIA BORDER REGION
503	10	18	23	31	4.6	-23.683	179.804	600	83.179	4.4	-	SOUTH OF FIJI ISLANDS
504	10	19	17	29	9.0	-7.616	127.428	153	82.166	4.8	-	BANDA SEA
505	10	19	21	45	7.2	-28.318	-71.093	71	70.853	-	-	NEAR COAST OF CENTRAL CHILE
506	10	20	5	24	30.6	-8.209	121.965	177	79.650	-	-	FLORES REGION, INDONESIA
507	10	21	5	25	14.8	-17.286	-175.176	292	90.418	5.1	-	TONGA ISLANDS
508	10	21	5	50	32.8	-6.599	129.792	168	83.959	4.8	-	BANDA SEA
509	10	21	11	35	59.1	-47.347	-12.403	10	33.403	5.2	5.7	SOUTHERN MID-ATLANTIC RIDGE
510	10	21	17	39	43.8	-7.462	128.540	132	82.709	5.2	-	BANDA SEA
511	10	23	23	4	11.8	-4.054	127.388	33	85.450	5.7	5.2	BANDA SEA

512	10	24	2	4	2.7	-7.250	128.631	136	82.938	5.1	-	BANDA SEA
513	10	24	3	24	45.2	-5.805	146.405	70	90.571	5.2	-	EASTERN NEW GUINEA REG., P.N.G.
514	10	24	6	35	24.5	-17.964	-178.595	600	89.061	4.7	-	FIJI ISLANDS REGION
515	10	24	11	9	14.1	-15.225	-72.675	107	83.590	5.3	-	SOUTHERN PERU
516	10	25	5	26	38.8	-34.605	-109.648	10	74.219	5.6	5.7	SOUTHERN EAST PACIFIC RISE
517	10	25	9	32	23.9	-6.549	105.630	38	75.459	6.3	6.6	SUNDA STRAIT, INDONESIA
518	10	25	17	42	22.6	-7.464	107.823	33	75.352	5.3	-	JAWA, INDONESIA
519	10	25	19	0	17.4	-34.678	-109.458	10	74.117	5.6	5.7	SOUTHERN EAST PACIFIC RISE
520	10	26	8	54	30.7	10.516	92.782	48	87.527	4.8	-	ANDAMAN ISLANDS, INDIA REGION
521	10	26	14	8	37.3	-34.573	-109.370	10	74.206	5.5	5.0	SOUTHERN EAST PACIFIC RISE
522	10	26	21	9	15.4	-5.314	153.977	146	93.572	4.7	-	NEW IRELAND REGION, P.N.G.
523	10	26	22	44	5.9	-6.943	129.004	158	83.357	5.1	-	BANDA SEA
524	10	27	0	8	53.5	54.707	94.983	33	129.860	5.6	5.3	SOUTHWESTERN SIBERIA, RUSSIA
525	10	27	4	21	51.6	26.266	140.460	388	118.137	6.1	-	BONIN ISLANDS, JAPAN REGION
526	10	28	14	47	22.3	-36.970	-97.040	10	69.585	-	-	WEST CHILE RISE
527	10	29	8	36	55.1	-5.212	153.960	33	93.662	5.6	-	NEW IRELAND REGION, P.N.G.
528	10	29	13	32	39.9	-29.026	-67.024	150	68.896	-	-	LA RIOJA PROVINCE, ARGENTINA
529	10	30	1	3	26.6	0.824	-25.586	10	82.073	5.2	5.4	CENTRAL MID-ATLANTIC RIDGE
530	10	30	12	1	30.7	-9.708	119.075	33	77.226	5.7	5.3	SUMBA REGION, INDONESIA
531	10	31	10	5	48.8	-54.033	8.397	10	20.763	4.9	-	BOUVET ISLAND REGION
532	10	31	18	9	36.2	-17.964	-175.259	33	89.741	5.4	5.6	TONGA ISLANDS
533	10	31	18	43	20.9	-17.867	-175.312	33	89.825	5.8	5.9	TONGA ISLANDS
534	11	1	0	51	44.4	-19.134	-177.649	568	88.123	4.7	-	FIJI ISLANDS REGION
535	11	1	4	27	45.5	-7.950	-74.422	151	90.978	5.9	-	PERU-BRAZIL BORDER REGION
536	11	1	10	35	55.0	-45.070	167.009	25	59.797	5.8	5.9	SOUTH ISLAND, NEW ZEALAND
537	11	1	12	9	58.9	-45.052	167.118	33	59.839	4.5	-	SOUTH ISLAND, NEW ZEALAND
538	11	1	18	32	10.4	-62.839	145.224	10	38.349	4.8	4.9	SOUTH OF AUSTRALIA
539	11	1	22	4	29.6	-7.271	120.186	573	79.881	4.2	-	FLORES SEA
540	11	1	23	16	36.0	50.410	155.783	134	144.950	-	-	SPAIN
541	11	2	7	27	11.8	-52.639	11.848	10	20.943	5.0	5.0	SOUTHWEST OF AFRICA
542	11	3	6	21	34.1	-32.671	-69.985	105	66.463	4.5	-	MENDOZA PROVINCE, ARGENTINA
543	11	4	12	38	41.3	5.762	125.773	134	93.965	5.4	-	MINDANAO, PHILIPPINES
544	11	5	12	47	4.5	9.938	92.978	33	87.033	5.2	5.4	NICOBAR ISLANDS, INDIA REGION
545	11	7	0	18	4.9	-55.627	-29.876	10	32.864	-	6.7	SOUTH SANDWICH ISLANDS REGION
546	11	7	1	1	49.2	-5.538	151.592	33	92.575	5.6	6.0	NEW BRITAIN REGION, P.N.G.
