

30. UNDERWAY GEOPHYSICAL MEASUREMENTS: *GLOMAR CHALLENGER* LEG 74, CAPETOWN TO WALVIS BAY¹

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We present here the navigation and underway geophysical measurements (magnetics, bathymetry, and seismic profiling) obtained aboard *Glomar Challenger* during Leg 74 of the Deep Sea Drilling Project. On this leg the *Glomar Challenger* departed Capetown, Republic of South Africa, on 6 June 1980 and proceeded to Site 525 near the crest of Walvis Ridge at about 29°S, 3°E. After completion of drilling at Site 525 the ship proceeded to Walvis Bay on 22 June 1980 to disembark a sick seaman. The ship departed Walvis Bay the same day and went to Site 526 near the crest of Walvis Ridge. A beacon was dropped at the site, but inclement weather and sea conditions did not permit us to drill at Site 526 at this time. We drilled Sites 527 and 528 on Walvis Ridge with very successful results before returning to drill Site 526, and we completed the cruise with a final hole at Site 529 on Walvis Ridge. The cruise ended in Walvis Bay on 24 July 1980. The ship's track for Leg 74 is shown in Figure 1. Dates and times for the first navigational fix of the day, progressive distance in hundreds of nautical miles along the ship's track, and site numbers are noted. Table 1 lists the positioning information for Leg 74 acquired underway by the satellite navigation system and used to plot the ship's tracks. Errors are generally less than 1 nautical mile (Talwani et al., 1966). Also listed in Table 1 are the regional magnetic field values, computed at each navigation point using the reference field of Fabiano and Peddie (1969), and used to determine the magnetic anomaly profiles in Figure 2.

Figure 2 shows magnetic anomaly and bathymetric data plotted as functions of time, distance, latitude, and longitude, with the distance plotted as a linear function. The data processing procedure, including program listings, is given in Talwani (1969). The vertical scales show

depth in uncorrected fathoms (assuming a sound speed of 800 fm/s or 1463 m/s) under "D" and magnetic anomaly values in gammas under "M." On the lowermost scale at the bottom of the figure, distances are shown at intervals of 200 nautical miles. In addition, tick marks shown above the distance scale indicate the distance at which any change in course or speed occurred. The corresponding course and speed between changes and the coordinates at the points of change are noted above the distance scale listings. Navigational changes, which occur too frequently to be shown in the space available, or minor adjustments in course or speed, are indicated only by tick marks. At the top of the figures, from top to bottom, are shown date in day-month-year, time in hours, with labels every 4 hr, and latitude and longitude in degrees, with a tick mark whenever a whole degree is crossed.

Seismic reflection profile records for Leg 74 are given in Figure 3. These data were recorded on dry-paper EDO recorders and in general were obtained using two air guns (20 and 40 in.³ firing chambers) as a sound source. Depths are labeled on the sides of the records in two-way reflection time (1 s \approx 750 m water depth). Times and dates are listed on the bottom of the records to key into the navigation plots (Fig. 1) and listings (Table 1).

For detailed descriptions of the geophysical measurements in the vicinity of Sites 325 to 329 the reader is referred to Rabinowitz and Simpson (this volume).

ACKNOWLEDGMENTS

The efforts of the laboratory technicians aboard *Glomar Challenger*, Leg 74, under the direction of laboratory officer Ted Gustafson, are greatly appreciated.

REFERENCES

- Fabiano, E. G., and Peddie, N. U., 1969. Grid values of total magnetic intensity I.G.R.F., 1965. *U.S. ESSA Tech. Rept.*, 38:55.
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Talwani, M., Dorman, J., Worzel, J. L., and Bryan, G. M., 1966. Navigation at sea by satellite. *J. Geophys. Res.*, 71:5891-5902.

¹ Moore, T. C., Jr., Rabinowitz, P. D., et al., *Init. Repts. DSDP, 74*; Washington (U.S. Govt. Publishing Co.).

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Table 1. Positioning information (from satellite navigation system): Leg 74.

Table with columns: Date (day/mo./y.), Time, Latitude (South), Longitude (East), Miles, Speed, Heading, Regional Magnetic Field Values. Rows include data for Site 525 and various dates from 6-6-80 to 21-6-80.

Table 1. (Continued).

Table with columns: Date (day/mo./y.), Time, Latitude (South), Longitude (East), Miles, Speed, Heading, Regional Magnetic Field Values. Rows include data for Site 525 (Cont.), Walvis Bay, and First attempt at Site 526.

Table 1. (Continued).

Date (day/mo./y.)	Time	Latitude (South)	Longitude (East)	Miles	Speed	Heading	Regional Magnetic Field Values
Site 527 (Cont.)							
4-7-80	0650	28 6.72	1 45.62	2332.0	8.3	139	28291.
4-7-80	0740	28 11.99	1 50.73	2338.9	8.5	132	28284.
4-7-80	0800	28 13.89	1 53.09	2341.8	8.5	127	28282.
4-7-80	1100	28 29.23	2 16.06	2367.1	8.7	127	28274.
4-7-80	1120	28 31.00	2 18.66	2370.0	4.9	127	28273.
4-7-80	1130	28 31.49	2 19.40	2370.8	0.0	360	28272.
4-7-80	1140	28 31.49	2 19.40	2370.8	0.0	309	28272.
Site 528							
13-7-80	1420	28 31.20	2 19.00	2371.3	7.2	198	28271.
13-7-80	1530	28 39.10	2 15.94	2379.6	6.3	193	28245.
13-7-80	1550	28 41.15	2 15.36	2381.8	8.0	194	28239.
13-7-80	1600	28 42.44	2 14.99	2383.1	8.5	148	28235.
13-7-80	1630	28 46.06	2 17.53	2387.3	8.6	156	28229.
13-7-80	1840	29 3.08	2 26.08	2405.9	8.8	149	28195.
13-7-80	2140	29 25.70	2 41.60	2432.3	8.7	144	28156.
14-7-80	0020	29 44.63	2 56.89	2455.4	8.3	153	28126.
14-7-80	0150	29 55.77	3 3.28	2467.9	8.3	159	28105.
Site 526							
17-7-80	2220	30 5.41	3 8.27	2482.3	1.4	346	28086.
17-7-80	2230	30 5.18	3 8.20	2482.5	9.0	345	28087.
18-7-80	0020	29 49.27	3 3.29	2499.0	6.9	345	28122.
18-7-80	0040	29 47.05	3 2.60	2501.3	9.0	345	28126.
18-7-80	0200	29 35.47	2 59.03	2513.3	8.7	340	28152.
18-7-80	0230	29 31.36	2 57.32	2517.6	8.8	345	28161.
18-7-80	0340	29 21.40	2 54.29	2527.9	9.7	341	28183.
18-7-80	0450	29 10.69	2 50.23	2539.2	9.7	345	28206.
18-7-80	0610	28 58.23	2 46.43	2552.1	11.3	350	28235.
18-7-80	0630	28 54.53	2 45.71	2555.9	4.1	352	28244.
18-7-80	0640	28 53.86	2 45.60	2556.6	6.7	168	28246.
18-7-80	0650	28 54.95	2 45.86	2557.7	5.3	166	28243.
18-7-80	0700	28 55.80	2 46.10	2558.5	0.0	360	28241.
18-7-80	0710	28 55.80	2 46.10	2558.5	0.0	160	28241.
Site 529							
20-7-80	2330	28 56.22	2 46.27	2559.0	6.7	160	28240.
21-7-80	0040	29 3.63	2 49.30	2566.9	6.0	151	28224.
21-7-80	0050	29 4.51	2 49.86	2567.9	9.8	64	28222.
21-7-80	0120	29 2.38	2 54.88	2572.7	9.0	57	28234.
21-7-80	0140	29 0.75	2 57.77	2575.8	9.0	52	28243.
21-7-80	0310	28 52.53	3 10.11	2589.3	9.3	60	28282.
21-7-80	0610	28 38.63	3 37.81	2617.3	9.3	60	28358.
21-7-80	0730	28 32.48	3 50.15	2629.8	8.8	57	28392.
21-7-80	1030	28 18.28	4 15.29	2656.0	8.8	57	28467.
21-7-80	1130	28 13.55	4 23.75	2664.9	10.3	65	28492.
21-7-80	1430	28 0.70	4 55.57	2695.7	10.3	65	28573.
21-7-80	1610	27 53.53	5 13.20	2712.9	9.4	58	28618.
21-7-80	1630	27 51.87	5 16.22	2716.0	9.2	52	28627.
21-7-80	1930	27 35.04	5 41.12	2743.8	8.9	51	28712.
21-7-80	2200	27 21.04	6 0.71	2766.1	8.9	56	28782.
21-7-80	2330	27 13.62	6 13.13	2779.4	8.1	49	28822.
22-7-80	0110	27 4.90	6 24.70	2792.9	8.8	57	28865.
22-7-80	0140	27 2.54	6 28.89	2797.3	8.8	64	28878.
22-7-80	0440	26 50.98	6 55.50	2823.7	8.8	64	28951.
22-7-80	0450	26 50.34	6 56.98	2825.1	8.7	72	28955.
22-7-80	0510	26 49.47	7 0.08	2828.0	8.8	74	28962.
22-7-80	0530	26 48.70	7 3.24	2831.0	8.7	71	28969.
22-7-80	0540	26 48.24	7 4.78	2832.4	8.6	63	28973.
22-7-80	0620	26 45.71	7 10.52	2838.1	8.0	60	28988.
22-7-80	0640	26 44.39	7 13.12	2840.8	9.0	60	28996.
22-7-80	0940	26 31.10	7 39.54	2867.9	8.6	59	29075.
22-7-80	1240	26 17.98	8 4.18	2893.6	8.4	57	29151.
22-7-80	1540	26 4.51	8 27.88	2918.7	7.9	56	29228.
22-7-80	1840	25 51.52	8 50.08	2942.6	8.1	53	29301.
22-7-80	2140	25 37.06	9 11.60	2966.7	8.3	51	29379.
22-7-80	2200	25 35.33	9 14.00	2969.5	7.3	49	29388.
22-7-80	2240	25 32.17	9 18.11	2974.4	7.1	56	29404.
23-7-80	0020	25 25.56	9 29.09	2986.3	7.0	62	29442.
23-7-80	0120	25 22.30	9 35.96	2993.3	7.5	64	29462.
23-7-80	0330	25 15.31	9 52.30	3009.6	7.6	59	29508.
23-7-80	0620	25 4.20	10 12.80	3031.3	7.6	58	29573.
23-7-80	0920	24 52.07	10 34.16	3054.1	8.0	61	29643.
23-7-80	1120	24 44.43	10 49.58	3070.1	7.9	62	29690.
23-7-80	1250	24 38.91	11 1.19	3082.0	7.5	59	29725.
23-7-80	1310	24 37.64	11 3.55	3084.5	7.7	62	29732.
23-7-80	1430	24 32.90	11 13.50	3094.7	8.8	65	29762.
23-7-80	1500	24 31.04	11 17.88	3099.1	8.3	64	29774.
23-7-80	1800	24 20.16	11 42.52	3124.0	8.8	65	29844.
23-7-80	1930	24 14.65	11 55.63	3137.2	8.8	61	29880.
23-7-80	2230	24 1.98	12 20.99	3163.6	8.8	61	29957.
24-7-80	0130	23 49.31	12 46.35	3190.0	8.6	62	30034.
24-7-80	0430	23 37.36	13 11.27	3215.7	8.6	60	30108.
24-7-80	0450	23 35.96	13 14.02	3218.6	8.6	58	30116.
24-7-80	0630	23 28.45	13 27.36	3233.0			30160.

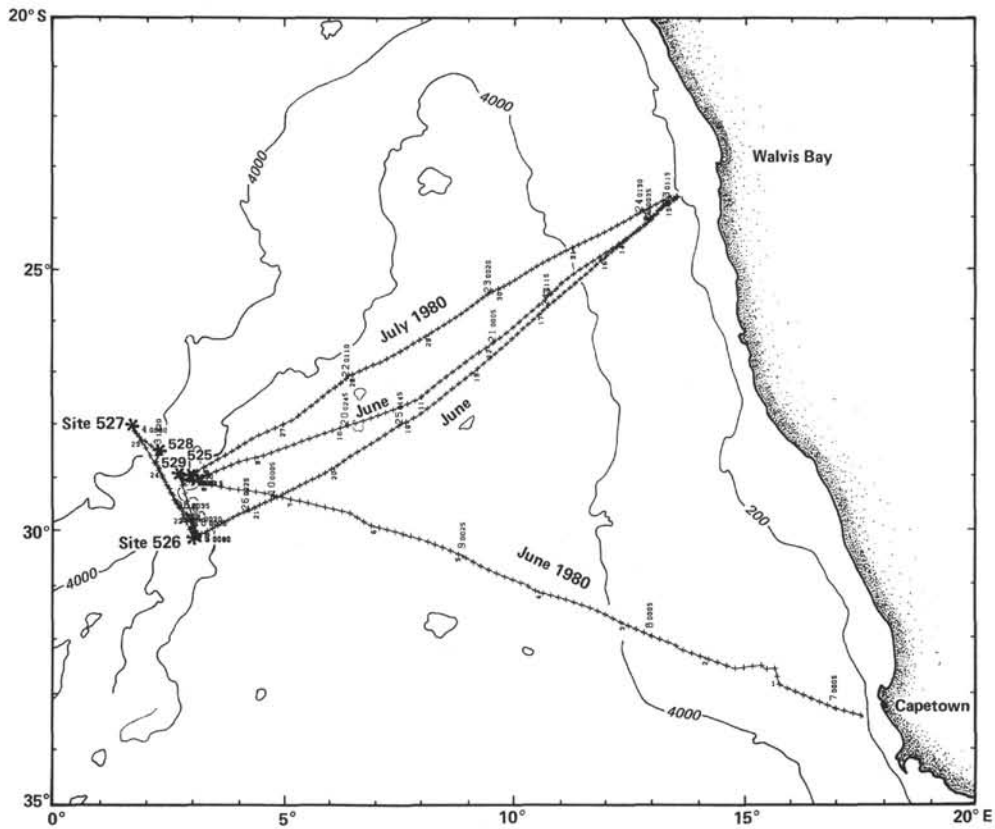


Figure 1. Track chart of *Glomar Challenger* Leg 74 from Capetown to Walvis Bay. First navigation fix of every day and distance in hundreds of nautical miles along track are shown. Hour marks along track designated by "plus" marks.

