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Inneholder appendix F,G og H
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F: Logistic report on GPS survey
G: Interpretation Report - 2006 UTEM survey
H: 2006 In-house UTEM Maxwell Modeling

Med CD: Espedalen GPS 2006

06/00131
Kopi

2006 Winter Program
Drilling, Borehole & Surface Geophysics
Espedalen Project

Oppland County, Norway

APPENDICES F, G & H

Appendix F

APPENDIX F

Logistics Report on GPS Survey for Falconbridge Ltd., Espedalen Project, Oppland Province, Norway, January - February 2006,

Rob McKeown, McKeown Exploration Services

LOGISTICS REPORT ON GPS SURVEY

FOR FALCONBRIDGE LTD.

ESPEDALEN PROECT

OPPLAND PROVINCE, NORWAY

JANUARY-FEBRUARY 2006

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1 Introduction

On 23rd January, 2006, a crew was mobilised from Oshawa, Ontario to Falconbridge's Espedalen Project in the Oppland province of Norway, approximately 70km north of Lillehammer, to fix the position of an exploration grid in three dimensions using Global Positioning System (GPS) satellite receivers. The work was carried out by McKeown Exploration Services of Oshawa, Ontario.

Figure 1.1 Location Map

2 Background

2.1 GPS General Theory

The Global Positioning System (GPS) is a network of twenty four earth orbiting NAVSTAR satellites (SVs) operated by the United States Department of Defense. The satellites orbit the earth every twelve hours at an altitude of approximately 20,200km. Four SVs orbit in each of six different planes inclined at 55deg to the equator, they provide constant positioning and time information by means of radio signals broadcast from each satellite.

Each GPS satellite broadcasts two radio signals known as L1 and L2 (1575.42 MHz, 1227.6 MHz). The L1 signal is modulated with two pseudorandom noise (PRN) ranging codes; P-code, and C/A code. The precision or P-code can be encrypted for military use, while the C/A code is not encrypted. The L2 signal is modulated with the P-code only. Most GPS receivers make use of the L1 signal only, while some survey grade GPS receivers take advantage of both

The US Department of Defense tracks each of the satellites continuously, constantly monitoring and calculating the exact orbit of the satellite. The exact path of the satellite, as well as atomic clock correction coefficients (each satellite contains several very precise atomic clocks) are broadcast to the satellite daily, this information (called the Broadcast Ephemeris and Almanac) is rebroadcast by each SV and used by the GPS receiver on the ground.

The GPS receiver is capable of receiving signals from several different satellites at once. The incoming code from the satellite contains information regarding the identity of each SV. The receiver calculates the distance that it is from the satellite by looking at the incoming code from the satellite, and then looks at how long ago it (the receiver) generated the same code. The difference in time is multiplied by the speed of light to give the distance, and through the use of triangulation, an exact position of the receiver antenna can be calculated.

2.2 Errors in the GPS Position

The calculated GPS position assumes that light travels at a constant speed, unfortunately this is only true of light travelling in a vacuum. When the GPS signal enters the Earth's atmosphere, the signal is slowed down by both the ionosphere and the troposphere, which may result in incorrect distance calculations. This effect is minimized by calculated correction factors that are broadcast with the Broadcast Ephemeris.

Multipath can be another significant source of error in the calculated GPS position. If the satellite signal is reflected off of objects in close proximity to the GPS receiver, it can interfere with the straight-line signal coming from the satellite, slowing the signal down and "confusing" the GPS receiver. This type of error is more common in areas with man-made cultural influence, such as large buildings, and generally is not a factor in the wilderness setting.

Until recently, the largest single source of error was known as Selective Availability, or the intentional degradation of the GPS signal by the US Department of Defense, it may cause an error in the horizontal positions of the receiver of more than 100m. In the Spring of 2000 the US government removed Selective Availability, as a result, a standard off-the-shelf single frequency GPS may now yield a horizontal position with a +/- 5m precision.

2.3 Real Time Differential Correction

The technique of Real Time Differential Correction (RTC) greatly increases the accuracy of the GPS position and helps minimize the effects of atmosphere, multipath, and selective availability. It employs two GPS receivers, one placed at a known location (the base) and one at an unknown position (the rover). The data collected at the base are used to determine the error in the GPS position, this error is in turn broadcast, through the use of an FM/UHF band radio-modem, to the rover unit and used to remove the errors in the position at the unknown location in real-time.

Using a single frequency GPS receiver (L1 only), with a base-rover separation (base-line length) of less than 10km can yield real-time sub-meter accuracy in both horizontal and vertical position, while use of a survey grade dual frequency L1/L2 GPS receiver can yield real-time 2cm-5cm accuracy in both horizontal and vertical positions.

2.4 Post-processed Differential Corrections

Similar to the RTC method described above, data can be corrected after-the-fact by collecting data at a base station, and simultaneously collecting data at the rover unit. The data can then be downloaded from the GPS receiver to a computer and "post-processed" to give a differentially corrected position. This is useful in "fixing" base station positions from known geodetic control points where base-rover separation is in excess of 10km (the range of the FM radio modem). The amount of data collected (i.e. the time spent "occupying" a station) to produce a precise position is proportional to the base-rover separation. A general rule of thumb for rover occupation time is fifteen minutes plus one minute for every kilometre over ten kilometres base-rover separation, i.e. a base-rover separation of 100km should be occupied for 15min + (100km- 10km) * 1min / km = 15min + 90 min = 105 minutes.

Post-processed single frequency data can yield 10-15cm precision, while survey grade dual frequency receivers can yield up to part-per-million precision.

2.5 Dilution of Precision (DOP) and Elevation Mask

The DOP is a measure of the geometry of the satellites relative to each other. The best possible position fix, or most accurate, will be possible when the geometry of the satellites is such that the satellites are within range, but as far apart from each other as possible. A low PDOP (position DOP) indicates that the geometry of the satellites, relative to each other, is good for a triangulation fix. If the SVs are close to each other, or are lined up, then the geometry will be poor for triangulation, and the PDOP will be higher. A PDOP less than 4 gives the best position fix, 5-8 is marginally acceptable, and 9 or over is poor. Generally a PDOP mask (or filter) is applied so that if the PDOP is over a certain level (6 is the maximum for this particular survey), then a reading is not possible.

A minimum of four satellites are generally required to give an accurate position fix. The GPS system used for this particular survey uses a proprietary algorithm called "Over-Determined 3D" , which requires at least five common base/rover SVs to compute a position fix.

The elevation mask is a user entered angle filter which will tell the GPS to ignore all SVs within the zero degree above horizon to elevation mask range. When satellites are low on the horizon, the signal is forced to travel farther through the atmosphere, and the low angle of incidence means signals reflect off of objects more readily and the multipath error is increased. The elevation mask for this survey is 13°.

3 Mobilisation and Equipment

3.1 Mobilisation

On 23rd January 2006, a crew was mobilised from Toronto to Falconbridge's Espedalen Project in the Oppland province of Norway, approximately 70km north of Lillehammer.

The crew, which included the author, representatives from Falconbridge Ltd and Lamontagne Geophysics stayed in the Strand Fjellstue Hotel on the east shore of Lake Espedal. Access to Espedal was via the E6 highway north from Oslo to Lillehammer, then highway 255 to Espedalen. The grid was accessed primarily by snowmobile from the Strand hotel, while some grid access was also possible by truck on plowed cottage access roads.

3.2 Equipment

All GPS equipment was rented or purchased by the author on behalf of Falconbridge. Three Trimble 5700 dual frequency geodetic grade GPS receivers were employed (one base two mobile units), along with a Trimble 25 watt Trimark 3 base station radio modem, and a similar Trimark 3 radio acting as a modem repeater (see Appendix D for specifications).

4 Survey Procedure

4.1 The Local Grid

The local grid was originally designed and oriented to produce lines perpendicular to the geological trend or strike. An arbitrary point was chosen by Falconbridge personnel as the origin of the grid. The grid lines were chosen to run at 050° east of grid north. Magnetic declination in the survey area is zero, so magnetic north and grid north are essentially the same.

Grid Easting	Grid Northing	UTM Easting X	UTM Northing Y	UTM Zone	Grid Azimuth
0	0	525500	6808100	32NORTH	050

Figure 4.1.1. Local Grid Origin

$$X_{UTM} = X_{UTMORIGIN} + (X_{GRID} \cos \theta + Y_{GRID} \sin \theta)$$

$$Y_{UTM} = Y_{UTMORIGIN} - (X_{GRID} \sin \theta - Y_{GRID} \cos \theta)$$

Where: X_{UTM}, Y_{UTM} = unknown UTM
X_{ORIGIN}, Y_{ORIGIN} = origin of local grid in UTM coordinates
X_{GRID}, Y_{GRID} = known local grid coordinates
θ = azimuth of local grid relative to north in degrees

Figure 4.1.2 – Formulae for converting "Local Grid" to "UTM Grid"

The World Geodetic System 1984 (WGS84) UTM reference system was chosen by Falconbridge as the default coordinate system.

Lines were placed at either 50, 100, or 200 metre intervals, with a station spacing of 25 metres.

4.2 GPS Base Station and Repeater

On 25 January 2006, the real-time GPS base station was erected at government geodetic control point known as F30T0135 "Vassendass" which was chosen due to it's central location to the grid and easy snowmobile access. This was the only base occupied during the duration of the survey.

In 2005, during the previous field campaign, a reading was done adjacent to the base in order to compare coordinates obtained by Falconbridge's single frequency Trimble Pathfinder Pro XRS GPS; a real-time system that receives it's differential correction from a Omnistar satellite (see www.omnistar.com or www.esa.int). In the past, the Falconbridge system was used to place grids in a similar fashion. It was found that the two systems varied by 11.1cm in X, 15.5cm in Y, 2.9cm in Z; well within the specifications of this survey.

Figure 4.2.1 – GPS Base station F30T0135 "Vassendaas"

Also during the 2005 campaign, to ensure like coordinate systems, it was decided to occupy two other government geodetic control points, the results were as follows:

ID	Name	UTM_N	UTM_E	Elev.
F30T0135	Vassendaas	6803033.119	534131.190	1078.194
F30T0118	Leppryggen	6801513.582	532751.301	1302.532
F31T0208	Ognsjoefjellryggen	6799492.139	535691.529	1103.244

Figure 4.2.2 – Coordinates of published government control points, ETRS89.

ID	UTM_N	UTM_E	Elev.	dX	dY	dZ
F30T0118	6801513.700	532751.199	1302.625	0.102	-0.118	-0.093
F31T0208	6799492.111	535691.585	1103.245	-0.056	0.028	-0.001

Figure 4.2.3 – Observed coordinates and difference versus published

The observed elevation coordinates were within 10cm of the published coordinates, well within the specifications of the survey.

The published geodetic control point coordinates are in the ETRF89 (or EUREF89) coordinate system, or European Terrestrial Reference Frame. At the start-up of the survey, the author nor any of the Falconbridge personnel could locate any detailed information on the definition of the coordinate system. The Norwegian government agency "Statenskart" which is responsible for geodetic control points in Norway responded to an inquiry on the definition with the following: "…EUREF89 is apparently very close to WGS84, the difference is in the order of 20-30cm".

This statement, combined with the evidence from the comparison of the coordinates obtained from the Falconbridge stand-alone system, provided enough support for keeping WGS84 without any detrimental effects.

WGS84 elevations and coordinates were used for the duration of the survey.

The Falconbridge GPS system (Pathfinder) was pre-loaded with a coordinate system definition that included a choice of the Global DMA 10x10 geoid. The Trimble 5700 high precision GPS was therefore also loaded with the same geoid model for consistency, but when the geoid was applied, the 5700 elevations varied from the Pathfinder elevations by approximately 41.5m. This indicates that the Pathfinder is not producing nor displaying elevations with the geoid model applied. For consistency, the geoid heights were not used and everything was kept in WGS84 heights as this is what appears to be generated by the Pathfinder GPS.

A GPS repeater was brought to the survey site and was used as needed.

4.3 The Survey

The Trimble RTK GPS system was used to navigate from one ideal station to the next, Falconbridge personnel then placed a labelled bamboo picket at the station. Periodically it was not possible to place the real station at the ideal station location due to trees or topographic obstruction, in such instances the station was moved away from the ideal by up to 5 metres. The station was then staked out, i.e. the real location and elevation observed and recorded in the GPS data controller.

Figure 4.3.1 The author wearing Trimble GPS backpack

The GPS antenna was placed on the GPS backpack, which was 1.88m above "snowshoe" level (see figure 4.3.1). During the course of the survey, the snow depth was approximately 0-100cm, readings were taken on top of the snow and not at ground level where the UTEM geophysical observations would be taken.

The GPS fix, depending on the Dilution of Precision (DOP) value was usually obtained with 3 readings (one per second) taken over the course of at least 5 seconds. If DOPs were low, (<6.0) then a shorter reading was possible, if high (>6.0), then generally a longer observation was necessary to obtain the desired precision, normally less than one minute.

Where possible, high precision L1/L2 "fixed ambiguity" observations were recorded, with a precision of approximately 5-10cm. Where thick tree cover prevented a fixed solution, a low precision "float" solution was recorded. Internal quality control within the GPS was set to observe data until errors were within 70cm horizontal and 50 cm vertical, a typical reading recording once a second for 2-3 minutes. The initialization type is displayed in the attached data file in column 9, a "F" indicates fine or L1/L2 high precision observation (+/- 5cm), and a "C" indicates course or L1 only float observation (+/-1m).

2515 stations were observed, of that 1396, or 56% were "fine" or fixed, and 1119, or 44% were low precision "course" or float readings.

Approximately 0.4% of the observations were repeated, and the change from fine to course initializations appears to have had little affect on the data quality; the highest Z repeat value was 87cm.

Readings were stored in the hand-held GPS computer and downloaded nightly to a laptop computer. Trimble Geomatics Office Version 1.6 (TGO) software was used to transfer and decode binary data. Data were exported from TGO into ASCII format, which was then imported in Excel. An master Excel spreadsheet was created and contained all merged data (see Appendix A).

The production GPS survey was started 26 January 2006, and completed 20 February 2006 (see Appendix C for details on daily progress).

The GPS was also used to fix the positions of all UTEM Loop wires placed by Lamontagne Geophysics. Twelve loops were surveyed (30, 31,32, 33, 34, 5, 36, 37, B38, B36, B41 ,B42), with position fixes taken every 100m, or at any line or elevation break (see Map).

5.0 Quality Control

To maintain a quality data set, and to test the manufacturer's claim of error/precision, as many random repeats were taken as time would allow. The results of the repeats are outlined below (see Chart 6.1).

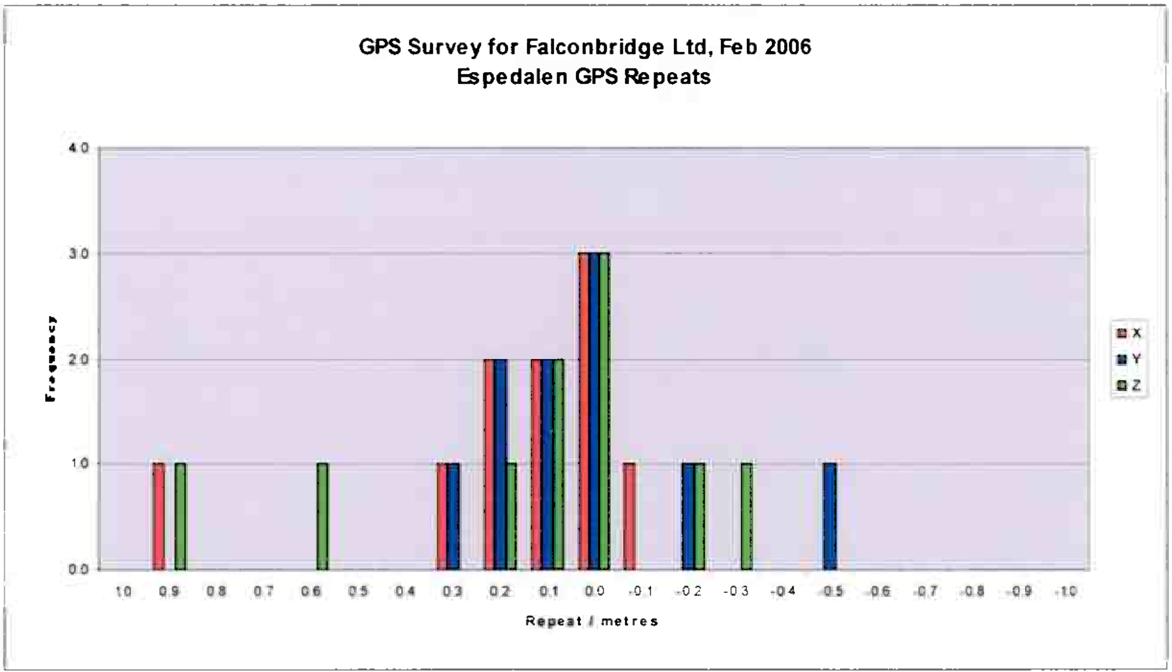


Chart 5.0.1 – GPS Repeats

The above chart illustrates that the precision is as expected (sub-metre). The average of the absolute repeat value is 24.5cm, with the standard deviation (single population) of 28.2cm.

As the error is random as far as being positive or negative in value, the absolute value is considered when calculating averages.

Repeat value is higher where a "course" or L1 float solution only is observed.

Only 10 repeats were taken for approximately 2515 stations, or 0.4%. Ideally 5-10% should be randomly repeated for a survey of this size. More repeats could have been taken comparing float versus fixed solutions.

6 Comments and Suggestions

6.1 Comments on Satellite Geometry

Satellite geometry over the course of the survey was quite favourable with no significant down-time due to poor geometry.

The satellite geometry changes with time, and it is generally the "luck of the draw" that at a particular location in time that the satellites will have a favourable geometry. One could return to the same survey area in a month or two and the geometry could be unfavourable all day everyday.

6.2 General Comments

Overall, the GPS survey was completed without any significant problems. , incredible considering the thick foliage and steep terrain.

Heavy recreational "trail touring" type snowmobiles weighing in excess of 300 kg were utilised for access to work areas, this type of snowmobile was certainly not ideal as a "working" snowmobile in this type of terrain with deep powder snow conditions; a lot of time was spent digging out stuck snowmobiles, a problem that could have been almost entirely avoided by a using smaller, lighter work snowmobile such as the Skidoo Tundra II, or Yamaha Bravo.

Chart 5.0.1 indicates that the precision of less than one metre is as claimed by the manufacturer and well within the specifications of the survey. Future surveys should allow for more time to collect a "statistically significant" number of repeats to ensure proper quality control, especially comparing fixed versus float solutions

Dense foliage and steep terrain are not conducive to GPS surveys, regardless of GPS type.

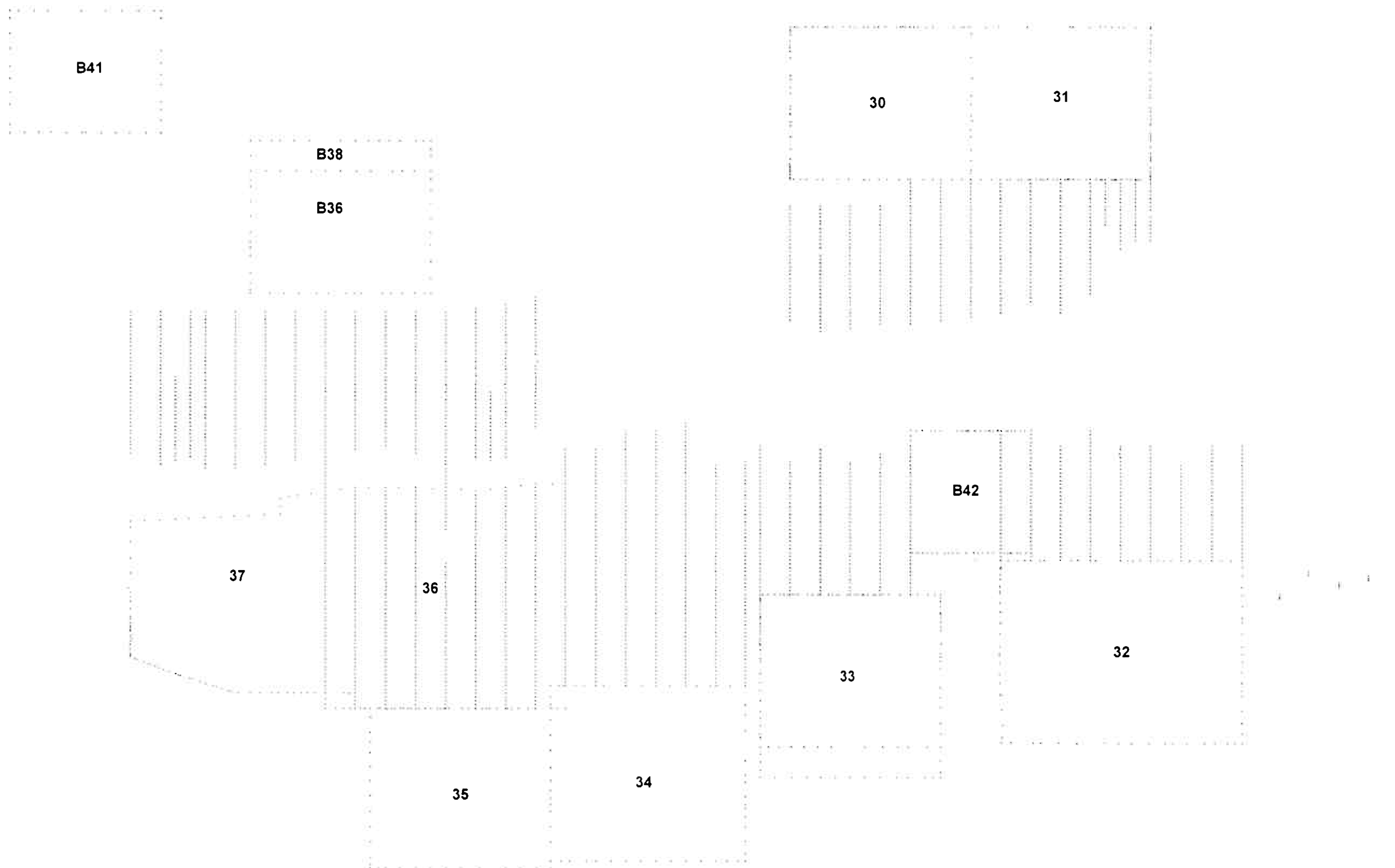
Respectfully Submitted,

Robert L. McKeown, B.Sc.
2006-04-28

Field surveyor:

Computer operator:

Reference:



Scale 1:30000

0 1250 m

Meters

N

Plot Scale: 1:30000

050 DEGREES GRID NORTH

Printed from Trimble Geomatics Office

Site: ESPEDALEN

Zone: 32 NORTH Datum: WGS84 UTM

Project: NORWAY

DTMLink Template

Appendix A - Data CD Information and Sample Data

The attached data CD contains all raw and processed data collected. Raw Trimble binary files are located in the directory :

\GPS\RAWDATA

and are only readable with Trimble Geomatics Office. All binary files were decoded and exported as ASCII text files, then imported into the excel spreadsheet all.xls Geosoft space delimited xyz data was exported from excel and saved in the folder:

\GPS\XYZ

UTEM loops' GPS data are located in the directories:

\GPS\LOOPS

The figure below is a sample of the final data format (Geosoft XYZ) located in the master spreadsheet :

\GPS\XYZ\2006EspedalenGPS.xls

/GPS Survey for Falconbridge Ltd 2006
/Espedalen Project, Norway
/Local_E Local_N ID UTM_E UTM_N Lat_N Long_E Elev Precision Date Line Station
/

3800.028	4050.369	38004050	531045.374	6807792.537	61.402796674	9.581383655	799.138	F	060214	3800	4050
3799.669	4075.266	38004075	531064.230	6807808.828	61.402943415	9.581739469	810.160	F	060214	3800	4075
3799.563	4103.096	38004100	531085.466	6807826.765	61.403102911	9.582140138	820.098	C	060214	3800	4100
3800.259	4124.624	38004125	531102.405	6807840.090	61.403220990	9.582459553	825.020	C	060214	3800	4125
3797.745	4150.523	38004150	531120.629	6807858.663	61.403386263	9.582803916	832.458	C	060214	3800	4150
3799.963	4175.438	38004175	531141.140	6807872.979	61.403513134	9.583190410	845.768	C	060214	3800	4175
3799.817	4198.711	38004200	531158.875	6807888.051	61.403646998	9.583525024	851.504	C	060214	3800	4200
3800.213	4225.041	38004225	531179.299	6807904.672	61.403794565	9.583910296	866.065	C	060214	3800	4225
3801.262	4249.728	38004250	531198.897	6807919.722	61.403928096	9.584279817	871.766	C	060214	3800	4250
3799.748	4274.999	38004275	531217.270	6807937.141	61.404082980	9.584626797	877.924	F	060214	3800	4275
3796.071	4300.429	38004300	531234.387	6807956.303	61.404253633	9.584950556	886.373	C	060214	3800	4300
3800.969	4325.613	38004325	531256.828	6807968.739	61.404363460	9.585372871	894.974	F	060214	3800	4325
3801.629	4348.339	38004350	531274.661	6807982.842	61.404486619	9.585709208	904.472	C	060214	3800	4350
3800.204	4375.236	38004375	531294.349	6808001.222	61.404652025	9.586080982	915.090	F	060214	3800	4375
3800.496	4399.937	38004400	531313.459	6808016.876	61.404791014	9.586441504	925.093	F	060214	3800	4400
3800.162	4424.491	38004425	531332.054	6808032.915	61.404933490	9.586792421	933.565	C	060214	3800	4425
3800.285	4449.256	38004450	531351.103	6808048.739	61.405074005	9.587151827	941.596	C	060214	3800	4450
3800.207	4474.952	38004475	531370.738	6808065.316	61.405221233	9.587522325	948.607	C	060214	3800	4475
3799.707	4500.352	38004500	531389.874	6808082.026	61.405369689	9.587883520	952.716	C	060214	3800	4500
3800.173	4525.042	38004525	531409.087	6808097.540	61.405507393	9.588245935	956.974	F	060214	3800	4525
3800.010	4549.902	38004550	531428.026	6808113.644	61.405650433	9.588603342	961.020	F	060214	3800	4550
3799.837	4574.809	38004575	531446.995	6808129.787	61.405793804	9.588961306	966.151	C	060214	3800	4575
3800.156	4599.666	38004600	531466.259	6808145.534	61.405933610	9.589324730	970.411	C	060214	3800	4600
3799.995	4625.240	38004625	531485.723	6808162.090	61.406080643	9.589692061	973.598	C	060214	3800	4625
3799.805	4650.010	38004650	531504.582	6808178.149	61.406223282	9.590047959	979.356	F	060214	3800	4650
3799.867	4675.765	38004675	531524.351	6808194.657	61.406369855	9.590420991	986.422	C	060214	3800	4675
3799.880	4700.289	38004700	531543.146	6808210.411	61.406509749	9.590775846	1003.070	F	060214	3800	4700
3800.259	4724.833	38004725	531562.191	6808225.897	61.406647217	9.591134955	1016.490	F	060214	3800	4725

Figure A.1 – Sample Data

APPENDIX B - REPEATS

Espedalen GPS Repeats 2006

Station	X_1	Y_1	Z_1	Precision_1	Date_1	X_2	Y_2	Z_2	Precision_2	Date_2	dX	dY	dZ	Abs_dX	Abs_dY	Abs_dZ
69003600	6900.033	3600.131	744.951	F	060129	6900.033	3600.131	744.951	F	060128	0.000	0.000	0.000	0.000	0.000	0.000
65003450	6500.682	3450.752	744.632	F	060129	6500.678	3450.461	744.720	F	060128	0.004	0.291	-0.088	0.004	0.291	0.088
88003775	8799.870	3774.936	869.706	F	060202	8799.816	3774.986	869.631	F	060202	0.054	-0.050	0.075	0.054	0.050	0.075
59003925	5900.011	3925.633	724.516	F	060211	5900.037	3925.866	723.642	C	060131	-0.026	-0.233	0.874	0.026	0.233	0.874
51003900	5100.023	3900.158	721.628	F	060212	5100.093	3900.018	721.652	F	060131	-0.070	0.140	-0.024	0.070	0.140	0.024
57004375	5700.253	4375.153	842.695	F	060212	5700.065	4375.058	842.665	F	060211	0.188	0.095	0.030	0.188	0.095	0.030
57004350	5700.325	4350.316	834.306	F	060212	5700.062	4350.147	834.122	F	060211	0.263	0.169	0.184	0.263	0.169	0.184
47003975	4699.697	3975.509	765.623	F	060213	4699.515	3975.582	765.919	C	060213	0.182	-0.073	-0.310	0.182	0.073	0.310
96003525	9600.152	3525.057	1009.815	F	060215	9600.342	3525.002	1009.913	F	060202	-0.190	0.055	-0.296	0.190	0.055	0.296
59003100	5900.325	3101.066	802.252	C	060131	5899.447	3101.651	801.686	C	060130	0.878	-0.585	0.566	0.878	0.585	0.566

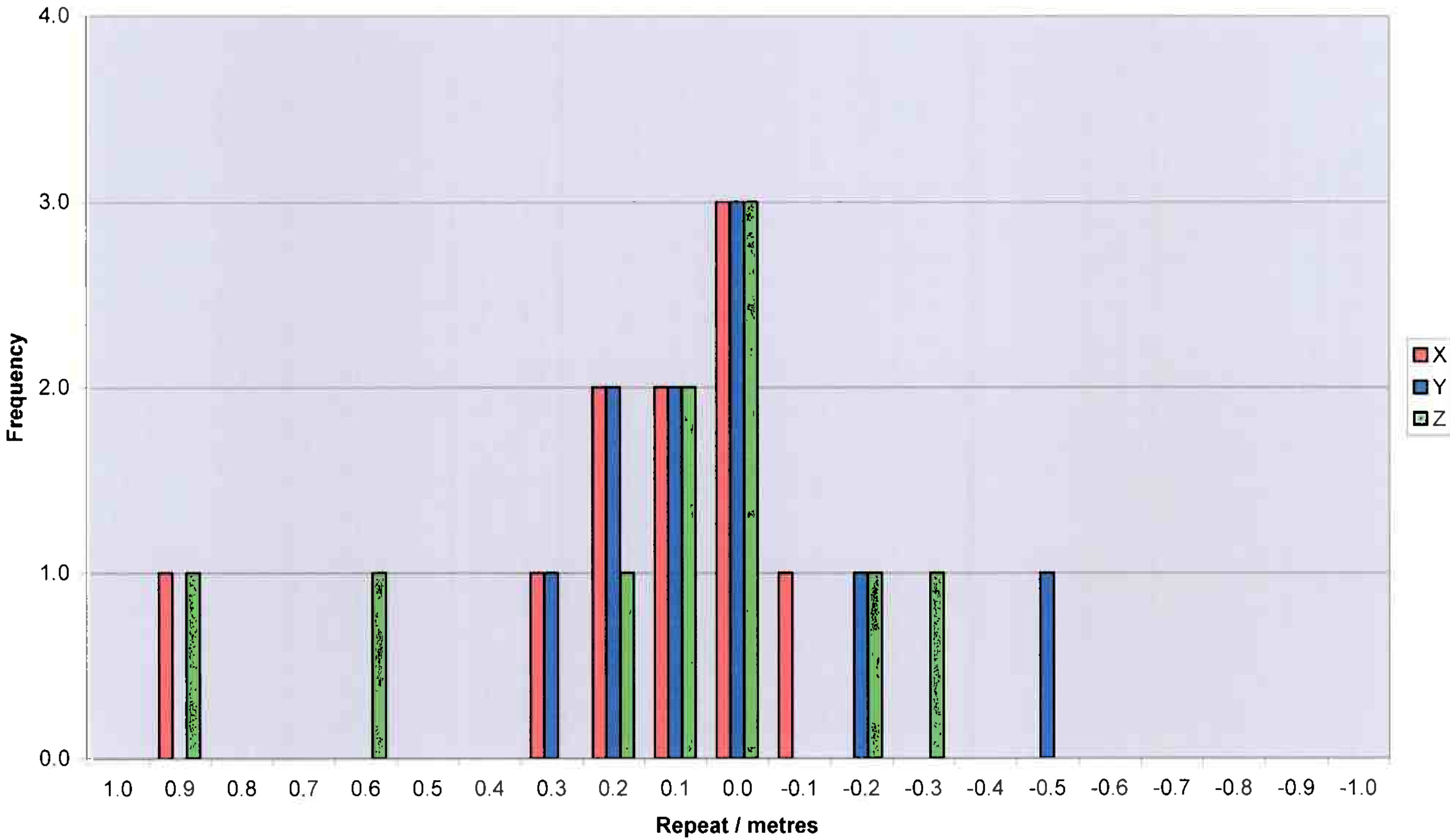
	Abs_dX	Abs_dY	Abs_dZ
Mean	0.185	0.169	0.245
Std Dev	0.260	0.171	0.282

******* "F" fixed ambiguity, precision <10cm

******* "C" Course or "Float" precision <1m

Interval / m	Freq_X	Freq_Y	Freq_Z
1.0	0.000	0.000	0.000
0.9	1.000	0.000	1.000
0.8	0.000	0.000	0.000
0.7	0.000	0.000	0.000
0.6	0.000	0.000	1.000
0.5	0.000	0.000	0.000
0.4	0.000	0.000	0.000
0.3	1.000	1.000	0.000
0.2	2.000	2.000	1.000
0.1	2.000	2.000	2.000
0.0	3.000	3.000	3.000
-0.1	1.000	0.000	0.000
-0.2	0.000	1.000	1.000
-0.3	0.000	0.000	1.000
-0.4	0.000	0.000	0.000
-0.5	0.000	1.000	0.000
-0.6	0.000	0.000	0.000
-0.7	0.000	0.000	0.000
-0.8	0.000	0.000	0.000
-0.9	0.000	0.000	0.000
-1.0	0.000	0.000	0.000

GPS Survey for Falconbridge Ltd, Feb 2006
Espedalen GPS Repeats



APPENDIX C – PRODUCTION SUMMARY

GPS Survey for Falconbridge Ltd.

Espedalen, Norway

Winter 2006

Production Summary

	Group A					Group B					TOT	Notes
Date	Prod	Line	St From	St To	Length	Prod	Line	St From	St To	Length	m	
06/01/20												-RLM picks up and inspects rental and for purchase GPS equipment
												from Cansel in Toronto
06/01/23												-RLM travels Toronto to Oslo on afternoon flight
06/01/24												-RLM travels Oslo to Espedalen, arrive 20:00
												-setup, inspection, and charging of GPS gear
06/01/25												-a.m. setup of software and GPS equipment
												- p.m. setup base station at F30T0135 atop Jenttjellet, same location as 2005 work
06/01/26	0.5	7900	2525	4000	1475							-a.m. breaking trail into survey area and strategically placing pickets
TOTAL					1475					0	1475	-p.m. read first line, 79E, from south to north
06/01/27						0.75	7700	2525	3950	1425		-a.m. problem with base station power cable, two pins broke off inside connector yesterday at end of day
							7500	3700	4125	425		impossible to get one broken pin out, switched base rx with rover rx to get one crew operating
TOTAL										1850	1850	-end of day switched base and rover connector module as external power connector not needed on rover
												-no production group A, group B 3/4 day
06/01/28	1	7100	2525	4200	1675	1	7500	4150	4250	100		-a.m. small problem with base rx power connector, returned to Strand to get different battery, group A lost 1 h
		6900	3600	4075	475		7500	2525	3675	1150		
		6500	3450	3850	400		7300	3750	4200	450		
		6100	3400	3800	400		6700	3500	4075	575		
							6300	3400	3825	425		
TOTAL					2950					2700	5650	
06/01/29	1	6900	2525	3600	1075	1	7300	2525	3725	1200		- no problems today, sats good all day
		6500	2375	3450	1075		6700	2525	3475	950		
		6300	2375	3025	650		5700	2375	2550	175		
TOTAL					2800					2325	5125	
06/01/30	1	6100	2375	3375	1000	1	5700	2575	3825	1250		-Group A lost one hour in morning while looking for lost snowshoes
		5900	2375	3100	725		5500	2375	3825	1450		
TOTAL					1725					2700	4425	
06/01/31	1	5900	3125	3325	200	1	5100	2475	3900	1425		
		5900	3550	3925	375		6300	3050	3375	325		
		5300	2375	3825	1450		8000	3125	3650	525		
		8200	3125	4000	875							
					2900					2275	5175	
06/02/01	1	8400	3125	4075	950	1	8000	3675	4100	425		
		9000	3125	4100	975		8600	3125	4000	875		
					1925					1300	3225	
06/02/02	1	9600	3525	4200	675	0.5	8800	3125	3775	650		-Group B problem with survey controller, did not charge properly, battery dead by 11:00, no further production possible
		8800	3775	4050	275							
					950					650	1600	
06/02/03	1	10800	3525	3975	450							-shorthanded today, group B placing pickets and breaking trail for north-eastern most lines
		11000	3525	4100	575							
		11200	3525	4100	575							
					1600					0	1600	
06/02/04	1	11200	3350	3500	150							-Group B breaking trail into north-west lines today
		11000	3350	3500	150							-rough ground, low production for Group A
		10800	3350	3500	150							
		10600	3350	4100	750							
		10400	3350	4100	750							
					1950					0	1950	
06/02/05	1	10200	3350	4200	850							-Group B breaking trail
		10000	3350	4100	750							
		9800	3350	4200	850							
					2450					0	2450	
06/02/06	1	9800	5050	5850	800	1	9600	4975	5850	875		-moved to lines north of road on north facing slope
		10200	5100	5850	750		10000	4975	5850	875		
		10300	5550	5850	300							
					1850					1750	3600	
06/02/07	1	9400	4950	5850	900	1	9000	4900	5850	950		
		8800	4900	5675	775		9200	4925	5850	925		
		10400	5400	5850	450		10500	5450	5850	400		
					2125					2275	4400	
06/02/08	1	8400	4850	5675	825	0.5	8200	4925	5675	750		-group B GPSed in complete south edge (1200m) of Loop 30, and western 600m of south egde of Loop 31
		8600	4875	5675	800							group A, L 8400 ST 5375 is missing due to operator error
		10600	5450	5850	400							-group A, L 10600 ST 5625 is missing due to cliff
					2025					750	2775	
06/02/09												-Group A GPSed in Loop 31, west edge 1000m, north edge 1200m, east edge 650m, loop not complete 350m remains
												-Group B broke in trails to north lines after heavy snowfall and placed pickets
06/02/10						0.5	6500	4225	5075	850		-Group A GPSed Loop 31, 350m of south end of east edge, Loop 31 GPS complete
												-Group A GPSed Loop 30, west edge (1000m) and north edge (1200m), Loop 30 GPS complete
												-problem in morning with stuck snowmobile, lost 3h
												-Group B surveyed L65 north of the Strand. One station missing due to cliff (4675N), 4650N is 12m east of line
										850	850	
06/02/11	1	6300	4025	5025	1000	1	6100	4025	5000	975		-possible picket numbering error, Line 5700 between 4350 and 4600, should be checked in the field
		5900	3925	4975	1050		5700	4350	4975	625		
					2050					1600	3650	
06/02/12	1	5500	4100	4975	875	1	4900	4000	4975	975		
		5100	3925	4975	1050		5300	4075	4975	900		
		5700	4050	4325	275							
					2200					1875	4075	

06/02/13	1	4700 4300	3975 3950	4975 4975	1000 1025 2025	1	4500 4200	3950 4025	4975 4975	1025 950 1975	4000	
06/02/14	1	3800 6200	4050 4000	4975 4450	925 450 1375	1	4000 4100	3975 4000	4975 4550	1000 550 1550	2925	gridding complete today
06/02/15												Group B GPSing Loop 32 (complete) Group A gone to Lillehammer to fix broken stabiliser bar on snowmobile
06/02/16												Group A laying wire on Loop 32 Group B GPSing Loop 33 (complete)
06/02/17												Group A GPSing new south edge to Loop 33 (moved 200m south), and half of east edge, south edge, west edge of Loop 34 Group B GPSing north edge of Loop 35 and part of south edge of Loop 37
06/02/18												Group A GPSing south and west edge of loop 37, and north edge of loop B42 Group B GPSing south and west edge of loop 35
06/02/19												Group A GPSing loop B41 and north edge of B38 Group B GPSing south edge of B42 and spotting Stormyra drill holes in afternoon Group B GPSing finished at Espedalen, D Fox and T Blair to Ertelien Project in the the south of Norway
06/02/20												Group A GPSing loop B36 and northern edges of loop 36 and 37 GPSin/Gridding complete at Espedalen
06/02/21												gear packed up, RLM and LRJ demobe for Ertelien Project
TOTAL											60800	

Production Days - Group A	16.50
Production Days - Group B	13.25
Total Production Days	29.75
Total Metres - Group A	34375
Total Metres - Group B	26425
Total Metres	60800
Average Daily Production - Group A	2083
AverageDaily Production - Group B	1994
Average Daily Production per Group (m/day)	2039
Average Production two groups	4078
Total Metres	61450
Metres Remaining	650
Percent Complete	99
Estimated Days remaining	0.2

APPENDIX D – GPS EQUIPMENT SPECIFICATIONS

Trimble 5700 GPS System

One receiver, many configurations, for greater flexibility and choice

The Trimble® 5700 GPS receiver is an advanced, but easy-to-use, surveying instrument that is rugged and versatile enough for any job.

Combine your 5700 with the antenna and radio that best suit your needs, and then add the Trimble controller and software of your choice for a total surveying solution. The powerful 5700 GPS system will provide all the advanced technological power and unparalleled flexibility you need to increase your efficiency and productivity in any surveying environment.

Advanced GPS receiver technology

The 5700 is a 24-channel dual-frequency RTK GPS receiver featuring the advanced Trimble Maxwell™ technology for superior tracking of GPS satellites, increased measuring speed, longer battery life through less power use, and optimal precision in tough environments. WAAS and EGNOS capability lets you perform real-time differential surveys to GIS grade without a base station.

Modular design for versatility

For topographic, boundary, or engineering surveying, clip the receiver to your belt, carry it in a comfortable backpack, or configure it with all components on a lightweight range pole. With the receiver attached to your site vehicle, you can survey a surface as fast as you can drive! For control applications, attach the receiver to a tripod...it's designed to work the way your job requires.

Full metal jacket...and lightweight

The 5700 GPS receiver boasts the toughest mechanical and waterproofing specs in the business. Its magnesium alloy case is stronger than aluminum,

but also 30% lighter—the 5700 weighs just 1.4 kg (3 lb) with batteries. Whether you're collecting control points on a tripod, or scrambling down a scree slope collecting real-time kinematic data, the receiver is light enough and tough enough to carry on performing.

Fast and efficient data storage and communications

Use the receiver's CompactFlash memory to store more than 3,400 hours of continuous L1/L2 data collection at an average of 15-second intervals. Transfer data to a PC at speeds of more than 1 megabit per second through the super-fast USB port. Your choice of UHF radio modem is built in to the receiver to provide RTK communications receiving without the need for cables or extra power!

Your choice of Trimble antenna

Choose the high-accuracy Trimble GPS antenna that best suits your needs: the lightweight and portable Zephyr™ antenna for RTK roving, or the Zephyr Geodetic™ antenna for geodetic surveying.

The Zephyr Geodetic antenna offers submillimeter phase center repeatability and excellent low-elevation tracking, while the innovative design of its

Key Benefits

- Industry-leading technology provides superior performance
- Flexible configurations put you in total control
- Rugged, high-performance hardware is built to last
- With the Trimble controller and software of your choice, enjoy seamless integrated surveying

Trimble Stealth™ ground plane literally burns up multipath energy using technology similar to that used by stealth aircraft to hide from radar. The Zephyr Geodetic antenna thus provides unsurpassed accuracy from a portable antenna.

Trimble

Trimble 5700 GPS System

General

- Front panel for on/off, one-button-push data logging, CompactFlash card formatting, ephemeris and application file deletion, and restoring default controls
- LED indicators for satellite tracking, radio-link, data logging, and power monitoring
- Tripod clip or integrated base case

Performance specifications

Measurements

- Advanced Trimble Maxwell technology
- High-precision multiple correlator L1 and L2 pseudorange measurements
- Unfiltered, unsmoothed pseudorange measurement data for low noise, low multipath error, low time domain correlation, and high dynamic response
- Very low noise L1 and L2 carrier phase measurements with <1 mm precision in a 1 Hz bandwidth
- L1 and L2 Signal-to-Noise ratios reported in dB-Hz
- Proven Trimble low-elevation tracking technology
- 24 Channels L1 C/A Code, L1/L2 Full Cycle Carrier, WAAS/EGNOS

Code differential GPS positioning[1]

Horizontal: ±(0.25 m + 1 ppm) RMS
Vertical: ±(0.5 m + 1 ppm) RMS
WAAS differential positioning accuracy typically <5 m 3DRMS[2]

Static and FastStatic GPS surveying[1]

Horizontal: ±5 mm + 0.5 ppm RMS
Vertical: ±5 mm + 1 ppm (× baseline length) RMS

Kinematic surveying[1]

Real-time and postprocessed kinematic surveys
Horizontal: ±(10 mm + 1 ppm) (× baseline length) RMS
Vertical: ±(20 mm + 1 ppm) RMS
Initialization time: Single/Multi-base minimum 10 sec + 0.5 times baseline length in km, up to 30 km
Scalable GPS infrastructure initialization time: <30 seconds typical anywhere within coverage area
Initialization reliability[3]: Typically >99.9%

Hardware

5700 GPS receiver

Physical:
Casing: Tough, lightweight, fully sealed magnesium alloy
Waterproof: Tested to IPX7 standards
Shock and vibration: Tested and meets the following environmental standards:
  Shock: MIL-STD-810F to survive a 1 m (3.28 ft) drop onto concrete
  Vibration: MIL-STD-810-F on each axis
Weight: With internal batteries, internal radio, internal battery charger, standard UHF antenna: 1.4 kg (3 lb)
As entire RTK rover with batteries for greater than 7 hours, less than 4 kg (8.8 lb)
Dimensions (W×H×L): 13.5 cm × 8.5 cm × 24 cm (5.3 in × 3.4 in × 9.5 in)

Electrical:
Power: DC input 11 to 28 V DC with over voltage protection
Power consumption: 2.5 W receiver only, 3.75 W including internal radio
Battery: Greater than 10 hours data logging, or greater than 7 hours of RTK operation on two internal 2.0 Ah lithium-ion batteries
Battery weight: 0.1 kg (3.5 oz)
Battery charger: Internal with external AC power adapter; no requirement for external charger
Power output: 11.5 to 20 V DC (Port 1), 11.5 to 27.5 V DC (Port 3) on external power input
Certification: Class B Part 15 FCC certification, CE Mark approved, C-Tick approved, Canadian FCC

Environmental:
Operating temperature[4]: -40 °C to 65 °C (-40 °F to 149 °F)
Storage temperature: -40 °C to 80 °C (-40 °F to 176 °F)
Humidity: 100%, condensing

Communications and data storage:

- 2 external power ports, 2 internal battery ports, 3 RS232 serial ports
- Integrated USB for data download speeds in excess of 1 Mb per second
- External GPS antenna connector
- CompactFlash advanced lightweight and compact removable data storage. Options of 64 MB or 128 MB from Trimble
- More than 3,400 hours continuous L1+L2 logging at 15 seconds with 6 satellites typical with 128 MB card
- Fully integrated, fully sealed internal UHF radio modem option
- GSM, cellphone, and CDPD modem support
- Dual event marker input capability
- 1 Hz, 2 Hz, 5 Hz, and 10 Hz positioning and data logging
- 1 pulse per second output capability
- CMRII, CMR+, RTCM 2.x and 3.x input and output standard
- 14 NMEA outputs

Zephyr antenna

Dimensions: 16.2 cm (6.38 in) diameter × 6.2 cm (2.44 in) height
Weight: 0.55 kg (1.20 lb)
Operating temperature: -40 °C to 70 °C (-40 °F to 158 °F)
Humidity: 100% humidity proof, fully sealed
Shock and vibration: Tested and meets the following environmental standards:
  Shock: MIL-STD-810-F to survive a 2 m (6.56 ft) drop onto concrete
  Vibration: MIL-STD-810-F on each axis

- 4-point antenna feed for submillimeter phase center repeatability
- Integral low noise amplifier
- 50 dB antenna gain

Zephyr Geodetic antenna

Dimensions: 34.3 cm (13.5 in) diameter × 7.6 cm (3 in) height
Weight: 1.31 kg (2.88 lb)
Operating temperature: -40 °C to 70 °C (-40 °F to 158 °F)
Humidity: 100% humidity proof, fully sealed
Shock and vibration: Tested and meets the following environmental standards:
  Shock: MIL-STD-810-F to survive a 2 m (6.56 ft) drop onto concrete
  Vibration: MIL-STD-810-F on each axis

- 4-point antenna feed for submillimeter phase center repeatability
- Integral low noise amplifier
- 50 dB antenna gain
- Trimble Stealth ground plane for reduced multipath

1 Accuracy may be subject to conditions such as multipath, obstructions, satellite geometry, and atmospheric parameters. Always follow recommended survey practices.
2 Depends on WAAS/EGNOS system performance.
3 May be affected by atmospheric conditions, signal multipath, and satellite geometry. Initialization reliability is continuously monitored to ensure highest quality.
4 Receiver operates normally to -40 °C (-40 °F) but some office based functions such as USB download or internal battery charging are not recommended at temperatures below freezing.
Specifications subject to change without notice.

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www.trimble.com

Trimble

DATASHEET

TRIMBLE TSC2 CONTROLLER

KEY FEATURES

Advanced handheld field computer for exceptional versatility, efficiency, and freedom

Microsoft Windows Mobile operating system 5.0 software

Highest flexibility for optical and GPS surveying

Wireless operations in both the field and office

COMBINE FIELD AND OFFICE IN ONE POWERFUL HANDHELD COMPUTER

The Trimble® TSC2® Controller is an advanced handheld computer especially designed for Trimble optical and GPS surveying systems[1]. With the Microsoft® Windows Mobile™ 5.0 software operating system, the TSC2 controller runs your choice of powerful Trimble field software[2]. Add specialized applications to the standard Microsoft Outlook Mobile, Excel Mobile, Word Mobile, Power Point Mobile and Internet Explorer programs, and the TSC2 controller becomes a powerhouse of field and office functions on one rugged business device.

SMART, EXPANDABLE HARDWARE

Every innovative feature on the TSC2 controller is designed to make your job easier. Clearly view background maps and check work on the vibrant color graphic display for greater data control and confidence. Use the full alphanumeric keyboard, or quickly select software options using the touch screen.

The unique TSC2 controller changeable cap enables the use of removable memory or third-party media, such as GPRS, GPS, camera, and product scanner functions. Extend your data logging capabilities and experience a major leap in productivity.

INDUSTRY-LEADING COMMUNICATION TECHNOLOGIES

Eliminate cable hassles and expedite setup with integrated Bluetooth® wireless technology. When the TSC2 controller is used with a Trimble R8 or 5800 GPS system, the rover is 100% cable free for unsurpassed convenience and ease of use. The internal 2.4 GHz radio option is ideal for use with a robotic system such as the Trimble S6 total station.

Using the expandable media function, a GSM/GPRS modem can add full wireless communication to the Internet in the field.

Transfer data in your office over a wireless 802.11 LAN—again, no cables are required. You can also use hotspots to quickly and securely share data with your office from remote locations.

FLEXIBLE COMMUNICATION OPTIONS

Choose the method of data transfer that suits your situation. Using an external modem such as a cell phone with Bluetooth, send and receive files over the Internet from the field: you don't need to drive back to the office. In the office, internal 802.11 technology provides wireless connection to your network. The TSC2 controller also provides USB and serial RS232 communication options; data can be transferred to a PC or another TSC2 controller using a cable, Bluetooth, CompactFlash, or Secure Digital memory card media.

BUILT FOR THE FIELD FOR ANY CONDITIONS

The TSC2 controller is rugged enough for any job in any weather. It holds an environmental rating of IP67 and operates in extreme temperatures of –30 °C to +60 °C (–22 °F to +140 °F). It can also withstand a pole drop of 1.22 m (4.0 ft) onto a hard surface[3]. The display is illuminated, so you can finish any job fast even in low lighting. The TSC2 controller receives power from an ultra-long-life lithium-ion battery that gives up to 30 hours[4] of power.

ONE CONTROLLER, ONE SOFTWARE, ONE INTERFACE

The TSC2 controller is central to Integrated Surveying™ from Trimble. With an application such as the Trimble Survey Controller™ software onboard, collect and manage both GPS and optical data in one Job file simply by switching the TSC2 controller between sensors. Standardize on one flexible controller for maximized investment. And your survey team only needs to know one interface. When field work is complete, simply transfer the Job file to your office using the communication method that suits your needs.

1 *The TSC2 controller is designed to support Trimble's latest surveying systems, including the Trimble S6 Total Station and Trimble R8 GPS system.*
2 *The TSC2 controller runs the Trimble Survey Controller software. In addition, a number of regional solutions are available. For more information, please contact your local Trimble authorized distribution partner.*
3 *26 drops of 1.22 m (4.0 ft) onto a hard surface.*
4 *Under normal operating conditions: no backlight, moderate temperature, no high power consumption CF cards.*

Trimble

TRIMBLE TSC2 CONTROLLER

TECHNICAL SPECIFICATIONS

STANDARD SOFTWARE

Microsoft Windows Mobile 5.0 software programs including:

- Internet Explorer
- File Explorer
- Word Mobile
- Power Point Mobile
- Excel Mobile
- Outlook Mobile
- Windows Media® Player Mobile
- Microsoft ActiveSync® technology
- Microsoft Transcriber (handwriting recognition)
- Pictures, Picture&Videos, Calendar, Contacts, Tasks and Notes
- Online help

HARDWARE

Physical

Size .... 266 mm × 131 mm × 48 mm (10.5 in × 5.2 in × 1.9 in); 76 mm (3.0 in) at handgrip

Weight .... 0.95 kg (2.1 lb) including battery; 1.09 kg (2.4 lb) including battery and optional internal radio

Memory........................... 128 MB SDRAM, 512 MB internal non-volatile storage memory

Expandable Memory .... CompactFlash (CF) card
Secure Digital (SD) card

Processor........................ 520 MHz Intel® PXA 270 XScale CPU

Wireless........................... Integrated Wireless LAN 802.11b

Power .... Li-Ion rechargeable pack, 6600 mAh, battery life of 30 hours under normal operating conditions[5]. Fast charge to 80% in 2 hours; full charge in 4.5 hours. Battery charge status LED indicator.

Software....................... The Trimble TSC2 controller runs the Trimble Survey Controller field software. In addition, a number of regional solutions are available. For more information on the field software that's best for you, contact your local Trimble authorized distribution partner.

CERTIFICATION

Class B Part 15 FCC certification, CE Mark approval and C-tick approval. Bluetooth type approvals and regulations are country specific.

ENVIRONMENTAL

Temperature

Operating Temperature........ -30 °C to +60 °C (-22 °F to +140 °F)

Storage Temperature .... -40 °C to +70 °C (-40 °F to +158 °F)

Humidity............. 100% condensing, MIL-STD-810F, Method 507.4

Sand & Dust .... Protection against wind-driven according to MIL-STD-810F, and IP6X

Water .... Waterproof IPX7

Drops................ 26 drops from 1.22 m (4.0 ft) onto hard surface

Vibration....... MIL-STD-810F, Method 514.5, Procedure I, Fig. 17 & 18

Altitude............ MIL-STD-810F, Method 500.4, Procedures I, II & III, 4572 m (15,000 ft) at +23 °C (+73 °F)

INTERFACE

Display......... Color, illuminated TFT, daylight-readable touch screen displayed at 320 × 240 pixels (QVGA), backlight illuminated display.

Keyboard .... 53 key alphanumeric keypad, 8-position spider key

Audio .... Integrated speaker and microphone for audio system events, warnings and notifications.

Operating system.................... Microsoft Windows Mobile 5.0

INPUT/ OUTPUT

Ports .... RS232 9-pin serial port
USB Client
USB Host
DC Power Port

Expansion .... 1 × Type I CompactFlash (CF) slot
1 × Type II CompactFlash (CF) slot
1 × Secure Data (SD) memory card slot

Radio-modem (optional).......... Internal 2.4 GHz frequency-hopping spread-spectrum radio-modem

RECYCLING INFORMATION

For product recycling instructions and more information, please go to www.trimble.com/environment/summary.html.

5. No backlight, moderate temperature, no high power-consumption CompactFlash cards.

Specifications subject to change without notice

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TSCe Controller

The flexible data collector of choice

The TSCe™ controller is a rugged and adaptable handheld data collector. Running powerful Trimble field software on a Microsoft® Windows® operating system, TSCe provides exceptional control of Trimble GPS and optical sensors, whatever your surveying or construction application.

Exceptional in the field even in extreme temperatures

The TSCe controller is the rugged data-collection solution that fits comfortably in your hand and in your field processes. And because it's designed to take the knocks and drops of the surveying and construction environment, the TSCe controller's ruggedness makes it a reliable and dependable member of your field crew. When you're out working long days, TSCe will keep on working right there with you.

In extremely cold temperatures, TSCe is more robust than ever before. With its new color touch screen, TSCe will easily operate in temperatures as low as -25 °C without the addition of an internal heater.

Full keyboard and touch screen

On the TSCe controller you can choose to drive your data collection software using the full alphanumeric keyboard, or via the easy-to-use color touch screen–TSCe enables you to use the method or method combination that provides you with the most efficient data control.

The instant results of the touch screen offer complete control over data and make light work of navigation, data selection, positioning, and stakeout.

Color graphic display

The color graphic display of the TSCe controller is clearly readable in a wide range of field conditions. The display's reflective LCD technology makes it easy to read in bright sunlight, and it is front lit for when light levels are low, such as on dark winter days.

The color display makes not only simple text easier to read, but also complex maps and technical drawings. Having these graphics in colour right at your fingertips makes navigating and positioning much easier, and speeds up stakeout and data selection. Data management and quality assurance are also greatly improved. Because you can thoroughly check your data in the field, errors and omissions are minimized.

Large memory capacity

The TSCe controller comes with 512 MB of CompactFlash memory as standard. This large storage capacity means that you can work with larger data files and background maps, and that you can work for longer in the field without backup storage.

Adaptable

The TSCe controller is designed to operate with all your Trimble sensors, including the Trimble® R7 and R8 GPS receivers with R-track technology, the 5700 and 5800 GPS receivers, and the 3600 and 5600 total stations. It also supports many major third-party total stations. In addition, when the Trimble BlueCap module is used, Bluetooth® wireless technology provides cable-free communication with the Trimble R8 and 5800 GPS systems.

TSCe Applications

- Exceptional in the field even in extreme temperatures
- Full keyboard and touch screen
- Color graphic display
- Large memory capacity
- Adaptable

Trimble

TSCe Controller

The flexible data collector of choice

Specifications

Power	Internal 3800 mAh NiMH rechargeable battery pack Battery life of 30 hours under normal operating conditions Complete recharge in under three hours
Size	25.8 cm (10.2 in) × 13 cm (5.1 in) × 5.2 cm (2.1 in) 7.4 cm (2.9 in) at handgrip
Weight	990 gm (2.2 lb) including battery
Certification	FCC class B, CE Mark, CSA, and C-tick approval
Serial Port I/O	9-pin serial port–RS232 (115 kB/s), COM1 with 5 V (250 mA) on pin 9
MultiPort I/O	26-pin MultiPort–RS232, COM2, Ethernet 10BaseT, USB client, power in/out and audio in/out 0-Shell Lemo RS-232 (115 kB/s)
Processor	Intel StrongARM SA-1110 @ 206 MHz
Memory	512 MB non-volatile flash disk; 64 MB SDRAM
Display	320 × 240 pixels (¼ VGA) reflective color TFT, frontlight illuminated display
Touch Screen	Passive touch screen, works with stylus or finger
Keyboard	57-key tactile action with separate navigation, alpha and numeric keypads
Audio	Integrated speaker and microphone

Environmental

Temperature:	
Operating	-25 °C to 60 °C (-13 °F to 140 °F)
Storage	-30 °C to 60 °C (-22 °F to 140 °F)
Water	ICE 529, IP 67, sealed against temporary immersion
Drop	1.22 m (4 ft) to concrete on all faces, edges and corners
Sand and Dust	ICE 529, IP 6X and MIL-STD-810E, Method 510.3
Vibration	MIL-STD-810E, I-3.4.9 category 10, Fig 16 and 17
Altitude	MIL-STD-810E, Method 500.3

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Trimble

DATA SHEET

TRIMMARK 3 RADIO MODEM

KEY FEATURES

Versatile: Use as base, repeater or rover

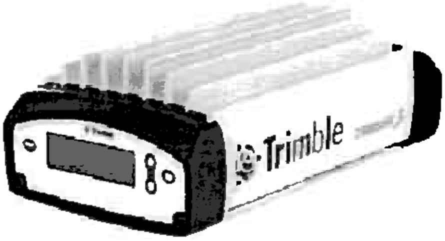
Flexible: 2 W, 10 W, or 25 W power output

Channel spacing programmable at 12.5 kHz or 25 kHz

Easy to use and configure

Built-in channel selector and monitor

Rugged and weatherproof



RUGGED AND VERSATILE MULTICHANNEL RADIO MODEM

The TRIMMARK™ 3 radio modem provides a convenient, versatile means of establishing a robust wireless data broadcast network for real-time, high-precision GPS survey and telemetry applications.

The rugged, compact TRIMMARK 3 radio modem is designed for use in tough environments and in a variety of situations. The single unit is usable as a base station, repeater station, or rover receiver for maximum versatility. However you use it, you'll appreciate its simplicity and famous Trimble reliability and quality.

SELECT THE POWER YOU NEED

The TRIMMARK 3 radio modem provides selectable power outputs of 2 W, 10 W, or 25 W to support both short and long-range operations, conserve battery life and minimize risk of interference with other systems.

A 25 W base unit broadcasts up to 15 km (8 miles) line-of-sight, under optimal conditions. Path obstructions and terrain can reduce the typical effective range to 10 km to 12 km (6 miles to 7 miles). One or two additional units can be networked as repeater stations to extend range, minimize base station moves, and provide seamless coverage around local obstacles such as large buildings or hills. The typical range of a 2 W repeater is 5 km to 8 km (3 miles to 5 miles).

A TRIMMARK 3 radio modem broadcasts or repeats data to Trimble survey-grade GPS receivers, such as the Trimble R8, 5800, Trimble R7, and 5700, that either contain an internal radio modem or are being used with an external rover radio. The TRIMMARK 3 is fully backward compatible with the TRIMMARK IIe radio modem, so it can be used in both new and existing systems.

CONFIGURE IT TO YOUR NEEDS

The TRIMMARK 3 radio modem can be configured completely and easily in the office by using the supplied WinFLASH utility on your computer. Many functions also can be configured in the field from the front panel or from the Trimble Survey Controller™ software used with your GPS survey receivers. The serial port communication settings are easily set to match the default settings on the GPS receiver.

You can configure each broadcast network to operate on one of up to 20 programmed channels via a built-in channel selector. Channel spacing of either 12.5 kHz or 25 kHz is programmable at the factory or by a service provider.

To reduce the risk of interference in a congested RF environment, you can use the built-in audio speaker to monitor activity on the selected channel. The unit also can automatically monitor the channel using its software selectable carrier detect function to detect other users on the channel before transmitting.

The TRIMMARK 3 radio modem is available as a stand-alone product as well as in convenient base and repeater equipment sets. Available in three frequency bands, the TRIMMARK 3 radio modem is designed to meet the licensing requirements of many countries around the world.

Trimble

TRIMMARK 3 RADIO MODEM

STANDARD FEATURES

- Selectable 20-channel capacity
- Rugged weatherproof construction
- Configurable from front panel, survey controller, or from supplied WinFLASH utility on your computer
- Up to 15 km line-of-sight range
- Same unit can function as base station, repeater station, or rover receiver
- Selectable power outputs of 2 W, 10 W, or 25 W
- Programmable channel spacing of 12.5 kHz or 25 kHz
- Built-in channel selector
- Supports up to two repeaters in a network
- 4800, 9600 and 19200 baud rate over the air
- Retrievable/storable radio diagnostic information

TRIMMARK 3 BASE/REPEATER

Physical

Size . . . . 12.5 cm W x 22.9 cm D x 7.9 cm H (4.9" W x 9.0" D x 3.1" H)
Weight . . . . 1.59 kg (3.5 lb)

Electrical

Power:
Input . . . . 12 V DC to 16 V DC, nominal
Connectors:
Power . . . . 2-pin LEMO (+VDC, GND)
Data . . . . 7-pin female LEMO (supports RXD, TXD and SGND)
Antenna . . . . TNC female

Environmental

Temperature:
Operating . . . . –40 °C to +65 °C (–40 °F to +149 °F)
Storage . . . . –55 °C to +75 °C (–67 °F to +167 °F)
Humidity . . . . 100%, fully sealed, weatherproof

TECHNICAL SPECIFICATIONS

Transmit Power[1] . . . . 2 W, 10 W, 25 W
Wireless Data Rate . . . . 4800 bps, 9600 bps, 19200 bps
Frequency Bands . . . . 410–420 MHz, 430–450 MHz, or 450–470 MHz (Only one band per radio modem)
Channel Spacing . . . . 12.5 kHz or 25 kHz (Only one spacing per radio modem)
Number of Channels[2] . . . . . . Can be ordered with up to 20 programmed frequencies, internally stored
RF Modulation Format . . . . Gaussian Minimum Shift Keying (GMSK)

Range (typical)[3]

25 W Base . . . . 10 km to 12 km (6 miles to 7 miles)
2 W Repeater . . . . 5 km to 8 km (3 miles to 5 miles)

Power Consumption[4]	Voltage	Current	Nominal Load
2 W mode	12.6 V	0.8 A	~10 W
10 W mode	12.6 V	3.6 A	~45 W
25 W mode	12.6 V	8.0 A	~75 W

Serial Port . . . . One set of RS-232 signals available. Data is 8 bits with selectable parity and 1 stop bit. Supported data rates are 9600 bps, 19200 bps, and 38400 bps[5]

ANTENNA PHYSICAL SPECIFICATIONS	LENGTH (TYPICAL)	WEIGHT
Standard antenna		
0 dB UHF omni whip	47 cm (18.5 in)	0.5 kg (1.1 lb)
5 dB UHF omni whip	99 cm (39 in)	0.5 kg (1.1 lb)

1. Radios are configured as 25 W units at the factory.
2. Use the same frequency for all radio modems in the same wireless data network.
3. Varies with terrain and operational conditions. Up to 2 repeaters can be used to extend range.
4. Power consumption and battery life depend on the broadcast information content and wireless data rate (e.g., CMR versus RTCM SC-104 Ver 2.x packets at 1 Hz epoch rates).
5. Communications rate between the radio and GPS receiver, not wireless rate.

Specifications subject to change without notice.

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APPENDIX E - REFERENCES

Trimble Navigation,2000. *Mapping Systems Manual*

Telford, W.M., Geldhart, L.P., and Sheriff, R.E. 1990. *Applied Geophysics, 2nd Edition*, NY: Cambridge University Press

Appendix G

APPENDIX G

Interpretation Report - 2006 UTEM Survey
Espedalen Norway
for A/S Sulfidmalm,

Robert Langridge, Lamontagne Geophysics Ltd.

LAMONTAGNE GEOPHYSICS LTD.
GEOPHYSIQUE LTEE.

-Interpretation Report-
2006 UTEM Survey
Espedalen
Norway
for
A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

April, 2006

Rob Langridge, M.Sc.

CONTENTS

Figures

Appendices

INTRODUCTION

During the period of February 17th 2006 through April 04th 2006 a UTEM/BHUTEM-3 survey was carried out by Lamontagne Geophysics Limited personnel for A/S Sulfidmalm in the area of Espedalen, Norway (Figure 1). This survey continues on from 2003/2004/2005 UTEM 3 surveys (Loops 01-04, Loops 05-18 and Loops 19-29 respectively). The location of the property is shown in Figures 1 and 2. The survey was carried out to locate/detail conductors in the immediate grid areas with the intention of outlining targets for future work and for drilling.

A total of 61.725km of surface UTEM data was collected using 8 transmitter loops (Loops 30-37). All lines were surveyed measuring the vertical component, Hz. A station spacing of 25m (50m beyond 1000m out from the loop) and a line spacing of 200m was employed with detailing lines at closer intervals as required.

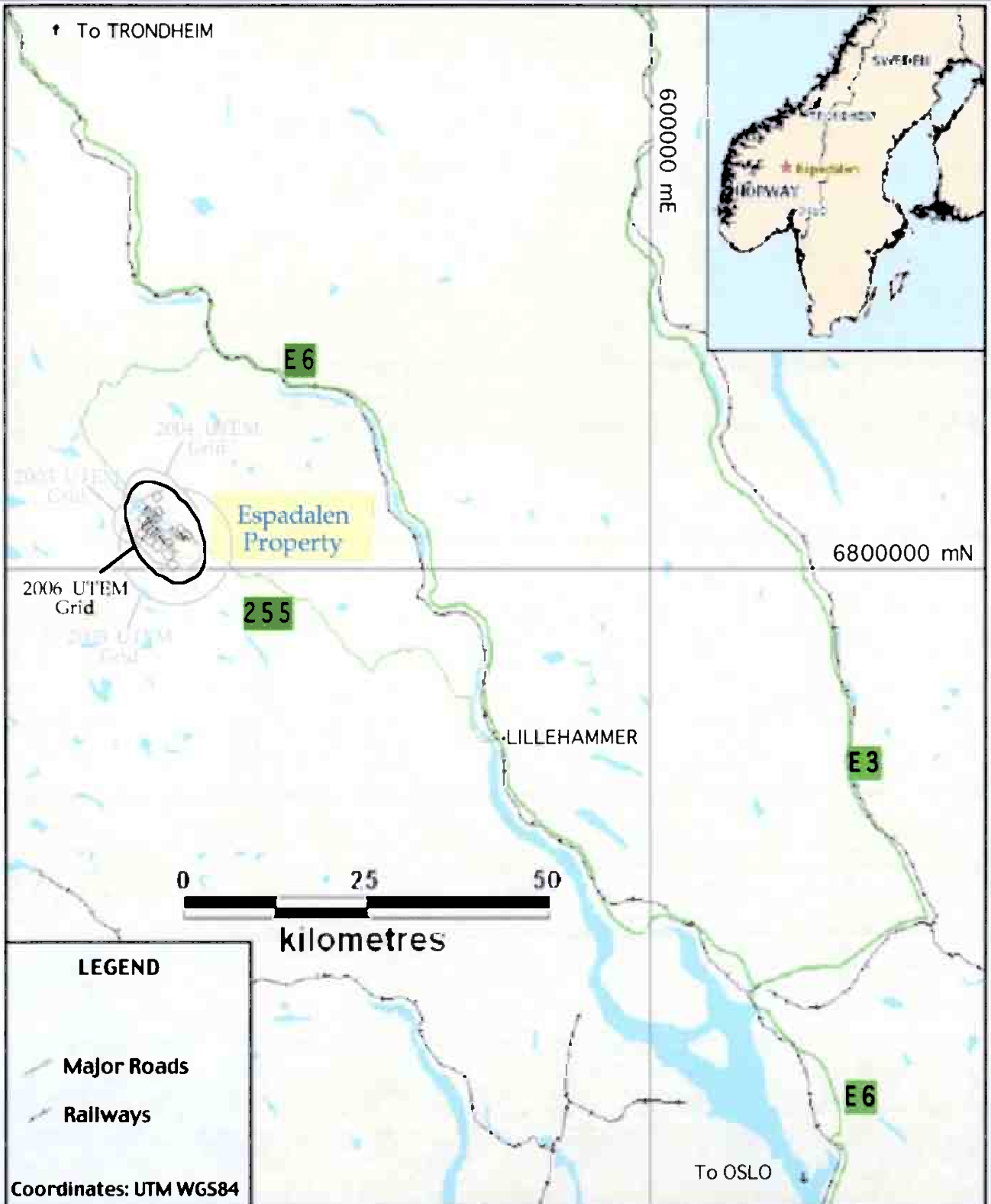
In addition to the surface UTEM a total of 21 holes were surveyed with BHUTEM-3. This included 2 holes drilled in 2004, 14 holes drilled in 2005 and 5 holes drilled in 2006. Six additional loops were required to complete the BHUTEM-3 surveying:

- Loop B41 - to survey	Jorstad	holes ES2004-14/15 and ES2005-41
- Loop B35 - to survey	Trona	hole ES2005-35
- Loop B36 - to survey	Storgruva ext.	holes ES2005-36/37
	Graho	hole ES2005-39
	Grahoin	hole ES2005-40
- Loop B38 - to survey	Graho saddle	hole ES2005-38
- Loop B42 - to survey	Vesle	holes ES2005-42/43/44
- Loop 20b - to survey	Stormyra	holes ES2006-51/52/53/54/55

For all loops - both surface UTEM and BHUTEM-3 - the receiver operated in 10-channel mode at a transmitter frequency of 3.251Hz.

This report documents the UTEM/BHUTEM survey in terms of logistics, survey parameters and field personnel. Appendix A contains the data presented in profile form. Other appendices contain:

- List of Personnel/Production Diary (Appendix B)
- an outline of the UTEM System (Appendix C)
- Note on sources of anomalous Ch1 (Appendix D)
- Note on 4Hz UTEM Data (Appendix E)



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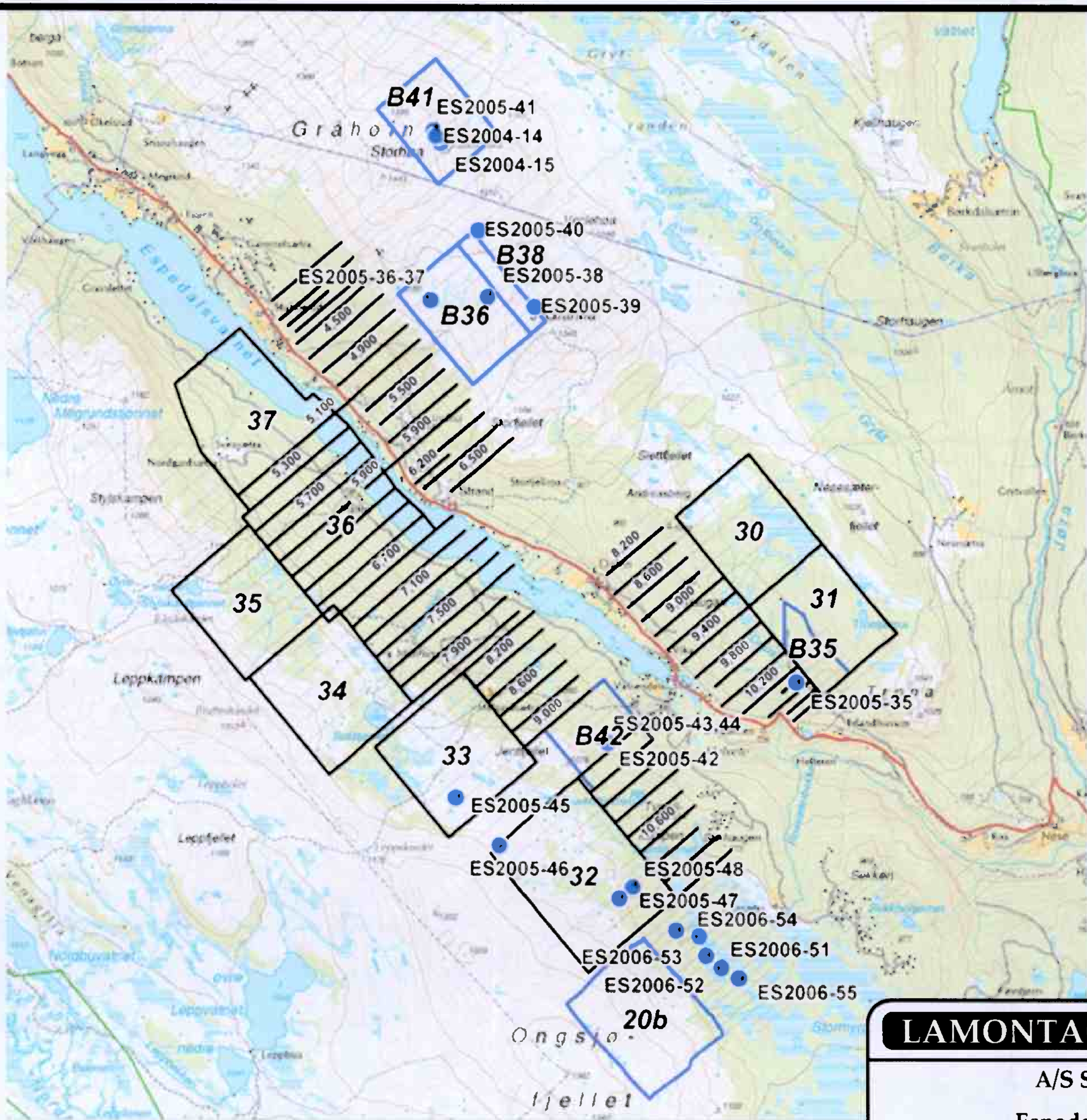
A/S Sulfidmalm

Espedalen, Norway

UTEM Survey Location Map

Figure 1



LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

A/S Sulfidmalm

Espedalen, Norway

Idealized Grid Map

0 500 2500m

Figure 2

SURVEY DESIGN

This UTEM survey is part of a nickel exploration program in the Espedalen area. Historically mining of Ni-bearing massive sulfide deposits has been carried out in the area. The UTEM survey was planned and carried out to outline and allow better definition of known conductors, to detect/outline new conductors and to detect/outline deeper features and depth continuations of known features.

The grid and loop layout was designed by A/S Sulfidmalm/Falconbridge Ltd. personnel to allow efficient coverage of the area. Loop size and locations were selected to provide good coupling with the expected targets and to allow efficient coverage of the grid area. The base frequency was lowered from the international standard ~26Hz to 3.251Hz to eliminate the response of many "moderate" conductors - these responses will have decayed away by Ch1 time. Any remaining Ch1 responses are then considered to be representative of conductors of an appreciably higher conductivity.

The survey parameters employed:

- outside-the-loop coverage with 2 receivers
- variable transmitter loop size - to fit the area to be covered and the relief
- 1.70mm diameter (~2mm^2 ~14-gauge) copper wire - DAMID PE GR 2
- line spacing of 200m with detailing lines at 100m intervals or as required
- station interval of 25m reduced to 12.5m in anomalous areas. At ~1000m from the loop the station spacing was changed to 50m.
- Hz (vertical component measurements)
- BHUTEM-3 coverage of selected boreholes @5m, 4/2/1m in zones of interest
- 10-channel data at a frequency of 3.251Hz
- minimum 256 stacking (512 half-cycles) increased where noise levels dictate

In nickel exploration non-decaying Channel 1 (Ch1) conductors are indicative of highly conductive mineralization. Any non-decaying anomalous Ch1 features are therefore of interest. Non-decaying channel UTEM anomalies can reflect:

i) the presence of conductive mineralization
ii) the presence of a magnetic anomaly
iii) poor geometric control - either station location or loop location

These are outlined in more detail in Appendix D. From an interpretation standpoint magnetic anomalies and geometric control should be considered and evaluated as a mandatory part of any interpretation. From a field standpoint precise geometric control should be part of any UTEM survey where the target is non-decaying. Poor geometric control has the potential to both mask and invent Ch1 conductors.

For this survey GPS data was collected by the client and made available for use in reducing the UTEM data. GPS data was collected for all survey points and at intervals around all transmitter loops. GPS data collection for UTEM reduction should be most detailed along loop fronts - the most important portion of the loop from a UTEM reduction perspective. The goal along the loop front - and loop sides/back - is to recover the topographic shape of the loop as well as the loop/line intersection points.

SURVEY LOGISTICS

A Lamontagne Geophysics crew mobilized from Canada on February 15th and arrived in Oslo on February 16th. The crew consisted of Rob Langridge (geophysicist/crew chief), Ryan Land (operator) and Bud Evans (looper). The crew met up with client representative Yannick Beaudoin and drove to the base of operations for the Espedalen survey - Strand Fjellstue (Figure 1 - www.strand-fjellstue.no). The equipment arrived by truck in the late evening of the same day. Unpacking/loop laying was carried out the following day and surveying began on February 18th.

Eight transmitter loops were used during the surface UTEM survey for a total survey coverage of 61.725km. Loop numbering began at Loop 30 - following along with the loop numbering in the 2003 and 2004 UTEM surveys. Six additional loops were required to complete the BHUTEM surveying:

- Loop B41 - to survey	Jorstad	holes ES2004-14/15 and ES2005-41
- Loop B35 - to survey	Trona	hole ES2005-35
- Loop B36 - to survey	Storgruva ext.	holes ES2005-36/37
	Graho	hole ES2005-39
	Grahoin	hole ES2005-40
- Loop B38 - to survey	Graho saddle	hole ES2005-38
- Loop B42 - to survey	Vesle	holes ES2005-42/43/44
- Loop 20b - to survey	Stormyra	holes ES2006-51/52/53/54/55

Figure 2 shows the loop locations and grid layout. Access to the grid was by snowmobile along a series of pre-existing trails used for accessing the area by skiers/hikers etc. Some ares were accessed by road. The grid/loop positions had been established by GPS and were demarcated by bamboo wands and flagging.

Surveying began with Loop 32. The UTEM equipment. was moved out to the loop along with the new generator -NORGESAGGREGATET 2200B. The generator was tested and adjusted - a higher throttle setting was required to prevent an oscillation. The generator required only minor adjustments over the next few weeks - and liberal use of "rod spirit" (gas-line antifreeze). Electrical connection to the generator was made through an LGL isolation-transformer/Variac combination wired to conform with the generator sockets (standard 2-pin/side-clip ground european). For all but a few nights the transmitter was connected to a battery, switched to remote, packed up against drifting snow and left in the field. This worked well for the duration of the survey.

In general surface and borehole surveying for all loops went well. Noise levels proved to be high and in places, along certain geologic structures, extremely high. This likely indicates channeling telluric currents along conductive features in the relatively-resistive host rock. The newly-purchased heavier-gauge copper wire worked well - no doubling of loop sides was required as in past surveys.

The UTEM surveying this year encountered the powerline and phoneline that parallel Road 255. In general crossing the powerlines required additional stacking and the profiles from Loops 30/31/36/37 (Appendix A) show responses and become noisier in the vicinity of the cultural features. The noise is particularly evident on the earlier channels - Ch10-5 - as the channel width is too narrow to allow the 50Hz powerline transmission to be adequately stacked out (Appendix E).

The final surface UTEM data was collected March 13th. Work continued on other projects and BHUTEM surveying until the final 2006 borehole was available. During this period individual crew demobilized to Canada as soon as they were no longer required. The final BHUTEM surveying was completed on April 3rd and all remaining wire was picked up on April 4th. The survey was declared completed and the equipment was packed for shipping and delivered to Roadfeeders @ Oslo Gardemoen Airport on April 5th. The remaining crew (Rob Langridge) demobilized to Canada - with a delay due to an SAS strike. Details of the daily production and personnel are included in the Production Diary (Appendix B) along with a summary of production.

The survey equipment consisted of two UTEM 3 receivers, the requisite BHUTEM-3 equipment and one UTEM 3 transmitter as well as all necessary accessories, support equipment and backup equipment. Data was reduced on a field computer (Macintosh) and UTEM profiles and digital data were made available/emailed to the client's personnel on a daily basis. Snowshoes equipped with crampons were obtained for the survey. In some area stiff boots - insulated if possible - are recommended.

Particular care was taken during the survey not to leave anything on the site. In practice the UTEM operators worked with coilers when personnel were available. As most of the work in this field season was done uphill-to-downhill coilers were used more extensively than in previous years. Where survey conditions allowed - where the topography was more gentle - the coiler could be freed up to facilitate looping and picket retrieval. The weather conditions were generally good for surveying - cold nights and pleasant days. The snow conditions were generally good.

SURVEY RESULTS

The results of the survey are summarized and presented as UTEM profiles in Appendix A. The final grid and Loop Locations are presented in Figures 2. Overall the data quality is good - though in places it is noisy. A number of conductors and/or conductive features are evident. Although every effort was taken to shelter the receiver coil minor wind noise may be evident in some profiles.

Surface profiles are listed by Loop number and presented as 3-axis profiles in the following order:

Hz	**continuous norm**	***Ch1 reduced***	**(blue separator)**
Hz	**point normalized**	***Ch1 reduced***	**(pink separator)**

BHUTEM3 profiles follow in order of Hole number by area. The following plots are presented for a borehole:

3-axis plot

total field plot

plan vectorplot

gridnorth-south section vectorplot

A description of the standard plotting formats used and of the UTEM System is presented in Appendix C.

Outline of surface profile types

Hz continuous norm *Ch1 reduced* **(blue separator)**

Continuous normalization is useful for detection of the presence of anomalies at any position on a profile. The anomaly shape is distorted by the normalization to the local field. As the field gets very big near the wire the continuously normalized Ch1 tends towards zero.

top axis - Ch5-10
middle axis - Ch2-5
bottom axis - Ch1
bottom axis - topography - no vertical exaggeration

Hz point normalized *Ch1 reduced* **(pink separator)**

normalization point: all data~300m out from the loop-front centre

Point normalized data is useful for interpretation purposes. Anomaly shape is preserved as is the amplitude if the normalization point is local to the anomaly.

All data has been point normalized to a the field at a point ~300m out from the centre of the loop front. Note that this field value is intermediate and it was chosen because the Espedalen surveys have been roughly half inside-the-loop and half off-loop. Normalizing to an intermediate point allows the interpretation of responses along the entire line. The amplitude of responses close to (**further from**) the loop front will be blown up (**muted**).
Note: Typically the normalization point for off-loop profiles is 4-500m out from the centre of the loop front and for inside-the-loop profiles it is the loop centre.

The disadvantage of point normalization is that small errors in location near the wire and in current tend to appear as large errors in Ch1. If the loop/station locations and the current are accurately known then point normalized Ch1 (in the absence of a local conductor) will tend to be continuous approaching the wire - unlike the continuously normalized Ch1 which, as described above, will dip to zero.

top axis - Ch5-10
middle axis - Ch2-5
bottom axis - Ch1
bottom axis - topography - no vertical exaggeration

Note: In areas near powerlines channels 4 and higher (earlier times) are quite noisy. In this instance - Loop 29 for instance on this survey - the axis are presented as follows:

top axis - Ch4-10
middle axis - Ch2-3
bottom axis - Ch1
bottom axis - topography - no vertical exaggeration

Outline of BHUTEM-3 plot types

3-axis plot - **secondary field**
total field plot - **total field**

Both continuously normalized secondary and total field plots are presented for each borehole surveyed. Note that for reference the primary field is plotted on all BHUTEM profiles. The axes on the **3-axis plot** contain:

top axis - Ch5-10
middle axis - Ch2-5
bottom axis - Ch1 + primary field

The axis on the **total field plot** contains:

axis - Ch1-10 + primary field

plan and gridnorth-south section vectorplots

Plan and gridnorth-south section vectorplots are included for each borehole surveyed. Vectorplots are useful in both planning loop locations and in evaluating profiles - particularly in areas of high relief. Vectorplots show the primary field local to the borehole - allowing the coupling to be evaluated.

Discussion of the Grid

The profiles presented in Appendix A have been reduced with a grid produced from the GPS data collected by the client. The overall results are quite good (Appendix A). Some of the character in Ch1 profiles is due to remaining errors in loop/line location - this is particularly true near the loop wire where errors in station/loop location/elevation have a larger effect (Appendix D). Aside from survey accuracy and day-to-day variation sources of error in location include "adjustments" of the loop to topography and wind.

Discussion of Results

A number of responses of interest can be seen on the profiles. An interpretation is presented in two figures:

Figures 3 Interpreted Features
Figures 4 Interpretation

Features outlined are mainly contacts, shallow conductors and thin conductive zones - geological units and structural features. A series of small but interesting conductors have been outlined - for the most part these have been modeled in-house by Falconbridge, however, a number were selected for modeling using MultiLoop. The details of these conductors and the MultiLoop modeling are presented in the Interpretation section.
Note: Conductors are designated by **ESP**edalen, loop number and conductor number. For example: **ESP-30-24** designates **ESP**edalen-Loop **30**-Conductor **24**. The 2003/04/05 surveys outlined Conductor 01-24. Note that the two conductors outlined in the 2003 report as **Conductor A** and **B** become:

- **Conductor A** = **ESP-04-01** and **Conductor B** = **ESP-02-02**

Note that character on the Ch1 profiles may reflect one or a combination of (see Appendix D):

- local magnetics
- conductive features
- poor geometric control

Ch1 responses - spikes and broader features - should be checked against magnetics and rechecked against geometry. The character of the Ch1 profiles suggests that geometric control is quite good. Stations affected by poor geometry are close to the loop.

A number of points can be said about the results in general:

- The pattern of responses outlined in Figure 3 generally fits with the map pattern of the geological mapping, contoured airborne magnetics and confirms the results of the airborne EM survey. Features are continuous over sections of the grid. Note: Some breaks or offsetting of weaker features occurs at the boundary between the area covered by one loop and the adjacent loop. This reflects the different coupling from the two loops.

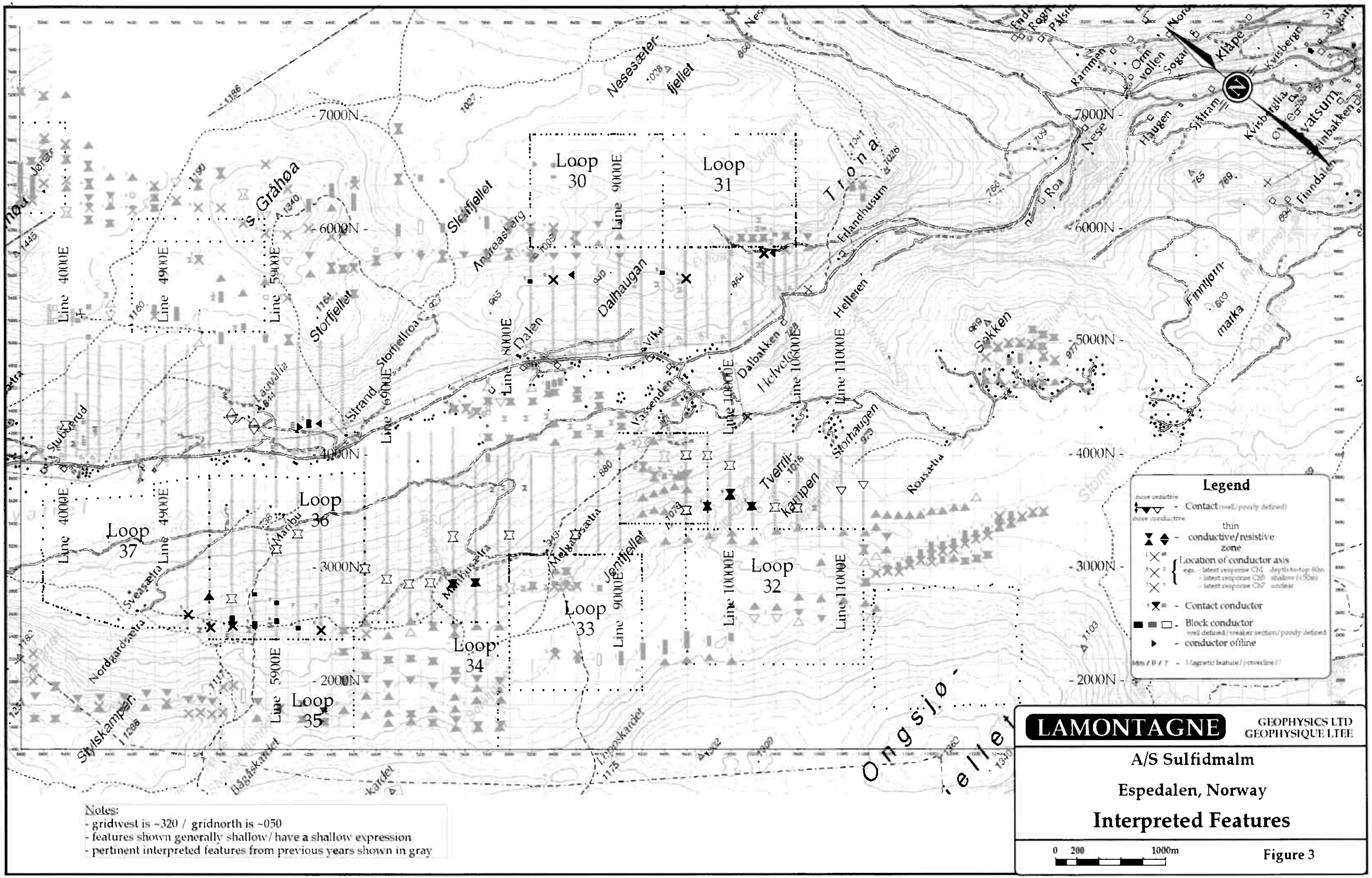
- Response of interest are typically in the Ch7-3 range, in places to Ch2. No clear Ch1 responses were detected. Responses reflect shallow features or features that have a shallow expression - possibly minor mineralization. Many features outlined in Figures 3/4 represent contacts, shallow conductors and thin conductive zones - geological units and structural features.

- The UTEM survey coverage was designed in part to follow up on conductive features detected by the airborne EM survey. The responses outlined by the UTEM survey outline features at a suitable depth - shallow - and sufficient conductivity - to UTEM Ch5-3 - to confirm the results of the airborne EM survey. Typically the airborne detects the updip edge (shallowest expression) of a feature.

- There is generally a good correlation between the airborne magnetics and the Ch1 profiles. Note that the correlation is not expected to be exact (Appendix D). Note that Ch1 responses may represent features small enough or poorly-located (steep/sharp terrain) that they may not be reflected in the airborne survey data.

- Overall the background response seen in the profiles indicates a resistive area. The background response is modeled in MultiLoop with a laterally-extensive layer (~15-30S) at depth. Where the local response requires it another laterally extensive layer (~0.2-2S) is added at an intermediate depth.

- The profiles are in places fairly noisy - in particular the mid-to-late time channels. Some of this is wind noise but a good portion of it is geological noise - reflecting the character of the local mineralization - in places thin stringers of sulphides - and the lithology.



Loop 30
Loop 31
Loop 32
Loop 33
Loop 34
Loop 35
Loop 36
Loop 37
Line 4000E
Line 4900E
Line 5900E
Line 6900E
Line 8000E
Line 9000E
Line 10000E
Line 10600E
Line 11000E
7000N
6000N
5000N
4000N
3000N
2000N
Nesesæter-fjellet
S. Gråhøa
Storfjellet
Andreasberg
Dalhaugan
Dalen
Vika
Strand
Storfjellroa
Stubberud
Vassenden
Dalbakken
Helvete
Helleren
Trona
Erlandhusum
Storhaugen
Tverrli-kampen
Sekken
Finntjørn-matka
Roa
Nese
Haugen
Klape
Kvisberget
Vatsum
Finndalen
Rammen
Ormvollen
Sogali
Svesæta
Nordgardsætra
Styggkampen
Ongsjø
Jøtfjellet
Legend
Contact (well/poorly defined)
thin conductive/resistive zone
Location of conductor axis
Contact conductor
Block conductor
conductor offline
Magnetic feature / powerline / ?
Notes:
- gridwest is ~320 / gridnorth is ~050
- features shown generally shallow / have a shallow expression
- pertinent interpreted features from previous years shown in gray
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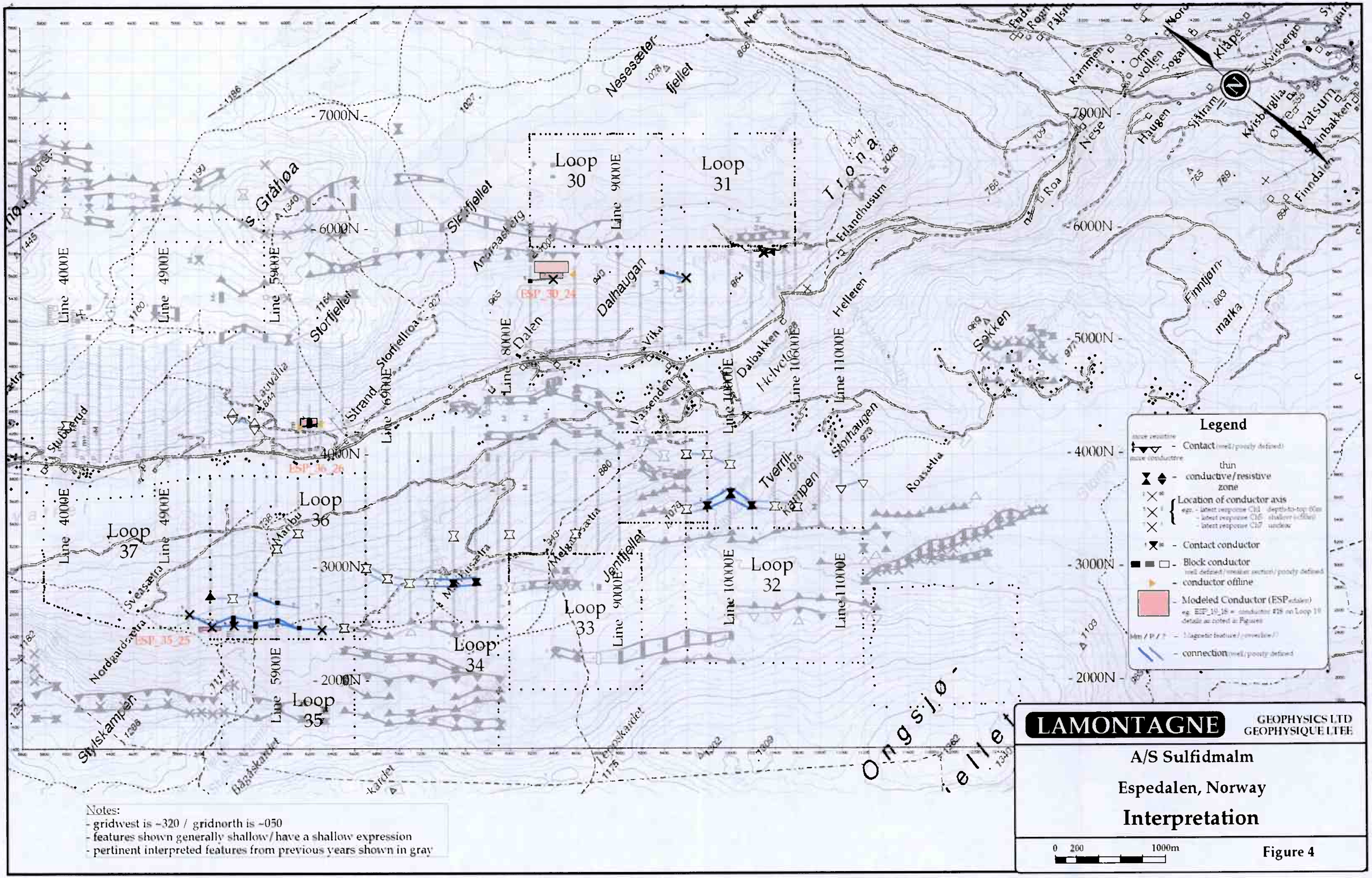
A/S Sulfidmalm
Espedalen, Norway
Interpreted Features
0 200 1000m
Figure 3


Legend
Contact (well/poorly defined)
thin conductive/resistive zone
Location of conductor axis
Contact conductor
Block conductor
conductor offline
Modeled Conductor (ESP)
connection (well/poorly defined)
Notes:
- gridwest is ~320 / gridnorth is ~050
- features shown generally shallow/have a shallow expression
- pertinent interpreted features from previous years shown in gray
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GEOPHYSIQUE LTEE
A/S Sulfidmalm
Espedalen, Norway
Interpretation
Figure 4

INTERPRETATION

An interpretation is presented in two figures:

Figures 3 Interpreted Features
Figures 4 Interpretation

Features outlined are mainly contacts, shallow conductors and thin conductive zones - geological units and structural features. A series of interesting small conductors have been outlined. The majority of the responses detected during the 2006 survey - including BHUTEM responses have been modeled in-house by Falconbridge geophysicist Tony Watts. Three were selected for modeling using MultiLoop. The details of these conductors and the MultiLoop modeling are presented in this Interpretation section.

The interpretation presented in this section is an interpretation of the UTEM data alone - with a passing reference to airborne magnetics and airborne EM anomaly maps. As such it should be evaluated in conjunction with other available information on the Espedalen property.

Note: Conductors are designated by **ESP**edalen, loop number and conductor number. For example: **ESP-20-24** designates **ESP**edalen-Loop **30**-Conductor **24**.

The 2003 and 2004 surveys outlined Conductor 01-17 as follows:

The two conductors outlined in the 2003 report as **Conductor A** and **B** become:

- **Conductor A = ESP-04-01**
- **Conductor B = ESP-02-02**

The 15 conductors outlined in the 2004 report are **Conductor 03-17**.

The 6 conductors outlined in the 2005 report are **Conductor 18-23**.

In general in the model figures significant conductors will be shown in black and other weaker conductors - modeling details of the local response - are shown in pale blue.

Several points about the interpretation in general:

- There is considerable similarity among the set of **Conductors** outlined by the combined 2003/2004/2006 UTEM surveys. As noted in the 2003 Report:
  - the main conductive zone(s) are modeled to be an enhancement along a conductive horizon..
  - noisy later channels noisy coincident with a **Conductor** suggests that sharp features - stringers of mineralization? - may be present.
- The models presented are not expected to match the drill results exactly. There are errors in depth estimates and dip angle (+/-5 to 10°). In particular note that the modeling of smaller zones at shallow depths will have relatively large errors.

A specific point about the interpretation:

- fewer conductors/conductive features were detected in 2006 than in previous years. This reflects the lower priority of the targets tested in 2006.

The responses chosen for discussion/modeling are as follows:

Conductor	**Figure #**	**Loop**	**Line #**	**~station**
ESP_30_24	Figure 5	Loop 30	Line 8400E	5575N
ESP_35_25	Figure 6	Loop 35	Line 5300E	2475N
ESP_36_26	Figure 7	Loop 36	Line 6200E	4250N

An interpretation of these features follows. Note: a general Legend for Figures 3 and 4 is enlarged and presented as Figure 8.

Conductor ESP_30_24 Lines 8400E ~5575N

Conductor ESP_30_24 was detected during surveying from Loop 30. Flanking Line 8200E shows a considerably weaker responses and the other flanking line (8600E) shows an off-line response. Note that **Conductor ESP_30_24** is located between 2004 **Conductor ESP_05_04** and **Conductors ESP_13_13/14_14**. The group may be related - along strike gaps may be due to the severe topography between **Conductor ESP_30_24** and **Conductor ESP_14_14**. The Loop 30 Line 8400E - to ~Ch4 - and this response was selected for MultiLoop modeling.

Modeling **Conductor ESP_30_24**: Loop 30 Line 8400E Figure 5

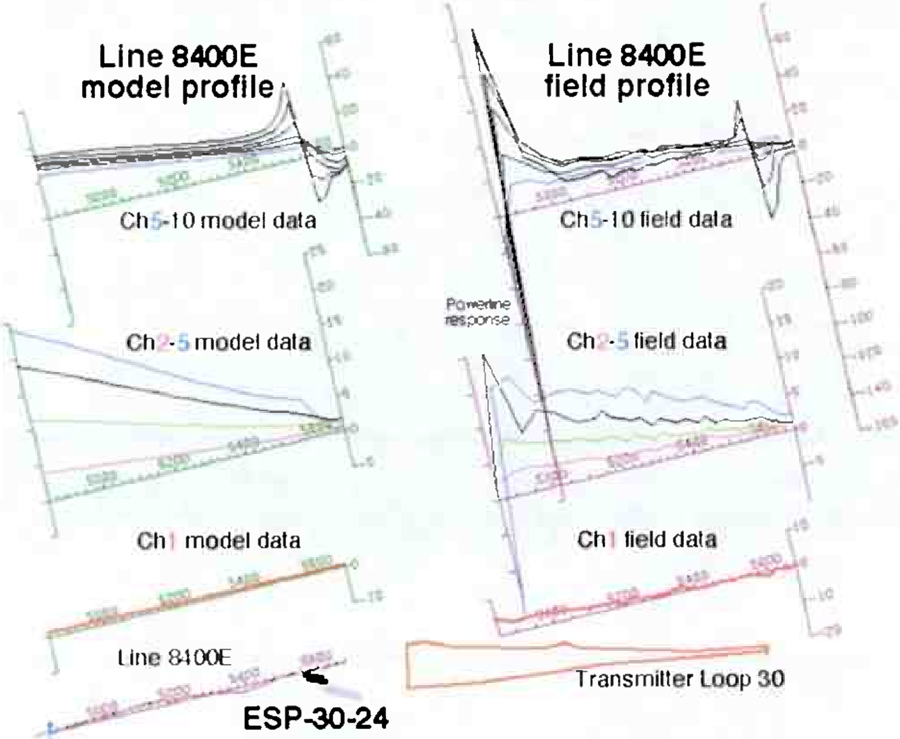
The modeling results for Loop 30 Lines 8400E are shown in Figure 5. The overall background response was modeled using a laterally extensive conductive layer at a depth of ~1200m and a weakly conductive layer at a depth of ~900m. The early time response (to Ch6) of **Conductor ESP_30_24** is very well modeled as a shallow short-strike length gently dipping conductor. Details of **ESP_30_24** as modeled as listed in Figure 5 are:

centre of conductor 8400E, 5590N, 904 m.a.s.l. (grid coords.)
local elevation ~927 m.a.s.l. giving ~23m depth-to-centre
strike/dip ~050/10° conductance 75S
along strike/downdip 200m/50m

There is also some character in this section of the profile on Ch5/4 that is difficult to model. With a single line of data and short-strike length conductors the source of the character may well be off to either side of the line. As a result the modeling results are shown on Figure 5 in grey. Details of grey conductor are as follows:

centre of conductor 8400E, 5663N, 867 m.a.s.l. (grid coords.)
local elevation ~946 m.a.s.l. giving ~79m depth-to-centre
strike/dip ~050/15° conductance 250S
along strike/downdip 300m/100m

Conductor ESP_30_24 is interpreted to be a small fair (<150S) possibly fair-to-good (150-400S) conductor. It should be evaluated in comparison with other known features in the Espedalen area - in particular **Conductors ESP_05_04** and **ESP_13_13/14_14**. Primary field coupling is ~not well coupled as modeled but the conductance is considered to be a reasonable estimate. Increasing the strike length of the modeled body would act to lower the conductance somewhat. If this conductor is to be drilled it is suggested that the initial target be the shallower of the two modeled plates



Conductor ESP_30_24 as modeled on Line 8400E

centre of conductor 8400E, 5590N, 904 m.a.s.l. (grid coords.)

local elevation ~927 m.a.s.l. giving ~23m depth-to-centre

strike/dip ~050/10° conductance 75S

along strike/downdip 200m/50m

centre of conductor 8400E, 5663N, 867 m.a.s.l. (grid coords.)

local elevation ~946 m.a.s.l. giving ~79m depth-to-centre

strike/dip ~050/15° conductance 250S

along strike/downdip 300m/100m

Notes:
- view is looking gridwest (~320)
- conductor as modeled is not well coupled.
- locations are listed in Grid coordinates - refer to GPS notes for UTM locations.
- the overall background response.in modeled by conductors (laterally extensive, centred under loop) at depth.

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ESP-30-24- Model Line 8400E

0 100 500m

Figure 5

Conductor ESP_35_25 Lines 5300E ~2475N

Conductor ESP_35_25 was detected during surveying from Loop 35 - the gridwestward extension of a feature outlined by 2005 UTEM in-loop surveying from Loop 23. The **Conductor ESP_35_25** response continues both:

- to the gridwest one line (no further coverage) - Line 5100E. Note that this line is slightly off to the side of the loop front. Off to the side of the loop the coupling is different..
- to the grideast Lines 5500E through 6500E and into the responses outlined from 2005 Loop 23 and possibly further grideast towards Stormyra.

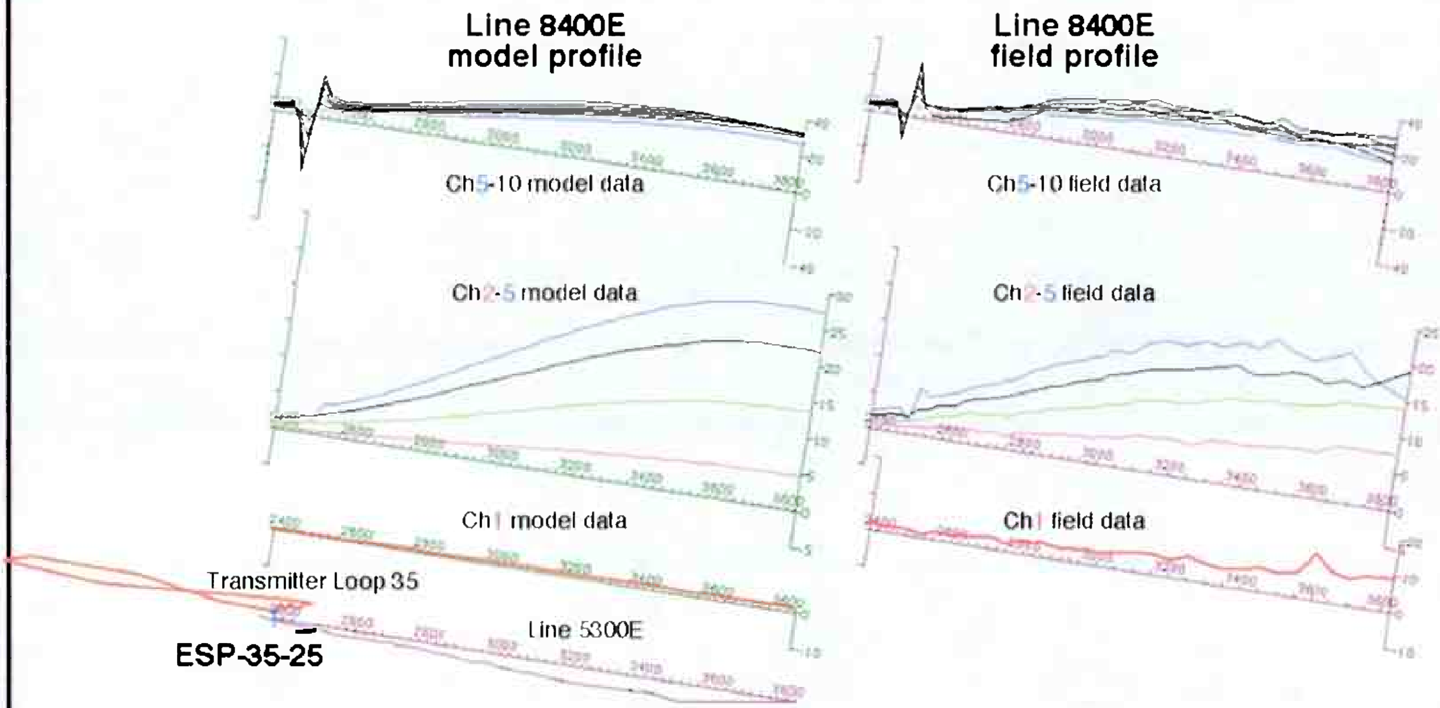
The overall best response detected was that on Loop 35 Line 5300E - to Ch4 - and this response was selected for MultiLoop modeling.

