

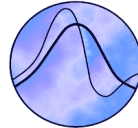
# PROCESSING REPORT

## Offshore Israel 2001 East Mediterranean Sea Phase I 2D Gravity and Magnetic Survey

*Prepared for*  
**TGS–NOPEC Geophysical Company**



*Acquired by*  
**Austin Exploration Inc.**



Austin Exploration Inc.

*Processed by*

# ARK

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# 1. Introduction

## Survey details :

Location	:	Offshore Israel
Survey type	:	2D marine gravity and magnetics
Acquisition dates	:	19 <sup>th</sup> September – 22 <sup>nd</sup> December 2001
Vessel	:	M/V Northern Access
Survey kilometerage	:	8043.90 km

The survey line layout is shown in Figure 1.

Relevant geodetic parameters can be found in Appendix A.

A list of equipment used during this survey can be found in Appendix B.

This report describes the processing procedures applied, defines the problems encountered and details the products generated during the course of this project. Data processing was carried out by ARK Geophysics Limited under the supervision of Matthew Croft.

## 2. Data received

### Data received from Austin Exploration Inc. and TGS–NOPEC :

#### 8<sup>th</sup> October 2001

2 ZIP disks containing gravity, magnetic data & raw navigation

1 8mm tape containing P1/90 navigation

Gravity & magnetic analogue records and navigation logs

#### 7<sup>th</sup> November 2001

3 ZIP disks containing gravity & magnetic data, raw navigation and paperwork

1 8mm tape containing P1/90 navigation

Gravity & magnetic analogue records, acquisition report and navigation logs

#### 21<sup>st</sup> November 2001

3 ZIP disks containing gravity & magnetic data, raw navigation and paperwork

1 8mm tape containing P1/90 navigation

Gravity & magnetic analogue records, still readings and navigation logs

#### 7<sup>th</sup> December 2001

3 ZIP disks containing gravity & magnetic data, raw navigation and paperwork

1 8mm tape containing P1/90 navigation

Gravity & magnetic analogue records, still readings and navigation logs

#### 14<sup>th</sup> January 2002

2 ZIP disks containing gravity & magnetic data, raw navigation and paperwork

1 8mm tape containing P1/90 navigation

Gravity & magnetic analogue records and navigation logs

### 3. Navigation

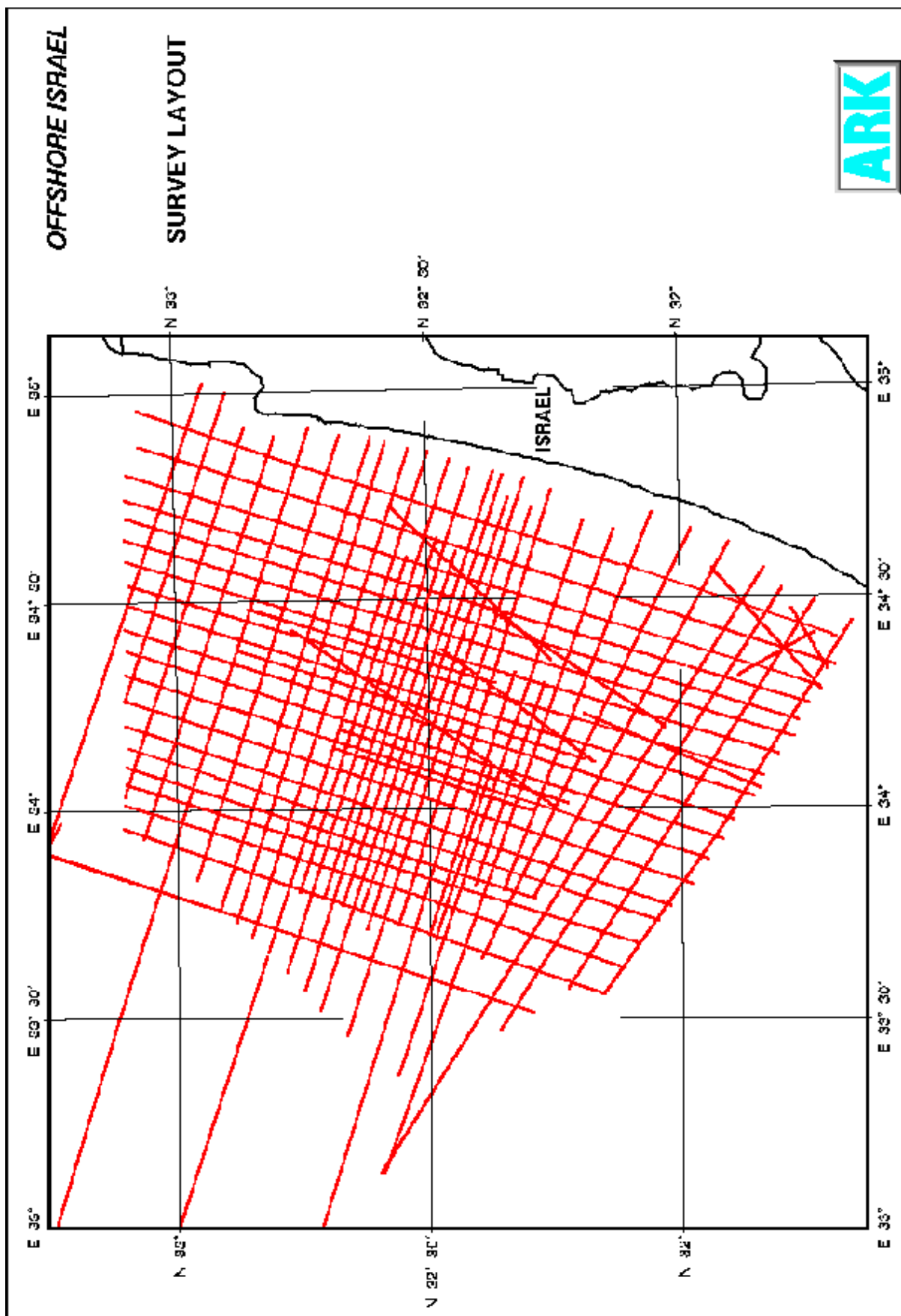
Shot point spacing	: 25 m
Shot point position	: Vessel NRP
Line spacing	: 2km to 7km

Shotpoint, Julian day and time information was extracted from the logs supplied by the acquisition contractor and cross-referenced with the P1/90 navigation. The P1/90 data were used for the final line positioning. The P1/90 data were used to calculate the Eötvös correction.

The survey layout is shown in Figure 1.

A listing of survey lines with both survey names and ARK internal line numbers appears in Appendix C.

Figure 1



## 4. Bathymetry data processing

### Data source

Bathymetry values were extracted from the P1/90 navigation data.

### Bathymetry sign convention

In the ARKive system, bathymetry values are stored as a negative quantity with sea level as zero.

### Data inspection

All lines were visually inspected using the ARK interactive graphical editor (XED).

### Data quality

Data quality was good to average. Problems were encountered with drop outs and spikes occurring at various depths on certain lines, these may have been due to adverse sea conditions.

### Data editing

Erroneous data were edited where required on certain lines.

A list of erroneous data can be found in Appendix E

### Offset correction

Using information supplied by Austin Exploration Inc., a lead correction of 5.0 m was applied to the bathymetry locations to compensate for the distance between the fathometer and the navigation co-ordinate position.

### Draught correction

Fathometer sensors are located below the water line. A draught correction was performed by TGS–NOPEC.



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## 5. Gravity data processing

### Data source

The gravity data were acquired using LaCoste & Romberg (s/n S27) equipped with a ULTRASYS upgraded acquisition system. Relevant data channels were extracted from the ZIP disks.

### Unit conversion

A unit conversion of 1.0184 was required as the gravity data were supplied in counter units.

### Data merge with navigation

The P1/90 navigation data were merged with the gravity dataset using Julian Day and time information.

### Offset correction

Using information supplied by Austin Exploration Inc., a lag correction of 20.8 m was applied to the gravity data to compensate for the distance between the gravity meter and the navigation co–ordinate position.

### Eötvös correction and meter lag correction

The Eötvös correction is the most important factor determining the accuracy of gravity data acquired on a moving platform. The Eötvös correction was computed using time and position information from the P1/90 navigation data. Using the ARK interactive data editor (XED), profiles of raw gravity and the Eötvös correction were inspected for correlation of events in both amplitude and time. The Eötvös correction was filtered with a multiple stage RC filter of 3 x 20, 3 x 27, 6 x 27 and 1 x 65 seconds to remove characteristic high frequency noise caused by a lack of precision in the velocity calculations over short periods and to match the amplitude and phase of the Eötvös correction with the Eötvös noise within the gravity data.

The Eötvös correction was applied to the gravity values by means of a moving window cross–correlating algorithm which permits small lateral movements to compensate for phase imprecision and limited local scale changes, based on a minimum curvature principal. A 1km matching window was used, with amplitude gain limits of 0.7 and 1.3 and along track

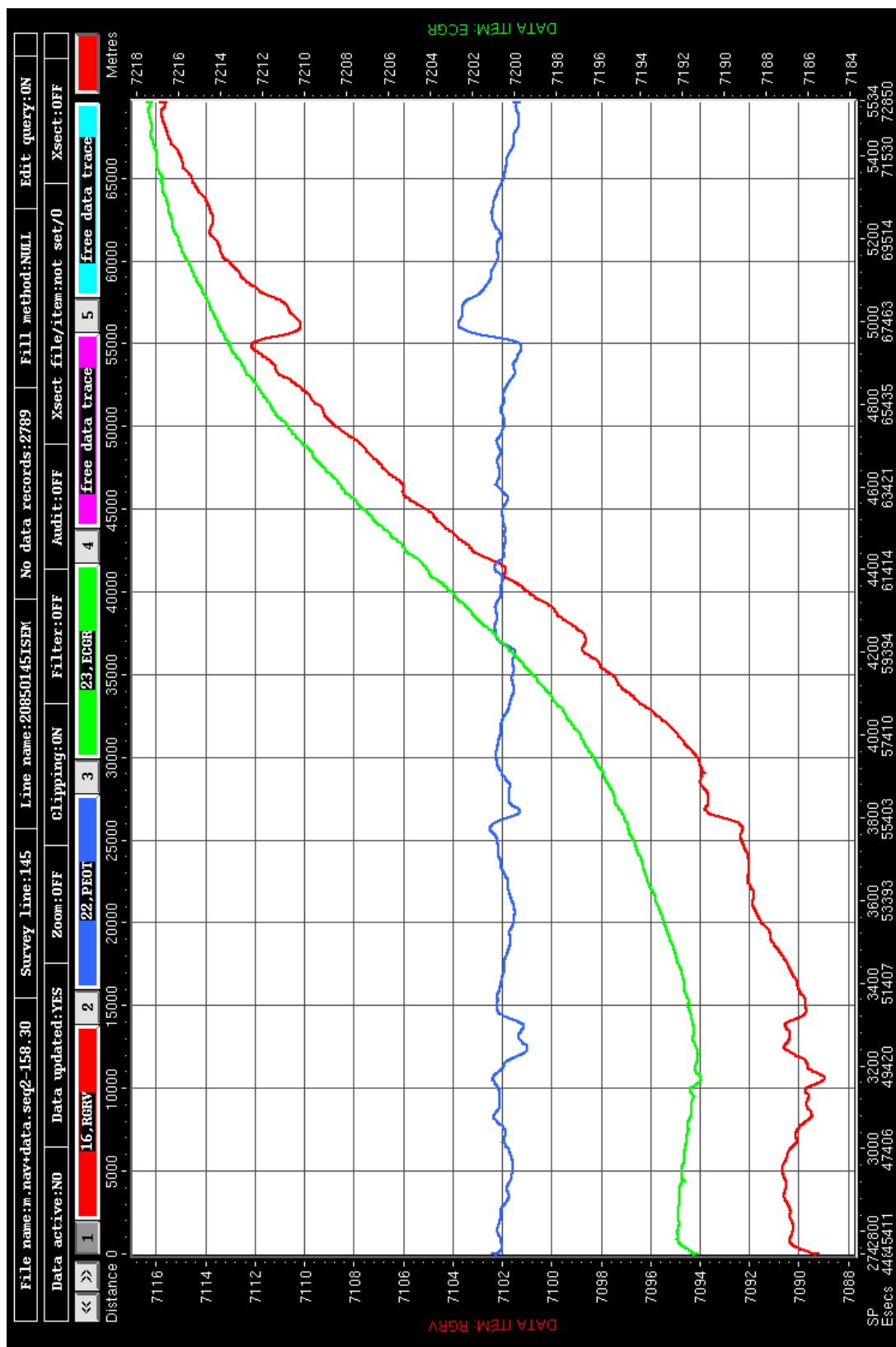
movement restricted to a maximum of 100m.

