CRUISE REPORT

CSS HUDSON CRUISE 93034

IN

HUDSON STRAIT AND UNGAVA BAY,

CANADIAN EASTERN ARCTIC

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Dartmouth, N.S.

GEOLOGICAL SURVEY OF CANADA OPEN FILE 2818

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GENERAL INFORMATION

Cruise Designation: 93034

Vessel: CSS Hudson

Dates: Oct. 17 - Nov. 8, 1993

Program Area:

The cruise commenced at St. John's, Newfoundland and ended at Bedford Institute of Oceanography, Dartmouth, N.S.

The program was conducted in Hudson Strait and Ungava Bay and comprised: (a) studies of the Quaternary geology and history of the region, including global change; and (b) physical geodesy of the Ungava Bay region.

Responsible Agency:

The cruise was organized by Atlantic Geoscience Centre.

Ship's Master: Captain John Lewis

Senior Scientist: Brian MacLean

Participating personnel:

B. MacLean	AGC
B. Loncarevic	"
I. Hardy	"
A. Boyce	"
R. Brown	Canadian Wildlife Service
T. Brynczka	U. of Montreal
B. Chapman	AGC
R. Daigneault	GSC (Centre Geoscientifique de Quebec)
M. Day	Artist
M. Gorveatt	AGC
L. Johnston	"
M. Kerwin	U. of Colorado
P. Loncarevic	AGC
W. Manley	U. of Colorado
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E. Thibault	U. of Montreal
K. Wagner	AGC
M. Yusegi	Geoforce

Cruise Objectives:

a) Quaternary Geology and Global Climate Change

Hudson Strait and Ungava Bay are a key region in the study of conditions that formerly existed at and adjacent to the northeast margin of the Laurentide Ice Sheet. Hudson Strait was a distributory route for ice from Hudson Bay and the interior of North America, as well as ice from Ungava and Labrador peninsulas and Baffin Island. The various marine and onshore data suggest that ice entering the Strait from the Ungava Peninsula has been a very important component in the total setting. Hudson Strait and Ungava Bay are also thought to have been major routes for meltwater discharge.

The record of paleoceanographic conditions contained in the sediment sequences in Hudson Strait is considered to be an important regional source of proxy data relating to global change during the last 12,000 years; lying as it does, midway between Lancaster Sound and the Gulf of St. Lawrence, the two other major eastern Canadian ice and meltwater dispersal routes to the Atlantic. Merging of ice and meltwater flowing into the North Atlantic from Hudson Strait with meltwater from Lake Aggassiz entering the Atlantic through the Gulf of St. Lawrence, has been postulated as a cause of the Younger Dryas cold climatic period.

The Quaternary geology is complex, representing sediments associated with the advance and retreat of glacial ice from Hudson Bay and the adjacent land masses of Ungava and Labrador peninsulas and from Baffin Island, as well as bottom currents and postglacial influences. The studies carried out during cruise 93034 were designed to sample sediment deposits in critical localities identified from previous cruises 90023 and 85027, and to extend the regional surveys into areas not previously examined.

Specific cruise objectives included collection of data relating to:

a) extent, occurrence, and retreat of Laurentide Ice;
b) the postulated late readvances of Ungava / Labrador ice in eastern Hudson Strait;
c) extent, trends, timing, ice margin positions, and relations to onshore deposits and trends;
d) the chronology of events;
e) depositional environments;
f) paleoceanography;
g) proxy data relating to global climate change;
h) sedimentological and related data (clay mineralogy, grain size).

b) Geophysical Studies:

Accurate global physical geodetical data to provide precise geoid information are required for such services as accurate satellite navigation. Such geoidal data are not available for the large area encompassed by Ungava Bay. It was proposed to obtain these data by surveys of Ungava Bay with a high precision shipboard gravitymeter. Gravity data obtained in Ungava Bay and along tracks in Hudson Strait would also provide information on the crustal structure and physical properties of the rocks underlying these various areas.

Methods:

Cruise objectives were achieved through a combination of sediment sampling (using Benthos piston corer and IKU clam shell sampler) at critical localities identified from previous surveys (90023, and 85027), and surveys conducted with Huntec, high resolution seismic reflection, single channel seismic reflection profiling, sidescan sonar, and 3.5 kHz systems. Gravity and magnetic data were obtained with hull mounted and towed systems, respectively. Navigation was by Differential GPS. The various systems are described in the Technical Report (Appendix G).

Achievements:

Survey and sampling objectives were reduced due to the condenced time schedule resulting from ice damage to Hudson during the preceding cruise. All of the reduced program was achieved all (Figs. 1 and 2), except for a small area adjacent to Nottingham and Salisbury islands in the westernmost part of the Strait where the presence of pack ice precluded surveys. with towed survey systems.

Benthos cores were obtained from eleven localities. The cores were excellent in both core recovery and quality (i.e. lack of disturbance and in the sedimentological parameters they contained).

Sediment sections cored included: the basal part of the acoustically stratified glaciomarine sediments in the floor of the eastern basin in Hudson Strait and on its northern and western flanks; in the Baie Héricart region of south central Hudson Strait; and in the marginal channel in southeastern Ungava Bay. Cores of the younger, late Holocene sediments were obtained from three localities where deposits of those sediments are best developed. These were in the Western Basin of Hudson Strait, in the Burgoyne Bay area in the south central part of the Strait, and in the southwestern part of Ungava Bay.

Visual logging of the cores indicates a variety of sedimentary depositional characteristics. These are illustrated by cores from the flanks of the Eastern Basin, which include intervals of rhythmically finely banded sediments that correlate well with magnetic susceptibility profile data, as well as intervals of diamict-like sediments. Core 93034-29 appears to have bottomed in glacial drift which had a distinct orange colouration. Small clay clasts bearing similar colouration occur in 93034-31. These cores are expected to yield very important chronological and biostratigraphic / paleoceanographic information on late glacial / deglacial events and their timing in the eastern part of the

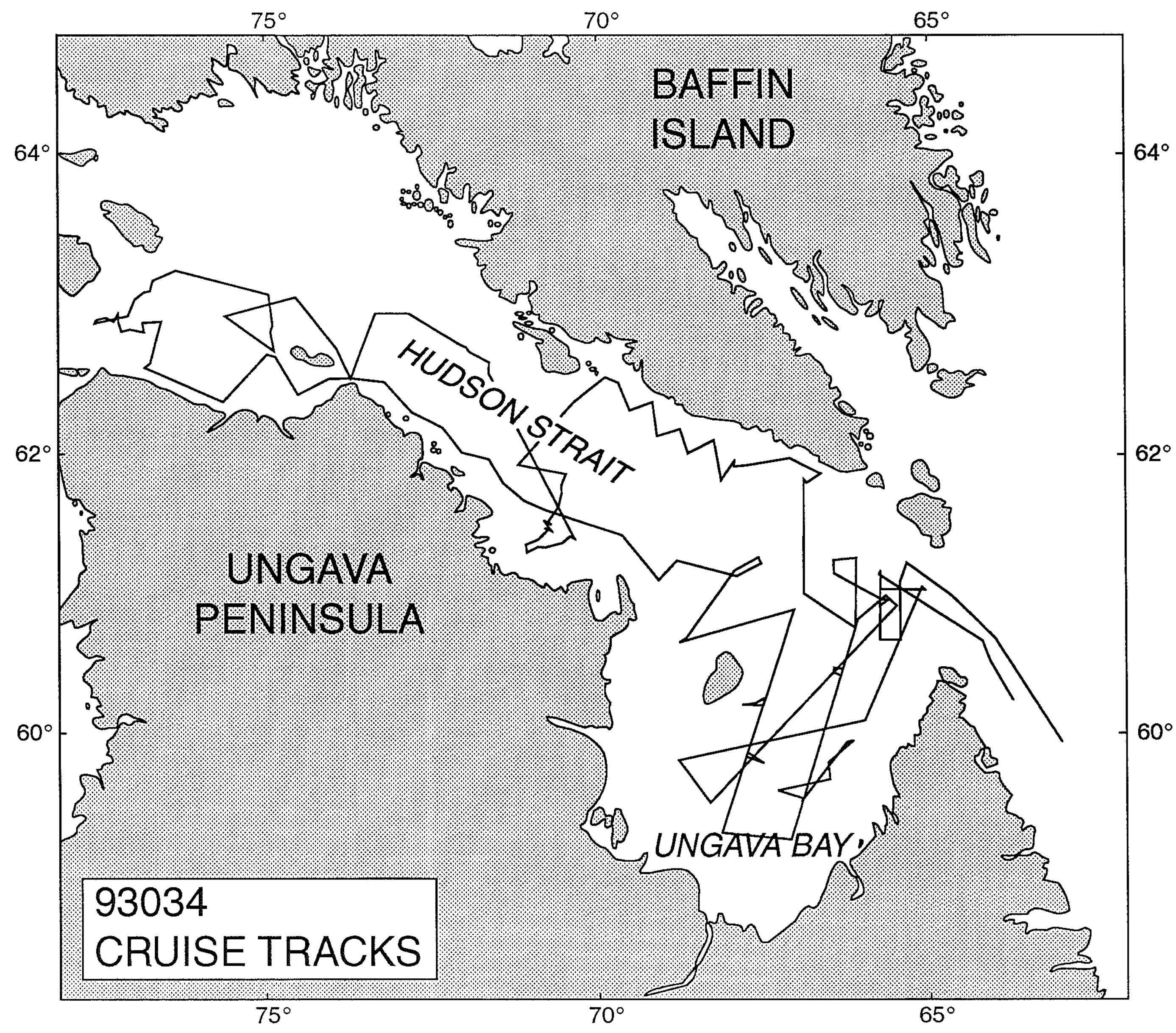


Fig. 1

39/93/108/3

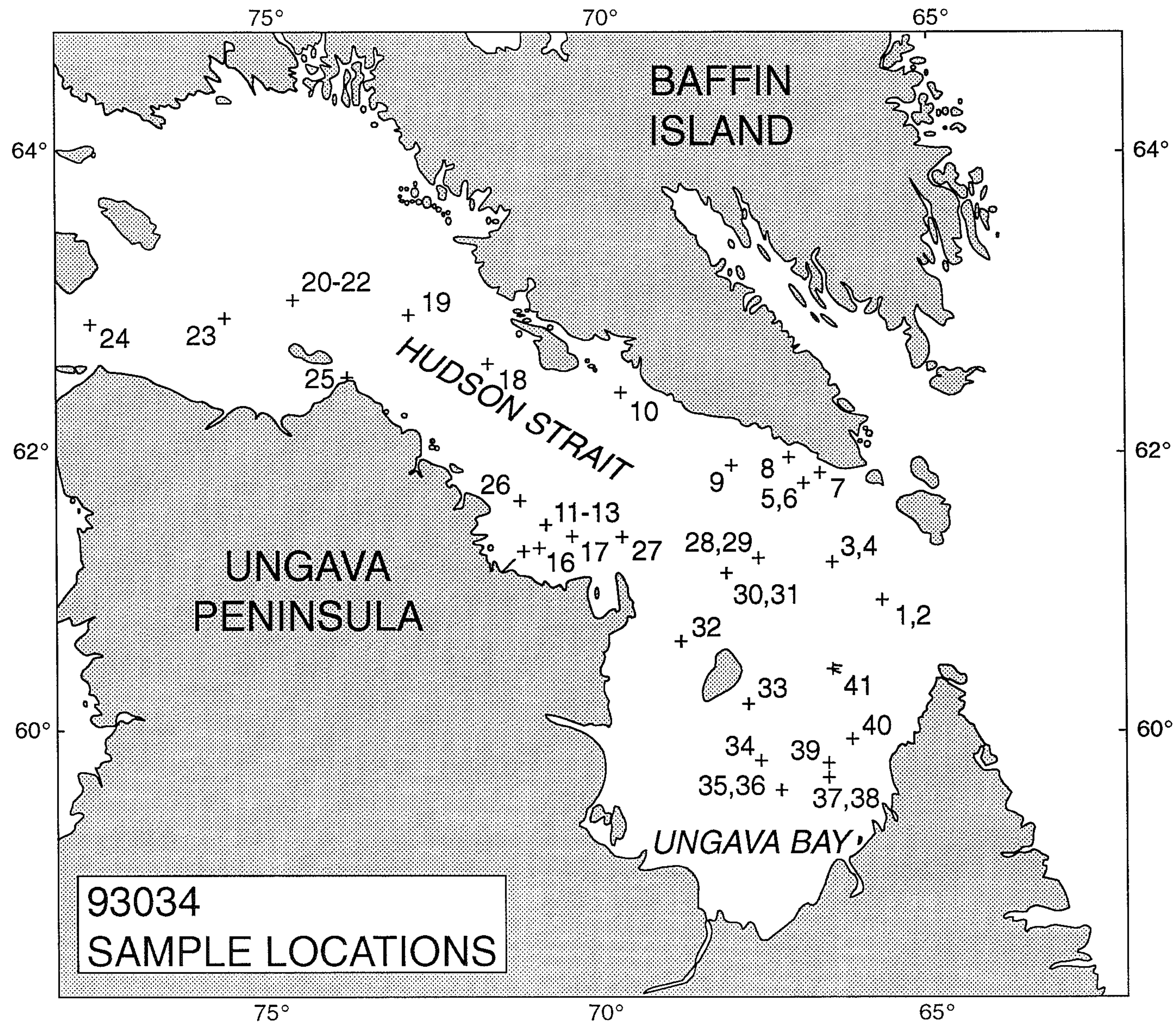


Fig. 2

39/108/93/2

Strait. Cores from the late Holocene part of the section appear to contain much more organic matter and to have been extensively bioturbated.

Regional surveys were conducted in areas adjacent to Meta Incognita Peninsula, Ungava Peninsula, in the western Ungava Peninsula - Charles Island - Nottingham Island region, and in Ungava Bay with sidescan sonar and acoustic profiling systems to investigate glacial ice flow directions and sediment deposits.

In addition, studies were conducted on lithologies of pebble clasts recovered in IKU sediment samples to investigate glacial sources and flow trajectories (see section by R.A. Daigneault).

Acknowledgements:

Sincere thanks are extended to Captain John Lewis, officers, and crew of CSS Hudson, and to all members of the scientific staff for their excellent cooperation and hard work in making this cruise so successful. Special thanks are also due senior personnel in BIO Ship Division and aboard CSS Hudson for their efforts to achieve in the shortest possible time, repairs to damage sustained by Hudson during the previous cruise, and for their committment to achievement of as much of the originally scheduled scientific program as possible. Data assembly for this report was by I. Hardy and L. Johnston. Our thanks are extended to G. B. Fader and H. W. Josenhans for review of this report.

APPENDICES

GRAVITY MEASUREMENTS 17 November 1993
in Hudson Strait and Ungava Bay
(Bosko D. Loncarevic)

1 - Summary

The compilation of the Canadian East Coast Gravity Map identified two large areas as sparsely covered: Foxe Basin and Hudson Strait / Ungava Bay. The purpose of gravity measurements on HUDSON Cruise 93034 (Oct. 17 - Nov. 8, 1993) was to fill-in some of the gaps in the latter area, on an opportunity basis.

The location of the ship's tracks was governed by the primary objective of the cruise: to complete the geological mapping (mostly shallow seismic profiling) and bottom sampling programs initiated several years ago.

Twelve tracks were planned in Ungava Bay but due to cruise delays following Hudson's accident, most of these lines were cancelled. Among the few lines that were retained from the original program,, data were collected along the ECSOOT Lithoprobe track and along a foot print of one of the satellite passes along which gravity has been computed. Because of the problems with the gravimeter logging computer crashing (see Annex A) there are gaps in the data. Some of the lost data may be retrieved from the on-line printout.

2 - Preliminary results

Due to the equipment and software problems, all the available time had to be spent on data acquisition so that there was little opportunity on board to proceed with data analysis and interpretation. Based on provisional shipboard speculations, it would appear that the gravity field in general is low, about -20 Mgal in the middle of Hudson Strait and increases towards a zero level on the northern side.

On the southern side of the Strait there is a large negative anomaly which reaches a minimum of about -90 Mgal north west of Akpatok Island. In comparison with the Orpheus Anomaly off Nova Scotia, one could guess this anomaly reflects a graben-like depression with more than 5 km of Paleozoic sediments.

The large negative anomaly and the ship's track along which it was recorded (heavy portion of the track), are shown in Fig. 1.

2 - Navigation

The major problem in Dynamic Gravimetry (Gravity Measurements from a moving platform) is to measure the East-West velocity, so that a sufficiently accurate Eotvoes Correction can be computed. The Global Positioning System (GPS) was used for the navigational control for the cruise. Two on-board receivers were used: a MAGNAVOX 4200D was used for differential GPS using a correction transmitted via a communication satellite. (This is a commercial system called SatMark and transmits corrections obtained at ground stations on Long Island, NY and Duluth, Minnesota). The second system used regular GPS coverage with a TRIMBLE Navigator receiver.

Differential GPS is superior, as it gives more accurate estimates of position and thus a smoother ship's track. However, the great distance between the ground stations and the working area made it impossible to have the identical satellite constellations in view all the time. The result was that for three periods of the day (on the average) differential GPS was not reliable. For two of those periods (lasting 1 to 2 hours each) the D-GPS would lose lock for a few seconds at a time, several times a minute. For the third period, also lasting a couple of hours, the lock would be lost completely.

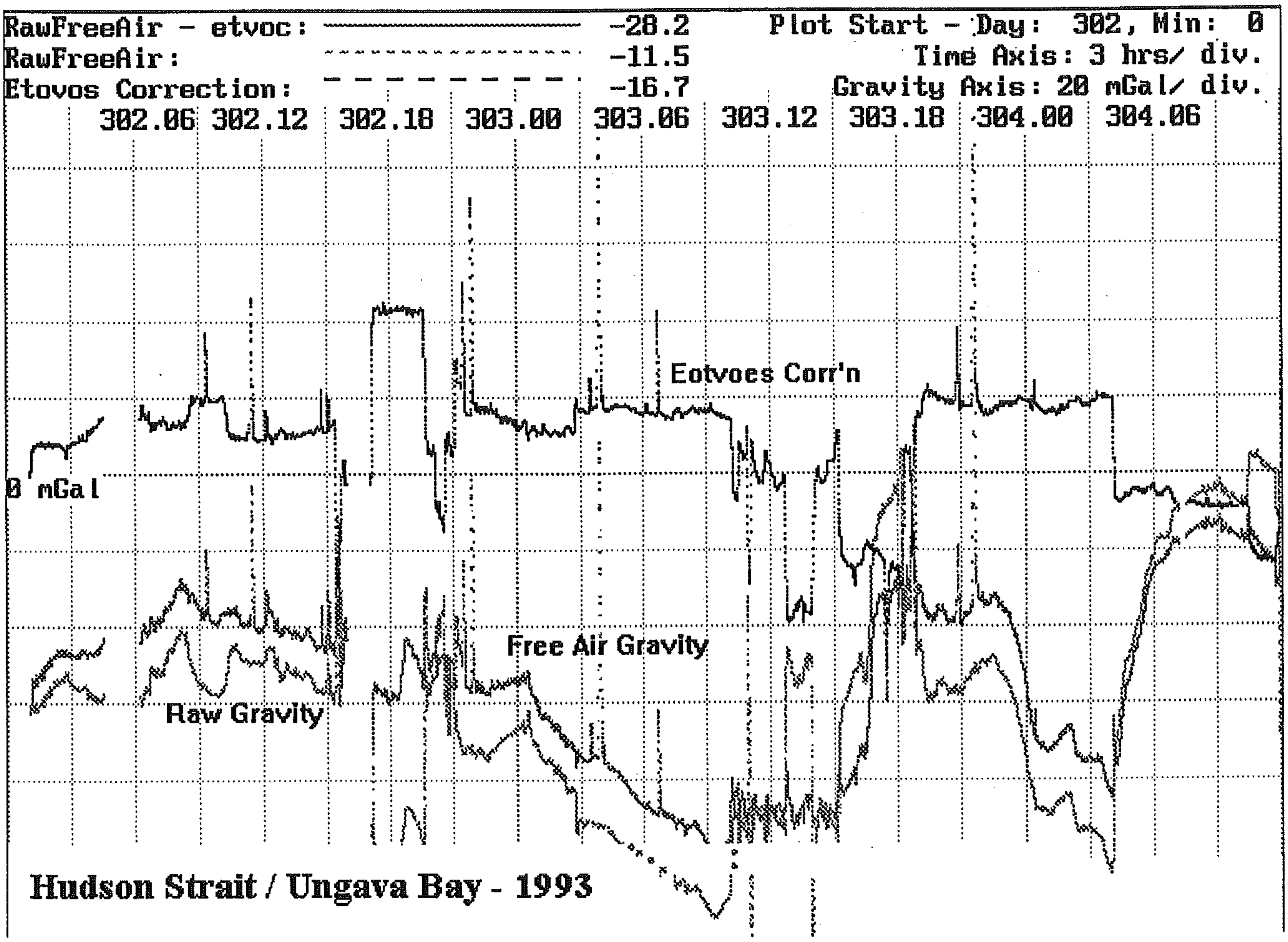
Data acquisition software was modified on board so that the drop-outs of the D-GPS were detected and the fixes from the regular GPS substituted. This resulted in jumps in calculated Eotvoes correction as can be seen in Fig. 2. Further processing is required to eliminate these jumps from the final data file.

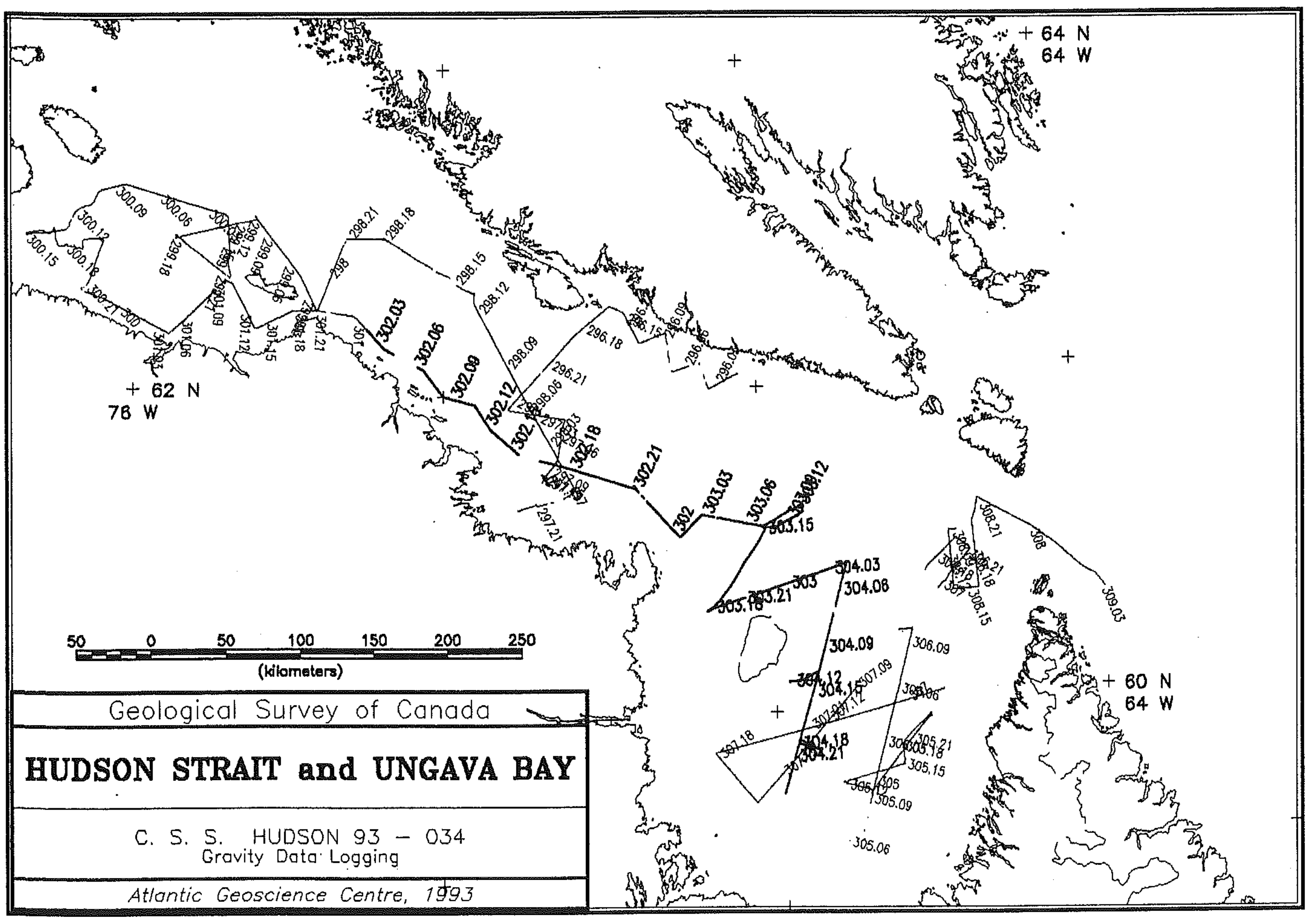
3. Future Intentions

The first step in the final data processing will be to eliminate from the data file all the periods when the ship was not engaged in gravity measurements, i.e. while on station for geological sampling or manoeuvering on seismic lines.

The navigational file must be examined next to resolve the problems of switching from regular to differential GPS and the problems of data gaps. A particular problem of data reduction will be accounting for the tides, which in Ungava Bay are the second largest in the world.

After the data processing for this cruise is completed, it will be integrated with two existing sources of data: earlier shipboard measurements in Hudson Strait, and the existing satellite gravity. If the shipboard and satellite data can be made into a homogeneous data set, then the coverage in Hudson Strait and Ungava Bay should be sufficient for geodetic purposes.


RawFreeAir - etvoc: -28.2
RawFreeAir: -11.5
Etovos Correction: -16.7
Plot Start - Day: 302, Min: 0
Time Axis: 3 hrs/ div.
Gravity Axis: 20 mGal/ div.
302.06 302.12 302.18 303.00 303.06 303.12 303.18 304.00 304.06
Eotvoes Corr'n
0 mGal
Free Air Gravity
Raw Gravity
Hudson Strait / Ungava Bay - 1993


+ 64 N
64 W
+ 62 N
76 W
+ 60 N
64 W
50 0 50 100 150 200 250
(kilometers)
Geological Survey of Canada
HUDSON STRAIT and UNGAVA BAY
C. S. S. HUDSON 93 – 034
Gravity Data Logging
Atlantic Geoscience Centre, 1993

ANNEX A to Gravity Report

Program: MX2ZEHUD

Purpose

Select from Incoming GPS messages data for Navigation Output to ZE30 Sea Gravimeter Controller; Accept and log data from Sea Gravimeter on NAV Port.

Program Structure

... Initialization

Initialize the clock from a GPS Message.

Initialize date from CPU Clock - therefore important to have the date in CPU clock set correctly.

... Main Loop

- Check a message has been received.
- Can the message be recognized
- If a recognized message than decode it.
- If it is a Differential GPS message check Status Code.
- If a status code is 4 or 5 then D-GPS is OK and can be used. Set ID codes to "M X".
- If a status code is less than 4 then ignore D-GPS and look for regular GPS message from TRIMBAL. Set ID codes to "T L".
- Compose the output message to ZE30 in prescribed format.
- Send a message out and display it on the screen.

- Check time progress and if six messages sent out then send out a trigger code [ENQ i.e. CHR$(05)] following which ZE30 will send back to laptop an output message consisting of gravity value, accelerations, etc. Compose a second output message for logging.

... Inputs

1) On COM1 at 4800 baud receive GPS signals. Any combination of NMEA messages can be sent out and the program will decode the selected ones.

2) On COM2 at 9600 baud receive gravimeter output after a trigger code. (This can be also programmed to a timed output on the ZE front panel).

... Outputs

1) On COM2 at 9600 baud send navigation to ZE30.

2) Log an output record to a Hard |Disk file.

Operation

For the first week of the survey the program was operating directly from the QuickBasic environment and the name of the output file logged on a floppy disk was imbedded in the program. The program was crashing on a regular basis during the night because of an overflow on the comport and it was felt desirable to make the program more automatic so that any night watch keeper could restart it.

Modifications were therefore made to the program to load it from the AUTOEXEC file with the COMMAND line containing the name of the Hard Disk file to which output records were logged. This was updated every day after midnight (ZULU) and the previous days file backed up to a floppy disk.

The arrangement had a serious shortcoming which did not become apparent until the last day of the survey. Since the LapTop was configured with a 512 k SmartDrive the logging to a hard-drive did not write data to disk but to a protected part of memory. On normal completion of the program these data were dumped to disk. But in case of the system crash requiring re-booting this data was lost. The work-around this problem was to close the file after every record. (As an alternative, self booting floppies could be used and the data logged to floppy in which case only a small amount of data would be lost after system crash and re-booting).

The hard learned lesson is that Pcs were not designed for real-time, on-line operations and a great care should be exercised when using them for logging purposes.

Gravimeter output was also logged on a line printer at 5 minute intervals. It is hoped that it will be possible to recover most of the lost data but software will have to be modified to merge separately logged navigation and gravity.

Known bugs

1) Day change is one record late so that an apparent "jump" in time occurs at every midnight.

2) A space is missing in the first record after booting.

Improvements

1) Check if the output format is the most efficient

2) Check if the screen display format is the most efficient one.

ANNEX B to Gravity Report

GRAVPROC.EXE

Processes Free Air Gravity from MX2ZEHUD output files, display them on screen as profiles and produce an output ASCII file suitable for use by SigmaPlot or GEOSOFT programs.

There are two principal components to this program. The first one is the new algorithm to calculate the Eotvos Correction based on the longitude differences as a measure of the East-West velocity. The second component is the graphics section which sets the graphics scales and displays and profiles three variables: Eotvos Correction, RawFreeAir Gravity (defined as measured gravity corrected for the base value and theoretical gravity) and Reduced Free Air Gravity.

Known bugs

1) Origin of graphics screen not set properly.
2) ON ERROR does not work properly. (Check with Help line)

Improvements

1) Select how often to output time for Geosoft posting.
2) Adjustable vertical scales.
3) An indication of how much file is left un-plotted.
4) Implement Visual Basic Interface.:
   - Select how many and which profiles to plot.

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ANNEX C to Gravity Report

FILESTAT.EXE

A simple program to scan through an MX2ZEHUD output file, list the first and last records, and check for gaps in time sequence and for jumps in either Latitude or Longitude.

The output of this program is given in ANNEX D.

ANNEX D to Gravity Report

Status if Data Files

```
Reading File:  93295X.GLG

First Record Reads
   93 296 0133 06 M 62 04.889N X068 13.607W 0133 03E 3  1275.21 -0.0006  0.0028
Record Gap Greater then 5 minutes:   425247.8 , (  34  mins)
    93 296 0653 48 M 62 07.445N X069 04.204W
    93 296 0727 48 M 62 10.545N X069 05.761W
LAST  Record Reads
   93 296 1236 54 M 62 25.909N X069 36.492W  1236 50E 3  1299.91  0.0049  0.0022

Total Number of Records:   6624


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Reading File:  93296A.GLG

First Record Reads
   93 296 1239 06 M 62 26.004N X069 36.593W 1237 56C 3  1300.25 -0.0002 -0.0007

Record Gap Greater then 5 minutes:   426240.1 , (  1440.09999999998  mins)
    93 296 0000 00 M 61 58.607N X071 03.969W
    93 297 0000 06 M 61 58.601N X071 03.983W

LAST  Record Reads
   93 297 1532 30 M 61 29.817N X070 44.414W  1532 27E 3  1242.25  0.0000 -0.0077

Total Number of Records:   16984


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Reading File:  93297A.GLG

First Record Reads
   93 297 1906 36 M 61 17.966N X071 03.803W 1905 38C 3  1182.65 -0.0013 -0.0013

Record Gap Greater then 5 minutes:   427680.1 , (  1440.09999999998  mins)
    93 297 0000 00 M 61 27.265N X070 23.447W
    93 298 0000 06 M 61 27.275N X070 23.457W

LAST  Record Reads
   93 298 0006 42 M 61 27.833N X070 24.042W  0006 40E 3  1223.92  0.0028  0.0035

Total Number of Records:   3125
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Reading File:  93298A.GLG

First Record Reads
   93 298 0007 18 M 61 27.875N X070 24.090W 0007 16E 3  1223.14  0.0007 -0.0106

Record Gap Greater then 5 minutes:   429120.2 , (  1440.20000000001  mins)
    93 298 0000 00 M 62 43.406N X073 29.924W
    93 299 0000 12 M 62 43.388N X073 29.938W

LAST  Record Reads
   93 299 0000 12 M 62 43.388N X073 29.938W  0000 08E 3  1319.99  0.0011  0.0002

Total Number of Records:   14956

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Reading File:  93299A.GLG

First Record Reads
   93 299 0001 48 M 62 43.252N X073 30.041W 0000 37C 3  1319.41 -0.0020  0.0020

Record Gap Greater then 5 minutes:   430560.1 , (  1440.09999999998  mins)
    93 299 0000 00 M 62 54.484N X074 50.665W
    93 300 0000 06 M 62 54.494N X074 50.666W

LAST  Record Reads
   93 300 0032 12 M 62 57.174N X074 51.234W  0032 10E 3  1335.97 -0.0004 -0.0009

Total Number of Records:   15313

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Reading File:  93300A.GLG

First Record Reads
   93 300 0033 54 M 62 57.325N X074 51.254W 0032 38C 3  1335.88  0.0015 -0.0040

Record Gap Greater then 5 minutes:   432000.2 , (  1440.10000000004  mins)
    93 300 0000 06 M 62 29.587N X076 12.951W
    93 301 0000 12 M 62 29.583N X076 12.932W

LAST  Record Reads
   93 301 0139 00 M 62 25.614N X075 54.925W  0138 57E 3  1275.13  0.0146 -0.0234

Total Number of Records:   15687

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Reading File:  93301A.GLG
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First Record Reads
   93 301 0139 54 M 62 25.582N X075 54.760W 0138 55C 3  1274.17 -0.0102  0.0187

Record Gap Greater then 5 minutes:   432548.1 , (  23.2010000000009  mins)
    93 301 0844 54 M 62 37.814N X075 00.413W
    93 301 0908 06 M 62 39.565N X074 57.066W
Record Gap Greater then 5 minutes:   433440.2 , (  1440.20000000001  mins)
    93 301 0000 00 M 62 27.496N X073 05.992W
    93 302 0000 12 M 62 27.487N X073 05.971W

LAST  Record Reads
   93 302 0059 06 M 62 24.839N X073 00.638W  0059 03E 3  1273.65  0.0100 -0.0072

Total Number of Records:   14487

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Reading File:  93302A.GLG

First Record Reads
   93 302 0102 00 M 62 24.696N X073 00.380W 0101 52E 3  1272.86  0.0024 -0.0052

Record Gap Greater then 5 minutes:   433813 , (  100.799999999988  mins)
    93 302 0432 12 M 62 15.649N X072 38.645W
    93 302 0613 00 M 62 11.071N X072 20.340W
Record Gap Greater then 5 minutes:   434467 , (  71.7999999999884  mins)
    93 302 1555 12 M 61 39.971N X071 06.391W
    93 302 1707 00 M 61 36.173N X070 47.230W
Record Gap Greater then 5 minutes:   434880.1 , (  1440.09999999998  mins)
    93 302 0000 00 M 61 07.805N X069 07.058W
    93 303 0000 06 M 61 07.796N X069 07.043W

LAST  Record Reads
   93 303 0200 06 M 61 11.356N X068 52.646W  0200 04E 3  1165.13  0.0011  0.0011

Total Number of Records:   13871

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Reading File:  93303A.GLG

First Record Reads
   93 303 0201 30 M 61 11.438N X068 52.451W 0201 27E 3  1164.49 -0.0028  0.0100

Record Gap Greater then 5 minutes:   436320.1 , (  1440.09999999998  mins)
    93 303 0000 00 M 60 47.006N X067 46.250W
    93 304 0000 06 M 60 47.009N X067 46.227W

LAST  Record Reads
   93 304 0030 12 M 60 47.757N X067 40.755W  0030 10E 3  1124.16  0.0031 -0.0027

Total Number of Records:   14170
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Reading File:  93304A.GLG

First Record Reads
   93 304 0031 12 M 60 47.785N X067 40.579W 0030 12C 3  1124.40  0.0011  0.0004

Record Gap Greater then 5 minutes:   436769.4 , (  23.2000000000116  mins)
    93 304 0706 12 M 60 37.446N X067 12.480W
    93 304 0729 24 M 60 34.694N X067 14.289W
Record Gap Greater then 5 minutes:   437079.5 , (  14.7000000000116  mins)
    93 304 1224 48 M 60 10.845N X067 42.955W
    93 304 1239 30 M 60 10.935N X067 42.465W
Record Gap Greater then 5 minutes:   437085.5 , (  5.20000000001164  mins)
    93 304 1240 18 M 60 10.920N X067 42.517W
    93 304 1245 30 M 60 10.886N X067 42.801W
Record Gap Greater then 5 minutes:   437097.1 , (  10.7999999999884  mins)
    93 304 1246 18 M 60 10.879N X067 42.832W
    93 304 1257 06 M 60 10.768N X067 42.085W

LAST  Record Reads
   93 304 2314 06 M 59 29.787N X067 57.791W  2314 04E 3  1075.06  0.0043 -0.0073

Total Number of Records:   13334


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Reading File:  93305A.GLG

First Record Reads
   93 305 0609 42 T 59 10.722N L067 14.631W 0608 22C 3  1024.62  0.0049 -0.0021

Record Gap Greater then 5 minutes:   438159.4 , (  5.40000000002328  mins)
    93 305 0634 00 T 59 10.722N L067 14.631W
    93 305 0639 24 T 59 10.722N L067 14.631W
Record Gap Greater then 5 minutes:   438164.5 , (  284.467000000004  mins)
    93 305 02  T 28 1N L44. 0W          022
    93 305 0644 30 T 59 10.722N L067 14.631W
Record Gap Greater then 5 minutes:   438165.4 , (  405.300000000047  mins)
    93 305 000. 6 T 00 0.7N L001 .0*W
    93 305 0645 24 T 59 10.722N L067 14.631W
Record Gap Greater then 5 minutes:   438184.3 , (  6.79999999998836  mins)
    93 305 0657 30 T 59 10.722N L067 14.631W
    93 305 0704 18 T 59 10.722N L067 14.631W
Record Gap Greater then 5 minutes:   438242.5 , (  45.7000000000116  mins)
    93 305 0716 48 M 59 14.421N X067 03.463W
    93 305 0802 30 T 59 18.936N L067 00.813W
Record Gap Greater then 5 minutes:   438264.4 , (  6.60000000003493  mins)
    93 305 0817 48 T 59 18.936N L067 00.813W
    93 305 0824 24 T 59 18.936N L067 00.813W
Record Gap Greater then 5 minutes:   438669.183 , (  11.7829999999958  mins)
    93 305 1457 24 T 59 37.662N L066 30.960W
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    93 305 1509 11 T 59 37.793N L066 31.154W
Record Gap Greater then 5 minutes:   438676.883 , (  5.93399999995017  mins)
    93 305 1510 57 T 59 37.814N L066 31.227W
    93 305 1516 53 T 59 37.911N L066 31.350W
Record Gap Greater then 5 minutes:   439200.133 , (  1440.09999999998  mins)
    93 305 0000 02 T 59 32.507N L066 52.840W
    93 306 0000 08 T 59 32.513N L066 52.835W

LAST  Record Reads
   93 306 1104 21 M 60 26.828N X066 27.281W  1104 13E 3  1179.18  0.0058 -0.0025

Total Number of Records:   14677


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Reading File:  93306A.GLG

First Record Reads
   93 306 1306 42 M 60 27.145N X066 16.911W 1306 33E 3  1167.61 -0.0006  0.0016

Record Gap Greater then 5 minutes:   440221.366 , (  234.165999999968  mins)
    93 306 1307 12 M 60 27.181N X066 16.887W
    93 306 1701 22 T 60 48.190N L066 03.555W

LAST  Record Reads
   93 307 0029 14 M 60 40.980N X065 55.624W  0029 11E 3  1196.28 -0.0027  0.0064

Total Number of Records:   4387


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Reading File:  93307A.GLG

First Record Reads
   93 307 0406 37 M 60 26.118N X066 24.679W 0406 33E 3  1184.08 -0.0056 -0.0039

Record Gap Greater then 5 minutes:   441239.266 , (  352.065999999992  mins)
    93 307 0407 12 M 60 26.083N X066 24.749W
    93 307 0959 16 M 60 07.443N X067 00.799W
Record Gap Greater then 5 minutes:   442080.1 , (  1440.09999999998  mins)
    93 307 0000 00 M 60 01.138N X066 24.811W
    93 308 0000 06 M 60 01.142N X066 24.771W

LAST  Record Reads
   93 308 0111 47 M 60 04.367N X065 57.792W  0111 45E 3  1097.66 -0.0181  0.0390

Total Number of Records:   9080


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Reading File:  93308A.GLG
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First Record Reads
   93 308 0247 03 M 60 19.494N X065 44.535W 0247 00E 3  1139.23  0.0053 -0.0094

Record Gap Greater then 5 minutes:   442679.666 , (  432.017000000051  mins)
    93 308 0247 39 M 60 19.596N X065 44.439W
    93 308 0959 40 M 61 02.012N X065 38.270W
Record Gap Greater then 5 minutes:   443520.133 , (  1440.08299999998  mins)
    93 308 0000 03 T 60 59.720N L064 41.702W
    93 309 0000 08 M 60 59.735N X064 41.700W

LAST  Record Reads
   93 309 0300 13 M 60 35.425N X063 54.152W  0300 08E 3  1193.91  0.0002  0.0211

Total Number of Records:   10068


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Reading File:  93309A.GLG

First Record Reads
   93 309 1256 47 M 58 36.435N X061 23.721W 1256 46E 3  1023.85 -0.0045 -0.0045

Record Gap Greater then 5 minutes:   444960.083 , (  1440.08299999998  mins)
    93 309 0000 00 M 56 28.045N X058 44.241W
    93 310 0000 05 M 56 28.023N X058 44.219W

LAST  Record Reads
   93 310 0003 05 M 56 27.378N X058 43.559W  0003 01E 3   893.78  0.0014 -0.0145

Total Number of Records:   6480

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Reading File:  A:93310A.GLG

First Record Reads
   93 310 0004 56 M 56 26.982N X058 43.163W 0004 54E 3   892.49 -0.0023 -0.0156
Record Gap Greater then 5 minutes:   446042.983 , (  79.0840000000317  mins)
    93 310 1643 54 M 53 04.254N X055 31.134W
    93 310 1802 59 M 52 45.935N X055 28.705W
LAST  Record Reads
   93 311 0006 29 T 51 41.157N L055 58.364W  0006 19E 3   460.00 -0.0020  0.0028

Total Number of Records:   13316
```

HUDSON LABORATORY CORE PROCESSING: DETAILS OF OPERATION

I.A. HARDY

During this cruise all Benthos cores, boxcores and IKU's were processed onboard (Figure 1). Processing included: magnetic susceptibility (by INSTAAR), sediment description, split core photography as well as a variety of subsampling for post-cruise laboratory measurements. All core processing was performed following those procedures established in the Atlantic Geoscience Centre (AGC) sampling manual (GSC Open File #1044) and as per Figure 2.

Initial core procedures included orientation of the core liners, capping, waxing and labelling, in the starboard core half-height container. Core sections were waxed and maintained in an upright manner within the CSS Hudson coldroom locker until eventually processed.

Prior to sampling, each core had a pre-designated sampling schedule. This permitted subsampling to proceed as per each cruise participant's requirements (Figure 2). All subsampling performed has been documented and annotated in the Program Support Subdivision's database FINSS for eventual onshore downloading to the master SID, Sample Information Database.

Initially, magnetic susceptibility measurements were made on each whole core commencing with the core top and at 20 cm intervals downcore to a total depth (TD). Each whole core round was then split longitudinally on the AGC Duits core splitter into an archive and working half. The archive halves were then photographed at 20 cm intervals downcore against a Munsell Gley Chart, Kodak grey scale and colour control patch. A Colormet wand was then applied to the saran covered face of the archive core at 10 cm intervals downcore for coloration analyses. A visual core description was made of the working core half. This was followed by subsampling according to the sample requirements pre-determined for each core.

Summary

Over a 25 day period, more than 27 cores (Table 2) and boxcores (Table 3), recovered more than 115 metres of unconsolidated sediment. In almost 55% of the core sites selected, the Trigger Weight Core (TWC) failed to penetrate the upper veneer of sediment. Three of the Benthos cores (018, 022

and 036), selected from the western basin in Hudson Strait, from Burgoyne Bay in the south central part of the Hudson Strait, and from northern Ungava Bay penetrated postglacial late Holocene sediments. As part of the global change program, these sediment sections may provide sufficient proxy baseline data relating to global change for the last 6000-8000 years. Two of the cores (018 and 022), penetrated organic highly bioturbated sequences with numerous biotraces throughout. The data obtained from cores 002, 004, 013, 018, 029 and 038 should compliment and promote a better understanding of the paleoceanographic conditions which existed during the advance and retreat of the glacial ice from Hudson Bay and the adjacent land masses of Ungava, Labrador and Baffin Island.

