3. ODP LEG 104, UNDERWAY GEOPHYSICS[1]

Shipboard Scientific Party[2]

INTRODUCTION

We obtained geophysical site surveys during Leg 104 of the Ocean Drilling Program between Bremerhaven, Federal Republic of Germany and St. John's, Newfoundland, Canada. Five lines of geophysical data were collected on Leg 104. Line 1 data were collected before the beacon drop at Site 642; Line 2 when underway between Sites 642 and 643; Line 3 between Sites 643 and 644; Line 4 during the transit from Site 644 to Stavanger, Norway; and Line 5 between Stavanger and St. John's (Leg 104 Part B). We were underway 13.9 days (21% percent of the time) during the 65.4 days of Leg 104 and traveled a total of 3,087 miles (4980 km).

The onboard instrumentation included two precision echo-sounders, a magnetometer, seismic-reflection profilers, and a satellite-navigation system. The instruments were maintained and operated by the ODP marine technicians in cooperation with the scientific party and the officers and crew of SEDCO-FOREX, Inc.

NAVIGATION

Navigation data were collected on the ship's bridge by a Decca navigation system and a Magnavox MX702A satellite-navigation system (SATNAV). Positions were obtained with these systems through the entire 57 days spent at sea (Table 1). The general ship track chart for Leg 104 is shown in Figure 1. Detailed navigation of the ship surveys for site location, reference multichannel seismic lines, and the positions of Leg 104 drill sites are illustrated in Figure 2.

BATHYMETRIC DATA RECORDING

Bathymetric data were obtained with both 3.5-kHz and 12-kHz echo-sounders using a Raytheon recorder system for the 3.5-kHz and an EDO 248C recorder for the 12-kHz instrument. Unfortunately, because of transducer location, the quality of the recorded data is very poor at times when the ship operated at speeds over 6 kt. A total of 2,020 n. mi. (3258 km) of bathymetric coverage was collected on Leg 104 and is displayed in Figures 3 and 4. The real-time recording parameters of the data are provided in Table 2.

MAGNETICS

A Geometrics 801 proton precession magnetometer was towed between sites and along the transits from Site 644 to Stavanger and from Stavanger to St. John's. The analog record is incomplete; however, summaries of the results are shown in Figures 3 and 4. Preliminary studies of the magnetic record suggest that some anomalies may be detected in future data processing.

SEISMIC-REFLECTION PROFILES

Seismic-reflection profiles were collected over 2,367 n. mi. (3818 km) during Leg 104 Parts A and B (Fig. 3). The seismic-reflection coverage is shown by means of the bar in Figures 3 and 4, and records are available from the Data Base Supervisor, Ocean Drilling Program. These data were recorded with the equipment described here.

Sources

The seismic sources used aboard the *JOIDES Resolution* during Leg 104 were usually two 80-in.[3] waterguns. Several seismic sources were used during the transit to St. John's: two 80-in.[3] guns were deployed the first 3 days of the transit. Later, one of the waterguns was replaced by an airgun for a few hours. The transit ended with one watergun as the seismic source.

Streamer-hydrophones

One Teledyne streamer was deployed at the fantail. The 100-m-long streamer contains sixty active sections and was towed approximately 500 m behind the vessel. The towing depth was set by external depth depressors (birds). The hydrophone elements were combined to procure a single signal.

Data Recording

The seismic system was supported by a supermicro 561 Masscomp computer as the central unit to record, process, and display the data. The Masscomp allowed data to be processed and displayed in real time on a 15-in.-wide Printronix, a high-resolution graphic printer (160 dots per inch). The processing treatments applied are described in Table 3. The raw data were recorded on a Cither tape, using an SEG-Y format and a density of 1600 bits/in.

Seismic lines 1, 4, and 5 were displayed in the Printronix printer with the following parameters:

Traces per inch = 10
Clip high = 0.10 in.
Clip low = −0.10 in.
Deflection = 0.10 in.
Positive peaks to the right

Seismic data were also displayed in real time in analog format on two EDO 550 dry-paper recorders, using only streamers, an amplifier, and two band-pass filters (see Table 3).

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[1] Eldholm, O., Thiede, J., Taylor, E., et al., 1987. *Proc., Init. Repts. (Pt. A), ODP*, 104.