547	11	7	7	29	31.6	-18.094	168.120	33	85.728	5.0	-	VANUATU ISLANDS
548	11	7	7	50	9.6	-5.432	154.016	91	93.474	5.4	-	SOLOMON ISLANDS
549	11	7	10	39	48.9	-28.356	-176.874	33	79.317	4.9	-	KERMADEC ISLANDS REGION
550	11	8	6	59	58.8	7.042	-77.829	17	106.159	6.0	6.4	PANAMA-COLOMBIA BORDER REGION
551	11	8	15	43	8.3	-7.111	123.252	500	81.129	-	-	BANDA SEA
552	11	9	1	46	42.7	5.737	127.174	63	94.445	5.2	-	PHILIPPINE ISLANDS REGION
553	11	9	5	45	54.1	-15.425	-173.420	53	92.569	5.6	-	TONGA ISLANDS
554	11	9	9	55	43.1	-55.148	-28.873	33	32.886	4.8	-	SOUTH SANDWICH ISLANDS REGION

555	11	9	21	14	8.0	-5.415	154.158	120	93.537	4.8	-	SOLOMON ISLANDS
556	11	10	19	57	5.8	-5.420	154.279	95	93.572	5.1	-	SOLOMON ISLANDS
557	11	10	20	37	51.3	-55.185	-29.779	10	33.178	4.8	-	SOUTH SANDWICH ISLANDS REGION
558	11	12	3	29	57.6	-55.359	-29.896	33	33.082	5.3	5.2	SOUTH SANDWICH ISLANDS REGION
559	11	12	11	49	15.1	-45.063	167.145	33	59.835	4.8	4.7	SOUTH ISLAND, NEW ZEALAND
560	11	12	14	2	10.6	-31.379	76.648	10	43.174	4.8	-	MID-INDIAN RIDGE
561	11	13	0	38	40.8	-3.311	130.439	33	87.237	4.6	-	SERAM, INDONESIA
562	11	13	0	57	46.1	-5.039	153.988	100	93.834	4.8	-	NEW IRELAND REGION, P. N. G.
563	11	13	6	3	3.5	-5.391	154.181	84	93.567	5.2	-	SOLOMON ISLANDS
564	11	13	6	46	11.2	-8.175	-79.929	33	92.521	5.3	5.3	NEAR COAST OF NORTHERN PERU
565	11	13	16	11	45.2	24.295	123.592	53	110.322	4.1	-	SOUTHWESTERN RYUKYU ISL., JAPAN.
566	11	13	16	57	43.5	-50.865	27.958	10	19.046	4.3	-	SOUTH OF AFRICA
567	11	13	23	52	5.9	-57.071	-24.810	33	29.953	-	-	SOUTH SANDWICH ISLANDS REGION
568	11	14	5	38	27.7	-5.005	153.914	100	93.842	-	-	NEW IRELAND REGION, P. N. G.
569	11	14	17	26	32.0	-45.163	167.113	10	59.733	-	-	SOUTH ISLAND, NEW ZEALAND
570	11	15	12	36	21.8	-21.664	170.439	200	82.925	5.1	-	SOUTHEAST OF LOYALTY ISLANDS
571	11	15	19	27	14.3	-14.605	166.656	33	88.653	5.1	5.5	VANUATU ISLANDS
572	11	16	4	7	42.5	-14.584	166.604	33	88.658	5.2	4.7	VANUATU ISLANDS
573	11	16	4	54	56.7	-3.980	152.169	33	94.226	6.0	8.2	NEW IRELAND REGION, P. N. G.
574	11	16	6	40	54.2	-13.660	167.145	192	89.689	5.3	-	VANUATU ISLANDS
575	11	16	7	42	16.9	-5.233	153.102	30	93.361	6.2	7.8	NEW IRELAND REGION, P. N. G.
576	11	16	8	54	27.9	-5.478	153.109	33	93.133	5.4	-	NEW IRELAND REGION, P. N. G.
