3. UNDERWAY GEOPHYSICS[1]

Dean L. Merrill[2] and Shipboard Scientific Party[3]

INTRODUCTION

Geophysical data were collected during Leg 116 of the Ocean Drilling Program (ODP) while the drill ship was in transit to and from the drill sites. Of the 1052 nmi traveled during the round trip from Colombo, Sri Lanka, geophysical data were collected for approximately 880 nmi. Bathymetry data were collected for 870 nmi; magnetic data were collected for 830 nmi; and seismic reflection data were collected for 73 nmi. Of the 42.7 total days spent at sea, 3.6 days were spent in transit. Shipboard geophysical instruments included two precision echosounders, a magnetometer, a seismic reflection profiling system, and Loran-C and satellite navigation systems. These instruments were maintained and operated by ODP marine technicians in cooperation with the scientific party and the officers and crew of SEDCO-FOREX, Inc.

NAVIGATION DATA

Navigation data were collected in the underway geophysics lab by a Magnavox 1107 GPS system and on the ship's bridge by a Magnavox MX 4400 GPS system. The satellite receiver in the underway geophysics lab obtains fixes from the Global Positioning System (GPS) as well as the standard doppler satellite system. Both the Magnavox 1107 GPS and the Magnavox 4400 GPS satellite receivers calculate dead-reckoning positions between fixes. The navigation data were based primarily on the Magnavox 4400 GPS data set, which gave more consistent positions.

A plot of the transit ship tracks of Leg 116 is shown in Figure 1. An enlarged plot of the navigation in the vicinity of the drill sites is shown in Figure 2. These plots were generated from satellite-derived positions and course- and speed-change information (Table 1) compiled from the bridge log, underway geophysical log, and satellite-navigation sheets. The course and speed information came from the digital seismic tape headers. The Geological Data Center at Scripps Institution of Oceanography produced this navigation compilation.

BATHYMETRIC DATA

Bathymetric data were obtained with both 3.5-kHz and 12-kHz echo-sounders. The 3.5-kHz system uses an array of 12 Raytheon TR-109 transducers and a Raytheon PTR-105B Transceiver. A Raytheon CESP-III correlator was used to improve the signal-to- noise ratio (20 dB). The pulse width used was 100 ms. The hull-mounted transducers are situated 6 m below sea level. The ship has two 12-kHz transducers: a Raytheon TR-12/34, mounted aft of the moonpool and an EDO-323B, mounted under the bridge, forward of the moonpool. The EDO-323B transducer is more commonly used on site approaches because it is mounted in a quieter location than the aft transducer. The 12-kHz system uses an EDO-248C transceiver.

Because of the transducer locations, the quality of the recorded data was poor when the ship was traveling at speeds greater than 6 kt. Consequently, site surveys requiring detailed bathymetric data were conducted at speeds slower than 6 kt. However, a total of 870 nmi of bathymetric coverage was collected during Leg 116. A summary of these data is displayed in Figure 3.

MAGNETIC DATA

A Geometrics 801 proton precession magnetometer was towed approximately 300 m astern during transit. The data were recorded in analog format on a graphics recorder, in digital format on the header of the seismic tapes (one reading per seismic shot), and manually every 5 min in the underway geophysical log. The magnetic field values were reduced to anomaly values by subtracting the 1985 IGRF. Figure 4 shows a plot of the magnetic anomalies along the Leg 116 transit track.

SEISMIC-REFLECTION DATA

Single-channel seismic-reflection profiles were collected over 73 nmi during Leg 116. A seismic line was run across the three sites to be drilled before any sites were occupied (Fig. 5). This seismic line was run from north to south, 6 km to the east of the sites with a continuation run back to the north over the proposed Leg 116 site locations. Seismic records are available from the Data Base Supervisor, Ocean Drilling Program.

The seismic sources used aboard the *JOIDES Resolution* during Leg 116 consisted of two synchronized 80-cm^3 Seismic Systems Inc. water guns. The seismic receiver was a 100-m-long Teledyne Model 178 streamer, deployed from the fantail and towed approximately 500 m behind the vessel. Towing depth was set by external depth depressors (birds). Seismic data were displayed in real time in analog format on two EDO-550 dry-paper recorders, using only streamers, amplifier, and two band-pass filters (Table 2). These data were also digitally recorded using a supermicro 561 Masscomp computer, which functioned as the central unit for recording, processing, and displaying the data. Raw data were recorded on 9-track Cipher tapes, using SEG-Y format and a density of 1600 bpi. The header file for each shotpoint includes the following information: shotpoint number, date, time, wind speed, wind direction, ship's speed (pit log), ship's gyro heading, cumulative distance traveled, streamer and gun depth, and information concerning the timing of gun firing.

One digitally recorded seismic-reflection line (line 1) was collected during the cruise, recorded with the Masscomp computer, and reprocessed at ODP headquarters. Table 2 gives the reprocessing parameters. The digitally processed record is shown in Figure 5. The location of line 1 is shown in Figure 2; course and speed changes are indicated. A second seismic line was run while proceeding from Site 717 to 718. However, due to a computer malfunction, this line was not digitally recorded.

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[1] Cochran, J. R., Stow, D. A. V., et al., 1988. *Proc. ODP, Init. Repts.*, 116: College Station, TX (Ocean Drilling Program).

[2] Ocean Drilling Program, Texas A&M University, 1000 Discovery Drive, College Station, TX 77840.

[3] Shipboard Scientific Party is as given in the list of Participants preceding the contents.

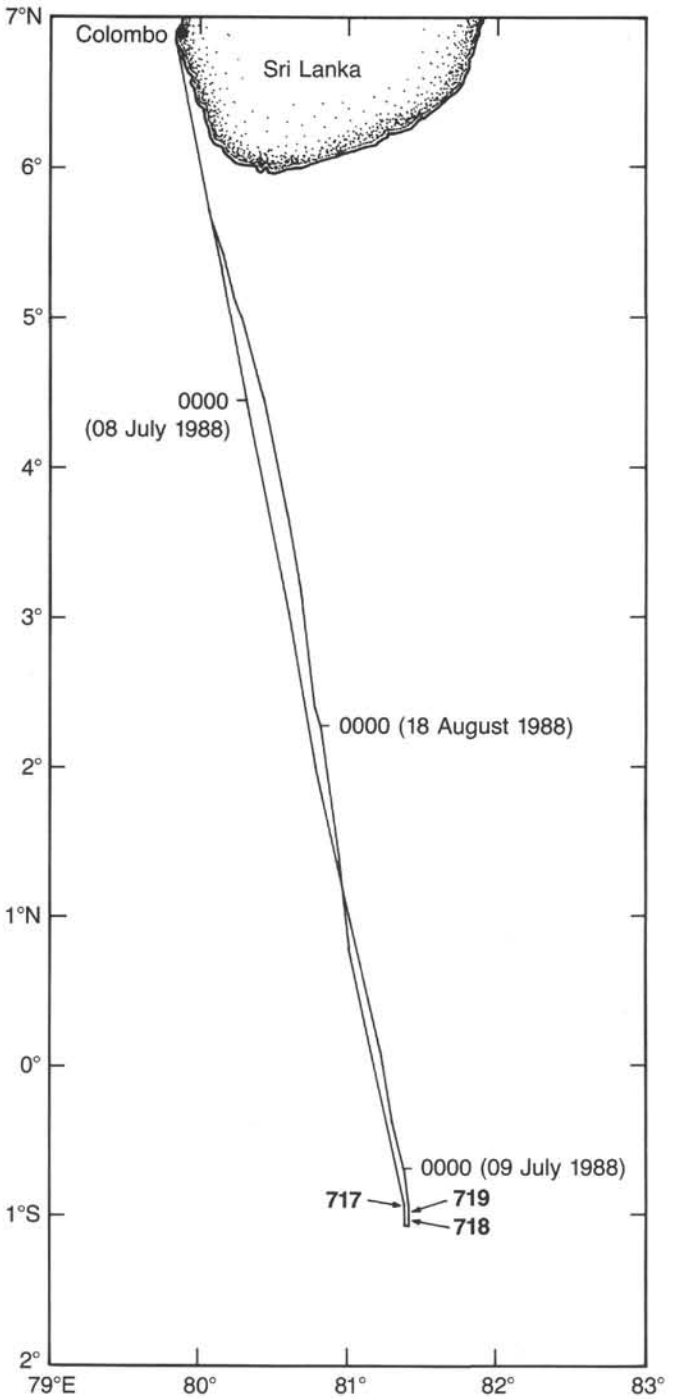

Figure 1. Navigation plot for ODP Leg 116 generated from data given in Table 1.

