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Ontario Geological Survey 2015. Airborne magnetic and electromagnetic surveys, shaded colour image of the second vertical derivative of the residual magnetic field and Keating correlation coefficients, Gullrock Lake area—Purchased data; Ontario Geological Survey, Map 60 442,scale 1:20 000.

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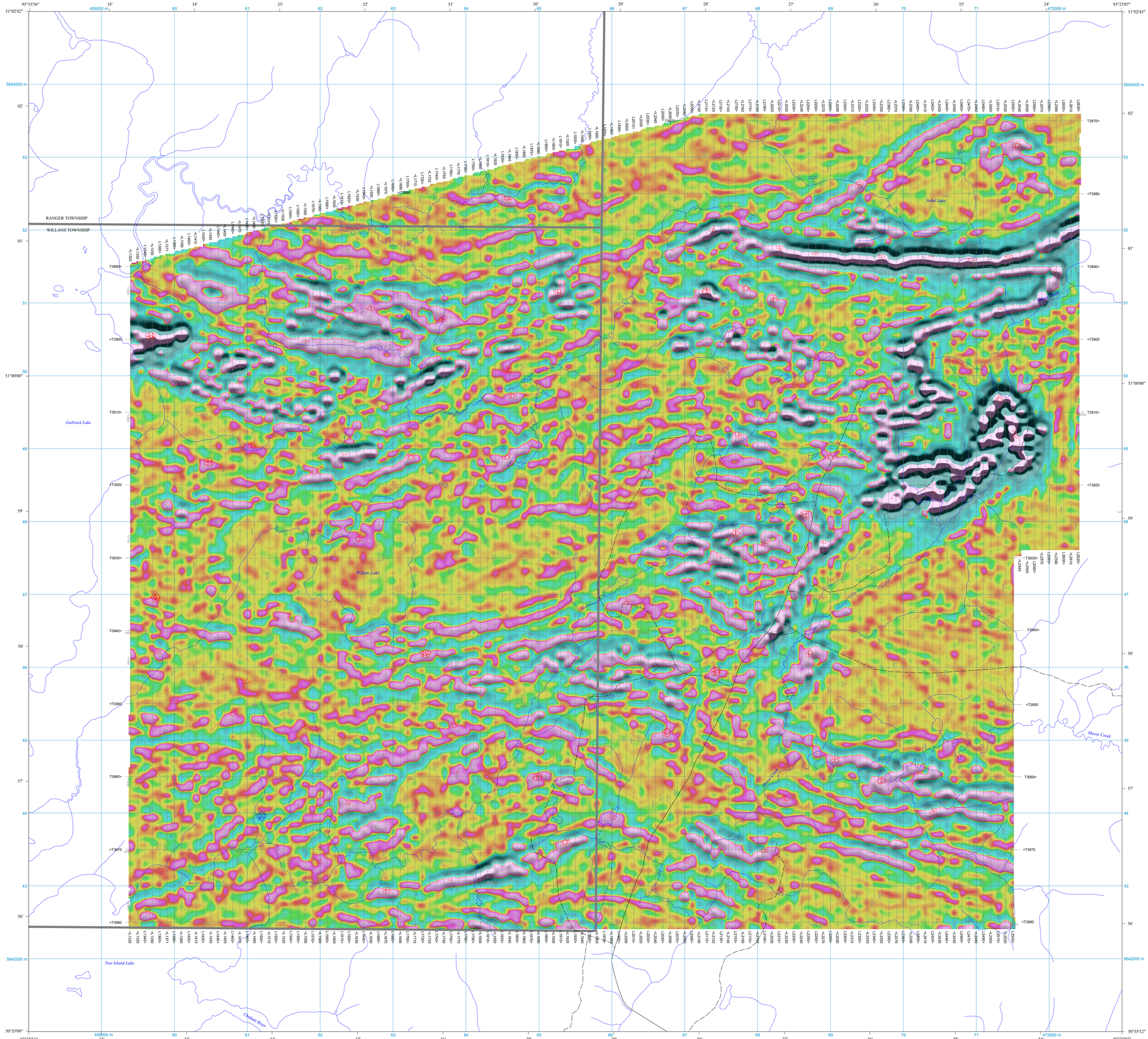


DESCRIPTIVE NOTES

Introduction

This map was compiled from a proprietary airborne survey purchased by the Ministry of Northern Development and Mines. The survey was flown using the Geotech VTEM helicopter-borne magnetic and electromagnetic system. The aircraft was also equipped with GPS navigation systems and digital data acquisition systems.

Second Vertical Derivative of the Magnetic Field

The second vertical derivative values of the magnetic field were computed directly from the gridded residual magnetic intensity data using a fast Fourier transform, combining the transfer functions of the second vertical derivative and a 125 m Butterworth filter (order 6). The low-pass filter was applied in order to attenuate unwanted high frequencies enhanced by the derivative operator.

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

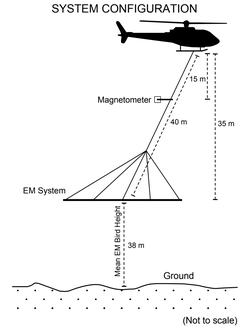
Magnetic declination on February 18, 2008, for the centre of the survey area, was 0.51°W. Inclination was 76.52°. Magnetic field strength was 58 322 nT (calculated using IGRF).

