

**AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER AREA,
ALASKA**

Emond, A.M., Graham, G.R.C., Drenth, B.J., Jones, J.V.III., and EON Geosciences Inc.

Geophysical Report 2019-1

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STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS



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<http://doi.org/10.14509/29737>



AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER AREA, ALASKA

Emond, A.M.,¹ Graham, G.R.C.,¹ Drenth, B.J.,² Jones, J.V.III.,³ and EON Geosciences Inc.

ABSTRACT

The Porcupine River fixed wing aeromagnetic geophysical survey is located in eastern Alaska, along the Canadian border, in the Sheenjek and Black mining districts. This survey is located about 135 kilometers east of Fort Yukon, Alaska and about 85 kilometers east of Circle, Alaska. Magnetic data were collected with a Geometrics G-822A cesium-vapor split-beam sensor mounted in a tail stinger. Between May 5th and June 28th, 2017, a total of 50,329 line kilometers were collected covering 13,646.9 square kilometers. Data were collected at a line spacing of 300 meters (m) with a mean ground clearance of 235 m.

PURPOSE

The survey data will be used by USGS, DGGs, and other researchers to better understand the crustal suture between Arctic Alaska and North America. Both the North American and Arctic Alaska successions contain rift- and arc-related volcanic and plutonic rocks associated with substantial mineral endowment farther west in the Brooks Range and to the east in the Selwyn Basin of Yukon Territory. The boundary of the two terranes is inferred to lie in a broad corridor parallel to the Porcupine River near where it crosses the international border. The data will also assist with evaluation of the mineral-resource potential for land-management planning.

SURVEY OVERVIEW DESCRIPTION

This document provides an overview of the survey and includes text and figures of select primary and derivative products of this survey. A table of digital data packages available for download is provided to assist users in data selection. For reference a catalog of the available maps is presented in reduced resolution. Please consult the metadata, project report, and digital data packages for more information and data.

ACKNOWLEDGMENTS

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³ Alaska Science Center, 4210 University Drive, Anchorage, AK 99508

AVAILABLE DATA

Data Type	Provider	Description
ascii_data	contractor	ASCII format line data, other ASCII data
databases_geosoft	contractor	Geosoft format database of line data, other Geosoft format databases
documents	contractor and DGGs	Project and field reports, survey background information, gridded data explanations, other supporting documentation
grids_ermapper	contractor and DGGs	Geographically registered gridded data, ER Mapper ERS format
grids_geosoft	contractor and DGGs	Geosoft-format grids, these grids can be viewed in ESRI ArcMap using a free plugin from Geosoft
images_registered	DGGs	GeoTiff format images of gridded data
kmz	DGGs	keyhole markup language (kml) kmz archive files of project data. Viewable in Google Earth and other compatible programs
maps_pdf_format	contractor	Printable maps in pdf format
vector_data	contractor and DGGs	Line path, data contours, and survey boundary in ESRI shape file (SHP) format, ESRI Geodatabase format, and/or AutoCAD dxf format
video_flightpath	contractor	Survey flight path downward facing video

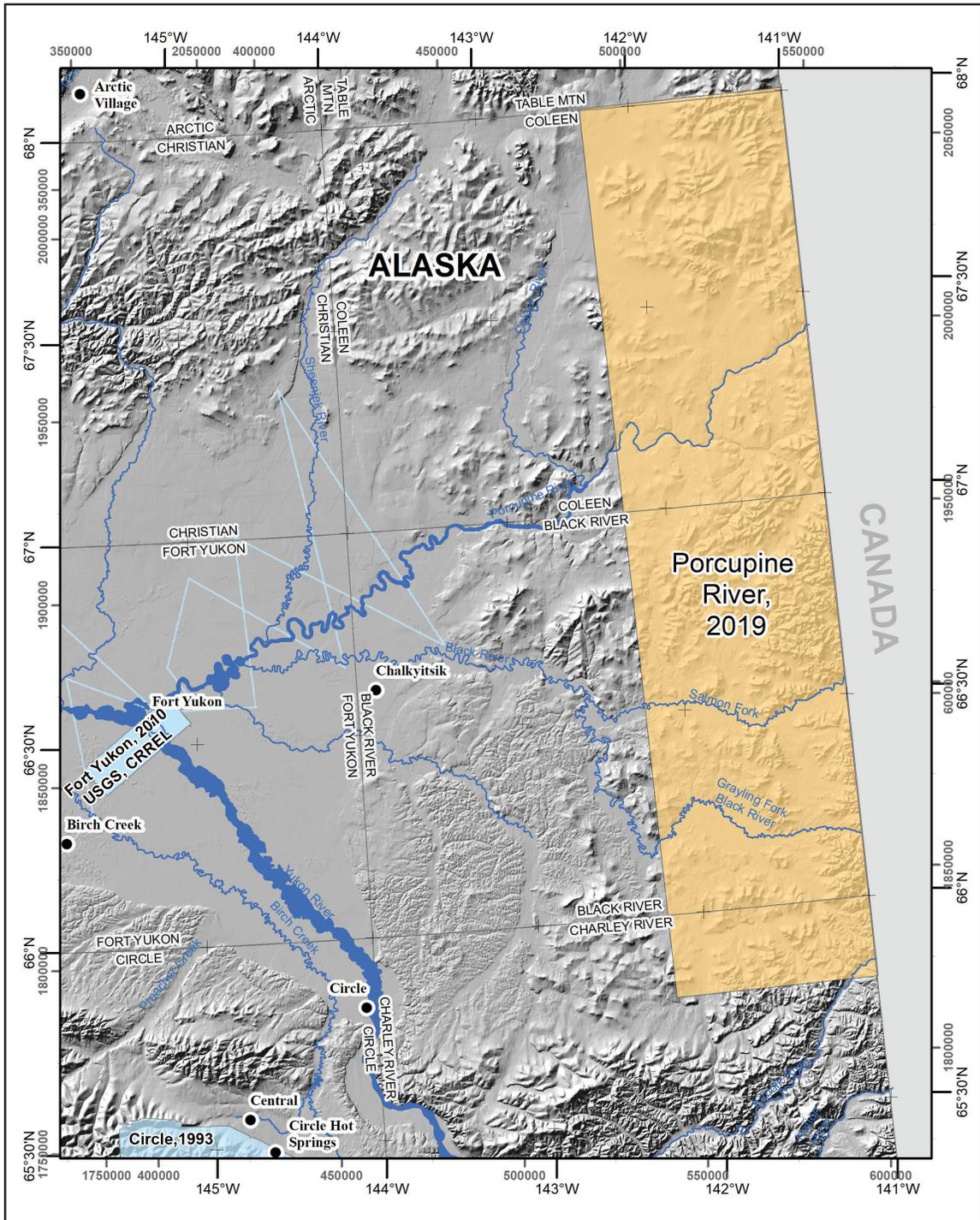


Figure 1. Porcupine River magnetic airborne geophysical survey location shown in north eastern Alaska (right). Porcupine River survey area shown with adjacent DGGs geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, glaciers, and elevation hillshade.



