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GEOPHYSICAL CHARACTERIZATION OF A CIRCULAR MAGNETIC ANOMALY, MONTGOLFIER-WEST PROJECT

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1746, CH. SULLIVAN, VAL-D'OR (QUEBEC) J9P 7H1

TEL.: 819-874-8800 FAX: 819-874-8801

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EXPLORATION BARLOW INC.

GEOPHYSICAL CHARACTERIZATION OF
A CIRCULAR MAGNETIC ANOMALY

MONTGOLFIER-WEST PROJECT

JAMES BAY, QUÉBEC, CANADA

INTERPRETATION REPORT

11N012 JUNE 2011

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ABSTRACT

On behalf of Exploration Barlow inc., A GPS-Integrated ground magnetic field survey was carried out over the Montgolfier-West property located within Puiseaux and d'Orvilliers Townships, Québec. The objective of this geophysical follow-up is to locate (characterize) a previously selected circular magnetic anomaly identified from the last (2010) geophysical campaign.

*On **February 22**, **2011**, a total of **4 line-km** were recorded using GSM-19 Proton precession magnetometer over the Montgolfier-West grid. Survey specifications, instrumentation control, data acquisition, processing and interpretation were all successfully performed within our quality system framework.*

The magnetic survey, with 50 m line-spacing resolution, successfully identified the position and the shape of the circular bipolar magnetic anomaly. Quantitative interpretation was performed on this magnetic feature and its geometrical and physical parameters were successfully determined. Recommended follow-up is also presented for this anomaly on page 8.

1. THE MANDATE

❑ *PROJECT ID*	**Montgolfier-West** (Our reference: **11N012**)
❑ *GENERAL LOCATION*	Joutel region, Québec
❑ *CUSTOMER*	**Exploration Barlow inc.** 324, avenue de l'Épée Outremont, QC H2V 3T6 Telephone: (514) 274-5929 Fax: (514) 274-1822
❑ *REPRESENTATIVE*	**Mr. Pierre D'Aragon, Eng.** President daragon.pierre@videotron.ca
❑ *SURVEY TYPE*	• **Detailed GPS-integrated ground total magnetic field over a circular magnetic anomaly.**
❑ *GEOPHYSICAL OBJECTIVE*	• Geophysical characterization of a circular magnetic anomaly on the Montgolfier-West Property.