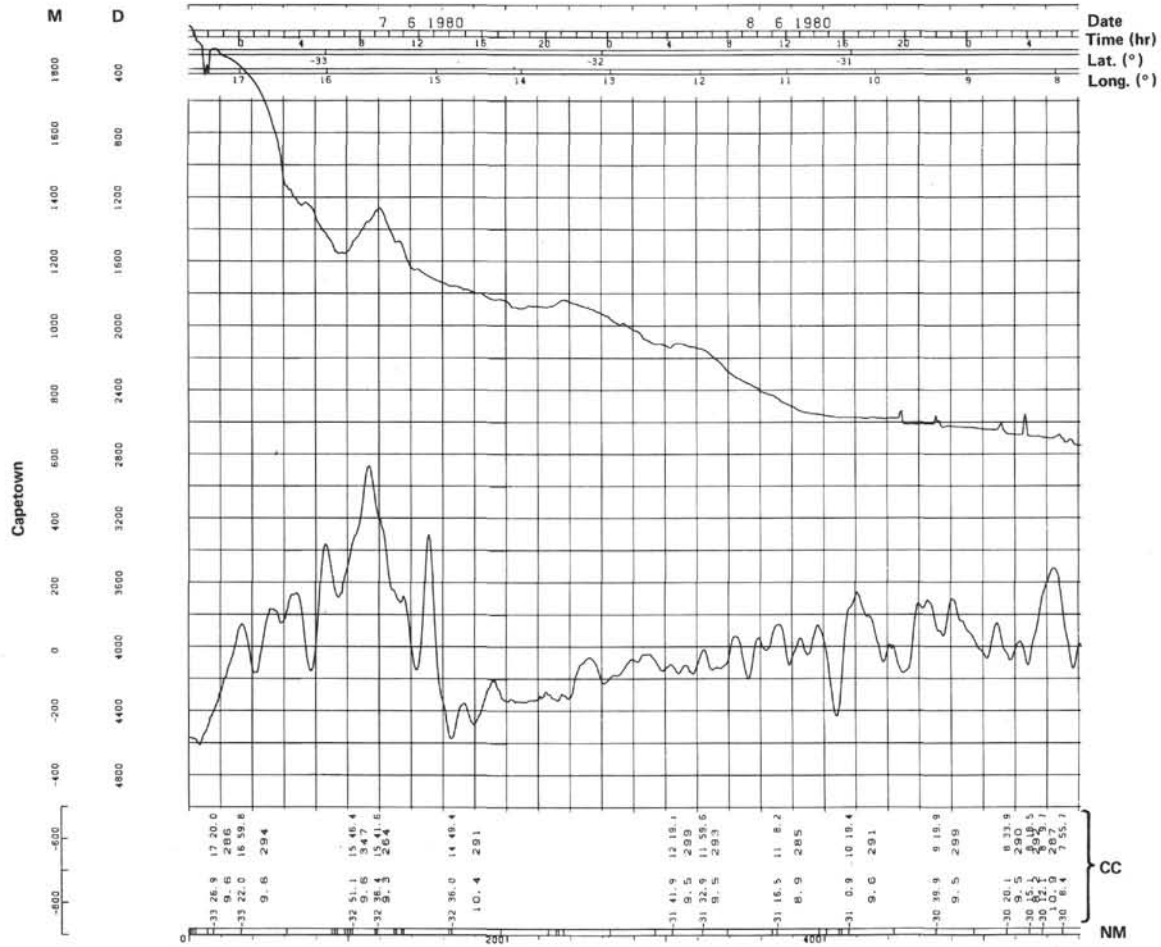


Figure 2. Magnetic anomaly and bathymetric profiles along track of Leg 74 of *Glomar Challenger*. Plots and scales further explained in text. (D = depth, in uncorrected fathoms. M = magnetic anomaly values, in gammas; NM = distance, in nautical miles; CC = course changes, speed between changes, and coordinates at the point of change.)

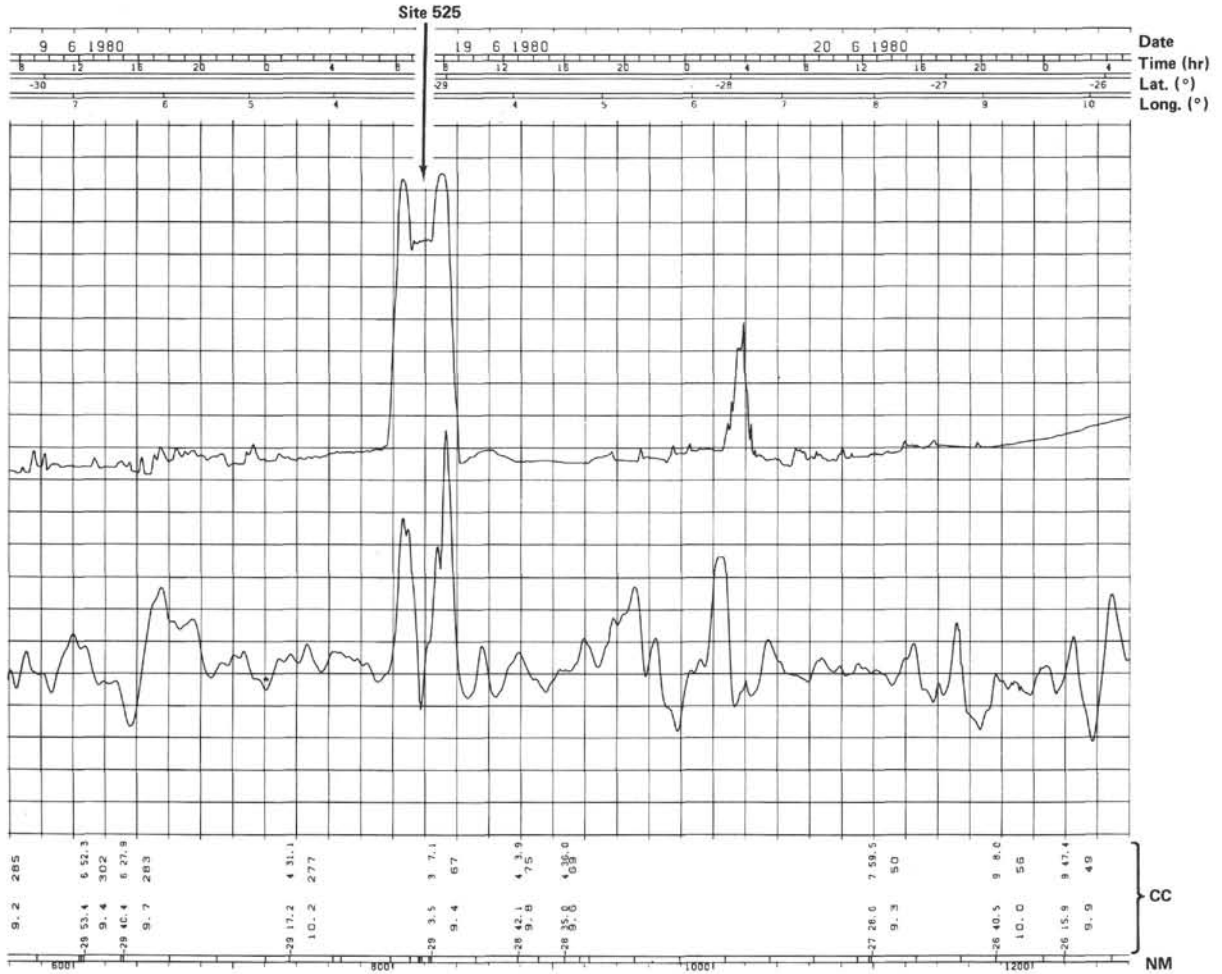


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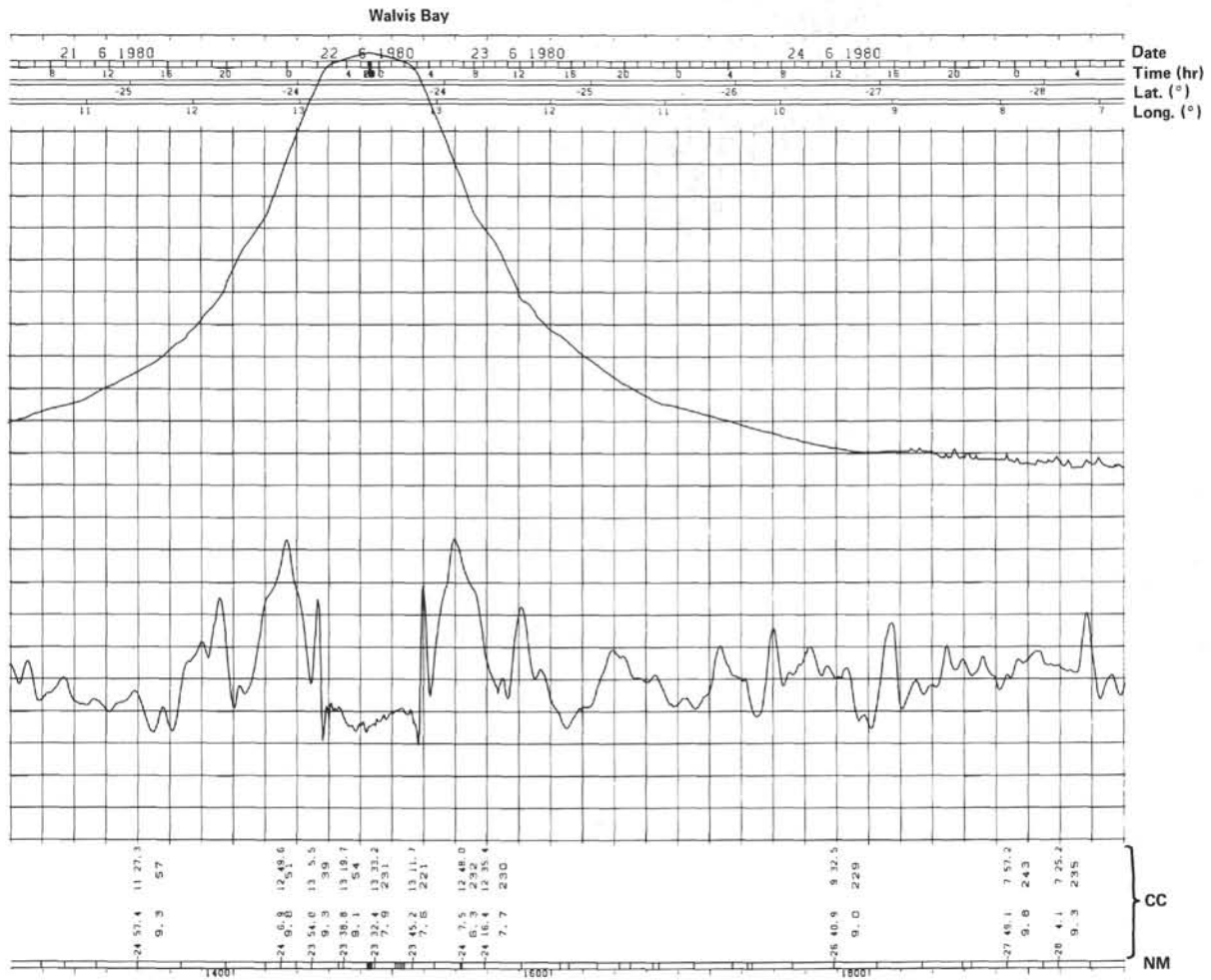


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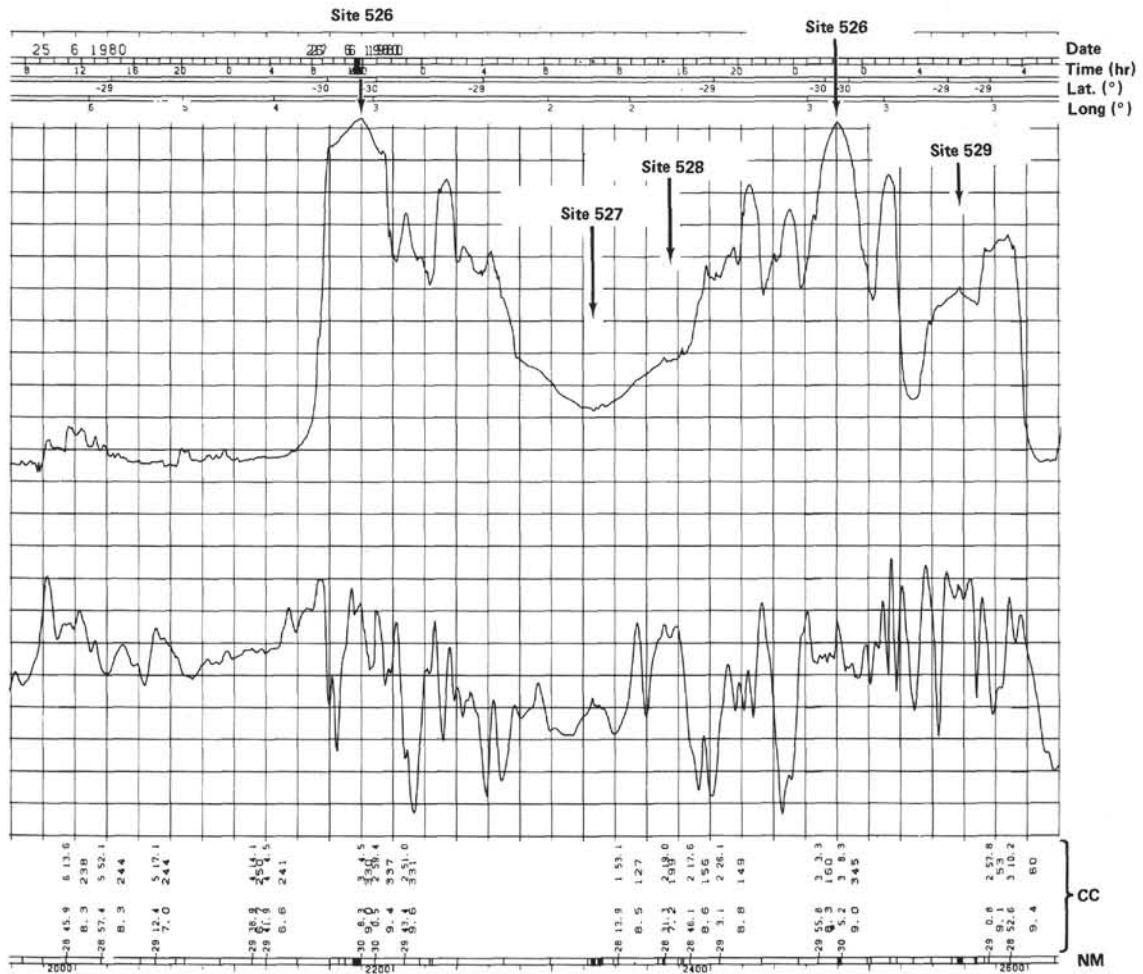