577	11	16	9	23	13.0	-5.003	153.320	33	93.648	5.6	-	NEW IRELAND REGION, P. N. G.
578	11	16	11	5	41.6	-5.290	152.968	33	93.263	5.9	6.2	NEW BRITAIN REGION, P. N. G.
579	11	16	12	26	18.5	-4.093	152.685	33	94.291	5.5	5.3	NEW BRITAIN REGION, P. N. G.
580	11	16	13	4	43.5	-5.059	153.152	33	93.540	5.2	4.8	NEW IRELAND REGION, P. N. G.
581	11	16	13	22	53.7	-4.690	153.015	33	93.841	5.2	-	NEW IRELAND REGION, P. N. G.
582	11	16	15	55	3.7	-14.702	166.738	33	88.583	5.3	5.0	VANUATU ISLANDS
583	11	16	17	6	31.8	-14.751	166.718	33	88.531	5.2	5.1	VANUATU ISLANDS
584	11	16	17	37	46.7	-5.562	153.466	33	93.172	5.2	4.6	NEW IRELAND REGION, P. N. G.
585	11	16	20	1	6.4	-5.233	152.741	33	93.242	4.6	-	NEW BRITAIN REGION, P. N. G.
586	11	16	23	4	4.7	-5.398	153.171	33	93.229	5.3	5.0	NEW IRELAND REGION, P. N. G.
587	11	17	1	37	4.1	-5.120	152.897	33	93.399	5.7	5.8	NEW BRITAIN REGION, P. N. G.
588	11	17	1	54	2.7	-5.094	153.110	33	93.494	5.4	4.7	NEW IRELAND REGION, P. N. G.
589	11	17	4	22	55.8	-6.268	153.366	33	92.477	5.5	5.5	NEW BRITAIN REGION, P. N. G.
590	11	17	6	30	11.5	-4.982	153.155	33	93.614	5.2	5.0	NEW IRELAND REGION, P. N. G.
591	11	17	20	14	32.3	-20.566	-178.447	536	86.568	4.7	-	FIJI ISLANDS REGION
592	11	17	21	1	56.4	-5.496	151.781	33	92.677	6.2	8.0	NEW BRITAIN REGION, P. N. G.
593	11	18	2	5	48.8	-5.097	153.181	33	93.514	5.9	6.6	NEW IRELAND REGION, P. N. G.
594	11	18	3	30	35.6	-4.224	152.729	33	94.183	5.8	5.5	NEW BRITAIN REGION, P. N. G.
595	11	18	6	54	58.3	-5.228	151.771	33	92.925	6.2	6.6	NEW BRITAIN REGION, P. N. G.
596	11	18	15	4	15.0	-4.583	153.140	33	93.983	5.7	-	NEW IRELAND REGION, P. N. G.
597	11	18	15	51	38.1	-4.632	153.129	33	93.933	5.9	5.4	NEW IRELAND REGION, P. N. G.

598	11	18	19	4	41.4	-5.219	153.446	33	93.487	5.2	5.0	NEW IRELAND REGION, P.N.G.
599	11	18	23	5	39.7	-5.384	153.452	33	93.334	5.7	6.0	NEW IRELAND REGION, P.N.G.
600	11	19	0	38	36.5	-4.682	153.100	33	93.877	5.4	5.5	NEW IRELAND REGION, P.N.G.
601	11	19	2	45	27.5	-5.133	151.655	58	92.975	5.8	5.6	NEW BRITAIN REGION, P.N.G.
602	11	19	5	29	25.8	-4.858	153.015	64	93.684	5.3	-	NEW IRELAND REGION, P.N.G.
603	11	19	5	35	19.3	-5.588	151.867	33	92.619	5.3	5.9	NEW BRITAIN REGION, P.N.G.
604	11	19	16	22	14.9	-4.801	153.112	33	93.769	5.4	5.8	NEW IRELAND REGION, P.N.G.
605	11	20	8	49	34.0	-5.065	152.833	33	93.429	5.5	5.3	NEW BRITAIN REGION, P.N.G.
606	11	21	17	33	34.4	-5.486	152.153	33	92.810	5.7	5.9	NEW BRITAIN REGION, P.N.G.
607	11	21	21	21	5.2	-5.430	152.688	33	93.040	5.6	6.2	NEW BRITAIN REGION, P.N.G.
608	11	22	6	27	13.9	-6.378	153.340	33	92.365	5.7	5.2	NEW BRITAIN REGION, P.N.G.
609	11	22	23	35	4.5	-15.015	166.768	33	88.294	5.4	5.5	VANUATU ISLANDS
610	11	23	4	56	38.6	-5.076	152.559	33	93.329	5.6	5.5	NEW BRITAIN REGION, P.N.G.
611	11	23	18	43	15.6	-4.585	153.058	33	93.954	5.7	6.4	NEW IRELAND REGION, P.N.G.