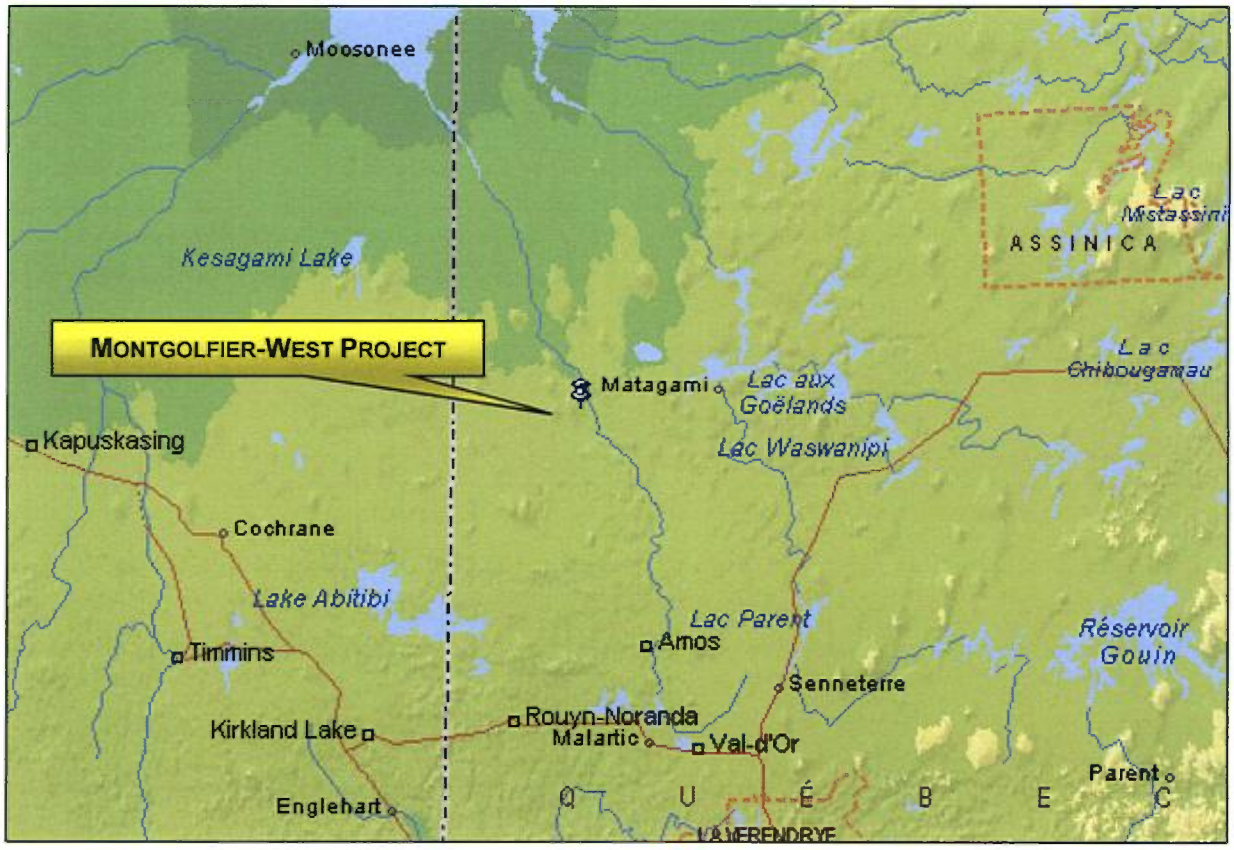


FIGURE 1. GENERAL LOCATION OF THE MONTGOLFIER-WEST PROPERTY

2. MONTGOLFIER-WEST PROJECT

❑ *LOCATION*	**Puiseaux and d'Orvilliers Townships**, Québec, Canada Centered on 49°42' N and 78°48' W UTM NAD 83, zone 17: 5 509 000 mN, 658 000 mE NTS sheet: **32E/10**
❑ *NEAREST SETTLEMENTS*	**Villebois:** approximately 125 km to the SW **La Sarre:** 160 km to the SW
❑ *ACCESS*	From Villebois, drive about 109 km north, in direction of the Selbaie mine. Turn right and continue southward along the main logging road for about 13 km. The survey grid is accessed via snowmobile trails.
❑ *GEOMORPHOLOGY*	The terrain shows very little to no topographic relief. Elevations across the property range from 256 to 305 m above mean sea level. Hydrographically, the region is drained by a few rivers and several streams connected to shallow and small lakes partially covering the area of the property.
❑ *CULTURAL FEATURES*	No cultural features were observed on the survey grid.
❑ *LAND TENURE*	The claims included in the present survey are illustrated on the following page. They belong 100% to Exploration Barlow inc.
❑ *SECURITY AND ENVIRONMENT*	As for all of our projects, our health and safety program encompass all of our field operations. In addition, the crew was given a portable phone, giving them communication access at all times. No incident was reported during the project.
❑ *SURVEY LINES*	The GPS-Magnetic survey consists of three N-S lines (L162+50W, L163+00W and L163+50W) of 1 km length with line spacing of 50 m. One tie-line, TL8000+00N completes the property's detailed area. The magnetic survey lines were accurately positioned using the GPS guidance system integrated into the GSM-19 magnetometers.
❑ *COORDINATE SYSTEM*	Projection: Universal Transverse Mercator, zone 17N Datum: NAD 83

NUMÉRIQUE

Page(s) de dimension(s) hors standard numérisée(s) et positionnée(s) à la suite des présentes pages standard

DIGITAL FORMAT

Non-standard size page(s) scanned and placed after these standard pages

3. GPS-INTEGRATED GROUND MAGNETIC FIELD SURVEY

- ❑ *TYPE OF SURVEY*

  Observation of the Total Magnetic Field (TMF) with GPS readings recorded every second. The plotted values were corrected for diurnal variations using readings from a synchronized MAG base station.

- ❑ *PERSONNEL*

Philippe Larouche,	Crew chief, geophysical operator
Marcel Naud,	Geophysical operator
Carole Picard, Tech.,	Plotting
Denis McNichols, P.Geo,	Logistics
Madjid Chemam, P.Geo,	QC, data processing & interpretation
Chris Brown, G.I.T,	Final validation of product conformity

- ❑ *DATA ACQUISITION*

  February 16 to 22, 2011

- ❑ *SURVEY COVERAGE*

  4.0 km

- ❑ *FIELD MAGNETOMETERS*

  GEM Systems GSM-19W, s/n 2071191 & 3101321
  Proton precession magnetometers with overhauser effect and built-in GPS.

