Aberlour Environmental Seabed Survey, UK 2007.

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Report C016/08

Institute for Marine Resources and Ecosystem Studies

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Summary

In July 2007 Geolab Nor AS carried out an environmental survey for Chevron North Sea Limited / Chevron Upstream Europe at the Aberlour prospect at UKCS block 213/28 in the Faroe Shetland Channel. The objective of the survey was to describe the physico-chemical and biological characteristics in the Aberlour prospect area.

A total of 5 sample locations were selected over an area of approximately 1 km^2 . Four sampling stations were located northwest, southwest, northeast and southeast at distances of approximately 500 m from a central station. Samples of the seabed were taken using a 0.25 m^2 Haja box corer. Sub samples were collected for different geochemical analyses and biological analysis on macrofauna.

The top seabed sediment at the five stations can be characterised as fine silt with an average medium grain size d(0.5) of 150.2 µm. The sediment of the deeper layer consisted of tough and compacted clay.

The macrofauna community in the study area is relative homogeneous with an overall similarity between the sampling stations of 50%. A total number of 78 macrofauna taxa were identified. The macrofauna community at the Aberlour prospect is almost completely living in the top 10 cm's of the seabed. In the deeper, compact clay layer below 10 cm only a few organisms were found.

The average macrofauna density was 1100 ind/m^2. Species diversity in the area was moderately high with an average of 35 species per station. Although some species reached higher abundances than others, no indications were found for a macrofauna community that was dominated by a few species.

The macrofauna assemblage at the Aberlour prospect area corresponds to the deep and 'cold' temperature assemblage found in the Faroe Shetland Channel during the AFEN investigations between 1996 and 2000 and also resembles the community at the Lochside prospect NNW of the Aberlour prospect.

Contents

1 Introduction

Chevron North Sea Limited / Chevron Upstream Europe has contracted Geolab Nor AS to conduct several environmental surveys to describe the seabed at a number of areas and locations in the UK sector of the North Sea. One of these locations comprises the Aberlour prospect at UKCS block 213/28 in the West of Shetland area (Figure 1).

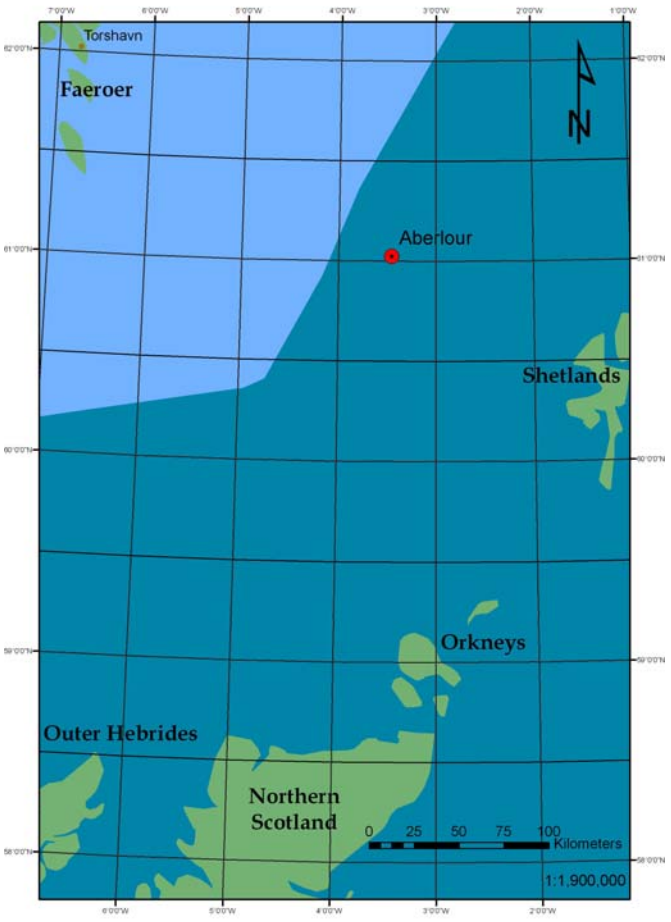

Figure 1: Location of the Aberlour prospect.

The Aberlour prospect is located approximately 140 km northwest of the Shetland Islands. An environmental characterisation is part of the requirements for the Environmental, Social and Health Impact Assessment (ESHIA) and the regulatory required Environmental Statement prior to exploration drilling operations which are foreseen in 2008. Next to remote sensing operations to describe the seabed, Geolab Nor AS has undertaken geochemical sampling as well as environmental sampling to groundtruth the seabed and sub-seabed. TNO IMARES assisted in the environmental description of the seabed.

The objective of the survey was to describe the physico-chemical and biological characteristics at the Aberlour prospect area. In this report the macrofaunal community is characterised.

2 Sampling and techniques

2.1 Field survey

The centre of the Aberlour environmental description area is located at 475522 X and 6765757 Y (ED50). In the area of UKCS block 213/28 a total of 5 sample stations were selected. Four sampling stations are located northwest, southwest, northeast and southeast at distances of approximately 500 m from a central station at the Aberlour prospect. The coordinates of the sampling stations were provided by Geolab Nor. The positions of the actual sampling stations are given in Table 1 and Figure 2. Positioning and administration of positions were taken care of by Geolab Nor.

