CRUISE REPORT

CSS HUDSON CRUISE 90-023

MARINE GEOLOGICAL INVESTIGATIONS IN HUDSON STRAIT, UNGAVA BAY, AND FROBISHER BAY

B. MacLean, G. Vilks, A. Aitken, H. Boudreau, W. Briggs, D. Bruneau, A. Doiron, D. Durham, I. Hardy, W. Mode, R. Powell, M. Retelle, J. Stravers, A. Taylor, V. Allen.

Atlantic Geoscience Centre
Geological Survey of Canada,
Bedford Institute of Oceanography,
Dartmouth, N.S.

GEOLOGICAL SURVEY OF CANADA OPEN FILE 2372

1991

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ILLUSTRATIONS

TABLES

GENERAL INFORMATION

Cruise Designation: 90-023

Vessel: CSS Hudson

Dates: Sept. 18 - Oct 22, 1990.

Program Area:

The cruise commenced at Iqaluit and ended at BIO (Fig. 1).

The program principally was in Hudson Strait/Ungava Bay (Sept. 23 - Oct. 16), and also included: studies in Frobisher Bay and offshore from Hall Peninsula (Sept. 18 - 23 [J. Stravers et al.]); core stations in Resolution Basin (J. Andrews, INSTAAR) and in northern Hudson Bay (H. Josenhans, AGC); and other studies in Wakeham Bay, Deception Bay, and in the Charles Island region (D. Bruneau - J. Gray).

Other cruise participants were involved in various facets of the investigations in these areas and in onboard data analyses. Individuals responsible for these various aspects were: A. Aitken, W. Briggs, A. Doiron, I. Hardy, W. Mode, and A. Taylor.

Stations on the Labrador continental slope (K. Moran, AGC and C. Hillaire-Marcel, UQUAM) were occupied but could not be completed due to sea conditions.

Exchange of some personnel took place at Wakeham Bay on Oct. 4, and at Cape Dorset on Oct. 12.

Responsible Agency:

Atlantic Geoscience Centre (Cruise was a joint program, organized by AGC and conducted in collaboration with researchers from Terrain Sciences (GSC), Centre Geoscientifique de Quebec (GSC), Bates College, Northern Illinois University, Queen's University, University of Colorado, University of Montreal, University of Wisconsin).

Ship's Master: Captain L. Strum

Senior Scientist: Brian MacLean

Second Scientist: Gus Vilks

Participating Personnel:

A. Aitken	Queen's University
V. Allen[3]	Terrain Sciences, GSC, Ottawa
H. Boudreau[2]	Canadian Hydrographic Service
A. Boyce	Atlantic Geoscience Centre, GSC
W. Briggs	University of Colorado
D. Bruneau	University of Montreal
B. Chapman	Atlantic Geoscience Centre, GSC
A. Doiron[3]	Centre Geoscientific de Quebec
D. Durham	Atlantic Geoscience Centre, GSC
M. Escamilla[3]	Northern Illinois University
G. Fenn	Atlantic Geoscience Centre, GSC

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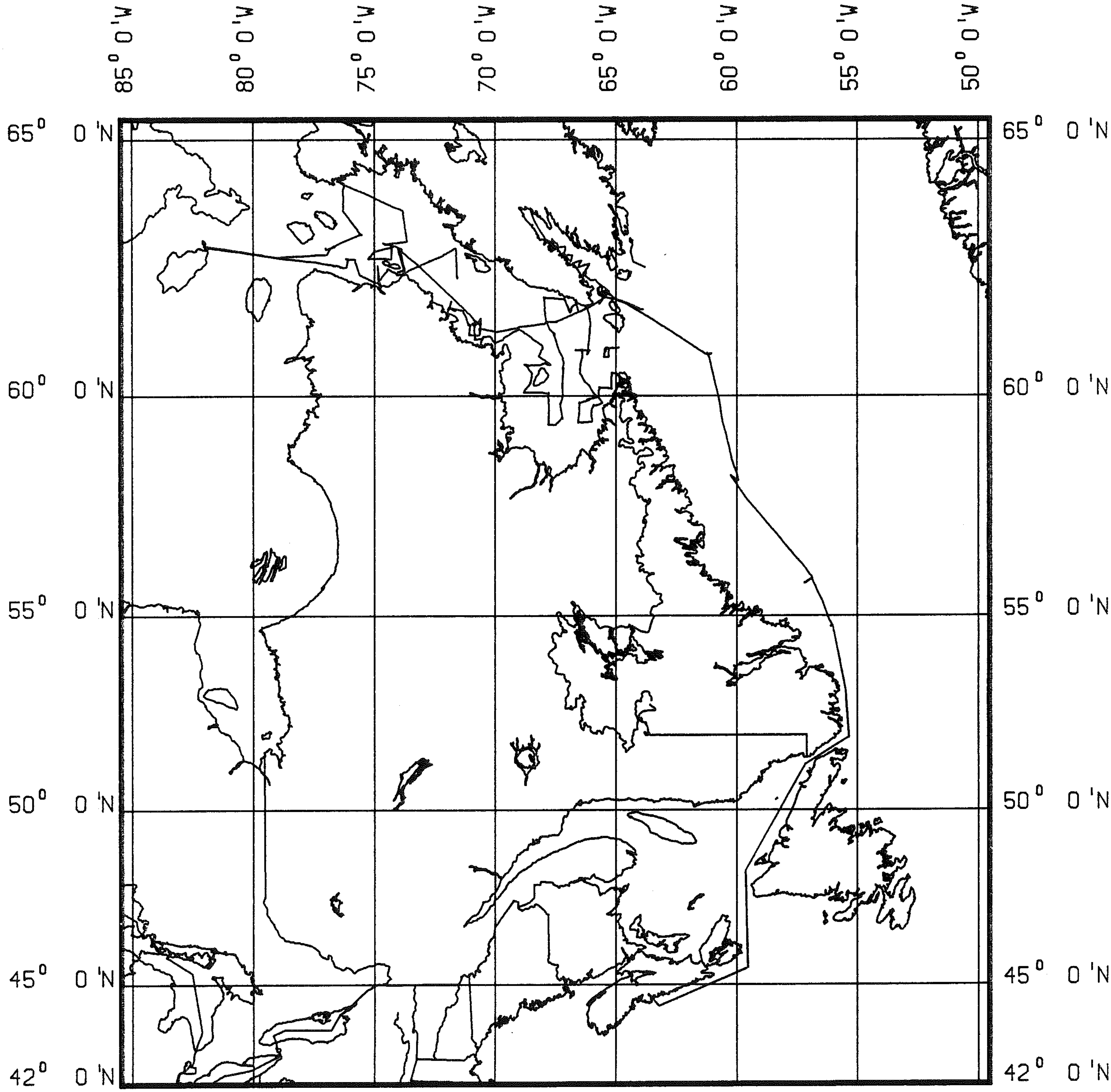
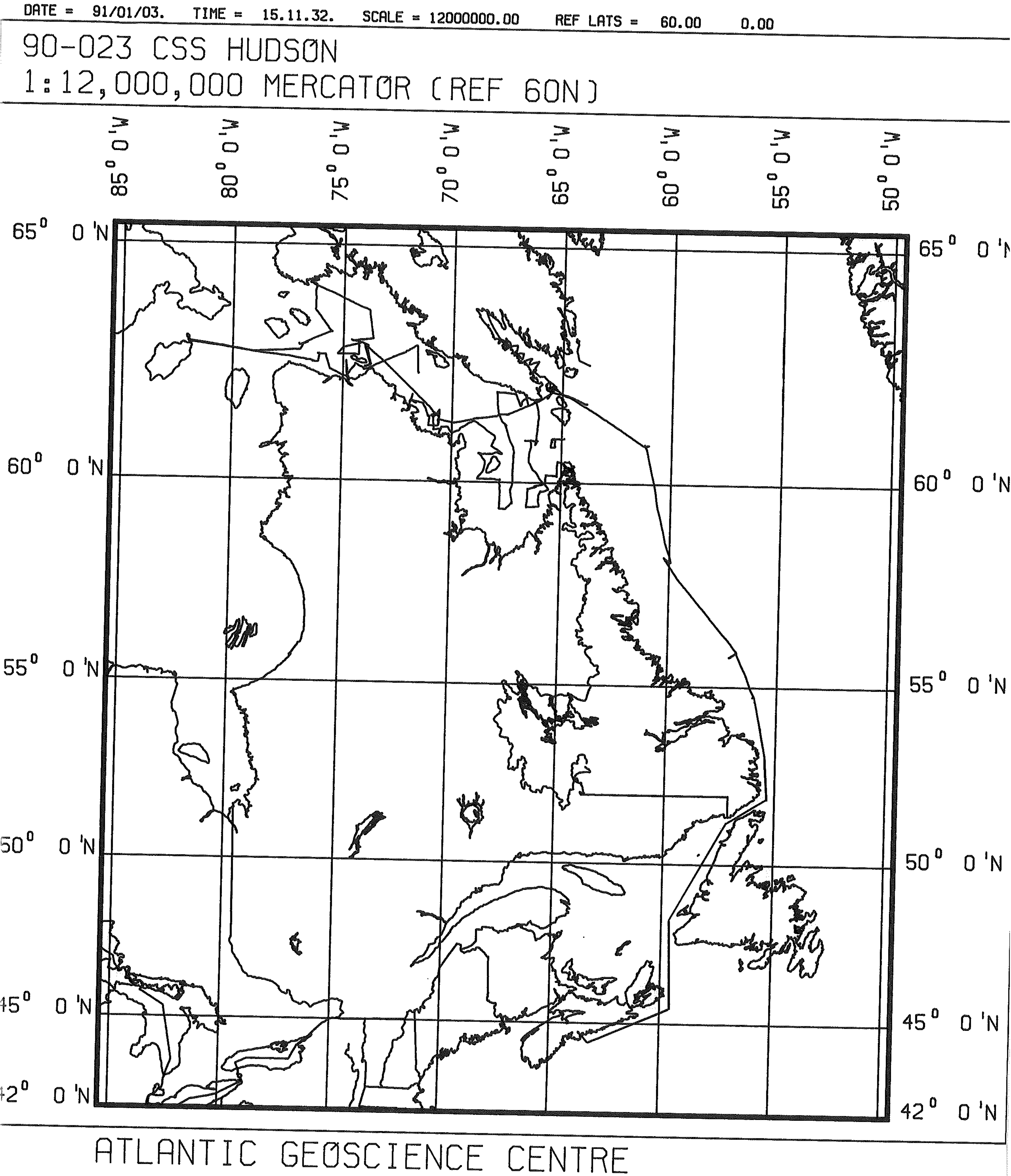


ATLANTIC GEØSCIENCE CENTRE

Fig. 1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75° 0'W
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65° 0'W
60° 0'W
55° 0'W
50° 0'W
65° 0'N
60° 0'N
55° 0'N
50° 0'N
45° 0'N
42° 0'N
ATLANTIC GEØSCIENCE CENTRE

Fig. 1

I. Hardy	Atlantic Geoscience Centre, GSC
R. Howie[1]	Atlantic Geoscience Centre, GSC
B. MacLean	Atlantic Geoscience Centre, GSC
J. Miner[1]	Northern Illinois University
W. Mode[3]	University of Wisconsin
R. Murphy	Atlantic Geoscience Centre, GSC
P. Potter[2]	Atlantic Geoscience Centre, GSC
R. Powell[3]	Northern Illinois University
M. Retelle[1]	Bates College
R. Sparkes[1]	Atlantic Geoscience Centre, GSC
G. Standen	Seachem/Star Ltd.
J. Stravers[3]	Northern Illinois University
A. Taylor[3]	Terrain Sciences, GSC, Ottawa
G. Vilks	Atlantic Geoscience Centre, GSC
N. Weiner	University of Colorado

[1]Iqaluit to Wakeham Bay
[2]Wakeham Bay to BIO
[3]Iqaluit to Cape Dorset

CRUISE OBJECTIVES

Frobisher Bay region

Primary objectives were to obtain information on the glacial and climatic history of this region, and data on marine sediment transfer and accumulation rates by means of acoustic profiling and analyses of samples from Late Quaternary marine sequences.

Hudson Strait/Ungava Bay

Hudson Strait is a key region for studies of events and conditions at the northeast margin of the Laurentide Ice Sheet. It was a distributary route for ice from Hudson Bay, northern Quebec, and from Baffin Island, and it has been postulated as a major meltwater discharge route. The cruise was undertaken to investigate the record of glacial/deglacial/postglacial events, conditions, and environments contained in the sediments in various parts of the Strait and Ungava Bay.

Specific objectives included collection of data relating to:

a) extent, occurrence and retreat of Laurentide ice;
b) the postulated late readvance of Ungava/Labrador ice;
c) postulated meltwater discharge; and possible presence of a ice dammed lake in the western part of the Strait;
d) extent, trends, age, onshore relationships of moraine offshore in Cape Hopes Advance - Wakeham region, and moraines offshore Lake Harbour;
e) the chronology of events;
f) onshore/offshore relationships;
g) depositional environments;
h) paleoceanography;
i) erosion and deposition by debris flow/slump events;
j) proxy data from the above pertaining to global change.

The studies are a follow-up and extension to previous shipborne reconnaissance surveys and to various onshore programs that have been carried out in the region.

METHODS

Sediment samples were obtained principally with the large AGC piston corer (9.916 cm I.D.), box corer, and IKU clam shell and Van Veen grab samplers.

Measurements of in situ temperature and pore pressure were conducted at selected stations by means of an instrumented "smart" core cutter on the piston core (A. Taylor and V. Allen) (see Appendix B).

Vertical plankton tows provided data on modern microfaunal populations within the water column.

Acoustic stratigraphic data were obtained with a Huntec deep towed high resolution seismic reflection system fitted with internal and towed hydrophones, a hull-mounted 3.5 kHz sub-bottom profiler, and a single channel shallow seismic reflection system using a small compressed air source and a Nova Scotia Research Foundation hydrophone. These provided information relating to both the Quaternary sediments and underlying bedrock. Systems components and settings are detailed in Table 1.

Bedford Institute of Oceanography sidescan sonar (Table 1) and Umel camera systems provided additional information on sediments, morphology, and modifying influences at the immediate seabed.

Magnetometer measurements provided additional data on the bedrock underlying parts of Hudson Strait and Ungava Bay.

The launch "Dunlin" was used for nearshore geological surveys in Watts Bay, York Sound, and in Deception Bay. Acoustic systems included a Datasonics Bubble Pulser boomer with NSRF and Benthos hydrophones, Elac echosounder, and a Klein 401 sidescan sonar. Sediment grab samples were obtained by means of a small Van Veen sampler. A coreliner corer intended to collect short cores was unusable due to mechanical problems. Launch positioning was by radar and compass. Problems were encountered initially with the acoustic systems due in part to remobilizing from the launch "Grebe" after it was rendered unserviceable in an accident as Hudson was leaving Halifax.

Laboratory processing and measurements on sediment cores and samples were carried out onboard Hudson. (See Appendices III - XII by A. Aitken, W. Briggs, D. Durham, A. Doiron, I. Hardy who organized these activities, W. Mode, J. Stravers, A. Taylor, and G. Vilks for greater detail). All piston cores, box cores and IKU push-samples were processed on board. Processing and measurements included thermal conductivity, magnetic susceptibility, core splitting, sediment description, core photography, physical property measurements, and subsampling that included: microfossils, palynology, texture, chronology, water content/bulk density, gas, and on selected cores subsamples for: paleomag, ostracods, diatoms, TL, and consolidation studies. It was not possible to x-ray sediment samples onboard. This will be part of the post-cruise laboratory analyses.

Bulk samples from box cores, IKU, and Van Veen grabs were washed and sieved to provide data on gravel lithologies (A. Doiron, Appendix D).

Seabed surface and subsurface biota were collected from grab and box core samples (A. Aitken, Appendix E).

NAVIGATION

Navigational positioning (H. Boudreau, Appendix F) utilized Navstar GPS, Loran-C, and log and gyro integrated through BIONAV.

Table 1. Acoustic Systems Equipment

Lab Equipment Set-up Specifications:

Seismics

Raytheon 1811
Sweep = 1.0 seconds
Airgun firing rate = 4.0 seconds
40 in^3 Sleeve gun on a 20" Norwegian Float
N.S.R.F. LT-18 Streamer on side boom, port
Filtered 60-1500 Hz, 40 db gain added

Huntec D.T.S.

AGC #2 with 2nd adaptive processor
EPC 4100 x 2 each - S/N 317 & 181
Boomer firing rate = 0.75 sec.
Boomer power = 4 Kvolts (app. 400 joules)
Bottom tracking (adaptive) TVG to max. 4 volt level
Two vehicle heave compensated in pressure mode
Internal hydrophone filtered - 0.5 to 10 kHz
External hydrophone filtered - 0.5 to 10 kHz

BIO Sidescan Sonar

Transducers: SP152TT --> 800 watts --> -8° angle
Transceiver: EDO Western 248E
Range (Firing): 1 sec. = 750 metres = 1.5 km swath
Klein 521 graphic recorder - paper rate = 30 1/cm
scale line each 75 m
taped time marker each 5 minutes

Automatic Graphic Annotation

Technical Survey Services Model 312B-S/N 040
External Event - each 5 min. from seismics clock/timing unit
channel 1 - Hull Profiler 3.5 kHz data on EPC 4100
channel 2 - Seismics data on LSR 1811 in series
channel 3 - BIO Sidescan on Klein 521 recorder
channel 4 - Huntec DTS data on two EPC 4100 recorders

TEAC XR5000 Multitrack VHS Cassette Recorder

S/N 723346
Tape speed = 2.4 cm/sec
T120 tape = 2 hr. 52 min.
ID code every 4 seconds in TIME CODE priority
Search for file #0006 - Title: HUDSON 90-023 for recording conditions on tape with time and tape counter (0.1 m)

Recording Conditions:

Cha. #	Data	Mode	Input Range	Input Zero	Output Level	Output Zero	Filter Type	Band #
1	Flt'd Seismics NSRF	DR	1-3v		5v			
2	Seismics Trigger	FM	3.0v	+000%	5v	0v	LP	7
3	Raw 25' SE eel Seismics	DR	0-1v		5v			
4	DTS Internal Signal	DR	0.3v		2v			
5	DTS Trigger/Sync.	DR	0.5v		5v			
6	DTS External Signal	DR	0.7v		2v			
7	ORE 3.5 kHz Trigger	FM	3.0v	+0%	2v	+0%	FA	0
8	ORE 3.5 kHz Data	DR	0.5v		5v			
9	(N/C)	FM	10v	+0%	2v	0%	FA	0
10	BIOSSS - Port	FM	3.0v	-099%	2v	+100%	FA	0
11	BIOSSS - Trigger	FM	3.0v	+000%	5v	0v	LP	7
12	BIOSSS - Starboard	FM	3.0v	-099%	2v	+100%	FA	0
13	ID Code	FM	5.0v	+000%	5v	0v	LP	7
14	DTS - Zero Trigger	FM	3.0v	+000%	5v	0v	LP	0
15	DR - Voice Memo from Mike - each 1 hr.							

TEAC System Set-up:

* 1. Tape servo ch.: Data
2. Ch. 13 memo read: Off
3. Inhibit on rec.: On
4. Erase: On
* 5. FM band select: Hi Band
6. I.D. code format: 5000
7. Reverse rec.: Off
* 8. Reset initialize: 1
9. Power fail restart: 0
10. Power SW. off mode: 2
11. Cal switch mode: 0
12. Tape remain: min
13. Beep tone: on

Bandwidth for DR mode is 100 Hz to 4.69 kHz - S/N = 28 db
Bandwidth for FM mode on high band is: DC to 2.5 kHz - 5N = 33 db
Carrier frequency = 259.2 kHz

GPS, the primary positioning system, was used approximately 20 hours per day. Very good repeatability of the navigational positioning was demonstrated on coring station site surveys.

ICE CONDITIONS

Icebergs were occasionally seen in Hudson Strait and Ungava Bay, but pack ice only was encountered in the vicinity of Coats Island in northern Hudson Bay.

STUDIES AND RESULTS

Tracks and stations in the principal cruise study areas are illustrated in Figures 2 and 3. The cruise comprised two complementary segments. Part one, Sept. 18-23 was coordinated by Jay Stravers and was concerned with studies of the Quaternary sediments in Frobisher Bay and seaward of Hall Peninsula (Fig. 4 and 5). Part two, Sept. 23 - Oct. 16, was principally concerned with studies of Quaternary geology and history of Hudson Strait and Ungava Bay. The Quaternary history of areas one and two is in part interrelated, and both areas are of interest to many of the cruise participants who previously have pursued studies of the geology onshore and offshore in this region.

Investigative techniques employed during the cruise were basically similar in both segments. These included profiling with acoustic systems from Hudson to examine the regional distribution of sediments and their inter-relations and to select sample localities. Sediment sample collection mainly was by means of piston coring, supplemented by box coring and by grab sampling (Table 2). Launch-borne surveys and sampling with small systems were conducted in Watts Bay and York Sound in Frobisher Bay and in Deception Bay in Hudson Strait (Fig. 3, 4).

The cruise studies represent a collaborative program among the various participants. Table 3 lists the principal scientific participants and fields of specific research.

Preliminary results of the investigations are outlined in the following section.

<u>Frobisher Bay and Hall Peninsula Region</u>

prepared by: Jay A. Stravers, Department of Geology, Northern Illinois University, DeKalb, Illinois, U.S.A., 60115

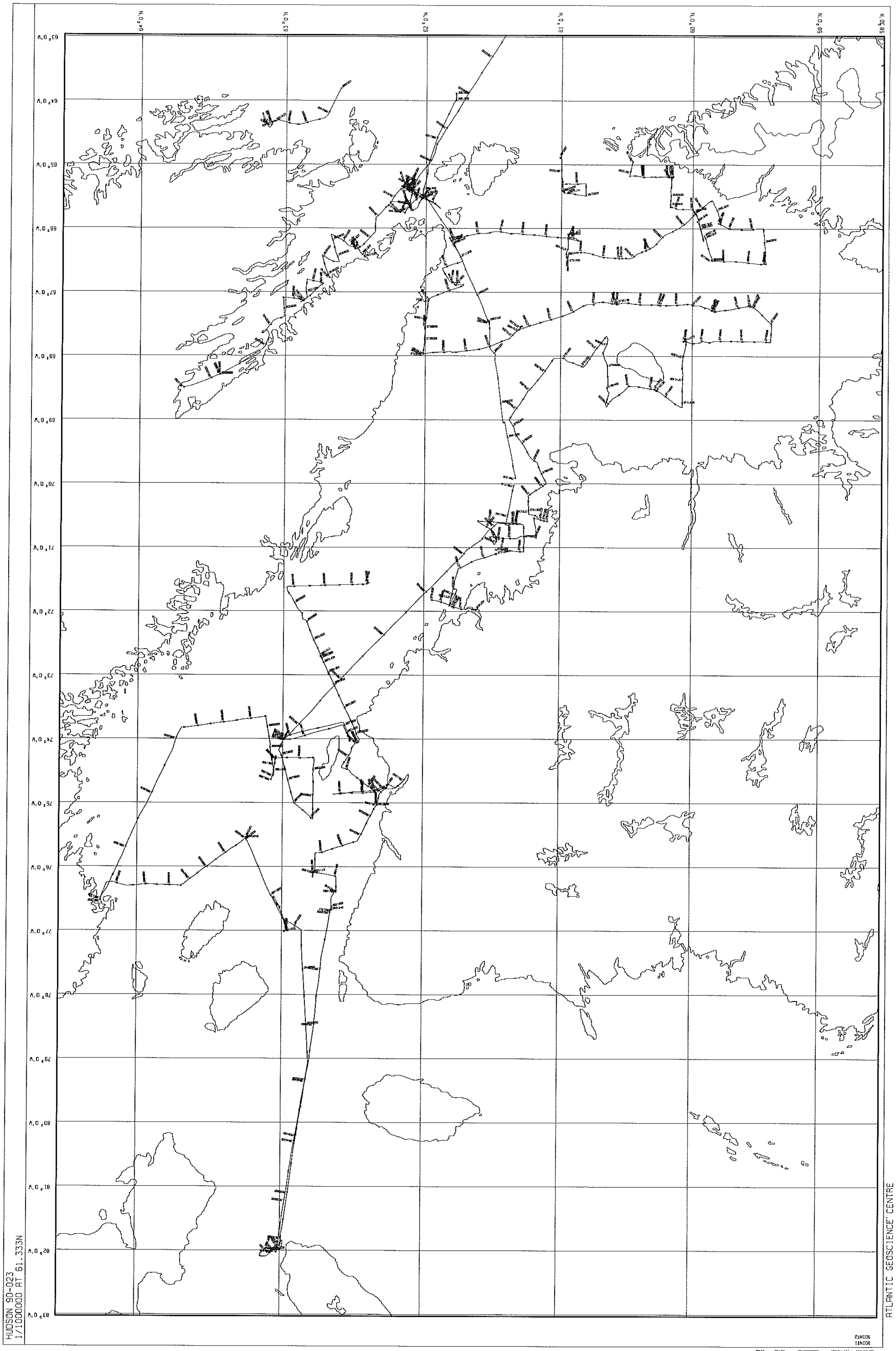
Investigations in Frobisher Bay and approaches were designed to obtain additional data on the glacial and climatic history, and information relating to sediment transfer and accumulation rates for project SEDFLUX.

Seismic Data

Over 500 km of shallow single channel seismic reflection and Huntec high resolution seismic lines were run between day 262/0314 and day 266/1120 (Figs. 3 and 4). In Frobisher Bay, the seismic data were collected in order to determine the following:

1. To further define the glacial and postglacial stratigraphic sequence.
2. To define the areal distribution of marine sediments.
3. To quantify the volume of marine sediment that has accumulated under glacial and postglacial conditions.

Marine sediments are relatively thin (generally <20 m) and discontinuous over the region of central Frobisher Bay. They have accumulated mainly in isolated basins within a bedrock trough along the margin of the Everett Mountain escarpment (southwestern shore of the bay) and to the northeast of the Grinnell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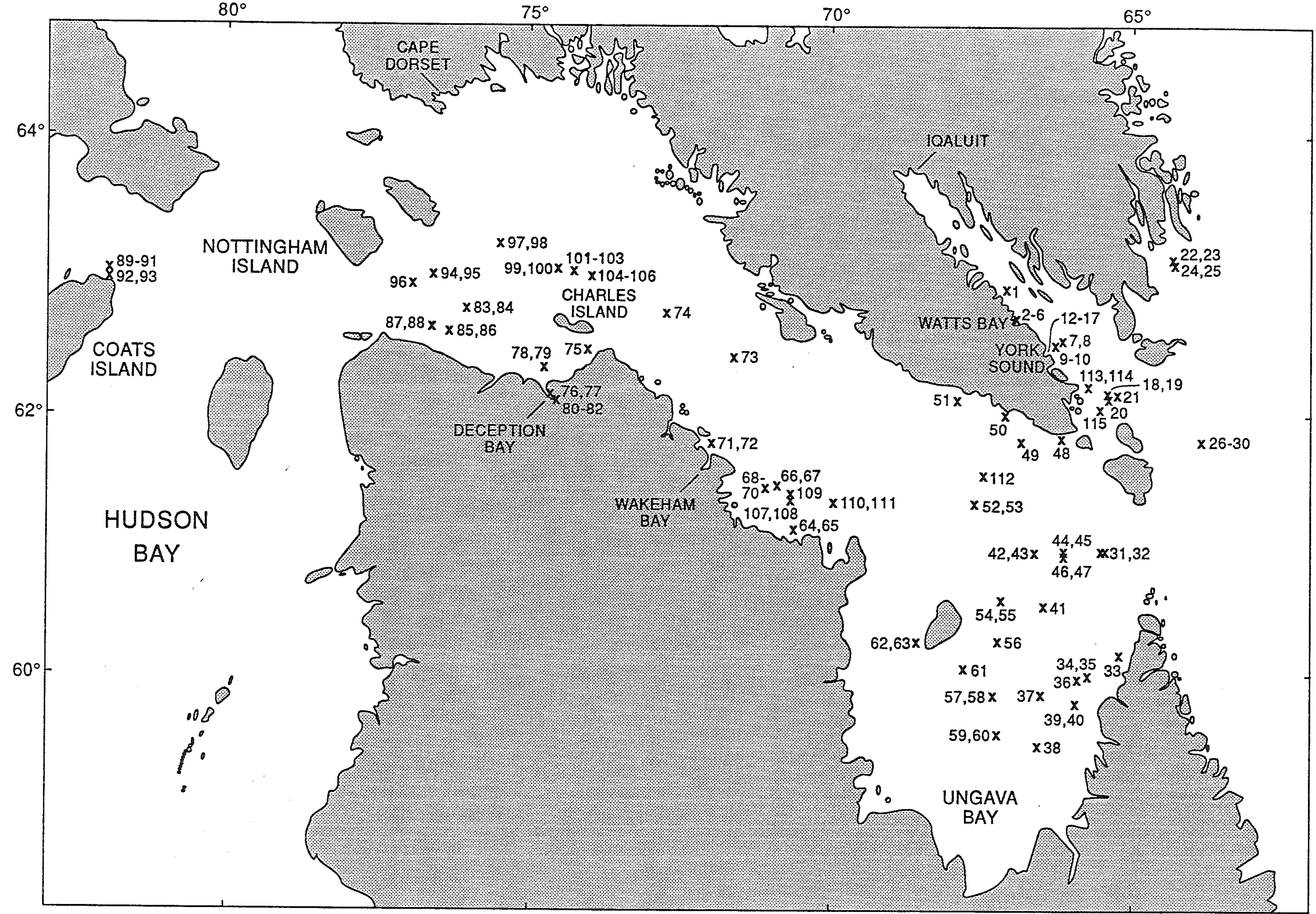
ATLANTIC GEOSCIENCE CENTRE

Fig. 2


80°
75°
70°
65°
64°
62°
60°
CAPE DORSET
IQALUIT
NOTTINGHAM ISLAND
COATS ISLAND
CHARLES ISLAND
DECEPTION BAY
WAKEHAM BAY
WATTS BAY
YORK SOUND
HUDSON BAY
UNGAVA BAY
89-91
92,93
96
94,95
97,98
99,100
101-103
104-106
83,84
87,88
85,86
74
73
78,79
75
76,77
80-82
71,72
68-70
66,67
109
107,108
110,111
64,65
1
2-6
12-17
7,8
9-10
113,114
18,19
21
20
115
22,23
24,25
26-30
51
50
49
48
112
52,53
42,43
44,45
46,47
31,32
54,55
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62,63
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61
34,35
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57,58
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39,40
59,60
38

Fig. 3

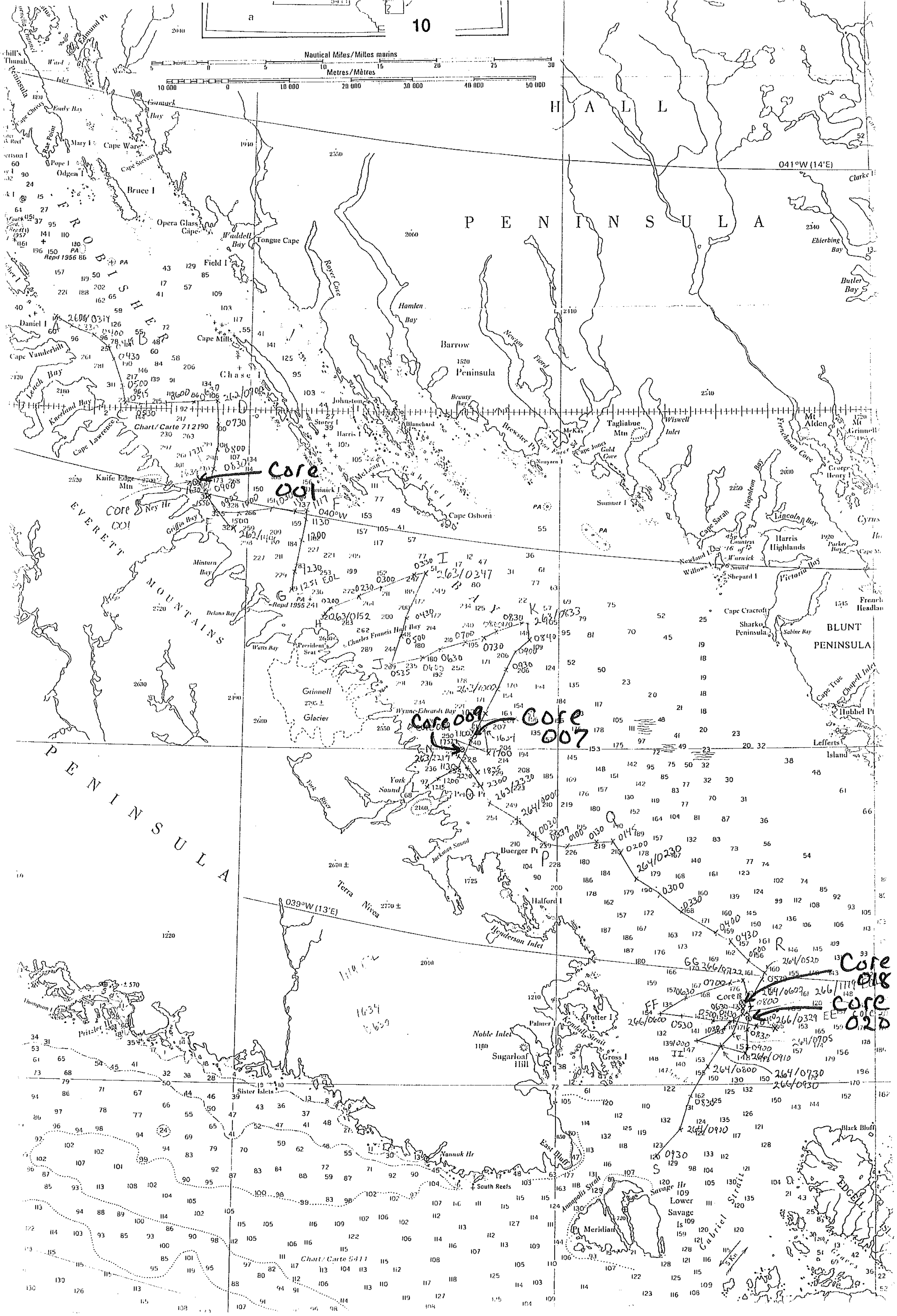
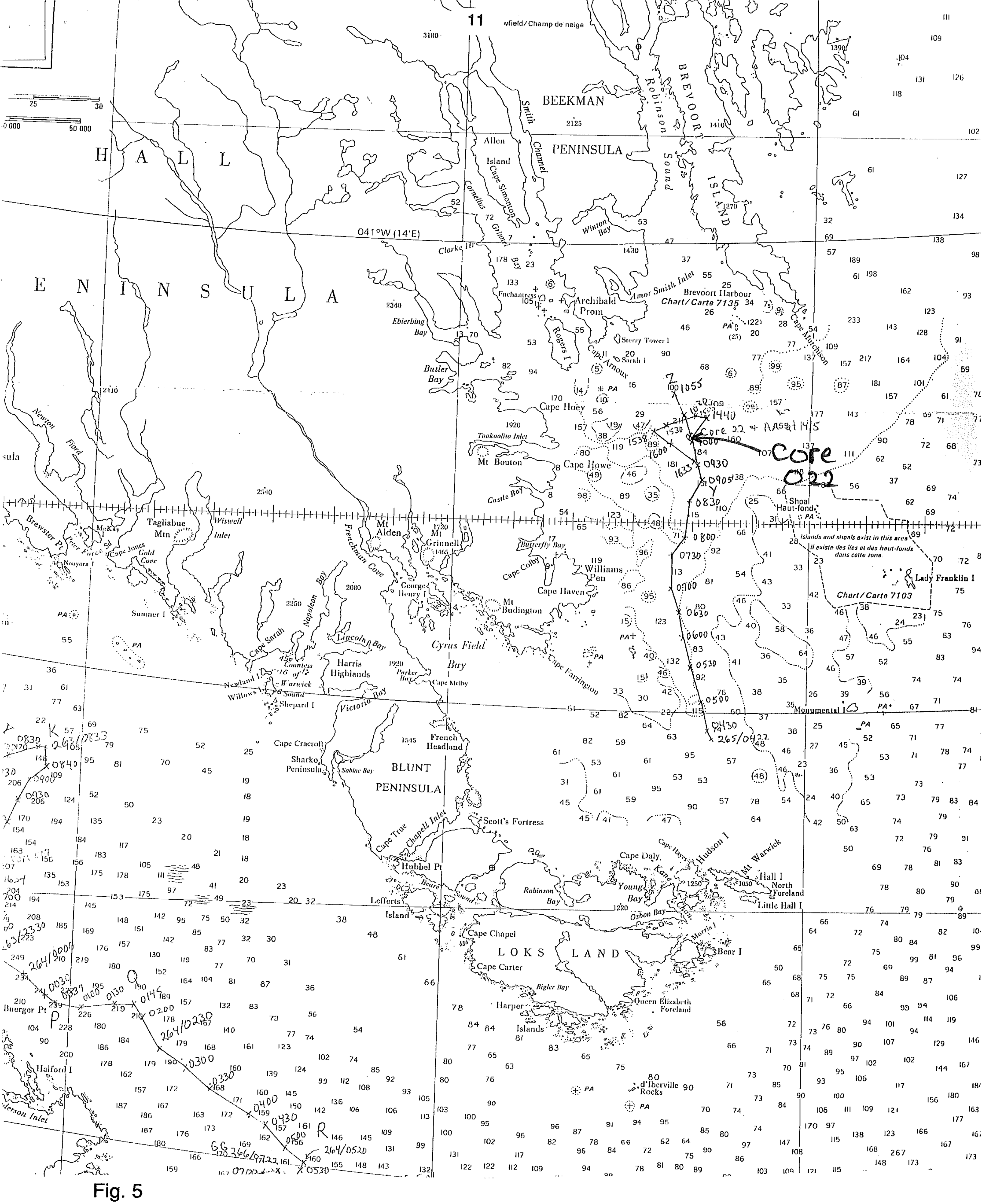

10
Nautical Miles/Milles marins
Metres/Mètres
HALL PENINSULA
FROBISHER
EVERETT MOUNTAINS
PENINSULA
Barrow Peninsula
BLUNT PENINSULA
041°W (14'E)
040°W
039°W (13'E)
Chart/Carte 7121
Chart/Carte 5411
Cape Vanderbilt
Leach Bay
Kneeland Bay
Cape Lawrence
Knife Edge Mtn
Ney Hr
Griffin Bay
Cape Mills
Chase I
Tongue Cape
Waddell Bay
Opera Glass Cape
Field I
Bruce I
Odgen I
Cape Ware
Johnston
Storey I
Harris I
Dominick I
Cape Osborn
Hamlen Bay
Tagliabue Mtn
Wiswell Inlet
Mt Alden
Frenchman Cove
Sumner I
Cape Sarah
Lincoln Bay
Harris Highlands
Newland I
Willows I
Shepard I
Cape Cracroft
Sharko Peninsula
Sabine Bay
Victoria Bay
Cape True
Hubbel Pt
Lefferts Island
Minturn Bay
Delano Bay
Watts Bay
President's Seat
Charles Francis Hall Bay
Grinnell Glacier
Wynne-Edwards Bay
York Sound
York River
Peter Pt
Jackman Sound
Buerger Pt
Halford I
Henderson Inlet
Terra Nivea
Potter I
Kendall Strait
Gross I
Noble Inlet
Sugarloaf Hill
Palmer
Pritzler Hr
Sister Islets
Nannuk Hr
South Reefs
East Bluff
Annapolis Strait
Pt Meridian
Savage Hr
Lower Savage Is
Gabriel Strait
Black Bluff
EDGELL
Core 001
Core 009
Core 007
Core 018
Core 020
Repd 1955
Repd 1956

Fig. 4



11
HALL PENINSULA
BEEKMAN PENINSULA
BREVOORT ISLAND
Robinson Sound
Smith Channel
Allen Island
Cape Simonton
Cornelius Grinnell Bay
041°W (14'E)
Clarke Hr
Winton Bay
Amor Smith Inlet
Brevoort Harbour
Chart/Carte 7135
Archibald Prom
Enchantress
Ebierbing Bay
Rogers I
Sterry Tower I
Sarah I
Cape Arnoux
Cape Murchison
Butler Bay
Cape Hoey
Tookoolito Inlet
Mt Bouton
Cape Howe
Castle Bay
Core 22
Core 022
Shoal Haut-fond
Islands and shoals exist in this area
Il existe des îles et des haut-fonds dans cette zone.
Lady Franklin I
Chart/Carte 7103
Newton Fiord
Brewster Pt
McKay I
Peter Force Sd
Cape Jones
Tagliabue Mtn
Gold Cove
Wiswell Inlet
Summer I
Mt Alden
Mt Grinnell
Frenchman Cove
George Henry I
Butterfly Bay
Cape Colby
Williams Pen
Cape Haven
Mt Budington
Napoleon Bay
Cape Sarah
Lincoln Bay
Countess of Warwick Sound
Harris Highlands
Parker Bay
Cape Melby
Cyrus Field Bay
Cape Farrington
Newland I
Willows I
Shepard I
Victoria Bay
Monumental I
Cape Cracroft
Sharko Peninsula
Sabine Bay
French Headland
BLUNT PENINSULA
Scott's Fortress
Cape True
Chapell Inlet
Hubbel Pt
Beare Sound
Lefferts Island
Robinson Bay
Young Bay
Cape Daly
Kane
Cape Hayes
Hudson I
Mt Warwick
Hall I
North Foreland
Little Hall I
Osbon Bay
Cape Chapel
LOKS LAND
Cape Carter
Morris I
Bear I
Bigler Bay
Harper Islands
Queen Elizabeth Foreland
Buerger Pt
Halford I
d'Iberville Rocks

Fig. 5

ice cap. Farther south they become much more continuous from the region of York Sound outward to the continental shelf.

A detailed survey of the trough extending northeastward from York Sound was also conducted and a continuous sequence of stratified sediment originating from the sound was documented. Track lines include both longitudinal and transverse profiles (Fig. 4) which may be used to define the three dimensional distribution of seismic facies and to determine sediment volume for the York trough system.

Just east of the southeastern tip of Meta Incognita Peninsula, a significant late glacial sedimentary basin was discovered (the Savage Basin). The southern margin of the basin consists of a thick complex sequence (locally up to 120 m) of glacial drift which thins and differentiates northward into two "till tongues". These are observed to interbed with stratified sediments within the basin proper. Sediment transport is to the northeast, consistent with the known late glacial ice flow out of Hudson Strait. Seismic coverage, within and surrounding the basin, includes several crossing track lines which will enable us to model the sedimentary facies distribution in three dimensions.

To the east of Hall Peninsula, the seismic data were collected in a search for sedimentary basins that have been protected from iceberg scours (Fig. 5). The seabed is generally devoid of sediment in this region with the important exception of a small, but undisturbed basin to the south of Beekman Peninsula (near the northern end of the survey track on Figure 5). Two morainal deposits were also discovered just to the south and they appear to be the source for the lower sediments within the basin.

Core Data

Coring operations in this region met with mixed results. Core 001 (Fig. 4) consists of 17 m of silts and clays deposited in one of the thicker basins of the Frobisher Bay trough. A portion of the lower core however was disturbed by suck up.

Core 007 was taken off the mouth of York Sound but outside of the York trough. It is short (243 cm), but contains an impressive array of large clasts ranging up to cobble size. Orientations within the core were measured in order to determine if the clasts originated as dropstones or were deposited as a debris flow.

Core 009 consists of stratified sands, silts, and clays retrieved from York trough. These may represent a record of distal deltaic sedimentation related to the late and postglacial sediment flux from the York River.

Cores 018 and 020 were retrieved from the Savage Basin and consist of up to 5 m of angular sands devoid of any fine fraction. The sand cover appears to blanket the entire basin (as seen on the Huntec records) and prohibits corer penetration to the underlying stratified sediments. Although the cores are of very limited stratigraphic use, the seismic stratigraphy is probably correlative to a detailed glacial chronology developed from nearby onshore raised marine sections.

Core 022 was retrieved from the basin east of Hall Peninsula and consists of bioturbated muds with evidence for anoxic bottom water conditions. Paired and single bivalves as well as marine mollusc fragments are present throughout the entire core with the exception of the base which is also devoid of foraminifera. The basal sediments were probably deposited during the last occurrence of glacial ice across this portion of the continental shelf. According to current ice flow models, these sediments may represent late Foxe/Wisconsinan glacial maximum deposits and as such should contribute greatly to the development of a more complete glacial chronology for the region.

Hudson Strait and Ungava Bay Phase

prepared by: Brian MacLean, Atlantic Geoscience Centre, Geological Survey of Canada

Acoustic Profile Data

Surveyed tracks in Hudson Strait and Ungava Bay (Fig. 2) were designed to improve the regional geological knowledge relating to character, extent, and relationships of the sediment units, and to obtain more site specific data for sample localities, and locally, more detailed data on specific geological features.

Data obtained indicate that the main accumulations of Quaternary sediments are in the three main basins in Hudson Strait: the eastern basin lying north of Ungava Bay; and two basins in the west, lying north, and southwest of Charles Island, respectively; locally in bays and fiords along the south coast of the Strait; and in the channel marginal to the central plateau in southern and western Ungava Bay.

Sediments in the three main basins which were recognized by reconnaissance surveys and initially sampled during cruise 85-027 comprise glacial, glaciomarine and postglacial units. Sediment accumulations reach 130 m in thickness in the eastern basin and in the western basin north of Charles Island. Similar units are present in the basin southwest of Charles Island. Glaciomarine sediments, which constitute 14 m of that section, laterally are partly transitional to, and interfinger with glacial drift which thickens to 60 m to the west.

In Ungava Bay south of the central plateau glaciomarine and postglacial sediments infill depressions and drape over intervening bedrock highs. Sediment thickness in the depressions commonly is in the order of 20 - 30 m but locally reaches 60 m. Sediments displaying complex structural and depositional styles that include apparent deltaic and slump deposits locally unconformably overlie inferred glaciomarine sediments in the channel bordering the platform in the eastern part of this region.

Glaciomarine and postglacial sediments also fill bedrock depressions southwest and west of Akpatok Island. Sediment thickness is in the order of 15 - 20 m. Glaciomarine sediments there are transitional in places to acoustically unstratified sediments that represent either glacial drift or iceberg turbate.

Thick sediment sequences were also found in Wakeham Bay and Deception Bay on the south coast of Hudson Strait. The Wakeham section comprises up to 50 + m of glacial drift, glaciomarine, and postglacial sediments, whereas the section in Deception Bay while attaining an approximately similar total thickness, appears from the acoustic data to consist mainly of glaciomarine and postglacial sediments, with the former being predominant.

The thicker sediment deposits in southern parts of the Strait and Ungava Bay, in comparison to those on the north side of the Strait suggest their derivation from longer persisting glacial ice to the south together with some later sediment input from the numerous rivers that flow into that region.

Preliminary copies of high resolution seismic profiles across coring localities (Appendix K) illustrate the seismic stratigraphy in the various basin areas.

Sediments in Hudson Strait between the basins are very thin in the region southeast of Big Island, and elsewhere, though thicker, consist of sediments that appear on the basis of acoustic data and preliminary examination of samples to mainly comprise glacial drift, and possibly some marine sediments that subsequently were overridden by glacial ice. Iceberg turbate may be represented.

Sidescan sonar imagery obtained in accessible water depths (<200m) revealed ice scours in most areas, except in protected deeper basins. Many of these features appear degraded and are considered relict.

Parallel scours possibly representing glacial ice sheet sole marks were observed adjacent to southeastern Meta Incognita Peninsula. Features tentatively interpreted to represent current derived bedforms were observed in a few localities.

Sidescan imagery and high resolution seismic profiles were obtained across approaches to Port Burwell where the historic flying boat "Untin Bowler" was last seen. These indicate that the area is floored by a hard bottom that bears the imprint of extensive ice scours, some of which possibly represent sole marks of a glacial ice sheet.

The central platform in Ungava Bay is variably mantled by thin surficial sediments that show intense ice scouring. Paleozoic strata of the platform have been offset by faulting in places.

Multiple glacial drift sequences that thicken shoreward and total up to 100 m in thickness were found adjacent to the northern part of the east coast of Ungava Bay, offshore from Christopher Inlet. Spatial relationships of the deposits suggest deposition by ice moving into northern Ungava Bay from northern Labrador.

Core Data

Piston core sampling was carried out at 24 localities in Hudson Strait and Ungava Bay (including one each in Wakeham Bay and in Deception Bay areas). Two cores were collected in northern Hudson Bay and two in Resolution Basin. Three coring attempts were unsuccessful.

The core sites in Hudson Strait - Ungava Bay were selected with the objective of establishing type sections for the glaciomarine and postglacial sequences in the main basins with penetration into underlying glacial drift where possible, and to obtain chronological, depositional, and other data on specific glacial features/events/relationships where e.g. transitions / tonguing of glaciomarine - glacial drift deposits were seen to occur from the acoustic profiles. The coring operations were conducted mainly at localities identified from profiles obtained during cruises 85-027 and 86-027, as well as at some localities found during the course of the 90-023 survey.

As in Frobisher Bay core recovery of the large diameter corer was very disappointing, constituting only 59 per cent of apparent penetration. As well overall penetration capability of the corer was less than anticipated, but the poor recovery was the greater problem of the two. Various mechanical adjustments and checks were carried out in an attempt to improve core recovery, with limited success. As a consequence of the recovery and penetration problems, attempts were made to bracket type sections through more, shorter cores where the various sediment units were accessible. At most other localities sampling of the glaciomarine sequences was the main coring objective and sites were chosen where access to and penetration of these was most feasible.

Assembly/disassembly time requirements and the fact that coring with the large corer is essentially a day time operation on the ship are critical scheduling factors that limit total number of localities possible. Coring activities governed the schedule of cruise operations on a day-to-day and overall basis. Generally, surveys to, and site surveys for, a core locality were conducted overnight in order to be on site at 0800. This was necessary particularly when a second core locality had to be reached and completed the same day which was usually the case.

Because the piston corer, IKU sampler, and box corer required use of the same winch, complete rigging of the wire in the corer was sometimes delayed until on site to provide operational flexibility and efficiency where sampling was planned on previously unsurveyed terrain. The fact that the majority of sample target areas were selected from profiles obtained during previous cruises was a major asset for planning and efficient cruise operations. Core sites were resurveyed in order to home in on the desired location, and to establish the position of the core site relative to the seismic stratigraphy.

Despite the coring problems, important samples were collected. The various laboratory studies and analyses planned are expected to contribute substantially to the knowledge of late glacial, deglacial, and postglacial events and conditions in this region, and will provide base line proxy data relating to global change.

Other Areas

Cores were recovered at two of three sites attempted northeast of Coats Island in northern Hudson Bay. Operations in this area were hampered by pack ice and deteriorating weather.

Cores were recovered from two attempts in Resolution Basin, but an attempt to obtain a longer core near the 82-034-068 locality in outer Frobisher Bay was unsuccessful due to a combination of bad weather and sandy surface sediments. Rapidly worsening sea conditions did not permit a second attempt.

Rough sea conditions also prevented survey and coring at Kate Moran's primary sites on the continental slope east of Hudson Strait, and at her secondary site seaward of Nain Bank. Conditions also prevented collection of box cores for C. Hillaire-Marcel in that same general locality. A core was collected in Cartwright Saddle, but two attempts at a shallow water box core station yielded only sand and gravel and two other box coring attempts in deep water pre-tripped due to large swells. A planned core in Esquiman Channel could not be attempted due to unsatisfactory sea and weather conditions.

ACKNOWLEDGEMENTS

Sincere thanks are extended to the following individuals and groups for their excellent cooperation and assistance: Captain L. Strum, officers and crew of CSS Hudson; AGC Program Support technical personnel A. Boyce, B. Chapman, G. Fenn, R. Murphy; G. Standen, Seachem/Star Ltd.; M. Escamilla and J. Miner, Northern Illinois University, N. Weiner, University of Colorado; and to R. Sparkes and R. Howie, AGC. Special thanks are also extended to BIO Ship Division for their strenuous efforts to ready Dunlin as a replacement for the damaged launch Grebe. We are also grateful to H. Josenhans and G. Sonnichsen for review of this report.

RECOMMENDATIONS/COMMENTS

1. There are problems with the large AGC corer in terms of penetration and sample recovery in the types of sediments (glaciomarine) present in the program area. These sediments are prevalent on the shelves in the Canadian eastcoast offshore so the problem is not confined only to Hudson Strait. The corer difficulties require thorough examination and remedial action. The core catcher needs to be strengthened or redesigned, but we also feel that much of the recovery problem is in some way related to the piston (e.g. is it splitting prematurely?).

2. Partial enclosure/shelter with some heating of the AGC coring half-container is required for late season and other cold temperature coring operations.

3. Problems encountered with getting track plots, etc. demonstrate the desirability of a more dependable system for data storage and plotting.

4. Handling systems for Huntec tow fish need to be improved to reduce risk of damage during retrieval when sea conditions deteriorate.

5. Recommendations relating to GP lab ducts and other CSS Hudson facilities have been outlined on Form C.

6. The new hull mounted 3.5 kHz system proved very useful in: monitoring final station positioning after retrieval of the Huntec; provision of data to return to previously surveyed core stations during a period when Huntec was inoperable; and in data collection where high speed travel was necessary.

7. Improvements are required to launch systems for coring and sampling. The coreliner corers were unusable and the small gasoline sampling winch was insufficiently powerful.