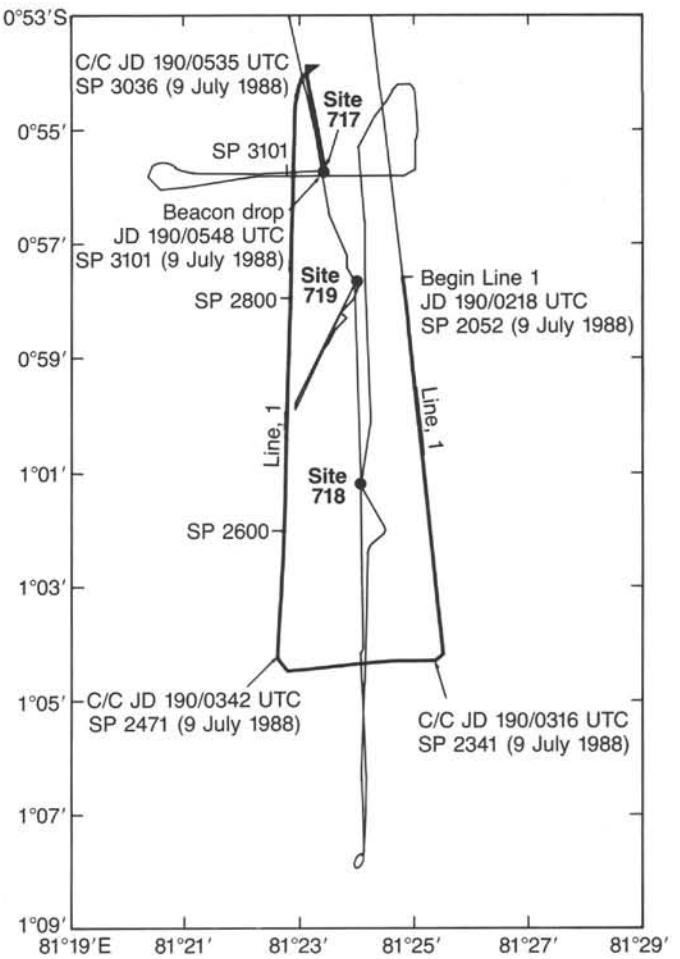

Figure 2. Navigation plot for the vicinity of Sites 717, 718, and 719. Location of seismic line 1 is shown by a heavy line.

Table 1. Satellite navigation and course and speed-change data used to generate Leg 116 track-line plots shown in Figures 1 and 2.

Date (1987)	Julian day	Time (UTC)	North latitude (deg)	(min)	East longitude (deg)	(min)	Distance (nmi)	Actual speed (kt)	course (deg)	Comments[a]
7 July	188	1800	5	43.03	80	3.58	0.0	14.1	168	GPS
7	188	1815	5	39.58	80	4.32	3.5	13.3	167	GPS
7	188	1830	5	36.30	80	5.00	6.8	13.4	168	c/cs
7	188	1840	5	34.20	80	5.50	9.1	13.3	168	c/cs
7	188	1845	5	33.10	80	5.80	10.2	13.3	168	c/cs
7	188	1900	5	29.83	80	6.49	13.5	13.8	168	GPS
7	188	1905	5	28.70	80	6.70	14.7	13.9	168	c/cs
7	188	1915	5	26.45	80	7.23	17.0	12.9	167	GPS
7	188	1923	5	24.80	80	7.60	18.7	12.9	167	c/cs
7	188	1933	5	22.70	80	8.10	20.8	12.7	167	c/cs
7	188	1953	5	18.50	80	9.10	25.1	12.7	170	c/cs
7	188	2000	5	17.09	80	9.36	26.6	13.8	168	GPS
7	188	2015	5	13.73	80	10.09	30.0	13.2	170	GPS
7	188	2032	5	10.10	80	10.70	33.7	13.2	170	c/cs
7	188	2057	5	4.60	80	11.60	39.3	13.2	170	c/cs
7	188	2112	5	1.40	80	12.20	42.6	13.3	170	c/cs
7	188	2138	4	55.70	80	13.10	48.3	13.1	170	c/cs
7	188	2150	4	53.10	80	13.60	50.9	13.4	170	c/cs
7	188	2157	4	51.60	80	13.80	52.5	12.8	170	c/cs
7	188	2202	4	50.50	80	14.00	53.6	13.4	170	c/cs
7	188	2231	4	44.10	80	15.10	60.0	13.4	169	c/cs
7	188	2254	4	39.10	80	16.10	65.2	13.5	168	c/cs
7	188	2306	4	36.50	80	16.70	67.9	13.5	169	c/cs
7	188	2332	4	30.70	80	17.90	73.7	13.3	168	c/cs
7	188	2350	4	26.80	80	18.70	77.7	13.2	168	c/cs
8	189	0000	4	24.70	80	19.20	79.9	13.2	168	c/cs
8	189	0005	4	23.60	80	19.40	81.0	13.5	169	c/cs
8	189	0010	4	22.50	80	19.70	82.1	13.5	169	c/cs
8	189	0014	4	21.60	80	19.80	83.0	13.2	169	c/cs
8	189	0023	4	19.70	80	20.20	85.0	13.4	169	c/cs
8	189	0100	4	11.60	80	21.90	93.3	13.3	170	c/cs
8	189	0111	4	9.10	80	22.30	95.7	13.5	170	c/cs
8	189	0115	4	8.30	80	22.50	96.6	13.3	169	c/cs
8	189	0204	3	57.60	80	24.60	107.5	13.2	169	c/cs
8	189	0216	3	55.00	80	25.20	110.1	13.3	169	c/cs
8	189	0254	3	46.80	80	26.80	118.6	13.4	169	c/cs
8	189	0315	3	42.20	80	27.80	123.3	12.5	168	c/cs
8	189	0320	3	41.20	80	28.00	124.3	13.2	169	c/cs
8	189	0358	3	32.90	80	29.70	132.7	13.3	169	c/cs
8	189	0423	3	27.50	80	30.80	138.2	13.3	169	c/cs
8	189	0428	3	26.40	80	31.00	139.4	13.3	169	c/cs
8	189	0441	3	23.60	80	31.50	142.2	13.4	169	c/cs
8	189	0457	3	20.10	80	32.30	145.8	13.4	169	c/cs
8	189	0547	3	9.10	80	34.50	157.0	13.5	169	c/cs
8	189	0617	3	2.50	80	35.80	163.7	13.6	170	c/cs
8	189	0626	3	0.50	80	36.20	165.8	13.4	169	c/cs
8	189	0631	2	59.40	80	36.40	166.9	13.5	169	c/cs
8	189	0703	2	52.30	80	37.80	174.1	13.3	169	c/cs
8	189	0715	2	49.71	80	38.34	176.8	13.1	169	GPS
8	189	0746	2	43.10	80	39.60	183.6	13.3	169	c/cs
8	189	0800	2	40.00	80	40.20	186.7	13.8	172	GPS
8	189	0812	2	37.30	80	40.60	189.4	14.0	172	c/cs
8	189	0815	2	36.58	80	40.68	190.1	12.8	171	GPS
8	189	0832	2	33.00	80	41.20	193.8	13.0	171	c/cs
8	189	0847	2	29.80	80	41.70	197.0	13.0	171	c/cs
8	189	0911	2	24.60	80	42.50	202.2	13.0	171	c/cs
8	189	0915	2	23.74	80	42.61	203.1	13.0	171	GPS
8	189	0936	2	19.20	80	43.40	207.7	13.3	171	c/cs
8	189	0951	2	16.00	80	43.90	211.0	10.9	170	c/cs
8	189	0953	2	15.60	80	44.00	211.4	13.1	171	c/cs
8	189	1015	2	10.86	80	44.73	216.2	13.0	172	GPS
8	189	1036	2	6.40	80	45.40	220.7	12.8	170	c/cs
8	189	1054	2	2.60	80	46.10	224.5	13.0	169	c/cs
8	189	1115	1	58.15	80	46.99	229.1	12.6	168	GPS
8	189	1123	1	56.50	80	47.30	230.7	12.5	169	c/cs
8	189	1143	1	52.40	80	48.10	234.9	12.6	169	c/cs
8	189	1155	1	49.90	80	48.60	237.4	12.5	168	c/cs
8	189	1200	1	48.91	80	48.79	238.5	12.6	168	GPS
8	189	1216	1	45.62	80	49.48	241.8	12.7	167	GPS
8	189	1221	1	44.60	80	49.70	242.9	12.7	167	c/cs
8	189	1233	1	42.10	80	50.30	245.4	12.6	166	c/cs
8	189	1256	1	37.40	80	51.40	250.3	12.7	166	c/cs
8	189	1300	1	36.61	80	51.62	251.1	12.8	166	GPS
8	189	1316	1	33.30	80	52.42	254.5	14.2	166	GPS

Table 1 (continued).

