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**1986 Great Lakes Seismic Refraction
Survey (GLIMPCE): Line A -
Refraction Mode**

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1986 GREAT LAKES SEISMIC REFRACTION SURVEY:

LINE A - REFRACTION MODE

by/par

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ABSTRACT

In the fall of 1986, the Geological Survey of Canada (GSC), the United States Geological Survey (USGS), two Canadian universities -- University of Western Ontario and University of Saskatchewan, and four American universities -- Northern Illinois University, Southern Illinois University, University of Wisconsin-Madison and University of Wisconsin-Oshkosh participated in a major deep seismic experiment in Lake Superior under the GLIMPCE (Great Lakes International Multidisciplinary Program on Crustal Evolution) umbrella. This Open-File Report presents the seismic sections for line A, which was shot specifically for refraction recording. The main target for study by this line was the Mid-continent Rift System. All recording stations, 31 in total (26 land stations and 5 OBSs), recorded energy from shots fired every two minutes (333 m spacing) by a tuned airgun array towed by a contracted ship along line A in Lake Superior. These data are the densest such data ever recorded in the continental North America over such distances. It is also unique since coincident seismic reflection and refraction are available.

RESUME

Pendant l'automne 1986, la Commission géologique du Canada (CGC), le United States Geological Survey (USGS), deux universités canadiennes -- université de Western Ontario et université de la Saskatchewan, et quatre universités américaines -- Université de Northern Illinois, université de Southern Illinois, Université du Wisconsin-Madison et université du Wisconsin-Oshkosh ont participé à un levé de sismique profonde dans la région du lac Supérieur, levé effectué sous les auspices de GLIMPCE (Great Lakes International Multidisciplinary Program on Crustal Evolution). Dans ce dossier public, nous présentons les profils de sismique réfraction enregistrés pour la ligne A lorsque celle-ci fut effectuée spécialement pour la sismique réfraction. La cible principale de cette ligne était le système du rift mid-continental. Toutes les stations, 31 au total, (26 stations terrestres et 5 OBSs) enregistrèrent l'énergie en provenance de tirs effectués toutes les deux minutes (espacement d'environ 333 m) par un réseau de canons à air tiré le long du profil A par un vaisseau sous contrat. Ces données sont les plus denses jamais enregistrées en Amérique du Nord sur de telles distances. C'est aussi un ensemble de données unique puisque sismique réflexion et sismique réfraction coïncidentes sont disponibles.

INTRODUCTION

The Great Lakes International Multidisciplinary Program on Crustal Evolution (GLIMPCE) was initiated at the end of 1985. It is a consortium of Canadian and U.S. government, academic and industry scientists interested in the evolution of the midcontinental region of North America. Its main purpose is to conduct and coordinate future geoscientific research in the Great Lakes region. In the fall of 1986 (August and September), it conducted its first major experiment via a contract to Geophoto Services Ltd. (GSI, Calgary). The seismic vessel M/V Fred J. Agnich recorded 8 lines of multichannel seismic reflection data whilst 8 government and academic groups recorded seismic wide-angle reflection/refraction data at various land stations and OBSs (Figure 1). This experiment was jointly funded by the Geological Survey of Canada through its contribution to the Canadian LITHOPROBE program and by the United States Geological Survey. The main targets of this survey were: (i) the Mid-Continent (Keweenaw) Rift System (MRS) and Hemlo and Michipicoten granite/greenstone belts in Lake Superior, (ii) the Niagara Fault and the Penokean foldbelt in Lake Michigan and (iii) the Grenville Front and Huronian foldbelt in Lake Huron.

The purpose of this open-file report is to present the seismic refraction data for Line A in Lake Superior and make them available

to the scientific community in such a way that independent interpretations of the data can be undertaken. Most details regarding the survey will not be repeated here as they are given in Hutchinson et al (1988). Coordination between the shooting vessel and the land recording crews was achieved through a coordinator located in Sault Ste Marie for all data in Lake Superior, and in Ottawa for all data in Lake Huron.

ENERGY SOURCE

The source of energy was provided by a tuned airgun array with an operating volume of 127.49 litres. The array was towed at a depth of $12 \text{ m} \pm 1 \text{ m}$ in Lake Superior. During the shooting of line A in refraction mode, this array was detonated every 2 minutes providing an average spacing between shots of about 333 m. Its computed signature is given in figure 2. All shot information relevant to this report is given in appendix A.

LINE RECORDING

During the recording of profile A in refraction mode, 8 sites were occupied on the north shore of Lake Superior (7 by the GSC and one by the University of Saskatchewan), 8 sites were occupied on the south shore of Lake Superior (5 by the University of Wisconsin-Madison, 2 by the Northern Illinois University and one by the University of Wisconsin-Oshkosh), 4 sites were occupied on Keweenaw Peninsula (3 by the University of Wisconsin-Madison and

one by the Southern Illinois University) and 5 USGS OBSs were deployed along the profile. In addition, fan recording was performed on Michipicoten Island where one site was run by the University of Western Ontario, on Isle Royale Island where two sites were occupied by the University of Wisconsin-Madison, on the northwestern shore of Lake Superior where one site was occupied by the University of Wisconsin-Madison and on the southwestern shore of Lake Superior where two sites were occupied by the University of Wisconsin-Madison. In all, 31 sites were occupied (figure 3). Details about the recording for each institution can be found in Hutchinson et al. (1988).

PLOTTING PARAMETERS

Of the 31 sites occupied, 29 provided useful data and the various seismic sections are given in figures 5 to 33 (all in back pocket). All sections have been plotted with a reduction velocity of 6.5 km/s ($T-X/6.5$ km) and display 18 seconds of data starting at -2 s for the land data and 16 seconds starting at 0 s for the OBSs. The data have been bandpass filtered with a 5 to 24 Hz filter for which the response is given in figure 4. The geographic north is always to the left of the sections with the south to the right. Seismic sections are organized such as to present the on-line data from north to south first followed by the fan sections.

Each trace of the land data (figures 5 - 12 and 18 - 33) has been normalized to its maximum value. Fan profiles have been

plotted with the northern end (last shot) of the profile being the origin. All distances were then calculated with respect to this origin. In this manner, direct comparison between seismograms recorded at each site from a single shot can be accomplished.

The OBS data (figures 13 - 17) have had the same treatment as the land data with the exception that instead of being normalized, the amplitudes have been scaled by a factor equals to $X/10$, where X is the distance. The effect of such a scaling is to preserve relative amplitude differences.

For uniformity, and to take advantage of existing seismic processing packages, these data were put into a common SEG-Y format that was modified to accommodate the needs of the seismic refraction data. Copies of the digital data displayed in this report can be obtained at cost from:

Seismology and Electromagnetism
Continental Geoscience Division
Geological Survey of Canada
1, Observatory Crescent
Ottawa, Ontario
Canada
K1A 0Y3

ACKNOWLEDGEMENTS

The authors of this report are particularly in debt to all of the people (professionals and students) who spent long hours in the field in order to collect these data. A list of most of these people is given in Hutchinson et al. (1988) and will not be repeated. We would like to express special thanks to Tom J. Jefferson from the University of Wisconsin-Oshkosh and John T. Shay from Oregon State University who plotted the data. We thank John Clink (GSI) and the captain and crew of Fred J. Agnich for their cooperation during the experiment. We thank the captain and crew of the U.S. Coast Guard Katmai Bay for their help during the deployment and recovery of the USGS OBSS in Lake Superior. We also thank the Ontario Geological Survey for providing helicopter logistics on Mitchipicoten Island.

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in pocket

Fig. 33 Seismic section recorded at the University of Wisconsin-Madison site BF on the western end of Lake Superior.

in pocket

EXPÉRIENCE GLIMPCE EXPERIMENT
1986



Fig. 1 General survey map on simplified geology background.

Final Array Signature

Output wavelet at a sample rate of 4 ms

19.631	30.410	15.081	-20.763	-49.673	-52.222	-30.033	-2.204
11.304	9.347	6.163	9.402	13.494	13.138	10.828	10.067
10.028	8.911	7.440	6.929	6.556	4.610	1.113	-2.442
-4.856	-5.927	-6.715	-8.825	-12.239	-14.668	-13.819	-9.537
-3.692	1.347	4.298	5.522	6.105	6.623	6.899	6.519
5.311	3.570	1.919	0.871	0.505	0.454	0.139	-0.714
-1.700	-2.117	-1.771	-1.224	-1.242	-2.063	-3.190	-3.798
-3.377	-2.144	-0.828	-0.011	0.303	0.470	0.758	1.193
1.621	1.828	1.739	1.516	1.354	1.219	0.929	0.445
-0.031	-0.253	-0.155	0.084	0.163	-0.115	-0.683	-1.249
-1.520	-1.401	-1.014	-0.558	-0.162	0.148	0.379	0.516
0.563	0.589	0.658	0.726	0.675	0.469	0.217	0.073
0.072	0.110	0.066	-0.063	-0.177	-0.213	-0.223	-0.288
-0.395	-0.445	-0.378	-0.256	-0.191	-0.201	-0.205	-0.123
0.038	0.205	0.307	0.316	0.244	0.128	0.031	0.013
0.078	0.161	0.190	0.155	0.102	0.074	0.058	0.014

This table gives arbitrary amplitudes at a spacing of 4 ms and should be read from left to right.

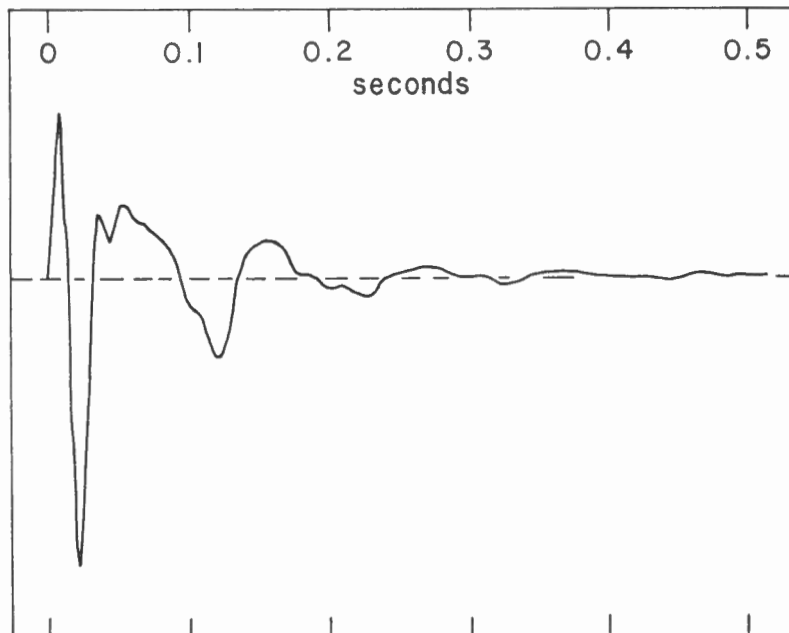


Fig. 2 Air gun array signature.

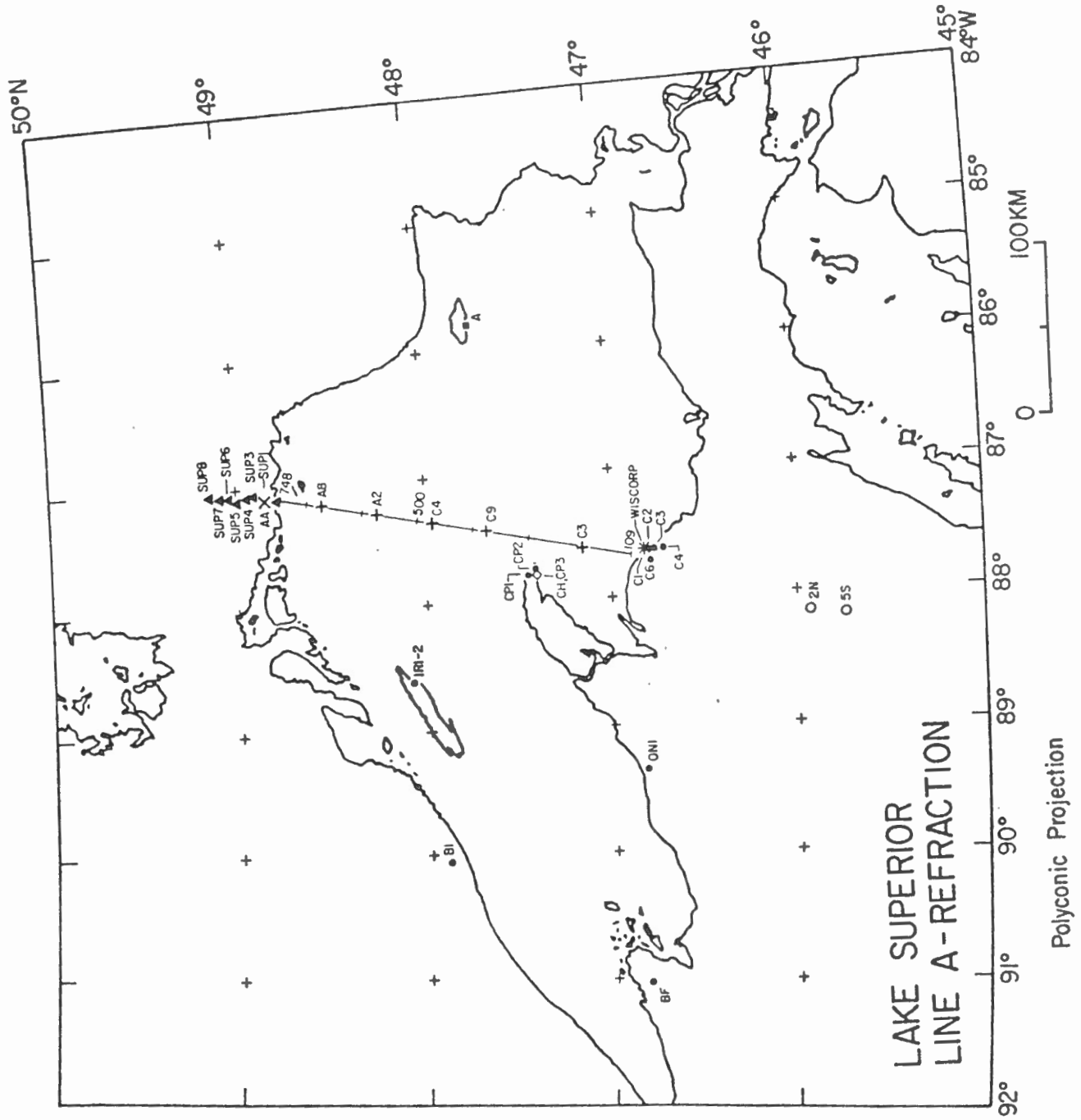
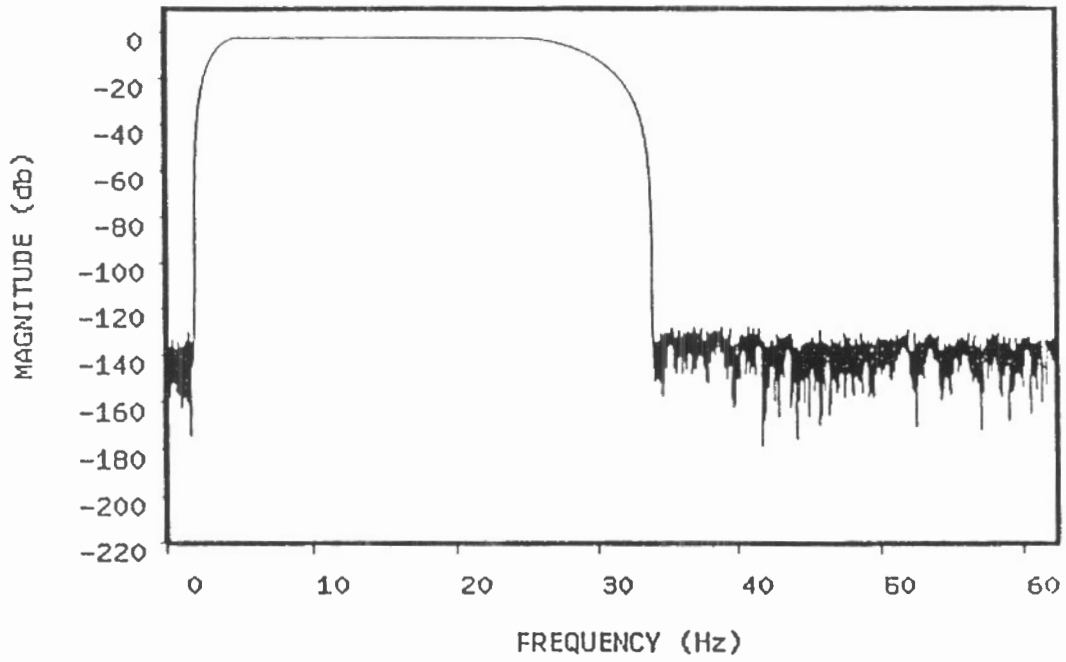


Fig. 3 Site location map for the recording of line A shot especially for the original refraction component of the survey.



Magnitude response of the 5-24 hz bandpass filter applied to the data before plotting.

Fig. 4 Filter response.

Appendix A

SHOT INFORMATION FOR LINE A

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
109	16: 0: 0.90796	46 52 54.0	87 40 25.4	30
110	16: 2: 0.90796	46 53 4.3	87 40 22.8	31
111	16: 4: 0.90796	46 53 14.9	87 40 19.6	30
112	16: 6: 0.90796	46 53 25.6	87 40 18.0	35
113	16: 8: 0.90796	46 53 36.3	87 40 16.4	44
114	16:10: 0.90796	46 53 47.0	87 40 13.7	43
115	16:12: 0.90796	46 53 57.5	87 40 11.4	43
116	16:14: 0.90796	46 54 8.5	87 40 8.7	45
117	16:16: 0.90796	46 54 19.2	87 40 5.4	48
118	16:18: 0.90796	46 54 29.7	87 40 2.3	61
119	16:20: 0.90796	46 54 40.7	87 39 59.5	63
120	16:22: 0.90796	46 54 51.4	87 39 56.8	67
121	16:24: 0.90796	46 55 2.2	87 39 54.0	67
122	16:26: 0.90796	46 55 13.2	87 39 51.1	80
123	16:28: 0.90796	46 55 23.9	87 39 48.1	81
124	16:30: 0.90796	46 55 34.6	87 39 45.1	91
125	16:32: 0.90796	46 55 45.4	87 39 42.1	95
126	16:34: 0.90796	46 55 56.1	87 39 39.0	97
127	16:36: 0.90796	46 56 6.8	87 39 36.0	101
128	16:38: 0.90796	46 56 17.5	87 39 33.1	107
129	16:40: 0.90796	46 56 28.5	87 39 30.0	115
130	16:42: 0.90796	46 56 39.2	87 39 27.3	125
131	16:44: 0.90796	46 56 50.0	87 39 24.4	133
132	16:46: 0.90796	46 57 1.0	87 39 21.7	119
133	16:48: 0.90796	46 57 11.5	87 39 19.4	110
134	16:50: 0.90796	46 57 21.8	87 39 16.2	109
135	16:52: 0.90796	46 57 32.1	87 39 12.7	106
136	16:54: 0.90796	46 57 42.5	87 39 9.8	122
137	16:56: 0.90796	46 57 53.2	87 39 6.4	115
138	16:58: 0.90796	46 58 3.7	87 39 3.1	108
139	17: 0: 0.90796	46 58 14.5	87 38 59.7	112
140	17: 2: 0.90796	46 58 25.6	87 38 55.8	108
141	17: 4: 0.90796	46 58 36.1	87 38 52.8	108
142	17: 6: 0.90796	46 58 46.8	87 38 49.6	110
143	17: 8: 0.90796	46 58 57.8	87 38 46.1	104
144	17:10: 0.90796	46 59 8.6	87 38 42.8	121
145	17:12: 0.90796	46 59 19.0	87 38 39.4	121
146	17:14: 0.90796	46 59 29.9	87 38 36.3	122
147	17:16: 0.90796	46 59 41.0	87 38 32.4	122
148	17:18: 0.90796	46 59 51.6	87 38 28.6	118
149	17:20: 0.90796	47 0 2.1	87 38 25.1	112
150	17:22: 0.90796	47 0 13.1	87 38 21.2	111
151	17:24: 0.90796	47 0 23.7	87 38 17.8	106
152	17:26: 0.90796	47 0 34.2	87 38 13.8	107
153	17:28: 0.90796	47 0 45.2	87 38 9.7	106
154	17:30: 0.90796	47 0 55.7	87 38 6.2	103