Examples of Eötvös compensation for local and major events can be seen in Figures 2 & 3.

In each case, the colours of the various traces are as follows :

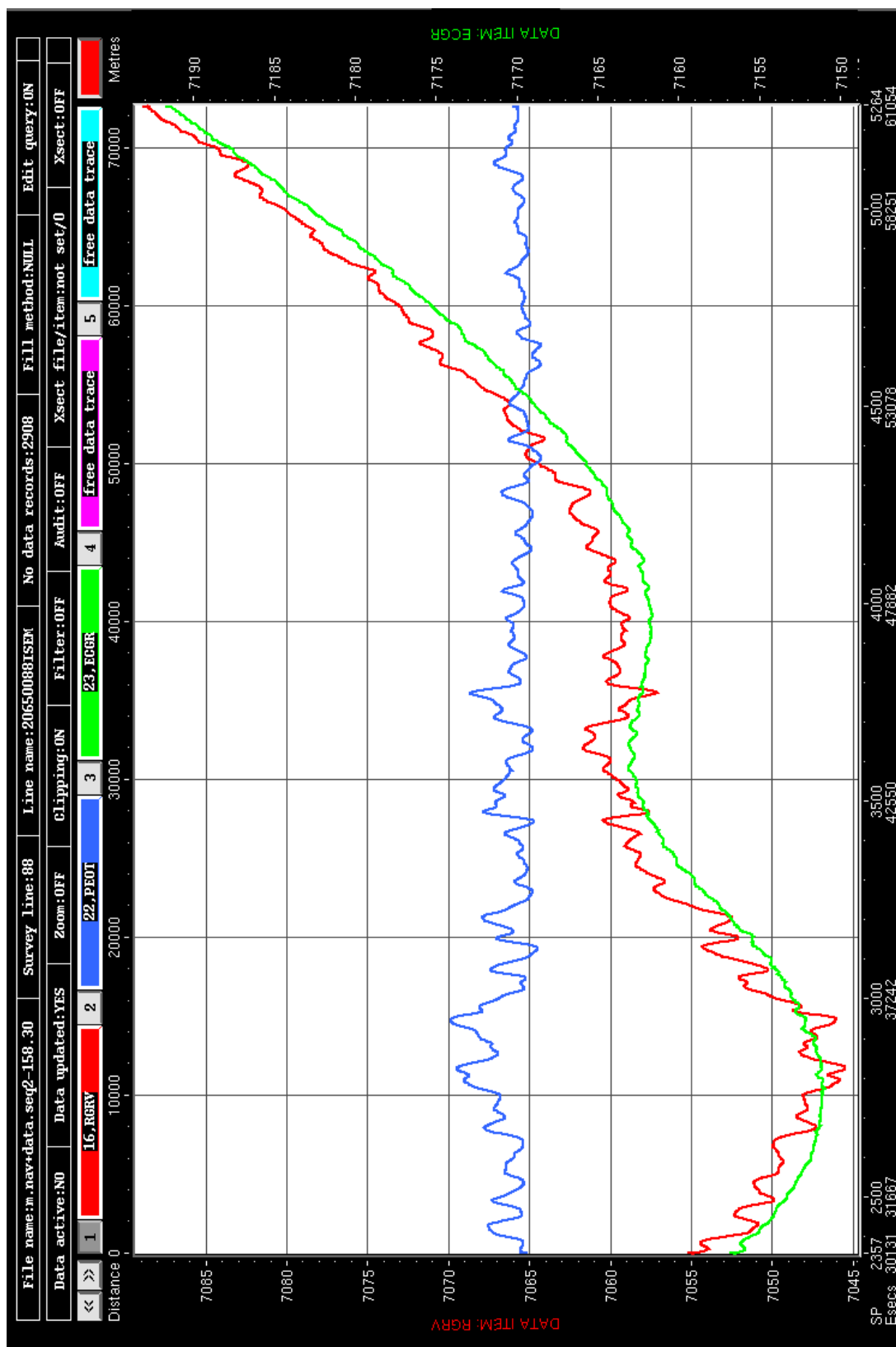
Red	:	Gravity prior to Eötvös correction
Blue	:	Filtered, synchronized Eötvös correction
Green	:	Eötvös corrected gravity

Figure 2



Example of Eötvös and gravity correlation Line 20850145ISEM

Figure 3



Example of Eötvös and gravity correlation Line 20650088ISEM

### **Instrument lag correction**

The Eötvös corrected gravity data values were corrected in time with respect to the navigation by 300 seconds to compensate for the delay between data capture and recording, introduced by the instrument's internal filters.

### **Latitude correction and base tie calculation**

Theoretical gravity was computed and subtracted from observed gravity at all survey points using the 1967 International Gravity Formula :

$$G_{(\text{theoretical})} = 978031.8 * (1.0 + 0.0053024 * \sin^2 \phi) - 0.0000059 * \sin^2 (2\phi) \text{ mGal}$$

This correction is routinely made to the acquired gravity data to compensate for the bulk effects of the Earth's mass and rotation which result in an increase in the gravitational field from the equator to the poles and is referred to as the latitude correction. An approximate base tie to a IGSN71 network station at Nicosia, Cyprus was performed using still reading data recorded at Bollard#70, container RORO dock, Limassol, Cyprus.

For details of the base constant calculation see Appendix D.

### **Bouguer correction**

The Bouguer correction was computed using a 3 dimensional algorithm from unlevelled bathymetry line data and a levelled bathymetry grid extended beyond the survey area by 30km using GTOPO30 Topex global topography supplied by the Institute of geophysics and Planetary Physics UCDS (Ref. Smith, W.H.F. And D.T. Sandwell, Science, v.277, p. 1956–1962, 26 September, 1997). A correction density of 2.0gm/cc was selected as the most suitable for the area.

### **Bouguer gravity**

Bouguer gravity was derived by summing the free air gravity and the 3D Bouguer correction.

### **Data quality assessment**

A data quality assessment was made by analyzing the standard deviations of data wavelengths shorter than 4km, line by line, as defined by application of a cosine tapered filter. Lines were

ranked in order of increasing standard deviation. This list is shown in Appendix F.

### **Along–line gravity filtering and final editing**

Low–pass filters were applied to the free air and Bouguer gravity data according to their quality index as defined previously. A full list of filter lengths applied can be found in Section 7. The data were further inspected using the ARK interactive graphical editor.

## 6. Magnetic data processing

### **Data Source**

The magnetic data were acquired using a Geometrics 801 proton magnetometer system with a towed sensor. Relevant data channels were extracted from the ZIP disks.

### **Data merge with navigation**

P190 navigation data were merged with the magnetic dataset using Julian Day and time information.

### **Data quality and editing**

The magnetic data were found to be of good quality. Spikes were edited where found, a list of these can be found in appendix E.

### **Offset correction**

Using information supplied by Austin Exploration Inc., a lag correction of 283.0 m was applied to the magnetic data to compensate for the distance between the magnetometer sensor and the navigation co-ordinate position.

### **IGRF subtraction**

The International Geomagnetic Reference Field (IGRF 2000 model) updated to the epoch of the survey was calculated and subtracted from the offset corrected magnetic data.

### **Diurnal subtraction**

The magnetic data were checked for the effects of diurnal events. Diurnal may affect some of the data although a subtraction was not performed due to the difficulty in obtaining suitable data covering the period and location of the survey.

## 7. Line filtering

### Bathymetry

Bathymetry data were filtered along line with a 70% cosine tapered boxcar operator of 1 km cutoff.

### Magnetics

Magnetic anomaly data were filtered along line with a 70% cosine tapered boxcar operator of between 1 and 6 km cutoff.