Date (1987)	Julian day	Time (UTC)	North latitude (deg)	(min)	East longitude (deg)	(min)	Distance (nmi)	Actual speed (kt)	course (deg)	Comments[a]
8	189	1324	1	31.46	80	52.87	256.4	12.3	166	SN
8	189	1335	1	29.30	80	53.40	258.7	12.2	166	c/cs
8	189	1345	1	27.30	80	53.90	260.7	12.2	165	c/cs
8	189	1346	1	27.09	80	53.94	260.9	12.8	167	GPS
8	189	1354	1	25.40	80	54.30	262.6	12.7	167	c/cs
8	189	1400	1	24.19	80	54.61	263.9	12.6	167	GPS
8	189	1416	1	20.91	80	55.38	267.2	12.7	167	GPS
8	189	1435	1	17.00	80	56.30	271.3	12.7	167	c/cs
8	189	1451	1	13.70	80	57.10	274.7	12.8	167	c/cs
8	189	1500	1	11.83	80	57.52	276.6	12.7	167	GPS
8	189	1514	1	8.90	80	58.20	279.5	12.6	167	c/cs
8	189	1516	1	8.54	80	58.29	280.0	12.6	167	GPS
8	189	1534	1	4.80	80	59.10	283.7	12.5	167	c/cs
8	189	1539	1	3.80	80	59.40	284.8	12.7	166	c/cs
8	189	1600	0	59.51	81	0.45	289.2	12.7	167	GPS
8	189	1607	0	58.10	81	0.80	290.7	12.7	167	c/cs
8	189	1616	0	56.21	81	1.23	292.6	12.9	167	GPS
8	189	1635	0	52.20	81	2.10	296.7	12.7	167	c/cs
8	189	1700	0	47.09	81	3.33	302.0	13.0	166	GPS
8	189	1700	0	47.10	81	3.30	302.0	13.2	166	c/cs
8	189	1703	0	46.50	81	3.50	302.6	13.1	167	c/cs
8	189	1716	0	43.69	81	4.12	305.5	12.9	167	GPS
8	189	1723	0	42.20	81	4.40	307.0	13.0	166	c/cs
8	189	1743	0	38.00	81	5.50	311.3	13.1	166	c/cs
8	189	1804	0	33.60	81	6.50	315.9	13.0	166	c/cs
8	189	1815	0	31.24	81	7.10	318.3	13.1	166	GPS
8	189	1821	0	30.00	81	7.40	319.6	13.1	166	c/cs
8	189	1823	0	29.50	81	7.50	320.0	13.3	166	c/cs
8	189	1845	0	24.82	81	8.68	324.9	13.3	166	GPS
8	189	1915	0	18.38	81	10.26	331.5	13.3	167	GPS
8	189	1928	0	15.60	81	10.90	334.4	13.3	166	c/cs
8	189	1941	0	12.80	81	11.60	337.3	13.3	167	c/cs
8	189	1945	0	11.89	81	11.79	338.2	13.3	167	GPS
8	189	1953	0	10.20	81	12.20	340.0	13.2	166	c/cs
8	189	2015	0	5.47	81	13.34	344.8	12.5	170	GPS
8	189	2022	0	4.00	81	13.60	346.3	12.5	170	c/cs
8	189	2047	-0	1.10	81	14.50	351.5	12.6	171	c/cs
8	189	2057	-0	3.20	81	14.80	353.6	12.2	171	c/cs
8	189	2102	-0	4.20	81	15.00	354.6	12.6	170	c/cs
8	189	2127	-0	9.30	81	15.90	359.8	12.5	171	c/cs
8	189	2158	-0	15.70	81	16.90	366.3	12.6	170	c/cs
8	189	2213	-0	18.80	81	17.40	369.4	12.5	170	c/cs
8	189	2215	-0	19.21	81	17.47	369.8	12.9	167	DR
8	189	2245	-0	25.51	81	18.94	376.3	12.9	167	DR
8	189	2259	-0	28.40	81	19.60	379.3	12.8	167	c/cs
8	189	2315	-0	31.76	81	20.40	382.7	12.8	167	DR
8	189	2319	-0	32.60	81	20.60	383.6	13.0	167	c/cs
8	189	2324	-0	33.60	81	20.80	384.6	12.9	167	c/cs
8	189	2345	-0	38.05	81	21.86	389.2	13.8	164	DR
9	190	0000	-0	41.40	81	22.80	392.6	13.8	164	c/cs
9	190	0002	-0	41.80	81	22.90	393.1	12.5	175	c/cs
9	190	0003	-0	42.00	81	22.90	393.3	10.6	174	c/cs
9	190	0005	-0	42.40	81	23.00	393.6	8.6	174	c/cs
9	190	0008	-0	42.80	81	23.00	394.1	6.8	172	c/cs
9	190	0015	-0	43.60	81	23.10	394.9	6.9	173	c/cs
9	190	0218	-0	57.60	81	24.80	409.0	7.1	173	c/cs
9	190	0248	-1	1.20	81	25.20	412.6	7.1	173	c/cs
9	190	0313	-1	4.10	81	25.50	415.5	6.3	195	c/cs
9	190	0314	-1	4.20	81	25.50	415.6	4.4	244	c/cs
9	190	0316	-1	4.30	81	25.40	415.7	5.3	263	c/cs
9	190	0324	-1	4.30	81	24.70	416.5	6.0	265	c/cs
9	190	0343	-1	4.50	81	22.80	418.4	4.8	314	c/cs
9	190	0344	-1	4.40	81	22.70	418.4	4.5	344	c/cs
9	190	0348	-1	4.20	81	22.60	418.7	6.2	2	c/cs
9	190	0401	-1	2.80	81	22.70	420.1	6.4	3	c/cs
9	190	0407	-1	2.20	81	22.70	420.7	6.1	2	c/cs
9	190	0413	-1	1.60	81	22.70	421.3	6.4	2	c/cs
9	190	0442	-0	58.50	81	22.80	424.4	6.1	3	c/cs
9	190	0448	-0	57.90	81	22.80	425.0	6.4	2	c/cs
9	190	0520	-0	54.50	81	22.90	428.4	6.1	4	c/cs
9	190	0524	-0	54.10	81	23.00	428.8	5.5	60	c/cs
9	190	0527	-0	53.90	81	23.20	429.1	3.1	4	c/cs
9	190	0528	-0	53.90	81	23.20	429.2	2.3	291	c/cs
9	190	0529	-0	53.90	81	23.20	429.2	3.0	219	c/cs
9	190	0531	-0	53.90	81	23.10	429.3	4.7	191	c/cs
9	190	0533	-0	54.10	81	23.10	429.5	6.3	171	c/cs

Table 1 (continued).