CSS Hudson Cruise 93034
Magnetic Susceptibility Measurements

William F. Manley and Michael W. Kerwin, Institute of Arctic and Alpine Research & Department of Geological Sciences, University of Colorado, Boulder, Colorado

Whole-core, volume magnetic susceptibility (MS) was measured on 11 piston cores, 6 trigger-weight cores, 8 box cores, and 2 IKU samples collected from Hudson Strait during CSS Hudson Cruise 93034. Magnetic susceptibility is a measure of sediments' response to an induced magnetic field, dependent on the composition and concentration of magnetic minerals, and is an indicator of sediment density, texture, and mineralogy (Thompson and Oldfield, 1986; King and Channell, 1991). Downcore MS variations can be used to ascertain sediment provenance and stratigraphy relating to late Quaternary glacial history. Previously obtained MS records from cores in Hudson Strait and the eastern Baffin Island shelf have demonstrated the utility of MS for stratigraphic correlation and interpretation (Andrews and Jennings, 1987; Andrews and others, 1991; Manley and others, 1993; Andrews and Stravers, in press). Taking advantage of the ease and rapidity with which MS can be measured, this summary presents the MS data collected during the 1993 cruise and provides a preliminary discussion of MS in relation to core stratigraphy. Future studies will relate the MS variations to a history of glacial advances through and into Hudson Strait (cf., Lauriol and Gray, 1987; Miller and Kaufman, 1990; Andrews and others, 1990; MacLean and others, 1991, 1992; Stravers and others, 1992).

Magnetic susceptibility was measured within two days of core recovery using a Bartington MS2 meter attached to a laptop microcomputer for automated data entry. Smaller diameter cores (the Benthos piston cores and Benthos trigger-weight cores) were measured using an 80-mm-diameter Bartington MS2C sensor, whereas larger diameter cores (push cores from box cores and IKU's, and the Murphy trigger-weight cores used for sites 93034-015, -022, and -036) were measured using a 125-mm-diameter Bartington MS2C sensor. Measurements were made every 2.5 cm along the length of each core, except for intervals of 2.5-10 cm at core section breaks. Replicate measurements of the trigger-weight core for site 93034-036 demonstrated reproducibility with an average difference between measurements of 1.2%. Volume MS is presented in 10^{-5} SI units (dimensionless) in Figs. M1 to M12 (exclusive of the two IKU's measured, 93034-016 and -027). Note that absolute values of volume MS are dependent on both core diameter and size of the MS sensor being used; thus, absolute values might not be directly comparable when relating the Benthos core results with the larger diameter core results or with data from previous cruises.

Magnetic susceptibility values in the eleven piston cores vary from 5 to 954 x 10^{-5} SI units. Averages of the piston cores vary from 14 to 327 x 10^{-5} SI units. Commonly the MS plots exhibit well defined peaks rising above baseline values (e.g., 93034-013 and -031; Figs. M4 and M9), although some plots show a general downward trend in MS values with depth (e.g., -004; Fig. M2) or a series of step-like baseline values or stable modes (e.g., -002; Fig. M1). Some of the cores are characterized in part by cyclic or rhythmic MS oscillations (e.g., -004 and -018; Figs. M2 and M6; see discussion below relating core -004 to logged core descriptions). Many of the cores retain very high MS values at core tops (e.g., -002, -004, -015, and -018; Figs. M1, M2, M5, and M6). Also common are pronounced MS peaks below the core tops but within the upper few meters of several cores (e.g., -002, -004, -013, and -018; Figs. M1, M2, M4, and M6). In each case, the MS variations downcore are described by several individual MS measurements, without single data-point outliers.

Thorough interpretations of the magnetic susceptibility variations await further analyses, including radiocarbon dating, microfossil identification, grain-size analysis, and correlation using seismic stratigraphy. However, general guidelines exist to help relate MS variations to lithologic changes or glacial events. For example, high MS values in the 1993 cores might reflect delivery of sediment derived from glacial erosion of Precambrian granites and gneisses surrounding the strait (cf., Stravers, 1986; Andrews and Stravers, in press). High MS values might also reflect concentration of a surface lag due to current winnowing on the sea floor (i.e., concentration of sand and gravel via reworking and removal of clay and silt by bottom currents). Conversely, low MS excursions might record pulses of carbonate-rich sediment derived from glacial erosion of Paleozoic limestone and dolostone from the floors of Hudson Strait, Hudson Bay, and Foxe Basin (cf., Andrews and others, 1990; Andrews and Tedesco, 1992). Low MS values might also reflect concentrations of organic matter in the cores or intervals of low bulk density (Thompson and Oldfield, 1986). Furthermore, MS changes can mirror variations in grain size, inasmuch that magnetic minerals are often concentrated into discrete grain-size classes by transport and reworking into terminal modes.

By comparing the magnetic susceptibility variations with core lithostratigraphy while the cores were split and described during the cruise, a few qualitative, preliminary interpretations of the 1993 MS variations are readily available. For example, in core 93034-022, a Global Change core, intervals of relatively low MS (e.g., 1185-1190 cm) seemed to correspond with bands and blebs of black or dark gray (organic-rich?) sediment within the more common greenish-gray sediment (Fig. M7). This relationship might hold for the other Global Change cores, and could be tested by comparison of the MS with the core descriptions and color measurements. On another Global Change core, core -036, discrete spikes of low MS (e.g., ca. 525 cm) correlated with voids in the core ("gas cracks") created by evolution of gas in the core after core recovery (Fig. M10). In core -031, five discrete high-MS peaks in the lower half of the core (ca. 405-440 cm, 525-550 cm, 575-620 cm, 670-695 cm, and 780-805 cm) correlated closely with muddy intervals concentrated with fine pebbles and clay clasts (Fig. M9); in contrast, a low-MS baseline in the core coincided with a homogenous, uniformly fine-grained mud. Finally, in core -038, an anomalous low-MS spike (ca. 430 cm) was found to match with a 4-cm-thick bed of light brown mud surrounded above and below by the uniformly dark gray sediment of the core (Fig. M11). In this case, the low-MS spike might be a result of a higher concentration of calcium carbonate in the brown bed, as suggested by a test with hydrochloric acid.

The most pronounced correlation apparent on the cruise between the magnetic susceptibility and lithostratigraphy comes from core 93034-004. A section of the core (494-644 cm) displayed evenly spaced cycles of high MS fluctuating with low MS (Fig. M12). Upon inspection with Iris Hardy of the split core, each high MS interval was found to correlate with an interval of strongly laminated mud and fine sand (designated unit A). Each low MS interval corresponded with very weakly laminated, clay-rich mud without sand (designated unit B). Apparently in this case the higher MS values can be attributed to the coarser grain size of unit A sediments. To examine the downcore MS cycles in more detail, we measured the MS of the archive half of the core section at a sample interval of 1 cm (Fig. M12), affirming reproducibility of the MS, highlighting the fine-scale structure of the MS signature, and demonstrating a close correspondence between sediment characteristics and magnetic susceptibility.

Comparisons of MS records at each coring site often permit determination of core recovery of the uppermost sediment section (cf., Manley and others, 1993). Correlation of the trigger-weight core and/or box core with the piston core allows measurement of the thickness of sediment bypassed by the piston core. For example, in core 93034-002 (Fig. M1), the piston-core MS agrees closely with that of the trigger-weight core, indicating that the former did not bypass much of the uppermost site stratigraphy. However, the MS signature of the box core from the site (-001) suggests that both the trigger-weight and piston cores missed the uppermost 10-20 cm of seafloor sediment. Core -031 (Fig. M9) provides another example, where offset of a high-MS peak implies that the piston core missed about 60 cm of sediment captured by the trigger-weight core.

Although downcore MS changes can often be used to correlate stratigraphy from one core to another over a span of several kilometres (Manley and others, 1993), our preliminary analysis has found no clear correlation between the 1993 MS curves and curves from nearby cores collected in 1990 or 1992. In particular, we found no convincing correspondence between 93034-013 and 90023-066, despite continuity of seismic stratigraphy over a span of less than seven kilometres between the cores. A similar situation exists for cores 93034-029 and 90023-052. These relations show that lithostratigraphy may vary laterally due to significant facies changes even where seismic stratigraphy is continuous.

In summary, measurement of magnetic susceptibility from the 93034 cores has rapidly provided a detailed framework for interpreting core lithostratigraphy. This framework can later be used as a basis for comparing biostratigraphy or seismic stratigraphy, and can guide subsampling for radiocarbon dates or lithologic analyses. Although further work is needed to relate the downcore MS changes to specific variations in sediment lithology, the MS profiles promise to relate sediment characteristics and provenance to depositional environments and glacial history of the Hudson Strait region.

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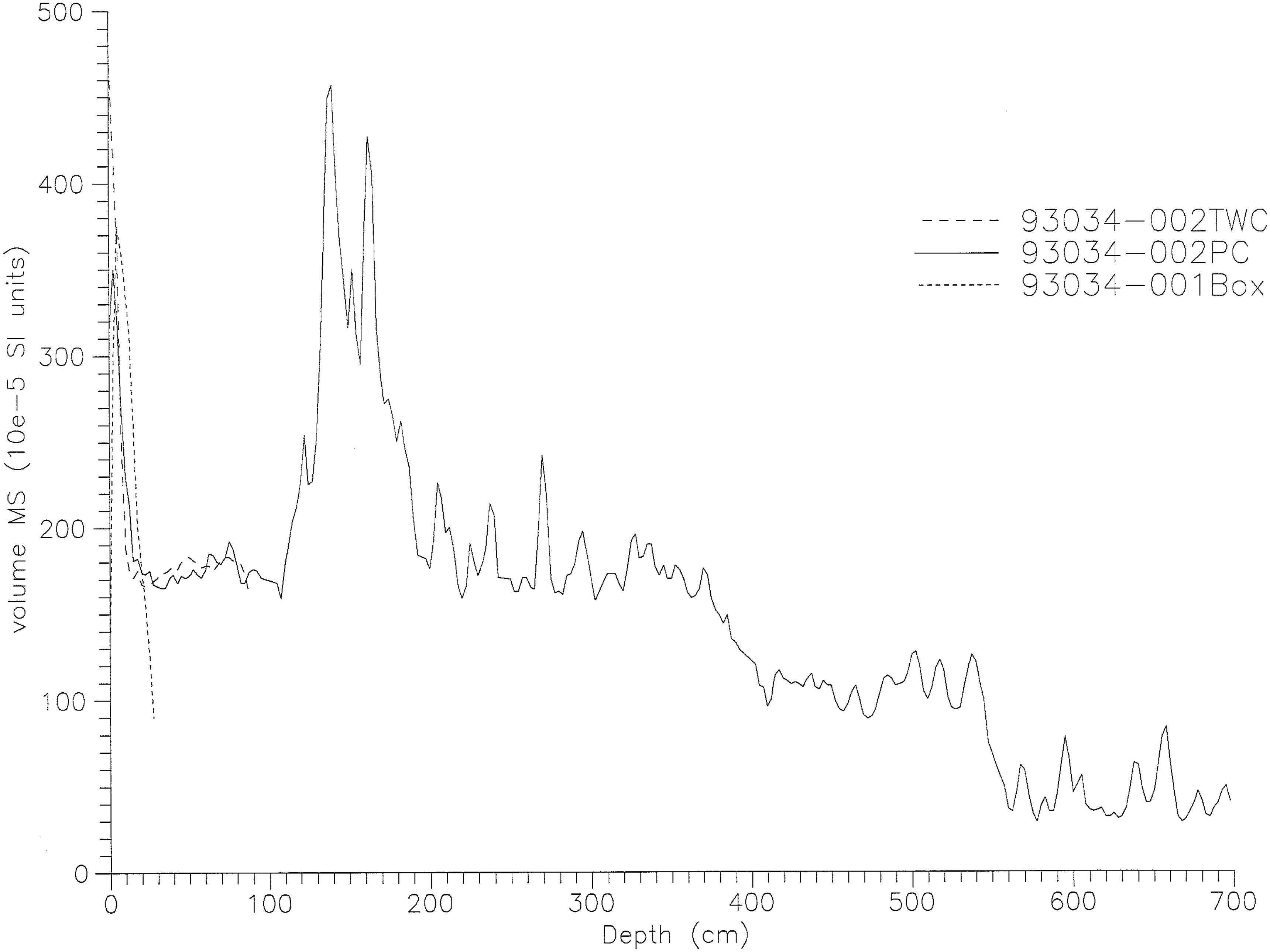
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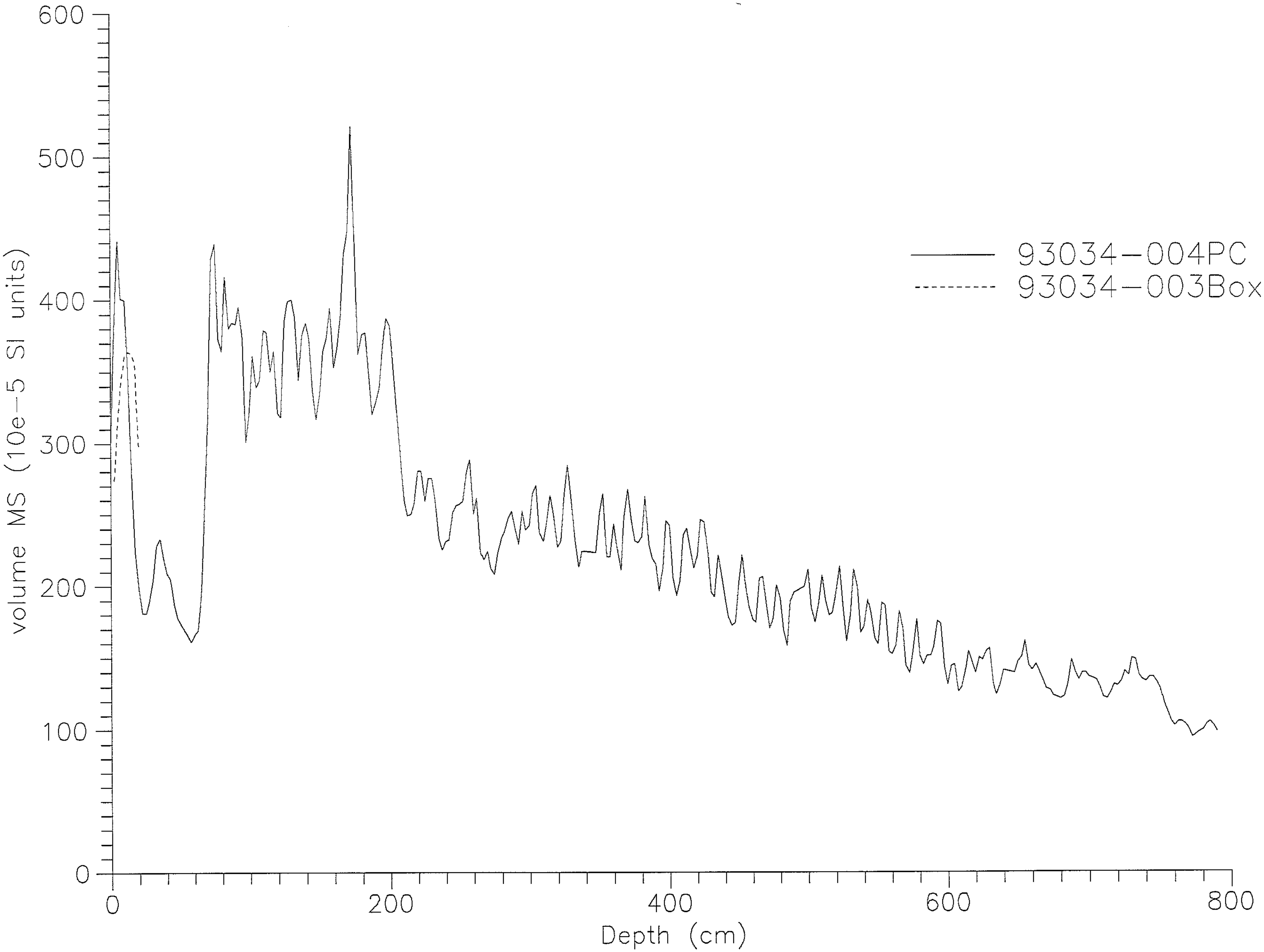
93034-002PC
93034-001Box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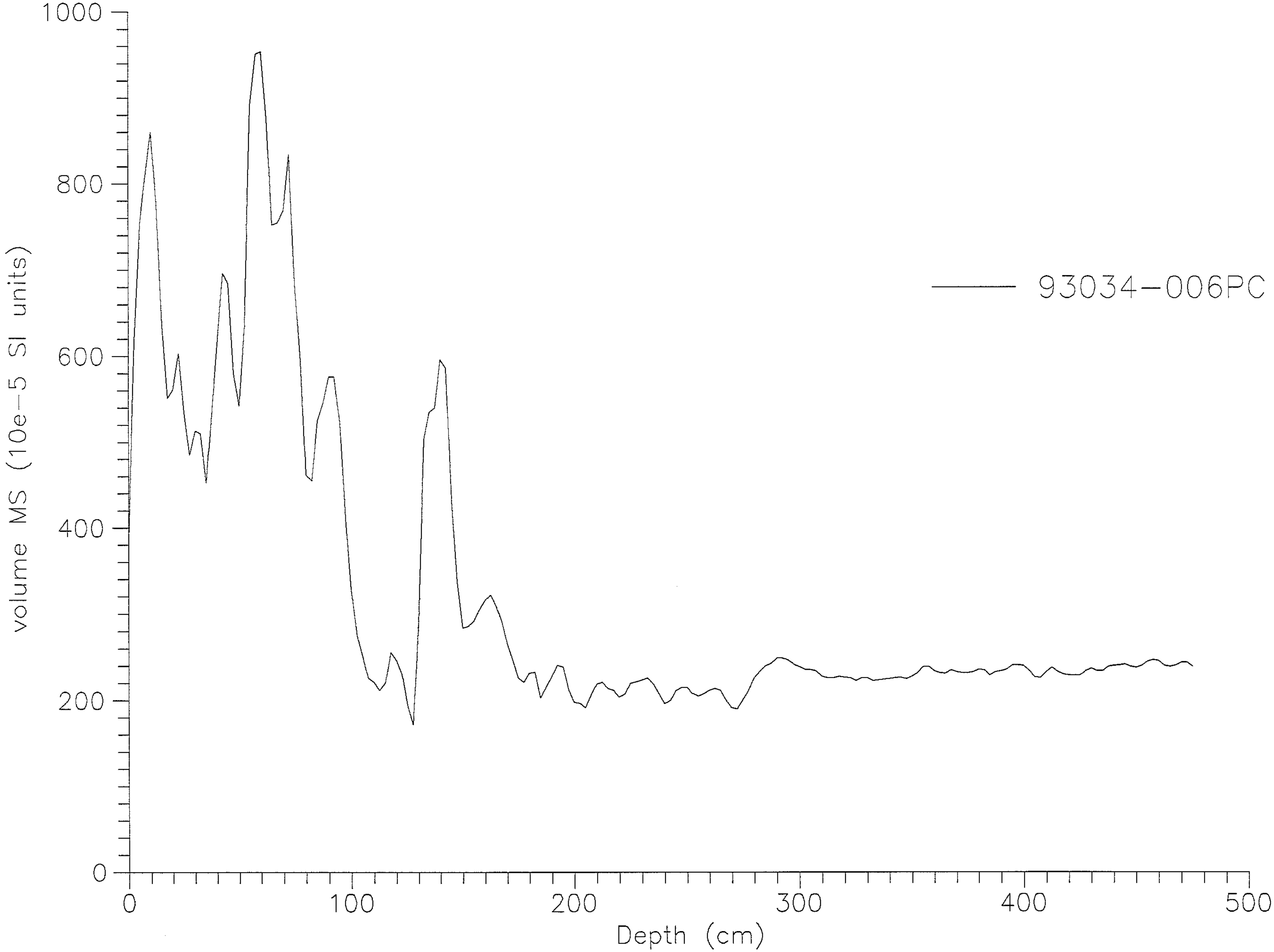
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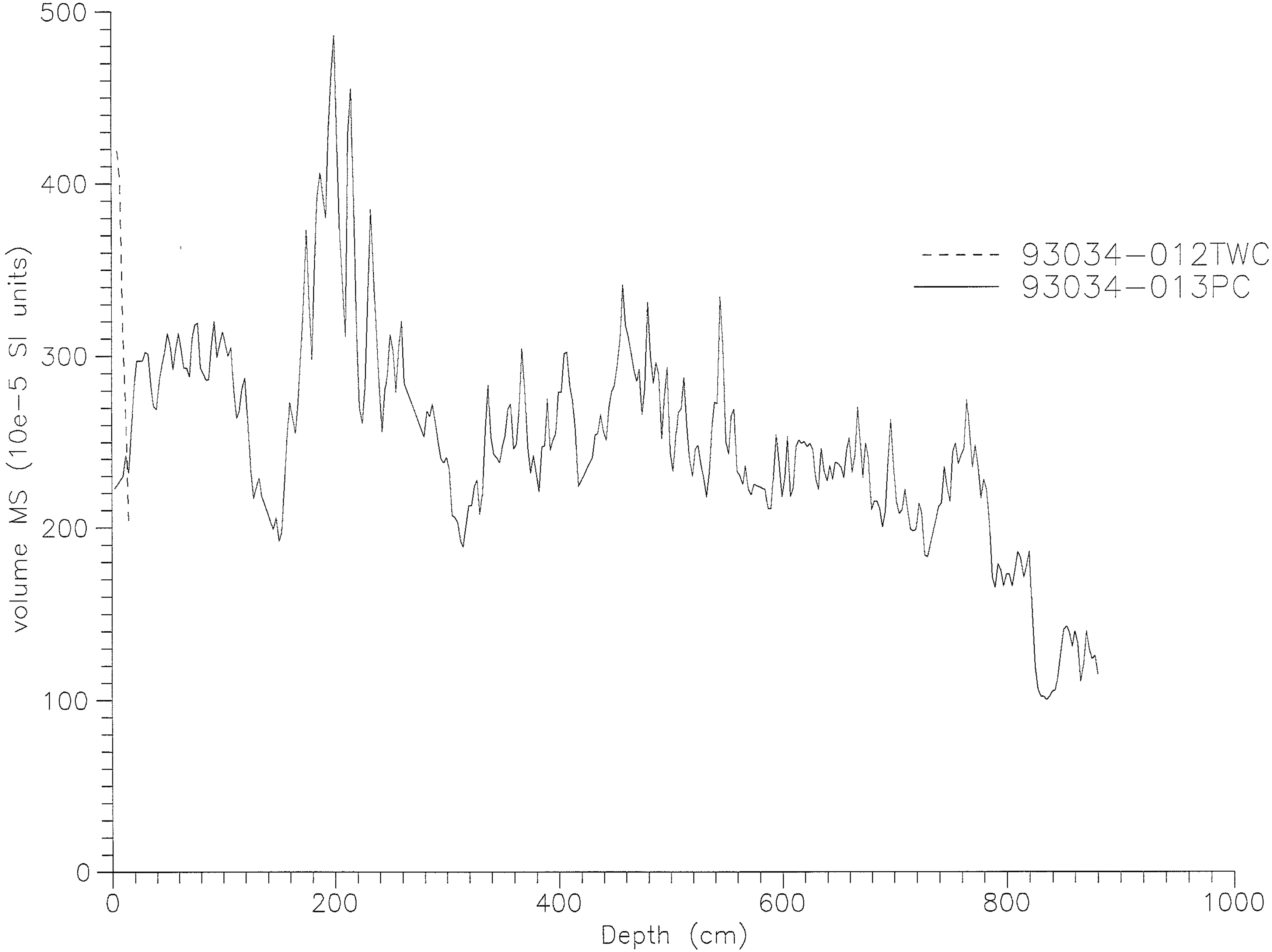
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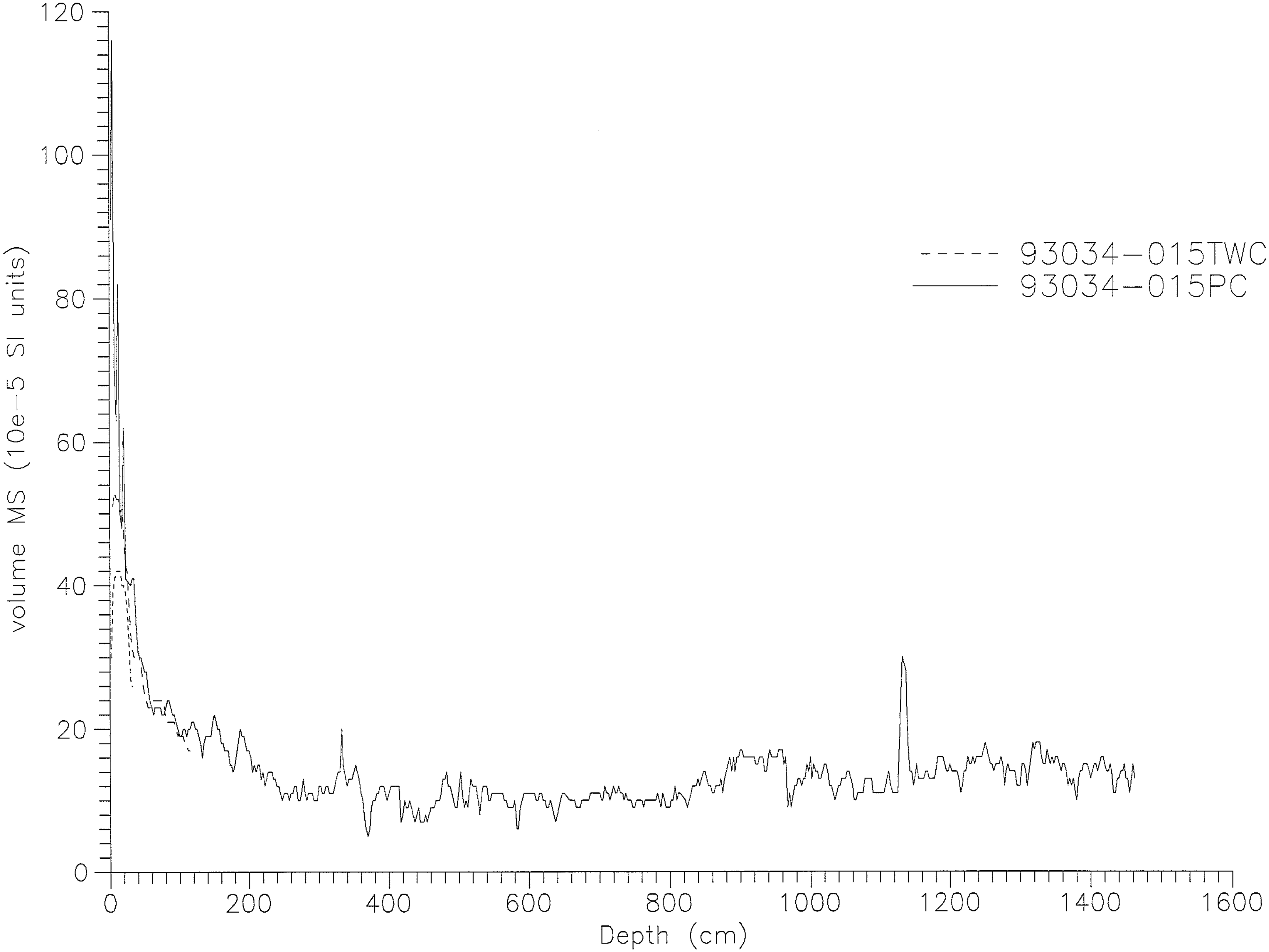
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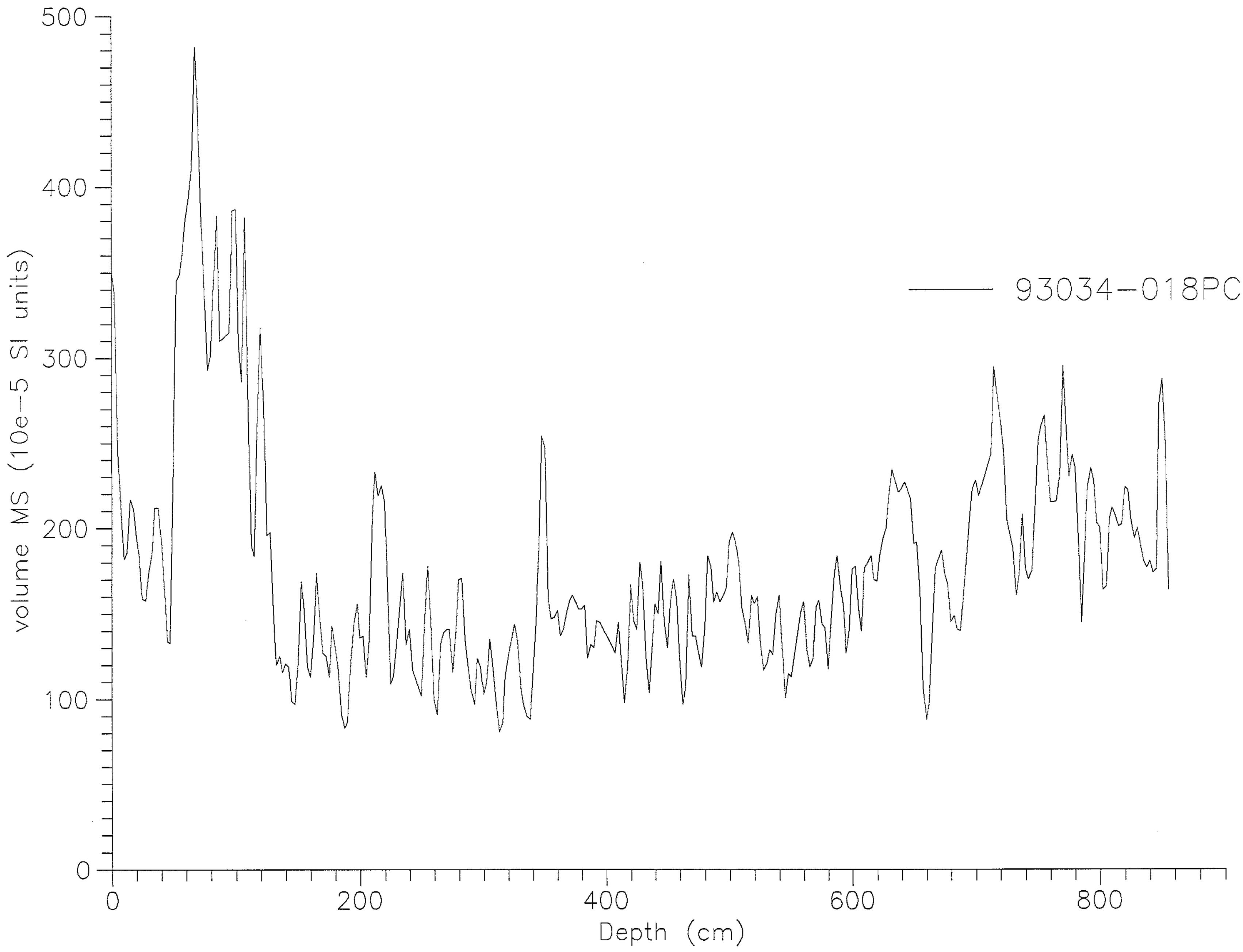
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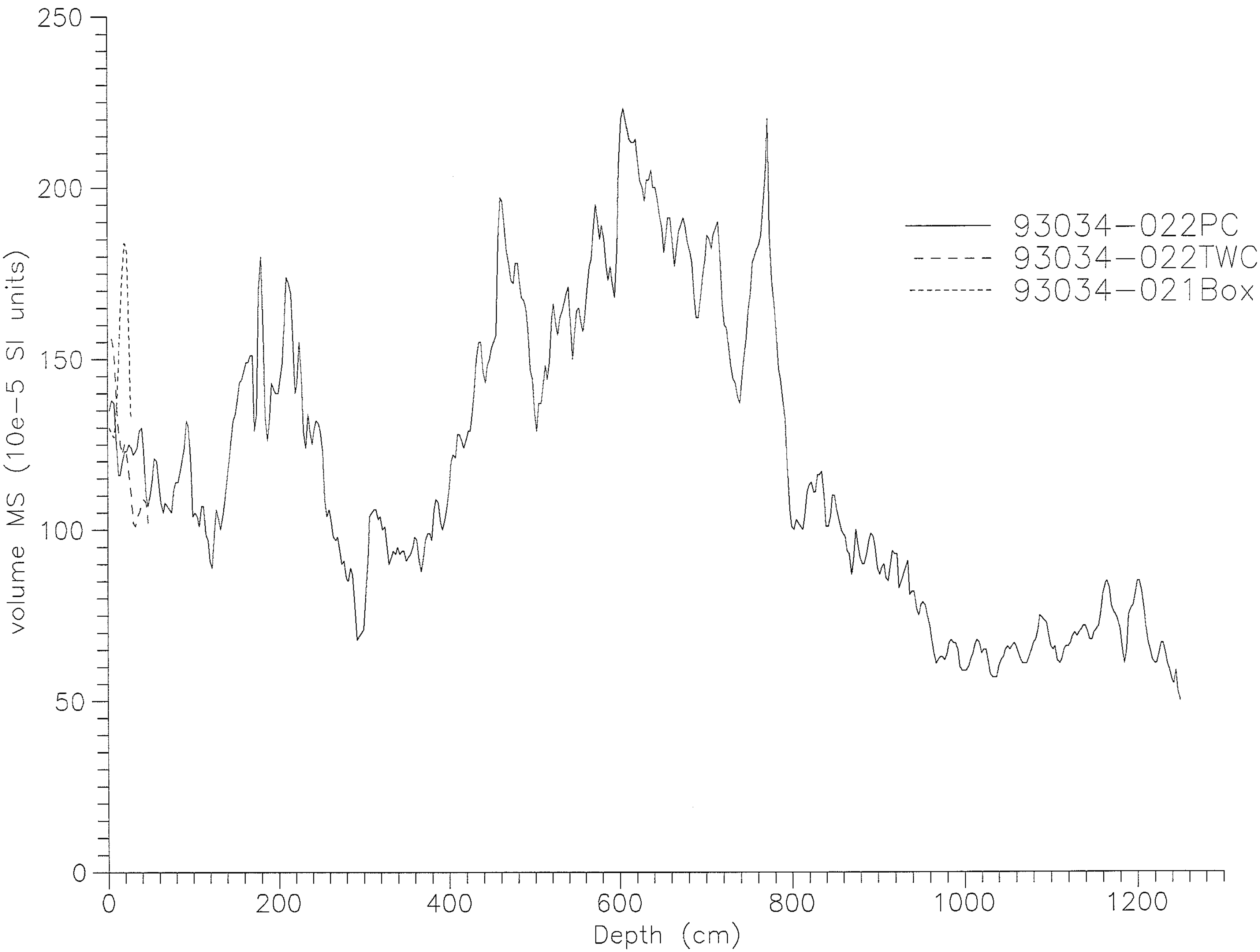
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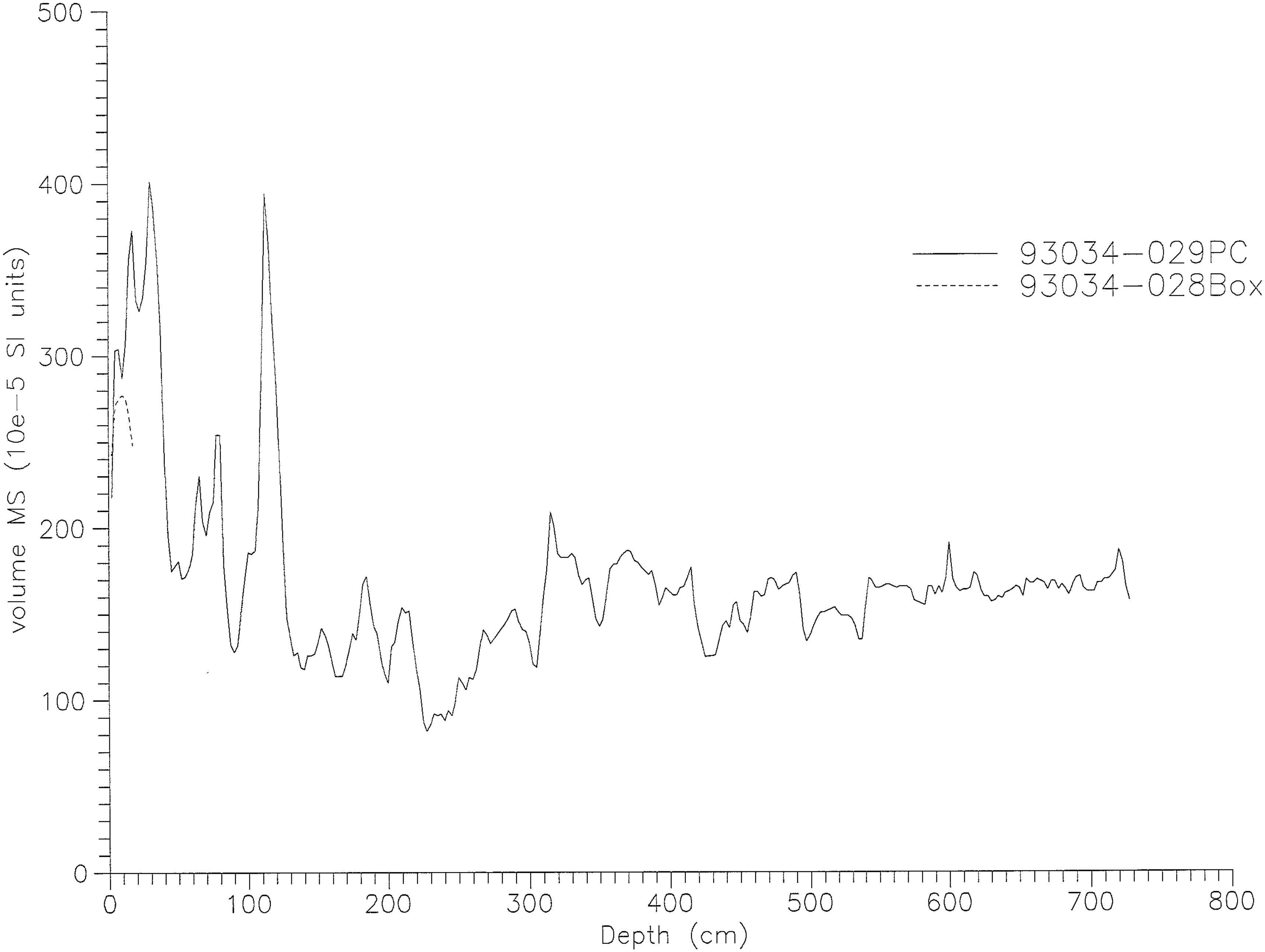
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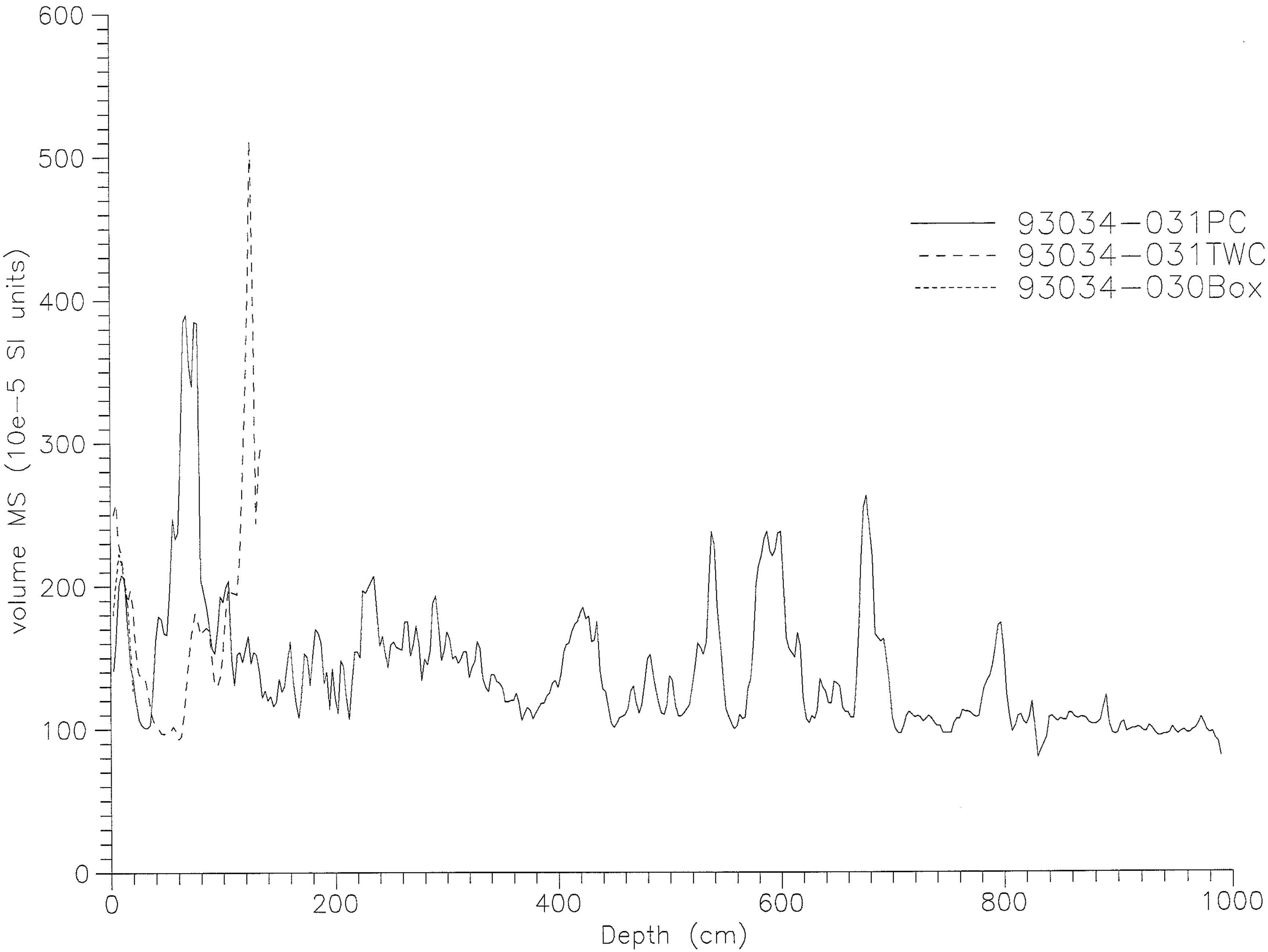

