

**Technical Information**

The map was compiled from data acquired during an airborne electromagnetic survey carried out by Geotech Canada Inc. utilizing Geotech's VTEM Max Three-Domain Electromagnetic (TDEM) system. The system was mounted on a Eurocopter AS330 helicopter (registration C-GLHX) and the survey was carried out between December 1, 2022 and March 13, 2023. The helicopter flight altitude was maintained at an average of 80 m and the survey was carried out with an average speed of 90 km/h. Aircraft navigation used a 14-channel Novatel dual frequency GPS system. Post-flight differential corrections were applied to the flight path position. A vertically mounted video camera was used to record images of the ground. The data was recorded at 10 times per second using a TRS2000000 transmitter. The magnetic data were recorded 10 times per second using a Geometrics G823A cesium magnetometer installed in a bid 10 below the helicopter.

**Electromagnetics**

The TDEM system operated at a base frequency of 30 Hz and transmits a 7 m half square wave pulse from a base station, 340 m horizontal line mounted approximately 48 m above and 8 m behind the helicopter. This configuration generates a peak dipole moment of 733 200 Am<sup>2</sup>. The response of conductors in the subsurface was recorded at 100 kHz over the entire waveform using a three axis (X, Y and Z) electromagnetic receiver co-located with the transmitter. The receiver was mounted on a 1.5 m horizontal boom extending 1.5 m from the stream for each of the three components. The EM receiver directly measures the change in the magnetic field with respect to time (dB/dt) (nT/s) and the secondary magnetic field (B) is numerically integrated. High-altitude background sections from at the start and end of each flight allowed for first-order removal of system noise.

**Apparent Conductivity**

The apparent conductivity values (mS/m) were derived from the electromagnetic decays using selected early channels 4 to 14 (0.021 - 0.096 ms) and late channels 31 to 46 (1.010 - 8.083 ms) of the off-time signal. The nomogram indicates the correspondence between the value of dB/dt (nT/s) and halfspace conductivity (S/m). Forward thin plate modeling is used to estimate the depth to the top of target (m) for the VTEM MAX TDEM system.

**Electromagnetic Decay Constant**

Decay constant (Tau) values were obtained by fitting the data from selected early Z channels 4 to 14 (0.021 - 0.096 ms) and late channels 31 to 46 (1.010 - 8.083 ms) and late channels 31 to 46 (1.010 - 8.083 ms) of the off-time signal to a single exponential. In semi-log space, the slope of this function will reflect the exponential decay rate of the transient field and, therefore, the strength of the conductivity. A slow rate of decay, reflecting a high conductivity, will be represented by a high decay constant.

**Magnetics**

The magnetic field was sampled 10 times per second using a cesium vapour magnetometer (model 823A) with a resolution of 0.01 nT. Differences in magnetic values at the elevations of control and traverse lines were analyzed to obtain a mutually leveled set of flight-line magnetic data. The leveled data were then integrated to 10 m in the horizontal direction. The International Geomagnetic Reference Field (IGRF) defined at a mean GPS altitude (530 m) for a constant mid-airway date (January 20, 2022) was then removed. Removal of the IGRF, representing the magnetic field of Earth's core, produces a residual component related essentially to magnetizations within Earth's crust.

**The 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. A property of first vertical derivative maps is the coincidence of the zero-value contour with vertical magnetic contacts at high magnetic latitudes (Hood, 1965). The first vertical derivative of the magnetic field reduced to the pole was calculated using the fast Fourier transform with a grid cell size of 50 m.

**Availability**

This map is available for free download through GEOCAN (<https://geocan.nrc.ca/geocan>). Corresponding digital profile and profile data as well as similar data for adjacent channels, geophysical surveys can be downloaded, at no charge, from Natural Resources Canada's Geospatial Data Inventory for Geophysical Data at <https://geophysicaldata.nrc.ca/>. For more information, please contact the Geospatial Data Centre, Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario. E-mail: [gdci@geospatial.gc.ca](mailto:gdci@geospatial.gc.ca)