Modeling **Conductor ESP_35_25**: Loop 35 Line 5300E Figure 6

The modeling results for Loop 35 Line 5300E are shown in Figure 6. The overall background response was modeled using a laterally extensive conductive layer at a depth of ~1200m and a weakly conductive layer at a depth of ~900m. **Conductor ESP_35_25** is modeled as an enhancement (shallowing?) along a ~grideast-gridwest feature. The details of **ESP_35_25** as modeled as listed in Figure 6 are:

centre of conductor 5300E, 4467N, 914 m.a.s.l. (grid coords.)
local elevation ~929 m.a.s.l. giving ~15m depth-to-centre
strike/dip ~230/05° conductance 500S
along strike/downdip 200m/30m

Conductor ESP_35_25 is interpreted to be a good (400-1000S) conductor. It should be evaluated in comparison with other known features in the Espedalen area. Primary field coupling is ~fairly well coupled as modeled suggesting that the conductance is a reasonable estimate. Increasing the strike length of the modeled body would act to lower the conductance somewhat.



Conductor ESP_35_25 as modeled on Line 5300E
centre of conductor 5300E, 4467N, 914 m.a.s.l. (grid coords.)
local elevation ~929 m.a.s.l. giving ~15m depth-to-centre
strike/dip ~230/5° conductance 500S
along strike/downdip 200m/30m

Notes:
- view is looking gridwest (~320)
- conductor as modeled is ~fairly well coupled.
- locations are listed in Grid coordinates - refer to GPS notes for UTM locations.
- the overall background response in modeled by conductors (laterally extensive, centred under loop) at depth.

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ESP-35-25 - Model Line 5300E

0 100 500m

Figure 6

Conductor ESP_36_26 Line 6200E ~4250N

Conductor ESP_36_26 was detected as a short strike-length feature on the airborne survey profiles. Line 6200E was added to the survey lines to detail the feature. The **Conductor ESP_36_26** response continues both:

- to the gridwest one line - Line 6100E - which shows an off-line response.
- to the grideast one line - Lines 5500E - which shows a sharp early time (Ch9) response.

The **Conductor ESP_36_26** response coincides with a slight flattening in slope (old work?) and has a coincident magnetic feature. **Conductor ESP_36_26** is interpreted to be a short strike-length feature. The Loop 36 Line 6200E response - to Ch3 - was selected for MultiLoop modeling.

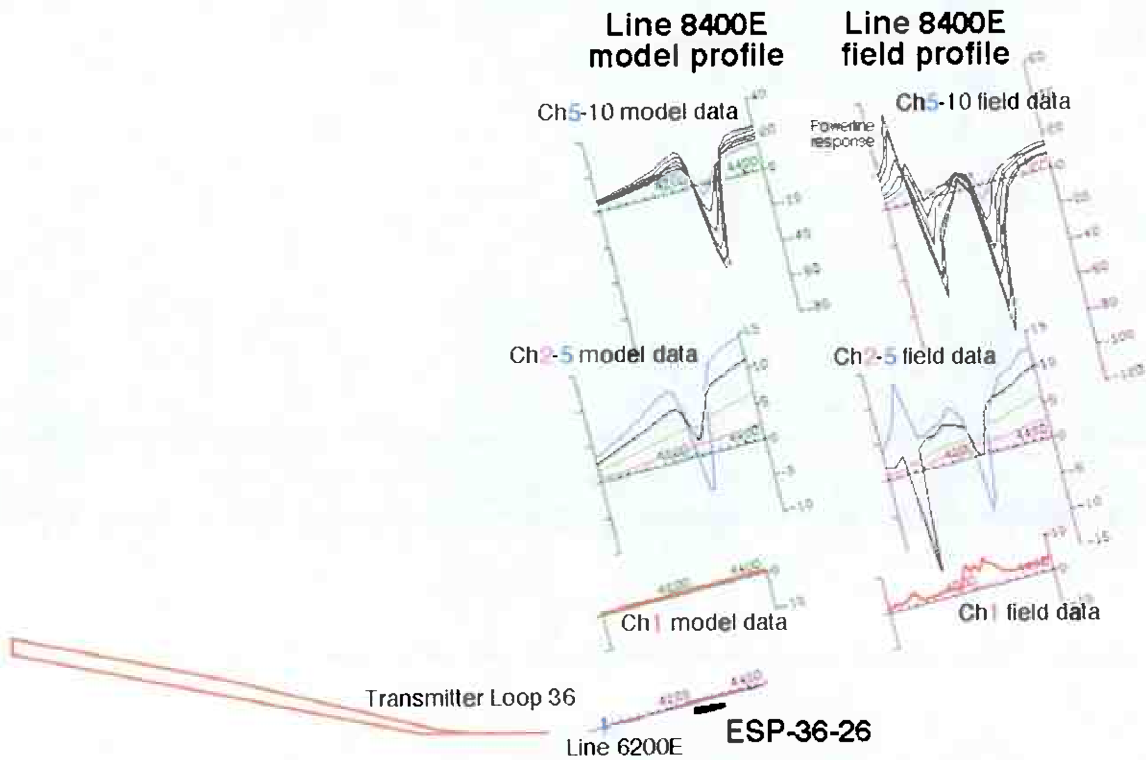
Modeling **Conductor Conductor ESP_36_26**: Loop 36 Line 6200E Figure 7

The modeling results for Loop 36 Line 6200E are shown in Figure 7. The overall background response was modeled using a laterally extensive conductive layer at a depth of ~1100m and a weakly conductive layer at a depth of ~800m. **Conductor ESP_36_26** is modeled as a small, shallow very gently dipping feature - the model includes two plates. Details of **Conductor ESP_36_26** as modeled as listed in Figure 7 are:

centre of conductor 6200E, 4285N, 781 m.a.s.l. (grid coords.)
local elevation ~818m.a.s.l. giving ~37m depth-to-centre
strike/dip ~230/10° conductance 1000S
along strike/downdip 150m/50m

centre of conductor 6200E, 4298N, 789 m.a.s.l. (grid coords.)
local elevation ~821m.a.s.l. giving ~32m depth-to-centre
strike/dip ~230/10° conductance 150S
along strike/downdip 150m/75m

Conductor ESP_36_26 a small good-excellent conductor (>1000S). It should be evaluated in comparison with any information about the old workings as well as other known features in the Espedalen area. Primary field coupling is ~maximum coupled as modeled suggesting that the conductance is a reasonable estimate. Increasing the strike length of the modeled body would act to lower the conductance somewhat, however, the local survey line spacing of 100m serves to give a good definition of the strike length.



Conductor ESP_36_26 as modeled on Line 6200E
centre of conductor 6200E, 4285N, 781m.a.s.l. (grid coords.)
local elevation ~818 m.a.s.l. giving ~37m depth-to-centre
strike/dip ~230/10° conductance 1000S
along strike/downdip 150m/50m
centre of conductor 6200E, 4298N, 789m.a.s.l. (grid coords.)
local elevation ~821 m.a.s.l. giving ~32m depth-to-centre
strike/dip ~230/10° conductance 150S
along strike/downdip 150m/75m

Notes:
- view is looking gridwest (~320)
- conductor as modeled is ~maximum coupled.
- locations are listed in Grid coordinates - refer to GPS notes for UTM locations.
the overall background response.in modeled by conductors (laterally extensive, centred under loop) at depth.

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ESP-36-26 - Model Line 6200E

0 100 500m

Figure 7

CONCLUSIONS AND RECOMMENDATIONS

The results of the survey are summarized and presented as UTEM profiles and BHUTEM-3 profiles/vectorplots in Appendix A. Overall the data quality is good and a number of conductive features are evident. The final Grid and Loop Locations are presented in Figure 2 and an interpretation is presented as Interpreted Features (Figure 3) and Interpretation (Figure 4). There are a number of responses of considerable interest - although no clear Ch1 conductors have been delineated.

Features outlined are mainly contacts, shallow conductors and thin conductive zones - geological units and structural features. The pattern of responses outlined in Figures 3 and 4 fits the map pattern of the geological mapping and pattern of airborne EM conductors. In general the airborne EM detected shallower features or the shallowest occurrence of deeper features. There is also a reasonable correlation between the airborne magnetics and UTEM Ch1 features interpreted as magnetic in origin. This indicates that field location of the grids was sufficiently accurate to cover the target geology.

The profiles presented in Appendix A have been reduced with a grid corrected as well as possible using available information. The location of all survey points and loop locations were collected using a GPS system. For reference GPS collection for UTEM reduction should be more detailed along loop fronts. The goal along the loop front - and loop sides/back - is to recover the topographic shape of the loop as well as the loop/line intersection points.

As in the 2003/04/05 UTEM surveys a number of responses of interest were detected. Overall fewer conductors/conductive features were detected in 2006 than in previous years. This reflects the lower priority of the targets tested in 2006. The majority of the responses detected during the 2006 survey - including BHUTEM responses have been modeled in-house by Falconbridge geophysicist Tony Watts. The profiles were examined by Falconbridge personnel and a number - 3 - were selected for MultiLoop modeling. The results of the modeling are presented in the Interpretation section and the reader is directed there and to the accompanying CD for specific details. A summary follows:

good-to-excellent - >1000S	**Conductor 26**
good - 400-1000S	**Conductor 25**
fair <150S/fair-to-good - 150-400S	**Conductor 24?**

Note that in some instances an adjustment is made to allow for size - a large feature moving up a category, a small feature down. The features are listed on the following page in numerical order - no ranking of **Conductors** within a group has been done.

In conclusion - the UTEM survey and subsequent MultiLoop modeling have resulted in a number of **Conductors** of interest. Several of the **Conductors** of interest come near to surface, in one instance mining has been done in the past, allowing for possible field examination. Following a surface examination of the shallower **Conductors** drill testing several of the **Conductors** should be considered.

In terms of logistics the survey ran very smoothly and the crew supplied by Falconbridge was excellent and is thanked for their efforts. Several small points should be noted for future surveys:

- Rectangular transmitter loops work very well and are recommended. Transmitter loops, however, can take any shape and take advantage of/be fit to trails and topography. Factors to consider in setting out a uniquely-shaped transmitter loop:
  - will the primary field be well-coupled to potential targets?
  - can the loop be safely laid out and picked up?
  - can the loop be accurately GPS surveyed?
  - avoid UTEM surveying close to (say within 3-400m of) "uniquely" shaped sidewires. Errors in location can superimpose the shape on Ch1.

- Both the new generator and the heavier gauge wire worked out well.

Legend

more resistive

– Contact (well / poorly defined)

more conductive

– thin conductive / resistive zone

1 60

5 S

7 ?

Location of conductor axis

egs. - latest response Ch1 depth-to-top 60m

- latest response Ch5 shallow (<50m)

- latest response Ch7 unclear

5 80 – Contact conductor

– Block conductor

well defined / weaker section / poorly defined

– conductor offline

– Modeled Conductor (ESPedalen)

eg. ESP_05_03 = conductor #03 on Loop 05
details as noted in Figures

Mm / P / ? – Magnetic feature / powerline / ?

– connection (well / poorly defined)

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Interpretation Legend

Figure 8

Appendix A

0611 UTEM Profiles
0611 BHUTEM Profiles

UTEM 3 Survey

Espedalen
Norway

for

A/S Sulfidmalm

Presentation

The results of the survey are summarized and presented as UTEM profiles in Appendix A. The final grid and Loop Locations are presented in Figures 2. Overall the data quality is good and a number of conductors and/or conductive features are evident. Moderate-to-severe noise levels to the gridnorth of lines surveyed from Loops 05 through 12 reflect the presence of a regional powerline beyond the end of the lines. A description of the standard plotting formats used and of the UTEM System is presented in Appendix C.

The profiles are listed by Loop number and presented as 3-axis profiles in the order:

Hz continuous norm *Ch1 reduced* **(blue separator)**
Hz point normalized *Ch1 reduced* **(pink separator)**

BHUTEM3 profiles follow in order of Hole number by area. The following plots are presented for a borehole:

3-axis plot
total field plot
plan vectorplot
gridnorth-south section vectorplot

Outline of surface profile types

Hz continuous norm *Ch1 reduced* **(blue separator)**

Continuous normalization is useful for detection of the presence anomalies at any position on a profile. The anomaly shape is distorted by the normalization to the local field. As the field gets very big near the wire the continuously normalized Ch1 tends towards zero.

top axis - Ch5-10
middle axis - Ch2-5
bottom axis - Ch1
bottom axis - topography - no vertical exaggeration

Hz point normalized *Ch1 reduced* **(pink separator)**

normalization point: all data ~300m out from the loop-front centre

Point normalized data is useful for interpretation of responses. Anomaly shape is preserved as is the amplitude if the normalization point is local to the anomaly.

All data has been point normalized to a the field at a point ~300m out from the centre of the loop front. Note that this field value is intermediate and it was chosen because the survey was roughly half inside-the-loop and half off-loop. Normalizing to an intermediate point allows the interpretation of responses along the entire line. The amplitude of responses close to (**further from**) the loop front will be blown up (**muted**). Note: Typically the normalization point for off-loop profiles is 4-500m out from the centre of the loop front and for inside-the-loop profiles it is the loop centre.

The disadvantage of point normalization is that small errors in location near the wire and in current tend to appear as large errors in Ch1. If the loop/station locations and the current are accurately known then point normalized Ch1 (in the absence of a local conductor) will tend to be continuous approaching the wire - unlike the continuously normalized Ch1 which, as described above, will dip to zero.

top axis - Ch5-10
middle axis - Ch2-5
bottom axis - Ch1
bottom axis - topography - no vertical exaggeration

Outline of BHUTEM-3 plot types

3-axis plot - **secondary field**
total field plot - **total field**

Both continuously normalized secondary and total field plots are presented for each borehole surveyed. Note that for reference the primary field is plotted on all BHUTEM profiles. The axes on the **3-axis plot** contain:

top axis - Ch5-10
middle axis - Ch2-5
bottom axis - Ch1 + primary field

The axis on the **total field plot** contains:

axis - Ch1-10 + primary field

plan and gridnorth-south section vectorplots

Plan and gridnorth-south section vectorplots are included for each borehole surveyed. Vectorplots are useful in both planning loop locations and in evaluating profiles - particularly in areas of high relief. Vectorplots show the primary field local to the borehole - allowing the coupling to be evaluated.

Notes on Survey and Presentation/plotting details

- An effort has been to keep the scales consistent. The horizontal scale for the surface profiles is 1cm:100m.

<u>List of Data Collected and Plotted</u>

Espedalen 2006 Grid

Surface coverage - @ 3.251 Hertz

	Line	coverage	
Loop 30	Line 8200E	4925N - 5675N	750m
	Line 8400E	4925N - 5675N	750m
	Line 8600E	4875N - 5675N	800m
	Line 8800E	4950N - 5675N	725m
	Line 9000E	4900N - 5850N	950m
	Line 9200E	4925N - 5850N	925m
	Espedalen	Loop 30 Total	4975m
Loop 31	Line 9400E	4950N - 5850N	900m
	Line 9600E	4975N - 5850N	875m
	Line 9800E	5050N - 5850N	800m
	Line 10000E	4975N - 5850N	875m
	Line 10200E	5100N - 5850N	750m
	Line 10300E	5550N - 5850N	300m
	Line 10400E	5400N - 5850N	450m
	Line 10500E	5450N - 5850N	400m
	Line 10600E	5450N - 5850N	400m
	Espedalen	Loop 31 Total	5750m
Loop 32	Line 9600E	3350N - 4100N	750m
	Line 9800E	3350N - 4200N	850m
	Line 10000E	3350N - 4100N	750m
	Line 10200E	3350N - 4200N	850m
	Line 10400E	3350N - 4100N	750m
	Line 10600E	3350N - 4100N	750m
	Line 10800E	3350N - 3975N	625m
	Line 11000E	3350N - 4100N	750m
	Line 11200E	3350N - 4100N	750m
	Espedalen	Loop 32 Total	7050m
Loop 33	Line 7900E	3125N - 4000N	875m
	Line 8000E	3125N - 4100N	975m
	Line 8200E	3125N - 4000N	875m
	Line 8400E	3125N - 4050N	925m
	Line 8600E	3125N - 4000N	875m
	Line 8800E	3125N - 4050N	925m
	Line 9000E	3125N - 4100N	975m
	Espedalen	Loop 33 Total	6425m

List of Data Collected and Plotted (cont)

	Line	coverage	
Loop 34	Line 6700E	2525N - 4075N	1550m
	Line 6900E	2525N - 4075N	1550m
	Line 7100E	2525N - 4200N	1675m
	Line 7300E	2525N - 4200N	1675m
	Line 7500E	2525N - 4250N	1725m
	Line 7700E	2525N - 3975N	1450m
	Line 7900E	2525N - 3275N	750m
	Espedalen	Loop 34 Total	10375m
Loop 35	Line 5100E	2475N - 3900N	1425m
	Line 5300E	2375N - 3825N	1450m
	Line 5500E	2375N - 3825N	1450m
	Line 5700E	2375N - 3825N	1450m
	Line 5900E	2375N - 3900N	1525m
	Line 6100E	2375N - 3800N	1425m
	Line 6300E	2375N - 3825N	1450m
	Line 6500E	2375N - 3850N	1475m
	Espedalen	Loop 35 Total	11425m
Loop 36	Line 5300E	4075N - 4975N	900m
	Line 5500E	4100N - 4975N	875m
	Line 5700E	4050N - 4975N	925m
	Line 5900E	4025N - 5000N	975m
	Line 6100E	3850N - 4975N	1125m
	Line 6200E	4000N - 4450N	450m
	Line 6300E	4025N - 5025N	1000m
	Line 6500E	4225N - 5075N	850m
	Espedalen	Loop 36 Total	7100m
Loop 37	Line 3800E	4050N - 4975N	925m
	Line 4000E	3975N - 4975N	1000m
	Line 4100E	4000N - 4550N	550m
	Line 4200E	4025N - 4975N	950m
	Line 4300E	3950N - 4975N	1025m
	Line 4500E	3950N - 4975N	1025m
	Line 4700E	3975N - 4975N	1000m
	Line 4900E	4000N - 4975N	975m
	Line 5100E	3800N - 4975N	1175m
	Espedalen	Loop 37 Total	8625m
	Espedalen 2006	**Total**	**61.725km**

List of Borehole Data Collected and Plotted

Area	Borehole Name	Survey Depth	Dummy Depth	Loop Number	Frequency
Listed by hole number:					
Jorstad	ES2004-14	128m	128.5m	Loop B41	3.251Hz
Jorstad	ES2004-15	123m	123m	Loop B41	3.251Hz
Trona	ES2005-35	78m	79m	Loop B35	3.251Hz
Storgruva ext	ES2005-36	170m	172m	Loop B36	3.251Hz
Storgruva ext	ES2005-37	169m	170m	Loop B36	3.251Hz
Graho saddle	ES2005-38	90m	90m	Loop B38	3.251Hz
Graho	ES2005-39	114m	115m	Loop B36	3.251Hz
Grahoin	ES2005-40	70m	70.5m	Loop B36	3.251Hz
Jorstad	ES2005-41	178m	179m	Loop B41	3.251Hz
Vesle	ES2005-42	34m	35m	Loop B42	3.251Hz
Vesle	ES2005-43	44m	46m	Loop B42	3.251Hz
Vesle	ES2005-44	39m	40m	Loop B42	3.251Hz
Stormyra ext	ES2005-45	154m	156m	Loop 33	3.251Hz
Stormyra ext	ES2005-46	270m	271m	Loop 33	3.251Hz
Stormyra ext	ES2005-47	330m	331.5m	Loop 32	3.251Hz
Stormyra ext	ES2005-48	323m	325.5m	Loop 32	3.251Hz
Stormyra	ES2006-51	246m	247.5m	Loop 20b	3.251Hz
Stormyra	ES2006-52	266m	268m	Loop 20b	3.251Hz
Stormyra	ES2006-53	268m	269m	Loop 20b	3.251Hz
Stormyra	ES2006-54	245m	246m	Loop 20b	3.251Hz
Stormyra	ES2006-55	214m	214m	Loop 20b	3.251Hz

List of Borehole Data Collected and Plotted

Area	Borehole Name	Survey Depth	Dummy Depth	Loop Number	Frequency
Listed by area:					
Jorstad	ES2004-14	128m	128.5m	Loop B41	3.251Hz
	ES2004-15	123m	123m	Loop B41	3.251Hz
	ES2005-41	178m	179m	Loop B41	3.251Hz
Trona	ES2005-35	78m	79m	Loop B35	3.251Hz
Storgruva ext	ES2005-36	170m	172m	Loop B36	3.251Hz
	ES2005-37	169m	170m	Loop B36	3.251Hz
Graho saddle	ES2005-38	90m	90m	Loop B38	3.251Hz
Graho	ES2005-39	114m	115m	Loop B36	3.251Hz
Grahoin	ES2005-40	70m	70.5m	Loop B36	3.251Hz
Vesle	ES2005-42	34m	35m	Loop B42	3.251Hz
	ES2005-43	44m	46m	Loop B42	3.251Hz
	ES2005-44	39m	40m	Loop B42	3.251Hz
Stormyra ext	ES2005-45	154m	156m	Loop 33	3.251Hz
	ES2005-46	270m	271m	Loop 33	3.251Hz
	ES2005-47	330m	331.5m	Loop 32	3.251Hz
	ES2005-48	323m	325.5m	Loop 32	3.251Hz
Stormyra	ES2006-51	246m	247.5m	Loop 20b	3.251Hz
	ES2006-52	266m	268m	Loop 20b	3.251Hz
	ES2006-53	268m	269m	Loop 20b	3.251Hz
	ES2006-54	245m	246m	Loop 20b	3.251Hz
	ES2006-55	214m	214m	Loop 20b	3.251Hz

0611

Surface UTEM Profiles

Espedalen

Loop 30

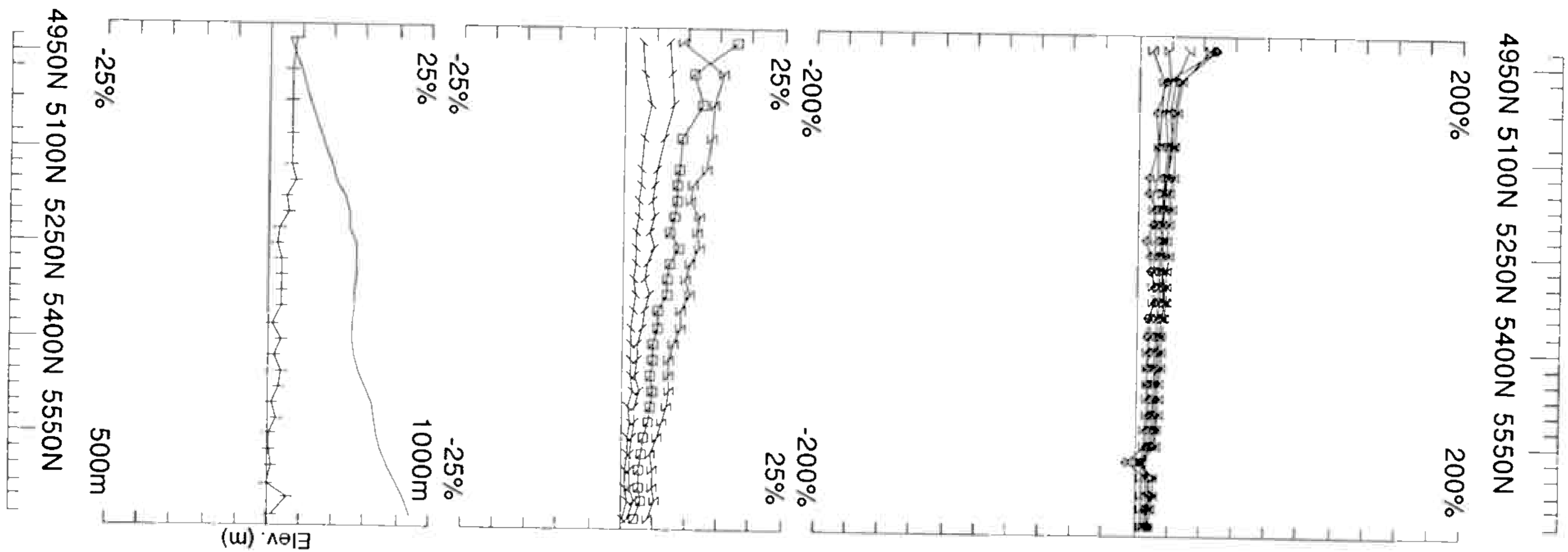
Hz
@3.251 Hz frequency

continuous norm

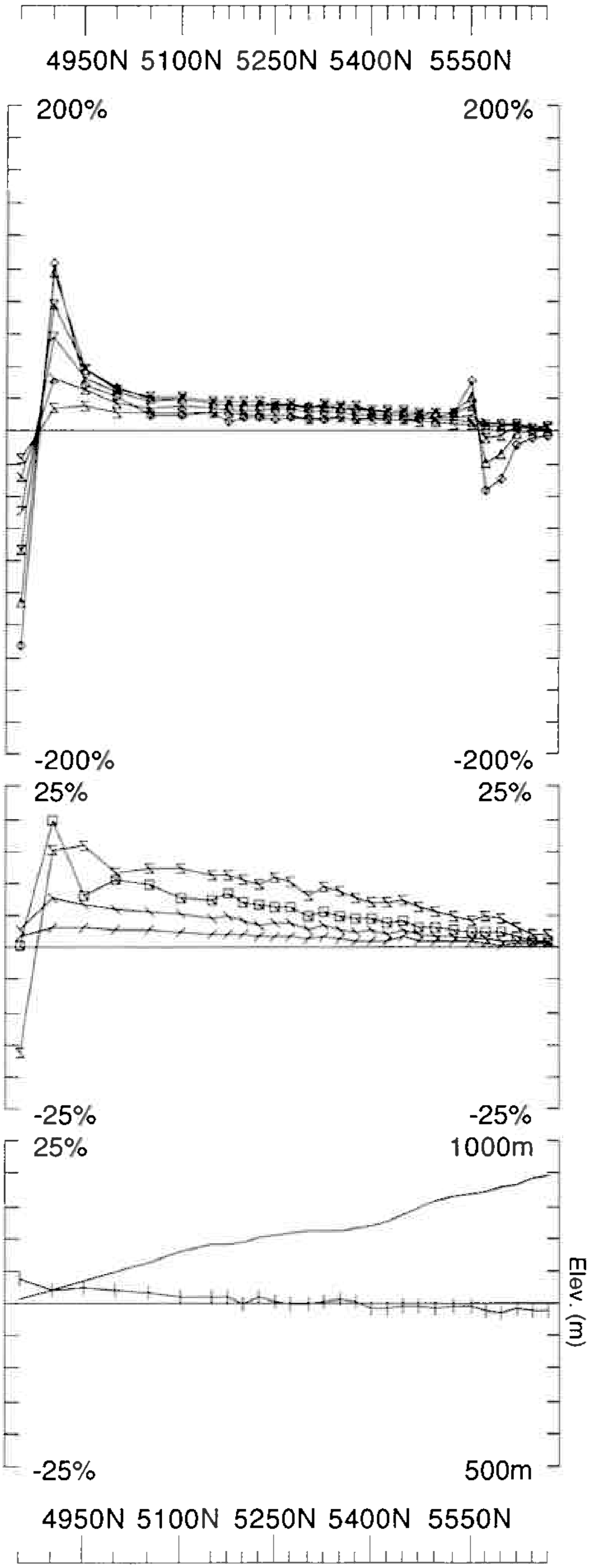
Ch1 reduced

Loop 30	Line 8200E	4925N - 5675N	750m
	Line 8400E	4925N - 5675N	750m
	Line 8600E	4875N - 5675N	800m
	Line 8800E	4950N - 5675N	725m
	Line 9000E	4900N - 5850N	950m
	Line 9200E	4925N - 5850N	925m
	Espedalen	Loop 30 Total	4975m

Loop 30 - continuous norm



Loop: 30	Secondary, (Chn - Ch1)/IHpl	UTEM Survey at: Espedalen
Line: 8200E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed: 7/3/6 Reduced: 7/3/6 Plotted: 18/3/32



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

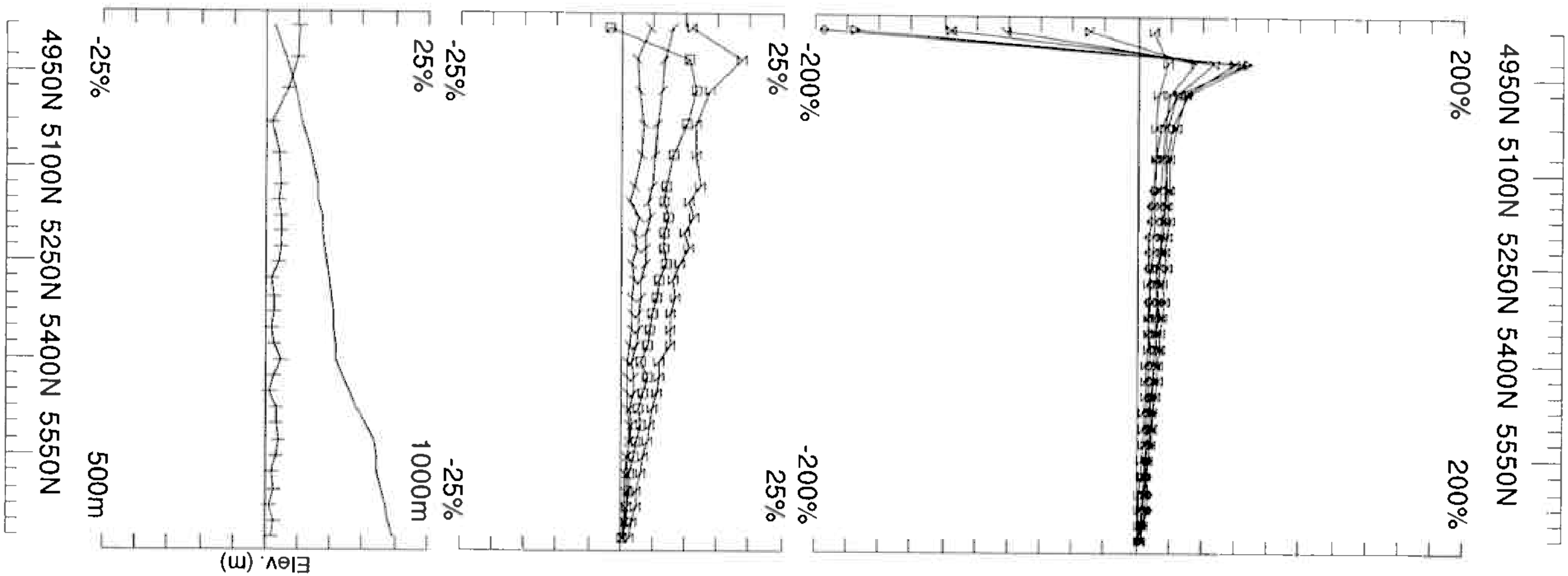
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

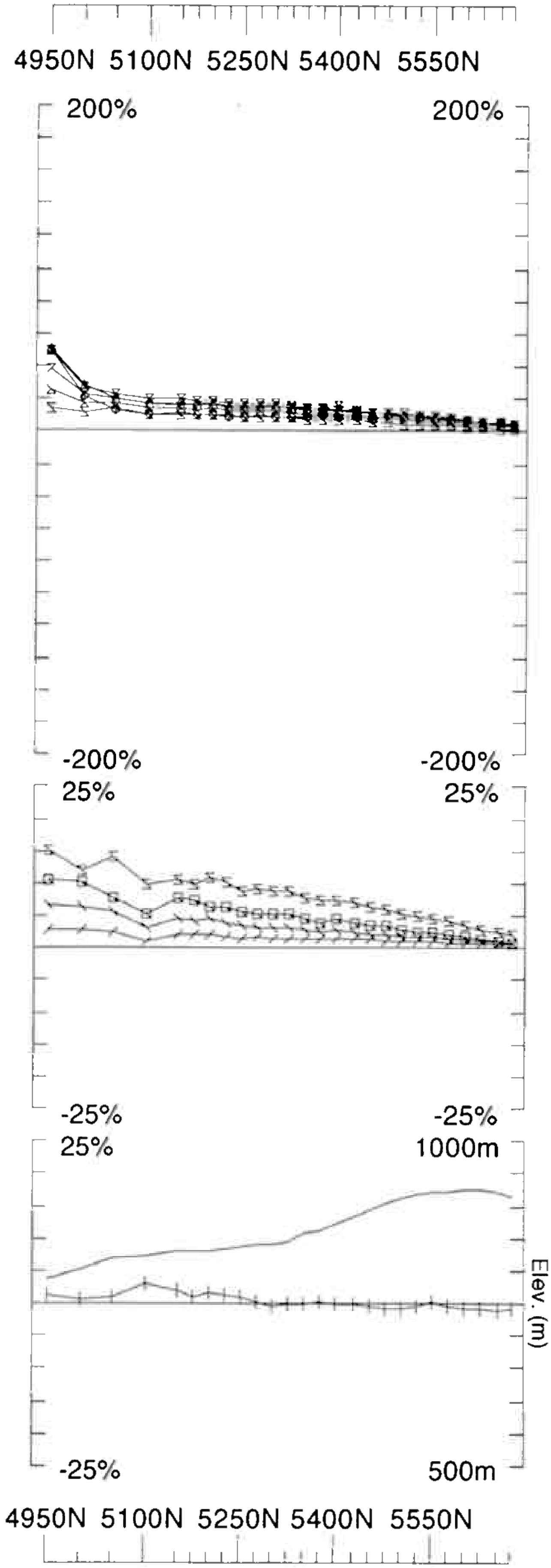
Surveyed : 7/3/6
Reduced : 7/3/6
Plotted : 18/3/32

Loop: 30
Line: 8400E
Compt: Hz

Secondary, (Chn - Ch1)/IHpI
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



Loop: 30 Line: 8600E Compt: Hz	Secondary, (Chn - Ch1)/lHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 7/3/6 Reduced : 7/3/6 Plotted : 18/3/32



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

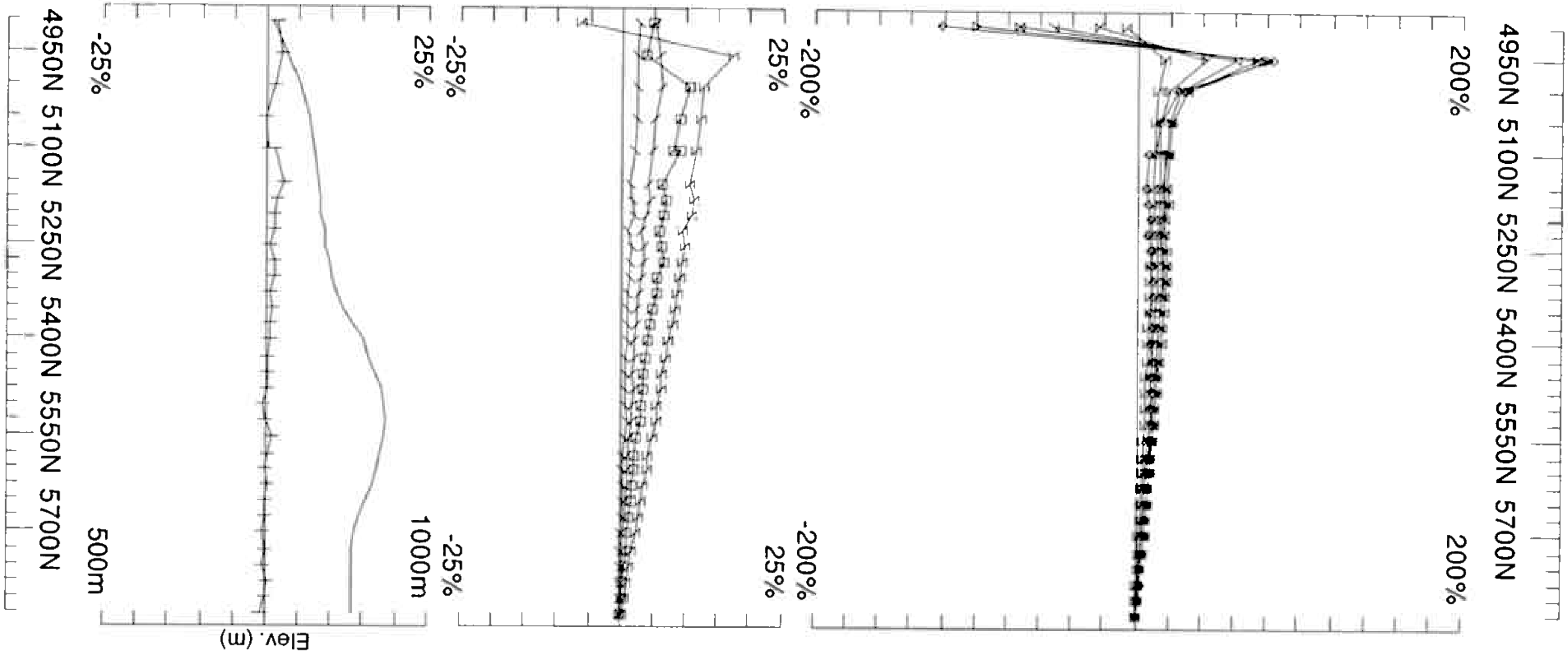
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

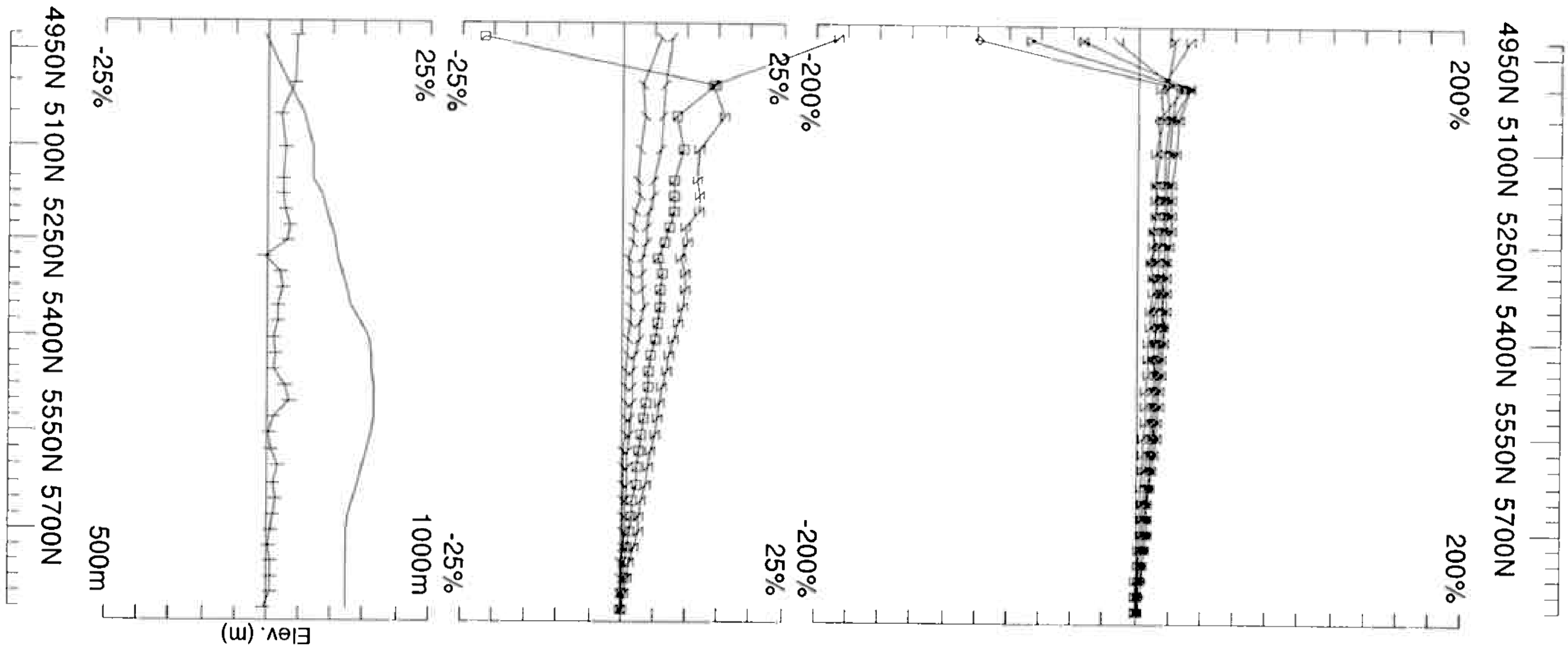
Surveyed: 7/3/6
Reduced: 7/3/6
Plotted: 18/3/32

Secondary, (Chn - Ch1)/lHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Loop: 30
Line: 8800E
Compt: Hz



Loop: 30	Secondary, (Chn - Ch1)/IHpI	UTEM Survey at: Espedalen
Line: 9000E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE — Job 0611 — Surveyed : 6/3/6 Reduced : 6/3/6 Plotted : 18/3/32



Loop: 30	Secondary, (Chn - Ch1)/|Hp|	UTEM Survey at: Espedalen
Line: 9200E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 6/3/6 Reduced : 7/3/6 Plotted : 18/3/32

Espedalen

Loop 31

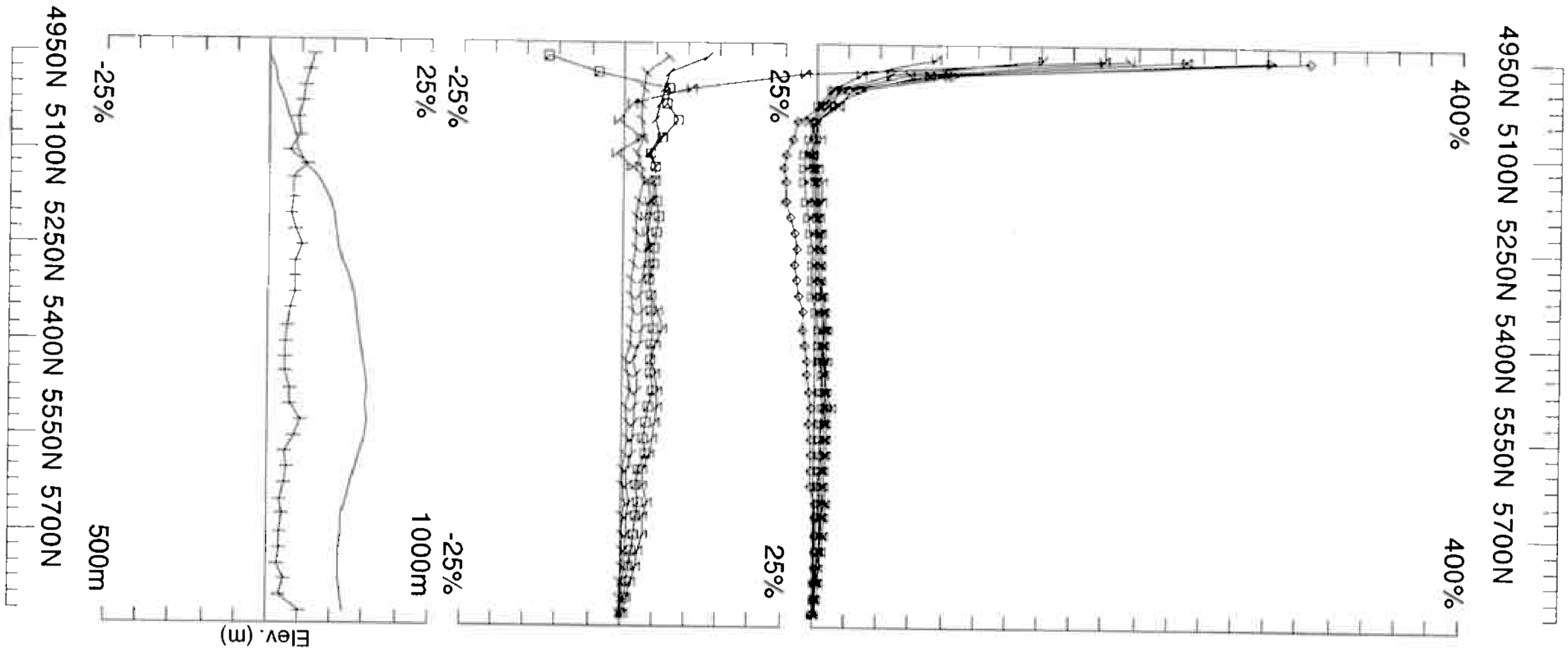
Hz
@3.251 Hz frequency

continuous norm

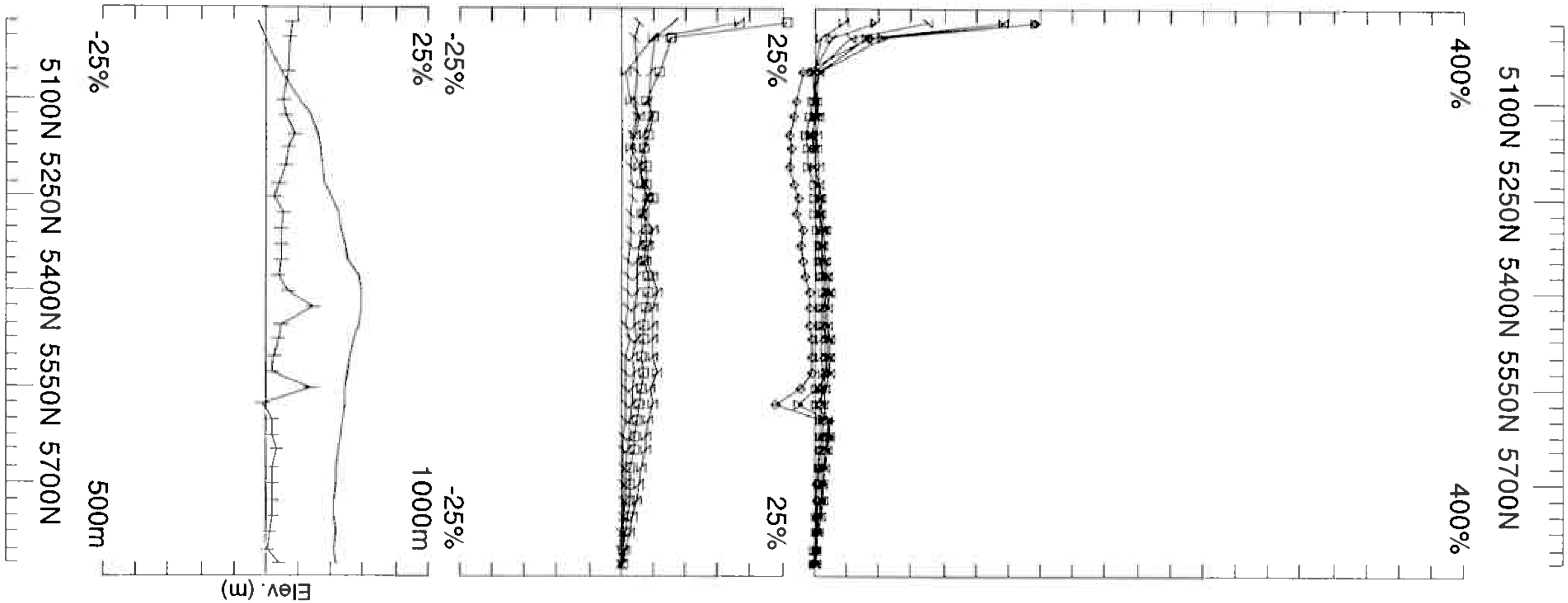
Ch1 reduced

Loop 31	Line 9400E	4950N - 5850N	900m
	Line 9600E	4975N - 5850N	875m
	Line 9800E	5050N - 5850N	800m
	Line 10000E	4975N - 5850N	875m
	Line 10200E	5100N - 5850N	750m
	Line 10300E	5550N - 5850N	300m
	Line 10400E	5400N - 5850N	450m
	Line 10500E	5450N - 5850N	400m
	Line 10600E	5450N - 5850N	400m
	Espedalen	Loop 31 Total	5750m

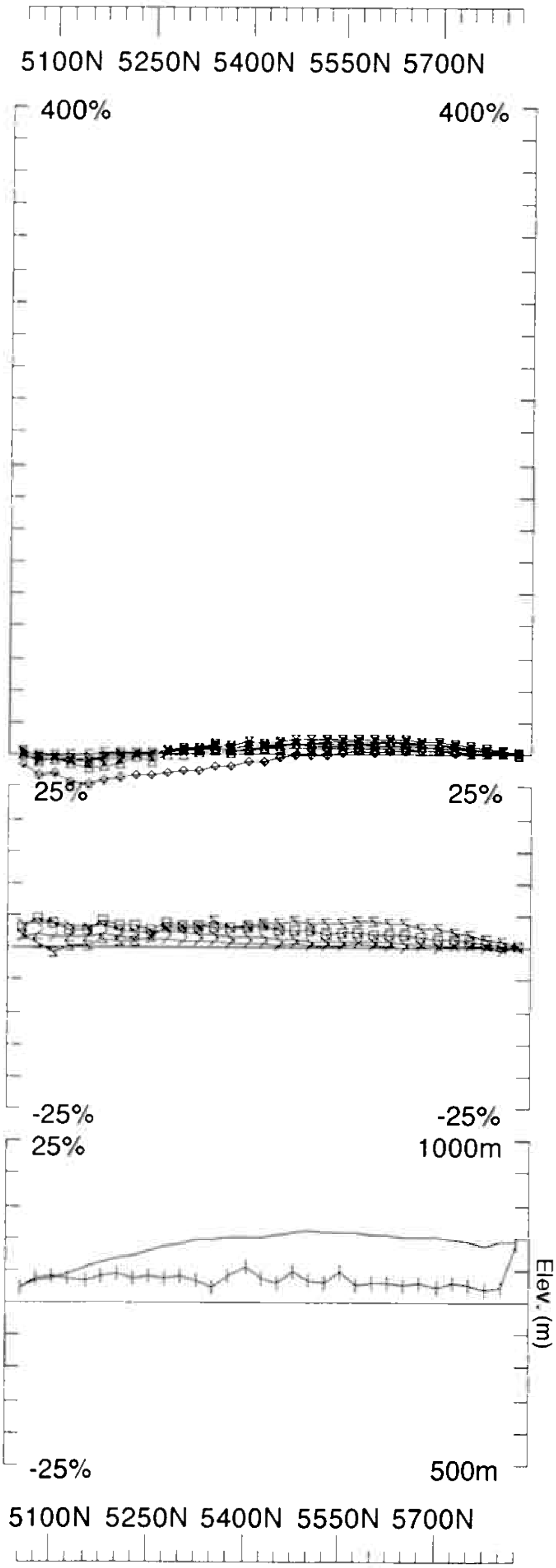
Loop 31 - continuous norm



Loop: 31	Secondary, (Chn - Ch1)/IHpl	UTEM Survey at: Espedalen
Line: 9400E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 4/3/6 Reduced : 5/3/6 Plotted : 18/3/32



Loop: 31	Secondary, (Chn - Ch1)/IHpI	UTEM Survey at: Espedalen		
Line: 9600E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm		
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE	Job 0611	Surveyed : 4/3/6 Reduced : 5/3/6 Plotted : 18/3/32



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

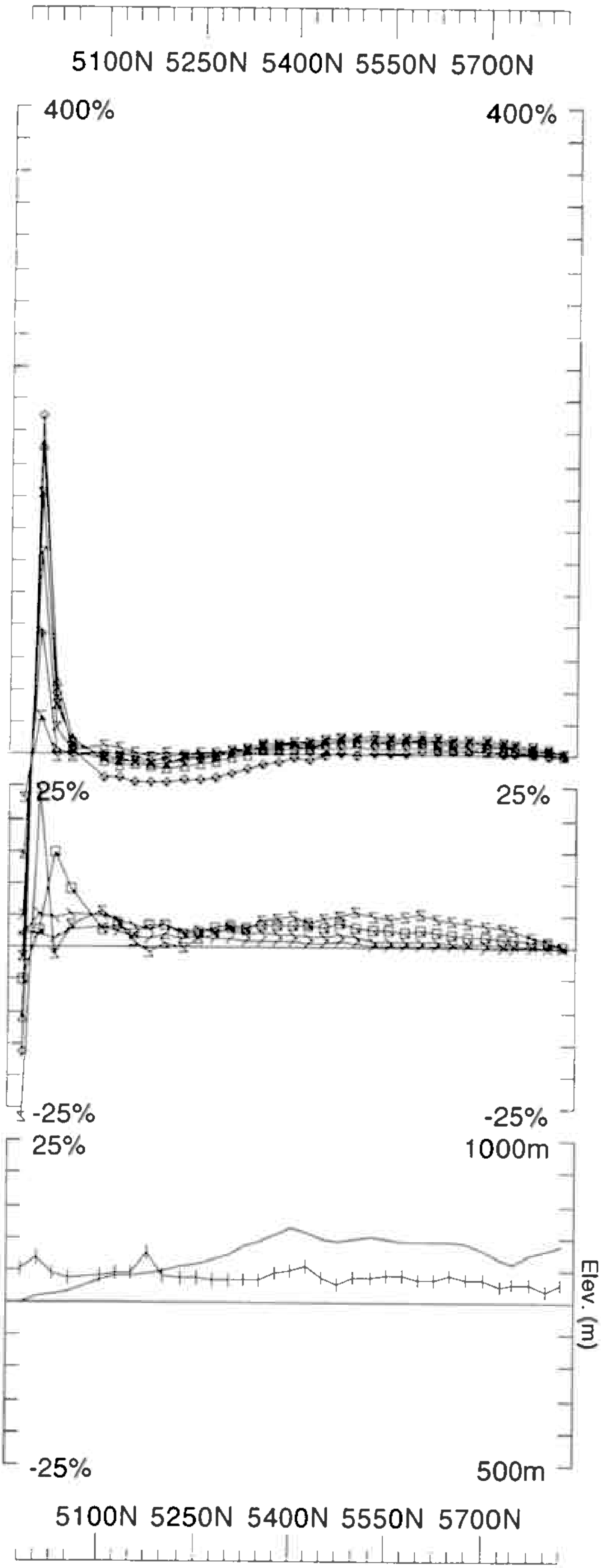
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 5/3/6
Reduced : 5/3/6
Plotted : 18/3/32

Loop: 31
Line: 9800E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

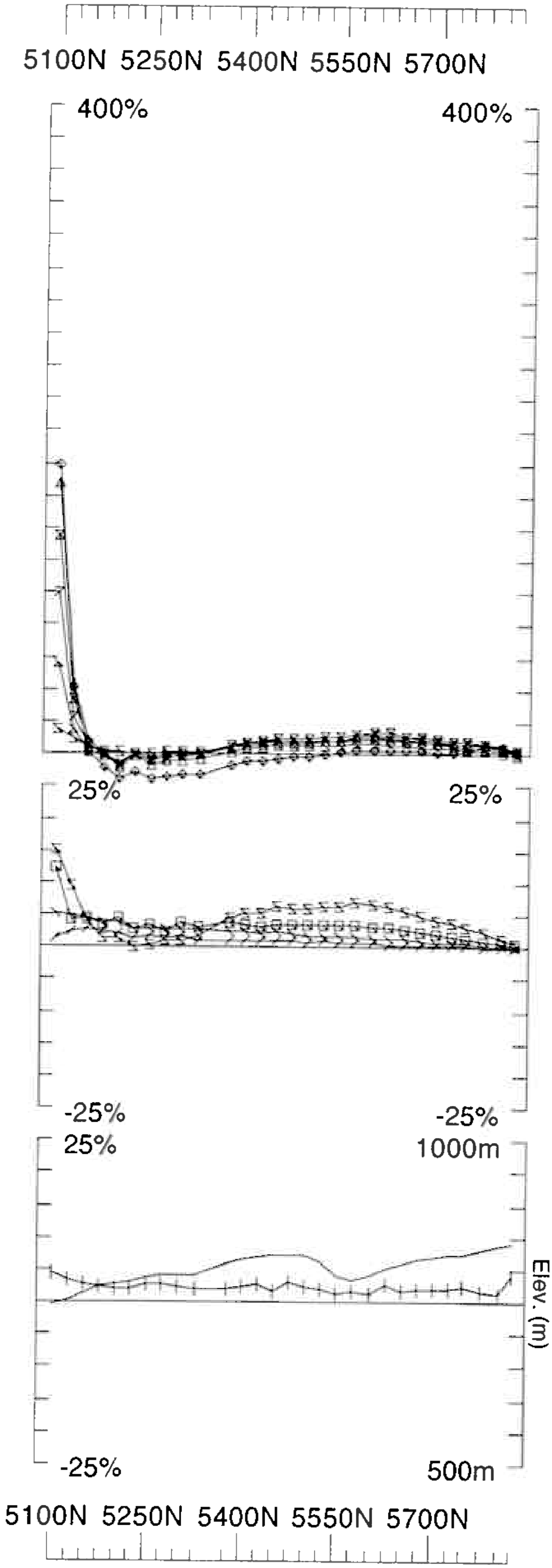
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 4/3/6
Reduced : 5/3/6
Plotted : 18/3/32

Loop: 31
Line: 10000E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



Loop: 31
Line: 10200E
Compt: Hz

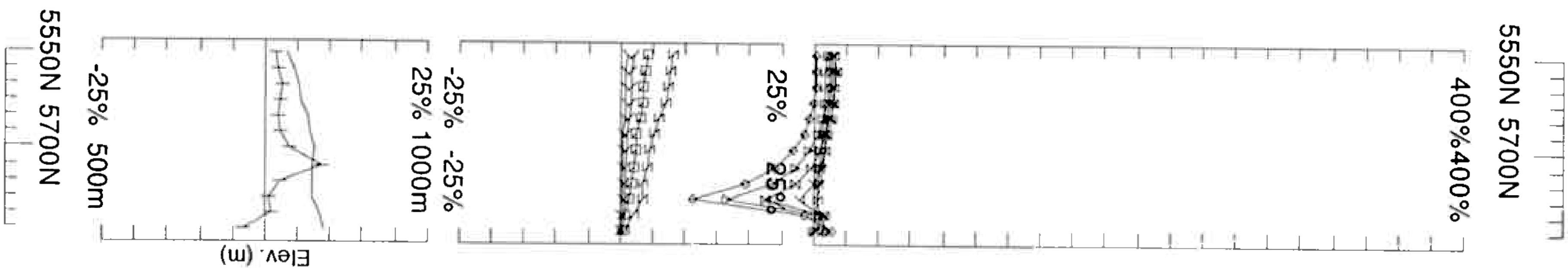
Secondary, (Chn - Ch1)/lHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

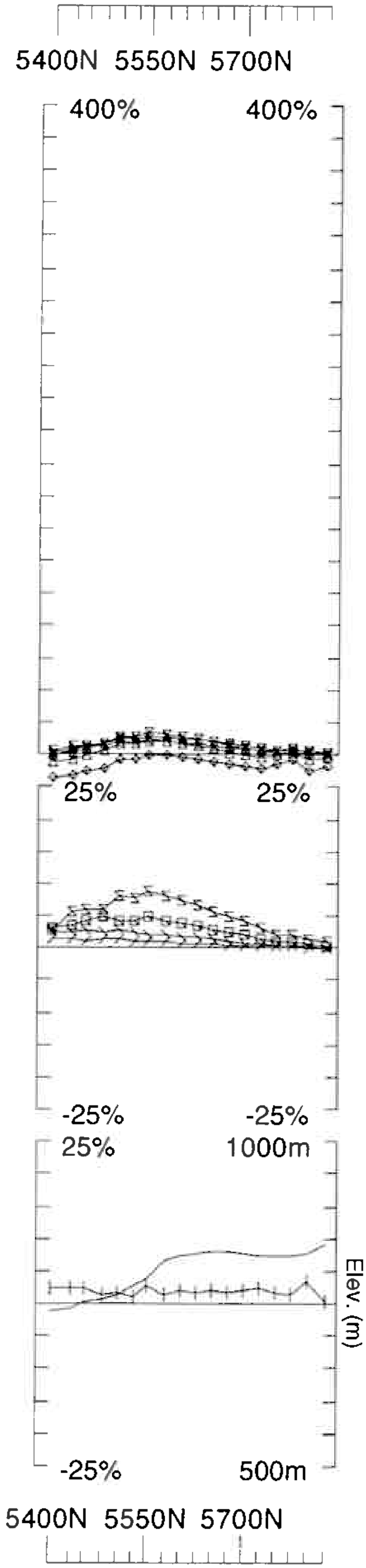
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 5/3/6
Reduced : 5/3/6
Plotted : 18/3/32



Loop: 31	Secondary, (Chn - Ch1)/lHpl	UTEM Survey at: Espedalen
Line: 10300E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 5/3/6 Reduced : 5/3/6 Plotted : 18/3/32



Loop: 31
Line: 10400E
Compt: Hz

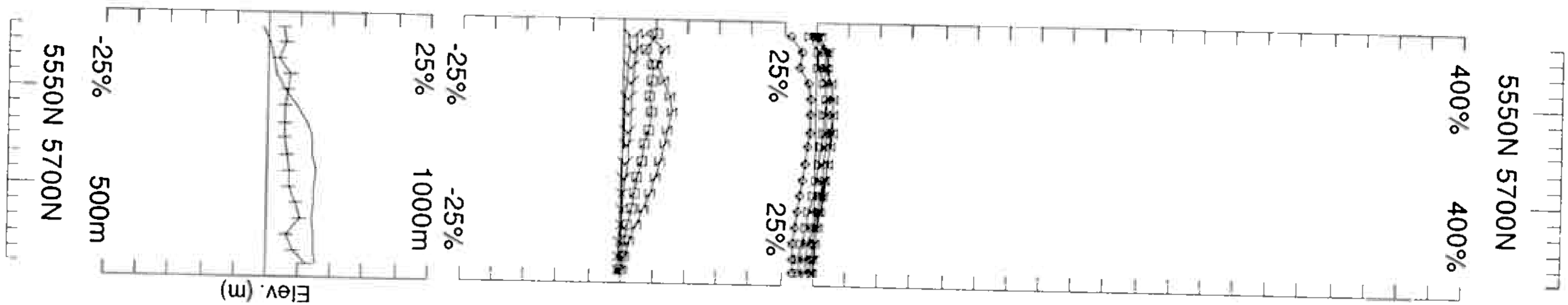
Secondary, (Chn - Ch1)/lHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

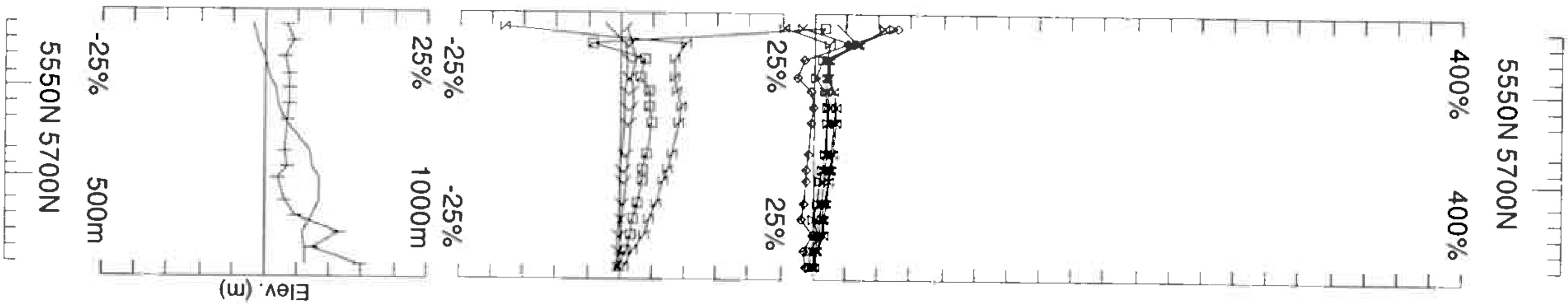
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 5/3/6
Reduced : 5/3/6
Plotted : 18/3/32



Loop: 31	Secondary, (Chn - Ch1)/lHpl	UTEM Survey at: Espedalen
Line: 10500E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed: 5/3/6 Reduced: 5/3/6 Plotted: 18/3/32



Loop: 31	Secondary, (Chn - Ch1)/IHpI	UTEM Survey at: Espedalen
Line: 10600E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 5/3/6 Reduced : 5/3/6 Plotted : 18/3/32

Espedalen

Loop 32

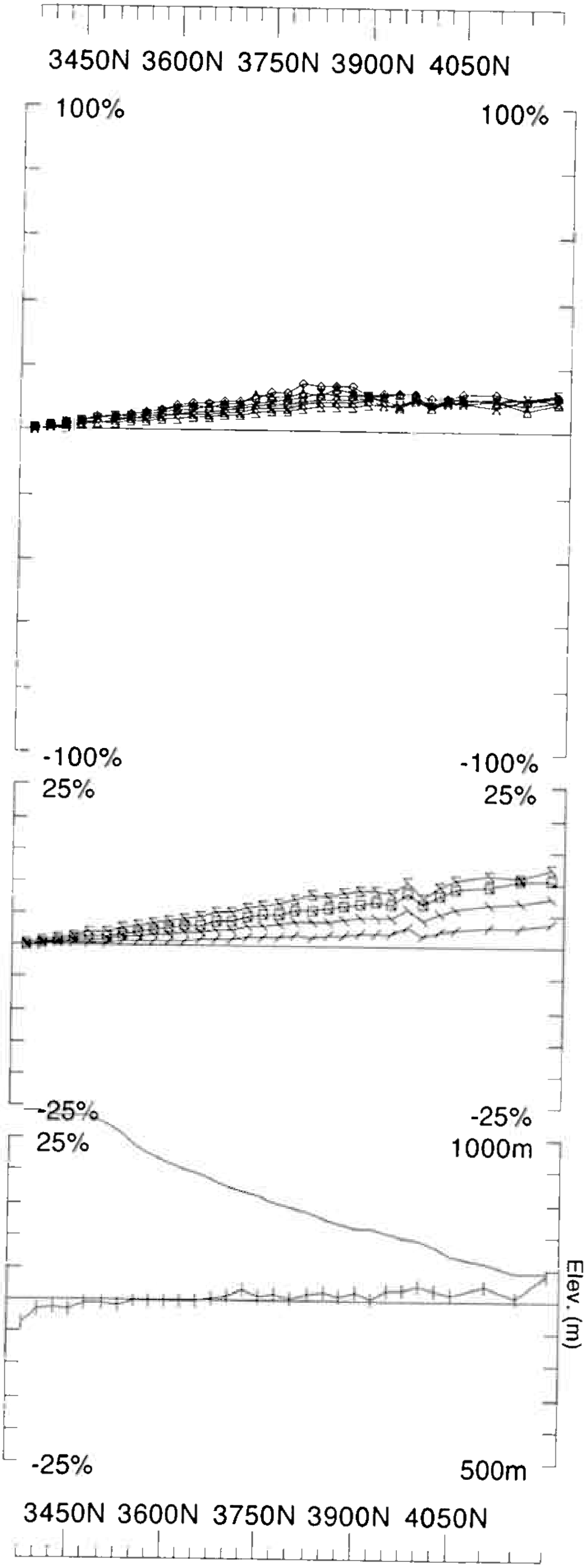
Hz
@3.251 Hz frequency

continuous norm

Ch1 reduced

Loop 32	Line 9600E	3350N - 4100N	750m
	Line 9800E	3350N - 4200N	850m
	Line 10000E	3350N - 4100N	750m
	Line 10200E	3350N - 4200N	850m
	Line 10400E	3350N - 4100N	750m
	Line 10600E	3350N - 4100N	750m
	Line 10800E	3350N - 3975N	625m
	Line 11000E	3350N - 4100N	750m
	Line 11200E	3350N - 4100N	750m
	Espedalen	Loop 32 Total	7050m

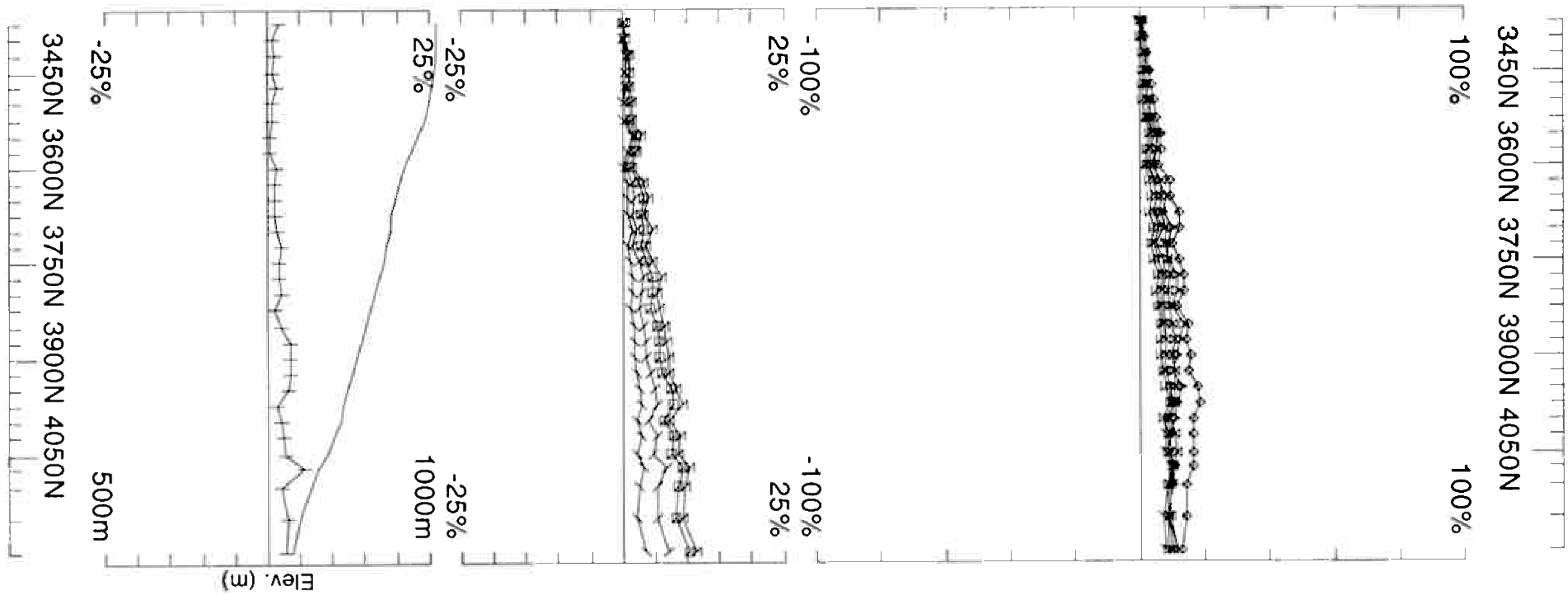
Loop 32 - continuous norm



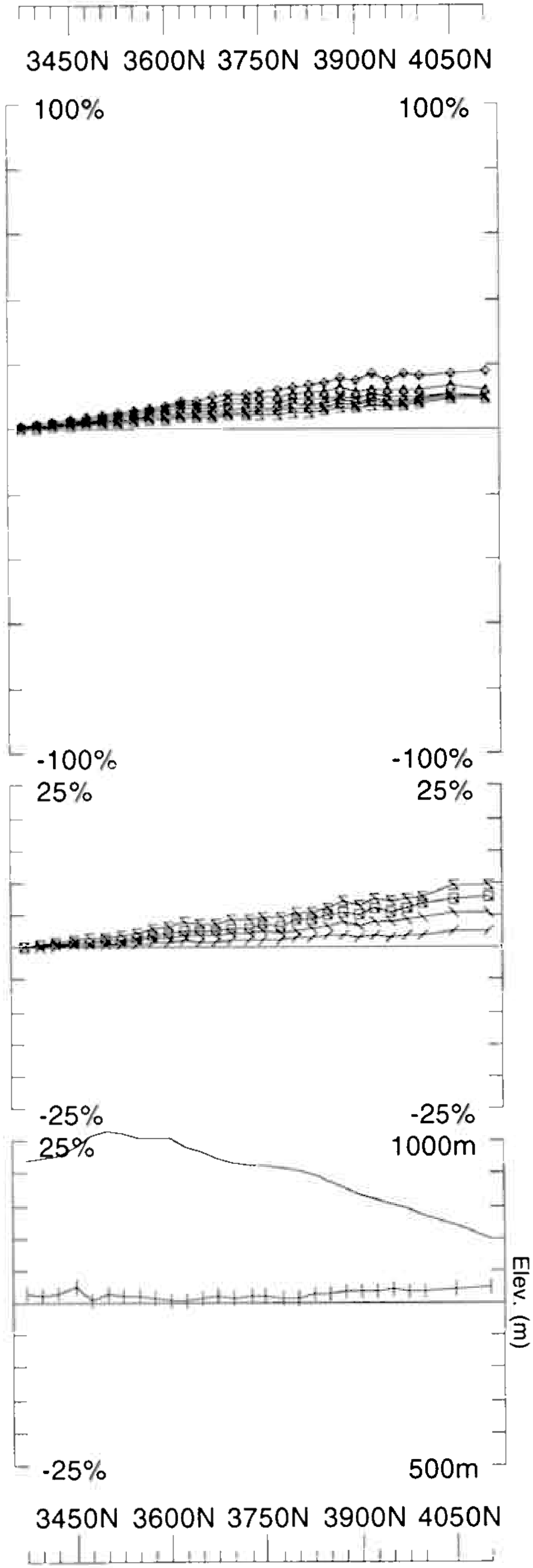
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 21/2/6
Reduced : 21/2/6
Plotted : 18/3/32

Loop: 32
Line: 9600E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



Loop: 32	Secondary, (Chn - Ch1)/|Hp|	UTEM Survey at: Espedalen
Line: 9800E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 22/2/6 Reduced : 22/2/6 Plotted : 18/6/6



Loop: 32
Line: 10000E
Compt: Hz

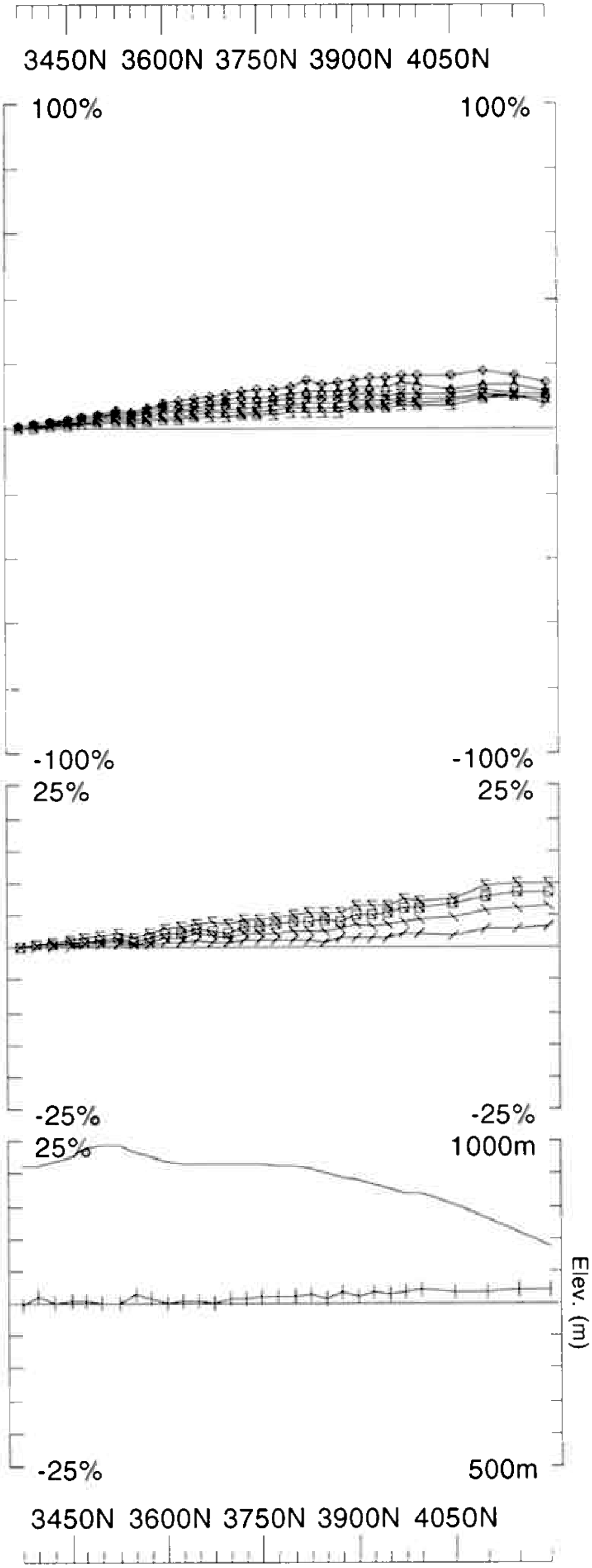
Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

Surveyed : 22/2/6
Reduced : 22/2/6
Plotted : 18/6/6



Loop: 32
Line: 10200E
Compt: Hz

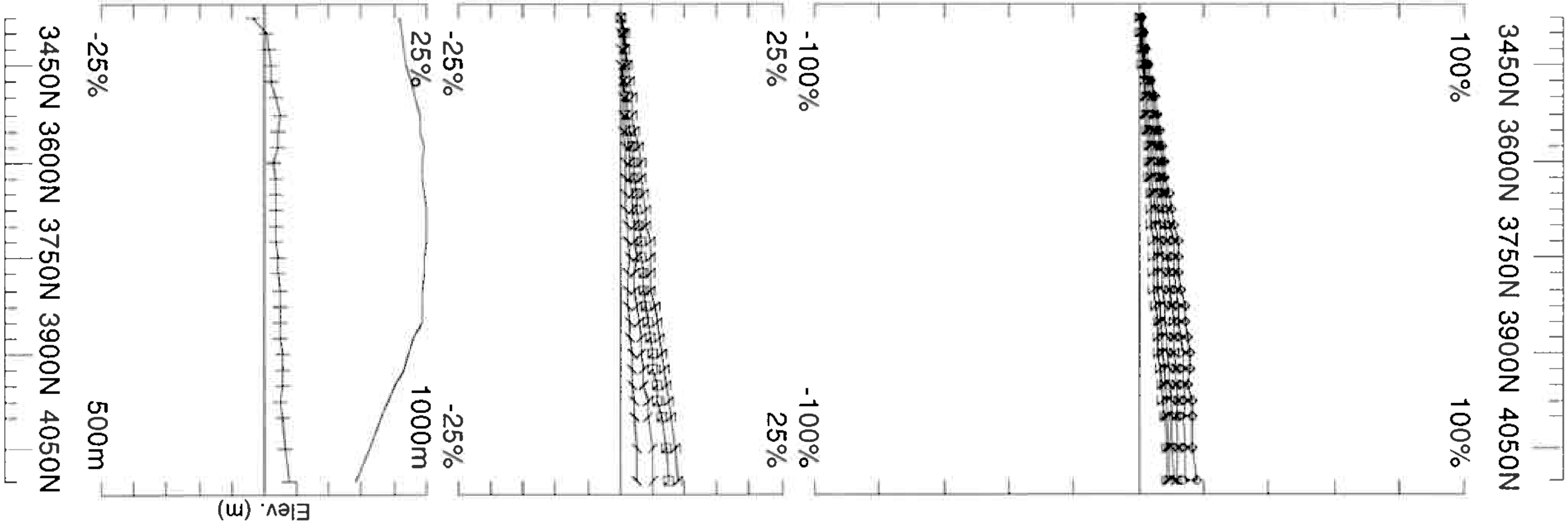
Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

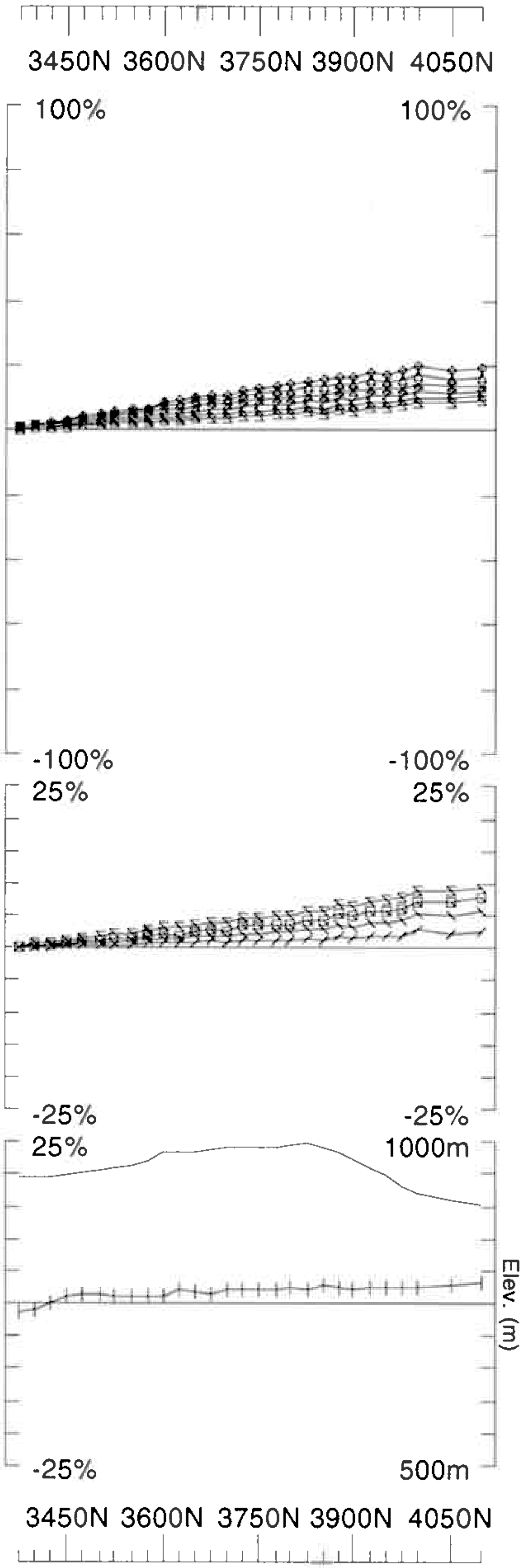
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 22/2/6
Reduced : 22/2/6
Plotted : 18/6/6



Loop: 32	Secondary, (Chn - Ch1)/|Hp|	UTEM Survey at: Espedalen
Line: 10400E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 20/2/6 Reduced : 20/2/6 Plotted : 18/6/6



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

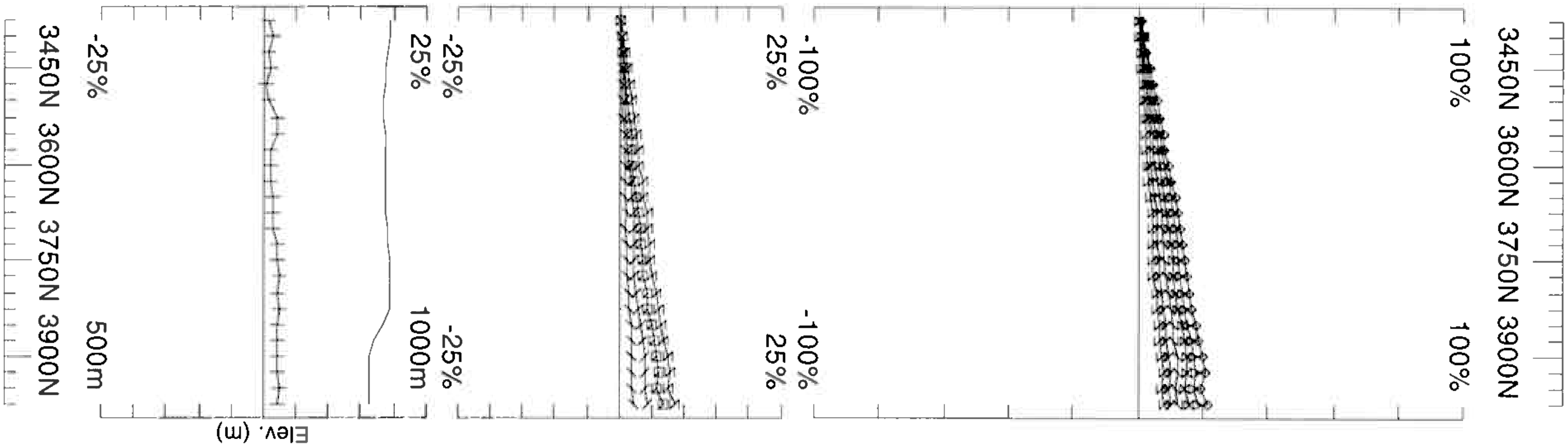
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

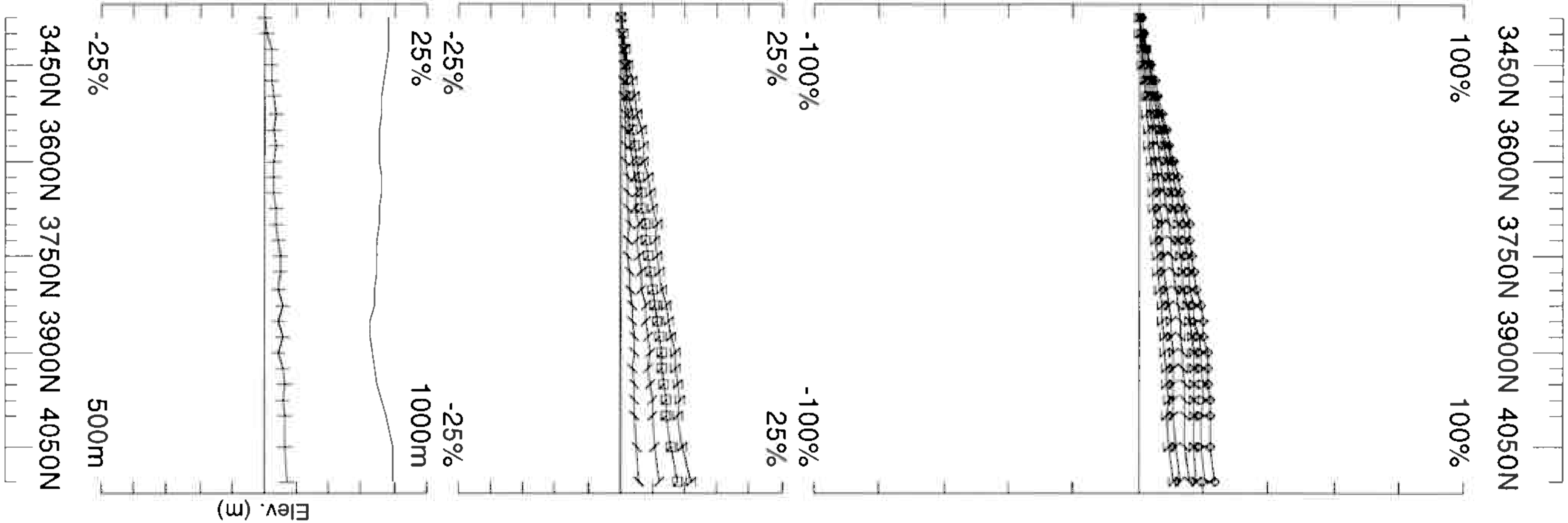
Surveyed : 20/2/6
Reduced : 20/2/6
Plotted : 18/6/6

Loop: 32
Line: 10600E
Compt: Hz

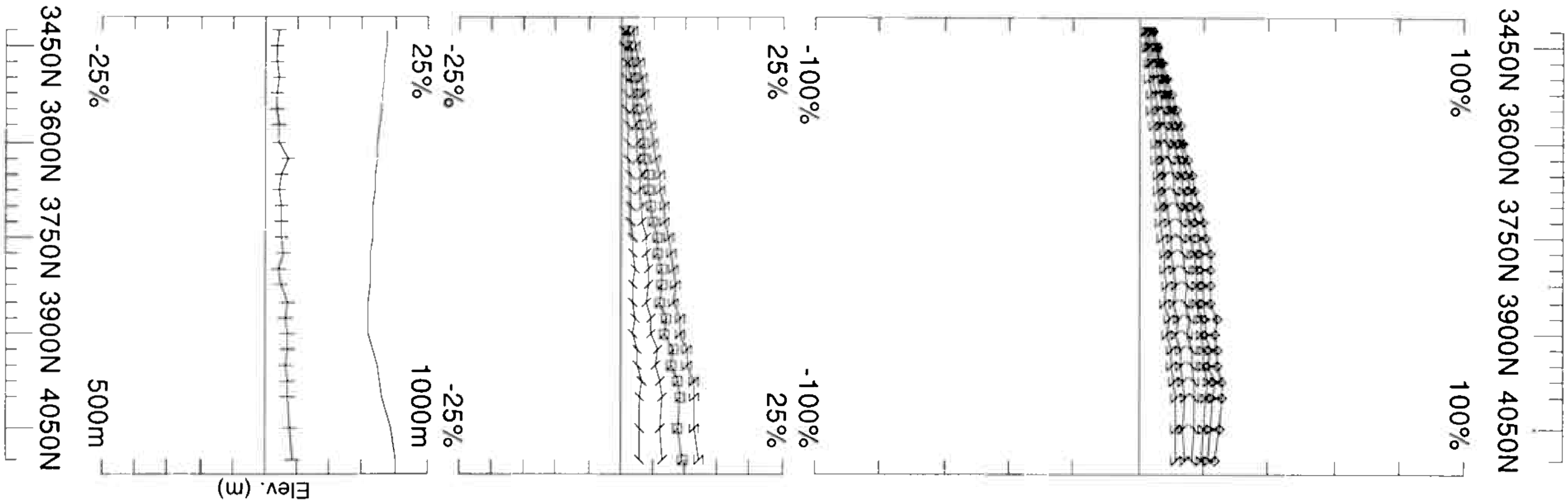
Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



Loop: 32	Secondary, (Chn - Ch1)/|Hp|	UTEM Survey at: Espedalen
Line: 10800E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 17/2/6 Reduced : 21/2/6 Plotted : 18/6/6



Loop: 32	Secondary, (Chn - Ch1)/|Hp|	UTEM Survey at: Espedalen
Line: 11000E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 18/2/6 Reduced : 20/2/6 Plotted : 18/6/6



Loop: 32	Secondary, (Chn - Ch1)/|Hp|	UTEM Survey at: Espedalen
Line: 11200E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 18/2/6 Reduced : 20/2/6 Plotted : 18/6/6

Espedalen

Loop 33

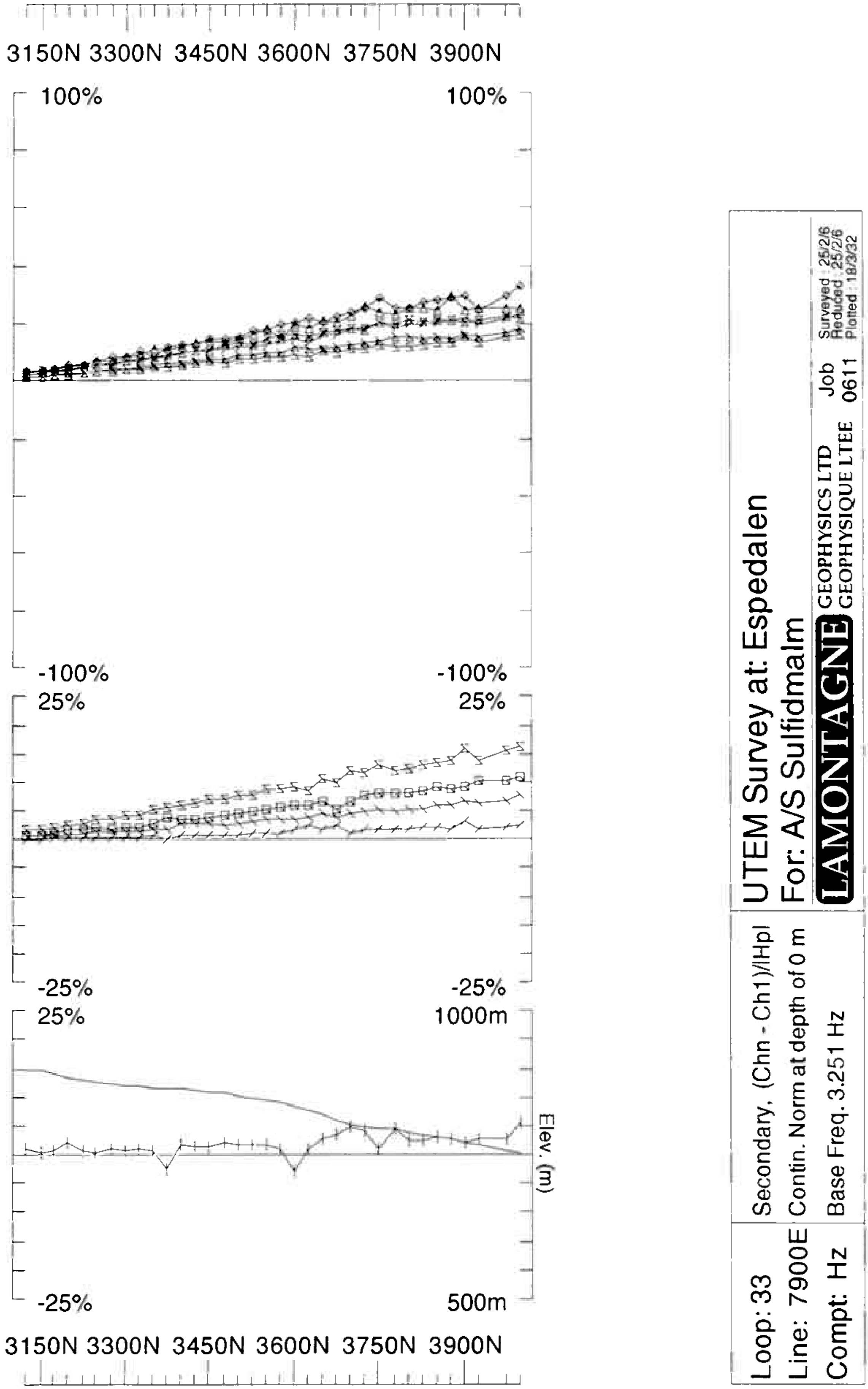
Hz
@3.251 Hz frequency

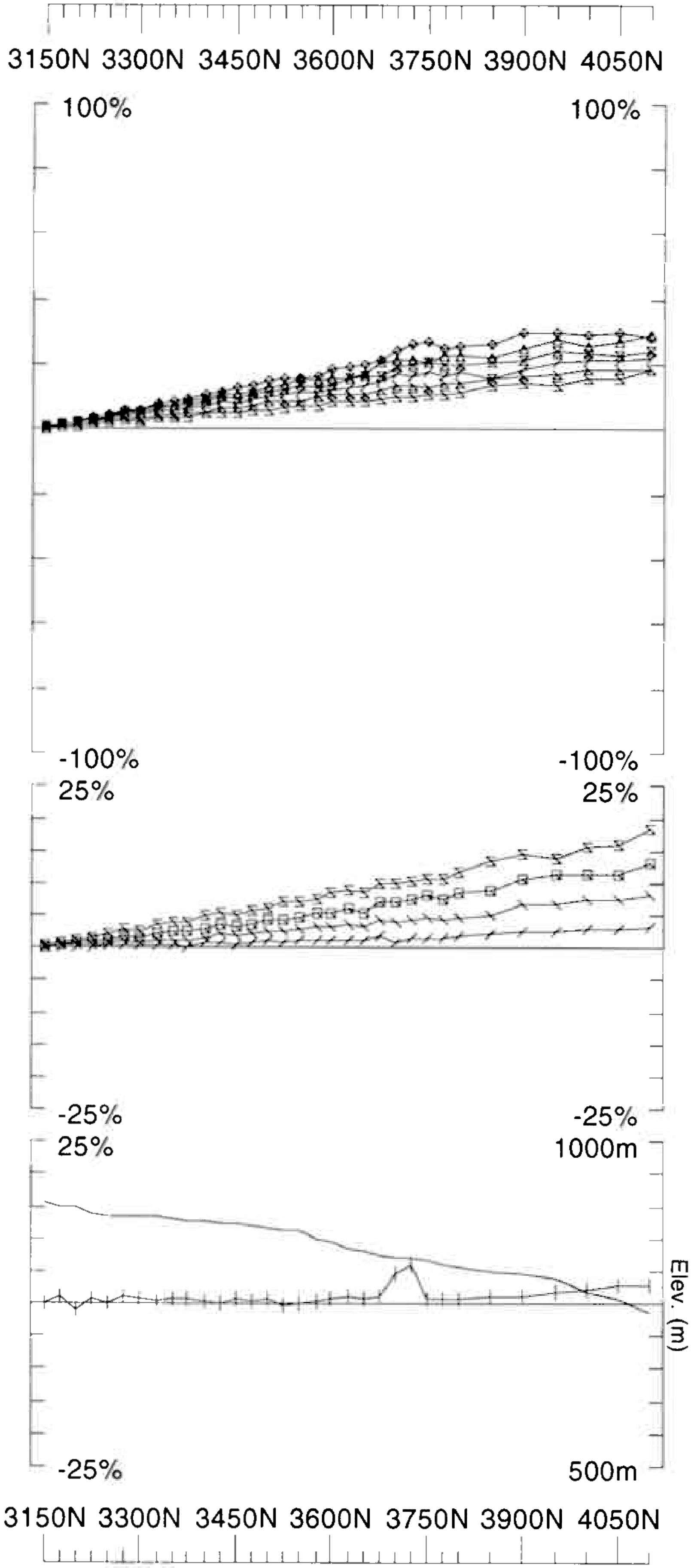
continuous norm

Ch1 reduced

Loop 33	Line 7900E	3125N - 4000N	875m
	Line 8000E	3125N - 4100N	975m
	Line 8200E	3125N - 4000N	875m
	Line 8400E	3125N - 4050N	925m
	Line 8600E	3125N - 4000N	875m
	Line 8800E	3125N - 4050N	925m
	Line 9000E	3125N - 4100N	975m
	Espedalen	Loop 33 Total	6425m

Loop 33 - continuous norm


3150N 3300N 3450N 3600N 3750N 3900N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1000m
Elev. (m)
-25%
500m
3150N 3300N 3450N 3600N 3750N 3900N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job
0611
Surveyed : 25/2/6
Reduced : 25/2/6
Plotted : 18/3/32
Loop: 33
Line: 7900E
Compt: Hz
Secondary, (Chn - Ch1)/IHpI
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



Loop: 33
Line: 8000E
Compt: Hz

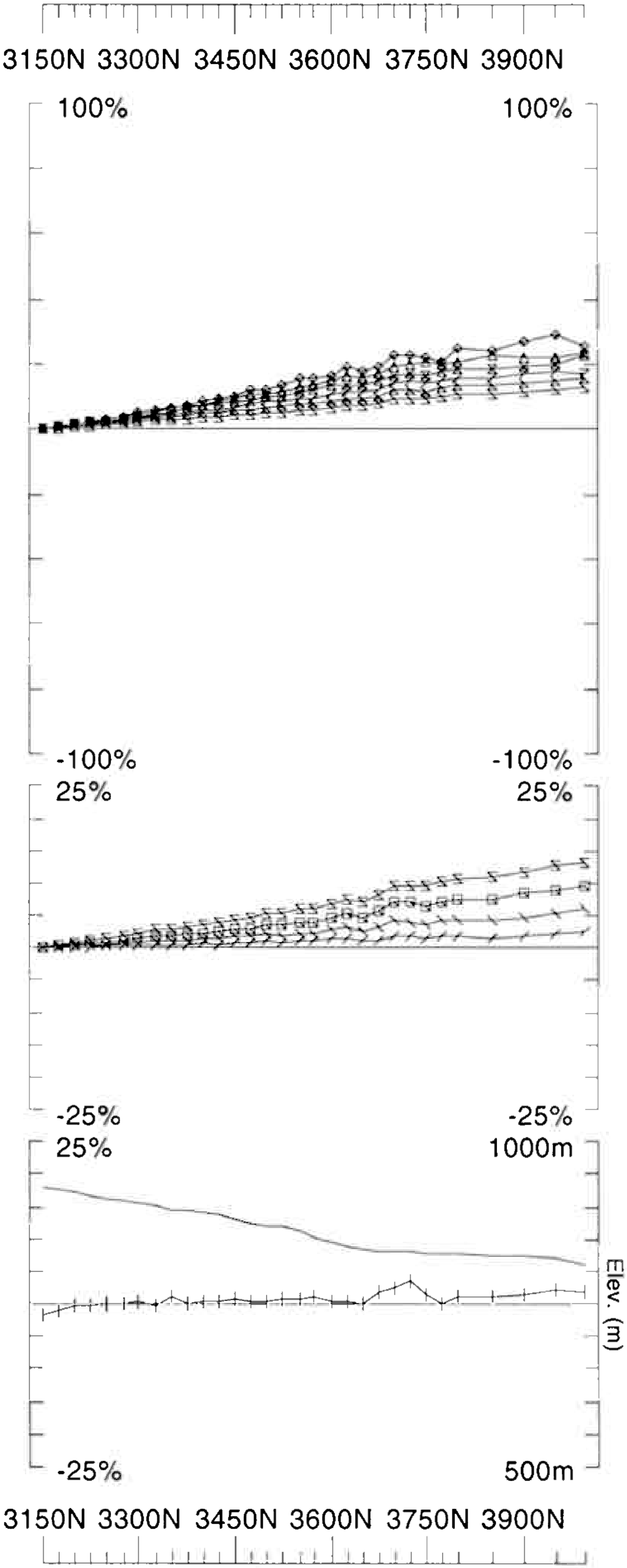
Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 25/2/6
Reduced : 25/2/6
Plotted : 18/6/6



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

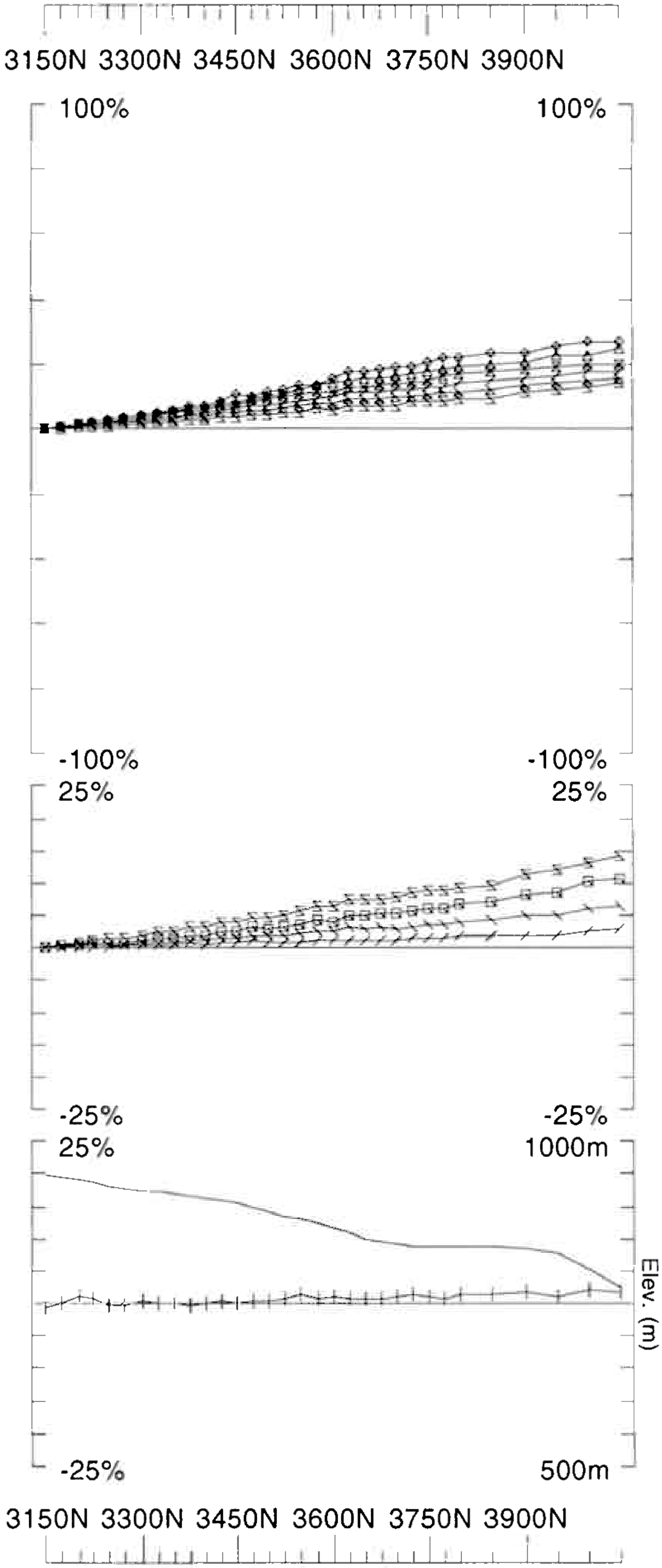
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 24/2/6
Reduced : 24/2/6
Plotted : 18/6/6

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

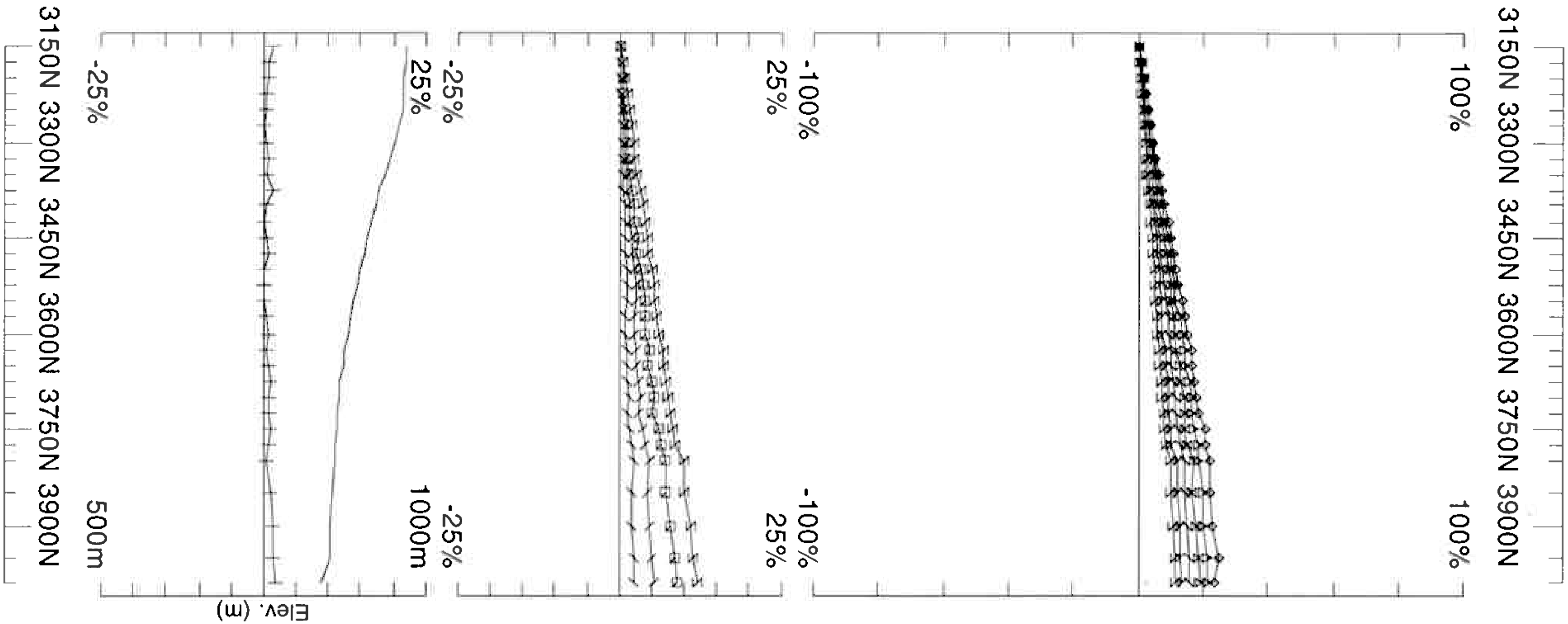
Loop: 33
Line: 8200E
Compt: Hz



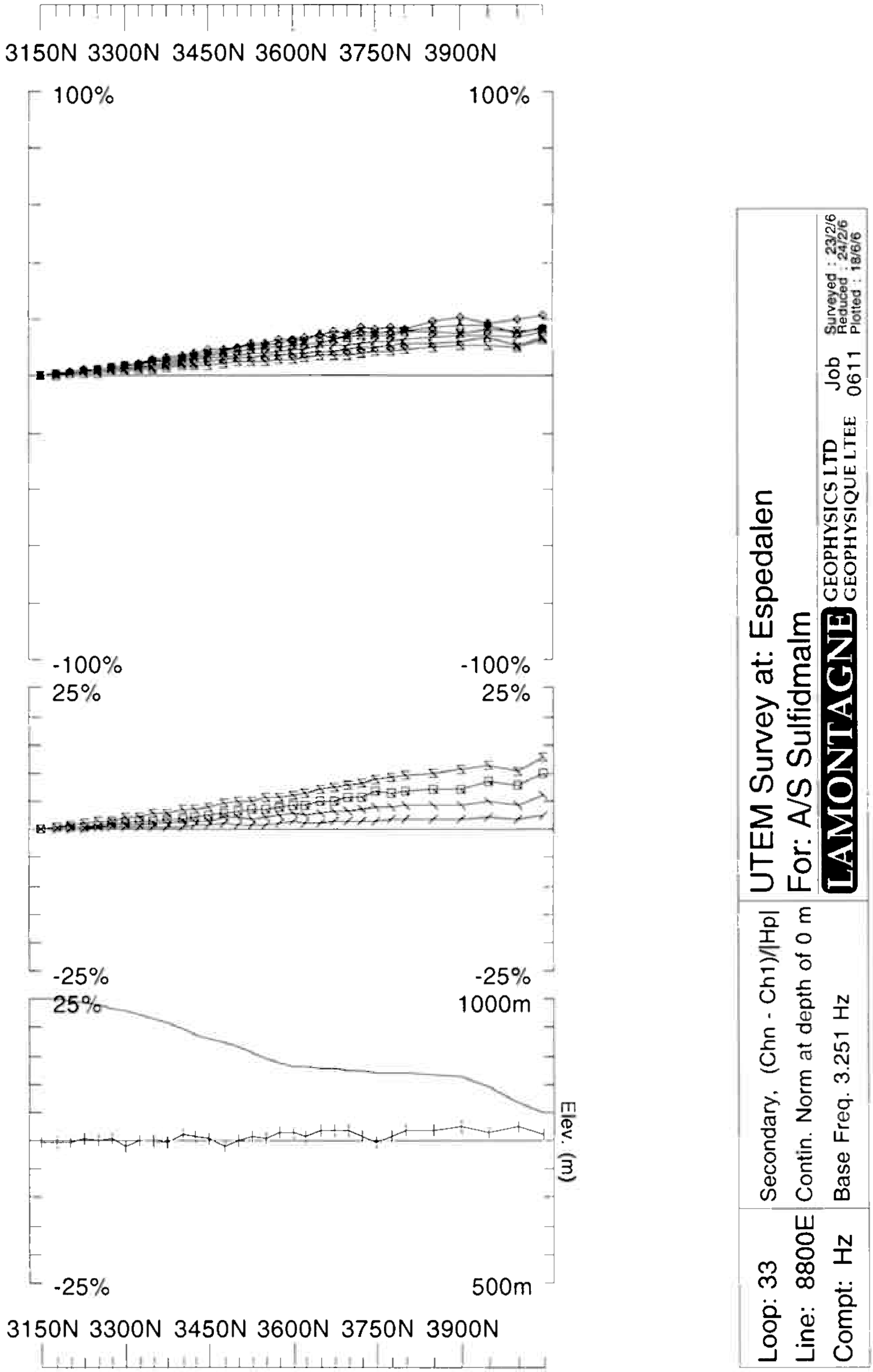
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 24/2/6
Reduced : 24/2/6
Plotted : 18/6/6

