2. GEOPHYSICAL PROFILING[1]

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INTRODUCTION

Site selection for ODP Leg 110 on the Barbados forearc was based on multichannel seismic (MCS) profiles described in Chapter 1. Positioning the ship to core at these previously chosen locations required using a combination of navigation and recognition of bathymetric features such as slope breaks and ponded sediments, and seismic structural characteristics. Underway geophysical data were collected as we approached all sites except where only minor offsetting was required (i.e., usually less than 1-2 km). The shipboard geophysical data provided the tie needed to position the ship at preferred locations relative to the principal MCS seismic sections.

The JOIDES Resolution was underway 4.5% of the time during the 50.7 days spent at sea. During most of this time routine geophysical measurements were obtained. The onboard instrumentation used included precision echo-sounders, magnetometer, seismic reflection profilers, and satellite navigation systems. The instruments were maintained and operated by the ODP marine technicians, in cooperation with the scientific party and the officers and crew of SEDCO-SCHLUMBERGER, Inc.

NAVIGATION

A variety of navigational aids were used when underway, in transit between sites, and during site approaches. The ship has two transit satellite receivers: a Magnavox 1107-GPS, located aft in the underway geophysics laboratory, and a Magnavox 702A-3 located on the bridge. The satellite receiver in the laboratory receives fixes from the Global Positioning System (GPS) as well as the standard transit satellite system. Both the Magnavox 1107-GPS and the Magnavox 702HP satellite receivers calculate dead-reckoning positions.

Satellite fixes were written to the extended tape headers on a Masscomp computer (Table 1) and extracted later to produce a general navigation plot for Leg 110 (Fig. 1). Satellite navigation fixes collected during Leg 110 are indicated by date and time in Figures 1 and 2. Figure 2 is an expanded view of the ship track and site locations of Leg 110 operations. Navigation for the tracks shown are derived from both satellite fixes and dead-reckoning data. Fixes collected while on site are averaged and a single point is plotted for the entire site. All navigation is plotted on Mercator projection maps.

BATHYMETRIC DATA RECORDING

Bathymetric data were collected at 3.5 and 12 kHz during site approaches. The standard 3.5-kHz system uses an array of 12 Raytheon TR-109 transducers and a Raytheon PTR-105B transceiver. The data were displayed on an EDO model 550 flatbed recorder. A Raytheon CESP-III correlator was used to improve signal-to-noise ratio (20 dB). Pulse width for the hull-mounted array, located 6 m below sea level, was 100 ms.

The ship has two 12-kHz transducers: a Raytheon TC-12/34 is mounted aft of the moon pool and an EDO 323B is mounted forward, under the bridge. The 12-kHz system uses an EDO 248C transceiver and an EDO 550 flatbed recorder. All bathymetric data obtained during Leg 110 is available, upon request, from the ODP Data Base Supervisor.

MAGNETICS

Total intensity measurements of the Earth's magnetic field were obtained with a Geometrics 801 proton precession magnetometer, the sensor of which was towed approximately 300 m astern. These data were recorded in the header of seismic tapes, one reading per seismic shot, and were also recorded manually every 5 min in the geophysical log. This measurement was displayed in real time on a strip chart recorder and is available from the ODP Data Base Supervisor.

SEISMIC REFLECTION PROFILES

Single-channel seismic reflection data were collected along four lines during ODP Leg 110. The following equipment was employed.

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[1] Mascle, A., Moore, J. C., et al., 1988. *Proc., Init. Repts. (Pt. A), ODP*, 110: College Station, TX (Ocean Drilling Program).

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Sources

Lines 1 and 5 were shot with two synchronized 80-in^3. Seismic System, Inc. water guns. The source for Line 3 consisted of one 400-in.^{3} watergun towed at 10 to 15 ft below sea level.

Streamer-hydrophones

A Teledyne Model 178 streamer, 100 m long, was towed less than 500 m behind the vessel. The streamer contains 60 equally spaced hydrophones whose output is transformer-coupled to the ship. The towing depth was set by external depth depressors (birds). The hydrophone elements were combined to produce a single signal.

Data Recording

The unprocessed 20- to 250-Hz prefiltered digital signal was recorded on 9-track magnetic tape using an SEG-Y format and a density of 1600 bpi. In addition to the magnetometer and navigation data discussed above, the header file for each shotpoint on the magnetic tape includes the following information: shotpoint number, field time break delay, date and time, wind speed and direction, ship's speed (pit log), ship's gyro heading, cumulative distance traveled, streamer and gun depth, and information concerning timing of gun firing. These data can be obtained, on request, from the ODP Database Supervisor.

The seismic system used a super-micro 561 Masscomp computer to record, process, and display the data. The processed profiles were displayed approximately 3 min after measurement on a 15-in.-wide Printronix high-resolution graphic printer (160 dots per inch).

Seismic data were also displayed in real time in analog format on two EDO 550 dry-paper recorders. The streamer signal was passed through amplifiers and band-pass filters to each recorder. These analog seismic lines are not shown here but can be obtained, on request, from the ODP Data Base Supervisor.

SEISMIC PROCESSING

Leg 110 survey seismic lines were reprocessed at ODP-TAMU Headquarters after the cruise. The processing techniques applied are described in Table 2. The reprocessing profiles were displayed on a 22-in.-wide Versatec plotter (200 dots per in.). See Figures 3 to 6.

Seismic lines were displayed with the following plotting parameters:

Traces per inch: 22
Clip high: 0.10 in.
Clip Low: -0.10 in.
Deflection: 0.10 in.
SP numbering increment: 20
Plot time scale: 6.25 in./s
Variable area display
Positive peaks to the right

ACKNOWLEDGMENTS

The scientific party of Leg 110 is extremely grateful to Captain Ed Oonk, his officers and crew for their excellence in navigation and cooperative spirit. Thanks goes also to the ODP group for the many hours of watch-standing and to Mark Weiderspahn and Ali Tufayli of the University of Texas at Austin who designed and wrote the seismic digital acquisition system.

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Table 1. Navigation data for Leg 110.

Date	Time [a](UTC)	*N. lat.* deg	min	*W. long.* deg	min	Cum. dis. nmi	*Actual* speed kt	cse deg	*Drift* speed kt	cse deg	*Dead rec.* speed kt	cse deg	comm.
June 1986													
26	*1621	13	6.28	59	37.87	0	8.1	344	1.7	138	9.6	340	[b]SN
26	1741	13	16.7	59	40.8	10.8	11.4	342	1.7	138	13.0	339	[c]c/cs
26	1747	13	17.8	59	41.2	12.0	10.4	343	1.7	138	12.0	340	c/cs
26	1749	13	18.1	59	41.3	12.3	11.2	342	1.7	138	12.8	339	c/cs
26	1758	13	19.7	59	41.8	14.0	11.4	343	1.7	138	12.9	340	c/cs
26	1800	13	20.1	59	42.0	14.4	8.3	344	1.7	138	9.9	340	c/cs
26	1801	13	20.2	59	42.0	14.5	11.4	342	1.7	138	13.0	339	c/cs
26	1802	13	20.4	59	42.1	14.7	10.9	357	1.7	138	12.3	352	c/cs
26	1803	13	20.6	59	42.1	14.9	11.3	24	1.7	138	12.1	17	c/cs
26	*1808	13	21.44	59	41.66	15.8	12.0	24	1.5	115	12.1	17	SN
26	1823	13	24.2	59	40.4	18.8	11.9	25	1.5	115	12.0	18	c/cs
26	1847	13	28.5	59	38.3	23.6	11.1	26	1.5	115	11.2	18	c/cs
26	1854	13	29.6	59	37.7	24.9	12.0	25	1.5	115	12.1	18	c/cs
26	1906	13	31.8	59	36.7	27.3	10.7	26	1.5	115	10.8	18	c/cs
26	1909	13	32.3	59	36.4	27.8	11.9	26	1.5	115	12.0	19	c/cs
26	1925	13	35.1	59	35.0	31.0	10.7	26	1.5	115	10.8	18	c/cs
26	1928	13	35.6	59	34.8	31.5	11.7	25	1.5	115	11.8	18	c/cs
26	1945	13	38.6	59	33.3	34.8	10.7	26	1.5	115	10.7	18	c/cs
26	1947	13	38.9	59	33.1	35.2	11.8	25	1.5	115	11.9	18	c/cs
26	2006	13	42.3	59	31.5	38.9	7.6	29	1.5	115	7.6	18	c/cs
26	2007	13	42.4	59	31.4	39.0	11.9	25	1.5	115	12.0	18	c/cs
26	2017	13	44.2	59	30.6	41.0	11.8	25	1.5	115	11.9	18	c/cs
26	2029	13	46.3	59	29.5	43.4	11.8	25	1.5	115	11.9	18	c/cs
26	2045	13	49.2	59	28.1	46.5	11.7	25	1.5	115	11.8	18	c/cs
26	2058	13	51.5	59	27.0	49.1	11.7	25	1.5	115	11.8	18	c/cs
26	2112	13	54.0	59	25.8	51.8	11.5	25	1.5	115	11.6	18	c/cs
26	2133	13	57.6	59	24.0	55.8	7.0	31	1.5	115	7.0	19	c/cs
26	2135	13	57.8	59	23.9	56.1	11.6	26	1.5	115	11.7	19	c/cs
26	*2140	13	58.66	59	23.45	57.0	11.7	10	1.8	284	11.7	19	SN
26	2141	13	58.9	59	23.4	57.2	12.1	9	1.8	284	12.1	17	c/cs
26	2145	13	59.7	59	23.3	58.0	11.5	9	1.8	284	11.5	18	c/cs
26	2201	14	2.7	59	22.8	61.1	12.1	10	1.8	284	12.1	18	c/cs
26	2214	14	5.3	59	22.3	63.7	11.3	24	1.8	284	11.7	33	c/cs
26	2224	14	7.0	59	21.5	65.6	11.5	25	1.8	284	11.9	33	c/cs
26	2232	14	8.4	59	20.9	67.1	11.1	24	1.8	284	11.6	33	c/cs

Table 1 (continued).

Date	Time ᵃ(UTC)	*N. lat.* deg	*N. lat.* min	*W. long.* deg	*W. long.* min	Cum. dis. nmi	*Actual* speed kt	*Actual* cse deg	*Drift* speed kt	*Drift* cse deg	*Dead rec.* speed kt	*Dead rec.* cse deg	comm.
June 1986 (cont.)													
26	2241	14	9.9	59	20.2	68.8	11.4	25	1.8	284	11.8	33	c/cs
26	2246	14	10.8	59	19.8	69.8	11.4	25	1.8	284	11.8	33	c/cs
26	2257	14	12.7	59	18.9	71.9	11.6	25	1.8	284	12.0	33	c/cs
26	2310	14	14.9	59	17.8	74.4	11.5	21	1.8	284	11.8	30	c/cs
26	2320	14	16.7	59	17.1	76.3	11.8	23	1.8	284	12.1	31	c/cs
26	*2328	14	18.16	59	16.44	77.8	12.9	22	2.0	317	12.1	31	SN
26	2329	14	18.4	59	16.4	78.1	13.0	22	2.0	317	12.3	31	c/cs
26	2350	14	22.6	59	14.6	82.6	12.4	23	2.0	317	11.7	32	c/cs
26	2358	14	24.1	59	13.9	84.3	13.0	22	2.0	317	12.3	31	c/cs
27	0000	14	24.5	59	13.7	84.7	13.0	22	2.0	317	12.3	31	c/cs
27	0008	14	26.1	59	13.1	86.4	9.4	20	2.0	317	8.7	32	c/cs
27	0010	14	26.4	59	12.9	86.7	12.8	22	2.0	317	12.1	31	c/cs
27	0031	14	30.5	59	11.2	91.2	12.7	23	2.0	317	12.0	32	c/cs
27	0041	14	32.5	59	10.3	93.3	13.1	23	2.0	317	12.4	32	c/cs
27	*0042	14	32.67	59	10.24	93.5	13.0	25	1.7	317	12.4	32	SN
27	0046	14	33.5	59	9.9	94.4	12.5	24	1.7	317	12.0	32	c/cs
27	0054	14	35.0	59	9.2	96.1	12.8	24	1.7	317	12.2	31	c/cs
27	0103	14	36.7	59	8.4	98.0	2.1	339	1.7	317	0.8	32	c/cs
27	0104	14	36.8	59	8.4	98.0	12.5	23	1.7	317	11.9	31	c/cs
27	0112	14	38.3	59	7.7	99.7	12.9	21	1.7	317	12.2	28	c/cs
27	0124	14	40.7	59	6.8	102.3	12.7	21	1.7	317	12.1	28	c/cs
27	0132	14	42.3	59	6.1	104.0	12.9	20	1.7	317	12.2	27	c/cs
27	0147	14	45.3	59	5.0	107.2	10.0	20	1.7	317	9.3	29	c/cs
27	0149	14	45.6	59	4.9	107.5	12.8	21	1.7	317	12.1	28	c/cs
27	0209	14	49.6	59	3.3	111.8	13.0	21	1.7	317	12.3	28	c/cs
27	0212	14	50.2	59	3.1	112.4	4.0	3	1.7	317	3.1	27	c/cs
27	0214	14	50.4	59	3.1	112.5	12.7	22	1.7	317	12.0	29	c/cs
27	0218	14	51.1	59	2.8	113.4	12.2	27	1.7	317	11.7	35	c/cs
27	0225	14	52.4	59	2.1	114.8	12.6	26	1.7	317	12.1	34	c/cs
27	*0230	14	53.34	59	1.62	115.9	12.6	29	1.2	329	12.1	34	SN
27	0248	14	56.7	58	59.7	119.7	12.5	31	1.2	329	12.0	36	c/cs
27	0303	14	59.3	58	58.0	122.8	12.5	31	1.2	329	12.0	36	c/cs
27	0308	15	0.2	58	57.5	123.8	13.0	31	1.2	329	12.5	36	c/cs
27	0311	15	0.8	58	57.1	124.5	12.6	31	1.2	329	12.1	36	c/cs
27	0357	15	9.1	58	52.0	134.2	12.5	30	1.2	329	11.9	35	c/cs
27	*0358	15	9.27	58	51.88	134.4	12.6	31	1.0	342	11.9	35	SN
27	0401	15	9.8	58	51.5	135.0	7.5	30	1.0	342	6.9	36	c/cs
27	0402	15	9.9	58	51.5	135.1	12.6	32	1.0	342	12.0	36	c/cs
27	0417	15	12.6	58	49.7	138.3	12.7	32	1.0	342	12.1	36	c/cs
27	0437	15	16.1	58	47.4	142.5	12.5	32	1.0	342	11.9	36	c/cs
27	0442	15	17.0	58	46.8	143.5	12.9	33	1.0	342	12.3	36	c/cs
27	0450	15	18.5	58	45.8	145.2	12.5	33	1.0	342	11.9	37	c/cs
27	0455	15	19.3	58	45.2	146.3	6.4	29	1.0	342	5.8	36	c/cs
27	0457	15	19.5	58	45.1	146.5	12.8	32	1.0	342	12.2	36	c/cs
27	0510	15	21.8	58	43.6	149.3	12.8	32	1.0	342	12.2	36	c/cs
27	0520	15	23.6	58	42.4	151.4	12.8	32	1.0	342	12.2	36	c/cs
27	0533	15	26.0	58	40.9	154.2	8.8	31	1.0	342	8.2	36	c/cs
27	0535	15	26.2	58	40.7	154.5	12.7	32	1.0	342	12.1	36	c/cs
27	0541	15	27.3	58	40.0	155.7	11.1	26	1.0	342	10.4	30	c/cs
27	0543	15	27.6	58	39.8	156.1	8.0	23	1.0	342	7.3	28	c/cs
27	0546	15	28.0	58	39.7	156.5	6.4	16	1.0	342	5.7	21	c/cs
27	*0548	15	28.22	58	39.61	156.7	5.9	1	2.0	289	5.7	21	SN
27	0551	15	28.5	58	39.6	157.0	5.7	355	2.0	289	5.2	16	c/cs
27	0554	15	28.8	58	39.6	157.3	5.3	359	2.0	289	5.0	21	c/cs
27	0613	15	30.5	58	39.7	159.0	5.6	357	2.0	289	5.2	18	c/cs
27	0636	15	32.6	58	39.8	161.1	5.6	359	2.0	289	5.3	20	c/cs
27	0644	15	33.4	58	39.8	161.9	6.9	340	2.0	289	5.8	356	c/cs
27	0645	15	33.5	58	39.8	162.0	7.1	308	2.0	289	5.3	315	c/cs
27	0646	15	33.6	58	39.9	162.1	7.2	275	2.0	289	5.2	269	c/cs
27	0650	15	33.6	58	40.4	162.6	7.5	258	2.0	289	5.9	248	c/cs
27	0651	15	33.6	58	40.5	162.7	5.1	222	2.0	289	4.8	199	c/cs
27	0652	15	33.5	58	40.6	162.8	2.4	174	2.0	289	3.7	145	c/cs
27	0654	15	33.4	58	40.6	162.9	2.3	139	2.0	289	4.2	125	c/cs
27	0700	15	33.3	58	40.4	163.1	3.2	135	2.0	289	5.0	125	c/cs
27	0709	15	32.9	58	40.1	163.6	4.1	183	2.0	289	5.1	161	c/cs
27	0710	15	32.9	58	40.1	163.7	5.5	220	2.0	289	5.2	199	c/cs
27	0711	15	32.8	58	40.1	163.8	6.8	248	2.0	289	5.5	234	c/cs
27	0712	15	32.7	58	40.3	163.9	7.5	273	2.0	289	5.6	267	c/cs
27	0720	15	32.8	58	41.3	164.9	7.0	270	2.0	289	5.1	263	c/cs
27	0741	15	32.8	58	43.8	167.3	6.0	234	2.0	289	5.2	216	c/cs
27	0742	15	32.7	58	43.9	167.4	2.5	185	2.0	289	3.6	152	c/cs
27	0744	15	32.7	58	43.9	167.5	1.8	149	2.0	289	3.6	128	c/cs
27	0747	15	32.6	58	43.9	167.6	2.3	72	2.0	289	4.1	89	c/cs
27	*0752	15	32.65	58	43.68	167.8	5.1	89	1.0	87	4.1	89	SN
27	0754	15	32.7	58	43.5	168.0	6.0	90	1.0	87	5.0	91	c/cs