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
155	17:32: 0.90796	47 1 5.9	87 38 2.4	98
156	17:34: 0.90796	47 1 16.8	87 37 58.7	93
157	17:36: 0.90796	47 1 27.8	87 37 55.4	88
158	17:38: 0.90796	47 1 38.9	87 37 51.8	90
159	17:40: 0.90796	47 1 50.1	87 37 48.4	95
160	17:42: 0.90796	47 2 1.0	87 37 44.8	101
161	17:44: 0.90796	47 2 11.7	87 37 41.4	106
162	17:46: 0.90796	47 2 22.5	87 37 38.3	107
163	17:48: 0.90796	47 2 33.5	87 37 34.7	116
164	17:50: 0.90796	47 2 44.4	87 37 31.1	120
165	17:52: 0.90796	47 2 54.8	87 37 28.4	112
166	17:54: 0.90796	47 3 5.2	87 37 25.5	117
167	17:56: 0.90796	47 3 16.4	87 37 21.3	122
168	17:58: 0.90796	47 3 27.2	87 37 17.4	119
169	18: 0: 0.90796	47 3 37.7	87 37 14.0	114
170	18: 2: 0.90796	47 3 48.7	87 37 10.1	113
171	18: 4: 0.90796	47 3 59.5	87 37 6.1	115
172	18: 6: 0.90796	47 4 10.3	87 37 2.3	119
173	18: 8: 0.90796	47 4 21.3	87 36 58.3	119
174	18:10: 0.90796	47 4 32.2	87 36 54.3	125
175	18:12: 0.90796	47 4 43.0	87 36 49.9	127
176	18:14: 0.90796	47 4 53.7	87 36 45.3	125
177	18:16: 0.90796	47 5 4.4	87 36 40.9	124
178	18:18: 0.90796	47 5 15.2	87 36 36.2	124
179	18:20: 0.90796	47 5 25.9	87 36 31.9	123
180	18:22: 0.90796	47 5 37.0	87 36 28.6	122
181	18:24: 0.90796	47 5 48.2	87 36 25.3	121
182	18:26: 0.90796	47 5 59.2	87 36 21.8	124
183	18:28: 0.90796	47 6 10.4	87 36 18.5	120
184	18:30: 0.90796	47 6 21.6	87 36 14.8	126
185	18:32: 0.90796	47 6 32.7	87 36 11.4	126
186	18:34: 0.90796	47 6 43.7	87 36 7.7	130
187	18:36: 0.90796	47 6 54.7	87 36 3.1	126
188	18:38: 0.90796	47 7 5.7	87 35 58.4	128
189	18:40: 0.90796	47 7 16.6	87 35 53.8	136
190	18:42: 0.90796	47 7 27.6	87 35 49.2	130
191	18:44: 0.90796	47 7 38.5	87 35 44.4	135
192	18:46: 0.90796	47 7 49.6	87 35 39.9	125
193	18:48: 0.90796	47 8 0.8	87 35 36.9	132
194	18:50: 0.90796	47 8 12.0	87 35 34.4	119
195	18:52: 0.90796	47 8 23.5	87 35 31.5	120
196	18:54: 0.90796	47 8 34.9	87 35 29.0	123
197	18:56: 0.90796	47 8 46.2	87 35 26.2	121
198	18:58: 0.90796	47 8 57.4	87 35 23.4	119
199	19: 0: 0.90796	47 9 8.6	87 35 20.9	121
200	19: 2: 0.90796	47 9 19.9	87 35 18.4	123

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
201	19: 4: 0.90796	47 9 31.1	87 35 15.8	133
202	19: 6: 0.90796	47 9 42.2	87 35 13.4	112
203	19: 8: 0.90796	47 9 53.4	87 35 10.8	121
204	19:10: 0.90796	47 10 4.4	87 35 8.5	123
205	19:12: 0.90796	47 10 15.5	87 35 6.3	118
206	19:14: 0.90796	47 10 26.8	87 35 3.9	125
207	19:16: 0.90796	47 10 38.1	87 35 1.5	124
208	19:18: 0.90796	47 10 49.3	87 34 59.1	118
209	19:20: 0.90796	47 11 0.5	87 34 56.9	125
210	19:22: 0.90796	47 11 11.8	87 34 55.0	116
211	19:24: 0.90796	47 11 23.0	87 34 52.6	116
212	19:26: 0.90796	47 11 34.1	87 34 50.1	114
213	19:28: 0.90796	47 11 45.2	87 34 47.4	115
214	19:30: 0.90796	47 11 56.2	87 34 45.0	128
215	19:32: 0.90796	47 12 7.1	87 34 42.7	121
216	19:34: 0.90796	47 12 17.9	87 34 39.9	124
217	19:36: 0.90796	47 12 28.6	87 34 36.9	124
218	19:38: 0.90796	47 12 39.3	87 34 33.6	118
219	19:40: 0.90796	47 12 49.8	87 34 30.5	122
220	19:42: 0.90796	47 13 0.2	87 34 27.2	110
221	19:44: 0.90796	47 13 10.7	87 34 23.8	106
222	19:46: 0.90796	47 13 20.9	87 34 20.8	108
223	19:48: 0.90796	47 13 31.3	87 34 17.4	106
224	19:50: 0.90796	47 13 41.7	87 34 14.6	106
225	19:52: 0.90796	47 13 52.4	87 34 11.8	125
226	19:54: 0.90796	47 14 3.3	87 34 8.6	120
227	19:56: 0.90796	47 14 13.8	87 34 5.9	120
228	19:58: 0.90796	47 14 24.4	87 34 2.2	120
229	20: 0: 0.90796	47 14 34.5	87 34 1.3	120
230	20: 2: 0.90796	47 14 43.6	87 34 3.6	132
231	20: 4: 0.90796	47 14 54.0	87 34 2.0	127
232	20: 6: 0.90796	47 15 5.1	87 33 59.0	133
233	20: 8: 0.90796	47 15 15.8	87 33 57.1	135
234	20:10: 0.90796	47 15 26.8	87 33 54.4	130
235	20:12: 0.90796	47 15 36.9	87 33 52.1	139
236	20:14: 0.90796	47 15 47.0	87 33 49.7	139
237	20:16: 0.90796	47 15 58.0	87 33 47.0	138
238	20:18: 0.90796	47 16 8.7	87 33 44.8	142
239	20:20: 0.90796	47 16 19.6	87 33 42.1	144
240	20:22: 0.90796	47 16 30.6	87 33 39.5	146
241	20:24: 0.90796	47 16 41.1	87 33 36.2	144
242	20:26: 0.90796	47 16 51.6	87 33 32.8	148
243	20:28: 0.90796	47 17 2.1	87 33 29.8	149
244	20:30: 0.90796	47 17 12.7	87 33 26.1	138
245	20:32: 0.90796	47 17 23.5	87 33 21.9	135
246	20:34: 0.90796	47 17 34.5	87 33 16.6	137

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
247	20:36: 0.90796	47 17 45.4	87 33 12.4	140
248	20:38: 0.90796	47 17 56.1	87 33 7.1	141
249	20:40: 0.90796	47 18 6.3	87 32 56.3	138
250	20:42: 0.90796	47 18 16.3	87 32 46.8	139
251	20:44: 0.90796	47 18 27.2	87 32 42.3	139
252	20:46: 0.90796	47 18 38.2	87 32 39.1	140
253	20:48: 0.90796	47 18 49.1	87 32 35.5	135
254	20:50: 0.90796	47 19 0.0	87 32 32.5	140
255	20:52: 0.90796	47 19 9.9	87 32 34.0	138
256	20:54: 0.90796	47 19 19.9	87 32 35.6	139
257	20:56: 0.90796	47 19 30.9	87 32 32.6	137
258	20:58: 0.90796	47 19 41.9	87 32 29.2	140
259	21: 0: 0.90796	47 19 52.8	87 32 26.0	145
260	21: 2: 0.90796	47 20 3.8	87 32 22.1	137
261	21: 4: 0.90796	47 20 14.7	87 32 18.7	140
262	21: 6: 0.90796	47 20 25.5	87 32 15.2	141
263	21: 8: 0.90796	47 20 36.3	87 32 11.6	141
264	21:10: 0.90796	47 20 47.1	87 32 8.1	140
265	21:12: 0.90796	47 20 58.0	87 32 4.6	139
266	21:14: 0.90796	47 21 8.7	87 32 1.5	141
267	21:16: 0.90796	47 21 19.5	87 31 58.5	138
268	21:18: 0.90796	47 21 30.5	87 31 55.1	144
269	21:20: 0.90796	47 21 41.4	87 31 51.8	138
270	21:22: 0.90796	47 21 52.5	87 31 48.6	143
271	21:24: 0.90796	47 22 3.5	87 31 45.6	142
272	21:26: 0.90796	47 22 14.4	87 31 42.6	142
273	21:28: 0.90796	47 22 25.2	87 31 39.8	142
274	21:30: 0.90796	47 22 36.0	87 31 36.9	151
275	21:32: 0.90796	47 22 46.9	87 31 33.7	149
276	21:34: 0.90796	47 22 57.6	87 31 30.5	147
277	21:36: 0.90796	47 23 8.1	87 31 27.3	142
278	21:38: 0.90796	47 23 18.7	87 31 24.2	143
279	21:40: 0.90796	47 23 29.3	87 31 21.4	147
280	21:42: 0.90796	47 23 40.0	87 31 18.7	147
281	21:44: 0.90796	47 23 50.5	87 31 15.9	144
282	21:46: 0.90796	47 24 1.0	87 31 13.1	143
283	21:48: 0.90796	47 24 11.2	87 31 9.8	138
284	21:50: 0.90796	47 24 21.3	87 31 5.9	133
285	21:52: 0.90796	47 24 31.3	87 31 1.5	136
286	21:54: 0.90796	47 24 41.2	87 30 57.0	134
287	21:56: 0.90796	47 24 51.1	87 30 52.5	125
288	21:58: 0.90796	47 25 0.9	87 30 48.1	131
289	22: 0: 0.90796	47 25 10.5	87 30 44.0	133
290	22: 2: 0.90796	47 25 20.3	87 30 40.9	124
291	22: 4: 0.90796	47 25 29.8	87 30 38.3	123
292	22: 6: 0.90796	47 25 39.8	87 30 35.2	122

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
293	22: 8: 0.90796	47 25 50.0	87 30 32.5	120
294	22:10: 0.90796	47 25 59.8	87 30 30.3	119
295	22:12: 0.90796	47 26 9.7	87 30 27.5	131
296	22:14: 0.90796	47 26 19.8	87 30 24.0	140
297	22:16: 0.90796	47 26 29.9	87 30 20.5	136
298	22:18: 0.90796	47 26 40.1	87 30 17.3	137
299	22:20: 0.90796	47 26 50.3	87 30 13.9	139
300	22:22: 0.90796	47 27 0.5	87 30 10.9	135
301	22:24: 0.90796	47 27 10.8	87 30 8.8	130
302	22:26: 0.90796	47 27 21.3	87 30 7.1	153
303	22:28: 0.90796	47 27 32.0	87 30 5.7	142
304	22:30: 0.90796	47 27 42.7	87 30 4.2	143
305	22:32: 0.90796	47 27 53.4	87 30 1.8	155
306	22:34: 0.90796	47 28 3.9	87 29 59.6	149
307	22:36: 0.90796	47 28 14.6	87 29 56.8	144
308	22:38: 0.90796	47 28 25.3	87 29 53.3	140
309	22:40: 0.90796	47 28 35.8	87 29 50.4	139
310	22:42: 0.90796	47 28 46.6	87 29 47.1	153
311	22:44: 0.90796	47 28 57.5	87 29 43.8	159
312	22:46: 0.90796	47 29 7.8	87 29 40.7	163
313	22:48: 0.90796	47 29 18.0	87 29 37.1	156
314	22:50: 0.90796	47 29 28.5	87 29 33.9	160
315	22:52: 0.90796	47 29 39.0	87 29 31.0	156
316	22:54: 0.90796	47 29 49.5	87 29 27.9	160
317	22:56: 0.90796	47 29 59.8	87 29 25.0	168
318	22:58: 0.90796	47 30 10.1	87 29 22.2	170
319	23: 0: 0.90796	47 30 20.5	87 29 19.2	158
320	23: 2: 0.90796	47 30 30.8	87 29 16.5	153
321	23: 4: 0.90796	47 30 41.4	87 29 13.4	150
322	23: 6: 0.90796	47 30 52.0	87 29 10.6	147
323	23: 8: 0.90796	47 31 2.5	87 29 8.4	156
324	23:10: 0.90796	47 31 13.1	87 29 5.4	155
325	23:12: 0.90796	47 31 23.7	87 29 2.4	158
326	23:14: 0.90796	47 31 34.2	87 28 59.6	160
327	23:16: 0.90796	47 31 44.9	87 28 56.5	161
328	23:18: 0.90796	47 31 55.6	87 28 53.4	156
329	23:20: 0.90796	47 32 6.4	87 28 50.0	159
330	23:22: 0.90796	47 32 17.1	87 28 47.3	168
331	23:24: 0.90796	47 32 27.5	87 28 44.3	182
332	23:26: 0.90796	47 32 38.2	87 28 40.2	163
333	23:28: 0.90796	47 32 48.7	87 28 37.0	164
334	23:30: 0.90796	47 32 59.1	87 28 34.1	166
335	23:32: 0.90796	47 33 9.7	87 28 30.1	163
336	23:34: 0.90796	47 33 20.3	87 28 26.1	158
337	23:36: 0.90796	47 33 30.8	87 28 22.3	160
338	23:38: 0.90796	47 33 41.5	87 28 18.4	157

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
339	23:40: 0.90796	47 33 52.0	87 28 14.3	153
340	23:42: 0.90796	47 34 2.6	87 28 10.2	153
341	23:44: 0.90796	47 34 13.3	87 28 6.0	149
342	23:46: 0.90796	47 34 23.7	87 28 2.1	149
343	23:48: 0.90796	47 34 34.2	87 27 58.4	150
344	23:50: 0.90796	47 34 44.8	87 27 53.8	147
345	23:52: 0.90796	47 34 55.3	87 27 49.1	146
346	23:54: 0.90796	47 35 5.7	87 27 44.6	148
347	23:56: 0.90796	47 35 16.1	87 27 40.3	145
348	23:58: 0.90796	47 35 26.5	87 27 36.8	145
349	0: 0: 0.90796	47 35 37.0	87 27 32.3	143
350	0: 2: 0.90796	47 35 47.4	87 27 27.5	156
351	0: 4: 0.90796	47 35 57.9	87 27 23.1	157
352	0: 6: 0.90796	47 36 8.4	87 27 18.4	150
353	0: 8: 0.90796	47 36 18.9	87 27 13.6	150
354	0:10: 0.90796	47 36 29.4	87 27 8.9	150
355	0:12: 0.90796	47 36 39.9	87 27 4.0	153
356	0:14: 0.90796	47 36 50.4	87 26 59.3	150
357	0:16: 0.90796	47 37 1.0	87 26 54.6	148
358	0:18: 0.90796	47 37 11.6	87 26 50.1	153
359	0:20: 0.90796	47 37 22.1	87 26 45.7	151
360	0:22: 0.90796	47 37 32.6	87 26 41.3	151
361	0:24: 0.90796	47 37 43.1	87 26 36.4	157
362	0:26: 0.90796	47 37 53.4	87 26 32.3	160
363	0:28: 0.90796	47 38 4.2	87 26 30.2	157
364	0:30: 0.90796	47 38 14.9	87 26 28.8	154
365	0:32: 0.90796	47 38 25.6	87 26 26.9	153
366	0:34: 0.90796	47 38 36.4	87 26 24.9	155
367	0:36: 0.90796	47 38 47.0	87 26 23.9	155
368	0:38: 0.90796	47 38 57.7	87 26 23.0	160
369	0:40: 0.90796	47 39 8.3	87 26 22.0	164
370	0:42: 0.90796	47 39 19.0	87 26 21.0	162
371	0:44: 0.90796	47 39 29.9	87 26 19.3	169
372	0:46: 0.90796	47 39 40.7	87 26 18.0	172
373	0:48: 0.90796	47 39 51.6	87 26 17.0	172
374	0:50: 0.90796	47 40 2.5	87 26 15.4	176
375	0:52: 0.90796	47 40 13.3	87 26 14.3	177
376	0:54: 0.90796	47 40 24.0	87 26 13.0	180
377	0:56: 0.90796	47 40 34.9	87 26 10.7	171
378	0:58: 0.90796	47 40 45.5	87 26 8.4	174
379	1: 0: 0.90796	47 40 56.3	87 26 5.7	168
380	1: 2: 0.90796	47 41 7.4	87 26 2.6	162
381	1: 4: 0.90796	47 41 18.5	87 25 59.4	157
382	1: 6: 0.90796	47 41 29.6	87 25 55.9	161
383	1: 8: 0.90796	47 41 40.6	87 25 52.7	165
384	1:10: 0.90796	47 41 51.7	87 25 49.3	166

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
385	1:12: 0.90796	47 42 2.8	87 25 46.0	161
386	1:14: 0.90796	47 42 13.8	87 25 43.3	159
387	1:16: 0.90796	47 42 24.6	87 25 39.6	162
388	1:18: 0.90796	47 42 35.4	87 25 36.2	164
389	1:20: 0.90796	47 42 46.2	87 25 33.3	164
390	1:22: 0.90796	47 42 56.8	87 25 29.8	160
391	1:24: 0.90796	47 43 7.6	87 25 26.9	165
392	1:26: 0.90796	47 43 18.5	87 25 24.1	164
393	1:28: 0.90796	47 43 29.2	87 25 21.9	164
394	1:30: 0.90796	47 43 39.7	87 25 20.8	164
395	1:32: 0.90796	47 43 50.4	87 25 18.6	163
396	1:34: 0.90796	47 44 1.4	87 25 15.4	164
397	1:36: 0.90796	47 44 12.2	87 25 11.8	159
398	1:38: 0.90796	47 44 23.0	87 25 9.2	154
399	1:40: 0.90796	47 44 34.0	87 25 6.7	143
400	1:42: 0.90796	47 44 45.1	87 25 2.9	142
401	1:44: 0.90796	47 44 56.3	87 25 0.6	145
402	1:46: 0.90796	47 45 7.5	87 24 56.7	141
403	1:48: 0.90796	47 45 18.2	87 24 49.8	142
404	1:50: 0.90796	47 45 29.1	87 24 45.8	145
405	1:52: 0.90796	47 45 40.1	87 24 42.4	143
406	1:54: 0.90796	47 45 50.7	87 24 37.4	144
407	1:56: 0.90796	47 46 1.4	87 24 33.8	139
408	1:58: 0.90796	47 46 12.1	87 24 30.3	140
409	2: 0: 0.90796	47 46 22.9	87 24 26.6	140
410	2: 2: 0.90796	47 46 33.7	87 24 23.3	136
411	2: 4: 0.90796	47 46 44.6	87 24 19.8	140
412	2: 6: 0.90796	47 46 55.5	87 24 16.4	135
413	2: 8: 0.90796	47 47 6.2	87 24 11.9	135
414	2:10: 0.90796	47 47 16.8	87 24 7.0	132
415	2:12: 0.90796	47 47 27.5	87 24 2.7	130
416	2:14: 0.90796	47 47 38.2	87 23 57.8	137
417	2:16: 0.90796	47 47 48.9	87 23 53.2	132
418	2:18: 0.90796	47 47 59.6	87 23 48.7	121
419	2:20: 0.90796	47 48 10.3	87 23 43.7	121
420	2:22: 0.90796	47 48 20.9	87 23 39.6	131
421	2:24: 0.90796	47 48 31.6	87 23 34.2	132
422	2:26: 0.90796	47 48 42.3	87 23 28.2	133
423	2:28: 0.90796	47 48 52.9	87 23 24.6	133
424	2:30: 0.90796	47 49 3.7	87 23 21.7	133
425	2:32: 0.90796	47 49 14.4	87 23 19.2	133
426	2:34: 0.90796	47 49 25.0	87 23 16.6	135
427	2:36: 0.90796	47 49 35.7	87 23 13.6	132
428	2:38: 0.90796	47 49 46.3	87 23 10.8	132
429	2:40: 0.90796	47 49 57.0	87 23 7.9	135
430	2:42: 0.90796	47 50 7.7	87 23 5.1	134