### Gravity

Following statistical analysis of the gravity dataset, quality dependent filters were applied to the data, based on the standard deviation figures generated from wavelengths shorter than 4.0km. The following table gives the relationship between standard deviation and low pass filter cutoff wavelength applied to the dataset :

Std dev. (mGal)	Filter cutoff (Km)
0.05	0.75
0.07	1.00
0.10	1.30
0.12	1.40
0.15	1.60
0.17	2.00
0.20	2.50
0.25	3.00
0.30	3.50
0.40	4.00
0.50	4.50
0.60	5.00
0.80	5.50
1.00	6.00
2.00	8.00

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 In the table below, line names and internal numbers are given, together with the mean point spacing per line and the low pass filter cutoff information in both Km and data points.  
 The filter is a 70% cosine tapered boxcar.  
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Line name	Line number	Mean point spacing	Filter (km)	length (dp)	Std. Dev.	Quality Index
40070002	2	24.99	0.75	30.01	0.044	1



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40010004IS01	4	24.99	0.98	39.01	0.068	1
40020007IS01	7	24.99	0.80	32.01	0.054	1
40040008IS01	8	25.00	0.82	33.00	0.056	1
40040009IS01	9	25.00	0.84	33.50	0.057	1
10340011IS01	11	25.00	0.75	30.00	0.046	1
10340012ISEM	12	25.00	0.75	30.00	0.048	1
10420013ISEM	13	24.99	0.93	37.01	0.064	1
40350014IS01	14	24.99	0.75	30.01	0.048	1
40470017IS01	17	25.00	1.21	48.40	0.091	2
40470018IS01	18	25.00	1.07	42.81	0.077	1
40370019IS01	19	24.99	0.75	30.01	0.046	1
10500020ISEM	20	24.99	1.03	41.21	0.073	1
40740021IS01	21	25.00	3.84	153.38	0.367	8
40800022IS01	22	25.00	3.12	124.81	0.262	6
40800023IS01	23	25.00	2.23	89.35	0.184	5
10760024ISEM	24	24.99	1.41	56.55	0.122	4
10640025ISEM	25	24.99	1.29	51.61	0.099	2
10600026ISEM	26	25.00	0.75	30.01	0.047	1
40490028IS01	28	24.99	0.75	30.01	0.042	1
40490029IS01	29	25.00	2.66	106.41	0.216	5
20510030ISEM	30	25.00	0.81	32.50	0.055	1
40510031IS01	31	24.99	1.45	58.15	0.128	4
10040032ISEM	32	25.00	2.97	118.80	0.247	6
10100033ISEM	33	25.00	1.42	56.79	0.123	4
10100035ISEM	35	25.00	1.30	52.00	0.100	2
20450036ISEM	36	25.00	2.48	99.34	0.199	5
40530037IS01	37	25.00	0.75	30.00	0.050	1
20530038ISEM	38	25.00	1.19	47.60	0.089	2
40030039IS01	39	25.00	1.07	42.80	0.077	1
40450040IS01	40	25.00	3.61	144.39	0.322	7
10040041ISEM	41	25.00	2.81	112.42	0.231	6
40060042IS01	42	25.00	2.52	100.82	0.202	5
10100043ISEM	43	24.99	3.70	148.05	0.340	7
10100044ISEM	44	25.00	1.13	45.21	0.083	2
10100045ISEM	45	25.00	0.76	30.51	0.051	1
20450046ISEM	46	24.99	0.79	31.51	0.053	1
40450047IS01	47	24.99	0.75	30.01	0.041	1
40450048IS01	48	25.00	0.75	30.01	0.028	1
10100049ISEM	49	25.00	1.38	55.41	0.117	3
40330050IS01	50	25.00	0.93	37.00	0.064	1
10600051ISEM	51	25.00	0.89	35.51	0.061	1
10700052ISEM	52	24.99	0.77	31.01	0.052	1
10700053ISEM	53	24.99	0.85	34.01	0.058	1
10700054ISEM	54	24.99	1.21	48.41	0.091	2
10520055ISEM	55	24.99	0.75	30.01	0.038	1
10520056ISEM	56	25.00	0.75	30.01	0.037	1
10480057ISEM	57	24.99	0.75	30.01	0.040	1
10480059ISEM	59	25.00	1.00	40.01	0.070	1
10440060ISEM	60	25.00	0.93	37.00	0.064	1
10440061ISEM	61	25.00	0.84	33.50	0.057	1
10440062ISEM	62	25.00	0.82	33.01	0.056	1
10400064ISEM	64	25.00	1.20	48.01	0.090	2
40050065IS01	65	25.00	3.13	125.21	0.263	6
40050066IS01	66	24.99	0.88	35.01	0.060	1
10360067ISEM	67	25.00	0.90	36.01	0.062	1
20410068ISEM	68	25.00	3.37	134.79	0.287	7
40410070IS01	70	25.00	3.14	125.59	0.264	6
40430071IS01	71	25.00	3.51	140.39	0.302	7
20390072ISEM	72	25.00	2.63	105.20	0.213	5

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20350073ISEM	73	25.00	5.65	226.23	0.862	10
20270075ISEM	75	25.00	7.74	309.64	1.870	11
20310076ISEM	76	24.99	6.23	249.25	1.115	10
20150077ISEM	77	25.00	5.97	239.03	0.990	10
20110078ISEM	78	25.00	4.01	160.62	0.403	8
20110079ISEM	79	24.99	1.33	53.42	0.107	3
20070080ISEM	80	24.99	3.72	148.84	0.344	8
20150081ISEM	81	24.99	0.77	31.01	0.052	1
20150082ISEM	82	24.99	0.79	31.51	0.053	1
20310083ISEM	83	24.99	0.84	33.51	0.057	1
20350084ISEM	84	25.00	0.81	32.50	0.055	1
20350085ISEM	85	24.98	1.42	56.85	0.123	4
20570086ISEM	86	25.00	1.43	57.07	0.124	4
20650087ISEM	87	25.00	3.69	147.82	0.339	7
20650088ISEM	88	25.01	1.27	50.79	0.097	2
40410089IS01	89	25.00	1.33	53.41	0.107	3
40430090IS01	90	25.00	1.25	50.00	0.095	2
20230091ISEM	91	25.00	1.43	57.34	0.125	4
10190092ISEM	92	25.00	1.19	47.60	0.089	2
20170093ISEM	93	25.00	1.15	46.01	0.085	2
10190094ISEM	94	25.00	3.57	142.81	0.314	7
2003B095ISEM	95	25.00	1.54	61.61	0.141	4
10210097ISEM	97	25.00	1.25	50.01	0.095	2
2003B098ISEM	98	25.00	1.02	40.80	0.072	1
2003A099ISEM	99	24.99	0.91	36.51	0.063	1
10860100ISEM	100	24.99	1.57	62.68	0.145	4
40740102IS01	102	24.99	0.75	30.01	0.039	1
20770103ISEM	103	24.99	0.79	31.51	0.053	1
20810104ISEM	104	25.00	1.98	79.20	0.169	5
20850105ISEM	105	25.00	2.00	80.00	0.170	5
20850106ISEM	106	25.00	1.25	50.00	0.095	2
20770107ISEM	107	25.00	2.83	113.20	0.233	6
20730108ISEM	108	25.00	1.57	62.67	0.145	4
20730109ISEM	109	25.00	0.75	30.00	0.046	1
20730111ISEM	111	24.99	1.16	46.41	0.086	2
20810112ISEM	112	25.00	0.75	30.00	0.044	1
10360113ISEM	113	25.00	0.75	30.00	0.045	1
20270114ISEM	114	24.99	0.80	32.01	0.054	1
20170115ISEM	115	24.99	0.84	33.51	0.057	1
20230116ISEM	116	24.99	0.77	31.01	0.052	1
20230117ISEM	117	24.99	1.45	58.15	0.128	4
40590118IS01	118	25.00	1.40	56.01	0.120	3
20390119ISEM	119	24.99	0.84	33.51	0.057	1
20410120ISEM	120	25.00	0.75	30.01	0.041	1
40410121IS01	121	25.00	0.91	36.50	0.063	1
20610122ISEM	122	24.99	1.05	42.01	0.075	1
20610123ISEM	123	25.00	1.72	68.80	0.156	4
20690124ISEM	124	25.00	2.00	80.00	0.170	5
10340126ISEM	126	25.00	0.75	30.01	0.047	1
10340127ISEM	127	25.00	1.15	46.00	0.085	2
40070129IS01	129	25.00	2.63	105.21	0.213	5
40020130IS01	130	25.00	1.44	57.61	0.126	4
40410131IS01	131	25.00	0.75	30.00	0.035	1
40430132IS01	132	25.00	0.88	35.01	0.060	1
20650133ISEM	133	25.00	0.75	30.01	0.047	1
10160134ISEM	134	25.00	2.15	86.00	0.179	5
10160135ISEM	135	25.00	2.18	87.34	0.181	5
10200136ISEM	136	25.00	4.20	168.21	0.441	8
10200137ISEM	137	25.00	0.84	33.50	0.057	1

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10040138ISEM	138	25.01	5.07	202.86	0.629	9
10240140ISEM	140	25.00	3.93	157.40	0.387	8
10240141ISEM	141	25.00	1.44	57.60	0.126	4
10500142ISEM	142	25.00	2.03	81.34	0.172	5
10500143ISEM	143	24.99	1.23	49.21	0.093	2
10240144ISEM	144	25.00	0.96	38.50	0.067	1
20850145ISEM	145	25.00	0.75	30.00	0.042	1
10860146ISEM	146	24.99	0.77	31.01	0.052	1
10280147ISEM	147	25.00	1.34	53.80	0.109	3
10280148ISEM	148	25.00	2.00	80.00	0.170	5
10280149ISEM	149	25.00	1.42	56.81	0.123	4
10320150ISEM	150	25.00	1.33	53.40	0.107	3
20690151ISEM	151	24.99	0.88	35.01	0.060	1
20690152ISEM	152	24.99	0.85	34.01	0.058	1
20850153CYEM	153	24.99	1.28	51.22	0.098	2
10940155ISEM	155	24.99	2.12	84.69	0.177	5
10940156ISEM	156	24.99	1.23	49.21	0.093	2
10940157ISEM	157	24.99	1.05	42.01	0.075	1

## 8. Network adjustment

### Procedure

- a) Compute intersections between all survey lines
- b) Compute initial mis–ties at intersections
- c) Carry out network adjustment procedure to minimize mis–ties.  
This is a multi–stage operation and may consist of a combination of DC shifts, gradient limited datum tilts (to replicate long wavelength effects, such as diurnal [magnetics] or tidal [gravity]) and gradient limited datum bends (to replicate shorter wavelength effects, such as diurnal [magnetics] or swell [gravity]).
- d) Adjusted values at intersection points are then used to create a new datum for each line by fitting an Akima spline through the differences. This modified datum is applied to dataset.

### Bathymetry

<i>Stage</i>	<i>MGC (m/km)</i>	<i>RMS mis–tie</i>
Pre–network adjustment		1.767 (100.0 % better than 20 metres)
DC shift	n/a	1.491
Datum bend	0.2	1.063
DC shift	n/a	1.052
Datum bend	0.5	0.536
DC shift	n/a	0.538 (98.3% better than 1 metre)

### Free air gravity

<i>Stage</i>	<i>MGC (mGal/km)</i>	<i>RMS mis–tie</i>
Pre–network adjustment		2.481 (100.0% better than 9 mGal)
DC shift	n/a	0.364
Datum bend	0.2	0.085
DC shift	n/a	0.080
Datum bend	0.25	0.074
DC shift	n/a	0.070 (100% better than 1 mGal)

**Bouguer gravity**

<i>Stage</i>	<i>MGC (mGal/km)</i>	<i>RMS mis-tie</i>
Pre-network adjustment		0.071
DC shift	n/a	0.070

**Magnetic anomaly**

<i>Stage</i>	<i>MGC (nT/km)</i>	<i>RMS mis-tie</i>
Pre-network adjustment		32.557 (98.3% better than 100 nT)
DC shift	n/a	12.007
Datum Tilt	0.25	9.420
DC Shift	n/a	9.438
Datum bend	0.5	5.519
DC shift	n/a	5.320
Datum bend	1.0	2.581
DC shift	n/a	2.490 (96.0% better than 5 nT)

MGC = Maximum Gradient Change

RMS = Root Mean Squared

## **9. Gridding, filtering and display**

### **Gridding**

#### **Free air gravity, Bouguer gravity and magnetic anomaly**

The data were gridded at a pitch of 1000 metres using continuous splines under tension.

