Wallbridge Mining Company

-2014 UTEM5 Survey-
Ministic and CBA Ermatinger
Sudbury

Explanation of Costs Incurred

To complete the survey, Wallbridge Mining Company incurred costs in addition to that for the services provided by Lamontagne Geophysics.

Consultant Alan King was contracted by Wallbridge to review and interpret the results of the survey.

Wallbridge Mining contracted Daniel Gauthier Exploration Inc. out of Abitibi, Quebec to cut the 8.1 line kilometer grid.

Canadian Exploration Services Ltd. were contracted to perform DGPS surveys.

Wallbridge employees Tom Johnson, Jesse Bagnell, and Dave Coventry were responsible for supervising the contractors. Dave Smith and Natalie MacLean were responsible for planning the survey, sequestering, supervising and coordinating contractors, and review of the results. Peter Anderson was responsible for data preparation and management. Nick Wray was responsible for assembling the assessment report. Wallbridge's trucks, trailers and snowmobiles were used for the purpose of supervision and establishing access.

From: A.King
To: Dist'n
Date: Mar 2014
Subject: Review of Ministic Geophysics with particular emphasis on recent EM surveys

The Wallbridge Ministic property has been covered with multiple generations of geophysical surveys with particular emphasis on EM surveys to assist in the location of conductive Ni-Cu-PGE sulphide mineralization.

EM surveys have included full or partial coverage with:

Inco
- AEM/Mag

Wallbridge
- Regional airborne Geotem/Mag
- airborne VTEM/Mag 2013
- Ground UTEM5 2013
- airborne HeliTEM/Mag 2014
- ground MaxMin 2014

Reviews of these surveys have indicated 2 untested conductivity targets - one fairly well defined and one probable.
The location of these targets are shown in Figure 1

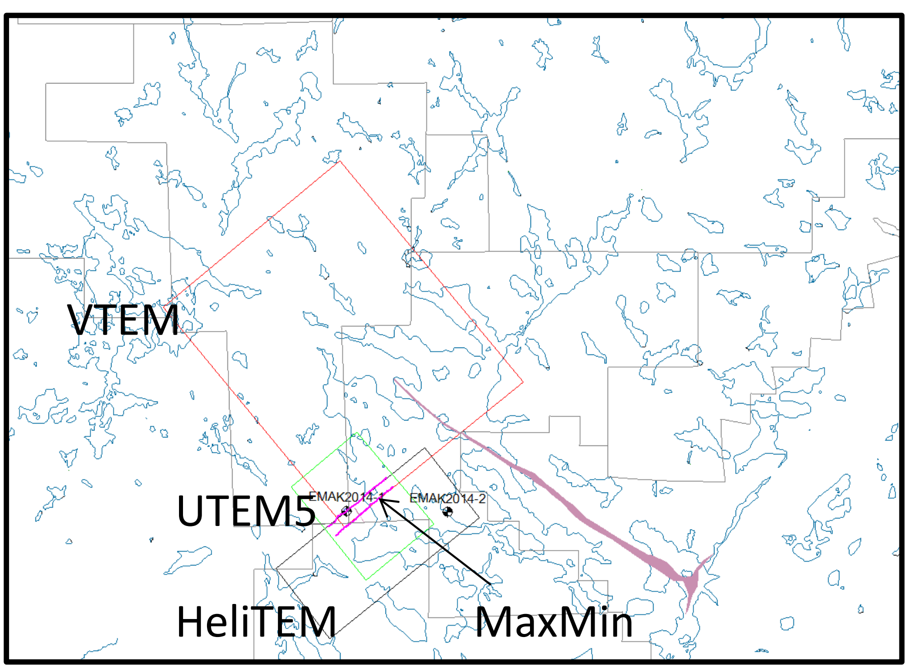


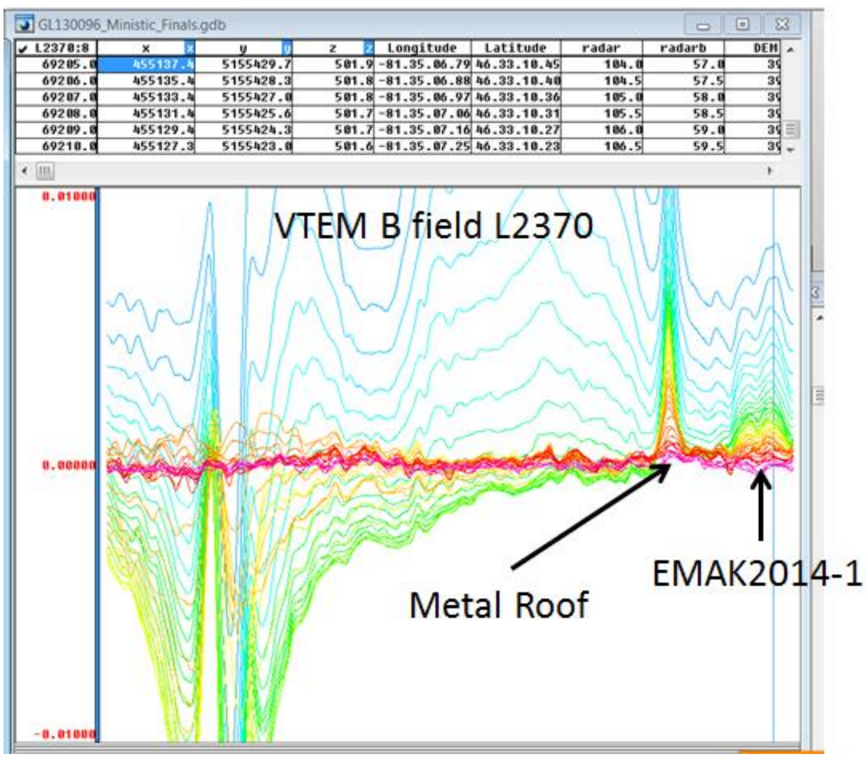
Figure 1 Showing Ministic EM targets and EM survey blocks (AEM and UTEM) and lines (MaxMin)

The EM data over the property is in general of good quality but there is increasing power line noise in the AEM surveys towards the east side of the property and local interference over and around Ministic Lake from cottages and electrical lines (some underwater).
Ground EM surveys were targeted on areas of interest identified from the AEM surveys and other data.

Targets

EMAK2014-1

This target area was first identified in the later time (LT) 2013 VTEM AEM db/dt and B field data as shown in Figure 2 and was subsequently covered by ground UTEM5, airborne Helitem, and Maxmin surveys. The UTEM5 survey showed small scale anomalies in the same area in most time channels and components in in-loop and out-loop data.



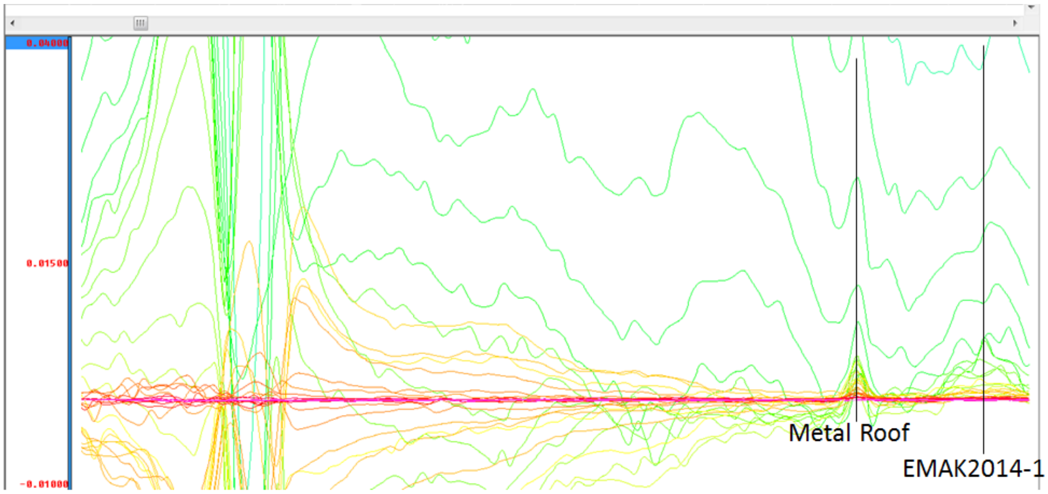


Figure 2 VTEM AEM B Field (top) and and dB/dt (bottom)

The target is also apparent the Helitem LT db/dt data but is not as clear in the Helitem B field data due to high noise levels.
The ground Maxmin data targeted on this anomaly was overwhelmed by topographic noise and natural EM noise in the in-phase component with the noise exceeding the expected response from the target as interpreted from other EM surveys.
The target was modeling in Maxwell for VTEM, UTEM (in and out loop) and Maxmin in an effort to find a source body that fit all the data. Interpretations for the VTEM and UTEM surveys are similar but not identical suggesting an area of small complex veins with various orientations rather than a single discrete conductive body.
The characteristic double peaked VTEM LT B field anomaly suggests a small sub-vertical relatively shallow source but most models (by Dele and myself) also suggested a deeper good quality sub-horizontal or wide source to explain the broad positive AEM late-time plateau typical of a flat or flat topped source. However these models with flat sources were clearly not compatible with the UTEM in-loop data that, with its mainly vertical primary field, should be quite sensitive to any flat source body. After considerable work with the various data sets it appears that the most likely scenario that could explain all the data is as follows:

- a very small relatively shallow sub-vertical plate at the anomaly location above a similar but slightly larger, deeper, and possibly fatter plate as shown in Figure 3.

- the signal from these small very conductive plates decays slowly explaining the discrete LT db/dt and B field responses.
- Because the signal is close to noise levels the characteristic null value in the center of the anomaly due to a vertical plate is wiped out by natural noise in the dB/dt data and by noise plus filtering applied in processing to get the B field data. Hence the overall LT response is aliased (destructively filtered) into a broad background response.

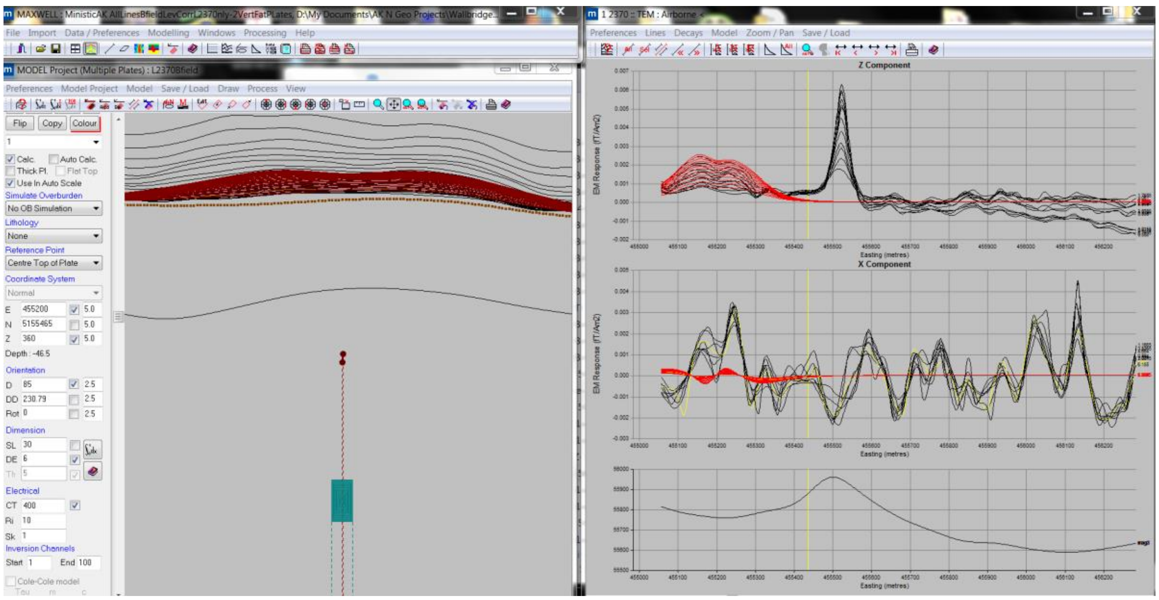


Figure 3 VTEM Line 2370 - Maxwell Model 3 Two fat Vertical Plates

Due to the variety of responses in the different surveys it appears that this may be an area of small complex veins with various orientations rather than a single discrete conductive body. In previous drilling on small high conductance targets like this on the NW Range we have intersected conductive/magnetic magnetite but in this case there is no local mag high over the EM anomaly.

It is likely that this conductor extends along strike to the conductor interpreted by Dele on VTEM line 2380 as shown in plan view in Figure 4 . It may also extend further SE to the crossover in the UTEM Z component data on Line 500 N although there is no clear evidence of this in the Helitem data.

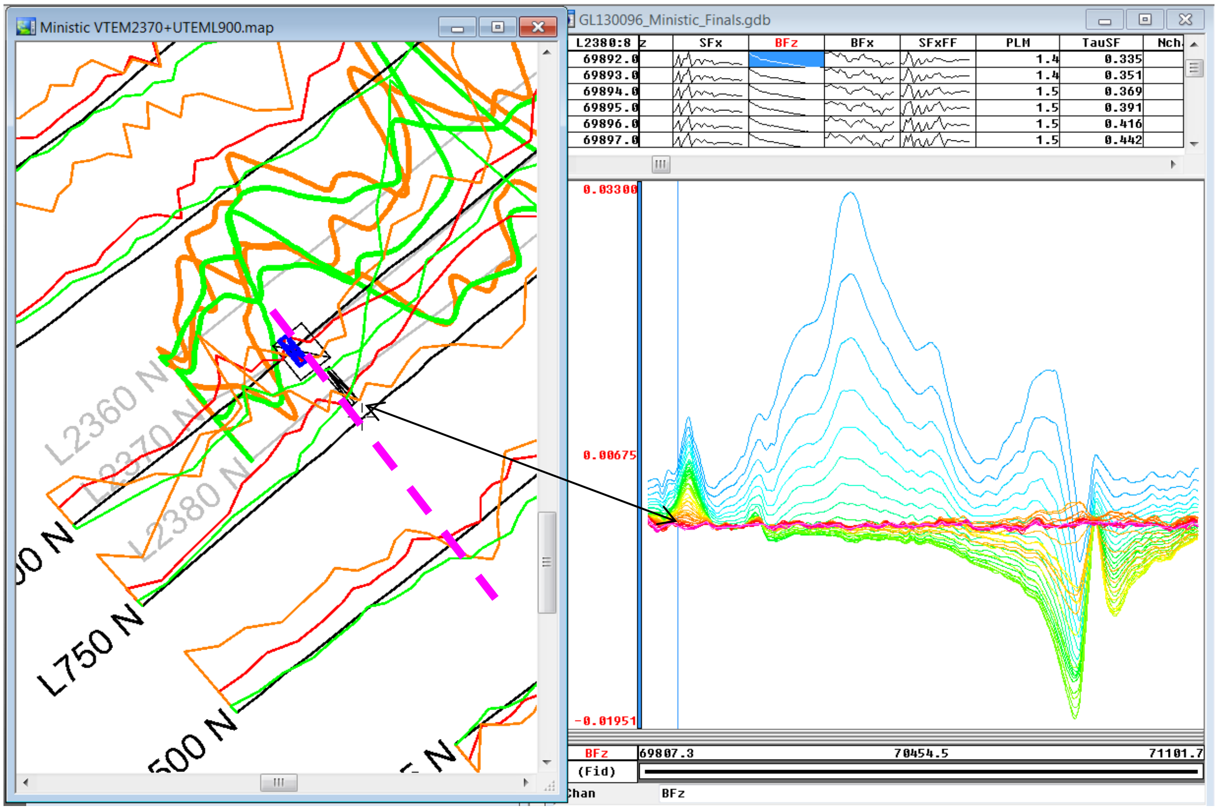


Figure 4 UTEM and VTEM B field data in plan and VTEM B field data from L2380 shown in profile plus Plates interpreted from VTEM data by AK L2370 (in blue) and Dele L2380 (shown in black)

An Autocad .dxf file of the most likely VTEM L2370 model (2 sub-vertical plates at different depths at the anomaly location) is attached. The modeled plate are small but quite conductive and are of interest as they could represent small conductive veins in a larger less conductive/disseminated mineralized system like the Vale's Capre project.

Due to the uncertainty surrounding the exact nature of the source it is suggested that all possible models be reviewed with the exploration team to design a drill follow up plan that maximizes the probability of success.

EMAK2014-2

This target (shown in Figure 4) has only been detected in the Helitem data on line L10100 but is similar enough to the EMAK2014-1 signature to warrant further consideration if the results from EMAK2014-1 are positive.

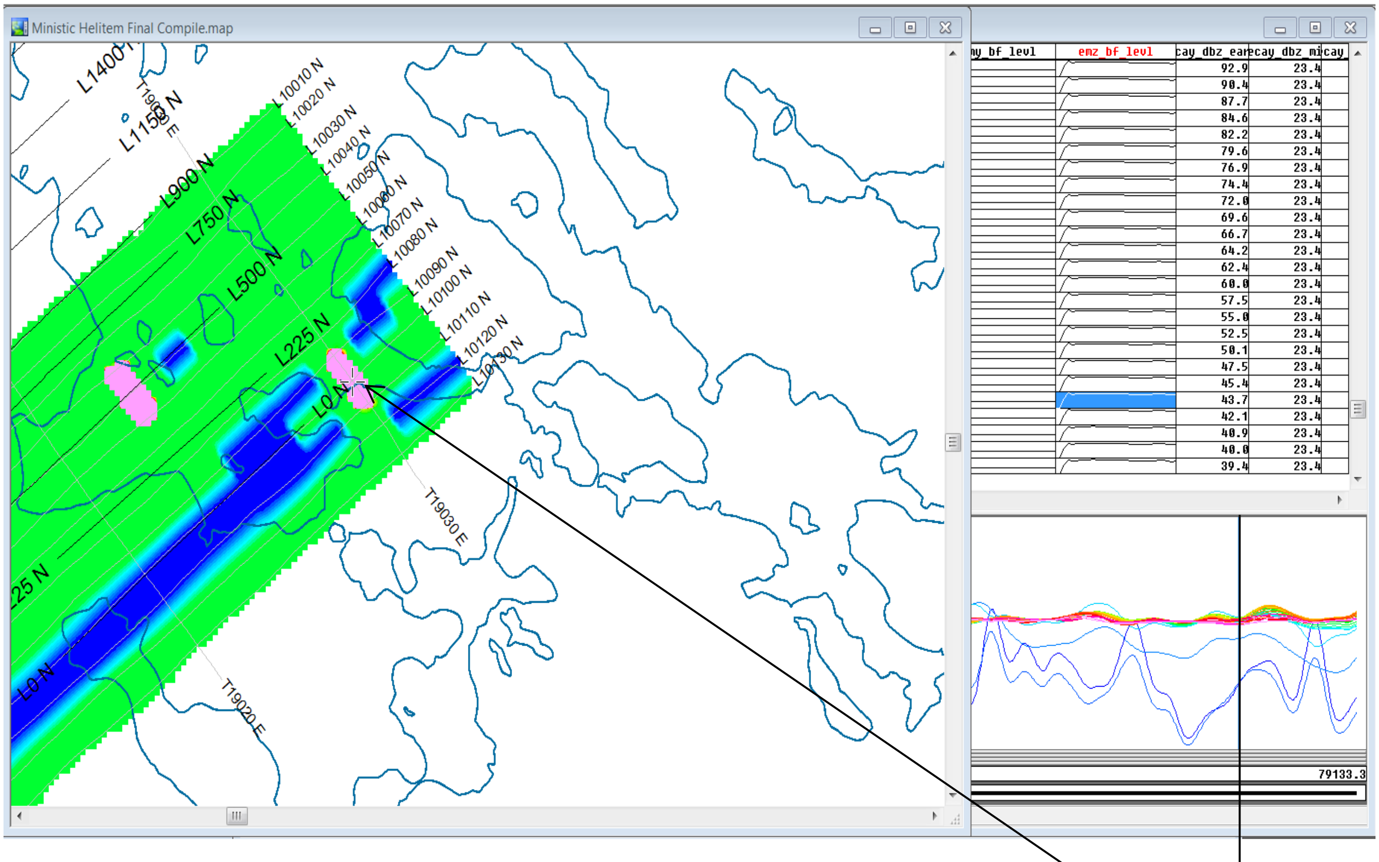
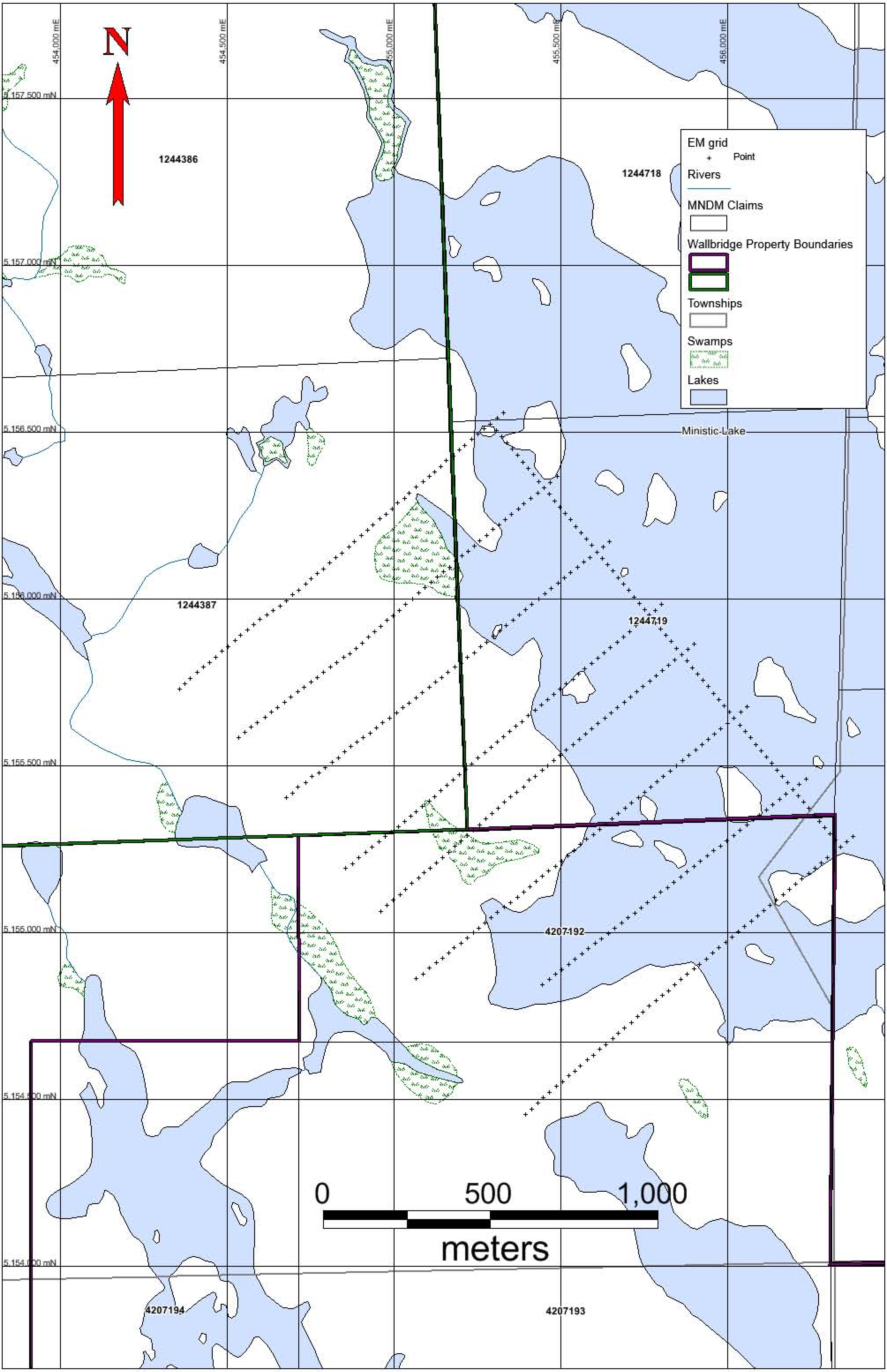


Figure 4 EMAK2014-2 Helitem B field data Line L10100



N
454,000 mE
454,500 mE
455,000 mE
455,500 mE
456,000 mE
5,157,500 mN
5,157,000 mN
5,156,500 mN
5,156,000 mN
5,155,500 mN
5,155,000 mN
5,154,500 mN
5,154,000 mN
1244386
1244718
1244387
1244719
4207192
4207194
4207193
Ministic Lake
EM grid
Point
Rivers
MNDM Claims
Wallbridge Property Boundaries
Townships
Swamps
Lakes
0
500
1,000
meters

-2014/14 UTEM5 Survey Report-
Ministic Grid
Sudbury District
for
Wallbridge Mining Company Ltd.

LAMONTAGNE GEOPHYSICS LTD
GEOPHYSIQUE LTEE

February, 2014

Rob Langridge, M.Sc.

CONTENTS

Figures

Appendices

INTRODUCTION

During the period of January 14th 2014 through into February 2014 a UTEM5 survey (surveying days: January 19th - January 28th) was carried out by Lamontagne Geophysics Limited personnel for Wallbridge Mining Company Ltd. on the Ministic Grid in the Sudbury District. The location/layout of the Ministic survey is shown in Figures 1 and 2. The UTEM5 survey was carried out to test anomalies outlined by an airborne survey, to detect/outline new conductors and to detect/outline deeper features and potential depth continuations of shallow features.

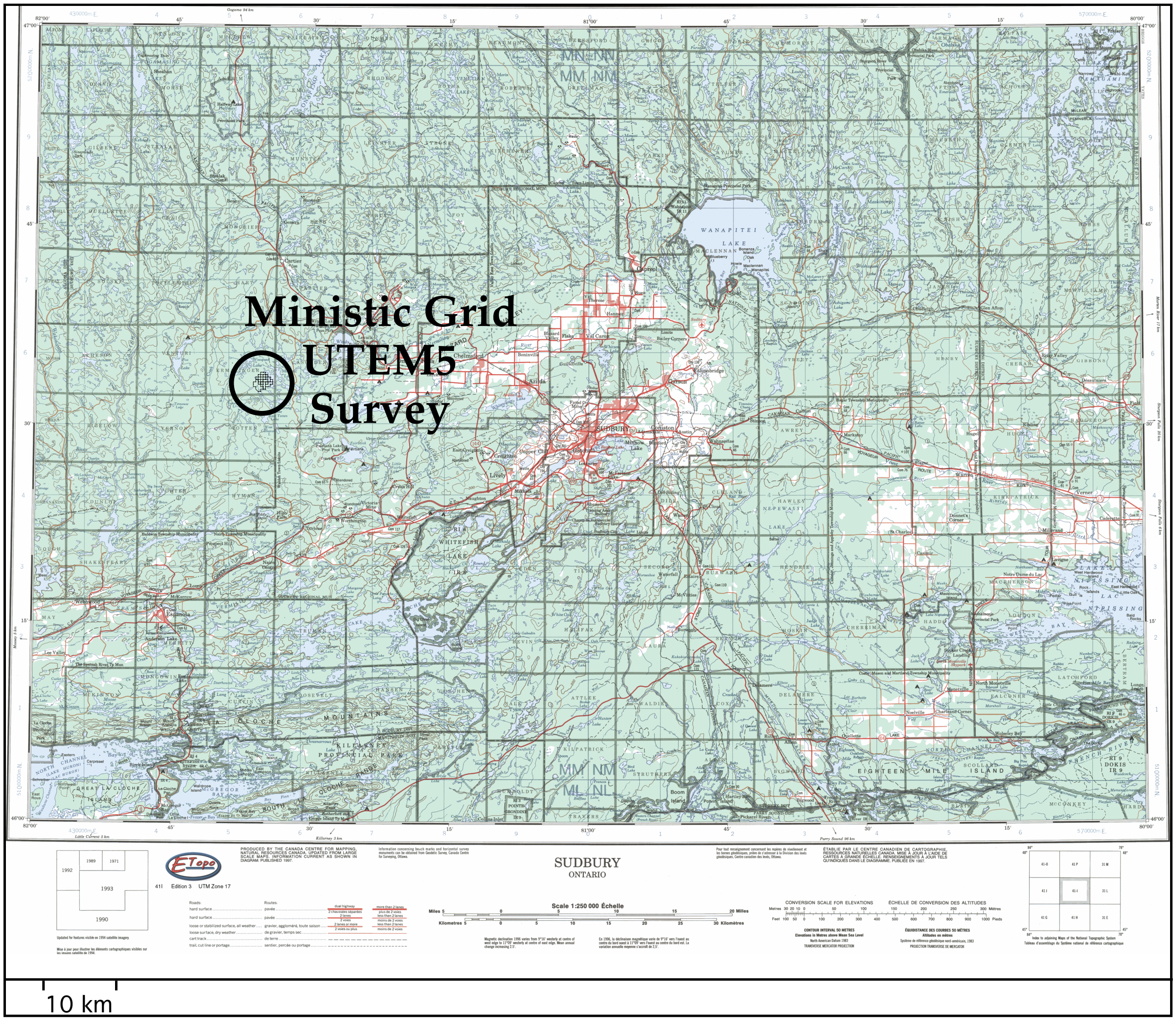
A total of 10.000 line km of Hz/Hx/Hy UTEM5 data was collected with the UTEM5 receiver using a two transmitter loops (Figure 2). For all stations on the Ministic Grid three-component data were collected from two loops simultaneously. The survey frequencies for the Ministic Grid were as follows:

- 12Ch UTEM5 two loop coverage (27.250 line km) of the Ministic Grid
  actual frequencies (in the ratio of 2:1) were:
  2.045Hz (inside-the-loop) - Loop 1450
  4.090Hz (outside-the-loop - loop to the gridwest) - Loop 1451

This report documents the UTEM5 survey in terms of logistics, survey parameters and field personnel, outlines the data processing and discusses the results. Appendix A contains the data presented as Hz/Hx/Hy profiles.

Other appendices contain:

- List of Personnel/Production Diary (Appendix B)
- an outline of the UTEM5 System (Appendix C)
- Note on sources of anomalous Ch0 (Appendix D)



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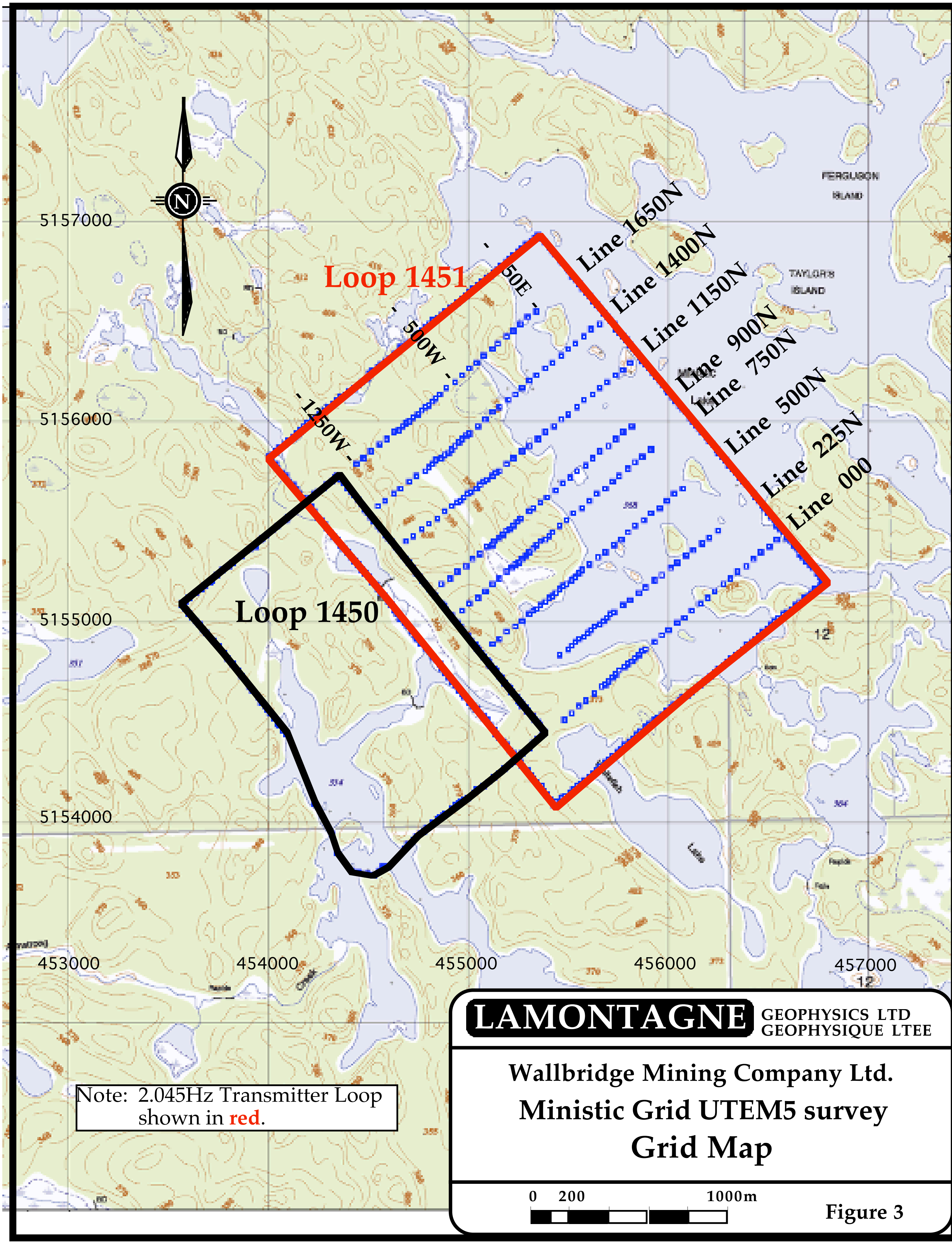
Ministic Grid UTEM5 survey

Location Map

Figure 1



N
5157000
5156000
5155000
5154000
453000
454000
455000
456000
457000
FERGUSON ISLAND
TAYLOR'S ISLAND
Loop 1451
Loop 1450
Line 1650N
Line 1400N
Line 1150N
Line 900N
Line 750N
Line 500N
Line 225N
Line 000
250E
500W
1250W
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Wallbridge Mining Company Ltd.
Ministic Grid UTEM5 survey
Grid Map
0 200 1000m
Figure 3
Note: 2.045Hz Transmitter Loop shown in red.

SURVEY DESIGN

The UTEM survey was planned and carried out to test anomalies outlined by an airborne survey, to detect/outline new conductors and to detect/outline deeper features and potential depth continuations of shallow features.

The grid and loop layout was designed by Wallbridge Mining Company Ltd. personnel in consultation with Lamontagne Geophysics. Loop size and location were selected to provide good coupling with the expected targets, to allow efficient coverage of the area of interest and to minimise .

The survey parameters employed are as follows:

- line spacing of 250m adjusted in places to detail airborne anomalies
- station interval of 50m/25m in areas of interest (Figure 2)
- a total of 2 transmitter loops
- three component measurements, collected from two Tx loops simultaneously:
  - • inside-the-loop 2.045Hz coverage
  - • outside-the-loop (loop to the gridwest) 4.090Hz coverage
- 12 Ch/136s single stacking (with duplicate readings as required).
- frequencies for main grid coverage (in the ratio 2:1) (Figure 3):
  - • 2.045Hz (outside-the-loop - loop to the grideast) Loops 1450
stacking: 285 full-cycles/ 570 half-cycles
  - •4.090Hz (outside-the-loop - loopfront parallel to line) Loops 1451
stacking: 570 full-cycles/1140 half-cycles

Wallbridge Mining Company Ltd. provided GPS (NAD 27) locations for all survey stations and the transmitter loops. The LGL crews routinely collect handheld-GPS (Garmin eTrex) data for all transmitter loops for the purpose of control.