Resolution:	0.01 nT/1m
Absolute accuracy:	0.2 nT / 2-5m
Gradient tolerance:	>10 000 nT/m
TMI sensor:	at a height of 1.8 m above ground

- ❑ *BASE STATION*

  GEM Systems GSM-19, s/n 6102128
  Proton precession magnetometer with Overhauser effect

Resolution:	0.01 nT
Absolute accuracy:	0.2 nT
Cycle time:	**10 seconds**
Location (UTM NAD83):	5 499 422 mN, 695 623 mE
Reference field:	56 470 nT

- ❑ *QUALITY CONTROLS* (RECORDS AVAILABLE UPON REQUEST)

  Before the survey:
  - ✓ All magnetometers were successfully field-tested on Abitibi Geophysics' private control line.

  Every day during data acquisition:
  - ✓ Every morning, the operator had to successfully test for any magnetic contamination.
  - ✓ In the evening, the geophysical operator reviewed the base station recordings and the repeat stations using our proprietary *MAGneto*® processing and QC software. No active magnetic storms were observed during the survey.

  At the Base of Operations:
  - ✓ Field QCs were inspected & validated.
  - ✓ All profiles were inspected and no readings were removed from the database.

4. DATA PROCESSING

- *TOTAL MAGNETIC FIELD*

The total magnetic field was merged and levelled with the 2010 magnetic data and then gridded using a minimum curvature gridding method (RANGRID GX) with grid cell size of 25 m. This method is ideal for line-oriented data for it inherently tends to strengthen trends perpendicular to the survey lines direction. One pass of a 3 x 3 Hanning filter was then applied to improve the overall appearance of the final Total Field Contour (figure 4).

- *CALCULATED TOTAL GRADIENT AMPLITUDE CONTOURS*

The Total Gradient Amplitude (Analytic Signal) is defined as the square root of the squared sum of the vertical and the two horizontal derivatives of the total magnetic field. The resulting signal exhibits a maximum in magnetization contrasts, independently of the ambient magnetic field and of the direction of magnetization of the source. Consequently, this tool is an indicator of the location of magnetic sources.

One pass of a 3 x 3 Hanning filter was applied to the derived grid to improve the overall appearance of the final Contour (figure 5).

- *DIGITAL DATA*

The maps described are delivered in the Oasis Montaj map file format on DVD-Rom.

A copy of all survey acquisition data (ASCII text format) and processed data (Geosoft Montaj databases) are also delivered on DVD-Rom.

5. RESULTS AND INTERPRETATION

❑ *MAGNETIC SURVEY*

The contour map of the total magnetic field is dominated by a circular bipolar magnetic anomaly, centered at coordinate 654 685 mE, 5 508 055 Mn (figure 3). The anomaly, about 90 m in diameter, deviates by approximately +800 nT & -255 nT above a local background of 56590 nT. The presence of this type of polarization indicates that the orientation of the resultant magnetization vector of the source is different from the present inducing magnetic field direction (effect of remanent component).

The observed magnetic response may vary according to several factors, weathering, chemistry, content of magnetic minerals and remanent magnetization. Thus, to help in the interpretation procedure, enhancement techniques, such as the Total Gradient Amplitude (analytic signal) are used in order to clarify the expected signature (figure 4). The integrated analytic signal amplitude enhances the boundaries of magnetic sources regardless of the direction of source magnetization. Consequently, it is an indicator for the location of magnetic intrusion.

To study the effect of departure from circularity and the geometric shape of the unknown circular magnetic feature, a simple pattern recognition technique, based on a first order regression analysis over a moving window (9 x 9 grid points), between the previous analytic signal and the theoretical analytic signal of a magnetic model, was performed. The pipe-like model used is a vertical cylinder with a radius of 35 m located at depth of 40 m. The unknown magnetic source was identified by 5 solutions with a correlation coefficient threshold of more than 85 (85.5 to 92.7). The obtained solutions are presented in figure 5.

For initial rapid estimations of the depth and plane location, without need for the information on the type of magnetization of the source, a 3D Euler deconvolution of the total magnetic field was also performed. A structural index of 2, corresponding to a magnetic dipole (pipe structure), was used. Only solutions that had a relative error of less than 7% for their depths were retained, they are presented in Figure 6. The solutions obtained on the center part of the circular magnetic signature from using a window size of 8 grid points indicate a depth to the top body ranging from 40 to 50 m.

Inversion modelling (figure 7) using different algorithms has fixed the causative source to the depth (average) of 40 m below surface with a width of 50 to 90 m for different magnetic susceptibilities ranging from 0.009 to 0.01 SI. The inclination of the remanent magnetization was estimated between 4 to 30°. The detailed results were reported on the table 2 at page 14.