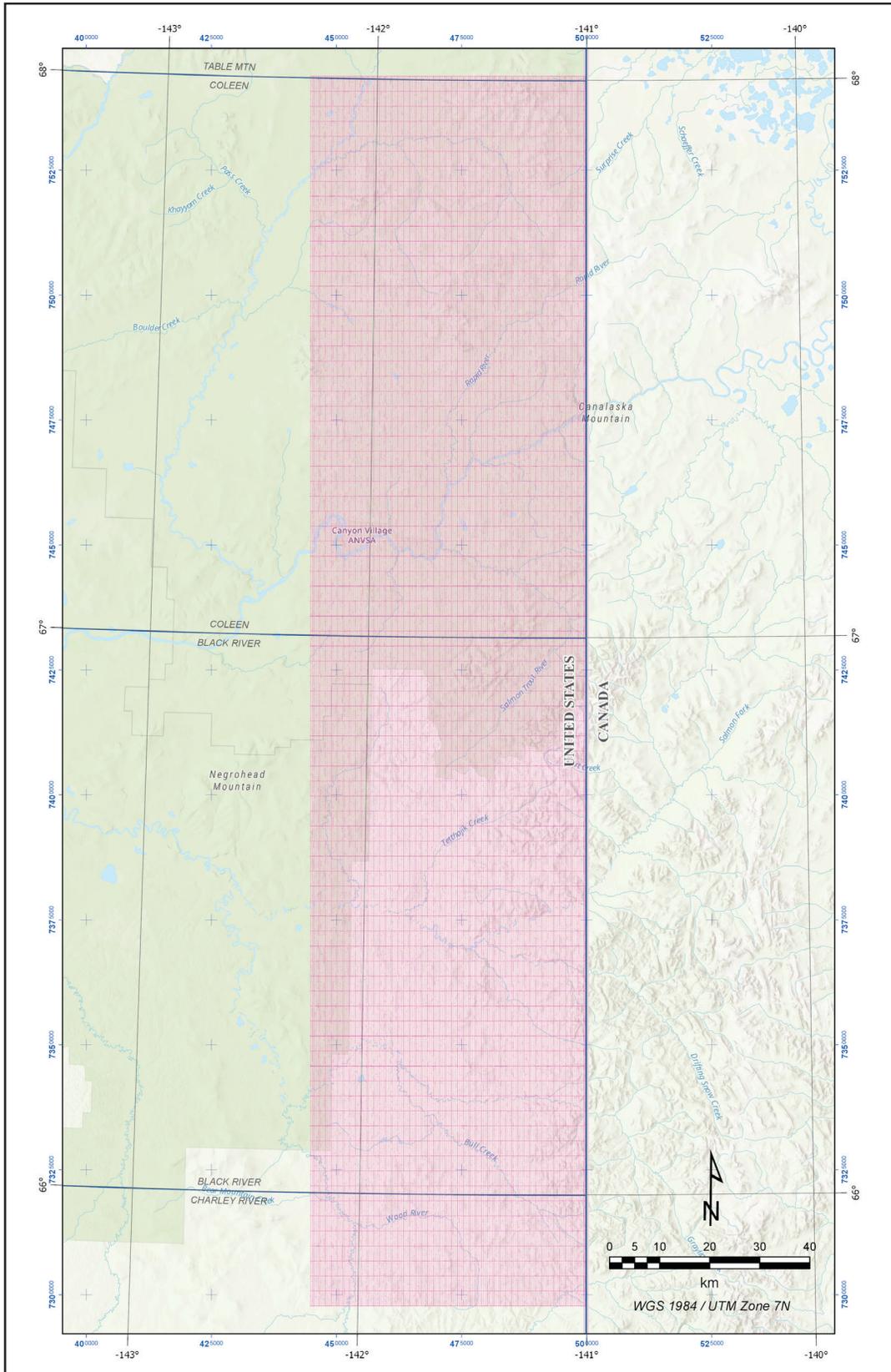


Figure 2. The final flight path was recovered following post-flight differential corrections which improve positioning accuracy to the sub-meter level. Additional onboard equipment included a FreeFlight Systems TRA-3500 radar altimeter, a Vaisala PTB110 barometric altimeter, and a vertically mounted video camera. Ground based systems included two GEM Systems GSM-19W Overhauser magnetometers and a NovAtel DL-V3 GNSS receiver.

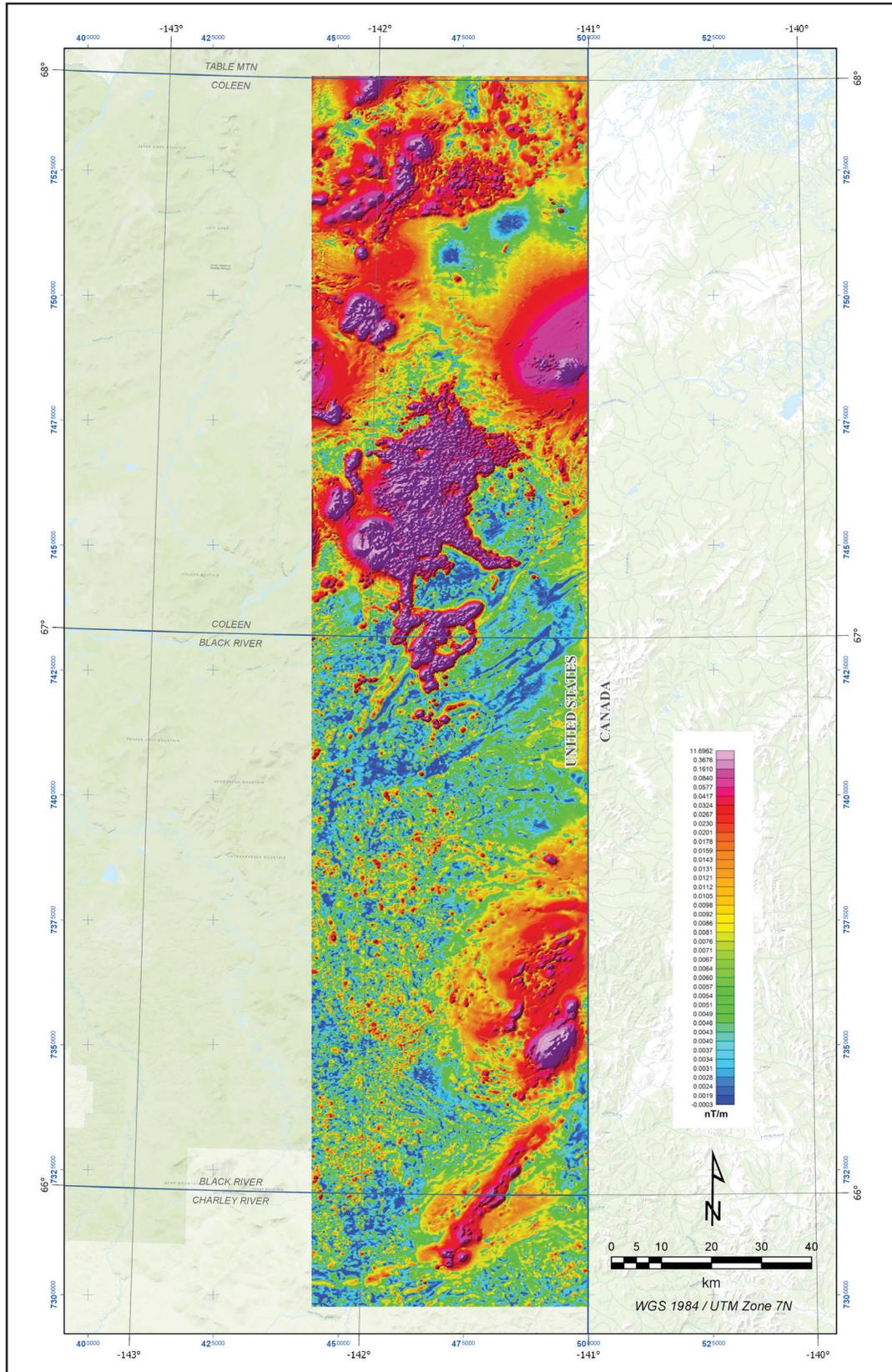


Figure 3. The analytic signal of the magnetic field is the total amplitude of the vector sum of the horizontal and vertical magnetic gradients. Computation of the analytic signal enhances the boundaries of magnetic anomalies and is independent of direction of magnetization. The data presented here were calculated from the residual magnetic intensity grid by: (1) computation of the total magnitude of the components obtained from the application of horizontal and FFT-based vertical derivative transfer functions, and (2) sampling this initial grid back into the line database and re-gridding the sampled data in order to attenuate the artefacts generated between traverse lines during gridding and FFT computations.