**Acknowledgments**

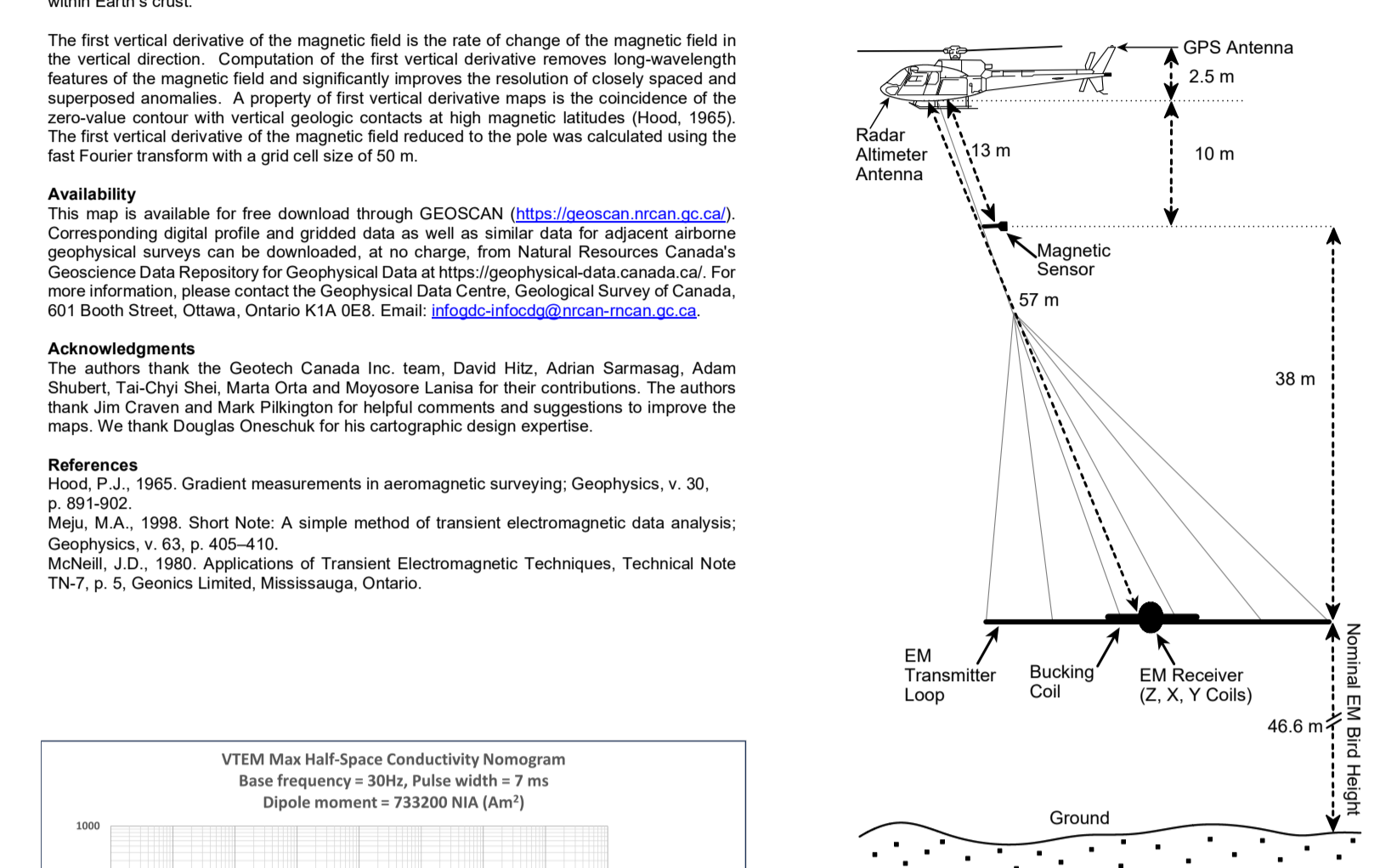
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**References**

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Mey, M.A., 1998. Short Note: A simple method of transient electromagnetic data analysis. *Geophysics*, v. 63, p. 405-410.