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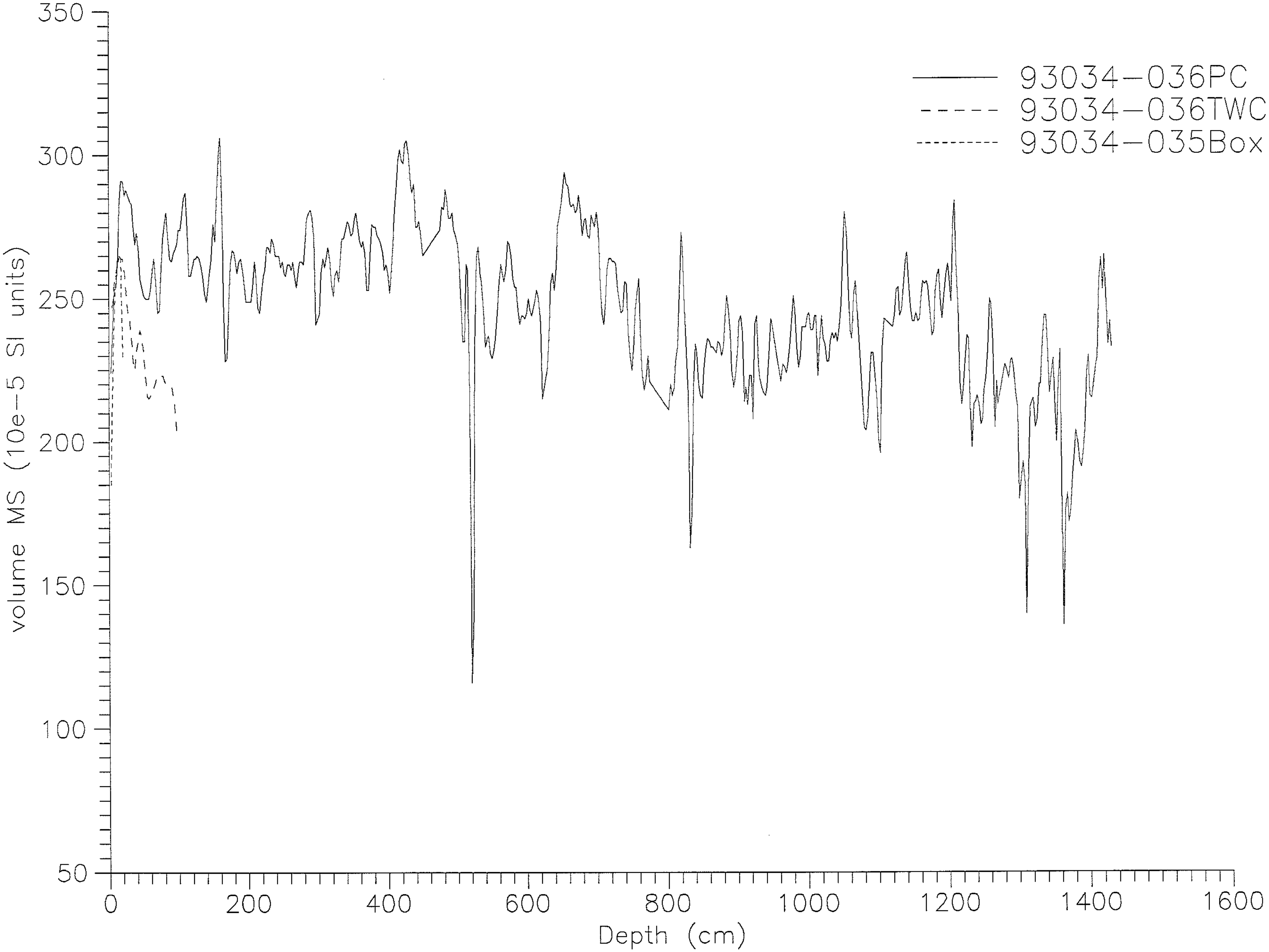
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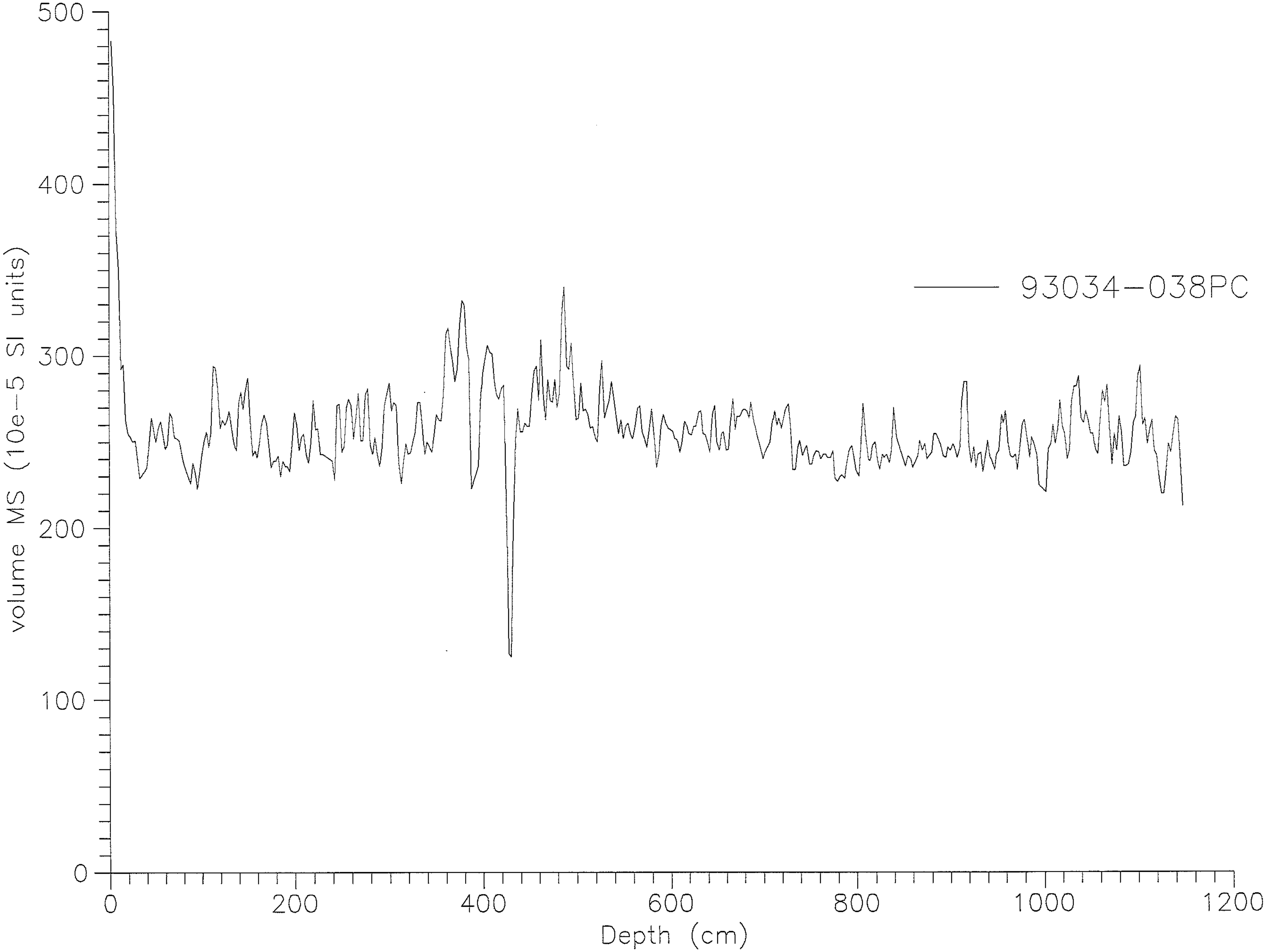
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Depth (cm)
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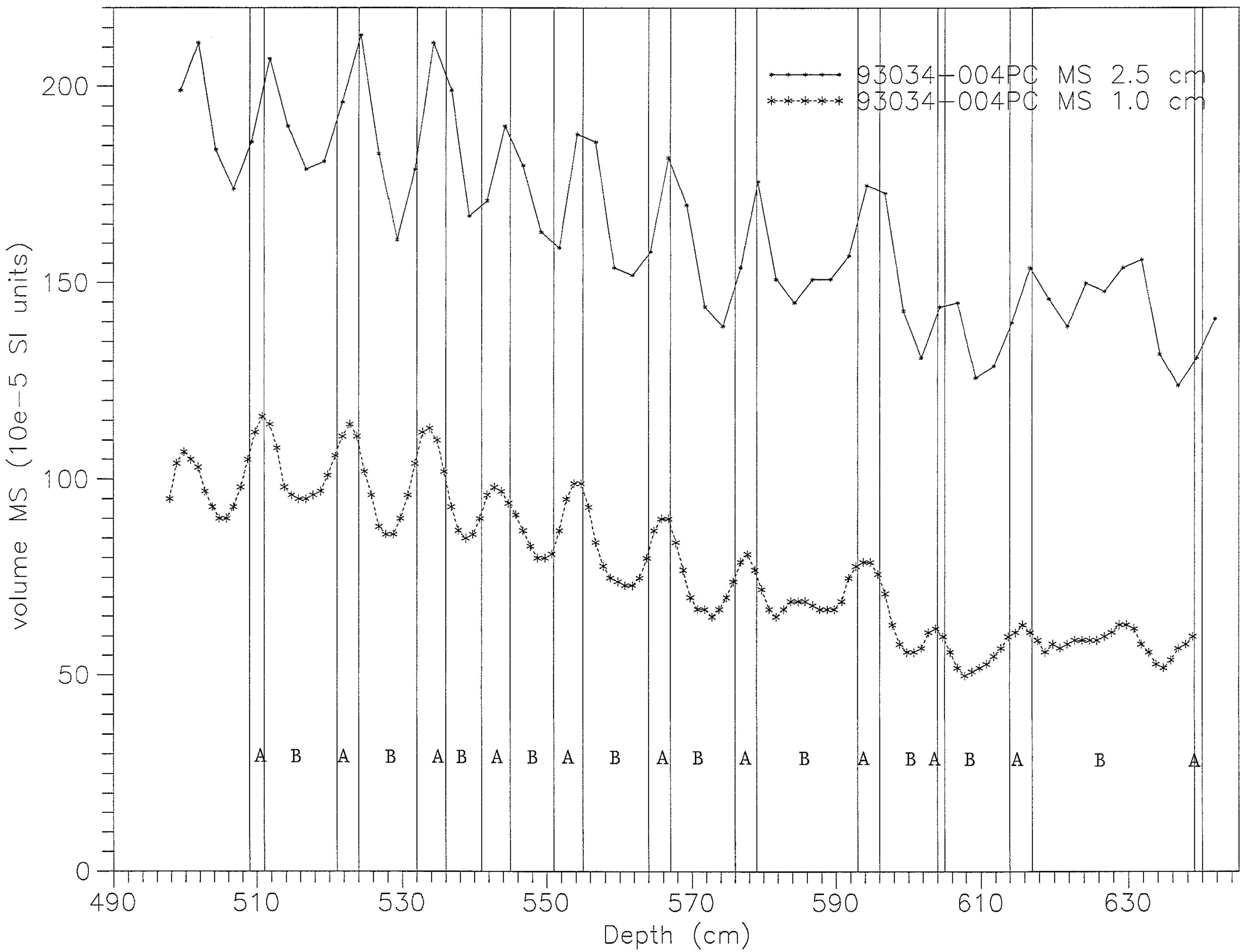

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150
100
50
0
490
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550
570
590
610
630
Depth (cm)
A B A B A B A B A B A B A B A B A B A B A

Résultats préléminaires sur la composition lithologique de la fraction grossière des sédiments quaternaires du détroit d'Hudson et de la baie d'Ungava; Territoire du Nord-Ouest.

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Introduction

Les travaux effectués durant la croisière 93-034 se veulent la poursuite des études de dispersion glaciaires effectuées lors des croisières 85-027 et 90-023 et dont le but vise à retracer les patrons de dispersion glaciaires à partir de la composition lithologique des sédiments.

Les résultats obtenus lors de la dernière étude mettent en relief la difficulté de définir les ligne d'écoulements glaciaires faute de bons indicateurs lithologiques (source unique et ponctuelle) mais aussi par la diversité des milieux de sédimentation échantillonnés (MacLean et al.1991).

Méthodologie

Durant la croisière 93-034 du CSS Hudson, l'échantillonnage des sédiments glaciaires fut limité au détroit d'Hudson et à la baie d'Ungava. La localisation des sites d'échantillonnage fut déterminée en grande partie sur la possibilité d'échantillonner les sédiments glaciaires directement sur le fond marin. Ceux-ci sont acoustiquement non-stratifiés et latéralement sont soit recouverts par des unités stratifiées ou s'interdigitent avec ces dernières (B. MacLean comm.pers.). Pour ce type de sédiments, l'échantillonnage fut effectué à l'aide d'une benne de type IKU.

Afin de connaitre la composition lithologique de la fraction grossière délestée par les glaces flottantes, quelques échantillons de matériel stratifié furent récoltés avec un échantillonneur de type Box core.

Les échantillons recueillis furent tamisés de façon à séparer les trois fractions granulométriques suivantes: >25mm, 8-25mm et 4-8mm. Par la suite, on procéda à l'identification visuelle et au comptage des granules et galets. Les subdivisions suivantes furent retenues: roches cristallinnes, métavolcaniques, métasédimentaires, grès, siltstone, argilites, roches carbonatées, marbres et enfin formations de fer.

Résultats

Au total, 18 sites furent échantillonnés à l'aide de la benne IKU à une profondeur d'eau variant entre 84 et 326m. Généralement l'échantillon recueilli présente la séquence sédimentaire suivante: à la base 10 à 30cm d'un diamiction montrant des traces de bioturbation, parfois fossilifère et très riche en granules et la dont la matrice varie de silteuse à sableuse, recouvert par une tapis de galets et granules. Pour toutes les stations le diamicton à la base fut échantillonné et dans 10 cas on échantillonna également le couvert de galets et granules. La comparaison de la composition lithologique des deux échantillons devrait nous permettre de savoir si cette concentration de matériel grossier est le produit de l'activité glaciel ou du délavage du matériel sous-jacent. Dans un seul cas, station 93034-23, nous avons récupéré, sous la couches de matériel grossier, un diamicton très compacte à galets non-jointifs que l'on croit être un till de fond.

Neuf échantillons de matériel acoustiquement stratifié furent récoltés avec le box core à une profondeur variant entre 199 et 786m. Une carotte de sédiment fut également récupérée à chacun de ces sites avec un carottier de type Piston-Gravity. Il s'agit généralement d'une argile silteuse contenant peu ou pas de granules (6 cas sur 9), fossilifère et occasionnellement recouvert par quelques galets ou blocs isolés.

Pour les échantillons recueillis à l'aide de la benne IKU, les résultats préliminaires de l'analyse lithologiques des fractions granulométriques sont les suivants: dans la fraction > 25mm les débris sont peu nombreux (15 en moyenne) et sont constitués principalement de roches cristallines et de roches carbonatées. Les débris analysés dans les fractions 8-25 et 4-8mm sont beaucoup plus nombreux soit respectivement 182 et 319 en moyenne. Les roches cristallines et les roches carbonatées dominent également ces assemblages et leur proportion relative sont sensiblement les même dans les deux fractions granulométriques ainsi que dans les deux types d'échantillon prélevés (diamicton et gravier de surface). Notons que l'on observe dans les échantillons de la baie d' Ungava des siltstones rougeâtres qui pourrait être associés à la présence de lits ocre à rouge observés dans les carottes de sédiments recueillies dans ce secteur.

Dans les trois échantillons de sédiments stratifiés comprenant suffisamment de débris de roches pour un traitement statistique (8-25mm, 164 en moyenne; 4-8mm, 367) les résultats indiquent, pour les deux fractions, une quantité deux à trois fois plus élevée de roches carbonatées que de roches cristallines.

Travaux futurs

L'analyse à la loupe binoculaire devrait nous permettre de raffiner la classification et d'indentifier les débris de roches de nature indéterminée. Les résultats seront par la suite comparés à la distribution spatiale des sources lithologiques.

CRUISE REPORT - SEABIRD SURVEYS

DR. RICHARD G.B. BROWN
SEABIRD RESEARCH UNIT, CANADIAN WILDLIFE SERVICE,
ENVIRONMENT CANADA

The primary objective of BIO Cruise 93-034 was to conduct geological surveys in Hudson Strait and Ungava Bay. However, this area, and the route from and to Nova Scotia, are also of considerable interest to marine ornithologists. At least 16 million pairs of Thick-billed Murres *Uria Lomvia* nest on the cliffs of Hudson Strait and Ungava Bay. These birds, and many other seabirds from farther north use the Labrador Shelf and Current as a migration route and a wintering area. The cruise seemed a good opportunity to do some pelagic seabird surveys as well.

Since 1966, the Canadian Wildlife Service's PIROP programme has placed observers on BIO cruises, to collect quantified information on pelagic seabird distributions off Atlantic Canada and elsewhere. Our initial objective was to use these data to predict the hazards of oil spills and other marine pollutants. We are now working on the roles that seabirds play on pelagic ecosystems, using our seabird atlases for multi-level correlations with other environmental databases. The emphasis is not on ornithological rarities, but on where and why the commonest birds are common.

There are many gaps in survey coverage, especially in the Arctic in winter, and the plan for Cruise 93-034 covered some of these. I hoped the initial transect from Reykjavik would show something of the split in species between eastern and western Davis Strait, and put me in Ungava Bay in time to catch the murres' exodus from Akpatok Island. On a smaller scale, I hoped to compare seabirds feeding in the Ungava tide-races with my earlier field studies in the Bay of Fundy.

HUDSON's iceberg collision on her previous cruise trimmed my plans considerably. Most of the seabirds had migrated south by the time we reached Hudson Strait, and the limited daylight was an added difficulty. However, it was interesting to find murres in Ungava Bay as late as the end of October. Murres, Dovekies, Black-legged Kittiwakes and Fulmars were regularly seen during our passages along the Labrador Shelf. As usual, their densities were highest when our track ran close to the shelf-break and the outer edge of the Labrador Current - on Makkovik Bank, for example. The weather was difficult, especially on the return leg, but I ran census lines from Hudson Strait south to Halifax. None of the observations were unusual, but they provide the first PIROP surveys made later than August, in the region of Hudson Strait.

I enjoyed my cruise, in spite of the delays and the weather. Thank you for having me along.

APPENDIX F

UNDERWATER - SURFACE SEASCAPES

Melissa Day
Artist/printmaker
CSS Hudson 93034 cruise

I participated on the CSS Hudson as an artist/printmaker. My objective is to create a series of prints based on my experiences in the Canadian Arctic. These prints (mainly lithographs) will primarily depict underwater seascapes, incorporating both the subaqueous morphology, and the lines, layers, and structures beneath the sea bed. The majority of these prints will be large scale panoramic vistas of sediments, water, and sky, constructed by veils and layers of colour and line.

I intend to explore the connection between lithography, which uses lithographic limestone as its printing matrix, and the deposition of marine sediments. The layering process of marine sedimentation parallels the layering process and accumulation of lines built up through the lithographic process. Each print will be my own artistic interpretation of a depositional environment.

Ideas and material for these prints were collected from the acoustical data, sediment samples, and the insights of the geologists on the cruise. In preparatory sketches, photographs, and journal accounts, I was able to combine and collect images from seismic profiles, sidescan records, with my own observations of the box cores, IKU's, piston cores and the surrounding seascape.

In addition to the series of long panoramic prints, I envision one suite of prints based on a vertically elongated format, mimicking the shape of the core samples. These prints will resemble a thin cross-section of the sky down to the water, seabed, and the stratified layers beneath its surface.

Tentatively, an exhibition of this work will be shown in the fall of 1994 at the Bedford Institute of Oceanography and galleries over the course of the next year. Exhibition details will be mailed out and posted at the B.I.O.

On this cruise, I accumulated much of the material and information for these prints from the scientific and technical staff. In turn, I hope an exhibition of these prints will help to integrate artistic and scientific sensibilities.

ACKNOWLEDGMENTS:

I extend my sincere thanks to Brian Maclean (Atlantic Geoscience Centre) who was helpful at every stage, the scientists and technical staff who patiently answered all my questions, to the officers and crew of the CSS Hudson for their assistance and to the B.I.O for their support. I thank also IMP Group Ltd., for providing foul weather gear.

HUDSON 93-034

TECHNICAL REPORT

compiled by

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K. WAGNER, W. A. BOYCE, M. GORVEATT

HUDSON 93-033 FACTS SHEET

SAMPLE INVENTORY:

IKU GRABS -------------------------	19
BENTHOS PISTON CORES ---	12
BOXCORES --------------------------	10

KILOMETRES RUN:

HUNTEC DTS ----------------------------------	2209 km
3.5 KHZ BATHYMETRY ---------------------	4312 km
AGC SLEEVEGUN SEISMICS -----------	2340 km
BIO SIDESCAN --------------------------------	863 km

AGC Seismic Operation (Technical) For HUDSON 93-034

During HUDSON 93-034 AGC/PSS supplied the equipment necessary to collect seismic reflection profiles. The main acoustic components of this system included a four stage model W-2 electric Price compressor, a Pacer VF 200 motor speed controller, a rotation of two Haliburton Geophysical sleeve guns (one with a 40 cubic inch chamber, and the other with a 10 cubic inch chamber), and various recording electronic systems. The compressor delivered 1900 PSI of compressed air to the sleeve gun, which was fired at a three second repetition rate.

The reflected sleeve gun signal was received on the 25' (and later in the cruise, the 100 foot section) of the starboard SE eel array, and the NSRF tapered eel array. These signals were routed through the standard AGC electronics configuration.

Either the 25' or 100' section of the SE array was fed to a differential eel amplifier. The signal was sent to channel one of the AGC time varying gain unit, (TVG), then on to a Krohn-Hite model 3323 band pass filter, with the band pass set for 100-1500 Hz. The signal was then displayed on a Raytheon LSR1811 graphic recorder operating in the start/stop mode. The delayed trigger output from this LSR supplied the trigger for the other graphic recorder and both TVG channels. The delay was used for water column removal.

The NSRF eel signal was amplified by the NSRF "Blue Box" and fed into channel two of the AGC time varying gain unit (TVG). It was then passed through a second Krohn-Hite model 3323 filter with band pass set for 125-3500 Hz. The filtered seismic signal was displayed on a Raytheon LSR1811 graphic recorder.

Both graphic recorders were set for a 1 sec sweep rate.

The Beta test version of MITS (Master Intuitive Timing System) supplied the timing control for the firing of the sleeve gun and the Huntec system. This provided, for the first time on an AGC cruise, the ability to mask out the Huntec shot pulse, and thus the sleeve gun return signal in the Huntec record. The result was a greatly improved "cleaner" record. A second advantage was realized, that being the problem of the usual drift of the time bases used to fire the two sound sources. No cross interference between the Huntec and sleeve gun occurred. With the purchase of new graphic recorders for the 3.5kHz sounder, further reduction of record interference caused by the sounder and Huntec will be possible.

SHIPCLOCK supplied, at a five minute rate, trigger pulses used to initiate record annotation from the TSS record annotator. The annotator provided date and time annotation to all paper records.

The seismic and timing signals were recorded on standard VHS type tape using the TEAC XR5000 analogue tape recorder. A total of 80 - three hour tapes were recorded for a total of 250 hours (approx) of seismic data collected. Channel one and three (both DR format) of the XR5000 were used to record the raw SE eel signal from the Eel amplifier and the NSRF eel signal from the "blue Box". Channel two (FM format) of the XR5000 was used to record the master trigger from the MITS computer.

Approximately 12 hours of survey down time occurred with the failure on the sleeve gun solenoid connector. The subsequent manufacturer of a replacement required almost a full day to complete.

Repairs required before the next cruise are:

1) Metrox Block; sensor problems are recurrent, and should be completed before the next field program.

2) TEAC XR5000 tape recorder problems still persist. Complete shut down of recorder happened several times, with partial loss of pre-programmed memory.

3) Complete inventory and update, as necessary, of all compressor and sleeve gun spares.

4) Factory repairs to both SE eel arrays.

5) Repair to NSRF eel termination box. Connector from eel to "Blue Box" is defective.

6) Graphic recorder overhaul is required. Inventory of spares and update of spares is required.

7) Inventory and update of the electronic spares is required.

3.5 KHZ PROFILER

Bathymetry was recorded during the survey using a EPC 4100 recorder set at a 0.5 second sweep to trigger the ORE model 140, 3.5 kHz hull mounted 16 transducer array. Fire rate, and delay times, were changed to accommodate the changing ocean depth using the EPC 4100 graphic recorder's programmer. This system was run almost continuously during the cruise providing excellent penetration over sample sites and during line running where sediments were reasonably soft.

BIO Sidescan Sonar System:

The BIO Side Scan Sonar was deployed to generate medium range, 72.5 kHz seafloor topography/reflectivity data of 1.5 km swath. Data is displayed on the Klein 521 recorder with 5 minute event markers and day/time, course/speed annotation. Data is also stored along with the trigger transmit pulse on a TEAC XR-5000 multitrack VHS cassette mag. tape recorder in the FM unipolar (+) record mode.

As the Klein 521, 19", two channel wet paper recorder is obsolete, and no longer supported by the manufacturer, the other graphic recorders were connected to the BIO Side Scan System for trial recordings.

(a) A short record on the EPC 9800 was trialed and found to have the finest pixel density, cross track, and good gray tone but the along track print needs repeat writing to fill in the gap between sweeps. Otherwise, the along track distortion due to lack of speed correction is too large, i.e., greater than 3:1. The Klein 521 distortion compression is 2.5 : 1 at 5.8 knots (equivalent to 2.6 knots actual speed). The Senior Scientist found this EPC 9800 presentation type too "dusty" or unsmooth as compared with the wet recorder record which chemically "halos" the write pixel making essentially fake, infinite resolution.

(b) The Klein 595 Side Scan System recorder was set up as master recorder of the BIO Side Scan System for a day, since the EPC 9800 was dedicated to the Huntec DTS. With the 595 on "Tape Monitor" Mode and used as the master, without the 521 wet recorder running, produced a good discriminatory presentation but with large pixels in full 18" display width mode. Real Speed Correction can also be accomplished with the 595.. not available with the 521.. using pixel stretching to fill in between sweeps but at speeds over 3.5 knots, the pixel stretch is too great at full display width. The 595 has built-in, automatic annotation of the record and taped data. Again, the Senior Scientist found the large digital pixel size too distracting as compared with the analog wet record. From an electronic noise point of view, the 595 was the most discriminating of real sonar returns verses noise, interference, and d.c. gray level (unlike the 521 wet record which shows all noise pickup as a pleasing background tone or pattern). This made this presentation more interpretable in my opinion, especially when speed corrected as explained next in trial (c).

(c) The Klein 595 recorder, as a backup to the Klein 521 recorder as master, was set up for most of this survey as the best compromise. The 595 was put in "Tape" playback mode, recording the same 521 data in real time. To compress along track resolution, the 595 was put in three channel mode to decrease channel width allowing for true speed correction. This decreases pixel size as well as resolution, but allows for a true bottom presentation to complement the standard Klein 521 wet paper record with its inherent speed distortion. In "Tape" Mode, the 595 record had to be hand annotated by watch-keepers as all of the channels of the TSS312B External annotator were used up with other systems.

In the BIO Side Scan towfish, the transducer angle from horizontal is set at around "-8°" mounted in the MOBY 1 low noise/drag tow vehicle, connected to the ship via a new four channel, 750 m. tow cable. With all the tow cable deployed, layback at 6 knots is about 5 minutes. A new connection mechanism was used this year to make this towcable compatible with the Klein Sonar Systems and has the advantage of quick changeover to the other back-up BIO Side Scan vehicle.

At one point in mid-Hudson Strait, the sea bottom came up from 60 to 30 fathoms in a one minute interval, too fast for the winch recovery speed via the new remote controls, and Fish "B" collided with bedrock at maximum winch speed, severely damaging the nose cone of the vehicle. However, there was no interruption of data flow or quality that night because of this. The spare tow vehicle was eventually substituted for the remainder of the cruise.

Data collected on this cruise was typical of other cruises. Data was of the usual high quality (depending on watchkeepers) but limited to only 40% of the survey area travelled due to large water depths and 6 knot survey speeds. Data quality could be further improved if watchkeepers were encouraged more in taking an interest in fine tuning the BIO Side Scan TVG controls and tow vehicle altitude. Overtime could have been reduced and data quality increased if this as well as TEAC XR5000 programming proficiency were stressed more.

ACKNOWLEDGEMENTS:

It should be mentioned here that before HUDSON Cruise 93-030, a severe quarterdeck wave shorted out the BIO Side Scan winch power unit, which had to be completely disassembled and cleaned and further waterproofed. This was accomplished very well by the Ship's Chief Electrician, Jim Hinds, prior to AGC personnel arriving aboard ship, and contributed considerably to the amount of Side Scan data collected this cruise. Jim Hinds should be congratulated for this effort above and beyond his normal responsibilities.

Deep Tow Seismic System

The Huntec DeepTow Seismic (DTS) system is a high resolution, sub-bottom profiler with the acoustic source, energy supply, heave sensor, and two receiving hydrophones housed in an underwater towed body. The AGC #3 Deep Tow system is configured for a maximum power output of 1000 joules (60 mfd storage capacitance) with an ED 10 F/C Boomer source. An LC10 single element hydrophone mounts inside the tow fish beneath the boomer. A fifteen foot, ten element NSRF tapered streamer array is towed behind the fish.

The deck equipment consists of a HydroMac Oceanographic winch, which includes a multi-way NSRFslip ring and a 700 metre, 21conductor, armoured tow cable. The winch is powered by a 440 VAC, 50 HP hydraulic pump unit. The tow cable is handled by a 36 inch diameter roller block.

The lab instrumentation consists of the Huntec Systems Console and DC high voltage power supply (PCU). The Systems Console houses the Bottom Motion Compensator circuits, the +24 volt fish supply, and modules for signal processing and tape outputs. The Huntec Mk III PCU provides DC power to the boomer in switchable ranges from 2 to 6 kilovolts.

Graphic Display, Signal Processing and System Key

The DTS system normally utilizes two thermal EPC 9800 graphic recorders. The master EPC recorder (serial #126) displayed the signal from the internal LC10 hydrophone. A second EPC recorder (serial #134) displayed the external NSRF streamer array. The Adaptive Signal Processor (ASP) module processed the signal for the internal hydrophone. The streamer signal was processed by a second ASP console.

The Adaptive Signal Processors for both channels were set to Fixed Gain (+20 Db.) mode with the bottom tracking turned off. This gain setting produced more consistent record quality in the variable survey conditions.

Initially the master DTS trigger was derived from the KEY OUT jack of the master EPC recorder. The AGC Air Gun delay box was used to provide delayed print output triggers for the EPC recorders and TSS 312B annotator. This proved less than ideal as the AGC Air Gun delay box suffered from a timing offset and drift, plus the EPC recorder could not provide the full spectrum of DTS trigger rates, including the standard 750 milliseconds.

On the second day of survey operations, the new computer controlled integrated trigger system utilizing the MITS software program was installed for a trial. The software was run on a 386 PC desktop system fitted with a special I.O. interface card. The computer trigger system was used to trigger the DTS and AGC seismic system.

The new system functioned very well and was retained for the rest of the survey. The MITS system allows several systems to be run from a common time base. The MITS masking feature significantly reduces acoustic interference by inhibiting the coincidental triggering of interfering system(s). Each source has two independent, adjustable delayed trigger outputs for keying of graphic recorders and annotators.

Tape Recording

The DTS data was logged on the fifteen track Teac XR5000 analog tape deck. The following table details the configuration of the recording channels. Tape speed was 2.4 cm./second for the entire survey.

Channel	Type	Description
4	DR	Internal LC10 hydrophone
5	FM	Master trigger +5 volt
6	DR	External NSRF streamer

Equipment List

Unit Description	Serial Number
Tow Fish Body	1017
ED10F/C Boomer Source	2023
MK4-2 Attitude Sensor Unit	5010
S1000 Energy Storage Unit	1203
Internal LC 10 Hydrophone	---
External NSRF Streamer	NA
HydroMac Oceanographic Winch and Power Pack c/w 600 m tow cable	---
Roller Cluster 36" Dia.	---
Power Control Unit Mk III	120-1
PCU Filter	120
Systems Console	109
EPC 9800 Graphic Recorder (Master)	126
EPC 9800 Graphic Recorder (Slave)	134
KrohnHite 3700R	1760
XON 486 Computer with MITS software	---
Second ASP Console	101

EQUIPMENT SETTINGS

The following equipment settings were used for the majority of DTS survey lines.

Parameter	Setting
Fire rate	0.5 - 0.75 seconds (depth dependent)
PCU power setting	5 kilovolts (750 joules)
BMC (motion compensation)	Pressure Mode
ASP	Fixed +20 db Mode (both channels)
Filter Setting - internal - external	1400-6000 hertz 1000-6000 hertz
Processor Gain (System Console)	5 KV (both channels)
Krohn-Hite gain (streamer)	0 db gain
EPC sweep speed	250 milliseconds
EPC print polarity	positive

EQUIPMENT PERFORMANCE

Overview

The DTS collected approximately 234 hours of data with a utilization rate of 65%. Operationally, the Deep Tow Seismic system performed very well, with no equipment downtime during the cruise. There was some minor problems with the tow cable and winch (detailed below).

Overall, the DTS data quality was deemed to be very good. Rough seas prevented the DTS from being deployed on line #38 and the start of line #39. The DTS records were noisy at times due to the combination of factors (rough seas, deep water and higher than average tow speeds).

Tow Cable Damage

On day 299, a single steel strand on the outer layer of the tow cable broke in two separate locations. The breaks were located approximately 80 metres and 140 metres from the tow fish. The reason for the break in the armour is not known. There was no obvious damage to the cable (ie kinks, bends, or abrasion) where the breaks occurred. The tow cable is approximately ten years old, but has held up well mechanically over the years. The towing speeds on this cruise were higher than normal averaging from 5 to 7 knots (through water). Normal DTS tow speeds are 4 to 6 knots.

It is postulated that the higher tow speeds and rough weather, combined with the age of the cable caused the strands to break. The Senior Scientist reduced the survey speed to 6 knots maximum (over ground) to prevent further damage to the tow cable. Two strands did break subsequently near one of the previous breaks (bottom), but this was due to the tow cable rubbing on the side plate of the roller cluster. This occurred when the vertical roller vibrated loose.

Replacement tow cables for both AGC Deep Tow systems is overdue, due in part, to the ongoing development of the digital DTS. For the present, to preserve the existing DTS cables, it is strongly recommended that DTS tow speeds be kept below six knots(through water) in the future.

Cable Strumming

At the start of the survey approximately fifteen meters of ZipperTube fairing was installed on the tow cable to reduce cable strumming. The tow arm bushings were also replaced.

Hydromac Winch/Pump

As reported previously (Geoforce cruise report C109-03), the Hydromac winch jerks excessively when winched at any speed over minimum speed. The problem occurs only when winching "out" and is thought to be a hydraulic problem in the pump unit. The remote controller was not working due to a damaged brush assembly on the joy stick..

Equipment Servicing and Status

Other than the tow cable the DTS system completed the survey in operational order. The system is scheduled for its annual refit following this cruise.

Parts Consumed

Parts consumed during the survey are listed below.

DTS parts	2 junction box O rings
	2 tow arm bushings
	4 tow arm bushing - washers
	4 stainless cotter pins
	1 Scotch 82A1 splice kit
	4 side skin washers and screws
	8 bolts 1/4-20 SS flathead
	8 nyloc nuts 1/4-20 SS

RECOMMENDATIONS

1) If the DTS tow cable is reterminated at the lower break during this winter's refit, this will mean the loss of approximately 80 metres of cable. If the cable is reterminated at the upper break, this will shorten the cable an additional 60 metres. It may be possible to mend the upper break (only one strand broken).

2) In the future, DTS towing speeds should be restricted to six knots maximum (through water). DTS users should be informed of this speed limitation.

3) Zippertube fairing is field installable and effectively combats cable strumming below 6 knots. At speeds over six knots it is difficult to keep the fairing on the cable. More Zippertube fairing should be purchased for next field season, and the field operator encouraged to install it as often as possible as it is removed by normal wear and tear.

4) The HydroMac pump should be serviced to eliminate the jerking motion. This problem did not exist prior to the service performed last summer by the hydraulic contractor. The joy stick remote controller should be replaced.

5) The MITS master trigger system proved very effective at reducing acoustic interference. Use of a common time base and the masking feature eliminated most of the objectionable acoustic interference between the air gun and DTS systems. The masking feature does not work in deep water, when more than one DTS shots are in the water column.

   Improvements to MITS would include
   - a confirmation after the "escape" button is pressed, when exiting the program;
   - the default trigger rate settings at startup are much too fast
   - the masking table is somewhat confusing (ie which is the source being inhibited)
   - combine the existing Ships Clock software and the MITS into a single package capable of running on a compact PC.

SAMPLING PROGRAM

Coring:

The coring program was carried out using a model 2450 Benthos piston corer where the core head had been modified with lead to weigh 1364 Kgs. The system also used a split piston and the two metre long trigger weight was a standard Benthos gravity corer weighted to 219 Kgs. On two of the cores which will be used for global change studies the Benthos trigger weight was substituted by the Murphy gravity corer which has the same weight but is 2.5 metres long and has an inside diameter of 10 cms.

This system functioned very well, recovering 88% sediment compared to apparent penetration and 86% sediment compared to actual corer length. One other interesting comparison is that we had 97% apparent penetration to actual corer length. In attempting to recover 12649 cms. of sample at 12 sites, only two barrels were bent and no core cutters were damaged.

Box Coring:

The standard 1\2 metre box core was deployed a total of 10 times during this cruise and it was generally used at each coring site to ground truth the surface sediments. A tilt switch pinger has been mounted on the arm of the corer and is oriented so the pinger stops when the corer closes. This allows us to know when the corer has reached bottom and that it has tripped successfully.

Both boxes were damaged when large rocks became jammed between the box and the closing spade.

IKU Grabs:

The IKU grab was used 20 times during the cruise to collect bulk samples. The IKU sampler we had was the smaller 1\4 cubic metre model and it generally worked very well, although, it was quite stiff the first few stations due to its lack of use and the cold temperatures. Fortunately, when it was manufactured, provision was made to have many grease points installed and this helped significantly in the smoothness of operation.

RECOMMENDATIONS:

1) An eye be installed on the IKU grab to hook the trip chain.

2) The metal stop on the boxcorer frame be replaced.

3) The Metrox Block requires overhaul and repairs.

4) The two boxes for the boxcorer require repairs.

5) The cutter on the Murphy corer could be modified to allow the catcher to be outside the barrel.

6) Purchase new Benthos barrels.

7) Taper the locking pin on the boxcorer to allow easier arming.

ACKNOWLEDGMENTS:

Many thanks go out to the Captain, officers and crew of the vessel for the energetic and efficient manner in which they performed their duties. Such a successful sampling program cannot be attained without excellent station keeping by the bridge watches and the dedicated work of the deck department.

NAVIGATING WITH DIFFERENTIAL GPS ON HUDSON 93-034

For this cruise, an AGC Magnavox 4200 GPS receiver was used to provide navigation to the ships distribution system because of its ability to receive and utilize differential corrections from a shore based station. The Trimble 10X permanently mounted on the Hudson unfortunately does not have this capability and was used primarily as a backup receiver. The trimble uncorrected nav was also sent out through the distribution system allowing the various locations receiving the nav data to switch to this raw data when the differential was down. This receiver should be replaced with a 4200 or similar receiver with differential capability.

The differential corrections dramatically reduce the errors (from 50-150 m to 5-15 m or less) (selective availability) which appear in the raw GPS signal. The quality of gravity data collected is directly related to the quality of the navigation, thus the requirement for differentially corrected GPS on this cruise.

The differential corrections received by Hudson were bounced off a Starfix geostationary satellite from one of two base stations in the northern USA, Long Island, New York and Dileuth, Minnesota. The signals were received via an antenna/downconverter/downlink receiver combination supplied by McEllhaney Associates for a fixed dollar figure per day and are then fed into the AGC Magnavox 4200 GPS receiver. The Starfix Satellite used for this cruise was quite low on the horizon (12-14 degrees approx) with obvious associated problems. Acquiring differential corrections from this satellite had not previously been tried this far north and several factors caused interruptions in the acquisition link.

1) The signal from the Starfix satellite to the antenna was blocked at times by the ship's superstructure (ie. forward mast). This occurred on a course of 340-347 degrees and caused minor problems during the cruise. On one line a waypoint had to shifted eastward and on one other line the interruptions were accepted as the bow was swinging enough because of weather that the interruptions were not of long duration (1-2 min).

2) The gyro stabilized differential antenna lost lock and was scanning the wrong area of the horizon. This happened on the morning of Oct 20th when we arrived in the Strait area but did not occur again during the trip. A minor adjustment of 5 degrees was required on Nov 1.

3) The base station and mobile (HUDSON) must have at least three satellites in common to both stations at any time to allow for differential navigating. Because of the distance between our surveying areas and the base stations, this was not always the case. Alternating between the two base stations would decrease these non-navigating windows about 50 percent of the time. When this condition occurred, the AGCNAV display appeared to be frozen (except for time) as the Magnavox 4200 continued to output the same latitude and longitude until at least three satellites were again common to base and mobile. This resulted in gaps in differential navigating of 1-30 minutes. Fortunately the vast majority were within the 1-5 minute range and were spread over each 24 hours. Several suggestions are made in the 'AGCNAV PERFORMANCE' section to address this problem.

4) Even if 3 satellites were common to base and mobile, the geometry was not always there to allow the receiver to navigate. The azimuths of the visible satellites must cut at sufficient angles before the receiver will accept the information for fix calculations. This condition also caused interruptions in differential navigating but these are included in the gaps described in section 3.

NAVIGATION DISPLAY

'AGCNAV' was used to display navigation at various points throughout the vessel, ie. bridge, navigation centre, GP lab, drawing office etc. The more serious bugs in this system appear to have been eliminated with a few minor ones remaining. These have been documented from other trips and are on a list to be addressed this winter(95). The bridge system runs a second monitor through a video splitter for the conning of the vessel while on station. All other AGCNAV installations are stand alone using a common signal distributed throughout the vessel. Watchkeepers soon became proficient in inputting waypoint data and generally running the various options in AGCNAV.

NAVIGATION LOGGING

Differentially corrected navigation data were logged via an RS232 link at 9600 baud directly into port TXA5: on the VAX. This 'raw' data was then reformatted into SHIPAC format for processing via the shipboard system.

The same differentially corrected GPS data, the raw Trimble GPS data and the ships head and log were also logged, by AGCNAV, on a PC mounted in the navigation centre. This was originally to be mainly for backup purposes but proved to be invaluable in filling in gaps in the differential data, providing a second choice nav stream as well as providing overlay data for daily nav plots.

PERFORMANCE

With the exception of 2 or 3 occasions, logging was uninterrupted during the cruise. Small amounts of differential data were lost (<30 min) on 2 occasions when the VAX dropped the line to the network for unknown reasons. These gaps were filled by Trimble data logged on a PC. Fortunately no such problems occurred during silent hours when the systems are unattended.

DATA PROCESSING (VAX)

Data processing was carried out on a Microvax II minicomputer using the SHIPAC shipboard/shore geophysical processing and display software. Daily plots were done of navigation collected the previous day to continuously monitor navigation quality. The Microvax was configured with 11Mb of memory, a Wren 5 640 Mb disc, a Wren 7 1.2 gigabyte disc, a 95 Mb Tk50 tape cartridge and a 2 gigabyte XABYTE tape cartridge. Communications with the Vax were accomplished through two VT220 (System Console) and one VT240 graphics terminal. An LXY12 line printer was available for printing and an HP7586E pen plotter for plotting.

Dr Loncarevic processed the gravity and magnetic data on a PC based system in the gravity lab so the Vax system was used for navigation and bathymetry processing only.

Several new routines were written to process the Trimble data which was logged on a PC in the nav centre and then ported to the Vax over the network. Overlay plots were done each day of the differentially corrected GPS data and the raw Trimble GPS data to visually show the increased accuracy of the differential navigation. These plots will also be of interest to McEllhaney to give them some figures to work with for future work this far north.

The final VAX cruise data files were backed up to an XABYTE data cartridge. Navigation data was ported back to a PC via the network for backup to the PC hard drive and a Jumbo 8mm 250mb backup tape unit for the added security of backups on two systems. The nav data was also formatted into the multi-parameter format required by the AGC navigation database and backed up on the Jumbo. The data on the VAX backup tape will be downloaded to the shore VAX at BIO for further plotting/processing as required.

PERFORMANCE

SHIPAC is a proven system and as expected there were no major problems encountered with the processing procedures.

'SHIP' INVENTORY SYSTEM (RECORDS,TAPES,SAMPLES)

The Dbase 3 Plus based inventory system 'SHIP' (SID - HOUSE inventory package) was used to store data for and create reports on all samples, records and tapes collected on the cruise. A full inventory generated by SHIP of all collected data is included at the end of this report.

Hardware for this system includes a DTK FEAT-3331 DX 486 computer operating at 33 Mh with a 1.2 Mb 5 1/4" floppy drive, a 1.44 Mb 3 1/2 " drive and a 400.2 Mb hard disc. Printing capability was provided by a HEWLETT PACKARD Thinkjet and a NEC Model 95 Silentwriter Laser printer.

PERFORMANCE

A proven system in use now for several years, it performed as expected. Modifications to the report routines to allow configuration of various printers would add to the flexibility of this system.

FINS INVENTORY SYSTEM (SUBSAMPLE ANALYSIS)

The shipboard inventory package for subsamples (FINS) was used continuously this trip for generating labels and inventory of analysis work done on all cores, boxcores and IKU grabs. Data from this Dbase 3 Plus based system will then be downloaded directly to the inhouse SAD inventory system.

Several mods were made to speed up the label generating routines in FINS and a conversion to Dbase 4 this winter, which will provide greater speed when accessing very large databases.

PERFORMANCE

This system performed well and requires minimal training of personnel in its operation. New operators provide a different view of the methodology of the system and result in constructive ideas for improvements.

OVERALL COMPUTING SERVICES (PC's)

A DTK DX 486, a Compatible 286 and 2 Express 4000 486 systems (Ocean Circ) were available for general computing (word processing etc.) when not being used for their assigned tasks. Several printers including a newly installed (small computer group) NEC Model 95 Silentwriter Laser printer were available for hard copy.

PERFORMANCE

This setup works well as it means all personnel do not have to bring their own computers. Security of cruise data files is a problem on those machines which have a cruise related function as their main use.

No files, other than those created by a user, should be modified or deleted without the permission of the person in charge of these machines. This has occurred and should not be repeated.

NETWORKING

Four PCs were added to the network to utilize the NEC Model 95 Laser printer and port data files to and from the VAX. It became much more convenient to have the laser directly hooked to the PCs in the drawing office rather then pass the files to the VAX and then send them to the Laser. The raw Trimble data was ported to the VAX each day and the final dayfiles were ported back to a PC from the VAX at cruise end for backup to a Jumbo tape unit. The present method of accessing the Laser is very awkward and should be changed if at all possible.

