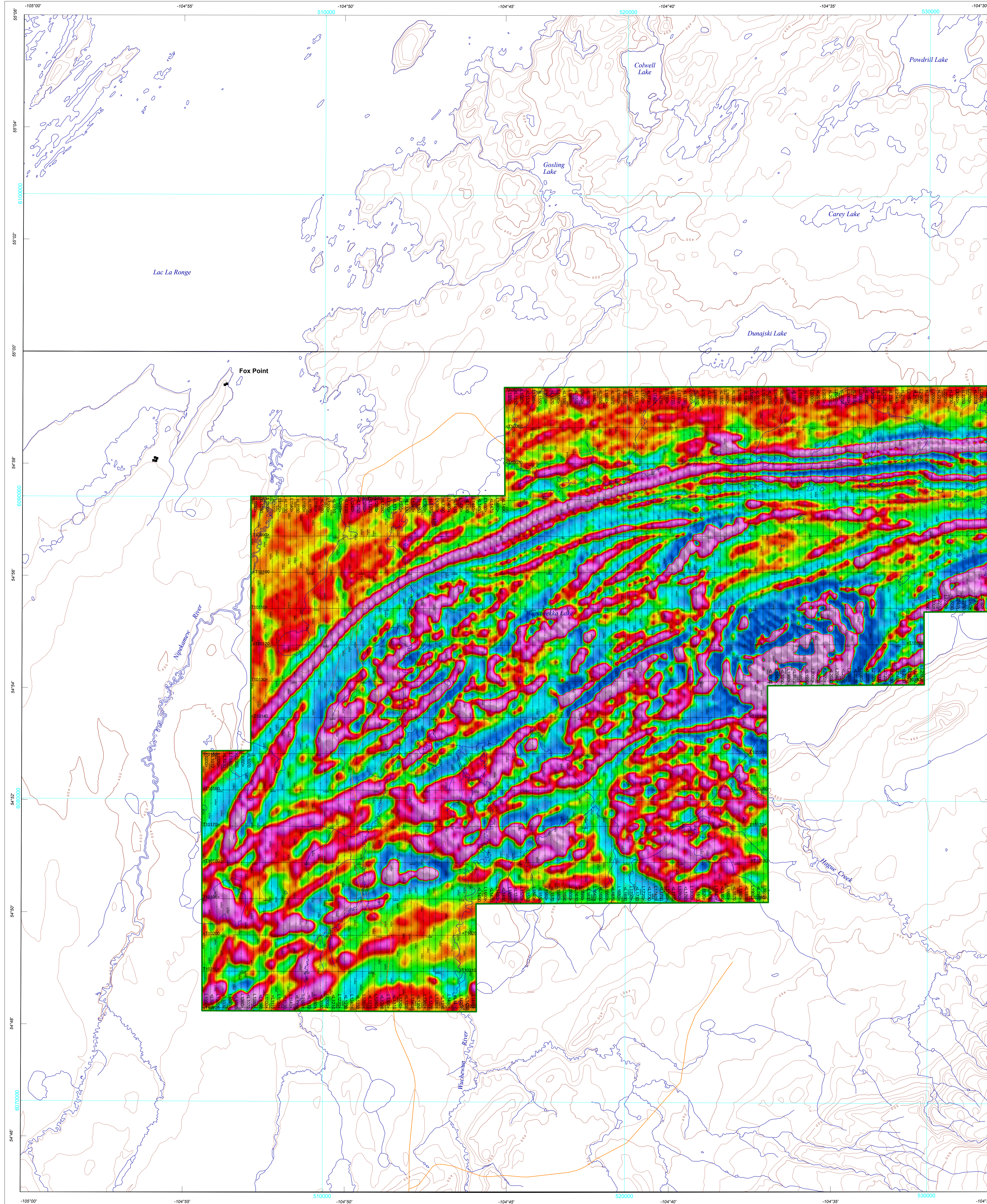




FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD



Technical Information
 This map was compiled from data acquired during an airborne electromagnetic/magnetic survey carried out by Geotech Canada Inc. using Geoscan VTEM Max Time Domain Electromagnetic (TDEM) system. The systems were mounted on two Eurocopter AS350 B3 helicopters (Registration C-GTCD and C-GTCE) and the survey was completed between December 19, 2019 and March 10, 2020. The helicopter flight altitude was maintained at an average ground clearance of 60 m, with an average speed of 90 km/h. Aircraft navigation used a Garmin NovaTair dual frequency GPS system. Post-flight differential corrections were applied to finalize the flight path position. A vertically mounted video camera was used to record images of the ground. The radar height was recorded ten times per second using a TRAX3000 altimeter. The magnetic data were recorded 10 times per second using a Geometrics G-822A cesium magnetometer installed at a fixed 10 m below the helicopter.

Electromagnetics
 The TDEM system operated at a base frequency of 30 Hz transmits a 7.0 m half square signal from a four-turn, 940 m² horizontal loop mounted approximately 48 m below and 8 m behind the helicopter. This configuration generates a peak dipole moment of 721,920 Am². The response of conductors in the subsurface was recorded at 192 kHz over the entire waveform using a three-axis (X, Y and Z) electromagnetic receiver coincident with the transmitter loop (in-Loop Transmitter-Receiver). The EM receiver recorded data in a continuous stream for each of the three components. The EM receiver directly measures the change in the magnetic field with respect to time (dB/dt) from which the secondary magnetic field (B) is numerically integrated. High-altitude background sections from at the start and end of each flight allowed a first-order removal of system drift.