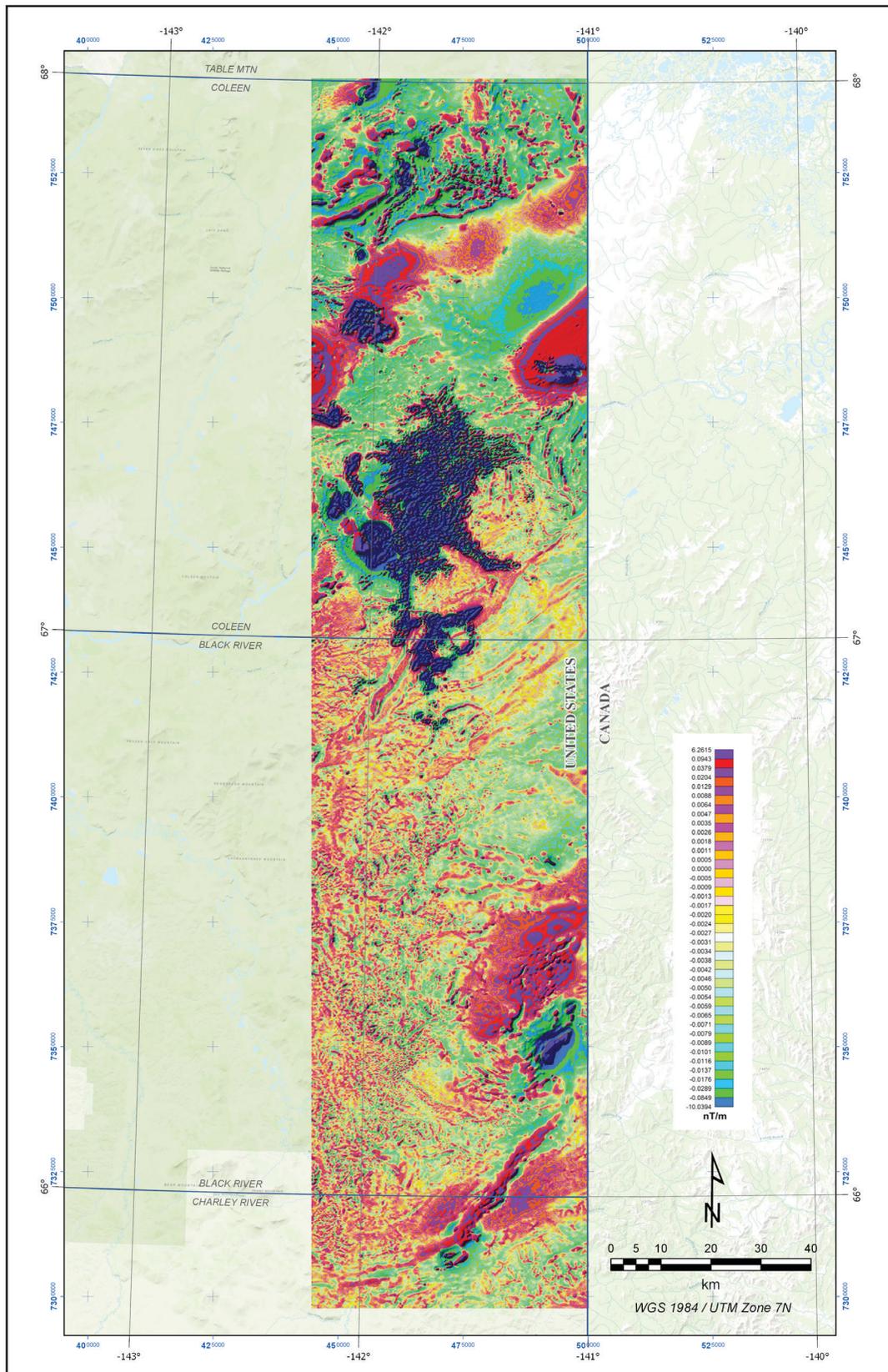


Figure 4. The first vertical derivative of the magnetic field is the rate of change of the magnetic field in the vertical direction. Computation of the first vertical derivative enhances shorter wavelength features and improves resolutions of closely spaced and superimposed anomalies. The data presented here were calculated from the residual magnetic intensity grid by (1) application of an FFT-based vertical derivative transfer function and (2) sampling this initial grid back into the line database and re-gridding the sampled data in order to attenuate the artefacts generated between traverse lines during gridding and FFT computations.

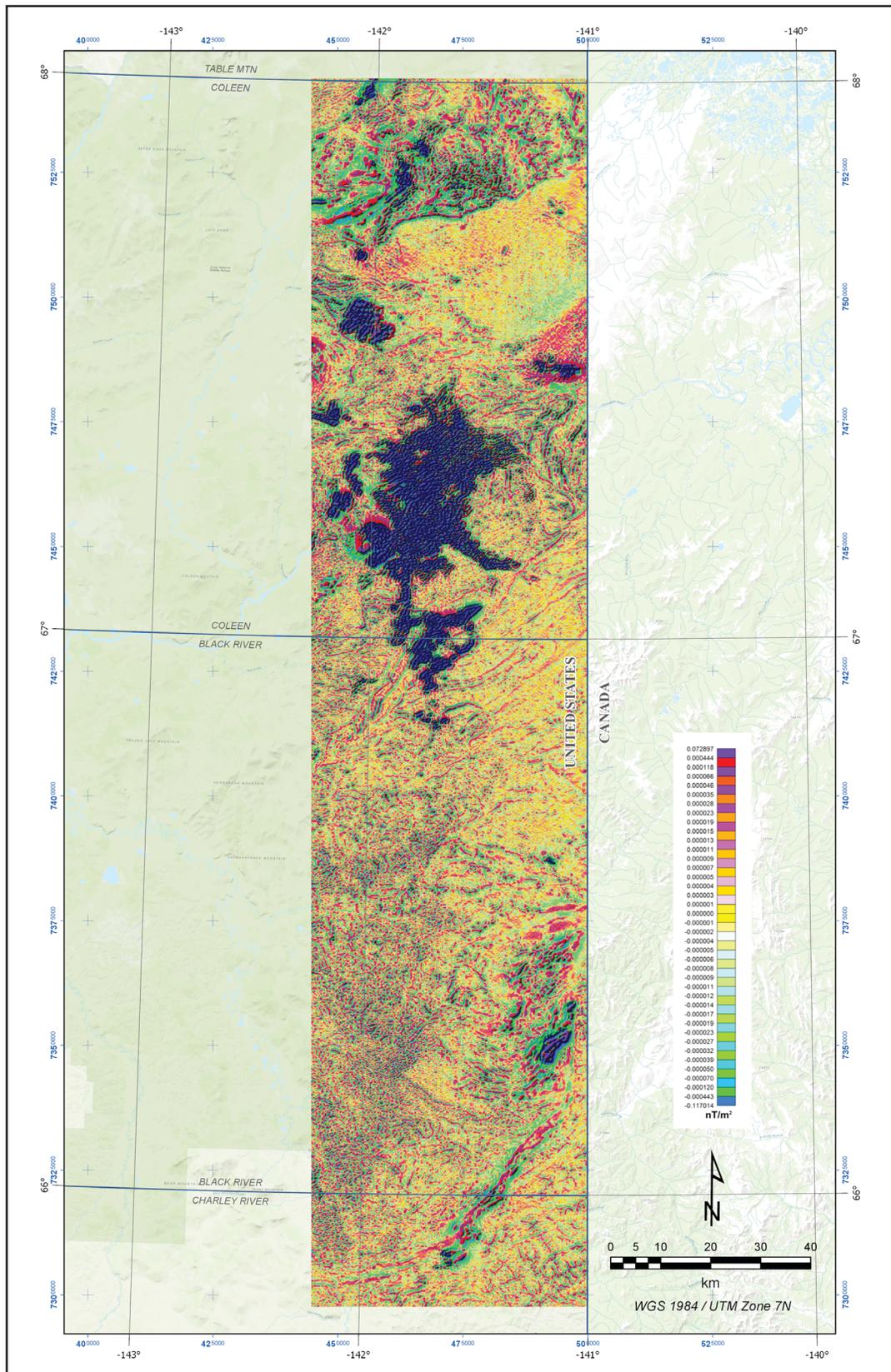


Figure 5. The second vertical derivative of the magnetic field is the curvature of the magnetic field with respect to the vertical direction. Computation of the second vertical derivative enhances shorter wavelength features and improves resolutions of closely spaced and superimposed anomalies. The data presented here were calculated from the residual magnetic intensity grid by (1) application of an FFT-based vertical derivative transfer function and (2) sampling this initial grid back into the line database and re-gridding the sampled data in order to attenuate the artefacts generated between traverse lines during gridding and FFT computations.

