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Survey Report:

SEA6_Meridian
Survey 2004
Job No.: 216/04/803
Cruise B

prepared for:

GEOTEK

Document Ref.:	216/04/803 SR
Copy No.:	electronic copy (uncontrolled document)
Revision:	0
Originator:	Kebbel
Checked / Approved:	Zepper
Date:	10.09.2004

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1 Introduction, scope of work

OSAE Offshore Survey and Engineering Gesellschaft für Seevermessung mbH have been contracted to perform offshore survey operations in connection with the SEA-6 Project in the Irish Sea. The SEA-6 survey should review and update previous surveys which were 30 to 40 years old.

The actual database was mainly acquired with nowadays-outdated equipment and the data sets of poorer quality and resolution. Some areas were completely unknown and the survey should provide the base for a better understanding of the sedimentary processes and sediment architecture in this area.

The survey provides information for use in geological, geophysical, marine biological, marine chemical, installation and subsequently for the offshore industry. The survey was planned in three legs.

Leg one (Cruise A) included SSS (Side Scan Sonar), SBP (Sub Bottom Profiler) and Swath Bathymetry survey mainly in the central region between the Isle of Man and Cumbrian coast.

Leg two (Cruise B) included SSS (Side Scan Sonar), SBP (Sub Bottom Profiler), Swath Bathymetry survey and CTD measurements and was carried out between Ireland and the Isle of Man and at the north of Wales.

Onboard charting was used to guide the sampling and photographic work on the third leg (Cruise C).
This report presents the results of leg one and two. The third leg will focus on benthos investigations and does not form part of this report.

The geophysical survey(Cruise B) was carried out using the 35m *SV Meridian* as a survey platform. The survey operations were carried out 24h a day within the time period 24.08.2004 – 09.09.2004.
OSAE's Meridian is fully geared to accommodate a wide range of survey requirements and due to it's draught ideal but not limited for shallow water work.

All settings and line planning's were carried out jointly by the Client and the OSAE Party Chief in order to optimise data quality in all areas.

It has been jointly agreed with the Client's Representative's Dave Tappin and Alan Judd to present the survey data as quickly turn-around presentation, with generation of mosaics (SSS) and image files of the seafloor for each area as well as processed Bathymetry data. Survey area descriptions contained in this report must be regarded as descriptive online text and online interpretation.

2 Technical details : DP Survey Vessel *Meridian*

Class	GL +100 A5 K(50) (+)M.C.aut.
Flag / Port of Registry	Germany / Bremen
Gross Tonnage	299 GRT
Dimensions	35.16m x 10.2 (1.3-1.6m draft)
Propulsion	2 X Schottel STP 200 azimuth thrusters
Power	2 X 375kW MAN 2876 LE 402
Bow Thruster	1 X 50 kW electrical
Speed	15.4 kts max / 14 kts cruise economy
Generator Output	2 x 120 kVA, 400/240V~ 50kC Stamford / MAN2866E 1 X 30 kVA / 240V~ 50kC Stamford / Hatz 4L41C/30
Deck Equipment	1 x Palfinger PK 14080MA knuckleboom 1.34 m @ 8.4m 1 X A-Frame 6 m @ height 5m /width 4.2m + winch 6m Hydraulic sonar pole 20ft / 10ft / 8ft 'Twistlock' facilities 0.6m Moonpool
Bridge Equipment	GMDSS A2, Radar Simrad RA73, Gyro Anschütz Std 20, Simrad GN333 DGPS, DP Kongsberg SDP10 / Autopilot, Echo Sounder Atlas Deso 25, ENC -C-Map
Communication	Voice / Fax / E-mail: GSM , Iridium Satphone, Inmarsat

3 Vessel offsets SV Meridian

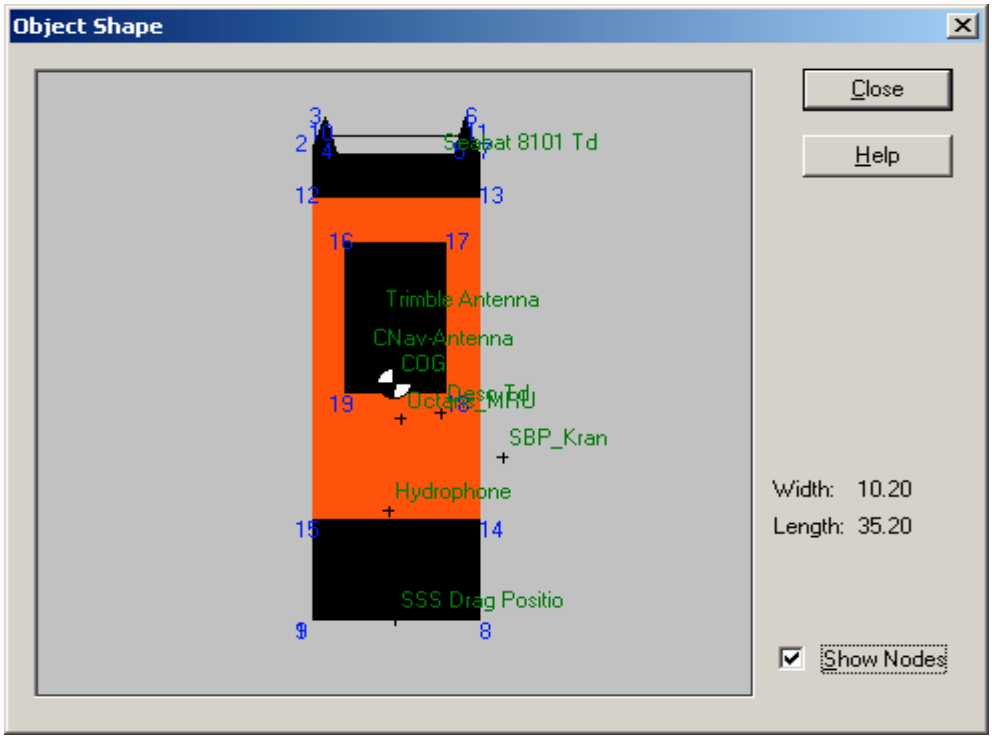

Figure 3-1 ***Vessel diagram M/V Meridian***

Table 3-1 shows the vessel offsets applicable onboard the *Meridian* in the course of the current project. Dimensions given are in metres from the common vessel reference point (Centre of Gravity COG).

Sensor	Offset X	Offset Y	Offset Z
GPS 1 (Primary)	-1,727	1,835	7,545
GPS 2 (Secondary)	-0,940	4,638	12,568
Octans MRU	0,385	-2,496	1,610
Seabat 8101	2,556	15,630	-1,413
SSS Drag Position	0,0	-16,560	0,0
SBP Drag Postion	6,609	-5,192	-1,20
COG	0,00	0,00	0,00
ATS II Hydrophone	-0,399	-8,932	-2,467
Deso SBES Td	2,815	-2,050	0.0

Table 3-1 ***Offsets M/V Meridian***

.

4 Equipment and performance

The following equipment was used onboard the *SV Meridian*

Equipment:

- DGPS Trimble 4000ssi / Inmarsat RTCM Corrections
- DGPS C-Nav / Starfire Sat Corrections
- Atlas Deso 25 SBES
- Datasonics Chirp II Cap 6600 sub-bottom profiler
- IXSEA Octans motion sensor
- IXSEA Fibre optical gyro
- Nautronix ATS II
- EG&G DF 1000 digital side scan sonar
- EPC Analog SBP paper recorder
- Ultra 120 Analog SSS paper recorder later replaced by second EPC recorder
- AMD SVP
- EIVA CTD

Software:

- QINSy Data Acquisition Software
- QINSy Data Processing Software
- Triton Delph Seismic and Chirp II Sub-bottom Data Acquisition Software
- Tritin Isis Side Scan Sonar Data Acquisition Software
- HIPS (Hydrographic Information Processing System) incl.
- HDCS (Hydrographic Data Cleaning System)
- Autodesk Map Autochart
- SIPS (Sonar Processing Information System)
- OSAE tide modelling
- Various other standard software packages

4.1 Positioning

4.1.1 Surface positioning / navigation

Onboard the Meridian, the primary navigation system was based on C-Nav for differential yielding positional accuracy's of better ± 0.5m, while the secondary system a TRIMBLE 4000ssi corrected with pseudo range corrections transmitted in a RTCM code via Sat link.
C-NAV system corrections are not based on traditional pseudo range DGPS. The new methodology is a further enhancement of the WADGPS technique. C-NAV GcGPS operates in real time, providing seamless global coverage and decimetre capable positioning in the marine environment, between the Latitudes of 75 Deg. North and 75 Deg South.
A Geodetic Dual Frequency receiver is embedded in the antenna to correct for the user's local ionosphere range errors. To access the C-NAV global broadcast subscription correction signal service, an integrated L-Band decoder is embedded within the C-NAV receiver.
A global network of reference stations is utilized to track the entire constellation of GPS satellites, which measure the RAW GPS signal observations. These observations are then transmitted via the Internet back to the NetworkControl Center(NCC).
The NCC then calculates and models, in 'real-time' (RTG), all the GPS constellation satellite orbital corrections and also individual delta clock offset values. These orbit and clock correctors are then transmitted to the mobile user, via geostationary INMARSAT communications satellites.
Typical accuracy:
C-Nav : 2 Sigma +/-0,25m
Trimble : 2 Sigma +/-2.00m

Performance:
No problems encountered.

4.1.2 Sub-surface positioning

For sub-sea positioning of the towed equipment onboard *Meridian*, OSAE used the Nautronix ATS II sub-sea positioning system in conjunction with some Mini Beacons, enabling tracking of towed or lowered equipment in both shallow and deep water.
Nautronix pioneered the development and application of chirp signalling technology in underwater acoustics. The chirp replaces the normal sinusoidal burst signal with a train of chirps, each sweeping through a range of frequencies. This provides a significant reduction in the effect of multi-pathing, reflection and refraction. It results in the superior performance achieved by the ATS II in the demanding acoustic environments of shallow water, close proximity to structures and towing applications.
The ATS II is an Ultra Short Base Line (USBL) system. The ATS is integrated with the online computer system to provide an accurate and reliable absolute position of transponders and responders mounted on subsurface equipment
Raw data were send to the navigational computer and corrected within QINSy for heading and attitude .
Typical accuracy:
ATS II : 0,25% of the slant range

Performance:
Both beacon died during the Cruise B and weren't replaced. Two new Beacon will be mobilised for leg three.

4.2 Vessel Motion Compensation

The system used was the iXSEA Octans Motion Sensor. Octans provided true heading, heave , roll , pitch sway ,surge and rates of accelerations even in highly volatile environment.. The Octans measures vertical displacement and vessel attitude. The sensor includes an array of sensitive accelerometers and angular rate sensors measuring the forces of gravity and acceleration acting on the sensor. These signals are converted into measurements of motion and attitude.
Typical accuracy:
Roll / Pitch / Yaw : 0.01°
Range : No limitations
Follow up speed: up to 500°/s
Heave: 5cm or 5% whichever is highest
Resolution: 1cm

Performance:
No problems encountered.

4.3 Primary Gyro Compass

The primary gyro installed onboard the Meridian was a fibre optical gyro. It's heart consists of a small strap down Inertial Measurement Unit (IMU) which contains three accelerometers, three fibre optical gyro meters and a real time computer. Octans features the benefits of fibre-optic gyro meter technology and therefore shares the advantages of not requiring maintenance and re-calibration. Strap down equation processing enables the system to find north in less than 5 min whatever the sea conditions may be. To optimise the computation results the sensor was fed by GPS providing correct latitude and speed information.

The gyrocompass was calibrated prior to the survey operation.
Typical accuracy:
Gyro: +/- 0.2° Secant Lat
Resolution: 0.01°

Performance:
No problems encountered.

4.4 Secondary Gyro Compass

For this purpose an ANSCHÜTZ Standard 20 Survey Gyro compass was used.
In contrast to north seeking compasses gyro-systems are not corrected for compass deviations. These systems show true values relative to the geographic North Pole. The gyrocompass uses the specific properties of the gyroscope in combination with the rotation of the earth and the effects of gravity.
The gyrocompass was calibrated prior to the survey operation.

After calibration the compass dependably puts out the true heading. This data is directly fed into the QINSy navigation software.

Typical accuracy:
Resolution: higher 0.1°

Performance:
No problems encountered.

4.5 Single Beam Echosounder (SBES)

An Atlas Deso 25 EA hydrographic echosounder is permanently installed onboard the *Meridian* . The operating frequencies used by this system are 33 kHz and 200 kHz.
Depths were corrected within the system for S/V and draft (optional)

Performance:
During the mobilisation it was investigated that the paper gear drive was not alive.
Spares were sent to Workington and installed during the port call.
No other problems encountered.

4.6 Multibeam Echosounder (MBES)

The Meridian was fitted with a Reson 8101 High Resolution MBES where the transducer head contains all electronics required to transmit and receive sonar signals, digitise the returns and transmit them to the surface processor. On the Reson 8101 the seafloor is ensonified by a 150° swath consisting of 101 individual 1,5° x 1,5° beams.
Sonar operating frequency is 240kHz.
The system is designed to International Hydroghraphic Organisation (IHO) standards to measure the seafloor at a maximum range of 320m.
With an across track subtended angle of 150° the standard Reson 8101 measures a swath width that is 7.4 times the measured water depth , in water depth from 1 to 70 m. Beyond 70 meters water depth the ratio oft depth and swath coverage decreases down to 3.2 times depth at 150m.
Data acquisition and real-time data visualisation are realised on a QINSy Win 2002 workstation.

Performance:
No problems encountered.

4.7 Side Scan Sonar (SSS)

OSAE used an EG&G DF-1000 Digital Side Scan Sonar together with 500m 11mm coaxial tow cable. The DF-1000 tow fish is a hydrodynamically stable towed body, which contains the transducers, and electronics necessary to generate and receive the side scan sonar signals. And communicate with the surface unit. Where the number of data channels in conventional analog systems is limited by the number of conductors, this is not the case with the DF-1000. The digital communication link enables both the standard 100kHz side-scan frequency as well as the high resolution 500kHz frequency data to be simultaneously transmitted to the surface data acquisition SW.
Typical Setup :
Frequency : 100kHz Range 100m-150m
Frequency : 500kHz Range 75m

Performance:
No problems encountered.

4.8 Sub-bottom profiler (SBP)

For sub-bottom profiling onboard the *Meridian*, OSAE utilised the Datasonics CAP 6600 Chirp II Acoustic Profiling System. This system uses the advanced chirp technology to produce high resolution sub-bottom profiles of both the shallow and the deep sub-bottom layers. Chirp sonar technology

employs swept FM transmitted signals and digital signal processing and features a greater dynamic range over conventional sub-bottom profiling as well as enhanced resolution. The sub-bottom sonar data are stored digitally in SEG-Y format on hard disk and CD's.
As contractual obligation the data were not processed.

The system operates within the frequency band 2-7 kHz. The transducer array (AT-471 low frequency transducers) is mounted on a TTV 190 tow vehicle. The onboard work unit consists of the DSP 662 transceiver (high power transmitter and receiver) coupled with the PC-based Triton Elics Delph – seismic software suite including display of sub-bottom data and monitoring and control tools for system performance. All relevant settings such as trig rate, hardware gain, power control and chirp length as well as bottom tracking / TVG are software-driven.

Performance:
No problems encountered.

