

Geochemical seabed sampling Licence 1/99

Geological Report

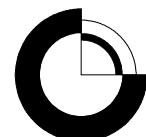
Jørn Bo Jensen and Steen Lomholt

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Jørn Bo Jensen and Steen Lomholt

Released 01.12.2005



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1. Introduction

This report concludes the Geochemical Sampling work done by GEUS for the Agip group in License 1/99.

The report contains a short description of the geological results from the geochemical investigations within and nearby the License 1/99 area. The acquisition and handling of shallow seismic survey data and a Vibrocoring programme, carried out by GEUS in the period 15. August to 11. September 2000 is presented in the Survey Report No 2000/75 October 2000.

A seismic survey of 182,5 km. has been shoot in August, consisting of a seismic grid of 112 km lines and 70,5 km transit lines.

19 shallow sealed cores have been taken with a 6 m vibrocorer and a sedimentological core log is presented in Enclosure B. from each core. The cores are illustrated on seismic section in enclosure D.1-19.

Results from the seismic survey, including older seismic data and the present cores have been used to interpret possible Seabed conditions and stratigraphy, and a thickness Map of the Marine Surface is presented in Enclosure A3.

Based on the above mentioned data, deep seismic data provided by Agip and general knowledge within GEUS a short general description of the area is presented.

2. Seismic Mapping

A Marine Surface Map covering the six selected areas for Seabed coring is prepared on seismic data mainly acquired in august this year. But also existing data are used including data from 1995 to 2000 acquired by GEUS in a general geological mapping project, covering most of the Danish North Sea acreage and older data. The seismic program acquired in the present survey is presented in Enclosure A1 and the total seismic coverage is shown in Enclosure A2.

All cores from the Geochemical Surface programme have been used in this mapping project. The result is presented in Enclosure A3.

It can be seen on the map, that the thickness of the surface sand in general is less than 2 m in the eastern part of the area and increasing towards west. An attempt to avoid areas with the greatest thickness of surface sand is done during the selection of core positions. At the same time is is aimed on basis of seismic data to cover areas with different lithology, combined with areas with possibly visual gas seepage in near surface layers.

3. Cores

A total of 19 cores have been collected during this work. All cores except one (S 6-1) have penetrated more than 5 m of Seabed material. Six cores have penetrated clays or clayey material and in most of the cores sediment composition are fining downwards to fine grained sand or silt. (Enclosure D 1-19)

Core positions are listed in Enclosure E1 and sampling depths in Enclosure E 2 – 4.

4. General Geological overview:

The AGIP licence area 1/99 is located in the Danish central North Sea on the south-western margin of the Horn Graben Main Border Fault, close to the deep well S-1 (Fig. 1).

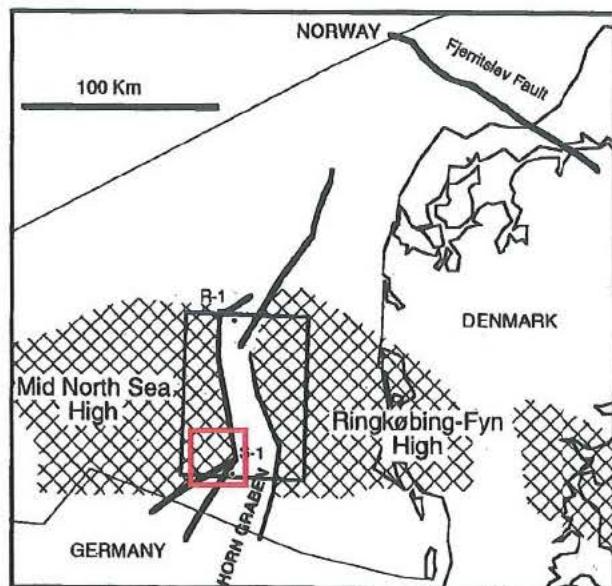


Figure 1. The setting of the Horn Graben. The mapped area is indicated by a red square.

The Horn Graben is generally defined as a single standing extensional structure, formed during the Triassic time period, while the Jurassic and Cretaceous time periods were tectonically quiet and characterised by subsidence. In the post Danian period late Tertiary inversion has been argued (Clausen and Korstgård, 1994) related to reactivated basement faults.

The general stratigraphy is illustrated in figure 2 showing seismic line DK2-5544 crossing the Main Border Fault (Fig 3). In addition indications of the post Danian inversion can be observed.

On basis of deep seismic data AGIP has selected 6 areas of interest (S1 - S6) for Geochemical Seabed sampling. These areas shows characteristic, possibly minor faulting in the post Danian sediments related to reactivation of the Main Border Fault zone, as it is illustrated in the selected deep seismic examples (fig. 3 and enclosures C1-C10). Seepage of possible Thermogenic gas from the deeper structures most likely will take place along the minor faults and the 6 selected areas represents the most promising areas.

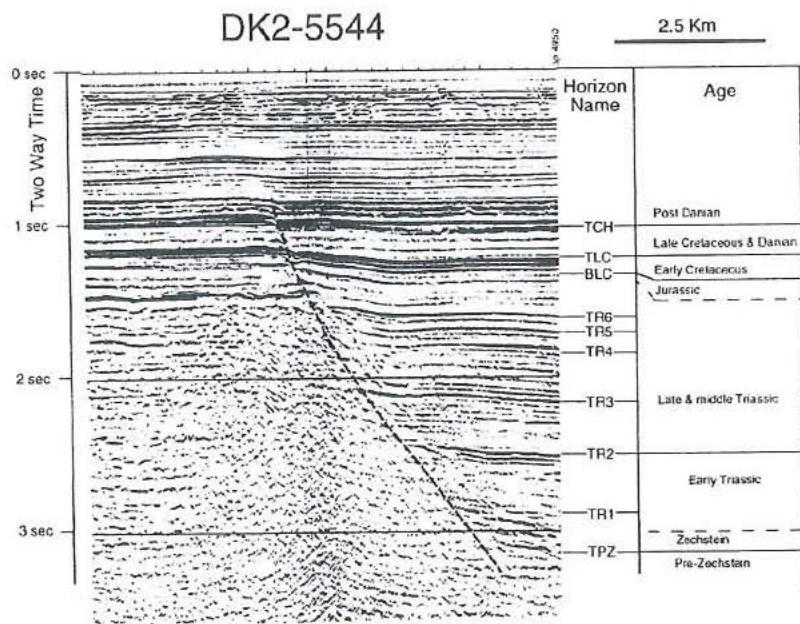


Fig.2 The seismic stratigraphy in the Horn Graben

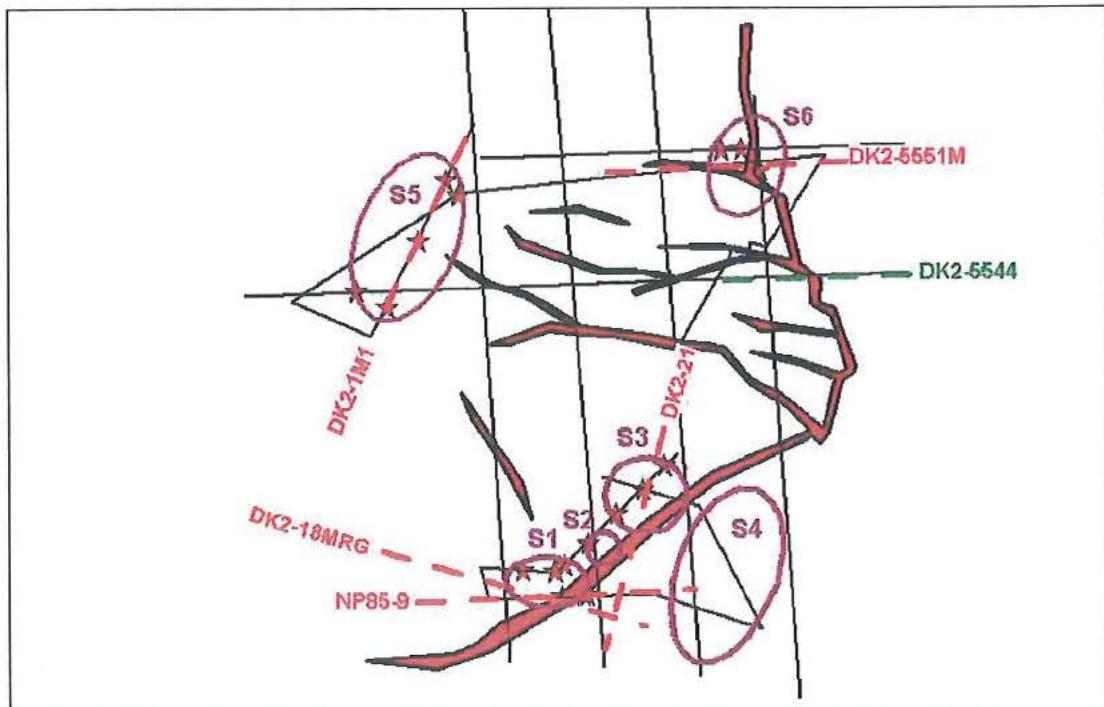


Fig.3 Overview Map of the selected areas S1-S6 (Purple Ellipses), deep seismic examples (Green stippled line Fig. 2 and red stippled lines seismic examples enclosures C1-C10), major fault zones (red areas) and shallow seismic lines (black lines)

The Miocene to Middle Pleistocene sedimentation in the Southern North Sea Basin has been dominated by the progressive westward expansion of a delta complex followed by

Middle Pleistocene (Elsterian) intersections of glacial palaeovalleys that has been incised into the upper part of the delta complex. Reactivation of the palaeovalleys has occurred several times in the Late Pleistocene time period (Huuse and Lykke-Andersen 2000). In spite of infilling in connection with the Holocene transgression the present bathymetri to a certain extent still reflects the framework of palaeovalleys. An interesting thought is that the fracture zones of minor faults in the post Danian sediments might have been developed as a result of reactivation of the Main Border Fault zone related to isostatic adjustments in the Pleistocene glacier ice marginal zone. Some of the palaeovalleys might even have been eroded in the fracture zones.

5. Geological results

Based on the first evaluation of the seismic data from the area, it was expected that Saalien moraine could be reached by cores in the area. But no cores have penetrated into Moraines. The results from the coring programme shows, that the area is covered with medium to fine grained Marine Sand covering fine grained Late Glacial Freshwater Sand or silt. In cores no. S1-1, S1-4, S1-5, S5-3 and S5-5 the fine grained Marine Sand covers Marine Clays. This could indicate the presence of smaller basins with quite conditions or greater depths in the marine area. In a single core (S5-4) the Freshwater sand or silt is followed by fresh water clays and in S2-1 the marine sand is followed by Peat and Freshwater sand.

The shallow seismic mapping carried out in the present project reveals a number of channels in the area as presented in Enclosure A3.

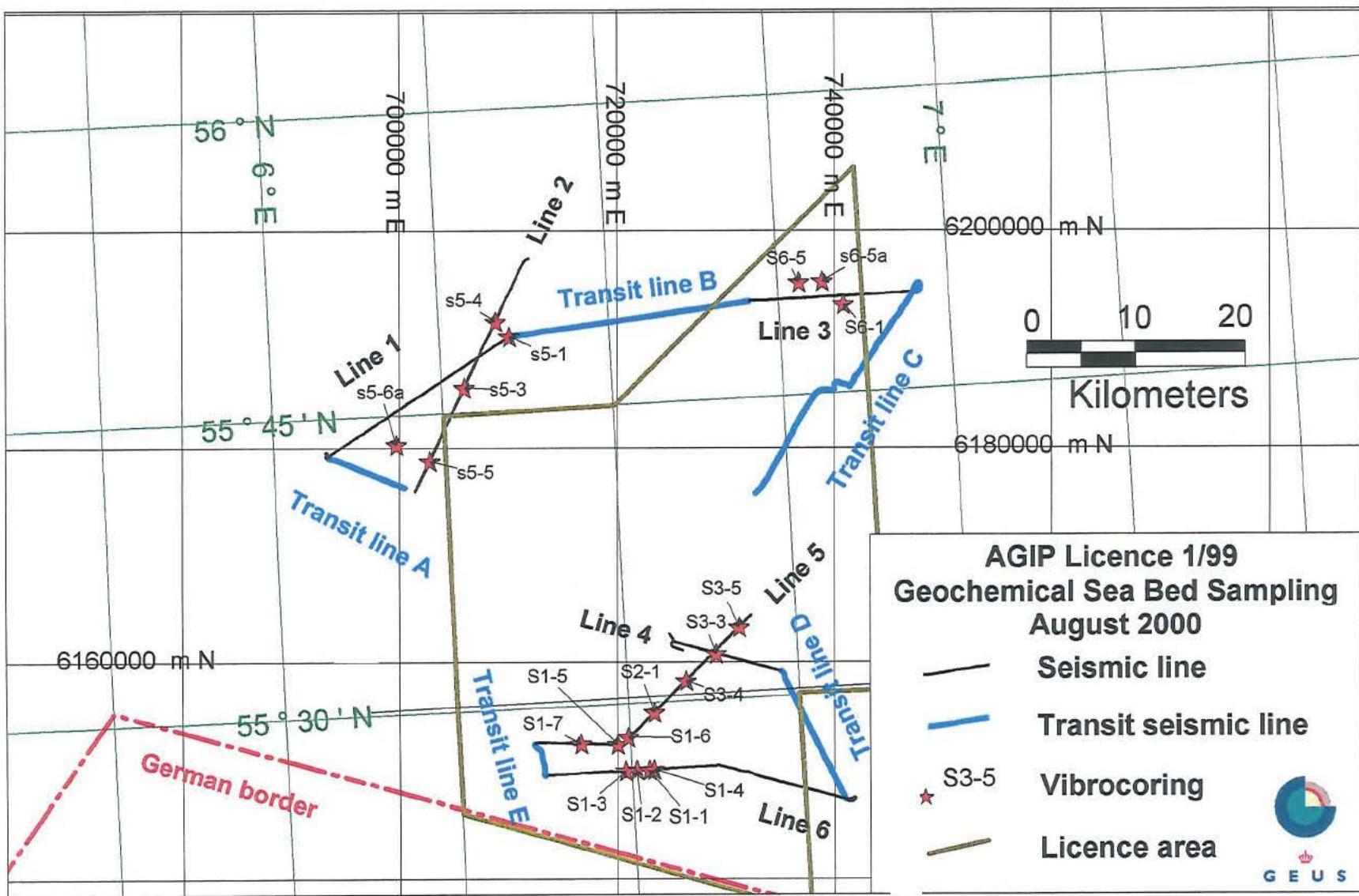
6. Reference

Survey Report: Lomholt, S. and Jensen J.B. Geochemical Seabed sampling License 1/99. GEUS report 2000/75.