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
431	2:44: 0.90796	47 50 18.4	87 23 2.1	134
432	2:46: 0.90796	47 50 28.9	87 22 59.0	134
433	2:48: 0.90796	47 50 39.4	87 22 56.8	133
434	2:50: 0.90796	47 50 49.9	87 22 54.2	136
435	2:52: 0.90796	47 51 0.4	87 22 51.5	137
436	2:54: 0.90796	47 51 11.0	87 22 48.8	137
437	2:56: 0.90796	47 51 21.7	87 22 45.4	136
438	2:58: 0.90796	47 51 32.1	87 22 42.3	134
439	3: 0: 0.90796	47 51 42.6	87 22 39.5	133
440	3: 2: 0.90796	47 51 53.2	87 22 36.5	132
441	3: 4: 0.90796	47 52 3.7	87 22 33.5	131
442	3: 6: 0.90796	47 52 14.3	87 22 30.5	133
443	3: 8: 0.90796	47 52 24.9	87 22 27.6	135
444	3:10: 0.90796	47 52 35.3	87 22 24.5	139
445	3:12: 0.90796	47 52 45.9	87 22 21.8	142
446	3:14: 0.90796	47 52 56.7	87 22 18.6	144
447	3:16: 0.90796	47 53 7.1	87 22 14.8	145
448	3:18: 0.90796	47 53 17.5	87 22 11.8	146
449	3:20: 0.90796	47 53 28.1	87 22 9.1	149
450	3:22: 0.90796	47 53 38.5	87 22 6.3	153
451	3:24: 0.90796	47 53 49.1	87 22 3.3	157
452	3:26: 0.90796	47 53 59.6	87 22 0.7	162
453	3:28: 0.90796	47 54 10.1	87 21 58.7	167
454	3:30: 0.90796	47 54 21.0	87 21 55.9	176
455	3:32: 0.90796	47 54 31.5	87 21 52.8	179
456	3:34: 0.90796	47 54 42.1	87 21 49.5	184
457	3:36: 0.90796	47 54 52.6	87 21 46.6	185
458	3:38: 0.90796	47 55 2.6	87 21 45.4	186
459	3:40: 0.90796	47 55 13.0	87 21 42.8	189
460	3:42: 0.90796	47 55 23.6	87 21 39.3	184
461	3:44: 0.90796	47 55 33.8	87 21 36.9	189
462	3:46: 0.90796	47 55 44.2	87 21 34.2	196
463	3:48: 0.90796	47 55 54.9	87 21 31.9	205
464	3:50: 0.90796	47 56 5.3	87 21 29.3	216
465	3:52: 0.90796	47 56 15.5	87 21 26.3	217
466	3:54: 0.90796	47 56 25.8	87 21 23.6	215
467	3:56: 0.90796	47 56 36.3	87 21 20.6	221
468	3:58: 0.90796	47 56 46.5	87 21 18.0	219
469	4: 0: 0.90796	47 56 56.5	87 21 16.3	220
470	4: 2: 0.90796	47 57 6.5	87 21 13.5	213
471	4: 4: 0.90796	47 57 16.7	87 21 10.4	215
472	4: 6: 0.90796	47 57 27.0	87 21 8.0	219
473	4: 8: 0.90796	47 57 36.9	87 21 5.1	216
474	4:10: 0.90796	47 57 46.9	87 21 2.3	220
475	4:12: 0.90796	47 57 57.2	87 20 59.9	222
476	4:14: 0.90796	47 58 7.4	87 20 56.4	220

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
477	4:16: 0.90796	47 58 17.6	87 20 53.2	228
478	4:18: 0.90796	47 58 28.0	87 20 50.4	230
479	4:20: 0.90796	47 58 38.3	87 20 47.2	228
480	4:22: 0.90796	47 58 48.6	87 20 44.7	229
481	4:24: 0.90796	47 58 59.2	87 20 40.9	235
482	4:26: 0.90796	47 59 9.5	87 20 37.5	251
483	4:28: 0.90796	47 59 19.7	87 20 34.7	244
484	4:30: 0.90796	47 59 30.2	87 20 30.0	230
485	4:32: 0.90796	47 59 40.4	87 20 27.7	250
486	4:34: 0.90796	47 59 50.9	87 20 25.0	257
487	4:36: 0.90796	48 0 2.0	87 20 18.4	260
488	4:38: 0.90796	48 0 12.4	87 20 15.4	256
489	4:40: 0.90796	48 0 23.0	87 20 13.9	252
490	4:42: 0.90796	48 0 35.0	87 20 9.9	251
491	4:44: 0.90796	48 0 46.2	87 20 7.4	256
492	4:46: 0.90796	48 0 56.6	87 20 4.9	254
493	4:48: 0.90796	48 1 7.2	87 20 2.0	245
494	4:50: 0.90796	48 1 17.6	87 20 0.0	242
495	4:52: 0.90796	48 1 28.1	87 19 57.2	241
496	4:54: 0.90796	48 1 38.6	87 19 54.4	237
497	4:56: 0.90796	48 1 48.7	87 19 52.0	230
498	4:58: 0.90796	48 1 59.1	87 19 48.9	236
499	5: 0: 0.90796	48 2 9.6	87 19 45.9	239
500	5: 2: 0.90796	48 2 19.9	87 19 43.5	230
501	5: 4: 0.90796	48 2 30.1	87 19 40.9	221
502	5: 6: 0.90796	48 2 40.5	87 19 38.5	217
503	5: 8: 0.90796	48 2 50.9	87 19 35.8	218
504	5:10: 0.90796	48 3 1.1	87 19 33.0	217
505	5:12: 0.90796	48 3 11.2	87 19 30.7	220
506	5:14: 0.90796	48 3 21.7	87 19 27.5	193
507	5:16: 0.90796	48 3 31.9	87 19 24.3	144
508	5:18: 0.90796	48 3 41.5	87 19 21.4	205
509	5:20: 0.90796	48 3 51.0	87 19 18.4	250
510	5:22: 0.90796	48 4 0.6	87 19 15.5	273
511	5:24: 0.90796	48 4 10.2	87 19 12.4	274
512	5:26: 0.90796	48 4 19.6	87 19 9.5	271
513	5:28: 0.90796	48 4 29.3	87 19 6.4	281
514	5:30: 0.90796	48 4 39.4	87 19 2.5	284
515	5:32: 0.90796	48 4 49.8	87 18 58.7	275
516	5:34: 0.90796	48 5 0.1	87 18 54.6	270
517	5:36: 0.90796	48 5 10.1	87 18 51.4	263
518	5:38: 0.90796	48 5 20.4	87 18 48.7	285
519	5:40: 0.90796	48 5 31.0	87 18 44.9	284
520	5:42: 0.90796	48 5 41.4	87 18 41.0	282
521	5:44: 0.90796	48 5 52.0	87 18 36.8	283
522	5:46: 0.90796	48 6 2.8	87 18 32.3	276

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
523	5:48: 0.90796	48 6 13.5	87 18 28.0	283
524	5:50: 0.90796	48 6 24.2	87 18 23.7	282
525	5:52: 0.90796	48 6 34.9	87 18 19.5	287
526	5:54: 0.90796	48 6 45.6	87 18 15.0	278
527	5:56: 0.90796	48 6 56.3	87 18 10.9	232
528	5:58: 0.90796	48 7 7.1	87 18 6.3	210
529	6: 0: 0.90796	48 7 17.7	87 18 2.2	229
530	6: 2: 0.90796	48 7 28.4	87 17 59.8	221
531	6: 4: 0.90796	48 7 39.2	87 17 57.5	215
532	6: 6: 0.90796	48 7 49.7	87 17 55.1	224
533	6: 8: 0.90796	48 8 0.5	87 17 53.0	209
534	6:10: 0.90796	48 8 11.4	87 17 50.7	206
535	6:12: 0.90796	48 8 22.2	87 17 48.4	207
536	6:14: 0.90796	48 8 33.1	87 17 45.8	208
537	6:16: 0.90796	48 8 43.6	87 17 42.3	216
538	6:18: 0.90796	48 8 54.3	87 17 38.9	216
539	6:20: 0.90796	48 9 5.1	87 17 36.1	216
540	6:22: 0.90796	48 9 15.4	87 17 33.2	223
541	6:24: 0.90796	48 9 25.9	87 17 30.2	224
542	6:26: 0.90796	48 9 36.8	87 17 27.7	224
543	6:28: 0.90796	48 9 47.3	87 17 25.1	226
544	6:30: 0.90796	48 9 58.0	87 17 21.5	223
545	6:32: 0.90796	48 10 8.8	87 17 17.6	221
546	6:34: 0.90796	48 10 19.4	87 17 14.4	230
547	6:36: 0.90796	48 10 30.4	87 17 11.0	228
548	6:38: 0.90796	48 10 41.7	87 17 7.5	227
549	6:40: 0.90796	48 10 52.9	87 17 4.5	224
550	6:42: 0.90796	48 11 4.1	87 17 1.7	230
551	6:44: 0.90796	48 11 15.3	87 16 58.4	227
552	6:46: 0.90796	48 11 26.5	87 16 55.6	225
553	6:48: 0.90796	48 11 37.3	87 16 52.2	227
554	6:50: 0.90796	48 11 48.2	87 16 48.2	228
555	6:52: 0.90796	48 11 59.1	87 16 45.4	233
556	6:54: 0.90796	48 12 9.7	87 16 41.9	232
557	6:56: 0.90796	48 12 20.4	87 16 37.6	232
558	6:58: 0.90796	48 12 31.1	87 16 34.6	234
559	7: 0: 0.90796	48 12 41.5	87 16 31.8	237
560	7: 2: 0.90796	48 12 51.8	87 16 28.6	238
561	7: 4: 0.90796	48 13 2.3	87 16 25.2	236
562	7: 6: 0.90796	48 13 12.9	87 16 21.4	237
563	7: 8: 0.90796	48 13 23.5	87 16 18.7	240
564	7:10: 0.90796	48 13 33.9	87 16 16.0	230
565	7:12: 0.90796	48 13 44.4	87 16 13.1	225
566	7:14: 0.90796	48 13 55.1	87 16 10.6	231
567	7:16: 0.90796	48 14 5.6	87 16 7.3	235
568	7:18: 0.90796	48 14 16.1	87 16 3.8	237

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
569	7:20: 0.90796	48 14 26.9	87 16 0.6	235
570	7:22: 0.90796	48 14 37.5	87 15 57.4	242
571	7:24: 0.90796	48 14 47.6	87 15 54.7	240
572	7:26: 0.90796	48 14 57.9	87 15 51.6	241
573	7:28: 0.90796	48 15 8.5	87 15 48.1	238
574	7:30: 0.90796	48 15 18.9	87 15 45.1	237
575	7:32: 0.90796	48 15 29.3	87 15 41.8	236
576	7:34: 0.90796	48 15 39.9	87 15 38.6	236
577	7:36: 0.90796	48 15 50.2	87 15 35.5	247
578	7:38: 0.90796	48 16 0.6	87 15 30.2	242
579	7:40: 0.90796	48 16 10.8	87 15 25.1	239
580	7:42: 0.90796	48 16 21.0	87 15 21.0	243
581	7:44: 0.90796	48 16 31.3	87 15 15.8	235
582	7:46: 0.90796	48 16 41.3	87 15 10.2	247
583	7:48: 0.90796	48 16 51.0	87 15 4.1	249
584	7:50: 0.90796	48 17 1.0	87 14 58.6	257
585	7:52: 0.90796	48 17 11.1	87 14 53.3	250
586	7:54: 0.90796	48 17 21.4	87 14 48.2	253
587	7:56: 0.90796	48 17 31.9	87 14 44.3	245
588	7:58: 0.90796	48 17 42.5	87 14 40.1	241
589	8: 0: 0.90796	48 17 52.9	87 14 37.6	237
590	8: 2: 0.90796	48 18 3.7	87 14 33.8	229
591	8: 4: 0.90796	48 18 14.3	87 14 29.8	228
592	8: 6: 0.90796	48 18 24.4	87 14 28.2	233
593	8: 8: 0.90796	48 18 36.0	87 14 20.7	228
594	8:10: 0.90796	48 18 45.5	87 14 21.4	226
595	8:12: 0.90796	48 18 52.8	87 14 32.1	226
596	8:14: 0.90796	48 19 3.9	87 14 27.4	225
597	8:16: 0.90796	48 19 16.6	87 14 16.8	226
598	8:18: 0.90796	48 19 28.2	87 14 9.6	215
599	8:20: 0.90796	48 19 40.3	87 14 1.8	218
600	8:22: 0.90796	48 19 51.5	87 13 57.7	210
601	8:24: 0.90796	48 20 2.4	87 13 51.8	214
602	8:26: 0.90796	48 20 13.3	87 13 47.7	213
603	8:28: 0.90796	48 20 24.1	87 13 47.5	210
604	8:30: 0.90796	48 20 35.2	87 13 44.3	214
605	8:32: 0.90796	48 20 45.9	87 13 41.8	215
606	8:34: 0.90796	48 20 57.0	87 13 38.9	218
607	8:36: 0.90796	48 21 8.3	87 13 35.9	209
608	8:38: 0.90796	48 21 19.4	87 13 34.1	204
609	8:40: 0.90796	48 21 30.5	87 13 30.6	202
610	8:42: 0.90796	48 21 41.4	87 13 28.1	201
611	8:44: 0.90796	48 21 52.5	87 13 25.9	202
612	8:46: 0.90796	48 22 3.6	87 13 22.8	197
613	8:48: 0.90796	48 22 14.5	87 13 19.8	203
614	8:50: 0.90796	48 22 25.7	87 13 16.3	202

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
615	8:52: 0.90796	48 22 36.9	87 13 13.6	202
616	8:54: 0.90796	48 22 47.8	87 13 11.2	205
617	8:56: 0.90796	48 22 58.9	87 13 8.6	205
618	8:58: 0.90796	48 23 10.1	87 13 6.0	211
619	9: 0: 0.90796	48 23 21.2	87 13 2.8	212
620	9: 2: 0.90796	48 23 32.5	87 12 59.8	219
621	9: 4: 0.90796	48 23 43.5	87 12 56.6	210
622	9: 6: 0.90796	48 23 54.5	87 12 53.6	201
623	9: 8: 0.90796	48 24 5.7	87 12 51.2	189
624	9:10: 0.90796	48 24 16.6	87 12 48.3	178
625	9:12: 0.90796	48 24 27.7	87 12 45.5	172
626	9:14: 0.90796	48 24 39.0	87 12 42.6	168
627	9:16: 0.90796	48 24 50.0	87 12 39.7	160
628	9:18: 0.90796	48 25 1.0	87 12 36.8	160
629	9:20: 0.90796	48 25 12.0	87 12 33.6	159
630	9:22: 0.90796	48 25 23.0	87 12 30.5	158
631	9:24: 0.90796	48 25 33.9	87 12 27.4	157
632	9:26: 0.90796	48 25 45.0	87 12 24.3	163
633	9:28: 0.90796	48 25 56.1	87 12 21.1	162
634	9:30: 0.90796	48 26 7.1	87 12 17.6	165
635	9:32: 0.90796	48 26 18.0	87 12 14.0	163
636	9:34: 0.90796	48 26 28.9	87 12 10.6	164
637	9:36: 0.90796	48 26 40.0	87 12 7.3	162
638	9:38: 0.90796	48 26 51.1	87 12 4.1	162
639	9:40: 0.90796	48 27 1.9	87 12 0.9	157
640	9:42: 0.90796	48 27 12.9	87 11 57.5	160
641	9:44: 0.90796	48 27 24.3	87 11 54.2	162
642	9:46: 0.90796	48 27 35.1	87 11 51.7	167
643	9:48: 0.90796	48 27 46.0	87 11 48.4	160
644	9:50: 0.90796	48 27 57.4	87 11 44.8	156
645	9:52: 0.90796	48 28 8.4	87 11 41.8	147
646	9:54: 0.90796	48 28 19.4	87 11 38.0	137
647	9:56: 0.90796	48 28 30.5	87 11 34.7	132
648	9:58: 0.90796	48 28 41.5	87 11 31.6	116
649	10: 0: 0.90796	48 28 53.3	87 11 26.6	117
650	10: 2: 0.90796	48 29 4.6	87 11 23.0	113
651	10: 4: 0.90796	48 29 14.0	87 11 22.5	108
652	10: 6: 0.90796	48 29 24.0	87 11 20.0	107
653	10: 8: 0.90796	48 29 34.8	87 11 15.4	110
654	10:10: 0.90796	48 29 45.6	87 11 11.9	106
655	10:12: 0.90796	48 29 56.3	87 11 8.6	107
656	10:14: 0.90796	48 30 6.8	87 11 4.6	109
657	10:16: 0.90796	48 30 17.4	87 11 1.2	110
658	10:18: 0.90796	48 30 28.1	87 10 58.2	110
659	10:20: 0.90796	48 30 38.7	87 10 54.4	109
660	10:22: 0.90796	48 30 49.2	87 10 50.5	114

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
661	10:24: 0.90796	48 30 59.6	87 10 46.9	110
662	10:26: 0.90796	48 31 10.4	87 10 43.1	118
663	10:28: 0.90796	48 31 20.9	87 10 39.4	120
664	10:30: 0.90796	48 31 31.4	87 10 35.5	148
665	10:32: 0.90796	48 31 42.2	87 10 31.8	144
666	10:34: 0.90796	48 31 53.0	87 10 28.6	152
667	10:36: 0.90796	48 32 3.6	87 10 25.1	144
668	10:38: 0.90796	48 32 14.0	87 10 21.0	140
669	10:40: 0.90796	48 32 24.6	87 10 17.2	135
670	10:42: 0.90796	48 32 35.2	87 10 13.5	135
671	10:44: 0.90796	48 32 45.8	87 10 9.5	140
672	10:46: 0.90796	48 32 55.9	87 10 6.5	140
673	10:48: 0.90796	48 33 6.1	87 10 4.2	144
674	10:50: 0.90796	48 33 16.8	87 10 0.7	146
675	10:52: 0.90796	48 33 27.7	87 9 57.1	143
676	10:54: 0.90796	48 33 38.3	87 9 53.7	136
677	10:56: 0.90796	48 33 48.9	87 9 50.2	136
678	10:58: 0.90796	48 33 59.6	87 9 47.1	138
679	11: 0: 0.90796	48 34 10.3	87 9 44.2	140
680	11: 2: 0.90796	48 34 20.8	87 9 40.7	138
681	11: 4: 0.90796	48 34 31.5	87 9 37.2	139
682	11: 6: 0.90796	48 34 42.2	87 9 34.2	142
683	11: 8: 0.90796	48 34 53.0	87 9 30.9	144
684	11:10: 0.90796	48 35 3.9	87 9 27.2	159
685	11:12: 0.90796	48 35 14.2	87 9 23.8	183
686	11:14: 0.90796	48 35 24.5	87 9 20.8	189
687	11:16: 0.90796	48 35 34.6	87 9 18.4	191
688	11:18: 0.90796	48 35 44.6	87 9 15.8	189
689	11:20: 0.90796	48 35 55.1	87 9 12.1	186
690	11:22: 0.90796	48 36 5.5	87 9 8.4	186
691	11:24: 0.90796	48 36 15.8	87 9 5.1	173
692	11:26: 0.90796	48 36 26.3	87 9 1.8	168
693	11:28: 0.90796	48 36 36.5	87 8 58.3	160
694	11:30: 0.90796	48 36 46.8	87 8 54.9	145
695	11:32: 0.90796	48 36 57.4	87 8 51.6	114
696	11:34: 0.90796	48 37 8.2	87 8 48.9	123
697	11:36: 0.90796	48 37 18.5	87 8 46.2	110
698	11:38: 0.90796	48 37 28.8	87 8 43.4	135
699	11:40: 0.90796	48 37 39.2	87 8 40.6	146
700	11:42: 0.90796	48 37 49.5	87 8 37.7	151
701	11:44: 0.90796	48 38 0.0	87 8 35.0	143
702	11:46: 0.90796	48 38 10.4	87 8 32.4	140
703	11:48: 0.90796	48 38 20.7	87 8 29.4	148
704	11:50: 0.90796	48 38 31.4	87 8 26.3	162
705	11:52: 0.90796	48 38 41.7	87 8 22.2	204
706	11:54: 0.90796	48 38 51.9	87 8 17.1	220

Shot information for LINE A Paramètres de tir pour le PROFIL A

Begin date and time (UT)/Date et heure (TU) du début: 31-08-86/1600

End date and time (UT)/Date et heure (TU) de la fin: 01-09-86/1518

Shot Nu. No. tir	Shot Time Heure de tir hr:mn:sec	Latitude N Latitude N ° ' ''	Longitude W Longitude O ° ' ''	Water depth Prof. eau m
707	11:56: 0.90796	48 39 2.1	87 8 12.1	209
708	11:58: 0.90796	48 39 12.1	87 8 7.6	179
709	12: 0: 0.90796	48 39 22.7	87 8 2.9	168
710	12: 2: 0.90796	48 39 32.7	87 7 57.6	165
711	12: 4: 0.90796	48 39 42.4	87 7 52.2	146
712	12: 6: 0.90796	48 39 52.7	87 7 46.8	136
713	12: 8: 0.90796	48 40 2.7	87 7 41.5	142
714	12:10: 0.90796	48 40 12.8	87 7 36.2	151
715	12:12: 0.90796	48 40 23.1	87 7 30.7	162
716	12:14: 0.90796	48 40 33.1	87 7 25.4	161
717	12:16: 0.90796	48 40 43.3	87 7 20.2	146
718	12:18: 0.90796	48 40 53.8	87 7 14.9	119
719	12:20: 0.90796	48 41 4.0	87 7 10.2	125
720	12:22: 0.90796	48 41 14.0	87 7 5.3	125
721	12:24: 0.90796	48 41 24.3	87 7 0.6	118
722	12:26: 0.90796	48 41 34.9	87 6 56.3	119
723	12:28: 0.90796	48 41 45.0	87 6 51.8	119
724	12:30: 0.90796	48 41 55.5	87 6 48.3	120
725	12:32: 0.90796	48 42 6.2	87 6 45.9	122
726	12:34: 0.90796	48 42 16.6	87 6 42.5	125
727	12:36: 0.90796	48 42 26.7	87 6 38.9	122
728	12:38: 0.90796	48 42 36.6	87 6 36.0	106
729	12:40: 0.90796	48 42 46.7	87 6 33.0	103
730	12:42: 0.90796	48 42 56.8	87 6 29.7	100
731	12:44: 0.90796	48 43 7.0	87 6 27.3	118
732	12:46: 0.90796	48 43 17.8	87 6 25.4	137
733	12:48: 0.90796	48 43 28.5	87 6 23.5	147
734	12:50: 0.90796	48 43 39.3	87 6 21.7	147
735	12:52: 0.90796	48 43 50.0	87 6 19.7	146
736	12:54: 0.90796	48 44 0.8	87 6 17.4	142
737	12:56: 0.90796	48 44 11.3	87 6 15.5	143
738	12:58: 0.90796	48 44 22.2	87 6 13.9	142
739	13: 0: 0.90796	48 44 33.1	87 6 12.1	138
740	13: 2: 0.90796	48 44 43.4	87 6 10.1	143
741	13: 4: 0.90796	48 44 54.7	87 6 8.4	129
742	13: 6: 0.90796	48 45 4.9	87 6 5.6	122
743	13: 8: 0.90796	48 45 15.3	87 6 3.2	99
744	13:10: 0.90796	48 45 26.4	87 6 1.0	73
745	13:12: 0.90796	48 45 34.6	87 5 54.2	42
746	13:14: 0.90796	48 45 42.1	87 5 42.4	56
747	13:16: 0.90796	48 45 42.4	87 5 25.8	78
748	13:18: 0.90796	48 45 41.6	87 5 14.2	76