4.9 Sound Speed / CTD Profiling

An Applied Microsystem sound velocity probe was carried onboard the Meridian as well as an EIVA CTD probe for determination of sound velocity and salinity within the water column.
The profiles were fed subsequently into the echo sounder systems and the USBL .
The following probes were launched during the survey

Performance:
No problems encountered

Geotek 216/04/803 Sea6_Meridian **Cruise B**					
Date:	**Time UTC:**	**Lat:**	**Lon:**	**Depth:**	**Area:**
24.08.04	19:08	53°58'47'' N	003°00'47'' W	25 m	2
25.08.04	00:23	53°40' 08''N	003°22' 00''W	25 m	2
25.08.04	11:54	53°54'25''N	003°12'26'' W	25 m	2
27.08.04	19:36	54°41'59''N	004°17'10'' W	45 m	3
28.08.04	22:57	54°08'40'' N	005°14'21''W	70 m	4
31.08.04	11:30	54°00'05'' N	005°25'07''W	75 m	5
01.09.04	15:01	53°51'27'' N	005°32'11''W	70 m	6
02.09.04	13:39	53°29'43''N	005°15'57''W	70 m	7
02.09.04	20:43	53°26'59''N	005°12'54''W	70 m	7
03.09.04	03:47	53°22'48''N	005°11'09''W	71 m	9
04.09.04	11:55	53°09'33''N	005°19'08''W	70 m	10
05.09.04	14:20	53°17'39''N	005°02'37''W	71 m	10
06.09.04	12:38	53°17'51''N	005°05'31''W	72 m	9
06.09.04	14:43	53°08.58''N	004°57'37'' W	50 m	11
07.09.04	15:08	53°23'22''N	004°45'25''W	65 m	13
08.09.04	17:54	53°54'34''N	003°12'58''W	25 m	2
09.09.04	05:30	53°57'34''N	003°05'14''W	25 m	2

Table4-1: List of performed S/V and CTD Dips

4.10 Vertical Control

Vertical control of bathymetric data was archived by a method which was agreed with the UKMaritime and Coastguard agency (MCA) .
During the data acquisition OSAE used a predicted tide file for the actual area generated by OSAE's own SW using harmonic constants and weighted solutions for multiple stations
For the final tide processing Proudman Oceanographic Laboratory (POL) data, were sent upon request to the vessel . POL data contain date, time and correction values for significant positions in the different survey areas .
POL data were fed into Caris .

Performance:
During the post processing it was investigated that even the tide-model was not accurate enough. The different data sets were corrected for absolute height with different parameters according to the swath-model. This was done manually and a harmonic seafloor model was archived for the surveyed areas.

5 Data acquisition and processing system

5.1 QINSy Data Acquisition Software

The QINSy real-time integrated navigation and data acquisition software system from QPS (USA) is permanently installed on *SV Meridan*. This software package was used for on-line data acquisition and processing.
The system is characterised by a wide range of sensor inputs, such as navigation, gyrocompass, heave, pitch and roll, echosounder, etc. Navigation parameters are displayed to the helmsman on a monitor and can comprise representations of the selected runline and outline of the vessel, as well as the line bearing, ship's speed and heading, course made good, distance along line, distance off line, standard deviation and ship's position in UTM projection and or WGS 84.
In addition, positional fix data are displayed to the surveyor on a separate monitor which comprise the ship and offset positions. Fix marks and annotation are sent to such devices as the echosounders, sub-bottom profiler, side scan sonar, etc. All positional and depth data is logged on the internal hard disk every computer cycle, typically once per second.
All raw sensor data is logged and permanently stored in a fast relational database to which the entire survey configuration is copied from the template. Data stored in the database were converted into XTF – Files and transmitted via LAN to HIPS.
The timing in QINSy is based on the PPS option. All incoming and outgoing data were accurately time stamped with an UTC time label. The integrated ring buffer interpolates raw data to the exact moment of ping or event. Using advanced gridding methods a real time sounding grid was available to optimise the survey strategy and open a wide range of QC possibilities such as average standard deviation per cell or hit count per cell.
The sounding grid was generated with a grid cell size of 2m.

Performance:
No problems were encountered apart some minor PC clitches .

5.2 ISIS - Delph Seismic Data Acquisition Software

The sub-bottom profiling onboard work unit consisted of the DSP 622 transceiver (high power transmitter and receiver) coupled with the PC-based Triton ISIS Delph-Seismic software suite including display of sub bottom data and monitoring and control tools for system performance. All relevant settings such as trig rate, hardware gain, power control and chirp length as well as bottom tracking / TVG are software-driven.

Performance:
At the first two days of the survey there were major problems with the hard and software.
A service engineer was necessary to solve the problems and set up the SW suite from the scratch. Even the specialised engineer couldn't explain the investigated faults. New software updates were installed to solve the problem
Apart from that – no problems encountered.

5.3 HIPS (Hydrographic Information Processing System)

Multibeam bathymetry data were edited using a PC-based version of the well-established Hydrographic Information Processing System incl. Hydrographic Data Cleaning System (HDCS, V5.4)

by Caris-Universal Systems Ltd. Data sets were edited / processed for navigation, motion sensor data (gyro heading, roll, heave and pitch), tide, sound velocity and noise / spikes in the depth values.

The Reson xtf raw data from the Seabat 8101 are converted into HDCS, split into different projects, vessel configurations and days. First, navigation data area edited for possible spikes using self definable filter or manually. Due to the accurate and stabile navigation from C-Nav Starfire DGPS, only a few spikes were found during the whole survey.

The following step is a quick control of gyro heading, roll, heave and pitch for not detected problems during survey operations.

This is followed by swath editing, whereby the depth information of one survey line is filtered for spurious values and not to use data. Flagged as rejected data by this filtering method are all values outside a defined depth range, the 5 outer beams of each ping and all data, which does not meet the internal Reson Brightness and Colinearity quality.

Predicted tides were calculated for each survey area using Proudman Oceanographic Laboratory (POL) data, reduced to LAT. The tide tables contain date, time and correction values and it is applied to each survey line.

The Reson xtf raw data are not corrected for any sound velocity so far. This has to be done inside HDCS using SVP data from the Microsystem sound velocity probe. If the sound velocity correction has been insufficient, the swath editor offers the possibility to insert an artificial additional layer boundary into the water column, where an artificial change of sound velocity (relative to the existing one in m/s) can be added manually. This may be done for files which show obviously wrong sound velocity values. The user can decide what change value has to be added in order to achieve a most probable horizontal profile. A QC check on correct offline adjustment may be carried out later within the subset editor.

Next step is to merge all survey lines so that each single depth value is calculated in respect to vessel offsets (settings found inside the vessel configuration file), motion data, sound velocity and tide data. During this computation each single depth value is supplied with a position, using vessel offsets, gyro heading, motion values and beam angle information.

Within the HDCS subset mode the complete survey area can be covered with a number of squared areas (subsets). This offers the opportunity of surface cleaning with overlapping data from several survey lines.

After cleaning the complete survey area, charting grids off different extension and grid cell sizes were calculated and exported as gridded ascii data and geotiff images for further processing and charting.

Performance:
No problems were encountered.

5.4 Caris GIS

Caris GIS a PC-based version was utilised onboard the *Meridian* for final data inspection and to calculate regular DTM's. Caris GIS offers the possibility to calculate DTM's in various methods and generate contours in user defined intervals. Data passed the QC were exported to DXF and further on to the charting utility Autochart.

Performance:
No problems were encountered.

5.5 Autodesk Autochart

Autodesk Autochart was utilised onboard the *Meridian* for chart layout and file conversion into PDF.

Performance:
No problems were encountered.

5.6 SIPS (Sonar Processing Information System)

Side scan sonar files were processed within the side scan imagery processing software SIPS by Caris Universal Systems. SIPS offers powerful tools for navigation editing, slant range correction, geo-referenced mosaicing of seafloor imagery, identification and measurement of sonar targets, etc. The produced mosaics of different resolutions were subsequently exported as geotif image files to be imported into Autochart.

Performance:
No problems were encountered.

5.7 Various other software packages

This included standard PC office software, such as Word, Excel, Powerpoint.

Performance:
No problems were encountered.

6 List of Survey Personnel

Position	Name	On Board
Party Chief	Marc Kebbel	30.07.04 – 10.09.04
Surveyor	Alrik Schuppan	03.08.04 – 10.09.04
	Marco Iwan	30.07.04 – 10.09.04
Acoustic Engineer	Jürgen Pasche	30.07.04 – 10.09.04
	Andy Vogt	30.07.04 – 10.09.04
Data Processor	Sven Christen	30.07.04 – 24.08.04
	Alexandra Frahm	30.07.04 – 24.08.04
		29.08.04 – 10.09.04
	Katja Zepper	30.07.04 – 10.09.04
	Alexander Iffland	24.08.04 – 10.09.04

Table6-1: List of Personnel, *SV Meridan*

7 General description and overview of the survey areas

Figure 7-1 provides an overview of the survey areas Cruise A. The map shows the survey sites of the Strategic Environmental Assessment, Part 6 (SEA-6_Meridian).
The survey was divided into several sites and not all displayed areas were fully covered wih MBES / SSS / SBP and SBES data. Detailed high resolution surveys were conducted in Area 1a;1e;3 and 4. Reconnaissance lines were surveyed in all other areas.

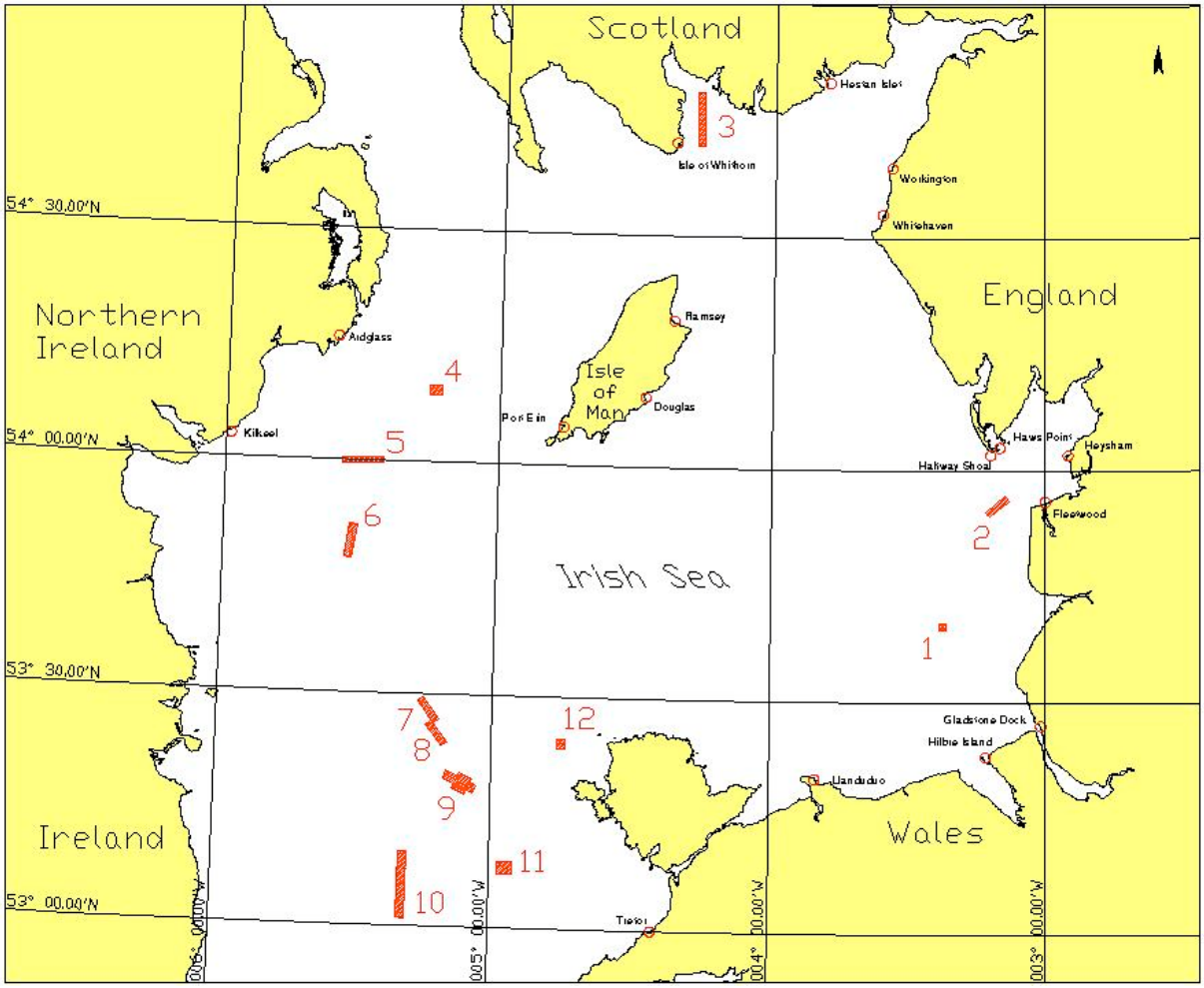

Figure 4.1.2-1 ***Location Map SEA6_Meridian Cruise B***

8 Area Report as surveyed

Cruise A was divided into several areas of interest. The general scope of work was to fill in data and study sediment processes in areas of interest like proposed wind farm sites where no data were available or where previous surveys were carried out long time ago.

Cruise B was divided into several areas of interest . The general scope of work was to fill in data gaps and study the distribution and extent of 'Submarine structures made by leaking gas'[Methane-derived authigenic carbonate –MDAC] in the SEA6 area.

8.1 Cruise B

The following chapter contains a brief description of the surveyed areas including general settings, processing work-flow and encountered problems . Chart and data interpretation will be done by the client .

Survey Parameters:

Ellipsoid: WGS 84
Inv. flat.: 298.2572235630
Semi major: 6378137.0000
Projection: UTM (north)
Zone: 30
Org. scale: 0.999600000000
Longitude: -3°00'00.0000"
Latitude: 00'00.0000"
Easting: 500000.0000
Northing: 0.0000
UTM zones: 30 /31

Datum Shift: None
Method: None
Tx : 0.000000 m
Ty : 0.000000 m
Tz : 0.000000 m
Rx : 0.0000000000 °
Ry : 0.0000000000 °
Rz : 0.0000000000 °
PPM : 0.000000

Navigation Systems:
1: GPS1 (NMEA): C-Nav Starfire DGPS
2: GPS2 (NMEA): Trimble 4000ssi RTCM DGPS

8.1.1 Area 1

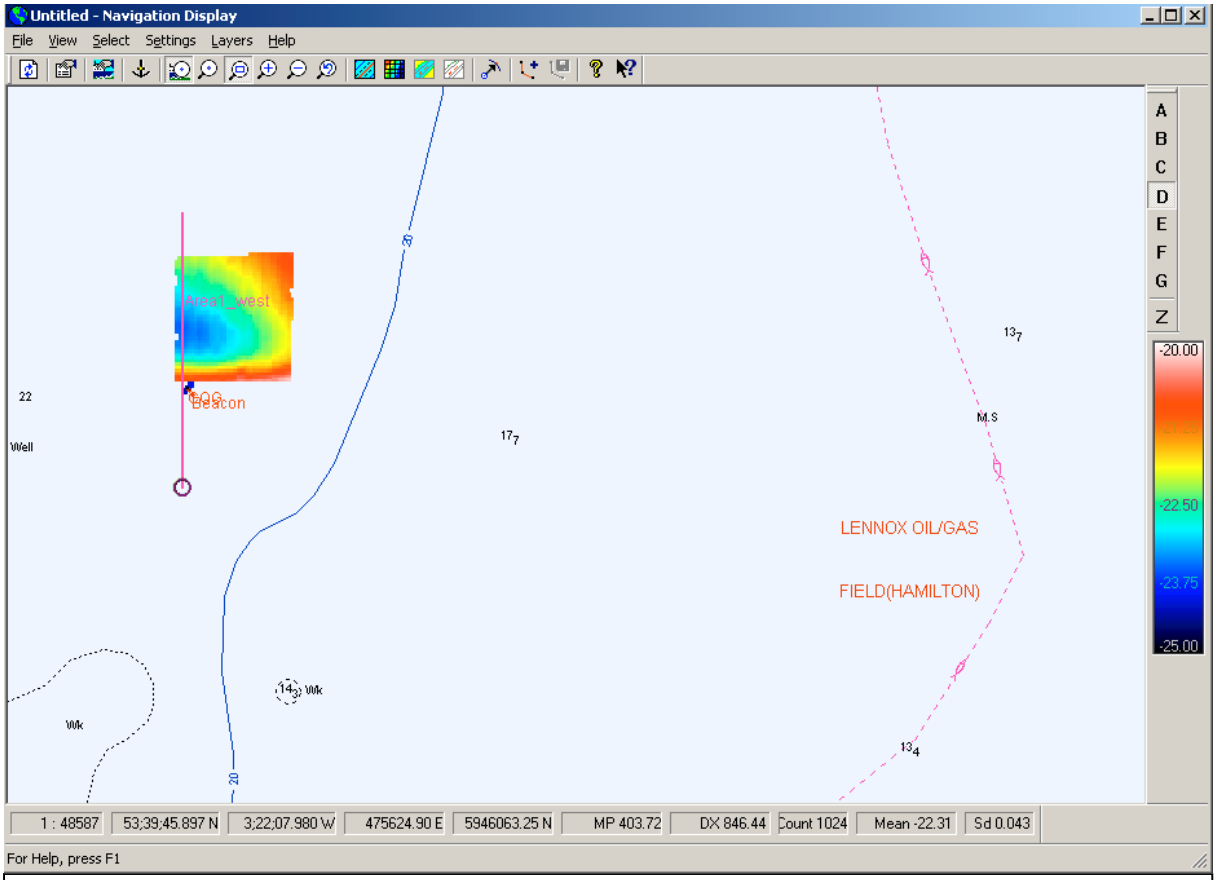

Figure 8.1.1-1 Overview Area 1 Cruise B

Area 1	
Date of Survey:	25.08.2004
Chart /Mosaic No.:	001/001
Chart Scale:	1 : 5000
No. of profiles:	13
Line Spacing:	According clients request
SBP Trigger and Chirp length:	0.25s and 10ms
SSS Freq / Range	100 kHz / 100 m
Min / Max depth:	20m – 24m