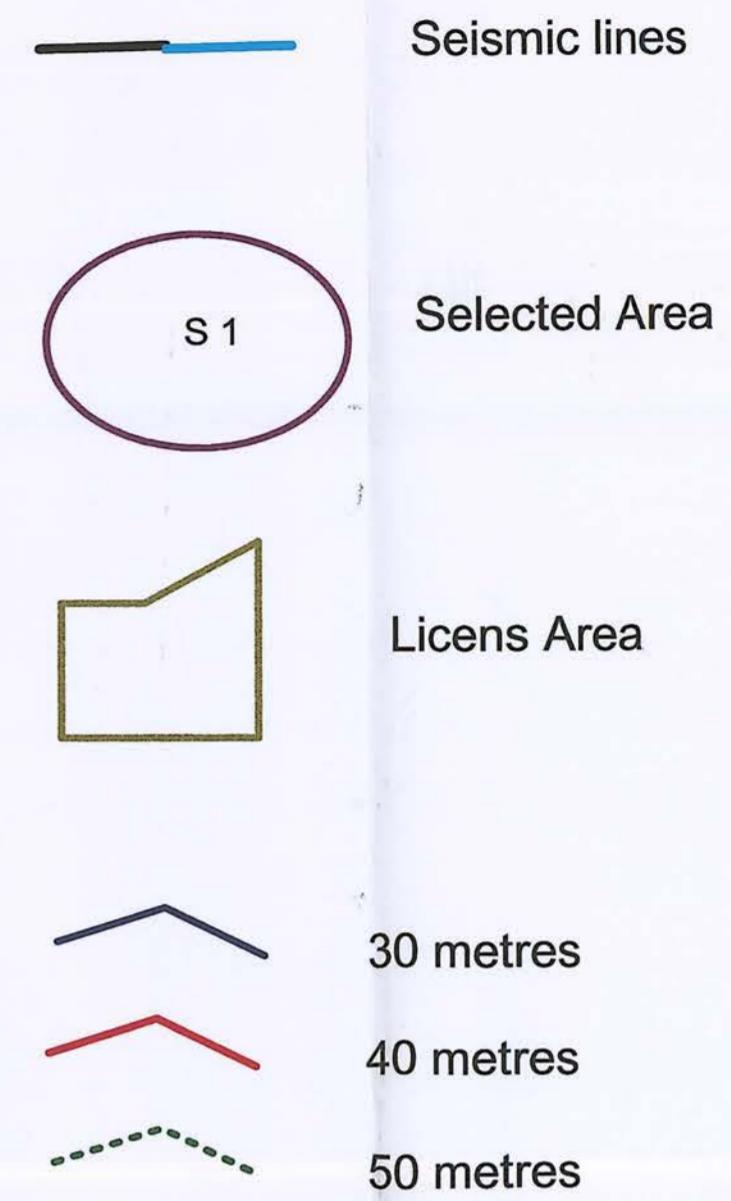
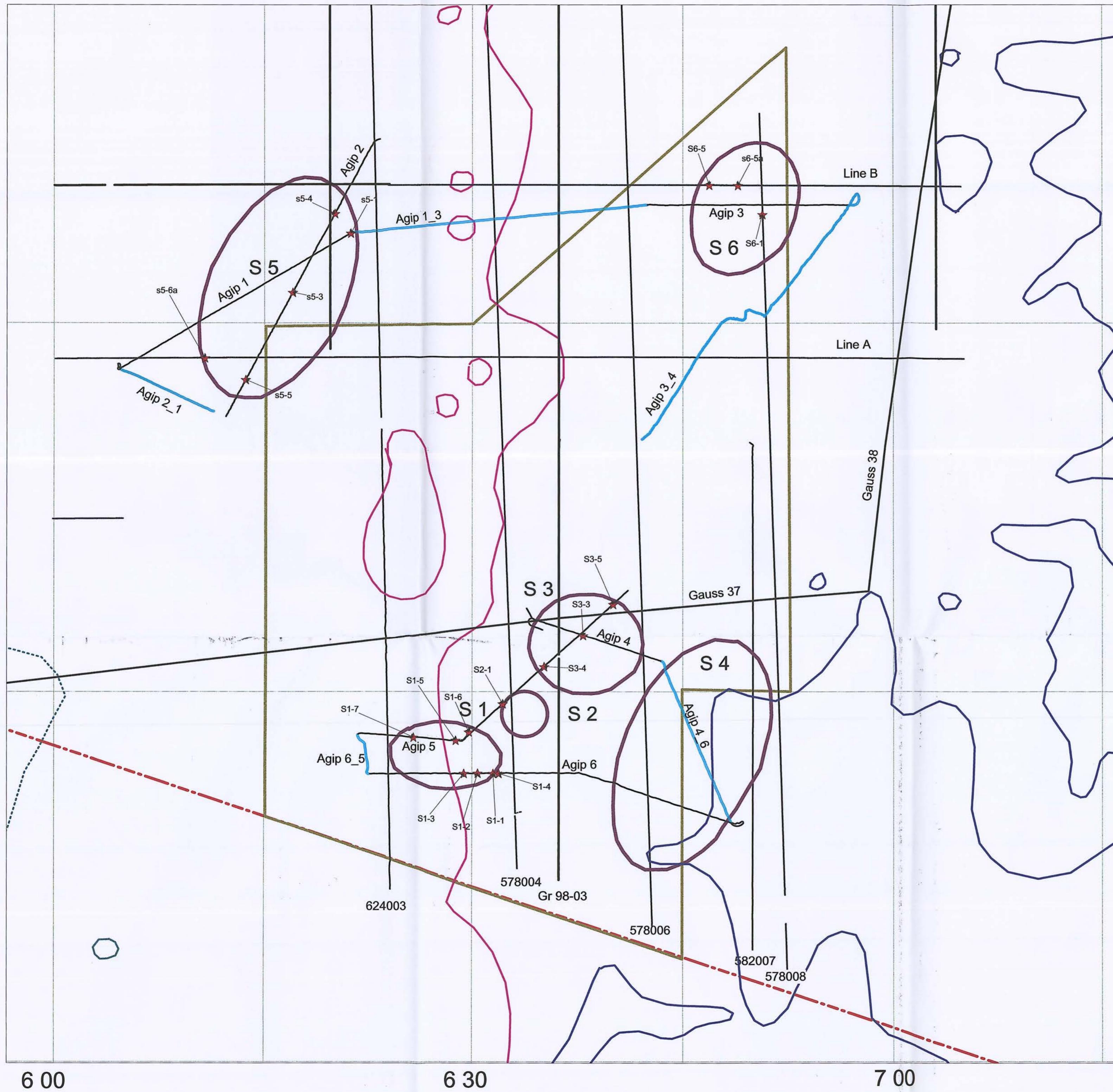
Clausen O. R. and Korstgaard J.A.. Displacement geometries along Graben bounding faults in the Horn Graben, Offshore Denmark. First Break Vol. 12. No. 6. June 1994/305.

Huuse M. and Lykke-Andersen H. Overdeepened Quaternary valleys in the eastern Danish North Sea: Morphology and origin. Quaternary Science Reviews 19 2000 1233-1253.

Enclosure A



Seismic data Area License 1/99

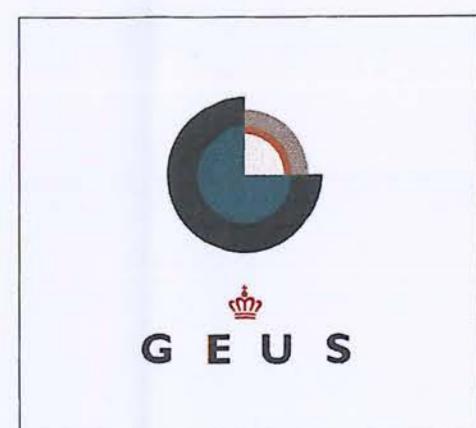


55 45

55 30

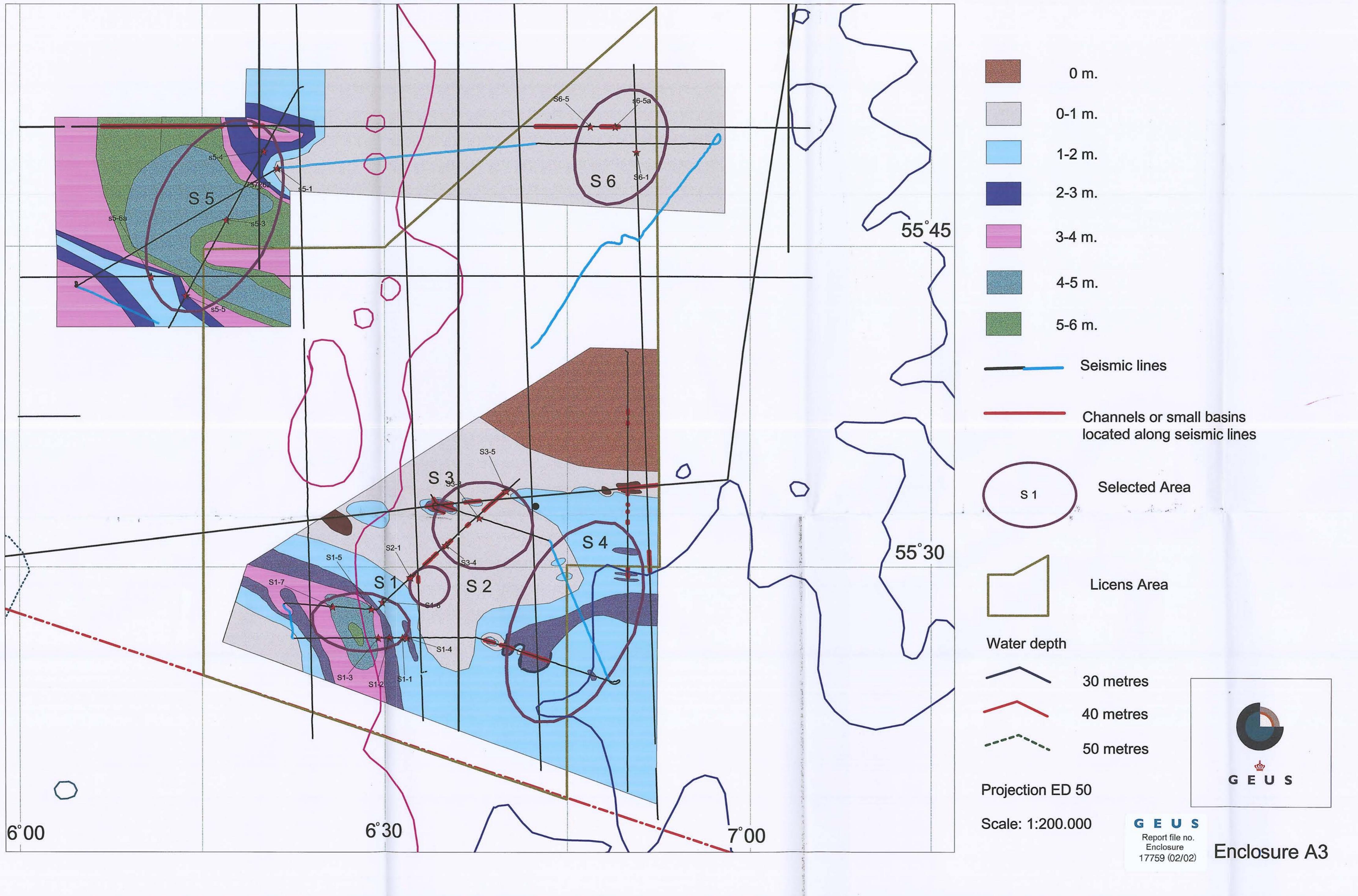
Projection ED 50

Scale: 1:200.000



Enclosure A2

Thickness of Marine Surface Sand



Enclosure B

SEDIMENTOLOGICAL CORE LOG

CORE NR.: S1-1, I-VI

LINE: AGIP 06A

FIX: 03.20.97 WATER DEPTH: 38,6m

Sample depth	Core	Box	Scale	Lithology	Grain size & Sedimentary structure	Description	
Stratigr.							
	VI					· 0,20-0,78 SAND, very-fine, slightly silty, areas with gyttja, shell fragments, dark grey 5Y 5/1	HS
	V		1			· · · · ·	
	IV		2			· 1,78-2,63 SAND, very fine, silty, shells and shell fragments, bioturbation?, dark grey 5Y 4/1	HS
	III		3			· · · · ·	
						· 2,63-3,01 SAND, very fine, slightly silty, laminated, few shell fragments disseminated fine organic particles grey 5Y 5/1	HS
Kem III						· · · · ·	
Gas III						· 3,01-3,53 CLAY, silty, sand pats in top, area's with gyttja, few shell fragments, bioturbated?, grey 5Y 5/1	HL
	II		4			· · · · ·	
						· 3,78-4,53 CLAY, silty bioturbated, few shell fragments, some gyttja, very dark grey - dark grey - grey 5Y 3/1 - 4/1 - 5/1	HL
Kem II						· · · · ·	
Gas II			5			· · · · ·	
	I					· 4,78-5,53 CLAY, silty, few shell fragments, bioturbated, black - dark grey - grey 5Y 2,5/1 - 4/1 - 5/1	
Kem I						· · · · ·	
Gas I						· · · · ·	
			6			Position in ED50 Latitude 55 26,7306' longitude 06 31,5722'	
			m		Clay Silt F M C Gr Pb		
					0.0039 0.0625 0.125 0.25 0.5 1 2 4 64		
					mm		
18.09.2000	PK					Geological Survey of Denmark and Greenland	
Date	Described by						G E U S

SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S1-2

LINE: AGIP 06A

FIX: 03.30.25

WATER DEPTH: 38,3m

Position in ED50
Latitude 55 26,7339'
longitude 06 30,4682'



*Geological Survey of Denmark
and Greenland*

14.09.2000 PK
Date *Described by*

Enclosure B2

SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S1-3

LINE: AGIP 06A

FIX: 03.38.45

WATER DEPTH: 38,1m

13.09.2000 PK
Date Described by

0.0039	<i>Sili</i>
0.0625	<i>F</i>
0.125	<i>M</i>
0.25	<i>C</i>
0.5	<i>Gr</i>
1	<i>Pb</i>
2	
4	
64	

Geological Survey of Denmark
and Greenland



SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S1-4

LINE: AGIP 06A

FIX: 03.17.50 WATER DEPTH: 38,5

Position in ED50
Latitude 55 26,7257'
Longitude 06 31,9802'

20.09.2000 PK

Geological Survey of Denmark
and Greenland



SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S1-5					LINE: AGIP 05	FIX: 05,59,12	WATER DEPTH: 39,3m
Sample depth	Core	Box	Scale	Lithology	Grain size & Sedimentary structure		Description
Stratigr.				-			
	VI		1				0,20-2,88 SAND, very fine, weak lamination, few seems with gyttja, few clay seems, one wood fragment, bioturbated, few shells and shell fragments, grey 5Y 5/1
	V		2				
	IV		3				
	III		4				2,88-3,88 SAND, very fine, silty, few shells and shell fragments, bioturbated, grey 5Y 5/1
Kem III Gas III							
II			5				2,88-4,62 SAND, very fine, silty, clay seems in lower part, horizontal layering, bioturbated ?, shell fragments, few wood fragments, grey 5Y 5/1
Kem II Gas II							
I			6				4,88-5,62 CLAY, slightly silty, sand pots, bioturbated, few shell fragments, dark grey-very dark grey 5Y 4/1 - 5Y 3/1
Kem I Gas I							
							Position in ED50 Latitude 55 28,0707' Longitude 06 28,9303'
14.09.2000	PK				0.0039	0.0625	0.125
Date	Described by				0.25	0.5	1
					2	4	64
				Clay	Silt	F	M
				C	Gr	Pb	

Geological Survey of Denmark and Greenland



Enclosure B5

SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S1-6

LINE: AGIP 05

FIX: 06,08,82 WATER DEPTH: 39,8m

Sample depth	Core	Box	Scale	Lithology	Grain size & Sedimentary structure	Description	
Stratigr.							
	VI					0,20-0,72 SAND, very fine, slightly silty, some gyttja, contorted bedding, bioturbation, few shell fragments, dark grey 5Y 4/1	HS
	V					0,72-3,02 SAND, very fine, silty, some gyttja in uppermost part, few wood fragments, shells and shell fragments, bioturbated, grey - dark grey 5Y 5/1 - 4/1	HS
	IV						
	III					3,02-3,47 SAND, very fine, laminated, dissiminated organic particles, grey 10YR 6/1	TS
Kem III Gas III							
	II					3,72-4,47 SAND, very fine - fine, fining upward, laminated, wood fragment, dissiminated organic particles, grey 10YR 6/1	TS
Kem II Gas II							
	I					4,72-5,47 SAND, very fine and fine, laminated, few clayey lamina, dissiminated fine organic particles, Grey 10YR 6/1	TS
Kem I Gas I							
	6	m				Position in ED50 Latitude 55 28,4126' Longitude 06 29,8733'	
15.09.2000	PK				0.0039 0.0625 0.125 0.25 0.5 1 2 4 64	Geological Survey of Denmark and Greenland	
Date	Described by				mm		

SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S1-7				LINE: AGIP 05	FIX: 05,35,35	WATER DEPTH: 37,6m
Sample depth	Core Box	Scale	Lithology	Grain size & Sedimentary structure		Description
Stratigr.						
	VI					0,2-3,5 SAND, very fine, slightly silty, shells and shell fragments, wood fragments, grey-greyish brown 5Y 5/1-10YR 5/2 HS
	V					.
	IV					.
	III					.
Kem III						.
Gas III						.
	II					3,7-4,5 SAND, very fine, silty, shell fragments, few wood fragments, grey 5Y 5/1 HS
	I					.
Kem II						.
Gas II						.
	5					4,7-5,5 SAND, very-fine, silty-very silty, shell fragments, few wood fragments, grey 5Y 5/1 HS
Kem I						.
Gas I						.
	6	m		Clay Silt F M C Gr Pb	mm	Position in ED50 Latitude 55 28,1797' Longitude 06 25,7394'
12.09.2000	PK			0.0039 0.0625 0.125 0.25 0.5 1 2 4 64		Geological Survey of Denmark and Greenland
Date	Described by					GEUS

Enclosure B7

SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S2-1

LINE: AGIP 05

WATER
DEPTH: 38,4m

Sample depth	Core	Box	Scale	Lithology	Grain size & Sedimentary structure	Description	
Stratigr.							
	VI					0,20-3,25 SAND, very fine, slightly silty, uppermost 0,5m some gyttja, shells and shell fragments, bioturbated, grey 5Y 5/1	HS
	V		1				
	IV		2				
	III		3				
Kem III							
Gas III							
	II		4			3,50-3,79 SAND, very fine, slightly silty, many shell fragments, bioturbated, dark grey 5Y 4/1	HS
						3,79-4,04 SAND, very fine, area with gyttja, slightly micaceous, light grey 10YR 7/1	HS
Kem II						4,04-4,25 PEAT, upper part laminated with sand lamina	FT
Gas II							
	I		5			4,50-4,75 SAND, very fine, slightly silty, many lamina rich in plant fragments, dark grey 10YR 4/1	FS
						4,75-5,25 SAND, very fine, few lamina rich in plant fragments, grey 5Y 5/1	FS
Kem I							
Gas I							
	6	m			Clay Silt F M C 2 Gr 4 Pb	Position in ED50 Latitude 55 29,5537' Longitude 06 32,2531'	
16.09.2000	PK				0.0039 0.0625 0.125 0.25 0.5 1 2 4 64		
Date	Described by				mm	Geological Survey of Denmark and Greenland	GEUS

SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S3-3

LINE: AGIP 04

FIX: 22,21,80

WATER DEPTH: 36,6m

Position in ED50
Latitude 55 32,3415'
Longitude 06 37.9393'

18.09.2000

PK

Clay	Silt	F	M	C	Gr	Pb
0039	0625	0.125	0.25	0.5	1	2

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SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S3-4				LINE: AGIP 05	FIX: 07,29,60	WATER DEPTH: 36,7m
Sample depth	Core	Box	Scale	Lithology	Grain size & Sedimentary structure	Description
Stratigr.				-		0,20-0,55 SAND, fine, slightly silty, some gyttja, shells and shell fragments, very dark grey-grey 5Y 3/1-5/1 HS
	VI					0,55-0,70 SAND, very fine, slightly silty, many shells and shell fragments, grey 5Y 5/1 FS
	V		1			0,70-3,30 SAND, very fine, slightly silty, slightly micaceous, laminated, fine organic particles, in lamina, slightly micaceous, in lower part rounded shell fragment and wood fragments, light grey 5Y 6/1 TS
	IV		2			.
	III		3			.
Kem III						3,55-3,81 SAND, very fine, slightly silty, laminated, fine organic particles, grey 5Y 6/1 TS
Gas III						3,81-3,92 SAND, medium, laminated, fine organic particles, grey 5Y 6/1 TS
	II		4			3,92-4,30 SAND, very fine, slightly silty at base and top, laminated, fine organic particles, grey 5Y 5/1-6/1 TS
Kem II						.
Gas II						.
	I		5			5,55-5,30 SAND, very fine, slightly silty, laminated, fine organic particles, grey 5Y 5/1-6/1 TS
Kem I						.
Gas I						.
			6			Position in ED50 Latitude 55 31,0814' Longitude 06 35,1983'
			m	Clay Silt F M C Gr Pb	0.0039 0.0625 0.125 0.25 0.5 1 2 4 64 mm	
19,09,2000	PK					
Date	Described by					