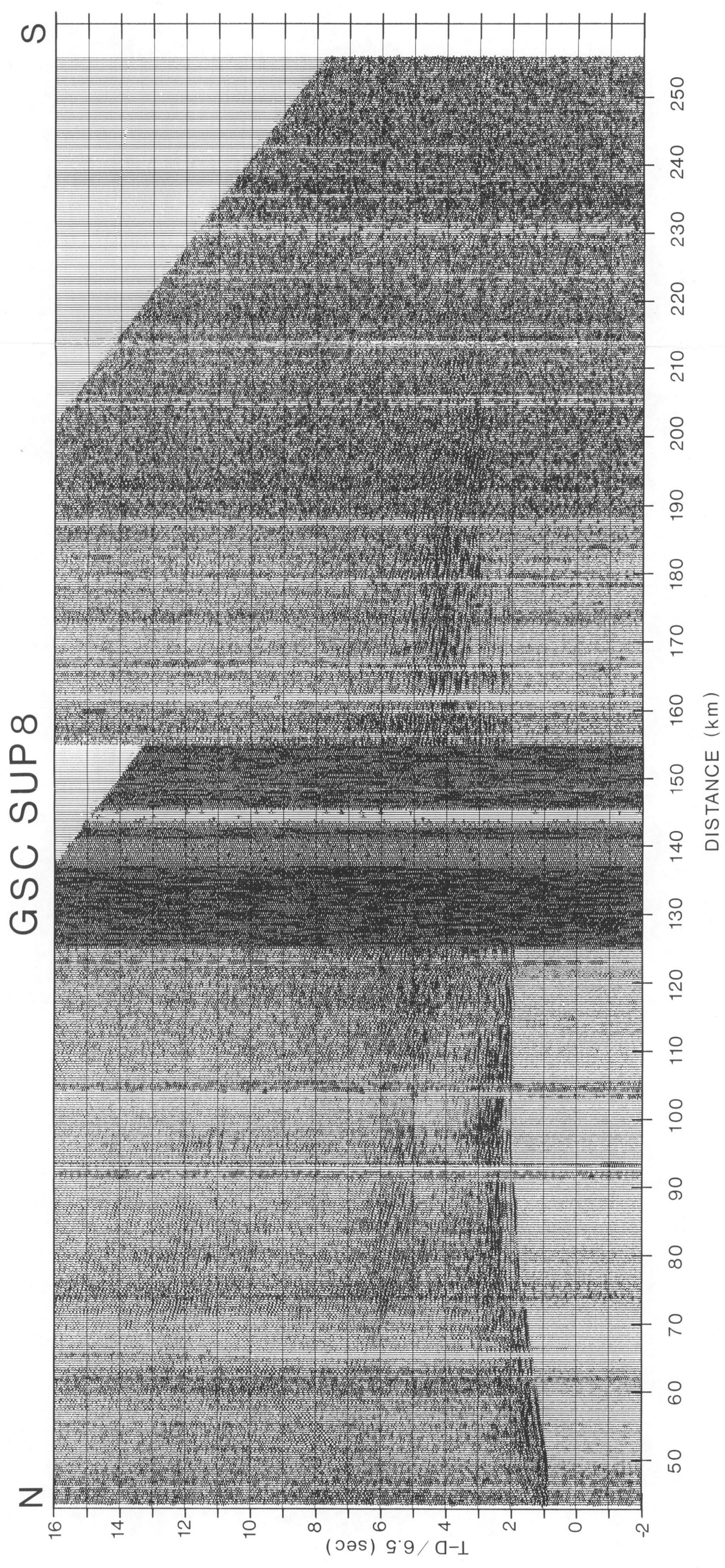


Fig. 5 Seismic section recorded at GSC site SUP8 on the north shore of Lake Superior.

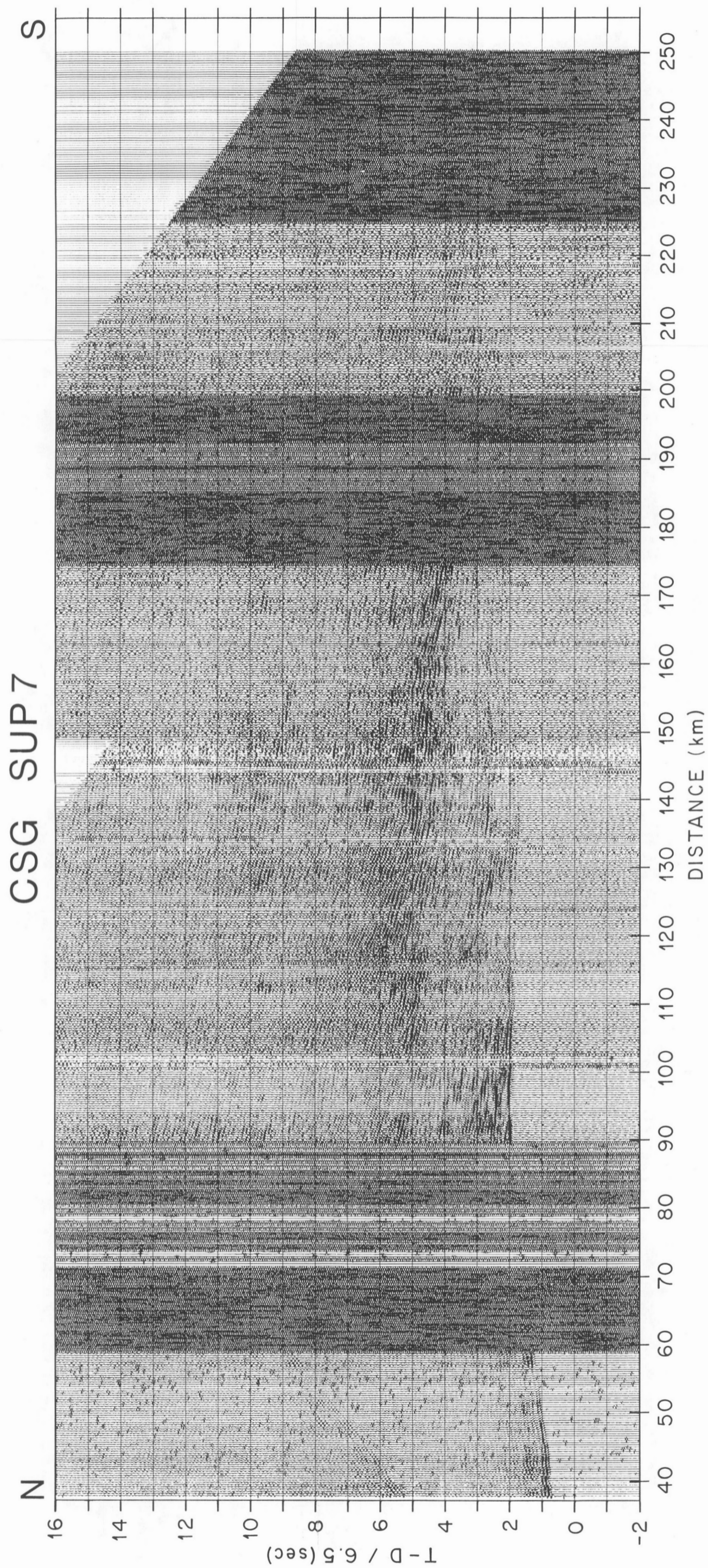


Fig. 6 Seismic section recorded at GSC site SUP7 on the north shore of Lake Superior.

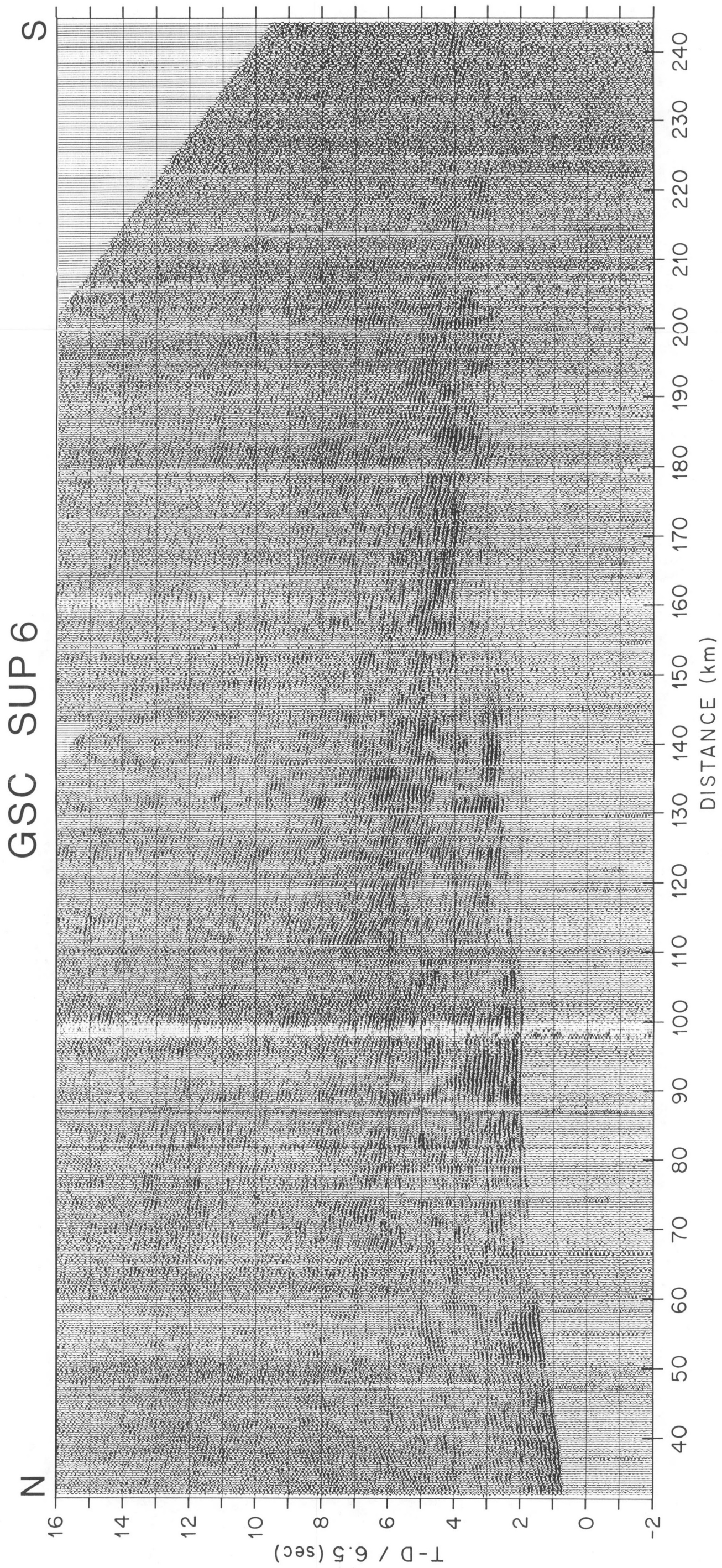


Fig. 7 Seismic section recorded at GSC site SUP6 on the north shore of Lake Superior.

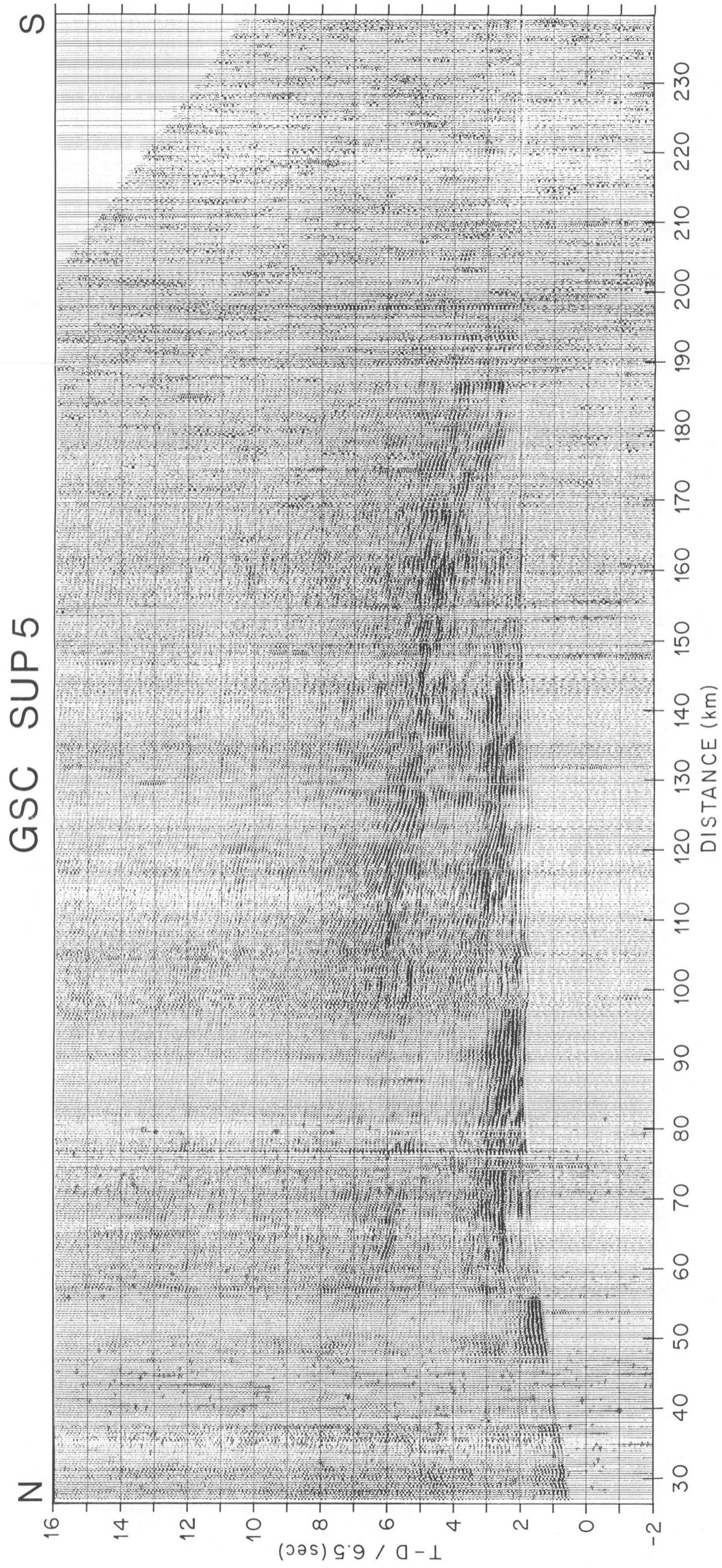


Fig. 8 Seismic section recorded at GSC site SUP5 on the north shore of Lake Superior.

GSC SUP 4

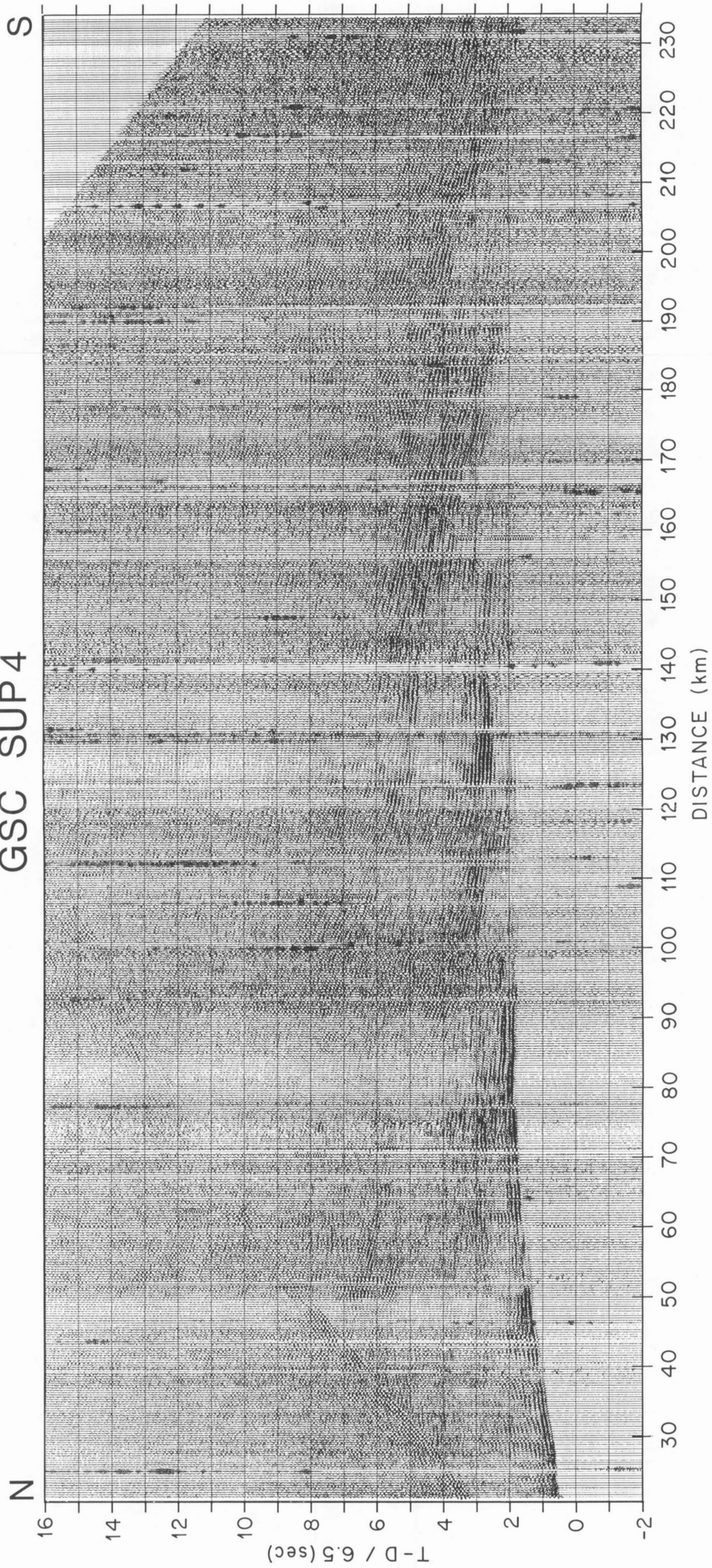


Fig. 9 Seismic section recorded at GSC site SUP4 on the north shore of Lake Superior.

