United States Department of the Interior
Geological Survey

Geophysical Data from the 1975 cruise of the N.O.A.A. ship Surveyor in northern Gulf of Alaska

by

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and

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Open File Report

78-209

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Introduction

In April and May 1975, a U.S. Geological Survey marine geology field party under the leadership of Bruce F. Molnia and Paul R. Carlson collected geophysical data from the N.O.A.A. ship Surveyor. The cruise, which consisted of 3 legs, studied the area between Cross Sound and Seward (Figure 1). Maps 1, 2, and 3 (scale 1:250,000) show the location of track lines and ship positions for the 3 legs.

The cruise was divided as follows:

Leg 1 - Juneau to Juneau, Julian days 096-108, Lines 200-230.

Leg 2 - Juneau to Kodiak, Julian days 111-122, Lines 233-250.

Leg 3 - Kodiak to Seward, Julian days 125-136, Lines 260-306.

In addition to the Surveyor geophysical data, three short seismic lines were run aboard the NOAA Fisheries Research Ship Townsend Cromwell. These lines (310-312) are also shown on Maps 1, 2 and 3. Geophysical data from the cruise consisted of bathymetry, high and medium-resolution seismic reflection records, gravity and magnetics.

The purpose of this Open-file report is to present additional data necessary to understand and interpret the geophysical records collected by Surveyor and Cromwell. A total of 18 sections of selected seismic profiles are included as part of this report to demonstrate the variability of near surface and sea floor environments.

Table 1 lists the systems that were operated on each geophysical survey line and shows the times of the start and end of data collection for each geophysical system. A line through a block indicated that no data were collected by that system.

The bathymetry and seismic data are available as microfilm or paper copies from:

1) Tom Chase

U.S. Geological Survey

Pacific Arctic Branch of Marine Geology

345 Middlefield Road

Menlo Park, California 94025

Phone: (415) 323-8111

<u>OR</u>

2) National Geophysical and Solar Terrestrial Data Center

NOAA/EDS

Boulder, Colorado 80302

Gravity and magnetics data are presently being compiled and will be available in the near future.

Table 1

Summary of start and end times for each geophyscial system on *Surveyor* and *Cromwell* track lines.

Surveyor Line Number	3.5 kHz Bathymetry start (J.D.) time Z	3.5 kHz Bathymetry end (J.D.) time Z	Mini-sparker start (J.D.) time Z	Mini-sparker end (J.D.) time Z	25 KJ Sparker start (J.D.) time Z	25 KJ Sparker end (J.D.) time Z	Gravity start (J.D.) time Z	Gravity end (J.D.) time Z	Magnetometer start (J.D.) time Z	Magnetometer end (J.D.) time Z
200	(96) 0900	(97) 1155	(96) 0858	(97) 1130	(96) 0852	(97) 1130	(96) 0859	(97) 1134	(96) 1900	(96) 1945
201	(97) 1212	(97) 1345	—	—	—	—	(97) 1202	(97) 1800	—	—
202	(97) 1845	(98) 1728	(97) 1849	(98) 1727	(97) 1854	(98) 1727	(97) 1854	(98) 1730	(97) 2200	(98) 1713
203	(98) 1730	(98) 2145	(98) 1731	(98) 1900	(98) 1731	(98) 1900	(98) 1731	(98) 2132	—	—
204	(98) 2150	(99) 1400	(98) 2150	(99) 1135	(99) 0141	(99) 1134	(98) 2145	(99) 1415	—	—
205	(99) 1401	(101) 1022	(99) 1601	(101) 1022	(99) 1430	(101) 1020	(99) 1432	(101) 1022	(100) 2255	(101) 1015
206	(101) 1026	(101) 1730	(101) 1026	(101) 1722	(101) 1020	(101) 1736	(101) 1026	(101) 1730	(101) 1020	(101) 1736
207	(101) 1736	(102) 0417	(101) 1745	(102) 0415	(101) 1746	(102) 0413	(101) 1735	(102) 0415	(101) 1740	(102) 0413
208	(102) 0418	(102) 0632	(102) 0417	(102) 0630	(102) 0417	(102) 0630	(102) 0418	(102) 0630	(102) 0417	(102) 0630
209	(102) 0633	(102) 1408	(102) 0634	(102) 1408	(102) 0634	(102) 1408	(102) 0632	(102) 1408	(102) 0634	(102) 1337
210	(102) 1418	(102) 1800	(102) 1419	(102) 1800	(102) 1419	(102) 1800	(102) 1418	(102) 1800	—	—
211	(102) 1801	(102) 1840	(102) 1811	(102) 1840	(102) 1811	(102) 1840	(102) 1802	(102) 1840	—	—
212	(102) 1844	(103) 0300	(102) 1844	(103) 0240	(102) 1844	(103) 0300	(102) 1844	(103) 0255	(102) 1910	(103) 0300
213	(103) 0305	(103) 0602	(103) 0324	(103) 0602	(103) 0304	(103) 0602	(103) 0300	(103) 0602	(103) 0304	(103) 0602
214	(103) 0604	(103) 1508	(103) 0606	(103) 1507	(103) 0606	(103) 1507	(103) 0603	(103) 1508	(103) 0606	(103) 1443

Line Number	3.5 kHz Bathymetry start (J.D.) time Z	3.5 kHz Bathymetry end (J.D.) time Z	Mini-sparker start (J.D.) time Z	Mini-sparker end (J.D.) time Z	25 KJ Sparker start (J.D.) time Z	25 KJ Sparker end (J.D.) time Z	Gravity start (J.D.) time Z	Gravity end (J.D.) time Z	Magnetometer start (J.D.) time Z	Magnetometer end (J.D.) time Z
215	(103) 1511	(103) 1724	(103) 1511	(103) 1719	(103) 1511	(103) 1719	(103) 1511	(103) 1724	—	—
216	(103) 1725	(104) 0355	(103) 1746	(104) 0355	(103) 1724	(104) 0355	(103) 1724	(104) 0357	(103) 1815	(104) 0355
217	(104) 0400	(104) 0615	(104) 0400	(104) 0615	(104) 0400	(104) 0615	(104) 0400	(104) 0615	(104) 0400	(104) 0615
218	(104) 0620	(104) 1554	(104) 0620	(104) 1554	(104) 0620	(104) 1554	(104) 0620	(104) 1554	(104) 0620	(104) 1545
219	(104) 1557	(104) 2152	(104) 1557	(104) 2153	(104) 1557	(104) 2152	(104) 1557	(104) 2152	—	—
220	(104) 2200	(105) 1039	(104) 2154	(105) 1039	(104) 2154	(105) 1039	(104) 2200	(105) 1039	(104) 2329	(105) 1030
221	(105) 1040	(105) 1250	(105) 1040	(105) 1250	(105) 1039	(105) 1245	(105) 1040	(105) 1250	(105) 1040	(105) 1250
222	(105) 1252	(105) 2349	(105) 1256	(105) 2349	(105) 1333	(105) 2349	(105) 1256	(105) 2349	(105) 1256	(105) 2327
223	(105) 2356	(106) 0252	(105) 2354	(106) 0253	(105) 2354	(106) 0253	(105) 2354	(106) 0252	—	—
224	(106) 0255	(106) 1308	(106) 0255	(106) 1308	(106) 0255	(106) 1308	(106) 0255	(106) 1308	(106) 0330	(106) 1308
225	(106) 1314	(106) 1509	(106) 1311	(106) 1509	(106) 1314	(106) 1509	(106) 1314	(106) 1509	(106) 1314	(106) 1509
226	(106) 1513	(107) 0205	(106) 1513	(107) 0205	(106) 1513	(107) 0205	(106) 1513	(107) 0205	(106) 1513	(107) 0205
227	(107) 0210	(107) 0426	(107) 0210	(107) 0426	(107) 0210	(107) 0426	(107) 0210	(107) 0426	(107) 0210	(107) 0400
228	(107) 0429	(107) 0809	(107) 0429	(107) 0812	(107) 0429	(107) 0812	(107) 0429	(107) 0809	(107) 0153	(107) 0812
229	(107) 0812	(108) 0430	(107) 0813	(108) 0430	(107) 0815	(108) 0430	(107) 0812	(108) 0430	(107) 0813	(108) 0430

Line Number	3.5 kHz Bathymetry start (J.D.)time Z	end	Mini-sparker start (J.D.)time Z	end	25 KJ Sparker start (J.D.)time Z	end	Gravity start (J.D.)time Z	end	Magnetometer start (J.D.)time Z	end
230	(108) 0431	(108) 1543	—	—	—	—	(108) 0431	(108) 1530	—	—
233	(111) 1037	(111) 1756	—	—	—	—	(111) 1037	(111) 1756	—	—
234	(111) 1757	(112) 1750	—	—	—	—	(111) 1757	(113) 0400	—	—
235	—	—	(112) 2207	(113) 0110	—	—	—	—	—	—
236	(113) 1557	(113) 2155	—	—	—	—	(113) 1600	(114) 0130	—	—
237	—	—	(113) 2045	(114) 0140	—	—	—	—	—	—
238	(114) 1839	(114) 1954	—	—	—	—	(114) 1903	(114) 2000	—	—
239	—	—	(114) 2045	(115) 0105	—	—	—	—	—	—
240	(115) 1719	(115) 2335	(115) 2120	(115) 2325	—	—	(115) 1730	(115) 2339	—	—
241	(116) 1948	(116) 2116	—	—	—	—	(116) 1830	(116) 2126	—	—
242	—	—	(116) 2215	(117) 0245	—	—	—	—	—	—
243	(117) 1945	(118) 0320	(118) 0123	(118) 0315	(118) 0130	(118) 0318	(117) 1913	(118) 0320	—	—
244	(118) 0325	(118) 1157	(118) 0320	(118) 1157	(118) 0320	(118) 1157	(118) 0325	(118) 1200	—	—
245	(118) 1200	(118) 1455	(118) 1200	(118) 1435	(118) 1200	(118) 1435	(118) 1200	(118) 1455	—	—
246	(118) 1455	(118) 1526	—	—	—	—	(118) 1500	(118) 1526	—	—

Line Number	3.5 kHz Bathymetry start (J.D.) time Z	3.5 kHz Bathymetry end (J.D.) time Z	Mini-sparker start (J.D.) time Z	Mini-sparker end (J.D.) time Z	25 KJ Sparker start (J.D.) time Z	25 KJ Sparker end (J.D.) time Z	Gravity start (J.D.) time Z	Gravity end (J.D.) time Z	Magnetometer start (J.D.) time Z	Magnetometer end (J.D.) time Z
247	(118) 2130	(119) 0245	—	—	—	—	(118) 2132	(119) 0245	—	—
248	(119) 0651	(119) 1708	(119) 0736	(119) 1013	(119) 0711	(119) 1052	(119) 0645	(119) 1708	—	—
249	(121) 1607	(121) 1756	—	—	—	—	(121) 1607	(121) 1756	—	—
250	(121) 2310	(122) 1900	—	—	—	—	(121) 2310	(122) 1903	—	—
260	(125) 2353	(126) 1346	—	—	—	—	(125) 2353	(126) 1400	—	—
261	(126) 1356	(126) 1711	(126) 1520	(126) 1711	(126) 1528	(126) 1711	(126) 1400	(126) 1701	—	—
262	(126) 1711	(127) 0300	(126) 1712	(127) 0322	(126) 1711	(127) 0322	(126) 1713	(127) 0300	—	—
263	(127) 0322	(127) 0708	(127) 0325	(127) 0700	(127) 0326	(127) 0702	(127) 0331	(127) 0708	—	—
264	(127) 0709	(127) 1305	(127) 0703	(127) 1250	(127) 0703	(127) 1250	(127) 0709	(127) 1305	—	—
265	(127) 1310	(127) 1736	—	—	—	—	(127) 1331	(127) 1948	—	—
266	(127) 1951	(128) 0138	(127) 1950	(128) 0142	(127) 2000	(128) 0142	(127) 1949	(129) 0138	—	—
267	(128) 0153	(128) 1600	—	—	—	—	(128) 0153	(128) 1602	—	—
268	(128) 1602	(128) 1900	(128) 1616	(128) 1859	(128) 1614	(128) 1859	(128) 1602	(128) 1855	—	—
269	(128) 1900	(129) 0120	(128) 1902	(129) 0116	(128) 1902	(129) 0116	(128) 1900	(129) 0101	(128) 1922	(128) 2010
270	(129) 0120	(129) 0300	(129) 0116	(129) 0302	(129) 0120	(129) 0302	(129) 0130	(129) 0301	—	—