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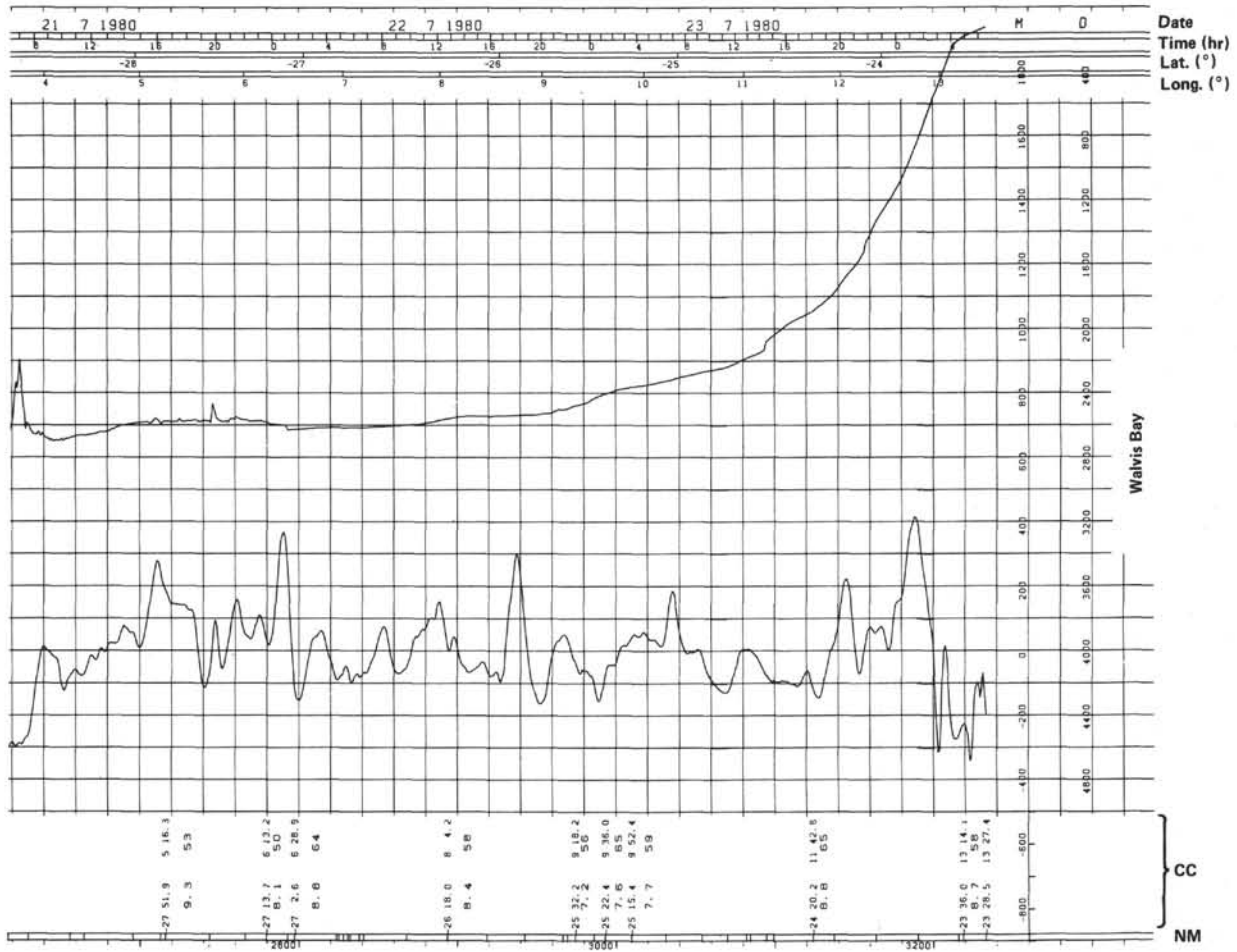


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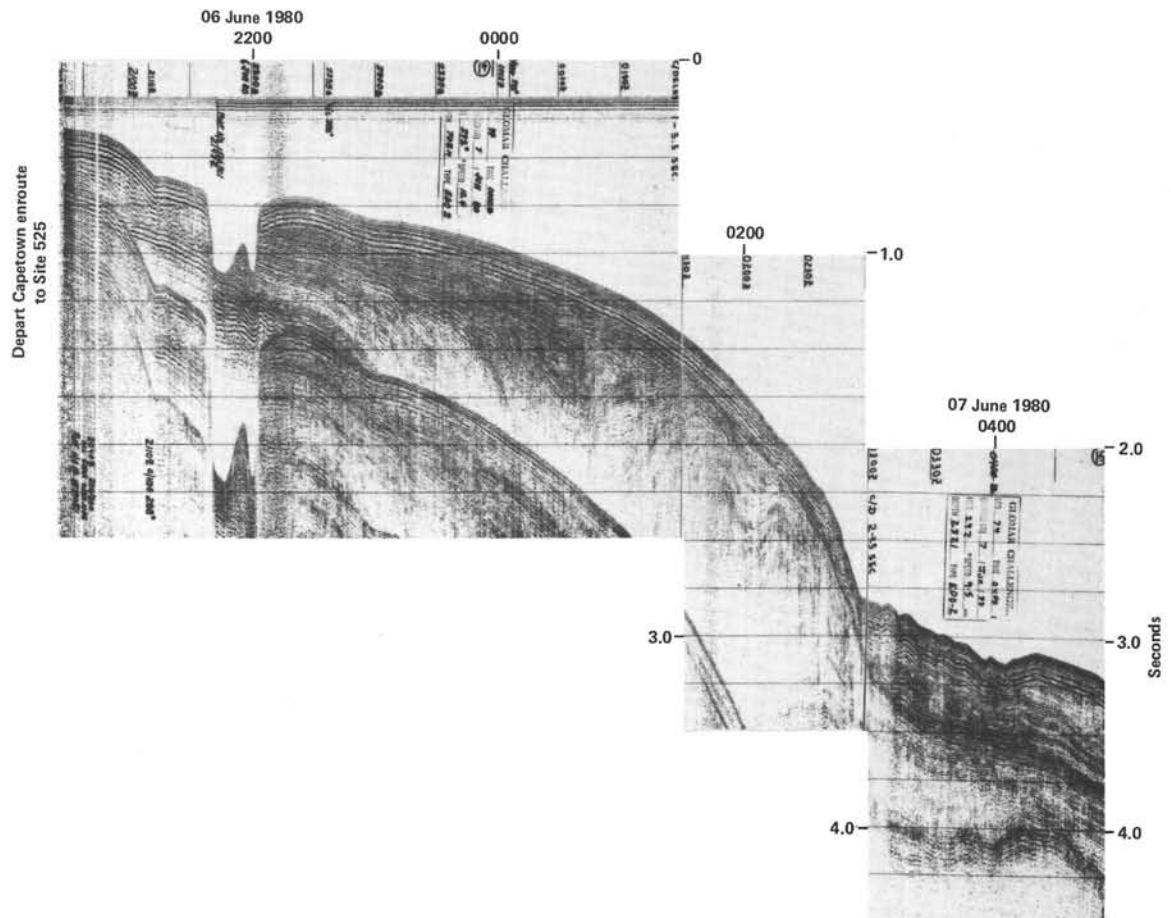


Figure 3. Seismic reflection profiles along tracks of Leg 74 of *Glomar Challenger*.

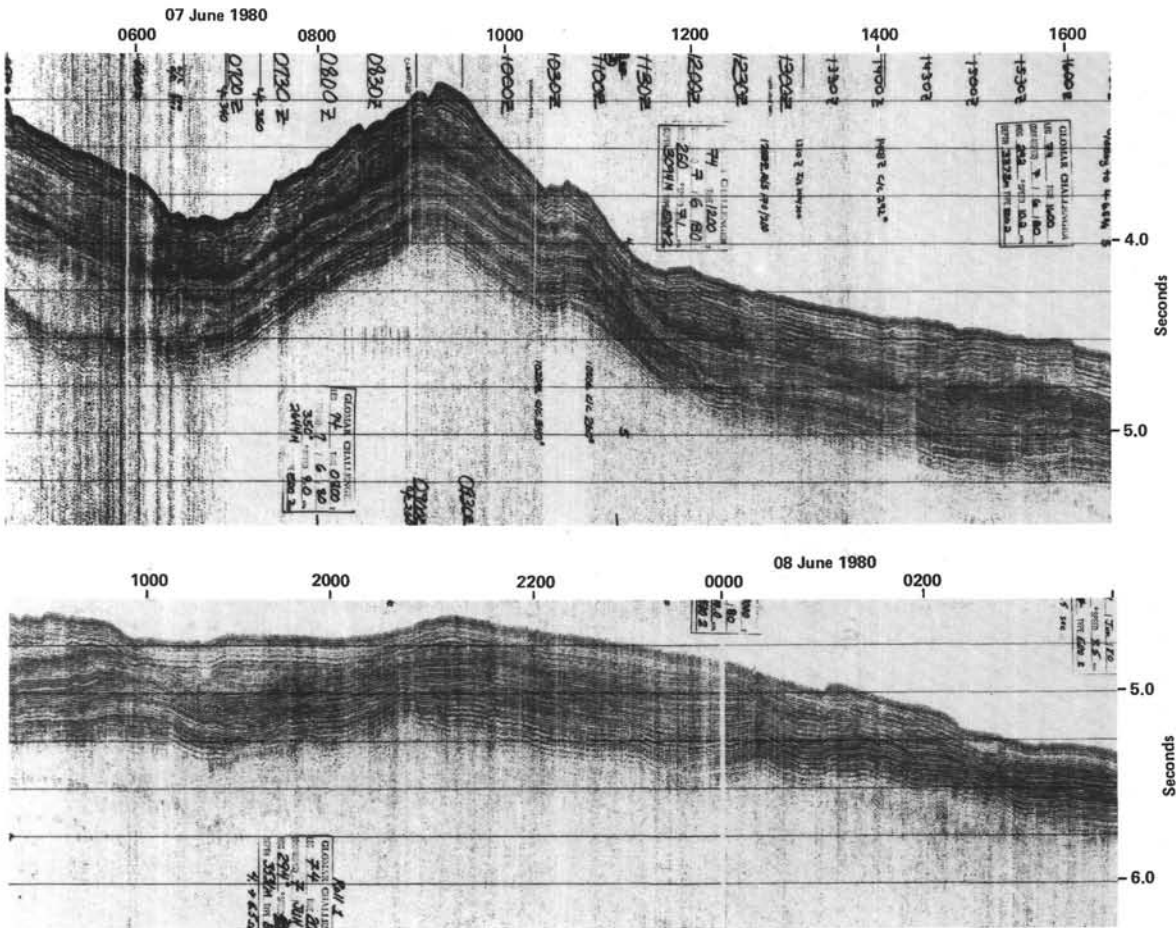


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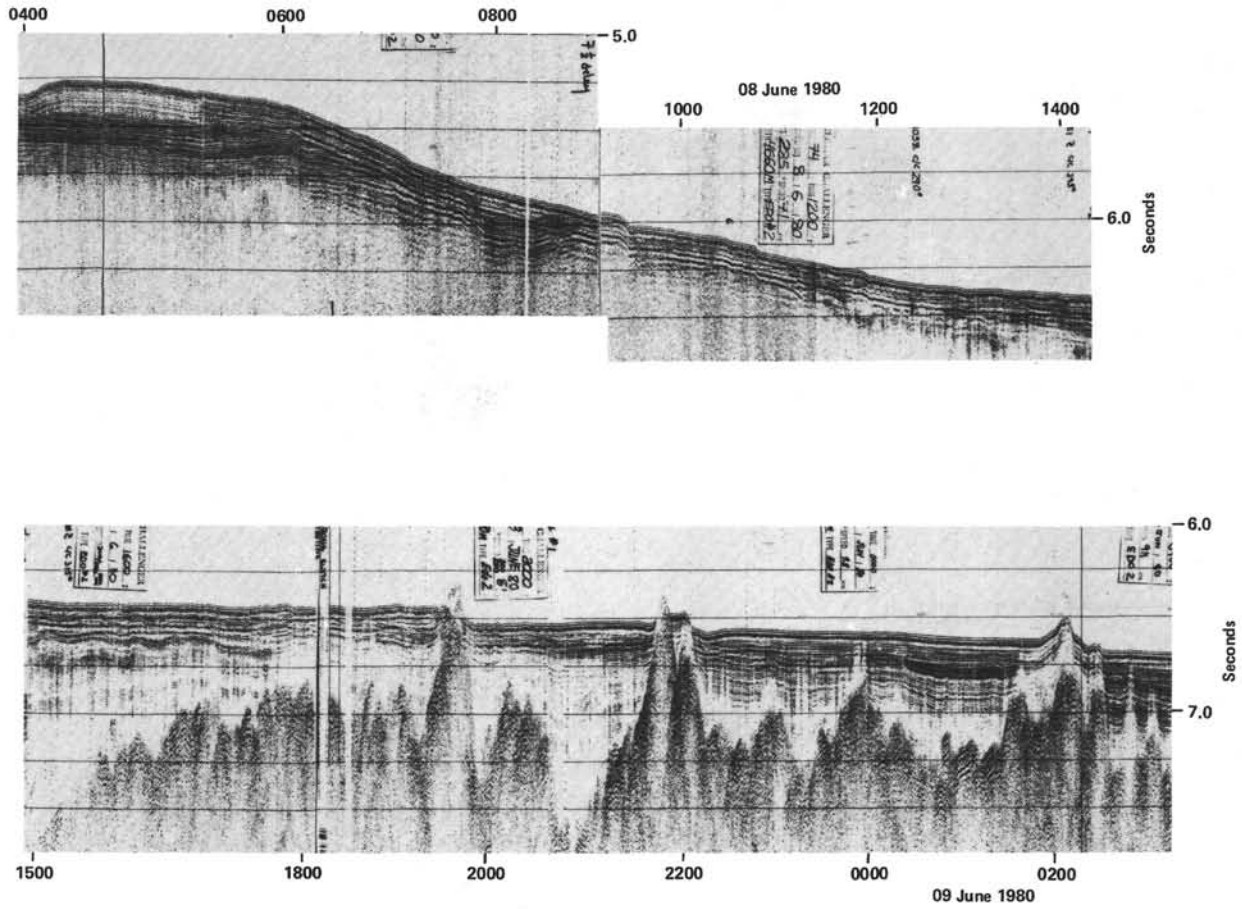