(Smith, W.H.F. and Wessel, P. 1990)

### **Bathymetry**

The data were gridded at a pitch of 1000 metres using a proprietary gridding program. This program uses a multi-pass method of fitting splined curves to a regular grid mesh in eight or four directions. At each empty mesh point a weighted-mean value was derived from eight or four curves. The weight to be applied to each curve was proportional to the distance from the occupied points from which the curve was derived.

### **Grid filtering**

#### **Bathymetry**

A 6 km directional filter was applied to the grid where depths were greater than 1500 metres.

#### **Gravity and magnetic anomaly**

Both the gravity and magnetic anomaly grids were smoothed with a 3 x 3 (3 km x 3 km ) median filter and a 4 km cutoff low-pass 70% cosine tapered boxcar filter.

### **Display**

The bathymetry, free air gravity, Bouguer gravity and magnetic anomaly grids were displayed as colour shaded relief at a scale of 1:200000.

Colour shaded relief images of bathymetry, free air gravity, Bouguer gravity and magnetic anomaly data are shown in Figures 4, 5, 6 and 7.

Figure 4

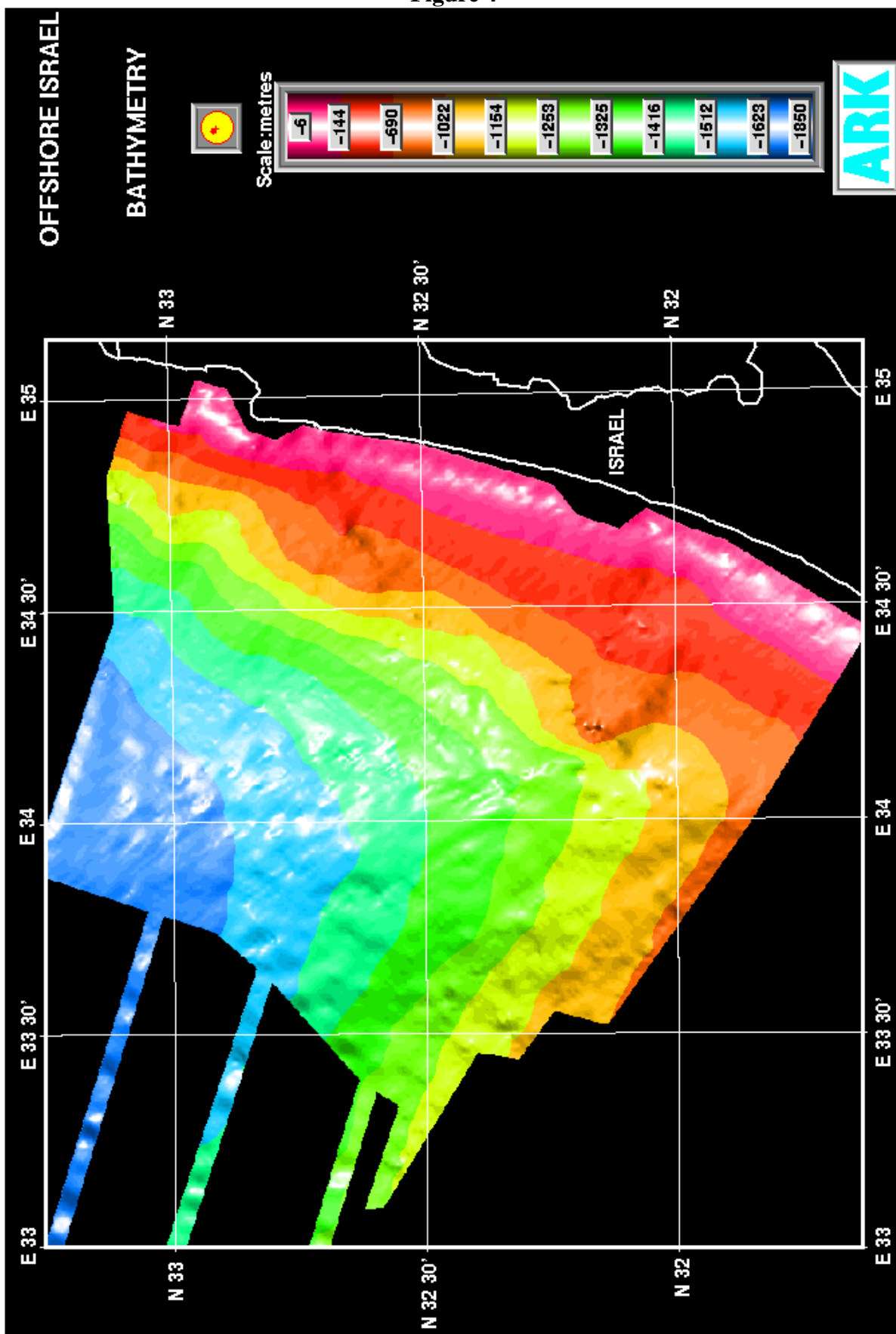


Figure 5

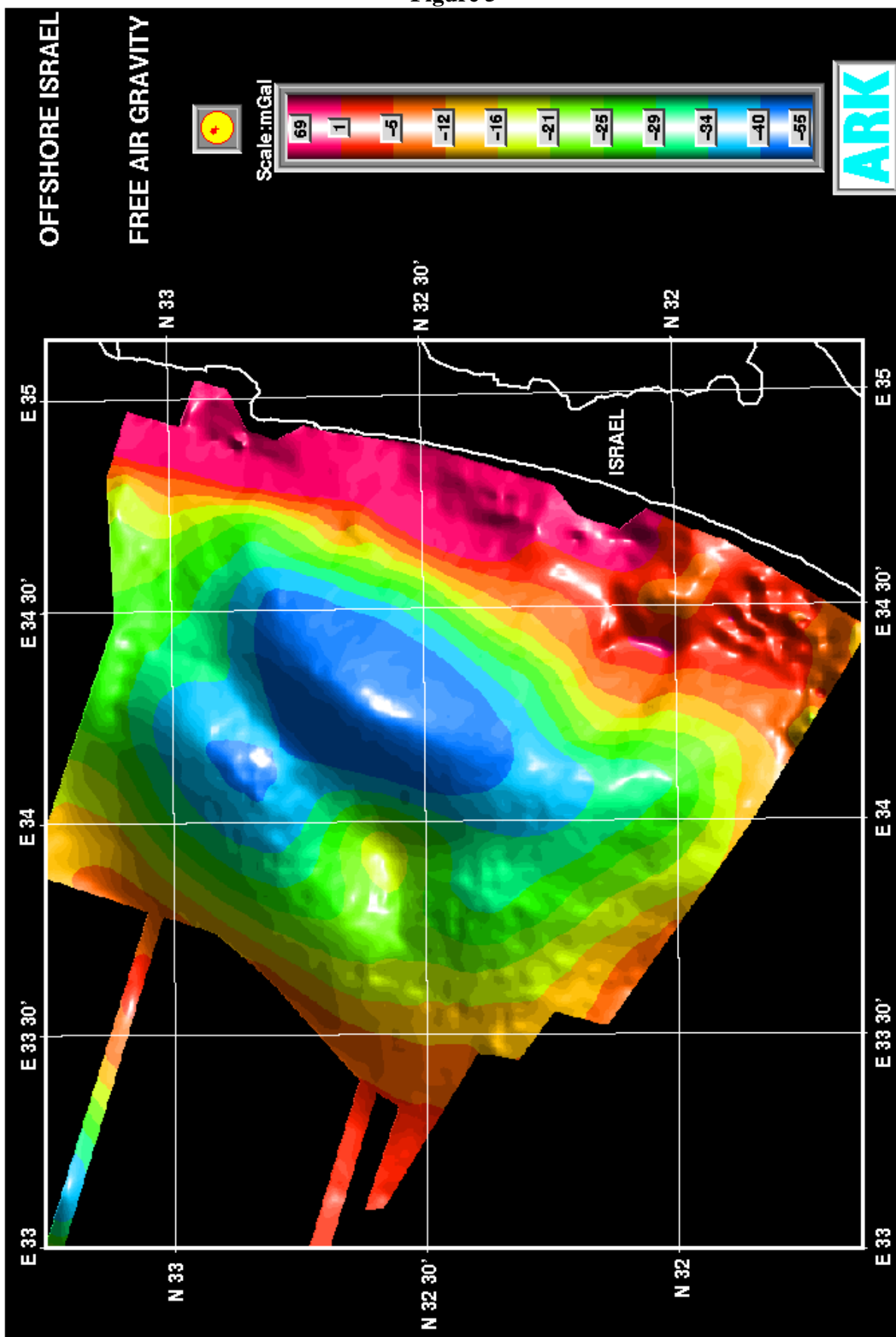




Figure 6

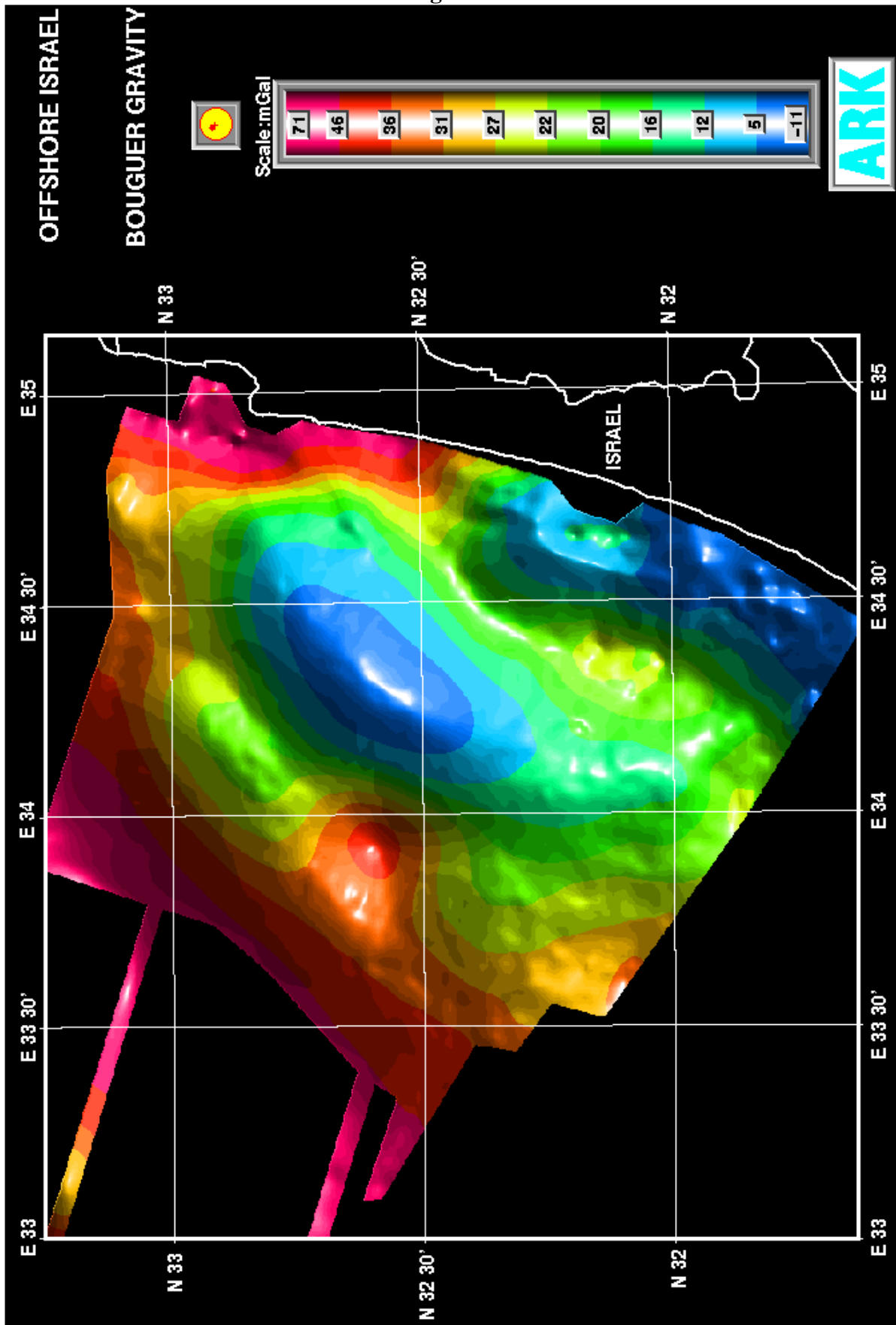
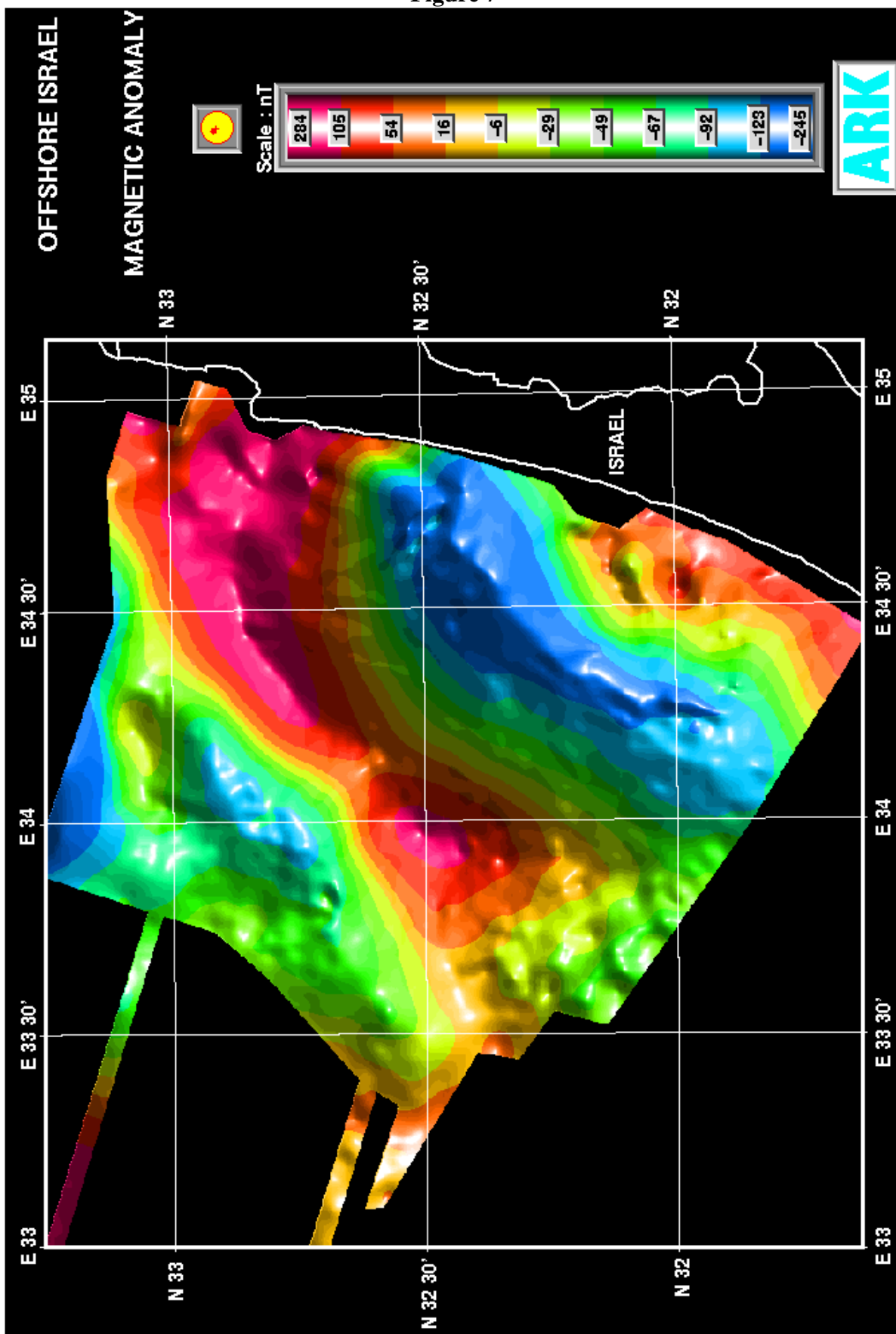


Figure 7



## 10. Products – Hard copy

The following datasets were displayed as colour shaded relief with superimposed contours and navigation data, on paper, at 1:200000 scale:

Bathymetry

Free air gravity

Bouguer gravity

Magnetic anomaly

## 11. Products – Digital

A CD–Rom containing line and grid data was produced for archival purposes.

The CD was allocated with ARK number 02.0092.

The files written and the formats are detailed below :

### File index

README.asc	Information file (ASCII)
archive.asc	Survey line data (ASCII)
dep.grd.asc	Bathymetry grid (ASCII)
fag.grd.asc	Free air gravity grid (ASCII)
bgrv.grd.asc	Bouguer gravity grid (ASCII)
mag.grd.asc	Magnetic anomaly grid (ASCII)
report_israel.pdf	Processing Report (PDF)

## File formats

### a) Line data

The ASCII file of raw and processed survey line data 'archive.asc' contains a 46 record header which describes the contents, followed by 320529 data records in the following fortran data format:

```
Data Format: (A16,I8,2(I3,I2,F6.3,A1),2F12.2,I5,I4,3I2,F10.3,18F10.3)
Null data values= -99999.000
START  END  FORMAT      ITEM DESCRIPTION                               UNITS
   1   16    A16        LINE Line name or number
   17   24    I8         SHOT Shot-point or Fix
   25   27    I3         LAT  Latitude                               (degrees)
   28   29    I2         LAT  Latitude                               (minutes)
   30   35    F6.3       LAT  Latitude                               (seconds)
   36   36    A1         LAT  Latitude                               (N or S)
   37   39    I3         LONG Longitude                               (degrees)
   40   41    I2         LONG Longitude                               (minutes)
   42   47    F6.3       LONG Longitude                               (seconds)
   48   48    A1         LONG Longitude                               (E or W)
   49   60    F12.2      XCRD X co-ordinate                               (m)
