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Gravity measurements in eclogite mapping, Naustdal, Sogn og fjordane

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REPORT

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Gravity measurements in eclogite mapping, Naustdal , Sogn og Fjordane

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Summary:

Gravity measurements have been carried out along 10 profiles in the region between Naustdal and Engebø. The objective of the measurements was to detect new heavy bodies of eclogite and to map the extension to the depth of the known eclogite at Bygdahaugen. To confirm the ability of the gravity method, two profiles were measured across the known eclogite deposit in Naustdal. The size (depth) of this deposit should be estimated.

The results show that the gravity method is well suited for such investigations and the Naustdal deposit was clearly indicated by a strong anomaly. To the East of Bygdahaugen a new body with a possible density of around 3400 kg/m^3 (eclogite) was indicated. The eclogite outcropping at Bygdahaugen seems to be the same as the indicated body. The depth extent is estimated to 600 m in the model. The size of the body is probably in the same range as the Engebø deposit, approximately 400 mill. tons.

More detailed investigations, both geophysical and geological, have to be carried out before drilling can start. At least four gravity profiles should be measured which will confirm the anomalies and lead to an improved estimate of the size of the indicated deposits.

Keywords: Geofysikk	Gravimetri	Eklogitt
Rutil	Modellforsøk	
		Fagrapport

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1. INTRODUCTION

Gravity measurements have been carried out in the mountainous area between Naustdal and Engebø in Sogn og Fjordane county, western Norway. The objective of the gravimetric survey was to detect new deposits of rutile-bearing eclogite like the known deposits in Naustdal and Engebø. The overview map (map –01) shows the investigated area. The investigated area lies between these two deposits in the same tectonostratigraphic position. The main bedrock in the area is a granitic to granodioritic gneiss, in which the eclogite lenses occurs (Lutro and Ragnhildstveit 1996). Gravity measurements have been carried out successfully on the Engebø eclogite deposit (Mauring & Gellein 1996 and 1997) showing that gravity measurements are suitable for detecting big deposits of eclogite. The density contrast between eclogite (3400 kg/m^3) and gneiss (2700 kg/m^3) gives anomalies of several mGals at the Engebø deposit.

Data acquisition and leveling were performed in September 1998 by Harald Elvebakk and Leif Furuhaug. Data processing was done by Jomar Gellein and Harald Elvebakk. Bouguer and residual maps were made by Ola Kihle. Interpretation and modelling of gravity profile data were done by Harald Elvebakk.

2. THE GRAVITY METHOD AND DATA ACQUISITION

The gravity method is based on the attraction between all masses. In the gravity method the masses are a known mass inside the gravimeter and the underlying masses on the Earth. Variations in the density of the bedrock varies the attraction forces between the masses which can be measured by the gravimeter. For this reason, measurements of the variation, with location, in the gravitational attraction forces can provide valuable information about subsurface geology. The gravity method is particularly useful in differentiating rock types which are not distinguishable by virtue of their magnetic or electric properties.

Several corrections have to be performed on the measured gravity data due to variations in latitude, elevation, time and terrain (surrounding masses). These corrections are very important. The terrain correction may give some uncertainty in the processed data in very rough terrain combined with poor elevation data.

Data acquisition was carried out using a LaCoste & Romberg gravimeter (model G No. 569). Measurements were made along 10 profiles. Some additional points were measured to make a Bouguer and residual anomaly map of the investigated area. The elevation (m.a.s.l.) in each point was calculated by using a Sokkia (SET4B) electronic total station. Map –01 shows the investigated area with the profiles. Profile details are shown in Table 1.

Table 1. Number of stations, station interval and length of the profiles

Profile no.	Number of stations	Station interval (m)	Profile length (km)
1a + 1b	79	c. 200 and 50	11
2	12	c. 200	2.1
3	20	c. 200	3.2
4	37	c. 200 and 50	3.3
5	21	c. 200	3.2
6	21	c. 200	3.6
7	19	c. 200	3.5
8 + 10	21	c. 200	3.6
9	14	c. 200	2.5

Station interval was normally 200 m. To map known deposit in Naustdal and Bygdahaugen, a station interval of 50 m was used.

To correct for diurnal variations in the gravity field and instrument drift, base station readings were made before and after measurements along profiles at a station located close to the profiles (UTM 32W 3116 68224 WGS84). This base station was tied to a gravity base station at Mo School of Agriculture in Førde (Statens kartverk, UTM 32W 3390 68147 WGS84) where the value of absolute gravity is known. Absolute gravity values could thus be obtained for all stations.

3. DATA PROCESSING

Bouguer anomaly values were calculated using software from the Norwegian Mapping Authority (Statens Kartverk, Mathisen 1976). Bouguer and terrain corrections were carried out using a standard density of 2670 kg/m^3. Terrain corrections were performed using 8 points with known elevation on four circles around each gravity station. Circle radii were 100, 200, 400 and 800 m. Usually, 50 m circle radii is also used, but this was removed, see later. For terrain corrections of stations under 600 m.a.s.l., 1:5000 scale maps were used as basis for manually readings of elevations on the circle radii. Above 600 m.a.s.l. (in the most interesting part of the area) 1:5000 scale maps were missing and 1:50 000 scale maps were used for elevation readings. This might cause some inaccuracy in the terrain correction values. In addition, elevations from the Norwegian Mapping Authority's database were used for terrain corrections outside the 800 m radii. At some profiles the terrain correction values seems to correlate with the Bouguer anomaly values. This was especially pronounced when the 50 m circle radii was included. For this reason the 50 m radii was removed in the terrain correction process. However, it seems to be quite clear that the obtained Bouguer anomalies are real and

caused by variation in the density (eclogite). On profile 10-8 there is no correlation between the terrain corrections and the Bouguer anomaly. The terrain correction values show a positive peak (2 mGal) while the Bouguer anomaly curve is flat. This profile is outside the Naustdal deposit and should not give a gravity anomaly. A table of co-ordinates (geodetic datum ED50), absolute gravity, corrections and Bouguer anomalies is shown in appendix 1.

Prior to modelling the data, a local gravity gradient was subtracted from the terrain corrected Bouguer anomaly. The gravity gradient was calculated from the trend in the Bouguer anomaly curves. Most of the profiles show a linear trend in the Bouguer anomaly curve except for profile 1a and 7 where the local gravity gradient was calculated from a local regional model. At profile 1b the gradient was locally influenced by a seawater body (Førdefjord) and the gradient was not linear. At profile 7 the gradient also seems to differ from a linear trend. On profile 2 the gradient was calculated using data from NGUs regional database. The computed regional gradients may cause some inaccuracy in the size of the residual Bouguer anomalies. This is always a problem in gravity modelling.

The modelled profiles are straight lines between two points close to each end of the measured profiles. The gravity stations do not lay on this line, and this will also cause some inaccuracy in the modelling.

Modelling of the data was performed using the 2.5D GMM (Gravity and Magnetic Modelling) program from Swedish Geological Company (1991). The length of the modelled body is 1000 m, 500 m to each side of the profile. For presentation of the models and the model response curves, the Grapher program from Golden Software INC. was used. Bouguer and residual anomaly maps were made using Oasis montaj system from Geosoft (Geosoft 1997).

4. INTERPRETATION – MODELLING

4.1 Densities and geological information

A geological map of the Førdefjord area, 1:50 000, (Lutro and Ragnhildstveit 1996) is used as a basis for the modelling. A part of the geological map covering the investigated area is shown in Map –04. The main rock type in the area is a granitic to granodioritic gneiss. Inside the gneiss unit there is a mixed unit of eclogite, amphibolite, metagabbro and grey gneiss. Rock sampling has revealed average density values of 2700 kg/m^3 for the granitic gneiss, 2900 – 3000 kg/m^3 for the mixed unit and 3400 kg/m^3 for the eclogite (Korneliussen et al., 1996 & 1997). There are no drillholes in the investigated area to put constraints on the

modelling of the rock unit towards depth. Except profile 1a and 1b the profiles are far from the sea, and a sea water body is not used in the modelling. A sea water body on profile 1a seems to have just a small effect on the Bouguer anomaly on shore. This was shown when modelling the regional gradient on this profile.

In Naustdal two profiles cross the outcrop of the known eclogite deposit. At Bygdahaugen profile 4 and 7 cross an outcropping eclogite. Profile 2 and 3 crossed the mixed unit. This geological information is used in the modelling process.

All the graphs in the appendix section are plotted from the South to the North seen from the East. There was no grid established in the area and the co-ordinates on the profiles do not correspond to each other. Because of some strange conventions in the processing software some of the profiles have descending co-ordinates on the x-axis.

4.2 Profile 1b

Profile 1b is the easternmost profile in the investigated area. The location of the profile is shown in Map –01. The profile crossed the thickest part of the outcrop of the Naustdal eclogite deposit. Appendix 2, page 1 shows Bouguer anomaly and terrain corrections. The high terrain correction values to the South are probably caused by the very steep Kletten mountain. The calculated Bouguer anomaly and selected gradient are shown in appendix 3, page 1.

The residual Bouguer anomaly is 4 – 5 mGal. The model with calculated response and observed values (residual Bouguer anomaly) are shown in appendix 4, page 1. The anomaly had to be modelled with two bodies with density 3400 kg/m^3 (eclogite). The largest body is approximately 500 m deep, 200 m thick and it is dipping ca 60^O to the North. The response from the model fits well with the observed data. However, with poor geological control many different shapes of the model will give almost the same response. In spite of that, it is possible to get an idea of a model suitable for quantitative evaluation. Details in geometry of a body cannot be modelled with certainty.

4.3 Profile 1a

Profile 1a was measured along RV 5 (main road) from the centre of Naustdal (see Map –01). Also this profile crossed the Naustdal eclogite deposit. Bouguer anomaly and terrain corrections are shown in appendix 2, page 2. Bouguer anomaly and an interpreted local gradient are shown in appendix 3, page 2. The gradient had to be modelled using a model including a sea water body. For that reason the local gradient is not linear.

The residual Bouguer anomaly is approximately 1 mGal indicated at two stations. This rather small anomaly is modelled in appendix 4, page 2 which also shows the calculated response and observed data. The eclogite is mapped to be about 200 m wide on the surface, which fits well with the model. The extension to the depth is rather small, 50 – 100 m. This means that the size of the deposit seems to decrease strongly on the western side of the Nausta river. The deposit is located close to a built up area and may not be put into production. However, the size and the extension to the East are not known in detail.

4.4 Profile 10-8

This profile is located 500 – 600 m to the West of profile 1a and was measured along a private road up in the steep hillside. The interpreted profile consists of stations from profile 8 and 10. Terrain correction and Bouguer anomaly are shown in appendix 2, page 3. Bouguer anomaly and local gradient are shown in appendix 3, page 3. The gradient can easily be estimated from the increasing Bouguer values towards south-west.

The residual Bouguer anomaly shows no clear anomalies. In one station there is a small anomaly, 0.6 – 0.7 mGal. The model and response are shown in appendix 4, page 3. No large bodies of eclogite (3400 kg/m^3) are indicated. The profile is located close to the western end of the Naustdal deposit.

4.5 Profile 5

Profile 5 is located 4 – 5 km west of profile 10 – 8, in the western end of Stølsdalen. Terrain correction and Bouguer anomaly are shown in appendix 2, page 4 and indicates that there could be a correlation between the terrain correction values and the Bouguer anomaly. This will cause some uncertainty in the modelling. If the terrain correction values are real, the Bouguer anomaly is real. The high terrain correction values between co-ordinate 3000 and 2000 are probably caused by Vindkjegla, a mountain top (big mass) close to the profile. This mass is taken care of by the terrain correction process (terrain correction is always positive). If terrain correction has not been performed on a homogenous underground the Bouguer anomaly would be negative close to a topographic irregularity. By doing terrain correction the Bouguer anomaly curve would be flat. This effect can be seen on profile 10-8, appendix 2, page 3. Bouguer anomaly and local gradient are shown in appendix 3, page 4.

The residual Bouguer anomaly is about 5 mGal between co-ordinate 2750 and 1500. Appendix 4, page 4 shows the model, response and observed data (NB! descending x-co-ordinates). The model shows a body with density 3400 kg/m^3 which is 200 – 300 m thick,

700 m deep and dipping ca 60^{O} to the North. The top of the body is close to the surface and the upper part is 100 – 150 m thick. The size of the cross-sectional area (eclogite) is in the same range as the Naustdal deposit.

4.6 Profile 6

Profile 6 starts at Knibben (611 m.a.s.l.) and ends up at Ørnehamrane (703 m.a.s.l.) about 1 km to the West of profile 5. The terrain correction curve, appendix 2, page 5, comes up with increasing values on the southern part of the profile. This is probably caused by the Knibben mountain. There is no correlation between the Bouguer anomaly and the terrain correction Bouguer anomaly and local gradient are shown in appendix 3, page 5.

The residual Bouguer anomaly shows a gravity anomaly between co-ordinate 1700 and 500 of 2 – 3 mGal. Models, response and observed data are shown in appendix 4, page 5. The main anomaly is modelled by two bodies with a density of 3400 kg/m^3. One body (the smallest) is close to the surface. The top of the main body is indicated at 200 m depth with a depth extent of 400 m. The body width is 150 – 200 m, the dip is ca 60^{O} to the North. Two small bodies, both south and north of the main body, are also indicated. The main body could be the same body indicated on profile 5.

4.7 Profile 7

Profile 7 is located 1 km to the West of profile 6. Terrain correction and Bouguer anomaly are shown in appendix 2, page 6. Increasing terrain correction values from co-ordinate 2000 to 1000 are probably cause by the very steep hillside close to Frammarsvikstølen. The gravity anomaly on the Bouguer anomaly curve is indicated further to the East and do not correlate with the terrain correction. Appendix 3, page 6 shows the Bouguer anomaly and the selected local gradient.

A residual Bouguer anomaly of 2 – 3 mGal is indicated between co-ordinate 1500 and 500. Appendix 4, page 6 shows the model, response and observed data. The outcrop of an eclogite body has been mapped on this profile and the next profile to the West (profile 4). On profile 7 the outcrop is mapped from co-ordinate 1250 to 1150. This geological information has been put into the model. The upper part of the model body, density 3400 kg/m^3, is approximately 100 m thick increasing to 150 – 200 m in the deeper part. The dip is c. 45^{O} to the North. This body could be the same body as indicated on profile 5 and 6. Two small bodies, density 3300 kg/m^3, are indicated at co-ordinates 3250 and 2000.

4.8 Profile 4

Profile 4 starts at Holtane (739 m.a.s.l.) and ends up at Albotnefjellet. Station intervals of 50 m were used when passing the eclogite outcrop at Bygdahaugen. Terrain correction and Bouguer anomaly are shown in appendix 2, page 7. Bouguer anomaly and local gradient are shown in appendix 3, page 7.

The southern part of the profile is close to the outcropping mixed unit of eclogite, amphibolite, metagabbro and gneiss. Appendix 4, page 7 shows the model, response and observed data. Three bodies of the mixed unit with a density of 3000 kg/m^3 are put into the model at the southern part of the profile which give a nice fit with the observed data. The outcrop of the eclogite is also put into the model which gives a main body dipping 20^O to the North. The body is 25 – 75 m thick, 500 – 600 m wide and about 150 m deep. A smaller body is indicated 200 m to the North of the main body. The outcrop of the eclogite at Bygdahaugen may represent the outcrop of the subsurface bodies indicated on profile 5, 6 and 7. It means that the length of the body is at least 2.5 km.

4.9 Profile 3

Profile 3 is located at the western side of Blåfjellet passing Skitnestølen. The southern part of the profile passes through the mixed unit. The terrain correction, see appendix 2, page 8, shows increasing values both at the southern and northern part of the profile. This is probably caused by the very steep hillsides at Kalleskardet and Blåfjellet. The peaks on the terrain correction curve do not influence the Bouguer anomaly. Bouguer anomaly and local gradient are shown in appendix 3, page 8.

The residual Bouguer anomaly shows two gravity anomalies, see appendix 4, page 8, where the model and the response are also shown. The southernmost anomaly is the strongest, 2.5 mGal, and fits well with the surface mapped mixed unit. At the surface it is mapped to be 800 – 900 m wide. The gravity model (density 3000 kg/m^3) shows a deep structure of the mixed unit dipping c. 75^O to the North. The body width is about 200 m. The northern anomaly is indicating a horizontal body using the density of the mixed unit. This could be a subsurface continuation of the mixed unit which outcrops further to the West. Another possibility is a westward continuation of the eclogite mapped at Bygdahaugen. The geological map however, indicates that the eclogite turns to north-west.

4.10 Profile 2

Profile 2 is the westernmost profile which was modelled. The profile starts at Holten (419 m.a.s.l.) and ends up north-east of Langheia. Except a couple of stations, the entire profile is inside the mixed unit. The terrain correction and Bouguer anomaly are shown in appendix 2, page 9. The Bouguer anomaly and the selected gradient are shown in appendix 3, page 9. Some stations in NGUs regional database are used to calculate the regional gradient.

The model, response and observed data are shown in appendix 4, page 9. The rise in the Bouguer anomaly from co-ordinate 1750 seems to be caused by the mixed unit with a density of 3000 kg/m^3. This unit is 400 – 500 m thick and 1.5 – 2 km wide. The model fits well to the observed data and the geological map.

4.11 Additional stations

Besides the profiles which have been modelled, several additional stations were measured in order to make a Bouguer anomaly map and a residual map of the investigated area. These stations were in Redalen (profile 9), one part of profile 1 from the centre of Naustdal to Stølsdalen and five stations on Skeisknausen/Liafjellet were also measured.

4.12 Bouguer anomaly map

Map –02 shows the Bouguer anomaly map of the investigated area (geodetic datum WGS 84). Besides the stations measured in this project, several stations from NGUs database are implemented in the gridding of the Bouguer values. The map shows an increasing regional gradient from east to west. The Naustdal eclogite deposit are clearly indicated. Because of missing data to the East of the deposit the extension of the deposit to the East are not fully mapped.

About 3 km to the West of the Naustdal eclogite deposit a 3 km long anomalous structure is indicated. Except the surface mapped eclogite at Bygdahaugen no eclogite deposits are known or mapped in this area. From the modelling, this structure probably represent a body with a density of 3400 kg/m^3 and the same size as the Naustdal deposit.

2 km to the West of Bygdahaugen the Bouguer anomaly map indicates the mixed unit of eclogite, amphibolite, metagabbro and gneiss (density 3000 kg/m^3).

4.13 Residual map

Map –03 shows the residual gravity map of the investigated area (geodetic datum WGS 84). A third order polynomial surface was fitted to the Bouguer grid values and then subtracted to produce the residual gravity grid. (Geosoft 1997). The Naustdal deposit and the Bygdahaugen eclogite structure are clearly indicated. This map was produced to enhance the local gravity anomalies in the area. These residual values include some semi regional trends, and can not be used as a basis for the eclogite deposit modelling.

5. DISCUSSION AND RECOMMENDATIONS

The gravity measurements seems to indicate a body with a density of 3400 kg/m^3 (eclogite) not known from the surface geological mapping. The body seems to be c. 600 m deep and 100 – 300 m thick. With an average estimate of (150 x 400) m^2, 2 km long, density 3400 kg/m^3, the body is approximately 400 mill. tons. This is in the same range as the size of the Engebø deposit. A modelled cross-section in the central part of the Naustdal deposit (profile 1b), indicates a cross-sectional area of a body at the same size as the indicated Bygdahaugen body.

To confirm the anomalies and the size of the indicated body further investigations have to be carried out. One profile should be measured to the east of profile 5 and one between profile 5 an 6, 6 and 7 and between profile 7 and 4. Station intervals should be 100 m when crossing the anomalous structure. To map the extension of the Naustdal eclogite body, profiles east of profile 1b should be measured.

There are some uncertainty about the terrain corrections and regional gradient. To further minimise the terrain correction error a digital elevation grid should be made. The elevations on the circle radii and the terrain correction values will then be more accurate. The regional gradient is difficult to calculate. The size of the residual Bouguer anomaly depends on the level of the local gradient. Regional gravity stations (from the regional database) which can confirm the observed local gradient on the measured profiles, will give the best regional gradient to subtract from the Bouguer anomaly.

More detailed geological mapping along the profiles and rock sampling for more accurate density determination should also be carried out. This will make better models in the gravity modelling process.

6. CONCLUSIONS

Gravity measurements have been carried out along 10 profiles in the region between Naustdal and Engebø. The objective of the measurements was to detect new bodies of rutile-bearing eclogite and to map the extension to the depth of the known eclogite at Bygdahaugen. To confirm the ability of the gravity method two profiles were measured across the known eclogite deposit in Naustdal. The size of the Naustdal deposit should also be estimated.

The results show that the gravity method is well suited for such investigations and the Naustdal deposit was clearly indicated by a strong anomaly. To the East of Bygdahaugen a new body with a possible density of 3400 kg/m^3 (eclogite) was indicated. The eclogite outcropping at Bygdahaugen seems to be the same as the indicated body. The depth extent is estimated to 600 m. The size of the body is probably in the same range as the Engebø and Naustdal deposits, approximately 400 mill. tons.

More detailed investigations, both geophysical and geological, have to be carried out before drilling can start. At least four gravity profiles should be measured which will confirm the anomalies and size of the indicated deposits.