ATLANTIC GEOSCIENCE CENTRE
DATA SECTION
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TABLE 2

TOTAL SAMPLE INVENTORY

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

SAMPLE NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE	LONGITUDE	DEPTH (M)	GEOGRAPHIC LOCATION
001	CORE	2621933	62 52.57N	67 07.46W	538	FROBISHER BAY
001TWC	CORE	2621933	62 52.57N	67 07.46W	538	FROBISHER BAY
002	GRAB	2621530	62 40.00N	66 50.00W	15	FROBISHER BAY, WATTS BAY
003	GRAB	2621530	62 40.00N	66 50.00W	65	FROBISHER BAY, WATTS BAY
004	GRAB	2621630	62 40.00N	66 50.00W	135	FROBISHER BAY, WATTS BAY
005	GRAB	2621730	62 40.00N	66 50.00W	135	FROBISHER BAY, WATTS BAY
006	GRAB	2621730	62 40.00N	66 50.00W	112	FROBISHER BAY, WATTS BAY
007	CORE	2631438	62 31.80N	66 11.00W	397	FROBISHER BAY
007TWC	CORE	2631438	62 31.80N	66 11.00W	397	FROBISHER BAY
008	GRAB	2631533	62 31.70N	66 11.30W	425	FROBISHER BAY
009	CORE	2631925	62 29.90N	66 18.00W	463	FROBISHER BAY
009TWC	CORE	2631925	62 29.90N	66 18.00W	463	FROBISHER BAY
010	GRAB	2632021	62 29.80N	66 18.20W	463	FROBISHER BAY
011	GRAB		62 27.00N	66 30.00W		FROBISHER BAY
012	GRAB	2631500	62 27.00N	66 30.00W	10	FROBISHER BAY
013	GRAB	2631615	62 27.00N	66 30.00W	40	FROBISHER BAY, YORK SOUND
014	GRAB	2631630	62 27.00N	66 30.00W	90	FROBISHER BAY, YORK SOUND
015	GRAB	2631700	62 27.00N	66 30.00W	10	FROBISHER BAY, YORK SOUND
016	GRAB	2631715	62 27.00N	66 30.00W	10	FROBISHER BAY, YORK SOUND
017	GRAB	2631730	62 27.00N	66 30.00W	95	FROBISHER BAY, YORK SOUND

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SAMPLE NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE	LONGITUDE	DEPTH (M)	GEOGRAPHIC LOCATION
018	CORE	2641331	62 07.71N	65 25.00W	335	FROBISHER BAY
018TWC	CORE	2641331	62 07.71N	65 25.00W	335	FROBISHER BAY
019	GRAB	2641418	62 06.70N	65 24.80W	335	FROBISHER BAY
020	CORE	2641840	62 06.10N	65 23.60W	330	FROBISHER BAY
020TWC	CORE	2641840	62 06.10N	65 23.60W	330	FROBISHER BAY
021	GRAB	2641915	62 06.10N	65 24.00W	335	FROBISHER BAY
022	CORE	2651307	63 06.54N	64 20.22W	396	OFF HALL PENINSULA, BAFFIN SHELF
022TWC	CORE	2651307	63 06.54N	64 20.22W	396	OFF HALL PENINSULA, BAFFIN SHELF
023	GRAB	2651352	63 07.10N	64 21.30W	396	OFF HALL PENINSULA, BAFFIN SHELF
024	CORE	2651656	63 04.70N	64 19.20W	344	OFF HALL PENINSULA, BAFFIN SHELF
024TWC	CORE	2651656	63 04.70N	64 19.20W	344	OFF HALL PENINSULA, BAFFIN SHELF
025	GRAB	2651722	63 04.70N	64 19.00W	340	OFF HALL PENINSULA, BAFFIN SHELF
026	CORE	2661709	61 47.05N	63 52.00W	574	RESOLUTION BASIN, BAFFIN SHELF
026TWC	CORE	2661709	61 47.05N	63 52.00W	574	RESOLUTION BASIN, BAFFIN SHELF
027	GRAB	2661749	61 47.06N	63 51.10W	574	RESOLUTION BASIN
028	WATER	2661811	61 47.08N	63 50.63W	200	RESOLUTION BASIN

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029	WATER	2661840	61 47.37N	63 49.71W	200	RESOLUTION BASIN
030	CORE	2662009	61 46.93N	63 52.60W	572	RESOLUTION BASIN, BAFFIN SHELF
030TWC	CORE	2662009	61 46.93N	63 52.60W	572	RESOLUTION BASIN, BAFFIN SHELF
031	CORE	2671257	60 57.10N	65 26.70W	872	HUDSON STRAIT
031TWC	CORE	2671257	60 57.10N	65 26.70W	872	HUDSON STRAIT
032	GRAB	2671318	60 57.30N	65 29.70W	872	HUDSON STRAIT
033	GRAB	2680249	60 09.75N	65 11.22W	112	UNGAVA BAY
034	CORE	2681349	59 59.41N	65 44.03W	112	UNGAVA BAY
034TWC	CORE	2681349	59 59.41N	65 44.03W	112	UNGAVA BAY
035	GRAB	2681426	59 59.35N	65 44.00W	336	UNGAVA BAY
036	CORE	2681957	59 57.81N	65 53.89W	332	UNGAVA BAY
036TWC	CORE	2681957	59 57.81N	65 53.89W	332	UNGAVA BAY
037	GRAB	2690002	59 51.00N	66 29.69W	108	UNGAVA BAY
038	GRAB	2690548	59 26.17N	66 32.88W	245	UNGAVA BAY
039	CORE	2691356	59 47.06N	65 55.82W	387	UNGAVA BAY
039TWC	CORE	2691356	59 47.06N	65 55.82W	387	UNGAVA BAY
040	GRAB	2691429	59 47.00N	65 55.79W	408	UNGAVA BAY
041	GRAB	2700346	60 31.80N	66 28.30W	149	UNGAVA BAY
042	CORE	2701157	60 57.01N	66 36.95W	761	EASTERN HUDSON STRAIT
042TWC	CORE	2701157	60 57.01N	66 36.95W	761	EASTERN HUDSON STRAIT
043	GRAB	2701244	60 57.03N	66 36.95W	729	EASTERN HUDSON STRAIT

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044	BOXCORE	2701549	60 56.97N	66 08.92W	844	EASTERN HUDSON STRAIT
045	CORE	2701806	60 56.80N	66 08.28W	845	EASTERN HUDSON STRAIT
045TWC	CORE	2701806	60 56.80N	66 08.28W	845	EASTERN HUDSON STRAIT
046	WATER	2701926	60 55.48N	66 08.64W	200	HUDSON STRAIT
047	WATER	2701947	60 54.73N	66 08.76W	200	HUDSON STRAIT
048	GRAB	2710938	61 48.29N	66 11.78W	226	HUDSON STRAIT
049	IKU	2711718	61 47.37N	66 51.62W	223	HUDSON STRAIT
050	GRAB	2712211	61 58.80N	67 06.96W	87	EASTERN HUDSON STRAIT
051	GRAB	2720344	62 00.95N	67 57.34W	150	EASTERN HUDSON STRAIT
052	CORE	2721413	61 19.48N	67 36.21W	402	HUDSON STRAIT
052TWC	CORE	2721413	61 19.48N	67 36.21W	402	HUDSON STRAIT
053	GRAB	2721443	61 19.31N	67 36.01W	400	HUDSON STRAIT
054	GRAB	2730104	60 34.98N	67 10.47W	137	UNGAVA BAY
055	CAMERA	2730118	60 34.85N	67 09.26W	141	UNGAVA BAY
056	GRAB	2730606	60 15.90N	67 12.15W	111	UNGAVA BAY
057	GRAB	2731245	59 50.19N	67 17.75W	57	SOUTHERN UNGAVA BAY
058	CAMERA	2731306	59 50.45N	67 16.50W	82	SOUTHERN UNGAVA BAY
059	CORE	2731920	59 32.01N	67 13.26W	290	SOUTHERN UNGAVA BAY
059TWC	CORE	2731920	59 32.01N	67 13.26W	290	SOUTHERN UNGAVA BAY
060	GRAB	2731956	59 31.60N	67 12.63W	294	SOUTHERN UNGAVA BAY

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061	GRAB	2741033	60 02.89N	67 45.78W	72	UNGAVA BAY
062	CORE	2742022	60 15.76N	68 32.97W	234	UNGAVA BAY/WEST AKPATOK ISLAND
062TWC	CORE	2742022	60 15.76N	68 32.97W	234	UNGAVA BAY/WEST AKPATOK ISLAND
063	GRAB	2741853	60 15.55N	68 32.89W	232	UNGAVA BAY/WEST AKPATOK ISLAND
064	CORE	2761332	61 07.50N	70 34.60W	196	WEST BAIE HERICART, N. QUE.
064TWC	CORE	2761332	61 07.50N	70 34.60W	196	WEST BAIE HERICART, N. QUE.
065	GRAB	2761400	61 08.10N	70 34.00W	196	WEST BAIE HERICART, N. QUE.
066	CORE	2762100	61 27.82N	70 51.00W	193	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.
066TWC	CORE	2762100	61 27.82N	70 51.00W	193	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.
067	GRAB	2762207	61 27.29N	70 52.12W	193	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.
068	CORE	2771124	61 26.58N	71 02.39W	157	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.
068TWC	CORE	2771124	61 26.58N	71 02.39W	157	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.
069	GRAB	2771144	61 26.39N	71 02.98W	150	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.
070	IKU	2771224	61 26.21N	71 03.34W	149	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.

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SAMPLE NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE	LONGITUDE	DEPTH (M)	GEOGRAPHIC LOCATION
071	CORE	2791547	61 46.72N	71 56.65W	110	WAKEHAM BAY AREA, HUDSON STRAIT, N. QUE.
071TWC	CORE	2791547	61 46.72N	71 56.65W	110	WAKEHAM BAY AREA, HUDSON STRAIT
072	GRAB	2791644	61 46.72N	71 56.20W	111	WAKEHAM BAY AREA, HUDSON STRAIT
073	IKU	2792133	62 25.17N	71 34.63W	333	CENTRAL HUDSON STRAIT
074	IKU	2801307	62 44.28N	72 42.26W	358	CENTRAL HUDSON STRAIT
075	IKU	2802112	62 27.90N	74 03.11W	86	WESTERN HUDSON STRAIT
076	CORE	2811452	62 09.70N	74 42.28W	67	DECEPTION BAY, QUE.
076TWC	CORE	2811452	62 09.70N	74 42.28W	67	DECEPTION BAY, QUE.
077	GRAB	2811517	62 09.58N	74 42.14W	69	DECEPTION BAY QUE.
078	CAMERA	2811704	62 21.24N	74 48.19W	110	WESTERN HUDSON STRAIT, (OFFSHORE DECEPTION BAY)
079	IKU	2811725	62 21.31N	74 48.37W	115	WESTERN HUDSON STRAIT, (OFFSHORE DECEPTION BAY)
080	GRAB	2811740	62 08.47N	74 38.56W	40	DECEPTION BAY, QUE.
081	GRAB	2811805	62 08.20N	74 38.42W	70	DECEPTION BAY, QUE.
082	CORE	2811820	62 08.20N	74 38.42W	70	DECEPTION BAY, QUE.
083	IKU	2821200	62 46.71N	76 05.34W	315	WESTERN HUDSON STRAIT

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PROJECT NUMBER = 760015

SAMPLE NUMBER	SAMPLE TYPE	DAY/TIME (GMT)	LATITUDE	LONGITUDE	DEPTH (M)	GEOGRAPHIC LOCATION
084	GRAB	2821242	62 46.72N	76 05.27W	315	WESTERN HUDSON STRAIT
085	CORE	2821607	62 36.95N	76 22.53W	380	WESTERN HUDSON STRAIT
085TWC	CORE	2821607	62 36.95N	76 22.53W	380	WESTERN HUDSON STRAIT
086	GRAB	2821644	62 37.01N	76 22.54W	390	WESTERN HUDSON STRAIT
087	CORE	2821855	62 38.90N	76 39.77W	390	OFFSHORE PROMONTOIRE COLBERT, N. QUE.
087TWC	CORE	2821855	62 38.90N	76 39.77W	390	OFFSHORE PROMONTOIRE COLBERT, N. QUE.
088	GRAB	2821938	62 38.95N	76 39.97W	390	OFFSHORE PROMONTOIRE COLBERT, N. QUE.
089	CORE	2831222	63 02.75N	81 59.78W	217	NORTHERN COATS IS., HUDSON BAY
089TWC	CORE	2831222	63 02.75N	81 59.78W	217	NORTHERN COATS IS., HUDSON BAY
090	GRAB	2831348	63 02.75N	81 59.82W	219	NORTHERN COATS IS., HUDSON BAY
091	CORE	2831609	63 02.77N	81 59.30W	212	NORTH COATS IS. HUDSON BAY
091TWC	CORE	2831609	63 02.77N	81 59.30W	212	NORTH COATS IS. HUDSON BAY
092	CORE	2831954	62 59.45N	81 58.18W	220	NORTH COATS IS. HUDSON BAY
092TWC	CORE	2831954	62 59.45N	81 58.18W	220	NORTH COATS IS. HUDSON BAY
093	GRAB	2831954	62 59.76N	81 58.30W	220	NORTH COATS IS. HUDSON BAY

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094	CORE	2841224	63 00.97N	76 38.61W	320	SOUTHEAST OF SALISBURY IS., WESTERN HUDSON STRAIT
094TWC	CORE	2841224	63 00.97N	76 38.61W	320	SOUTHEAST OF SALISBURY IS., WESTERN HUDSON STRAIT
095	GRAB	2841255	63 01.01N	76 38.56W	320	SOUTHEAST OF SALISBURY IS., WESTERN HUDSON STRAIT
096	IKU	2841637	62 57.45N	76 59.91W	275	SOUTHEAST OF SALISBURY IS., WESTERN HUDSON STRAIT
097	CORE	2842056	63 14.96N	75 32.68W	427	WESTERN HUDSON STRAIT
097TWC	CORE	2842056	63 14.96N	75 32.68W	427	WESTERN HUDSON STRAIT
098	GRAB	2842145	63 14.83N	75 32.40W	427	WESTERN HUDSON STRAIT
099	CORE	2861205	63 03.98N	74 33.96W	386	WESTERN HUDSON STRAIT
099TWC	CORE	2861205	63 03.98N	74 33.96W	386	WESTERN HUDSON STRAIT
100	GRAB	2861239	63 04.07N	74 34.00W	393	WESTERN HUDSON STRAIT
101	CORE	2861615	63 02.99N	74 18.24W	389	WESTERN HUDSON STRAIT
101TWC	CORE	2861615	63 02.99N	74 18.24W	389	WESTERN HUDSON STRAIT
102	GRAB	2861654	63 03.07N	74 18.31W	421	WESTERN HUDSON STRAIT
103	WATER	2861713	63 02.89N	74 18.05W	200	WESTERN HUDSON STRAIT

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104	CORE	2871208	62 59.58N	74 00.04W	410	WESTERN HUDSON STRAIT
104TWC	CORE	2871208	62 59.58N	74 00.04W	410	WESTERN HUDSON STRAIT
105	GRAB	2871248	62 59.57N	73 59.90W	410	WESTERN HUDSON STRAIT
106	CORE	2872047	62 59.38N	73 59.90W	412	WESTERN HUDSON STRAIT
106TWC	CORE	2872047	62 59.38N	73 59.90W	412	WESTERN HUDSON STRAIT
107	CORE	2881137	61 20.67N	70 37.77W	182	WHITLEY BAY AREA, HUDSON STRAIT
107TWC	CORE	2881137	61 20.67N	70 37.77W	182	WHITLEY BAY AREA, HUDSON STRAIT
108	GRAB	2881209	61 20.70N	70 37.67W	182	WHITLEY BAY AREA, HUDSON STRAIT
109	IKU	2881326	61 24.17N	70 37.35W	152	WHITLEY BAY AREA, HUDSON STRAIT
110	IKU	2881547	61 19.90N	69 54.80W	210	EASTERN HUDSON STRAIT
111	GRAB	2881634	61 19.75N	69 54.54W	214	EASTERN HUDSON STRAIT
112	IKU	2882341	61 32.06N	67 28.07W	265	EASTERN HUDSON STRAIT
113	CORE	2891243	62 11.73N	65 44.24W	338	FROBISHER BAY
113TWC	CORE	2891243	62 11.73N	65 44.24W	338	FROBISHER BAY
114	GRAB	2891330	62 11.75N	65 44.51W	343	FROBISHER BAY
115	IKU	2891655	62 01.94N	65 32.36W	282	OUTER FROBISHER BAY AREA
116	BOXCORE	2921156	55 48.66N	57 07.49W	1000	LABRADOR SHELF SLOPE

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117	BOXCORE	2921400	55 54.36N	56 53.13W	2040	LABRADOR SHELF SLOPE
118	CORE	2922253	54 44.57N	56 05.04W	458	CARTWRIGHT SADDLE
118TWC	CORE	2922253	54 44.57N	56 05.04W	458	CARTWRIGHT SADDLE

Table 3. Principal Scientific Participants

	Foraminifera	Paleoceanography	Seismic/Acoustic interpretation		Geotechnical properties	Core logging, sample curation		Core palynology	Age dating	Lithologies - provenance	Textural analyses	Sedimentology	Diatoms, opals	Ostracods	Clay mineralogy	TL	Paleomag	Magnetic susceptibility	Seabed biology biogenic structure	Seabed palynology	Thermal conductivity/pore pressures	Nearshore/Onshore studies	Trace elements	O-18	Plankton tows	Organic carbon	Velocities	Integration of data	Synthesis	Frobisher Bay
A. Aitken			watchkeeping assistance at sea			various participants assist at sea													√									most participants on local or regional basis		√
AGC									S		S													S		S				
B. MacLean				√																										
G. Vilks	√	√																						S	√					
I. Hardy							√																							
K. Moran*					√																									
P. Mudie*								√																						
A. Doiron										√																				
INSTAAR									S						S?	S?	S	√												
J. Andrews*																	S													
W. Briggs														√				√												
N. Weiner																		√												
K. Williams*													√																	
W. Mode																				√										√
University of Montreal									S																					
J. Gray*				S							S												?							
D. Bruneau				S						L												S								
N. Illinois University									S		S	S																		√
J. Stravers				S						L												S								√
R. Powell				S								S																		√
M. Escamilla												S																		√
J. Miner												S																		√
M. Retelle																														√
Terrain Sciences																					√									
A. Taylor																					√									
V. Allen																					√									

* home based participants
S some
L local

APPENDIX A - FORAMINIFERA

G. Vilks, Atlantic Geoscience Centre, Bedford Institute of Oceanography
P.O. Box 1006, Dartmouth, N.S., B2Y 4A2

Cruise 90023 Core Cutter Faunas

Small samples of sediment from cores and from most of the Van Veen grabs were collected and washed through a 63 micron sieve. Four faunal assembages were recognized (Vilks, at al, 1989) The dominating species in each assemblage are as follows: Assemblage A - Elphidium excavatum, Cassidulina reniforme, no or very few fauna. Assemblage B - Fursencoina fusiformis, Islandiella helenae, I. norcrossi in addition to the above species (Haynessina orbiculare in Ungava Bay). Assemblage C - Cassidulina laevigata and Neogloboquadrina pachyderma in addition to the species of assemblages A and B. Assemblage D contains the most diverse fauna and is present in the Van Veen grabs. The key species are Nonionellina labradorica and N. pachyderma. The environment for each assemblage:

A Late glacial to early post glacial with fast sedimentation rates from runoff related to glacial melting. The zone is associated with glacial marine sediments in acoustic profiles.

B Early post glacial to modern environment in fine sediments normally rich in diatom frustules. In acoustic profiles related to distal glacial marine sediments.

C Bottom water was relatively more saline. So far only found in eastern Hudson Strait Basin.

D Present oceanographic setting represented by highly diverse fauna and some aglutinated species.

Table 4. Foram Assemblages (lists the species identified in the order of abundance)

Sample	Assemblage	Faunas
Frobisher Bay		
90-023-1-PC (cutter)	B	E. excavatum, C.reniforme, F. fusiformis, C. lobatulus, I. norcrossi, R. charlottensis, I. helenae, Ostracoda
90-023-7-PC (cutter)	A	No fauna
(120 cm)	A	No fauna
90-023-9-PC (cutter)	B	E. excavatum, C. reniforme, I. norcrossi, F. fusiformis, N. labradorica, R. charlottensis
90-023-18-PC (bottom)		C. lobatulus, sand, pebbles (carbonates)
90-023-19-VV		C. lobatulus ooze, H. orbiculare
90-023-20-PC (top)		C. lobatulus ooze
90-023-20-PC (bottom)		C. lobatulus ooze
Off Hall Peninsula		
90-023-22-PC (cutter)	A	No fauna
90-023-24-PC (cutter)	A	No fauna
Resolution Basin		
90-023-30-PC (cutter)	D	N. labradorica, E. excavatum, N. pachyderma, C. reniforme, I. helenae, I. norcrossi, F. fusiformis, V. loeblichi

Sample	Assemblage	Faunas
Hudson Strait, Eastern Basin		
90-023-31-PC (bottom)	C	Very few N. pachyderma, E. excavatum, C. reniforme, I. helenae?
90-023-31-PC (128-130)	D	Few fauna. N. pachyderma, E. excavatum, C. lobatulus, M. zaandamae
Ungava Bay		
90-023-34-PC (bottom)	B	E. excavatum C. reniforme, H. orbiculare, C. lobatulus, I. helenae, T. fluens, Buccella, N. pachyderma, R. turbinatus, C. jeffreysi, E. advena
90-023-36-PC (bottom)	D	E. excavatum, C. reniforme, N. labradorica, I. norcrossi C. lobatulus, I. helenae, V. loeblichi, H. orbiculare, A. gallowayi, E. bartletti, Pseudopolymorphina, Ostracoda
90-023-39-PC (bottom)	D	C. reniforme, E. excavatum, N. labradorica, A. gallowayi, I. helenae, Pseudopolymorphina, C. lobatulus, V. loeblichi, E. advena, N. pachyderma
Hudson Strait, Eastern Basin		
90-023-42-PC (264-265)	C	E. excavatum, C. reniforme, I. norcrossi, Buccela, Pseudopolymorphina, C. laevigata, N. labradorica, C. lobatulus
90-023-42-PC (cutter)	A	No fauna
90-023-44-BC (top)	D	N. pachyderma, M. zaandamae, B. frigida, N. atlantica, A. glomerata, A. gallowayi, C. jeffreysi, F. marginata, S. biformis
90-023-45-PC (cutter)	C	C. lobatulus, E. excavatum, N. pachyderma, I. norcrossi, M. zaandamae, F. fusiformis, N. labradorica, A. gallowayi, B. frigida, C. laevigata, V. loeblichi, L. flatulenta, E. bartletti, Ostracoda
90-023-45-PC (365)	D	E. excavatum, N. labradorica, C. lobatulus, M. zaandamae, T. tricarinata, N. atlantica, A. gallowayi, I. norcrossi, C. reniforme, P. bulloides, Ostracoda, diatoms
Hudson Strait Central		
90-023-52-PC (bottom)	A	E. excavatum,
90-023-52-PC (250)	D	C. lobatulus, N. pachyderma, E. excavatum, P. corugata, C. reniforme, P. bullata, F. marginata
Ungava Bay		
90-023-59-PC (cutter)	B	C. reniforme, E. excavatum, F. fusiformis, N. pachyderma, E. subarcticum, E. takajanagii, C. lobatulus, A. gallowayi
90-023-59-PC (580)	D	C. reniforme, E. excavatum, F. fusiformis, S. biformis, N. labradorica, R. arctica, P. pulchella, E. takajanagii, C. lobatulus, B. frigida, P. fusiformis, L. mollis, B. pacifica
90-023-59-PC (134)	D	E. excavatum, C. reniforme, H. orbiculare, B. frigida, C. lobatulus, T. torquata, N. labradorica, F. fusiformis, E. advena
90-023-62-PC (cutter)	A	(few) E. excavatum, C. reniforme, C. lobatulus, Elphidiella, O. lineata, E. subarcticum

Sample	Assemblage	Faunas
Central Hudson Strait		
90-023-64-PC (bottom)	B	C. reniforme, E. excavatum, C. lobatulus, F. fusiformis, N. labradorica, T. trihedra, Ostracoda, S. groenlandica, T. torquata, E. takajanagii
90-023-65-Van Veen		E. excavatum, N. labradorica, B. frigida, I. helenae, C. reniforme, F. fusiformis, D. frobisherensis, A. gallowayi, L. mollis, C. lobatulus, R. arctica
90-023-66-PC (cutter)	B	F. fusiformis, E. excavatum, C. reniforme, Ostracoda, Pseudopolymorphina, Triloculina sp, H. nana, N. pachyderma
90-023-67-Van Veen		I. helenae, E. excavatum, B. frigida, N. labradorica, F. fusiformis, D. ittai, E. takajanagii, D. pauperata, S. biformis, R. arctica, T. torquata
90-023-69-Van Veen		B. frigida, I. helenae, C. reniforme, E. excavatum, I. norcrossi, B. pseudopuncata E. advena, E. takajanagii, S. biformis, F. marginata, H. orbiculare, T. squamata, N. labradorica
90-023-70-IKU (bottom)	B	C. reniforme, E. excavatum, B. frigida, I. helenae, F. fusiformis, Ostracoda, I. norcrossi, A. gallowayi, H. nana, C. lobatulus
90-023-71-PC (cutter)	B	E. excavatum, C. reniforme, F. fusiformis
90-023-72-Van Veen		B. frigida, I. helenae, N. labradorica, E. excavatum, E. bartletti, A. gallowayi, F. fusiformis, T. tricarinata, H. orbiculare, E. advena, R. curtus, C. reniforme
Western Hudson Strait		
90-023-74-PC IKU (B)	B	E. excavatum, C. reniforme, B. frigida, I. helenae, F. fusiformis, N. labradorica, Pseudopolymorphina, A. glomerata
90-023-76-PC (cutter)	A	Very few E. excavatum, E. subarcticum
90-023-76-PC (577)	A	Few E. excavatum, C. reniforme, Pyrgo, sp.
90-023-77-Van Veen		E. excavatum, A. cassis, C. crassimargo, E. bartletti, C. reniforme, E. advena, R. curtus, N. labradorica, B. frigida, Ostracoda
90-023-85-PC (cutter)	A	no fauna
90-023-85-PC (183)	D	E. excavatum, N. labradorica, I. helenae, H. friabilis, B. frigida, V. loeblichi, C. lobatulus, F. fusiformis,
90-023-85-PC (120)	A	no fauna
90-023-86-Van Veen		C. reniforme, N. labradorica, I. helenae A. glomerata, E. excavatum, V. loeblichi, I. norcrossi, G. auricula, B. frigida, E. takajanagii, E. arctica, N. pachyderma, B. pseudopuncata, F. fusiformis
90-023-87-PC (cutter)	A	E. excavatum
90-023-88-Van Veen		N. labradorica, I. helenae, C. reniforme, D. ittai, Dentalina, sp., M. zaandamae, N. atlantica, E. excavatum, A. glomerata
90-023-91-PC (cutter)	A	E. excavatum, V. loeblichi, A. gallowayi, C. reniforme, I. norcrossi

Sample	Assemblage	Faunas
90-023-90-Van Veen		I. helenae, C. reniforme, E. excavatum, N. labradorica, I. norcrossi, A. glomerata, V. loeblichi, N. pachyderma, S. groenlandica, C. jeffreyssi, R. atlantica, B. frigida, R. curtis
90-023-92-PC (cutter)	B	C. reniforme, E. excavatum, B. frigida, I. norcrossi, A. glomerata, R. charlottensis, H. orbiculare, P. fusiformis, E. takajanagii, I. helenae
90-023-94-PC (cutter)	B	Very few forams B. frigida, C. reniforme, E. excavatum, I. helenae
90-023-96-IKU 61cm	A	E. excavatum, C. reniforme, I. helenae
90-023-97-PC (cutter)	A	Few E. excavatum, C. reniforme, L. flatulenta, T. fluens
90-023-98-Van Veen		N. labradorica, B. frigida, C. lobatulus, V. loeblichi, R. charlottensis, N. turgida, N. pachyderma, I. norcrossi, E. subarcticum, A. gallowayi
90-023-99-PC (cutter)	B	E. excavatum, C. reniforme, F. fusiformis, Ostracoda, Shells
90-023-100-Van Veen		N. labradorica, I. helenae, R. curtus, B. frigida, E. excavatum, N. pachyderma, S. groenlandica, E. advena, G. auricularis
90-023-101-PC (cutter)	D	Pyrite, C. reniforme, E. excavatum, I. helenae F. fusiformis, N. labradorica, H. orbicularis
90-023-102-Van Veen		N. labradorica, B. frigida, I. helenae, T. fluens, B. pseudopunctata, R. charlottensis, M. zaandami, T. torquata, V. loeblichi, N. atlantica, A. glomerata, E. excavatum, S. biformis, R. curtus, T. triloba, R. arctica
90-023-104-PC (cutter)	D	C. reniforme, I. helenae, E. excavatum, Shells, F. fusiformis, N. labradorica
90-023-105-Van Veen		N. labradorica, I. helenae, B. frigida, E. excavatum, R.curtus, N. pachyderma, V. loeblichi, I. norcrossi, Pseudopolymorphina, S. groenlandica, C. reniforme
90-023-106-PC (cutter)	A	Pyrite C. reniforme, Shells, E. excavatum, Ostracoda (both valves), N. pachyderma
90-023-107-PC (cutter)	A	E. excavatum, C. reniforme, I. norcrossi
90-023-108-Van Veen		E. excavatum, N. labradorica, B. frigida, I. helenae, A. glomerata, R. fusiformis, S. biformis, H. orbiculare, C. reniforme
90-023-112-IKU	D	E. excavatum, C. reniforme, N. labradorica, I. norcrossi, I. helenae, Ostracoda, N. pachyderma A. gallowayi, B. frigida, V. loeblichi, E. subarcticum

APPENDIX B - GEOTHERMAL AND SEDIMENT PHYSICAL PROPERTIES PROGRAM

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Ottawa, Ontario

Motivation

A program to measure deep sediment temperatures and sediment properties was undertaken to compliment permafrost and geothermal studies undertaken in mining exploratory holes onshore in the Ungava Peninsula more than a decade ago (e.g. Taylor and Judge, Geogr. phys. Quat. 33, 245-251, 1979). This paper had suggested that the geothermal data may provide a constraint to the glacial history of the region. Hence, on this cruise, there was interest in offshore confirmation of the onshore thermal regime. It was also of interest to see if the extent of the last glaciation might be detected in residual pore pressure anomalies due to loading of the preglacial sediments. In-situ pore pressure measurements were meant also to complement consolidation tests done on some samples from the core cutter.

Summary of Accomplishments

Over 500 measurements of thermal conductivity were made by the needle probe technique (see Figures 6-25). The average value is 1.40 +/- 0.36 $Wm^{-1}K^{-1}$. There were few measurements of $k<0.8$ and $k>2.4$ $Wm^{-1}K^{-1}$, unlike an earlier cruise where higher values were encountered and identified with till-like beds (MacLean, GSC Open File 1501, 1986).

A newly developed tool (TAPPT) was used to measure in-situ sediment temperatures and pore pressures. The tool was deployed at stations 45, 64 and 66 (Figs. 26-31; in-situ pore pressures appear to be 2 or 3 times hydrostatic at 13-18 m beneath the seabed at these stations (Table 5). Intermittent electronic problems with this prototype instrument prevented its use elsewhere.

A profiling data logger was used to measure temperatures of the water column at stations 55 and 78, where it accompanied the camera. Bottom water temperatures were -1 and -1.3°C at these stations, respectively (Figs. 32 and 33); bottom water temperatures were recovered also from the TAPPT data at stations 45, 64 and 66 (Table 5). Of these 5 stations, only at station 45 does the seabed lie within the methane gas hydrate stability zone (Fig. 34).

A. Thermal Properties of Sediment Cores

Measurements of thermal conductivity were made on the cores to characterize the thermal properties of the sediments and to enable the estimation of the terrestrial heat flow.

Thermal conductivity is the physical property that determines the ability of a material to conduct heat. Of the geotechnical parameters, it is possibly the least often measured and yet is the principal parameter that is needed to describe the response of the geological environment to changes in temperature, whether as a result of geological processes or engineering works.

Measurement of thermal conductivity on unconsolidated samples is generally made by the needle probe technique (Von Herzen and Maxwell, J. Geophys. Res. 64, 1557-1563, 1959). A hypodermic-type needle is fitted with a fine heater wire running the full length and with a precision thermistor as temperature sensor at its mid-point. A calibrated current applied to the heater constitutes a line source of heat (from the perspective of the temperature sensor), and the temperature rise recorded by the thermistor is indirectly proportional to the thermal conductivity of the medium in which the probe is inserted. On this cruise, the probes and computer-based measuring system were made by Geotherm Inc., Markham, Ontario. 5 probes of length 6 cm and diameter 0.5 mm were used simultaneously, each dissipating 0.2 watt for a 10 minute measuring period.

After retrieval from the piston corer and cutting into 1.5 m lengths, the sediment cores were placed in a refrigerated container maintained at 4 +/- 3°C. Cores were allowed to stabilize thermally as long as possible, generally 6 hrs or more, prior to measurement. Measurements of sediment thermal conductivity were undertaken at 30cm intervals on all core recovered in the Frobisher Bay, Hudson Strait and Ungava Bay areas. Conductivity-depth profiles for cores longer than 5 m are given in the figures that follow; the full data set is available from the authors as a print-out and on diskette.

Thermal conductivity is governed mainly by the mineralogy and water content of the soils. High values are generally associated with sands and gravels, with quartz and carbonate mineralogies being particularly high; low values may reflect fine grained materials with higher water contents, or clay mineralogies which are particularly low. The conductivity peak in the upper metre at station 031 occurs in a section described as silty sand. The higher conductivities between 2 and 5 m at station 045 may be attributed to the sand in the clayey silt matrix between these intervals.

Thermal conductivity values have been matched with generalized core descriptions made during the cruise, and plotted as frequency distributions for the major categories (Fig. 25). We note that there is no statistically significant difference in the thermal conductivity of material described on this cruise as "silty clay" from that recorded as "clayey silt".

Table 5. Bottom Water and Sediment Temperatures

Station	**T (sbd)** [C]	**T (sed)** [C]	**App. Pen.** [m]	**App. Grad.** [mK/m]	**k(avg)** [W/mK]	**Q (app.)** [mW/m^2]	**W.D.** [m]
45	1.09	1.89	18	44	1.31	58	845
55	-1.00						140
64	-1.36						196
66	-1.57	-1.07	12	42	1.65	69	193
78	-1.30						110

Station	**P (sbd)** [kPa]	**P (sed)** [kPa]	**DEL_P** [kPa]	**DEL_P** (hydro)	**App. Pen.** [m]
45	8300	8860	560	56	18
64	1553	1840	287	29	13
66	1500	2000	400	40	

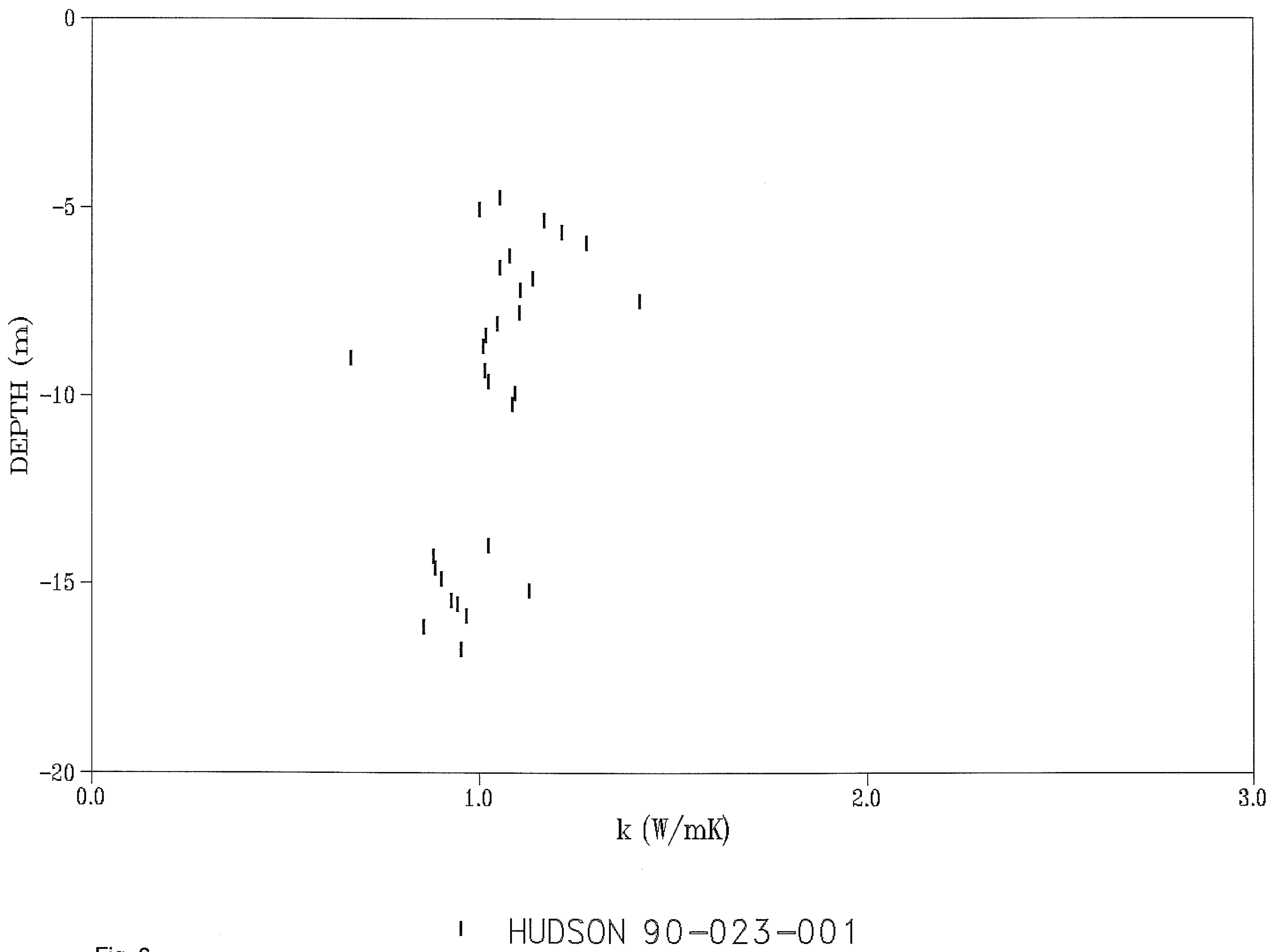


Fig. 6

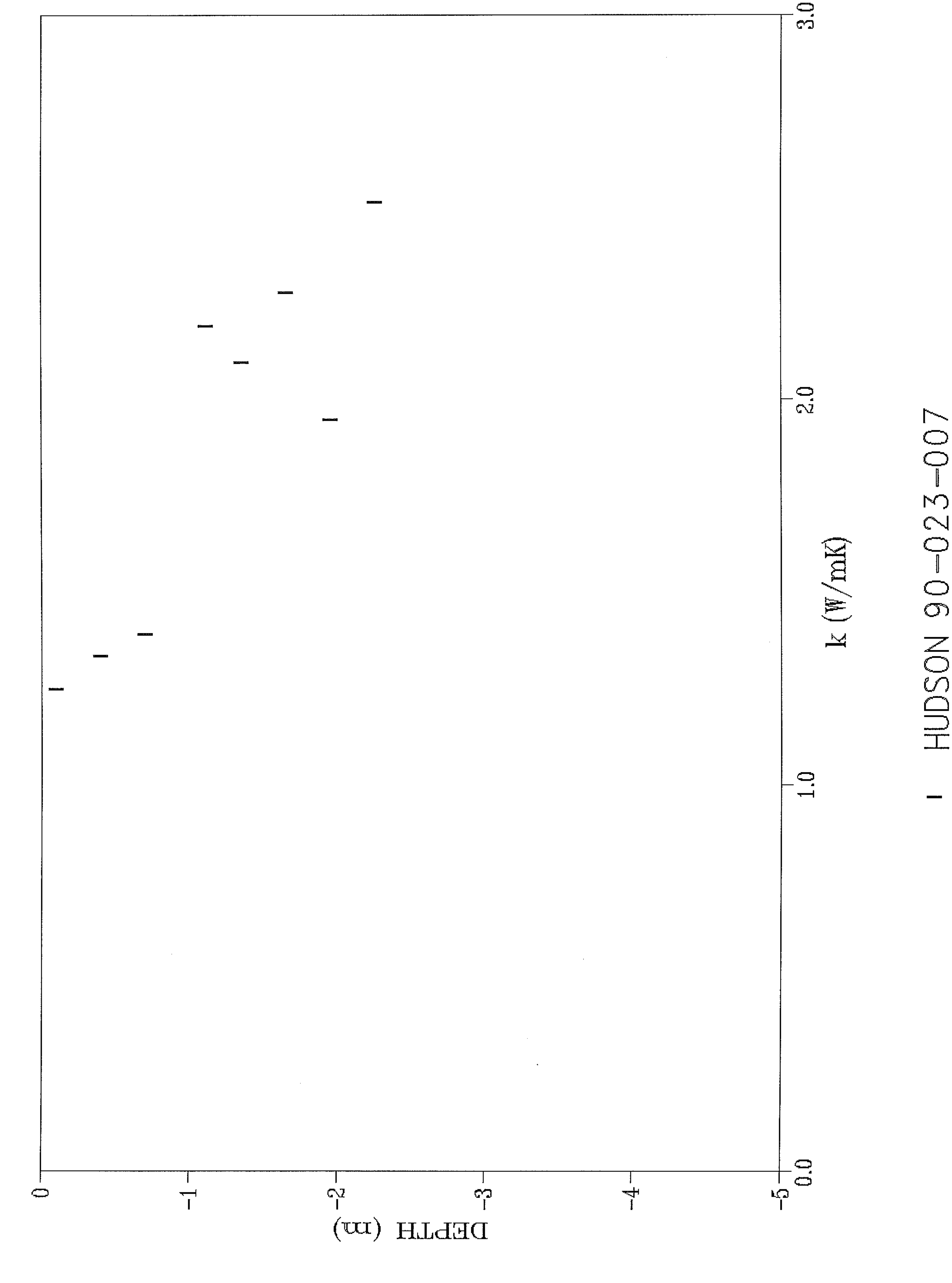


Fig. 7

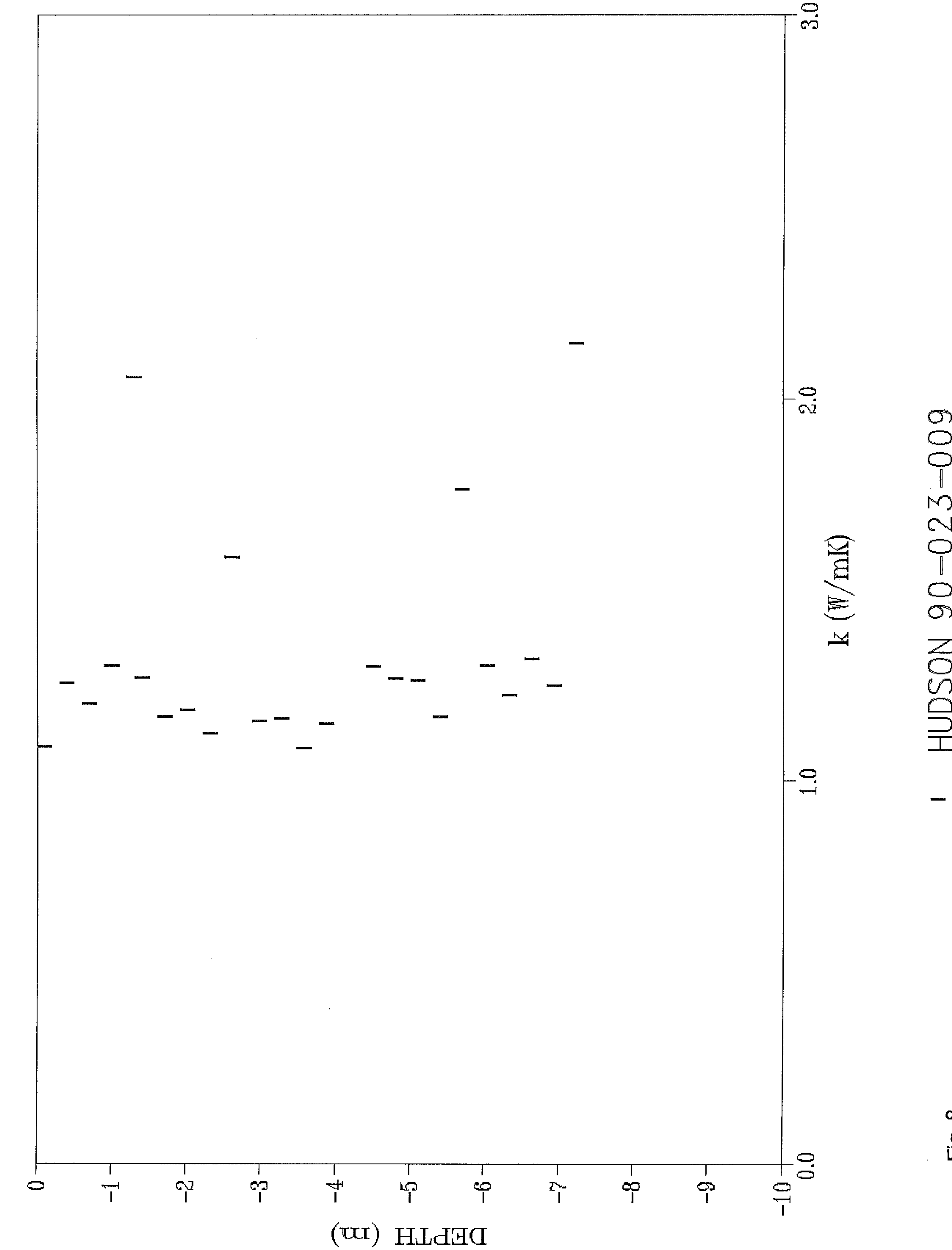


Fig. 8

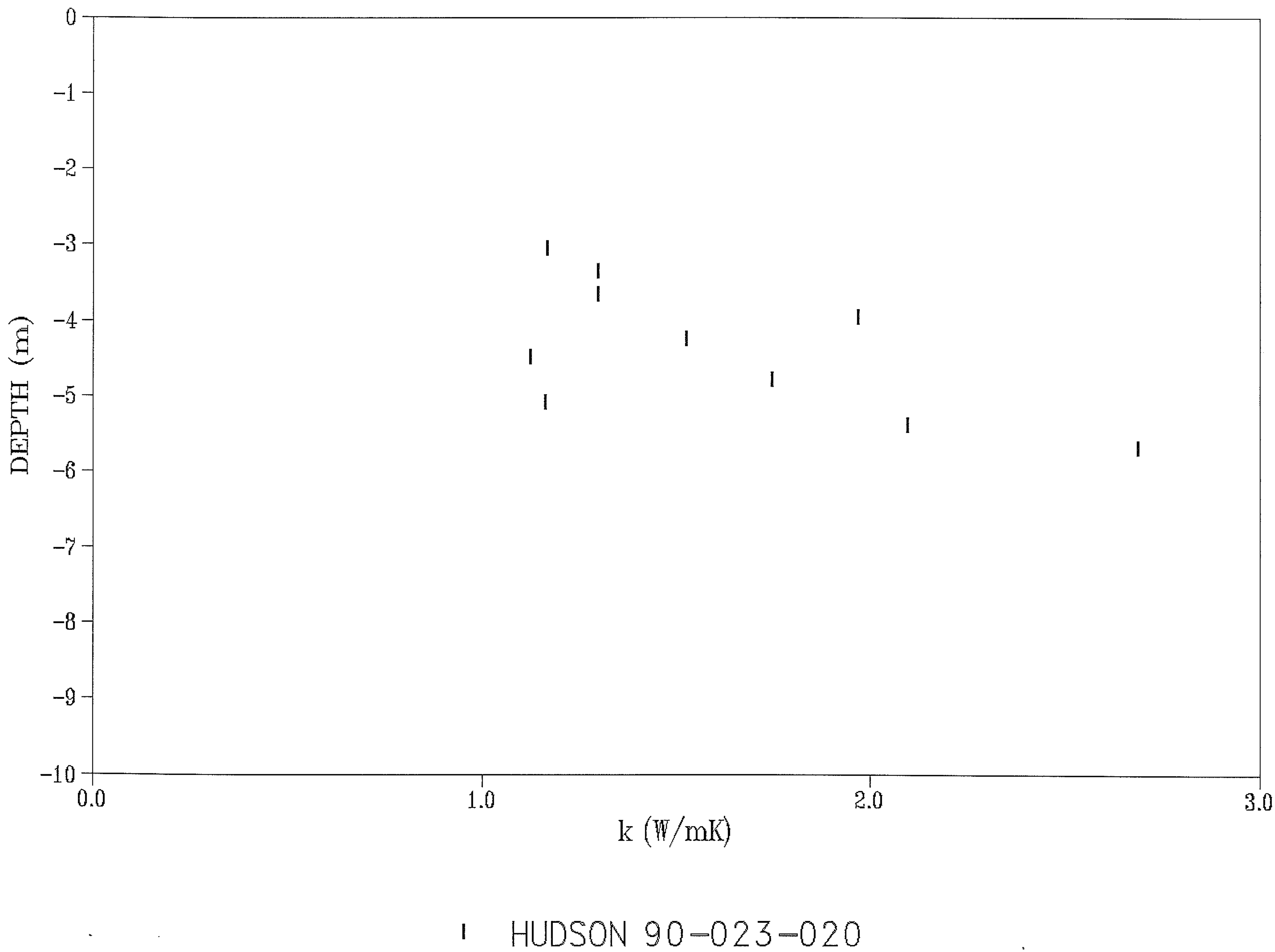


Fig. 9

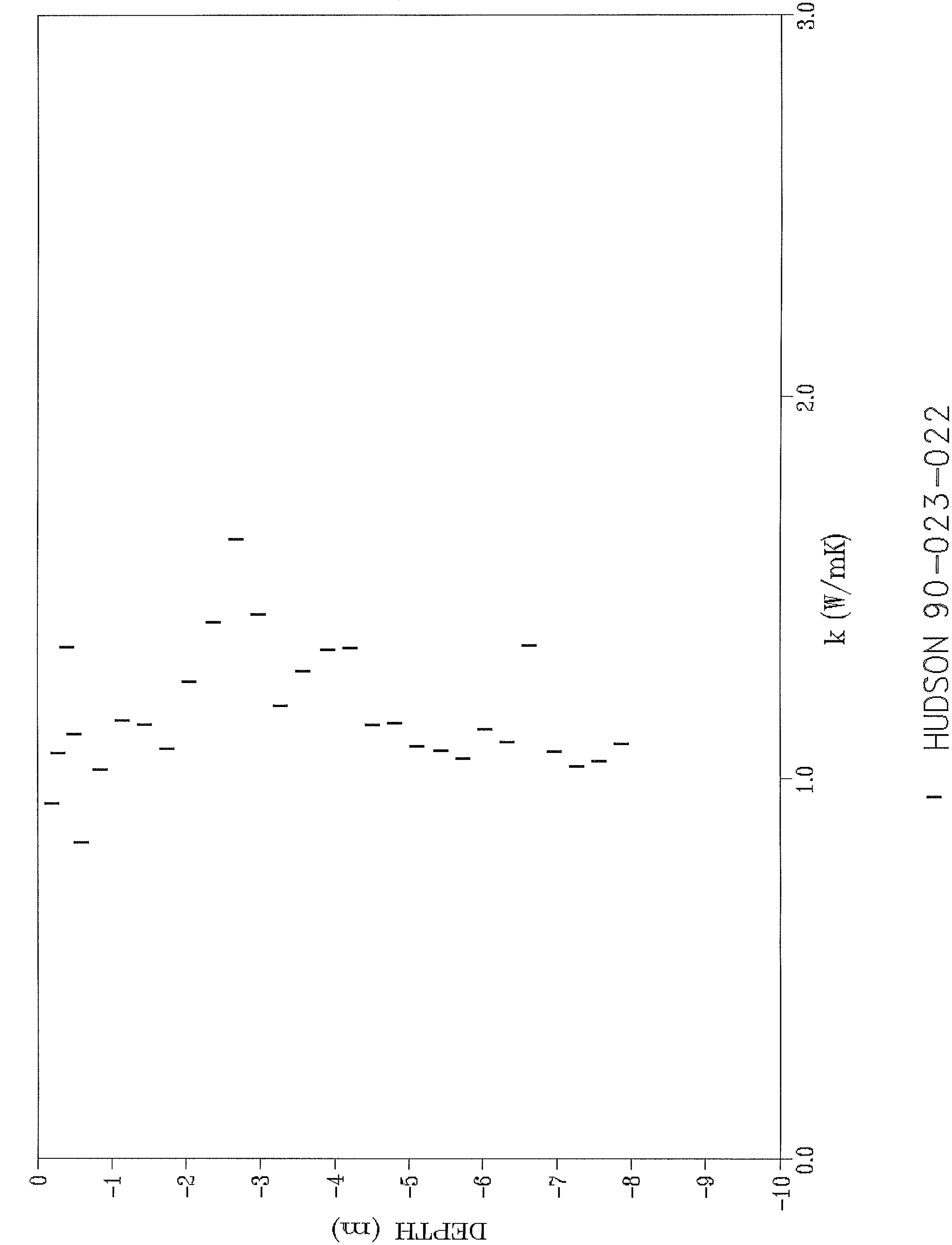
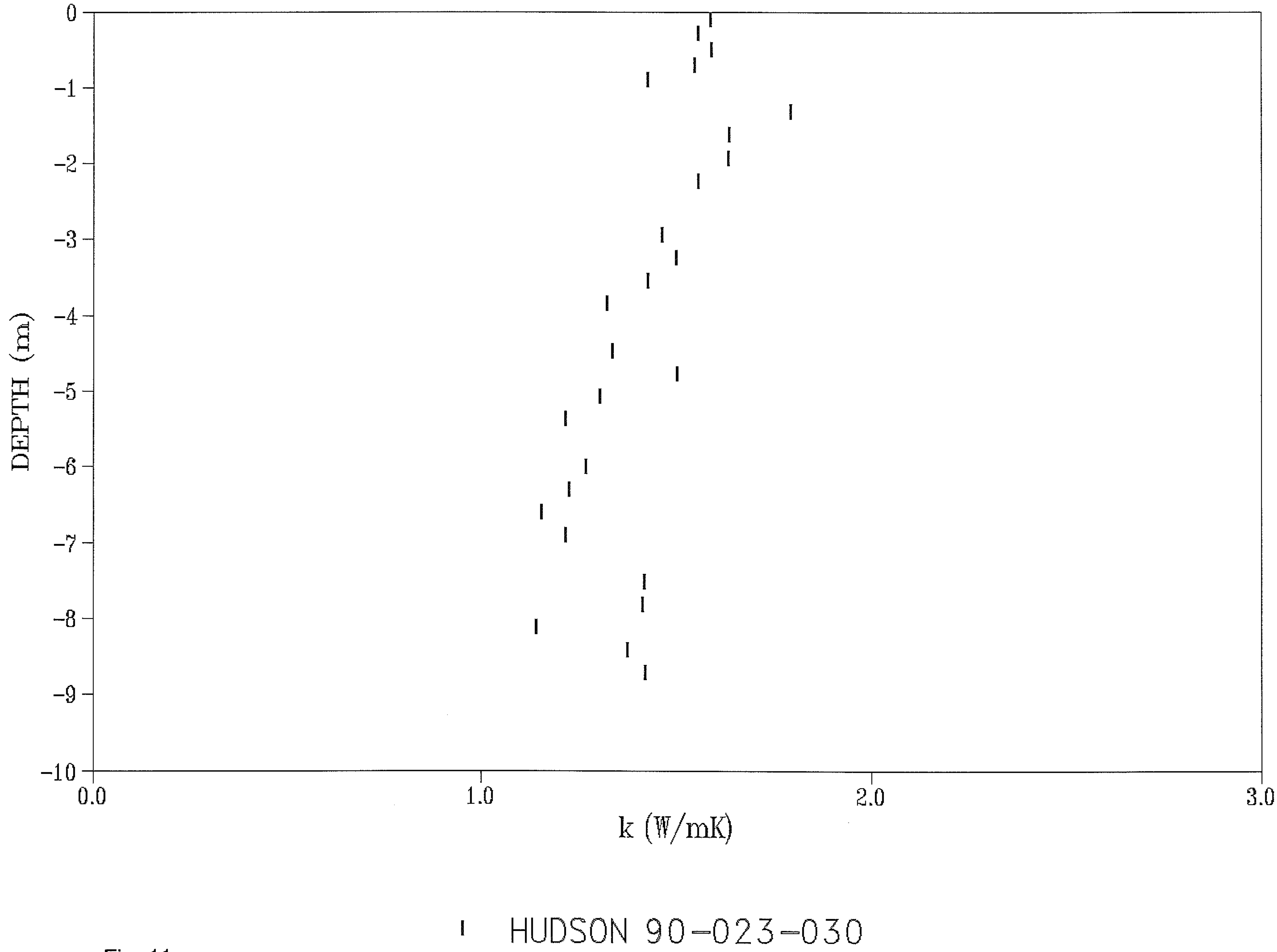


Fig. 10



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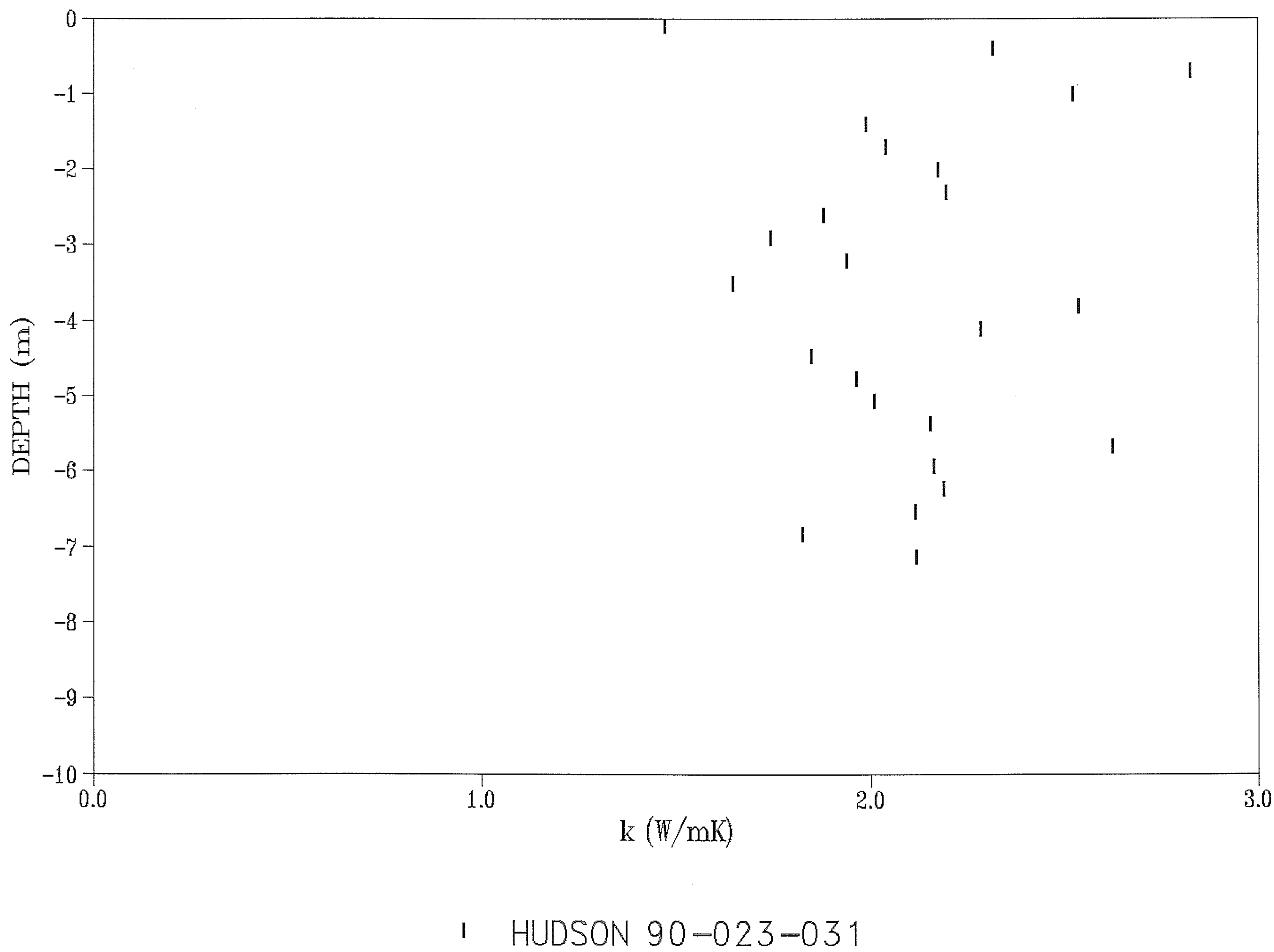