Table 1: Position of the stations sampled at Aberlour prospect, coordinates in UTM 30N, ED50

Station	Distance	Bearing	Easting	Northing	Depth
1	central	-	475480	6765748	-1087.24
2	500 m	SW	475456	6765687	-1094.61
3	500 m	NE	475842	6766113	-1092.25
4	500 m	NW	475119	6766067	-1095.05
5	500 m	SE	475900	6765428	-1087.27

For the survey, the vessel MV Elisabeth was chartered by Geolab Nor. The MV Elisabeth is fully capable of undertaking safe seabed sampling and was adjusted for sampling in great water depths. It is equipped with the necessary navigation equipment (DGPS and USBL) for the positioning. General information on water depth, time of sampling and allocation of samples was recorded at the bridge for each sample. Water depth was measured by using CTD probes.

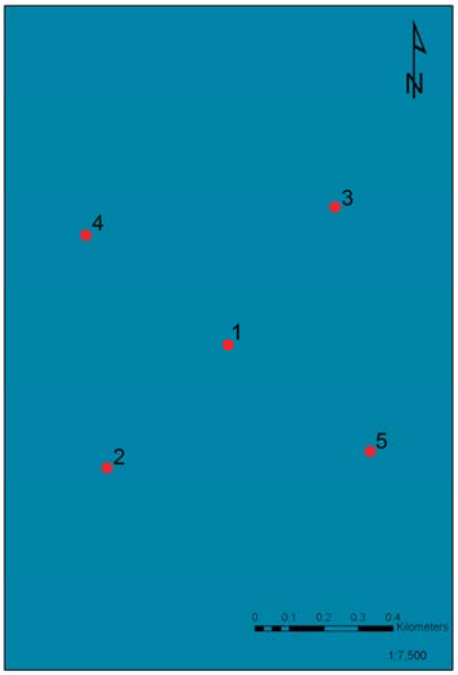

Figure 2: Sampling grid with station numbers at the Aberlour prospect, 2007

2.2 Seabed sampling

Sampling of the seabed was conducted using a Haja box corer with a sampling surface of 0.25m². This type of box corer has been designed for undisturbed sampling of the sea bed top soil and is suitable for each sediment type. This equipment has two movable arms. One serves for closing the box with a connected spade, the other ensures the resistance in the sediment is equal at both sides preventing distortions and minimizes disruption of the sediment. The corer is operated by a self releasing trigger system, which is released when the frame touches the sea bed (Figure 3).

Figure 3: Haja box corer used at the Aberlour prospect

When the box corer was brought on board samples were collected for different geochemical analyses (sediment particle size analysis, heavy and trace metal analyses) and biological analyses on macrofauna.

For the biological analyses, two subsamples were taken from each core: a rectangle sub sample of 0.1 m² and a sub core with an surface area of 50 cm² for the macrofauna analysis. Both samples were split into two layers, i.e. the 0-10 cm surface layer and a rest deeper than 10 cm. This resulted in a total of four samples per core sample. The 0.1 m² samples were sieved over a sieve with 1 mm diameter mesh size and the 50 cm² samples were sieved over a sieve with 500 µm diameter mesh size. From each sample the material left behind on the sieve was collected separately into polyethylene containers and preserved in a 6% borax buffered formaldehyde seawater solution. Each sample was clearly marked for easy identification.

Photographs were taken of both the intact box core surface and the residues of sieving,. If applicable notes were made on specific fauna elements present in the sample.

2.3 Geophysical characterisation

The sediment samples were analyzed for particle size distribution and heavy and trace metals by TNO Built Environment and Geosciences, the Netherlands. The particle size distribution was performed on dried sediment and determined using a Malvern Master Particle Sizer. The results are integrated in this report as background information in order to describe the macrofauna in wider environmental setting.

2.4 Macrofauna analyses

In the laboratory of TNO IMARES, the macrobenthos samples were washed over a 0.5 mm mesh sieve to remove the formaldehyde solution and then sorted. Collected macrofauna are examined and identified under a stereomicroscope. Standard taxonomic keys and reference are used to identify the individual organisms. Most taxa were identified at species level, but some at a higher taxonomic level.

In each of the samples, the number of species and species abundance was determined at species level, or, if not possible, at a higher taxonomic level. Juveniles of polychaetes and crustaceans, whose species-specific features weren't present at the time of sampling, were listed as genus followed by "spec. juv.". Data are presented as species-abundance data. Control and further taxonomical analysis was conducted by Mr. B. Wasson of Benthic Studies, UK. Problematic specimens were kept aside for further examination and were double checked by specialists.