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SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S3-5

LINE: AGIP 05

FIX: 08,22,09 WATER DEPTH: 34,9m

Position in ED50
Latitude 55 33,6153'
Longitude 06 40,0943'

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SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S5-1

LINE: AGIP 01

FIX: 21,47,10 WATER DEPTH: 40,9m

Sample depth	Core	Box	Scale	Litho- logy	Grain size & Sedimentary structure	Description	
Stratigr.							
	VI					0,20-2,66 SAND, fine, laminated, at 0,20m and 0,40m few gravel and stones, disseminated fine organic particles, grey 10YR 7/2	TS
	V		1				
	IV		2				
	III		3			2,66-3,41 SAND, fine, laminated, contorted, disseminated fine organic particles in some lamina, grey 10YR 7/2	TS
Kem III							
Gas III							
	II		4			3,66-4,40 SAND, fine-very fine, laminated, contorted, fine organic particles in some lamina, grey 10YR 6/1	TS
Kem II							
Gas II							
	I		5			4,66-5,41 SAND, fine-very fine, laminated, disseminated fine organic particles in some lamina, grey 10YR 6/1	TS
Kem I							
Gas I							
	6	m		Clay Silt F M C Gr Pb		Position in ED50 Latitude 55 48,6920' Longitude 06 21,2343'	
21.09.2000	PK			0.0039 0.0625 0.125 0.25 0.5 1 2 4 64	mm		
Date	Described by						

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SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S5-3

LINE: AGIP 02

FIX: 16,00,30 WATER DEPTH: ~41m

Position in ED50
Latitude 55 46,2952'
Longitude 06 17,0603'

20.09.2000 PK

PK

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SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S5-4

LINE: AGIP 02

FIX: 15,03,80 WATER DEPTH: ~41m

Sample depth	Core	Box	Scale	Litho- logy	Grain size & Sedimentary structure	Description
Stratigr.						
	VI					0,20-1,72 SAND, very fine-fine, silty, some gyttja at top, shell and shell fragments, wood fragment, clay seams in lower part, bioturbated, grey 5Y 5/1 HS
	V			1		
	IV			2		1,72-2,30 SAND, very fine, lamina- ted, few fine sand lamina, slightly silty in upper part, few shell frag- ments, some organic particles, grey 5Y 5/1 HS
	III			3		2,30-2,65 SAND, medium-fine, laminated, some clasts, few shell fragments, grey-yellowish brown 5Y 5/1 - 10YR 5/4 TS
Kem III						
Gas III						
	II			4		2,65-3,47 SAND, laminated, fine-very fine, disseminated, fine organic particles on lamina, contorted, light grey 10YR 7/1
	I			5		3,72-4,47 SAND, fine-very fine, laminated, few lamina with medium sand, contorted, fine organic par- ticles, some laminae, grey-light grey 5Y 6/1- 10YR 7/2 TS
Kem II						
Gas II						
						4,72-4,98 SAND, fine, laminated, fine organic particles, grey 10YR 7/2 TS
						4,98-4,47 CLAY, silty, laminated, silt lamina, grey brown 10YR 5/2 and light greybrown 10YR 6/2 TL
Kem I						
Gas I						
						Position in ED50 Latitude 55 49,5081' Longitude 06 20,0824'
					Clay Silt F M C Gr Pb	
				6 m	0.0039 0.0625 0.125 0.25 0.5 1 2 4 64 mm	
21.09.2000	PK					
Date	Described by					

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SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S5-5					LINE: AGIP 02	FIX: 17,11,46	WATER DEPTH: ~41m	
Sample depth	Core	Box	Scale	Litho-logy	Grain size & Sedimentary structure		Description	
Stratigr.				-	.	.	0,20-1,23 SAND, very-fine, slightly silty, few areas with gytta, shell fragments, bioturbated, olive grey 5Y 5/2	HS
	VI		1		.	.	.	
	V				.	.	1,23-1,73 CLAY, silty, many sand pots and streaks, some gytta, shells and shell fragments, bioturbated, grey 5Y 5/1	HL
	IV		2		.	.	1,73-2,71 CLAY, silty, many sand pots and streaks, some gytta, shells and shell fragments, bioturbated, dark grey 5Y 4/1	HL
	III		3		.	.	2,71-2,74 SAND, medium and fine, shell fragments, light grey 10YR 7/2	HS
Kem III					.	.	2,74-2,97 CLAY, silty, sand layers and lamina, laminated, few lamina rich in organic rest, shell fragments dark grey 5Y 4/1	HL
Gas III			4		.	.	2,97-3,49 SAND, fine-medium, laminated, few shell fragments, few clay seams, grey 5Y 6/1	HS
	II				.	.	3,74-4,10 SAND, medium -fine, laminated, clay layers, shells and shell fragments, grey 5Y 5/1	HS
Kem II					.	.	4,10-4,49 CLAY, sand layers, laminated, layers rich in organic material, shells and shell fragments, grey 5Y 5/1	HL
Gas II			5		.	.	4,74-5,50 CLAY-SAND, fine to very fine, laminated, lamina rich in organic material and gytta, few shells and shell fragments, grey-very dark grey 5Y 5/1 - 5Y 3/1	HV
Kem I					.	.	Position in ED50 Latitude 55 42,1544' Longitude 06 13,7463'	
Gas I			6		Clay Silt F M C Gr Pb	mm		
			m		0.0039 0.0625 0.125 0.25 0.5 1 2 4 64			
22.09.2000	PK						Geological Survey of Denmark and Greenland	GEUS
Date	Described by							

Enclosure B15

SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S5-6A

LINE: A

FIX:

WATER DEPTH: ~41m

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SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S6-1

LINE: 578208

FIX: 26461

**WATER
DEPTH:**

Sample depth	Core	Box	Scale	Lithology	Grain size & Sedimentary structure	Description
Stratigr.	V					0,20-0,55 SAND, fine-very fine, silty, shells and shell fragments, dark grey 5Y 4/1
	IV			1		0,55-2,18 SAND, laminated, medium-coarse, few gravel size clasts, light grey 10YR 7/1
	III			2		
Kem III						
Gas III						
	II			3		2,43-3,18 SAND, laminated, medium and coarse, few lamina with very coarse sand, few clasts of fine gravel, light grey 10YR 7/2
Kem II						
Gas II						
	I			4		3,43-4,18 SAND, laminated, medium and coarse, few lamina with very coarse, few clasts of fine gravel, light grey 10YR 7/2
Kem I						
Gas I						
				5		
				6		
m				m	Clay Silt F M C Gr Pb	Position in ED50 Latitude 55 49,4392' Longitude 06 50,7461'
25.09.2000	PK				0.0039 0.0625 0.125 0.25 0.5 1 2 4 64	Geological Survey of Denmark and Greenland
Date	Described by				mm	GEUS

Position in ED50
Latitude 55 49,4392'
Longitude 06 50,7461'

*Geological Survey of Denmark
and Greenland*



25.09.2000

PK

Da

Described by

0.0039	<i>Si</i>
0.0625	<i>T</i>
0.125	<i>M</i>
0.25	<i>C</i>
0.5	<i>G</i>
1	<i>P</i>
2	<i>mm</i>
4	
64	

Enclosure B17

SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S6-5				LINE: B	FIX:	WATER DEPTH:						
Sample depth	Core	Box	Scale	Litho- logy	Grain size & Sedimentary structure	Description						
Stratigr.												
	VI					0,20-0,86 SAND, fine-very fine, slightly silty, many shell fragments, wood fragment at base, bioturbated, grey 5Y 5/1 HS						
	V					0,86-1,03 SAND, very fine, silty, shells and shell fragments, dark grey 5Y 5/1 HS						
	1					1,03-1,54 SAND, fine-medium, laminated, few gravel and clay clasts, rootlets, grey 10YR 6/1 TS						
	2					1,54-2,20 SAND, very fine, laminated, dissimilated fine organic particles, light grey 10YR 7/2 TS						
	3					2,20-2,95 SAND, very fine and fine-medium, oblique lamination, few finegravel clasts, dissimilated fine organic particles, light grey 10YR 7/2 TS						
Kem III												
Gas III												
	II					3,20-3,95 SAND, very fine and fine-medium, oblique lamination, dissimilated fine organic particles, 1cm lamina, light grey 10YR 7/2 TS						
Kem II												
Gas II												
	4					4,20-4,95 SAND, very fine and fine, laminated, slightly contorted in top, medium to fine organic particles in lamina, light grey 10YR 7/2 TS						
Kem I												
Gas I												
	5											
	6		m									
				Clay	Silt	F	M	C	Gr	Pb		
				0.0039	0.0625	0.125	0.25	0.5	1	2	4	64
26.09.2000	PK											
Date	Described by											
							Position in ED50 Latitude 55 50,4525' Longitude 06 46,9228'					
							Geological Survey of Denmark and Greenland				 GEUS	

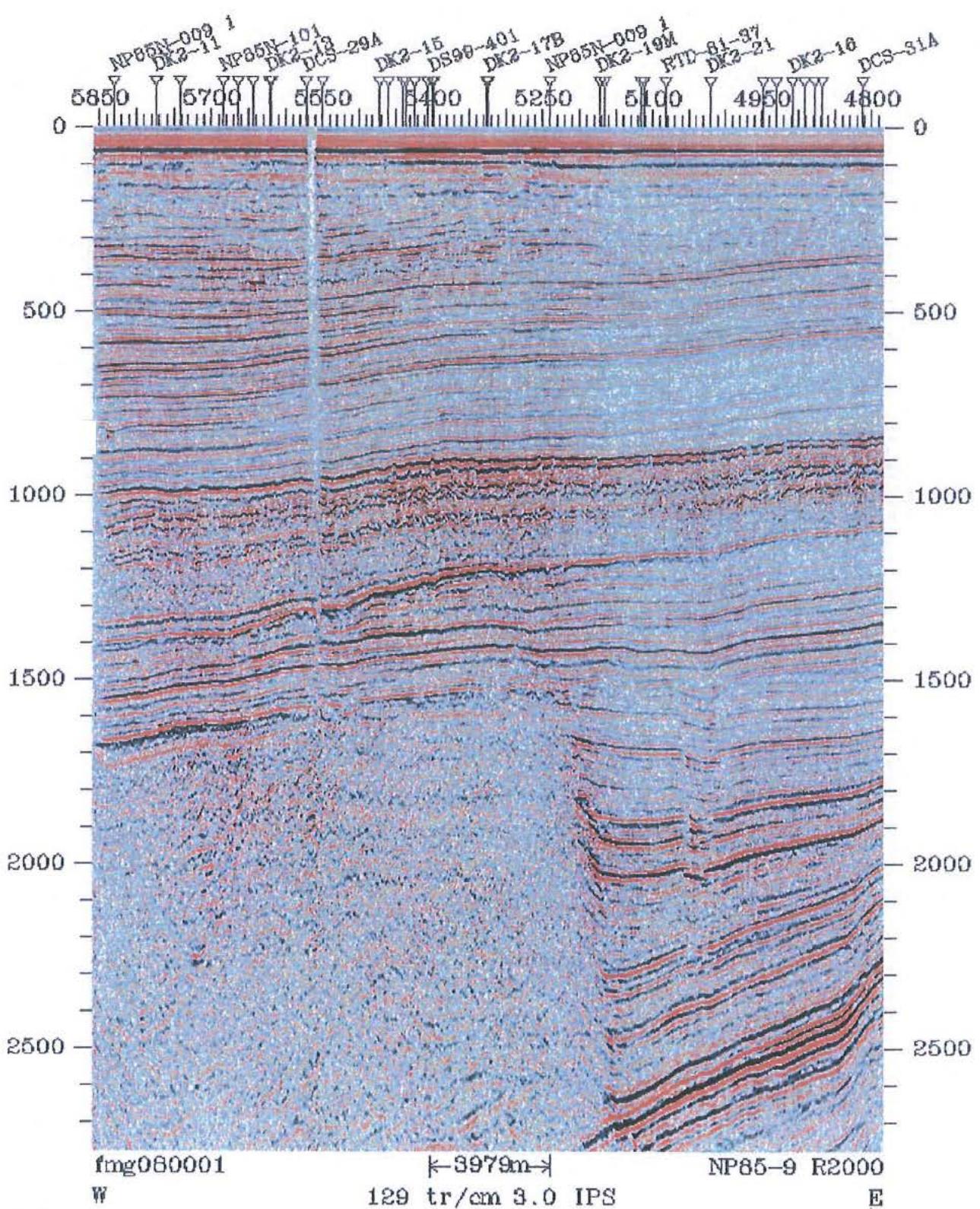
Enclosure B18

SEDIMENTOLOGICAL CORE LOG

CORE NR.: AGIP S6-5A				LINE: B	FIX:	WATER DEPTH:
Sample depth	Core Box	Scale	Litho-logy	Grain size & Sedimentary structure	Description	
Stratigr.					· 0,20-0,27 SAND, medium, with fine shell fragments, light yellowish brown, 10YR 6/4 · 0,27-0,69 SAND, fine, slightly silty, some gyttja, many shells and shell fragments, grey 5Y 5/1 · 0,69-0,81 SAND, fine-very fine, some gyttja, few shell fragments, clasts at base, dark grey 5Y 5/1 · 0,81-0,86 SAND, fine-very fine, dissimilated fine organic particles, irregular base, light grey 10YR 7/2 · 0,86-3,61 SAND, very fine and fine, laminated, dissimilated fine organic particles, stone 10cm at 0,90m, rootlets, light grey 10YR 7/2	HS HS HS TS TS
Kem III Gas III	VI	1				
	V	2				
	IV	3				
	III					
Kem II Gas II	II	4			· 3,86-4,61 SAND, laminated, very fine and fine, dissimilated fine organic particles, light grey 10YR 7/2	TS
	I	5			· 4,86-5,51 SAND, very fine and fine, laminated, dissimilated fine organic particles, light grey 10YR 7/2 · 5,51-5,61 SAND, very coarse - medium and gravel fine, laminated, few clasts, light grey 10YR 7/2	TS TS
Kem I Gas I		6	m	Clay Silt F M C Gr Pb	Position in ED50 Latitude 55 50,4927' Longitude 06,48,9397'	
26.09.2000	PK			0.0039 0.0625 0.125 0.25 0.5 1 2 4 64	mm	Geological Survey of Denmark and Greenland GEUS
Date	Described by					