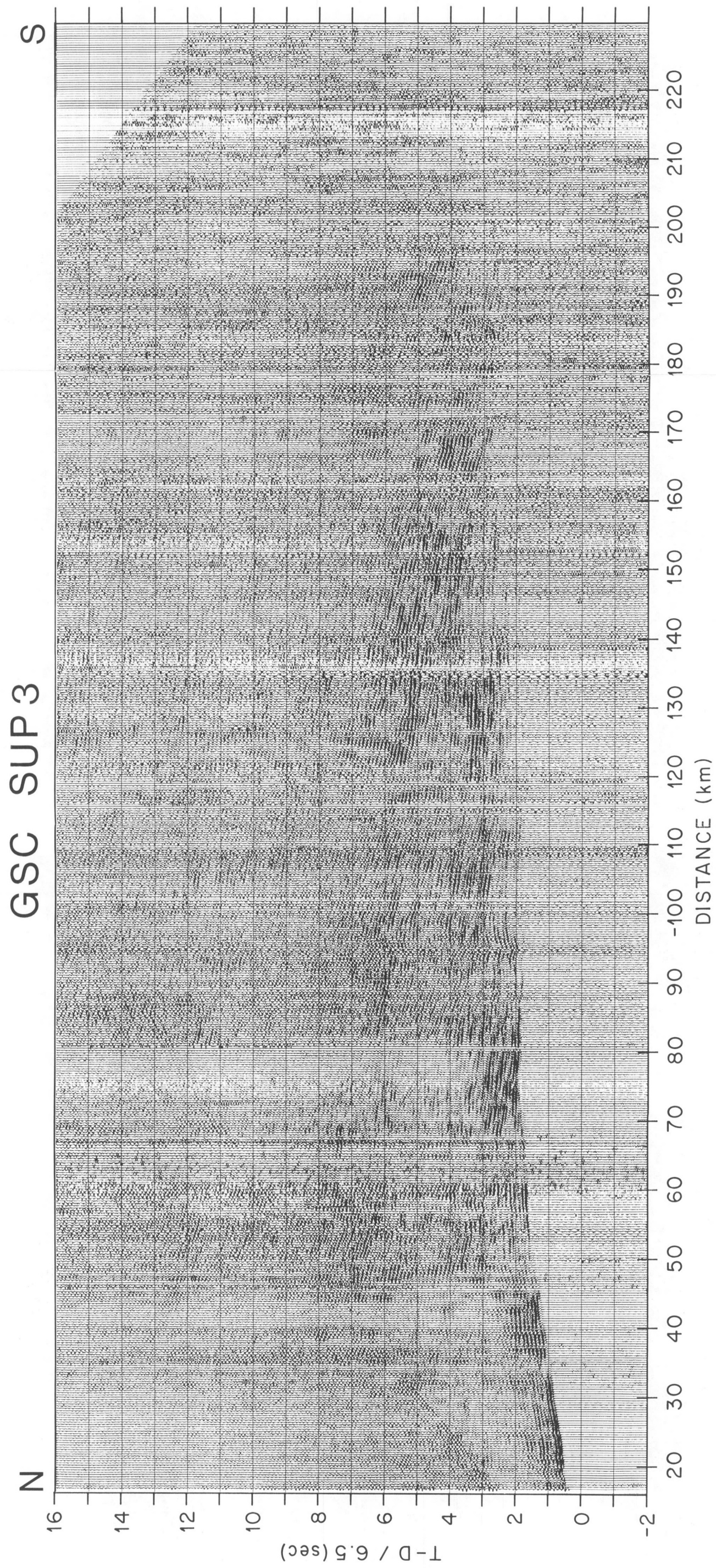


Fig. 10 Seismic section recorded at GSC site SUP3 on the north shore of Lake Superior.

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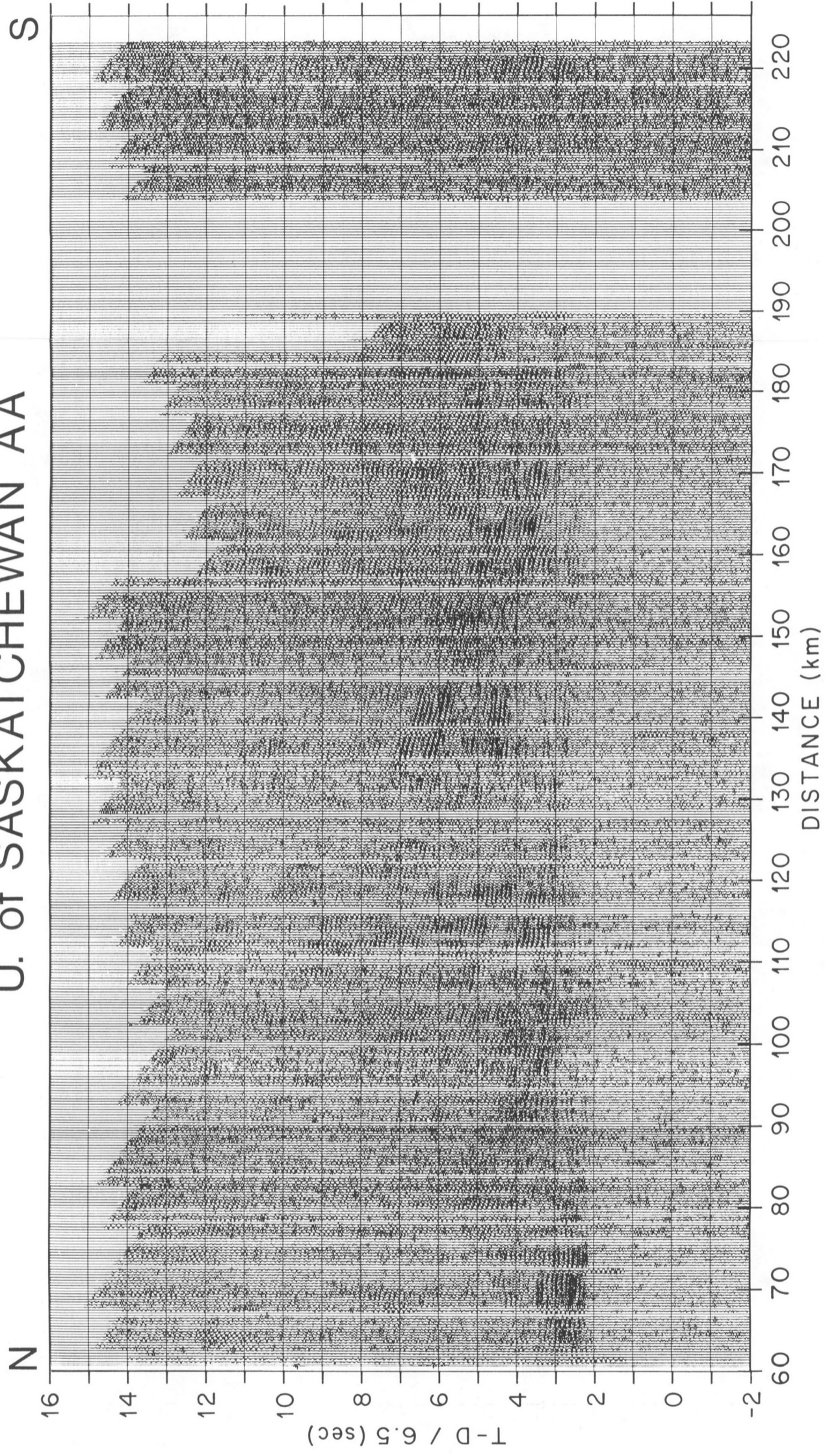


Fig. 11 Seismic section recorded at the University of Saskatchewan site AA on the north shore of Lake Superior.

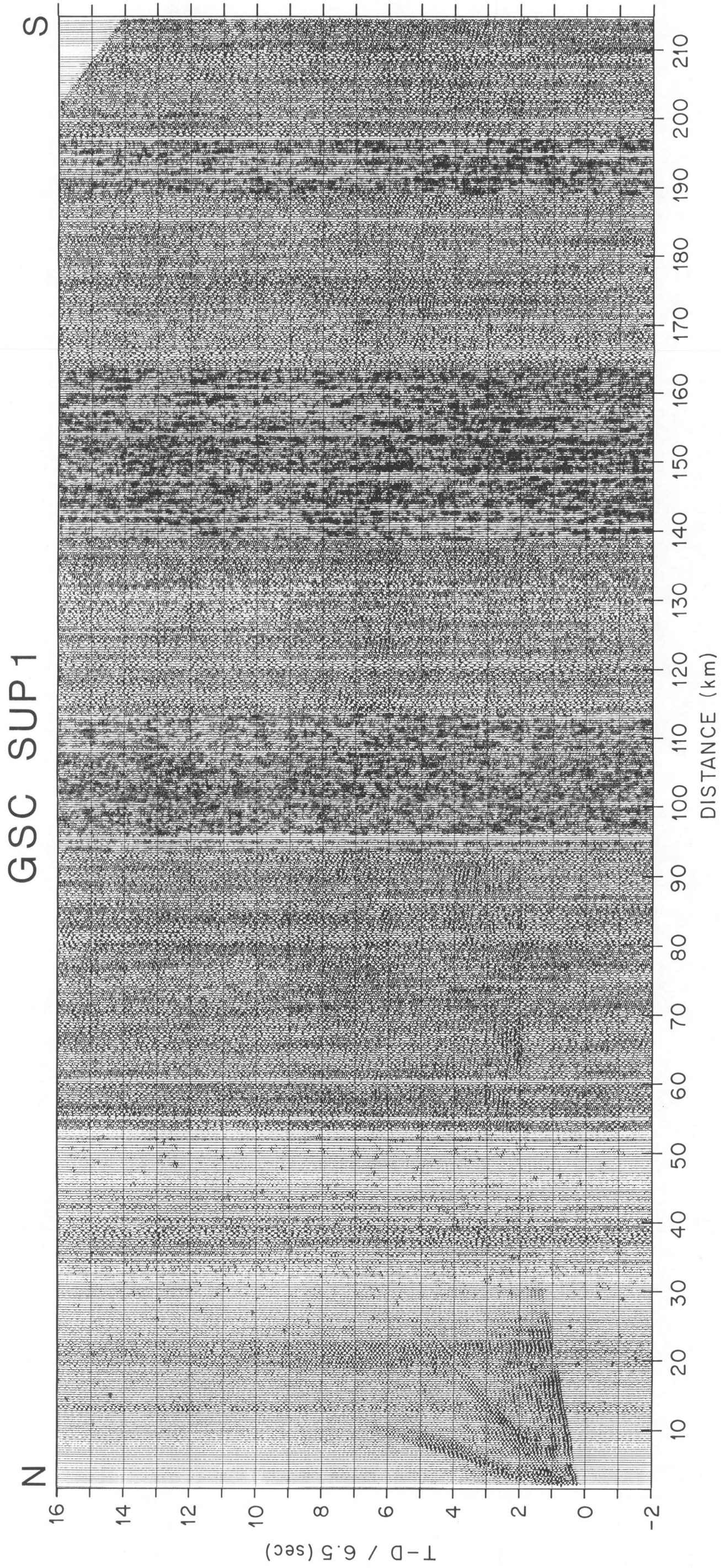


Fig. 12 Seismic section recorded at GSC site SUP1 on the north shore of Lake Superior.

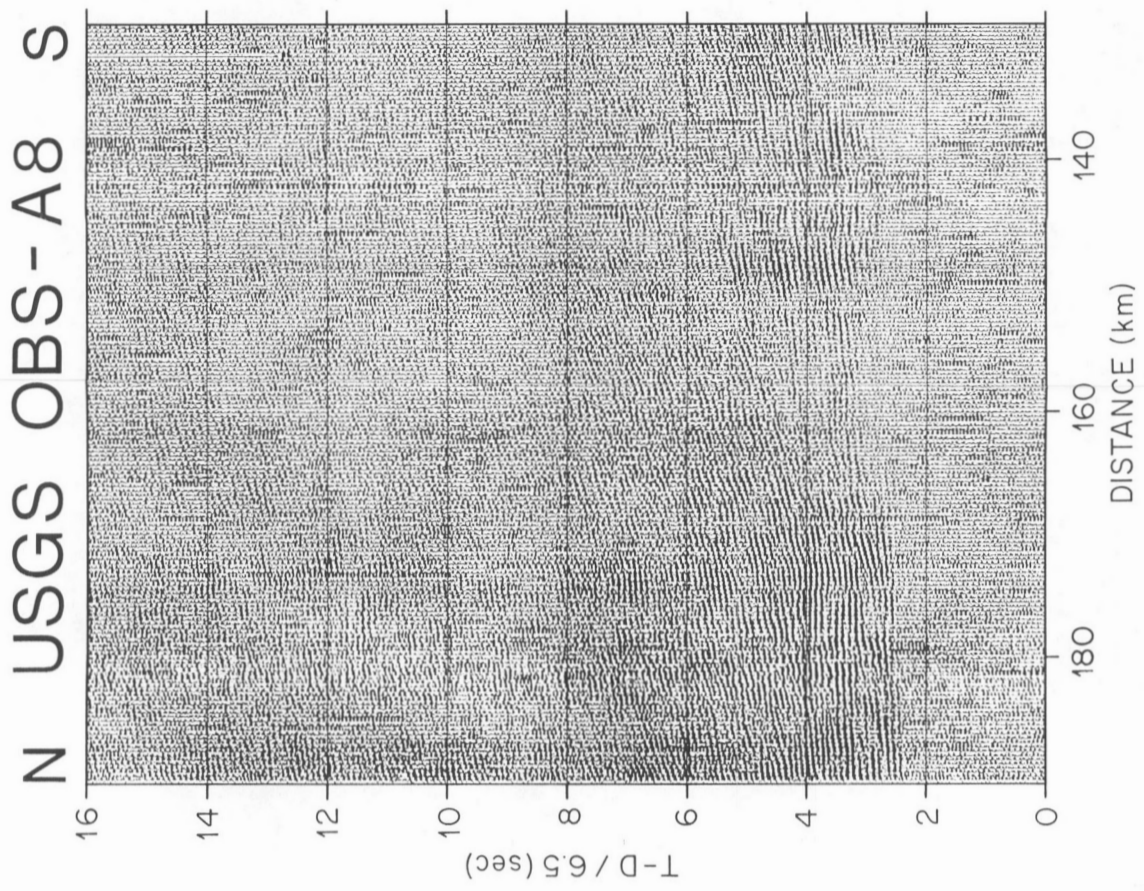


Fig. 13 Seismic section recorded in Lake Superior at USGS OBS A8.

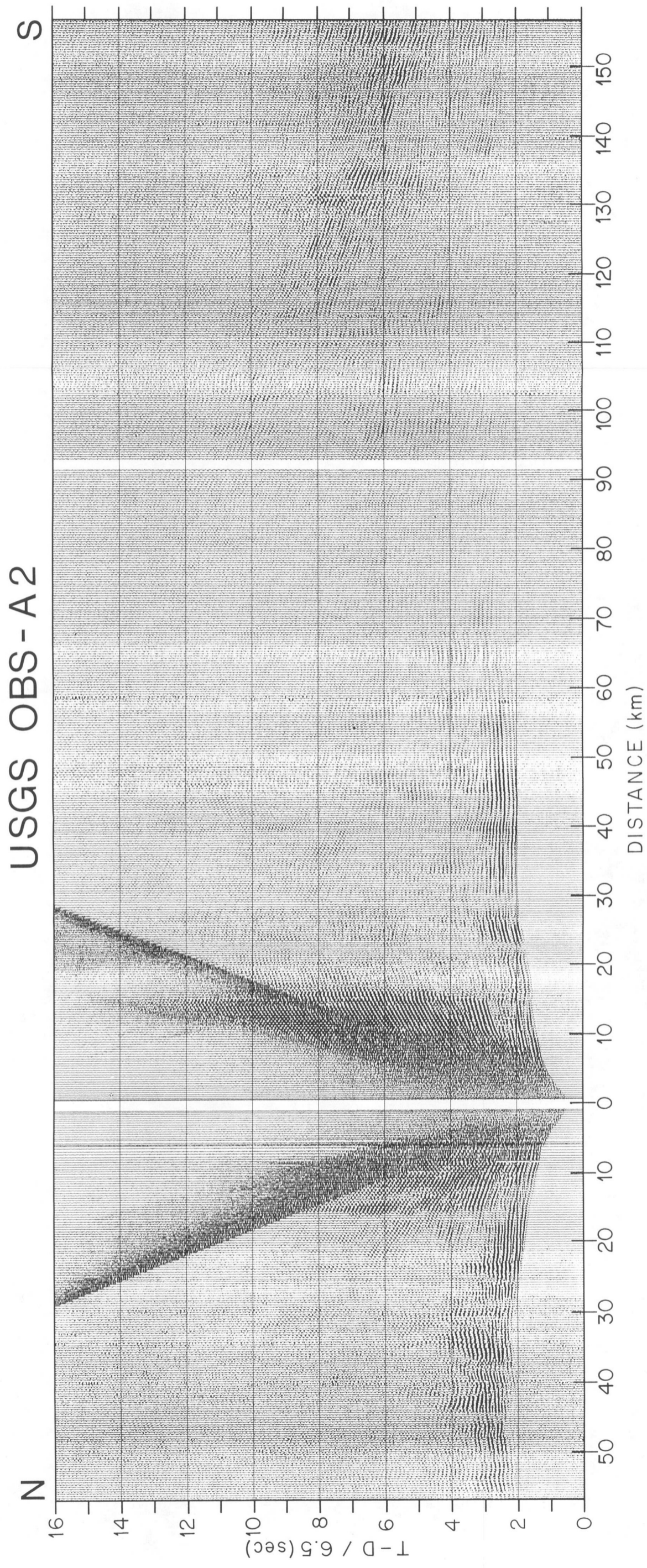


Fig. 14 Seismic section recorded in Lake Superior at USGS OBS A2.

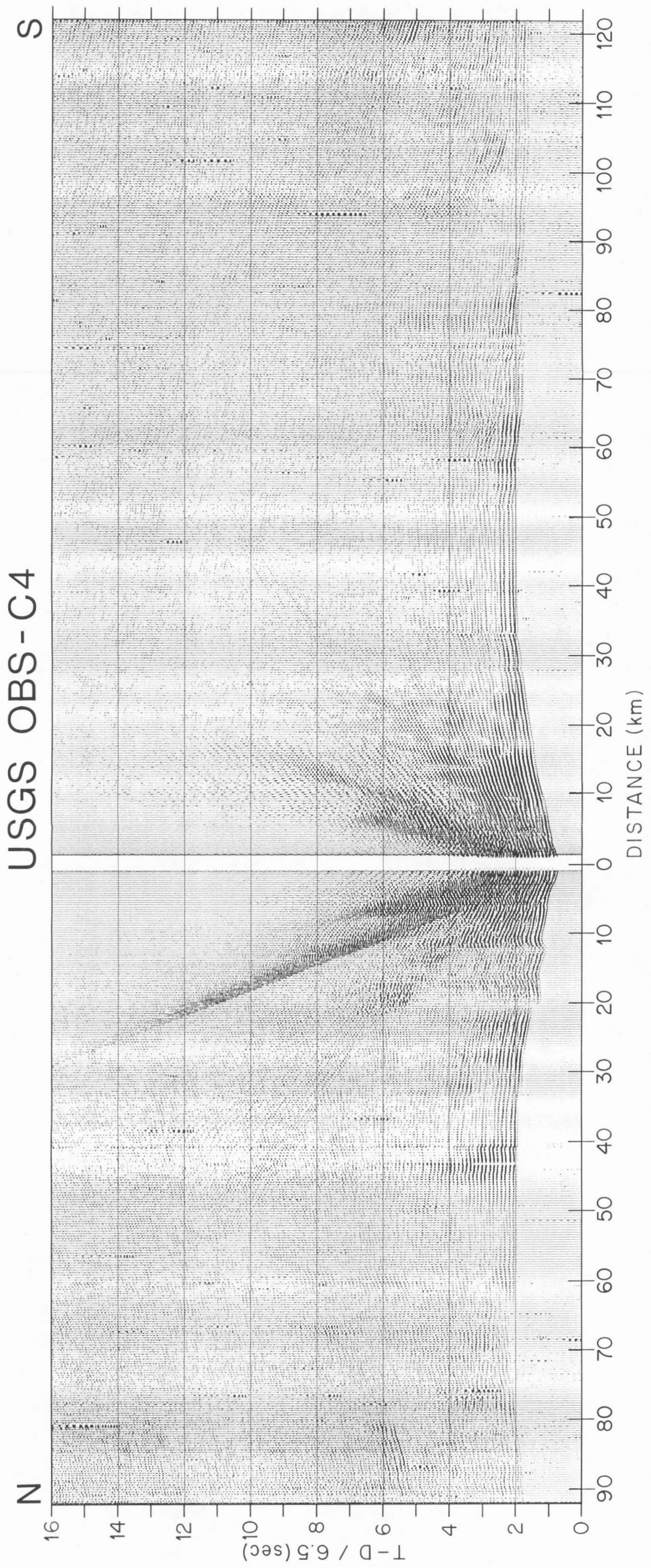


Fig. 15 Seismic section recorded in Lake Superior at USGS OBS C4.

