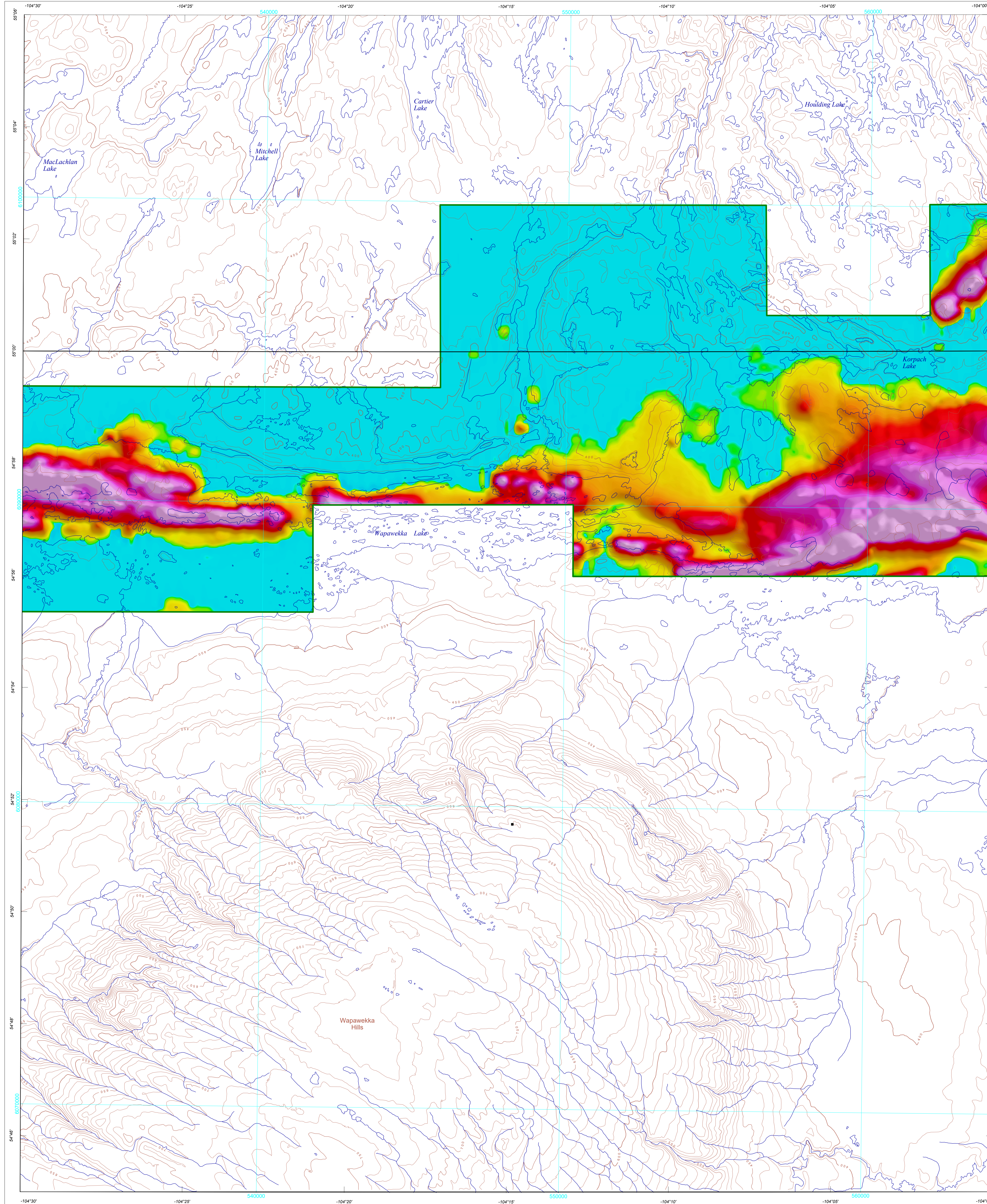




APPARENT CONDUCTIVITY - LATE CHANNELS 31 to 46 (1.010 - 8.083 ms)