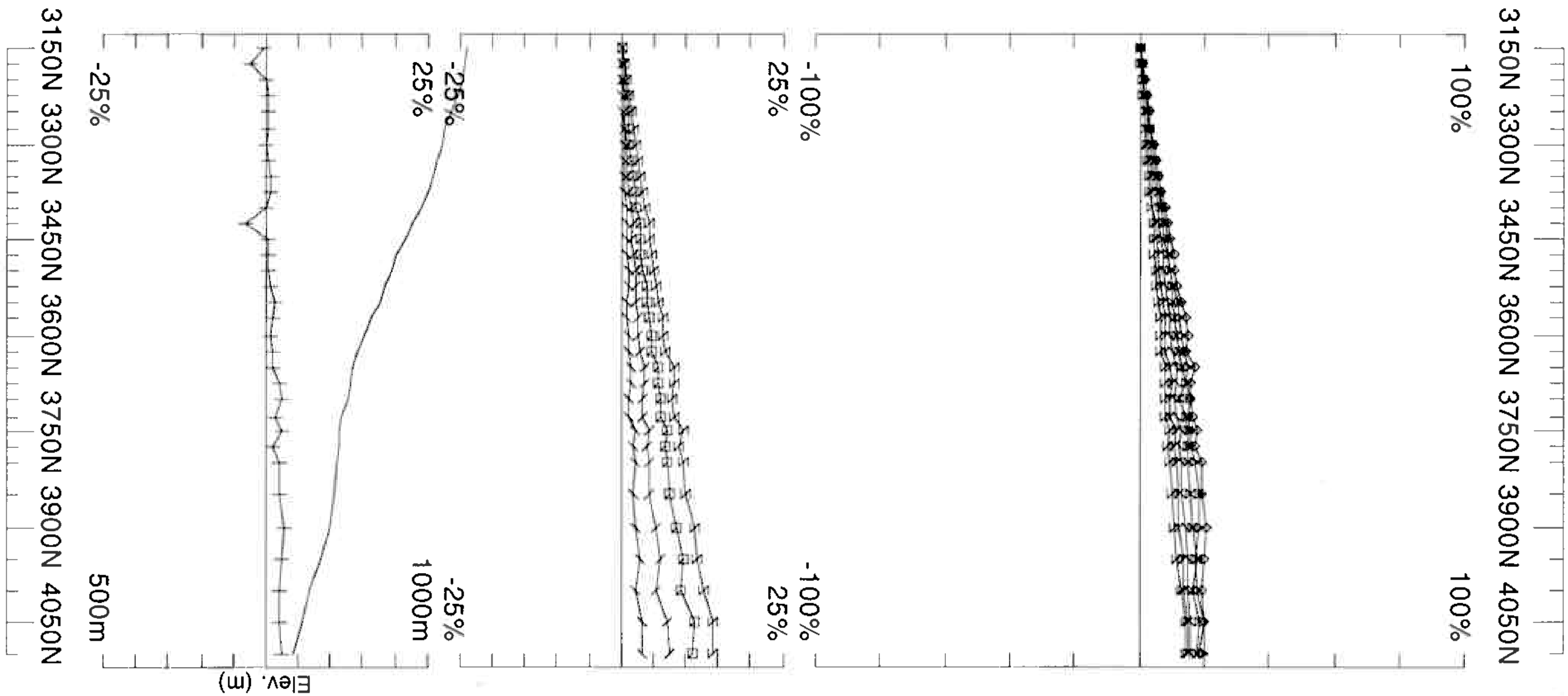
Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Loop: 33
Line: 8400E
Compt: Hz



Loop: 33	Secondary, (Chn - Ch1)/|Hp|	UTEM Survey at: Espedalen
Line: 8600E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 24/2/6 Reduced : 24/2/6 Plotted : 18/6/6


3150N 3300N 3450N 3600N 3750N 3900N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1000m
Elev. (m)
-25%
500m
3150N 3300N 3450N 3600N 3750N 3900N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job 0611
Surveyed : 23/2/6
Reduced : 24/2/6
Plotted : 18/6/6
Loop: 33
Line: 8800E
Compt: Hz
Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



Loop: 33	Secondary, (Chn - Ch1)/|Hp|	UTEM Survey at: Espedalen
Line: 9000E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 23/2/6 Reduced : 24/2/6 Plotted : 18/6/6

Espedalen

Loop 34

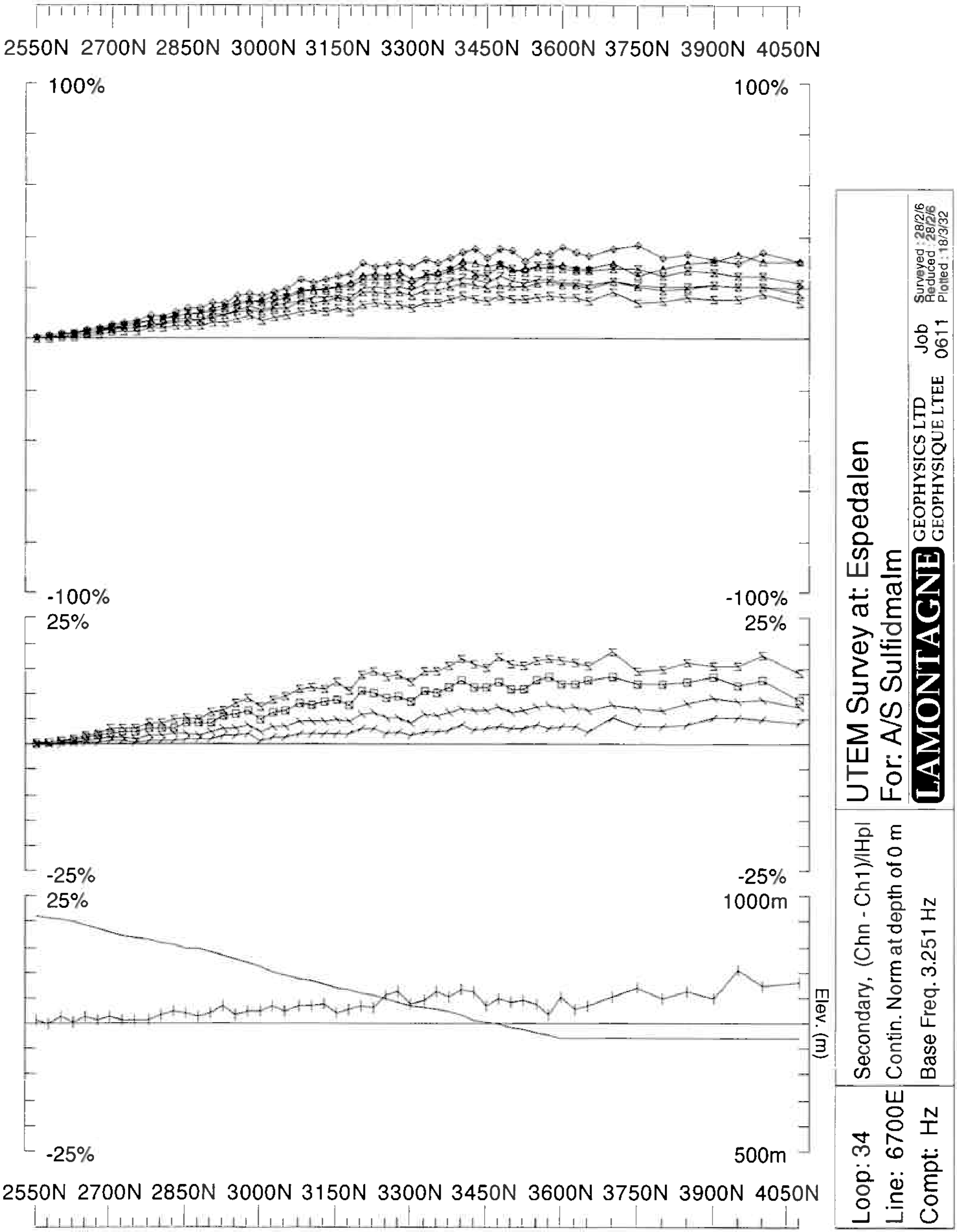
Hz
@3.251 Hz frequency

continuous norm

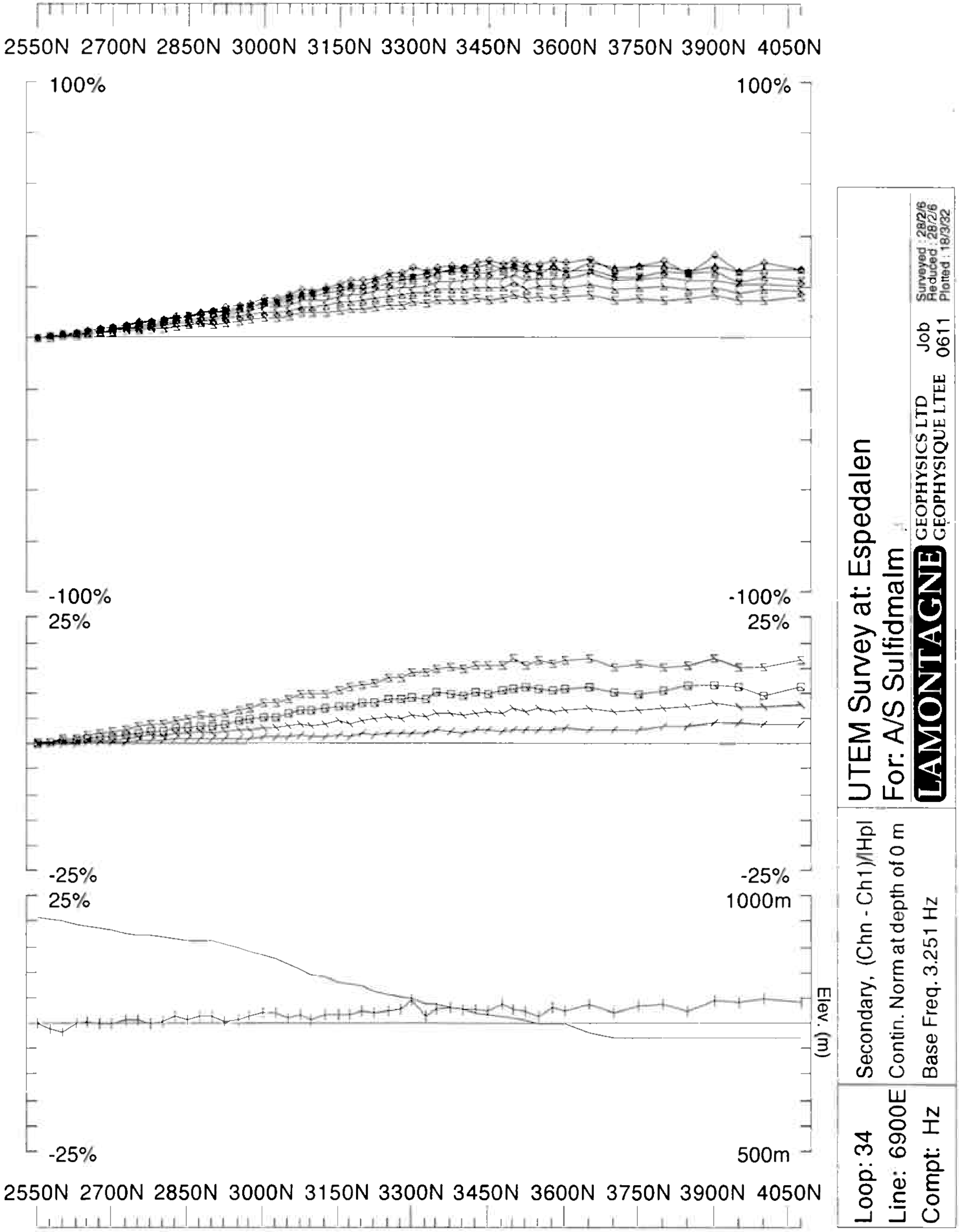
Ch1 reduced

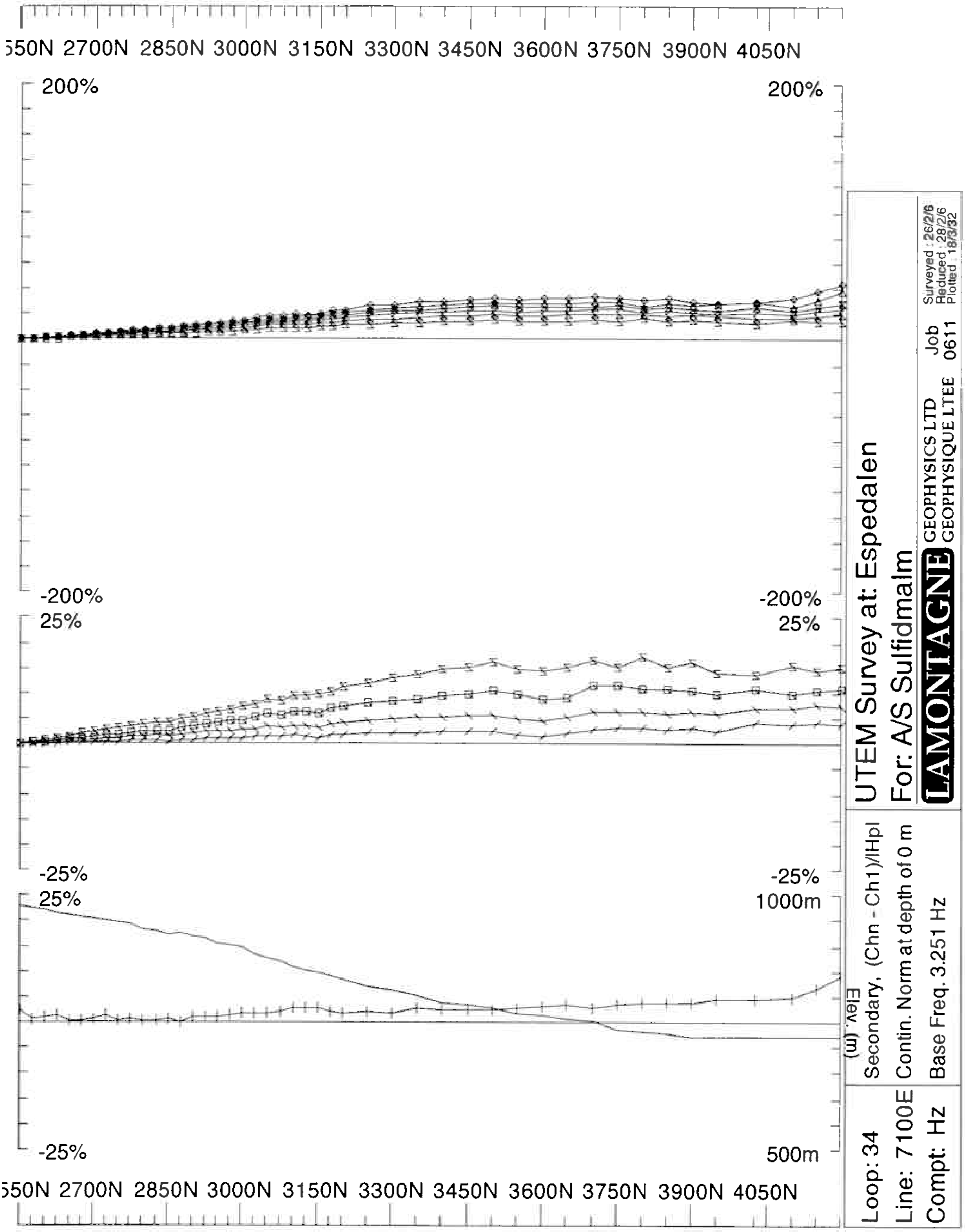
Loop 34	Line 6700E	2525N - 4075N	1550m
	Line 6900E	2525N - 4075N	1550m
	Line 7100E	2525N - 4200N	1675m
	Line 7300E	2525N - 4200N	1675m
	Line 7500E	2525N - 4250N	1725m
	Line 7700E	2525N - 3975N	1450m
	Line 7900E	2525N - 3275N	750m
	Espedalen	Loop 34 Total	10375m

Loop 34 - continuous norm

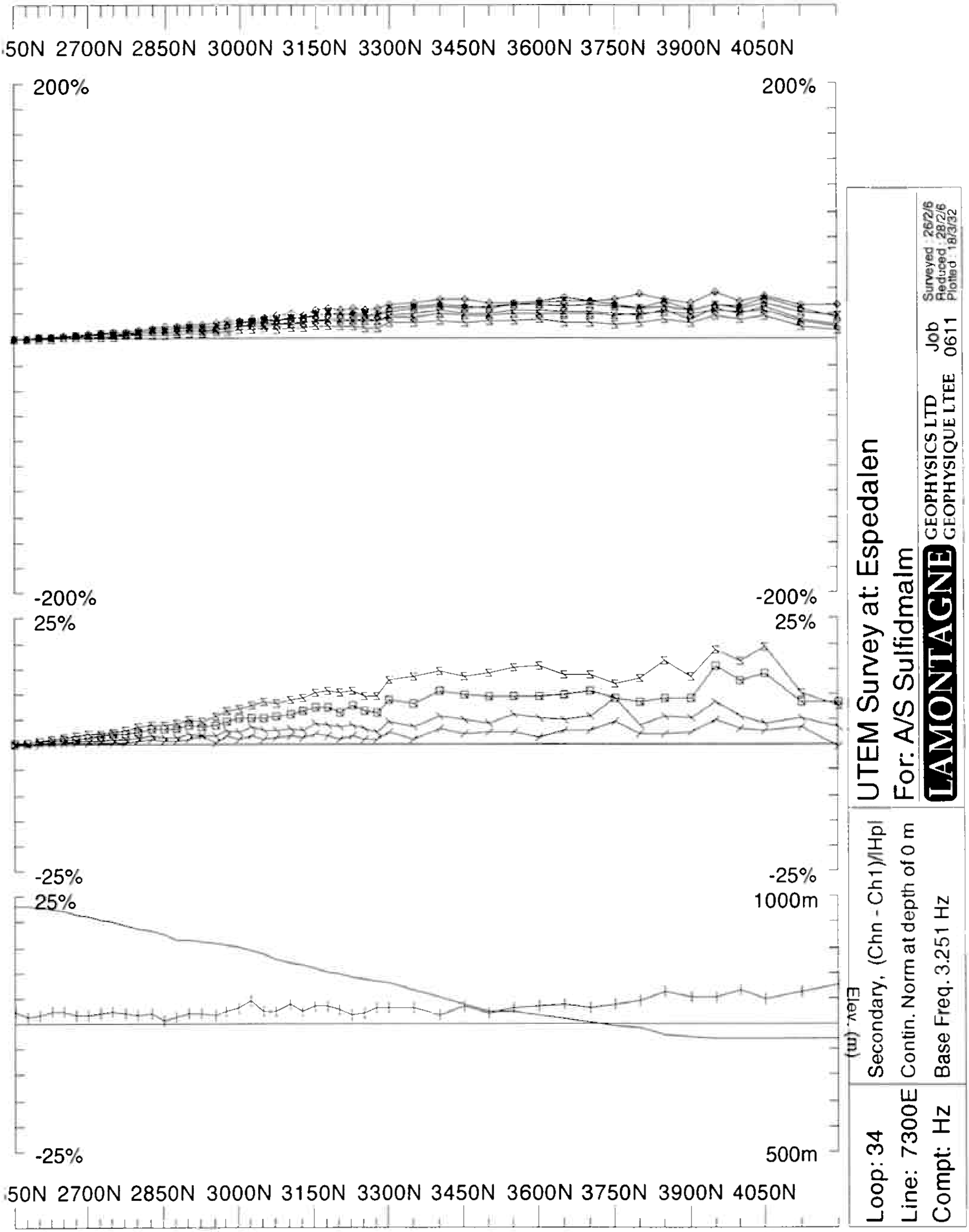


2550N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1000m
Elev. (m)
-25%
500m
2550N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE
GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job
0611
Surveyed : 28/2/6
Reduced : 28/2/6
Plotted : 18/3/32
Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz
Loop: 34
Line: 6700E
Compt: Hz

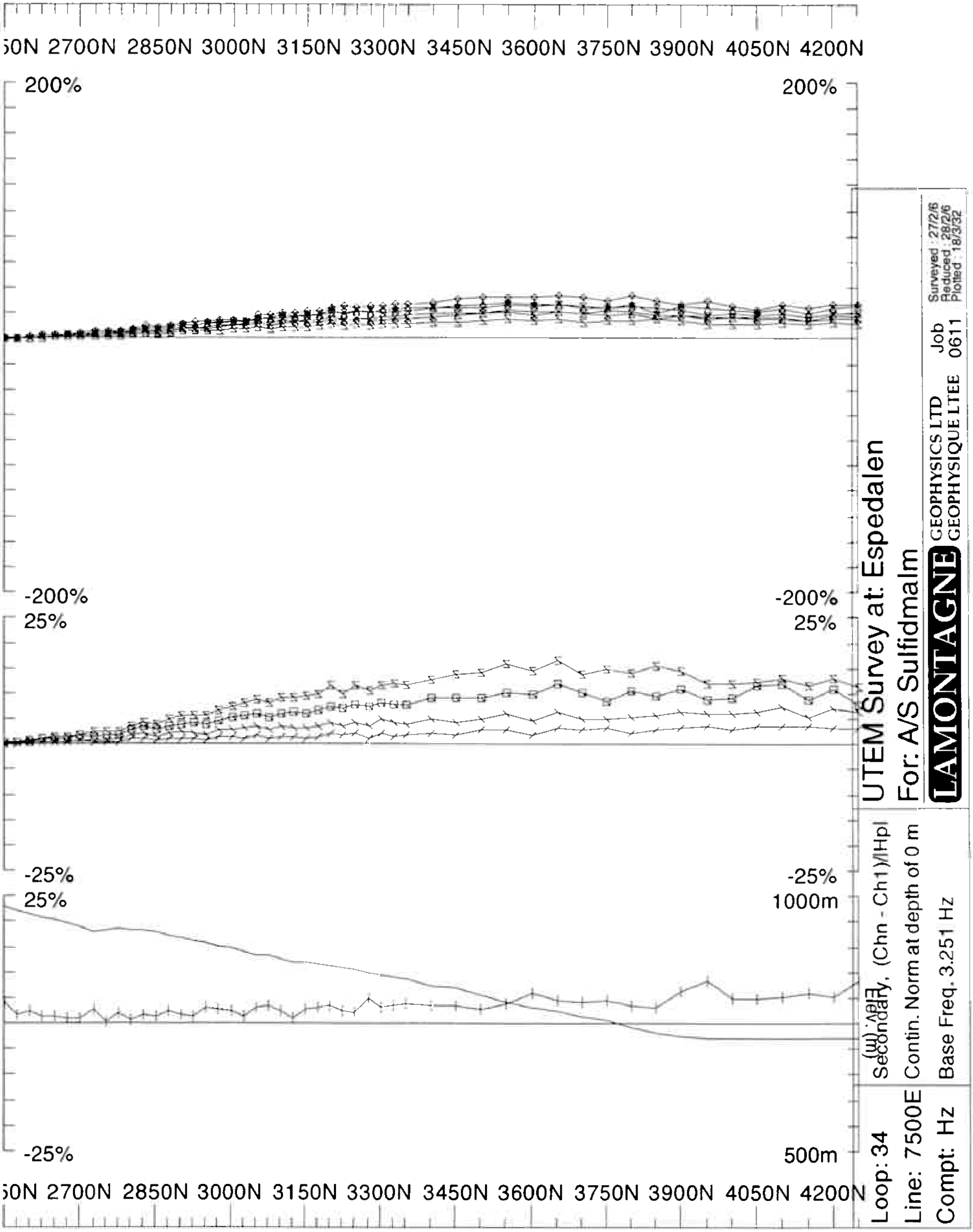

2550N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1000m
Elev. (m)
-25%
500m
2550N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job
0611
Surveyed : 28/2/6
Reduced : 28/2/6
Plotted : 18/3/32
Secondary, (Chn - Ch1)/Hpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz
Loop: 34
Line: 6900E
Compt: Hz

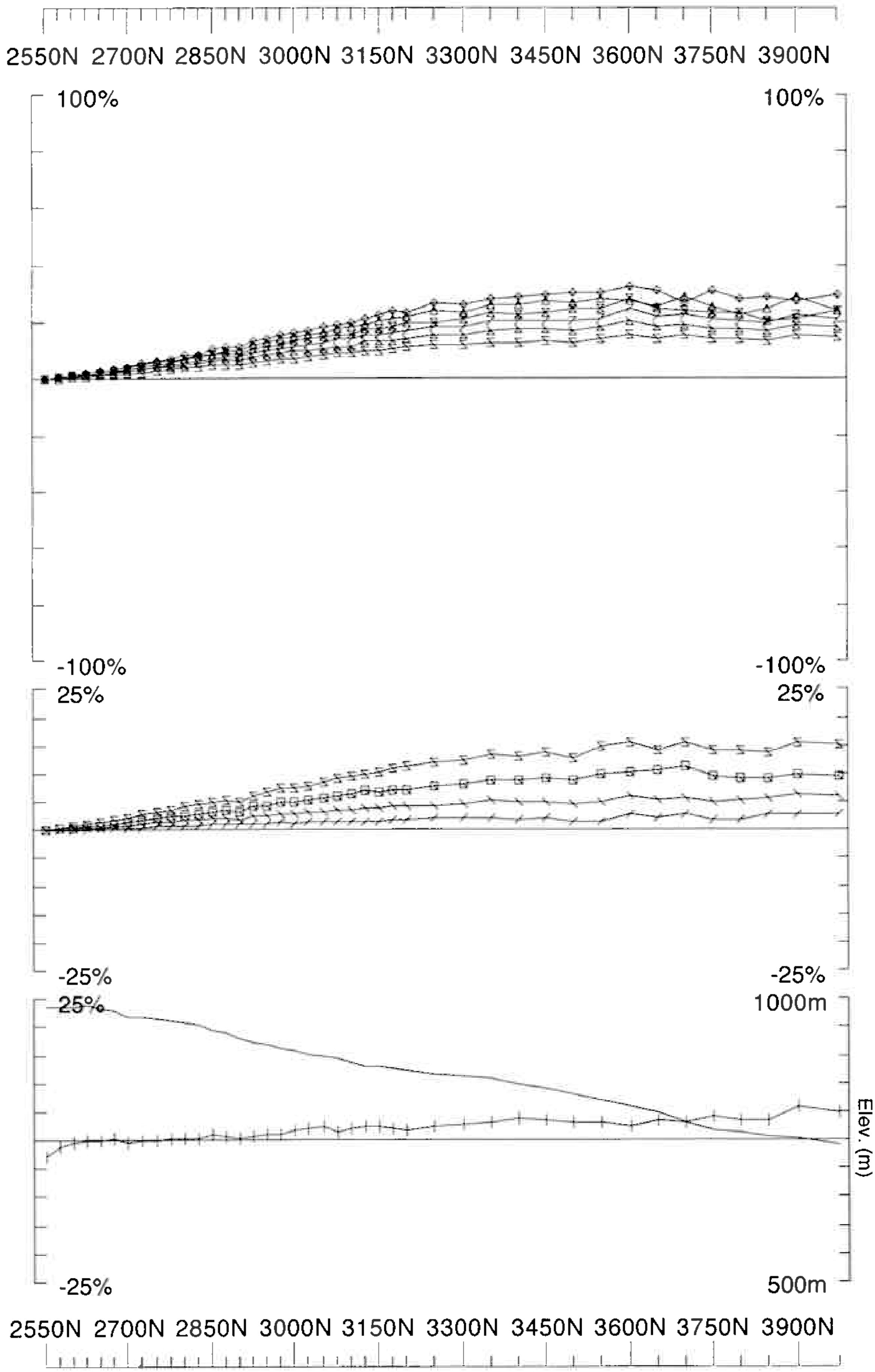


550N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
200%
-200%
25%
-25%
25%
-25%
1000m
500m
Elev. (m)
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 26/2/6
Reduced : 28/2/6
Plotted : 18/3/32
Secondary, (Chn - Ch1)/lHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz
Loop: 34
Line: 7100E
Compt: Hz



50N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
200%
200%
-200%
-200%
25%
25%
-25%
-25%
25%
1000m
-25%
500m
Elev. (m)
50N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE
GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job
0611
Secondary, (Chn - Ch1)/Hpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz
Loop: 34
Line: 7300E
Compt: Hz

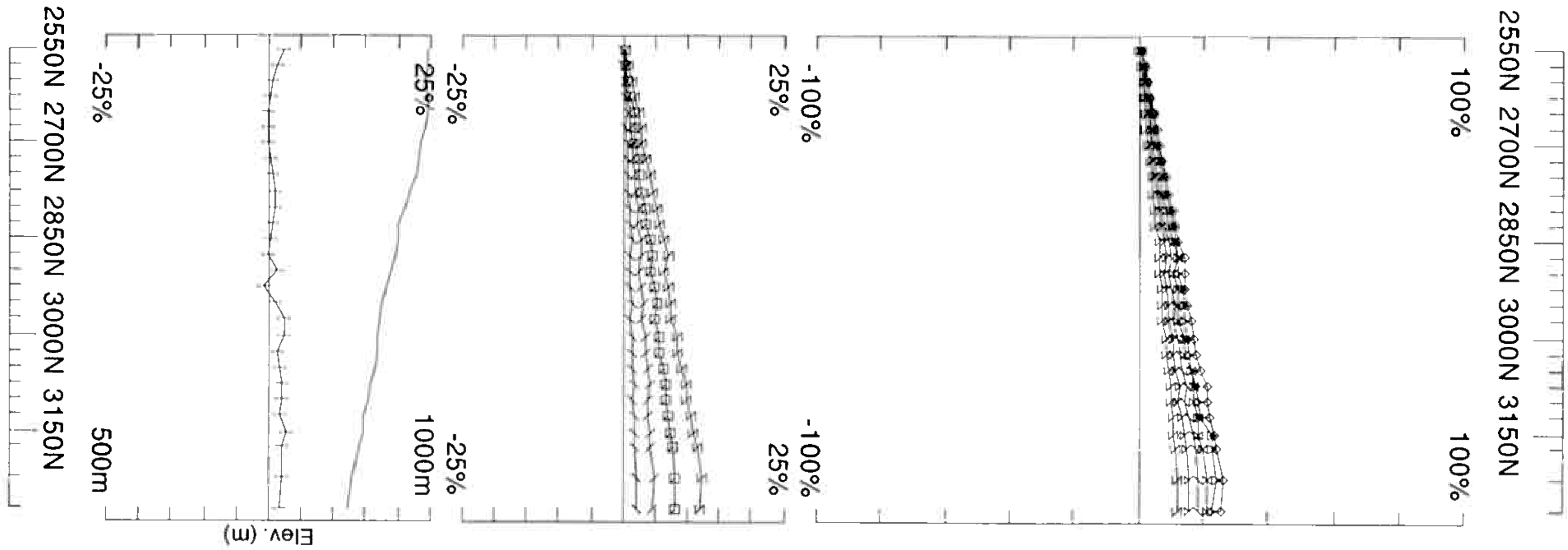

2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N 4200N
200%
200%
-200%
-200%
25%
25%
-25%
-25%
25%
1000m
-25%
500m
2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N 4200N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE
GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job
0611
Secondary, (Chn - Ch1)/IHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz
Loop: 34
Line: 7500E
Compt: Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job 0611
Surveyed : 27/2/6
Reduced : 28/2/6
Plotted : 18/3/32

Loop: 34
Line: 7700E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



Loop: 34	Secondary, (Chn - Ch1)/|Hp|	UTEM Survey at: Espedalen
Line: 7900E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 27/2/6 Reduced : 28/2/6 Plotted : 18/3/32

Espedalen

Loop 35

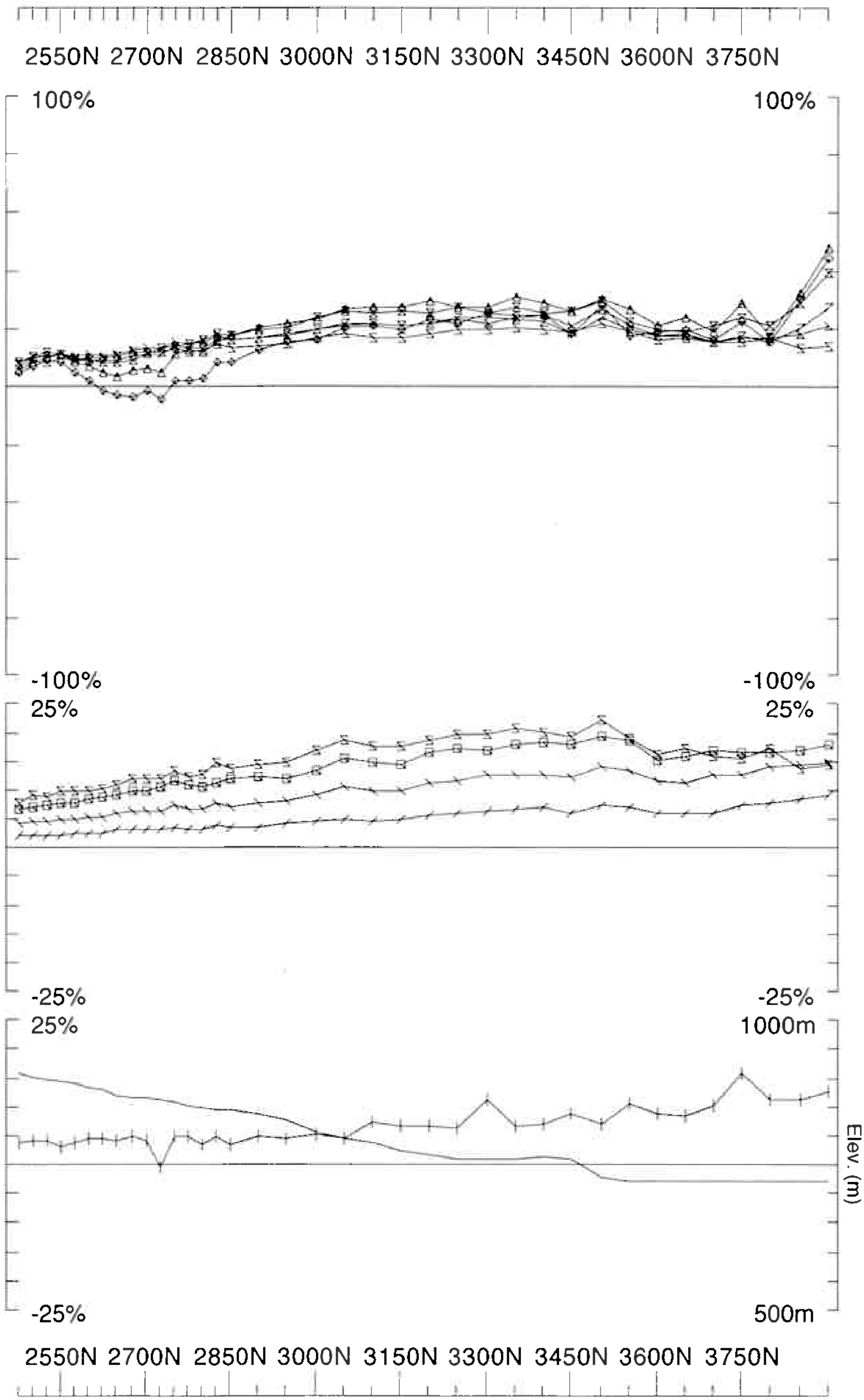
Hz
@3.251 Hz frequency

continuous norm

Ch1 reduced

Loop 35	Line 5100E	2475N - 3900N	1425m
	Line 5300E	2375N - 3825N	1450m
	Line 5500E	2375N - 3825N	1450m
	Line 5700E	2375N - 3825N	1450m
	Line 5900E	2375N - 3900N	1525m
	Line 6100E	2375N - 3800N	1425m
	Line 6300E	2375N - 3825N	1450m
	Line 6500E	2375N - 3850N	1475m
	Espedalen	Loop 35 Total	11425m

Loop 35 - continuous norm



UTEM Survey at: Espedalen

For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 1/3/6
Reduced : 3/3/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/|Hp|

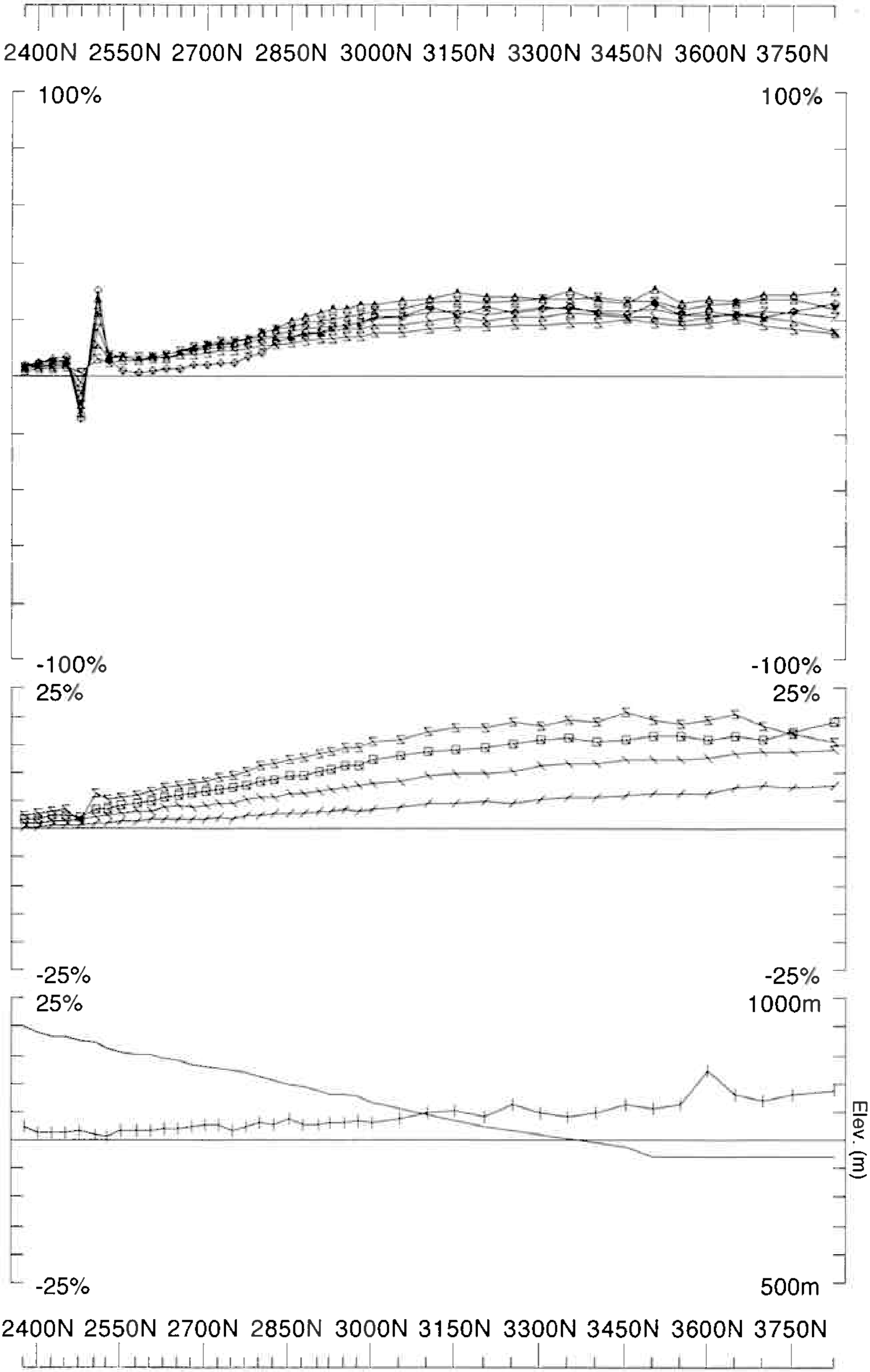
Contin. Norm at depth of 0 m

Base Freq. 3.251 Hz

Loop: 35

Line: 5100E

Compt: Hz



UTEM Survey at: Espedalen

For: A/S Sulfidmalm

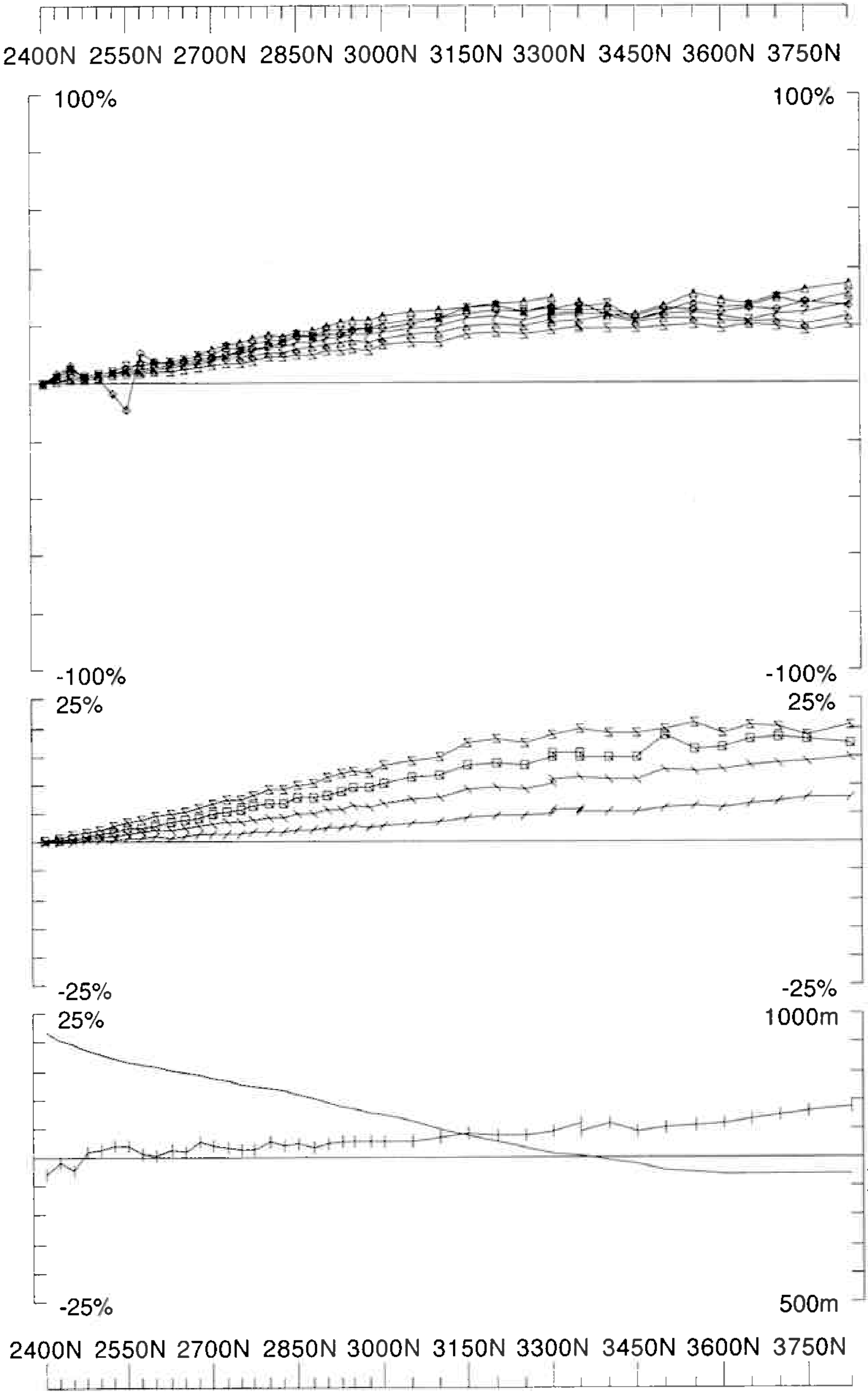
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 1/3/6
Reduced : 3/3/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Loop: 35
Line: 5300E
Compt: Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

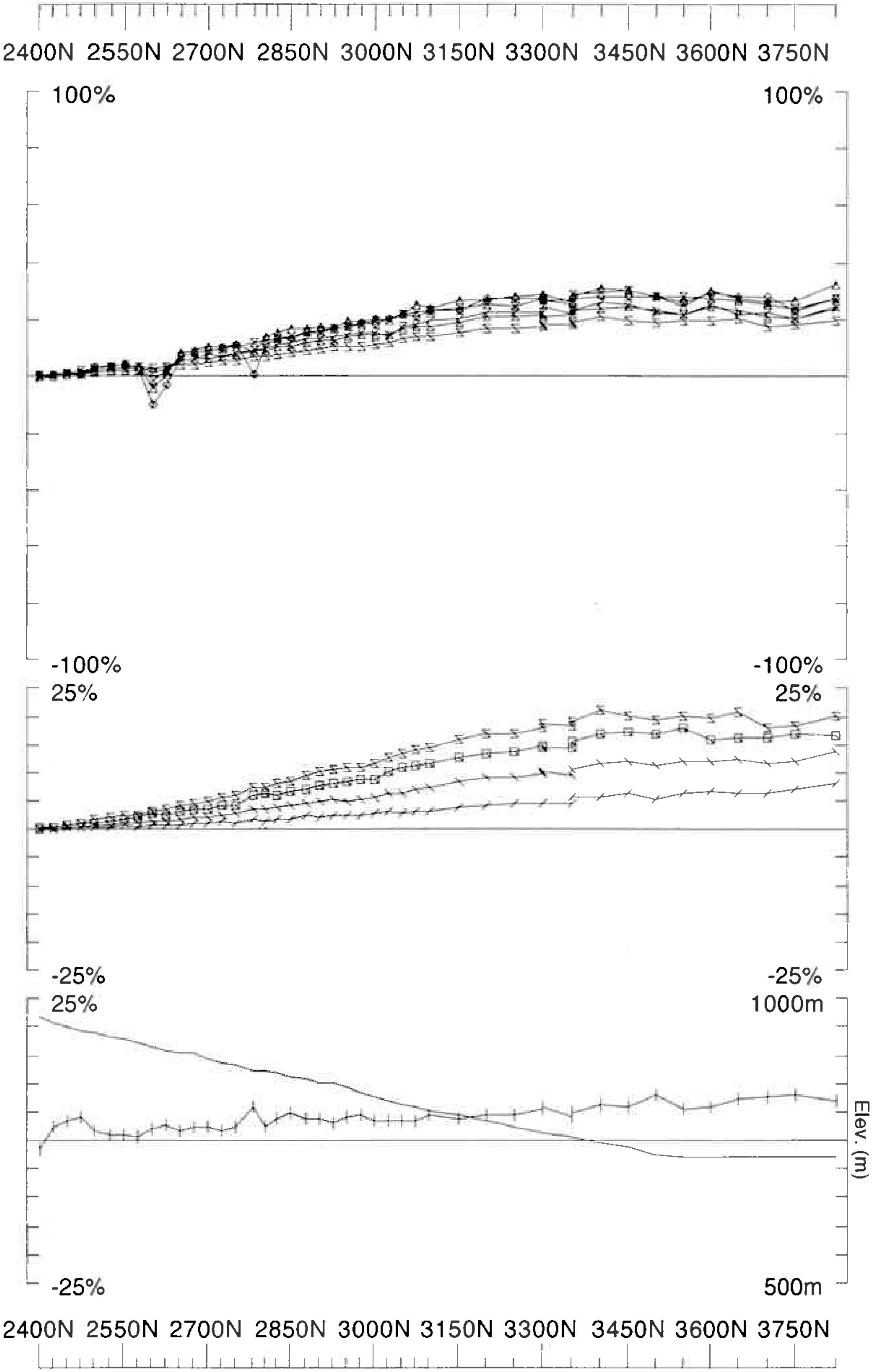
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 2/3/6
Reduced : 2/3/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Loop: 35
Line: 5500E
Compt: Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

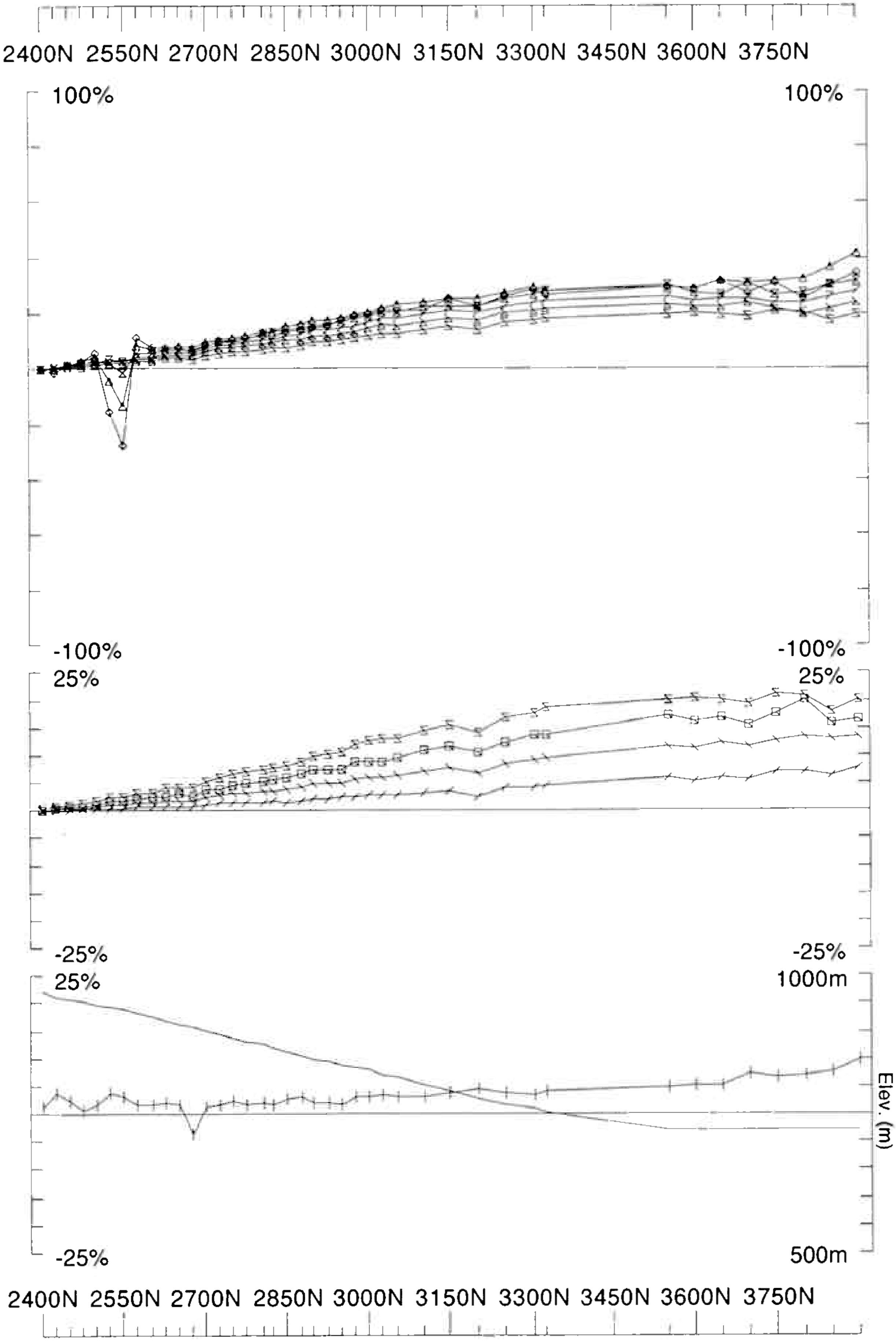
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 1/3/6
Reduced : 1/3/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/IHpI
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Loop: 35
Line: 5700E
Compt: Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

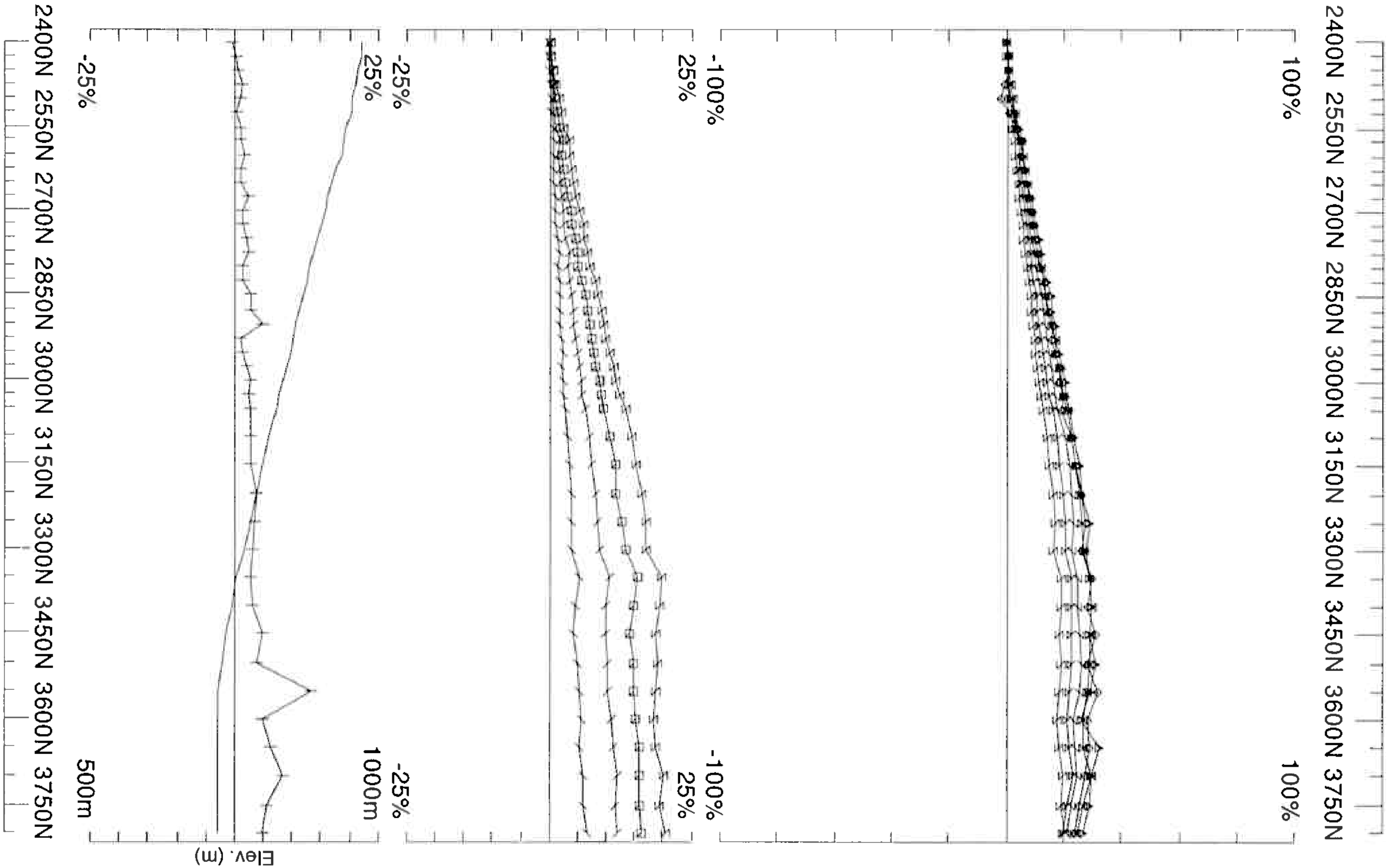
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

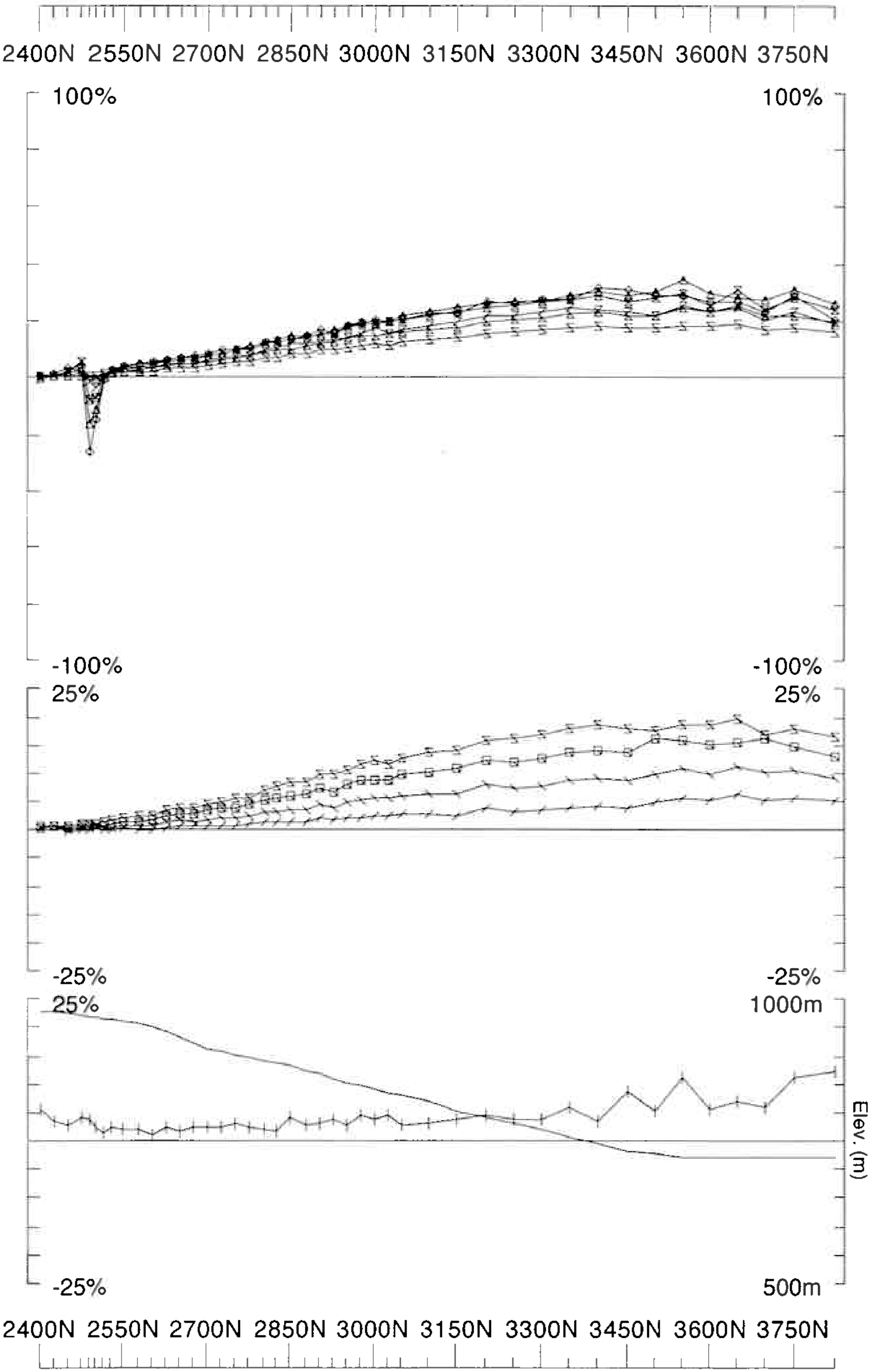
Surveyed : 2/3/6
Reduced : 2/3/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/lHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Loop: 35
Line: 5900E
Compt: Hz



Loop: 35 Line: 6100E Compt: Hz	Secondary, (Chn - Ch1)/lHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 3/3/6 Reduced : 3/3/6 Plotted : 18/3/32



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

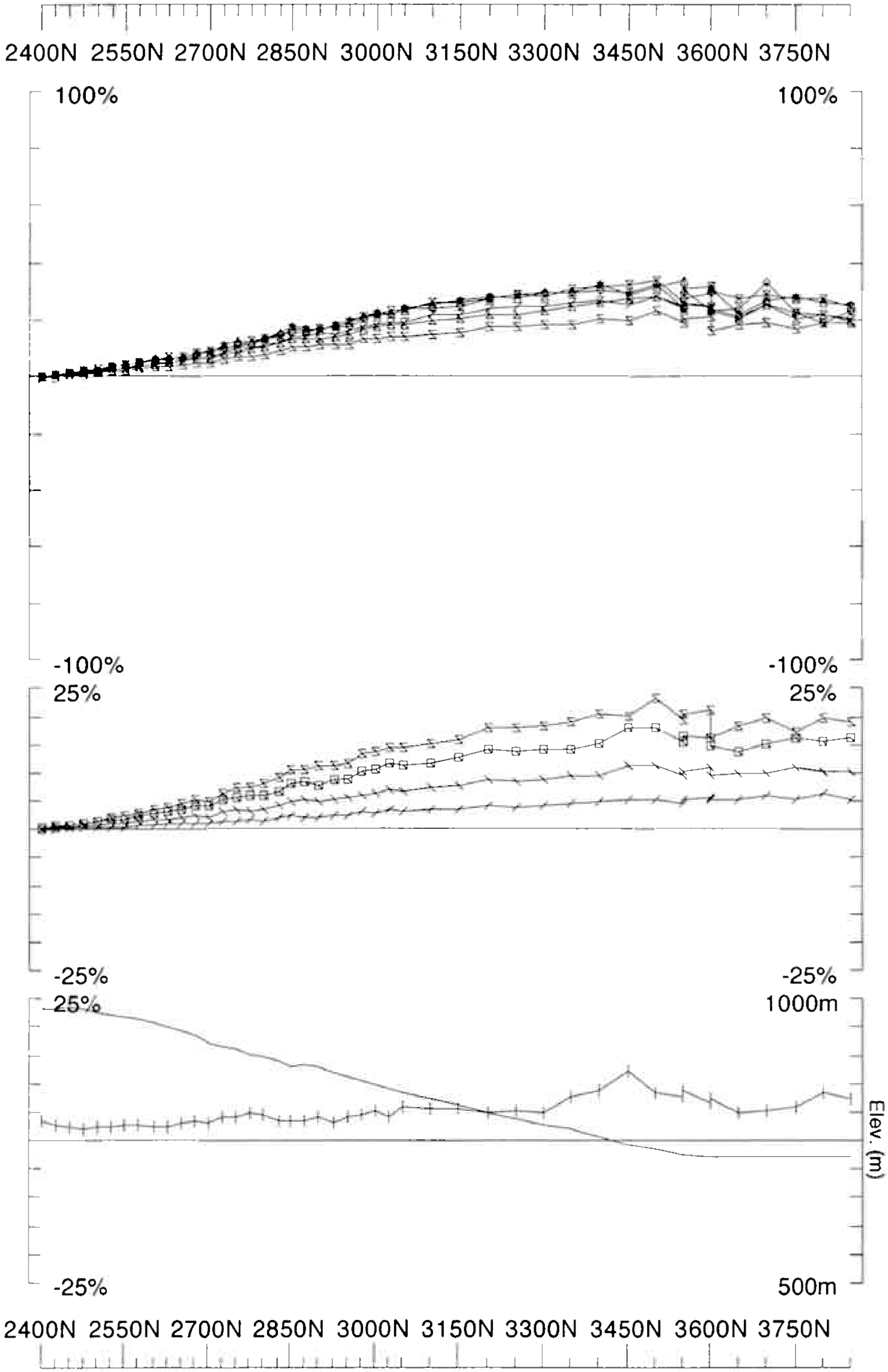
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

Surveyed : 3/3/6
Reduced : 3/3/6
Plotted : 18/3/32

Loop: 35
Line: 6300E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen

For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed: 2/3/6
Reduced: 2/3/6
Plotted: 18/3/32

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Loop: 35
Line: 6500E
Compt: Hz

Espedalen

Loop 36

Hz

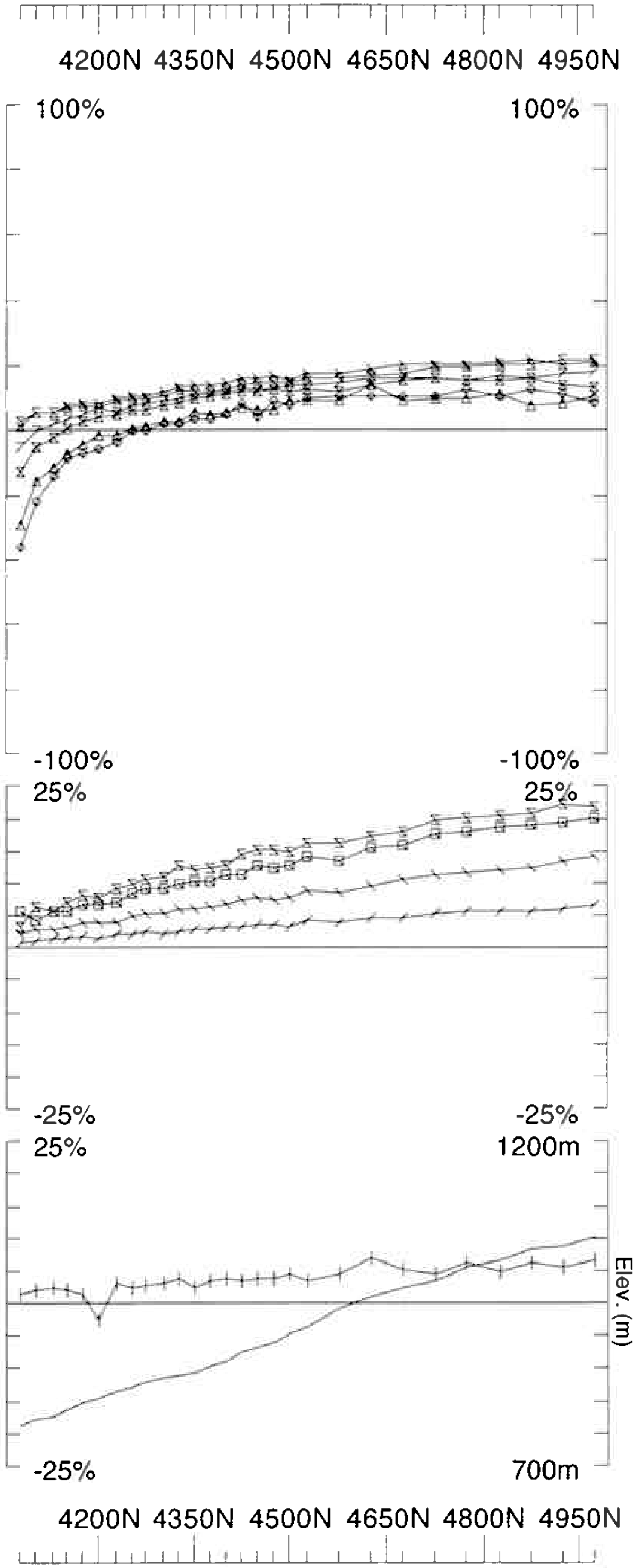
@3.251 Hz frequency

continuous norm

Ch1 reduced

Loop 36	Line 5300E	4075N - 4975N	900m
	Line 5500E	4100N - 4975N	875m
	Line 5700E	4050N - 4975N	925m
	Line 5900E	4025N - 5000N	975m
	Line 6100E	3850N - 4975N	1125m
	Line 6200E	4000N - 4450N	450m
	Line 6300E	4025N - 5025N	1000m
	Line 6500E	4225N - 5075N	850m
	Espedalen	Loop 36 Total	7100m

Loop 36 - continuous norm



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

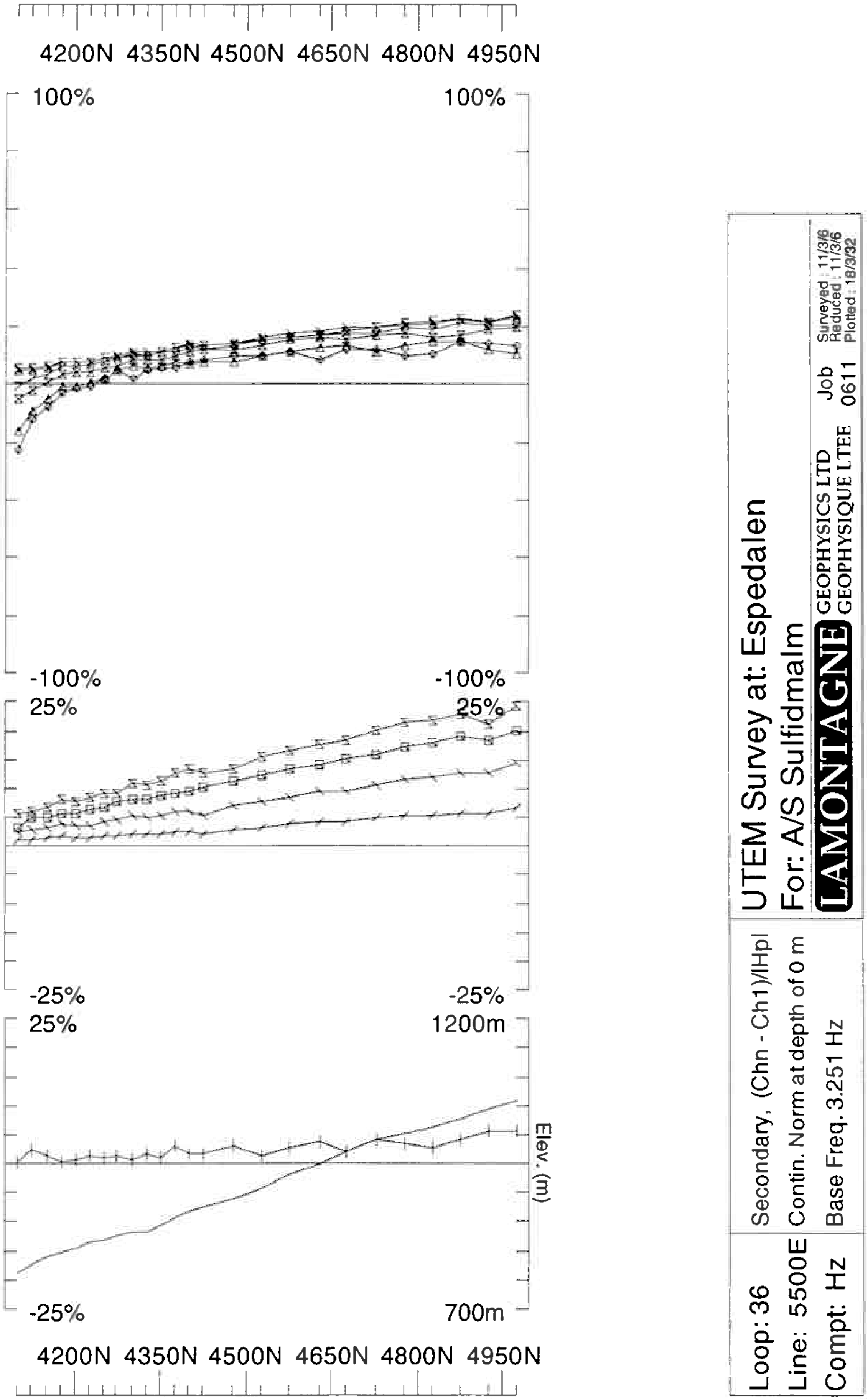
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

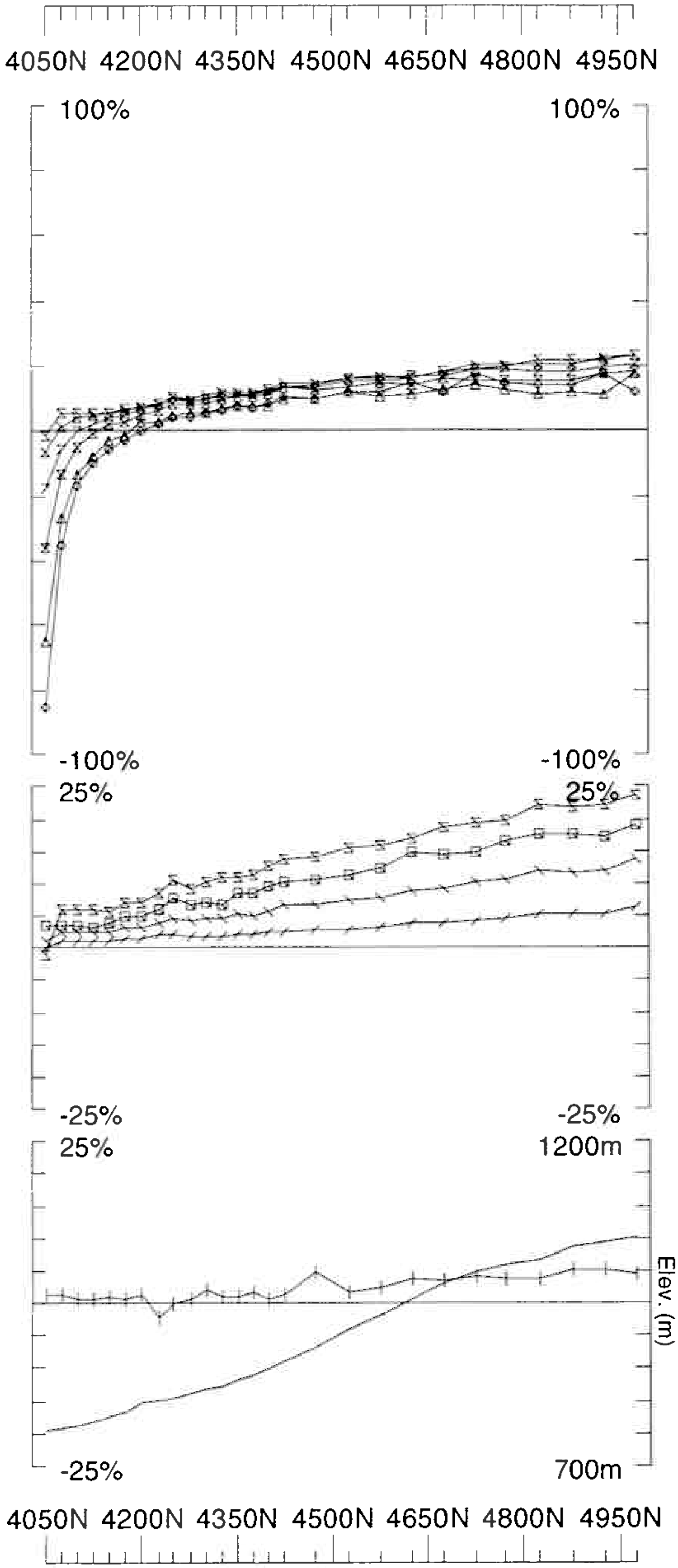
Surveyed : 11/3/6
Reduced : 11/3/6
Plotted : 18/3/32

Loop: 36
Line: 5300E
Compt: Hz

Secondary, (Chn - Ch1)/lHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



4200N 4350N 4500N 4650N 4800N 4950N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1200m
Elev. (m)
-25%
700m
4200N 4350N 4500N 4650N 4800N 4950N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 11/3/6
Reduced : 11/3/6
Plotted : 18/3/32
Loop: 36
Line: 5500E
Compt: Hz
Secondary, (Chn - Ch1)/IHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

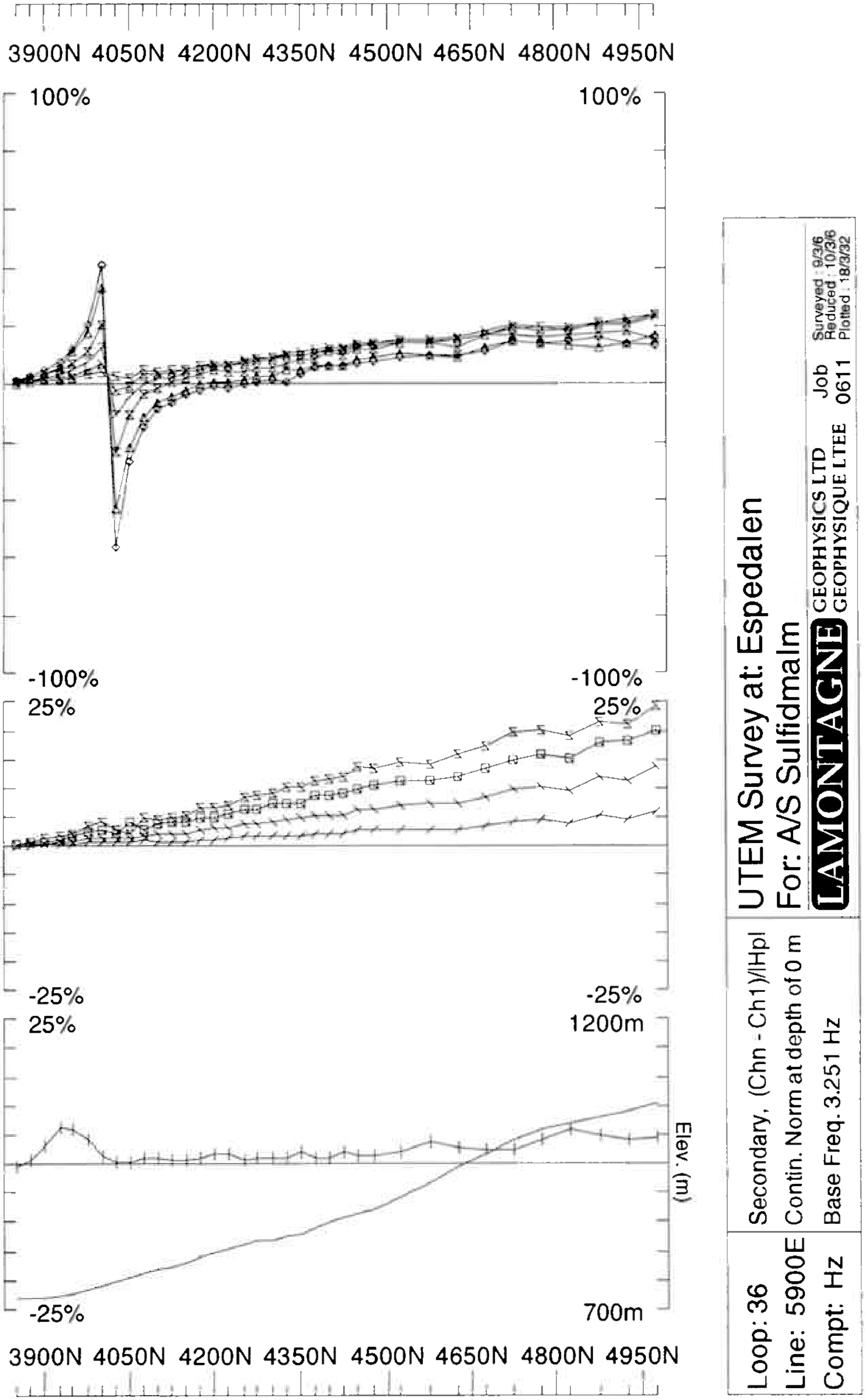
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

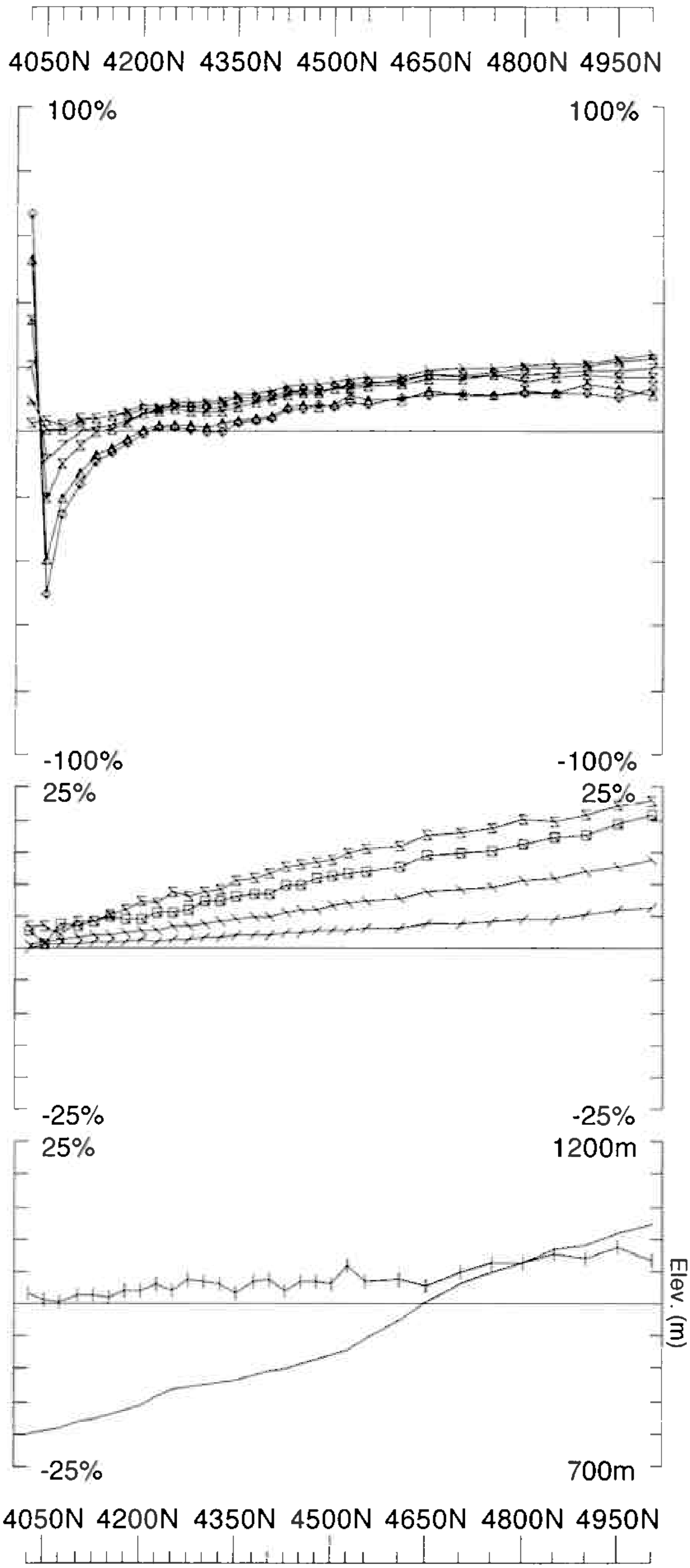
Surveyed : 10/3/6
Reduced : 10/3/6
Plotted : 18/3/32

Loop: 36
Line: 5700E
Compt: Hz

Secondary, (Chn - Ch1)/lHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



3900N 4050N 4200N 4350N 4500N 4650N 4800N 4950N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1200m
Elev. (m)
-25%
700m
3900N 4050N 4200N 4350N 4500N 4650N 4800N 4950N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job
0611
Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz
Loop: 36
Line: 5900E
Compt: Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

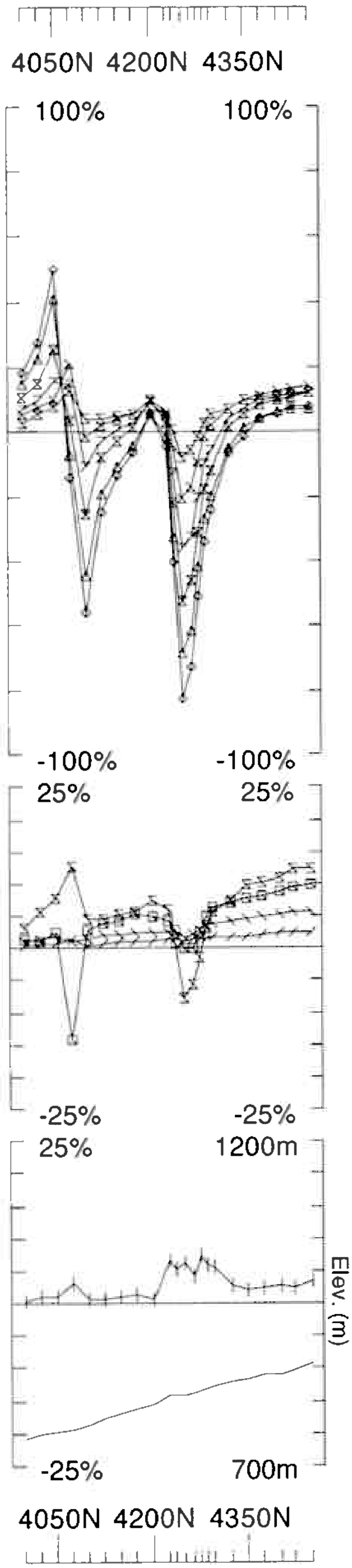
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 9/3/6
Reduced : 10/3/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/IHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Loop: 36
Line: 6100E
Compt: Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

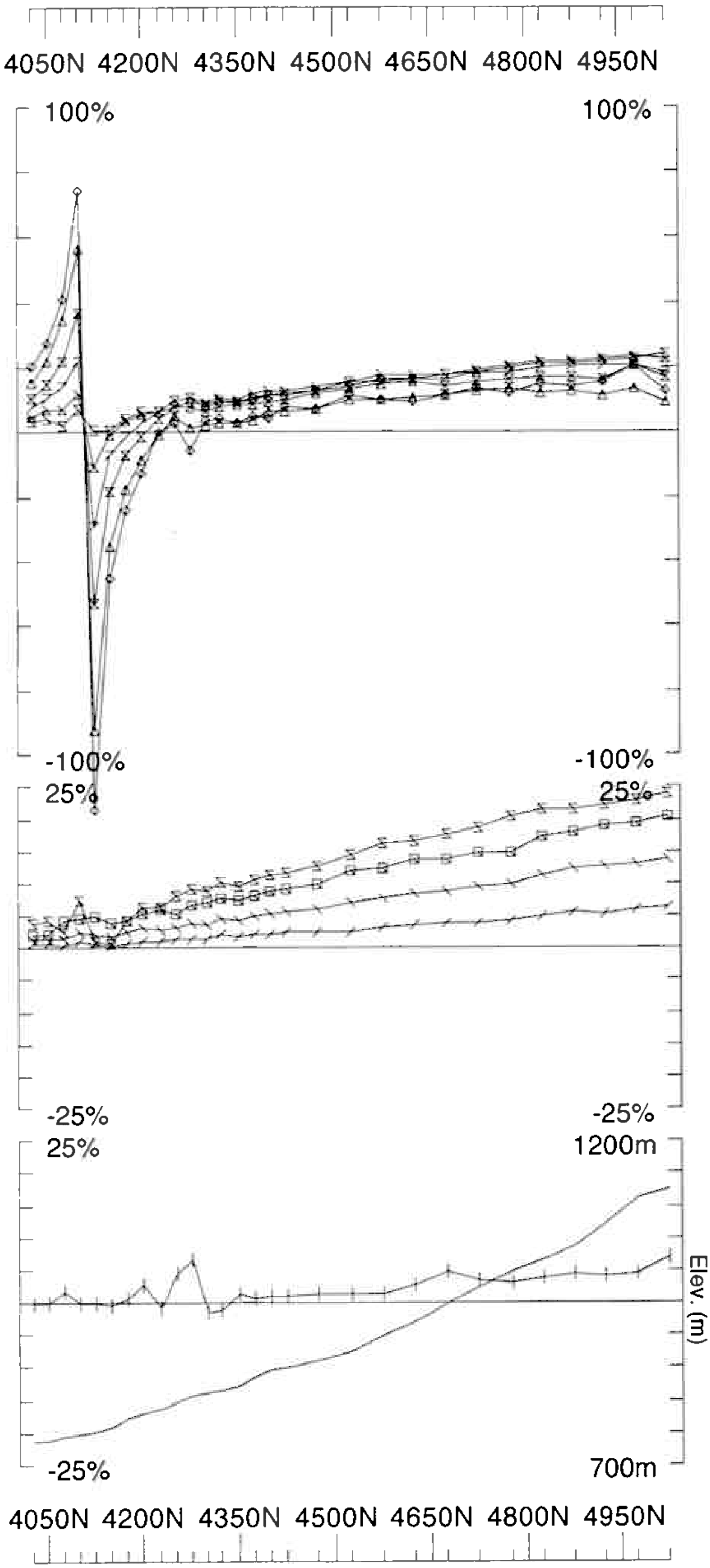
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 10/3/6
Reduced : 10/3/6
Plotted : 18/3/32

Loop: 36
Line: 6200E
Compt: Hz

Secondary, (Chn - Ch1)/lHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen

For: A/S Sulfidmalm

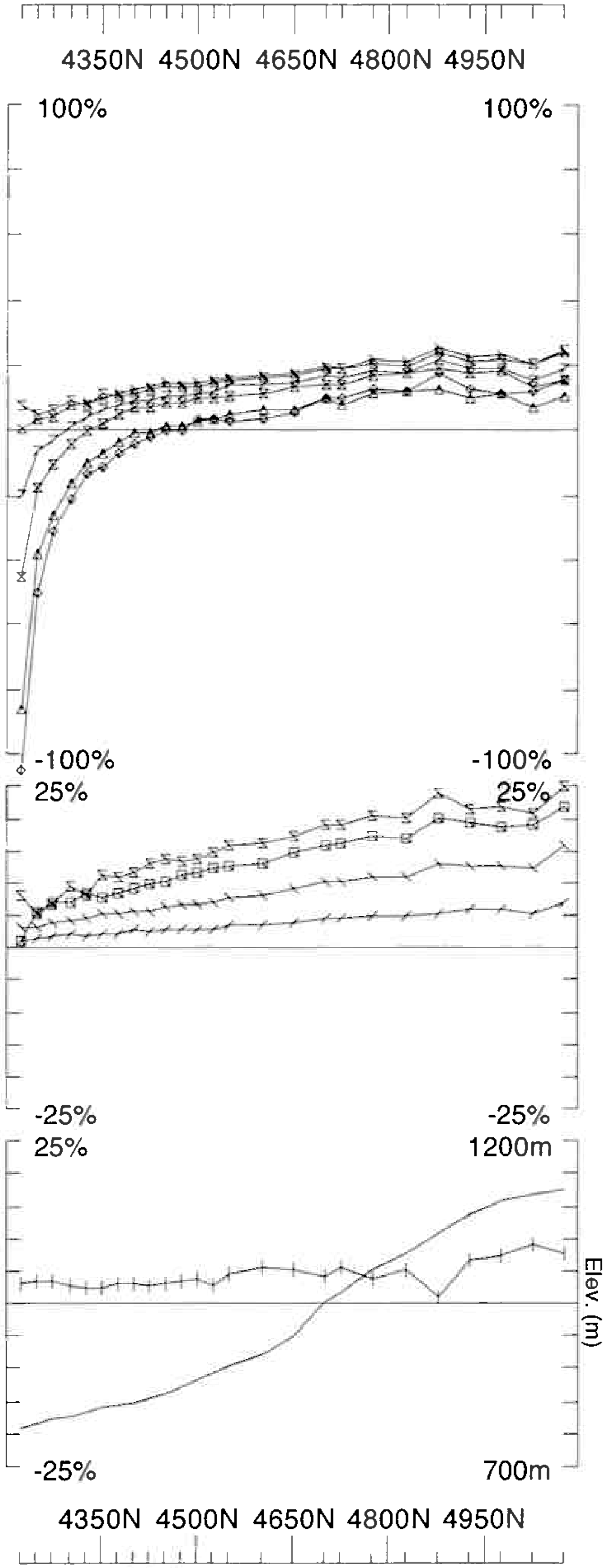
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed: 10/3/6
Reduced: 10/3/6
Plotted: 18/3/32

Loop: 36
Line: 6300E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 10/3/6
Reduced : 10/3/6
Plotted : 18/3/32

Loop: 36
Line: 6500E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Espedalen

Loop 37

Hz

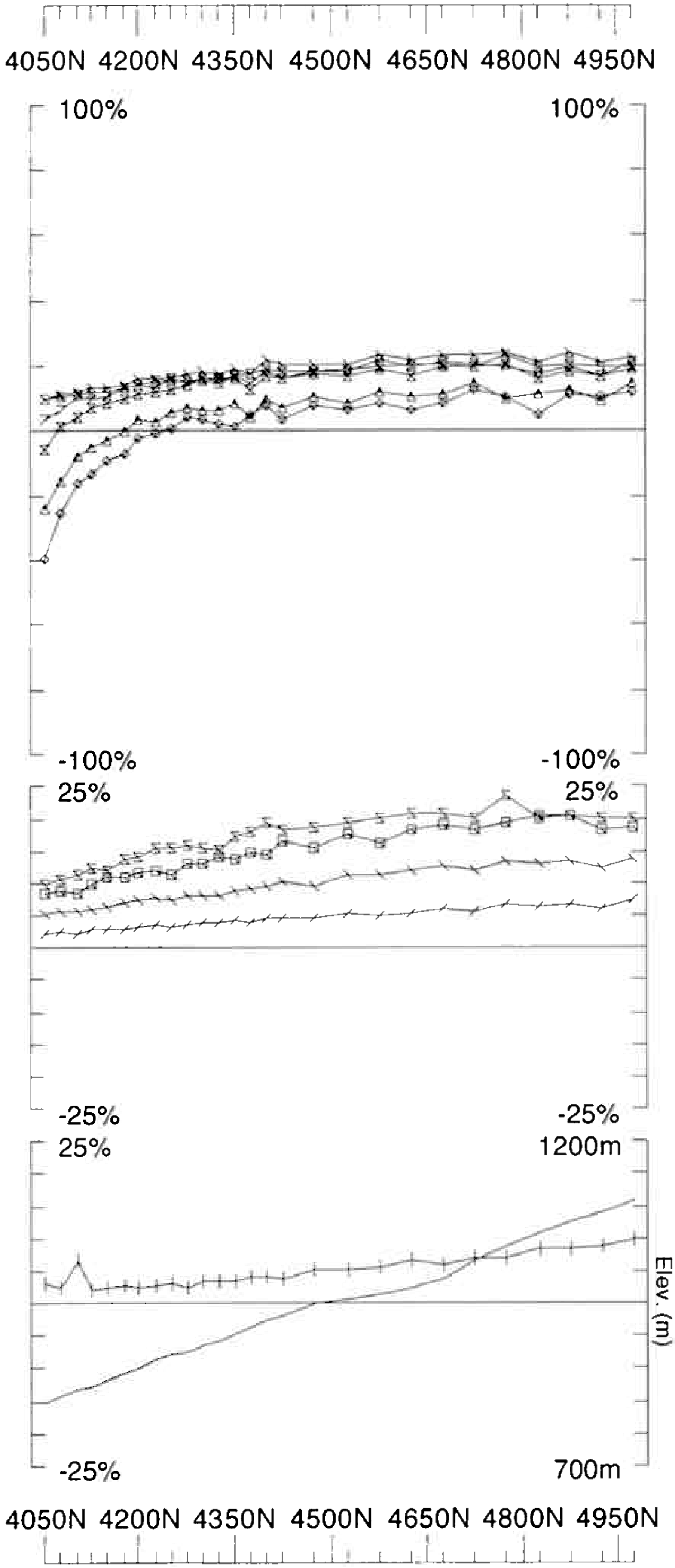
@3.251 Hz frequency

continuous norm

Ch1 reduced

Loop 37	Line 3800E	4050N - 4975N	925m
	Line 4000E	3975N - 4975N	1000m
	Line 4100E	4000N - 4550N	550m
	Line 4200E	4025N - 4975N	950m
	Line 4300E	3950N - 4975N	1025m
	Line 4500E	3950N - 4975N	1025m
	Line 4700E	3975N - 4975N	1000m
	Line 4900E	4000N - 4975N	975m
	Line 5100E	3800N - 4975N	1175m
	Espedalen	Loop 37 Total	8625m

Loop 37 - continuous norm



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

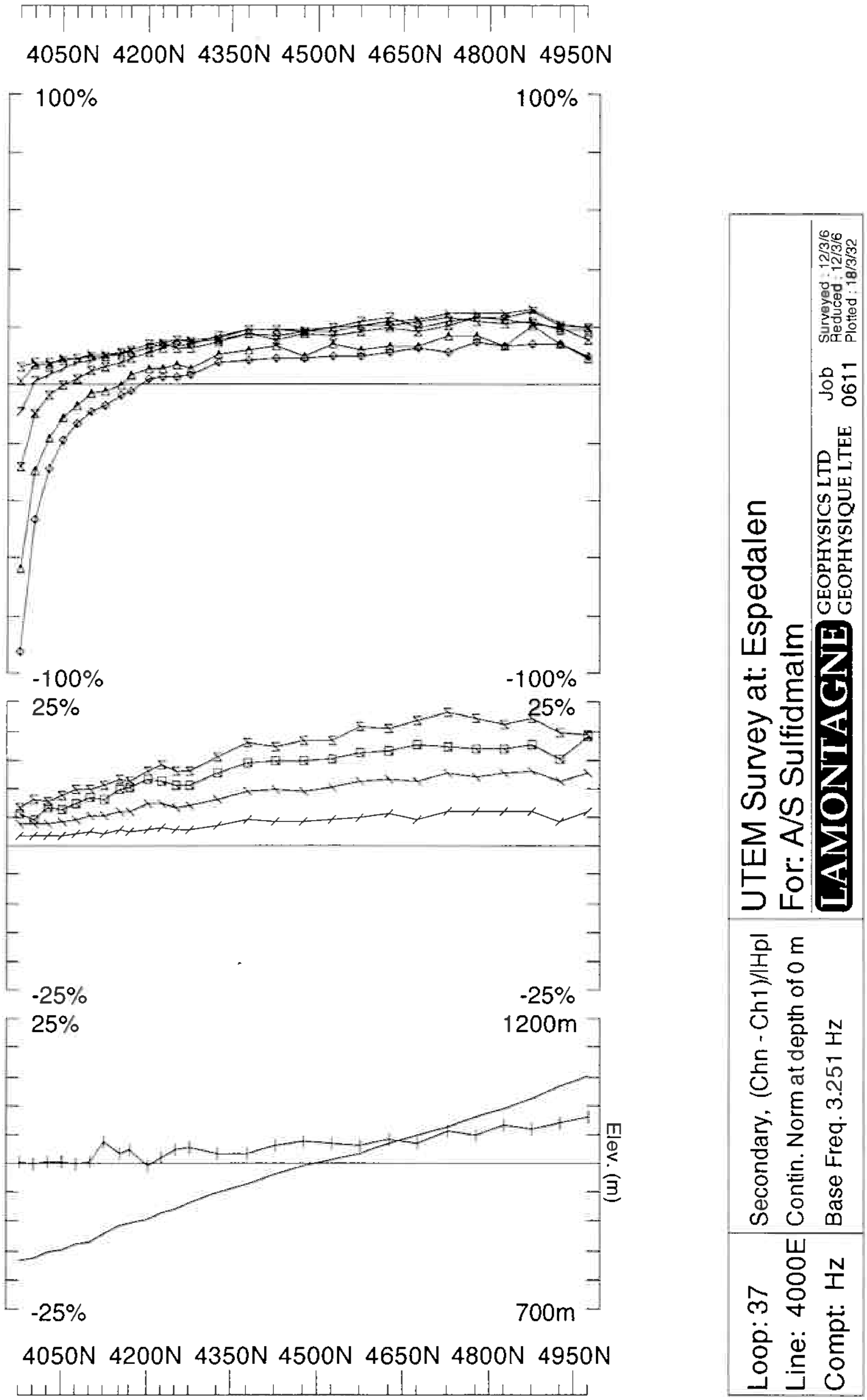
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

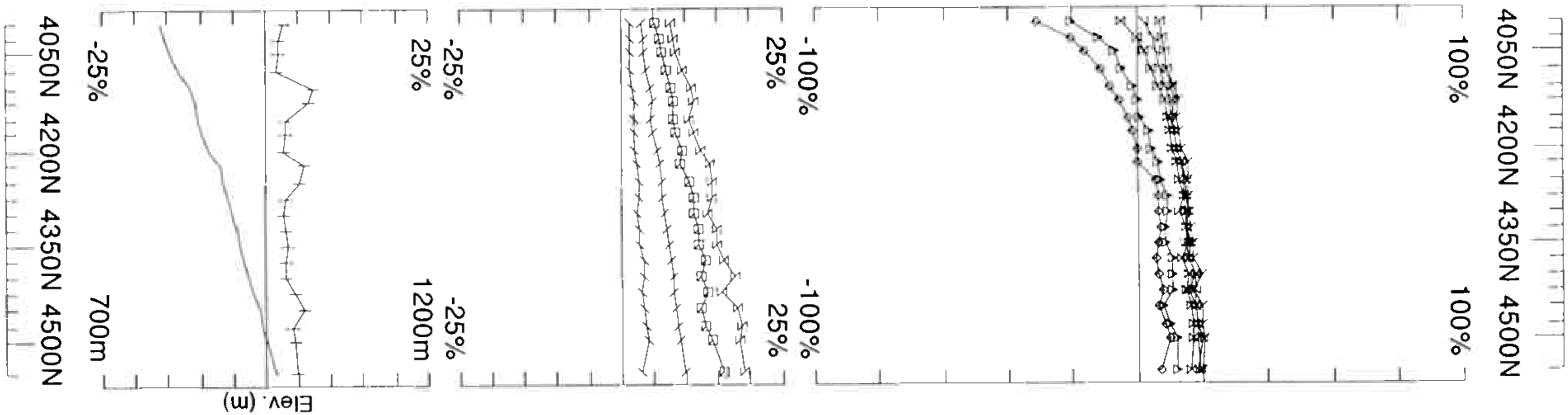
Job 0611

Surveyed : 12/3/6
Reduced : 12/3/6
Plotted : 18/3/32

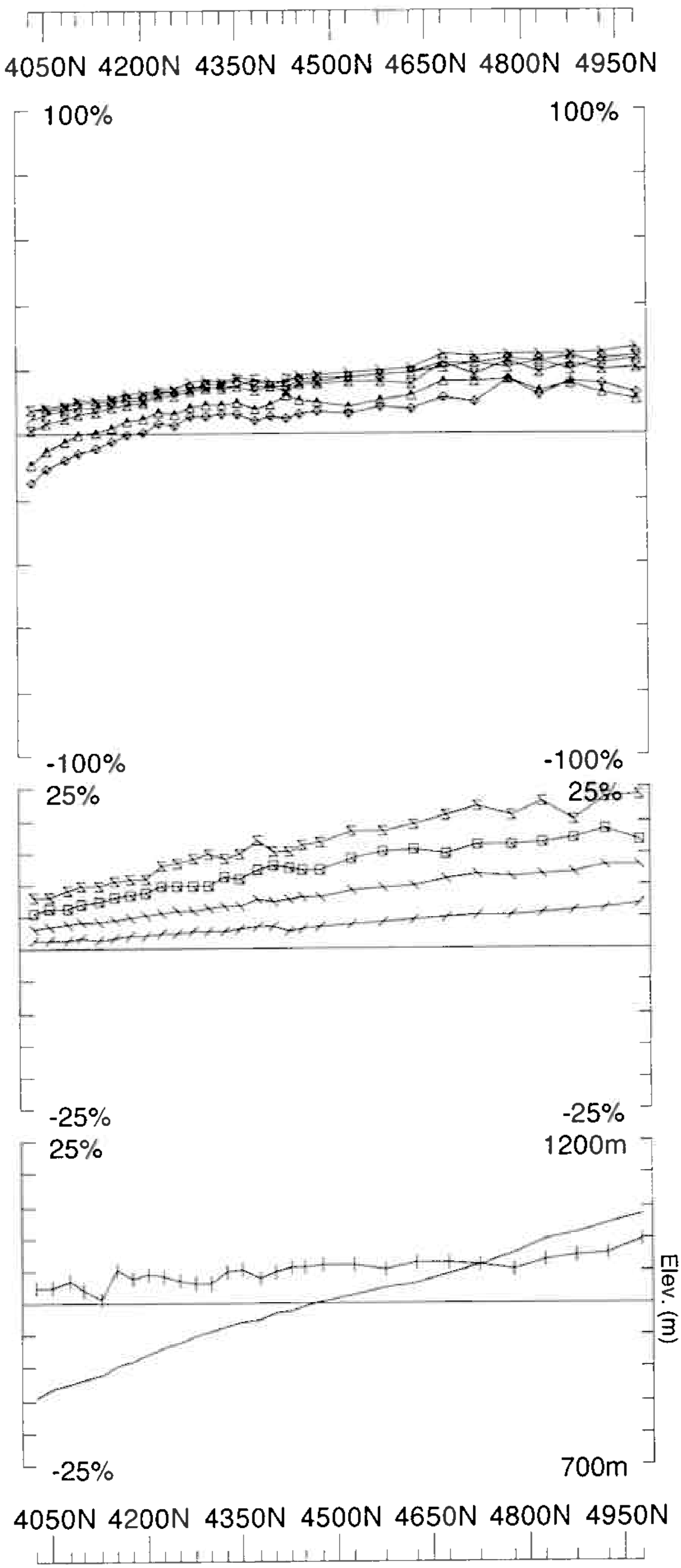
Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Loop: 37
Line: 3800E
Compt: Hz


4050N 4200N 4350N 4500N 4650N 4800N 4950N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1200m
Elev. (m)
-25%
700m
4050N 4200N 4350N 4500N 4650N 4800N 4950N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE
GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job
0611
Surveyed : 12/3/6
Reduced : 12/3/6
Plotted : 18/3/32
Loop: 37
Line: 4000E
Compt: Hz
Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



Loop: 37	Secondary, (Chn - Ch1)/IHpl	UTEM Survey at: Espedalen
Line: 4100E	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Hz	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 13/3/6 Reduced : 13/3/6 Plotted : 18/3/32



Loop: 37
Line: 4200E
Compt: Hz

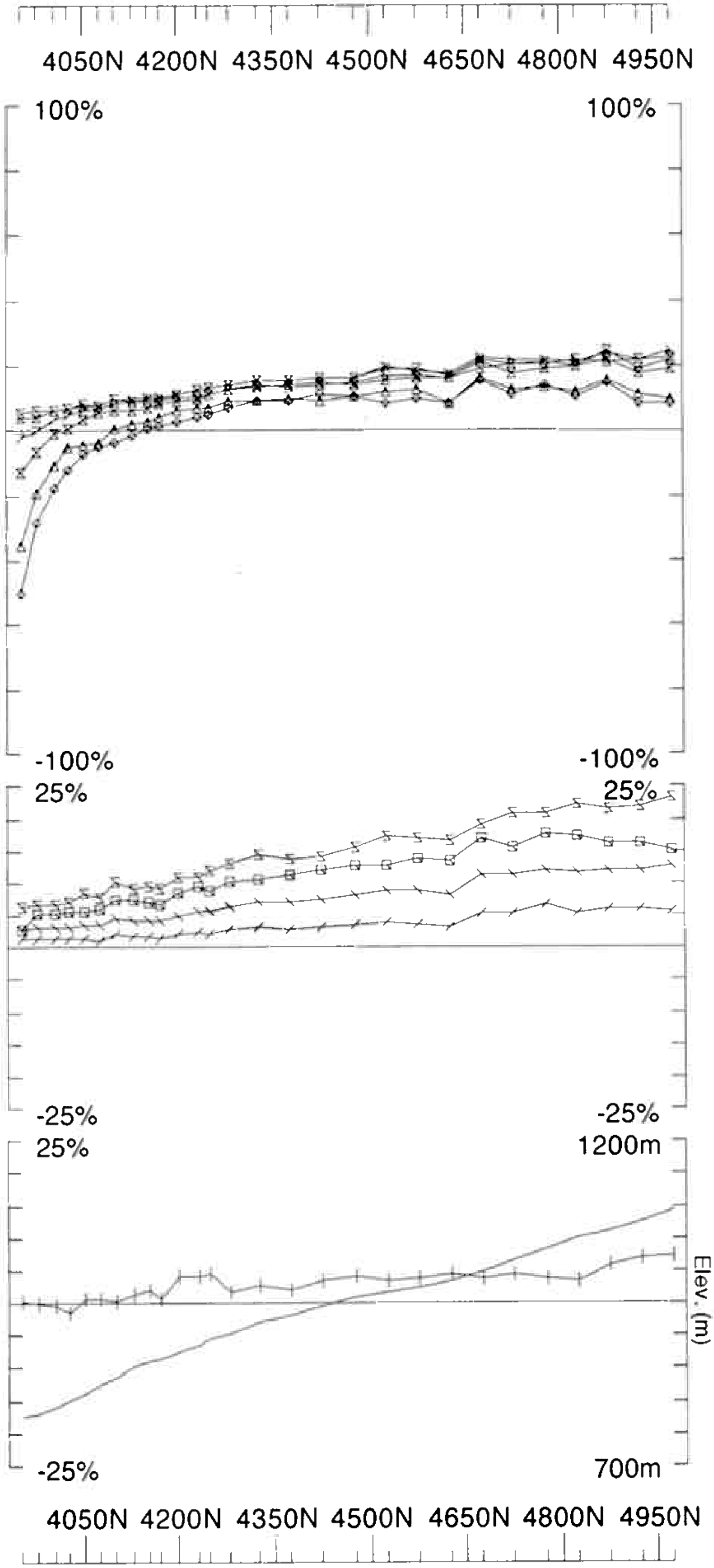
Secondary, (Chn - Ch1)/lHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