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ACKNOWLEDGMENTS

The scientific party of Leg 104 is extremely grateful to Captain Ed Oonk and his officers and crew for their excellence in navigation and their cooperative spirit. Thanks go 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 software for the seismic digital acquisition system.

Table 1. Leg 104 navigation satellite fixes.

Day of Year	Time UTC	Latitude N	Longitude E	Site
177	1144	61.68000	4.12000	642
177	1338	62.06205	4.02408	
177	1436	62.27527	4.00640	
177	1550	62.54350	3.94040	
177	1654	62.66670	3.87642	
177	1738	62.93425	3.87250	
177	1820	63.08123	3.83018	
177	1842	63.15017	3.80722	
177	1928	63.31750	3.73222	
177	2028	63.52790	3.71772	
177	2116	63.69880	3.67222	
177	2304	64.06780	3.61952	
177	2348	64.22552	3.61608	
178	0034	64.38242	3.59470	
178	0134	64.57872	3.58207	
178	0408	65.05950	3.53227	
178	0556	65.31185	3.48422	
178	0724	65.51580	3.42270	
178	0852	65.73147	3.34812	
178	1158	66.22657	3.25213	
178	1250	66.36618	3.30053	
178	1416	66.59573	3.30407	
178	1630	66.98322	3.04298	
178	1710	67.07816	2.95327	
178	1900	67.23337	2.87237	
211	0930	67.22200	2.92933	
213	1958	67.22010	2.93090	642
213	2104	67.21990	2.93070	
213	2146	67.21986	2.93098	
214	0046	67.41513	2.07648	
214	0212	67.55985	1.51277	
214	0306	67.64326	1.26815	
214	0548	67.70572	1.04273	
214	0638	67.71385	1.02582	
214	0652	67.71447	1.03243	
214	0732	67.71535	1.03510	
214	0752	67.71600	1.02363	
219	0205	67.71535	1.03347	
219	2320	67.71458	1.03683	643
220	0046	67.64795	1.19952	
220	0144	67.55534	1.67857	
220	0532	67.04668	3.21820	
220	0624	66.94047	3.60280	
220	0718	66.83280	4.00718	
220	0746	66.77730	4.21508	
220	0816	66.75177	4.39257	
220	0842	66.73238	4.53615	
222	0100	66.67834	4.57667	
222	1716	66.62680	4.53615	644
222	1926	66.21993	4.55118	
222	2022	66.02412	4.56002	
222	2056	65.90332	4.56260	
222	2304	65.44217	4.53017	
223	0724	63.67697	4.37253E	
228	1700	59.50322	3.98238W	
228	1806	59.48475	4.41725	
228	2048	59.46437	5.56102	
228	2158	59.47055	6.02872	
228	2242	59.43044	6.29323	
229	0132	59.36067	7.52420	
229	0250	59.34045	8.08948	
229	1012	59.21320	11.20010	
229	1126	59.15897	11.69958	
229	1404	59.09872	12.41238	
229	1452	59.06820	12.75848	
229	1554	59.02685	13.20328	
229	1744	58.98457	13.96278	
229	1834	58.97005	14.30970	

Table 1 (continued).