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), middle channels 15 to 30 (0.110 - 0.850 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. Forward time 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 channels 4 to 14 (0.021 - 0.096 ms), middle channels 15 to 30 (0.110 - 0.850 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 value.

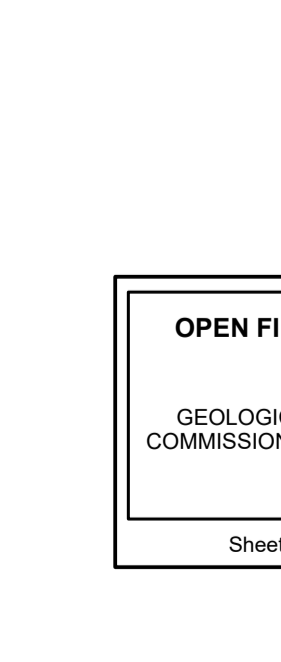
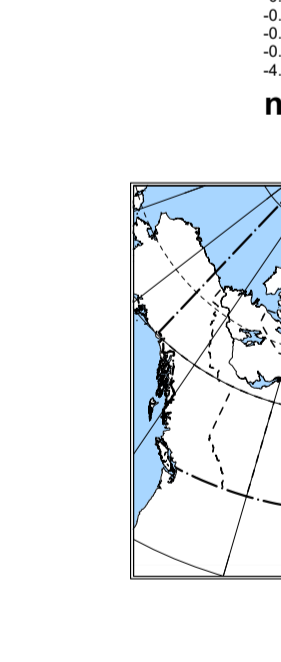
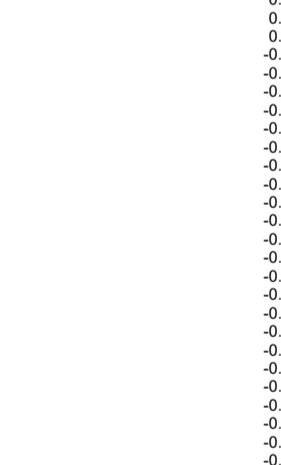
Magnetics
 The magnetic field was sampled 10 times per second using a cesium vapour magnetometer (sensitivity = 0.021 nT) mounted on the EM transmitter loop. Differences in magnetic values at the intersections of control and traverse lines were analysed to obtain a mutually levelled set of flightline magnetic data. The levelled values were then interpolated to a 50 m grid. The International Geomagnetic Reference Field (IGRF) defined at a mean GPS altitude (47 m) for a constant mid-survey date (January 15, 2020) 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 is the rate of change of the magnetic field in the vertical direction. Computation of the first vertical derivative removes low-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 geologic contacts at high magnetic latitudes (Hood, 1965). The first vertical derivative of the magnetic field was calculated using the fast Fourier transform on the gridded total magnetic field with a grid cell size of 50 m.

Availability
 This map is available for free download through GEOSCAN (<http://geoscan.nrcan.gc.ca/>). Corresponding digital profile and gridded data as well as similar data for adjacent airborne geophysical surveys can be downloaded, at no charge, from Natural Resources Canada's Geoscience Data Repository for Geophysical Data at http://gdr.nrcan.gc.ca/index_e.html. The same products are also available, for a fee, from the Geophysical Data Centre, Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario K1A 0E8. Telephone: 613-995-5326; email: info@gdr.nrcan.gc.ca.

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Reference
 Hood, P.A., 1965. Gradient measurements in aeromagnetic surveying. *Geophysics*, v. 30, p. 891-902.



Geological Survey of Canada Open File numbers in blue
 Saskatchewan Geological Survey Geophysical Map series numbers in green
 National Topographic Reference System and Geographical Map Index

Geological Survey of Canada Open File 8671
 SASKATCHEWAN GEOLOGICAL SURVEY GEOPHYSICAL MAP GP 2020-1
 ELECTROMAGNETIC SURVEY OF THE SOUTHERN GLENNIE AREA
 SASKATCHEWAN
 Part of NTS 73-I15
 FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD
 Scale 1:50 000
 (kilometres)
 WGS 84 UTM zone 13N
 Universal Transverse Mercator Projection
 World Geodetic System 1984
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 Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications
 Elevations in metres above sea level

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 8671
 GEOLOGICAL SURVEY OF CANADA
 COMMISSION GÉOLOGIQUE DU CANADA
 2020
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GEOPHYSICAL MAP
CARTE GÉOPHYSIQUE
 GP 2020-1
 SASKATCHEWAN GEOLOGICAL SURVEY
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Survey Area Parameters:

Traverse line azimuth	N0°E
Traverse line spacing	200 m
Traverse line width	1000 m
Traverse line spacing	1000 m
Aircraft average clearance	68 m
EM transmitter nominal clearance	50 m
Magnetic sensor nominal clearance	38 m
EM receiver nominal clearance	50 m

Electromagnetic System Specifications:

Base frequency	30 Hz
Waveform	Polyphasic
Transmitter pulse width	7 ms
Transmitter area	940 m ²
Transmitter off-time	8.7 ms
Transmitter loop diameter	34.6 m
Transmitter peak current	192 A
Dipole moment (peak)	721 920 Am ² (4 turns)
Transmitter data sampling rate	10 Hz
Receiver	S-component induction coil (Z, X, Y)
Measured response	Voltage (dB/dt)
Digital recording	Z: 4-48 channels X, Y: 20-48 channels
1 st off-time Z channel	Channel 4 at ~0.021 ms after pulse turn off
Tx-Rx configuration	In-loop configuration