Line Number	3.5 kHz Bathymetry start (J.D.) time Z	end	Mini-sparker start (J.D.) time Z	end	25 KJ Sparker start (J.D.) time Z	end	Gravity start (J.D.) time Z	end	Magnetometer start (J.D.) time Z	end
271	(129) 0306	(129) 0700	(129) 0302	(129) 0700	(129) 0307	(129) 0701	(129) 0306	(129) 0700	—	—
272	(129) 0707	(129) 1145	(129) 0702	(129) 1145	(129) 0702	(129) 1146	(129) 0707	(129) 1130	—	—
273	(129) 1147	(129) 1605	(129) 1153	(129) 1600	(129) 1153	(129) 1605	(129) 1147	(129) 1608	—	—
274	(129) 1607	(129) 1830	(129) 1604	(129) 1820	(129) 1605	(129) 1826	(129) 1609	(129) 1830	—	—
275	(129) 1831	(130) 0722	(129) 1829	(130) 0721	(129) 1829	(130) 0721	(129) 1831	(130) 0701	(129) 1916	(130) 0232
276	(130) 0725	(130) 1749	(130) 0724	(130) 1750	(130) 0724	(130) 1750	(130) 0725	(130) 1749	(130) 0850	(130) 1750
277	(130) 1752	(130) 2000	(130) 1753	(130) 1959	(130) 1753	(130) 1959	(130) 1752	(130) 2000	(130) 1753	(130) 1959
278	(130) 2001	(131) 0422	(130) 2006	(131) 0420	(130) 2006	(131) 0420	(130) 2001	(131) 0422	(130) 2006	(131) 0410
279	(131) 0422	(131) 0712	(131) 0420	(131) 0711	(131) 0420	(131) 0711	(131) 0422	(131) 0712	—	—
280	(131) 0715	(131) 1612	(131) 0714	(131) 1559	(131) 0714	(131) 1607	(131) 0715	(131) 1600	(131) 0740	(131) 1606
281	(131) 1612	(131) 1859	(131) 1633	(131) 1837	(131) 1607	(131) 1855	(131) 1612	(131) 1859	(131) 1606	(131) 1845
282	(131) 1900	(131) 2300	(131) 2058	(131) 2300	(131) 1859	(131) 2230	(131) 1900	(131) 2300	(131) 1859	(131) 2300
283	(131) 2300	(132) 0446	(131) 2300	(132) 0445	(131) 2300	(132) 0445	(131) 2300	(132) 0446	(131) 2300	(132) 0445
284	(132) 0450	(132) 0705	(132) 0445	(132) 0705	(132) 0445	(132) 0705	(132) 0450	(132) 0705	(132) 0445	(132) 0645
285	(132) 0711	(132) 1503	(132) 0710	(132) 1503	(132) 0710	(132) 1502	(132) 0711	(132) 1500	(132) 0710	(132) 1035

Line Number	3.5 kHz Bathymetry start (J.D.) time Z	3.5 kHz Bathymetry end (J.D.) time Z	Mini-sparker start (J.D.) time Z	Mini-sparker end (J.D.) time Z	25 KJ Sparker start (J.D.) time Z	25 KJ Sparker end (J.D.) time Z	Gravity start (J.D.) time Z	Gravity end (J.D.) time Z	Magnetometer start (J.D.) time Z	Magnetometer end (J.D.) time Z
286	(132) 1504	(132) 1650	(132) 1505	(132) 1646	(132) 1507	(132) 1646	(132) 1530	(132) 1650	—	—
287	(132) 1653	(132) 2327	(132) 1650	(132) 2325	(132) 1650	(132) 2325	(132) 1650	(132) 2327	(132) 1700	(132) 2315
288	(132) 2328	(133) 0109	(132) 2328	(133) 0108	(132) 2341	(133) 0108	(132) 2328	(133) 0109	—	—
289	(133) 0112	(133) 0945	(133) 0130	(133) 0945	(133) 0112	(133) 0945	(133) 0112	(133) 0930	(133) 0247	(133) 0945
290	(133) 0947	(133) 1145	(133) 0946	(133) 1145	(133) 0954	(133) 1145	(133) 0947	(133) 1155	(133) 0955	(133) 1145
291	(133) 1155	(133) 1821	(133) 1146	(133) 1820	(133) 1150	(133) 1820	(133) 1155	(133) 1821	(133) 1146	(133) 1715
292	(133) 1823	(134) 0030	(133) 1822	(134) 0030	(133) 1822	(134) 0030	(133) 1823	(134) 0030	(133) 2104	(134) 0030
293	(134) 0031	(134) 0856	(134) 0035	(134) 0900	(134) 0030	(134) 0855	(134) 0031	(134) 0856	(134) 0045	(134) 0900
294	(134) 0900	(134) 1115	(134) 0901	(134) 1115	(134) 0900	(134) 1114	(134) 0900	(134) 1115	(134) 0901	(134) 1115
295	(134) 1117	(135) 0725	(134) 1117	(135) 0711	(134) 1117	(135) 0716	(134) 1117	(135) 0725	(134) 1117	(135) 0645
296	(135) 0730	(135) 1819	—	—	—	—	(135) 0731	(136) 0100	—	—
297	(136) 0106	(136) 0232	—	—	—	—	(136) 0106	(136) 0201	—	—
	NO LINES # 298 OR 299									
300	(136) 0308	(136) 0630	(136) 0248	(136) 0633	(136) 0300	(136) 0633	(136) 0231	(136) 0631	(136) 0312	(136) 0630
301	(136) 0633	(136) 1225	(136) 0637	(136) 0903	(136) 0637	(136) 0903	(136) 0633	(136) 1300	(136) 0645	(136) 0811

Line Number	3.5 kHz Bathymetry start (J.D.)time Z	end	Mini-sparker start (J.D.)time Z	end	25 KJ Sparker start (J.D.)time Z	end	Gravity start (J.D.)time Z	end	Magnetometer start (J.D.)time Z	end
303	(136) 1713	(136) 1945	(136) 1711	(136)1945	(136) 1713	(136) 1945	(136) 1713	(136) 1945	(136)1749	(135) 1846
304	(136) 1948	(136) 2345	(136) 1948	(136) 2326	(136) 1948	(136) 2345	(136) 1948	(136) 2345	—	—
305	(136) 2347	(137) 0646	(136) 2344	(137) 0646	(136) 2346	(137) 0645	(136) 2347	(137) 0646	—	—
306	(137) 0650	(137) 1640	(137) 0649	(137) 1255	(137) 0649	(137) 1255	(137) 0650	(137) 1630	—	—
302	(136) 1330	(136) 1712	—	—	—	—	(136) 1330	(136) 1712	—	—
Cromwell										
310	—	—	(149) 2230	(150) 0013	—	—	—	—	—	—
311	—	—	(156) 0030	(156) 0405	—	—	—	—	—	—
312	—	—	(158) 1220	(158) 1400	—	—	—	—	—	—

Navigation and Accuracy

Navigation for the cruise was based on a combination of methods. Raydist with an accuracy of $\pm$ 50 m was the primary system, but due to numerous equipment failures and onshore problems, proved to be of minimal value. Satellite navigation was the secondary system and functioned well about 75% of the cruise. Other positions are based on Loran A, radar, dead reckoning, and in the case of small launch work during Leg 2, sextant 3-point fixes.

The accuracy of the navigation varied greatly. Numerous problems were encountered in the production of usable navigation plots. The attached letter from N.O.A.A's Processing Division in Seattle indicates some of the post cruise modifications that had to be made to improve the navigation. Known problems still exist on lines 234, 267-269, and 270-275. The authors feel that the cruise as a whole has navigation accuracy of 2-3 km, with some larger exceptions. This severely hampers correlation of Surveyor and Cromwell data with other Gulf of Alaska cruises.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SURVEY, Pacific Marine Center
1801 Fairview Ave. E., Seattle, Washington 98102

Date : 4 September 1975

Reply to Attn. of:

To : Dr. Bruce Molnia
Office of Marine Geology Western Region

From : Walter F. Forster, Cdr.
Chief, Processing Division

Subject: Resolution of Data - RP-4-SU-75

The navigational data for Leg III of Northeastern Gulf of Alaska (NEGOA) Environmental Assessment Project, RP-4-SU-75 is provided per your request on the accompanying six Ocean Survey Sheets labeled Sheets A thru F. Forms CD-26, Worksheet, for each of the above plots list Julian Day, GMT time, latitude-longitude, control source, RPM/Speed/Course, and noting actions in resolving conflicting data. Rejected control and adjusted positions are clearly anotated on Form CD-26. Comments on each of the six sheets follow:

1. OSS Plotting Sheet A, Kodiak to SU-200-3-75, 1 of 2.

   This sheet had good land tie control coming out of Kodiak. Some of the fixes on the eastern end of the sheet were a little weak but were easily upgraded by better control further east on the adjoining sheet.

2. OSS Plotting Sheet B, Kodiak to SU-200-3-75, 2 of 2.

   This is the other half of two sheets that go to the working grounds from Kodiak. The control was fairly good and tied in well with the ship's plotted positions.

3. OSS Plotting Sheet C, Yakutat - Ocean Cape.

   This sheet covers the direct line to Fairweather Ground with good control. Also plotted on this sheet is the area requested around Pamlona Ridge. The control there was mostly Loran and Satellite. Some of the Loran fixes were rejected and plotted on the stronger Satellite fixes and dead reckoning. The lines going in and out of Yakutat were visual and Raydist. These fixes plot within accuracy standards of satellite control.

4. OSS Plotting Sheet D, Fairweather Ground.

This sheet has the plotting data for the Fairweather Ground area. There were times when there were some differences between the Raydist and Satellite positioning. In these few instances, the Raydist fixes were adjusted to fit the Satellite control. The Satellite fixes checked well with time and course. Due to various maneuverings of the vessel, dashed lines between fixes are shown between 129 J.D./ØØ16Z to Ø3Ø5Z. The positions could not be confirmed by time, speed and course; therefore, the adjusted plot is considered to be greater than ± ½ mile in this area. Between 129 J.D./Ø82ØZ to 14Ø6Z, the Raydist control had significant lane losses; however, the plot was relative within itself. The relative Raydist plot was adjusted to the Satellite navigation fixes.

5. OSS Plotting Sheet E, SU-2ØØ-2-75 to Port Etches.

This sheet has one line from SU-2ØØ-2-75 going into Port Etches with Satellite control. As the line closes in on Port Etches, the control changed to visual. The various controls held well except for one area about 1214Z Day 135, where steering problems were encountered. Good Satellite control helped in this area.

6. OSS Plotting Sheet F, Seward - Cordova.

This sheet has one short line coming out of Port Etches with good coast pilot control. Also there are lines, into and out of Cordova. The course is shown as a dashed line between 1347Z to 141ØZ Day 136 because the course of the vessel was not consistant. In addition, there is one line into Seward. Most of the control for these lines was visual and very few problems were encountered.

We estimate that most of the plotted positions are accurate within ± ½ mile.

In addition, SU-2ØØ-1-75, SU-2ØØ-2-75, SU-2ØØ-3-75 and SU-2ØØ-4-75 have been replotted to correct grid discrepancies and to clarify position number identification. Please note that the replot of the positions are consistantly for positions 308 and 321. The plotting of computed loran line of positions significantly strengthened the navigational plot on Sheet 6.

Generally, accuracy requirements of all Fixes were ± 1/4 mile except for those fixes previously indicated.

Geophysical Systems and Data Quality

Three separate seismic reflection systems were operated simulataneously and provided high frequency and intermediate frequency acoustic records. The specifications for each system are shown in Table 2. Examples of records from the minisparker system and the 25 KJ sparker system are shown in the Interpretation of Data section.

Data quality varied substantially from line to line and area to area. Problems were encountered due to propeller noise and ship's wake which degraded data quality. The 25 KJ system records were recorded in single channel mode only and not processed to remove multiples, hence much data is lost below the first water bottom multiple; 3.5 kHz bathymetry data is generally good but bottom was occasionally lost beyond the shelf break.

Minisparker records were the most variable, often with little or no penetration, due to the high reflectivity of the sediment-water interface and the hard nature of the bottom. All records show interference from other systems and ship noise.

TABLE 2

SEISMIC REFLECTION SYSTEMS

Equipment	Deployed	Power	Sensor	Filters	Fire and Sweep Rate	Signal Processor	Display
3.5kHz correlated transducer	Hull mounted	2 Kw	Hull mounted transceiver	———	¼ - 1 sec	EDO	Raytheon UGR-196
Minisparker	Two cages	variable 100-600J	Single channel Teledyne high resolution Hydrophone . Streamer	variable between 100-900 Hz; generally 250-600 Hz	¼ - 1 sec	Teledyne Model 300 Amplifier	EDO 5500
25 KJ Medium resolution sparker	One towed 25 KJ Teledyne Sparker	2-40 cu in with WSK 27 KJ max	50' single Channel Teledyne med. resolution 25 element streamer towed ~200' aft. OR deep water 200' single channel teledyne hydrophone towed 400'-600' aft.	25-95 Hz	3 sec or 4	Teledyne Signal Conditioner	Raytheon PTR 196

Interpretation of Geophysical Data

The 1975 Surveyor geopysical data covers the area from Cross Sound to west of Prince William Sound. The area west of Yakutat has been investigated previously by cruises on the RV Thomas G. Thompson in 1974 (von Huene et al. 1975; Carlson, Bruns and Molnia, 1975; Molnia and Carlson, 1975a, Molnia and Carlson, 1975b; Carlson and Molnia 1975; and Bruns and Plafker, 1975). Therefore this report concentrates on data from Yakutat east to Cross Sound. Map 4 depicts surface and near surface environmental hazards, sediment thickness and shelf morphology, as well as very shallow structure for the area between Yakutat and Cross Sound.

No attempt has been made to correlate features from one seismic line to the next. This is primarily due to the 20-30 km distance between adjacent lines. In order to attempt detailed correlation a line density at least five times that of the present survey would be needed. However, regional trends can be seen in some areas of the shelf. Southwest of Cross Sound and landward of the shelf edge is a zone of irregular surface morphology (Figure 2) which trends southwest for at least 80 km. Another example is the very irregular and rugged morphology of Fairweather Ground (Figures 3,4,5), which extends over 60 km of shelf just landward of the shelf break south of Cape Fairweather. This morphology is unique to only this area.

Regional Structure

In general, the high and medium resolution seismic profiles only show areas of folding near the shelf break in the vicinity of Fairweather Ground (Figs. 3-7). Shoreward of the Ground, beds which appear to be dipping to the north are found on 9 siesmic lines (generally N-S lines) covering an east to west distance of about 75 km. Near the shelf break, dips are generally seaward, but not as well expressed as the shoreward dipping zone. The dips suggest an anticlinal structure roughly paralleling the shelf break running through Fairweather Ground. Problems due to multiples and lack of penetration (discussed above) may have prevented the identification of structures in other areas.