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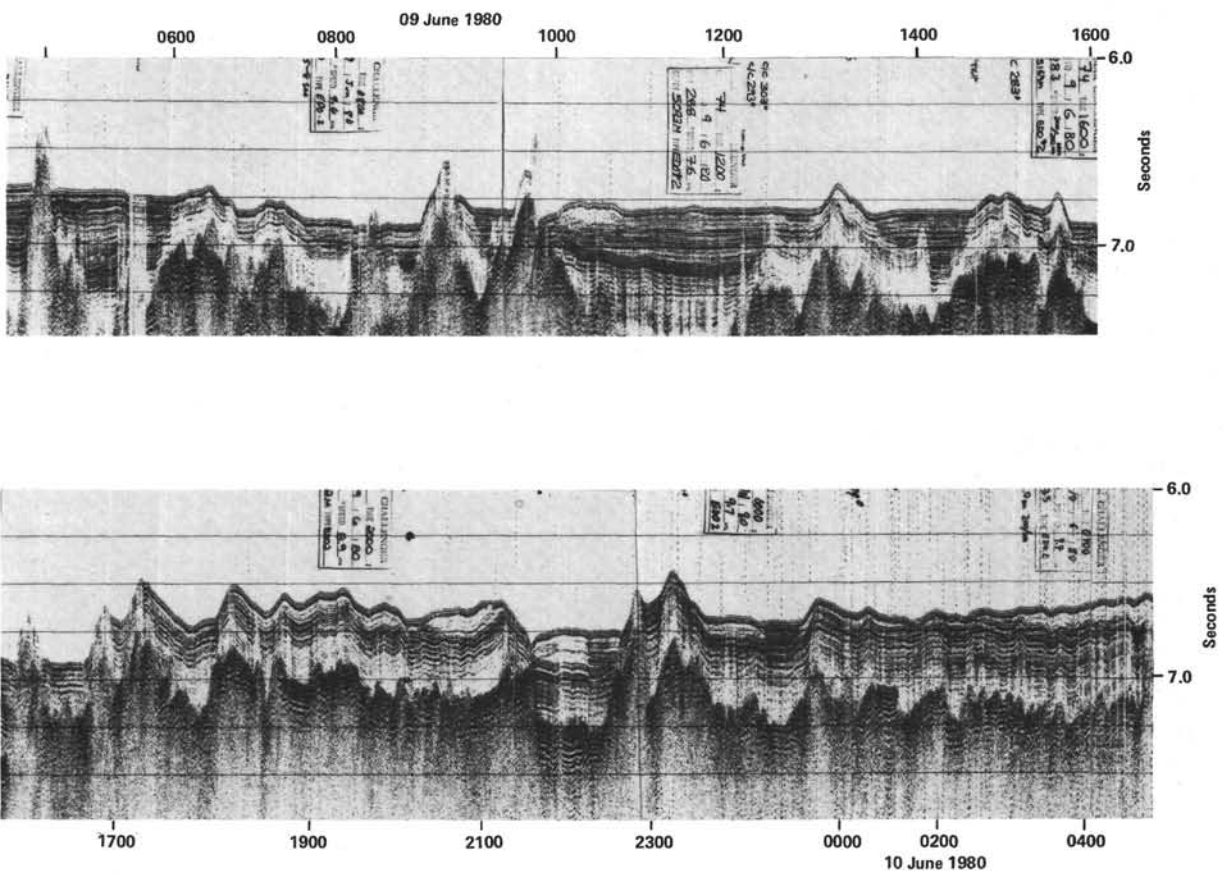


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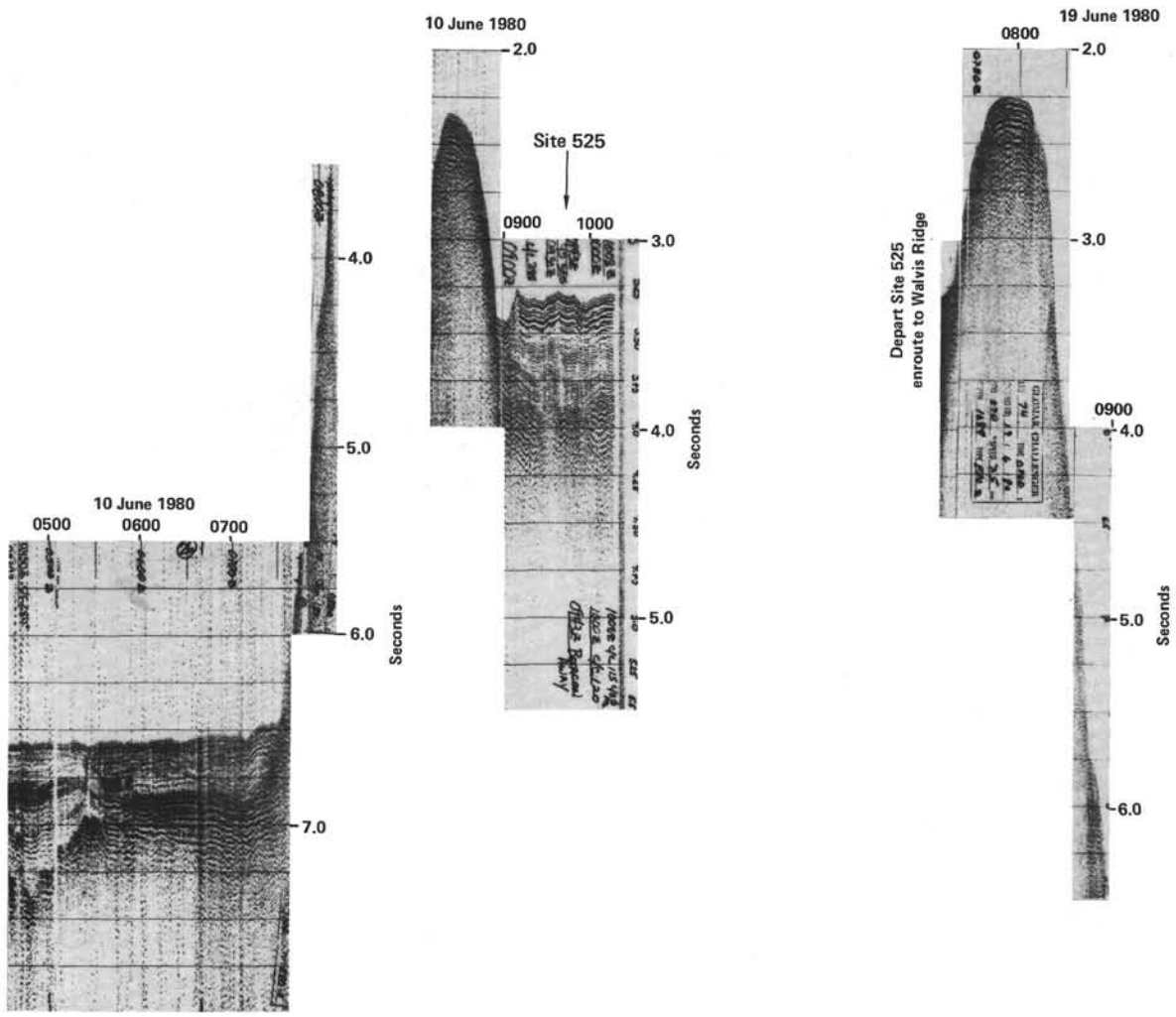


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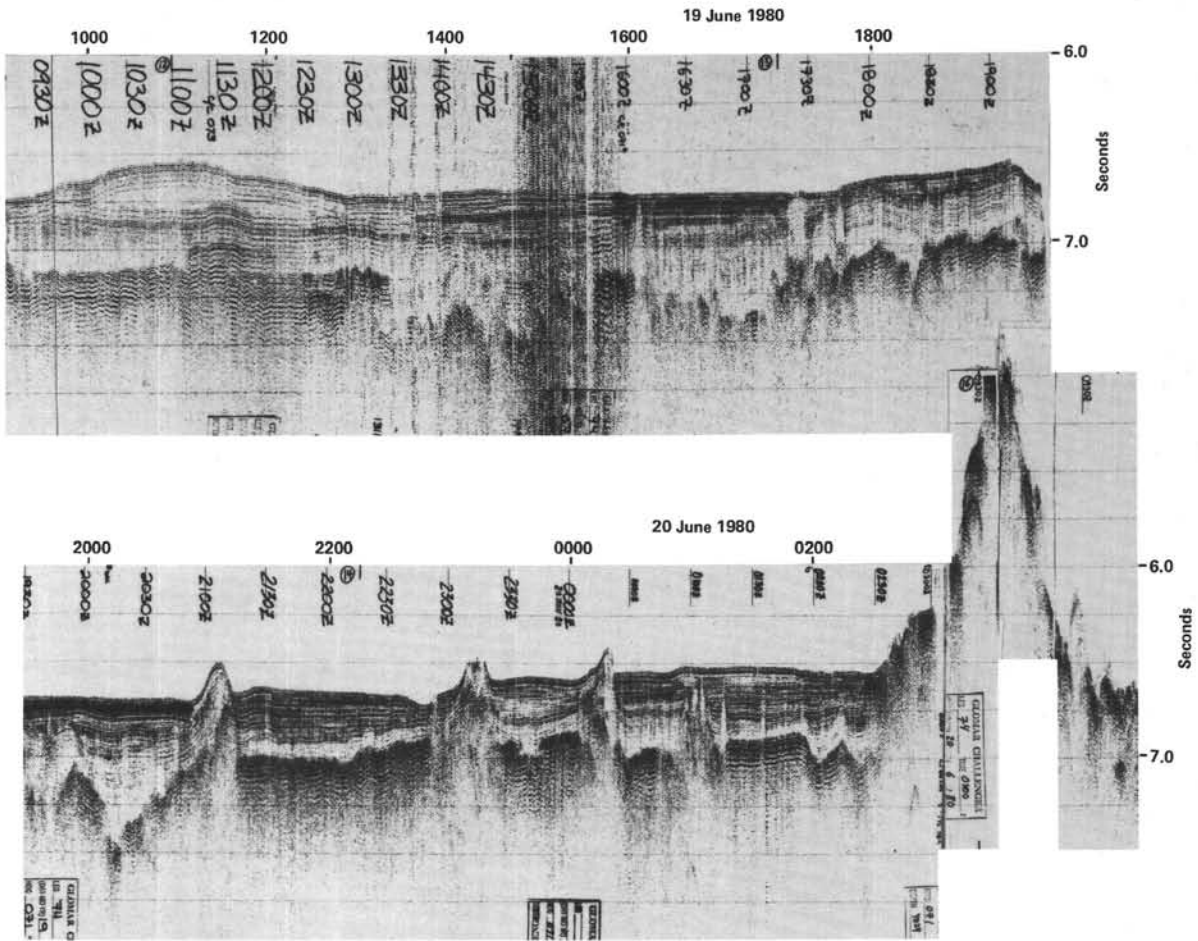


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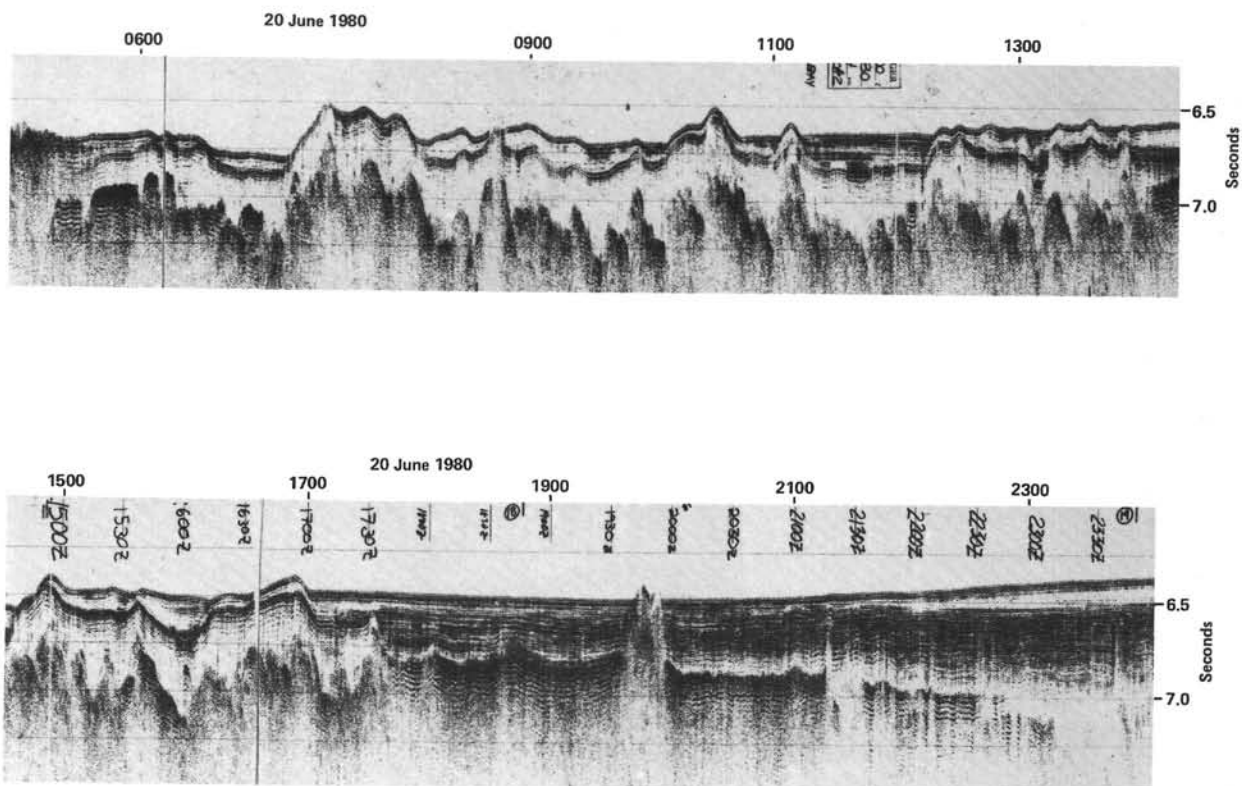


