

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 Services Corp. supplements the new survey data in block C. Data from all survey blocks were recorded using split-beam cesium vapour magnetometers (operating at 0.005 mT) mounted in each of the tail booms of the GDS Piper Navajo and a Cessna Twin 450 aircraft operated by Fugro Airborne Services Corp.

Survey project specifications

	Block A	Block B	Block C	Block C (in-fill)
Survey year	2017	2017	2009	2017
Aircraft	C-PTVL	C-PTVL	C-PTVL	C-PTVL
Registration	C-PTVL	C-PTVL	C-PTVL	C-PTVL
Flight height	100 m	100 m	100 m	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 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 design surface to minimize differences in magnetic values at the intersections of tie lines and traverse lines. The design 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 design surface before these intersection differences were computed. Anomalous magnetic values were then interpolated to a 62.5 m grid. The International Geomagnetic Reference Field (IGRF) defined at the average GPS altitude of 234 m for the current 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, 1954) 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 -23 to 23 degrees, 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).

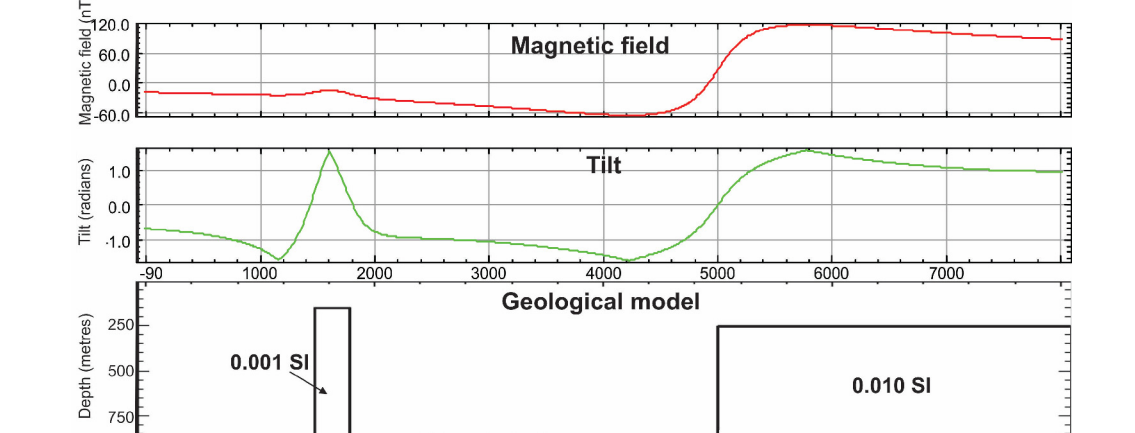
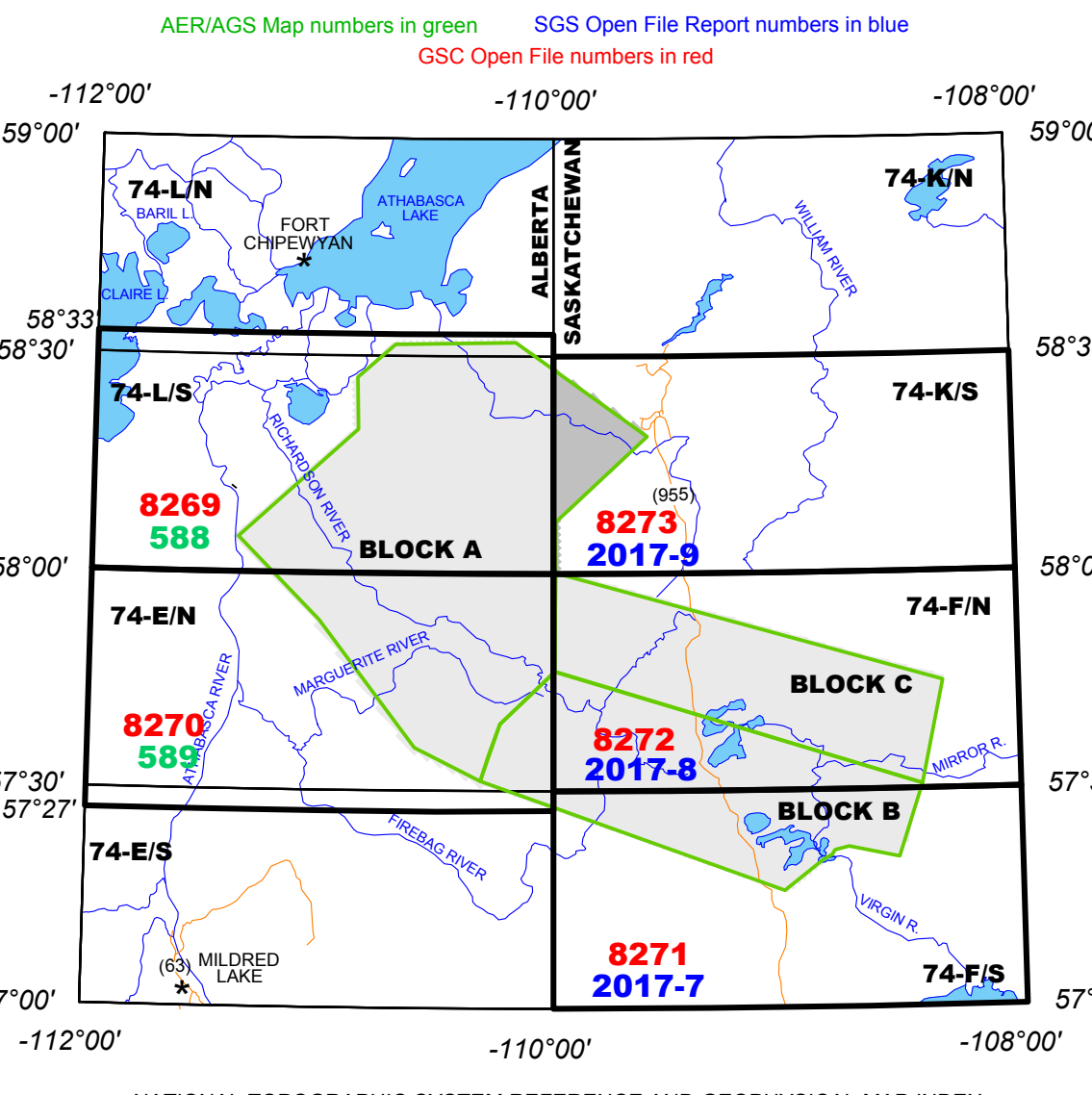
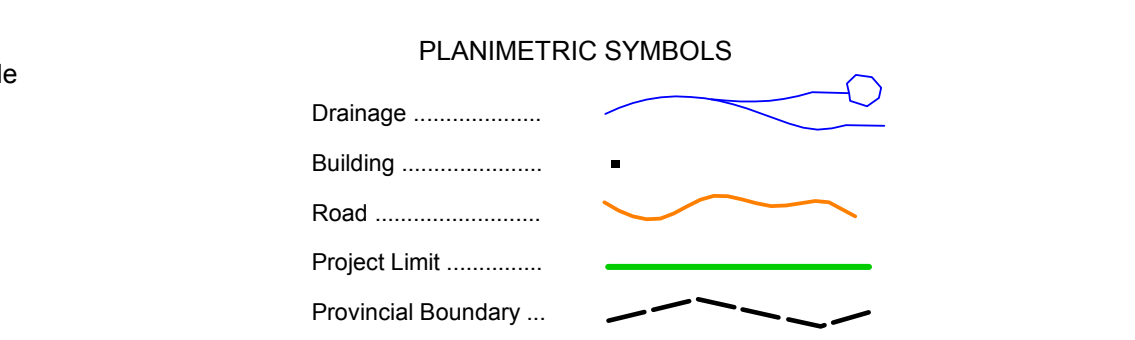