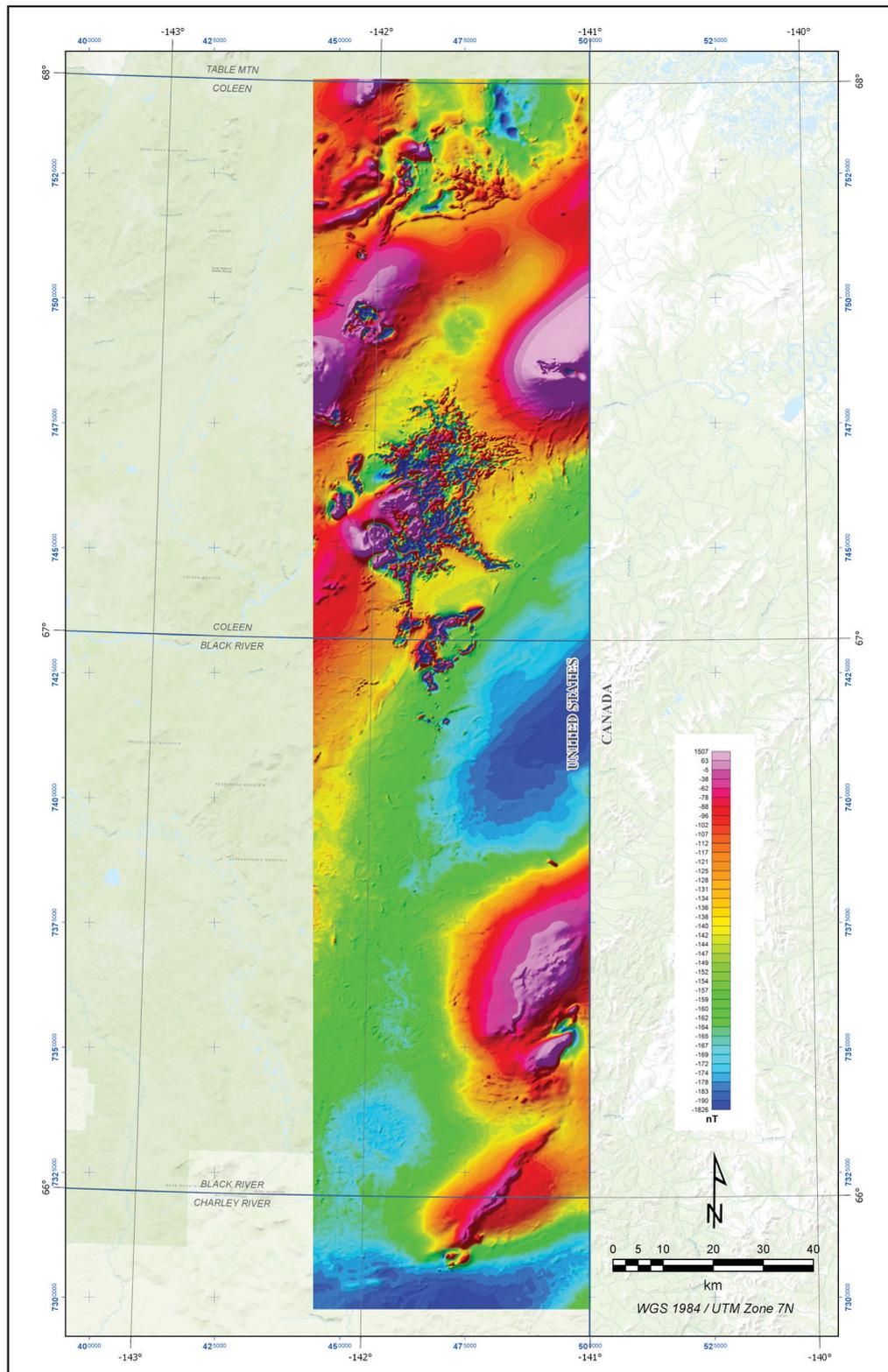


Figure 6. The residual magnetic field represents the component of the total magnetic field related almost entirely to the magnetic properties of the Earth's crust. The data presented here were derived from the recorded data by: (1) application of a lag to compensate for system latency, (2) correction against discrete spikes and high-frequency residual compensation noise, (3) application of a height correction derived from the International Geomagnetic Reference Field (IGRF) computed for flight and drape surfaces, (4) application of a diurnal correction derived from the magnetic base station data, (5) analysis of the remaining differences between the traverse and control line values at the intersection points to obtain a correction profile that results in mutually levelled line data, (6) application of a micro-leveling correction to further reduce residual noise, and (7) removal of the IGRF values defined at the average mean sea-level height of 690.0 m for a fixed date of June 1st 2017 to obtain the residual magnetic intensity. The final residual magnetic field was then gridded at a cell size of 60 m, using data from the traverse lines only.

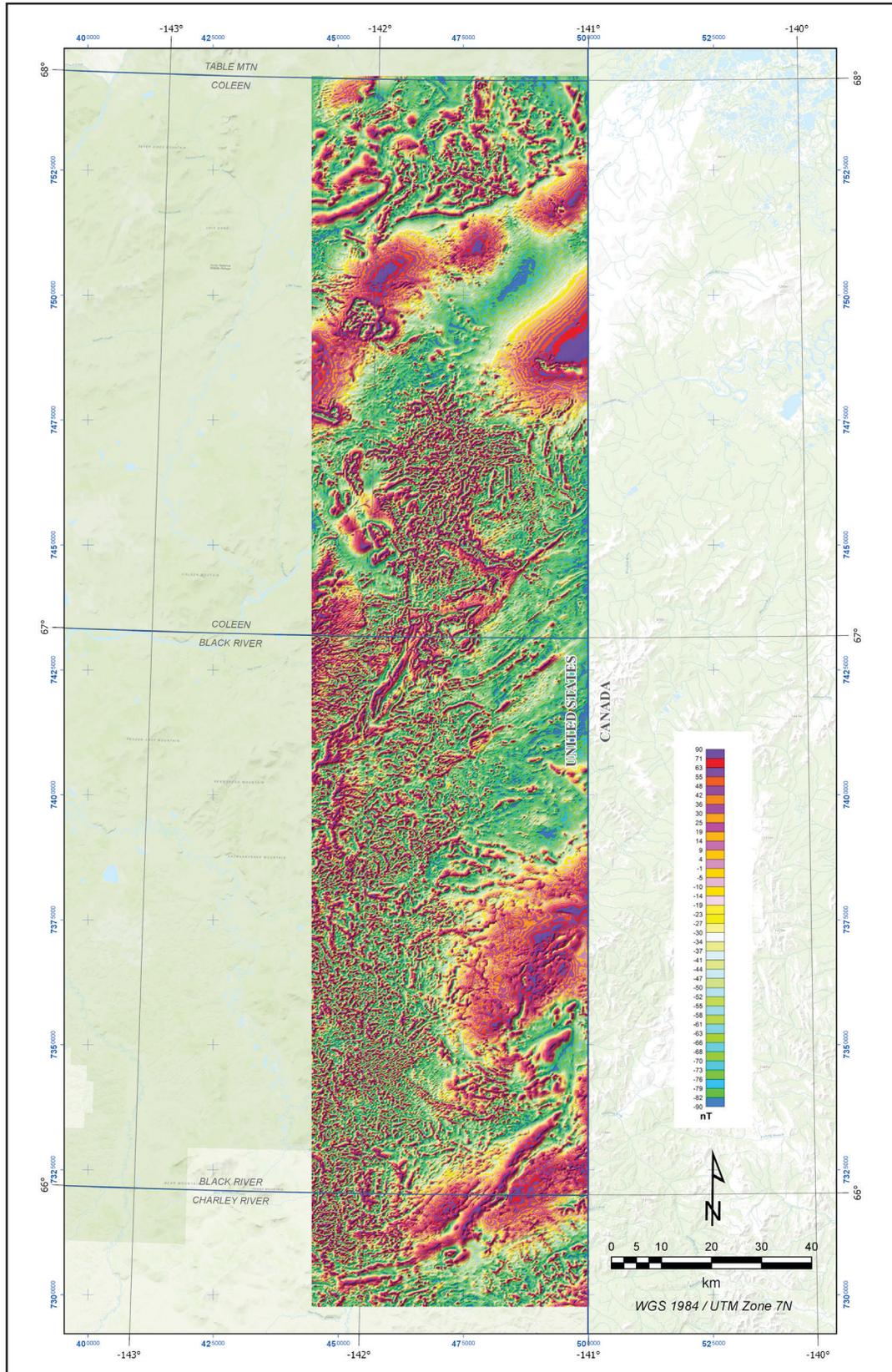
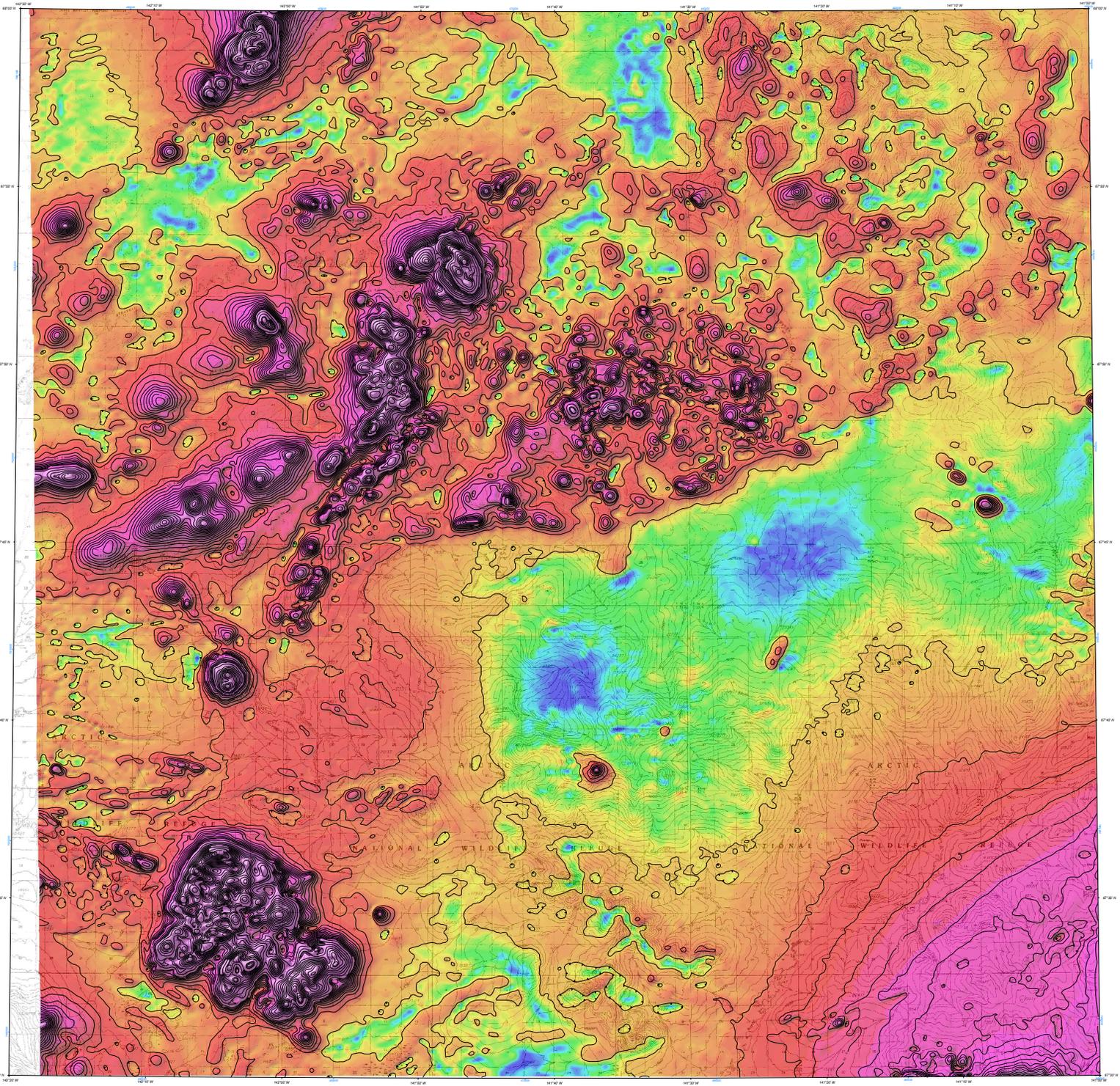


