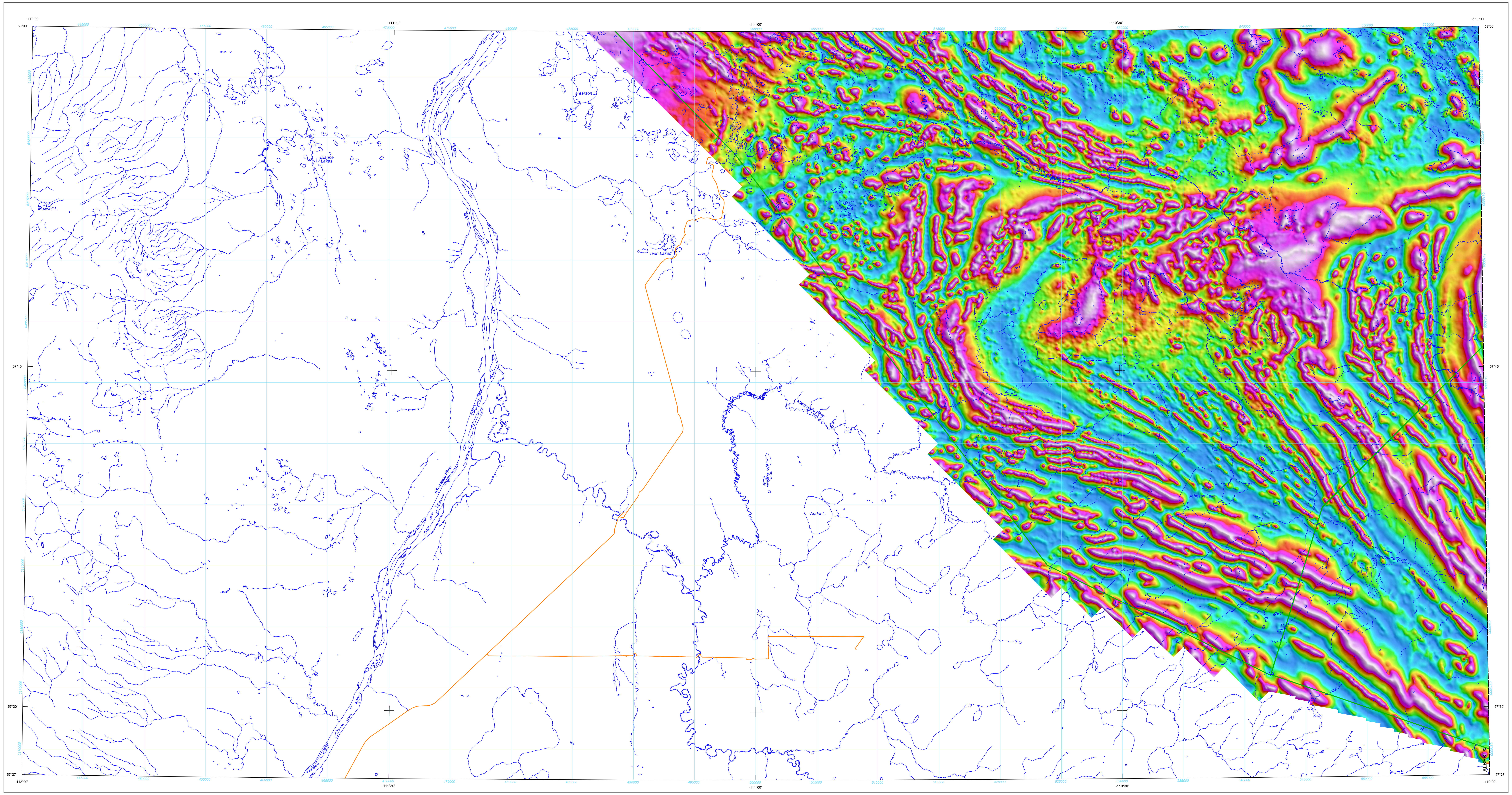
Natural Resources Canada / Ressources naturelles Canada
TILT ANGLE OF THE MAGNETIC FIELD
Celebrating 175 yrs
Alberta Energy Regulator
AGS ALBERTA GEOLOGICAL SURVEY