Date (1987)	Julian day	Time (UTC)	North latitude (deg)	North latitude (min)	East longitude (deg)	East longitude (min)	Distance (nmi)	Actual speed (kt)	Actual course (deg)	Comments[a]
9	190	0539	-0	54.70	81	23.20	430.1	7.2	168	c/cs
9	190	0548	-0	55.78	81	23.41	431.2	6.4	174	S717
9	190	0548	-0	55.80	81	23.40	431.2	0.0	90	c/cs
19	200	1535	-0	55.78	81	23.41	431.2	0.7	10	S717
19	200	1540	-0	55.72	81	23.42	431.2	1.2	270	GPS
19	200	1541	-0	55.72	81	23.40	431.3	1.3	296	GPS
19	200	1542	-0	55.71	81	23.38	431.3	2.4	270	GPS
19	200	1543	-0	55.71	81	23.34	431.3	1.8	261	GPS
19	200	1545	-0	55.72	81	23.28	431.4	4.9	277	GPS
19	200	1546	-0	55.71	81	23.20	431.5	4.2	270	GPS
19	200	1547	-0	55.71	81	23.13	431.5	4.9	263	GPS
19	200	1548	-0	55.72	81	23.05	431.6	4.1	262	GPS
19	200	1549	-0	55.73	81	22.98	431.7	6.0	270	GPS
19	200	1550	-0	55.73	81	22.88	431.8	6.6	265	GPS
19	200	1551	-0	55.74	81	22.77	431.9	6.6	265	GPS
19	200	1552	-0	55.75	81	22.66	432.0	7.3	275	GPS
19	200	1553	-0	55.74	81	22.54	432.1	7.2	270	GPS
19	200	1554	-0	55.74	81	22.42	432.2	7.3	261	GPS
19	200	1555	-0	55.76	81	22.30	432.4	7.9	266	GPS
19	200	1556	-0	55.77	81	22.17	432.5	6.5	275	GPS
19	200	1557	-0	55.76	81	22.06	432.6	7.2	270	GPS
19	200	1558	-0	55.76	81	21.94	432.7	7.4	270	GPS
19	200	1601	-0	55.76	81	21.57	433.1	7.2	270	GPS
19	200	1602	-0	55.76	81	21.45	433.2	7.2	270	GPS
19	200	1603	-0	55.76	81	21.33	433.3	7.0	270	GPS
19	200	1604	-0	55.76	81	21.21	433.5	7.8	270	GPS
19	200	1605	-0	55.76	81	21.08	433.6	7.3	279	GPS
19	200	1606	-0	55.74	81	20.96	433.7	7.3	294	GPS
19	200	1607	-0	55.69	81	20.85	433.8	7.9	302	GPS
19	200	1608	-0	55.62	81	20.74	434.0	7.3	294	GPS
19	200	1609	-0	55.57	81	20.63	434.1	6.6	270	GPS
19	200	1610	-0	55.57	81	20.52	434.2	7.3	246	GPS
19	200	1611	-0	55.62	81	20.41	434.3	6.2	205	GPS
19	200	1613	-0	55.81	81	20.32	434.5	6.2	138	GPS
19	200	1616	-0	56.04	81	20.53	434.8	7.3	90	GPS
19	200	1617	-0	56.04	81	20.65	434.9	7.2	85	GPS
19	200	1618	-0	56.03	81	20.77	435.1	7.6	90	GPS
19	200	1619	-0	56.03	81	20.90	435.2	8.0	77	GPS
19	200	1620	-0	56.00	81	21.03	435.3	8.5	86	GPS
19	200	1621	-0	55.99	81	21.17	435.5	7.9	86	GPS
19	200	1622	-0	55.98	81	21.30	435.6	8.5	82	GPS
19	200	1623	-0	55.96	81	21.44	435.7	7.9	81	GPS
19	200	1624	-0	55.94	81	21.57	435.9	8.8	74	GPS
19	200	1625	-0	55.90	81	21.71	436.0	7.9	86	GPS
19	200	1626	-0	55.89	81	21.84	436.2	7.8	77	GPS
19	200	1627	-0	55.86	81	21.97	436.3	8.0	77	GPS
19	200	1628	-0	55.83	81	22.10	436.4	5.2	83	GPS
19	200	1630	-0	55.81	81	22.27	436.6	2.6	100	GPS
19	200	1630	-0	55.80	81	22.30	436.6	8.0	88	c/cs
19	200	1635	-0	55.79	81	22.94	437.3	7.0	90	GPS
19	200	1640	-0	55.79	81	23.52	437.8	7.1	91	GPS
19	200	1650	-0	55.81	81	24.70	439.0	6.2	79	GPS
19	200	1651	-0	55.80	81	24.80	439.1	5.9	61	c/cs
19	200	1653	-0	55.70	81	25.00	439.3	5.6	8	c/cs
19	200	1658	-0	55.20	81	25.00	439.8	6.2	3	c/cs
19	200	1700	-0	55.03	81	25.05	440.0	5.8	355	GPS
19	200	1708	-0	54.30	81	25.00	440.8	5.8	314	c/cs
19	200	1709	-0	54.20	81	24.90	440.9	4.9	269	c/cs
19	200	1711	-0	54.20	81	24.70	441.0	4.3	225	c/cs
19	200	1714	-0	54.30	81	24.60	441.2	4.5	209	c/cs
19	200	1717	-0	54.50	81	24.50	441.5	6.2	222	c/cs
19	200	1720	-0	54.77	81	24.28	441.8	7.3	212	GPS
19	200	1723	-0	55.10	81	24.10	442.1	7.7	189	c/cs
19	200	1725	-0	55.30	81	24.00	442.4	7.6	179	c/cs
19	200	1731	-0	56.09	81	24.06	443.1	7.8	179	GPS
19	200	1734	-0	56.50	81	24.10	443.5	8.0	178	c/cs
19	200	1740	-0	57.28	81	24.10	444.3	8.0	177	GPS
19	200	1750	-0	58.62	81	24.17	445.7	8.1	178	GPS
19	200	1800	-1	00.00	81	24.20	447.0	8.1	184	c/cs
19	200	1801	-1	0.10	81	24.22	447.2	8.4	188	GPS
19	200	1810	-1	1.35	81	24.04	448.4	8.3	180	GPS
19	200	1830	-1	4.10	81	24.10	451.2	2.2	161	c/cs
19	200	1831	-1	4.15	81	24.07	451.2	8.5	176	GPS
19	200	1832	-1	4.29	81	24.08	451.4	8.4	180	GPS
19	200	1833	-1	4.43	81	24.08	451.5	8.2	176	GPS
19	200	1834	-1	4.57	81	24.09	451.6	8.5	176	GPS

Table 1 (continued).

Date (1987)	Julian day	Time (UTC)	North latitude (deg)	(min)	East longitude (deg)	(min)	Distance (nmi)	Actual speed (kt)	course (deg)	Comments[a]
19	200	1835	-1	4.71	81	24.10	451.8	7.8	180	GPS
19	200	1836	-1	4.84	81	24.10	451.9	8.5	176	GPS
19	200	1837	-1	4.98	81	24.11	452.1	8.4	180	GPS
19	200	1838	-1	5.12	81	24.11	452.2	8.5	176	GPS
19	200	1839	-1	5.26	81	24.12	452.3	7.9	176	GPS
19	200	1840	-1	5.39	81	24.13	452.5	8.4	180	GPS
19	200	1841	-1	5.53	81	24.13	452.6	7.6	176	GPS
19	200	1842	-1	5.66	81	24.14	452.7	8.4	180	GPS
19	200	1843	-1	5.80	81	24.14	452.9	8.0	177	GPS
19	200	1846	-1	6.20	81	24.16	453.3	7.9	176	GPS
19	200	1847	-1	6.33	81	24.17	453.4	7.8	180	GPS
19	200	1848	-1	6.46	81	24.17	453.5	8.2	180	GPS
19	200	1849	-1	6.60	81	24.17	453.7	7.8	180	GPS
19	200	1850	-1	6.73	81	24.17	453.8	8.4	180	GPS
19	200	1851	-1	6.87	81	24.17	453.9	8.4	180	GPS
19	200	1852	-1	7.01	81	24.17	454.1	7.9	184	GPS
19	200	1853	-1	7.14	81	24.16	454.2	8.5	184	GPS
19	200	1854	-1	7.28	81	24.15	454.4	8.5	184	GPS
19	200	1855	-1	7.42	81	24.14	454.5	8.4	180	GPS
19	200	1856	-1	7.56	81	24.14	454.6	7.7	189	GPS
19	200	1857	-1	7.69	81	24.12	454.8	6.0	233	GPS
19	200	1858	-1	7.75	81	24.04	454.9	3.9	219	GPS
19	200	1900	-1	7.85	81	23.96	455.0	6.8	135	GPS
19	200	1901	-1	7.93	81	24.04	455.1	3.8	72	GPS
19	200	1902	-1	7.91	81	24.10	455.2	5.2	21	GPS
19	200	1903	-1	7.83	81	24.13	455.3	5.3	6	GPS
19	200	1904	-1	7.74	81	24.14	455.4	6.0	0	GPS
19	200	1905	-1	7.64	81	24.14	455.5	7.3	355	GPS
19	200	1906	-1	7.52	81	24.13	455.6	7.9	4	GPS
19	200	1907	-1	7.39	81	24.14	455.7	7.9	356	GPS
19	200	1908	-1	7.26	81	24.13	455.8	8.4	0	GPS
19	200	1909	-1	7.12	81	24.13	456.0	8.4	0	GPS
19	200	1910	-1	6.98	81	24.13	456.1	8.4	0	GPS
19	200	1911	-1	6.84	81	24.13	456.3	8.8	0	GPS
19	200	1912	-1	6.69	81	24.13	456.4	8.5	356	GPS
19	200	1913	-1	6.55	81	24.12	456.5	9.0	359	GPS
19	200	1916	-1	6.10	81	24.11	457.0	9.1	4	GPS
19	200	1917	-1	5.95	81	24.12	457.1	9.0	0	GPS
19	200	1918	-1	5.80	81	24.12	457.3	8.8	0	GPS
19	200	1919	-1	5.65	81	24.12	457.4	9.0	0	GPS
19	200	1920	-1	5.50	81	24.12	457.6	9.0	0	GPS
19	200	1921	-1	5.35	81	24.12	457.7	9.0	0	GPS
19	200	1922	-1	5.20	81	24.12	457.9	9.1	4	GPS
19	200	1923	-1	5.05	81	24.13	458.0	9.0	0	GPS
19	200	1924	-1	4.90	81	24.13	458.2	9.0	0	GPS
19	200	1925	-1	4.75	81	24.13	458.3	9.1	4	GPS
19	200	1926	-1	4.60	81	24.14	458.5	8.8	0	GPS
19	200	1927	-1	4.45	81	24.14	458.6	9.0	0	GPS
19	200	1928	-1	4.30	81	24.14	458.8	9.0	0	GPS
19	200	1931	-1	3.85	81	24.14	459.2	9.7	3	GPS
19	200	1932	-1	3.69	81	24.15	459.4	9.0	0	GPS
19	200	1933	-1	3.54	81	24.15	459.6	8.8	0	GPS
19	200	1934	-1	3.39	81	24.15	459.7	9.1	4	GPS
19	200	1935	-1	3.24	81	24.16	459.9	9.0	0	GPS
19	200	1936	-1	3.09	81	24.16	460.0	9.0	0	GPS
19	200	1937	-1	2.94	81	24.16	460.2	9.1	4	GPS
19	200	1938	-1	2.79	81	24.17	460.3	9.0	0	GPS
19	200	1939	-1	2.64	81	24.17	460.5	9.0	0	GPS
19	200	1940	-1	2.49	81	24.17	460.6	7.3	5	GPS
19	200	1941	-1	2.37	81	24.18	460.7	5.8	24	GPS
19	200	1942	-1	2.28	81	24.22	460.8	4.7	40	GPS
19	200	1943	-1	2.22	81	24.27	460.9	3.0	53	GPS
19	200	1945	-1	2.16	81	24.35	461.0	6.5	56	GPS
19	200	1946	-1	2.10	81	24.44	461.1	3.8	39	GPS
19	200	1947	-1	2.05	81	24.48	461.2	3.7	10	GPS
19	200	1948	-1	1.99	81	24.49	461.2	2.3	330	GPS
19	200	2010	-1	1.25	81	24.07	462.1	0.0	90	718A
1 Aug	213	0545	-1	1.25	81	24.07	462.1	0.1	358	718D
2	214	1515	-0	57.65	81	23.96	465.7	0.0	90	719A
9	221	1030	-0	57.65	81	23.96	465.7	0.0	205	719B
17	229	0709	-0	59.90	81	22.90	468.1	1.5	3	c/cs
17	229	0714	-0	59.80	81	22.90	468.3	1.0	24	c/cs
17	229	0722	-0	59.60	81	23.00	468.4	0.7	8	c/cs
17	229	0730	-0	59.60	81	23.00	468.5	1.0	25	c/cs
17	229	0807	-0	59.00	81	23.30	469.1	0.9	33	c/cs
17	229	0825	-0	58.80	81	23.40	469.4	0.9	41	c/cs