Figure 7. The tilt derivative of the magnetic field is its angle in the vertical direction with respect to the horizontal gradient. Computation of the tilt derivative is independent of magnetic intensity and depth to source, and therefore enhances weaker magnetic anomalies. The data presented here were calculated from the residual magnetic intensity grid by the application of horizontal and FFT-based vertical derivative transfer functions, and computation of the angle between the resulting components.

Table 1. Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: <http://doi.org/10.14509/29737>.

Map Title	Description
porcupine_analytic_signal_1of4.pdf	analytic signal of the residual magnetic intensity with data contours and topographic base map
porcupine_analytic_signal_2of4.pdf	analytic signal of the residual magnetic intensity with data contours and topographic base map
porcupine_analytic_signal_3of4.pdf	analytic signal of the residual magnetic intensity with data contours and topographic base map
porcupine_analytic_signal_4of4.pdf	analytic signal of the residual magnetic intensity with data contours and topographic base map
porcupine_calculated1vd_1of4.pdf	calculated first vertical derivative of the residual magnetic intensity with data contours and topographic base map
porcupine_calculated1vd_2of4.pdf	calculated first vertical derivative of the residual magnetic intensity with data contours and topographic base map
porcupine_calculated1vd_3of4.pdf	calculated first vertical derivative of the residual magnetic intensity with data contours and topographic base map
porcupine_calculated1vd_4of4.pdf	calculated first vertical derivative of the residual magnetic intensity with data contours and topographic base map
porcupine_calculated2vd_1of4.pdf	calculated second vertical derivative of the residual magnetic intensity with data contours and topographic base map
porcupine_calculated2vd_2of4.pdf	calculated second vertical derivative of the residual magnetic intensity with data contours and topographic base map
porcupine_calculated2vd_3of4.pdf	calculated second vertical derivative of the residual magnetic intensity with data contours and topographic base map
porcupine_calculated2vd_4of4.pdf	calculated second vertical derivative of the residual magnetic intensity with data contours and topographic base map
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porcupine_digital_terrain_model_2of4.pdf	digital terrain model with topographic base map
porcupine_digital_terrain_model_3of4.pdf	digital terrain model with topographic base map
porcupine_digital_terrain_model_4of4.pdf	digital terrain model with topographic base map
porcupine_flightlines_1of4.pdf	flightlines with topographic base map
porcupine_flightlines_2of4.pdf	flightlines with topographic base map
porcupine_flightlines_3of4.pdf	flightlines with topographic base map
porcupine_flightlines_4of4.pdf	flightlines with topographic base map
porcupine_ground_clearance_1of4.pdf	ground clearance with topographic base map
porcupine_ground_clearance_2of4.pdf	ground clearance with topographic base map
porcupine_ground_clearance_3of4.pdf	ground clearance with topographic base map
porcupine_ground_clearance_4of4.pdf	ground clearance with topographic base map
porcupine_residualmag.pdf	residual magnetic intensity grid with topographic base map
porcupine_residualmag_1of4.pdf	residual magnetic intensity grid with data contours and topographic base map
porcupine_residualmag_2of4.pdf	residual magnetic intensity grid with data contours and topographic base map
porcupine_residualmag_3of4.pdf	residual magnetic intensity grid with data contours and topographic base map
porcupine_residualmag_4of4.pdf	residual magnetic intensity grid with data contours and topographic base map
porcupine_tiltderivative_1of4.pdf	magnetic tilt derivative of the residual magnetic intensity with data contours and topographic base map
porcupine_tiltderivative_2of4.pdf	magnetic tilt derivative of the residual magnetic intensity with data contours and topographic base map
porcupine_tiltderivative_3of4.pdf	magnetic tilt derivative of the residual magnetic intensity with data contours and topographic base map
porcupine_tiltderivative_4of4.pdf	magnetic tilt derivative of the residual magnetic intensity with data contours and topographic base map



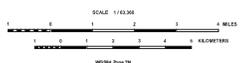
SURVEY LOCATION



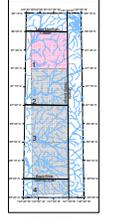
AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

ANALYTIC SIGNAL GRID AND CONTOURS

<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2019



LOCATION INDEX OF 1:63,360 SCALE MAP



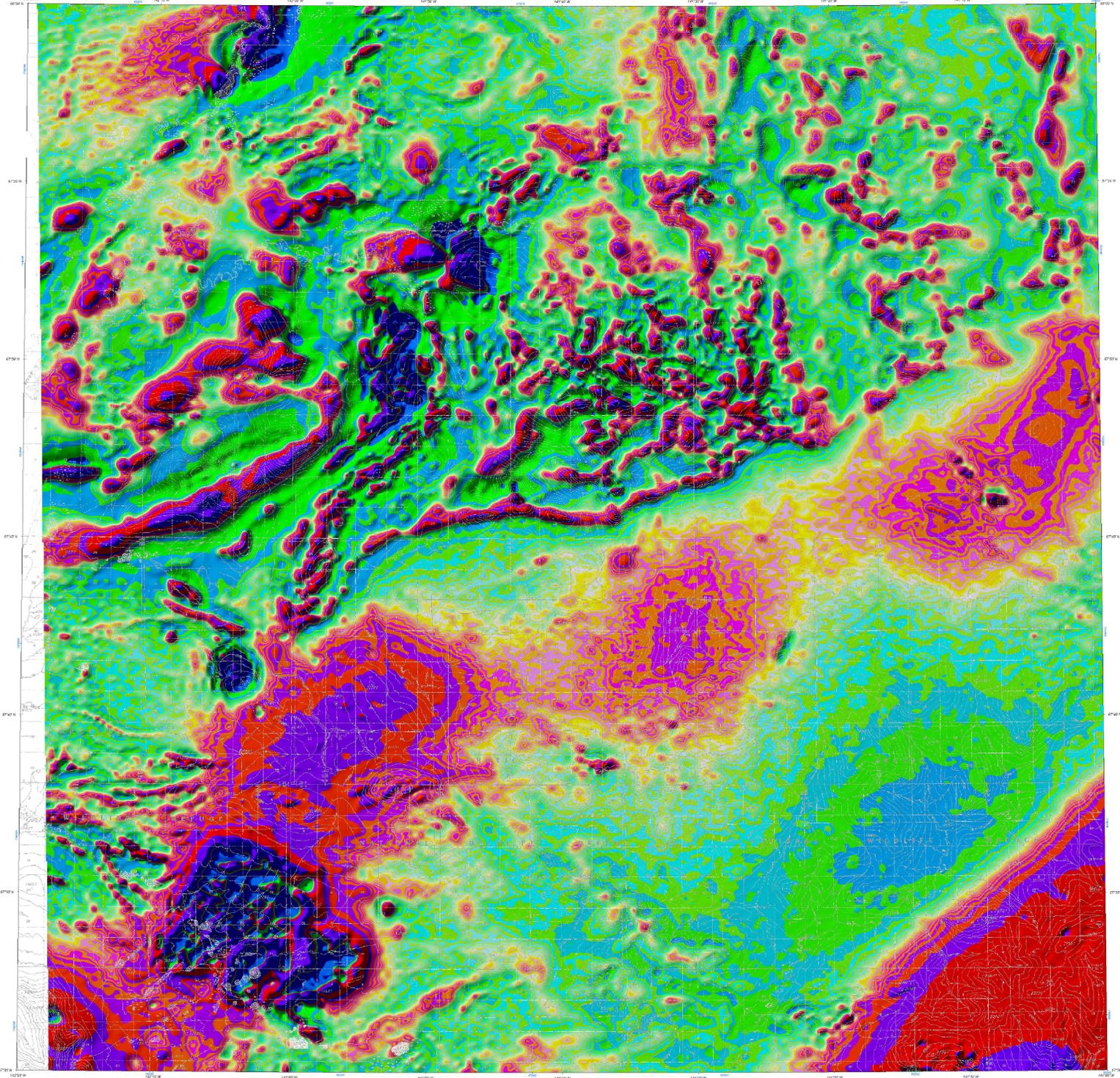
DESCRIPTIVE NOTES

This map was derived from data acquired during an aeromagnetic survey conducted by EON Geosciences Inc. from 2015 to 2017. The survey was conducted using a GOMOS 2000A digital vector magnetometer mounted on a Cessna 441QII twin-engine turboprop aircraft. The flight path was recorded following grid flight altitude contours which were previously acquired by the Alaska State Geodetic Survey in 1993. The data were processed using a 100-metre grid spacing and a 100-metre grid spacing. The data were processed using a 100-metre grid spacing and a 100-metre grid spacing. The data were processed using a 100-metre grid spacing and a 100-metre grid spacing.