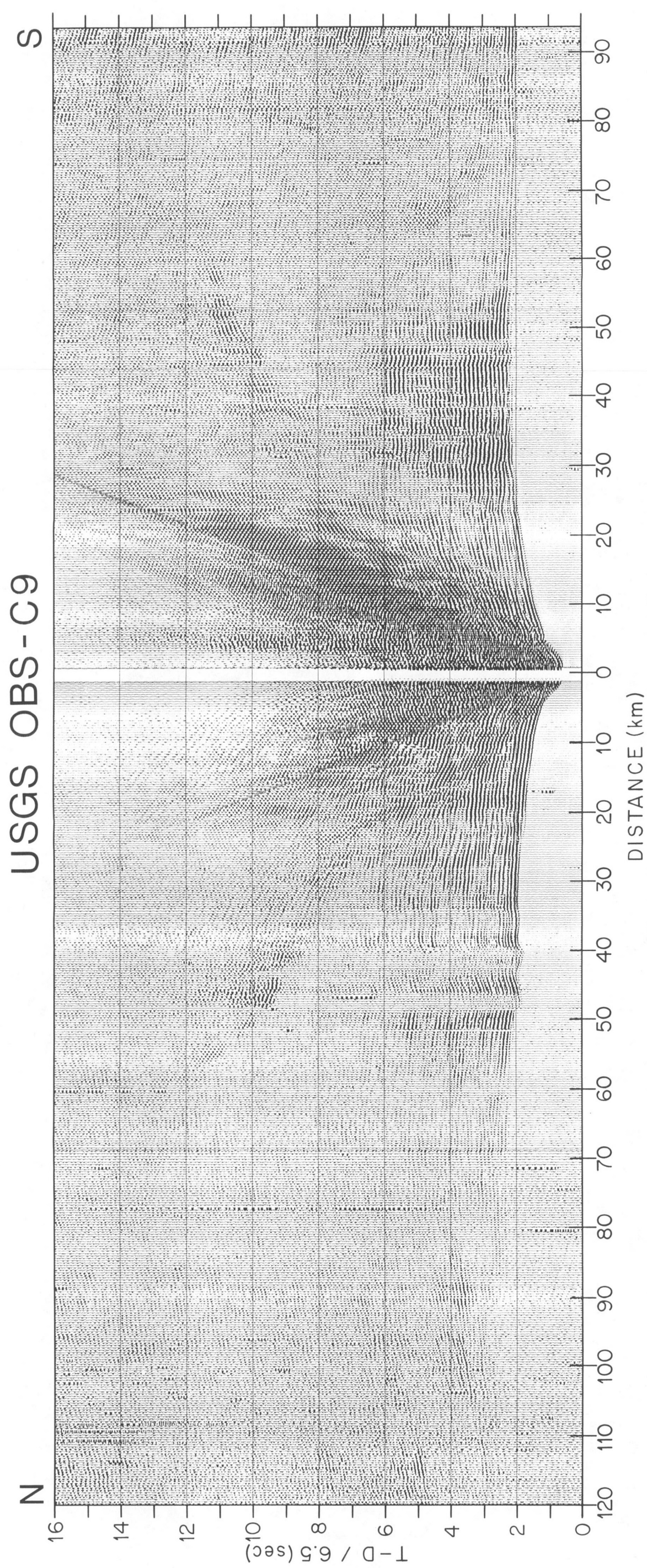


Fig. 16 Seismic section recorded in Lake Superior at USGS OBS C9.

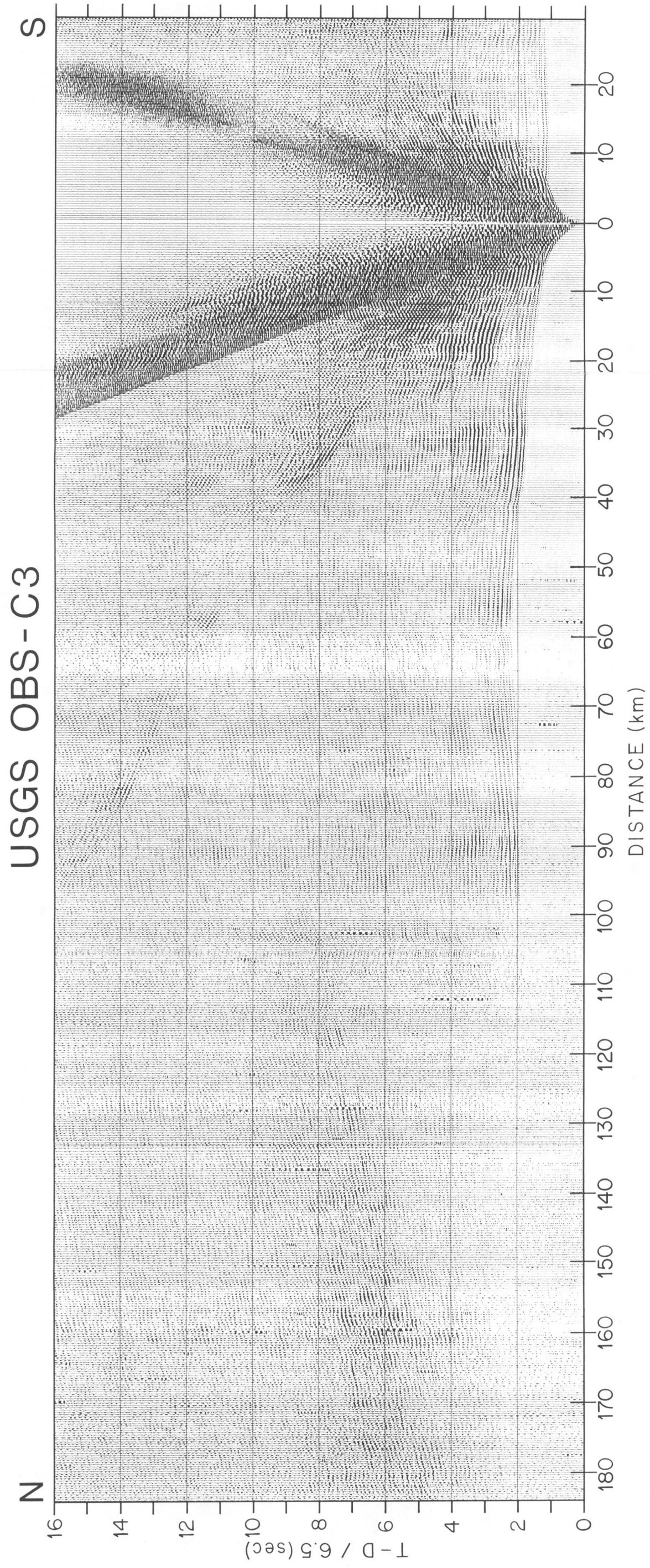


Fig. 17 Seismic section recorded in Lake Superior at USGS OBS C3.

U. of WISCONSIN, OSHKOSH - WISCORP.

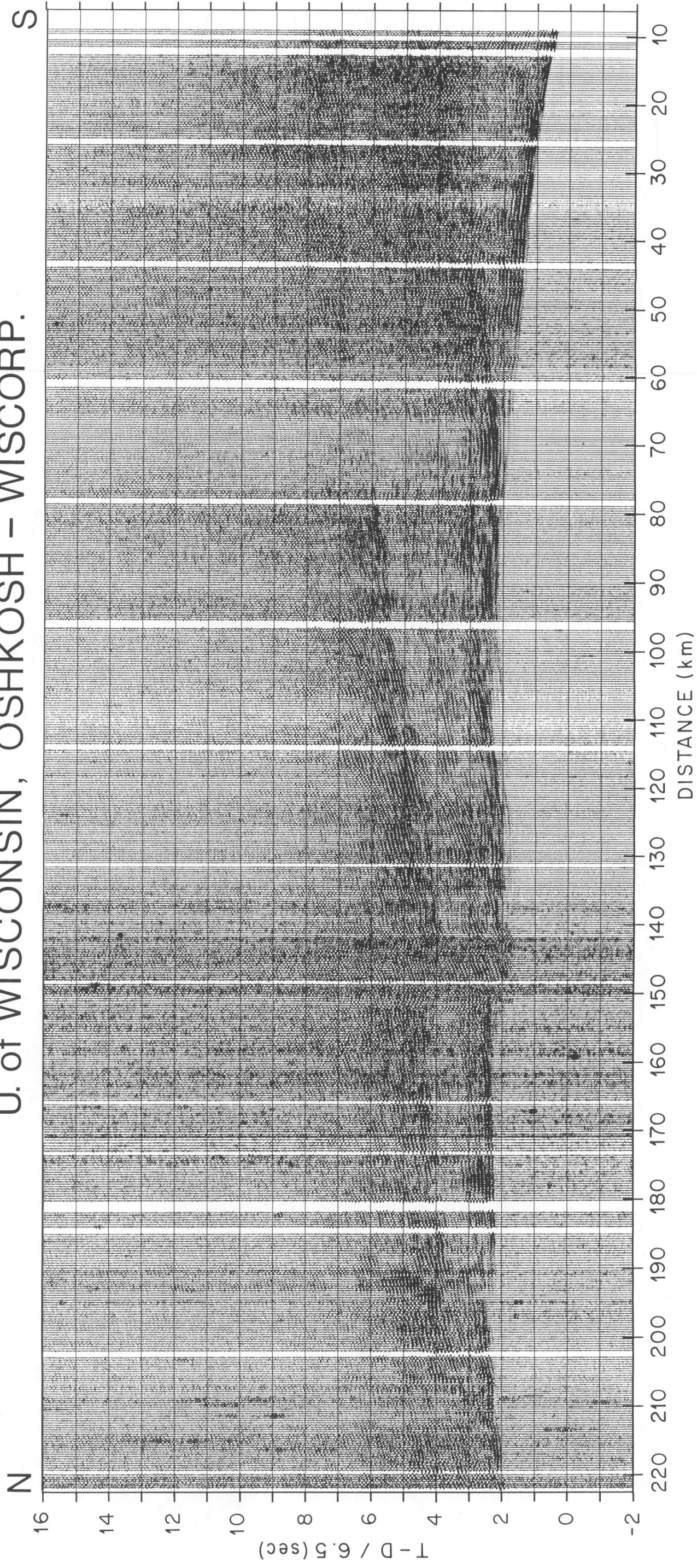


Fig. 18 Seismic section recorded at the University of Wisconsin-Oshkosh site WISCORP on the south shore of Lake Superior.

U. of WISCONSIN, MADISON C1

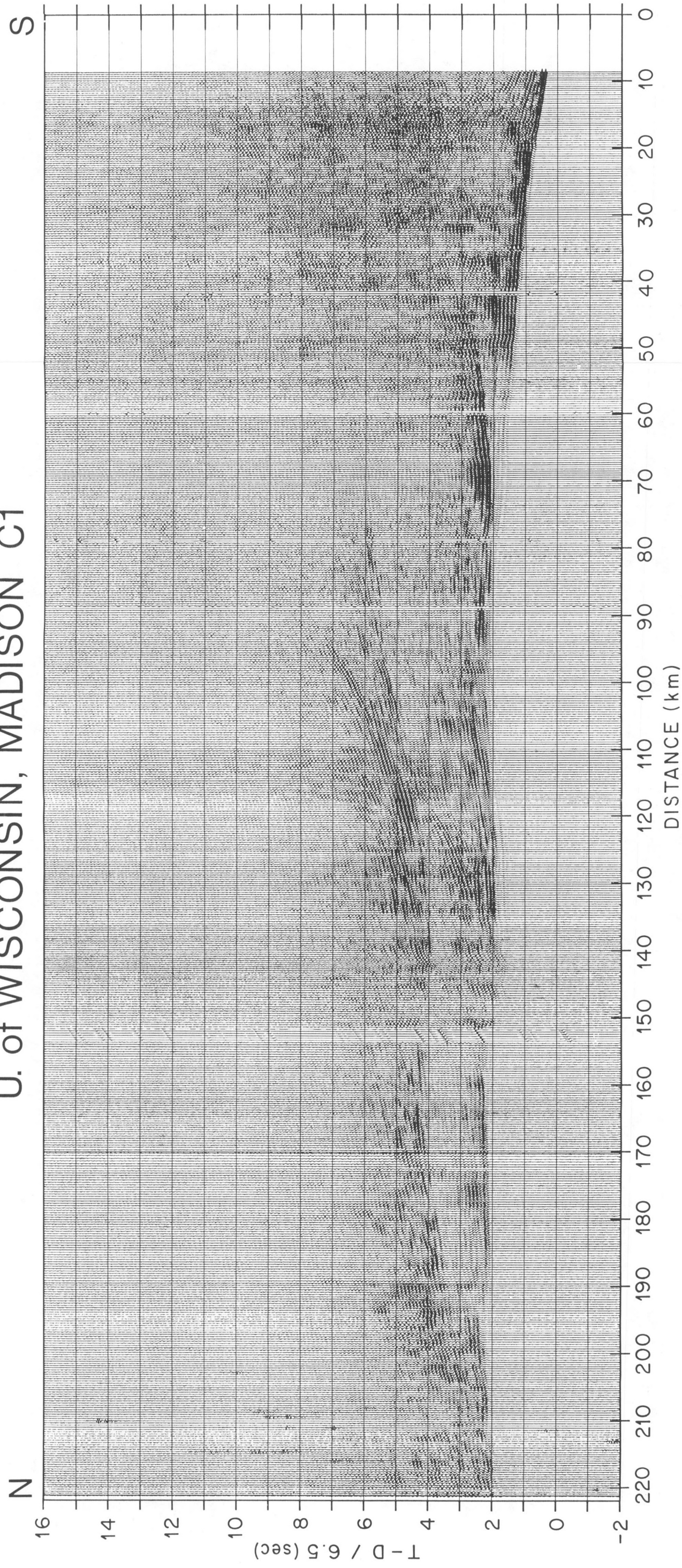


Fig. 19 Seismic section recorded at the University of Wisconsin-Madison site C1 on the south shore of Lake Superior.

U. of WISCONSIN, MADISON C2

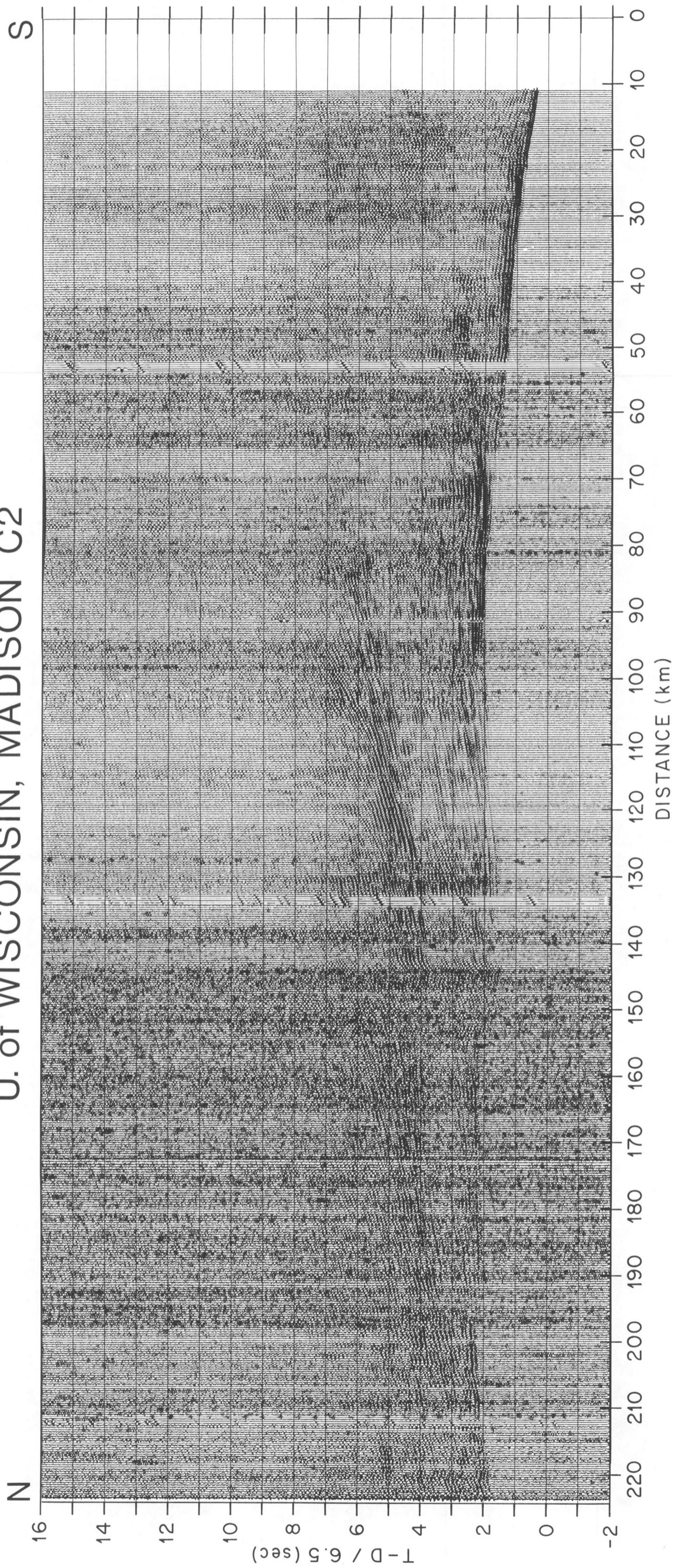


Fig. 20 Seismic section recorded at the University of Wisconsin-Madison site C2 on the south shore of Lake Superior.

U. of WISCONSIN, MADISON C3

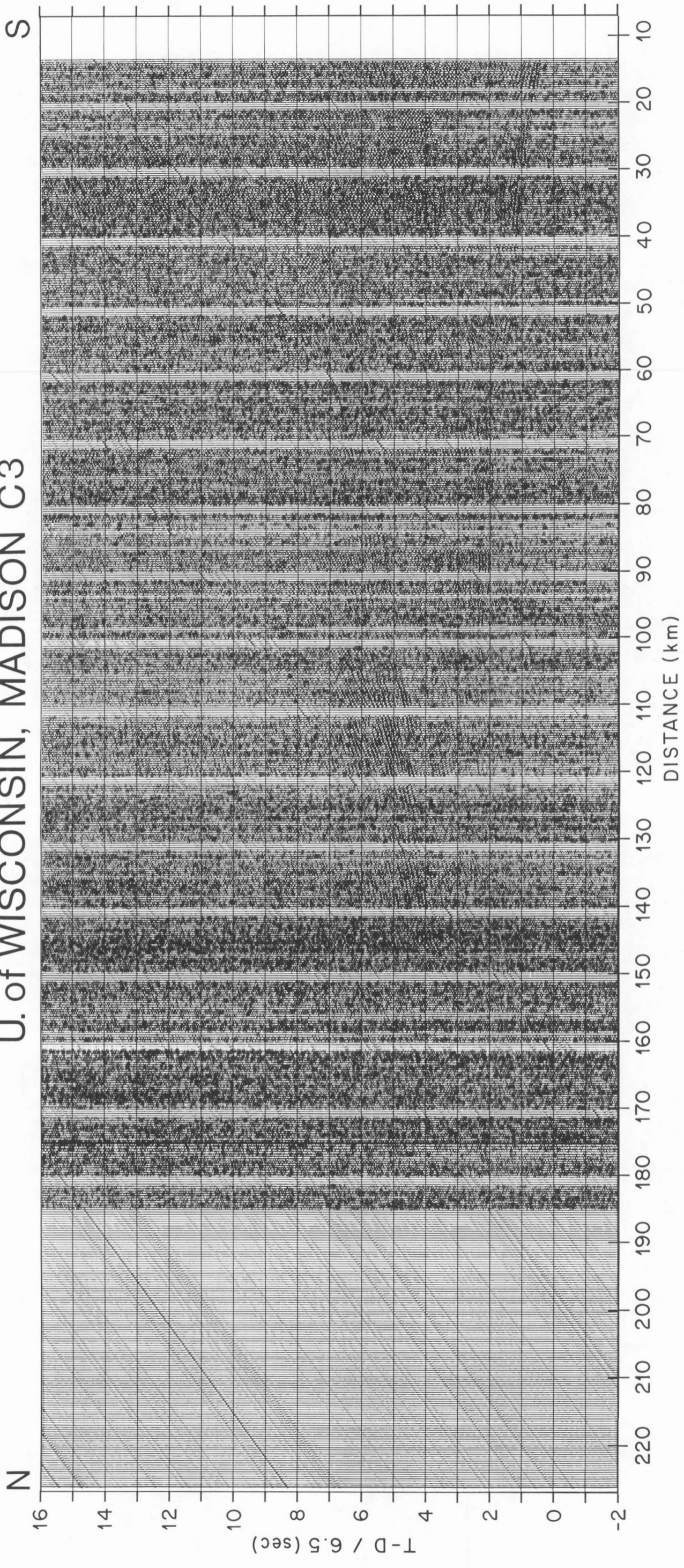


Fig. 21 Seismic section recorded at the University of Wisconsin-Madison site C3 on the south shore of Lake Superior.