Faulting

Over 20 areas were located which had faults with surface expression (Map 4). The largest surface offset noted was on a fault southeast of Palma Bay (Figs. 8 and 9) where the offshore upthrown block cut Holocene sediment and was elevated about 25 meters (line 207, Fig. 4). A similar offset is found on the adjacent line to the east (line 206). A line drawn through these two locations projects toward Palma Bay and connects with the onshore position of the Fairweather Fault as mapped by Plafker (1967). We speculate that the two offsets on lines 207 and 206 are offshore extensions of the Fairweather Fault.

Other faults were less well expressed at the surface, but many have offsets of 3-10 m and cut Holocene sediment. Figure 10 shows a horst block with about 10 m of surface expression. Horst and graben faulting was found at only 3 locations (Map 4).

Bedforms

The identification of bedforms is difficult due to the uni-directional crossing of most features and the large scale (½-1 sec) used in profiling. However, about 10 areas were found which had regular undulatory surfaces. One area with bedform heights of 5-10 m and wave length of about a km (Fig. 11) may have resulted from a catastrophic draining of glacial lakes in the Alsek area, Yakutat Glacier or Russel Fjord. All areas need more detailed surveys including side-scan sonar, to better define the nature of the bedforms and establish whether the features are relict or active.

Shelf Break

The edge of the continental shelf was crossed over a dozen times between Cross Sound and Yakutat (Map 4). The depth of the shelf edge varied from 220 m - 280 m. On two-thirds of the crossings, the shelf edge had a small structural high or knob at the outer limit (Fig. 12). On some profiles, a well developed structural basin was present shoreward of the shelf edge high. On seismic line 206 there was over 20 m of shoaling as the shelf edge was approached. This may be related to glacial scour and erosion of the middle shelf.

Surface Irregularities, Disruptions and Slumping

Over 30 areas have been identified where the surface shows some type of irregularities which may be related to slumping, sliding or other types of mass movement. Some may be related to gas in the near surface sediment while other irregularities may be related to subsurface structure. As in the case with bedforms, more detailed surveys are necessary to resolve the nature of these irregular surface features. Figures 13, 14 and 15 are examples of three areas which show varieties of such surface irregularity. The discontinuous subsurface reflectors in Figure 15 are very similar to areas on the Copper River delta and Kayak Island Platform where high gas content has been noted in the sediment. A similar situation is present on line 228.

Glacial Morphology

Many areas exhibit U-shaped channels filled with Holocene sediment. In some cases glacially carved straths (Lines 229 and 207) still have surface expressions. Figures 16, 17 and 18 show a strath wall and two examples of filled glacial channels, respectively. The fill in the strath (Fig. 16) reaches a thickness of almost 100 m. The U-shaped channels in Figure 17 and 18 have widths of up to 2 km and over 100 m of sediment fill.

A well developed moraine system exists at the south of Yakutat Bay. Examples of sediment ponding behind recessional lobes of the moraine can be seen on lines 201, 202 and 276.

Holocene Sediment

Much of the continental shelf between Yakutat and Cross Sound is covered by Holocene sediment. Thicknesses of more than 150 m have been observed south of Fairweather Glacier. Southeast of Yakutat, 150 m of sediment cover the glaciated inner shelf near the Situk River. Over 50 measurements of sediment thickness are shown on Map 4. Poor data quality does not permit measurements of sediment thickness of many parts of the lines plotted on Map 4. Examples of lines which show well layered Holocene sediment filling glaciated channels are shown in Figures 18 and 19.

Acknowledgements

The cruise was supported jointly by the U.S. Geological Survey, Bureau of Land Management and the National Oceanic and Atmospheric Administration. We are appreciatiative of assistance on the cruise provided by the scientific personnel: (Kenneth Bayer, Duane Cavit, Steven Davenport, Paul T. Fuller, Samuel Johnson, James Joyce, Rebecca Larsen, James Nicholson, Milton Randall, Gordon Tanner, Francis Wahl and Steven Wallace), the ship's captain, Capt. Kenneth A. MacDonald, and the ship's crew.

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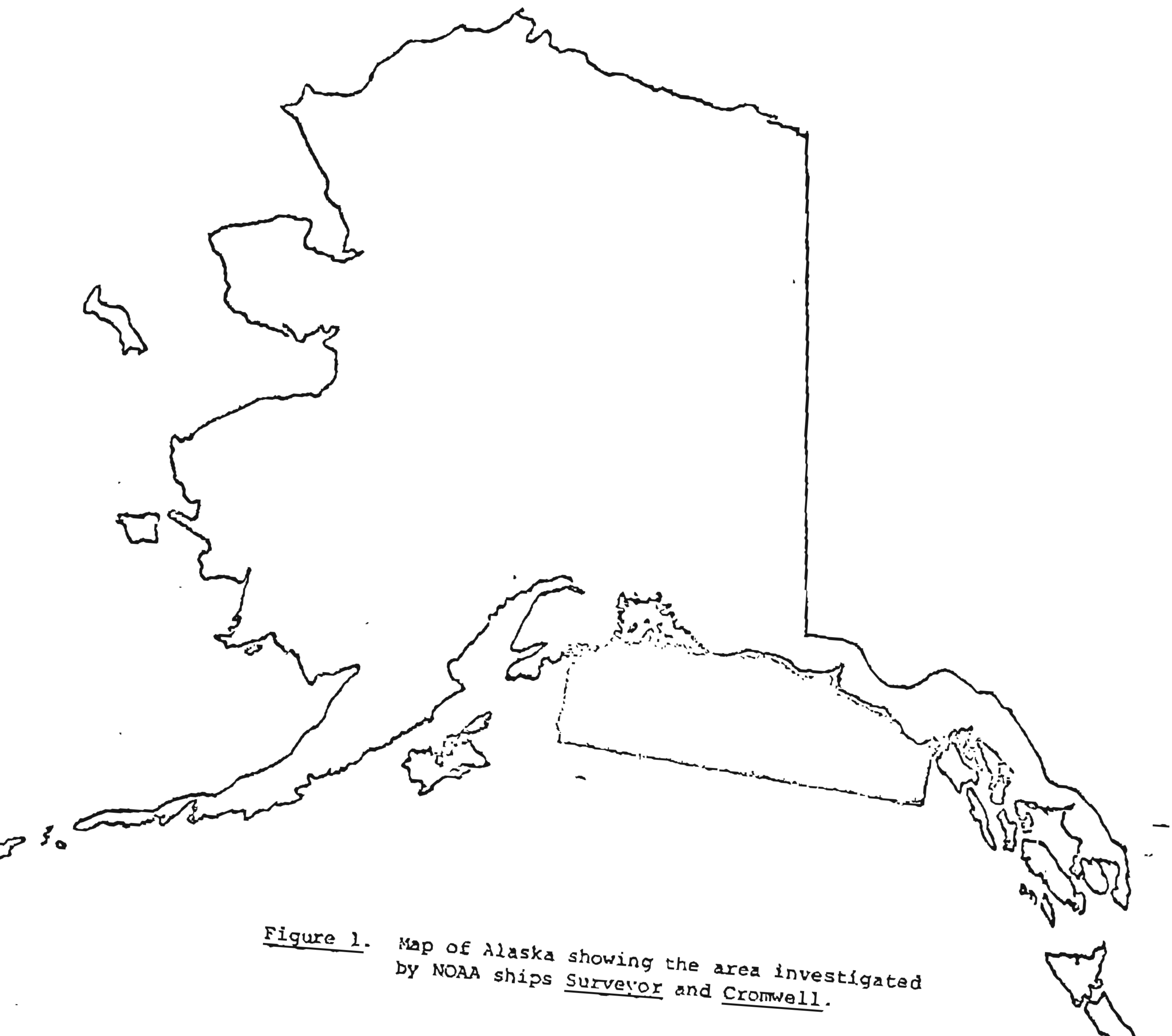


Figure 1. Map of Alaska showing the area investigated by NOAA ships *Surveyor* and *Cromwell*.

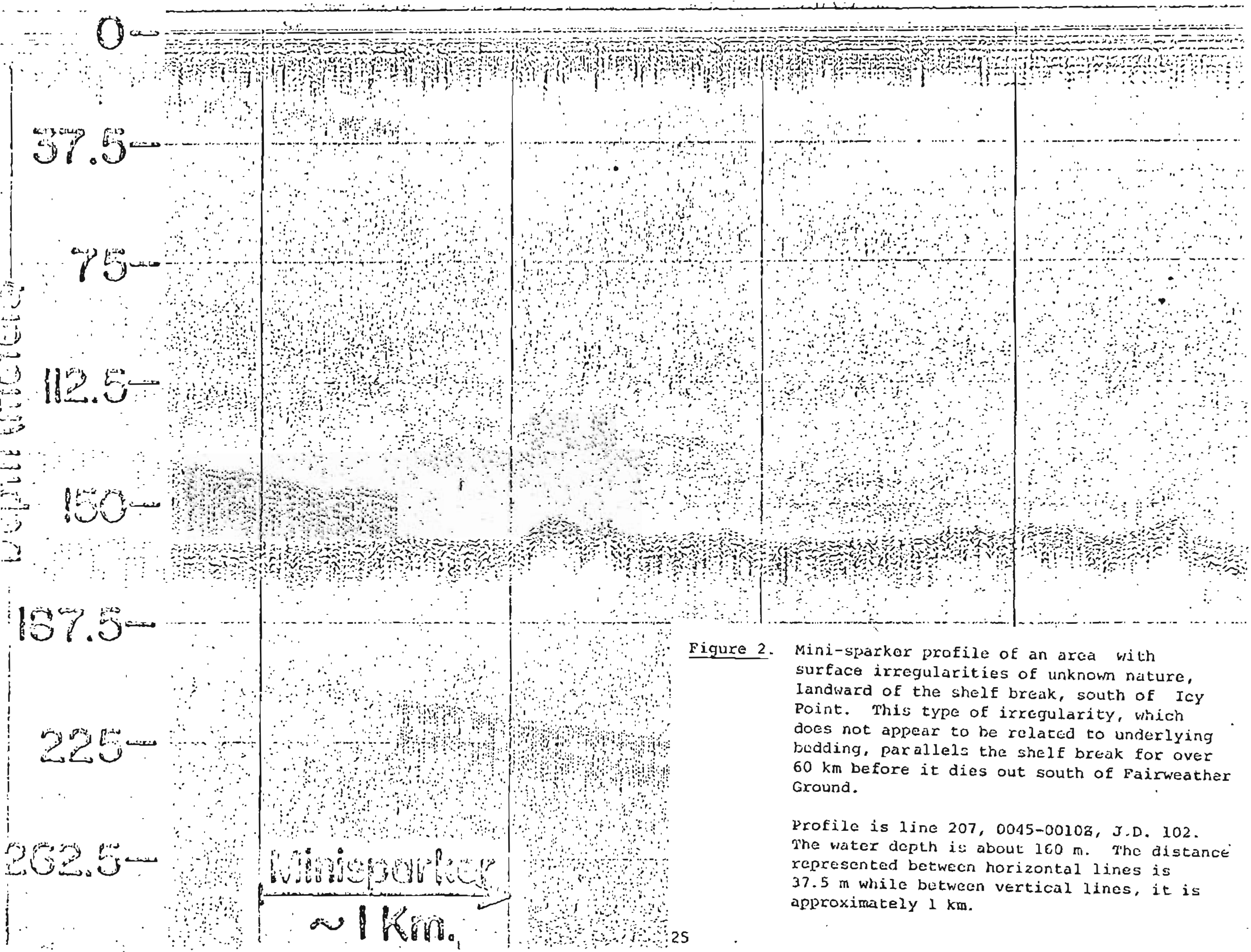


Figure 2. Mini-sparker profile of an area with surface irregularities of unknown nature, landward of the shelf break, south of Icy Point. This type of irregularity, which does not appear to be related to underlying bedding, parallels the shelf break for over 60 km before it dies out south of Fairweather Ground.

Profile is line 207, 0045-0010Z, J.D. 102. The water depth is about 160 m. The distance represented between horizontal lines is 37.5 m while between vertical lines, it is approximately 1 km.