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TABLE OF CO-ORDINATES, ABSOLUTE GRAVITY, CORRECTIONS AND BOUGUER ANOMALIES

Location : Naustdal r=100,200,400,800m Project no: 190005 Fieldwork carried out in 1998 Processing performed in June 1999

Station Profile	Point	Lati-tude	Longi-tude	UTM zone	UTM East	UTM North	Elevation (in m)	Absolute gravity	Bouguer corr.	Terrain corr.	Free air corr.	Bouguer anomaly
	1	61 31.54	5 42.35	32V	324825	6825930	560.00	981910.759	63.35	9.16	172.69	-6.59
	2	61 31.57	5 41.93	32V	324460	6826010	622.00	981899.108	70.35	9.93	191.81	-5.35
	3	61 31.99	5 41.73	32V	324325	6826790	726.00	981879.836	82.09	10.56	223.88	-4.22
	4	61 31.88	5 40.79	32V	323480	6826640	699.00	981888.803	79.04	7.74	215.55	-3.23
	5	61 31.72	5 39.84	32V	322625	6826380	677.00	981894.695	76.56	6.74	208.77	-2.39
1	1	61 30.46	5 43.91	32V	326113	6823854	269.31	981960.144	30.49	12.14	83.06	-9.62
1	2	61 30.48	5 44.10	32V	326283	6823885	271.43	981962.702	30.73	7.22	83.71	-11.57
1	3	61 30.48	5 44.35	32V	326500	6823882	273.55	981963.828	30.97	6.62	84.36	-10.63
1	4	61 30.50	5 44.57	32V	326698	6823900	250.85	981970.060	28.40	5.06	77.36	-10.46
1	5	61 30.59	5 44.69	32V	326810	6824064	244.10	981972.866	27.64	3.90	75.28	-10.25
1	6	61 30.72	5 44.82	32V	326940	6824303	229.69	981976.178	26.01	3.64	70.84	-10.14
1	7	61 30.75	5 45.05	32V	327143	6824351	205.67	981981.617	23.29	2.84	63.43	-10.25
1	8	61 30.77	5 45.04	32V	327141	6824378	202.49	981981.897	22.93	2.87	62.45	-10.57
1	9	61 30.79	5 45.00	32V	327105	6824417	197.05	981983.088	22.32	2.94	60.77	-10.43
1	10	61 30.81	5 44.95	32V	327060	6824467	190.28	981984.552	21.55	3.31	58.68	-9.92
1	11	61 30.82	5 44.89	32V	327008	6824483	184.54	981985.529	20.90	3.42	56.91	-9.95
1	12	61 30.81	5 44.83	32V	326957	6824475	178.43	981986.827	20.21	3.42	55.03	-9.84
1	13	61 30.81	5 44.78	32V	326908	6824462	171.86	981988.002	19.47	3.43	53.00	-9.94
1	14	61 30.80	5 44.72	32V	326859	6824455	164.57	981989.183	18.64	3.51	50.76	-10.10
1	15	61 30.80	5 44.66	32V	326809	6824451	158.59	981990.550	17.96	3.49	48.91	-9.92
1	16	61 30.80	5 44.61	32V	326759	6824452	155.19	981991.355	17.58	3.42	47.86	-9.85
1	17	61 30.81	5 44.55	32V	326710	6824473	147.75	981992.597	16.74	3.50	45.57	-9.98
1	18	61 30.83	5 44.59	32V	326742	6824511	140.27	981994.373	15.89	3.28	43.26	-9.89
1	19	61 30.86	5 44.59	32V	326750	6824563	134.36	981995.538	15.22	3.22	41.44	-9.99
1	20	61 30.86	5 44.54	32V	326705	6824568	129.20	981996.570	14.64	3.26	39.85	-9.93
1	21	61 30.87	5 44.52	32V	326684	6824589	123.70	981997.861	14.01	3.27	38.15	-9.70
1	22	61 30.88	5 44.56	32V	326726	6824615	120.98	981998.428	13.70	3.29	37.31	-9.64
1	23	61 30.89	5 44.61	32V	326769	6824634	118.94	981998.594	13.47	3.30	36.68	-9.93
1	24	61 30.91	5 44.67	32V	326820	6824653	112.81	981999.671	12.78	3.46	34.79	-9.89
1	25	61 30.92	5 44.62	32V	326785	6824687	104.99	982001.324	11.89	3.40	32.38	-9.82
1	26	61 30.95	5 44.60	32V	326767	6824732	99.00	982002.726	11.22	3.44	30.53	-9.62
1	27	61 30.98	5 44.54	32V	326716	6824800	100.45	982003.963	11.38	3.27	30.98	-8.33
1	28	61 31.01	5 44.55	32V	326723	6824852	99.06	982005.107	11.22	3.51	30.55	-7.22
1	29	61 31.03	5 44.61	32V	326782	6824886	89.21	982007.094	10.11	3.57	27.51	-7.15
1	30	61 31.05	5 44.51	32V	326698	6824934	78.43	982009.465	8.89	3.84	24.19	-6.61
1	31	61 31.09	5 44.53	32V	326721	6824997	69.30	982011.183	7.85	4.29	21.37	-6.29
1	32	61 31.13	5 44.60	32V	326785	6825079	50.34	982014.540	5.70	4.66	15.53	-6.33
1	33	61 31.15	5 44.67	32V	326850	6825103	46.49	982014.987	5.27	5.06	14.34	-6.23
1	34	61 31.18	5 44.71	32V	326882	6825166	42.16	982016.131	4.78	4.97	13.00	-6.08
1	35	61 31.25	5 44.72	32V	326901	6825281	28.91	982019.143	3.28	5.16	8.92	-5.53
1	36	61 31.28	5 44.80	32V	326976	6825333	30.88	982019.273	3.50	5.12	9.52	-5.11
1	37	61 31.35	5 45.02	32V	327175	6825455	32.54	982018.495	3.69	5.09	10.04	-5.67
1	38	61 31.43	5 45.13	32V	327276	6825605	33.98	982017.263	3.85	4.85	10.48	-6.98
1	39	61 31.52	5 45.24	32V	327382	6825770	37.66	982015.910	4.27	4.64	11.62	-7.89

Location : Naustdal r=100,200,400,800m Project no: 190005 Fieldwork carried out in 1998 Processing performed in June 1999

Station Profile	Station Point	Lati-tude	Longi-tude	UTM zone	UTM East	UTM North	Elevation (in m)	Absolute gravity	Bouguer corr.	Terrain corr.	Free air corr.	Bouguer anomaly
1	40	61 31.62	5 45.31	32V	327461	6825943	42.93	982014.383	4.86	4.66	13.24	-8.49
1	41	61 31.73	5 45.45	32V	327590	6826152	45.18	982013.490	5.12	5.05	13.93	-8.75
1	42	61 31.89	5 45.37	32V	327539	6826447	34.59	982015.034	3.92	5.30	10.67	-9.21
1	43	61 32.04	5 45.22	32V	327415	6826725	30.01	982014.205	3.40	6.22	9.26	-10.20
1	44	61 31.93	5 45.07	32V	327274	6826536	31.18	982014.068	3.53	6.63	9.62	-9.57
1	45	61 31.85	5 44.98	32V	327190	6826381	30.01	982014.186	3.40	6.83	9.26	-9.35
1	46	61 31.75	5 44.86	32V	327071	6826216	26.19	982014.092	2.97	7.39	8.08	-9.51
1	47	61 31.63	5 44.73	32V	326942	6825986	22.22	982015.706	2.52	6.59	6.85	-9.34
1	48	61 31.55	5 44.56	32V	326784	6825855	17.11	982016.286	1.94	7.37	5.28	-8.85
1	49	61 31.43	5 44.36	32V	326597	6825640	18.85	982015.314	2.14	6.87	5.81	-9.86
1	50	61 31.36	5 44.23	32V	326472	6825510	15.57	982017.277	1.76	6.96	4.80	-8.33
1	51	61 31.27	5 44.03	32V	326295	6825360	9.71	982018.691	1.10	6.64	2.99	-8.24
1	52	61 31.24	5 43.82	32V	326106	6825312	8.86	982018.082	1.00	7.36	2.73	-8.30
1	53	61 31.17	5 43.50	32V	325809	6825191	9.66	982018.443	1.09	7.74	2.98	-7.28
1	54	61 31.10	5 43.34	32V	325660	6825071	9.66	982019.429	1.09	7.68	2.98	-6.29
1	55	61 31.02	5 43.21	32V	325543	6824930	7.82	982018.815	0.89	7.86	2.41	-6.96
1	56	61 30.87	5 43.26	32V	325570	6824651	3.21	982019.995	0.36	5.84	0.99	-8.51
1	57	61 30.77	5 43.27	32V	325573	6824461	1.80	982020.336	0.20	5.54	0.56	-8.61
1	58	61 30.64	5 43.28	32V	325568	6824221	2.13	982019.888	0.24	5.15	0.66	-9.26
1	59	61 30.53	5 43.25	32V	325535	6824023	2.47	982019.753	0.28	4.86	0.76	-9.43
1	60	61 30.41	5 43.24	32V	325514	6823800	3.53	982020.011	0.40	4.72	1.09	-8.99
1	61	61 30.51	5 42.99	32V	325295	6824000	1.98	982020.089	0.22	5.04	0.61	-9.01
1	62	61 30.61	5 43.09	32V	325400	6824178	6.28	982019.345	0.71	5.35	1.94	-8.74
1	63	61 30.70	5 43.04	32V	325358	6824343	11.03	982019.209	1.25	5.71	3.40	-7.71
1	64	61 30.76	5 42.97	32V	325307	6824461	26.93	982016.504	3.05	5.54	8.31	-7.55
1	65	61 30.81	5 42.87	32V	325218	6824563	44.20	982013.321	5.01	5.88	13.63	-7.09
1	66	61 30.87	5 42.74	32V	325109	6824675	63.99	982009.119	7.25	6.06	19.74	-7.31
1	67	61 30.90	5 42.54	32V	324934	6824741	91.75	982003.589	10.39	6.18	28.30	-7.37
1	68	61 30.93	5 42.15	32V	324597	6824815	141.30	981994.728	16.01	5.81	43.58	-6.92
1	69	61 31.00	5 41.98	32V	324450	6824941	167.66	981990.043	18.99	5.72	51.71	-6.68
1	70	61 31.08	5 42.05	32V	324521	6825092	187.47	981986.218	21.23	5.61	57.82	-6.87
1	71	61 31.10	5 41.84	32V	324331	6825141	214.22	981981.387	24.26	5.25	66.07	-6.84
1	72	61 31.09	5 41.56	32V	324082	6825142	244.84	981975.864	27.72	4.90	75.51	-6.74
1	73	61 31.10	5 41.32	32V	323875	6825167	269.01	981971.626	30.46	5.20	82.96	-5.96
1	74	61 31.15	5 41.10	32V	323680	6825260	290.09	981967.690	32.84	5.15	89.46	-5.89
1	75	61 31.18	5 40.83	32V	323451	6825337	290.52	981966.759	32.89	6.27	89.60	-5.68
1	76	61 31.16	5 40.61	32V	323250	6825300	291.03	981966.753	32.95	6.40	89.75	-5.39
1	77	61 31.14	5 40.42	32V	323080	6825268	296.91	981965.310	33.62	6.85	91.57	-5.23
1	78	61 31.22	5 40.25	32V	322939	6825425	326.35	981960.116	36.95	6.63	100.65	-4.96
1	79	61 31.23	5 40.05	32V	322761	6825468	343.24	981956.607	38.86	7.03	105.85	-4.83
2	1	61 29.88	5 33.42	32V	316753	6823255	419.00	981944.493	47.42	8.16	129.22	0.73
2	2	61 29.99	5 33.37	32V	316726	6823473	480.30	981933.296	54.35	7.86	148.12	1.08
2	3	61 30.13	5 33.42	32V	316781	6823727	488.84	981936.391	55.31	4.59	150.75	2.39
2	4	61 30.17	5 33.27	32V	316655	6823806	512.82	981932.706	58.02	5.20	158.15	3.93

Location : Naustdal r=100,200,400,800m Project no: 190005 Fieldwork carried out in 1998 Processing performed in June 1999

Station Profile	Point	Lati-tude	Longi-tude	UTM zone	UTM East	UTM North	Elevation: (in m)	Absolute gravity	Bouguer: corr.	Terrain corr.	Free air corr.	Bouguer anomaly
2	5	61 30.22	5 33.05	32V	316458	6823905	524.69	981931.379	59.36	4.69	161.81	4.36
2	6	61 30.27	5 32.81	32V	316251	6824020	543.33	981929.674	61.47	4.66	167.55	6.20
2	7	61 30.32	5 32.71	32V	316166	6824112	558.80	981927.205	63.21	4.40	172.32	6.43
2	8	61 30.38	5 32.52	32V	316007	6824235	574.47	981923.899	64.98	4.84	177.16	6.56
2	9	61 30.40	5 32.25	32V	315766	6824283	587.81	981921.166	66.49	5.16	181.27	6.70
2	10	61 30.46	5 32.01	32V	315566	6824412	586.58	981921.195	66.35	5.73	180.89	6.99
2	11	61 30.49	5 31.78	32V	315361	6824471	568.72	981924.763	64.34	5.68	175.38	6.96
2	12	61 30.53	5 31.59	32V	315197	6824546	536.13	981931.751	60.65	5.13	165.33	7.03
3	1	61 29.62	5 34.59	32V	317763	6822717	445.41	981940.948	50.41	6.19	137.36	0.69
3	2	61 29.72	5 34.51	32V	317707	6822921	490.38	981931.446	55.49	7.18	151.23	0.83
3	3	61 29.86	5 34.40	32V	317620	6823185	593.24	981912.079	67.10	8.62	182.94	2.82
3	4	61 29.96	5 34.30	32V	317540	6823373	602.81	981912.769	68.18	7.55	185.89	4.19
3	5	61 30.08	5 34.37	32V	317615	6823598	587.91	981917.646	66.50	5.23	181.30	3.71
3	6	61 30.20	5 34.37	32V	317625	6823807	598.23	981915.084	67.67	5.04	184.48	2.79
3	7	61 30.22	5 34.30	32V	317573	6823857	612.00	981912.331	69.22	5.35	188.73	3.03
3	8	61 30.32	5 34.43	32V	317697	6824022	580.91	981918.322	65.71	5.14	179.14	2.61
3	9	61 30.42	5 34.36	32V	317645	6824212	578.72	981918.485	65.46	5.04	178.47	2.12
3	10	61 30.44	5 34.25	32V	317549	6824267	579.90	981917.851	65.60	4.81	178.83	1.42
3	11	61 30.54	5 34.23	32V	317542	6824444	610.75	981912.637	69.08	5.67	188.34	2.98
3	12	61 30.61	5 34.06	32V	317393	6824580	635.68	981907.839	71.89	6.10	196.03	3.42
3	13	61 30.65	5 33.83	32V	317195	6824677	662.54	981902.586	74.93	6.58	204.31	3.83
3	14	61 30.71	5 33.63	32V	317025	6824800	689.57	981896.807	77.98	7.02	212.64	3.71
3	15	61 30.71	5 33.53	32V	316933	6824800	692.43	981896.236	78.30	7.04	213.53	3.72
3	16	61 30.78	5 33.39	32V	316822	6824940	681.62	981898.640	77.08	6.96	210.19	3.87
3	17	61 30.84	5 33.25	32V	316696	6825050	695.15	981894.689	78.61	8.31	214.37	3.78
3	18	61 30.90	5 33.13	32V	316602	6825169	679.52	981897.344	76.84	8.68	209.55	3.69
3	19	61 31.09	5 33.05	32V	316543	6825515	585.78	981917.117	66.26	6.43	180.64	2.64
3	20	61 31.17	5 33.03	32V	316537	6825669	529.63	981929.796	59.92	4.76	163.33	2.62
4	1	61 29.88	5 35.28	32V	318408	6823173	739.00	981879.984	83.55	12.07	227.88	2.66
4	2	61 30.03	5 35.29	32V	318426	6823445	669.77	981899.073	75.74	6.54	206.54	2.50
4	3	61 30.13	5 35.30	32V	318445	6823638	668.20	981900.422	75.57	6.00	206.06	2.88
4	4	61 30.23	5 35.34	32V	318491	6823830	670.84	981899.744	75.86	5.75	206.87	2.34
4	5	61 30.37	5 35.44	32V	318590	6824076	681.32	981897.524	77.05	5.87	210.10	2.11
4	6	61 30.43	5 35.45	32V	318611	6824191	675.29	981898.850	76.37	5.42	208.24	1.74
4	7	61 30.54	5 35.45	32V	318621	6824383	669.42	981899.902	75.70	5.17	206.43	1.20
4	8	61 30.57	5 35.47	32V	318642	6824447	686.87	981895.730	77.67	5.78	211.81	1.05
4	9	61 30.59	5 35.49	32V	318664	6824491	702.07	981892.518	79.39	6.54	216.50	1.52
4	10	61 30.62	5 35.51	32V	318682	6824540	702.04	981892.694	79.38	6.26	216.49	1.40
4	11	61 30.64	5 35.53	32V	318704	6824580	703.06	981892.732	79.50	6.26	216.80	1.57
4	12	61 30.67	5 35.55	32V	318717	6824625	703.10	981892.676	79.50	6.16	216.82	1.43
4	13	61 30.69	5 35.57	32V	318737	6824671	704.24	981892.393	79.63	6.14	217.17	1.28
4	14	61 30.72	5 35.57	32V	318744	6824725	718.43	981888.996	81.23	6.65	221.54	1.17
4	15	61 30.75	5 35.57	32V	318750	6824772	715.32	981890.009	80.88	6.18	220.58	1.04

Location : Naustdal r=100,200,400,800m Project no: 190005 Fieldwork carried out in 1998 Processing performed in June 1999

Station Profile	Point	Latitude	Longitude	UTM zone	UTM East	UTM North	Elevation (in m)	Absolute gravity	Bouguer corr.	Terrain corr.	Free air corr.	Bouguer anomaly
4	16	61 30.77	5 35.58	32V	318760	6824813	707.32	981891.884	79.98	5.95	218.12	1.13
4	17	61 30.79	5 35.60	32V	318777	6824855	712.13	981890.630	80.52	6.05	219.60	0.85
4	18	61 30.83	5 35.60	32V	318781	6824914	740.53	981884.657	83.73	6.96	228.36	1.34
4	19	61 30.85	5 35.61	32V	318791	6824955	744.52	981884.068	84.18	6.86	229.59	1.37
4	20	61 30.87	5 35.62	32V	318804	6825004	738.54	981885.809	83.50	6.55	227.74	1.63
4	21	61 30.91	5 35.61	32V	318793	6825072	755.60	981882.087	85.43	7.04	233.00	1.67
4	22	61 30.93	5 35.65	32V	318834	6825109	770.75	981878.439	87.13	7.89	237.67	1.84
4	23	61 30.96	5 35.65	32V	318840	6825157	761.59	981881.341	86.10	7.27	234.85	2.27
4	24	61 30.99	5 35.65	32V	318840	6825216	751.37	981884.160	84.95	6.80	231.70	2.55
4	25	61 31.02	5 35.65	32V	318846	6825270	746.55	981885.306	84.40	6.61	230.21	2.57
4	26	61 31.04	5 35.67	32V	318863	6825318	738.67	981887.306	83.52	6.35	227.78	2.70
4	27	61 31.07	5 35.67	32V	318863	6825368	727.86	981889.669	82.30	6.10	224.45	2.70
4	28	61 31.10	5 35.67	32V	318869	6825416	726.03	981889.952	82.09	6.10	223.89	2.56
4	29	61 31.12	5 35.67	32V	318870	6825460	722.63	981890.405	81.71	6.08	222.84	2.34
4	30	61 31.15	5 35.64	32V	318850	6825509	708.58	981893.702	80.12	5.80	218.51	2.54
4	31	61 31.17	5 35.62	32V	318832	6825551	698.19	981895.738	78.95	5.62	215.30	2.36
4	32	61 31.19	5 35.59	32V	318810	6825598	691.77	981896.901	78.22	5.47	213.32	2.06
4	33	61 31.22	5 35.56	32V	318785	6825648	682.28	981898.881	77.15	5.32	210.40	2.03
4	34	61 31.33	5 35.47	32V	318711	6825857	665.51	981901.833	75.26	5.24	205.23	1.44
4	35	61 31.40	5 35.42	32V	318676	6825980	665.46	981901.499	75.26	5.87	205.21	1.66
4	36	61 31.51	5 35.25	32V	318538	6826207	630.77	981907.964	71.34	5.97	194.51	1.32
4	37	61 31.69	5 35.17	32V	318481	6826535	528.94	981929.799	59.84	3.80	163.12	0.84
5	1	61 32.11	5 39.52	32V	322380	6827119	590.35	981913.458	66.78	5.70	182.05	-2.10
5	2	61 32.01	5 39.44	32V	322296	6826926	567.95	981918.813	64.25	4.15	175.15	-2.55
5	3	61 31.90	5 39.30	32V	322163	6826740	599.65	981912.417	67.83	4.43	184.92	-2.35
5	4	61 31.79	5 39.22	32V	322081	6826530	647.38	981902.242	73.22	5.14	199.64	-2.35
5	5	61 31.73	5 39.13	32V	321991	6826435	668.73	981897.058	75.62	6.18	206.22	-2.26
5	6	61 31.61	5 39.03	32V	321895	6826217	632.33	981905.508	71.52	5.06	195.00	-1.87
5	7	61 31.55	5 38.98	32V	321840	6826094	652.67	981900.956	73.81	5.63	201.27	-1.80
5	8	61 31.43	5 38.86	32V	321723	6825890	637.92	981903.381	72.15	5.67	196.72	-2.10
5	9	61 31.29	5 38.70	32V	321575	6825639	622.24	981906.411	70.38	5.46	191.88	-2.16
5	10	61 31.20	5 38.53	32V	321413	6825483	615.58	981908.507	69.63	5.47	189.83	-1.23
5	11	61 31.11	5 38.59	32V	321460	6825312	633.38	981904.506	71.64	6.11	195.32	-0.99
5	12	61 31.01	5 38.72	32V	321566	6825120	646.01	981901.158	73.06	7.45	199.21	-0.40
5	13	61 30.94	5 38.98	32V	321782	6824967	651.72	981898.771	73.71	8.43	200.97	-0.62
5	14	61 30.89	5 39.18	32V	321961	6824862	665.76	981894.464	75.29	9.24	205.30	-1.31
5	15	61 30.78	5 39.27	32V	322024	6824659	668.85	981893.935	75.64	8.05	206.26	-2.24
5	16	61 30.68	5 39.38	32V	322118	6824471	638.17	981899.028	72.18	7.30	196.80	-3.78
5	17	61 30.60	5 39.39	32V	322114	6824323	592.07	981908.574	66.97	6.48	182.58	-4.00
5	18	61 30.56	5 39.56	32V	322265	6824232	576.91	981910.831	65.26	6.64	177.91	-4.47
5	19	61 30.47	5 39.79	32V	322457	6824071	554.00	981913.780	62.67	7.80	170.84	-4.72
5	20	61 30.45	5 40.04	32V	322677	6824013	530.18	981917.338	59.98	8.60	163.50	-5.01
5	21	61 30.44	5 40.15	32V	322779	6823990	510.30	981920.673	57.74	8.69	157.37	-5.47