Surveyed : 13/3/6
Reduced : 13/3/6
Plotted : 18/3/32



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

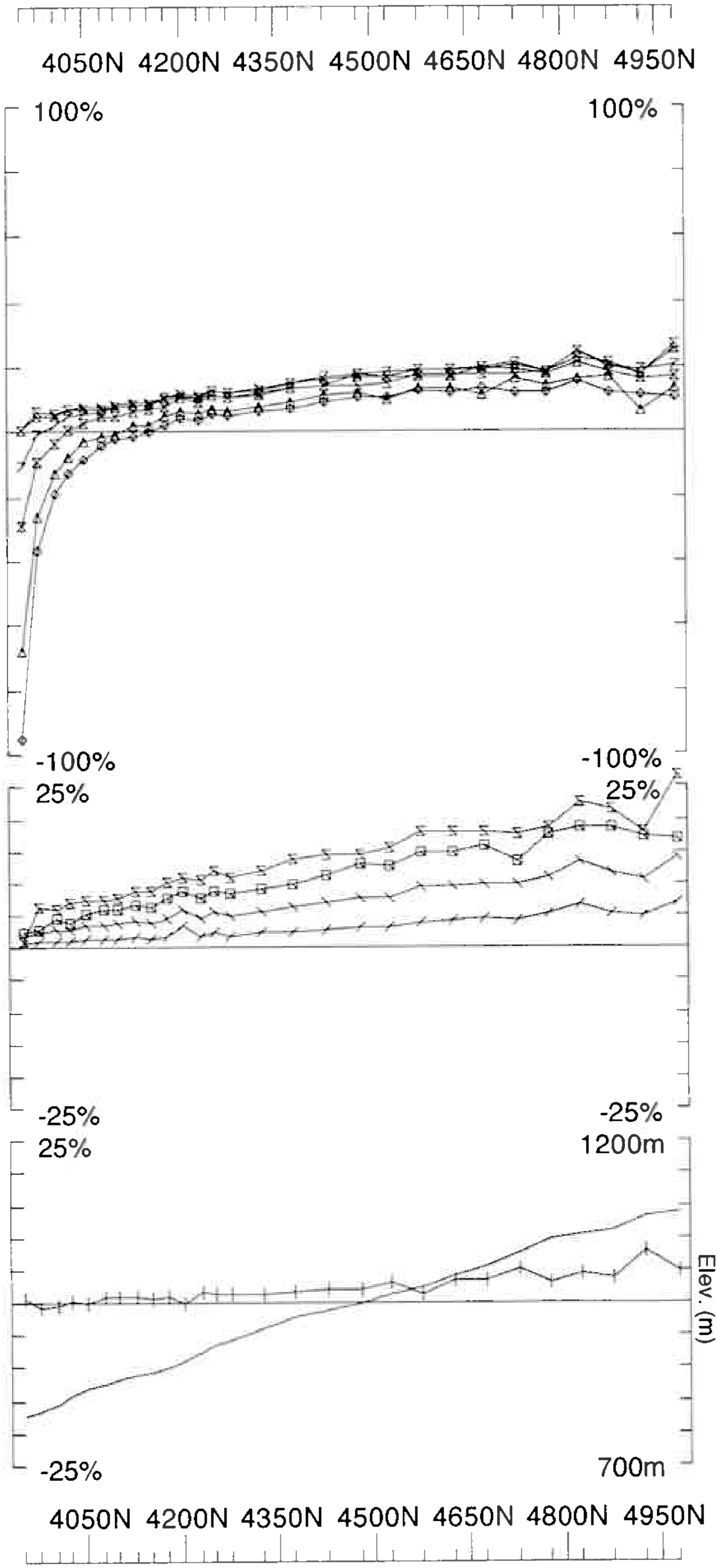
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 13/3/6
Reduced : 13/3/6
Plotted : 18/3/32

Loop: 37
Line: 4300E
Compt: Hz

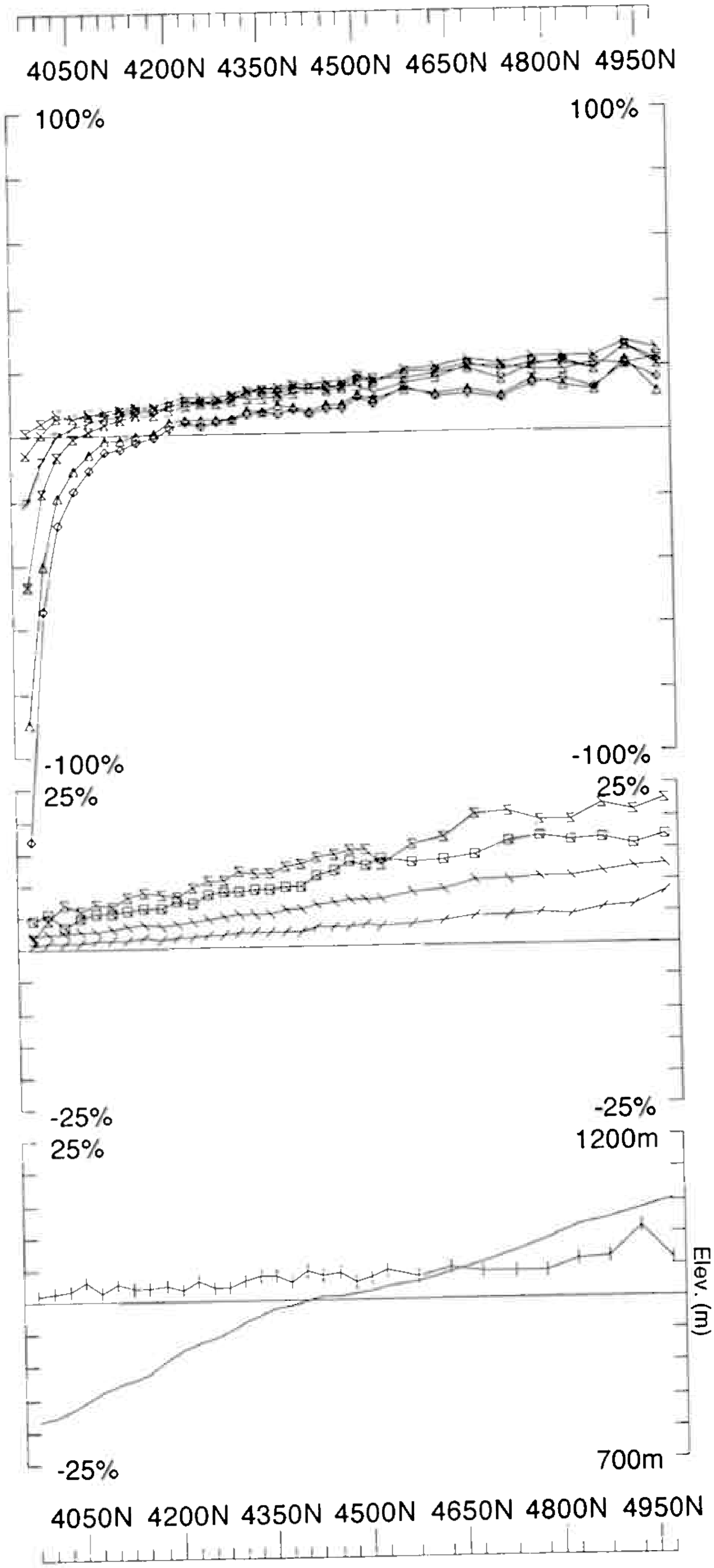
Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 12/3/6
Reduced : 12/3/6
Plotted : 18/3/32

Loop: 37
Line: 4500E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

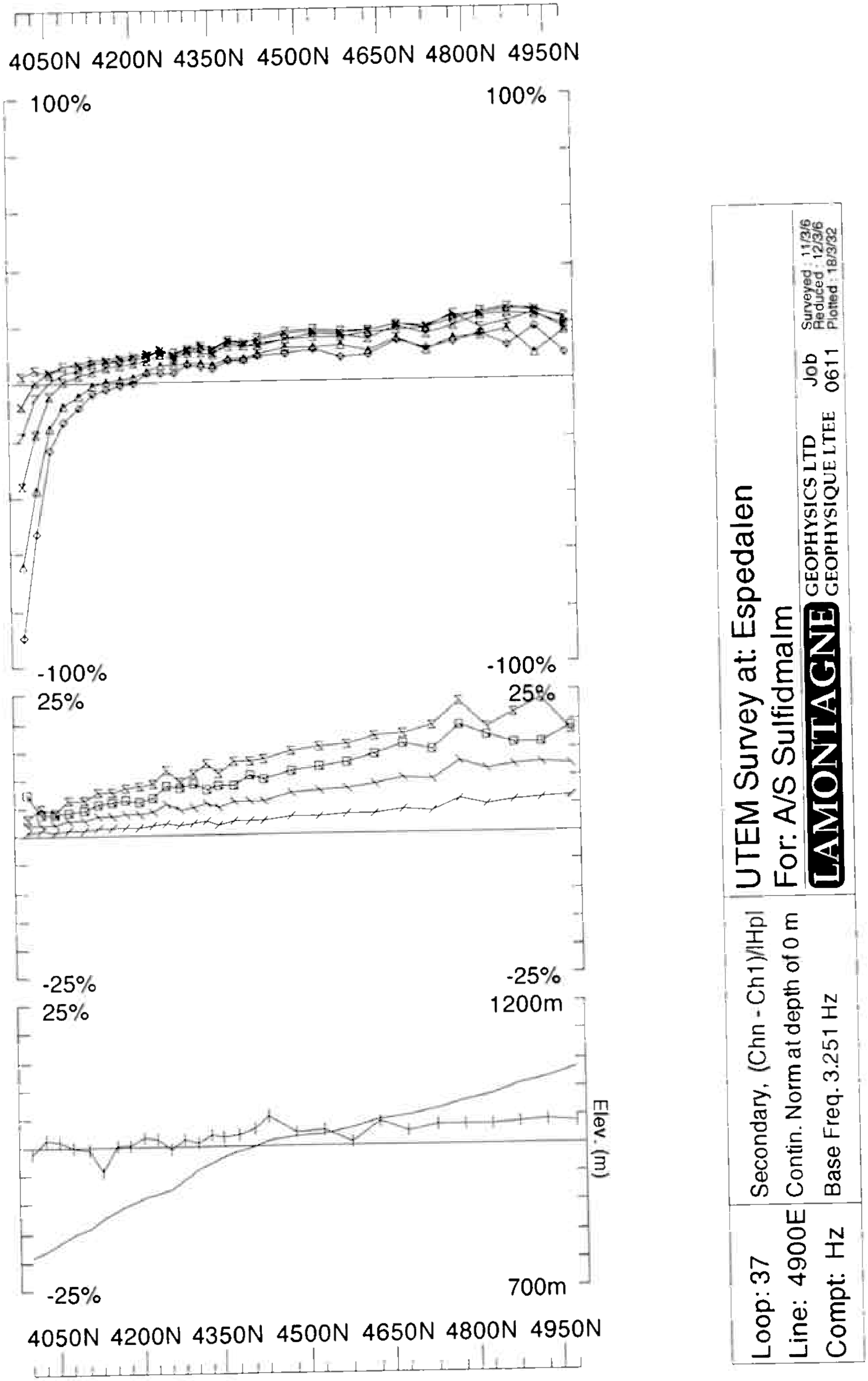
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

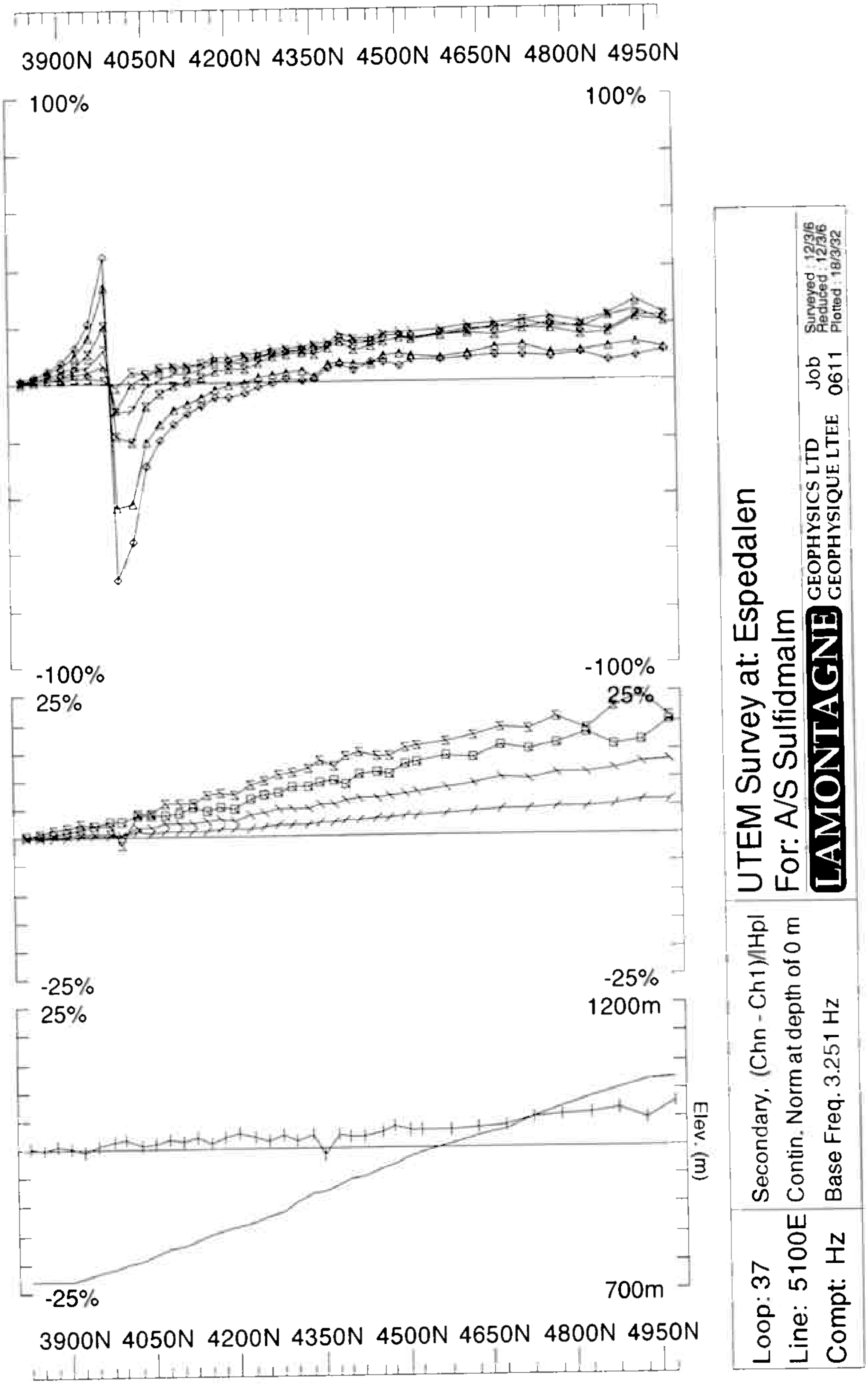
Job 0611

Surveyed: 11/3/6
Reduced: 12/3/6
Plotted: 18/3/32

Loop: 37
Line: 4700E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz


4050N 4200N 4350N 4500N 4650N 4800N 4950N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1200m
Elev. (m)
-25%
700m
4050N 4200N 4350N 4500N 4650N 4800N 4950N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE
GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job
0611
Surveyed : 11/3/6
Reduced : 12/3/6
Plotted : 18/3/32
Secondary, (Chn - Ch1)/IHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz
Loop: 37
Line: 4900E
Compt: Hz



3900N 4050N 4200N 4350N 4500N 4650N 4800N 4950N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1200m
Elev. (m)
-25%
700m
3900N 4050N 4200N 4350N 4500N 4650N 4800N 4950N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Loop: 37
Line: 5100E
Compt: Hz
Secondary, (Chn - Ch1)/IHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Espedalen

Loop 30

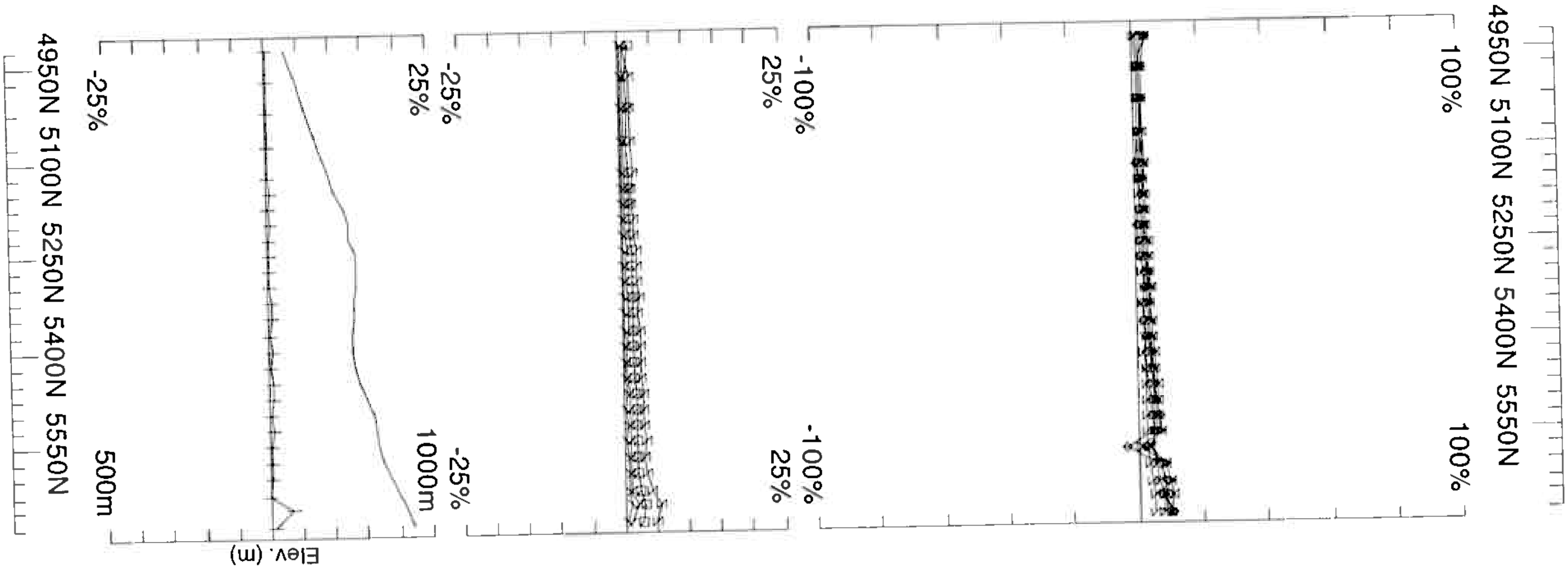
Hz
@3.251 Hz frequency

point norm
@
(x,y,z) = (8800E,5550N, 920 m.a.s.l.)

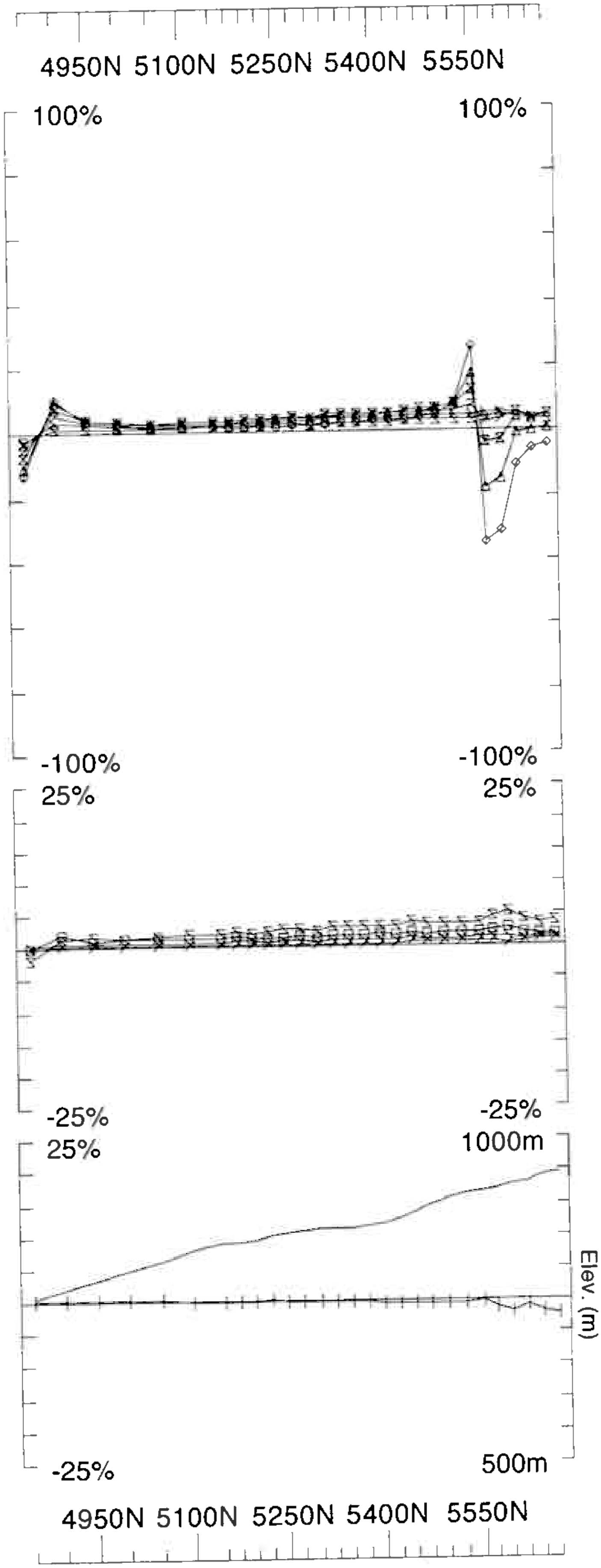
Ch1 reduced

Loop 30	Line	8200E	4925N - 5675N	750m
	Line	8400E	4925N - 5675N	750m
	Line	8600E	4875N - 5675N	800m
	Line	8800E	4950N - 5675N	725m
	Line	9000E	4900N - 5850N	950m
	Line	9200E	4925N - 5850N	925m
	Espedalen		Loop 30 Total	4975m

Loop 30 - point norm



Loop: 30 Line: 8200E Compt: Hz	Secondary, (Chn - Ch1)/lHpl Point Norm.at x,y,z (8800,5550,920) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 7/3/6 Reduced : 7/3/6 Plotted : 18/3/32



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

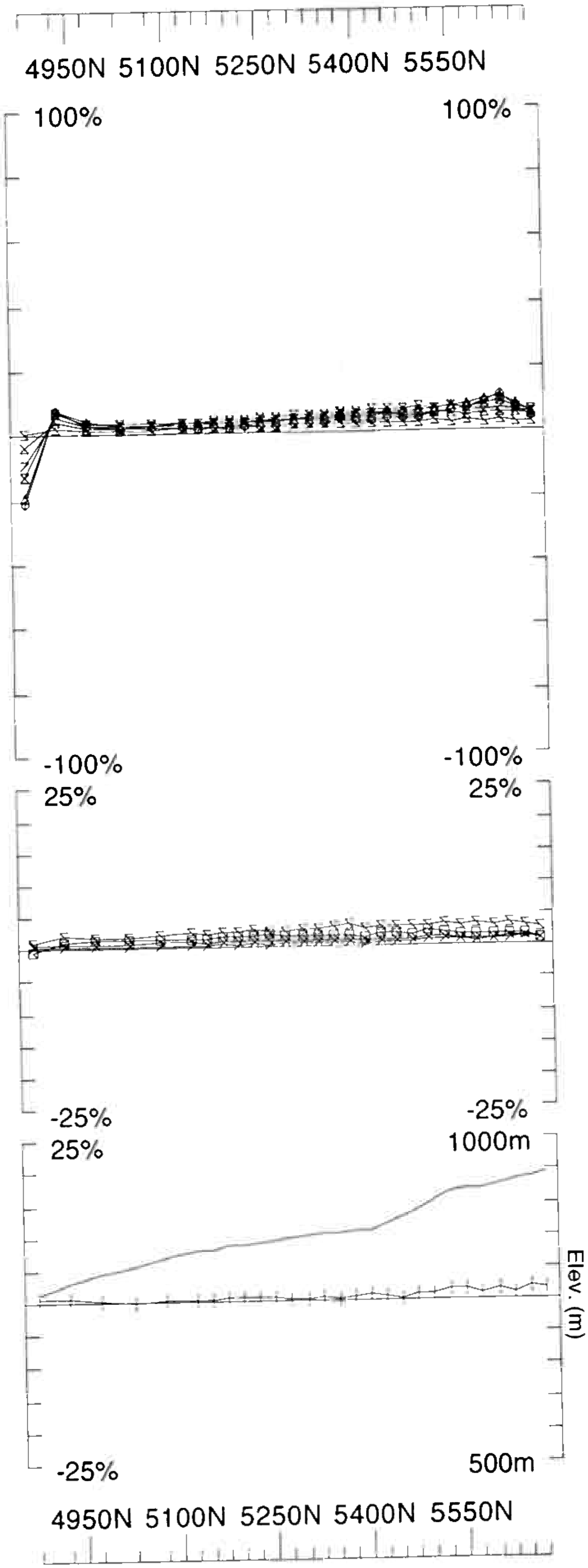
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 7/3/6
Reduced : 7/3/6
Plotted : 18/3/32

Loop: 30
Line: 8400E
Compt: Hz

Secondary, (Chn - Ch1)/IHpI
Point Norm.at x,y,z
(8800,5550,920)
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

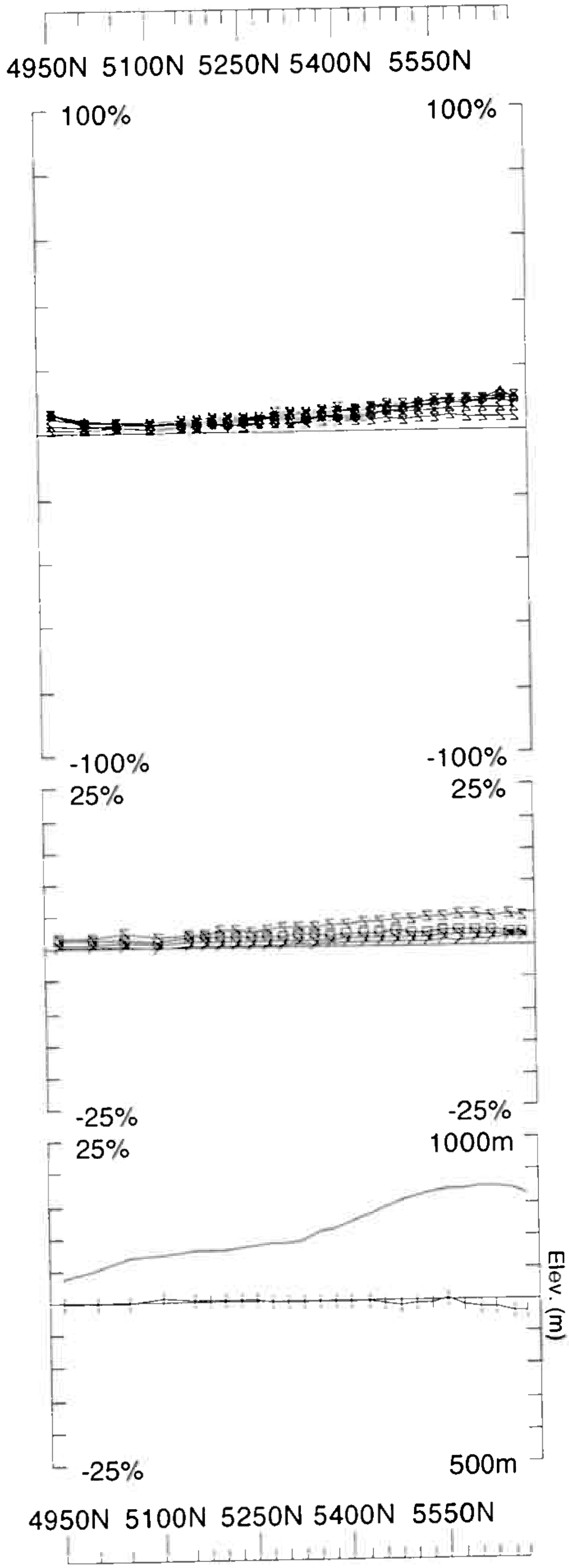
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 7/3/6
Reduced : 7/3/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/IHpI
Point Norm.at x,y,z
(8800,5550,920)
Base Freq. 3.251 Hz

Loop: 30
Line: 8600E
Compt: Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

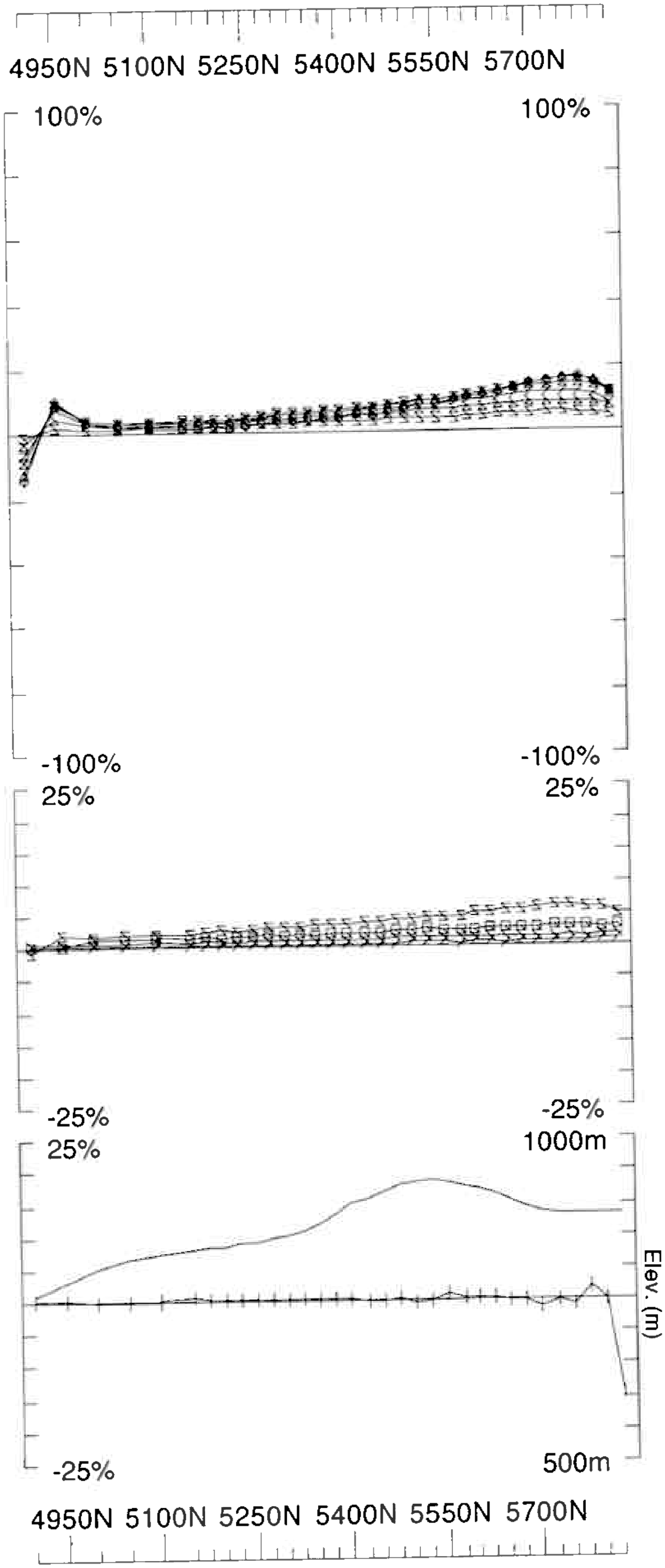
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 7/3/6
Reduced : 7/3/6
Plotted : 18/3/32

Loop: 30
Line: 8800E
Compt: Hz

Secondary, (Chn - Ch1)/IHpl
Point Norm.at x,y,z
(8800,5550,920)
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

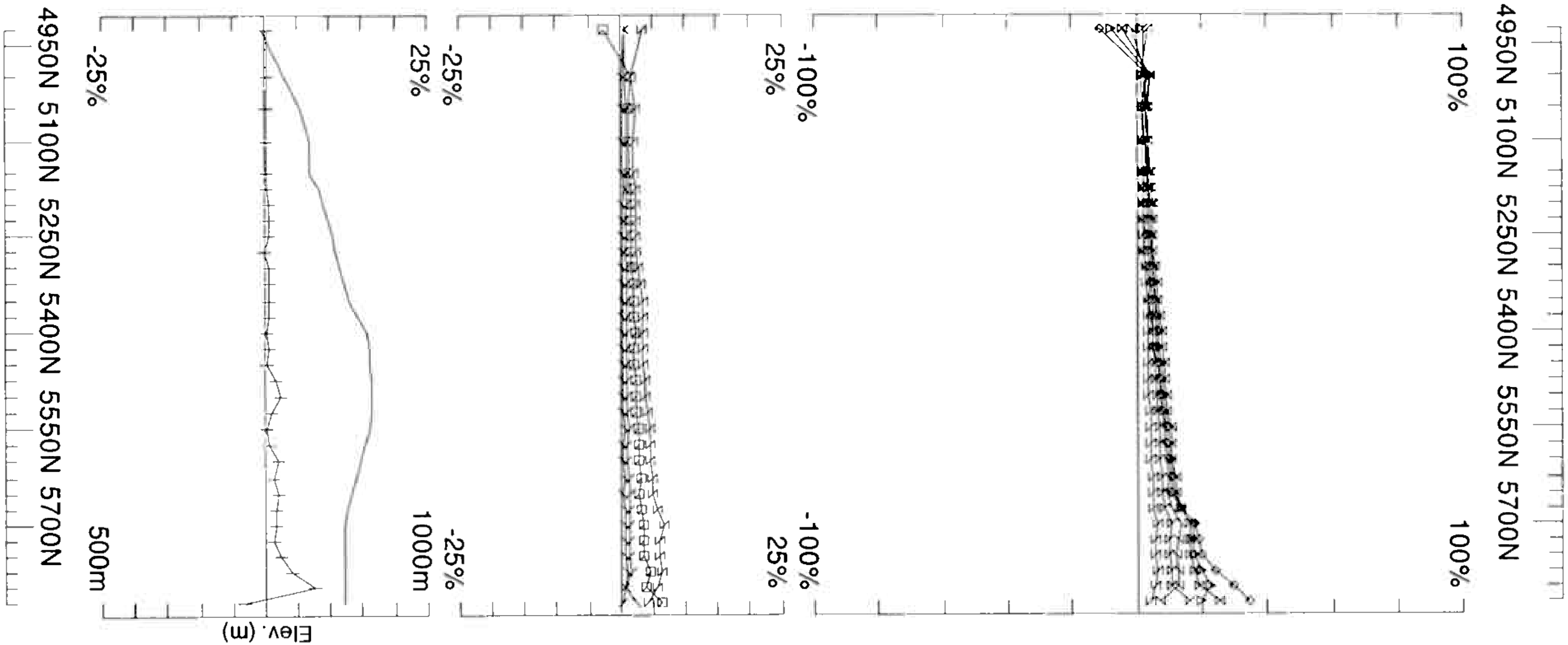
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 6/3/6
Reduced : 6/3/6
Plotted : 18/3/32

Loop: 30
Line: 9000E
Compt: Hz

Secondary, (Chn - Ch1)/IHpI
Point Norm.at x,y,z
(8800,5550,920)
Base Freq. 3.251 Hz



Loop: 30 Line: 9200E Compt: Hz	Secondary, (Chn - Ch1)/lHpl Point Norm.at x,y,z (8800,5550,920) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 6/3/6 Reduced : 7/3/6 Plotted : 18/3/32

Espedalen

Loop 31

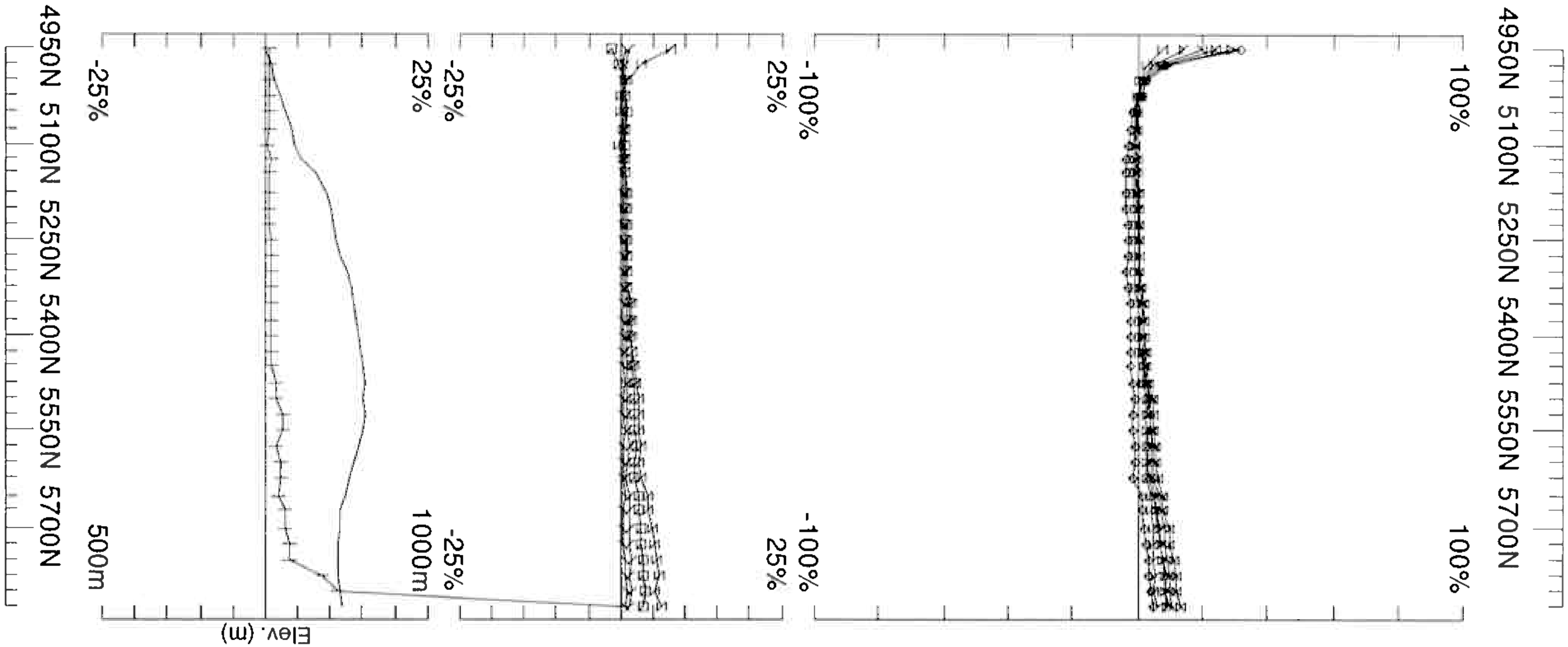
Hz
@3.251 Hz frequency

point norm
@
(x,y,z) = (10000E,5550N, 850 m.a.s.l.)

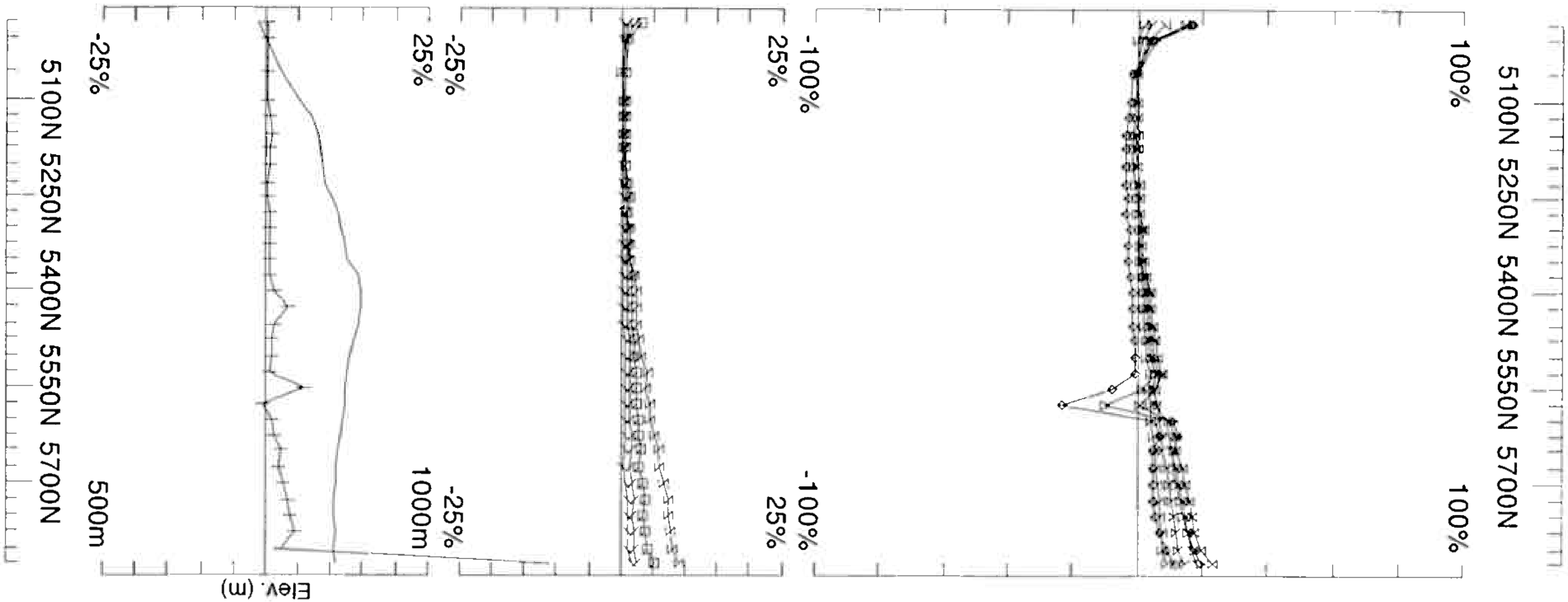
Ch1 reduced

Loop 31	Line 9400E	4950N - 5850N	900m
	Line 9600E	4975N - 5850N	875m
	Line 9800E	5050N - 5850N	800m
	Line 10000E	4975N - 5850N	875m
	Line 10200E	5100N - 5850N	750m
	Line 10300E	5550N - 5850N	300m
	Line 10400E	5400N - 5850N	450m
	Line 10500E	5450N - 5850N	400m
	Line 10600E	5450N - 5850N	400m
	Espedalen	Loop 31 Total	5750m

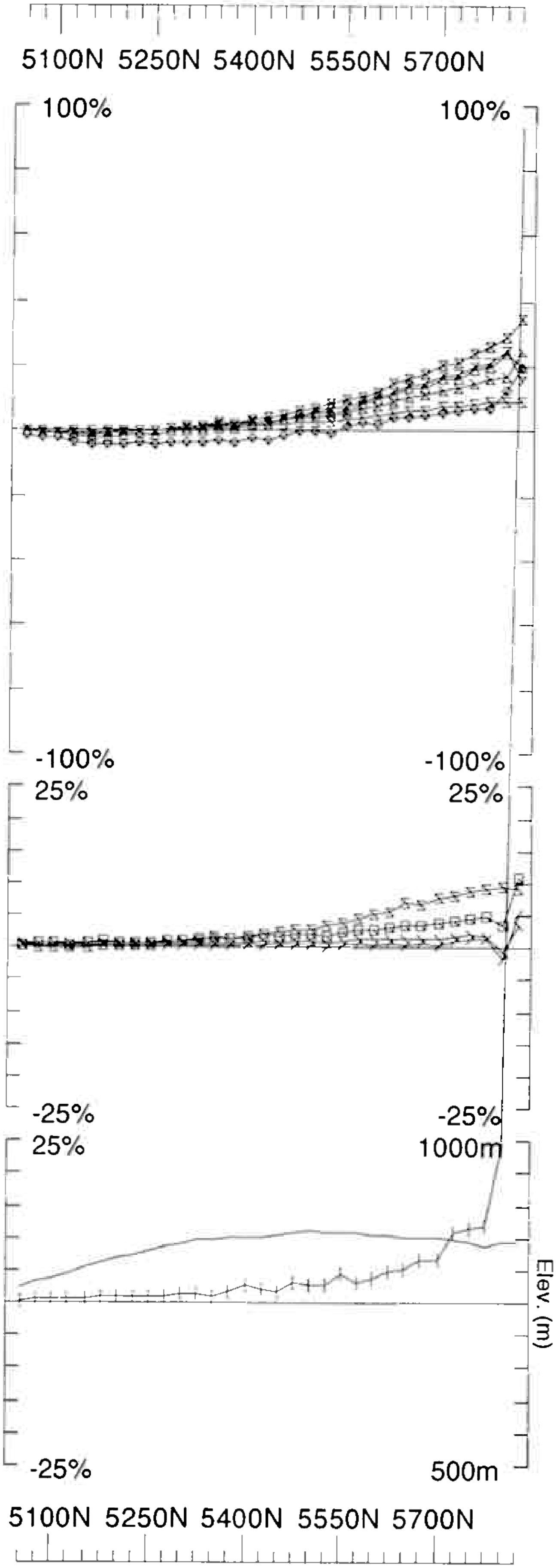
Loop 31 - point norm



Loop: 31 Line: 9400E Compt: Hz	Secondary, (Chn - Ch1)/IHpl Point Norm.at x,y,z (10000,5550,850) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 4/3/6 Reduced : 5/3/6 Plotted : 18/3/32



Loop: 31 Line: 9600E Compt: Hz	Secondary, (Chn - Ch1)/lHpl Point Norm.at x,y,z (10000,5550,850) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 4/3/6 Reduced : 5/3/6 Plotted : 18/3/32



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

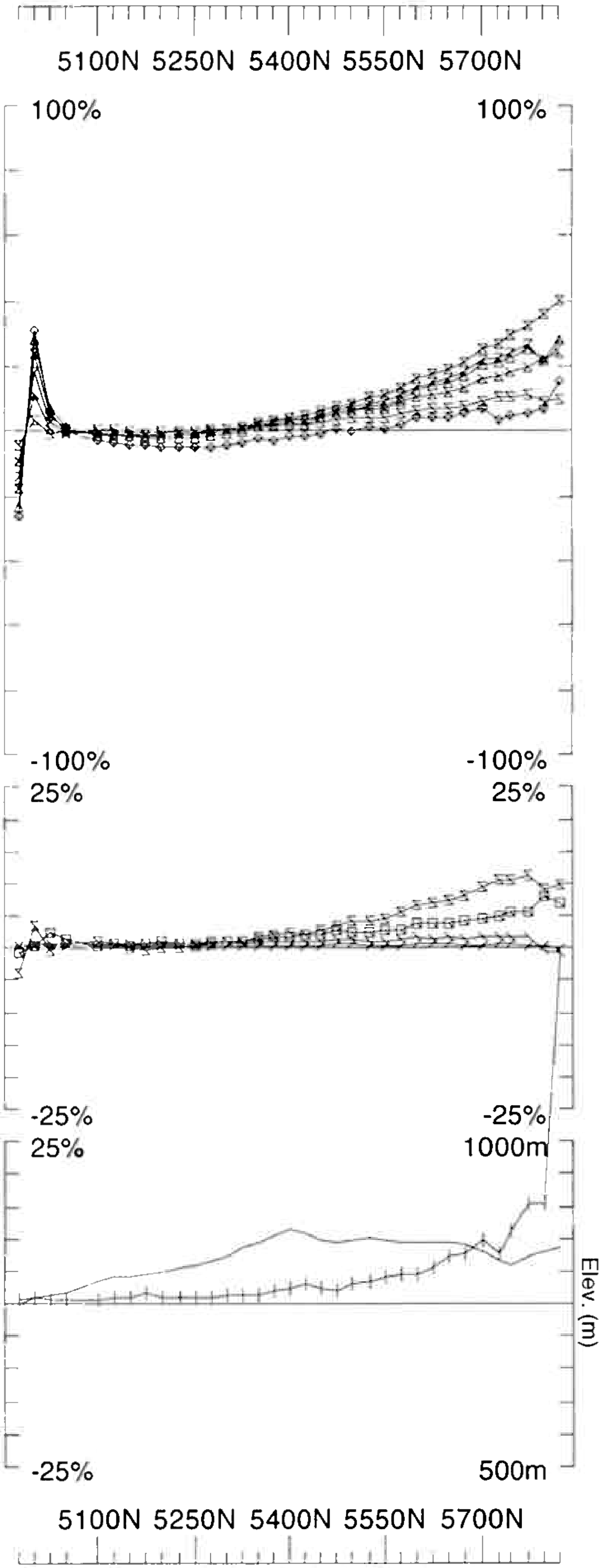
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 5/3/6
Reduced : 5/3/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(10000,5550,850)
Base Freq. 3.251 Hz

Loop: 31
Line: 9800E
Compt: Hz



Loop: 31
Line: 10000E
Compt: Hz

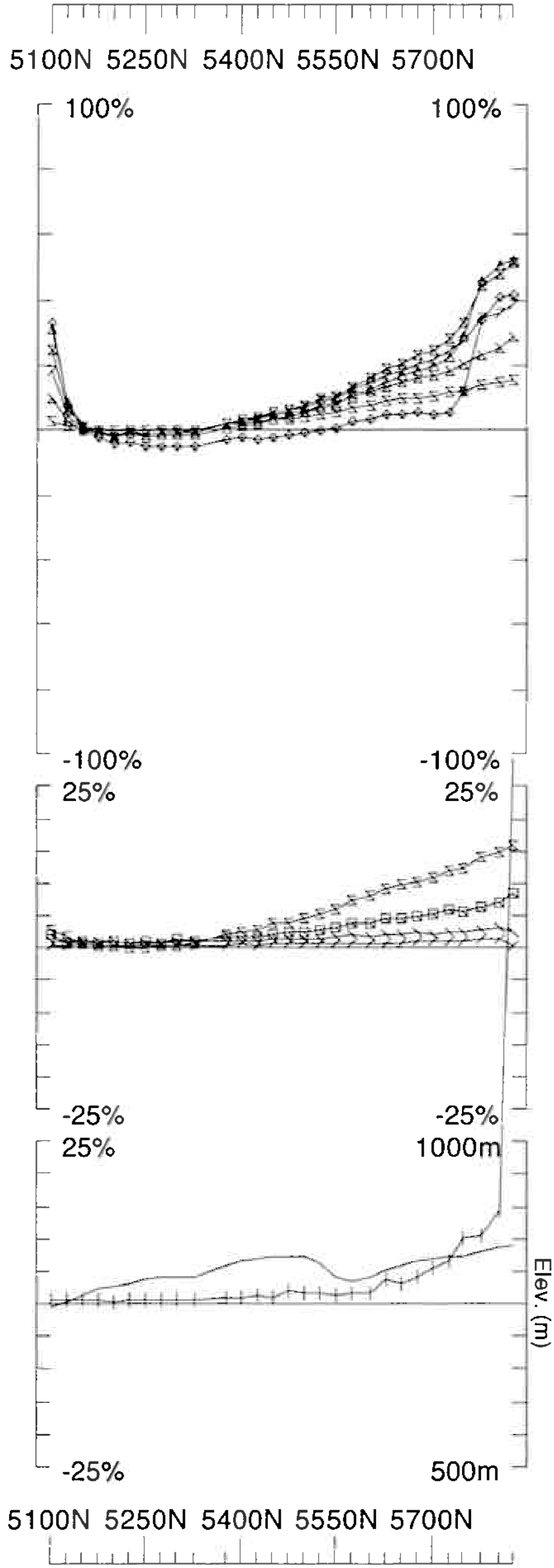
Secondary, (Chn - Ch1)/IHpI
Point Norm.at x,y,z
(10000,5550,850)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

Surveyed : 4/3/6
Reduced : 5/3/6
Plotted : 18/3/32



Loop: 31
Line: 10200E
Compt: Hz

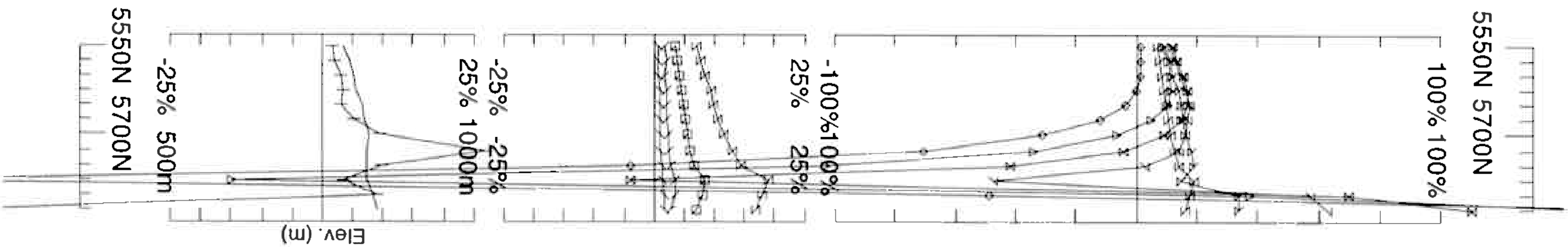
Secondary, (Chn - Ch1)/IHpl
Point Norm.at x,y,z
(10000,5550,850)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

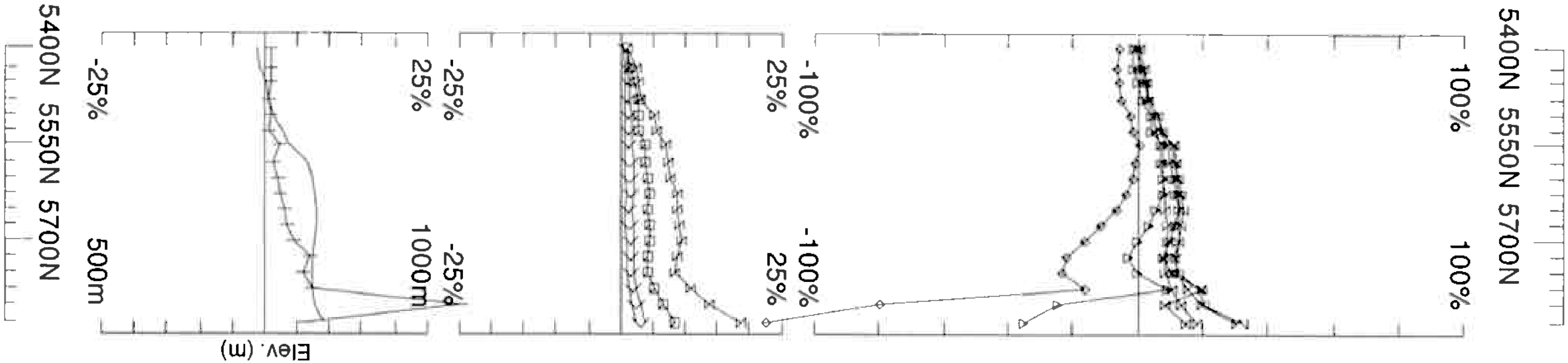
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

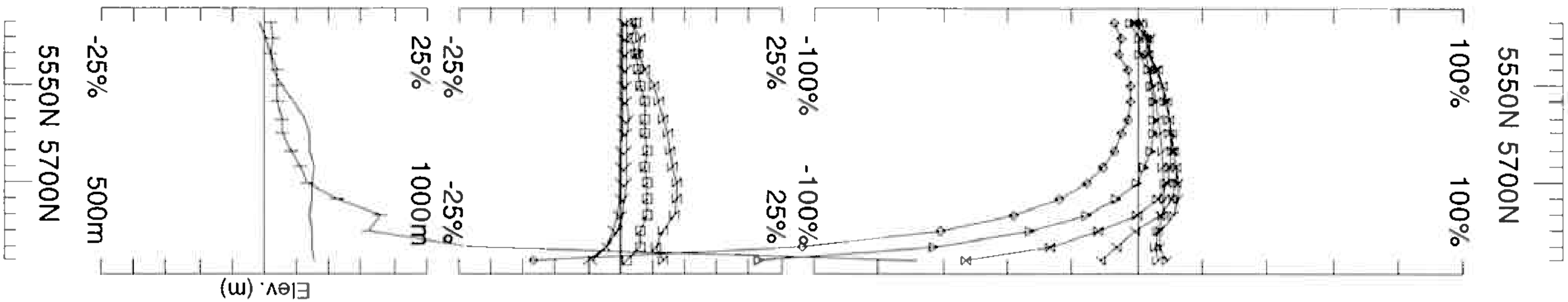
Surveyed : 5/3/6
Reduced : 5/3/6
Plotted : 18/3/32



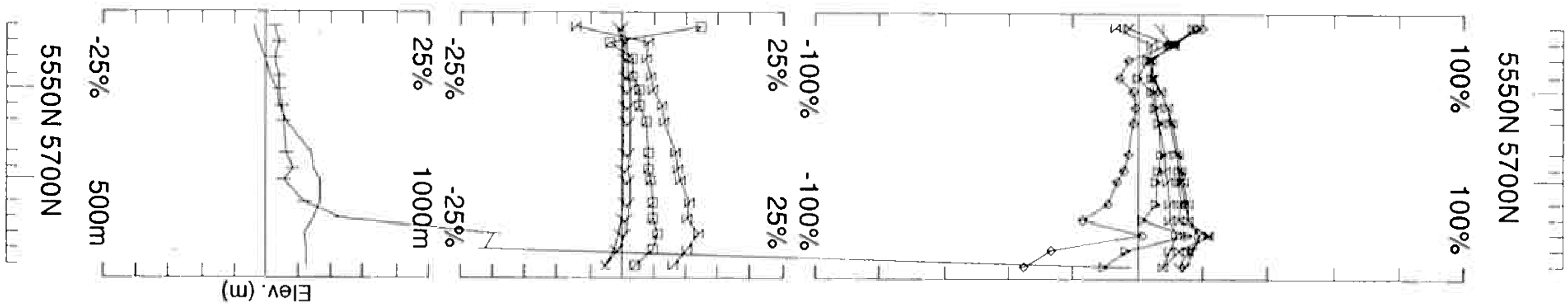
Loop: 31 Line: 10300E Compt: Hz	Secondary, (Chn - Ch1)/IHpl Point Norm.at x,y,z (10000,5550,850) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE	Job 0611 Surveyed : 5/3/6 Reduced : 5/3/6 Plotted : 18/3/32



Loop: 31 Line: 10400E Compt: Hz	Secondary, (Chn - Ch1)/IHpl Point Norm.at x,y,z (10000,5550,850) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 5/3/6 Reduced : 5/3/6 Plotted : 18/3/32



Loop: 31 Line: 10500E Compt: Hz	Secondary, (Chn - Ch1)/IHpI Point Norm.at x,y,z (10000,5550,850) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 5/3/6 Reduced : 5/3/6 Plotted : 18/3/32



Loop: 31 Line: 10600E Compt: Hz	Secondary, (Chn - Ch1)/lHpl Point Norm.at x,y,z (10000,5550,850) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 5/3/6 Reduced : 5/3/6 Plotted : 18/3/32

Espedalen

Loop 32

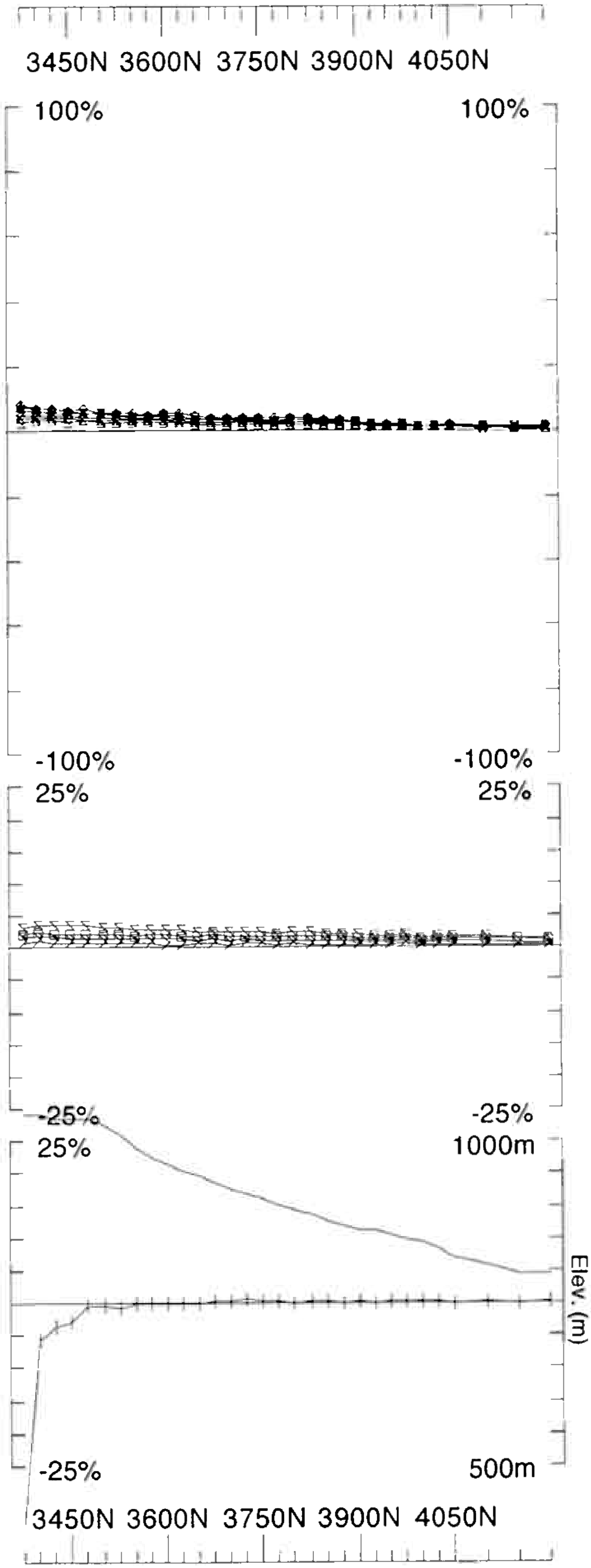
Hz
@3.251 Hz frequency

point norm
@
(x,y,z) = (10400E,3650N, 1000 m.a.s.l.)

Ch1 reduced

Loop 32	Line 9600E	3350N - 4100N	750m
	Line 9800E	3350N - 4200N	850m
	Line 10000E	3350N - 4100N	750m
	Line 10200E	3350N - 4200N	850m
	Line 10400E	3350N - 4100N	750m
	Line 10600E	3350N - 4100N	750m
	Line 10800E	3350N - 3975N	625m
	Line 11000E	3350N - 4100N	750m
	Line 11200E	3350N - 4100N	750m
	Espedalen	Loop 32 Total	7050m

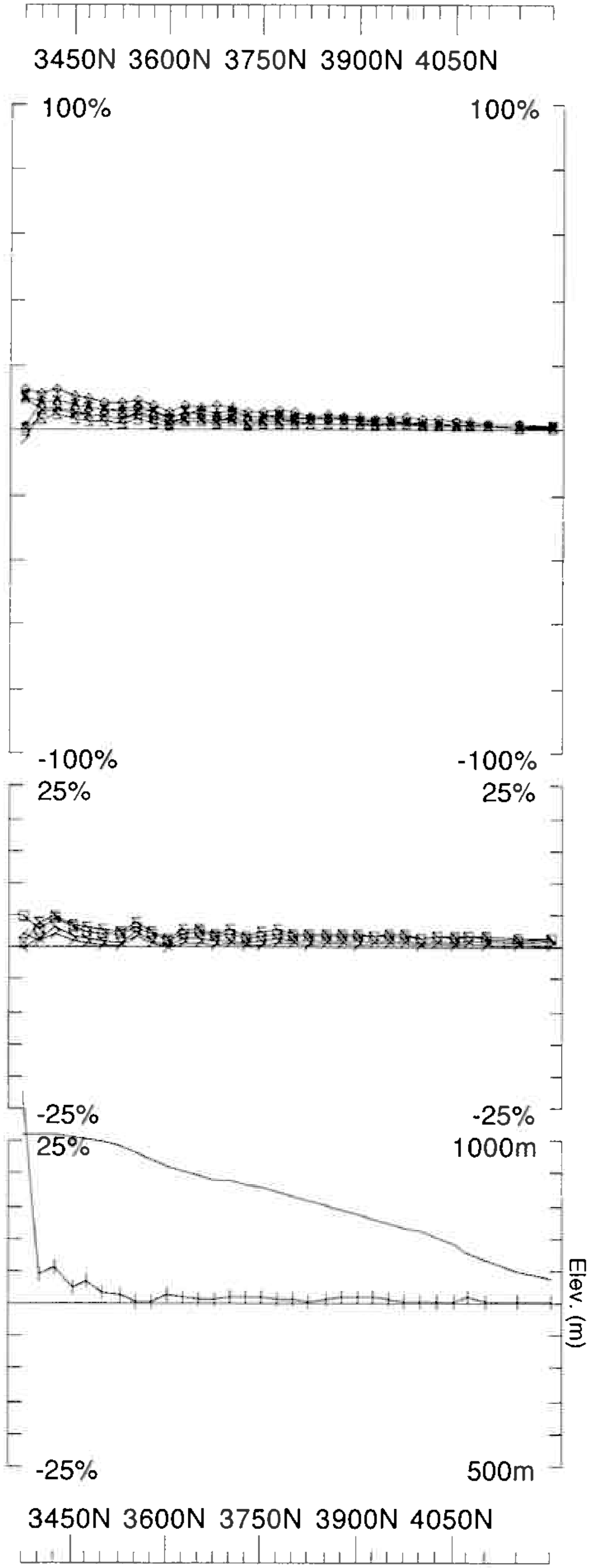
Loop 32 - point norm



UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 21/2/6
Reduced : 21/2/6
Plotted : 18/3/32

Loop: 32
Line: 9600E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(10400,3650,1000)
Base Freq. 3.251 Hz



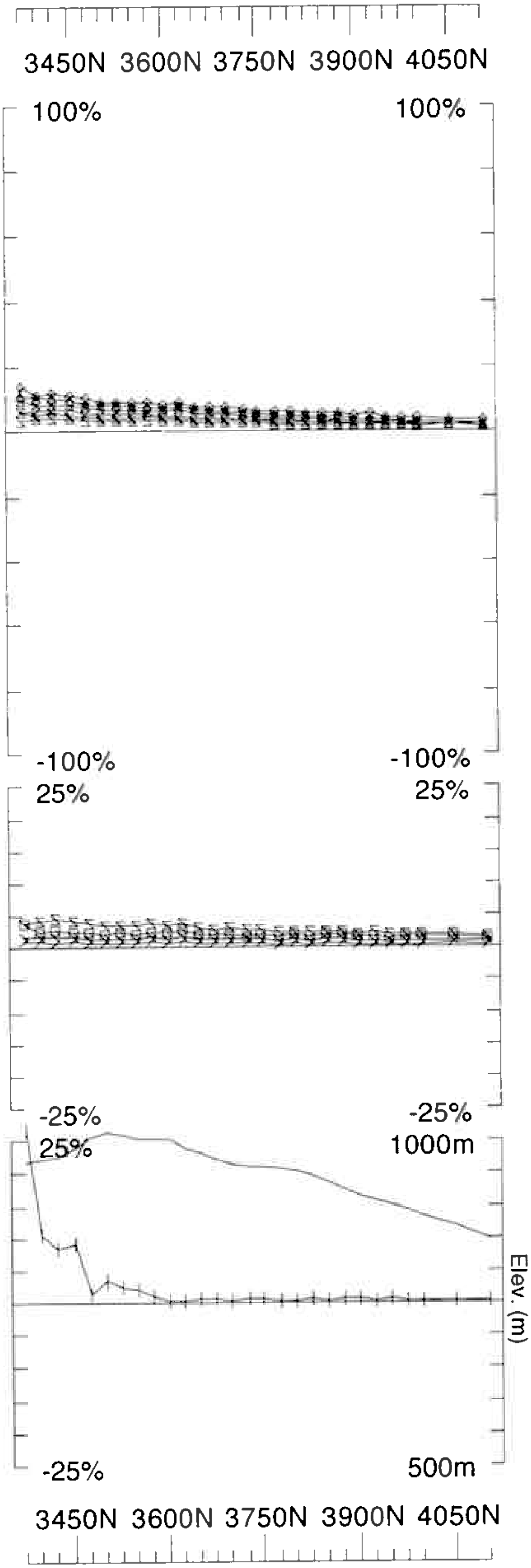
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 22/2/6
Reduced : 22/2/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(10400,3650,1000)
Base Freq. 3.251 Hz

Loop: 32
Line: 9800E
Compt: Hz



Loop: 32
Line: 10000E
Compt: Hz

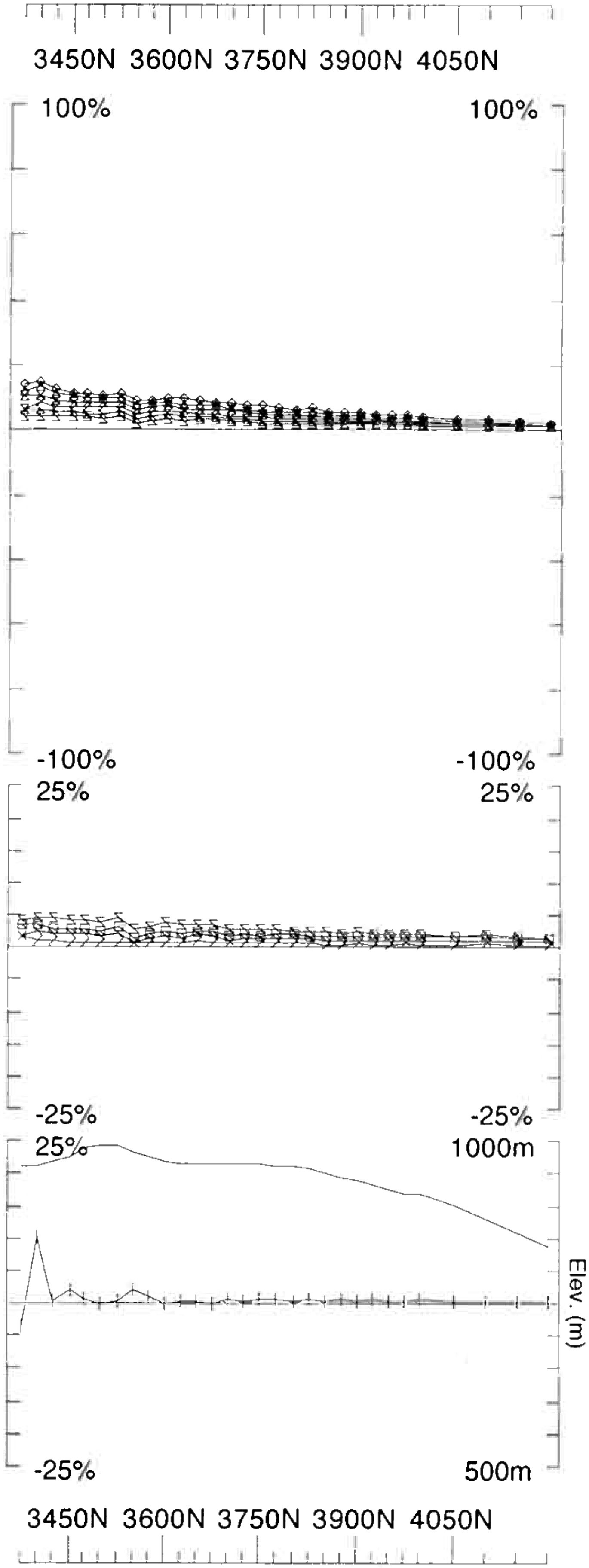
Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(10400,3650,1000)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 22/2/6
Reduced : 22/2/6
Plotted : 18/3/32



Loop: 32
Line: 10200E
Compt: Hz

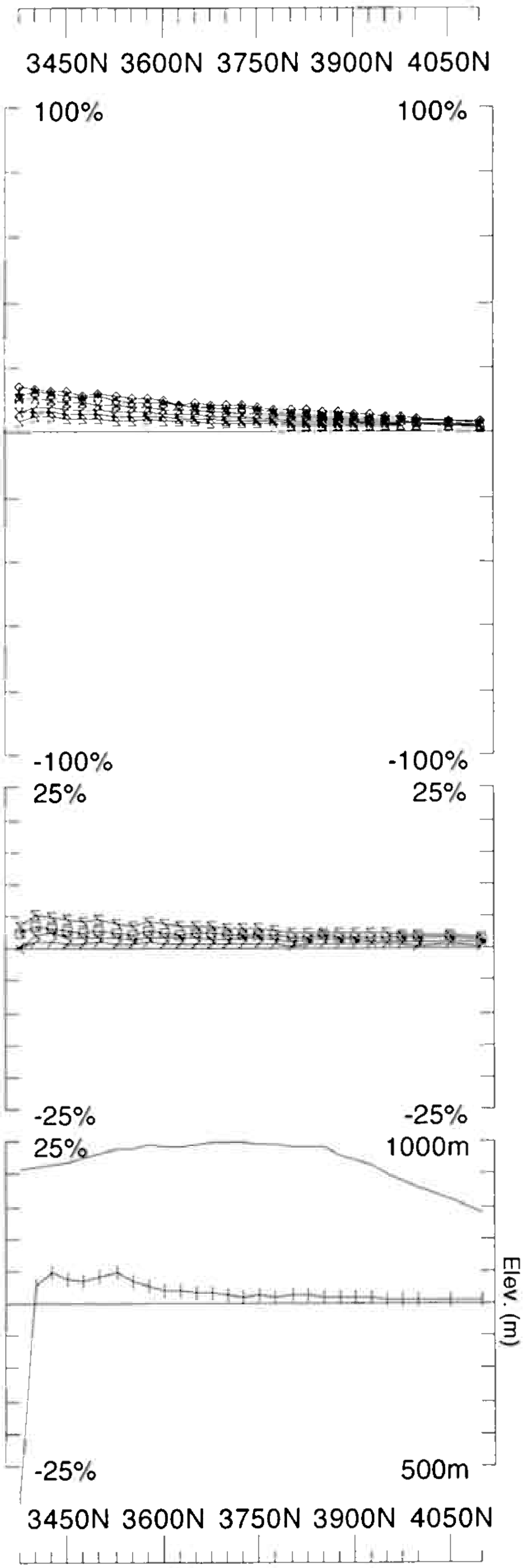
Secondary, (Chn - Ch1)/lHpl
Point Norm.at x,y,z
(10400,3650,1000)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

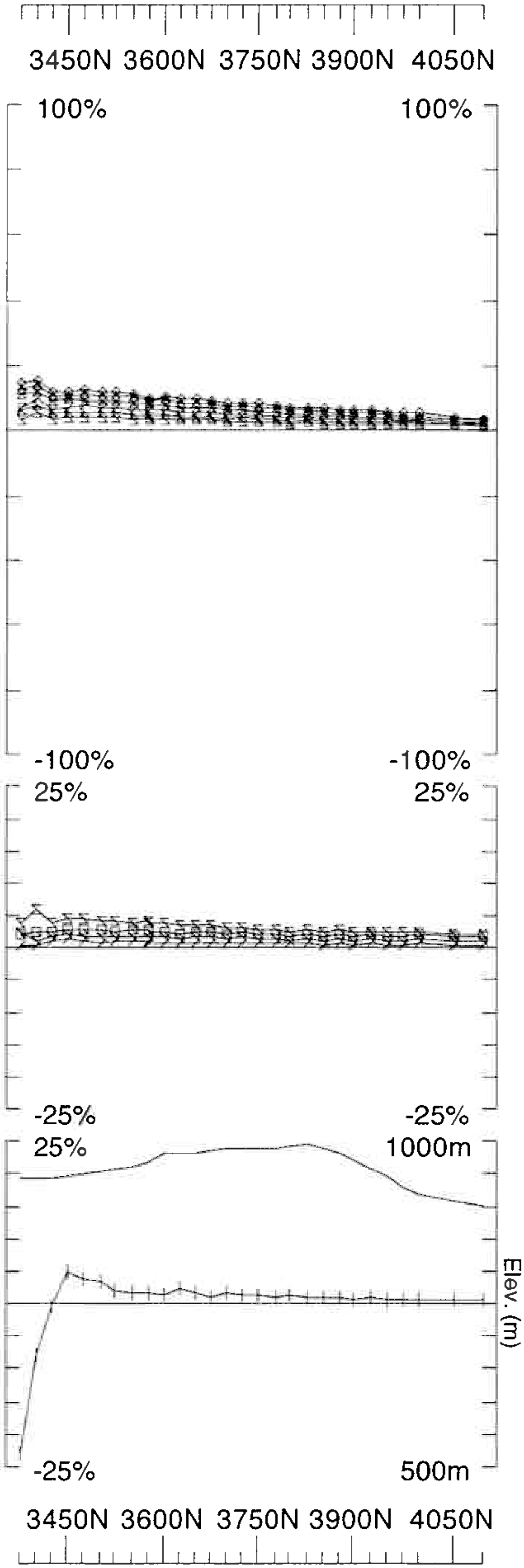
Surveyed : 22/2/6
Reduced : 22/2/6
Plotted : 18/3/32



UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 20/2/6
Reduced : 20/2/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(10400,3650,1000)
Base Freq. 3.251 Hz

Loop: 32
Line: 10400E
Compt: Hz



Loop: 32
Line: 10600E
Compt: Hz

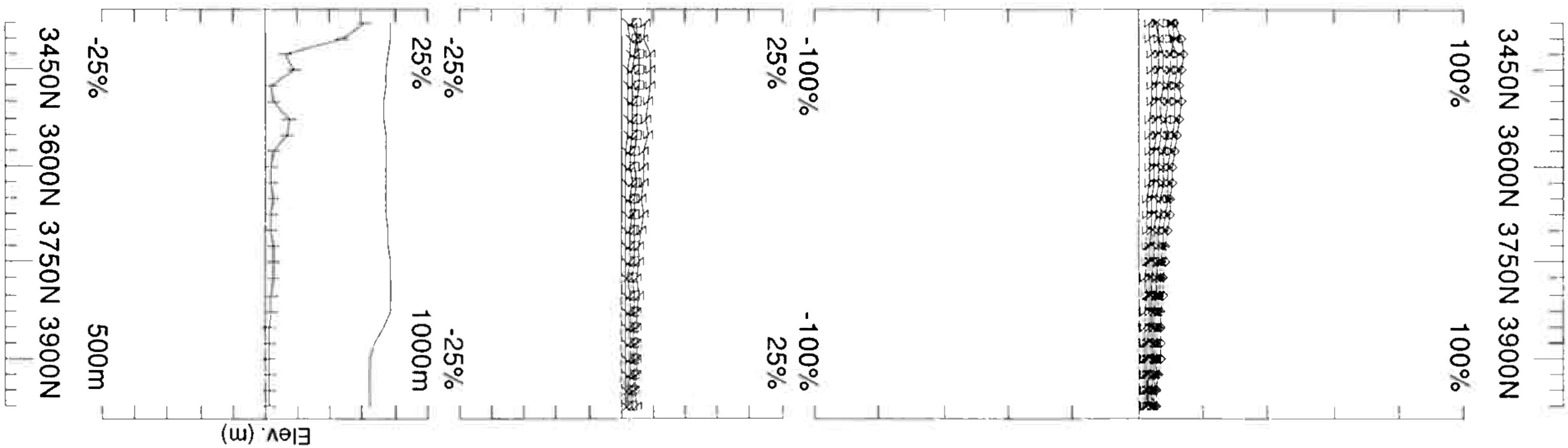
Secondary, (Chn - Ch1)/IHpl
Point Norm.at x,y,z
(10400,3650,1000)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

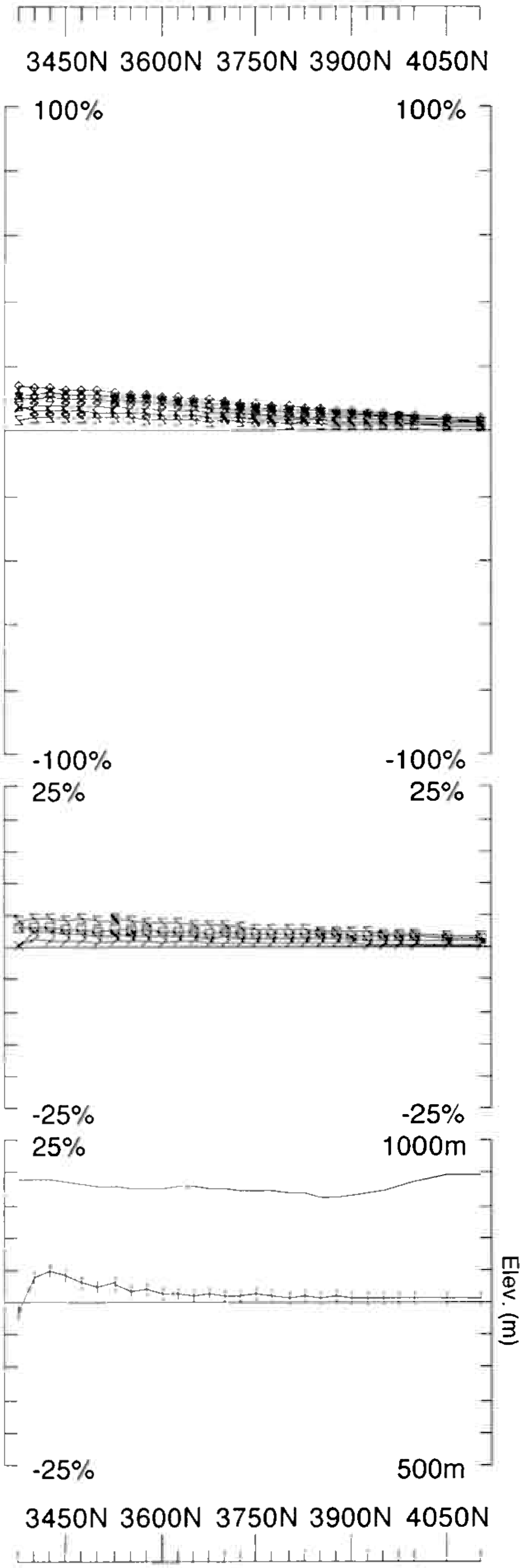
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

Surveyed : 20/2/6
Reduced : 20/2/6
Plotted : 18/3/32



Loop: 32 Line: 10800E Compt: Hz	Secondary, (Chn - Ch1)/IHpI Point Norm.at x,y,z (10400,3650,1000) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 17/2/6 Reduced : 21/2/6 Plotted : 18/3/32



Loop: 32
Line: 11000E
Compt: Hz

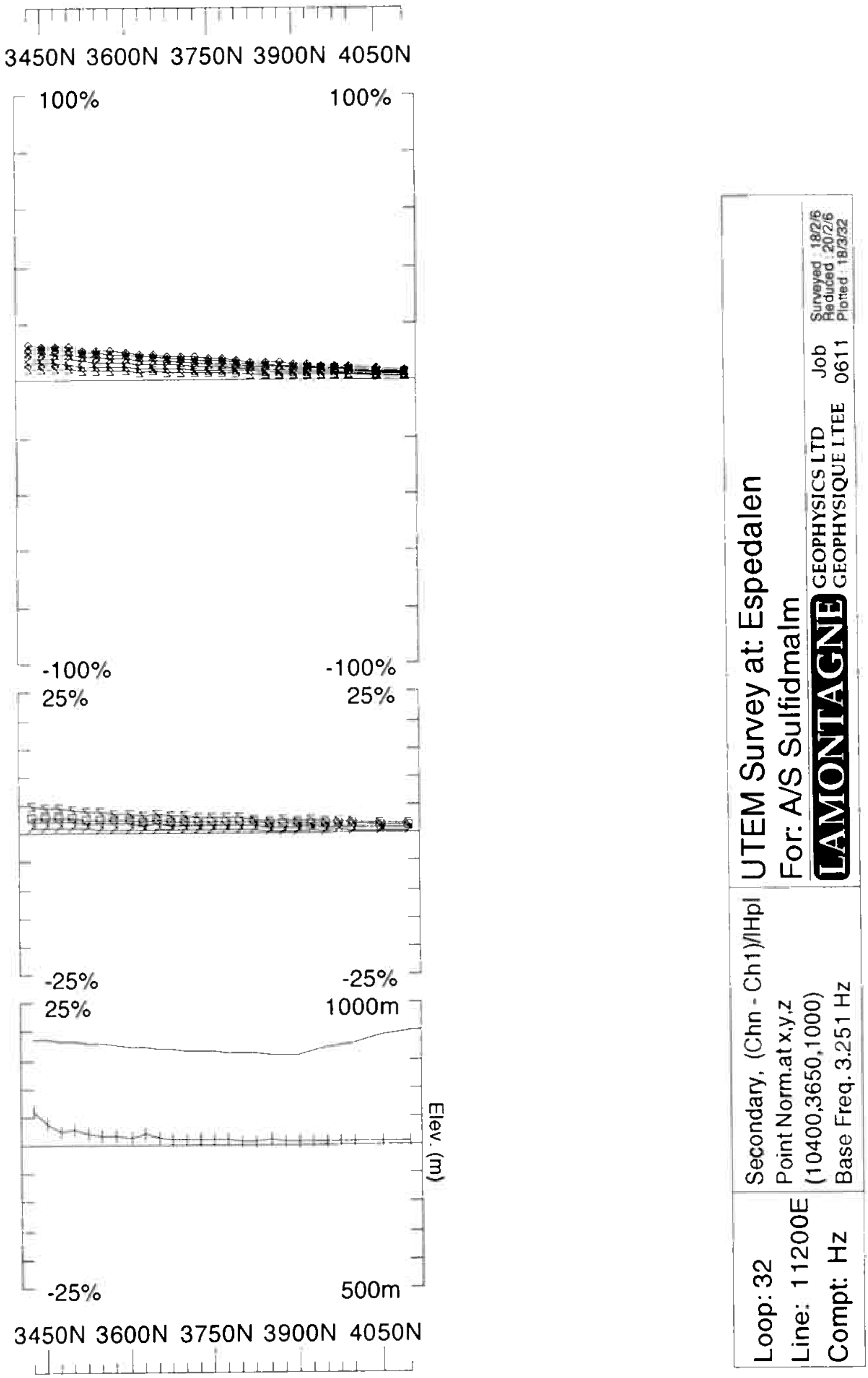
Secondary, (Chn - Ch1)/IHp|
Point Norm.at x,y,z
(10400,3650,1000)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

Surveyed : 18/2/6
Reduced : 20/2/6
Plotted : 18/3/32


3450N 3600N 3750N 3900N 4050N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1000m
Elev. (m)
-25%
500m
3450N 3600N 3750N 3900N 4050N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 18/2/6
Reduced : 20/2/6
Plotted : 18/3/32
Secondary, (Chn - Ch1)/IHpI
Point Norm.at x,y,z
(10400,3650,1000)
Base Freq. 3.251 Hz
Loop: 32
Line: 11200E
Compt: Hz

Espedalen

Loop 33

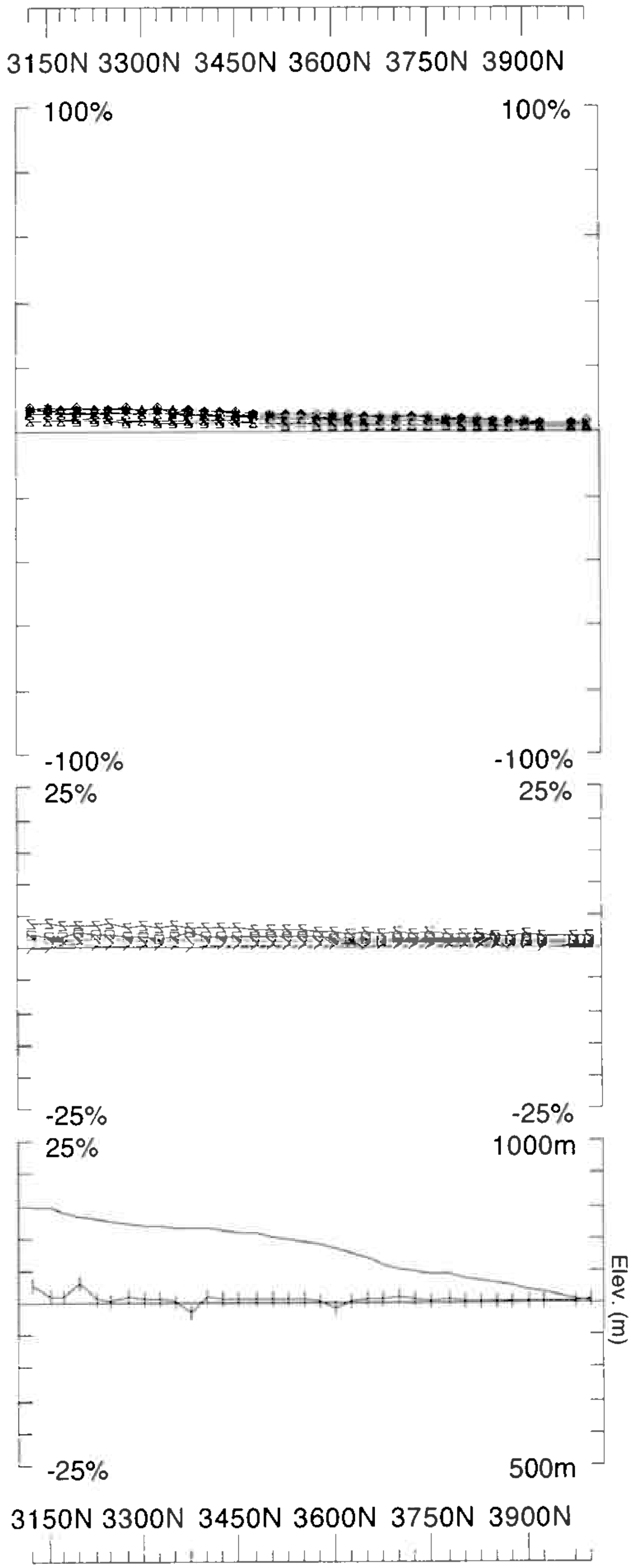
Hz
@3.251 Hz frequency

point norm
@
(x,y,z) = (8600E,3425N, 915 m.a.s.l.)

Ch1 reduced

Loop 33	Line 7900E	3125N - 4000N	875m
	Line 8000E	3125N - 4100N	975m
	Line 8200E	3125N - 4000N	875m
	Line 8400E	3125N - 4050N	925m
	Line 8600E	3125N - 4000N	875m
	Line 8800E	3125N - 4050N	925m
	Line 9000E	3125N - 4100N	975m
	Espedalen	Loop 33 Total	6425m

Loop 33 - point norm



Loop: 33
Line: 7900E
Compt: Hz

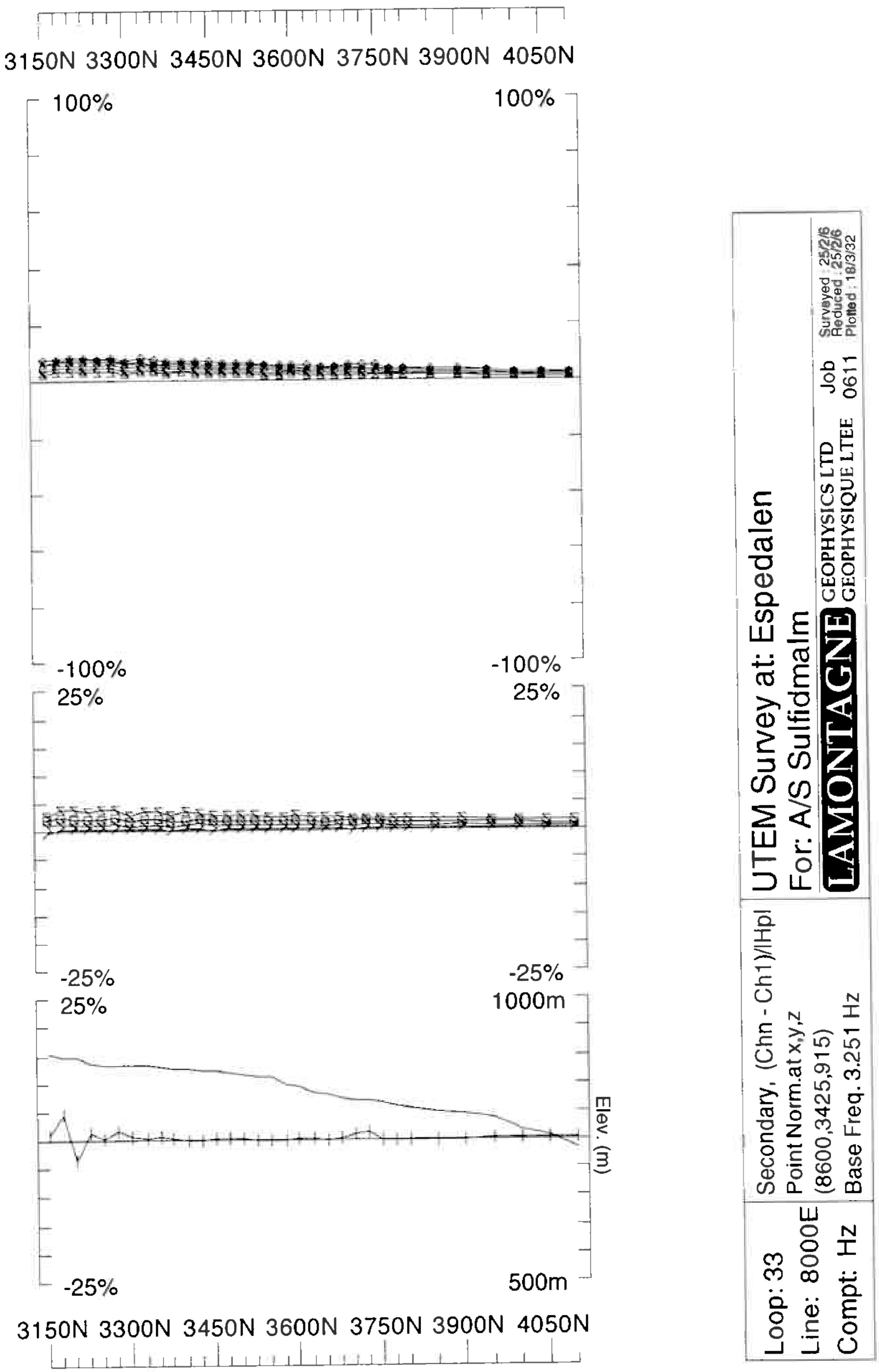
Secondary, (Chn - Ch1)/lHpl
Point Norm.at x,y,z
(8600,3425,915)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

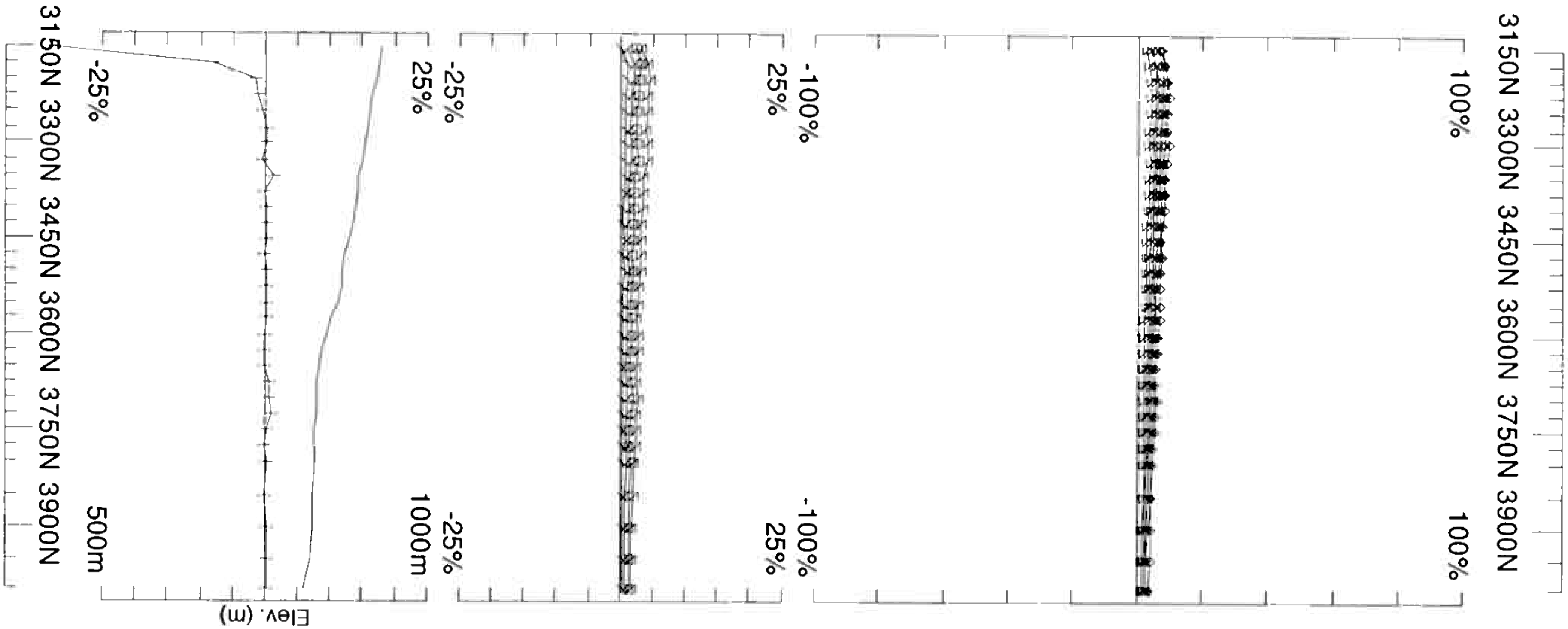
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

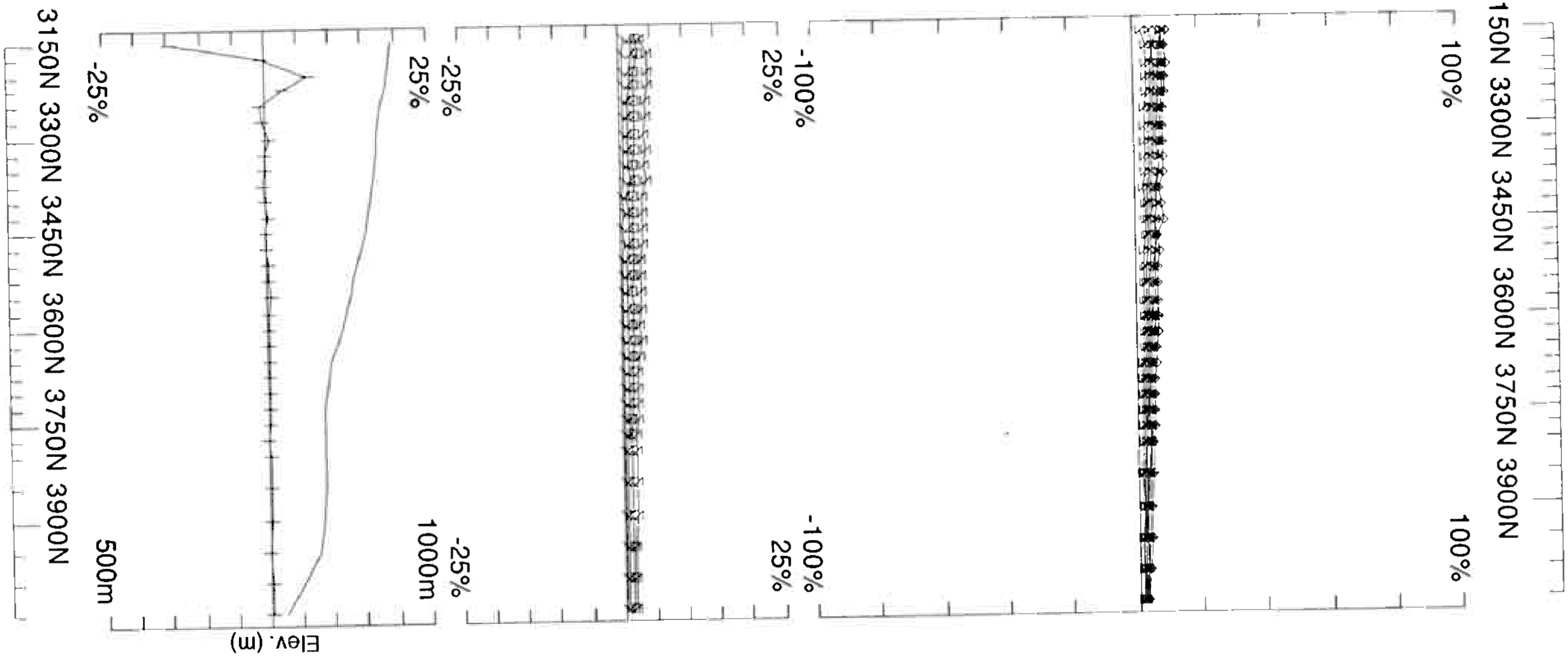
Surveyed : 25/2/6
Reduced : 25/2/6
Plotted : 18/3/32



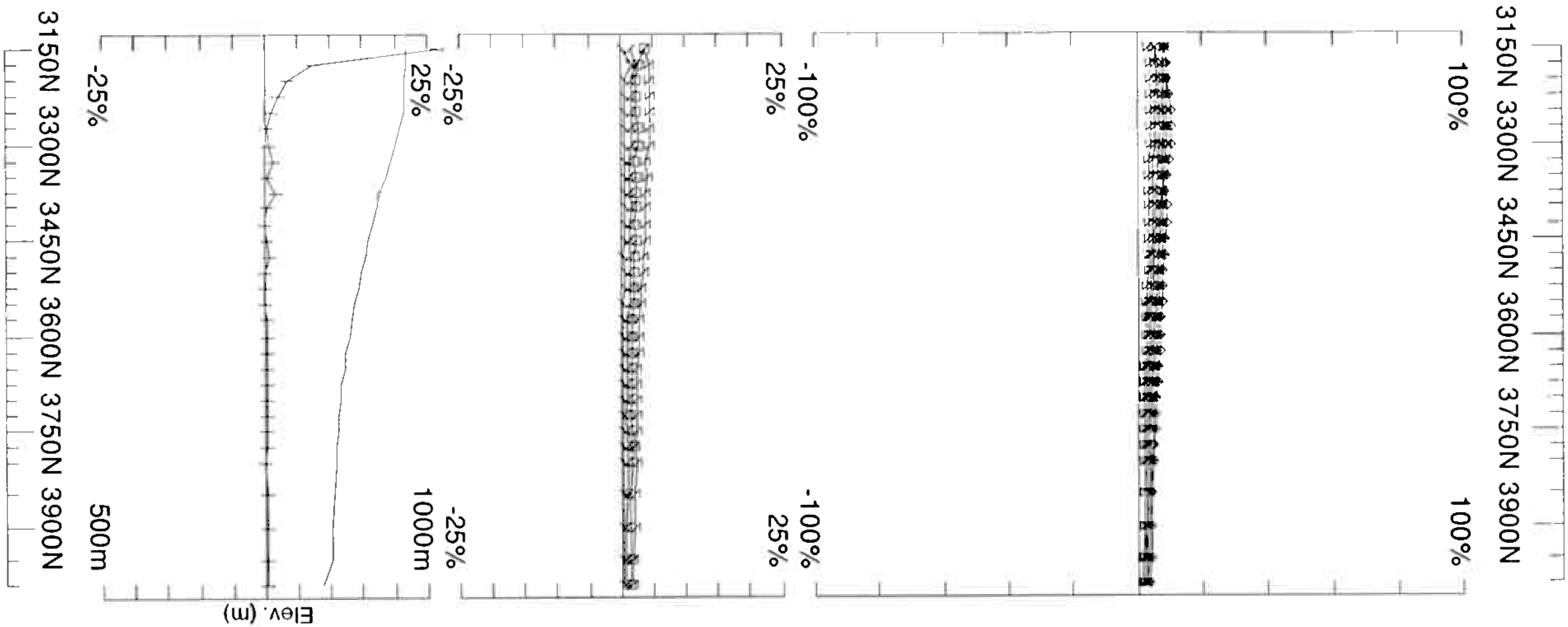
3150N 3300N 3450N 3600N 3750N 3900N 4050N
100%
-100%
25%
-25%
1000m
500m
Elev. (m)
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 25/2/6
Reduced : 25/2/6
Plotted : 18/3/32
Loop: 33
Line: 8000E
Compt: Hz
Secondary, (Chn - Ch1)/IHpI
Point Norm.at x,y,z
(8600,3425,915)
Base Freq. 3.251 Hz



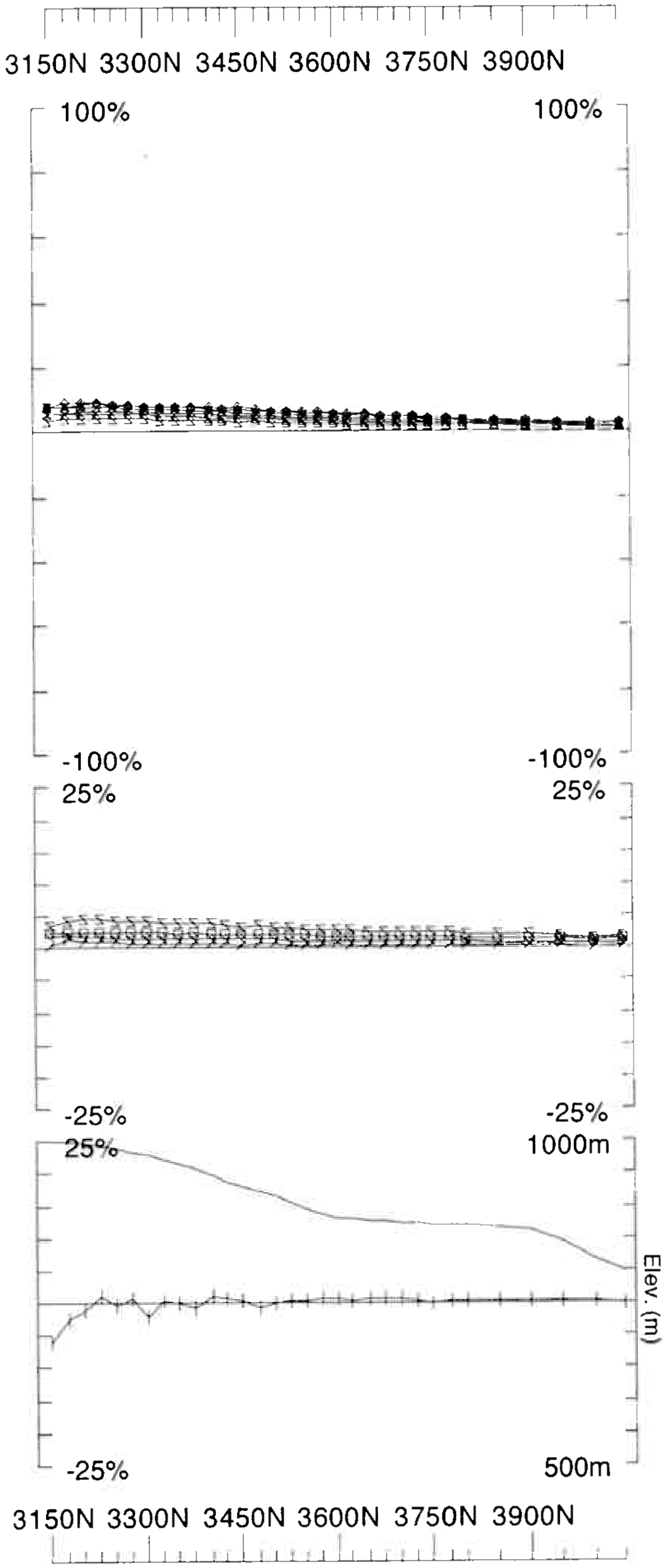
Loop: 33 Line: 8200E Compt: Hz	Secondary, (Chn - Ch1)/IHpI Point Norm.at x,y,z (8600,3425,915) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 24/2/6 Reduced : 24/2/6 Plotted : 18/3/32



Loop: 33 Line: 8400E Compt: Hz	Secondary, (Chn - Ch1)/IHpl Point Norm.at x,y,z (8600,3425,915) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 24/2/6 Reduced : 24/2/6 Plotted : 18/3/32



Loop: 33 Line: 8600E Compt: Hz	Secondary, (Chn - Ch1)/lHpl Point Norm.at x,y,z (8600,3425,915) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 24/2/6 Reduced : 24/2/6 Plotted : 18/3/32



UTEM Survey at: Espedalen

For: A/S Sulfidmalm

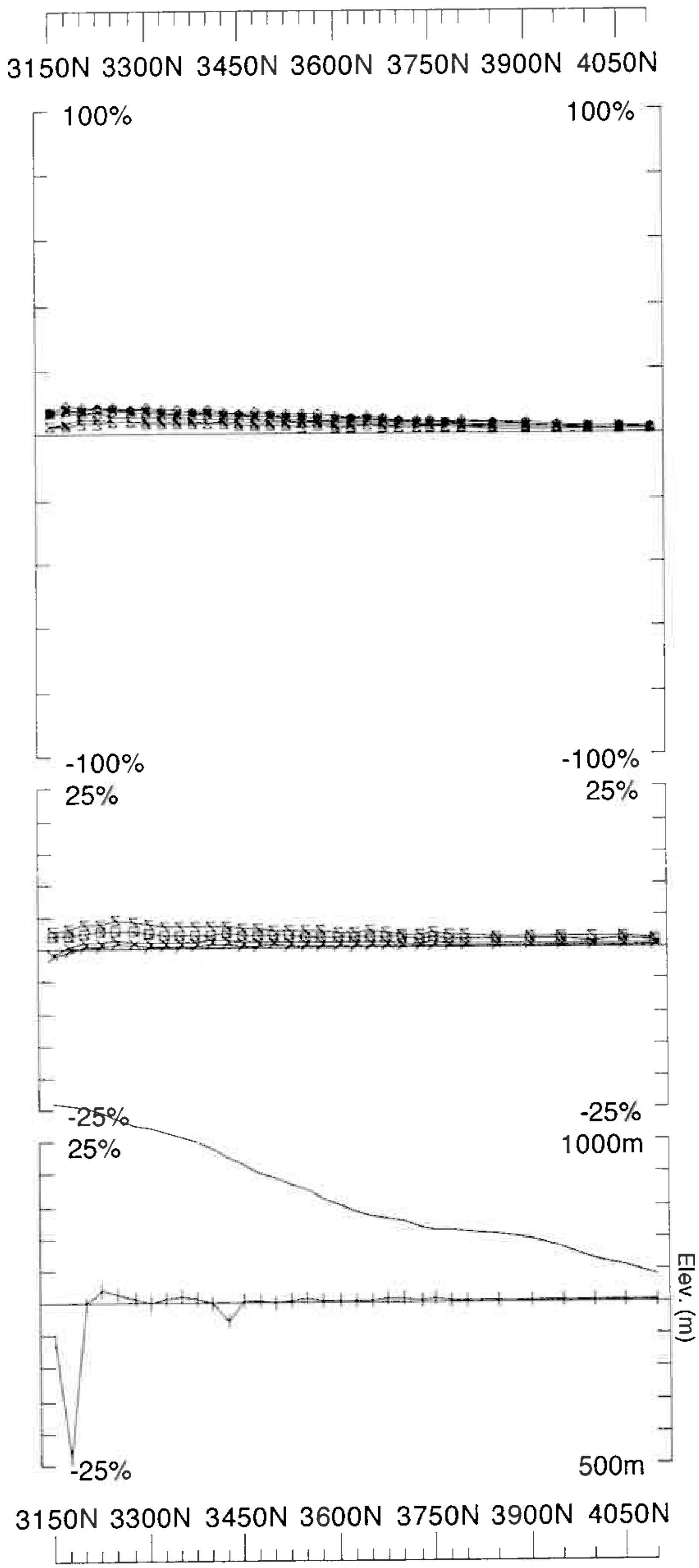
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 23/2/6
Reduced : 24/2/6
Plotted : 18/3/32

Loop: 33
Line: 8800E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(8600,3425,915)
Base Freq. 3.251 Hz



Loop: 33
Line: 9000E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(8600,3425,915)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 23/2/6
Reduced : 24/2/6
Plotted : 18/3/32

Espedalen

Loop 34

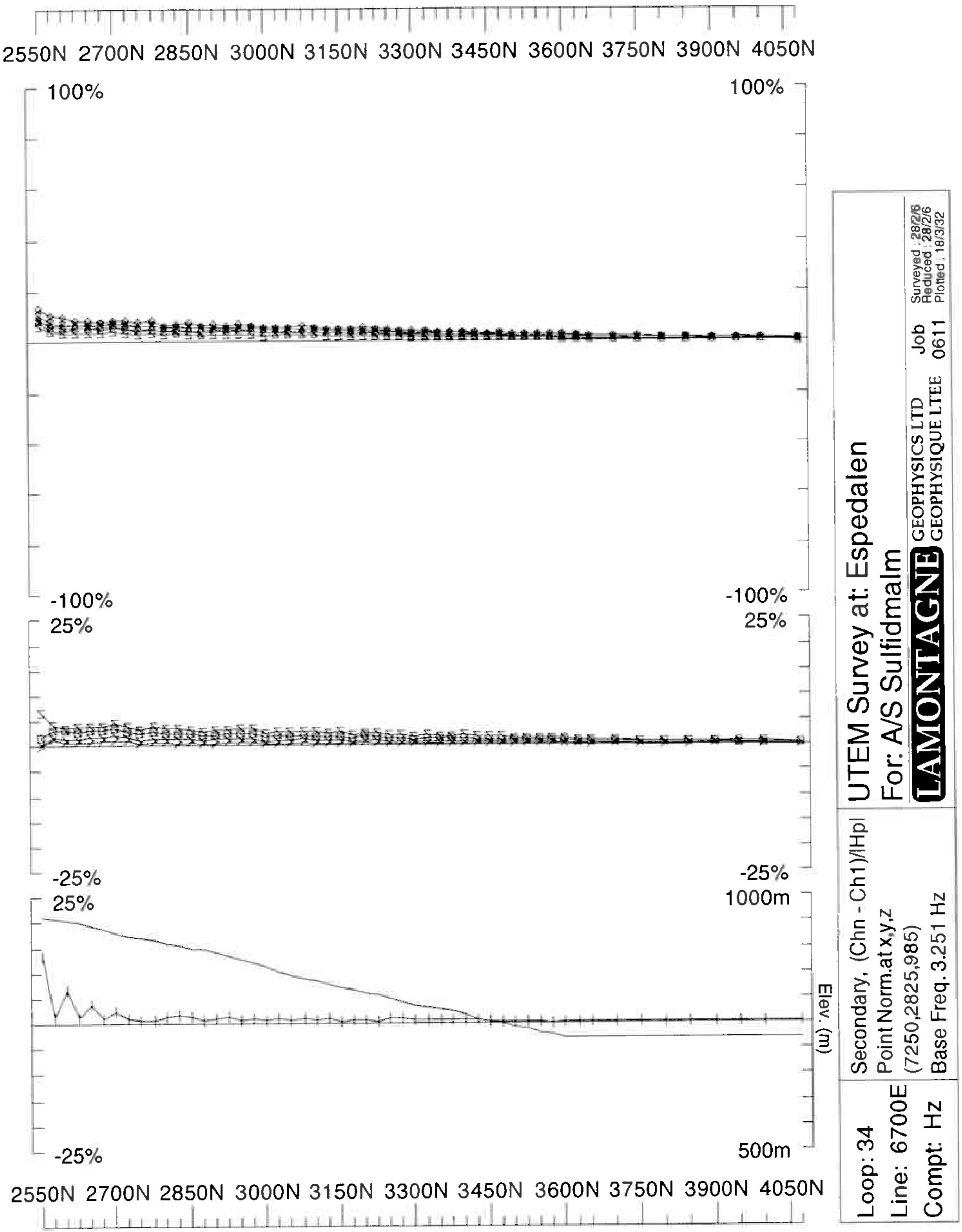
Hz
@3.251 Hz frequency

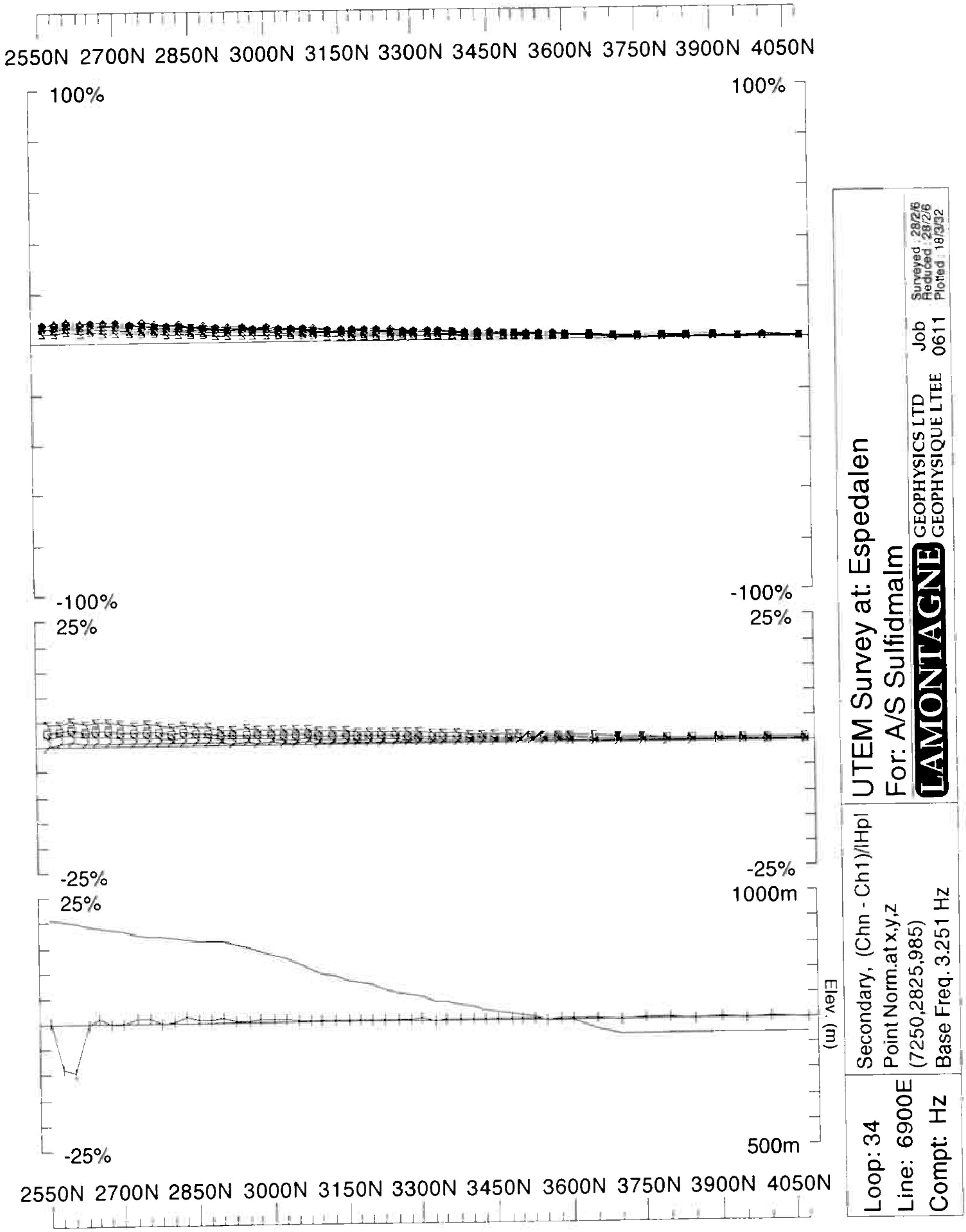
point norm
@
(x,y,z) = (7250E,2825N, 985 m.a.s.l.)