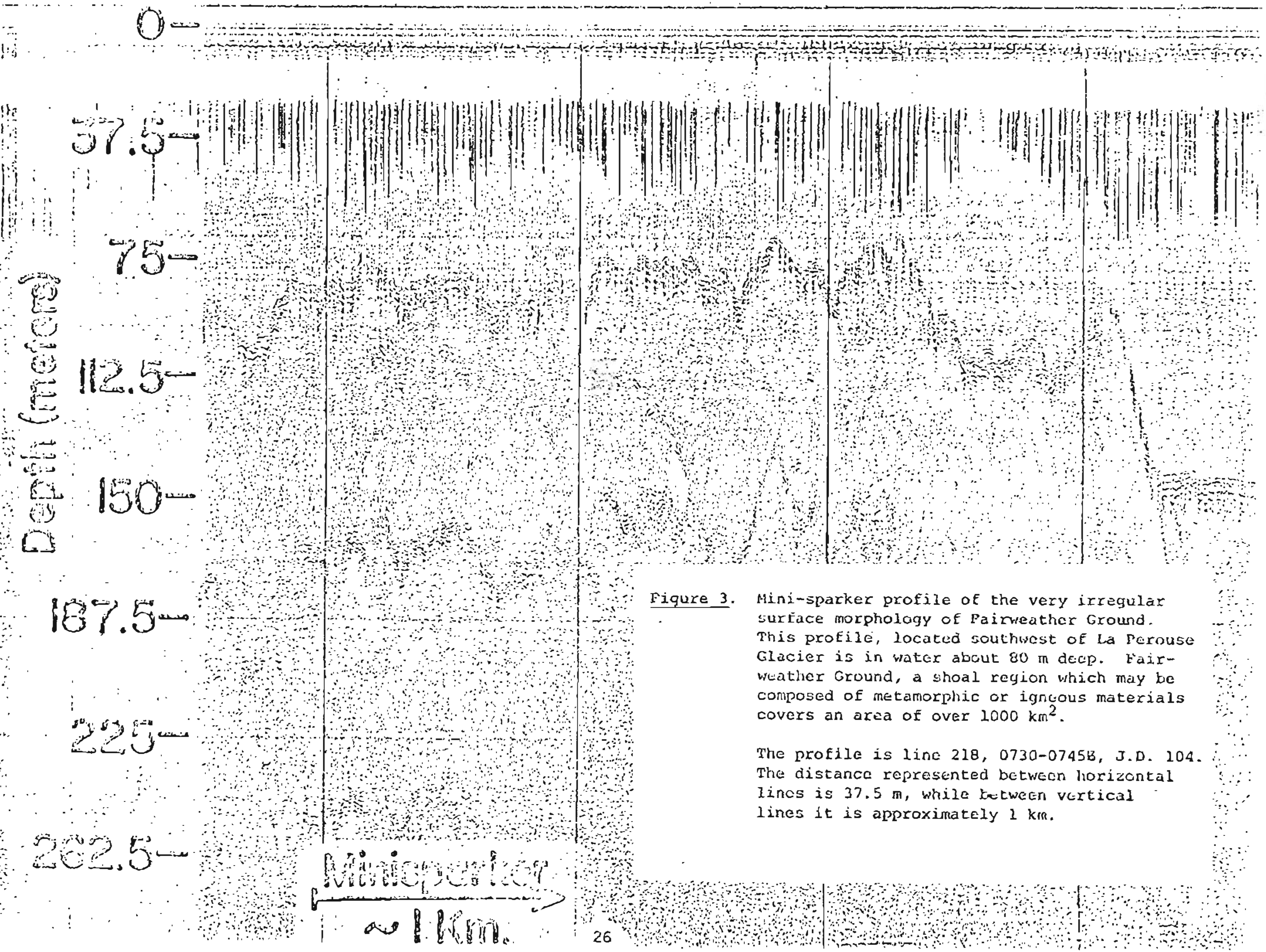


Figure 3. Mini-sparker profile of the very irregular surface morphology of Fairweather Ground. This profile, located southwest of La Perouse Glacier is in water about 80 m deep. Fairweather Ground, a shoal region which may be composed of metamorphic or igneous materials covers an area of over 1000 km^2.

The profile is line 218, 0730-0745B, J.D. 104. The distance represented between horizontal lines is 37.5 m, while between vertical lines it is approximately 1 km.

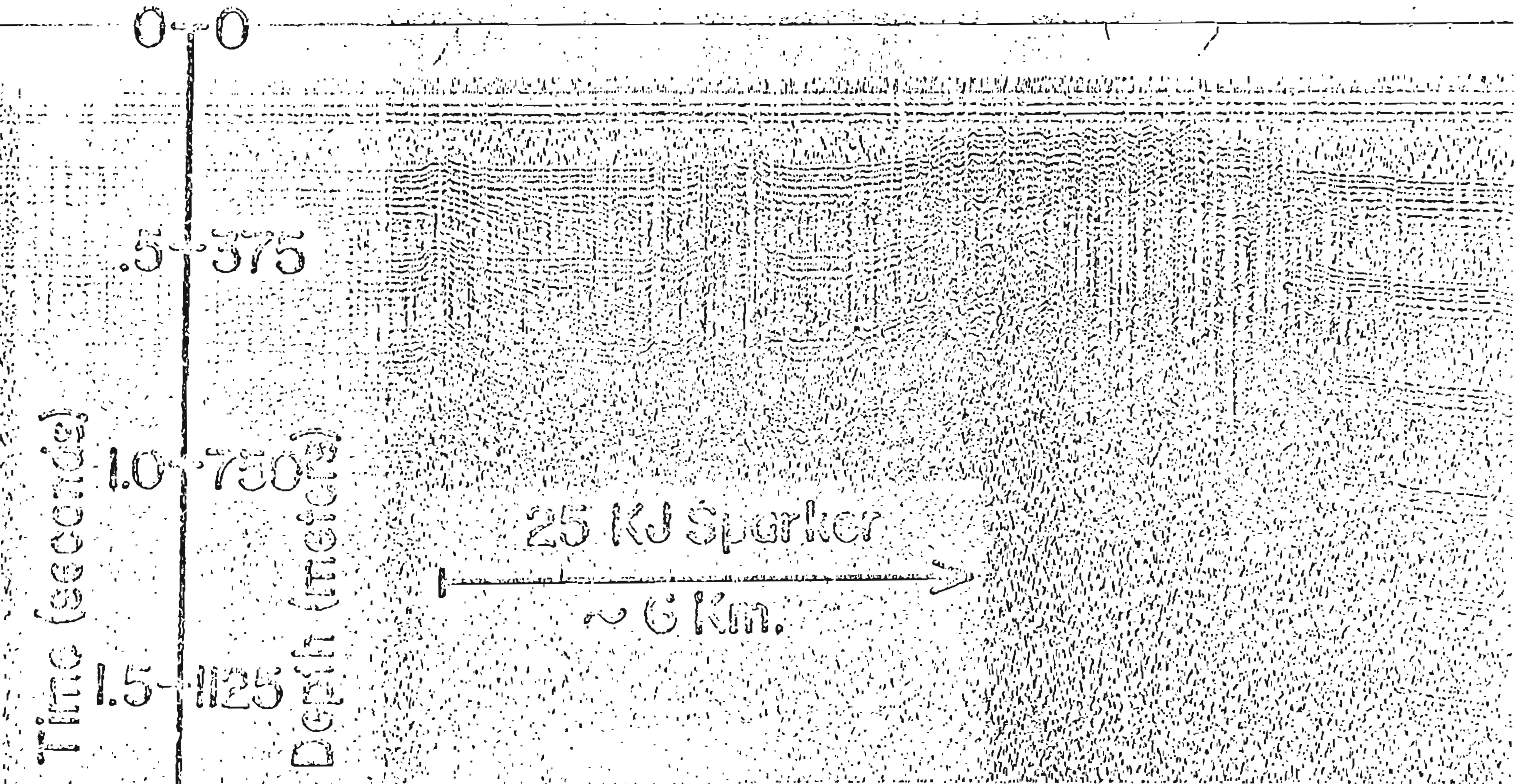


Figure 4. 25 K.J. sparker profile of the Fairweather Ground region (line 218) including the area of Figure 3. The width (left to right) of the profile represents about 16 km of sea floor while the height (top to bottom) represents slightly less than 2 km. Note the multiples, noise, and the lack of deep penetration. This is typical of the 25 K.J. data.

The profile which was recorded on JD 104, 0726-0840B, shows some near surface folding shoreward of Fairweather Ground and the irregular and rugged morphology of the Ground area.

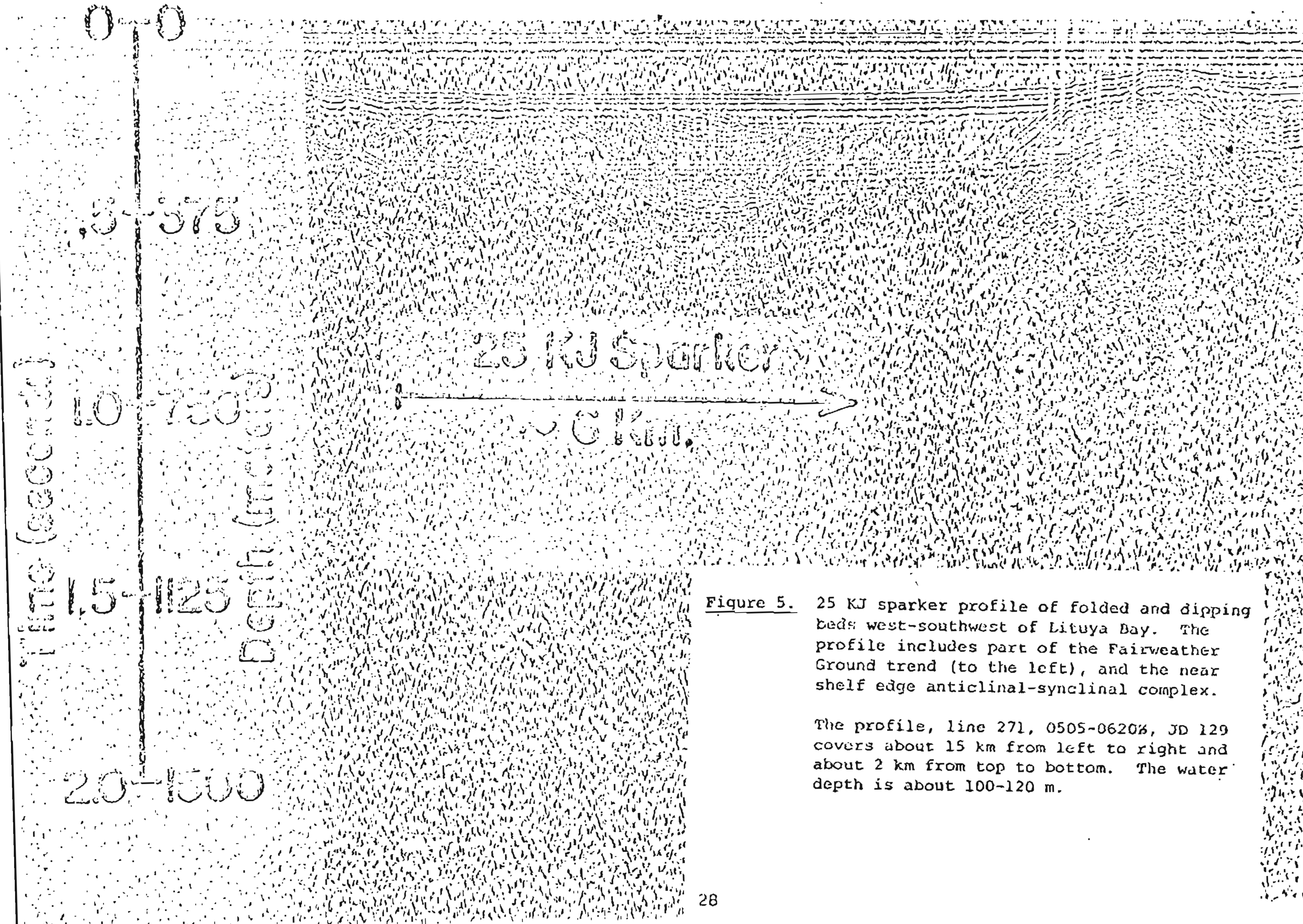


Figure 5. 25 KJ sparker profile of folded and dipping beds west-southwest of Lituya Bay. The profile includes part of the Fairweather Ground trend (to the left), and the near shelf edge anticlinal-synclinal complex.

The profile, line 271, 0505-0620Z, JD 129 covers about 15 km from left to right and about 2 km from top to bottom. The water depth is about 100-120 m.

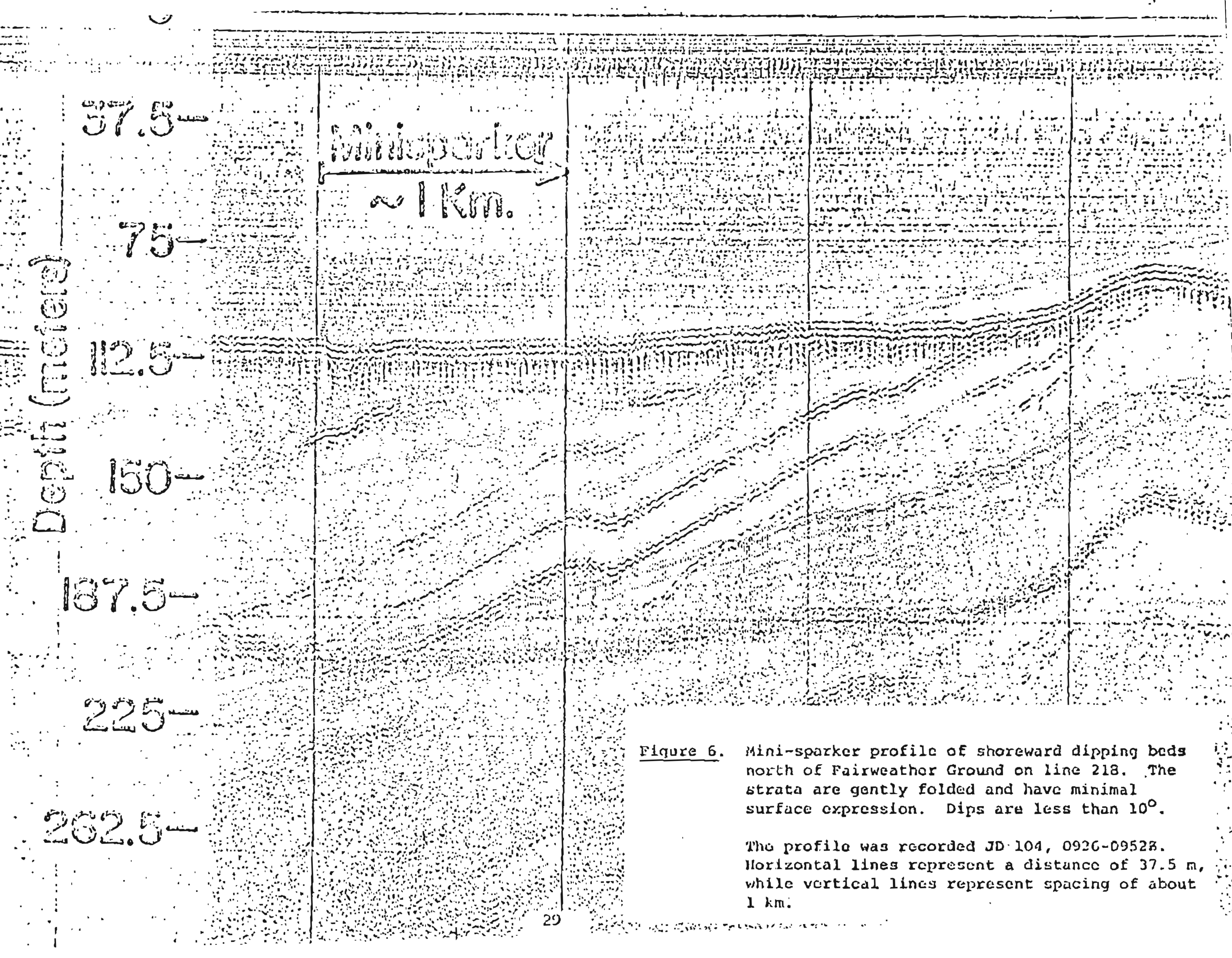


Figure 6. Mini-sparker profile of shoreward dipping beds north of Fairweather Ground on line 218. The strata are gently folded and have minimal surface expression. Dips are less than 10°.