Day of Year	Time UTC	Latitude N	Longitude E	Site
229	1932	58.95847	14.69333	
229	2022	58.93884	15.00442	
229	2256	58.82787	15.95315	
230	0142	58.70483	16.96750	
230	0330	58.61568	17.59898	
230	1032	58.32549	20.10438	
230	1108	58.28738	20.30308	
230	1440	58.08445	21.08597	
230	1758	57.89590	22.19347	
230	1856	57.84402	22.55623	
230	1914	57.82398	22.66780	
230	2154	57.69580	23.60088	
230	2342	57.59020	24.20120	
231	0130	57.47117	24.82167	
231	0736	57.13935	26.70268	
231	0830	57.07555	26.98342	
231	1927	56.39030	30.27800	
231	2038	56.27725	30.72737	
231	2103	56.24854	30.86622	
231	2133	56.20615	31.03930	
231	2250	56.10122	31.44420	
231	2308	56.07632	31.54980	
232	0114	55.89147	32.22405	
232	0259	55.73500	32.77150	
232	0339	55.67517	32.95284	
232	0525	55.50452	33.49902	
232	0653	55.37593	33.97698	
232	0714	55.34700	34.08950	
232	0732	55.32345	34.16597	644
232	0919	55.16727	34.73867	
232	0957	55.13951	34.86032	
232	1305	55.00515	35.41145	
232	1335	54.95007	35.56577	
232	2028	54.44653	37.08700	
232	2301	54.21368	37.78762	
233	0050	54.01300	38.30380	
233	0151	53.90082	38.61642	
233	0229	53.83395	38.79727	
233	0417	53.66767	39.32900	
233	0502	53.59883	39.52917	
233	0604	53.52650	39.77550	
233	0650	53.44967	40.00633	
233	1122	52.97438	41.17592	
233	1216	52.88085	41.42162	
233	1311	52.78593	41.68168	
233	1348	52.72997	41.84795	
233	1534	52.55030	42.34230	
233	2142	52.02162	43.65110	
233	2238	51.93185	43.88240	
234	0000	49.44278	49.25048	
234	0106	51.70500	44.44164	
234	0413	51.41883	45.18567	
234	0439	51.37667	45.26633	
234	0701	51.14067	45.75583	
234	0808	51.01472	45.97807	
234	0955	50.80985	46.35817	
234	1059	50.68845	46.56553	
234	1144	50.61105	46.75128	
234	1240	50.51497	46.95382	
234	1312	50.45560	47.07215	
234	1424	50.33823	47.34165	
234	1458	50.28283	47.46883	
234	1610	50.16600	47.72867	
234	1647	50.11370	47.84998	
234	1720	50.06057	47.94490	
234	1930	49.86522	48.34888	
234	2104	49.72325	48.65190	
234	2212	49.62015	48.86345	
235	0002	49.44278	49.25048	
235	0118	49.31655	49.50980	
235	0150	49.26155	49.61173	
235	0600	48.78428	50.38194	
235	0730	48.62535	50.67238	
235	0748	48.59307	50.72637	
235	1034	48.32385	51.23337	
235	1104	48.27488	51.32645	
235	1314	48.05302	51.73962	
235	1406	47.96520	51.90535	