Table 1 (continued).

Date	Time [a](UTC)	N. lat. deg	N. lat. min	W. long. deg	W. long. min	Cum. dis. nmi	Actual speed kt	Actual cse deg	Drift speed kt	Drift cse deg	Dead rec. speed kt	Dead rec. cse deg	comm.
June 1986 (cont.)													
27	*0800	15	32.65	58	42.88	168.6	3.6	78	1.7	299	5.0	91	CC
27	0803	15	32.7	58	42.7	168.7	3.6	81	1.7	299	5.1	93	c/cs
27	0807	15	32.7	58	42.4	169.0	3.1	122	1.7	299	4.8	121	c/cs
27	0809	15	32.7	58	42.4	169.1	3.9	177	1.7	299	5.0	160	c/cs
27	0811	15	32.5	58	42.3	169.2	4.7	188	1.7	299	5.5	171	c/cs
27	0818	15	32.0	58	42.4	169.8	4.3	193	1.7	299	5.0	174	c/cs
27	0823	15	31.7	58	42.5	170.1	5.0	225	1.7	299	4.8	205	c/cs
27	0825	15	31.5	58	42.6	170.3	0.1	270	1.7	299	4.7	260	c/cs
27	0827	15	31.5	58	42.8	170.5	7.2	279	1.7	299	5.7	273	c/cs
27	0837	15	31.7	58	44.1	171.7	6.9	284	1.7	299	5.2	279	c/cs
27	0844	15	31.9	58	44.9	172.5	6.5	280	1.7	299	4.9	274	c/cs
27	0847	15	32.0	58	45.2	172.8	6.9	289	1.7	299	5.2	286	c/cs
27	0908	15	32.8	58	47.6	175.2	7.0	287	1.7	299	5.3	283	c/cs
27	0909	15	32.8	58	47.7	175.3	1.7	299	1.7	299	0.0	500	c/cs
27	*0936	15	33.17	58	48.38	176.1	1.4	65	1.4	65	0.0	500	SN
27	*1124	15	34.28	58	45.93	178.7	1.0	149	1.0	149	0.0	500	SN
27	*1424	15	31.82	58	44.40	181.6	0.3	206	0.3	206	0.0	500	SN
27	*1558	15	31.41	58	44.61	182.0	0.3	17	0.3	17	0.0	500	SN
27	*1746	15	31.84	58	44.47	182.5	1.5	186	1.5	186	0.0	500	SN
27	*1806	15	31.34	58	44.52	183.0	0.1	359	0.1	359	0.0	500	SN
28	*0008	15	31.95	58	44.53	183.6	0.0	251	0.0	251	0.0	500	SN
28	*0336	15	31.94	58	44.56	183.6	0.1	198	0.1	198	0.0	500	SN
28	*0514	15	31.85	58	44.59	183.7	0.2	124	0.2	124	0.0	500	SN
28	*0702	15	31.65	58	44.28	184.1	0.0	107	0.0	107	0.0	500	SN
28	*1400	15	31.55	58	43.95	184.4	0.0	90	0.0	90	0.0	500	[d]671
July 1986													
11	*1700	15	31.55	58	43.95	184.4	0.0	350	0.0	350	0.0	500	671
15	1212	15	32.0	58	44.0	184.9	0.2	89	0.0	350	0.2	91	c/cs
15	1225	15	32.0	58	44.0	184.9	0.5	91	0.0	350	0.5	92	c/cs
15	1237	15	32.0	58	43.9	185.0	0.1	152	0.0	350	0.1	153	c/cs
15	*1250	15	31.99	58	43.87	185.1	0.4	118	0.3	103	0.1	153	ST
15	1258	15	32.0	58	43.8	185.1	0.5	136	0.3	103	0.3	174	c/cs
15	1313	15	31.9	58	43.7	185.2	1.3	112	0.3	103	1.0	115	c/cs
15	1323	15	31.8	58	43.5	185.4	1.8	99	0.3	103	1.5	98	c/cs
15	1330	15	31.8	58	43.3	185.7	2.6	98	0.3	103	2.3	97	c/cs
15	1401	15	31.6	58	42.0	187.0	2.5	94	0.3	103	2.2	93	c/cs
15	1404	15	31.6	58	41.8	187.1	4.6	95	0.3	103	4.3	95	c/cs
15	1414	15	31.5	58	41.0	187.9	3.7	95	0.3	103	3.4	94	c/cs
15	*1432	15	31.42	58	39.89	189.0	3.7	93	0.3	80	3.4	94	SN
15	1432	15	31.4	58	39.9	189.0	4.3	84	0.3	80	4.0	84	c/cs
15	1434	15	31.4	58	39.7	189.1	3.9	59	0.3	80	3.6	57	c/cs
15	1439	15	31.6	58	39.5	189.4	4.4	59	0.3	80	4.1	57	c/cs
15	1449	15	32.0	58	38.8	190.2	2.9	59	0.3	80	2.6	57	c/cs
15	1452	15	32.1	58	38.7	190.3	0.8	75	0.3	80	0.4	72	c/cs
15	1500	15	32.1	58	38.6	190.4	1.2	143	0.3	80	1.1	157	c/cs
15	1504	15	32.0	58	38.5	190.5	2.0	220	0.3	80	2.2	225	c/cs
15	1507	15	31.9	58	38.6	190.6	1.8	268	0.3	80	2.1	267	c/cs
15	1512	15	31.9	58	38.7	190.8	1.1	350	0.3	80	1.1	334	c/cs
15	1515	15	32.0	58	38.7	190.8	0.5	73	0.3	80	0.2	61	c/cs
15	1527	15	32.0	58	38.7	190.9	0.3	80	0.3	80	0.0	500	c/cs
15	*2230	15	32.40	58	36.46	193.1	0.0	271	0.0	271	0.0	500	672
22	*1825	15	32.42	58	38.41	194.9	1.7	77	1.7	77	0.0	500	ST
22	1830	15	32.5	58	38.3	195.1	4.3	91	1.7	77	2.7	100	c/cs
22	1845	15	32.4	58	37.1	196.1	6.3	108	1.7	77	4.9	118	c/cs
22	1900	15	31.9	58	35.6	197.7	6.7	110	1.7	77	5.4	120	c/cs
22	1913	15	31.4	58	34.2	199.2	6.4	15	1.7	77	5.8	0	c/cs
22	1920	15	32.2	58	34.0	199.9	5.7	356	1.7	77	5.7	339	c/cs
22	1922	15	32.4	58	34.0	200.1	4.6	321	1.7	77	5.6	305	c/cs
22	1924	15	32.5	58	34.1	200.3	4.3	268	1.7	77	5.9	265	c/cs
22	1933	15	32.4	58	34.7	200.9	4.2	267	1.7	77	5.9	264	c/cs
22	1941	15	32.4	58	35.3	201.5	4.0	268	1.7	77	5.7	265	c/cs
22	1952	15	32.4	58	36.1	202.2	4.2	271	1.7	77	5.8	267	c/cs
22	*1957	15	32.40	58	36.46	202.6	6.1	268	0.2	283	5.8	267	SN
22	2004	15	32.4	58	37.2	203.3	6.0	268	0.2	283	5.8	267	c/cs
22	2009	15	32.3	58	37.7	203.8	6.0	267	0.2	283	5.8	266	c/cs
22	2032	15	32.2	58	40.1	206.1	5.2	267	0.2	283	5.0	266	c/cs
22	2051	15	32.1	58	41.8	207.7	5.3	268	0.2	283	5.1	267	c/cs
22	2121	15	32.0	58	44.6	210.4	5.3	267	0.2	283	5.1	266	c/cs
22	2151	15	31.9	58	47.3	213.0	5.4	267	0.2	283	5.2	266	c/cs
22	2159	15	31.8	58	48.1	213.8	5.0	268	0.2	283	4.8	267	c/cs
22	2200	15	31.8	58	48.2	213.8	0.2	283	0.2	283	0.0	500	c/cs
23	*0000	15	31.90	58	48.60	214.3	0.0	287	0.0	287	0.0	500	673
28	1700	15	32.2	58	49.7	215.4	3.2	272	0.0	287	3.2	272	c/cs

Table 1 (continued).