ANALYTIC SIGNAL OF THE MAGNETIC FIELD

The analytic signal of the magnetic field is the sum of the squares of the horizontal and vertical derivatives of the magnetic field. It is a scalar quantity that is independent of the direction of magnetization. The data presented here were derived from the vertical magnetic intensity data. The analytic signal is a scalar quantity that is independent of the direction of magnetization. The data presented here were derived from the vertical magnetic intensity data.

All data and maps produced from this survey are disseminated from the USGS under the Creative Commons Attribution-NonCommercial-ShareAlike license. For more information, please visit <https://creativecommons.org/licenses/by-nc-sa/4.0/>.



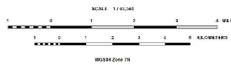
SURVEY LOCATION



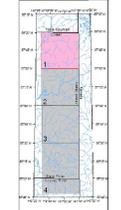
AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

CALCULATED FIRST VERTICAL DERIVATIVE GRID

<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2017



LOCATION INDEX OF 1:63,360 SCALE MAP



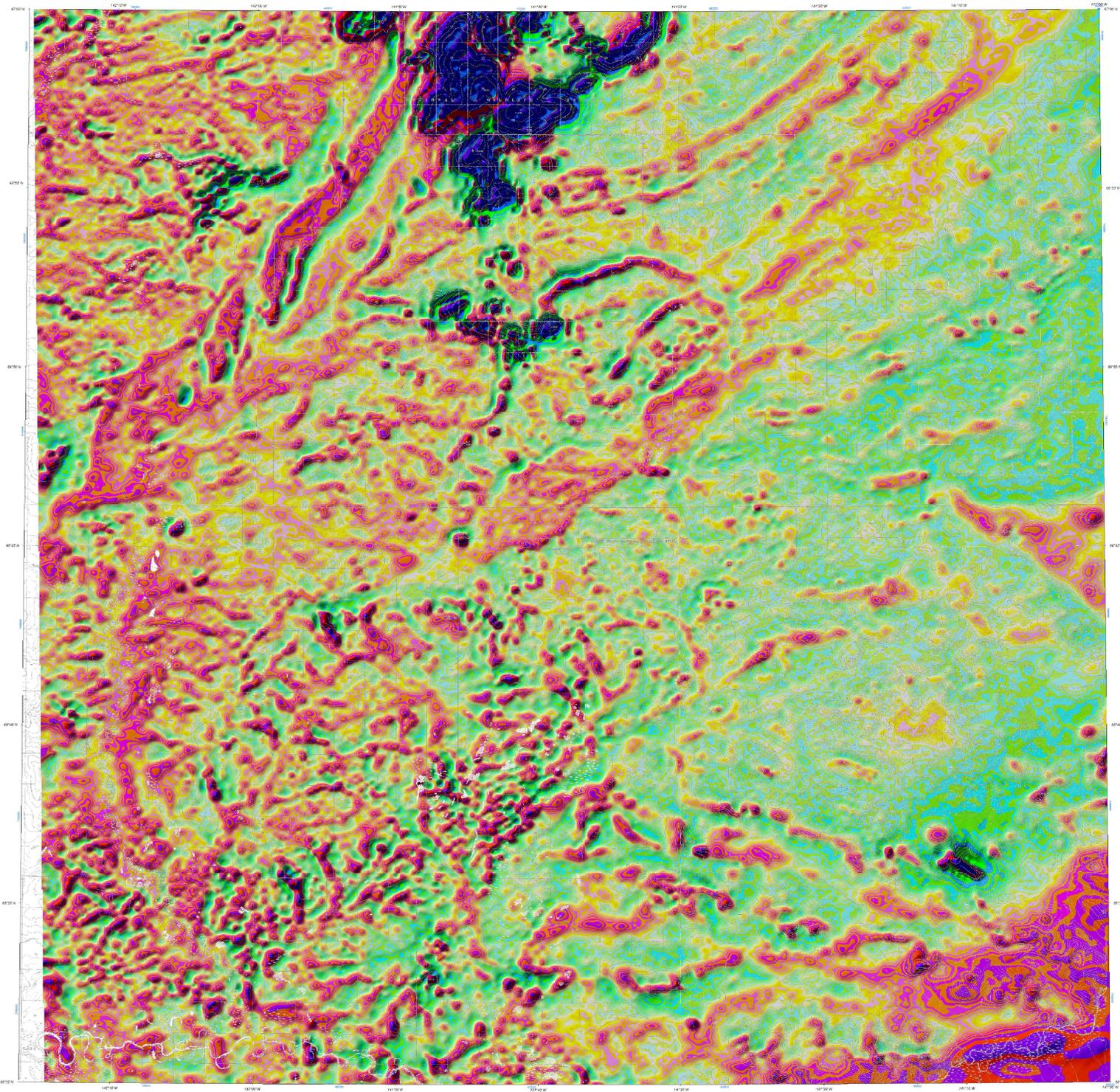
DISCLAIMER

This map was derived from data collected during an aeromagnetic survey conducted by EON Geosciences Inc. from May 15 to June 20, 2017, using a GEM-3000 magnetometer. The data were processed using the magnetic reduction software developed by EON Geosciences Inc. The magnetic data were gridded on a 100 m x 100 m grid. The map was produced using the software developed by EON Geosciences Inc. The map is a preliminary product and should not be used for navigation or other purposes. The map is provided as a service to the public and is not a warranty of any kind. The map is provided as a service to the public and is not a warranty of any kind. The map is provided as a service to the public and is not a warranty of any kind.

CALCULATED FIRST VERTICAL DERIVATIVE

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 of the magnetic field is a useful tool for identifying magnetic anomalies. The first vertical derivative of the magnetic field is a useful tool for identifying magnetic anomalies. The first vertical derivative of the magnetic field is a useful tool for identifying magnetic anomalies.

All data and maps produced from this survey are disseminated from the USGS website. For more information, visit the USGS website at <http://www.usgs.gov>. This map is a preliminary product and should not be used for navigation or other purposes. The map is provided as a service to the public and is not a warranty of any kind. The map is provided as a service to the public and is not a warranty of any kind. The map is provided as a service to the public and is not a warranty of any kind.



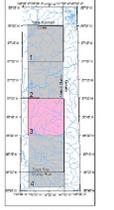
AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