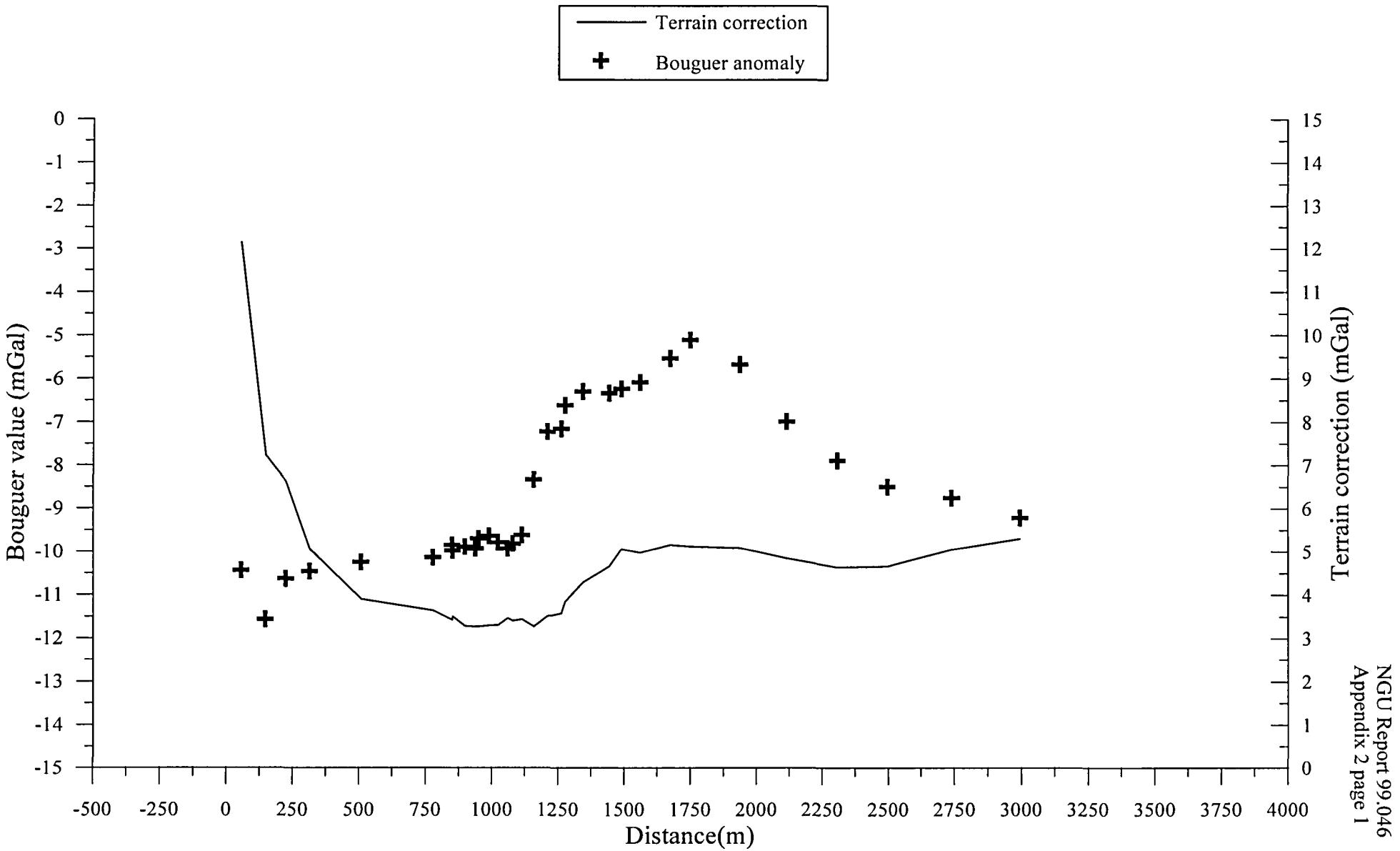
Location : Naustdal r=100,200,400,800m Project no: 190005 Fieldwork carried out in 1998 Processing performed in June 1999

Station Profile	Point	Latitude	Longitude	UTM zone	UTM East	UTM North	Elevation (in m)	Absolute gravity	Bouguer corr.	Terrain corr.	Free air corr.	Bouguer anomaly
6	2	61 29.84	5 38.25	32V	321030	6822969	611.00	981899.088	69.11	11.07	188.42	-4.19
6	3	61 29.91	5 38.28	32V	321068	6823085	615.51	981899.171	69.62	9.15	189.81	-5.26
6	4	61 30.03	5 38.18	32V	320990	6823317	594.85	981906.737	67.29	6.77	183.44	-4.24
6	5	61 30.15	5 38.19	32V	321007	6823542	633.22	981898.613	71.62	7.92	195.27	-3.90
6	6	61 30.26	5 38.17	32V	321004	6823753	629.96	981900.975	71.25	7.24	194.27	-2.99
6	7	61 30.36	5 38.13	32V	320980	6823943	605.74	981906.820	68.52	6.76	186.80	-2.48
6	8	61 30.44	5 38.19	32V	321036	6824076	654.76	981896.418	74.05	7.85	201.91	-2.33
6	9	61 30.53	5 38.22	32V	321074	6824246	656.68	981897.068	74.26	7.09	202.50	-2.13
6	10	61 30.60	5 38.27	32V	321127	6824366	619.80	981905.595	70.10	5.97	191.13	-2.06
6	11	61 30.71	5 38.22	32V	321090	6824572	660.95	981897.675	74.75	6.21	203.82	-1.82
6	12	61 30.82	5 38.16	32V	321044	6824786	685.96	981892.973	77.57	6.70	211.53	-1.28
6	13	61 30.92	5 38.01	32V	320926	6824972	686.75	981893.776	77.66	6.48	211.78	-0.66
6	14	61 31.02	5 37.88	32V	320818	6825162	691.86	981893.649	78.23	6.19	213.35	-0.21
6	15	61 31.16	5 37.79	32V	320752	6825434	730.10	981886.628	82.55	6.54	225.14	0.41
6	16	61 31.26	5 37.87	32V	320832	6825615	716.47	981889.644	81.01	6.05	220.94	0.15
6	17	61 31.40	5 37.92	32V	320894	6825875	688.26	981895.866	77.83	5.19	212.24	-0.19
6	18	61 31.49	5 37.99	32V	320962	6826032	684.06	981896.336	77.35	5.20	210.95	-0.66
6	19	61 31.52	5 38.00	32V	320976	6826091	694.39	981894.103	78.52	5.40	214.13	-0.67
6	20	61 31.61	5 38.02	32V	321000	6826254	702.28	981892.361	79.41	5.91	216.56	-0.48
6	21	61 31.74	5 37.94	32V	320940	6826505	702.76	981891.920	79.46	6.30	216.71	-0.64
7	1	61 29.82	5 37.47	32V	320338	6822966	476.60	981930.759	53.93	6.06	146.98	-3.79
7	2	61 29.92	5 37.37	32V	320259	6823154	508.24	981925.031	57.50	6.09	156.73	-3.43
7	3	61 29.97	5 37.27	32V	320176	6823252	554.22	981915.010	62.70	7.83	170.91	-2.79
7	4	61 30.06	5 37.25	32V	320172	6823422	543.57	981919.663	61.49	5.39	167.63	-2.78
7	5	61 30.19	5 37.26	32V	320187	6823651	535.24	981922.958	60.55	4.34	165.06	-2.35
7	6	61 30.30	5 37.25	32V	320194	6823870	532.05	981924.319	60.19	4.44	164.08	-1.64
7	7	61 30.41	5 37.26	32V	320209	6824070	561.70	981919.418	63.54	4.15	173.22	-1.16
7	8	61 30.52	5 37.30	32V	320259	6824265	564.99	981919.409	63.91	4.15	174.23	-0.66
7	9	61 30.64	5 37.22	32V	320198	6824500	560.38	981920.523	63.39	4.50	172.81	-0.28
7	10	61 30.76	5 37.13	32V	320128	6824730	641.03	981903.779	72.50	5.85	197.68	-0.03
7	11	61 30.89	5 37.01	32V	320033	6824966	708.91	981890.371	80.16	6.69	218.61	0.48
7	12	61 30.98	5 36.99	32V	320026	6825143	742.53	981883.897	83.95	6.96	228.97	0.72
7	13	61 31.07	5 36.90	32V	319960	6825312	754.93	981882.314	85.35	7.72	232.80	2.26
7	14	61 31.15	5 36.77	32V	319850	6825468	708.97	981893.806	80.17	5.80	218.63	2.72
7	15	61 31.24	5 36.70	32V	319793	6825640	679.43	981900.044	76.83	5.31	209.52	2.57
7	16	61 31.31	5 36.71	32V	319810	6825770	653.98	981904.517	73.96	5.16	201.67	1.85
7	17	61 31.43	5 36.79	32V	319892	6825982	577.81	981918.681	65.36	4.49	178.19	0.27
7	18	61 31.54	5 36.83	32V	319936	6826186	551.70	981924.571	62.41	4.02	170.13	0.47
7	19	61 31.66	5 36.82	32V	319944	6826412	544.70	981925.934	61.62	3.90	167.98	0.22
8	1	61 32.11	5 44.60	32V	326872	6826895	209.88	981980.921	23.77	5.38	64.73	-9.28
8	2	61 31.99	5 44.51	32V	326786	6826666	217.01	981979.613	24.58	5.75	66.93	-8.70
8	3	61 31.89	5 44.47	32V	326738	6826480	221.40	981978.604	25.07	5.76	68.28	-8.72
8	4	61 31.82	5 44.32	32V	326603	6826360	222.99	981977.978	25.25	5.81	68.77	-8.92
8	5	61 31.75	5 44.14	32V	326431	6826245	225.11	981977.819	25.49	5.49	69.43	-8.86

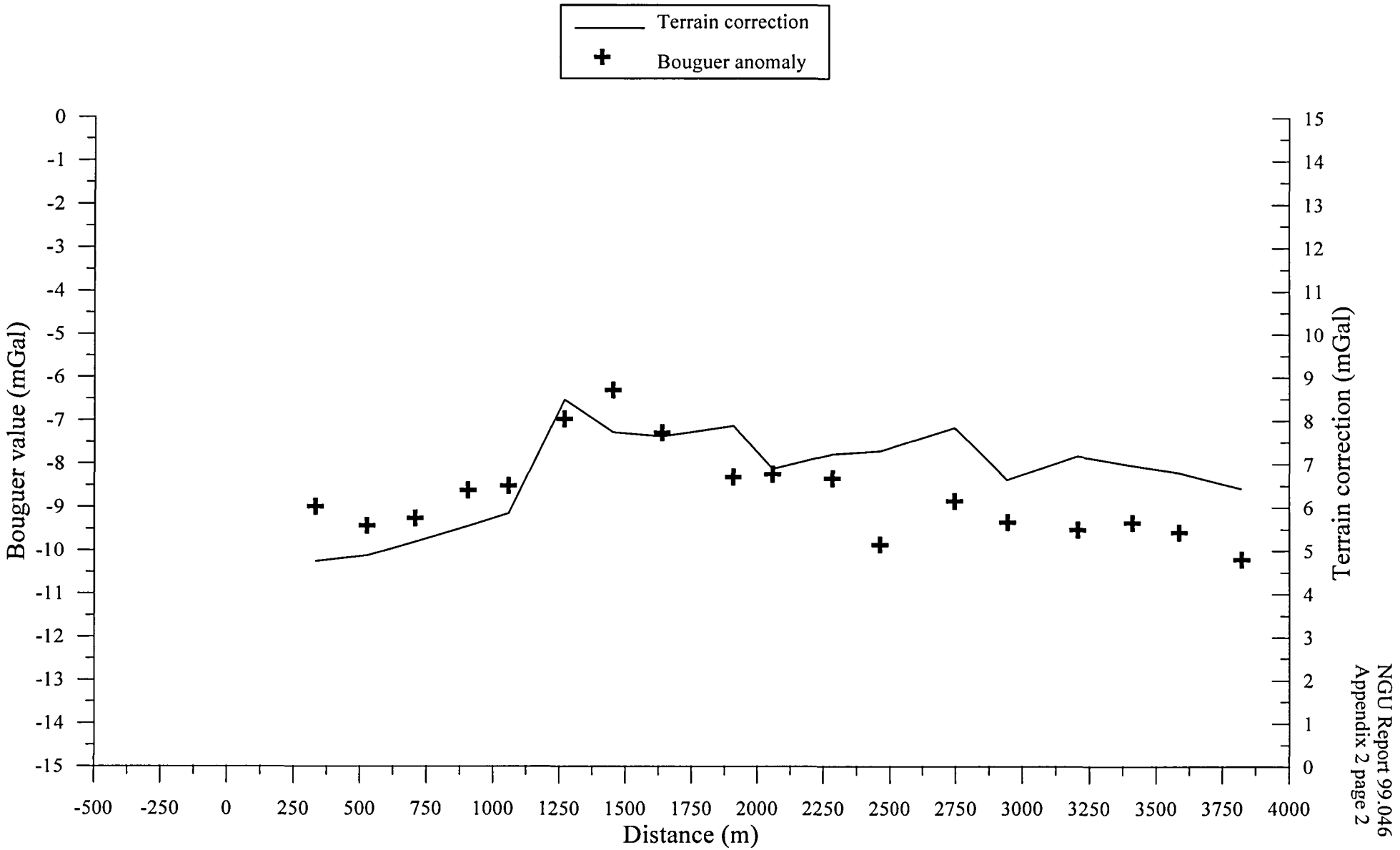
Location : Naustdal r=100,200,400,800m Project no: 190005 Fieldwork carried out in 1998 Processing performed in June 1999

Station Profile	Point	Latitude	Longitude	UTM zone	UTM East	UTM North	Elevation (in m)	Absolute gravity	Bouguer corr.	Terrain corr.	Free air corr.	Bouguer anomaly
8	6	61 31.70	5 44.04	32V	326339	6826157	221.38	981978.744	25.07	5.43	68.27	-8.66
8	7	61 31.64	5 43.89	32V	326200	6826050	227.28	981978.617	25.74	5.47	70.09	-7.53
8	8	61 31.56	5 43.68	32V	326005	6825918	234.35	981976.614	26.54	5.53	72.27	-7.97
8	9	61 31.50	5 43.47	32V	325812	6825800	239.25	981975.089	27.09	6.06	73.79	-7.94
8	10	61 31.41	5 43.30	32V	325657	6825643	245.91	981973.071	27.85	7.01	75.84	-7.58
8	11	61 31.38	5 43.05	32V	325434	6825602	254.53	981970.838	28.82	7.65	78.50	-7.49
8	12	61 31.34	5 42.83	32V	325231	6825534	259.65	981970.197	29.40	7.25	80.08	-7.48
8	13	61 31.29	5 42.76	32V	325163	6825445	253.62	981971.592	28.72	7.00	78.22	-7.44
8	14	61 31.23	5 42.60	32V	325021	6825345	235.57	981975.676	26.68	6.31	72.65	-7.51
8	15	61 31.12	5 42.44	32V	324865	6825158	216.34	981980.816	24.50	5.39	66.72	-6.86
8	16	61 31.08	5 42.30	32V	324737	6825081	199.44	981984.351	22.59	5.24	61.51	-6.77
9	1	61 29.56	5 32.91	32V	316271	6822695	40.29	982015.916	4.57	11.53	12.43	1.96
9	2	61 29.61	5 32.80	32V	316180	6822792	43.95	982015.457	4.98	11.23	13.56	1.86
9	3	61 29.68	5 32.58	32V	315988	6822930	34.97	982015.942	3.96	12.41	10.79	1.71
9	4	61 29.70	5 32.36	32V	315800	6822969	34.06	982016.536	3.86	11.89	10.50	1.54
9	5	61 29.73	5 32.14	32V	315604	6823040	25.34	982016.770	2.87	14.04	7.82	2.22
9	6	61 29.68	5 32.00	32V	315479	6822950	25.07	982020.324	2.84	11.53	7.73	3.28
9	7	61 29.63	5 31.66	32V	315168	6822879	28.12	982022.573	3.19	9.83	8.67	4.48
9	8	61 29.62	5 31.45	32V	314979	6822864	22.21	982023.883	2.52	9.14	6.85	3.95
9	9	61 29.59	5 31.22	32V	314780	6822823	15.29	982025.962	1.73	9.77	4.72	5.37
9	10	61 29.57	5 30.98	32V	314561	6822797	15.31	982027.350	1.73	9.06	4.72	6.05
9	11	61 29.55	5 30.75	32V	314358	6822780	19.71	982028.050	2.23	7.07	6.08	5.62
9	12	61 29.54	5 30.55	32V	314174	6822772	23.88	982028.638	2.71	6.78	7.37	6.80
9	13	61 29.53	5 30.34	32V	313988	6822765	11.43	982031.140	1.30	6.92	3.53	7.01
9	14	61 29.69	5 29.93	32V	313647	6823070	0.00	982027.768	0.00	11.32	0.00	5.62
10	1	61 30.95	5 41.90	32V	324378	6824865	167.87	981989.826	19.01	5.88	51.77	-6.63
10	2	61 30.91	5 41.79	32V	324275	6824787	194.14	981984.997	21.99	5.88	59.87	-6.27
10	3	61 30.82	5 41.96	32V	324418	6824620	228.33	981978.864	25.86	5.22	70.42	-6.27
10	4	61 30.73	5 41.88	32V	324336	6824459	253.73	981973.330	28.73	5.25	78.25	-6.68
10	5	61 30.75	5 41.71	32V	324189	6824495	283.64	981967.310	32.11	5.82	87.48	-6.36

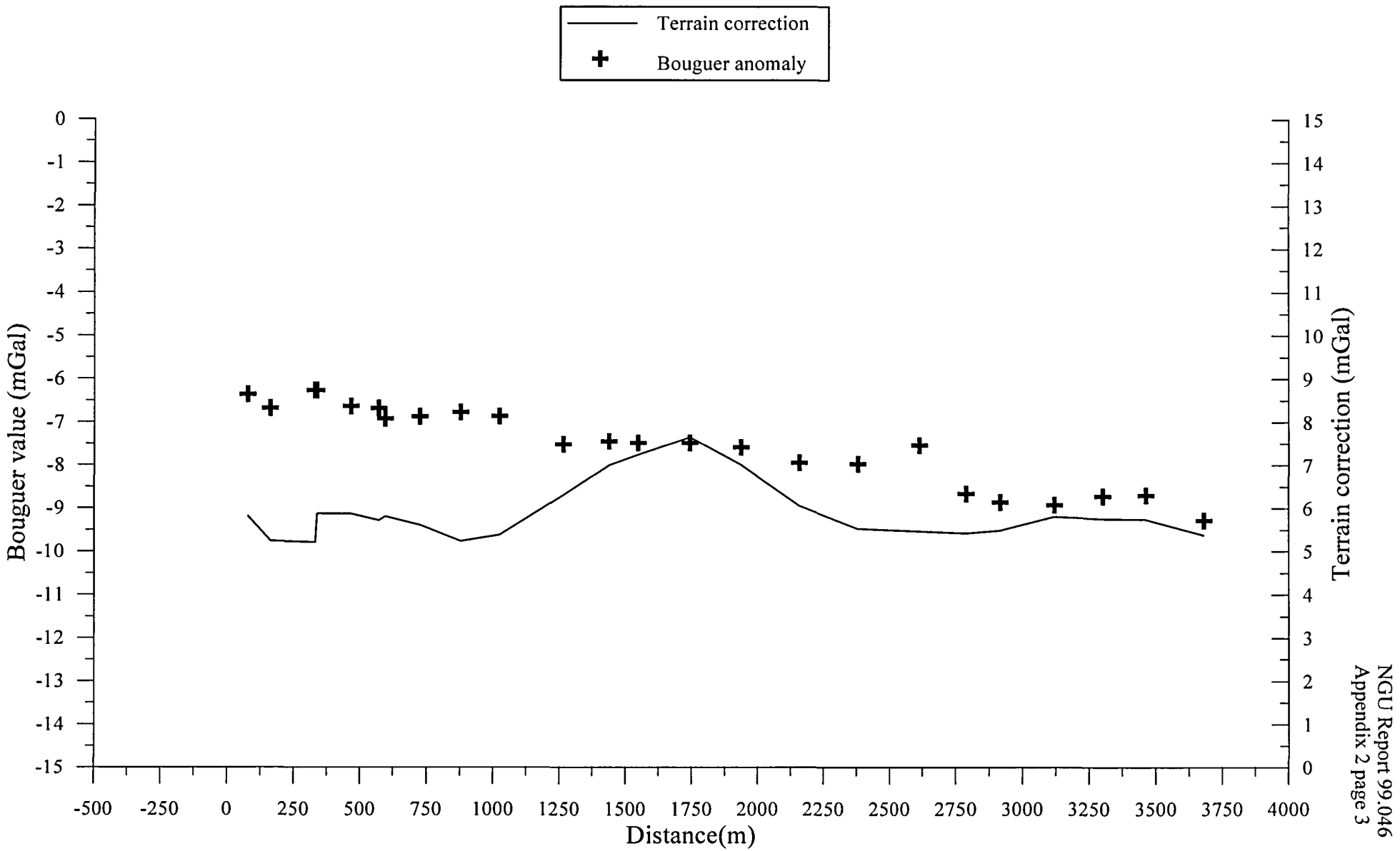
NAUSTDAL, gravity profile 1b
Terrain correction and Bouguer anomaly values