Date	Time [a](UTC)	*N. lat.* deg	*N. lat.* min	*W. long.* deg	*W. long.* min	Cum. dis. nmi	*Actual* speed kt	*Actual* cse deg	*Drift* speed kt	*Drift* cse deg	*Dead rec.* speed kt	*Dead rec.* cse deg	comm.
July 1986 (cont.)													
28	1730	15	32.3	58	51.4	217.0	0.3	90	0.0	287	0.3	90	c/cs
28	1800	15	32.3	58	51.2	217.1	0.1	89	0.0	287	0.1	90	c/cs
28	*1917	15	32.29	58	51.09	217.3	0.1	90	0.0	90	0.1	90	674
28	1917	15	32.3	58	51.1	217.3	0.0	90	0.0	90	0.0	500	c/cs
August 1986													
3	*0000	15	32.29	58	51.09	217.3	0.1	273	0.1	273	0.0	500	674
3	1237	15	32.4	58	52.6	218.7	4.9	93	0.1	273	5.0	93	c/cs
3	*1255	15	32.29	58	51.10	220.2	6.7	96	1.7	103	5.0	93	ST
3	1324	15	32.0	58	47.8	223.4	6.9	92	1.7	103	5.2	89	c/cs
3	1333	15	31.9	58	46.7	224.5	6.0	92	1.7	103	4.3	88	c/cs
3	1349	15	31.9	58	45.0	226.1	6.2	93	1.7	103	4.6	89	c/cs
3	1411	15	31.8	58	42.7	228.3	6.0	93	1.7	103	4.3	89	c/cs
3	1418	15	31.7	58	41.9	229.0	6.4	93	1.7	103	4.7	89	c/cs
3	1423	15	31.7	58	41.4	229.6	5.5	118	1.7	103	3.9	125	c/cs
3	1425	15	31.6	58	41.2	229.8	5.0	154	1.7	103	4.1	173	c/cs
3	1426	15	31.5	58	41.2	229.8	4.1	185	1.7	103	4.2	209	c/cs
3	1430	15	31.3	58	41.2	230.1	5.0	352	1.7	103	5.8	336	c/cs
3	1440	15	32.1	58	41.3	230.9	4.5	260	1.7	103	6.2	266	c/cs
3	1445	15	32.0	58	41.7	231.3	3.1	260	1.7	103	4.7	268	c/cs
3	1454	15	31.9	58	42.2	231.8	2.6	258	1.7	103	4.2	268	c/cs
3	*1513	15	31.77	58	43.01	232.6	4.2	268	0.0	303	4.2	268	675
3	1524	15	31.7	58	43.8	233.4	4.1	272	0.0	303	4.1	272	c/cs
3	1541	15	31.8	58	45.0	234.5	4.3	275	0.0	303	4.3	275	c/cs
3	1542	15	31.8	58	45.1	234.6	0.0	303	0.0	303	0.0	500	c/cs
10	1123	15	32.0	58	45.4	234.9	1.0	99	0.0	303	1.0	99	c/cs
10	*1430	15	31.49	58	42.20	238.1	1.0	99	0.0	90	1.0	99	676
10	1430	15	31.5	58	42.2	238.1	0.0	90	0.0	90	0.0	500	c/cs
15	*0300	15	31.49	58	42.20	238.1	0.4	296	0.4	296	0.0	500	676
15	0300	15	31.5	58	42.2	238.1	0.6	108	0.4	296	1.0	111	c/cs
15	0448	15	31.1	58	41.1	239.2	0.7	102	0.4	296	1.1	107	c/cs
15	0453	15	31.1	58	41.0	239.3	1.7	101	0.4	296	2.0	104	c/cs
15	0455	15	31.1	58	41.0	239.3	3.4	114	0.4	296	3.8	114	c/cs
15	0458	15	31.0	58	40.8	239.5	4.0	83	0.4	296	4.3	86	c/cs
15	0500	15	31.1	58	40.7	239.6	3.7	349	0.4	296	3.5	354	c/cs
15	0501	15	31.1	58	40.7	239.7	3.9	269	0.4	296	3.6	266	c/cs
15	0503	15	31.1	58	40.8	239.8	4.4	203	0.4	296	4.4	198	c/cs
15	0506	15	30.9	58	40.9	240.0	6.8	204	0.4	296	6.8	201	c/cs
15	0511	15	30.4	58	41.1	240.6	7.7	206	0.4	296	7.7	203	c/cs
15	0521	15	29.2	58	41.7	241.9	8.7	206	0.4	296	8.7	204	c/cs
15	0549	15	25.6	58	43.6	245.9	9.1	206	0.4	296	9.1	204	c/cs
15	0604	15	23.6	58	44.6	248.2	9.4	206	0.4	296	9.4	204	c/cs
15	0619	15	21.5	58	45.7	250.5	7.4	207	0.4	296	7.4	204	c/cs
15	0621	15	21.3	58	45.8	250.8	9.9	205	0.4	296	9.9	203	c/cs
15	0629	15	20.1	58	46.4	252.1	10.2	205	0.4	296	10.2	203	c/cs
15	0652	15	16.5	58	48.1	256.0	11.4	206	0.4	296	11.4	204	c/cs
15	0702	15	14.8	58	49.0	257.9	11.8	206	0.4	296	11.8	204	c/cs
15	0705	15	14.3	58	49.2	258.5	7.8	207	0.4	296	7.8	204	c/cs
15	0707	15	14.0	58	49.3	258.8	12.0	206	0.4	296	12.0	204	c/cs
15	0725	15	10.8	58	51.0	262.4	12.4	207	0.4	296	12.4	205	c/cs
15	0743	15	7.5	58	52.7	266.1	7.3	209	0.4	296	7.3	206	c/cs
15	0745	15	7.2	58	52.8	266.4	12.4	207	0.4	296	12.4	205	c/cs
15	0801	15	4.3	58	54.4	269.6	11.1	214	0.4	296	11.1	212	c/cs
15	0803	15	4.0	58	54.6	270.0	12.4	222	0.4	296	12.3	220	c/cs
15	0805	15	3.7	58	54.9	270.4	11.7	246	0.4	296	11.5	245	c/cs
15	0806	15	3.6	58	55.0	270.6	12.5	266	0.4	296	12.2	265	c/cs
15	0810	15	3.5	58	55.9	271.5	13.2	269	0.4	296	12.8	268	c/cs
15	0831	15	3.4	59	0.7	276.1	12.8	268	0.4	296	12.4	267	c/cs
15	0846	15	3.3	59	4.0	279.3	13.0	268	0.4	296	12.6	267	c/cs
15	0901	15	3.2	59	7.3	282.5	12.4	244	0.4	296	12.2	243	c/cs
15	0904	15	2.9	59	7.9	283.1	12.2	215	0.4	296	12.2	213	c/cs
15	0906	15	2.6	59	8.1	283.5	11.5	193	0.4	296	11.6	191	c/cs
15	0909	15	2.0	59	8.3	284.1	11.0	172	0.4	296	11.2	170	c/cs
15	0914	15	1.1	59	8.1	285.0	11.5	169	0.4	296	11.7	168	c/cs
15	0944	14	55.5	59	7.1	290.7	11.4	169	0.4	296	11.6	168	c/cs
15	0955	14	53.4	59	6.7	292.8	11.8	190	0.4	296	11.9	188	c/cs
15	0957	14	53.0	59	6.7	293.2	11.9	200	0.4	296	11.9	198	c/cs
15	1003	14	51.9	59	7.1	294.4	9.8	199	0.4	296	9.8	197	c/cs
15	1005	14	51.6	59	7.2	294.7	7.3	197	0.4	296	7.3	194	c/cs
15	1008	14	51.3	59	7.4	295.1	5.6	198	0.4	296	5.6	194	c/cs
15	1017	14	50.5	59	7.6	295.9	4.4	197	0.4	296	4.5	192	c/cs
15	1022	14	50.1	59	7.7	296.3	2.1	121	0.4	296	2.5	120	c/cs
15	1025	14	50.1	59	7.6	296.4	0.3	112	0.4	296	0.7	114	c/cs
15	1031	14	50.1	59	7.6	296.4	0.4	240	0.4	296	0.3	177	c/cs

Table 1 (continued).

Date	Time [a](UTC)	N. lat. deg	N. lat. min	W. long. deg	W. long. min	Cum. dis. nmi	Actual speed kt	Actual cse deg	Drift speed kt	Drift cse deg	Dead rec. speed kt	Dead rec. cse deg	comm.
August 1986 (cont.)													
15	*1036	14	50.04	59	7.63	296.5	0.4	313	0.7	334	0.3	177	SN
15	1043	14	50.1	59	7.7	296.5	0.4	318	0.7	334	0.3	175	c/cs
15	1100	14	50.2	59	7.7	296.6	4.4	207	0.7	334	4.8	201	c/cs
15	1110	14	49.5	59	8.1	297.4	5.6	206	0.7	334	6.0	201	c/cs
15	1123	14	48.4	59	8.6	298.6	5.6	206	0.7	334	6.0	201	c/cs
15	1146	14	46.5	59	9.6	300.7	5.7	225	0.7	334	5.9	219	c/cs
15	1148	14	46.4	59	9.7	300.9	5.8	256	0.7	334	5.7	249	c/cs
15	1150	14	46.3	59	9.9	301.1	6.7	282	0.7	334	6.3	277	c/cs
15	1159	14	46.5	59	11.0	302.1	7.1	281	0.7	334	6.7	276	c/cs
15	1213	14	46.8	59	12.6	303.7	6.4	248	0.7	334	6.4	242	c/cs
15	1214	14	46.8	59	12.7	303.9	4.6	200	0.7	334	5.1	195	c/cs
15	1216	14	46.6	59	12.8	304.0	4.5	194	0.7	334	5.0	189	c/cs
15	1220	14	46.4	59	12.9	304.3	5.4	202	0.7	334	5.9	197	c/cs
15	1247	14	44.1	59	13.8	306.7	5.4	203	0.7	334	5.9	198	c/cs
15	1317	14	41.6	59	14.9	309.4	5.4	203	0.7	334	5.8	198	c/cs
15	1347	14	39.1	59	16.0	312.1	5.5	203	0.7	334	6.0	198	c/cs
15	1417	14	36.6	59	17.1	314.9	5.5	204	0.7	334	5.9	199	c/cs
15	1429	14	35.6	59	17.6	316.0	5.7	203	0.7	334	6.2	198	c/cs
15	1438	14	34.8	59	17.9	316.9	5.7	204	0.7	334	6.2	199	c/cs
15	1448	14	33.9	59	18.3	317.8	5.5	203	0.7	334	6.0	198	c/cs
15	1518	14	31.4	59	19.4	320.6	5.6	203	0.7	334	6.1	198	c/cs
15	1548	14	28.8	59	20.5	323.4	5.6	204	0.7	334	6.1	199	c/cs
15	1609	14	27.0	59	21.3	325.4	5.7	203	0.7	334	6.1	198	c/cs
15	1616	14	26.3	59	21.6	326.0	4.6	205	0.7	334	5.0	199	c/cs
15	*1618	14	26.21	59	21.68	326.2	4.5	208	0.9	329	5.0	199	SN
15	1618	14	26.2	59	21.7	326.2	5.5	205	0.9	329	6.1	198	c/cs
15	1643	14	24.1	59	22.7	328.5	5.4	206	0.9	329	6.0	198	c/cs
15	1700	14	22.7	59	23.4	330.0	5.3	206	0.9	329	5.9	198	c/cs
15	1703	14	22.5	59	23.5	330.3	5.4	206	0.9	329	6.0	198	c/cs
15	*1722	14	20.94	59	24.27	332.0	5.7	202	0.5	325	6.0	198	SN
15	1737	14	19.6	59	24.8	333.4	5.6	201	0.5	325	5.9	197	c/cs
15	1744	14	19.0	59	25.1	334.1	5.5	198	0.5	325	5.9	194	c/cs
15	1809	14	16.8	59	25.8	336.4	5.6	198	0.5	325	6.0	194	c/cs
15	1839	14	14.2	59	26.7	339.2	5.5	198	0.5	325	5.8	194	c/cs
15	1909	14	11.6	59	27.6	341.9	5.5	198	0.5	325	5.8	194	c/cs
15	1922	14	10.4	59	28.0	343.1	5.5	198	0.5	325	5.8	194	c/cs
15	1935	14	9.3	59	28.4	344.3	5.6	198	0.5	325	5.9	194	c/cs
15	2003	14	6.8	59	29.2	346.9	5.5	198	0.5	325	5.9	194	c/cs
15	2032	14	4.3	59	30.1	349.6	5.6	199	0.5	325	5.9	195	c/cs
15	2049	14	2.8	59	30.6	351.2	5.6	198	0.5	325	6.0	194	c/cs
15	2119	14	0.1	59	31.5	354.0	5.7	198	0.5	325	6.1	194	c/cs
15	2137	13	58.5	59	32.1	355.7	5.7	198	0.5	325	6.0	194	c/cs
15	2207	13	55.8	59	33.0	358.5	5.6	198	0.5	325	5.9	194	c/cs
15	2229	13	53.8	59	33.6	360.6	5.7	198	0.5	325	6.1	194	c/cs
15	2257	13	51.3	59	34.5	363.3	5.6	198	0.5	325	6.0	194	c/cs
15	2320	13	49.2	59	35.2	365.4	5.6	198	0.5	325	6.0	194	c/cs
15	2331	13	48.3	59	35.5	366.5	5.3	198	0.5	325	5.7	194	c/cs
15	2339	13	47.6	59	35.8	367.2	4.8	199	0.5	325	5.2	194	c/cs
16	0000	13	46.0	59	36.3	368.9	4.8	199	0.5	325	5.2	194	c/cs
16	0009	13	45.3	59	36.6	369.6	5.0	199	0.5	325	5.3	194	c/cs
16	*0110	13	40.49	59	38.23	374.7	6.2	201	1.1	239	5.3	194	SN
16	0200	13	35.7	59	40.1	379.8	6.0	201	1.1	239	5.2	194	c/cs
16	*0300	13	30.15	59	42.35	385.8	4.3	183	1.2	55	5.2	194	SN
16	0300	13	30.1	59	42.4	385.8	4.5	184	1.2	55	5.3	194	c/cs
16	0900	13	3.1	59	44.2	412.8	1.2	55	1.2	55	0.0	500	c/cs
16	*1410	13	6.69	59	38.96	419.1	0.9	93	0.9	93	0.0	500	SN
16	*1654	13	6.54	59	36.40	421.6	0.2	261	0.2	261	0.0	500	SN
16	*2326	13	6.32	59	37.79	423.0	0.2	261	0.0	0	0.0	500	SN

Previous accum. miles 0. present accum. dist. 422.951

[a] UTC = Universal Coordinated Time
[b] c/cs = change of course
[c] SN = satellite navigation
[d] Site number
* Satellite navigation time.

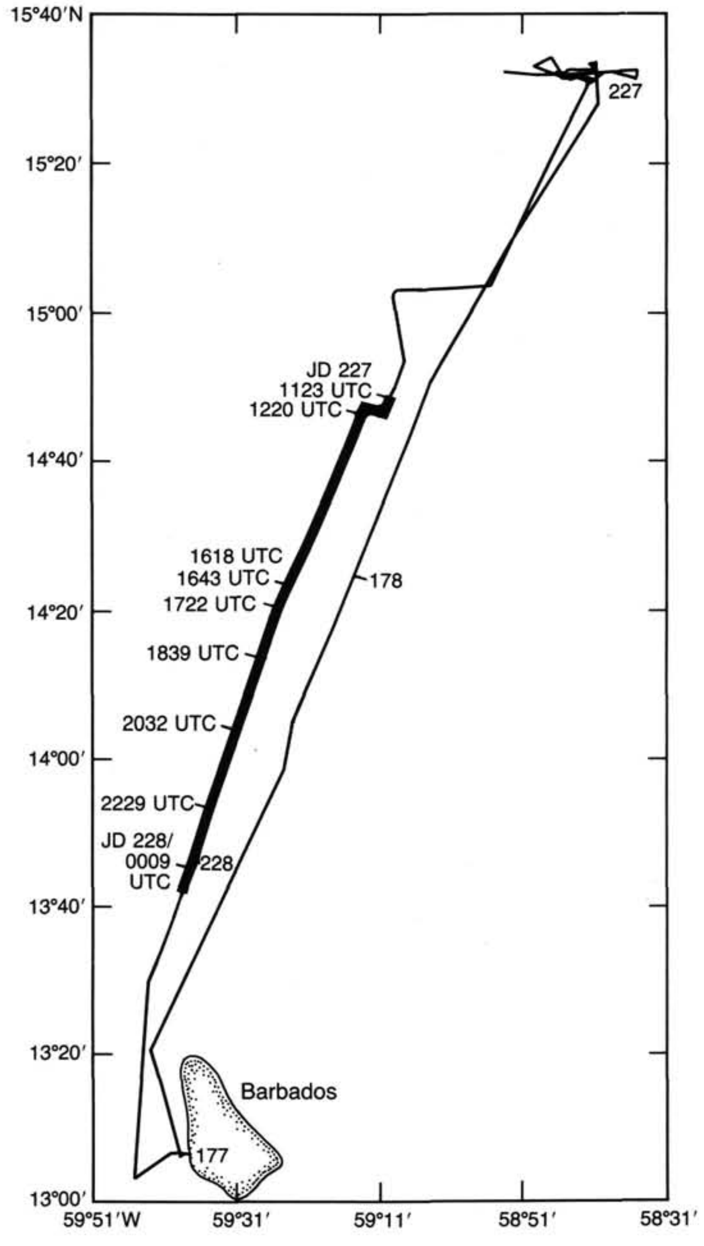


Figure 1. Track chart of *JOIDES Resolution* during Leg 110. Bold portion of track indicates navigation for seismic line 7.