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
-SHIP- REPORTING PACKAGE

TABLE 1

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

TOTAL SAMPLE INVENTORY

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DAY/TIME	SEISMIC DAY/TIME	LATITUDE	LONGITUDE	DEPTH (M)	GEOGRAPHIC LOCATION
001	BOXCORE	2941323		60 57.192	65 42.440	786.0	HUDSON STRAIT
002TWC	CORE	2941437		60 56.781	65 41.984	822.0	HUDSON STRAIT
002	CORE	2941437		60 56.781	65 41.984	822.0	HUDSON STRAIT
003	BOXCORE	2941929		61 13.466	66 25.989	529.0	HUDSON STRAIT
004	CORE	2942046		61 13.455	66 25.932	526.0	HUDSON STRAIT
004TWC	CORE	2942046		61 13.455	66 25.932	526.0	HUDSON STRAIT
005	BOXCORE	2951203		61 46.515	66 51.643	220.0	HUDSON STRAIT
006	CORE	2951326		61 46.446	66 51.740	223.0	HUDSON STRAIT
006TWC	CORE	2951326		61 46.446	66 51.740	223.0	HUDSON STRAIT
007	IKU	2951555		61 50.860	66 36.756	179.0	HUDSON STRAIT
008	IKU	2951745		61 57.515	67 04.815	108.0	HUDSON STRAIT
009	IKU	2951948		61 54.398	67 56.812	159.0	HUDSON STRAIT
010	IKU	2961335		62 25.371	69 35.942	136.0	HUDSON STRAIT
011	BOXCORE	2971148		61 29.499	70 43.843	204.0	HUDSON STRAIT
012	CORE	2971254		61 29.203	70 42.340	205.0	HUDSON STRAIT
012TWC	CORE	2971254		61 29.203	70 42.340	205.0	HUDSON STRAIT
013TWC	CORE	2971608		61 30.010	70 43.409	201.0	HUDSON STRAIT
013	CORE	2971608		61 30.010	70 43.409	201.0	HUDSON STRAIT
014	BOXCORE	2971805		61 17.893	71 03.854	199.0	HUDSON STRAIT
015	CORE	2971905		61 17.958	71 03.796	200.0	HUDSON STRAIT
015TWC	CORE	2971905		61 17.958	71 03.796	200.0	HUDSON STRAIT
016	IKU	2972042		61 19.800	70 49.837	177.0	HUDSON STRAIT
017	IKU	2972227		61 24.481	70 20.269	177.0	HUDSON STRAIT
018	CORE	2981346		62 37.278	71 35.681	338.0	HUDSON STRAIT
018TWC	CORE	2981346		62 37.278	71 35.681	338.0	HUDSON STRAIT
019	IKU	2981754		62 57.940	72 46.299	326.0	HUDSON STRAIT
020	IKU	2991003		63 04.471	74 29.832	414.0	HUDSON STRAIT
021	BOXCORE	2991246		63 04.355	74 29.754	411.0	HUDSON STRAIT
022	CORE	2991358		63 04.351	74 29.820	410.0	HUDSON STRAIT
022TWC	CORE	2991358		63 04.351	74 29.820	410.0	HUDSON STRAIT
023	IKU	2991715		62 56.492	75 30.935	120.0	HUDSON STRAIT
024	IKU	3001550		62 54.070	77 30.767	304.0	HUDSON STRAIT
025	IKU	3001953		62 31.470	73 41.620	129.0	HUDSON STRAIT
026	IKU	3021607		61 39.930	71 06.628	131.0	HUDSON STRAIT
027	IKU	3021950		61 24.400	69 35.340	235.0	HUDSON STRAIT
028	BOXCORE	3031124		61 15.036	67 32.840	431.0	HUDSON STRAIT
029TWC	CORE	3031209		61 15.043	67 32.948	430.0	HUDSON STRAIT
029	CORE	3031209		61 15.043	67 32.948	430.0	HUDSON STRAIT
030	BOXCORE	3031400		61 08.315	68 01.796	455.0	HUDSON STRAIT

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
-SHIP- REPORTING PACKAGE

TABLE 1

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

TOTAL SAMPLE INVENTORY

SAMPLE NUMBER	SAMPLE TYPE	SAMPLE DAY/TIME	SEISMIC DAY/TIME	LATITUDE	LONGITUDE	DEPTH (M)	GEOGRAPHIC LOCATION
031	CORE	3031440		61 08.247	68 01.732	454.0	HUDSON STRAIT
031TWC	CORE	3031440		61 08.247	68 01.732	454.0	HUDSON STRAIT
032	IKU	3031825		60 38.886	68 43.931	170.0	N. UNGAVA BAY
033	IKU	3041222		60 10.894	67 42.618	092.0	UNGAVA BAY
034	IKU	3041846	3041846	59 45.446	67 32.144	084.0	S. UNGAVA BAY
035	BOXCORE	3051149	3051105	59 31.997	67 13.630	295.0	S. UNGAVA BAY
036TWC	CORE	3051237		59 32.028	67 13.198	297.0	S. UNGAVA BAY
036	CORE	3051237	3051105	59 32.028	67 13.198	297.0	S. UNGAVA BAY
037	BOXCORE	3051514		59 37.835	66 31.279	376.0	S. UNGAVA BAY
038	CORE	3051557		59 38.169	66 13.070	376.0	S. UNGAVA BAY
038TWC	CORE	3051557		59 38.169	66 13.070	376.0	S. UNGAVA BAY
039	IKU	3051742		59 44.248	66 31.088	258.0	UNGAVA BAY
040	IKU	3051922		59 54.982	66 10.214	154.0	UNGAVA BAY
041	IKU	3061139	3051050	60 26.607	66 26.361	127.0	UNGAVA BAY

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
-SHIP- REPORTING PACKAGE

TABLE 2

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

CORE SAMPLES

SAMPLE NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE LONGITUDE	DEPTH (MTRS)	CORER LENGTH (CM)	APP. PENN (CM)	CORE LENGTH (CM)	NO OF SECT	GEOGRAPHIC LOCATION	NOTES
002TWC	TRIGGER WEIGHT	2941437	60 56.781 65 41.984	822.0	300	000	94	1	HUDSON STRAIT	CORE SURFICAL VENEER BOUNDARY WITH UNDERLYING CLAY. AGREES WITH BOXCORE AT 10 CM AND PISTON CORE- NO LOSS OF SURFACE. SEISMIC TIME = 86-027/2660310
002	BENTHOS PISTON	2941437	60 56.781 65 41.984	822.0	0910	0900	0702	5	HUDSON STRAIT	CUTTER BAGGED/BUCKET. D/E 18 CM MAGNETIC CHECK. PLASTIC LINER AT F/E BROKEN. F/E = 0-101 CM, E/D = 101-248 CM, D/C = 248-400 CM, C/B = 400-550 CM, B/A = 550-700 CM. SUBSAMPLES IN SAME BUCKET AS CUTTER. SEISMIC TIME = 86-027/2660310
004	BENTHOS PISTON	2942046	61 13.455 66 25.932	526.0	0909	750	793	6	HUDSON STRAIT	G/F = 0-55 CM, F/E = 55-203 CM, E/D = 203-343 CM, D/C = 343-494 CM, C/B = 494-644 CM, B/A = 644-793 CM.; LAMINATED SEQUENCE GLACIAL MARINE. SEISMIC TIME = 85-027/2842050
004TWC	TRIGGER WEIGHT	2942046	61 13.455 66 25.932	526.0	300	0	0	0	HUDSON STRAIT	NO SEDIMENT RECOVERED. SEISMIC TIME = 85-027/2842050
006	BENTHOS PISTON	2951326	61 46.446 66 51.740	223.0	606	606	486	4	HUDSON STRAIT	SEISMIC TIME = 90-023/2711806
006TWC	TRIGGER	2951326	61 46.446 66 51.740	223.0	303		0	0	HUDSON STRAIT	NO SAMPLE RECOVERED. SEISMIC TIME = 90-023/2711806
012	BENTHOS	2971254	61 29.203 70 42.340	205.0	1515	0	0	0	HUDSON STRAIT	NO SAMPLE. WIRE ANGLE WAS TOO LARGE FOR THE CORER TO PENETRATE THE SEDIMENT. SEISMIC TIME = 90-023/2762323
012TWC	TRIGGER	2971254	61 29.203 70 42.340	205.0	303		19	1	HUDSON STRAIT	SMALL SAMPLE DUE TO WIRE ANGLE. SEISMIC TIME = 90-023/2762323
013TWC	TRIGGER	2971608	61 30.010 70 43.409	201.0	303	0	1	0	HUDSON STRAIT	SMALL SAMPLE BAGGED. SEISMIC TIME = 90-023/2762323
013	BENTHOS	2971608	61 30.010 70 43.409	201.0	1515	1200	888	8	HUDSON STRAIT	EXTRUSION AT F'-F'. SECTION E'-F' DISTURBED AS WELL AS A SECTION OF G'-H'.
015	BENTHOS	2971905	61 17.958 71 03.796	200.0	1515	1515	1467	13	HUDSON STRAIT	N/M=0-28, M/L=28-186, L/K=186-340, K/J=340-493, J/I=493-501, I/H=501-655, H/G=655-809, G/F=809-821, F/E=821-976, E/D=976-1131, D/C=1131-1158, C/B=1158-1313, B/A=1313-1467 SEVERAL EXTRUDED PIECES LABELLED UPCORE AS NOTED ON SAMPLE SHEET. SEISMIC TIME = 90-023/2770804
015TWC	TRIGGER	2971905	61 17.958 71 03.796	200.0	303	100	120	1	HUDSON STRAIT	SEISMIC TIME = 90-023/2770804
018	BENTHOS	2981346	62 37.278 71 35.681	338.0	900	950	861	6	HUDSON STRAIT	SAMPLED FOR POLLEN=20CM, FORAMS=20CM, MS=2.5CM, CLAY MINERALOGY=20CM SEISMIC TIME = 90-023/2800107 GLOBAL CHANGE CORE. G/F=0-93, F/E=93-248, E/D=248-402, D/C=402-554, C/B=554-708, A/B=708-861
018TWC	TRIGGER	2981346	62 37.278 71 35.681	338.0	300	50	0	0	HUDSON STRAIT	SMALL SAMPLE BAGGED. SEISMIC TIME = 90-023/2800107
022	BENTHOS	2991358	63 04.351 74 29.820	410.0	1500	1350	1252	8	HUDSON STRAIT	CUTTER BAGGED. SECTION AT C'-C' BAGGED. SEISMIC TIME = 85-027/2920655 GLOBAL CHANGE CORE.
022TWC	MURPHY	2991358	63 04.351 74 29.820	410.0	303	40	52	1	HUDSON STRAIT	SEISMIC TIME = 85-027/2920655
029TWC	TRIGGER	3031209	61 15.043 67 32.948	430.0	303	0	0	0	HUDSON STRAIT	NO SAMPLE RECOVERED. SEISMIC TIME = 90-023/2721547

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
-SHIP- REPORTING PACKAGE

TABLE 2

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

CORE SAMPLES

SAMPLE NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE LONGITUDE	DEPTH (MTRS)	CORER LENGTH (CM)	APP. PENN (CM)	CORE LENGTH (CM)	NO OF SECT	GEOGRAPHIC LOCATION	NOTES
029	BENTHOS	3031209	61 15.043 67 32.948	430.0	900	900	742	5	HUDSON STRAIT	ANN JENNINGS C14 TOP AND BOTTOM. CLAY, POLLEN, FORAMS EVERY 20CM. CORE CATCHER BAGGED WITH REP SAMP. 732-742 732-745 GS-JENNINGS 740-742 XRD AGC; GLACIAL MARINE; TD DRIFT ? SEISMIC TIME = 90-023/2721547
031	BENTHOS	3031440	61 08.247 68 01.732	454.0	1200	1240	1016	7	HUDSON STRAIT	H/G=0-82, G/G'=DISTURBED, G/F=82-233, F/E=233-384, E/D=384-537, D/C=537-688, C/B=688-834, A/B=834-994; DIAMICT CATCHER= 994-1016; TD DRIFT ? SEISMIC TIME = 85-027/2961245
031TWC	TRIGGER	3031440	61 08.247 68 01.732	454.0	303	110	140	1	HUDSON STRAIT	SEISMIC TIME = 85-027/2961245
036TWC	MURPHY	3051237	59 32.028 67 13.198	297.0	303	200	104	1	UNGAVA BAY	SEISMIC TIME = 93-034/3051105
036	BENTHOS	3051237	59 32.028 67 13.198	297.0	1500	1450	1456	9	UNGAVA BAY	(90-023 SEISMIC TIME = 273/2150) G-G'=455-473, E-E'=779-779, D-D'=955-959, C-C'=1112-1120, B-B'=1273-1279 CATCHER = 1436-1456; GLOBAL CHANGE CORE TD DRIFT; EXCELLENT BIOTRACES THROUGH-OUT. SEISMIC TIME = 93-034/3051105
038	BENTHOS	3051557	59 38.169 66 13.070	376.0	1200	1300	1170	8	UNGAVA BAY	SEISMIC TIME = 90-023/2690320 CATCHER SAMPLE.
038TWC	TRIGGER	3051557	59 38.169 66 13.070	376.0	303	0	5	0	UNGAVA BAY	SMALL PIECE OF CORE RECOVERED, BAGGED. SEISMIC TIME = 90-023/2690320

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
-SHIP- REPORTING PACKAGE

TABLE 3

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

BOXCORE SAMPLES

SAMPLE NUMBER	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (MTRS)	NO OF ATMTS	NO OF SUBS	NO OF CORES	PHOTOS TAKEN	GEOGRAPHIC LOCATION	NOTES
001	2941323	60 57.192 65 42.440	786.0	1	2	4	Y	EASTERN HUDSON STRAIT	5Y4/2 OLIVE GRAY MED TO COARSE SAND VENEER UNDERLAIN BY GRAY 5Y5/1 CLAY. MACROBENTHOS AT SURFACE: BRITTLE STARS, SEVERAL POLYCHAETES. SEISMIC RECORD = 86-027 / 2660310 PUSH CORES TAKEN AT 'A','B','C','D'. SPLIT 'D' ONLY; DESCRIBED/PHOTOGRAPHED. SAMPLE FOR FORAM/POLLEN- NO PALEO; ALSO MS. TOOK BULK SAMPLE OF SURFACE- BAGGED. LARGE ERRATIC AT INTERFACE BETWEEN CLAY AND SAND. BULK SAMPLE BAGGED FOR QGC FOR ERRATIC /PEBBLE CONTENT BY ROBERT DAIGNEAULT.
003	2941929	61 13.466 66 25.989	529.0	1	1	4	Y	HUDSON STRAIT	5Y4/2 SILTY SANDY VENEER UNDERLAIN BY GRAY 5Y5/1 CLAY; MACROBENTHOS: SPONGE, ECHINODERM, ISOPODA, SEVERAL BRITTLE STARS. REPRESENTATIVE SAMPLE BAGGED/BKT. REMAINING SAMPLE BAGGED FOR QGC FOR SIEVING ON BOARD BY ROBERT ANDRE DAIGNEAULT. PUSH CORES TAKEN AT 'A', 'B', 'C', 'D' SEISMIC TIME = 85-027/2842050
005	2951203	61 46.515 66 51.643	220.0	1	1	0	Y	HUDSON STRAIT	BAGGED A SMALL SAMPLE. MYA TRUNCATA AT SURFACE IN SITU. NUMEROUS POLYCHAETES. 5Y5/1 COHESIVE HOMOGENEOUS CLAY WITH THIN <10CM MED TO FINE 5Y4/2 SAND. BROKEN MYA SHELL FRAGS. LARGE COBBLE >20CM LONG AXIS CRYSTALINE. NO CORES TAKEN. BOXCORE FRAME BENT FROM IMPACT WITH A BOULDER LAG. SAMPLE PARTIALLY WASHED OUT. SEISMIC TIME = 90-023/2711806 SAMPLE TAKEN FOR QGC FOR SIEVING ON BOARD.
011	2971148	61 29.499 70 43.843	204.0	1	2	3	Y	HUDSON STRAIT	5Y4/2 SILTY CLAY; APPROX 40 CM LAG DEPOSIT OF SEVERAL COBBLES/BOULDERS. SAMPLED FOR SOURCE; MACROBENTHOS: BRITTLE STARS, AMPHIPODA, SHRIMP. 5Y4/2 UPPER 10 CM GIVES WAY TO DARK GRAY CLAY 5Y4/1. 5 CORES ATTEMPTED, 2 ABORTED AS HIT UNDERLYING COBBLES. CORES TAKEN AT 'A', 'B', 'C'. REPRESENTATIVE SAMPLE BAGGED/BUCKET. 1 GALLON BUCKET FOR QGC FOR SIEVING ONBOARD SHIP. SEISMIC TIME = 90-023/2762323
014	2971805	61 17.893 71 03.854	199.0	2	1	0	Y	HUDSON STRAIT	THIN SURFICIAL CLAY VENEER 5Y4/2 UNDERLAIN BY DARK GRAY 5Y3/2 CLAY. FEW MACROBENTHOS; FEW WORM TUBES, BRITTLE STARS. REPRESENTATIVE SAMPLE BAGGED/BUCKET. 1 SAMPLE FOR QGC FOR SIEVING ON BOARD. SEISMIC TIME = 90-023/2770804
021	2991246	63 04.355 74 29.754	411.0	1	1	4	Y	HUDSON STRAIT	CORES TAKEN AT 'A', 'B', 'C', 'D'. 4 CM THICK 5Y4/3 SURFICIAL VENEER, SILT UNDERLAIN BY BLACK ORGANIC 5Y3/2 CLAY. MACROBENTHOS; AMPHIPODS, FEW BRITTLE STARS, SOME POLYCHAETE LININGS DOWN TO 10 CM.FEW SMALL ERRATICS ANGULAR APPROX 3 CM LONG AXIS IN LOWER MOST UNIT SOME SHELL FRAGMENTS. A REPRESENTATIVE SAMPLE WAS BAGGED IN A BUCKET. SAMPLE TAKEN FOR QGC FOR PROVENANCE/ ERRATICS. SEISMIC TIME = 85-027/2920655

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
-SHIP- REPORTING PACKAGE

TABLE 3

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

BOXCORE SAMPLES

SAMPLE NUMBER	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (MTRS)	NO OF ATMTS	NO OF SUBS	NO OF CORES	PHOTOS TAKEN	GEOGRAPHIC LOCATION	NOTES
028	3031124	61 15.036 67 32.840	431.0	1	5	4	Y	HUDSON STRAIT	THIN 5Y4/2 SURFICIAL SAND VENEER WITH A FEW BRITTLE STARS AT SURFACE, POLYCHAETE TUBES; UNDERLAIN BY DARK GRAY 5Y5/1 STIFF CLAY SOMEWHAT SILTY. NO APPARENT ERRATICS IN MATRIX. 4 CORES TAKEN AT 'A','B','C','E'. 1 REPRESENTATIVE SAMPLE BAGGED/BUCKET. SEISMIC TIME = 90-023/2721547 1 BUCKET SAMPLE FOR SIEVING FOR QGC.
030	3031400	61 08.315 68 01.796	455.0	1	1	4	Y	HUDSON STRAIT	REPRESENTATIVE SAMPLE BAGGED/BUCKET. PUSH CORES TAKEN AT 'A','B','C','E'. THIS SURFICIAL VENEER (<2CM) THICK UNDERLAIN BY DARK GRAY 5Y5/2 STIFF CLAY. FEW ERRATICS NOTED AT BOUNDARY BETWEEN 2 UNITS AS WELL AS WITHIN LOWERMOST UNIT MACROBENTHOS: FEW BRITTLE STARS, AMPHIPODS AT SURFACE. 1 SAMPLE FOR QGC FOR SIEVING ON BOARD. SEISMIC TIME = 85-027/2961245
035	3051149	59 31.997 67 13.630	295.0	1	2	4	Y	SOUTHERN UNGAVA BAY.	THIN 5Y4/2 <2CM THICK SANDY SURFICIAL VENEER UNDERLAIN BY STIFF 5Y5/1 HEAVILY BIOTURBATED CLAY TO 10 CM, VERY STIFF AT BOTTOM. MACROBENTHOS- BRITTLE STARS, SEA ANEMONE 4 CORES TAKEN AT 'A','B','C','D' , 10CM SHORT (24CM TOTAL LENGTH) FROM BOTTOM BOXCORE. REPRESENTATIVE SAMPLE BAGGED/BUCKET. 1 SAMPLE FOR QGC FOR SIEVING ON BOARD. SEISMIC TIME = 93-034/3051105
037	3051514	59 37.835 66 31.279	376.0	1	0	0	Y	UNGAVA BAY	1 BOULDER PRECAMBRIAN GNEISS. NO SAMPLE TAKEN. SEISMIC TIME = 90-023/2690320

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
-SHIP- REPORTING PACKAGE

TABLE 4

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

IKU SAMPLES

SAMPLE NUMBER	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (MTRS)	NO OF ATMTS	NO OF SUBS	NO OF CORES	PHOTOS TAKEN	GEOGRAPHIC LOCATION	NOTES
007	2951555	61 50.860 66 36.756	179.0	3	2	0	Y	HUDSON STRAIT	SHELL HASH - LAG DEPOSIT. MOSTLY CRYSTALLINE METAMORPHOSED GRANITE PEBBLES, COARSE SAND. 5Y4/2 DARK MOTTLING; FRAGMENTS OF MYA TRUNCATA THROUGHOUT. 1 ST ATTEMPT DID NOT TRIP. 2 ND ATTEMPT FAILURE. 3 RD ATTEMPT TRIPPED ON SECOND BOUNCE. PEBBLES SAMPLED FOR PROVENANCE BY QGC. REPRESENTATIVE SAMPLE BAGGED/BUCKET. SEISMIC TIME = 90-023/2711400 SAMPLE TAKEN FOR QGC FOR SIEVING ON BOARD.
008	2951745	61 57.515 67 04.815	108.0	1	2	0	Y	HUDSON STRAIT	5Y4/3 OLIVE GRAY COARSE SAND WITH GRAY 5Y5/1 CLAY MATRIX; SURFICAL VENEER MACROBENTHOS: BRITTLE STARS, CORALS, SHELL HASH - MYA TRUNCATA, SCALLOPS. SAMPLE TAKEN FOR QGC FOR SIEVING ON BOARD. ROBERT DAIGNEAULT REPRESENTATIVE SAMPLE BAGGED/BUCKET. SEISMIC TIME = 90-023/2712134
009	2951948	61 54.398 67 56.812	159.0	1	2	0	Y	HUDSON STRAIT	COBBLED SURFACE WITH OLIVE GRAY 5Y4/2 MEDIUM TO COARSE-GRAINED SAND UNDERNEATH ; BRITTLE STARS, BASKET STARS, BROKEN MYA TRUNCATA ON SURFACE. POLYCHAETES AND WORM LININGS. REPRESENTATIVE SAMPLE TAKEN SD/COBBLES. SAMPLE FOR QGC FOR SIEVING ON BOARD. REP SAMPLE BAGGED (AGC) SEISMIC TIME = 90-023/2720527
010	2961335	62 25.371 69 35.942	136.0	1	2	0	Y	HUDSON STRAIT	VERY FINE OLIVE GRAY 5Y4/2 SURFICIAL SAND VENEER. FEW ANGULAR BOULDERS TO COBBLE SIZED ERRATICS; MACROBENTHOS; BRITTLE STARS, ISOPODS, BROKEN SHELL HASH, SHRIMP, BLOOD POLYCHAETES. 1 BAG OF REPRESENTATIVE SAMPLE BAGGED/ BUCKET. BUCKETS FOR ERRATIC ID/SOURCE - QGC. SEISMIC TIME = 85-027/2872230
016	2972042	61 19.800 70 49.837	177.0	1	1	1	Y	HUDSON STRAIT	CORE TAKEN AT 'F'. 5Y4/3 GRITTY CLAY WITH LARGE BOULDERS AND NUMEROUS ERRATICS AT SURFACE - LAG DEPOSIT ? MACROBENTHOS; MOSTLY BLOOD POLYCHAETES, SEA ANEMONE; SOME CORAL. REPRESENTATIVE SAMPLE BAGGED/BUCKET. 2 1 GALLON BUCKETS TAKEN FOR SIEVING ON BOARD SHIP BY QGC. SEISMIC TIME = 92-028/2500715
017	2972227	61 24.481 70 20.269	177.0	1	1	0	Y	HUDSON STRAIT	SURFICIAL VENEER: 5Y4/2 OLIVE GRAY FINE TO COARSE GRAINED SAND WITH SHELL HASH; MINOR COBBLES, PEBBLES- SAMPLED FOR PROVENANCE, FEW WORM TUBES. REPRESENTATIVE SAMPLE BAGGED/BUCKET. 1 GALLON BUCKET TAKEN FOR QGC FOR SIEVING ON BOARD SHIP. SEISMIC TIME = 85-027/2871030
019	2981754	62 57.940 72 46.299	326.0	1	2	0	Y	HUDSON STRAIT	SAMPLE OF UPPER UNIT BAGGED. SAMPLE OF LOWER UNIT BAGGED. (DIAMICT ?) UPPER- OLIVE GRAY 5Y4/2 GRIT WITH LARGE BOULDERS(20CM)/COBBLES AT SURFACE; MACROBENTHOS: BRITTLE STARS, POLYCHAETES; BROKEN SHELL HASH. LOWER- GRAY 5Y4/1 SILTY CLAY WITH SHELL HASH. FEW ERRATICS. LOWER UNIT SAMPLED FOR ERRATICS BY QGC. SEISMIC TIME = 85-027/2891140 REPRESENTATIVE SAMPLE BAGGED/BUCKET. 1 SAMPLE FOR QGC FOR SIEVING ON BOARD.
020	2991003	63 04.471 74 29.832	414.0	3	0	0	N	HUDSON STRAIT	NO SAMPLE RECOVERED. 5Y4/2 SURFICIAL VENEER (?). FINE SAND ON THE SIDES OF THE JAWS. SEISMIC TIME = 85-027/2920655

TABLE 4

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

IKU SAMPLES

SAMPLE NUMBER	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (MTRS)	NO OF ATMTS	NO OF SUBS	NO OF CORES	PHOTOS TAKEN	GEOGRAPHIC LOCATION	NOTES
023	2991715	62 56.492 75 30.935	120.0	1	3	0	Y	HUDSON STRAIT	5Y4/2 THIN (<5CM) GRAVEL AND OLIVE GREEN SAND ON SURFACE. STIFF LIGHT GRAY (TILL?)(DIAMICTM BELOW) LOWER SEDIMENT SAMPLE WAS HANGING FROM BOTTOM OF SAMPLER. 2 SAMPLES TAKEN - LOWER DIAMICTM, UPPER VENEER. 1 SAMPLE PENETROMETER. (AGC) 1 REPRESENTATIVE SAMPLE BAGGED/BUCKET. 2 BUCKETS FOR SIEVING ON BOARD SHIP-QGC BY QGC. SEISMIC TIME = 92-028/2490512
024	3001550	62 54.070 77 30.767	304.0	8	2	0	Y	HUDSON STRAIT	SAMPLED UPPER UNIT- 5Y4/2 GRITTY CLAY- NO SURFICIAL SAND VENEER- SEVERAL ANGULAR COBBLES AT SURFACE, FEW ERRATICS WITHIN CLAY. MACROBENTHOS: BRITTLE STARS, CORAL AND POLYCHAETE TUBES. SEISMIC TIME = 92-028/2481940 REP SAMPLE BAGGED/BUCKET. 1 SAMPLE FOR QGC FOR SIEVING ON BOARD.
025	3001953	62 31.470 73 41.620	129.0	2	1	0	Y	HUDSON STRAIT	1ST ATTEMPT: SEVERAL COBBLES PRE-CAMBRIAN,ANGULAR LIMESTONE, CRYSTALENE; GOOSE BARNACLES ON SURFACE + REWORKED SHELL. 2ND ATTEMPT: STIFF 5Y5/2 CLAYEY SAND WITH SHELL HASH; LARGE COBBLES AT SURFACE WITH GOOSE BARNACLES, BROKEN SHELLS-MACOMA . REP SAMPLE BAGGED/BUCKET. 1 SAMPLE FOR QGC FOR SIEVING ON BOARD. SEISMIC TIME = 90-023/2801900
026	3021607	61 39.930 71 06.628	131.0	1	2	0	Y	HUDSON STRAIT	10 CM THICK OLIVE GREEN SURFICIAL COARSE SAND, GRIT, COBBLE VENEER UNDERLAIN BY DARK GRAY 5Y4/1 HOMOGENEOUS DIAMICT; SOME POLYCHAETE TUBES THROUGH-OUT. MACROBENTHOS; BRITTLE STARS, SCALLOP SHELLS, BROKEN SHELL HASH. REP SAMPLE BAGGED/BUCKET. 1 SAMPLE FOR QGC FOR SIEVING ON BOARD.
027	3021950	61 24.400 69 35.340	235.0	2	3	1	Y	HUDSON STRAIT	OLIVE GREEN 5Y4/2 SANDY SURFICIAL VENEER WITH NUMEROUS POLYCHAETE TUBES; APPROX 5 CM THICK; UNDERLAIN BY 5Y4/2 DIAMICT WITH NUMEROUS LIMESTONE CLASTS AND OTHER PRECAMBRIAN ERRATICS. SEISMIC TIME = 85-027/2861730 REP SAMPLE BAGGED/BUCKET. 1 SAMPLE FOR QGC FOR SIEVING ON BOARD.
032	3031825	60 38.886 68 43.931	170.0	1	1	0	Y	N. UNGAVA BAY	REPRESENTATIVE SAMPLE BAGGED/BUCKET. COBBLE/BOULDER SURFACE UNDERLAIN BY 5Y4/2 OLIVE GRAY SAND/GRIT. NUMEROUS BLOOD WORMS, BRITTLE STARS AT SURFACE; SAND MEDIUM TO VERY COARSE. REPRESENTATIVE SAMPLE BAGGED/BUCKET. 2 SAMPLES TAKEN FOR QGC FOR SIEVING ON BOARD.
033	3041222	60 10.894 67 42.618	092.0	2	1	0	Y	UNGAVA BAY	BAGGED REPRESENTATIVE SAMPLE- SHELL HASH WITH LARGE PEBBLES- ROUNDED TO ANGULAR; MACROBENTHOS; BRITTLE STARS, SEA URCHINS , LAMILLIBRANCHS. SHELL HASH UNDERLAIN @ APPROX. 6 CM BY DARK GRAY 5Y5/2 STIFF DIAMICT. 2 SAMPLES TAKEN FOR QGC FOR SIEVING ON BOARD. SEISMIC TIME = 93-034/3041120
034	3041846	59 45.446 67 32.144	084.0	1	2	0	Y	SOUTHERN UNGAVA BAY	1 REPRESENTATIVE SAMPLE BAGGED/BUCKET. 2 BUCKET FOR QGC (SIEVING). LAG DEPOSIT OF PEBBLES, CARBONATES. WINNOWED (SURFICIAL VENEER 5Y4/2 (<5CM THICK) UNDERLAIN BY DARK GRAY (5Y5/2) HOMOGENOUS CLAY, STIFF. 1 REPRESENTATIVE SAMPLE BAGGED/BUCKET. BUCKET FOR QGC FOR SIEVING ONBOARD. SEISMIC TIME = 93-034/3041846

ATLANTIC GEOSCIENCE CENTRE
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TABLE 4

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

IKU SAMPLES

SAMPLE NUMBER	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (MTRS)	NO OF ATMTS	NO OF SUBS	NO OF CORES	PHOTOS TAKEN	GEOGRAPHIC LOCATION	NOTES
039	3051742	59 44.248 66 31.088	258.0	4	1	0	Y	UNGAVA BAY	WINNOWED GRAVEL LAG DEPOSIT WITH METAMORPHIC/CARBONATE CLASTS. BIOTURBATED 5Y4/2 CLAY, GRITTY, ORGANIC, HEAVILY BIOTURBATED THROUGH OUT. REPRESENTATIVE SAMPLE BAGGED. 2 SAMPLES FOR QGC FOR SIEVING ON BOARD. SEISMIC TIME = 90-023/2690200
040	3051922	59 54.982 66 10.214	154.0	1	2	0	Y	UNGAVA BAY	WINNOWED LAG DEPOSIT AT SURFACE, CLASTS NOT AS NUMEROUS OR LARGE AS AT 039; SURFICIAL THIN VENEER SHELL HASH AT SURFACE <5CM UNDERLAIN BY GRAY 5Y5/1 STIFF HOMOGENOUS CLAY WITH FEW CLASTS. MACROBENTHOS: FEW SMALL BRITTLE STARS, POLYCHAETES, TUNICATES. REPRESENTATIVE SAMPLE BAGGED/BUCKET. 2 SAMPLES FOR QGC FOR SIEVING ON BOARD. SEISMIC TIME = 90-023/2681700
041	3061139	60 26.607 66 26.361	127.0	1	1	0	Y	UNGAVA BAY	SURFACE LAG DEPOSIT- LARGE NUMBER OF BRITTLE STARS, FEW SEA URCHINS; UNIT UNDERLAIN BY MUDDY 5Y4/2 COARSE GRIT, SAND, BROKEN SHELL FRAGMENTS. REPRESENTATIVE SAMPLE BAGGED/BUCKET. 2 SAMPLES FOR QGC FOR SIEVING ON BOARD. SEISMIC TIME = 90-023/2700205 ALSO SEISMIC TIME = 93-034/3051050

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
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TABLE 5

SEISMIC RECORDS

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	GEOGRAPHIC LOCATION	RECORDER	SYSTEM/ SOUND SOURCE
001	2940712	2941115	NSRF 25 FT	1, 2, 3	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
002	2950316	2951057	NSRF 25 FT	4 TO 6 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
003	2952057	2961224	NSRF 25 FT	7 TO 14 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
004	2961435	2971012	NSRF 25 FT	15 TO 21 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
005	2972318	2981300	NSRF 25 FT	22, 23	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
006	2981835	2991012	NSRF 25 FT	24 TO 27 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
007	2991813	3001305	NSRF 25 FT	28 TO 31 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
008	3002135	3011510	NSRF 25 FT	32 TO 36 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
009	3011525	3011855	NSRF 25 FT	36, 37	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
010	3012035	3021456	NSRF 25 FT	38 TO 43 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
011	3022109	3031022	NSRF 25 FT	44 TO 49 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
012	3031905	3041133	NSRF 25 FT	51 TO 53 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
013	3041407	3061055	NSRF 25 FT	53,55,59,60	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
014	3061235	3071357	NSRF 25 FT	68 TO 72 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
015	3080705	3082353	NSRF 25 FT	68 TO 72 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
001	2950318	2951058	SE 25 FT	4 TO 6 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
002	2952055	2961224	SE 25 FT	7 TO 14 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
003	2961435	2971012	SE 25 FT	15 TO 21 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
004	2972318	2981300	SE 25 FT	22, 23	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
005	2981835	2990042	SE 25 FT	24, 25	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
006	2990058	2991012	SE 25 FT	25 TO 27 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
007	2992300	3001305	SE 25 FT	28 TO 31 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
008	3080705	3082353	SE 25 FT	68 TO 72 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
001	2940712	2941115	SE 100 FT	1, 2, 3	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
002	3002132	3011853	SE 100 FT	32 TO 37 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
003	3012035	3021456	SE 100 FT	38 TO 43 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
004	3022109	3031022	SE 100 FT	44 TO 49 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
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TABLE 5

SEISMIC RECORDS

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	GEOGRAPHIC LOCATION	RECORDER	SYSTEM/ SOUND SOURCE
005	3031905	3041133	SE 100 FT	51 TO 53 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
006	3041406	3061055	SE 100 FT	53,55,59,60	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
007	3061235	3071357	SE 100 FT	61 TP 64 INCL	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
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TABLE 6

HUNTEC RECORDS

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	HUNTEC SYSTEM
001	2940720	2941118	EXTERNAL	1, 2, 3	SINGLE	MOUTH OF HUDSON STR, NORTH OF UNGAVA BAY	EPC9800	(AGC-3)
002	2941827	2951058	EXTERNAL	4, 6 -NO LINE 5	SINGLE	MOUTH OF HUDSON STR, NORTH OF UNGAVA BAY	EPC9800	(AGC-3)
003	2952057	2961226	EXTERNAL	7 TO 14 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
004	2961435	2970030	EXTERNAL	15 TO 18 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
005	2970030	2971007	EXTERNAL	19 TO 21 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
006	2972309	2981259	EXTERNAL	22, 23	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
007	2981830	2990200	EXTERNAL	24, 25	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
008	2990200	2991015	EXTERNAL	26, 27	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
009	2991827	3000133	EXTERNAL	28, 29	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
010	3000136	3001257	EXTERNAL	29 TO 31 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
011	3002138	3010945	EXTERNAL	32 TO 34 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
012	3010946	3011854	EXTERNAL	35 TO 37 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
013	3020337	3021457	EXTERNAL	39 TO 43 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
014	3022040	3031022	EXTERNAL	44 TO 49 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
015	3031908	3040356	EXTERNAL	51	SINGLE	UNGAVA BAY	EPC9800	(AGC-3)
016	3040400	3041133	EXTERNAL	52, 53	SINGLE	UNGAVA BAY	EPC9800	(AGC-3)
017	3041407	3050146	EXTERNAL	53 TO 55 INCL	SINGLE	UNGAVA BAY	EPC9800	(AGC-3)
018	3050146	3051106	EXTERNAL	56 TO 58 INCL	SINGLE	UNGAVA BAY	EPC9800	(AGC-3)
019	3052310	3061056	EXTERNAL	59, 60	SINGLE	UNGAVA BAY	EPC9800	(AGC-3)
020	3061235	3070130	EXTERNAL	61 TO 64 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
021	3070130	3071358	EXTERNAL	64	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
022	3080705	3081210	EXTERNAL	68, 69	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
023	3081212	3082353	EXTERNAL	69 TO 72 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
001	2940720	2941118	INTERNAL	1,2,3	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
002	2941827	2951058	INTERNAL	4, 6	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
003	2952057	2961226	INTERNAL	7 TO 14 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
004	2961420	2970030	INTERNAL	15 TO 18 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
005	2970030	2971007	INTERNAL	19 TO 21 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
006	2972309	2981259	INTERNAL	22, 23	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
007	2991830	2990200	INTERNAL	24, 25	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
008	2990200	2991015	INTERNAL	26, 27	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
009	2991827	3000150	INTERNAL	28, 29	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
010	3000151	3000904	INTERNAL	30, 31	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
011	3000906	3001257	INTERNAL	31	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
012	3002138	3010945	INTERNAL	32 TO 34 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
013	3010946	3011854	INTERNAL	35 TO 37 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
014	3020337	3021457	INTERNAL	39 TO 43 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
015	3022040	3031022	INTERNAL	44 TO 49 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
016	3031908	3041133	INTERNAL	51 TO 53 INCL	SINGLE	UNGAVA BAY	EPC9800	(AGC-3)
017	3041410	3042300	INTERNAL	53 TO 55 INCL	SINGLE	UNGAVA BAY	EPC9800	(AGC-3)

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
-SHIP- REPORTING PACKAGE

TABLE 6

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

HUNTEC RECORDS

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	HUNTEC SYSTEM
018	3042300	3050648	INTERNAL	55, 56	SINGLE	UNGAVA BAY	EPC9800	(AGC-3)
019	3050650	3051106	INTERNAL	57, 58	SINGLE	UNGAVA BAY	EPC9800	(AGC-3)
020	3052316	3061056	INTERNAL	59, 60	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
021	3061235	3070130	INTERNAL	61 TO 64 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
022	3070130	3071358	INTERNAL	64	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
023	3080705	3081406	INTERNAL	68, 69	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)
024	3081408	3082352	INTERNAL	70 TO 72 INCL	SINGLE	HUDSON STRAIT	EPC9800	(AGC-3)

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
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TABLE 7

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

SIDESCAN RECORDS

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	SIDESCAN SYSTEM
001	2960325	2961223	9 TO 14 INCL	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
002	2961415	2961857	15 TO 18 INCL	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
003	2990040	2990652	25 TO 27 INCL	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
004	2990654	2990920	27	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
005	2991803	3000204	28, 29	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
006	3000305	3000605	30	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
007	3000611	3001037	30, 31	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
008	3010700	3011127	34, 35	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
009	3011127	3011625	35, 36	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
010	3011627	3011857	36, 37	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
011	3012036	3020010	38,39	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
012	3020015	3020522	39, 40	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
013	3020525	3021503	40 TO 43 INCL	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
014	3031900	3032345	51	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
015	3040540	3041455	52, 53	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
016	3041500	3041850	53, 54	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
017	3042015	3050227	55, 56	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
018	3050230	3051011	56 TO 58 INCL	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
019	3060130	3060608	59	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
020	3060610	3061105	59, 60	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
021	3061235	3061612	61	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
022	3062333	3070648	64	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
023	3070655	3071403	64	SINGLE	HUDSON STRAIT	KLEIN 521	BIO SIDESCAN (70 KHZ
001	2952055	2960345	7 TO 9 INCL	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
002	2960350	2961224	10 TO 14 INCL	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
003	2961415	2990200	15 TO 17 INCL + 25	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
004	2990200	2990920	26, 27	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
005	2992120	3010930	29 TO 31 INCL	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ

			33, 34				
006	3010930	3011855	35 TO 37 INCL	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
007	3012045	3020521	38 TO 40	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
008	3020535	3021012	40 TO 42 INCL	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
009	3021013	3021500	43	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
010	3031900	3041024	51, 52	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
011	3041024	3041850	53, 54	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
012	3042025	3050152	55	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
013	3050155	3051005	56 TO 58 INCL	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
014	3060126	3060900	59	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
015	3060900	3061630	59 TO 61 INCL	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
016	3070140	3070600	64	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ
017	3070600	3071405	64	SINGLE	HUDSON STRAIT	KLEIN 595	BIO SIDESCAN (70 KHZ

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
-SHIP- REPORTING PACKAGE

TABLE 8

CRUISE NUMBER = 93-034
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER =

3.5 KHZ RECORDS

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	RECORDER	SYSTEM / SOUND SOURCE
001	2940220	2941123	1, 2, 3	HUDSON STRAIT	EPC 4100	HULL MOUNTED
002	2941417	2950030	4	HUDSON STRAIT	EPC 4100	HULL MOUNTED
003	2950045	2951100	6	HUDSON STRAIT	EPC 4100	HULL MOUNTED
004	2951102	2951959	7	HUDSON STRAIT	EPC 4100	HULL MOUNTED
005	2952000	2960718	7 TO 12 INCL	HUDSON STRAIT	EPC 4100	HULL MOUNTED
006	2960720	2961244	12 TO 14 INCL	HUDSON STRAIT	EPC 4100	HULL MOUNTED
007	2961245	2962300	15 TO 18 INCL	HUDSON STRAIT	EPC 4100	HULL MOUNTED
008	2962300	2971035	18 TO 21 INCL	HUDSON STRAIT	EPC 4100	HULL MOUNTED
009	2971040	2972300	22	HUDSON STRAIT	EPC 4100	HULL MOUNTED
010	2972300	2981319	22, 23	HUDSON STRAIT	EPC 4100	HULL MOUNTED
011	2981332	2990355	24 TO 26 INCL	HUDSON STRAIT	EPC 4100	HULL MOUNTED
012	2990357	2992130	26 TO 28 INCL	HUDSON STRAIT	EPC 4100	HULL MOUNTED
013	2992130	3001312	29 TO 31 INCL	HUDSON STRAIT	EPC 4100	HULL MOUNTED
014	3001318	3010353	32, 33	HUDSON STRAIT	EPC 4100	HULL MOUNTED
015	3010353	3011318	34, 35	HUDSON STRAIT	EPC 4100	HULL MOUNTED
016	3011318	3020018	36, 37	HUDSON STRAIT	EPC 4100	HULL MOUNTED
017	3020020	3021510	39 TO 43 INCL	HUDSON STRAIT	EPC 4100	HULL MOUNTED
018	3021510	3030907	44 TO 49 INCL	HUDSON STRAIT	EPC 4100	HULL MOUNTED
019	3030915	3041028	52, 53	HUDSON STRAIT	EPC 4100	HULL MOUNTED
020	3041028	3050145	53 TO 55 INCL	HUDSON STRAIT	EPC 4100	HULL MOUNTED
021	3050200	3050648	56	HUDSON STRAIT	EPC 4100	HULL MOUNTED
022	3050648	3052319	57, 58	HUDSON STRAIT	EPC 4100	HULL MOUNTED
023	3052319	3061105	59, 60	HUDSON STRAIT	EPC 4100	HULL MOUNTED
024	3061109	3070108	61 TO 64 INCL	HUDSON STRAIT	EPC 4100	HULL MOUNTED
025	3070108	3071612	64	HUDSON STRAIT	EPC 4100	HULL MOUNTED
026	3071614	3072210	65, 66	HUDSON STRAIT	EPC 4100	HULL MOUNTED
027	3072212	3081933	66 TO 71 INCL	HUDSON STRAIT	EPC 4100	HULL MOUNTED
028	3081935	3082359	71, 72	HUDSON STRAIT	EPC 4100	HULL MOUNTED
029	3090005	3091122		HUDSON STRAIT	EPC 4100	HULL MOUNTED

TABLE 9

PARAMETER START/STOP TIMES

3.5 KHZ BATHYMETRY	SLEEVEGUN SEISMICS
2940220-2941137	2940712-2941115
2941530-2941909	2950316-2951057
2942150-2951130	2952057-2961224
2951410-2951505	2961435-2971012
2951635-2961230	2972318-2981300
2961430-2971050	2981835-2981920
2971250-2971525	2982000-2991012
2971610-2971752	2991813-2991305
2971930-2972015	3002135-3010311
2972045-2981300	3010316-3011510
2981415-2981740	3011525-3011855
2981820-2991035	3012035-3021456
2991440-2991700	3022109-3031022
2991800-3001430	3031905-3040900
3001615-3011854	3040904-3041133
3012041-3021445	3041407-3042113
3021620-3021936	3060000-3061055
3022100-3031020	3061235-3061612
3031210-3031350	3061627-3071357
3031440-3031830	3080705-3082353
3031855-3041215	
3041255-3051130	
3051310-3051448	
3051610-3051641	
3051810-3051911	
3051950-3061050	
3061150-3091122	

TABLE 9

PARAMETER START/STOP TIMES

HUNTEC (DTS)	BIO SIDESCAN
2940720-2941118	2960325-2961223
2941827-2941915	2961415-2961841
2950300-2951058	2990040-2990920
2952057-2961226	2991803-3000204
2961420-2971007	3000305-3001037
2972309-2981259	3010305-3011857
2981830-2991015	3012036-3021503
299182703001257	3031900-3032345
3002138-3011854	3040540-3041130
3020337-3021457	3041300-3041850
3022040-3031022	3042015-3051011
3031908-3031133	3060130-3061105
3041410-3041609	3061235-3061612
3042130-3051106	3062333-3071403
3052316-3061056	
3061235-3061612	
3061636-3071358	
3080705-3082352	

TABLE 10

LINE NUMBER START/STOPS

LINE NUMBER	START DAY/TIME	STOP DAY/TIME
1	294-0738	294-1000
2	294-1009	294-1038
3	294-1045	294-1114
4	294-1826	294-1905
5	NO LINE 5	
6	295-0300	295-1058
7	295-2105	295-2218
8	295-2225	296-0127
9	296-0143	296-0338
10	296-0345	296-0520
11	296-0524	296-0646
12	296-0653	296-0921
13	296-0927	296-1100
14	296-1105	296-1224
15	296-1420	296-1508
16	296-1508	296-1612
17	296-1612	296-1843
18	296-1843	297-0030
19	297-0102	297-0441
20	297-0447	297-0750
21	297-0750	297-1007
22	297-2300	298-1225
23	298-1233	298-1300
24	298-1840	298-2100
25	298-2130	299-0200
26	299-0211	299-0500
27	299-0500	299-1013
28	299-1800	299-2130
29	299-2135	300-0149
30	300-0200	300-0816
31	300-0824	300-1305
32	300-2137	300-2258
33	300-2258	301-0350
34	301-0357	301-0930
35	301-1000	301-1310
36	301-1320	301-1710
37	301-1710	301-1900
38	301-2036	301-2314
39	302-2310	302-0344
40	302-0344	302-0636
41	302-0640	302-0820
42	302-0826	302-1012
43	302-1018	302-1510
44	302-2045	303-0028
45	303-0024	303-0240
46	303-0240	303-0659