Tilt Angle of the Magnetic Field

This map of the tilt angle of the magnetic field was derived from data acquired during an aeromagnetic survey carried out by Geo Data Solutions (GDS) Inc. from March 1, 2017 to April 2, 2017. The survey area consists of three adjoining survey blocks, A, B and C. Published data (Buckle et al., 2009) originating from a survey flown by Fugro Airborne Surveys Corp. supplements the new survey data in block C. Data from all survey blocks were recorded using split-beam cesium vapour magnetometers (sensitivity = 0.005 nT) mounted in each of the tail booms of two GDS Piper Navajo and a Cessna Titan 404 aircraft operated by Fugro Airborne Surveys Corp.

Survey project specifications

	Block A	Block B	Block C	Block C (in-fill)
Survey year	2017	2017	2009	2017
Aircraft registration	C-FQQB C-FVTL	C-FQQB C-FVTL	C-FYAU	C-FQQB C-FVTL
Flight height	Drape, 100 m	Drape, 100 m	Drape, 125 m	Drape, 100 m
Line spacing	250 m	250 m	400 m	400 m
Line direction	45° / 225°	100° / 280°	100° / 280°	100° / 280°
Tie line spacing	1200 m	1200 m	2400 m	2400 m
Tie line direction	135° / 315°	10° /190°	10° /190°	10° /190°

In block C, the in-fill flight lines and tie lines for the current 2017 survey were offset to provide the denser coverage of 200 m line and 1200 m tie line spacing when combined with the 2009 survey.

The flight path was recovered following post-flight differential corrections to the raw Global Positioning System (GPS) data. The survey blocks were flown on a pre-determined flight drape surface to minimize differences in magnetic values at the intersections of tie lines and traverse lines. The drape surface for the 2009 survey in block C was lowered and the magnetic data were downward continued to the new surface level of the 2017 survey drape surface before these intersection differences were computer-analysed to obtain a mutually levelled set of flight line magnetic data. The levelled values were then interpolated to a 62.5 m grid. The International Geomagnetic Reference Field (IGRF) defined at the average GPS altitude of 534 m for the current mid-survey date of 2017/03/17 was then removed. Removal of the IGRF, representing the magnetic field of the Earth's core, produces a residual component related almost entirely to magnetizations within the Earth's crust.

The tilt angle of the magnetic field (Miller and Singh, 1994) is the arctangent of the ratio of the vertical derivative of the magnetic field over the magnitude of the horizontal derivative of the magnetic field. The amplitude is restricted to $-\pi/2$ to $\pi/2$ radians, is generally positive over a magnetic source, negative outside the source and is zero at or near the source edge for vertical contacts (Figure 1). The tilt effectively equalizes amplitudes of the magnetic field so weak and strong magnetic anomalies have a similar appearance (Figure 1 – middle panel).

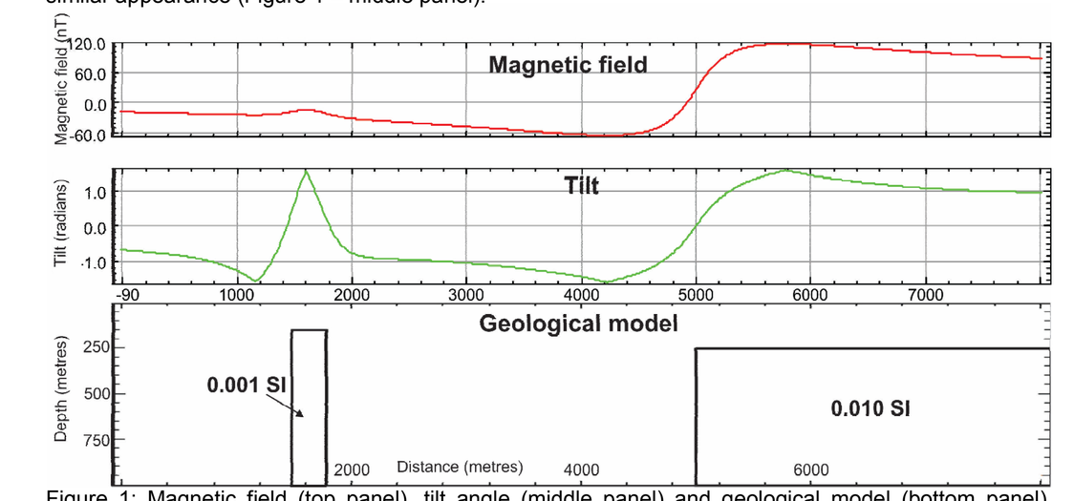


Figure 1: Magnetic field (top panel), tilt angle (middle panel) and geological model (bottom panel). Magnetic susceptibility is labelled and bodies are magnetized in a vertical field.