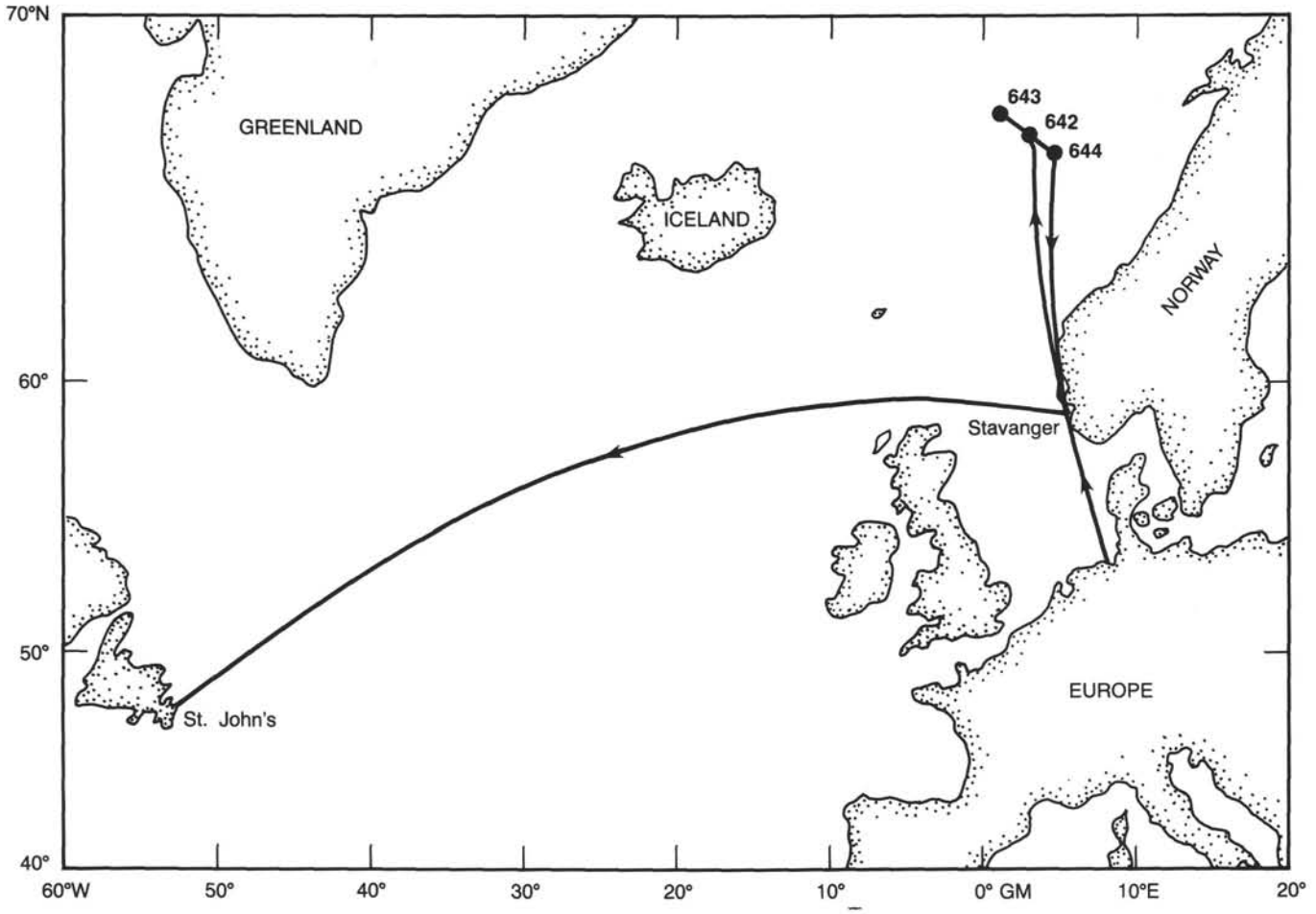

Figure 1. Leg 104 ship track.