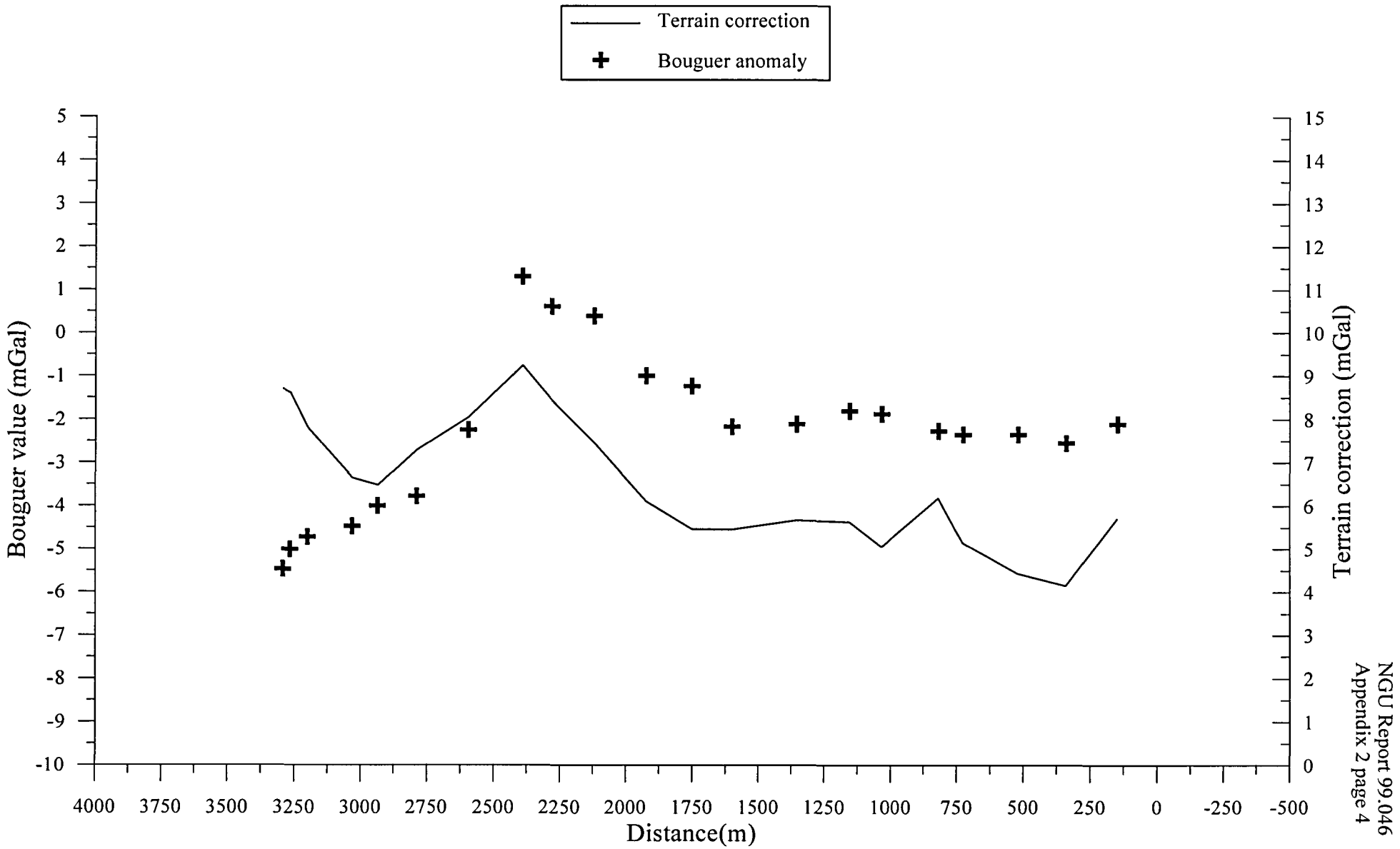
NAUSTDAL, gravity profile 1a
Terrain correction and Bouguer anomaly values



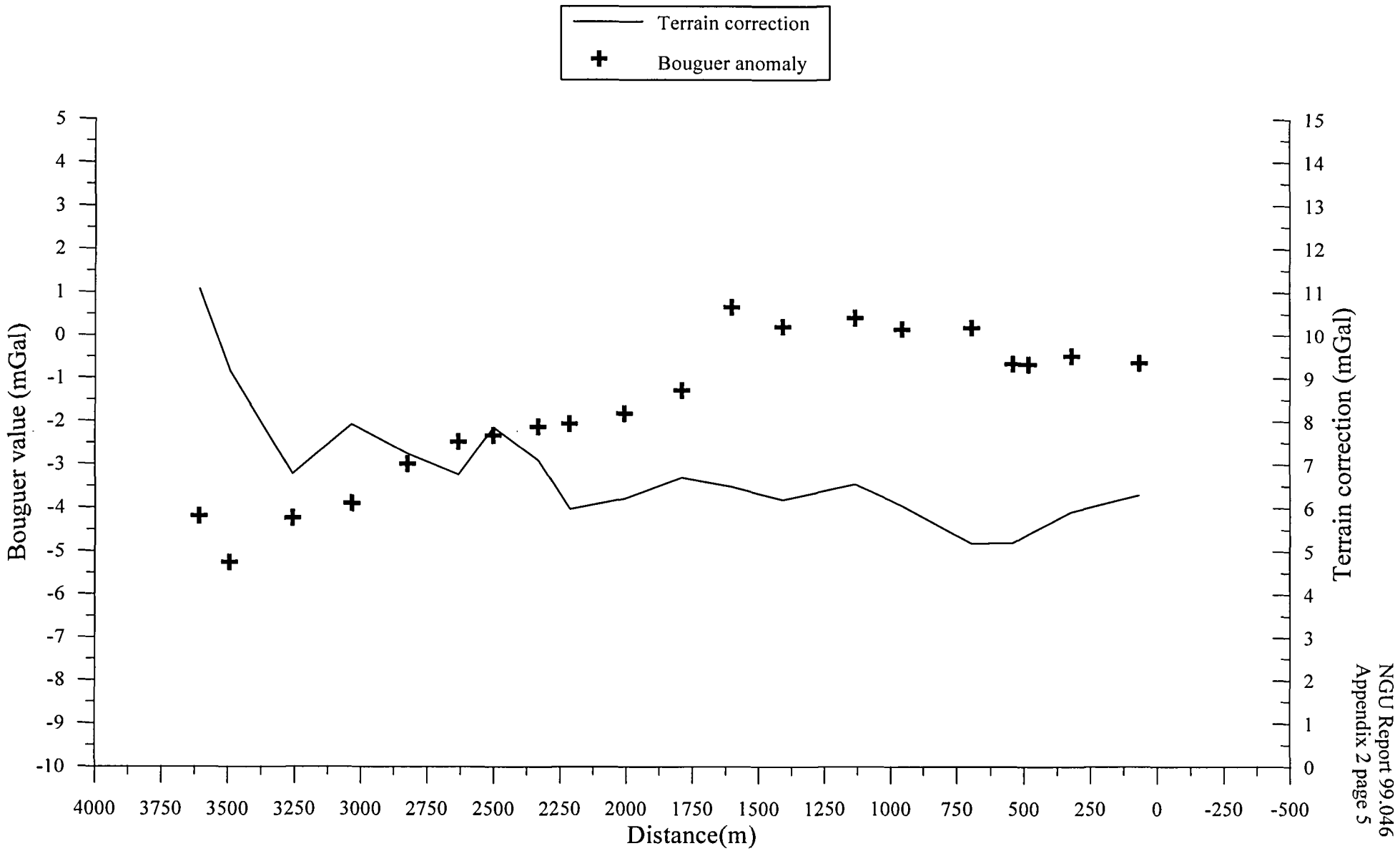
NAUSTDAL, gravity profile 10-8
Terrain correction and Bouguer anomaly values



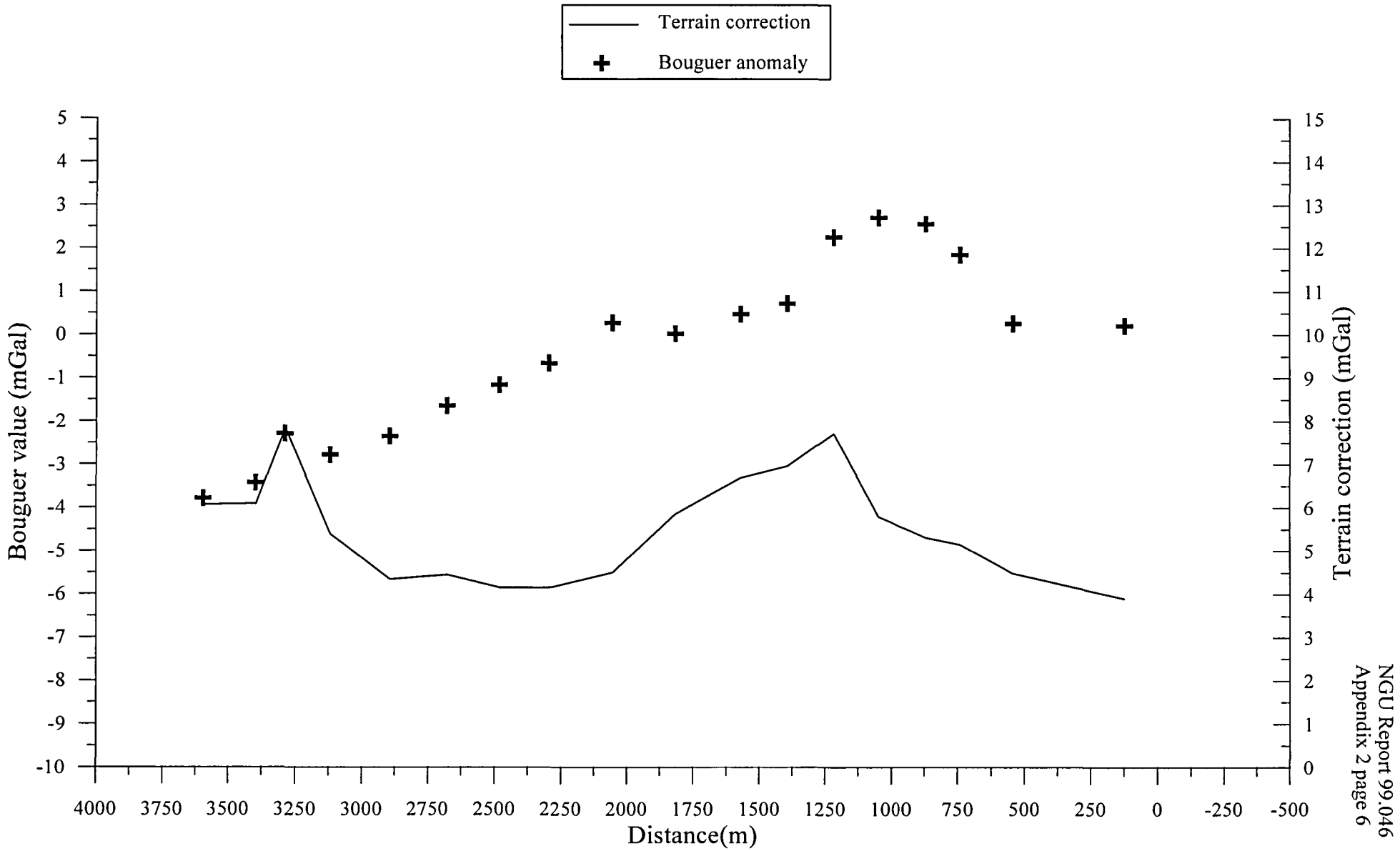
NAUSTDAL, gravity profile 5
Terrain correction and Bouguer anomaly values



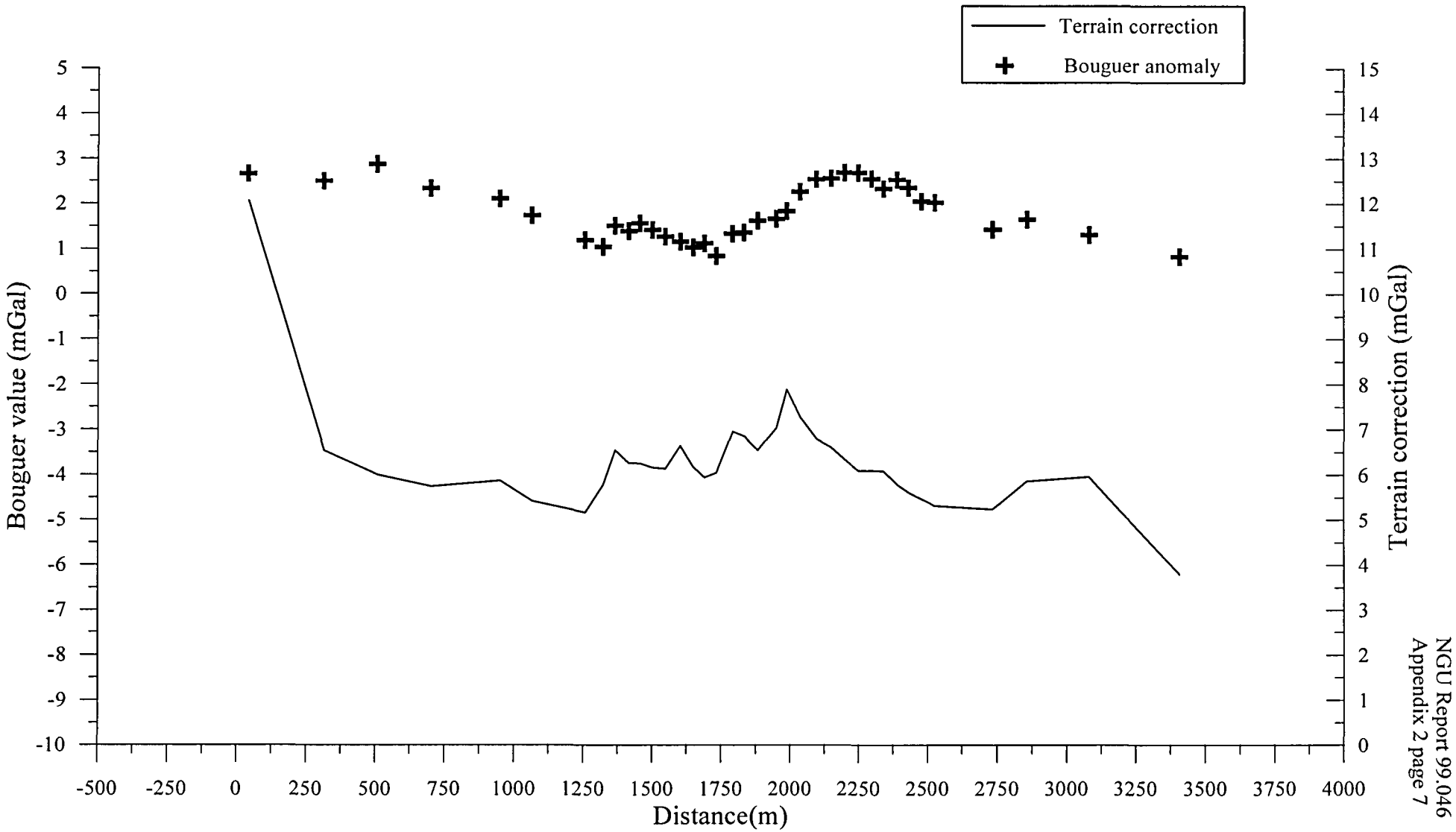
NAUSTDAL, gravity profile 6
Terrain correction and Bouguer anomaly values



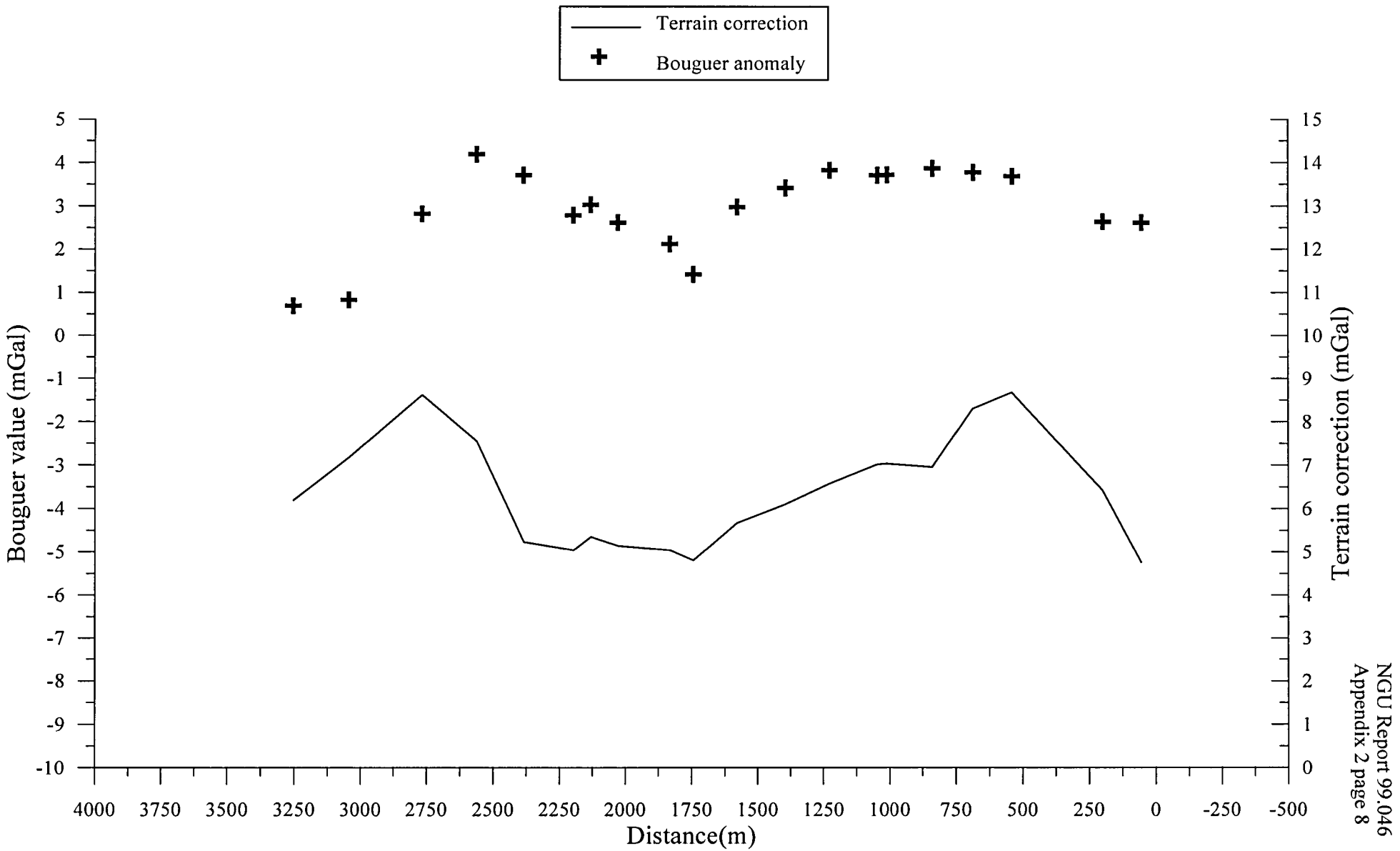
NAUSTDAL, gravity profile 7
Terrain correction and Bouguer anomaly values



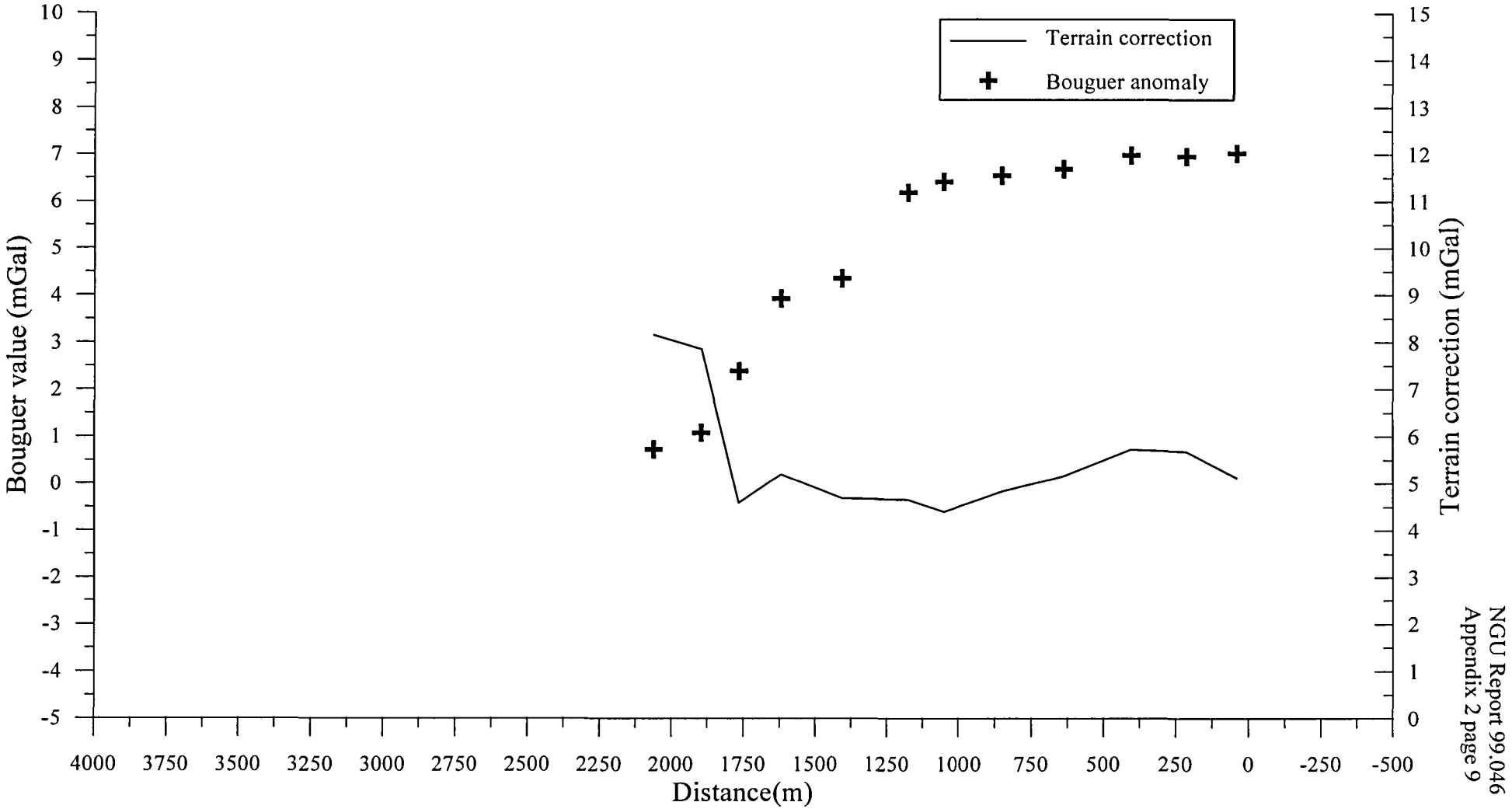
NAUSTDAL, gravity profile 4
Terrain correction and Bouguer anomaly values