Table 1 (continued).

Date (1987)	Julian day	Time (UTC)	North latitude (deg)	(min)	East longitude (deg)	(min)	Distance (nmi)	Actual speed (kt)	course (deg)	Comments[a]
17	229	0836	-0	58.70	81	23.50	469.5	1.0	38	c/cs
17	229	0846	-0	58.50	81	23.60	469.7	1.2	35	c/cs
17	229	0909	-0	58.20	81	23.70	470.1	1.0	35	c/cs
17	229	0921	-0	58.00	81	23.90	470.3	1.9	24	c/cs
17	229	0924	-0	58.00	81	23.90	470.4	3.7	26	c/cs
17	229	0928	-0	57.70	81	24.00	470.6	2.8	331	c/cs
17	229	0930	-0	57.65	81	23.96	470.7	4.6	322	718E
17	229	0931	-0	57.60	81	23.90	470.8	4.3	335	c/cs
17	229	0934	-0	57.40	81	23.80	471.0	5.5	339	c/cs
17	229	0936	-0	57.20	81	23.80	471.2	7.7	343	c/cs
17	229	0938	-0	57.00	81	23.70	471.4	10.9	346	c/cs
17	229	0941	-0	56.50	81	23.50	472.0	13.0	347	c/cs
17	229	0949	-0	54.80	81	23.20	473.7	13.8	347	c/cs
17	229	0957	-0	53.00	81	22.80	475.6	13.4	347	c/cs
17	229	1007	-0	50.80	81	22.30	477.8	13.9	347	c/cs
17	229	1032	-0	45.10	81	21.00	483.6	13.8	347	c/cs
17	229	1045	-0	42.20	81	20.30	486.6	14.0	347	c/cs
17	229	1112	-0	36.10	81	19.00	492.9	13.9	347	c/cs
17	229	1131	-0	31.80	81	18.00	497.3	14.2	348	c/cs
17	229	1159	-0	25.30	81	16.60	503.9	13.5	347	c/cs
17	229	1204	-0	24.20	81	16.30	505.0	14.1	348	c/cs
17	229	1224	-0	19.60	81	15.30	509.7	14.0	347	c/cs
17	229	1706	0	44.79	81	1.02	575.7	13.5	353	SN
17	229	1910	1	12.44	80	57.59	603.6	13.6	353	SN
17	229	2014	1	26.90	80	55.80	618.1	12.9	352	c/cs
17	229	2019	1	27.90	80	55.60	619.2	13.5	351	c/cs
17	229	2041	1	32.80	80	54.80	624.1	13.3	351	c/cs
17	229	2052	1	35.20	80	54.40	626.5	13.5	353	c/cs
17	229	2059	1	36.80	80	54.20	628.1	13.5	352	c/cs
17	229	2111	1	39.40	80	53.90	630.8	13.4	352	c/cs
17	229	2125	1	42.50	80	53.40	634.0	13.1	352	c/cs
17	229	2132	1	44.10	80	53.20	635.5	13.2	352	c/cs
17	229	2147	1	47.30	80	52.70	638.8	13.4	352	c/cs
17	229	2155	1	49.10	80	52.50	640.6	13.5	352	c/cs
17	229	2217	1	54.00	80	51.80	645.5	13.4	352	c/cs
17	229	2233	1	57.50	80	51.30	649.1	13.5	352	c/cs
17	229	2240	1	59.10	80	51.00	650.7	13.6	352	c/cs
17	229	2246	2	0.40	80	50.90	652.0	13.3	352	c/cs
17	229	2303	2	4.20	80	50.30	655.8	12.5	351	c/cs
17	229	2314	2	6.40	80	50.00	658.1	12.9	352	c/cs
17	229	2319	2	7.50	80	49.80	659.2	12.6	352	c/cs
17	229	2326	2	8.90	80	49.60	660.6	12.7	352	c/cs
17	229	2352	2	14.40	80	48.80	666.1	12.9	352	c/cs
18	230	0000	2	16.10	80	48.60	667.8	12.9	352	c/cs
18	230	0006	2	17.36	80	48.38	669.1	12.4	344	SN
18	230	0025	2	21.10	80	47.30	673.1	12.4	344	c/cs
18	230	0038	2	23.71	80	46.52	675.8	12.4	352	SN
18	230	0038	2	23.70	80	46.50	675.8	12.1	352	c/cs
18	230	0048	2	25.70	80	46.20	677.8	12.4	352	c/cs
18	230	0058	2	27.80	80	46.00	679.9	12.4	352	c/cs
18	230	0118	2	31.90	80	45.40	684.0	12.4	352	c/cs
18	230	0131	2	34.50	80	45.00	686.7	12.2	352	c/cs
18	230	0140	2	36.30	80	44.80	688.5	12.3	352	c/cs
18	230	0146	2	37.60	80	44.60	689.7	12.0	352	c/cs
18	230	0151	2	38.60	80	44.50	690.7	12.5	352	c/cs
18	230	0152	2	38.76	80	44.47	690.9	12.3	353	SN
18	230	0219	2	44.30	80	43.80	696.5	12.2	353	c/cs
18	230	0232	2	46.90	80	43.50	699.1	12.1	353	c/cs
18	230	0239	2	48.30	80	43.30	700.6	12.2	353	c/cs
18	230	0255	2	51.50	80	42.90	703.8	12.1	353	c/cs
18	230	0307	2	53.90	80	42.60	706.2	12.1	353	c/cs
18	230	0308	2	54.15	80	42.60	706.4	12.4	353	SN
18	230	0323	2	57.20	80	42.20	709.6	12.8	353	c/cs
18	230	0330	2	58.70	80	42.00	711.0	12.5	353	c/cs
18	230	0343	3	1.40	80	41.70	713.8	12.3	353	c/cs
18	230	0400	3	4.80	80	41.20	717.2	12.4	353	c/cs
18	230	0418	3	8.50	80	40.70	721.0	12.4	353	c/cs
18	230	0431	3	11.20	80	40.40	723.6	12.3	352	c/cs
18	230	0451	3	15.30	80	39.80	727.7	11.8	352	c/cs
18	230	0509	3	18.80	80	39.30	731.3	12.4	352	c/cs
18	230	0517	3	20.40	80	39.00	733.0	12.3	351	c/cs
18	230	0532	3	23.40	80	38.50	736.0	12.1	350	c/cs
18	230	0539	3	24.80	80	38.30	737.4	12.2	350	c/cs
18	230	0554	3	27.80	80	37.70	740.5	11.9	350	c/cs
18	230	0602	3	29.40	80	37.40	742.1	12.3	350	c/cs
18	230	0608	3	30.60	80	37.20	743.3	12.2	350	c/cs

Table 1 (continued).