Keating Correlation Coefficients

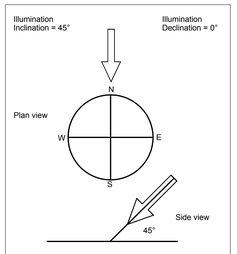
Possible kimberlite targets have been identified from the residual magnetic intensity data, based on the identification of roughly circular anomalies. This procedure was automated by using a known pattern-recognition technique (Keating 1995, 2001), which consists of computing, over a moving window, a 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: 9.7 m
Window size: 10 × 10 cells (400 m × 400 m)

SYSTEM CONFIGURATION



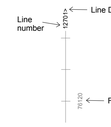
SHADED IMAGE SUN ANGLE



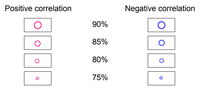
Shaded image is produced by applying an artificial sun illumination to the second vertical derivative of the magnetic field grid.

LEGEND

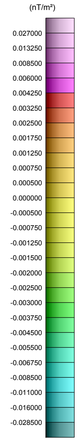
FLIGHT LINE INFORMATION



KEATING COEFFICIENTS



SECOND VERTICAL DERIVATIVE OF THE MAGNETIC FIELD GRID
nanoteslas per metre²



Ontario

Ontario Geological Survey

MAP 60 442

AIRBORNE MAGENTIC AND ELECTROMAGNETIC SURVEYS

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

GULLROCK LAKE AREA

Purchased Data

Scale 1:20 000

500 m 0 0.5 1 km

NTS References: 52 K/13, 14; N/3, 4

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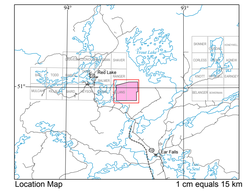

SURVEY PARAMETERS

AIRCRAFT
Type: Aerospatiale 350-FX
Registration: C-FXFU

MAGNETOMETER
Type: Geometrics cesium-vapour
Sensitivity: 0.02 nT
Sample interval: 10 readings per second
Sensor location: 15 m below aircraft

ELECTROMAGNETIC SYSTEM
Type: VTEM
Base frequency: 30 Hz
Current waveform: trapezoid
Peak dipole moment: 452 700 Am²
Pulse width: 7500 µs
Off-time: 9467 µs
Parameters: Z-component of dB/dt
Sample interval: 10 readings per second
Bird location: 35 m below aircraft

NAVIGATION SYSTEM
GPS receiver: NovAtel® OEM4-G2-3151W
GPS sample interval: 5 readings per second
Radar altimeter: Terra 3000/TRI-40
Radar sample interval: 5 readings per second
Guidance system: Geotech
Digital acquisition system: Geotech

BASE STATION
Type: Geometrics cesium-vapour
Magnetometer sample interval: 1 reading per second
GPS sample interval: 1 reading per second

SURVEY SPECIFICATIONS
Survey dates: February 13 to 20, 2008
Nominal aircraft terrain clearance: 73 m
Traverse line spacing: 100 m
Control line spacing: 1000 m
Traverse line direction: 0° and 180°
Control line direction: 90° and 270°

Data purchased from: Tri Origin Exploration Ltd.

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 0°19.74' W in 2015.

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.

Keating, P.B. 2001. Identification of kimberlite pipes from aeromagnetic surveys; oral presentation, Canadian Geophysical Union, Annual Meeting, May 2001.

Marich, M. 2008. Report on a helicopter-borne versatile time domain electromagnetic (VTEM) geophysical survey, Red Lake Extension project, Red Lake, Ontario, prepared for Tri Origin Exploration Ltd. by Geotech Ltd.; unpublished report, Tri Origin Exploration Ltd., Red Lake Resident Geologist's office, assessment file AFRO# 2.40855, AFR## 20000003997, 36p.

CREDITS

Data acquisition and data compilation by Geotech Limited, Aurora, Ontario, for Mustang Minerals Corp., Toronto, Ontario.

Data reprocessing and map production by Scott Hogg & Associates, Toronto, Ontario.

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

Every possible effort has been made to ensure the accuracy of the information presented on this map; however, the Ministry of Northern Development and Mines does not assume liability for errors that may occur. Users should verify critical information.

The geophysical data on this map were purchased from the private sector. The original data acquisition was neither supervised by the Ontario Geological Survey (OGS) nor carried out to OGS technical specifications. However, the purchased data do meet a pre-defined valuation criteria set out by the OGS. Some quality assurance and quality control checks have been carried out on the digital data.

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

Ontario Geological Survey 2015. Ontario airborne geophysical surveys, magnetic and electromagnetic data, grid and profile data (ASCII and Geosoft® formats) and vector data, Gullrock Lake area—Purchased data; Ontario Geological Survey, Geophysical Data Set 1245.

Issued 2015.

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Users of OGS products are encouraged to contact those Aboriginal communities whose traditional territories may be located in the mineral exploration area to discuss their project.