Fig. 12

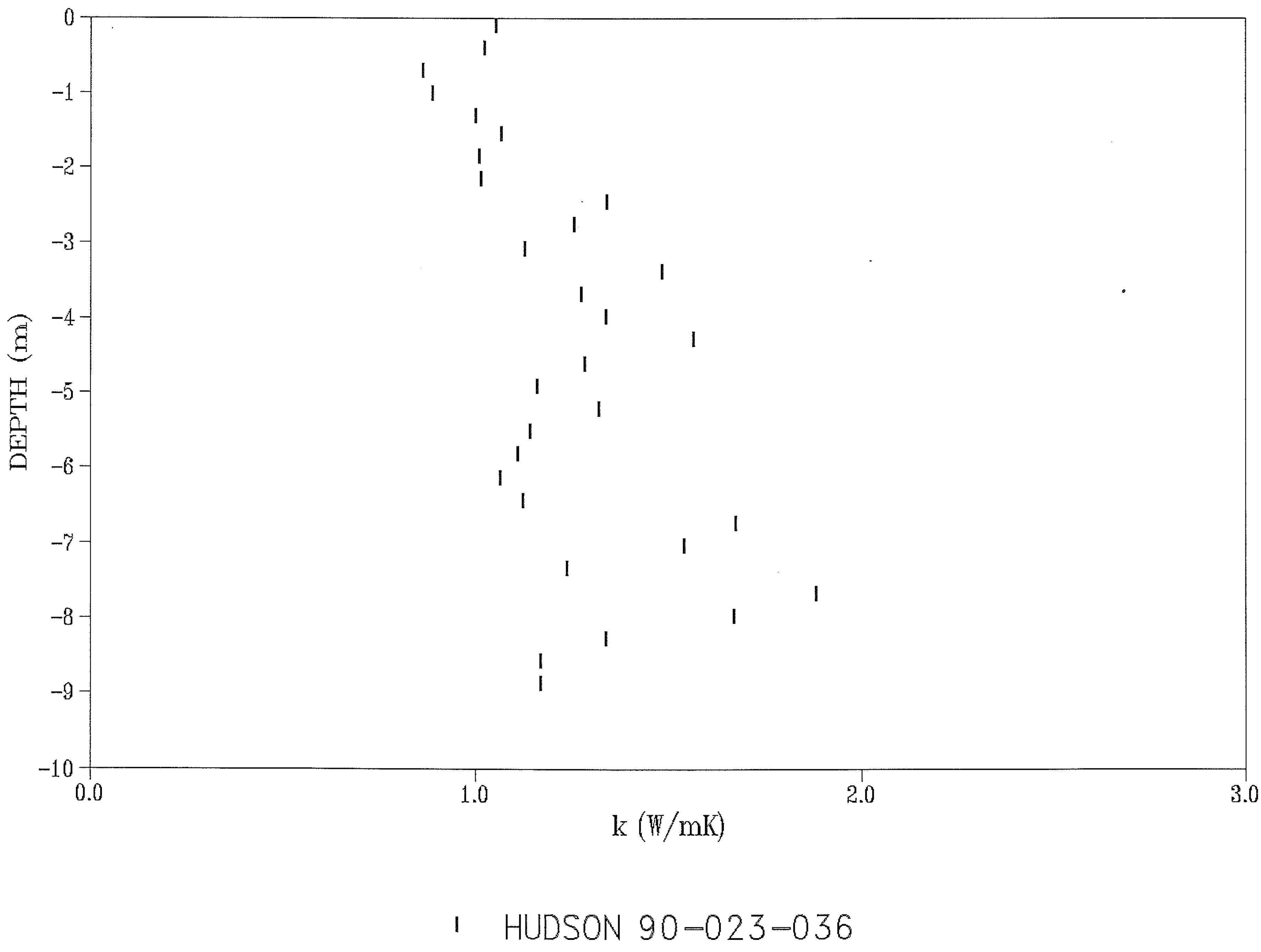


Fig. 13

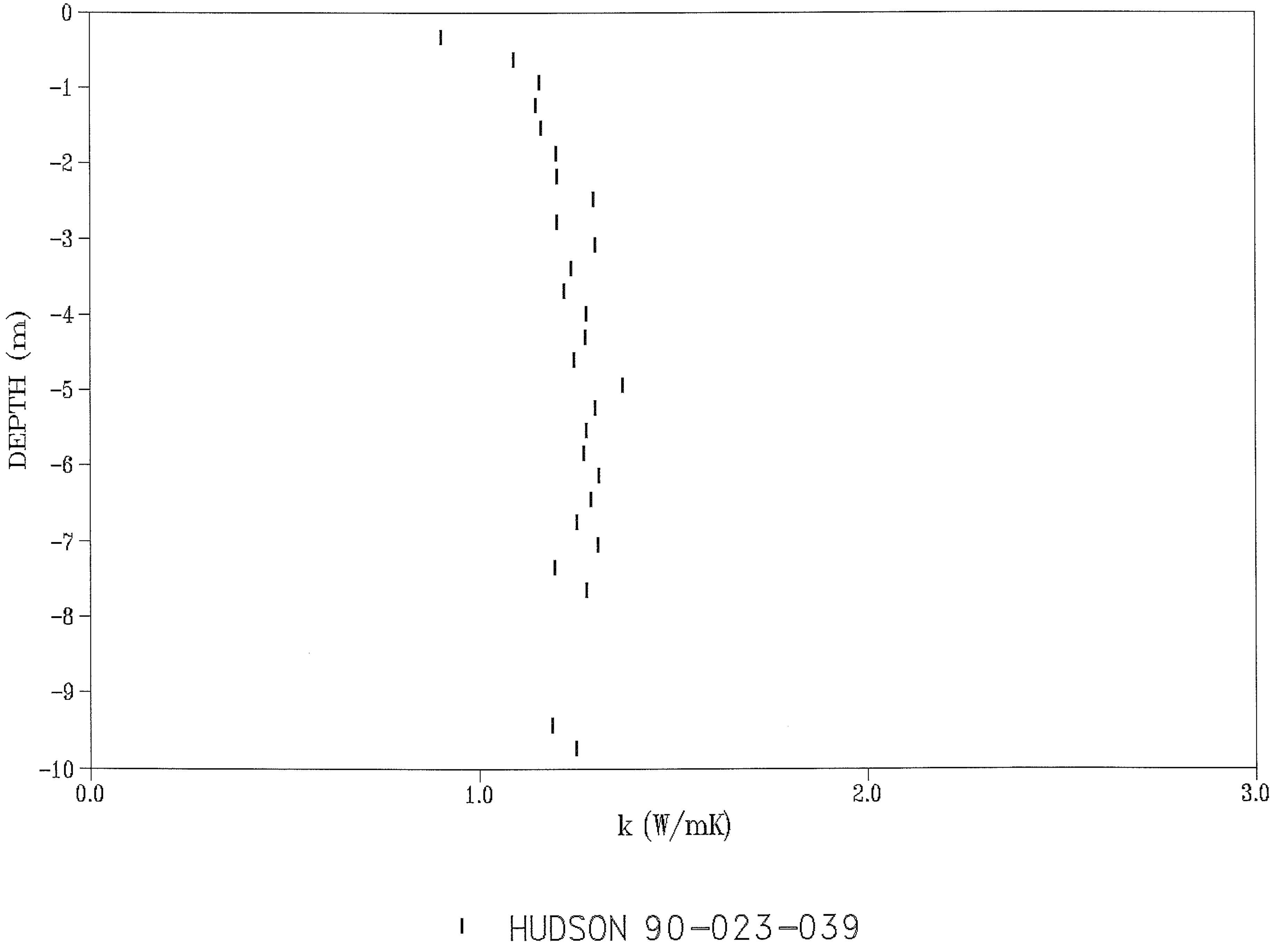


Fig. 14

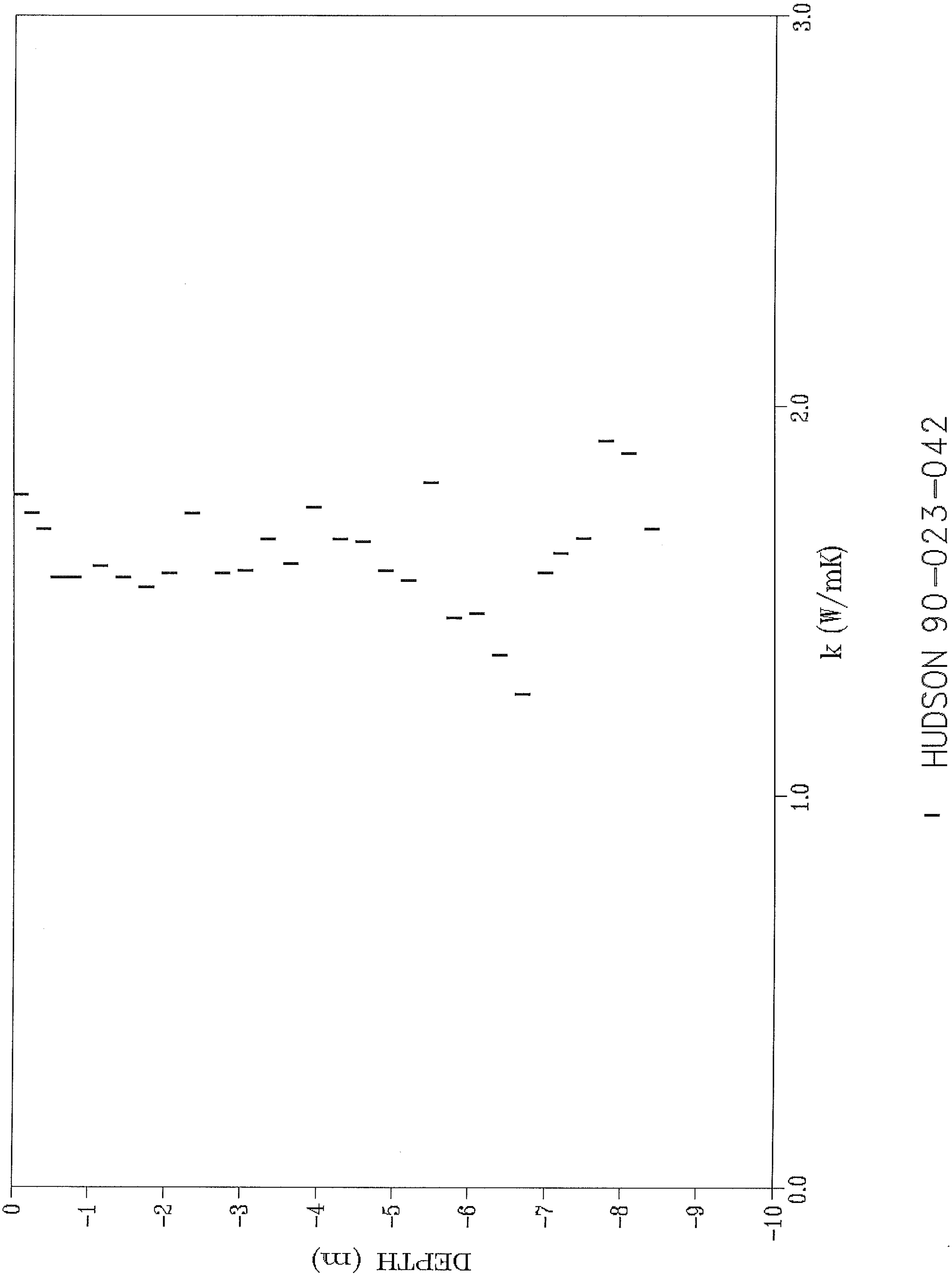


Fig. 15

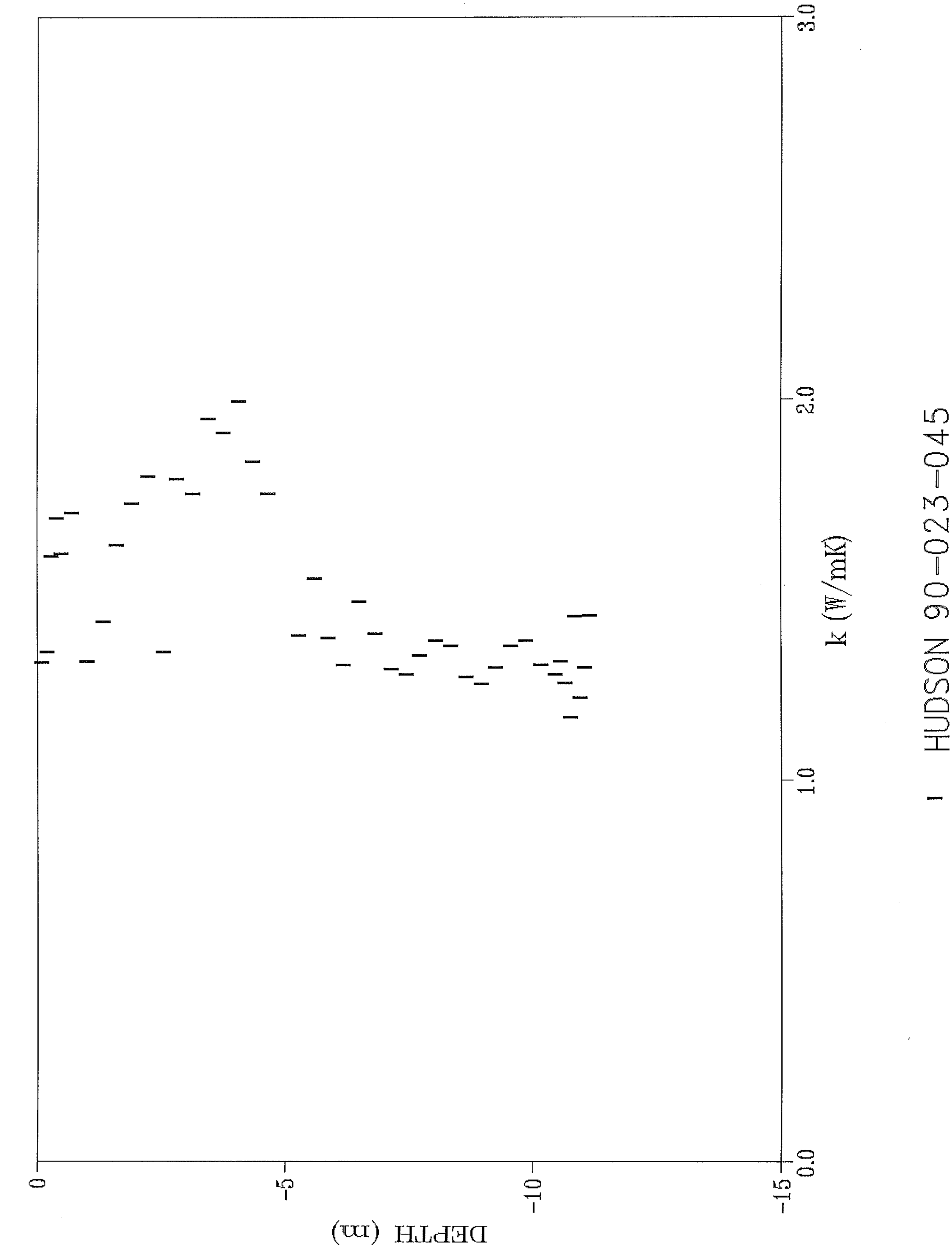


Fig. 16

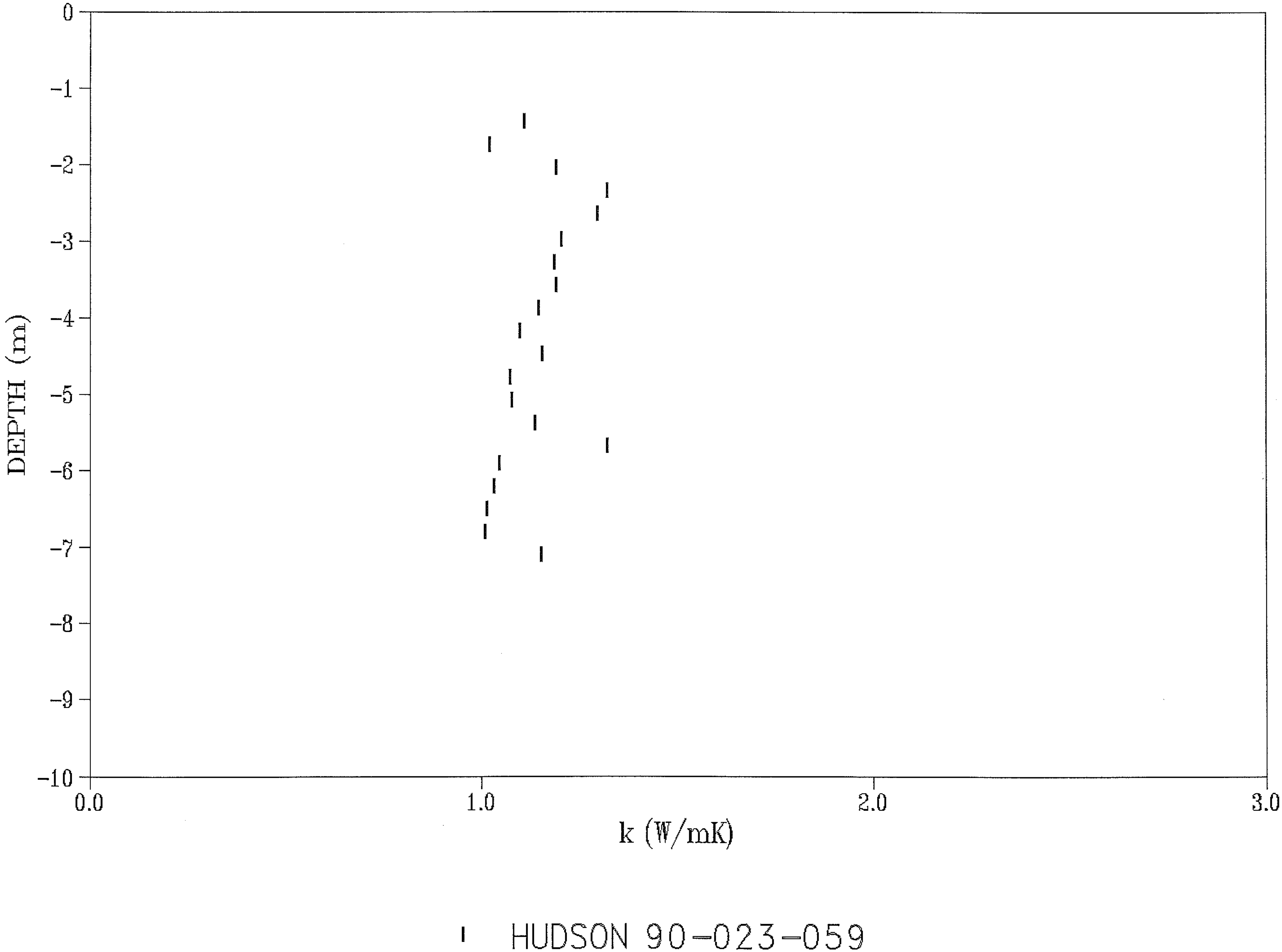


Fig. 17

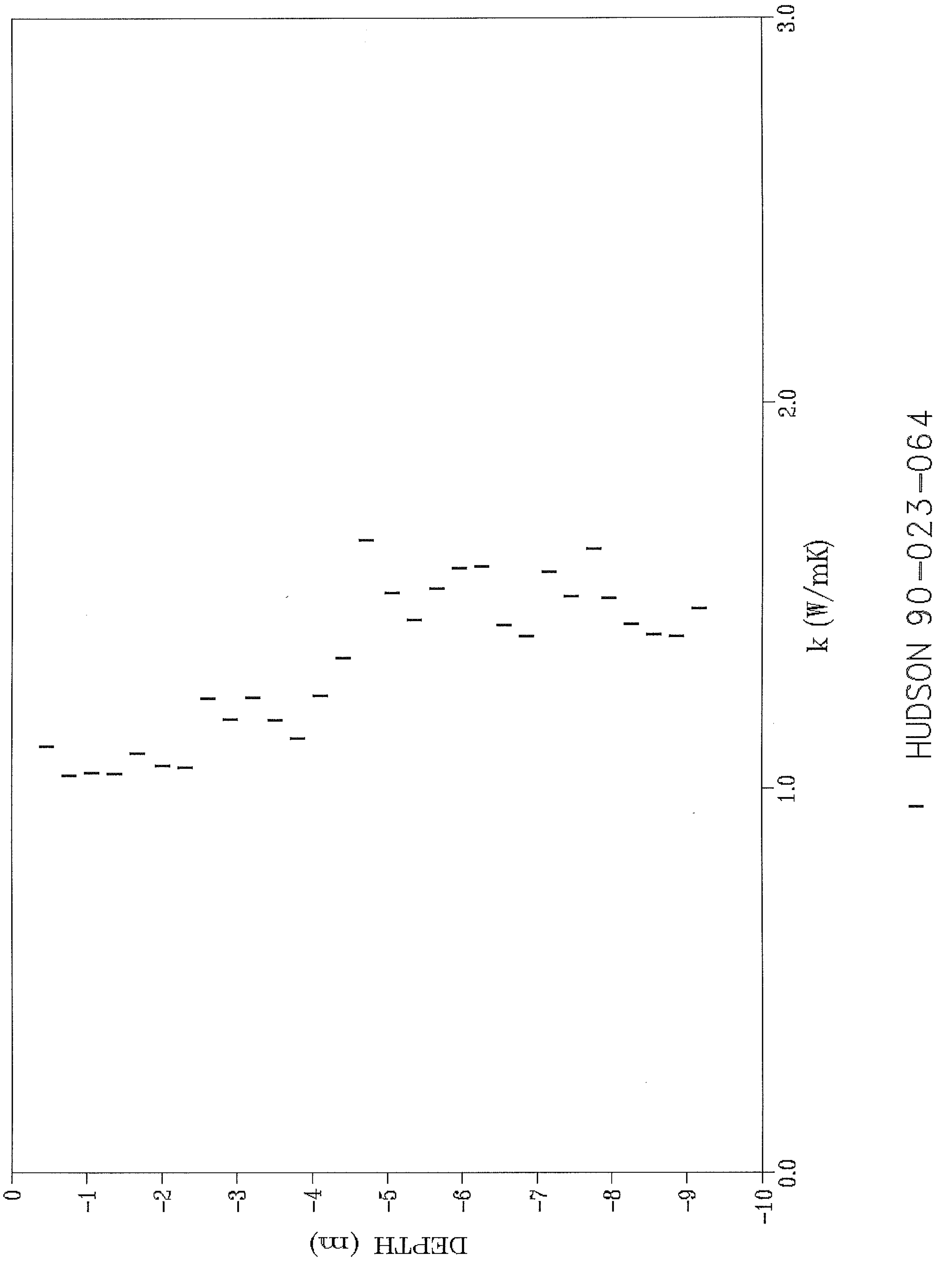


Fig. 18

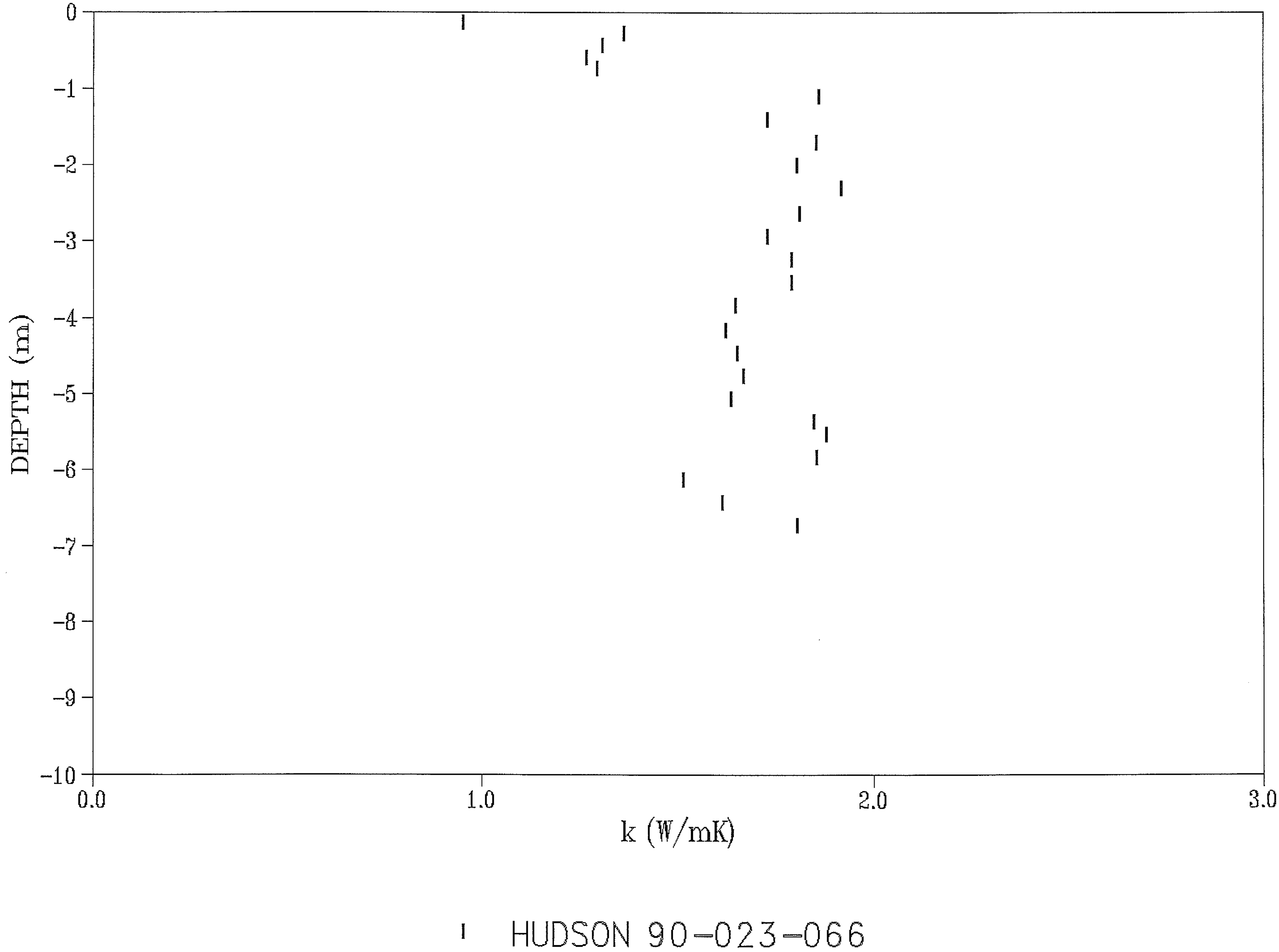


Fig. 19

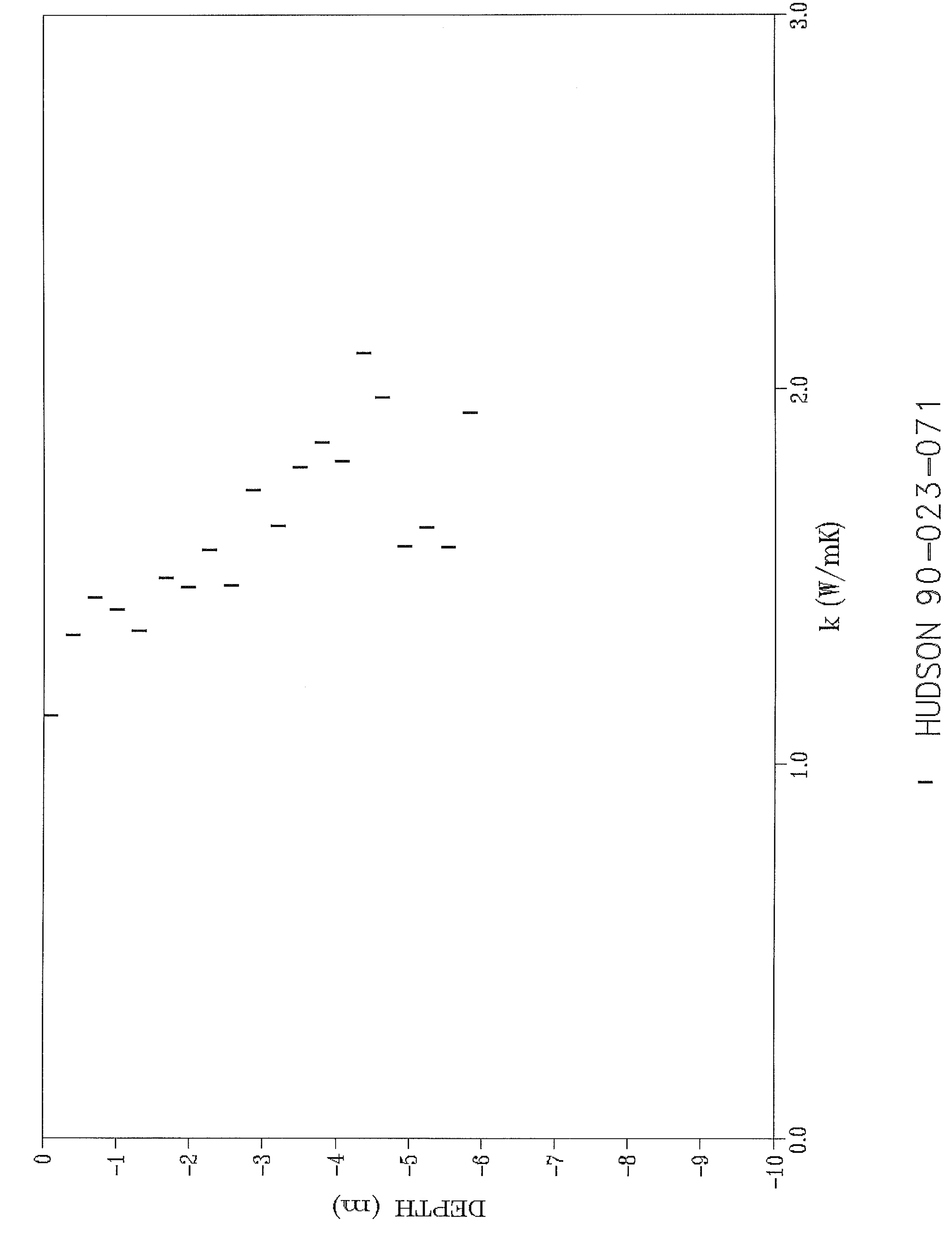


Fig. 20

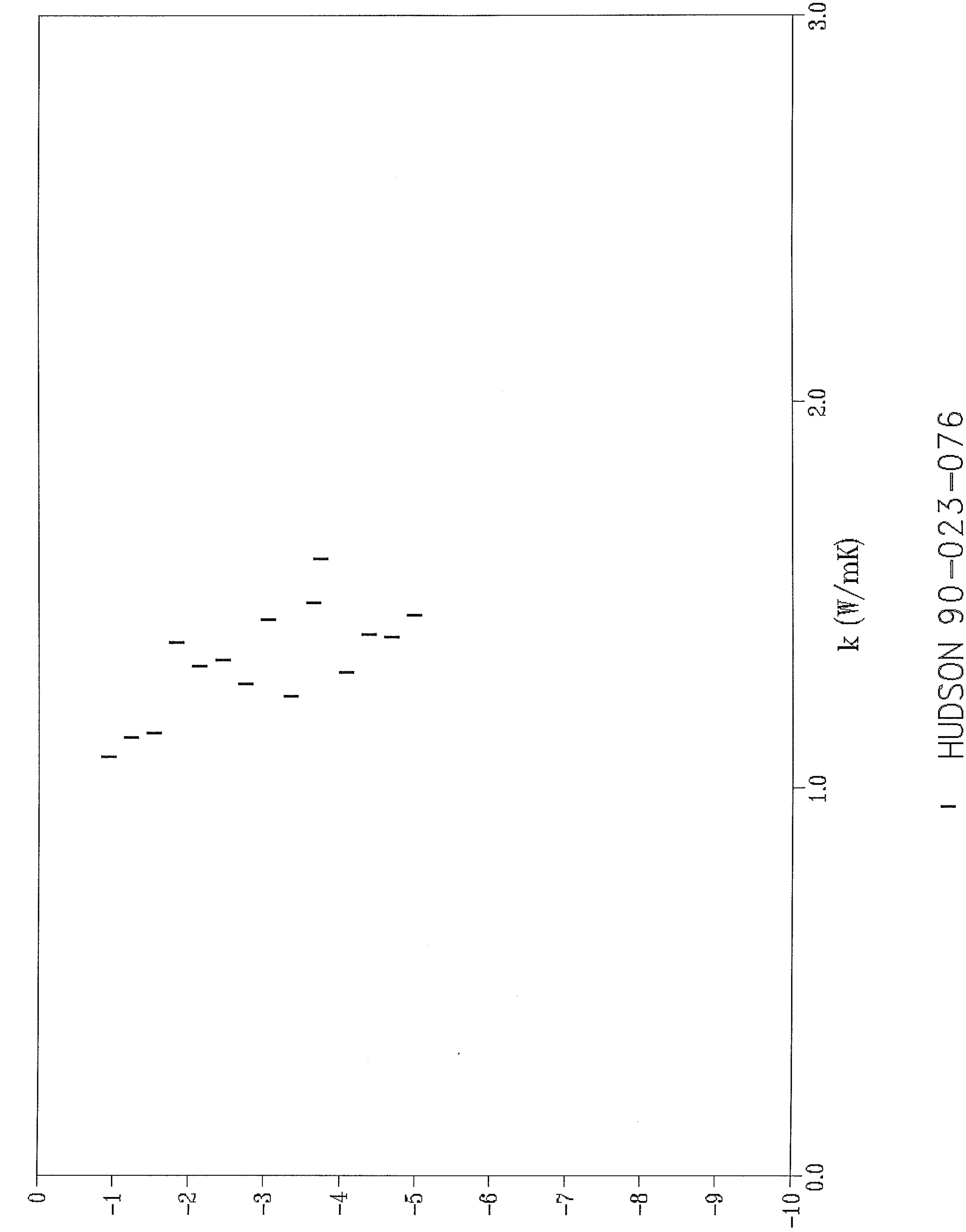


Fig. 21

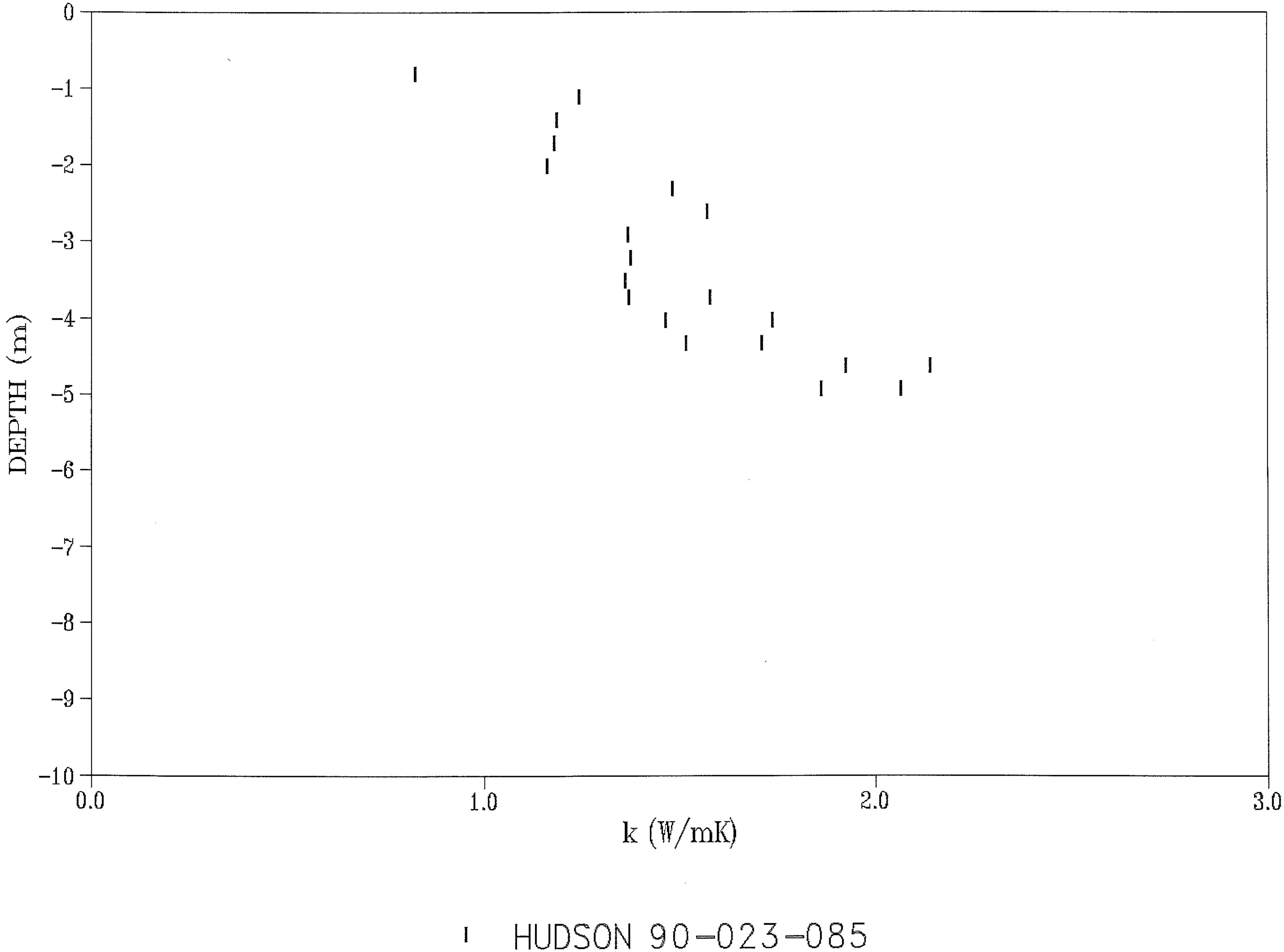


Fig. 22

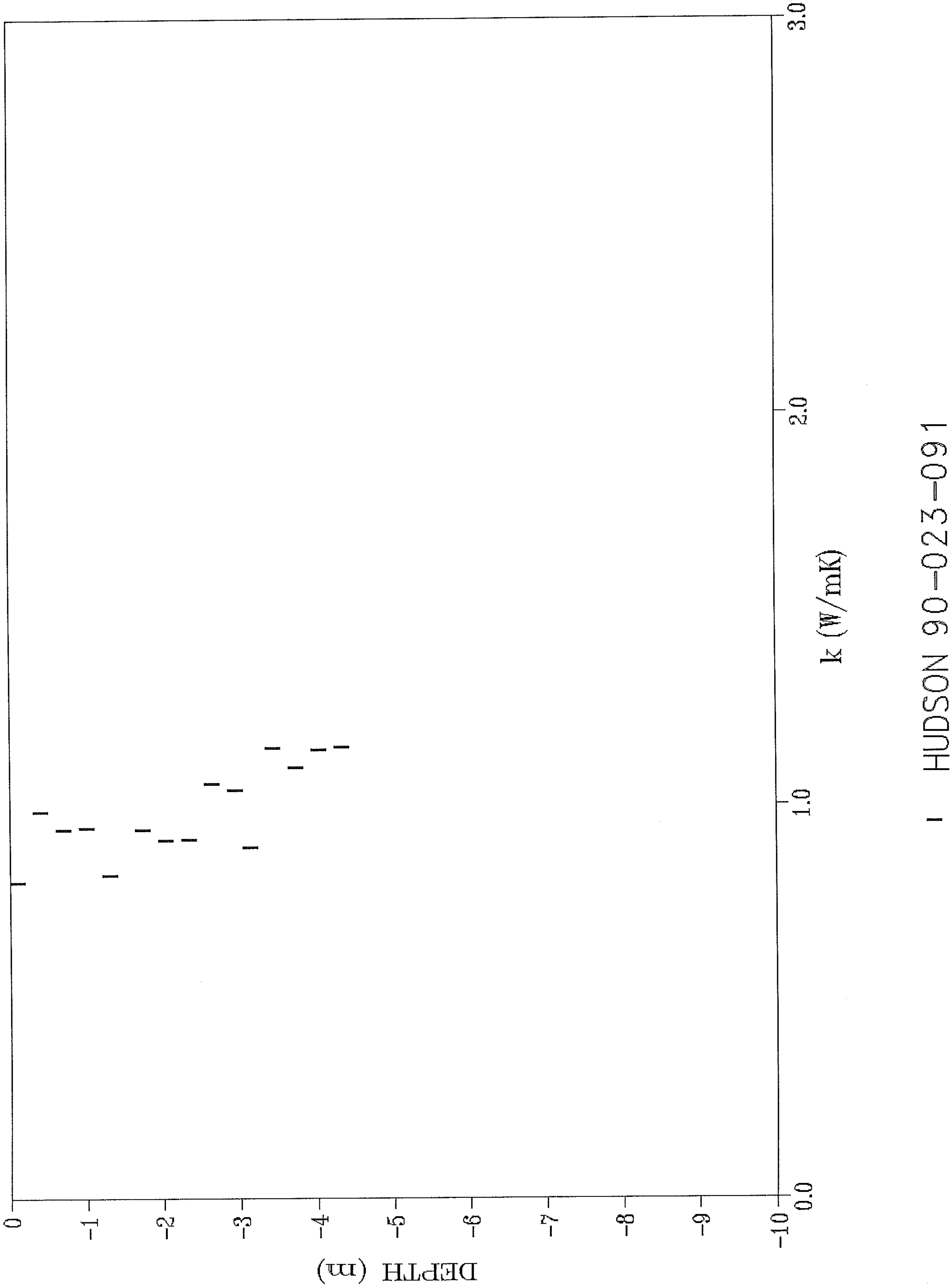


Fig. 23

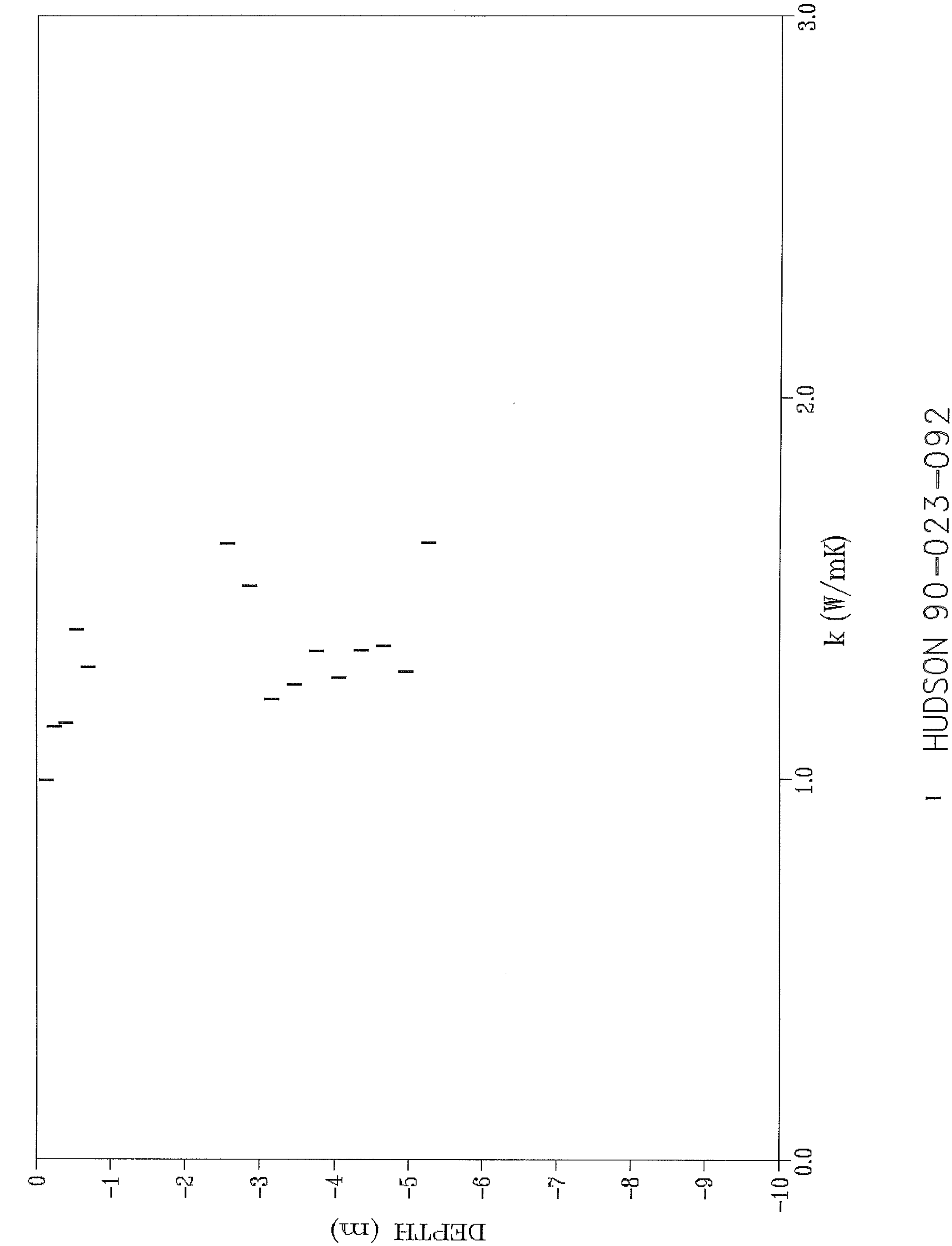


Fig. 24

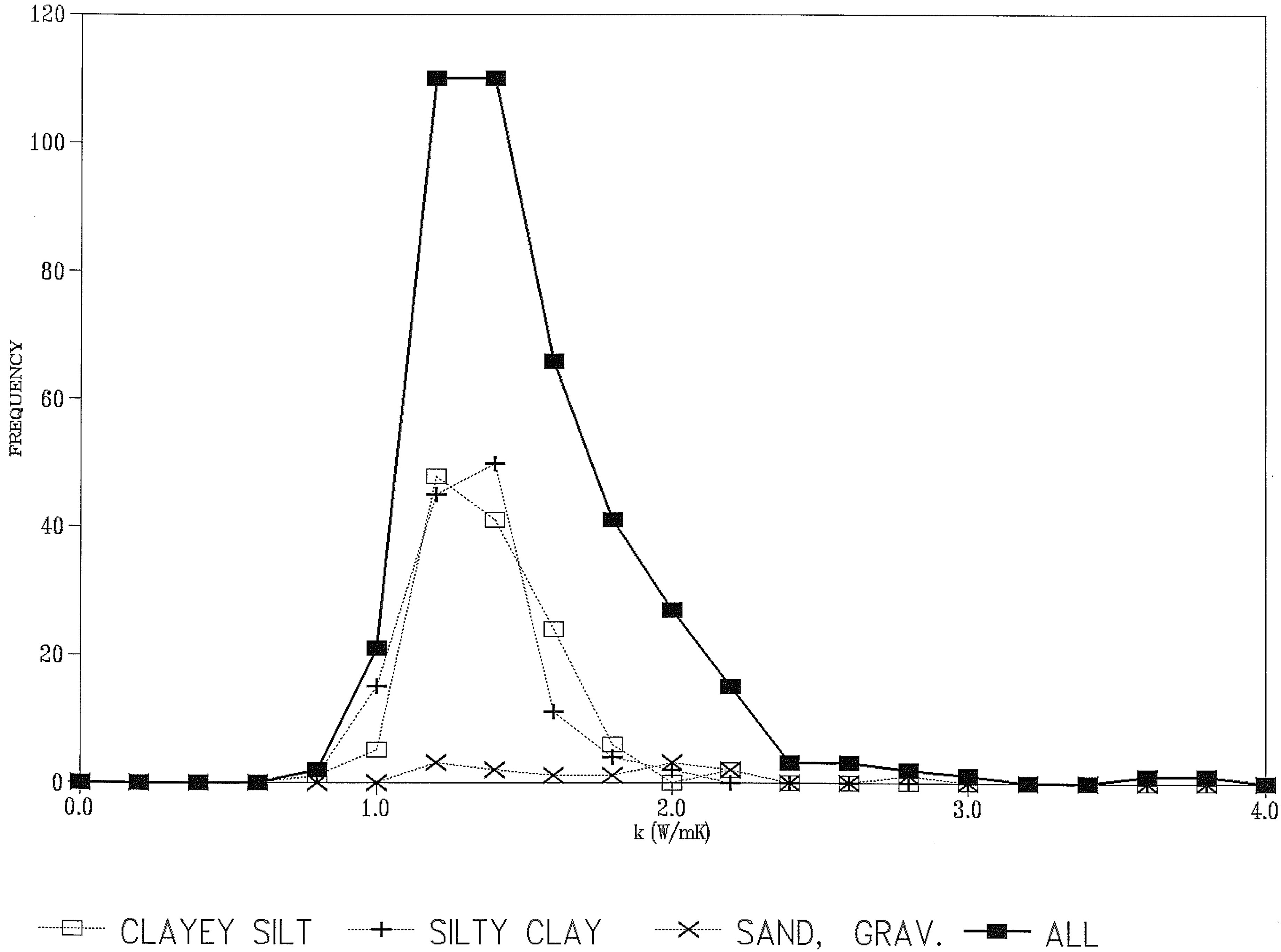

120
100
80
60
40
20
0
FREQUENCY
0.0
1.0
2.0
3.0
4.0
k (W/mK)
CLAYEY SILT
SILTY CLAY
SAND, GRAV.
ALL

Fig. 25

B. In-situ Property Measurements

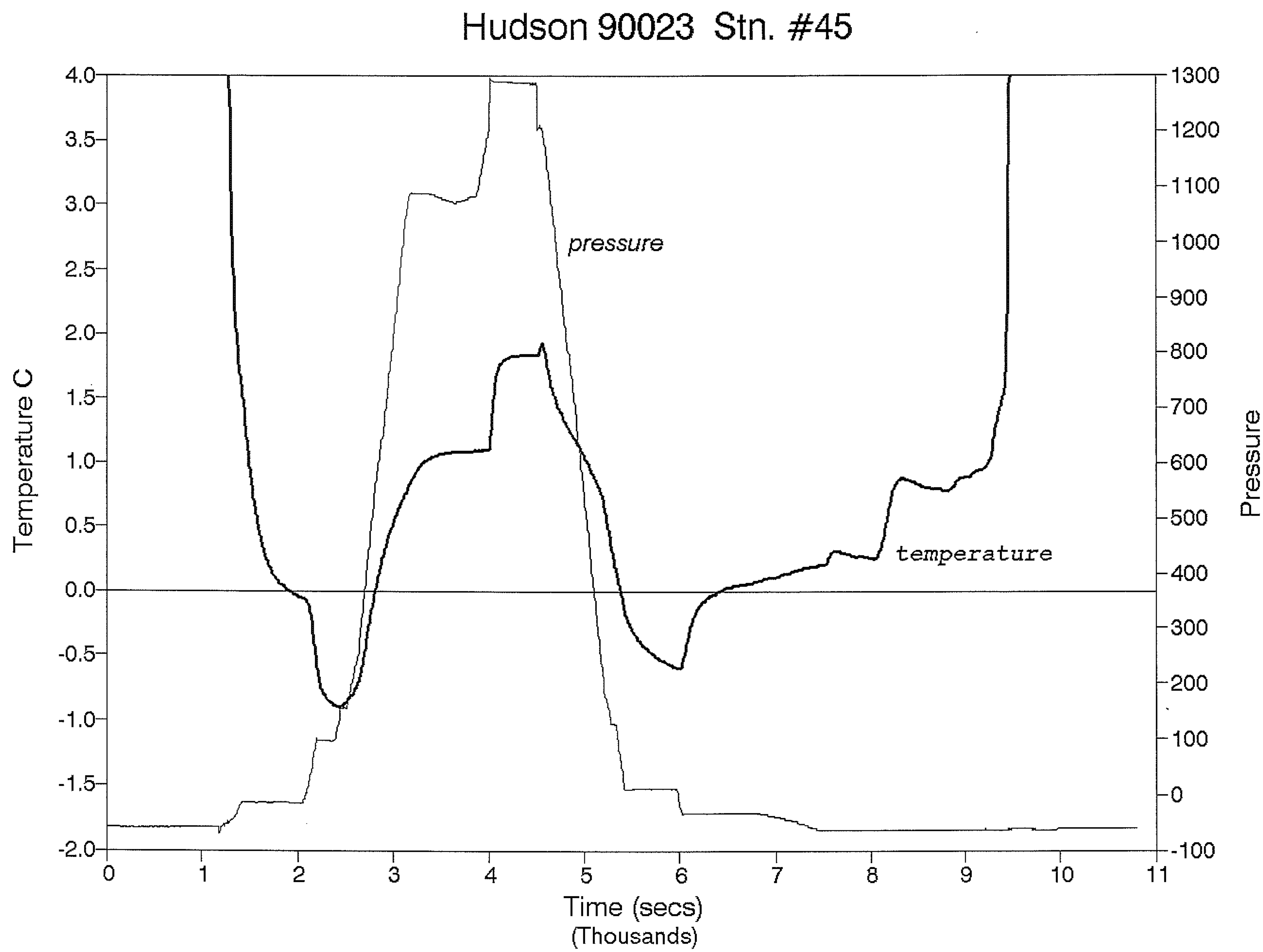
An instrument was designed similar to the LAST core cutter head developed several years ago at AGC (Moran, pers. comm.) and after the concept of an instrument designed by Woods Hole for the ODP (Koehler and Von Herzen, WHOI report 86-3, 1986; Horai and Von Herzen, Init. Rep. DSDP LXXXVI, 759-777, 1985). This "smart" core cutter is similar to the LAST tool but without the lateral stress capability; also, it was made for the larger, 4" piston corer known as the AGC Long Coring Facility. The device, called TAPPT for "temperature and pore pressure tool", was designed and built by Adara Systems Ltd., Port Coquitlam, BC.

The prototype instrument was used to measure in-situ temperature and pore pressure at full depth of penetration at 3 stations; several other stations were attempted, but an intermittent electronic problem interfered with the recovery of data and the program was terminated early. Figure 26 shows the record at station 045, illustrating (1) the temperature and pressure record as the piston corer is put into the water (around 2100 sec) and lowered in a couple of stages to tripping point at the seabed, (2) the elevated sediment temperatures and pore pressures upon penetration (4000 sec) and (3) the subsequent pull-out from the sediments (4500 sec) and (4) recovery to air (5300 sec). Detail of the in-situ phase is shown in Figure 27.

Equilibrium sediment temperatures are obtained from the transient temperatures following penetration, as the tool responds both to higher sediment temperatures and to the frictional heating of penetration. This calculation used ODP software and is shown in Figure 28. Results at station 66 are shown in Figures 29-31.

Table 5 lists values of calculated in-situ equilibrium temperatures and pressures and the equivalent seabed values. The temperature gradient is calculated from the difference in the seabed and deep sediment temperature, and the vertical separation, using the best visual estimate of penetration. The heat flow values Q in the Table are the product of this gradient and average thermal conductivity. They appear higher than the 1979 paper (38 +/- 5 mWm^{-2}) but would decrease if the apparent penetration was underestimated. The pore pressures at stations 045, 064 and 066 appear to be 2-3 times hydrostatic, relative to the seabed. Sediments penetrated at these stations are glaciomarine and post-glacial marine deposits.

Electronic problems with the TAPPT limited the number of successful stations and caused the program to be terminated early. However, two general deficiencies were noted. First, the long time constant for the temperature measurement makes for an unacceptably long period for the ship to hold station in water of a few hundred metres depth; a design modification is being considered. Second, the gradient calculation requires a more reliable method of determining the vertical distance, the apparent penetration of the barrels.