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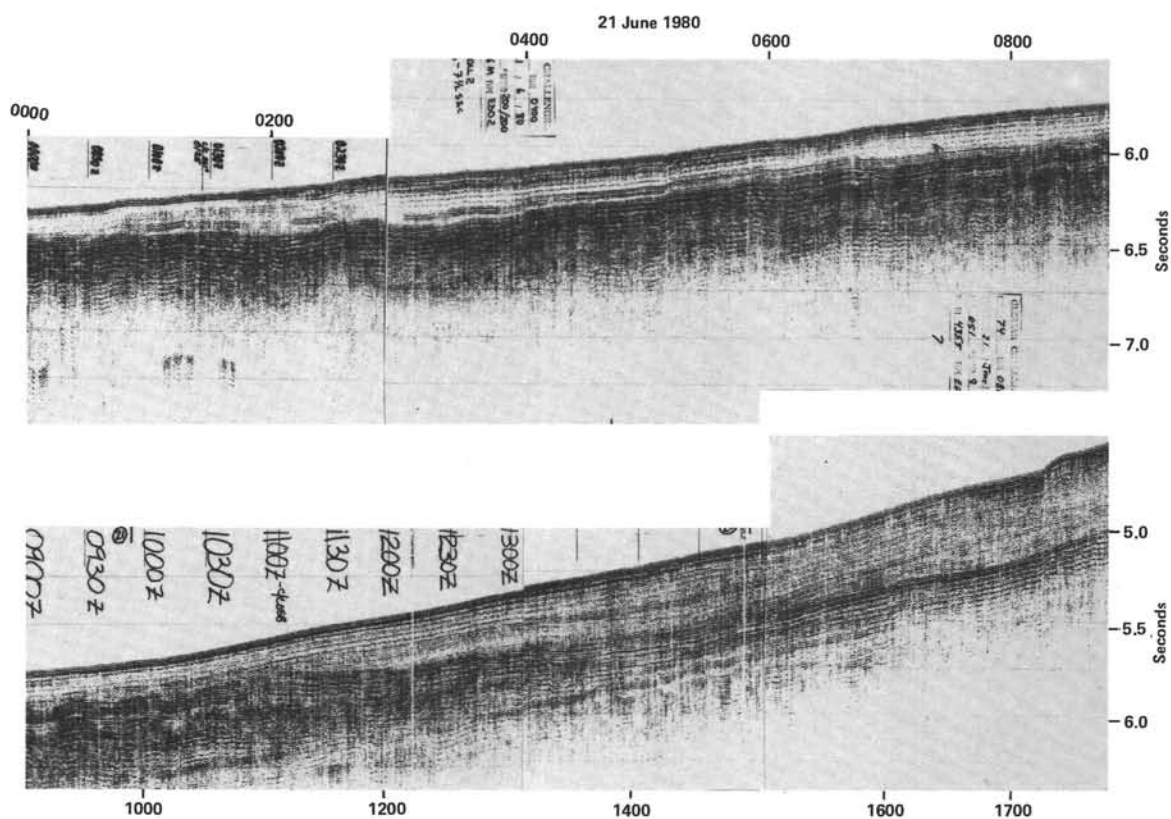
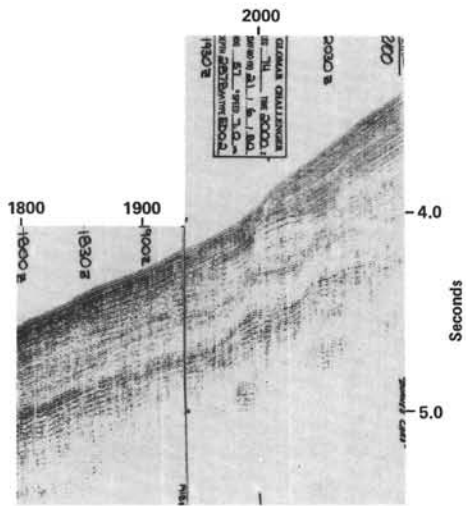
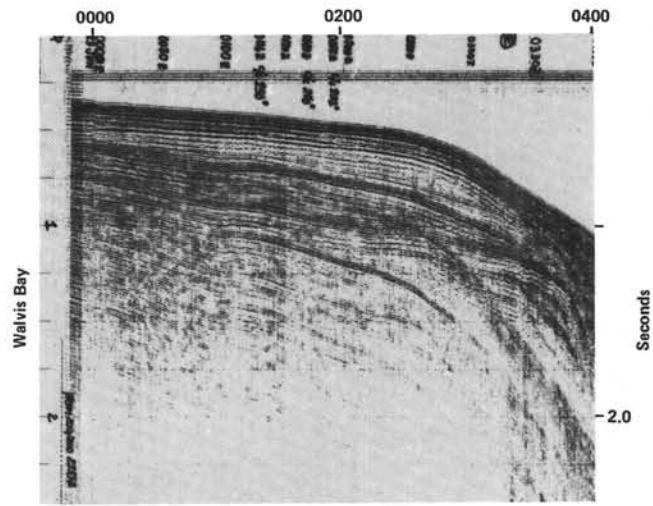


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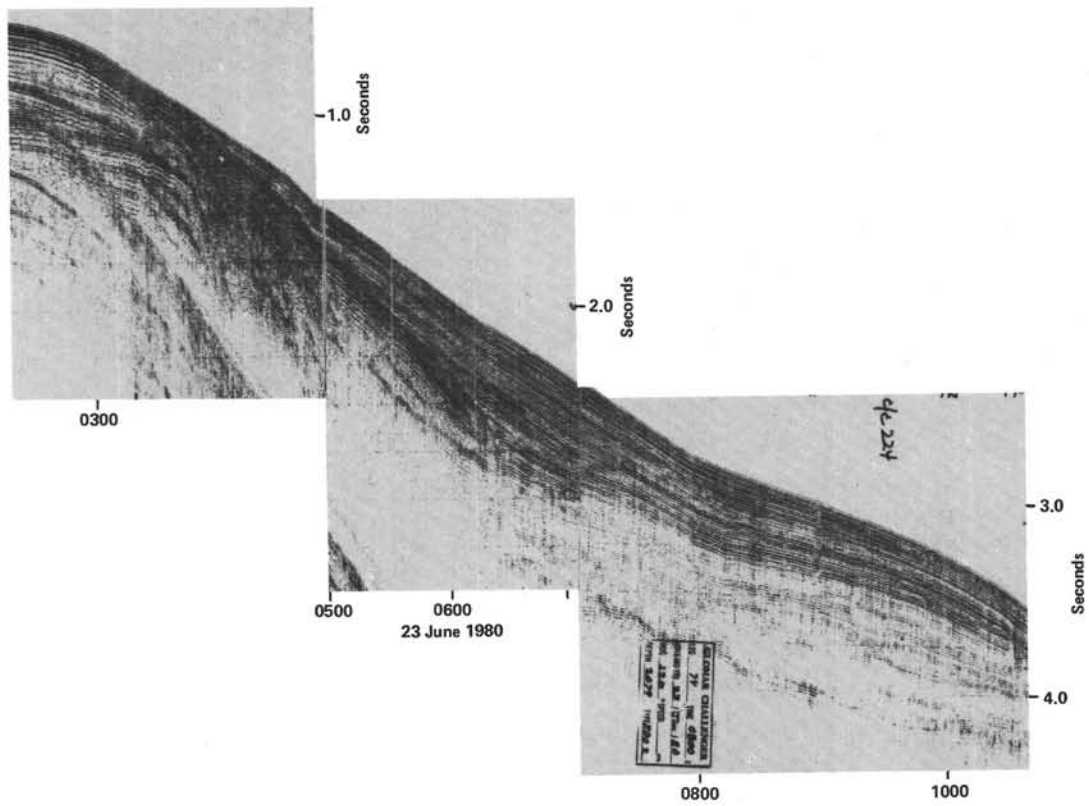


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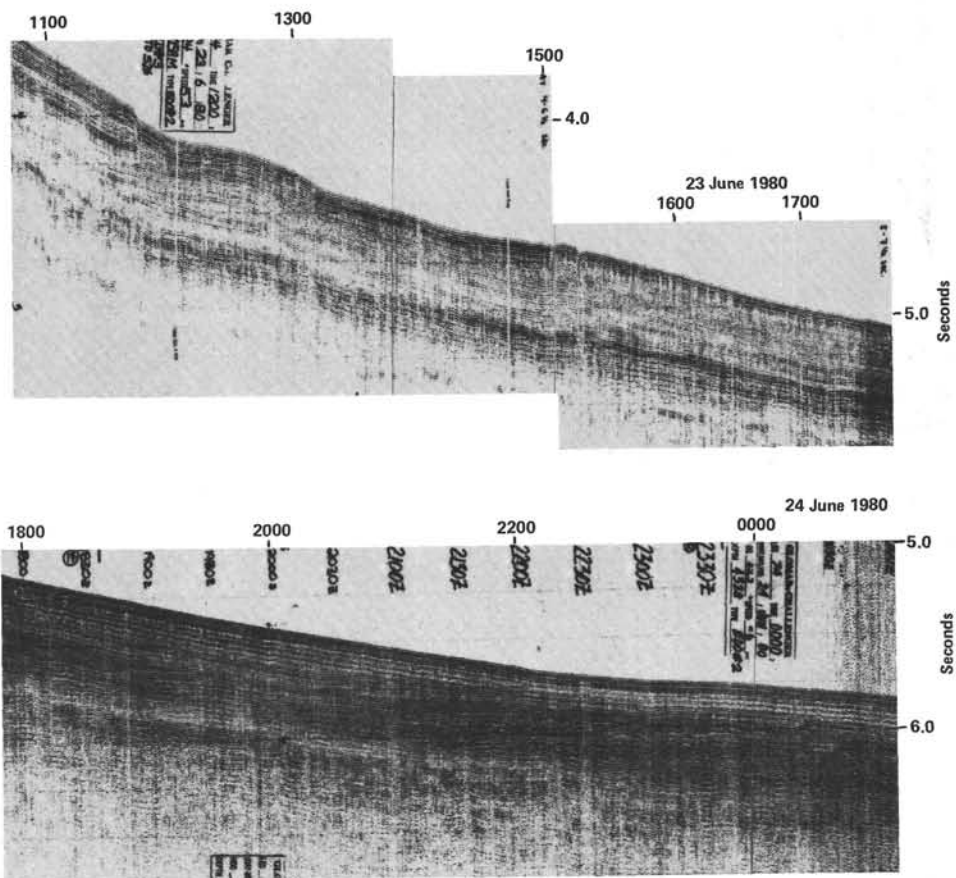


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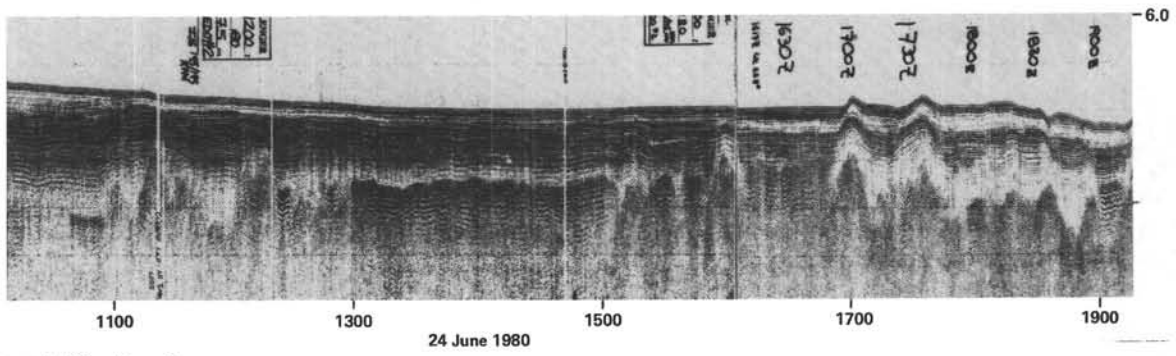
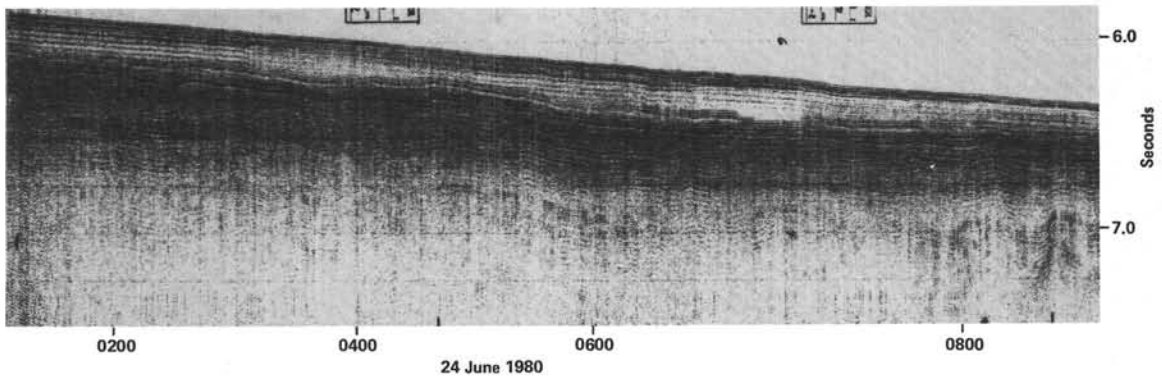