Date (1987)	Julian day	Time (UTC)	North latitude (deg)	(min)	East longitude (deg)	(min)	Distance (nmi)	Actual speed (kt)	course (deg)	Comments[a]
18	230	0632	3	35.40	80	36.30	748.2	12.2	350	c/cs
18	230	0651	3	39.20	80	35.70	752.1	12.0	350	c/cs
18	230	0655	3	40.00	80	35.50	752.9	12.0	350	c/cs
18	230	0701	3	41.20	80	35.30	754.1	11.9	350	c/cs
18	230	0711	3	43.10	80	34.90	756.0	11.5	350	c/cs
18	230	0721	3	45.00	80	34.60	757.9	11.7	349	c/cs
18	230	0736	3	47.90	80	34.00	760.9	11.8	348	c/cs
18	230	0744	3	49.40	80	33.70	762.4	12.2	348	c/cs
18	230	0749	3	50.40	80	33.50	763.4	11.4	348	c/cs
18	230	0802	3	52.80	80	33.00	765.9	11.6	348	c/cs
18	230	0817	3	55.70	80	32.40	768.8	11.1	350	c/cs
18	230	0822	3	56.60	80	32.20	769.7	11.7	350	c/cs
18	230	0832	3	58.50	80	31.90	771.7	11.8	349	c/cs
18	230	0842	4	0.40	80	31.50	773.7	11.8	349	c/cs
18	230	0858	4	3.50	80	30.90	776.8	11.9	349	c/cs
18	230	0915	4	6.80	80	30.20	780.2	11.5	349	c/cs
18	230	0928	4	9.20	80	29.70	782.7	11.8	349	c/cs
18	230	0943	4	12.10	80	29.20	785.6	12.0	349	c/cs
18	230	1008	4	17.00	80	28.20	790.6	11.6	350	c/cs
18	230	1014	4	18.20	80	28.00	791.7	12.0	349	c/cs
18	230	1021	4	19.50	80	27.70	793.2	11.9	347	c/cs
18	230	1034	4	22.10	80	27.10	795.7	12.3	347	c/cs
18	230	1037	4	22.60	80	27.00	796.3	11.7	347	c/cs
18	230	1044	4	24.00	80	26.70	797.7	11.8	346	c/cs
18	230	1057	4	26.50	80	26.00	800.3	11.9	343	c/cs
18	230	1105	4	28.00	80	25.60	801.9	12.1	344	c/cs
18	230	1110	4	28.90	80	25.30	802.9	11.6	343	c/cs
18	230	1117	4	30.20	80	24.90	804.2	12.0	342	c/cs
18	230	1124	4	31.60	80	24.50	805.6	11.7	341	c/cs
18	230	1140	4	34.50	80	23.50	808.7	12.0	342	c/cs
18	230	1144	4	35.30	80	23.24	809.5	11.3	347	SN
18	230	1153	4	37.00	80	22.90	811.2	10.8	348	c/cs
18	230	1158	4	37.80	80	22.70	812.1	10.2	348	c/cs
18	230	1205	4	39.00	80	22.40	813.3	10.7	347	c/cs
18	230	1223	4	42.10	80	21.70	816.6	10.7	346	c/cs
18	230	1236	4	44.40	80	21.10	818.9	10.5	347	c/cs
18	230	1251	4	46.90	80	20.50	821.5	11.0	346	c/cs
18	230	1304	4	49.30	80	19.90	823.9	10.4	347	c/cs
18	230	1311	4	50.40	80	19.70	825.1	10.6	346	c/cs
18	230	1324	4	52.70	80	19.10	827.4	11.0	345	c/cs
18	230	1327	4	53.20	80	19.00	827.9	10.8	346	c/cs
18	230	1330	4	53.71	80	18.82	828.5	11.1	342	SN
18	230	1339	4	55.30	80	18.30	830.1	11.6	341	c/cs
18	230	1349	4	57.10	80	17.70	832.1	11.5	341	c/cs
18	230	1407	5	0.40	80	16.60	835.5	11.6	340	c/cs
18	230	1425	5	3.70	80	15.40	839.0	12.1	341	c/cs
18	230	1430	5	4.60	80	15.10	840.0	10.9	341	c/cs
18	230	1453	5	8.60	80	13.70	844.2	10.8	341	c/cs
18	230	1454	5	8.74	80	13.62	844.4	10.5	345	SN
18	230	1501	5	9.90	80	13.30	845.6	10.1	345	c/cs
18	230	1510	5	11.40	80	12.90	847.1	10.5	345	c/cs
18	230	1518	5	12.70	80	12.60	848.5	10.2	345	c/cs
18	230	1528	5	14.40	80	12.10	850.2	10.3	345	c/cs
18	230	1546	5	17.40	80	11.30	853.3	10.0	346	c/cs
18	230	1602	5	20.00	80	10.60	856.0	10.4	346	c/cs
18	230	1617	5	22.50	80	10.00	858.6	10.5	344	c/cs
18	230	1627	5	24.20	80	9.50	860.3	10.0	345	c/cs
18	230	1635	5	25.50	80	9.10	861.7	10.0	345	c/cs
18	230	1636	5	25.62	80	9.10	861.8	10.0	343	SN
18	230	1645	5	27.00	80	8.70	863.3	10.6	341	c/cs
18	230	1657	5	29.10	80	8.00	865.5	10.2	342	c/cs
18	230	1708	5	30.80	80	7.40	867.3	10.4	340	c/cs
18	230	1740	5	36.00	80	5.40	872.9	10.6	340	c/cs
18	230	1748	5	37.40	80	5.00	874.3	10.9	340	c/cs
18	230	1758	5	39.10	80	4.30	876.1	10.6	340	c/cs
18	230	1800	5	39.41	80	4.23	876.5	10.1	346	SN
18	230	1811	5	41.20	80	3.80	878.3	10.4	346	c/cs
18	230	1824	5	43.39	80	3.23	880.6	10.4	346	SN

[a] GPS = Global Positioning System; SN = satellite navigation; DR = dead reckoning; c/cs = change of course. UTC = Universal Time Coordinated.

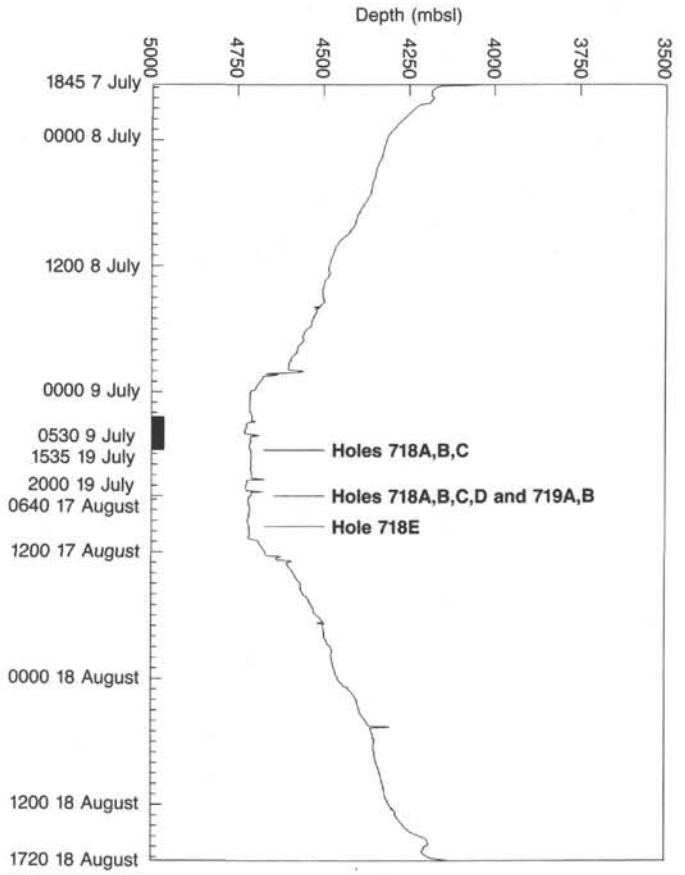

Figure 3. Bathymetric profile obtained during Leg 116. Solid bar indicates the digital seismic reflection coverage.