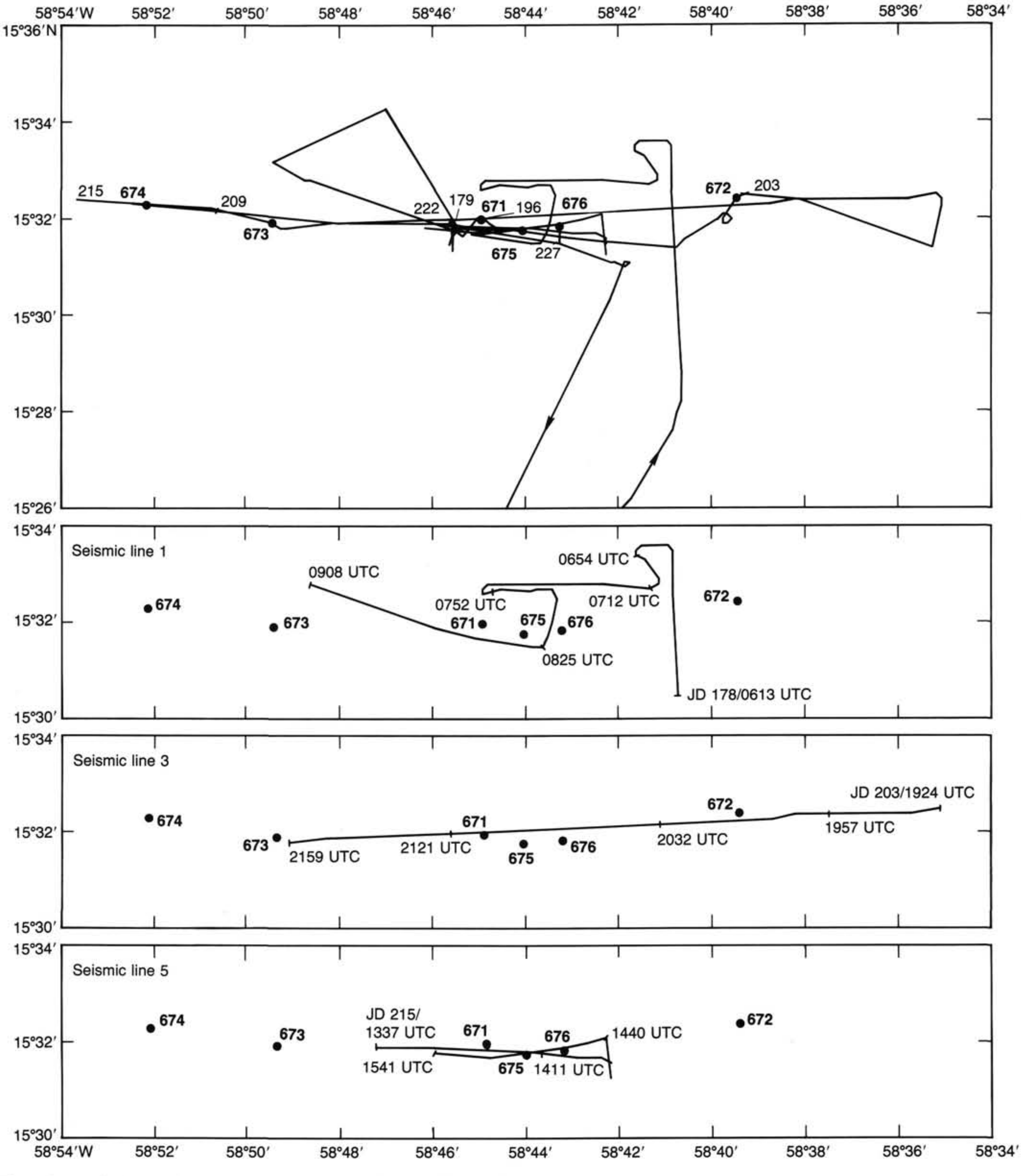
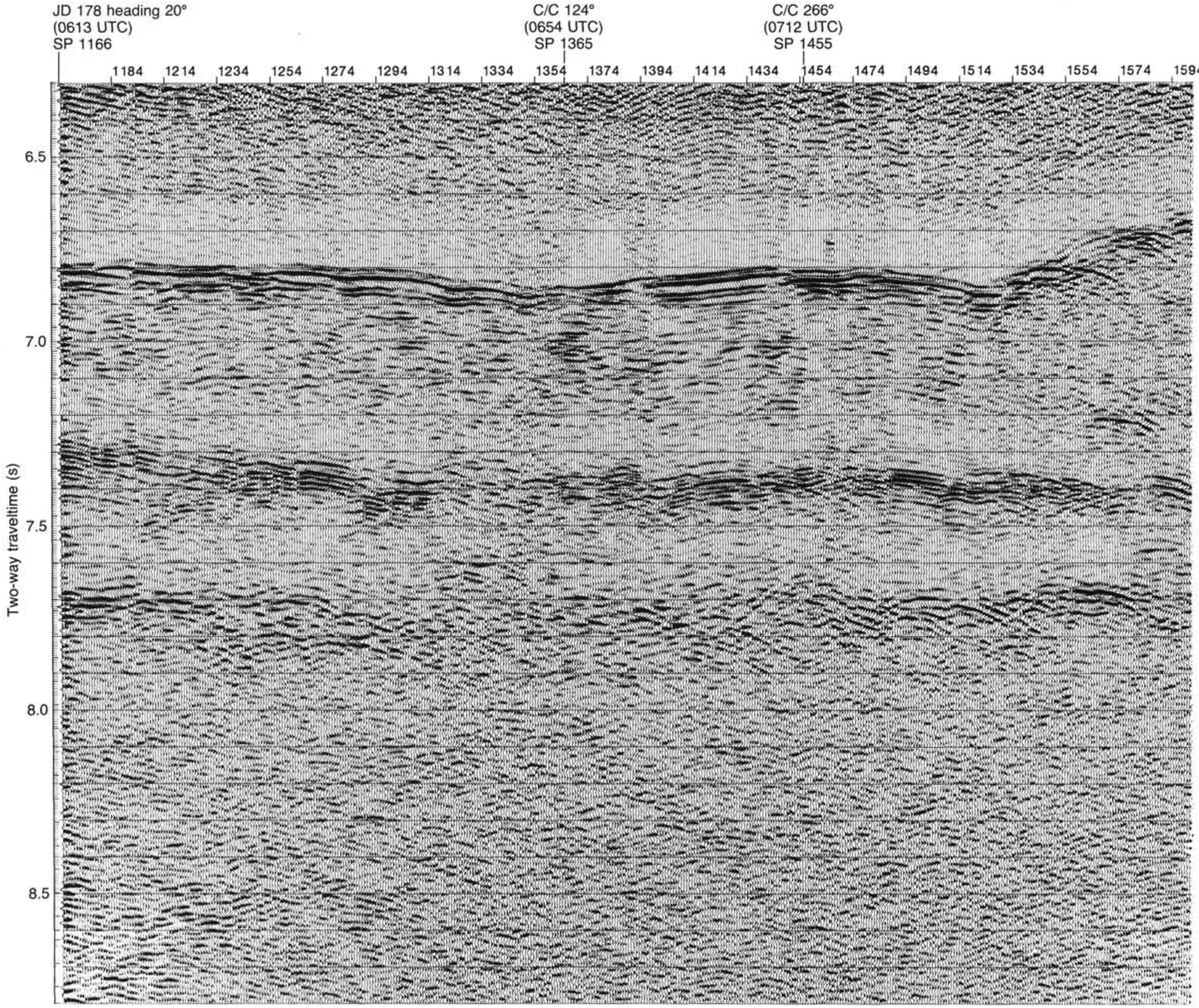


Figure 2. Detailed navigation and site locations of ODP Leg 110 operations and track lines of seismic lines 1, 3, and 5.

Table 2. Recording, processing, and display parameters of Leg 110 site survey seismic lines.

	Line 1	Line 3	Line 5	Line 7
Location	Survey of Site 671	Survey of Sites 671, 672, 673	Survey of Site 675	Survey departing Site 676 to Port
	Recording Parametters			
Water-gun source	Two 80 in.^{3}	One 400 in.^{3}	Two 80 in.^{3}	Two 80 in.^{3}
Amplifier gain (dB)	85	85	85	70–80
	Processing Parameters			
Predictive deconvolution				
Prediction distance (ms):	20	25	30	
Filter length (ms):	220	300	200	
% white noise added:	1	1	1	
AGC*				
Response time (ms)	400	400	400	400
Start time (ms)	6300	6000	6400	variable
% Gain	100	100	100	100
Zero-Phase Band-Pass Filter				
Low cut (Hz)	35	35	35	35
Taper width	20	20	20	20
High cut (Hz)	125	125	125	125
Taper width	20	20	20	20
Trace Mixing				
Number of traces	3	3	3	
mixed by:	Addition	Addition	Addition	
Trace Equalization				
Response distance (trace)	100	100	100	
Equalizing:	Amplitude	Amplitude	Amplitude	
	Display Parameters			
Plotter	Versatec	Versatec	Versatec	Versatec
Data Window				
from (ms)	6300	5800	6000	variable
to (ms)	9000	8000	9000	variable

* Automatic gain control


JD 178 heading 20°
(0613 UTC)
SP 1166
C/C 124°
(0654 UTC)
SP 1365
C/C 266°
(0712 UTC)
SP 1455
1184
1214
1234
1254
1274
1294
1314
1334
1354
1374
1394
1414
1434
1454
1474
1494
1514
1534
1554
1574
1594
6.5
7.0
7.5
8.0
8.5
Two-way traveltime (s)

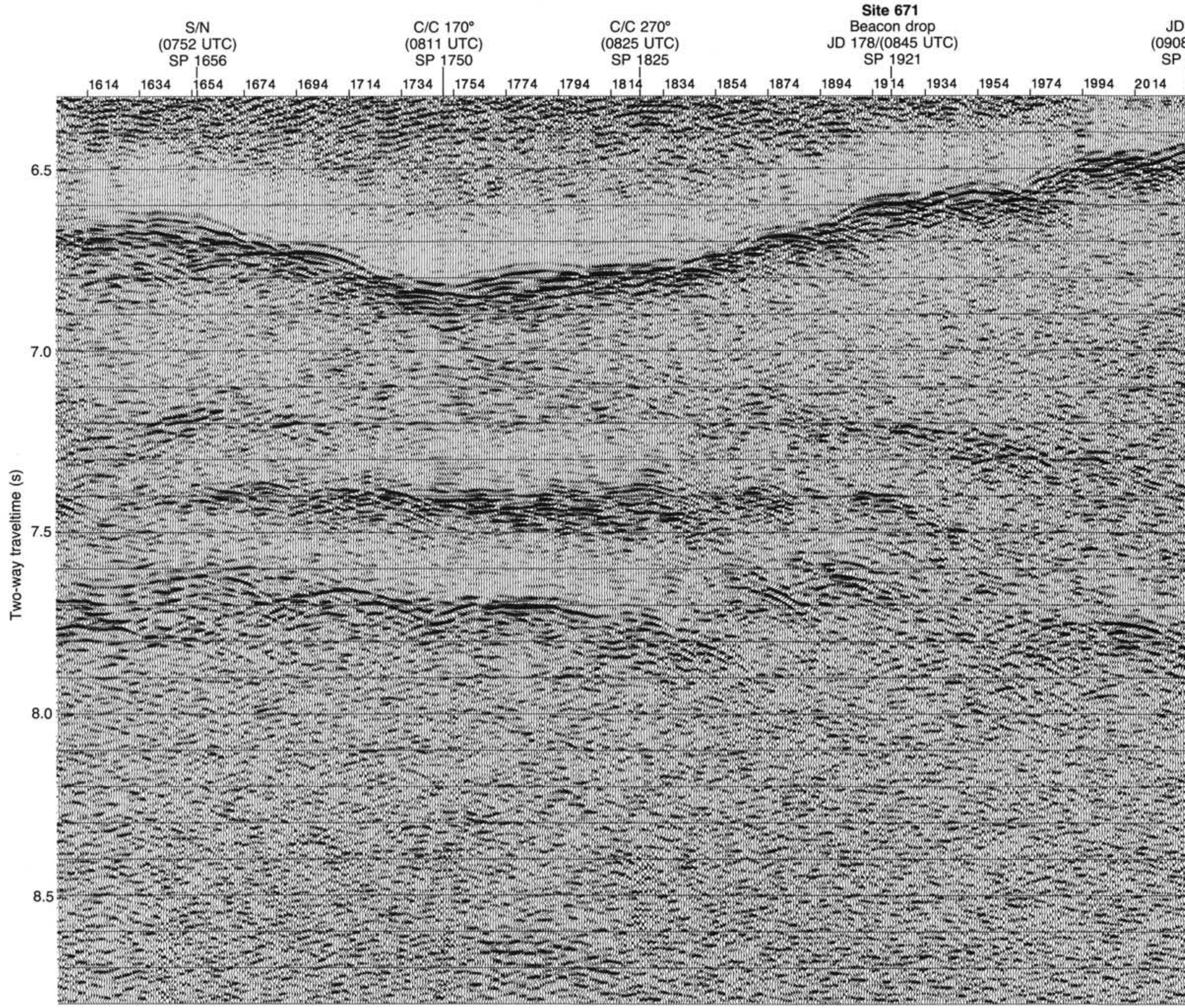


Figure 3. Leg 110 seismic line 1, ship approaching Site 671. Vertical exaggeration approximately 5.5.