Enclosure B19

Enclosure C

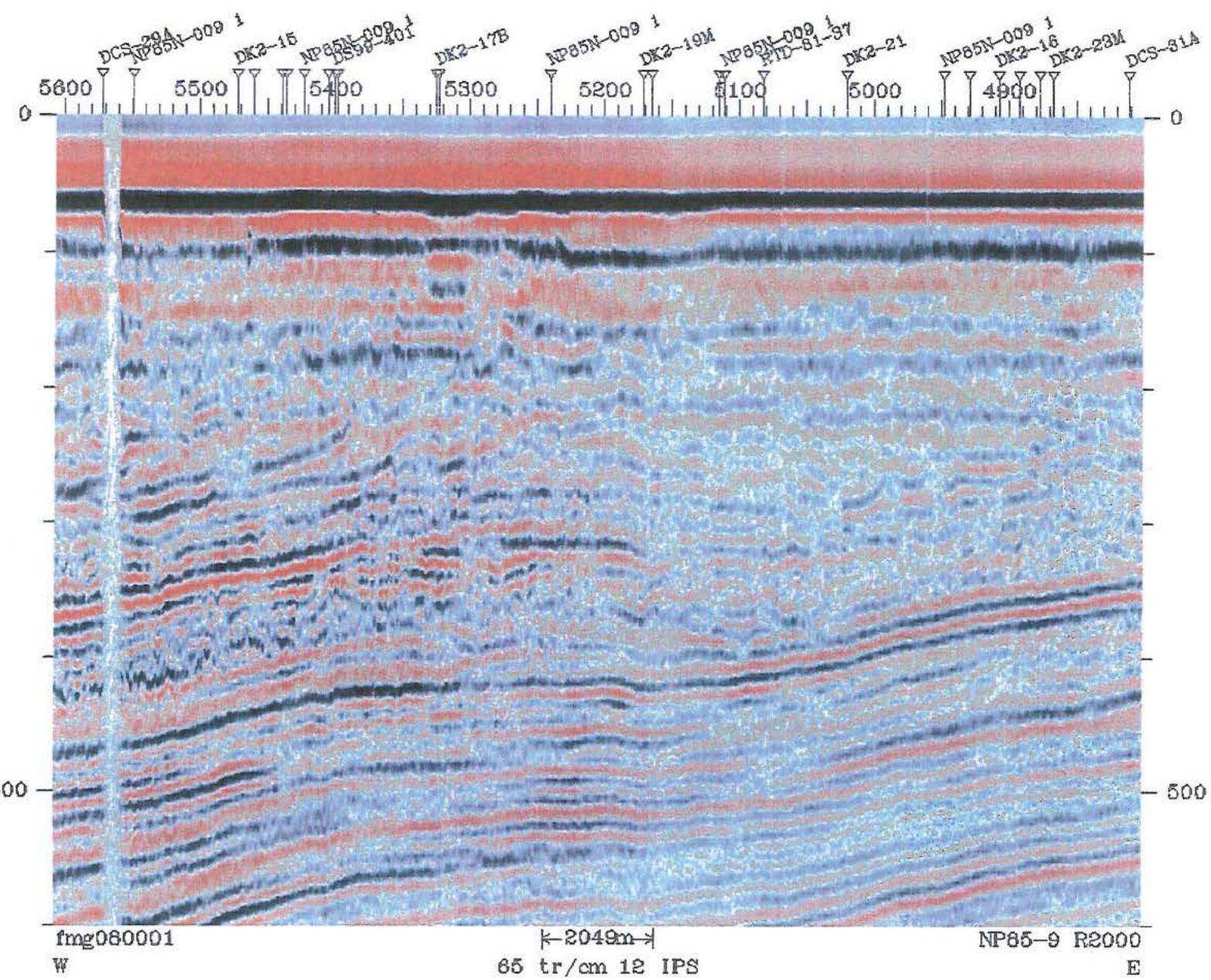


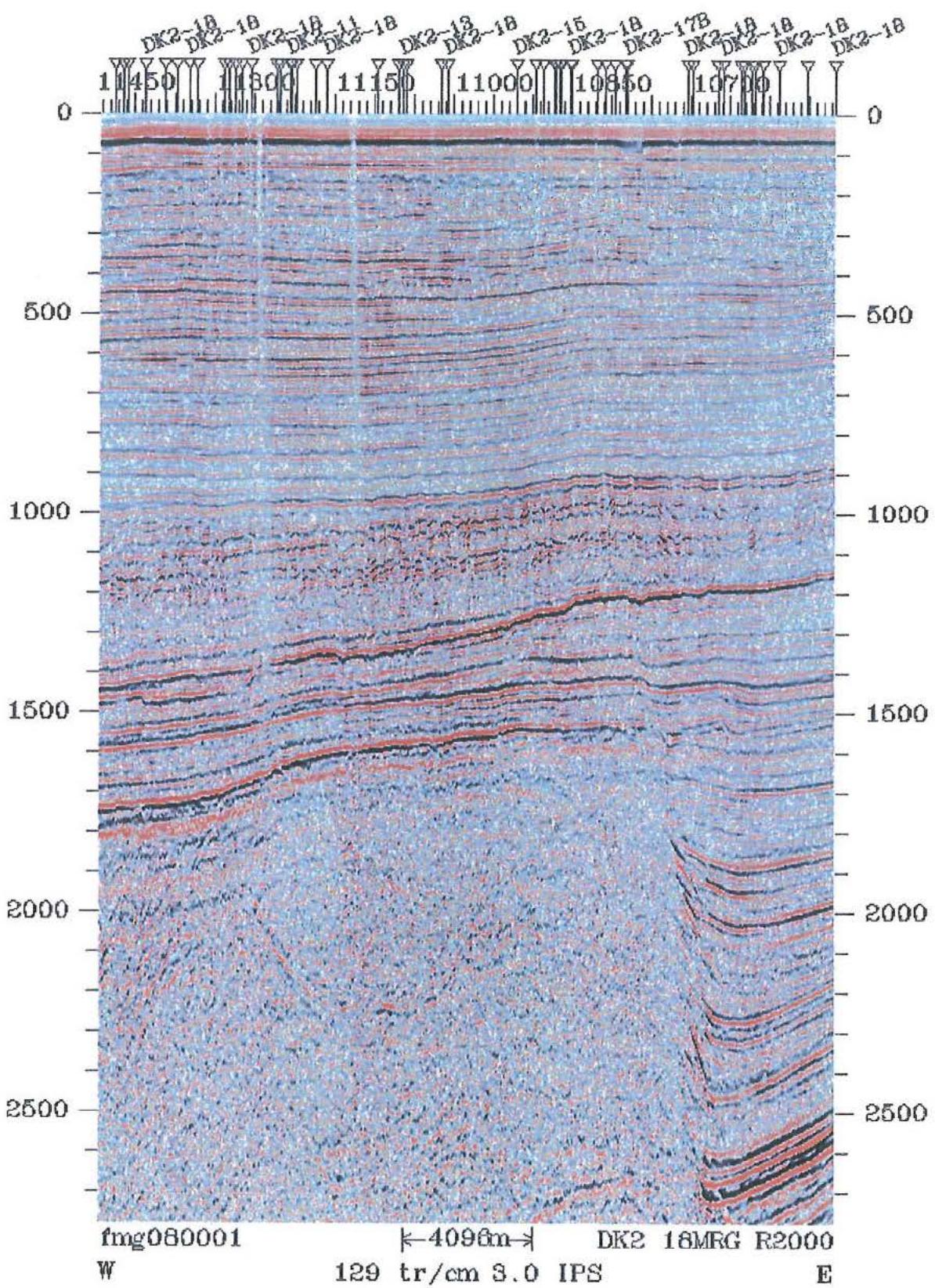
Seismic line NP85-9 R2000

Enclosure C1

Enclosure C2

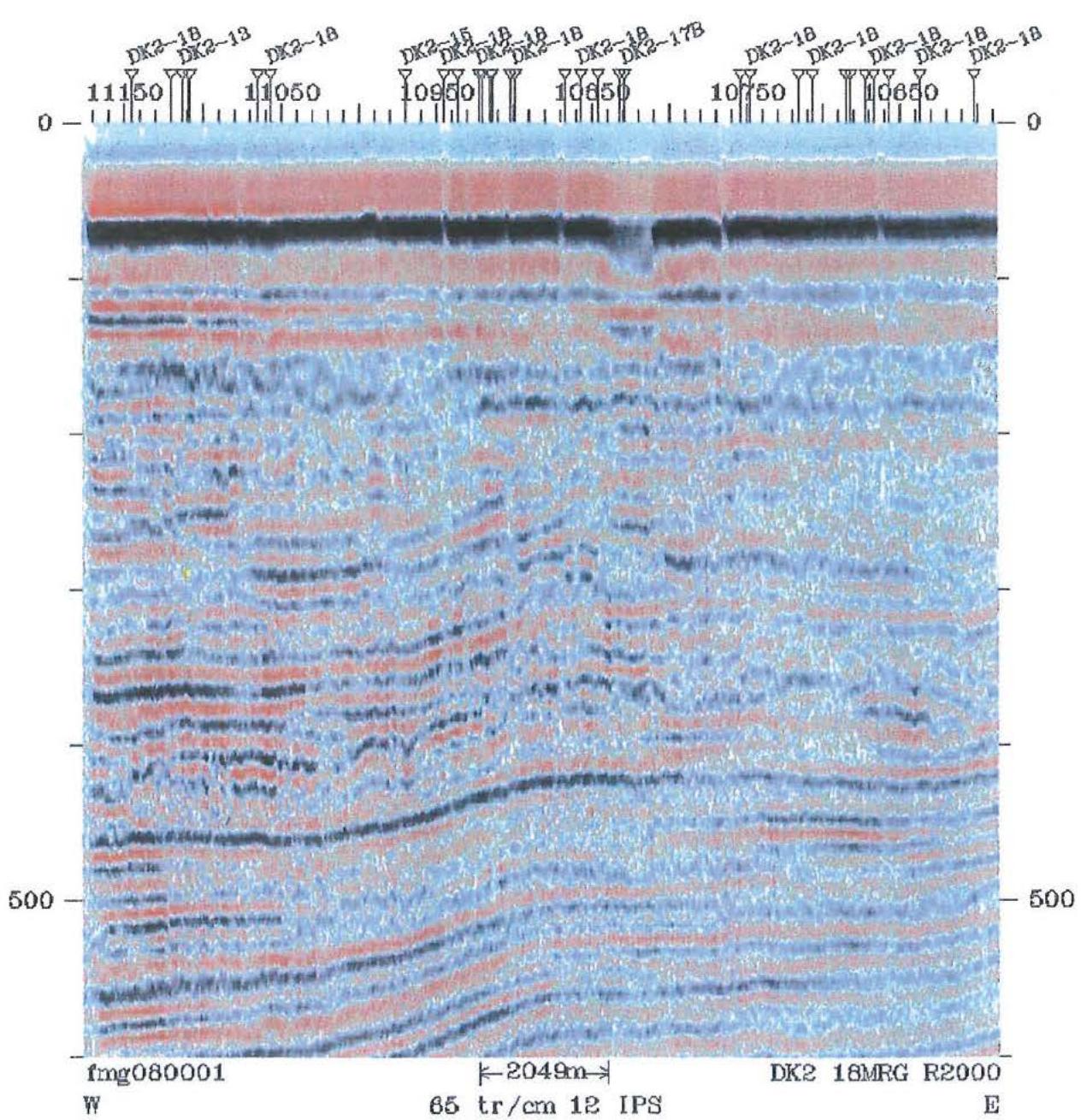
Seismic line NP85-9 R2000 zoom





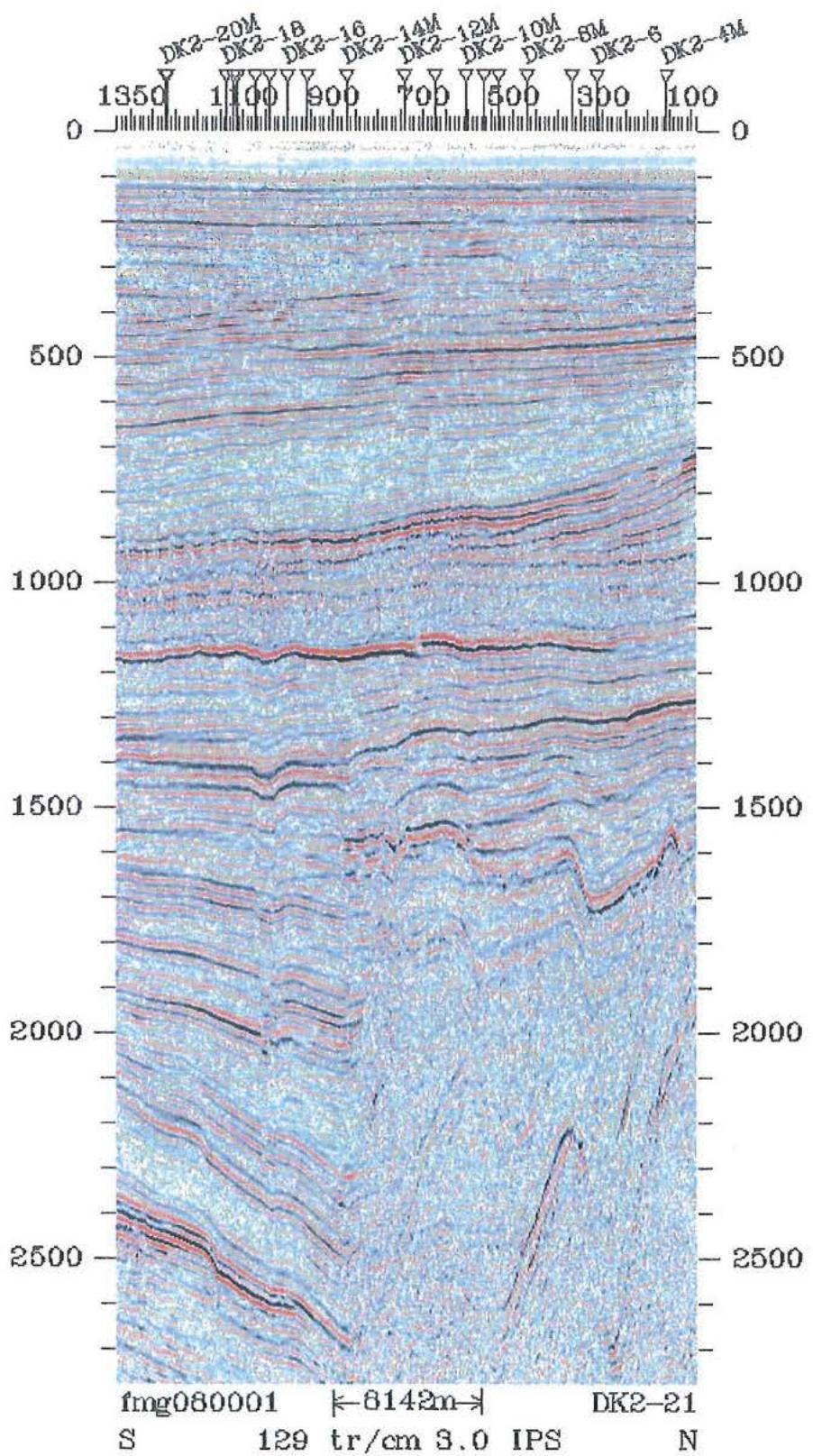
Seismic line DK2 18MRG R2000

Enclosure C3



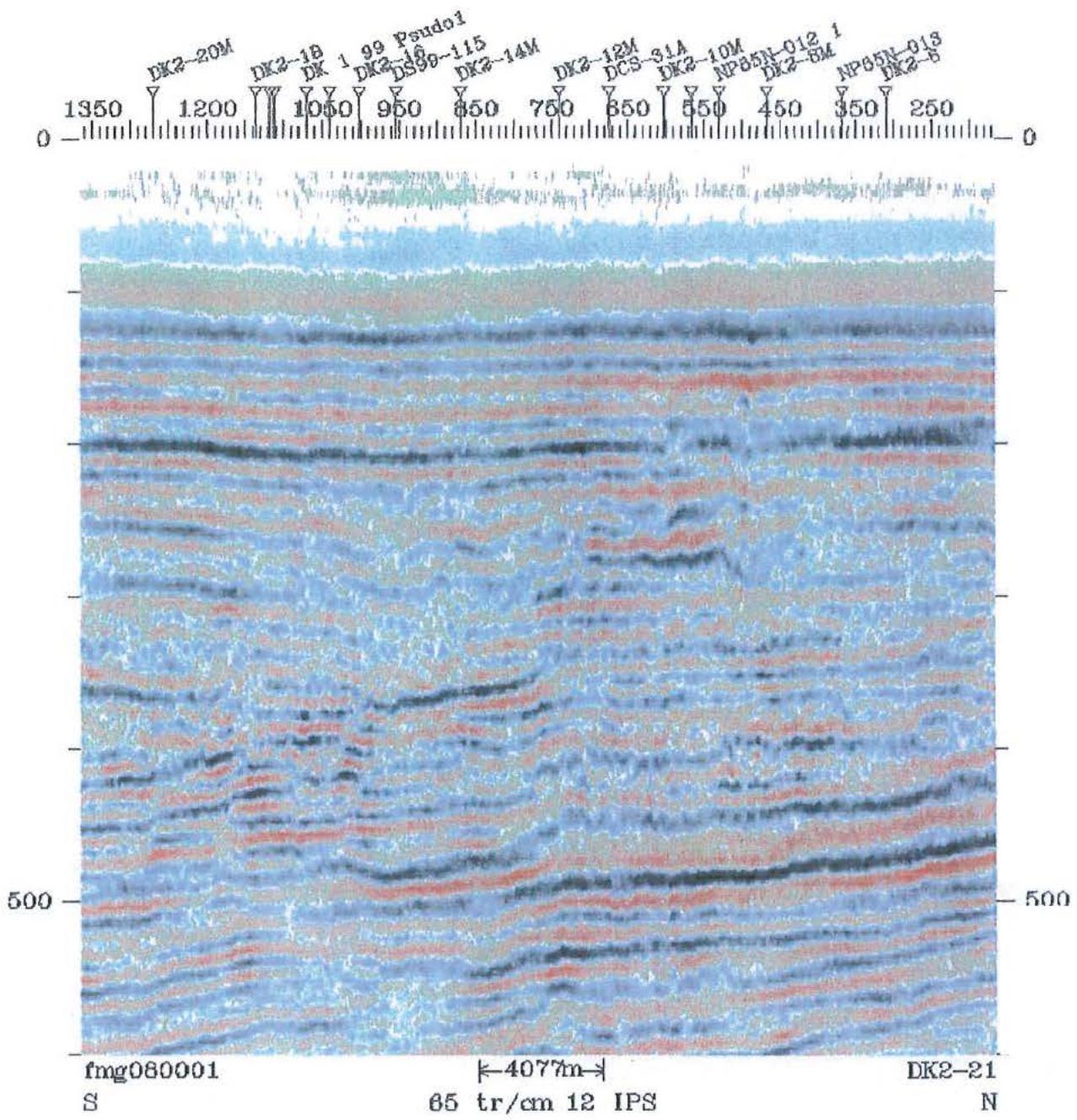
Seismic line DK2 18MRG zoom

Enclosure C4



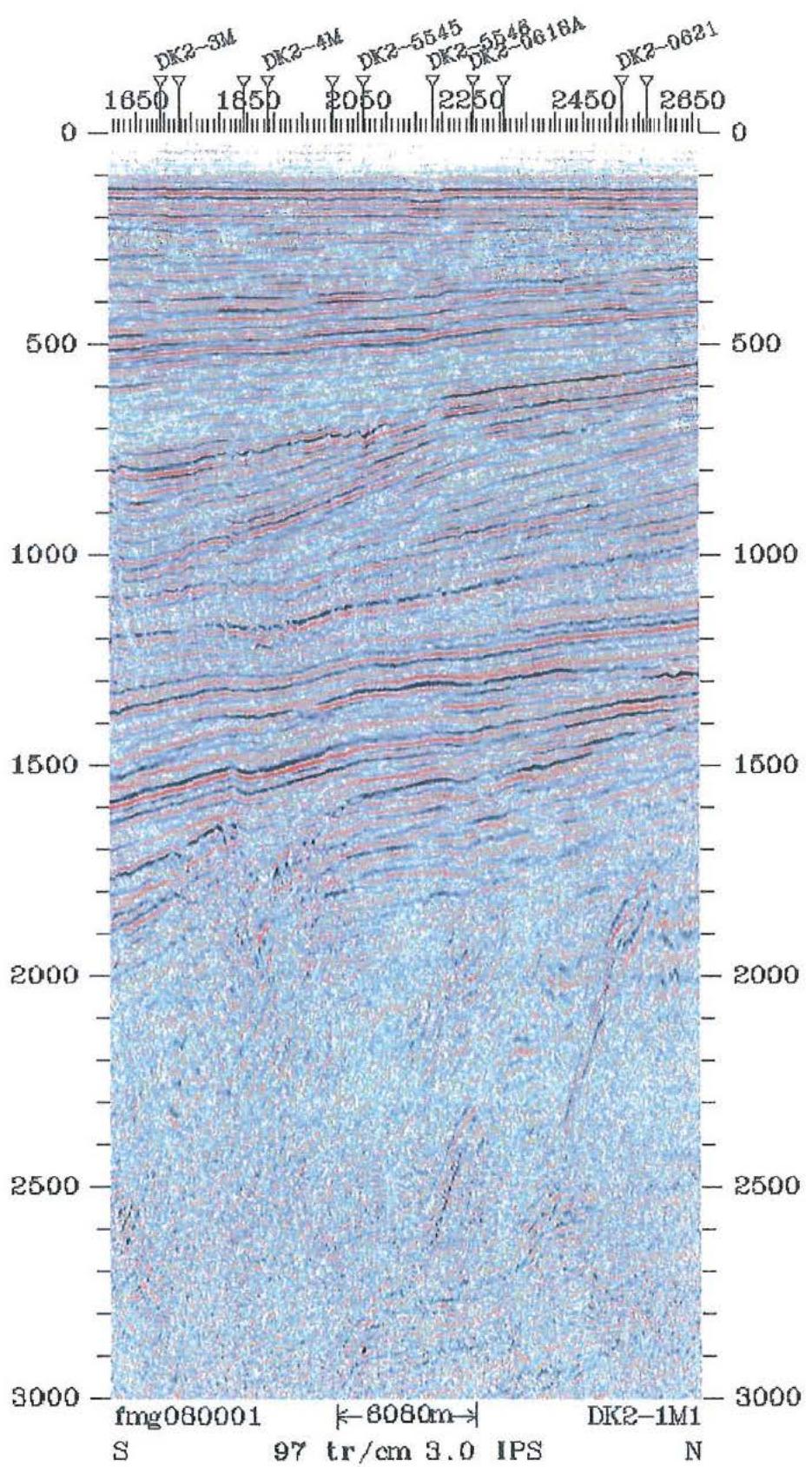
Seismic line DK2-21

Enclosure C5



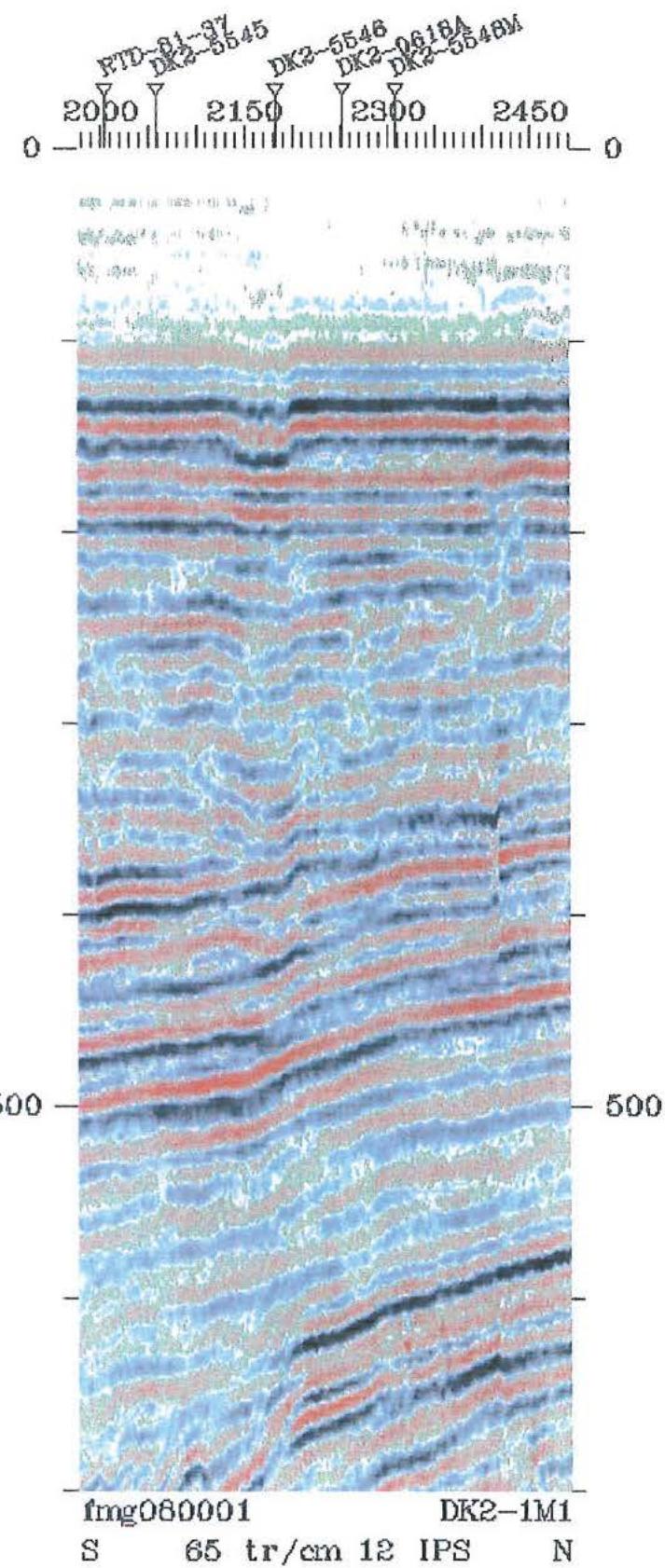
Seismic line DK2-21 zoom

Enclosure C6



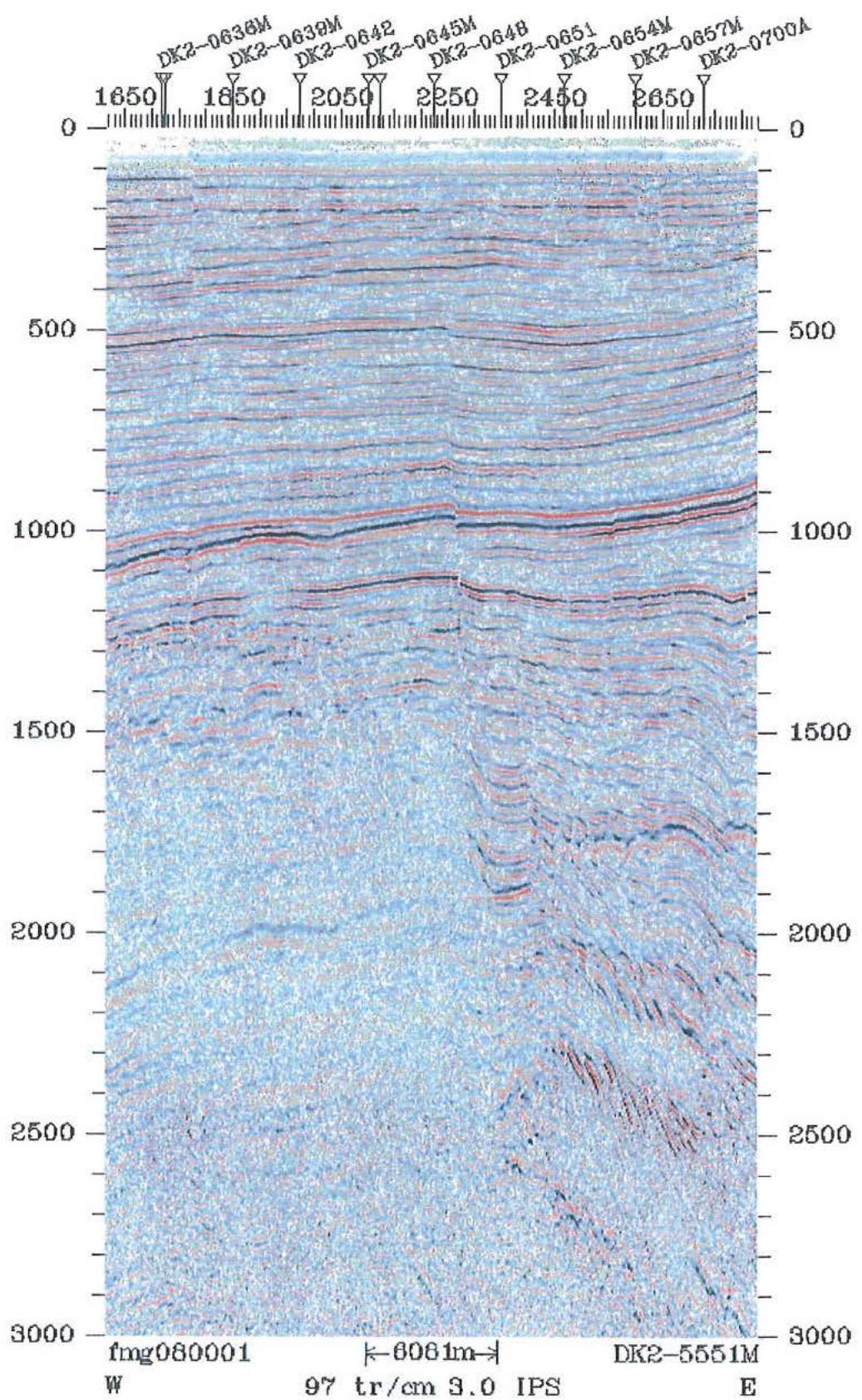
