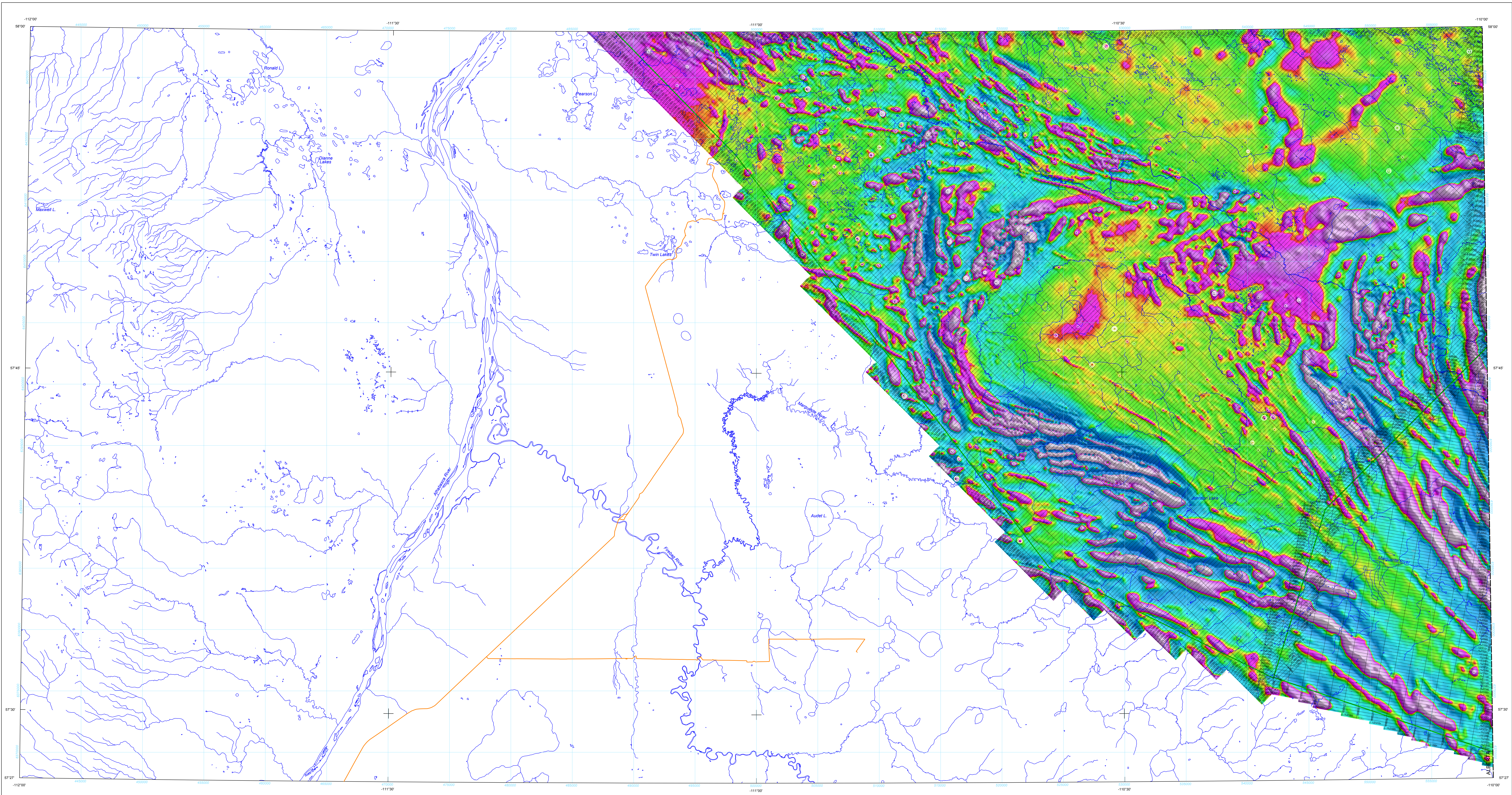




First Vertical Derivative of the Magnetic Field

This map of the first vertical derivative of the magnetic field was derived primarily from data acquired during an aeromagnetic survey carried out by Geo Data Solutions GDS Inc. from August 1, 2017 to April 2, 2017. The survey area consists of three adjoining survey blocks, A, B and C. Published data (Buckle et al., 2005) 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 F4U Navajo and a Cessna 441 aircraft operated by Fugro Airborne Surveys Corp.