This publication 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 are available from Natural Resources Canada's Geoscience Data Repository at http://gdr.agg.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. email: infogdc@agg.nrcan.gc.ca.

Digital versions of this map, as well as corresponding digital profile and gridded data, may also be downloaded free of charge from the Alberta Geological Survey website: http://www.ags.aer.ca.

Acknowledgements

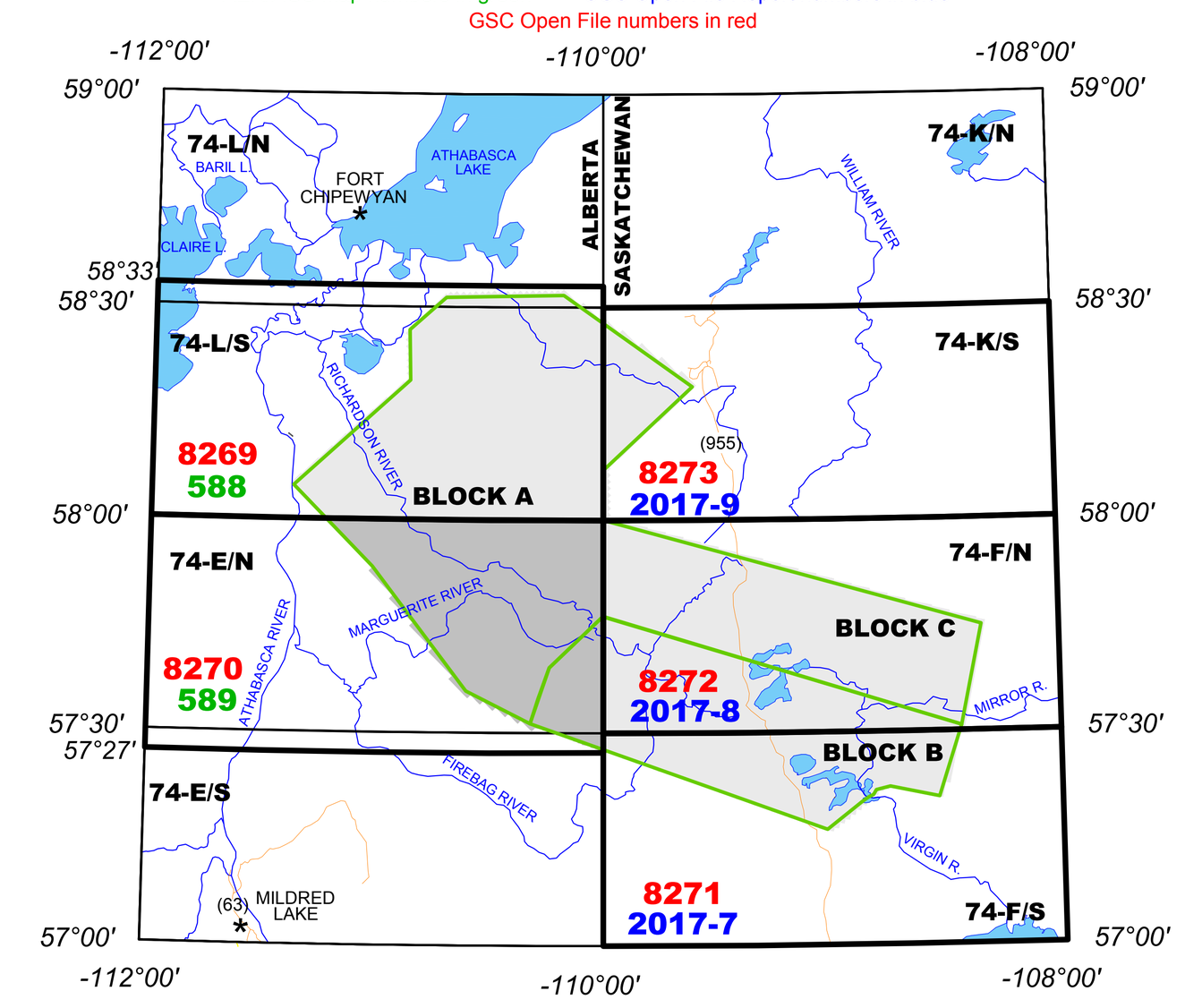
The authors thank G. Delaney at the Saskatchewan Geological Survey, and D. Pana and N. Atkinson at the Alberta Geological Survey for their feedback on the original survey bounds and support of the project. Thanks also to the field crew chief, Carlos Cortada at Geo Data Solutions GDS Inc. for his cooperation during the GSC field inspection visit as well as Albert Sayegh for his cartographic design expertise.