6. CONCLUSION AND RECOMMENDATION

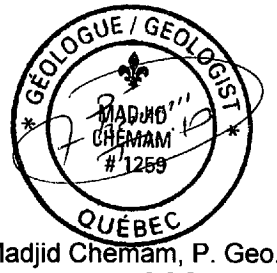
A target has been identified for kimberlite exploration within the Montgolfier-West property. For this purpose, one DDH should be conducted in order to test and verify the nature of the delineated circular bipolar magnetic anomaly. The following table provides the location and the parameters of the drill target:

Table 1. Priority target for drill hole

Drill Hole ID	Easting (mE)	Northing (mN)	Azimuth (degree)	Dip (degree)	Target Depth (m)	Total length (m)
DDH11-01	654 690	5 508 022	0	90	30 - 70	125

The interpretation of the geophysical data embodied in this report is essentially a geophysical appraisal of the Montgolfier-West Project. As such, it incorporates only as much geoscientific information as the author had on hand at the time. Geologists thoroughly familiar with the area may be in a better position to evaluate the geological significance of the various geophysical signatures. Moreover, as time passes and data provided by follow-up programs are compiled, the priority and significance of exploration targets reported in this study may be downgraded or upgraded.

Respectfully submitted,
Abitibi Geophysics Inc.