The profile was recorded JD 104, 0926-0952Z. Horizontal lines represent a distance of 37.5 m, while vertical lines represent spacing of about 1 km.

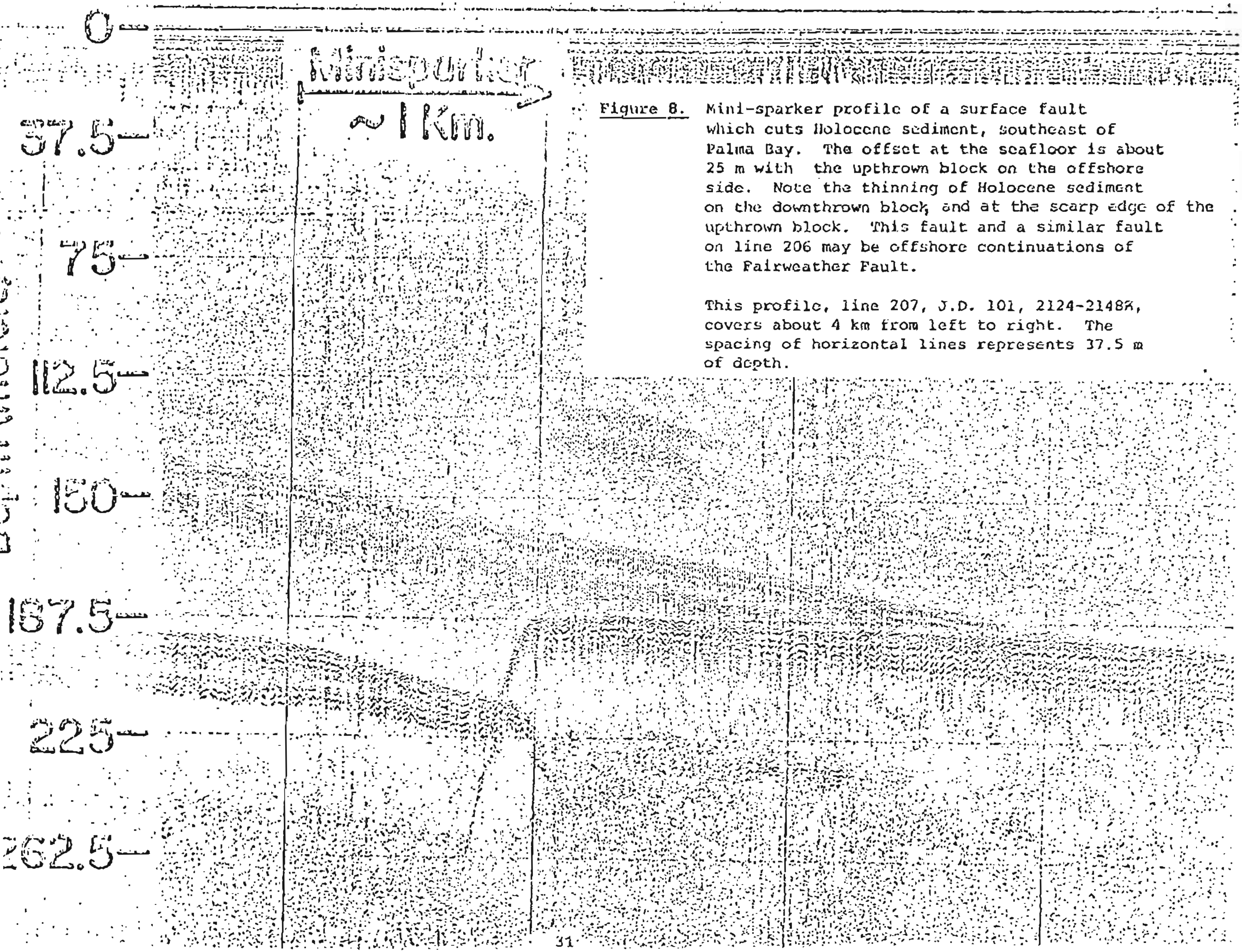


Figure 8. Mini-sparker profile of a surface fault which cuts Holocene sediment, southeast of Palma Bay. The offset at the seafloor is about 25 m with the upthrown block on the offshore side. Note the thinning of Holocene sediment on the downthrown block, and at the scarp edge of the upthrown block. This fault and a similar fault on line 206 may be offshore continuations of the Fairweather Fault.

This profile, line 207, J.D. 101, 2124-2148Z, covers about 4 km from left to right. The spacing of horizontal lines represents 37.5 m of depth.

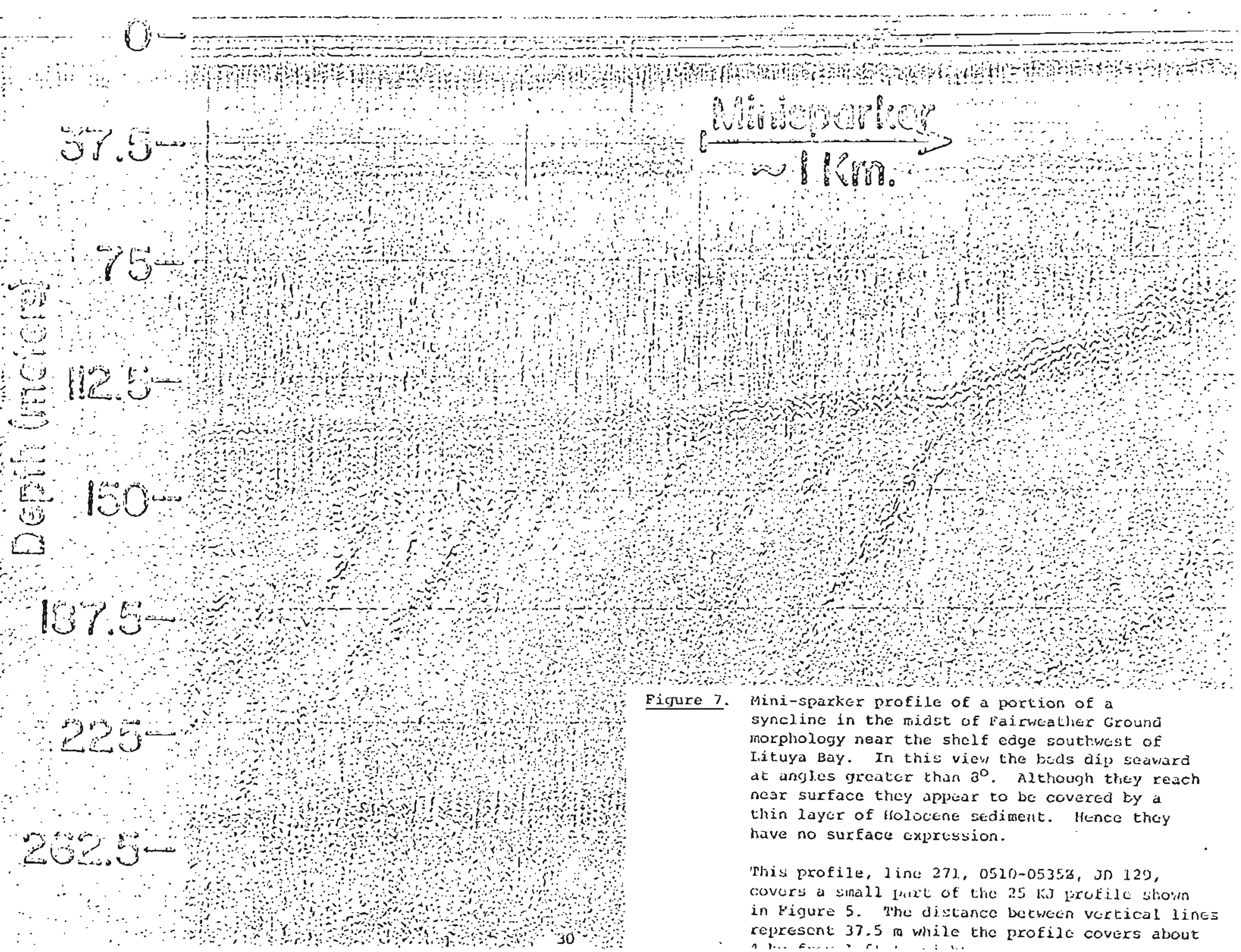
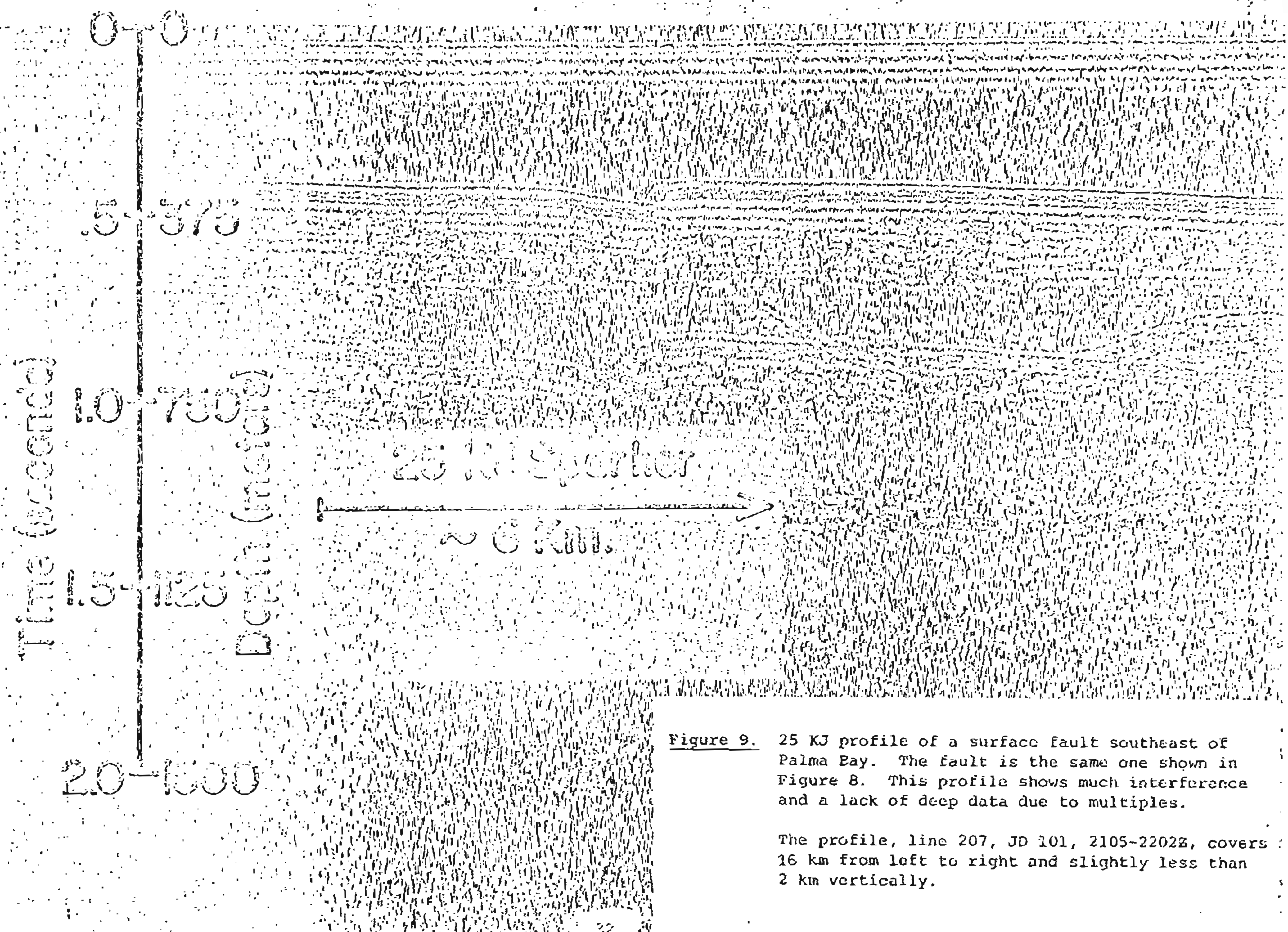


Figure 7. Mini-sparker profile of a portion of a syncline in the midst of Fairweather Ground morphology near the shelf edge southwest of Lituya Bay. In this view the beds dip seaward at angles greater than 8°. Although they reach near surface they appear to be covered by a thin layer of Holocene sediment. Hence they have no surface expression.

This profile, line 271, 0510-0535Z, JD 129, covers a small part of the 25 KJ profile shown in Figure 5. The distance between vertical lines represent 37.5 m while the profile covers about [illegible]



<u>Figure 9.</u> 25 KJ profile of a surface fault southeast of Palma Bay. The fault is the same one shown in Figure 8. This profile shows much interference and a lack of deep data due to multiples.

The profile, line 207, JD 101, 2105-2202Z, covers 16 km from left to right and slightly less than 2 km vertically.