Survey project specifications

	Block A	Block B	Block C	Block C (n-RR)
Survey year	2017	2017	2009	2017
Aircraft registration	C-PAFV	C-PAFV	C-PAFV	C-PAFV
Flight height	C-PVTL	C-PVTL	C-PVTL	C-PVTL
Drags	100 m	100 m	100 m	100 m
Line spacing	200 m	200 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 n-RR flight lines and tie lines for the current 2017 survey were offset to provide the same 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 drage surface to remove differences in magnetic values at the intersections of tie lines and traverse lines. The drage surface for the 2009 survey in block C was lowered and the magnetic data were down and corrected to the new surface level of the 2017 survey drage surface before these intersection differences were compensated to obtain a mutually matched set of flight line magnetic data. The residual values were then interpolated to a 62.5 m grid. The International Geomagnetic Reference Field (IGRF) defined at the average GPS altitude of 62 m for the current tie 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 values almost entirely in magnetization within the 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 contacts at high magnetic latitudes (Hood, 1965).

Keating Correlation Coefficients

Possible keratite targets have been identified from the first vertical derivative of the magnetic field 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 the anomaly due to a vertical cylinder model (Table 1) and the gridded magnetic data. Only the results where the absolute value of the correlation coefficient is above 0.75 were retained.

The results are depicted as circular symbols to reflect the correlation value. The most favorable targets are those that exhibit a higher correlation coefficient to the vertical cylinder model (Table 1). Correlation coefficients with a negative value correspond to reversed magnetized sources. It is important to be aware that other magnetic sources may correlate with the vertical cylinder models, whereas some keratite targets of irregular geometry or insufficient diameter may not.

Cylinder radius	75 m
Cylinder length	75 m
Height of cylinder	26000 m (approx. 147 ft)
Magnetic inclination	70°N
Magnetic declination	13°E
Vertical offset	15.7 m

Table 1: Parameters for vertical cylinder model anomaly.

This publication is available for free download through GEOCAN (<https://open.canada.ca/en/geoscan>). Corresponding digital profile and gridded data as well as aerial data for adjacent airborne geophysical surveys are available from Natural Resources Canada's Geoscience Data Repository at <https://open.canada.ca/en/geoscan>. 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) 995-3236, email: geoscan@nrc.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: <https://www.agr.alberta.ca/>.