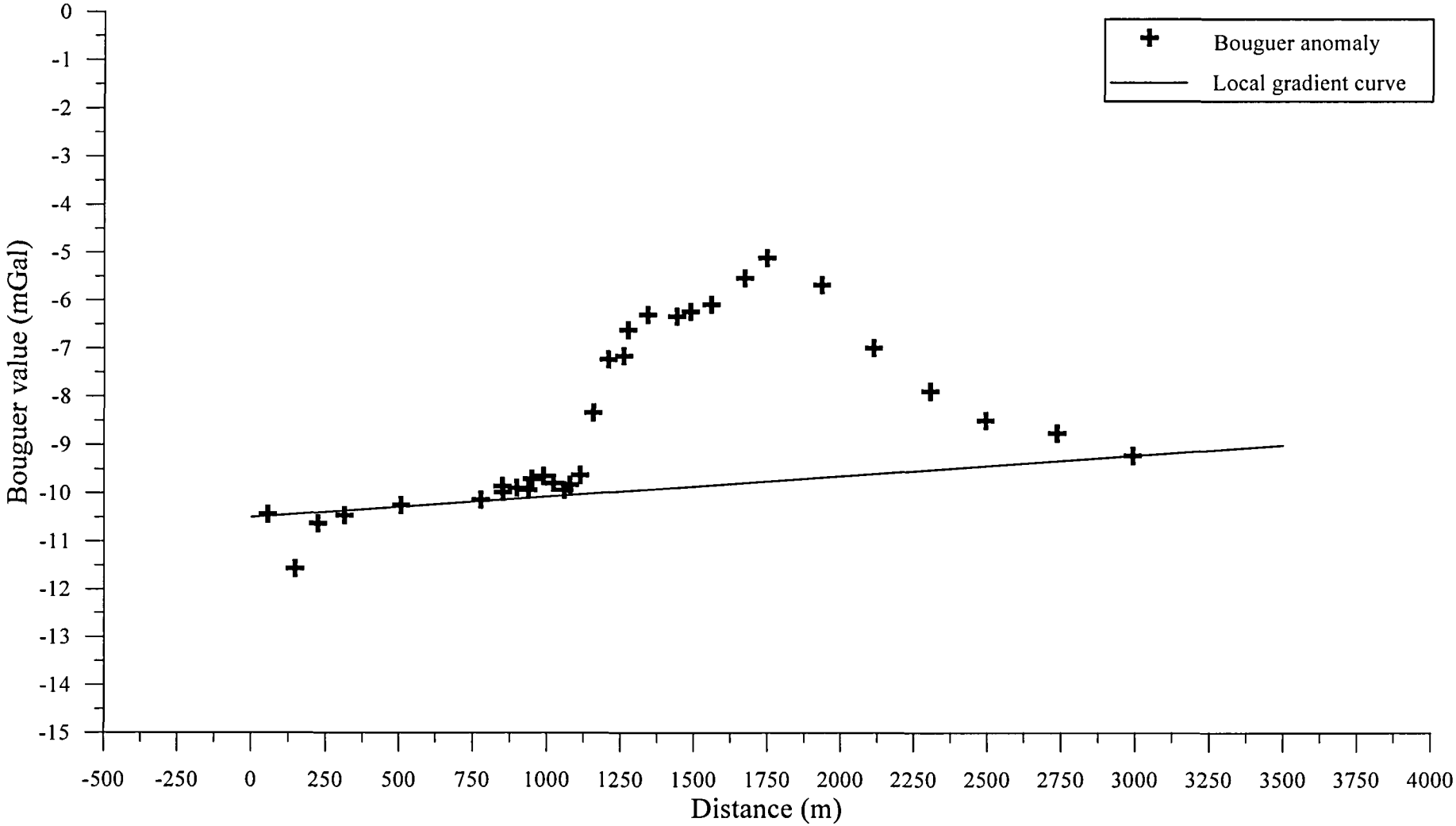
NAUSTDAL, gravity profile 3
Terrain correction and Bouguer anomaly values



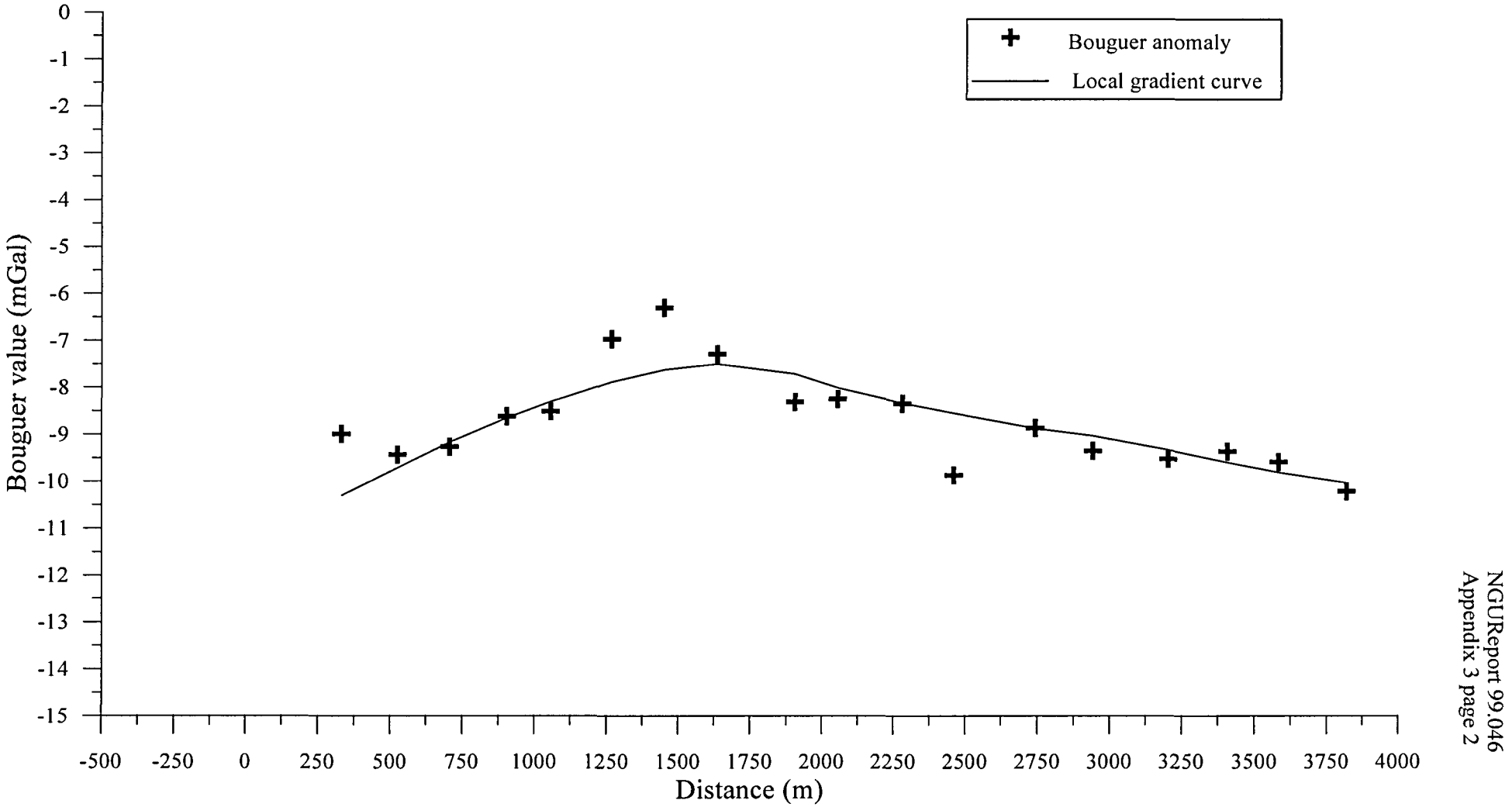
NAUSTDAL, gravity profile 2
Terrain correction and Bouguer anomaly values



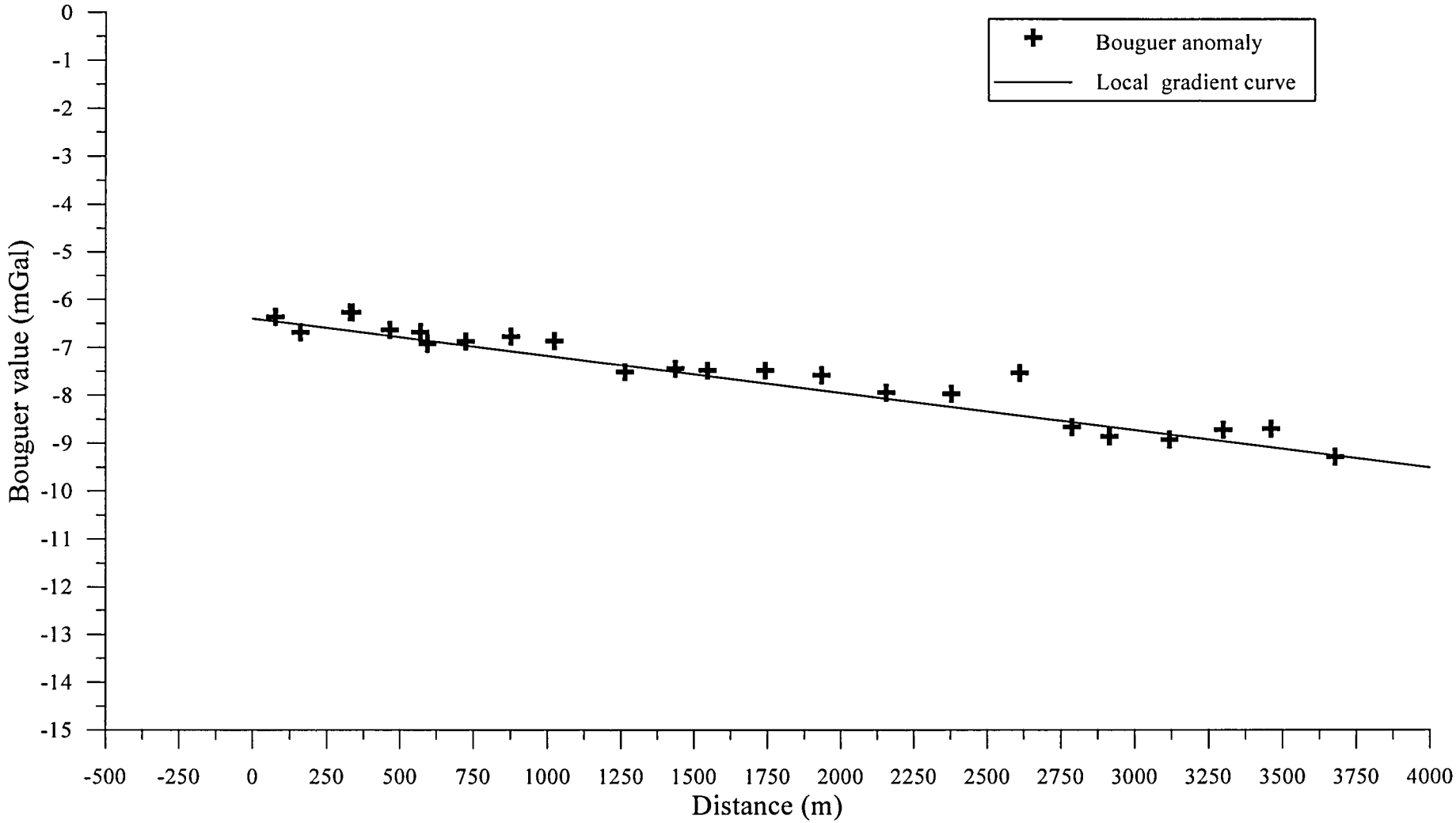
NAUSTDAL, gravity profile 1b
Bouguer anomaly values and local regional gradient



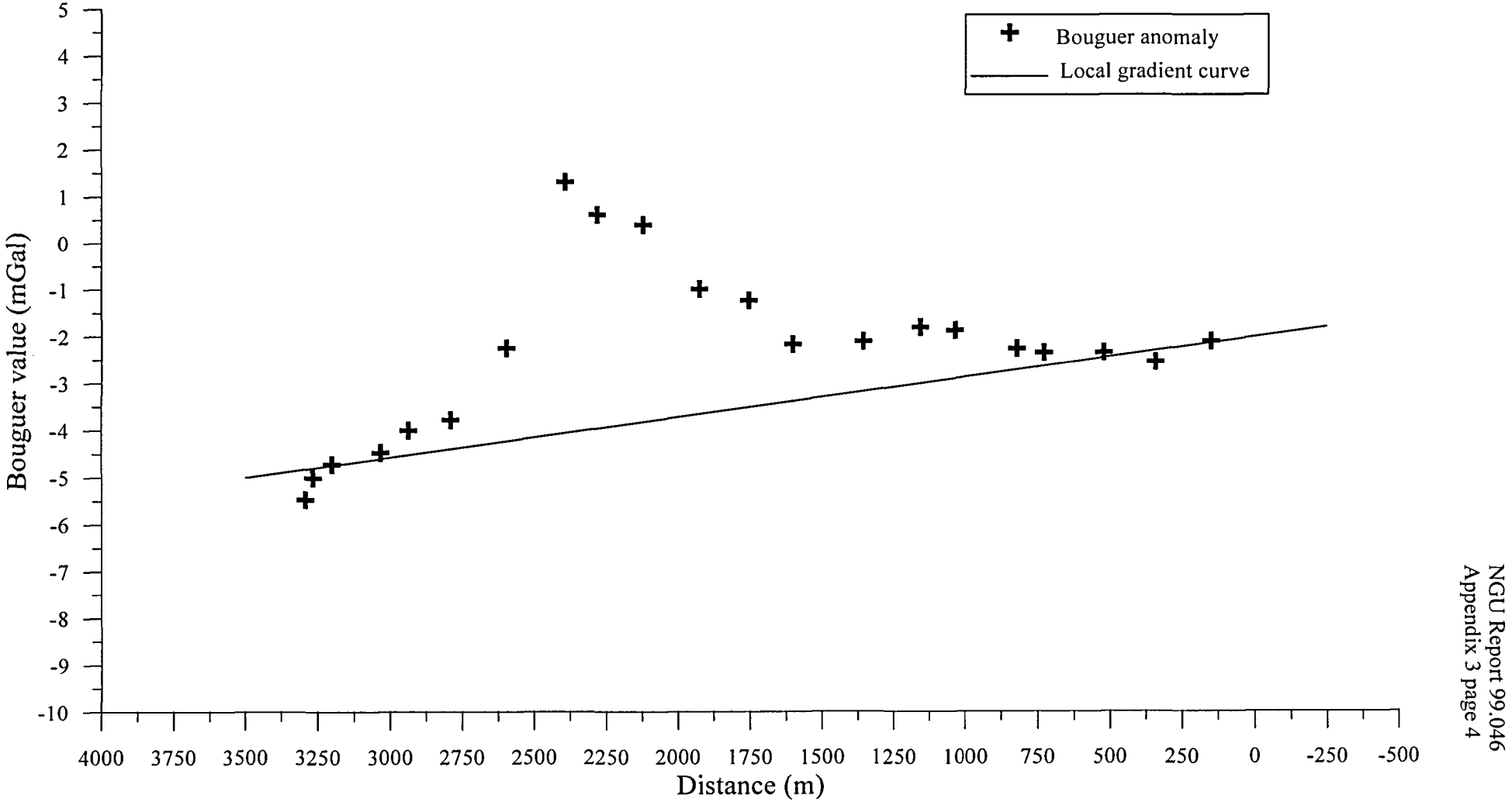
NAUSTDAL, gravity profile 1a
Bouguer anomaly values and local regional gradient



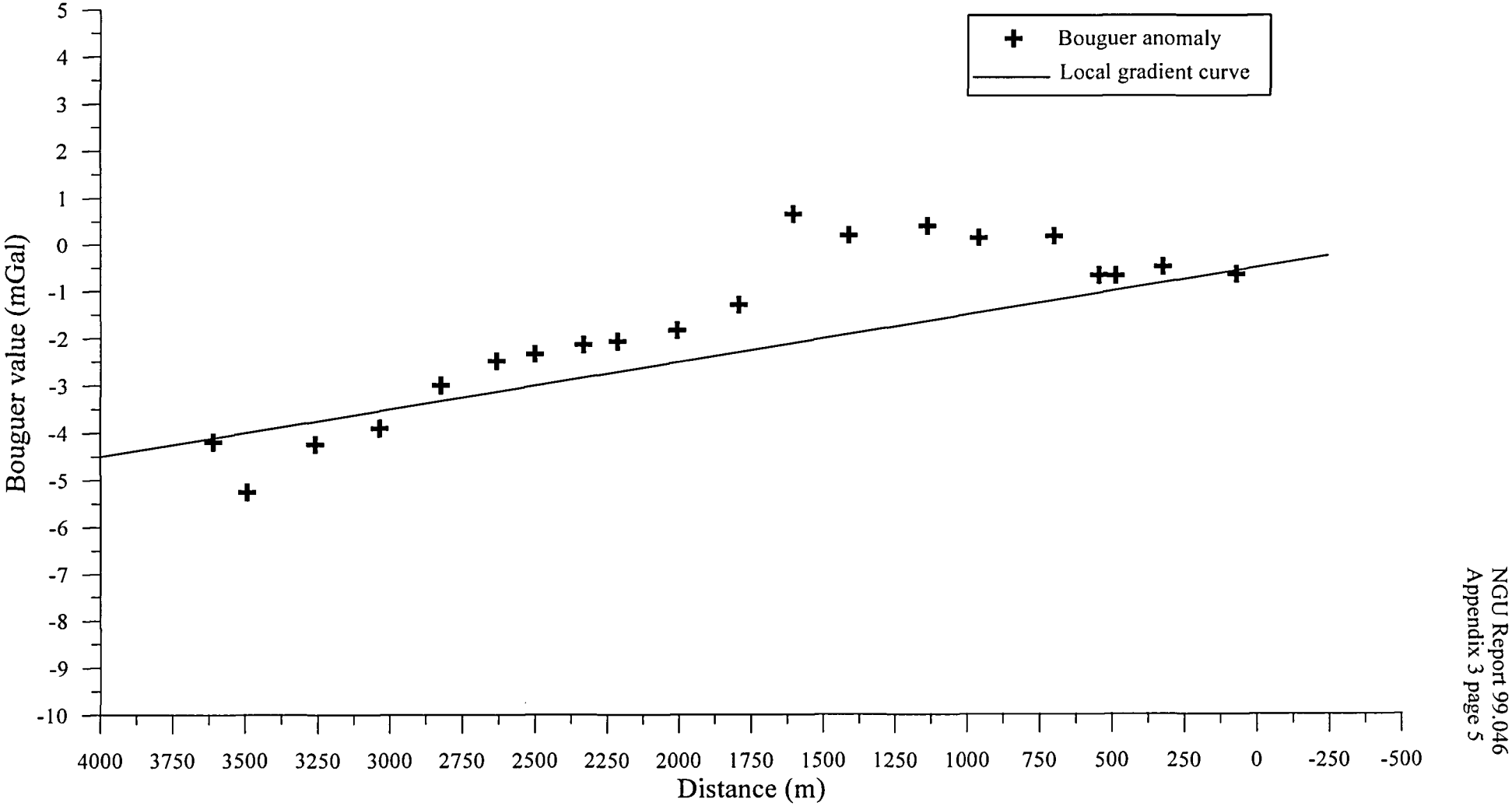
NAUSTDAL, gravity profile 10-8
Bouguer anomaly values and local regional gradient