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**PLANIMETRIC SYMBOLS**

- Project Limit
- Drainage
- Topographic Contour
- Road

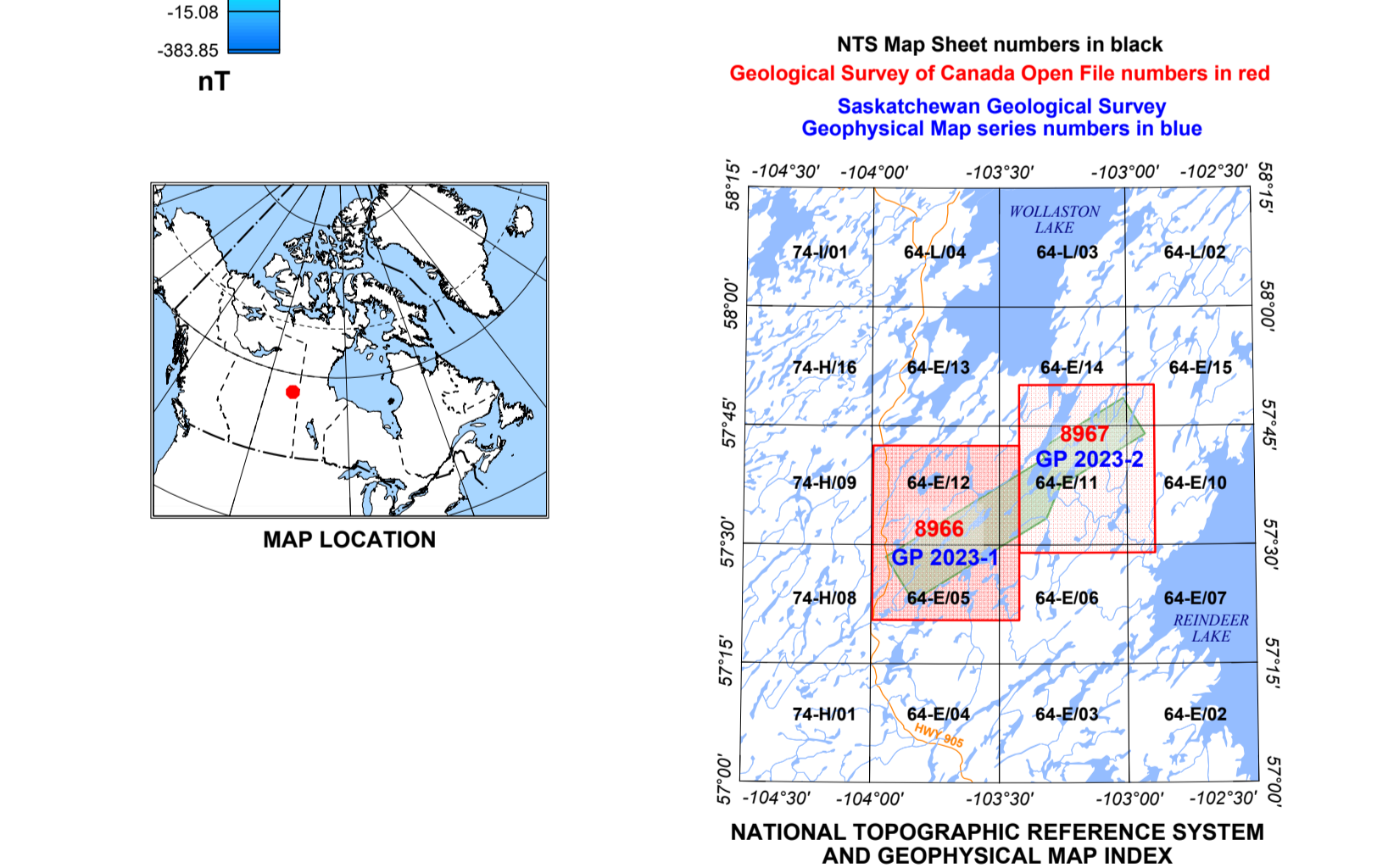
**ISOMAGNETIC LINES**

- 1000 nT
- 2500 nT
- 50 nT
- 10 nT
- Magnetic Depression

**MAP SHEET SUMMARY**

- Sheet 1: Time Decay Constant (Tau-Z) - Early Channels 4 to 14 (0.021 - 0.096 ms)
- Sheet 2: Time Decay Constant (Tau-Z) - Mid Channels 15 to 30 (0.110 - 0.880 ms)
- Sheet 3: Time Decay Constant (Tau-Z) - Late Channels 31 to 46 (1.010 - 8.083 ms)
- Sheet 4: Apparent Conductivity - Early Channels 4 to 14 (0.021 - 0.096 ms)
- Sheet 5: Apparent Conductivity - Mid Channels 15 to 30 (0.110 - 0.880 ms)
- Sheet 6: Apparent Conductivity - Late Channels 31 to 46 (1.010 - 8.083 ms)
- Sheet 7: Residual Total Magnetic Field
- Sheet 8: First Vertical Derivative of the Magnetic Field
- Sheet 9: Interpretation

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GEOLOGICAL SURVEY OF CANADA OPEN FILE 8966  
 SASKATCHEWAN GEOLOGICAL SURVEY GEOPHYSICAL MAP GP 2023-1  
 ELECTROMAGNETIC SURVEY OF THE EASTERN WOLLASTON AREA  
 SASKATCHEWAN  
 Parts of NTS 64-E/5, 6, 11 and 12  
**RESIDUAL TOTAL MAGNETIC FIELD**  
 Scale 1:50 000  
 Universal Transverse Mercator Projection  
 North American Datum (NAD83) 1983  
 UTM Zone 13N  
 © His Majesty the King in Right of Canada, as represented by the Minister of Natural Resources, 2023  
 Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications  
 Contour interval 20 metres. Elevations in metres above mean sea level

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