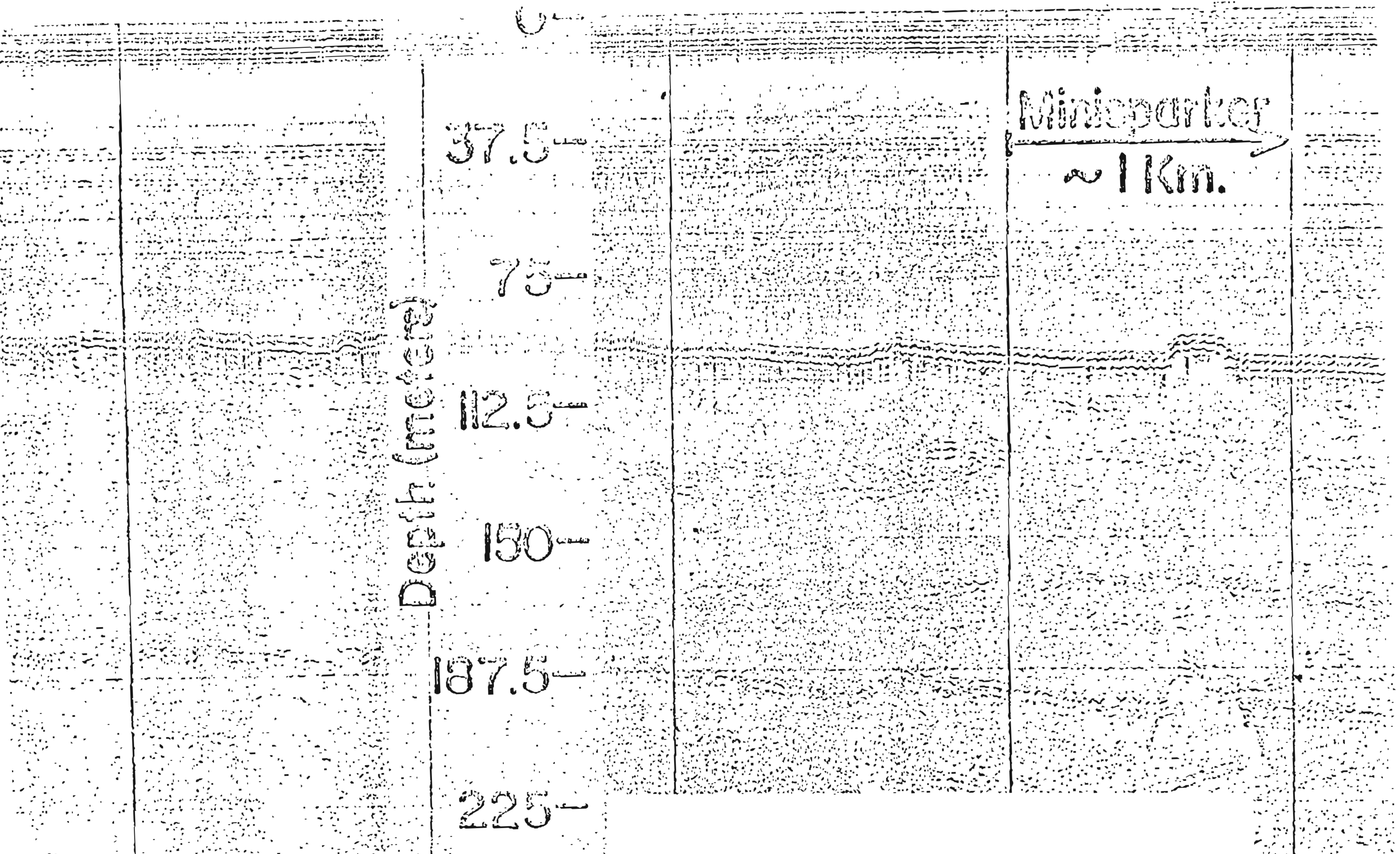


Figure 10. Mini-sparker profile of an area of surface irregularities including a horst-like block with about 10 m of upward displacement. This profile, line 218, JD 104, 1350-1417Z, is west of Lituya Bay. The distance between horizontal lines represents 37.5 m of depth while the profile covers about 4 km from left to right.

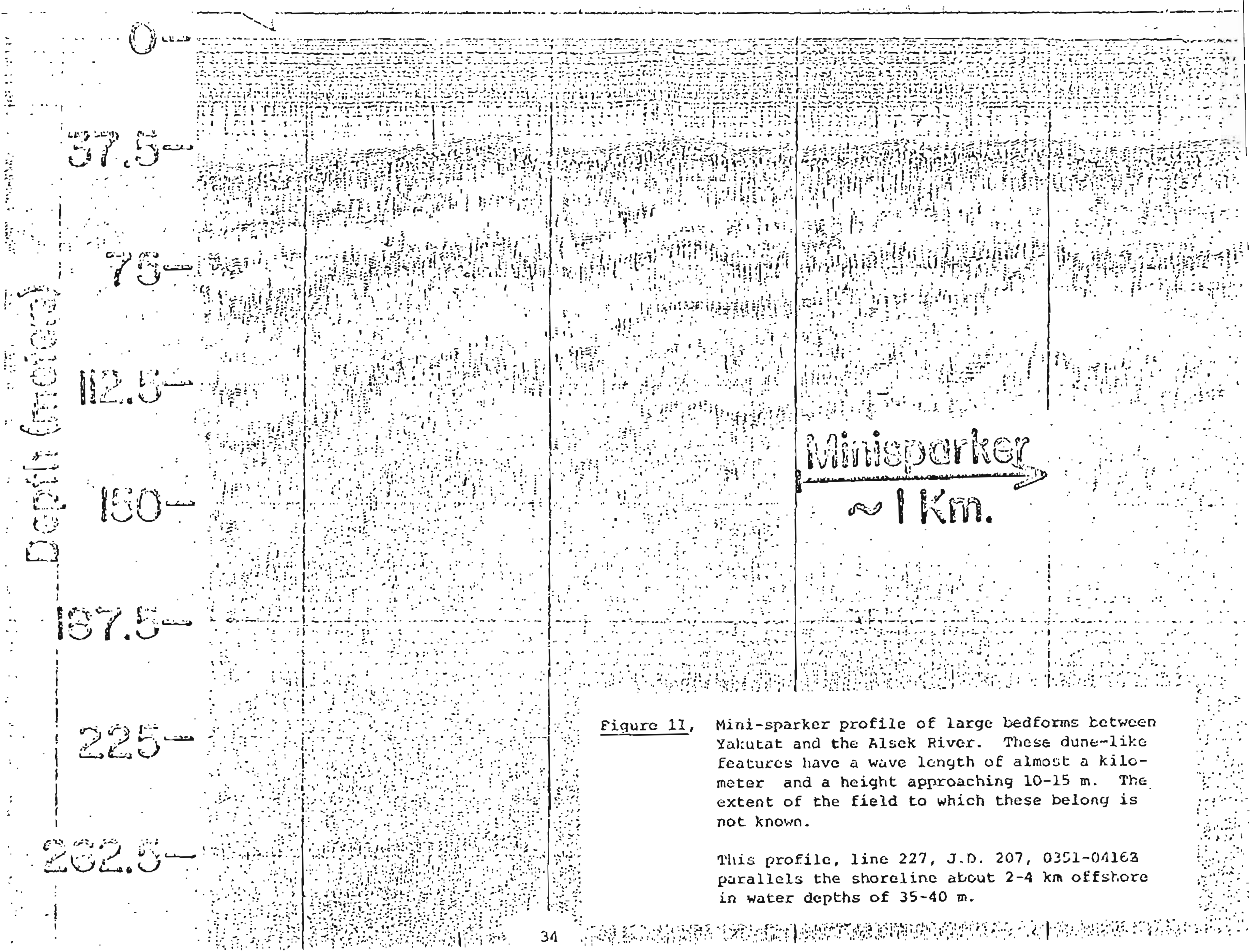


Figure 11, Mini-sparker profile of large bedforms between Yakutat and the Alsek River. These dune-like features have a wave length of almost a kilometer and a height approaching 10-15 m. The extent of the field to which these belong is not known.

This profile, line 227, J.D. 207, 0351-04163 parallels the shoreline about 2-4 km offshore in water depths of 35-40 m.

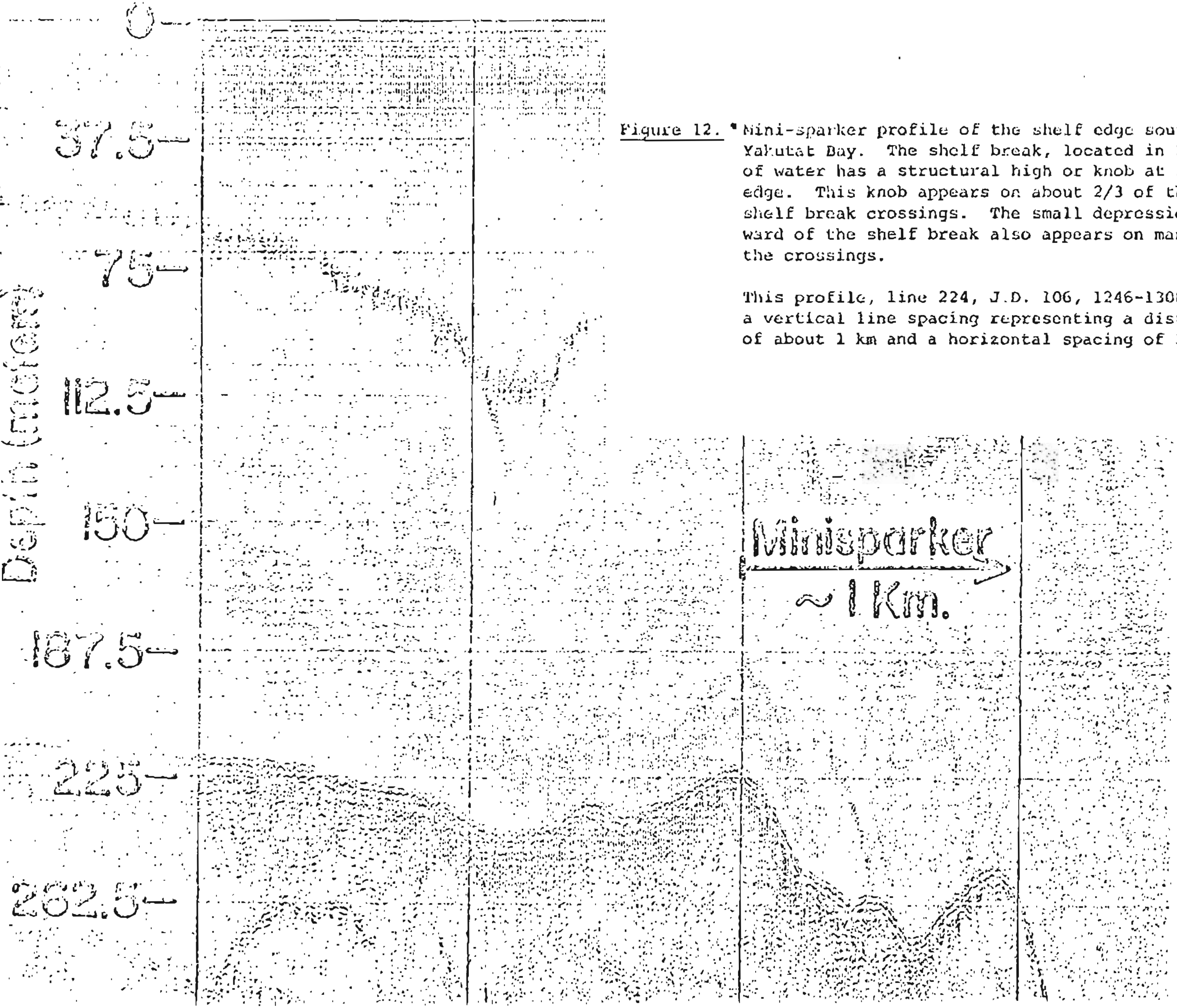


Figure 12. Mini-sparker profile of the shelf edge south of Yakutat Bay. The shelf break, located in 258 m of water has a structural high or knob at its edge. This knob appears on about 2/3 of the shelf break crossings. The small depression landward of the shelf break also appears on many of the crossings.

This profile, line 224, J.D. 106, 1246-1308B has a vertical line spacing representing a distance of about 1 km and a horizontal spacing of 37.5 m.