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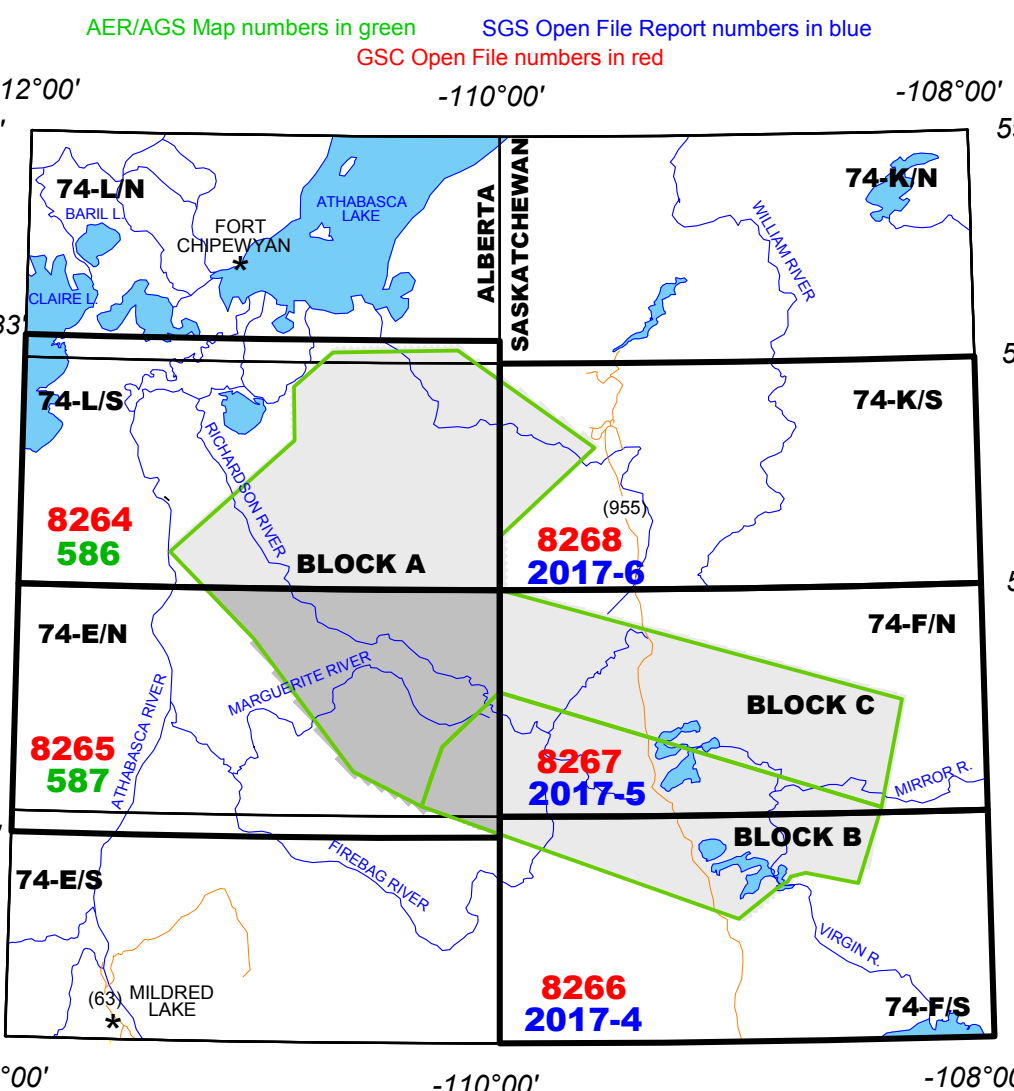
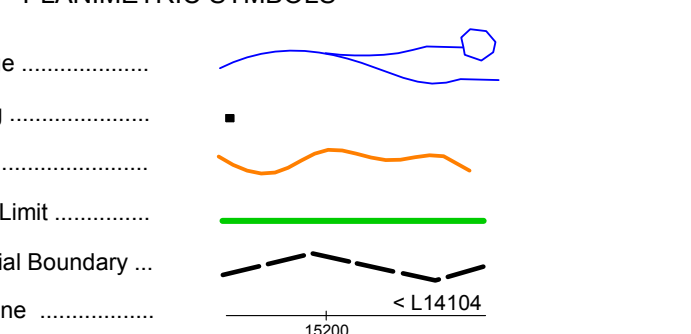
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KEATING COEFFICIENTS



PLANIMETRIC SYMBOLS

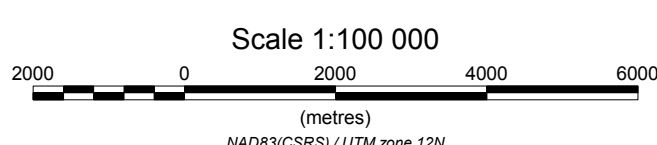


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ALBERTA GEOLOGICAL SURVEY MAP 587

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

AEROMAGNETIC SURVEY OF THE MARGUERITE RIVER AREA

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



Universal Transverse Mercator Projection
North American Datum 1983

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

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