612	11	23	23	10	35.4	-4.655	152.998	33	93.868	5.5	5.7	NEW BRITAIN REGION, P.N.G.
613	11	24	6	35	56.7	-43.302	-75.396	33	58.239	-	-	OFF COAST OF SOUTHERN CHILE
614	11	24	8	27	30.4	-5.277	152.967	33	93.275	5.2	4.8	NEW BRITAIN REGION, P.N.G.
615	11	24	10	31	3.3	-55.290	-27.076	33	32.137	4.5	-	SOUTH SANDWICH ISLANDS REGION
616	11	24	13	6	59.5	-22.657	-66.250	245	74.548	-	-	JUJUY PROVINCE, ARGENTINA
617	11	24	17	27	11.1	-20.508	-174.367	35	87.435	5.3	5.1	TONGA ISLANDS
618	11	25	2	12	41.5	-23.763	179.964	520	83.136	4.5	-	SOUTH OF FIJI ISLANDS
619	11	25	3	4	52.2	-4.953	152.902	33	93.557	4.6	-	NEW BRITAIN REGION, P.N.G.
620	11	25	3	9	37.4	-9.296	122.146	112	78.709	4.6	-	SAVU SEA
621	11	25	12	15	31.3	-17.930	-178.475	565	89.119	4.5	-	FIJI ISLANDS REGION
622	11	25	18	10	47.3	40.167	49.954	33	109.131	6.2	6.3	EASTERN CAUCASUS
623	11	26	5	23	11.6	-6.444	153.422	33	92.330	5.4	5.1	NEW BRITAIN REGION, P.N.G.
624	11	26	11	42	31.8	-33.688	-71.807	43	66.084	4.6	-	NEAR COAST OF CENTRAL CHILE
625	11	26	23	9	58.5	-60.228	-47.067	10	35.031	5.2	4.6	SCOTIA SEA
626	11	27	10	54	29.8	-24.663	-70.151	58	73.957	5.1	-	NEAR COAST OF NORTHERN CHILE
627	11	29	10	25	13.2	-24.869	-70.886	58	74.000	5.8	5.9	NEAR COAST OF NORTHERN CHILE
628	11	29	23	6	24.9	1.440	123.707	33	89.218	4.9	-	MINAHASSA PENINSULA, SULAWESI
629	12	1	9	2	2.1	-26.696	-71.511	33	72.495	-	-	OFF COAST OF NORTHERN CHILE
630	12	1	22	57	3.2	-30.467	-178.132	68	77.023	5.0	-	KERMADEC ISLANDS, NEW ZEALAND
631	12	2	6	2	58.6	-30.603	-178.056	58	76.905	5.0	-	KERMADEC ISLANDS, NEW ZEALAND
632	12	2	9	5	42.7	-57.560	-65.513	33	42.681	4.9	-	DRAKE PASSAGE
633	12	3	12	55	16.7	51.666	-178.156	43	155.130	5.6	5.1	ANDREANOF ISLANDS, ALEUTIAN ISLAND
634	12	4	10	17	24.6	53.080	171.018	33	152.596	5.2	4.6	NEAR ISLANDS, ALEUTIAN ISLANDS
635	12	4	22	16	37.4	-56.234	-143.535	10	55.042	5.0	-	PACIFIC-ANTARCTIC RIDGE
636	12	5	2	9	20.2	-26.266	179.591	487	80.633	5.0	-	SOUTH OF FIJI ISLANDS
637	12	5	11	8	25.0	4.222	126.439	101	92.777	5.5	5.1	TALAUD ISLANDS, INDONESIA
638	12	5	22	11	34.4	52.577	-167.847	33	159.089	5.6	5.6	FOX ISLANDS, ALEUTIAN ISLANDS
639	12	6	6	47	44.3	-10.900	-78.324	41	89.452	5.5	-	NEAR COAST OF PERU
640	12	6	17	11	6.4	39.566	54.799	30	108.848	6.7	7.5	TURKMENISTAN

641	12	6	22	57	40.0	-4.218	152.725	31	94.187	6.1	6.6	NEW BRITAIN REGION, P.N.G.
642	12	7	6	34	57.0	-32.474	-71.719	40	67.184	4.6	-	NEAR COAST OF CENTRAL CHILE
643	12	7	9	31	19.1	-4.274	152.786	33	94.155	5.7	5.7	NEW BRITAIN REGION, P.N.G.
644	12	7	19	13	33.0	-4.305	152.863	33	94.152	5.1	4.7	NEW BRITAIN REGION, P.N.G.
645	12	7	23	2	38.4	-4.307	152.842	33	94.143	5.1	-	NEW BRITAIN REGION, P.N.G.
646	12	7	23	18	19.7	-4.235	152.883	33	94.224	5.4	5.1	NEW BRITAIN REGION, P.N.G.