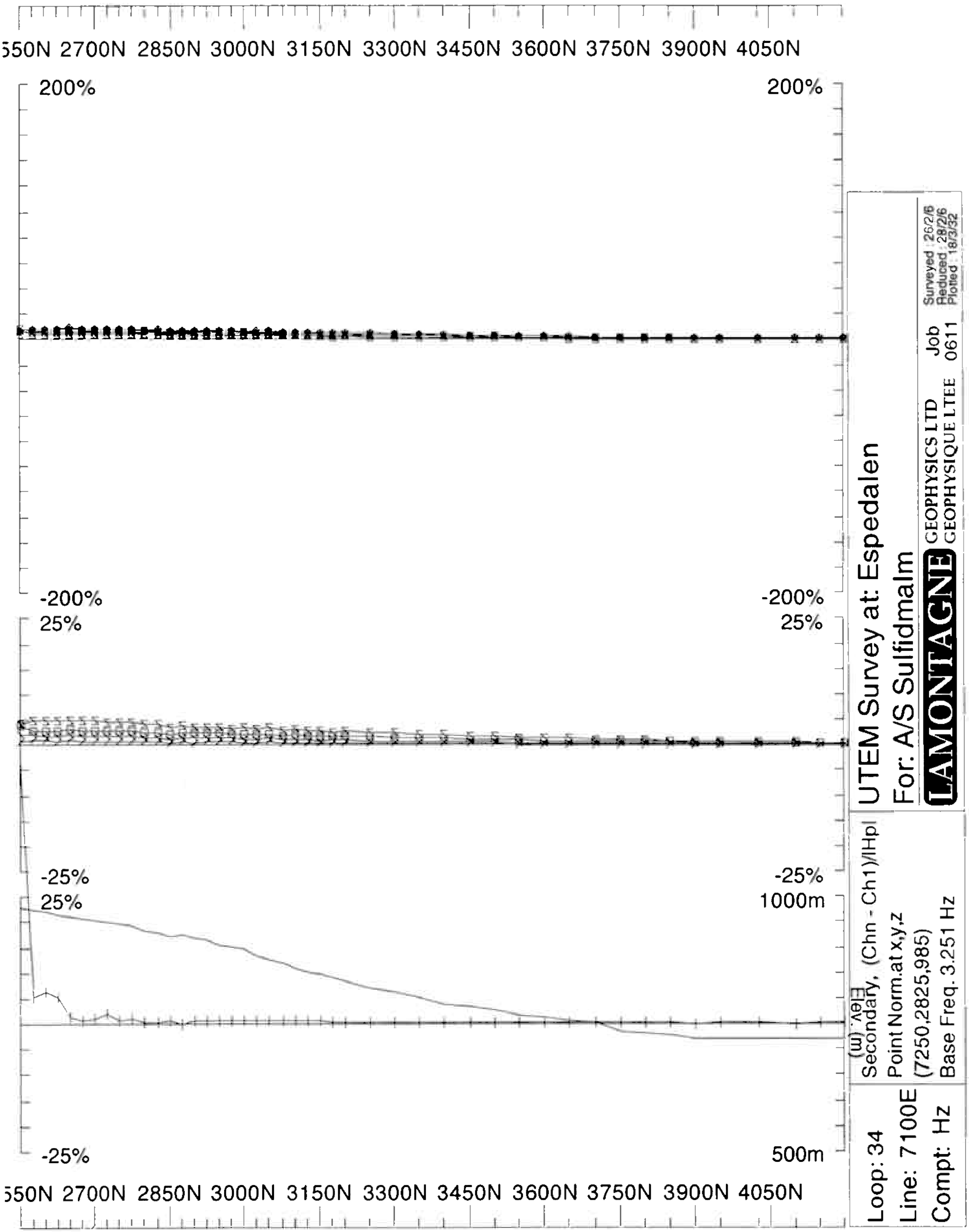
Ch1 reduced

Loop 34	Line	6700E	2525N - 4075N	1550m
	Line	6900E	2525N - 4075N	1550m
	Line	7100E	2525N - 4200N	1675m
	Line	7300E	2525N - 4200N	1675m
	Line	7500E	2525N - 4250N	1725m
	Line	7700E	2525N - 3975N	1450m
	Line	7900E	2525N - 3275N	750m
		Espedalen	Loop 34 Total	10375m

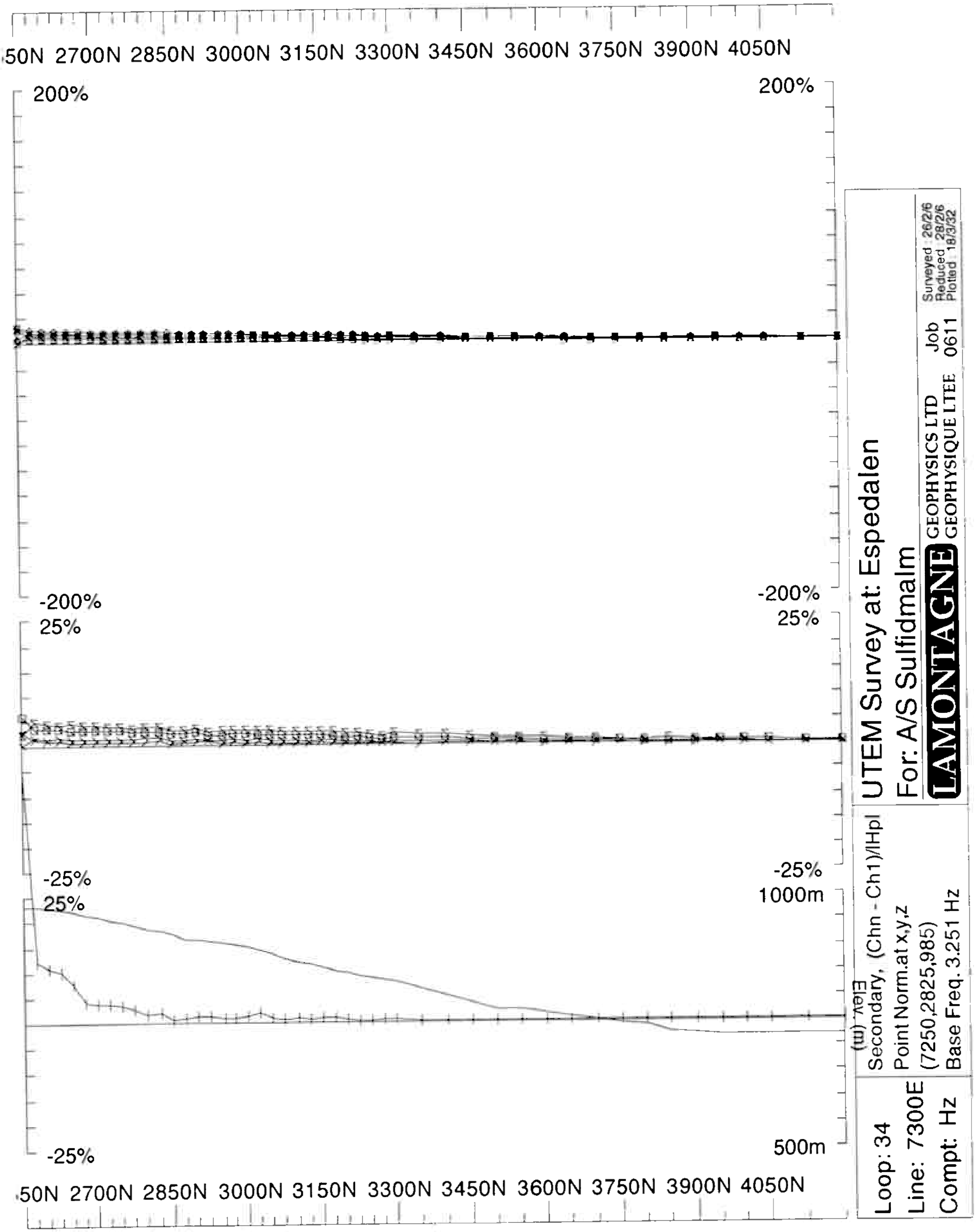
Loop 34 - point norm


2550N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1000m
Elev. (m)
-25%
500m
2550N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE
GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job
0611
Surveyed : 28/2/6
Reduced : 28/2/6
Plotted : 18/3/32
Loop: 34
Line: 6700E
Compt: Hz
Secondary, (Chn - Ch1)/IHpl
Point Norm.at x,y,z
(7250,2825,985)
Base Freq. 3.251 Hz

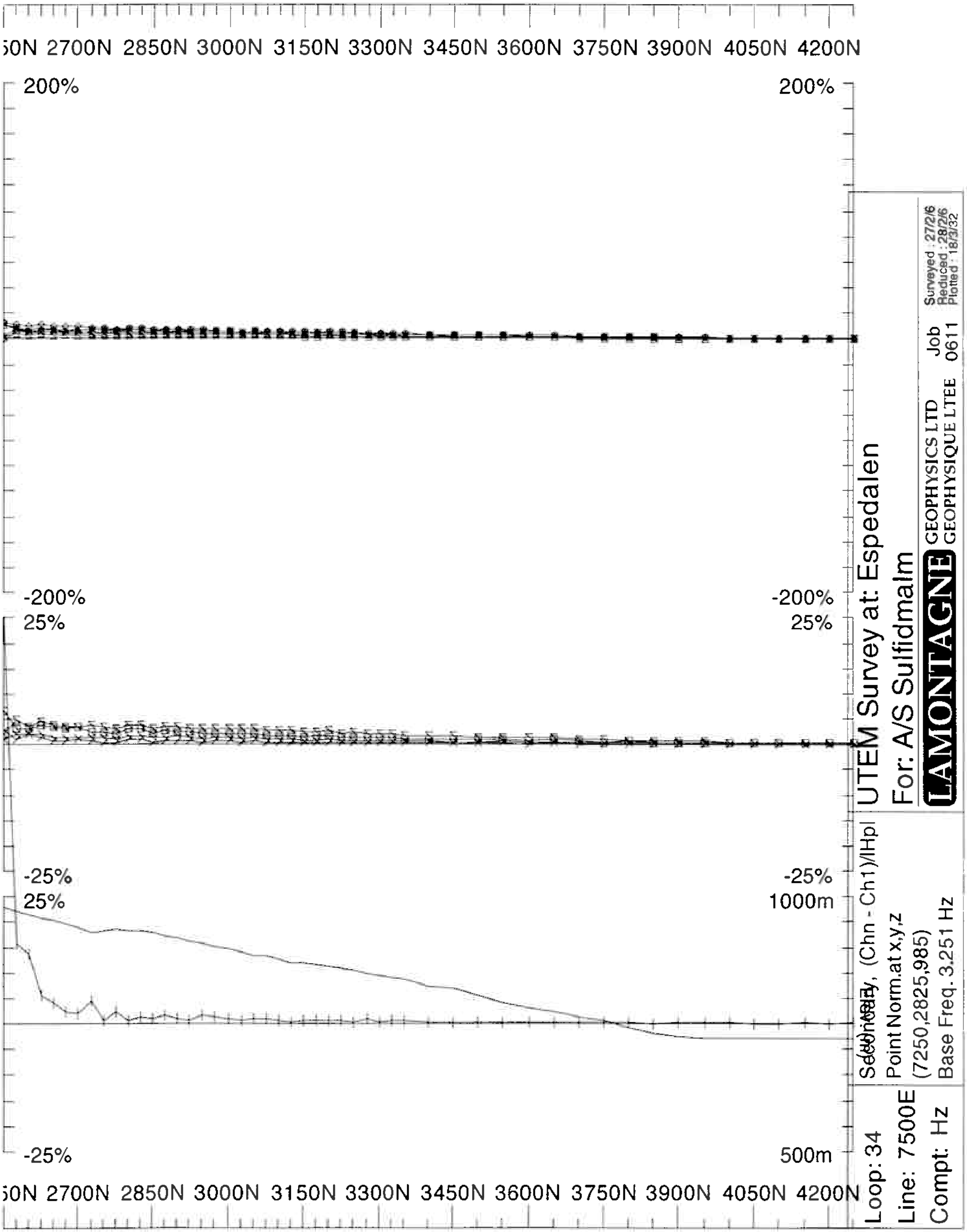

2550N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
100%
-100%
25%
-25%
25%
-25%
1000m
500m
Elev. (m)
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE
GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job 0611
Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(7250,2825,985)
Base Freq. 3.251 Hz
Loop: 34
Line: 6900E
Compt: Hz



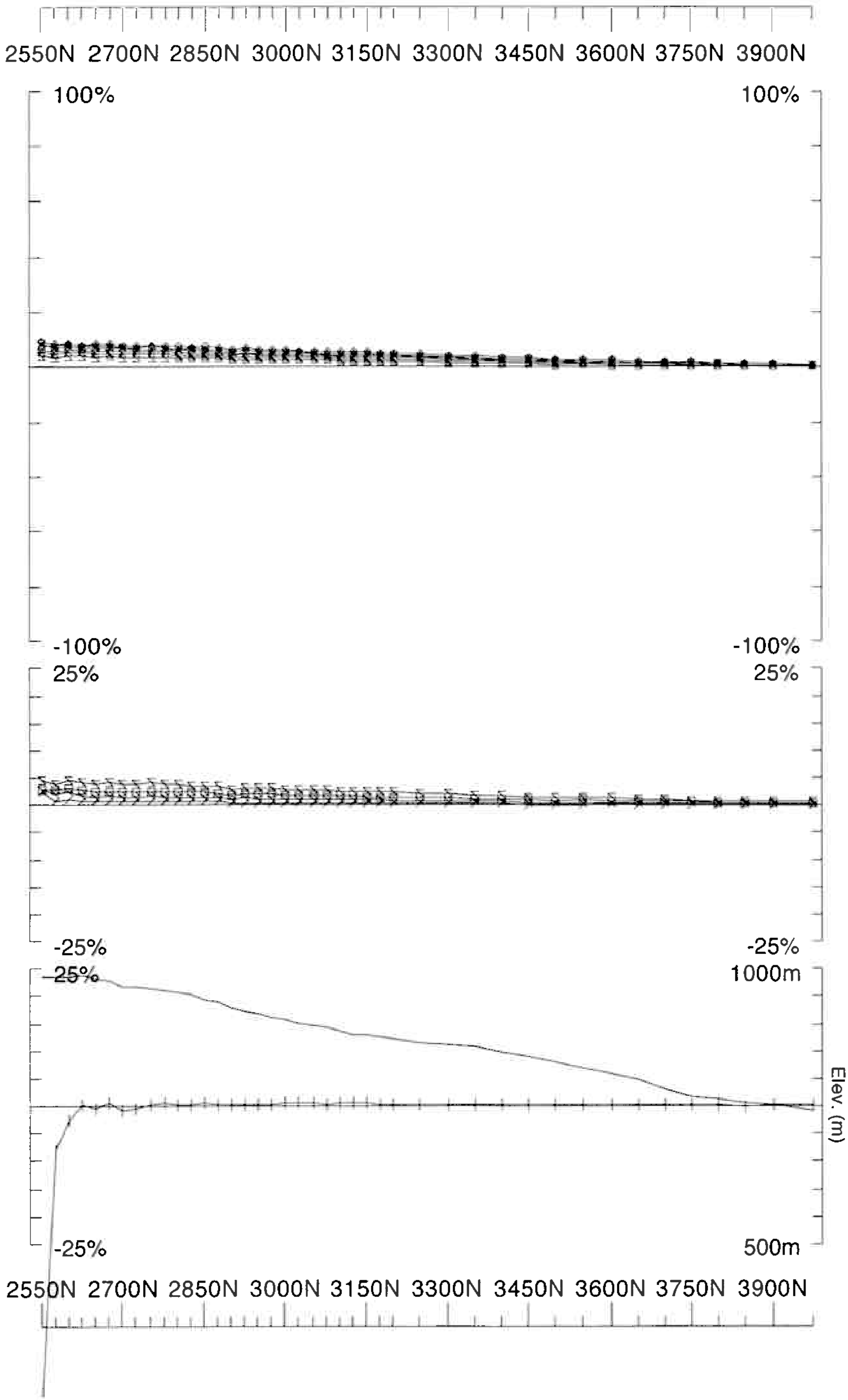
550N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
200%
-200%
25%
-25%
1000m
500m
Elev. (m)
Secondary, (Chn - Ch1)/lHpl
Point Norm.at x,y,z
(7250,2825,985)
Base Freq. 3.251 Hz
Loop: 34
Line: 7100E
Compt: Hz
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE
GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job
0611
Surveyed : 26/2/6
Reduced : 28/2/6
Plotted : 18/3/32



50N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
200%
200%
-200%
-200%
25%
25%
-25%
-25%
25%
1000m
-25%
500m
50N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Elev (m)
Secondary, (Chn - Ch1)/lHpl
Point Norm.at x,y,z
(7250,2825,985)
Base Freq. 3.251 Hz
Loop: 34
Line: 7300E
Compt: Hz



50N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N 4200N
200%
200%
-200%
-200%
25%
25%
-25%
-25%
25%
1000m
-25%
500m
50N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N 3900N 4050N 4200N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE
GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job
0611
Surveyed : 27/2/6
Reduced : 28/2/6
Plotted : 18/3/32
Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(7250,2825,985)
Base Freq. 3.251 Hz
Loop: 34
Line: 7500E
Compt: Hz



Loop: 34
Line: 7700E
Compt: Hz

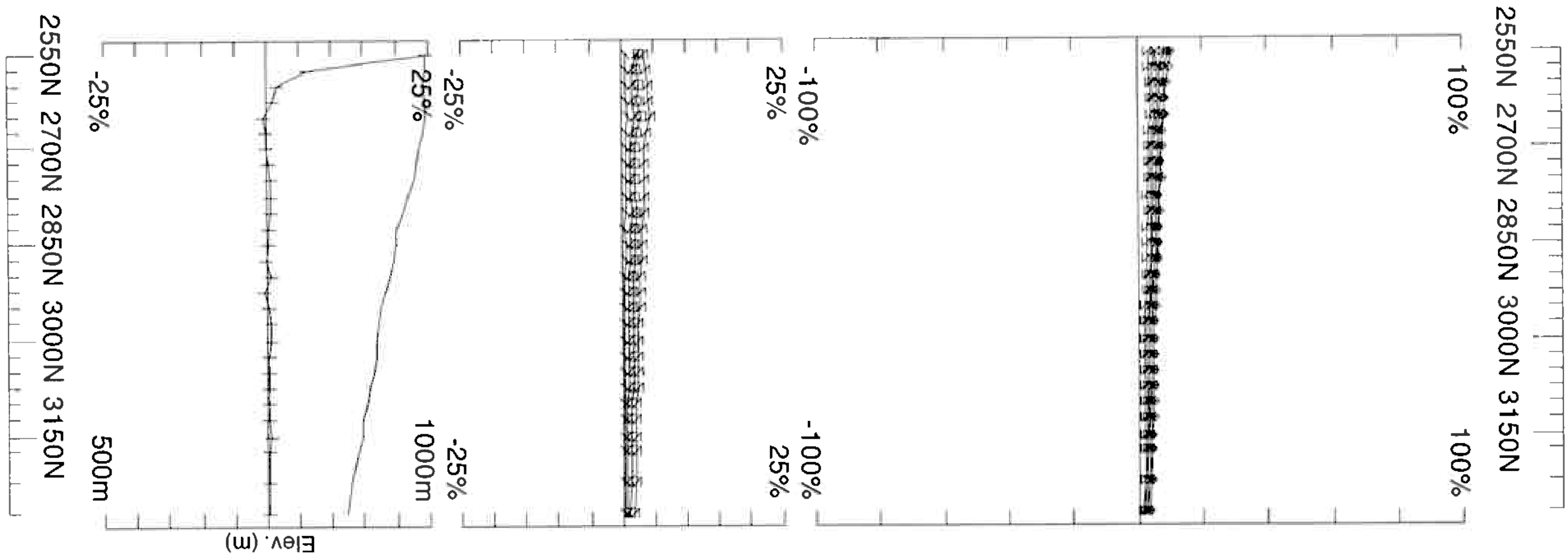
Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(7250,2825,985)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

Surveyed : 27/2/6
Reduced : 28/2/6
Plotted : 18/3/32



Loop: 34 Line: 7900E Compt: Hz	Secondary, (Chn - Ch1)/lHpl Point Norm.at x,y,z (7250,2825,985) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 27/2/6 Reduced : 28/2/6 Plotted : 18/3/32

Espedalen

Loop 35

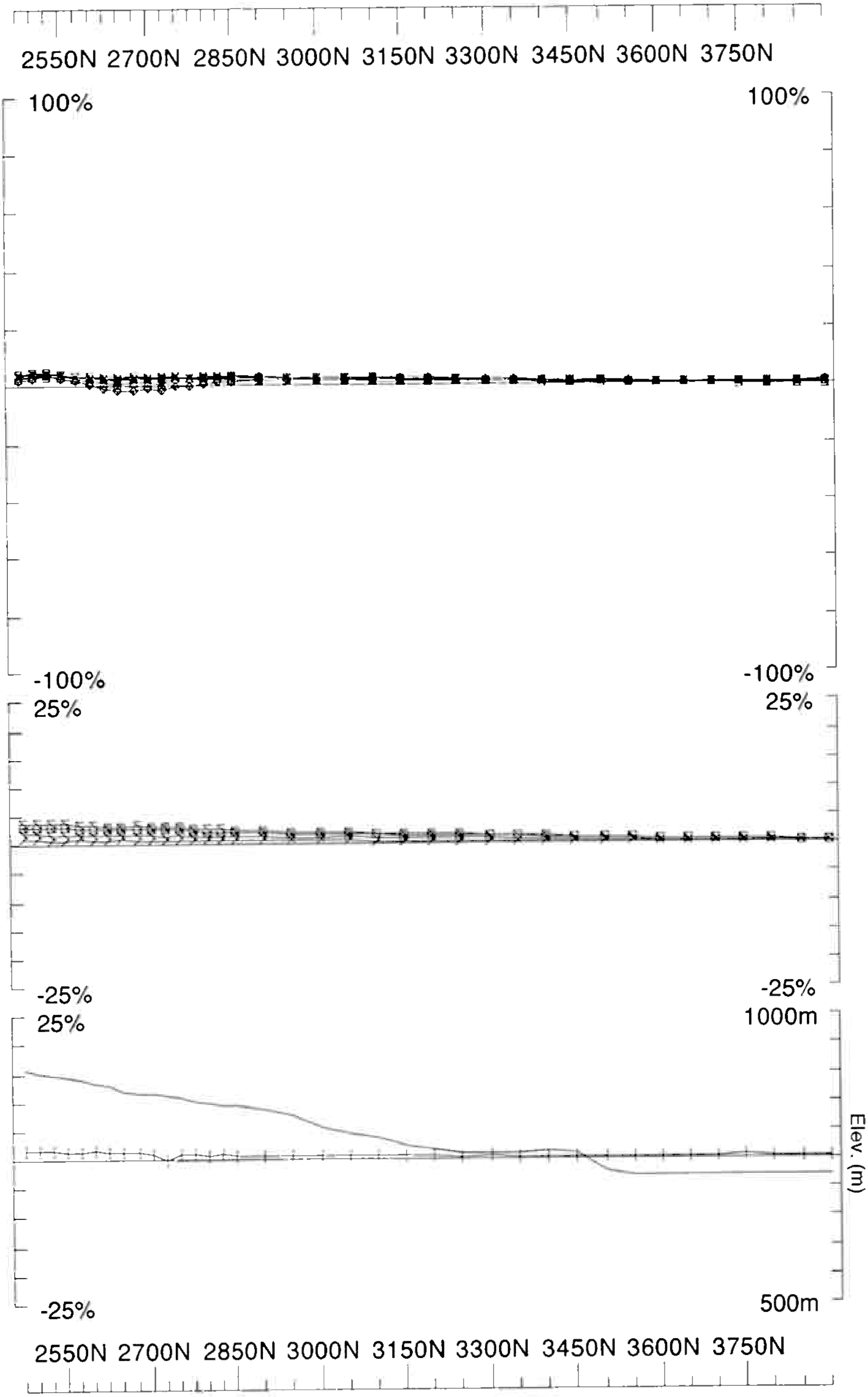
Hz
@3.251 Hz frequency

point norm
@
(x,y,z) = (6000E,2675N, 910 m.a.s.l.)

Ch1 reduced

Loop 35	Line	5100E	2475N - 3900N	1425m
	Line	5300E	2375N - 3825N	1450m
	Line	5500E	2375N - 3825N	1450m
	Line	5700E	2375N - 3825N	1450m
	Line	5900E	2375N - 3900N	1525m
	Line	6100E	2375N - 3800N	1425m
	Line	6300E	2375N - 3825N	1450m
	Line	6500E	2375N - 3850N	1475m
		Espedalen	Loop 35 Total	11425m

Loop 35 - point norm



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

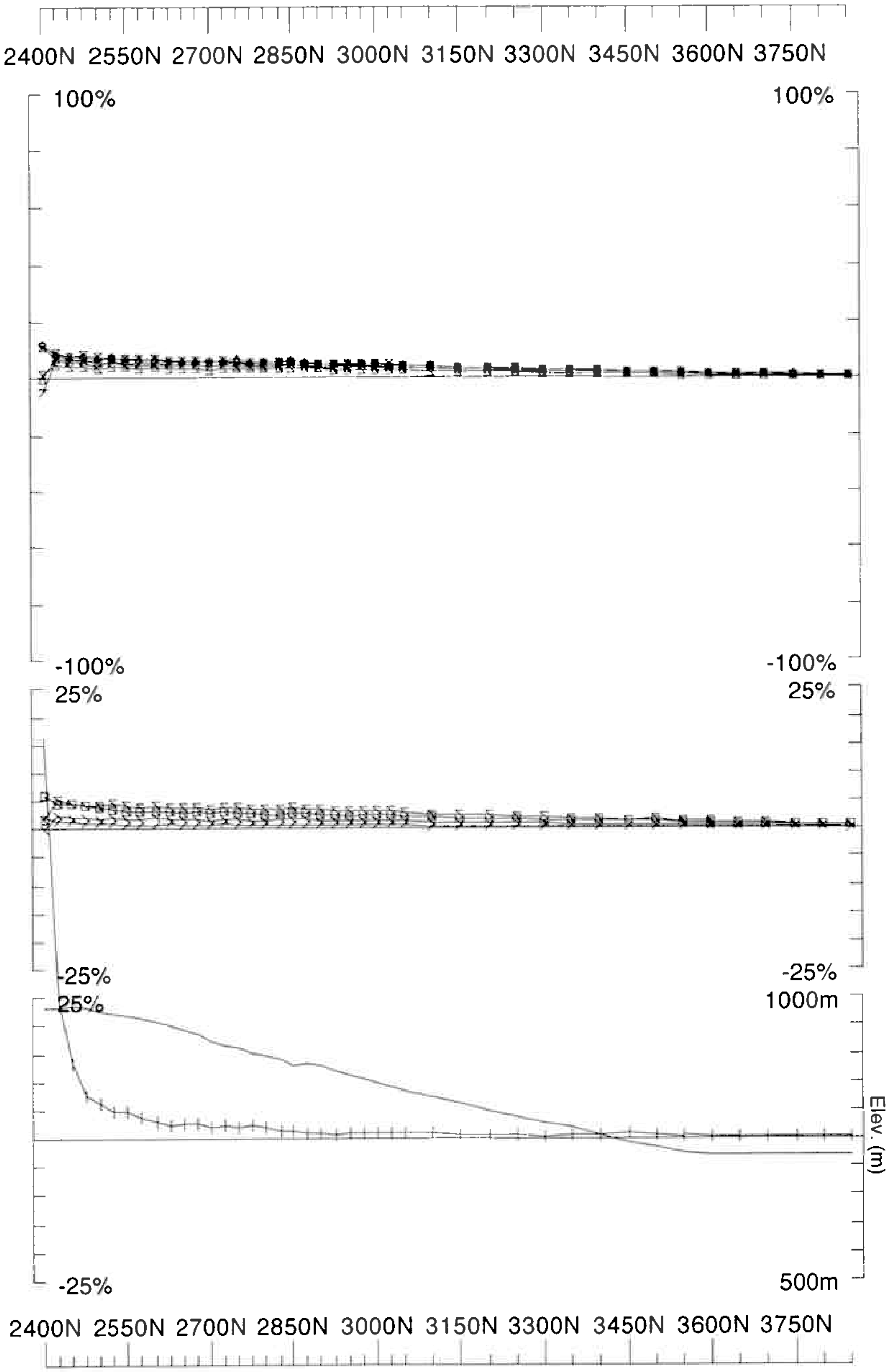
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

Surveyed : 1/3/6
Reduced : 3/3/6
Plotted : 18/3/32

Loop: 35
Line: 5100E
Compt: Hz

Secondary, (Chn - Ch1)/IHpI
Point Norm.at x,y,z
(6000,2675,910)
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

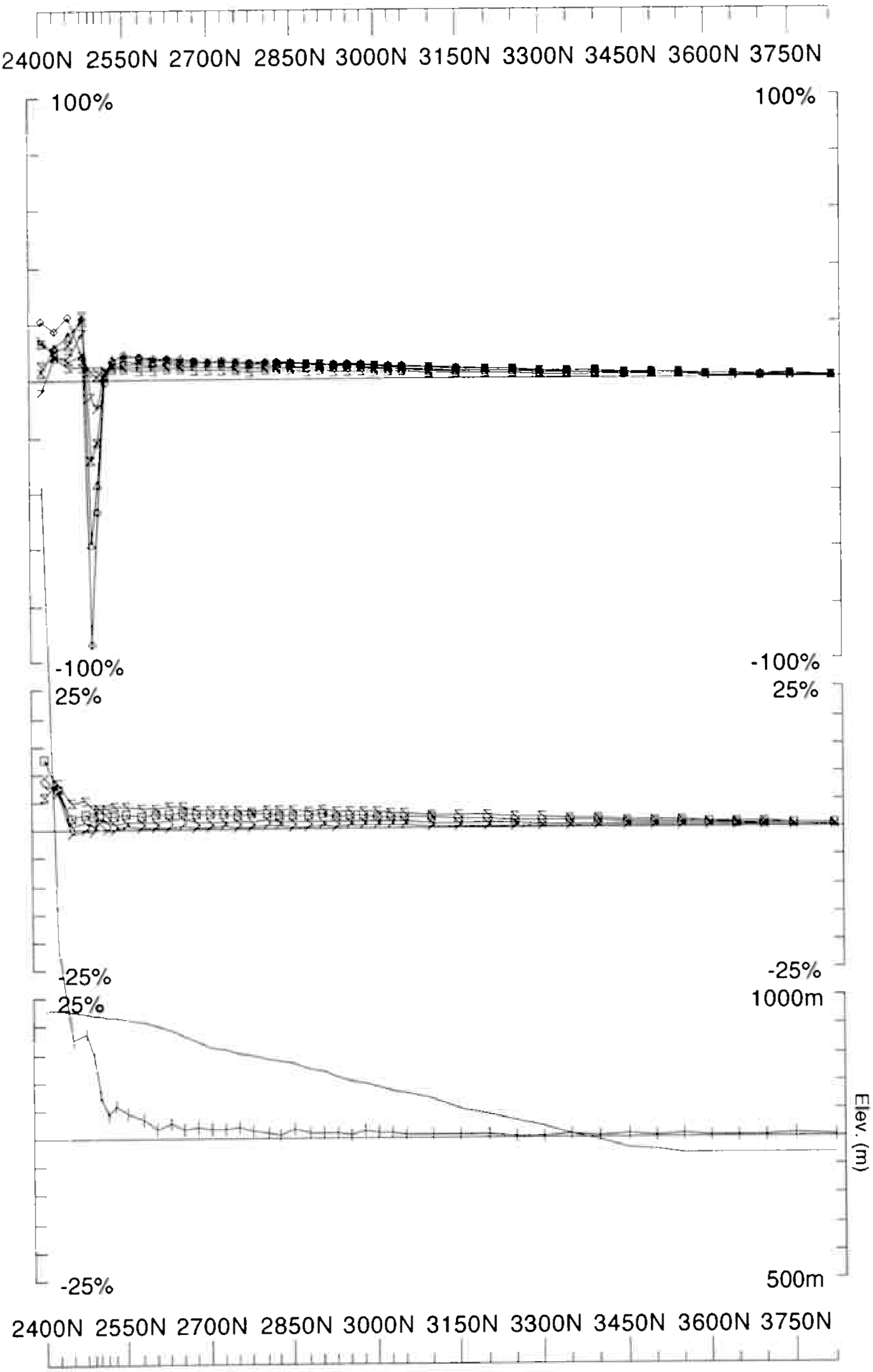
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 2/3/6
Reduced : 2/3/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/lHpl
Point Norm.at x,y,z
(6000,2675,910)
Base Freq. 3.251 Hz

Loop: 35
Line: 6500E
Compt: Hz



UTEM Survey at: Espedalen

For: A/S Sulfidmalm

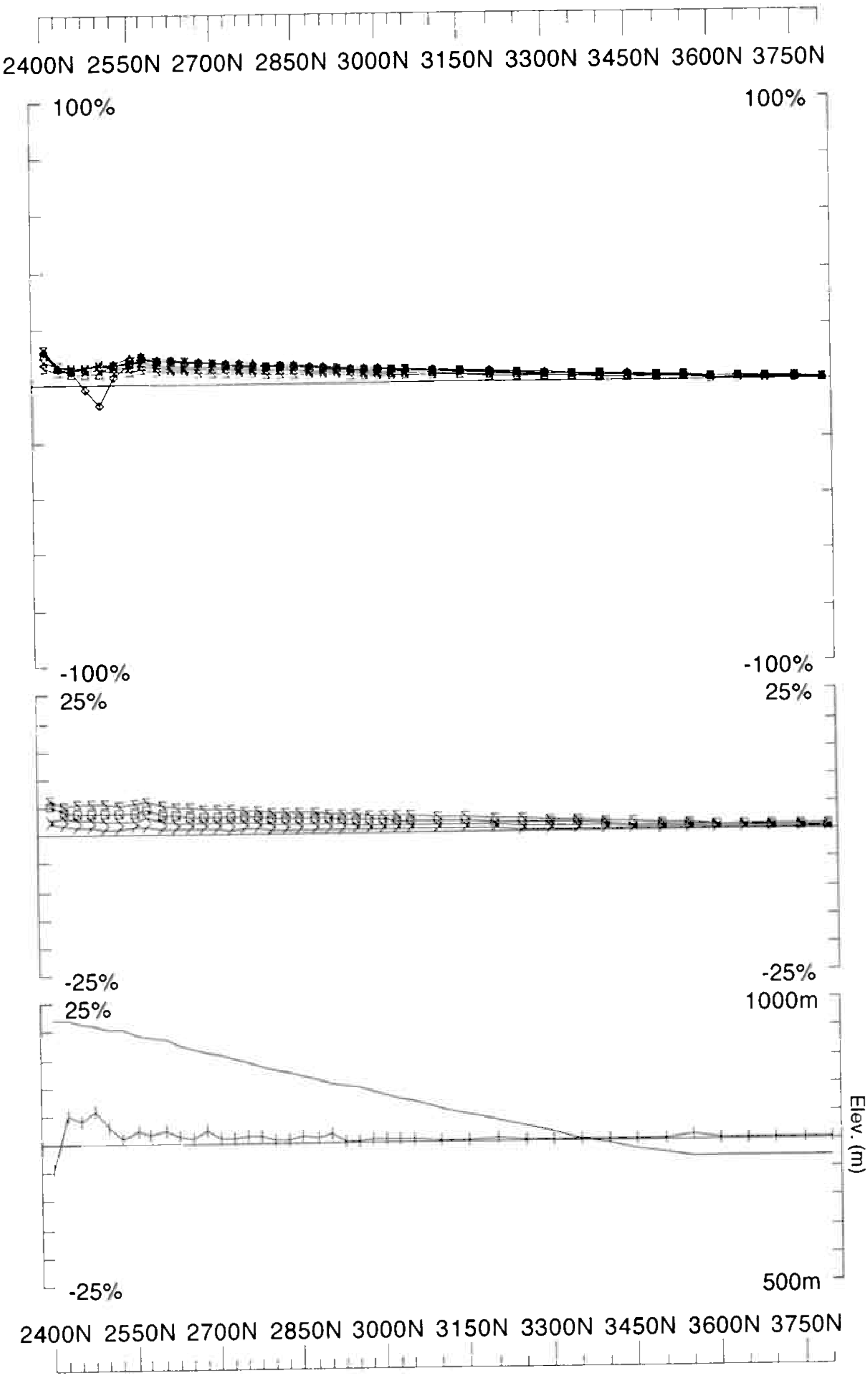
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 3/3/6
Reduced : 3/3/6
Plotted : 18/3/32

Loop: 35
Line: 6300E
Compt: Hz

Secondary, (Chn - Ch1)/IHpl
Point Norm,at x,y,z
(6000,2675,910)
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

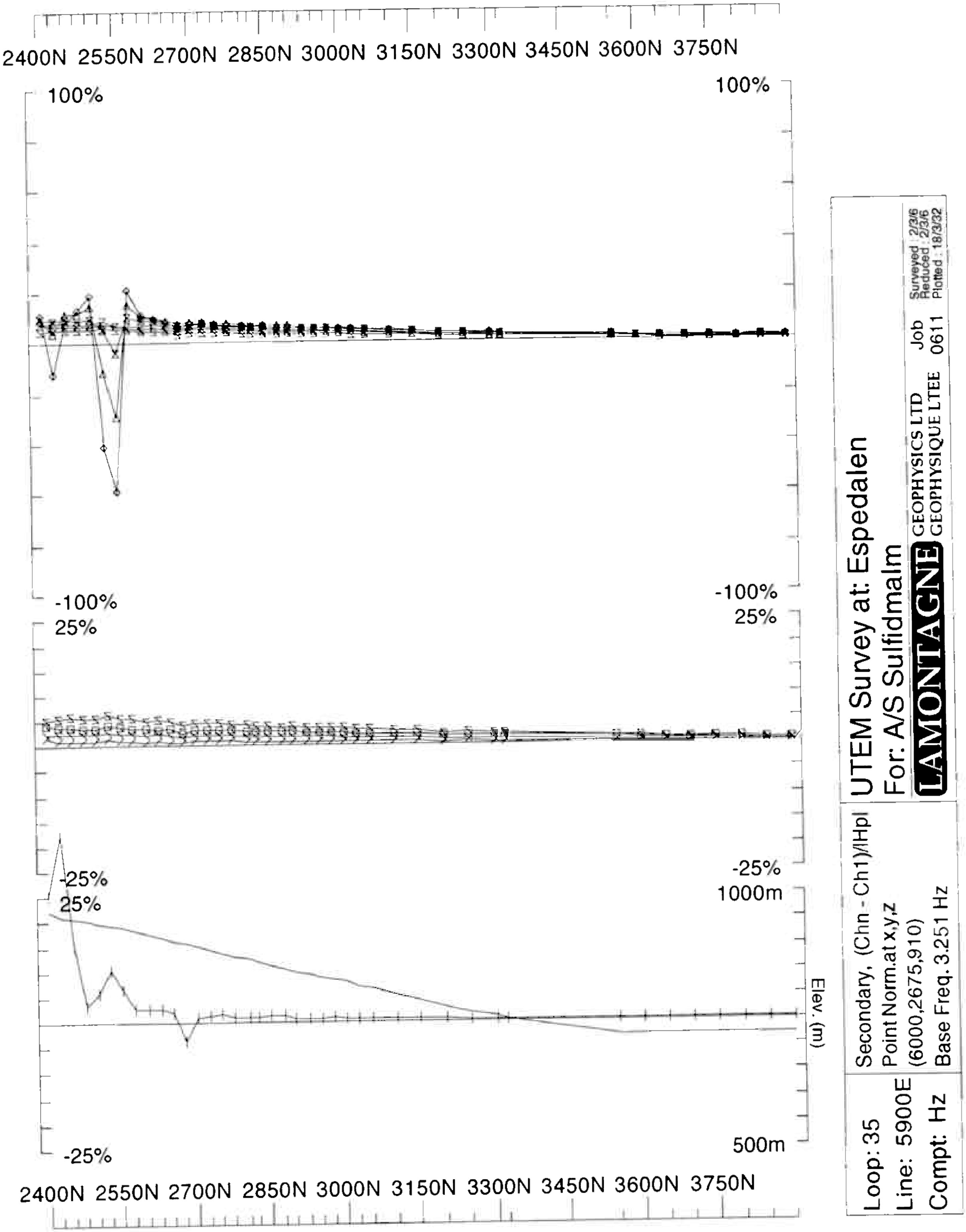
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

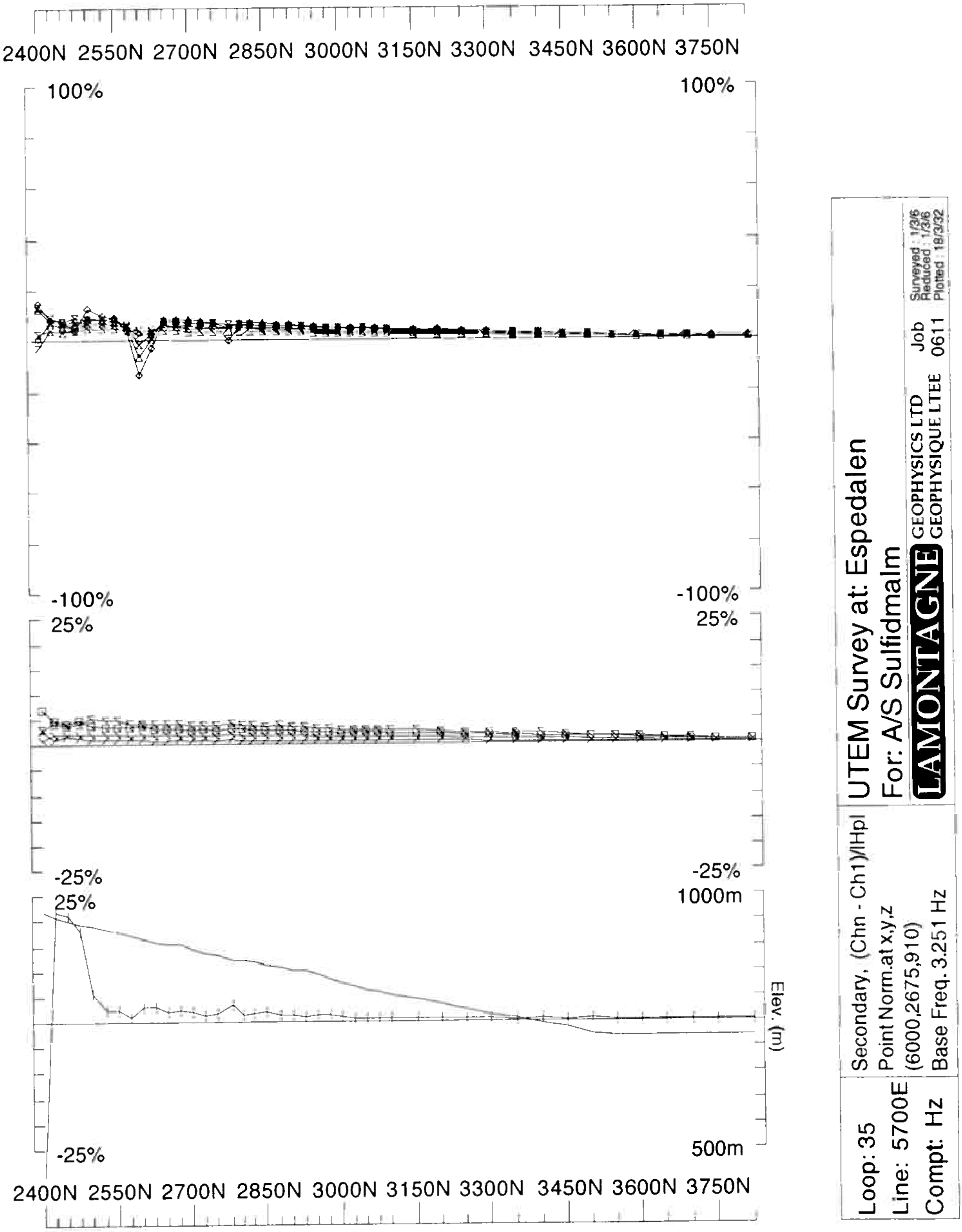
Surveyed : 3/3/6
Reduced : 3/3/6
Plotted : 18/3/32

Loop: 35
Line: 6100E
Compt: Hz

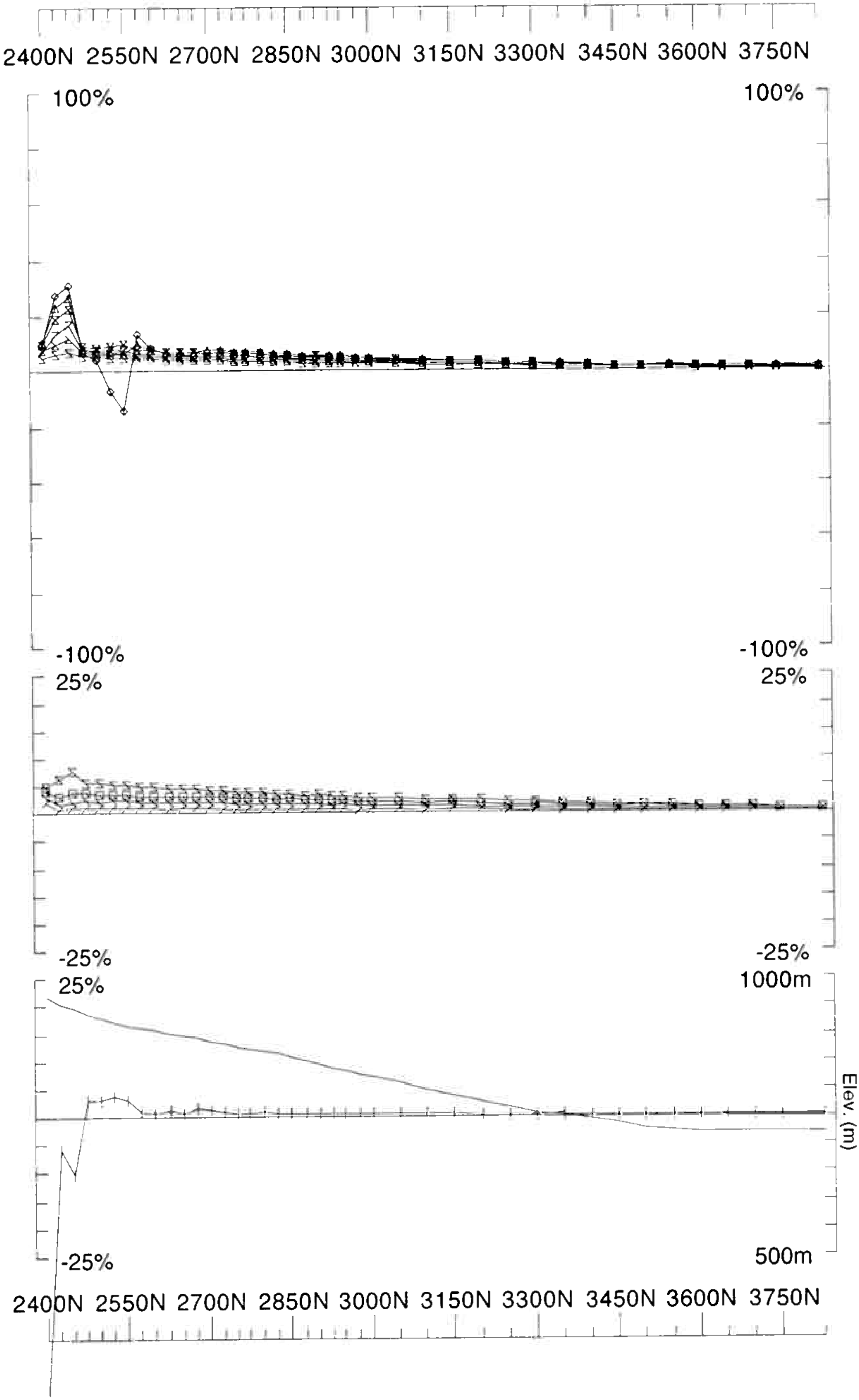
Secondary, (Chn - Ch1)/IHpI
Point Norm.at x,y,z
(6000,2675,910)
Base Freq. 3.251 Hz



2400N 2550N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N
100%
-100%
25%
-25%
1000m
500m
Elev. (m)
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 2/3/6
Reduced : 2/3/6
Plotted : 18/3/32
Secondary, (Chn - Ch1)/IHpI
Point Norm.at x,y,z
(6000,2675,910)
Base Freq. 3.251 Hz
Loop: 35
Line: 5900E
Compt: Hz



2400N 2550N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1000m
Elev. (m)
-25%
500m
2400N 2550N 2700N 2850N 3000N 3150N 3300N 3450N 3600N 3750N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 1/3/6
Reduced : 1/3/6
Plotted : 18/3/32
Loop: 35
Line: 5700E
Compt: Hz
Secondary, (Chn - Ch1)/IHpl
Point Norm.at x,y,z
(6000,2675,910)
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

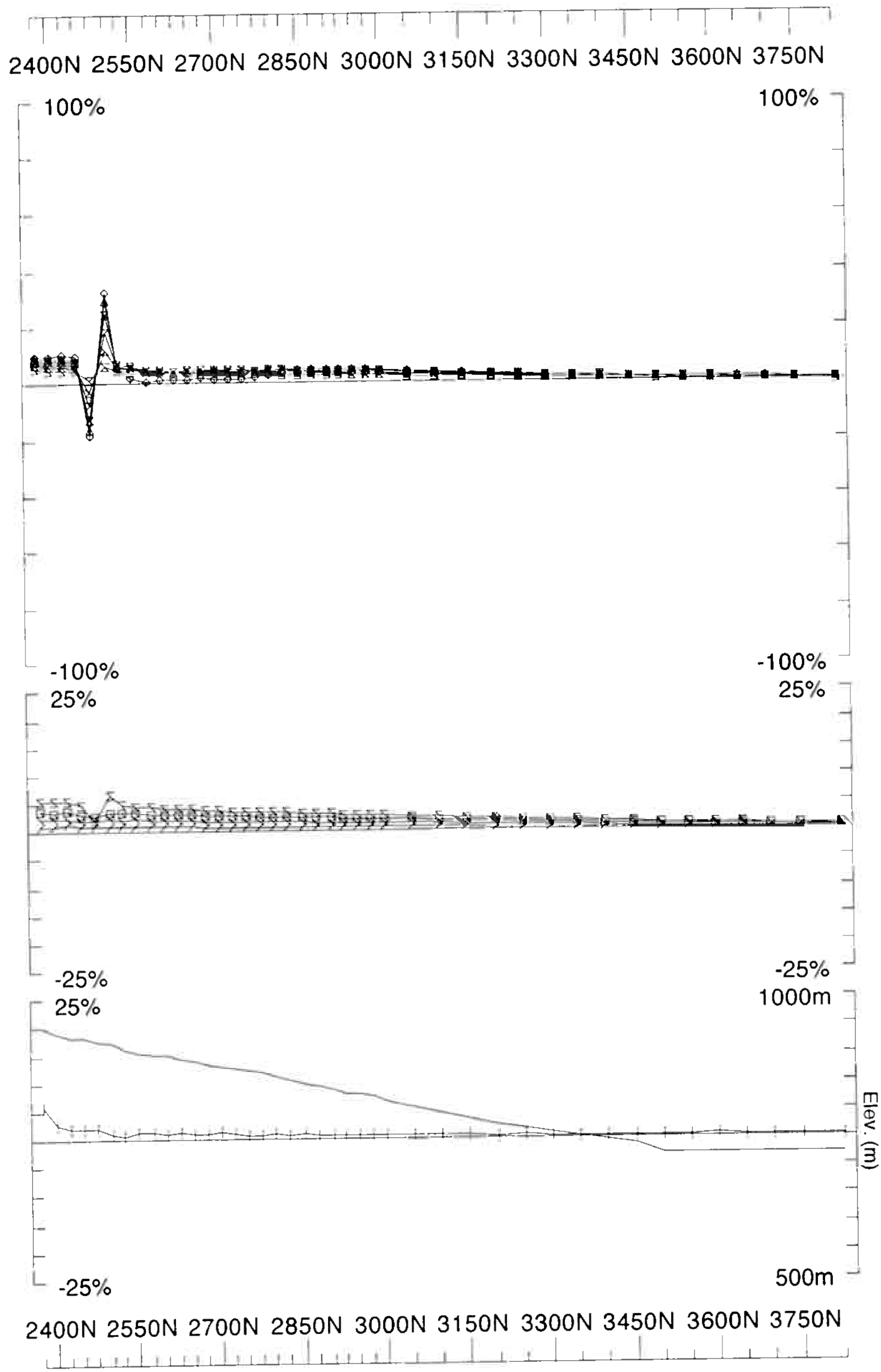
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 2/3/6
Reduced : 2/3/6
Plotted : 18/3/32

Loop: 35
Line: 5500E
Compt: Hz

Secondary, (Chn - Ch1)/IHpI
Point Norm.at x,y,z
(6000,2675,910)
Base Freq. 3.251 Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 1/3/6
Reduced : 3/3/6
Plotted : 18/3/32

Loop: 35
Line: 5300E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Point Norm. at x,y,z
(6000,2675,910)
Base Freq. 3.251 Hz

Espedalen

Loop 36

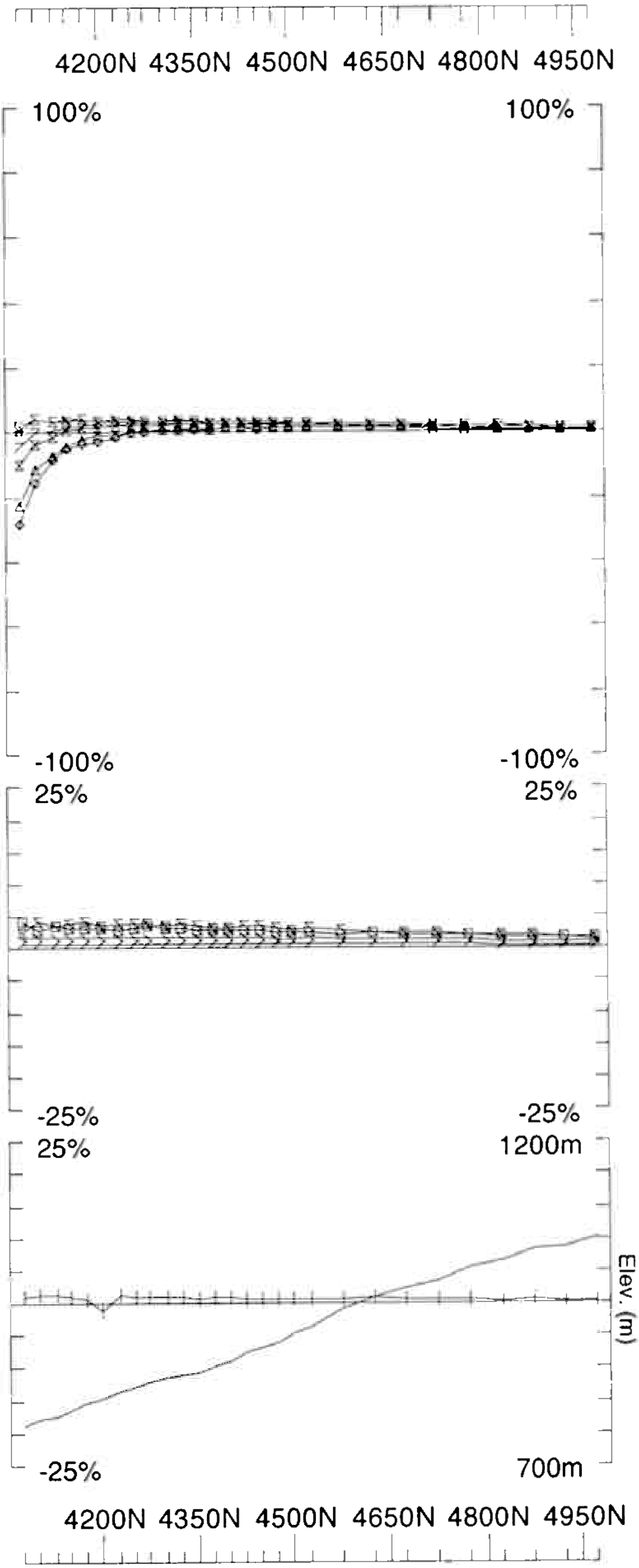
Hz
@3.251 Hz frequency

point norm
@
(x,y,z) = (6000E,4125N, 775 m.a.s.l.)

Ch1 reduced

Loop 36	Line	5300E	4075N - 4975N	900m
	Line	5500E	4100N - 4975N	875m
	Line	5700E	4050N - 4975N	925m
	Line	5900E	4025N - 5000N	975m
	Line	6100E	3850N - 4975N	1125m
	Line	6200E	4000N - 4450N	450m
	Line	6300E	4025N - 5025N	1000m
	Line	6500E	4225N - 5075N	850m
		Espedalen	Loop 36 Total	7100m

Loop 36 - point norm



UTEM Survey at: Espedalen

For: A/S Sulfidmalm

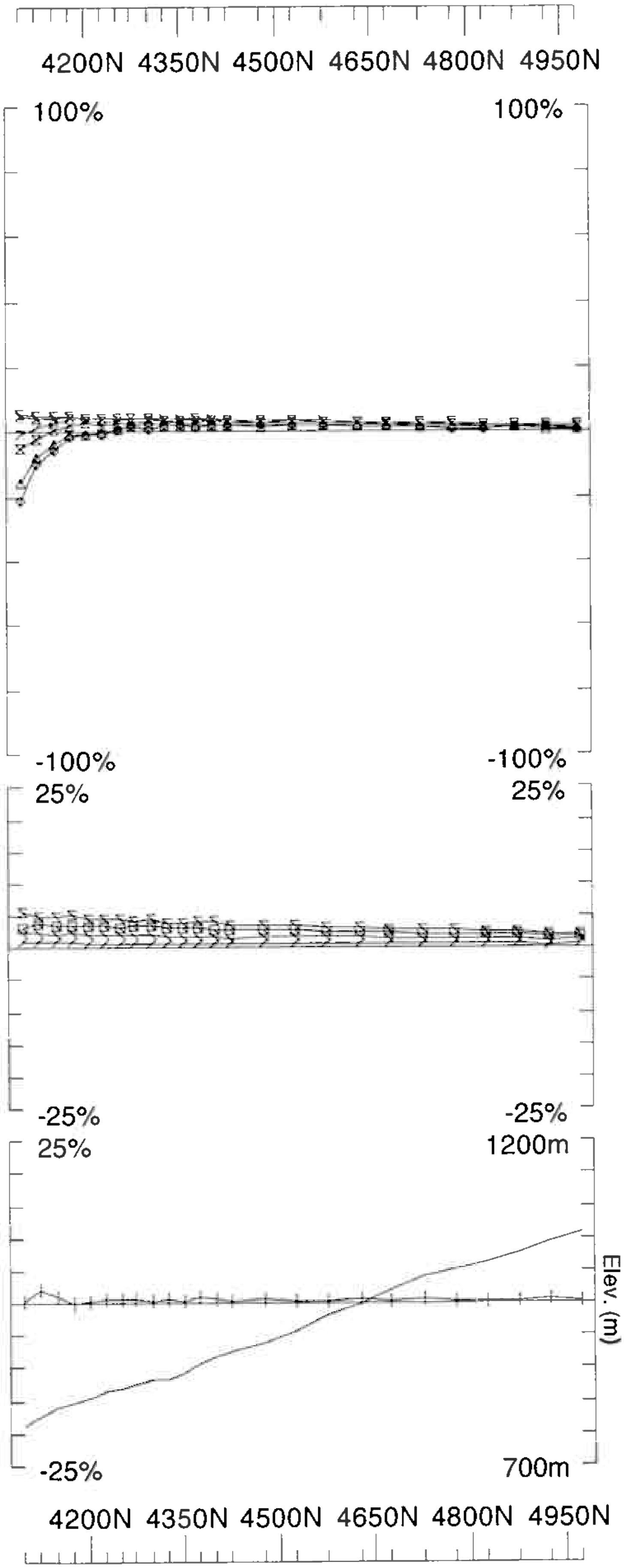
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 11/3/6
Reduced : 11/3/6
Plotted : 18/3/32

Loop: 36
Line: 5300E
Compt: Hz

Secondary, (Chn - Ch1)/IHpl
Point Norm.at x,y,z
(6000,4125,775)
Base Freq. 3.251 Hz



Loop: 36
Line: 5500E
Compt: Hz

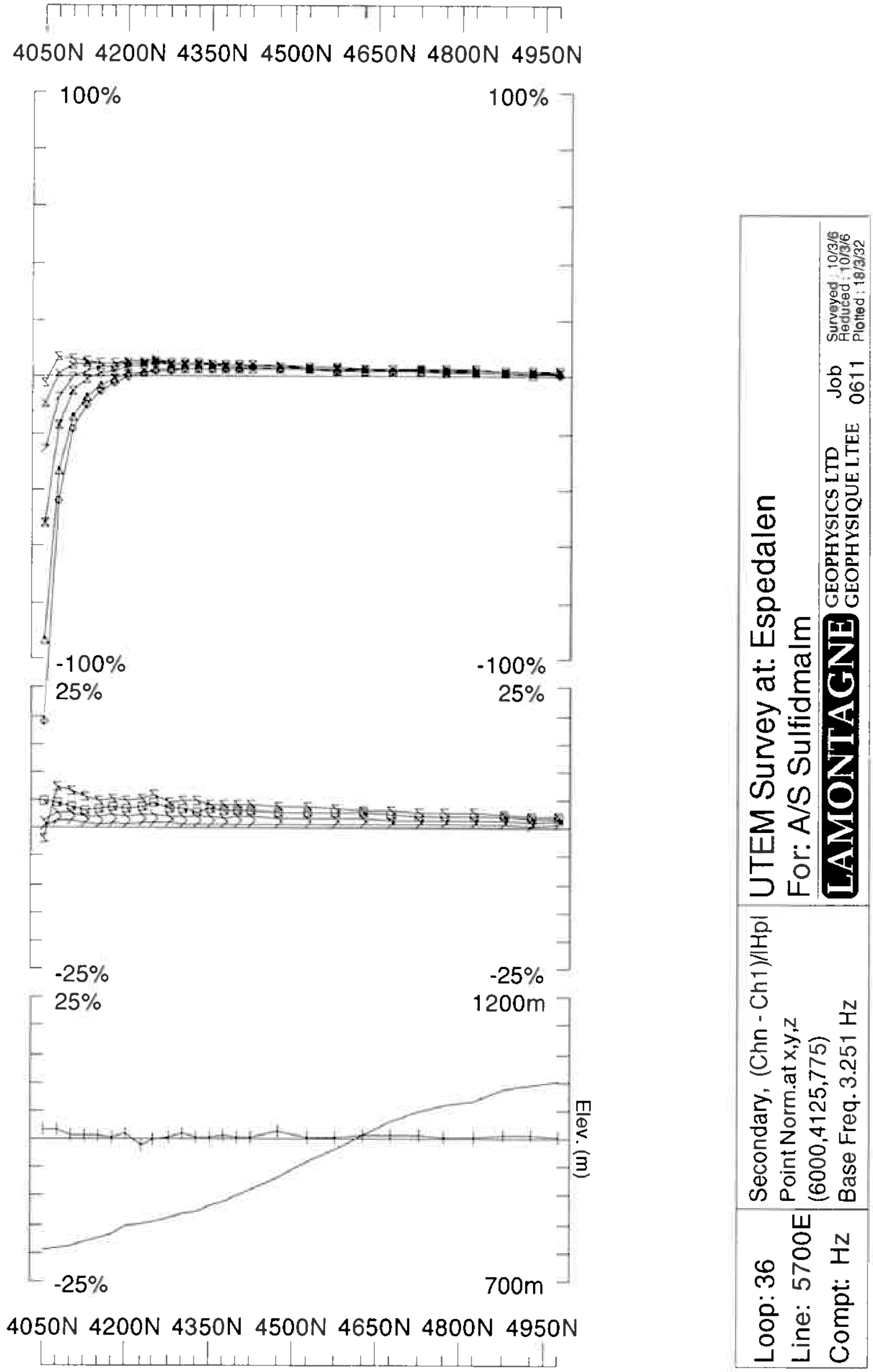
Secondary, (Chn - Ch1)/|Hp|
Point Norm. at x,y,z
(6000,4125,775)
Base Freq. 3.251 Hz

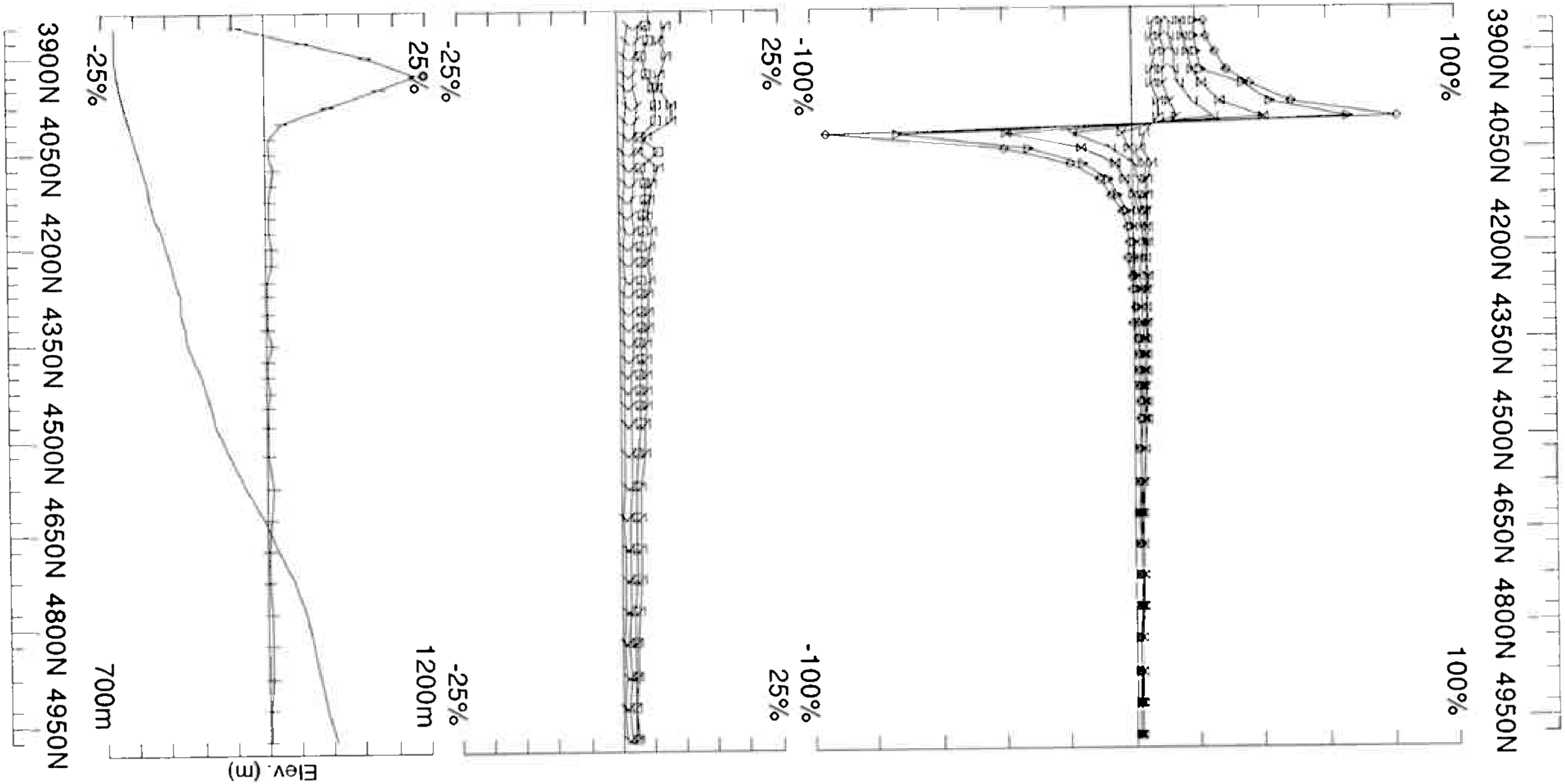
UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

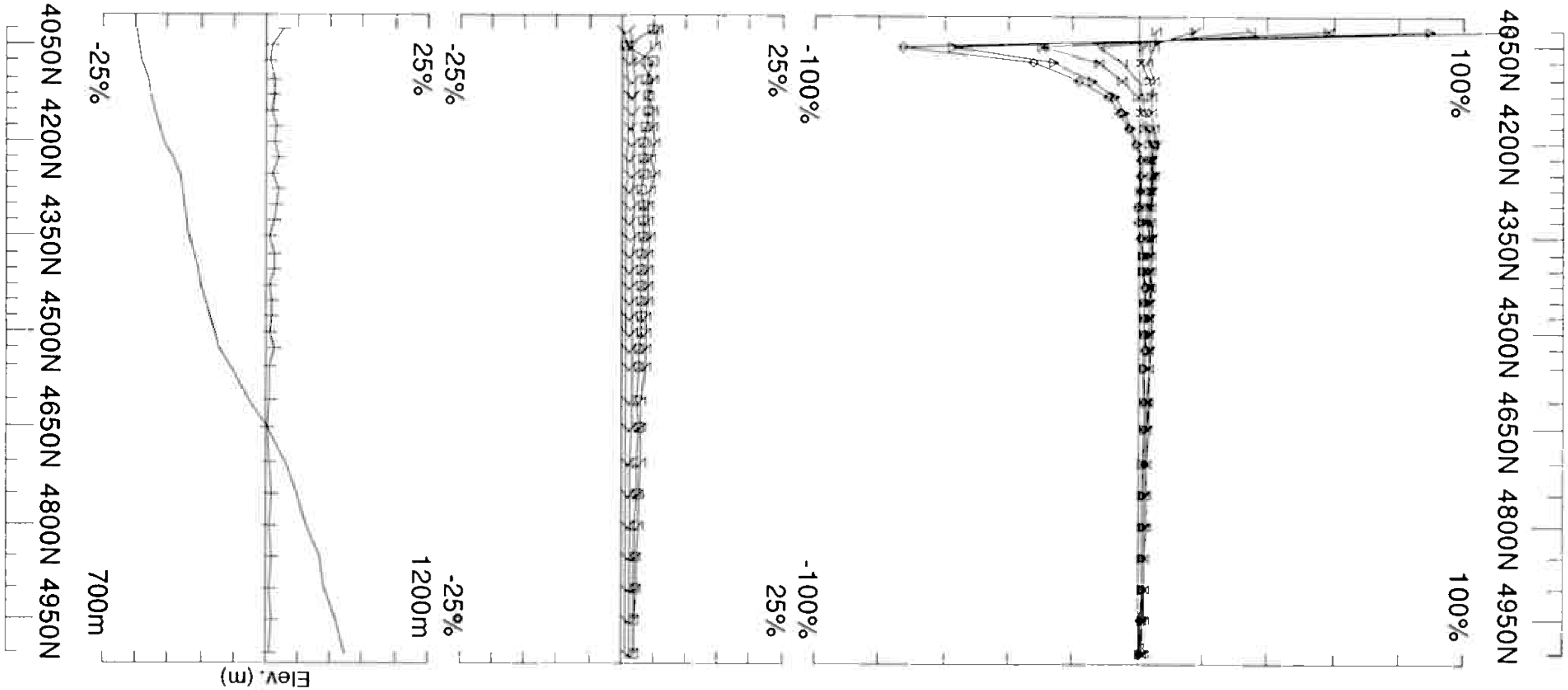
Job 0611

Surveyed : 11/3/6
Reduced : 11/3/6
Plotted : 18/3/32

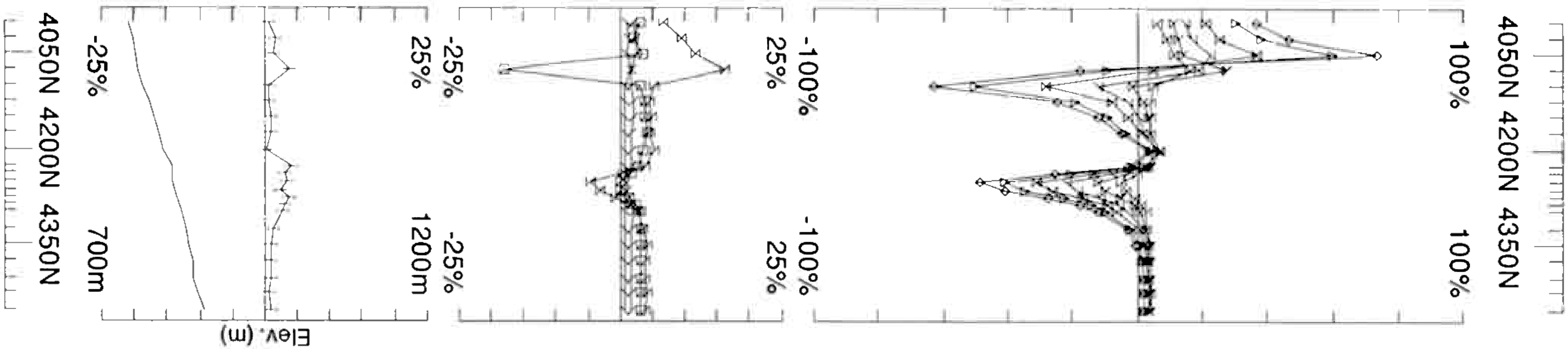

4050N 4200N 4350N 4500N 4650N 4800N 4950N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1200m
Elev. (m)
-25%
700m
4050N 4200N 4350N 4500N 4650N 4800N 4950N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 10/3/6
Reduced : 10/3/6
Plotted : 18/3/32
Loop: 36
Line: 5700E
Compt: Hz
Secondary, (Chn - Ch1)/lHpl
Point Norm.at x,y,z
(6000,4125,775)
Base Freq. 3.251 Hz



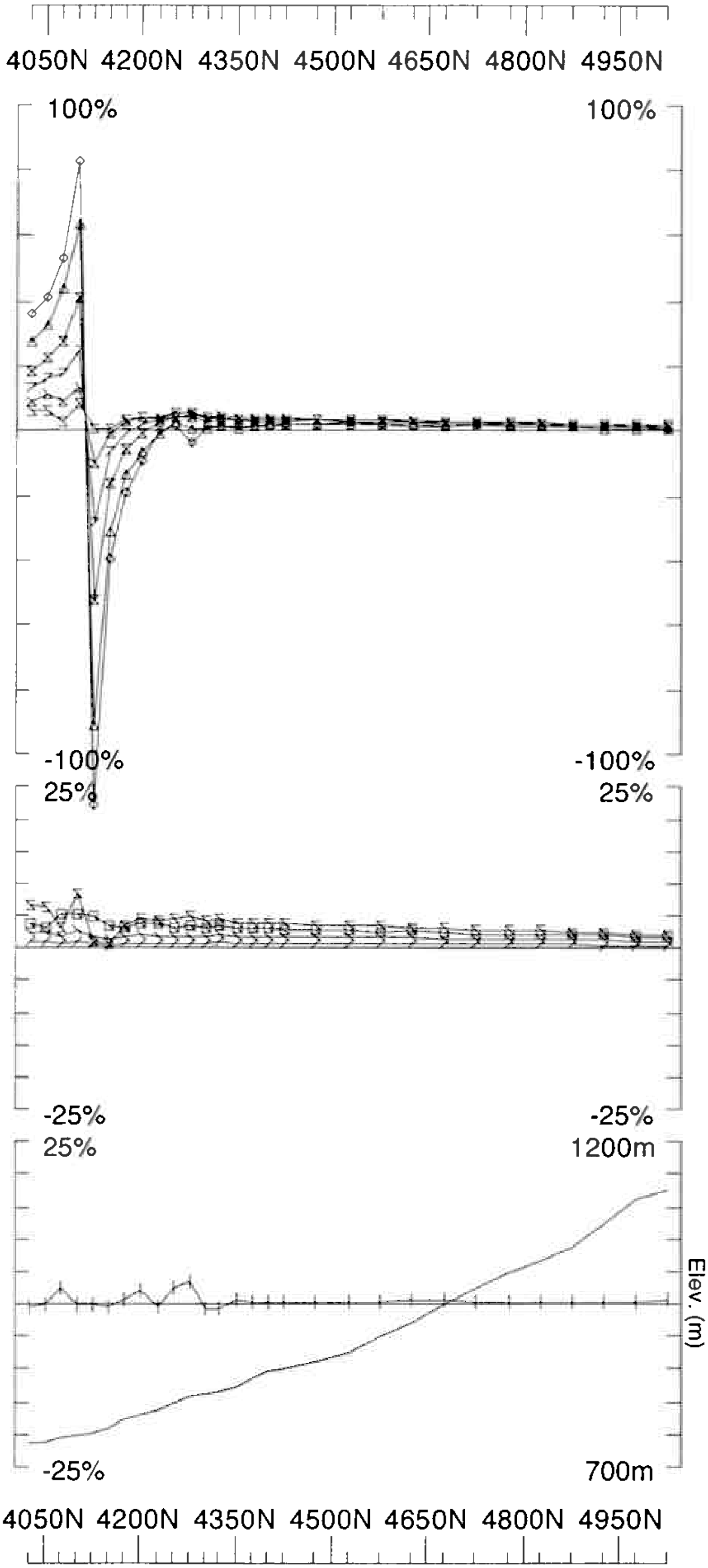
Loop: 36 Line: 5900E Compt: Hz	Secondary, (Chn - Ch1)/IHpl Point Norm.at x,y,z (6000,4125,775) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 9/3/6 Reduced : 10/3/6 Plotted : 18/3/32



Loop: 36 Line: 6100E Compt: Hz	Secondary, (Chn - Ch1)/IHpl Point Norm.at x,y,z (6000,4125,775) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 9/3/6 Reduced : 10/3/6 Plotted : 18/3/32



Loop: 36 Line: 6200E Compt: Hz	Secondary, (Chn - Ch1)/IHpl Point Norm.at x,y,z (6000,4125,775) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE	Job 0611	Surveyed : 10/3/6 Reduced : 10/3/6 Plotted : 18/3/32



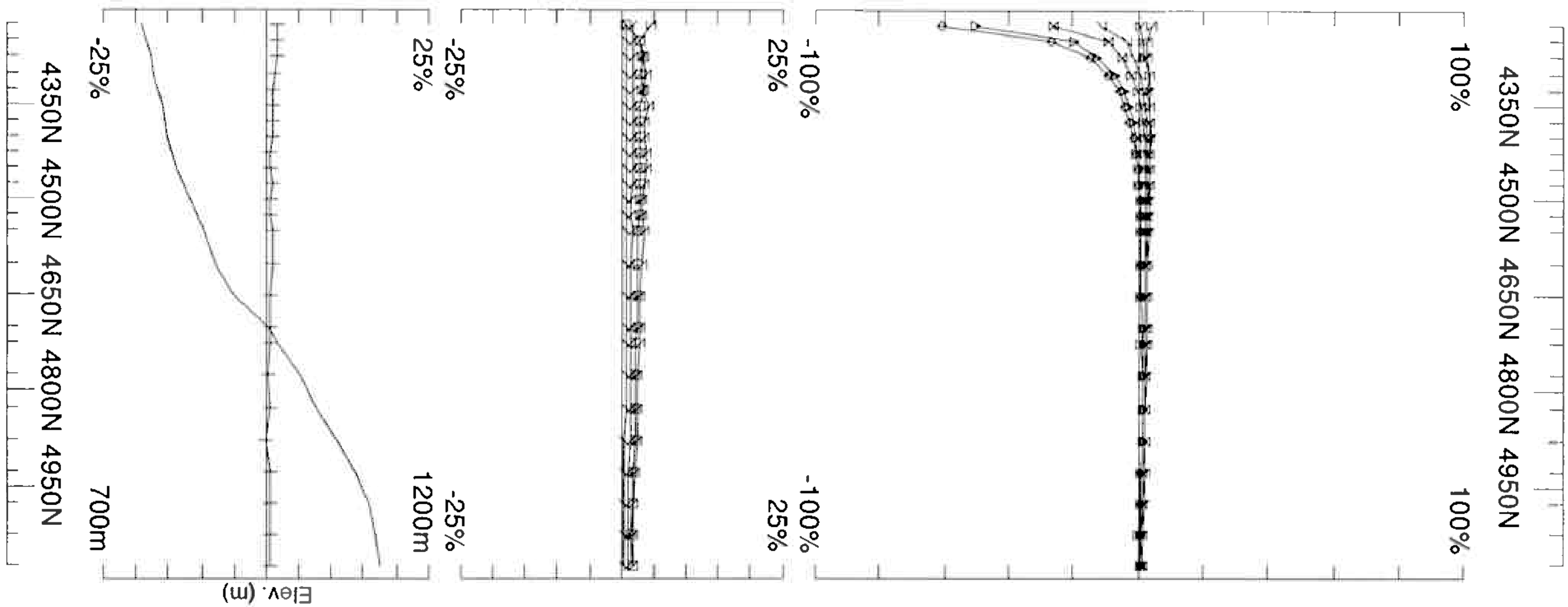
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 10/3/6
Reduced : 10/3/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/lHpl
Point Norm.at x,y,z
(6000,4125,775)
Base Freq. 3.251 Hz

Loop: 36
Line: 6300E
Compt: Hz



Loop: 36 Line: 6500E Compt: Hz	Secondary, (Chn - Ch1)/lHpl Point Norm.at x,y,z (6000,4125,775) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 10/3/6 Reduced : 10/3/6 Plotted : 18/3/32

Espedalen

Loop 37

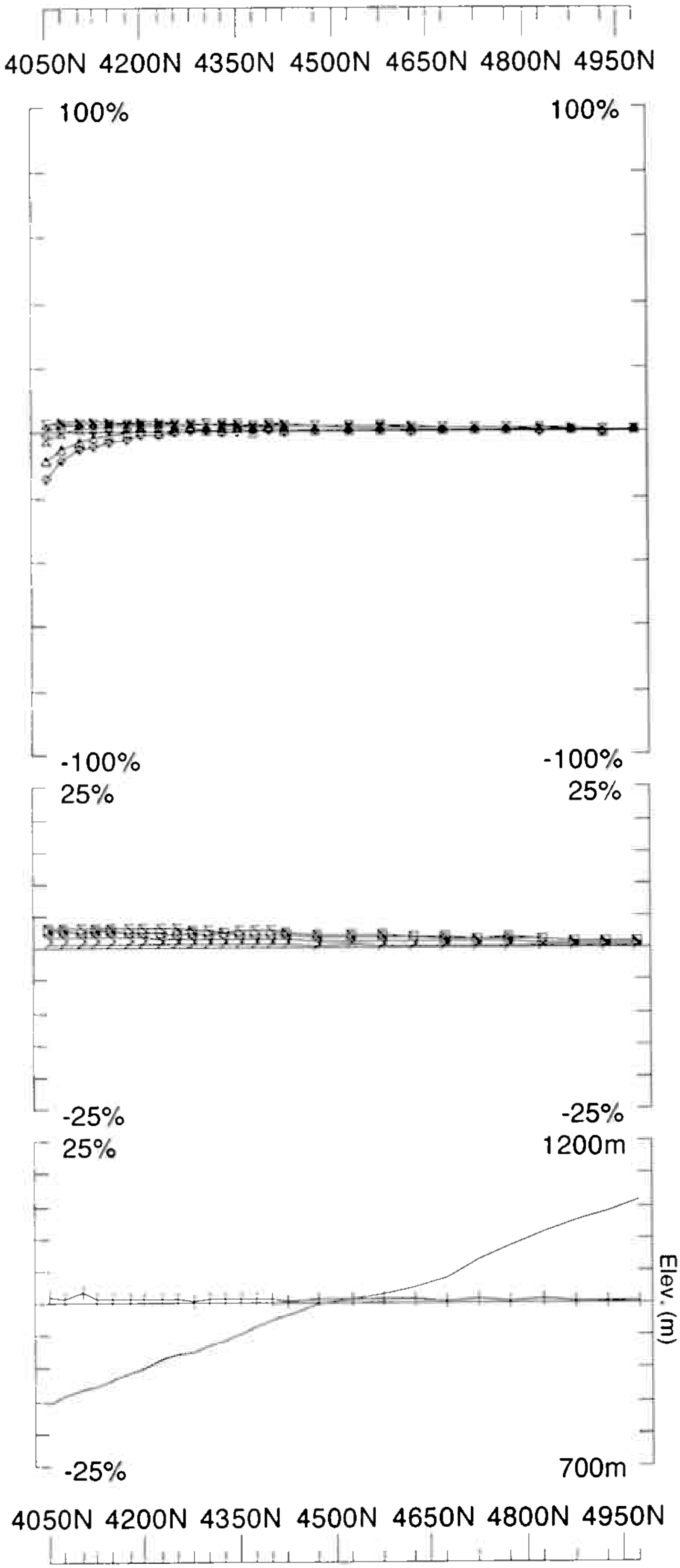
Hz
@3.251 Hz frequency

point norm
@
(x,y,z) = (4550E,3950N, 775 m.a.s.l.)