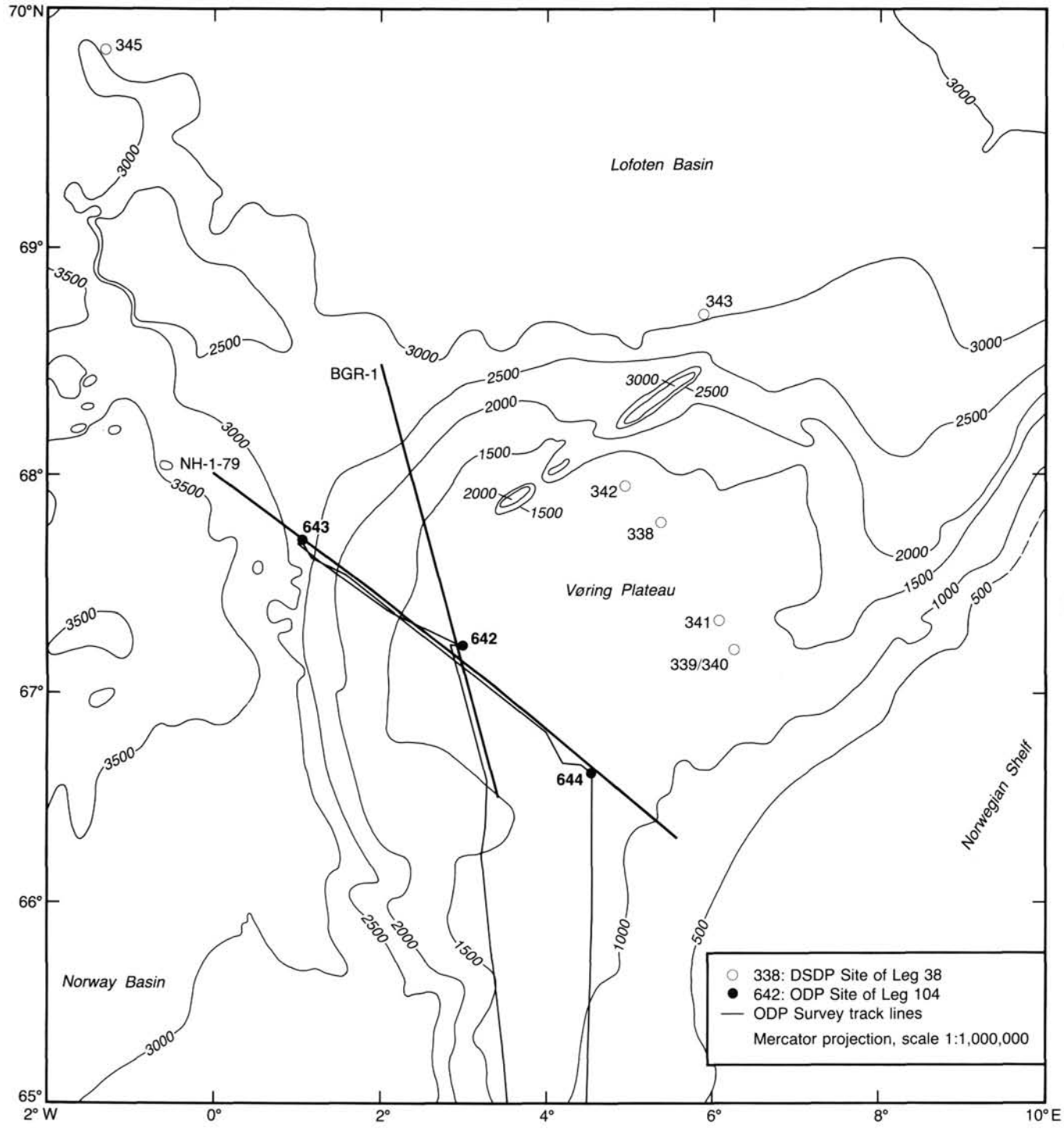

Figure 2. Positions of sites, and site survey profiles at the Vøring Plateau. Navigation for multichannel seismic lines BGR-1 and NH-1 is also shown.

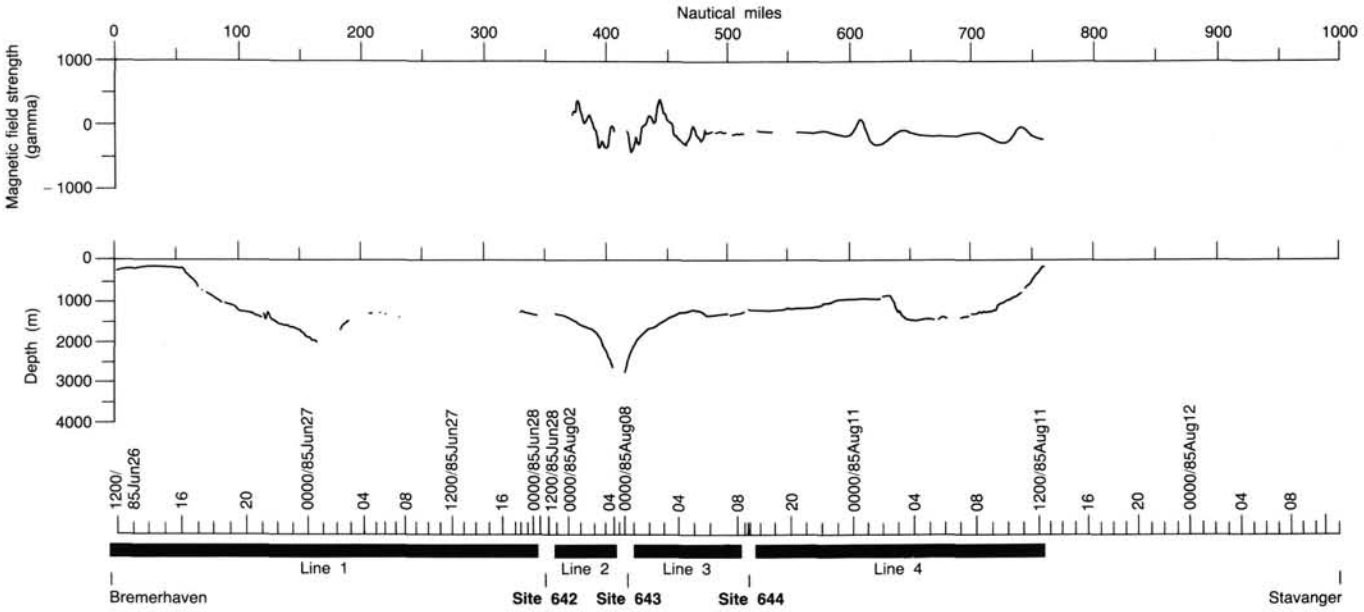

Figure 3. Magnetic and bathymetric profile records obtained during Leg 104A. Solid bars show the seismic reflection coverage during this portion of the leg.

Table 2. Real-time recording parameters for Leg 104 seismic data.