Note: Geometric control should be considered a mandatory part of the interpretation of any UTEM survey where the target is potentially non-decaying. Poor geometric control has the potential to both mask and invent Ch0 (latest time) conductors (Appendix D).

outside frequency		4.090910 Hz	
	period	0.24444 s	
(5MHz clock)	half period	611110 0.2μs cycles	
(narrowest Ch=1unit)	XNP	**4248** /halfperiod	
	width of unit channel	2.87717e-5 s	
	width of unit channel	28.7717 μs	
(symbol) channel	peak of tapered Ch (μs)	tapered Ch begins - unit -	tapered Ch - unit -
timing Ch13	14.39	-0.5	1.5
12	43.16	0.5	3
11	86.32	1.5	6
10	172.63	3	12
9	345.26	6	24
8	690.52	12	48
7	1381.04	24	96
6	2762.08	48	192
5	5524.17	96	384
4	11048.33	192	768
3	22096.67	384	1536
2	44193.34	768	3072
1	88386.67	1536	4171
0	120006.77	3072	4246.5
timing Ch15	122179.04	4171	4247.5
timing Ch14	122207.81	4246.5	4248+0.5
	sub-stack time =	**1.466666** s	
	number of substacks =	**95** substacks	
	stacking time =	139.33 s	
	cycles stacked =	570 cycles	
	half-cycles stacked =	1140 half-cycles	

in-loop frequency		2.045455 Hz	
	period	0.48889 s	
(5MHz clock)	half period	1222221 0.2μs cycles	
(narrowest Ch=1unit)	XNP	**4248** /halfperiod	
	width of unit channel	5.75434e-5 s	
	width of unit channel	57.5434 μs	
(symbol) channel	peak of tapered Ch (μs)	tapered Ch begins - unit -	tapered Ch ends - unit -
timing Ch13	28.77	-0.5	1.5
12	86.32	0.5	3
11	172.63	1.5	6
10	345.26	3	12
9	690.52	6	24
8	1381.04	12	48
7	2762.08	24	96
6	5524.17	48	192
5	11048.33	96	384
4	22096.67	192	768
3	44193.34	384	1536
2	88386.67	768	3072
1	176773.34	1536	4171
0	240013.55	3072	4246.5
timing Ch15	244358.08	4171	4247.5
timing Ch14	244415.62	4246.5	4248+0.5
	sub-stack time =	**1.466666** s	
	number of substacks =	**95** substacks	
	stacking time =	139.33 s	
	cycles stacked =	285 cycles	
	half-cycles stacked =	570 half-cycles	

A target frequency is entered for each UTEM transmitter and the local powerline frequency are entered in the UTEM receiver. The actual frequencies used are selected by the receiver sofware to be as close to the entered target frequencies as possible while optimizing rejection of the other transmitters and powerline noise. In this instance the two frequencies are in the ratio **2:1**.

The minimum substack time is set by the receiver software to the shortest time that will include an integer number of cycles of each frequency used and 30Hz (the first harmonic of the 60 Hz powerline frequency).

Allowable stacking times are required to be a multiple of the minimum substack time.

Where responses extend to the latest time-channel measured (Ch0) the survey frequency can be lowered. Reducing the number of channels from 12 to 10 allows for a wider anti-aliasing filter bandwidth. This can help improve S/N (signal-to-noise ratio) when dealing with high-frequency noise - eg. wind “whistling”.

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UTEM5 survey

12Ch base frequencies: details

Figure 3

SURVEY LOGISTICS

A Lamontagne Geophysics crew mobilized the UTEM5 survey equipment from Kingston, Ontario, to Sudbury on January 13th. The Lamontagne Base of operations in the Sudbury District is in Chelmsford and the crew was housed in the Valley Inn Motel Hotel in nearby Azilda. The initial crew consisted of Gerry Lafortune (crew chief/operator), Phil Guimond (asst. crew chief/Rx operator), Rob Sinclair (geophysicist/operator), Bill Dingwall (Tx operator/electronics), Richard Lahaye (Rx/Tx operator) and Tyler Gallant (Tx operator) with Dale Pitman (field assistant) joining the crew from January 24th onward.

The crew met with Wallbridge personnel on January 14th to receive their site orientation and then headed out to lay out the initial loops on the Wallbridge Ministic Project. Surveying began on the Ministic Grid on January 19th. Transportation to and from the grid was by pickup and transport onsite was by snowmobile/on snowshoe as required/feasible. The location of the Ministic Grid is shown in Figures 1 and 2.

The UTEM5 surveying on the Ministic Grid (detailed in Appendix B - the Production Diary) continued through fairly severe winter weather. Some issues with time-varying responses related to the local (underwater) telecom network (Figures 4/5/6) resulted in a monitor - R2/RD1 - Rx-coil pair being set up on the grid (January 25th and 26th). Coverage was completed on January 28th. At this point wire was picked up and crew began work for Wallbridge on another property in the Sudbury District. The wire pickup continued over the next week, finally being completed on February 5th when two men spent the day freeing up wire frozen into the ice.

The survey equipment consisted of two UTEM5 receiver/coils, 2 UTEM4 Transmitters as well as all necessary accessories, support equipment and backup equipment. Data was reduced on a field computer (PowerBook) and UTEM profiles and digital data were made available/emailed to the client's personnel as the data became available.

Note on response related to the telecom network

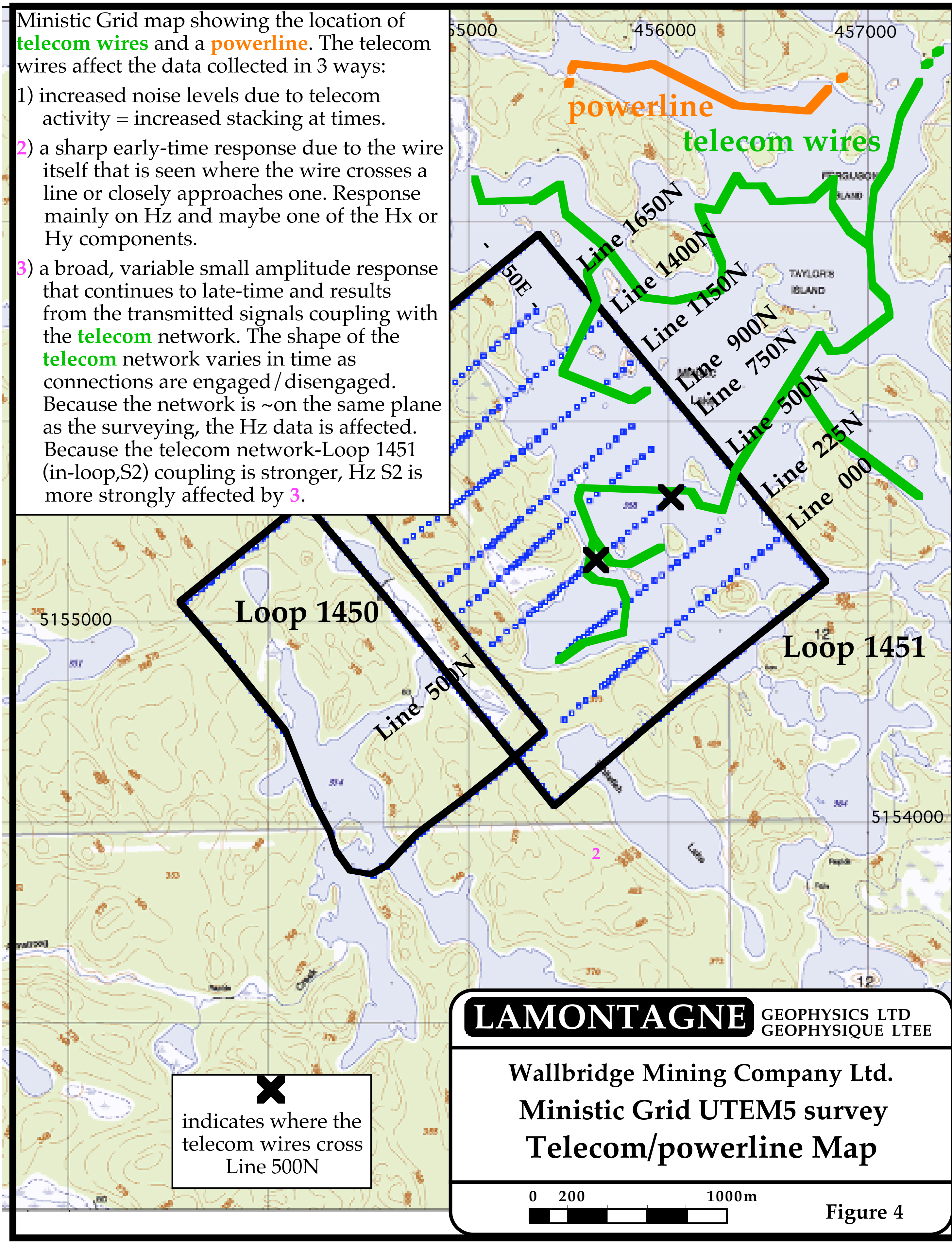
A local (underwater) telecom network services a number of properties on Ministic Lake. The telecom network and the affect the network has on the UTEM5 profiles is shown in Figure 4. Examples of the responses attributed to the telecom network are shown in Figure 5.

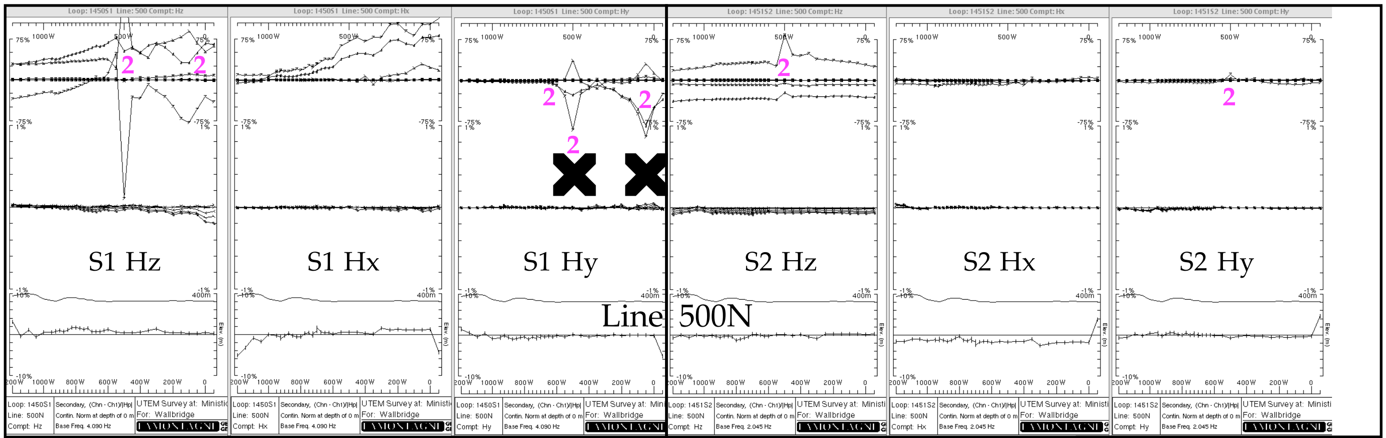
Time-varying responses seen in the profiles, particularly the S2 (2.045Hz Loop 1451) Hz profiles, are attributed to the telecom network. In order to document the responses a monitor - R2/RD1 - Rx-coil pair was set up on the grid for two days (January 25th and 26th). The monitor results (Figure 6) show both short longer term fluctuation with an overall amplitude of ~+/- 0.12 - consistent with the variations seen in the Hz profiles.

In some instances the variation in the telecom network response is simply a flip from one response to another or it takes place overnight such that the response is consistent on one day and consistent but different the following day. The deconvolution routine does a reasonably good job of matching the data across this kind of an event. In some instances, however, the variation seen in the response was more gradual making it more difficult to match up the data. An example would be the Loop 1450S1 Line 750N Hz profile between ~700W and 250W.

Ministic Grid map showing the location of **telecom wires** and a **powerline**. The telecom wires affect the data collected in 3 ways:

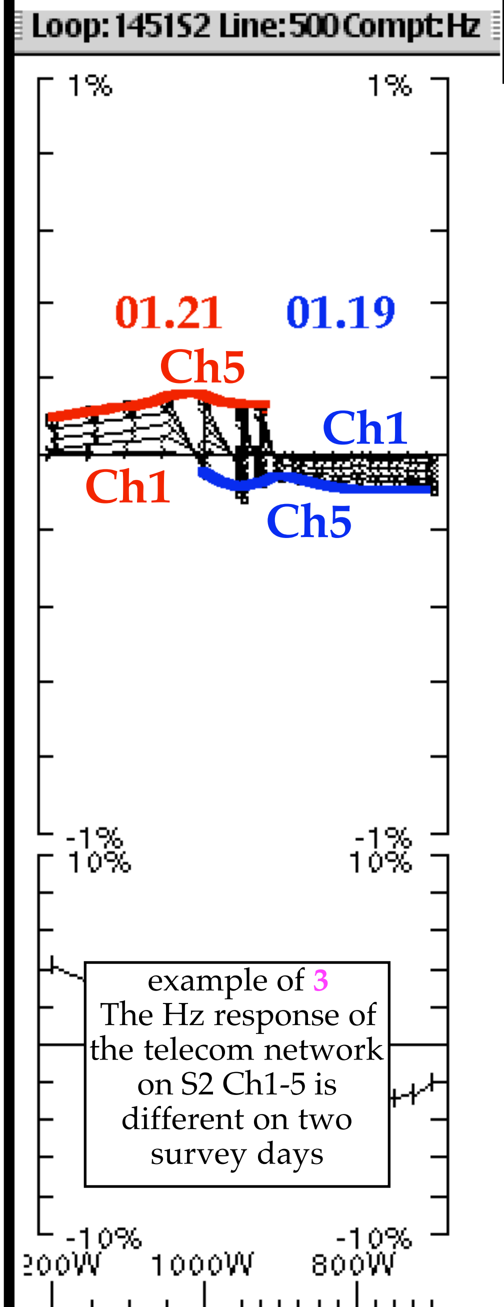
1) increased noise levels due to telecom activity = increased stacking at times.
2) a sharp early-time response due to the wire itself that is seen where the wire crosses a line or closely approaches one. Response mainly on Hz and maybe one of the Hx or Hy components.
3) a broad, variable small amplitude response that continues to late-time and results from the transmitted signals coupling with the **telecom** network. The shape of the **telecom** network varies in time as connections are engaged/disengaged. Because the network is ~on the same plane as the surveying, the Hz data is affected. Because the telecom network-Loop 1451 (in-loop,S2) coupling is stronger, Hz S2 is more strongly affected by 3.





example of 2
The local early-time response of
the telecom network
on Line 500N

indicates where the
telecom wires cross
Line 500N (Figure 4)



Ministic Grid map (Figure 4) shows the location of **telecom wires** and a **powerline**. The telecom wires affect the data collected in 3 ways:

1) increased noise levels due to telecom activity = increased stacking at times.

2) a sharp early-time response due to the wire itself that is seen where the wire crosses a line or closely approaches one. Response mainly on Hz and maybe one of the Hx or Hy components.

3) a broad, variable small amplitude response that continues to late-time and results from the transmitted signals coupling with the **telecom** network. The shape of the **telecom** network varies in time as connections are engaged/disengaged. Because the network is ~on the same plane as the surveying, the Hz data is affected. Because the telecom network-Loop 1451 (in-loop,S2) coupling is stronger, Hz S2 is more strongly affected by 3.

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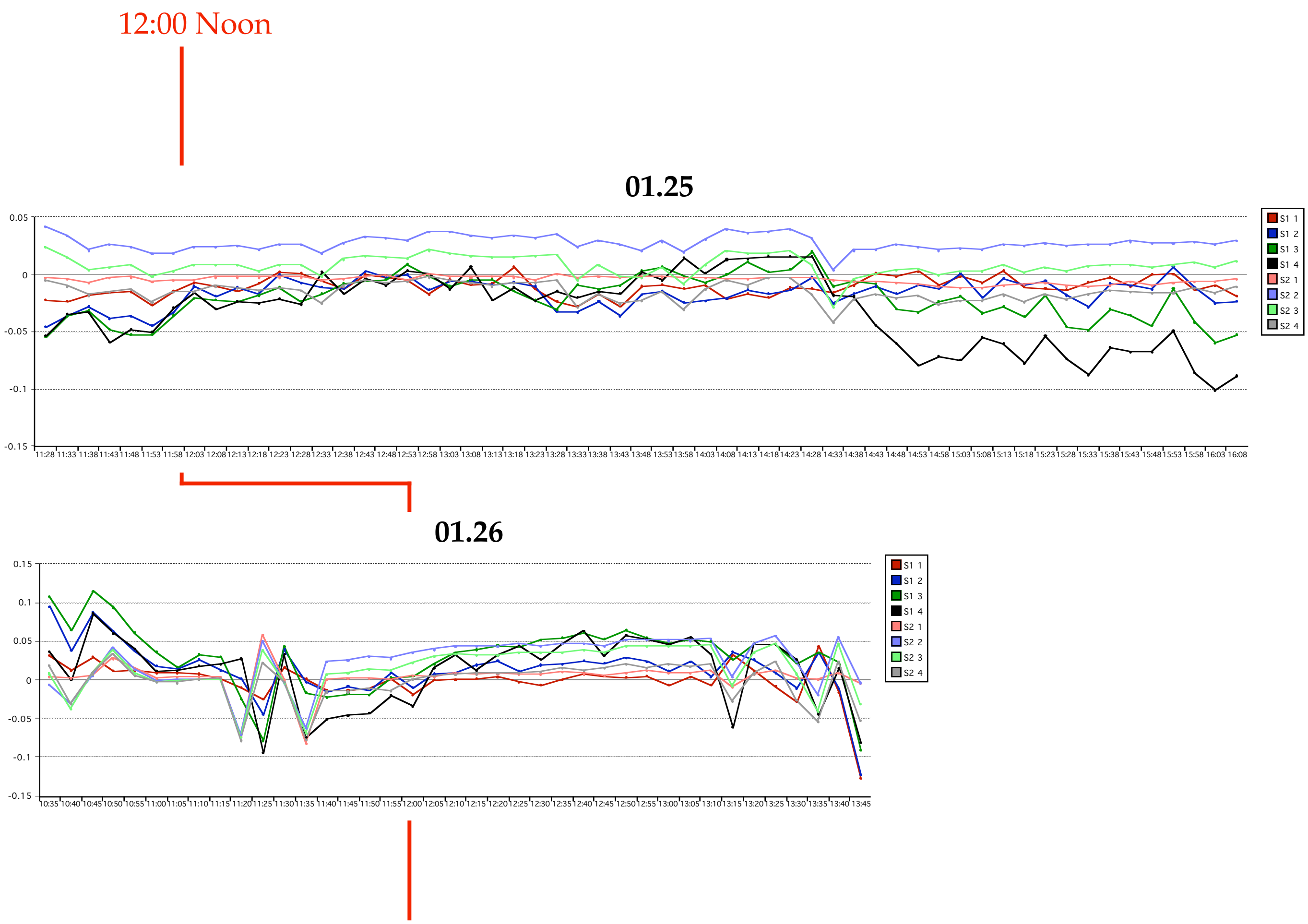
Ministic Grid UTEM5 survey

Telecom response examples

Figure 5



Monitor set up @ Line 750N/500W

Plotted are S1 Ch1-4 and S2 Ch1-4 Hz values (Ch0 normalized)
in general:
both short and longer term fluctuations are seen
overall amplitude is ~+/- 0.12 which is what we see in the Hz profiles
(see example 3 Figure 5)

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Wallbridge Mining Company Ltd.

Ministic Grid UTEM5 survey
Survey monitor results

Figure 6

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 Figure 2. The data presented in Appendix A are reduced with a UTM grid (NAD27) produced from DGPS points provided by the client. Overall the UTEM data quality is considered good. Note: the latest time profiles (Ch0) should be considered in conjunction with other available information (Appendix D).

Profiles are listed by Loop number on the following pages but it was felt that presentation by line number would be more appropriate. For each line surveyed the continuously normalized profiles have been plotted for the three components collected. Profile are presented as 3-axis profiles in order of line number from west-to-east: Line 4000E through Line 8400E. The order is as follows:

Ministic Grid

Loops 1351 - 1352

Hz (HZ) **continuous norm**	2.045Hz	**(blue separator)**
Hx (HL) **continuous norm**	2.045Hz	(blue separator)
Hy (HT) **continuous norm**	2.045Hz	(blue separator)

Loops 1352 - 1353 - 1354 - 1355 - 1361

Hz (HZ) **continuous norm**	4.090Hz	**(pink separator)**
Hx (HL) **continuous norm**	4.090Hz	(blue separator)
Hy (HT) **continuous norm**	4.090Hz	(blue separator)

Note: the 4.090Hz **(pink separator)** profiles include Lines 5400/5600E resurveyed from Loop 1361 @2.045Hz originally surveyed from Loop 1355 @4.090Hz

Note: in future reports UTEM5 data will be presented as:

- HZ the vertical component (currently Hz)
- HL the in-line horizontal component (currently Hx)
- HT the transverse horizontal component (currently Hy)

Outline of profile type

Hz Hx Hy continuous norm ***Ch0 reduced***

Continuous normalization is useful for detection of the presence of anomalies at any position on a profile. The anomaly shape is distorted by normalization to the local field. Near the wire (large field) the continuously normalized Ch0 tends towards zero.

Note: Ch0 is later in time and narrower than Ch1 (Appendix C).

The Hz/Hx/Hy continuously normalized data are presented as 3-axis profiles:

for the 12Ch @ 4.090/2.045Hz data:

top axis - Ch6-12	*Ch0 Reduced*
middle axis - Ch1-6	*Ch0 Reduced*
bottom axis - Ch0	*Primary Field Reduced*
bottom axis - topo	*some vertical exaggeration*

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

Appendix A

1401 UTEM5 Profiles

UTEM5 Survey

Ministic Grid
Sudbury District

for

Wallbridge Mining Company Ltd.

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 Figure 2. The data presented in Appendix A are reduced with a UTM grid (NAD27) produced from DGPS points provided by the client.

Overall the UTEM data quality is considered good. Note: the latest time profiles (Ch0) should be considered in conjunction with other available information (Appendix D).

For each line surveyed the continuously normalized profiles have been plotted for the three components collected. Profiles are listed by Loop number and presented as 3-axis profiles in the following order:

Ministic Grid

Loop 1450	**Hz** (HZ) **continuous norm**	4.090Hz	**(pink separator)**
	Hx (HL) **continuous norm**	4.090Hz	(yellow separator)
	Hy (HT) **continuous norm**	4.090Hz	(yellow separator)
Loop 1451	**Hz** (HZ) **continuous norm**	2.045Hz	**(blue separator)**
	Hx (HL) **continuous norm**	2.045Hz	(blue separator)
	Hy (HT) **continuous norm**	2.045Hz	(blue separator)

Note: in future reports UTEM5 data will be presented as:

- HZ the vertical component (currently Hz)
- HL the in-line horizontal component (currently Hx)
- HT the transverse horizontal component (currently Hy)

Outline of profile type

Hz Hx Hy continuous norm ***Ch0 reduced***

Continuous normalization is useful for detection of the presence of anomalies at any position on a profile. The anomaly shape is distorted by normalization to the local field. Near the wire (large field) the continuously normalized Ch0 tends towards zero.

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top axis - Ch6-12	*Ch0 Reduced*
middle axis - Ch1-6	*Ch0 Reduced*
bottom axis - Ch0	*Primary Field Reduced*
bottom axis - topo	*some vertical exaggeration*

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

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

Wallbridge Mining Company Ltd. (1401)
Ministic Grid - 12Ch @ 4.090/2.045Hz

	Line	Coverage		
Loop 1450	Line 000	1200W - 50E	1250m	Hz/Hx/Hy
(@ 4.090Hz)	Line 225N	950W - 50E	1000m	Hz/Hx/Hy
	Line 500N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 750N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 900N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 1150N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 1400N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 1650N	1200W - 50E	1250m	Hz/Hx/Hy
Loop 1451	Line 000	1200W - 50E	1250m	Hz/Hx/Hy
(@ 2.045Hz)	Line 225N	950W - 50E	1000m	Hz/Hx/Hy
	Line 500N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 750N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 900N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 1150N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 1400N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 1650N	1200W - 50E	1250m	Hz/Hx/Hy
U5 Hz/Hx/Hy 2 loop coverage: Totals			10000m	Hz/Hx/Hy
Ministic Grid UTEM5 coverage Total			**10000m**	**Hz/Hx/Hy**

<u>Ministic Grid Survey totals:</u>

10000m UTEM5 2 loop six-component coverage

- 10000m UTEM5 Hz/Hx/Hy line coverage

equalling: • 20000m UTEM5 three-component coverage
equalling: ~60000m UTEM5 single component coverage

- 10000m UTEM5 2 loop coverage

- 10000m UTEM 4.090Hz coverage
- 10000m UTEM 2.045Hz coverage

Ministic Grid - UTEM5

Loop 1450 (@ 4.090Hz)	Line 000	1200W - 50E	1250m	Hz/Hx/Hy
	Line 225N	950W - 50E	1000m	Hz/Hx/Hy
	Line 500N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 750N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 900N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 1150N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 1400N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 1650N	1200W - 50E	1250m	Hz/Hx/Hy

Loop 1451 (@ 2.045Hz)	Line 000	1200W - 50E	1250m	Hz/Hx/Hy
	Line 225N	950W - 50E	1000m	Hz/Hx/Hy
	Line 500N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 750N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 900N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 1150N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 1400N	1250W - 50E	1300m	Hz/Hx/Hy
	Line 1650N	1200W - 50E	1250m	Hz/Hx/Hy

Ministic Grid

Loop 1450

Hz

4.090Hz frequency

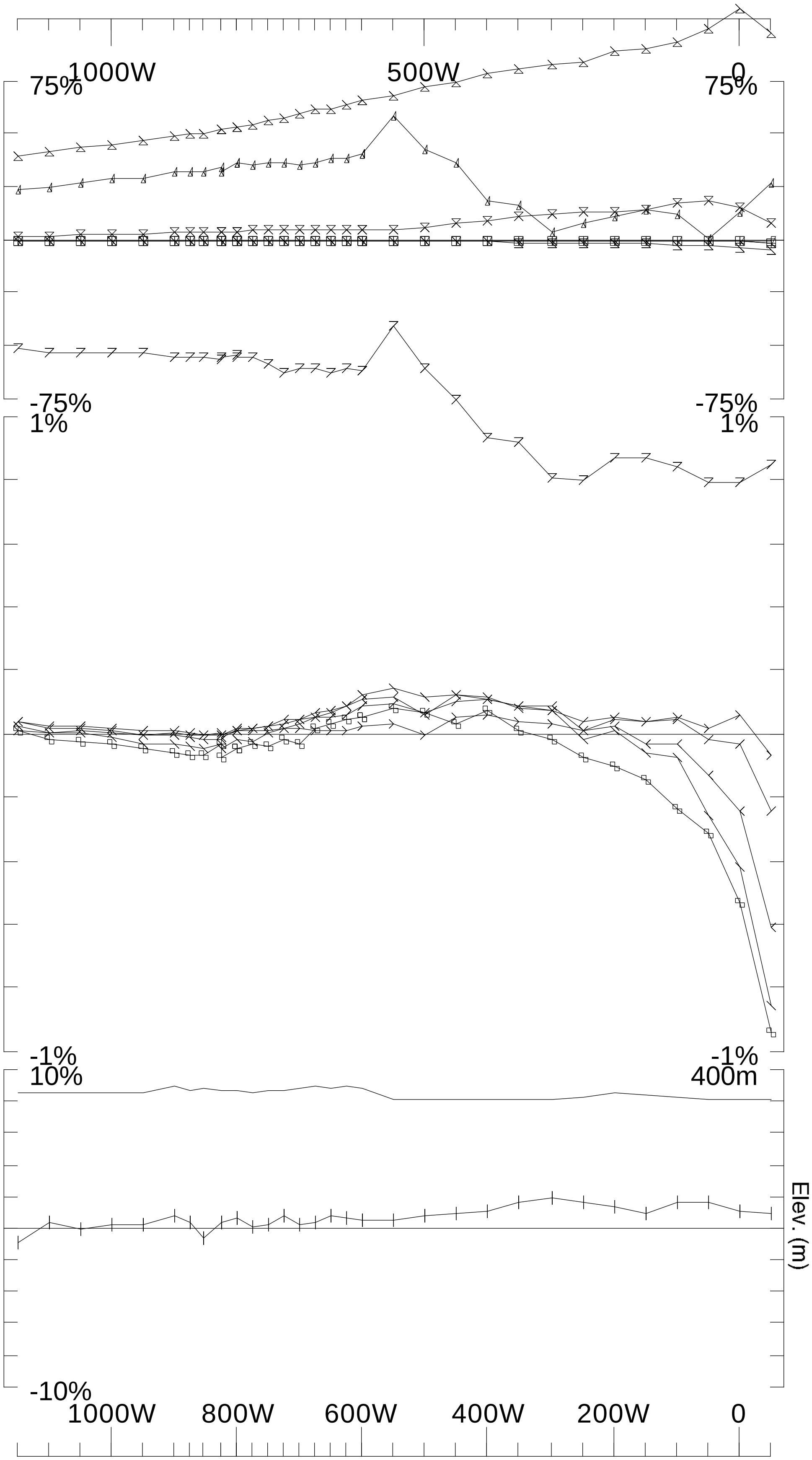
continuous norm

12Ch - Ch0 reduced

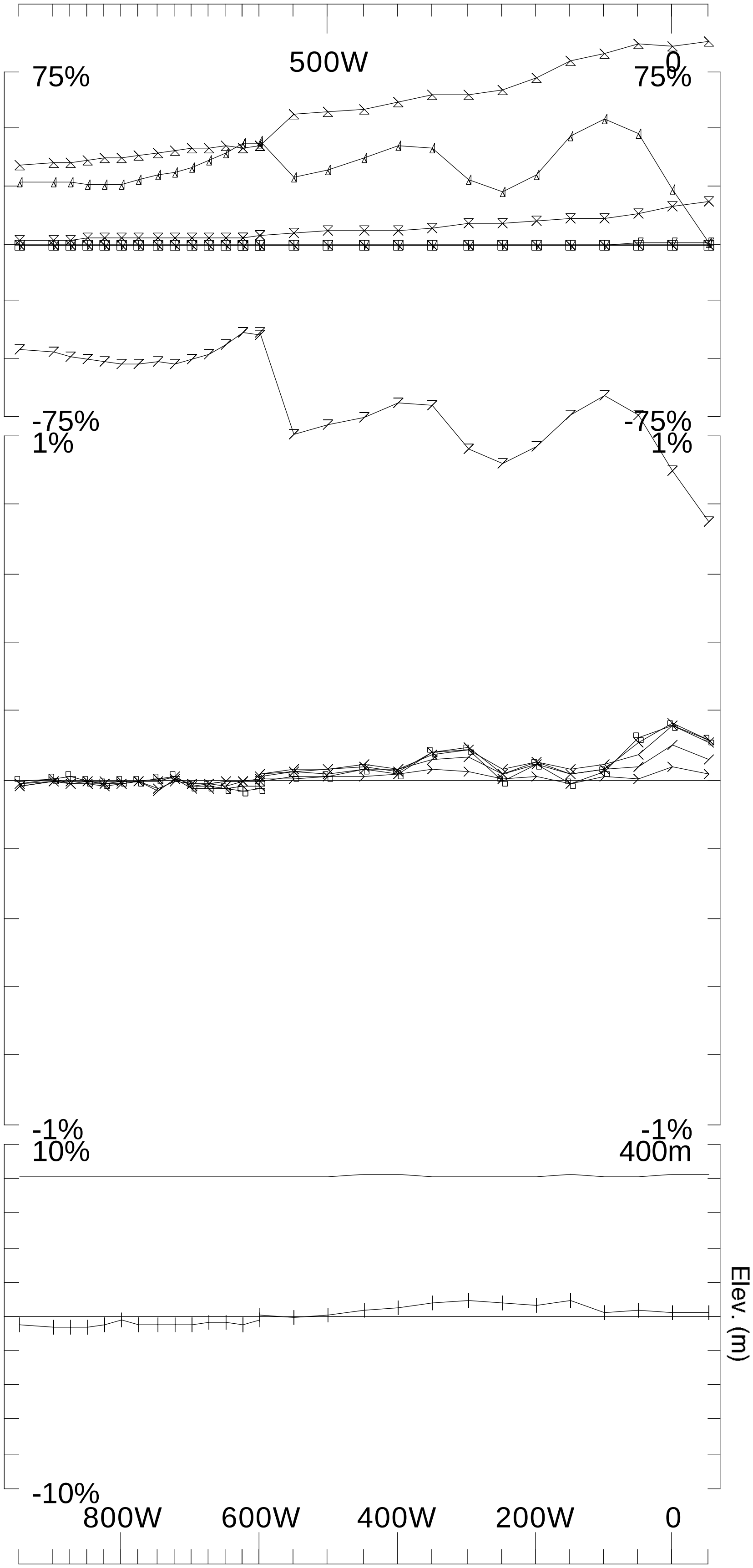
Loop 1450 @4.090Hz

Line 000	1200W - 50E	1250m	Hz/Hx/Hy
Line 225N	950W - 50E	1000m	Hz/Hx/Hy
Line 500N	1250W - 50E	1300m	Hz/Hx/Hy
Line 750N	1250W - 50E	1300m	Hz/Hx/Hy
Line 900N	1250W - 50E	1300m	Hz/Hx/Hy
Line 1150N	1250W - 50E	1300m	Hz/Hx/Hy
Line 1400N	1250W - 50E	1300m	Hz/Hx/Hy
Line 1650N	1200W - 50E	1250m	Hz/Hx/Hy