Figure 1. Magnetic field (top panel), tilt angle (middle panel) and geological model (bottom panel). Magnetic susceptibility is labelled and bodies are magnetized in a vertical field.

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References
Buckle, J. L., Coyle, M., Carson, J. M., Harvey, B. J. A. and Delaney, G., 2009. Geophysical Survey of the Southern Alberta Basin. Geological 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. <http://www.saskatchewan.ca/geoscan>.
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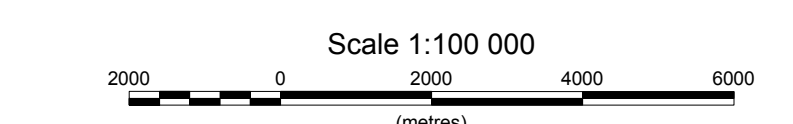


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SASKATCHEWAN GEOLOGICAL SURVEY OPEN FILE REPORT 2017-9

TILT ANGLE OF THE MAGNETIC FIELD

AEROMAGNETIC SURVEY OF THE MARGUERITE RIVER AREA

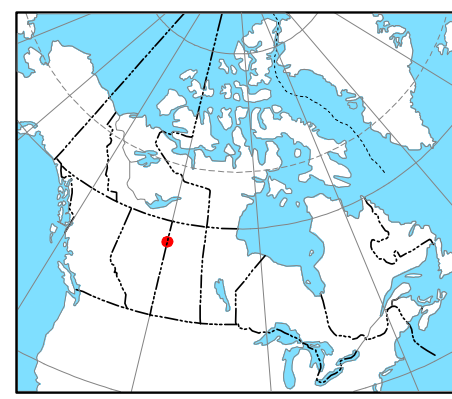
SASKATCHEWAN
Part of NTS 74-K South



Universal Transverse Mercator Projection
North American Datum, 1983
© Her Majesty the Queen in Right of Canada, as represented by the Minister of Natural Resources, 2017
Base map at the scale of 1:50 000 from Natural Resources Canada, with modifications

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