The benthic community of the samples is described by species richness and diversity. The diversity is expressed by the number of species and by the Shannon-Wiener index (H'). The Shannon-Wiener index is the most commonly used index in marine ecology and takes both the number of species and their abundance into account. To express how evenly the individuals are distributed among the different species, Pielou's evenness index (J') is also given. The index J' ranges between 0 and 1, with low values indicating that one or a few species dominate the benthic community, whereas a higher value indicates a more even distribution of the number of individuals over the species. Furthermore, Margalef's index (d) is calculated as a measure for species richness.

3 Results

3.1 Sampling

All samples were taken at July 17 - 18th, 2007. All 5 samples were taken using the 0.25 m^2 Haja box corer. Two times, a sample needed to be resampled. The box corer deployments resulted in good quality cores with virtually undisturbed sediment surfaces.

In all samples the sediment consisted of fine mud with scattered stones ranging in size from approximately 1mm to several cm's. Sediment of the deeper layers of the cores consisted of extremely tough and compacted clay. In all cases the sediment surface gave a clear undisturbed appearance. Due to the handling on board the overlying water was turbid by resuspension of the very finest sediment fraction. Visible macrofauna elements were holothurians, some sea stars, sea spiders, amphipods, as well as tube building polychaetes and a few molluscs. A photographical description of the samples is given the Annex 2.

3.2 Sediment parameters

The surface sediment characteristics of the five samples can ranges from fine sand to medium silt with scattered stones ranging in size from approximately 1mm to several cm's. The sediment analysis revealed differences in silt content and sorting coefficient (d(0.6)/d(0.1)) between the five samples. The results of the particle size distribution are summarised in Table 2. The silt content at the surface varied between 18.9 and 59.7%. The average medium grain size d(0.5) is 150.2 µm, A very low value of 24.9 µm was found at station AB 03, indicating a silty sediment. At station AB 04 most of the heavy and trace metals had their lowest values when compared to the other stations (Table 3). This may be explained by a slightly coarser surface sediment.

Table 2: *Sediment parameters (TNO Built Environment and Geosciences)*

Sample Name	**< 63µ**	**d (0.1)**	**d (0.5)**	**d (0.6)**	**d (0.9)**	**d(0.6)/d(0.1)**
AB 01	21.57	7.96	190.58	222.89	462.23	28.01
AB 02*	29.69	4.54	172.40	210.21	449.13	46.43
AB 03	59.69	4.39	24.87	65.68	297.45	14.97
AB 04	18.87	11.95	209.38	245.29	474.35	20.53
AB 05*	36.05	4.16	153.79	194.98	466.73	46.97
avg	33.17	6.60	150.20	187.81	429.98	31.38

* average of 2 samples

Table 3: Metal concentrations as mg/kg dry sediment (TNO Built Environment and Geosciences).

Element	**As**	**Ba**	**Cr**	**Cd**	**Hg**	**Pb**	**Mn**	**Ni**	**Sr**	**V**	**Zn**
Detection limit	0.01	0.03	0.09	0.00	0.00	0.01	0.10	0.03	0.01	0.01	0.09
Sample name	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm	ppm
AB 01	3.83	133	43	1.44	0.05	7.96	409	26	204	80	65
AB 02	4.14	133	38	1.65	0.05	8.74	568	22	196	76	64
AB 03	3.25	94	30	1.73	0.02	7.55	349	18	150	57	69
AB 04	3.31	109	26	1.40	0.04	6.61	348	16	200	58	49
AB 05	4.23	158	50	1.77	0.05	8.81	471	30	214	91	74
avg	3.75	126	37	1.60	0.04	7.93	429	22	193	73	64

3.3 Macrofaunal analysis

3.3.1 Abundance

Next to Sycettidae and Anthozoa being present, an average density of 1060 individuals per m^2 was found in the top 10 cm of the sediment of the five stations. Most dominant in terms of abundance were the polychaetes *Paramphinome jeffreysii*, *Notoproctus oculatus*, *Chaetozone setosa* and *Proclea grafii* and individuals belonging to the family of sipunculan worms *Golfingiidae.*
In the deeper sediment layer of more than 10 cm's the average abundance over all stations was 28 ind/m^2 , including station AB-5, at which not even a single individual was found in the deeper layer.

3.3.2 Diversity

De results of the macrofauna analysis are given in Annex 3. A total number of 79 macrofauna taxa was identified. These species belong for 81 % to two taxonomical groups; crustaceans were represented with 42% and polychaete worms with 39%. The other species belong to various taxa.

In the top 10 cm of the sediment all 78 taxa were found with an average of 35 taxa per station. Only 8 taxa were found in the layer below 10 cm, with an average of 2 taxa per station. None of these taxa was restricted to this layer.
Eleven taxa were present at all stations of the top 10 cm of sediment. These were the sipunculan worm *Golfingiidae,* the polychaete worms *Glycera mimica*, *Paramphinome jeffreysii*, *Aphelochaeta sp.*, *Notomastus sp.*, *Notoproctus oculatus*, *Chaetozone setosa and Chone duneri* , the amphipods *Harpinia mucronata* and *Harpinia abyssi* and the cumacean *Eudorella sp*. These eleven species represent approximately 59 % of the total number of individuals found in the top sediment layer.