Hudson 90023 Stn. #45
Temperature C
Pressure
Time (secs)
(Thousands)
pressure
temperature
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
-0.5
-1.0
-1.5
-2.0
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
-100
0
1
2
3
4
5
6
7
8
9
10
11

Fig. 26

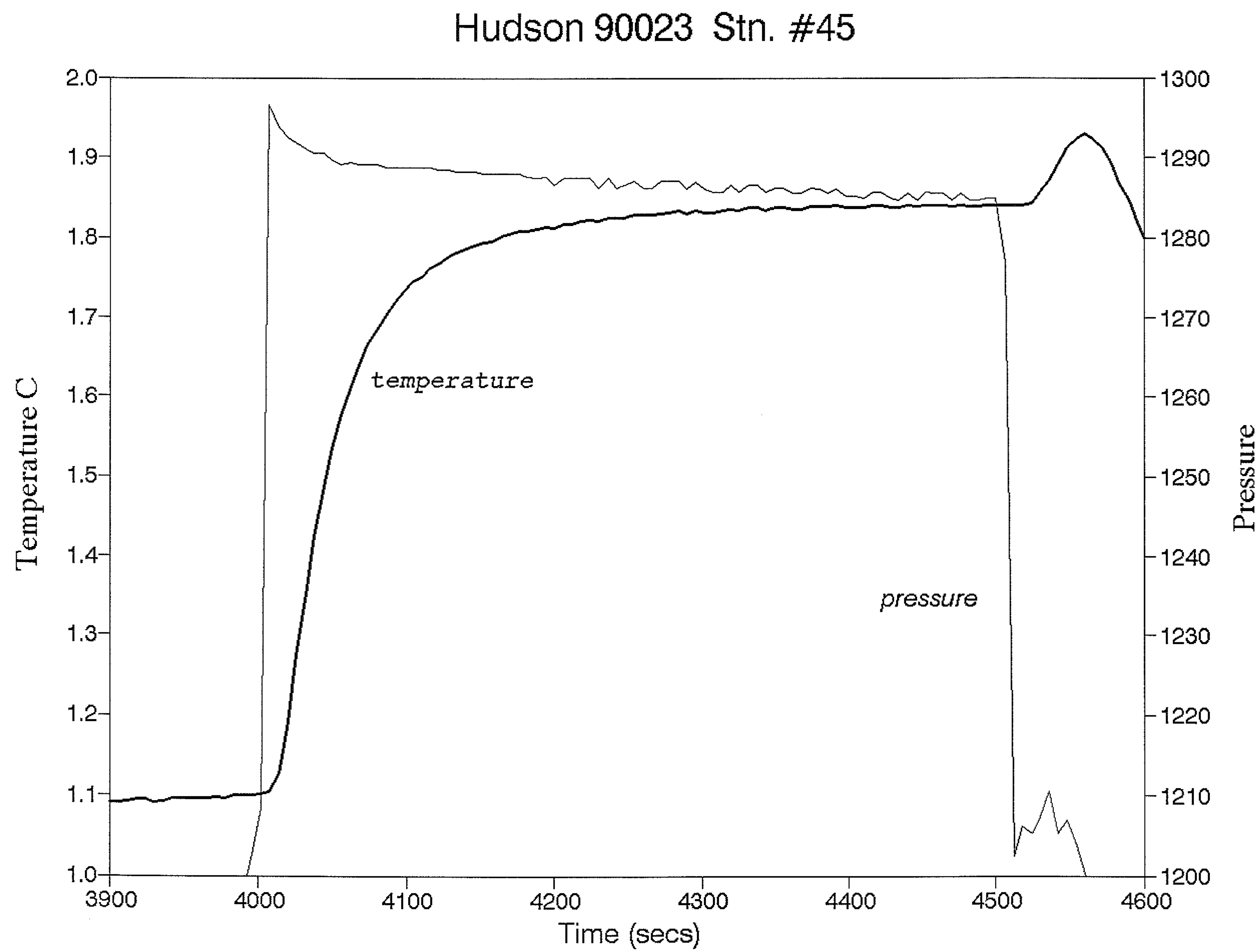

Hudson 90023 Stn. #45
Temperature C
Pressure
Time (secs)
temperature
pressure
2.0
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1.0
1300
1290
1280
1270
1260
1250
1240
1230
1220
1210
1200
3900
4000
4100
4200
4300
4400
4500
4600

Fig. 27

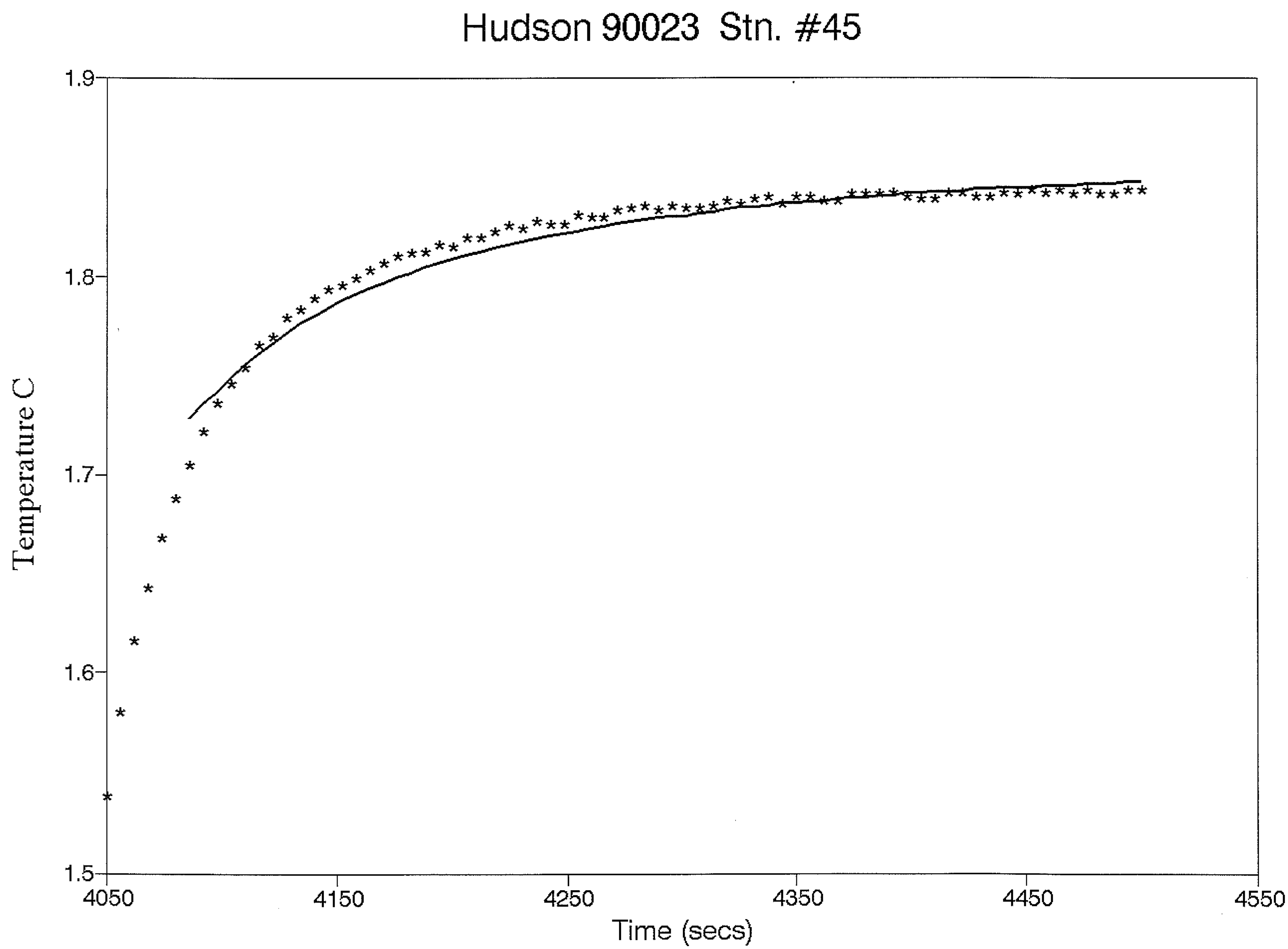

Hudson 90023 Stn. #45
Temperature C
1.9
1.8
1.7
1.6
1.5
4050
4150
4250
4350
4450
4550
Time (secs)

Fig. 28

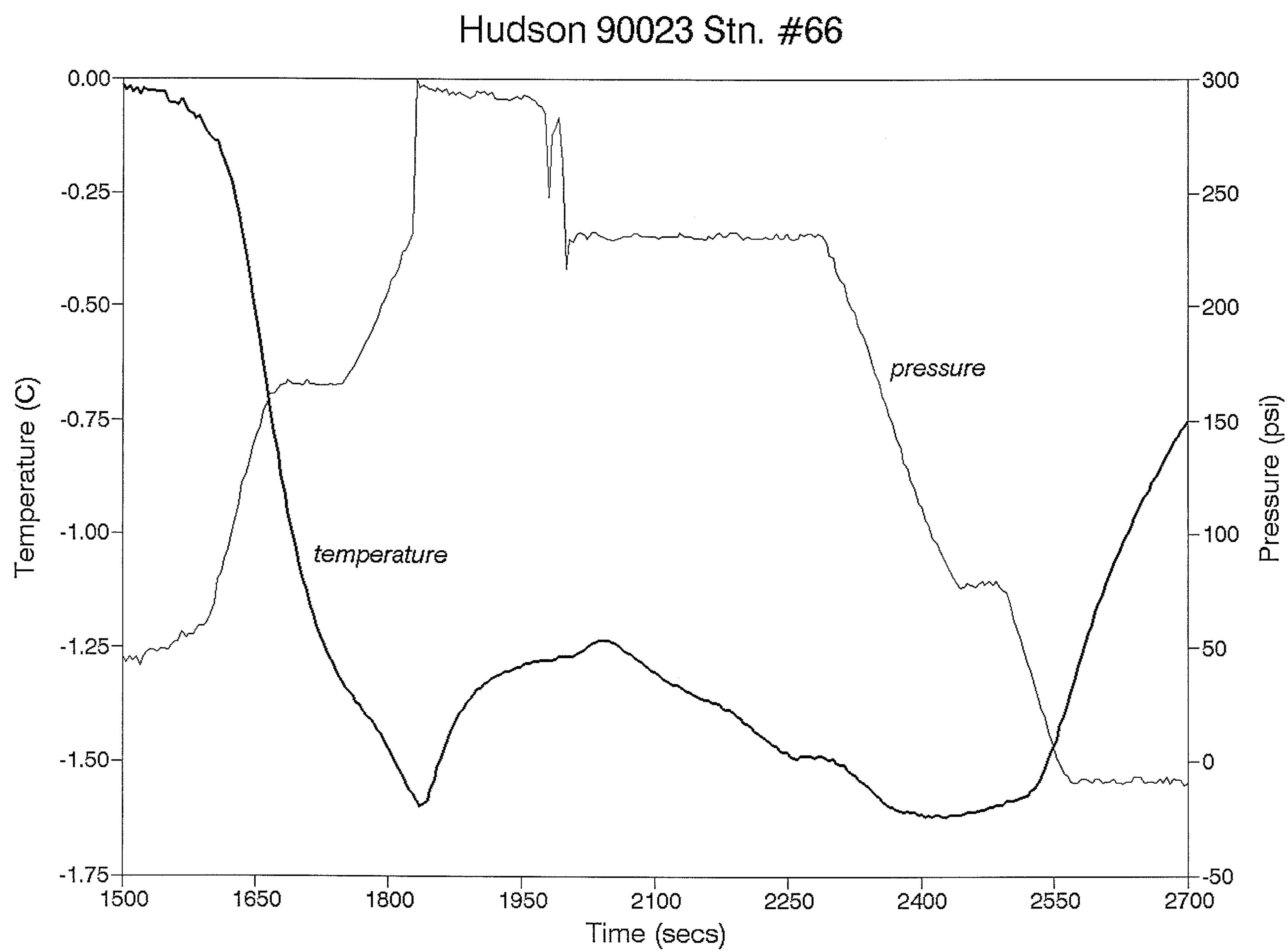

Hudson 90023 Stn. #66
Temperature (C)
0.00
-0.25
-0.50
-0.75
-1.00
-1.25
-1.50
-1.75
Pressure (psi)
300
250
200
150
100
50
0
-50
Time (secs)
1500
1650
1800
1950
2100
2250
2400
2550
2700
temperature
pressure

Fig. 29

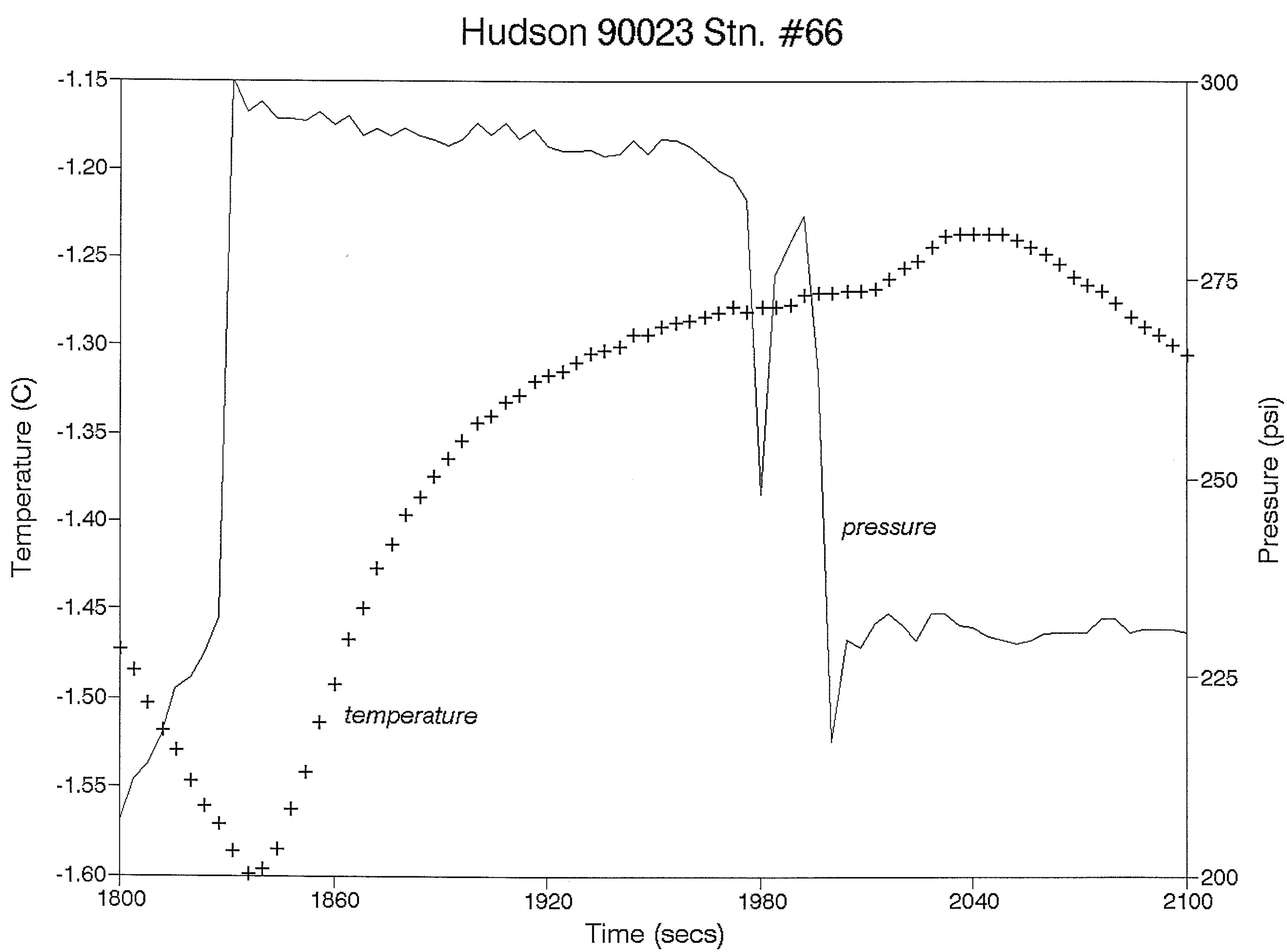

Hudson 90023 Stn. #66
Temperature (C)
-1.15
-1.20
-1.25
-1.30
-1.35
-1.40
-1.45
-1.50
-1.55
-1.60
Pressure (psi)
300
275
250
225
200
1800
1860
1920
1980
2040
2100
Time (secs)
temperature
pressure

Fig. 30

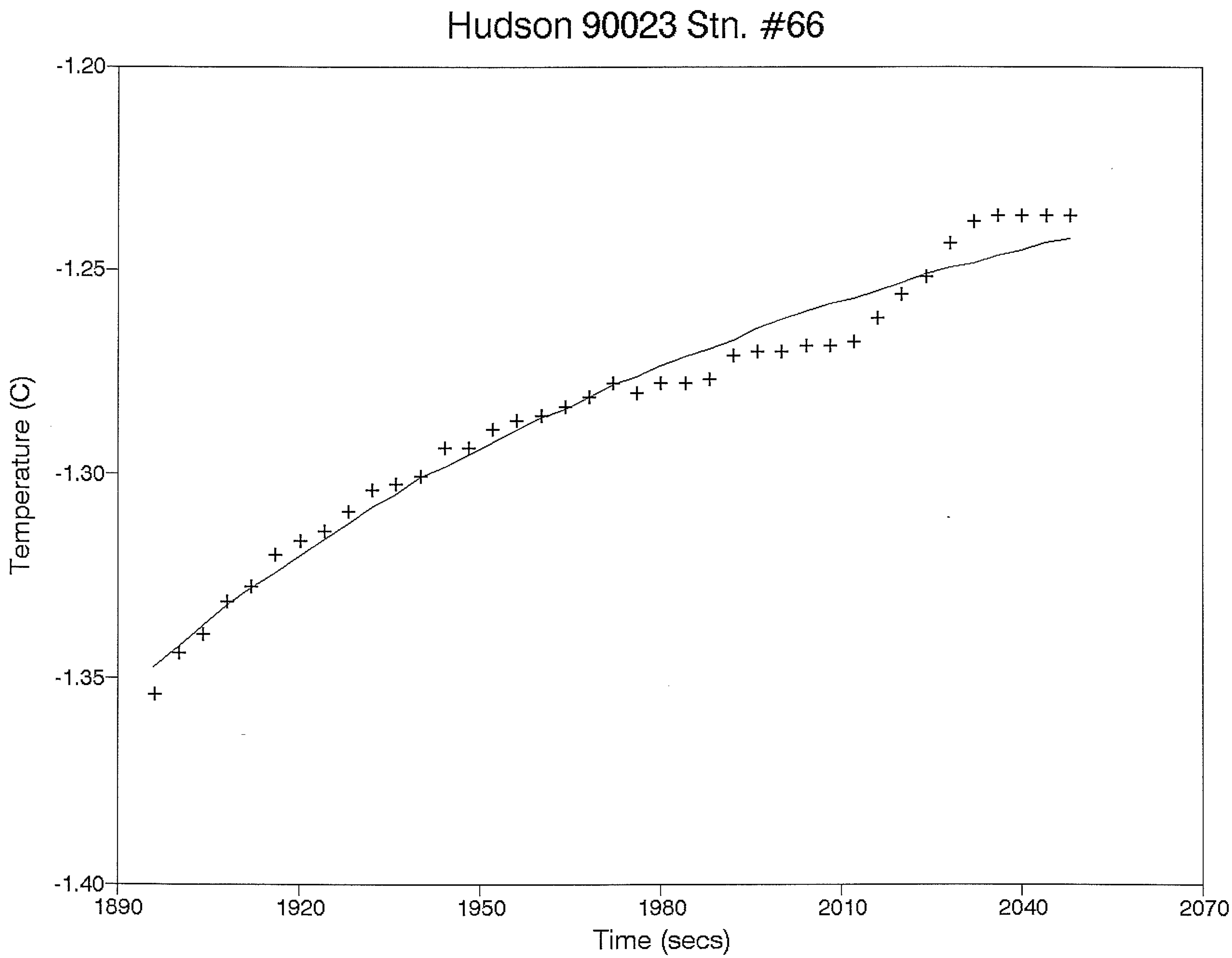

Hudson 90023 Stn. #66
Temperature (C)
-1.20
-1.25
-1.30
-1.35
-1.40
1890
1920
1950
1980
2010
2040
2070
Time (secs)

Fig. 31

C. Temperature Profiles of the Water Column and Bottom-Water Temperatures

Water temperatures were recorded from TAPPT and from separate data loggers deployed at the camera stations. At stations 55 and 78, two Brancker Research type XL-200 loggers were attached to the camera frame. These loggers measure both pressure and temperature, and pressure has been used as the measure of depth (10.094 kPa increase per metre depth). Precision is +/- 0.2 K in temperature; estimated +/- 3m in absolute depth. Figures 32 and 33 show the water temperature profiles at stations 55 and 78, respectively.

As TAPPT is lowered to and raised from the sea floor, a water temperature profile is also obtained; however, temperatures are skewed in the direction of motion due to thermal lag arising from the large thermal mass and time constant of the temperature sensor (e.g. Fig. 26). Going down at station 45, a temperature minimum of -0.9°C is recorded at 2100-2300s, coincident with a brief stop around 70m to mount a pinger; water temperatures then increase and become positive probably somewhat above 400m. Estimates from the curve coming up are probably less reliable due to the thermal mass of the sediment in the cutter. TAPPT bottom water temperatures are summarized in Table 5.

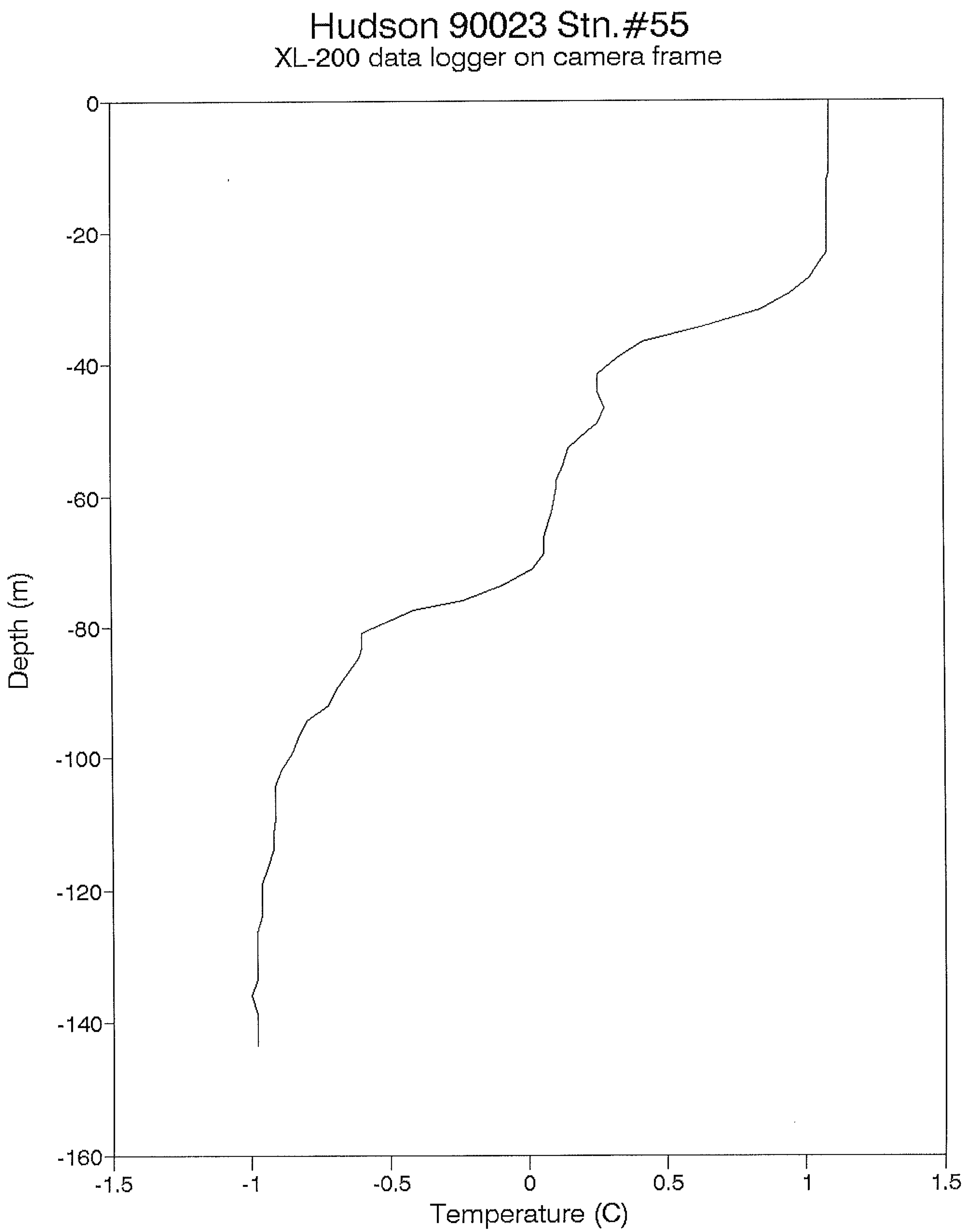

Hudson 90023 Stn.#55
XL-200 data logger on camera frame
Depth (m)
0
-20
-40
-60
-80
-100
-120
-140
-160
-1.5
-1
-0.5
0
0.5
1
1.5
Temperature (C)

Fig. 32

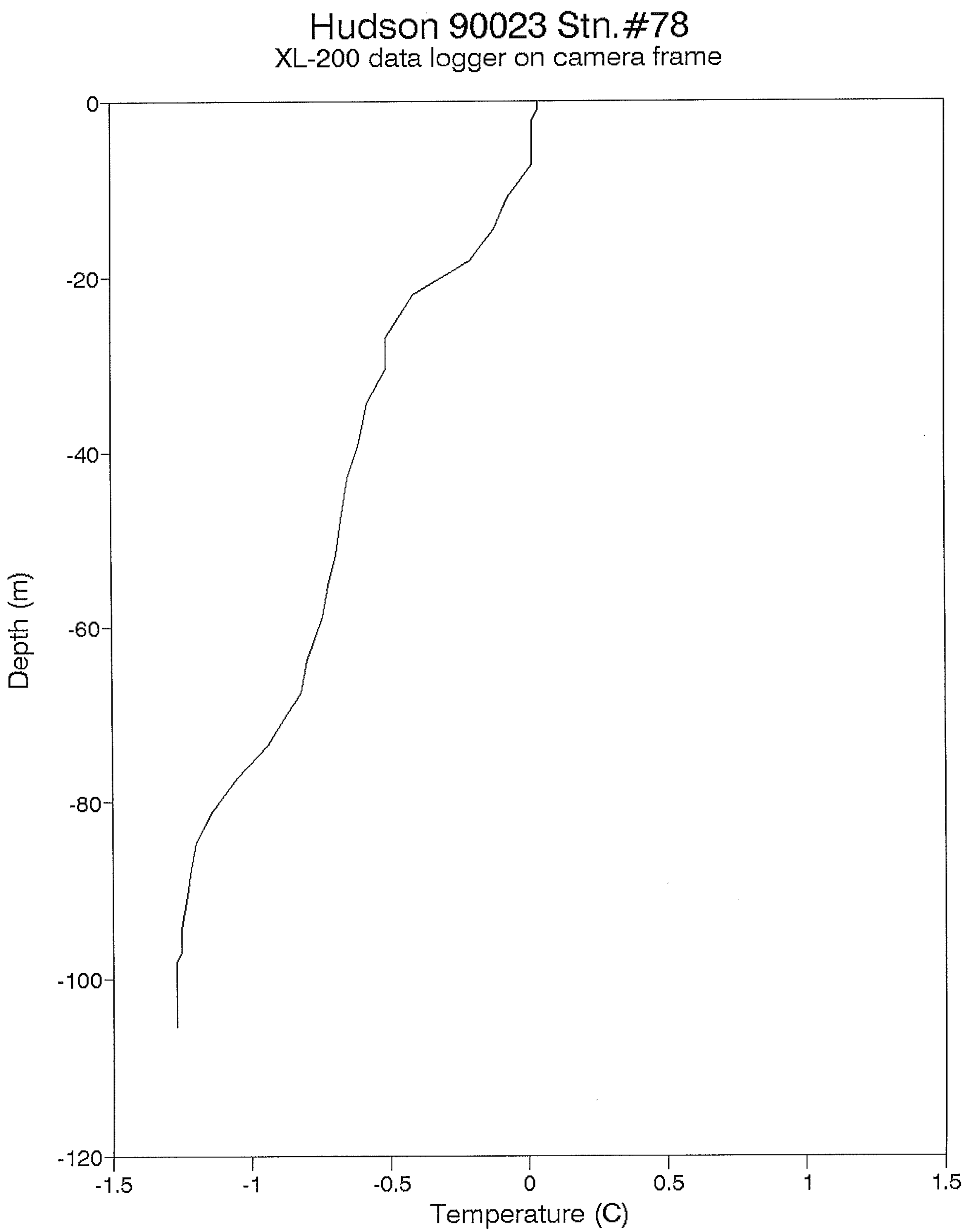
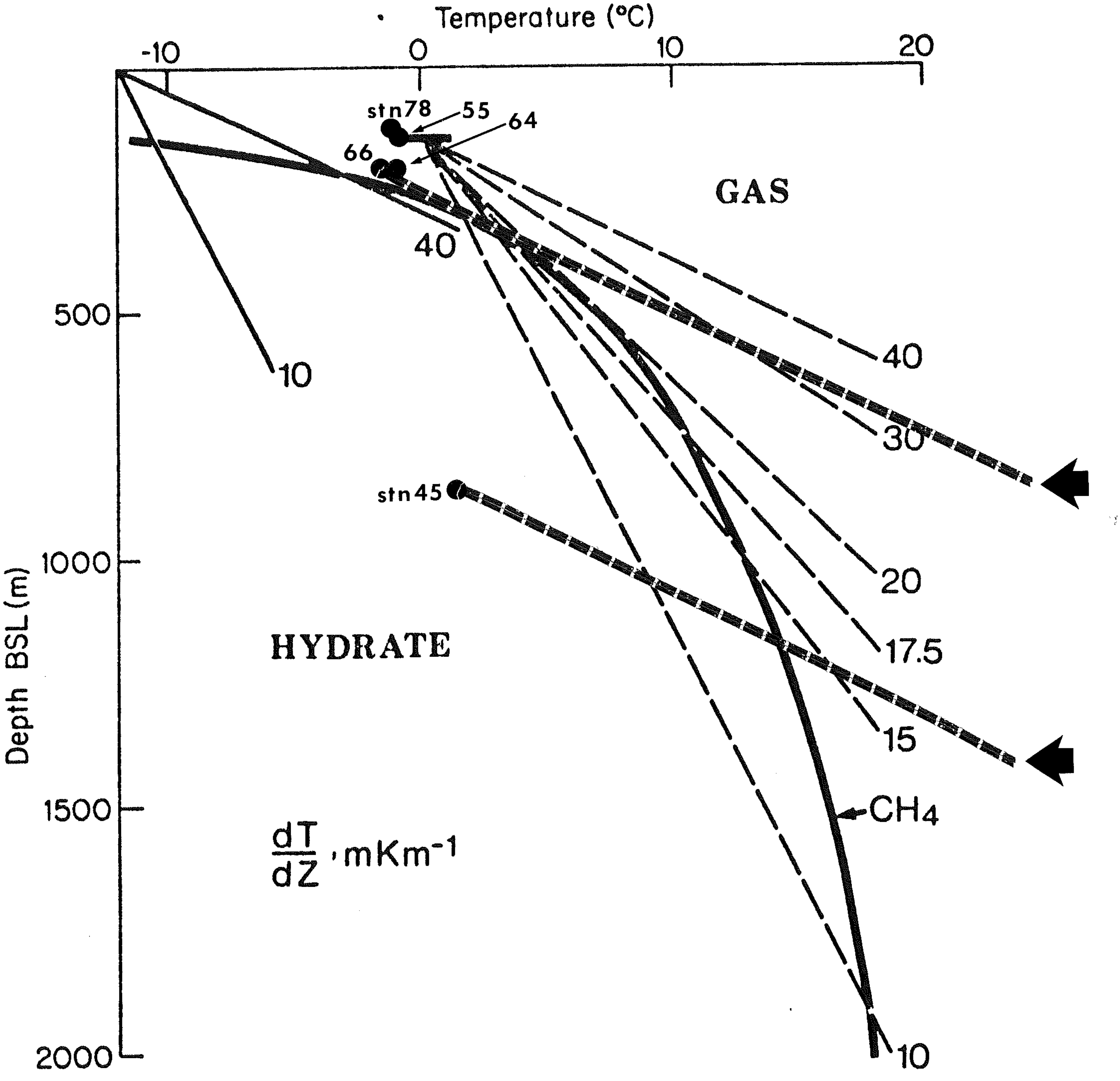

Hudson 90023 Stn.#78
XL-200 data logger on camera frame
Depth (m)
0
-20
-40
-60
-80
-100
-120
-1.5
-1
-0.5
0
0.5
1
1.5
Temperature (C)

Fig. 33

D. Gas Hydrate Stability Zone

The stability curve of gas hydrate is shown in Figure 34. Given sufficient gas present, gas could exist as an ice-like compound to the left, or lower temperature side of the curve; gas in its gaseous form would exist to the right, or higher temperature side of the curve. In this offshore environment where water temperatures are near 0°C, the curve shows that hydrate is not stable at the seabed in water depths less than about 250m. In particular, the water temperatures measured in section C are plotted on this figure, with the estimated temperature gradients at stations 45 and 66. At station 45, up to 300m of hydrated sediments are possible. Samples of sediment for gas analysis were taken at most stations; the geothermal data will complement these results.



The thickness of the potential hydrate zone is quite sensitive to the geothermal gradient, as shown here for water of 150m depth. In such shallow water, hydrate is not stable for the larger gradients; in water deeper than about 250m, some hydrate might occur regardless of gradient. The same span of gradients is shown for an onshore arctic location where the surface temperature is -12°C.

Fig. 34 (from Taylor et al., 1979)

APPENDIX C - LABORATORY CORE PROCESSING: DETAILS OF OPERATION

I. Hardy, Atlantic Geoscience Centre, Bedford Institute of Oceanography
P.O. Box 1006, Dartmouth, N.S., B2Y 4A2

During this cruise all long cores, boxcores and IKU's were processed onboard (Table 2). Processing included magnetic susceptibility (INSTAAR), sediment description, split core photography, physical and acoustic property measurements as well as a variety of subsamples 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 Report #1044) and as per Figure 35.

Initial core procedures included orientation of the core liners, capping, waxing and labelling in the starboard core half container. Gas samples for onshore geochemistry measurements and consolidation samples from the last 10 centimetres of sediment penetrated were also removed at this time. Core sections were then waxed and maintained in an upright manner within the AGC sample container. Thermal conductivity was measured when temperature of the sediments stabilized thermally between 3-7°C. These measurements were made on each core (001-101 inclusive) utilizing needle probes at 30 cm intervals along a predesignated orientation splitting line, before further sampling was conducted.

Prior to sampling, each core had a designated sampling schedule posted in the GP lab. This permitted each sampling shift to conduct subsampling as per each cruise participant's requirements (Fig. 36). All subsampling performed has been documented and annotated in the Program Support database FINSS for eventual onshore downloading to SID (Sample Information Database).

After initial completion of thermal conductivity analyses, magnetic susceptibility measurements were made on whole core commencing with the core top and at 20 cm intervals downcore to total depth (TD). Then each whole core round was split longitudinally on the AGC Duits core splitter into an archive and working half. The archive core 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 (cores 101-119) for coloration analyses. A visual core description was made of the archive while geotechnical shear vane measurements were performed on the working half. This was followed by subsampling of the working halves according to the sample requirements determined for each core. Velocity measurements could not be performed due to inadequate interfacing with the software provided.

Summary

Over a 33 day period, more than 40 long cores (Table 10) and boxcores (Table 12), recovered more than 222 metres of unconsolidated sediment. In almost 30% of the core sites selected, the Trigger Weight Core (TWC) failed to penetrate the upper veneer of sediment. Examination of the upper sections of each long core, suggests that the first metres or more of sediment was not recovered in the majority of cores. Consolidation samples taken from cores in the eastern and western Hudson Strait basins and in Ungava Bay may assist assessment of the history of glacial loading in these areas.

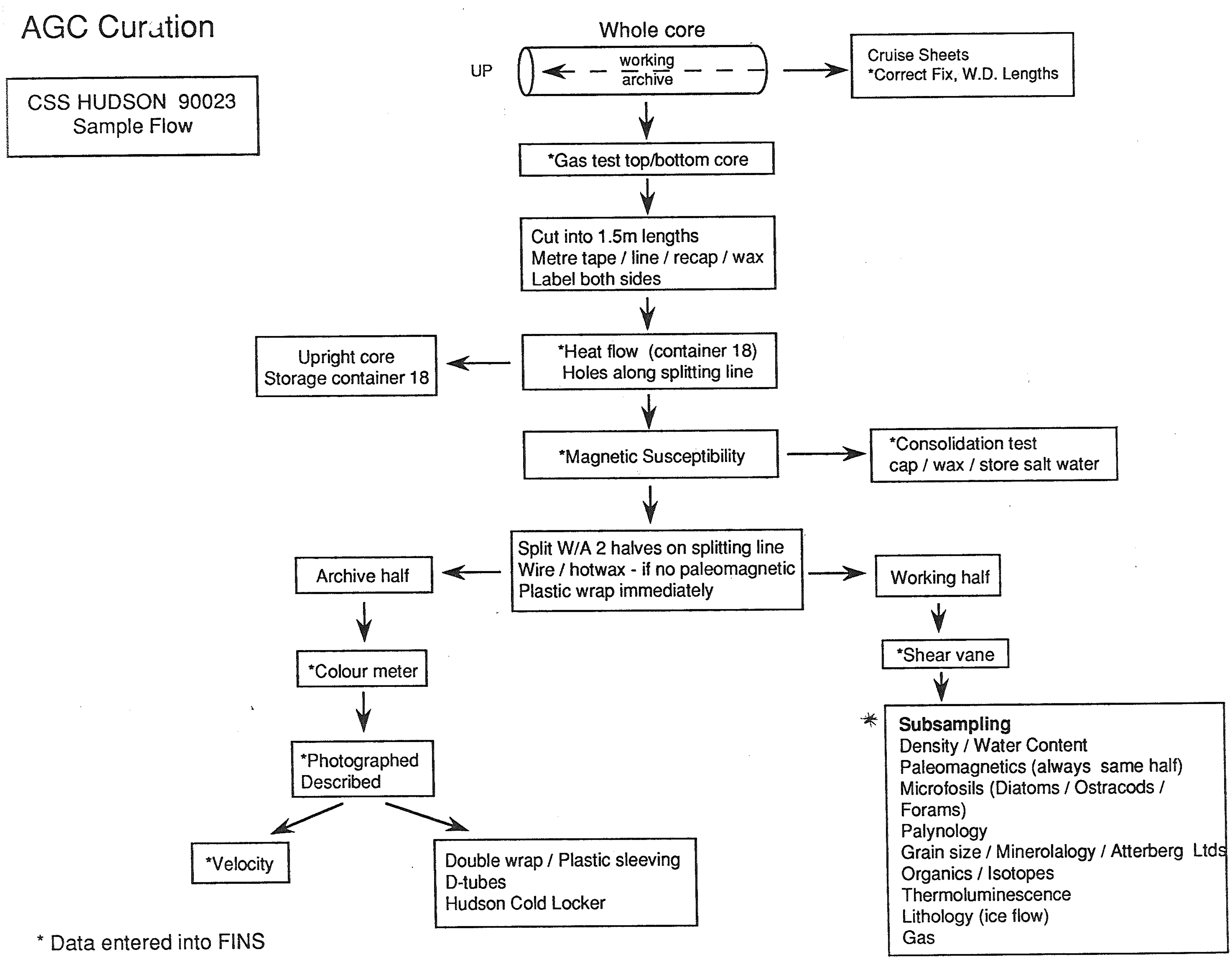

AGC Curation
CSS HUDSON 90023
Sample Flow
Whole core
UP
working
archive
Cruise Sheets
*Correct Fix, W.D. Lengths
*Gas test top/bottom core
Cut into 1.5m lengths
Metre tape / line / recap / wax
Label both sides
*Heat flow (container 18)
Holes along splitting line
Upright core
Storage container 18
*Magnetic Susceptibility
*Consolidation test
cap / wax / store salt water
Split W/A 2 halves on splitting line
Wire / hotwax - if no paleomagnetic
Plastic wrap immediately
Archive half
*Colour meter
*Photographed
Described
*Velocity
Double wrap / Plastic sleeving
D-tubes
Hudson Cold Locker
Working half
*Shear vane
*
Subsampling
Density / Water Content
Paleomagnetics (always same half)
Microfosils (Diatoms / Ostracods /
Forams)
Palynology
Grain size / Minerolalogy / Atterberg Ltds
Organics / Isotopes
Thermoluminescence
Lithology (ice flow)
Gas
* Data entered into FINS

Fig. 35

AGC Curation

CSS Hudson 900023
Sampling Schedule

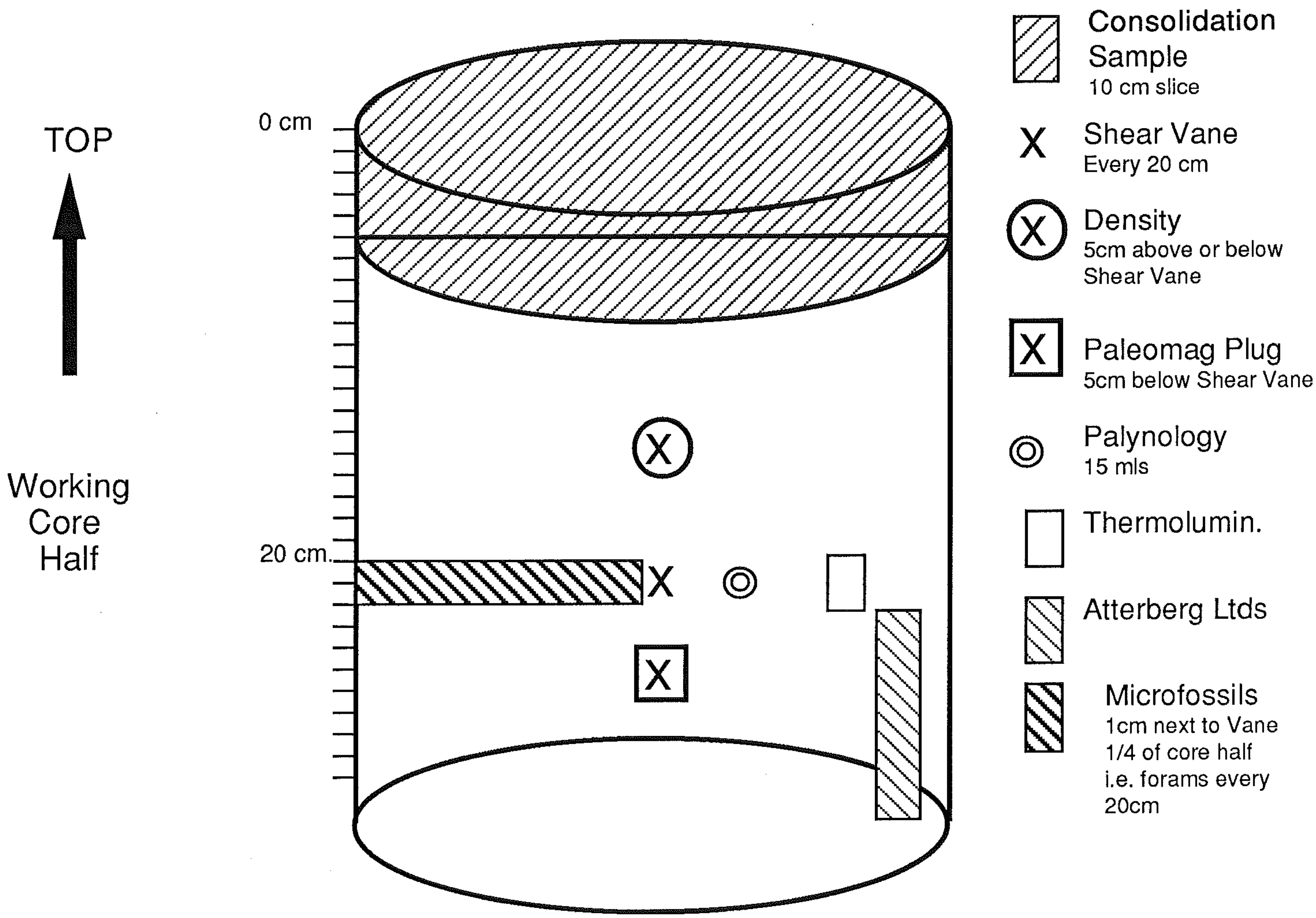


Fig. 36

APPENDIX D - STUDIES OF CLAST LITHOLOGY AND PROVENANCE

Andre Doiron, Quebec Geoscience Centre, Geological Survey of Canada

A lithological study of the clastic fraction of bottom sediments was undertaken during the cruise in Hudson Strait and Ungava Bay. Samples were collected using three different samplers: Van Veen, IKU and box core. The objective of the study was to establish the source of the clasts studied. If the samples originate in a till, it is possible to derive certain indications as to the trajectory of glacial ice flow associated with the deposition of the till.

In this type of study, it is important to first establish the nature and the mode of deposition of the material sampled. In the case of diamictons, on which the present study is centred, it is necessary to establish whether they are tills deposited beneath a grounded ice sheet, glaciomarine sediments dropped from an ice shelf or iceberg having transported material from the coast, or if they are a result of debris flows. This identification can be accomplished by a sedimentological and paleoecological study of the samples in conjunction with the interpretation of high resolution seismic profiles. If the sample is effectively a till, its lithological composition can possibly result from many glacial events having various ice flow directions, or even a combination of many modes of transport.

Only the samples having a granulometric fraction greater than coarse sand were retained for the purpose of this study. This fraction was divided into 5 granulometric fractions: >70 mm, 70-25 mm, 25-100 mm, and 10-4 mm. If available, 100 elements of each class were lithologically identified. During the cruise, approximately 25 lithological classes were established in order to characterize the samples. In each lithological class, the roundness of the particles were noted according to 4 classes. The presence of glacial striations and of superficial dissolution marks was also noted. During the cruise, 29 samples separated according to the chosen granulometric classes were studied. The analysis of samples collected between October 12 and October 22 has yet to be completed.

APPENDIX E - MARINE MACROBENTHOS SAMPLED IN FROBISHER BAY, HUDSON STRAIT AND UNGAVA BAY ONBOARD C.S.S. HUDSON CRUISE 90-023

Alec E. Aitken, Department of Geography, Queen's University

The area examined on this cruise traverses an important zoogeographic boundary marked by the mixing of Polar and Atlantic waters in central Hudson Strait. Quantitative investigations of the marine macrobenthos have been undertaken within the study area in inner Frobisher Bay, at Brevoort Island, at Nuvuk Harbour at the western end of Hudson Strait and along a transect, consisting of 4 stations, from Akpatok Island to Pritzier Harbour at depths to 240 metres. Much of the sea bottom in the study area, therefore, remains to be explored.

Sampling for macrobenthos, employing a Van Veen grab sampler was undertaken at 65 stations at depths of 15 to 872 metres. Organisms recovered in the Van Veen samples were washed in seawater onto a 0.5 mm sieve then preserved in 10% buffered Formalin in seawater. Organisms belonging to the following taxa have been identified in the samples: bivalves, gastropods, limpets, chitons, polychaetes, nemerteans, sipunculids, priapulids, hydroids, sponges, sea anemones, bryozoans, sea urchins, starfish, sea cucumbers, brittlestarts, crinoids, brachiopods, shrimp, amphipods, tanaids, barnacles and pycnogonids. Of these taxa, only bivalves, polychaetes, sea urchins, brittlestars, brachiopods, bryozoans and sipunculids are common.

The samples at hand (as of Oct. 2, 1990) can be roughly organized into 3 groups: 1) soft substrates of mud and sand at depths to 400 metres; 2) soft substrates of mud and sand at depths greater than 400 metres; and 3) hard substrates of stones, sand and mud at depths to 150 metres. The common macrofauna occurring in each of these groups is described in Table 6.

The bivalves and brachiopods occur most frequently as empty valves intimately mixed with stones to form a shell hash at many stations, notably in Ungava Bay.

Table 6. Organisms

Group 1 - Soft Substrates at Depths to 400 metres

Organisms	Life Habits	Feeding Habits
Bivalves		
Macoma calcarea	infaunal	deposit-feeders
Macoma moesta	infaunal	deposit-feeders
Yoldia sp.	infaunal	deposit-feeders
Nucula sp.	infaunal	deposit-feeders
Nuculana sp.	infaunal	deposit-feeders
Astarte striata	infaunal	suspension-feeders
Astarte crenata	infaunal	suspension-feeders
Hiatella arctica	infaunal/epifaunal	suspension-feeders
Polychaetes Sedentary, tubiculous Maldanids Salbellids	 infaunal infaunal	 deposit-feeders suspension-feeders
Motile, carnivorous *Nephthys* spp.	 infaunal/epifaunal	 carnivores
Echinoderms Sea urchin - *Strongylocentrotus droebachiensis* Brittlestars - *Ophiocten* sp. *Ophiura* sp.	 epifaunal epifaunal	 herbivores omnivores?
Gammaridean amphipods	epifaunal	scavengers

Group 2 - Soft Substrates at Depths Greater than 400 metres

Organisms	Life Habits	Feeding Habits
Bivalves *Thyasira* sp.	 infaunal	 deposit-feeders
Polychaetes Sedentary, tubiculous	 infaunal	deposit-feeders and suspension-feeders
Tanaidacean crustaceans	epifaunal	deposit-feeders?
Sipunculids	infaunal	deposit-feeders

Group 3 - Hard Substrates at Depths to 150 metres

Organisms	Life Habits	Feeding Habits
Bivalves *Macoma calcarea* *Hiatella arctica* *Cyclocardia borealis* *Mya truncata* (empty shells only)	 infaunal epifaunal infaunal infaunal	 deposit-feeders suspension-feeders suspension-feeders suspension-feeders
Brachiopods *Hemithyris psittacea* *Terebratulina* spp.	 epifaunal epifaunal	 suspension-feeders suspension-feeders
Gastropods *Margarites* spp. Egg cases of *Buccinum* spp.	 epifaunal	 herbivores
Polychaetes Sedentary, tubiculous Serpulids	 epifaunal	 suspension-feeders
Motile, tubiculous Onuphids	 epifaunal	 scavengers
Motile, carnivorous Polynoids	 epifaunal	 carnivores
Hydroids	epifaunal	?suspension-feeders
Bryozoans	epifaunal	suspension-feeders

APPENDIX F - NAVIGATION

H. Boudreau, Canadian Hydrographic Service, Bedford Institute of Oceanography
Dartmouth, N.S.

General

Positioning was done using NAVSTAR GPS, LORAN-C, and Ship's Log/Gyro, all integrated using BIONAV. Navigation, display, logging, and outputs were through BIONAV.

The primary positioning system was GPS, which was used approximately 20 hours per day. During periods of GPS outages, positioning was by LOG/GYRO supplemented by NNSS TRANSIT satellite system (SATNAV) and LORAN-C when available.

Site survey missions and station sampling operations requiring utmost position accuracies were scheduled to coincide with periods of good GPS satellite constellations or very short duration GPS outages.

Observations

Accuracy obtained was estimated as ± 150 metres - error during periods of GPS availability. Normal constraints on acceptability and measurement integrity were relaxed slightly in order to extend GPS coverage periods. It was suspected that during most of the time using GPS, an actual accuracy of ± 25 to 35 m was realized. This was because the normal signal degradation (SA, or Selective Availability) enforced by the military was in all probability not implemented during the survey.

Position errors using LOG/GYRO during GPS outages varied from 150 metres to 500 metres. The magnitude and direction of errors were more or less linear, and a function of time since last GPS update. LOG/GYRO positions during GPS outages of longer than 1/2 hour were updated by TRANSIT satellite, giving accuracies estimated at ± 100 m to ± 500 m.

Position errors during periods bridged by LORAN-C were equivalent to GPS.

Specific Problems

1. The relaxation of measurement integrity constraints; while significantly extending the GPS time window, left the system susceptible to unpredictable large errors. It was necessary to closely monitor it during critical operations and on three occasions a complete system reset was required.

2. The GPS antenna was mounted on the rail above the wheelhouse. A significant amount of signal loss was observed because of shading by the mast and funnel of the ship. Future installations should consider an antenna mounted high on the mast.

Conclusions

The Navigation system in general worked well, as evidenced by the reliability with which small area bottom features were repeatedly sampled. The problems encountered can be dealt with on subsequent cruises, in terms of antenna location and the scheduled increase of the GPS satellite constellation.

APPENDIX G - NEARSHORE INVESTIGATIONS

SEDIMENTOLOGICAL RECONNAISSANCE OF WATTS BAY AND YORK SOUND META INCOGNITA PENINSULA, OUTER FROBISHER BAY AREA SOUTHEASTERN BAFFIN ISLAND, NORTHWEST TERRITORIES

Preliminary Report of Research Conducted from Launch Dunlin, September 1990

M. Retelle, Bates College, Lewiston, Maine
R. Powell, Northern Illinois University, Dekalb, Illinois
W. Mode, University of Wisconsin at Oshkosh, Oshkosh, Wisconsin

Introduction

A preliminary survey of bathymetry, acoustic stratigraphy and bottom sediment sampling was conducted in the Watts Bay and York Sound areas during CSS Hudson Cruise 90023 in the Frobisher Bay area of southeastern Baffin Island. A preliminary bathymetric map of York Sound was made during the survey of the basin together with limited sidescan sonar and acoustic stratigraphy. A total of 12 samples were recovered from the two inlets with a Van Veen grab.

The primary objective of this research is to better understand sediments and processes in the nearshore marine environment in the area adjacent to the Grinnell and Terra Nivea Ice Caps. Sediment is transferred from the glaciers to the sea through a variety of processes in this system. A field program recently initiated in the York Sound area (Retelle, et al., in progress) has focused on the study of modern sedimentary processes in the Grinnell Glacier-Long Lake-York River-York Sound system with the intent to investigate the effects of climate variability and how these processes are recorded in the sediment record. The combination of study of modern processes and sediments in the York Sound-Watt's Bay areas will aid in the interpretation of the late Quaternary marine sediment record recovered in cores from Frobisher Bay.

Preliminary Results

Watts Bay

The Watt's Bay inlet is carved into high-relief alpine terrain along the Frobisher Bay shore of southern Meta Incognita Peninsula (Fig. 37). The bay consists of two main arms. The western arm is the longest and broadest, open to the east and narrowing to the west. The eastern inlet forms a shallower indentation in the coast and opens to the north. The northwestern margin of the Grinnell Glacier reaches tidewater in the eastern corner of the east arm of Watt's Bay. The highly crevassed glacier margin extends for approximately 200 metres across a narrow trough of the east arm of the inlet. An obvious trimline and lateral moraines are visible above the present glacier and probably relate to late Neoglacial ice extent in the inlet (cf. Dowdeswell, 1986).

Reconnaissance was conducted from the launch Dunlin in the east arm of Watt's Bay on September 19, 1990. Sediment sampling sites (Fig. 38) were chosen after a brief bathymetric survey of the bay. Unfortunately, due to malfunctioning of the bubble pulser unit, we were unable to accomplish an acoustic stratigraphic survey of the inlet. In addition, because of the coarse nature of the sediments, attempts at recovering gravity cores failed. Sediment sampling was undertaken with a Van Veen grab sampler.

Sediments in the bay displayed a relatively wide range of textural and faunal composition (Table 7). Sample 002, located in the narrow trough within 0.2 km of the tidewater glacier margin consisted of brown to black-layered mud and sand with abundant organic material. The sediment emits a sulphurous odour

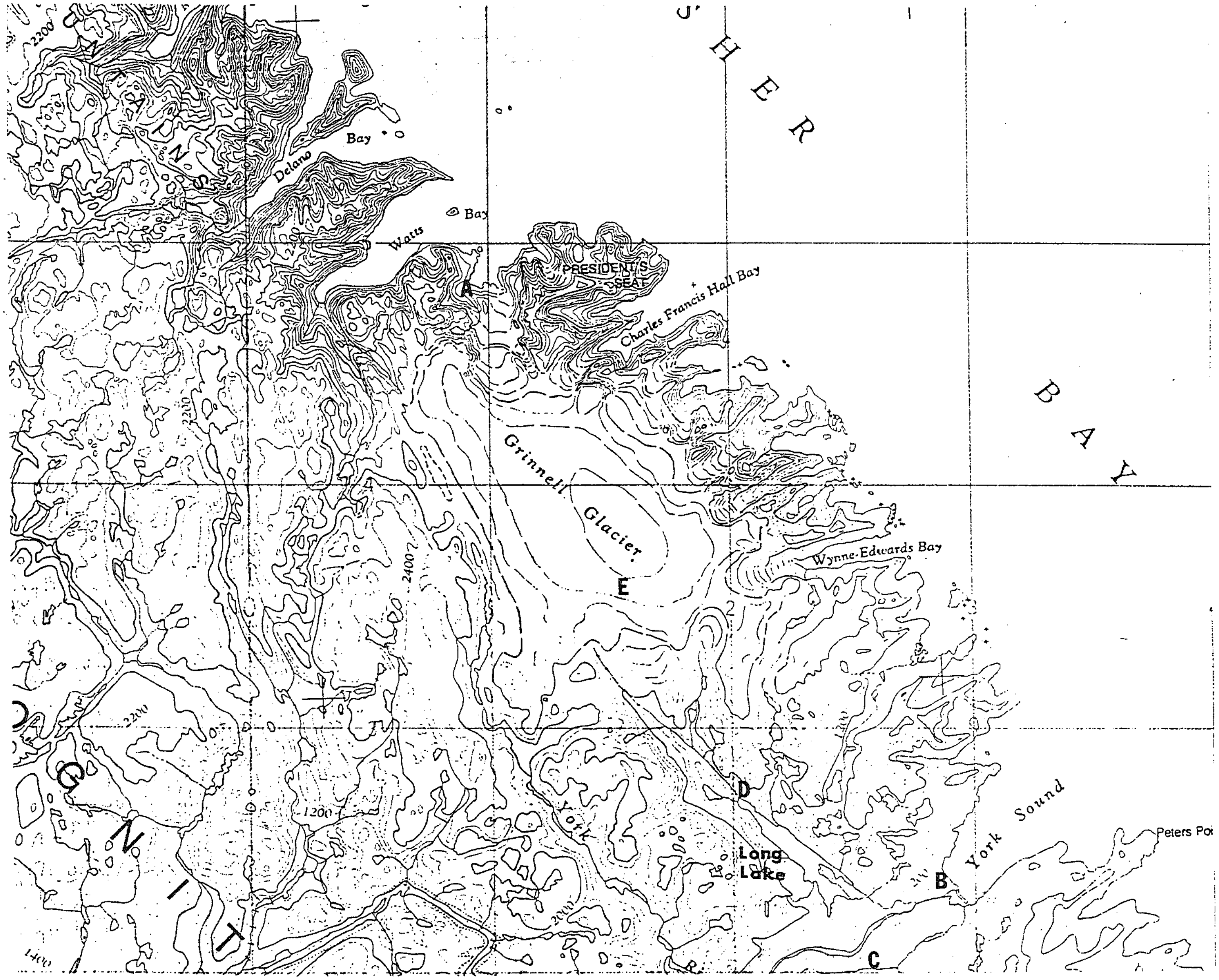


Fig. 37 Section of Frobisher Bay coast of Meta Incognita Peninsula adjacent to the Grinnell Glacier. Watts Bay and York Sound field areas are indicated by letters A and B.