Madjid Chemam, P. Geo.
OGQ #1259
Geophysicist

MC/mw

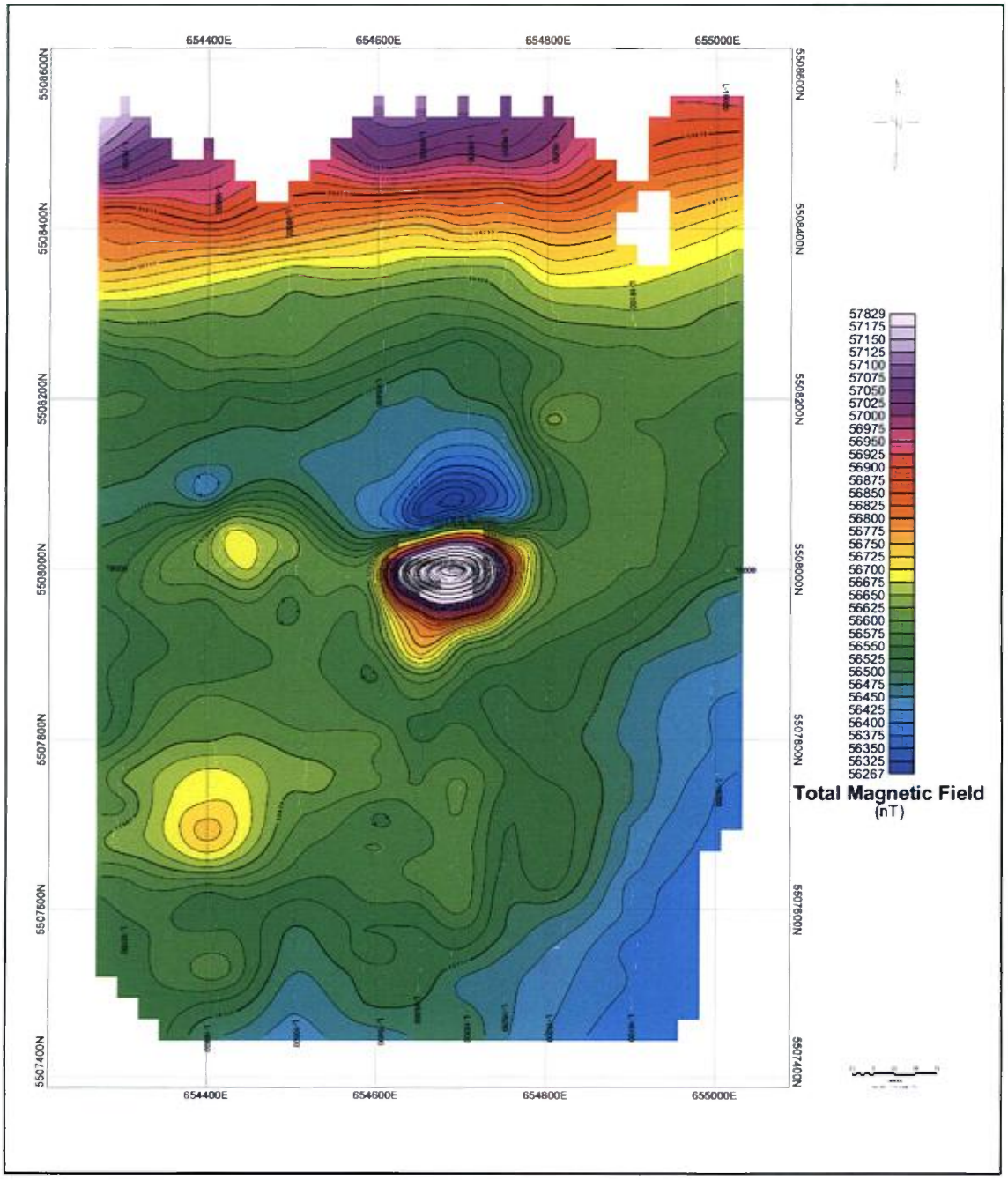


FIGURE 3. TOTAL MAGNETIC FIELD CONTOURS MAP

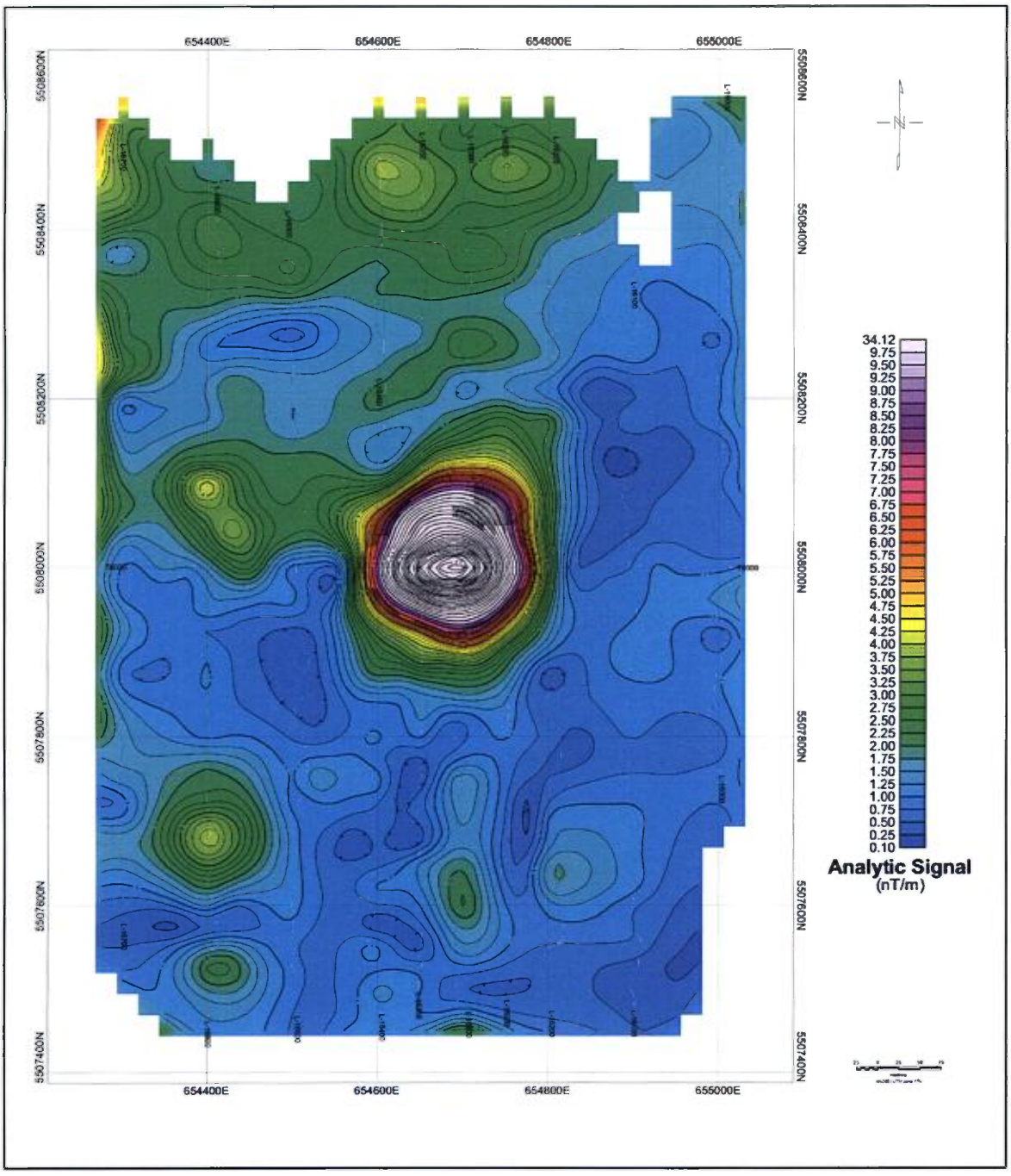


FIGURE 4. TOTAL GRADIENT AMPLITUDE (ANALYTIC SIGNAL) CONTOURS MAP

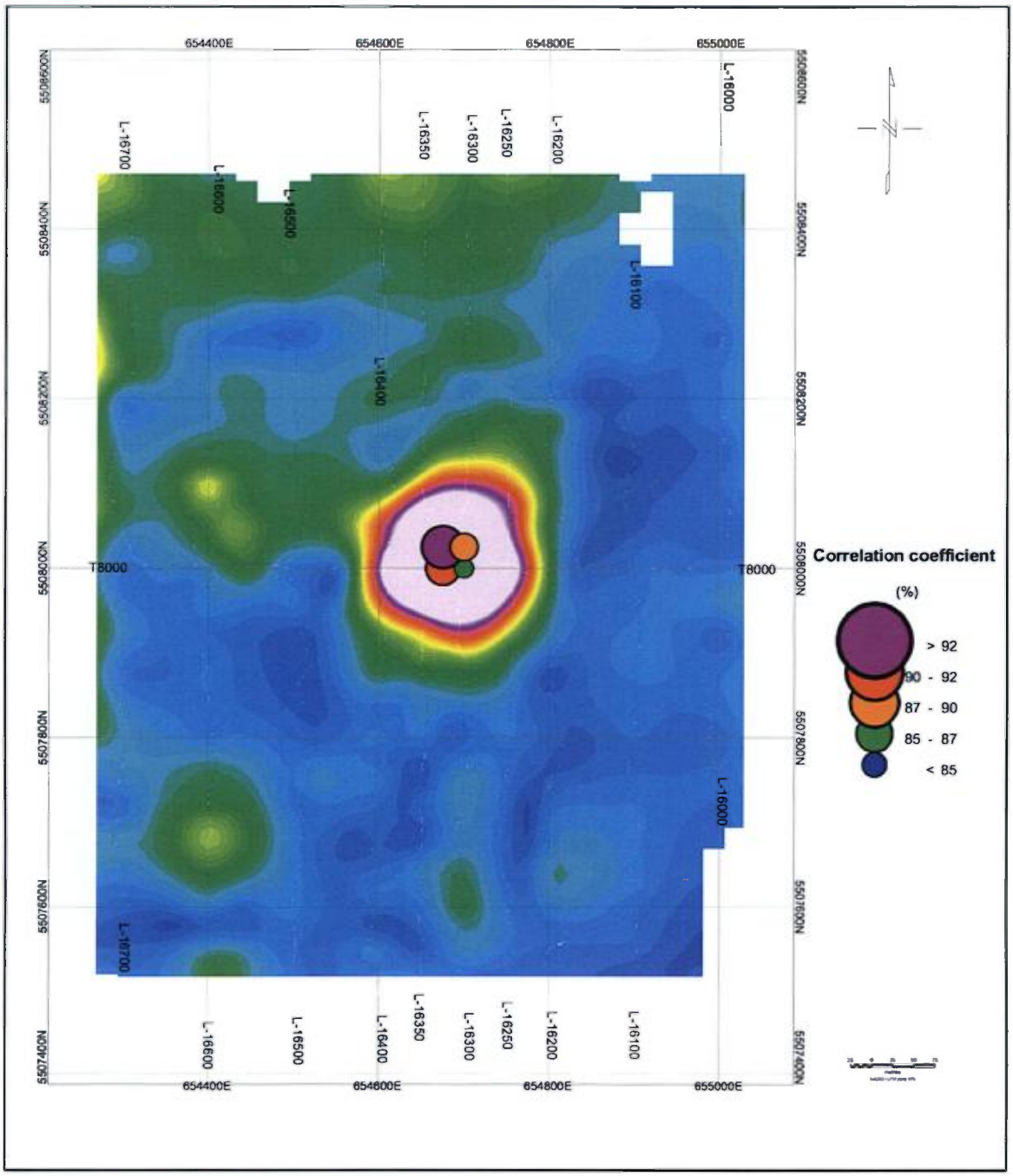


FIGURE 5. A SIMPLE PATTERN RECOGNITION TECHNIQUE (CORRELATION COEFFICIENT) TO IDENTIFY PIPE-LIKE TARGETS

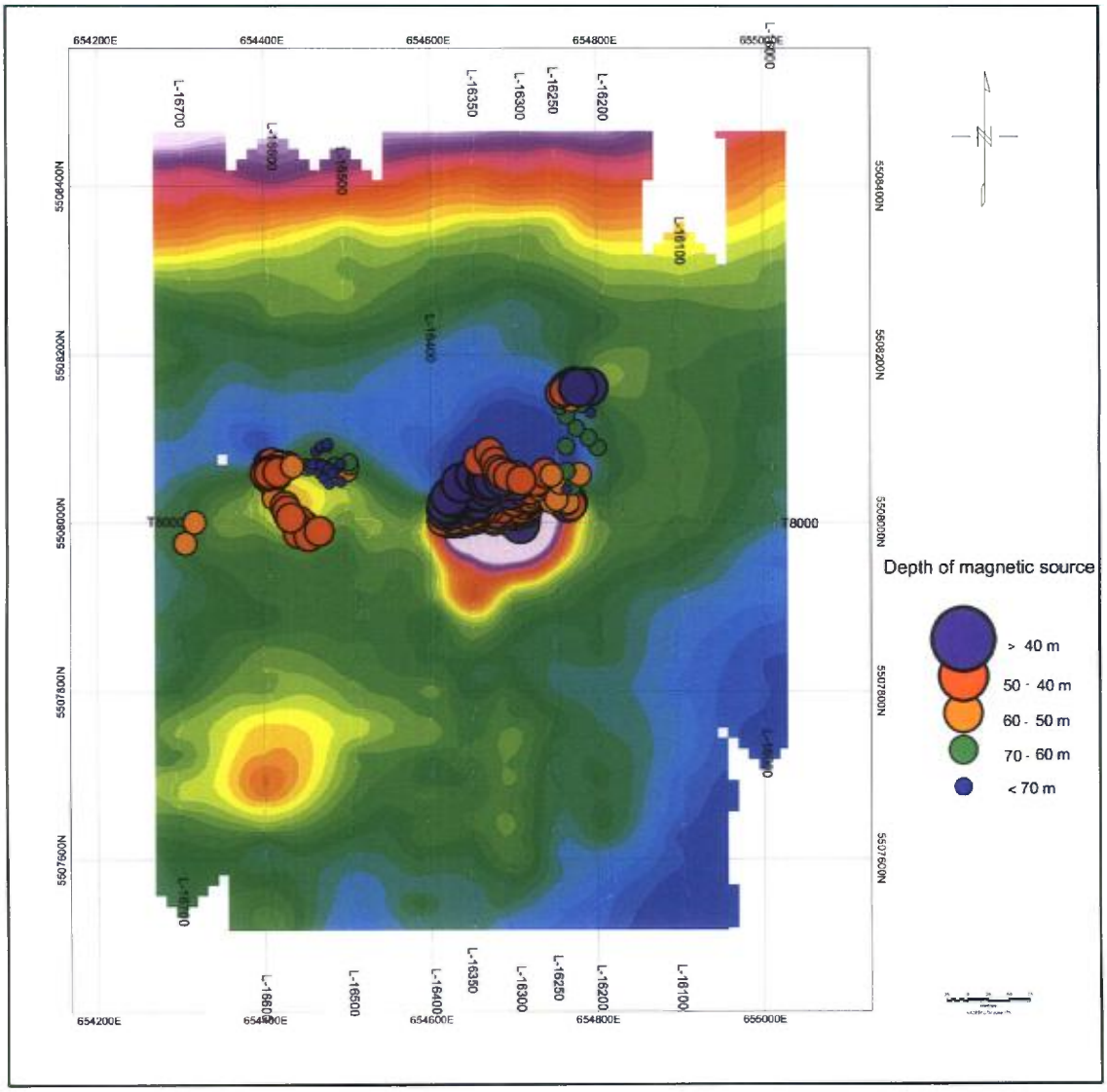