Ch1 reduced

Loop 37	Line 3800E	4050N - 4975N	925m
	Line 4000E	3975N - 4975N	1000m
	Line 4100E	4000N - 4550N	550m
	Line 4200E	4025N - 4975N	950m
	Line 4300E	3950N - 4975N	1025m
	Line 4500E	3950N - 4975N	1025m
	Line 4700E	3975N - 4975N	1000m
	Line 4900E	4000N - 4975N	975m
	Line 5100E	3800N - 4975N	1175m
	Espedalen	Loop 37 Total	8625m

Loop 37 - point norm



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

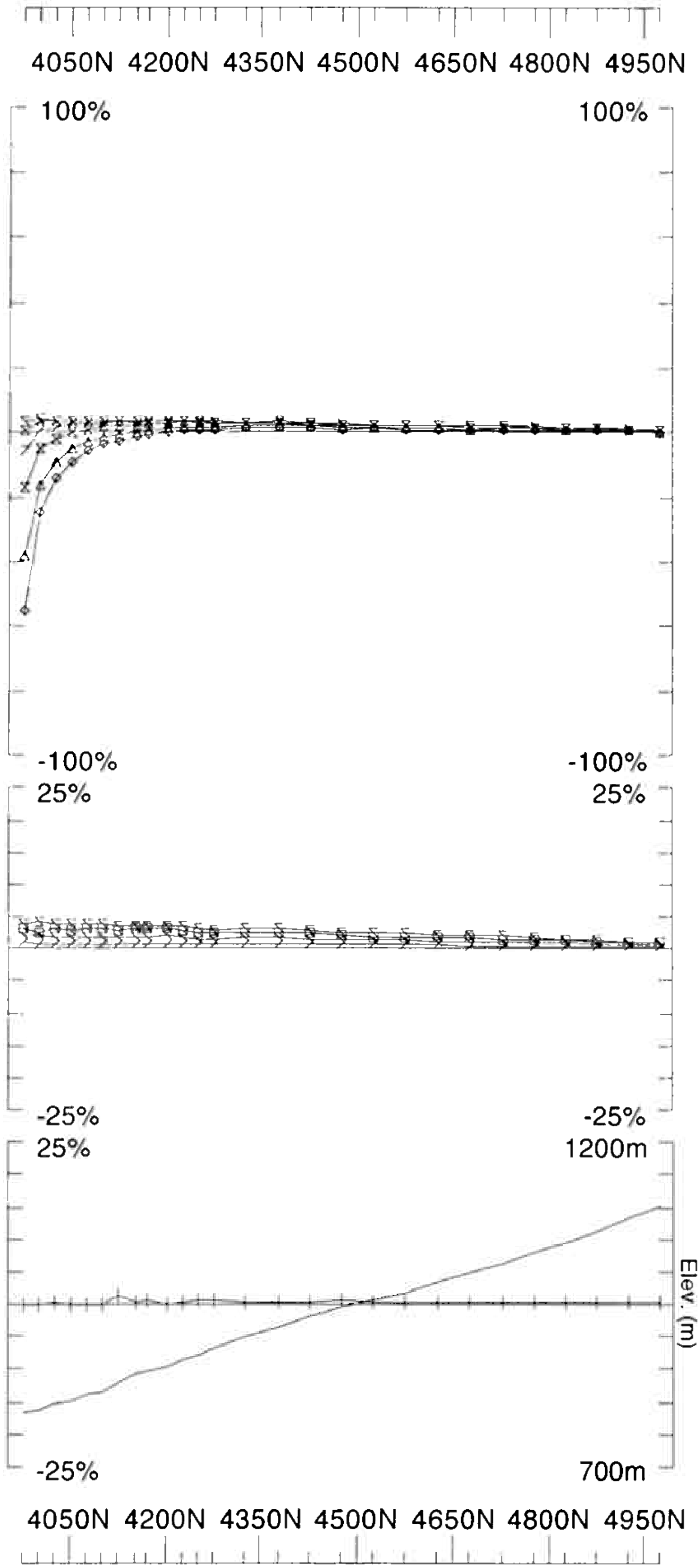
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

Surveyed : 12/3/6
Reduced : 12/3/6
Plotted : 18/3/32

Secondary, (Chn - Ch1)/IHpl
Point Norm.at x,y,z
(4550,3950,775)
Base Freq. 3.251 Hz

Loop: 37
Line: 3800E
Compt: Hz



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

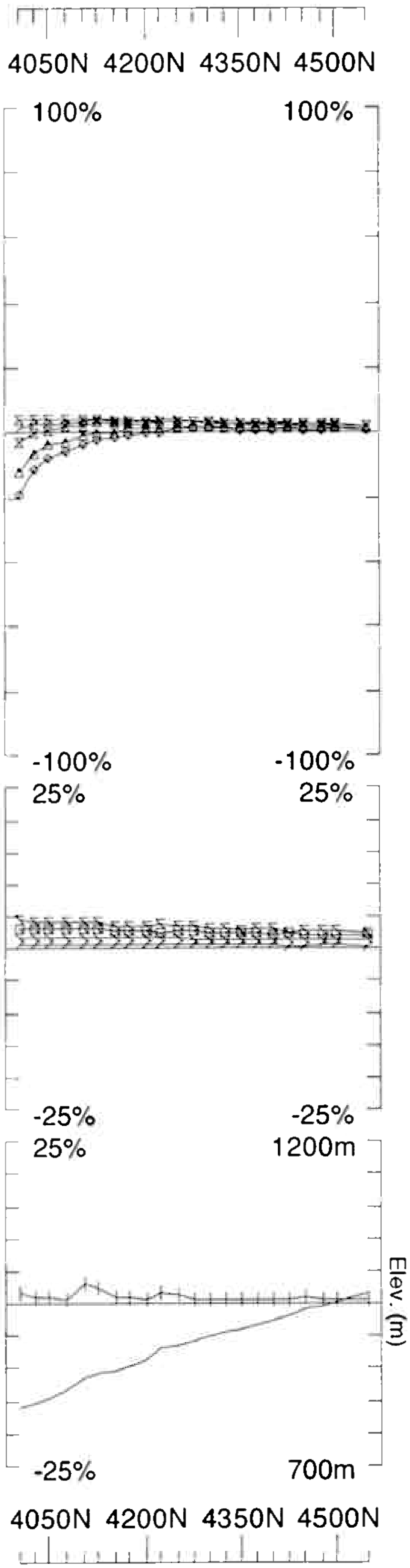
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 12/3/6
Reduced : 12/3/6
Plotted : 18/3/32

Loop: 37
Line: 4000E
Compt: Hz

Secondary, (Chn - Ch1)/IHpI
Point Norm.at x,y,z
(4550,3950,775)
Base Freq. 3.251 Hz



Loop: 37
Line: 4100E
Compt: Hz

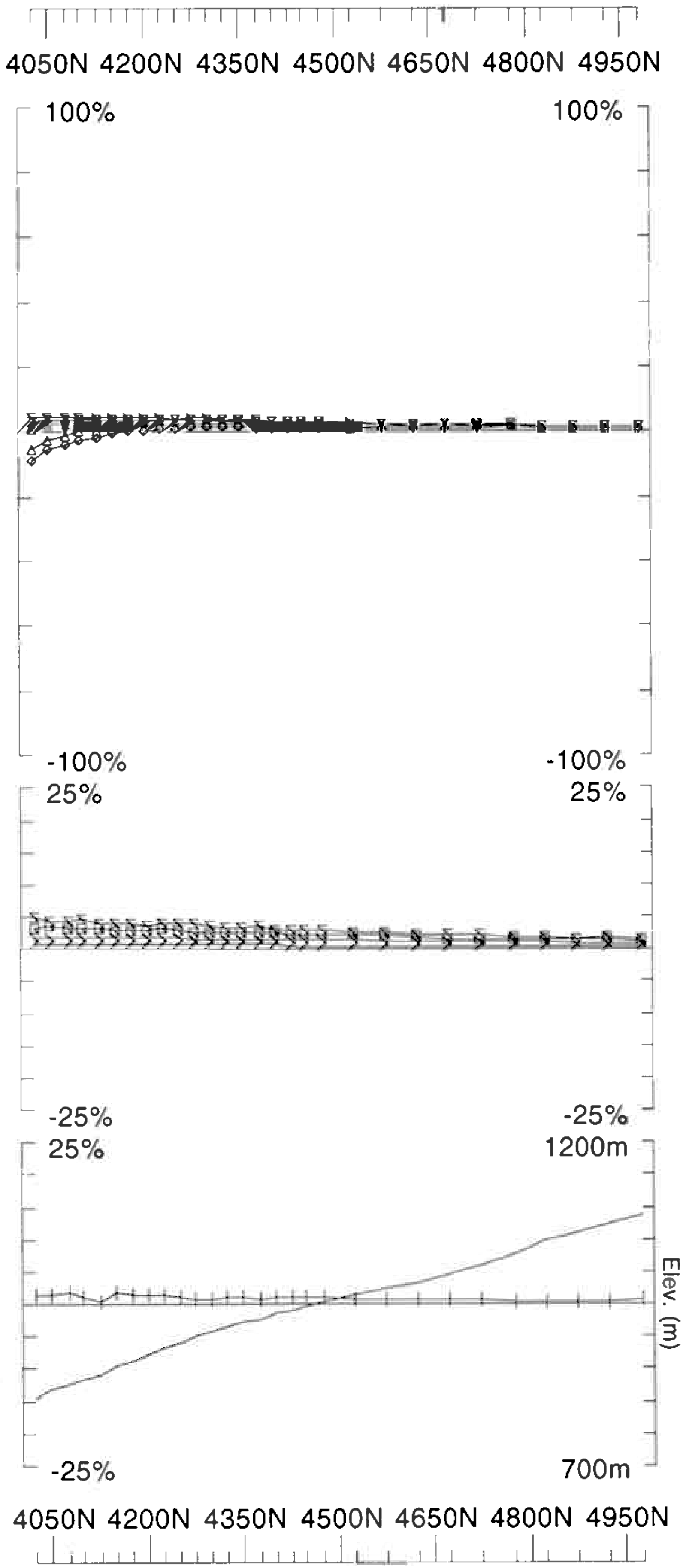
Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(4550,3950,775)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

Surveyed : 13/3/6
Reduced : 13/3/6
Plotted : 18/3/32



Loop: 37
Line: 4200E
Compt: Hz

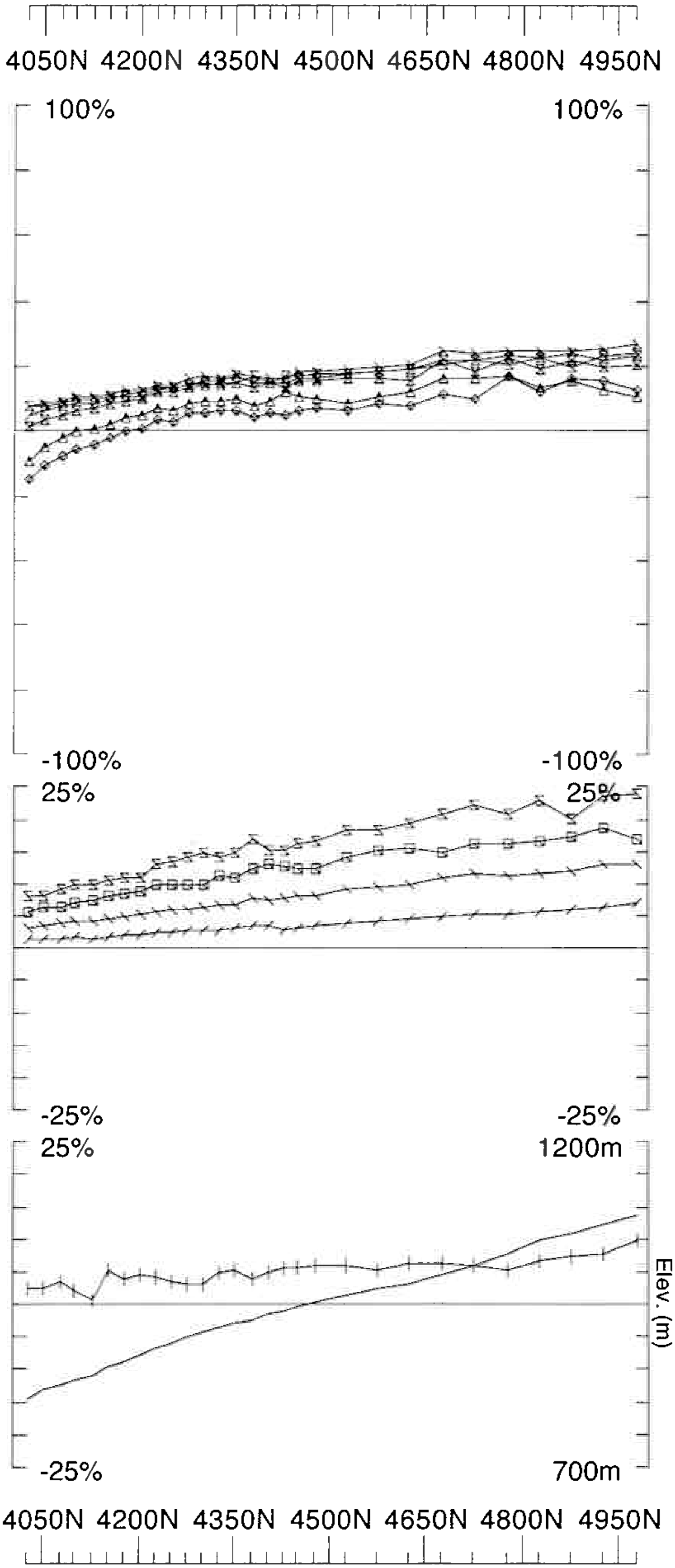
Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(4550,3950,775)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

Surveyed : 13/3/6
Reduced : 13/3/6
Plotted : 17/6/6



UTEM Survey at: Espedalen
For: A/S Sulfidmalm

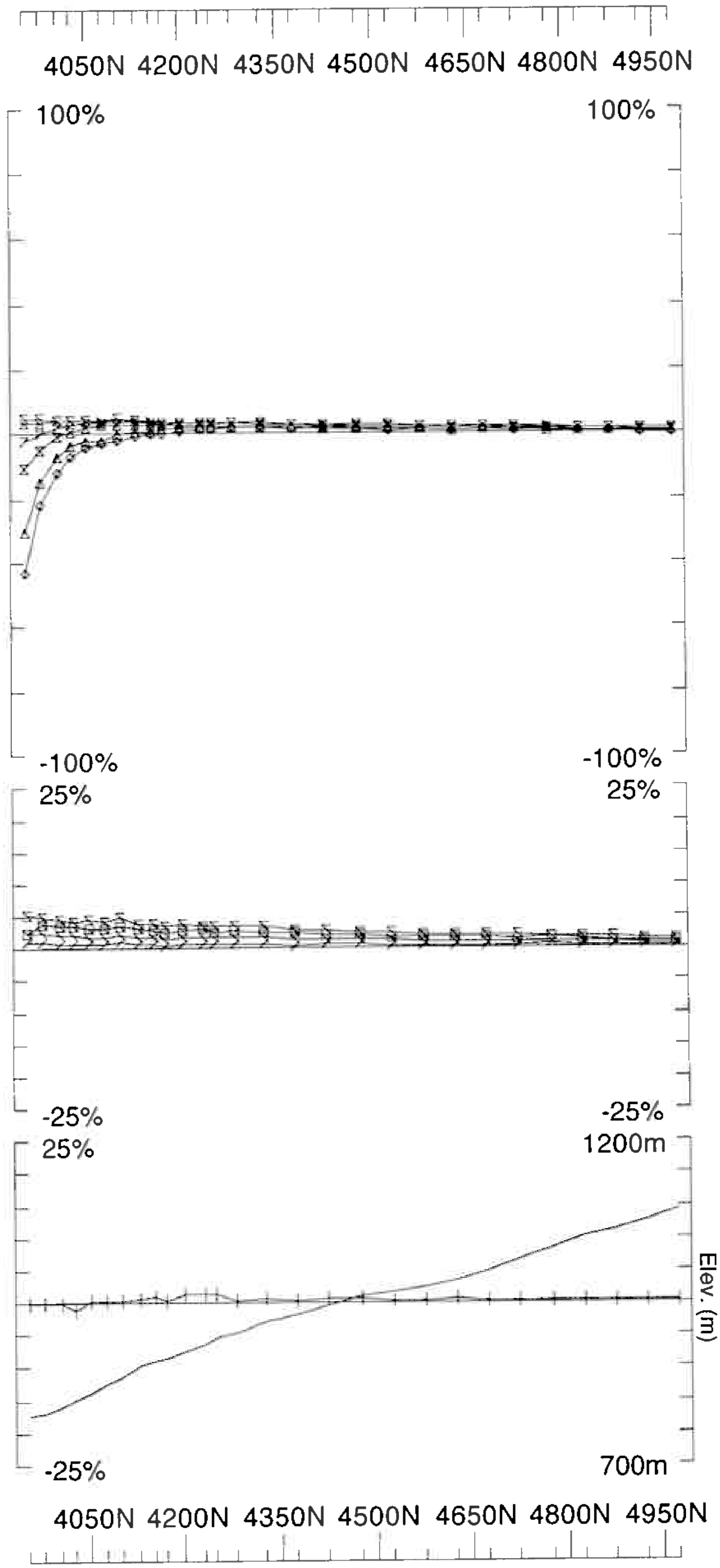
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 13/3/6
Reduced : 13/3/6
Plotted : 18/3/32

Loop: 37
Line: 4200E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



Loop: 37
Line: 4300E
Compt: Hz

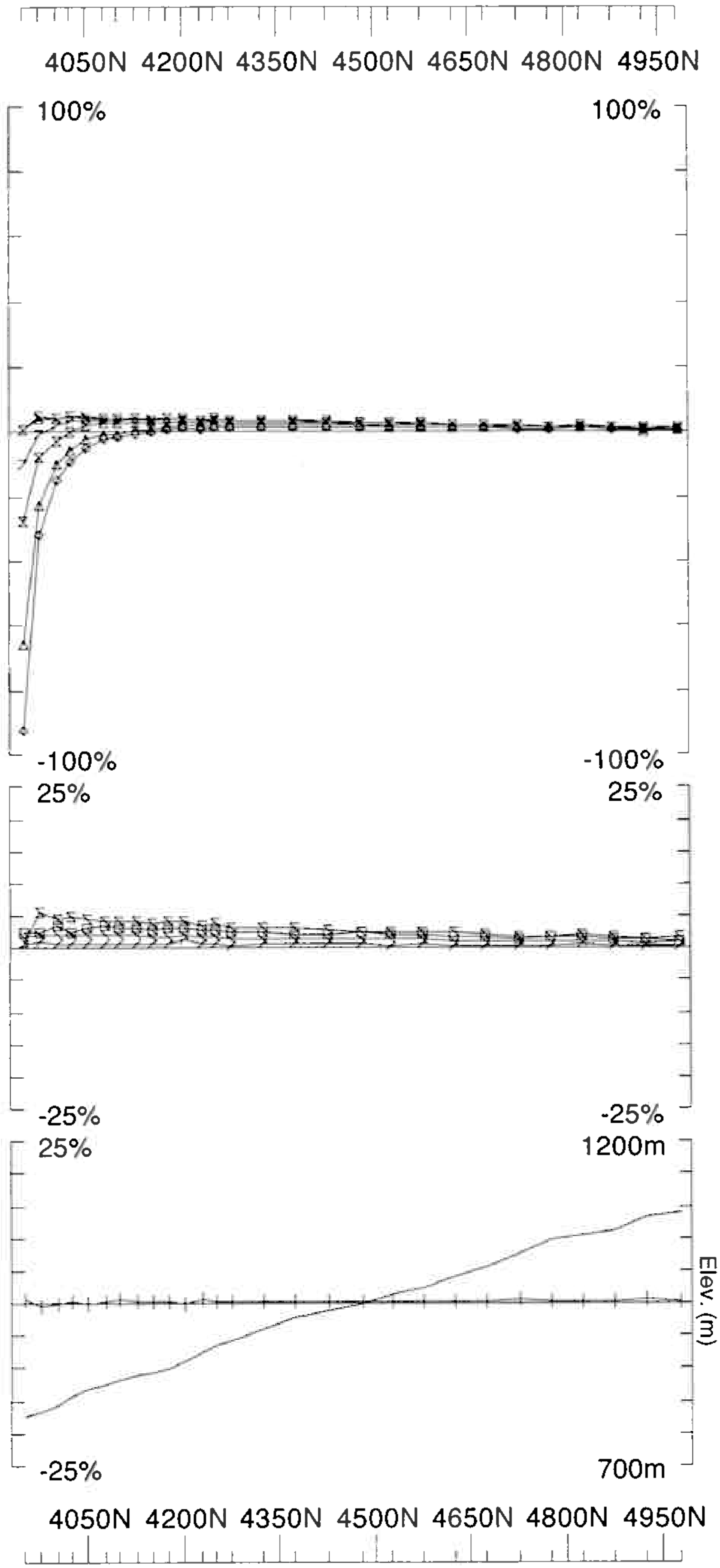
Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(4550,3950,775)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

Surveyed : 13/3/6
Reduced : 13/3/6
Plotted : 18/3/32



Loop: 37
Line: 4500E
Compt: Hz

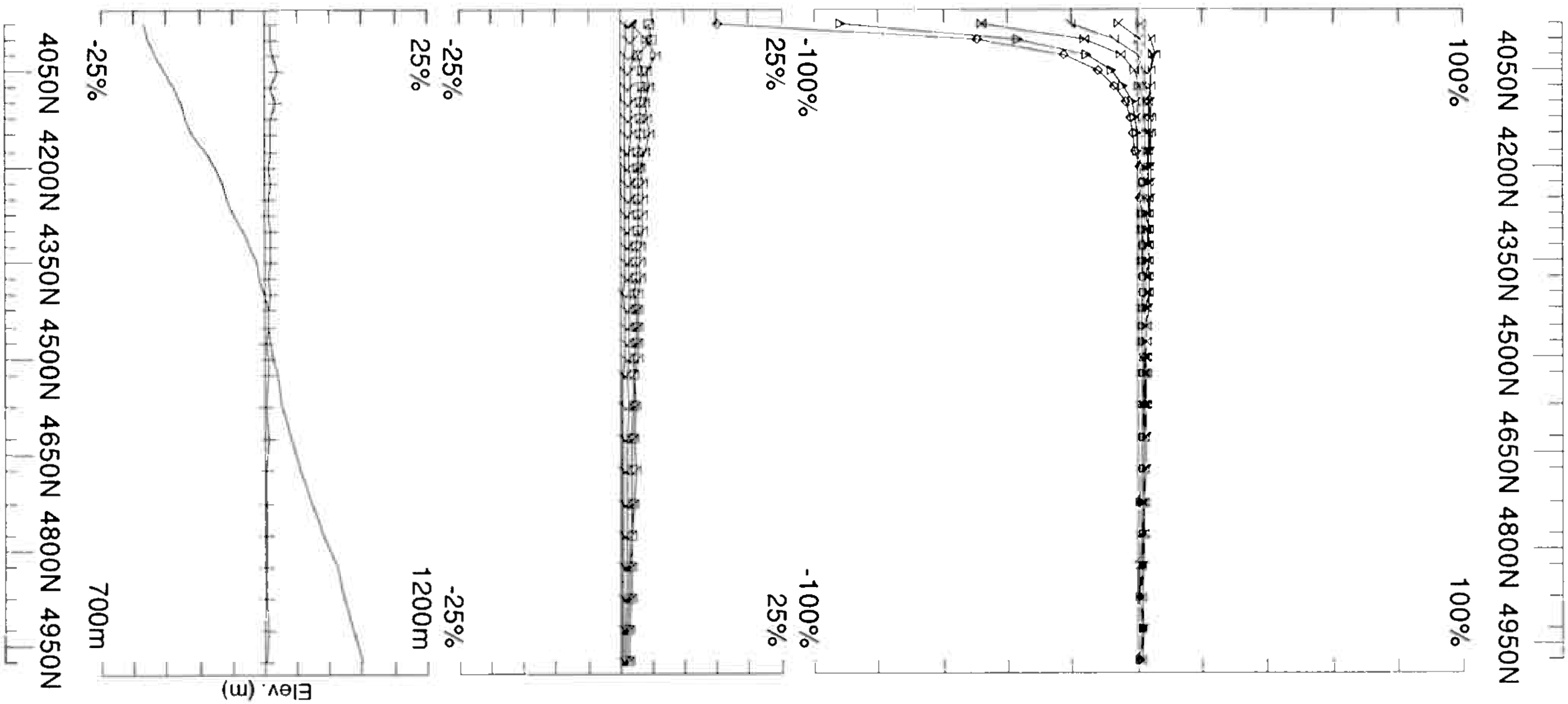
Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(4550,3950,775)
Base Freq. 3.251 Hz

UTEM Survey at: Espedalen
For: A/S Sulfidmalm

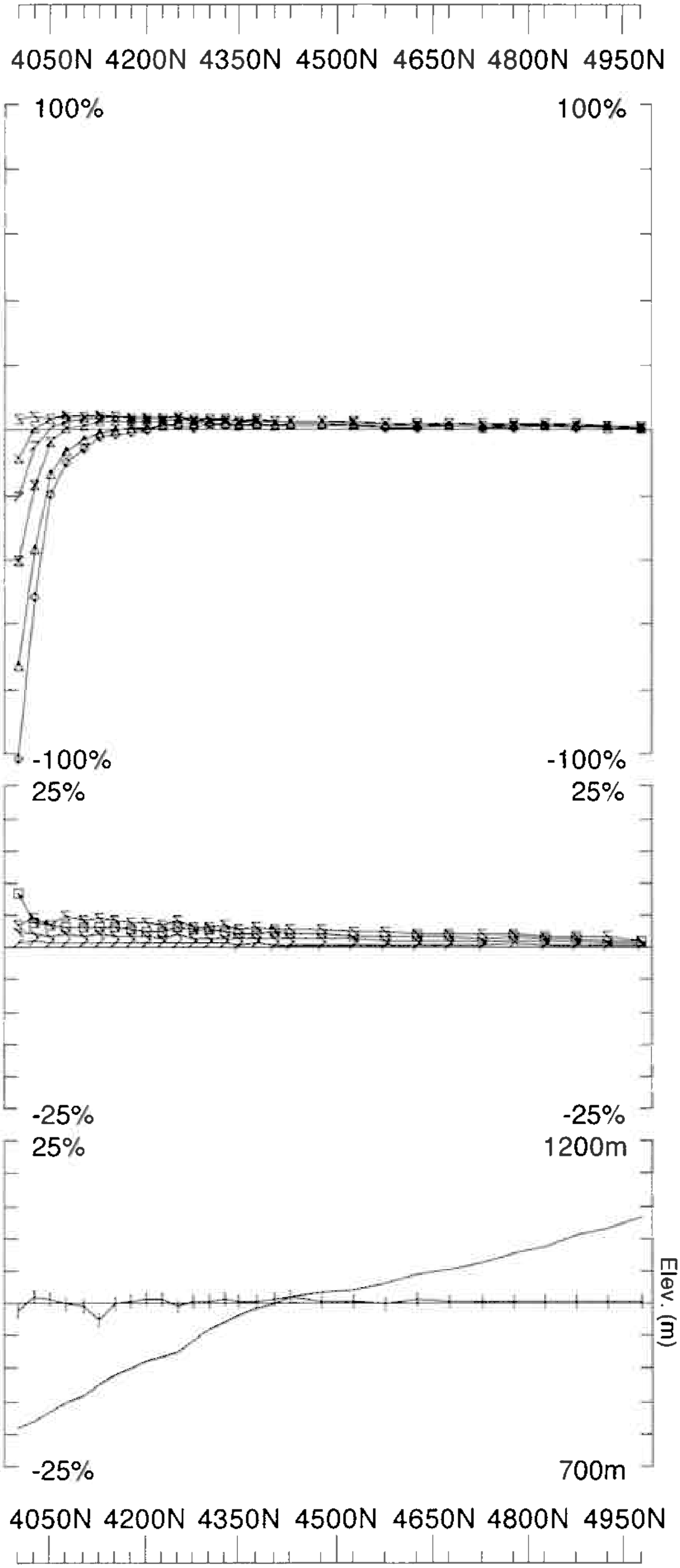
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job
0611

Surveyed : 12/3/6
Reduced : 12/3/6
Plotted : 18/3/32



Loop: 37 Line: 4700E Compt: Hz	Secondary, (Chn - Ch1)/IHpl Point Norm.at x,y,z (4550,3950,775) Base Freq. 3.251 Hz	UTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 11/3/6 Reduced : 12/3/6 Plotted : 18/3/32



UTEM Survey at: Espedalen

For: A/S Sulfidmalm

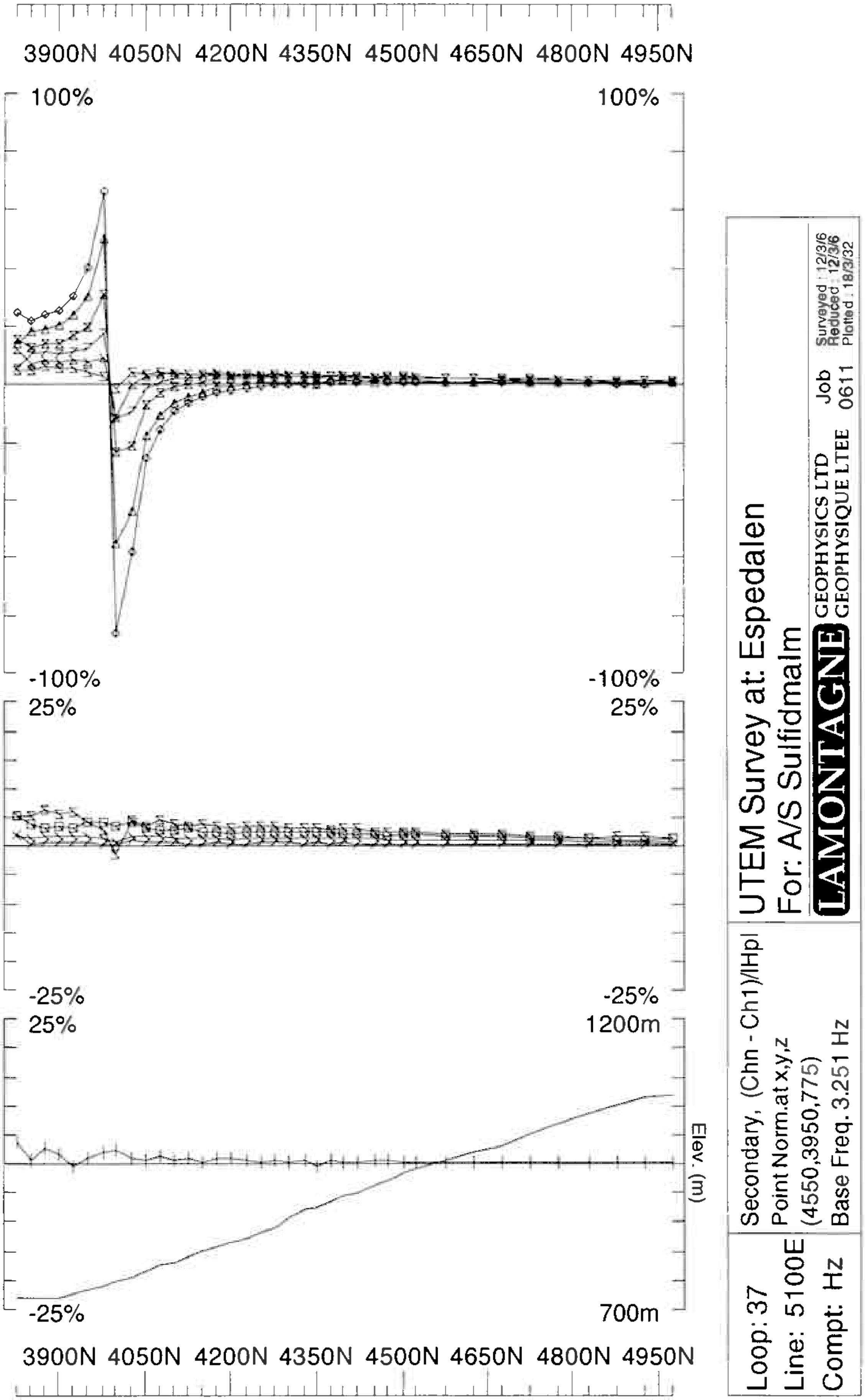
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

Surveyed : 11/3/6
Reduced : 12/3/6
Plotted : 18/3/32

Loop: 37
Line: 4900E
Compt: Hz

Secondary, (Chn - Ch1)/|Hp|
Point Norm.at x,y,z
(4550,3950,775)
Base Freq. 3.251 Hz


3900N 4050N 4200N 4350N 4500N 4650N 4800N 4950N
100%
100%
-100%
-100%
25%
25%
-25%
-25%
25%
1200m
Elev. (m)
-25%
700m
3900N 4050N 4200N 4350N 4500N 4650N 4800N 4950N
UTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 12/3/6
Reduced : 12/3/6
Plotted : 18/3/32
Secondary, (Chn - Ch1)/lHpl
Point Norm.at x,y,z
(4550,3950,775)
Base Freq. 3.251 Hz
Loop: 37
Line: 5100E
Compt: Hz

0611

BHUTEM 3 Profiles
with
Vectorplots

BHUTEM 3 Profiles
Listed by area in the order drilled

Area	Borehole Name	Survey Depth	Dummy Depth	Loop Number	Frequency
Jorstad	ES2004-14	128m	128.5m	Loop B41	3.251Hz
	ES2004-15	123m	123m	Loop B41	3.251Hz
	ES2005-41	178m	179m	Loop B41	3.251Hz
Trona	ES2005-35	78m	79m	Loop B35	3.251Hz
Storgruva ext	ES2005-36	170m	172m	Loop B36	3.251Hz
	ES2005-37	169m	170m	Loop B36	3.251Hz
Graho saddle	ES2005-38	90m	90m	Loop B38	3.251Hz
Graho	ES2005-39	114m	115m	Loop B36	3.251Hz
Grahoin	ES2005-40	70m	70.5m	Loop B36	3.251Hz
Vesle	ES2005-42	34m	35m	Loop B42	3.251Hz
	ES2005-43	44m	46m	Loop B42	3.251Hz
	ES2005-44	39m	40m	Loop B42	3.251Hz
Stormyra ext	ES2005-45	154m	156m	Loop 33	3.251Hz
	ES2005-46	270m	271m	Loop 33	3.251Hz
	ES2005-47	330m	331.5m	Loop 32	3.251Hz
	ES2005-48	323m	325.5m	Loop 32	3.251Hz
Stormyra	ES2006-51	246m	247.5m	Loop 20b	3.251Hz
	ES2006-52	266m	268m	Loop 20b	3.251Hz
	ES2006-53	268m	269m	Loop 20b	3.251Hz
	ES2006-54	245m	246m	Loop 20b	3.251Hz
	ES2006-55	214m	214m	Loop 20b	3.251Hz

Jorstad

Loop B41 - BH UTEM-3

@3.251 Hz frequency

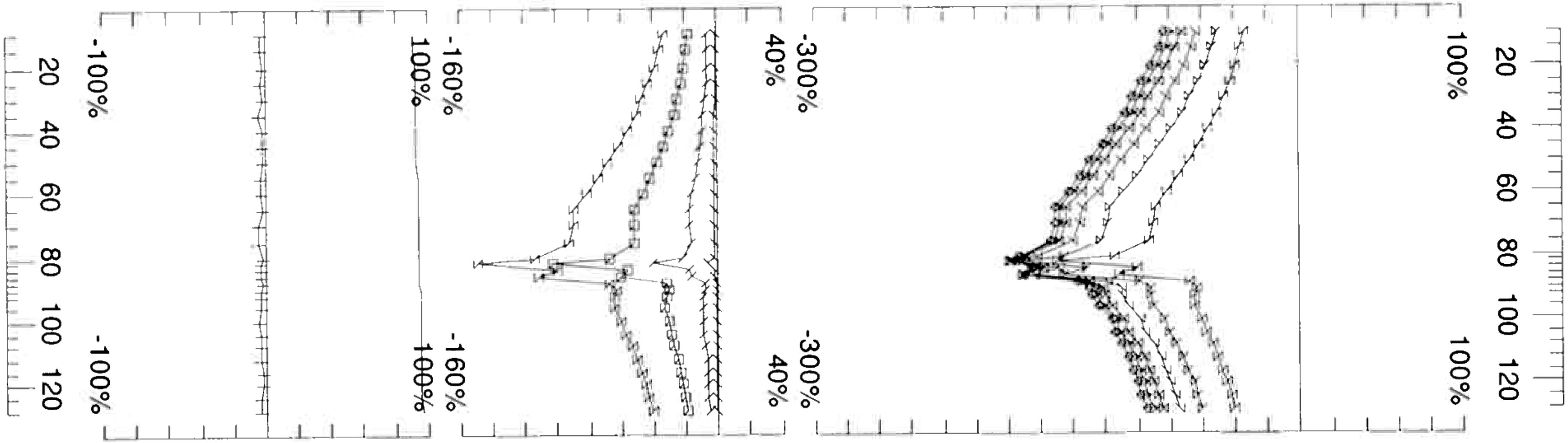
Ch1 reduced

Jorstad	ES2004-14	128m	128.5m	Loop B41	3.251Hz
	ES2004-15	123m	123m	Loop B41	3.251Hz
	ES2005-41	178m	179m	Loop B41	3.251Hz

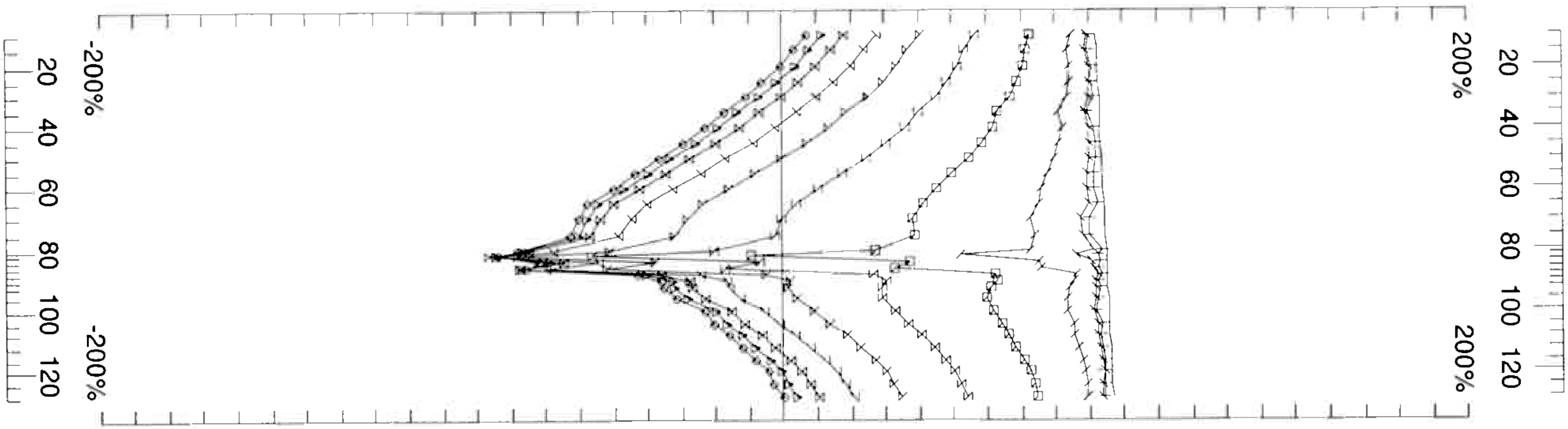
ES2004-14
ES2004-15
ES2005-41

3-axis plot
total field plot
plan vectorplot
gridnorth-south section vectorplot

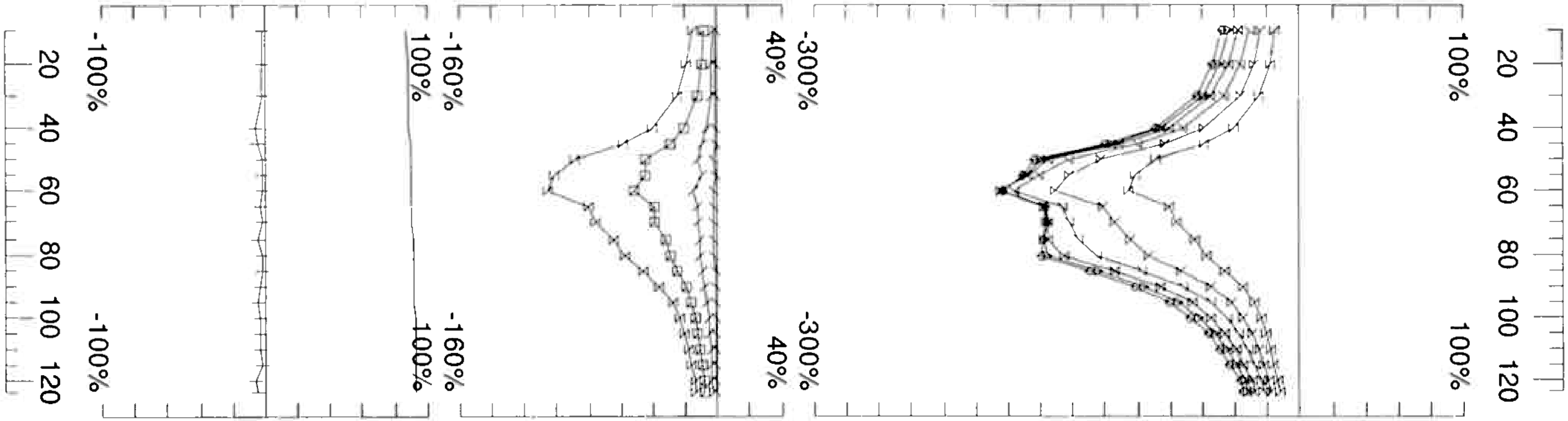
ES2004-14/15 + ES2005-41



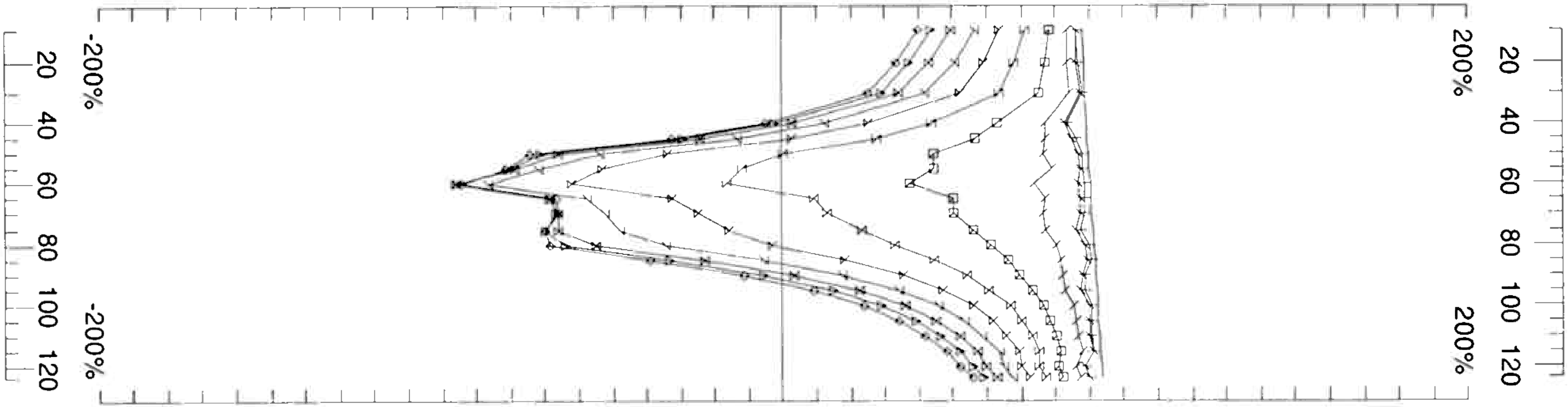
Loop: B41 Hole: ES-2004-14 Compt: Axial	Secondary, (Chn - Ch1)/lHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 22/3/6 Reduced : 22/3/6 Plotted : 17/3/32



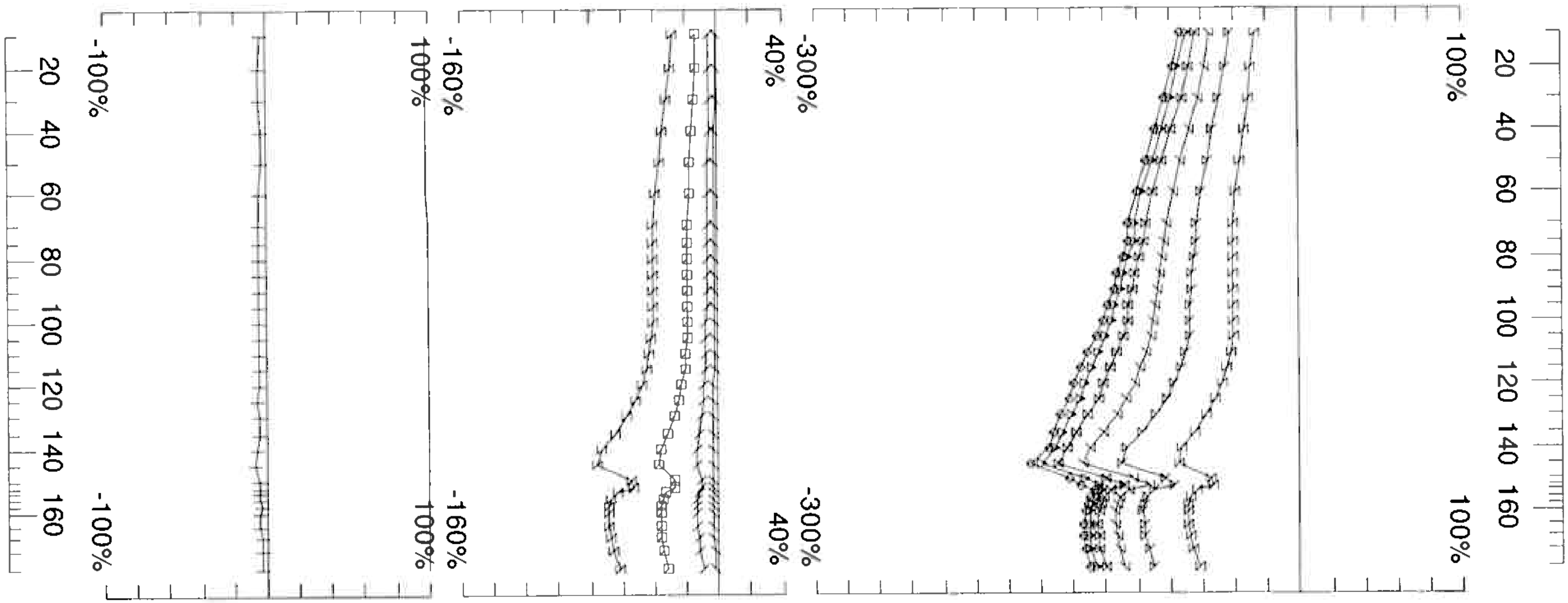
Loop: B41 Hole: ES-2004-14 Compt: Axial	Total, Chn/lHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 22/3/6 Reduced : 22/3/6 Plotted : 17/3/32



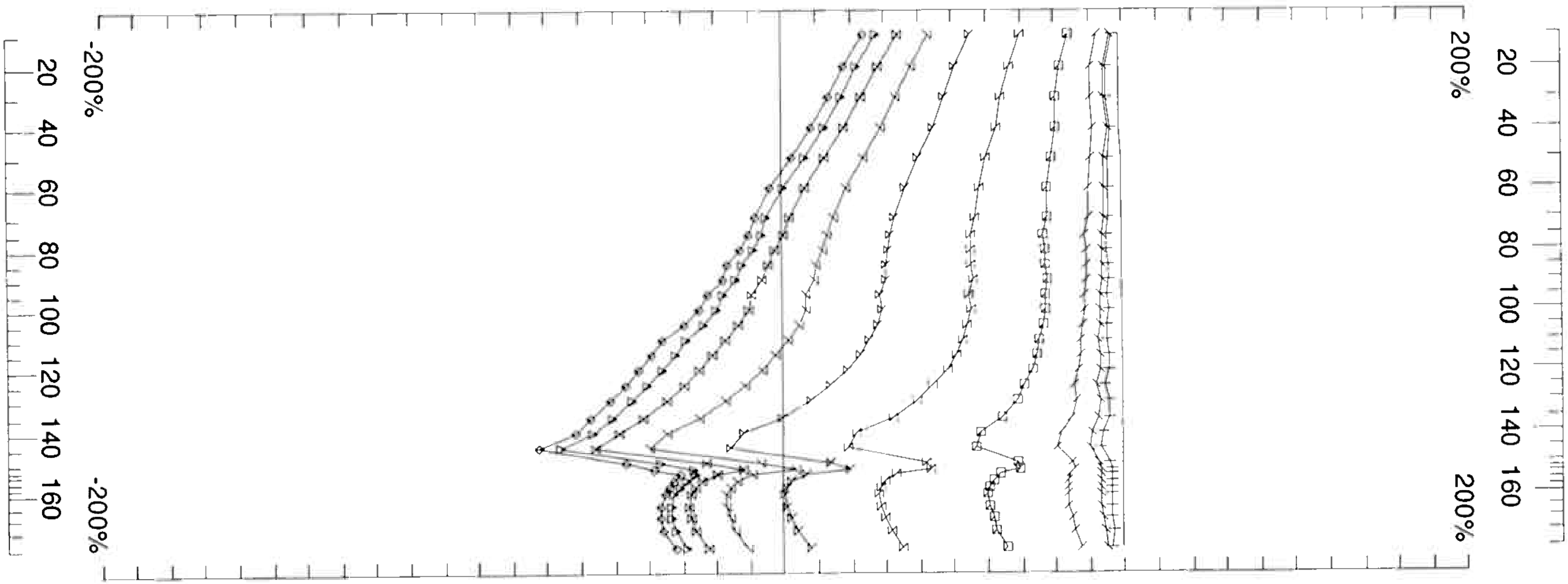
Loop: B41	Secondary, (Chn - Ch1)/IHpI	BHUTEM Survey at: Espedalen
Hole: ES-2004-15	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 22/3/6 Reduced : 22/3/6 Plotted : 17/3/32



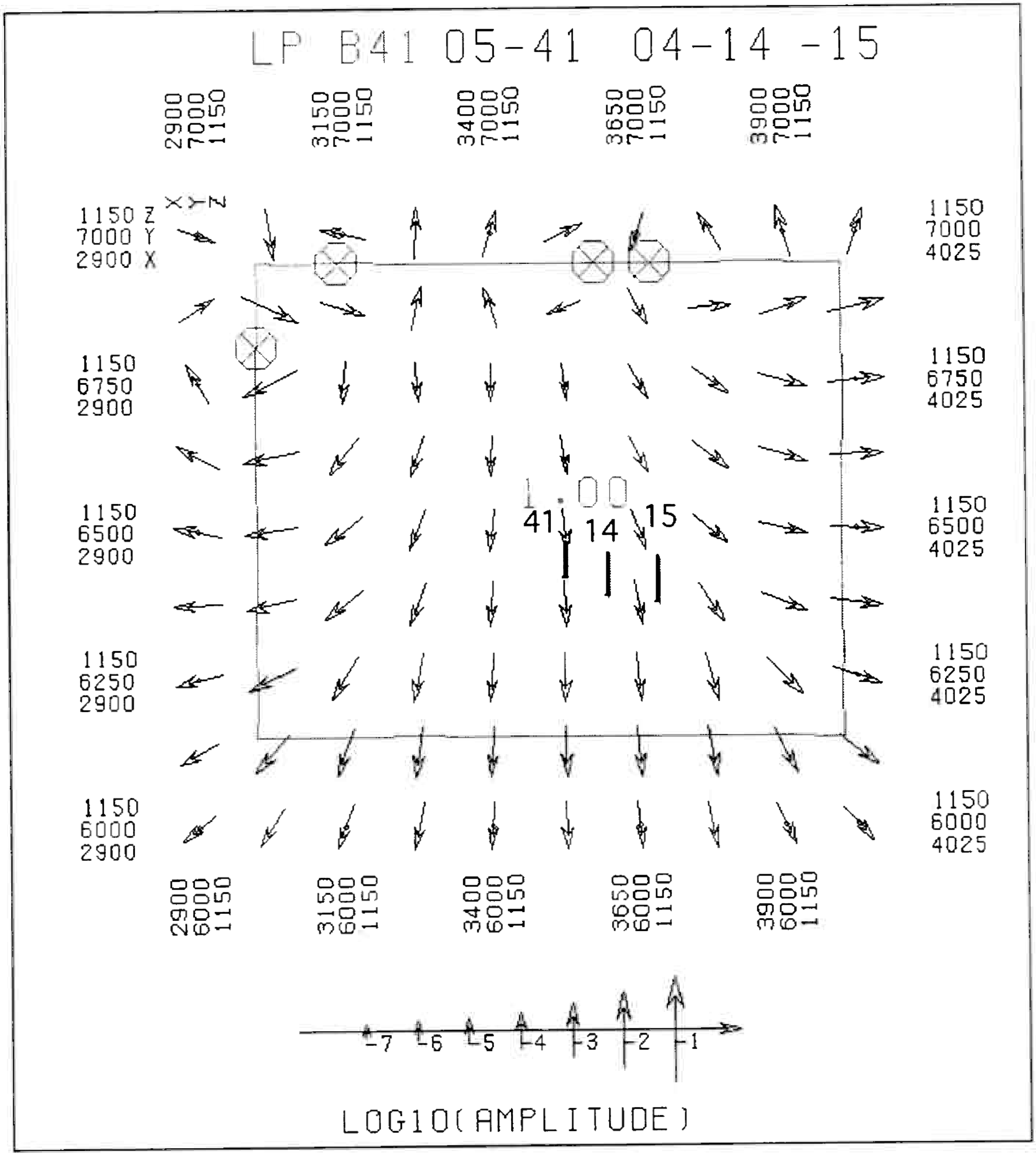
Loop: B41	Total, Chn/IHpl	BHUTEM Survey at: Espedalen
Hole: ES-2004-15	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 22/3/6 Reduced : 22/3/6 Plotted : 17/3/32

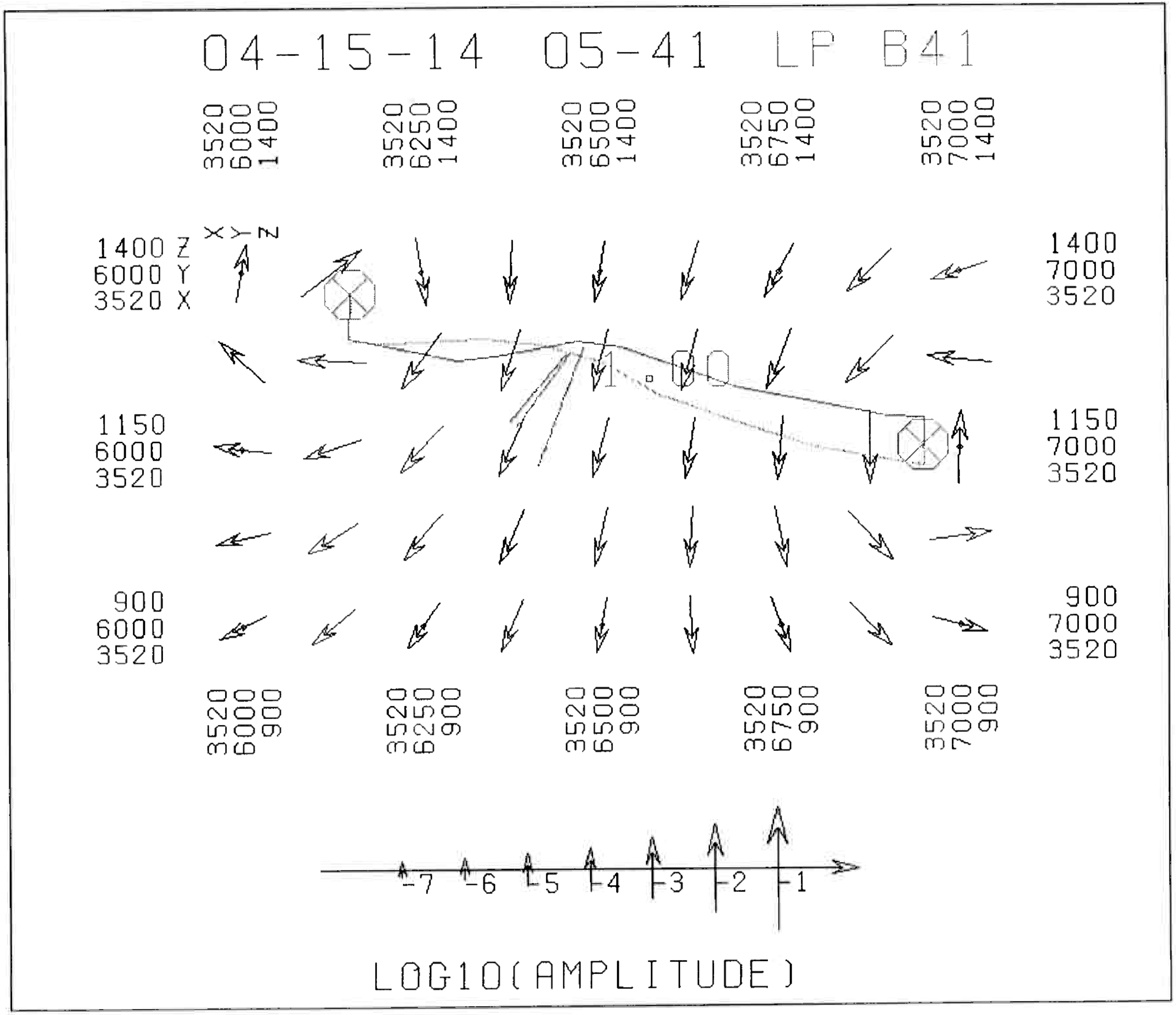


Loop: B41 Hole: ES-2005-41 Compt: Axial	Secondary, (Chn - Ch1)/lHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 22/3/6 Reduced : 22/3/6 Plotted : 17/3/32



Loop: B41	Total, Chn/lHpl	BHUTEM Survey at: Espedalen
Hole: ES-2005-41	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 22/3/6 Reduced : 22/3/6 Plotted : 17/3/32


LP B41 05-41 04-14 -15
1150 Z 7000 Y 2900 X
1.00
41
14
15
LOG10(AMPLITUDE)


04-15-14 05-41 LP B41
3520 6000 1400
3520 6250 1400
3520 6500 1400
3520 6750 1400
3520 7000 1400
1400 Z
6000 Y
3520 X
X Y Z
1400
7000
3520
1150
6000
3520
1150
7000
3520
1.00
900
6000
3520
900
7000
3520
3520 6000 900
3520 6250 900
3520 6500 900
3520 6750 900
3520 7000 900
-7
-6
-5
-4
-3
-2
-1
LOG10(AMPLITUDE)

Trona
Loop 35 - BH UTEM-3

@3.251 Hz frequency

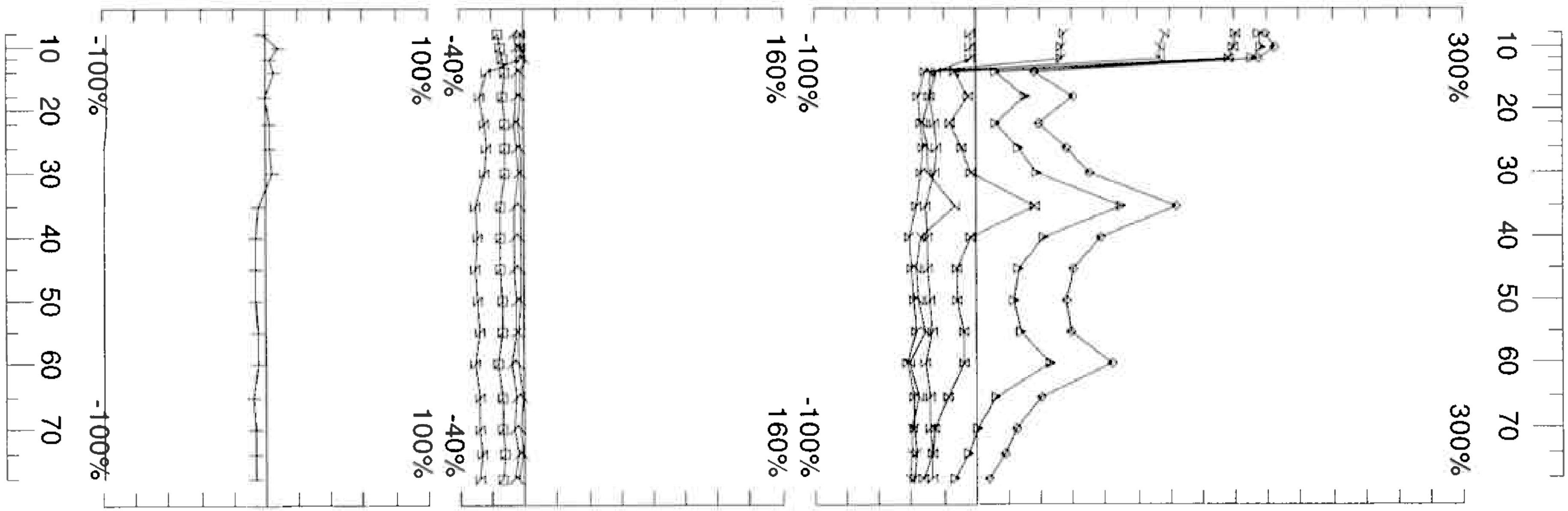
Ch1 reduced

Trona	ES2005-35	78m	79m	Loop B35	3.251Hz

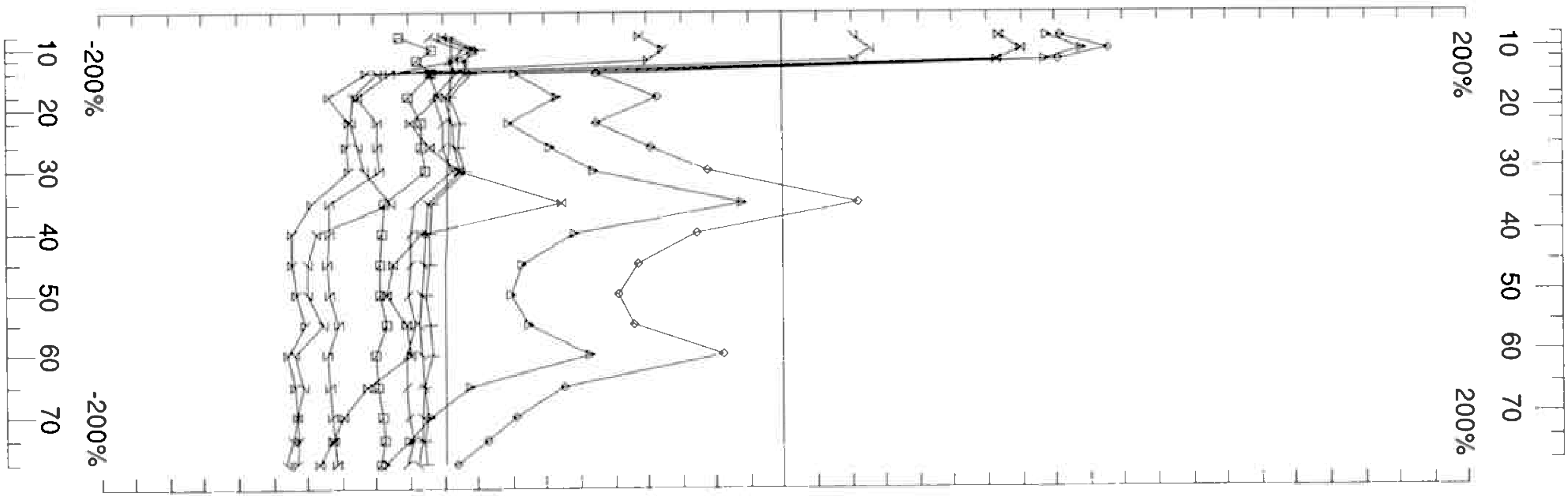
ES2005-35

3-axis plot
total field plot
plan vectorplot
gridnorth-south section vectorplot

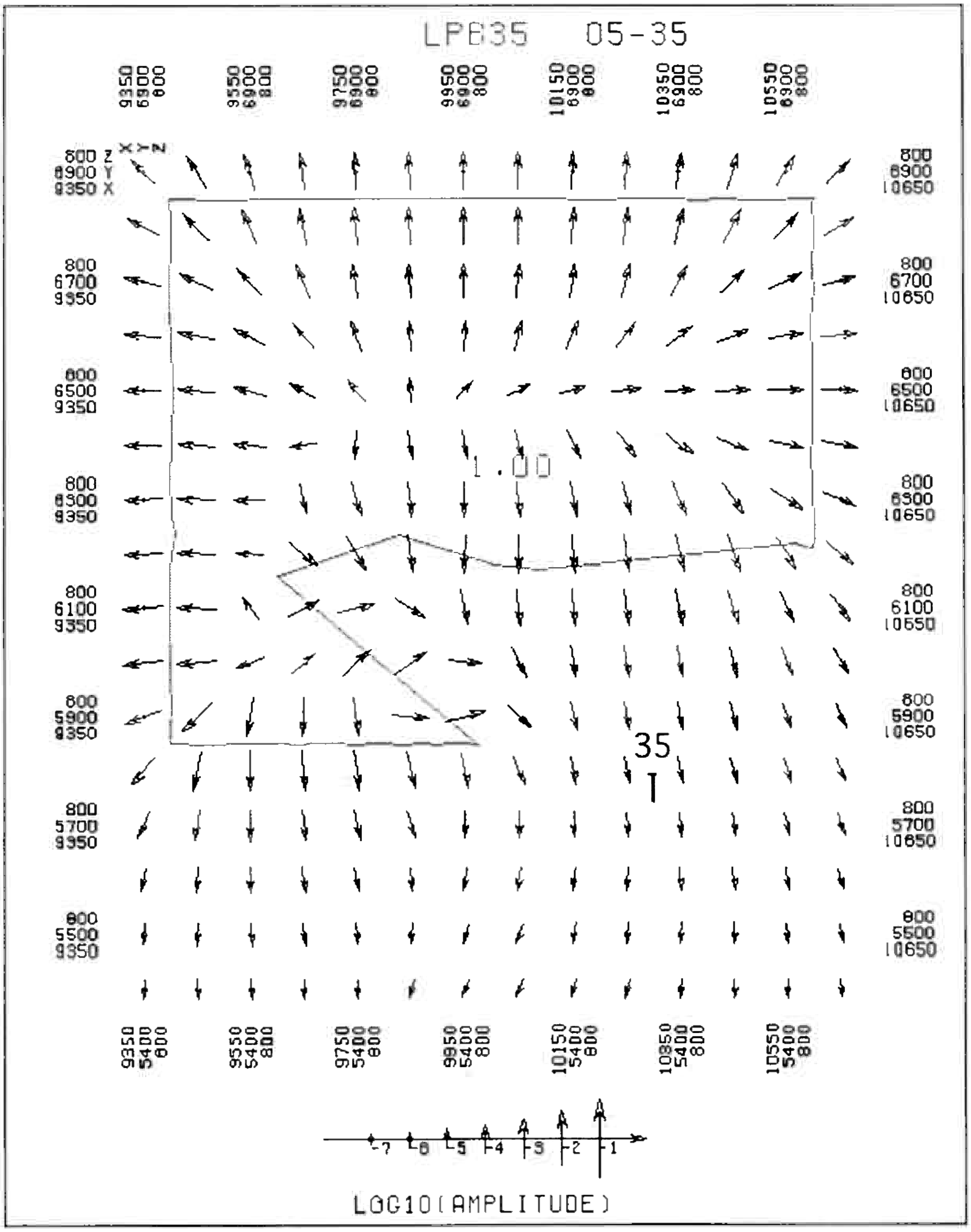
ES2005-35

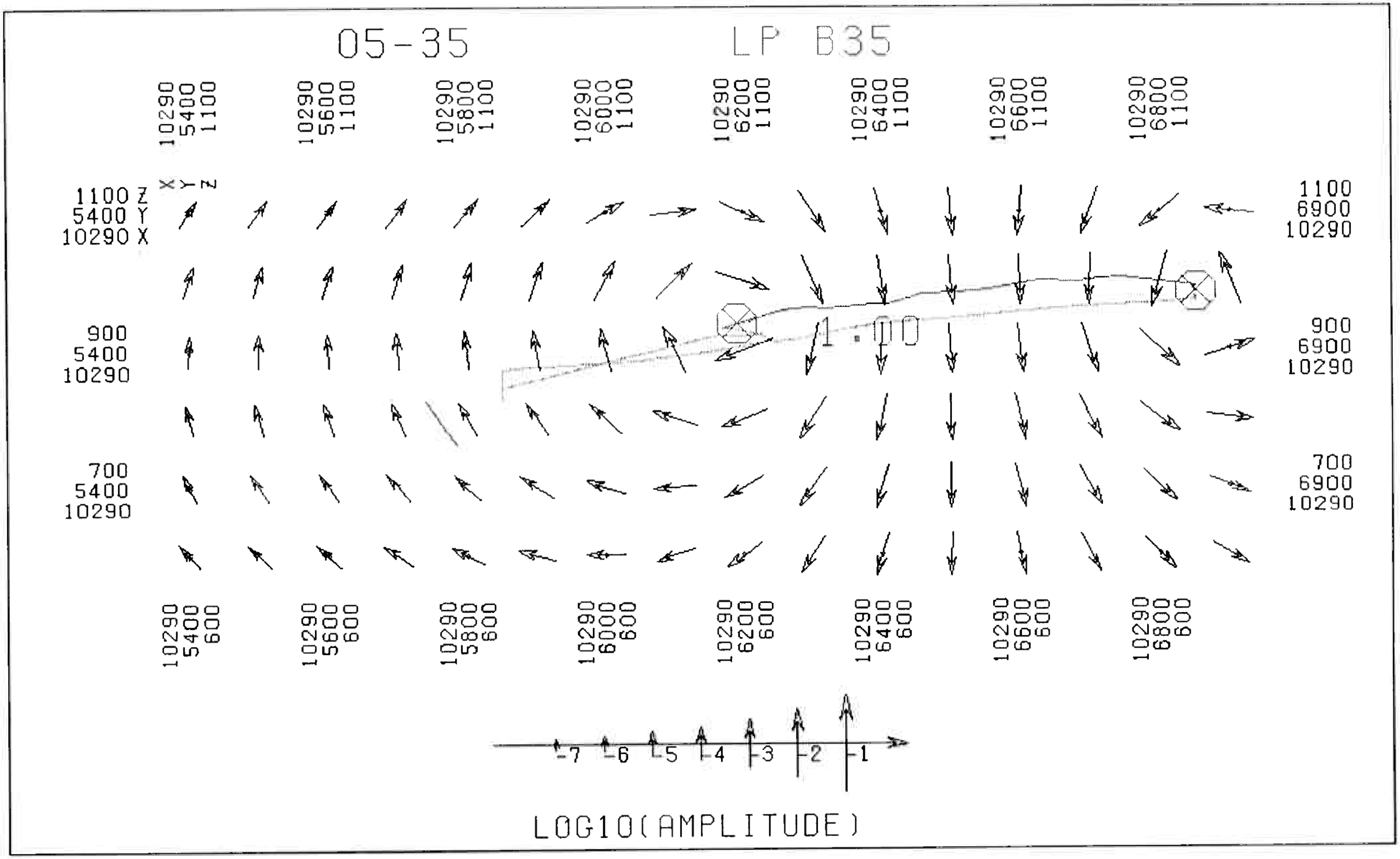


Loop: B35	Secondary, (Chn - Ch1)/lHpl	BHUTEM Survey at: Espedalen
Hole: ES-2005-35	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 6/3/6 Reduced : 6/3/6 Plotted : 17/3/32



Loop: B35 Hole: ES-2005-35 Compt: Axial	Total, Chn/IHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 6/3/6 Reduced : 6/3/6 Plotted : 17/3/32


LPB35 05-35
9350 6900 800
9550 6900 800
9750 6900 800
9950 6900 800
10150 6900 800
10350 6900 800
10550 6900 800
800 Z
6900 Y
9350 X
X Y Z
800 6700 9350
800 6500 9350
800 6300 9350
800 6100 9350
800 5900 9350
800 5700 9350
800 5500 9350
800 6900 10650
800 6700 10650
800 6500 10650
800 6300 10650
800 6100 10650
800 5900 10650
800 5700 10650
800 5500 10650
1.00
35
9350 5400 800
9550 5400 800
9750 5400 800
9950 5400 800
10150 5400 800
10350 5400 800
10550 5400 800
-7 -6 -5 -4 -3 -2 -1
LOG10(AMPLITUDE)


05-35
LP B35
10290 5400 1100
10290 5600 1100
10290 5800 1100
10290 6000 1100
10290 6200 1100
10290 6400 1100
10290 6600 1100
10290 6800 1100
X Y Z
1100 Z
5400 Y
10290 X
900
5400
10290
700
5400
10290
1100
6900
10290
900
6900
10290
700
6900
10290
1.00
10290 5400 600
10290 5600 600
10290 5800 600
10290 6000 600
10290 6200 600
10290 6400 600
10290 6600 600
10290 6800 600
-7
-6
-5
-4
-3
-2
-1
LOG10(AMPLITUDE)

Storgruva extension

Loop B36 - BH UTEM-3

@3.251 Hz frequency

Ch1 reduced

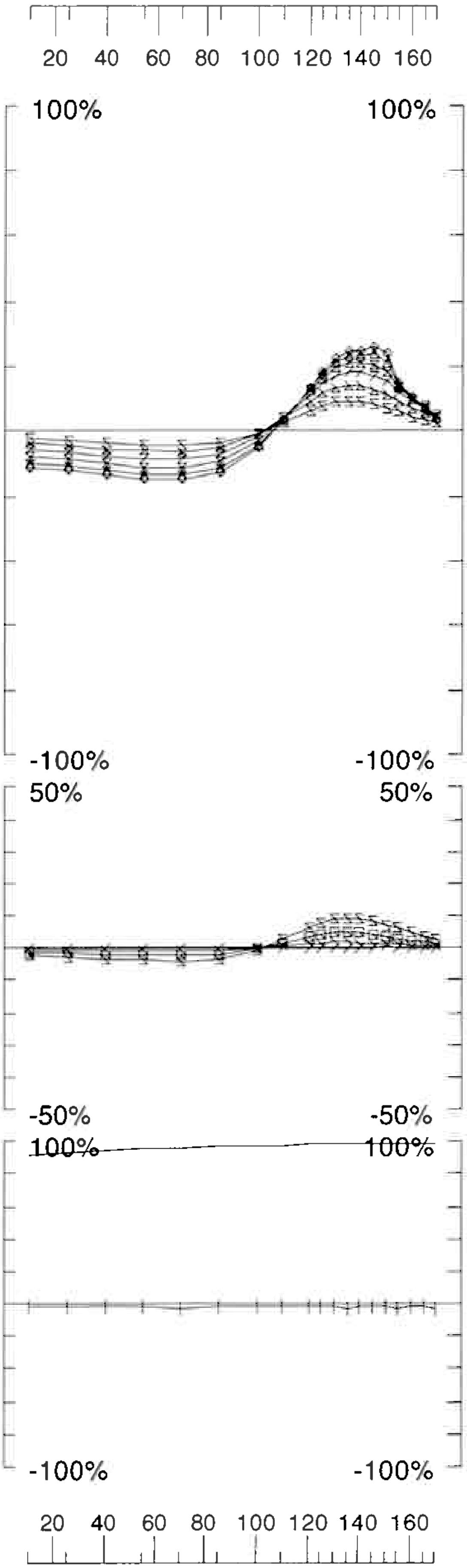
Storgruva ext	ES2005-36	170m	172m	Loop B36	3.251Hz
	ES2005-37	169m	170m	Loop B36	3.251Hz

ES2005-36
ES2005-37

3-axis plot
total field plot

plan vectorplot
gridnorth-south section vectorplot

ES2005-36/37



Loop: B36
Hole: ES-2005-36
Compt: Axial

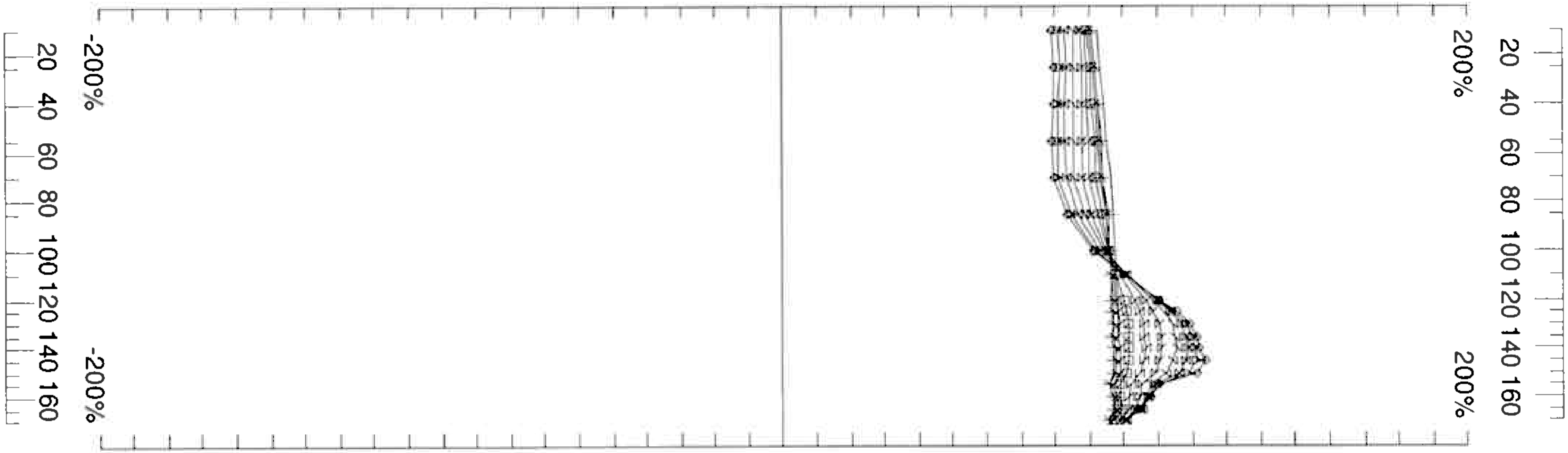
Secondary, (Chn - Ch1)/IHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

BHUTEM Survey at: Espedalen
For: A/S Sulfidmalm

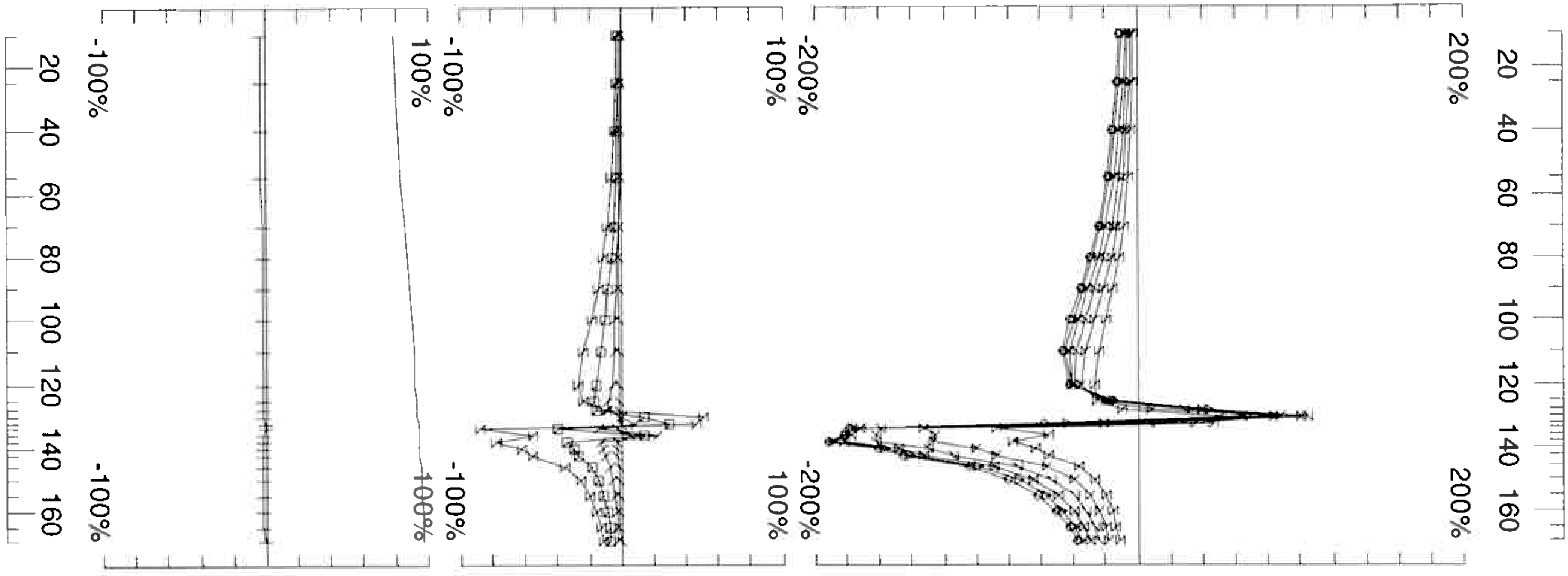
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

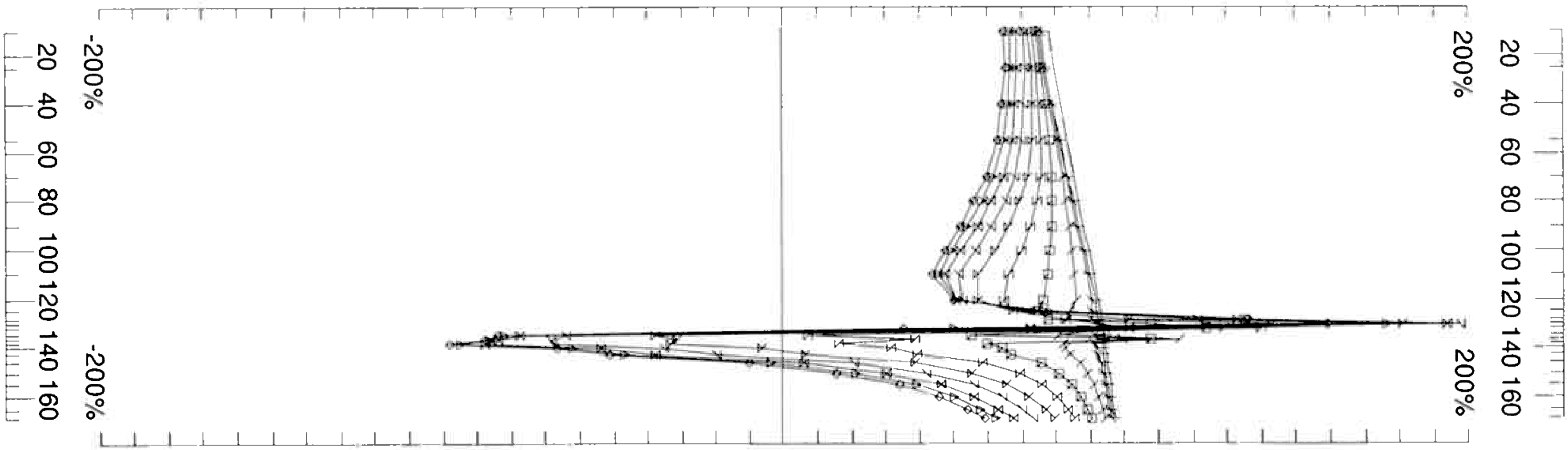
Surveyed : 24/3/6
Reduced : 24/3/6
Plotted : 17/3/32



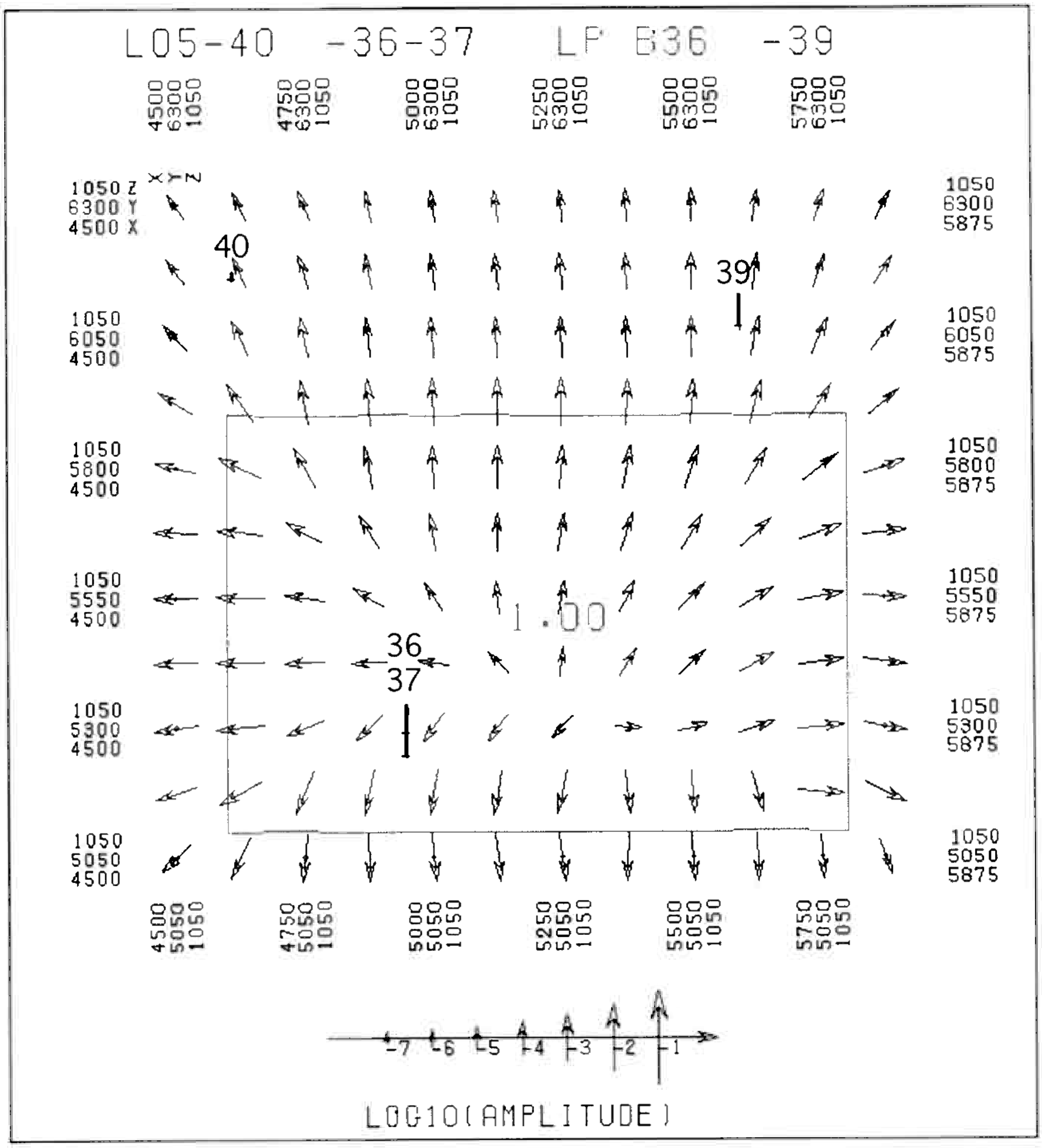
Loop: B36	Total, Chn/lHpl	BHUTEM Survey at: Espedalen
Hole: ES-2005-36	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE · Job 0611 · Surveyed : 24/3/6 Reduced : 24/3/6 Plotted : 17/3/32

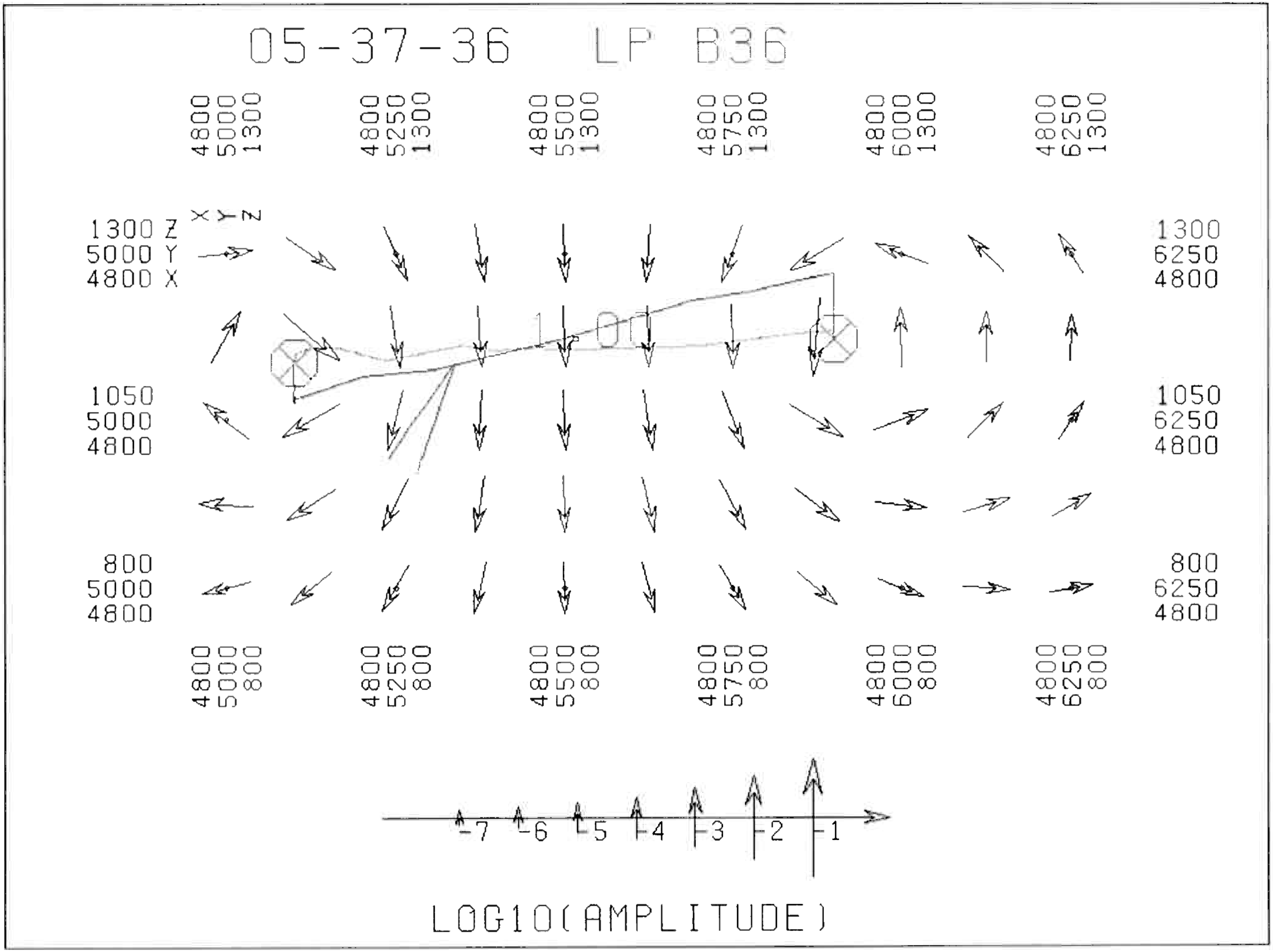


Loop: B36 Hole: ES-2005-37 Compt: Axial	Secondary, (Chn - Ch1)/IHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 24/3/6 Reduced : 24/3/6 Plotted : 17/3/32



Loop: B36	Total, Chn/IHpl	BHUTEM Survey at: Espedalen
Hole: ES-2005-37	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 24/3/6 Reduced : 24/3/6 Plotted : 17/3/32


L05-40 -36-37 LP B36 -39
40
39
36
37
1.00
LOG10(AMPLITUDE)


05-37-36 LP B36
X Y Z
1300 Z
5000 Y
4800 X
1050
5000
4800
800
5000
4800
1300
6250
4800
1050
6250
4800
800
6250
4800
4800 5000 1300
4800 5250 1300
4800 5500 1300
4800 5750 1300
4800 6000 1300
4800 6250 1300
4800 5000 800
4800 5250 800
4800 5500 800
4800 5750 800
4800 6000 800
4800 6250 800
1.00
-7
-6
-5
-4
-3
-2
-1
LOG10(AMPLITUDE)

Graho saddle

Loop B38 - BH UTEM-3

@3.251 Hz frequency

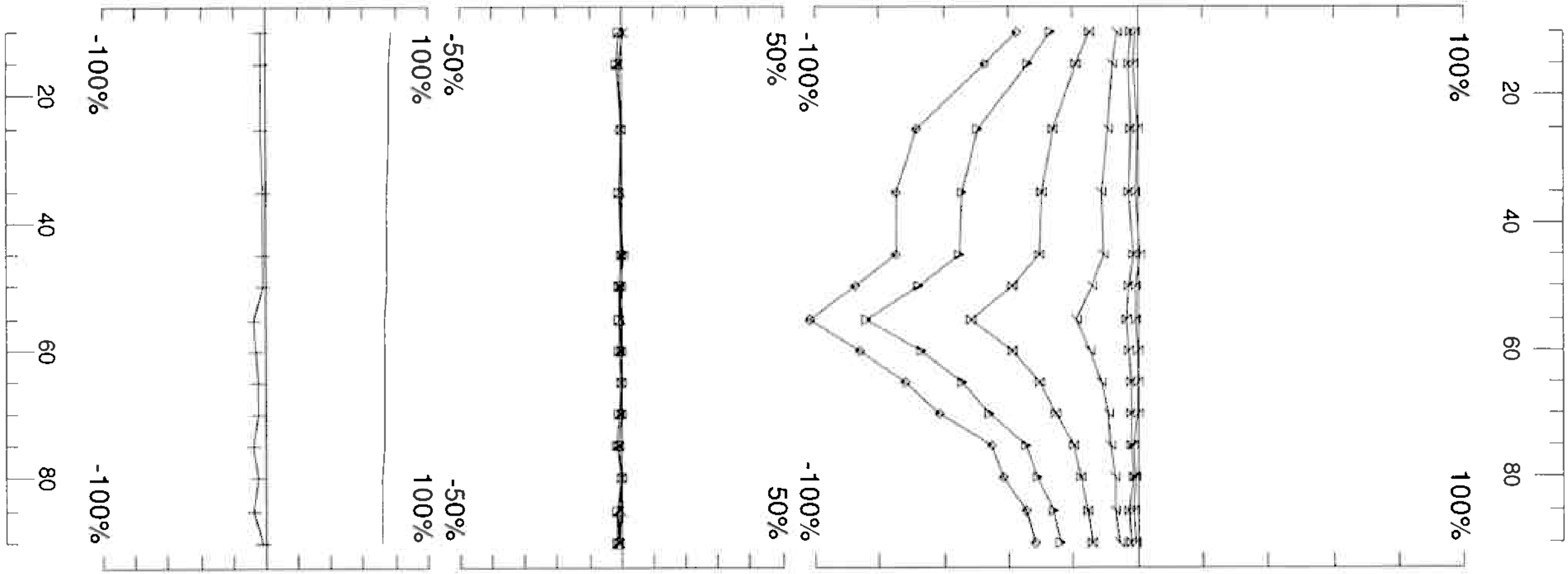
Ch1 reduced

Graho saddle ES2005-38 90m 90m Loop B38 3.251Hz

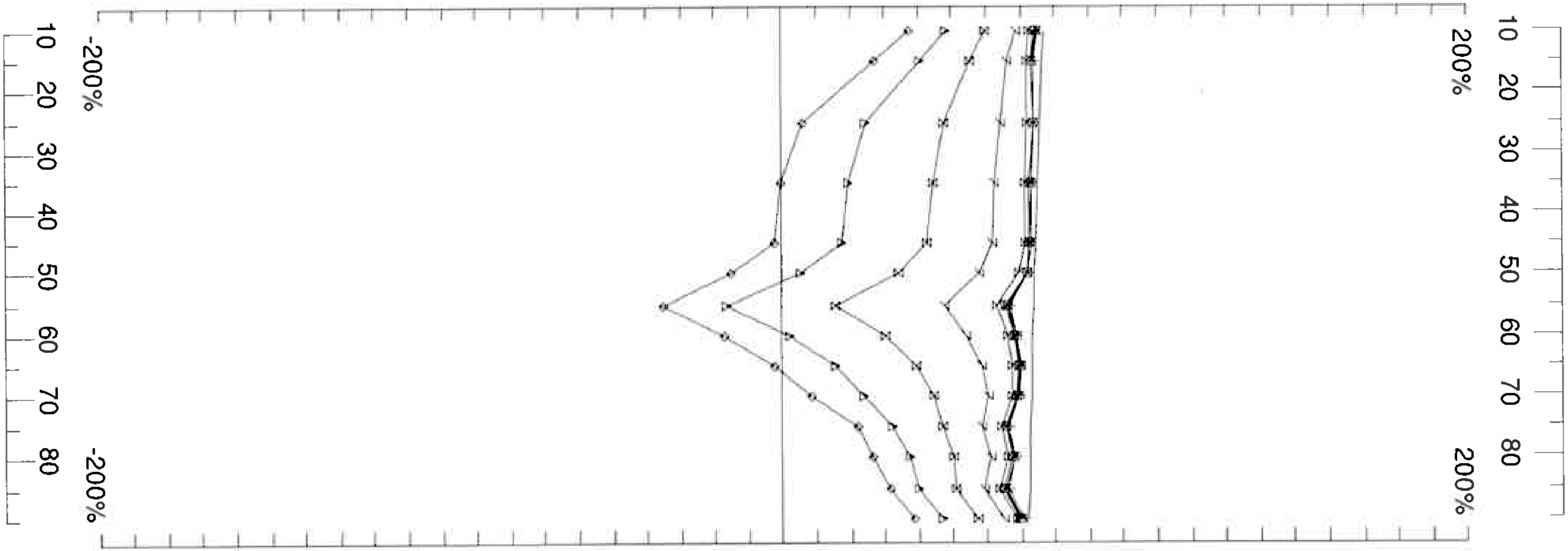
ES2005-38

3-axis plot
total field plot
plan vectorplot
gridnorth-south section vectorplot

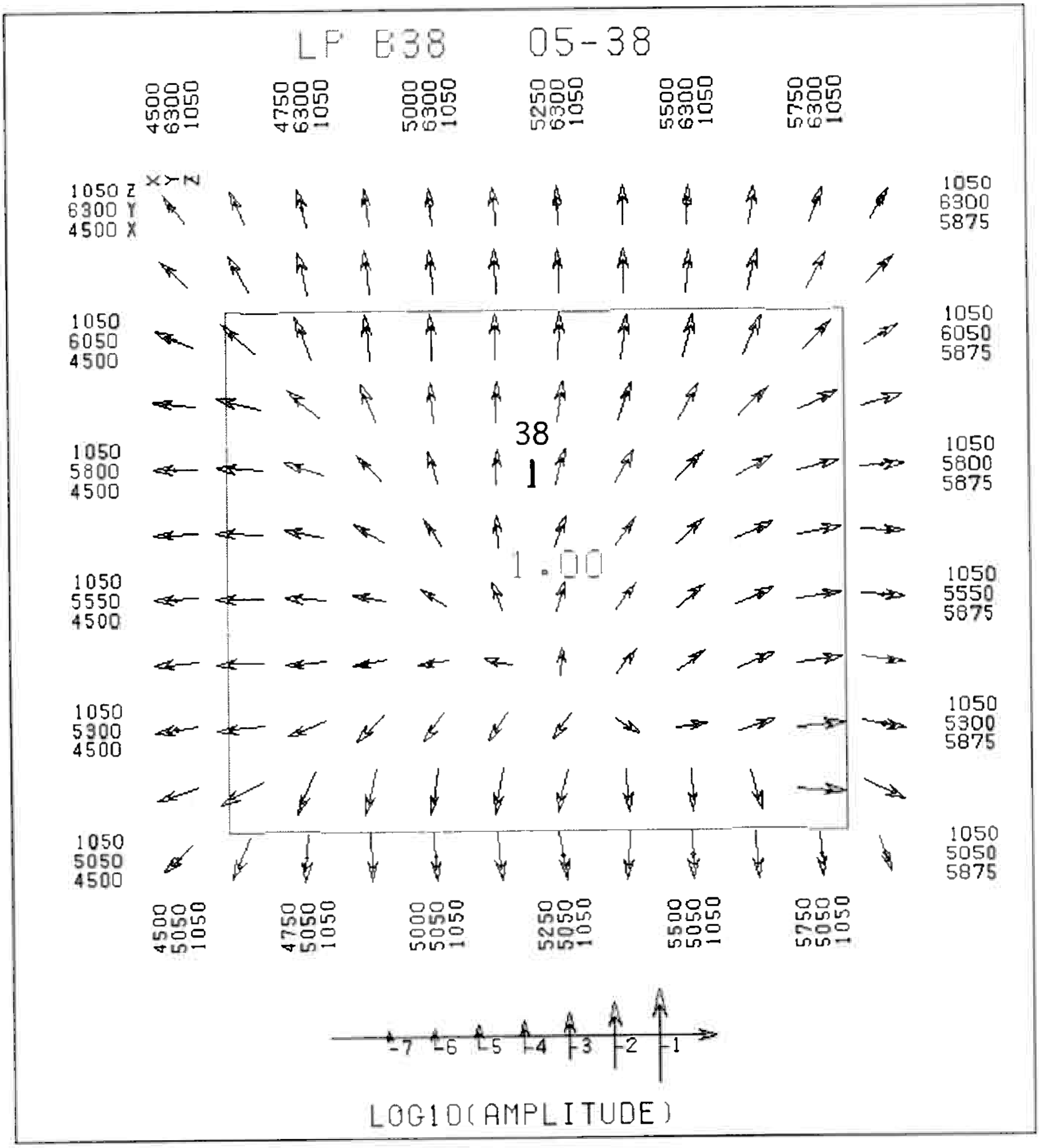
ES2005-38

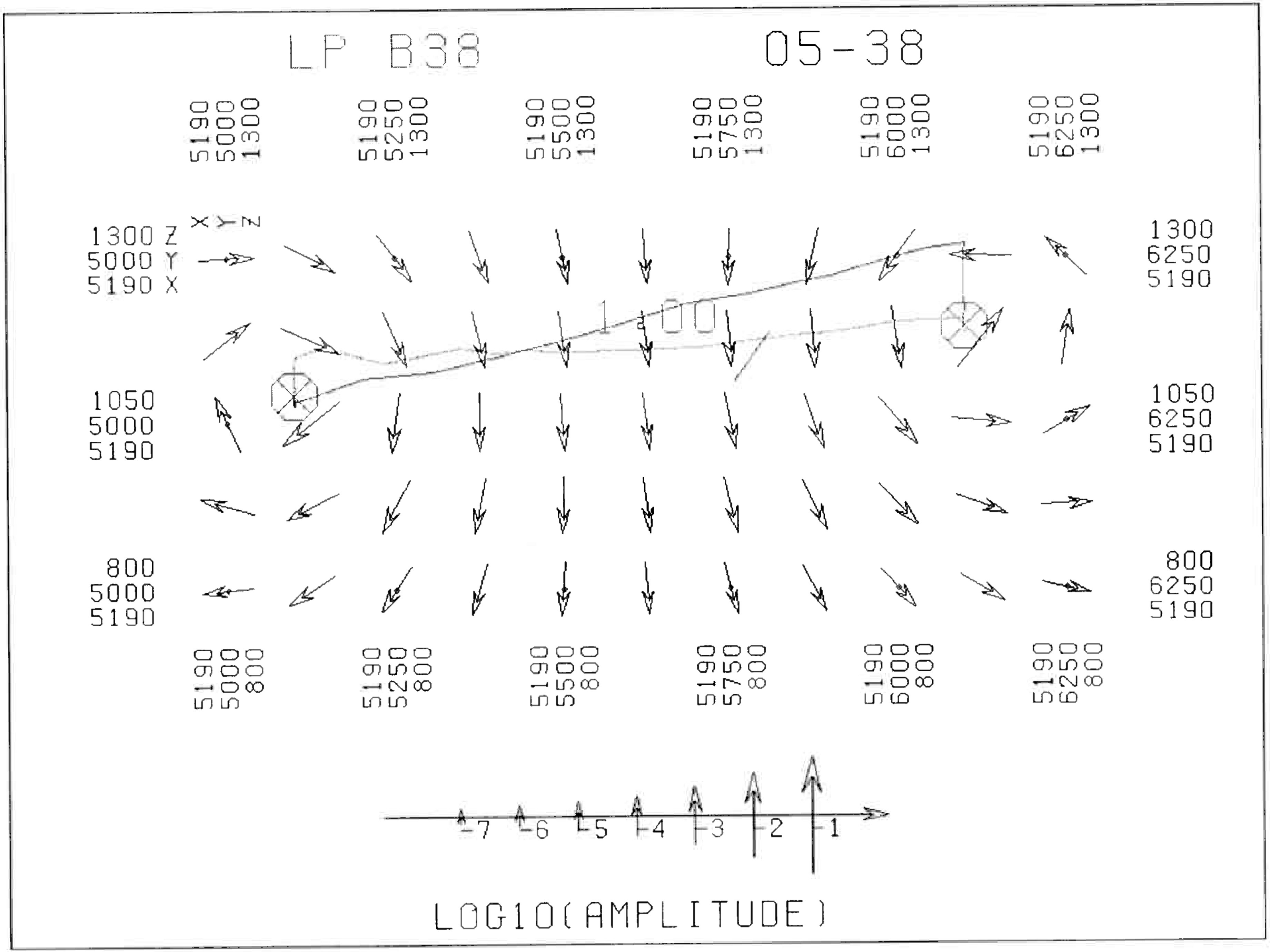


Loop: B38 Hole: ES-2005-38 Compt: Axial	Secondary, (Chn - Ch1)/lHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 23/3/6 Reduced : 23/3/6 Plotted : 17/3/32



Loop: B38	Total, Chn/IHpl	BHUTEM Survey at: Espedalen
Hole: ES-2005-38	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE — Job 0611 — Surveyed : 23/3/6 Reduced : 23/3/6 Plotted : 17/3/32


LP B38 05-38
4500 6300 1050
4750 6300 1050
5000 6300 1050
5250 6300 1050
5500 6300 1050
5750 6300 1050
1050 Z 6300 Y 4500 X
X Y Z
1050 6300 5875
1050 6050 4500
1050 6050 5875
1050 5800 4500
1050 5800 5875
38
1
1.00
1050 5550 4500
1050 5550 5875
1050 5300 4500
1050 5300 5875
1050 5050 4500
1050 5050 5875
4500 5050 1050
4750 5050 1050
5000 5050 1050
5250 5050 1050
5500 5050 1050
5750 5050 1050
-7 -6 -5 -4 -3 -2 -1
LOG10(AMPLITUDE)


LP B38
05-38
5190 5000 1300
5190 5250 1300
5190 5500 1300
5190 5750 1300
5190 6000 1300
5190 6250 1300
X Y Z
1300 Z
5000 Y
5190 X
1300
6250
5190
1.00
1050
5000
5190
1050
6250
5190
800
5000
5190
800
6250
5190
5190 5000 800
5190 5250 800
5190 5500 800
5190 5750 800
5190 6000 800
5190 6250 800
-7 -6 -5 -4 -3 -2 -1
LOG10(AMPLITUDE)

Graho

Loop B36 - BH UTEM-3

@3.251 Hz frequency

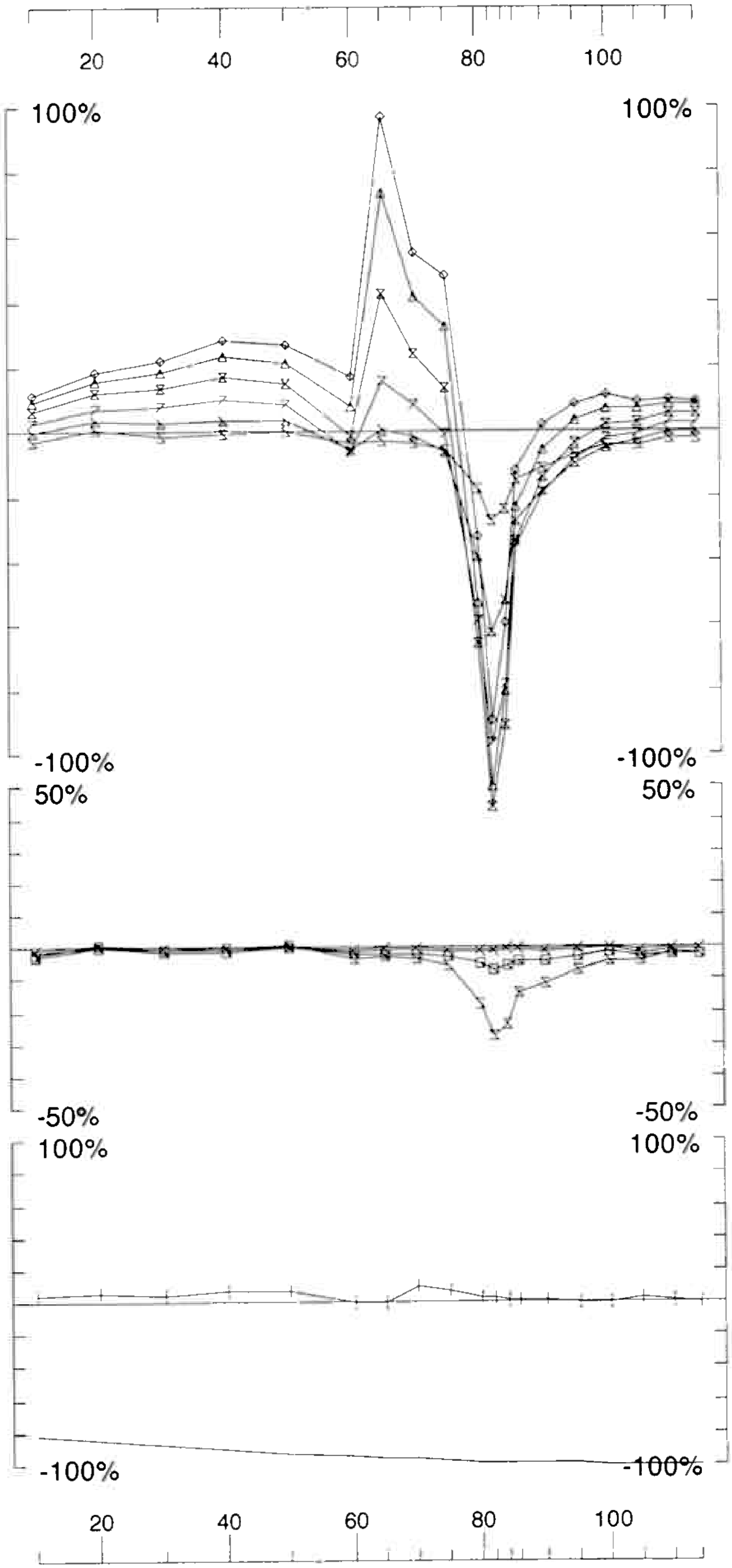
Ch1 reduced

Graho	ES2005-39	114m	115m	Loop B36	3.251Hz

ES2005-39

3-axis plot
total field plot
plan vectorplot
gridnorth-south section vectorplot

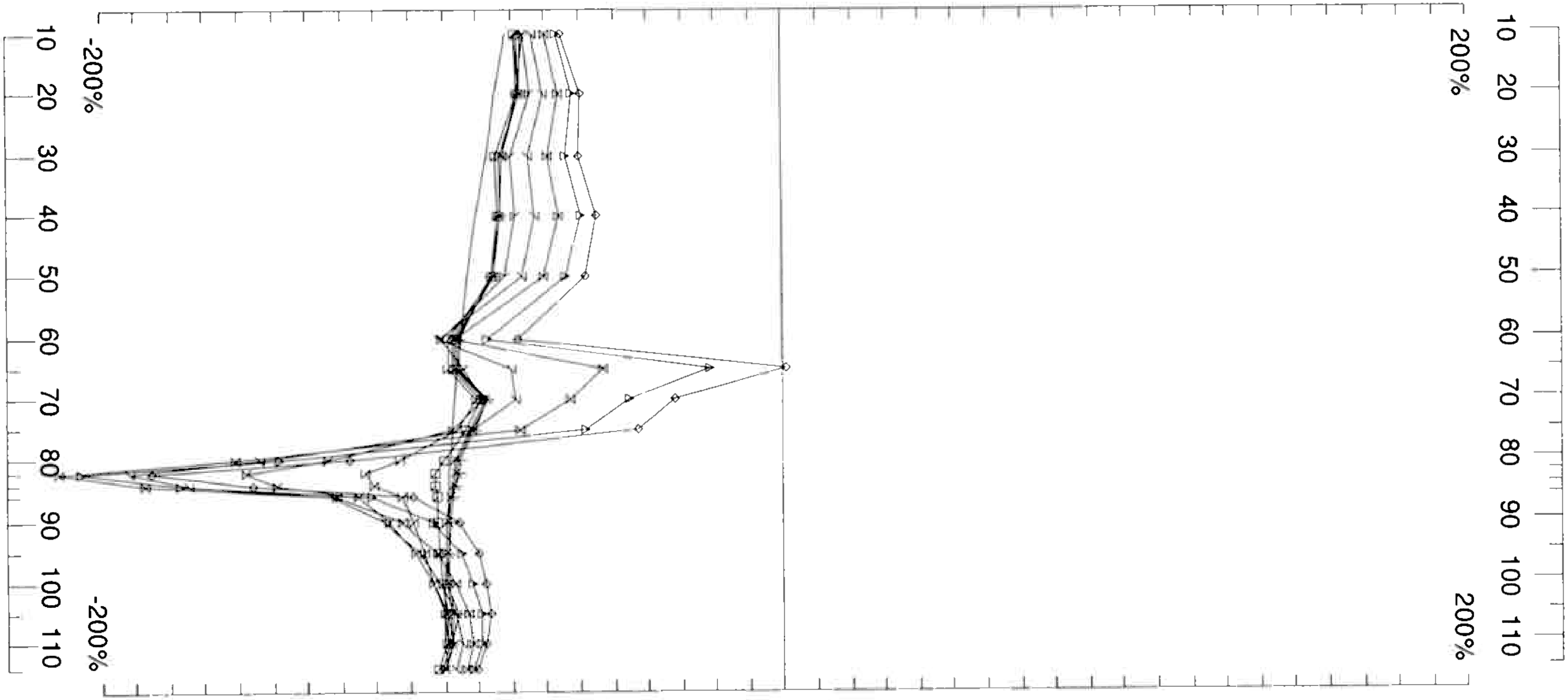
ES2005-39



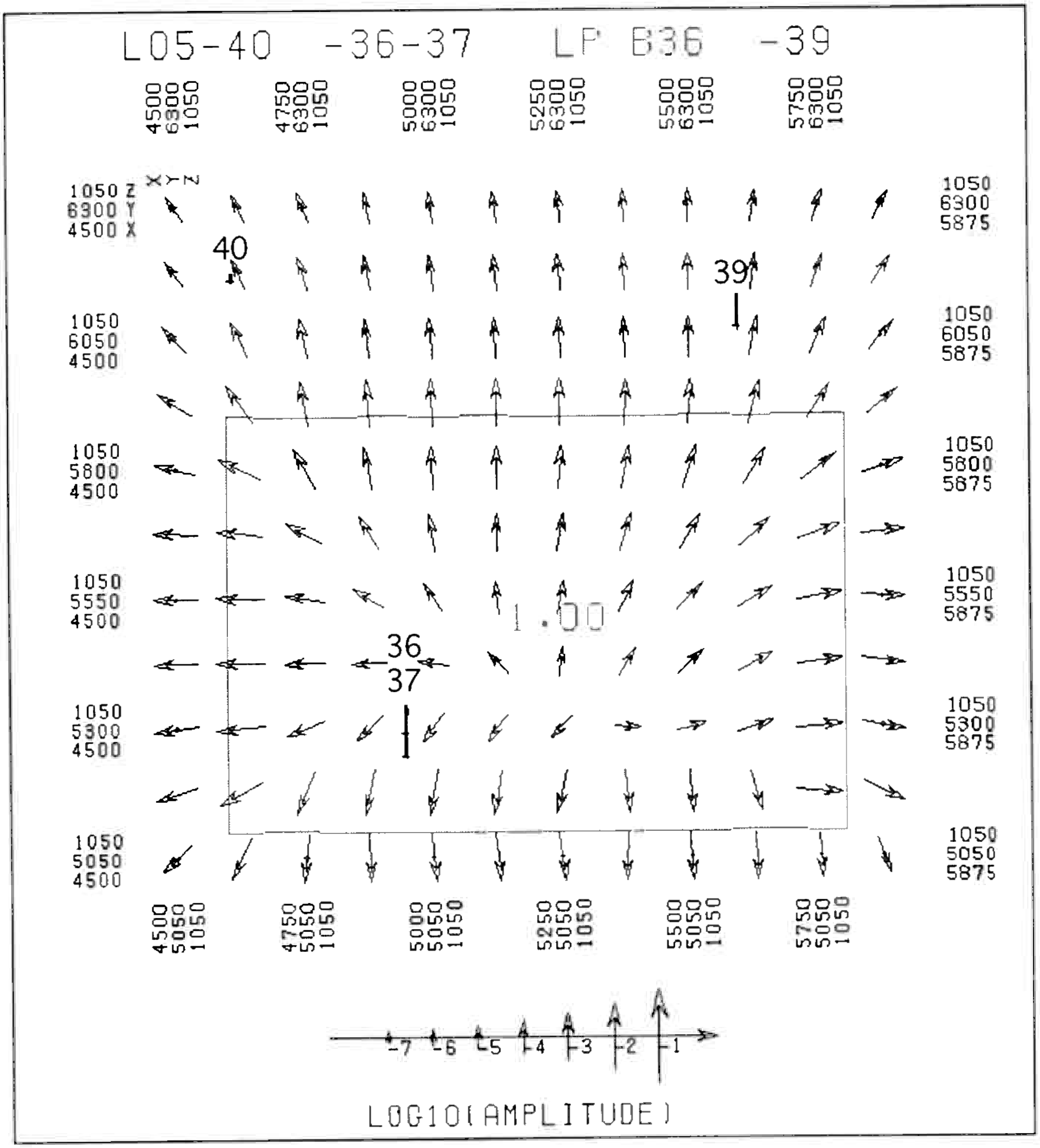
BHUTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE
Job 0611
Surveyed 23/3/6
Reduced 23/3/6
Plotted 17/3/32

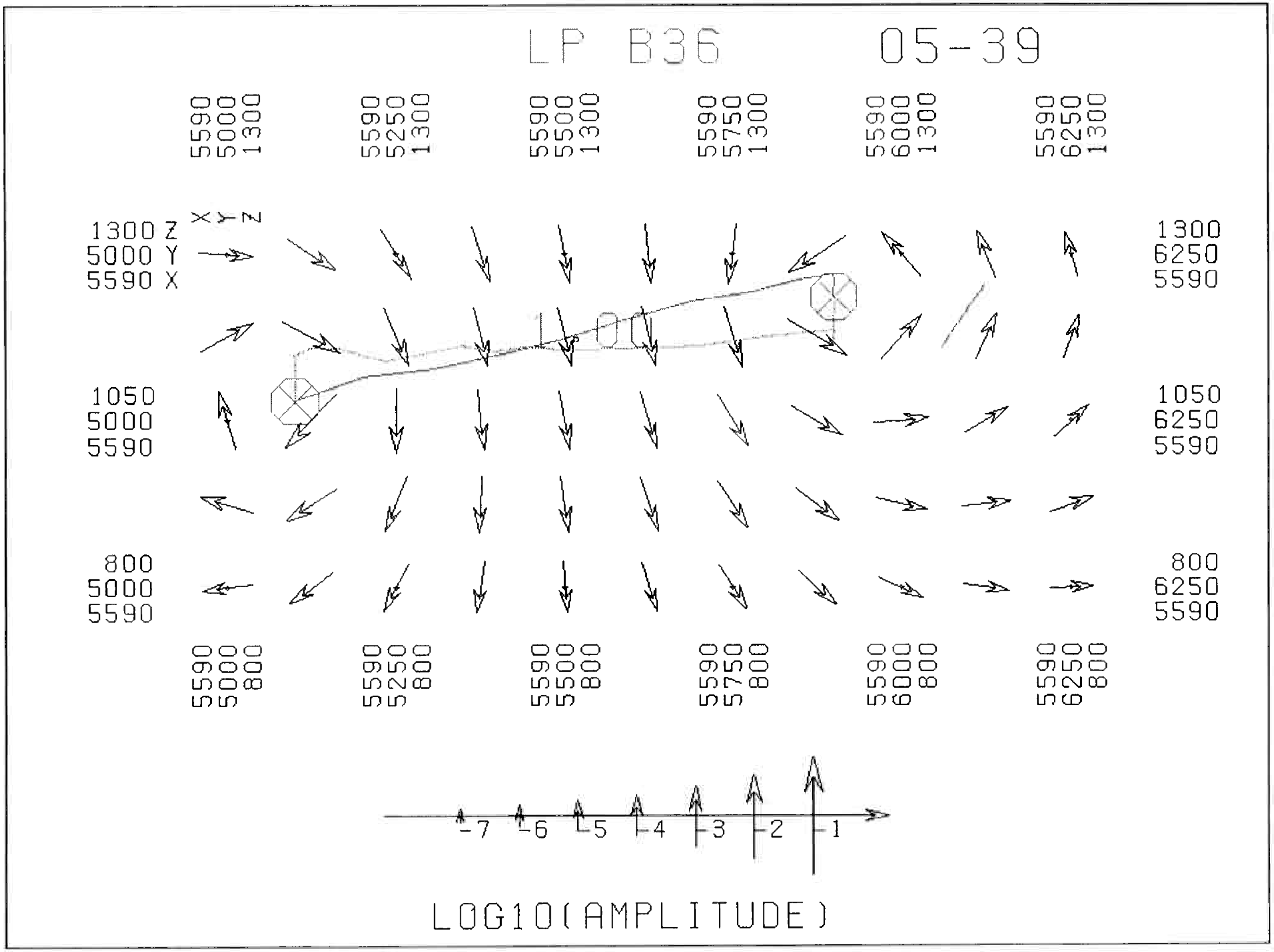
Secondary, (Chn - Ch1)/IHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Loop: B36
Hole: ES-2005-39
Compt: Axial



Loop: B36 Hole: ES-2005-39 Compt: Axial	Total, Chn/IHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 23/3/6 Reduced : 23/3/6 Plotted : 17/3/32


L05-40 -36-37 LP B36 -39
4500 6300 1050
4750 6300 1050
5000 6300 1050
5250 6300 1050
5500 6300 1050
5750 6300 1050
X Y Z
1050 Z 6300 Y 4500 X
1050 6300 5875
40
39
1050 6050 4500
1050 6050 5875
1050 5800 4500
1050 5800 5875
1050 5550 4500
1050 5550 5875
1.00
36
37
1050 5300 4500
1050 5300 5875
1050 5050 4500
1050 5050 5875
4500 5050 1050
4750 5050 1050
5000 5050 1050
5250 5050 1050
5500 5050 1050
5750 5050 1050
-7 -6 -5 -4 -3 -2 -1
LOG10(AMPLITUDE)



LP B36 05-39
5590 5000 1300
5590 5250 1300
5590 5500 1300
5590 5750 1300
5590 6000 1300
5590 6250 1300
X Y Z
1300 Z
5000 Y
5590 X
1300 6250 5590
1.00
1050 5000 5590
1050 6250 5590
800 5000 5590
800 6250 5590
5590 5000 800
5590 5250 800
5590 5500 800
5590 5750 800
5590 6000 800
5590 6250 800
-7 -6 -5 -4 -3 -2 -1
LOG10(AMPLITUDE)