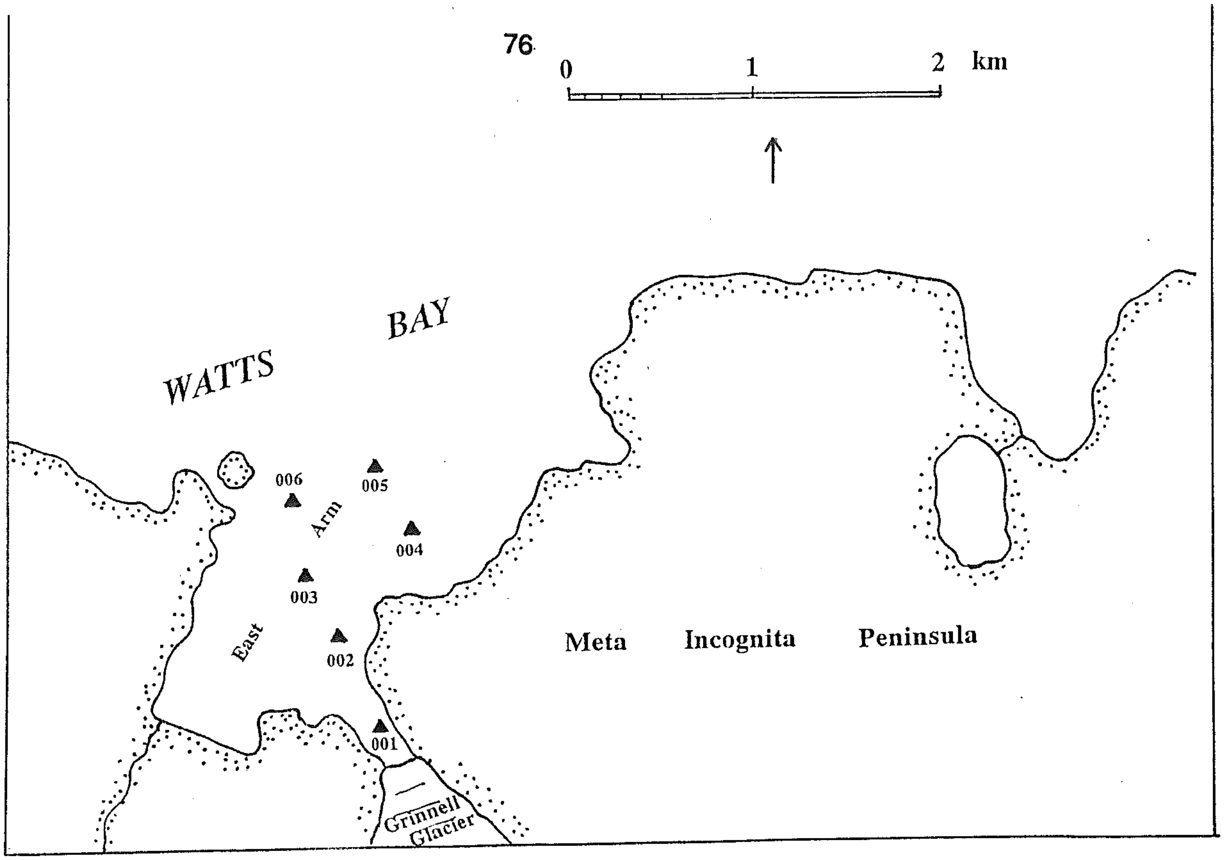


Fig. 38 Sample locations in the East Arm of Watts Bay. See Table 7 for descriptions and depths.

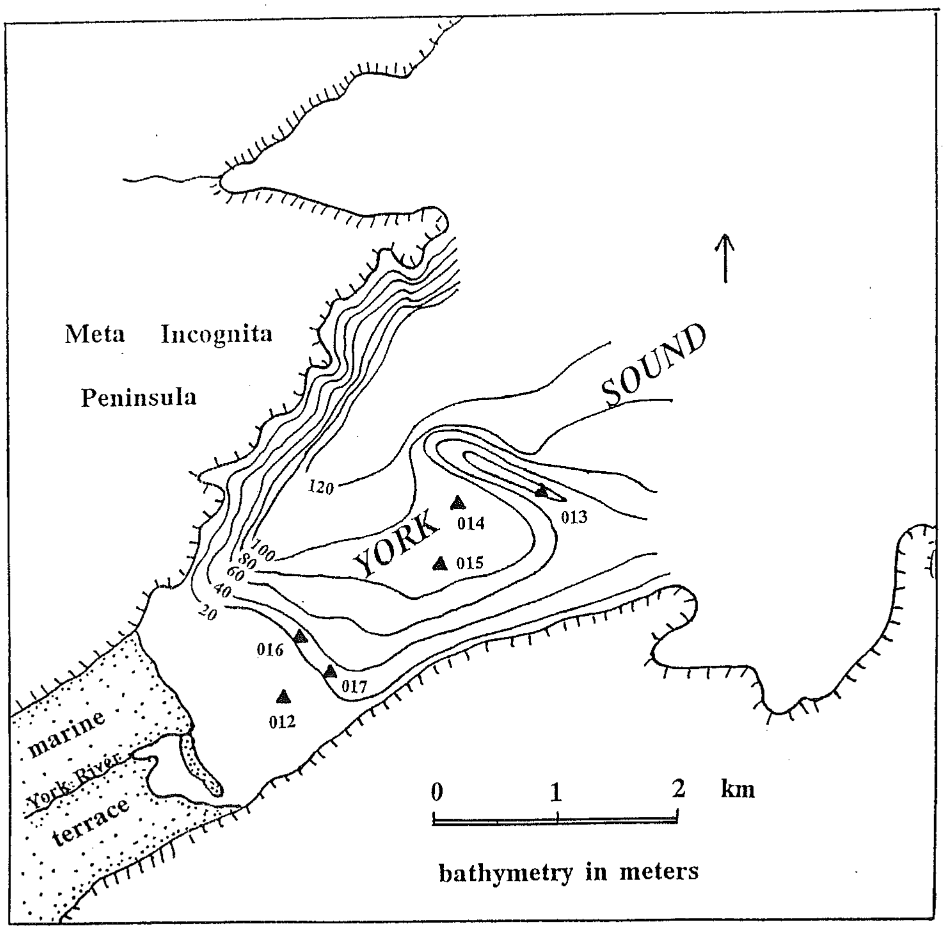


Fig. 39 Bathymetry and sample locations in York Sound. See Table 7 for descriptions and locations.

and contains numerous capitellid polychaete worms characteristic of anoxic bottom conditions (Alec Aitken, pers. comm., 1990). In contrast, at site 004, sediment recovered in 135 metres of water consisted of oxidized greyish olive gravelly sand with several living brittle stars and bivalves including *Hiatella arctica*. Coarse relatively well sorted gravelly sandy sediment occurs out to the mouth of the inlet approximately 2 km distal to the meltwater source (which appeared to be minimal at the time of sampling) at the tidewater margin and in the deeper water regime.

York Sound

York Sound is a relatively broad rectangular inlet, approximately 6 km by 4 km located on the Frobisher Bay coast midway between the Grinnell Glacier and the Terra Nivea Ice Cap (Fig. 37). The principle fluvial input into the sound is the York River which flows from the interior of the peninsula through the deeply incised York Canyons. A thick, expansive Holocene terrace system grades from the canyons to the present coast where the terrace measures approximately 38 m above mean high tide.

A preliminary bathymetric map of the York Sound area is shown in Figure 39. The sound is separated from deep water environment of Frobisher Bay by a prominent sill that extends across approximately 3/4 of the inlet. The sill rises approximately 60 metres from the seafloor and reaches within 40 metres of present sea level. The sill is breached by a narrow channel in the northwest side of the inlet connecting the inner sound basin with Frobisher Bay. Landward of the inner basin an extensive gently sloping platform at 10 to 15 metres below sea level grades seaward from the present shoreline to the inner basin. It is possible that this feature represents an earlier (mid to late Holocene) fluvial input into York Sound when sea level was at a lower stand.

Six sediment samples were recovered from York Sound using the Van Veen grab sampler. The modern sedimentary environment is dominated by coarse pebbly sand and a distinct lack of fines. Pebbly sand occurs on the shallow nearshore platform adjacent to the York River inlet to the mouth of the bay. This is not surprising given the proximity to the massive sand and gravel deposit of the York Delta. Reworking of this terrace system by the modern York River is likely responsible for the sediment that floors the sound and is transferred to the deeper marine environment. The raised marine delta is reworked directly by coastal processes supplying coarse material to longshore drift. A narrow spit extends from the northeastern corner of the raised delta to the southeast corner of the sound where the York River enters the inlet.

The transfer of sediment from the nearshore environment to the deep-water environment of Frobisher Bay may be presently accomplished through the breach in the sill that separates the 95 metre basin from main bay. This breach could also have been utilized during the earlier Holocene when glaciers in the interior of the peninsula extended closer to the coastal zone.

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Table 7. Grab Sample Collected in Watt's Bay and York Sound

Sample #	Water Depth (m)	Description
Watts Bay - September 19, 1990		
002	15	Black, brown, yellow, layered mud with fine sand, over gravel. Worms and fragment of bivalve shell.
003	65	Olive grey, oxidized sandy mud with pebbles. Fauna includes worms and disarticulated bivalve shells.
004	135	Pebbly muddy sand with brittle star and living Hiatell arctica.
005	135	Pebbly muddy sand with bivalve shells.
006	112	Pebbly sand with bivalve shells.
York Sound - September 20, 1990		
012	10	Pebbly, granular, medium to coarse sand with small shell fragments, pebbles up to 2 cm.
013	50	Pebbly, fine to coarse sand, pebbles up to 2.5 cm.
014	90	Pebbly, fine to coarse sand, pebbles up to 3 cm.
015	10	Pebbly, granular, medium to very coarse sand with shell fragments.
016	10	Fine to medium sand.
017	95	Pebbly fine to medium sand with shell fragments.

APPENDIX G - NEARSHORE INVESTIGATIONS

DATA FROM PARTS OF WESTERN HUDSON STRAIT AND AKPATOK ISLAND REGIONS

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This cruise permitted the collection of seismic data for two areas of interest. The first, and the main sector, is located towards the western part of Hudson Strait and the second sector is located in Ungava Bay (see location map, Fig. 40). The importance of these two sectors lies in the fact that they permit the onshore-offshore link of the data concerning the Quaternary History. Work onshore had been done in this area in the last few years by the authors.

Western Hudson Strait

The first sector of activity is located in the Western part of Hudson Strait in the Kangiqsujjuaq (Wakeham Bay), Cap de Nouvelle-France, Charles Island and Deception Bay region (see Fig. 40). In this area, Deception Bay was surveyed by launch work and by the ship to collect seismic profiles and samples (see Fig. 41). The seismic data obtained, as well as the core recovered, will permit the mapping of the sediment distribution and outline the stratigraphy.

The interpretation of the Deception Bay survey will help to correlate the adjacent Hudson Strait survey data in a stratigraphic as well as chronologic framework. We will also attempt to link the onshore data to the offshore data. Thus, the cores and the seismic information obtained during the cruise allow us to outline the glacial limits and the chronology of the retreat of the late Wisconsinan ice from Western Hudson Strait.

Ungava Bay Sector

The second area of interest, Akpatok Island, is actively being investigated by J. Gray et al. The data obtained will add much to establish the configuration and the ice dynamics in this area. The seismic data showing morainic buildup may be correlated with the onshore evidence. Unfortunately, the poor core recovery in the area will probably not permit the establishment of the chronological framework of the sedimentary environment. Despite this, the interpretation and the mapping of the sediment units will contribute information on the late occurrence of the ice in Ungava Bay as a whole.

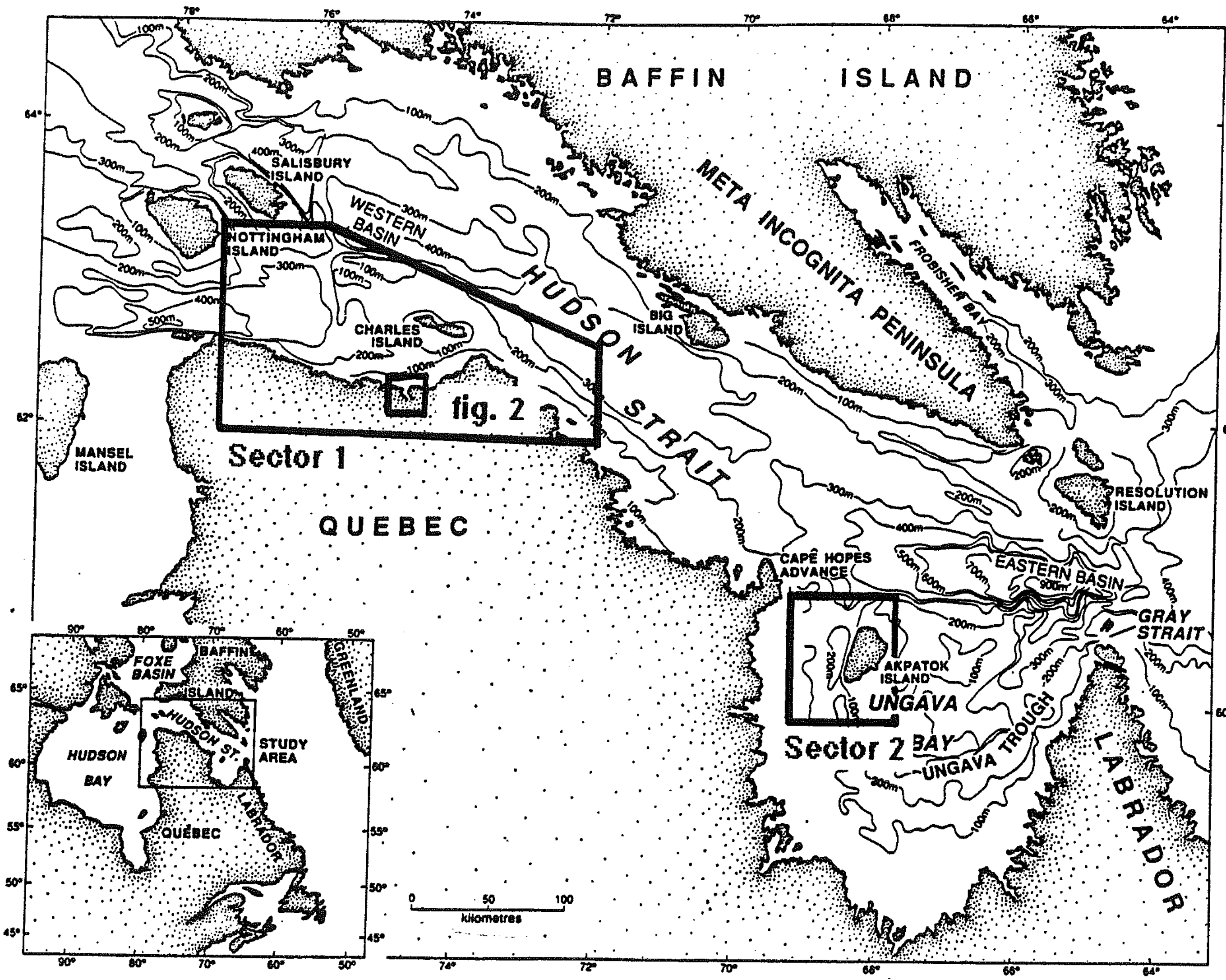

Fig. 40 Location of the area of interest in this report (from Vilks et al. 1989).

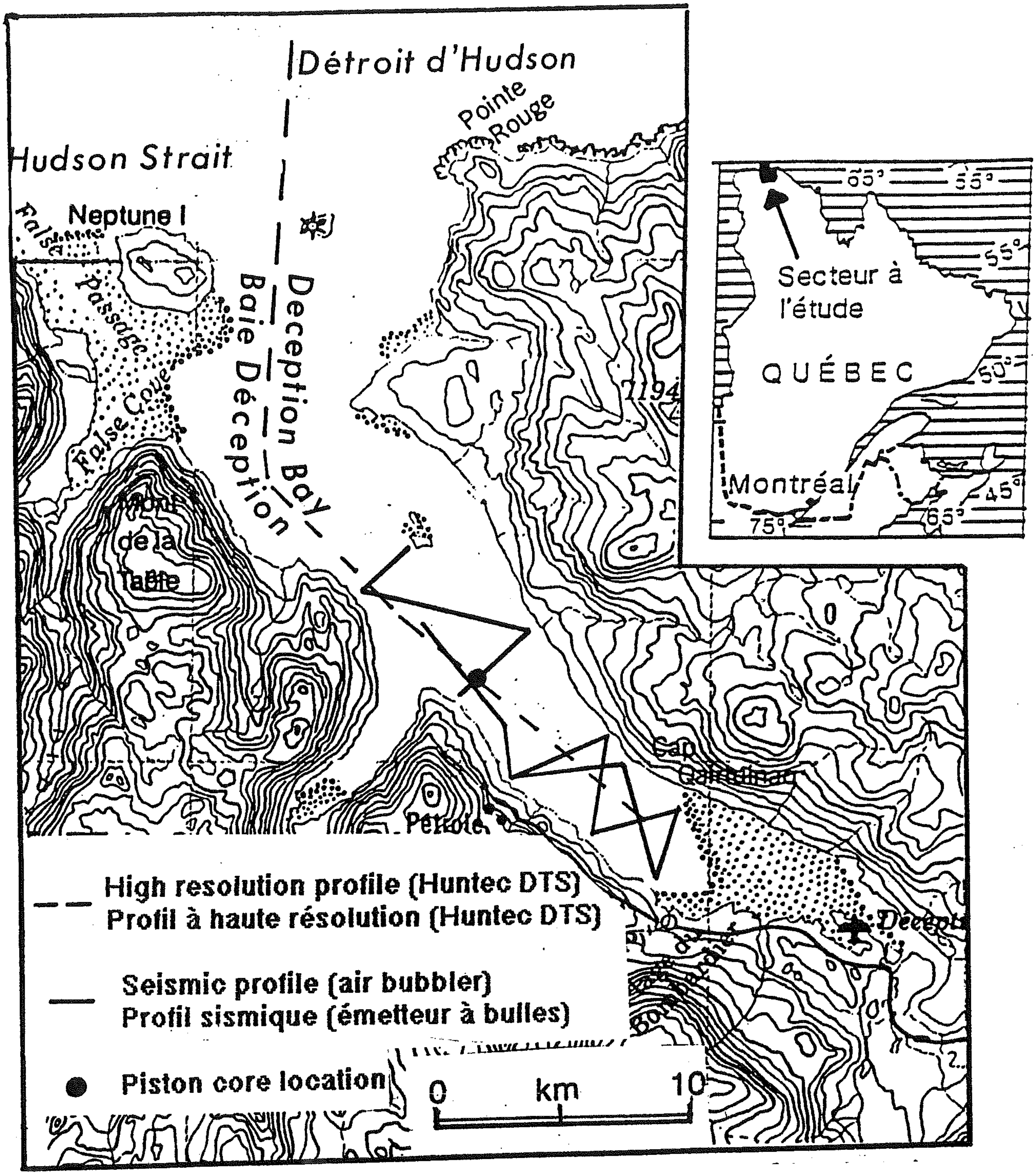

Fig. 41 Location of tracks survey in Deception Bay (the dotted line is the CSS Hudson track and the solid line is the launch tracks of the survey).

APPENDIX H - PRELIMINARY REPORT ON THE OSTRACODS FROM BOTTOM SAMPLES, C.S.S.HUDSON CRUISE 90-023

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Introduction

The ostracods examined from bottom samples taken in outer Frobisher Bay, Hudson Strait and Ungava Bay during C.S.S. HUDSON cruise 90-023 are cold-water species associated with the Frigid Climatic Zone and the Arctic Faunal Province, as used by Hazel (1970) . The frigid-water conditions necessary for the survival of Arctic ostracods in the study area arise from several sources, as outlined by Drinkwater (1986). Cold, southward-flowing Baffin Land Current water enters eastern Hudson Strait, where it flows around northern and southern sides of Resolution Island and impinges on the northern side of the Strait, at least as far as Big Island. A combined southeastward outflow of cold water from Foxe Basin and Hudson Bay, and southward cross-flow of Baffin Land Current water in the eastern half of the Strait, brings arctic water to the southern part of the Strait and Ungava Bay. Bottom-water temperatures of -1^{0} to $+1^{0}C$ occur in the study area (Drinkwater, 1986), and Taylor and Allen (this cruise) recorded a bottom-water temperature of $-1.5^{0}C$.

Material and Methods

Forty-nine bottom samples listed in Table 8 were processed on board **HUDSON** using a 63 µm screen and subsequently examined for ostracods with a low-power, stereo-binocular microscope. These samples include Van Veen grabs (40), IKU (8) and boxcore (1) tops. Shipboard processing was not done on Van Veen grabs taken during the early phase of the cruise in Frobisher Bay, including those taken from the launch, and the Baffin Island shelf, due to the pressure of other activities in the core lab, and these samples are not recorded in Table 8.

Some of the processed samples were stained with Rose Bengal in the manner prescribed by Walton (1952) to detect protoplasm in living foraminifera. Living occurrences of ostracods reported in Table 8 are based on 1) observation of the movements of the animal in wet samples prior to oven drying, and 2) examination of stained and unstained oven-dried samples containing carapaces in which the valves are agape, with the body and attached appendages of the ostracod exposed between the valves or with the appendages protruding some distance from the margins of the valves.

In samples treated with Rose Bengal, prior to drying the sample in the oven, the stain is readily absorbed by the chitinous body parts of the living ostracod, including the chitinous outer covering of the valves. The stain is not absorbed in the shells of subfossil populations, or in the carapaces and valves of modern populations where bacterial action has removed all traces of organic material from recently-living individuals. Some samples, however, contain specimens stained in variable intensities of pink. Close examination of the carapaces of these individuals usually reveals telltale signs indicating that the specimens were not alive at the time of collection. Traces of appendages, broken off parts of appendages and calcite dissolution in carapaces containing appendages are some of the criteria used in making this determination. The intensity of the pink coloration is probably related to the amount of organic material remaining in the carapace during the bacterial decomposition process and the ability of this material to absorb and concentrate the stain. Stained specimens are also easier to spot in the picking tray during microscopic examination of a sample.

Results and Conclusions

The ostracods found in bottom samples collected during C.S.S. HUDSON cruise 90-023 in outer Frobisher Bay, Ungava Bay and Hudson Strait, and listed in Table 9, are shallow-water, frigid-climate taxa that most closely resemble the ostracods near the mouth of Chesterfield Inlet, northwestern Hudson Bay (Briggs 1985), in water depths of 38 m to 107 m (bottom salinities = 27 to $33^{0}/^{00}$; bottom temperatures = -0.5^{0} to $+2.2^{0}$C). All of these taxa are characteristic of the shallow shelf ostracod faunas found in the lower regions of the Arctic Faunal Province. The ostracod *Rabilimis septentrionalis* (Brady, 1866), a shallow-water taxon found in eastern Baffin Bay, the Northwest Passage and the Alaskan and Canadian sectors of the Beaufort Sea, and an indicator of the high Arctic Faunal Province, is not present in any of the samples from cruise 90-023, or in other samples from the study area compiled and recorded by Hazel (1967, 1970) and Neale and Howe (1975).

Table 8 lists the 49 samples examined on shipboard for microfauna. The samples range in water depth from 40 m to 872 m, and 42 (86%) of these occur in depths of 400 m or less. Ostracods are present in variable numbers in 31 of the 49 samples that span the limits of the depth range, they are absent in the remaining 18 samples. With one exception, ostracods are abundant to common only in samples from water depths of 150 m or less. They are rare to absent in 4 out of 16 samples from these depths; and, except for IKU sample 115, at 275 m, where they are abundant, they are rare to absent in the 32 remaining samples from water depths greater than 150 m.

According to Hazel (1970), ostracod biogeographic provinces are only reliable in shelf depths of 200 m or less. The ostracods found in samples deeper than 150 m water depth in the present study (e.g., 150 m - 400 m) are less diverse than the shallower depth faunas, but the taxa that are present are the same, although their frequency is such that they are considered rare. Table 8 shows that some specimens were alive at the time of capture, ruling out the possibility that they were carried down slope from shallow to deeper water after death. Thus it can be concluded that some of the shallow-water ostracods found in this study do have the ability to live in limited numbers in deeper water.

Autochthonous and allochthonous ostracods have been found together in the same stratigraphic level in sections of core HU77-021-151. This core is located in the Hatton Basin, SE Baffin Island shelf/slope, in a water depth of 603 m. In the nearby Resolution Basin, two adjacent cores HU 82-034-057 and HU84-035-008, located in water depths of 549 m and 580 m, respectively, show strikingly different ostracod faunas. The ostracods in core HU82-057 at the 223-230 cm level are the deeper-water, indigenous (autochthonous) fauna, and there is no evidence of shallow-water forms. In core HU84-008 at the 105 cm level, the ostracods present are the shallow-water forms encountered in cruise 90-023, and none of the deeper-water forms found in the 223-230 level of HU82-057 are present. Unfortunately, not enough samples containing ostracods from these two cores are available for study at this time. Shallow-water ostracods are also present in some levels of core HU77-021-154, from the Eastern Basin of Hudson Strait, located in a water depth of 933 m. There is no evidence of a deep-water fauna.

Most foraminifera and all marine podocopid ostracods are in the sand-size range, 63 µm to 2,000 µm and, like sand, they behave as sedimentary particles and they can be transported over long distances, depending on the sedimentary environments and processes in operation in a basin of deposition. The geometry of the Eastern Basin is such that the down-slope transport of shallow-water ostracods and foraminifera to deeper water depths is entirely plausible. It is more difficult to envision this process in the Hatton and Resolution Basins, where bathymetric slopes are less steep and shallow-water sedimentary environments are farther away. Nevertheless, there is strong evidence for shallow-water ostracods in some levels of the stratigraphic record in cores from the Hatton and Resolution Basins. Caution is necessary when using foraminifera for AMS ^{14}C dating of glacial marine sediments.

There is a strong likelihood from the discussion above that shallow-water ostracods have been displaced to deeper water in the Hudson Strait - SE Baffin Island shelf/slope area. The mechanism for the displacement is probably due to gravity flows, the evidence for which is found in many of the cores examined during the cruise.

There are many problems that remain unresolved. Why, for example, is there not a deep-water ostracod fauna in the modern sediments of Hudson Strait, and is this absence related to the shallow-water sill located at the eastern entrance to the Strait? Why do some Rose-Bengal stained samples from Hudson Strait and Ungava Bay show no evidence for a living population of foraminifera, when the foraminifera present in these samples outnumber the ostracods (some of which were alive) by from 1-3 orders of magnitude?

This report is based on shipboard preparation and microscopic examination of only some of the samples of the total of bottom sediments collected during the cruise. None of the samples reported in Table 8 was completely picked and the results are based on a fairly rapid scan of a portion of the washed sample in a picking tray. The number of ostracods listed in Table 9, presently 37 species, will increase with more detailed examination of the samples. The terms "rare", "common" and "abundant" as used herein are subjective. Rare implies a count of from one to several specimens in one to several picking-trays full of processed sample; common refers to up to ~25 specimens per picking tray of sample, and abundant refers to >25 specimens per picking tray of sample. Only podocopid ostracods are reported here. Many samples contain large myodocopid ostracods, which are almost never preserved in the stratigraphic record and therefore are of limited use in Quaternary paleoecology; these taxa will be included in the final report.

Participation in **HUDSON** cruise 90-023 by Briggs and Nancy Weiner was made possible by National Science Foundation grant DPP 88 22022, awarded to J.T. Andrews.

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Table 8. List of Bottom Samples Examined for Ostracods, HU90-023

Station #	Depth (m)	Remarks
032	872	NO OSTRACODS; FEW FORAMS, FORAMS APPEAR TO BE REWORKED
033	336	OSTRACODS RARE, SOME LIVING: PATAGONACYTHERE DUBIA, MUNSEYELLA MAMANENSIS, FINMARCHINELLA FINMARCHICA, F. LOGANI, CYTHEROPTERON NODOSUM, SEMICYTHERURA AFFINIS, EUCYTHERE ARGUS, SARSICYTHERIDEA BRADII, ELOFSONELLA NEOCONCINNA
035	336	OSTRACODS RARE, SOME LIVING: E. NEOCONCINNA, CYTHEROPTERON INFLATA and possibly SARSICYTHERIDEA PUNCTILLATA and ARGILLOECIA CONOIDEA
037	108	OSTRACODS FAIRLY COMMON, MANY LIVING: S. BRADII, CYTHEROPTERON ARCTICUM, M. MANANENSIS, ROBERTSONITES TUBERCULATUS, E. NEOCONCINNA, NORMANICYTHERE LEIODERMA, HEMICYTHERE EMARGINATA, F. FINMARCHICA
038	245	OSTRACODS VERY RARE: 1 SARSICYTHERIDEA PUNCTILLATA, NON-LIVING
040	408	NO OSTRACODS; FEW FORAMS
041	149	OSTRACODS RARE, 1 BAFFINICYTHERE HOWEI FOUND LIVING
043	729	NO OSTRACODS; DIATOMS ABUNDANT; FORAMS COMMON: N. LABRADORICUM
044	844	OSTRACODS VERY RARE, 1 S. CONTORTUS FOUND LIVING, OTHER OSTRACODS: E. ARGUS, MUELLERINA ABYSSICOLA, C. INFLATUM; ABUNDANT FORAMS AND DIATOMS
048	226	NO OSTRACODS; SHELL HASH
049	223	NO OSTRACODS; FEW FORAMS, MANY RE-WORKED
050	87	OSTRACODS MODERATELY COMMON; SOME LIVING AT TIME OF CAPTURE
051	150	OSTRACODS MODERATELY COMMON; SOME LIVING AT TIME OF CAPTURE
053	400	OSTRACODS VERY RARE, 1 LIVING SARSICYTHERIDEA MACROLAMINATA
054	137	OSTRACODS MODERATELY COMMON, MANY LIVING S. BRADII
056	111	OSTRACODS ABUNDANT, MANY LIVING AT TIME OF CAPTURE
057	57	OSTRACODS ABUNDANT, SOME LIVING AT TIME OF CAPTURE

060	294	OSTRACODS RARE, SOME NORMANICYTHERE LEIODERMA SPECIMENS LIVING
061	72	OSTRACODS ABUNDANT, MANY LIVING AT TIME OF CAPTURE
063	232	OSTRACODS RARE, SOME LIVING; LIVING ELPHIDIELLA ARCTICA
065	196	NO OSTRACODS; DIATOMS ABUNDANT
067	193	NO OSTRACODS
069	150	NO OSTRACODS; FEW FORAMS
070	149	NO OSTRACODS; ABUNDANT FORAMS: N. LABRADORICUM
072	111	OSTRACODS RARE, 1 LIVING A. CONOIDEA; FEW FORAMS
073	333	OSTRACODS VERY RARE, LIVING N. LEIODERMA
074	358	OSTRACODS RARE, LIVING HETEROCYPRIDEIS SORBYANA; LIVING FORAMS: N. LABRADORICUM, R. CHARLOTTENSIS, B. FRIGIDA, M. ZAANDAMAE, I. HELENAE, N. ATLANTICA
075	86	OSTRACODS MODERATELY COMMON, SOME LIVING AT TIME OF CAPTURE
077	69	OSTRACODS VERY RARE, 1 LIVING CYTHEROPTERON ELAENI
079	115	OSTRACODS VERY RARE, 1 LIVE (?) SPECIMEN M. MANANENSIS; FORAMS RARE, LIVE I. HELENAE, E. EXCAVATUM CLAVATUM, D. FROBISHERENSIS
080	40	OSTRACODS VERY RARE; 1 JUVENILE ROBERTSONITES TUBERCULATUS
081	70	NO OSTRACODS
083	315	NOT EXAMINED
084	315	OSTRACODS VERY RARE, SOME LIVING; FORAMS MODERATELY COMMON
086	390	NO OSTRACODS; DIATOMS ABUNDANT
088	390	NO OSTRACODS
090	219	OSTRACODS VERY RARE, 1 VALVE S. PUNCTILLATA
093	220	NO OSTRACODS
095	320	OSTRACODS VERY RARE, 1 VALVE A. CONOIDEA
096	275	NO OSTRACODS
098	427	NO OSTRACODS
100	393	NO OSTRACODS; DIATOMS ABUNDANT
102	421	NO OSTRACODS; DIATOMS ABUNDANT; FEW FORAMS

105	410	OSTRACODS VERY RARE: F. BARENTZOVOENSIS, H. SORBYANA; N. LABRADORICUM COMMON
108	182	NO OSTRACODS; DIATOMS ABUNDANT; FEW FORAMS
109	152	OSTRACODS VERY RARE, 1 RECENTLY LIVE N. LEIODERMA, EATEN BY A GASTROPOD [SHELL BORED, BUT APPENDAGES STILL VISIBLE]
110	210	NOT EXAMINED: NO RECORD OF PROCESSED SAMPLE
111	214	OSTRACODS RARE, SOME LIVING: S. PUNCTILLATA, KRITHE sp., H. SORBYANA
112	265	OSTRACODS RARE, SOME LIVING: A. CONOIDEA, S. MACROLAMINATA
114	343	OSTRACODS RARE, 1 LIVE NEOCYTHERIDEIS sp.
115	275	OSTRACODS ABUNDANT, BUT NO EVIDENCE THAT ANY WERE ALIVE AT TIME OF CAPTURE

Table 9. List of Ostracods Observed During Hudson Cruise 90-023

ARGILLOECIA CONOIDEA (SARS, 1925)
BAFFINICYTHERE EMARGINATA (SARS, 1866)
B. HOWEI HAZEL, 1967
CYTHEROPTERON ANGULATUM BRADY & ROBERTSON, 1872
C. ARCTICUM NEALE & HOWE, 1973
C. ELAENI CRONIN, 1988
C. INFLATUM BRADY, CROSSKEY & ROBERTSON, 1874
C. LATISSIMUM (NORMAN, 1865)
C. NODOSOALATUM NEALE & HOWE, 1973
C. NODOSUM BRADY, 1868
C. PARARCTICUM WHATLEY & MASSON, 1979
ELOFSONELLA CONCINNA (JONES, 1857)
E. NEOCONCINNA BASSIOUNI, 1965
EUCYTHERE ARGUS (SARS, 1866)
FINMARCHINELLA BARENTZOVOENSIS (MANDELSTAM, 1957)
F. FINMARCHICA (SARS, 1866)
F. LOGANI (BRADY & CROSSKEY, 1871)
HEMICYTHERURA CLATHRATA (SARS, 1866)
HETEROCYPRIDEIS SORBYANA (JONES, 1856)
KRITHE sp.
MUELLERINA ABYSSICOLA (SARS, 1866)*
MUNSEYELLA MANANENSIS HAZEL & VALENTINE, 1969
NEOCYTHERIDEIS sp.
NORMANICYTHERE LEIODERMA (NORMAN, 1869)
PALMENELLA LIMICOLA (NORMAN, 1865)
PATAGONACYTHERE DUBIA (BRADY, 1868)
ROBERTSONITES TUBERCULATUS (SARS, 1866)
SARSICYTHERIDEA BRADII (NORMAN, 1865)
S. MACROLAMINATA (ELOFSON, 1939)
S. PUNCTILLATA (BRADY, 1865)
SCLEROCHILUS CONTORTUS (NORMAN, 1862)
SEMICYTHERURA AFFINIS (SARS, 1866)
S. COMPLANATA (BRADY, CROSSKEY & ROBERTSON, 1874)
S. MAINENSIS (HAZEL & VALENTINE, 1969)
S. RUDIS (BRADY, 1868)
S. UNDATA (SARS, 1866)
XESTOLEBERIS DEPRESSA SARS, 1866

*MUELLERINA ABYSSICOLA is generally regarded as a subfrigid taxon

APPENDIX I - SHEAR STRENGTH MEASUREMENTS

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During cruise 90-023, sediments were tested for shear strength on board CSS Hudson using modified AGC miniature shear vane number 119.

Thirty piston cores, eight trigger weight cores, and four push cores from IKU's were sampled. Peak shear strength and residual shear strength were recorded both manually and on data disks. Tests were run every 0.2 m where possible. Cores were considered unsuitable for testing if they contained abundant sand, coarse sediment, gas cracks or had obviously been disturbed during the coring process.

No major problems were encountered during testing. Minor computer malfunctions caused some tests to be repeated or aborted.

On average, the sediment had shear strengths in the range of 7-13 kPa. The greatest strength recorded was 36.78 kPa at a depth of 7 m in piston core 90-023-030. Push cores 074, 109B/E, and 112 all had peak strengths of greater than 17.88 kPa less then 0.2 m downcore.

APPENDIX J - SURFACE PALYNOLOGY

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Oshkosh, Wisconsin, 54901 U.S.A.

My primary objective for this cruise was to acquire surface pollen samples from the seafloor in Frobisher Bay and the Baffin Island side of Hudson Strait. The surface samples will be used to refine a model of pollen recruitment to arctic sedimentary basins (Short, Andrews, and Mode, 1989). In order to interpret fossil pollen sequences, pollen recruitment must be understood. Hence, these samples ultimately will contribute to interpretation of fossil pollen sequences.

Two marine cores from around southern Baffin Island were sampled for pollen. Though plans are not finalized, our intention is that Marci Escamilla (graduate student, Northern Illinois University) will do the palynology of one core and I will do the other. My time is fully committed to lake sediment palynology for the next two years (NSF grant), but the marine core will be completed as soon as possible.

My studies for the past nine years have focused on the palynology and vegetation history of southern Baffin Island. Though I did the pollen stratigraphy of a core from Sunneshine Fiord (SU5; Short, Andrews, and Mode, 1989), I have worked primarily with terrestrial samples. The data from the Hudson cruise will enhance this long-term project.

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TABLE 10

CORE SAMPLES

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

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
001	AGC LONG CORE	2621933	62 52.57N 67 07.46W	538	1800	1702	1406	6	FROBISHER BAY	TWC LENGTH - 140 CM. APPARENT PEN - 250 CM. M-L NO RECOVERY; K-J IMPLOSION; E-D/D-C CORE LINER CRACKED. BTW 1406 - 1702 CM. SUCKED. E-E' 1074-1080 CM.,I-I' 460-464 CM. K-K' 155-158CM., A-A' 1698-1702 CM. CORE WAS GASSY THROUGHOUT.
001TWC	TRIGGER WEIGHT	2621933	62 52.57N 67 07.46W	538		250	140	1	FROBISHER BAY	TWC LENGTH - 140 CM. APPARENT PEN - 250 CM.
007	AGC LONG CORE	2631438	62 31.80N 66 11.00W	397	1216	350	238	2	FROBISHER BAY	TWC - BADLY DISTURBED UPON RETR. APP. PEN. 30 CM., EST.LENGTH 15 CM. SECTION B-A 96 - 238 CM. DIAMICTON; LARGE ERRATICS THROUGHOUT.
007TWC	TRIGGER WEIGHT	2631438	62 31.80N 66 11.00W	397		30	15	1	FROBISHER BAY	TWC - BADLY DISTURBED UPON RETR. APP. PEN. 30 CM., EST.LENGTH 15 CM.
009	AGC LONG CORE	2631925	62 29.90N 66 18.00W	463	1520	1216	739	3	FROBISHER BAY	TWC - BADLEY DISTURBED/BAGGED. NO CUTTER FOR CORE. E-E' 132- 134 CM.
009TWC	TRIGGER WEIGHT	2631925	62 29.90N 66 18.00W	463		0	30	1	FROBISHER BAY	TWC - BADLEY DISTURBED/BAGGED.
018	AGC LONG CORE	2641331	62 07.71N 65 25.00W	335	1520	000			FROBISHER BAY	TWC - NO RECOVERY. UNABLE TO REMOVE CORE FROM THE CORE BARREL.
018TWC	TRIGGER WEIGHT	2641331	62 07.71N 65 25.00W	335		000	0	0	FROBISHER BAY	NO RECOVERY.
020	AGC LONG CORE	2641840	62 06.10N 65 23.60W	330	1520	0	571	4	FROBISHER BAY	TWC - NO RECOVERY. TOP 22 CM. CORE DEWATERED AND BAGGED. NO CORE CUTTER CATCHER RECOVERED.
020TWC	TRIGGER WEIGHT	2641840	62 06.10N 65 23.60W	330		0	0	0	FROBISHER BAY	NO RECOVERY.

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CORE SAMPLES

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

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
022	AGC LONG CORE	2651307	63 06.54N 64 20.22W	396	1520	1280	843	6	OFF HALL PENINSULA, BAFFIN SHELF	TWC - 0-125 CM., NO CUTTER CATCHER CORE - G-F 0-75 CM.; F-E 75-227 CM; E-D 227-381 CM.;D-C 381-533 CM.; C-B 533-687 CM.;B-A 687-834 CM.; CUTTER IS 834-843 CM.
022TWC	TRIGGER WEIGHT	2651307	63 06.54N 64 20.22W	396		210	125	1	OFF HALL PENINSULA, BAFFIN SHELF	NO CUTTER/CATCHER SAMPLE.
024	AGC LONG CORE	2651656	63 04.70N 64 19.20W	344	912		000		OFF HALL PENINSULA, BAFFIN SHELF	CORER DAMAGED, ERRATICS REMOVED FOR LATER IDENTIFICATION. NO SAMPLE RECOVERED FROM CORER.
024TWC	TRIGGER WEIGHT	2651656	63 04.70N 64 19.20W	344			61	1	OFF HALL PENINSULA, BAFFIN SHELF	
026	AGC LONG CORE	2661709	61 47.05N 63 52.00W	574	1216	912	283	4	RESOLUTION BASIN, BAFFIN SHELF	TWC - NO SAMPLE RECOVERED;APP. PENN. 40 CM. CORER - C-B SECT. 0-137 CM.; B-A 137-283 CM. CORE TAKEN FOR A. JENNINGS FOR THERMOLUMINESCENCE. VV. AT 90023-027 NOT LIKE 0-5 CM.
026TWC	TRIGGER WEIGHT	2661709	61 47.05N 63 52.00W	574		40		0	RESOLUTION BASIN, BAFFIN SHELF	NO SAMPLE RECOVERED.
030	AGC LONG CORE	2662009	61 46.93N 63 52.60W	572	1216		908	6	RESOLUTION BASIN, BAFFIN SHELF	TWC - 0-156 CM. CORE CATCHER/CUTTER 22 CM. IMPLOSION F-E 30-40 CM.;PLASTIC LINER STUCK AT F-CONTACT 122CM. G-F 0-122 CM; F-E 122-275 CM.; E-E' 275-284 CM.; E-D 284-436; D-C 436-589; C-B 589-741; B-A 741-885 CM.
030TWC	TRIGGER WEIGHT	2662009	61 46.93N 63 52.60W	572		175	156	1	RESOLUTION BASIN, BAFFIN SHELF	
031	AGC LONG CORE	2671257	60 57.10N 65 26.70W	872	2432		727	5	HUDSON STRAIT	TWC - APP. PENN. 20 CM; SLOPPY BAGGED. FIFTH BARREL BENT. F-E 0-129 CM.; E-D 129-280 CM,; D-C 280-431 CM.; C-C' 431-436 CM.; C-D 436-582 CM.; B-A 582-727 CM. NO CUTTER/CATCHER RECOVERED.

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PROJECT NUMBER = 760015

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
031TWC	TRIGGER WEIGHT	2671257	60 57.10N 65 26.70W	872		0	20		HUDSON STRAIT	SAMPLE OF SAND AND PEBBLES IN BAG. (SLOPPY).
034	AGC LONG CORE	2681349	59 59.41N 65 44.03W	112	608		352	2	UNGAVA BAY	TWC - NO RECOVERY CORE- D-C 0-46 CM.; C-C′ 46-51 CM.; C-B 51-201 CM.; A-B 201-352 CM.; GAS SAMPLE TAKEN AT TOTAL DEPTH.
034TWC	TRIGGER WEIGHT	2681349	59 59.41N 65 44.03W	112		0	0	0	UNGAVA BAY	NO RECOVERY.
036	AGC LONG CORE	2681957	59 57.81N 65 53.89W	332	1216	1216	931	6	UNGAVA BAY	TWC - 0-69 CM.; CUTTER/CATCHER ON HALF ROUND. CORE NO SMALL PIECES. G-F 0-144 CM.; F-E 144-296 CM.; E-D 296-450 CM.; D-C 450-603 CM.; C-B 603-756 CM.;B-A 756-906 CM.; CORE CATCHER 906-931 CM.
036TWC	TRIGGER WEIGHT	2681957	59 57.81N 65 53.89W	332			69	1	UNGAVA BAY	
039	AGC LONG CORE	2691356	59 47.06N 65 55.82W	387	1216	1216	956	4	UNGAVA BAY	TWC - 0-46 CM., NO CUTTER CORE- NO SMALL PIECES, G-H 0-23 CM. G-F 23-177 CM., F-E 177-328 CM., E-D 328-482 CM., D-C 482-634 CM., C-B 634-777 CM., B-A 777-923 CM., CONSOLIDATION SAMPLE IS 923-933 CM. CUTTER/CATCHER 933-956 CM.
039TWC	TRIGGER WEIGHT	2691356	59 47.06N 65 55.82W	387		70	46	1	UNGAVA BAY	NO CUTTER SAMPLE.
042	AGC LONG CORE	2701157	60 57.01N 66 36.95W	761	1824	1216	881	6	EASTERN HUDSON STRAIT	TWC - APP. PEN 140 CM. G′-F 0-106 CM., F-E 106-258 CM., E-E′ 258-264 CM., E-D 264-418 CM., D-C 418-569 CM., C-B 569-710 CM., B-A 710-857 CM. CUTTER/CATCHER 0-24 CM.
042TWC	TRIGGER WEIGHT	2701157	60 57.01N 66 36.95W	761		140			EASTERN HUDSON STRAIT	
045	AGC LONG CORE	2701806	60 56.80N 66 08.28W	845	2432	1824	1179	7	EASTERN HUDSON STRAIT	CUTTER/CATCHER 0-23 CM. CATCHER BAGGED, NO SMALL PIECES. CATCHER 1127-1179;I/H 0-63;H/G 63-214;G-F 214-366;F-E 366-518;E-D 518-673;D-C 673-825;C-B825-976; B-A 976-1127; TD. 1179CM.

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CORE SAMPLES

CRUISE NUMBER = 90023
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PROJECT NUMBER = 760015

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
045TWC	TRIGGER WEIGHT	2701806	60 56.80N 66 08.28W	845		70	0	0	EASTERN HUDSON STRAIT	NO SAMPLE RECOVERED.
052	AGC LONG CORE	2721413	61 19.48N 67 36.21W	402	608	608	275	2	HUDSON STRAIT	C/B 0-127; B/A 127-275 T.D. NO CUTTER.
052TWC	TRIGGER WEIGHT	2721413	61 19.48N 67 36.21W	402		0	0	0	HUDSON STRAIT	NO SAMPLE RECOVERED.
059	AGC LONG CORE	2731920	59 32.01N 67 13.26W	290	1520	1075	787	5	SOUTHERN UNGAVA BAY	TWC 5CM TOTAL; APPROX. PENN. 70CM. 5GY4/1 SILTY STIFF CLAY-GLEYED CLAY; IMPLOSION OBSERVED OUTSIDE THE F/E CORELINER;GAS SAMPLE TAKEN AT 724CM CONSOLIDATION SAMPLE TAKEN AT 724-734CM.F/E 0-134; E/D 134-288;D/C288-438;C/B438-580;B/A 580-724CM; CONSOLIDATION 724-734CM.;TD 787CM. NO EXTRUDED PIECES;
059TWC	TRIGGER WEIGHT	2731920	59 32.01N 67 13.26W	290		70	5		SOUTHERN UNGAVA BAY	5GY4/1 SILTY STIFF CLAY-GLEYED CLAY.
062	AGC LONG CORE	2742022	60 15.76N 68 32.97W	234	1200	1200	256	4	UNGAVA BAY/WEST AKPATOK ISLAND	TWC NO RECOVERY; IMPLOSION C/B; C/B 0-108CM; B/A 108-256CM;TD. CUTTER BAGGED-TOO SLOPPY TO MEASURE.
062TWC	TRIGGER WEIGHT	2742022	60 15.76N 68 32.97W	234		0	0	0	UNGAVA BAY/WEST AKPATOK ISLAND	NO SAMPLE RECOVERED.
064	AGC LONG CORE	2761332	61 07.50N 70 34.60W	196	1520	1260	987	7	WEST BAIE HERICART, N. QUE.	TWC NO RECOVERY; GAS SAMPLE TAKEN AT TD.;CONSOLIDATION TAKEN AT 932-942CM; H-G 0-37; G-F 37-192; F-E 192-342; E-D 342-495;D-C 495-645; C-C′ 645-648; C-B 648-786;B-A 786-932;CONSOL 932-942;CATCHER 942-987TD.
064TWC	TRIGGER WEIGHT	2761332	61 07.50N 70 34.60W	196		50	0	0	WEST BAIE HERICART, N. QUE.	NO SAMPLE RECOVERED.
066	AGC LONG CORE	2762100	61 27.82N 70 51.00W	193	1520	1206	749	5	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.	TWC NO RECOVERY; LONG CORE BARREL BROKE AT 40FT. COUPLING; BARREL WAS SAVED BY LIFTING WIRES AT 30 AND 50 FT.; ONE BARREL BROKE AND A SECOND BENT; F-E 0-99; E-D 99-254;D-C 254-406; C-B 406-543;B-A 543-690;CUTTER 690-698;CATCHER 698-749CM.

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CORE SAMPLES

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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
066TWC	TRIGGER WEIGHT	2762100	61 27.82N 70 51.00W	193		0	0	0	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.	NO SAMPLE RECOVERED.
068	AGC LONG CORE	2771124	61 26.58N 71 02.39W	157	608	400	0	2	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.	TWC 12 CM RECOVERED;BIOTURBATED CLAYEY SILT 5Y5/1; AGC LCF NO RECOVERY; CUTTER GREY CLAYEY SILT WITH LITTLE OR NO SAND; BAGGED;
068TWC	TRIGGER WEIGHT	2771124	61 26.58N 71 02.39W	157		50	12	1	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.	BIOTURBATED CLAYEY SILT 5Y5/1.
071	AGC LONG CORE	2791547	61 46.72N 71 56.65W	110	1520	1216	616	4	WAKEHAM BAY AREA, HUDSON STRAIT, N. QUE.	I/H LINER CRACKED; NO SAMPLE RECOVERED FROM THE TWC; CUTTER FOR LCF 599-616CM; TOP 0-3 CM FOR LCK BAGGED; NOTED IT WAS UNLIKE THE TOP OF THE VAN VEEN AT 072; E-D 0-157CM; D-C 157-309CM; C-B 309-453CM;B-A 453-599; WITH CUTTER TO 616CM.
071TWC	TRIGGER WEIGHT	2791547	61 46.72N 71 56.65W	110		50	0	0	WAKEHAM BAY AREA, HUDSON STRAIT	NO SAMPLE RECOVERED.
076	AGC LONG CORE	2811452	62 09.70N 74 42.28W	67	1520	1170	587	4	DECEPTION BAY, QUE.	TWC NO SAMPLE RECOVERED; 5 BARRELS USED, CUTTER DAMAGED; GAS SAPMLE TAKEN AT TD. CATCHER 529-577CM, CUTTER BAGGED; E/D 0-83; D/C 83-235 C/B 235-369; B/A 369-519;CONSOLID. SAMPLE 519-529CM. CUTTER STIFF 5Y4/1 CLAY.
076TWC	TRIGGER WEIGHT	2811452	62 09.70N 74 42.28W	67		0	0	0	DECEPTION BAY, QUE.	NO SAMPLE RECOVERED.
082	BENTHOS GRAVIT	2811820	62 08.20N 74 38.42W	70	150	0	0	0	DECEPTION BAY, QUE.	CORE CATCHER LOST UPON 2ND ATTEMPT; NO CORE RECOVERED AT SITE;
085	AGC LONG CORE	2821607	62 36.95N 76 22.53W	380	1520	1150	548	4	WESTERN HUDSON STRAIT	TWC CUTTER BAGGED; TWC 0-28CM; E/D CRACKED AND PLASTIC SHATTERED; CUTTER DEMOLISHED; CATCHER HAD FINGERS INVERTED;CONSOLIDATION 510-520CM. CATCHER 520-548CM; E/D 0-71; D/C 71-222; C/B 222-363; B/A 363-510; TD 548CM.

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085TWC	TRIGGER WEIGHT	2821607	62 36.95N 76 22.53W	380		50	30	1	WESTERN HUDSON STRAIT	TWC CUTTER SAMPLE BAGGED.
087	AGC LONG CORE	2821855	62 38.90N 76 39.77W	390	608	608	370	3	OFFSHORE PROMONTOIRE COLBERT, N. QUE.	TWC 3CM. BAGGED; LCF D/C 0-70CM.; C-B 70-214CM.; B/A 214-360CM.; GAS SAMPLE TAKEN AT TO 370CM. CONSOLIDATION SAMPLE TAKEN AT 360-370 CM.
087TWC	TRIGGER WEIGHT	2821855	62 38.90N 76 39.77W	390		0	3	0	OFFSHORE PROMONTOIRE COLBERT, N. QUE.	BAGGED.
089	AGC LONG CORE	2831222	63 02.75N 81 59.78W	217	1520	912	19	1	NORTHERN COATS IS., HUDSON BAY	NO SAMPLE RETRIEVED BY TWC; AGC LONG CORE CATCHER INVERTED; PISTON SPLIT 8 - 9 FT. ABOVE SAMPLE NO DAMAGE TO CUTTER OR TO LINERS; SAMPLE MAY HAVE BEEN SUCKED OUT; CORE SPLIT AND DESCRIBED.
089TWC	TRIGGER WEIGHT	2831222	63 02.75N 81 59.78W	217		30	0	0	NORTHERN COATS IS., HUDSON BAY	NO SAMPLE RECOVERED.
091	AGC LONG CORE	2831609	63 02.77N 81 59.30W	212	608	608	458	4	NORTH COATS IS. HUDSON BAY	NO TWC SAMPLE RECOVERED; NO LCF CATCHER; CUTTER BAGGED; CONSOLIDAT-ION SAMPLE TAKEN 448-458CM. GAS SAMPLE TAKEN AT TD. NUMBERING OF CORE LINERS TO BE CHANGED TO E/D 0-80CM; D/C 80-163; C/B 163-303; B/A 303-448CM. ERROR IN STARTING CORE FROM BOTTOM.
091TWC	TRIGGER WEIGHT	2831609	63 02.77N 81 59.30W	212		30	0	0	NORTH COATS IS. HUDSON BAY	NO SAMPLE RECOVERED.
092	AGC LONG CORE	2831954	62 59.45N 81 58.18W	220	912	912	710	5	NORTH COATS IS. HUDSON BAY	IMPLOSION OBSERVED AT E/D; NO TWC RECOVERED; PISTON FOUND TO BE 2.5FT ABOVE SEDIMENT SURFACE; F/E 0-89CM E/E' 89-92CM; E/D 92-246; D/C 246-397; C/B 397-541; A/B 541-686; CATCHER 686-700; CONSOLIDATION SAMPLE 700-710CM. GAS SAMPLE TAKEN AT 710CM.

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092TWC	TRIGGER WEIGHT	2831954	62 59.45N 81 58.18W	220		30	0	0	NORTH COATS IS. HUDSON BAY	NO SAMPLE RECOVERED.
094	AGC LONG CORE	2841224	63 00.97N 76 38.61W	320	1520	710	499	4	SOUTHEAST OF SALISBURY IS., WESTERN HUDSON STRAIT	NO TWC OBTAINED; IMPLOSION OBSERVED IN E/D;SITE SELECTED FROM CRUISE 86027 DAY 267/ 1830; LCF E/D 0-88; D/C 88-183; C/B 183-328; B/A 328-475; CUTTER 475-489CM; CONSOLIDATION SAMPLE 489-499CM; GAS SAMPLE TAKEN AT 499 TD.
094TWC	TRIGGER WEIGHT	2841224	63 00.97N 76 38.61W	320		0	0	0	SOUTHEAST OF SALISBURY IS., WESTERN HUDSON STRAIT	NO SAMPLE RECOVERED.
097	AGC LONG CORE	2842056	63 14.96N 75 32.68W	427	1520	1160	662	5	WESTERN HUDSON STRAIT	SITE SELECTED FROM 85027- 292/0155 TWC 0-138CM; TWC CUTTER BAGGED 15CM LCF CUTTER/CATCHER 643-662CM; CONSOLIDATION SAMPLE 633-643CM; GAS SAMPLE TAKEN AT 662CM TD; F/E 0-42; E/D 42-195; D/C 195-346; C/B 346-486; B/A 486-633; TD 662CM;
097TWC	TRIGGER WEIGHT	2842056	63 14.96N 75 32.68W	427		120	138	1	WESTERN HUDSON STRAIT	CUTTER SAMPLE BAGGED 15 CM.
099	AGC LONG CORE	2861205	63 03.98N 74 33.96W	386	1520	1520	479	4	WESTERN HUDSON STRAIT	PISTON LOCATED 1 FT. ABOVE SEDIMENT USED MEDIUM SCREW/STEEL PINS; NO TWC RECOVERED; E/D 0-85CM; D-C 85-170CM; C-C′ 170-172CM (BAGGED); C′/B 172-318CM; B/A 318-464CM; CUTTER/CATCHER 464-479CM.
099TWC	TRIGGER WEIGHT	2861205	63 03.98N 74 33.96W	386		0	0	0	WESTERN HUDSON STRAIT	NO SAMPLE RECOVERED.
101	AGC LONG CORE	2861615	63 02.99N 74 18.24W	389	1824	1000	776	6	WESTERN HUDSON STRAIT	TWC 0-17CM., SPLIT AND DESCRIBED; LCF PISTON 1 FT. ABOVE SEDIMENT; NO SMALL PIECES OF CORE;TWO FINGERS OF CATCHER INVERTED; F/G 0-86; F/E 86-170;E/D 170-323; D/C 323-475; C/B 475-613; B/A 613-759; CORE CATCHER 759-776 CM TD. CUTTER BAGGED.