Some genera e.g, the crustaceans *Pardisynopia*, *Paguridae* and *Galathea* and the echinoderm group *Amphiuridae* were mainly represented by juveniles. As juveniles specimens are very difficult to determine to species level, juveniles were not counted as separate species when adults of the same Genus were present in the sample. The 2 individuals found of the polychaete genus *Unobranchus sp* are rare and not well described for the UK waters. One amphipod of station AB 05 could not be identified with certainty, but was thought to be *Unciola leucopis*.

The diversity indices (Shannon-Wiener H', Pielou's eveness J' and Margalef's d) for the different seabed layers are given in Table 4 and Table 5. The Shannon Wiener index is comparable at all 5 stations of the top layer and ranges from 2.84 at station AB 05 to 3.18 at station AB 04, reflecting a moderate species richness in the survey area. In the deeper layer the diversity is poor as a result of the low abundance of organisms and species.
The values for the Pielou evenness index J' is high at all 5 stations and varies from 0.80 to 0.91 at station AB 05 and station AB 02, respectively, indicating that the macrofauna community is not dominated by any one species. Due to the absence of organisms in the samples of stations AB 03 and AB 05 in the deeper layer, no indices could be calculated (Table 5).

Table 4 Summary of macrofauna analysis of the top 10 cm samples; number of species, density, species richness (Margalef's d), Eveness (Pielou J') and Shannon Wiener Diversity index H'.

	no. of species	no. of individuals	Species richness (Margalef's d)	Eveness Pielou's (J')	Shannon Wiener Diversity (H')
Sample Name	**S****	**N***	**d**	**J'**	**H'(loge)**
AB 01	32	130	6.37	0.85	2.96
AB 02	31	77	6.91	0.91	3.14
AB 03	40	126	8.48	0.84	3.15
AB 04	36	91	7.98	0.88	3.18
AB 05	35	111	7.22	0.80	2.84
avg	34.8	107	7.39	0.86	3.06

Table 5 Summary of macrofauna analysis of the deeper seabed samples (>10 cm); number of species, density, species richness (Margalef's d), Eveness (Pielou J') and Shannon Wiener Diversity index H'.

	no. of species	no. of individuals	Species richness (Margalef's d)	Eveness Pielou's (J')	Shannon Wiener Diversity (H')
Sample Name	**S****	**N***	**d**	**J'**	**H'(loge)**
AB 01	4	6	1.67	0.96	1.33
AB 02	2	4	0.72	0.81	0.56
AB 03	1	2	-	-	-
AB 04	2	2	1.44	1.00	0.69
AB 05	-	-	-	-	-
avg	2.	3.	0.96	0.92	0.65

3.3.3 Benthic community structure

The benthic community structure in the top 10 cm was analysed using a hierarchical cluster analysis on the abundance data. The five stations are within a circle of approximately 1 km. As can be seen from the resulting dendrogram the species composition shows a moderate similarity of almost 50% among the 5 stations (Figure 4). Stations AB 02 and AB 05, as well as stations AB 01 and AB 03 have fairly similar species compositions, with a similarity of 58% and 62% respectively. An overall similarity of more than 50% is indicative for a relative homogeneous distribution of the macrofauna in an area under study. In the Aberlour area, the differences between the stations are related to differences in abundance of *Paramphinome jeffreysii*, *Golfingiidae* and

Notoproctus oculatus . The absence of *Proclea grafii* and higher abundance of *Notoproctus oculatus* is furthermore responsible for the differentiation between station AB 04 and the other stations.

Due to the almost absence of macrofauna organisms it is not sensible to make a community analysis of the deeper layer. It is clear that the benthic community in the Aberlour area has to be characterised by the organisms in the upper 10 cm of the seabed. The compacted clay of the deeper layer does not seem to be a suitable habitat for most benthic organisms.

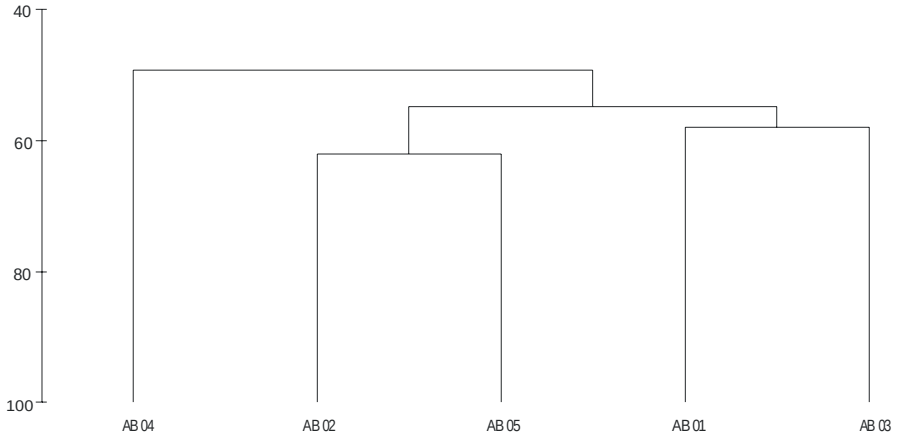

Figure 4 Dendrogram of Bray-Curtis Similarity (%) for all stations, abundance data square root transformed. Surface samples 0-10 cm.