FIGURE 6. EULER SOLUTIONS FOR A STRUCTURAL INDEX OF 2 (PIPE STRUCTURE SHAPE) SUPERIMPOSED ON THE TMF

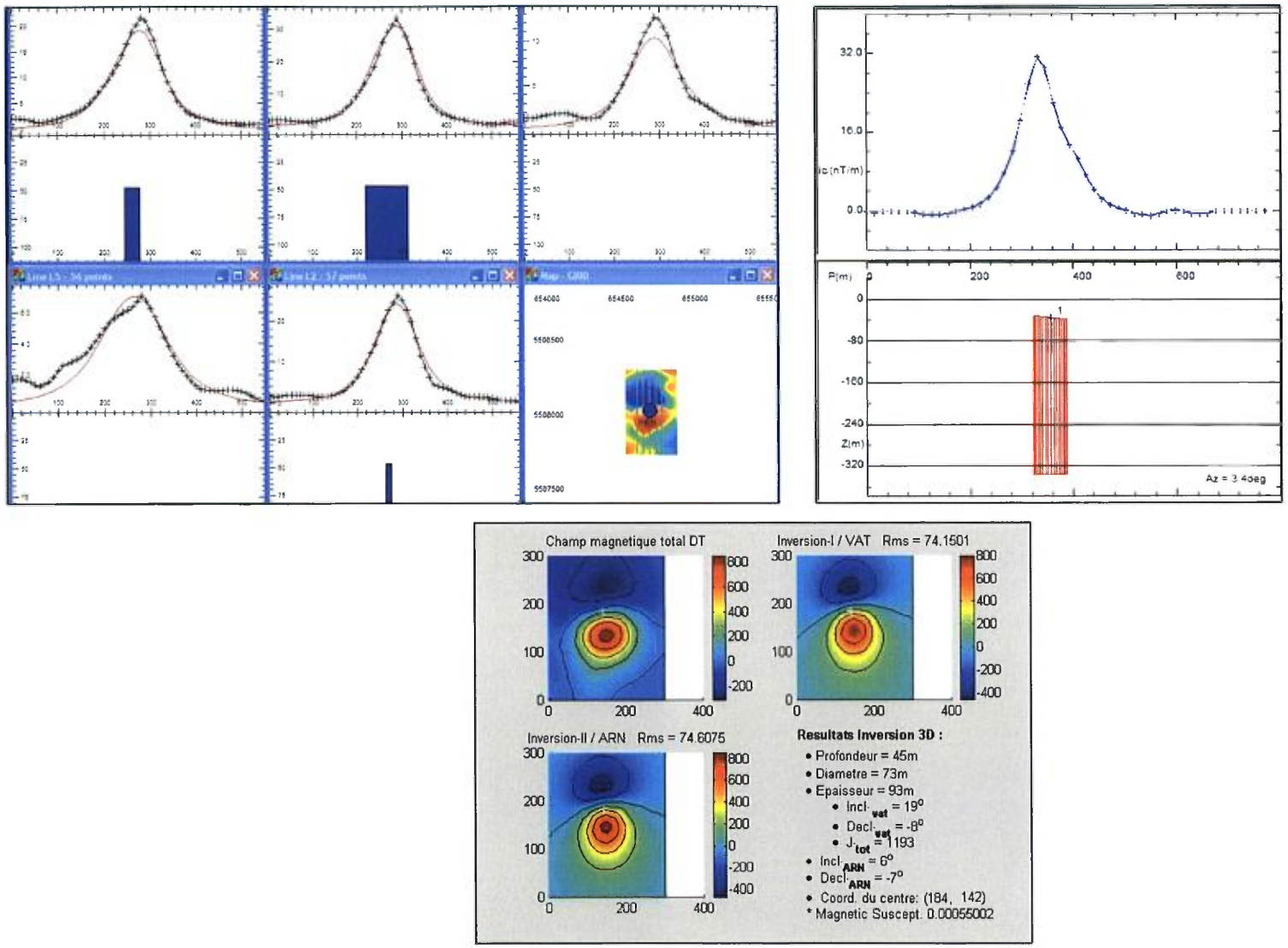


FIGURE 7. MAGNETIC INVERSION RESULTS OBTAINED OVER THE CIRCULAR MAGNETIC ANOMALY USING DIFFERENT ALGORITHMS

Table 2. Different inversion results

SOFTWARES	TARGET CENTER LOCATION (UTM/ NAD 83)		INVERSION RESULTS					REMANENCE PARAMETERS
	Easting (m)	Northing (m)	Width (m)	Depth (m)	Dip (degree)	Depth Extent (m)	Magnetic Susceptibility (SI)	
