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LEGEND

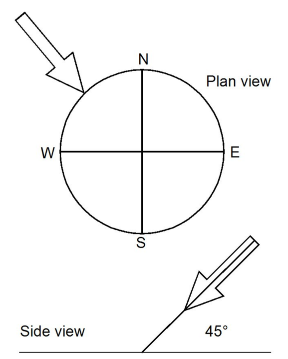
KEATING COEFFICIENTS

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

SHADED IMAGE SUN ANGLE

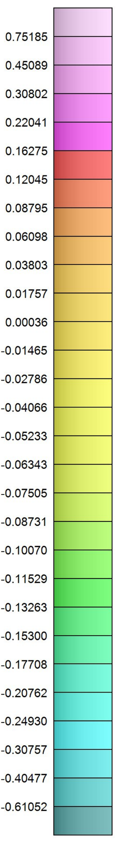
Illumination
Declination = 320°

Illumination
Inclination = 45°



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

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD GRID



DESCRIPTIVE NOTES

Introduction

The data comprising this map are derived from the results of an airborne magnetic survey carried out by Goldak Airborne Surveys. The survey was flown using two Piper PA-31 Navajo aircraft. Each aircraft was equipped with three Geometrics magnetic sensors, GPS navigation systems and digital data acquisition systems.

First Vertical Derivative of the Magnetic Field

The first vertical derivative of the magnetic field is the rate of change of the magnetic field in the vertical direction. Computation of the first 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 first vertical derivative of the magnetic field were computed directly from the gridded residual magnetic intensity data using a fast Fourier transform first vertical derivative function.

The shaded relief parameters are:
Shading inclination: 045°
Shading declination: N 320° 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: 7.4 m (average) or
~105 m below the tail sensor
Magnetic inclination: 70.4° N
Magnetic declination: 13.5° W
Window size: 1000 m

SURVEY PARAMETERS

AIRCRAFT
Type: Piper Navajo PA-31
Registration: C-GJBB, C-GJBG

MAGNETOMETER
Type: Geometrics caesium-vapour
Sensitivity: 0.005 nT
Noise level: 0.05 nT
Sample interval: 10 readings per second
Sensor locations: wing tips (transverse separation 14.783 m)
tail stinger (longitudinal separation 9.75 m)
Data Acquisition-Compensation: RMS AADCII
Data Acquisition: GEDAS

NAVIGATION SYSTEM
GPS receiver: Novatel OEM4 ProPak
GPS sample interval: 1 reading per second
Radar altimeter: Thompson CFS 530A
Radar sample interval: 10 readings per second
Barometric altimeter: Setra 270
Barometric sample interval: 10 readings per second
Video flight path camera: Panasonic GPKR402 HRSV
Navigation-Acquisition: GEDAS

BASE STATION
Magnetometer: GEM Systems GSM-19W
Magnetometer sample interval: 1 reading per second
GPS sample interval: 1 reading per second

SURVEY SPECIFICATIONS
Survey date: October 8 to December 6, 2013
Nominal aircraft terrain clearance: 200 m
Traverse line spacing: 400 m
Control line spacing: 4000 m
Traverse line direction: 140° azimuth
Control line direction: 50° aziumth

COORDINATE SYSTEM
Projection: Universal Transverse Mercator
Datum: NAD83
Central meridian: 75°00′ W (UTM zone 18N)
Central scale factor: 0.9996
False easting: 500 000 m
False northing: 0 m

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.

Ontario

Ontario Geological Survey

MAP 82 630

AIRBORNE MAGNETIC SURVEY

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

EASTERN ONTARIO AREA

Scale 1:50 000

1 km 0 1 2 km

NTS References: 31 B/15; G/1, 2, 3

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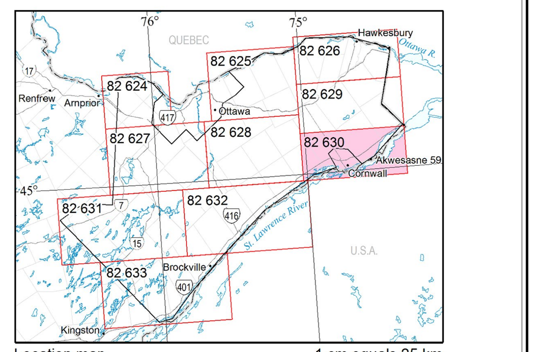

Location map 1 cm equals 25 km

SOURCES OF INFORMATION

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

Magnetic declination for the centre of the map area was approximately 13°57.8′W in 2014.

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

Data acquisition, data compilation and map production by Goldak Airborne Surveys, Saskatoon, Saskatchewan.

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

Contract management, base maps and map surrounds by the Ontario 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 Ontario Ministry of Northern Development and Mines does not assume liability for errors that may occur. Users should verify critical information.

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

Ontario Geological Survey 2014. Ontario airborne geophysical surveys, magnetic data, grid and profile data (ASCII and Geosoft® formats) and vector data, eastern Ontario area; Ontario Geological Survey, Geophysical Data Set 1075.

Issued 2014.

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