General:

Figure 8.2.1-1 shows an overview of Area 1.
The average number of hitcounts and the amount of crossprofiles don't meet MCA requirements.
Figure 8.2.1-2 shows the standard deviation of the surveyed area.
All lines were surveyed in N/S-S/N directions. The poor weather conditions degraded the quality of the data on all lines.
Nevertheless all data were processed in the best possible survey manner. The transit to the Area was logged and the data are digitally stored. It was agreed with the client not to process or chart the transit data.
All other data were processed for spikes, tide corrected to LAT (Lowest Astronomical Tide) and charted.
The SSS and Bathymetry data are available as XTF files.
SSS and SBP data have not been fully interpreted as per contractual obligation.
SSS was set to 100 kHz and 100m range !
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files .

Bathymetry:

The line spacing was a choice of the client and driven by the MBES swath width . The survey was laid out to reach 100% coverage of the area. One sound velocity dip was performed. No planned crosslines were surveyed.

Vertical control

Tide values were extracted from a standard tide program. The used tide station was Hilbre Island
The station was fed into OSAE's tide processing SW and a tide model was generated for the hole area. This guarantees a "relative" accurate model which is again only a model and not as accurate as real time tide gauges which can provide an "absolute" model . The error budget for the used tide data was according the SW 22cm !

Side Scan Sonar: / Sub Bottom Profiler
SSS was set to 100 kHz and 100m range .
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SSS data are available as XTF-Files.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files but saved by the data acquisition SW as *.Tra ! It is not necessary to rename the files . Most seismic processing packages are able to import the data directly as SegY. OSAE tested the data import on REFLEX seismic processing SW and on ER Mapper visualisation SW without having any problems!
SSS records were annotated throughout the SW package and printed on an EPC 9600 plotter.
SBP records were annotated throughout the SW package and printed on an EPC 9600 plotter.
Especially the SSS records were effected by the weather on some lines but according to the client still of acceptable value which didn't represent OSAE's opinion in all stages.

Charting :
The layout was worked out by OSAE and the client. One chart was generated for that area containing. 6 boxes. Box one representing bathymetry - contour lines;
box two representing bathymetry – shaded relief view; box three representing SSS – mosaic; box 4 representing SSS-tracks; box 5 representing SBP- tracks and box 6 representing the location map.

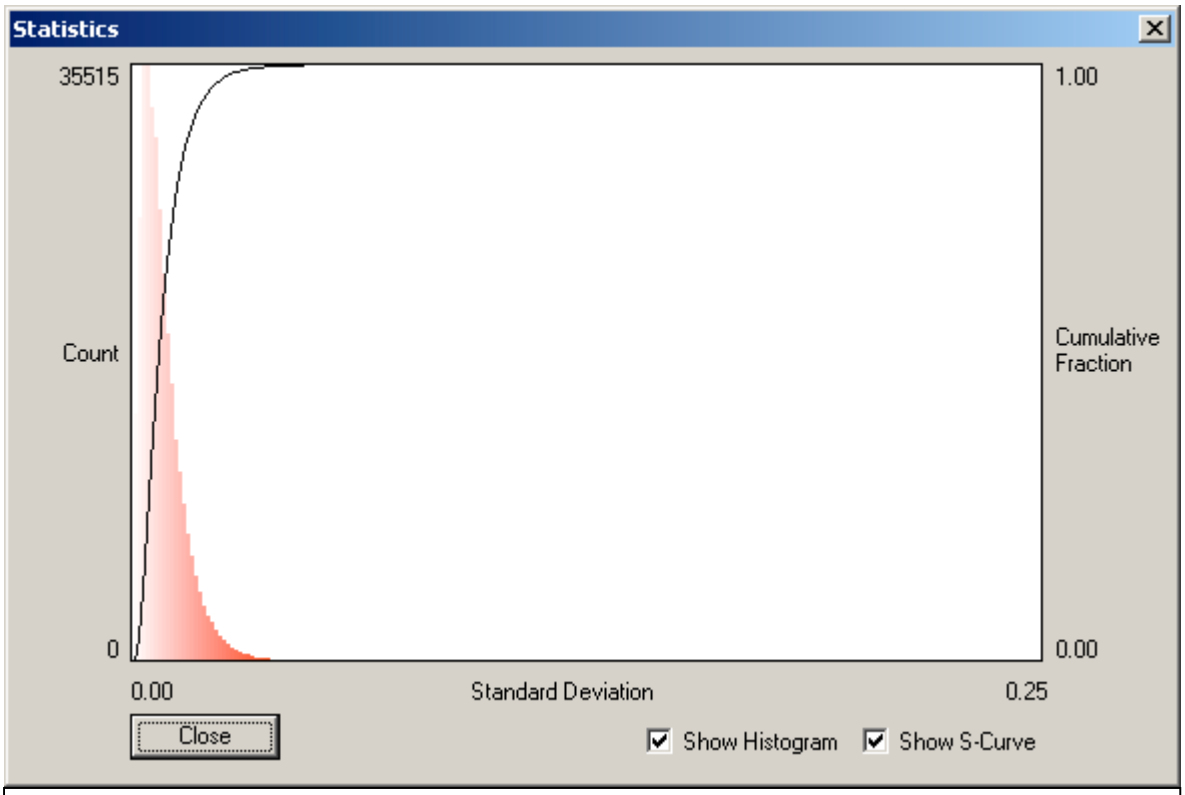

Figure 8.1.1-1 Statistic - Standard Deviation Area 2

8.1.2 Area 2 Lune Deep

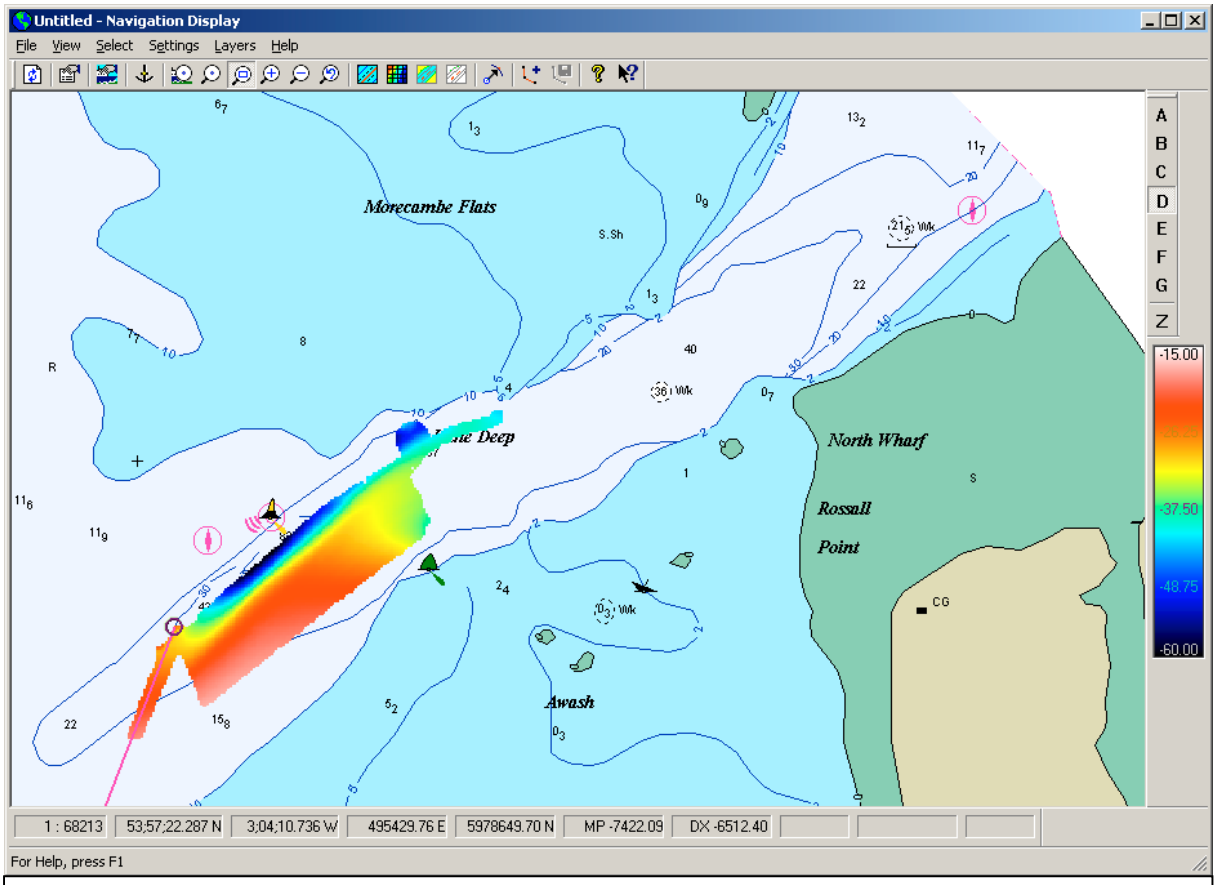

Figure 8.1.2-1 Overview Area 2

Area 2	Lune Deep
Date of Survey:	25.08.2004
Chart /Mosaic No.:	001/005 – 005/005
Chart Scale:	1 : 7500
No. of profiles:	12
Line Spacing:	According clients request
SBP Trigger and Chirp length:	0.25s and 10ms
SSS Freq / Range	100 kHz / 100 m
Min / Max depth:	17m-60m

General:

Figure 8.2.1-1 shows an overview of Area 2.
The average number of hit counts and the amount of cross profiles don't meet MCA requirements.
Figure 8.2.1-2 shows the standard deviation of the surveyed area..
The survey area was abandoned due to the poor weather conditions and therefore regarded as finished.
Nevertheless all data were processed in the best possible survey manner. The transit to the Area was logged and the data are digitally stored. This data-set is not processed or charted.
All other data were processed for spikes, tide corrected to LAT (Lowest Astronomical Tide) and charted.
The SSS and Bathymetry data are available as XTF files.
SSS and SBP data have not been fully interpreted as per contractual obligation.
SSS was set to 100 kHz and 100m range !
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files .

Bathymetry:

The line spacing was a choice of the client and driven by the MBES swath width . The survey was laid out to reach 100% coverage of the area. One sound velocity dip was performed. No planned cross lines were surveyed.

Vertical control

No POL data were required for that area due to the. Tide values were extracted from a standard tide program. The used tide stations was Fleetwood
The station was fed into OSAE's tide processing SW and a tide model was generated for the hole area. This guarantees a "relative" accurate model which is again only a model and not as accurate as real time tide gauges which can provide an "absolute" model . The error budget for the used tide data was according the SW 22cm !

Side Scan Sonar: / Sub Bottom Profiler
SSS was set to 100 kHz and 100m range .
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SSS data are available as XTF-Files.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files but saved by the data acquisition SW as *.Tra ! It is not necessary to rename the files . Most seismic processing packages are able to import the data directly as SegY. OSAE tested the data import on REFLEX seismic processing SW and on ER Mapper visualisation SW without having any problems!
SSS records were annotated throughout the SW package and printed on an EPC 9600 plotter.
SBP records were annotated throughout the SW package and printed on an EPC 9600 plotter.
Especially the SSS records were effected by the weather on some lines but according to the client still of acceptable value which didn't represent OSAE's opinion in all stages.

Charting :
The layout was worked out by OSAE and the client. One chart containing six boxes was generated for that area.
Box one representing bathymetry - contour lines;
box two representing bathymetry – shaded relief view; box three representing SSS – mosaic; box 4 representing SSS-tracks ;box 5 representing SBP- tracks and box six representing the location map .