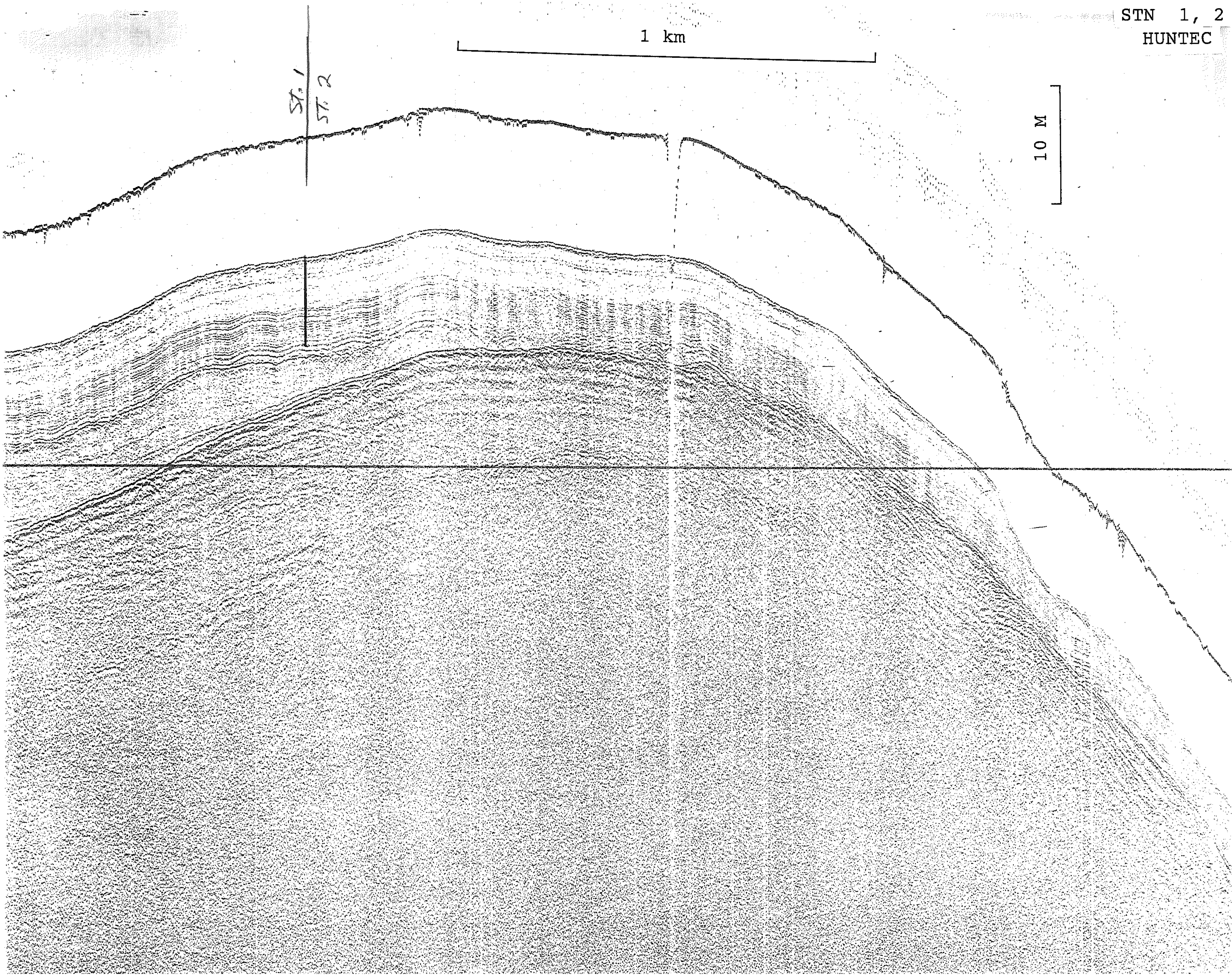
TABLE 10

LINE NUMBER START/STOPS

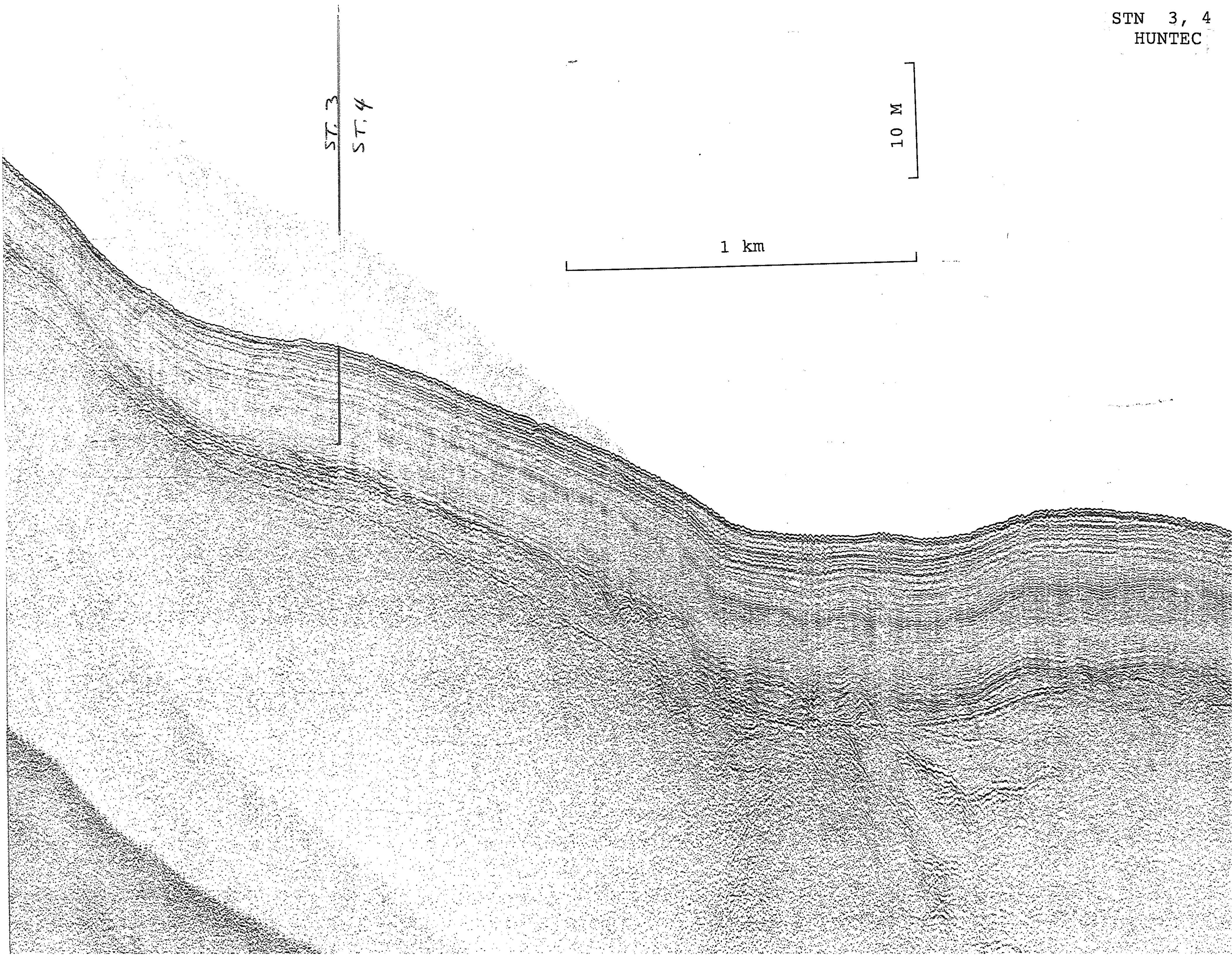
LINE NUMBER	START DAY/TIME	STOP DAY/TIME
47	303-0659	303-0742
48	303-0751	303-0957
49	303-1002	303-1020
50	3.5 LINE ONLY	
51	303-1901	304-0356
52	304-0400	304-1024
53	304-1027	304-1800
54	304-1800	304-1846
55	304-2022	305-0146
56	305-0152	305-0641
57	305-0645	305-0924
58	305-0931	305-1105
59	305-2319	306-0958
60	306-1012	306-1054
61	306-1233	306-1705
62	306-1711	306-1916
63	306-1919	306-2029
64	306-2034	307-1610
65	307-1612	307-1808
66	307-1808	308-0108
67	308-0109	308-0645
68	308-0721	308-1029
69	308-1034	308-1403
70	308-1408	308-1517
71	308-1522	308-2041
72	308-2047	308-2352