   61   72    F12.2      YCRD Y co-ordinate                               (m)
   73   77    I5         YEAR Year
   78   81    I4         DAY  Julian day
   82   83    I2         HH  Time                                   (hours)
   84   85    I2         MM  Time                                   (minutes)
   86   87    I2         SS  Time                                   (seconds)
   88   97    F10.3      RDEP Water depth/Elevation (-ve down)         (m)
   98  107    F10.3      FDEP Filtered Bathymetry                     (m)
  108  117    F10.3      CDEP Network adjusted Bathymetry            (m)
  118  127    F10.3      GLDP Final levelled Bathymetry              (m)
  128  137    F10.3      RMAG Raw Magnetics                          (nT)
  138  147    F10.3      IMAG Mag with IGRF subtracted                (nT)
  148  157    F10.3      FIMG Filtered Mag minus IGRF                (nT)
  158  167    F10.3      CMAG Network adjusted Magnetics             (nT)
  168  177    F10.3      GLMG Final levelled Magnetics               (nT)
  178  187    F10.3      RGRV Raw Gravity                            (mGal)
  188  197    F10.3      FEOT Filtered Eötvös                         (mGal)
  198  207    F10.3      PEOT Filtered corrected Eötvös              (mGal)
  208  217    F10.3      LATG Latitude corrected Gravity              (mGal)
  218  227    F10.3      QFGR Quality-filtered Free Air Gravity       (mGal)
  228  237    F10.3      CFAG Network adjusted Free Air Gravity       (mGal)
  238  247    F10.3      GLFG Final levelled Free Air Gravity         (mGal)
  248  257    F10.3      3DBC 3D Bouguer correction                  (mGal)
  258  267    F10.3      BGRV Bouguer Gravity                         (mGal)
  268  277    F10.3      GLBG Final levelled Bouguer Gravity          (mGal)
```

In all cases, null data is represented by the number : -99999.000

**b) Grid data**

The fortran format used to create the ASCII files of gridded data was : (2F10.1, F12.3)

START	END	FORMAT	ITEM	DESCRIPTION	UNITS
1	10	F10.1	XCRD	X co-ordinate	(m)
11	20	F10.1	YCRD	Y co-ordinate	(m)
21	32	F12.3	Z data	(Bathymetry,Gravity etc)	(as appropriate)

In all cases, null data is represented by the number : -99999.000

Files are ordered by column (left to right) and by row within each column (bottom to top)

In all cases, number of columns : 366  
 number of rows : 291

Grid pitch : 1000 metres

Total number of records : 36381

Sample of data from grid file :

```

500000.0 3500000.0 -99999.000
500000.0 3501000.0 -99999.000
500000.0 3502000.0 -99999.000
500000.0 3503000.0 -99999.000
500000.0 3504000.0 -99999.000
500000.0 3505000.0 -99999.000
500000.0 3506000.0 -99999.000
500000.0 3507000.0 -99999.000
500000.0 3508000.0 -99999.000
500000.0 3509000.0 -99999.000

```

## Appendix A      Geodetic parameters

Projection	:	Universal Transverse Mercator
Spheroid	:	World Geodetic System 1984
Geodetic Datum	:	WGS84
Central Meridian	:	33° East
Latitude of origin	:	0°
False Easting	:	500000
False Northing	:	0
Scale Factor	:	0.9996
Semimajor Axis	:	6378137.0
Semiminor Axis	:	6356752.3

## **Appendix B      Survey equipment**

Navigation	:	Racal Multifix DGPS
Gravity	:	LaCoste & Romberg ULTRASYS gravity meter serial number S-27
Bathymetry	:	Echotrac DF 3200 MKII Thermal Depth Sounder
Magnetometer	:	Geometric G801/3 proton