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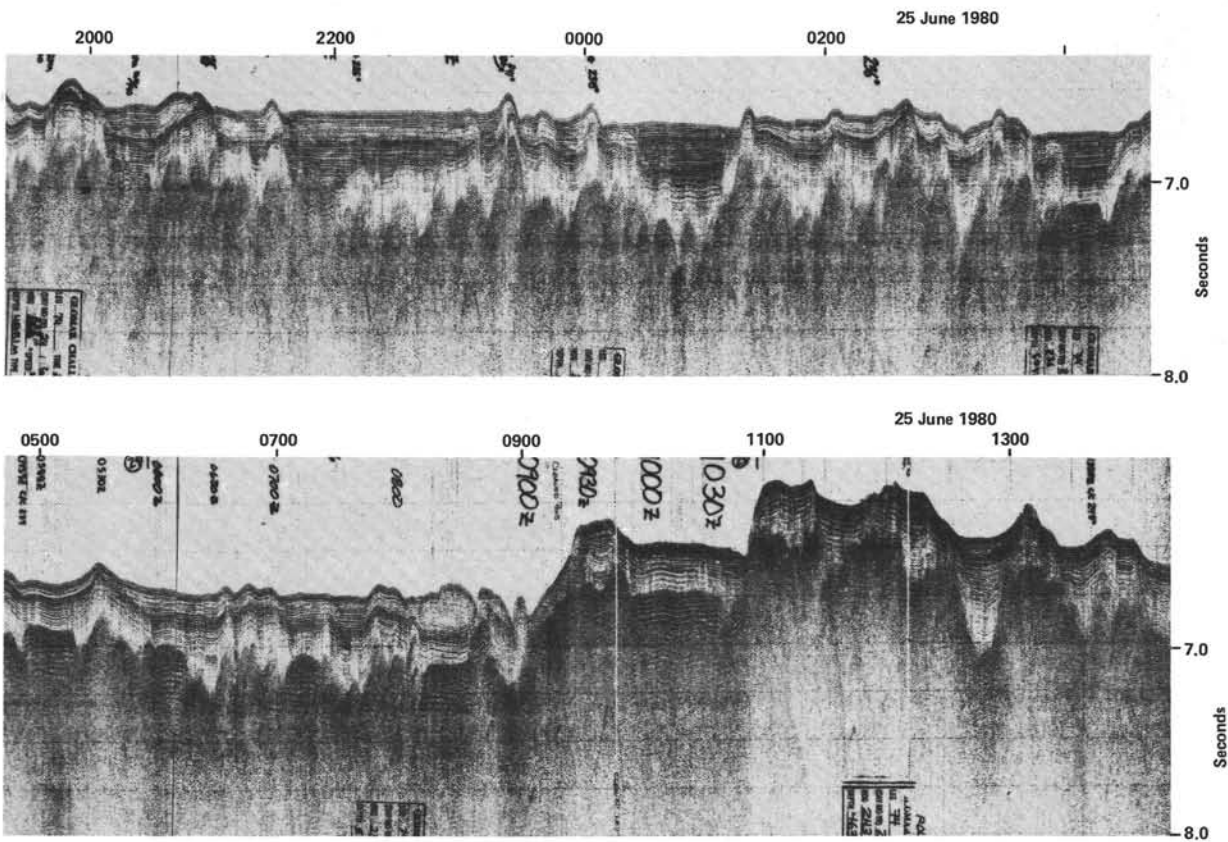


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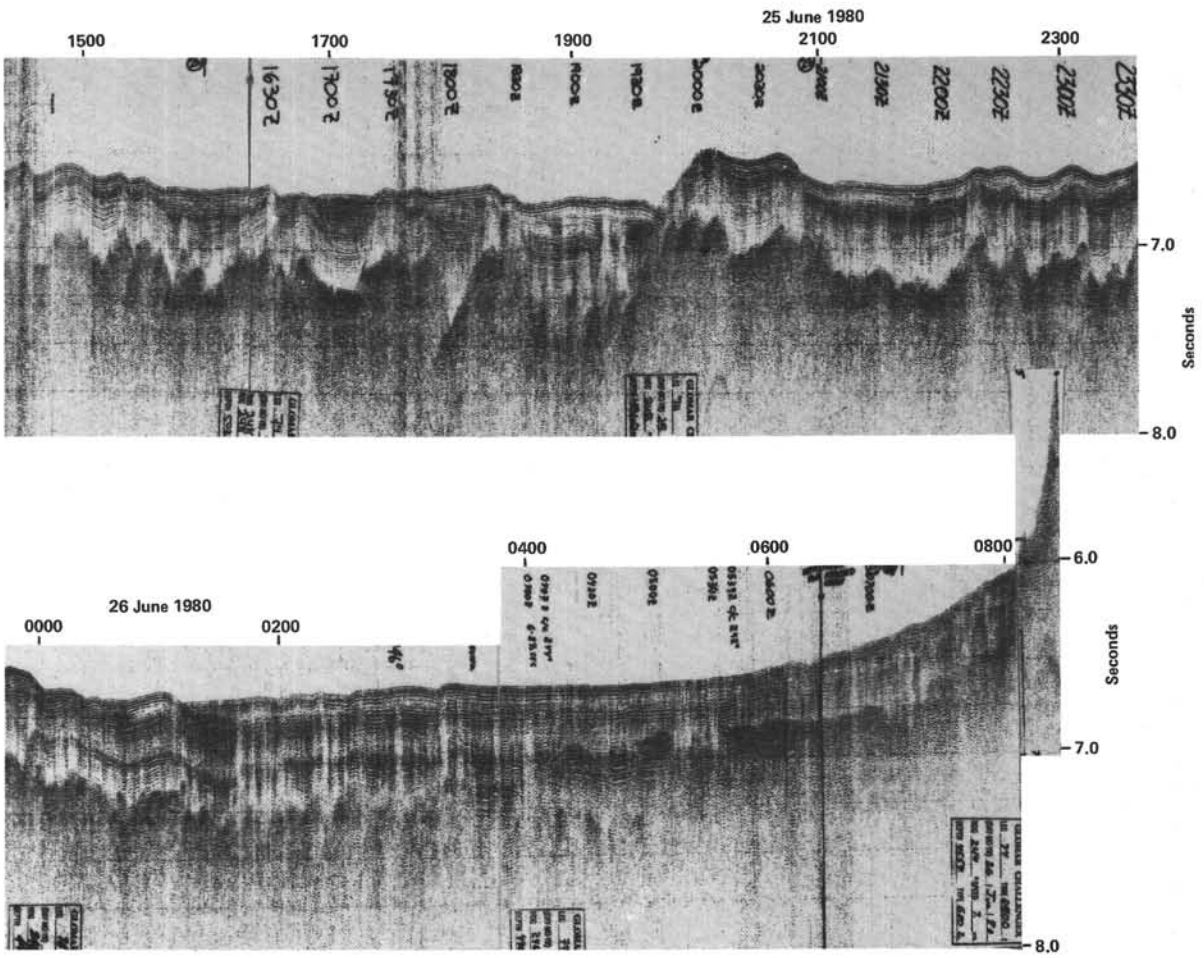


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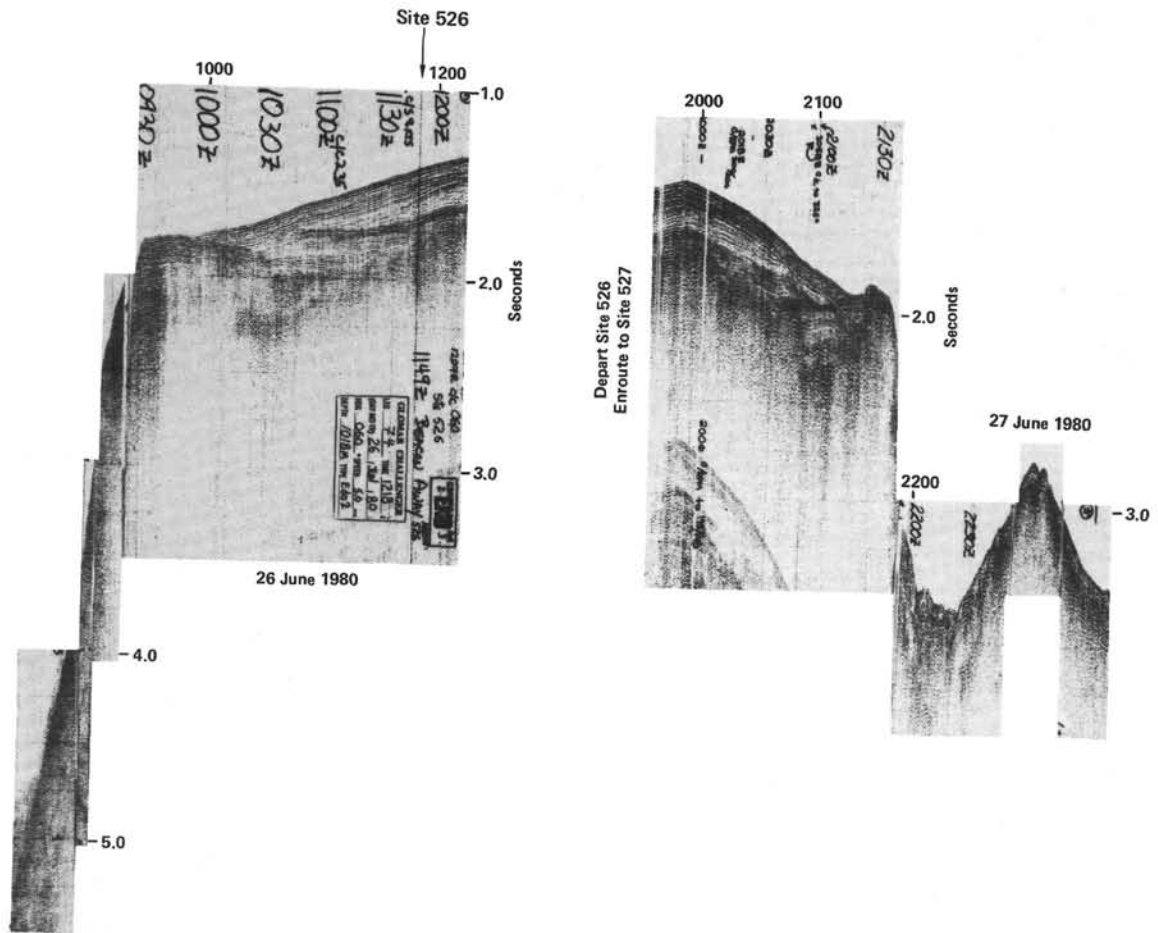


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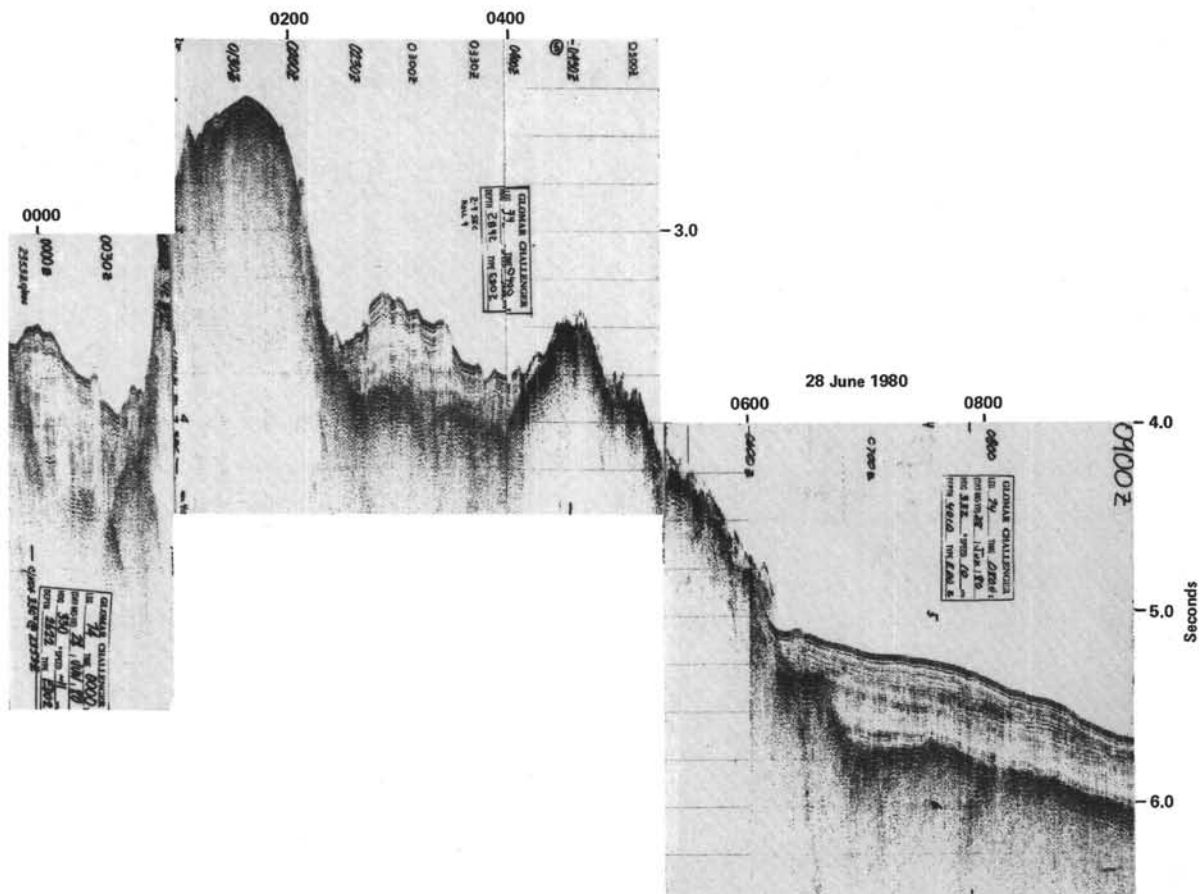