U. of WISCONSIN, MADISON C4

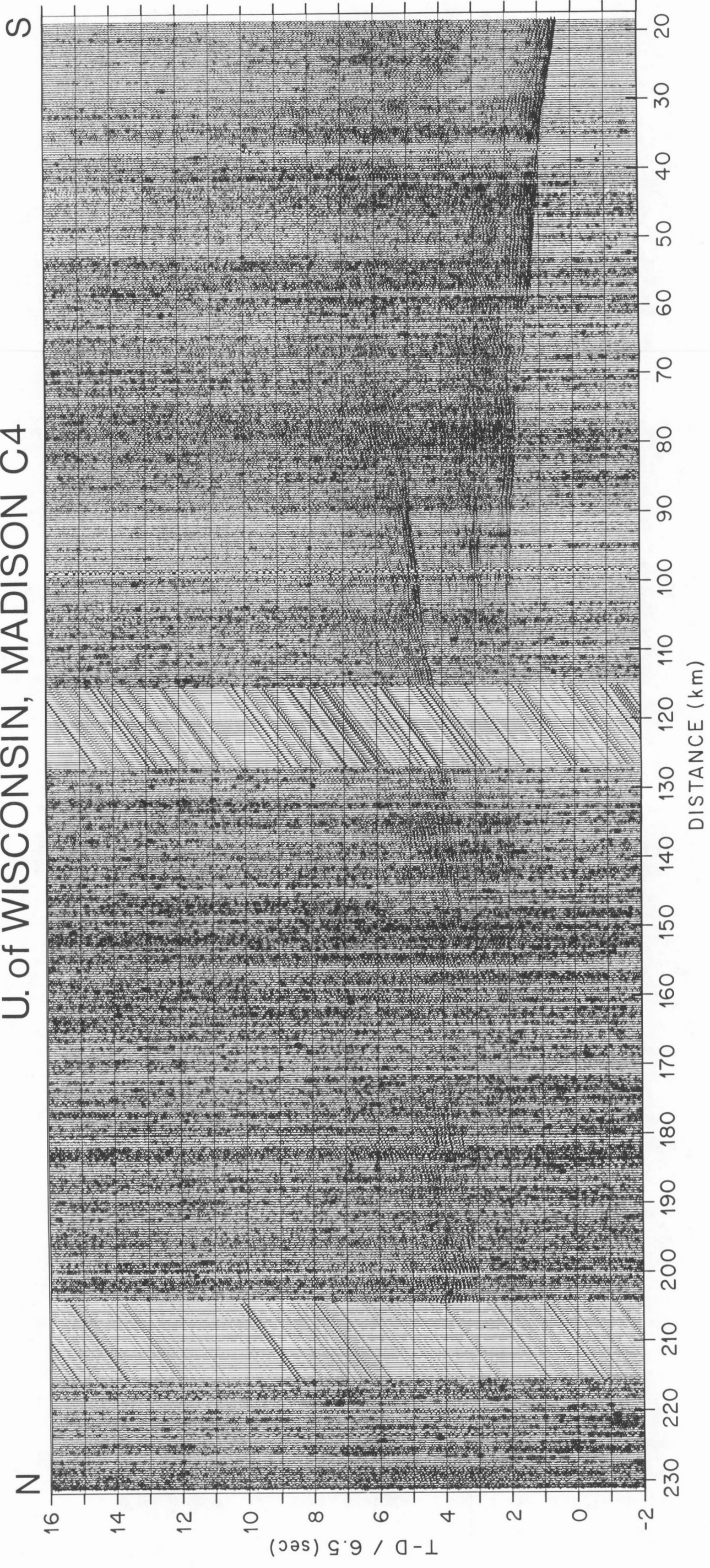


Fig. 22 Seismic section recorded at the University of Wisconsin-Madison site C4 on the south shore of Lake Superior.

U. of WISCONSIN, MADISON C6

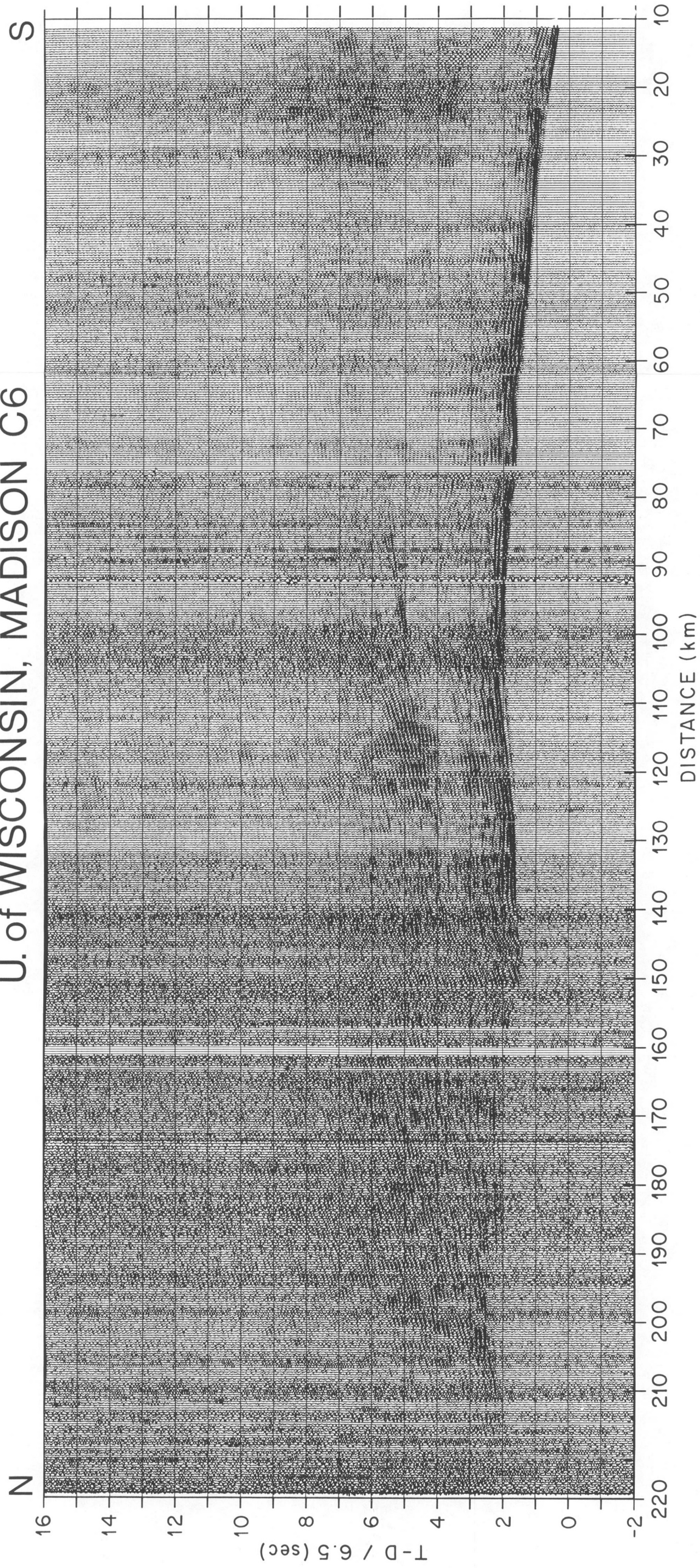


Fig. 23 Seismic section recorded at the University of Wisconsin-Madison site C6 on the south shore of Lake Superior.

U. of WISCONSIN, MADISON IR1

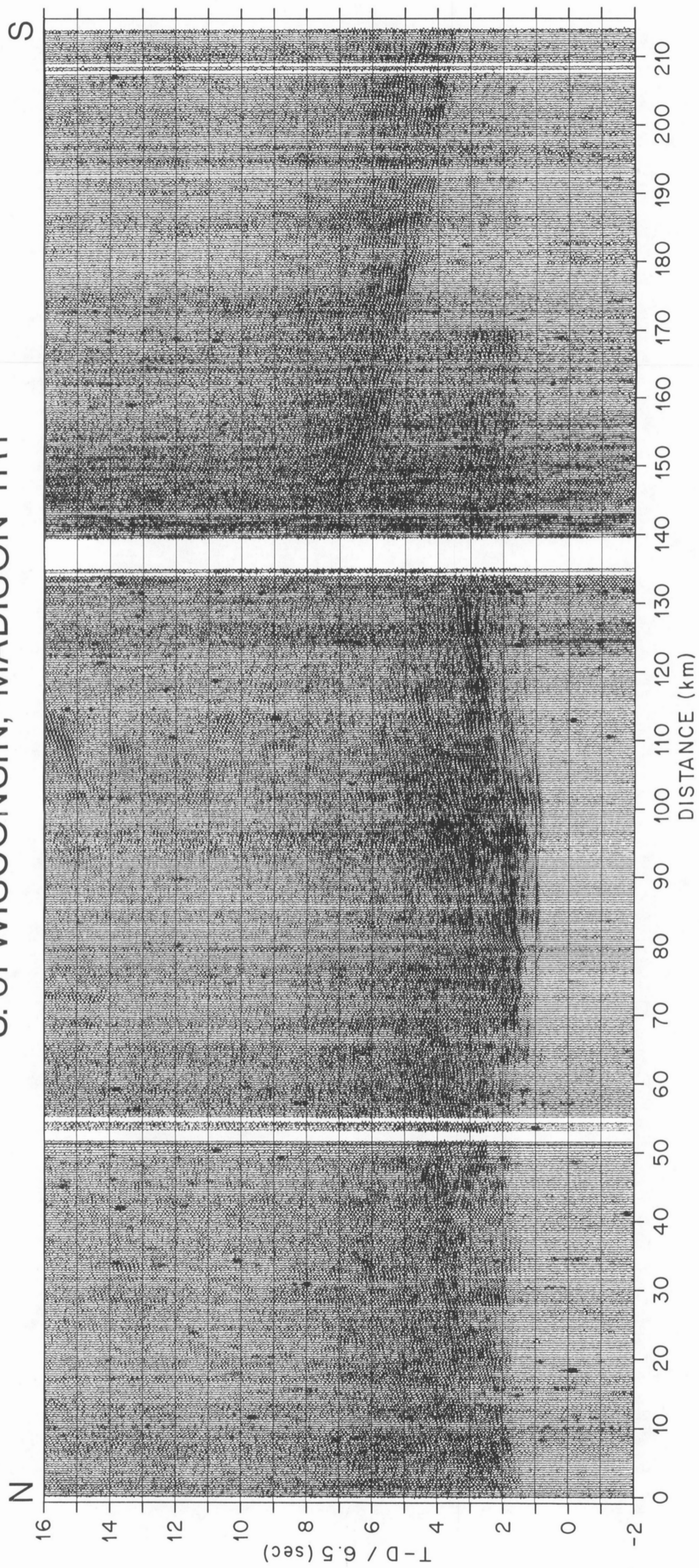


Fig. 24 Seismic section recorded at the University of Wisconsin-Madison site IR1 on the island of Isle Royale.

U. of WISCONSIN, MADISON IR2

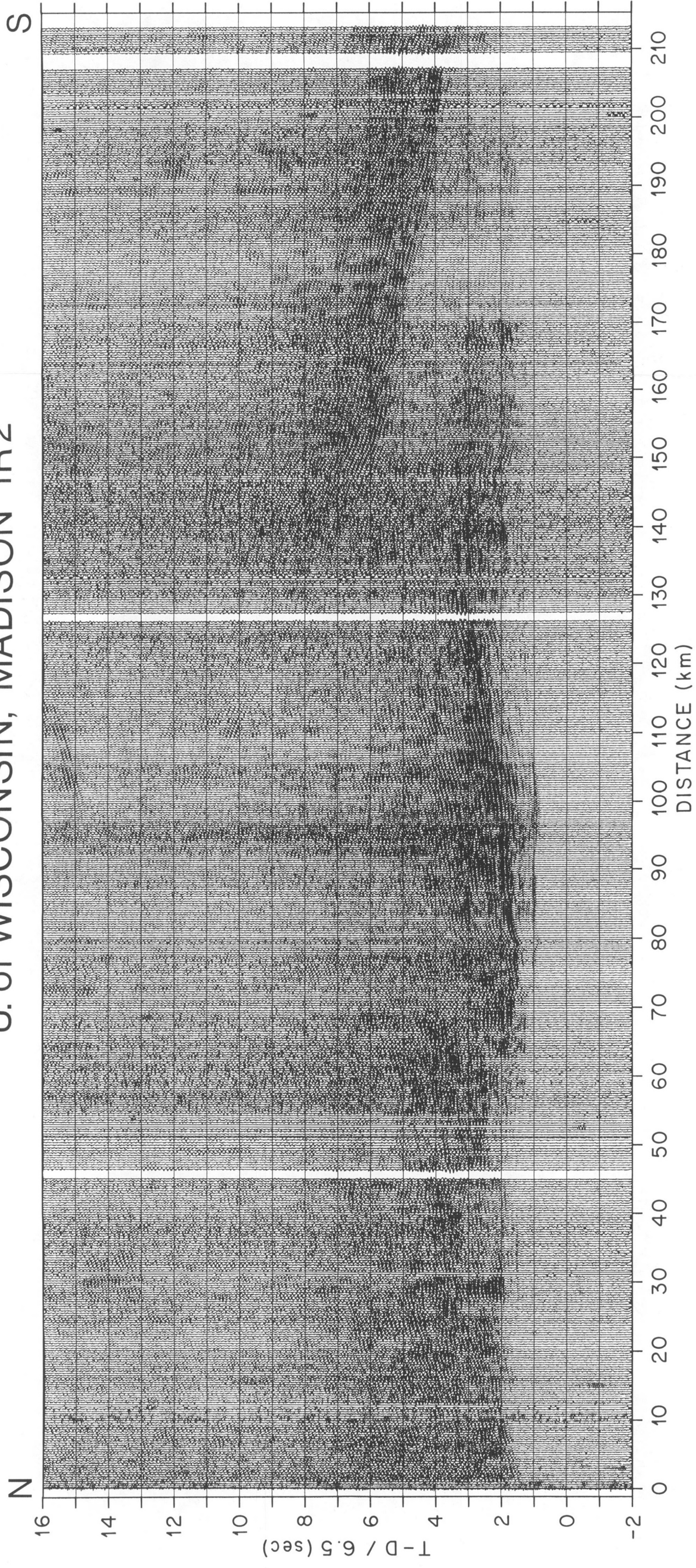


Fig. 25 Seismic section recorded at the University of Wisconsin-Madison site IR2 on the island of Isle Royale.

U. of WISCONSIN, MADISON CP1

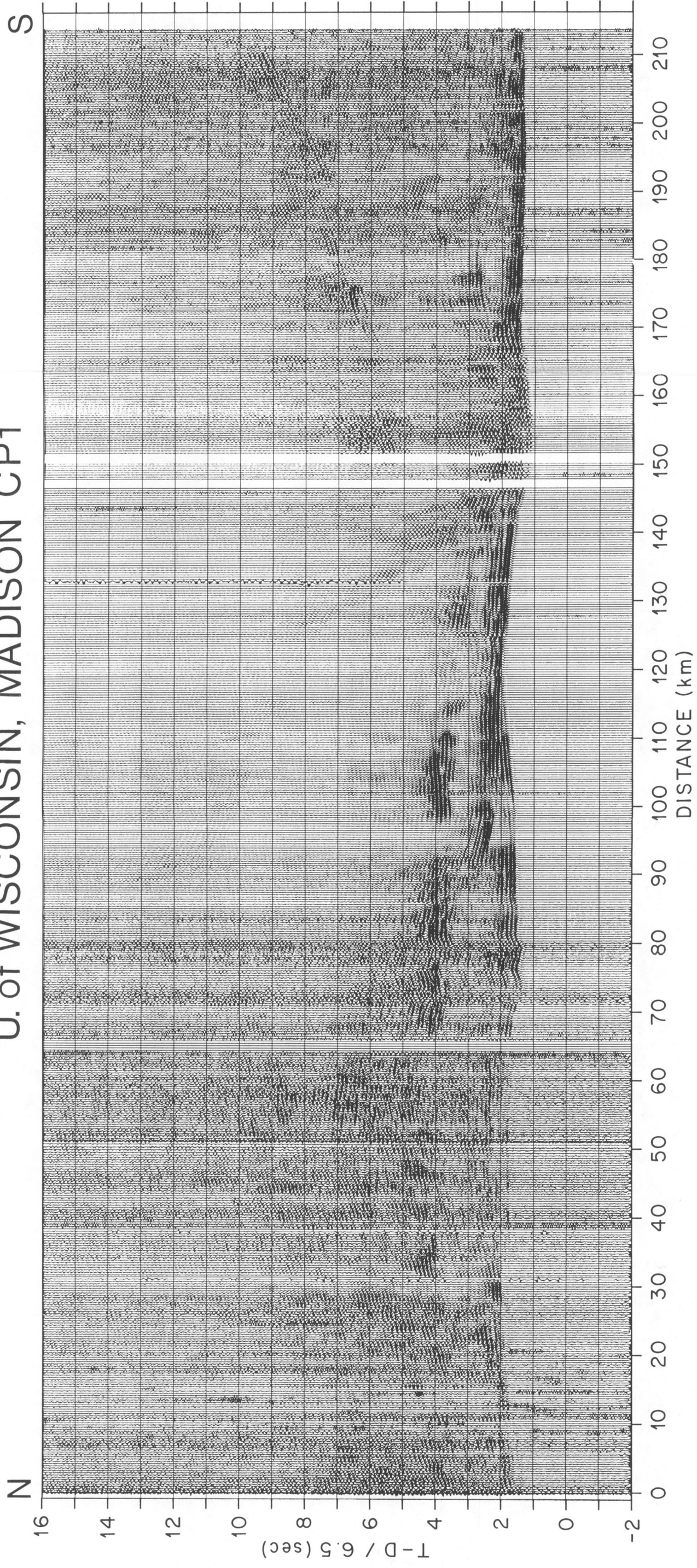


Fig. 26 Seismic section recorded at the University of Wisconsin-Madison site CP1 on the tip of the Keweenaw Peninsula.

U. of WISCONSIN, MADISON CP2

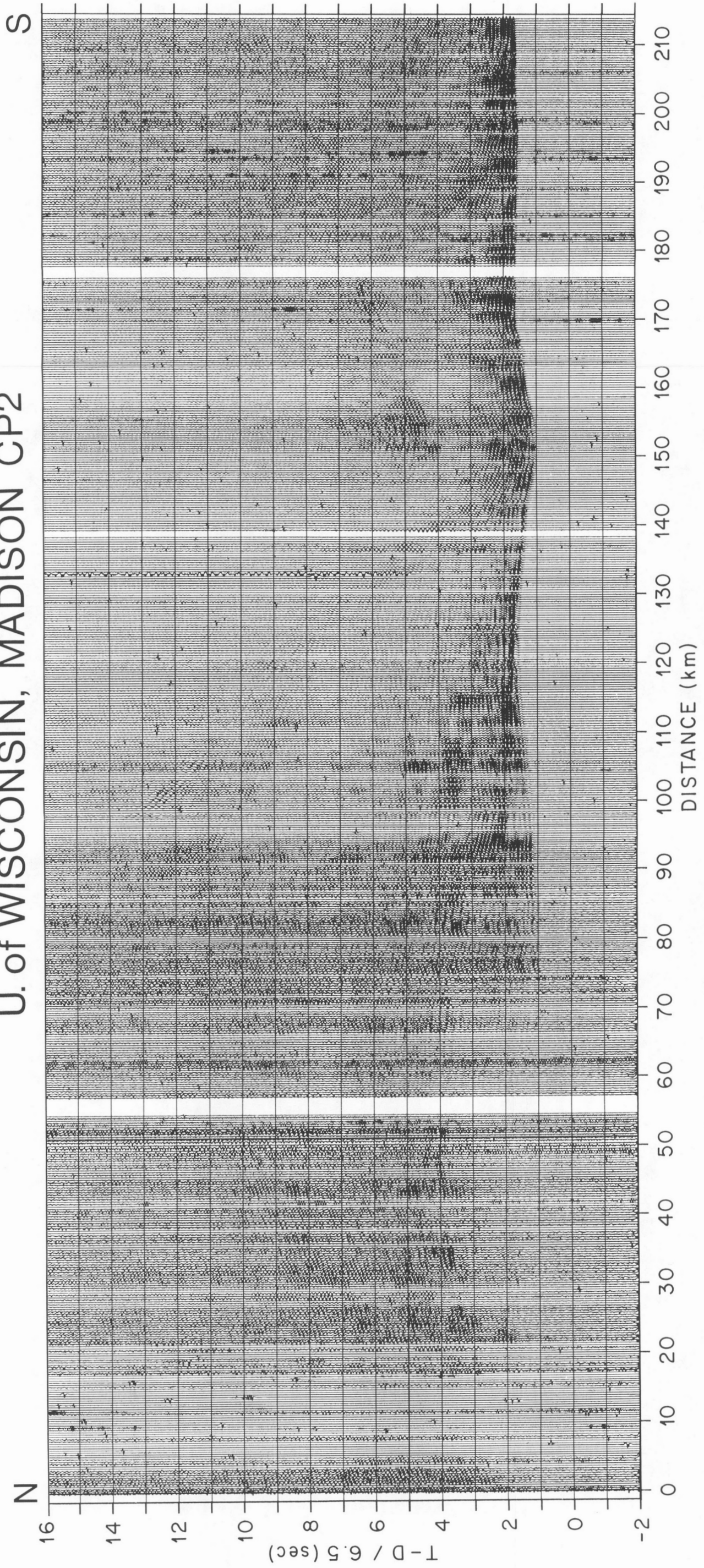


Fig. 27 Seismic section recorded at the University of Wisconsin-Madison site CP2 on the tip of the Keweenaw Peninsula.