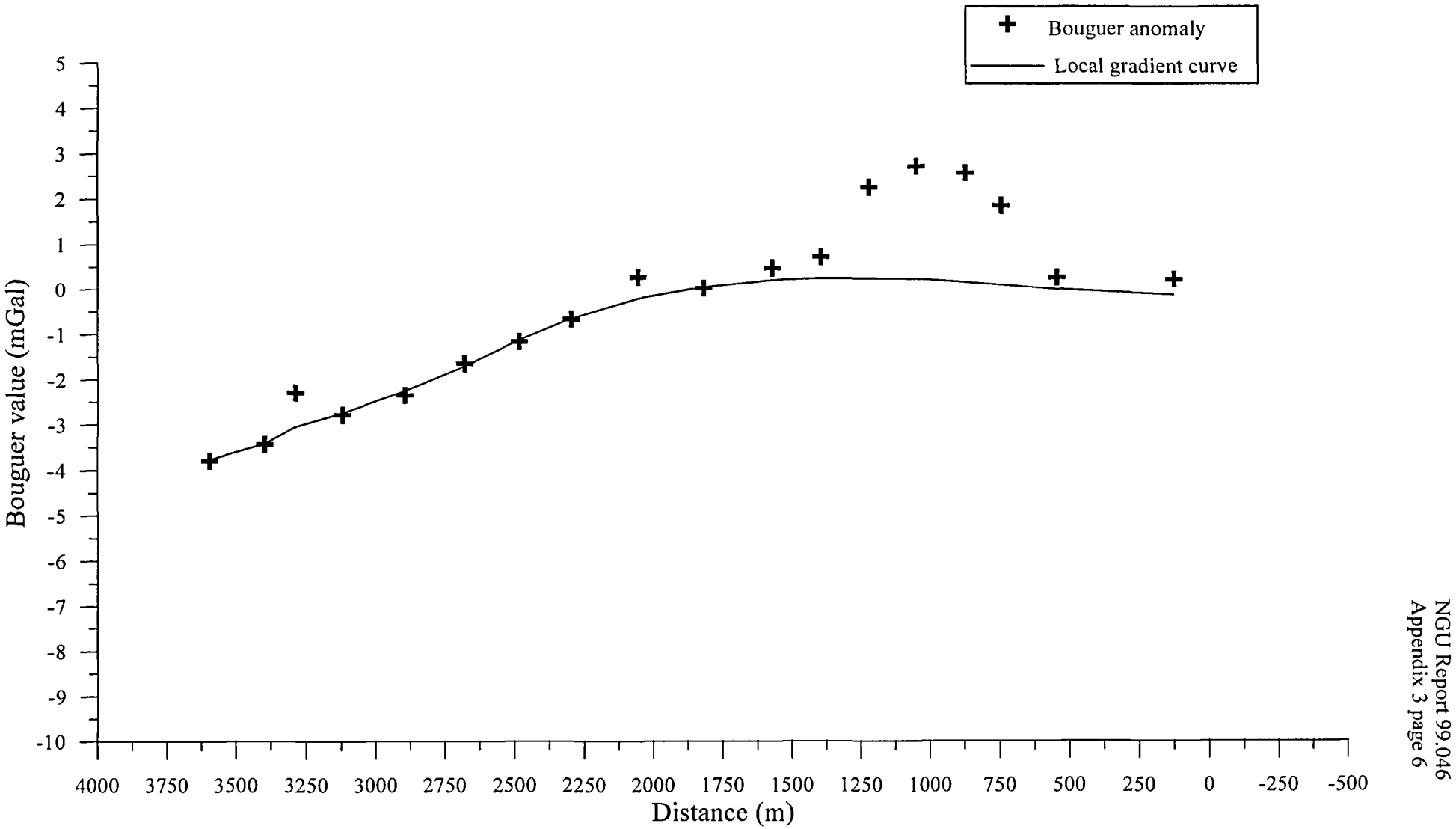
NAUSTDAL, gravity profile 5
Bouguer anomaly values and local regional gradient



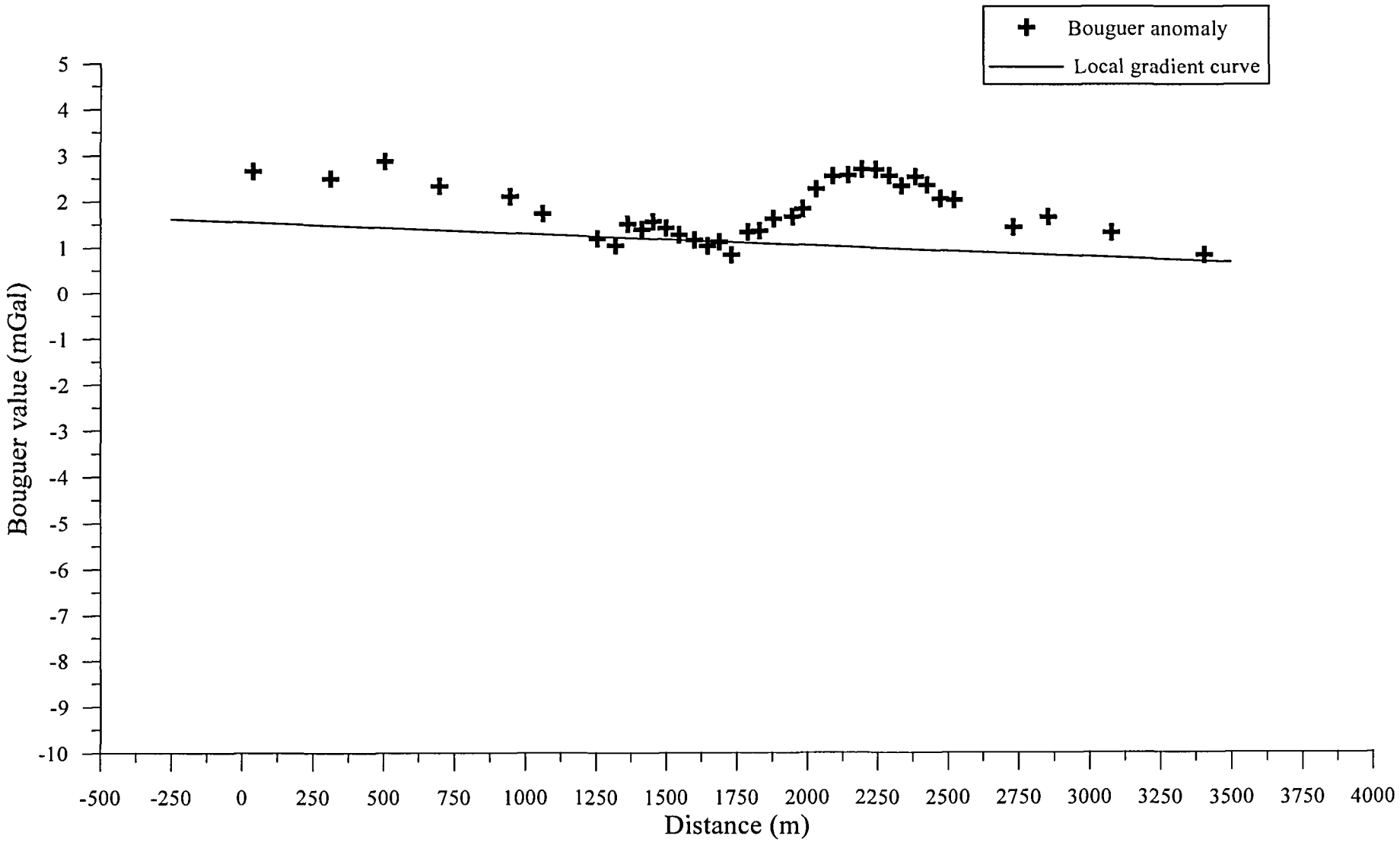
NAUSTDAL, gravity profile 6
Bouguer anomaly values and local regional gradient



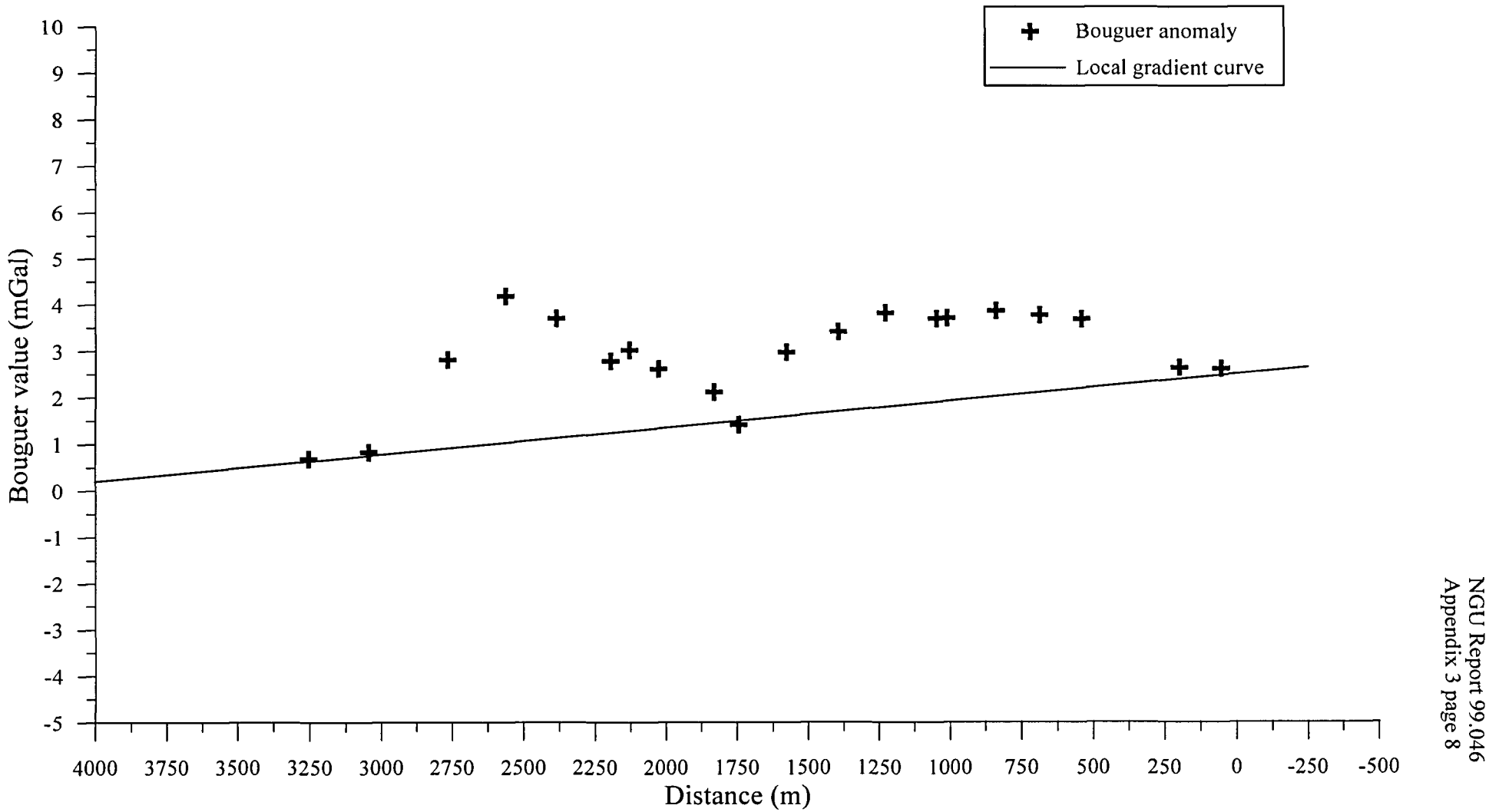
NAUSTDAL, gravity profile 7
Bouguer anomaly values and local regional gradient



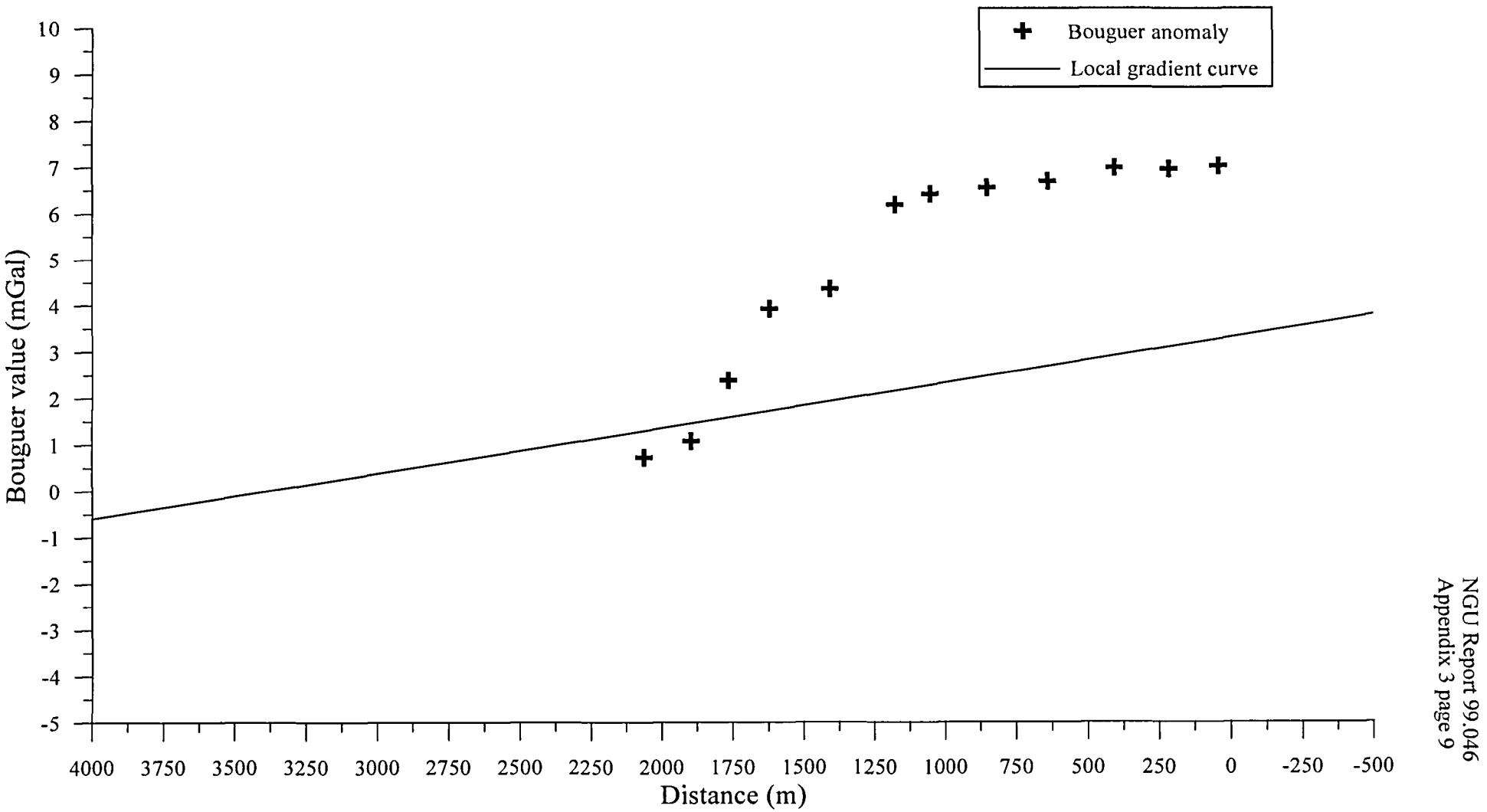
NAUSTDAL, gravity profile 4
Bouguer anomaly values and local regional gradient



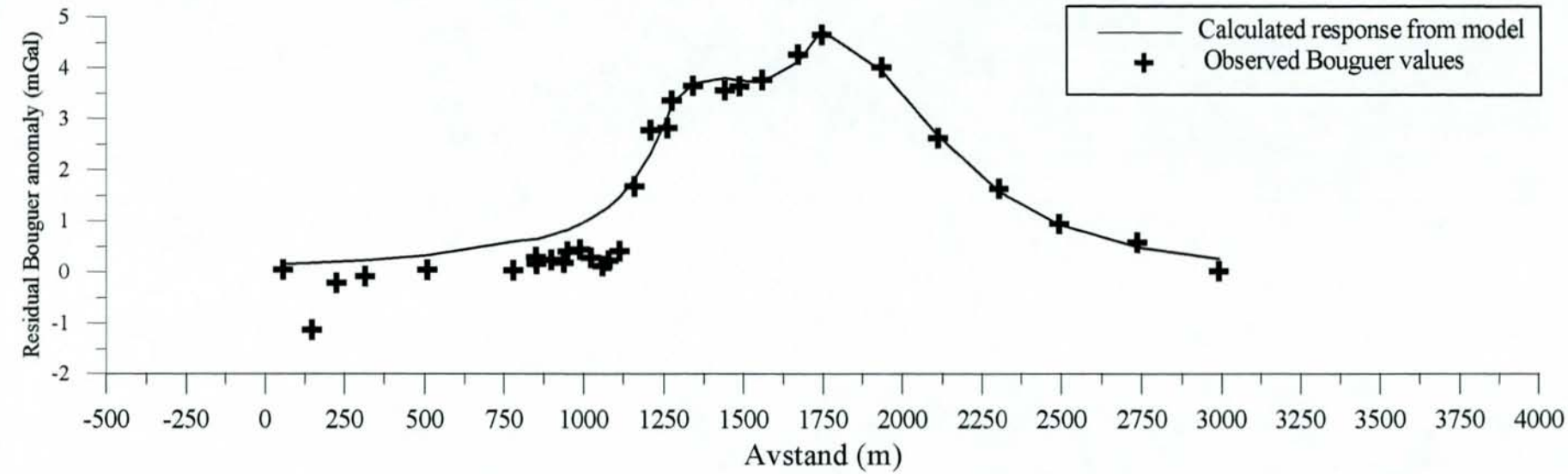
NAUSTDAL, gravity profile 3
Bouguer anomaly values and local regional gradient