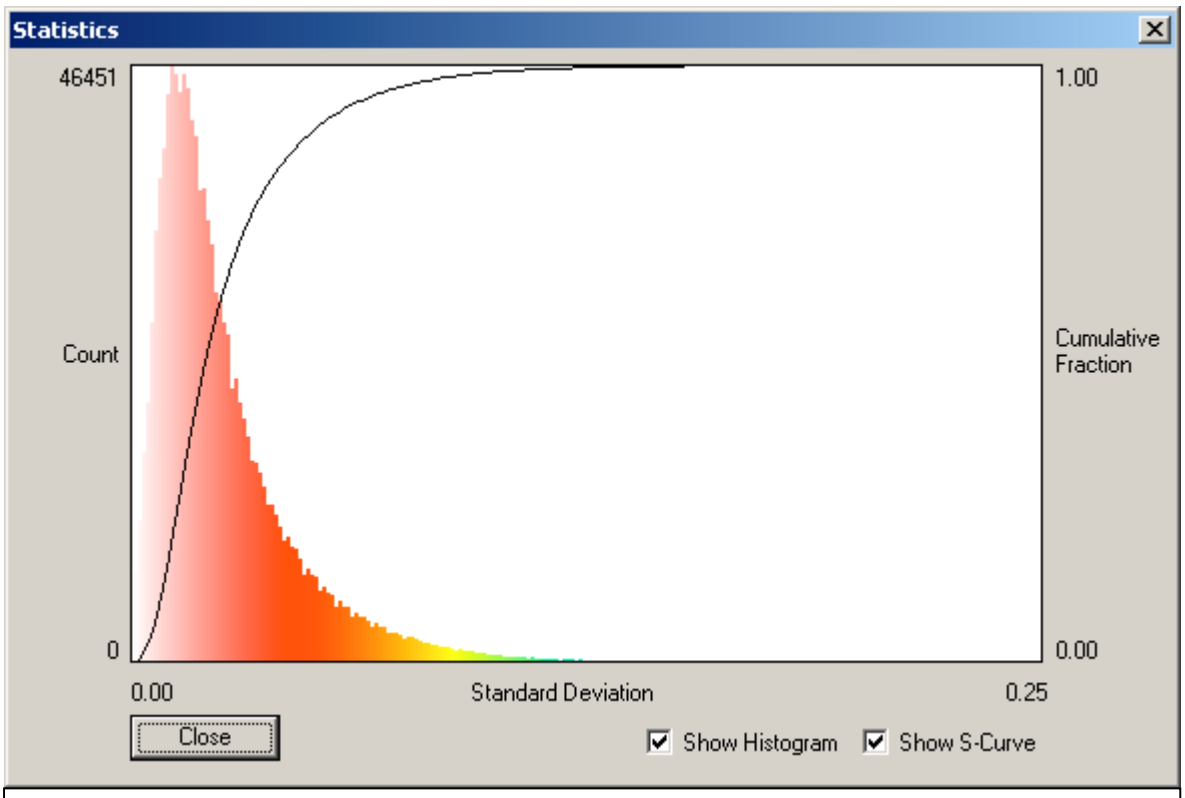

Figure 8.1.2-1 Statistic - Standard Deviation Area 2

8.1.3 Area 3 Wigtown Bay

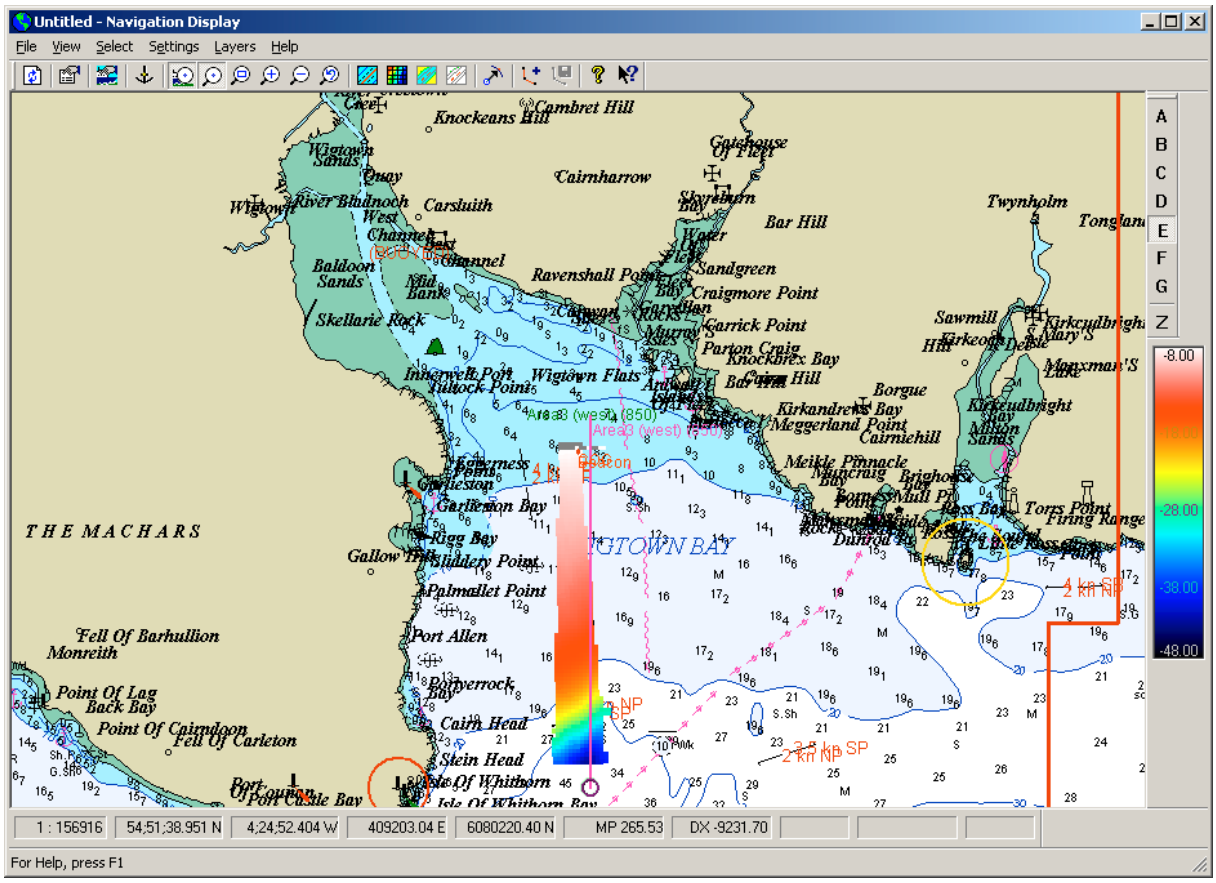

Figure 8.1.3-1 Overview Area 3 Wigtown Bay

Area 3	Wigtown Bay
Date of Survey:	26.08.2004/27.08.2004
Chart /Mosaic No.:	001/005 – 005/005
Chart Scale:	1 : 8000/ 1:3000/ 1:5000
No. of profiles:	23 lines and 18 cross lines
Line Spacing:	According clients request
SBP Trigger and Chirp length:	0.25s and 10ms
SSS Freq / Range	100 kHz / 100 m and for detailed survey 100kHz 50m
Min / Max depth:	8m – 43m

General:

Figure 8.1.3-1 shows an overview of Area 3.
The average number of hit counts don't meet MCA requirements. Several crosslines were surveyed.
Figure 8.1.3-2 shows the standard deviation of the surveyed area.
The weather was rough and it's influence is visible in the data. The survey was stopped for a few hours due to wind force 8-9 bft and sea state 5. The survey was carried on in better but still difficult conditions as wind force 6-7bft and sea state 3-4
Nevertheless all data were processed in the best possible survey manner.
All other data were processed for spikes, tide corrected to LAT (Lowest Astronomical Tide) and charted.
The SSS and Bathymetry data are available as XTF files.
SSS and SBP data have not been fully interpreted as per contractual obligation.
SSS was set to 100 kHz and 100m range! In an area of special interest the range was degreased to 50m.and crosslines surveyed.
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files .

Bathymetry:

The line spacing was a choice of the client and driven by the MBES swath width . The survey was laid out to reach 100% coverage of the proposed area. Sound velocity dips were performed daily or when the quality indicator of the MBES data shows a significant change. 18 planned cross lines were surveyed

Vertical control
During the post process two significant zones were investigated in the data set and three positions were picked out were POL data were requested.
The POL data of the two stations were fed into OSAE's tide processing SW and a tide model was generated for the hole area .This guarantees a "relative" accurate model which is again only a model and not as accurate as real time tide gauges which can provide an "absolute" model . The error budget for the POL data is not available till today

Side Scan Sonar: / Sub Bottom Profiler
SSS was set to 100 kHz and 100m range .On the cross lines defining an area of special interest the range was reduced to 50m
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SSS data are available as XTF-Files.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files but saved by the data acquisition SW as *.Tra ! It is not necessary to rename the files . Most seismic processing packages are able to import the data directly as SegY. OSAE tested the data import on REFLEX seismic processing SW and on ER Mapper visualisation SW without having any problems!
SSS records were annotated throughout the SW package and printed on an EPC 9600 plotter.
SBP records were annotated throughout the SW package and printed on an EPC 9600 plotter.
Especially the SSS records were effected by the weather on some lines but according to the client still of acceptable value which didn't represent OSAE's opinion in all stages.

Charting :
The layout was worked out by OSAE and the client. The area was divided into two sections containing each five charts detailed charts were produced for three areas of special interest each containing six boxes.
Chart one representing bathymetry - contour lines;
chart two representing bathymetry – shaded relief view; chart three representing SSS – mosaic; chart 4 representing SSS-tracks and chart 5 representing SBP- tracks.
Box one representing bathymetry - contour lines;
Box two representing bathymetry – shaded relief view; Box three representing SSS – mosaic; Box 4 representing SSS-tracks, Box 5 representing SBP- tracks and Box6 representing the location map.

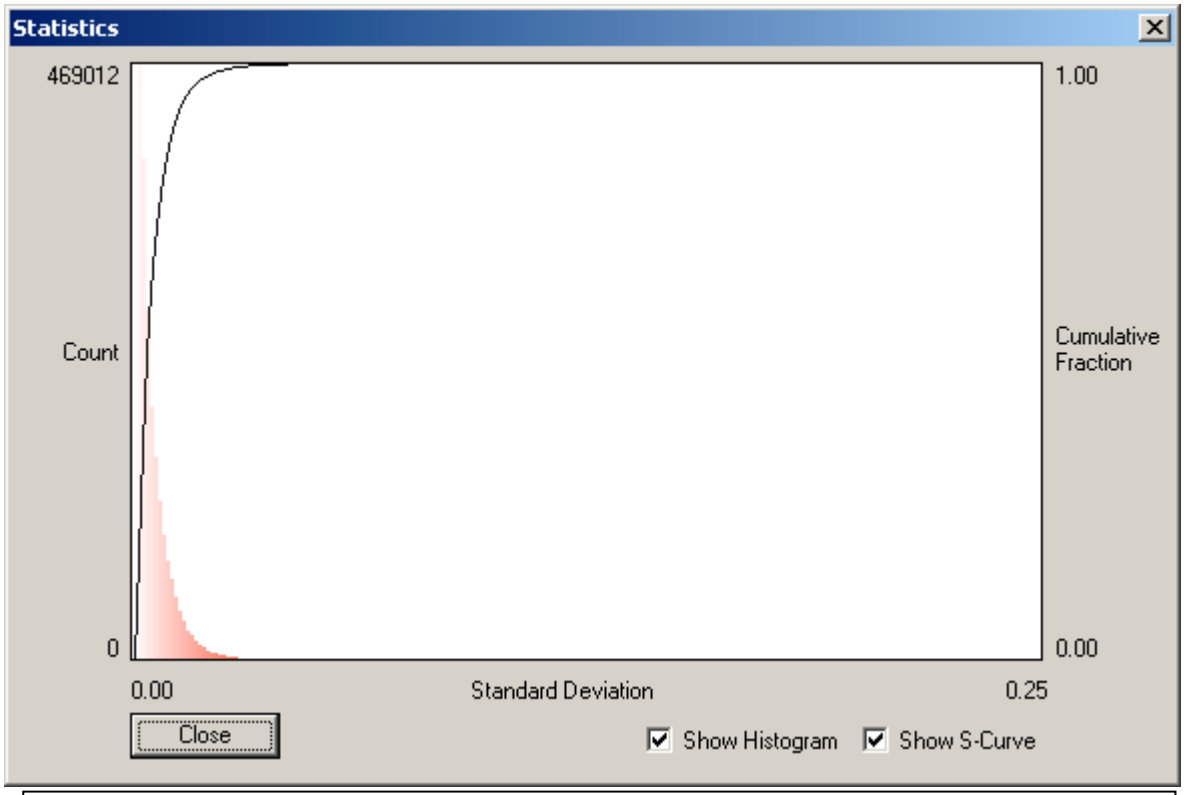

Figure 8.1.3-1 Standard Deviation Area 3

8.1.4 Area 4 Pisces

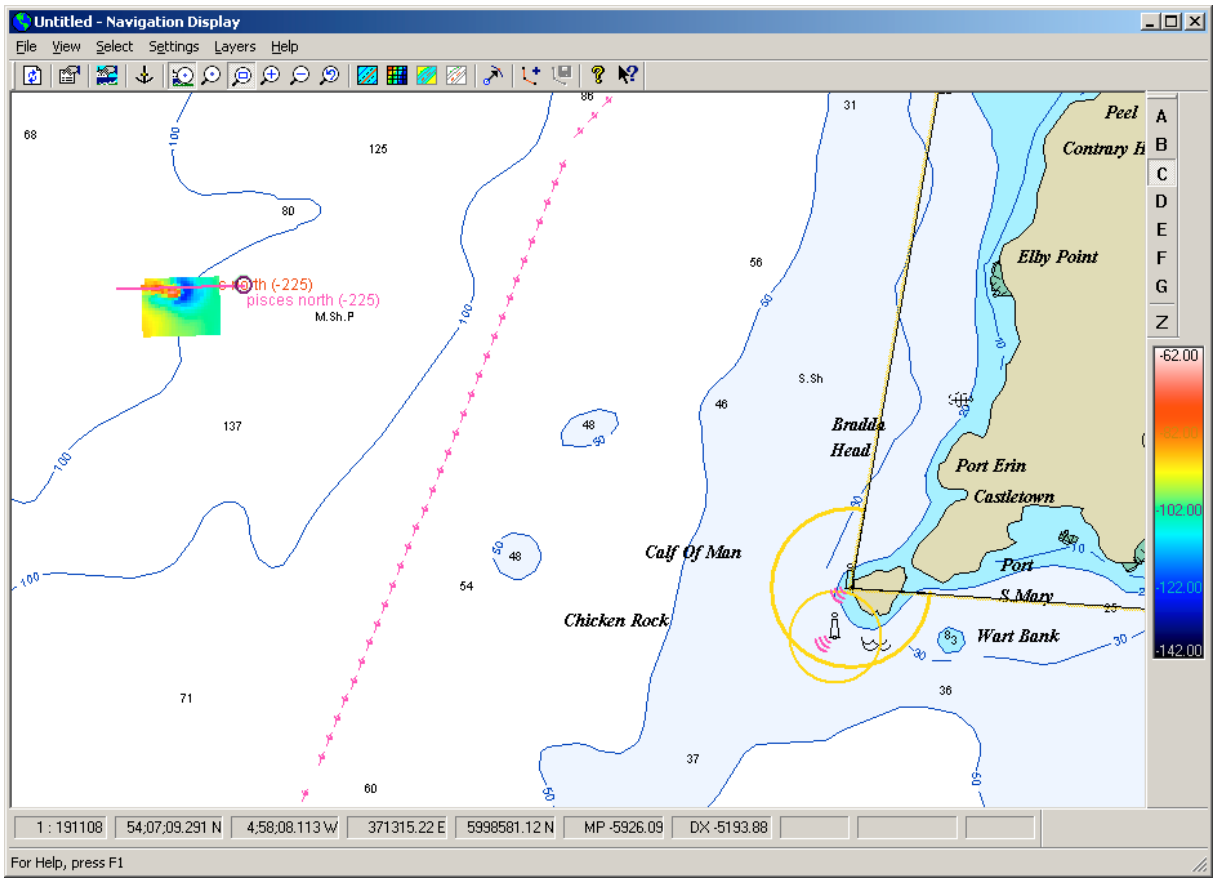

Figure 8.1.4-1 Overview Area 4 Pisces

Area 4	Pisces
Date of Survey:	28.08.2004/
Chart /Mosaic No.:	001/005 – 005/005
Chart Scale:	1 : 7500
No. of profiles:	28 lines and 2 cross lines
Line Spacing:	According clients request
SBP Trigger and Chirp length:	0.25s and 10ms
SSS Freq / Range	100 kHz / 100 m
Min / Max depth:	65m – 125m

General:

Figure 8.1.4-1 shows an overview of Area 4.
Two cross lines were surveyed.for tidal control.
Figure 8.1.4-2 shows the standard deviation of the surveyed area.
The weather was moderate and its influence is visible in the data. The survey was stopped for two days due to wind force 8-9 bft and sea state 5 after surveying that area.
Nevertheless all data were processed in the best possible survey manner.
All other data were processed for spikes, tide corrected to LAT (Lowest Astronomical Tide) and charted.
The SSS and Bathymetry data are available as XTF files.
SSS and SBP data have not been fully interpreted as per contractual obligation.
SSS was set to 100 kHz and 100m range!
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files .

Bathymetry:

The line spacing was a choice of the client and driven by the MBES data density.The survey was laid out to reach 100% coverage of the proposed area. Sound velocity dips were performed daily or when the quality indicator of the MBES data shows a significant change. 18 planned cross lines were surveyed and a final S/V dip performed.

Vertical control

No POL data were required for that area due to the. Tide values were extracted from a standard tide program. The used tide stations was Ardglass
The station was fed into OSAE's tide processing SW and a tide model was generated for the hole area. This guarantees a "relative" accurate model which is again only a model and not as accurate as real time tide gauges which can provide an "absolute" model . The error budget for the used tide data was according the SW 22cm !