HIGH RESOLUTION SEISMIC REFLECTION PROFILES
ACROSS CORE STATION LOCALITIES

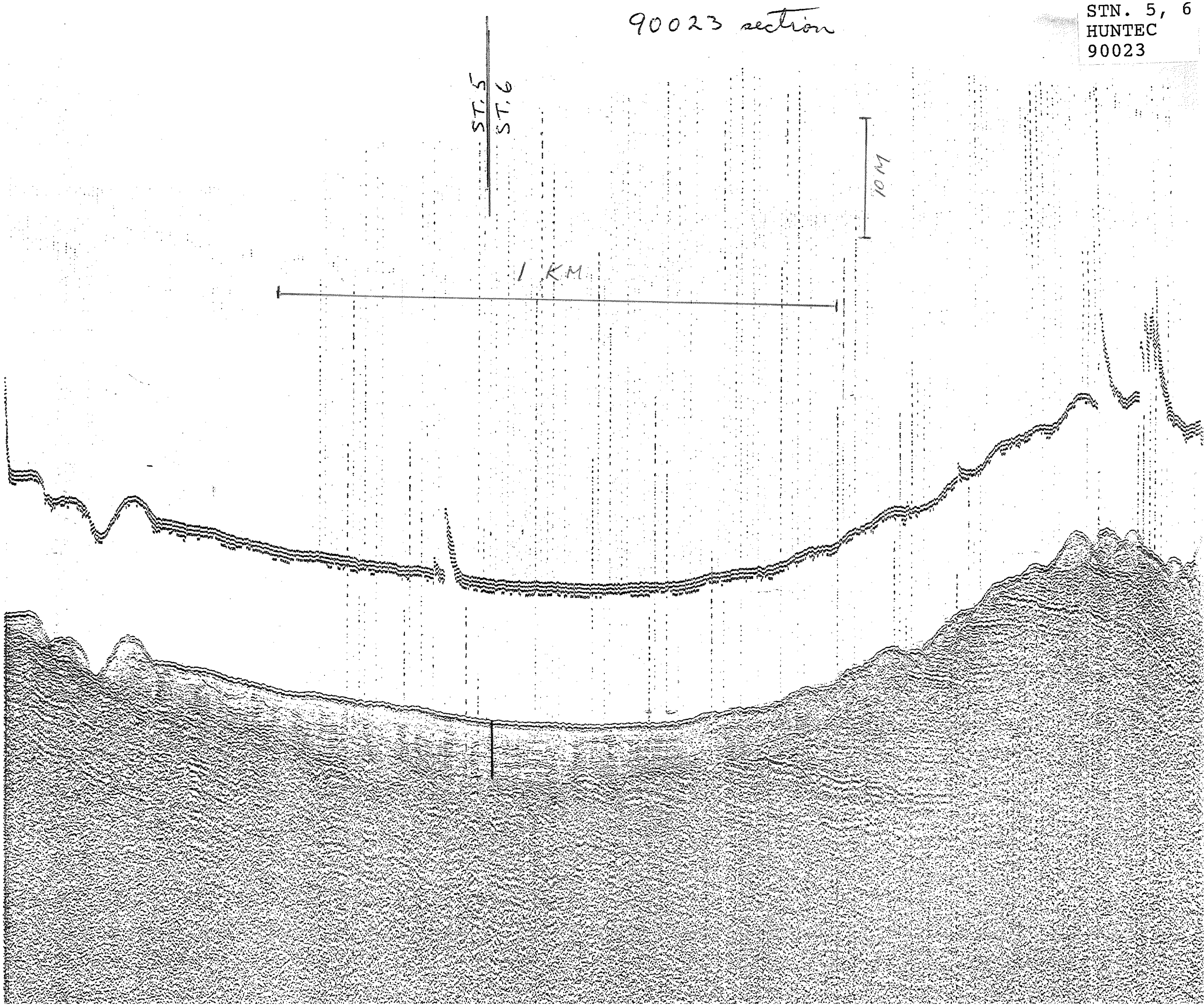
STN 1, 2
HUNTEC

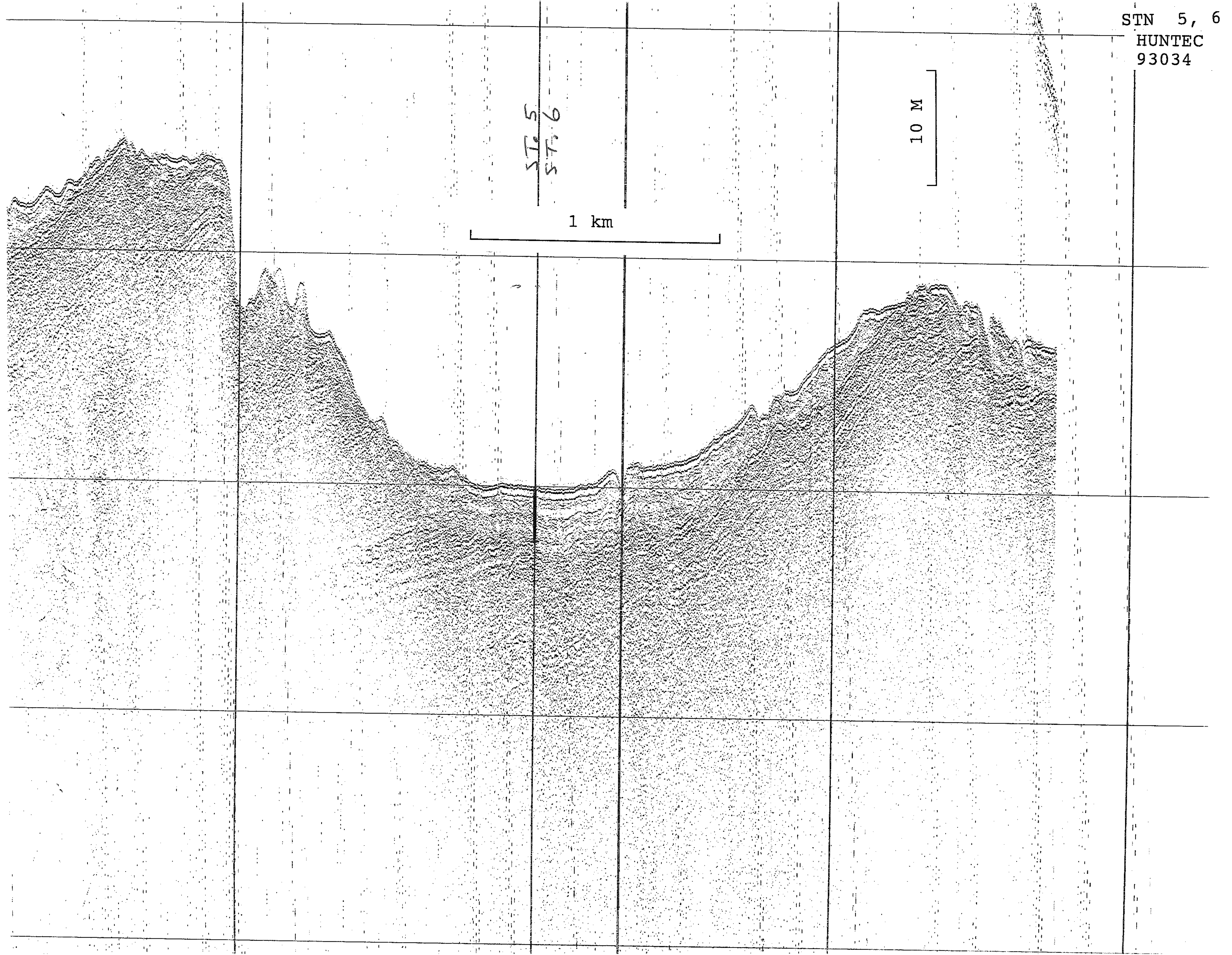


STN 3, 4
HUNTEC



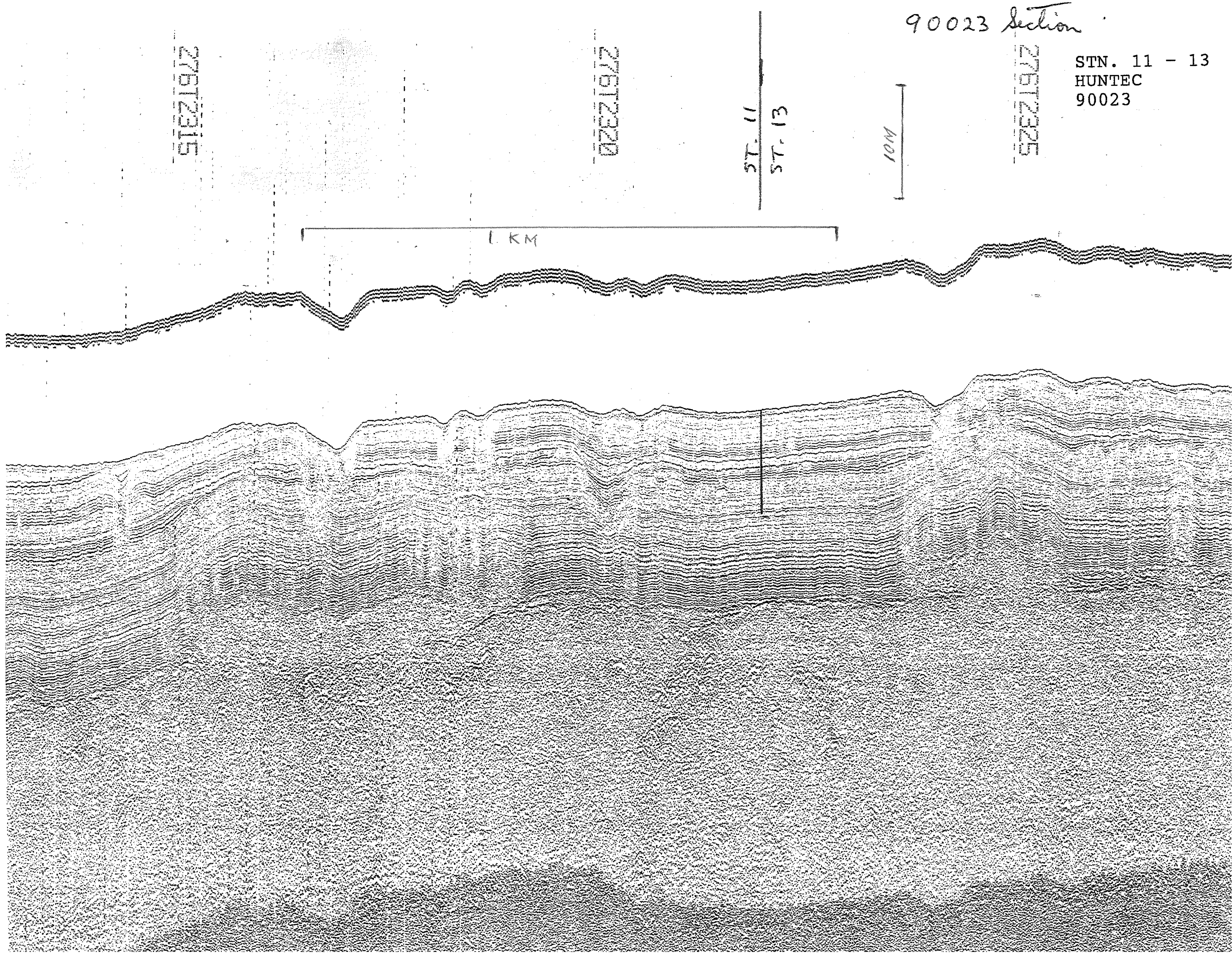
STN. 5, 6
HUNTEC
90023

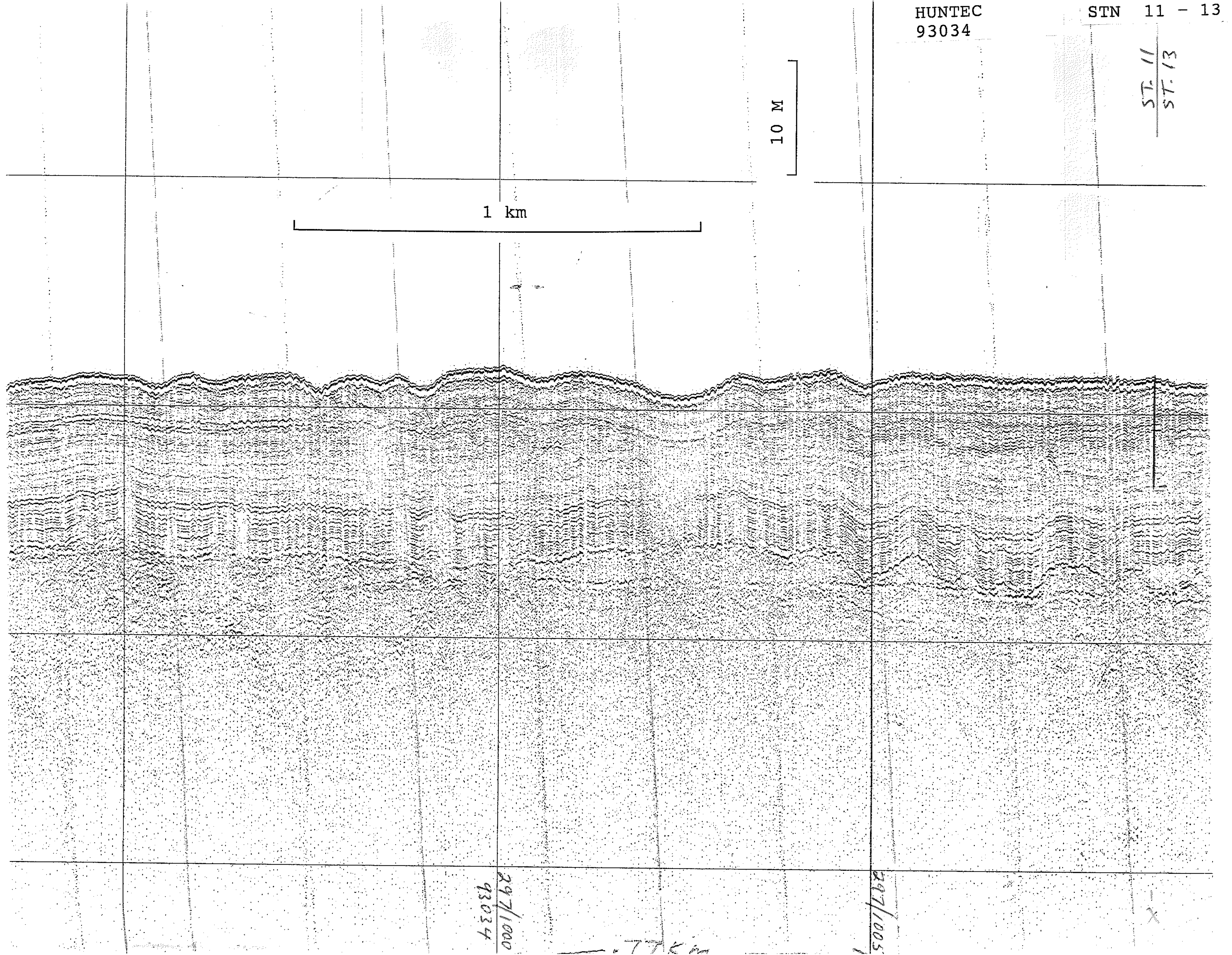


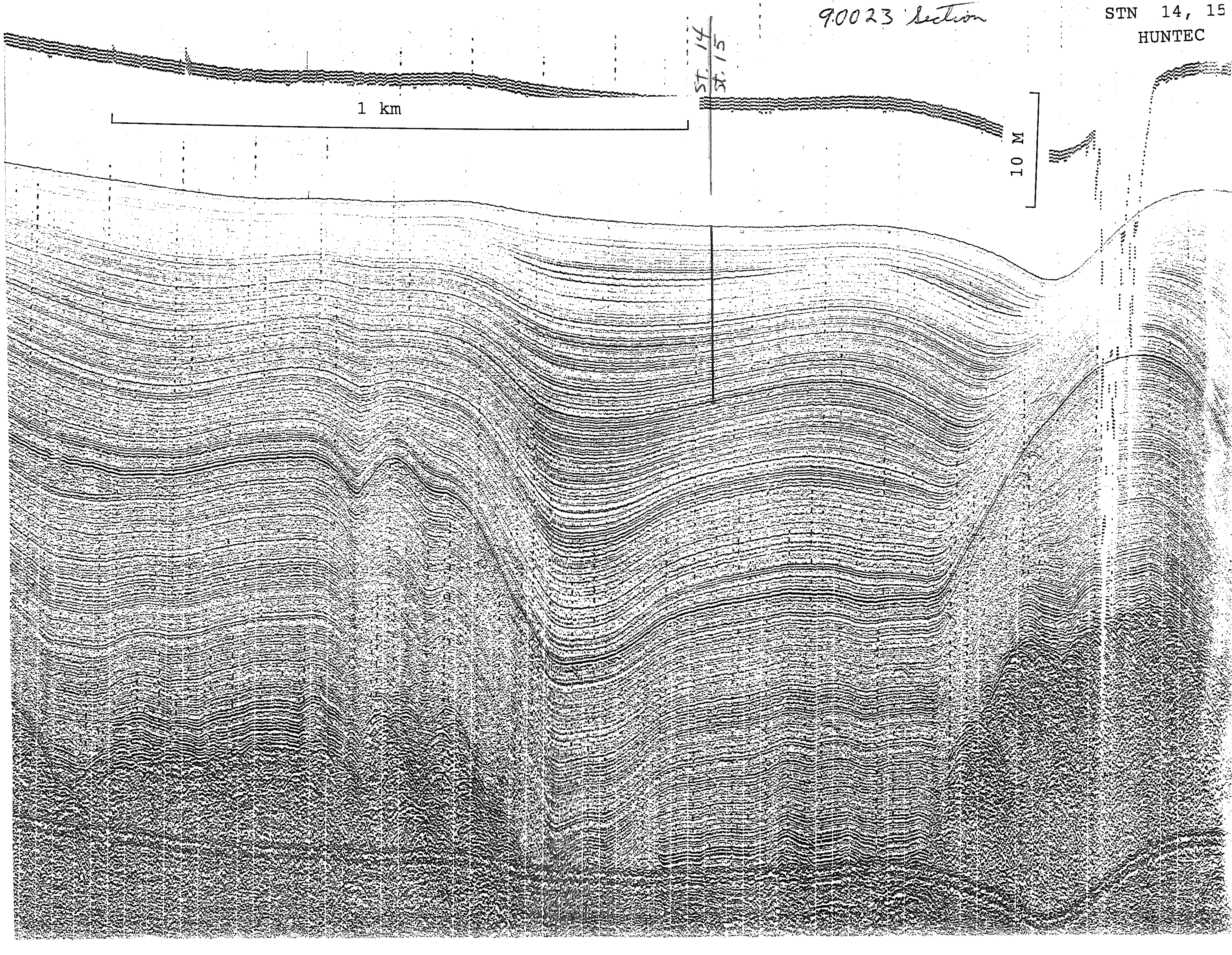

STN 5, 6
HUNTEC
93034
10 M
1 km
ST. 5
ST. 6

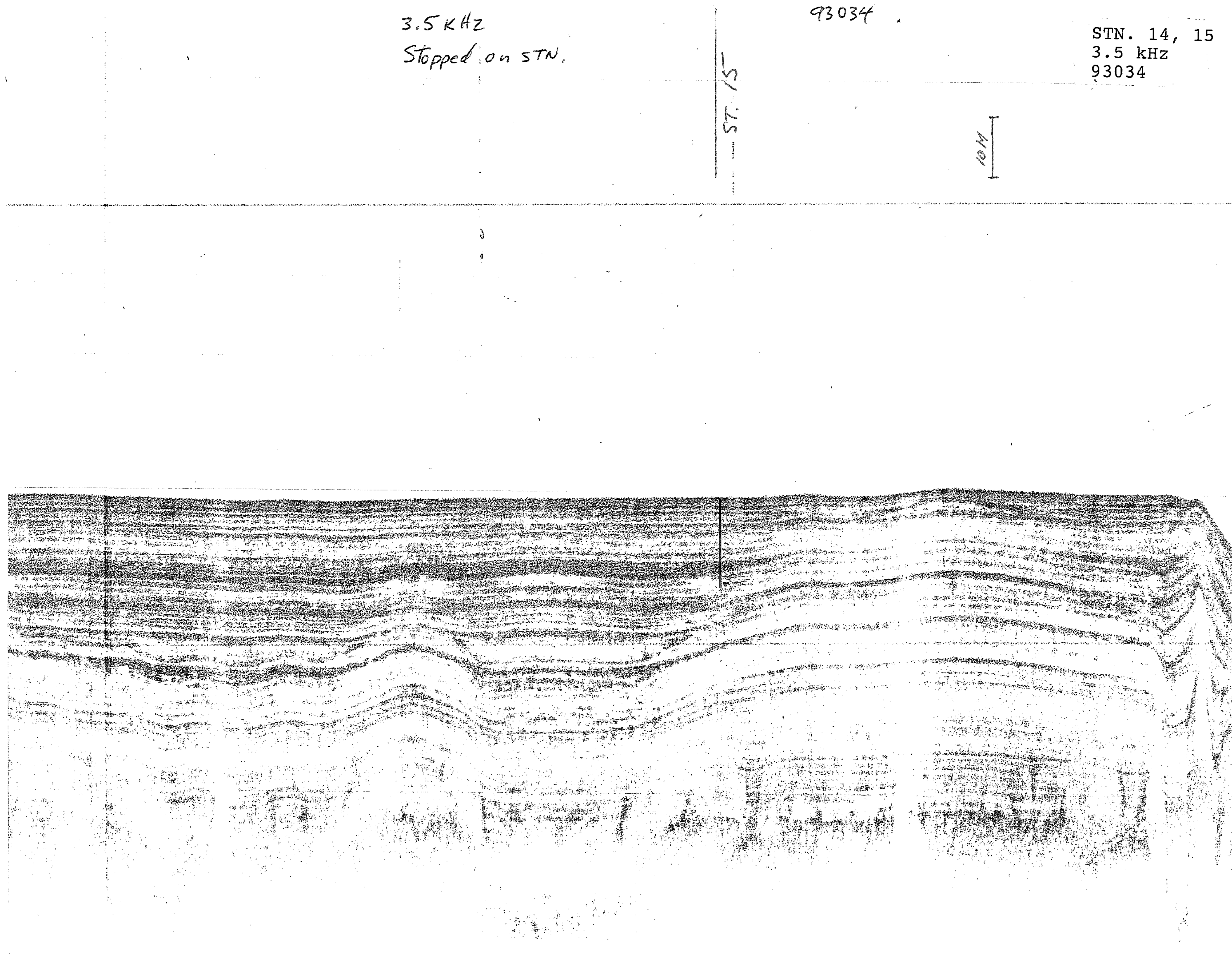
90023 Section

STN. 11 - 13
HUNTEC
90023



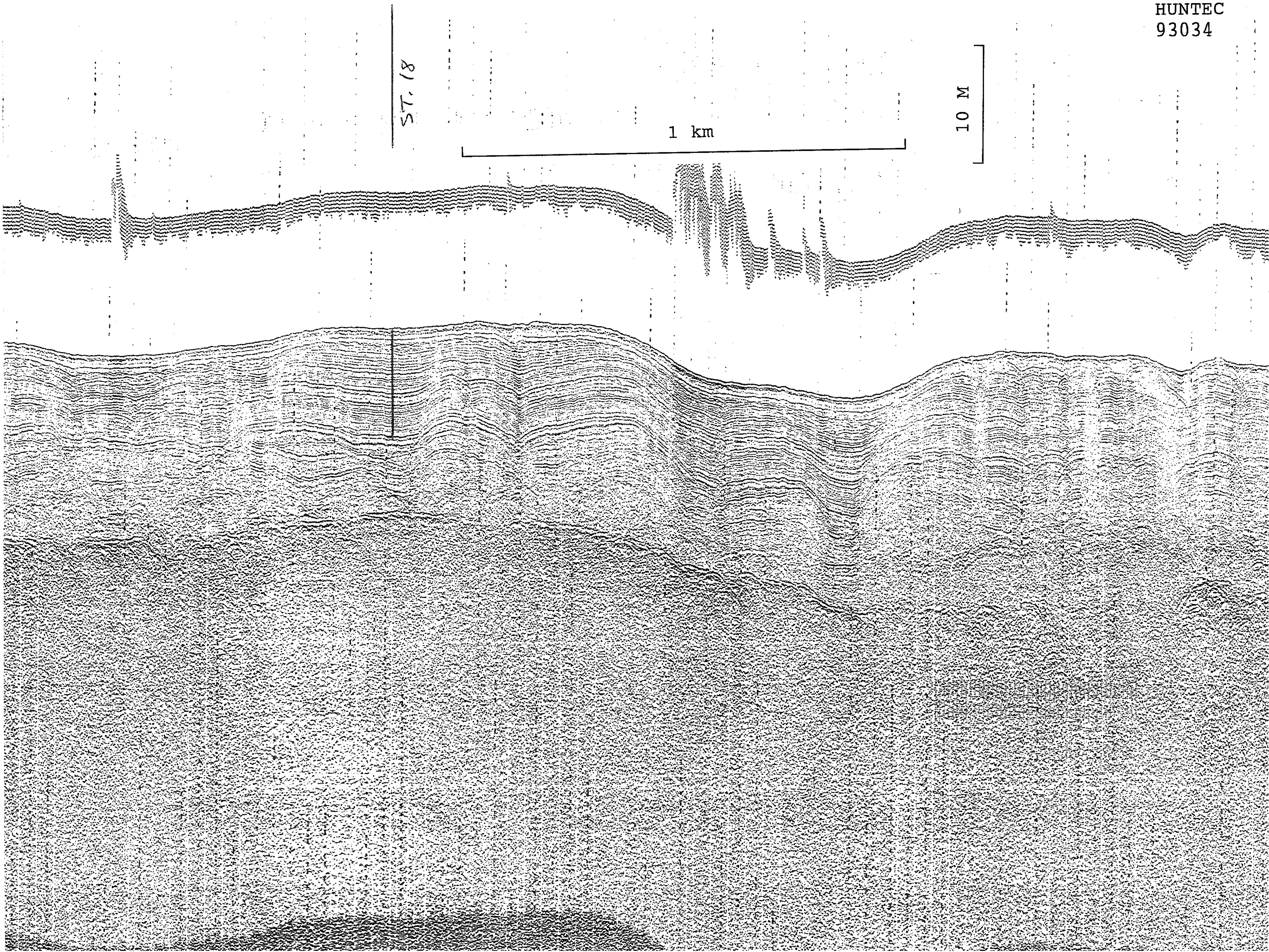

HUNTEC
93034
STN 11 - 13
ST. 11
ST. 13
10 M
1 km
297/1000
93034
297/1005


9.0023 Section
STN 14, 15
HUNTEC
ST. 14
ST. 15
1 km
10 M

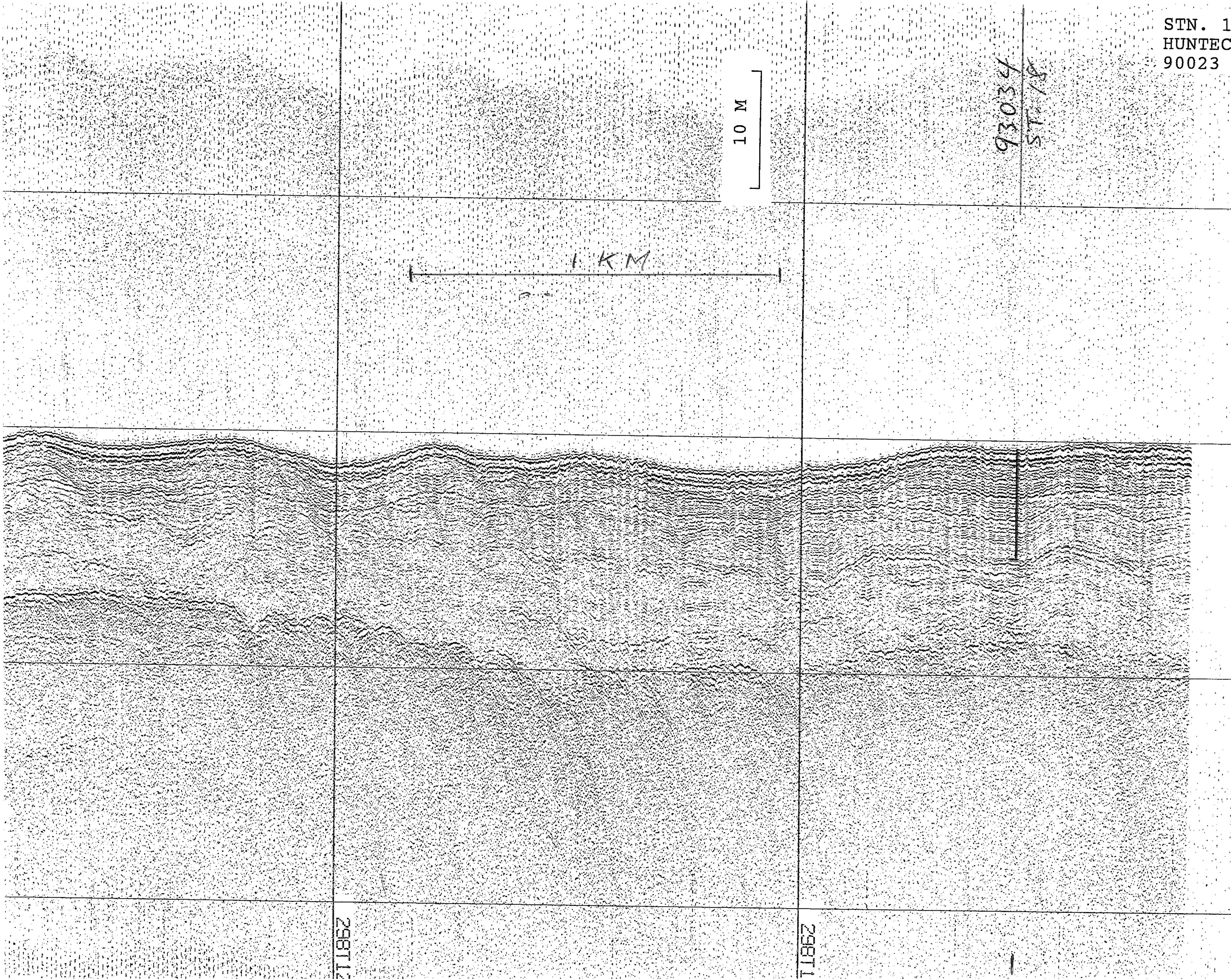

3.5 KHz
Stopped on STN.
ST. 15
93034
10M
STN. 14, 15
3.5 kHz
93034

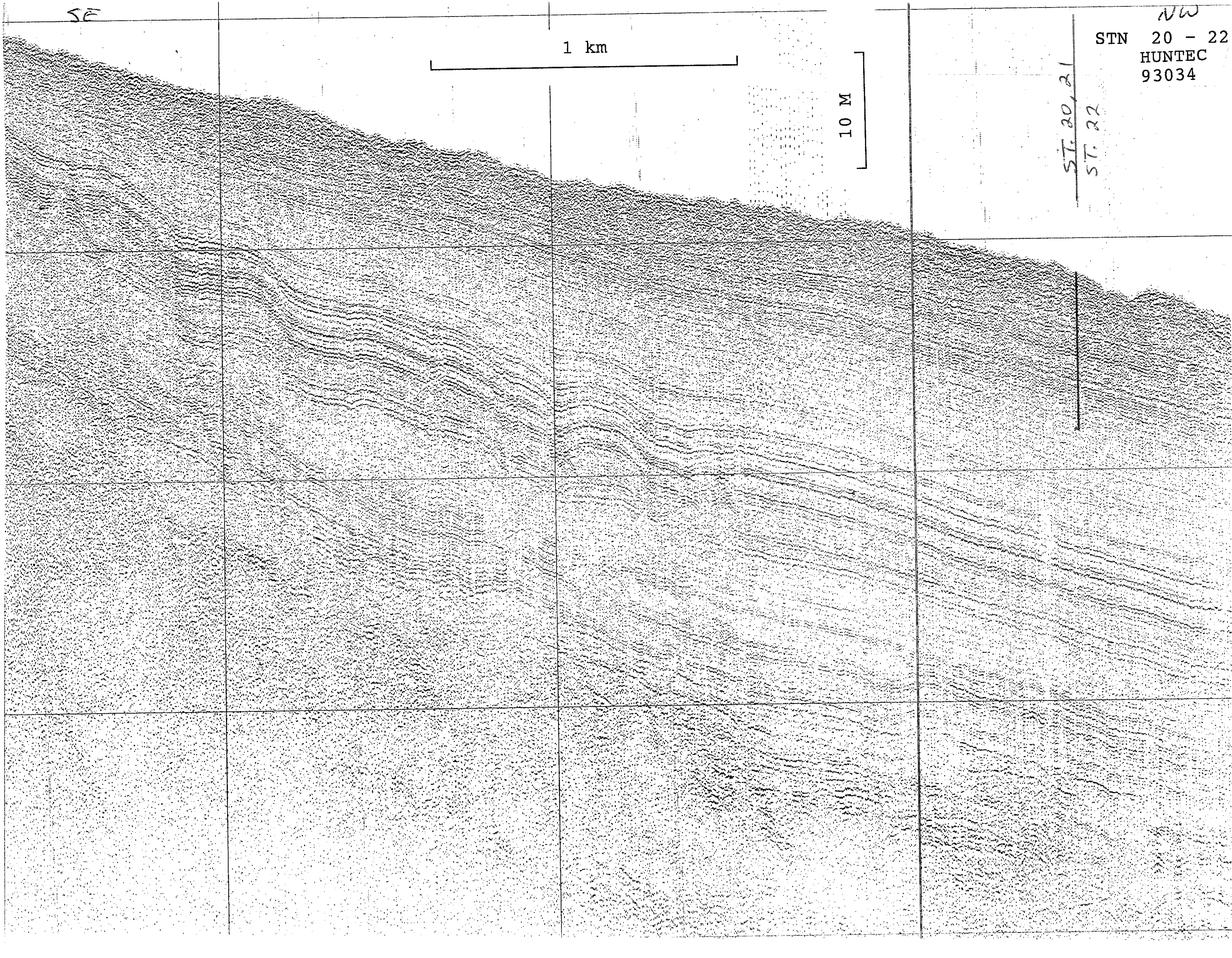
90023

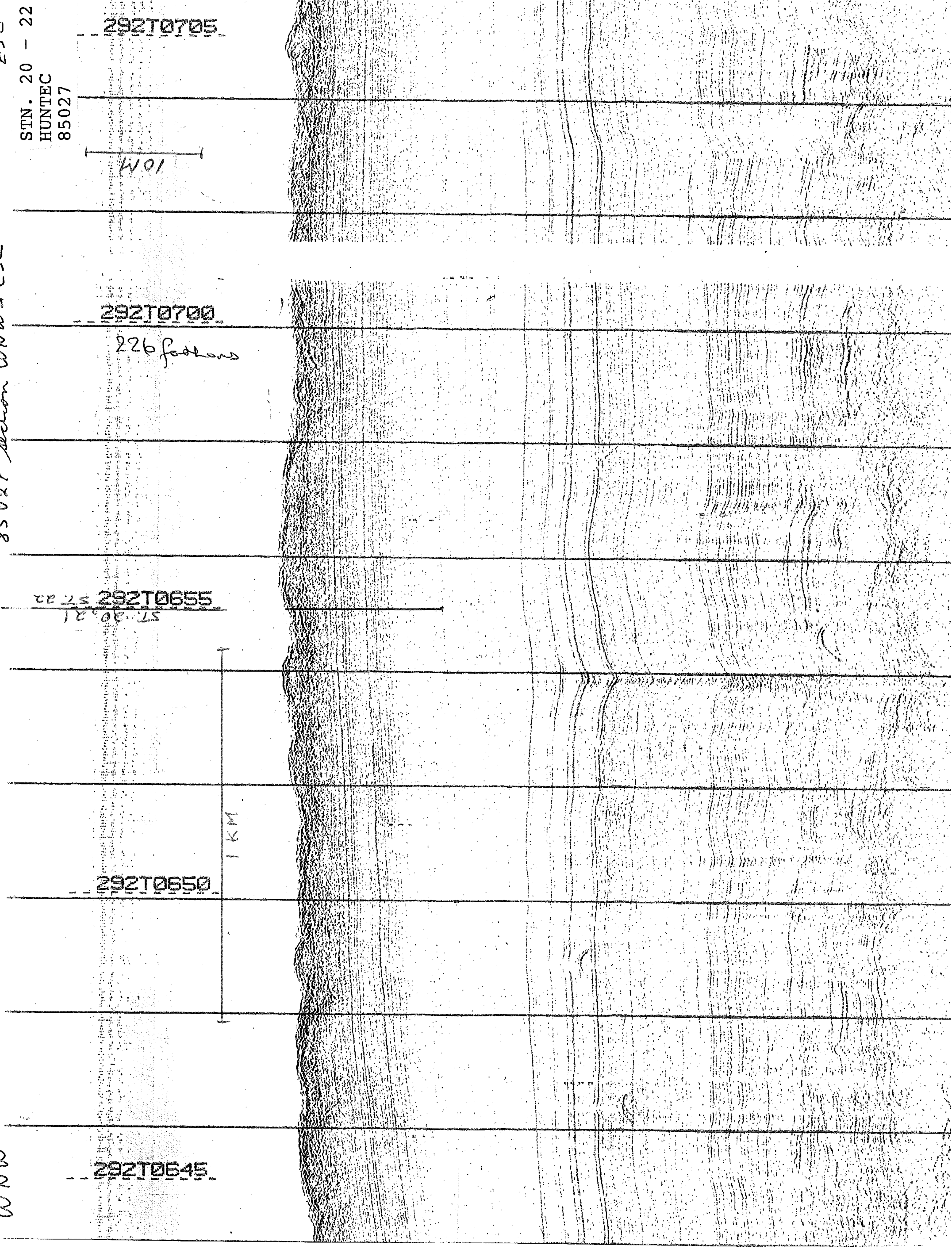
STN. 18
HUNTEC
93034

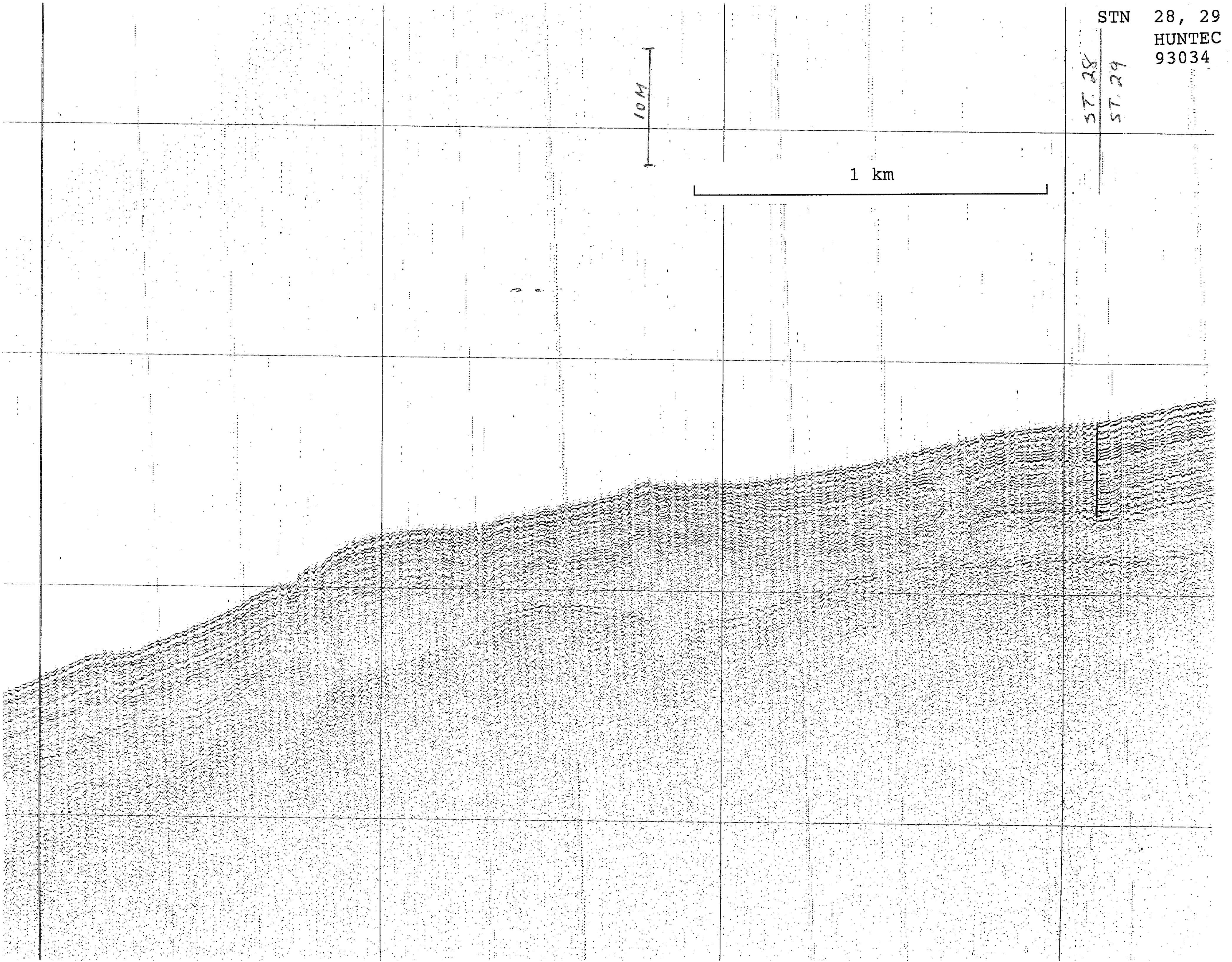


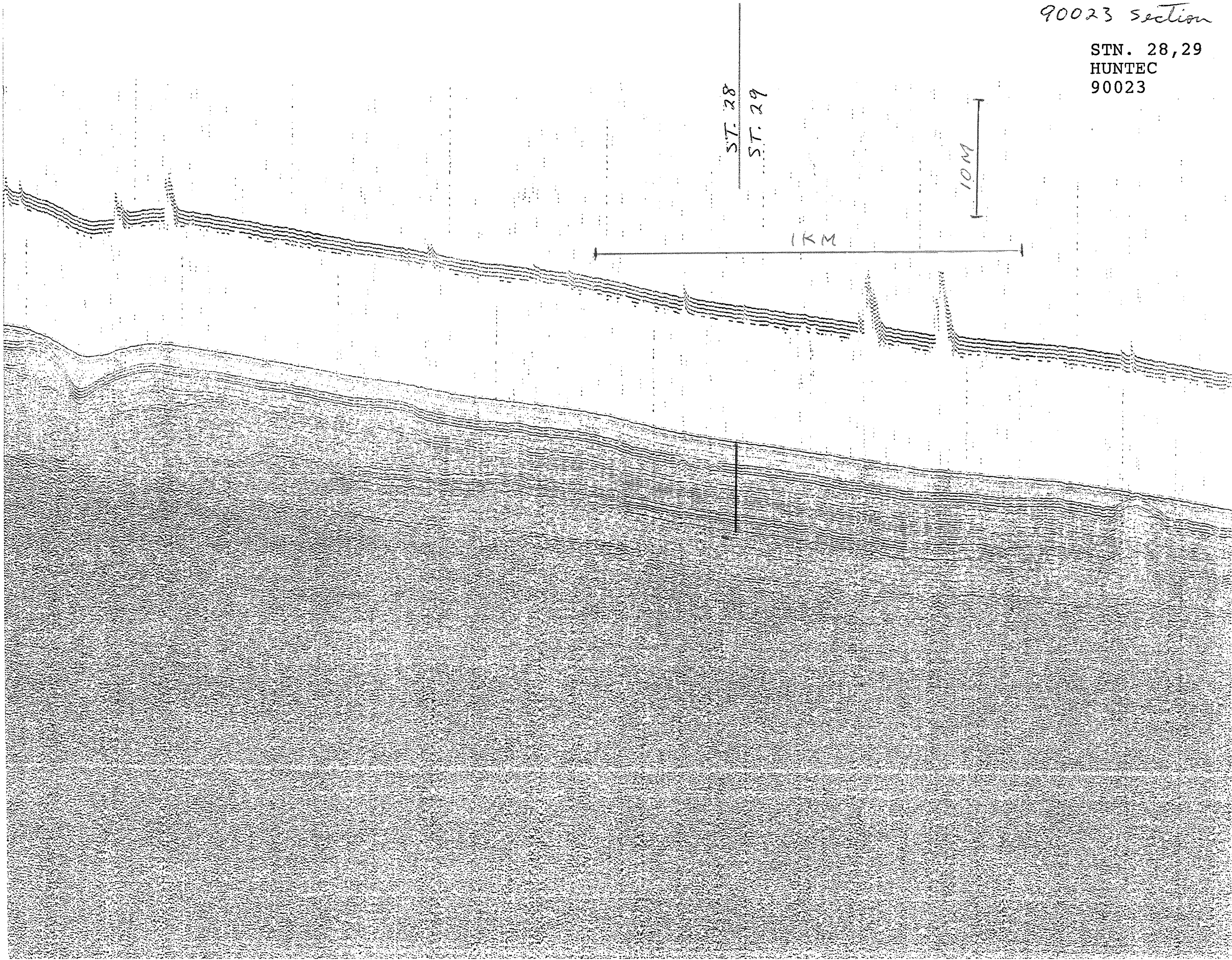
STN. 18
HUNTEC
90023

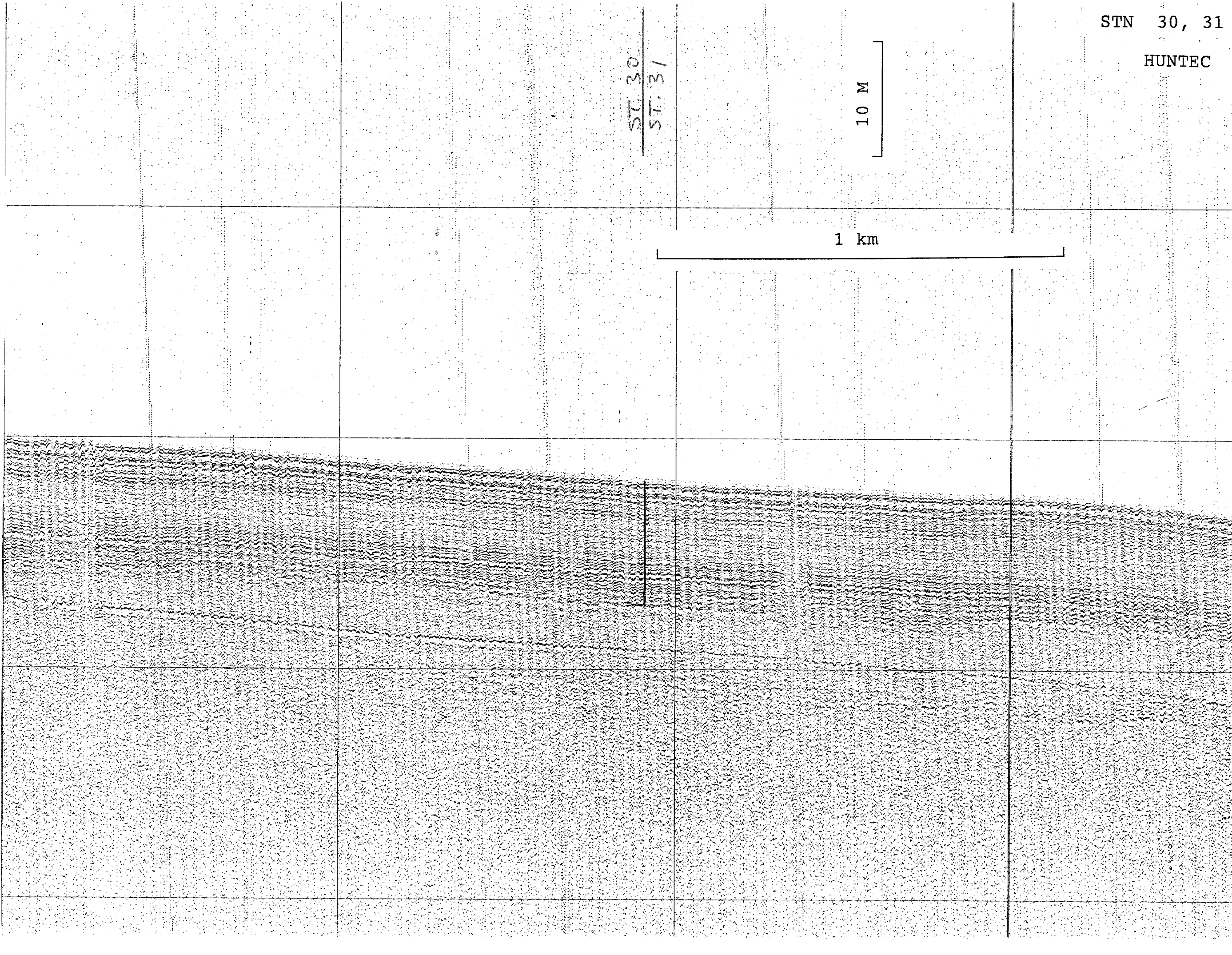


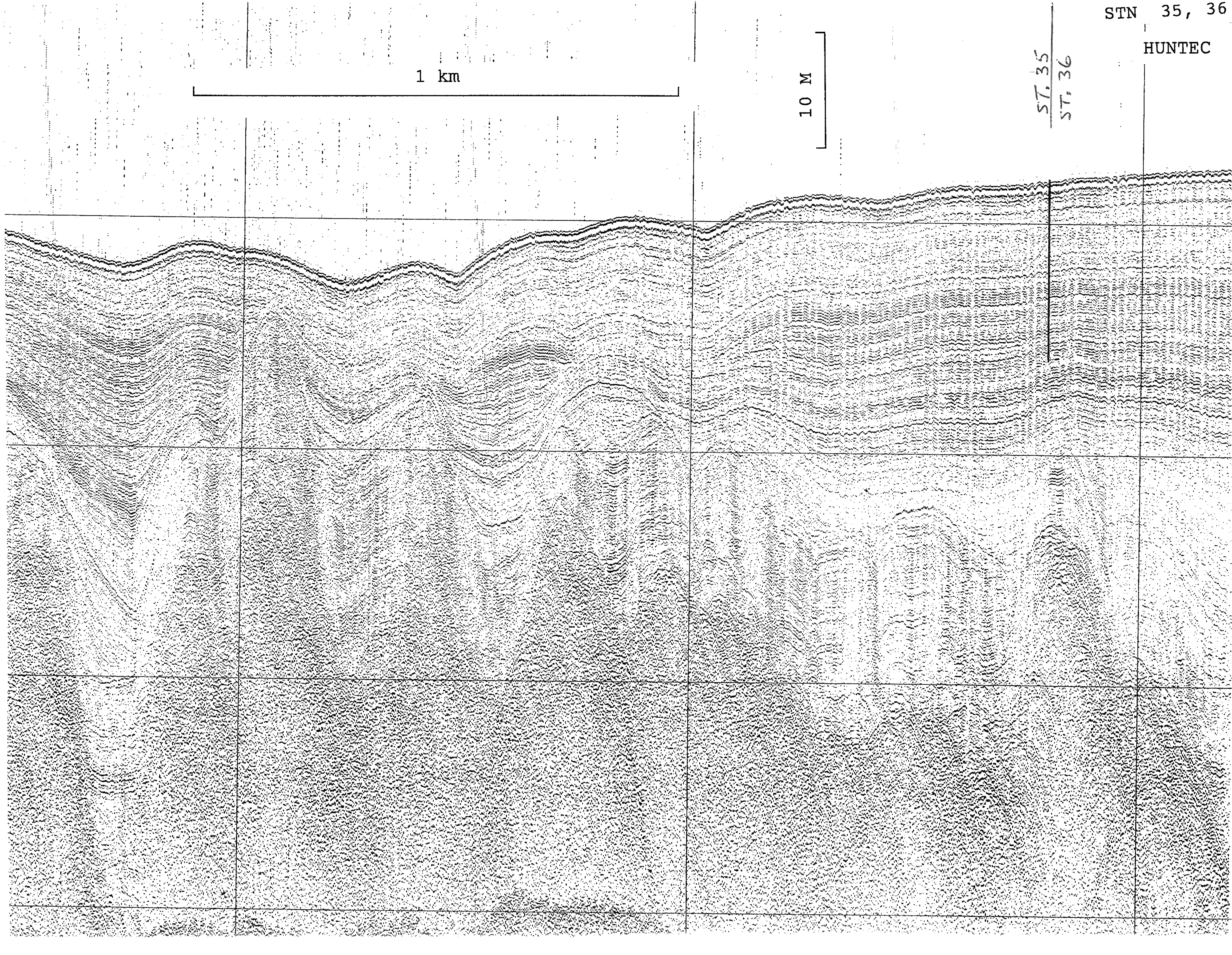

SE
NW
STN 20 - 22
HUNTEC
93034
1 km
10 M
ST. 20, 21
ST. 22

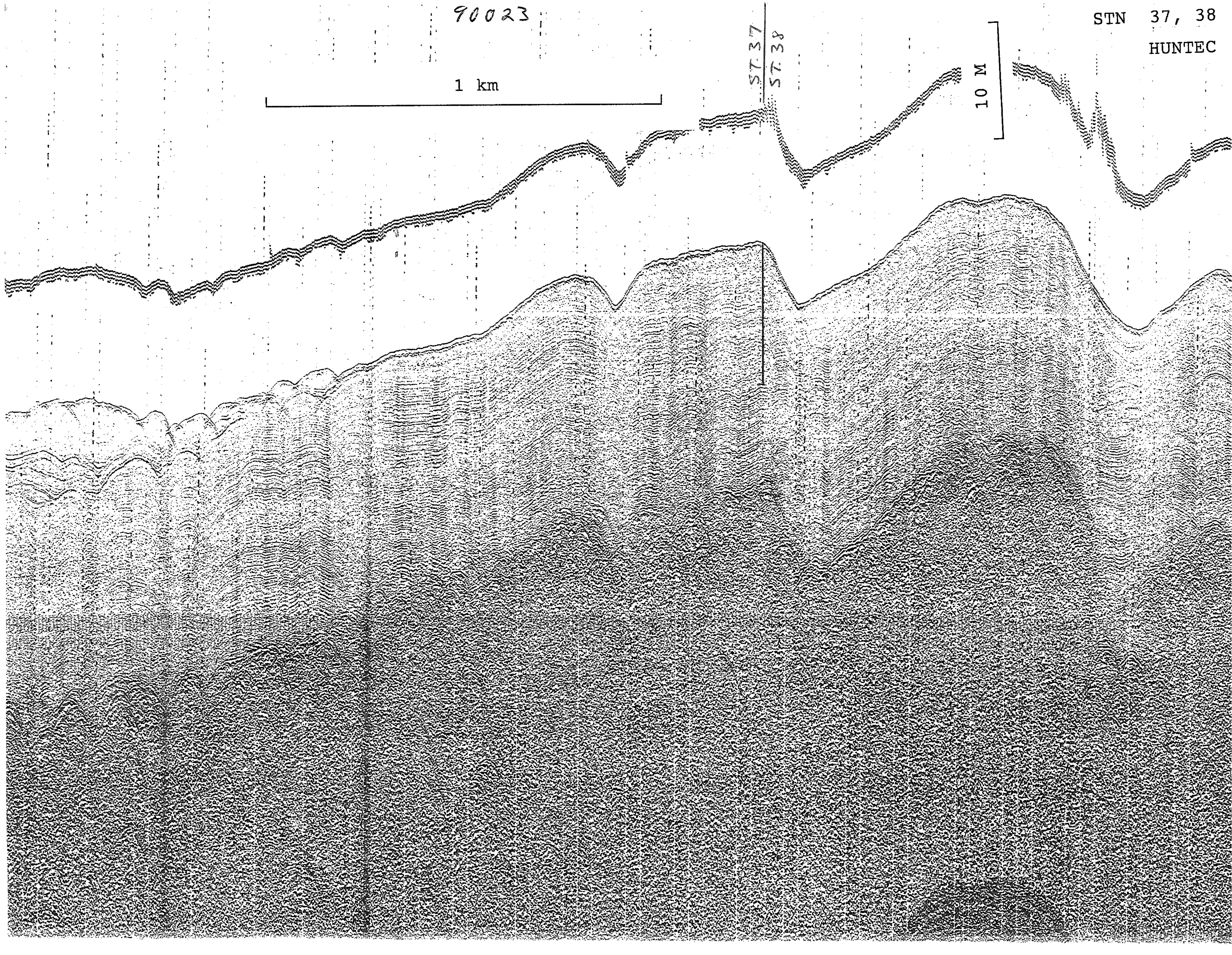

ESE
STN. 20 - 22
HUNTEC
85027
10M
85027 section WNW - ESE
292T0705
292T0700
226 fathoms
292T0655
ST. 22
ST. 20, 21
1 KM
292T0650
292T0645
WNW


STN 28, 29
HUNTEC
93034
ST. 28
ST. 29
10M
1 km


90023 Section
STN. 28,29
HUNTEC
90023
ST. 28
ST. 29
10M
1KM


STN 30, 31
HUNTEC
ST. 30
ST. 31
10 M
1 km

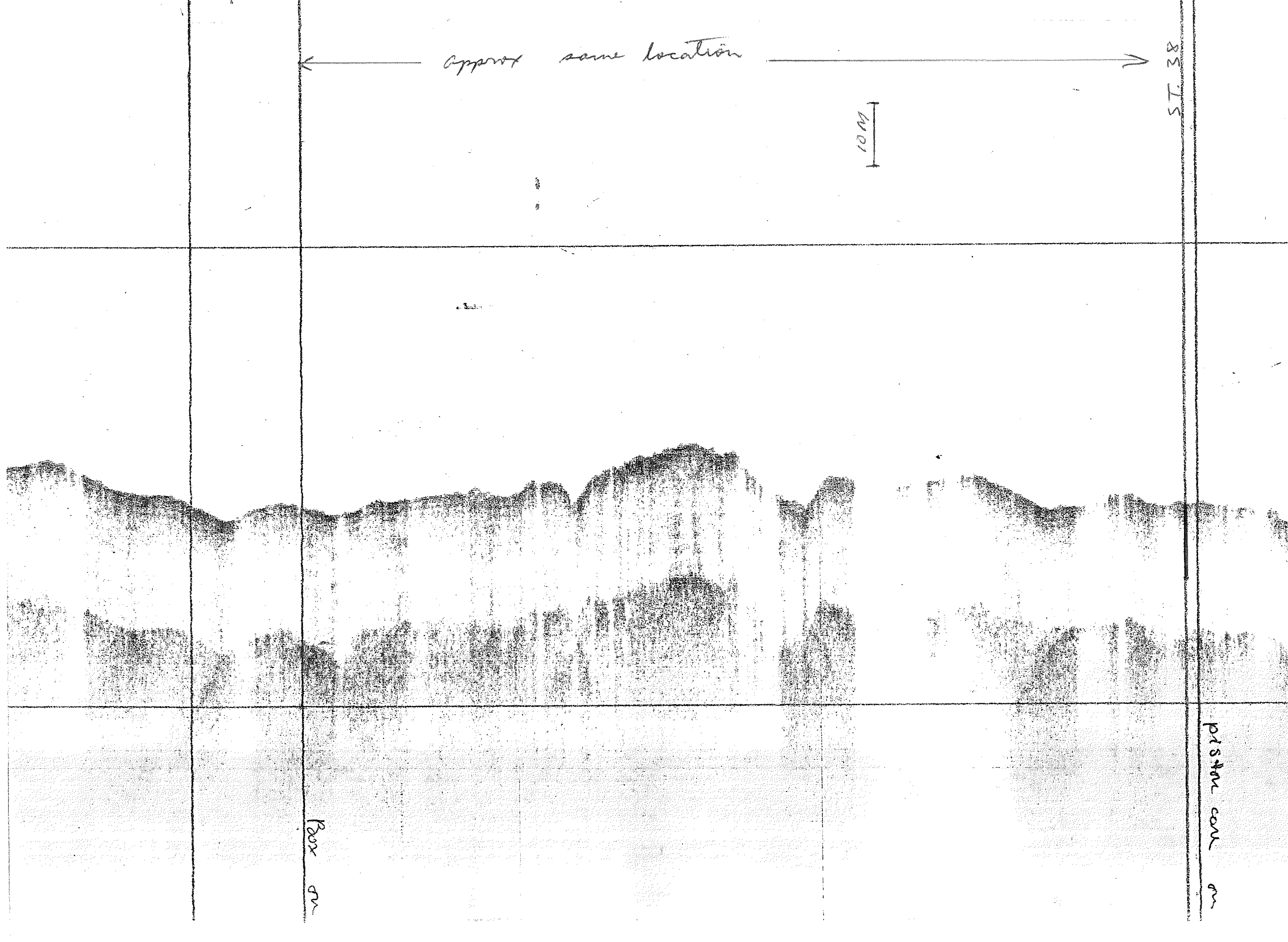

STN 35, 36
HUNTEC
ST. 35
ST. 36
10 M
1 km



90023
STN 37, 38
HUNTEC
1 km
10 M
ST 37
ST 38

STN. 38
3.5kHz

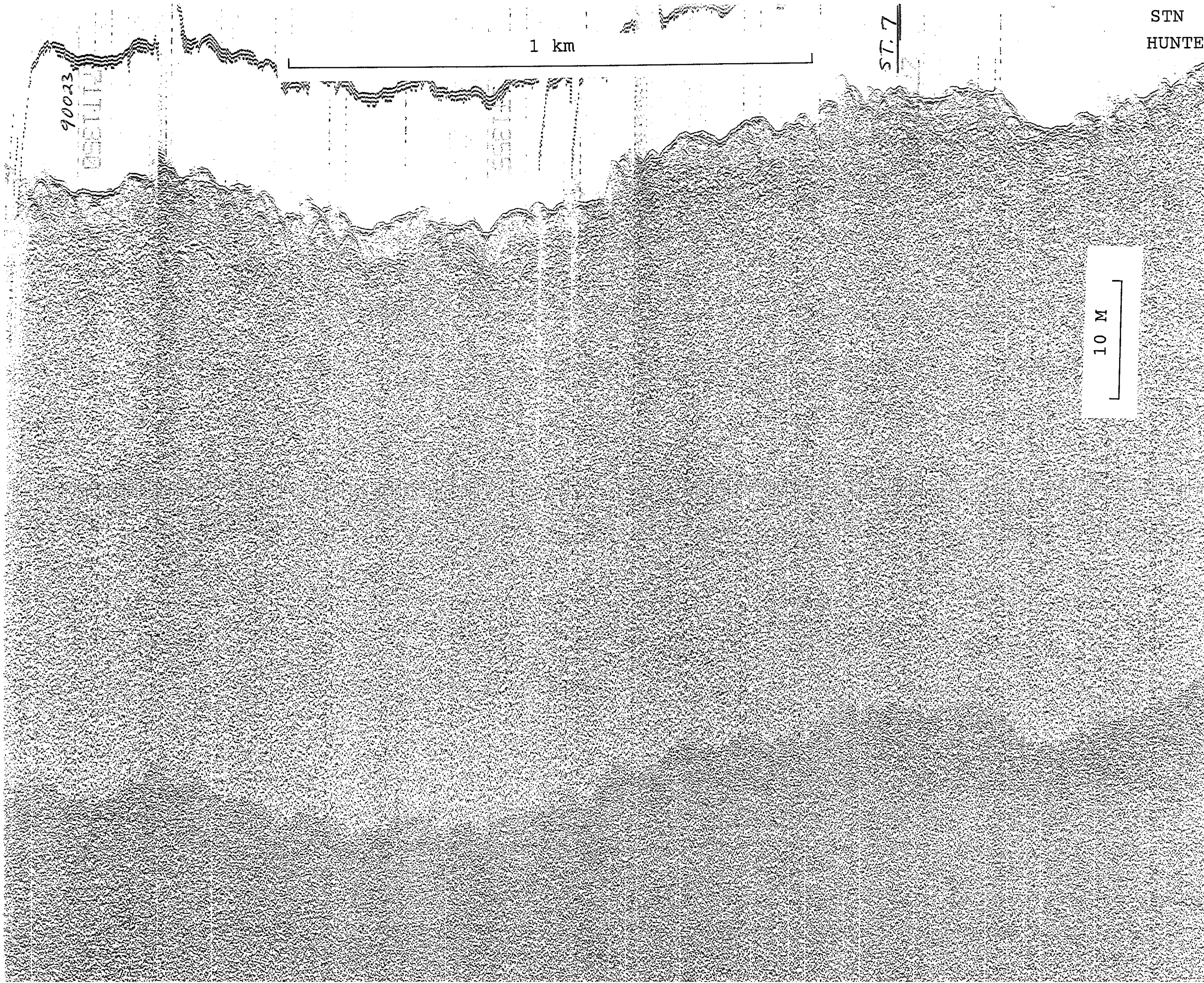
93034



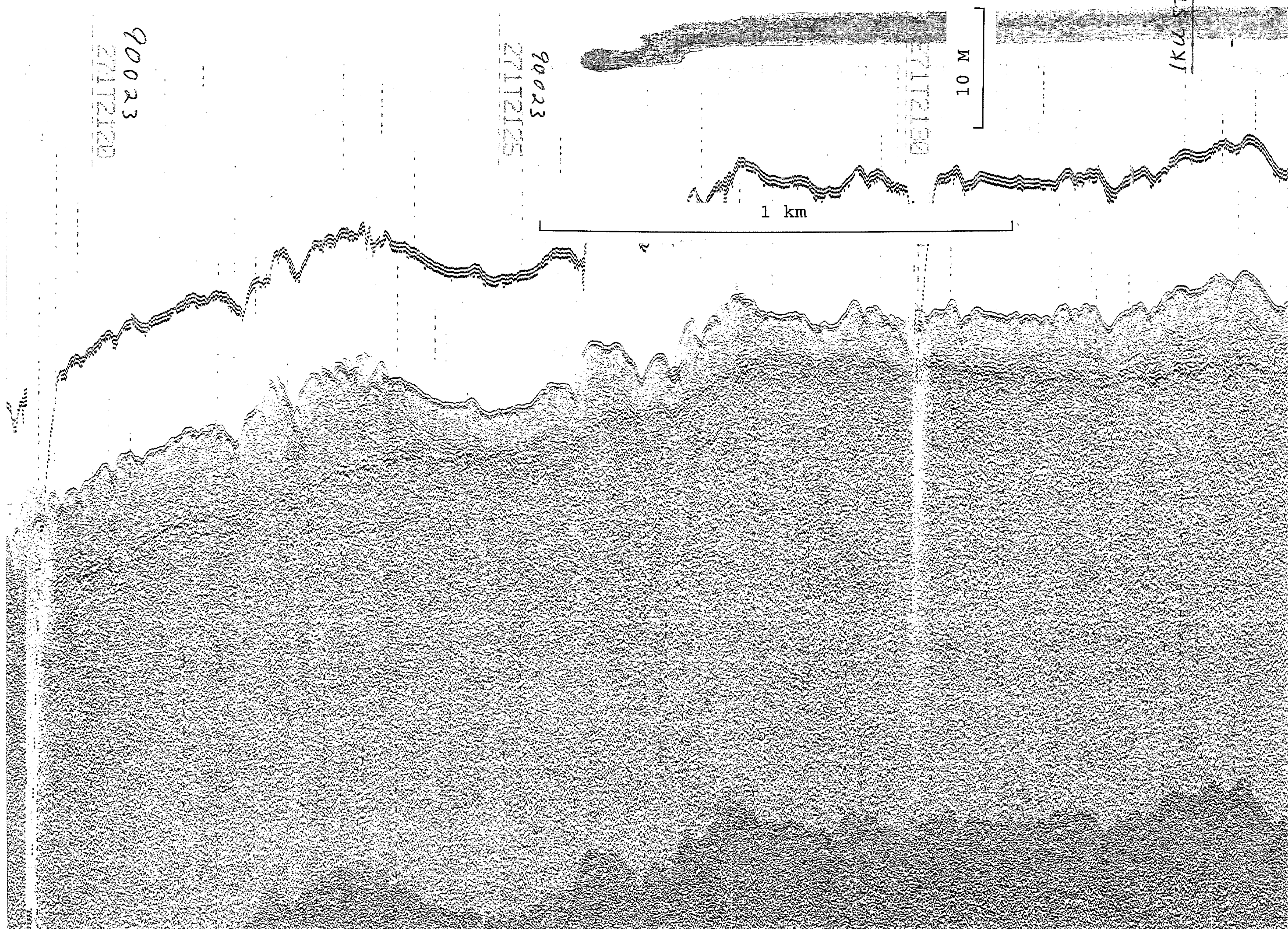
HIGH RESOLUTION SEISMIC REFLECTION PROFILES