Seismic line DK2-1M1

Enclosure C7



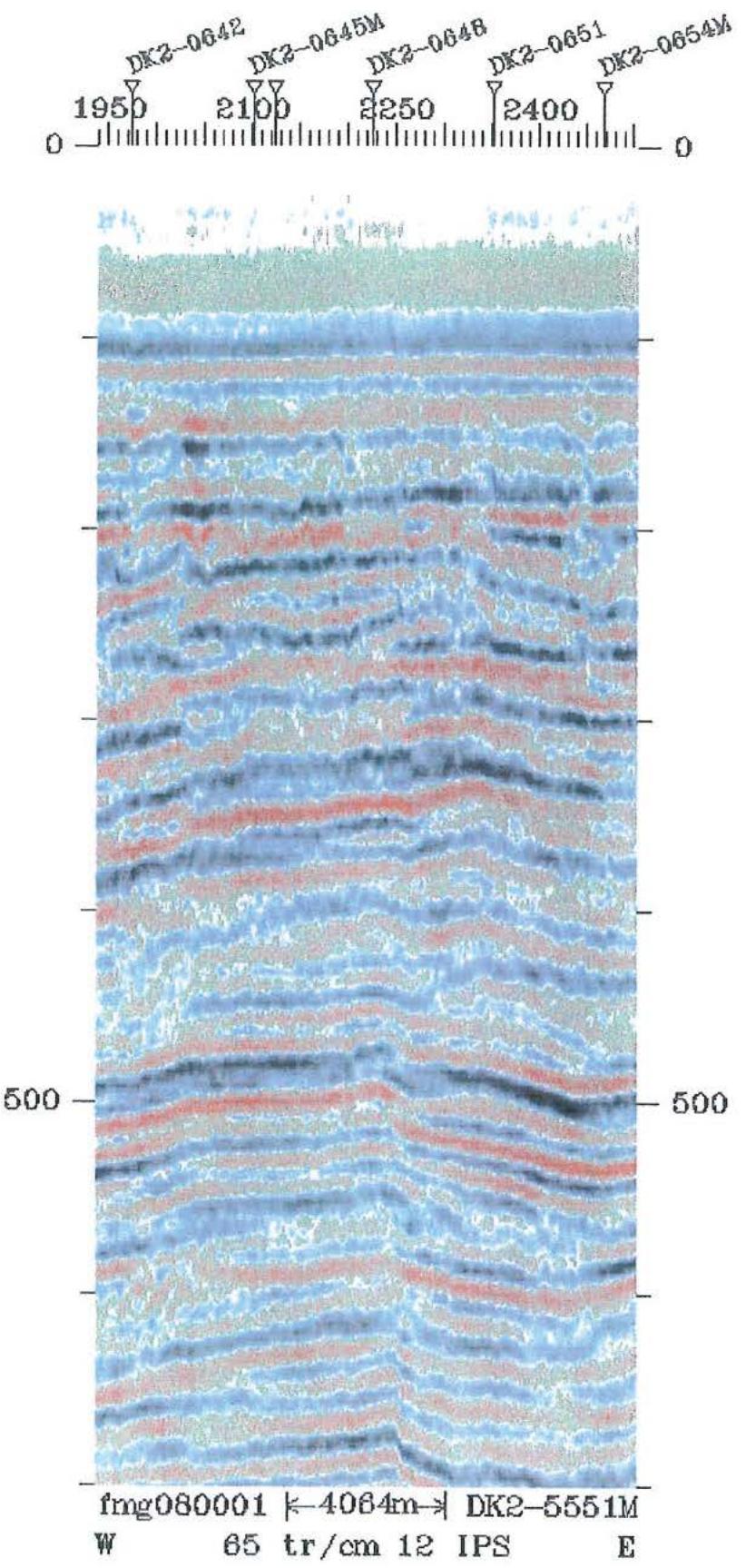
Seismic line DK2-1M1 zoom

Enclosure C8



Seismic line DK2-5551M

Enclosure C9



Seismic line DK2-5551M zoom

Enclosure C10

Enclosure D

Line Agip 6

0

200 m

S 1-1

—25 m

—40 m

Late Glacial
Freshwater Sand

Holocene Marine Sand

—25 m

—25 m

5 m

—25 m

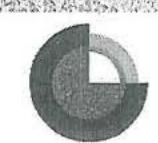
0 m

3 m

6 m

Enclosure D1.

—55 m



Line Agip 6

S 1-2

0

200 m



Holocene Marine Sand

0 m

3 m

6 m

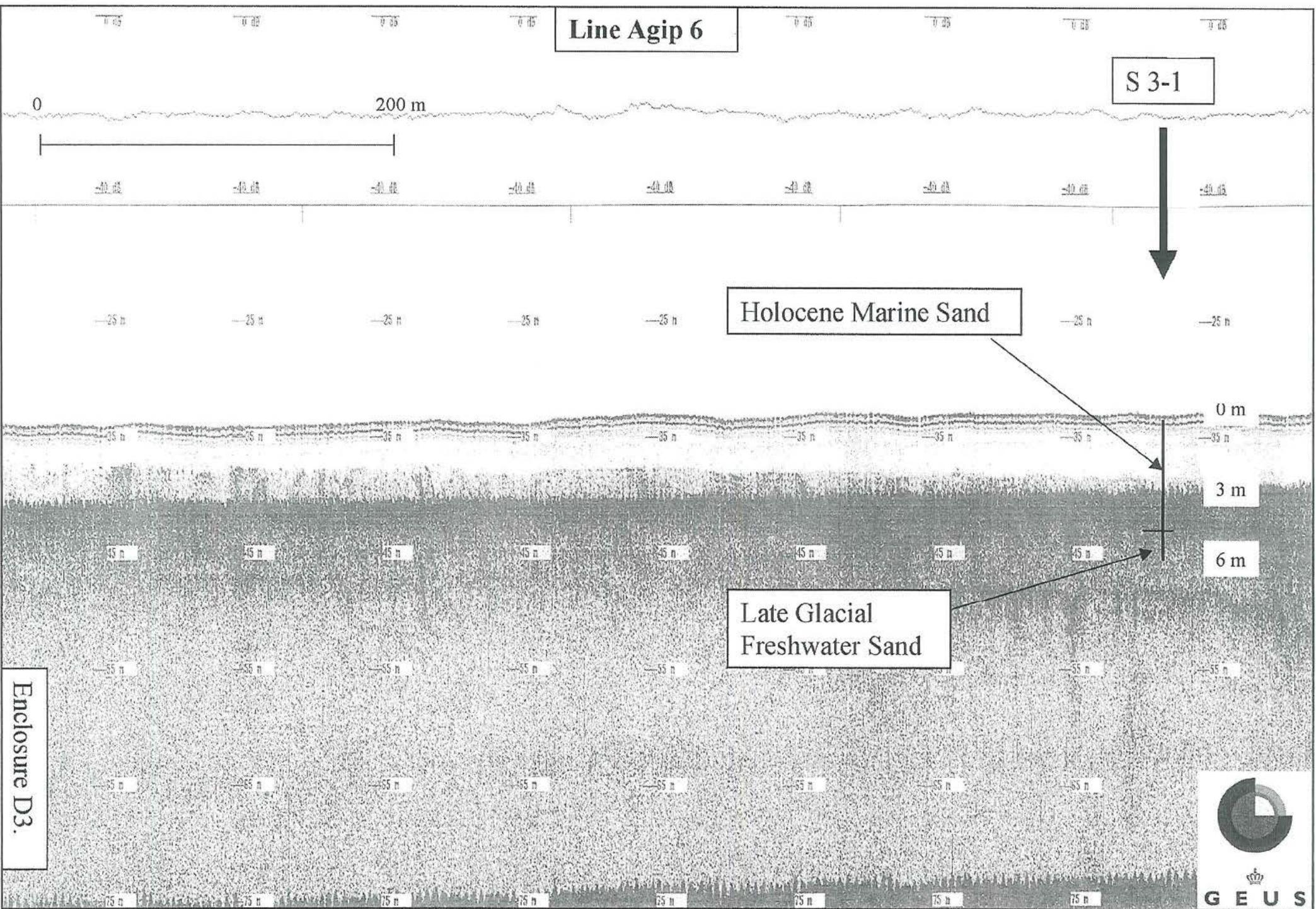
**Late Glacial
Freshwater Sand**

Enclosure D2.