CALCULATED FIRST VERTICAL DERIVATIVE GRID

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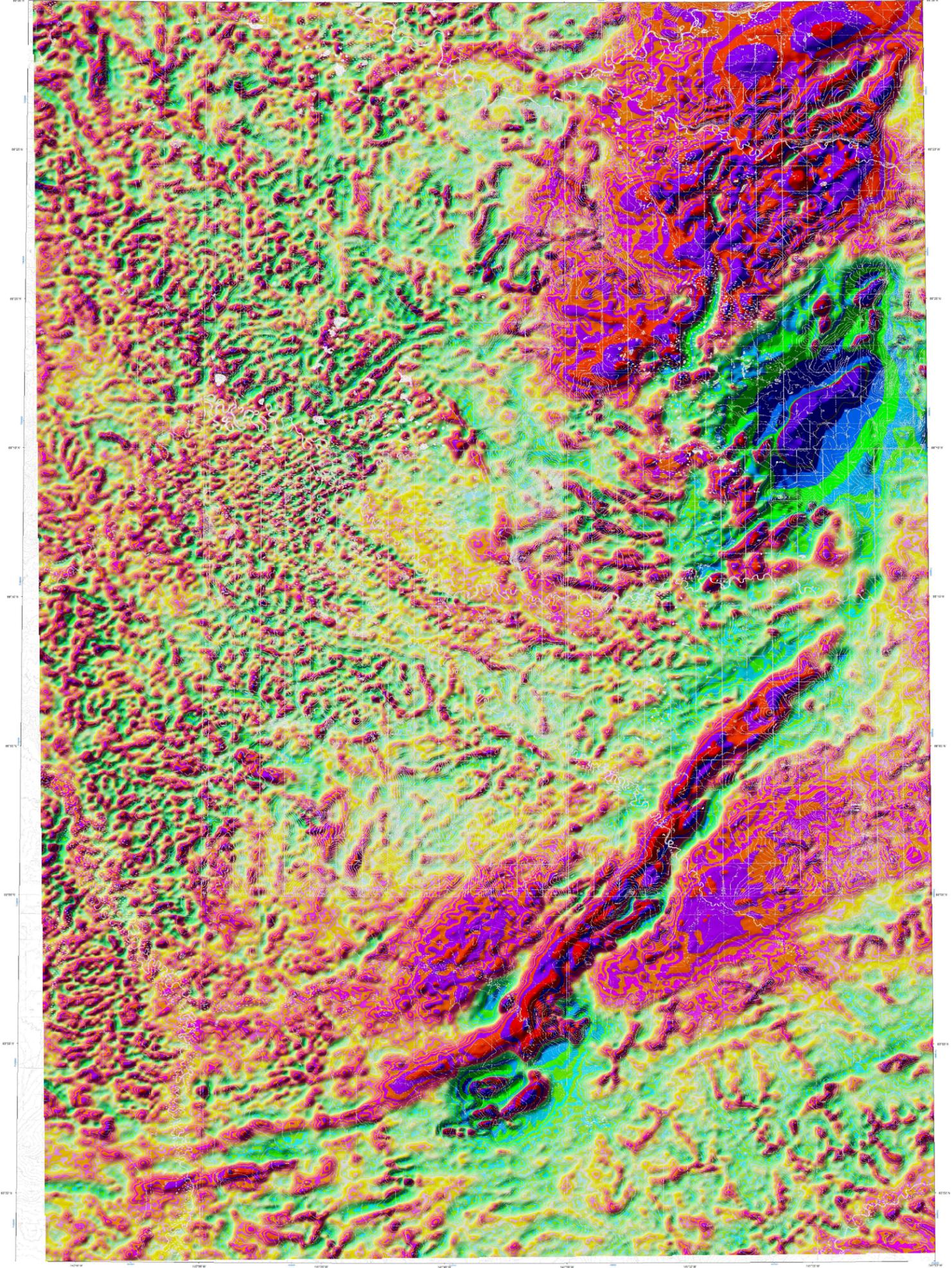
LOCATION INDEX OF 1:63,360 SCALE MAP



ACKNOWLEDGMENTS
This map was derived from data acquired during an aeromagnetic survey completed by USGS Geophysical Survey Team (GST) in June 2017 using a GEM-30T magnetometer and a GEM-30T-2000 fluxgate magnetometer. The data were processed and gridded at a resolution of 100 meters. The map features geophysical contours and a color-coded intensity scale. The map is a derivative of the original data and is not a true representation of the magnetic field. The map is a derivative of the original data and is not a true representation of the magnetic field. The map is a derivative of the original data and is not a true representation of the magnetic field.

CONTACT INFORMATION
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Division of Geological & Geophysical Surveys
1225 North 4th Street
Juneau, Alaska 99801
Phone: 907-586-3200
Fax: 907-586-3201
Email: alaska@usgs.gov



SURVEY AREA
This map was prepared from data acquired during an aeromagnetic survey conducted by EON Geosciences Inc. in 2017. The survey was conducted in accordance with the standards set forth in the Alaska Division of Geological & Geophysical Surveys (ADGGS) Manual of Operations, 2015 Edition. The data were processed using the same methods as those used in the previous aeromagnetic surveys of the region. The map is intended for use as a reference only and should not be used for navigation or other purposes.

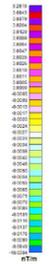
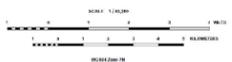


CALCULATED FIRST VERTICAL DERIVATIVE GRID
The intensity of anomalies of the magnetic field is a function of depth of the magnetic source. The first vertical derivative of the magnetic field is a function of depth of the magnetic source. The first vertical derivative of the magnetic field is a function of depth of the magnetic source. The first vertical derivative of the magnetic field is a function of depth of the magnetic source.

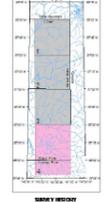
AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

CALCULATED FIRST VERTICAL DERIVATIVE GRID

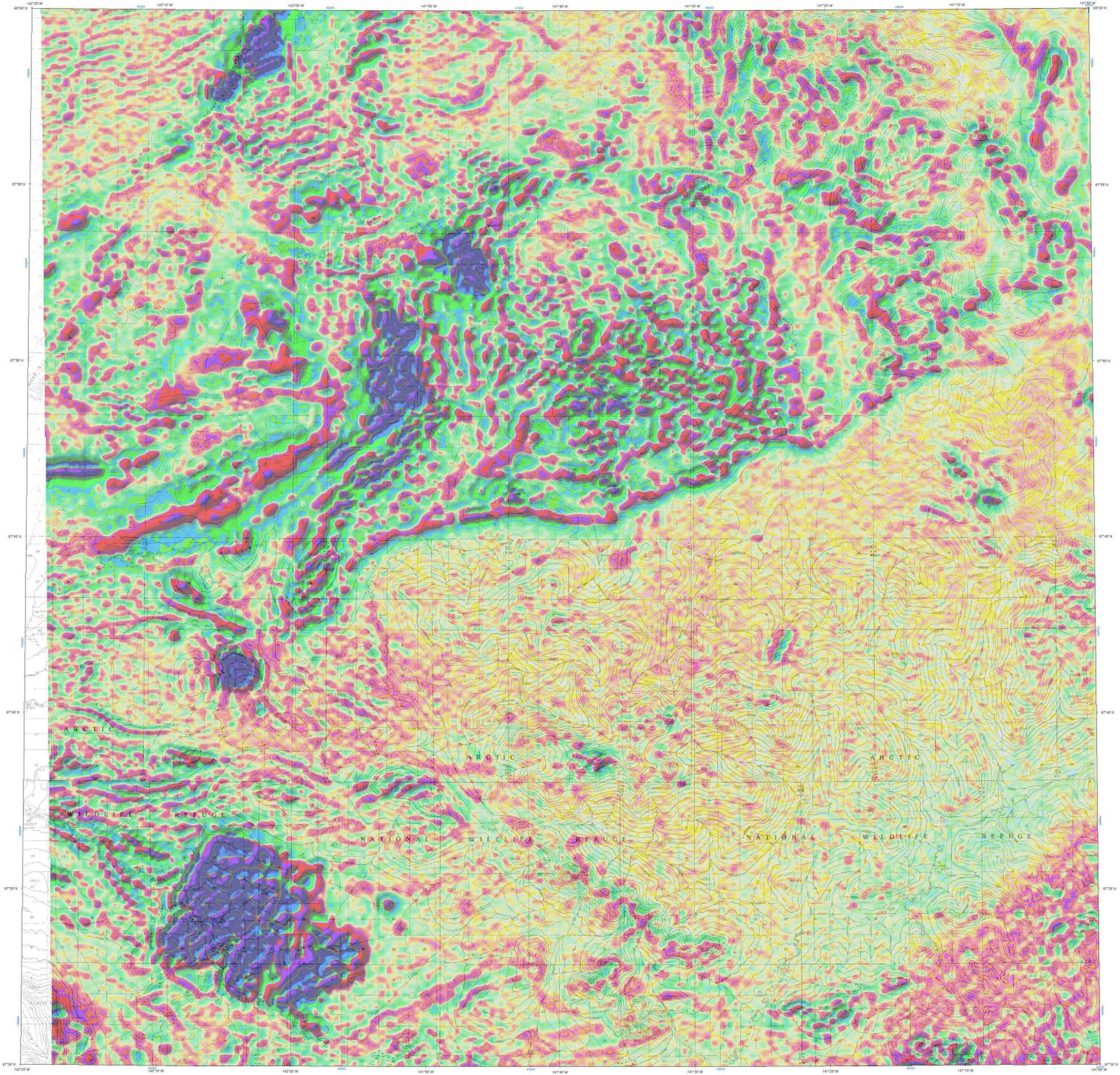
<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2017



LOCATION INDEX OF 1:63,360 SCALE MAP



ADDITIONAL INFORMATION
All data and maps produced from this survey are available to the public under the Alaska Open Data Act. For more information, please contact the Alaska Division of Geological & Geophysical Surveys at (907) 487-2500 or <http://www.adggs.alaska.gov>.



SURVEY LOCATION



AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

CALCULATED SECOND VERTICAL DERIVATIVE GRID

<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2019

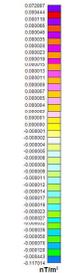


DE SIGNATURE MODELS

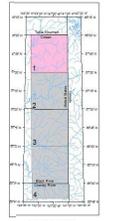
This map was derived from data acquired during an aeromagnetic survey... The second vertical derivative of the magnetic field is the curvature of the magnetic field with respect to the vertical direction. Contours of the second vertical derivative show magnetic anomalies and magnetic gradients. Contours of the second vertical derivative are perpendicular to contours of the magnetic field. Contours of the second vertical derivative are perpendicular to contours of the magnetic field. Contours of the second vertical derivative are perpendicular to contours of the magnetic field.