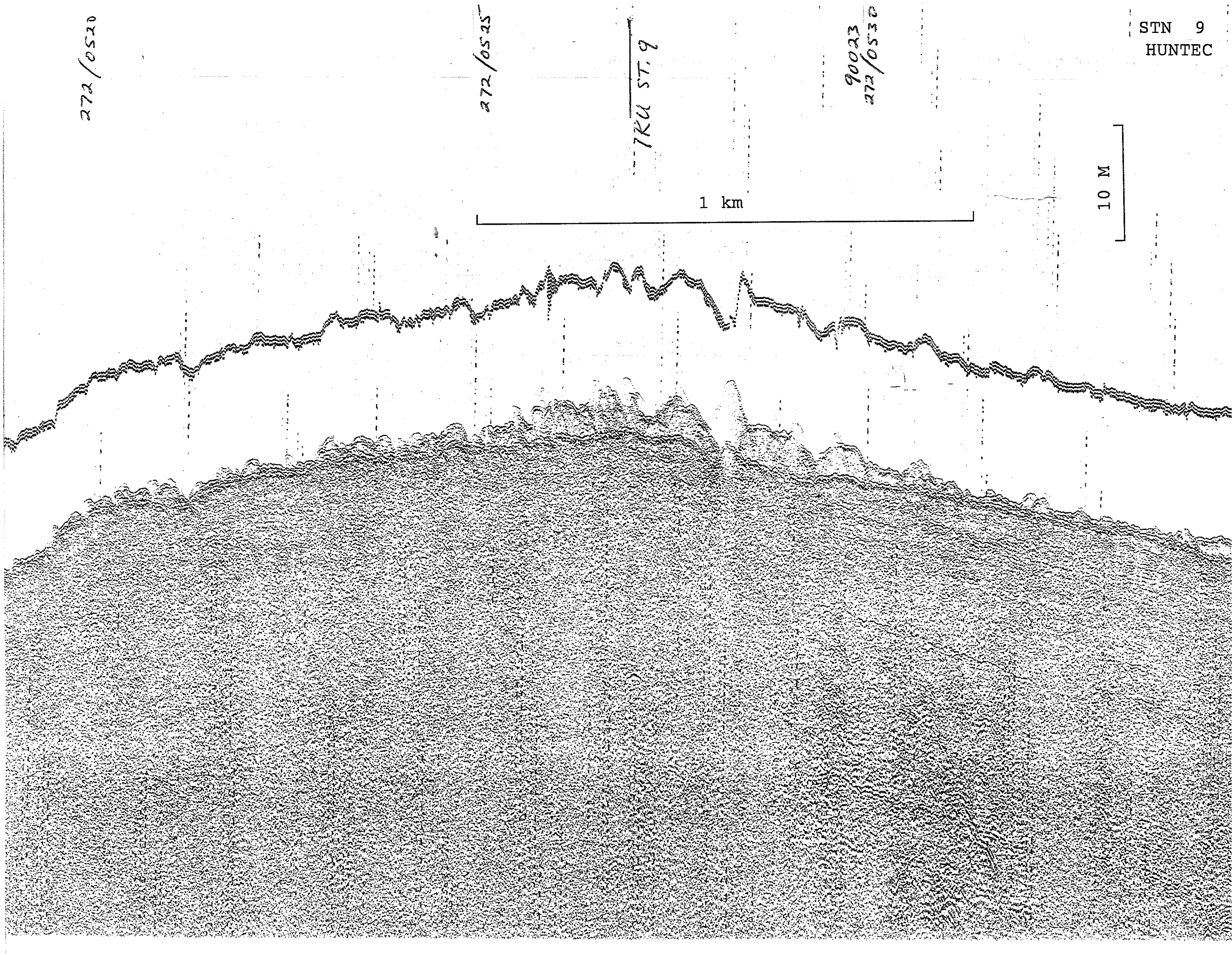
ACROSS IKU STATION LOCALITIES

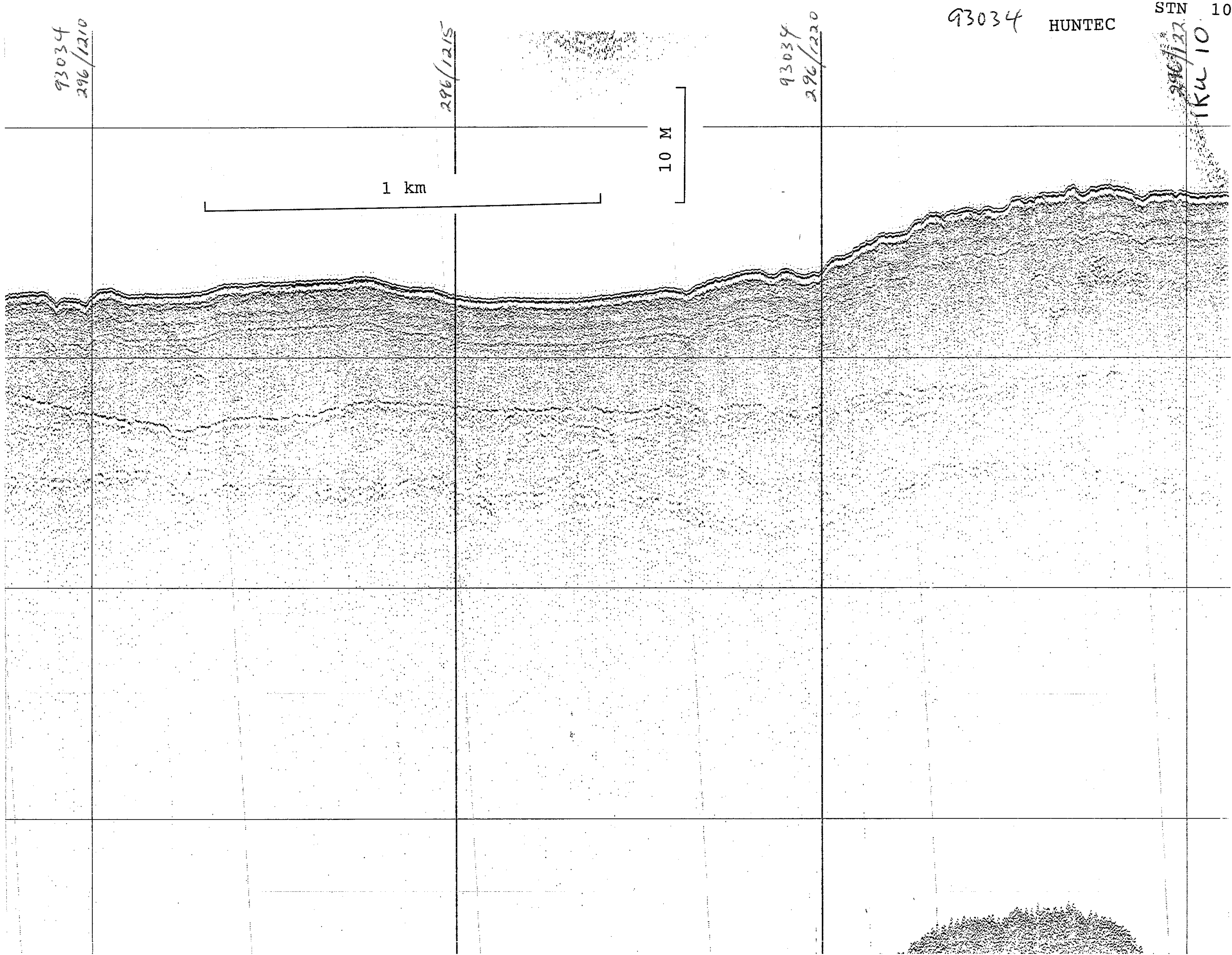
STN 7
HUNTEC



STN 8
HUNTEC




STN 9
HUNTEC
272/0520
272/0525
IKU ST. 9
90023
272/0530
1 km
10 M



93034 HUNTEC
STN 10
IKU 10
296/1225
93034
296/1220
296/1215
93034
296/1210
10 M
1 km

2300/287 81 fms

OL 57 2254

ART A/C

STN. 10
AIRGUN
85027

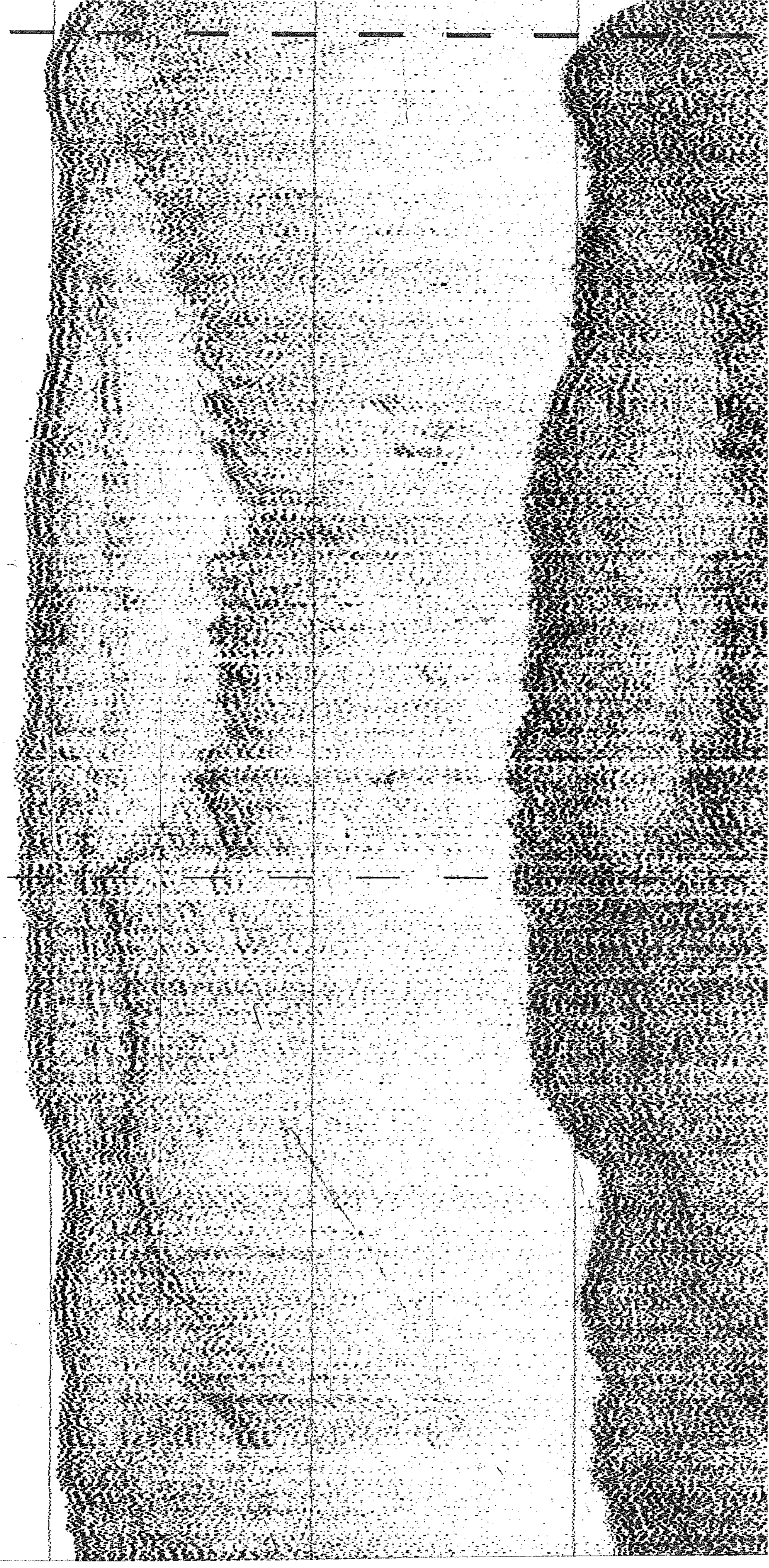
1KM

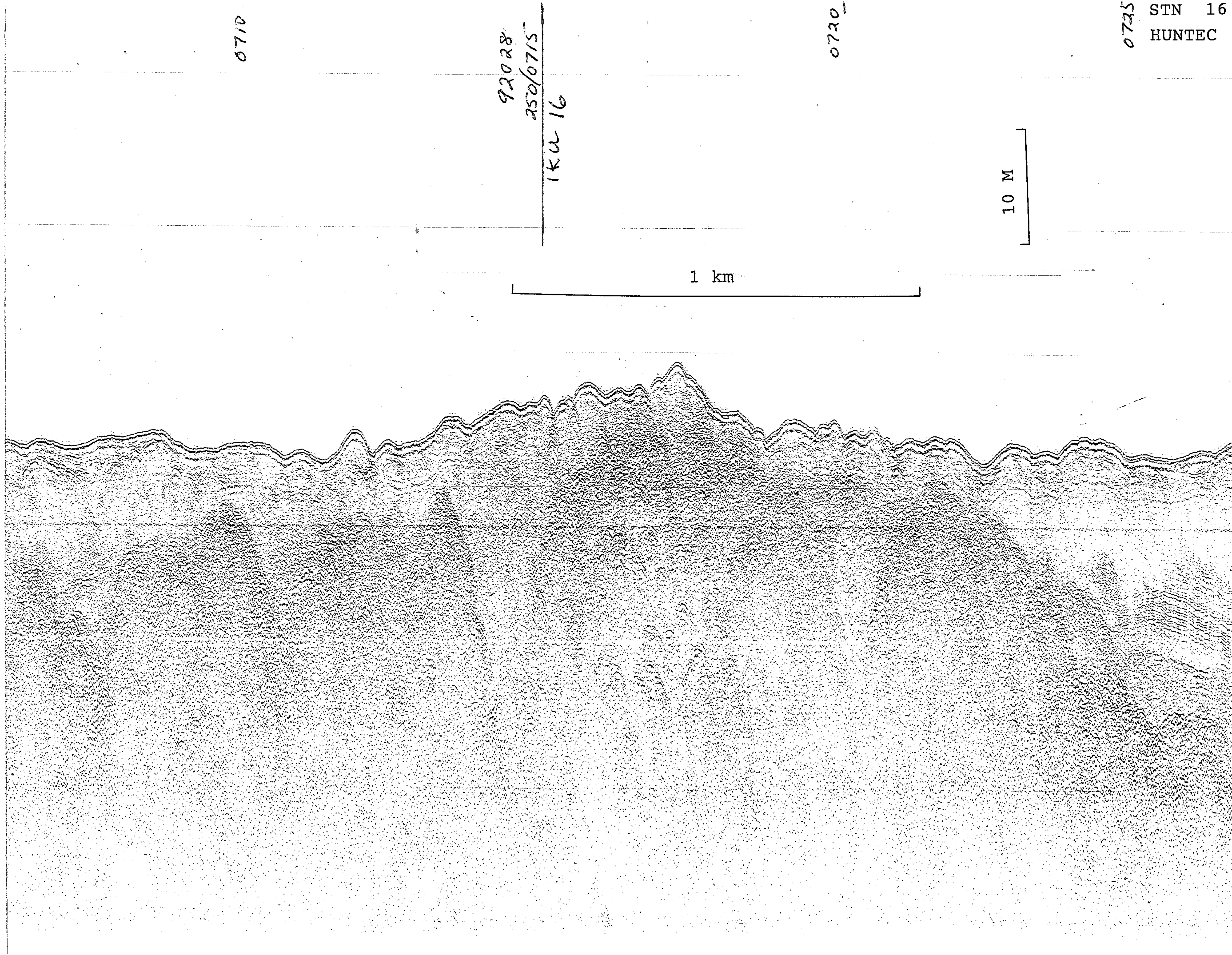
10M

85027

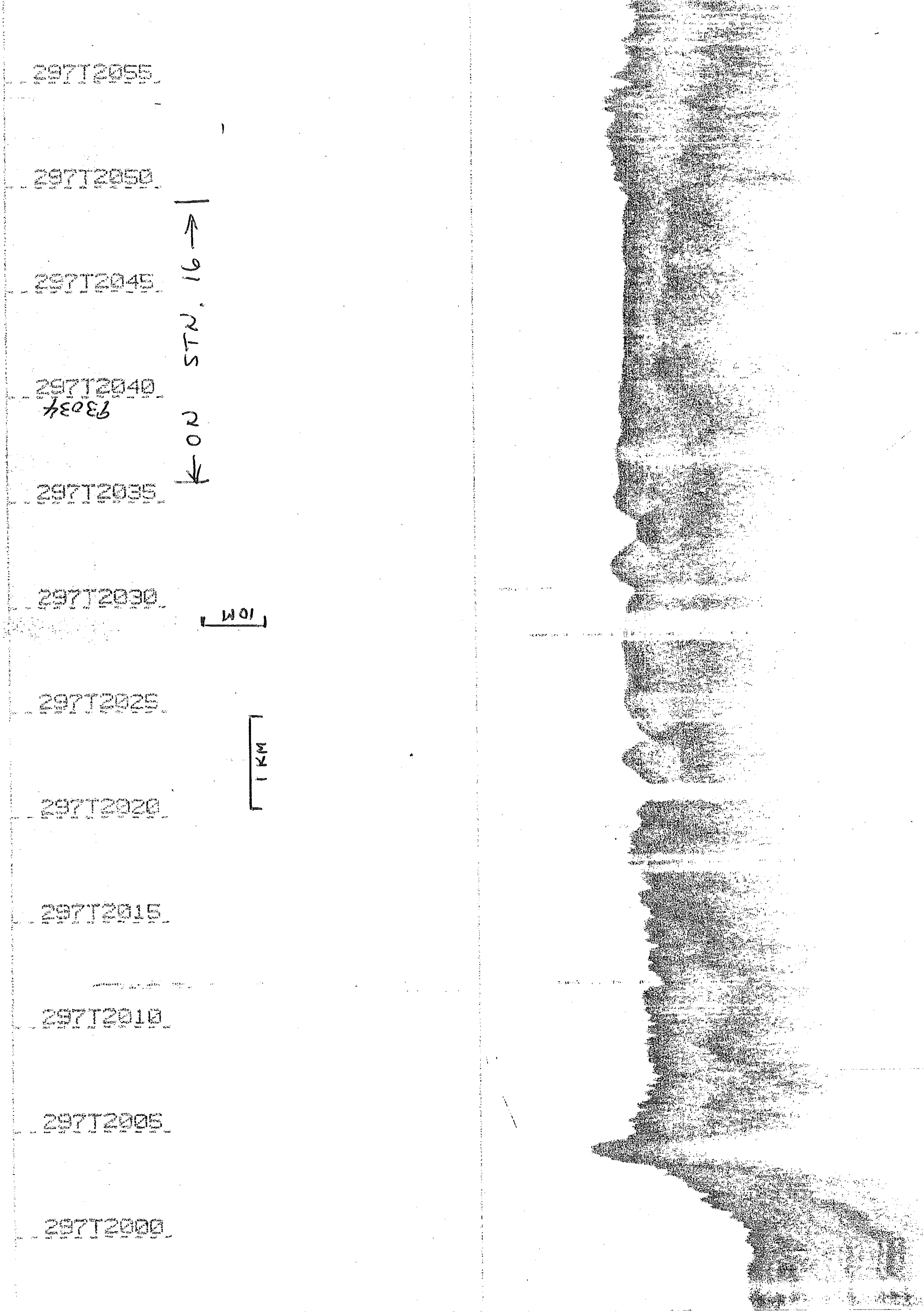
85027 1KM 10

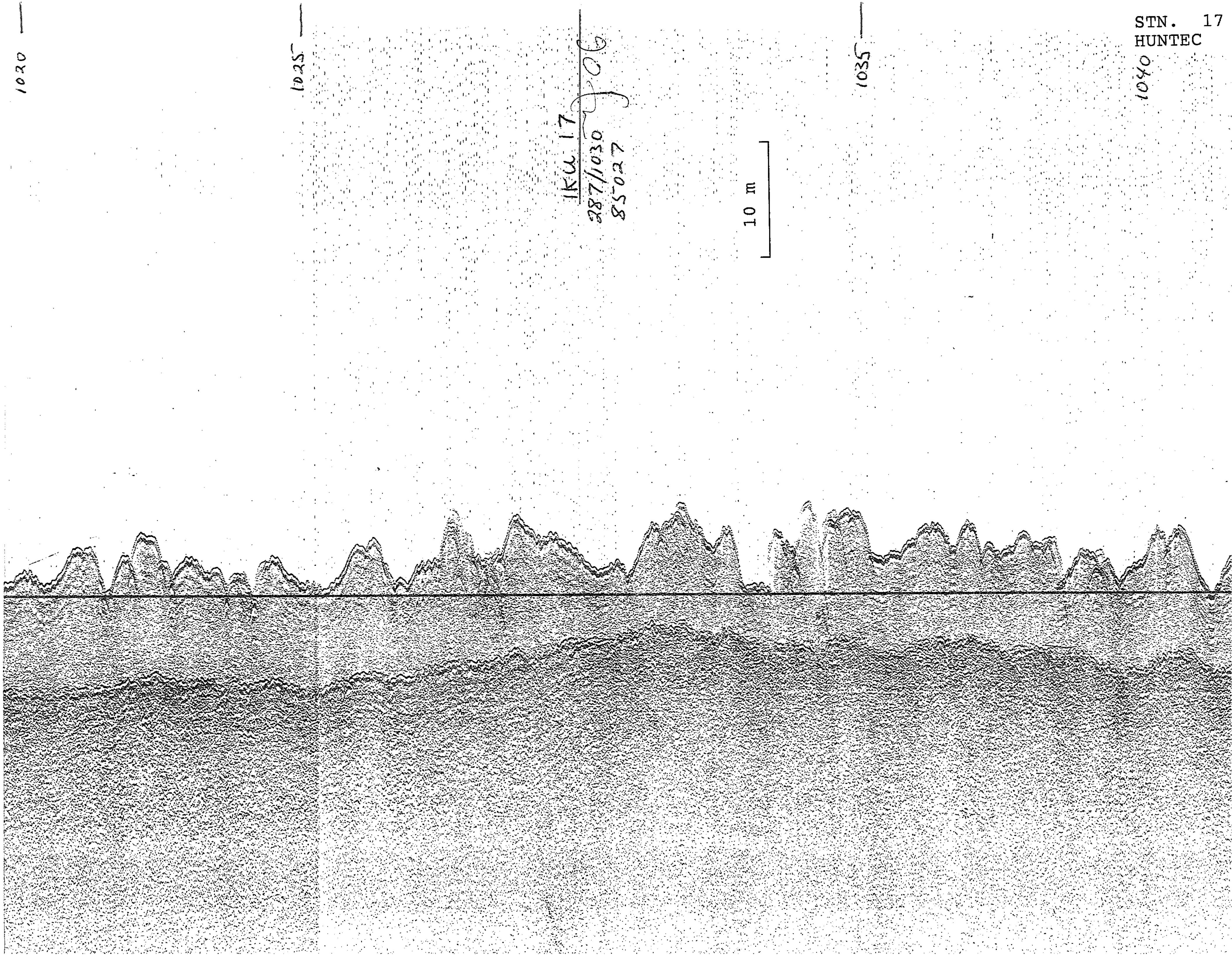
2230/287
76 fthms.

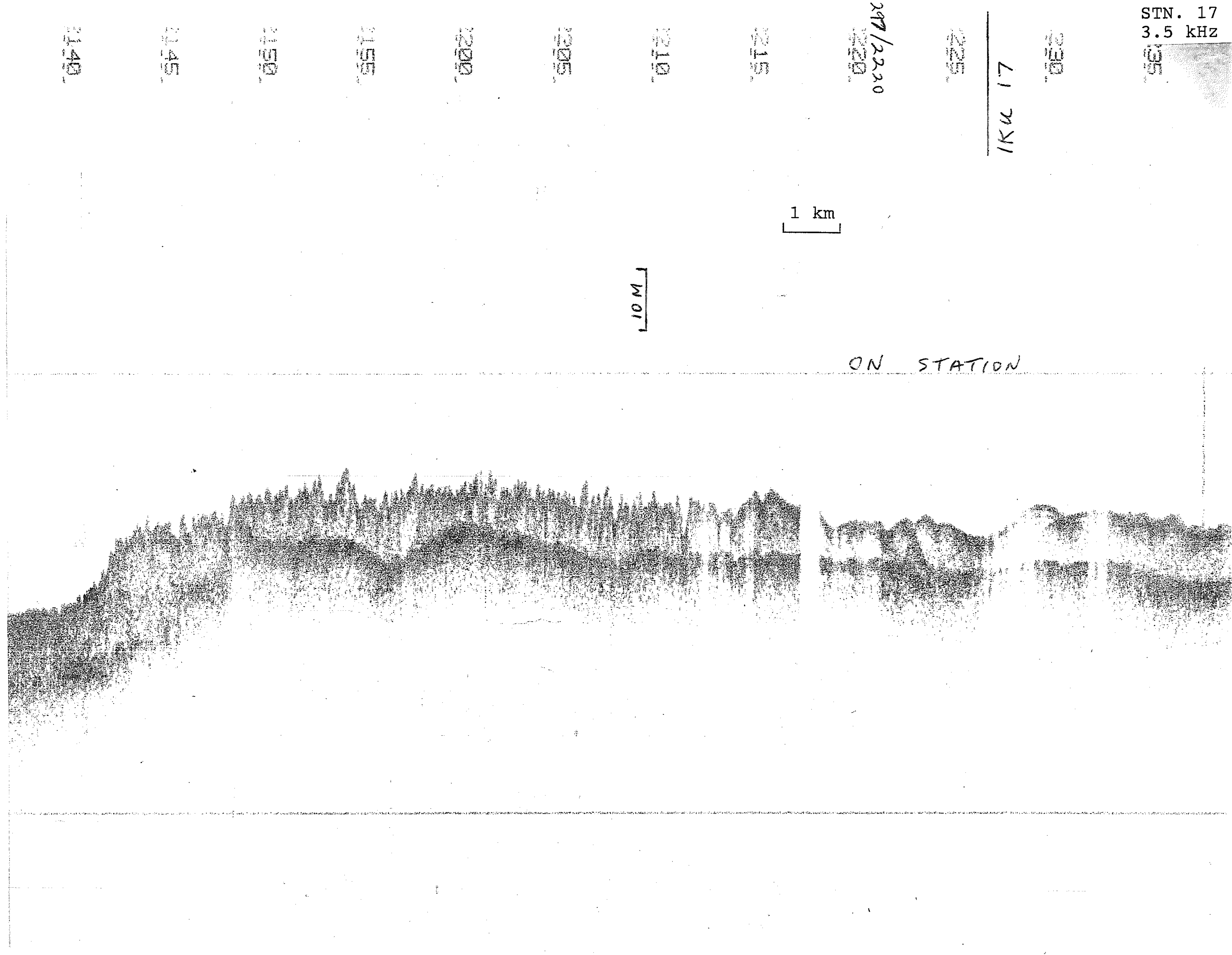


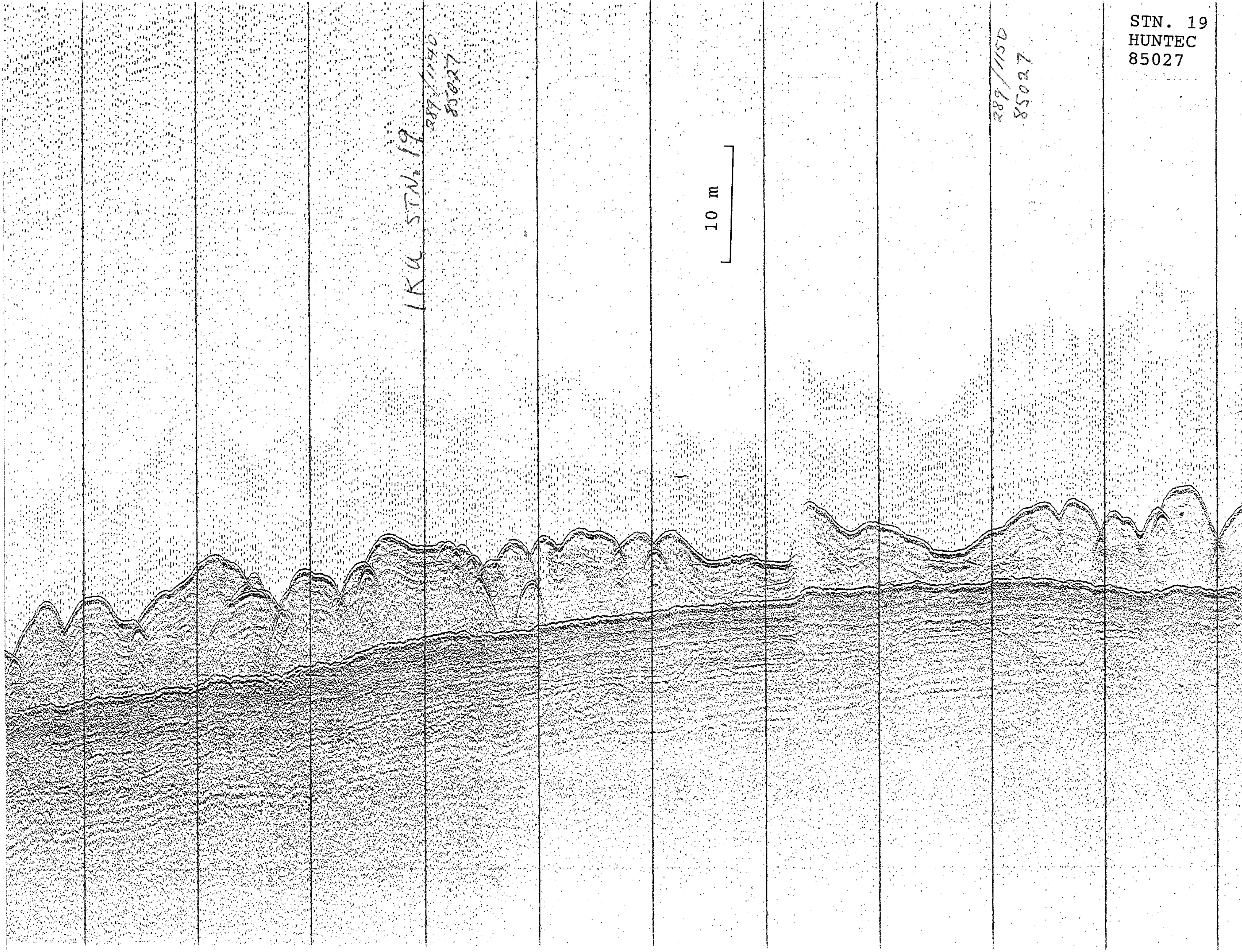

STN 16
HUNTEC
0725
0720
0710
92028
250/0715
1KU 16
10 M
1 km

STN. 16
3.5 kHz


297T2055
297T2050
297T2045
297T2040
297T2035
297T2030
297T2025
297T2020
297T2015
297T2010
297T2005
297T2000
ON STN. 16
10M
1 KM


STN. 17
HUNTEC
1020
1025
1035
1040
IKU 17
287/1030
85027
10 m


STN. 17
3.5 kHz
140
145
150
155
200
205
210
215
220
225
230
235
297/2220
1KU 17
1 km
10M
ON STATION


STN. 19
HUNTEC
85027
289/1150
85027
10 m
IKU STN. 19
289/1140
85027

STN 19
3.5 kHz

IKU stn. 19

10 M

93034

298T1755

IKU on bottom

298T1750

298T1745

298T1740

298T1735

298T1730 336,5 m.

STN20, IK

298T1725

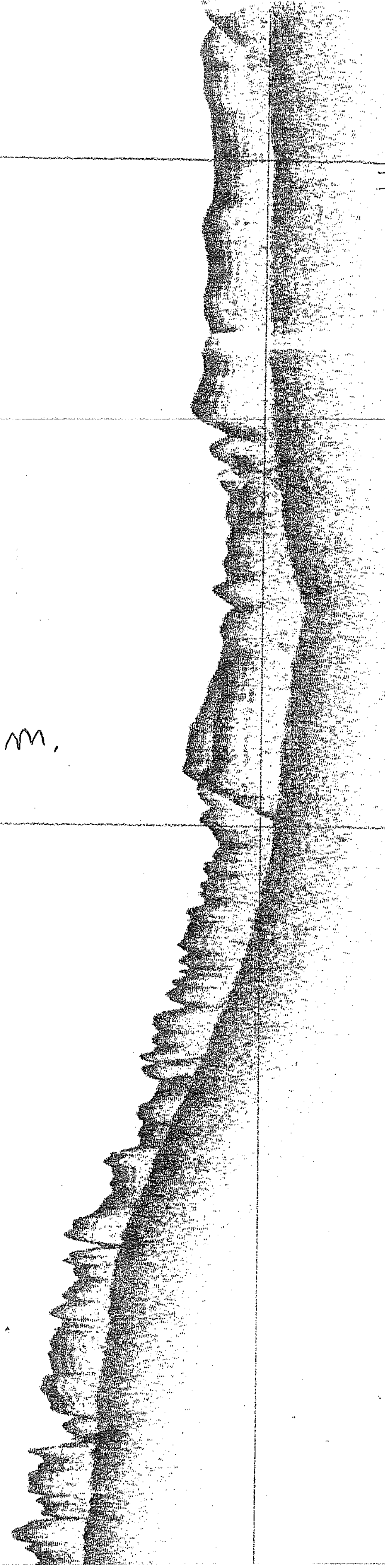
298T1720

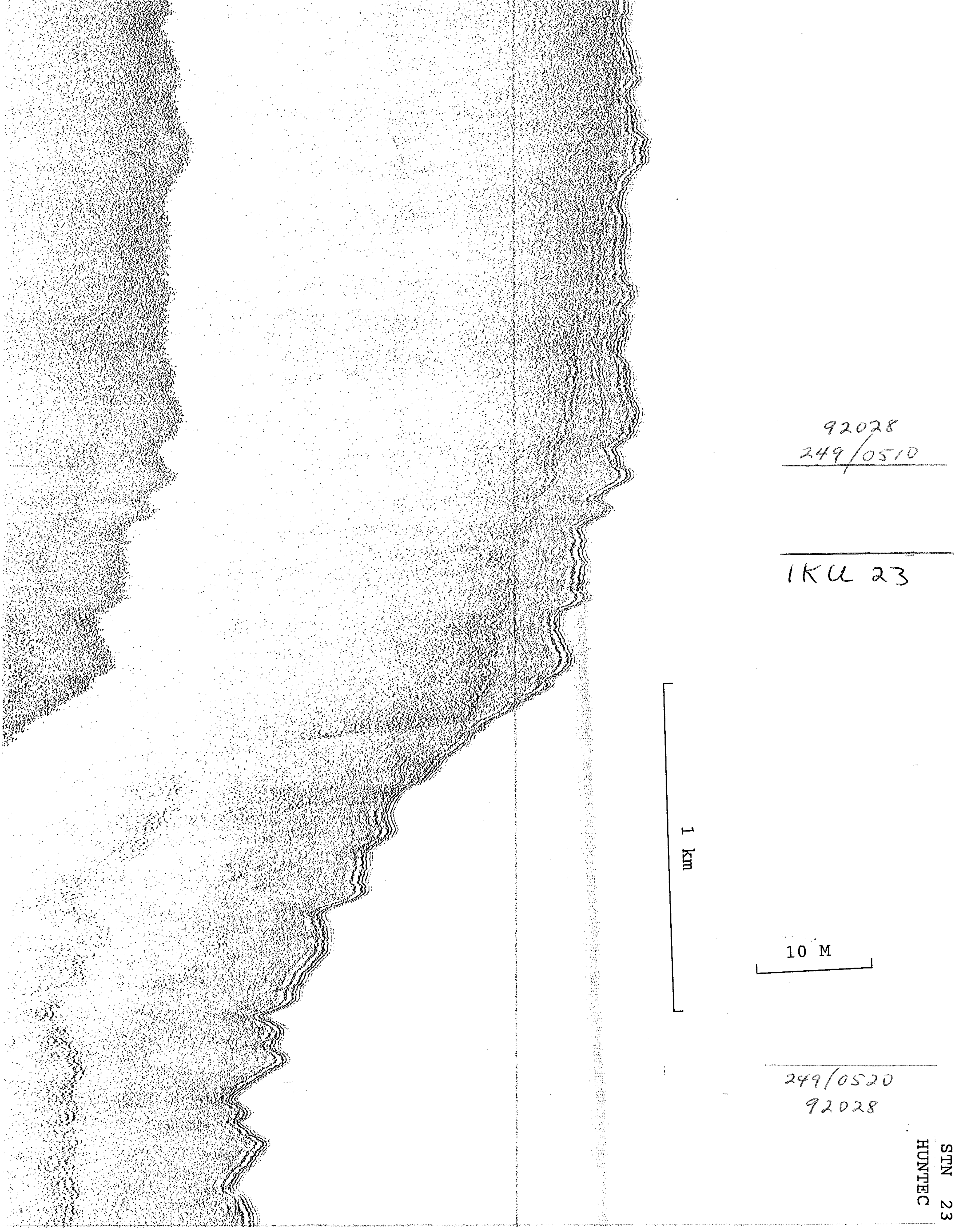
298T1715

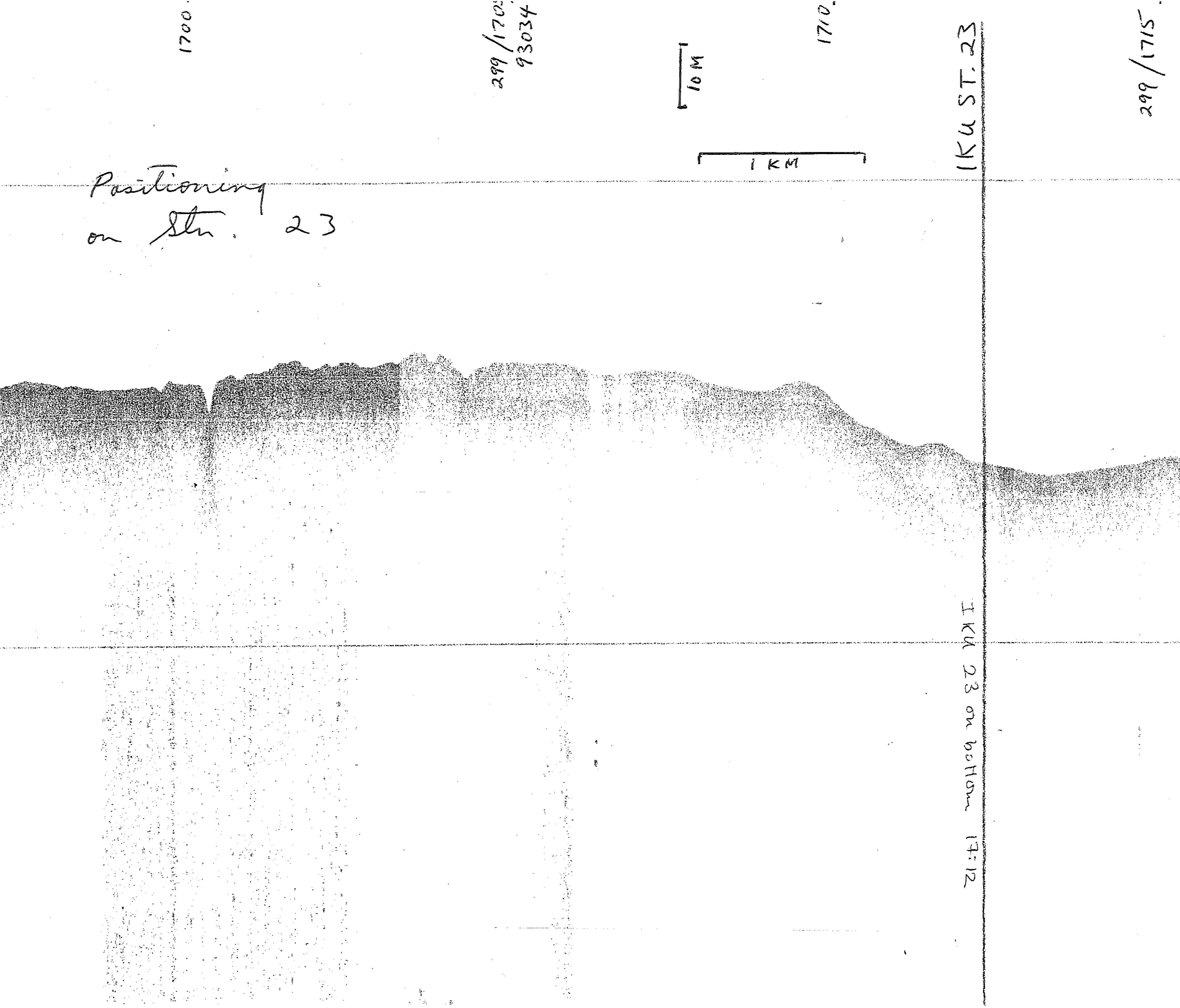
298T1710

298T1705

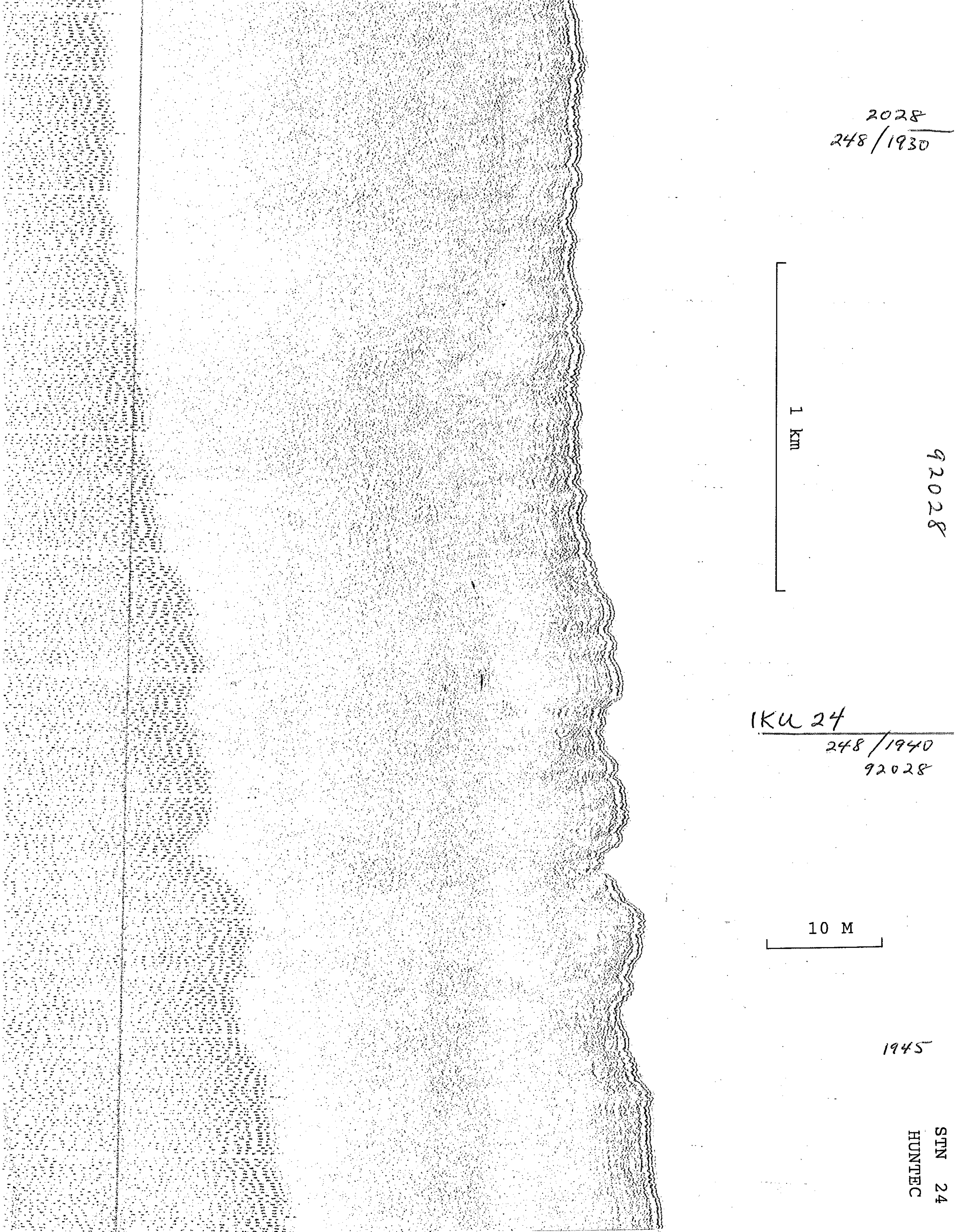
298T1700



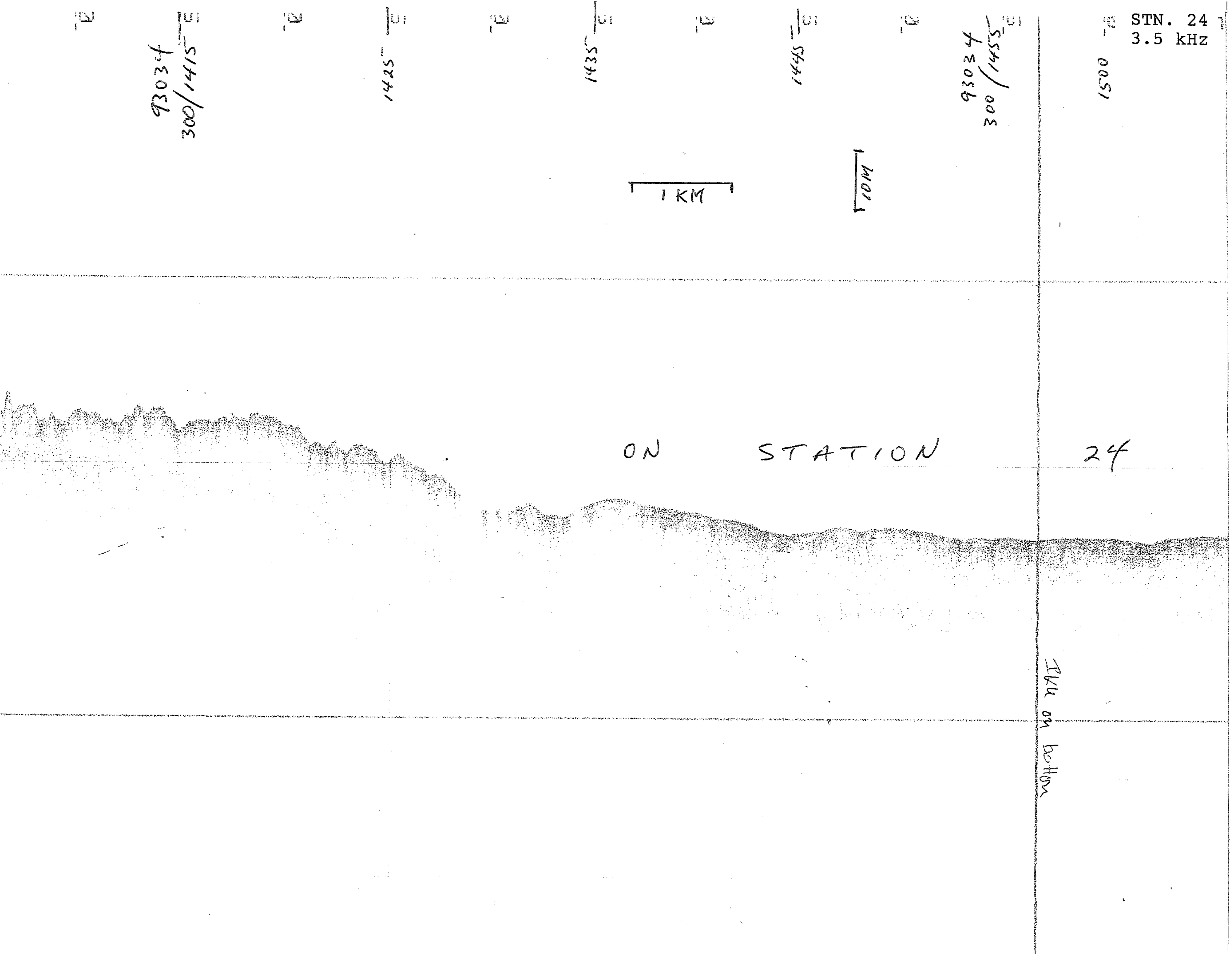

92028
249/0510
IKU 23
1 km
10 M
249/0520
92028
STN 23
HUNTEC

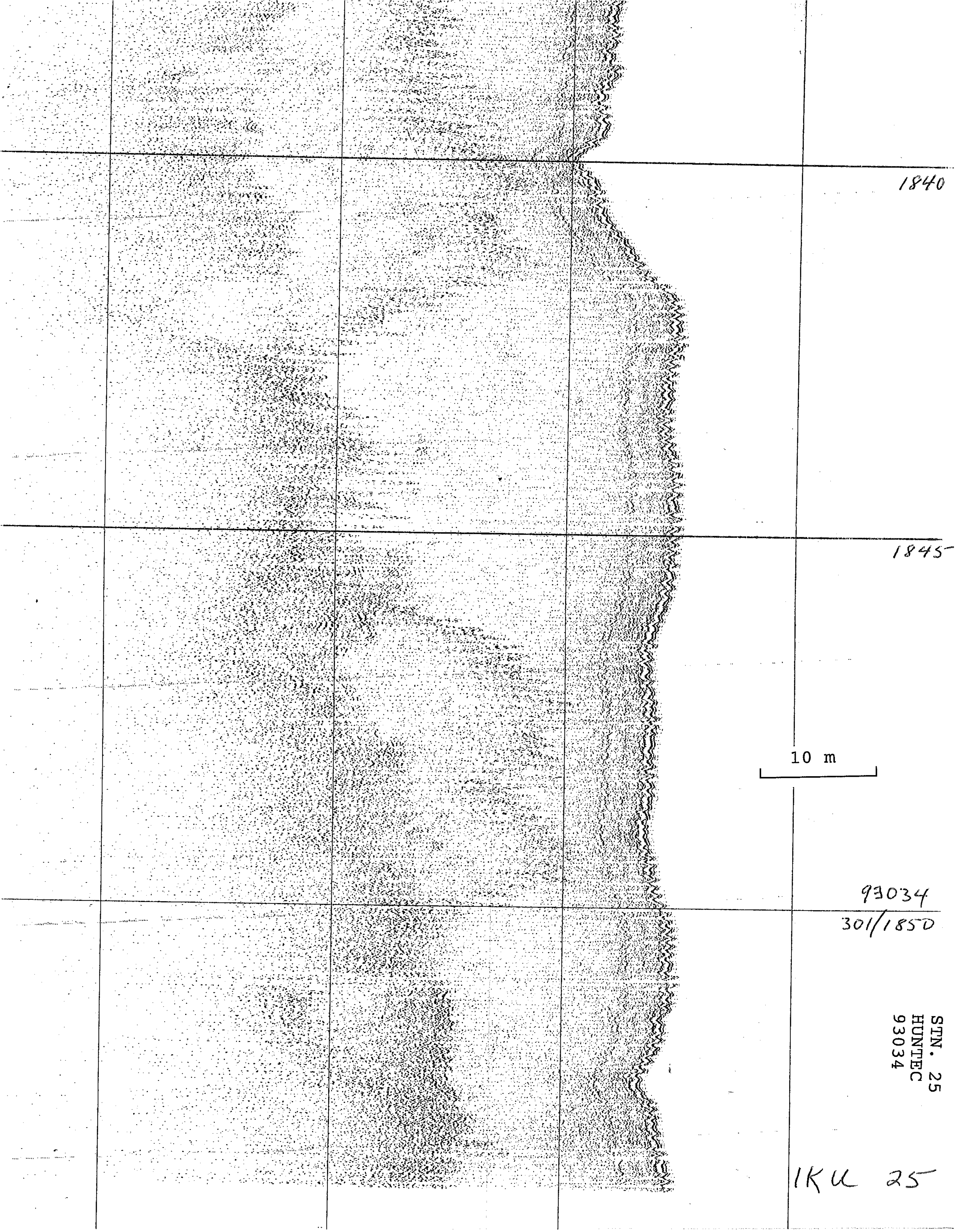

1700
299/1705
93034
10 M
1 KM
1710
IKU ST. 23
299/1715
Positioning on Stn. 23
IKU 23 on bottom 17:12

STN. 23
3.5 kHz

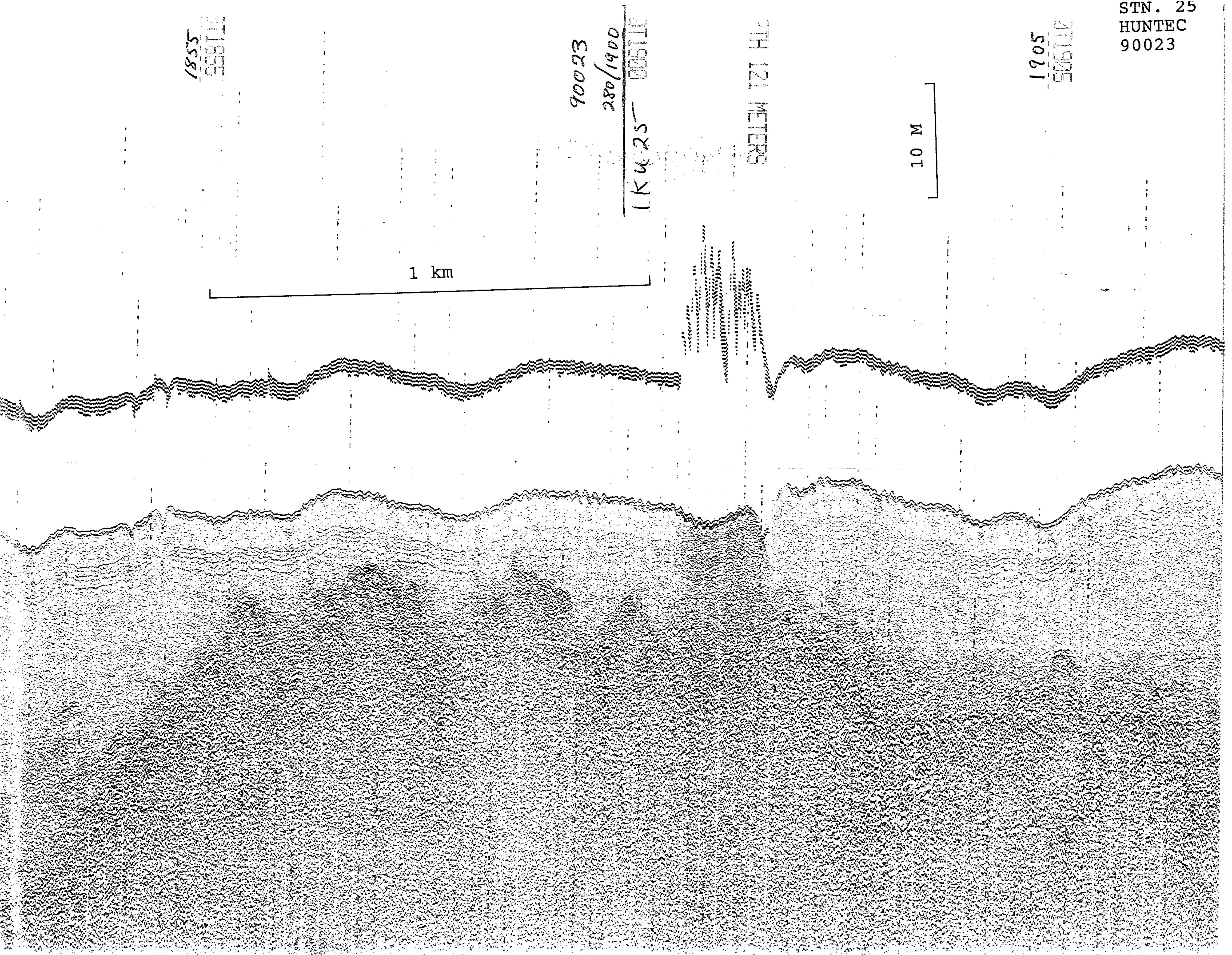

2028
248/1930
1 km
92028
IKU 24
248/1940
92028
10 M
1945
STN 24
HUNTEC

STN. 24
3.5 kHz

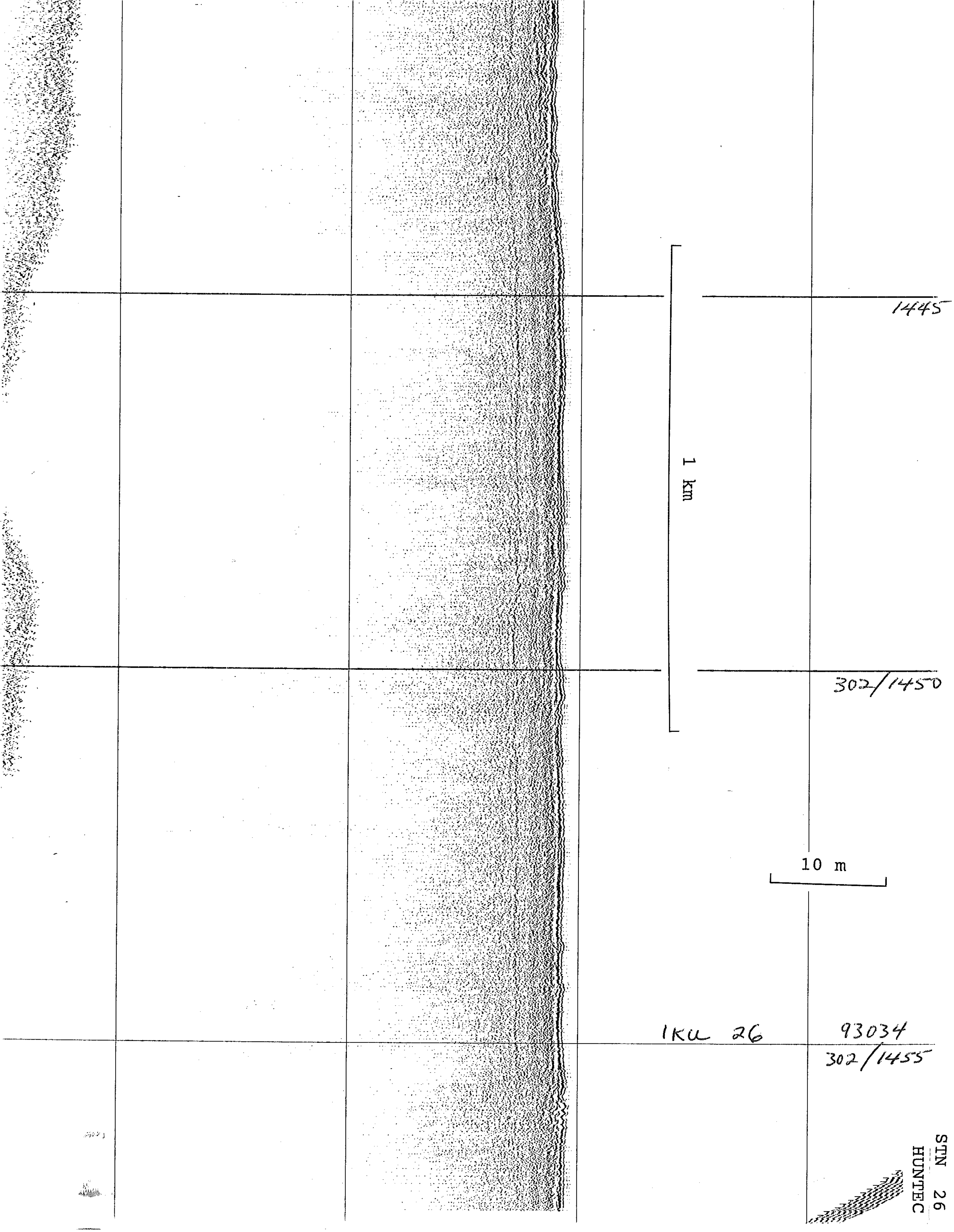

93034
300/1415
1425
1435
1445
93034
300/1455
1500
1 KM
10M
ON STATION 24
IKU on bottom