Side Scan Sonar: / Sub Bottom Profiler
SSS was set to 100 kHz and 100m range .
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SSS data are available as XTF-Files.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files but saved by the data acquisition SW as *.Tra ! It is not necessary to rename the files . Most seismic processing packages are able to import the data directly as SegY. OSAE tested the data import on REFLEX seismic processing SW and on ER Mapper visualisation SW without having any problems!
SSS records were annotated throughout the SW package and printed on an EPC 9600 plotter.
SBP records were annotated throughout the SW package and printed on an EPC 9600 plotter.
Especially the SSS records were effected by the weather on some lines but according to the client still of acceptable value which didn't represent OSAE's opinion in all stages.

Charting :
The layout was worked out by OSAE and the client. The chart was divided into six boxes.
Box one representing bathymetry - contour lines;
Box two representing bathymetry – shaded relief view; Box three representing SSS – mosaic; Box 4 representing SSS-tracks, Box 5 representing SBP- tracks and Box6 representing the location map.

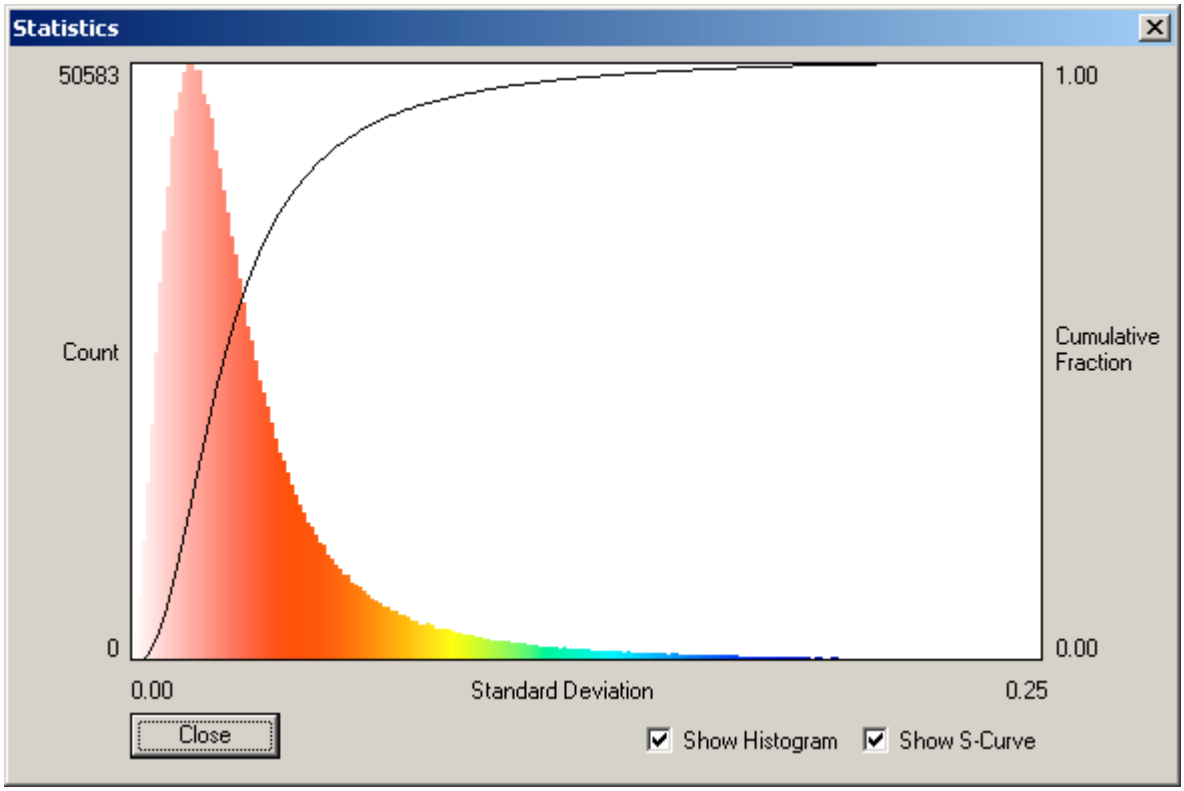

Figure 8.1.4-1 Standard Deviation Area 4

8.1.5 Area 5 Yuan's Pockmarks

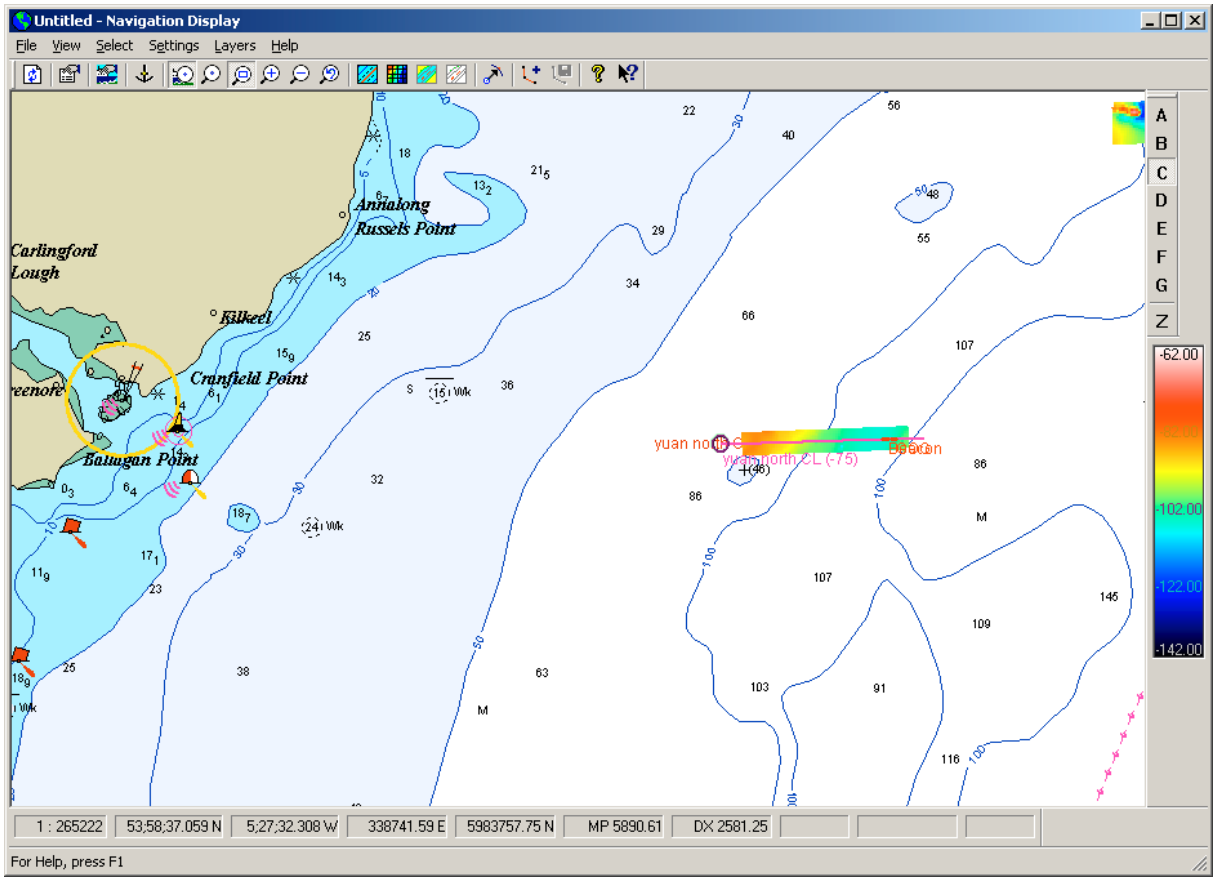

Figure 8.1.5-1 Overview Area 5

Area 5	Yuan's Pockmarks
Date of Survey:	31.08.2004/01.09.2004
Chart /Mosaic No.:	001/001 –
Chart Scale:	1 : 10000
No. of profiles:	14 lines and 5 cross lines
Line Spacing:	According clients request
SBP Trigger and Chirp length:	0.25s and 10ms
SSS Freq / Range	100 kHz / 100 m
Min / Max depth:	85m – 110m

General:

Figure 8.1.5-1 shows an overview of Area 5.
Two cross lines were surveyed for tidal control.
Figure 8.1.5-2 shows the standard deviation of the surveyed area.
The weather was good to moderate.
Nevertheless all data were processed in the best possible survey manner.
All other data were processed for spikes, tide corrected to LAT (Lowest Astronomical Tide) and charted.
The SSS and Bathymetry data are available as XTF files.
SSS and SBP data have not been fully interpreted as per contractual obligation.
SSS was set to 100 kHz and 100m range!
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files .

Bathymetry:

The line spacing was a choice of the client and driven by the MBES data density.The survey was laid out to reach 100% coverage of the proposed area. Sound velocity dips were performed daily or when the quality indicator of the MBES data shows a significant change. Altogether 18 lines and five planned cross lines were surveyed and a final S/V dip performed.

Vertical control

No POL data were required for that area due to the. Tide values were extracted from a standard tide program. The used tide stations was Ardglass.
The station was fed into OSAE's tide processing SW and a tide model was generated for the hole area. This guarantees a "relative" accurate model which is again only a model and not as accurate as real time tide gauges which can provide an "absolute" model . The error budget for the used tide data was according the SW 22cm !

Side Scan Sonar: / Sub Bottom Profiler
SSS was set to 100 kHz and 100m range .
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SSS data are available as XTF-Files.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files but saved by the data acquisition SW as *.Tra ! It is not necessary to rename the files . Most seismic processing packages are able to import the data directly as SegY. OSAE tested the data import on REFLEX seismic processing SW and on ER Mapper visualisation SW without having any problems!
SSS records were annotated throughout the SW package and printed on an EPC 9600 plotter.
SBP records were annotated throughout the SW package and printed on an EPC 9600 plotter.
Especially the SSS records were affected by the weather on some lines but according to the client still of acceptable value which didn't represent OSAE's opinion in all stages.
On half of the area SSS was positioned via manual layback after weak signals were investigated on both ATS Beacon.

Charting :
The layout was worked out by OSAE and the client. The chart was divided into five boxes.
Box one representing bathymetry - contour lines;
Box two representing bathymetry – shaded relief view; Box three representing SSS – mosaic; Box 4 representing SSS-tracks, Box 5 representing SBP- tracks ..

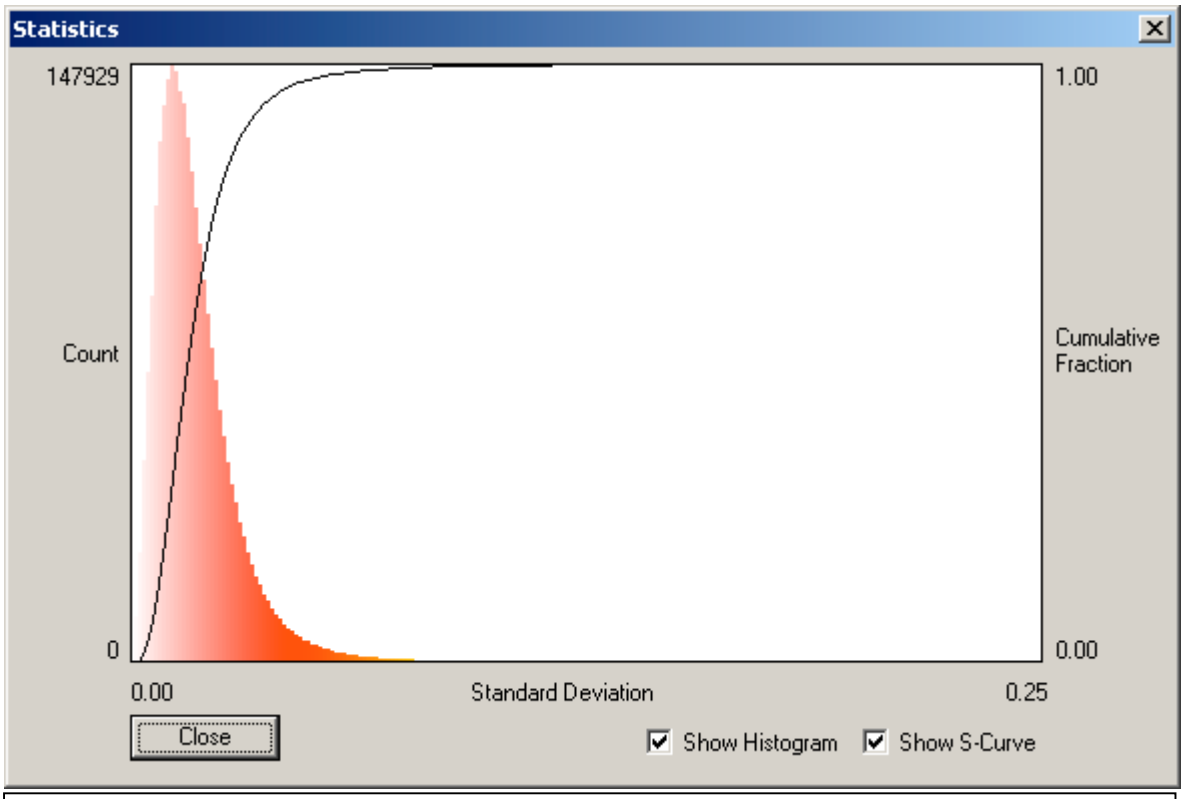

Figure 8.1.5-1 Standard Deviation of Area 5

8.1.6 Area 6 Peel Basin

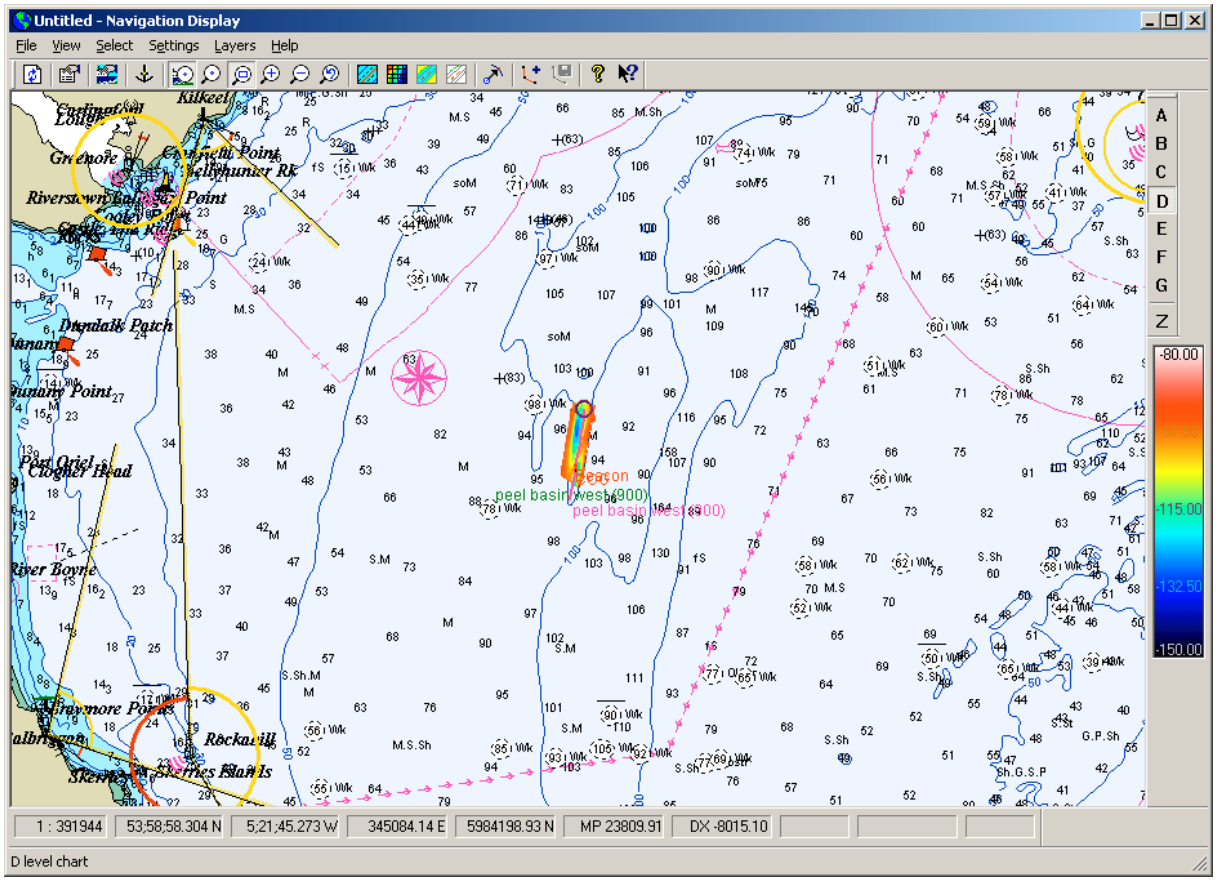

Figure 8.1.6-1 Overview Area 6

Area 6	Peel Basin
Date of Survey:	01.09.2004/02.09.2004
Chart /Mosaic No.:	001/001 –
Chart Scale:	1 : 10000
No. of profiles:	19 lines and 2 cross lines
Line Spacing:	According clients request
SBP Trigger and Chirp length:	0.25s and 10ms
SSS Freq / Range	100 kHz / 100 m
Min / Max depth:	95m – 135m

General:

Figure 8.1.6-1 shows an overview of Area 6.
Two cross lines were surveyed.for tidal control.
Figure 8.1.6-2 shows the standard deviation of the surveyed area.
The weather was good to moderate.
Nevertheless all data were processed in the best possible survey manner.
All other data were processed for spikes, tide corrected to LAT (Lowest Astronomical Tide) and charted.
The SSS and Bathymetry data are available as XTF files.
SSS and SBP data have not been fully interpreted as per contractual obligation.
SSS was set to 100 kHz and 100m range!
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files .