4 Discussion

The Aberlour prospect at UKCS block 213/28 in the West of Shetland area was described by taking samples of the seabed at five stations. The top seabed sediment of the Aberlour area can be characterised as fine silt with an average medium grain size d(0.5) of 150.2 µm. Some stones ranging in size from approximately 1 mm to several cm's were found as well. The sediment of the deeper layer consisted of extremely tough and compacted clay. The sediment at the five stations is similar with a slightly coarser sediment at station AB 04. The average grain size is comparable with the values (100 -200 µm) found at stations at comparable depth during cruises made in the Faroe Shetland Channel investigation between 1996 and 2000 (Bett, 2000, Hughes*et al.*, 2000). In this overview the seabed at >1000 m depth at the Faroe Shetland Channel was described as a relatively featureless zone. At all five stations the concentration of Barium as a trace metal of drilling activities was lower than the 250 – 300 mg/kg described in the AFEN investigations.

The macrofauna community at the Aberlour prospect is mainly living in the top 10 cm's of the seabed. In the deeper compact clay layer below 10 cm, only a few organisms were found. It does not appear to be a suitable habitat for benthic organisms. The macrofauna assemblage in the area can be described as homogeneous with an overall similarity of approximately 50% between the stations.

The range in average density of 760 - 1290 individuals per m^2 corresponds well to the 1000 – 1500 ind/m^2 described for stations in the same depth zone sampled in the AFEN investigations (Bett, 2000, Hughes*et al.*, 2000). At the five stations species richness in the top 10 cm of the seabed, as assessed by the Shannon-Wiener index and Pielou's index for Eveness, is relatively high. The values of the Shannon-Wiener diversity index and Pielou's Index of Eveness found for the different stations are also comparable to those found in the region during the AFEN study, respectively H' 2.72 – 3.25; J' 0.8 – 0.95.
The macrofauna assemblage at the Aberlour prospect area corresponds with the deep and 'cold" temperature assemblage described found in the SEA4 area of the AFEN study. It also shows resemblance to that of the Lochside prospect (Van Dalfsen & Witbaard, 2008). In the Aberlour survey crustaceans and polychaetes were the dominant taxonomical groups which clearly corresponds to the pattern in the deep and cold water assemblages.

The dominant polychaete species *Paramphinome jeffreysii* and to a lesser extent also *Chaetozone setosa,* found in this study were also amongst the dominant species during the cruises between 1996 and 2000. In the AFEN study, the polychaete *Spiophanes kroyeri* was dominant as well, but it was absent in this study. S*piophanes kroyeri* , however, showed a rapid decrease below 900 m in the AFEN studies (Hughes*et al.*, 2000).

The results of the environmental survey at the Aberlour prospect are in agreement with the biological characteristics of the deep-water fauna described for a larger area with water depths in excess of 1000 m in the Faroe Shetland Channel.

5 References

Bett B.J. (2000): An introduction to the benthic ecology of the Faroe-Shetland Channel (SEA4). In: Environmental Surveys of the Seafloor of the UK Atlantic Margin, Atlantic Frontier Environmental Network [CD-ROM] ISBN 09538399-0-7.

A.J. Hughes, B. E. Narayanaswamy & B.J. Bett (2000): An overview of the benthic ecology of the Faroe-Shetland Channel. In: Environmental Surveys of the Seafloor of the UK Atlantic Margin, Atlantic Frontier Environmental Network [CD-ROM] ISBN 09538399-0-7.

Van Dalfsen J.A. & R. Witbaard (2008): Lochside Environmental seabed survey, UK 2007. Wageningen IMARES report C015/08.

6 Referees and Authors

Repport	C016/08
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This report has been professionally prepared by Wageningen IMARES. The scientific validity of this report has been internally tested and verified by another researcher at Wageningen IMARES.

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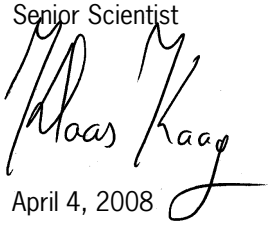
Signature:	
Date:	April 4, 2008

Approved:	Drs. J. Asjes Head Ecology department
Signature:	
Date:	May 7, 2008

7 Quality assurance

IMARES utilises an ISO 9001:2000 certified quality management system (certificate number: 08602-2004-AQ-ROT-RvA). This certificate is valid until 15 December 2009. The organisation has been certified since 27 February 2001. The certification was issued by DNV Certification B.V. The last certification inspection was held the 16-22 of May 2007. Furthermore, the chemical laboratory of the Environmental Division has NEN-AND-ISO/IEC 17025:2000 accreditation for test laboratories with number L097. This accreditation is valid until 27 March 2009 and was first issued on 27 March 1997. Accreditation was granted by the Council for Accreditation, with the last inspection being held on the 12th of June 2007.