647	12	8	0	5	39.3	-14.930	167.510	114	88.579	4.7	-	VANUATU ISLANDS
648	12	8	18	2	44.5	-29.832	-177.850	33	77.694	5.3	4.9	KERMADEC ISLANDS, NEW ZEALAND
649	12	9	23	38	39.4	-21.955	-179.503	597	85.000	5.1	-	FIJI ISLANDS REGION
650	12	10	3	17	58.4	-6.698	155.716	67	92.837	5.0	-	SOLOMON ISLANDS
651	12	10	18	58	36.5	0.050	127.380	150	89.250	5.4	-	HALMAHERA, INDONESIA
652	12	11	0	17	51.5	-54.234	-120.623	10	56.211	-	-	SOUTHERN EAST PACIFIC RISE
653	12	11	12	58	47.1	-29.896	-176.808	52	77.833	5.2	-	KERMADEC ISLANDS REGION
654	12	11	17	7	32.7	-55.910	-28.060	114	32.001	5.7	-	SOUTH SANDWICH ISLANDS REGION
655	12	11	18	26	41.2	-30.608	-178.117	33	76.889	4.9	-	KERMADEC ISLANDS, NEW ZEALAND
656	12	13	6	10	22.6	-3.095	148.331	33	93.759	5.1	5.6	BISMARCK SEA
657	12	13	6	46	11.0	-6.246	153.105	33	92.412	5.4	5.1	NEW BRITAIN REGION, P.N.G.
658	12	13	14	29	14.5	-4.856	153.196	33	93.745	5.1	-	NEW IRELAND REGION, P.N.G.
659	12	13	23	37	49.4	-21.652	170.626	100	82.984	4.9	-	SOUTHEAST OF LOYALTY ISLANDS
660	12	14	2	39	26.2	-0.041	123.508	165	87.773	4.9	-	MINAHASSA PENINSULA, SULAWESI
661	12	14	17	1	35.3	-8.323	110.909	104	75.619	4.8	-	JAWA, INDONESIA
662	12	15	12	47	9.8	-21.565	-69.736	75	76.710	5.1	-	NORTHERN CHILE
663	12	15	13	0	1.8	-50.400	-6.883	10	28.885	5.3	5.4	SOUTHERN MID-ATLANTIC RIDGE
664	12	15	22	53	30.1	-17.777	-178.838	600	89.190	4.6	-	FIJI ISLANDS REGION
665	12	16	11	5	28.4	-26.820	-113.342	10	82.420	5.3	5.1	EASTER ISLAND REGION
666	12	16	16	21	54.0	-8.060	156.150	33	91.696	4.3	-	SOLOMON ISLANDS
667	12	17	1	33	58.1	54.388	162.055	33	150.430	5.2	4.6	NEAR EAST COAST OF KAMCHATKA
668	12	17	7	31	59.5	-23.790	179.924	550	83.101	4.1	-	SOUTH OF FIJI ISLANDS
669	12	17	22	24	45.7	-20.514	169.774	123	83.854	5.3	-	VANUATU ISLANDS
670	12	18	1	19	21.6	-21.178	-179.124	628	85.833	6.4	-	FIJI ISLANDS REGION
671	12	18	11	39	51.1	-12.455	166.356	100	90.615	4.9	-	SANTA CRUZ ISLANDS
672	12	18	21	15	30.7	-21.182	-179.097	649	85.835	5.2	-	FIJI ISLANDS REGION
673	12	20	9	19	50.1	53.418	159.837	67	148.860	5.5	-	NEAR EAST COAST OF KAMCHATKA
674	12	20	10	31	58.2	-49.729	125.680	10	43.473	4.9	4.2	WESTERN INDIAN-ANTARCTIC RIDGE
675	12	20	11	23	54.1	-39.008	-74.662	11	62.001	6.1	6.2	OFF COAST OF CENTRAL CHILE
676	12	20	13	28	40.2	-22.820	-66.355	223	74.431	5.3	-	JUJUY PROVINCE, ARGENTINA
677	12	20	16	39	26.3	-24.123	-176.802	69	83.447	5.6	-	SOUTH OF FIJI ISLANDS
678	12	21	1	1	27.7	-5.706	151.122	33	92.261	6.4	6.5	NEW BRITAIN REGION, P.N.G.