U. of WISCONSIN, MADISON CP3

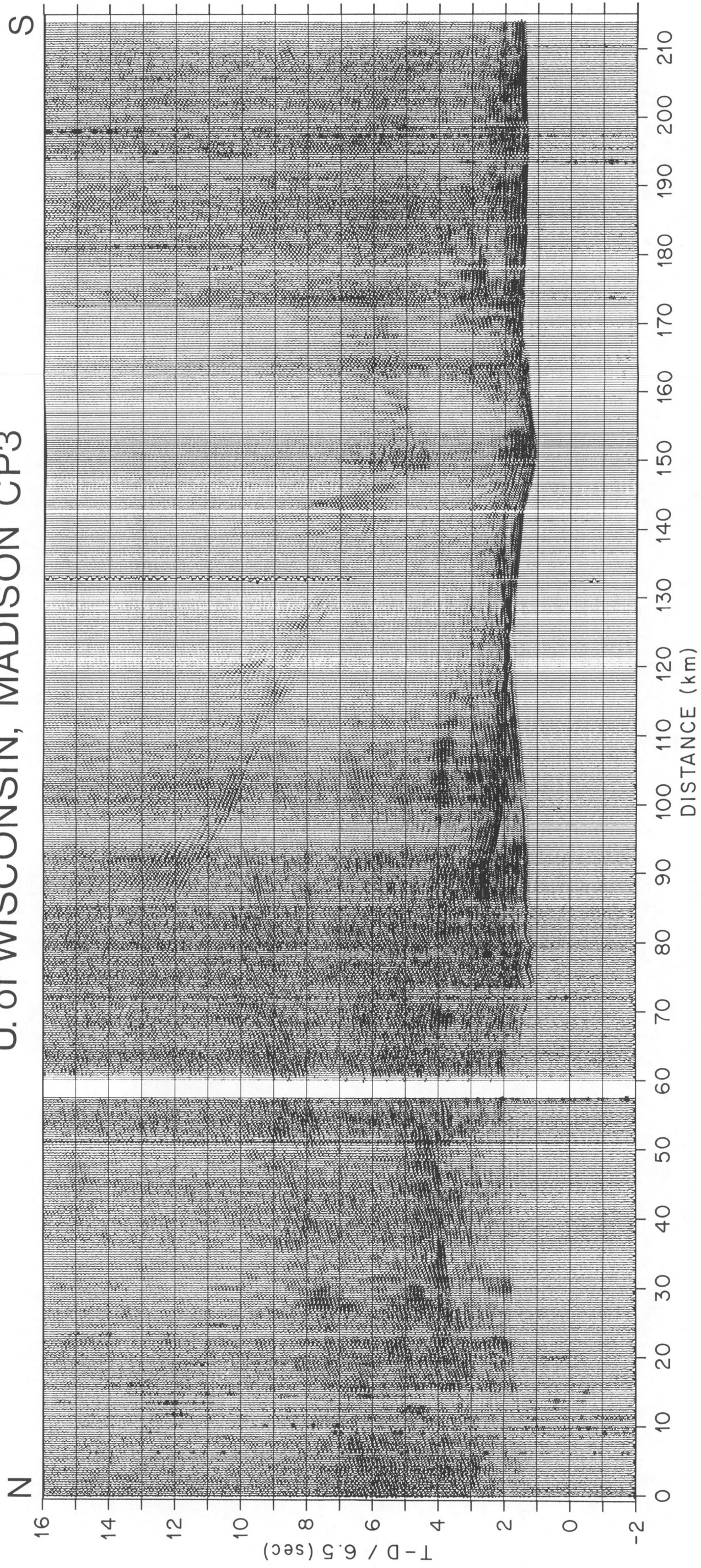


Fig. 28 Seismic section recorded at the University of Wisconsin-Madison site CP3 on the tip of the Keweenaw Peninsula.

SOUTHERN ILLINOIS U. CH

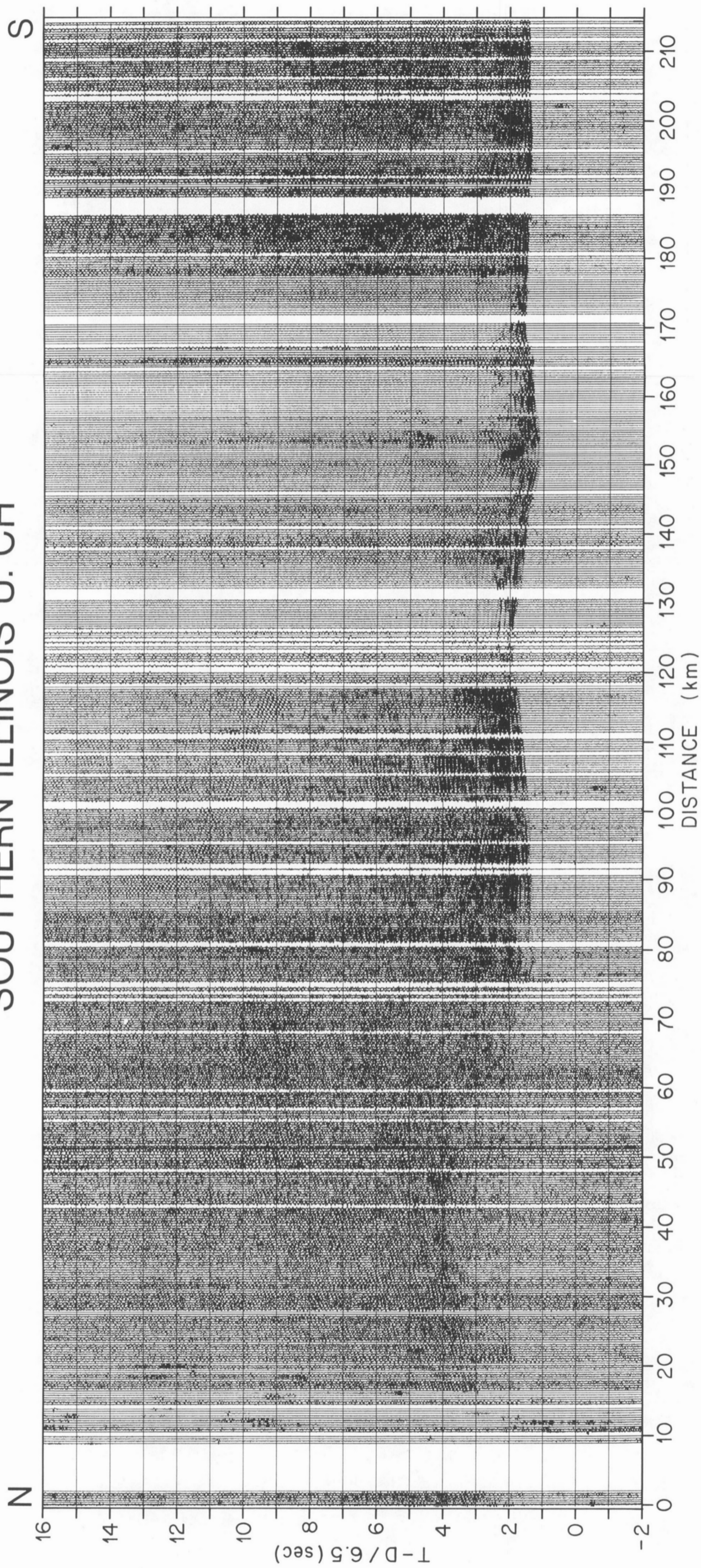


Fig. 29 Seismic section recorded at the Southern Illinois University site CH on the tip of the Keweenaw Peninsula.

U. of WESTERN ONTARIO A

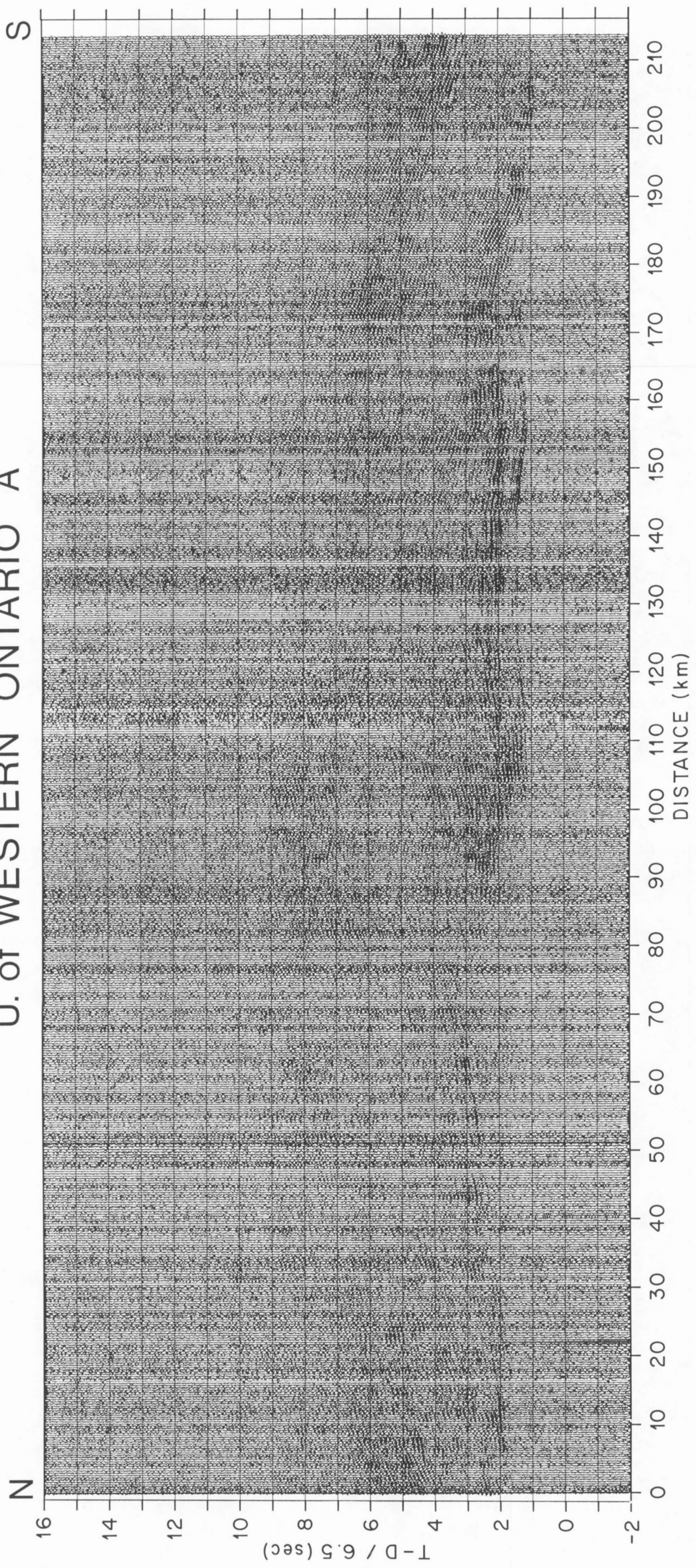


Fig. 30 Seismic section recorded at the University of Western Ontario site A on Mitchipicoten Island.

U. of WISCONSIN, MADISON B1

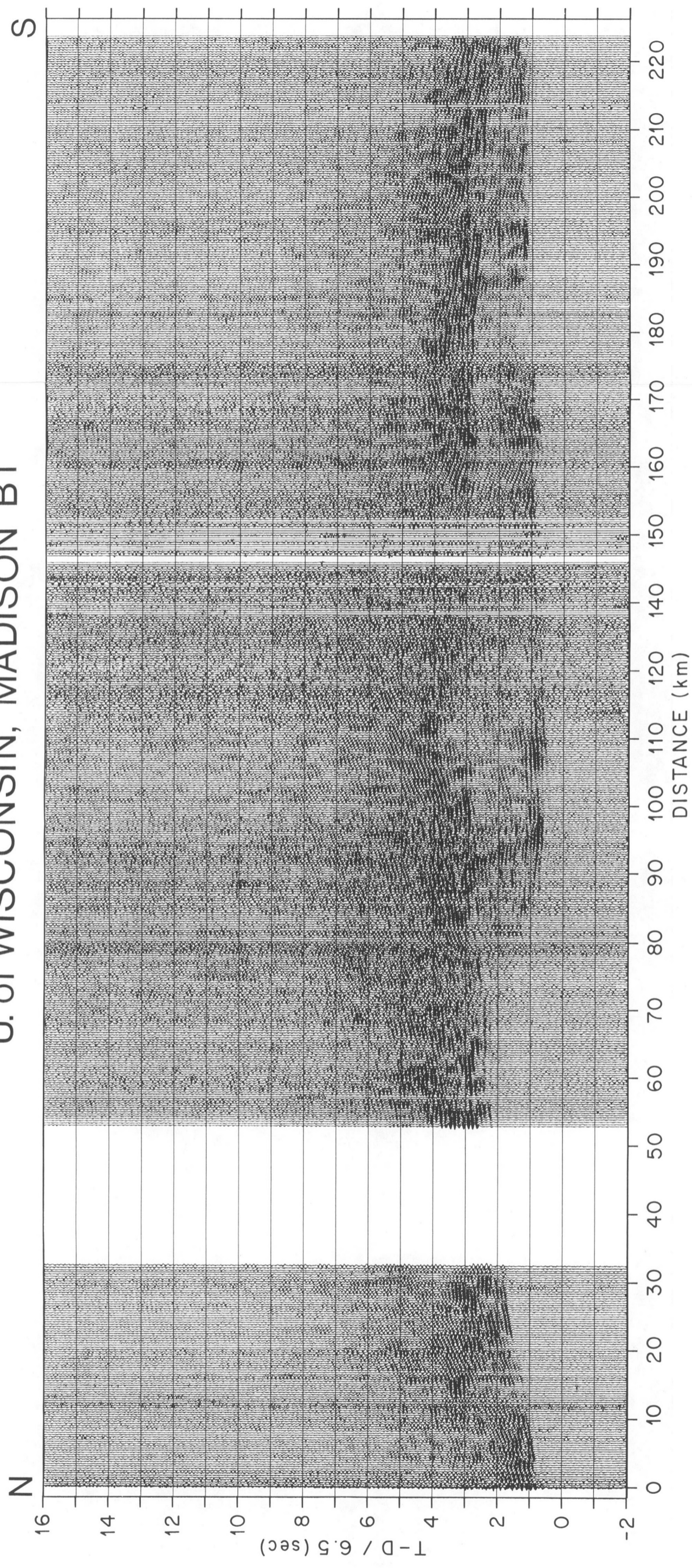


Fig. 31 Seismic section recorded at the University of Wisconsin-Madison site B1 on the northwestern shore of Lake Superior.

U. of WISCONSIN, MADISON ON1

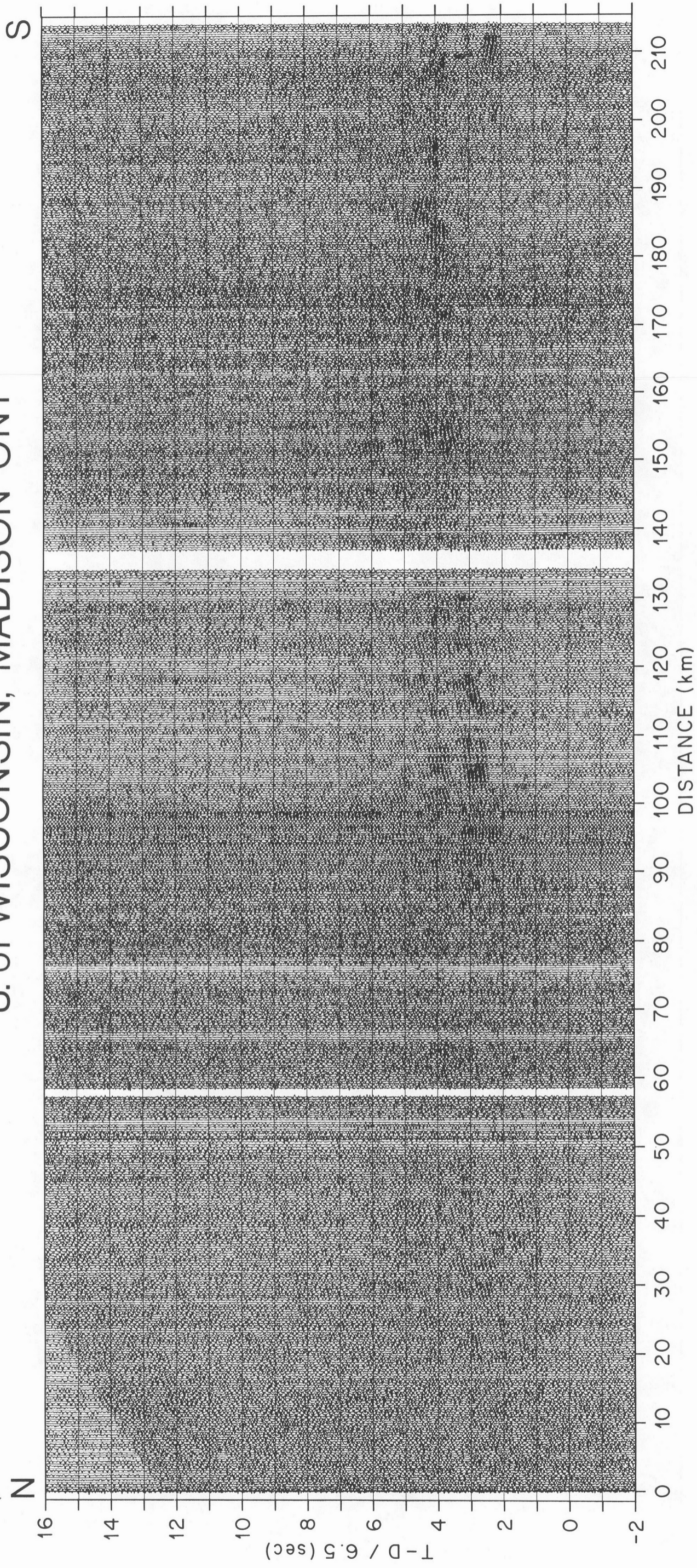


Fig. 32 Seismic section recorded at the University of Wisconsin-Madison site ON1 on the southwestern shore of Lake Superior.

U. of WISCONSIN, MADISON BF1

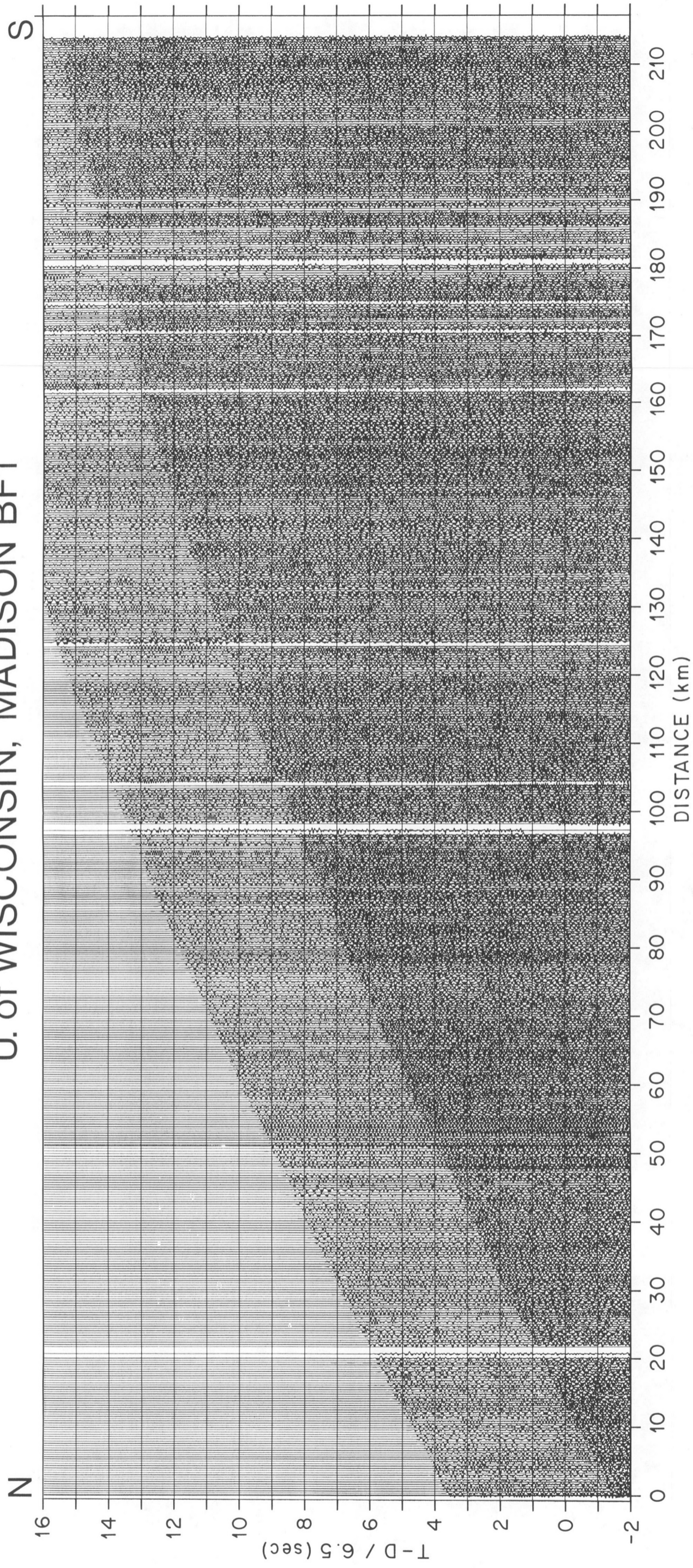


Fig. 33 Seismic section recorded at the University of Wisconsin-Madison site BF on the western end of Lake Superior.