Bathymetry:

The line spacing was a choice of the client and driven by the MBES data density.The survey was laid out to reach 100% coverage of the proposed area. Sound velocity dips were performed prior and after the survey or when the quality indicator of the MBES data shows a significant change. Altogether 19 lines and two planned cross lines were surveyed.

Vertical control

No POL data were required for that area due to the. Tide values were extracted from a standard tide program. The used tide stations was Ardglass.
The station was fed into OSAE's tide processing SW and a tide model was generated for the hole area. This guarantees a "relative" accurate model which is again only a model and not as accurate as real time tide gauges which can provide an "absolute" model . The error budget for the used tide data was according the SW 22cm !

Side Scan Sonar: / Sub Bottom Profiler
SSS was set to 100 kHz and 100m range .
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SSS data are available as XTF-Files.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files but saved by the data acquisition SW as *.Tra ! It is not necessary to rename the files . Most seismic processing packages are able to import the data directly as SegY. OSAE tested the data import on REFLEX seismic processing SW and on ER Mapper visualisation SW without having any problems!
SSS records were annotated throughout the SW package and printed on an EPC 9600 plotter.
SBP records were annotated throughout the SW package and printed on an EPC 9600 plotter.
Especially the SSS records were effected by the weather on some lines but according to the client still of acceptable value which didn't represent OSAE's opinion in all stages.
SSS was positioned via manual layback.

Charting :
The layout was worked out by OSAE and the client. The chart was divided into five boxes.
Box one representing bathymetry - contour lines;
Box two representing bathymetry – shaded relief view; Box three representing SSS – mosaic; Box 4 representing SSS-tracks, Box 5 representing SBP- tracks ..

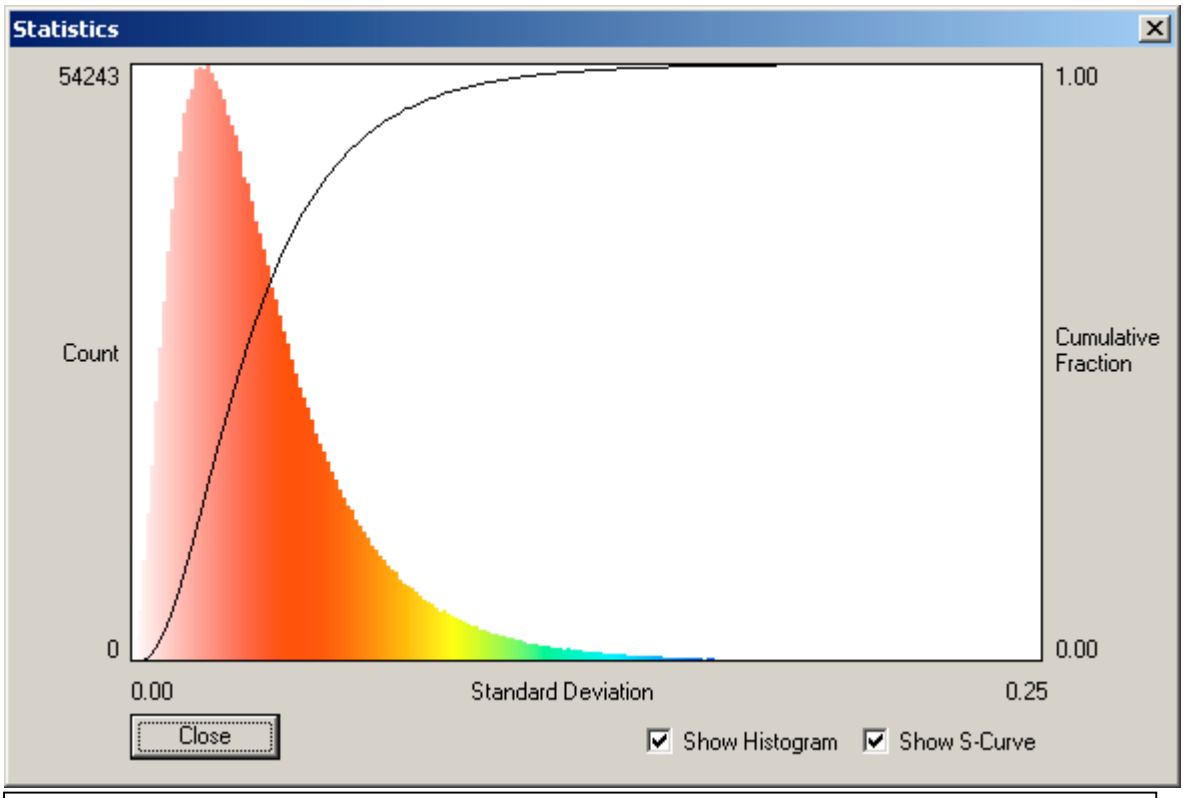

Figure 8.1.6-1 Standard Deviation of Area 6

8.1.7 Area 7 Texel11

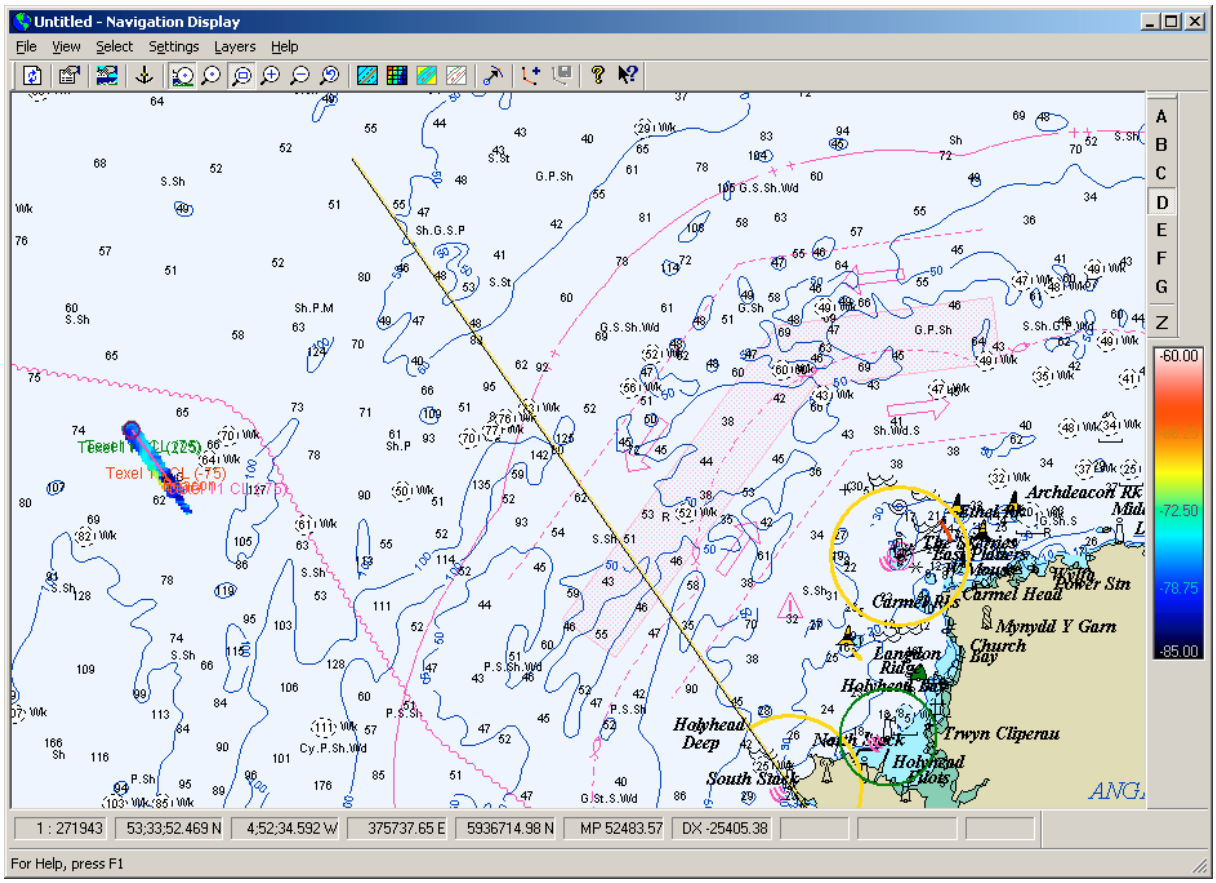

Figure 8.1.7-1 Overview Area 7 Texel11

Area 7	Texel 11
Date of Survey:	02.09.2004
Chart /Mosaic No.:	001/001 –
Chart Scale:	1 : 8000
No. of profiles:	7 lines and 2 cross lines
Line Spacing:	According clients request
SBP Trigger and Chirp length:	0.25s and 10ms
SSS Freq / Range	100 kHz / 100 m
Min / Max depth:	66m – 86m

General:

Figure 8.1.7-1 shows an overview of Area 7.
Two cross lines were surveyed.for tidal control.
Figure 8.1.7-2 shows the standard deviation of the surveyed area.
The weather was good to moderate.
Nevertheless all data were processed in the best possible survey manner.
All other data were processed for spikes, tide corrected to LAT (Lowest Astronomical Tide) and charted.
The SSS and Bathmetry data are available as XTF files.
SSS and SBP data have not been fully interpreted as per contractual obligation.
SSS was set to 100 kHz and 100m range!
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files .

Bathymetry:

The line spacing was a choice of the client and driven by the MBES data density.The survey was laid out to reach 100% coverage of the proposed area. Sound velocity dips were performed prior and after the survey or when the quality indicator of the MBES data shows a significant change. Altogether 19 lines and two planned cross lines were surveyed.

Vertical control

No POL data were required for that area due to the. Tide values were extracted from a standard tide program. The used tide stations was Holyhead.
The station was fed into OSAE's tide processing SW and a tide model was generated for the hole area. This guarantees a "relative" accurate model which is again only a model and not as accurate as real time tide gauges which can provide an "absolute" model . The error budget for the used tide data was according the SW 22cm !

Side Scan Sonar: / Sub Bottom Profiler
SSS was set to 100 kHz and 100m range .
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SSS data are available as XTF-Files.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files but saved by the data acquisition SW as *.Tra ! It is not necessary to rename the files . Most seismic processing packages are able to import the data directly as SegY. OSAE tested the data import on REFLEX seismic processing SW and on ER Mapper visualisation SW without having any problems!
SSS records were annotated throughout the SW package and printed on an EPC 9600 plotter.
SBP records were annotated throughout the SW package and printed on an EPC 9600 plotter.
Especially the SSS records were effected by the weather on some lines but according to the client still of acceptable value which didn't represent OSAE's opinion in all stages.
SSS was positioned via manual layback.

Charting :
The layout was worked out by OSAE and the client. The chart was divided into five boxes.
Box one representing bathymetry - contour lines;
Box two representing bathymetry – shaded relief view; Box three representing SSS – mosaic; Box 4 representing SSS-tracks, Box 5 representing SBP- tracks ..