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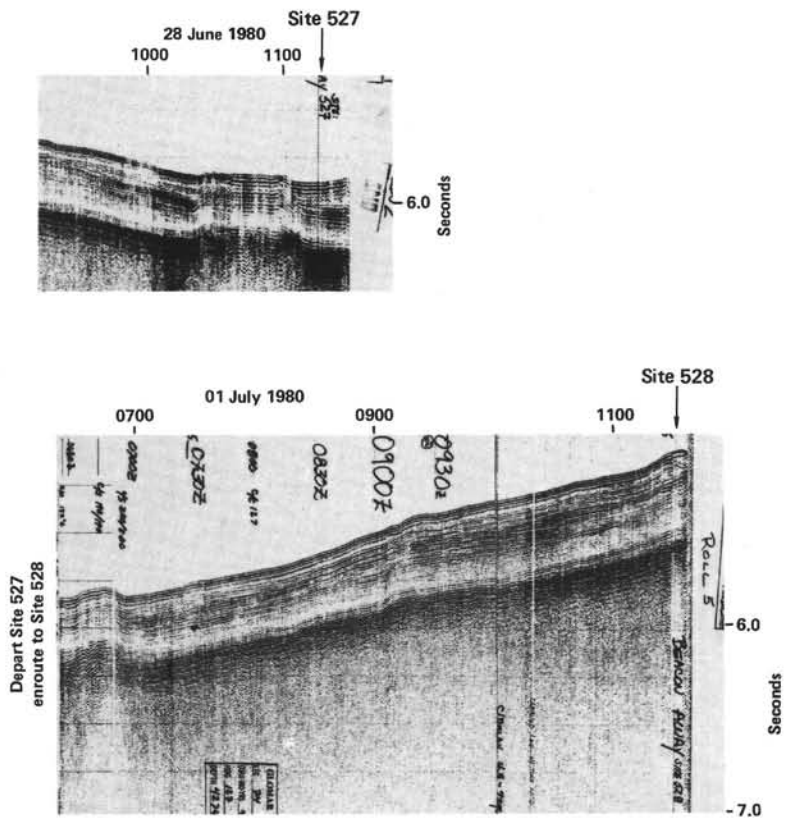


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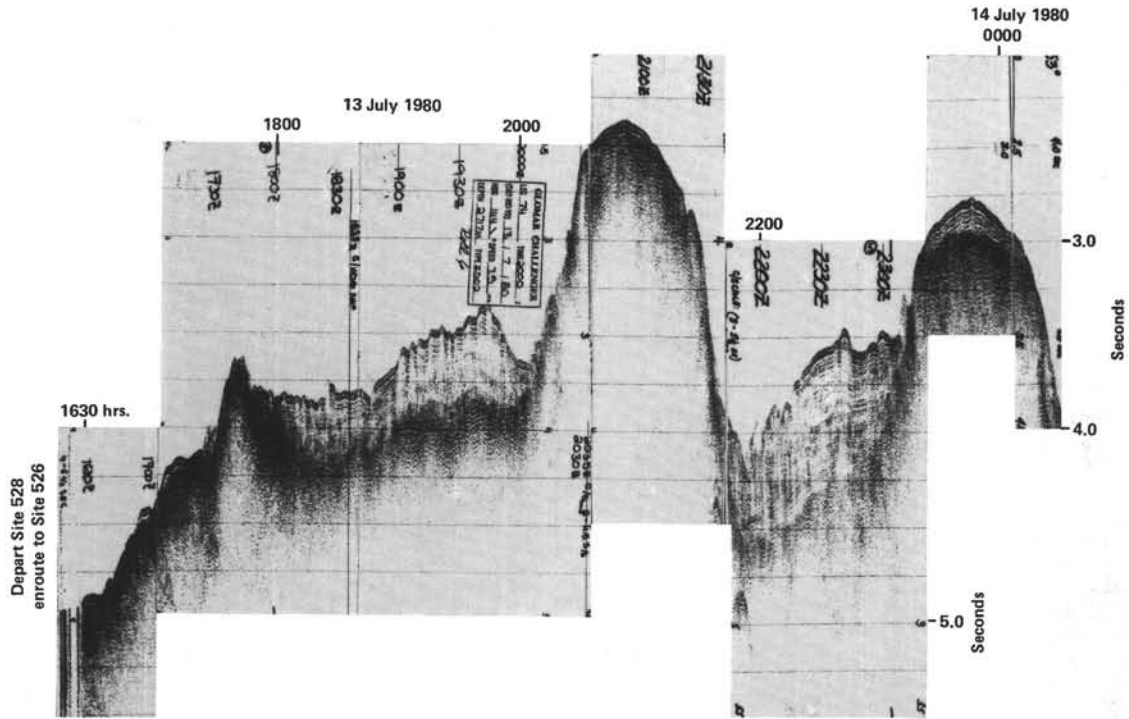


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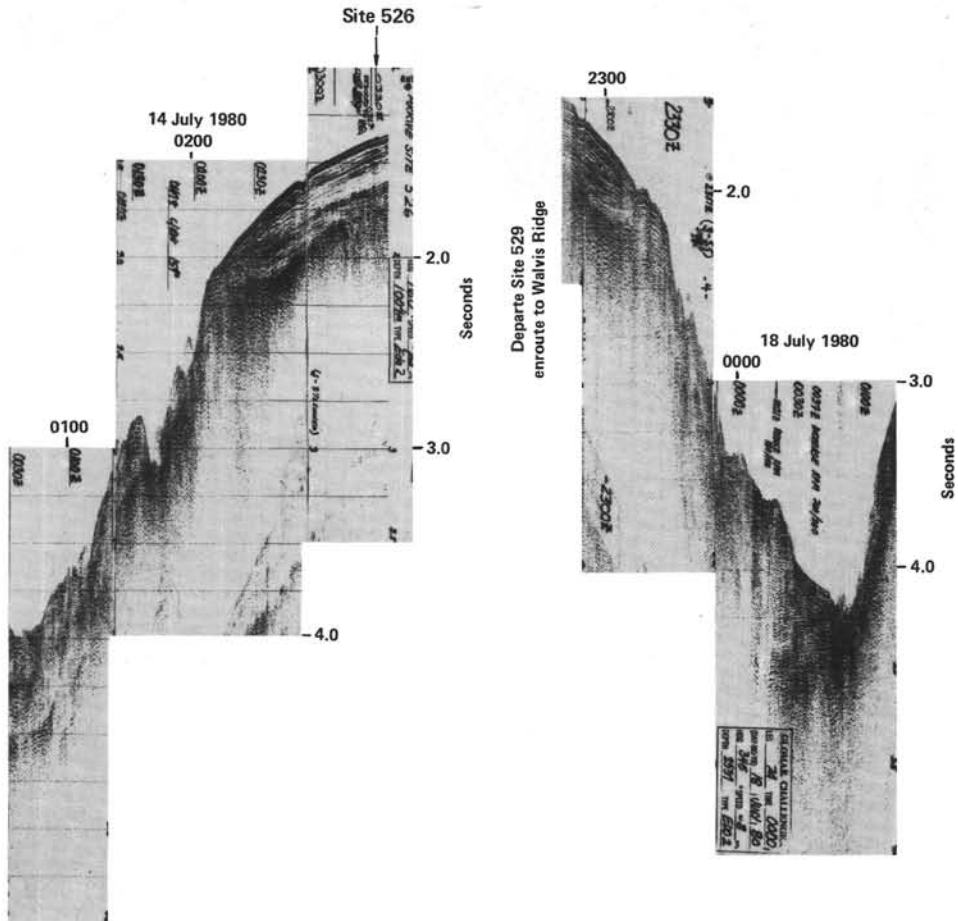


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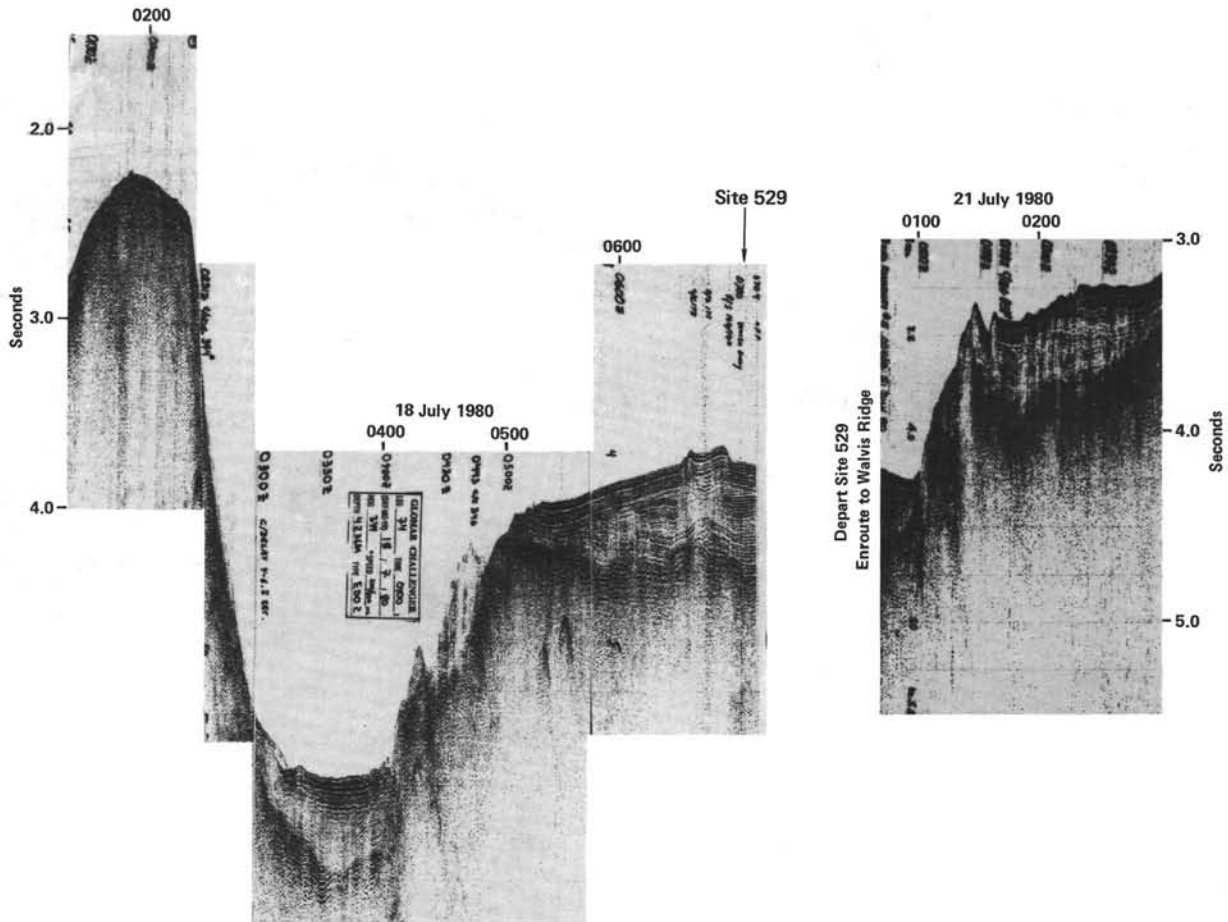


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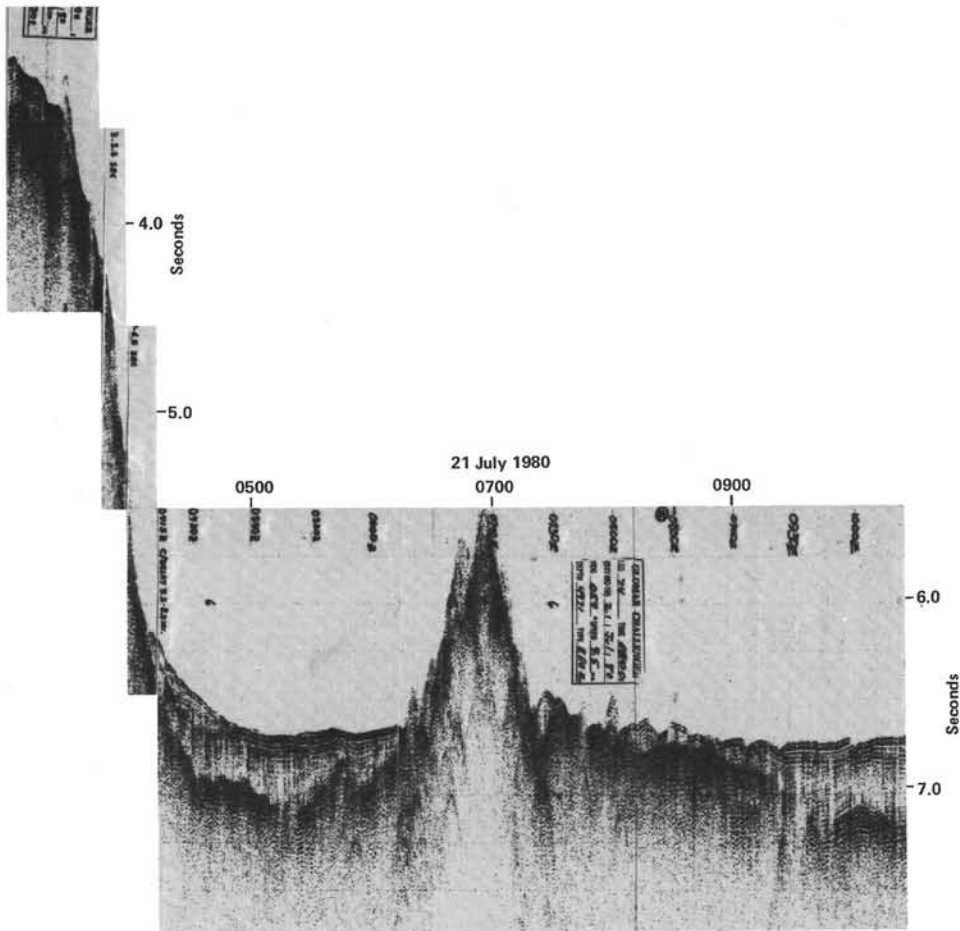