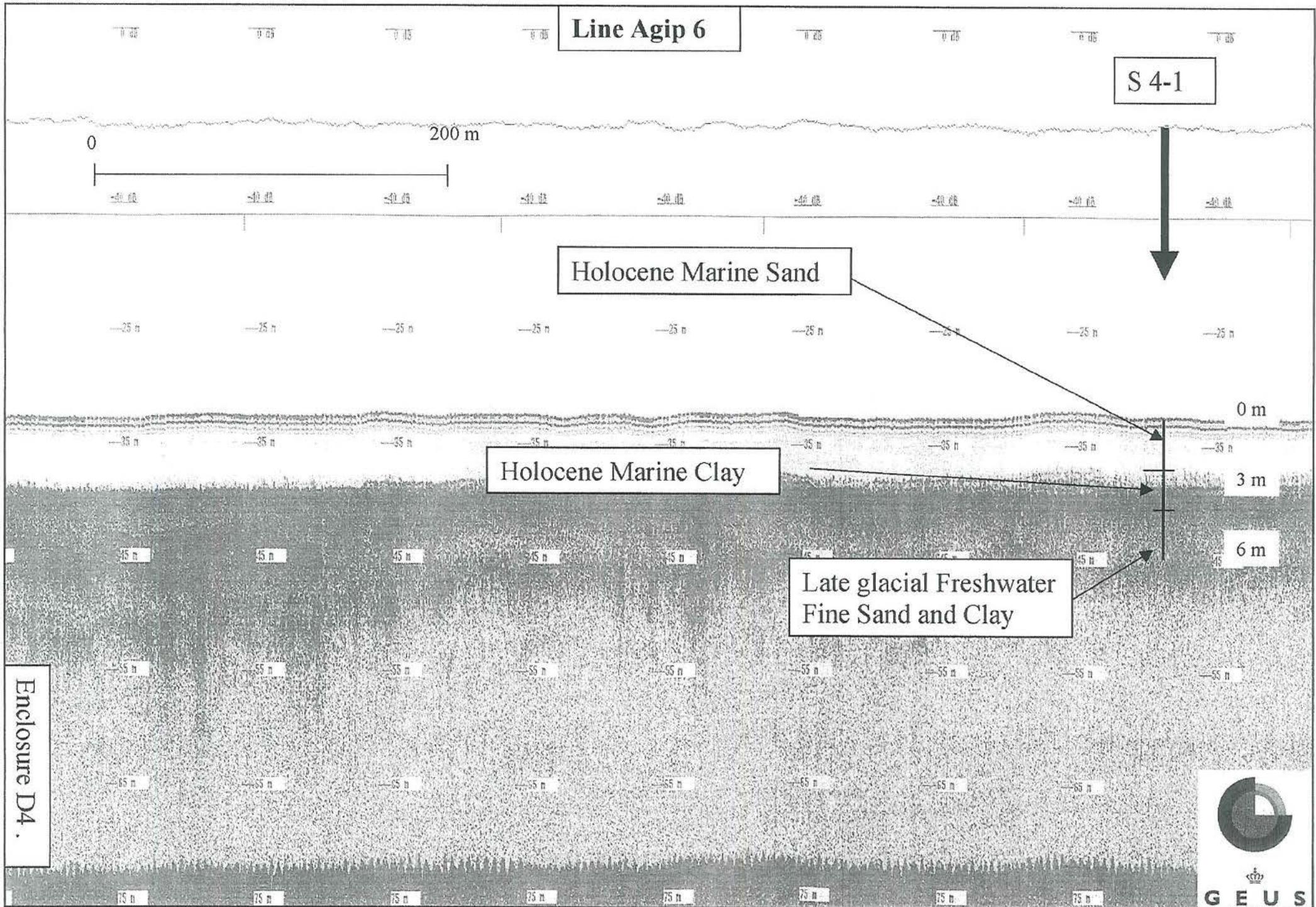


GEUS

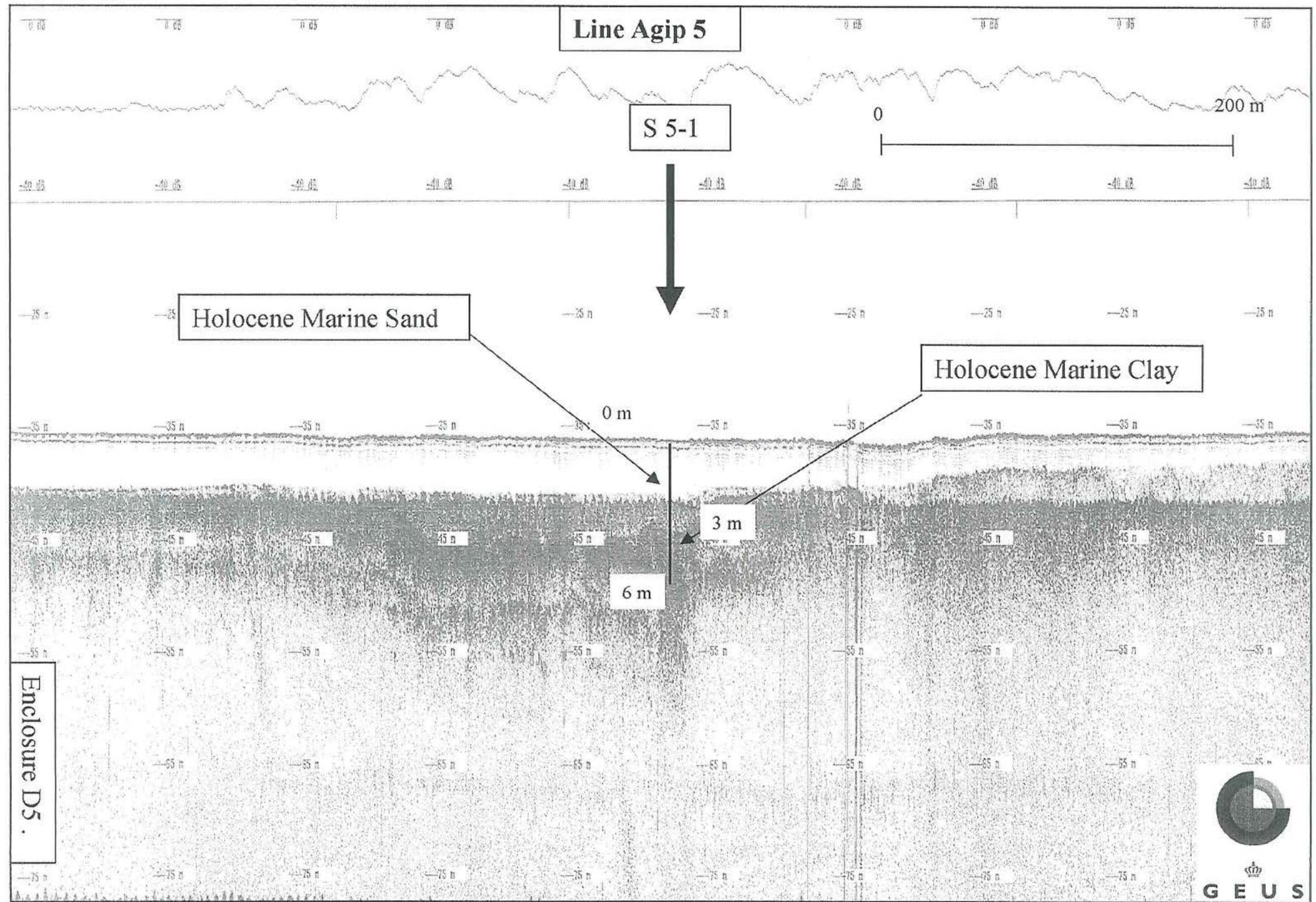
Line Agip 6



Line Agip 6



Line Agip 5



Line Agip 5

S 1-6

200 m

Holocene Marine Sand

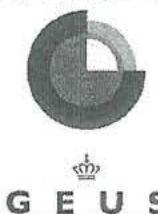
Late glacial Freshwater
Fine Sand

0 m

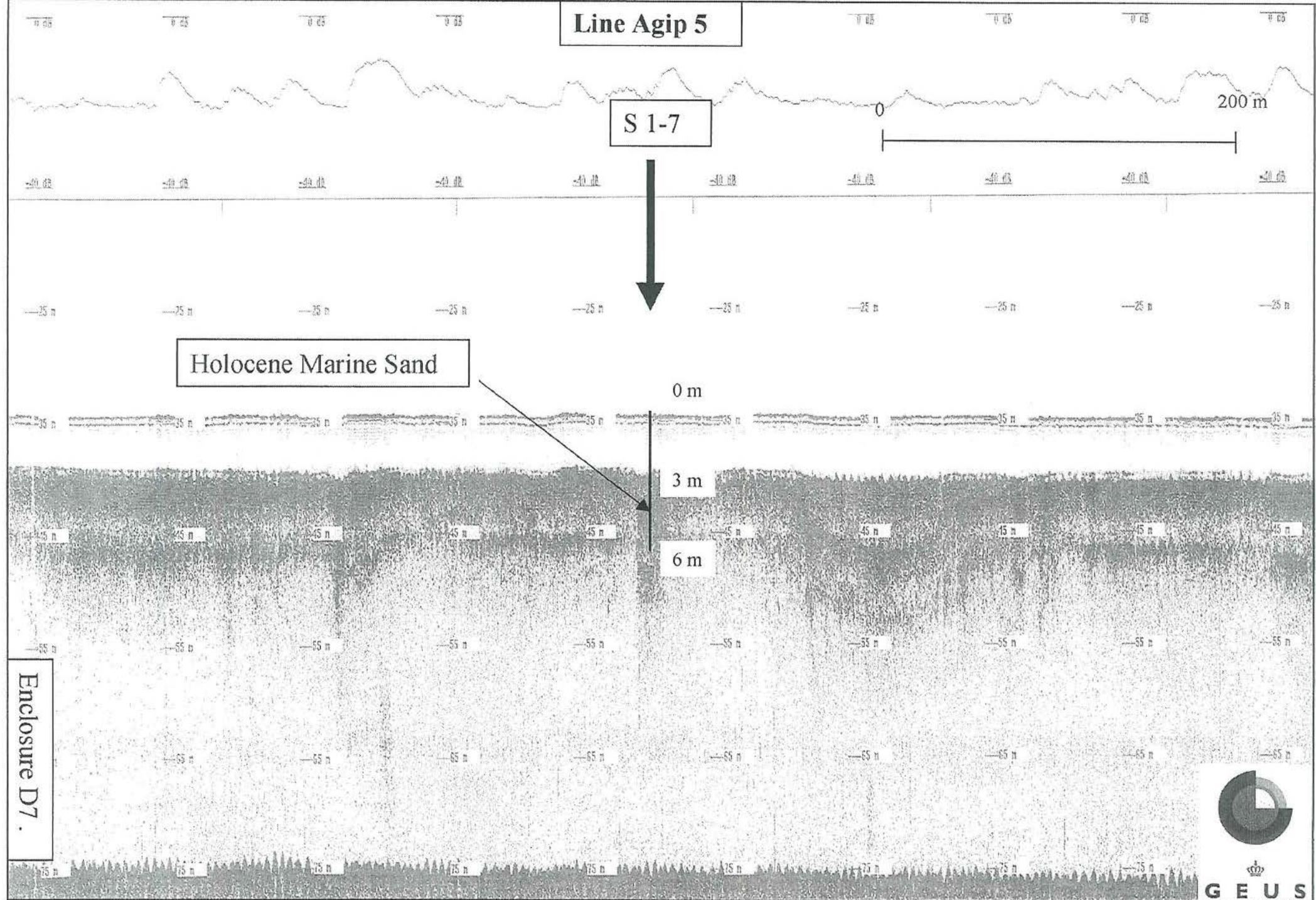
3 m

6 m

Enclosure D6 .



Line Agip 5



Line Agip 5

S 2-1

0

200 m

Post glacial Freshwater Sand

Holocene Marine Sand

0 m

6 m

3 m

Enclosure D8 .



Line Agip 5

S 3-3

0

200 m

**Late glacial Freshwater
Fine Sand/Silt**

0 m

3 m

6 m

-29 m

-39 m

-49 m

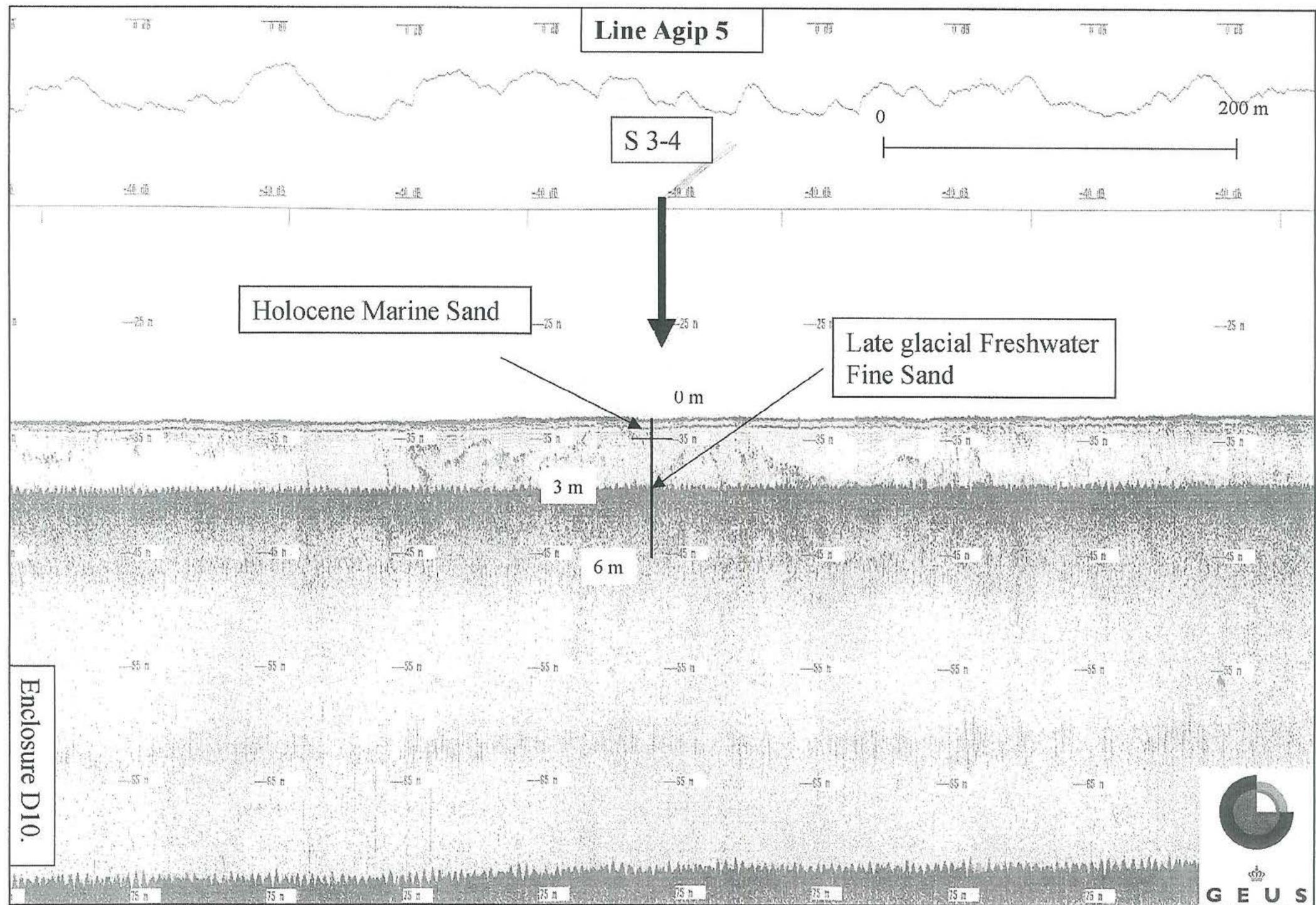
-59 m

-69 m

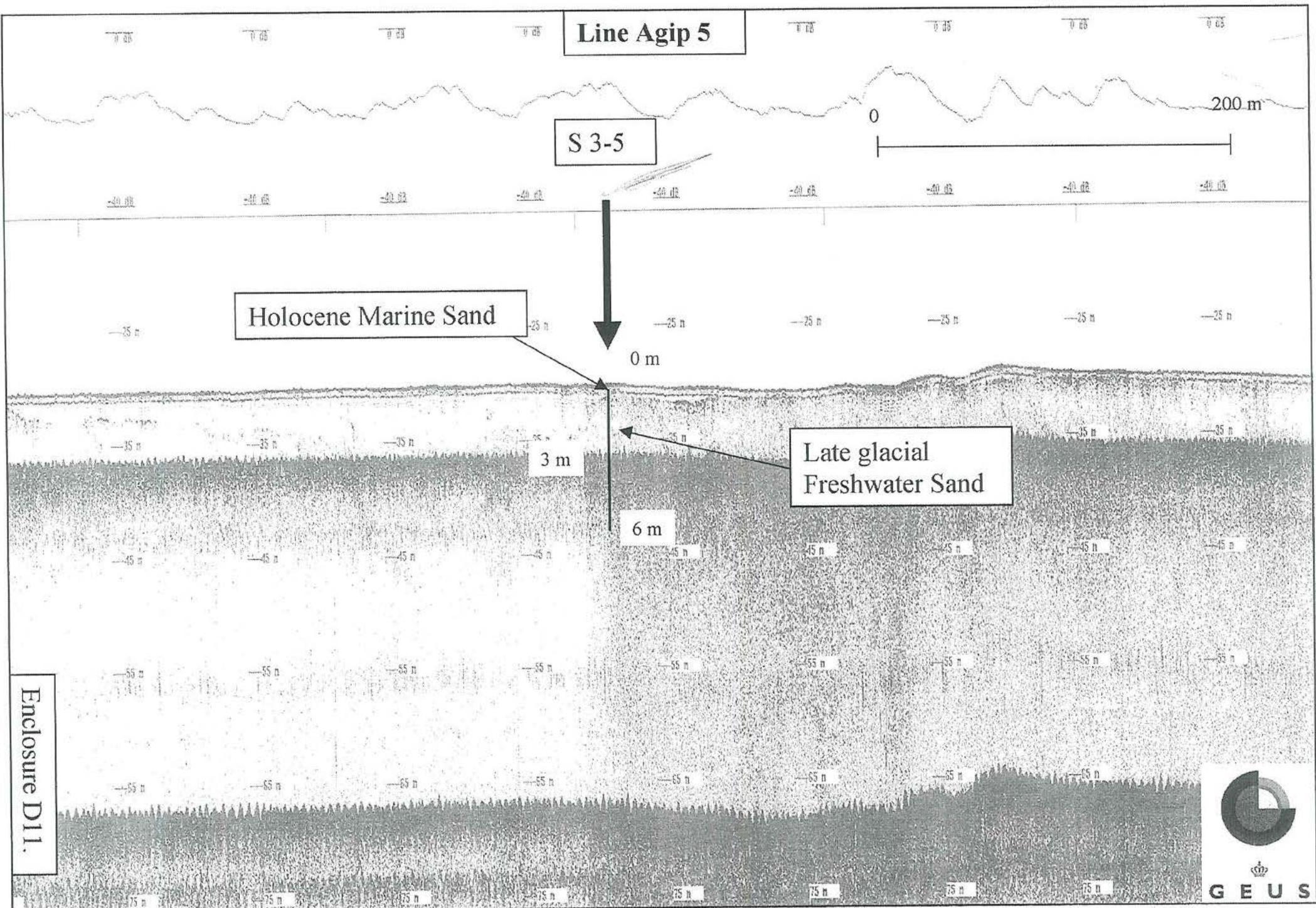
Enclosure D9 .