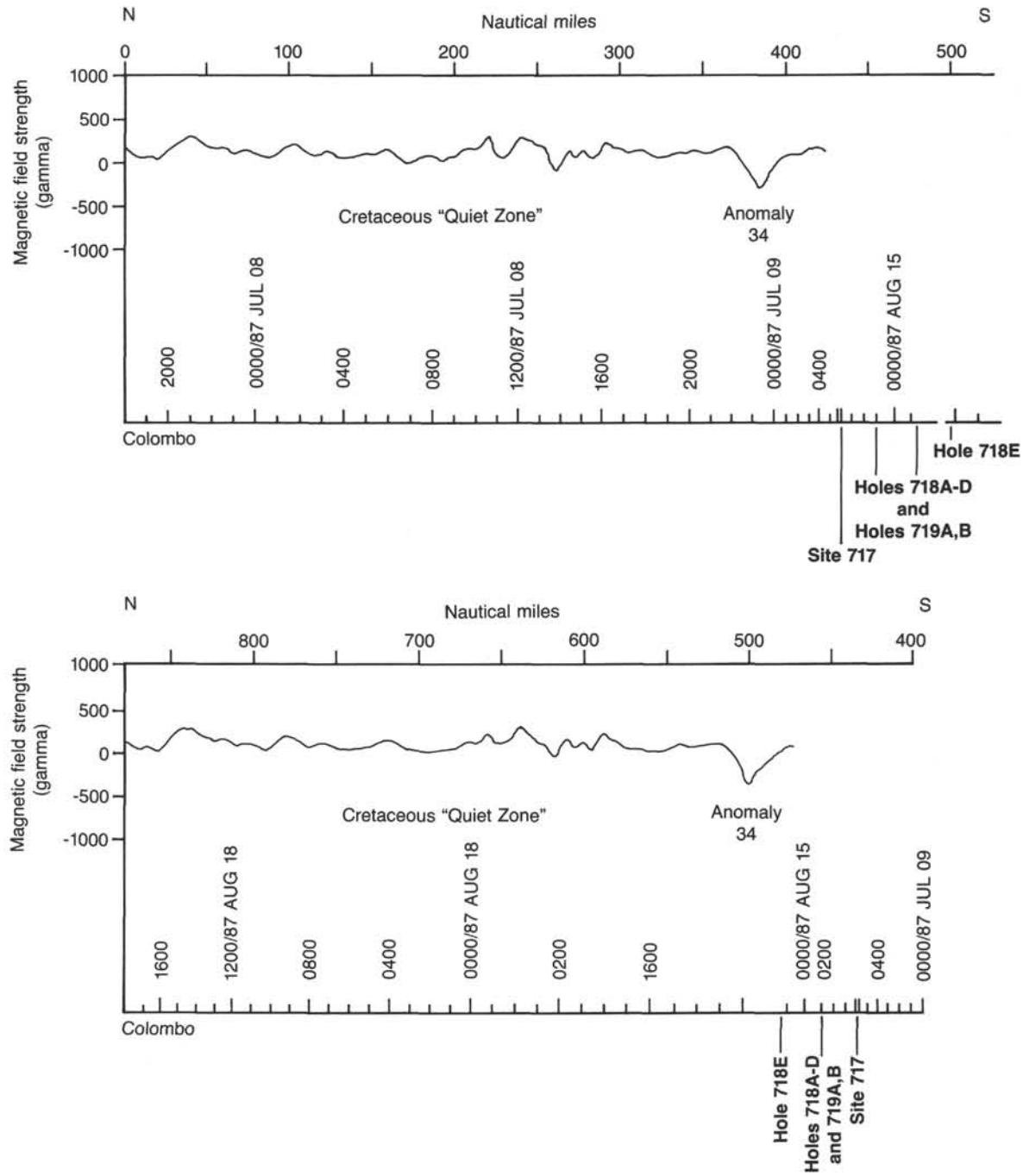

Figure 4. Records of total field magnetic anomaly obtained during Leg 116.

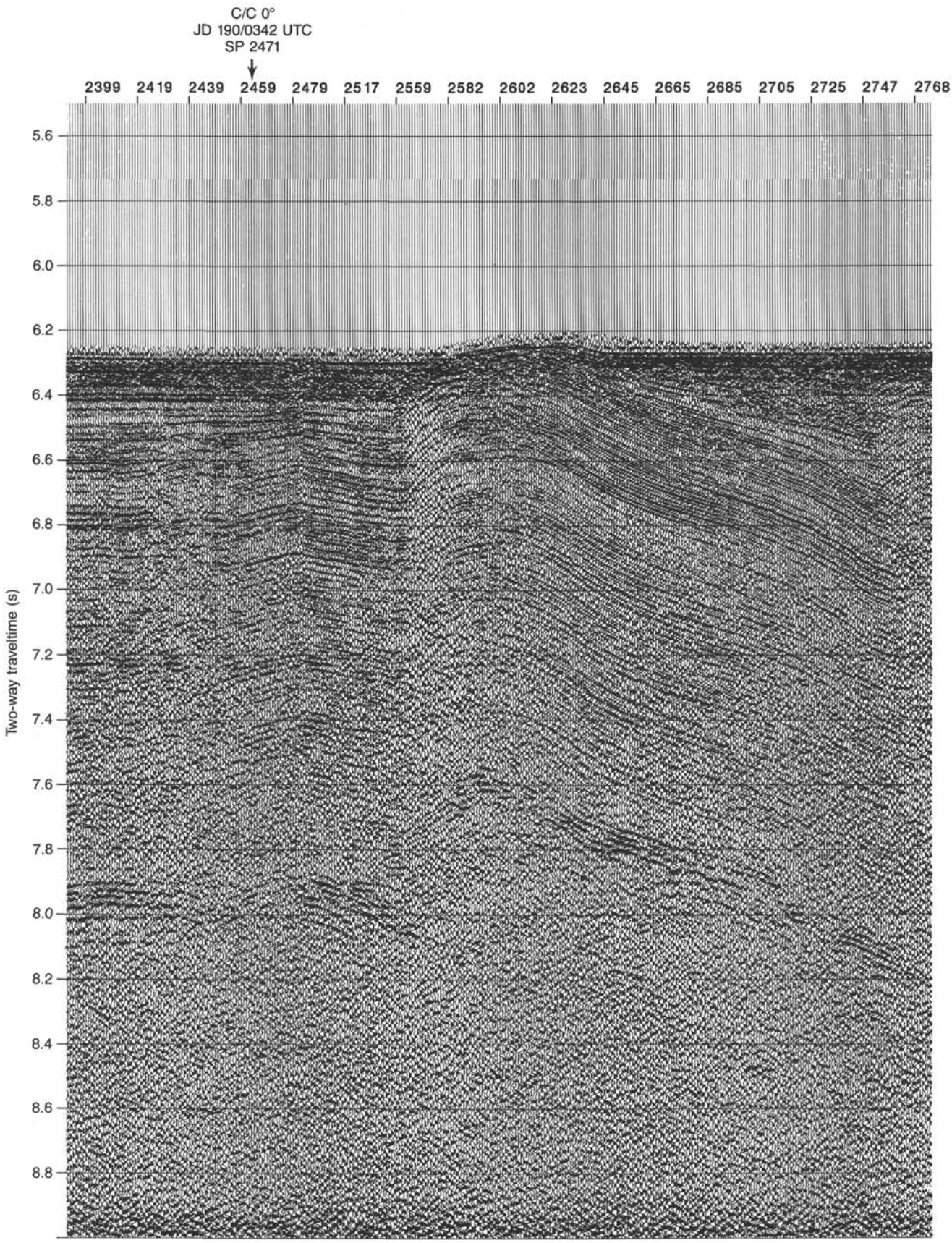

Figure 5. Processed digital seismic data collected from survey line 1, prior to occupation of sites (from Julian Day 190/0218 UTC to Julian Day 190/0554 UTC). Trackline navigation is shown in Figure 2.