## Appendix C      Line listing

LINE NO	LINE NAME	DAY	START SP	STOP SP	TOTAL RECS	POINT SEP 'N	LENGTH KMS
2	40070002	1262	857	2673	1817	24.99	45.39
4	40010004IS01	1262	1001	3805	2805	24.99	70.08
7	40020007IS01	1263	857	2395	1539	25.00	38.44
8	40040008IS01	1264	1001	2799	1799	25.00	44.95
9	40040009IS01	1264	2381	2956	576	25.00	14.37
11	10340011IS01	1265	3891	5990	2100	25.00	52.47
12	10340012ISEM	1265	5583	6159	577	25.00	14.40
13	10420013ISEM	1265	2941	6153	3213	24.99	80.28
14	40350014IS01	1266	3528	5170	1643	24.99	41.04
17	40470017IS01	1267	1780	3000	1221	25.00	30.50
18	40470018IS01	1267	1787	5114	3328	25.00	83.16
19	40370019IS01	1268	2670	5169	2500	24.99	62.46
20	10500020ISEM	1270	2961	5108	2148	24.99	53.66
21	40740021IS01	1271	1901	5702	3802	25.00	95.04
22	40800022IS01	1271	3127	5653	2527	25.00	63.15
23	40800023IS01	1272	1001	3270	2270	25.00	56.72
24	10760024ISEM	1272	1951	6711	4761	24.99	118.97
25	10640025ISEM	1273	1808	6890	5083	24.99	127.02
26	10600026ISEM	1274	1671	4400	2730	24.99	68.21
28	40490028IS01	1275	3262	5961	2700	24.99	67.46
29	40490029IS01	1276	1015	3405	2391	25.00	59.74
30	20510030ISEM	1276	1710	5107	3398	25.00	84.91
31	40510031IS01	1277	1000	5840	4841	25.00	120.98
32	10040032ISEM	1277	4201	7200	3000	25.00	74.98
33	10100033ISEM	1278	6100	7117	1018	25.00	25.42
35	10100035ISEM	1279	4000	6109	2110	25.00	52.72
36	20450036ISEM	1279	1000	2193	1194	25.00	29.82
37	40530037IS01	1280	1941	5106	3166	25.00	79.11
38	20530038ISEM	1280	1000	5738	4739	25.00	118.43
39	40030039IS01	1281	857	2840	1984	25.00	49.57
40	40450040IS01	1281	981	2166	1186	25.00	29.63
41	10040041ISEM	1282	1160	4210	3051	25.00	76.24
42	40060042IS01	1282	1001	1798	798	25.00	19.92
43	10100043ISEM	1282	1074	1900	827	25.00	20.65
44	10100044ISEM	1282	1895	3941	2047	25.00	51.14
45	10100045ISEM	1283	3577	4297	721	25.00	18.00
46	20450046ISEM	1283	2184	6081	3898	24.99	97.40
47	40450047IS01	1284	2890	5114	2225	24.99	55.59
48	40450048IS01	1284	2023	3033	1011	25.00	25.25
49	10100049ISEM	1284	3555	4130	576	25.00	14.37
50	40330050IS01	1285	2670	4603	1934	24.99	48.32

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51	10600051ISEM	1285	4257	6954	2698	25.00	67.41
52	10700052ISEM	1285	3962	6822	2861	24.99	71.48
53	10700053ISEM	1286	2624	4105	1482	24.99	37.01
54	10700054ISEM	1286	1883	2757	875	24.99	21.84
55	10520055ISEM	1286	1609	6021	4413	24.99	110.27
56	10520056ISEM	1287	5878	7021	1144	25.00	28.57
57	10480057ISEM	1287	5661	7077	1417	24.99	35.39
59	10480059ISEM	1288	1549	5804	4256	24.99	106.35
60	10440060ISEM	1289	1480	3580	2101	25.00	52.49
61	10440061ISEM	1289	3437	4687	1251	25.00	31.25
62	10440062ISEM	1289	4544	7132	2589	25.00	64.69
64	10400064ISEM	1290	1399	7186	5788	25.00	144.65
65	40050065IS01	1291	1001	2703	1703	25.00	42.55
66	40050066IS01	1291	1001	2558	1558	24.99	38.92
67	10360067ISEM	1292	1362	3335	1974	24.99	49.31
68	20410068ISEM	1292	980	2400	1421	25.00	35.50
70	40410070IS01	1293	1208	2091	884	25.00	22.07
71	40430071IS01	1293	1170	2460	1291	25.00	32.25
72	20390072ISEM	1294	996	2061	1066	25.00	26.62
73	20350073ISEM	1294	1170	2480	1311	25.00	32.75
75	20270075ISEM	1294	940	2200	1261	25.00	31.50
76	20310076ISEM	1295	1170	2551	1382	25.00	34.52
77	20150077ISEM	1295	1099	2489	1391	25.00	34.74
78	20110078ISEM	1295	1230	4957	3728	25.00	93.16
79	20110079ISEM	1296	4814	5923	1110	24.99	27.72
80	20070080ISEM	1296	1220	5371	4152	24.99	103.75
81	20150081ISEM	1297	2480	5871	3392	24.99	84.76
82	20150082ISEM	1298	5649	7489	1841	24.99	45.99
83	20310083ISEM	1298	2264	7330	5067	24.99	126.62
84	20350084ISEM	1299	2337	6087	3751	25.00	93.74
85	20350085ISEM	1299	5721	6440	720	24.99	17.97
86	20570086ISEM	1300	1020	5631	4612	25.00	115.26
87	20650087ISEM	1301	1070	2500	1431	25.00	35.75
88	20650088ISEM	1301	2357	5264	2908	25.01	72.70
89	40410089IS01	1301	1948	5162	3215	25.00	80.34
90	40430090IS01	1302	2317	3111	795	25.01	19.86
91	20230091ISEM	1307	979	2600	1622	25.00	40.52
92	10190092ISEM	1307	1744	2485	742	25.00	18.52
93	20170093ISEM	1307	1000	2200	1201	25.00	30.00
94	10190094ISEM	1308	1001	1887	887	25.00	22.15
95	2003B095ISEM	1308	1321	2721	1401	25.00	35.00
97	10210097ISEM	1309	1001	1650	650	25.00	16.22
98	2003B098ISEM	1309	2712	3430	719	24.99	17.95
99	2003A099ISEM	1309	3286	5325	2040	24.99	50.96
100	10860100ISEM	1310	2121	5230	3110	24.99	77.71
102	40740102IS01	1313	1901	5702	3802	24.99	95.00
103	20770103ISEM	1313	2507	4776	2270	25.00	56.72
104	20810104ISEM	1314	1000	2601	1602	25.00	40.03

105	20850105ISEM	1314	1010	2261	1252	25.00	31.28
106	20850106ISEM	1315	2122	3033	912	25.00	22.77
107	20770107ISEM	1315	1270	2650	1381	25.00	34.50
108	20730108ISEM	1315	1258	2440	1183	25.00	29.55
109	20730109ISEM	1316	2431	4491	2061	25.00	51.49
111	20730111ISEM	1317	4348	5040	693	24.99	17.30
112	20810112ISEM	1317	2458	3927	1470	25.00	36.72
113	10360113ISEM	1317	3048	7238	4191	25.00	104.74
114	20270114ISEM	1318	2191	4588	2398	24.99	59.91
115	20170115ISEM	1318	2057	4648	2592	24.99	64.76
116	20230116ISEM	1319	2591	4706	2116	24.99	52.86
117	20230117ISEM	1319	4563	5258	696	24.99	17.37
118	40590118IS01	1320	1000	5511	4512	25.00	112.76
119	20390119ISEM	1323	1774	8590	6817	24.99	170.35
120	20410120ISEM	1324	2257	6227	3971	24.99	99.23
121	40410121IS01	1325	2635	5162	2528	25.00	63.17
122	20610122ISEM	1327	2524	5512	2989	24.99	74.68
123	20610123ISEM	1327	1040	2667	1628	25.00	40.67
124	20690124ISEM	1328	1111	2350	1240	25.00	30.98
126	10340126ISEM	1328	4640	6159	1520	25.00	37.97
127	10340127ISEM	1328	3891	4783	893	25.00	22.30
129	40070129IS01	1330	857	2673	1817	25.00	45.40
130	40020130IS01	1330	1001	2539	1539	25.00	38.44
131	40410131IS01	1331	1948	2778	831	25.00	20.75
132	40430132IS01	1331	2317	5262	2946	24.99	73.61
133	20650133ISEM	1331	2357	5264	2908	25.00	72.66
134	10160134ISEM	1332	6345	7546	1202	25.00	30.02
135	10160135ISEM	1332	1145	6488	5344	25.00	133.56
136	10200136ISEM	1333	1184	2325	1142	25.00	28.52
137	10200137ISEM	1333	2316	7483	5168	25.00	129.17
138	10040138ISEM	1334	7057	7636	580	25.00	14.48
139	10100139ISEM	1335	6974	7513	540	25.02	13.48
140	10240140ISEM	1341	1247	2450	1204	25.00	30.07
141	10240141ISEM	1341	2441	5100	2660	25.00	66.47
142	10500142ISEM	1344	4008	5108	1101	25.00	27.49
143	10500143ISEM	1344	2961	4151	1191	24.99	29.74
144	10240144ISEM	1344	4957	7438	2482	25.00	62.02
145	20850145ISEM	1345	2746	5534	2789	25.00	69.69
146	10860146ISEM	1346	4943	6616	1674	24.99	41.81
147	10280147ISEM	1346	6185	7385	1201	25.00	30.00
148	10280148ISEM	1348	2804	6194	3391	25.00	84.75
149	10280149ISEM	1348	1236	2946	1711	25.00	42.75
150	10320150ISEM	1349	1275	7292	6018	25.00	150.42
151	20690151ISEM	1350	2341	4700	2360	25.00	58.97
152	20690152ISEM	1350	4558	10378	5821	24.99	145.45
153	20850153CYEM	1351	857	6453	5597	24.99	139.85
155	10940155ISEM	1355	1661	4310	2650	24.99	66.21
156	10940156ISEM	1355	4167	6292	2126	24.99	53.11

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157	10940157ISEM	1355	4606	6292	1687	24.99	42.14
158	20530158EGEM	1357	5745	11411	5667	31.24	177.01

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-----  
Total length of survey lines on file : 8043.90 km  
Total number of records on file : 320529  
-----

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## Appendix D      Base constant calculation