	Line 1	Line 2	Line 3	Line 4	Line 5
Start at:	Survey of Site 642	Site 642	Site 643	Site 644	Stavanger
End at:	Site 642	Site 643	Site 644	Stavanger	St. John's
Source:	Two 80-in.^{3} Waterguns	Two 80-in.^{3} Waterguns	Two 80-in.^{3} Waterguns	Two 80-in.^{3} Waterguns	See text
Streamer:	Port	Port	Port	Port	Port or Starboard
EDO 1:					
High Cut:	190–200 Hz	120–190 Hz	180 Hz	200 Hz	200 Hz
Low Cut:	80–40 Hz	20–40 Hz	80 Hz	80 Hz	70–80 Hz
Gain:					
Amp:	Unknown	20–30 db	80 db	80 db	80 db
Recorder:	Unknown	Full	Variable	Variable	Variable
EDO 2:					
High Cut:	200 Hz	120–200 Hz	180 Hz	200 Hz	200 db
Low Cut:	40–60 Hz	20–40 Hz	80 Hz	80 Hz	80–90 Hz
Gain:					
Amp:	Unknown	20–30 db	80 db	70-90 db	80 db
Recorder:	Unknown	Full	Variable	Variable	Variable

Table 3. Processing parameters for Leg 104 seismic data.

	Line 1	Line 4	Line 5
Data Window:	Variable	Variable	Variable
Plot start time:	Variable	Variable	Variable
Plot stop time:	Variable	Variable	Variable
Plot time scale:	6.25 in./s	4.00 in./s	4.00 in./s
Zero-phase band-pass filter:			
High cut (Hz):	250	250	250
Low cut (Hz):	20	20	20