References

Buckle, J. L., Coyle, M., Carson, J. M., Harvey, B. J. A. and Delaney, G., 2009. Geophysical Series, Southern Athabasca Basin Geophysical Survey, Saskatchewan, parts of NTS 74-F and 74-E; Geological Survey of Canada, Open File 6017; Saskatchewan Ministry of the Economy, Open File 2009-1, scale 1:250 000. https://doi.org/10.4095/247355

Miller, H.G. and Singh, V., 1994. Potential field tilt – a new concept for location of potential field sources; Journal of Applied Geophysics, v. 32, p. 213-217.

AER/AGS Map numbers in green. SGS Open File Report numbers in blue. GSC Open File numbers in red.



NATIONAL TOPOGRAPHIC SYSTEM REFERENCE AND GEOPHYSICAL MAP INDEX

GEOLOGICAL SURVEY OF CANADA OPEN FILE 8270
ALBERTA GEOLOGICAL SURVEY MAP 589

TILT ANGLE OF THE MAGNETIC FIELD

AEROMAGNETIC SURVEY OF THE MARGUERITE RIVER AREA

ALBERTA
Parts of NTS 74-E North and 74-E South

Scale 1:100 000
2000 0 2000 4000 6000
(metres)
NAD83(CSRS) / UTM zone 12N

Universal Transverse Mercator Projection
North American Datum,1983

Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications

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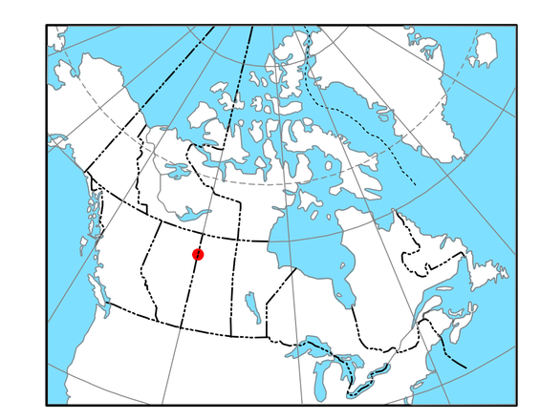
Contract and project management by the Geological Survey of Canada, Ottawa, Ontario.
Cartographic design by A. Sayegh.

Permanent link: https://doi.org/10.4095/302757

This aeromagnetic survey and the production of this map were funded by phase 5 of the Targeted Geoscience Initiative (TGI-5) program of the Lands and Minerals Sector, Natural Resources Canada.



MAP LOCATION

AEROMAGNETIC SURVEY OF THE MARGUERITE RIVER AREA

OPEN FILE
DOSSIER PUBLIC
8270
GEOLOGICAL SURVEY OF CANADA
COMMISSION GÉOLOGIQUE DU CANADA
2017

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AER/AGS MAP
589
ALBERTA ENERGY REGULATOR/
ALBERTA GEOLOGICAL SURVEY
2017

Recommended citation
Kiss, F. and Tschirhart, V., 2017.
Tilt Angle of the Magnetic Field,
Aeromagnetic Survey of the Marguerite River Area,
Alberta, Parts of NTS 74-E North and 74-E South;
Geological Survey of Canada, Open File 8270;
Alberta Energy Regulator, AER/AGS Map 589,
scale 1:100 000. https://doi.org/10.4095/302757

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