IGSN71/DMA LATITUDE	(d m s)	:	35.163333333
IGSN71/DMA LONGITUDE	(d m s)	:	33.346666667
IGSN71/DMA VALUE	(mGals)	:	979834.490
IGSN71/DMA HT. A.S.L.	(metres)	:	160.000
STILL READING LATITUDE	(d m s)	:	34.651666667
STILL READING LONGITUDE	(d m s)	:	33.018333333
STILL READING VALUE	(mGals)	:	7431.670
DOCK TO WATER	(metres +ve down)	:	2.000
DOCK TO METER	(metres +ve down)	:	0.200
METER HEIGHT CORRECTION	(mGals)	:	-0.062
METER READING AT DOCK	(mGals)	:	7431.608
DMA LATITUDE CORRECTION (1967)	(mGals)	:	-43.400
LATITUDE CORRECTED DMA	(mGals)	:	979791.090
DOCK TO DMA HEIGHT	(metres +ve down)	:	-158.000
DMA HEIGHT CORRECTION	(mGals)	:	48.759
DMA VALUE AT DOCK	(mGals)	:	979839.849
BASE CONSTANT	(mGals)	:	972408.241

## Appendix E Missing or erroneous data

### BATHYMETRY

<b>Line name</b>	<b>shotpoint range</b>	<b>Reason</b>
40070002	whole line	Data missing
40010004IS01	whole line	Data missing
40740021IS01	SOL~1903, 3210~3634, 4441~4873 4965~5015, 5122~5397	Drop out
40490029IS01	2996~2894	Drop out
20510030ISEM	1711~1729, 4093~4120, 4142~4322	Drop out
10040041ISEM	2843~2826	Spiking
20450046ISEM	3446~3575	Drop out
10700053ISEM	3447~3437	Drop out
10440060ISEM	3024~3045	Spiking
10440061ISEM	3946_3975	Spiking
10400064ISEM	3399~3150	Drop out
20350084ISEM	2854~3021, 3322~3338	Drop out
10340127ISEM	4447~4363	Drop out
10100139ISEM	6974~7006	Drop out
20850153CYEM	6330~6201	Drop out
10940156ISEM	4992~5193	Drop out
20530158EGEM	10871~10981	Drop out

### GRAVITY

<b>Line name</b>	<b>shotpoint range</b>	<b>Reason</b>
40040008IS01	2651~2799	UPS failure
10100139ISEM	whole line	scratched due to adverse weather
10320150ISEM	1324~1253	Drop-out
20530158EGEM	whole line	Test line

### MAGNETICS

<b>Line name</b>	<b>shotpoint range</b>	<b>Reason</b>
40040008IS01	2651~2799	UPS failure
10100139ISEM	whole line	scratched due to adverse weather
20530158EGEM	whole line	Test line

## Appendix F Data quality assessment

In order to quantify gravity data quality and to give a data reliability value, ARK has developed the following statistical procedure. System noise typically is represented by the higher frequency component. We need to exclude geological signal as far as possible for the analysis. In order to do this we analyse the RMS statistic of a high–pass filtered component on a line by line basis. In practice this is done by the application of a cosine tapered filter to the unfiltered Bouguer gravity data. The choice of analysis cutoff wavelength for this survey was 4km; sufficient noise content is sampled and most geological signal is excluded (for high resolution surveys in shallow water a shorter cut off would be suitable). If we assume that the noise component conforms generally to a normal distribution then approximately 66% of the data values will lie within one standard deviation, 97% within two standard deviations and 99.8% within three standard deviations of the true value at any point on a line. The line list on the following pages show the actual observed results from this dataset, showing how close the actual results are to a normal distribution. Experience with a wide variety of datasets from different sources permits us to define quantitative quality index thresholds and data reliability values which may be described thus :

<i>Quality Index</i>	<i>Description</i>	<i>Data Reliability</i> ~97% of data fall within this range of 2 standard deviations <b>+ or – mGals</b>
1	Excellent	0.16
2	Very good	0.21
3	Good	0.24
4	Good/average	0.32
5	Average	0.45
6	Average/poor	0.57
7	Poor	0.68
8	Very poor	0.97
9	Bad	1.62
10	Very bad	3.24
11	Extremely bad	4.86
12	Suitable only for regional 2D surveys after very long filters	6.48
13	Use only in exceptional circumstances	> 6.48

In the line list below, lines are ranked in order of increasing standard deviation, the better lines being at the top of the list, the worse at the bottom. The line name is shown together with the ARK line number, the year/Julian day of acquisition, line length of usable gravity data and the line heading in degrees measured clockwise from north. The signal minimum and maximum values are also given, showing the amplitude value in mGal of the worst "noise" on each line. After the standard deviation, the next three columns show the actual percentages of data values lying within one, two and three multiples of the standard deviation. After the list, there is a summary showing the number of survey lines which fall within each quality band, the results being displayed as a histogram.

LINE NAME	LINE NUMBER	DAY	LRES LENGTH (KM)	LINE HDG (DEG)	LRES MIN VALUE	LRES MAX VALUE	LRES STD DEV	PERCENTAGE 1xstd	LESS THAN 2xstd	LESS THAN 3xstd	Q INDEX
40450048IS01	48	1284	25.97	107.4	-0.07	0.07	0.028	67.4	95.1	100.0	1
40410131IS01	131	1331	21.47	107.1	-0.09	0.09	0.035	71.4	92.9	100.0	1
10520056ISEM	56	1287	29.32	17.7	-0.11	0.08	0.037	71.3	93.7	100.0	1
10520055ISEM	55	1286	110.97	17.7	-0.13	0.14	0.038	72.3	94.2	99.2	1
40740102IS01	102	1313	95.75	18.0	-0.12	0.15	0.039	72.0	94.3	99.4	1
10480057ISEM	57	1287	36.12	197.6	-0.17	0.15	0.040	76.3	94.5	98.3	1
20410120ISEM	120	1324	99.95	287.1	-0.20	0.15	0.041	72.1	95.2	98.8	1
40450047IS01	47	1284	56.31	107.4	-0.11	0.13	0.041	72.0	94.1	99.3	1
20850145ISEM	145	1345	70.39	288.1	-0.23	0.21	0.042	79.2	95.5	98.1	1
40490028IS01	28	1275	68.18	107.0	-0.19	0.14	0.042	69.9	95.3	99.2	1
20810112ISEM	112	1317	37.47	107.5	-0.24	0.12	0.044	80.2	95.4	98.2	1
40070002	2	1262	46.14	197.7	-0.17	0.16	0.044	73.6	95.0	98.1	1
10360113ISEM	113	1317	105.49	196.8	-0.17	0.26	0.045	75.6	94.3	98.7	1
20730109ISEM	109	1316	52.22	287.4	-0.17	0.15	0.046	72.7	94.0	99.0	1
10340011IS01	11	1265	53.22	16.7	-0.14	0.16	0.046	70.0	94.6	99.5	1
40370019IS01	19	1268	63.21	107.5	-0.25	0.15	0.046	76.9	93.9	98.5	1
20650133ISEM	133	1331	73.39	107.2	-0.23	0.43	0.047	79.2	97.4	98.7	1
10340126ISEM	126	1328	38.72	196.7	-0.13	0.14	0.047	71.5	93.9	100.0	1
10600026ISEM	26	1274	68.91	18.1	-0.14	0.14	0.047	72.0	93.3	100.0	1
10340012ISEM	12	1265	15.15	16.7	-0.17	0.13	0.048	74.8	94.2	98.5	1
40350014IS01	14	1266	41.84	287.6	-0.16	0.15	0.048	70.4	94.7	99.5	1
40530037IS01	37	1280	79.84	287.2	-0.20	0.25	0.050	76.6	95.0	98.0	1
10100045ISEM	45	1283	18.77	17.5	-0.18	0.13	0.051	72.3	93.9	99.2	1
20230116ISEM	116	1319	53.61	295.3	-0.18	0.16	0.052	71.5	94.1	99.3	1
20150081ISEM	81	1297	85.48	301.7	-0.36	0.17	0.052	78.7	95.1	98.3	1
10860146ISEM	146	1346	42.54	199.2	-0.25	0.26	0.052	80.4	95.1	97.7	1
10700052ISEM	52	1285	72.21	198.1	-0.20	0.19	0.052	71.4	94.9	99.2	1
20150082ISEM	82	1298	46.71	301.7	-0.24	0.21	0.053	76.2	95.3	98.1	1
20770103ISEM	103	1313	57.46	107.4	-0.26	0.44	0.053	80.7	96.3	98.2	1
20450046ISEM	46	1283	98.15	287.3	-0.51	0.28	0.053	78.5	96.4	98.9	1
40020007IS01	7	1263	39.19	216.9	-0.28	0.19	0.054	75.0	96.0	98.2	1
20270114ISEM	114	1318	60.64	290.8	-0.22	0.29	0.054	76.1	94.2	98.8	1
20510030ISEM	30	1276	85.64	286.8	-0.18	0.20	0.055	72.4	94.0	99.2	1
20350084ISEM	84	1299	94.46	287.9	-0.29	0.19	0.055	75.9	93.7	98.9	1
10440062ISEM	62	1289	65.39	17.5	-0.17	0.21	0.056	71.9	94.8	98.9	1
40040008IS01	8	1264	41.27	33.9	-0.16	0.14	0.056	68.5	95.5	100.0	1
10440061ISEM	61	1289	31.97	17.4	-0.17	0.14	0.057	68.0	95.9	99.9	1
20310083ISEM	83	1298	127.34	109.1	-0.27	0.35	0.057	79.0	93.7	98.1	1
40040009IS01	9	1264	15.10	33.9	-0.15	0.20	0.057	74.2	94.0	98.3	1
10200137ISEM	137	1333	129.89	16.6	-0.34	0.28	0.057	76.2	94.7	98.5	1
20170115ISEM	115	1318	65.48	118.2	-0.22	0.33	0.057	78.9	94.0	97.8	1
20390119ISEM	119	1323	171.13	106.8	-0.29	0.64	0.057	82.2	95.5	98.1	1
10700053ISEM	53	1286	37.74	198.1	-0.21	0.19	0.058	77.4	93.4	97.7	1
20690152ISEM	152	1350	146.23	286.7	-0.36	0.27	0.058	75.9	94.4	98.7	1
40430132IS01	132	1331	74.34	287.6	-0.29	0.22	0.060	75.5	95.1	98.4	1
40050066IS01	66	1291	39.64	203.1	-0.23	0.23	0.060	74.6	94.3	98.7	1
20690151ISEM	151	1350	59.69	287.3	-0.17	0.17	0.060	70.2	93.8	100.0	1
10600051ISEM	51	1285	68.14	18.1	-0.27	0.30	0.061	78.4	94.3	98.3	1
10360067ISEM	67	1292	50.04	16.8	-0.21	0.18	0.062	72.5	93.6	99.7	1
2003A099ISEM	99	1309	51.71	304.5	-0.20	0.21	0.063	70.8	93.8	99.4	1
40410121IS01	121	1325	63.92	107.1	-0.24	0.26	0.063	73.5	93.8	99.1	1
40330050IS01	50	1285	49.04	288.4	-0.16	0.26	0.064	74.0	94.2	98.6	1



