Ontario

Ontario Geological Survey

MAP 81 951

AIRBORNE MAGNETIC SURVEY

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

KIRKLAND LAKE – LARDER LAKE AREA

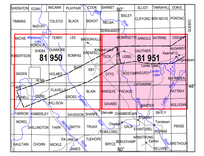
Scale 1:50 000

1 km 0 2 km

NTS References: 31 M/13; 32 D/4; 41 P/16; 42 A/1

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LOCATION MAP 1cm equals 10km

SURVEY PARAMETERS

AIRCRAFT
Type: Bell 206 Jet Ranger
Registration: C-GIGS, C-FFUJ

MAGNETOMETER
Type: Scintrex CS-2
Sensitivity: 0.001 nT
Noise level: < 0.10 nT
Sample interval: 10 readings per second
Sensor locations:
left boom tip
right boom tip

MAGNETIC COMPENSATION SYSTEM
Type: FAS-DAS Magnetic Compensator
Range: 20 000 to 100 000 nT
Resolution: 1 picotesla
Accuracy of compensation: 0.05 nT

NAVIGATION SYSTEM
Navigation console: FAS-DAS Nav Console
GPS receiver: Ashtech Z-Surveyor
Differential GPS receiver: Novatel 3951 with Omnistar
GPS sampling interval: 1 reading per second
Radar altimeter: Sperry RT220
Laser altimeter: Optech G-330 First-Last Pulse
Barometric altimeter: Motorola MPX4115AP
Barometric sample interval: 1 reading per second
Video flight path recorder: Panasonic AG-720

DATA ACQUISITION SYSTEM
Digital acquisition system: FAS-DAS

BASE STATION
Magnetometer: Scintrex CS-2
Magnetometer sample interval: 1 reading per second
Backup magnetometer: GSM 19
Magnetometer sample interval: 1 reading per 3 seconds
GPS receiver: Ashtech Z-Surveyor
GPS sample interval: 1 reading per second

SURVEY SPECIFICATIONS
Survey date: March 01, 2004 to April 07, 2004
Nominal aircraft terrain clearance: 50 m
Traverse line spacing: 75 m
Control line spacing: 3000 m
Traverse line direction: N-S (Block B), 140 degree azimuth (Block A)
Control line direction: E-W

COORDINATE SYSTEM
Projection: Universal Transverse Mercator
Datum: NAD83
Central meridian: 81°00'W (UTM zone 17N)
Central scale factor: 0.9996
False easting: 500 000 m
False northing: 0 m

LEGEND

KEATING COEFFICIENTS

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

OTHER SYMBOLS

(Some symbols may not apply to this map)

- Drainage
- Main road
- Secondary road
- Trail
- Power line
- Pipeline
- Administrative boundary
- Railroad

SECOND VERTICAL DERIVATIVE OF THE MAGNETIC FIELD GRID

nanoteslas per metre ^{2}
nT/m^2

0.025000
0.012000
0.008000
0.006000
0.005000
0.004000
0.003000
0.002000
0.001600
0.001200
0.000800
0.000400
0.000200
0.000000
-0.000200
-0.000400
-0.000800
-0.001200
-0.001600
-0.002000
-0.003000
-0.004000
-0.005000
-0.006000
-0.008000
-0.012000
-0.020000
-0.035000

SHADED IMAGE SUN ANGLE

Plan view
Illumination Declination = 45°

N E S W

Side view
Illumination Inclination = 30°

30°

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

DESCRIPTIVE NOTES

Introduction

This survey was flown using the Fugro MIDAS Helicopter Mounted Horizontal Gradiometer system. The helicopter was also equipped with a GPS navigation system and a digital data acquisition system.

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 an eight-order Butterworth low-pass filter (100 m cut-off wavelength). The low-pass filter was aimed at attenuating unwanted high frequencies enhanced by the derivative operator.
The shaded relief parameters are:
Shading inclination: 030°
Shading declination: N 045° E

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: 8 m
Magnetic inclination: 74.18 °N
Magnetic declination: 12.00 °W
Window size: 36 x 36 cells (540 m x 540 m)

SOURCES OF INFORMATION

Base map information data derived from Ontario Land Information Warehouse, Land Information Ontario.

Magnetic declination in 2004 for the centre of the map area was 12.1° W. Magnetic inclination in 2004 for the centre of the map area was 74.1° N. Magnetic field strength was 57 164 nT. (Calculated using IGRF.)

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.

CREDITS

Overall project management by Timmins Economic Development Corporation.

Contract management, project management by Robert Calhoun, Project Manager, Discover Abitibi Initiative.

Data acquisition, compilation and map production by Fugro Airborne Surveys, Mississauga, Ontario.

Base maps, and map surrounds by the Ontario Ministry of Northern Development and Mines, Sudbury, Ontario.

Quality assurance and quality control by Paterson, Grant & Watson Limited, Toronto, Ontario.

To enable the rapid dissemination of information, this map has not received a technical edit. Every possible effort has been made to ensure the accuracy of the information presented; however, the Ontario Ministry of Northern Development and Mines does not assume liability for any errors that may occur. Users can verify critical information from the corresponding digital profile and gridded data distributed by the Ontario Geological Survey.

Timmins

Discover Abitibi
A project of innovation, cooperation and revitalization
Découvrons l' Abitibi
Un projet d' innovation, de coopération et de renouvellement

Discover Abitibi Initiative
The Discover Abitibi Initiative is a regional, cluster economic development project based on geoscientific investigations of the western Abitibi greenstone belt. The initiative, centred on the Kirkland Lake and Timmins mining camps, will complete 19 projects developed and directed by the local stakeholders. FedNor, Northern Ontario Heritage Fund Corporation and private sector investors have provided the funding for the initiative.

Initiative Découvrons l'Abitibi
L'initiative Découvrons l'Abitibi est un projet de développement économique régional dans une grappe d'industries, projet fondé sur des études géoscientifiques de la ceinture de roches vertes de l'Abitibi occidental. Cette initiative, centrée sur les zones minières de Kirkland Lake et de Timmins, mènera à bien 19 projets élaborés et dirigés par des intervenants locaux. FedNor, la Société de gestion du Fonds du patrimoine du Nord de l'Ontario et des investisseurs du secteur privé ont fourni les fonds de cette initiative.

Ontario Northern Ontario Heritage Fund / Fonds du patrimoine du Nord de l'Ontario

FedNor Canada

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Information from this publication may be quoted if credit is given. It is recommended that reference be made in the following form:

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