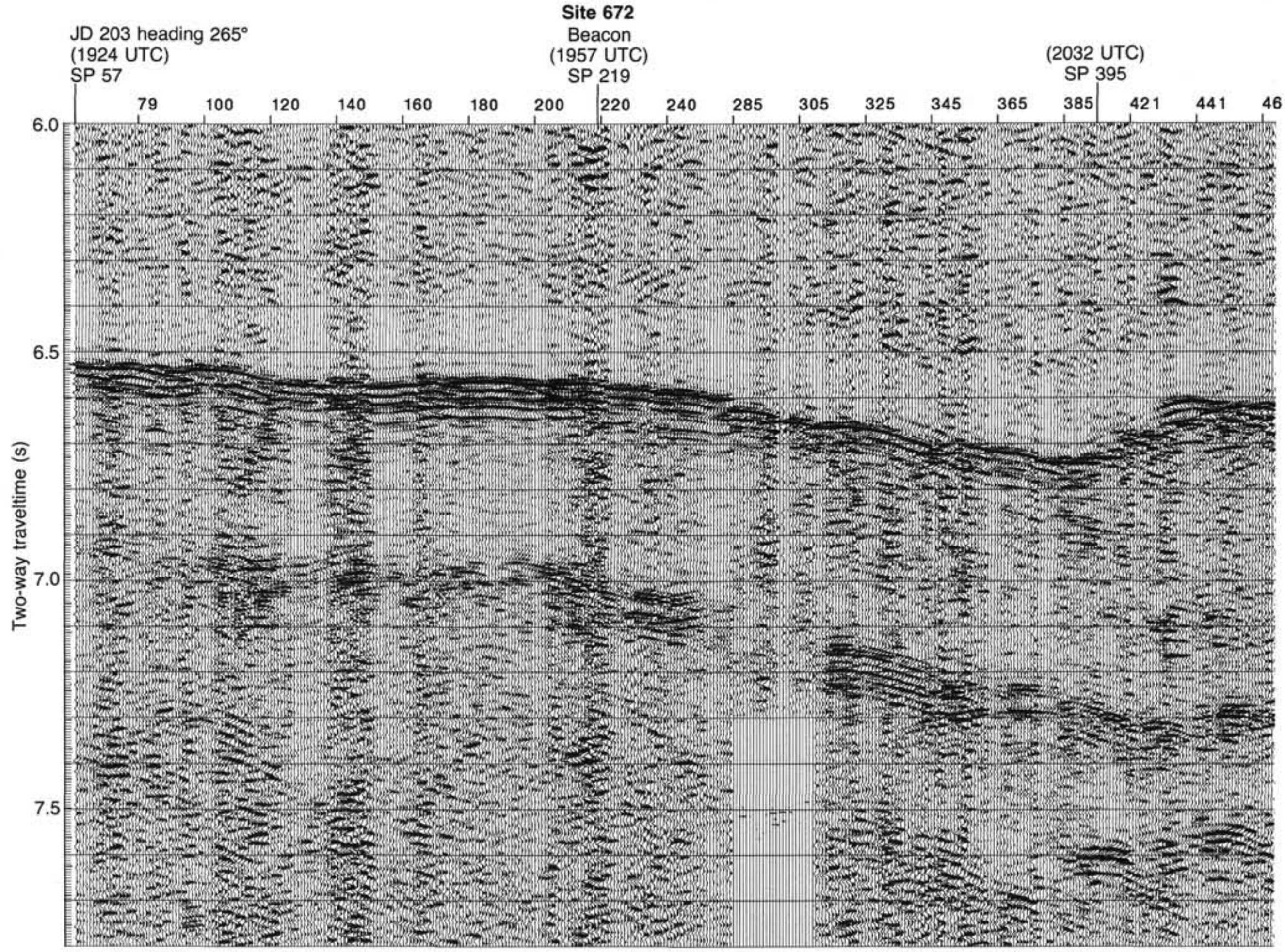


Figure 4. Leg 110 seismic line 3, ship crossing Sites 672 and 671, and approaching Site 673. Vertical exaggeration approximately 5.5.

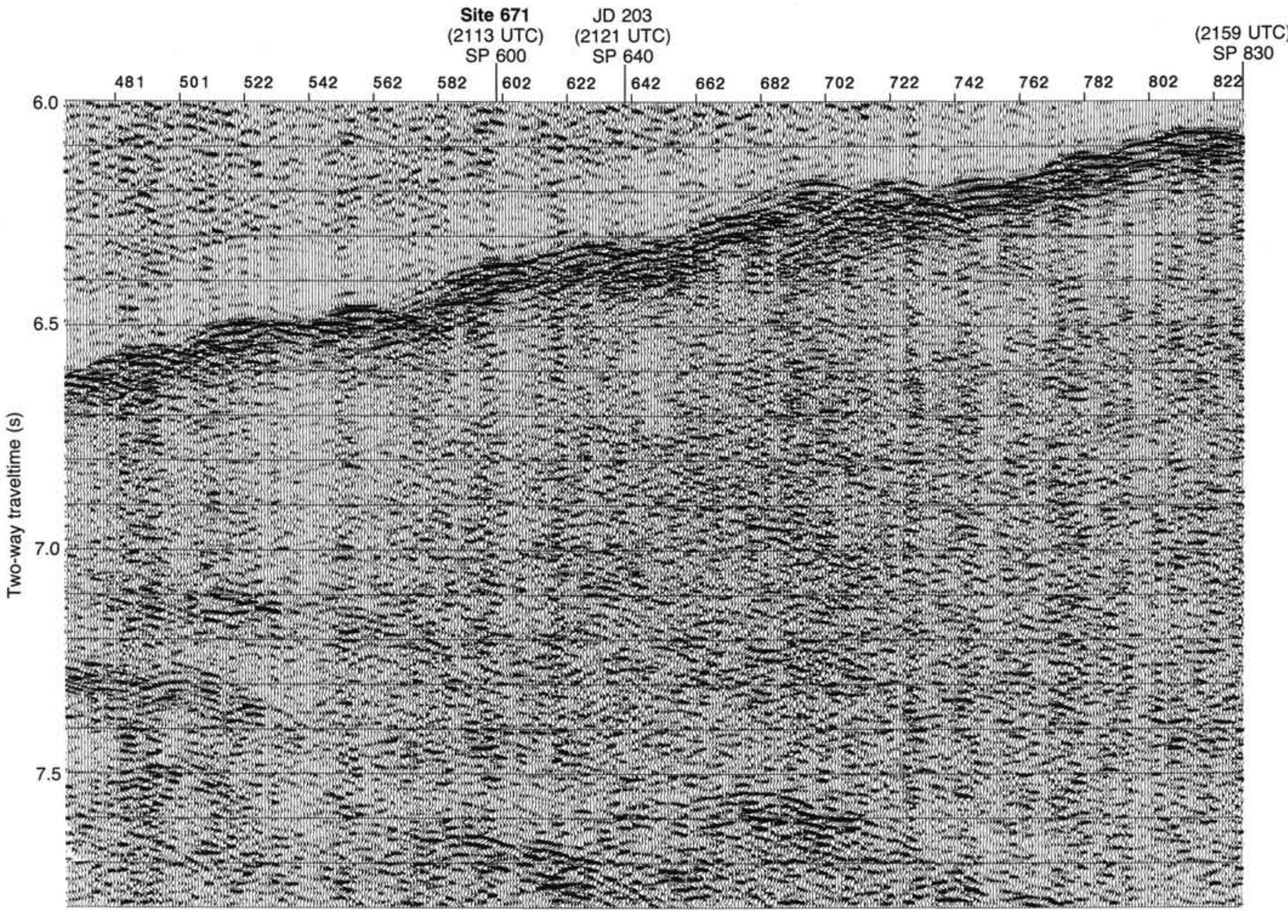


Figure 4 (continued).

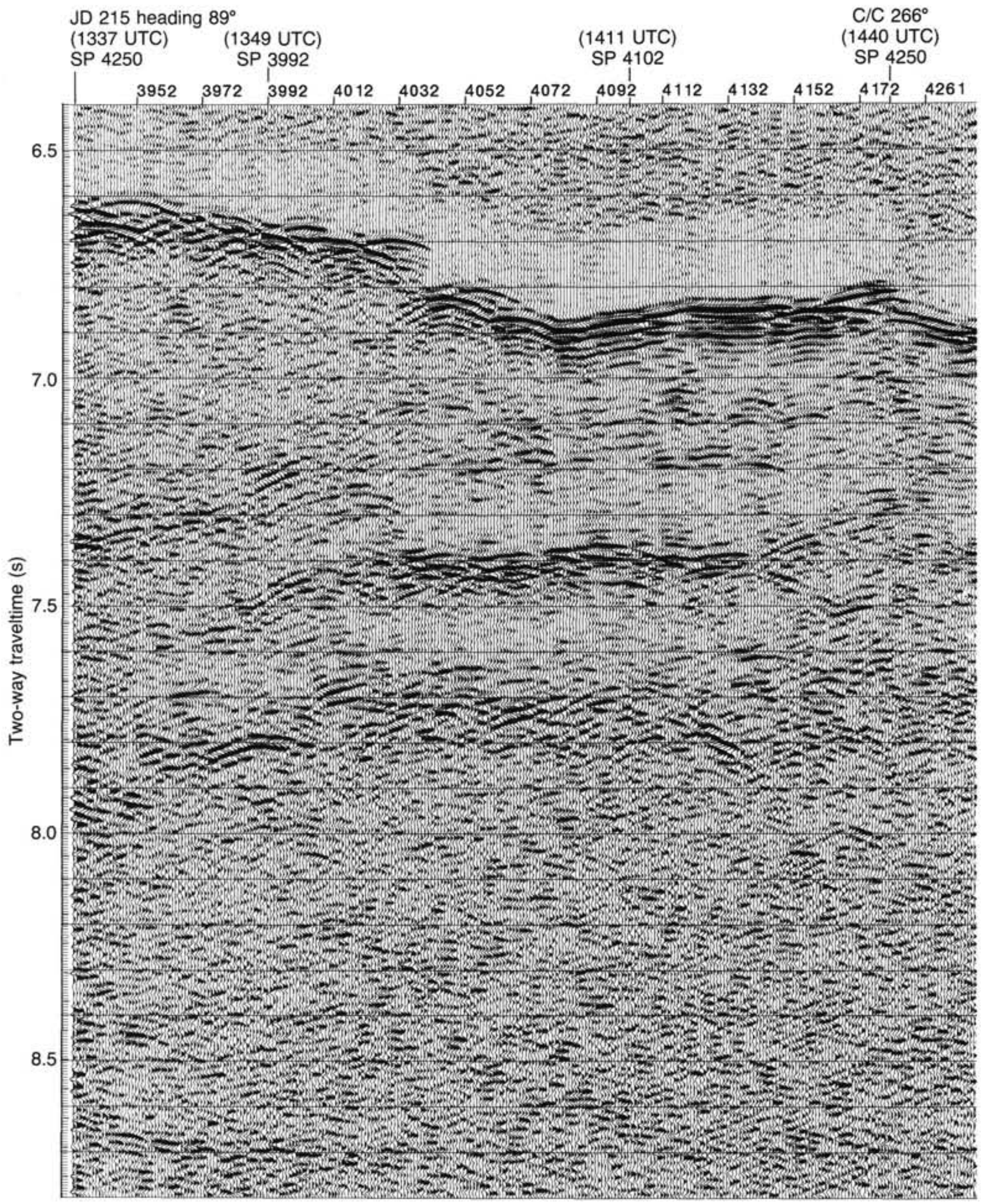


Figure 5. Leg 110 seismic line 5, ship approaching Site 675. Vertical exaggeration approximately 5.5.

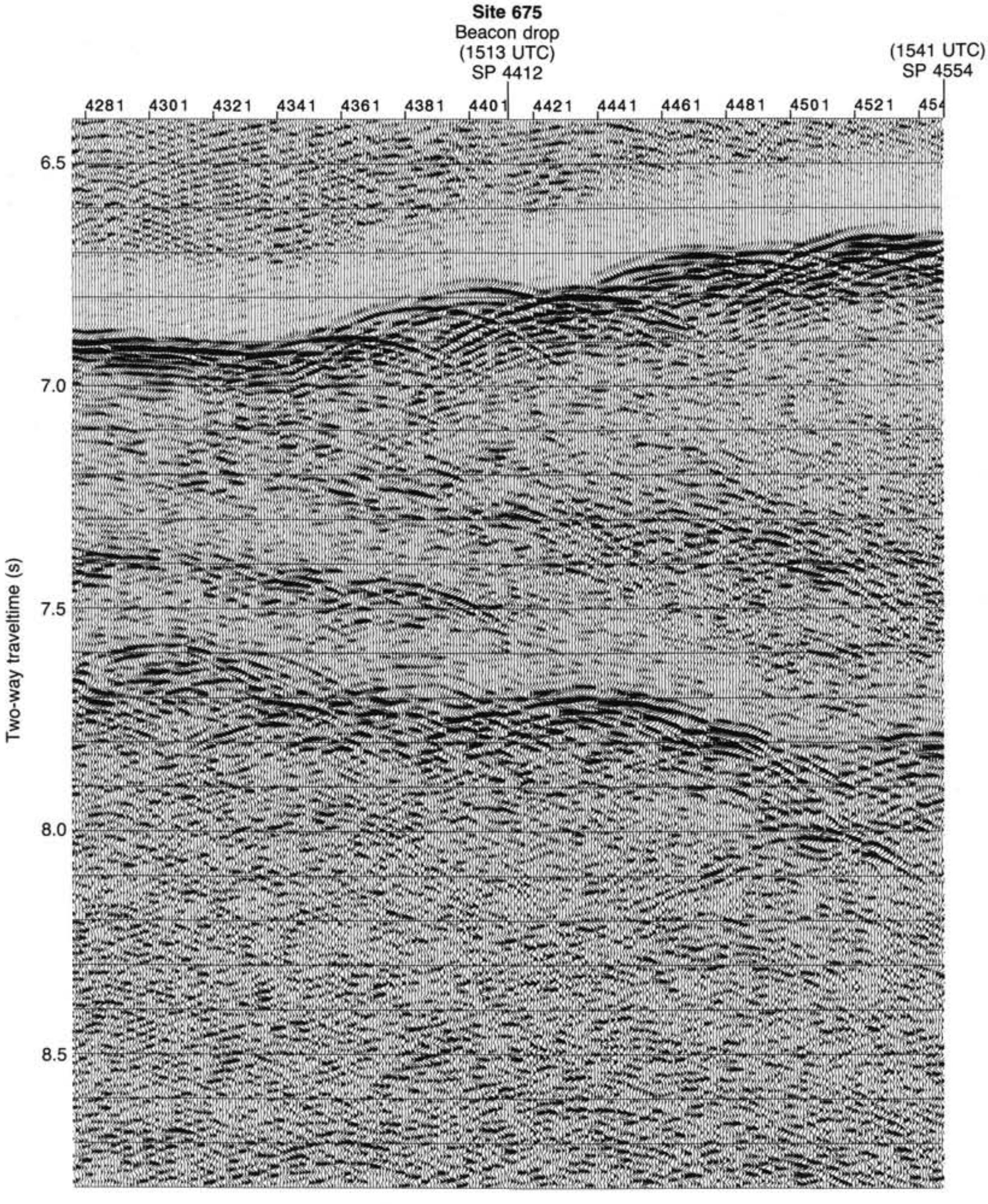


Figure 5 (continued).