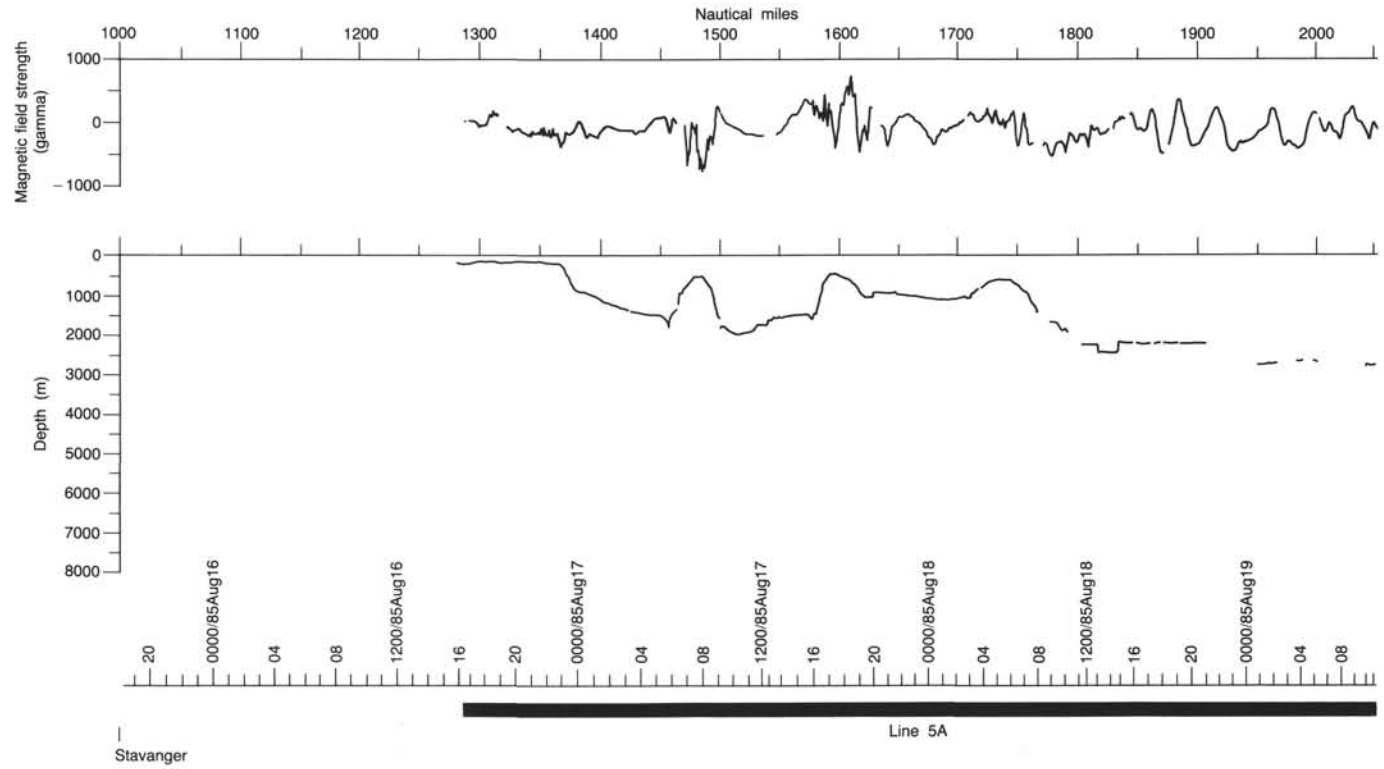

Figure 4. Magnetic and bathymetric profile records obtained during Leg 104B. Solid bars show the seismic-reflection coverage during this portion of the leg.

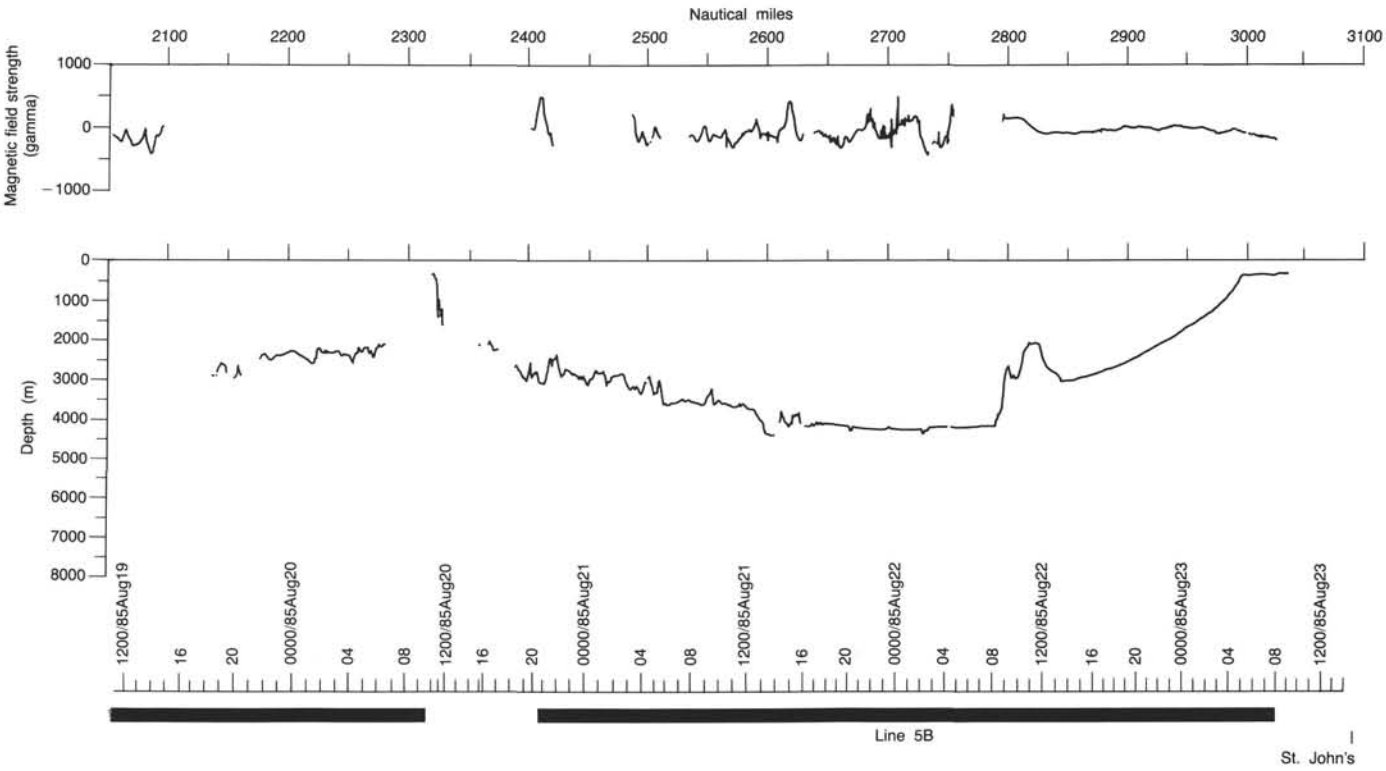

Figure 4 (continued).