Annex 1 Cruise summary

Participants; Rob Witbaard, Arnold Bakker
Subject: Environmental survey, macrofauna sampling
Ship: Elisabeth
Periode July 15th-21th 2007
Location; Faroe-Shetland Channel, Aberlour prospect.

Mobilisation at Grabster July 16th. Departure in the evening of July 16th, heading towards the research area in the Faroe-Shetland Channel, arrival Tuesday 17th around noon. Weather is rough, with windforce 5 to 6.
Boxcoring started at 12:45hr. Unfortunately the first core is not acceptable. The bottom is so soft that the core does not contain overlying water. Three layers of lead were removed and the stopper bar was moved on the central shaft of the boxcorer so that penetration of the corer is limited. This action was successful. The station was resampled and the penetration depth was limited resulting in approximately 20 cm of overlying water. The rest of the boxcores taken during this sampling campaign were accordingly good and in terms of penetration depth and core quality approved. All cores came on board with overlying water but due to the handling on board the overlying water was turbid by resuspension of the very finest sediment fraction. Apart from this minor disturbance, all cores appeared to have undisturbed surfaces. The sediment consisted of fine mud with scattered stones ranging in size from approximately 1mm to several cm. Sediment at deep layers of the cores was extremely tough and compacted clay. This was very hard to handle. When visible obvious fauna elements were photographed. Of the boxcorer a subsample with a size of 28X36 cm was sieved over a 500µ screen.

At the afternoon of the first sampling day wind picked up. At station AB-02 the boxcorer did not trip and the wire between lid and tripping mechanism broke. This has been repaired but at 21:00 hr it has been decided to stop working due to weather conditions.
Work was continued next morning (July 18th) at 08:30. All cores were successfully retrieved from location AB. At approximately 13:30 the final core from this area came on board. Transit was made to the Lochside area (LO) where coring was started at approximately 20:00 hr.

Table: List of station locations as supplied by I-Survey

Environmental Survey 2007 Aberlour
Sample locations and preliminary as-sampled positions.

	Intended X	Intended Y	Average Sampled X	Average Sampled Y	Average Depth	Average Delta X	Average Delta Y	Average Distance from Intended	Accepted?
AB01-1	475522	6765757	475479.52	6765747.73	-1094.84	42.48	9.27	43.48	NO - Grab Empty
AB01-2	475522	6765757	475455.59	6765687.07	-1087.24	66.41	69.93	96.43	YES
AB02-1	475167	6765402	475168.72	6765394.98	-1097.02	-1.72	7.02	7.23	NO - Grab Empty
AB02-2	475167	6765402	475153.47	6765341.90	-1094.61	13.53	60.10	61.60	YES
AB03	475826	6766161	475841.84	6766112.19	-1092.25	-15.84	48.81	51.32	YES
AB04	475113	6766078	475118.99	6766066.69	-1095.05	-5.99	11.31	12.80	YES
AB05	475931	6765451	475899.66	6765427.62	-1087.27	31.34	23.38	39.10	YES

All "as sampled" positions are preliminary calculations, and are taken as average of X/Y positions when Grab at maximum depth +/- 10m.

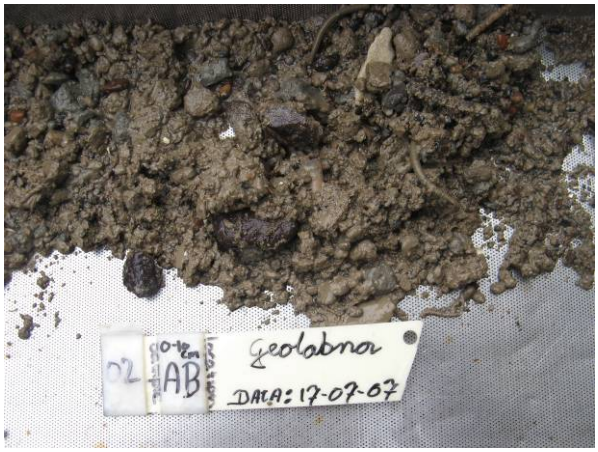
Geodetic information
Survey datum ED50
Ellipsoid: international 1924
Semi-major axis 6,378,388
1/Flattening; 297.00
Projection : UTM 30N
Central Meridian 3 deg West

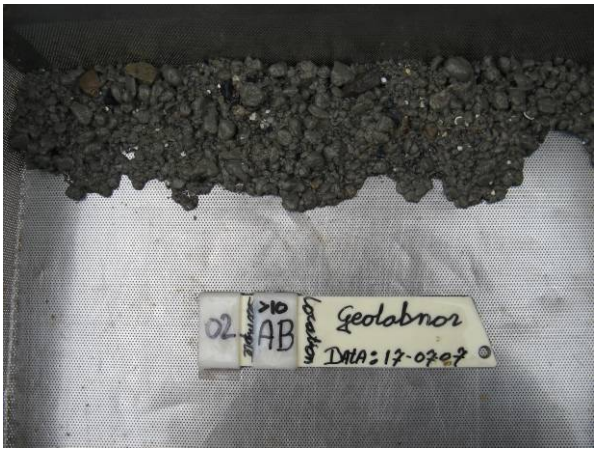
Annex 2 Photo documentation

In the photo documentation below for each station the following photographs have been given,
on the first row: Habitus of the drained core surface;
on the second row: Sieving residue of the top layer and of the deeper layer;
on the third row: Details and/or fauna components observed in the sample.