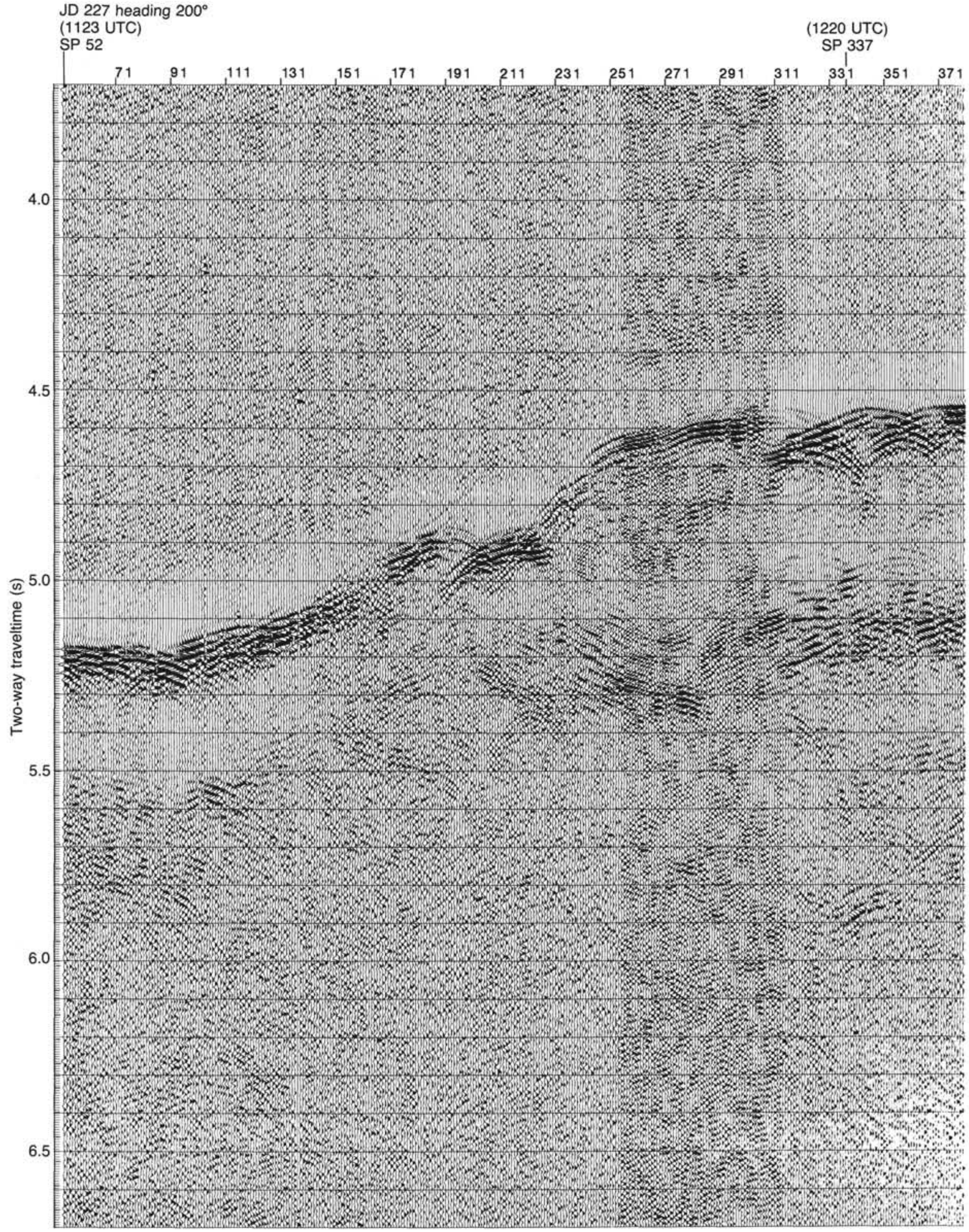


Figure 6. Leg 110 seismic line 7, ship en route from Site 676 to Bridetown, Barbados. Vertical exaggeration approximately 5.5.

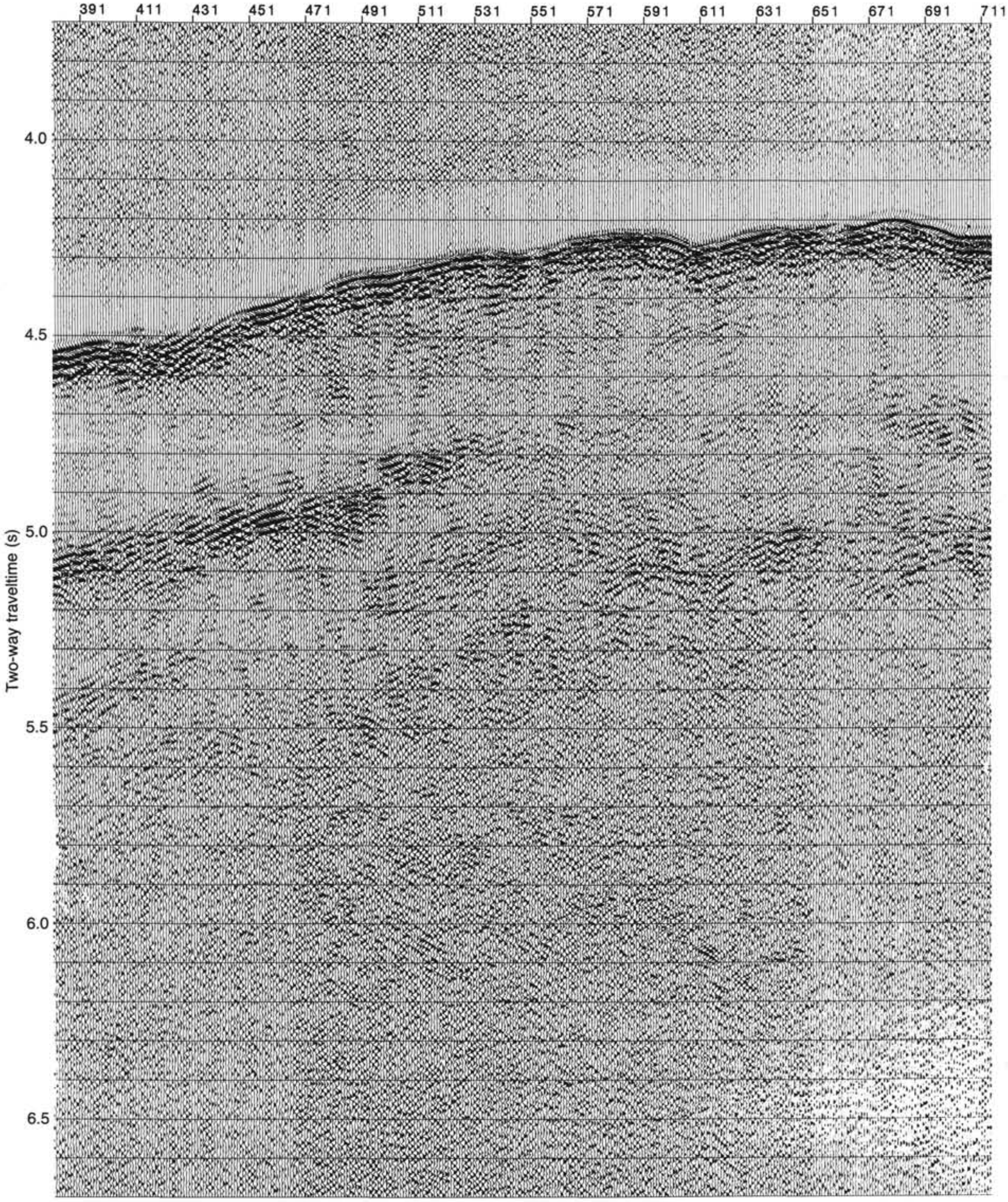
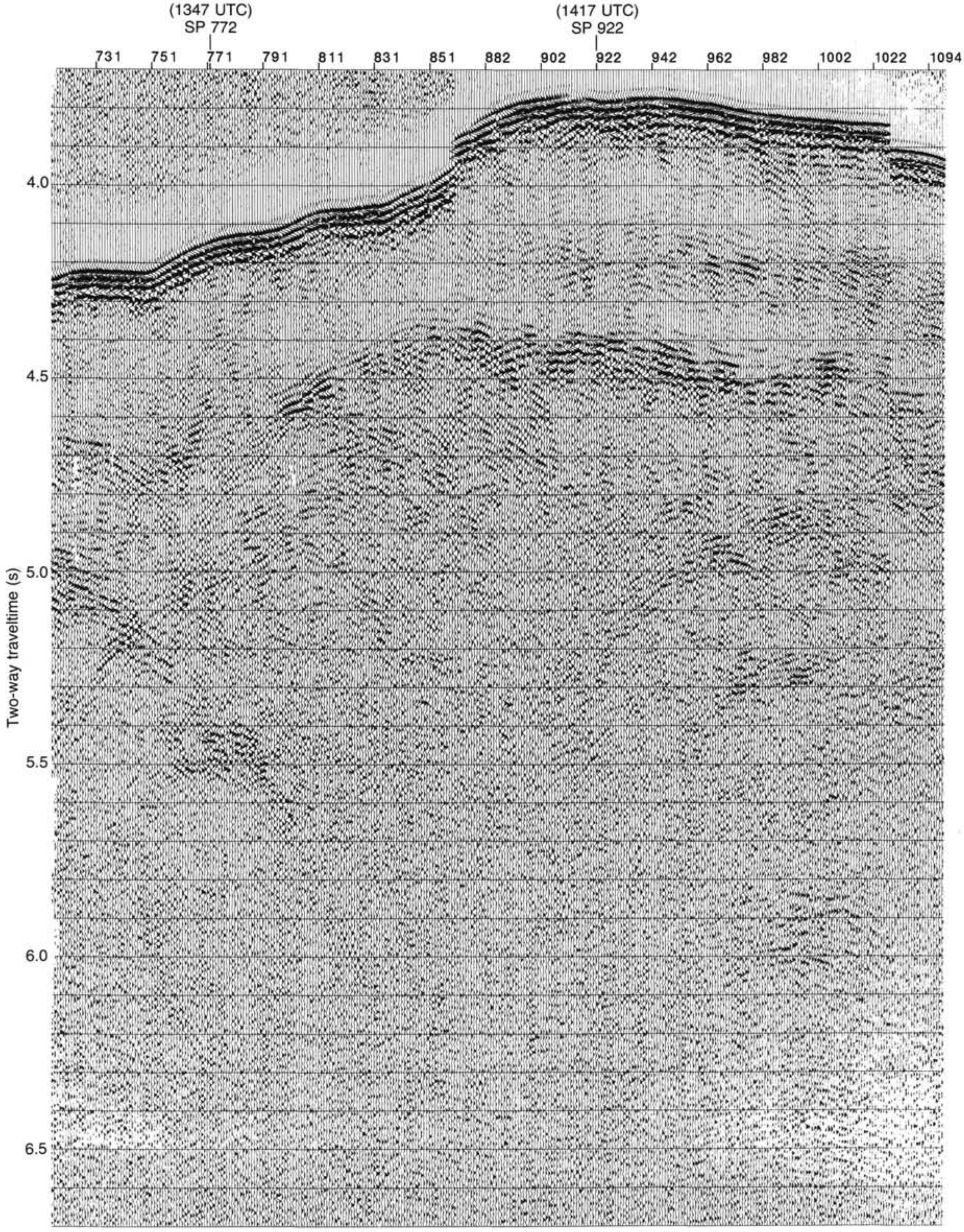


Figure 6 (continued).



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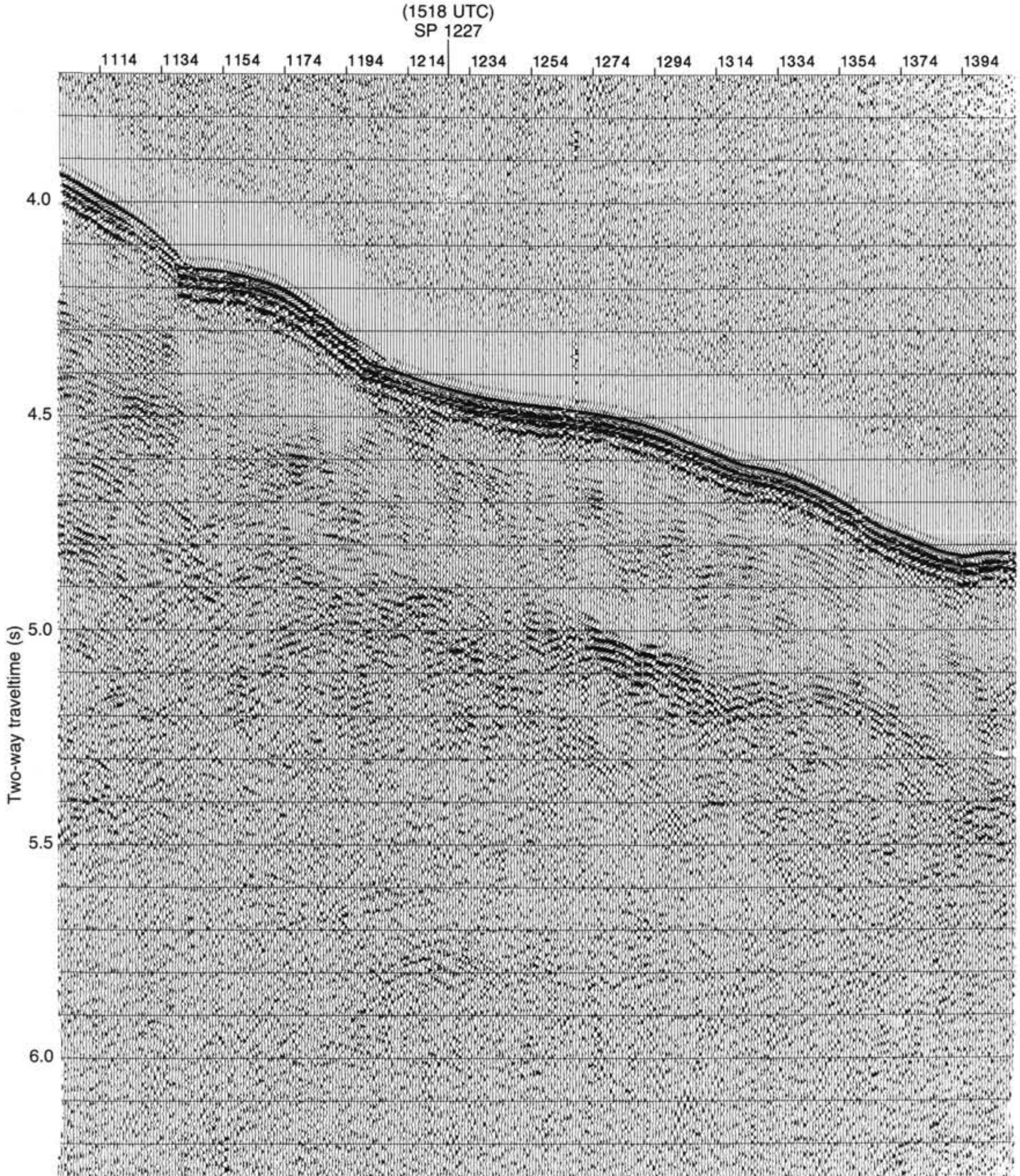