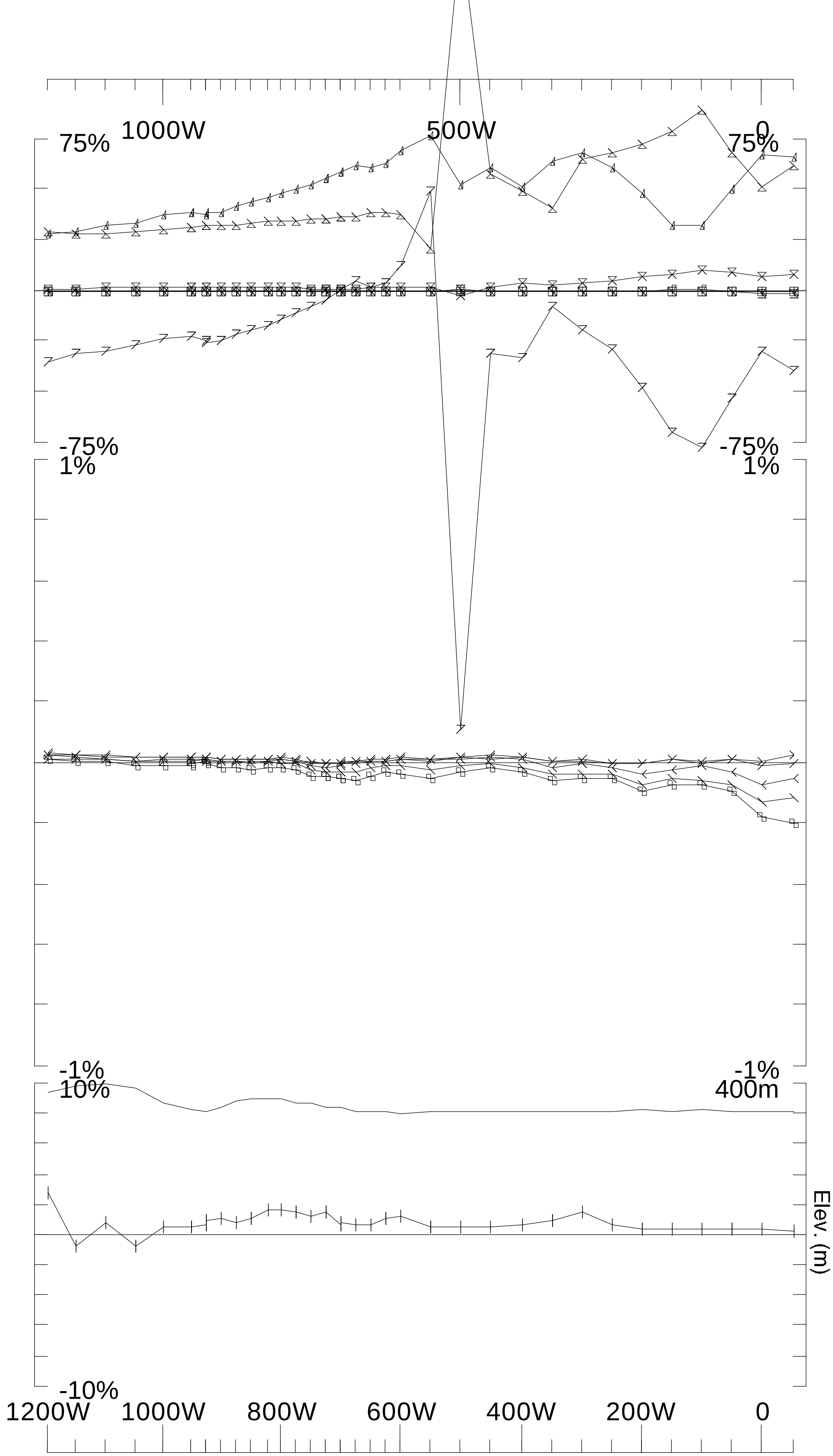
Loop 1450 - Hz



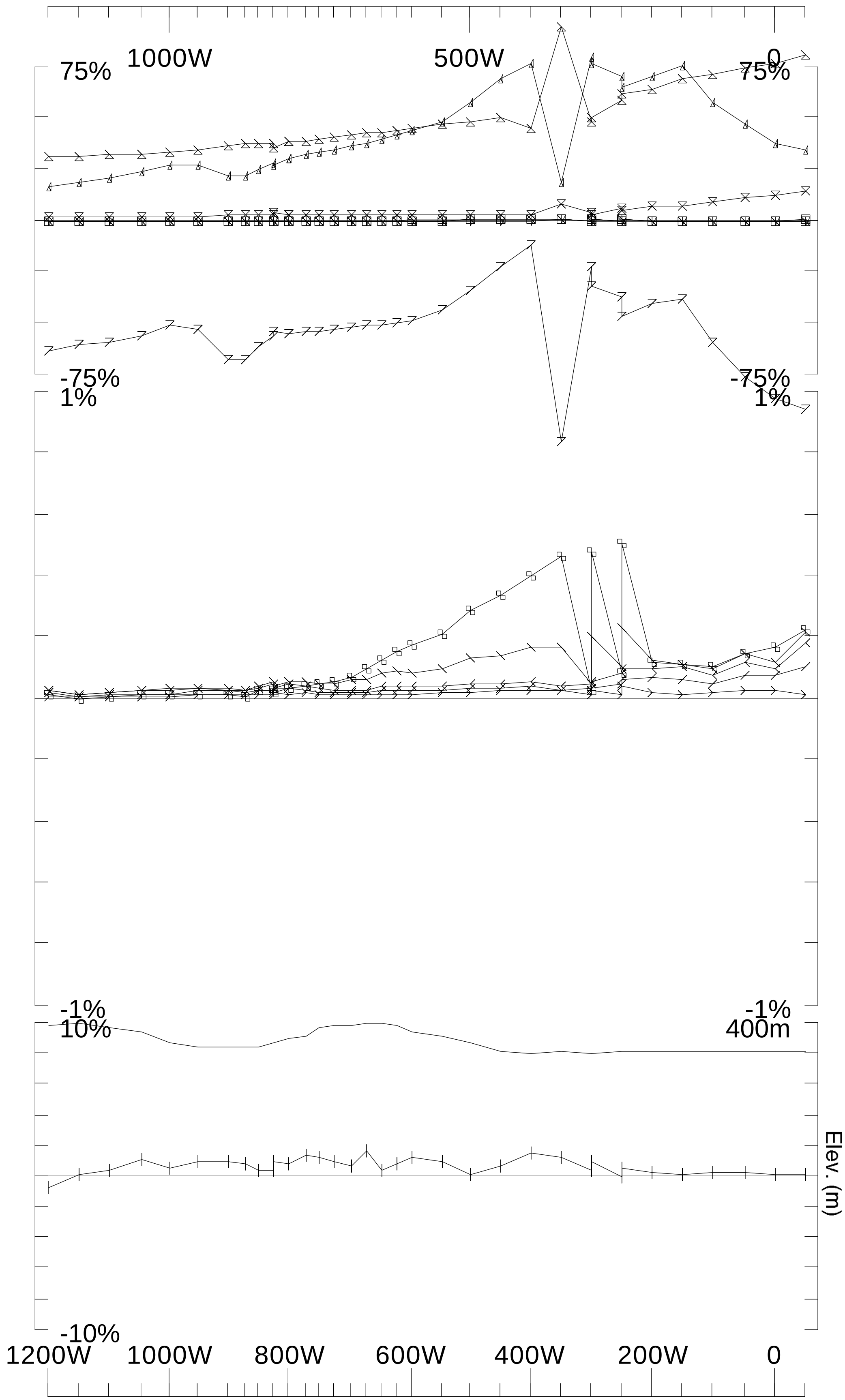
Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 000	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 29/1/14



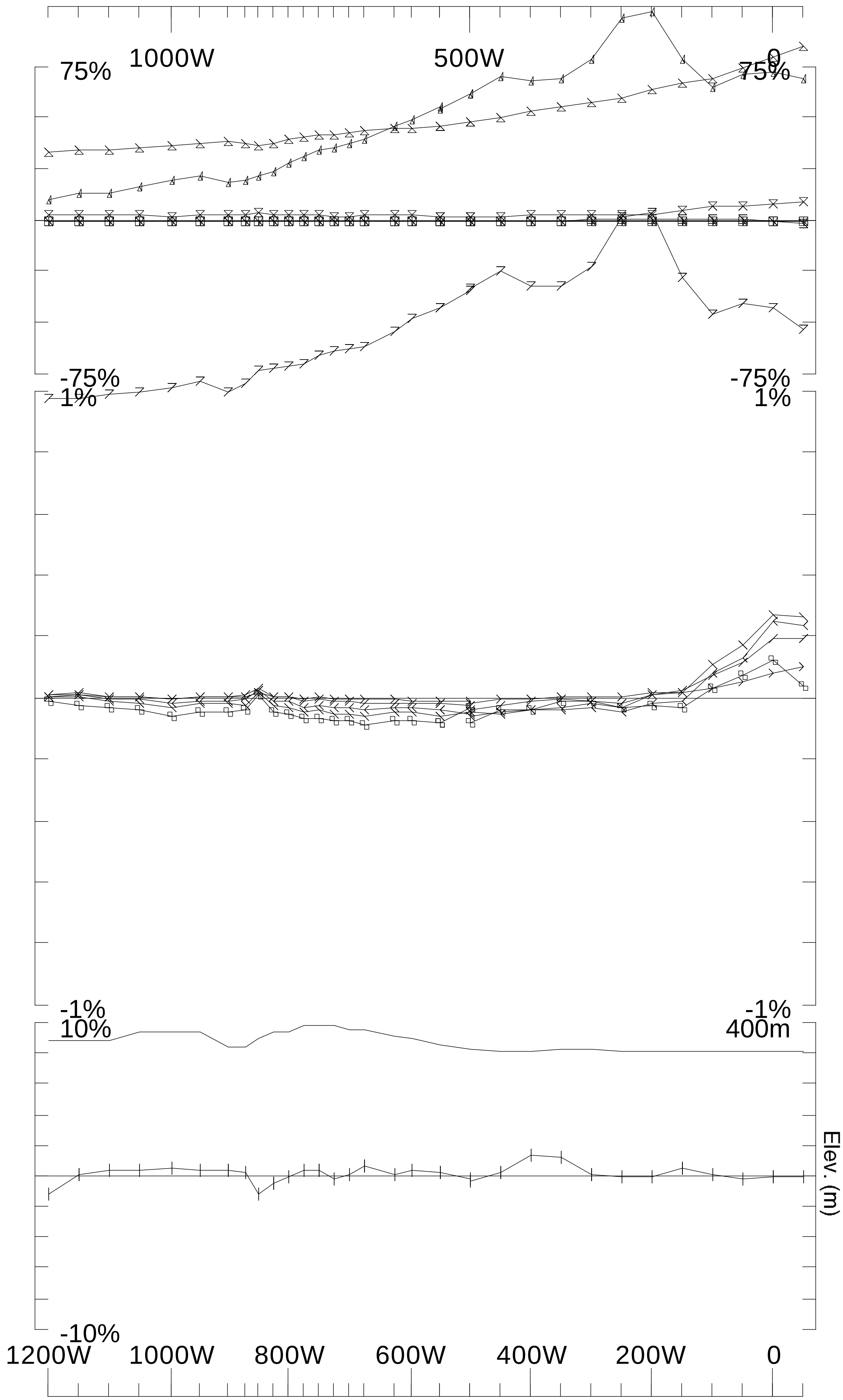
Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 225N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



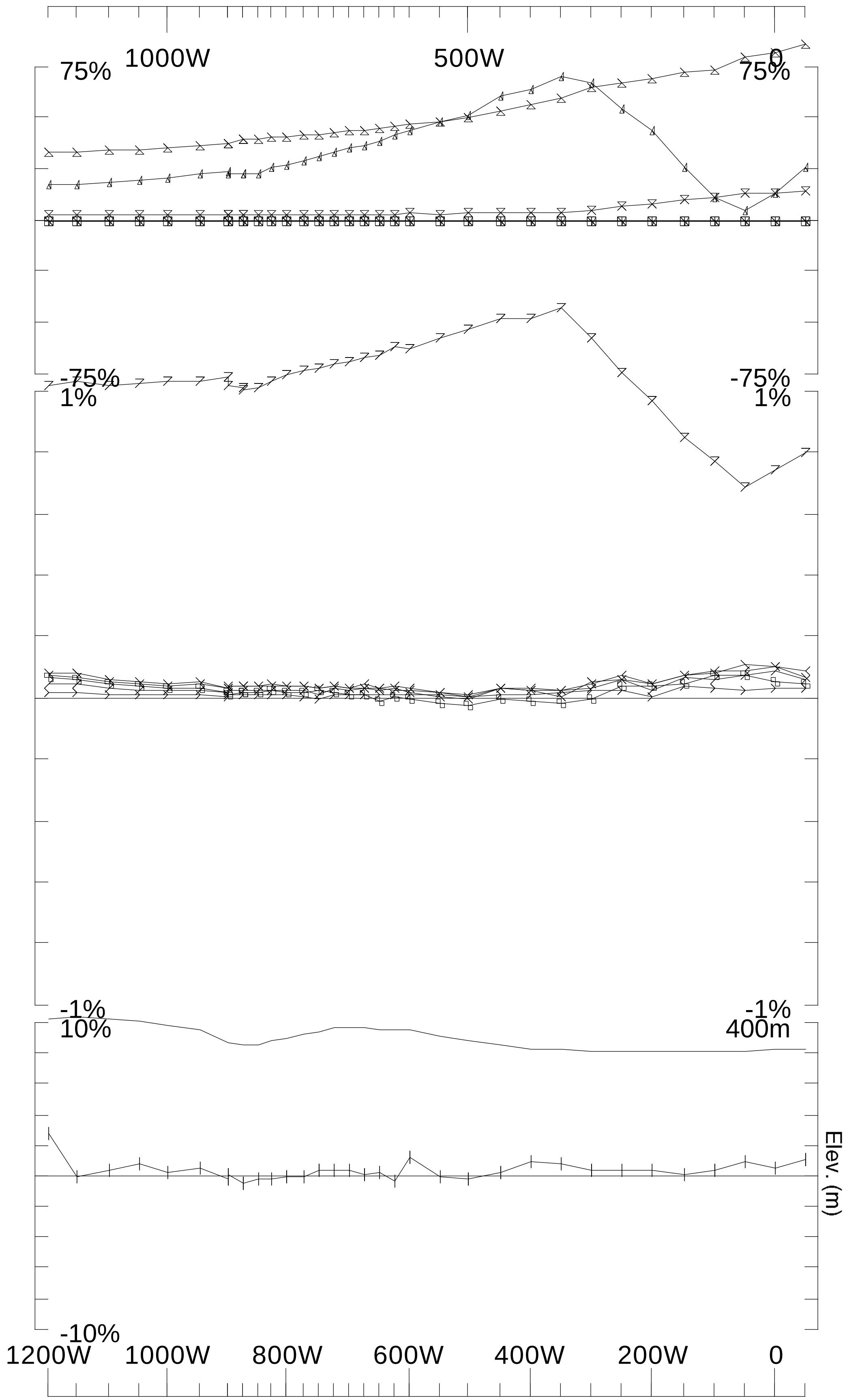
Loop: 1450S1	Secondary, (Chn - Ch0)/lHpl	UTEM Survey at: Ministic Lake
Line: 500N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 29/1/14



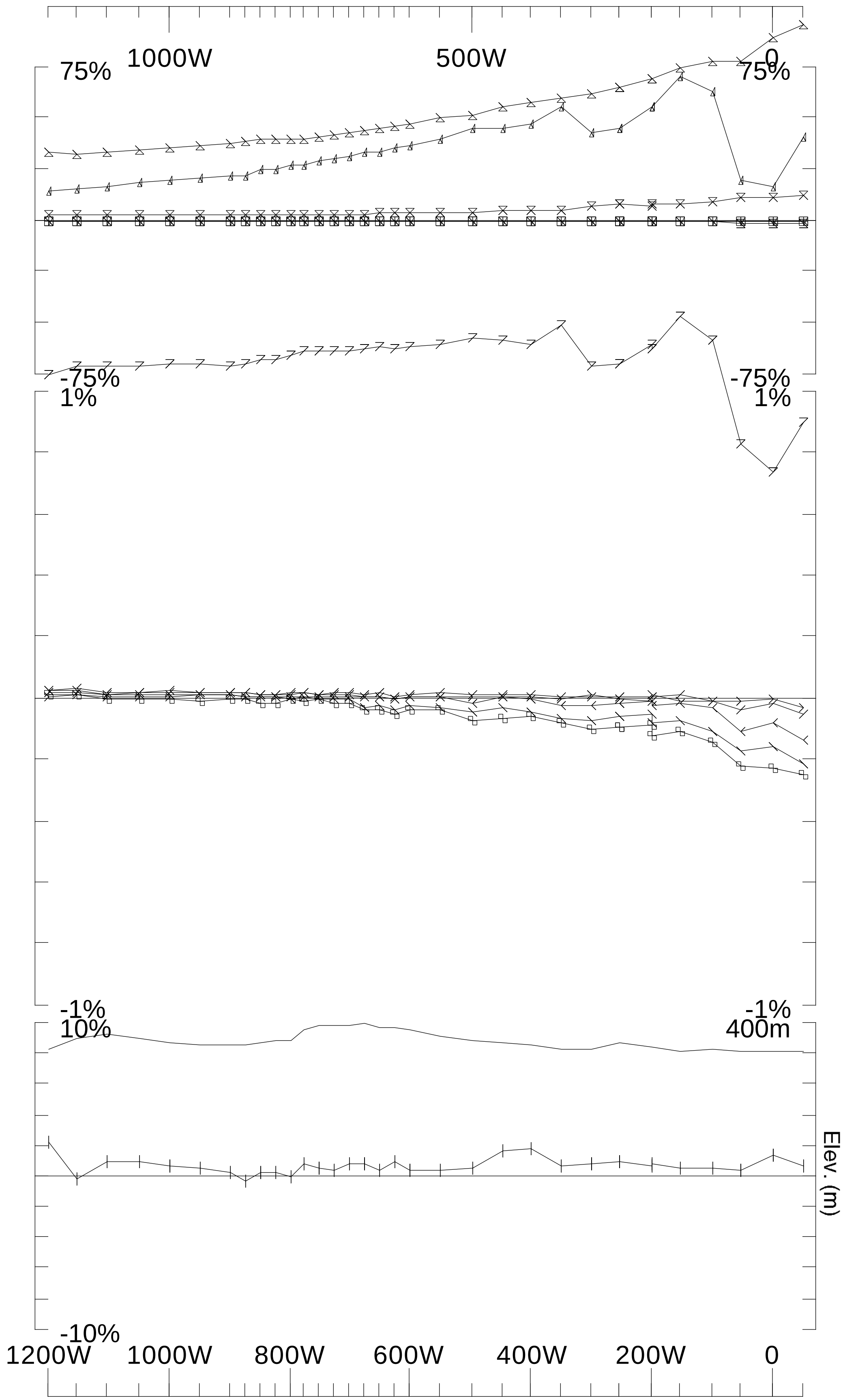
Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 750N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



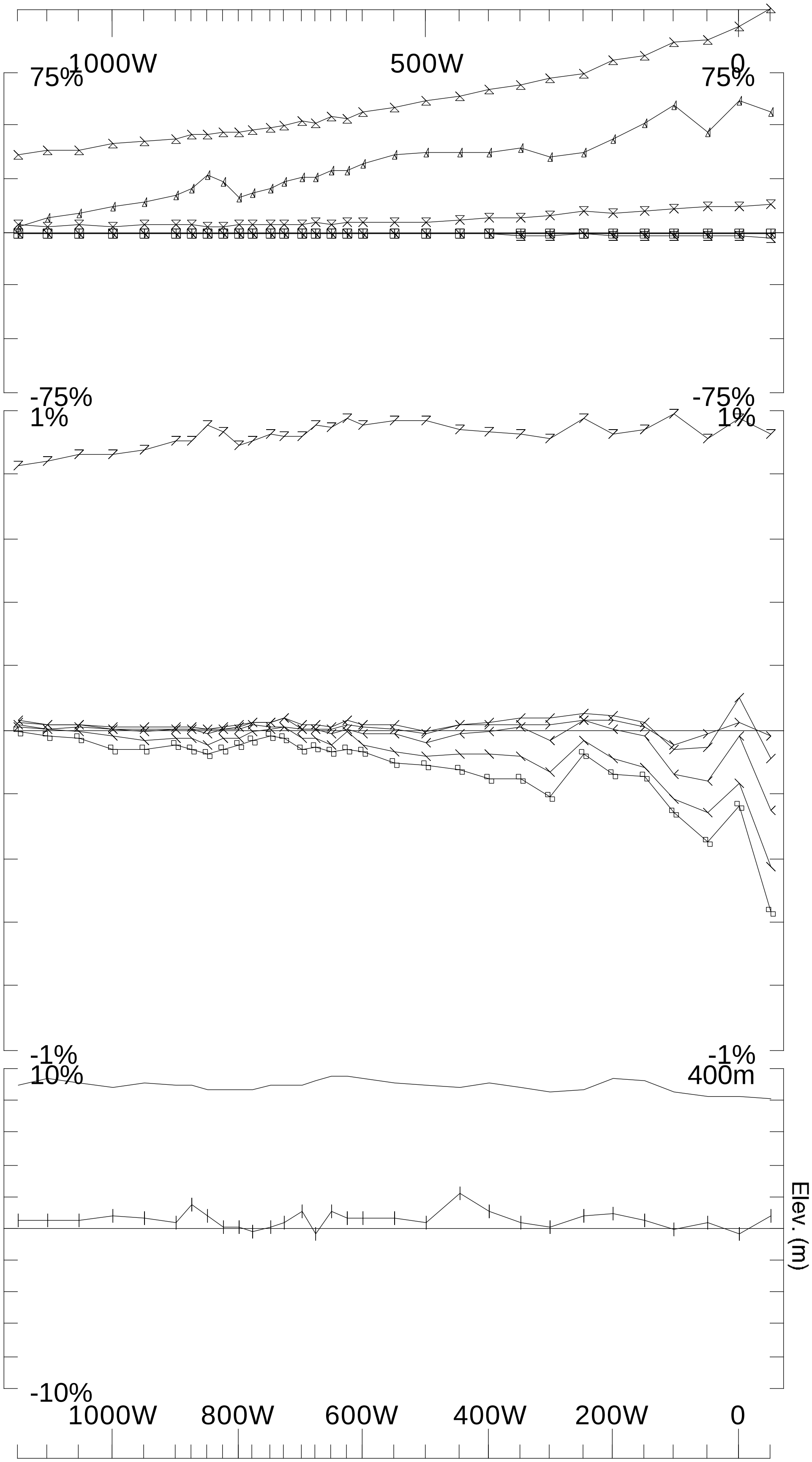
Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 900N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1150N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1400N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1650N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14

Ministic Grid

Loop 1450

Hx

4.090Hz frequency

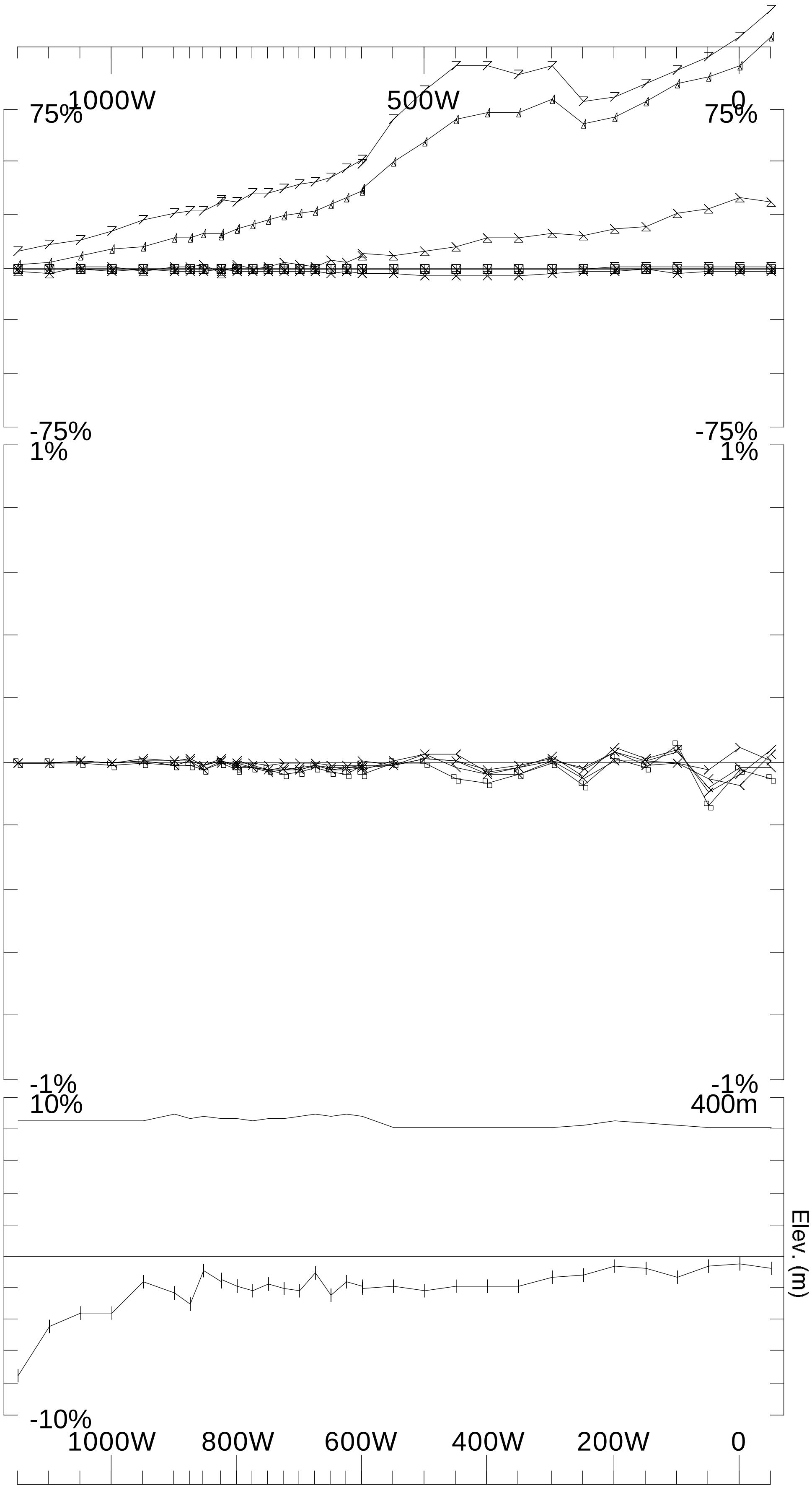
continuous norm

12Ch - Ch0 reduced

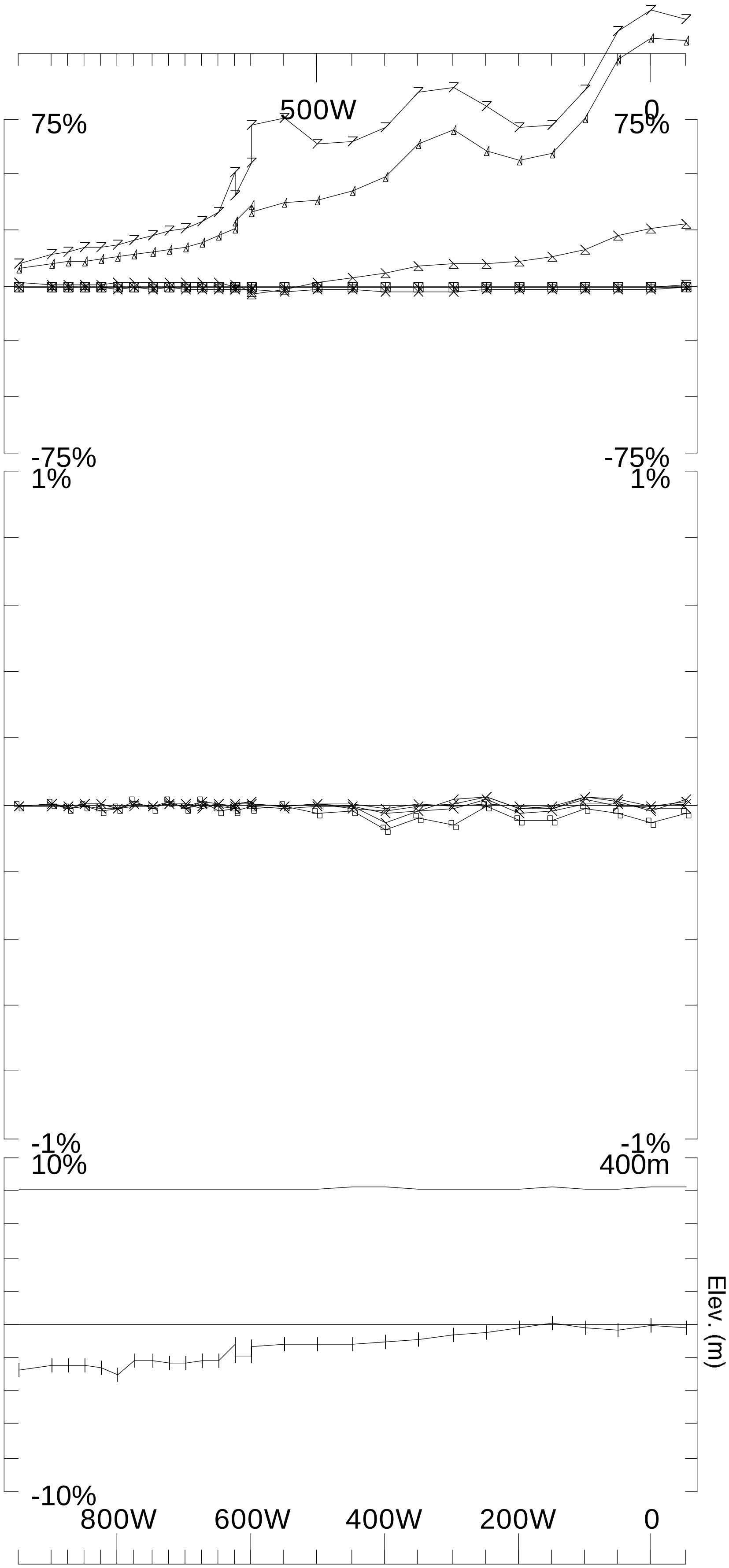
Loop 1450 @4.090Hz

Line 000	1200W - 50E	1250m	Hz/Hx/Hy
Line 225N	950W - 50E	1000m	Hz/Hx/Hy
Line 500N	1250W - 50E	1300m	Hz/Hx/Hy
Line 750N	1250W - 50E	1300m	Hz/Hx/Hy
Line 900N	1250W - 50E	1300m	Hz/Hx/Hy
Line 1150N	1250W - 50E	1300m	Hz/Hx/Hy
Line 1400N	1250W - 50E	1300m	Hz/Hx/Hy
Line 1650N	1200W - 50E	1250m	Hz/Hx/Hy

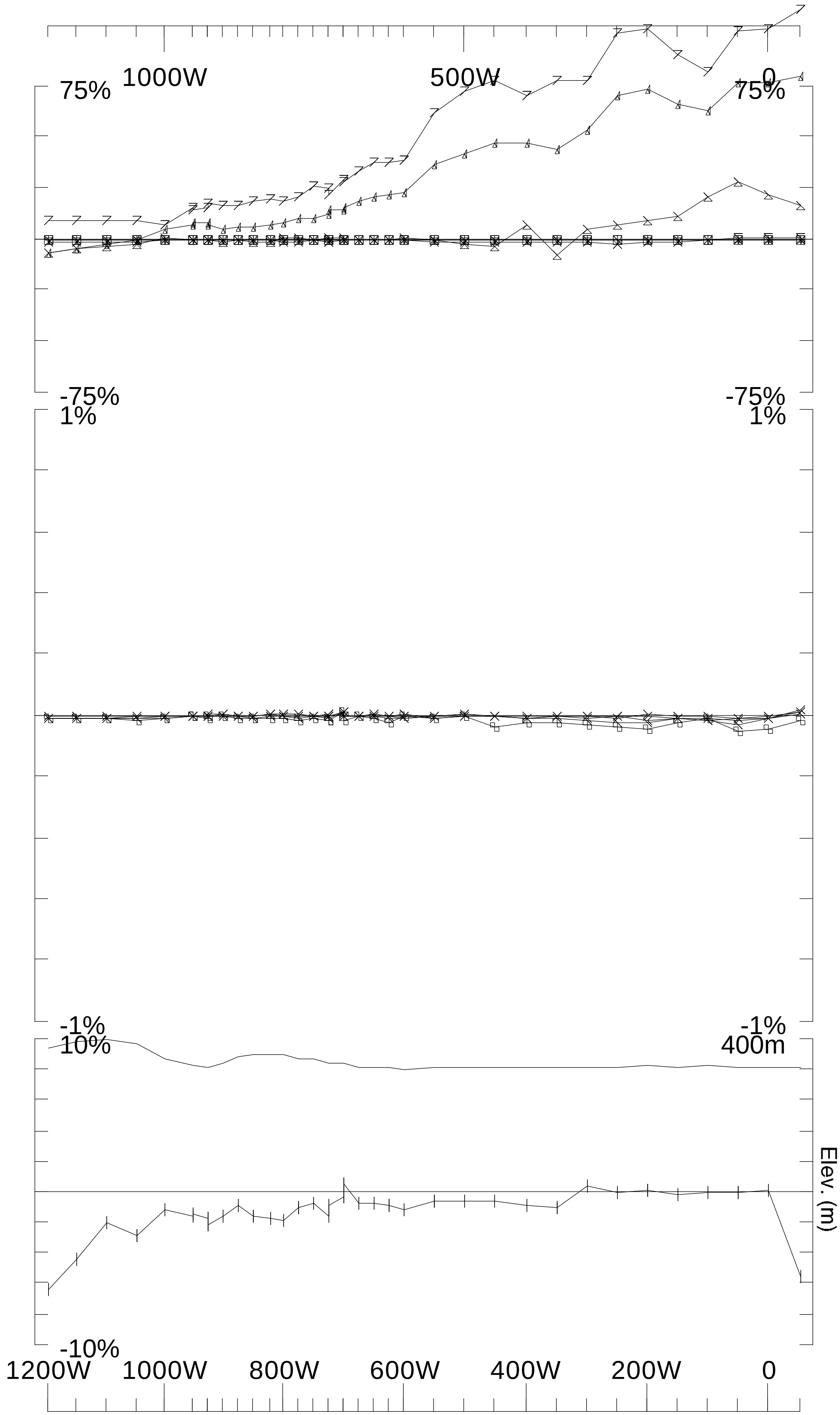
Loop 1450 - Hx



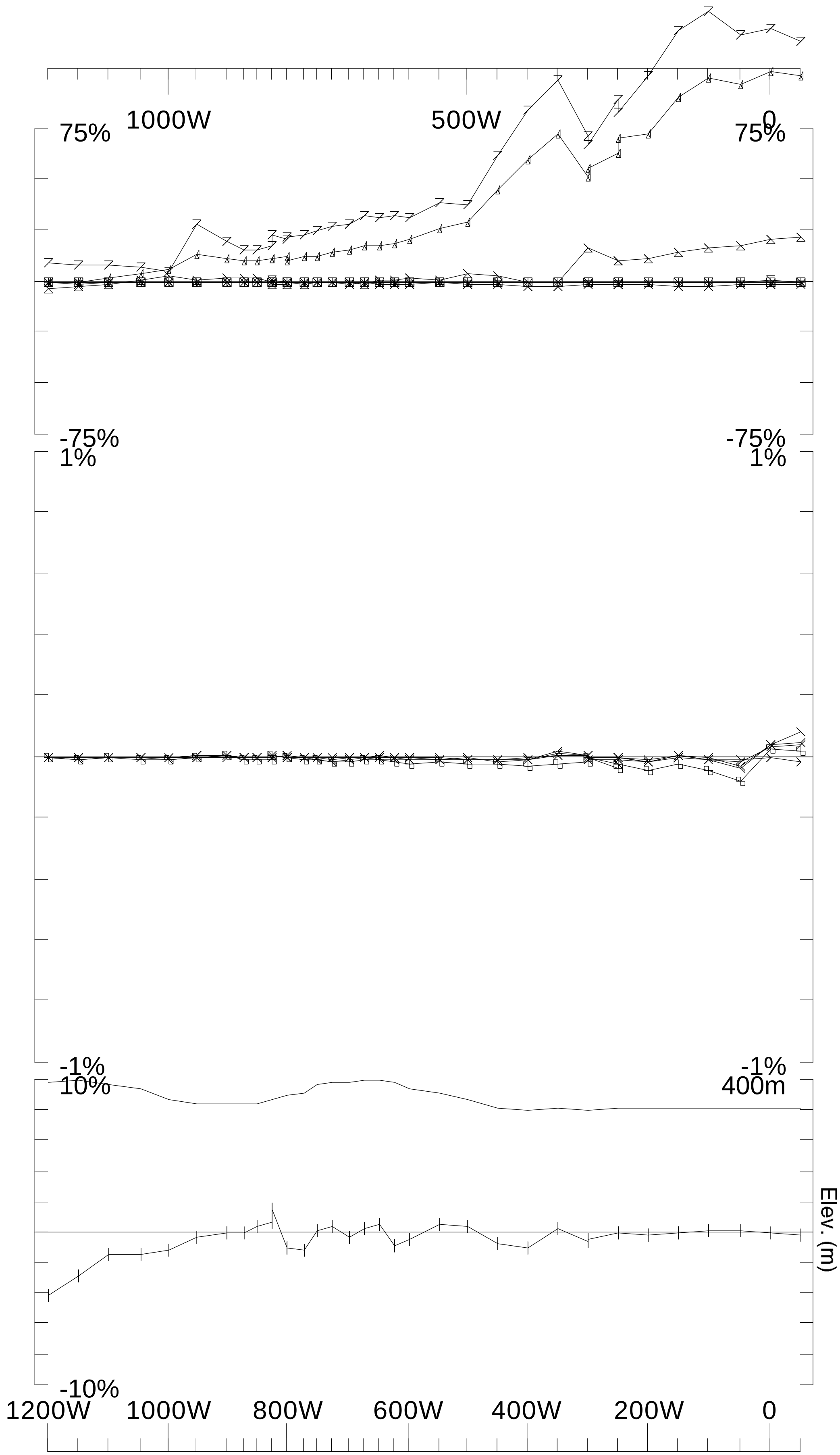
Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 000	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