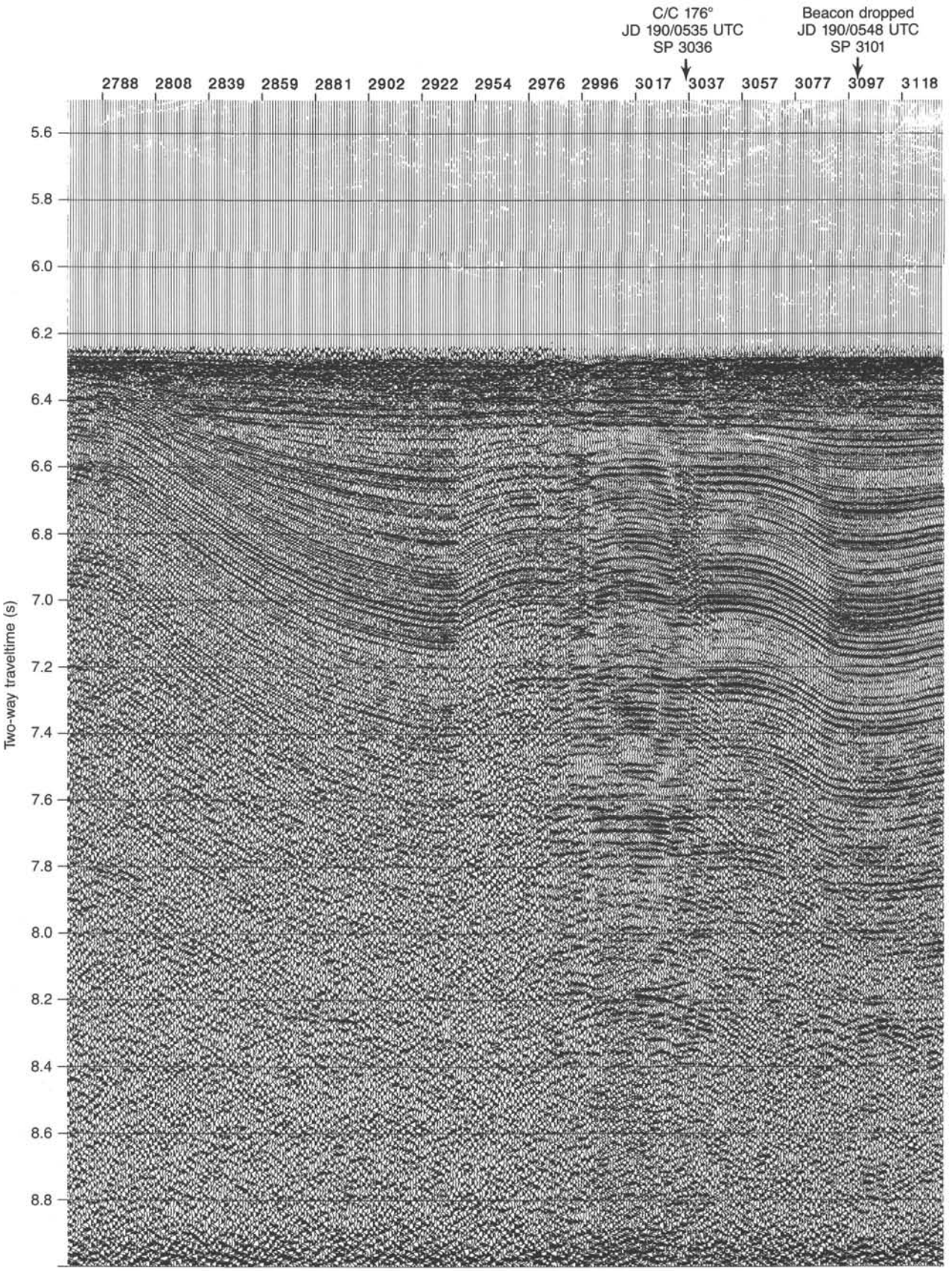

Figure 5 (continued).

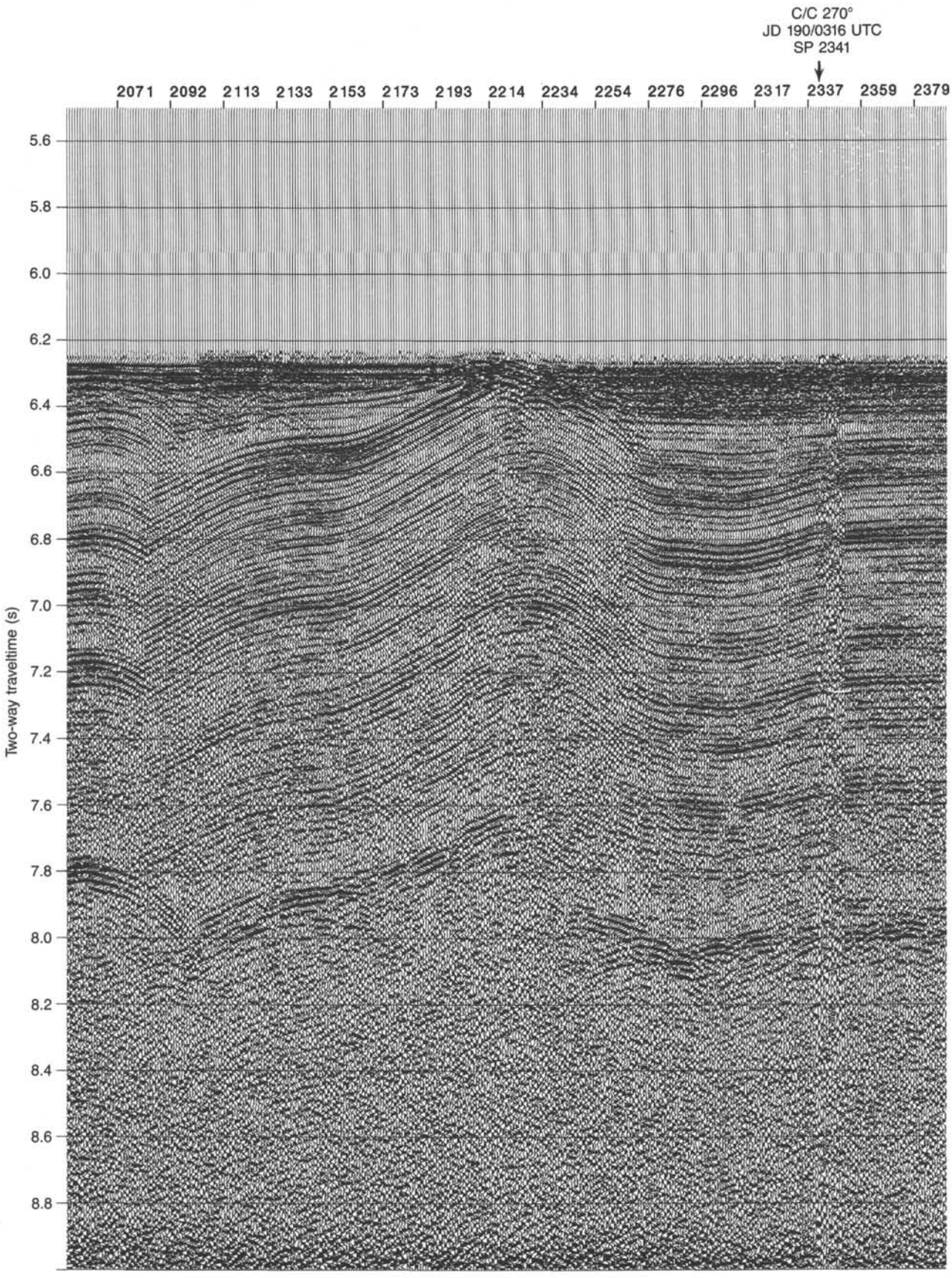

Figure 5 (continued).

Table 2. Line 1 seismic data real-time recording and reprocessing parameters.

Shipboard recording and processing parameters		Shorebased reprocessing parameters	
Start at:	0°58′S 81°25′E	Data window:	5500 to 9000 ms
End at:	Site 717		
Source:	Two 80 $in.^3$ water guns	AGC:	
Streamer:	Port		
		Response time:	300 ms
EDO 1		Start time:	6200 ms
		Gain:	100%
High cut:	120 Hz		
Low cut:	50 Hz	Zero-phase band-pass filter:	
EDO 2			
		High cut:	150 Hz
High cut:	135 Hz	Low cut:	30 Hz
Low cut:	45 Hz		