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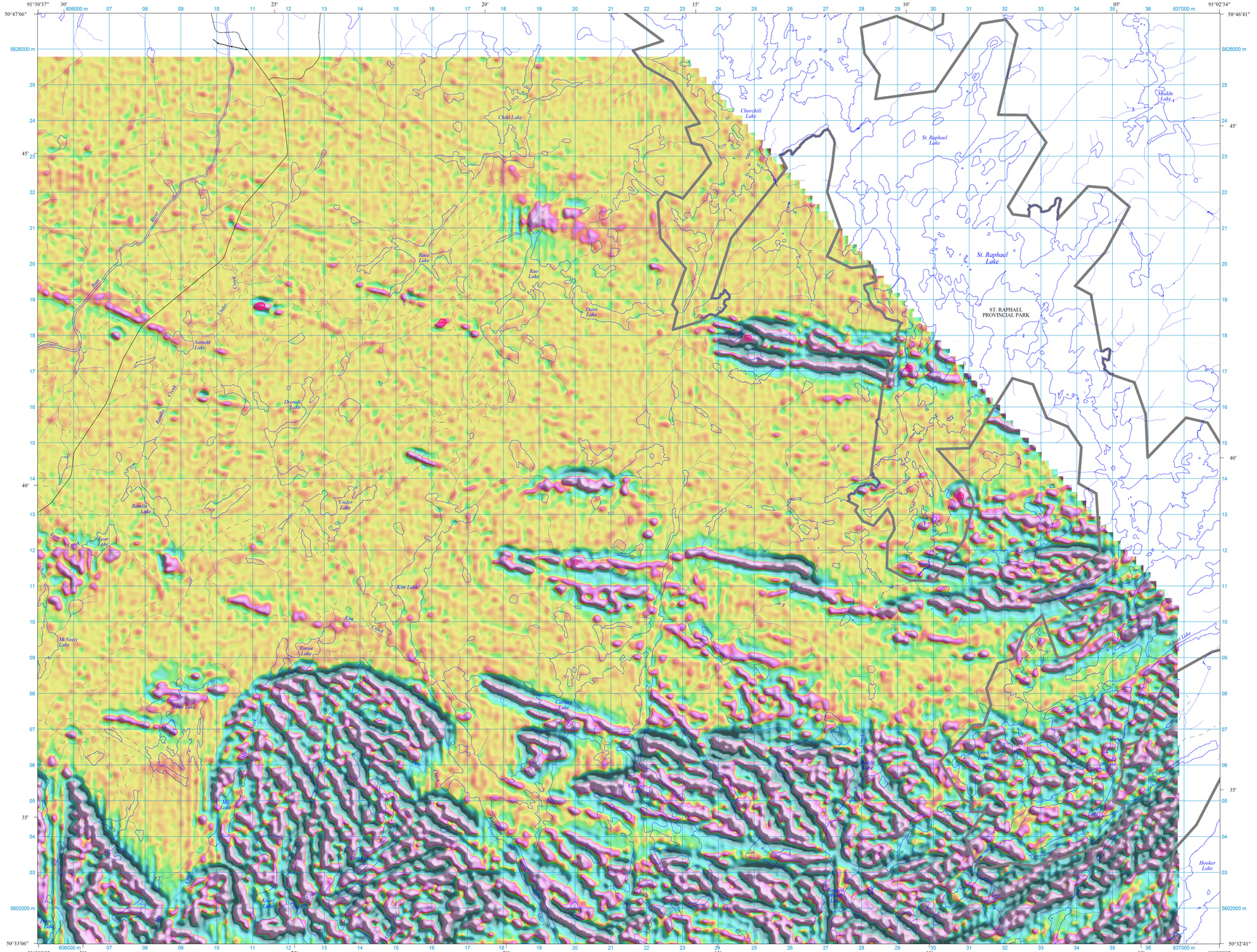
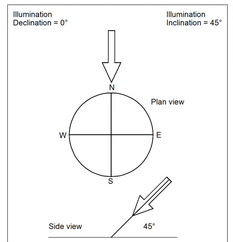


LEGEND

KEATING COEFFICIENTS

Positive correlation		Negative correlation
	90%	
	85%	
	80%	
	75%	

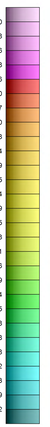
SHADED IMAGE SUN ANGLE



Shaded image is produced by applying an artificial sun illumination to the second vertical derivative of the magnetic field grid.

SECOND VERTICAL DERIVATIVE OF THE MAGNETIC FIELD GRID

nanoteslas per metre²
(nT/m²)



DESCRIPTIVE NOTES

INTRODUCTION

The data comprising this map are derived from the results of an airborne magnetic gradiometer and gamma-ray spectrometric survey carried out by Terraquest Ltd. The survey was flown using 1 Piper PA-31 Navajo aircraft and 1 King Air C-90 aircraft. The aircraft were equipped with 3 Scintrex and 1 Geometrics magnetic sensors, Radiation Solutions and Pico Envirotec gamma-ray spectrometers, GPS navigation system and digital data acquisition systems.

SECOND VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

The second vertical derivative of the magnetic field is the rate of change of the magnetic field in the vertical direction. Computation of the second vertical derivative removes long wavelength features of the magnetic field and significantly improves the resolution of closely spaced and superposed anomalies. The values for the second vertical derivative of the magnetic field were computed directly from the gridded gradient enhanced residual magnetic intensity data using a fast Fourier transform.