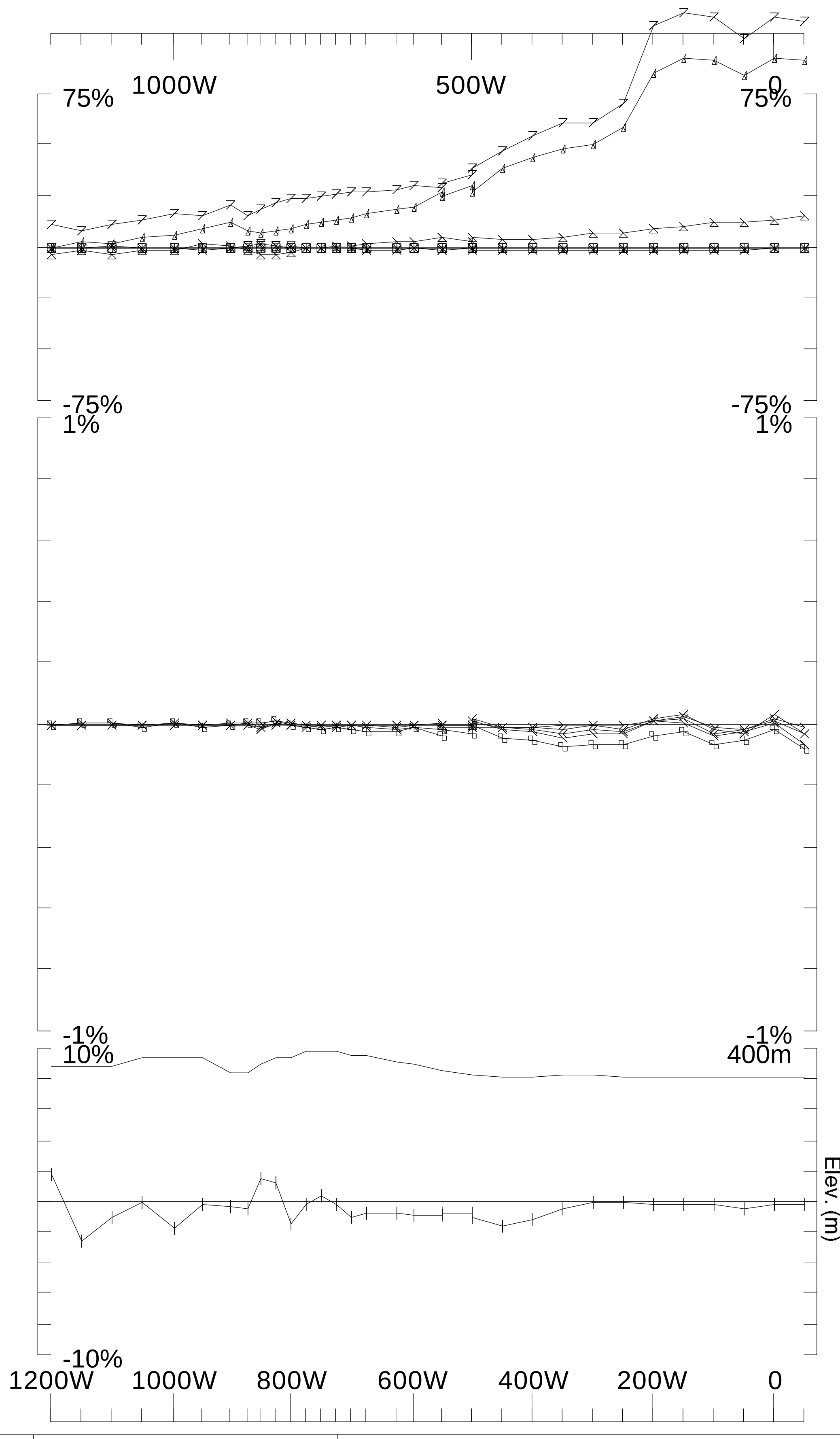
Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 225N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1450S1	Secondary, (Chn - Ch0)/lHpl	UTEM Survey at: Ministic Lake
Line: 500N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 29/1/14



Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 750N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1450S1
Line: 900N
Compt: Hx

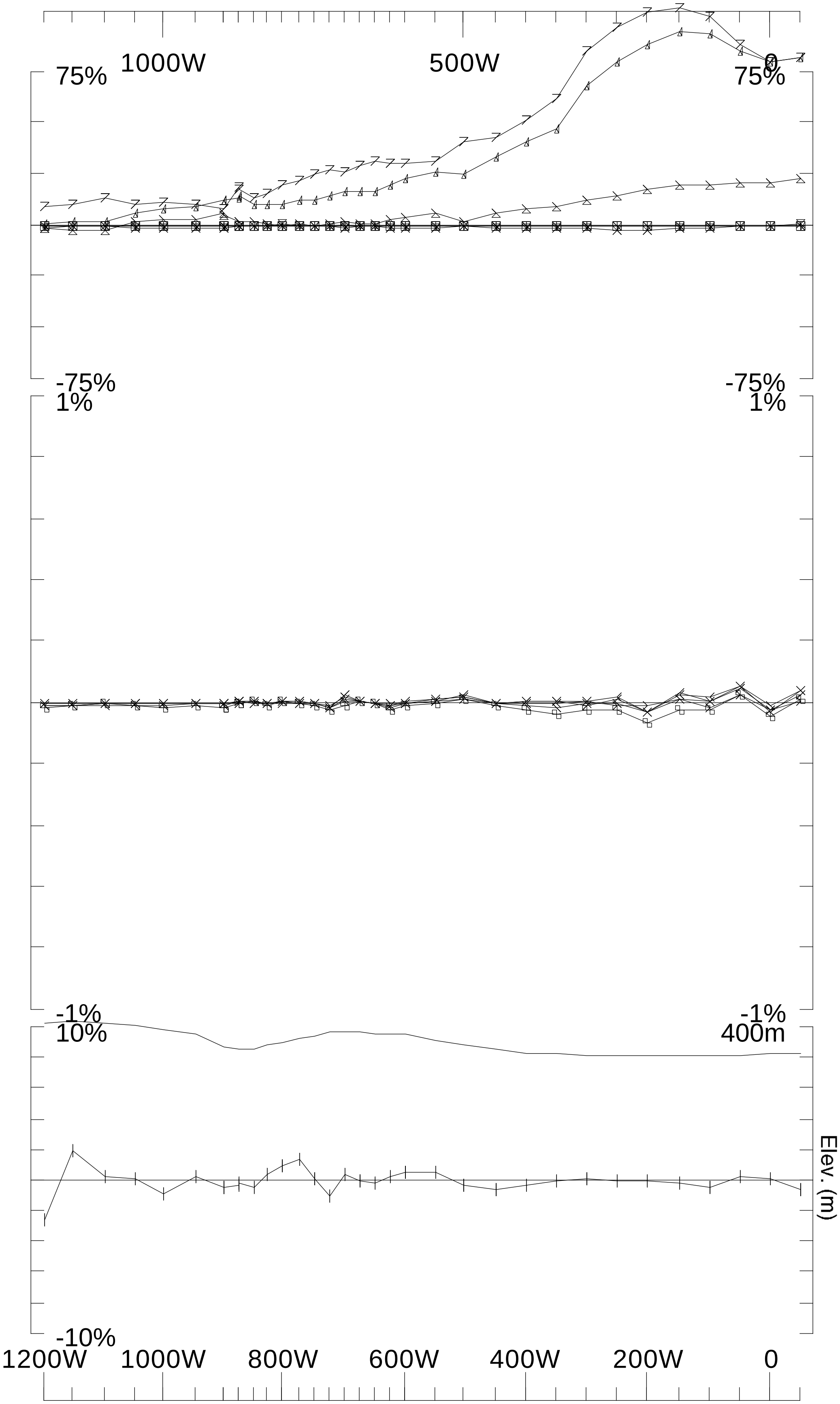
Secondary, (Chn - Ch0)/IHpl
Contin. Norm at depth of 0 m
Base Freq. 4.090 Hz

UTEM Survey at: Ministic Lake
For: Wallbridge

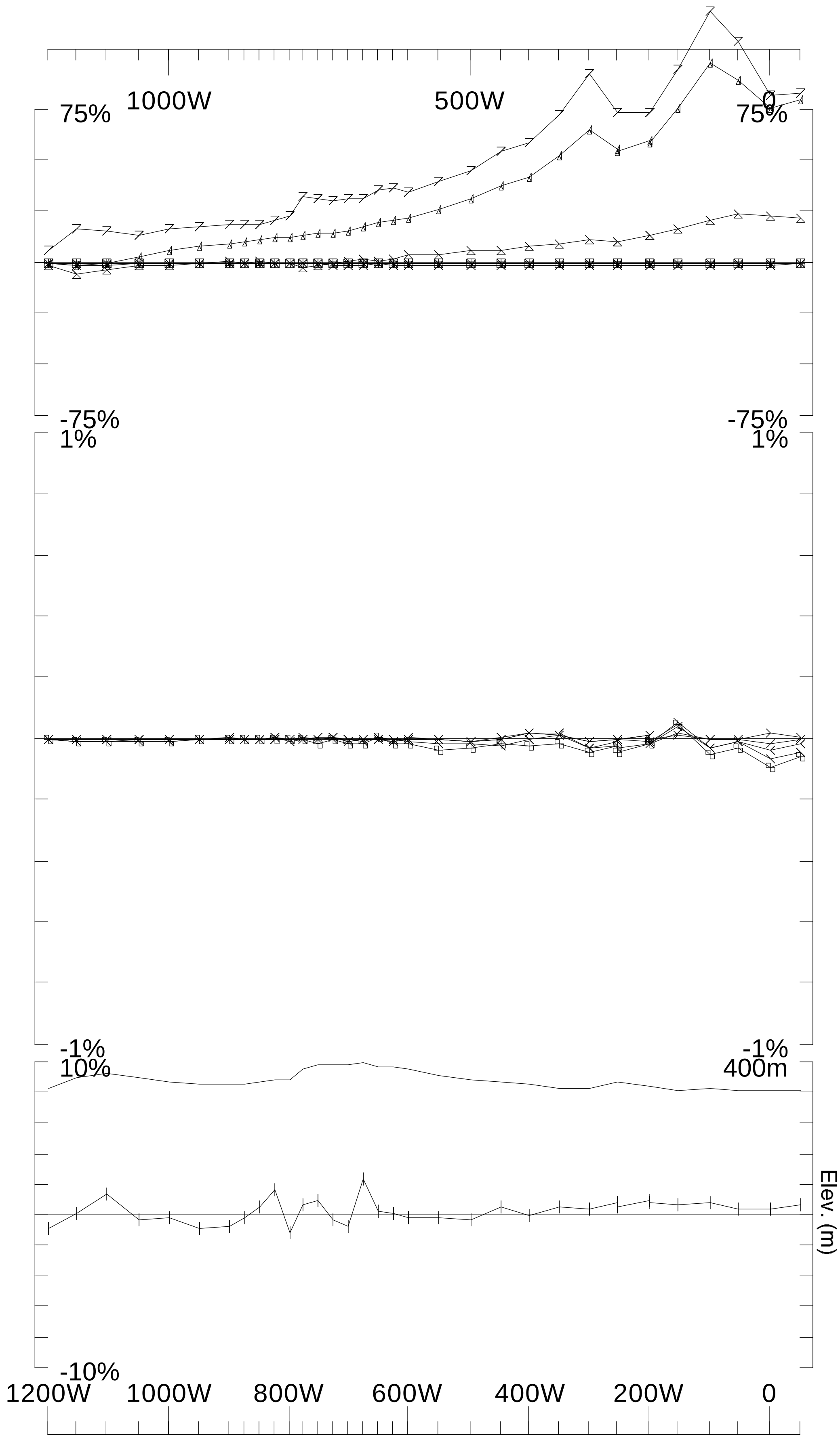
LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 1401

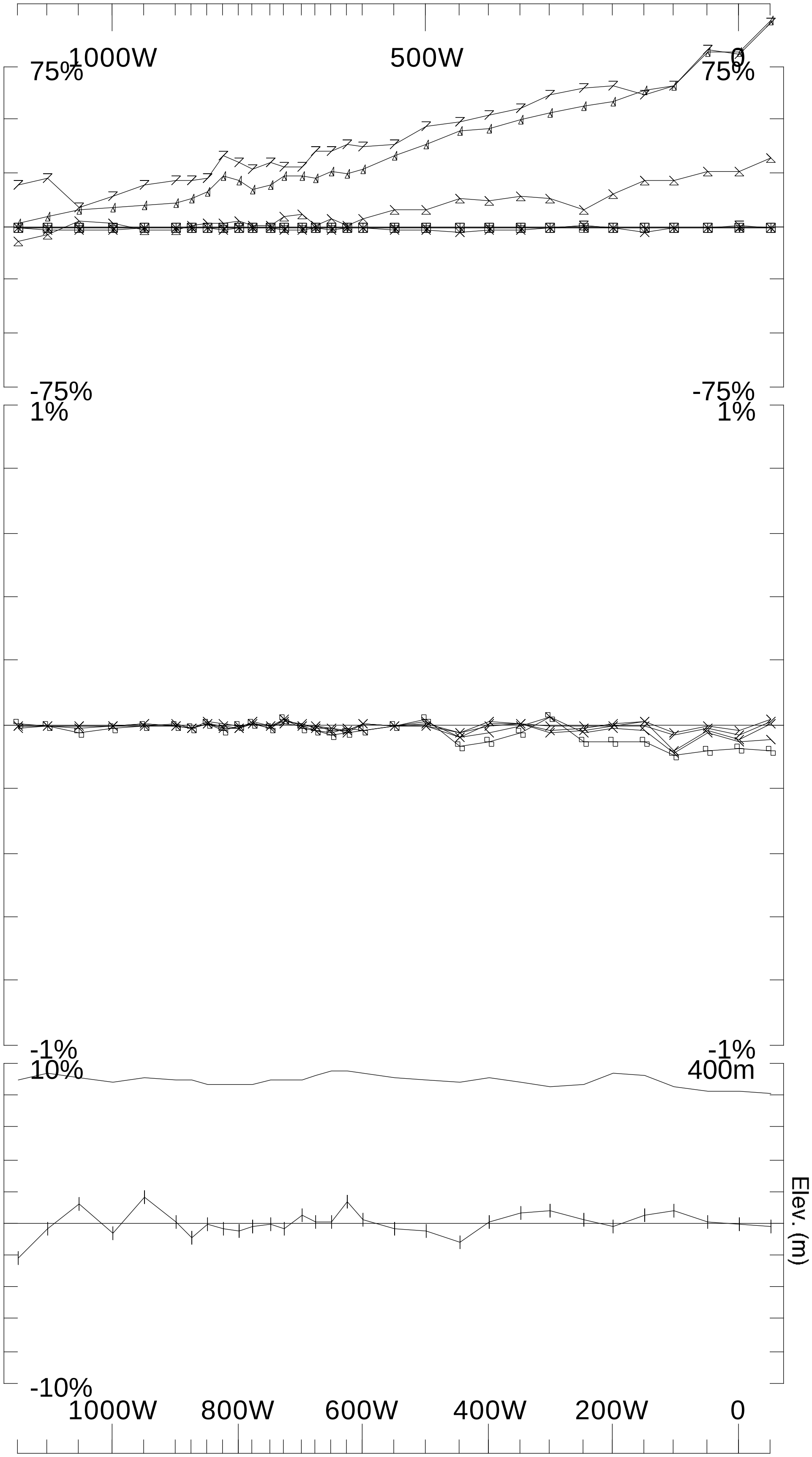
Plotted : 30/1/14



Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1150N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1400N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1650N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14

Ministic Grid

Loop 1450

Hy

4.090Hz frequency

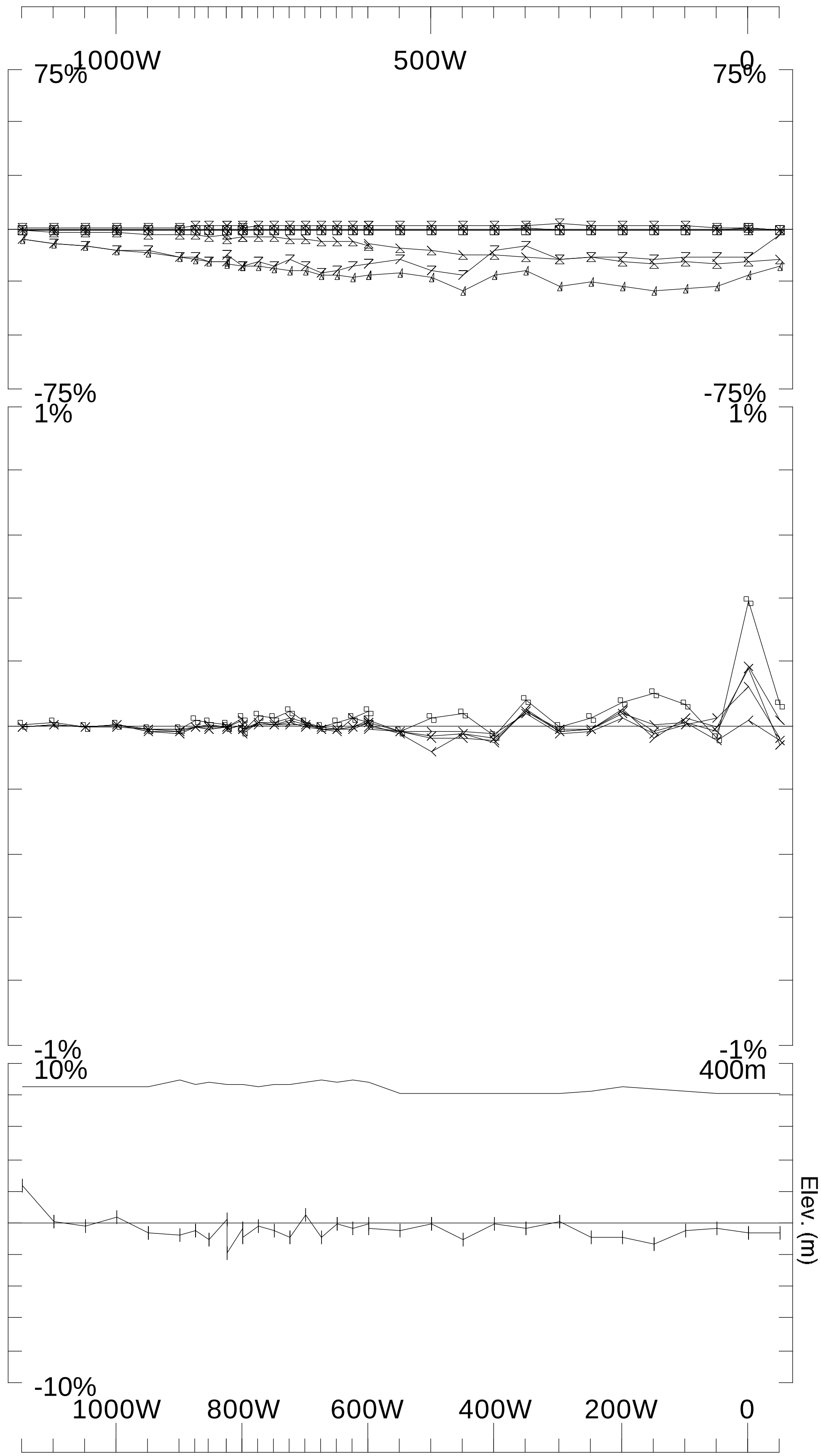
continuous norm

12Ch - Ch0 reduced

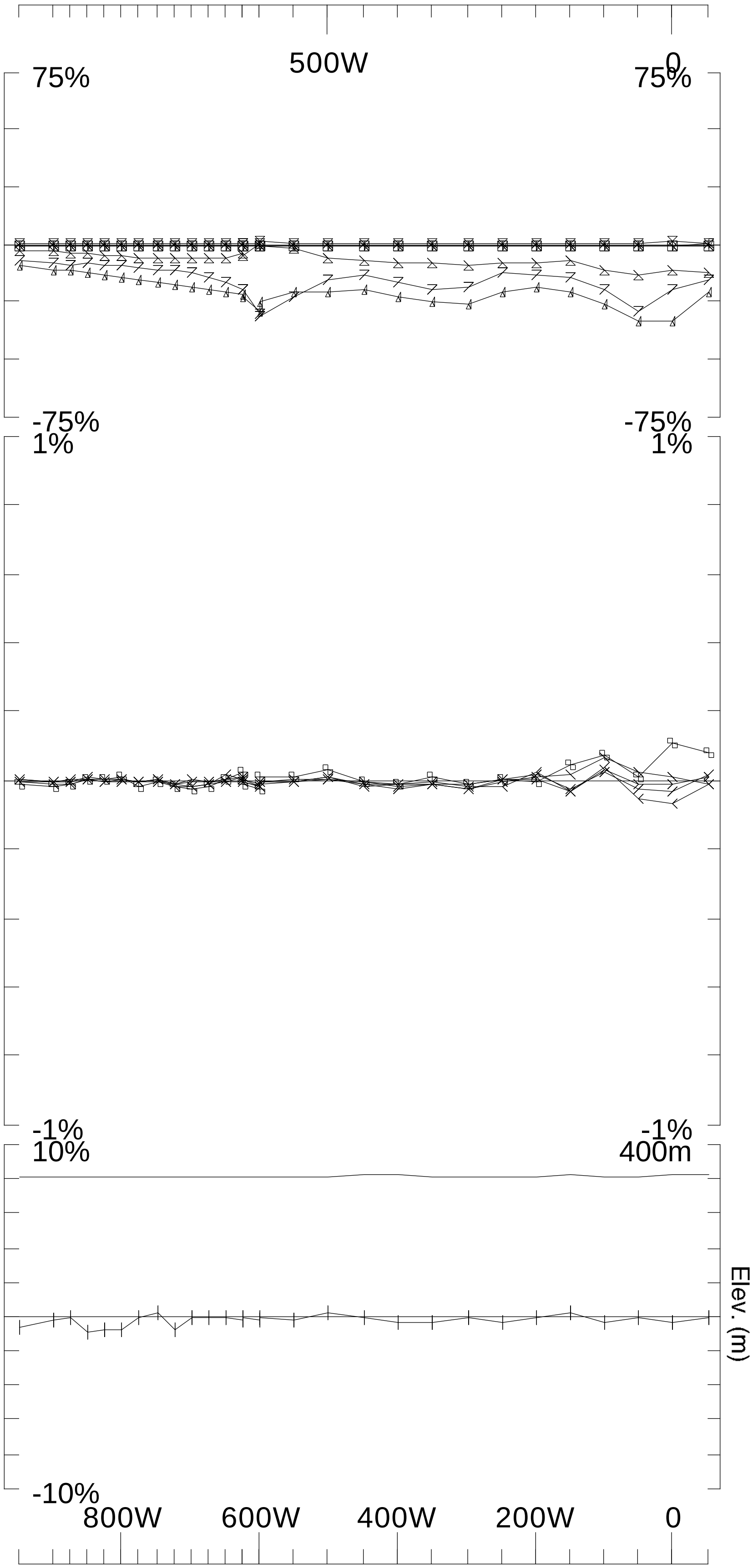
Loop 1450 @4.090Hz

Line 000	1200W - 50E	1250m	Hz/Hx/Hy
Line 225N	950W - 50E	1000m	Hz/Hx/Hy
Line 500N	1250W - 50E	1300m	Hz/Hx/Hy
Line 750N	1250W - 50E	1300m	Hz/Hx/Hy
Line 900N	1250W - 50E	1300m	Hz/Hx/Hy
Line 1150N	1250W - 50E	1300m	Hz/Hx/Hy
Line 1400N	1250W - 50E	1300m	Hz/Hx/Hy
Line 1650N	1200W - 50E	1250m	Hz/Hx/Hy

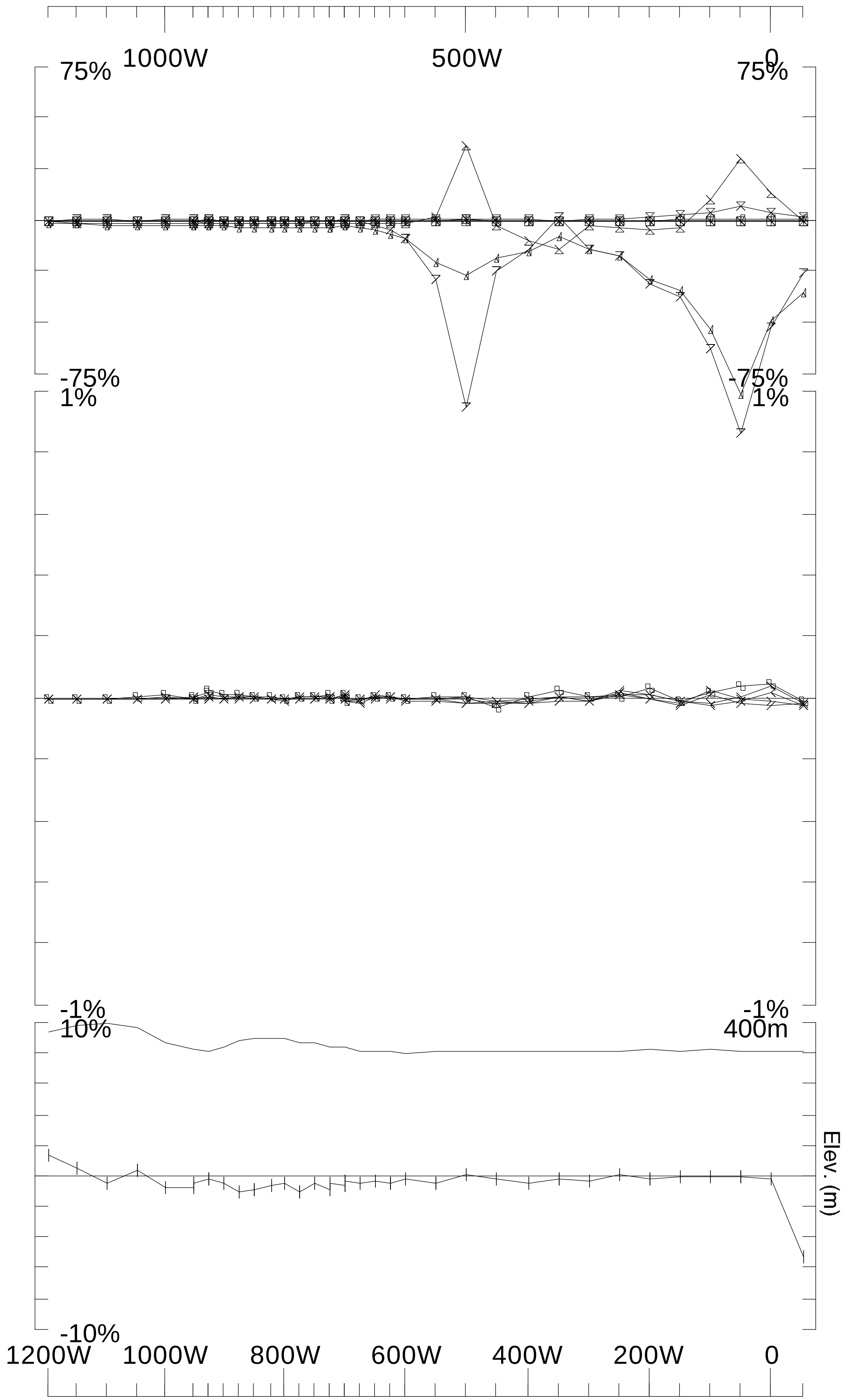
Loop 1450 - Hy



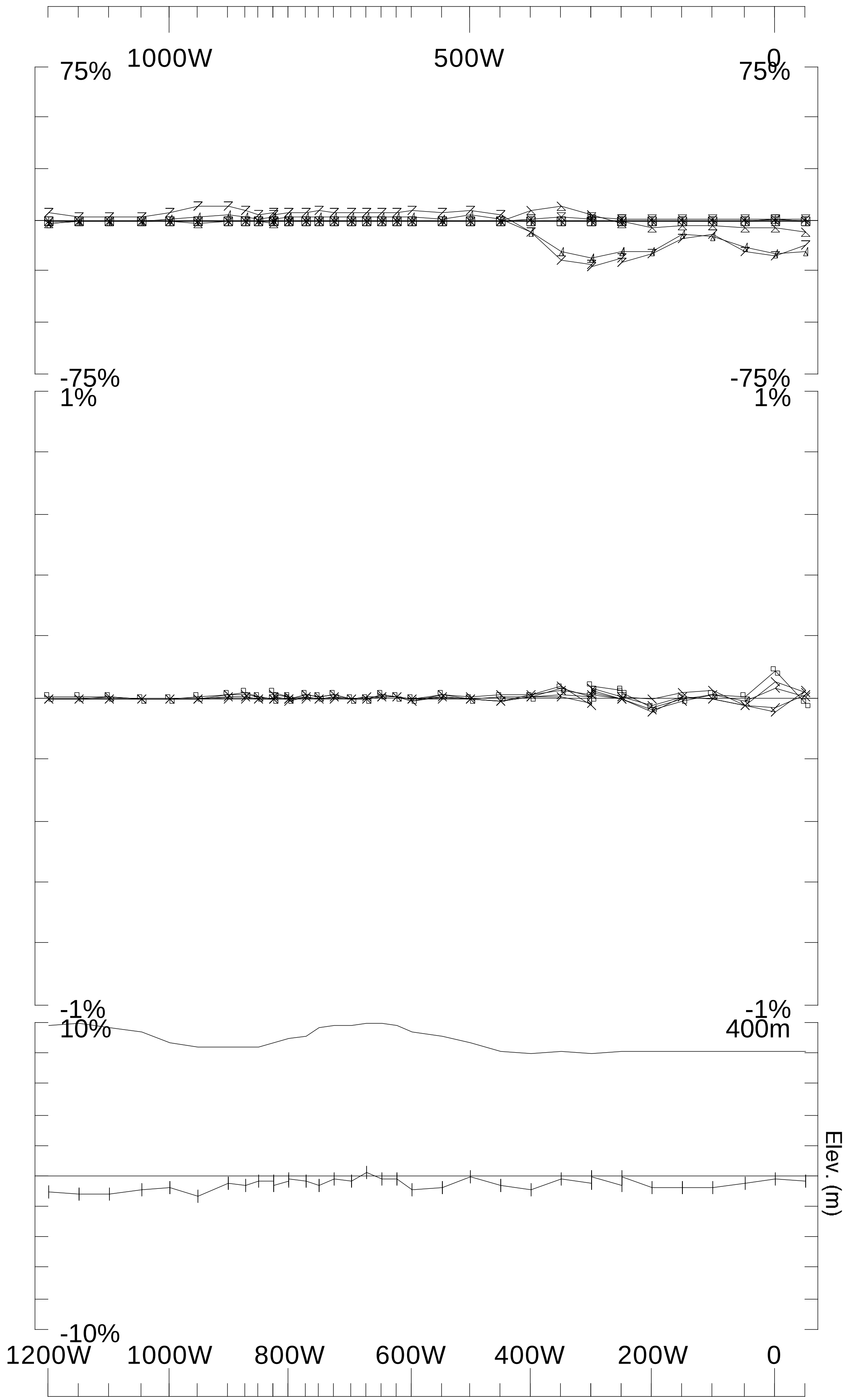
Loop: 1450S1	Secondary, (Chn - Ch0)/IHpI	UTEM Survey at: Ministic Lake
Line: 000	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 29/1/14



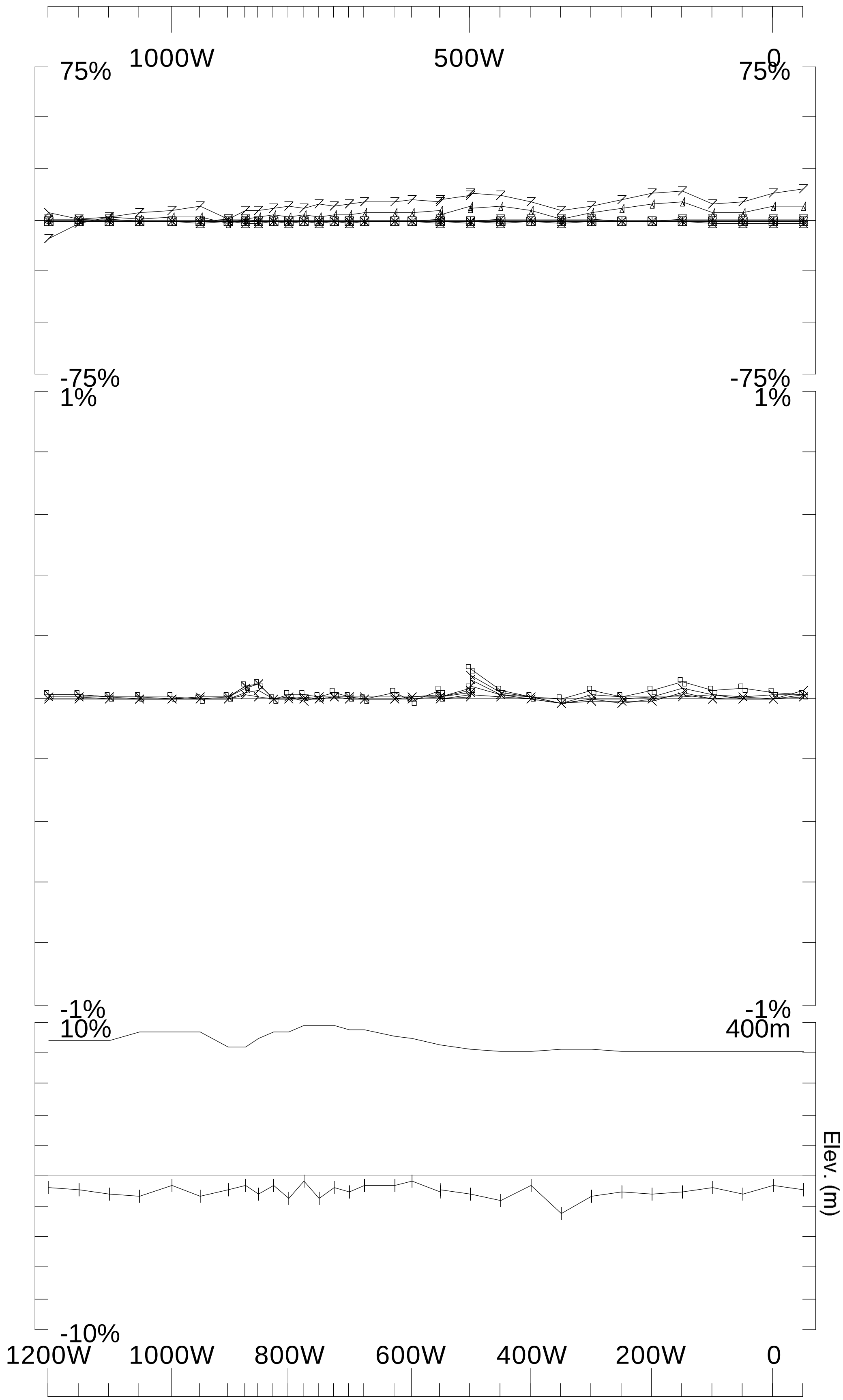
Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 225N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