G E U S



Enclosure D10.



Enclosure D11.

Line Agip 1

S 5-1

0

200 m

0

0

0

0

0

0

0

0

0

-23 n

Holocene Marine Sand

0 m

Late glacial Freshwater
Fine Sand

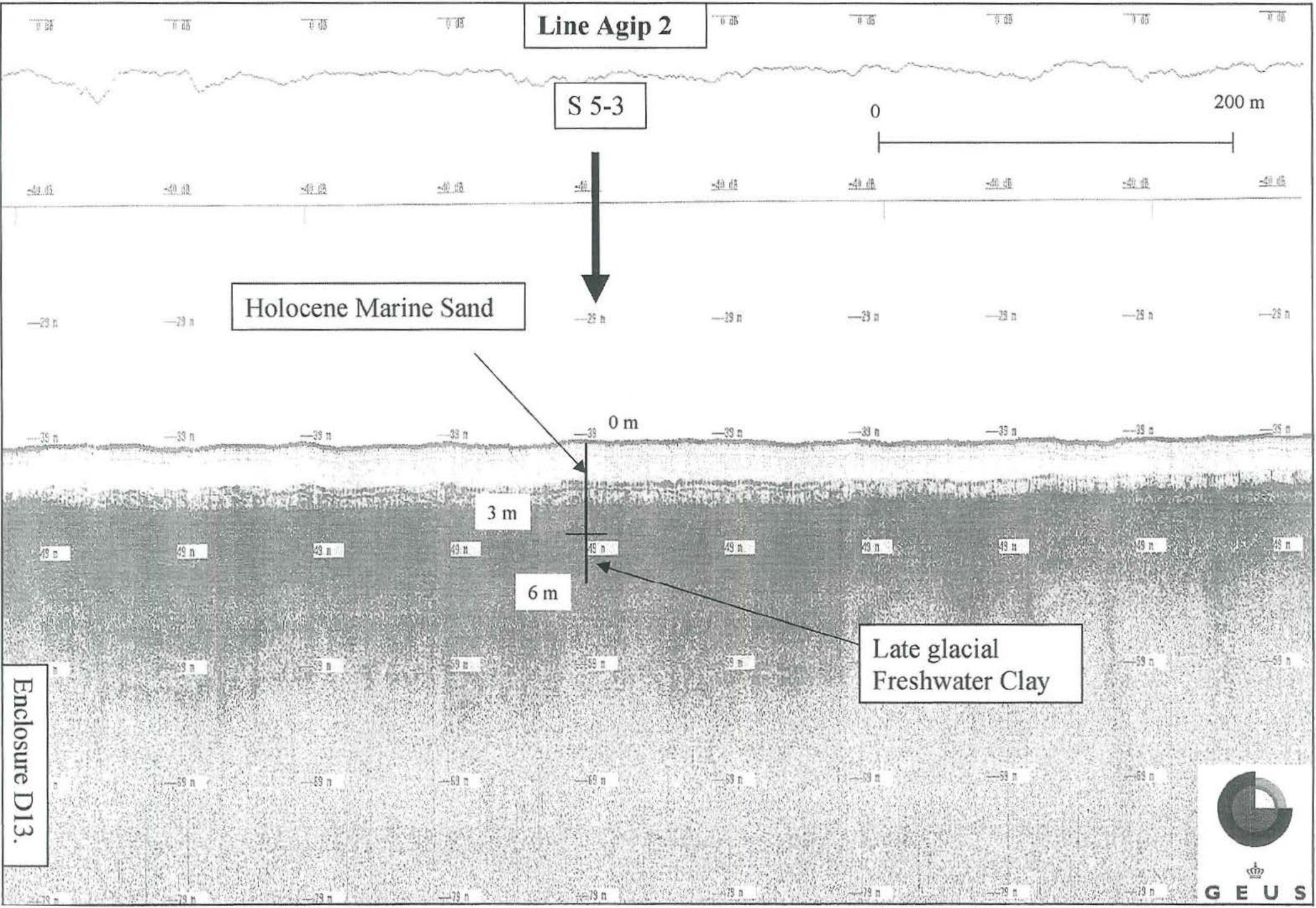
3 m

6 m

-43 n

-53 n

-63 n



Line Agip 02

S 5-4

0

200 m



Holocene Marine Sand

Late Glacial Freshwater Sand

3 m

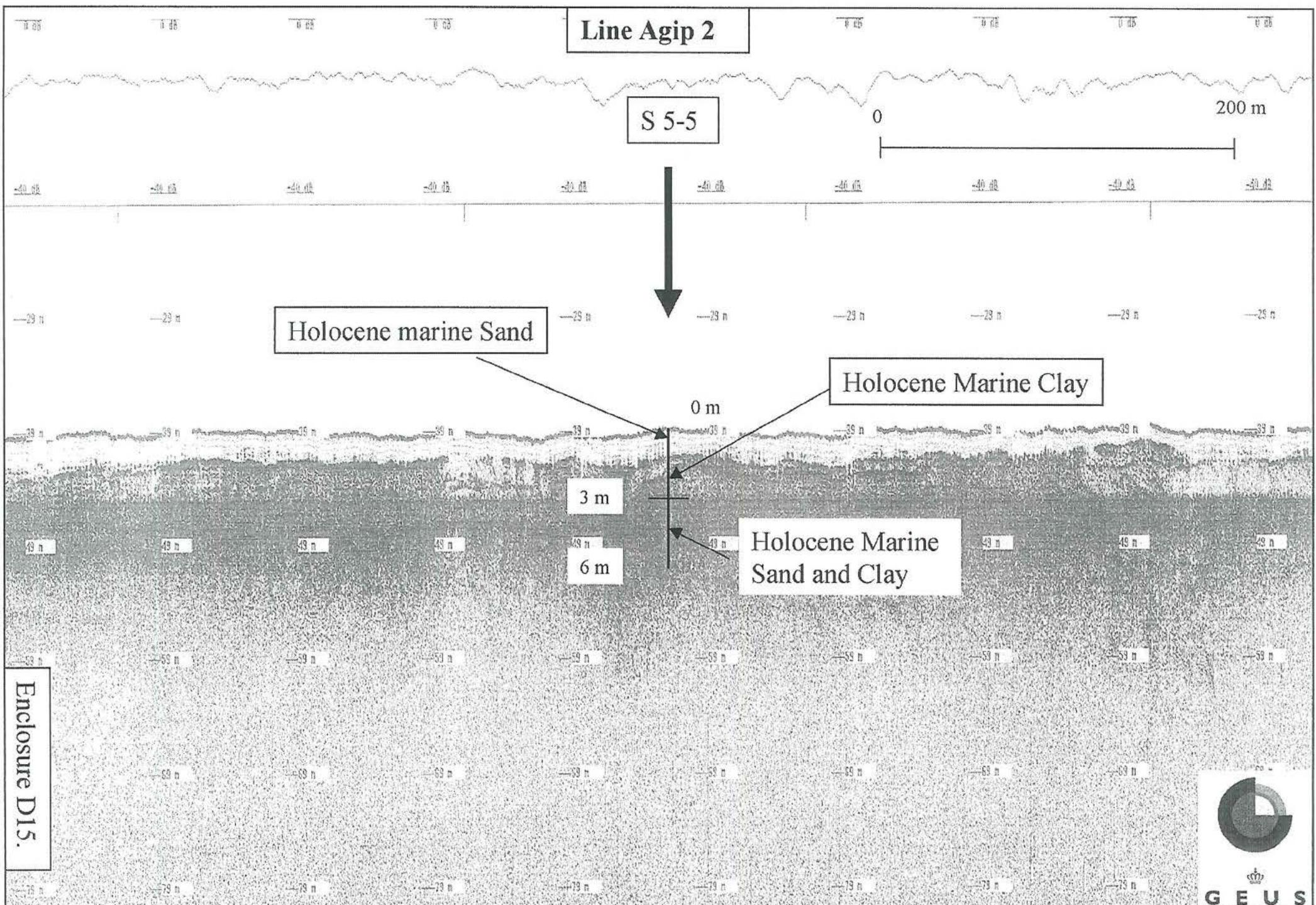
6 m

Late Glacial Freshwater Clay

Enclosure D14.

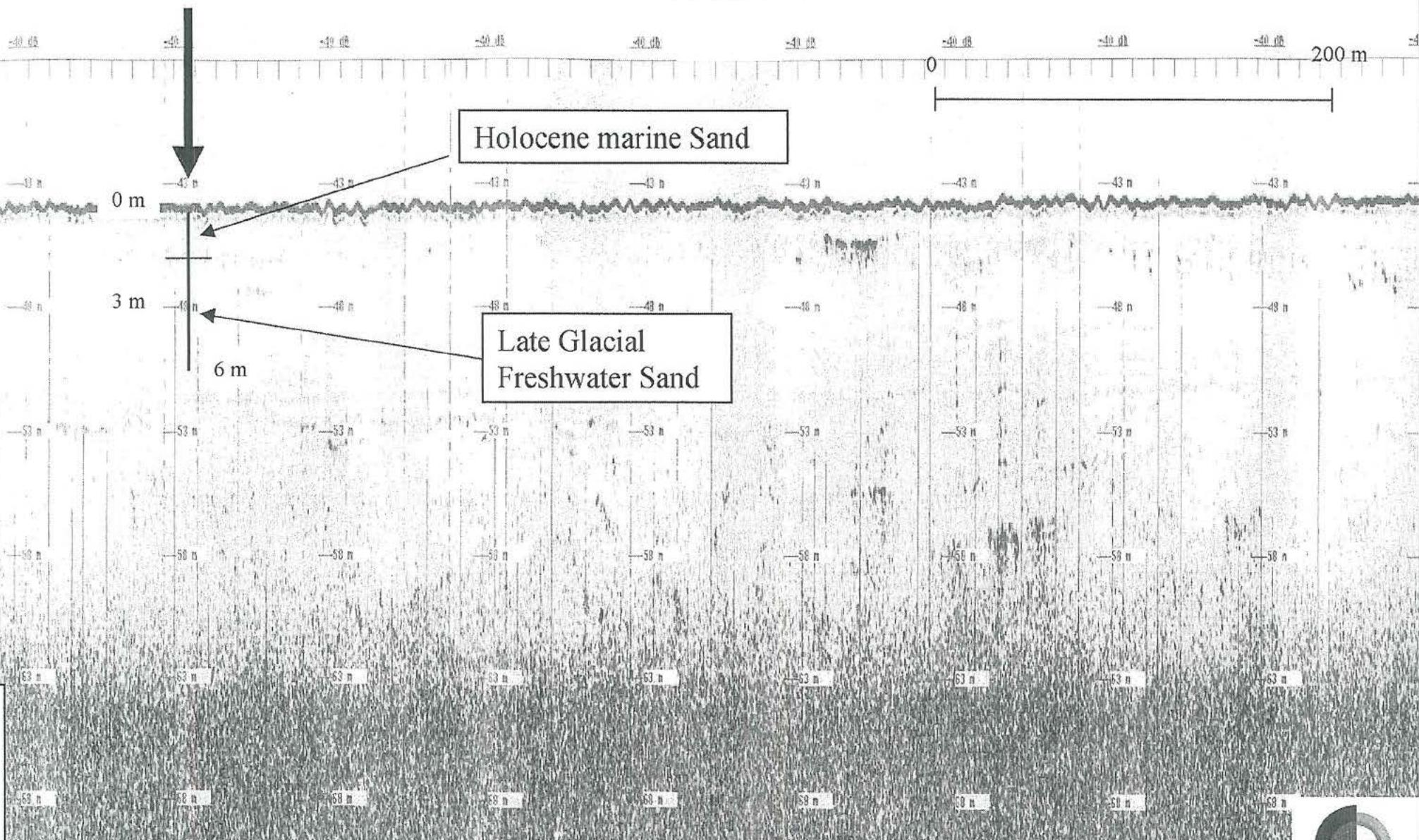


GEUS



S 5-6a

Line A



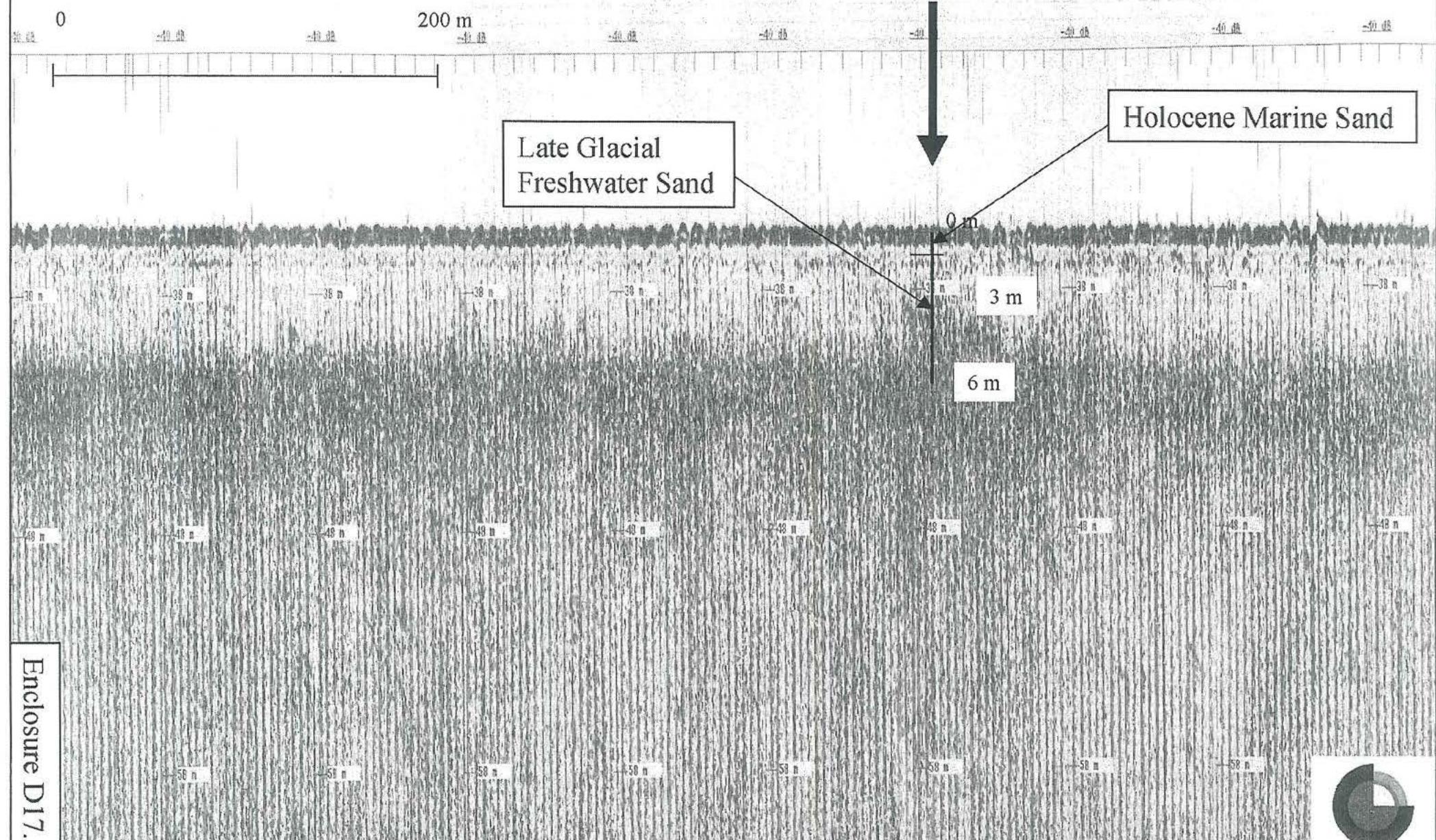
Enclosure D16.