Grahoin

Loop B36 - BH UTEM-3

@3.251 Hz frequency

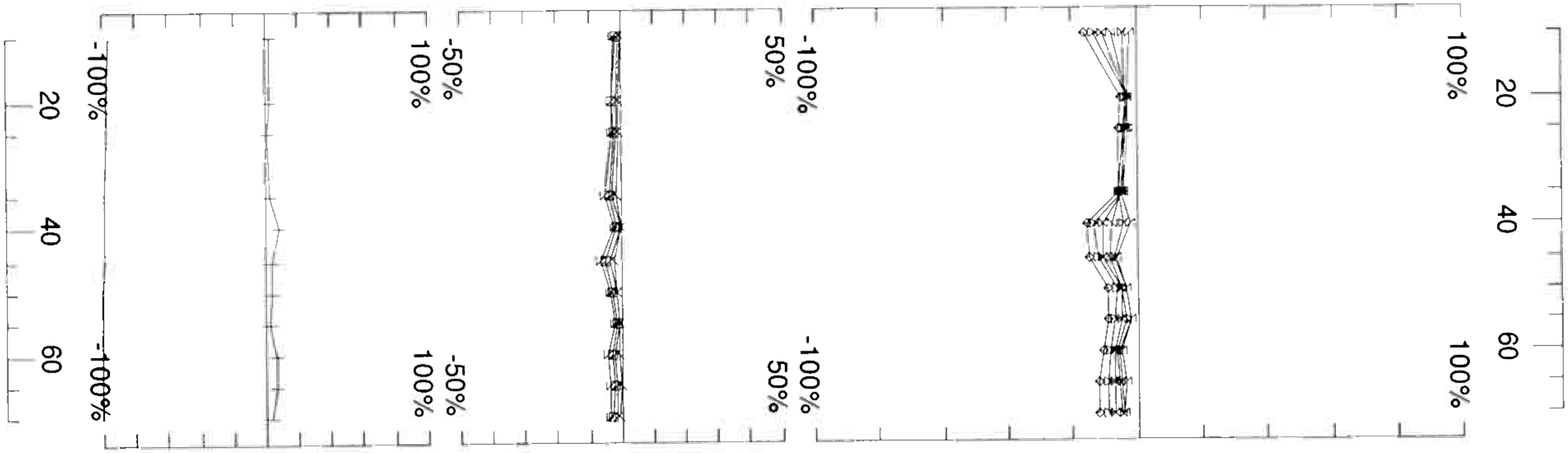
Ch1 reduced

Grahoin	ES2005-40	70m	70.5m	Loop B36	3.251Hz

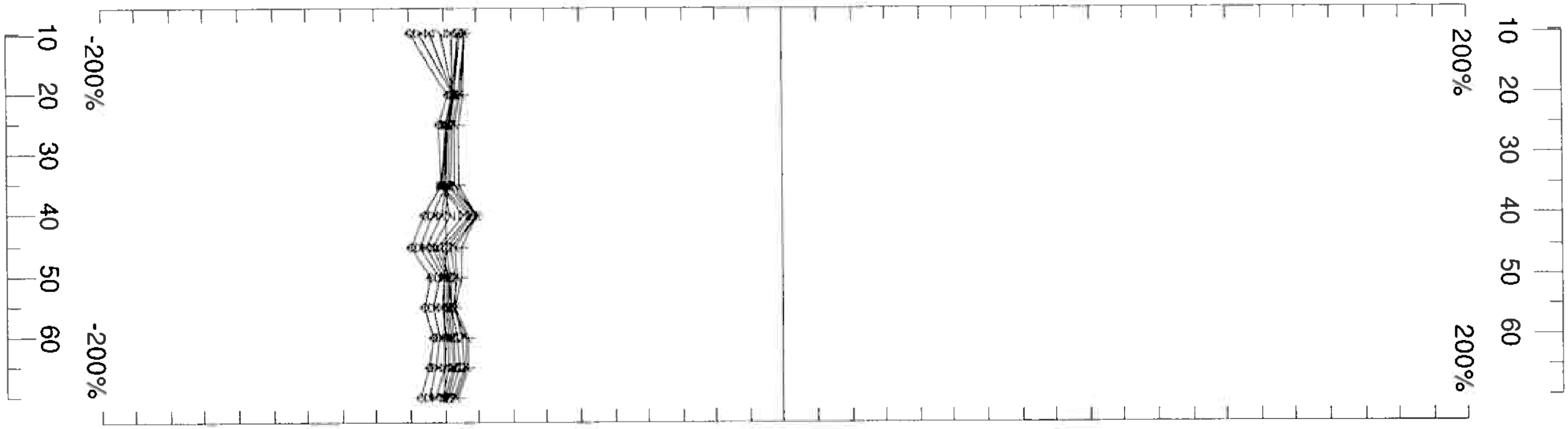
ES2005-40

3-axis plot
total field plot
plan vectorplot
gridnorth-south section vectorplot

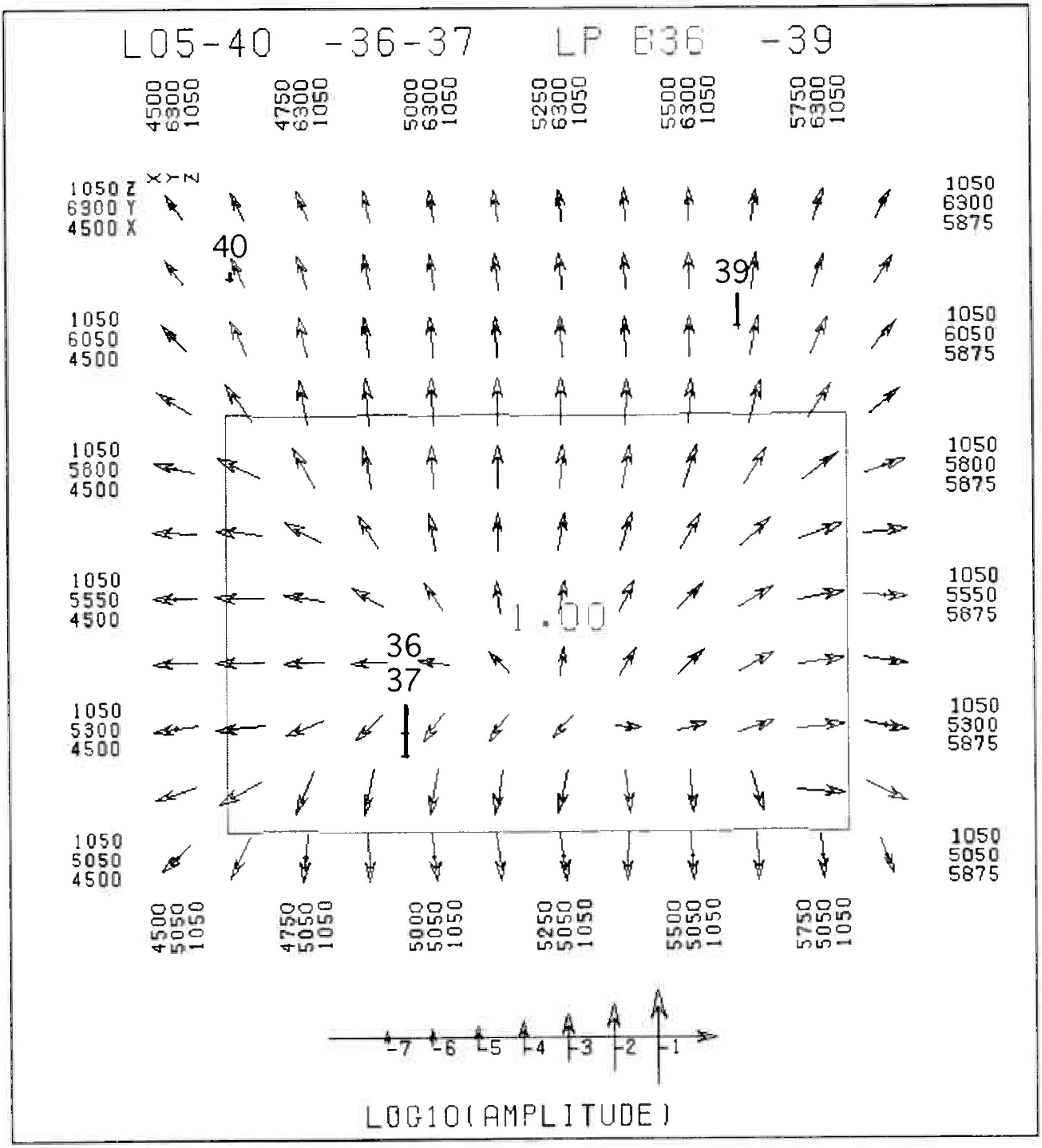
ES2005-40



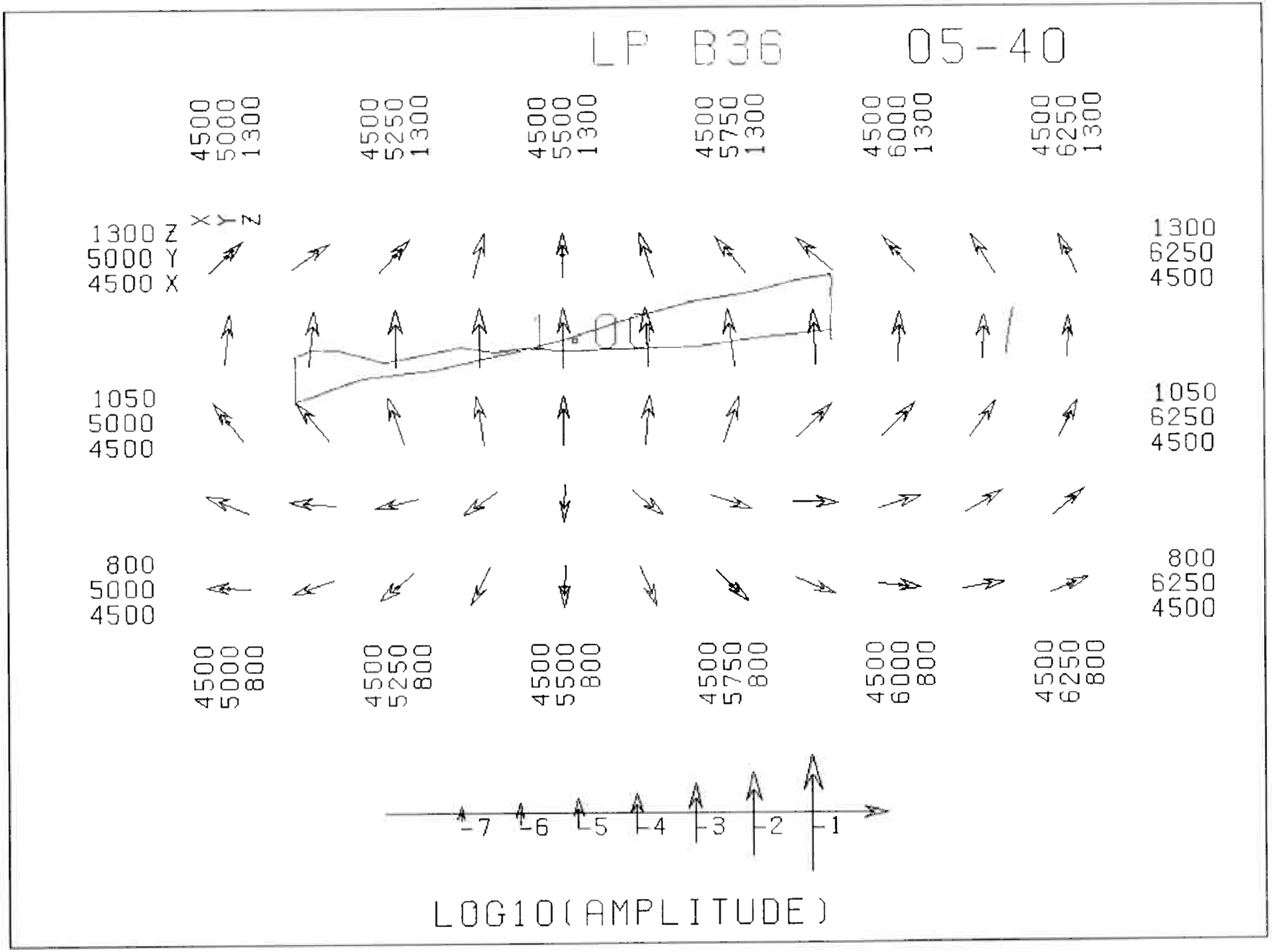
Loop: B36 Hole: ES-2005-40 Compt: Axial	Secondary, (Chn - Ch1)/IHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 23/3/6 Reduced : 24/3/6 Plotted : 17/3/32



Loop: B36	Total, Chn/IHpl	BHUTEM Survey at: Espedalen
Hole: ES-2005-40	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 23/3/6 Reduced : 24/3/6 Plotted : 17/3/32



L05-40 -36-37 LP B36 -39
4500 6300 1050
4750 6300 1050
5000 6300 1050
5250 6300 1050
5500 6300 1050
5750 6300 1050
X Y Z
1050 Z
6900 Y
4500 X
1050 6300 5875
40
39
1050 6050 4500
1050 6050 5875
1050 5800 4500
1050 5800 5875
1050 5550 4500
1050 5550 5875
1.00
36
37
1050 5300 4500
1050 5300 5875
1050 5050 4500
1050 5050 5875
4500 5050 1050
4750 5050 1050
5000 5050 1050
5250 5050 1050
5500 5050 1050
5750 5050 1050
-7 -6 -5 -4 -3 -2 -1
LOG10(AMPLITUDE)



LP B36 05-40
4500 5000 1300
4500 5250 1300
4500 5500 1300
4500 5750 1300
4500 6000 1300
4500 6250 1300
X Y Z
1300 Z
5000 Y
4500 X
1300 6250 4500
1050 5000 4500
1050 6250 4500
800 5000 4500
800 6250 4500
4500 5000 800
4500 5250 800
4500 5500 800
4500 5750 800
4500 6000 800
4500 6250 800
-7 -6 -5 -4 -3 -2 -1
LOG10(AMPLITUDE)

Vesle

Loop B42 - BH UTEM-3

@3.251 Hz frequency

Ch1 reduced

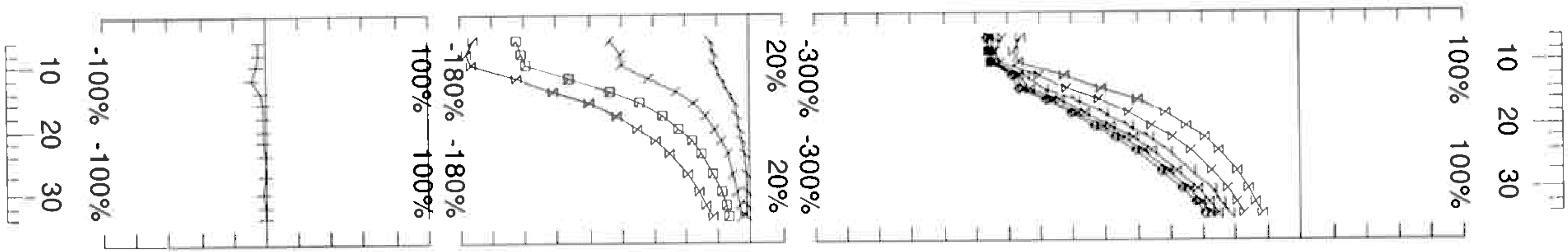
Vesle	ES2005-42	34m	35m	Loop B42	3.251Hz
	ES2005-43	44m	46m	Loop B42	3.251Hz
	ES2005-44	39m	40m	Loop B42	3.251Hz

ES2005-42
ES2005-43
ES2005-44

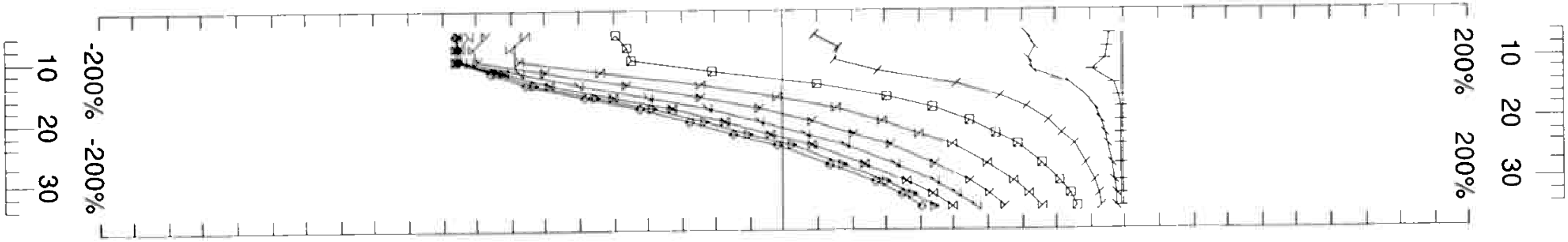
3-axis plot
total field plot

plan vectorplot
gridnorth-south section vectorplot

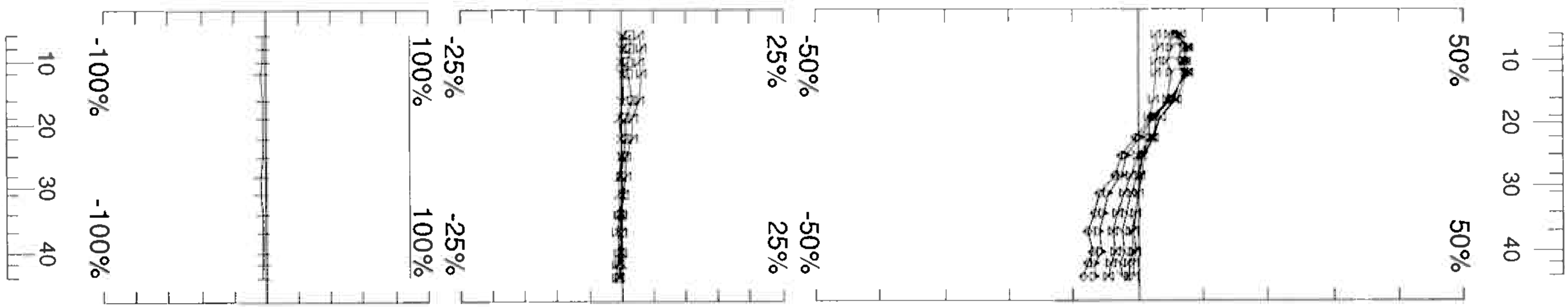
ES2005-42/43/44



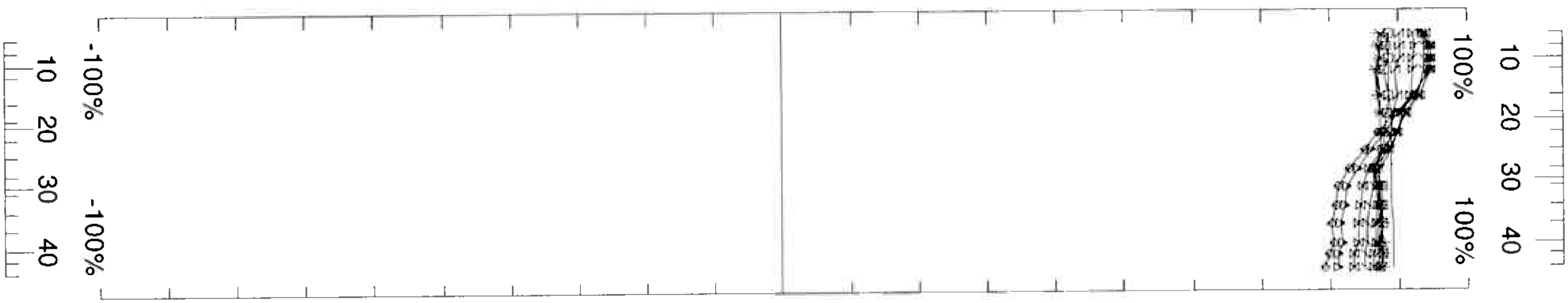
Loop: B42	Secondary, (Chn - Ch1)/IHpl	BHUTEM Survey at: Espedalen
Hole: ES-2005-42	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE — Job 0611 — Surveyed : 25/2/6 Reduced : 25/2/6 Plotted : 17/3/32



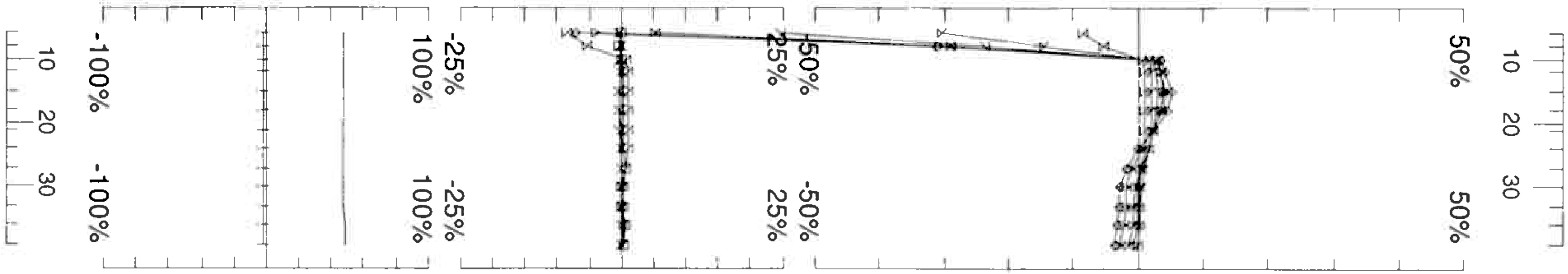
Loop: B42	Total, Chn/IHpl	BHUTEM Survey at: Espedalen
Hole: ES-2005-42	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 25/2/6 Reduced : 25/2/6 Plotted : 17/3/32



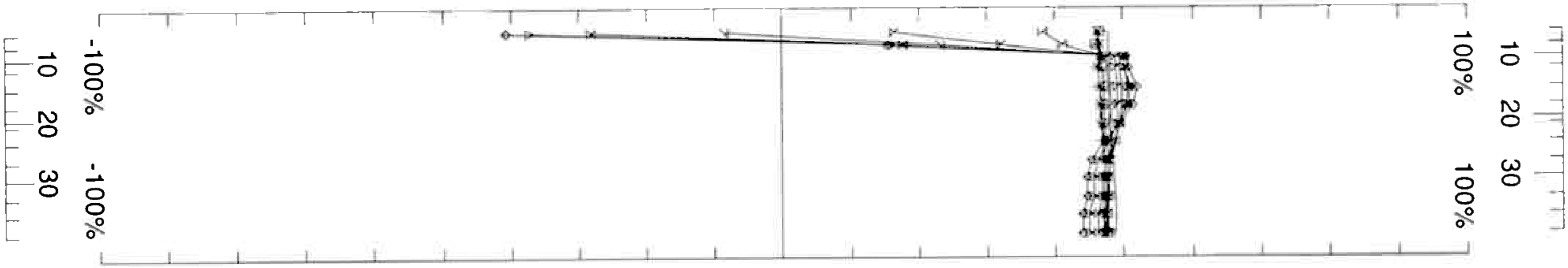
Loop: B42 Hole: ES-2005-43 Compt: Axial	Secondary, (Chn - Ch1)/IHpI Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 25/2/6 Reduced : 25/2/6 Plotted : 17/3/32



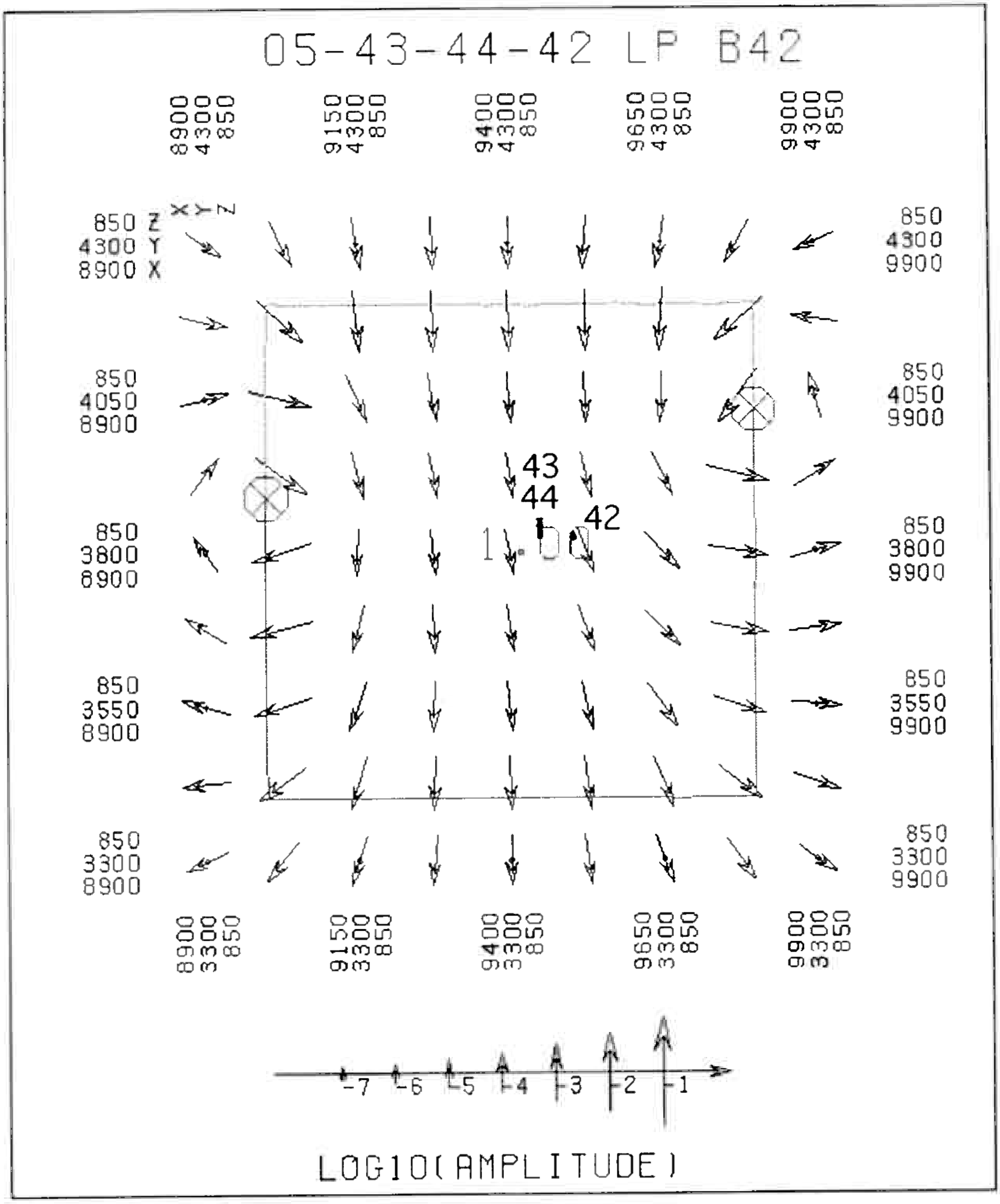
Loop: B42 Hole: ES-2005-43 Compt: Axial	Total, Chn/IHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 25/2/6 Reduced : 25/2/6 Plotted : 17/3/32



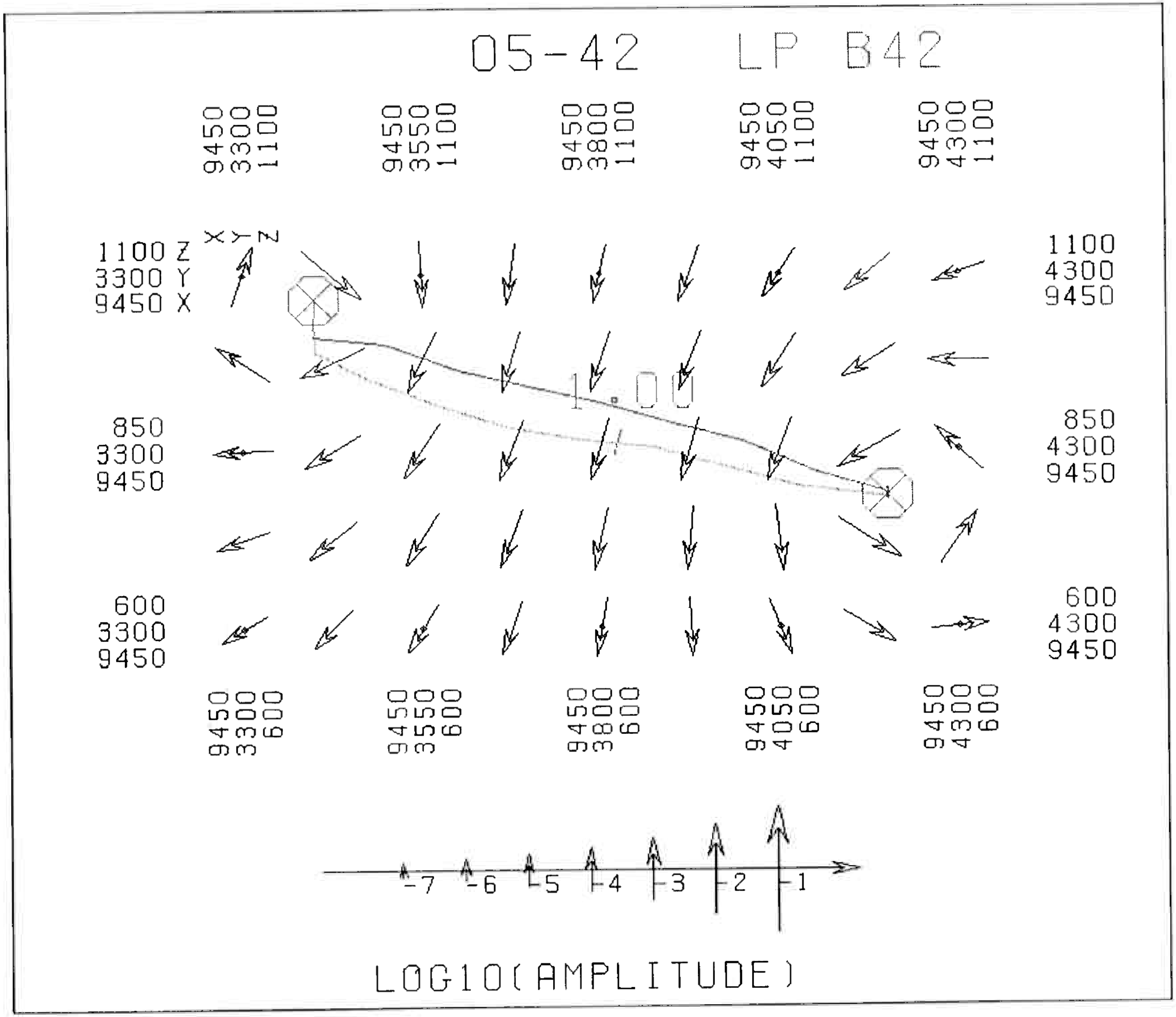
Loop: B42 Hole: ES-2005-44 Compt: Axial	Secondary, (Chn - Ch1)/IHpI Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 25/2/6 Reduced : 25/2/6 Plotted : 17/3/32

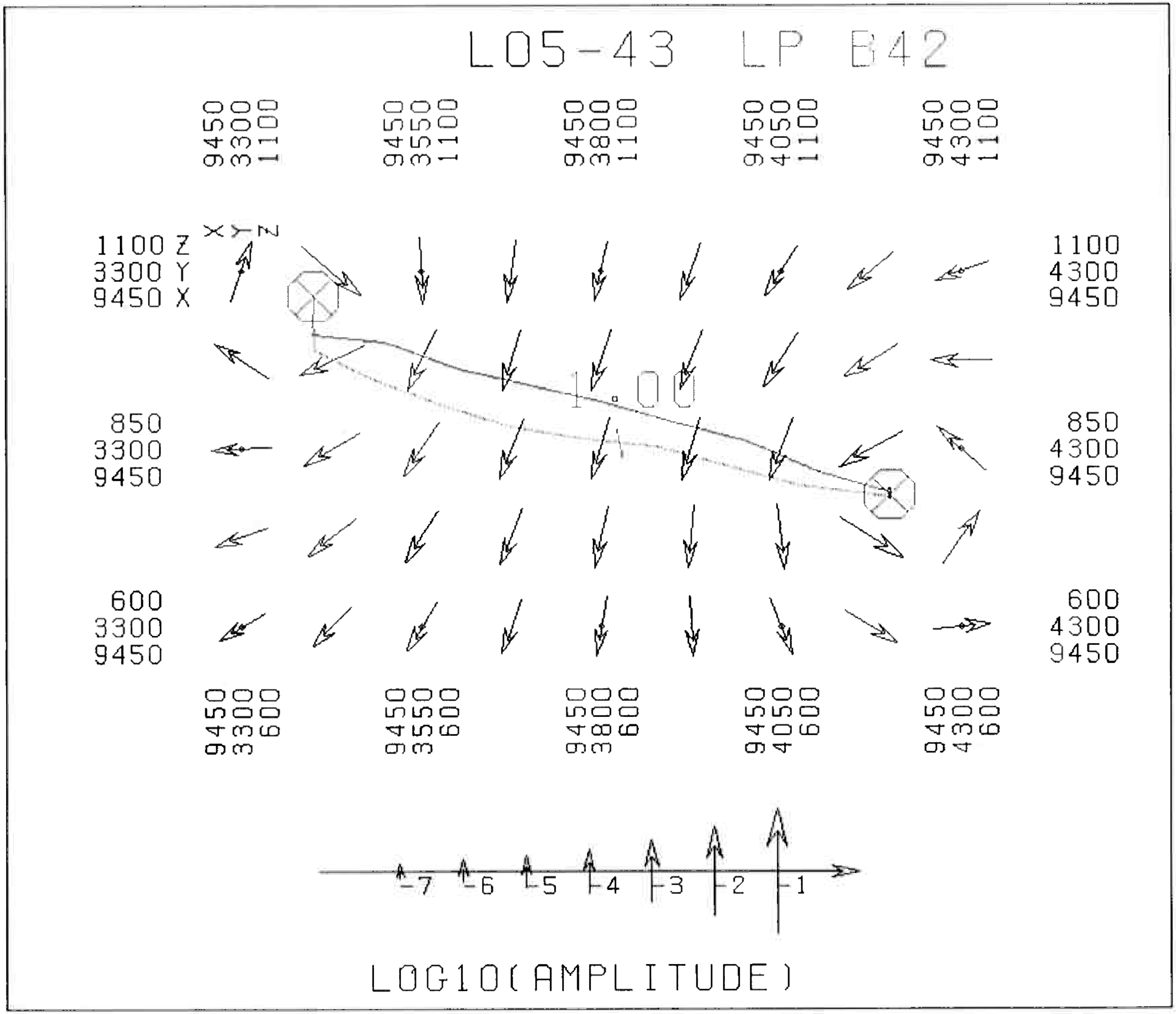


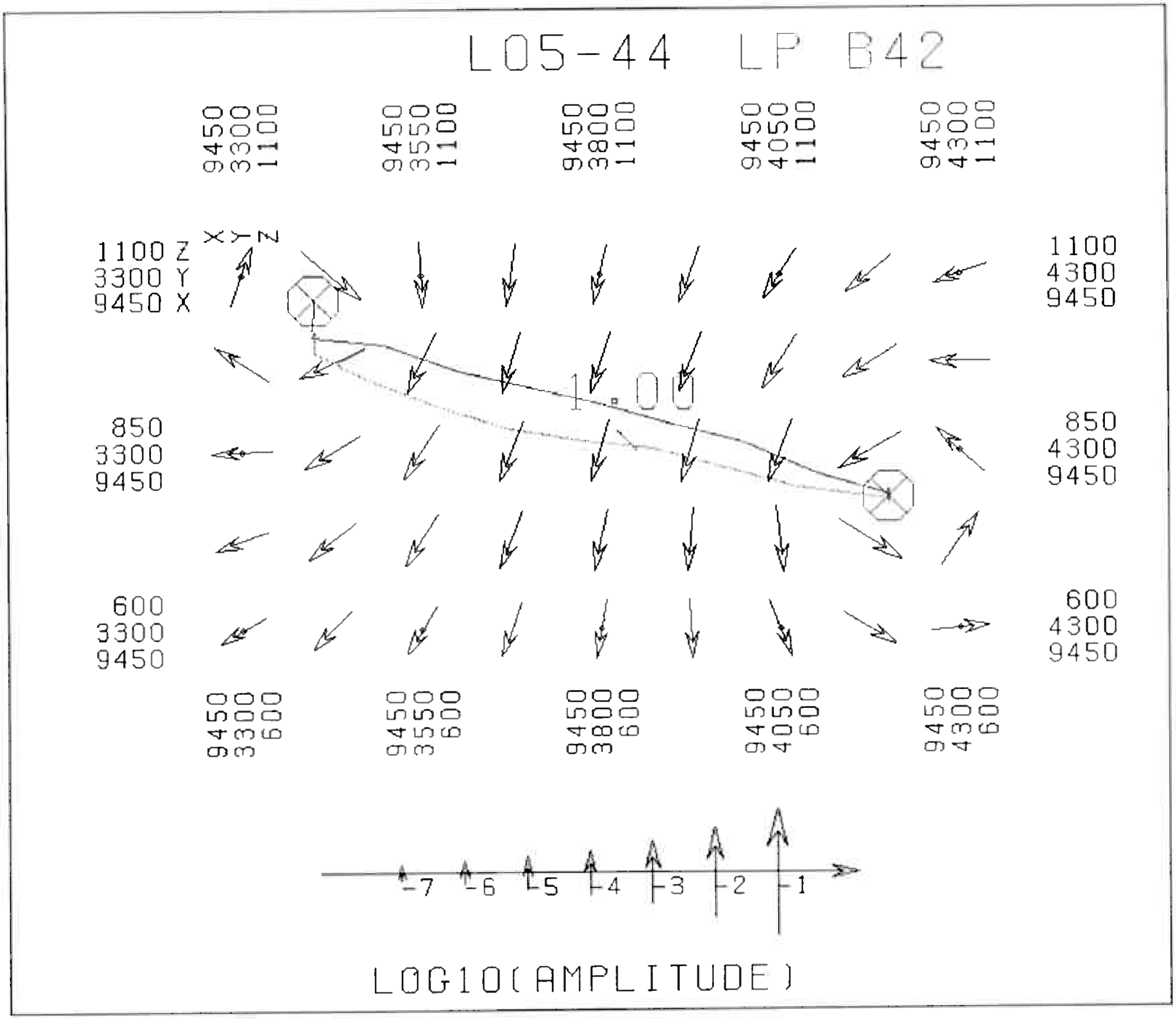
Loop: B42	Total, Chn/|Hp|	BHUTEM Survey at: Espedalen
Hole: ES-2005-44	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 25/2/6 Reduced : 25/2/6 Plotted : 17/3/32



05-43-44-42 LP B42
8900 4300 850
9150 4300 850
9400 4300 850
9650 4300 850
9900 4300 850
X Y Z
850 Z
4300 Y
8900 X
850 4300 9900
850 4050 8900
850 4050 9900
43
44
42
1.00
850 3800 8900
850 3800 9900
850 3550 8900
850 3550 9900
850 3300 8900
850 3300 9900
8900 3300 850
9150 3300 850
9400 3300 850
9650 3300 850
9900 3300 850
-7 -6 -5 -4 -3 -2 -1
LOG10(AMPLITUDE)


05-42 LP B42
9450 3300 1100
9450 3550 1100
9450 3800 1100
9450 4050 1100
9450 4300 1100
1100 Z
3300 Y
9450 X
X Y Z
1100
4300
9450
1.00
850
3300
9450
850
4300
9450
600
3300
9450
600
4300
9450
9450 3300 600
9450 3550 600
9450 3800 600
9450 4050 600
9450 4300 600
-7 -6 -5 -4 -3 -2 -1
LOG10(AMPLITUDE)


L05-43 LP B42
9450 3300 1100
9450 3550 1100
9450 3800 1100
9450 4050 1100
9450 4300 1100
X Y Z
1100 Z
3300 Y
9450 X
1100
4300
9450
1.00
850
3300
9450
850
4300
9450
600
3300
9450
600
4300
9450
9450 3300 600
9450 3550 600
9450 3800 600
9450 4050 600
9450 4300 600
-7
-6
-5
-4
-3
-2
-1
LOG10(AMPLITUDE)



L05-44 LP B42
9450 3300 1100
9450 3550 1100
9450 3800 1100
9450 4050 1100
9450 4300 1100
X Y Z
1100 Z
3300 Y
9450 X
1100
4300
9450
1.00
850
3300
9450
850
4300
9450
600
3300
9450
600
4300
9450
9450 3300 600
9450 3550 600
9450 3800 600
9450 4050 600
9450 4300 600
-7 -6 -5 -4 -3 -2 -1
LOG10(AMPLITUDE)

Stormyra extension

Loops 33/32 - BH UTEM-3

@3.251 Hz frequency

Ch1 reduced

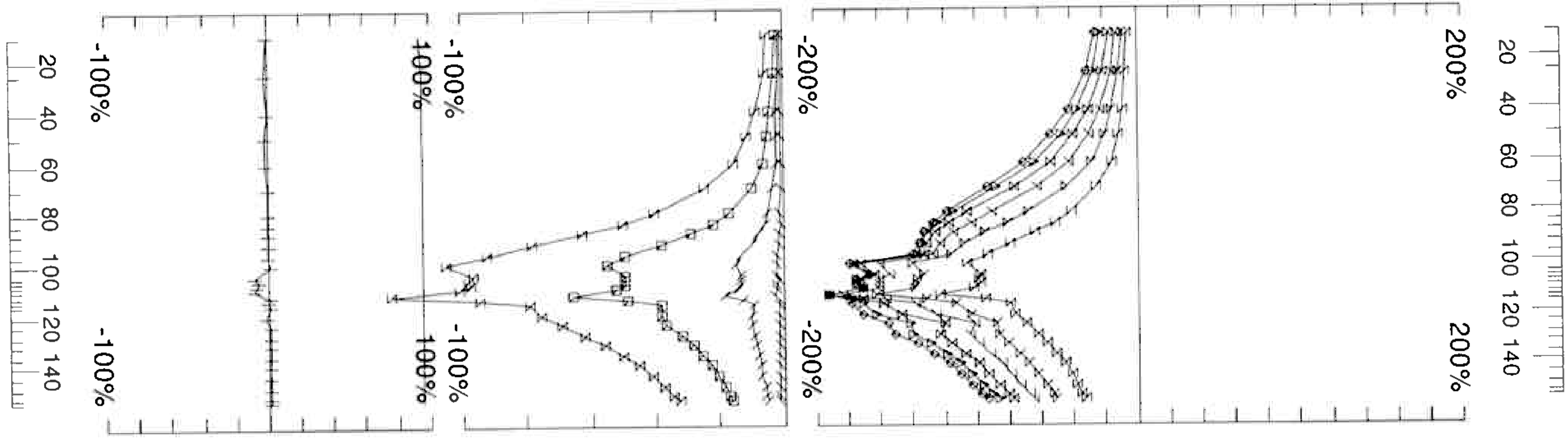
Stormyra ext	ES2005-45	154m	156m	Loop	33	3.251Hz
	ES2005-46	270m	271m	Loop	33	3.251Hz
	ES2005-47	330m	331.5m	Loop	32	3.251Hz
	ES2005-48	323m	325.5m	Loop	32	3.251Hz

ES2005-45
ES2005-46
then
ES2005-47
ES2005-48

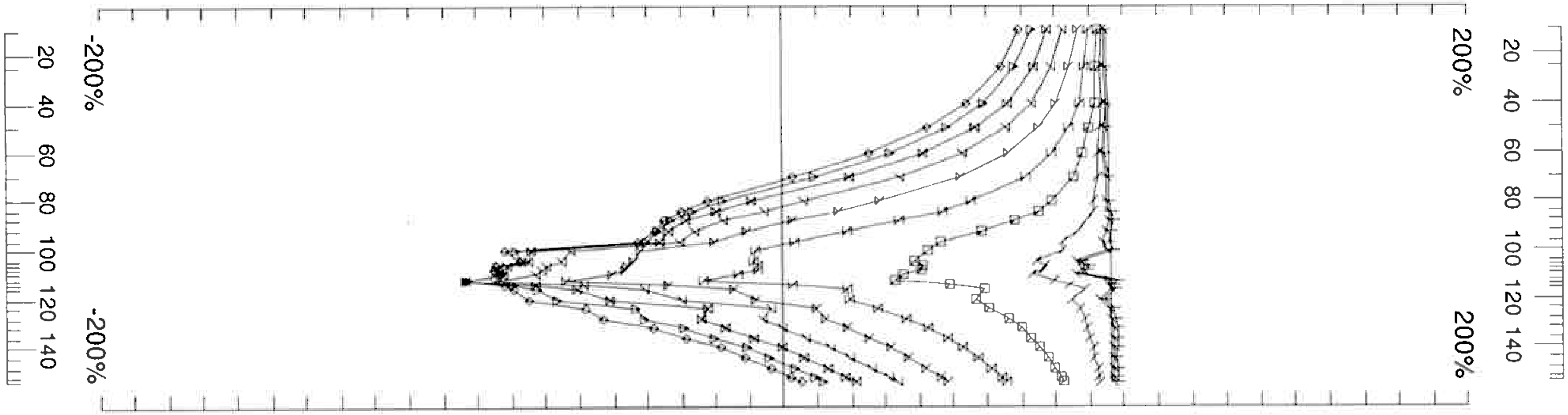
3-axis plot
total field plot

plan vectorplot
gridnorth-south section vectorplot
ES2005-47
ES2005-48

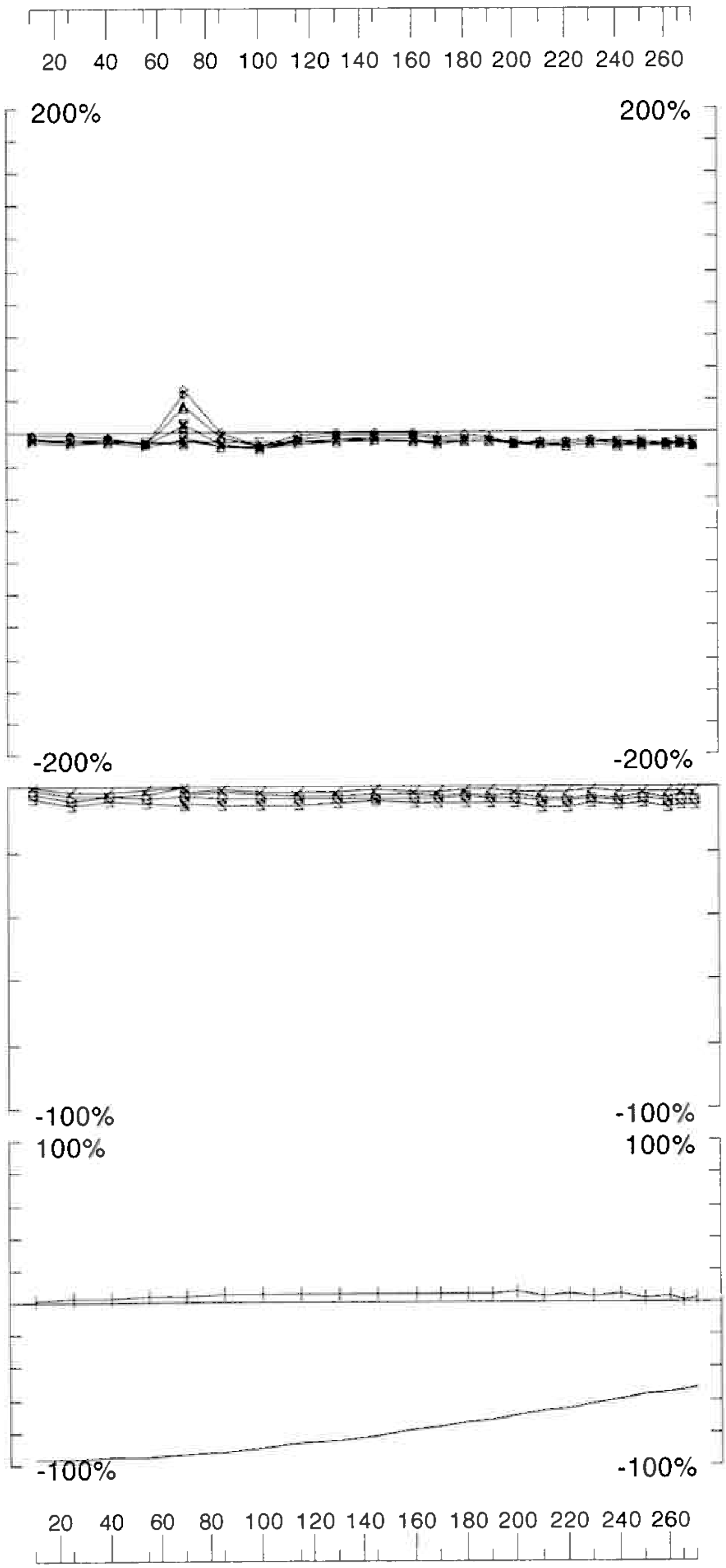
ES2005-45/46/47/48



Loop: 33 Hole: ES-2005-45 Compt: Axial	Secondary, (Chn - Ch1)/lHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 23/2/6 Reduced : 23/2/6 Plotted : 17/3/32



Loop: 33	Total, Chn/IHpl	BHUTEM Survey at: Espedalen
Hole: ES-2005-45	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 23/2/6 Reduced : 23/2/6 Plotted : 17/3/32



BHUTEM Survey at: Espedalen
For: A/S Sulfidmalm

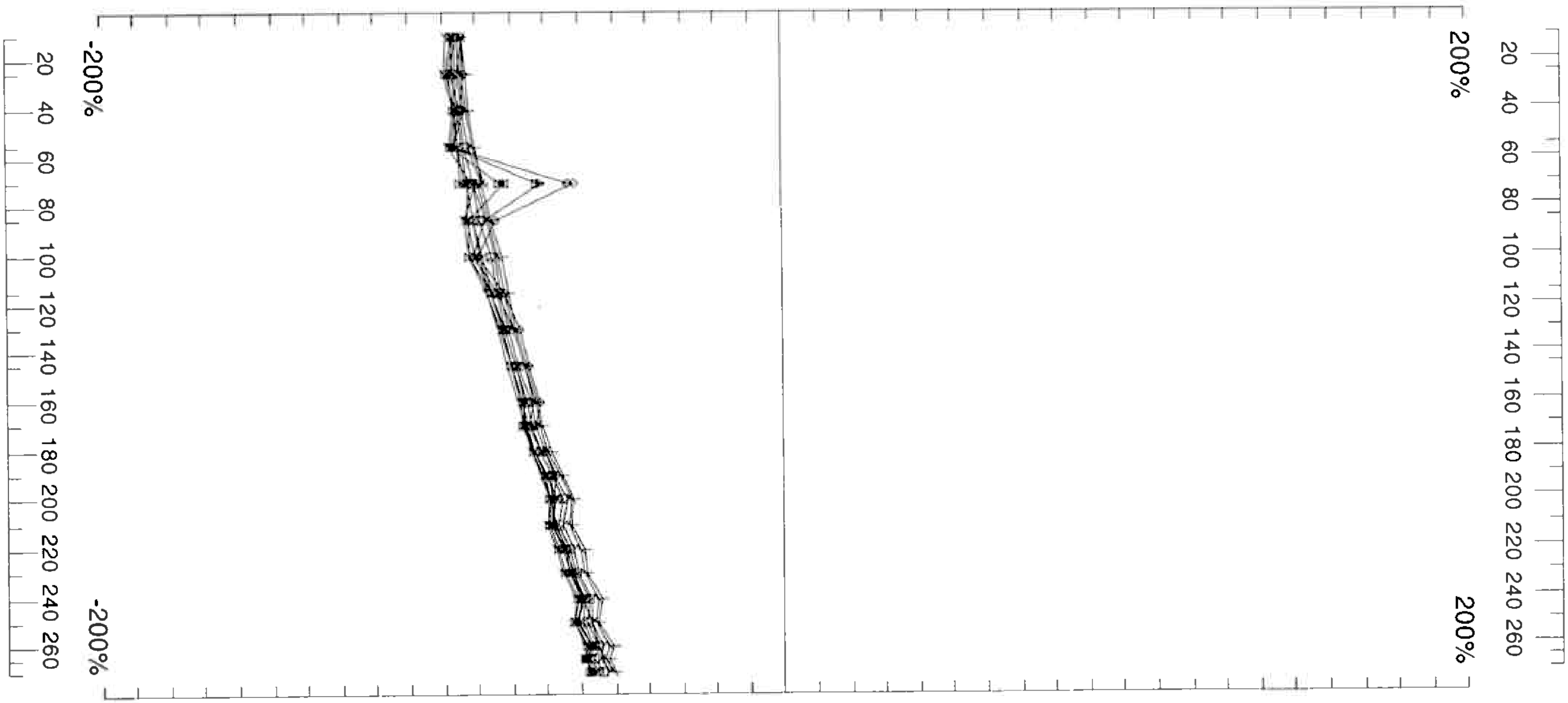
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

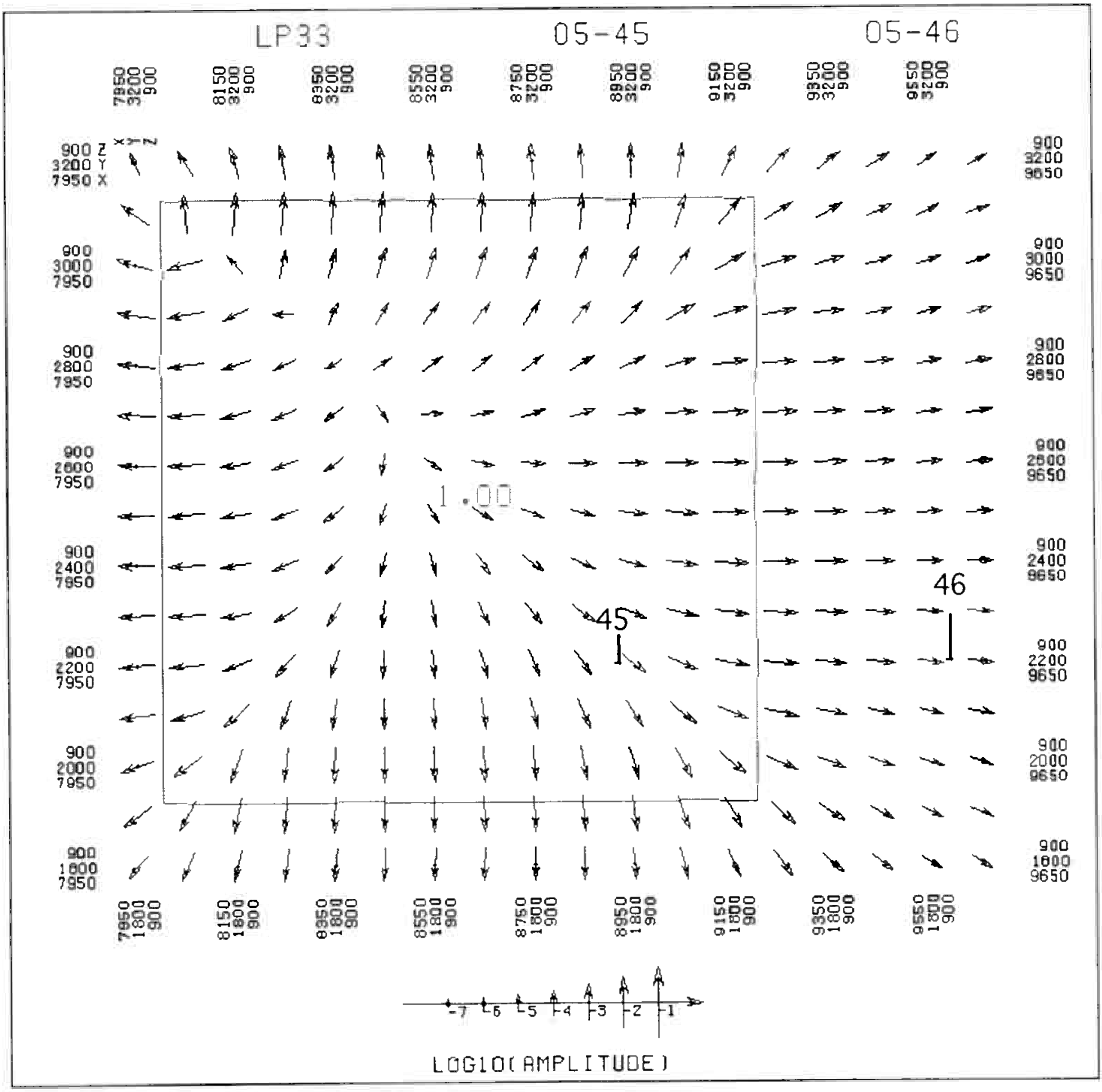
Surveyed : 23/2/6
Reduced : 23/2/6
Plotted : 17/3/32

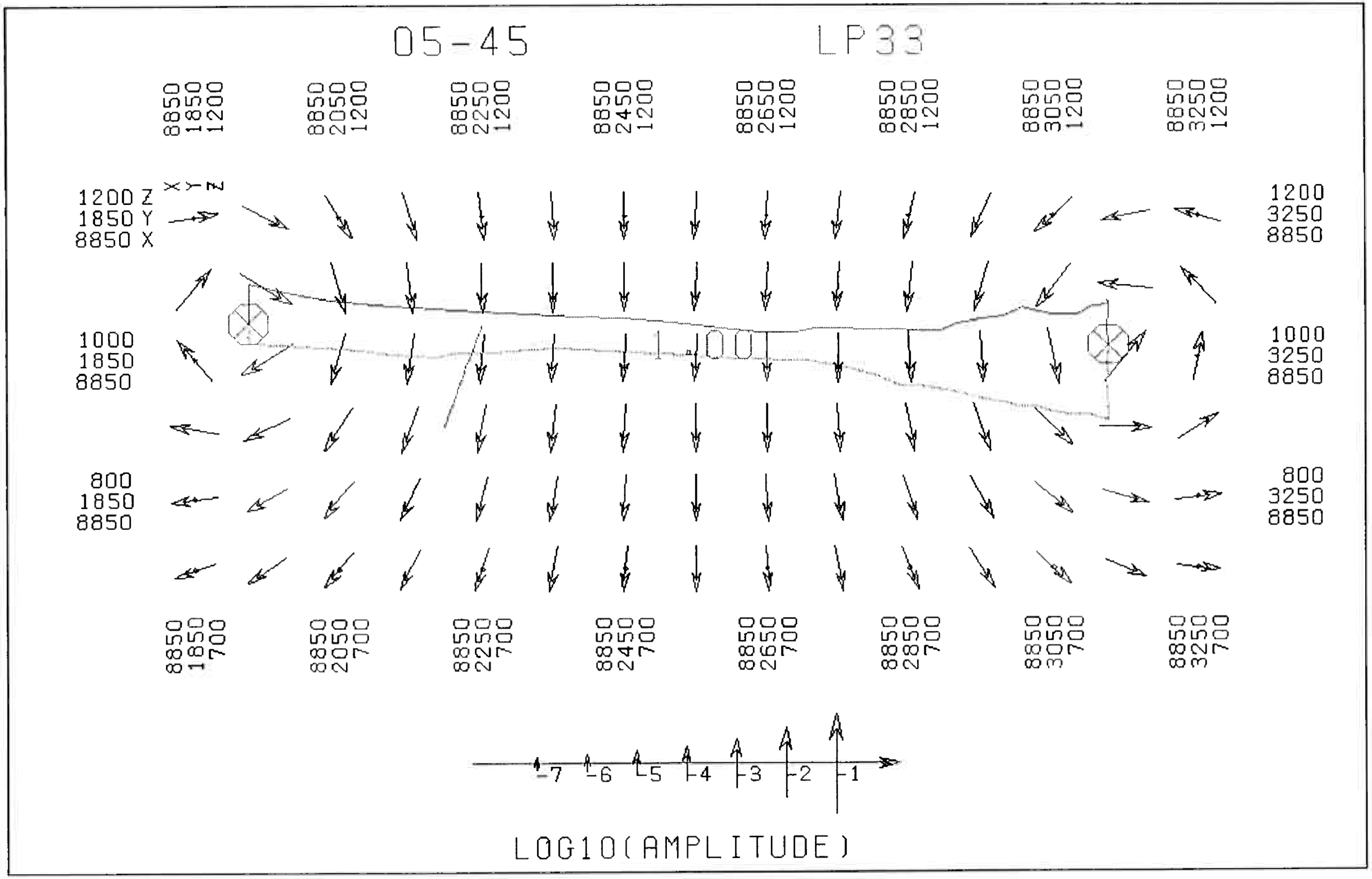
Loop: 33
Hole: ES-2005-46
Compt: Axial

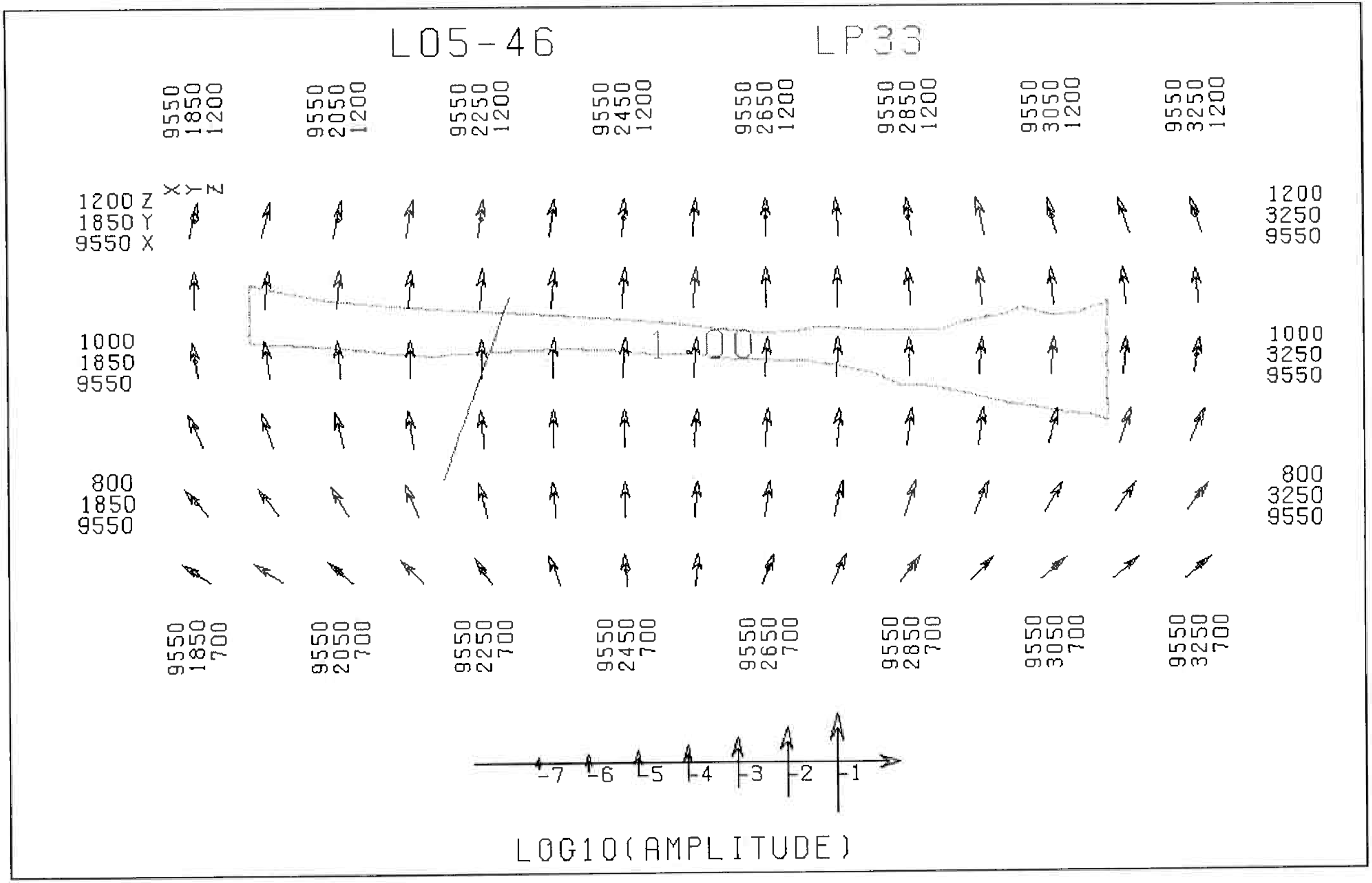
Secondary, (Chn - Ch1)/IHpI
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



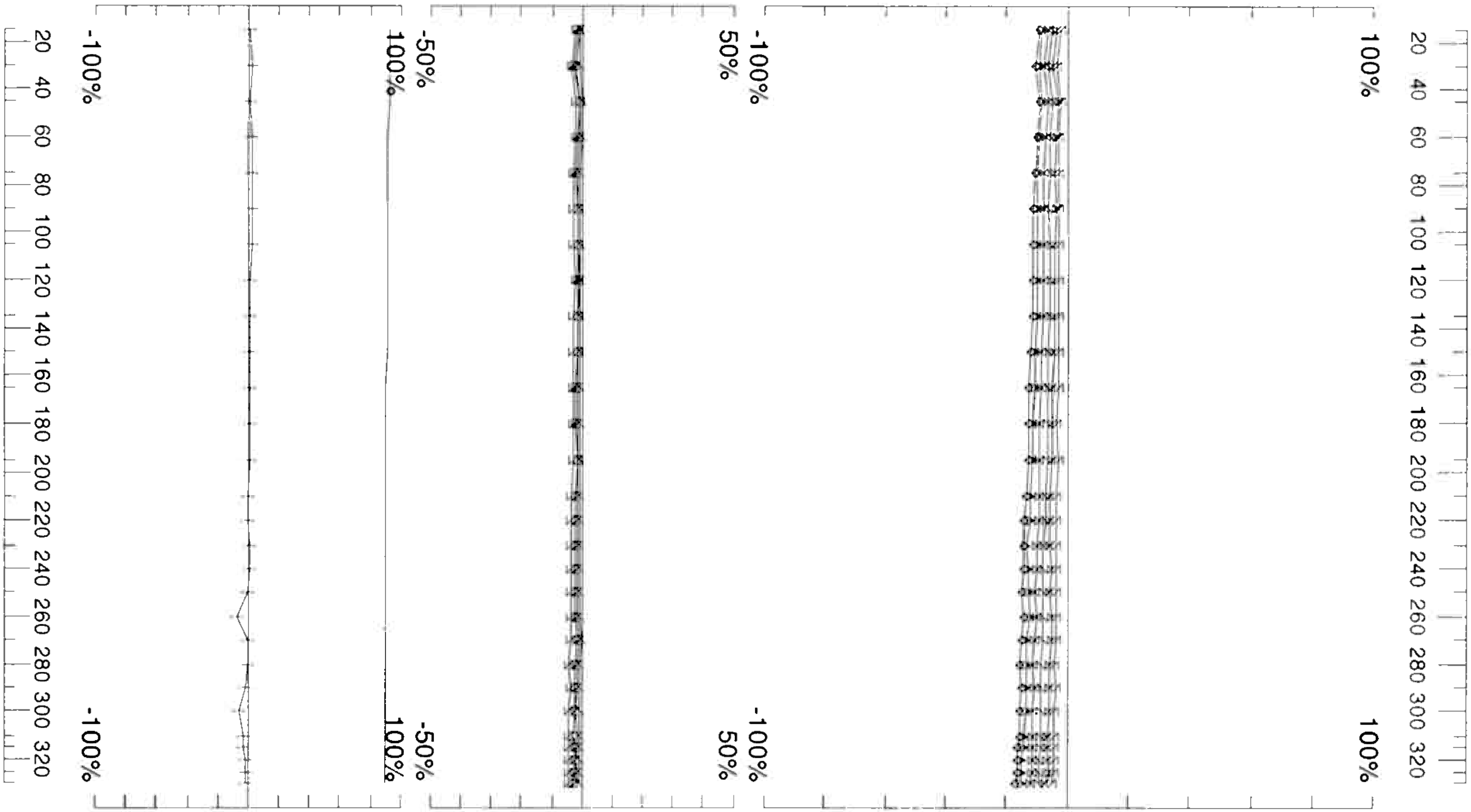
Loop: 33 Hole: ES-2005-46 Compt: Axial	Total, Chn/IHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 23/2/6 Reduced : 23/2/6 Plotted : 17/3/32


LP33
05-45
05-46
1.00
45
46
LOG10(AMPLITUDE)

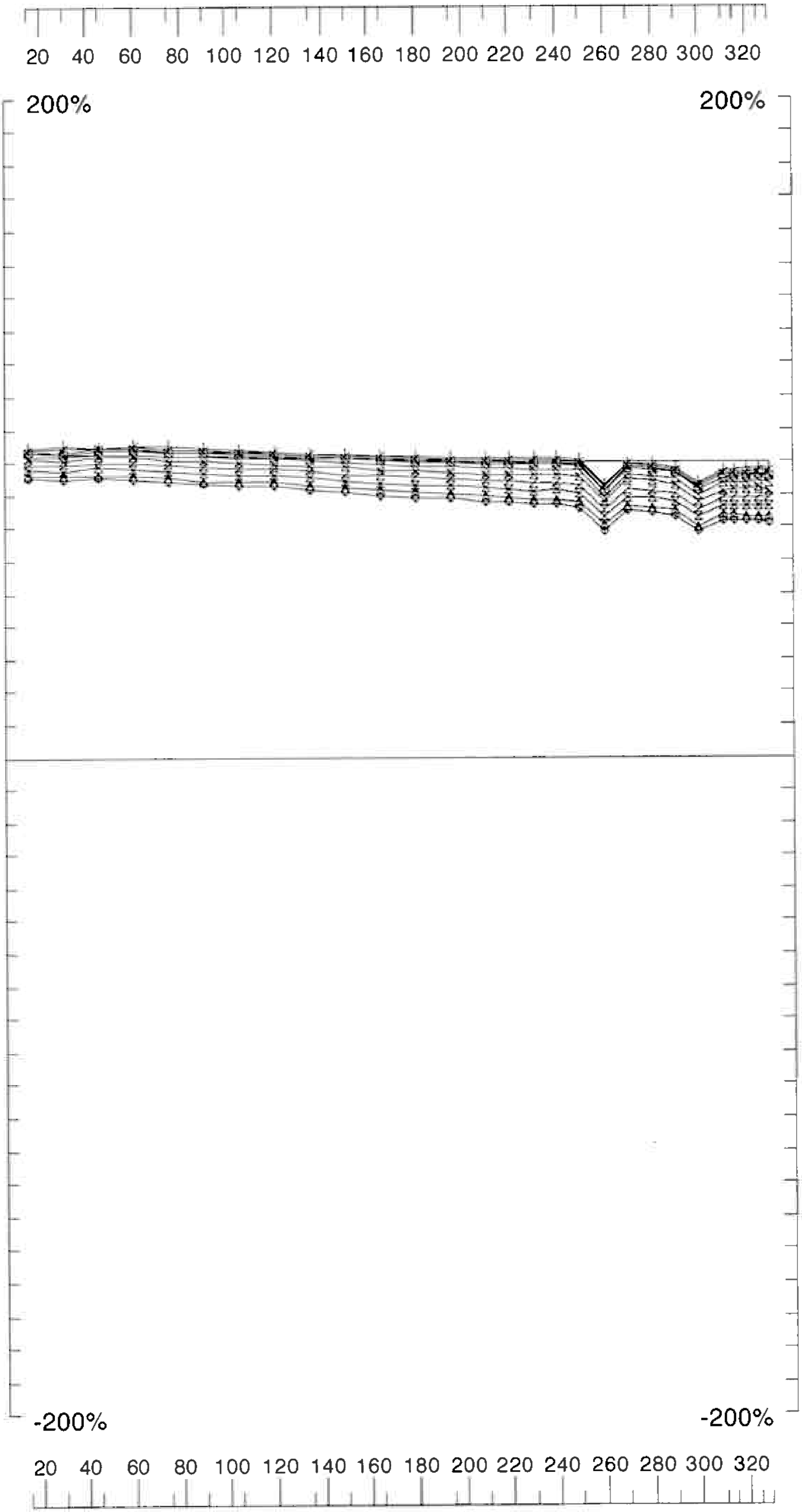

05-45
LP33
8850 1850 1200
8850 2050 1200
8850 2250 1200
8850 2450 1200
8850 2650 1200
8850 2850 1200
8850 3050 1200
8850 3250 1200
X Y Z
1200 Z
1850 Y
8850 X
1200
3250
8850
1000
1850
8850
1.00
1000
3250
8850
800
1850
8850
800
3250
8850
8850 1850 700
8850 2050 700
8850 2250 700
8850 2450 700
8850 2650 700
8850 2850 700
8850 3050 700
8850 3250 700
-7
-6
-5
-4
-3
-2
-1
LOG10(AMPLITUDE)



L05-46
LP33
9550 1850 1200
9550 2050 1200
9550 2250 1200
9550 2450 1200
9550 2650 1200
9550 2850 1200
9550 3050 1200
9550 3250 1200
X Y Z
1200 Z
1850 Y
9550 X
1200
3250
9550
1000
1850
9550
1000
3250
9550
800
1850
9550
800
3250
9550
9550 1850 700
9550 2050 700
9550 2250 700
9550 2450 700
9550 2650 700
9550 2850 700
9550 3050 700
9550 3250 700
1400
-7
-6
-5
-4
-3
-2
-1
LOG10(AMPLITUDE)



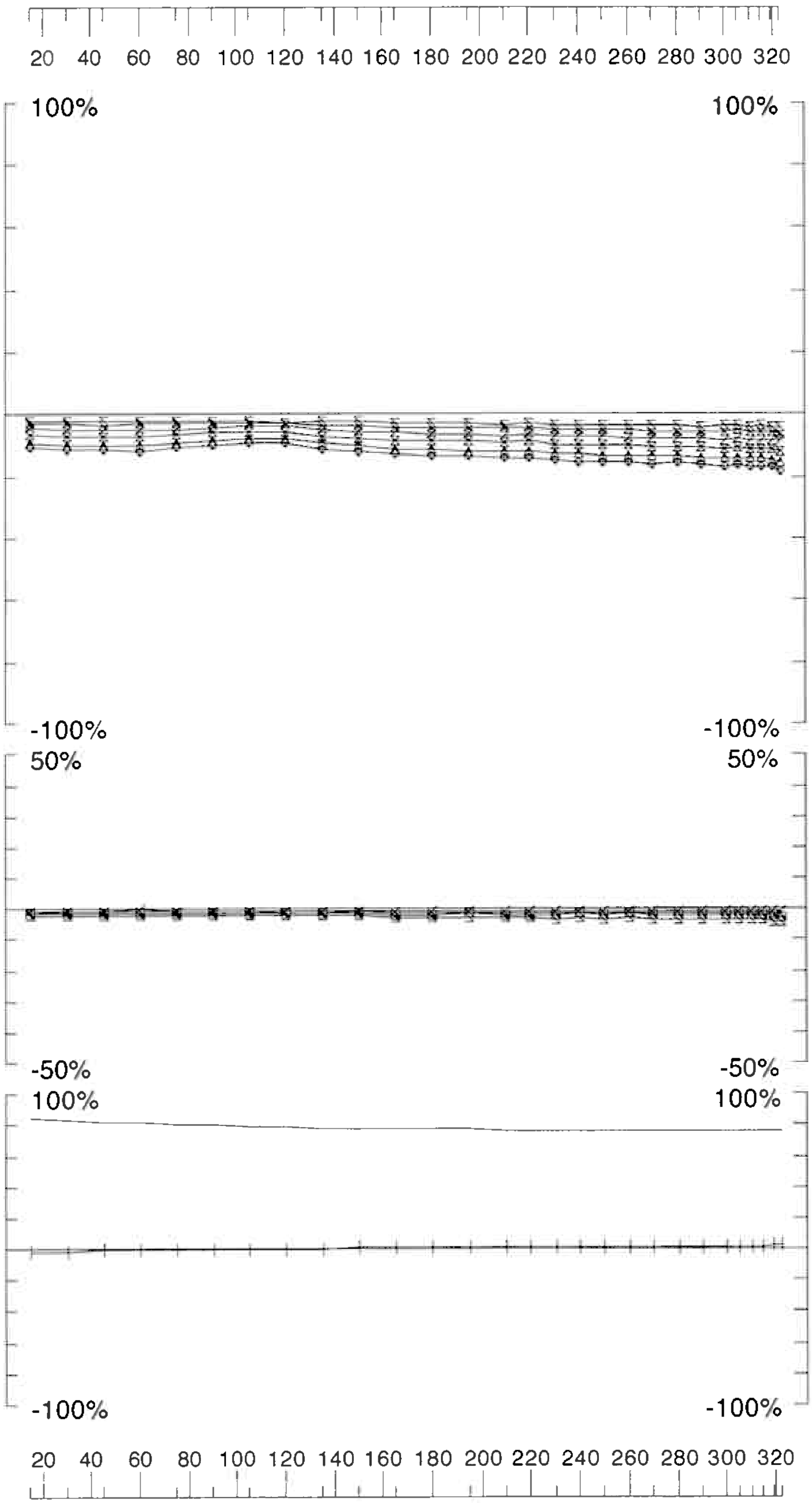
Loop: 32	Secondary, (Chn - Ch1)/IHpl	BHUTEM Survey at: Espedalen
Hole: ES-2005-47	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 20/2/6 Reduced : 20/2/6 Plotted : 17/3/32



BHUTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Job 0611
Surveyed : 20/2/6
Reduced : 20/2/6
Plotted : 17/3/32

Loop: 32
Hole: ES-2005-47
Compt: Axial

Total, Chn/lHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



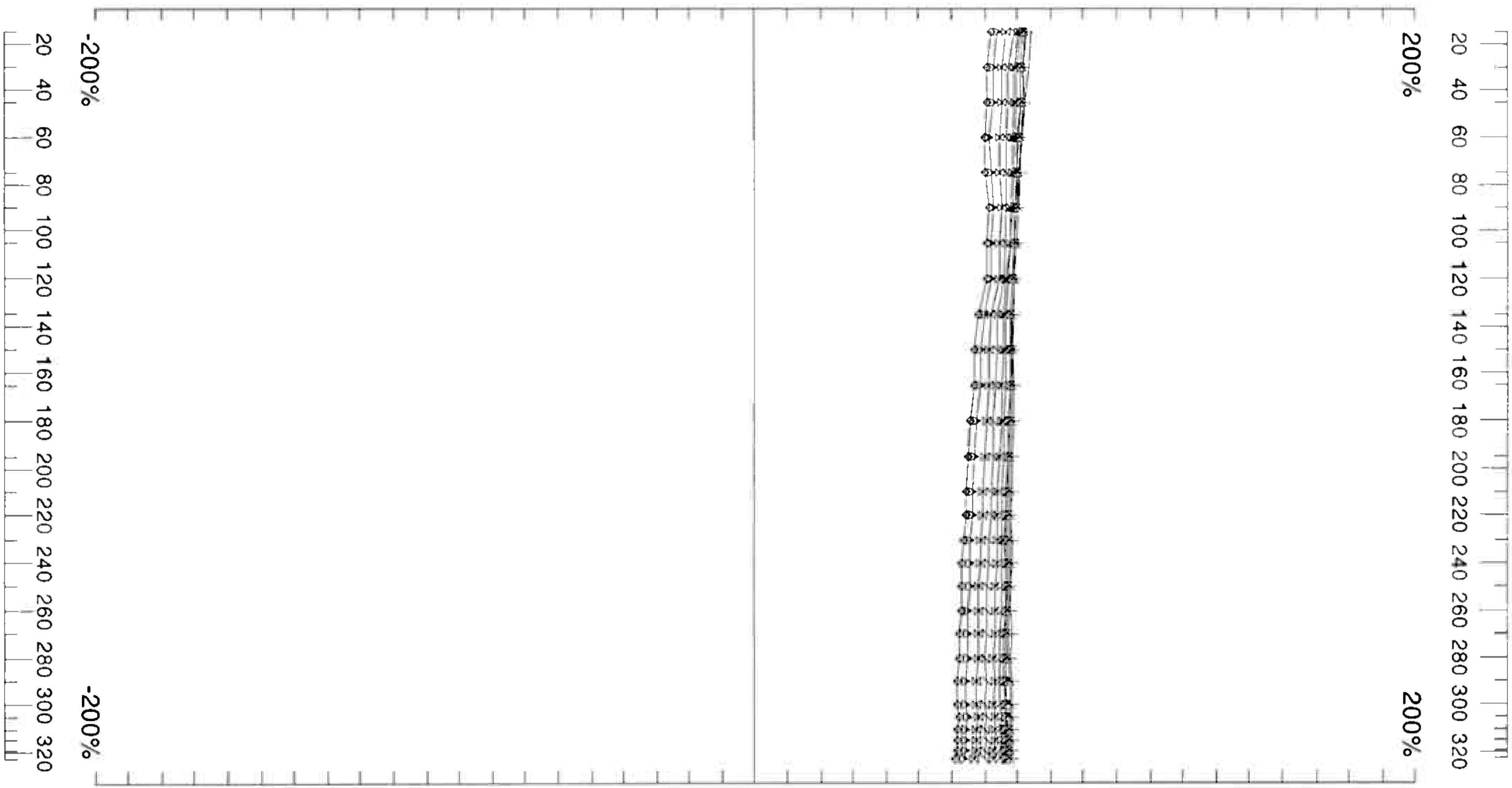
BHUTEM Survey at: Espedalen
For: A/S Sulfidmalm
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

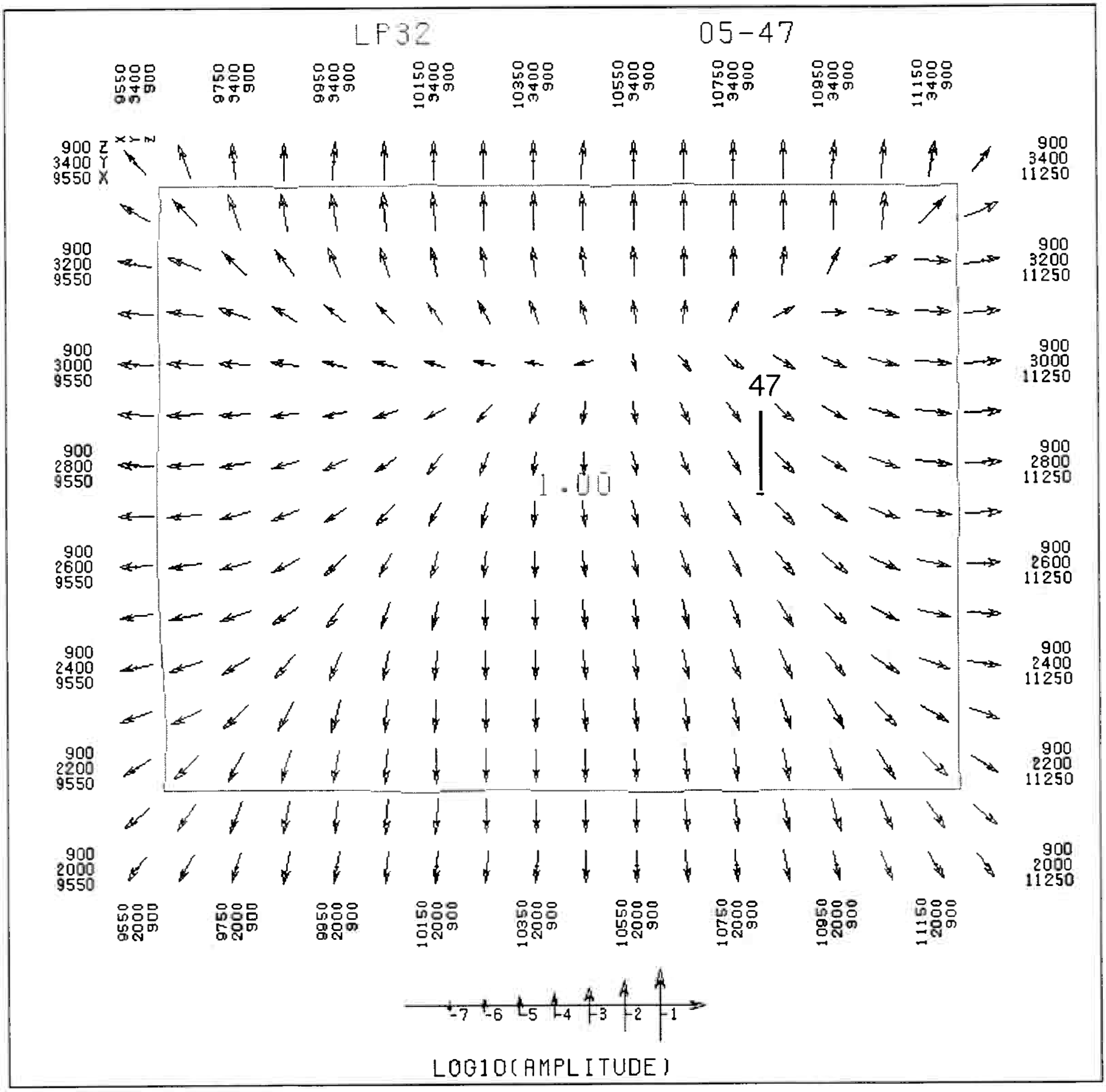
Surveyed : 21/2/6
Reduced : 21/2/6
Plotted : 17/3/32

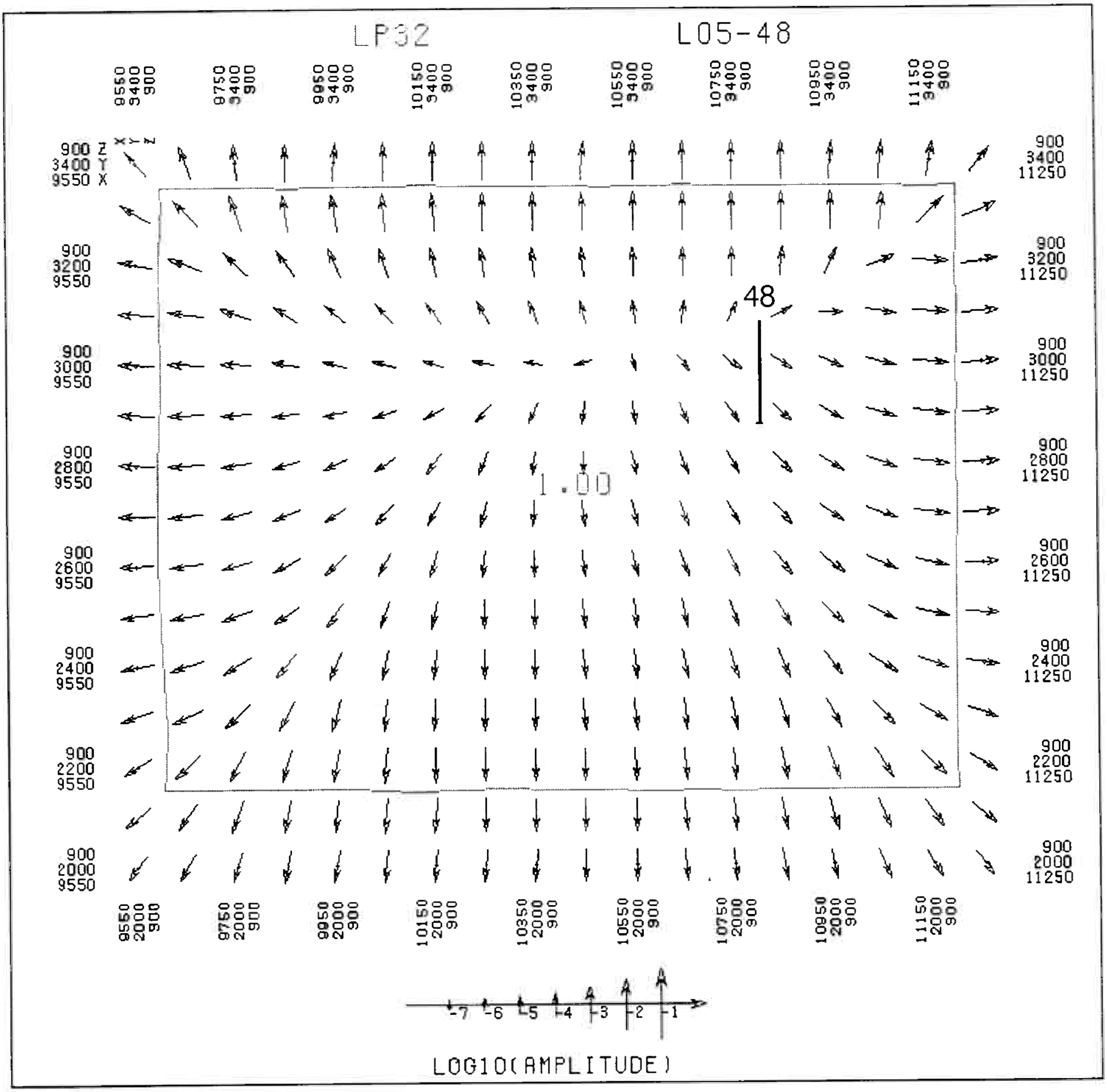
Loop: 32
Hole: ES-2005-48
Compt: Axial

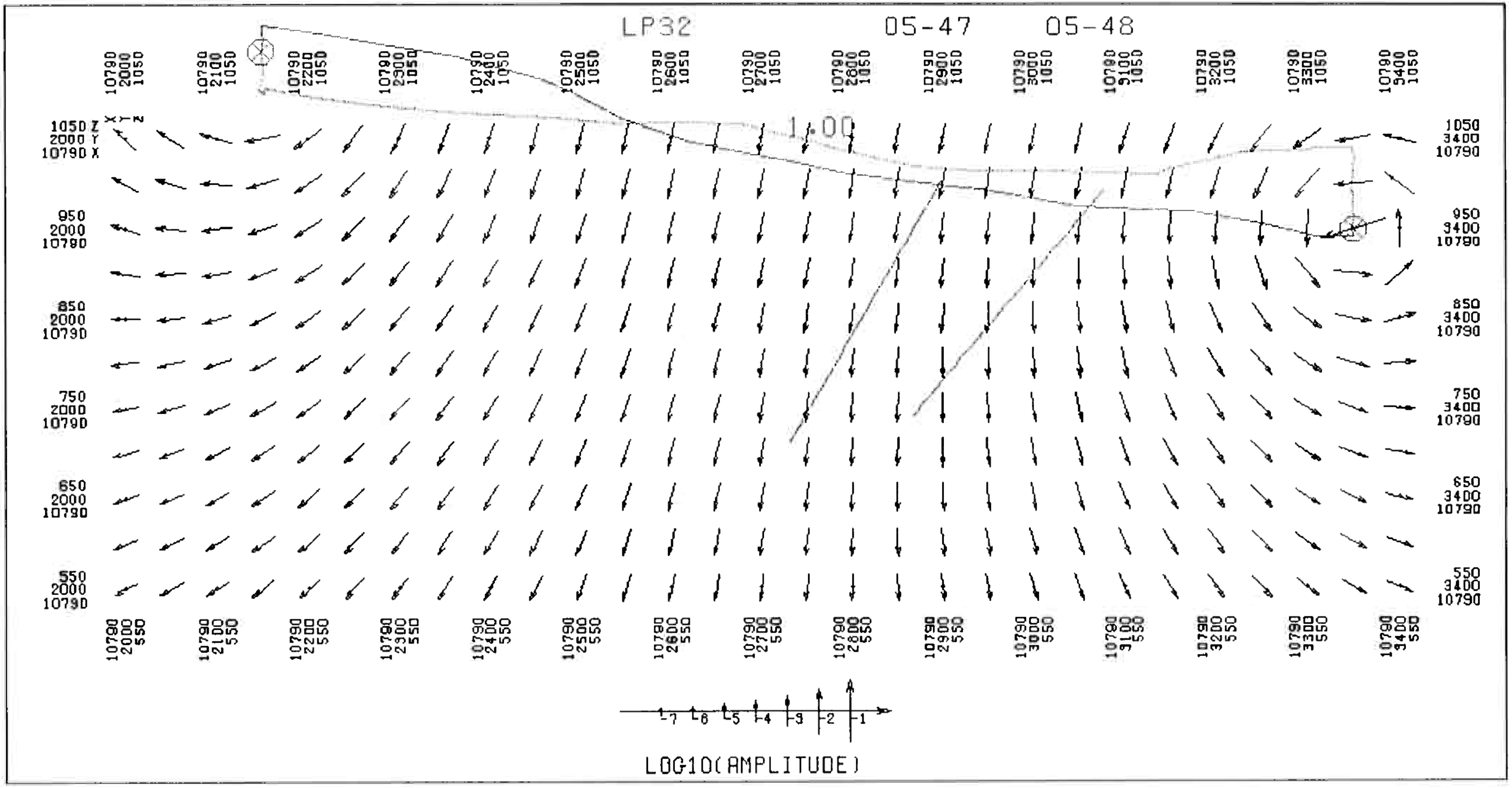
Secondary, (Chn - Ch1)/lHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz



Loop: 32 Hole: ES-2005-48 Compt: Axial	Total, Chn/lHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 21/2/6 Reduced : 21/2/6 Plotted : 17/3/32


LP32
05-47
47
1.00
X Y Z
LOG10(AMPLITUDE)
-7 -6 -5 -4 -3 -2 -1


LP32
L05-48
9550 3400 900
9750 3400 900
9950 3400 900
10150 3400 900
10350 3400 900
10550 3400 900
10750 3400 900
10950 3400 900
11150 3400 900
900 Z
3400 Y
9550 X
X Y Z
900 3400 11250
900 3200 9550
900 3200 11250
48
900 3000 9550
900 3000 11250
900 2800 9550
1.00
900 2800 11250
900 2600 9550
900 2600 11250
900 2400 9550
900 2400 11250
900 2200 9550
900 2200 11250
900 2000 9550
900 2000 11250
9550 2000 900
9750 2000 900
9950 2000 900
10150 2000 900
10350 2000 900
10550 2000 900
10750 2000 900
10950 2000 900
11150 2000 900
-7 -6 -5 -4 -3 -2 -1
LOG10(AMPLITUDE)



LP32
05-47
05-48
1.00
LOG10(AMPLITUDE)

Stormyra

Loop 20b - BH UTEM-3

@3.251 Hz frequency

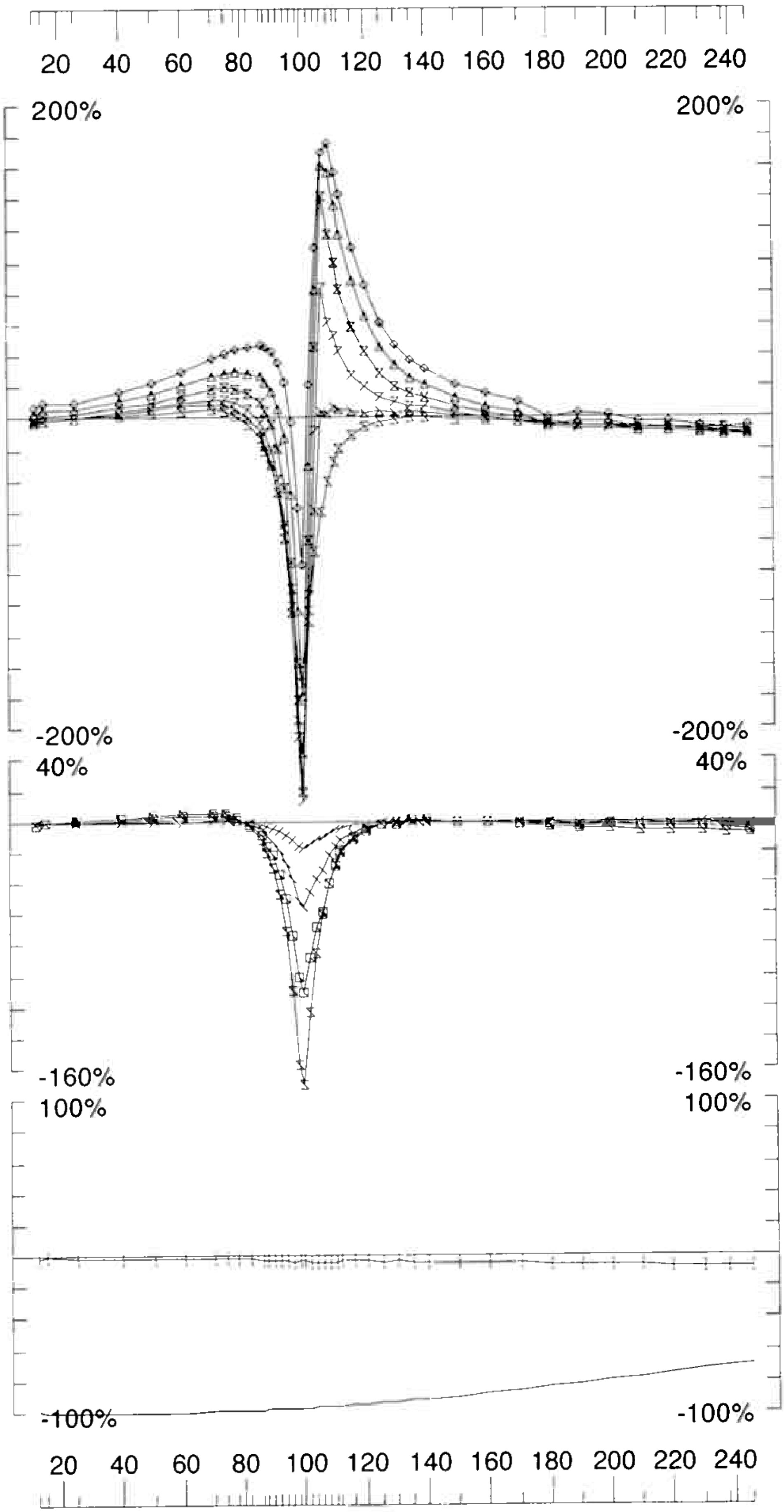
Ch1 reduced

Stormyra	ES2006-51	246m	247.5m	Loop 20b	3.251Hz
	ES2006-52	266m	268m	Loop 20b	3.251Hz
	ES2006-53	268m	269m	Loop 20b	3.251Hz
	ES2006-54	245m	246m	Loop 20b	3.251Hz
	ES2006-55	214m	214m	Loop 20b	3.251Hz

ES2006-51
ES2006-52
ES2006-53
ES2006-54
ES2006-55

3-axis plot
total field plot
plan vectorplot
gridnorth-south section vectorplot

ES2006-51/52/53/54/55



BHUTEM Survey at: Espedalen
For: A/S Sulfidmalm

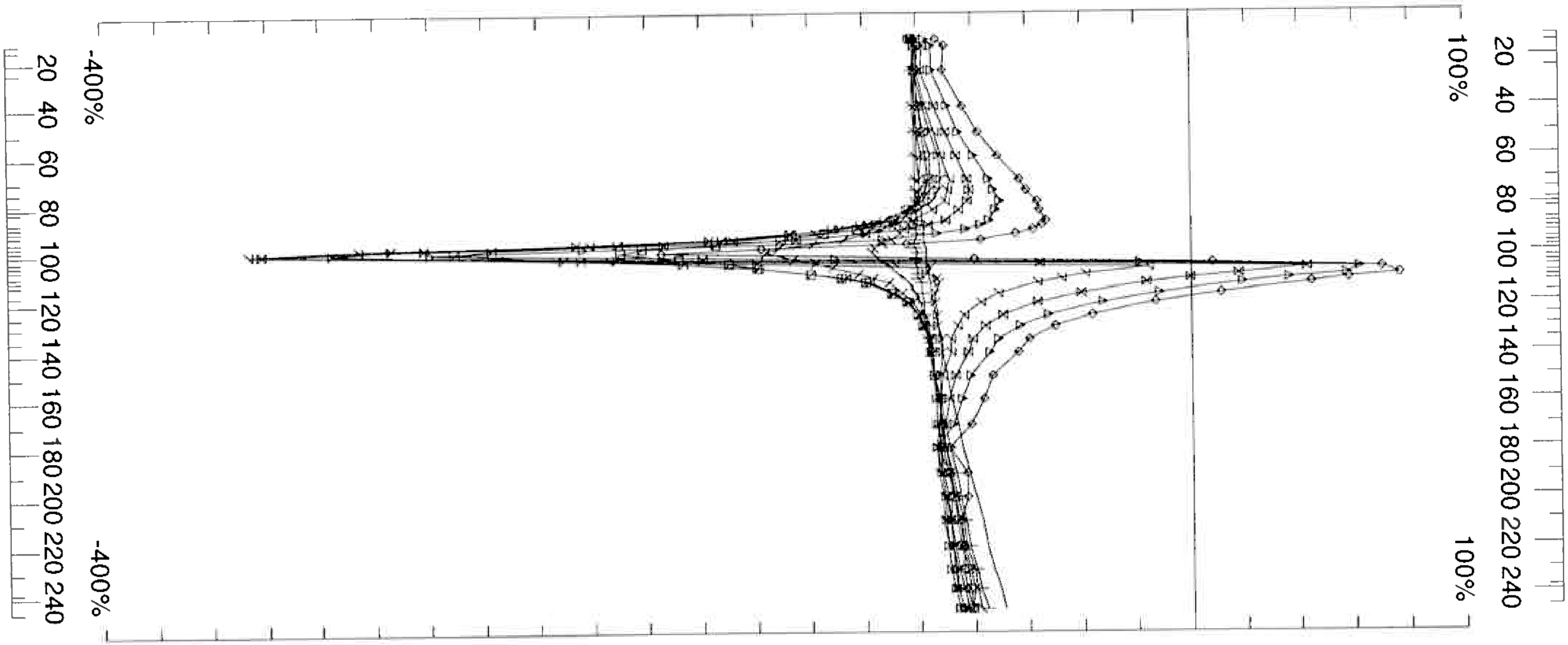
LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

Job 0611

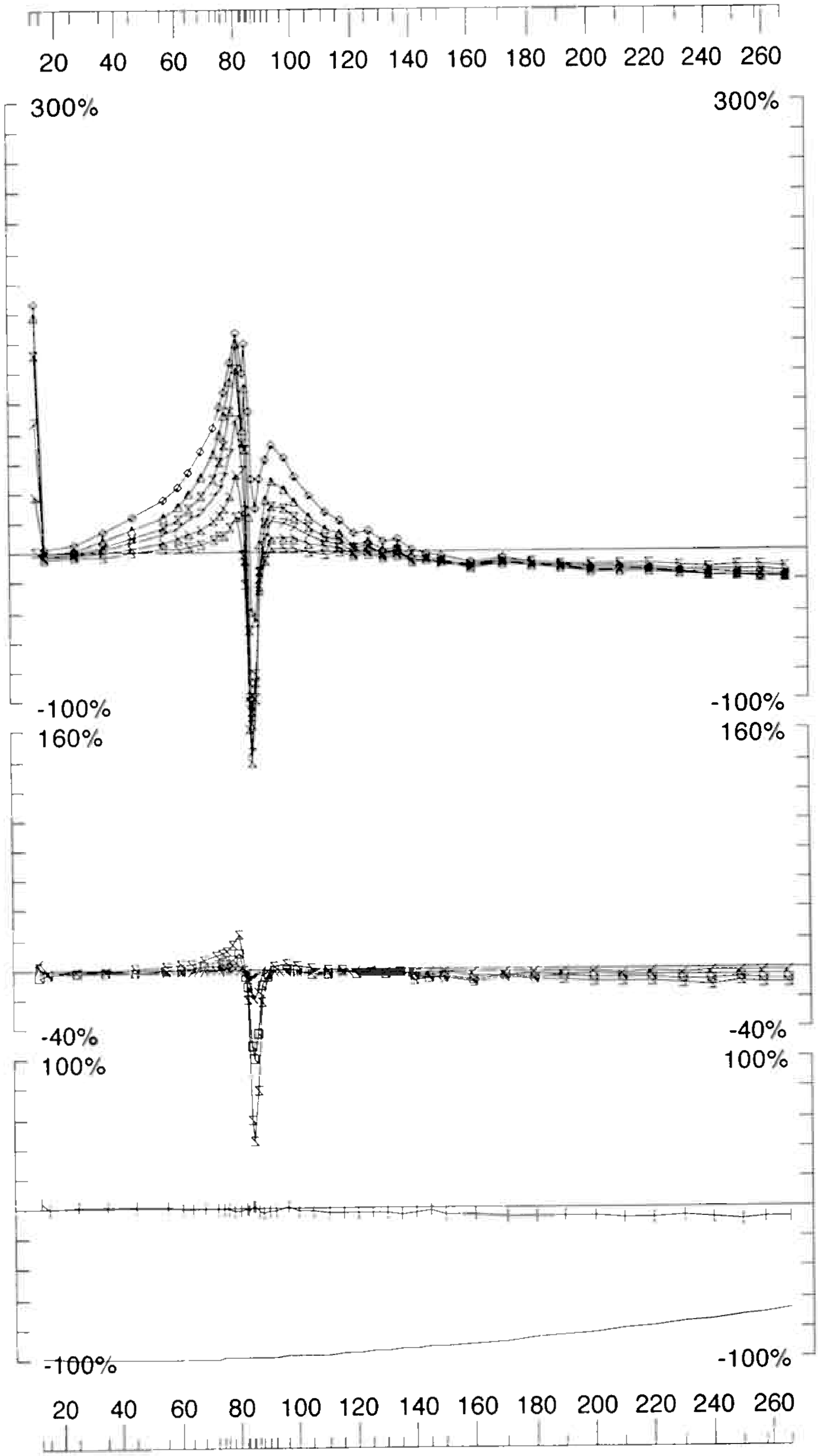
Surveyed : 14/3/6
Reduced : 13/4/6
Plotted : 17/3/32

Secondary, (Chn - Ch1)/IHpl
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Loop: 20b
Hole: ES-2006-51
Compt: Axial



Loop: 20b Hole: ES-2006-51 Compt: Axial	Total, Chn/lHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 14/3/6 Reduced : 13/4/6 Plotted : 17/3/32



BHUTEM Survey at: Espedalen
For: A/S Sulfidmalm

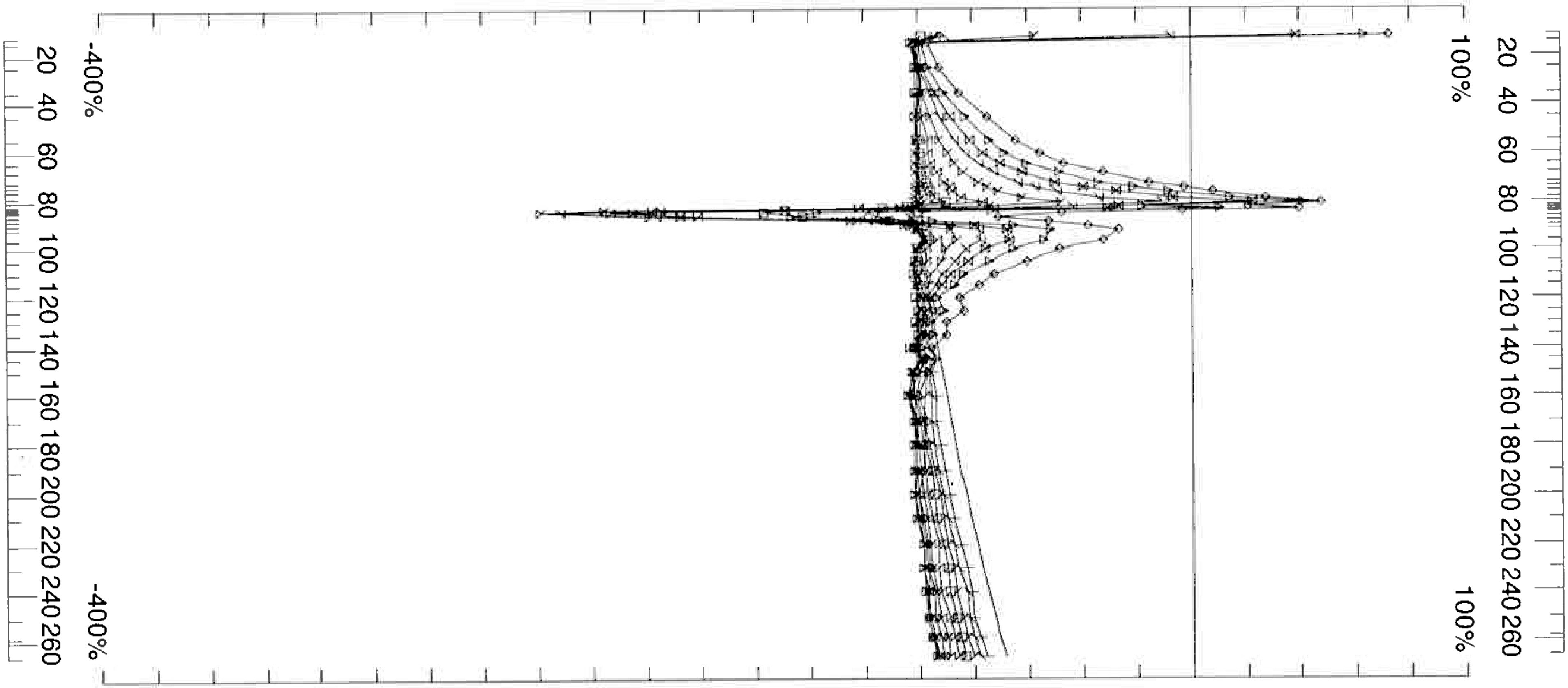
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

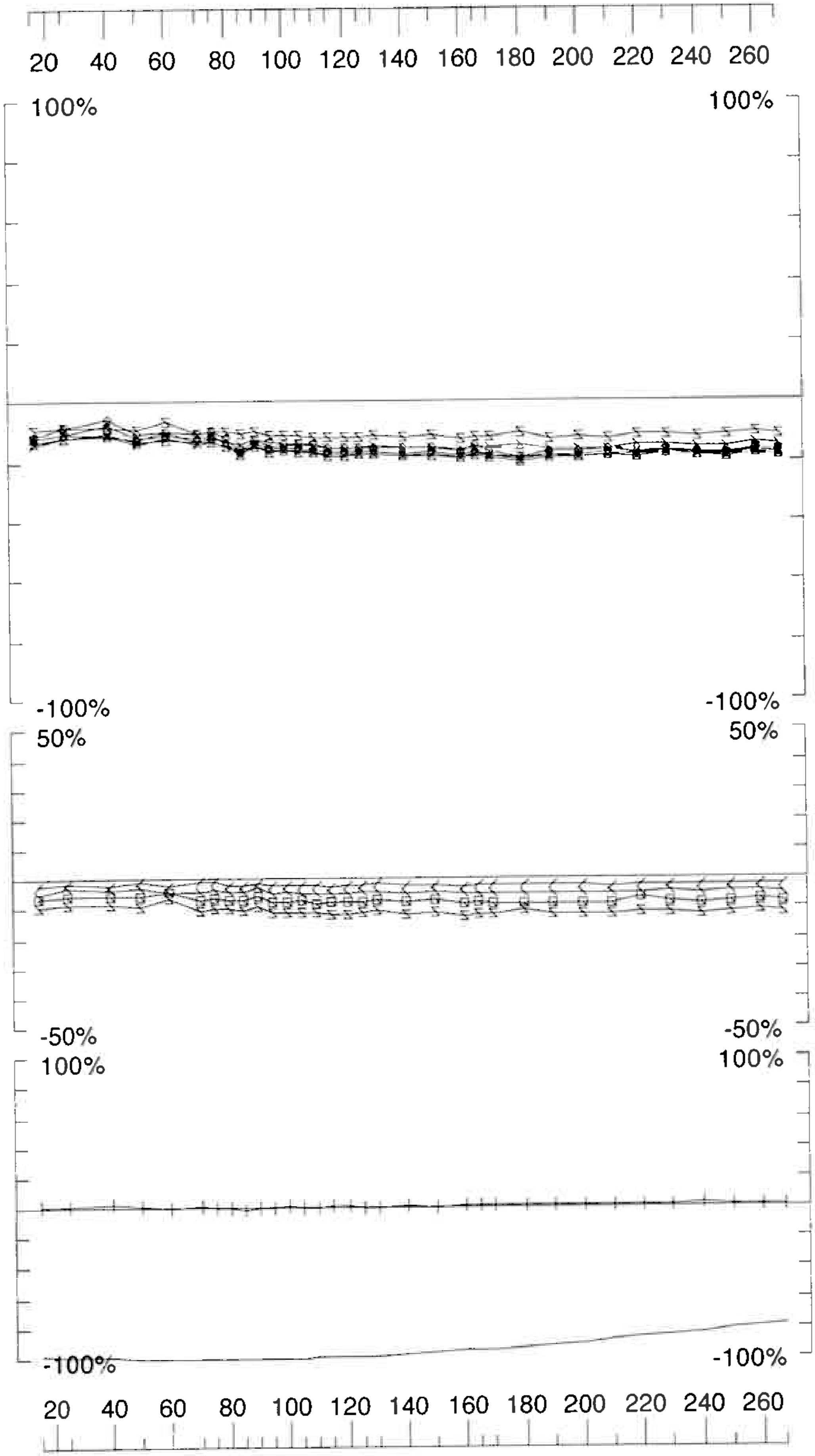
Surveyed : 15/3/6
Reduced : 13/4/6
Plotted : 17/3/32

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

Loop: 20b
Hole: ES-2006-52
Compt: Axial



Loop: 20b	Total, Chn/IHpl	BHUTEM Survey at: Espedalen
Hole: ES-2006-52	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE · Job 0611 · Surveyed : 15/3/6 Reduced : 13/4/6 Plotted : 17/3/32