PT	654 691	5 508 022	65	35	96	300	0.009	Inc: 30.6 Azimuth: 13
	654691	5508033	89	25	98	350	0.004	Inc: 23 Azimuth: -46
MV	654682	5508019	32/63	42	90	130	0.09	Inc: 10 Azimuth: 13
	654690	5508023	47.5	47	90	228	0.01	Inc: 4 Azimuth: 48
MHM	654690	5508020	73	45	90	93	0.005	Inc: 6 Azimuth: -7

APPENDIX

DAILY LOG OF THE GEOPHYSICAL SURVEY PERFORMED ON THE MONTGOLFIER-WEST PROJECT

DATE (YYYY-MM-DD)	ACTIVITY	11N012A, EXPLORATION BARLOW INC., MAG-GPS SURVEY		INVOICING		
		COMMENTS	MOB/ DEMOB	STAND-BY	SNOWMOBILE	PRODUCTION MAG (DAYS)
Project Geophysicist:		Madjid Chemam				
Crew chief:		Philippe Larouche				
Assistant:		Marcel Naud				
2011-02-15	Preparation/ Mobilization	Preparation of equipment and mobilization from Val-d'Or.	0			
2011-02-16	Survey	Mobilization to the survey grid (had to clean-out an access trail).		1	2	0
2011-02-19	Survey	Access problem to the grid (lost snowmobile in a creek).		1	2	0
2011-02-22	Survey	MAG-GPS.			2	1
		TOTAL	**0**	**2**	**6**	**1**