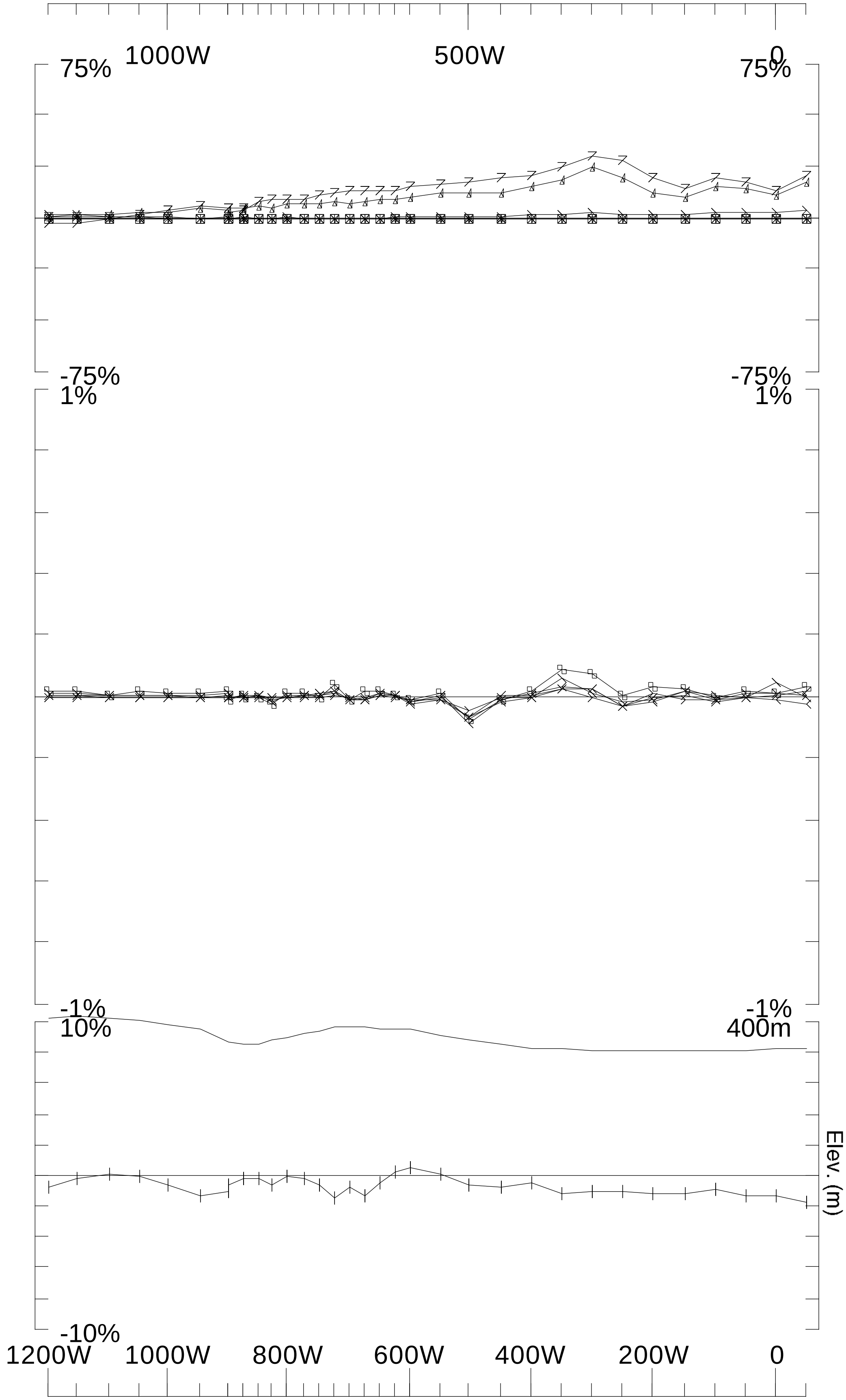
Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 500N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 29/1/14



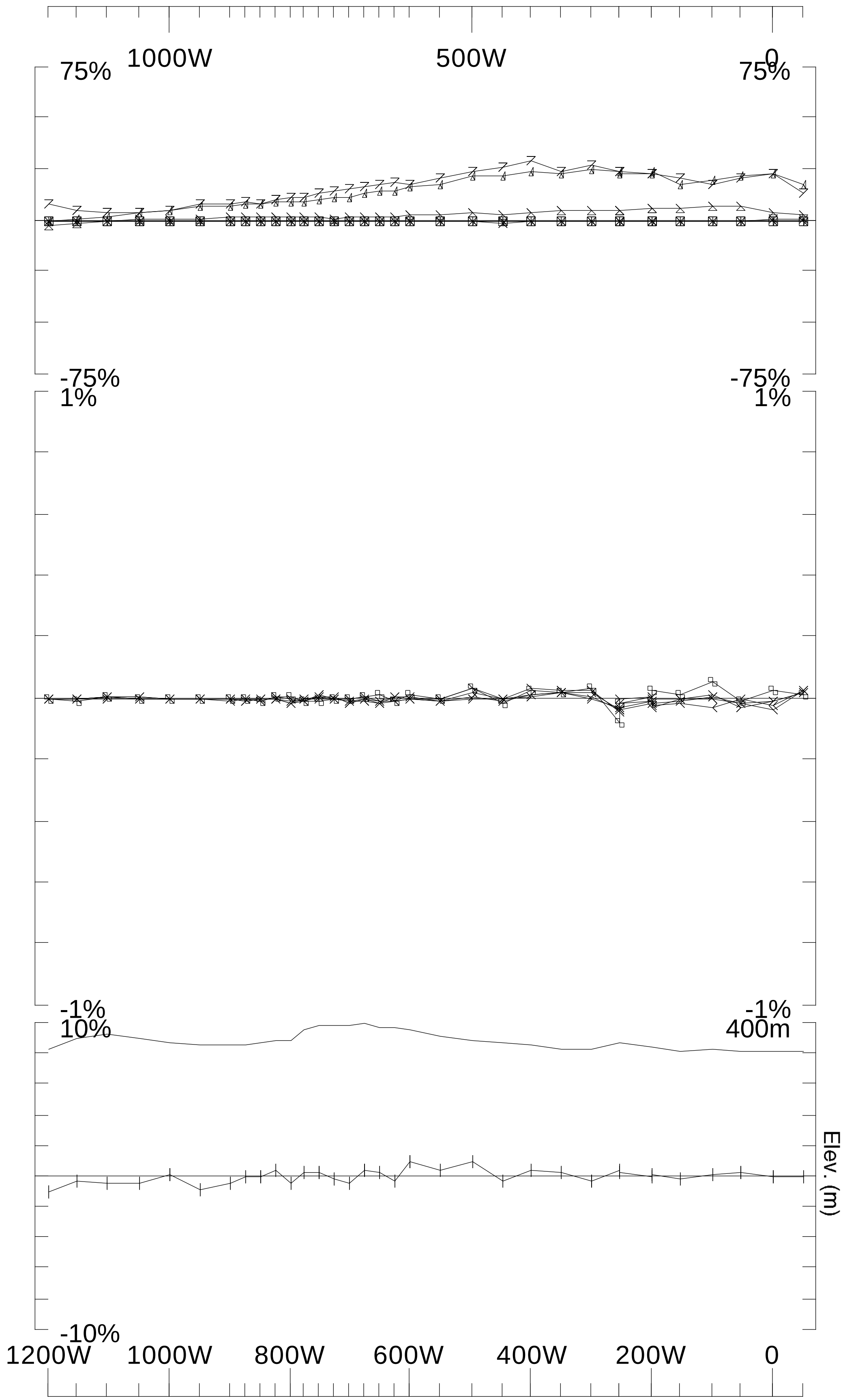
Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 750N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 900N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1150N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1450S1
Line: 1400N
Compt: Hy

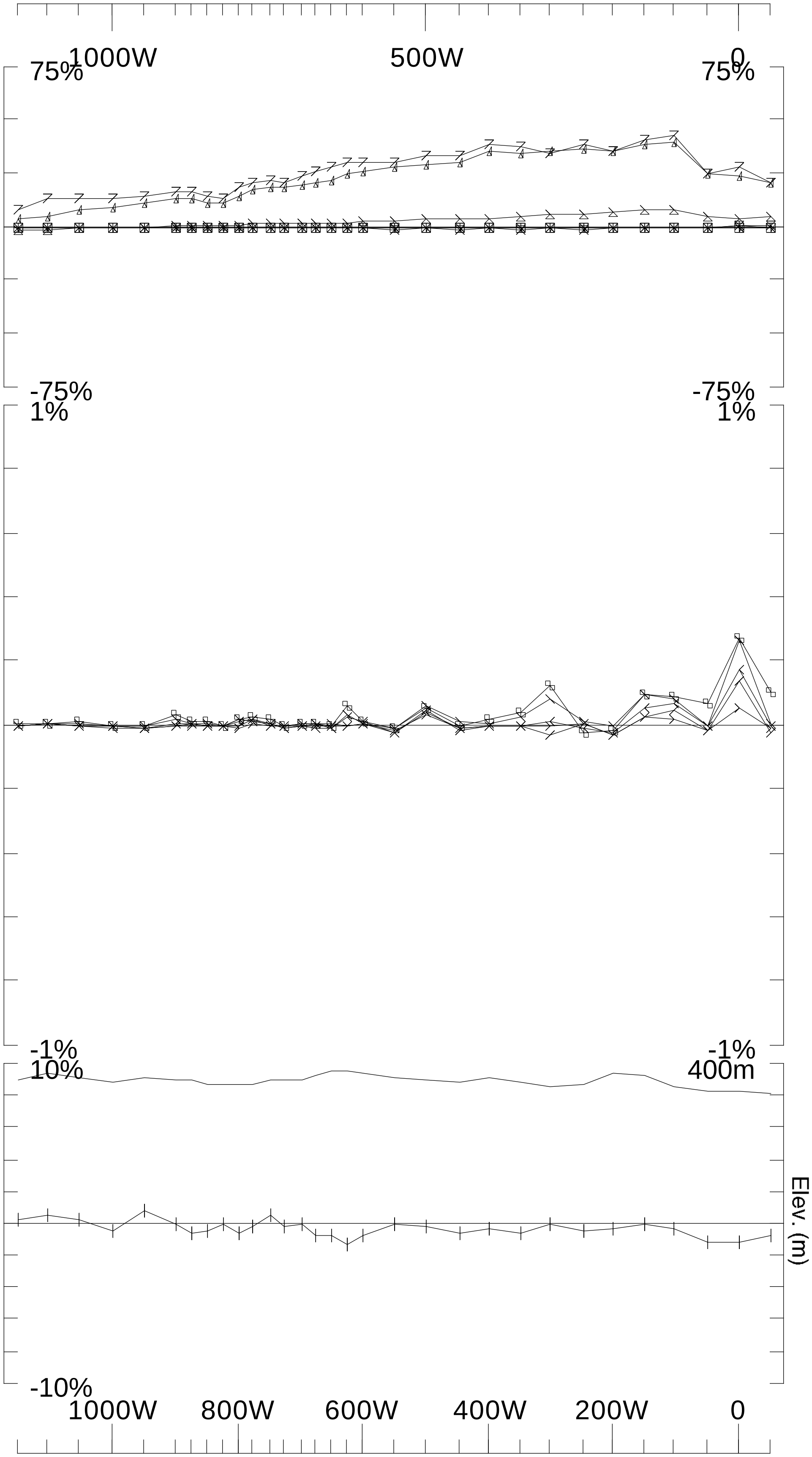
Secondary, (Chn - Ch0)/IHpl
Contin. Norm at depth of 0 m
Base Freq. 4.090 Hz

UTEM Survey at: Ministic Lake
For: Wallbridge

LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE

Job 1401

Plotted : 30/1/14



Loop: 1450S1	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1650N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 4.090 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14

Ministic Grid

Loop 1451

Hz

2.045Hz frequency

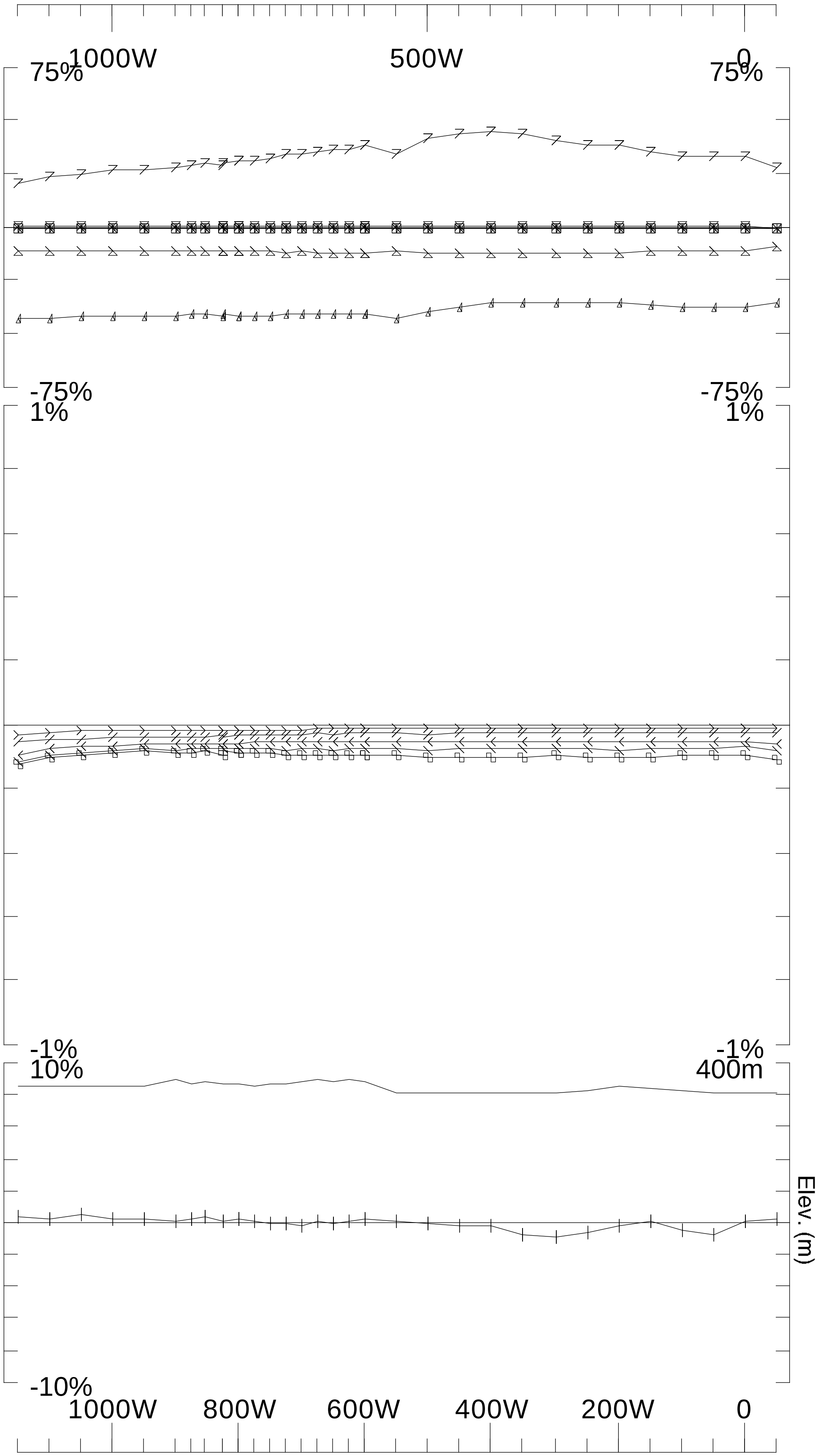
continuous norm

12Ch - Ch0 reduced

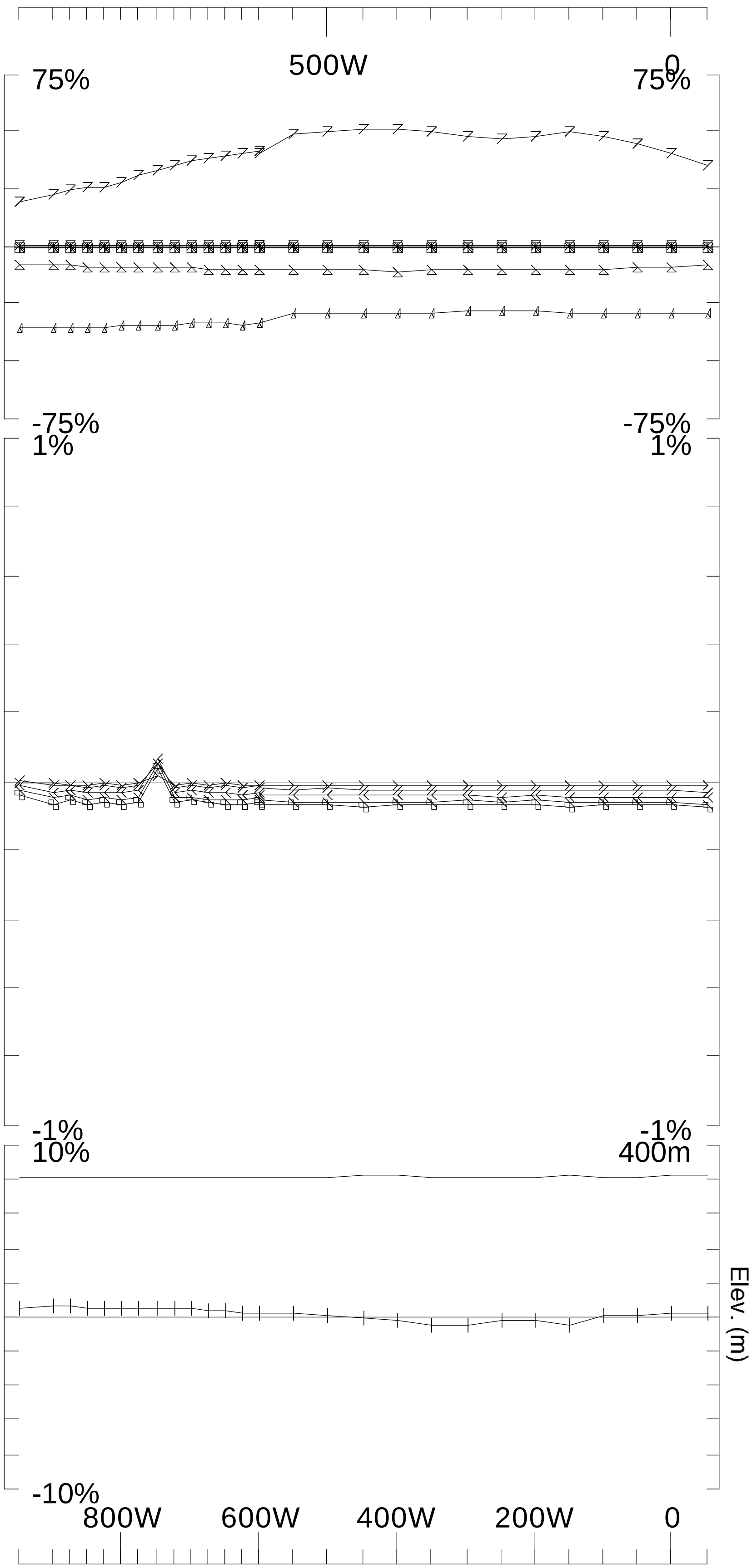
Loop 1451 @2.045Hz

Line	000	1200W - 50E	1250m	Hz/Hx/Hy
Line	225N	950W - 50E	1000m	Hz/Hx/Hy
Line	500N	1250W - 50E	1300m	Hz/Hx/Hy
Line	750N	1250W - 50E	1300m	Hz/Hx/Hy
Line	900N	1250W - 50E	1300m	Hz/Hx/Hy
Line	1150N	1250W - 50E	1300m	Hz/Hx/Hy
Line	1400N	1250W - 50E	1300m	Hz/Hx/Hy
Line	1650N	1200W - 50E	1250m	Hz/Hx/Hy

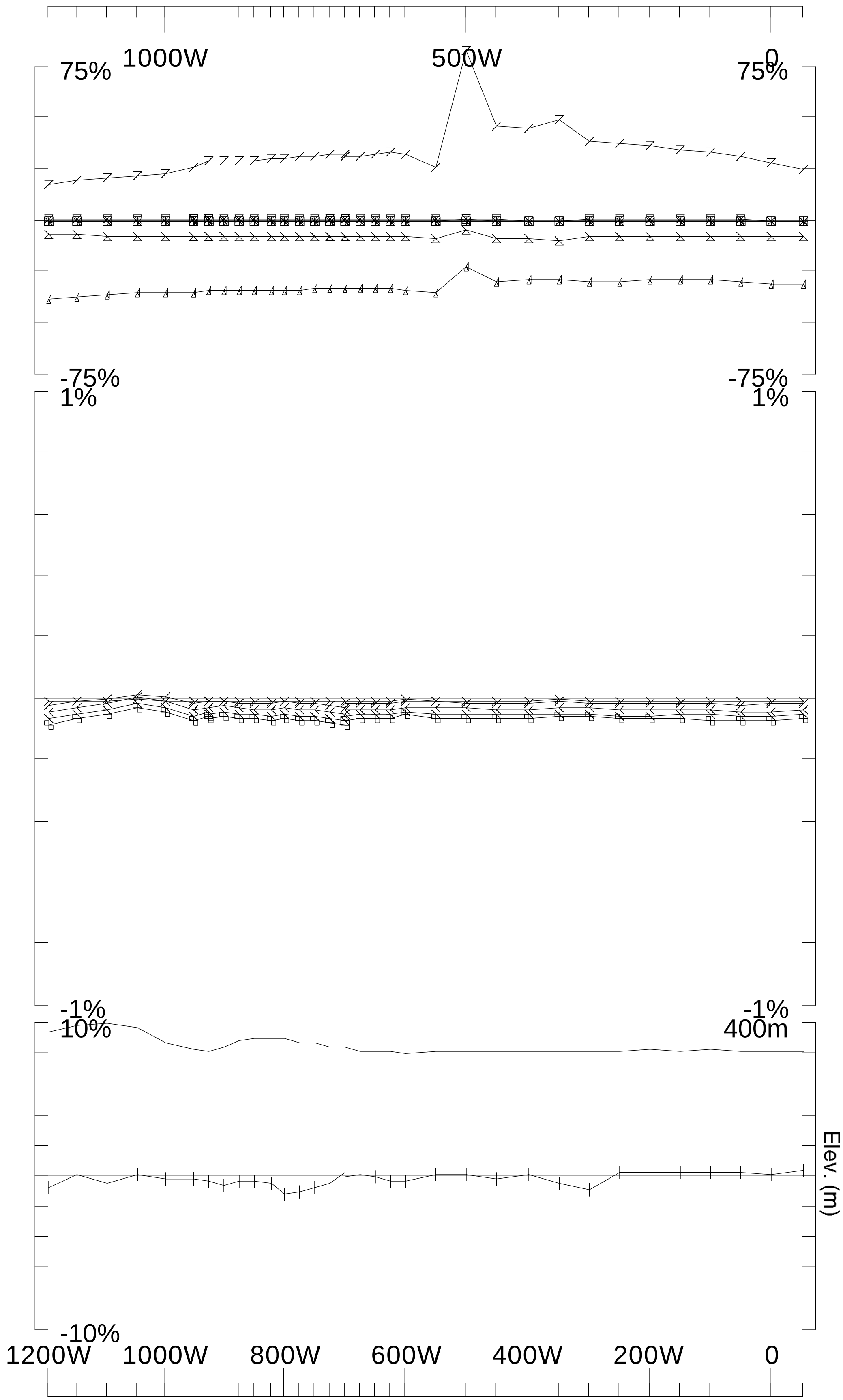
Loop 1451 - Hz



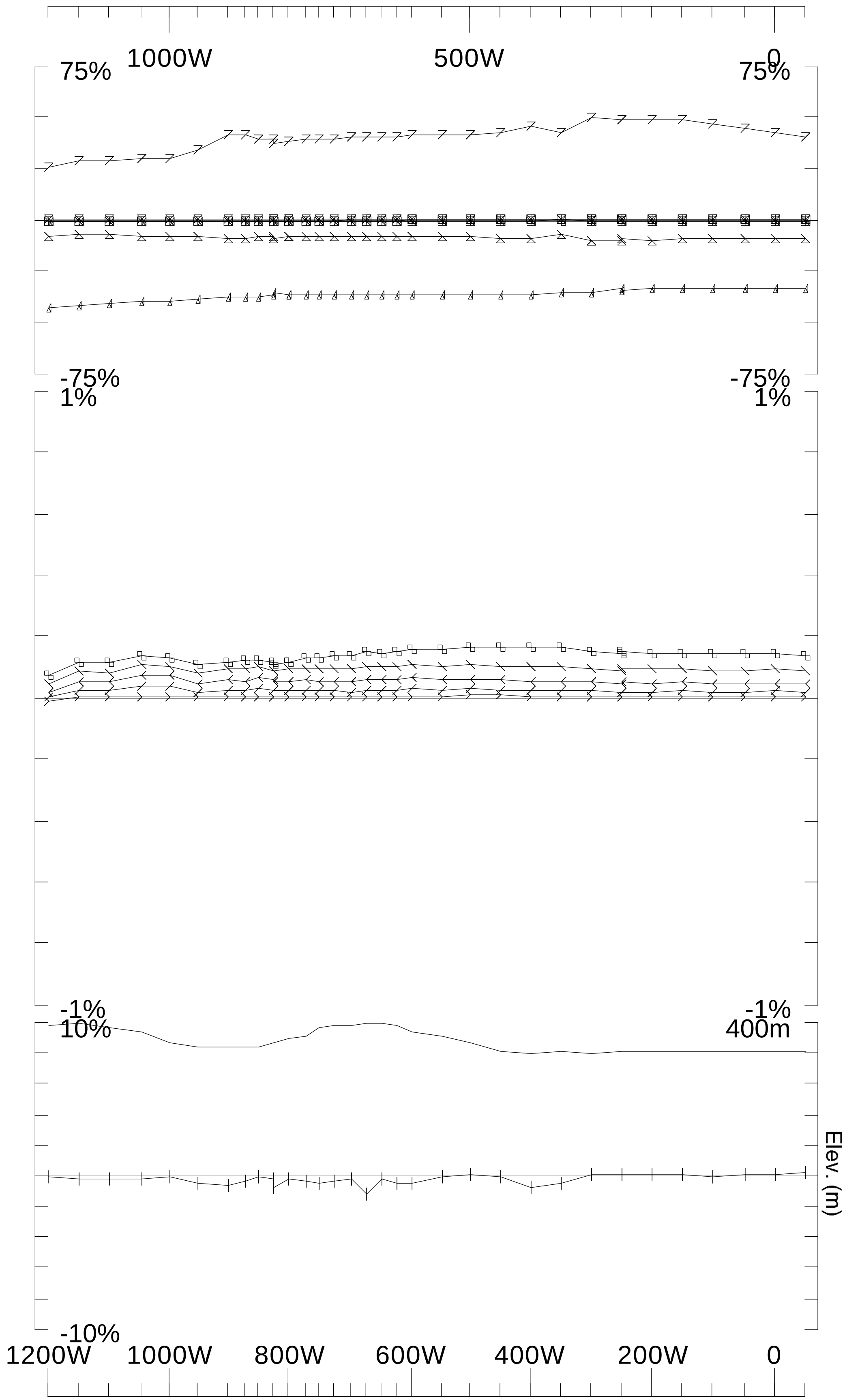
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 000	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 29/1/14



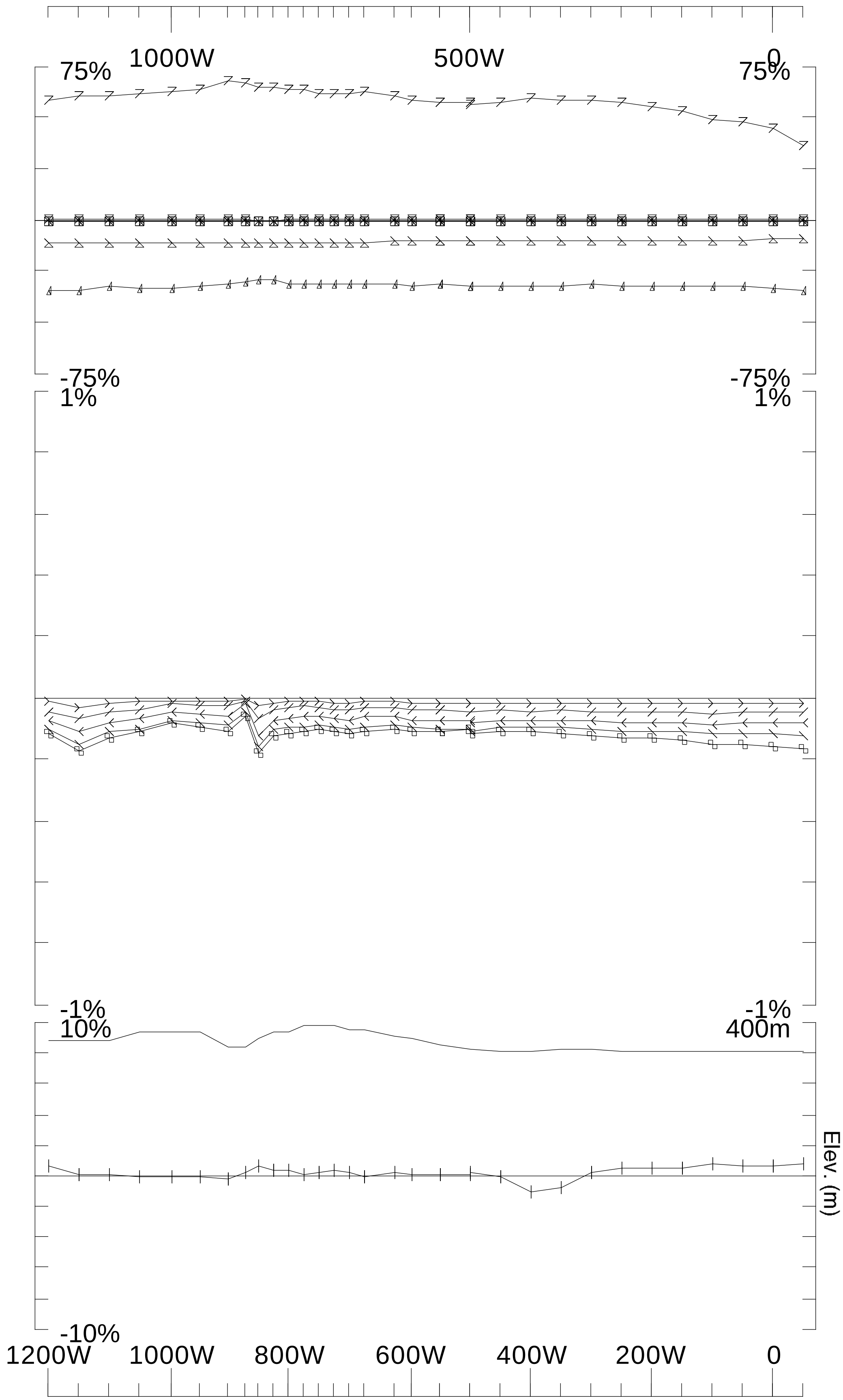
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 225N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



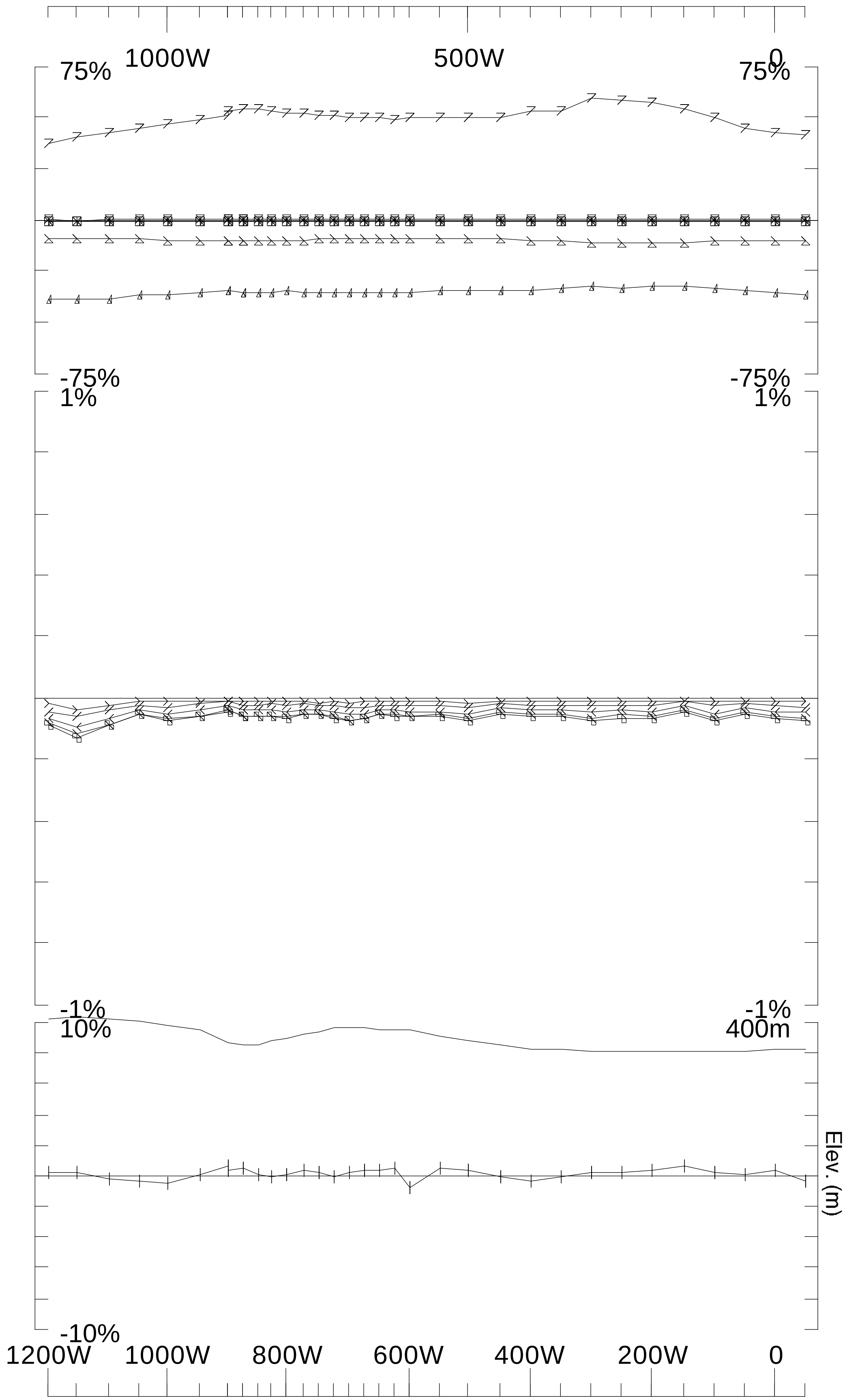
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 500N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