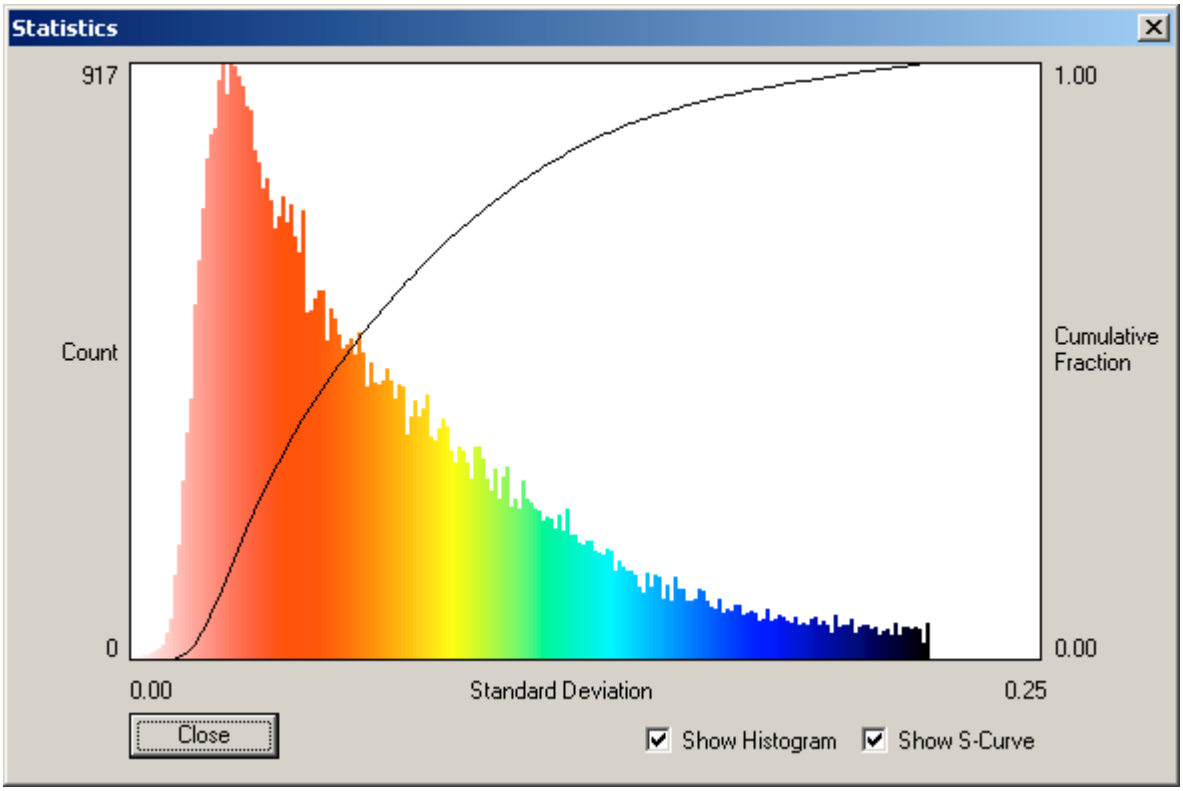

Figure 8.1.7-1 Standard Deviation of Area 7

8.1.8 Area 8 – Texel 10

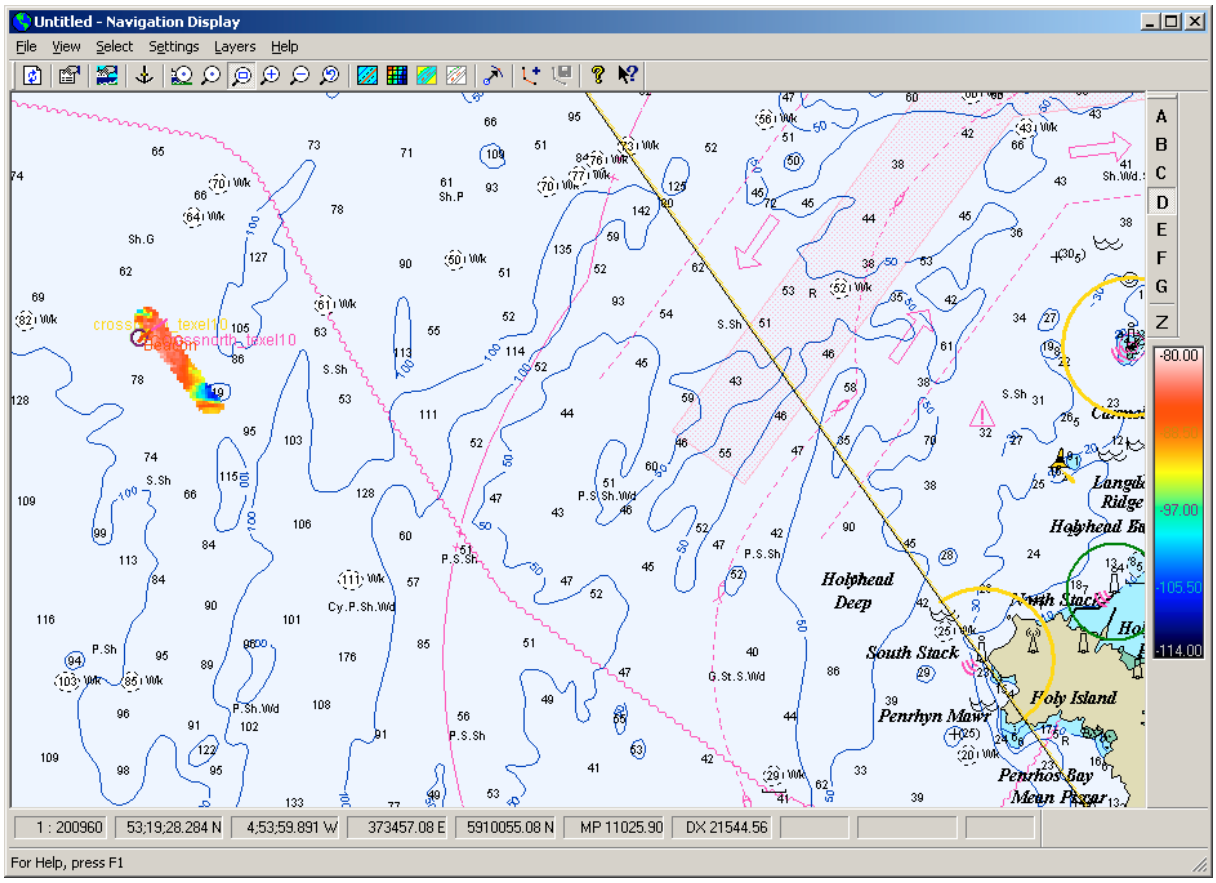

Figure 8.1.8-1 Overview Area 8

Area 8	Texel 10
Date of Survey:	02.09.2004 / 03.09.2004
Chart /Mosaic No.:	001/001 –
Chart Scale:	1 : 8000
No. of profiles:	7 lines and 1 cross line
Line Spacing:	According clients request
SBP Trigger and Chirp length:	0.25s and 10ms
SSS Freq / Range	100 kHz / 100 m
Min / Max depth:	76m – 111m

General:

Figure 8.1.8-1 shows an overview of Area 8.
One cross line was surveyed.for tidal control.
Figure 8.1.7-2 shows the standard deviation of the surveyed area.
The weather was good to moderate.
Nevertheless all data were processed in the best possible survey manner.
All other data were processed for spikes, tide corrected to LAT (Lowest Astronomical Tide) and charted.
The SSS and Bathmetry data are available as XTF files.
SSS and SBP data have not been fully interpreted as per contractual obligation.
SSS was set to 100 kHz and 100m range!
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files .

Bathymetry:

The line spacing was a choice of the client and driven by the MBES data density.The survey was laid out to reach 100% coverage of the proposed area. Sound velocity dips were performed prior and after the survey or when the quality indicator of the MBES data shows a significant change. Altogether 7 lines and one planned cross lines were surveyed.

Vertical control

No POL data were required for that area due to the. Tide values were extracted from a standard tide program. The used tide stations was Holyhead.
The station was fed into OSAE's tide processing SW and a tide model was generated for the hole area. This guarantees a "relative" accurate model which is again only a model and not as accurate as real time tide gauges which can provide an "absolute" model . The error budget for the used tide data was according the SW 22cm !

Side Scan Sonar: / Sub Bottom Profiler
SSS was set to 100 kHz and 100m range .
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SSS data are available as XTF-Files.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files but saved by the data acquisition SW as *.Tra ! It is not necessary to rename the files . Most seismic processing packages are able to import the data directly as SegY. OSAE tested the data import on REFLEX seismic processing SW and on ER Mapper visualisation SW without having any problems!
SSS records were annotated throughout the SW package and printed on an EPC 9600 plotter.
SBP records were annotated throughout the SW package and printed on an EPC 9600 plotter.
Especially the SSS records were effected by the weather on some lines but according to the client still of acceptable value which didn't represent OSAE's opinion in all stages.
SSS was positioned via manual layback.

Charting :
The layout was worked out by OSAE and the client. The chart was divided into five boxes.
Box one representing bathymetry - contour lines;
Box two representing bathymetry – shaded relief view; Box three representing SSS – mosaic; Box 4 representing SSS-tracks, Box 5 representing SBP- tracks ..

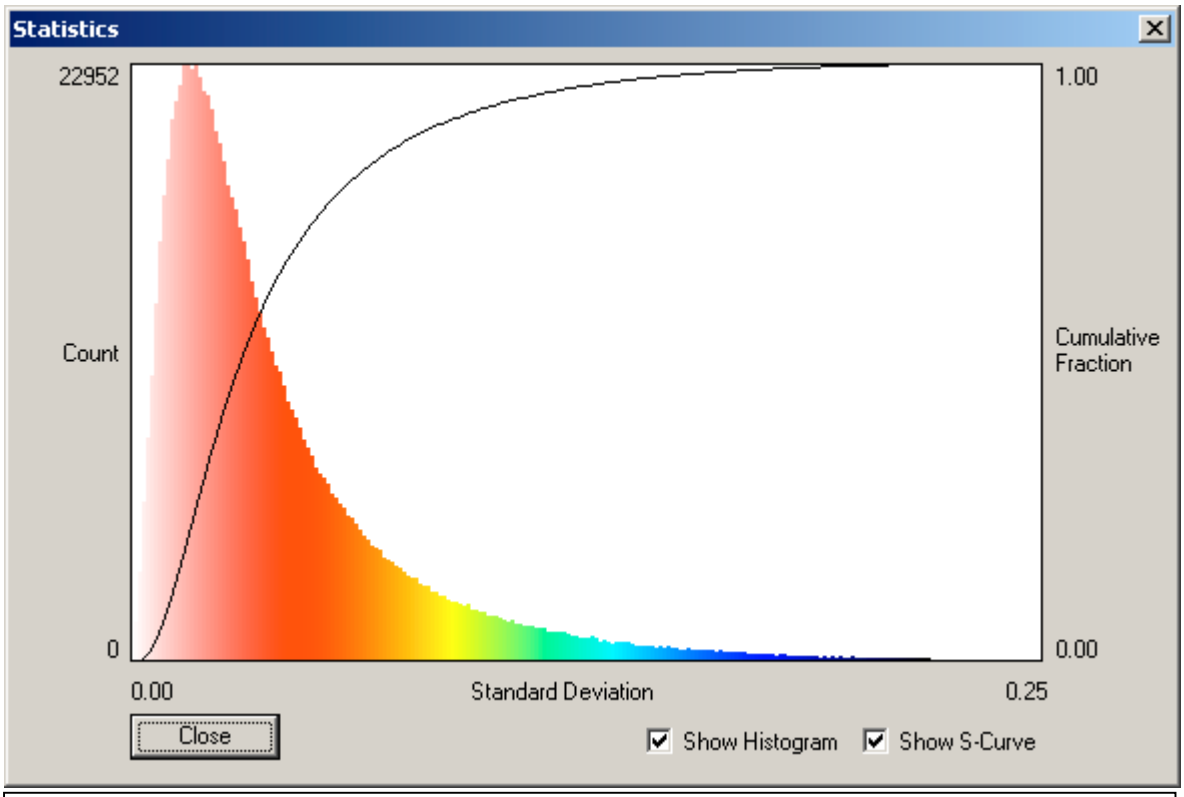

Figure 8.1.8-1 *Standard Deviation of Area 8 – Texel 10*

8.1.9 Area 9 – Harvey's Trench

Area 9	Harvey's Trench
Date of Survey:	05.09.2004 / 06.09.2004
Chart /Mosaic No.:	001/001 –
Chart Scale:	1 : 10 000
No. of profiles:	7 lines and 24 cross lines
Line Spacing:	According clients request
SBP Trigger and Chirp length:	0.25s and 10ms
SSS Freq / Range	100 kHz / 100 m
Min / Max depth:	86m – 177m

General:

Seven lines and twenty-four cross lines were surveyed. The cross lines were surveyed along the trench so the main route was crossing the trench.
Figure 8.1.9-2 shows the standard deviation of the surveyed area.
The weather was good to moderate.
Nevertheless all data were processed in the best possible survey manner.
All other data were processed for spikes, tide corrected to LAT (Lowest Astronomical Tide) and charted.
The SSS and Bathymetry data are available as XTF files.
SSS and SBP data have not been fully interpreted as per contractual obligation.
SSS was set to 100 kHz and 100m range!
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files .

Bathymetry:

The line spacing was a choice of the client and driven by the MBES data density.The survey was laid out to reach 100% coverage of the proposed area. Sound velocity dips were performed prior and after the survey or when the quality indicator of the MBES data shows a significant change. Altogether 7 lines and 24 planned cross lines were surveyed.

Vertical control

No POL data were required for that area due to the. Tide values were extracted from a standard tide program. The used tide stations was Holyhead
The station was fed into OSAE's tide processing SW and a tide model was generated for the hole area. This guarantees a "relative" accurate model which is again only a model and not as accurate as real time tide gauges which can provide an "absolute" model . The error budget for the used tide data was according the SW 22cm !

Side Scan Sonar: / Sub Bottom Profiler
SSS was set to 100 kHz and 100m range .
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SSS data are available as XTF-Files.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files but saved by the data acquisition SW as *.Tra ! It is not necessary to rename the files . Most seismic processing packages are able to import the data directly as SegY. OSAE tested the data import on REFLEX seismic processing SW and on ER Mapper visualisation SW without having any problems!
SSS records were annotated throughout the SW package and printed on an EPC 9600 plotter.
SBP records were annotated throughout the SW package and printed on an EPC 9600 plotter.
Especially the SSS records were affected by the weather on some lines but according to the client still of acceptable value which didn't represent OSAE's opinion in all stages.
SSS was positioned via manual layback.

Charting :
The layout was worked out by OSAE and the client. The chart was divided into five boxes.
Box one representing bathymetry - contour lines;
Box two representing bathymetry – shaded relief view; Box three representing SSS – mosaic; Box 4 representing SSS-tracks, Box 5 representing SBP- tracks ..

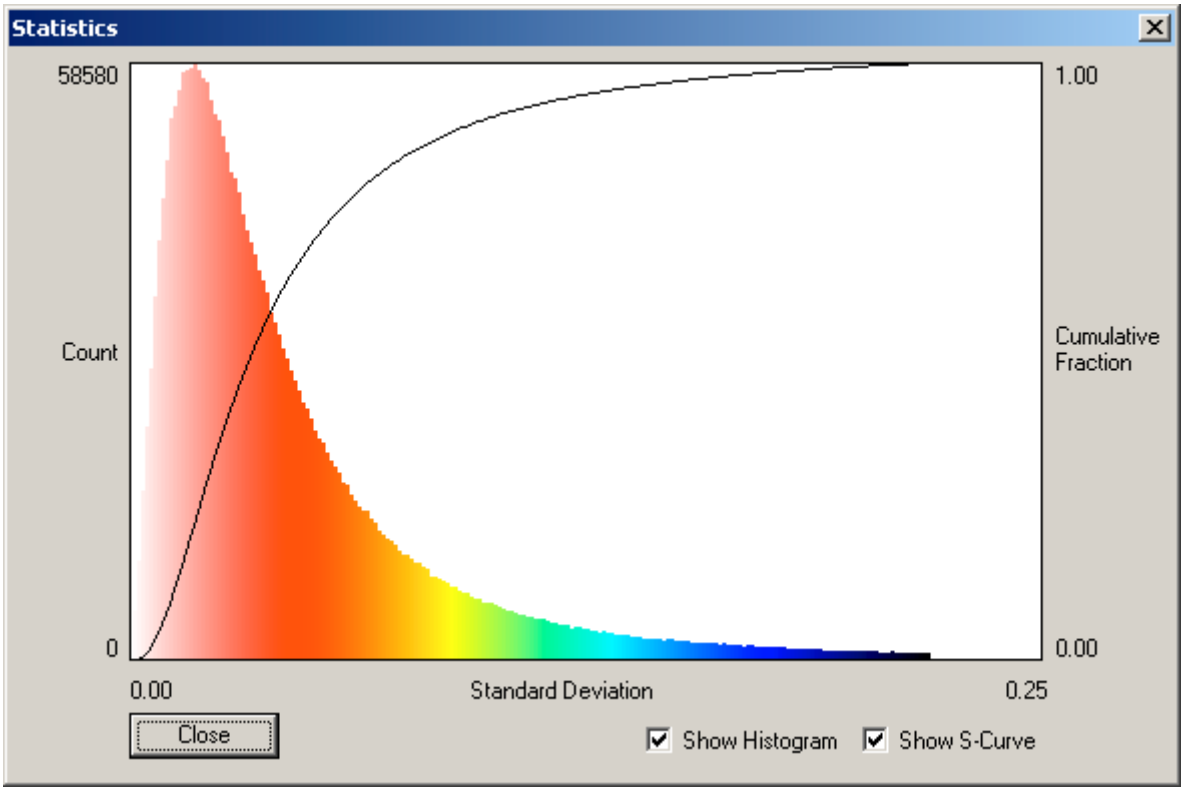

Figure 8.1.9-1 Standard Deviation of Area 9 – Harvey's Trench

8.1.10 Area 10 – Codling Extension

Area 10	Codling Extension
Date of Survey:	04.09.2004 / 05.09.2004
Chart /Mosaic No.:	001/001 –
Chart Scale:	1 : 10 000
No. of profiles:	10 lines and 2 cross lines
Line Spacing:	According clients request
SBP Trigger and Chirp length:	0.25s and 10ms
SSS Freq / Range	100 kHz / 100 m
Min / Max depth:	60m – 140m

General:

Ten lines and two cross lines were surveyed.
Figure 8.1.10-1 shows the standard deviation of the surveyed area.
The weather was moderate with sometimes strong winds.
Nevertheless all data were processed in the best possible survey manner.
All other data were processed for spikes, tide corrected to LAT (Lowest Astronomical Tide) and charted.
The SSS and Bathymetry data are available as XTF files.
SSS and SBP data have not been fully interpreted as per contractual obligation.
SSS was set to 100 kHz and 100m range!
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files .