10420013ISEM	13	1265	81.01	197.6	-0.26	0.21	0.064	73.3	94.6	98.8	1
10440060ISEM	60	1289	53.22	17.5	-0.21	0.17	0.064	67.7	95.5	99.7	1
10240144ISEM	144	1344	62.72	16.8	-0.22	0.24	0.067	72.7	93.6	99.4	1
40010004IS01	4	1262	70.83	34.3	-0.22	0.57	0.068	87.1	96.4	98.4	1
10480059ISEM	59	1288	107.10	197.6	-0.35	0.40	0.070	78.7	94.1	98.6	1
2003B098ISEM	98	1309	18.67	301.5	-0.20	0.20	0.072	72.3	92.9	100.0	1
10500020ISEM	20	1270	54.41	198.0	-0.23	0.22	0.073	69.3	94.6	99.7	1
20610122ISEM	122	1327	75.41	107.2	-0.26	0.30	0.075	72.7	95.0	98.9	1
10940157ISEM	157	1355	42.86	198.2	-0.28	0.32	0.075	77.3	93.2	98.3	1
40030039IS01	39	1281	50.30	223.9	-0.61	0.38	0.077	86.4	96.2	98.2	1
40470018IS01	18	1267	83.94	287.3	-0.71	0.26	0.077	83.2	96.6	98.6	1
10100044ISEM	44	1282	51.89	17.5	-0.32	0.32	0.083	77.1	93.4	97.9	2
20170093ISEM	93	1307	30.72	118.2	-0.30	0.32	0.085	75.4	93.6	98.3	2
10340127ISEM	127	1328	23.02	196.7	-0.21	0.34	0.085	73.9	95.1	98.5	2
20730111ISEM	111	1317	18.02	287.4	-0.18	0.32	0.086	76.2	94.9	97.6	2
20530038ISEM	38	1280	119.24	107.2	-0.36	0.72	0.089	83.4	94.4	98.0	2
10190092ISEM	92	1307	19.25	228.2	-0.47	0.17	0.089	83.5	96.0	97.7	2
10400064ISEM	64	1290	145.35	197.1	-0.33	0.36	0.090	75.4	93.1	98.8	2
40470017IS01	17	1267	31.30	107.3	-0.64	0.27	0.091	89.5	96.2	97.9	2
10700054ISEM	54	1286	22.59	198.1	-0.26	0.23	0.091	69.5	94.7	100.0	2
10500143ISEM	143	1344	30.44	198.0	-0.27	0.30	0.093	70.3	94.0	99.7	2
10940156ISEM	156	1355	53.89	18.1	-0.30	0.28	0.093	69.4	93.7	99.8	2
40430090IS01	90	1302	20.58	287.6	-0.30	0.25	0.095	71.2	94.4	99.4	2
10210097ISEM	97	1309	16.97	239.5	-0.28	0.38	0.095	77.1	93.8	97.8	2
20850106ISEM	106	1315	23.52	288.1	-0.30	0.43	0.095	78.0	94.1	97.7	2
20650088ISEM	88	1301	73.44	287.2	-0.49	0.29	0.097	72.9	94.8	99.5	2
20850153CYEM	153	1351	140.58	117.8	-0.29	0.84	0.098	76.3	95.8	99.4	2
10640025ISEM	25	1273	127.75	198.4	-0.36	0.53	0.099	72.5	94.7	99.2	2
10100035ISEM	35	1279	53.45	197.5	-0.33	0.34	0.100	75.6	93.4	98.5	2
20110079ISEM	79	1296	28.42	301.8	-0.23	0.64	0.107	81.3	95.8	98.2	3
40410089IS01	89	1301	81.09	107.1	-0.51	0.94	0.107	84.8	96.3	98.1	3
10320150ISEM	150	1349	149.92	16.5	-0.37	0.38	0.107	71.4	94.5	99.3	3
10280147ISEM	147	1346	30.70	16.5	-0.39	0.31	0.109	73.4	94.2	99.3	3
10100049ISEM	49	1284	15.10	197.5	-0.50	0.29	0.117	79.8	94.0	97.4	3
40590118IS01	118	1320	113.51	106.7	-0.91	0.95	0.120	91.3	96.1	97.2	3
10760024ISEM	24	1272	119.72	17.4	-0.53	0.45	0.122	73.6	94.3	98.5	4
20350085ISEM	85	1299	18.69	288.0	-0.47	0.32	0.123	79.4	93.1	97.9	4
10280149ISEM	149	1348	43.27	196.5	-0.43	0.38	0.123	71.3	94.7	99.4	4
10100033ISEM	33	1278	26.22	17.5	-0.84	0.27	0.123	91.2	96.4	97.6	4
20570086ISEM	86	1300	116.06	107.3	-0.82	1.19	0.124	87.4	96.6	97.7	4
20230091ISEM	91	1307	41.25	115.4	-0.44	0.46	0.125	77.3	92.7	98.1	4
10240141ISEM	141	1341	67.20	16.8	-0.41	0.38	0.126	69.7	94.5	99.7	4
40020130IS01	130	1330	39.17	36.9	-0.56	0.34	0.126	71.6	94.9	98.9	4
40510031IS01	31	1277	121.72	107.1	-1.06	0.77	0.128	90.7	95.4	97.3	4
20230117ISEM	117	1319	18.14	295.4	-0.68	0.27	0.128	87.1	95.0	96.7	4
2003B095ISEM	95	1308	35.75	121.4	-0.34	0.97	0.141	86.8	95.4	98.2	4
10860100ISEM	100	1310	78.48	19.2	-0.48	0.52	0.145	71.1	94.1	99.3	4
20730108ISEM	108	1315	30.32	107.5	-0.68	0.46	0.145	78.6	92.4	98.5	4
20610123ISEM	123	1327	41.42	107.1	-0.67	0.55	0.156	76.8	94.1	97.6	4
20810104ISEM	104	1314	40.73	107.5	-0.59	0.68	0.169	81.2	92.5	97.0	5
20850105ISEM	105	1314	32.03	108.1	-1.19	0.52	0.170	83.6	96.5	98.0	5
10280148ISEM	148	1348	85.55	196.5	-0.54	0.72	0.170	71.5	94.5	99.2	5
20690124ISEM	124	1328	31.72	107.3	-0.58	0.96	0.170	77.1	96.4	98.0	5
10500142ISEM	142	1344	28.27	198.0	-0.46	0.49	0.172	67.5	96.0	100.0	5
10940155ISEM	155	1355	66.96	18.2	-0.61	0.52	0.177	70.2	95.0	99.7	5
10160134ISEM	134	1332	30.75	17.0	-1.39	0.55	0.179	93.0	96.1	97.6	5
10160135ISEM	135	1332	134.31	197.0	-3.05	0.59	0.181	98.1	98.7	99.1	5
40800023IS01	23	1272	57.47	199.2	-0.65	0.57	0.184	70.3	95.1	99.4	5
20450036ISEM	36	1279	30.57	107.3	-0.77	0.69	0.199	77.0	93.6	98.2	5
40060042IS01	42	1282	20.65	329.8	-0.76	0.97	0.202	87.2	93.6	95.6	5
20390072ISEM	72	1294	27.37	106.8	-0.74	0.62	0.213	79.5	90.8	98.1	5
40070129IS01	129	1330	46.15	197.7	-0.69	0.79	0.213	77.0	92.7	98.3	5
40490029IS01	29	1276	60.52	107.0	-0.92	1.52	0.216	90.0	93.7	96.1	5
10040041ISEM	41	1282	77.02	198.2	-1.02	2.00	0.231	86.8	96.7	98.3	6
20770107ISEM	107	1315	35.22	107.4	-0.80	0.97	0.233	84.9	91.4	96.2	6
10040032ISEM	32	1277	75.75	17.8	-0.94	1.08	0.247	82.2	92.1	96.8	6
40800022IS01	22	1271	63.87	197.3	-0.76	1.03	0.262	72.1	94.2	99.2	6
40050065IS01	65	1291	43.30	23.1	-2.52	0.56	0.263	95.7	97.5	98.3	6
40410070IS01	70	1293	22.85	107.1	-1.62	0.56	0.264	91.7	95.7	97.3	6
20410068ISEM	68	1292	36.25	107.1	-0.73	1.64	0.287	79.5	93.7	98.4	7
40430071IS01	71	1293	32.98	287.6	-0.98	1.35	0.302	81.5	90.2	98.2	7
10190094ISEM	94	1308	22.93	228.4	-2.19	0.55	0.314	92.5	96.7	97.2	7
40450040IS01	40	1281	30.38	107.4	-1.15	1.34	0.322	80.7	91.7	97.1	7
20650087ISEM	87	1301	36.57	107.2	-2.01	1.32	0.339	87.8	93.9	97.2	7
10100043ISEM	43	1282	21.45	197.5	-0.41	2.27	0.340	93.0	96.5	97.1	7
20070080ISEM	80	1296	104.47	121.6	-1.56	2.23	0.344	89.1	93.1	96.3	8
40740021IS01	21	1271	95.81	18.0	-1.51	3.10	0.367	84.3	94.6	97.9	8
10240140ISEM	140	1341	30.80	196.8	-0.84	3.03	0.387	94.2	96.4	97.9	8
20110078ISEM	78	1295	93.88	301.8	-2.62	2.51	0.403	88.4	93.1	96.8	8

10200136ISEM	136	1333	29.30	196.6	-0.86	3.58	0.441	94.5	97.4	97.8	8
10040138ISEM	138	1334	15.25	18.9	-2.96	0.86	0.629	80.2	95.4	96.6	9
20350073ISEM	73	1294	33.47	287.9	-2.44	4.61	0.862	85.7	91.6	97.4	10
20150077ISEM	77	1295	35.54	121.7	-3.87	4.74	0.990	83.6	92.5	96.8	10
20310076ISEM	76	1295	35.24	289.1	-4.61	4.59	1.115	88.4	91.8	95.4	10
20270075ISEM	75	1294	32.22	110.8	-6.51	6.96	1.870	82.3	90.0	96.4	11
10100139ISEM	139	1335	0.00	17.2	*** All data null ***						
20530158EGEM	158	1357	0.00	287.6	*** All data null ***						

Quality Index	Std dev max	<<<< log scale >>>>	Cumulative percentage	Total per band
1	0.081	)*****	46.0	63
2	0.105	)*****	59.1	18
3	0.122	)*****	63.5	6
4	0.162	)*****	73.7	14
5	0.227	)*****	83.9	14
6	0.283	)*****	88.3	6
7	0.340	)*****	92.7	6
8	0.486	)*****	96.4	5
9	0.810	)*	97.1	1
10	1.620	)*****	99.3	3
11	2.430	)*	100.0	1
12	3.240	)	100.0	0
13	10.000	)	100.0	0

Counts -----> 1.....2 ..... 5 .. 7 ..10 .....25 ..... 50 ..... 137

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Total length of survey lines on file	:	8252.70 km
Total length with non-null data in item 29 (LRES )	:	7949.18 km
Overall coverage	:	96 %
Total number of records on file	:	328869
Total number of records with non-null data in item 29 (LRES )	:	318153
Overall minimum value for item 29 (LRES )	:	-6.51
Overall maximum value for item 29 (LRES )	:	6.96

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## **Appendix G      References**

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