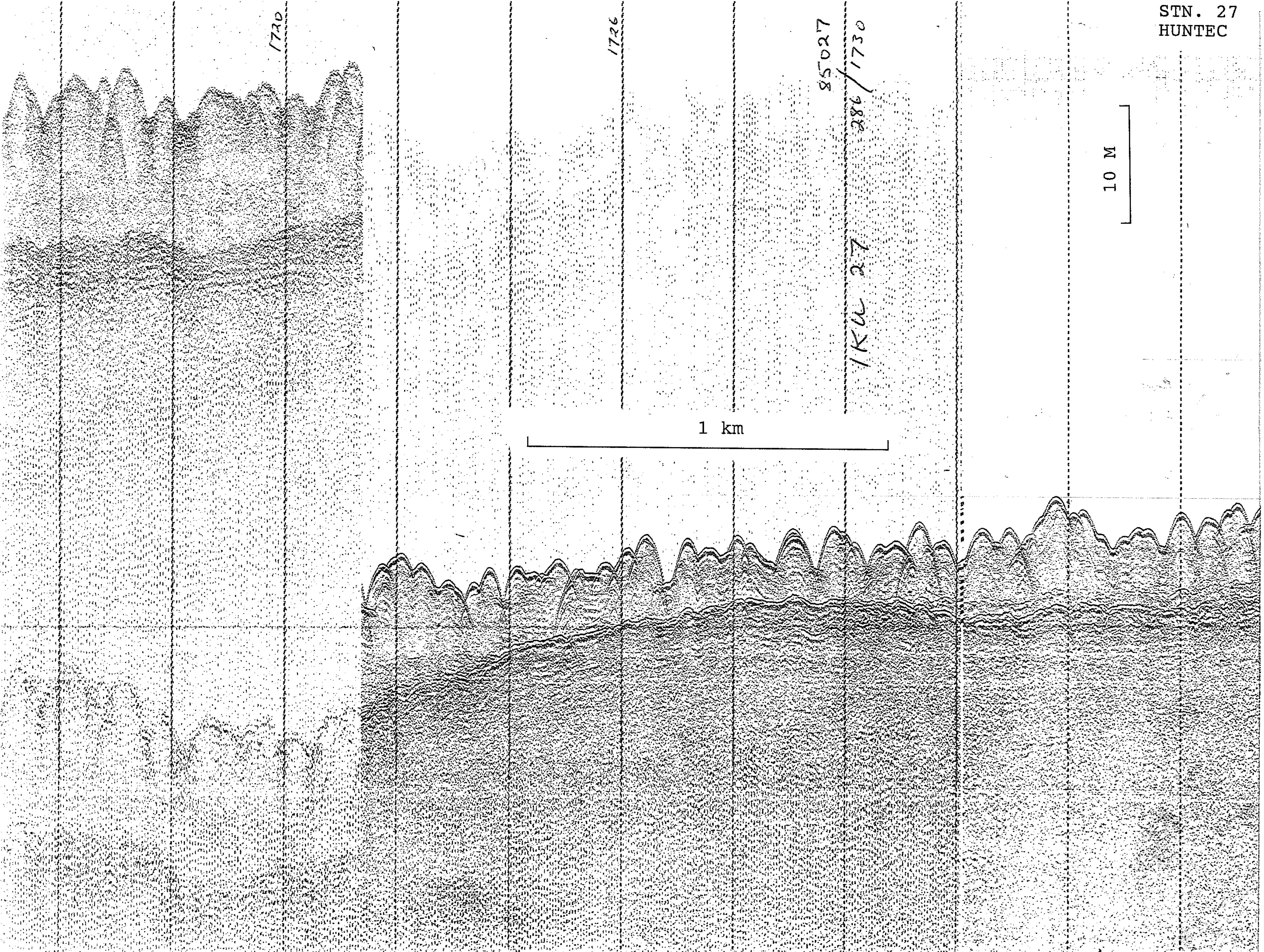
1840
1845
93034
301/1850
10 m
STN. 25
HUNTEC
93034
IKU 25



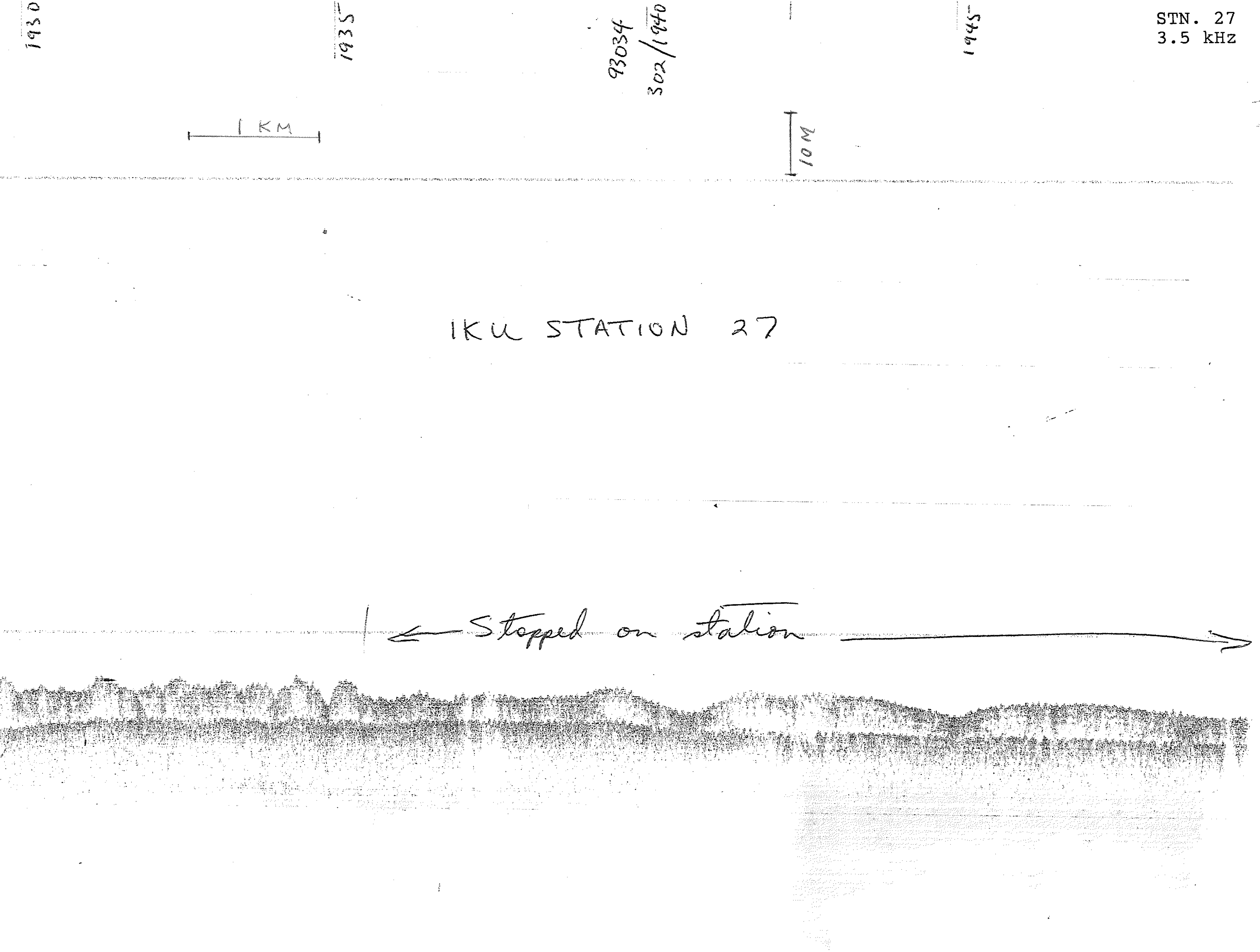
STN. 25
HUNTEC
90023
1855
90023
280/1900
1KU 25
1 km
10 M
1905


1445
1 km
302/1450
10 m
IKU 26
93034
302/1455
STN 26
HUNTEC

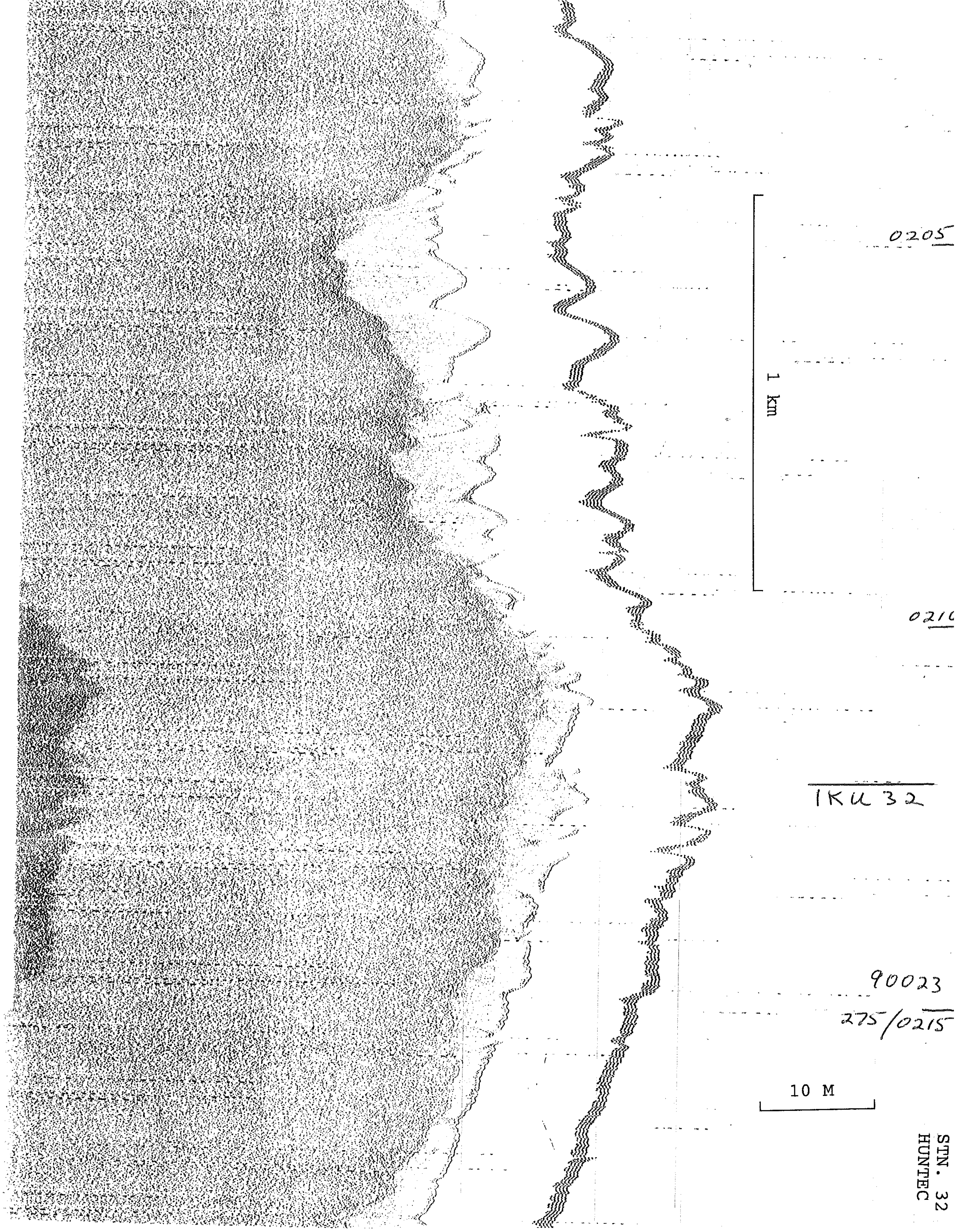
STN. 27
HUNTEC

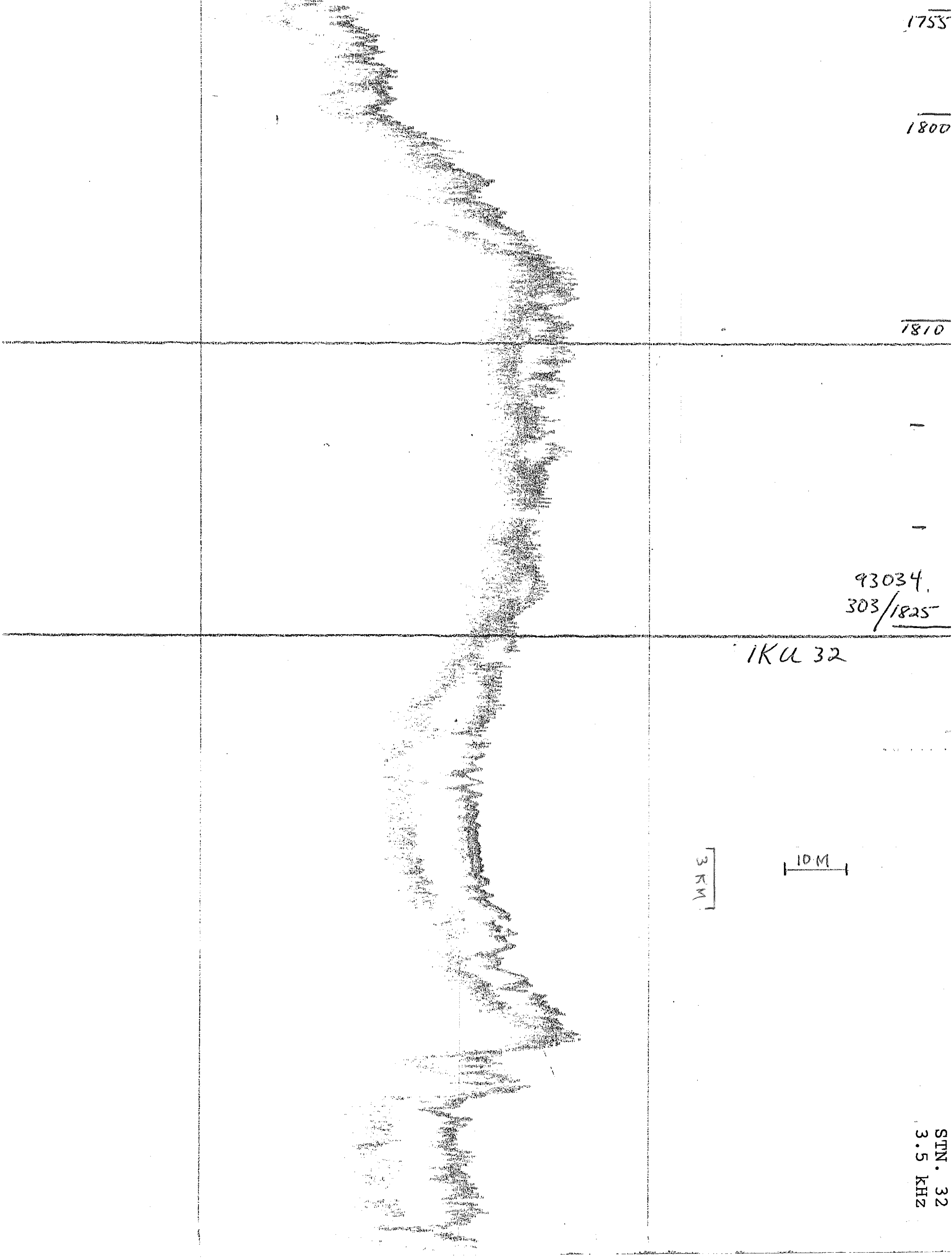


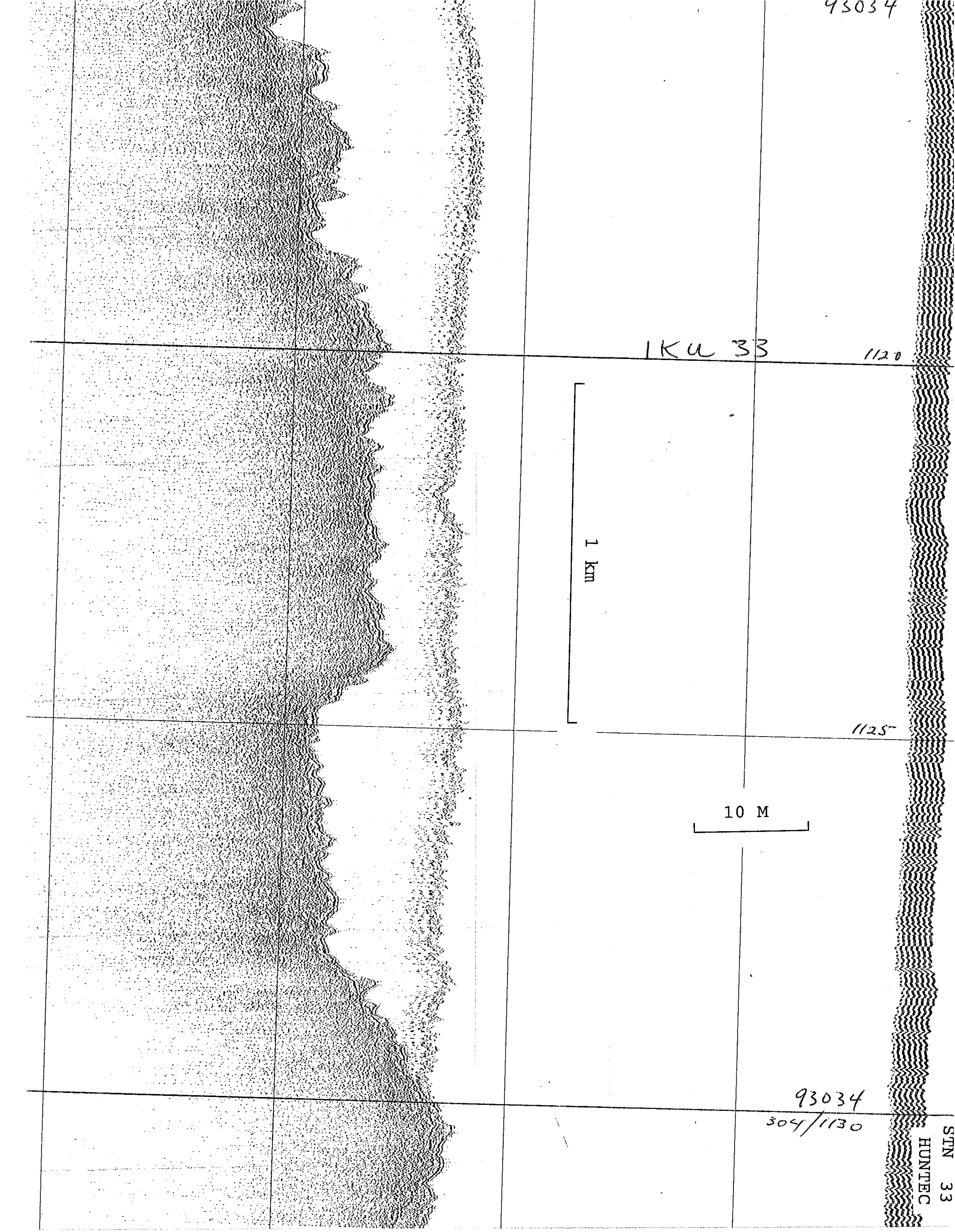
STN. 27
3.5 kHz

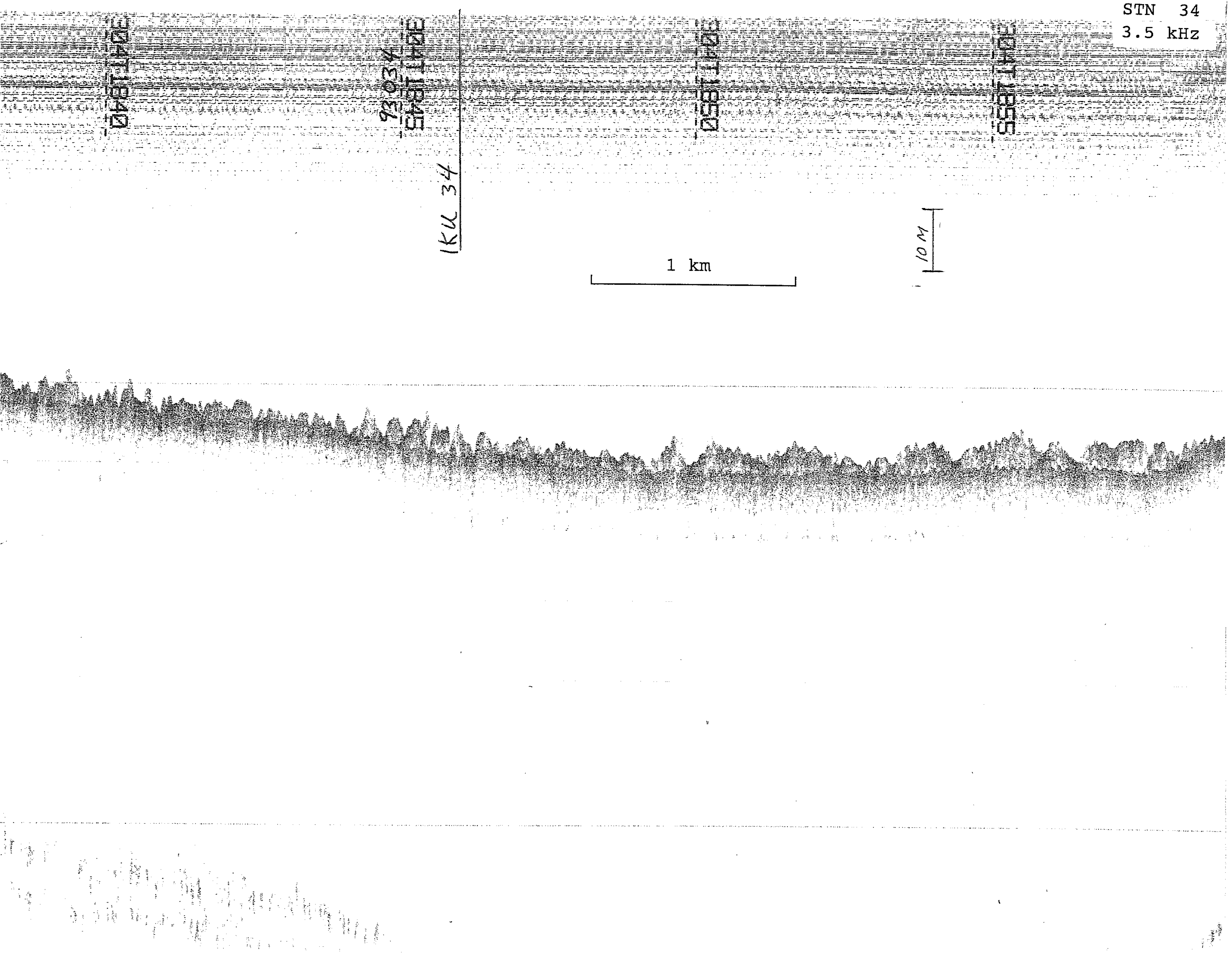


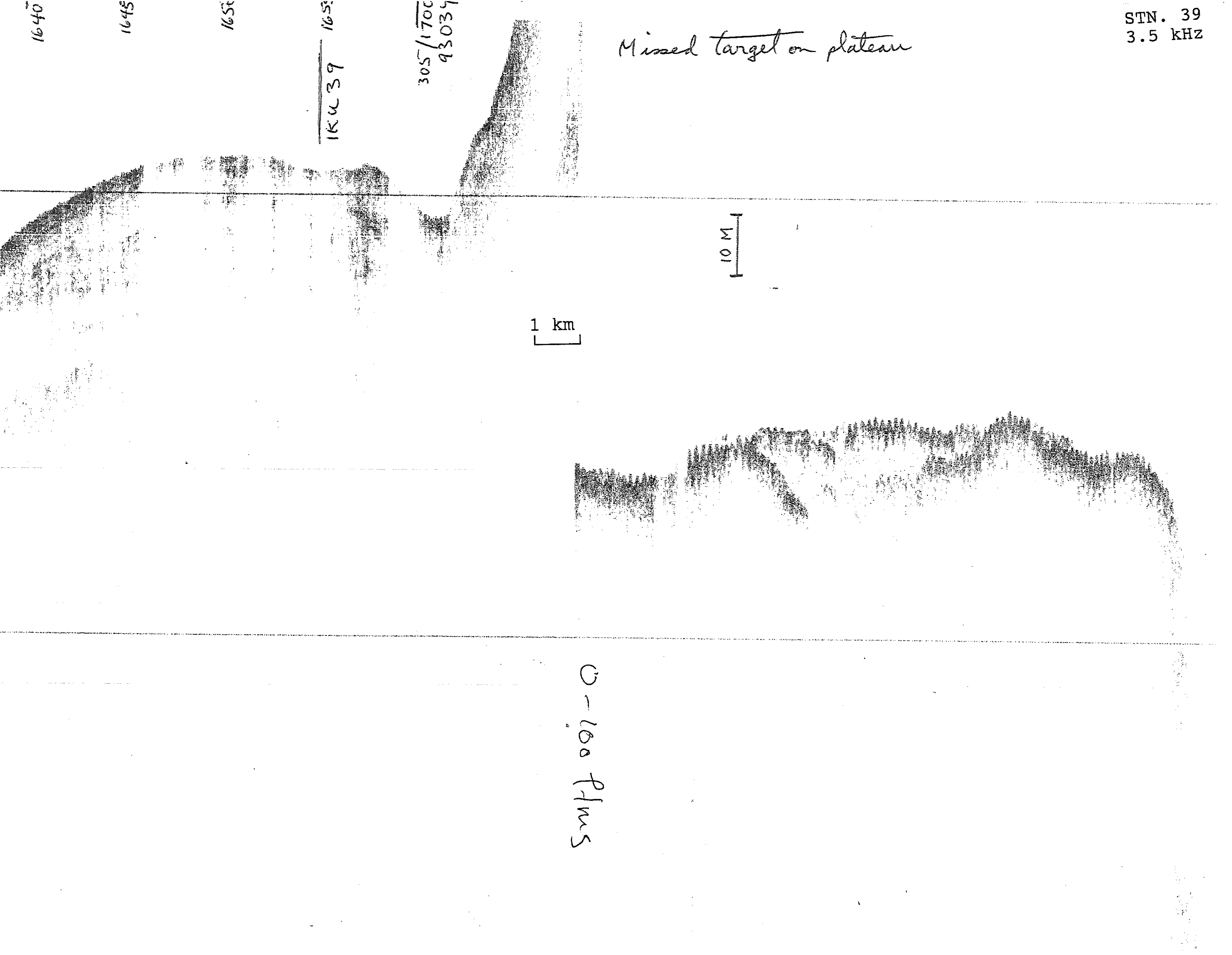
1930
1935
93034
302/1940
1945
1 KM
10 M
IKU STATION 27
← Stopped on station →

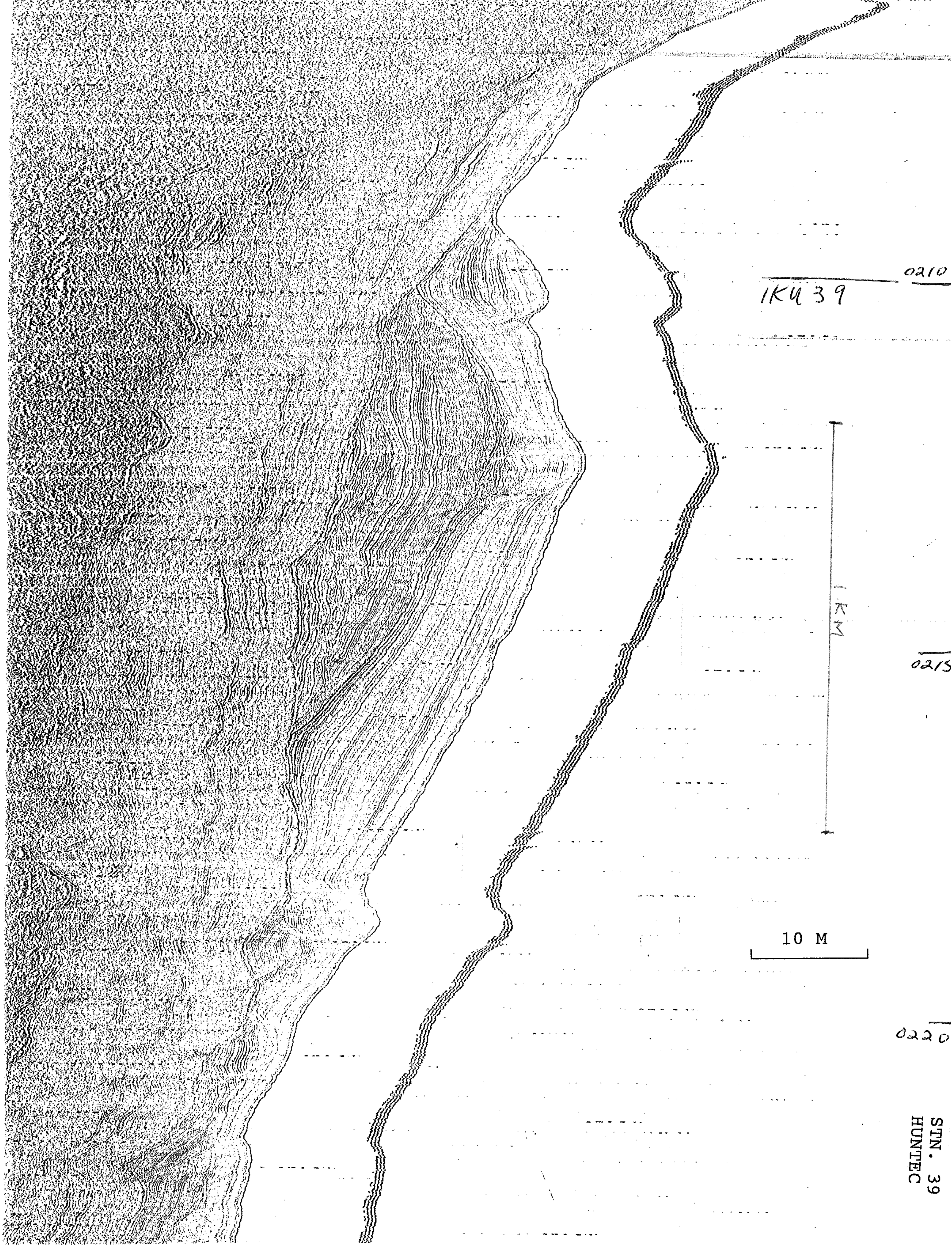

0205
0210
1 km
IKU32
90023
275/0215
10 M
STN. 32
HUNTEC


1755
1800
1810
93034.
303/1825
IKU 32
3 KM
10 M
STN. 32
3.5 kHz

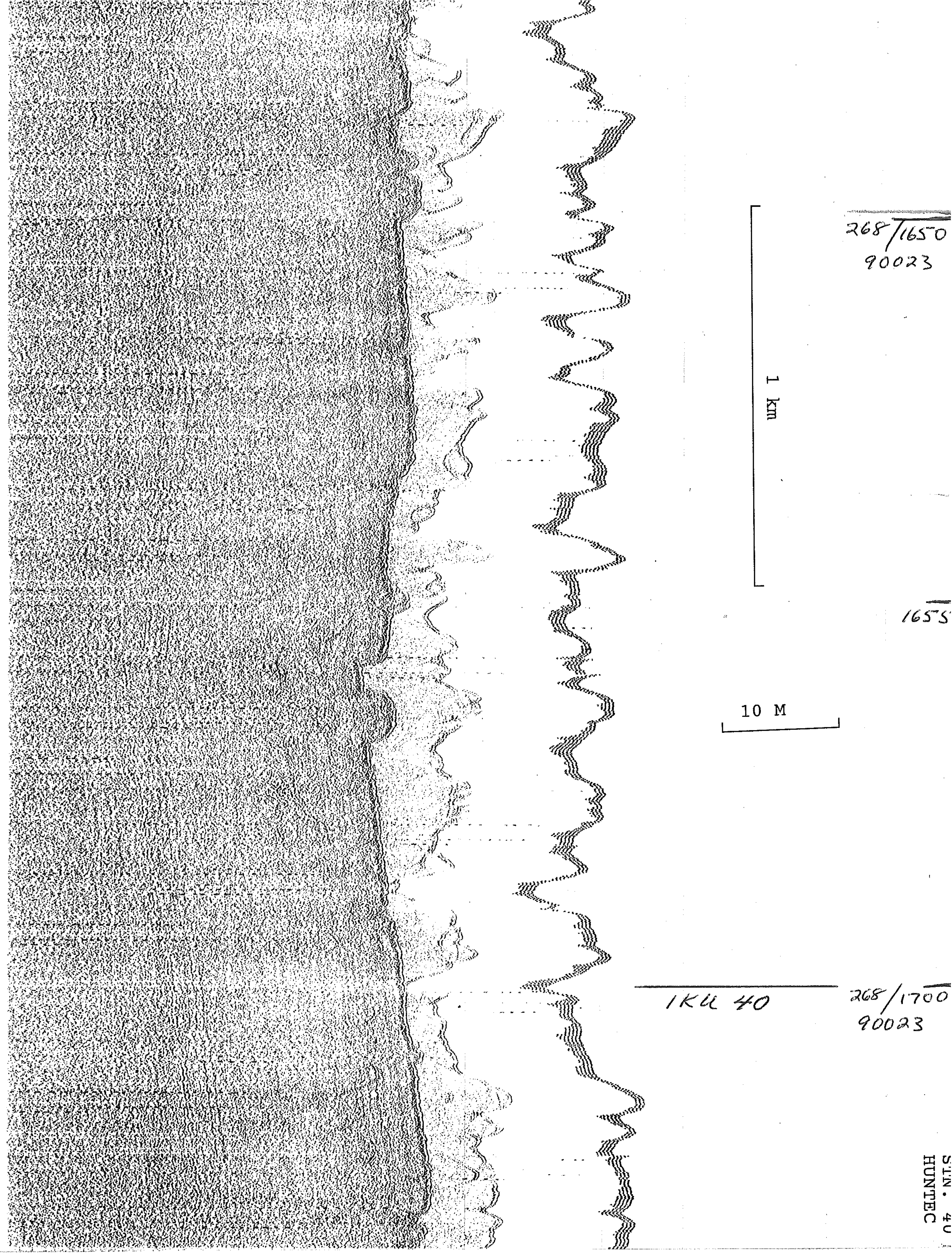

93034
1Ku 33
1120
1 km
1125
10 M
93034
304/1130
STN 33
HUNTEC

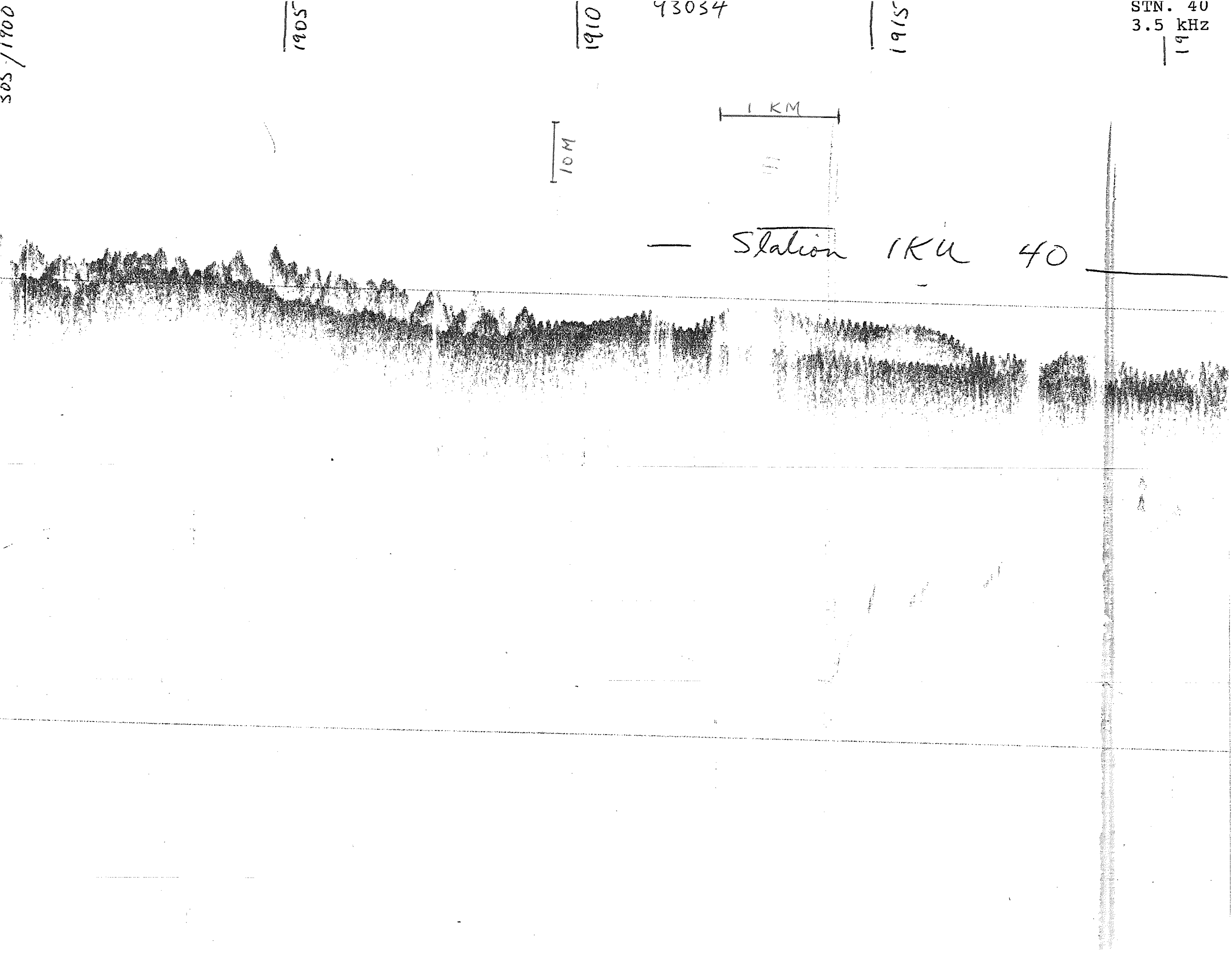

STN 34
3.5 kHz
304T1840
93 034
304T1845
IKU 34
304T1850
304T1855
1 km
10 M

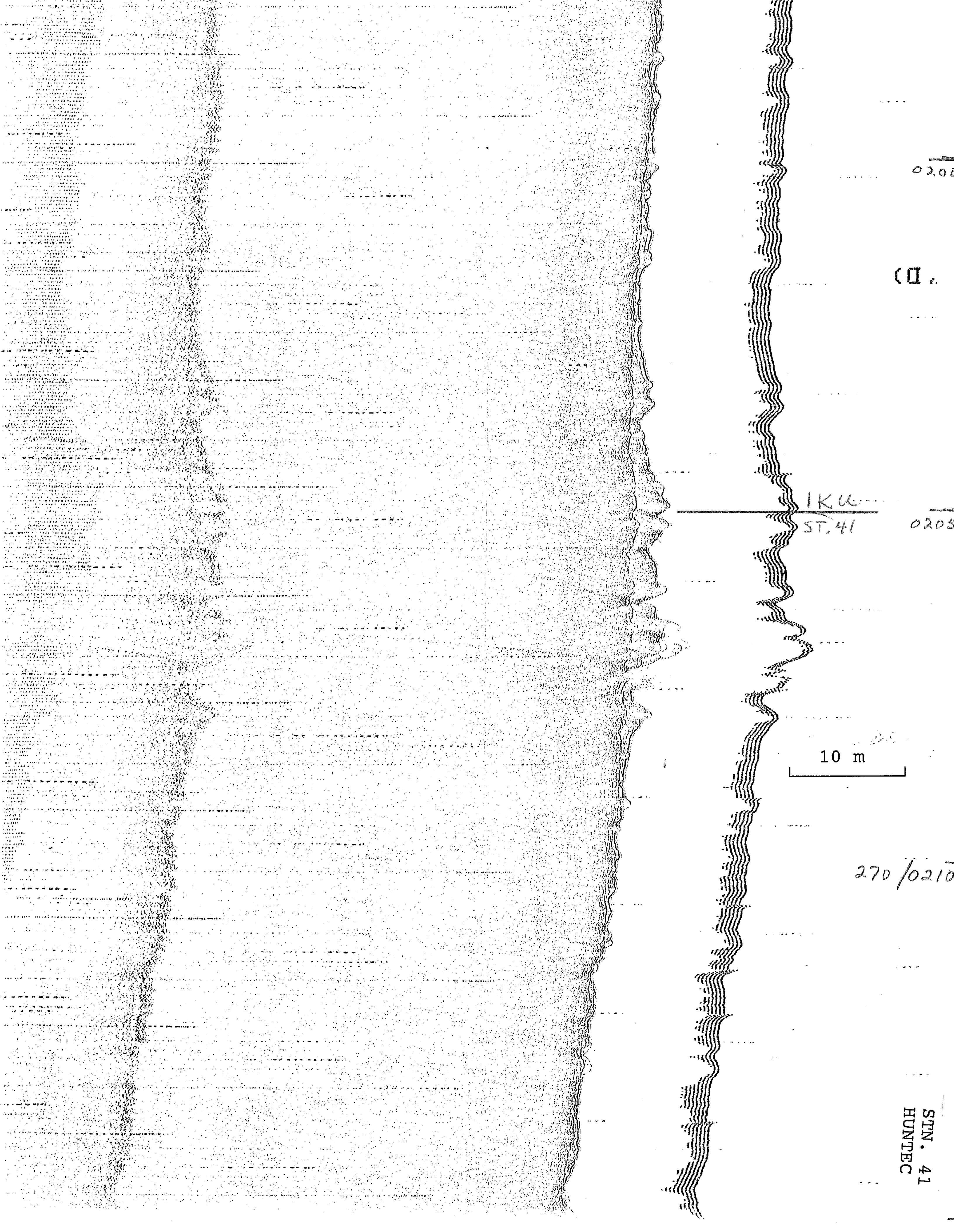

STN. 39
3.5 kHz
Missed target on plateau
1640
1645
1650
1655
IKU39
305/1700
93039
10 M
1 km
0-100 fthms

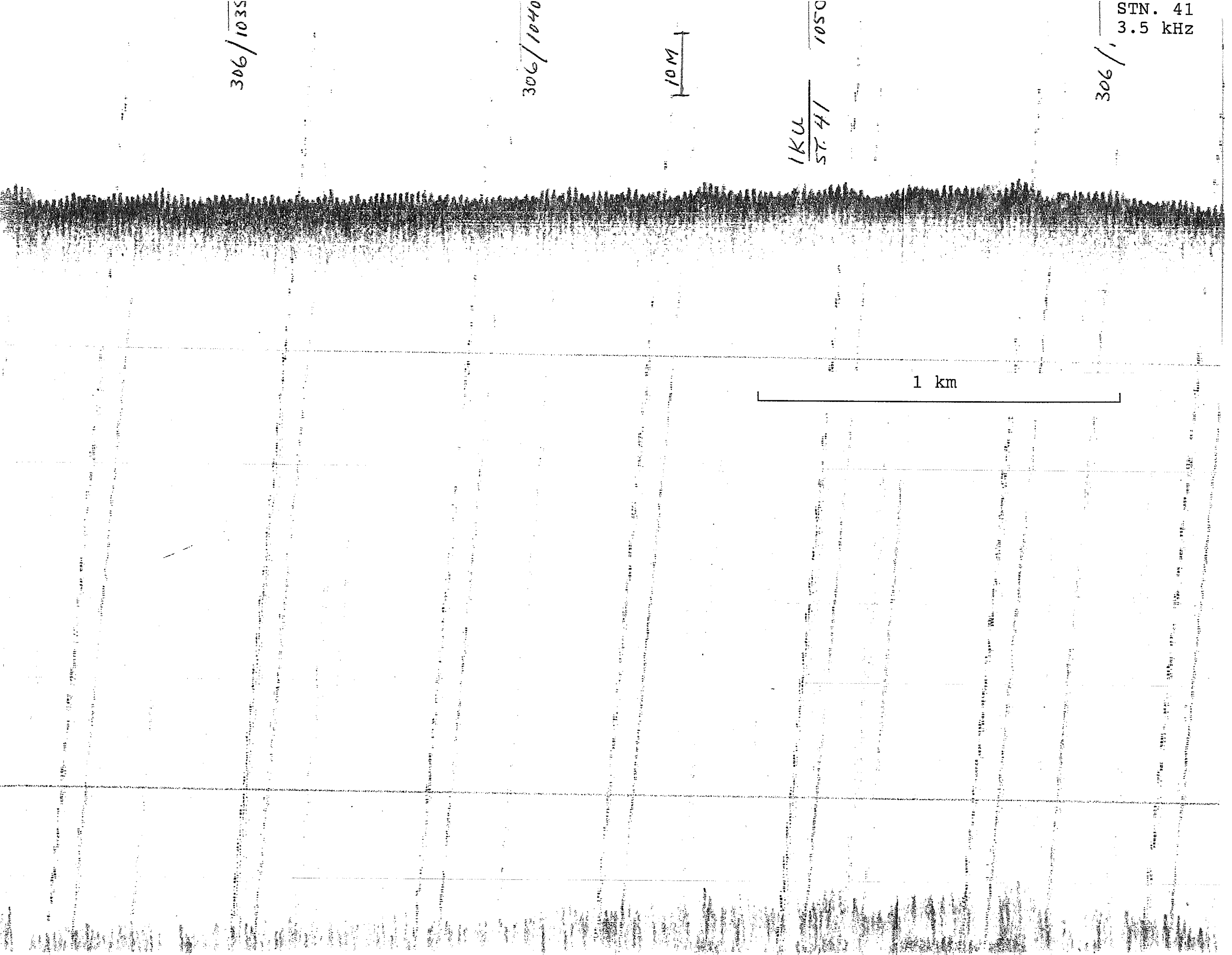


0210
IK439
1 KM
0215
10 M
0220
STN. 39
HUNTEC


268/1650
90023
1 km
1655
10 M
IKU 40
268/1700
90023
STN. 40
HUNTEC


305/1900
1905
1910
43054
1915
STN. 40
3.5 kHz
19
1 KM
10 M
Station IKU 40


0205
ST. 41
10 m
270/0210
STN. 41
HUNTEC



306/1035
306/1040
10M
1KU
ST. 41
1050
306/1
STN. 41
3.5 kHz
1 km