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101TWC	TRIGGER WEIGHT	2861615	63 02.99N 74 18.24W	389		30	17	1	WESTERN HUDSON STRAIT	SPLIT AND DESCRIBED.
104	AGC LONG CORE	2871208	62 59.58N 74 00.04W	410	1520	920	582	6	WESTERN HUDSON STRAIT	TWC 0-115CM; CUTTER AND EXTRUDED PIECE BELOW CUTTER BAGGED; TWC 81CM; CUTTER 20CM; PIECE 14CM; LCF G/F 0-60CM; F/E 60-212CM; E-E´ 212-222CM; E/D 222-256CM; D/C 256-381CM; B/C 381-528CM; A/B 528-552CM CORE CATCHER 552-582CM TD. CORE DISTURBED BELOW 528CM;
104TWC	TRIGGER WEIGHT	2871208	62 59.58N 74 00.04W	410		100	115	1	WESTERN HUDSON STRAIT	SAMPLE BELOW CATCHER AND CUTTER BAGGED.
106	AGC LONG CORE	2872047	62 59.38N 73 59.90W	412	1216	912	497	4	WESTERN HUDSON STRAIT	TWC 0-81CM;TOP OF CORE DISTURBED; LCF E/D IMPLODED, SPLIT/DESCRIBED AND PHOTOGRAPHED; E/D 0-87CM;D/C87-207CM; C/B 207-350CM; B/A 350-497 CM; CORE BADLY DISTURBED BELOW 160 CM; CORE WAS NOT SAMPLED; CORE WAS ALSO BADLY DISTURBED ABOVE 50 CM.
106TWC	TRIGGER WEIGHT	2872047	62 59.38N 73 59.90W	412		105	81	1	WESTERN HUDSON STRAIT	TOP OF CORE DISTURBED.
107	AGC LONG CORE	2881137	61 20.67N 70 37.77W	182	1520	1216	750	5	WHITLEY BAY AREA, HUDSON STRAIT	NO SAMPLE RECOVERED FROM TWC; CORE CATCHER FINGERS BROKEN AND INVERTED; F/E 0-109CM; E-E´ 109-112 CM; E/D 112-265CM.
107TWC	TRIGGER WEIGHT	2881137	61 20.67N 70 37.77W	182			0	0	WHITLEY BAY AREA, HUDSON STRAIT	NO SAMPLE RECOVERED.
113	AGC LONG CORE	2891243	62 11.73N 65 44.24W	338	1520	0			FROBISHER BAY	
113TWC	TRIGGER WEIGHT	2891243	62 11.73N 65 44.24W	338		0	0	0	FROBISHER BAY	NO SAMPLE RECOVERED.
118	AGC LONG CORE	2922253	54 44.57N 56 05.04W	458	2128	1520	1100	7	CARTWRIGHT SADDLE	APPROX. LENGTH 1100 CM.

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118TWC	TRIGGER WEIGHT	2922253	54 44.57N 56 05.04W	458		100			CARTWRIGHT SADDLE	

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GRAB SAMPLES

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

SAMPLE NUMBER	TYPE OF SAMPLER	DAY/TIME (GMT)	LATITUDE LONGITUDE	DEPTH (M)	NO. OF ATTEMPTS	GEOGRAPHIC LOCATION	GRAB SAMPLE NOTES
002	VAN VEEN	2621530	62 40.00N 66 50.00W	15	1	FROBISHER BAY, WATTS BAY	SAMPLE TAKEN FROM HUDSON LAUNCH. LOCATION IS .15 MILES FROM GLACIER MARGIN SEDIMENT: WATERY, LOOSE CLAYEY SILT, MOTTLED, DARK BROWN TO BLACK 5Y 2.5/1.
003	VAN VEEN	2621530	62 40.00N 66 50.00W	65	1	FROBISHER BAY, WATTS BAY	GRAB TAKEN FROM HUDSON LAUNCH. SANDY,CLAYEY SILT, MOTTLED WITH BIVALVE SHELL FRAGMENTS, WITH A FEW PEBBLES (UP TO 2 CM.). UPPER SURFACE IS MOTTLED AND OXIDIZED (5Y 4/3).
004	VAN VEEN	2621630	62 40.00N 66 50.00W	135	1	FROBISHER BAY, WATTS BAY	GRAVELLY SAND WITH MINOR % MUD. PAIRED BIVALVE (HIATELLA) + BRITTLE STAR. SOME MOTTLING IN GRAB. BASIC COLOR 5YR 4/3.
005	VAN VEEN	2621730	62 40.00N 66 50.00W	135	1	FROBISHER BAY, WATTS BAY	GRAVELLY SAND (LITTLE FINES) - OXIDIZED SURFACE OVERLYING MOTTLED BASIC COLOR 5YR 4/3.
006	VAN VEEN	2621730	62 40.00N 66 50.00W	112	1	FROBISHER BAY, WATTS BAY	GREENISH BROWN 5Y 3/2-4/2 MOTTLED GRAVELLY SAND. GRAVEL RANGE FROM GRANULE TO PEBBLE (1-2 CM.) SIZE. MED. TO COARSE SAND, SMALL % FINES.
008	VAN VEEN	2631533	62 31.70N 66 11.30W	425	1	FROBISHER BAY	1/2 FULL, SILTY, SANDY GRAVEL, RICH WITH MACRO- BENTHOS, SOME BLACK ORGANICS.
010	VAN VEEN	2632021	62 29.80N 66 18.20W	463	1	FROBISHER BAY	GREY, PEBBLEY MUD PLENTY OF MACROFAUNA, WORMS.
011	VAN VEEN		62 27.00N 66 30.00W			FROBISHER BAY	NO RECOVERY.
012	VAN VEEN	2631500	62 27.00N 66 30.00W	10	1	FROBISHER BAY	SAMPLE TAKEN FROM HUDSON LAUNCH. SANDY GRANULE GRAVEL W/10% PEBBLES (PINK & GREY GRANITE GNEISSES). SAND FRACTION RANGES FINE TO VERY COARSE; SAMPLE IS MODERATELY WELL SORTED; SHELL FRAGMENTS, KELP. PEBBLES ARE ROUNDED, SOME BROKEN. LOCATION: HEAD OF INLET APPROX 1 KM. OFFSHORE IN CENTRE AXIS OF SOUND.
013	VAN VEEN	2631615	62 27.00N 66 30.00W	40	1	FROBISHER BAY, YORK SOUND	SAMPLE TAKEN FORM HUDSON LAUNCH. LOCATION: ALONG CENTRE AXIS OF BASIN. PEBBLY SAND, MEDIUM SAND WITH MINER FRACTION OF MUD. APPROX. 10% PEBBLES AS LARGE AS 2 CM. MACROFAUNA INCLUDES WORMS, SNAIL, OTHER BIVALVE FRAGMENTS.
014	VAN VEEN	2631630	62 27.00N 66 30.00W	90	1	FROBISHER BAY, YORK SOUND	SAMPLE TAKEN FROM HUDSON LAUNCH. LOCATION; 90-100 M. HUMMOCKY BASIN BETWEEN SILL & MUD PLATFORM. SANDY GRAVEL, SAND-MEDIUM TO COARSE; GRAVEL FRACTION (GRANITE GNEISS LIMESTONE); MACROFAUNA: WORMS, SNAIL, BIVALVES, BRITTLE STAR.

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TABLE 11

GRAB SAMPLES

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

SAMPLE NUMBER	TYPE OF SAMPLER	DAY/TIME (GMT)	LATITUDE LONGITUDE	DEPTH (M)	NO. OF ATTEMPTS	GEOGRAPHIC LOCATION	GRAB SAMPLE NOTES
015	VAN VEEN	2631700	62 27.00N 66 30.00W	10	1	FROBISHER BAY, YORK SOUND	SAMPLE TAKEN FROM HUDSON LAUNCH. LOCATION:10M. DEPTH EAST-CENTRAL PORTION OF SOUND. SANDY PEBBLY GRAVEL; SAND FRACTION - VERY COARSE GRANULAR; GRAVELS - ROUNDED AS LARGE A 5 CM., SOME BROKEN, GRANITE GNEISS. BIVALVE SHELL FRAGMENTS.
016	VAN VEEN	2631715	62 27.00N 66 30.00W	10	1	FROBISHER BAY, YORK SOUND	SAMPLE TAKEN FROM HUDSON LAUNCH. LOCATION:10 M. DEPTH ALONG SEAWARD EDGE OF PLATFORM, WEST-CENTRAL AXIS OF INLET. FINE TO MEDIUM SAND, SHELL FRAGMENTS, KELP FRAGMENTS.
017	VAN VEEN	2631730	62 27.00N 66 30.00W	95	1	FROBISHER BAY, YORK SOUND	SAMPLE TAKE FROM HUDSON LAUNCH. LOCATION:BASIN BETWEEN SILL AND 10M. PLATFORM. GRAVELLY SAND: GRAVELS,SUBROUNDED TO SUB-ANGULAR, ROUND LARGEST UP TO 5 CM. MACROFOSSILS, BIVALVE FRAGMENTS (BROKEN), LIVE BIVALVES, FLATWORMS (SAND ENCRUSTED).
019	VAN VEEN	2641418	62 06.70N 65 24.80W	335	1	FROBISHER BAY	CLEAN BROWN SAND, RICH WITH FORAMS THAT CAN BE SEEN. BASIC COLOR 10YR 7/2
021	VAN VEEN	2641915	62 06.10N 65 24.00W	335	1	FROBISHER BAY	REDDISH BROWN, WELL SORTED AND ABUNDANT FORAMS, AND SHELL FRAGMENTS.
023	VAN VEEN	2651352	63 07.10N 64 21.30W	396	1	OFF HALL PENINSULA, BAFFIN SHELF	OLIVE GREY FINE MUD, ORGANIC SMELL. FEW WORMS AND BIVALVES.
025	VAN VEEN	2651722	63 04.70N 64 19.00W	340	1	OFF HALL PENINSULA, BAFFIN SHELF	OLIVE GREY MUD, FEW MACROBENTHEOS. BASIC COLOR 5Y 5/3.
027	VAN VEEN	2661749	61 47.06N 63 51.10W	574	1	RESOLUTION BASIN	GREY PEBBLY, SANDY MUD. BASIC COLOR 10YR 5/1.
032	VAN VEEN	2671318	60 57.30N 65 29.70W	872	1	HUDSON STRAIT	BASIC COLOR 10YR 5/3 BROWN SAND, COARSE AND WELL SORTED.
033	VAN VEEN	2680249	60 09.75N 65 11.22W	112	2	UNGAVA BAY	DARK GREY BROWN, SAND AND ROCKS COVERED WITH BRYOZOANS.
035	VAN VEEN	2681426	59 59.35N 65 44.00W	336	1	UNGAVA BAY	BROWNISH GREY, BIOTURBATED MUD; VERY RICH MACRO-MICRO FAUNA; ORGANIC LAYER BELOW BIOTURBATED ZONE (10-15 CM.); MACROFAUNA GAMMARID AMPHIPODS, HIATELLA ARCTICA, SPIONID POLYCHAETES; SIPUNCULANS

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GRAB SAMPLES

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

SAMPLE NUMBER	TYPE OF SAMPLER	DAY/TIME (GMT)	LATITUDE LONGITUDE	DEPTH (M)	NO. OF ATTEMPTS	GEOGRAPHIC LOCATION	GRAB SAMPLE NOTES
037	VAN VEEN	2690002	59 51.00N 66 29.69W	108	2	UNGAVA BAY	BASIC COLOR 5Y 4/2. BROWNISH GREY SANDY, MUDDY GRAVEL. PEBBLES WITH BRYOZOANS, HYDROIDS, AND ECHINOIDS.
038	VAN VEEN	2690548	59 26.17N 66 32.88W	245	1	UNGAVA BAY	GREY BROWN, 5YR 4/2. GRAVELLY SANDY MUD. MACROFAUNA, MACOMA CALCAREA, ONUPHID POLYCHAETES, AMPHIPODS, SEVERAL LARGE ERRATICS.
040	VAN VEEN	2691429	59 47.00N 65 55.79W	408	1	UNGAVA BAY	BROWNISH GREY PEBBLY MUD, MALCOMA CALCAREA AND POLYCHAETES. SAMPLE HALF FULL.
041	VAN VEEN	2700346	60 31.80N 66 28.30W	149	3	UNGAVA BAY	FIRST TRY CABLE SNARLED, SECOND TRY FIVE PEBBLES AND 300 ML. SAND, THIRD TRY 2 PEBBLES AND 100 ML. SAND AND SILTY MUD. BRITTLE STARS, SEA URCHINS, BRYOZOANS. JAWS OPEN DURING ALL THREE ATTEMPTS. BASE COLOR 5Y 2/6. DARK OLIVE GREY.
043	VAN VEEN	2701244	60 57.03N 66 36.95W	729	1	EASTERN HUDSON STRAIT	OLIVE BROWN MUD, 10 CM. SURFACE SLIGHTLY LIGHTER, POLYCHAETES AND BIVALVES. SAMPLE FULL AND DOORS CLOSED. BASIC COLOR 5Y 3.5/2.
048	VAN VEEN	2710938	61 48.29N 66 11.78W	226	1	HUDSON STRAIT	DARK GREY BROWN PEBBLY COARSE SAND. BRITTLE STARS, HIATELLA, SHELL HASH. BASIC COLOR 5Y 4/3.
050	VAN VEEN	2712211	61 58.80N 67 06.96W	87	1	EASTERN HUDSON STRAIT	BROWNISH GREY SANDY GRAVEL AND SHELL HASH, ANNELIDS, SEA URCHINS, SAMPLER ONE-HALF FULL, JAWS CLOSED;
051	VAN VEEN	2720344	62 00.95N 67 57.34W	150	1	EASTERN HUDSON STRAIT	5Y4/3 STONY MUDDY SAND OLIVE GREEN; OPHIURIDS, SEA URCHINS, HYDROZOANS AND BRYOZOANS;
053	VAN VEEN	2721443	61 19.31N 67 36.01W	400	1	HUDSON STRAIT	SANDY MUD, STIFF BELOW 10 CM. SURFACE; POLYCHAETES.
054	VAN VEEN	2730104	60 34.98N 67 10.47W	137	1	UNGAVA BAY	PEBBLY SAND 1/4 FULL; BRITTLE STARS, HYDROZOANS AND SEA URCHINS; BASIC COLOUR 5Y4/3.
056	VAN VEEN	2730606	60 15.90N 67 12.15W	111	1	UNGAVA BAY	BROWNISH GREY SANDY MUD, 5Y4.5/3; STONES, SHELL HASH, BRITTLE STARS, BRYOZOANS, SEA URCHINS; 3/4 FULL;
057	VAN VEEN	2731245	59 50.19N 67 17.75W	57	1	SOUTHERN UNGAVA BAY	MUDDY SAND AND FEW PEBBLES, 1/2 FULL;BRYOZOANS, CHITINS, SHELL HASH ON TOP; 5Y4/2.
060	VAN VEEN	2731956	59 31.60N 67 12.63W	294	1	SOUTHERN UNGAVA BAY	VERY FINE DARK BROWN MUD; BIVALVES AND ANNELIDS; 5Y3/2.

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GRAB SAMPLES

CRUISE NUMBER = 90023
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PROJECT NUMBER = 760015

SAMPLE NUMBER	TYPE OF SAMPLER	DAY/TIME (GMT)	LATITUDE LONGITUDE	DEPTH (M)	NO. OF ATTEMPTS	GEOGRAPHIC LOCATION	GRAB SAMPLE NOTES
061	VAN VEEN	2741033	60 02.89N 67 45.78W	72	1	UNGAVA BAY	GRAVELLY MUD ON SURFACE, VERY FINE MUD UNDER RICH EPIFAUNA, BRYOZOANS, SPONGES, BIVALVES; BIOLOGICA-LLY AN EXTREMELY RICH SAMPLE; LITTLE OR NO SEDIMENT; VAN VEEN BUCKET FULL, WATER DRAINED; 5Y4/2.
063	VAN VEEN	2741853	60 15.55N 68 32.89W	232	1	UNGAVA BAY/WEST AKPATOK ISLAND	SAND GRAVEL WITH FEW SHELLS; NOT A REPRESENTATIVE SAMPLE.
065	VAN VEEN	2761400	61 08.10N 70 34.00W	196	1	WEST BAIE HERICART, N. QUE.	5Y4/2 SILTY MUD, BIVALVES WITH POLYCHAETES.
067	VAN VEEN	2762207	61 27.29N 70 52.12W	193	1	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.	5Y4/3 SILTY MUD, ANNELIDS, AMPHIPODS.
069	VAN VEEN	2771144	61 26.39N 71 02.98W	150	1	WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.	FINE MUD FEW PEBBLES; BRITTLE STARS, GASTROPODS AND POLYCHAETES; 5Y4/3.
072	VAN VEEN	2791644	61 46.72N 71 56.20W	111	1	WAKEHAM BAY AREA, HUDSON STRAIT	3/4 FULL, CLOSED; SANDY, SILTY MUD; BRITTLE STARS, ANNELIDS AND BIVALVES; 5Y4/3; CLASTS SAMPLED BY DIORON, GSC.
077	VAN VEEN	2811517	62 09.58N 74 42.14W	69	1	DECEPTION BAY QUE.	VAN VEEN 1/2 FULL; STIFF CLAY, HOMOGENEOUS WITH BLACK BLEBS; 5Y4/2; ANNELIDS AND BIVALVES.
080	VAN VEEN	2811740	62 08.47N 74 38.56W	40	1	DECEPTION BAY, QUE.	GREENISH SURFACE WITH SHELLS AND WORMS;SUBSURFACE SILTY CLAY, GRAY WITH BLACK BANDS.
081	VAN VEEN	2811805	62 08.20N 74 38.42W	70	1	DECEPTION BAY, QUE.	GREY SILTY CLAY, MASSIVE; GREENISH SURFACE; SAMPLES TAKEN FOR AITKEN AND BRIGGS;
084	VAN VEEN	2821242	62 46.72N 76 05.27W	315	1	WESTERN HUDSON STRAIT	VAN VEEN HALF FULL; GRITTY, SANDY PEBBLY MUD, LOOSE; BRITTLE STARS AND ANNELIDS.
086	VAN VEEN	2821644	62 37.01N 76 22.54W	390	1	WESTERN HUDSON STRAIT	VAN VEEN FULL AND CLOSED; SILTY SANDY MUD; SHRIMP AND SMALL BIVALVES AND POLYCHAETES; 5Y4/2.
088	VAN VEEN	2821938	62 38.95N 76 39.97W	390	1	OFFSHORE PROMONTOIRE COLBERT, N. QUE.	VAN VEEN FULL; PEBBLY MUD; FEW POLYCHAETES, SMALL BIVALVES; LARGE ROCK RENT JAWS PARTIALLY OPEN; 5Y4/2.
090	VAN VEEN	2831348	63 02.75N 81 59.82W	219	1	NORTHERN COATS IS., HUDSON BAY	ROCKS ON SURFACE OF A SANDY (CLEAN) MUD; POLYCHAETES; 5Y4/3.

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TABLE 11

GRAB SAMPLES

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

SAMPLE NUMBER	TYPE OF SAMPLER	DAY/TIME (GMT)	LATITUDE LONGITUDE	DEPTH (M)	NO. OF ATTEMPTS	GEOGRAPHIC LOCATION	GRAB SAMPLE NOTES
093	VAN VEEN	2831954	62 59.76N 81 58.30W	220	2	NORTH COATS IS. HUDSON BAY	FIRST ATTEMPT: ONE LARGE BOULDER, JAWS OPEN; HIATELLA ARCTICA, SOME SANDY MUD; SECOND ATTEMPT: SURFACE CLEAN PEBBLES, BELOW SANDY MUD GRADING TO CLAY; 5Y4/3 TOP/ BELOW 5Y3/2.
095	VAN VEEN	2841255	63 01.01N 76 38.56W	320	3	SOUTHEAST OF SALISBURY IS., WESTERN HUDSON STRAIT	FIRST ATTEMPT: ONE BOULDER COVERED WITH GROWTH; JAWS OPEN; SOME STIFF SANDY MUD; SECOND ATTEMPT: WIRE TANGLED; THIRD ATTEMPT: VERY LITTLE OBTAINED IN VAN VEEN; SOME PEBBLES AND SAND, 5Y5/2.
098	VAN VEEN	2842145	63 14.83N 75 32.40W	427	1	WESTERN HUDSON STRAIT	VERY STIFF, GRITTY CLAY UNDER A SURFACE LAYER OF PEBBLES; 5Y4/3.
100	VAN VEEN	2861239	63 04.07N 74 34.00W	393	1	WESTERN HUDSON STRAIT	VAN VEEN CLOSED, 1/2 FULL; FINE MUD, STICKY; FEW POLYCHAETES, 5Y4/3.
102	VAN VEEN	2861654	63 03.07N 74 18.31W	421	1	WESTERN HUDSON STRAIT	VAN VEEN CLOSED AND FULL; GRITTY MUD ON SURFACE STICKY CLAY BELOW. WORMS AND AMPHIPODS, 5Y4/3.
105	VAN VEEN	2871248	62 59.57N 73 59.90W	410	1	WESTERN HUDSON STRAIT	VAN VEEN SLIGHTLY OPEN; 1/3 FULL; SANDY AND PEBBLY MUD; SOME GROWTH ON PEBBLES; 5Y4/2.
108	VAN VEEN	2881209	61 20.70N 70 37.67W	182	1	WHITLEY BAY AREA, HUDSON STRAIT	VAN VEEN PARTLY OPENED; 3/4 FULL; FINE MUD, PEBBLES ON SURFACE. BIVALVES, STARFISH, LITTLE EPIFAUNA; 5Y5/2.
111	VAN VEEN	2881634	61 19.75N 69 54.54W	214	1	EASTERN HUDSON STRAIT	FINE MUD, SLIGHTLY GRITTY; ABUNDANT POLYCHAETES. 5Y4/3.
114	VAN VEEN	2891330	62 11.75N 65 44.51W	343	1	FROBISHER BAY	BROWN SAND AND PEBBLES, SOME MUD 5Y5/2; VAN VEEN PARTLY OPEN, 1/10 FULL.

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TABLE 12

BOXCORE SAMPLES

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

SAMPLE NUMBER	TYPE OF SAMPLER	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (MTRS)	NO OF ATTEMPTS	NO OF SUBSAMPLES	NO OF CORES	PHOTOS TAKEN	GEOGRAPHIC LOCATION	NOTES
044	BOXCORE	2701549	60 56.97N 66 08.92W	844	1			N	EASTERN HUDSON STRAIT	OLIVE GRAY MUD 3/4 FULL, FEW TUBES OF WORMS OF FORAMS.
116	BOXCORE	2921156	55 48.66N 57 07.49W	1000	2	0	0	Y	LABRADOR SHELF SLOPE	2ND ATTEMPT 1247; BOULDERS AND STIFF CLAYEY MUD; 1/10 FULL; PREMATURE TRIPPING DUE TO WEATHER;
117	BOXCORE	2921400	55 54.36N 56 53.13W	2040	2	0	0	N	LABRADOR SHELF SLOPE	PRETRIPED ON TWO OCCASSIONS DUE TO INCLEMENT WEATHER; NO SAMPLE RECOVERED;

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TABLE 13

IKU GRAB SAMPLES

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

SAMPLE NUMBER	TYPE OF SAMPLER	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (MTRS)	NO OF ATTEMPTS	NO OF SUBSAMPLES	NO OF CORES	PHOTOS TAKEN	GEOGRAPHIC LOCATION	NOTES
049	IKU	2711718	61 47.37N 66 51.62W	223	2	3			HUDSON STRAIT	FIRST ATTEMPT 5 GALLON BUCKETS AND 1 GAL. SECOND ATTEMPT 1-5 GAL. SD; CONTENTS SAND AND ROCK; 10YR6/2; CLAST LITHOLOGY EXAMINED BY ANDRE GSC, AND MICROFOSSILS BY BRIGGS; RESAMPLED AT 90023050.
070	IKU	2771224	61 26.21N 71 03.34W	149	1		3		WHITLEY BAY AREA, HUDSON STRAIT, N. QUE.	3 PUSHCORES TAKEN FROM CENTRE OF IKU-1 AGC/1DOIRON GSC QUEBEC FOR CLASTS/1 AITKEN, QUEENS; 0-74CM; SURFACE EPIFAUNA: MALDANIO,POLYCHAETES IN THICK MUD TUBES, PAIRED BIVALVES, AMPHIPODS; SOFT CLAYEY SILT 5Y5/2 WITH UP TO 20% SAND.
073	IKU	2792133	62 25.17N 71 34.63W	333	1	6	3	Y	CENTRAL HUDSON STRAIT	PEBBLY, MUDDY SAND AT SURFACE OLIVE GREEN 5Y4/3 BELOW 20-30 CM.; PEBBLY SILT (DIAMICTON); BRITTLE STARS; 0-59CM PUSHCORE SPLIT SAMPLED FOR VILKS/MUDIE;
074	IKU	2801307	62 44.28N 72 42.26W	358	1	6	1	Y	CENTRAL HUDSON STRAIT	1/2 FULL UPON RECOVERY;SURFACE WITH BOULDERS+LARGE PEBBLES COVERED WITH GROWTH. BELOW 19 CM. STICKY TOUGH CLAY; 5 CM SURFACE OLIVE BROWN 5Y4/3 1 PUSHCORE FROM 0-19CM (A-B) SECOND PART 19-37CM(B-C) FROM THE SAME HOLE; SPLIT AND DESCRIBED; SAMPLED FOR FORAMS DIATOMS(INSTAAR),POLLEN;
075	IKU	2802112	62 27.90N 74 03.11W	86	1	6	0	Y	WESTERN HUDSON STRAIT	COARSE SAND AND GRAVEL 5Y4/3; LARGE BOULDERS COVERED WITH GROWTH; SHELL HASH CONSISTS OF BIVALVES HIATELLA,PECTINS;SOFT BODIED TUNICATES, CORALS;

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TABLE 13

IKU GRAB SAMPLES

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

SAMPLE NUMBER	TYPE OF SAMPLER	JULIAN DAY/TIME	LATITUDE LONGITUDE	DEPTH (MTRS)	NO OF ATTEMPTS	NO OF SUBSAMPLES	NO OF CORES	PHOTOS TAKEN	GEOGRAPHIC LOCATION	NOTES
079	IKU	2811725	62 21.31N 74 48.37W	115	1	5	0	Y	WESTERN HUDSON STRAIT, (OFFSHORE DECEPTION BAY)	SURFACE COVERED WITH COBBLES AND BOULDERS RICH WITH ORGANIC GROWTH; SUBSURFACE VERY STIFF GRAY CLAY; 1/3 FULL, CLOSED; 3 BAGS ARCHIVED; CLASTS WASHED
083	IKU	2821200	62 46.71N 76 05.34W	315	2	0	0	0	WESTERN HUDSON STRAIT	1ST ATTEMPT JAWS DID NOT CLOSE; 2ND NO SAMPLE RECOV.
096	IKU	2841637	62 57.45N 76 59.91W	275	1	5	3	Y	SOUTHEAST OF SALISBURY IS., WESTERN HUDSON STRAIT	THREE PUSHCORES REMOVED: AGC CORE A/B SPLIT AND SAMPLED; LOWER UNIT SUBBOTTOM BAGGED;
109	IKU	2881326	61 24.17N 70 37.35W	152	1	5	3	Y	WHITLEY BAY AREA, HUDSON STRAIT	3 CORES E (LONGEST), B/E, F E WAS SPLIT AND DESCRIBED, 0-27CM. REPRESENTATIVE CORE OF THE EXTENT OF BURROWING ACTIVITY BY POLYCHAETES; B/E WAS ALSO SPLIT AND DESCRIBED 0-22CM; REPRESENTS SURFICIAL VENEER;
110	IKU	2881547	61 19.90N 69 54.80W	210	3	0	0	N	EASTERN HUDSON STRAIT	1ST ATTEMPT JAWS OPEN; 2ND ATTEMPT 1600 JAWS OPEN; 3RD ATTEMPT 1609 JAWS OPEN; NO SAMPLE RECOVERED;
112	IKU	2882341	61 32.06N 67 28.07W	265	1	5	3	Y	EASTERN HUDSON STRAIT	BROWN SURFACE SANDY CLAY WITH ROCKS AND PEBBLES EXHIBITING ORGANIC GROWTH ON SURFACES; BELOW 3-4CM VERY COHESIVE CLAY VERY DARK BROWN TO BLACK; PUSHCORE H SPLIT AND DESCRIBED: 0-25CM BIOGENIC STRUCTURES TO TD. SEVERAL LARGE BACKFILLED BURROWS; 3 PUSHCORES G,H AND I; TWO BAGS OF SAMPLES ALSO TAKEN;
115	IKU	2891655	62 01.94N 65 32.36W	282	1	5	0	Y	OUTER FROBISHER BAY AREA	LIGHT BROWN SAND AND CLEAN ROUNDED PEBBLES WITH ORANIC GROWTH ON SURFACES; SPONGES BIVALVES; IKU PARTLY OPENED AND DRAINED OF WATER, 1/10FULL

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TABLE 14

PLANKTON TOWS

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

SAMPLE NUMBER	SAMPLE TYPE	JULIAN DAY/TIME	LATITUDE	LONGITUDE	WATER DEPTH (MTRS)	START TOW DEPTH	START-STOP DAYTIME	ELAPSED TIME (MIN)	MESH NO.1 AND MESH NO.2	FLOW-METER	SERIAL NUMBER	GEOGRAPHIC LOCATION	NOTES
029	PLANKTON	2661840	61 47.37	63 49.71	200	000			75			RESOLUTION BASIN	75 MICRON MESH,1 DIAMETER, 0-200
028	PLANKTON	2661811	61 47.08	63 50.63	200	000						RESOLUTION BASIN	75 MM. MESH,1 ME DIA.,0-200 VERTI
046	PLANKTON	2701926	60 55.48	66 08.64	200	0			75			HUDSON STRA	VERTIVAL TOW 0-2 M., 75 MICRON ME
047	PLANKTON	2701947	60 55.53	66 08.64	200							HUDSON STRA	NO SAMPLE, LOST BECAUSE OF HIGH
103	PLANKTON	2861713	63 02.89	74 18.12	200	200.0			75MU			CENTRAL HUD STRAIT	75 MU MESH 1 M DIAMETER APERATU

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TABLE 15

HUNTEC RECORDS

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	HUNTEC SYSTEM
1	2620245	2621255	INTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
2	2621640	2621735	INTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
3	2620320	2621735	INTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
4	2630135	2630615	INTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
5	2630150	2630635	EXTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
6	2630625	2631215	INTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
7	2631330	2631850	INTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
8	2630640	2631850	EXTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
9	2632145	2640640	INTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
10	2632145	2640655	EXTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
11	2640645	2640920	INTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
12	2640705	2641805	EXTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
13	2641125	2651620	INTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
14	2650415	2651620	EXTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
15	2660315	2661115	INTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
16	2660315	2661115	EXTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
17	2661535	2671110	EXTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
18	2671735	2672120	EXTERNAL		SINGLE	FROBISHER BAY	EPC 4100	HUNTEC DTS (AGC 3)
19	2661540	2661640	INTERNAL		SINGLE	OFF HALL PENINSULA	EPC 4100	HUNTEC DTS (AGC 3)
20	2670125	2672120	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
21	2672230	2680555	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
22	2672230	2690015	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
23	2680600	2690005	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
24	2690105	2691315	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
25	2690105	2691315	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)

ATLANTIC GEOSCIENCE CENTRE
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TABLE 15

HUNTEC RECORDS

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	HUNTEC SYSTEM
26	2691455	2701515	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
27	2691455	2700200	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
28	2700205	2701515	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
29	2702155	2710435	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
30	2702155	2711630	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
31	2711800	2712130	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
32	2710440	2711655	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
33	2711800	2712145	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
34	2712230	2720655	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
35	2712140	2720315	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
36	2720410	2721710	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
37	2720700	2721315	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
38	2721510	2721710	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
39	2732150	2741125	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
40	2732140	2740245	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
41	2740250	2740950	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
42	2741050	2750000	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
43	2741130	2750000	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
44	2750005	2750245	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
45	2750005	2750835	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
46	2750840	2751440	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
47	2750255	2751440	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
48	2751455	2752235	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
49	2751455	2760340	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
50	2752245	2761225	EXTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)

ATLANTIC GEOSCIENCE CENTRE
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TABLE 15

HUNTEC RECORDS

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	HUNTEC SYSTEM
51	2760345	2761220	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
52	2761605	2770050	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
53	2770100	2772100	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
54	2761605	2770055	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
55	2770100	2772100	INTERNAL		SINGLE	UNGAVA BAY	EPC 4100	HUNTEC DTS (AGC 3)
56	2791235	2791310	EXTERNAL	A-B	SINGLE	HUDSON STRAIT	EPC 4100	HUNTEC DTS (AGC 3)
57	2791235	2791805	INTERNAL	A-B	SINGLE	HUDSON STRAIT	EPC 4100	HUNTEC DTS (AGC 3)
58	2792200	2801920	INTERNAL		SINGLE	HUDSON STRAIT	EPC 4100	HUNTEC DTS (AGC 3)
59	2791320	2801515	EXTERNAL		SINGLE	HUDSON STRAIT	EPC 4100	HUNTEC DTS (AGC 3)
60	2801520	2812215	EXTERNAL	C-D	SINGLE	HUDSON STRAIT	EPC 4100	HUNTEC DTS (AGC 3)
61	2801925	2820405	INTERNAL		SINGLE	HUDSON STRAIT	EPC 4100	HUNTEC DTS (AGC 3)
62	2812220	2831240	EXTERNAL		SINGLE	WESTERN HUDSON STRAIT	EPC 4100	HUNTEC DTS (AGC 3)
63	2820410	2831820	INTERNAL		SINGLE	WESTERN HUDSON STRAIT	EPC 4100	HUNTEC DTS (AGC 3)
64	2860055	2870415	INTERNAL	66-67	SINGLE	WESTERN HUDSON STRAIT	EPC 4100	HUNTEC DTS (AGC 3)
65	2890905	2922150	EXTERNAL	LINE 82-83;	SINGLE	WESTERN HUDSON STRAIT	EPC 4100	HUNTEC DTS (AGC 3)
66	2870420	2922151	INTERNAL	LINE 66-67;	SINGLE	WESTERN HUDSON STRAIT	EPC 4100	HUNTEC DTS (AGC 3)

ATLANTIC GEOSCIENCE CENTRE
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TABLE 16

SEISMIC RECORDS

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	HYDROPHONE	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	SYSTEM / SOUND SOURCE
1	2630325	2631220	NSRF 25'		SINGLE	FROBISHER BAY	LSR	AGC SEISMICS SLEEVE GUN 40 CU IN
2	2631723	2631743	NSRF 25'		SINGLE	FROBISHER BAY	LSR	AGC SEISMICS SLEEVE GUN 40 CU IN
3	2632120	2661115	NSRF 25'		SINGLE	FROBISHER BAY	LSR	AGC SEISMICS SLEEVE GUN 40 CU IN
4	2670100	2681020	NSRF 25'		SINGLE	UNGAVA BAY	LSR	AGC SEISMICS SLEEVE GUN 40 CU IN
5	2680405	2681250	SE 25'		SINGLE	UNGAVA BAY	LSR	AGC SEISMICS SLEEVE GUN 40 CU IN
6	2681030	2700315	NSRF		SINGLE	UNGAVA BAY	LSR	AGC SEISMICS SLEEVE GUN 40 CU IN
7	2702155	2711300	NSRF		SINGLE	UNGAVA BAY	LSR	AGC SEISMICS SLEEVE GUN 40 CU IN
8	2721515	2731210	NSRF		SINGLE	UNGAVA BAY	LSR	AGC SEISMICS SLEEVE GUN 40 CU IN
9	2702210	2711010	SE 25'		SINGLE	UNGAVA BAY	LSR	AGC SEISMICS SLEEVE GUN 40 CU IN
10	2721515	2730022	SE 25'		SINGLE	UNGAVA BAY	LSR	AGC SEISMICS SLEEVE GUN 40 CU IN
11	2732145	2740410	SE 25'		SINGLE	UNGAVA BAY	LSR	AGC SEISMICS SLEEVE GUN 40 CU IN
12	2812120	2820700	SE 25'		SINGLE NSRF	HUDSON STRAIT	LSR 1811	AGC SEISMICS AIRGUN 40 CU IN
13	2821245	2821648	SE 25'		SINGLE	DECEPTION BAY FOR DENIS BRUNEAU	LSR 1811	BUBBLE PULSE AIRGUN 10 CU IN
14	2821000	2821240	SE 25'		SINGLE	DECEPTION BAY FOR DENIS BRUNEAU	LSR 1811	BUBBLE PULSE AIRGUN 10 CU IN
15	2761605	2810815	SE 25'		SINGLE NSRF	HUDSON STRAIT	LSR 1811	AGC SEISMICS SLEEVE GUN 40 CU IN
16	2820710	2872010	SE 25'	83-84;84-85;	SINGLE NSRF	HUDSON STRAIT	EPC 4100	AGC SEISMICS SLEEVE GUN 40 CU IN
17	2890613	2890953	SE 25'		SINGLE NSRF	OUTER FROBISHER BAY	EPC 4100	AGC SEISMICS SLEEVE GUN 40 CU IN

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TABLE 17

3.5 KHZ RECORDS

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	RECORDER	SYSTEM / SOUND SOURCE
1	2612326	2622030		FROBISHER BAY	EPC 4100	ORE HULL MOUNTED
2	2622035	2641455		FROBISHER BAY	EPC 4100	ORE HULL MOUNTED
3	2641530	2660120		FROBISHER BAY, OFF HALL PENINSULA	EPC 4100	ORE HULL MOUNTED
4	2660135	2680230		OFF HALL PENINSULA, UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
5	2680245	2692045		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
6	2692050	2702230		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
7	2702245	2711545		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
8	2711550	2720155		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
9	2720205	2722110		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
10	2722115	2740930		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
11	2730935	2740245		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
12	2740250	2750000		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
13	2750005	2750740		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
14	2750745	2751440		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
15	2751455	2761400		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
16	2761410	2772025		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
17	2772035	2801635		UNGAVA BAY	EPC 4100	ORE HULL MOUNTED
18	2801645	2811550		HUDSON STRAIT	EPC 4100	ORE HULL MOUNTED
19	2811552	2822128		HUDSON STRAIT	EPC 4100	ORE HULL MOUNTED
20	2822140	2840715		HUDSON STRAIT	EPC 4100	ORE HULL MOUNTED
21	2840720	2852020		HUDSON STRAIT	EPC 4100	ORE HULL MOUNTED
22	2852030	2870805		HUDSON STRAIT	EPC 4100	ORE HULL MOUNTED
23	2870810	2872230		HUDSON STRAIT	EPC 4100	ORE HULL MOUNTED
24	2872235	2882140		HUDSON STRAIT	EPC 4100	ORE HULL MOUNTED

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DATA SECTION
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TABLE 17

3.5 KHZ RECORDS

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	GEOGRAPHIC LOCATION	RECORDER	SYSTEM / SOUND SOURCE
25	2881705	2890904		HUDSON STRAIT	EPC 4100	ORE HULL MOUNTED
26	2882145	2912050		HUDSON STRAIT	EPC 4100	ORE HULL MOUNTED

ATLANTIC GEOSCIENCE CENTRE
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TABLE 18

SIDESCAN RECORDS

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	SIDESCAN SYSTEM
1	2621600	2621802		SINGLE	WATTS BAY, FROBISHER BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
2	2631622	2631845		SINGLE	YORK SOUND, FROBISHER BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
3	2671730	2672135		SINGLE	HUDSON STRAIT	KLEIN 531	BIO SIDESCAN(70 KHZ)
4	2681550	2690255		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
5	2690755	2691135		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
6	2691605	2692100		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
7	2692250	2700330		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
8	2711810	2712150		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
9	2712230	2720650		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
10	2722225	2730600		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
11	2730625	2731220		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
12	2731345	2731605		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
13	2740425	2740955		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
14	2741045	2741100		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
15	2741100	2741610		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ
16	2741615	2750000		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
17	2750010	2751100		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
18	2761605	2761740		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
19	2770255	2771030		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
20	2771250	2771600		SINGLE	UNGAVA BAY	KLEIN 531	BIO SIDESCAN(70 KHZ)
21	2801745	2810125		SINGLE	HUDSON STRAIT	KLEIN 531	KLEIN 531T (100 KHZ)
22	2810315	2810815	E-F	SINGLE	HUDSON STRAIT	KLEIN 521	KLEIN 421T (100 KHZ)
23	2762245	2770245		SINGLE	HUDSON STRAIT	KLEIN 531	KLEIN 531T (100 KHZ)
24	2812145	2820750		SINGLE	HUDSON STRAIT	KLEIN 531	KLEIN 531T (100 KHZ)

ATLANTIC GEOSCIENCE CENTRE
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TABLE 18

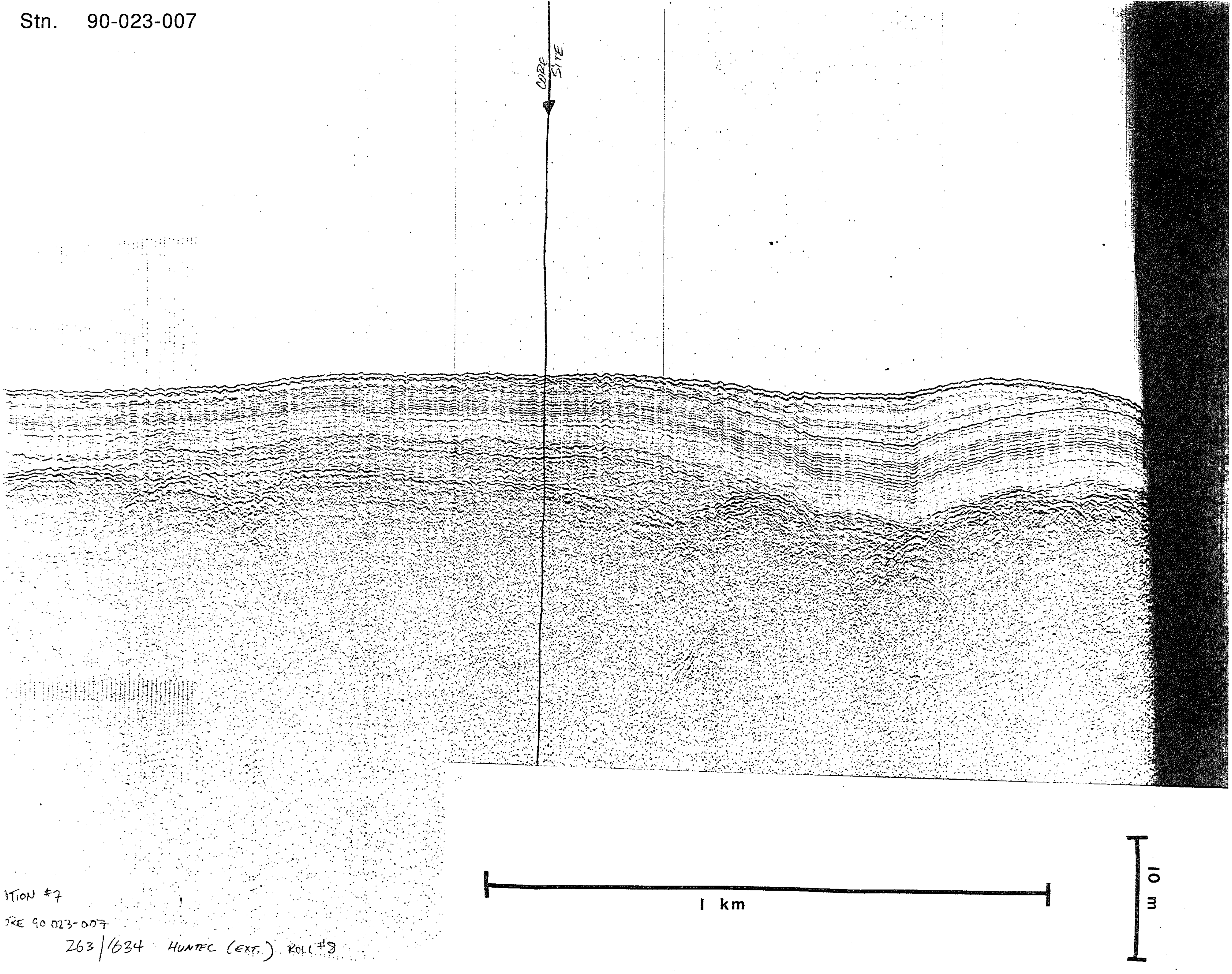
SIDESCAN RECORDS

CRUISE NUMBER = 90023
CHIEF SCIENTIST = B. MACLEAN
PROJECT NUMBER = 760015

ROLL NUMBERS	START DAY/TIME	STOP DAY/TIME	LINE NUMBERS	RECORD TYPE	GEOGRAPHIC LOCATION	RECORDER	SIDESCAN SYSTEM
25	2821000	2821336		SINGLE	DECEPTION BAY, N.QUE BY DENIS BRUNEAU	KLEIN 401	KLEIN 401 (100 KHZ)
26	2850740	2850930	EOL B-C	SINGLE	WESTERN HUDSON STRAIT	KLEIN 531	BIO SIDESCAN(70 KHZ)
27	2870155	2870741	65-66	SINGLE	WESTERN HUDSON STRAIT	KLEIN 531	BIO SIDESCAN(70 KHZ)
28	2861805	2870150	64-65	SINGLE	WESTERN HUDSON STRAIT	KLEIN 531	BIO SIDESCAN(70 KHZ)

Stn. 90-023-001

Stn. 90-023-007



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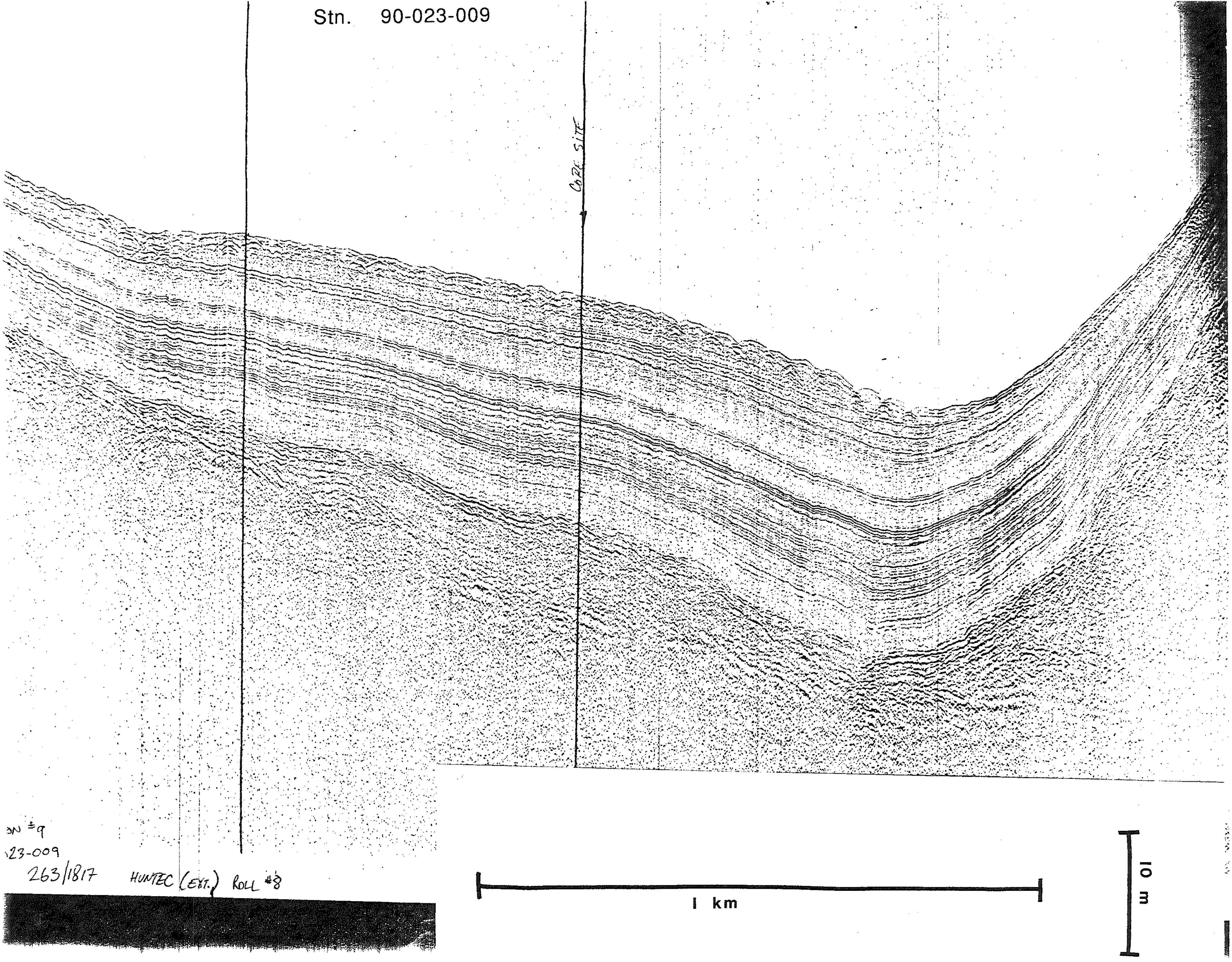

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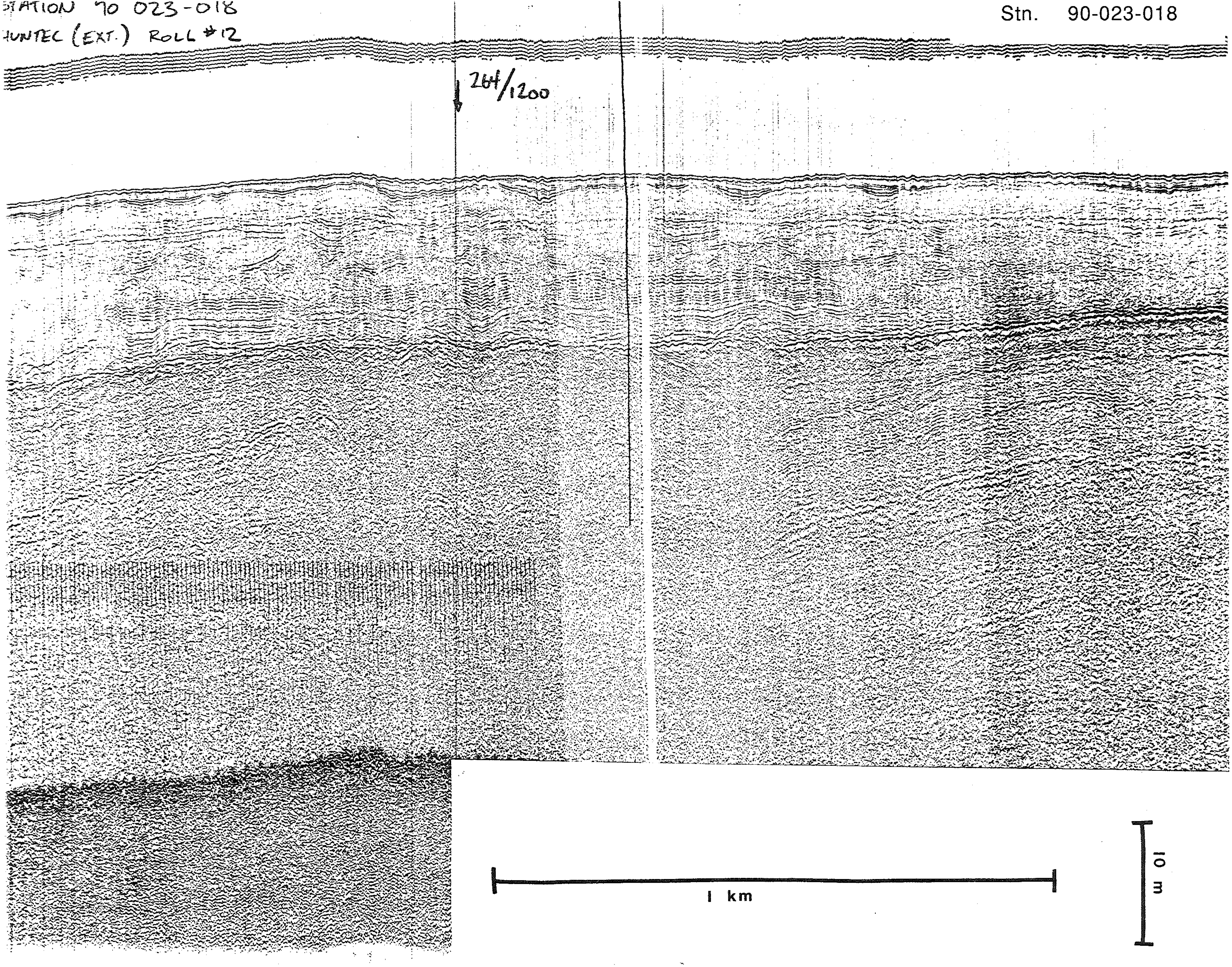
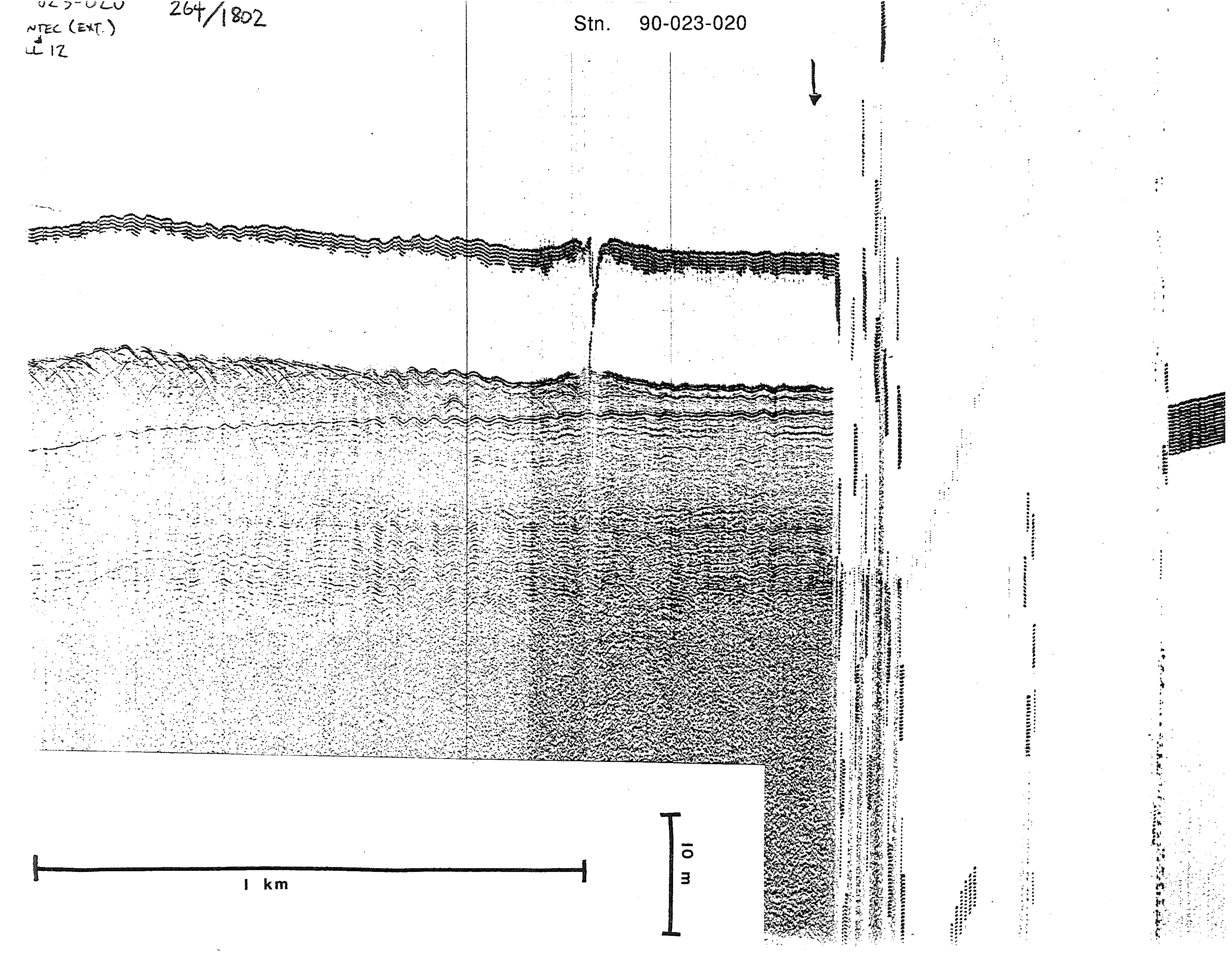
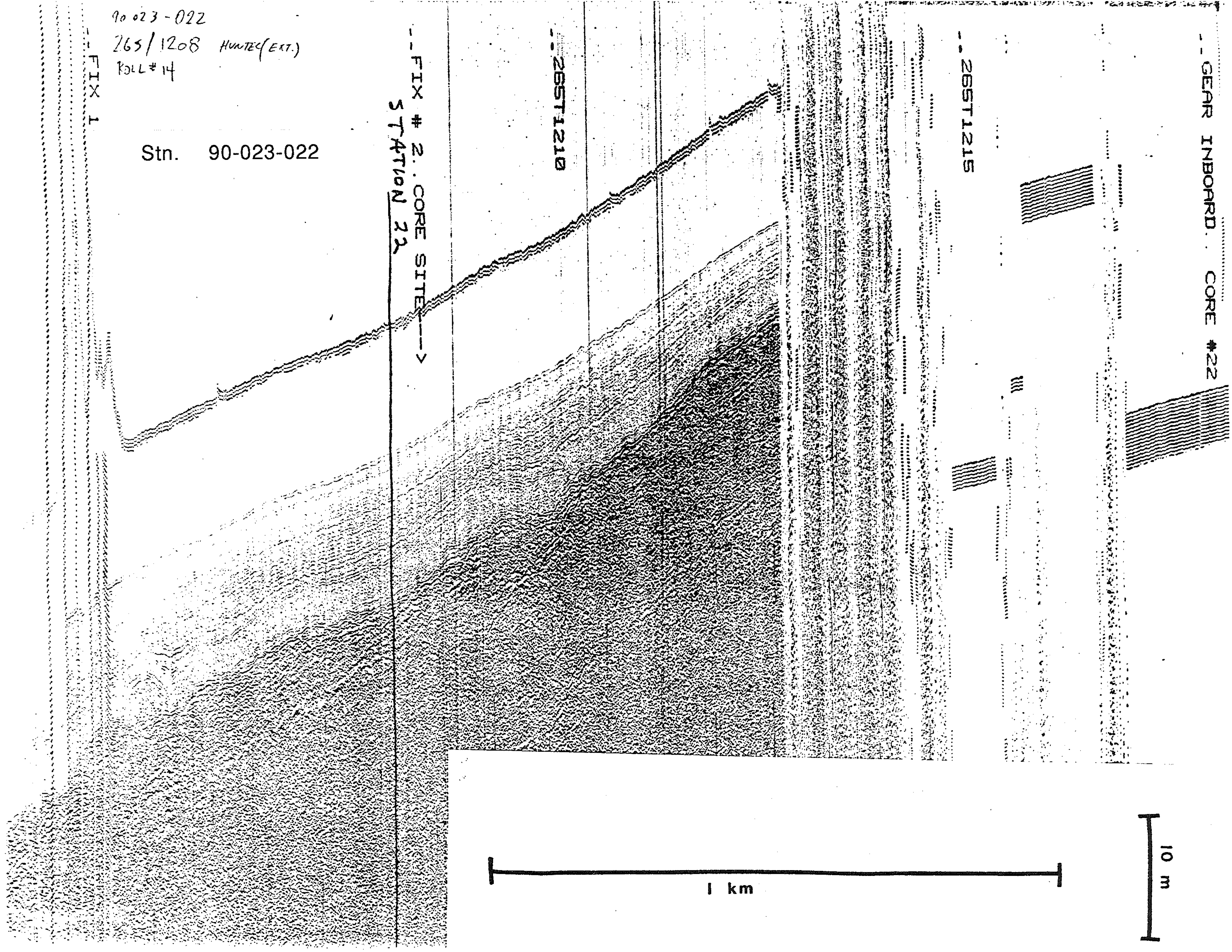
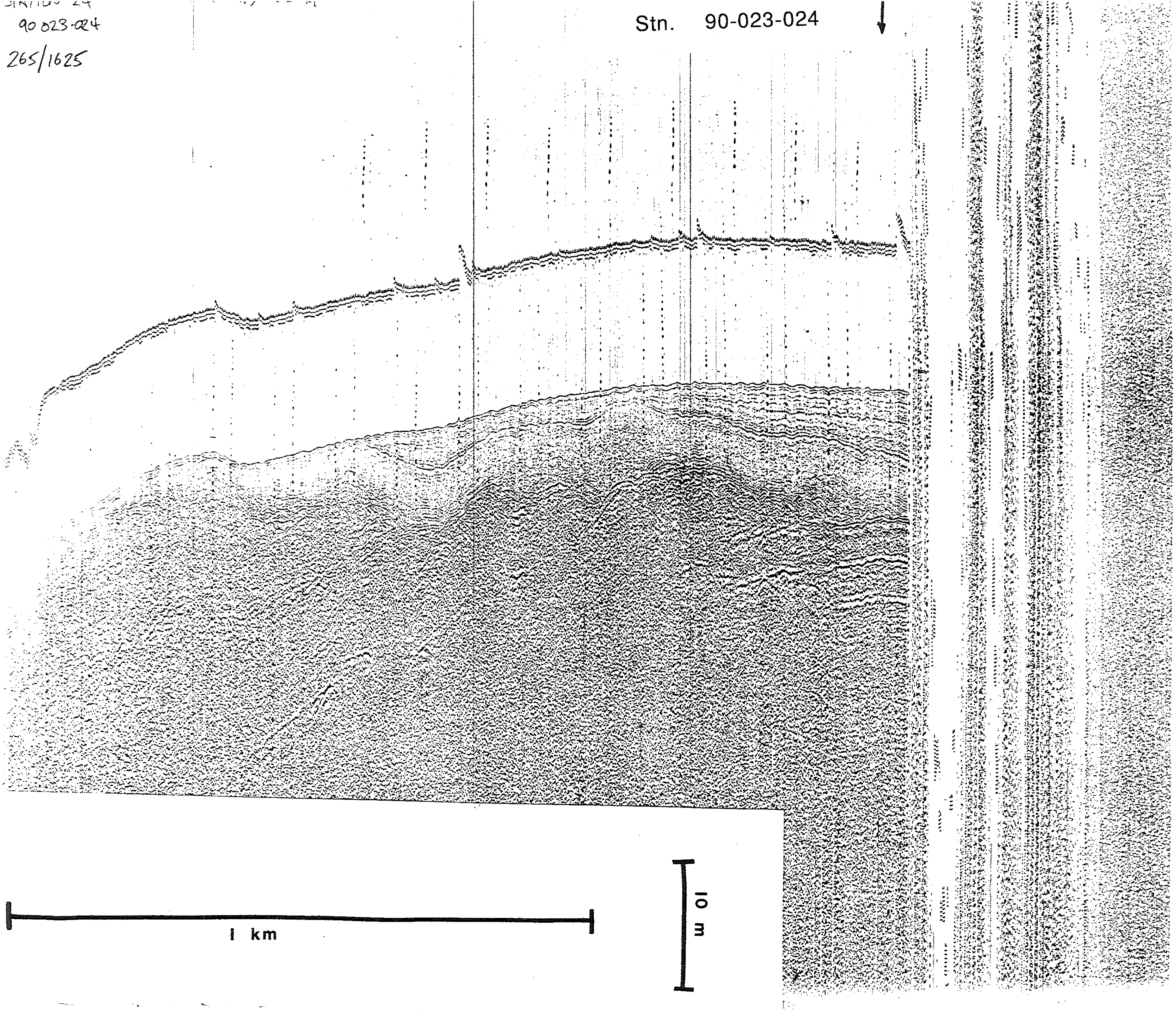