Station AB 01
17-july 2007
Time: 12:45-13:30 hr
Penetration depth 32 cm

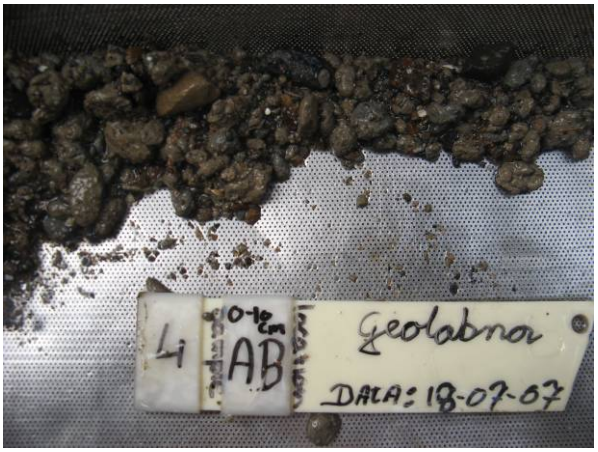
Station AB 02
Date 17/07/2007
Start time 8:30
End time 09:15
Penetration depth 36cm

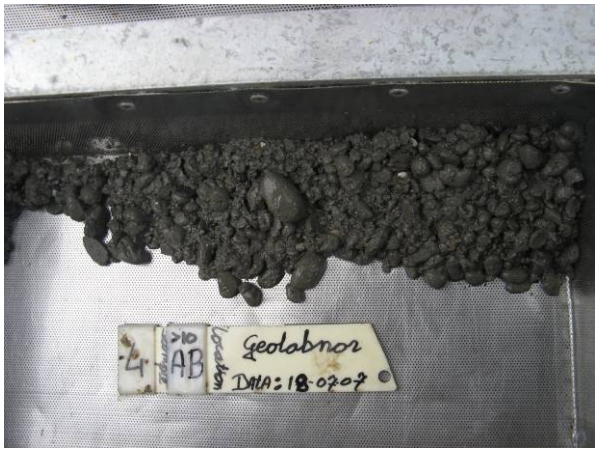


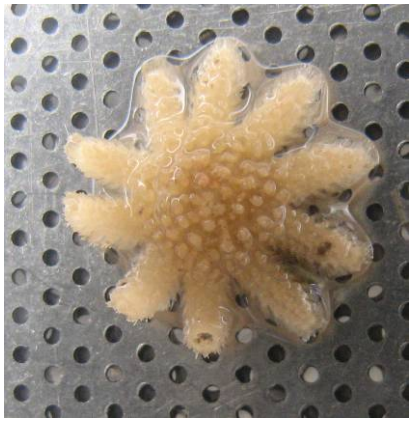


Station AB O3
Date; 18/07/2007
Start time 10:00
End time 10:50
Penetration depth 36cm

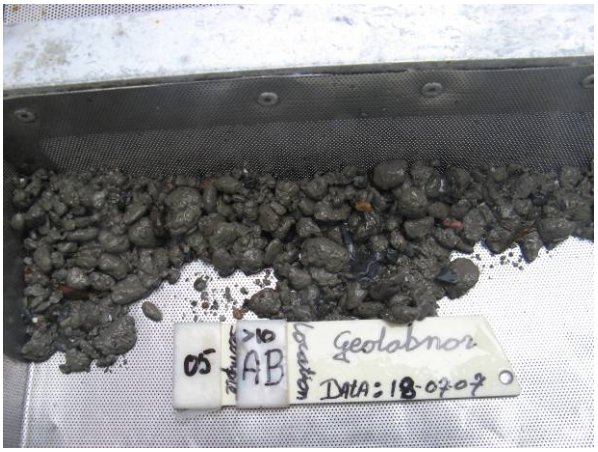
Station AB 04
Date 18/07/2007
Start time 11:00
End time 11:50
Penetration depth 36cm







Station AB 05
Date 18/07/2007
Start time 12:40
End time 13:20
Penetration depth 36cm