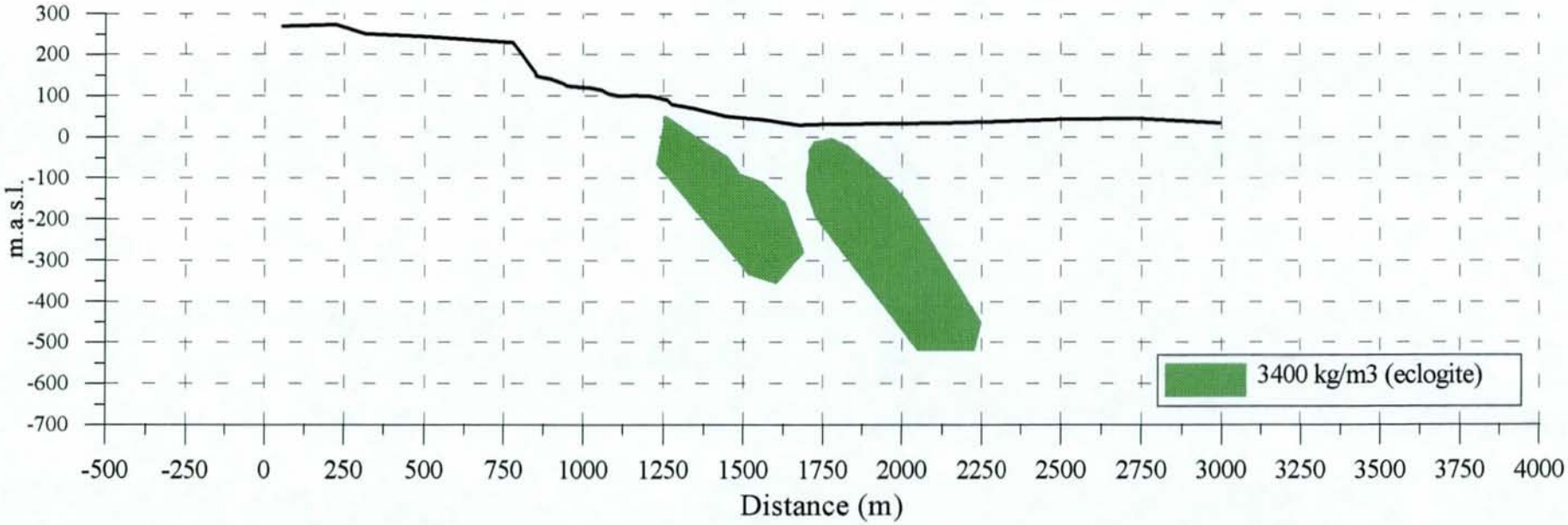


NAUSTDAL, gravity profile 2
Bouguer anomaly values and local regional gradient

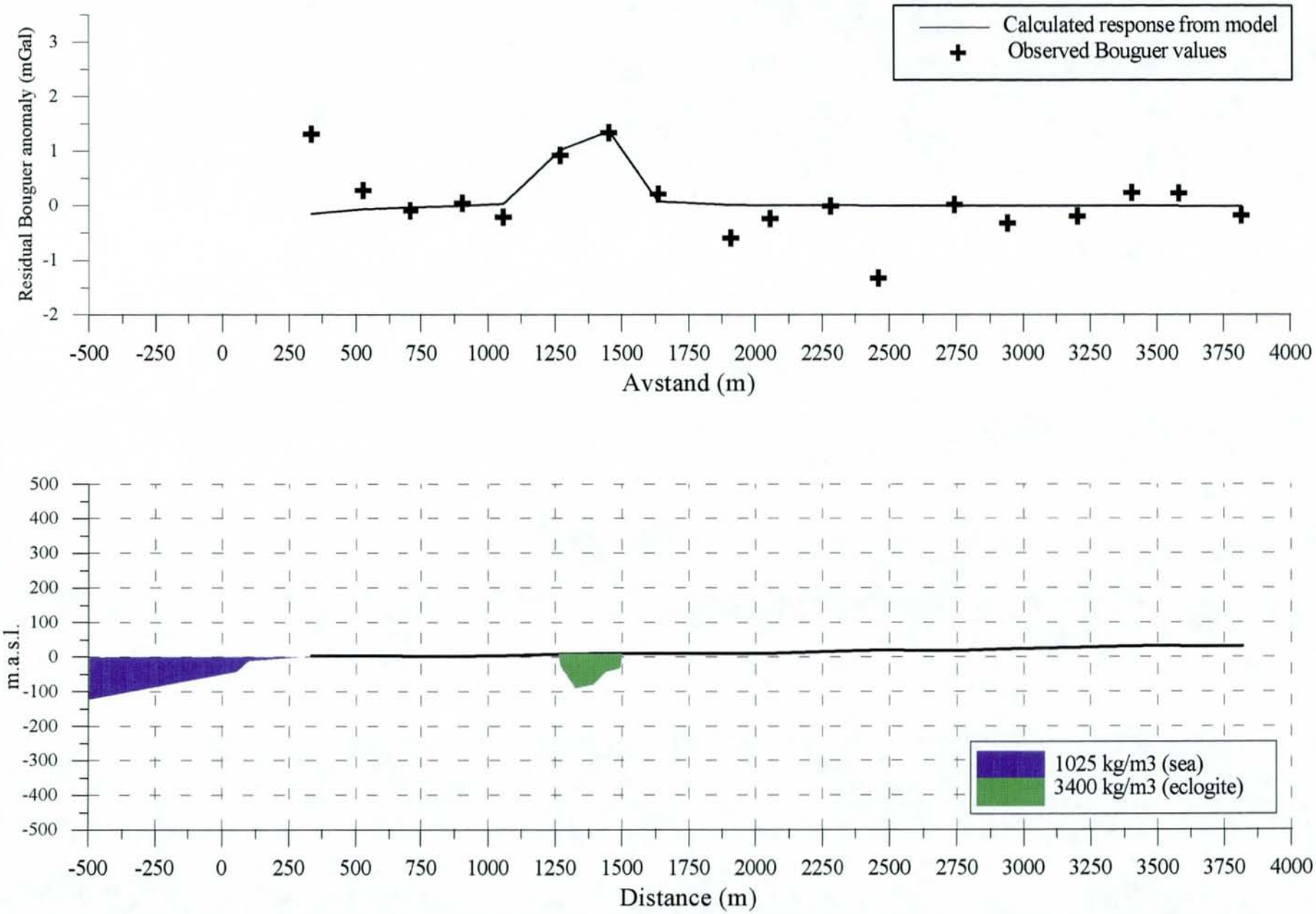


NAUSTDAL, gravity profile 1b

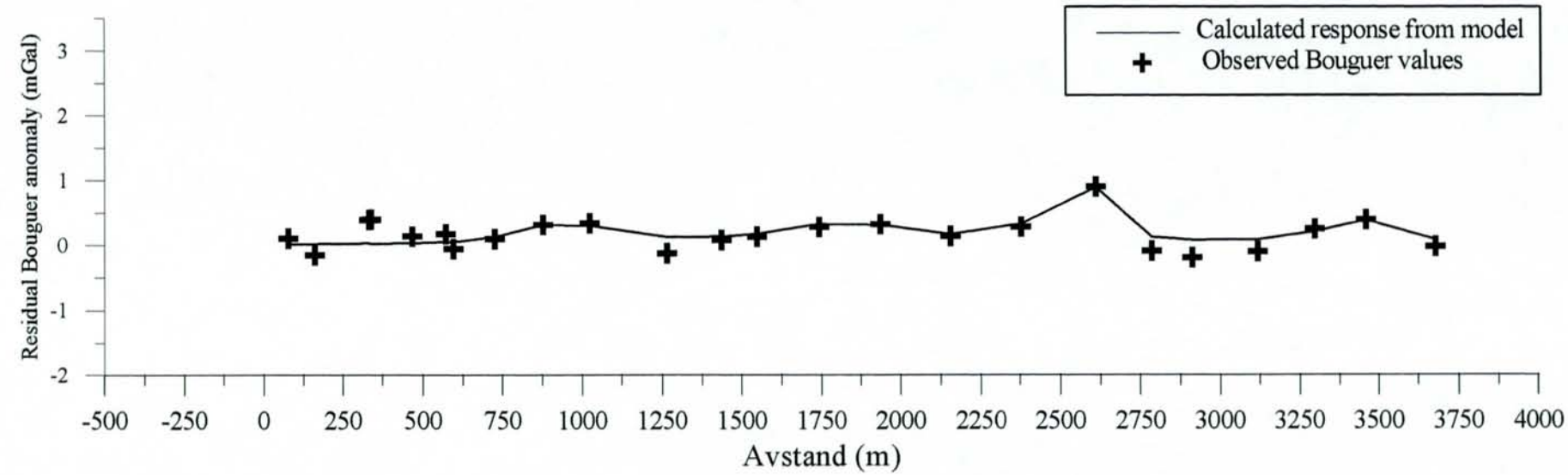


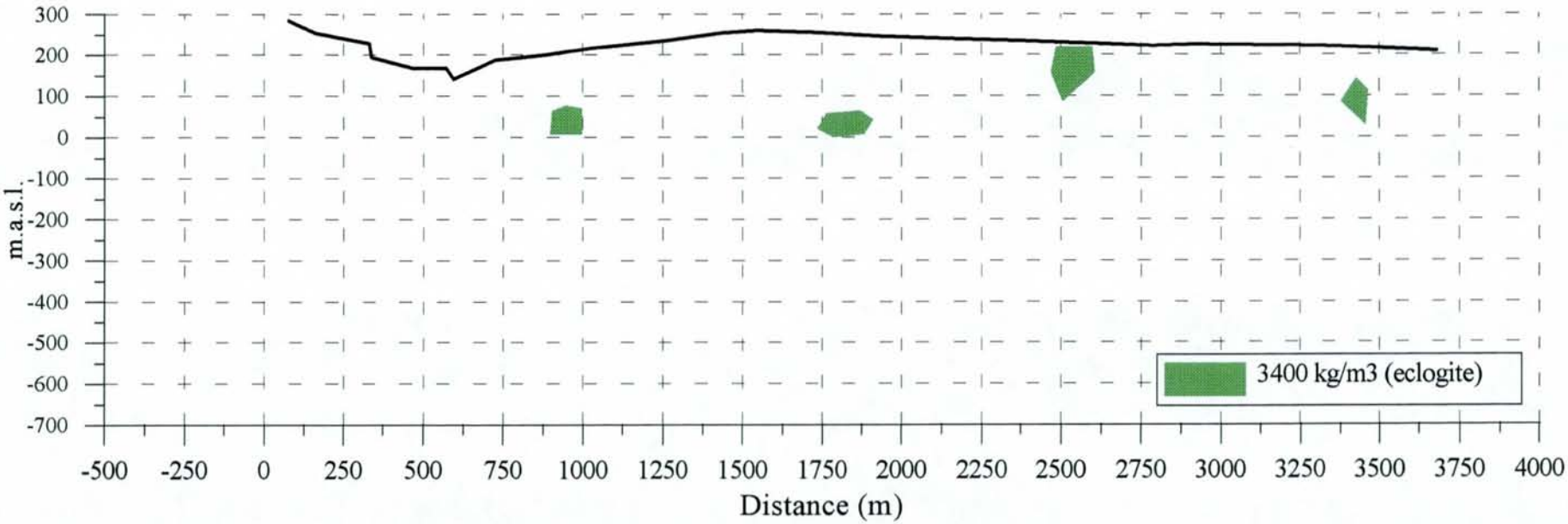


NAUSTDAL, gravity profile 1a

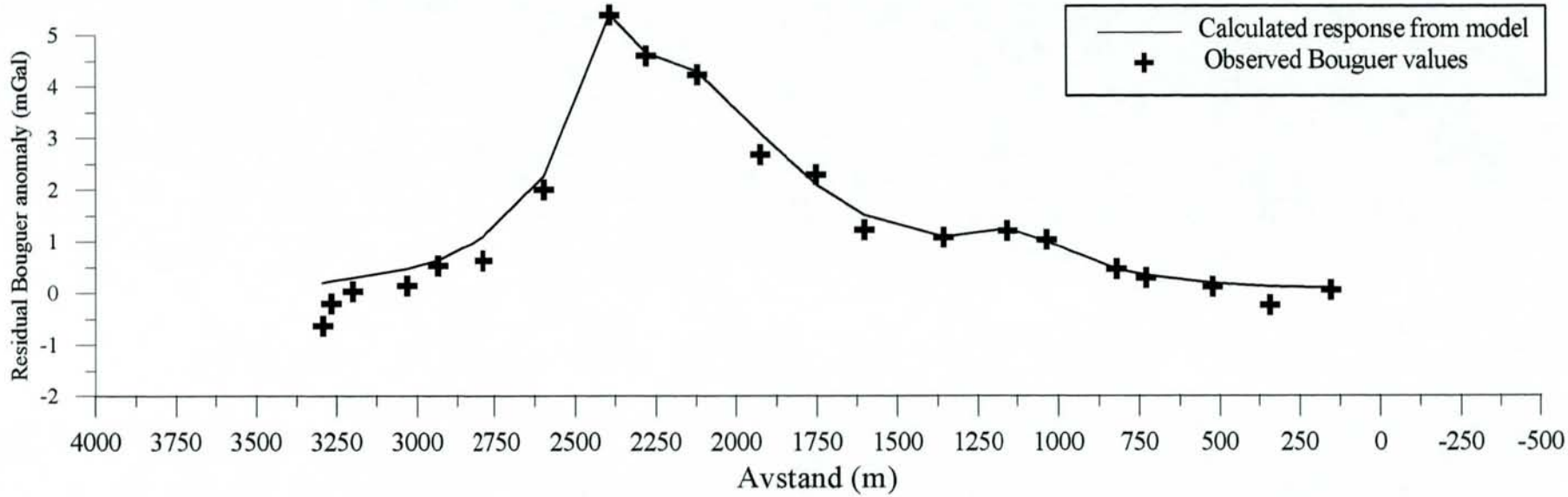


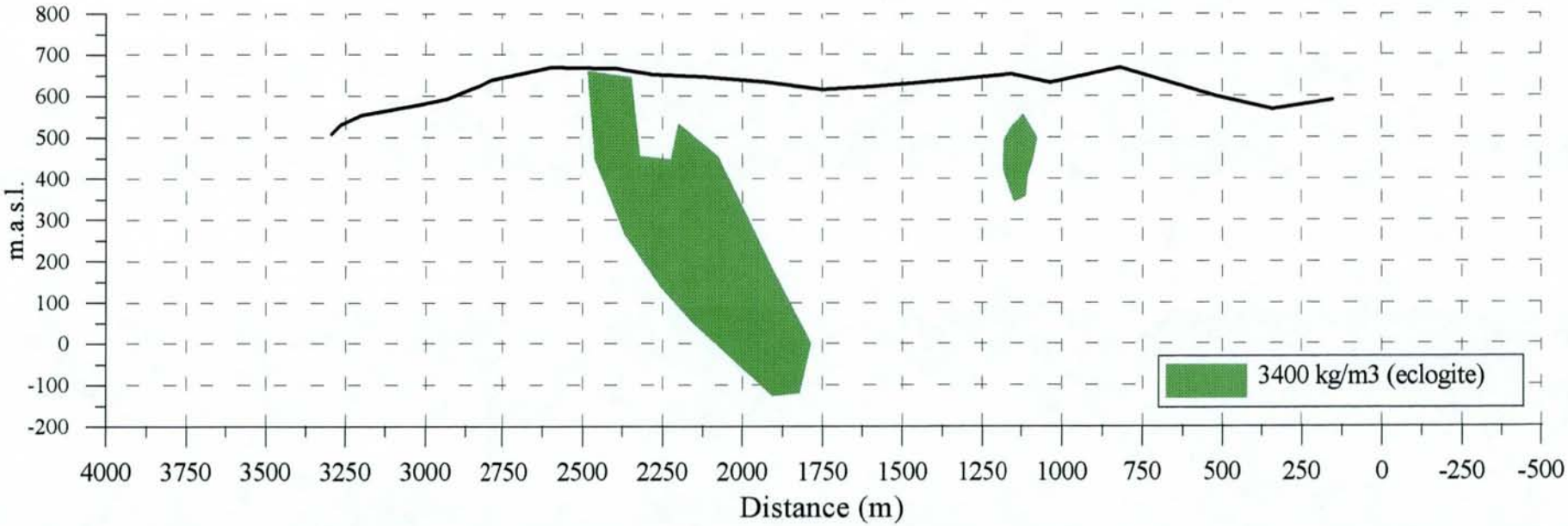
NAUSTDAL, gravity profile 10-8



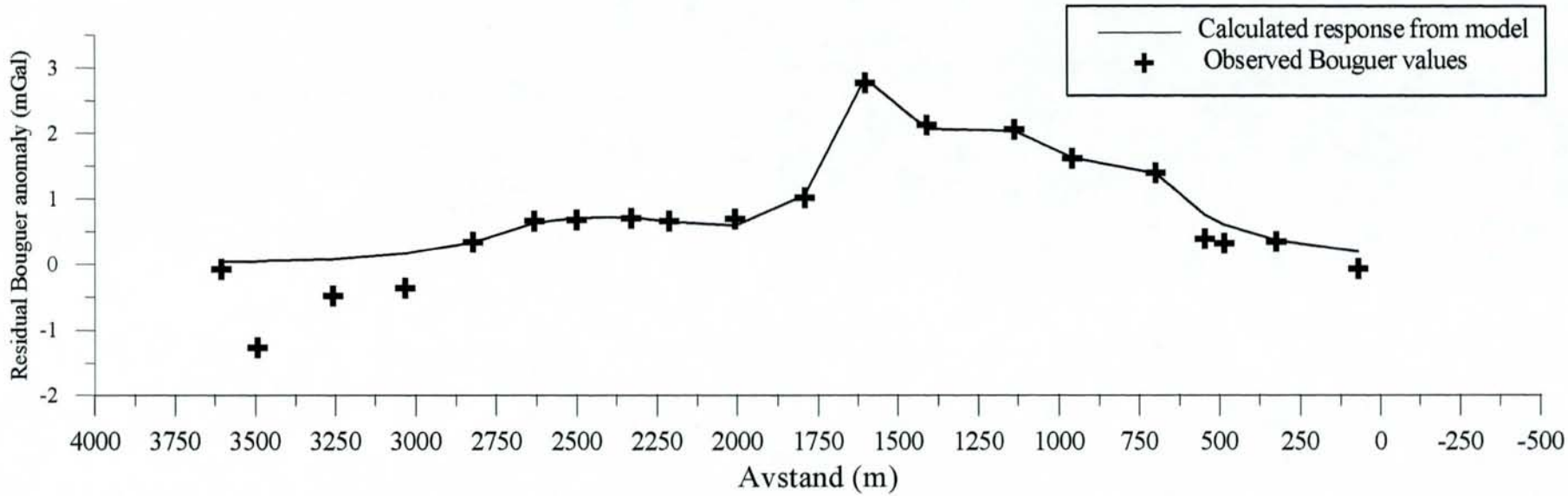


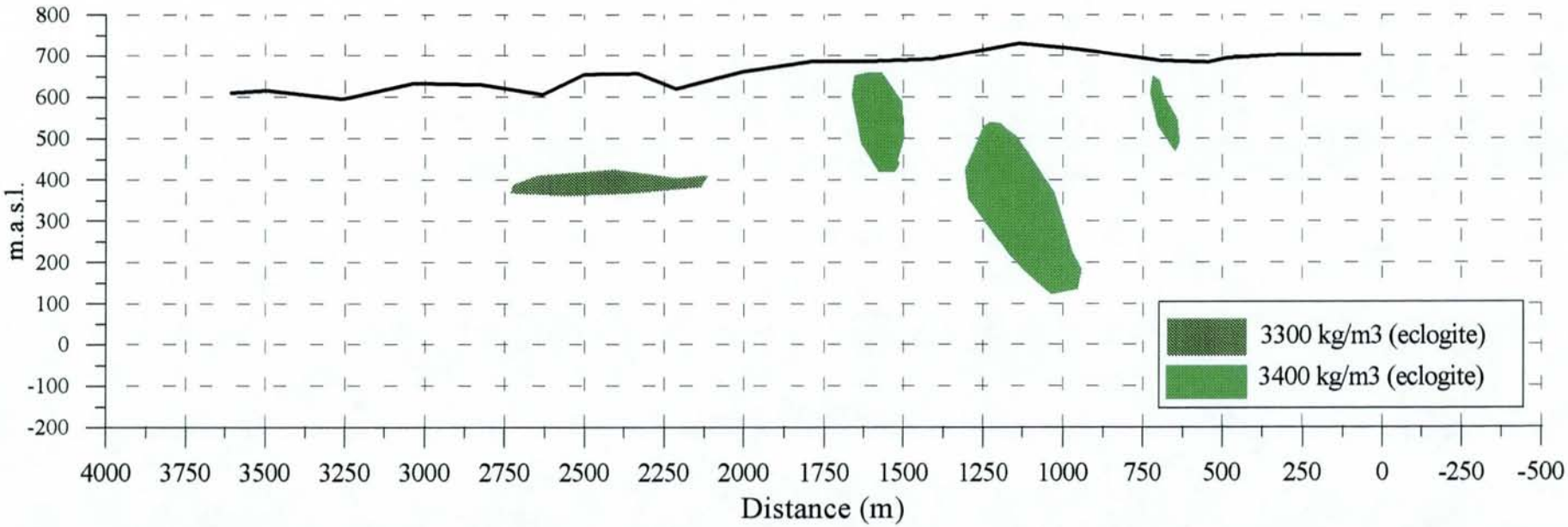
NAUSTDAL, gravity profile 5



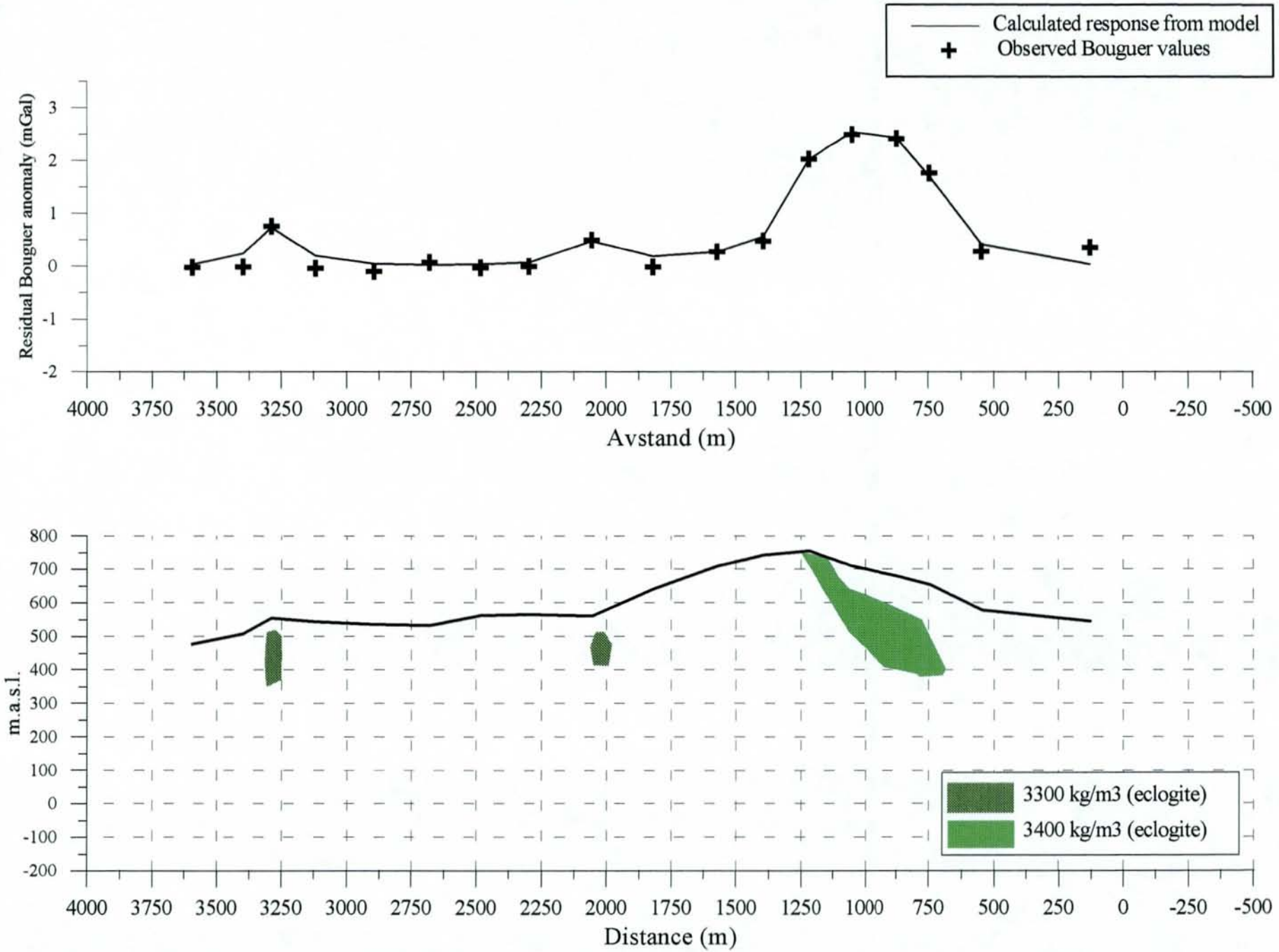


NAUSTDAL, gravity profile 6

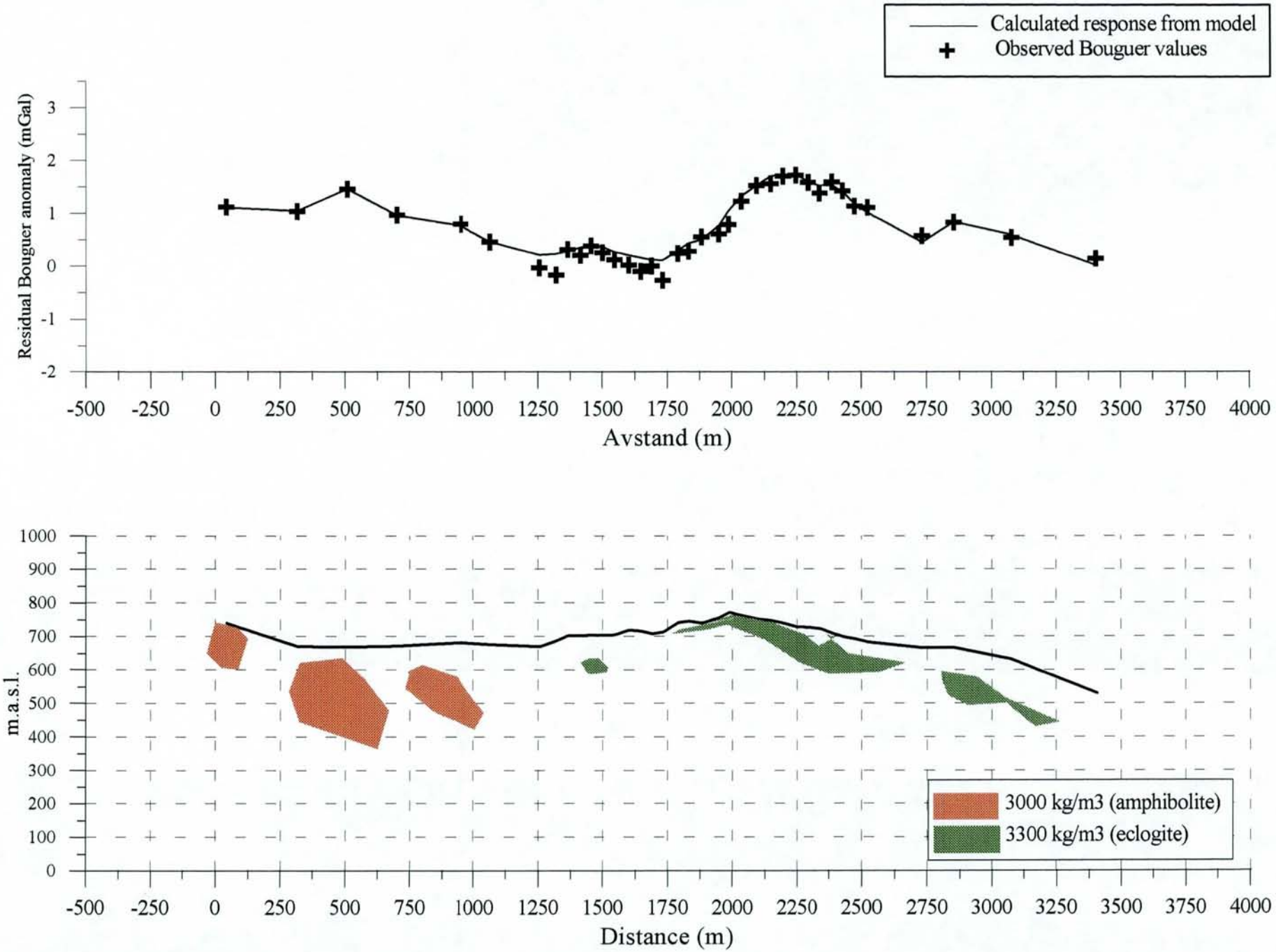




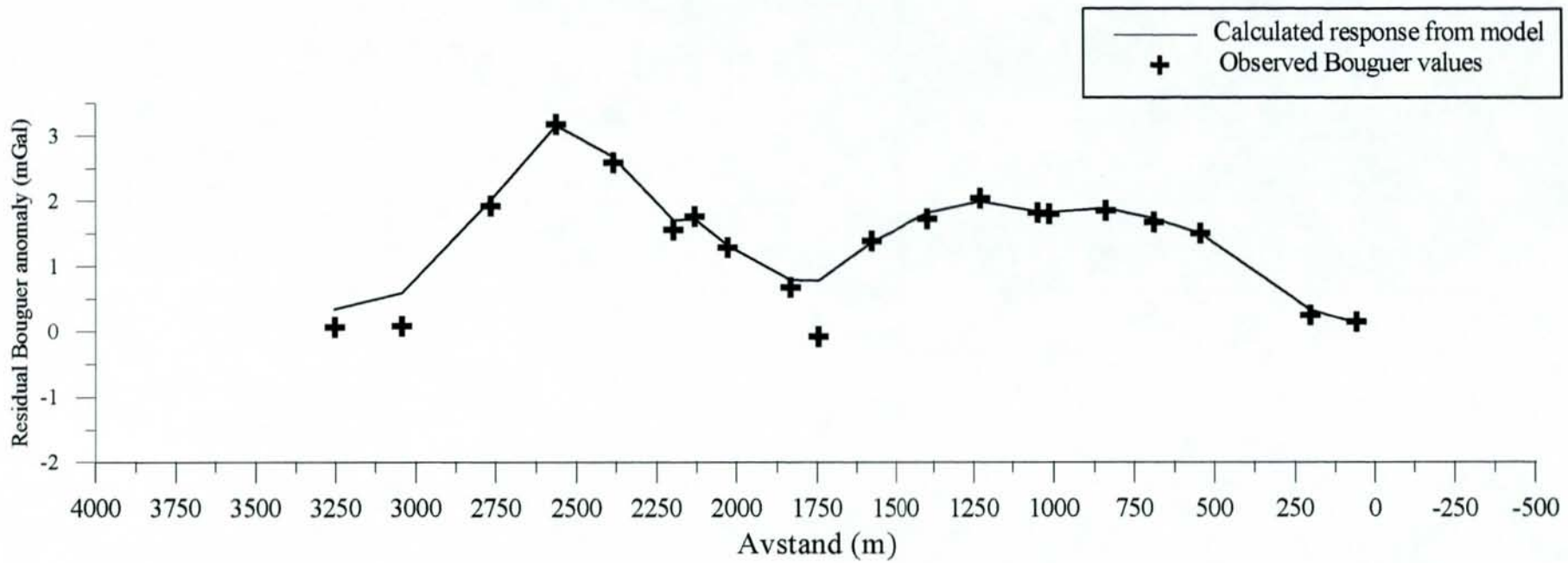
NAUSTDAL, gravity profile 7

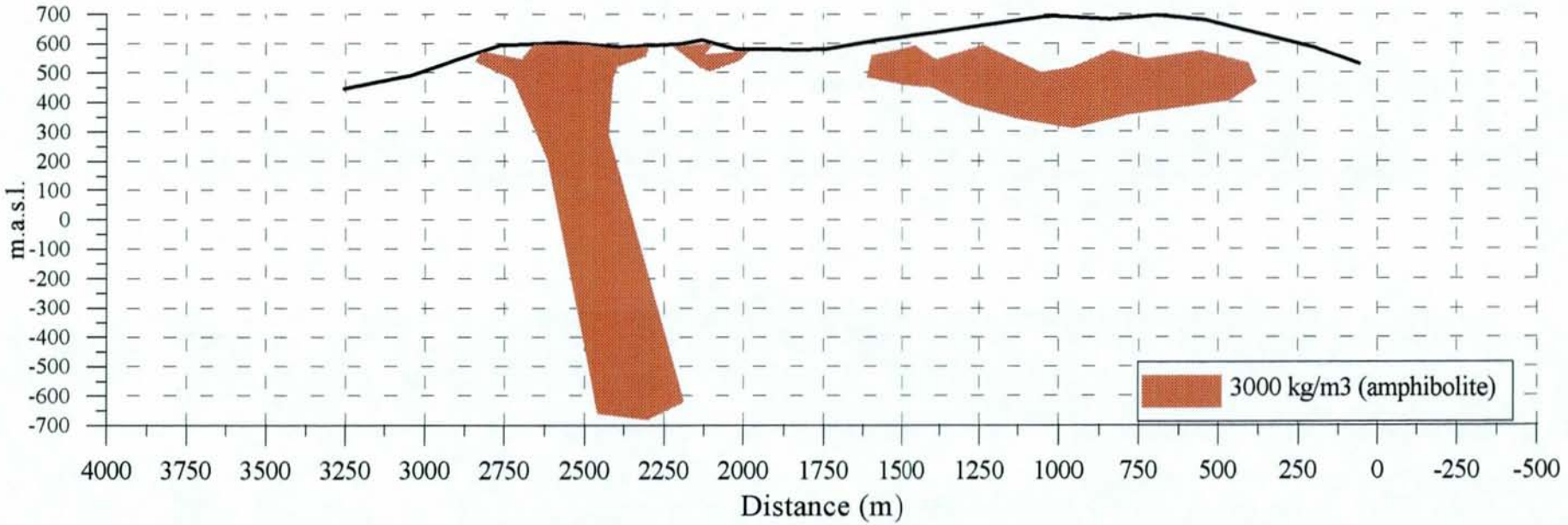


NAUSTDAL, gravity profile 4

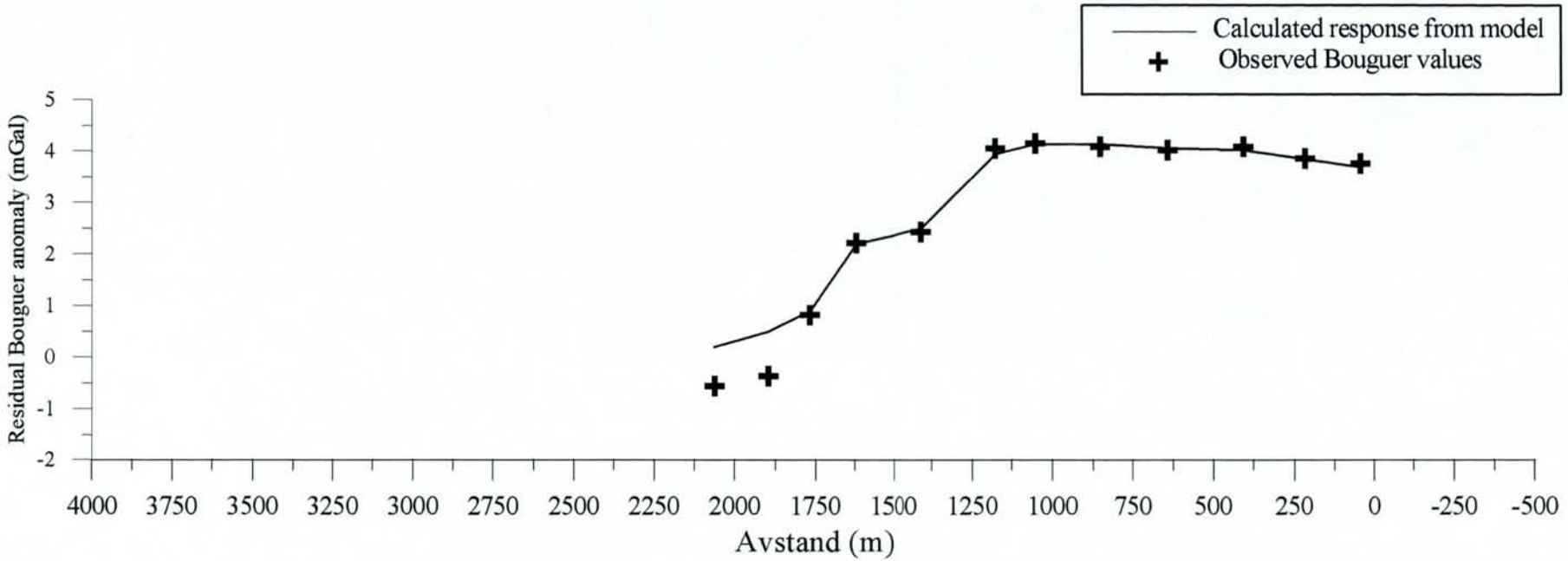


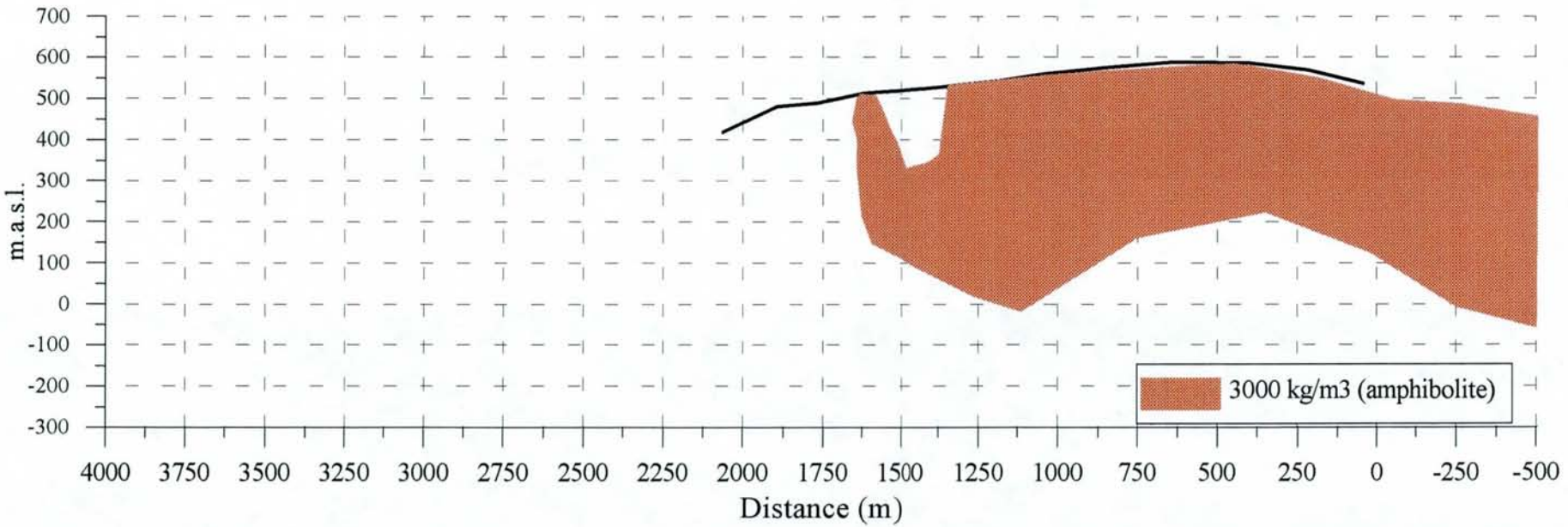
NAUSTDAL, gravity profile 3





NAUSTDAL, gravity profile 2





P4

Gravity profile

· Additional Gravity stations

Geological survey of Norway Overview map of investigated area **NAUSTDAL** NAUSTDAL, SOGN OG FJORDANE	SCALE 1:50 000	MEASURED HE, LF	SEPT. -98