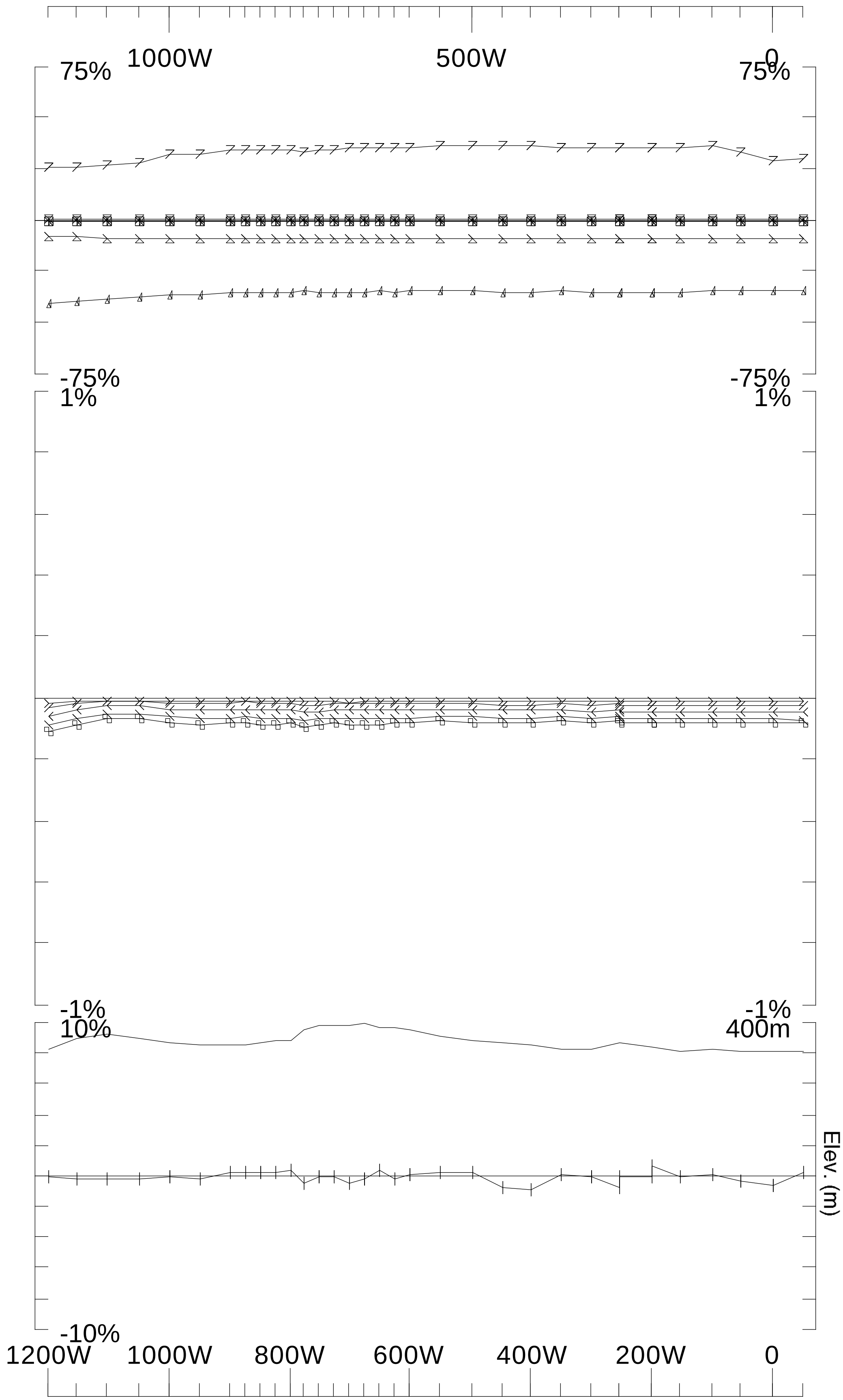
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 750N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



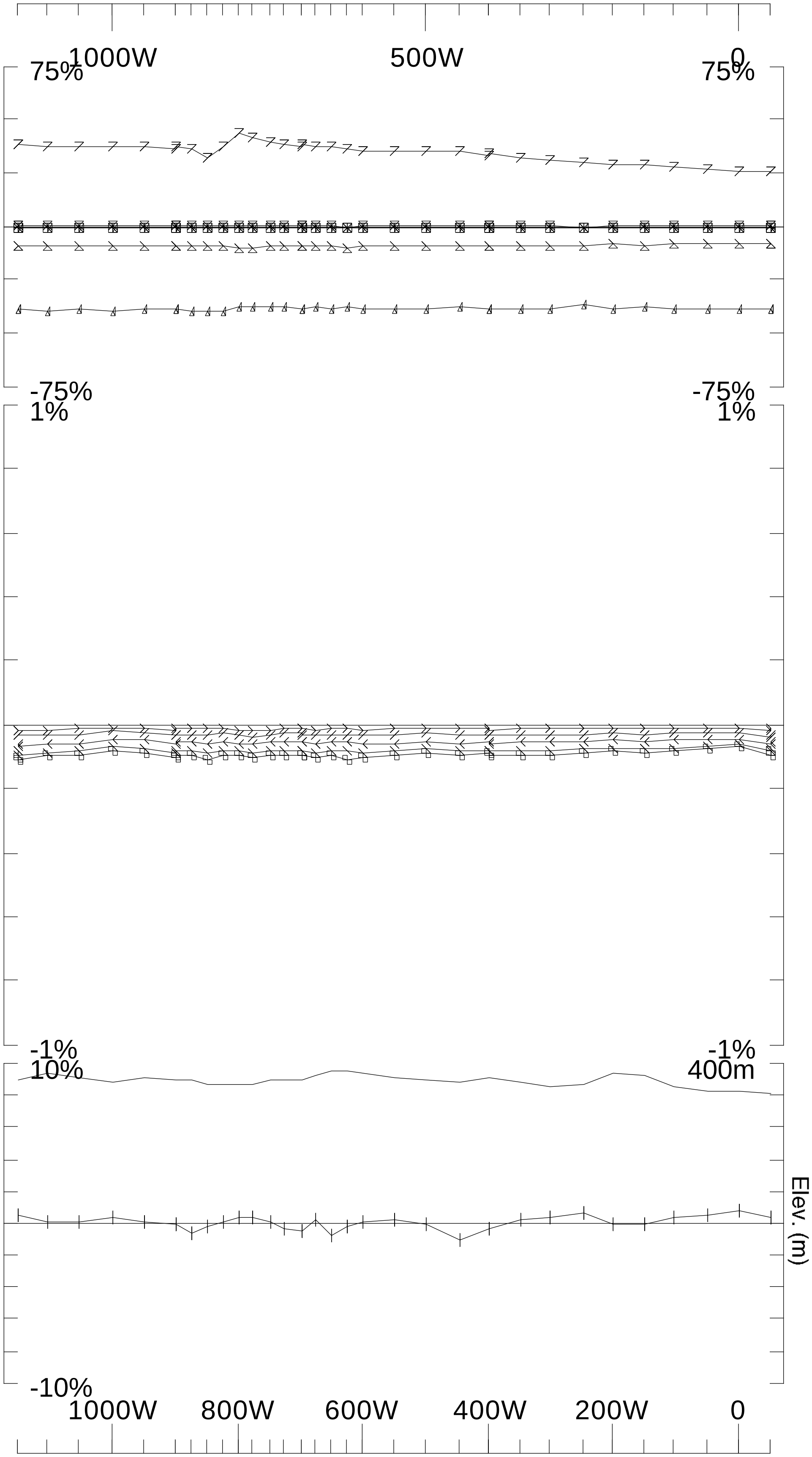
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 900N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



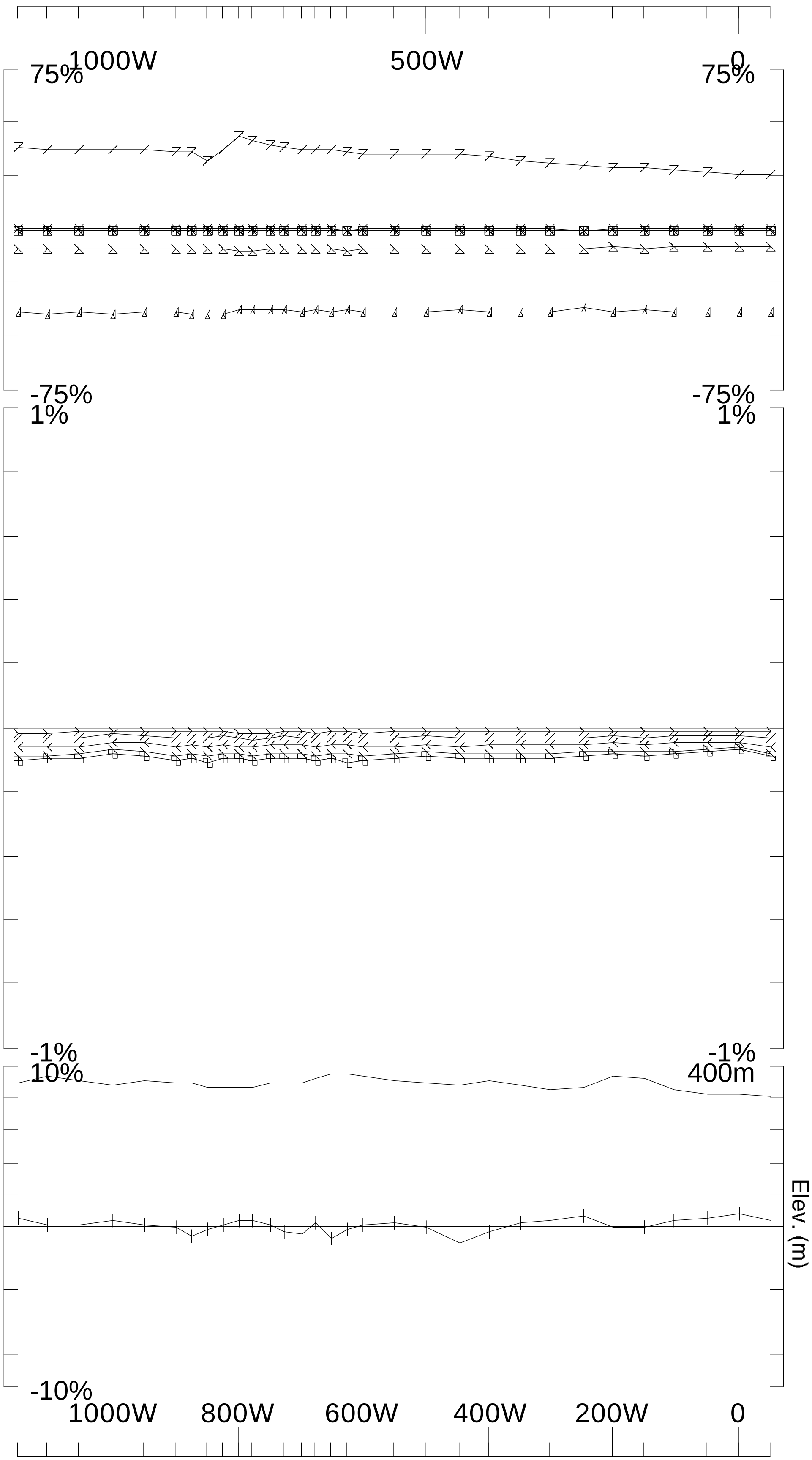
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1150N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1400N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1650N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1451S2	Secondary, (Chn - Ch0)/lHpl	UTEM Survey at: Ministic lake
Line: 1650N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hz	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14

Ministic Grid

Loop 1451

Hx

2.045Hz frequency

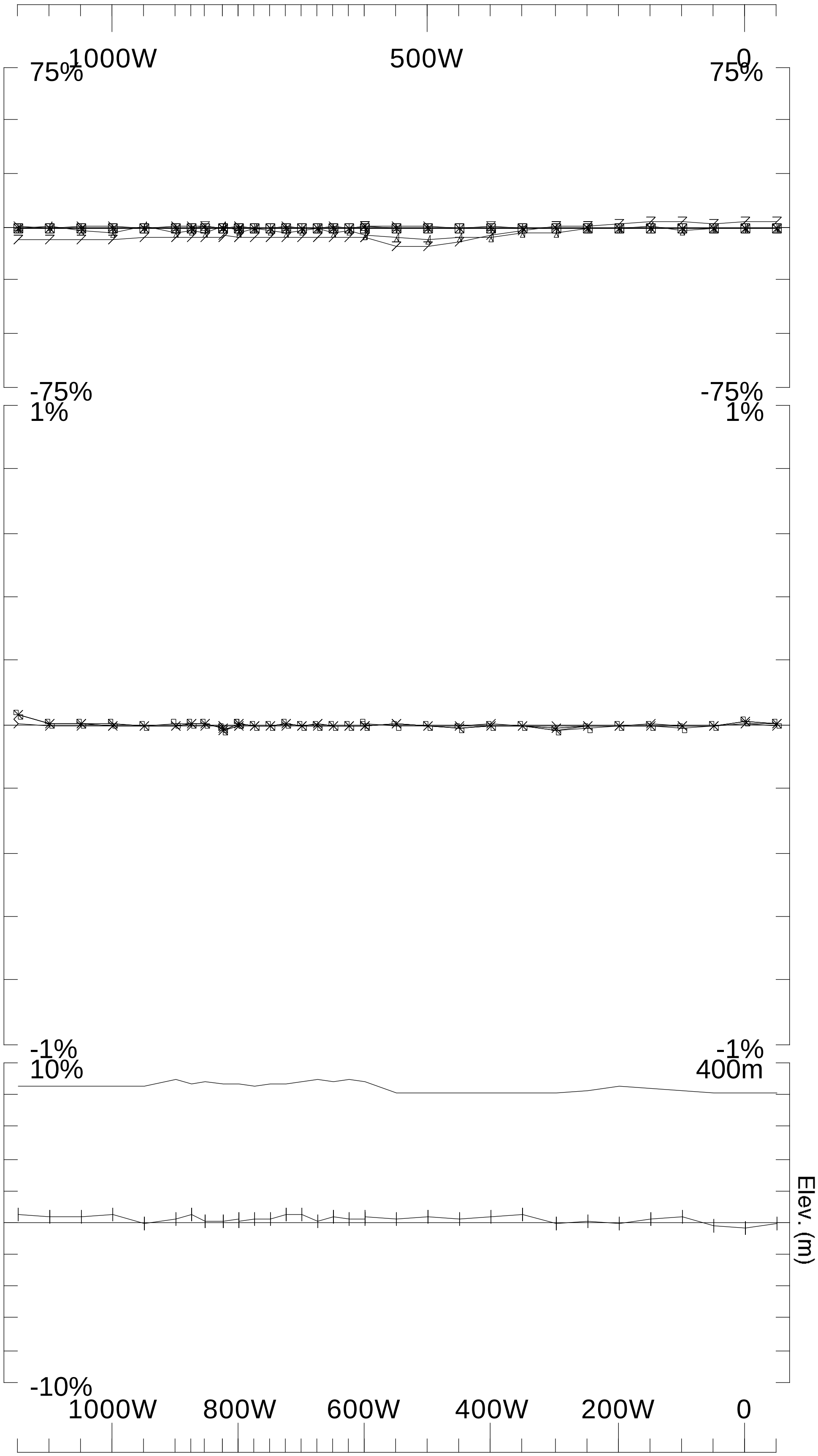
continuous norm

12Ch - Ch0 reduced

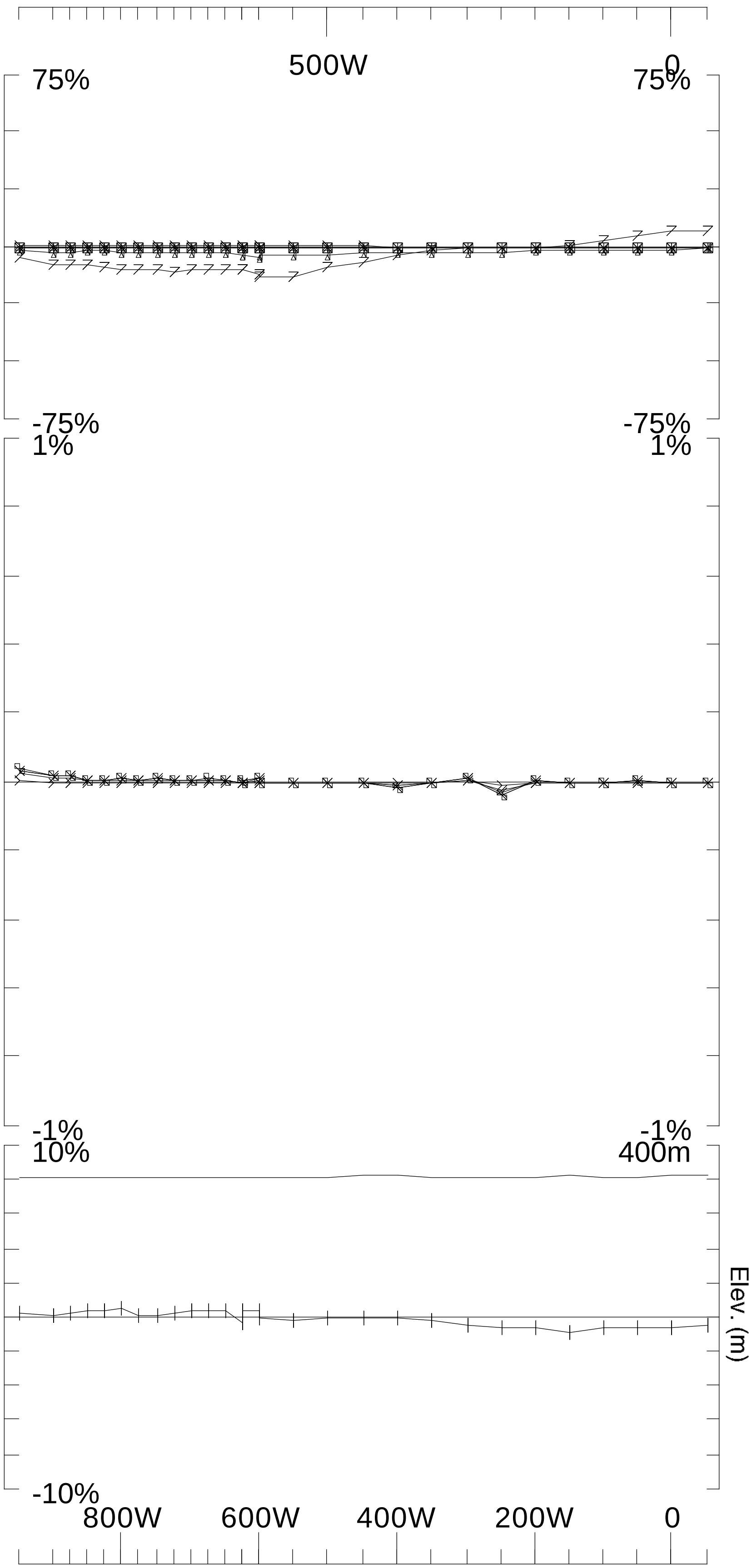
Loop 1451 @2.045Hz

Line	000	1200W - 50E	1250m	Hz/Hx/Hy
Line	225N	950W - 50E	1000m	Hz/Hx/Hy
Line	500N	1250W - 50E	1300m	Hz/Hx/Hy
Line	750N	1250W - 50E	1300m	Hz/Hx/Hy
Line	900N	1250W - 50E	1300m	Hz/Hx/Hy
Line	1150N	1250W - 50E	1300m	Hz/Hx/Hy
Line	1400N	1250W - 50E	1300m	Hz/Hx/Hy
Line	1650N	1200W - 50E	1250m	Hz/Hx/Hy

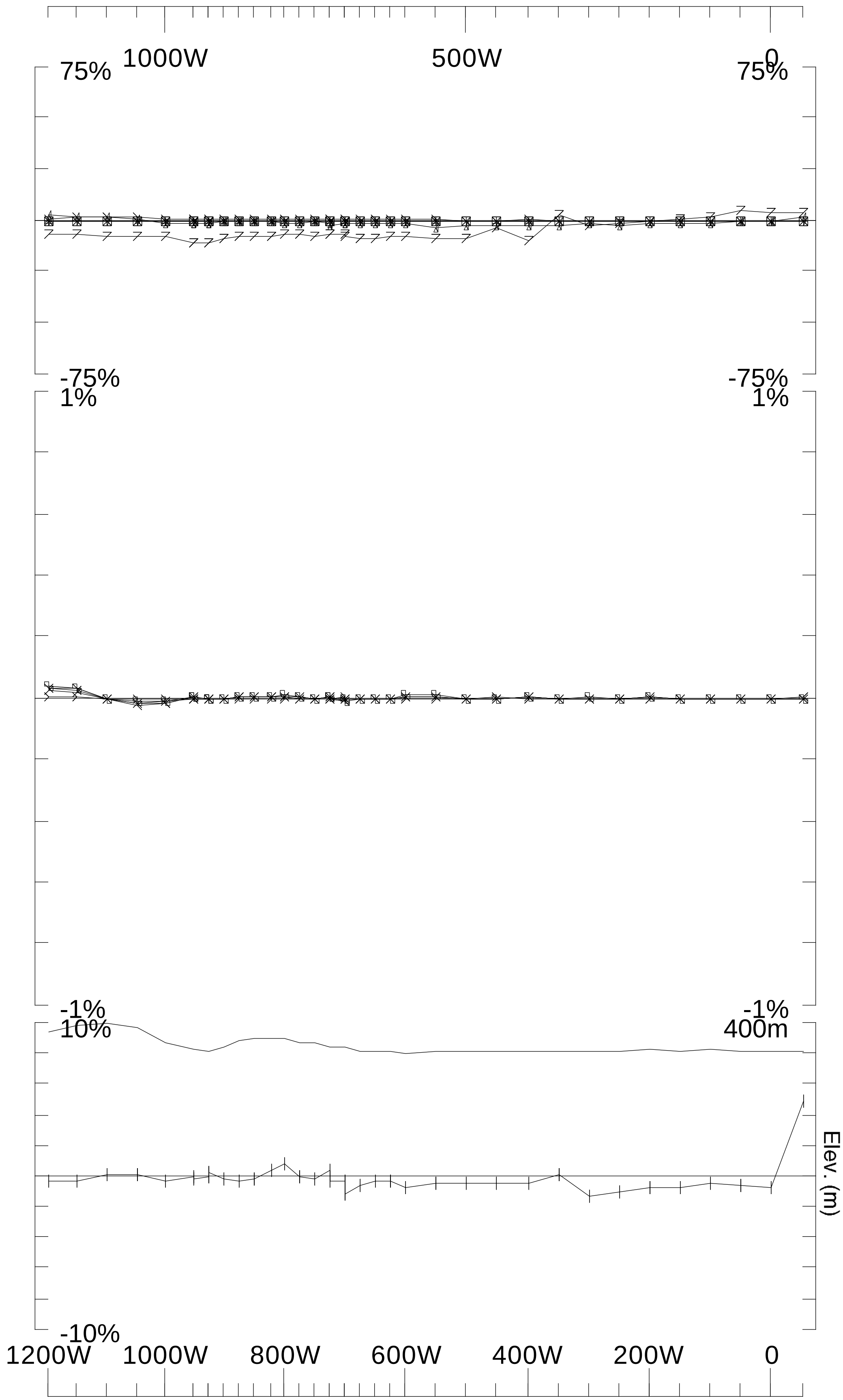
Loop 1451 - Hx



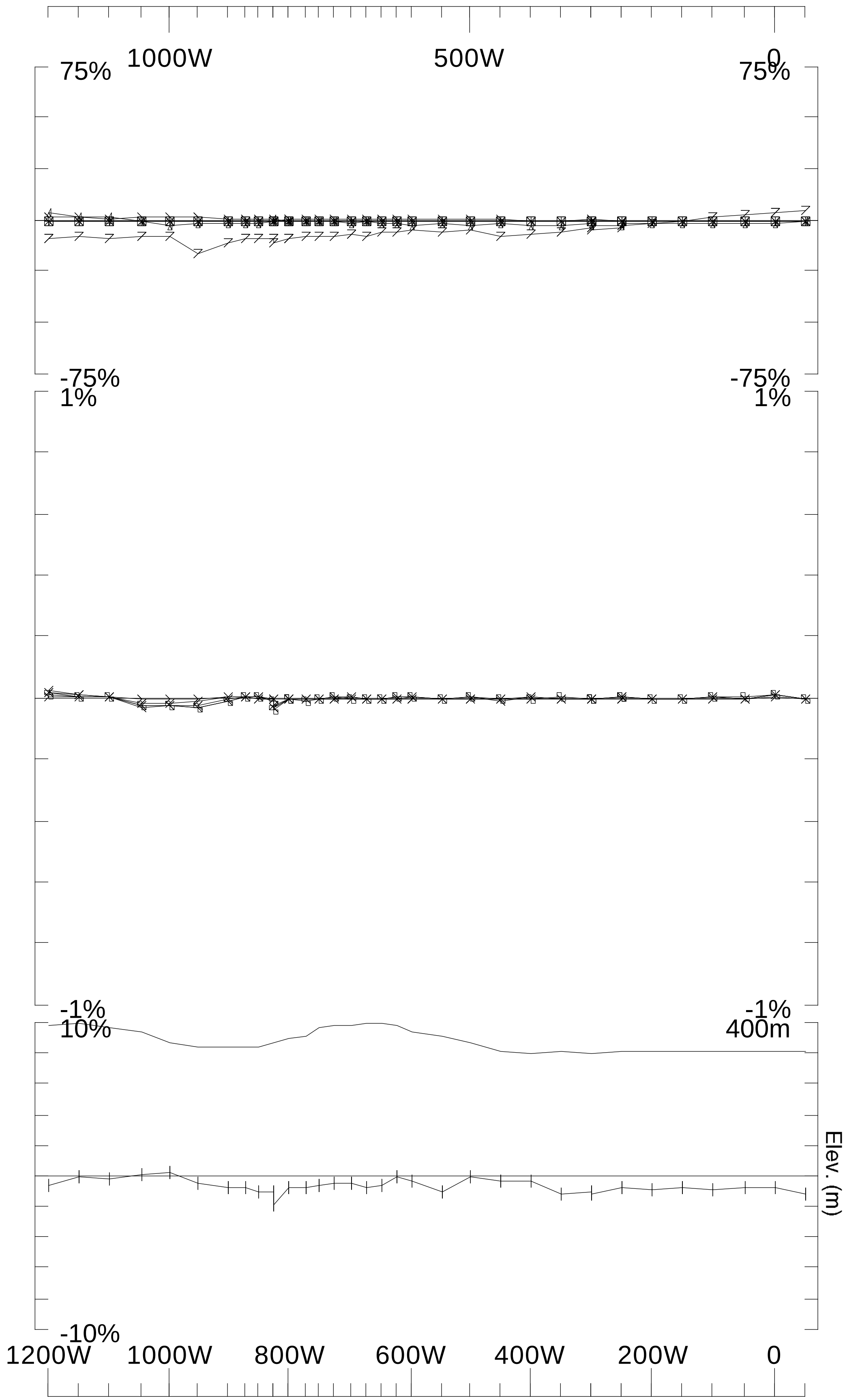
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 000	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



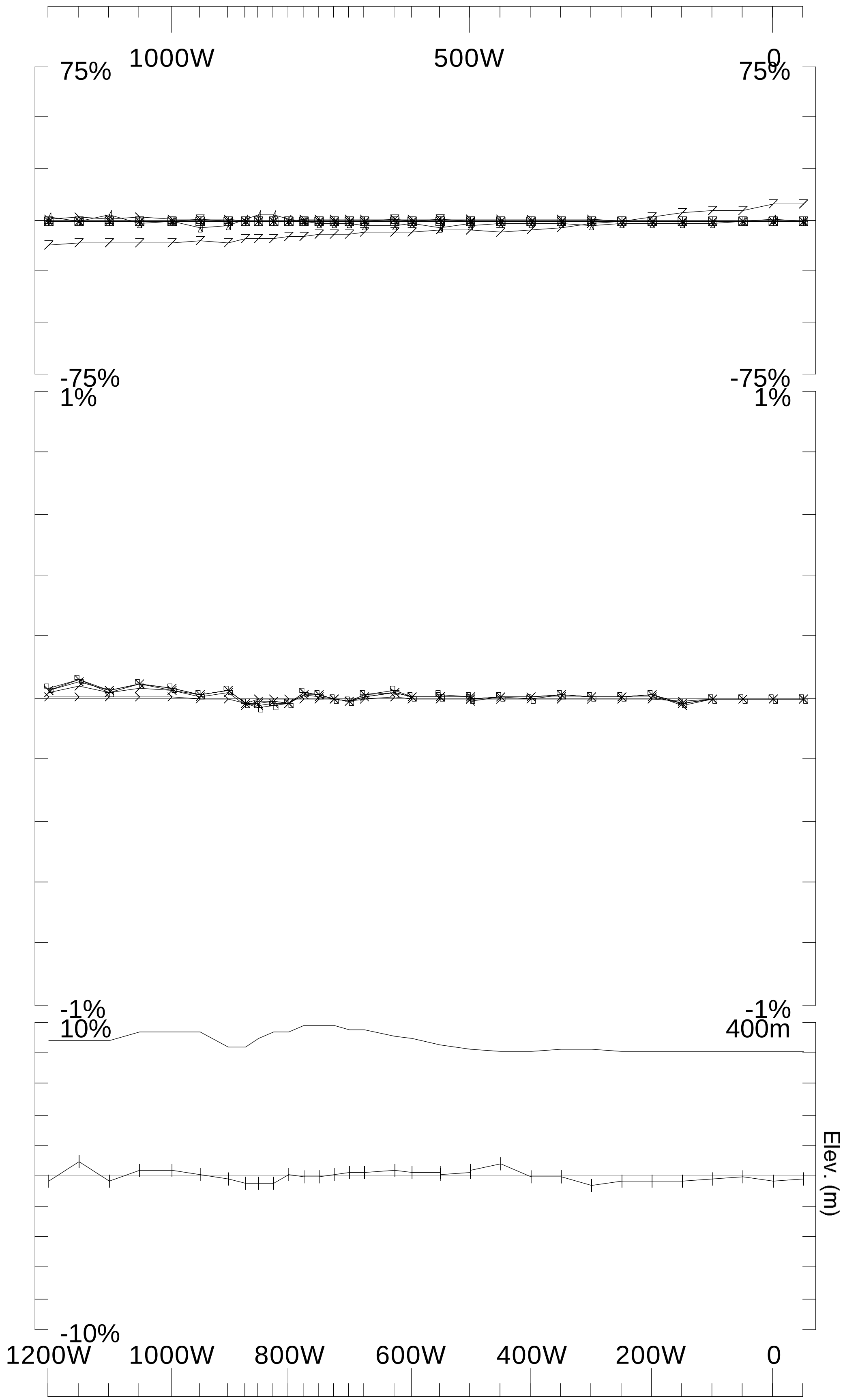
Loop: 1451S2	Secondary, (Chn - Ch0)/lHpl	UTEM Survey at: Ministic Lake
Line: 225N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



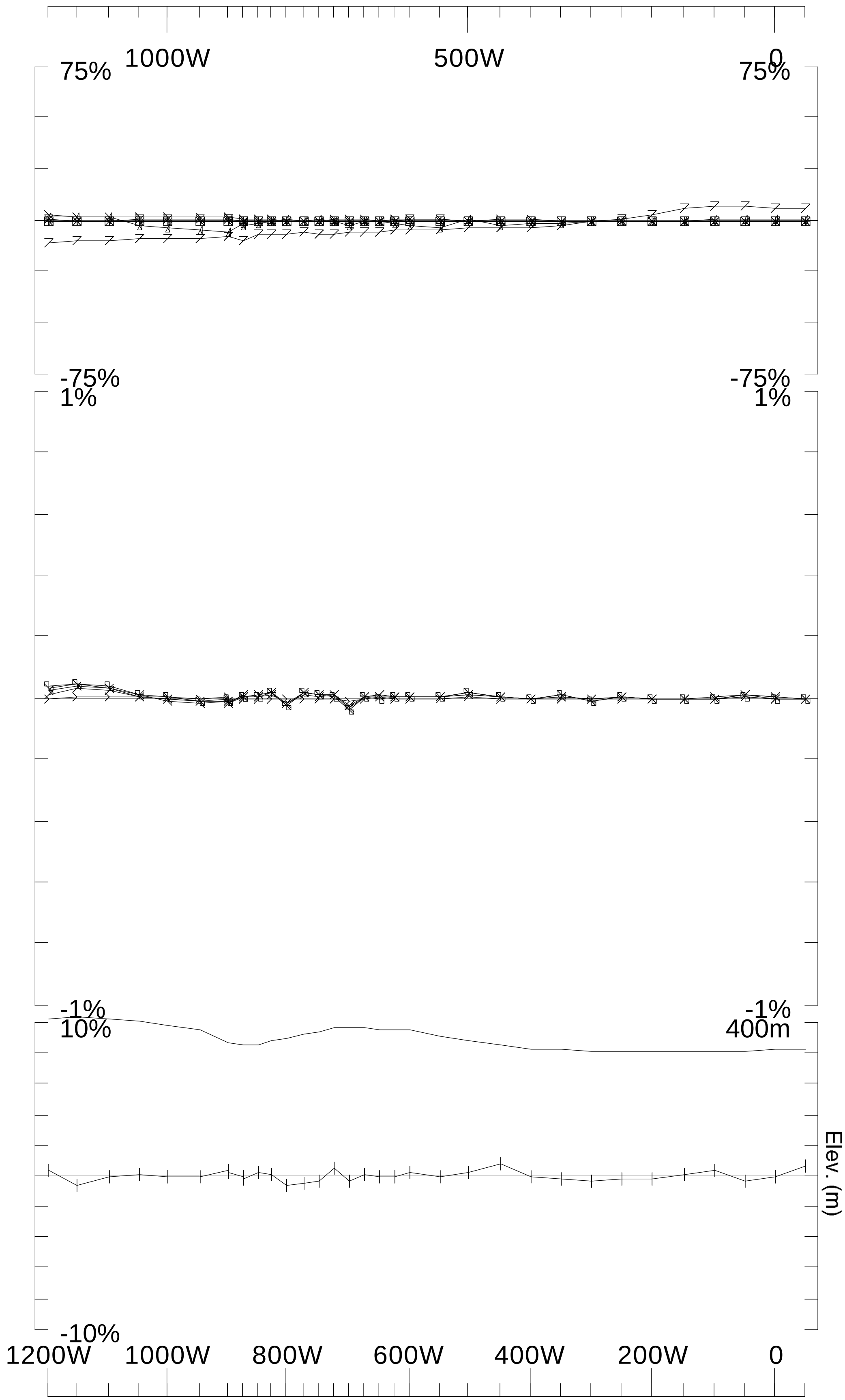
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 500N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 29/1/14