Annex 3 Species abundance

Species	Author	AB 01 0-10	AB 02 0-10	AB 03 0-10	AB 04 0-10	AB 05 0-10	AB 01 >10	AB 02 >10	AB 03 >10	AB 04 >10	AB 05 >10
Sycettidae			p		p	p					
Anthozoa		p				p					
Virgularia mirabilis	(O F Müller, 1776)		3	1		3					
Cerianthidae			1			1					
Nemertina		2		1	1						
Nematoda		2	2	2	2			3			
Golfingiidae		19	5	7	2	18					
Phascolion sp	Théel, 1875				2						
Eunoe nodosa	(M Sars, 1861)						1				
Mystides caeca	Langerhans, 1880		1								
Glycera mimica	Hartman, 1965	3	3	4	1	2					
Eunereis longissima	(Johnston, 1840)				1						
Paramphinome jeffreysii	(McIntosh, 1868)	16	5	27	7	26	2		2		
Nothria conchylega	(G O Sars, 1835)		1	3							
Paraonidae					1						
Cirrophorus sp	Ehlers, 1908			3							
Paradoneis lyra	(Southern, 1914)	1		1				1			
Poecilochaetus fulgoris	Claparède in Ehlers, 1875					1					
Spiochaetopterus sp	Sars, 1853				1						
Cirratulidae		1									
Chaetozone setosa	Malmgren, 1867	11	7	6	5	6					
Cirratulus cirratus	(O F Müller, 1776)		1		1	1					
Aphelochaeta sp	Blake, 1991	4	1	7	2	6					
Brada villosa	(Rathke, 1843)			2							
Notomastus sp	Sars, 1851	4	8	1	5	5					
Maldanidae				2							
Maldane sp	Grube, 1860			1							
Notoproctus oculatus	Arwidsson, 1907	9	6	12	17	6					
Myriochele fragilis	Nilson & Holthe, 1985				3	2					
Amage auricula	Malmgren, 1866			1						1	
Glyphanostomum pallescens	(Theel, 1878)			2							
Samythella neglecta	(Wollebaek, 1912)		1	1	1	1					

Species	Author	AB 01 0-10	AB 02 0-10	AB 03 0-10	AB 04 0-10	AB 05 0-10	AB 01 >10	AB 02 >10	AB 03 >10	AB 04 >10	AB 05 >10
Terebellides stroemi	M Sars, 1835	2									
Unobranchus sp	Hartman, 1965		1			1					
Amphitritinae		2									
Proclea grafii	(Langerhans, 1884)	12	5	9		9					
Thelepus cincinnatus	(Fabricius, 1780)	3	1	1		1					
Chone duneri	Malmgren, 1867	8	4	5	3	1					
Euchone rubrocincta	(M Sars, 1861)			1		2					
Potamilla neglecta	(M Sars, 1851)	2	1	2							
Enchytraeidae				1							
Nymphonidae						1					
Boreonymphon abyssorum	(Norman, 1873)					1					
Copepoda		2				1					
Amphipoda				1							
Oediceros ?borealis	(Boeck, 1871)		1								
Monoculopsis longicornis	(Boeck, 1871)					1					
Arrhis phyllonyx	(M Sars, 1858)			2							
Pleustidae					1						
Neopleustes pulchellus	(Kroyer, 1846)	1									
Harpinia mucronata	Sars, 1879	1	1	2	4	1					
Harpinia abyssi	Sars, 1879	1	2	2	1	1					
Hippomedon sp	Boeck, 1871			1	1	2					
Tmetonyx sp	Stebbing, 1906	1					1				
Tryphosella horingi	(Boeck, 1871)				1						
Onesimus sp	Boeck, 1871				1						
Idunella sp	Sars, 1894		1								
Byblis abyssi	Sars, 1879	1	2	2							
Byblis minuticornis	Sars, 1879	2	3		6	1					
Haploops sp	Liljeborg, 1855	8		1	6		2				
Haploops tubicola	Liljeborg, 1855			1							
Ischyrocerus sp	Kröyer, 1838	1		2	1						
Unciola ?leucopis	(Kroyer, 1845)					1					
Haploniscus bicuspis	(G.O. Sars, 1877)				2						
Gnathiidae [female]			1		1						
Gnathia sp	Leach, 1814			1	1	1					
Ilyarachna sp	Sars, 1870		1	1	1						
Macrostylidae				1	1						

Species	Author	AB 01 0-10	AB 02 0-10	AB 03 0-10	AB 04 0-10	AB 05 0-10	AB 01 >10	AB 02 >10	AB 03 >10	AB 04 >10	AB 05 >10
Desmosoma globiceps	(Meinert, 1890)	1		1							
Eurycope sp	Sars, 1864	1									
Paratanaoidea			5	2		2					
Akanthophoreinae		6			2						
Akanthophoreus longiremis	(Lilljeborg), 1864			1							
Eudorella sp	Norman, 1867	1	1	1	2	1				1	
Leucon sp	Kröyer, 1846					1					
Campylaspis sp	G O Sars, 1870					1					
Lampropidae			1								
Hemilamprops uniplicatus	(G.O. Sars, 1872)					1					
Mollusca				1							
Bivalvia					1						
Yoldiella lucida	(Lovén, 1846)				1						
Crossaster [juv]	(Linnaeus, 1767)				1						
Enteropneusta		1									
	nr individuals*	129	76	126	90	109	6	4	2	2	0
	nr species**	32	31	40	36	35	4	2	1	2	0

* presence p counted as 1

** corrected for juveniles or indet (sp)