679	12	21	2	41	23.1	-5.354	154.133	387	93.586	5.5	-	SOLOMON ISLANDS
680	12	21	3	5	58.6	-18.235	-178.134	436	88.895	5.0	-	FIJI ISLANDS REGION
681	12	22	16	29	59.9	-26.408	-107.147	10	81.810	5.0	4.9	EASTER ISLAND REGION
682	12	23	7	13	24.3	-7.873	135.816	62	84.938	5.8	5.4	ARU ISLANDS REGION, INDONESIA
683	12	23	21	31	6.3	-31.455	-178.214	96	76.048	4.9	-	KERMADEC ISLANDS REGION

684	12	24	1	14	14.2	-18.149	-13.605	10	60.393	-	-	SOUTHERN MID-ATLANTIC RIDGE
685	12	24	3	11	7.4	-4.196	123.247	33	83.828	5.3	5.1	BANDA SEA
686	12	24	12	42	58.6	-20.746	-178.757	626	86.329	4.4	-	FIJI ISLANDS REGION
687	12	25	5	11	58.5	-21.264	-179.124	645	85.750	5.3	-	FIJI ISLANDS REGION
688	12	25	11	16	35.1	-23.277	-176.410	33	84.347	5.2	4.9	SOUTH OF FIJI ISLANDS
689	12	25	13	24	22.9	-42.519	120.175	10	47.800	5.8	5.6	SOUTH OF AUSTRALIA
690	12	25	23	0	26.5	-25.820	-175.300	33	82.084	4.3	-	SOUTH OF TONGA ISLANDS
691	12	26	6	0	56.1	-21.051	168.655	33	83.048	5.0	-	LOYALTY ISLANDS
692	12	26	15	21	26.6	-35.025	179.670	33	72.170	5.3	5.4	OFF E. COAST OF N. ISLAND, N.Z.
693	12	27	2	31	34.9	-7.270	121.171	542	80.235	4.5	-	FLORES SEA
694	12	27	7	26	31.6	-4.228	152.730	33	94.180	5.7	5.6	NEW BRITAIN REGION, P.N.G.
695	12	28	4	34	28.4	-4.050	152.307	33	94.206	5.6	6.0	NEW BRITAIN REGION, P.N.G.
696	12	28	16	5	26.8	-8.138	117.940	33	78.274	5.2	5.0	SUMBAWA REGION, INDONESIA
697	12	28	18	12	33.1	-22.438	-175.110	33	85.414	5.1	5.3	TONGA ISLANDS REGION
698	12	28	22	0	51.1	-5.710	154.410	94	93.342	5.2	-	SOLOMON ISLANDS
699	12	30	7	42	46.7	-12.472	166.934	221	90.761	5.1	-	SANTA CRUZ ISLANDS
700	12	31	7	8	57.0	-63.998	-61.728	33	36.279	-	-	SOUTH SHETLAND ISLANDS
701	12	31	21	56	50.9	-38.040	178.800	33	69.081	4.9	-	OFF E. COAST OF N. ISLAND, N.Z.

APPENDIX

Table 3. List of the additional phase arrival-time data in 1999.

Date	Phase	UTC Time		Date	Phase	UTC Time	
		h	m s			h	m s
Jan.	1	+IPZ	0425 48.8	13	+EPZ	0659	24.5
		+EPZ	1304 07.5	14	+EPZ	1437	54.2
		-EPZ	1305 34.0		-IXZ	1437	57.0
		-EPZ	1309 51.4		-EPZ	1625	07.0
		+EPZ	1626 05.8	15	+EPZ	0351	44.2
	3	-EPZ	0636 05.7		-EPZ	1052	06.3
		+IPZ	0710 53.7	18	-EPZ	1236	10.3
		+IPZ	1849 24.0		+EPZ	2033	14.0
	6	-IPZ	0438 50.9	19	+EPZ	0644	19.1
	7	+EPZ	1607 45.8		+EPZ	1108	10.5
	9	+EPZ	0807 08.5		+EPZ	1129	08.0
	10	+IPZ	0713 38.6		-EPZ	1335	44.4
	12	+IPZ	1741 45.0	20	+EPZ	1034	10.2
	13	+EPZ	0314 53.5		-IXZ	1034	22.4
		IXZ	1342 54.4	21	+EPZ	1005	11.3
		+IPZ	2024 29.3	22	+EPZ	1149	23.8
	17	-EPZ	0825 49.5	27	+EPZ	0334	26.3
		+EPZ	1850 24.5		+EPZ	0909	37.8
	18	+EPZ	1156 30.0		+EPZ	0913	41.9