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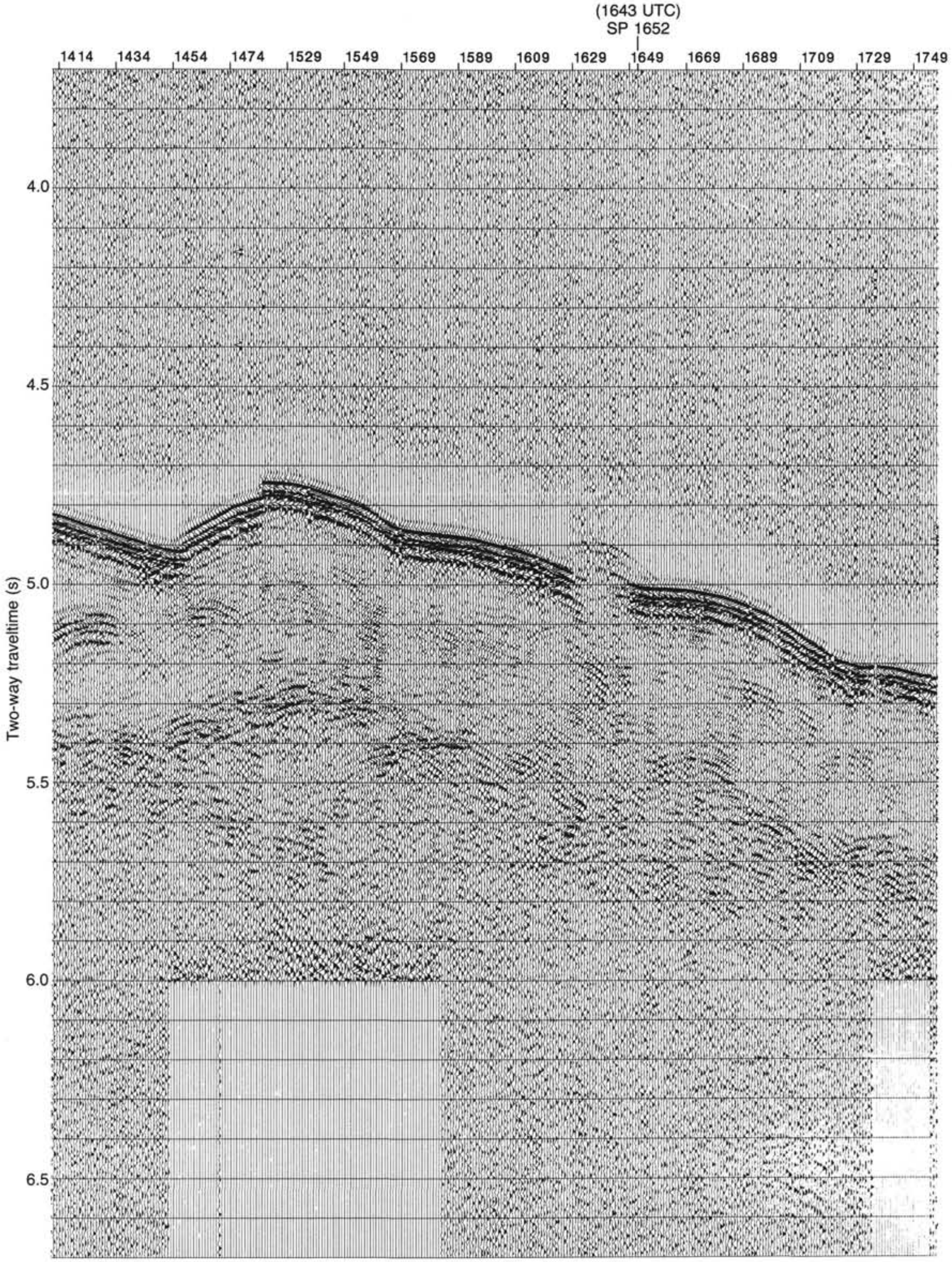

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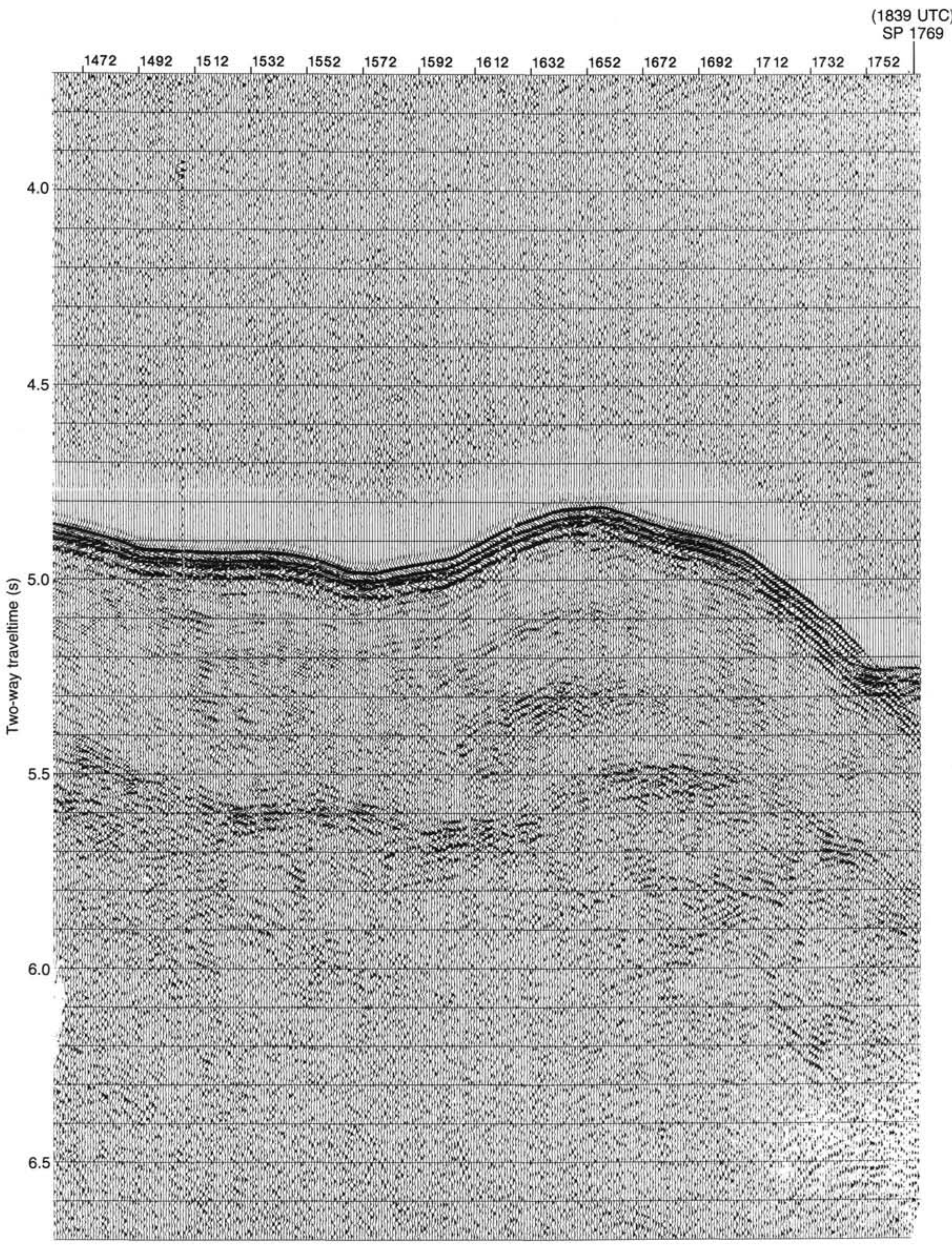

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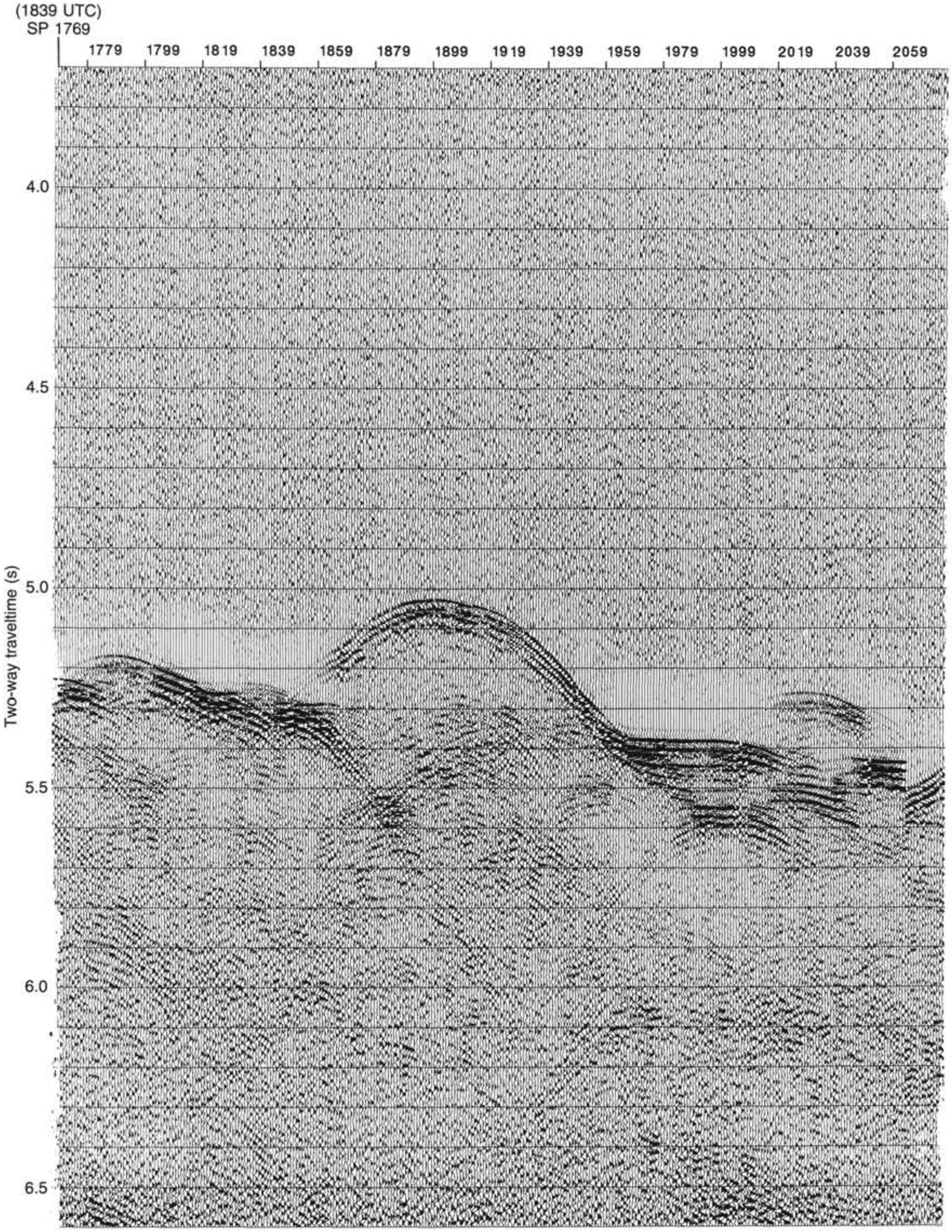


Figure 6 (continued).

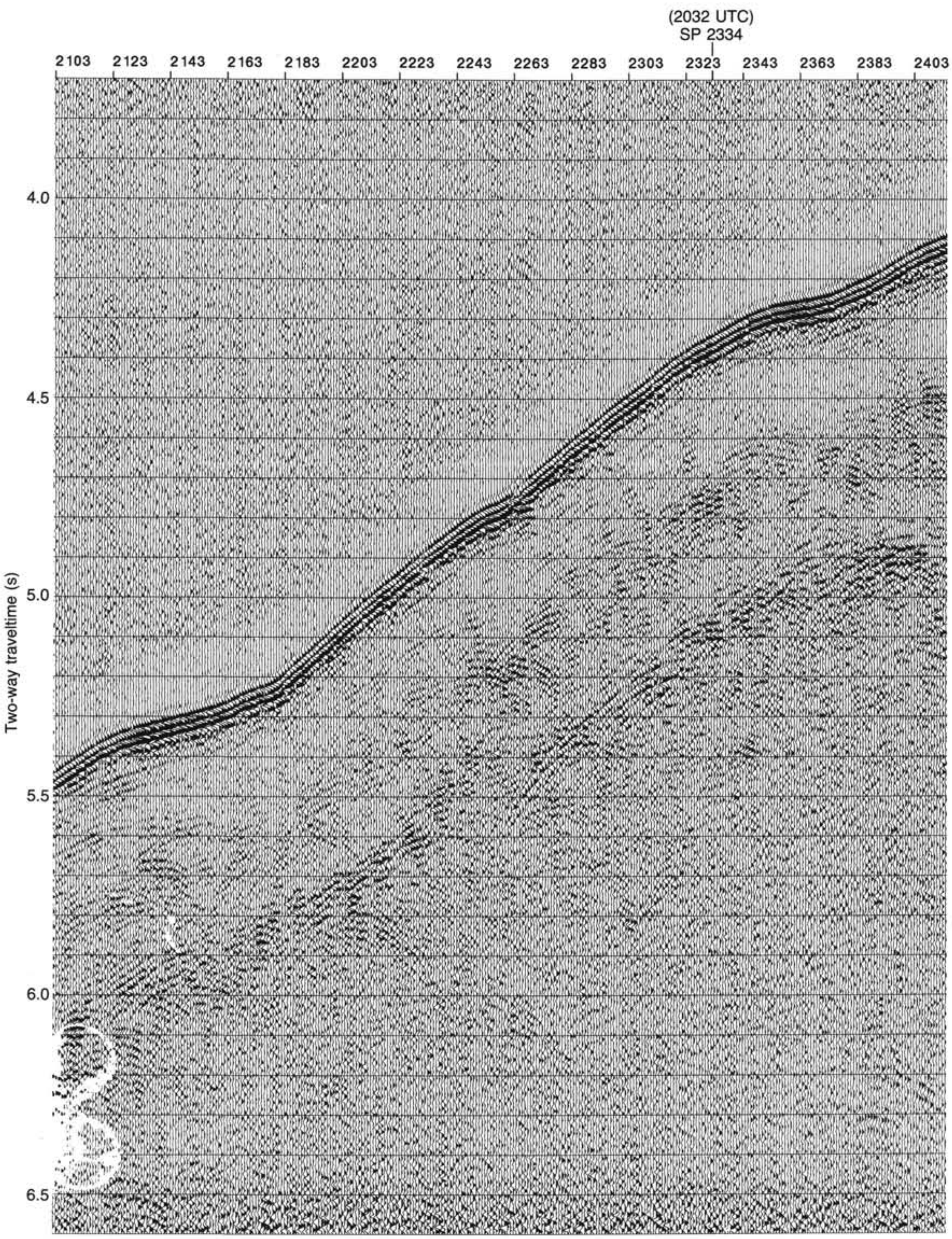


Figure 6 (continued).