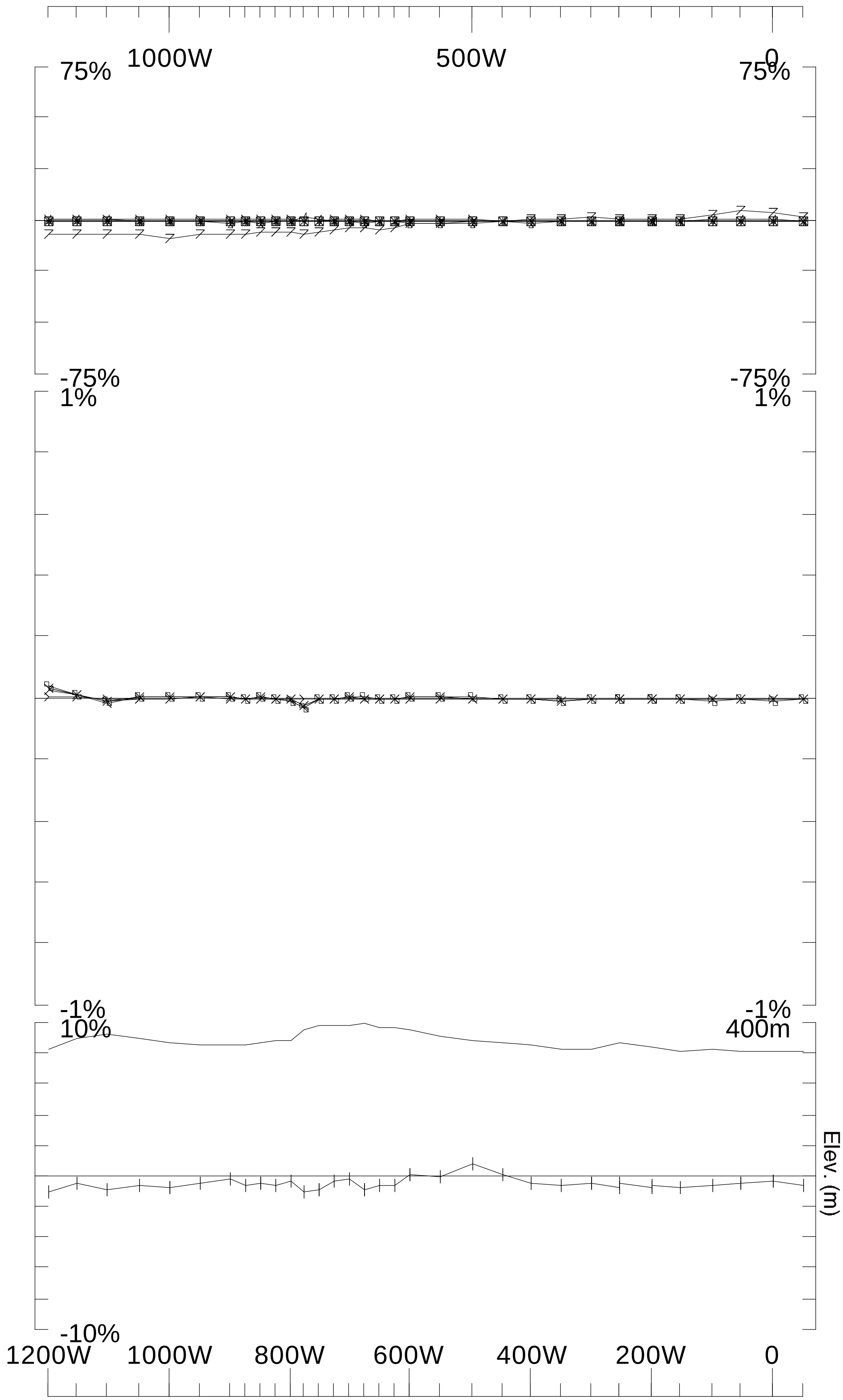
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 750N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



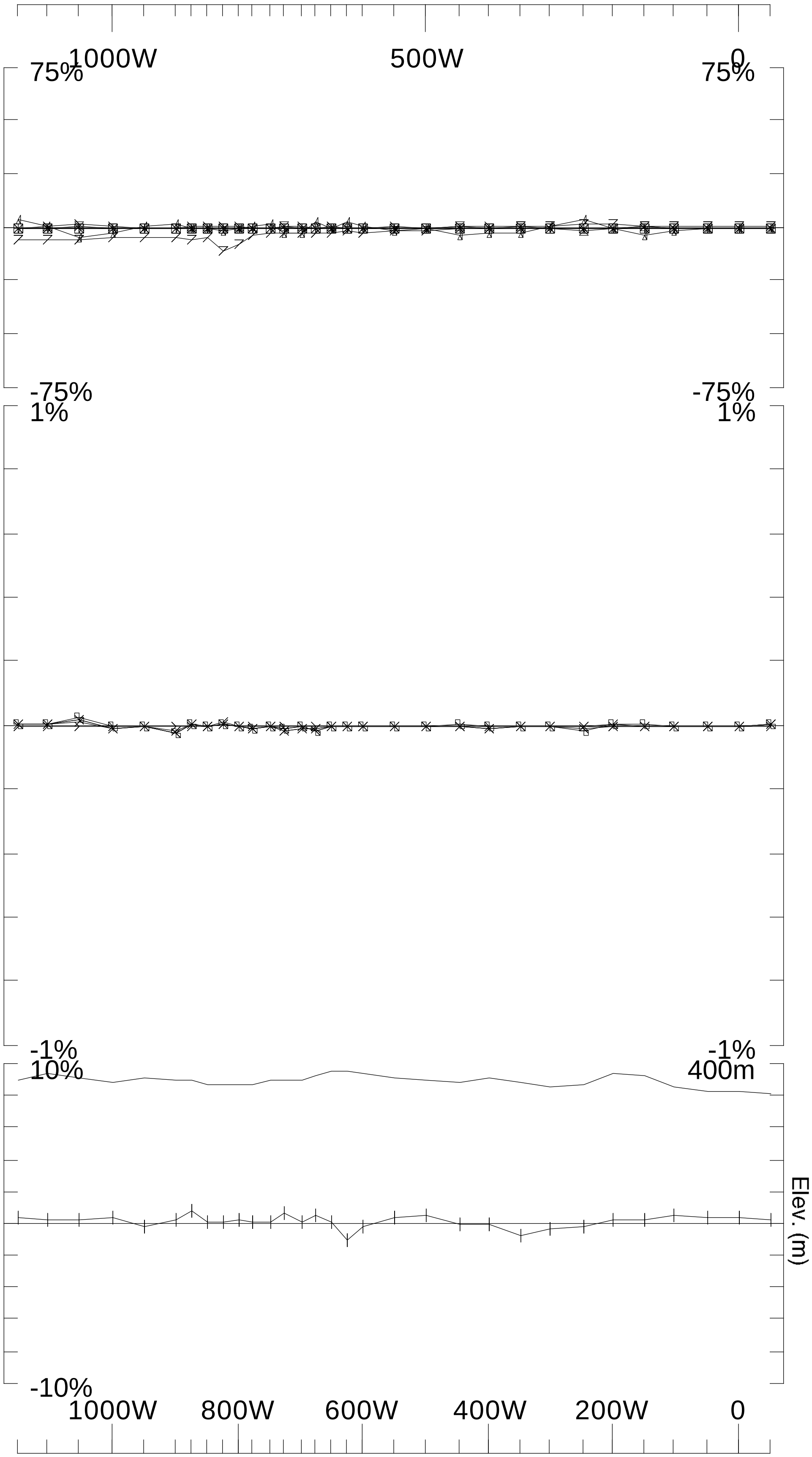
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 900N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1150N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1400N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1650N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hx	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14

Ministic Grid

Loop 1451

Hy

2.045Hz frequency

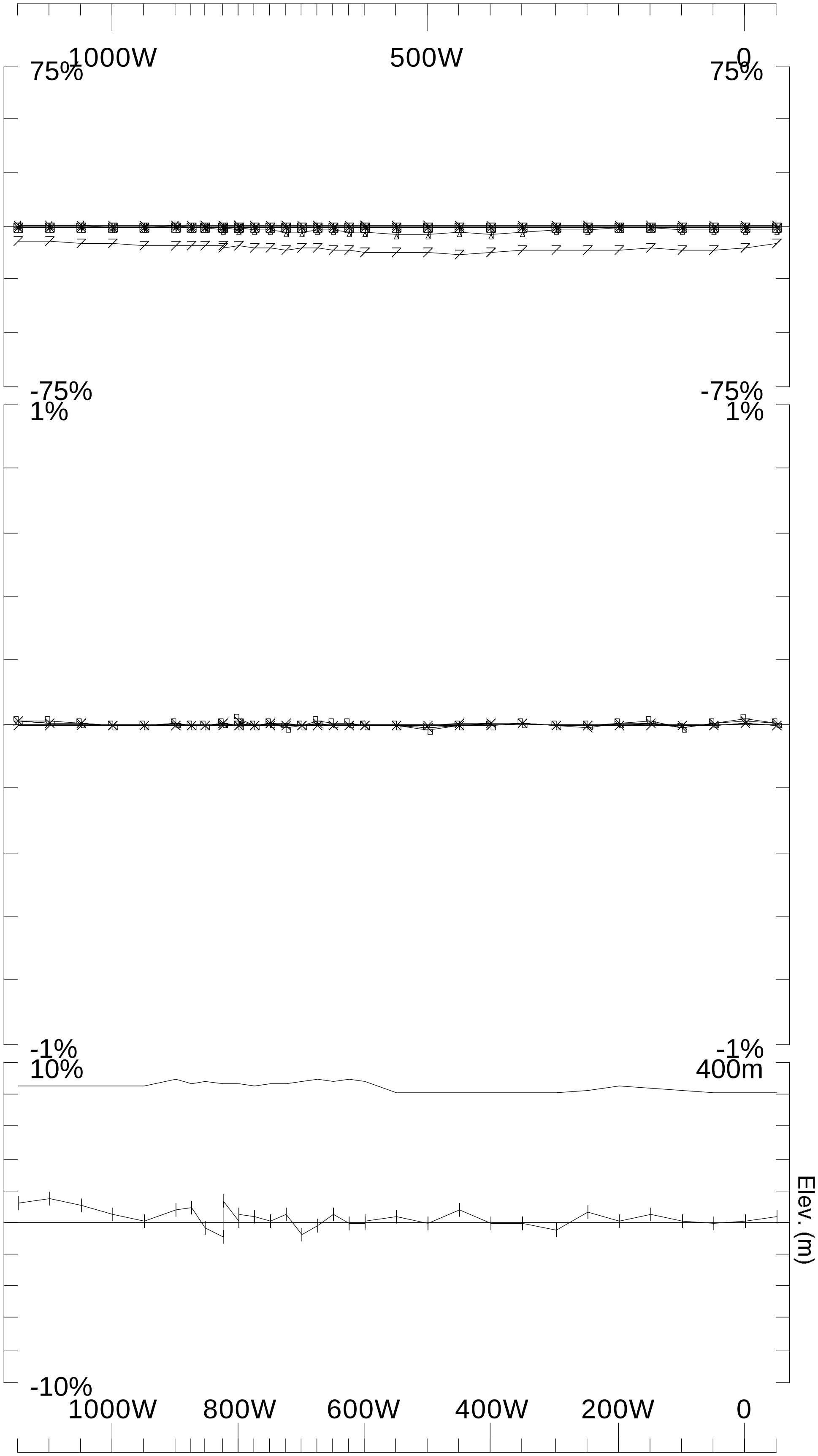
continuous norm

12Ch - Ch0 reduced

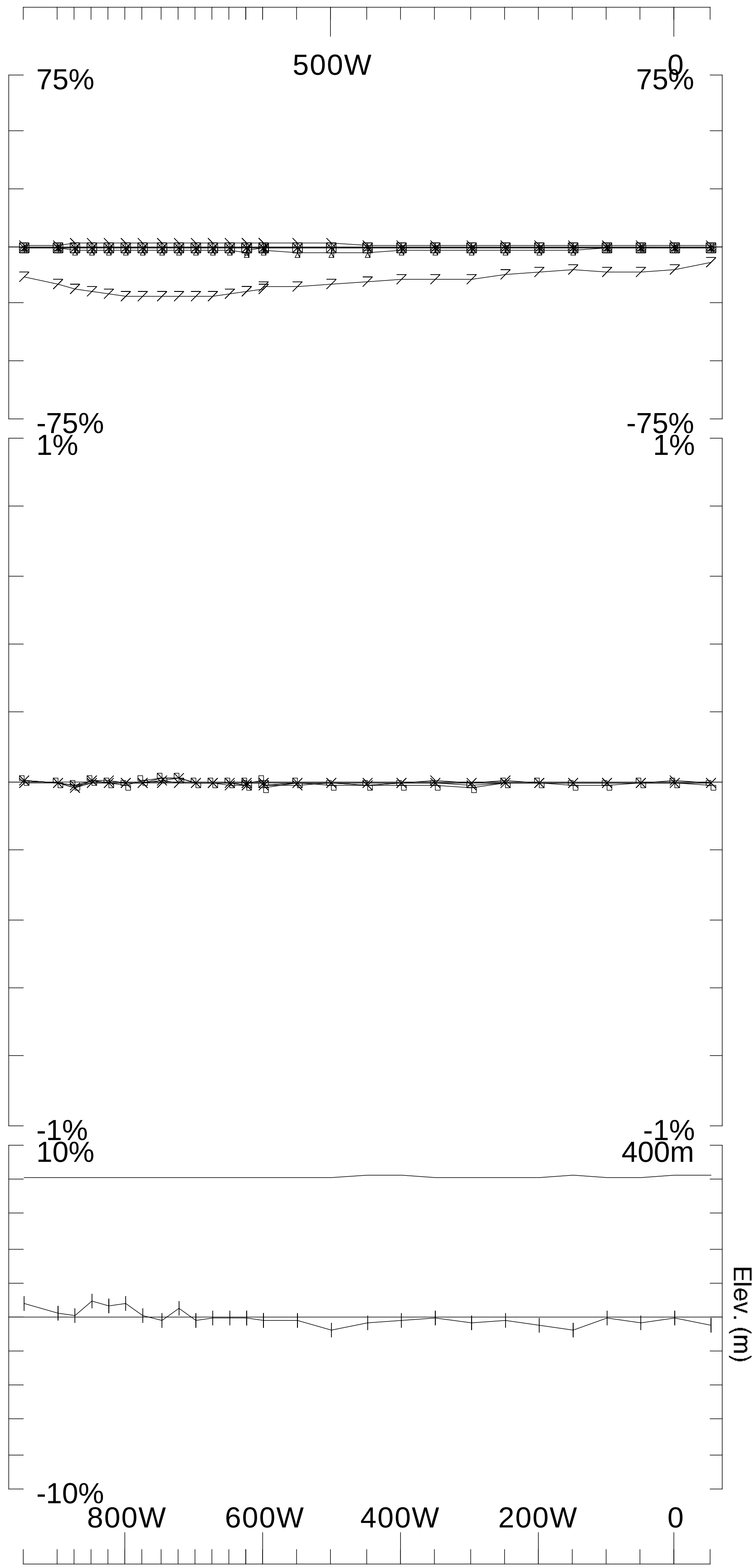
Loop 1451 @2.045Hz

Line 000	1200W - 50E	1250m	Hz/Hx/Hy
Line 225N	950W - 50E	1000m	Hz/Hx/Hy
Line 500N	1250W - 50E	1300m	Hz/Hx/Hy
Line 750N	1250W - 50E	1300m	Hz/Hx/Hy
Line 900N	1250W - 50E	1300m	Hz/Hx/Hy
Line 1150N	1250W - 50E	1300m	Hz/Hx/Hy
Line 1400N	1250W - 50E	1300m	Hz/Hx/Hy
Line 1650N	1200W - 50E	1250m	Hz/Hx/Hy

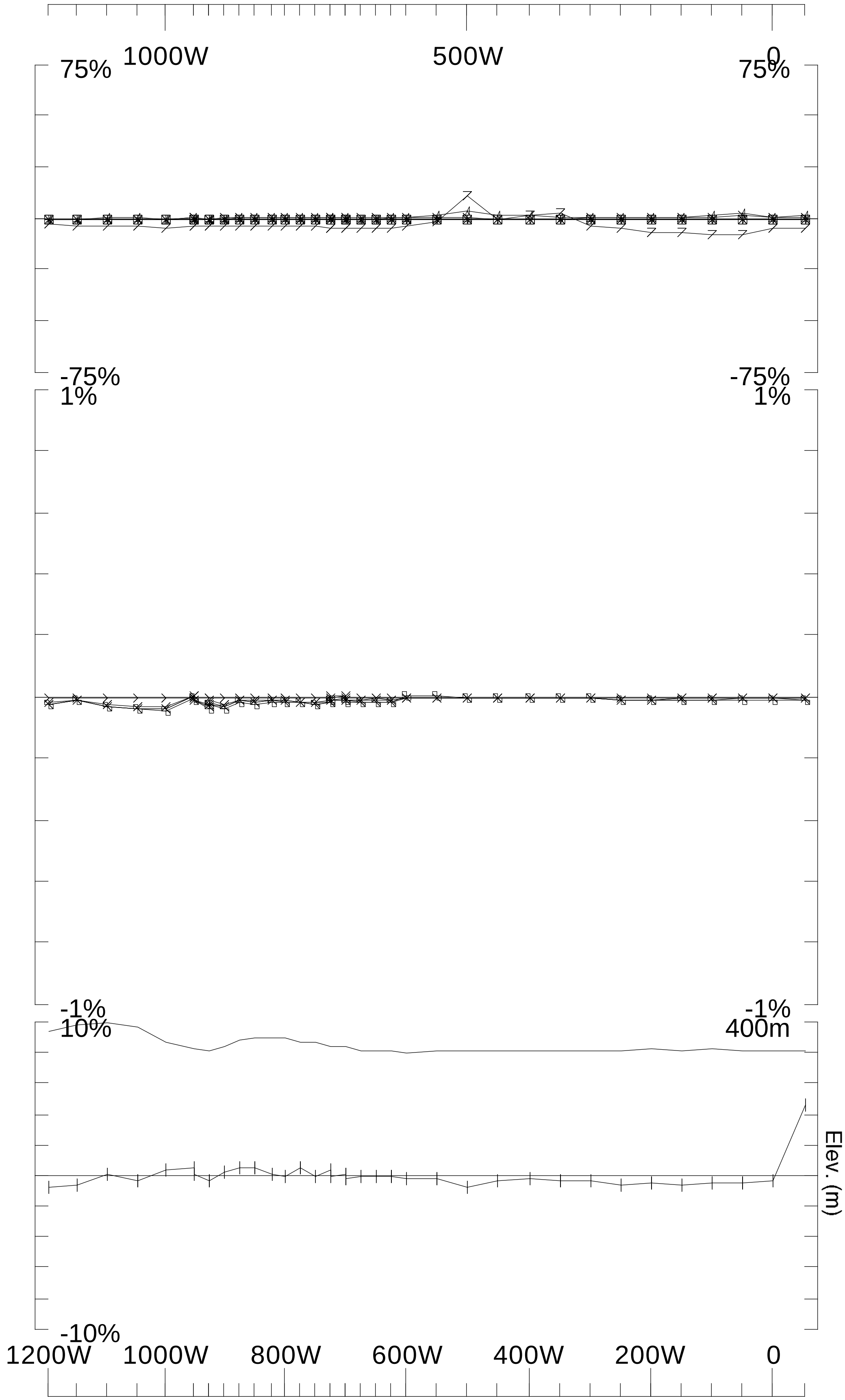
Loop 1451 - Hy



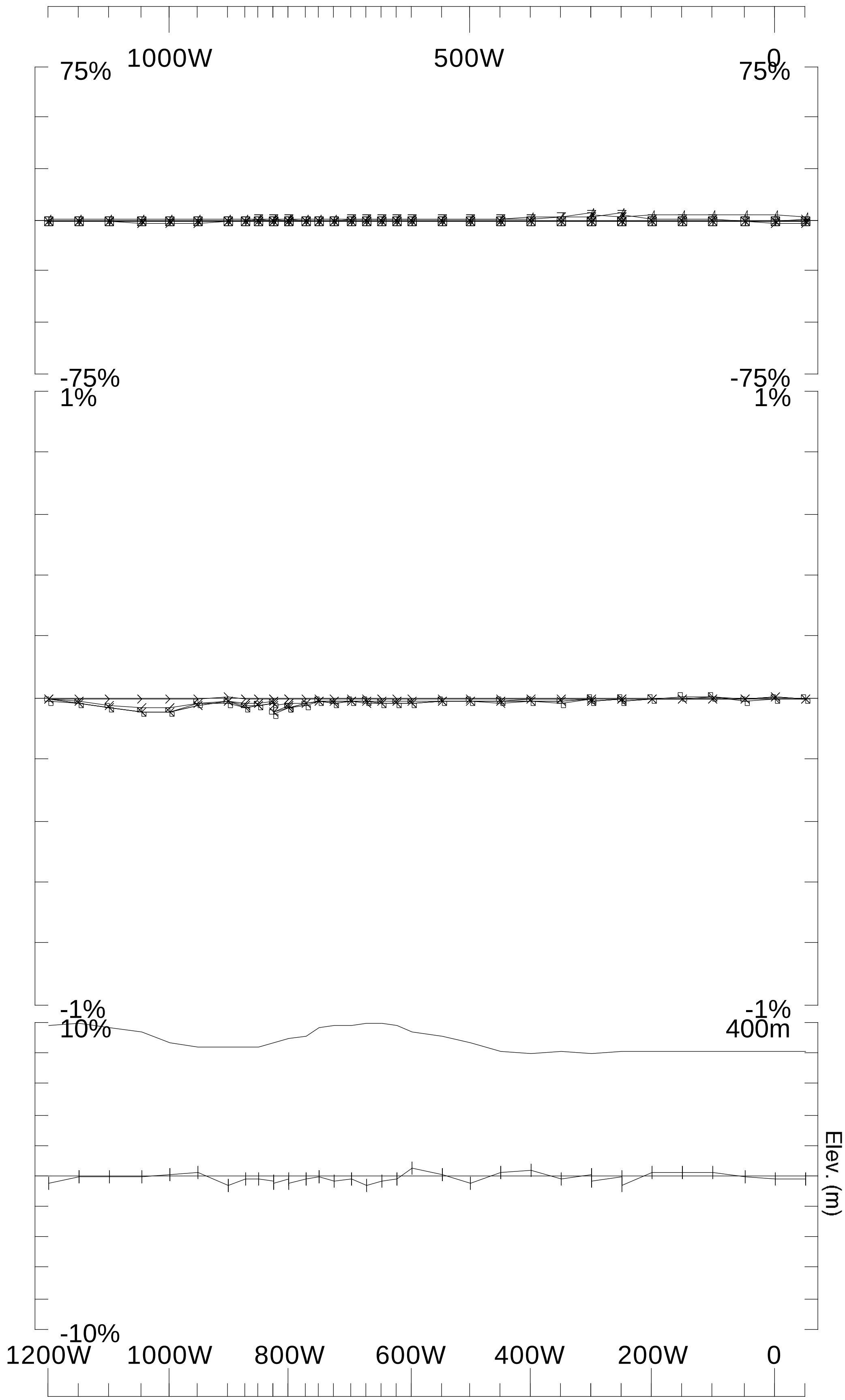
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 000	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



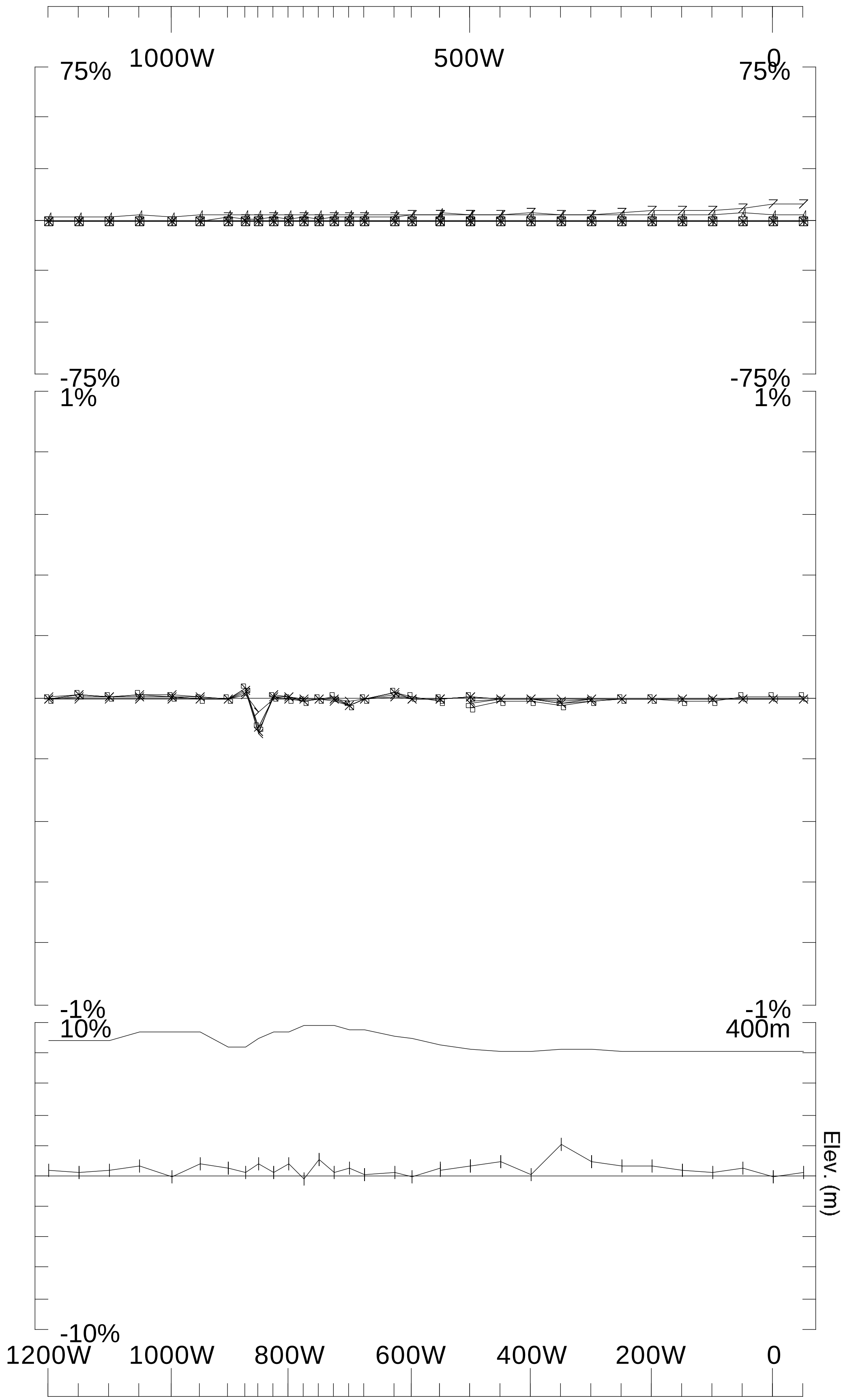
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 225N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



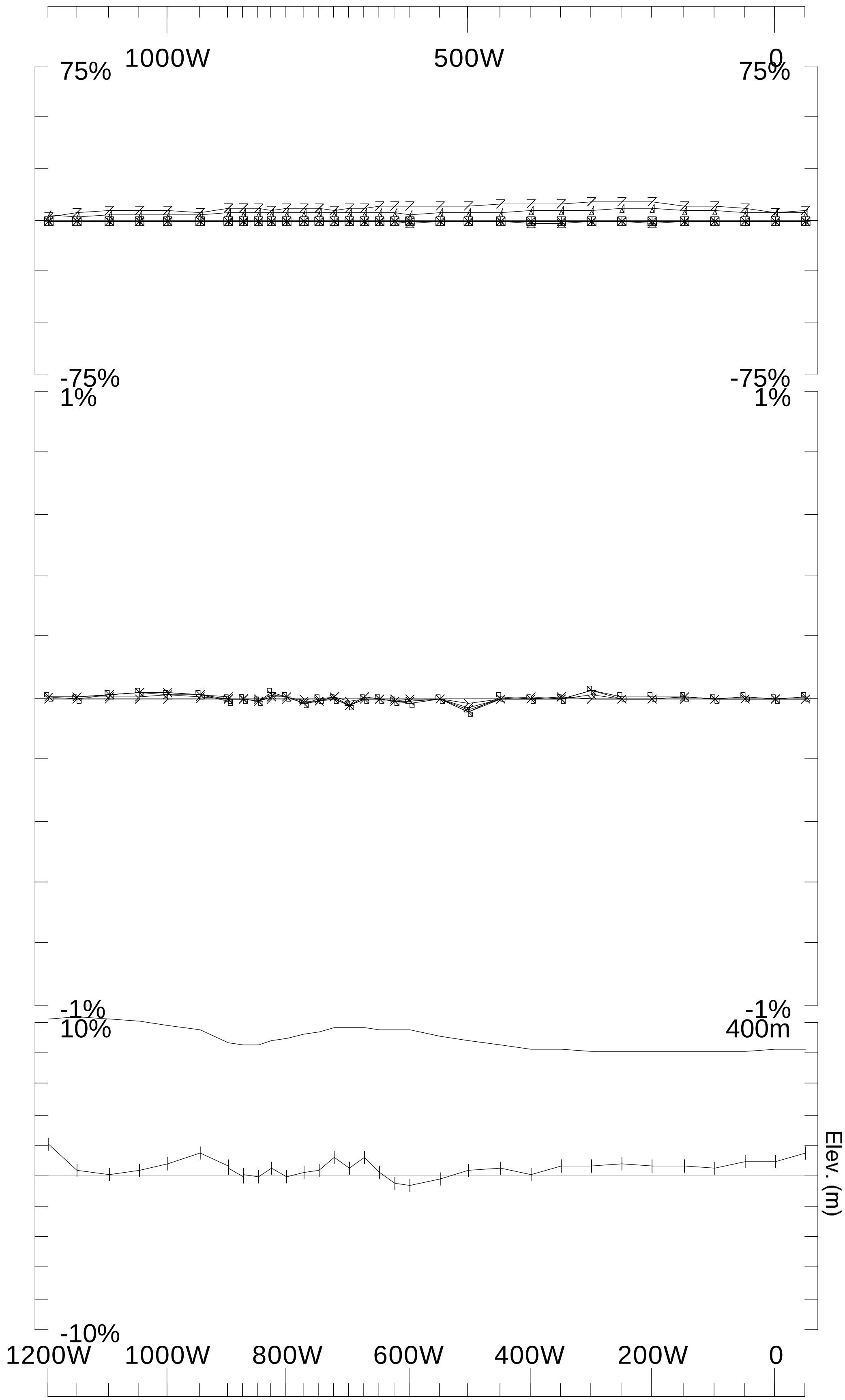
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 500N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 29/1/14



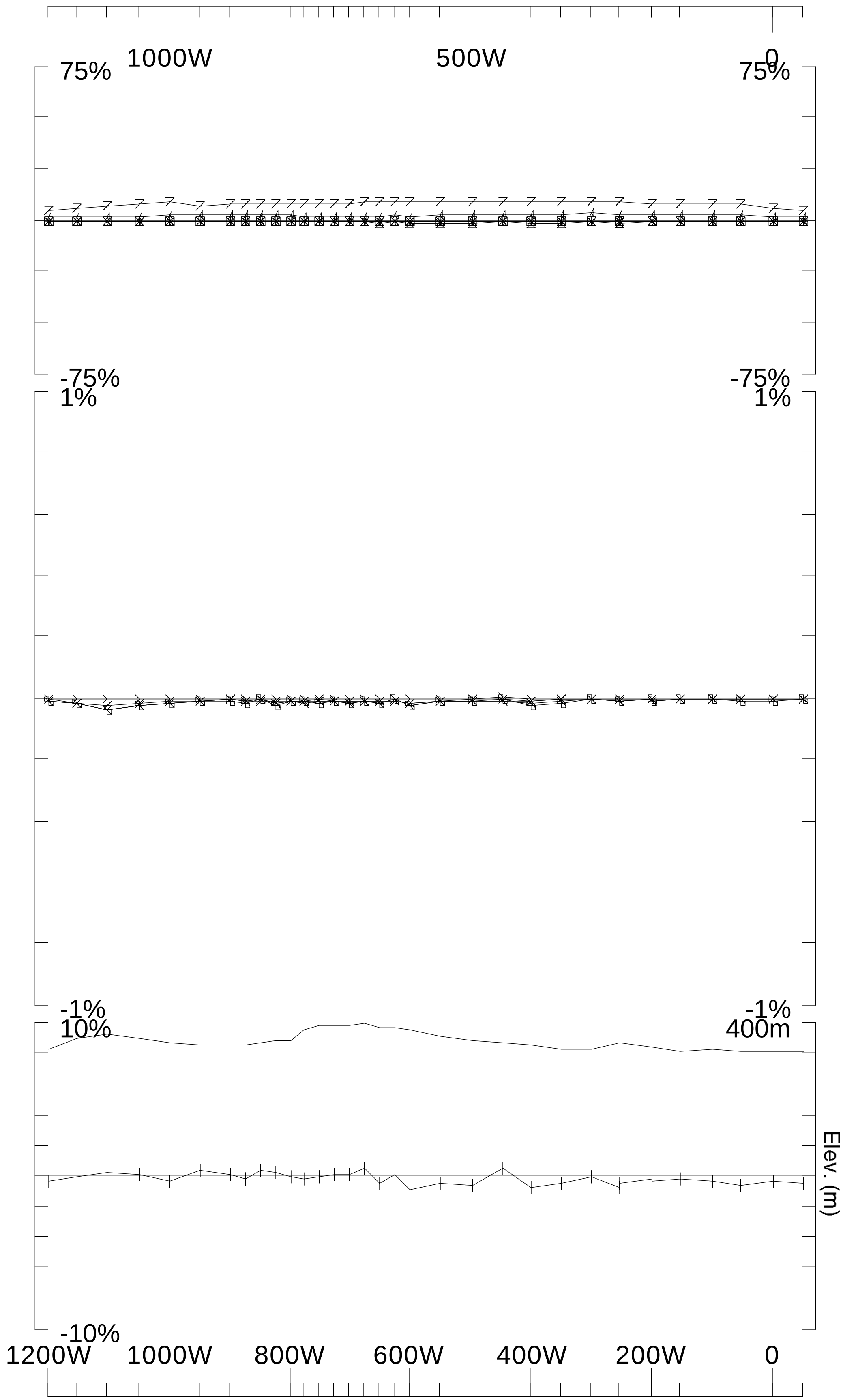
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 750N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



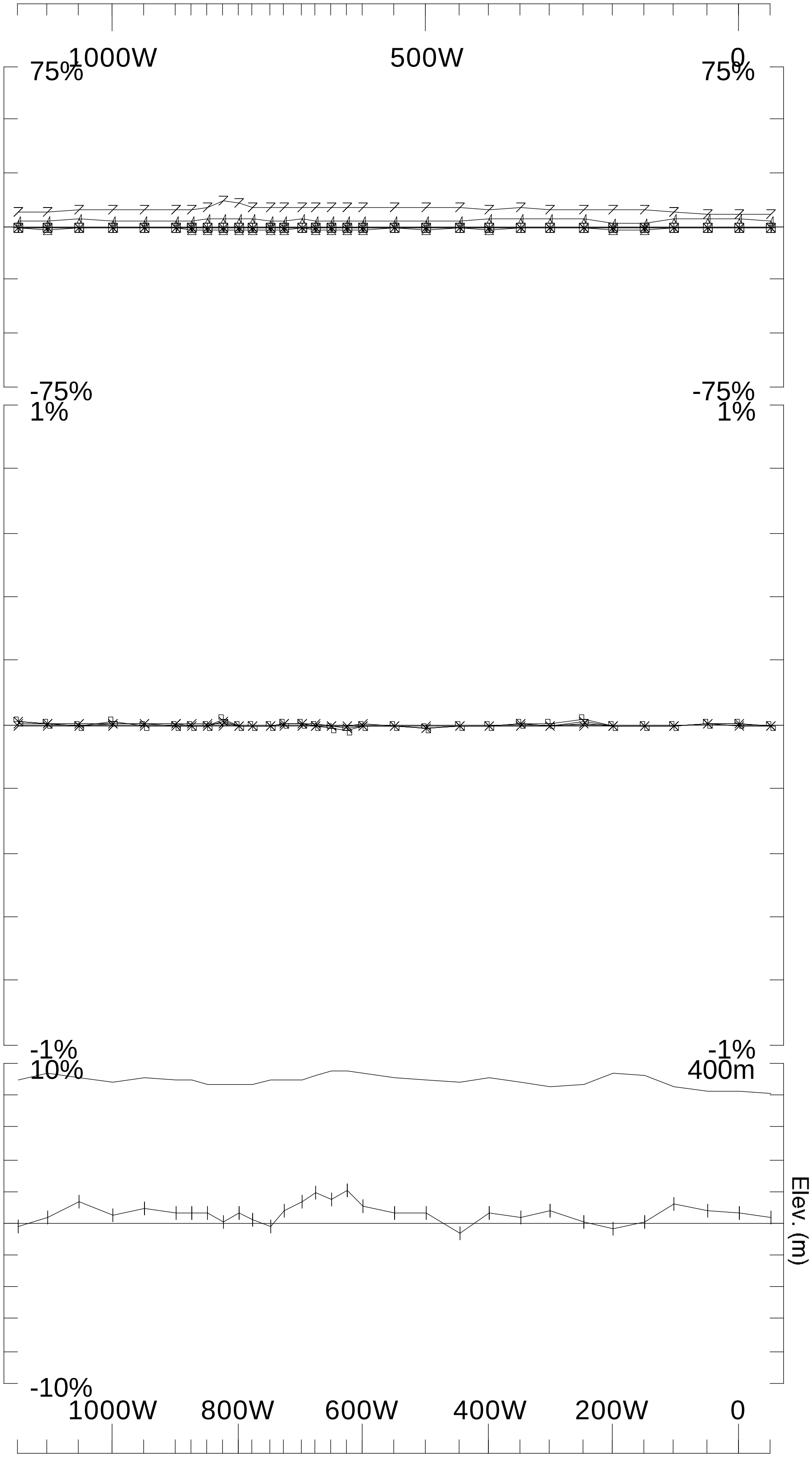
Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 900N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1150N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1400N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14



Loop: 1451S2	Secondary, (Chn - Ch0)/IHpl	UTEM Survey at: Ministic Lake
Line: 1650N	Contin. Norm at depth of 0 m	For: Wallbridge
Compt: Hy	Base Freq. 2.045 Hz	LAMONTAGNE GEOPHYSICS LTD GEOPHYSIQUE LTEE Job 1401 Plotted : 30/1/14

Appendix B

1401 Production Diary

UTEM5 Survey

Ministic Grid
Sudbury District

for

Wallbridge Mining Company Ltd.