Bathymetry:

The line spacing was a choice of the client and driven by the MBES data density. The survey was laid out to reach 100% coverage of the proposed area. Sound velocity dips were performed prior and after the survey or when the quality indicator of the MBES data shows a significant change. Altogether 10 lines and two planned cross lines were surveyed.

Vertical control
During the post process three significant zones were investigated in the data set and three positions were picked out were POL data were requested.
The POL data of the two stations were fed into OSAE's tide processing SW and a tide model was generated for the hole area .This guarantees a "relative" accurate model which is again only a model and not as accurate as real time tide gauges which can provide an "absolute" model . The error budget for the POL data is not available till today

Side Scan Sonar: / Sub Bottom Profiler
SSS was set to 100 kHz and 100m range .
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SSS data are available as XTF-Files.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files but saved by the data acquisition SW as *.Tra ! It is not necessary to rename the files . Most seismic processing packages are able to import the data directly as SegY. OSAE tested the data import on REFLEX seismic processing SW and on ER Mapper visualisation SW without having any problems!
SSS records were annotated throughout the SW package and printed on an EPC 9600 plotter.
SBP records were annotated throughout the SW package and printed on an EPC 9600 plotter.
Especially the SSS records were affected by the weather on some lines but according to the client still of acceptable value which didn't represent OSAE's opinion in all stages.
SSS was positioned via manual layback.

Charting :
OSAE and the client worked out the layout. The Area was separated into two charts each divided into five boxes.
Box one representing bathymetry - contour lines;
Box two representing bathymetry – shaded relief view; Box three representing SSS – mosaic; Box 4 representing SSS-tracks and Box 5 representing SBP- tracks ..

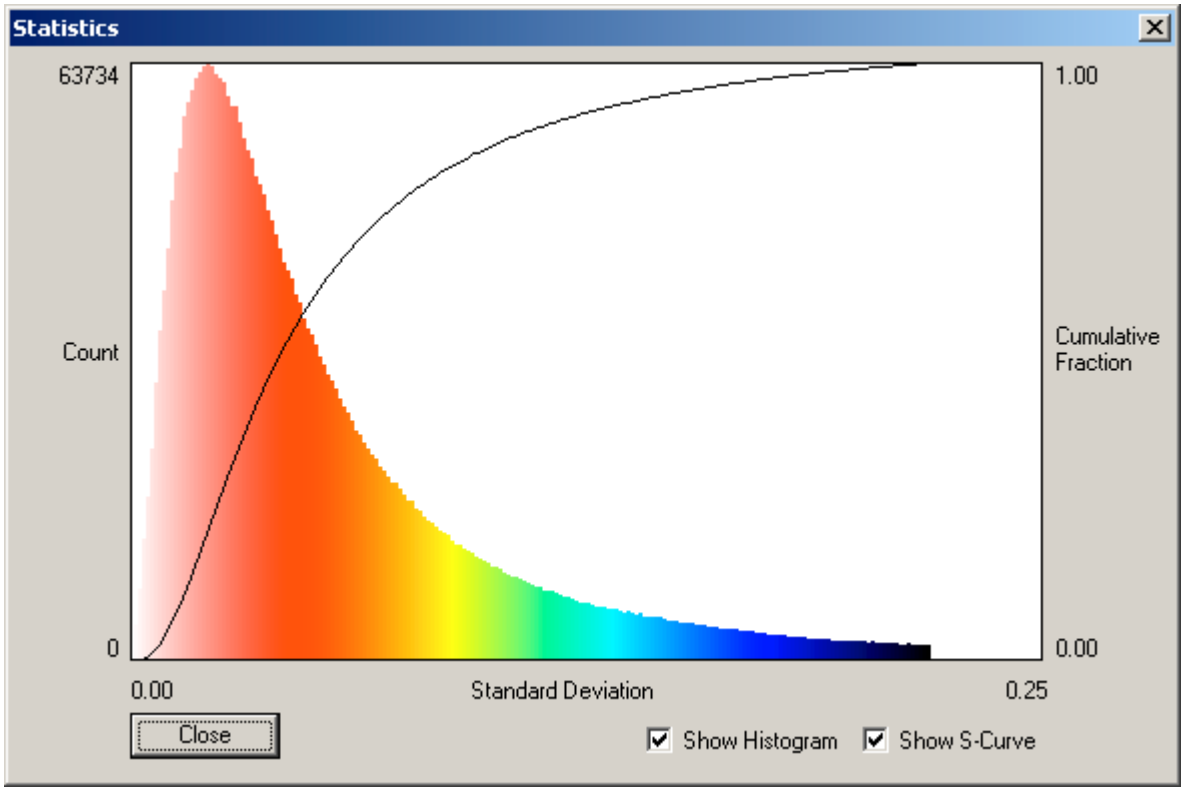

Figure 8.1.10-1 Standard Deviation of Area 10 – Codling Extension

8.1.11 Area11 Whittington Domes

Area 11	Whittington Domes
Date of Survey:	06.09.2004 / 07.09.2004
Chart /Mosaic No.:	001/001 –
Chart Scale:	1 : 9000
No. of profiles:	19 lines and 2 cross lines
Line Spacing:	According clients request
SBP Trigger and Chirp length:	0.25s and 10ms
SSS Freq / Range	100 kHz / 100 m
Min / Max depth:	48m – 62m

General:

Nineteen lines and two cross lines were surveyed.
Figure 8.1.11-1 shows the standard deviation of the surveyed area.
The weather was moderate with later strong winds.
Nevertheless all data were processed in the best possible survey manner.
All other data were processed for spikes, tide corrected to LAT (Lowest Astronomical Tide) and charted.
The SSS and Bathymetry data are available as XTF files.
SSS and SBP data have not been fully interpreted as per contractual obligation.
SSS was set to 100 kHz and 100m range!
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files .

Bathymetry:

The line spacing was a choice of the client and driven by the MBES data density. The survey was laid out to reach 100% coverage of the proposed area. Sound velocity dips were performed prior and after the survey or when the quality indicator of the MBES data shows a significant change. Altogether 19 lines and two planned cross lines were surveyed.

Vertical control

No POL data were required for that area due to the. Tide values were extracted from a standard tide program. The used tide stations was Holyhead
The station was fed into OSAE's tide processing SW and a tide model was generated for the hole area. This guarantees a "relative" accurate model which is again only a model and not as accurate as real time tide gauges which can provide an "absolute" model . The error budget for the used tide data was according the SW 22cm

Side Scan Sonar: / Sub Bottom Profiler
SSS was set to 100 kHz and 100m range .
The Chirp sub bottom profiler was triggered with 0.25 s and a chirp length of 10 milliseconds.
SSS data are available as XTF-Files.
SBP data are available as Tra files which are 16-Bit Motorola SegY Files but saved by the data acquisition SW as *.Tra ! It is not necessary to rename the files . Most seismic processing packages are able to import the data directly as SegY. OSAE tested the data import on REFLEX seismic processing SW and on ER Mapper visualisation SW without having any problems!
SSS records were annotated throughout the SW package and printed on an EPC 9600 plotter.
SBP records were annotated throughout the SW package and printed on an EPC 9600 plotter.
Especially the SSS records were affected by the weather on some lines but according to the client still of acceptable value which didn't represent OSAE's opinion in all stages.
SSS was positioned via manual layback.

Charting :
OSAE and the client worked out the layout. The Area was separated into two charts each divided into five boxes.
Box one representing bathymetry - contour lines;
Box two representing bathymetry – shaded relief view; Box three representing SSS – mosaic; Box 4 representing SSS-tracks, Box 5 representing SBP- tracks and Box 6 representing a location map.

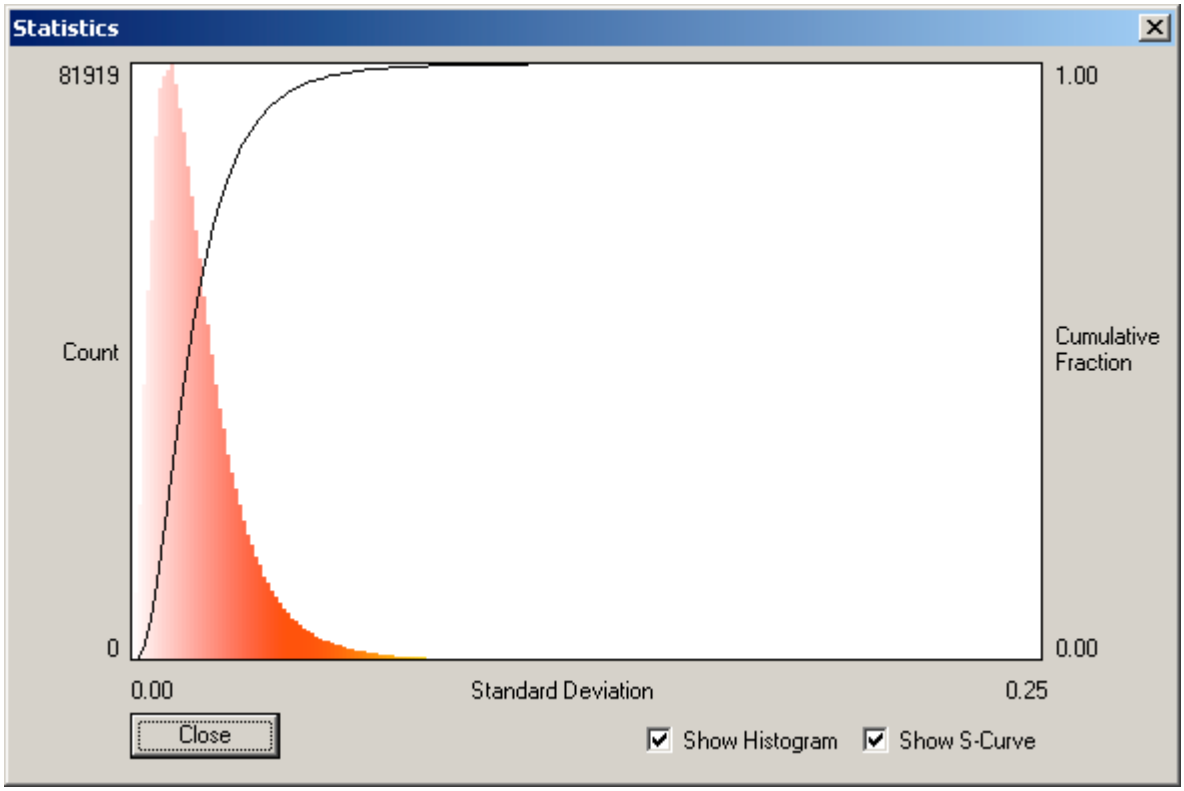

Figure 8.1.11-1 Standard Deviation Area 11 – Whittington Domes

8.1.12 Area12 Central Trench

Due to the bad weather conditions this area was cancelled from the survey program.

8.1.13 Area13 Wingfield's Pingo

Six lines were surveyed only with MBES and one additional cross line.
The weather was very bad and a lot of aeration degraded the data quality.
It was agreed with the client not to process the MBES data.
Only a shaded relief GeoTiff was produced for that area.

9 Operational summary

The following diagram gives an operational summary (Cruise A & B) of the survey activities of the SV Meridian during the SEA6-Meridian Project.

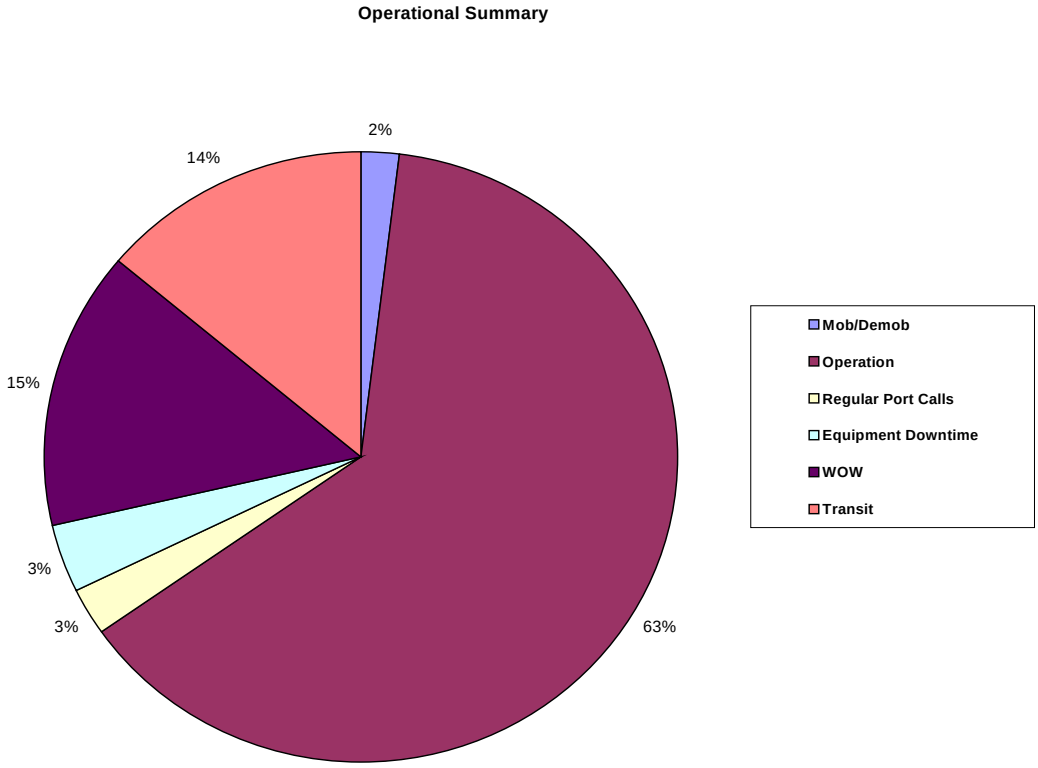

Figure 8.1.13-1 ***Operational Summary***

From a total of 871.25 hours, 550.75 hours were assigned to operation, 121.25 to transit, 128.75 to WOW, 22.75 to regular Port Calls; 30.25 to Equipment Downtime and 17.5 to mob / demob.

10 Appendix

10.1 Calibration Report

..\Calibration Report_final_V1_1.pdf

10.2 Daily Logs

Final\Daily NarrativeCruiseB.doc

10.3 Survey Log

\\helmsman-113\logs_meridian\Geotek 2004\Survey & Daily Log.xls

10.4 SSS & SBP Log

G:\216-04-803_raw_von_online_sss_sbp\Logs_korrigiert\unkorrigiert\SBP-SSS-GEO2004_cruiseB1.xls
G:\216-04-803_raw_von_online_sss_sbp\Logs_korrigiert\unkorrigiert\SBP-SSS-GEO2004_cruiseB2.xls

10.5 List of deliverables

List of deliverables (as per delivery note 09.09.2004):

Item	Quantity	Description	Media
1	2	Survey Report incl.Calibration Report incl. MCA Report	CD
2	4	Boxes SSS & SBP hardcopies Cruise A	Paper
3	3	Boxes SSS 6 SBP hardcopies Cruise B	Paper
4	1	Box DESO25 SBES hardcopies Cruise A	Paper
5	1	Set of charts containing 29charts incl. Cruise A Area 3 (Geotek)	Paper
6	1	Set of charts containing 29charts incl. Cruise A Area 3 (BGS)	Paper
7	1	Set of charts containing 29charts incl. Cruise A Area 3 (DTI)	Paper
8	3	Overview charts	Paper
9	1	Digital Survey data	Hard Disc

Table 10-1: ***List of deliverables.***

Digital Survey data:
SSS-XTF / MBES-XTF / SBP-Tra / SBP-Par / SVP-ASCII / Tide-ASCII / SBP-UKOOA / Gridded xyz / Shaded Relief-Geo Tiff / Mosaic-Geo Tiff / Charts-PDF and PLT

The project structure from Caris will be extracted and delivered end of September 2004.
The data shall be forwarded to the MCA.