	19	+EPZ	0954 16.2		+EPZ	1011	46.6
	20	+IPZ	0423 18.8		-EPZ	1749	27.7
		+EPZ	1946 03.0		+EPZ	2148	34.9
	24	+EPZ	0110 12.0		-EPZ	2357	34.7
	27	+EPZ	0932 14.4	28	-IPZ	0452	51.2
		+EPZ	1031 35.5		-IPZ	0503	37.7
	30	+EPZ	1717 52.2		-IPZ	0557	32.2
	Feb.	2	-IPZ	0833 53.3		-EPZ	1530
		+EPZ	2106 01.7	Mar.	1	-EPZ	0302 58.2
3		+EPZ	0822 17.4		-EPZ	1706 35.8	
5		-EPZ	0725 08.2	3	-EPZ	1215 39.4	
		-EPZ	1841 37.8		-EPZ	1408 14.2	
7		-EPZ	0829 20.0	4	+EPZ	0134 56.0	
		+EPZ	1942 23.8		-IPZ	0329 26.1	
8		+EPZ	0725 59.3	6	+EPZ	1855 59.2	
		-EPZ	0728 46.8	7	+EPZ	0229 18.0	
		-IPZ	0731 34.6		-IPZ	0531 59.8	
9		-EPZ	0253 35.7		-IXZ	0532 33.5	
10		-EPZ	1708 11.4	8	+EPZ	0115 06.3	
12		-IPZ	0722 12.5		-EPZ	1057 34.0	
		-EPZ	1504 40.6		-EPZ	1313 54.7	
		+EPZ	2019 13.7	9	-EPZ	1700 31.3	
	-EPZ	2118 24.0	10	+EPZ	0618 34.2		

Date	Phase	UTC Time h m s	
11	-EPZ	0804	31.0
	+EPZ	1830	13.7
14	-EPZ	0351	03.8
	+EPZ	1147	41.3
15	+EPZ	0007	59.3
	-EPZ	0535	01.9
16	+EPZ	0048	29.6
	+EPZ	0111	38.8
16	+EPZ	0315	22.5
	-IPZ	1407	01.0
	-EPZ	1923	39.6
19	-EPZ	0231	01.0
22	-EPZ	1218	24.5
23	+EPZ	0756	59.5
26	-EPZ	1147	07.2
27	-EPZ	1451	40.0
	-EPZ	1636	21.0
	-IPZ	2352	00.0
28	-EPZ	0813	20.6
29	+EPZ	2356	36.8
30	-IPZ	1627	34.4
Apr. 1	+EPZ	1745	49.4
	+EPZ	1803	36.0
	+EPZ	2038	35.6
2	-EPZ	0630	51.6
	+EPZ	1309	34.9
	+IPZ	1430	21.8
3	-EPZ	0458	04.7
	+IXZ	0458	14.8
4	-EPZ	0243	25.6
	+EPZ	2012	27.8
5	-EPZ	0004	11.8
	-EPZ	0809	15.7
6	-EPZ	0947	49.1
	+IPZ	2038	00.5
	+EPZ	2258	24.1
7	+IPZ	0134	40.8
	-IXZ	0135	01.3
	+EPZ	1611	40.5
	-EPZ	2005	24.5
8	+EPZ	0139	04.4
	+EPZ	0454	06.4

Date	Phase	UTC Time h m s	
8	+EPZ	1235	29.5
	+IPZ	1423	30.4
	+EPZ	1744	43.7
9	+EPZ	2022	12.0
	+IPZ	0109	11.3
	-EPZ	0903	24.2
10	+EPZ	1323	52.1
	-IPZ	1548	31.3
	-EPZ	2220	05.0
11	+EPZ	0337	19.7
	+EPZ	0708	35.1
	-EPZ	1143	42.3
13	+EPZ	1414	19.9
	+EPZ	1513	21.1
	+EPZ	0915	45.6
26	-EPZ	1157	53.8
	-IPZ	2058	53.0
	+EPZ	1927	26.6
29	+EPZ	0415	35.8
	+EPZ	0938	47.0
	-EPZ	1319	20.4
May 4	+EPZ	0016	20.4
	-EPZ	1921	20.3
	-EPZ	0119	25.5
16	+EPZ	0453	25.0
	-EPZ	1753	07.8
	+EPZ	1121	23.8
20	+EPZ	2054	33.1
	-IPZ	0945	51.0
	-EPZ	1343	36.5
27	-EPZ	0319	19.5
	-IXZ	0319	29.8
	-EPZ	0539	24.4
30	+EPZ	0102	19.3
	+EPZ	1456	32.0
	+EPZ	0452	23.1
Jun. 1	-EPZ	2017	36.7
	+EPZ	0631	39.3
	+EPZ	0018	34.5
2	+EPZ	1854	41.0
	-IXZ	1855	00.8
	+EPZ	2003	27.7

Date	Phase	UTC Time h m s		Date	Phase	UTC Time h m s	
	9	-EPZ	0905 27.0		15	+EPZ	0908 51.3
	10	-IPZ	1553 45.8		16	-EPZ	0409 32.0
	11	+EPZ	0434 19.4			+EPZ	0844 35.8
		-EPZ	0729 46.5		17	-EPZ	2252 50.5
	14	-EPZ	0945 03.0		21	+EPZ	1706 21.0