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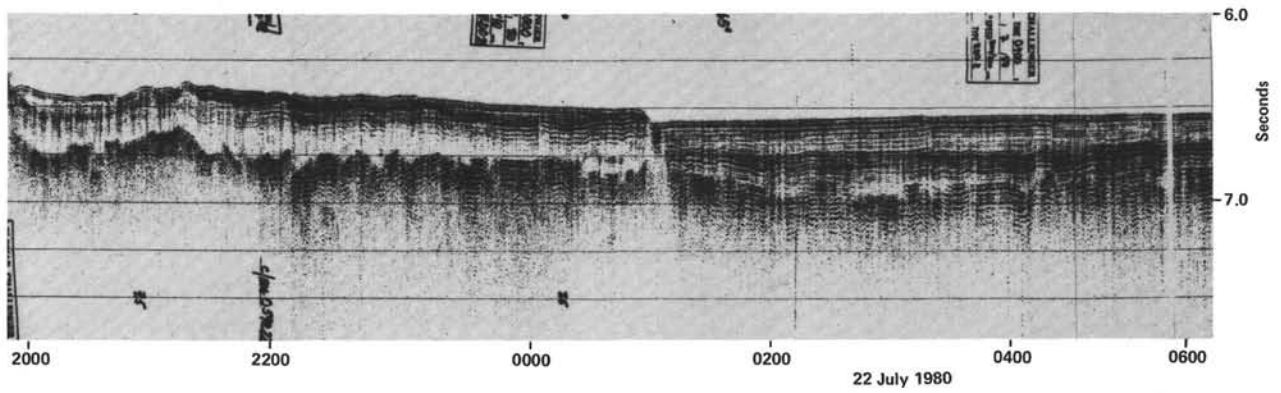
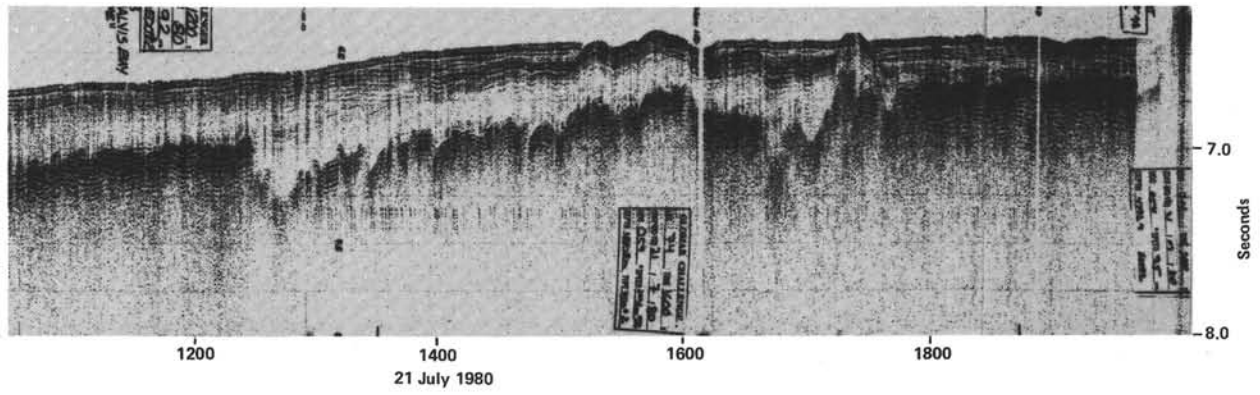


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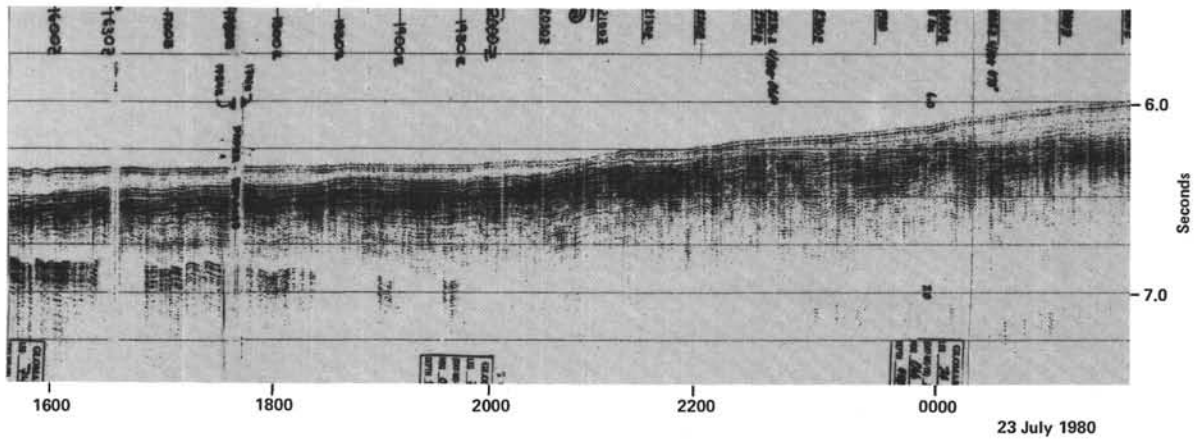
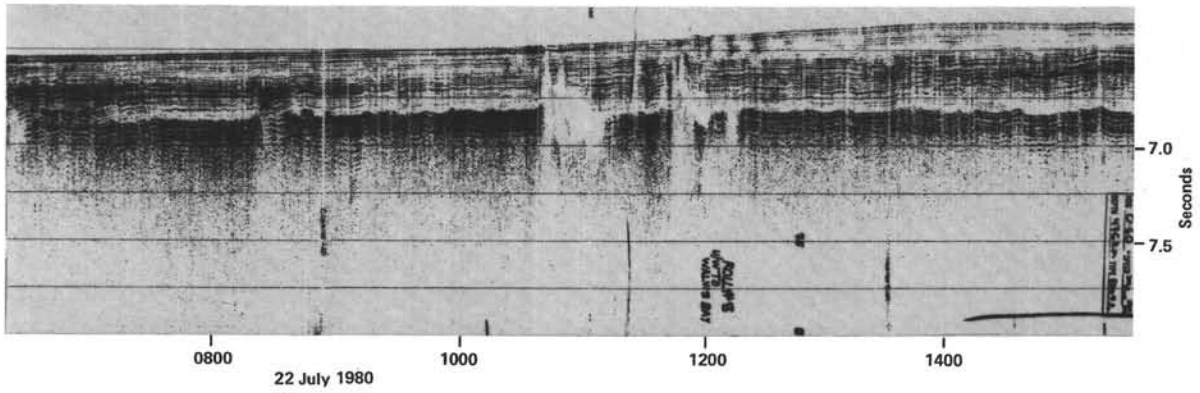


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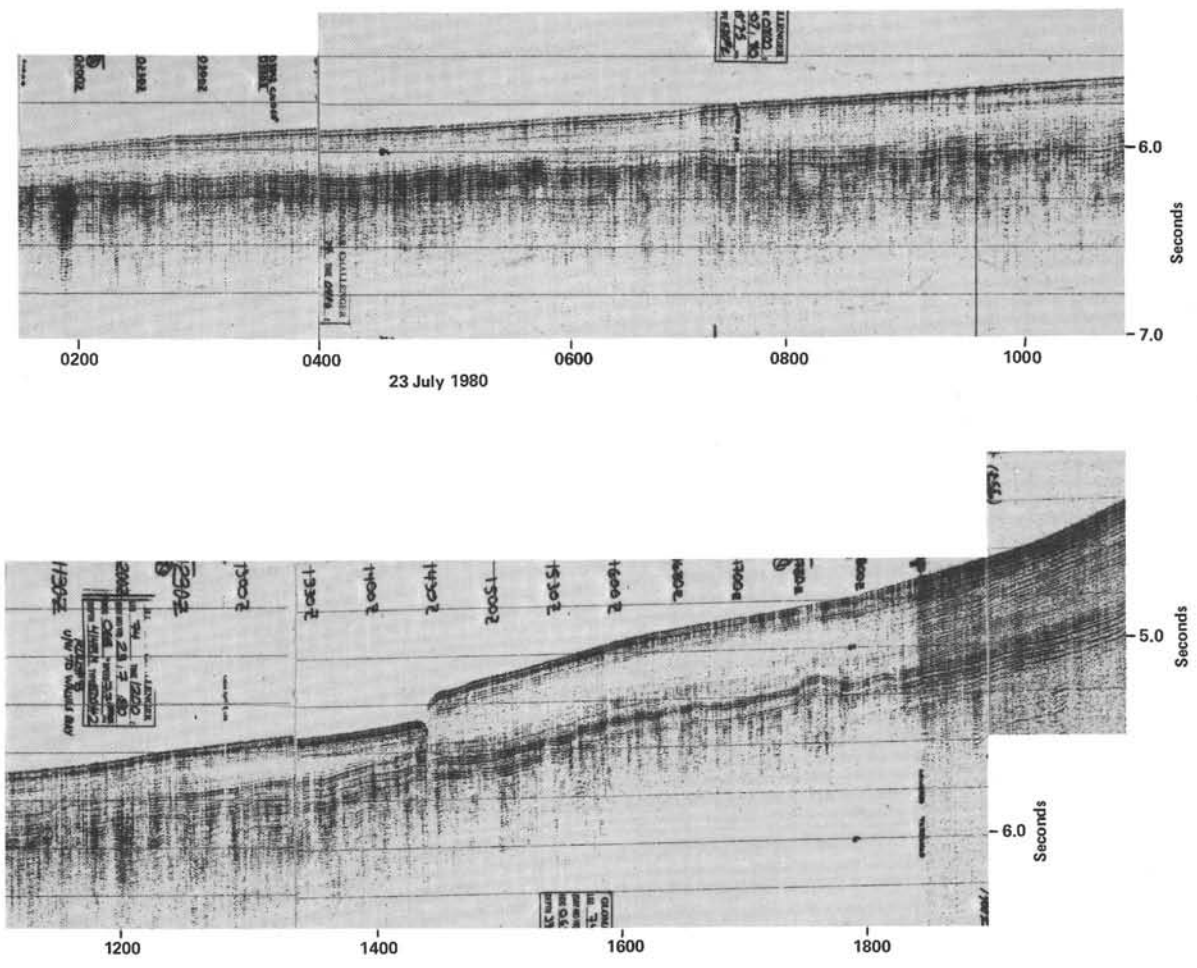


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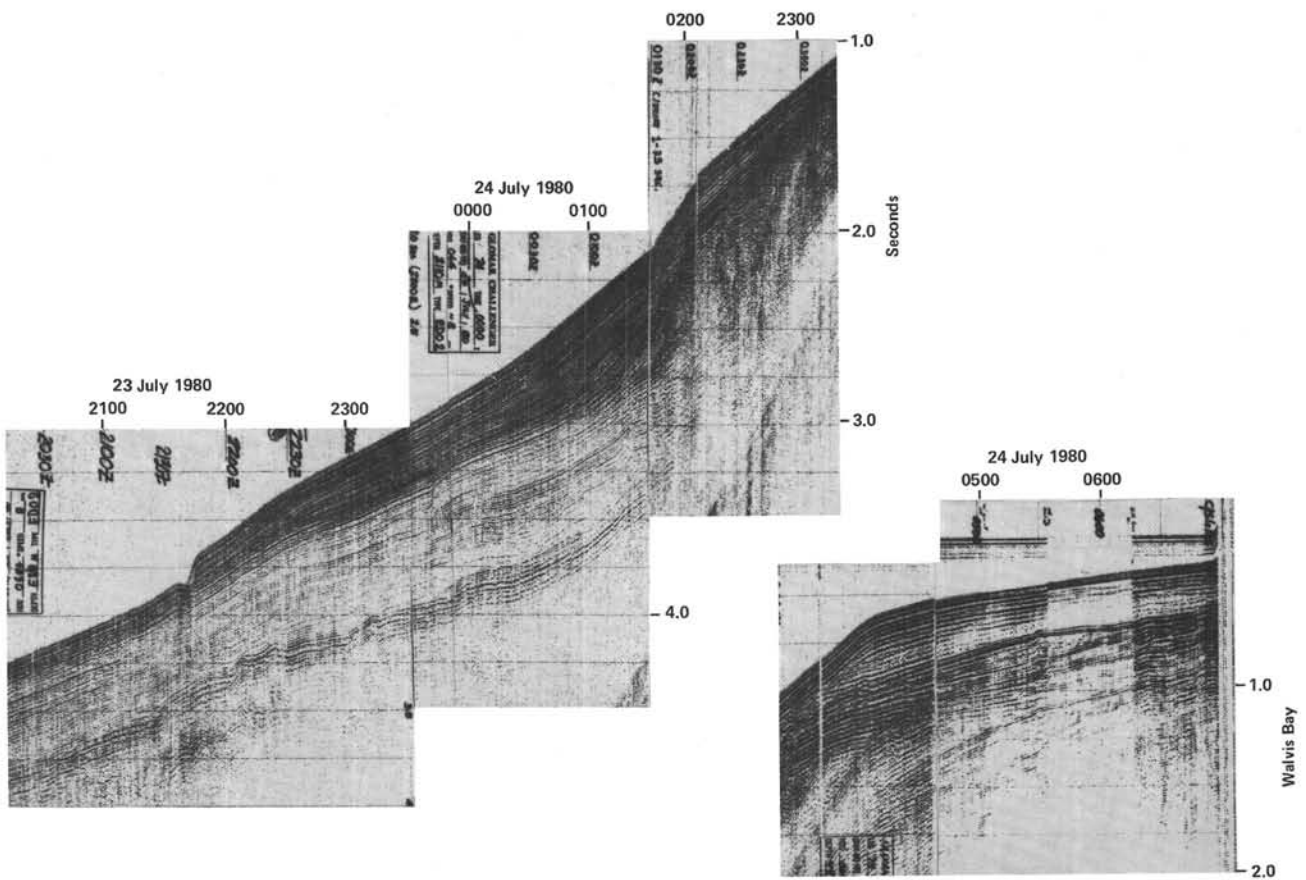


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