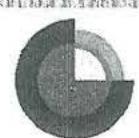
 G E U S

Line 578208

S 6-1

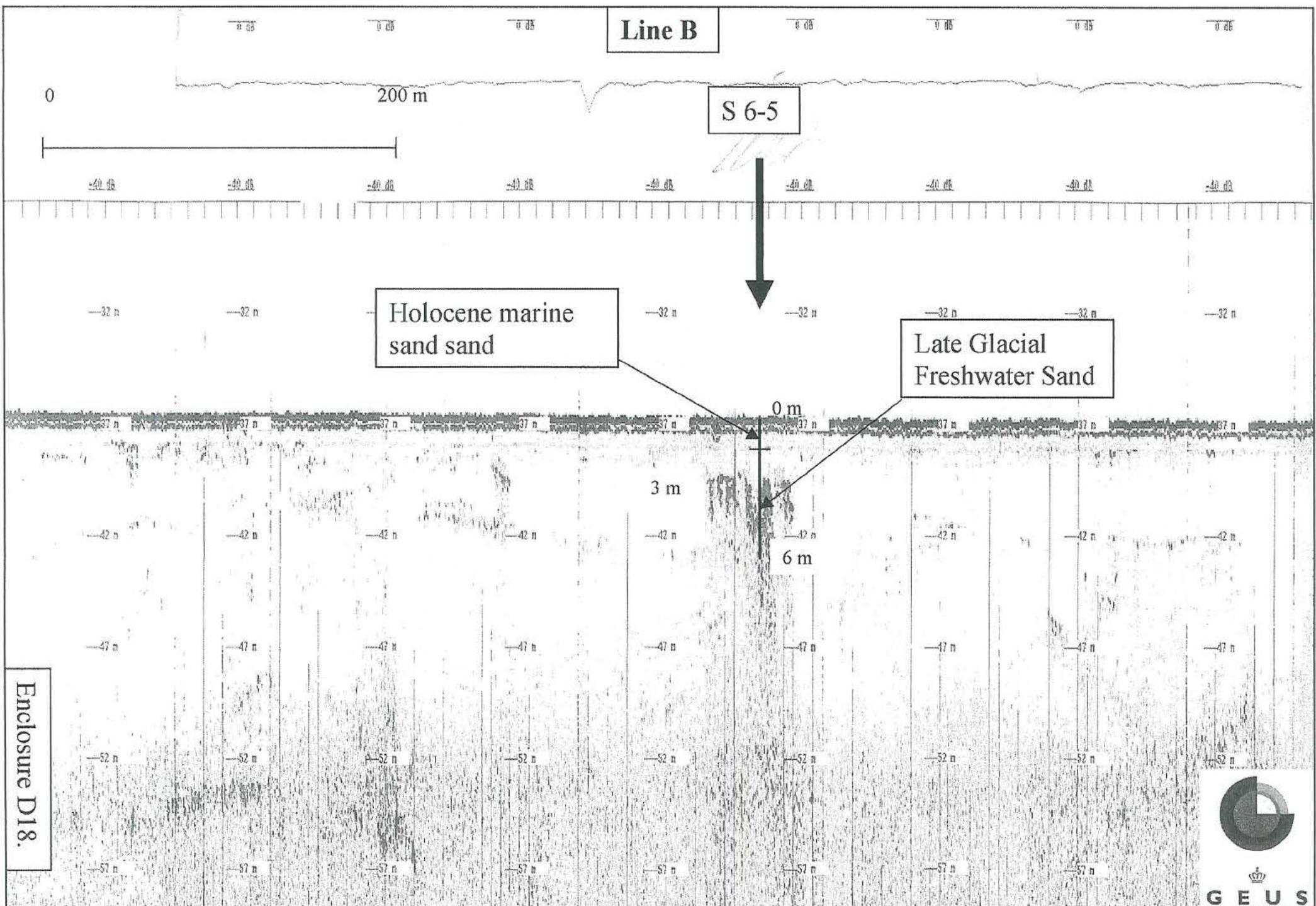


Enclosure D17.

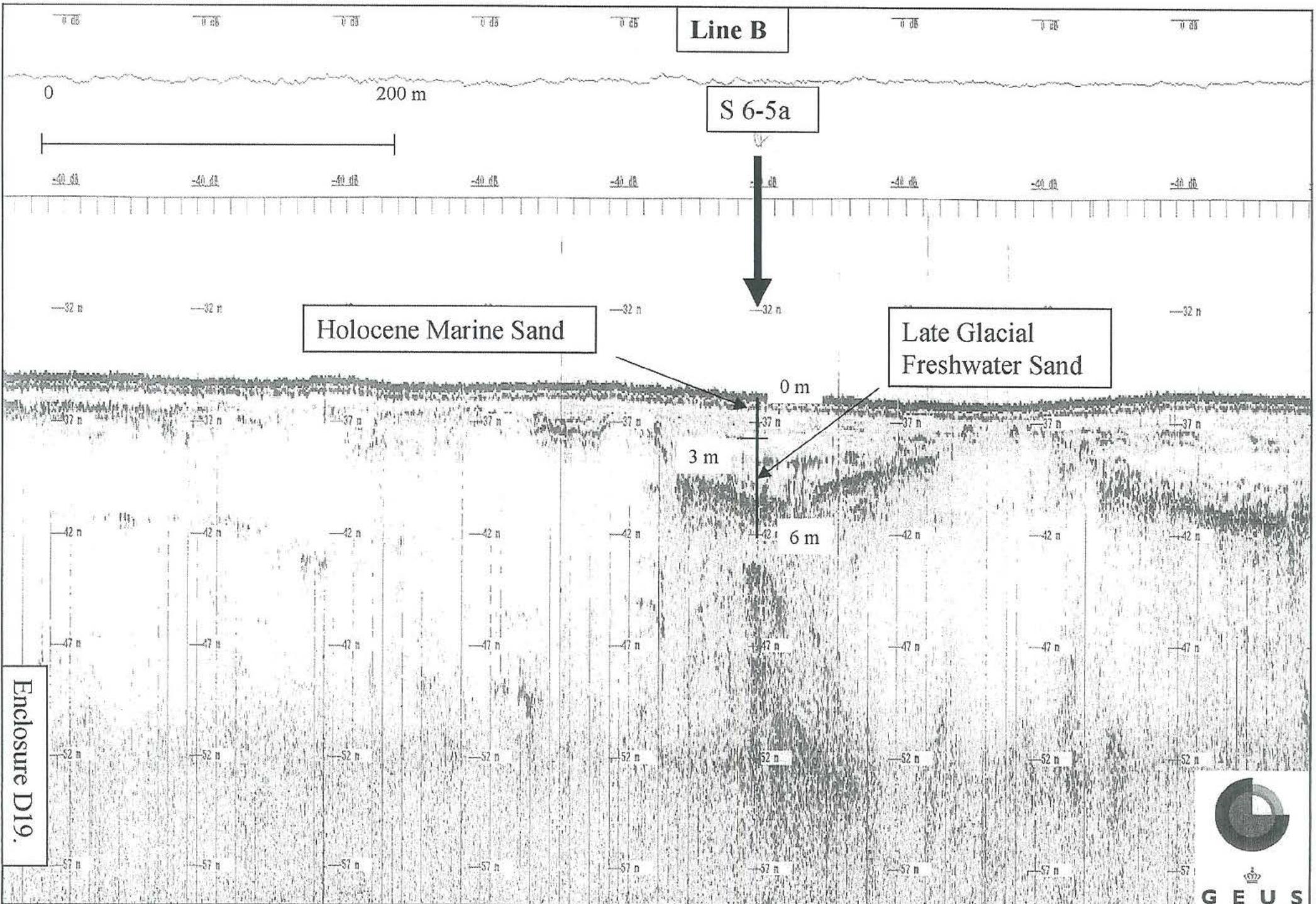


GEUS

P:40ms_1.00_7.00kHz_FH SB-0408
No. 685700 EdgeTech No. 685550 EdgeTech No. 686200 EdgeTech No. 686450 EdgeTech No. 686700 EdgeTech No. 686350 EdgeTech No. 687200 EdgeTech No. 687450 EdgeTech No. 687700 EdgeTech Time:16:25:48 Time:16:26:54 Time:16:20:2 Time:16:23:9



Enclosure D18.



Enclosure E

AGIP Licence 1/99 - Geochemical Sea Bed Sampling
CORE POSITIONS

	Well name	Latitude geographical ED50	Longitude geographical ED50
1	S1-1	55 26,7306'	06 31,5722'
2	S1-2	55 26,7339'	06 30,4682
3	S1-3	55 26,7317'	06 29,4773'
4	S1-4	55 26,7257'	06 31,9802'
5	S1-5	55 28,0707'	06 28,9303'
6	S1-6	55 28,4126'	06 29,8733'
7	S1-7	55 28,1797'	06 25,7394'
8	S2-1	55 29,5537'	06 32,2531'
9	S3-3	55 32,3415'	06 37,9393'
10	S3-4	55 31,0814'	06 35,1983'
11	S3-5	55 33,6153'	06 40,0943'
12	S5-1	55 48,6920'	06 21,2343'
13	S5-3	55 46,2952'	06 17,0603'
14	S5-4	55 49,5081'	06 20,0824'
15	S5-5	55 42,1544'	06 13,7463'
16	S5-6A	55 43,6437'	06 10,8794'
17	S6-1	55 49,4392'	06 50,7461'
18	S6-5	55 50,4525'	06 46,9228'
19	S6-5A	55 50,4927'	06 48,9397'

Enclosure E 1



G E U S

AGIP Licence 1/99 - Geochemical Sea Bed Sampling
Geochemical and Archive samples

	Well name	Depths below bottom in meters
1	S1 - 1 KEM I	5,50 - 5,70
2	S1 - 1 KEM II	4,50 - 4,70
3	S1 - 1 KEM III	3,50 - 3,70
4	S1 - 2 KEM I	5,10 - 5,30
5	S1 - 2 KEM II	4,10 - 4,30
6	S1 - 2 KEM III	3,10 - 3,30
7	S1 - 3 KEM I	5,45 - 5,65
8	S1 - 3 KEM II	4,45 - 4,65
9	S1 - 3 KEM III	3,45 - 3,65
10	S1 - 4 KEM I	5,05 - 5,25
11	S1 - 4 KEM II	4,05 - 4,25
12	S1 - 4 KEM III	3,05 - 3,25
13	S1 - 5 KEM I	5,63 - 5,83
14	S1 - 5 KEM II	4,63 - 4,83
15	S1 - 5 KEM III	3,63 - 3,83
16	S1 - 6 KEM I	5,47 - 5,67
17	S1 - 6 KEM II	4,47 - 4,67
18	S1 - 6 KEM III	3,47 - 3,67
19	S1 - 7 KEM I	5,53 - 5,73
20	S1 - 7 KEM II	4,53 - 4,73
21	S1 - 7 KEM III	3,53 - 3,73
22	S2 - 1 KEM I	5,35 - 5,55
23	S2 - 1 KEM II	4,35 - 4,55
24	S2 - 1 KEM III	3,35 - 3,55
25	S3 - 3 KEM I	5,47 - 5,67
26	S3 - 3 KEM II	4,47 - 4,67
27	S3 - 3 KEM III	3,47 - 3,67
28	S3 - 4 KEM I	5,43 - 5,63
29	S3 - 4 KEM II	4,43 - 4,63
30	S3 - 4 KEM III	3,43 - 3,63
31	S3 - 5 KEM I	5,10 - 5,30
32	S3 - 5 KEM II	4,10 - 4,30
33	S3 - 5 KEM III	3,10 - 3,30
34	S5 - 1 KEM I	5,37 - 5,57
35	S5 - 1 KEM II	4,37 - 4,57
36	S5 - 1 KEM III	3,37 - 3,57
37	S5 - 3 KEM I	5,10 - 5,30
38	S5 - 3 KEM II	4,10 - 4,30
39	S5 - 3 KEM III	3,10 - 3,30
40	S5 - 4 KEM I	5,47 - 5,67

Enclosure E 2



AGIP Licence 1/99 - Geochemical Sea Bed Sampling
Geochemical and Archive samples

	Well name	Depths
41	S5 - 4 KEM II	4,47 - 4,67
42	S5 - 4 KEM III	3,47 - 3,67
43	S5 - 5 KEM I	5,49 - 5,69
44	S5 - 5 KEM II	4,49 - 4,69
45	S5 - 5 KEM III	3,49 - 3,69
46	S5 - 6A KEM I	5,44 - 5,64
47	S5 - 6A KEM II	4,44 - 4,64
48	S5 - 6A KEM III	3,44 - 3,64
49	S6 - 1 KEM I	4,40 - 4,60
50	S6 - 1 KEM II	3,40 - 3,60
51	S6 - 1 KEM III	2,40 - 2,60
52	S6 - 5 KEM I	5,00 - 5,20
53	S6 - 5 KEM II	4,00 - 4,20
54	S6 - 5 KEM III	3,00 - 3,20
55	S6 - 5A KEM I	5,60 - 5,80
56	S6 - 5A KEM II	4,60 - 4,80
57	S6 - 5A KEM III	3,60 - 3,80
58		
59		
60		
61		
62		
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74		
75		
76		
77		
78		
79		
80		

Enclosure E 2

AGIP Licence 1/99 - Geochemical Sea Bed Sampling
Mini Head space samples

	Well name	Depths m
1	S1- 1 GAS I	5,70 - 5,75
2	S1- 1 GAS II	4,70 - 4,75
3	S1- 1 GAS III	3,70 - 3,75
4	S1- 2 GAS I	5,30 - 5,35
5	S1- 2 GAS II	4,30 - 4,35
6	S1- 2 GAS III	3,30 - 3,35
7	S1- 3 GAS I	5,65 - 5,70
8	S1- 3 GAS II	4,65 - 4,70
9	S1- 3 GAS III	3,65 - 3,70
10	S1- 4 GAS I	5,25 - 5,30
11	S1- 4 GAS II	4,25 - 4,30
12	S1- 4 GAS III	3,25 - 3,30
13	S1- 5 GAS I	5,83 - 5,88
14	S1- 5 GAS II	4,83 - 4,88
15	S1- 5 GAS III	3,83 - 3,88
16	S1- 6 GAS I	5,67 - 5,72
17	S1- 6 GAS II	4,67 - 4,72
18	S1- 6 GAS III	3,67 - 3,72
19	S1- 7 GAS I	5,73 - 5,78
20	S1- 7 GAS II	4,73 - 4,78
21	S1- 7 GAS III	3,73 - 3,78
22	S2- 1 GAS I	5,55 - 5,60
23	S2- 1 GAS II	4,55 - 4,60
24	S2- 1 GAS III	3,55 - 3,60
25	S3- 3 GAS I	5,67 - 5,72
26	S3- 3 GAS II	4,67 - 4,72
27	S3- 3 GAS III	3,67 - 3,72
28	S3- 4 GAS I	5,63 - 5,68
29	S3- 4 GAS II	4,63 - 4,68
30	S3- 4 GAS III	3,63 - 3,68
31	S3- 5 GAS I	5,30 - 5,35
32	S3- 5 GAS II	4,30 - 4,35
33	S3- 5 GAS III	3,30 - 3,35
34	S5- 1 GAS I	5,57 - 5,62
35	S5- 1 GAS II	4,57 - 4,62
36	S5- 1 GAS III	3,57 - 3,62
37	S5- 3 GAS I	5,30 - 5,35
38	S5- 3 GAS II	4,30 - 4,35
39	S5- 3 GAS III	3,30 - 3,35
40	S5- 4 GAS I	5,67 - 5,72

Enclosure E 3



G E U S

AGIP Licence 1/99 - Geochemical Sea Bed Sampling
Mini Head space samples

	Well name	Depths
41	S5 - 4 GAS II	4,67 - 4,72
42	S5 - 4 GAS III	3,67 - 3,72
43	S5 - 5 GAS I	5,69 - 5,74
44	S5 - 5 GAS II	4,69 - 4,74
45	S5 - 5 GAS III	3,69 - 3,74
46	S5 - 6A GAS I	5,64 - 5,69
47	S5 - 6A GAS II	4,64 - 4,69
48	S5 - 6A GAS III	3,64 - 3,69
49	S6 - 1 GAS I	4,60 - 4,65
50	S6 - 1 GAS II	3,60 - 3,65
51	S6 - 1 GAS III	2,60 - 2,65
52	S6 - 5 GAS I	5,20 - 5,25
53	S6 - 5 GAS II	4,20 - 4,25
54	S6 - 5 GAS III	3,20 - 3,25
55	S6 - 5A GAS I	5,80 - 5,85
56	S6 - 5A GAS II	4,80 - 4,85
57	S6 - 5A GAS III	3,80 - 3,85
58		
59		
60		
61		
62		
63		
64		
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71		
72		
73		
74		
75		
76		
77		
78		
79		
80		

Enclosure E 3



G E U S

AGIP Licence 1/99 - Geochemical Sea Bed Sampling
Stratigraphical Surface samples

	Well name	Depths below bottom in meters
1	S1-1	0,00 - 0,20
2	S1-2	0,00 - 0,20
3	S1-3	0,00 - 0,20
4	S1-4	0,00 - 0,20
5	S1-5	0,00 - 0,20
6	S1-6	0,00 - 0,20
7	S1-7	0,00 - 0,20
8	S2-1	0,00 - 0,20
9	S3-3	0,00 - 0,20
10	S3-4	0,00 - 0,20
11	S3-5	0,00 - 0,20
12	S5-1	0,00 - 0,20
13	S5-3	0,00 - 0,20
14	S5-4	0,00 - 0,20
15	S5-5	0,00 - 0,20
16	S5-6A	0,00 - 0,20
17	S6-1	0,00 - 0,20
18	S6-5	0,00 - 0,20
19	S6-5A	0,00 - 0,20

Enclosure E 4



G E U S