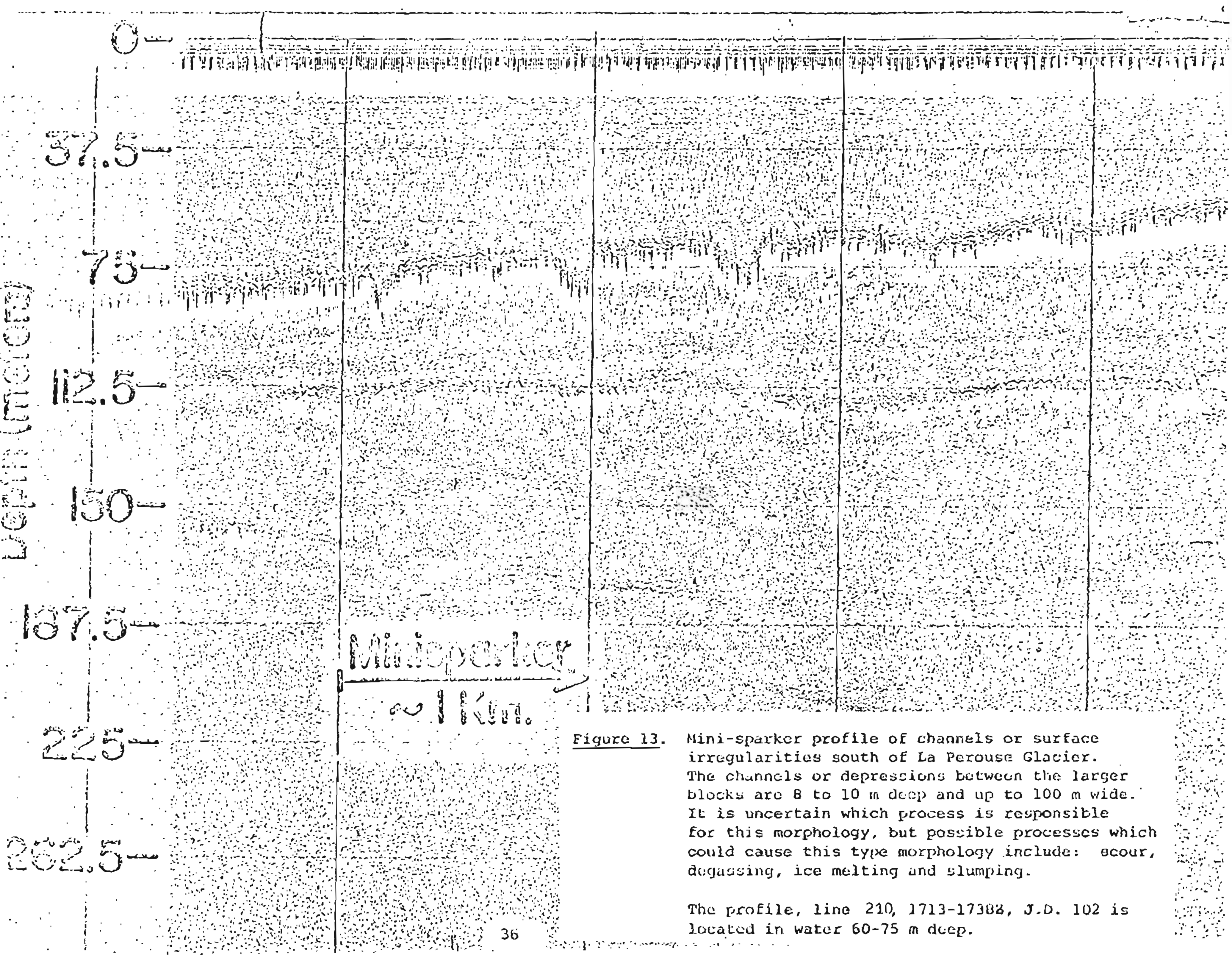


Figure 13. Mini-sparker profile of channels or surface irregularities south of La Perouse Glacier. The channels or depressions between the larger blocks are 8 to 10 m deep and up to 100 m wide. It is uncertain which process is responsible for this morphology, but possible processes which could cause this type morphology include: scour, degassing, ice melting and slumping.

The profile, line 210, 1713-17388, J.D. 102 is located in water 60-75 m deep.

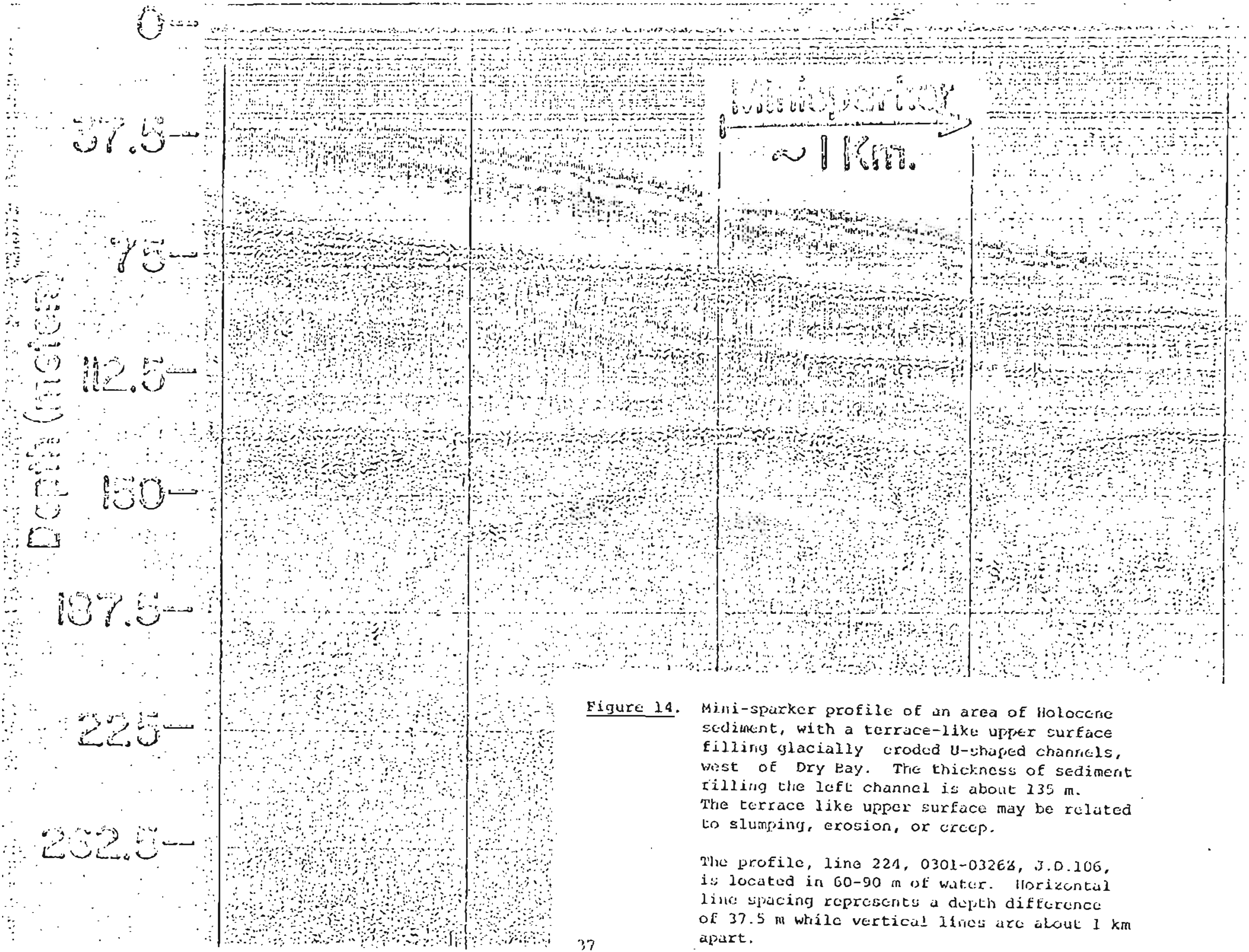


Figure 14. Mini-sparker profile of an area of Holocene sediment, with a terrace-like upper surface filling glacially eroded U-shaped channels, west of Dry Bay. The thickness of sediment filling the left channel is about 135 m. The terrace like upper surface may be related to slumping, erosion, or creep.

The profile, line 224, 0301-0326Z, J.D.106, is located in 60-90 m of water. Horizontal line spacing represents a depth difference of 37.5 m while vertical lines are about 1 km apart.

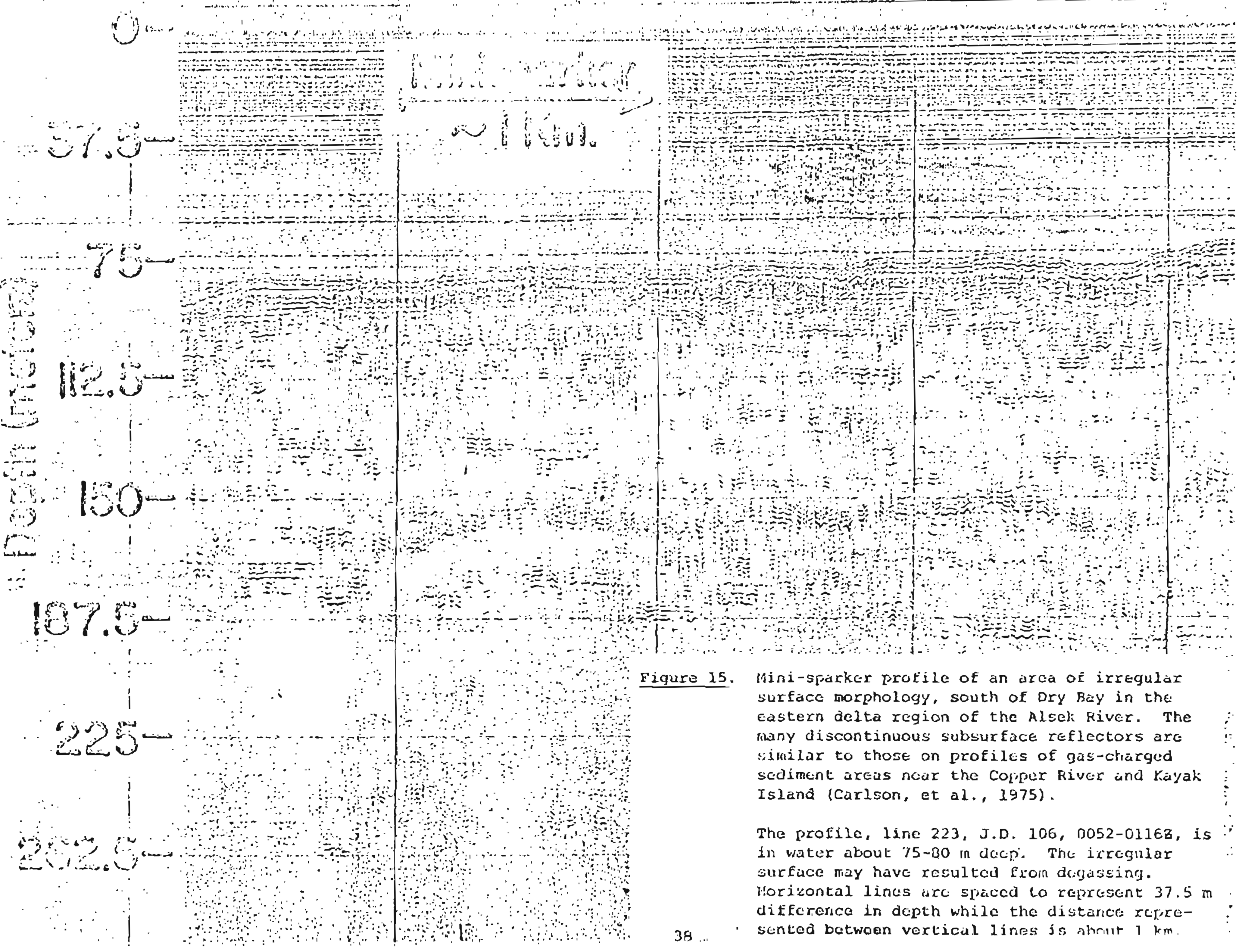


Figure 15. Mini-sparker profile of an area of irregular surface morphology, south of Dry Bay in the eastern delta region of the Alsek River. The many discontinuous subsurface reflectors are similar to those on profiles of gas-charged sediment areas near the Copper River and Kayak Island (Carlson, et al., 1975).

The profile, line 223, J.D. 106, 0052-0116Z, is in water about 75-80 m deep. The irregular surface may have resulted from degassing. Horizontal lines are spaced to represent 37.5 m difference in depth while the distance represented between vertical lines is about 1 km.

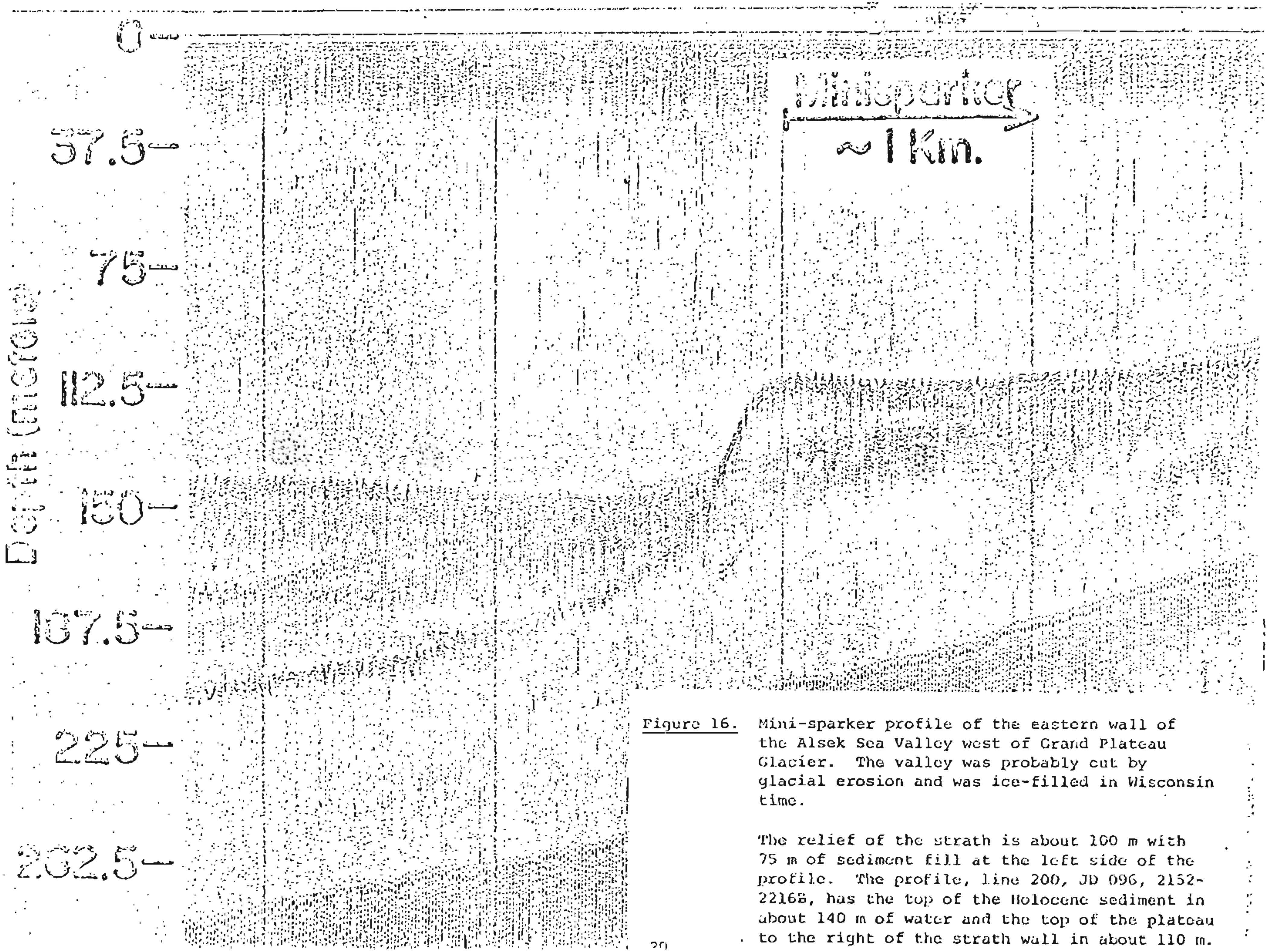


Figure 16. Mini-sparker profile of the eastern wall of the Alsek Sea Valley west of Grand Plateau Glacier. The valley was probably cut by glacial erosion and was ice-filled in Wisconsin time.