Technical Information

This map was compiled from data acquired during an airborne electromagnetic survey carried out by Geotech Canada Inc. utilizing Geoscan's 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 carried out between December 15, 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 Leica Novatel 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 radio height was recorded ten times per second using a TRK3000 altimeter. The magnetic data were recorded 10 times per second using a Geometrics G-822A cesium magnetometer installed at a fixed 7 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 400-turn, 940 m² horizontal loop mounted approximately 48 m below and 6 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 102 Hz with a sine 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-pass 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 - 0.880 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 Z channels 4 to 14 (0.021 - 0.096 ms), middle channels 15 to 30 (0.110 - 0.880 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 conductivity 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 as a mean GRS altitude (472 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 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 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

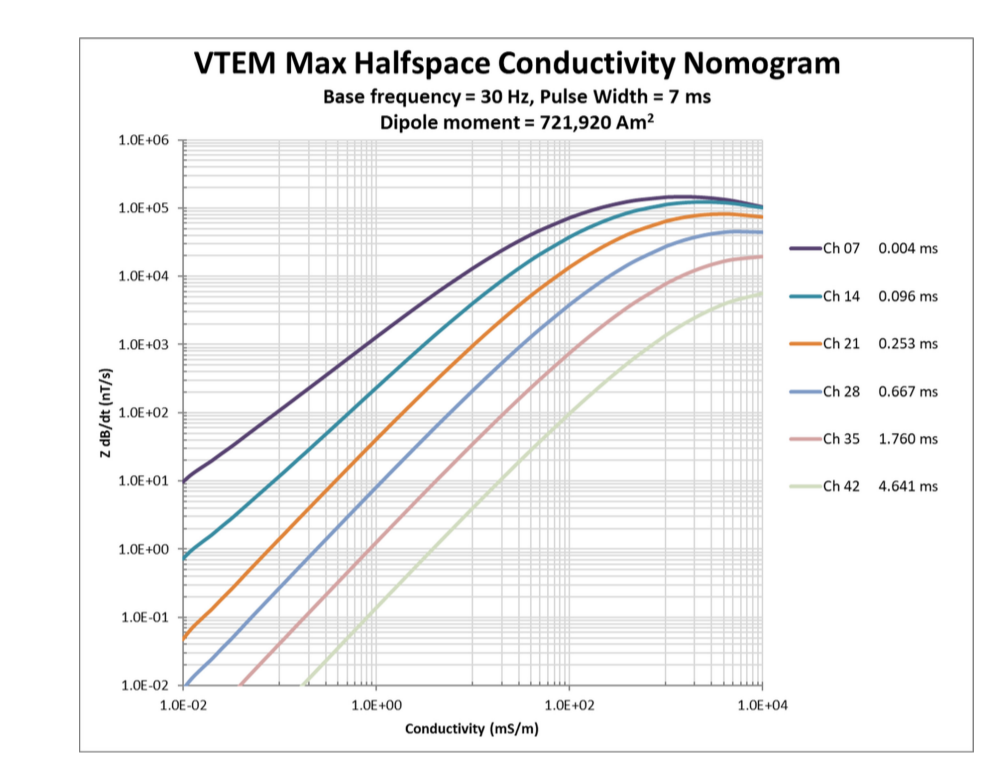
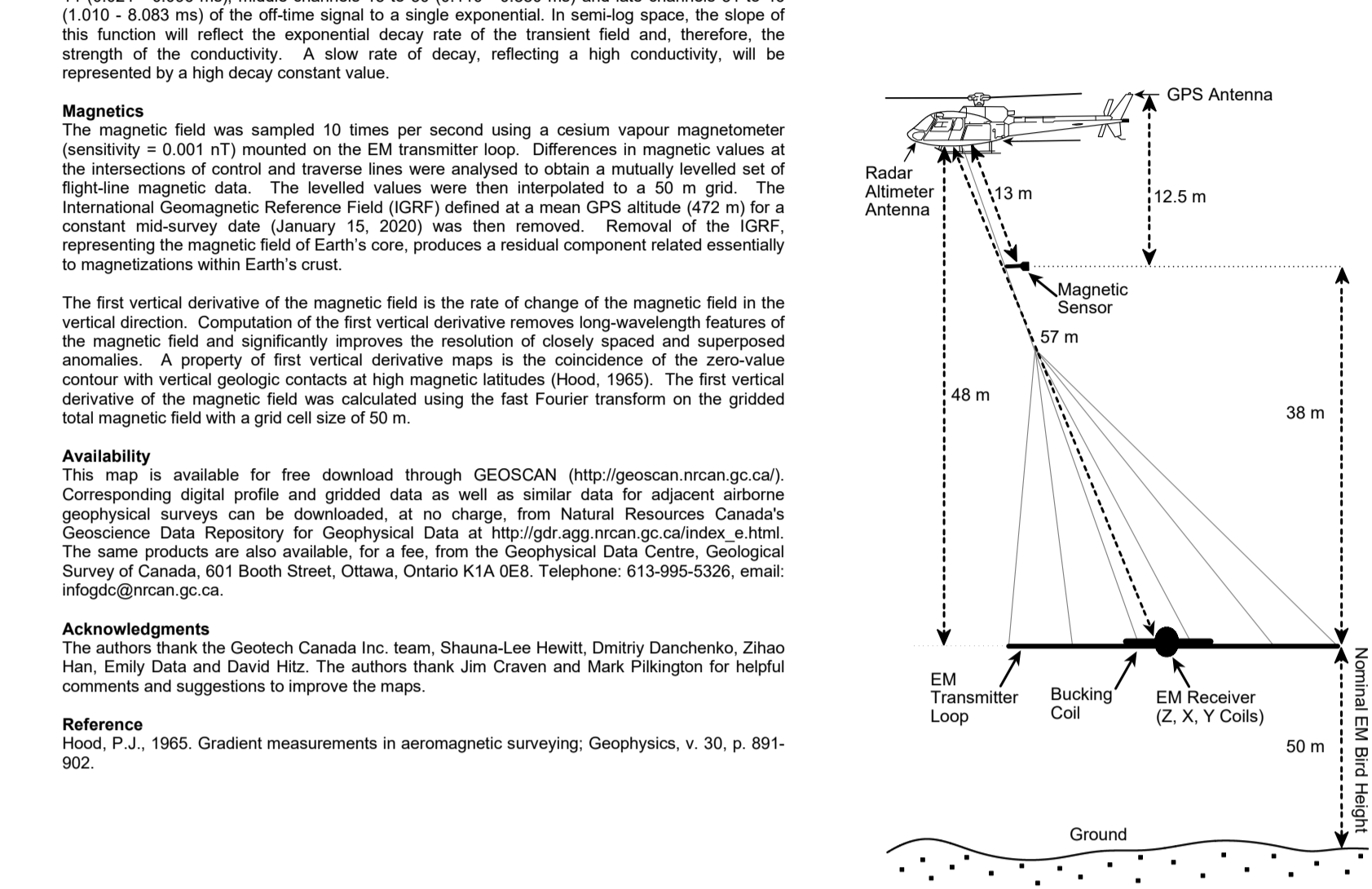
This map is available for free download through GEOSCAN (<http://geoscan.nrcan.gc.ca/>). Corresponding digital profile and gridded data as well as similar data for adjacent airborne geophysical surveys can be downloaded, at no charge, from Natural Resources Canada's Geospatial Data Repository for Geophysical Data at http://gpr.geoscan.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@geoscan.gc.ca