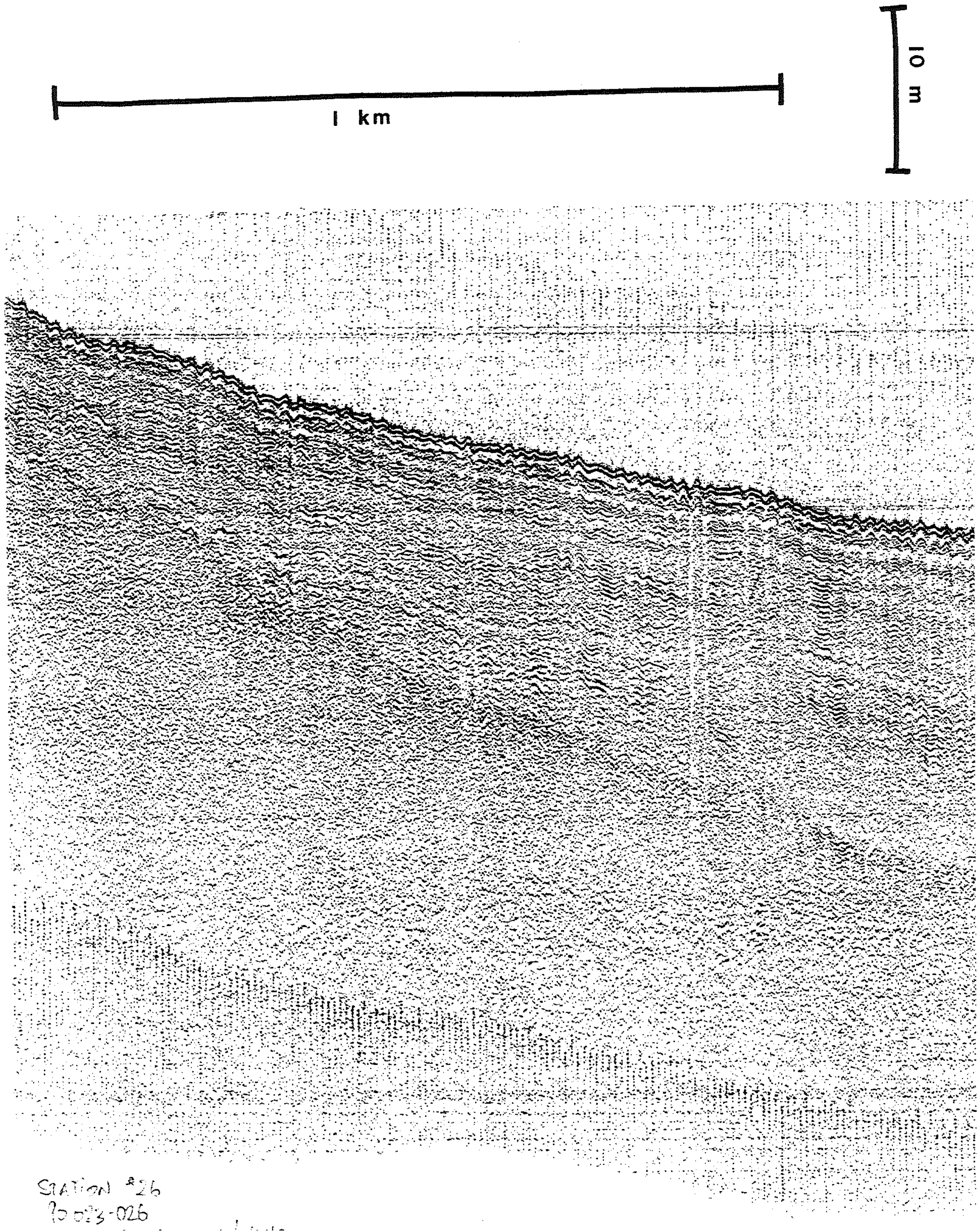

023-020
NTEC (EXT.)
LL 12
264/1802
Stn. 90-023-020
10 m
1 km

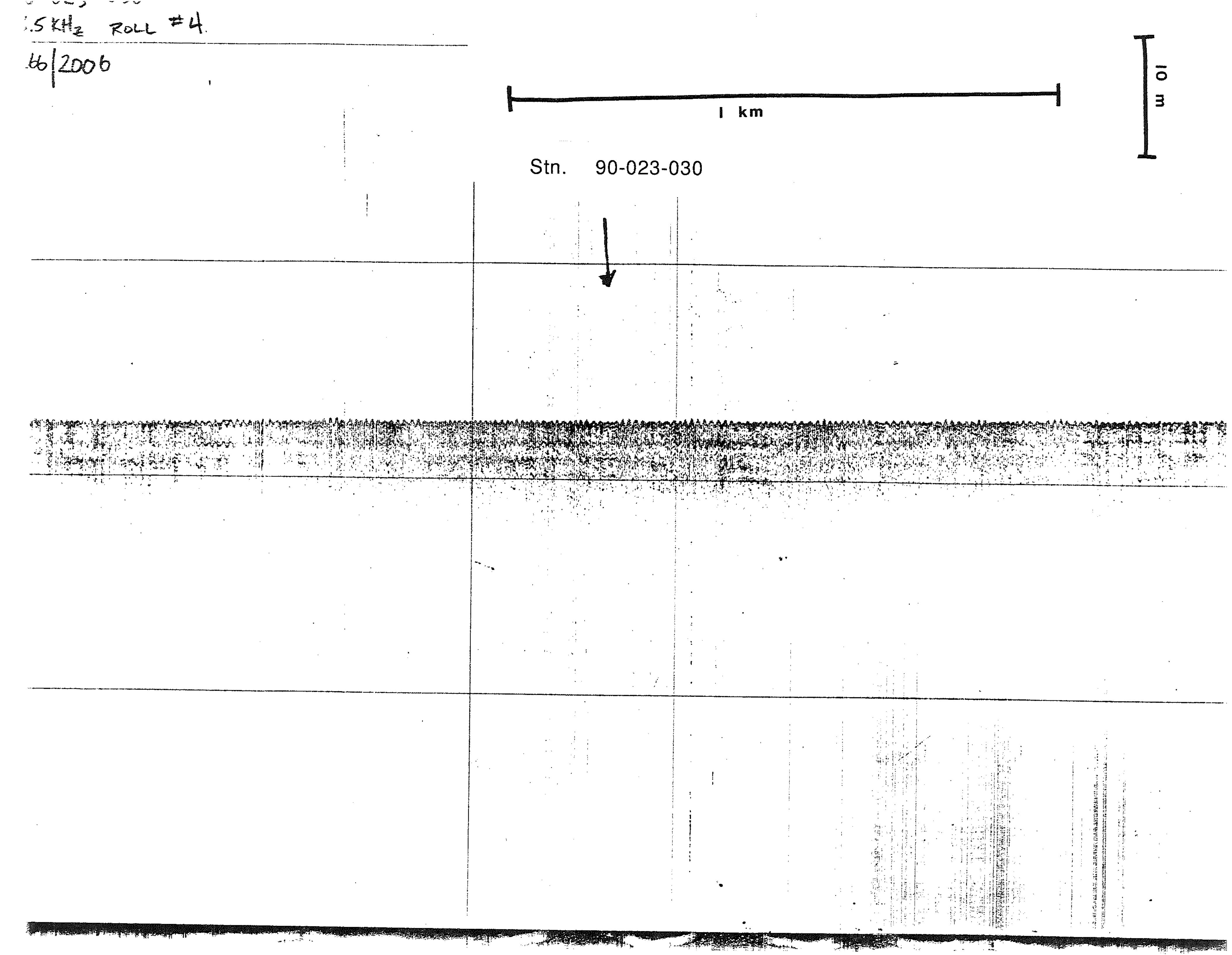


90 023 - 022
265/1208 HUNTEC (EXT.)
ROLL # 14
FIX 1
Stn. 90-023-022
FIX # 2. CORE SITE
STATION 22
265T1210
265T1215
GEAR INBOARD. CORE #22
1 km
10 m

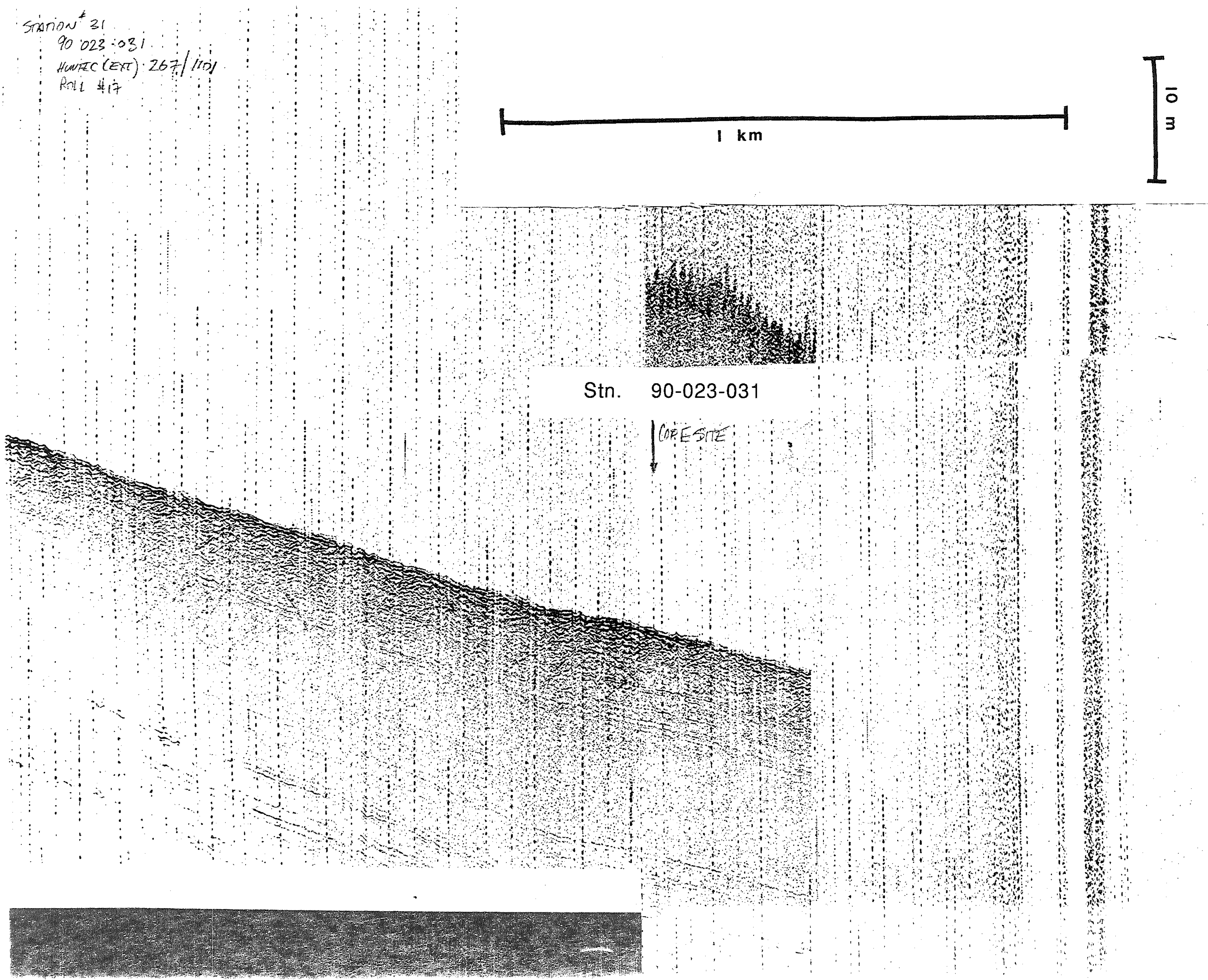


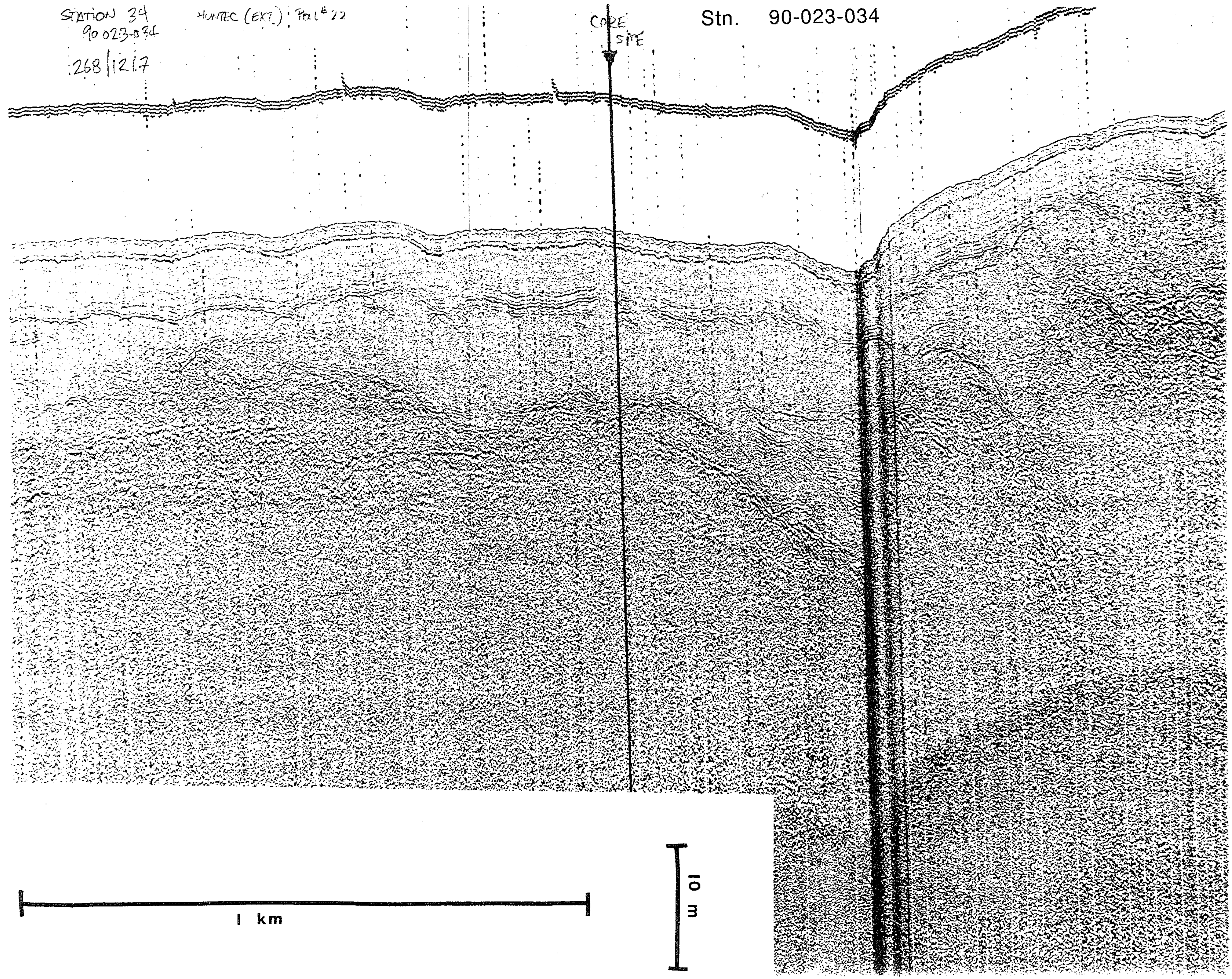
90 023-024
265/1625
Stn. 90-023-024
1 km
10 m


1 km
10 m
STATION #26
?0-023-026

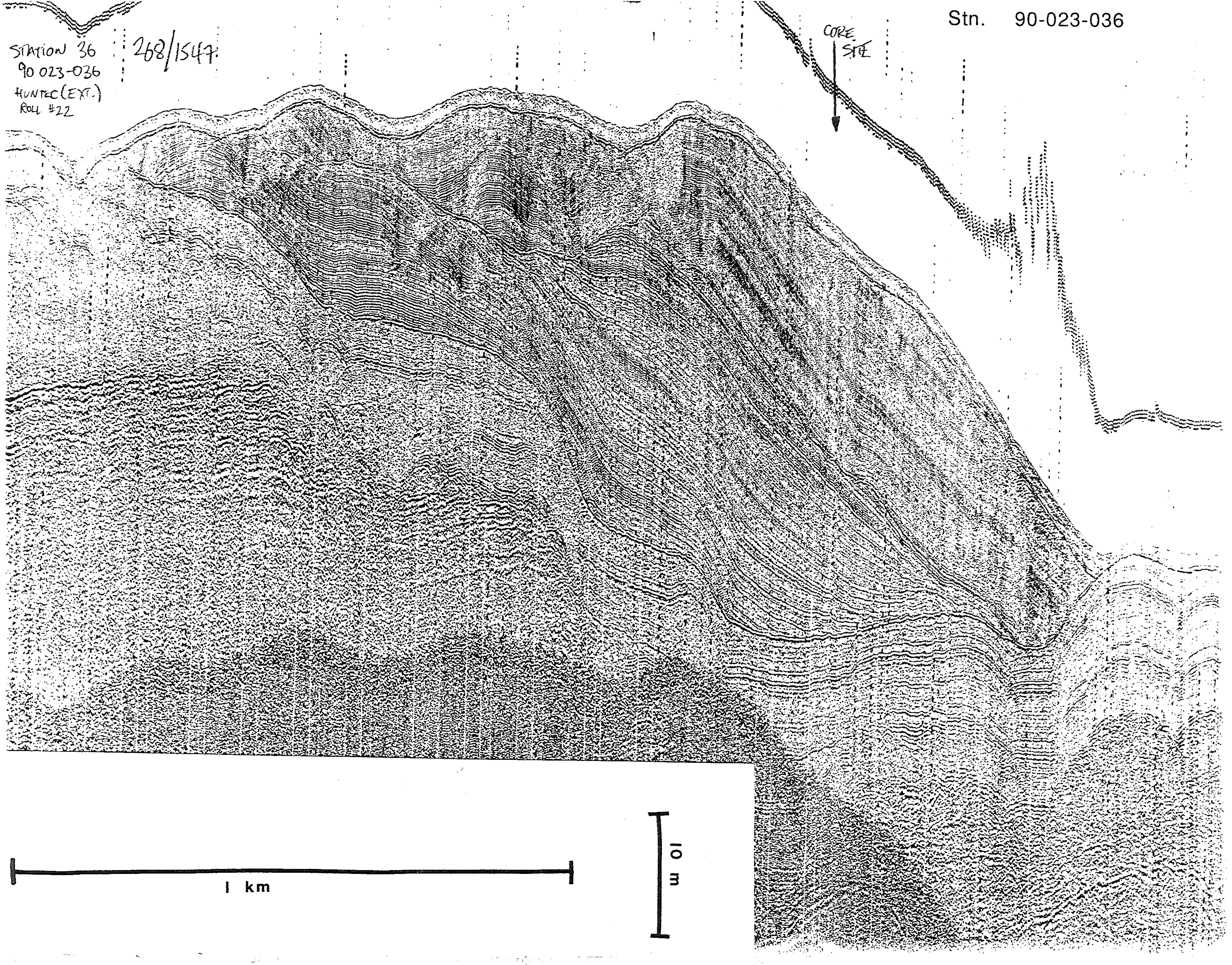


.5 KHz ROLL #4
.66|2006
1 km
10 m
Stn. 90-023-030

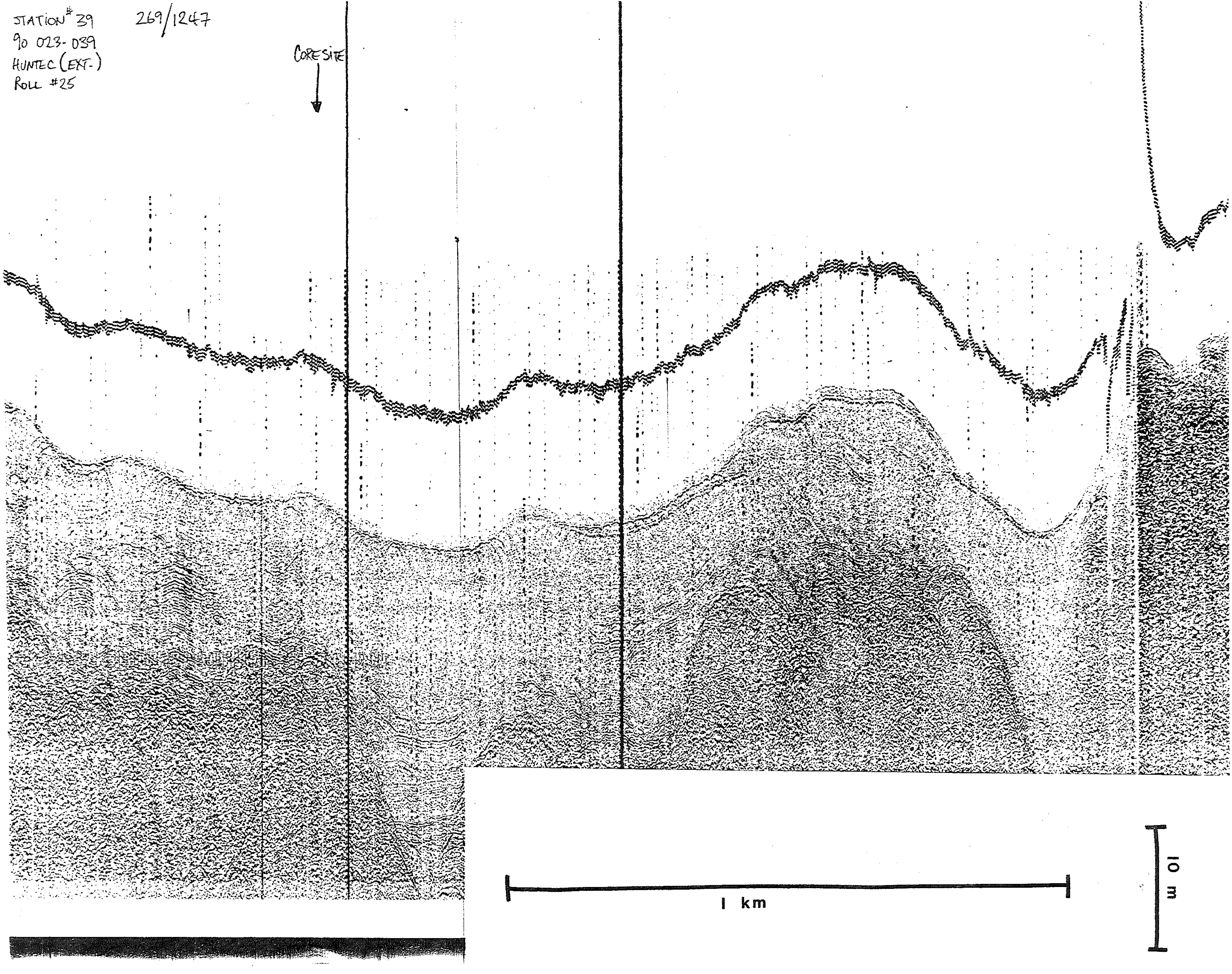

STATION # 31
90 023 031
HUNTEC (EXT) 267/1101
ROLL #17
1 km
10 m
Stn. 90-023-031
CORE SITE



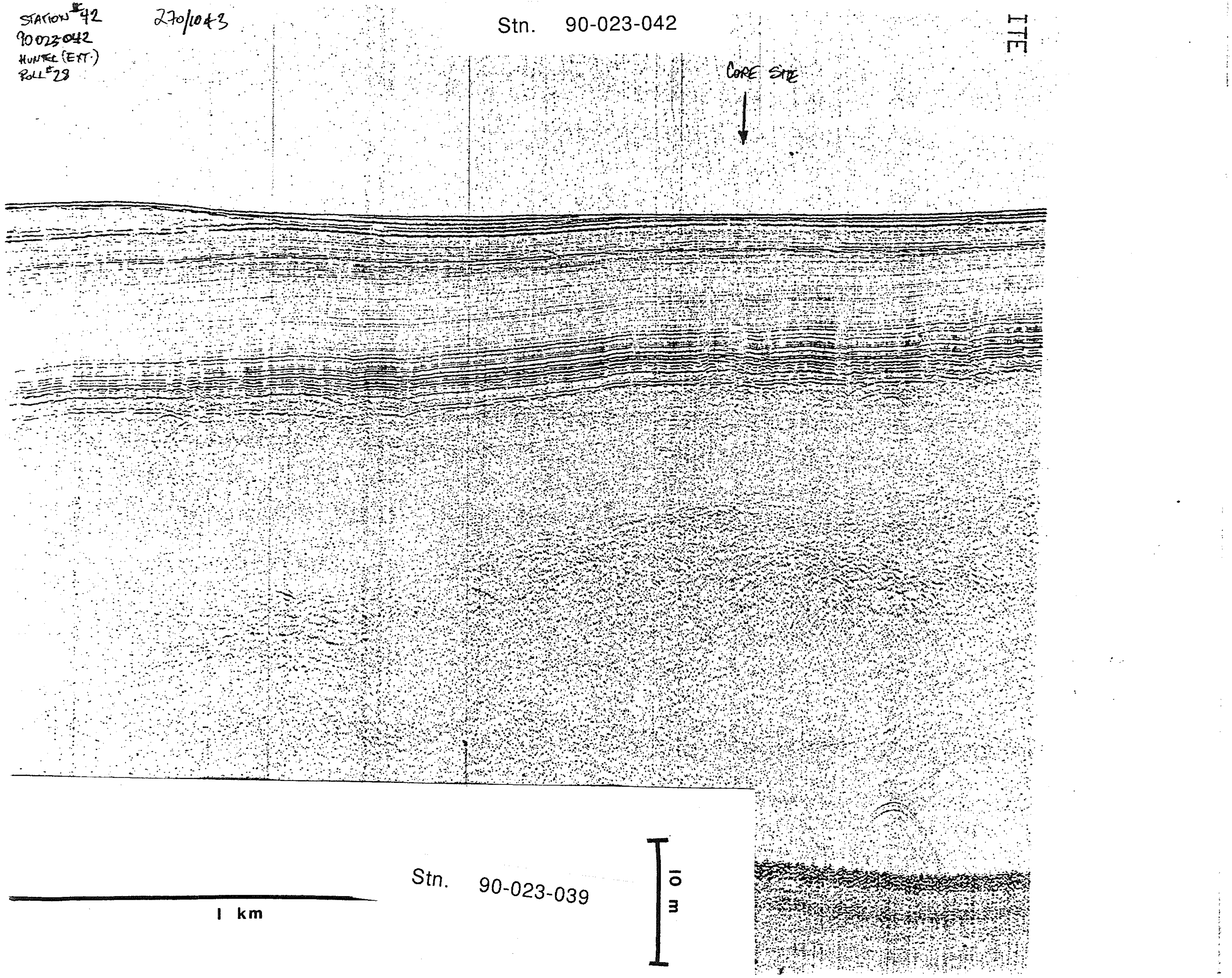
STATION 34
90 023-034
268 | 1217
HUNTEC (EXT.): Roll # 22
CORE SITE
Stn. 90-023-034
10 m
1 km

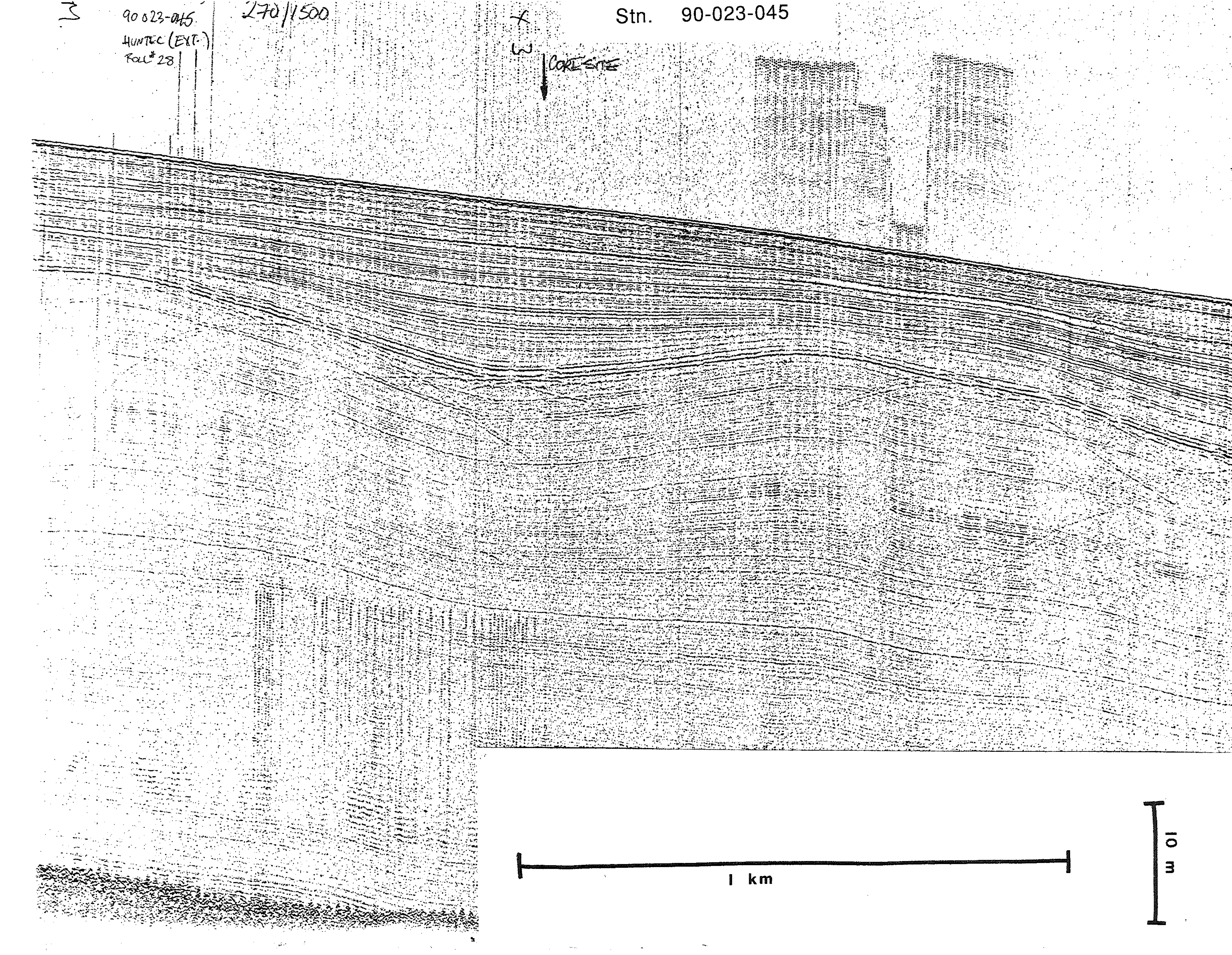


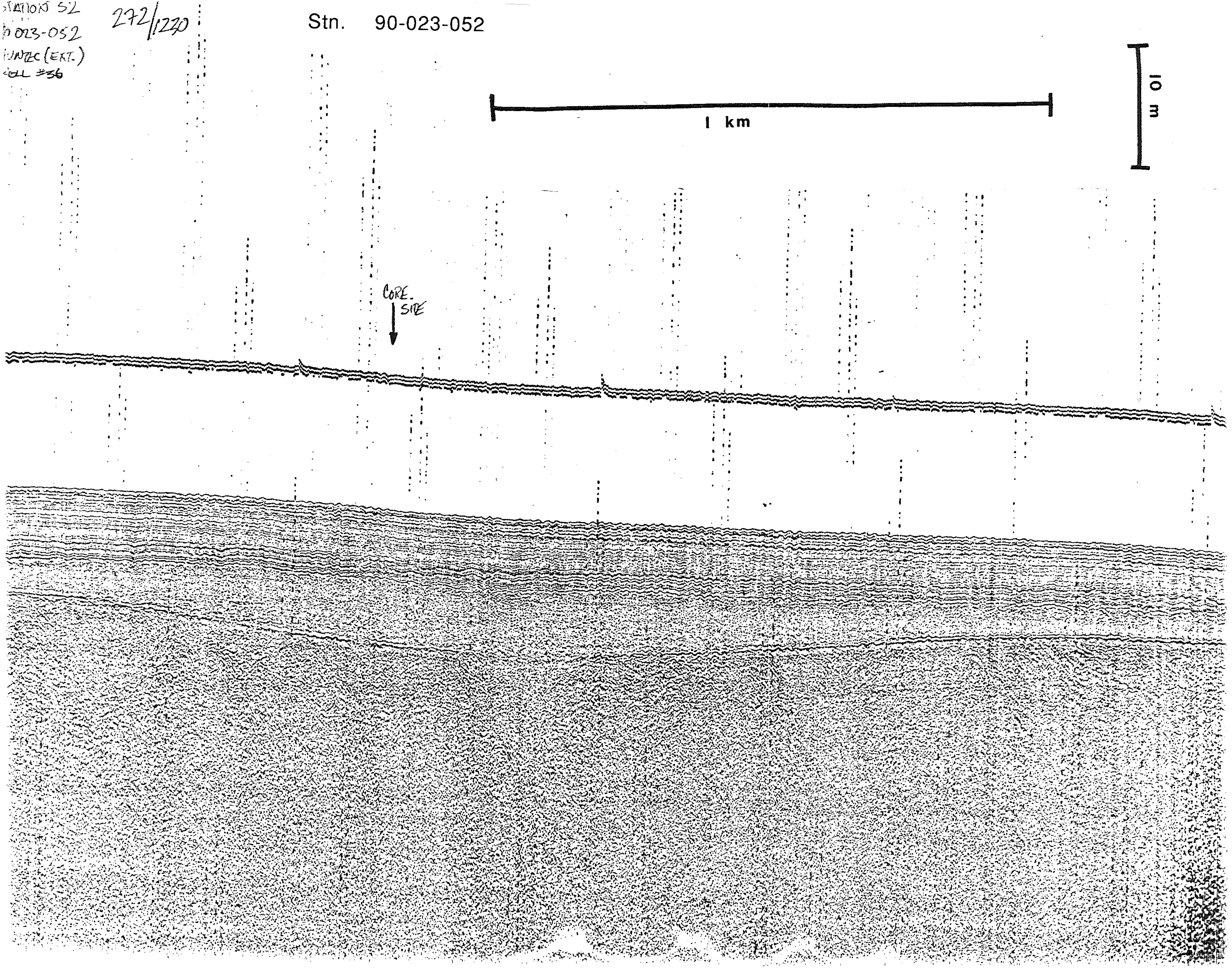
Stn. 90-023-036
STATION 36
90 023-036
HUNTEC (EXT.)
ROLL #22
268/1547
CORE SITE
1 km
10 m



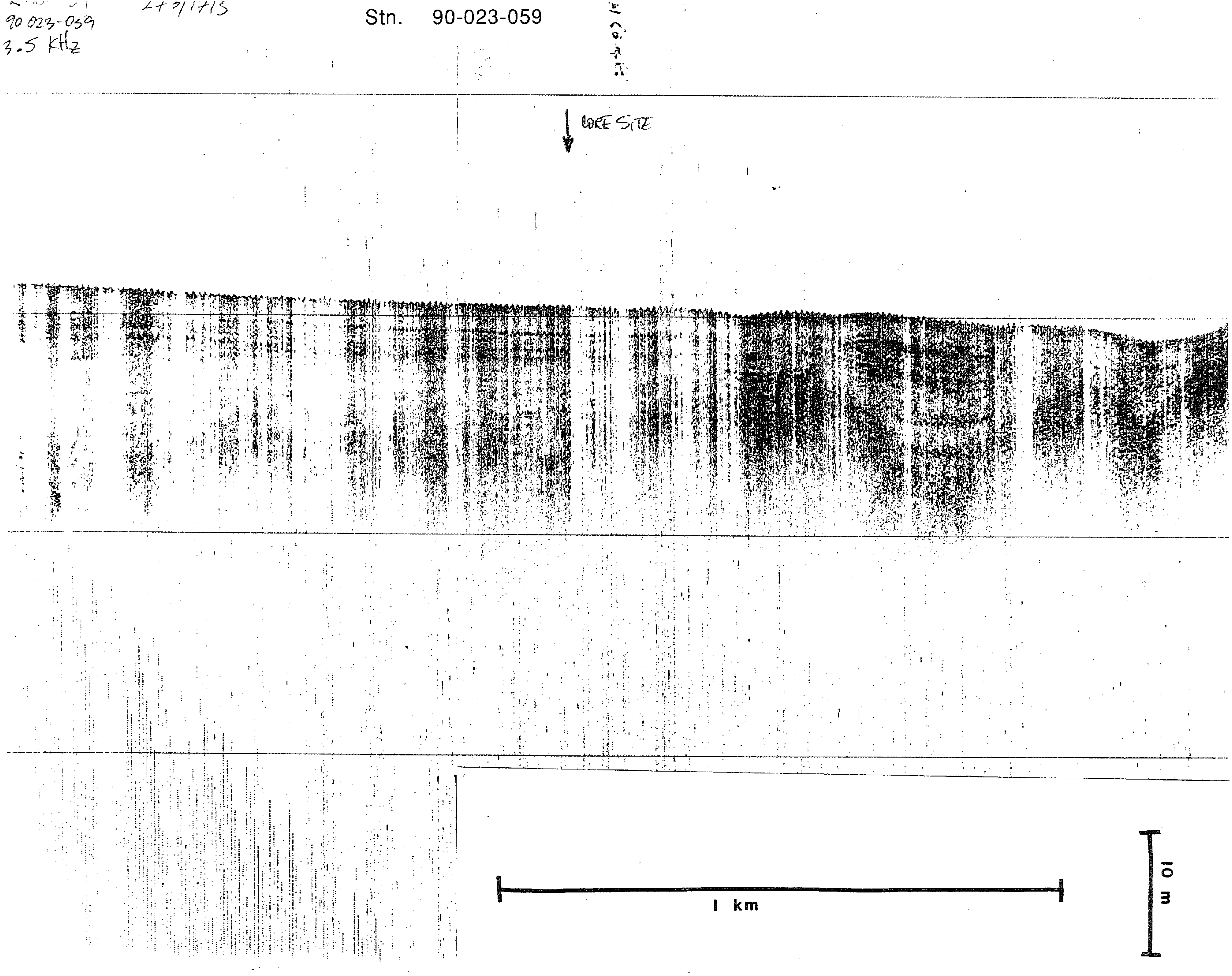
STATION # 39
269/1247
90 023-039
HUNTEC (EXT.)
ROLL #25
CORE SITE
1 km
10 m