		DRAW HE	JUNE -99
		TRAC	
		KFR KONF	
GEOLOGICAL SURVEY OF NORWAY TRONDHEIM	DRAW NO. 99.046-01	MAP SHEET 1217 IV, 1218 III	

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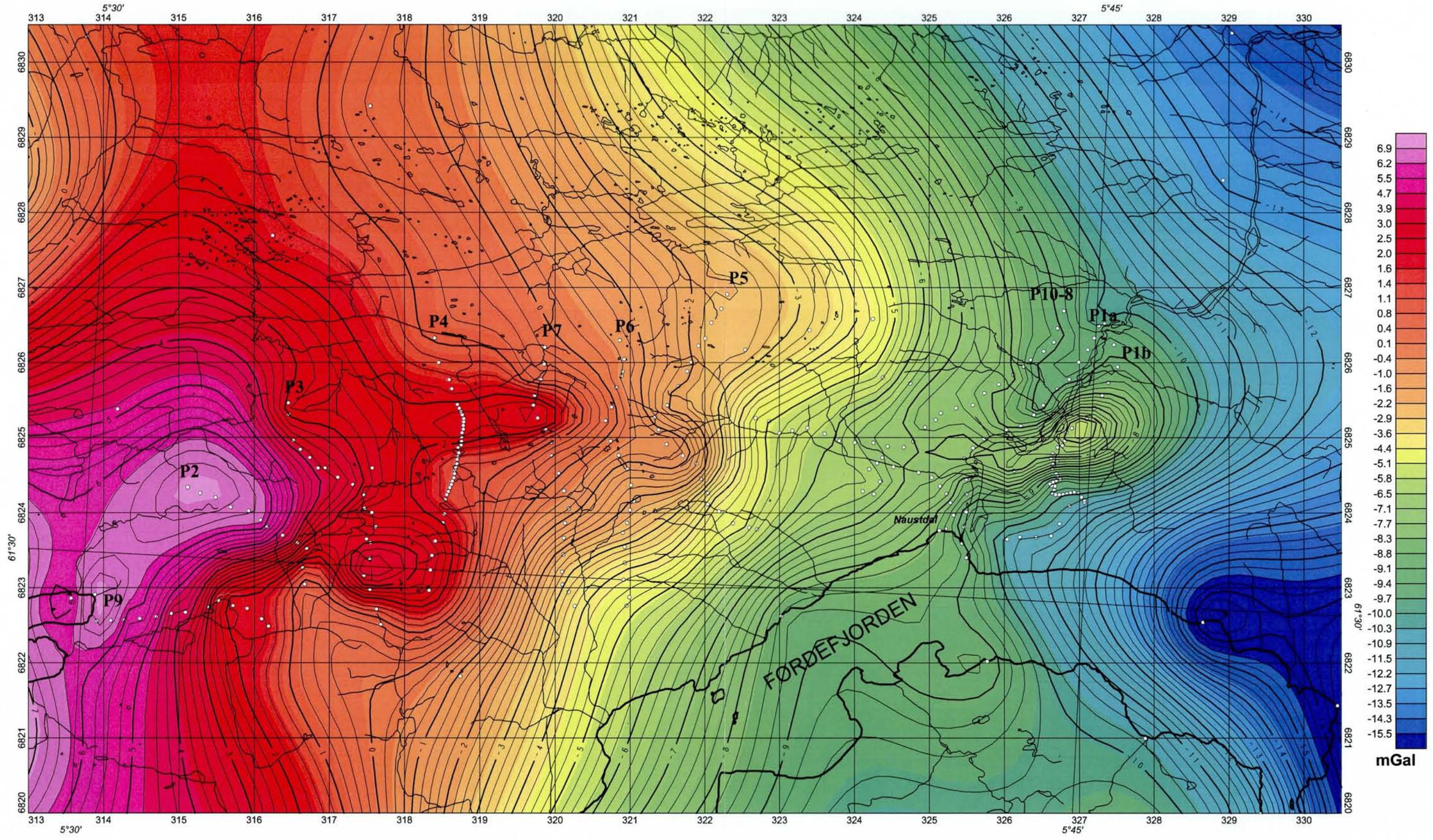

P4

Gravity profile

Scale 1 : 50 000

0.5 0 0.5 1 1.5

kilometre

WGS 84 / UTM zone 32N

Bouguer Anomaly Map

Naustdal

Draw. no. 99.046-02

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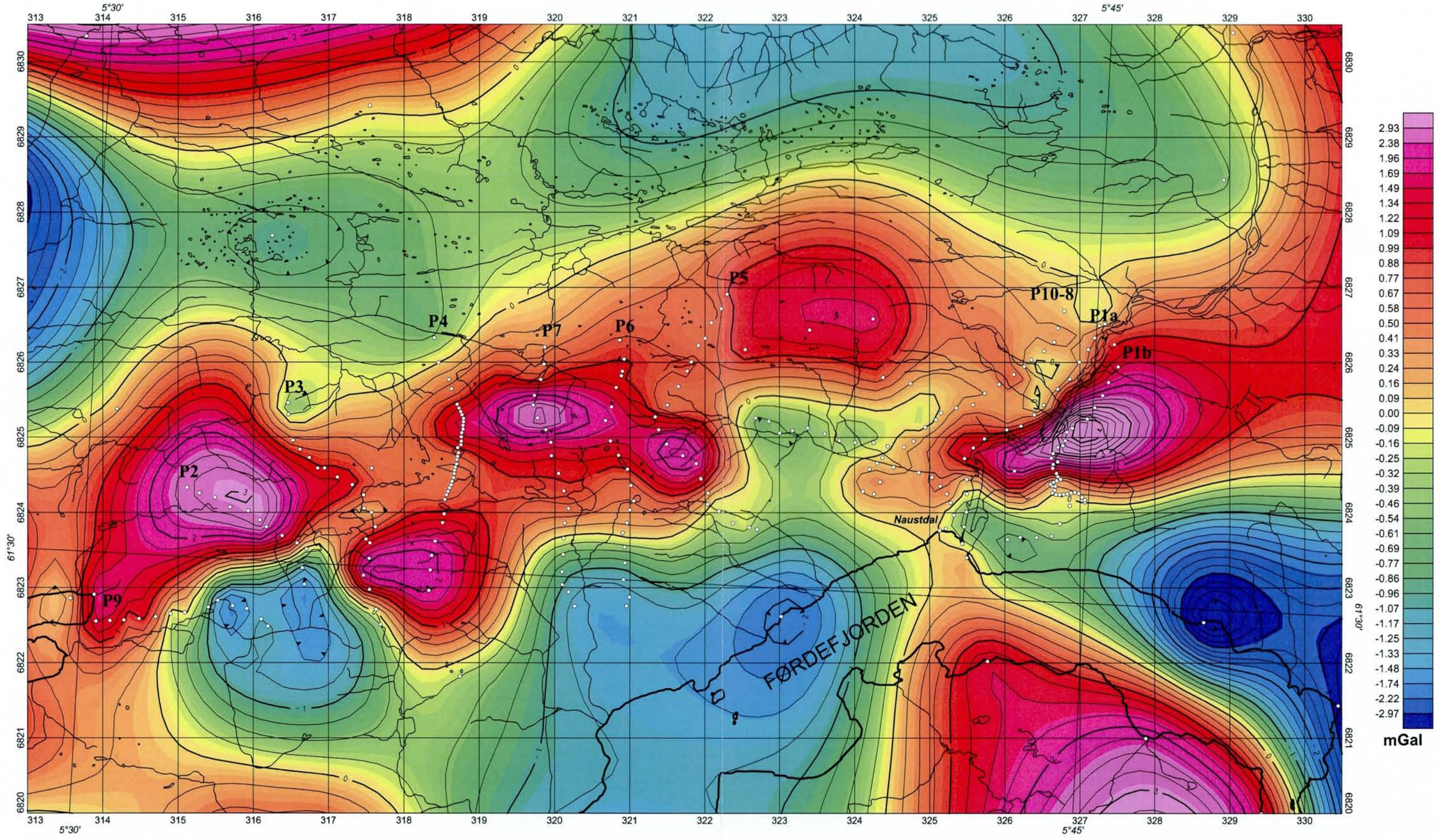

Scale 1 : 50 000

0.5 0 0.5 1 1.5

kilometre

WGS 84 / UTM zone 32N

P4

Gravity profile

Residual Gravity Map

Naustdal

Draw. no. 99.046-03

Data description

A third order polynomial surface was fitted to the Bouguer grid values and then subtracted to produce the residual gravity grid.

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B''
A''
P5
P10-8
P1a
P1b
P4
P7
P6
P3
P2
P9
B
A'
Engebø
Naustdal
Helle
Førdefjorden
Fureviknipa

Mica schist

Granitic orthogneiss

Augengneiss

Granitic to granodioritic gneiss

Eclogite

Eclogite, amphibolite, metagabbro and grey gneiss

Geological map of the Førde area

Scale 1:50.000

Map number 99.046-04

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