	16	+EPZ	1324 32.0		23	-EPZ	1404 25.0
	17	+EPZ	0112 50.9		24	-EPZ	0814 06.5
	18	-EPZ	0639 15.8		25	+EPZ	0521 12.5
	22	+EPZ	0229 58.0			-IPZ	1206 26.8
		+EPZ	1454 40.3			+EPZ	1602 53.2
	23	-EPZ	1657 25.8		27	-EPZ	1834 52.0
	28	-EPZ	0527 02.3			+IPZ	1902 40.5
		+EPZ	0900 10.0	Aug.	1	-IPZ	0732 04.2
		+EPZ	1906 38.5		5	-IPZ	0946 13.5
	29	-EPZ	1438 41.7		7	+EPZ	1737 13.5
		-IPZ	1508 11.0		9	+EPZ	1827 19.5
Jul.	2	+EPZ	2044 07.2			-EPZ	1948 20.0
		+IPZ	2055 10.3		10	+EPZ	0937 17.4
	3	+EPZ	0303 18.4		11	-EPZ	0314 30.5
		-EPZ	2033 29.4		12	-EPZ	0309 33.2
	4	+EPZ	0851 11.6			+IXZ	0309 40.4
		-EPZ	1001 23.2		14	+EPZ	1926 58.5
		+IPZ	1603 22.8		17	+EPZ	0538 49.2
	5	-EPZ	2034 53.5		18	+EPZ	2225 20.8
	7	-EPZ	2055 41.2		20	+EPZ	0931 13.2
		+EPZ	2141 54.7		21	-IPZ	1750 54.0
	9	+IPZ	0314 40.2		23	+EPZ	0417 53.4
		+IPZ	1143 43.2		28	+EPZ	1433 30.4
		+EPZ	1558 11.1		30	+EPZ	0313 53.9
		-EPZ	1723 49.0			-EPZ	1625 48.0
		-IPZ	1825 53.0	Sep.	1	+EPZ	0157 22.0
	10	+EPZ	1408 44.6		4	-EPZ	0427 29.3
		-IPZ	1600 22.7		6	+EPZ	0636 39.0
		+EPZ	1619 40.5		8	+EPZ	2008 44.4
		+IPZ	2032 21.4		9	+EPZ	1544 53.8
	11	+EPZ	2114 06.8		13	+EPZ	2334 50.0
		+EPZ	2144 37.3		14	+EPZ	1341 52.5
	12	+EPZ	1120 16.1		15	+EPZ	1056 46.8
		+EPZ	1449 26.9		16	+EPZ	1310 38.0
		-IPZ	2103 18.3		17	-EPZ	1150 51.3
	14	-IPZ	2003 43.2		22	-EPZ	1849 02.0
	15	+EPZ	0242 29.2		23	+EPZ	0929 34.5

Date	Phase	UTC Time h m s	
	23	+EPZ	1114 19.5
	24	+EPZ	2242 11.7
	25	+IPZ	2027 49.4
	26	+EPZ	2145 45.9
	29	+EPZ	0959 11.8
Oct.	3	+IPZ	2034 53.5
	5	-EPZ	0355 12.5
	6	+IPZ	1802 43.2
	9	-IPZ	2054 27.9
	10	+EPZ	0317 50.6
	11	-EPZ	0402 06.6
	15	+EPZ	0640 48.2
	16	-EPZ	1050 05.0
	17	-EPZ	0433 09.5
	19	-EPZ	0307 04.0
	20	+EPZ	1857 44.5
	21	+EPZ	2100 51.5
	22	+EPZ	0549 53.7
		+EPZ	0653 46.7
	27	+EPZ	0101 31.2
	28	+EPZ	1203 06.5
	29	+EPZ	2049 31.2
Nov.	1	+EPZ	0117 36.0
		+IPZ	0332 43.6
	4	+IPZ	1205 50.5
	7	+IPZ	1748 16.5
	9	+EPZ	0824 30.0
	10	-IXZ	0759 36.8
	11	-EPZ	0900 50.0
	12	+IPZ	1928 08.2
	17	+IPZ	1158 54.0
	18	+EPZ	1317 44.2
		+IXZ	1317 45.8
	20	+EPZ	1022 47.7
		-IPZ	2304 42.0
		-IXZ	2304 49.5
	21	-EPZ	1419 24.0
	22	+EPZ	0540 31.5
		+EPZ	0808 11.8
		+EPZ	1640 30.2
	24	-EPZ	1652 46.8
		+IPZ	2110 39.9

Date	Phase	UTC Time h m s	
	25	+EPZ	1958 40.1
	27	+EPZ	1834 48.5
	28	+EPZ	0521 06.3
Dec.	5	+EPZ	1411 51.7
		+EPZ	1615 03.5
	10	+EPZ	0551 10.1
	11	+IXZ	0814 06.8
	12	+EPZ	2156 25.4
	14	+EPZ	0102 56.5
		+EPZ	0124 44.8
	18	-EPZ	2319 19.0
	19	+EPZ	1826 54.3
		-EPZ	2118 41.2
		-EPZ	2121 54.2
	20	+EPZ	1015 13.2
	22	+EPZ	1531 38.8
	23	-EPZ	1308 24.6
	27	-EPZ	1933 57.6
	31	-EPZ	1006 22.4