Production Log (1401)

UTEM 5 Survey - Ministic Grid
Wallbridge Mining Company Ltd.

Date	Rate - Production		Comments
January 13	Mob	-	Travel from Kingston (T. Gallant,R.Lahaye) and Toronto (P.Guimond,R.Sinclair) to Sudbury
			Crew: T.Gallant,P.Guimond,R.Sinclair,R.Lahaye
January 14	AL(2/2)-5	-	Crew receives Wallbridge site orientation at 08:00, then drive out to the Ministic Lake Grid. Two crew members begin checking ice conditions and flag in the loop location for the east side of Loop 1451. Lay ~500m along the E side of Loop 1451 and start laying wire along E and S sides of Loop 1450. Back at the office by 18:30.
			Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye
January 15	AL(2/2)-4	-	Check ice conditions along S side of Loop 1451 and lay wire. Lay ~ half of Loop 1450. Back at the office by 18:30. R.Sinclair has first aid training.
			Crew: G.Lafortune,T.Gallant,P.Guimond,R.Lahaye
January 16	AL(2/2)-4	-	Finish laying Loop 1450. Back at 17:30. R.Sinclair continues first aid training.
			Crew: G.Lafortune,T.Gallant,P.Guimond,R.Lahaye
January 17	AL(2/2)-5	-	Finish laying Loop 1451. Back at the office by 13:30 and spend the rest of the day assembling sleighs.
			Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye
January 18	AL(2/2)-5	-	Advance looping at Trill. Lay all of Loop 1352 except for ~700m. Bill Dingwall arrives from Kingston in the evening.
			Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye
January 19	P(2/2)-6	650m	Move all the gear into the two transmitter sites (4 skidoo trips) and lay the section of Loop 1451 on the lake. Begin surveying by 14:00. Read until 15:30, then pick up the wire on the lake to prevent it from freezing in the slush (this is done daily). Back at the office by 18:30.

Loop 1450		**S1-Tx4**	**4.0909Hz_12Ch**
Loop 1451		**S2-Tx3**	**2.0455Hz_12Ch**
Line 000	**800W**	**- 1200W**	**R5/P1**
Line 500N	**700W**	**- 950W**	**R1/RD2**
		Ministic to date:	0.650 km

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall

Date	Rate - Production		Comments
January 20	D(2/2)-6	-	Move the gear to the site and set up the transmitters. Read 3 stations before Tx #3 (S2) stops working (blown output stage). Done for the day.

Loop 1450		**S1-Tx4**	**4.0909Hz_12Ch**
Loop 1451		**S2-Tx3**	**2.0455Hz_12Ch**
Line 000	**725W - 800W**		**R5/P1**
Line 500N	**950W - 1000W**		**R1/RD2**
		Ministic to date:	0.650 km

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall.

January 21	0.5 P(2/2)-6	900m	Slow startup because of cold temperatures (-35°C). R1 has problems starting up the coils (no fibre optic output). Return to the truck to retrieve R2. Start reading by 11:30 Loop break at 13:30, down for 1/2 hour. Preamp battery on coil P1 dies at 13:45. R5 can't start up RD1 so no production from R5 for the rest of the day. Read until 15:15, back at the office by 18:00.

Loop 1450		**S1-Tx4**	**4.0909Hz_12Ch**
Loop 1451		**S2-Tx8**	**2.0455Hz_12Ch**
Line 0	**550W - 800W**		**R5/P1**
Line 500N	**950W - 1200W**		**R1/RD2**
Line 750N	**800W - 1200W**		**R1/RD2**
		Ministic to date:	1.550 km

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall.

January 22	0.5 P(2/2)-6	1150m	Slow startup because of cold temperatures (-37C). Problems starting propane heater used to preheat generator. Pull cord assembly for the generator breaks. Makeshift repairs completed by 13:00. Start surveying by 13:30. Read until 15:40, back at the office by 17:40.

Loop 1450		**S1-Tx4**	**4.0909Hz_12Ch**
Loop 1451		**S2-Tx8**	**2.0455Hz_12Ch**
Line 750N	**250W - 800W**		**R1/RD2**
Line 900N	**50E - 550W**		**R5/P1**
		Ministic to date:	2.700 km

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall.

January 23	D(2/2)-6	-	No production. Transmitter #8 (S2) quits at 11:00. Bill tries to repair it in the field but was unsuccessful. Back at the office by 14:00. Run errands and service one generator for the remainder of the day. Gerry has an infected finger checked out at a health clinic.

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall.

Date	Rate - Production	Comments
January 24	0.75 P(1/2)-4 975m	Problems with R2 in the morning. Gerry returns to the office to repair it and R1 which has a similar problem. Start surveying by 11:35 with 1 Rx. Read until 15:35, back at the office by 18:00. Receiver issue fixed. Dale Pittman arrives in the evening.

Loop 1450		**S1-Tx4**	**4.0909Hz_12Ch**	
Loop 1451		**S2-Tx3**	**2.0455Hz_12Ch**	
Line 900N	**550W -**	**1200W**		**R5/P1**
Line 1150N	**875W -**	**1200W**		**R5/P1**
		Ministic to date:	3.675 km	

Crew: T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall.

Date	Rate - Production	Comments
January 25	P(2/2)-7 2200m	Set up R2/RD1 at L750N/500W to monitor underwater telecom cables. Start surveying by 11:30 with 2 Rx. Read until 16:00, back at the office by 18:45.

Loop 1450		**S1-Tx4**	**4.0909Hz_12Ch**	
Loop 1451		**S2-Tx3**	**2.0455Hz_12Ch**	
Line 1400N	**200W -**	**1200W**		**R5/P1**
Line 1650N	**50E -**	**1150W**		**R5/P1**
		Ministic to date:	5.875 km	

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye, B.Dingwall,D.Pittman

Date	Rate - Production	Comments
January 26	0.75 P(2/2)-7 1950m	Set up R2/RD1 at L750N/500W to monitor underwater telecom cables. Problems with Control Unit #3 fibre optic cable. Repaired in the field/surveying underway by 11:35 with 2 Rx. Read until 15:30, back at the office by 17:45.

Loop 1450		**S1-Tx4**	**4.0909Hz_12Ch**	
Loop 1451		**S2-Tx3**	**2.0455Hz_12Ch**	
Line 0	**50E -**	**550W**		**R5/P1**
Line 225N	**600W -**	**950W**		**R5/P1**
Line 500N	**50E -**	**700W**		**R1/RD2**
Line 1400N	**50E -**	**200W**		**R1/RD2**
		Ministic to date:	7.825 km	

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall,D.Pittman

Date	Rate - Production	Comments
January 27	0.5 P(2/2)-6 850m	Surveying underway by 10:40. Tx #4 (S1) stops working (blown output stage) at 12:15. Done for the day. Gerry in the office today.

Loop 1450		**S1-Tx4**	**4.0909Hz_12Ch**	
Loop 1451		**S2-Tx3**	**2.0455Hz_12Ch**	
Line 225N	**200W -**	**600W**		**R2/RD2**
Line 1150N	**50E -**	**400W**		**R5/P1**
		Ministic to date:	8.675 km	

Crew: T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall,D.Pittman

Date	Rate - Production		Comments
January 28	0.75 P(2/2)-6	1025m	Problems with Tx#3 first thing in the morning. Repaired in the field and surveying underway by 11:40. Very windy on the lake all day. Surveying completed by 14:20. One Tx site packed up and all gear moved out. Back at the office by 17:00. Gerry in the office today.

Loop 1450		**S1-Tx4**	**4.0909Hz_12Ch**	
Loop 1451		**S2-Tx3**	**2.0455Hz_12Ch**	
Line 225N	**200W -**	**600W**		**R2/RD2**
Line 1150N	**50E -**	**400W**		**R5/P1**
		Ministic to date:	9.700 km	

Crew: T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall,D.Pittman

January 29	AL(2/2)-6	-	Four men loop at Trill. Lay all of Loop 1361 except for 300m. Two men pick up 5.9 km on Loop 1451 at Ministic Lake and start to move gear from the second Tx site.

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,D. Pittman

January 30	n/c-6	2100m	Six men out to Trill to finish laying Loop 1361. Set up the transmitter site and start surveying by 12:00, finishing by 16:45. One man lays the rest of Loop 1352 and checks for continuity (loop is broken) Back at the office by 18:30. Gerry in the office to pick up rental truck and new skidoo. Then out to Ministic Lake to retrieve the rest of the gear from the second Tx site.

Loop 1361		**S2-Tx3**	**2.0455Hz_12Ch**	
Line 5400E	**7500N -**	**6300N**		**R1/RD2**
Line 5600E	**7400N -**	**6500N**		**R5/P1**
		Trill redo to date:	2.100 km	

Crew: T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall,D.Pittman

January 31	0.25 n/c-7 0.75 AL(2/2)-6	200m	Two men finish reading Line 5600N from Loop 1361. The other four men repair Loop 1352. Seven loop breaks were found (moose) as well as several areas where the wire was pulled offline. Repairs completed by 13:35. Set up a common Tx site for Loops 1352/1361 and start moving the gear in - finish at 16:15. Back at the office by 17:30.

Loop 1361		**S2-Tx3**	**2.0455Hz_12Ch**	
Line 5600E	**6500N -**	**6300N**		**R5/P1**
		Trill redo to date:	2.300 km	

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall,D.Pittman

Date	Rate - Production		Comments
February 01	n/c-5 AL-2	1575m	Shift the gear in to the common Tx site. Tx #4 needs field repairs. Surveying underway by 12:30, finishing at 16:00. Back at office by 18:15. Two men begin laying Loop 1353.

Loop 1361			**S1-Tx3**	**4.0909Hz_12Ch**
Loop 1352			**S2-Tx4**	**2.0455Hz_12Ch**
Line 8000E	**7475N -**	**6600N**		**R5/P1**
Line 8400E	**7000N -**	**6300N**		**R1/RD2**
	Trill redo to date:		3.875 km	

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall,D.Pittman

February 02	0.5n/c-5 0.5AL-4 + AL-2	800m	Complete reading Lines 8000/8400N. Pick up wire on Loop 1361 and complete Loop 1353.

Loop 1361			**S1-Tx3**	**4.0909Hz_12Ch**
Loop 1352			**S2-Tx4**	**2.0455Hz_12Ch**
Line 8000E	**6600N -**	**6300N**		**R5/P1**
Line 8400E	**7500N -**	**7000N**		**R1/RD2**
	Trill redo to date:		4.675 km	

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall,D.Pittman

February 03	AL-5	-	Issues with the new generator. Work on it until 10:15 but without success. Gerry and Bill return to the office. The remaining crew pick up Loop 1361. Two men at Ministic pick up the rest of Loop 1451 and 1 side of Loop 1450.

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall,D.Pittman

February 04	0.5P(2/2)-7	650m 1750m	Start surveying by 10:00, finishing by 14:30. Back at 17:00. Two men at Ministic Lake finish picking up Loop 1450 but some wire remains frozen in ice.

Loop 1353			**S1-Tx3**	**4.0909Hz_12Ch**
Loop 1352			**S2-Tx4**	**2.0455Hz_12Ch**
Line 7000E	**7500N -**	**6300N**		**R5/P1**
Line 7200E	**7500N -**	**6300N**		**R1/RD2**
	Trill redo to date:		6.425 km	
	Trill to date 2014:		0.650 km	

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall,D.Pittman

February 05	0.5P(2/2)-7	425m 1825m	Reads L7400 but R1 battery dies before line is completed. Two men at Ministic Lake spend the day freeing up the wire frozen in the ice. Back at 17:00.

Loop 1353			**S1-Tx3**	**4.0909Hz_12Ch**
Loop 1352			**S2-Tx4**	**2.0455Hz_12Ch**
Line 7000E	**7500N -**	**7000N**		**R5/P1**
Line 7400E	**7425N -**	**6500N**		**R1/RD2**
	Trill redo to date:		7.625 km	
	Trill to date 2014:		0.875 km	

Crew: G.Lafortune,T.Gallant,P.Guimond,R.Sinclair,R.Lahaye,B.Dingwall,D.Pittman

This completed the Ministic UTEM5 Survey.
The crew continue to work for Wallbridge on another property in the Sudbury District.

Date	Rate - Production	Comments

LEGEND

P(n/n)-x	Surface Production	(# of Rx/Tx) - # of personnel
D(n/n)-x	Down	(# of Rx/Tx) - # of personnel
AL(n/n)-x	Advance Looping	(# of Rx/Tx) - # of personnel
L(n/n)-x	Looping	(# of Rx/Tx) - # of personnel
S(n/n)-x	Standby	(# of Rx/Tx) - # of personnel
n/c(n/n)-x	no charge	(# of Rx/Tx) - # of personnel

Appendix C

The UTEM SYSTEM
- UTEM5 -

- Introduction to UTEM5 -

The UTEM System

UTEM Data Reduction and Plotting Conventions

Data Presentation

UTEM5

The UTEM5 system collects 3-component data from up to 3 transmitter loops - three coupling angles - simultaneously - translating to superior target definition and improved detection of all targets. In addition:

- UTEM5 precision is at least an order of magnitude better than the UTEM3 surface system. Our current estimate is that the UTEM5 surface coil precision will prove to be better by a factor of 10-40 times. Improved sensitivity equals better depth penetration. It also translates to significantly shorter stacking times or alternatively, better precision for the same stacking time. The improvement in precision is greater at lower frequencies (<4Hz).
- UTEM5 surface equipment has a greater advantage at low frequency - <4Hz. The UTEM5 technical advantage is greatest in the search for targets that are deeper and more highly-conductive when (very) large-loops (geometry of the applied field is simpler). UTEM5, however, will be found to be extremely useful in numerous other applications.
- Figure C1 shows the UTEM5 channels when 12Ch sampling is selected. Channels are spaced in a binary, geometric progression across each half-cycle of the received waveform - giving just over 3 channels per decade. Ch**12**, the earliest channel, is (~)$1/2^{12}$ of the half-cycle wide. Ch**1**, the latest channel, is (~)$1/2^{1}$ of the half-cycle wide. The use of UTEM4/5 Transmitters and UTEM5 Receivers allows for the implementation of:
  - Ch0 - a narrow Ch later than Ch1. Making Ch0 normalization an option.
  - 3 timing channels - Ch13/14/15 (Figure C1) for 12Ch UTEM5 The timing Chs improve the operator's ability to monitor Rx/Tx(s) synchronisation and allow for more precise phase correction/improved deconvolution.
- the UTEM5 rejection of non-survey frequencies including powerline noise is far superior to previous UTEM systems. One of the many features of the UTEM5 system that add up to the improved rejection is the option of tapered channel sampling (Figure C1).

The ability to simultaneously collect higher-precision, 3-component data from multiple transmitters (coupling angles) at low frequency is really what the UTEM5 system is designed for - to be efficient and precise. To date UTEM5 surveys using multiple transmitters operating at base frequencies as low as 0.25Hz have confirmed that both the sensitivity of the system and the rejection of non-survey frequencies (powerline noise etc.) is far superior to previous UTEM systems.

In terms of BH operations, UTEM5 Rx coupled with our existing BHUTEM system allows for the collection of 3-component data from multiple transmitters simultaneously. The precision improvement may not be that noticeable near surface - in high field strengths. But at depth - low field strength - we estimate up to a factor of 5 improvement in precision. That improvement, and the multiple transmitter option, will add up to a considerable increase in the ability to resolve deep, highly-conductive targets - allowing for the detection of smaller targets and targets more distant from the hole.

The UTEM SYSTEM

UTEM uses a large, fixed, horizontal transmitter loop as its source. Loops range in size from 300x300m to 4000x4000m and larger. Smaller loops are generally used over conductive terrain or for shallow sounding work. Larger loops are used over resistive terrain or where the ability of the system to resolve a response can be aided by the simpler geometry of the applied field. The UTEM receiver(s)/transmitter(s) are typically synchronised at the beginning of a survey day and the Rx(s) operates remotely after that point. The Rx/Tx clocks are sufficiently accurate to maintain synchronisation.

Measurements are routinely taken to a distance of twice the loop dimensions and can be continued further depending on the local noise levels. Lines are typically surveyed:

- off-loop: out from an edge of the loop when the target is steeply dipping.
- inside-the-loop: when the target is ~flat-lying

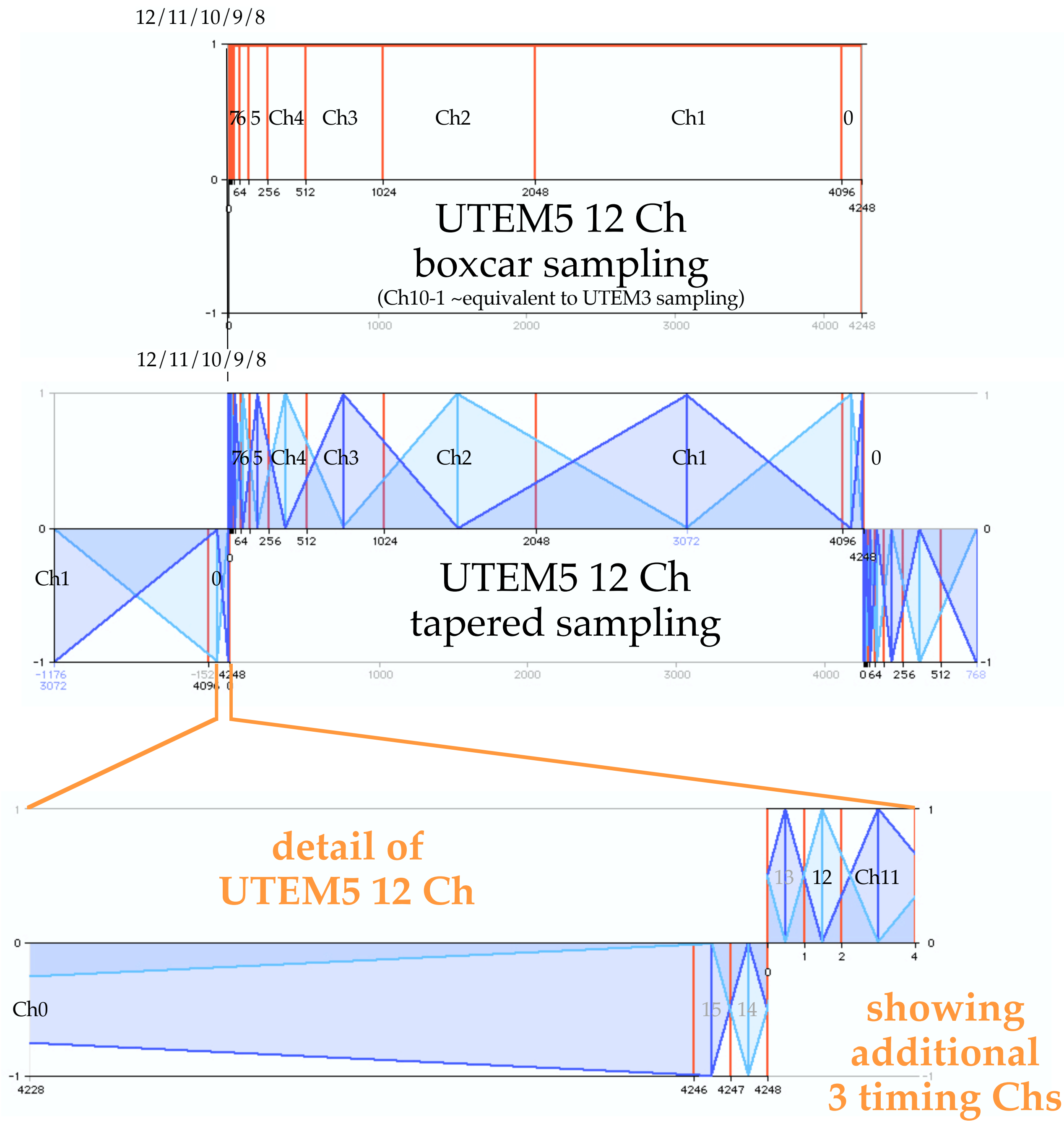
BHUTEM - the borehole version of UTEM -surveys have been carried out to depths up to 3000+ metres.

<u>System Waveform</u>

A UTEM transmitter passes a low-frequency 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. A target frequency for each UTEM transmitter and the local powerline frequency are entered. The actual frequencies used are selected to be as close to the target frequencies as possible while optimising rejection of the other transmitters and powerline noise (60 Hz in North America/generally 50Hz elsewhere). Since the receiver coils 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 TDEM systems to date transmit a modified step current and "see" the (im)pulse response of the ground at the receiver. In practice, the UTEM waveform is filtered - pre-whitened - to optimize signal-to-noise. Deconvolution techniques produce the equivalent to the conceptual “step response” at the receiver.

<u>System Sampling</u>

The UTEM receiver measures the time variation of the magnetic field in the direction of the receiver coil at (typically) channels or delay times. UTEM channels are spaced in a binary, geometric progression across each half-cycle of the received waveform. Channel **12 (or Ch10)** is the earliest channel and it is $1/2^{12}$ of the half-cycle wide. Channel **1**, the latest channel, is $1/2^{1}$ of the half-cycle wide (see UTEM3 10Ch figure below and Figure C1). The measurements obtained for each of channels are accumulated over many half-cycles. The final channel value stored is the average of the measurements. The number of half-cycles averaged depends on the signal strength and the ambient noise.

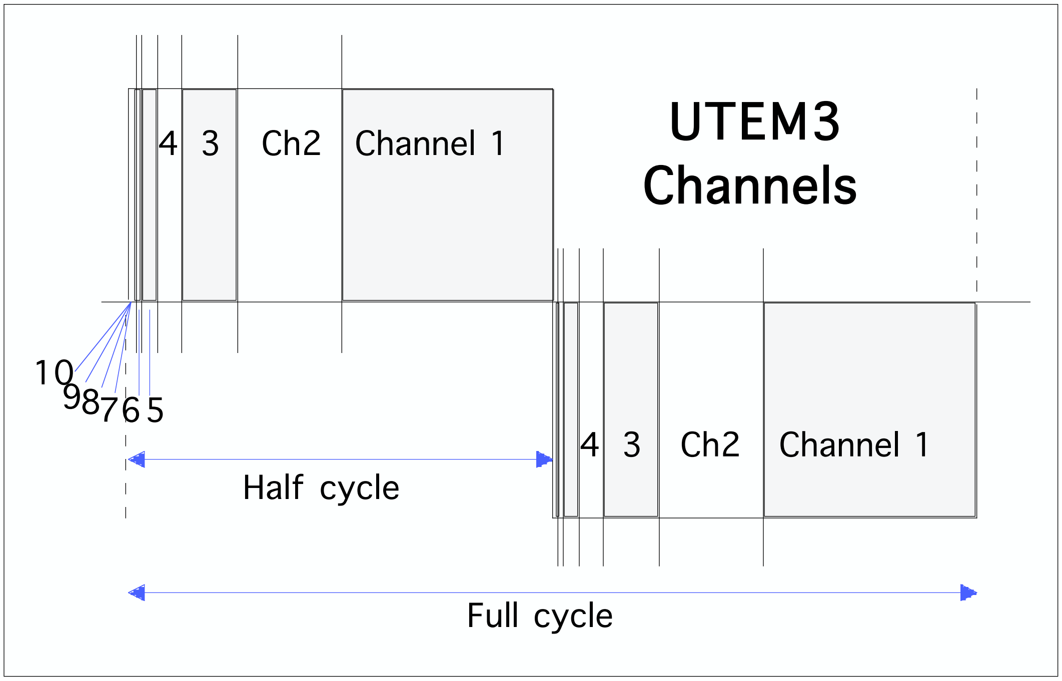


Notes:
- boxcar sampling equivalent to UTEM3 sampling
- tapered sampling: improved powerline rejection
- the use of UTEM4/5 Transmitters and UTEM5 Receivers improves syncing/timing and allows for the implementation of:
  - Ch0 - a narrow Ch after (later than) Ch1.
    - Ch0 normalization is an option
  - 3 timing channels - Ch13/14/15 shown for 12Ch UTEM5
    - improved ability to monitor Rx/Tx(s) synchronisation.
    - improved deconvolution/phase correction.

LAMONTAGNE GEOPHYSICS LTD / GEOPHYSIQUE LTEE

UTEM5 12Ch Sampling
boxcar/tapered options

Figure C1



<u>System Configurations</u>

During a surface UTEM5 survey the 3-component receiver coil is oriented along the survey line and the coil orientation is determined from the data from a set of three orthogonal accelerometers in the coil in combination with the GPS coordinates of the line. The 3 measured (raw) components of the magnetic field - uvw - are oriented and resolve into:

- u   the horizontal transverse component   ~ Hy = HT(ransverse)
- v   the vertical component   ~ Hz = HL(ine)
- w   the horizontal in-line component   ~ Hz = HZ

Note that the UTEM System is also capable of measuring the electric field, The two horizontal components,Ex and Ey can be measured using a dipole sensor comprised of two electrodes. E-field measurements are generally used for outlining resistive features to which the magnetic field is not very sensitive.

BHUTEM4 surveys employ a 3-component receiver coil - longer and 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) and the two transverse components of the magnetic field. 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 ~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 re-established 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.

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 favour 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 0

One estimate of the primary signal is the value of the latest time channel observed by the UTEM System, Channel 0. When Channel 0 is subtracted from the UTEM data the resulting data display is termed ***Channel 0 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 0 value is then a reasonable estimate of the primary signal present during Channels 1....10/12.

In practice the ***Channel 0 Reduced*** form is most useful when the secondary response is very small at the latest delay time. In these cases Channel 0 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 0 response is observed. In this case the assumption that the Channel 0 value is a reasonable estimate of the primary field effect is not valid.

Note: When UTEM data is plotted in the ***Channel 0 Reduced*** form the secondary field data for Channel 0 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 0,

$\mathbf{Chn_j}$ 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 0 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 0 Reduced Secondary Fields : Here, the latest time channel, Channel 0 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 0 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 0 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 0 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:

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

DATA PRESENTATION

All UTEM5 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 (Appendix A) as well as the mean delay time for each channel (3.750Hz/10Ch) is shown in the following table (for details of frequencies used in this survey see figures in the report):

outside frequency	3.750000 Hz	
period	0.26667	s
(5MHz clock) half period	666666	0.2μs cycles
(narrowest Ch=1unit) XNP	**1062**	half-period
width of unit channel	1.255493e-4	s
width of unit channel	125.5493	μs

(symbol) channel	midpoint of ch (microseconds)	tapered Ch begins - unit -	tapered Ch ends - unit -
timing Ch11	62.77	-0.5	1.5
10	188.32	0.5	3
9	376.65	1.5	6
8	753.30	3	12
7	1506.59	6	24
6	3013.18	12	48
5	6026.37	24	96
4	12052.73	48	192
3	24105.47	96	384
2	48210.93	192	768
1	96421.86	384	1042
0	130822.37	768	1060.5
timing Ch13	133145.03	1042	1061.5
timing Ch12	133270.58	1060.5	1062+0.5

Note: With UTEM5 there is the option of expanding the 10Ch (+Ch0) sampling to earlier time Chs - rountinely to 12Chs. There are tradeoffs involved in measuring additional earlier-time Chs - stacking time can be greatly increased by adding too many narrow(er) Chs. That said, when operating at a frequency of ~4Hz or lower, 2 Chs can be added without incurring significant penalty. 12Ch (+Ch0) sampling @4Hz brings the earliest delay time (Ch12) to 47.08μs - the equivalent of the earliest delay time when operating @15Hz with 10Ch sampling.

Notes on Standard plotting formats:

Channel 0 Reduced form - The data are typically displayed on three separate axes. This permits scale expansion and allows for the accurate determination of signal decay rates. The standard configuration is:

Top axis -	early time channels and a repeat of the latest channel from the centre axis for comparison are plotted at a reduced scale.
Center axis -	intermediate-to-late-time channels are plotted on the centre axis using a suitable scale.
Bottom axis -	the latest time channel (Ch0) is plotted alone in ***Primary Field Reduced*** form using the same scale as the center axis.

UTEM data in ***Primary Field Reduced*** form:

All channels are displayed on a single axis. Typically they are plotted using peak-to-peak scale values of up to -200% - 200%.

BHUTEM4 data plotted as total field profiles:

The 3 components are expressed directly as a percentage of the ***Total Field***. Each three-axis data plot shows peak values of up to 100%.
Note: the measured total field value is plotted as a polarity-reference tool.

BHUTEM data plotted as secondary field profiles:

Check the title block of the plot to determine if the data is in:
Channel 0 Reduced form or in ***Primary Field Reduced*** form.
Note: the measured total field value is plotted as a polarity-reference tool.

Appendix D

Note on sources of anomalous Ch0

Note: The data presented in this report are *channel 0 normalized* - the latest time chanel plotted is Ch0. Traditionally in UTEM data the latest time channel plotted has been Ch1.

Note on sources of anomalous Ch0

This section outlines the possible sources of anomalous channel 0 which is not correlated to the Ch1-10/12 profiles on the upper axes of a *channel 0 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 Ch0 value not correlated to *channel 0 normalized* Ch1-10/12. The effect is amplified near the loop front. This can be seen in the profiles - the error in Ch0 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 the Hz (vertical component) Ch0 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 $\sim 1/r^2$)

The in-loop survey configuration generally diminishes geometric error since the field gradients are considerably lower. 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.

Errors in elevation result in smaller errors in Hz but they can affect the chainage and accumulate along the line. Erroors in elevation have a stronger affect on the two horizontal components, Hx and Hy.

2) **Magnetostatic UTEM responses**

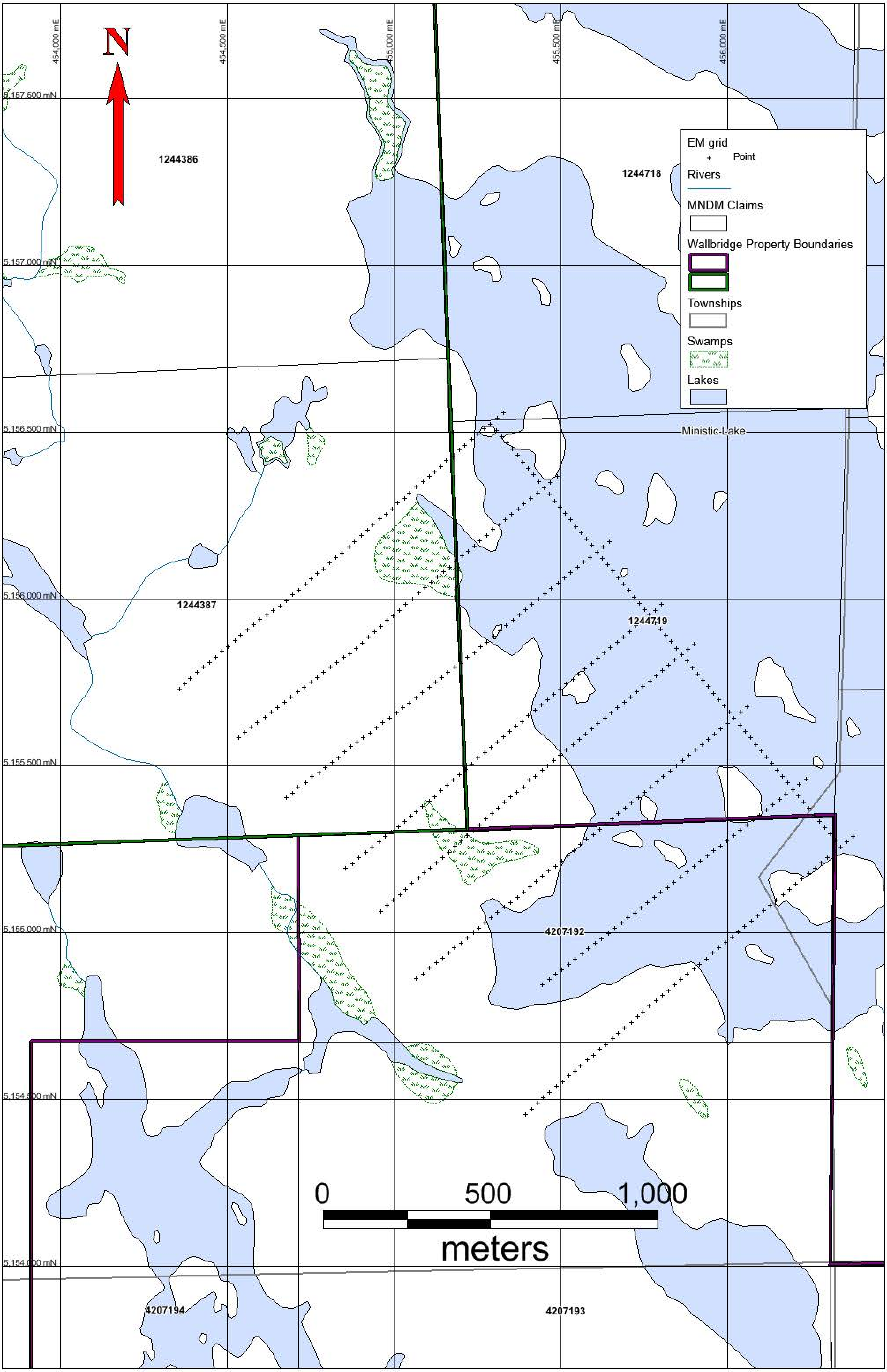
Magnetostatic UTEM responses arise over rocks which generate magnetic anomalies. Such magnetic materials will amplify the total (primary + secondary) field of the UTEM transmitter which is sensed by the receiver coil. The secondary field is generated by subtracting a computed primary which does not include magnetic effects. This can give rise to strong and abrupt channel 0 anomalies when the source of the magnetics is at or near 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 in-loop is vertical and it is stronger near the loop edges.
2) Most aeromagnetics are collected as total field while with UTEM we measure components - HZ, Hx and Hy..
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 Ch0 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 (*negative*) magnetic anomalies will cause:
- positive (*negative*) Ch0 anomalies in data collected outside the loop
- negative (*positive*) Ch0 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 Ch0 which is not correlated to the Ch1-10/12 data plotted on the upper axes of a *channel 0 normalized* plot.


N
454,000 mE
454,500 mE
455,000 mE
455,500 mE
456,000 mE
5,157,500 mN
5,157,000 mN
5,156,500 mN
5,156,000 mN
5,155,500 mN
5,155,000 mN
5,154,500 mN
5,154,000 mN
1244386
1244718
1244387
1244719
4207192
4207194
4207193
Ministic Lake
EM grid
Point
Rivers
MNDM Claims
Wallbridge Property Boundaries
Townships
Swamps
Lakes
0
500
1,000
meters