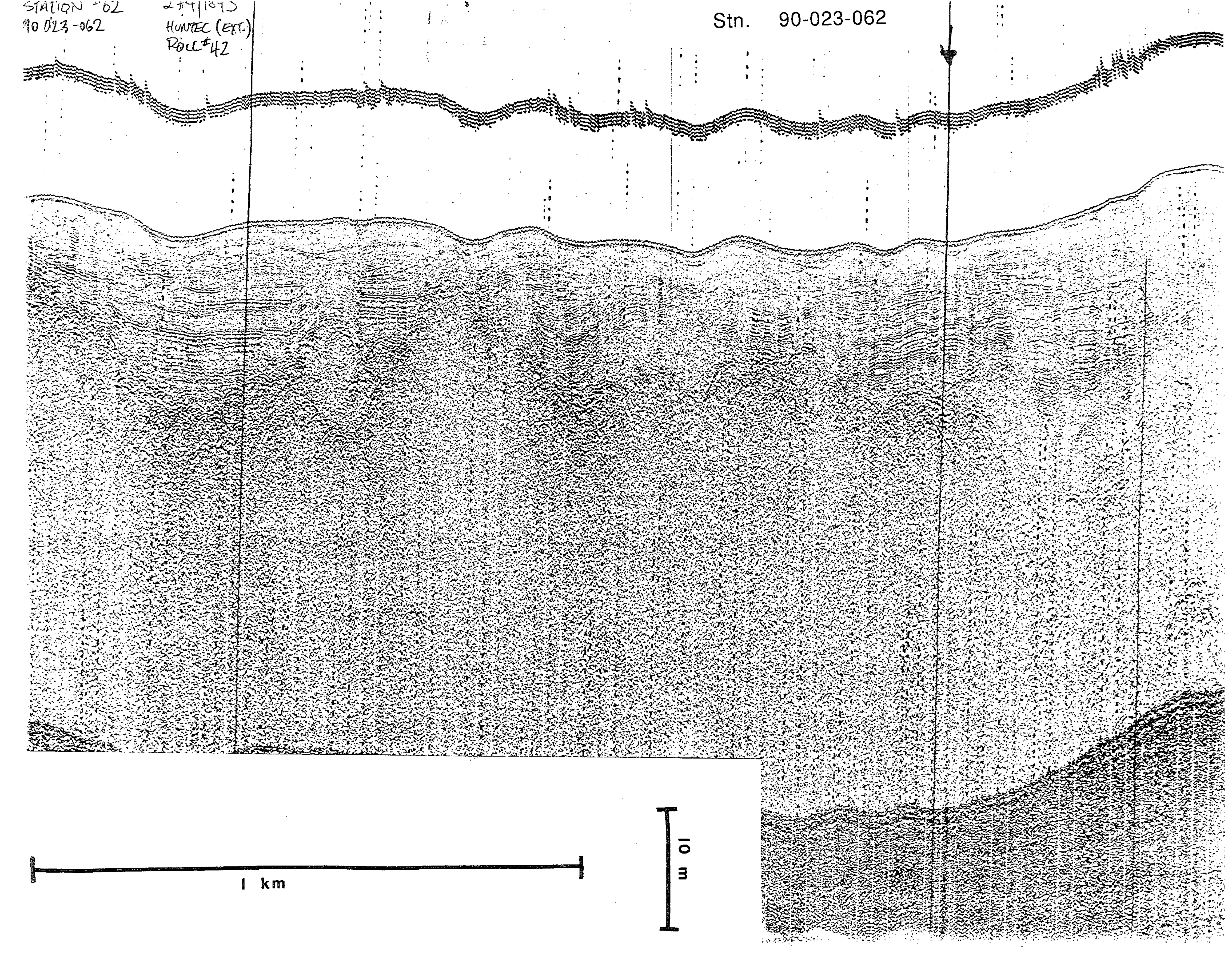

STATION #42
90-023-042
HUNTEC (EXT.)
ROLL #28
270/1043
Stn. 90-023-042
ITE
CORE SITE
Stn. 90-023-039
10 m
1 km


3
90023-045
HUNTEC (EXT.)
ROLL # 28
270/1500
CORE SITE
Stn. 90-023-045
1 km
10 m

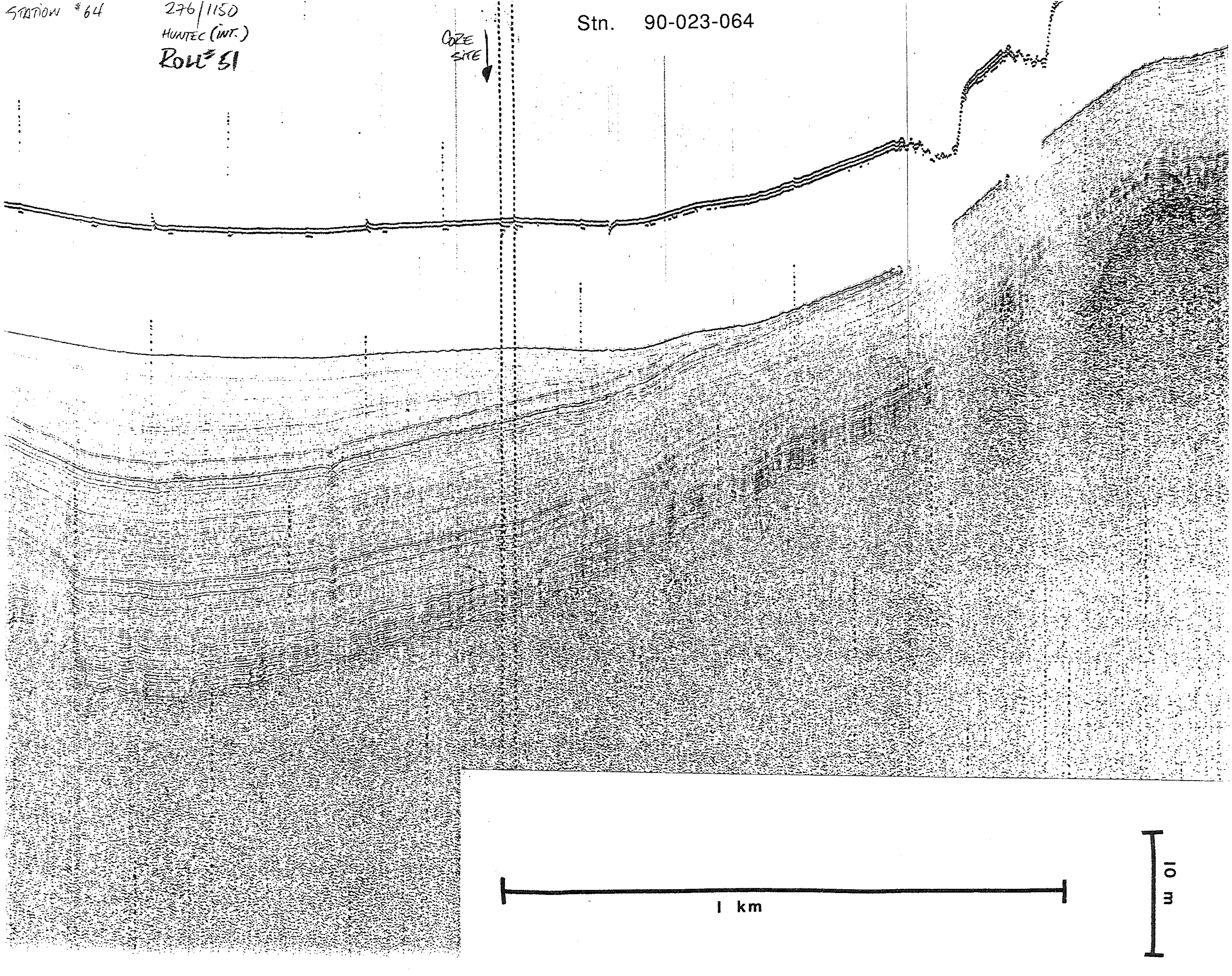

STATION 52
90-023-052
HUNTEC (EXT.)
ROLL #36
272/1230
Stn. 90-023-052
1 km
10 m
CORE SITE

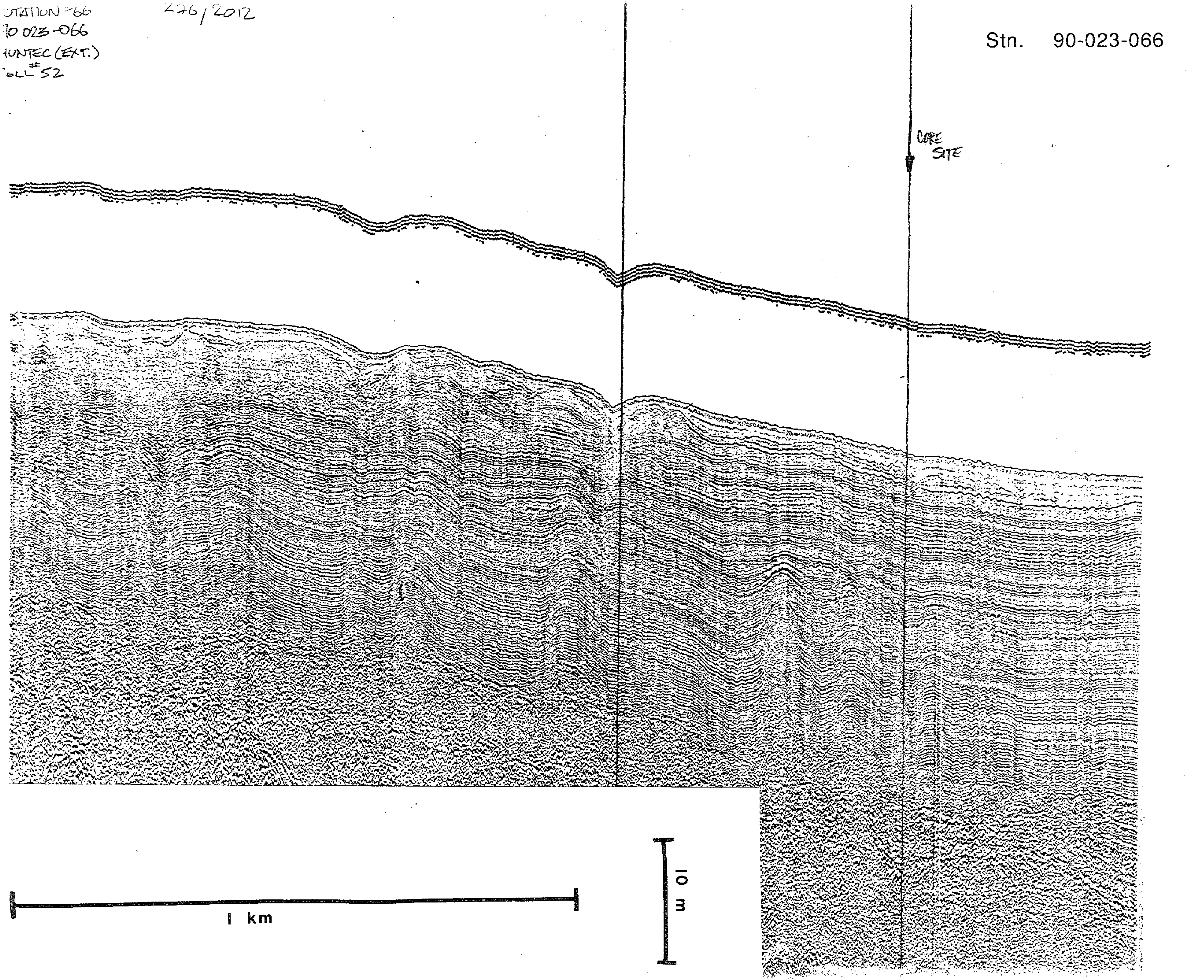
Stn. 90-023-059

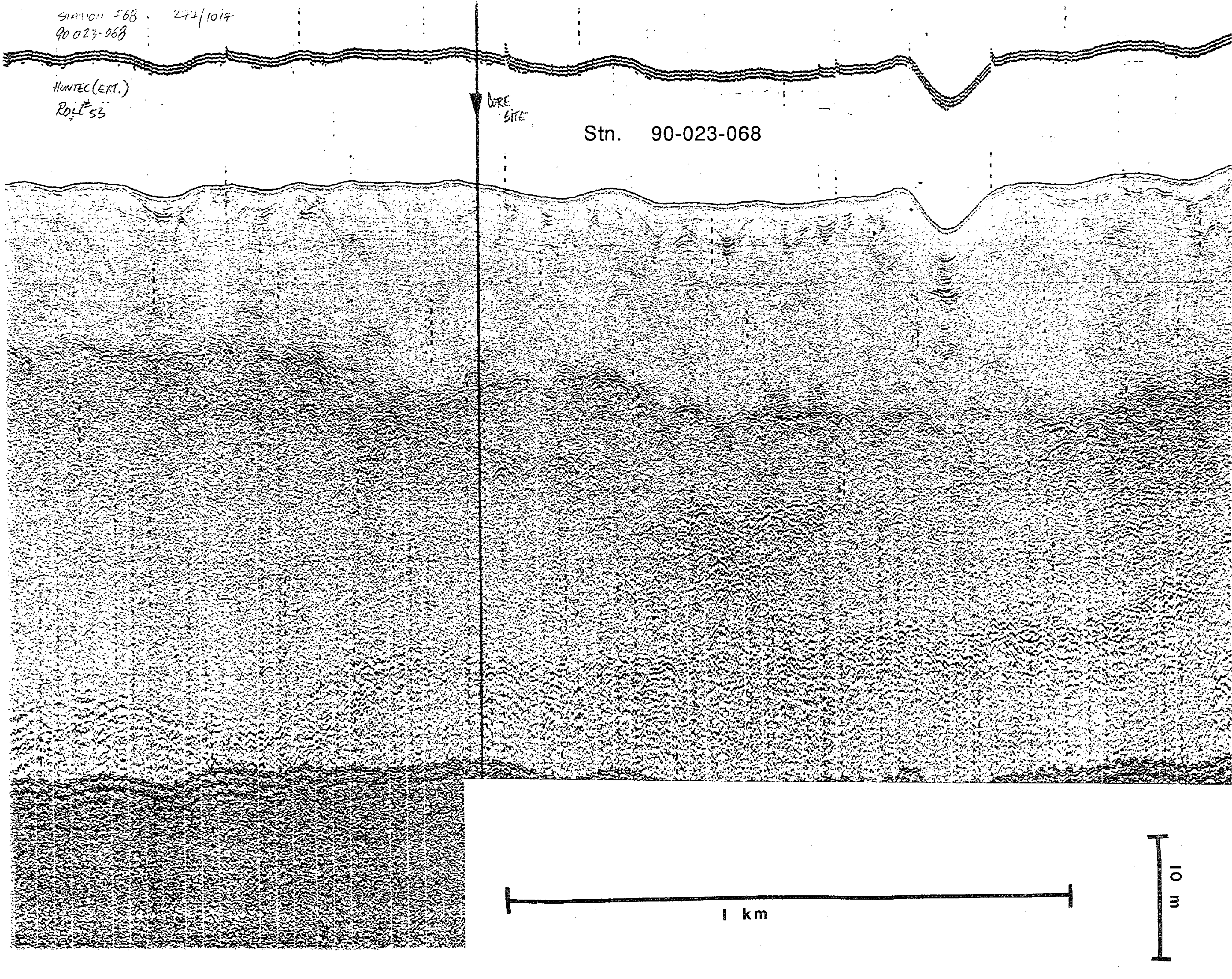



STATION #62
90 023-062
HUNTEC (EXT.)
ROLL #42
Stn. 90-023-062
1 km
10 m

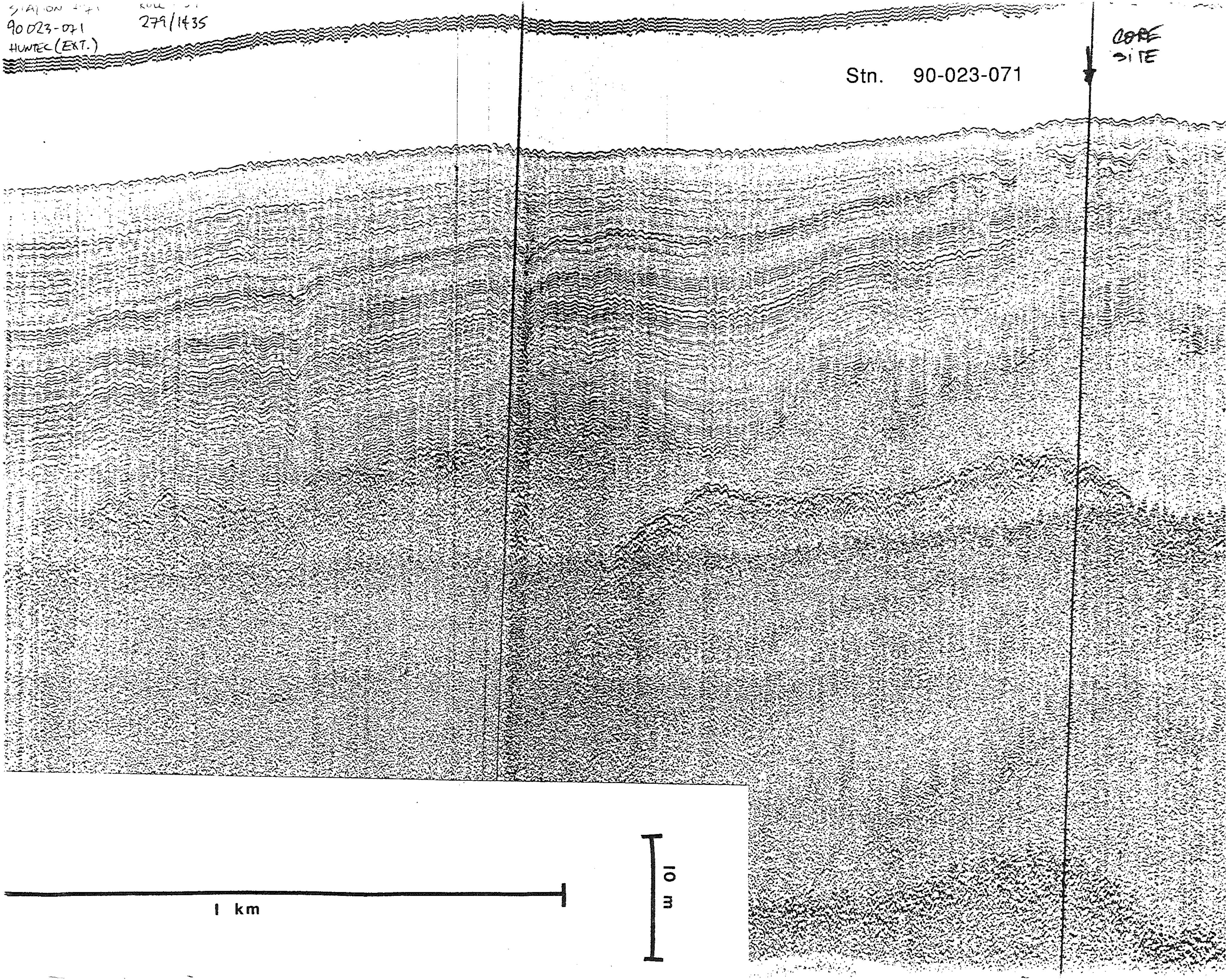
Stn. 90-023-064



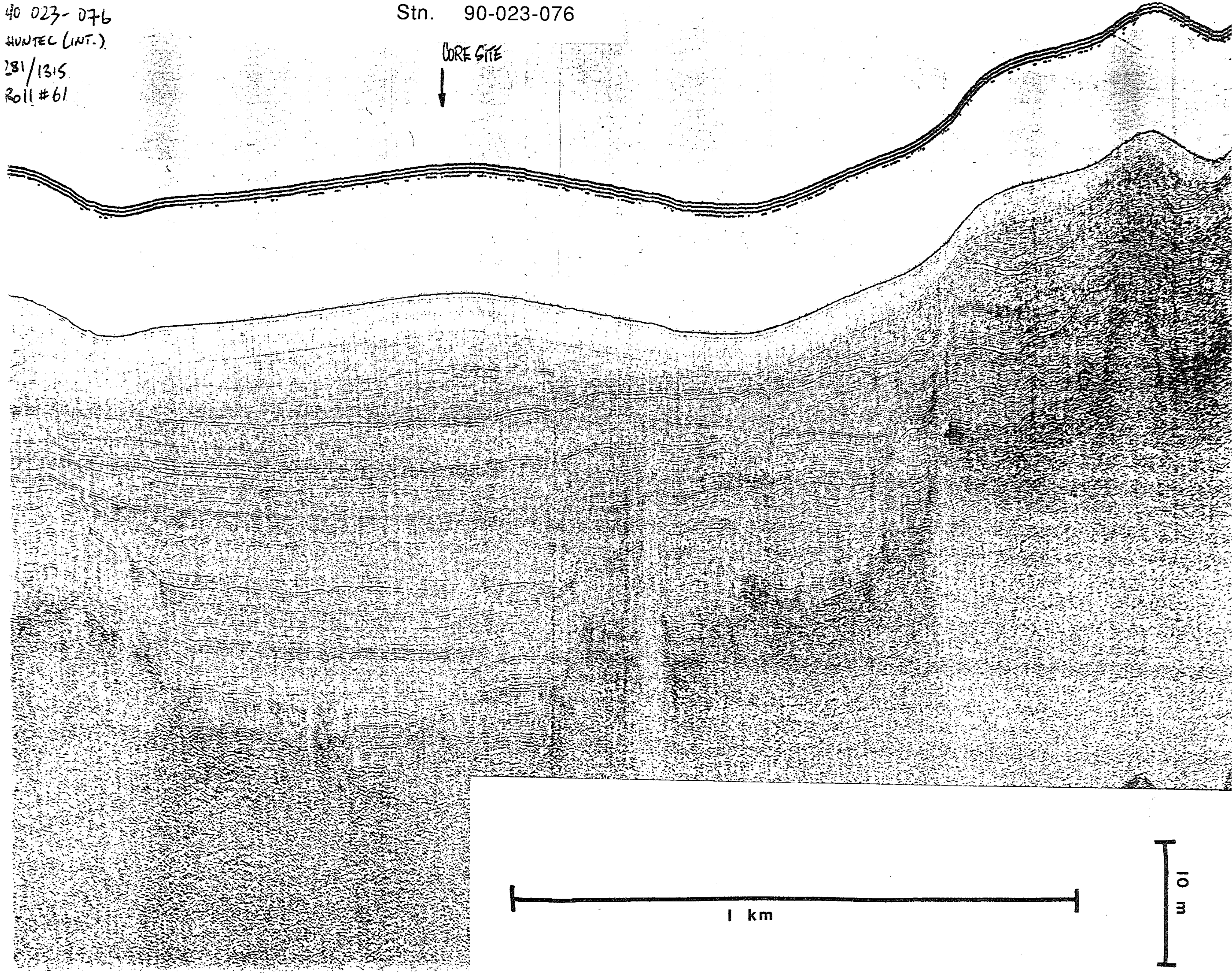

STATION #66
90 023-066
HUNTEC (EXT.)
ROLL #52
276/2012
Stn. 90-023-066
CORE SITE
10 m
1 km

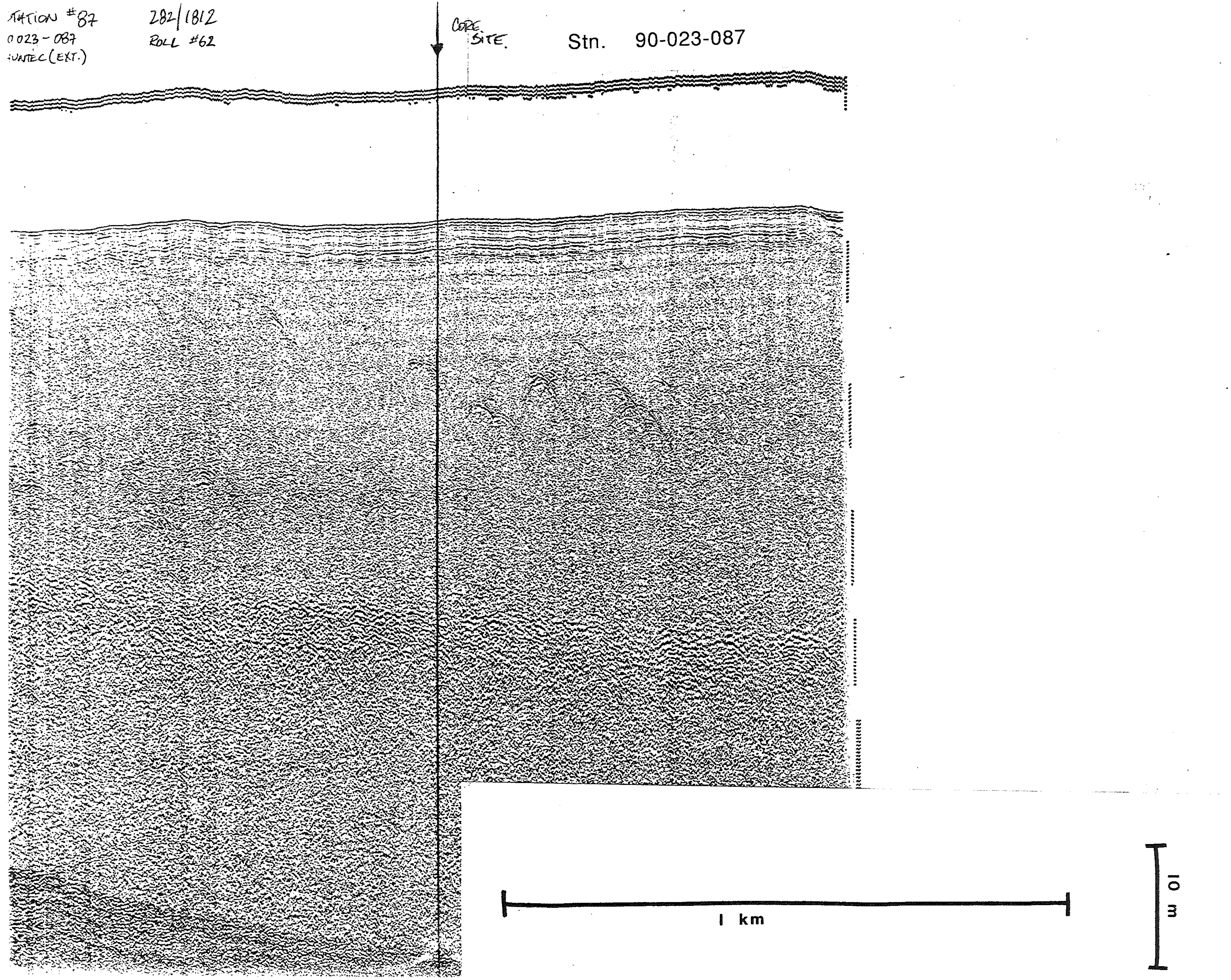


STATION 068 . 277/1017
90 023-068
HUNTEC (EXT.)
ROLL 53
CORE SITE
Stn. 90-023-068
1 km
10 m


STATION
90023-071
HUNTEC (EXT.)
ROLL
279/1435
Stn. 90-023-071
CORE SITE
10 m
1 km

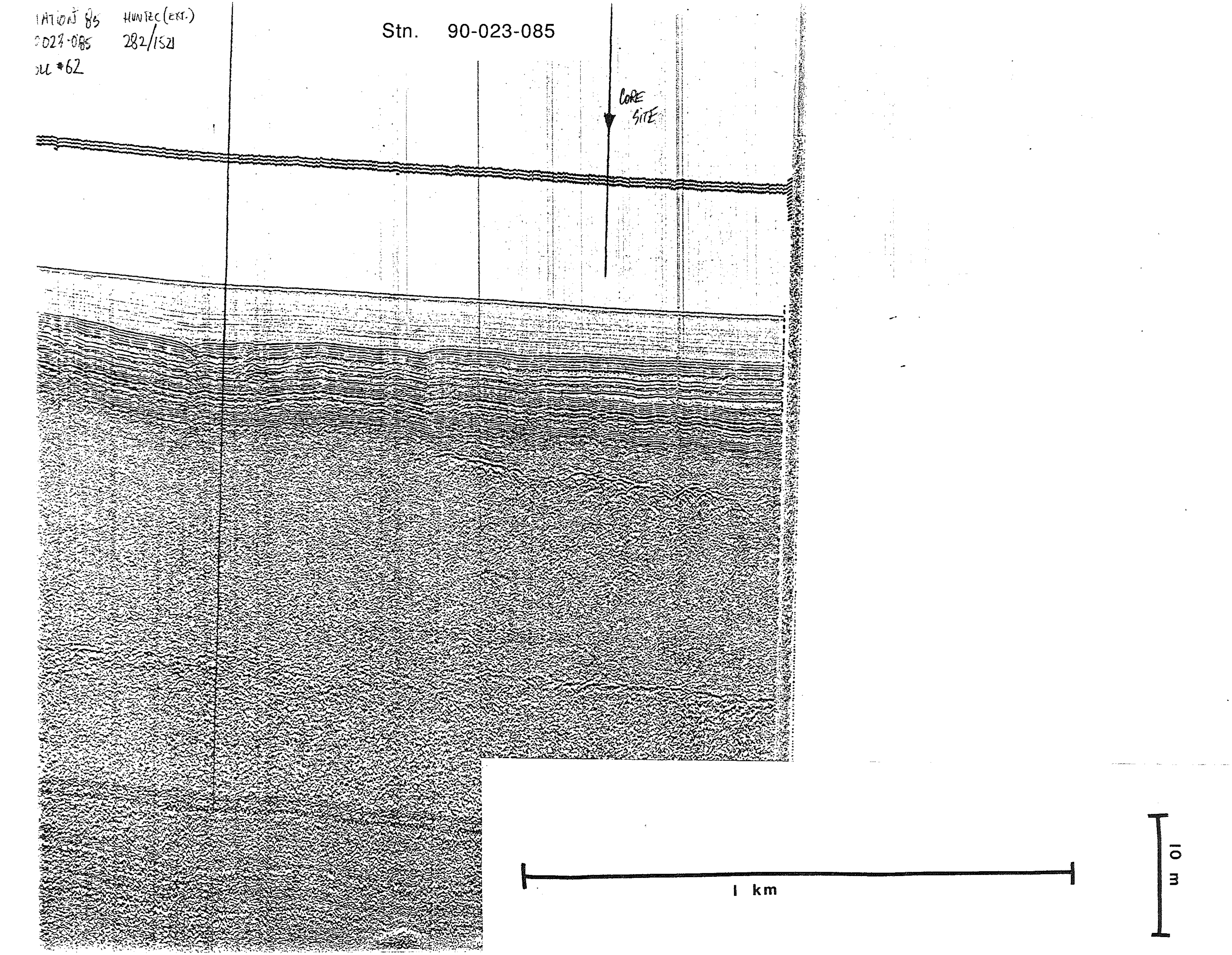
Stn. 90-023-076

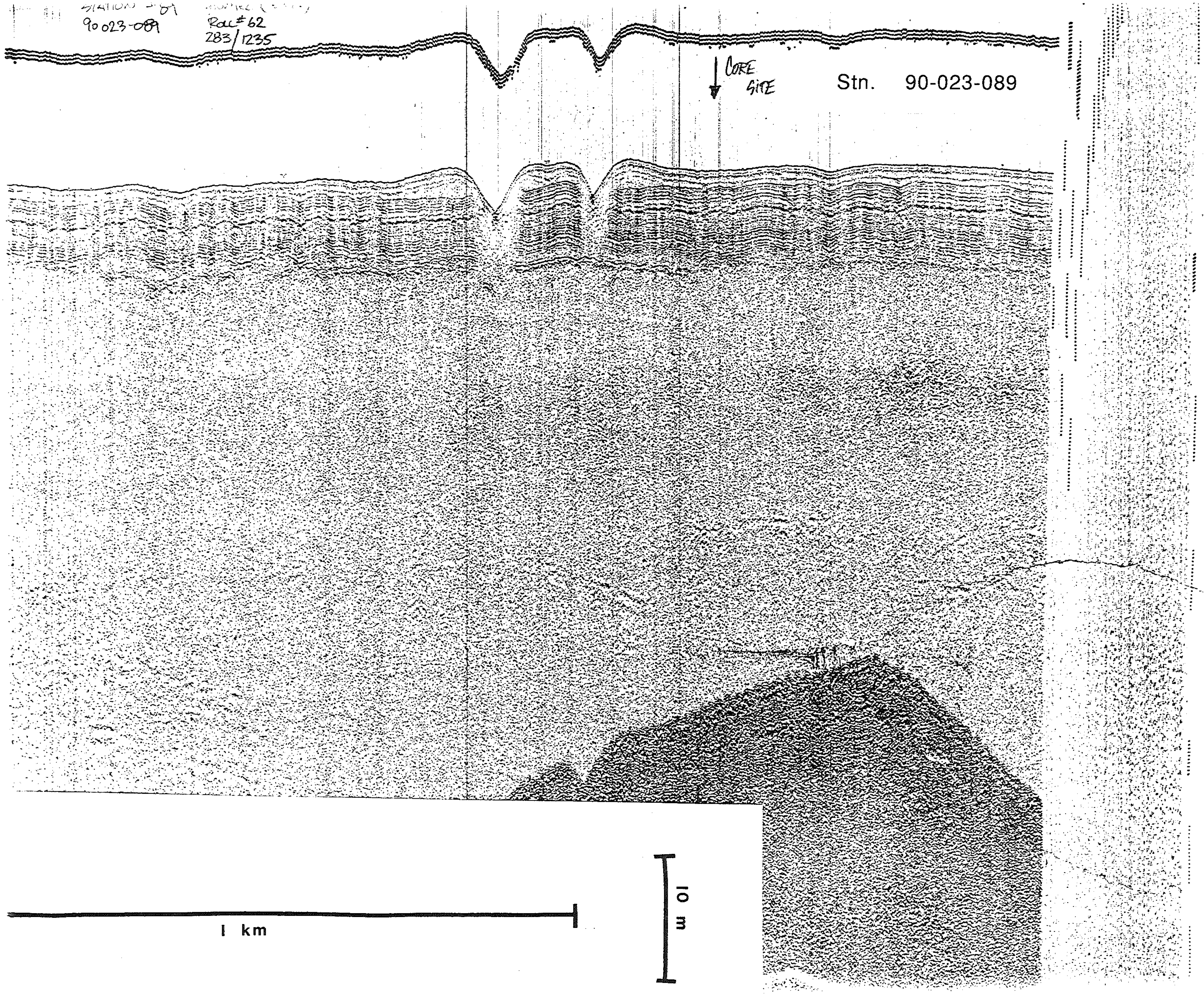


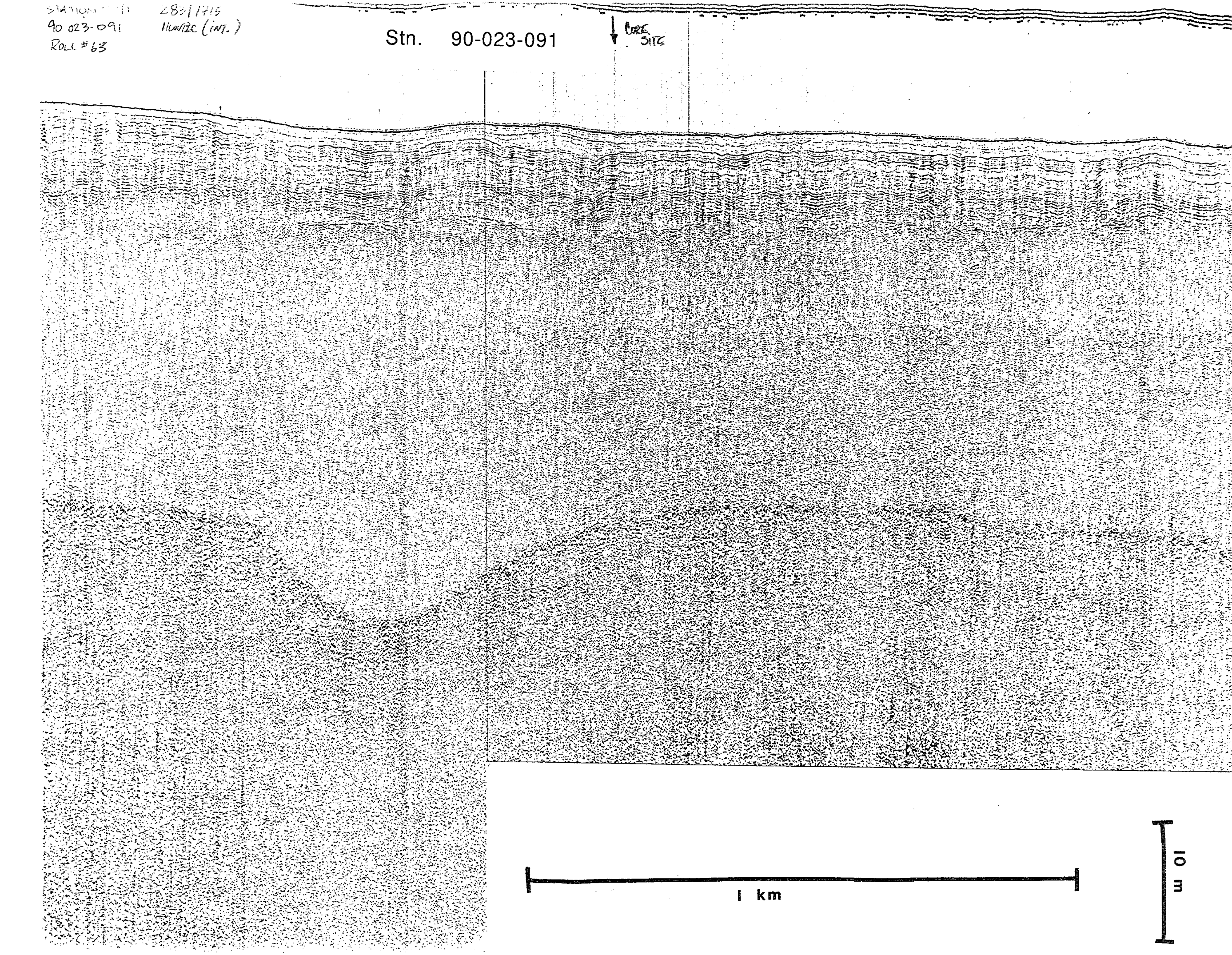


STATION #87
0023-087
HUNTEC (EXT.)
282/1812
ROLL #62
CORE SITE
Stn. 90-023-087
1 km
10 m

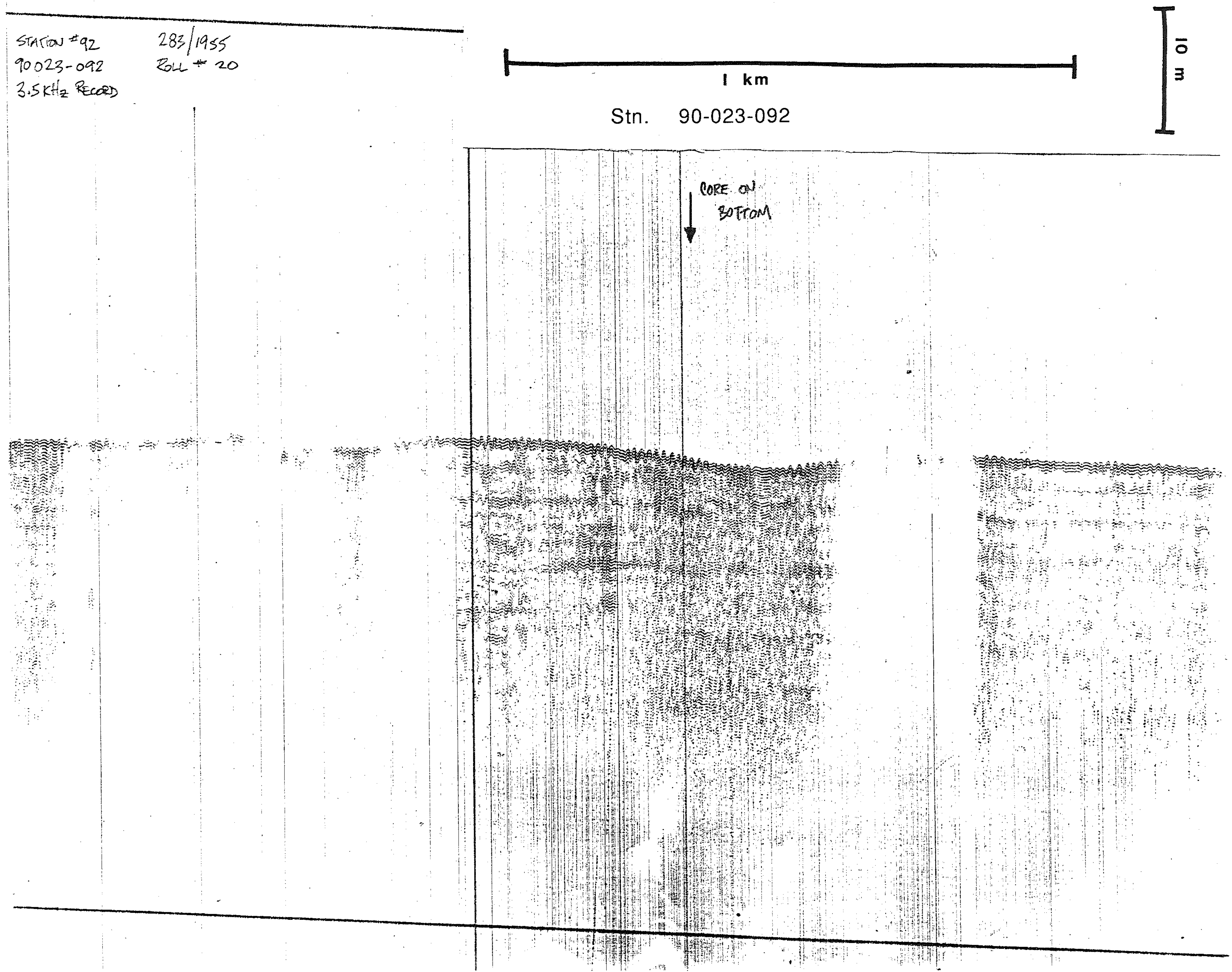
Stn. 90-023-085

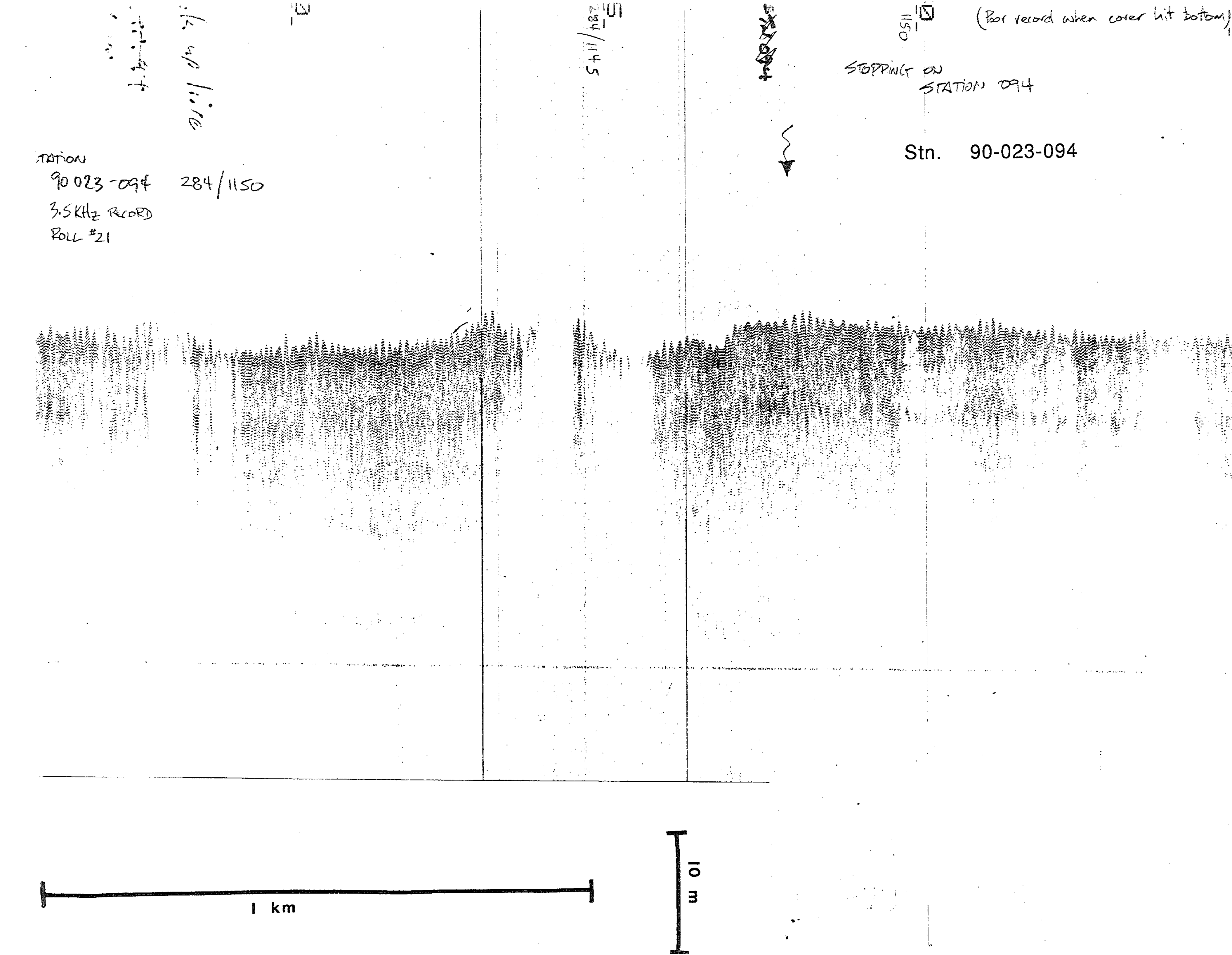



Station 90023-089
Roll #62
283/1235
CORE SITE
Stn. 90-023-089
10 m
1 km



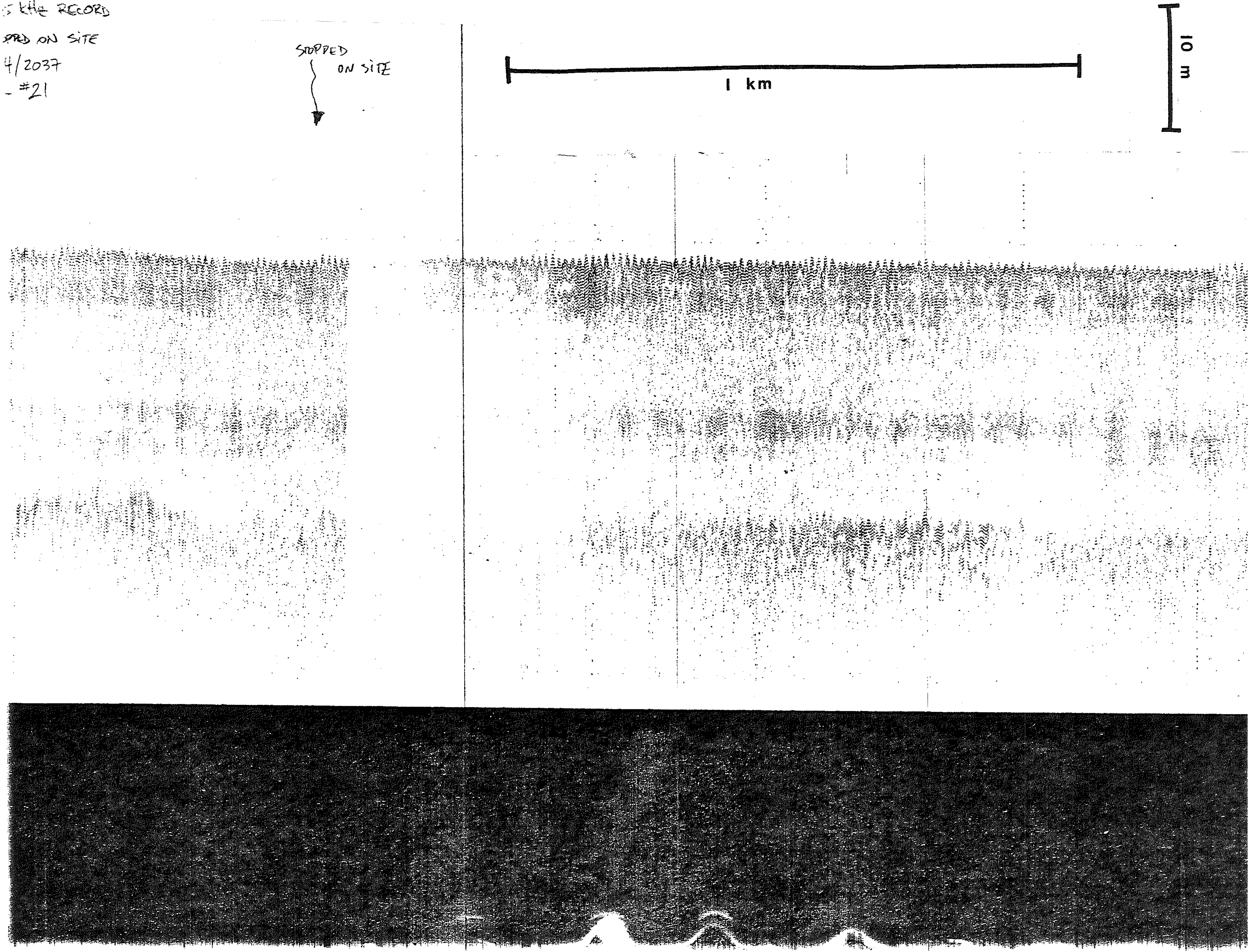
Stn. 90-023-091
CORE SITE
90 023-091
ROLL #63
1 km
10 m

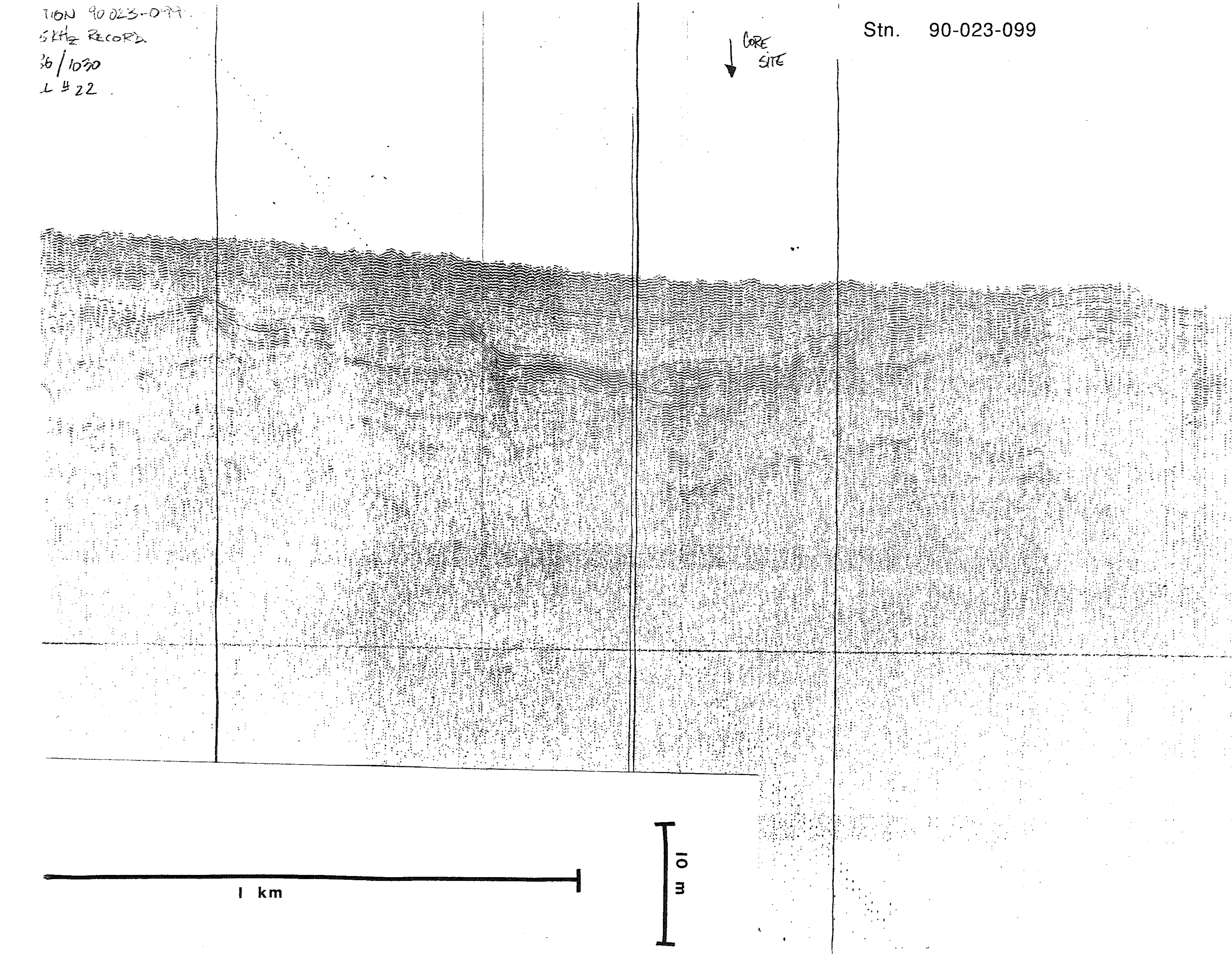

STATION #92
90023-092
3.5KHz RECORD
283/1955
ROLL # 20
1 km
10 m
Stn. 90-023-092
CORE ON BOTTOM


Stn. 90-023-094
(Poor record when corer hit bottom)
STOPPING ON STATION 094
1150
284/1145
STATION
90 023-094 284/1150
3.5 KHz RECORD
ROLL #21
10 m
1 km

…TION 90 023-097
…5 kHz RECORD
…PED ON SITE
4/2037
- #21

Stn. 90-023-097

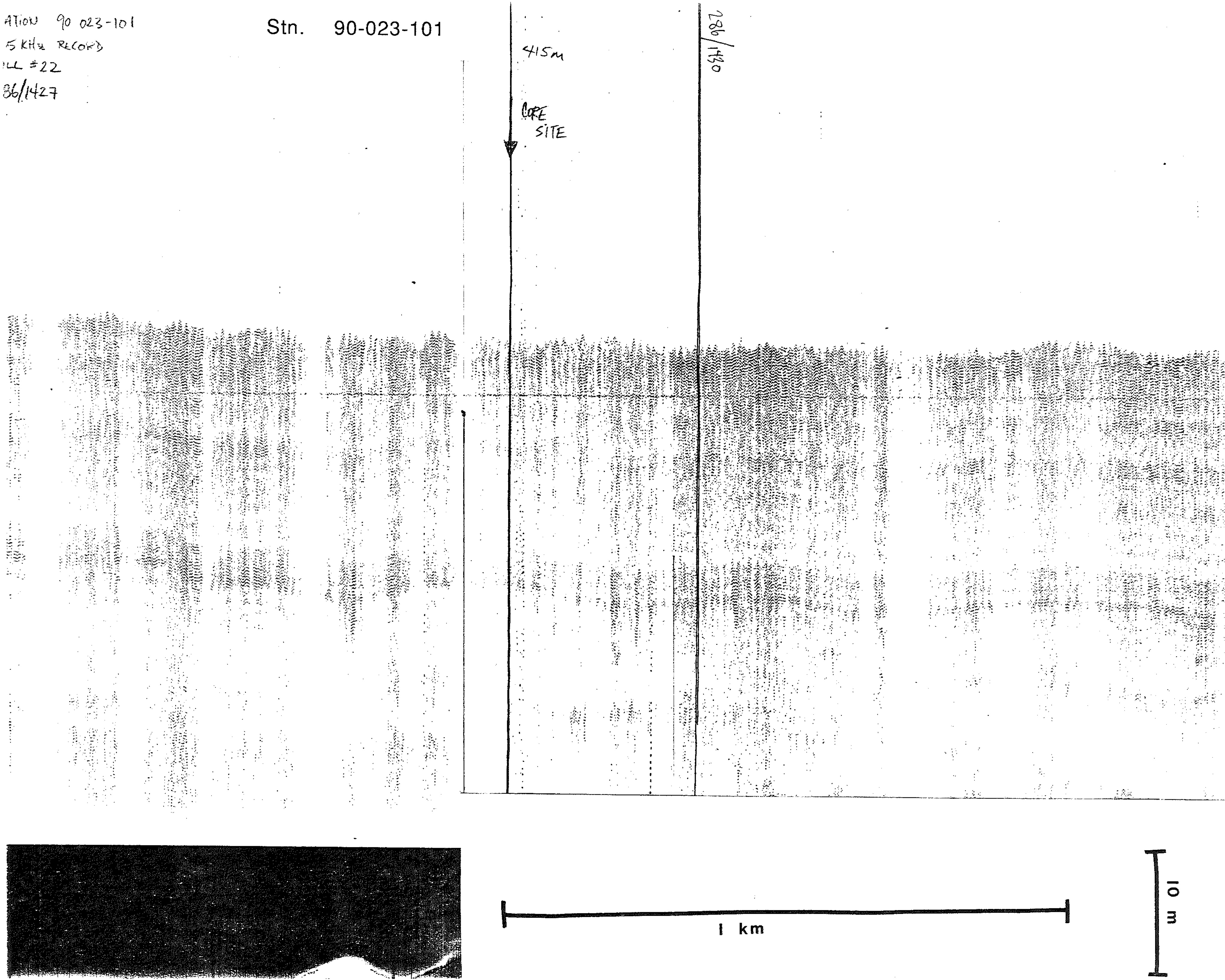


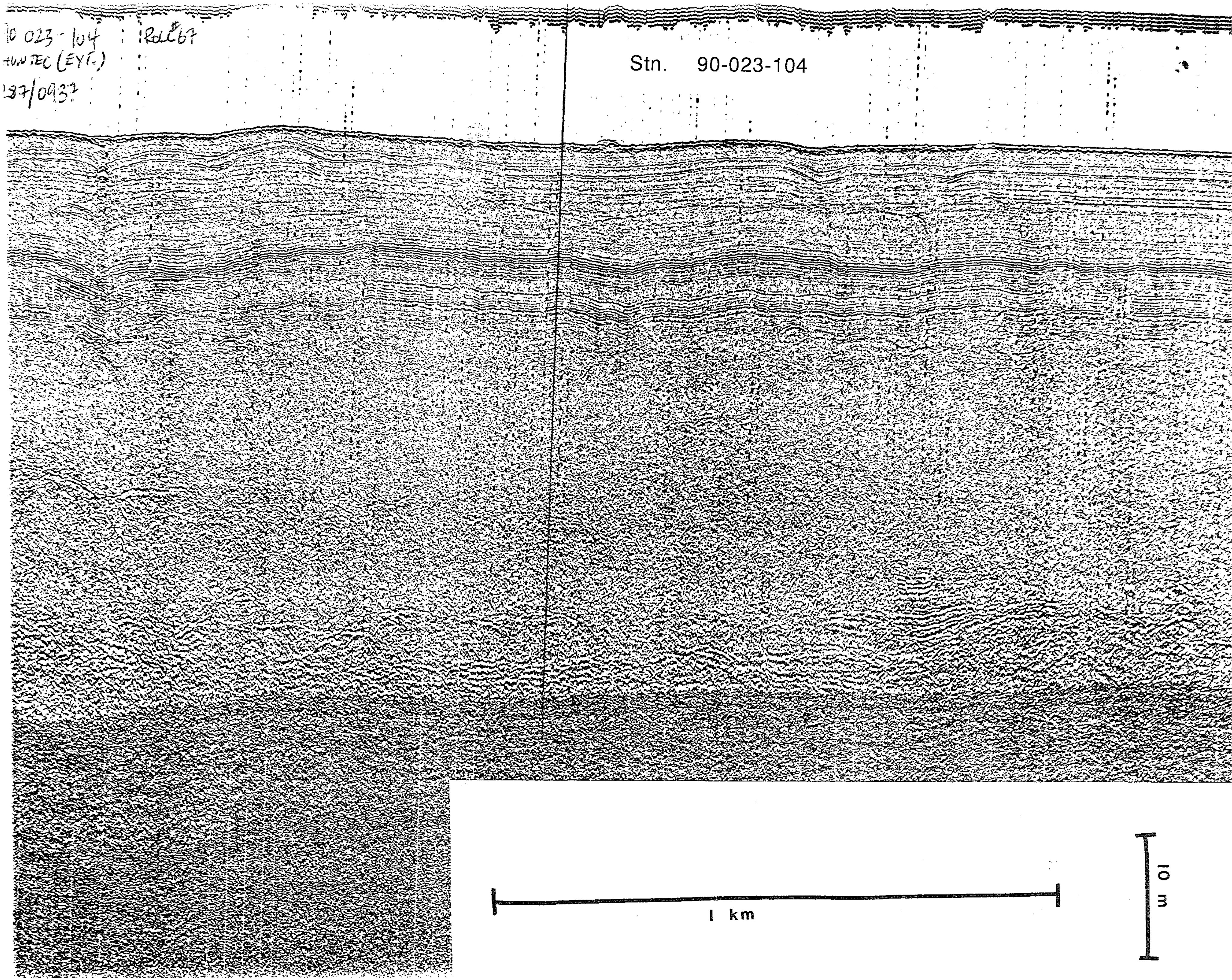


TION 90023-099
5 KHz RECORD
36/1030
L # 22
CORE SITE
Stn. 90-023-099
1 km
10 m

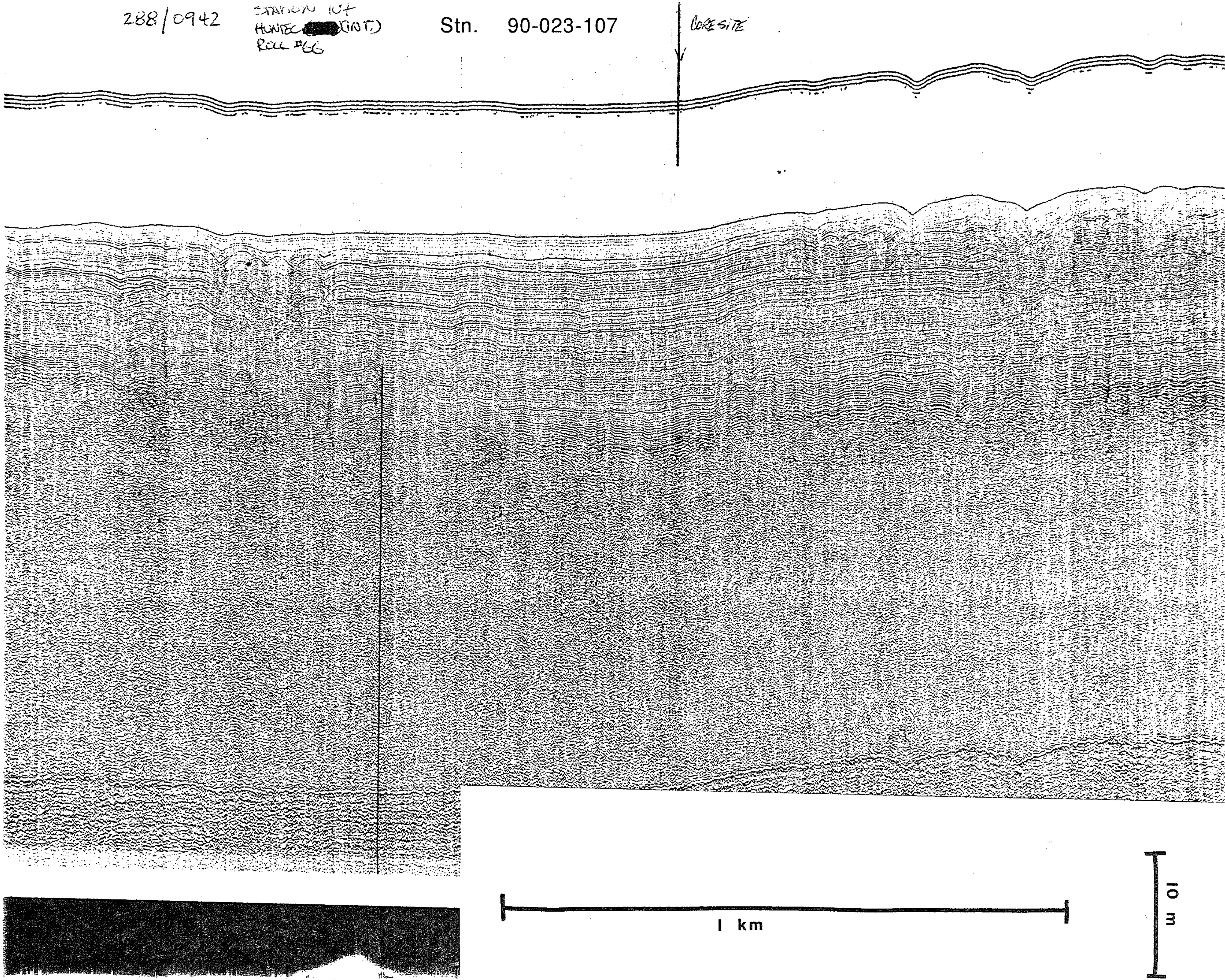
ATION 90 023-101
5 KHz RECORD
ILL #22
36/1427

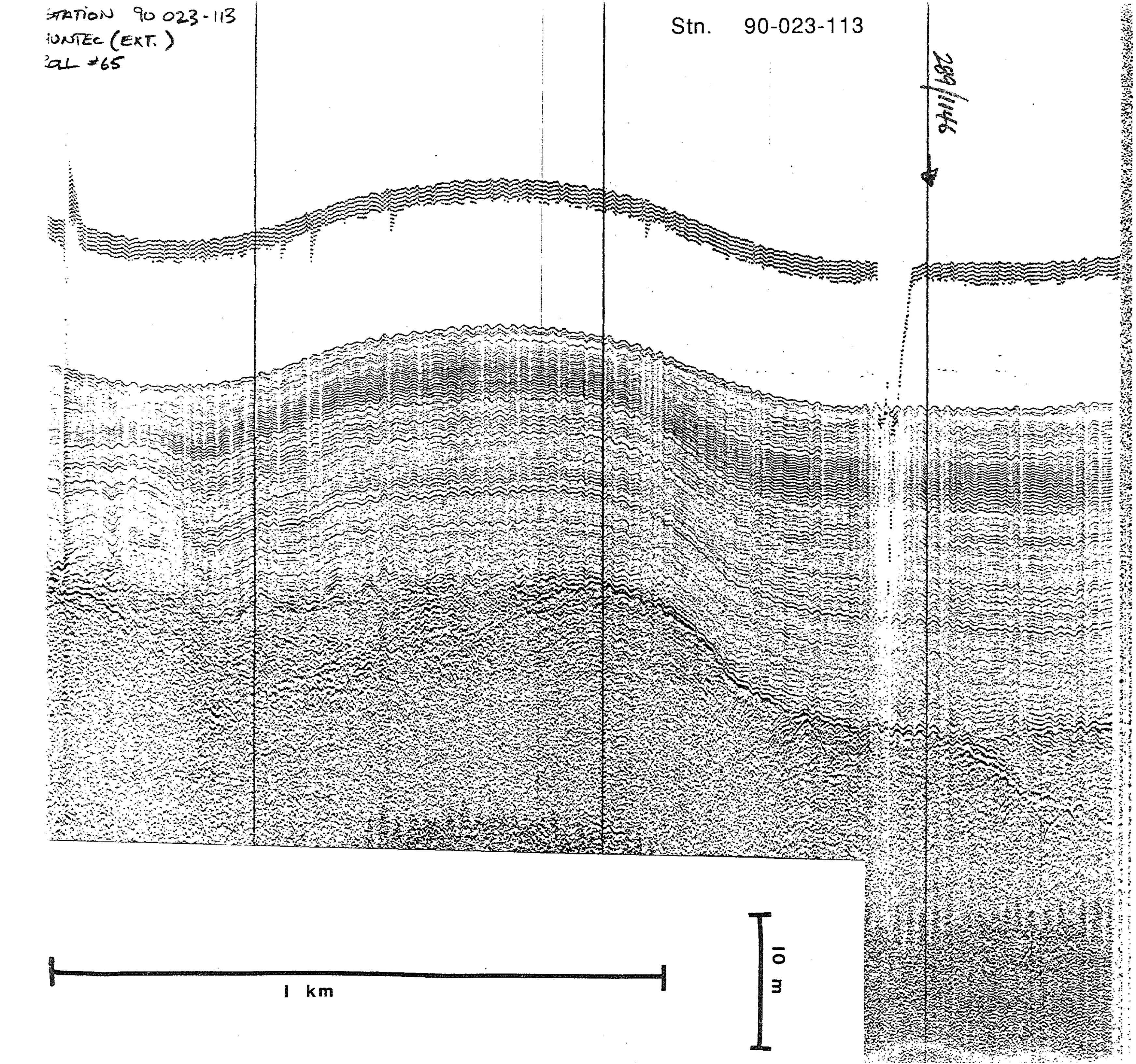
Stn. 90-023-101





90 023-104 Roll#67
HUNTEC (EYT.)
287/0937
Stn. 90-023-104
1 km
10 m


288/0942
STATION 107
HUNTEC [redacted] (INT.)
ROLL #66
Stn. 90-023-107
CORE SITE
1 km
10 m


STATION 90 023-113
HUNTEC (EXT.)
ROLL #65
Stn. 90-023-113
289/1146
1 km
10 m

STATION 90 023-118
HUNTEC (EXT.) ROLL #65
292/2151

Stn. 90-023-118