The relief of the strath is about 100 m with 75 m of sediment fill at the left side of the profile. The profile, line 200, JD 096, 2152-2216B, has the top of the Holocene sediment in about 140 m of water and the top of the plateau to the right of the strath wall in about 110 m.

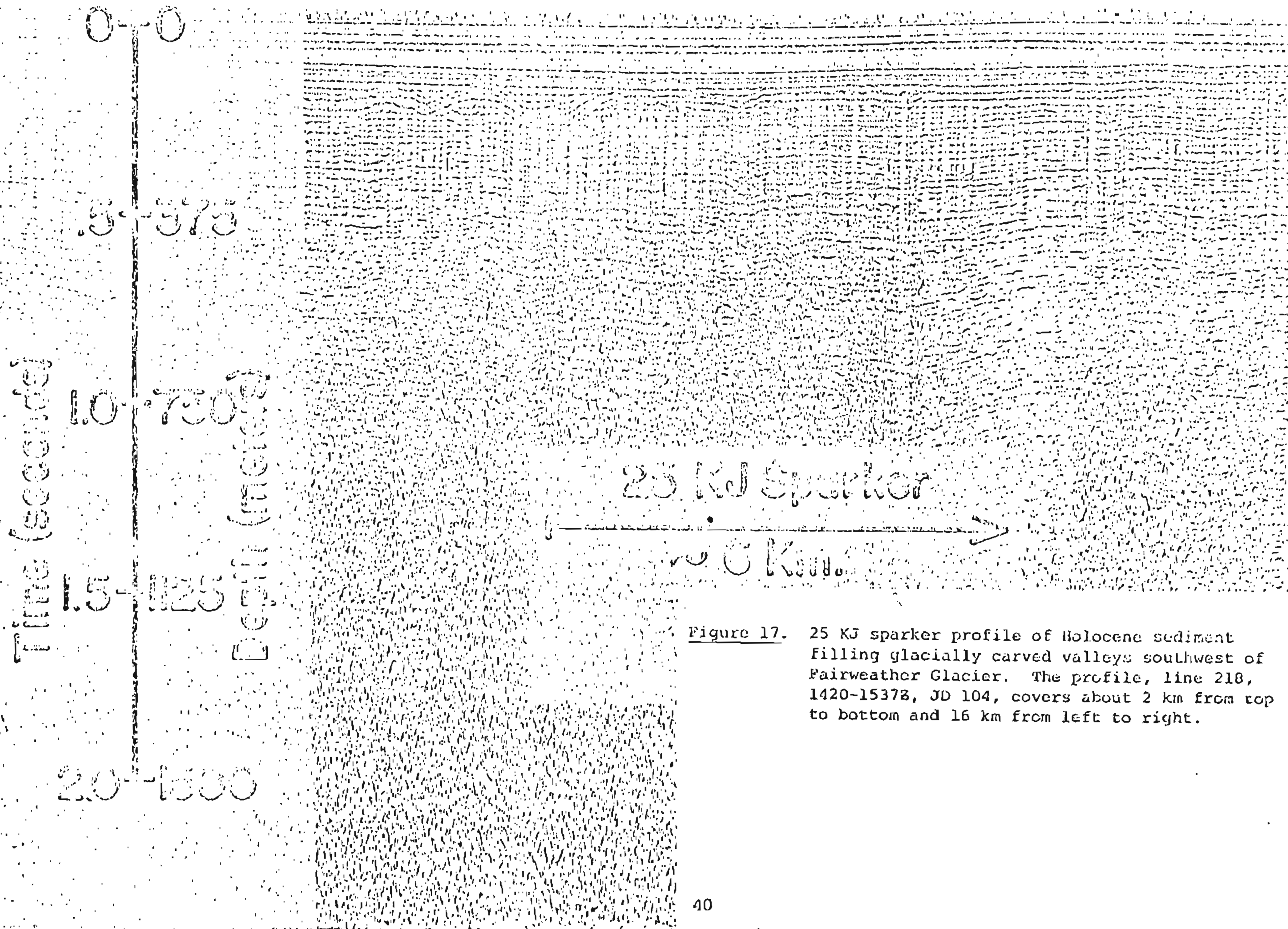


Figure 17. 25 KJ sparker profile of Holocene sediment filling glacially carved valleys southwest of Fairweather Glacier. The profile, line 218, 1420-1537Z, JD 104, covers about 2 km from top to bottom and 16 km from left to right.

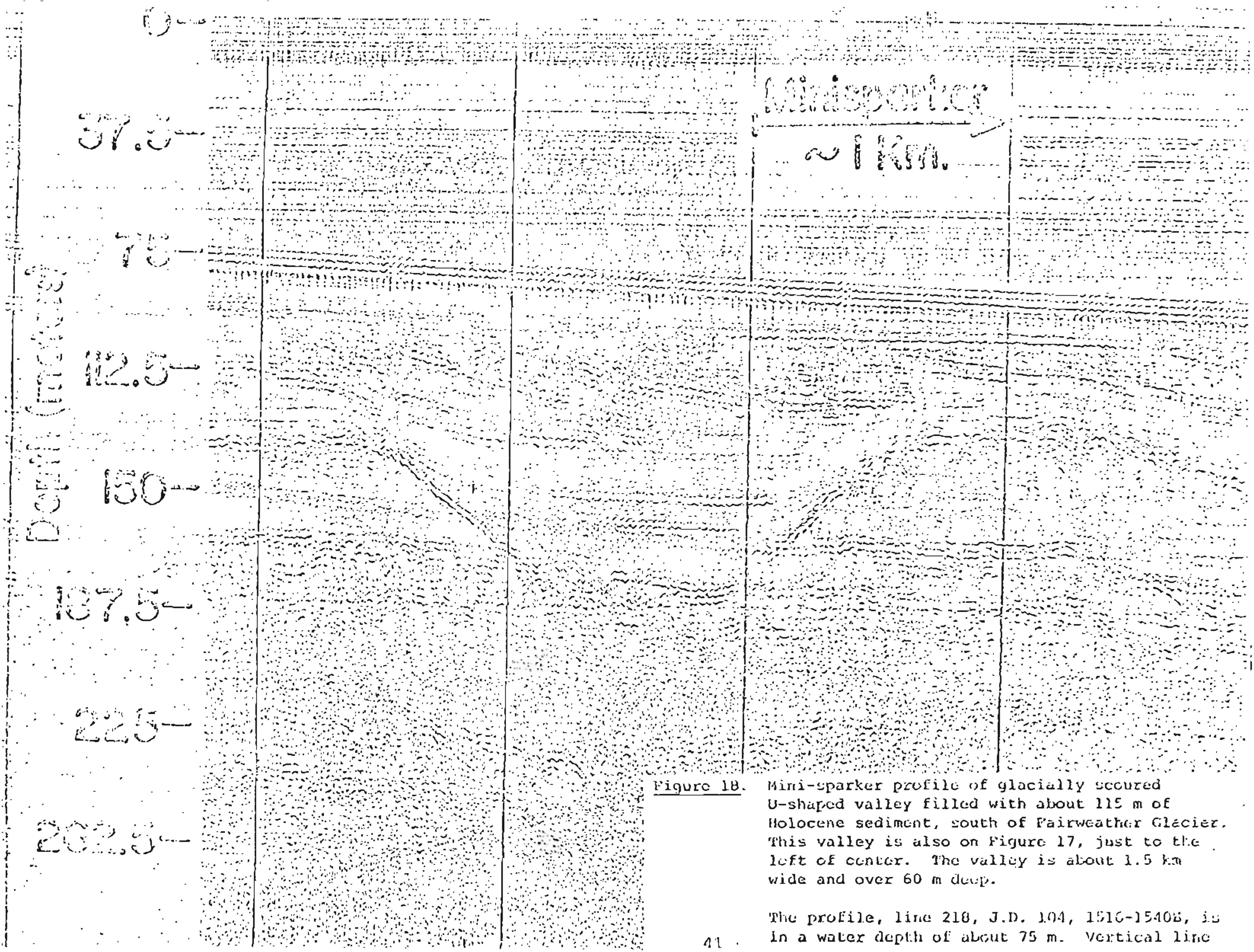


Figure 18. Mini-sparker profile of glacially scoured U-shaped valley filled with about 115 m of Holocene sediment, south of Fairweather Glacier. This valley is also on Figure 17, just to the left of center. The valley is about 1.5 km wide and over 60 m deep.

The profile, line 218, J.D. 104, 1516-1540B, is in a water depth of about 75 m. Vertical line

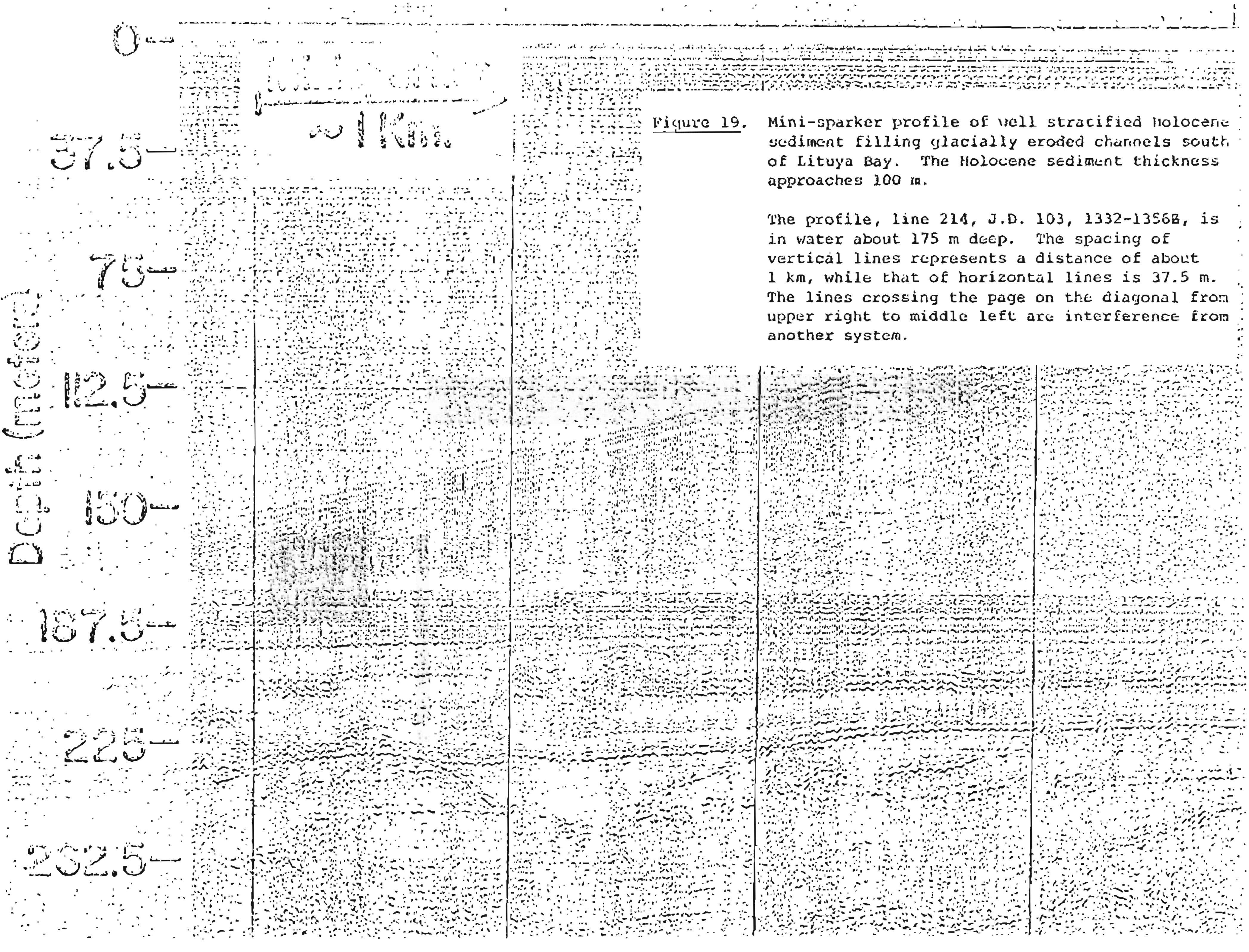


Figure 19. Mini-sparker profile of well stratified Holocene sediment filling glacially eroded channels south of Lituya Bay. The Holocene sediment thickness approaches 100 m.

The profile, line 214, J.D. 103, 1332-1356Z, is in water about 175 m deep. The spacing of vertical lines represents a distance of about 1 km, while that of horizontal lines is 37.5 m. The lines crossing the page on the diagonal from upper right to middle left are interference from another system.