BHUTEM Survey at: Espedalen
For: A/S Sulfidmalm

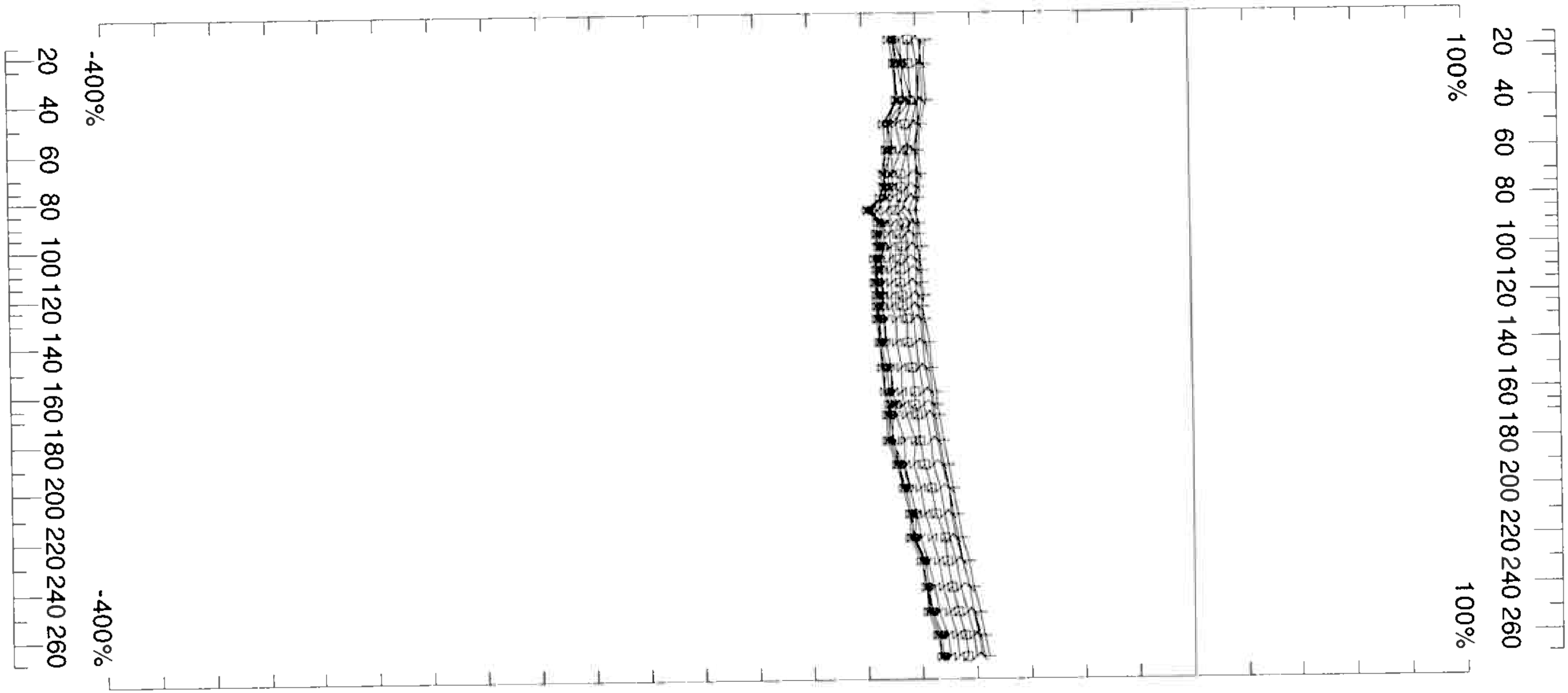
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 0611

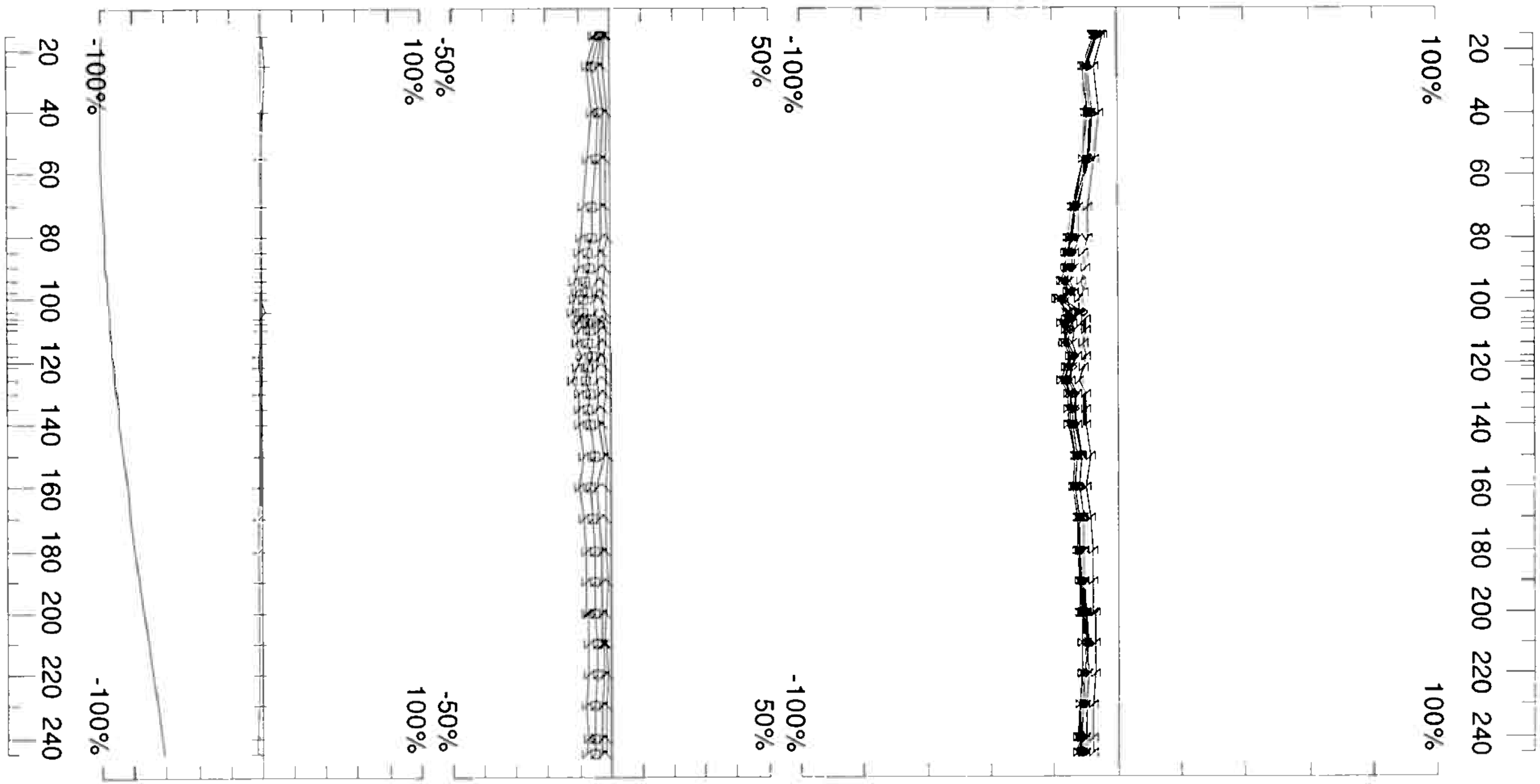
Surveyed : 21/3/6
Reduced : 13/4/6
Plotted : 17/3/32

Secondary, (Chn - Ch1)/|Hp|
Contin. Norm at depth of 0 m
Base Freq. 3.251 Hz

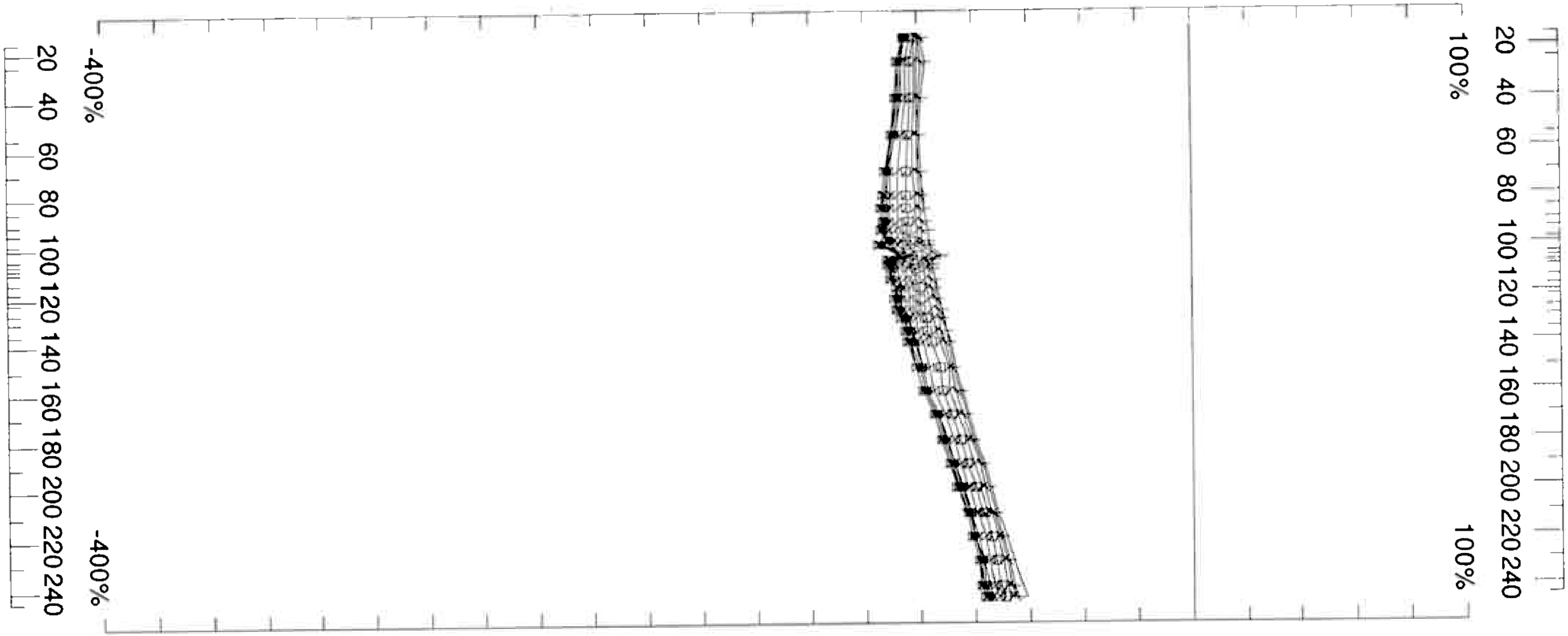
Loop: 20b
Hole: ES-2006-53
Compt: Axial



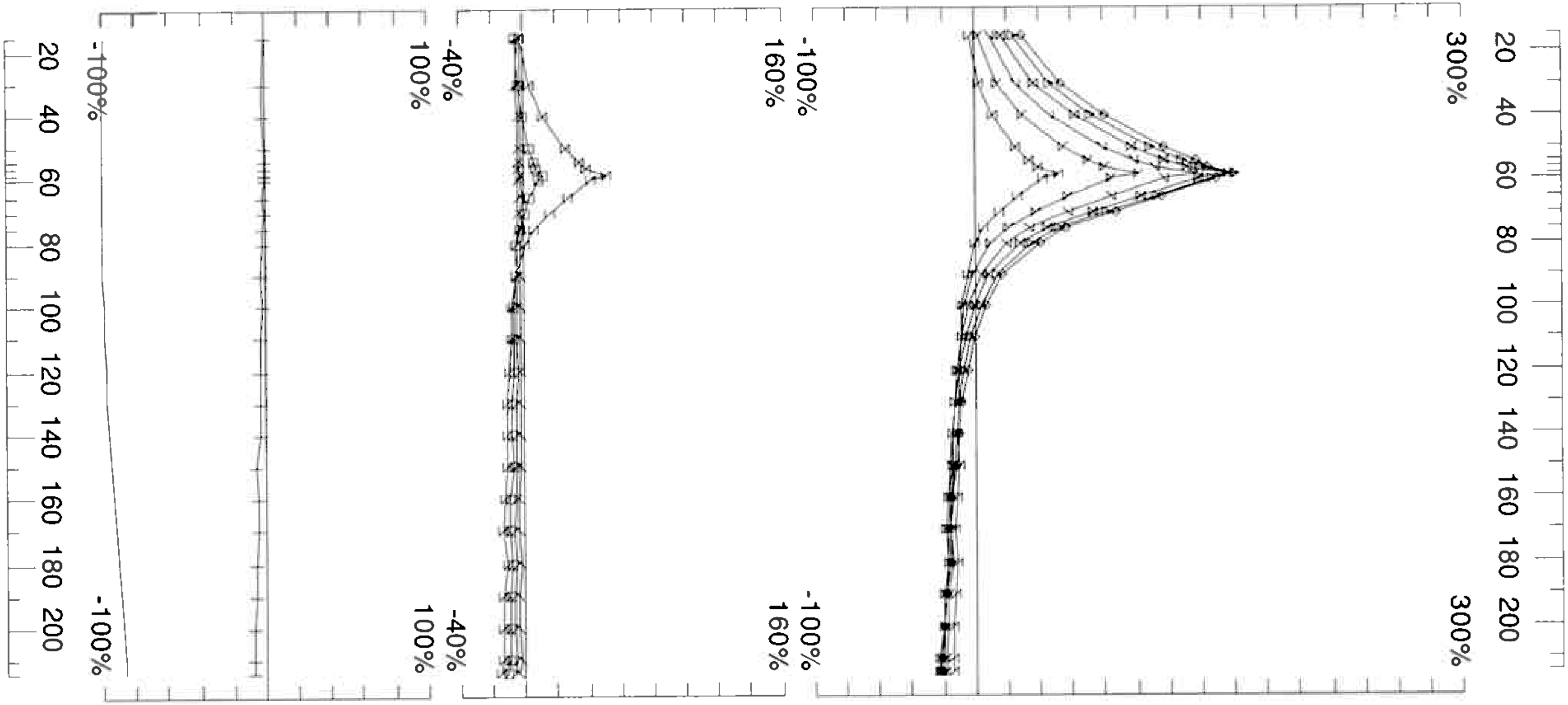
Loop: 20b Hole: ES-2006-53 Compt: Axial	Total, Chn/IHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 21/3/6 Reduced : 13/4/6 Plotted : 17/3/32



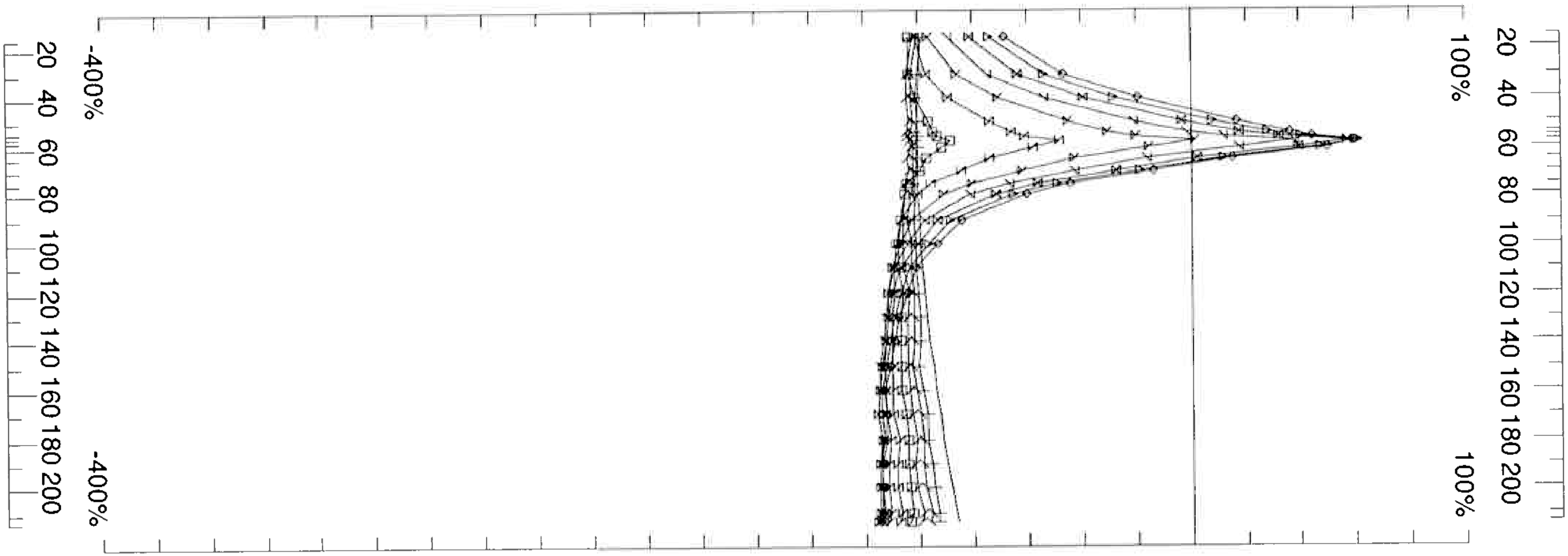
Loop: 20b Hole: ES-2006-54 Compt: Axial	Secondary, (Chn - Ch1)/IHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 3/4/6 Reduced : 13/4/6 Plotted : 17/3/32



Loop: 20b Hole: ES-2006-54 Compt: Axial	Total, Chn/lHpl Contin. Norm at depth of 0 m Base Freq. 3.251 Hz	BHUTEM Survey at: Espedalen For: A/S Sulfidmalm LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 3/4/6 Reduced : 13/4/6 Plotted : 17/3/32

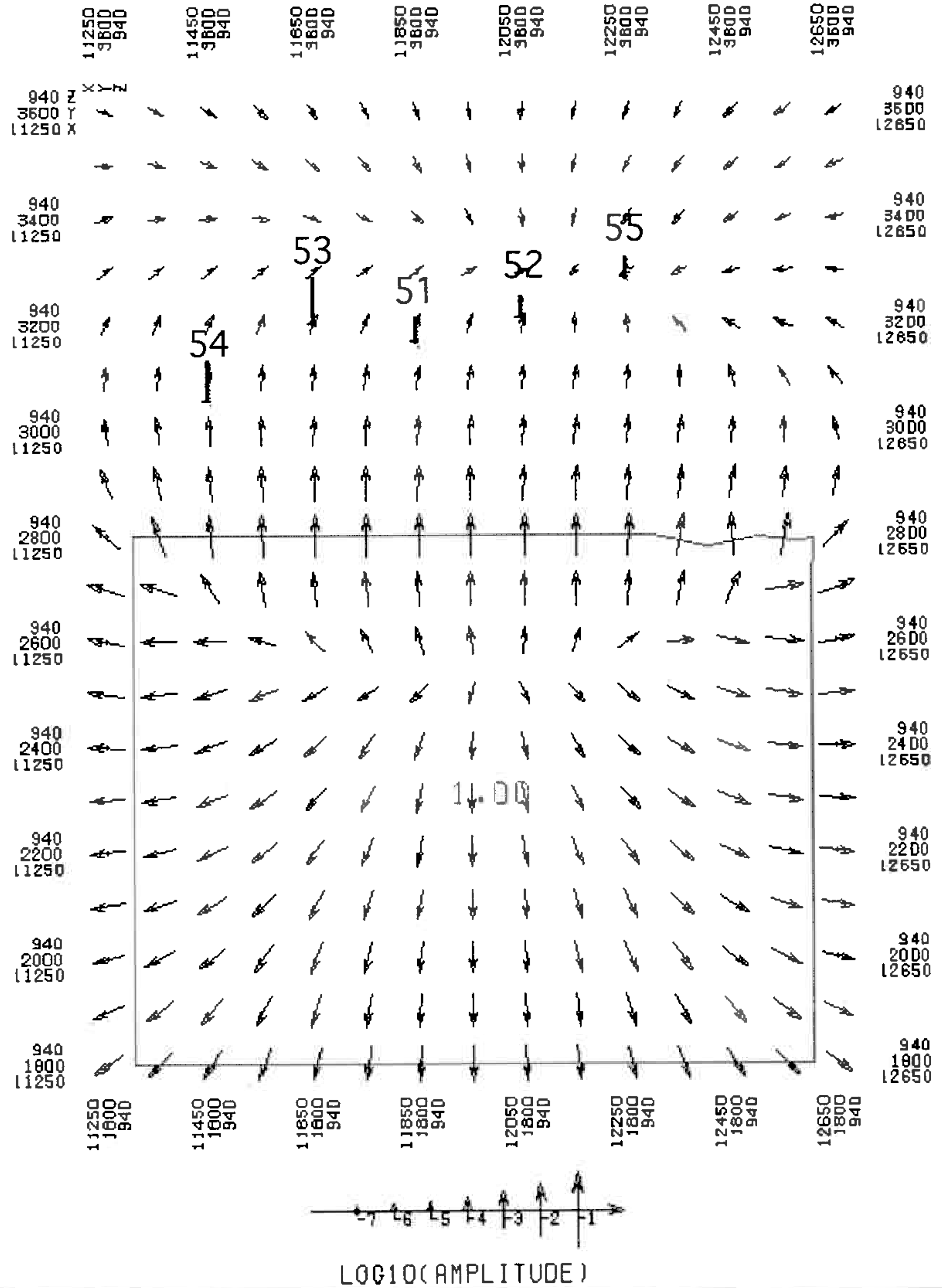


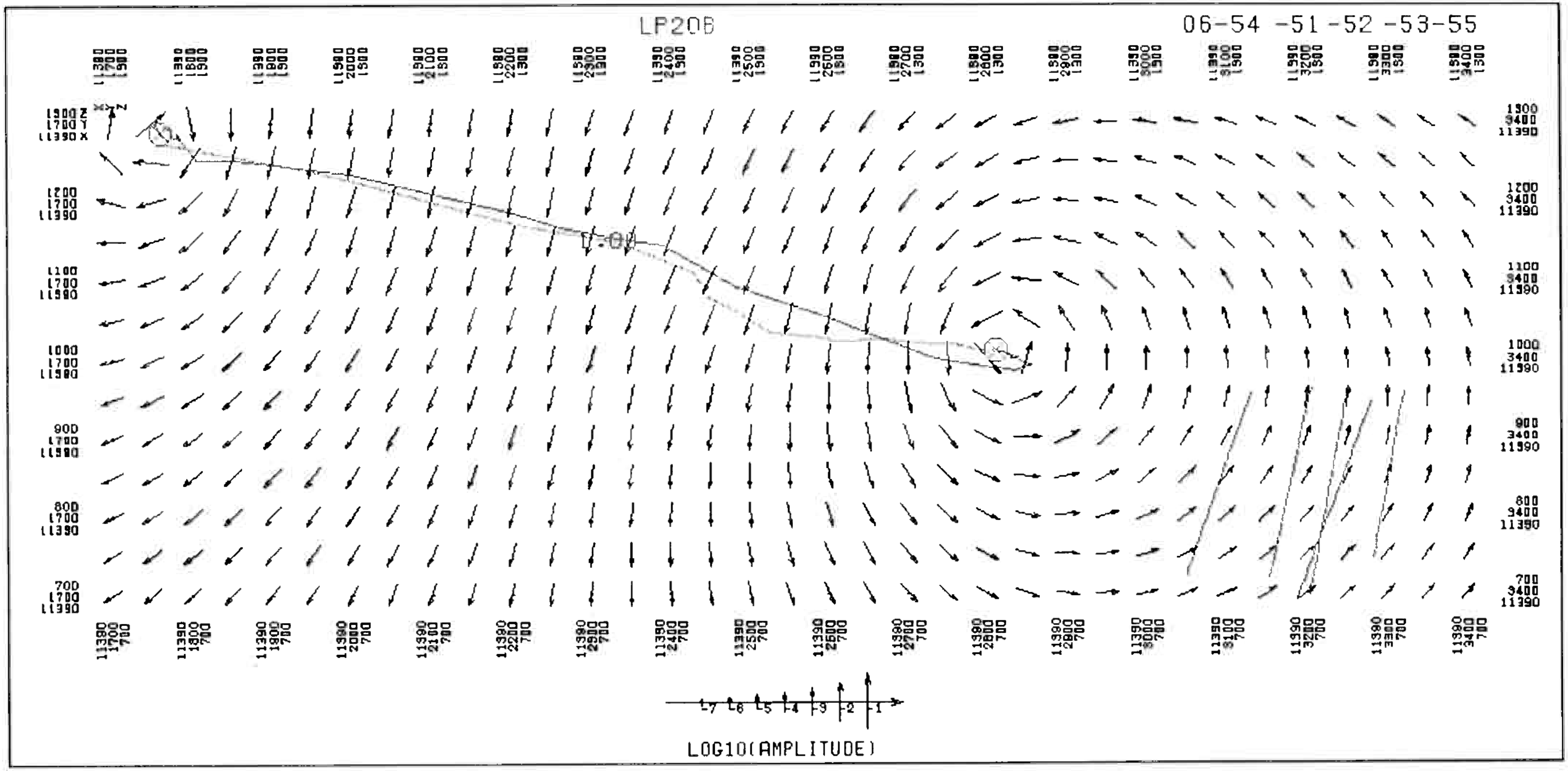
Loop: 20b	Secondary, (Chn - Ch1)/IHpl	BHUTEM Survey at: Espedalen
Hole: ES-2006-55	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 3/4/6 Reduced : 13/4/6 Plotted : 17/3/32



Loop: 20b	Total, Chn/lHpl	BHUTEM Survey at: Espedalen
Hole: ES-2006-55	Contin. Norm at depth of 0 m	For: A/S Sulfidmalm
Compt: Axial	Base Freq. 3.251 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 0611 Surveyed : 3/4/6 Reduced : 13/4/6 Plotted : 17/3/32

LP20b (Note: all holes are ES2006- series))




LP20B
06-54 -51 -52 -53 -55
LOG10(AMPLITUDE)

Appendix B

0611 Production Diary

UTEM 3 Surface Survey

Espedalen Grid
Norway

for

A/S Sulfidmalm

Production Log (0611)
UTEM Survey - Espedalen
Norway
A/S Sulfidmalm

Date	Rate	Production	Comments
up to February 09		-	Discussions, signing of the contract, assembly of crew and equipment.
February 10	Mob	(equip)	Equipment packed up and labelled. Picked up from Kingston. Shipping address is: Wilhelmsen Agencies AS P. Box 14 NO 2061 Gardermoen Norway
February 15	Mob	-	The LGL crew -Rob Langridge, Ryan Land and Warren (Bud) Evans - travel from Canada->Munich(MCH)->Oslo (OSL).
February 16	Mob	-	Continuation of air travel. The gear clears customs and meet with Falconbridge geologist Yannick Beaudoin. The group drives to Espedalen arriving ~18:15. The Equipment arrives in Espedalen ~21:00 and is off-loaded.
February 17	**L(2)-3** **borehole gear standby**		Rob in camp unpacking and setting up. Ryan and Warren assist the Sulfidmalm crew with field work/loop laying. Loop 32 is completed.

Crew:R.Langridge,R.Land,W.Evans

Date	Rate	Production	Comments
February 18	**P(1)-2**	625m	Assemble gear while Sulfidmalm crew is being taken out. Drive out to the field and meet with Lars Weiershaeuser. Spend the morning ferrying out equipment and crew and testing out the equipment and generator. Set up the surface crew ~12:30. they read one line without incident. Ferry out the borehole gear and spares as the skidoo is required elsewhere.
	PB(1)-1		Set up on BH-ESP-2005-48. Dummied -50° hole to 325.5m and set up gear for testing. All equipment appeared to be working and as the hole could not be read in the remains of the day (16:15) we packed the site, collected the Transmitter and headed back to camp. Crew back in camp ~17:10.

Loop 32

Line 10800E **3350N - 3975N** **Hz** **Rx16**

Crew:R.Langridge,R.Land,W.Evans Total to date: 0.625km

Date	Rate	Production	Comments
February 19	P(1)-2	1625m	Assemble gear while Sulfidmalm crew is being taken out. Drive out to the field and meet with Lars Weiershaeuser and ferry out equipment and crew. Set up the surface crew and they read without incident.
	PB(1)-1	BH 323m	Set up on BH-ESP-2005-48. All equipment appeared to be working but the data seemed a little noisy and Ch1 seemed low - although coupling was not ideal. the hole was finished and gear packed and headed back to camp. Crew back in camp ~17:30.

Loop 32

Line 10600E	**3350N**	**- 3575N**	**Hz**	**Rx16**
Line 11000E	**3350N**	**- 4100N**	**Hz**	**Rx16**
Line 11200E	**3350N**	**- 4100N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans Total to date: 2.225km

February 20	P(1)-2	1500m	Drive out to the field and set up the surface crew. Moved surface crew @13:00 back up to start a second line. They phoned for a pickup at the end of the day.
	PB(1)-1	BH 330m	Set up on BH-ESP-2005-47. Dummied -60° hole to 331.5m and set up. The winch belt had to be replaced. Read after moving the surface crew. Crew back in camp ~18:10.

Loop 32

Line 10400E	**3350N**	**- 4100N**	**Hz**	**Rx16**
Line 10600E	**3350N**	**- 4100N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans Total to date: 3.750km

February 21	P(1)-2	850m	Drive out to the field and set up the surface crew. Set up the borehole and started to read. There was no signal. The surface team called in and the borehole operator went to check the transmitter. The Transmitter had shut down - this has happened from time-to-time previously in Norway. Restarted - the transmitter seemed to have more trouble starting - clipping and even going into protect. It was decided to let it sit, get the surface crew back and to get the second transmitter. Set up the second transmitter and the loop was broken. The nordic ski track-setter had run along the loop edge and "taken" some wire. Repaired the loop and tested the second transmitter. It also went into protect - it was decided to switch back to Level 3 pre-whitening. Set up the original transmitter and read.
	PB(1)-1	BH 323m	Set up on BH-ESP-2005-48. Re-read ESP2005-48. Crew back in camp ~18:00.

Loop 32

Line 9600E	**3350N**	**- 4100N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans Total to date: 4.600km

Date	Rate	Production	Comments
February 22	**1/2P(2)-3** **1/2P(1)-2** **1/2 borehole gear standby** **1/2PB(1)-1**	2450m	Drive out to the field and set up as a surface crew. Read on Loop 32. After one line the borehole crew split off to deal with BH-ESP-2005-45 and 46. The remaining crew completed the final Loop 32 survey line Set up on BH-ESP-2005-45 - dummied to 156m. Shifted to BH-ESP-2005-46 and had the tiger torch on the frozen hole till 17:15.. Crew back in camp ~18:05

Loop 32

Line 9800E	**3350N**	**- 4200N**	**Hz**	**Rx15**
Line 10000E	**3350N**	**- 4100N**	**Hz**	**Rx16**
Line 10200E	**3350N**	**- 4200N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans Total to date: 7.050km

Date	Rate	Production	Comments
February 23	**P(1)-2** **PB(1)-1**	1900m BH 424m	Drive out to the field and set up the surface crew. Set up on BH-ESP-2005-45 and read to 154m. Moved to BH-ESP-2005-46 and dummied to 271m/read to 270m. Crew back in camp ~16:15.

Loop 33

Line 8800E	**3125N**	**- 4050N**	**Hz**	**Rx16**
Line 9000E	**3125N**	**- 4100N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans Total to date: 8.950km

Date	Rate	Production	Comments
February 24	**P(1)-2** **PB(1)-1**	2675m	Drive out to the field and set up the surface crew. Out to ESP2005-42/43/44. Extended skidoo trail up closer to the holes. Started moving gear in. With help from Falconbridge crew located the boreholes, excavated the snow and dummied all three holes to ESP2005-42/43/44 35/46/40m respectively. Moved Transmitter onto Loop B42 for the following morning. Crew back in camp ~18:00.

Loop 33

Line 8200E	**3125N**	**- 4000N**	**Hz**	**Rx16**
Line 8400E	**3125N**	**- 4050N**	**Hz**	**Rx16**
Line 8600E	**3125N**	**- 4000N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans Total to date: 11.625km

Date	Rate	Production	Comments
February 25	**1/2L(1)-2** **1/2P(2)-3** **1/2 borehole gear standby**	1850m	Ryan and Bud loop in the morning while borehole surveying was going on. Set up to read surface @ 12:30. Finish surface work and move transmitter to loop 34 and help lay a portion of Loop 34.
	1/2PB(1)-1	BH 117m	Set up and read ESP2005-42/43/44 to 34/44/39m respectively. Packed gear up and left it at the site pending data processing. Moved Transmitter back to Loop 33 and read surface. Crew back in camp ~18:00.

Loop 33

Line	**7900E**	**3125N**	**- 4000N**	**Hz**	**Rx15**
Line	**8000E**	**3125N**	**- 4100N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans — Total to date: 13.475km

Date	Rate	Production	Comments
February 26	**1P(2)-3** **borehole gear standby**	3350m	Complete Loop 34 first thing in the morning. Read on Loop 34 all day. Collect borehole gear from Vesla. Crew back in camp ~18:00.

Loop 34

Line	**7100E**	**2525N**	**- 4200N**	**Hz**	**Rx16**
Line	**7300E**	**2525N**	**- 4200N**	**Hz**	**Rx15**

Crew:R.Langridge,R.Land,W.Evans — Total to date: 16.825km

Date	Rate	Production	Comments
February 27	**1P(2)-3** **borehole gear standby**	3925m	Read on Loop 34 all day. Crew back in camp ~16:15.

Loop 34

Line	**7500E**	**2525N**	**- 4250N**	**Hz**	**Rx15**
Line	**7700E**	**2525N**	**- 3975N**	**Hz**	**Rx16**
Line	**7900E**	**2525N**	**- 3275N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans — Total to date: 20.750km

Date	Rate	Production	Comments
February 28	**1P(2)-3** **borehole gear standby**	3100m	Read on Loop 34 all day. Move transmitter to Loop 35 at the end of day. Crew back in camp ~17:30.

Loop 34

Line	**6700E**	**2525N**	**- 4075N**	**Hz**	**Rx15**
Line	**6900E**	**2525N**	**- 4075N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans — Total to date: 23.850km

Date	Rate	Production	Comments
March 01	**1P(2)-3** **borehole gear standby**	3925m	Read on Loop 35 all day. Crew back in camp ~18:00.

Loop 35

Line	**5100E**	**2475N**	**- 3900N**	**Hz**	**Rx15**
Line	**5300E**	**2375N**	**- 3825N**	**Hz**	**Rx16**
Line	**5500E**	**3300N**	**- 3825N**	**Hz**	**Rx16**
Line	**5700E**	**3300N**	**- 3825N**	**Hz**	**Rx15**

Crew:R.Langridge,R.Land,W.Evans — Total to date: 27.775km

Date	Rate	Production	Comments				
March 02	**1P(2)-3**	4025m	Read on Loop 35 all day. Crew back in camp ~18:00.				
	borehole gear standby		**Loop 35**				
			Line 5500E	**2375N**	**- 3300N**	**Hz**	**Rx16**
			Line 5700E	**2375N**	**- 3300N**	**Hz**	**Rx15**
			Line 5900E	**2375N**	**- 3325N**	**Hz**	**Rx16**
			Line 6500E	**2375N**	**- 3600N**	**Hz**	**Rx15**
	Crew:R.Langridge,R.Land,W.Evans				Total to date: 31.800km		
March 03	**1P(2)-3**	3475m	Read on Loop 35 all day. Rob works alone - Johan picks up wire. Back to camp to send data. Told to move on to Loop 31. Bring gear back to the Strand at the end of the day. Crew back in camp ~18:00.				
	borehole gear standby		**Loop 35**				
			Line 5900E	**3550N**	**- 3900N**	**Hz**	**Rx16**
			Line 6100E	**2375N**	**- 3800N**	**Hz**	**Rx16**
			Line 6300E	**2375N**	**- 3825N**	**Hz**	**Rx15**
			Line 6500E	**3600N**	**- 3850N**	**Hz**	**Rx15**
	Crew:R.Langridge,R.Land,W.Evans				Total to date: 35.275km		
March 04	**1P(2)-3**	2650m	Over to Loop 31 by skidoo trail. Set up transmitter so that wire crosses road in the air. Read on Loop 31 and drive back up the hill. Yannick requires some help so one receiver crew goes looping while the other crew reads. Return Johan to the Strand and go back for the transmitter. Crew back in camp ~18:00.				
	borehole gear standby		**Loop 31**				
			Line 9400E	**4950N**	**- 5850N**	**Hz**	**Rx15**
			Line 9600E	**4975N**	**- 5850N**	**Hz**	**Rx16**
			Line 10000E	**4975N**	**- 5850N**	**Hz**	**Rx15**
	Crew:R.Langridge,R.Land,W.Evans				Total to date: 37.925km		
March 05	**1P(2)-3**	3100m	Read on Loop 31 all day. Crew back in camp ~17:00.				
	borehole gear standby		**Loop 31**				
			Line 9800E	**5050N**	**- 5850N**	**Hz**	**Rx15**
			Line 10200E	**5100N**	**- 5850N**	**Hz**	**Rx16**
			Line 10300E	**5550N**	**- 5850N**	**Hz**	**Rx16**
			Line 10400E	**5400N**	**- 5850N**	**Hz**	**Rx16**
			Line 10500E	**5450N**	**- 5850N**	**Hz**	**Rx15**
			Line 10600E	**5450N**	**- 5850N**	**Hz**	**Rx15**
	Crew:R.Langridge,R.Land,W.Evans				Total to date: 41.025km		

Date	Rate	Production	Comments
March 06	1/2L(1)-2 1/2P(2)-3 1/2 borehole gear standby 1/2PB(1)-1	1675m BH 78m	Ryan and Bud loop in the morning while borehole surveying was going on. Set up to read surface @ 15:30. Read most of two lines before a coil acts up.. Set up on ESP2005-35. Thawed hole while Loop 31 was being modified to Loop B35. Dummied to 79m. Waited for the loop to be completed and finally aided in the looping. Read the hole - extra stacking was required because the loop edge had been set back further from the hole. Packed gear up and left it at the site pending data processing. Moved Transmitter to Loop 30 and read surface. Crew back in camp ~18:45

Loop 30

Line	**9000E**	**5100N**	**- 5850N**	**Hz**	**Rx16**
Line	**9200E**	**4925N**	**- 5850N**	**Hz**	**Rx15**

Crew:R.Langridge,R.Land,W.Evans — Total to date: 42.700km

Date	Rate	Production	Comments
March 07	1P(2)-3 borehole gear standby	3300m	Read on Loop 35 all day. Crew back in camp ~18:05

Loop 30

Line	**8200E**	**4925N**	**- 5675N**	**Hz**	**Rx15**
Line	**8400E**	**4850N**	**- 5675N**	**Hz**	**Rx15**
Line	**8600E**	**4875N**	**- 5675N**	**Hz**	**Rx15**
Line	**8800E**	**4950N**	**- 5675N**	**Hz**	**Rx15**
Line	**9000E**	**4900N**	**- 5100N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans — Total to date: 46.000km

Date	Rate	Production	Comments
March 08	1P(2)-3 borehole gear standby		Looped all day. Picked up pieces from Loops 30/31 and flagging. Moved equipment back to the Strand. laid out most of Loops 36 and 37. Crew back in camp ~17:55

Crew:R.Langridge,R.Land,W.Evans — Total to date: 46.000km

Date	Rate	Production	Comments
March 09	1P(2)-3 borehole gear standby	2100m	Finished laying Loop 36. Got stuck in slush on the lake moving the transmitter into place. Had to break trail into the lines - everything had blown in. Read on Loop 36. Crew back in camp ~17:05

Loop 36

Line	**5900E**	**4025N**	**- 5000N**	**Hz**	**Rx15**
Line	**6100E**	**3850N**	**- 4975N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans — Total to date: 48.100km

Date	Rate	Production	Comments

March 10 **1P(2)-3** 3225m
borehole gear standby

Read on Loop 36. Generator was frozen up in the morning - brought back to the Strand and thawed. Laid out part of the lake wire for Loop 37.
Crew back in camp ~18:05

Loop 36

Line	**5700E**	**4050N**	**- 4975N**	**Hz**	**Rx16**
Line	**6200E**	**4000N**	**- 4450N**	**Hz**	**Rx15**
Line	**6300E**	**4025N**	**- 5025N**	**Hz**	**Rx16**
Line	**6500E**	**4225N**	**- 5075N**	**Hz**	**Rx15**

Crew:R.Langridge,R.Land,W.Evans Total to date: 51.325km

March 11 **1P(2)-3** 3750m
borehole gear standby

Set up in the morning while the coilers completed Loop 37. Read the last two lines on Loop 36. Switched to Loop 37 and read two more lines.
Crew back in camp ~17:45

Loop 36

Line	**5300E**	**4075N**	**- 4975N**	**Hz**	**Rx16**
Line	**5500E**	**4100N**	**- 4975N**	**Hz**	**Rx15**

Loop 37

Line	**4700E**	**3975N**	**- 4975N**	**Hz**	**Rx15**
Line	**4900E**	**4000N**	**- 4975N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans Total to date: 55.075km

March 12 **1P(2)-3** 4125m
borehole gear standby

Read on Loop 37.
Crew back in camp ~17:45

Loop 37

Line	**3800E**	**4050N**	**- 4975N**	**Hz**	**Rx15**
Line	**4000E**	**3975N**	**- 4975N**	**Hz**	**Rx16**
Line	**4500E**	**3950N**	**- 4975N**	**Hz**	**Rx16**
Line	**5100E**	**3800N**	**- 4975N**	**Hz**	**Rx15**

Crew:R.Langridge,R.Land,W.Evans Total to date: 59.200km

March 13 **1P(2)-3** 2525m
borehole gear standby

Completed Loop 37. Broke trail into Loop 20 for the 2006 boreholes. Picked up all wire on Espedalvasnet. Transported equipment up to the parking lot.
Crew back in camp ~17:30

Loop 37

Line	**4100E**	**4000N**	**- 4550N**	**Hz**	**Rx15**
Line	**4200E**	**4025N**	**- 4975N**	**Hz**	**Rx15**
Line	**4300E**	**3950N**	**- 4975N**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans Total to date: 61.725km

Date	Rate	Production	Comments
March 14	**PB(1)-3** **surface Rx standby**	BH 246m	Ryan ,Bud and Johan loop in the morning - laying out Loop 20 again. After that they helped set up the transmitter and then picked up sections of Loop 36/37.Set up on ESP2006-51 and dummied the hole to 247.5m. Borrowed the drillers snuscooter and truck and went back to Espedalen for gear. Read ESP2006-51. Crew back in camp ~16:45

Crew:R.Langridge,R.Land,W.Evans Total to date: 61.725km

March 15	**PB(1)-3** **surface Rx standby**	BH 266m	Ryan ,Bud and Johan loop in the morning - picking up the remainder of Loops 36/37 and the Vesla Loop. They then put out Loop B36. Set up on ESP2006-52 after the drillers have moved off. Dummied the hole to 268m. Read ESP2006-52. Crew back in camp ~18:30.

Crew:R.Langridge,R.Land,W.Evans Total to date: 61.725km

March 16	**L(2)-3** **borehole gear standby**		Pack gear and get on road by 10:00. Drive to Kvikne for work on the Vakkerlien project. Arrive ~15:30. Unpack and meet up with Knute - the local snuscooter owner who is providing transport. Head out to the grid with Yannick and move gear in/establish corners and points. Crew back in camp ~18:30.

Crew:R.Langridge,R.Land,W.Evans

March 17	**1P(2)-3** **borehole gear standby**	2050m	Put in Loop 05. Establish chaining points and chain/survey 4 lines. Crew back in camp ~17:30

Loop V05

Line	**3365E**	**5750E**	**- 6275E**	**Hz**	**Rx16**
Line	**3360E**	**5750E**	**- 6275E**	**Hz**	**Rx15**
Line	**3370E**	**5750E**	**- 6275E**	**Hz**	**Rx16**
Line	**3375E**	**5800E**	**- 6275E**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans Vakkerlien Total to date: 2.050km

March 18	**1P(2)-3** **borehole gear standby**	525m	Out Loop 05 with Knute - windy and warm. Chain/survey the remaining line. Pick up all pickets and the loop. Transport all equipment back to the truck and back to the hotel. Drive Knute's car home. Plot data and pack. Crew back in camp ~14:00

Loop V05

Line	**3355E**	**5750E**	**- 6275E**	**Hz**	**Rx16**

Crew:R.Langridge,R.Land,W.Evans Vakkerlien Total to date: 2.575km

Date	Rate	Production	Comments
March 19	**L(2)-3** **borehole gear standby**		Gear packed and on the road by 09:00. Drive back to Espedalen. Leaving Kvikne the conditions were very windy with lots of blowing snow but conditions improved as we drove south of Dombas. Back in Espedalen ~13:30. The 2006 hole 53 was expected to be ready to read on Monday so we left the borehole gear in place and picked up 6 lines of pickets and set up the transmitter site for the 2004/2005 holes remaining to be read. Crew back in camp ~16:10.
	Crew:R.Langridge,R.Land,W.Evans		
March 20	**1PB(1)-3** **surface Rx standby**		The 2006 hole 53 would be ready to read on Tuesday so wwe left the borehole gear in place and dummied 7 of the 8 2004/2005 holes - 2004-15 and 2005-36,37,38,39,40,41. All holes dummied to ~a metre of the total depth recorded. We could not remove the cap from 2004-14. The loopers put in Loop B-46 and then dug out boreholes. They then picked up 6 lines of pickets. Crew back in camp ~17:30.
	Crew:R.Langridge,R.Land,W.Evans		
March 21	**1PB(1)-3** **surface Rx standby**	BH 268m	Set up on ESP2006-53 after the drillers moved off. Dummied the hole to 269m. Read ESP2006-53. The loopers finish off Loop B-46 and then opened up 2004-14 and spent the rest of the day removing pickets and transferring wire. Crew back in camp ~17:30.
	Crew:R.Langridge,R.Land,W.Evans		
March 22	**1PB(1)-3** **surface Rx standby**	BH 429m	Got all the gear out to the Jorstad loop. Set up and started reading by ~11:00. Dummied ESP2004-14 and read ESP2004-14/15 ESP2005-41 to 128/178/123m respectively. Packed gear up and moved it to the next hole. Loopers helped transport equipment, dig out holes and then remove pickets. Crew back in camp ~18:10.
	Crew:R.Langridge,R.Land,W.Evans		

Date	Rate Production	Comments
March 23	**1PB(1)-2** BH 274m **surface Rx standby?** **1 man demob**	Got all the gear out to Loop B38/B36. Set up and started reading by ~11:00. Read ESP2005-38 off Loop B38 to 90m. Switched to Loop B36 and read holes ESP2005-39/40 off Loop B38 to 114/70m respectively. Packed gear up and moved it to the next hole. Loopers helped transport equipment, dig out holes and then remove pickets. Ryan Land demobilized back to Canada. Crew back in camp ~18:10.
	Crew:**R.Langridge,W.Evans,**R.Land	
March 24	**1PB(1)-2** BH 339m **surface Rx standby?**	Got all the gear over to ESP2005-36/37. Read both holes to 170/169m respectively. Returned to the Strand with a load of gear and processed/sent the data. Went back up and picked up the rest of the gear and the transmitter. Crew back in camp ~16:00.
	Crew:R.Langridge,W.Evans	
March 25	**1PB(1)-2** BH 339m **surface Rx standby?**	Got all the gear over to ESP2005-36/37. Read both holes to 170/169m respectively. Returned to the Strand with a load of gear and processed/sent the data. Went back up and picked up the rest of the gear and the transmitter. Crew back in camp ~16:00.
	Crew:R.Langridge,W.Evans	
March 26	**1PB(1)-2** **surface Rx standby?**	Picked up all wire and prepared to take it south. Packed gear and checked out borehole gear. Crew back in camp ~16:00.
	Crew:R.Langridge,W.Evans	
March 27	**1/2L(1)-1** **borehole gear standby** **1/2 x 1 man demob** (((1/2L(1)-1 on 0612)))	Pack up truck and trailer and head to Gardermoen. Drop off samples and sort out Bud Evan's plane ticket. Continue on to the southern field house and unpack gear and equipment.
	Crew:R.Langridge,W.Evans (half day de-mob)	
March 28	**borehole gear standby** (((P(1)-1 on 0612)))	Surface equipment charged out as a one Rx system. Crew working on southern job - 0612.
	Crew:R.Langridge	

Date	Rate	Production	Comments
March 29	**demob - 1 man** **borehole gear standby** (((P(1)-1 on 0612))) Crew:R.Langridge		Bud Evans demobilized back to Canada. Surface equipment charged out as a one Rx system. Crew working on southern job - 0612.
March 30 - April 01	**borehole gear standby** (((P(1)-1 on 0612))) Crew:R.Langridge		Surface equipment charged out as a one Rx system. Crew working on southern job - 0612.
April 02	**1PB(1)-1** **surface Rx standby?** Crew:R.Langridge		Leave some gear at the southern field house as spares and to allow room to bring all the borehole/surface gear south. Drive from southern field house to Espedalen. Unpack and charge gear. Take gear out to the field. Dummy ESP2006-54/55 to 214/246m respectively.. Crew back in camp ~17:20.
April 03	**1PB(1)-1** **surface Rx standby?** Crew:R.Langridge	BH 459m	Got all the gear over to ESP2006-54/55. Read both holes to 245/214m respectively. Returned to the Strand with a load of gear and processed/sent the data. Went back up and picked up the rest of the gear and the transmitter. Crew back in camp ~18:30.
April 04	**1LB(1)-1** **surface Rx standby?** Crew:R.Langridge		Out to Loop 20 - with ~30cm of fresh snow. We were unable to get the skidoo up the ridge so we picked up the loop on foot in fairly high winds. Transferred wire and helped cap the 2006 holes. Started packing. Met with the Falconbridge/Blackstone visitors. Crew back in camp ~17:30.
April 05	**demob** **borehole/surface** Crew: R.Langridge		Continue packing. Get all gear and snoscooter/sleigh Pack empty boxes on the trailer and load the UTEM gear as "passengers" in the cab. Leave Espedalen ~11:30. Drive to south field camp. Drop off snoscooter/sleigh and retrieve gear. Drive to Roadfeeders (Gardemoen). Do a final pack on all UTEM gear - receivers/transmitters/coils. Drop off borehole (9 pieces) and surface (10 pieces). Drive back to southern field camp. Arrive ~20:15.

Date	Rate	Production	Comments
April 06	**demob borehole/surface**		Drive Falconbridge rental car to Asker (Finn's house) and drop off personal baggage. Drop rental car @ Toyota dealer and continue into Oslo to shop. Return to Asker ~20:00. Find out that the Falconbridge crew have gone to stay at a hotel near the airport instead of in Asker as planned. Also that a SAS strike may delay flights. Spend till ~02:00 trying to arrange flights.
		Crew:none	
April 07	**demob borehole/surface**		Get up @ 05:00 to call SAS. Spend several hours on hold before talking to an agent. By early afternoon the agent has arranged flights - same time but a day later. Travel to Gardemoen and stay @ the Norlandia. Go back to Gardemoen ~21:00 and line up till 23:15 to get my ticket in order. Back to the Norlandia @~23:50.
		Crew:R.Langridge	
April 08	**demob borehole/surface**		Up @ 04:20 and bus to Gardemoen. Line up again for boarding passes. Pass through the system and fly Oslo-London-StJohn's without incident.
		Crew:R.Langridge	
April 09 ->April 10	**equipment**	-	Equipment (borehole and surface) in transit.
April 11			Equipment (borehole and surface) arrives in Kingston.

LEGEND

P(n)-x	Surface Production (# of receivers) - # of personnel
PB(n)-x	BHUTEM3 Production (# of receivers) - # of personnel
L(n)-x	Looping (# of receivers) - # of personnel
S(n)-x	Standby (# of receivers) - # of personnel
D(n)-x	Down (# of receivers) - # of personnel
DB(n)-x	Down BHUTEM3 (# of receivers) - # of personnel

Appendix C

The UTEM SYSTEM

The UTEM System

UTEM Data Reduction and Plotting Conventions

Data Presentation

The UTEM SYSTEM

UTEM uses a large, fixed, horizontal transmitter loop as its source. Loops range in size from 300m x 300m up to as large as 4km x 4km. Smaller loops are generally used over conductive terrain or for shallow sounding work. The larger loops are only used over resistive terrain. The UTEM receiver is typically syncronized with the transmitter at the beginning of a survey day and operates remotely after that point. The clocks employed - one in each of the receiver and transmitter - are sufficiently accurate to maintain synchronisation.

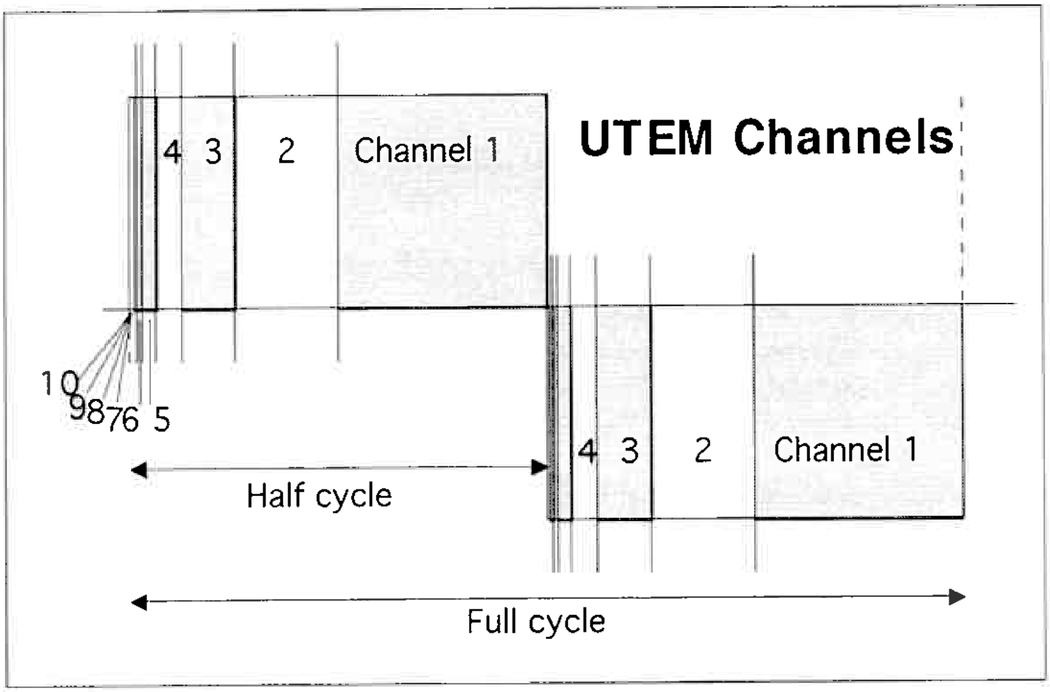
Measurements are routinely taken to a distance of 1.5 to twice the loop dimensions, depending on the local noise levels, and can be continued further. Lines are typically surveyed out from the edge of the loop but may also be read across the loop wire and through the centre of the loop, a configuration used mainly to detect horizontal conductors. BHUTEM - the borehole version of UTEM -surveys have been carried out to depths up to 3000+ metres.

System Waveform

The UTEM transmitter passes a low-frequency (4 Hz to 90 Hz) current of a precisely regulated triangular waveform through the transmitter loop. The frequency can be set to any value within the operating range of the transmitter, however, it is usually set at 31 Hz to minimise power line (60 Hz in North America) effects. Since a receiver coil responds to the time derivative of the magnetic field, the UTEM system really "sees" the step response of the ground. UTEM is the only time domain system which measures the step response of the ground. All other T.D.E.M. systems to date transmit a modified step current and "see" the (im)pulse response of the ground at the receiver. In practice, the transmitted UTEM waveform is tailored to optimize signal-to-noise. Deconvolution techniques are employed within the system to produce an equivalent to the conceptual "step response" at the receiver.

System Sampling

The UTEM receiver measures the time variation of the magnetic field in the direction of the receiver coil at 10 delay times (channels). UTEM channels are spaced in a binary, geometric progression across each half-cycle of the received waveform. Channel **10** is the earliest channel and it is $1/2^{10}$ of the half-cycle wide. Channel **1**, the latest channel, is $1/2^{1}$ of the half-cycle wide (see Figure below). The measurements obtained for each of 10 channels are accumulated over many half-cycles. Each final channel value, as stored, is the average of the measurements for that time channel. The number of half-cycles averaged generally ranges between 2048 (1024 full-cycles - 1K in UTEM jargon) to 32768 (16K) depending on the level of ambient noise and the signal strength.



System Configurations

For surface work the receiver coil is mounted on a portable tripod and oriented. During a surface UTEM survey the vertical component of the magnetic field (Hz) of the transmitter loop is always measured. Horizontal in-line (Hx) and cross-line (Hy) components are also measured if more detailed information is required. The UTEM System is also capable of measuring the two horizontal components of the electric field, Ex and Ey. A dipole sensor comprised of two electrodes is used to measure the electric field components. This is generally used for outlining resistive features to which the magnetic field is not very sensitive.

BHUTEM surveys employ a receiver coil that is smaller in diameter than the surface coil. The borehole receiver coil forms part of a down-hole receiver package used to measure the axial (along-borehole) component of the magnetic field of the transmitter loop. Due to the distance between coil and receiver in borehole surveys the signal must be transmitted up to the receiver. In BHUTEM the signal is transmitted to surface digitally using a kevlar-reinforced fibre-optic cable as a data link. Using a fibre-optic link avoids signal degradation problems and allows surveying of boreholes to 3000+m. The cable is also very light - the specific gravity is nearly 1.0 - making the cable handling hardware quite portable.

The EM Induction Process

Any time-varying transmitted ("primary") field induces current flow in conductive regions of the ground below and around the transmitter loop (i.e. in the earth or "half-space"). This current flow produces a measurable EM field, the secondary field, which has an inherent "inertia" that resists the change in primary field direction. This "inertial" effect is called self-inductance; it limits the rate at which current can change and is only dependent on the shape and size of a conductive path.

It takes a certain amount of time for the transmitted current flow to be redirected (reversed) and reestablished to full amplitude after the rate-of-change of the primary field reverses direction. This measurable reversal time is characteristic for a given conductor. In general, for a good conductor this time is greater than that of a poor conductor. This is because in a good conductor the terminal current level is greater, whereas its rate of change is limited by the inductance of the current path. The time-varying current causes an Emf in the sensor proportional to the time derivative of the current. This Emf decays with time - it vanishes when the reversal is complete - and the characteristic time of the Emf decay as measured by the sensor is referred to as the **decay time** of the conductor.

The large-scale current which is induced in the half-space by the primary field produces the half-space response as seen in typical UTEM profiles. This background response is influenced by the finite conductivity of the surrounding rock. Other currents may be induced in locally more conductive zones (conductors) that have longer decay times than the half-space response. The responses of these conductors are superimposed upon the background response. The result is that the UTEM receiver detects:

- the primary field waveform, a square-wave
- the half-space (background) response of the surrounding rock
- a slight-to-large response due to any conductors present.

The result is that in the presence of conductors the primary field waveform is substantially (and anomalously) distorted.

UTEM DATA REDUCTION and PLOTTING CONVENTIONS

The UTEM data as it appears in the data files is in total field, continuously normalized form. In this form, the magnetic field data collected by the receiver is expressed as a % of the calculated primary magnetic field vector magnitude at the station. These are total field values - the UTEM system measures during the "on-time" and as such samples both the primary and secondary fields.

For plotting purposes, the reduced magnetic field data (as it appears in the data file) are transformed to other formats as required. The following is provided as a description of the various plotting formats used for the display of UTEM data. A plotting format is defined by the choice of the *normalization* and *field type* parameters selected for display.

NORMALIZATION

UTEM results are always expressed as a % of a normalizing field at some point in space.

In **continuously normalized** form the normalizing factor (the denominator) is the magnitude of the computed local primary field vector. As the primary exciting field magnitude diminishes with increasing distance from the transmitter loop the response is continuously amplified as a function of offset from the loop. Although this type of normalization considerably distorts the response shape, it permits anomalies to be easily identified at a wide range of distances from the loop.

Note: An optional form of continuous normalization permits the interpreter to normalize the response to the magnitude of the primary field vector at a fixed depth below each station. This is useful for surface profiles which come very close to the loop. Without this adjustment option, the normalizing field is so strong near the loop that the secondary effects become too small in the presence of such a large primary component. In such circumstances interpretation is difficult, however; by "normalizing at some depth" the size of the normalizing field, near the loop in particular, is reduced and the resulting profile can be more effectively interpreted to a very close distance from the transmitter wire. The usual choice for the depth is the estimated target depth is used.

In **point normalized form** the normalizing factor is the magnitude of the computed primary field vector at a single point in space. When data is presented in this form, the point of normalization is displayed in the title block of the plot. Point normalized profiles show the non-distorted shape of the field profiles. Unfortunately, the very large range in magnitude of anomalies both near and far from the loop means that small anomalies, particularly those far from the loop, may be overlooked on this type of plot in favor of presenting larger amplitude anomalies.

Note: Selecting the correct plot scales is critical to the recognition of conductors over the entire length of a point normalized profile. Point normalized data is often used for interpretation where an analysis of the shape of a specific anomaly is required. Point normalized profiles are therefore plotted selectively as required during interpretation. An exception to this procedure occurs where surface data has been collected entirely inside a transmitter loop. The primary field does not vary greatly inside the loop, therefore, the benefits of continuous normalization are not required in the display of such results. In these cases data is often point normalized to a fixed point near the loop centre.

FIELD TYPE

The type of field may be either the **Total field** or the **Secondary field.** In general, it is the secondary field that is most useful for the recognition and interpretation of discrete conductors.

UTEM Results as Secondary Fields

Because the UTEM system measures during the transmitter on-time the determination of the secondary field requires that an estimate of the primary signal be subtracted from the observations. Two estimates of the primary signal are available:

1) UTEM Channel 1

One estimate of the primary signal is the value of the latest time channel observed by the UTEM System, channel 1. When Channel 1 is subtracted from the UTEM data the resulting data display is termed ***Channel 1 Reduced***. This reduction formula is used in situations where it can be assumed that all responses from any target bodies have decayed away by the latest time channel sampled. The Channel 1 value is then a reasonable estimate of the primary signal present during Channels 2....10.

In practice the ***Channel 1 Reduced*** form is most useful when the secondary response is very small at the latest delay time. In these cases channel 1 is indeed a good estimate of the primary field and using it avoids problems due to geometric errors or transmitter loop current/system sensitivity errors.

2) Calculated primary field

An alternate estimate of the primary field is obtained by computing the primary field from the known locations of the transmitter loop and the receiver stations. When the computed primary field is subtracted from the UTEM data the resulting data display is termed ***Primary Field Reduced*** .

The calculated primary field will be in error if the geometry is in error - mislocation of the survey stations or the loop vertices - or if the transmitter loop current/system sensitivity is in error. Mislocation errors from loop/station geometry may give rise to very large secondary field errors depending on the accuracy of the loop and station location method used. Transmitter loop current/system sensitivity error is rarely greater than 2%. ***Primary Field Reduced*** is plotted in situations where a large Channel 1 response is observed. In this case the assumption that the Channel 1 value is a reasonable estimate of the primary field effect is not valid.

Note: When UTEM data is plotted in the ***Channel 1 Reduced*** form the secondary field data for Channel 1 itself are always presented in ***Primary Field Reduced*** form and are plotted on a separate axis. This plotting format serves to show any long time-constant responses, magnetostatic anomalies and/or geometric errors present in the data.

Mathematical Formulations

In the following expressions:

$\mathbf{Rn_j}$ is the result plotted for the n^{th} UTEM channel,

$\mathbf{R1_j}$ is the result plotted for the latest-time UTEM channel, channel 1,

$\mathbf{Chn_j}$ is the raw component sensor value for the n^{th} channel at station j,

$\mathbf{Ch1_j}$ is the raw component sensor value for channel 1 at station j,

$\mathbf{H^P{}_j}$ is the computed primary field component in the sensor direction

$|\mathbf{H^P}|$ is the magnitude of the computed primary field at:
- a fixed station for the entire line (point normalized data)
- the local station of observation (continuously normalized data)
- a fixed depth below the station (continuously normalized at a depth).

Channel 1 Reduced Secondary Fields : Here, the latest time channel, Channel 1 is used as an "estimate" of the primary signal and channels 2-10 are expressed as:

$$\mathbf{Rn_j = (Chn_j - Ch1_j) / |H^P| \quad x\,100\%}$$

Channel 1 itself is reduced by subtracting a calculation of the primary field observed in the direction of the coil, $\mathbf{H^P}$ as follows:

$$\mathbf{R1_j = (Ch1_j - H^P{}_j) / |H^P| \quad x\,100\%}$$

Primary Field Reduced Secondary Fields : In this form all channels are reduced according to the equation used for channel 1 above:

$$\mathbf{Rn_j = (Chn_j - H^P{}_j) / |H^P| \quad x\,100\%}$$

This type of reduction is most often used in cases where very good geometric control is available (leading to low error in the calculated primary field, $\mathbf{H^P{}_j}$) and where very slowly decaying responses result in significant secondary field effects remaining in channel 1 observations.

UTEM Results as a Total Field

In certain cases results are presented as a % of the **Total Field**. This display is particularly useful, in borehole surveys where the probe may actually pass through a very good conductor. In these cases the shielding effect of the conductor will cause the observed (total) field to become very small below the intersection point. This nullification due to shielding effects on the total field is much easier to see on a separate ***Total Field*** plot. In cases where the amplitude of the anomalies relative to the primary field is small, suggesting the presence of poorly conductive bodies, the ***Total Field*** plot is less useful.

The data contained in the UTEM reduced data files is in ***Total Field,*** continuously normalized form if:

$$\mathbf{Rn_j = Chn_j / |H^P| \quad x\,100\%}$$

DATA PRESENTATION

All UTEM survey results are presented as profiles in an Appendix of this report. For BHUTEM surveys the requisite Vectorplots, presented as plan and section views showing the direction and magnitude of the calculated primary field vectors for each transmitter loop, are presented in a separate Appendix.

The symbols used to identify the channels on all plots as well as the mean delay time for each channel is shown in the table below.

UTEM System Mean Delay Times

10 Channel Mode @ 31 hz.(approx.)

(base freq: 30.974 hertz)

Channel #	Delay time (ms)	Plot Symbol
1	12.11	|
2	6.053	\
3	3.027	/
4	1.513	□
5	0.757	Σ
6	0.378	∡
7	0.189	7
8	0.095	×
9	0.047	△
10	0.024	◇

Notes on Standard plotting formats:

10 channel data in *Channel 1 Reduced* form - The data are usually displayed on three separate axes. This permits scale expansion, allowing for accurate determination of signal decay rates. The standard configuration is:

Bottom axis - Channel 1 (latest time) is plotted alone in ***Primary Field Reduced*** form using the same scale as the center axis.

Center axis - The intermediate to late time channels, ch5 to ch2 are plotted on the center axis using a suitable scale.

Top axis - The early time channels, ch10 to ch6 and a repeat of ch5 for comparison are plotted on the top axis at a reduced scale. The earliest channels, ch8 to ch10, may not be plotted to avoid clutter.

10 channel data in ***Primary Field Reduced*** form: The data are displayed using a

single axis plot format. Secondary effects are plotted using a Y axis on each data plot with peak to peak values up to 200%.

BHUTEM data plotted as total field profiles: Data are expressed directly as a percentage of the ***Total Field*** value. The Y axis on each single axis data plot shows peak values of up to 100%. These departures are always relative to the measured total field value at the observation station.

BHUTEM data plotted as secondary field profiles: Check the title block of the plot to determine if the data is in ***Channel 1 Reduced*** form or in ***Primary Field Reduced*** form.

Note that on all BHUTEM plots the ratio between the axial component of the primary field of the loop and the magnitude of the total primary field strength **(dc)** is plotted as a profile without symbols. In UTEM jargon this is referred to as the "primary field" and it is plotted for use as a polarity reference tool.

Appendix D

Note on sources of anomalous Ch1

Note on sources of anomalous Ch1

This section outlines the possible sources of anomalous channel 1 which is not correlated to the Ch2-10 data plotted on the upper axes of a *channel 1 normalized* plot.

1) **Mislocation of the transmitter loop and/or survey stations**

Mislocating the transmitter loop and/or the survey stations results in an error in the calculated primary field at the station and appears as an anomalous Ch1 value not correlated to *channel 1 normalized* Ch2-10. The effect is amplified near the loop front. This can be seen in the profiles - the error in Ch1 generally increases approaching the loop. As a rule a 1% error in measurement of the distance from the loop will result in, for outside the loop surveys, an error in Ch1 of:

- 1% near the loop front (long-wire field varies as $1/r$)
- 3% at a distance from the loop front (dipolar field varies as $1/r^3$)
- 2% at intermediate distances (intermediate field varies as $\sim 1/r^2$)

Errors in elevation result in smaller errors but as they often affect the chainage they accumulate along the line.

The in-loop survey configuration generally diminishes geometric error since the field gradients are very low. At the centre of the loop the gradient in the vertical field is essentially zero so it is difficult to introduce geometric anomalies near the loop centre. Near the loop sides and at the closest approach of the lines to the wire mislocation of the loop and the station becomes more critical. Typically loop sides are designed to be >200m from any survey stations.

2) **Magnetostatic UTEM responses**

Magnetostatic UTEM responses arise over rocks which generate magnetic anomalies. Such magnetic materials will amplify the total (primary + secondary) field of the UTEM transmitter which is sensed by the receiver coil. The secondary field is generated by subtracting a computed primary which does not include magnetic effects. This can give rise to strong and abrupt channel 1 anomalies when the source of the magnetics is at surface. This is the case in a number of places on these grids. UTEM magnetostatic anomalies differ from DC magnetic anomalies in the following three major ways:

1) In the case of DC magnetics the field is dipping N and is very uniform over the scale of the survey area while the UTEM field inside the loop is vertical and it is stronger near the loop edges.
2) Most aeromagnetics are collected as total field while with UTEM we measure a given (in this case generally z,x) component.
3) DC magnetic instruments observe the total magnetization of the causative body which is due to its susceptibility as well as any remnant magnetization. An AC method such as UTEM will not respond to the remnant portion of the magnetization.

The larger amplitude of the UTEM Ch1 response is explained by the fact that the UTEM primary field is often more favourably coupled (magnetostatically speaking) to

magnetic mineralization as compared to the earths field. Another factor could be the presence of a reverse remnant component to the magnetization.
Note that positive magnetic anomalies will cause:

- positive Ch1 anomalies in data collected outside the loop
- negative Ch1 anomalies in data collected inside the loop

3) **Extremely good conductors**

An extremely good conductor will be characterized by a time constant much longer than the half-period (@ 30Hz >>16ms). This will give rise to an anomalous Ch1 which is not correlated to the Ch2-10 data plotted on the upper axes of a *channel 1 normalized* plot.

Appendix E

Note on 4 Hz UTEM data: The effect of the presence of a 60-cycle powerline.

Note

While this Appendix uses data collected in the presence of a 60Hz powerline the issue dealt with applies equally to UTEM data collected in the presence of a 50Hz powerline.

Note: The standard presentation in Appendix A has Ch2-5 plotted on the middle axis. An alternative presentation - with Ch2 and Ch3 on the middle axis - is sometimes chosen when a powerline cuts through the surveyed area. This Appendix is a brief discussion of why the alternative presentation is chosen.

Note on 4 Hz UTEM data:The effect of the presence of a 60-cycle powerline.

This appendix outlines and discusses the effect of the presence of a 60-cycle powerline on ~4Hz (3.872Hz) UTEM data. This line is from a series of loops with a powerline cutting across the survey area. The UTEM data is affected by the presence of the powerline.

example data:

Figure E1(a) is the example data as presented in Appendix A - an alternative presentation with Ch2 and Ch3 on the middle axis. The standard presentation is shown in Figure E1(b) - with Ch2-5 plotted on the middle axis. The alternative presentation was chosen for a series of loops (including this loop) with a powerline cutting through the surveyed area. Figure E1(c) shows why - Ch4 and Ch5 show a pattern where when one is up the other is down and vice versa. The amplitude of the pattern decreases with distance away from the powerline. It was felt that this pattern obscured the information in Ch2 and 3 and the alternative presentation was chosen.

explanation:

Figure E2a) shows the UTEM waveform at ~4Hz with a 60Hz waveform superimposed on it. Roughly 16 cycles of the 60-cycle waveform fit into the full UTEM waveform. On a channel-by-channel basis:

~4 cycles fit into Ch1
~2 cycles fit into Ch2
~1 cycle fits into Ch3.

The multiple cycles tend to cancel out. Earlier channels are narrower - only part of a cycle wide. In particular Ch4 is ~half a cycle wide and Ch5 falls in the opposite halfcycle. The result is the pattern shown in Figure 1(c): Ch4 and Ch5 tending to diverge from one another - more strongly near the powerline.

other presentations:

Figures E3(a) and (b) show the example data in two other presentations where several channels are combined to give fewer, cleaner channels:

Figure E3(a): In this presentation Ch4 and 5 are combined to give a combined Ch"4" that is ~1.5 times as wide as the original Ch4. The Ch"4" is cleaner than the original. The original Ch5-10 are shown on the upper axis.

Figure E3(b): In this presentation Ch4-10 are combined to give a combined Ch"4" that is 2x as wide as the original Ch4 (equal in width to the original Ch3). The Ch"4" is as clean as the original Ch3. Note that Ch10 is added in twice to make the 2x factor exact. The original Ch5-10 are shown on the upper axis.

Discussion:

Several elements of UTEM survey design and procedure will have an affect on the number of useful channels in the final data set. These would include:

- careful positioning of the transmitter loops relative to the powerline(s)
- increasing the transmitter current (and the signal-to-noise ratio)
- care in the selection of gains during surveying. Near a source of coherent noise (eg powerline) the signal gain should be selected to minimize data rejections.

Consideration should also be given to increasing the station spacing in the vicinity of the powerline. This allows additional stacking to be done (at fewer stations) without much of an increase in surveying time.

Several other ways to increase the number of channels free of the powerline affects are:

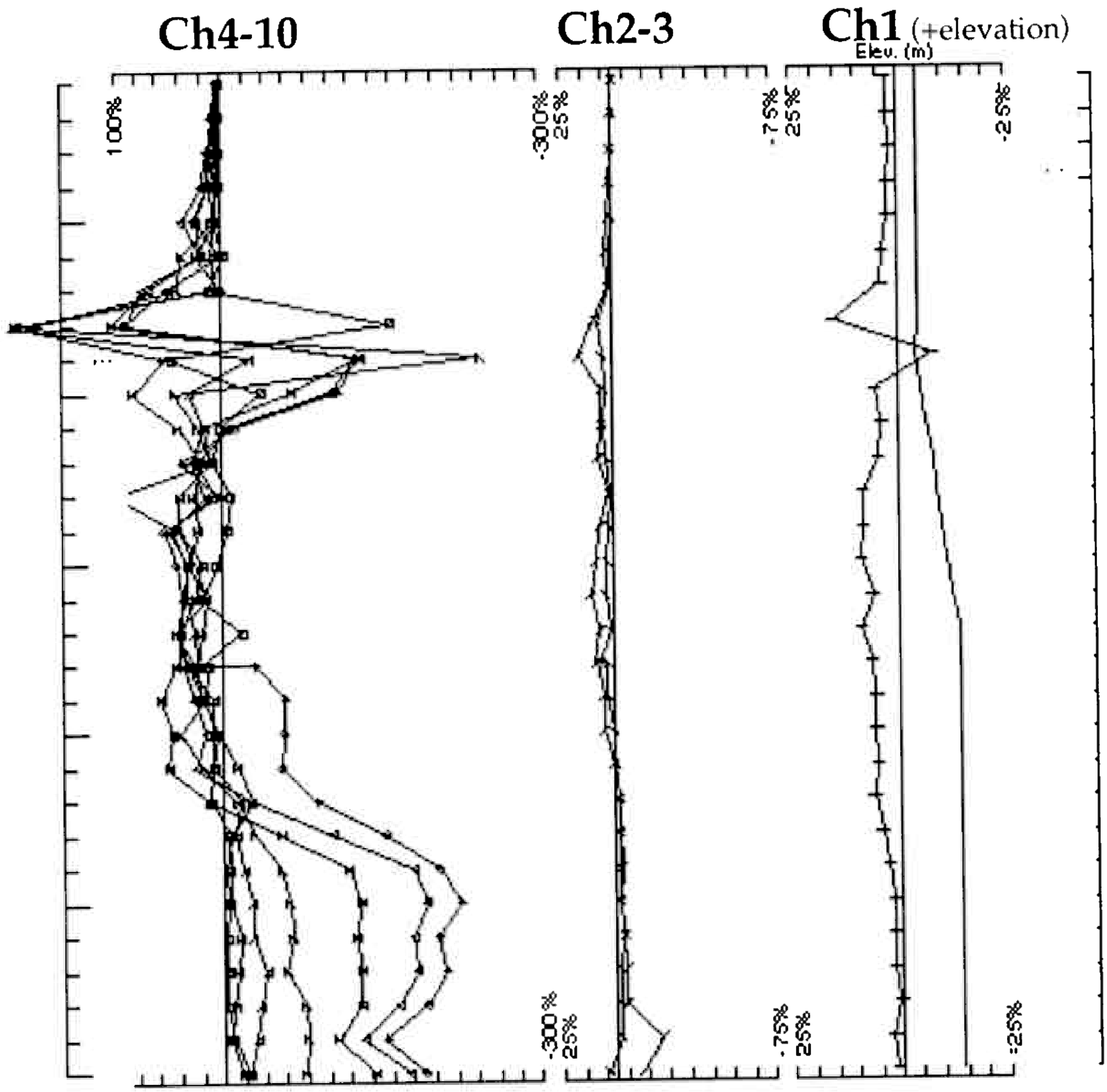
- lowering the frequency: each factor of two lower in frequency would add a channel relatively free of the affects of the powerline. The cost would be increased stacking time at each station.

- taking multiple readings: each reading starts at a different (random) point on the 60-cycle waveform. The sum of several readings will tend to better average out any affect.

- alternative channel sampling: Figure E2b) shows the standard UTEM 3 Boxcar channel sampling. An alternative - tapered channel sampling - is available (and often used) with UTEM 4. In this case if tapered sampling had been available it would likely have been used. The result would have been:

  - a slightly noisier Ch3
  - a considerably improved Ch4
  - an improved Ch5

  The choice of which sampling to use on a UTEM 4 survey depends on the frequency of the survey, the proximity and the frequency of any local powerline and the type of decay seen.



Loop	Secondary, (Chn-Ch1/Hp)	
Line	Contin. Norm at a depth of 0m	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Compt: Hz	Base Freq. 3.872Hz	

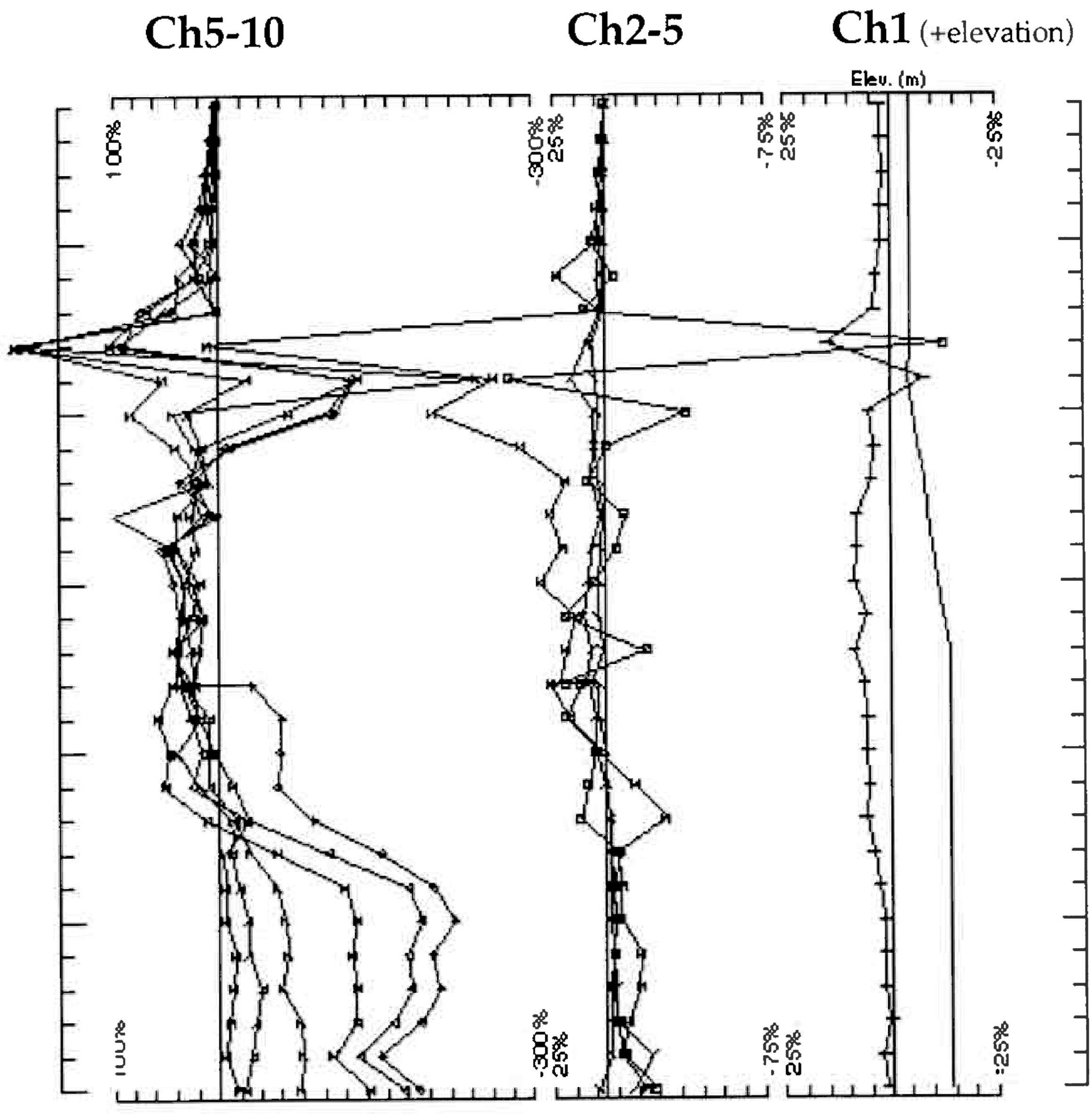
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Appendix E

Figure E1(a)

Original 4Hz data: alternative format

Figure E1a



Loop	Secondary, (Chn-Ch1/Hpl	
Line	Contin. Norm at a depth of 0m	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Compt: Hz	Base Freq. 3.872Hz	

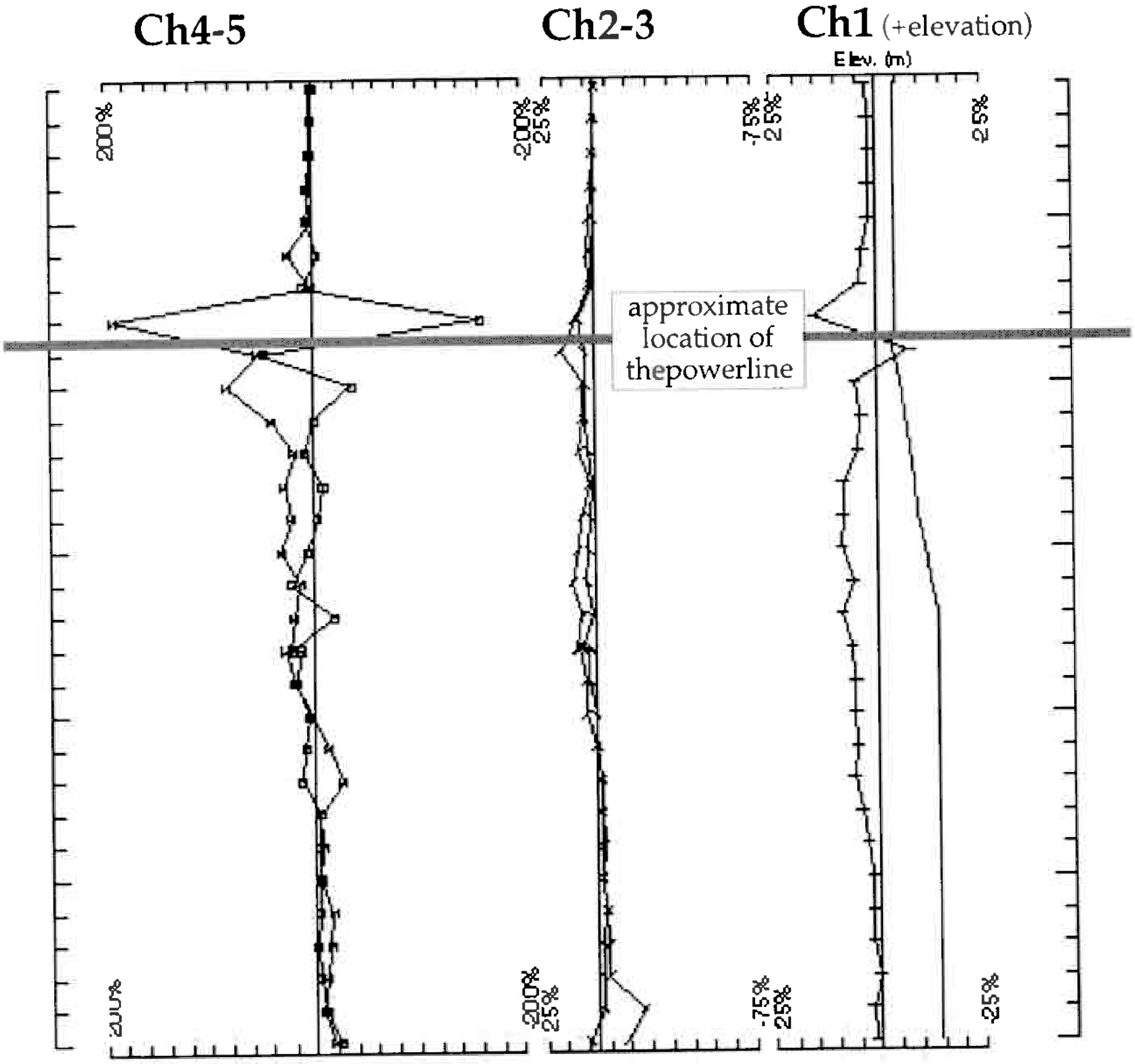
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Appendix E

Figure E1(b)

Original 4Hz data: standard format

Figure E1b



Loop	Secondary, (Chn-Ch1/Hpl	
Line	Contin. Norm at a depth of 0m	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Compt: Hz	Base Freq. 3.872Hz	

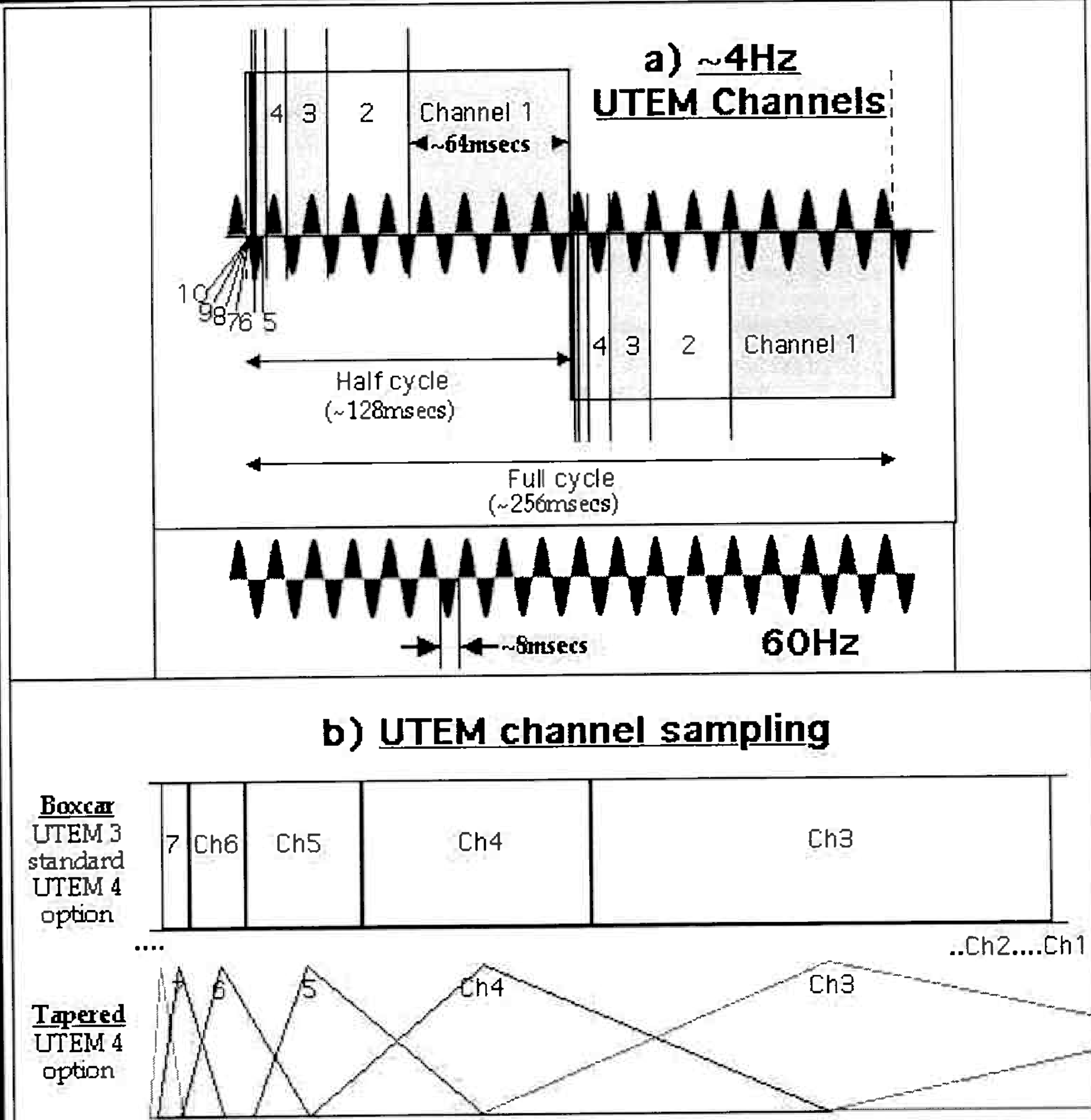
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Appendix E

Figure E1(c)

Original 4Hz data: Ch4/5 detail

Figure E1c



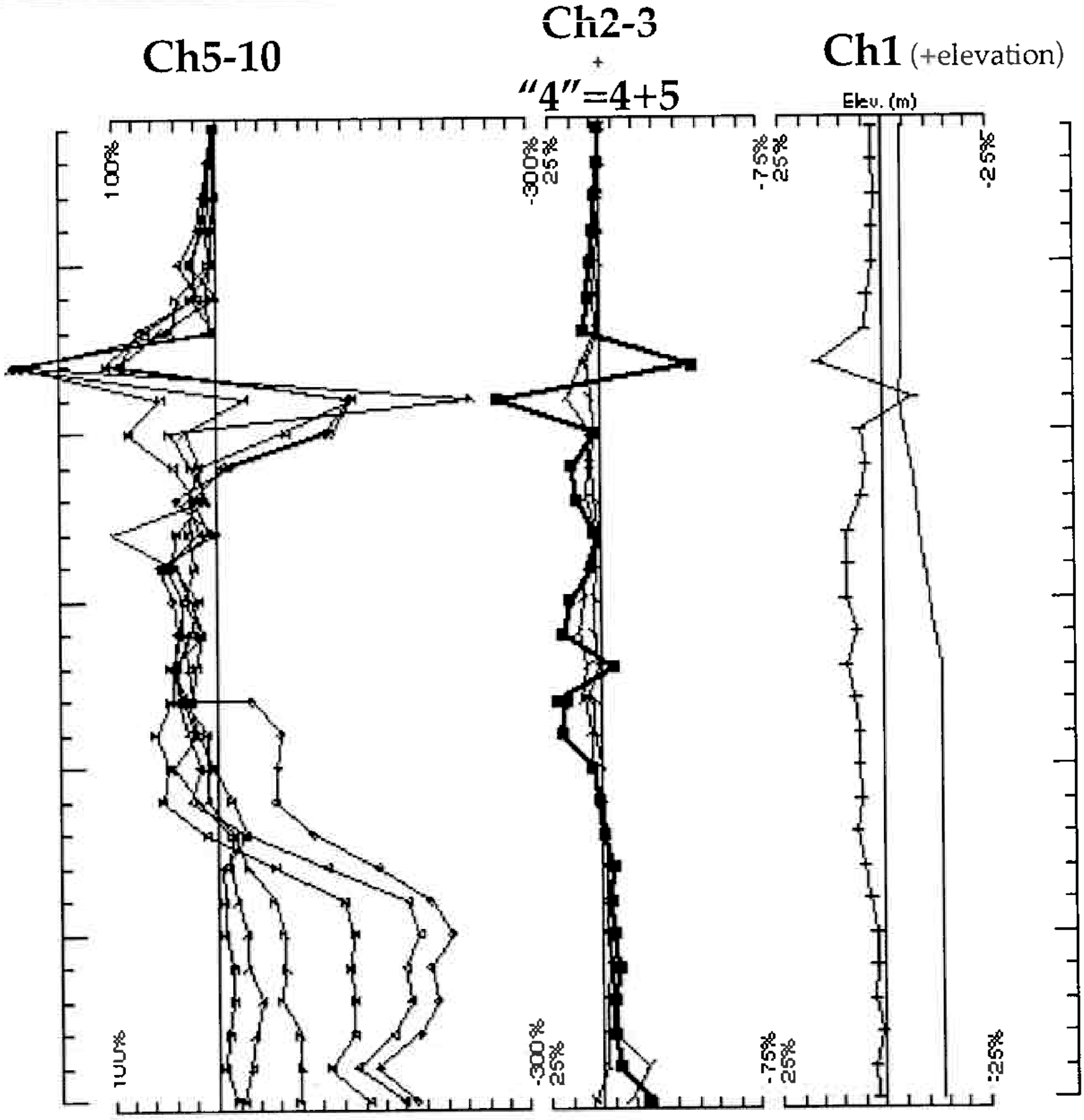
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Appendix E

Figure E2

a) ~4Hz UTEM Channels with 60Hz signal
b) UTEM Channel sampling options

Figure E2



Loop:	Secondary, (Chn-Ch1/Hpl	
Line	Contin. Norm at a depth of 0m	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE
Compt: Hz	Base Freq. 3.872Hz	

"modified" Ch4
=
2/3(Ch4+1/2Ch5)

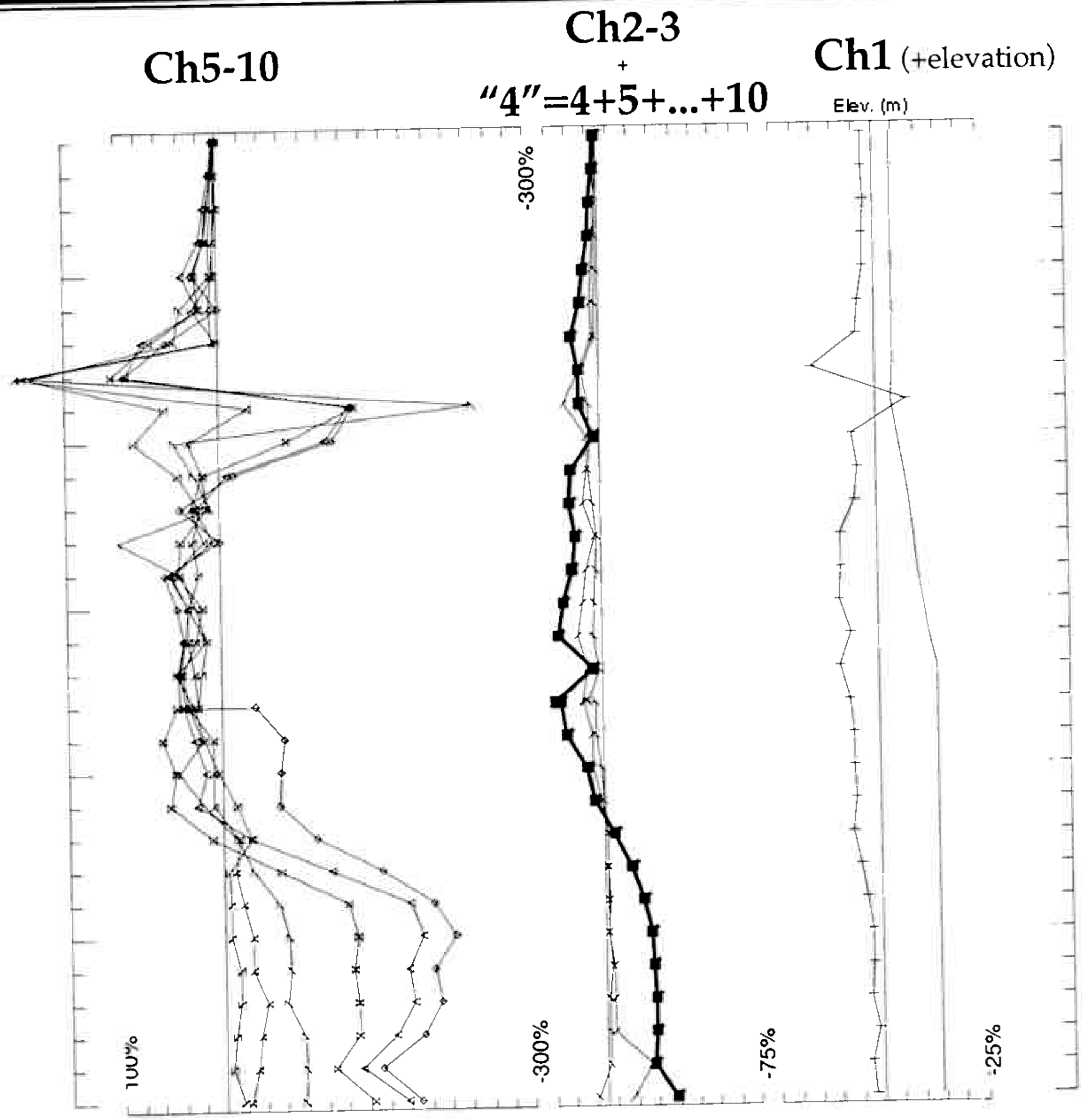
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Appendix E

Figure E3(a)

Modified 4Hz data: Ch4/5 combined

Figure E3a



Loop:	Secondary, (Chn-Ch1/Hpl	
Line	Contin. Norm at a depth of 0m	
Compt: Hz	Base Freq. 3.872Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

"modified" Ch4
=
1/2Ch4+1/4Ch5+1/8Ch6+1/16Ch7)+
1/32Ch8+1/64Ch9+1/128Ch10+
1/128Ch10
Note: extra 1/128Ch10 to ~complete "modified" Ch4

LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Appendix E

Figure E3(b)

Modified 4Hz data: Ch4-10 combined

Figure E3b

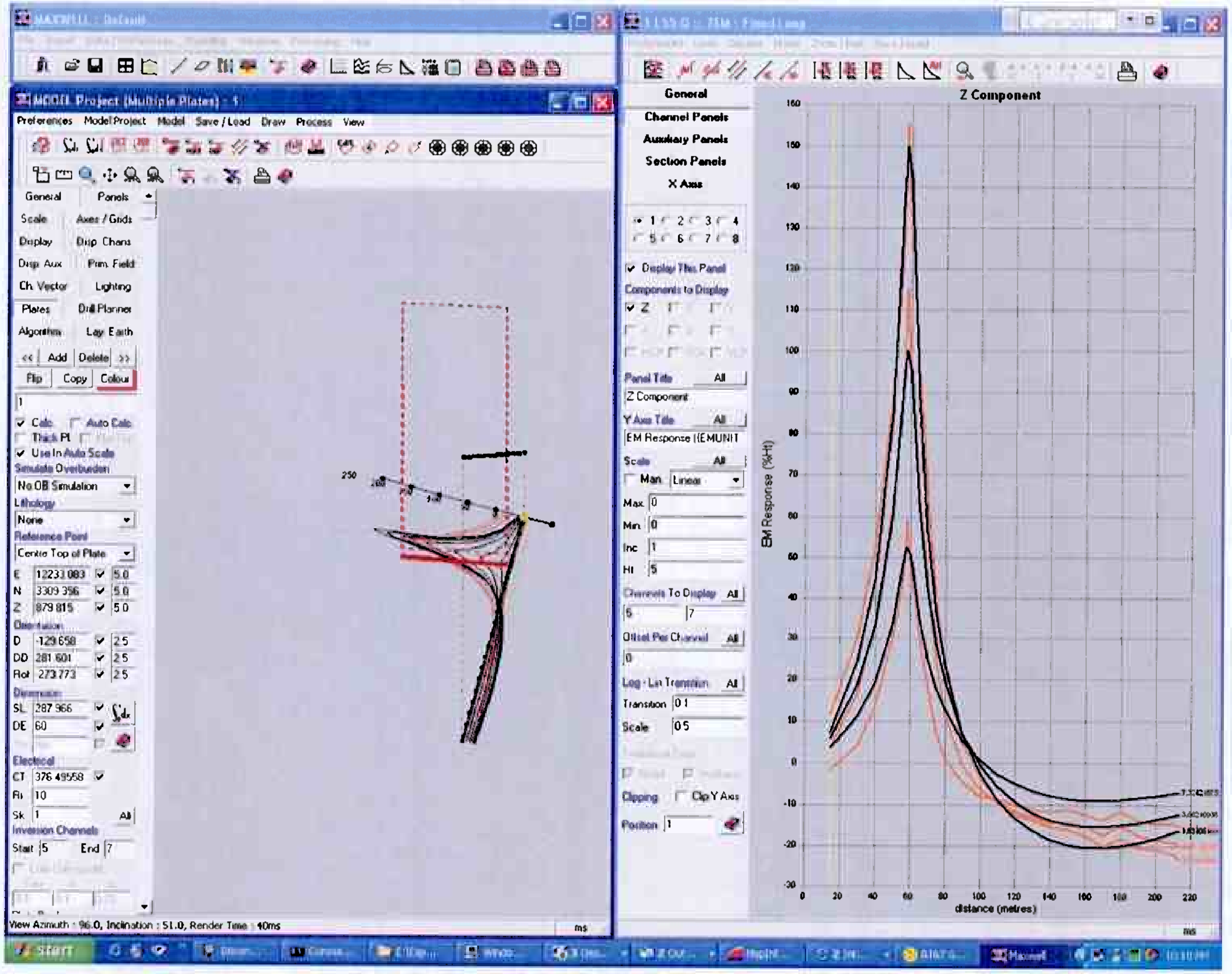
Appendix H

APPENDIX H

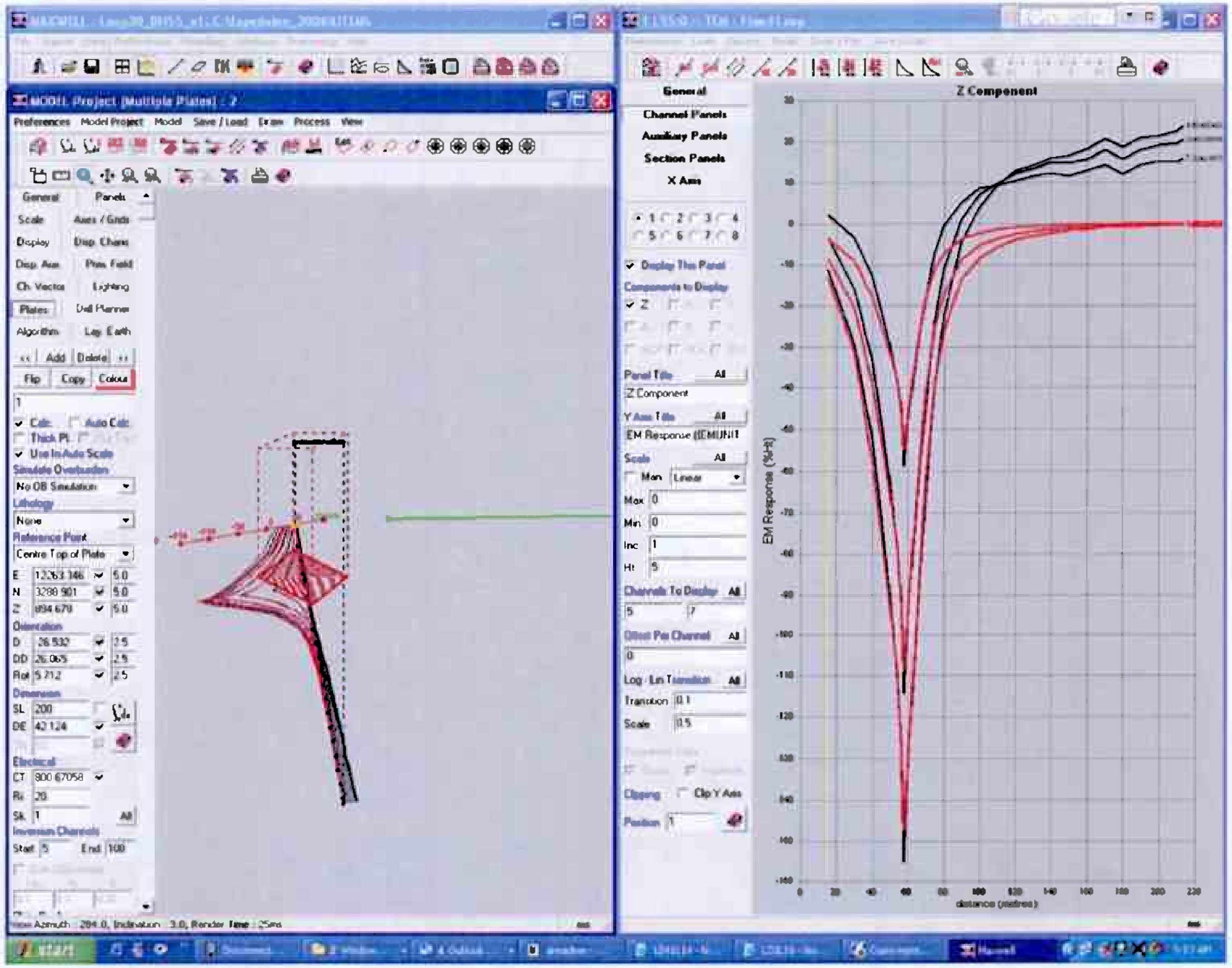
2006 In-house UTEM Maxwell Modeling, Espedalen Project

Anthony Watts,
Falconbridge Ltd for Sulfidmalm A/S

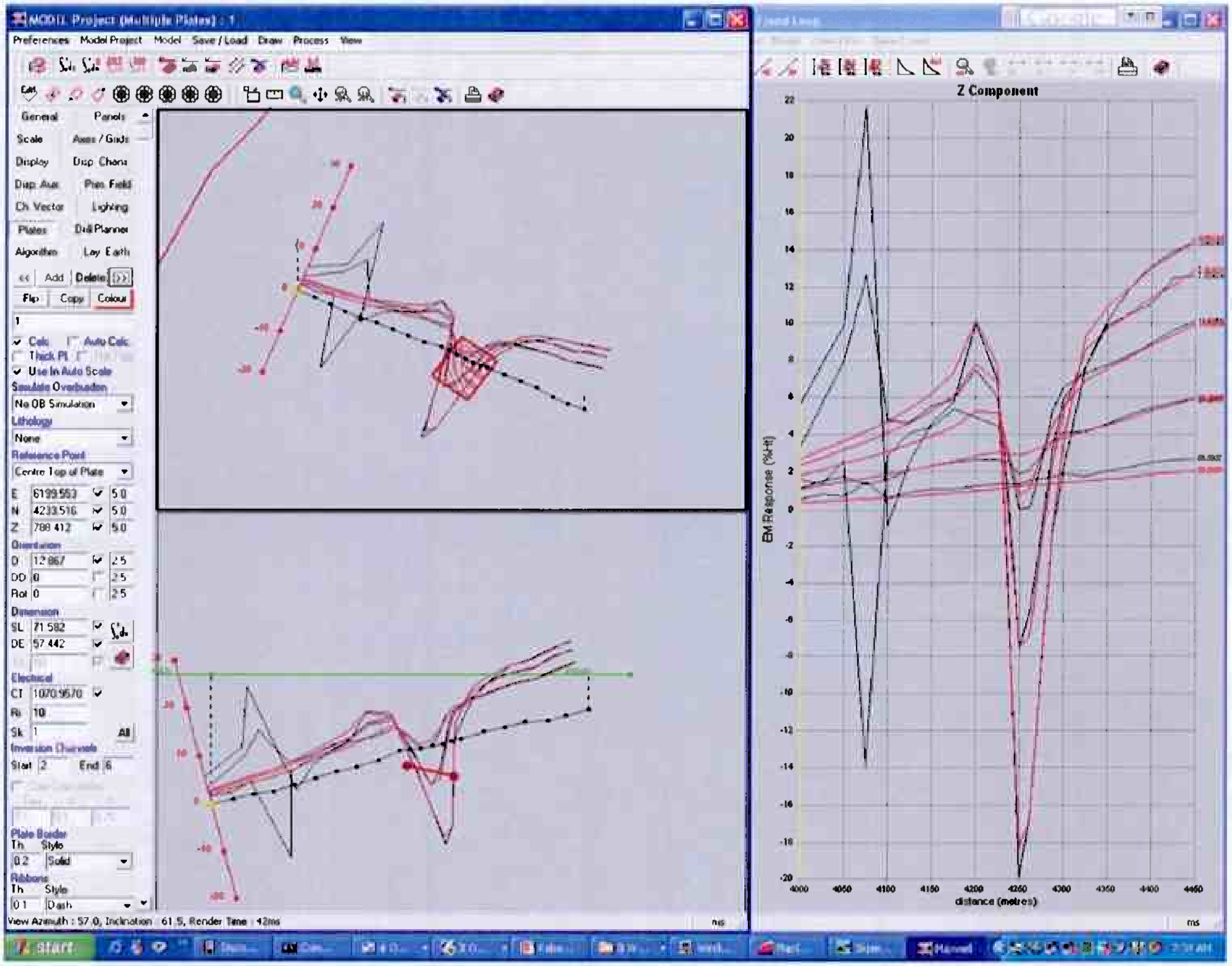
Maxwell Model for Drillhole ES2006-55 – Stormyra
Preliminary version 1



Maxwell Model for Drillhole ES2006-55 – Stormyra
Preliminary version 2 with polarity reversed



Maxwell Model for Loop 36, Line 6200E
2006 Strand Area UTEM Anomaly



Maxwell Model for Loop 31, Line 10300E
2006 Trona Area UTEM Anomaly