The shaded relief parameters are:
Shading inclination: 45°
Shading declination: 0°

KEATING CORRELATION COEFFICIENTS

Possible kimberlite targets have been identified from the residual magnetic intensity data, based on the identification of roughly circular anomalies. This procedure was automated by using a known pattern-recognition technique (Keating 1995), which consists of computing, over a moving window, a first-order regression between a vertical cylinder model anomaly and the gridded magnetic data. Only the results where the absolute value of the correlation coefficient is above a threshold of 75% were retained. The results are depicted as circular symbols, scaled to reflect the correlation value. The most favourable targets are those that exhibit a cluster of high amplitude solutions. Correlation coefficients with a negative value correspond to reversely magnetized sources. It is important to be aware that other magnetic sources may correlate well with the vertical cylinder model, whereas some kimberlite pipes of irregular geometry may not.

The cylinder model parameters are as follows:
Cylinder diameter: 200 m
Cylinder length: infinite
Overburden thickness: 6 m
Magnetic inclination: 75.4°
Magnetic declination: 1.9°W
Window size: 20 x 20 cells (40 m x 40 m)

REFERENCES

Keating, P.B. 1995. A Simple technique to identify magnetic anomalies due to kimberlite pipes; Exploration and Mining Geology, v.4, no.2, p.121-125.

SURVEY PARAMETERS

AIRCRAFT
Type: Piper Navajo PA-31-325, Beechcraft King Air C90
Registration: C-GXKS, C-GCFZ

MAGNETOMETER
Type: Single cell cesium vapour Scintrex CS-2 and CS-L (C-GXKS), Geometrics G-822A and in tail Scintrex CS-3 (C-GCFZ)
Sensitivity: 0.005 nT
Noise level: 0.1 nT
Sample interval: 10 readings per second
Sensor locations:
Piper PA-31-325 -wingtips (transverse separation: 14.6 m)
-tail stinger (longitudinal separation: 9.2 m)
King Air C90 -wingtips (transverse separation: 17.63 m)
-tail stinger (longitudinal separation: 10.86 m)
Compensation: RMS DAARC500 (both aircraft)
Data acquisition: RMS DAARC500 (both aircraft)

GAMMA-RAY SPECTROMETER SYSTEM
Type: Radiation Solution RS-500, console RS-501 with crystal detector packs RSX-5 (C-GXKS); Pico Envirotec gamma-ray spectrometer GRS5 with crystal detector packs (C-GCFZ)
Data Acquisition: RMS DAARC (C-GXKS), Laptop (C-GCFZ)
Downward-looking crystal volume: 33.6 L
Upward-looking crystal volume: 8.4 L
Number of channels: 256 (both aircraft)
Sample interval: 1 reading per second
Sensor location: near centre of aircraft
Potassium window: 1370 to 1570 keV
Uranium window: 1660 to 1860 keV
Thorium window: 2410 to 2810 keV
Total count window: 410 to 2810 keV

NAVIGATION SYSTEM
Survey navigation: Ag-Nav Inc. Guia P151 (both aircraft)
GPS receiver: Trimble Ag132 (both aircraft)
GPS sample interval: 10 readings per second
Radar altimeter: King KRA-10A (both aircraft)
Radar sample interval: 10 readings per second
Barometric altimeter: Honeywell PPT0020AWN2VA-C (both aircraft)
Barometric sample interval: 10 readings per second
Video flight path camera: Allied Vision Technology, Prosilica GT2450C (C-GXKS); Allied Vision Technology, Manta MG201C (C-GCFZ)
Navigation-acquisition: RMS DAARC500 (both aircraft)

BASE STATION
Type: Scintrex CS-2/3 single cell cesium vapour
Magnetometer sample interval: 1 reading per second
GPS sample interval: 1 reading per second

SURVEY SPECIFICATIONS
Survey date: July 28 to November 2, 2016
Nominal aircraft terrain clearance: 100 m
Traverse line spacing: 200 m
Control line spacing: 2000 m
Traverse line direction: North-south
Control line direction: East-west

CO-ORDINATE SYSTEM
Projection: Universal Transverse Mercator
Datum: NAD83
Central meridian: 93°W (UTM zone 15N)
Central scale factor: 0.9996
False easting: 500 000 m
False northing: 0 m

Ontario

Ontario Geological Survey

MAP 82 899

AIRBORNE MAGNETIC GRADIOMETER AND GAMMA-RAY SPECTROMETRIC SURVEYS

Shaded colour image of the second vertical derivative of the residual magnetic field and Keating coefficients

LAC SEUL EAST AREA

Scale 1:50 000

1 km 0 1 2 km

NTS References: 52 J/11, 14

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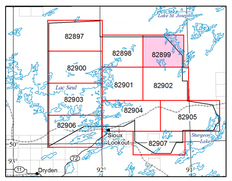

Location map 1 cm equals 20 km

SOURCES OF INFORMATION

Base map information derived from the Land Information Ontario Data Warehouse, Land Information Ontario, Ministry of Natural Resources and Forestry, scale 1:50 000.

Magnetic declination for the centre of the map area was approximately 2°28'W in 2017.

CREDITS

Data acquisition, data compilation and map production by Terraquest Ltd., Markham, Ontario.

Project management and quality assurance by Paterson, Grant and Watson Limited, Toronto, Ontario.

Contract management, base maps and map surrounds by the Ministry of Northern Development and Mines, Sudbury, Ontario.

Corresponding digital data for this survey are available from the following Ontario Geological Survey publication:

Ontario Geological Survey 2017. Ontario airborne geophysical surveys, magnetic gradiometer and gamma-ray spectrometric data, grid and profile data (ASCII format) and vector data, Lac Seul east area; Ontario Geological Survey, Geophysical Data Set 1084a.

Ontario Geological Survey 2017. Ontario airborne geophysical surveys, magnetic gradiometer and gamma-ray spectrometric data, grid and profile data (Geosoft® format) and vector data, Lac Seul east area; Ontario Geological Survey, Geophysical Data Set 1084b.

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Issued 2017.

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