Acknowledgments

The authors thank the Geotech Canada Inc. team, Shauna-Lee Hewitt, Dmitry Danosheko, Zhao Hui, Emily Data and David Fitz. The authors thank Jim Crayon and Mark Pilkington for helpful comments and suggestions to improve the maps.

Reference

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



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

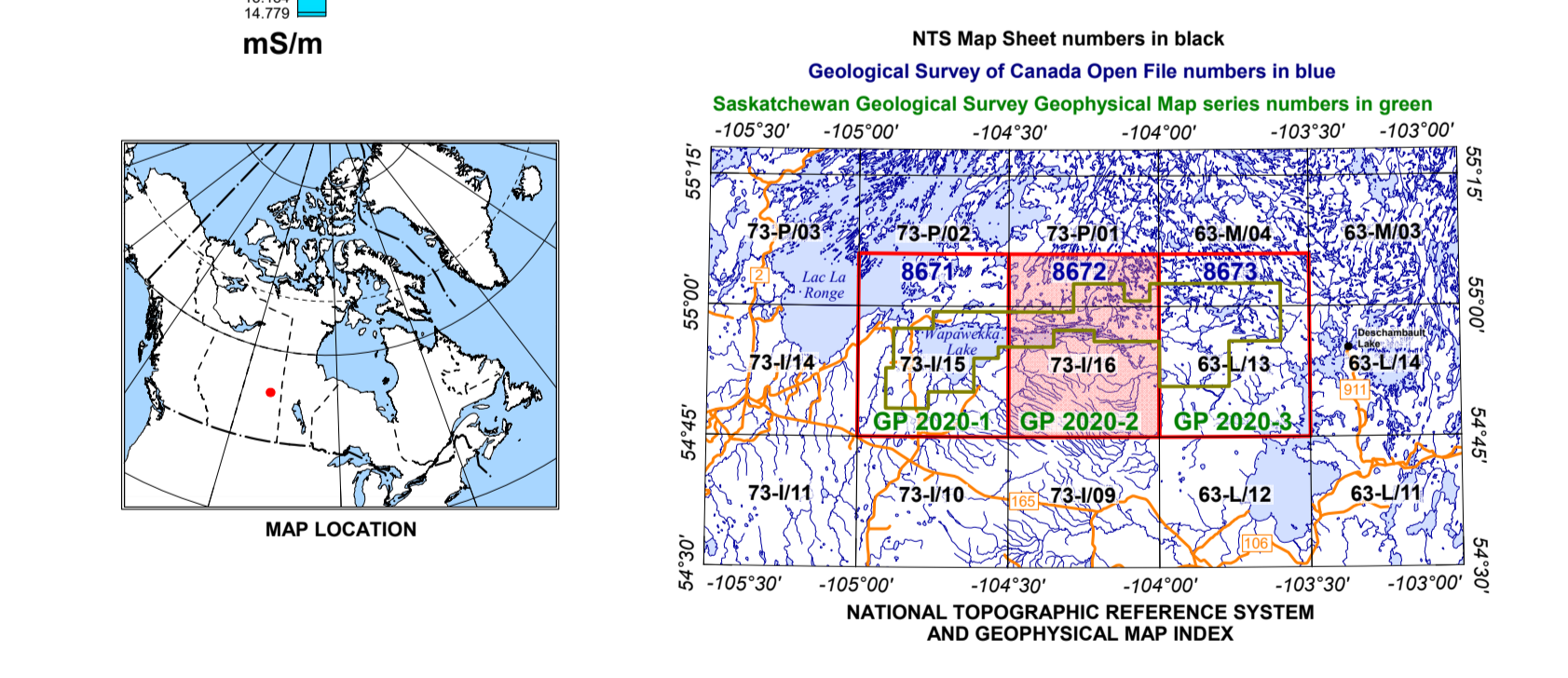
Authors: O. Boulanger, F. Kiss, R. Fortin and O. Mahmoudi

Data acquisition and data compilation by Geotech Limited, Aurora, Ontario

Contract and project management by the Geological Survey of Canada, Ottawa, Ontario

Digital cartography by D. Oneschuk, Geological Survey of Canada

Permanent link: <https://doi.org/10.4095/326711>



Geological Survey of Canada Open File 8672
 SASKATCHEWAN GEOLOGICAL SURVEY GEOPHYSICAL MAP GP 2020-2
ELECTROMAGNETIC SURVEY OF THE SOUTHERN GLENNIE AREA
 SASKATCHEWAN
 Parts of NTS 73-1/16 and NTS 73-P/01

APPARENT CONDUCTIVITY - LATE CHANNELS 31 to 46 (1.010 - 8.083 ms)
 Scale 1:50 000

Scale 1:50 000
 0 1 2 3 4 5 6 7 8 9 10
 Kilometres
 NGS 84 UTM zone 13N
 Universal Transverse Mercator Projection
 World Geodetic System 1984

© Her Majesty the Queen in Right of Canada, as represented by the Minister of Natural Resources, 2020
 Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications
 Elevations in metres above sea level

OPEN FILE / DOSSIER PUBLIC
8672
 GEOLOGICAL SURVEY OF CANADA
 COMMISSION GÉOLOGIQUE DU CANADA
 2020

Publications in this series have not been edited; they are released as submitted by the author.
 Les publications de cette série ne sont pas révisées; elles sont publiées telles que soumises par l'auteur.

GEOPHYSICAL MAP
CARTE GÉOPHYSIQUE
GP 2020-2
 SASKATCHEWAN GEOLOGICAL SURVEY
 COMMISSION GÉOLOGIQUE DE LA SASKATCHEWAN
 2020

Sheet 6 of 9 / Feuille 6 de 9