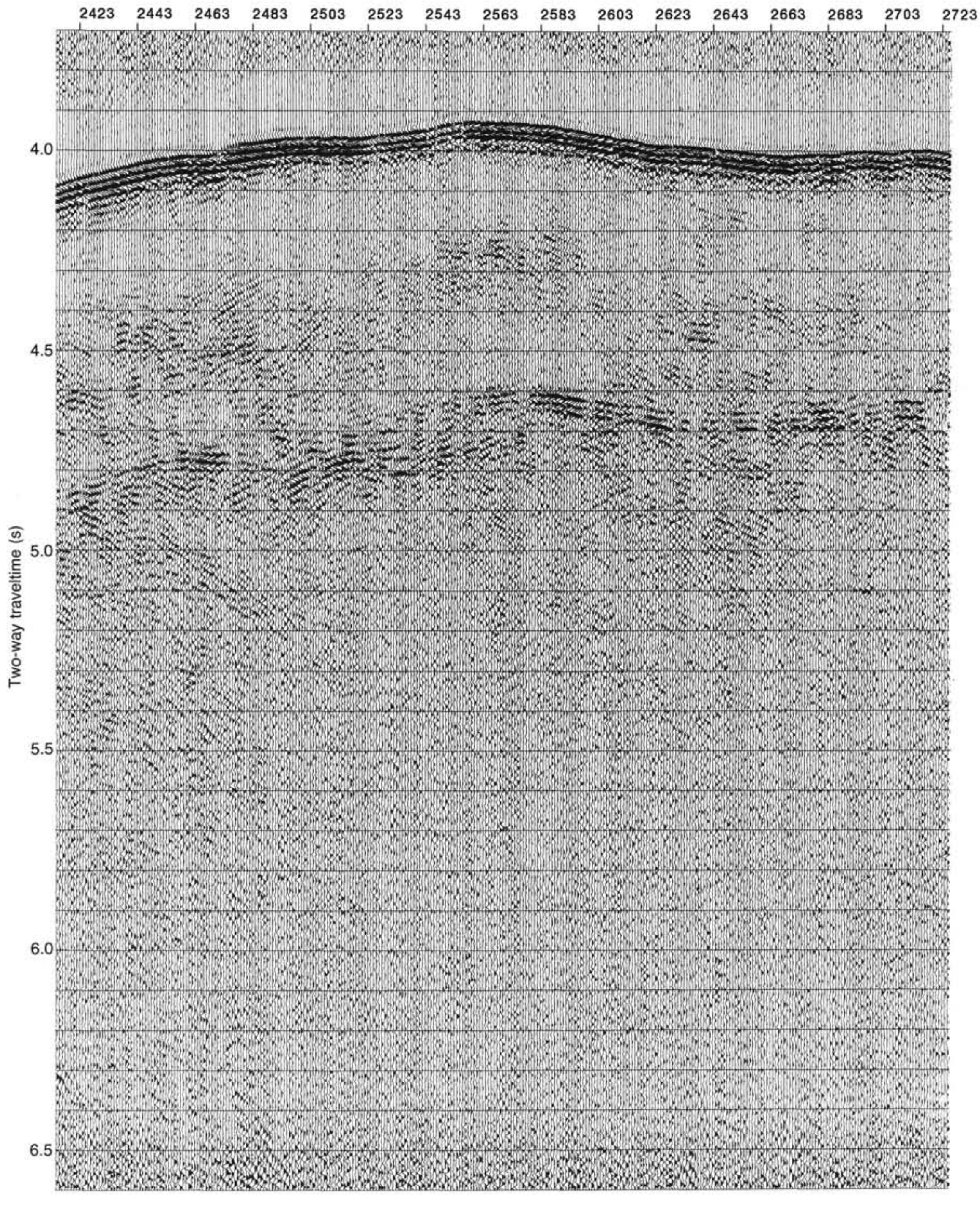


Figure 6 (continued).

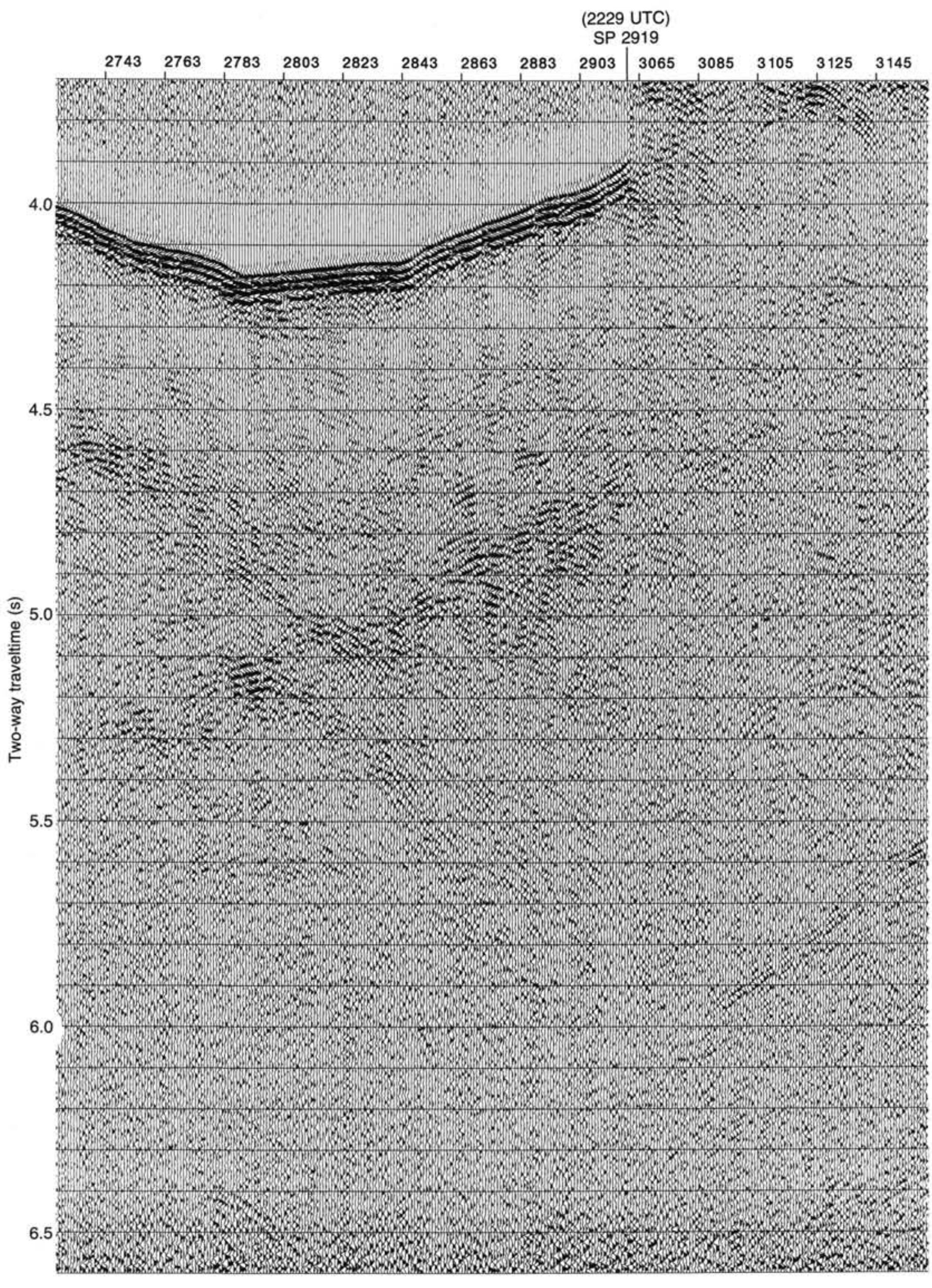
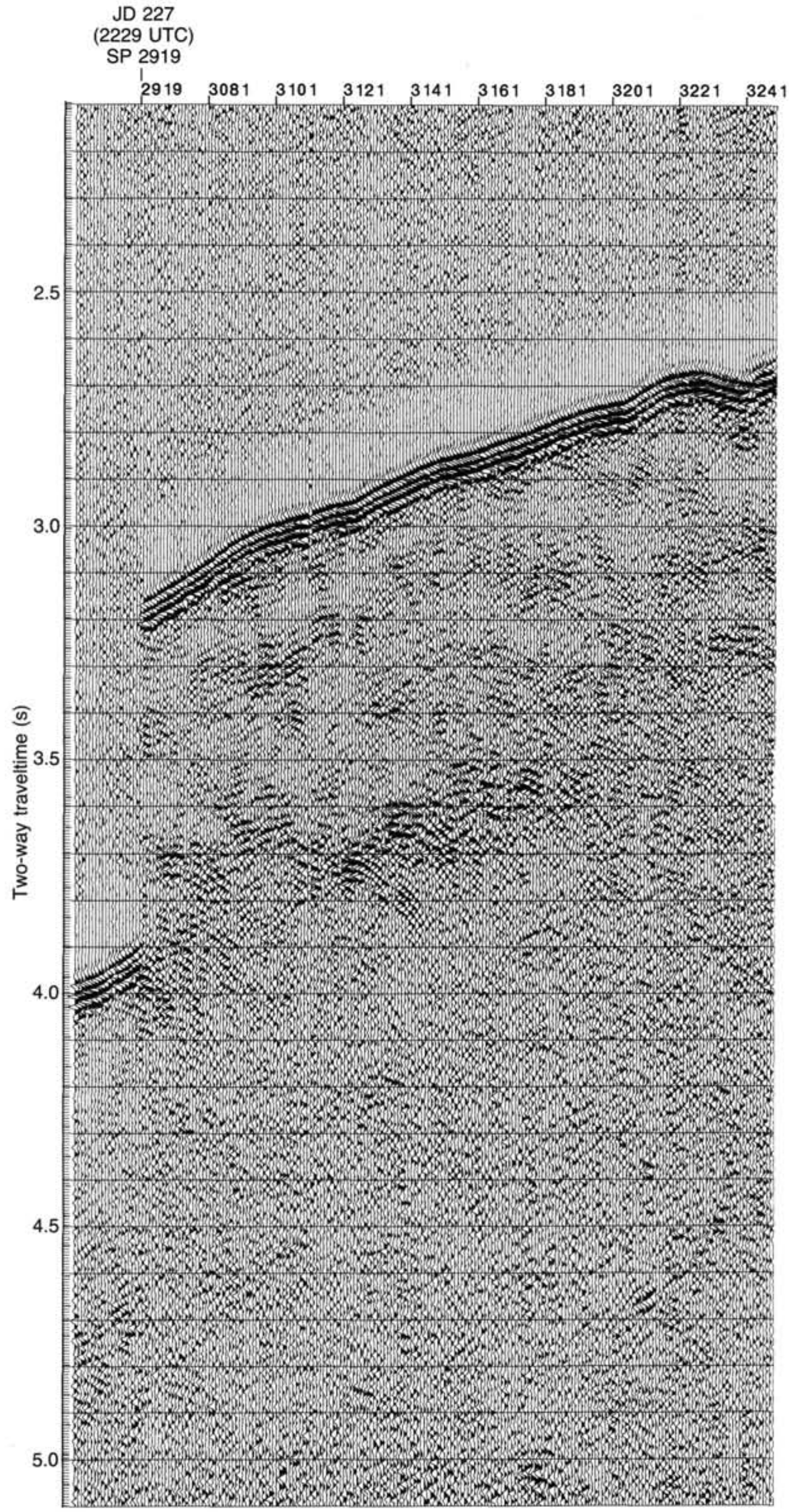


Figure 6 (continued).



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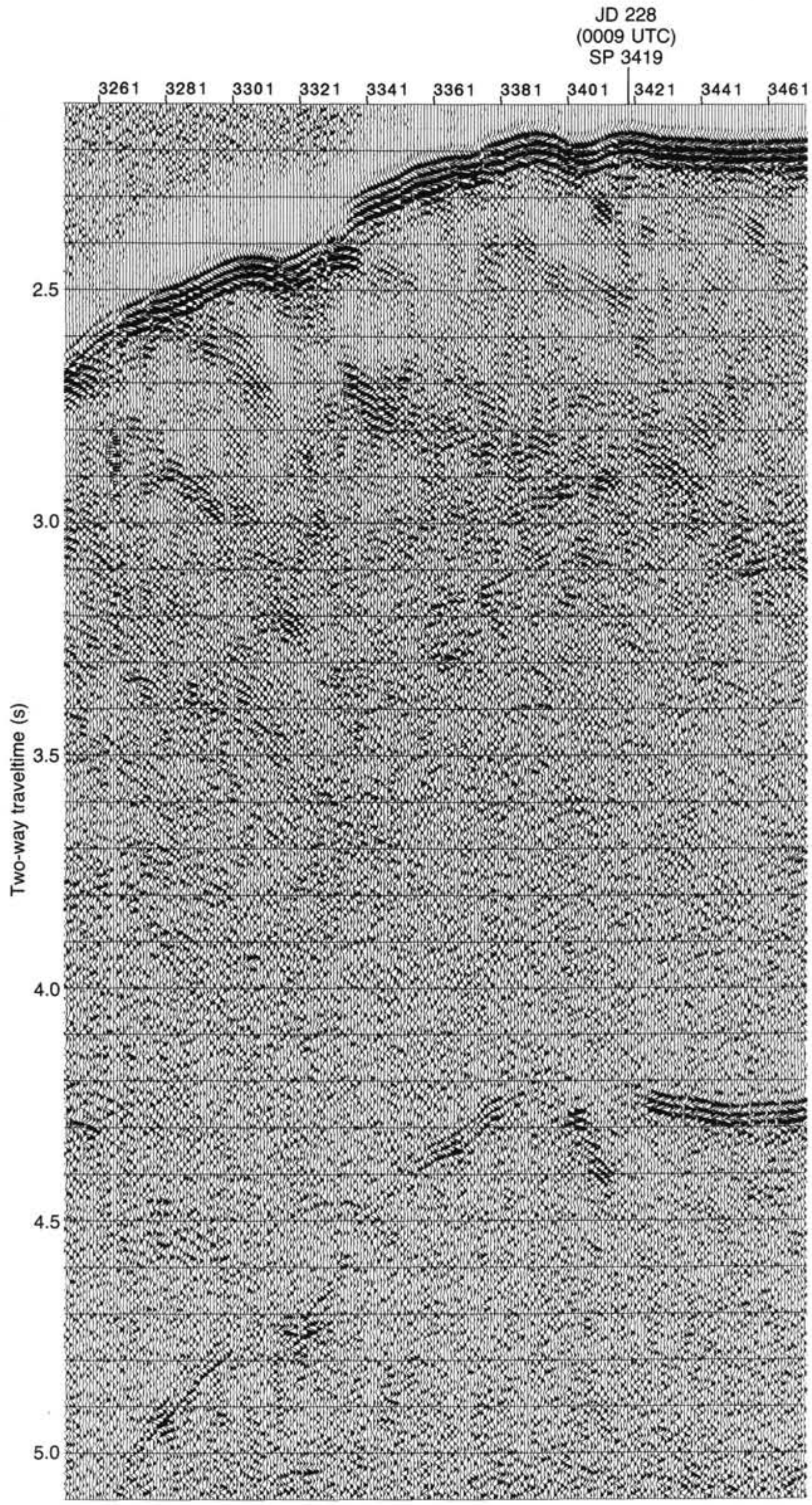

Figure 6 (continued).