CALCULATED SECOND VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

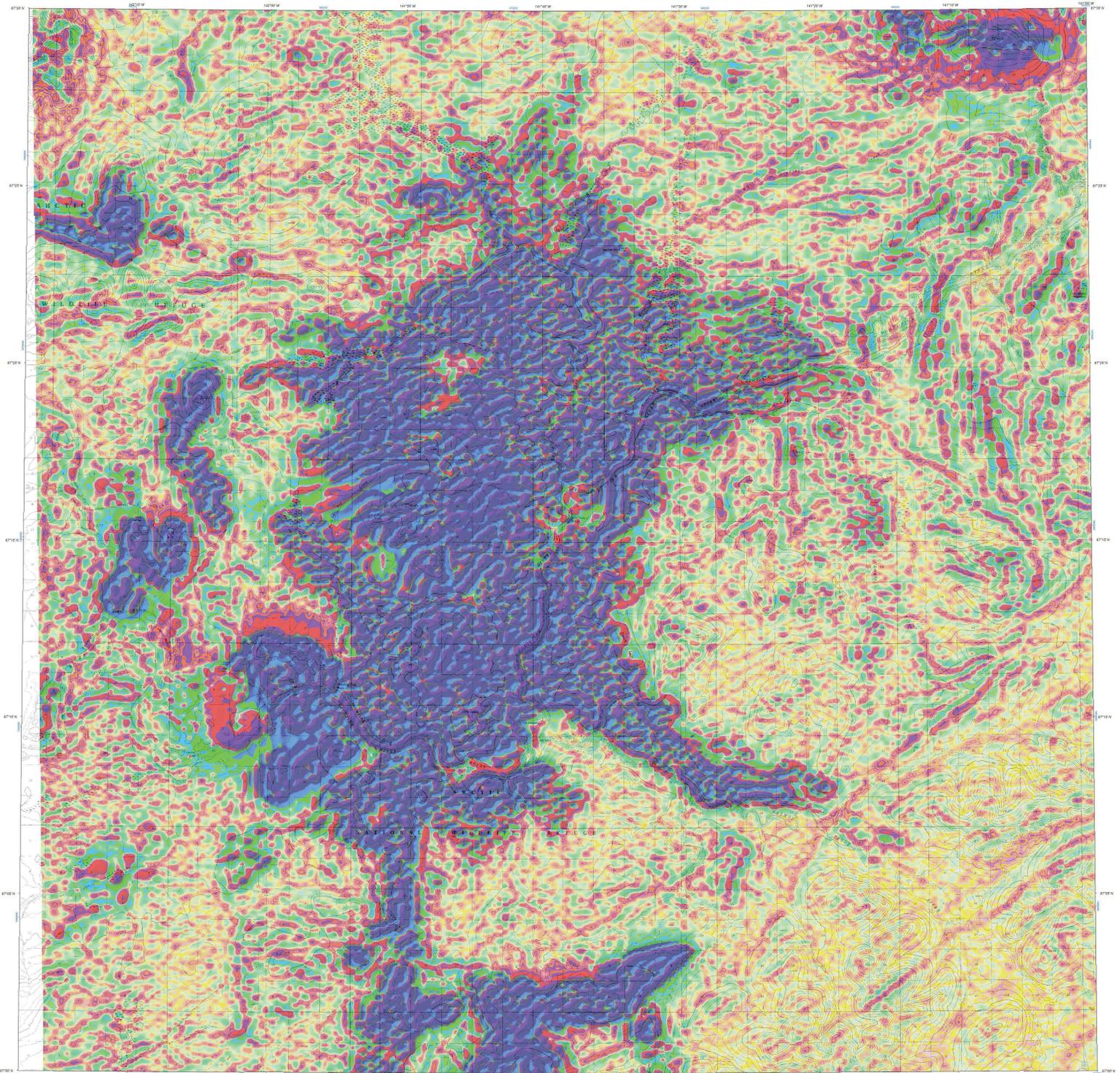
The second vertical derivative of the magnetic field is the curvature of the magnetic field with respect to the vertical direction. Contours of the second vertical derivative show magnetic anomalies and magnetic gradients. Contours of the second vertical derivative are perpendicular to contours of the magnetic field. Contours of the second vertical derivative are perpendicular to contours of the magnetic field.



LOCATION INDEX OF 1:63,360 SCALE MAP



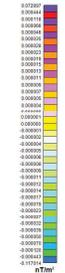
Additional geophysical data for this area were acquired and processed by EON Geosciences Inc. under contract with the U.S. Geological Survey, Alaska Division of Geological & Geophysical Surveys. This report is also available as a USGS Paper under the title 'Airborne Magnetic Geophysical Survey of the Porcupine River Region, Alaska, 2019-2020' (USGS Open-File Report 2020-100).



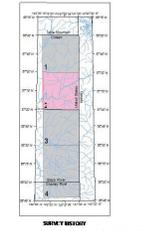
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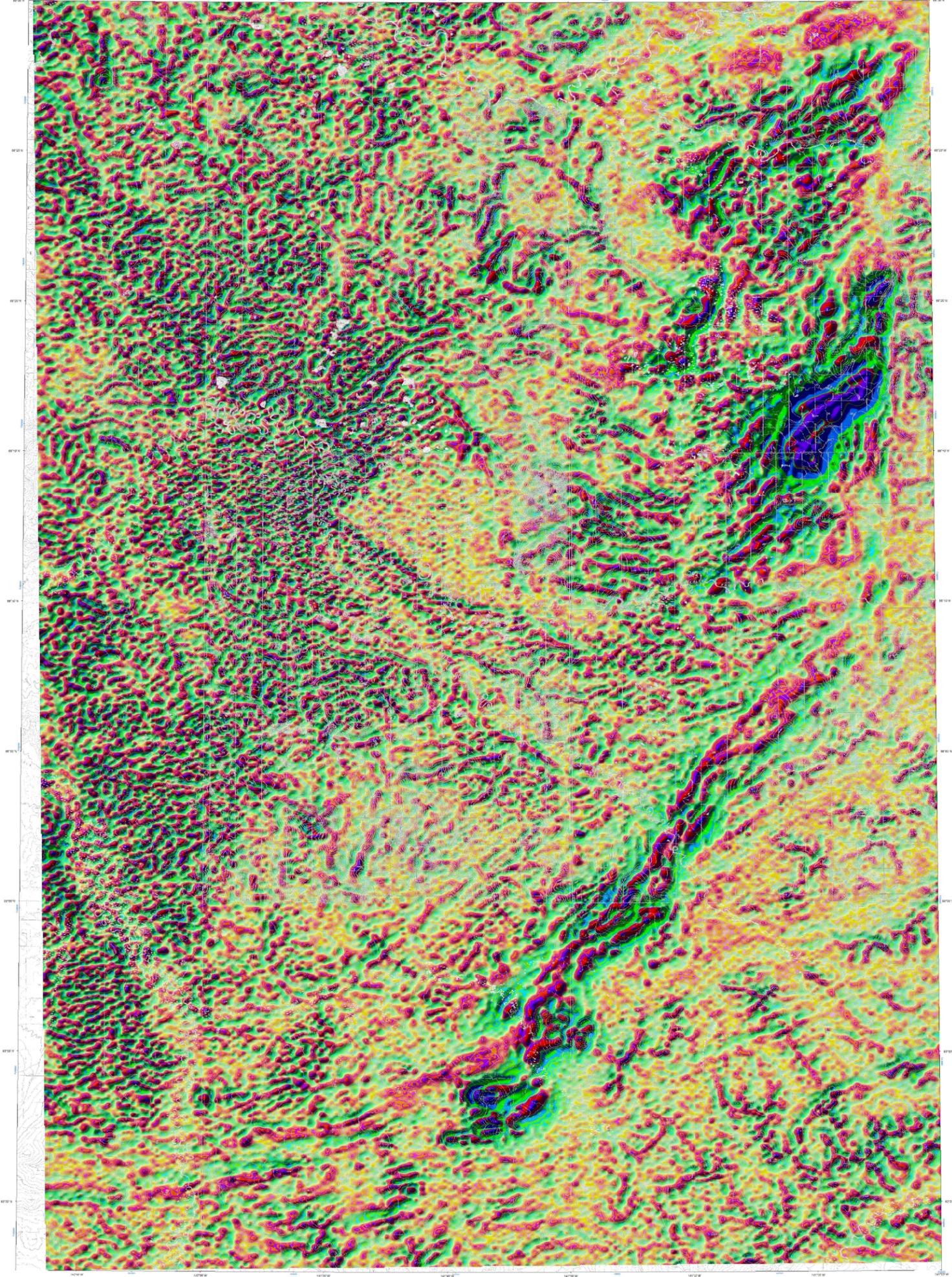
Follow-up geophysical data for the area was acquired and processed by EON Geosciences Inc. under contract from the State of Alaska, Department of Natural Resources, under a contract with the University of Alaska Fairbanks. All data and maps produced from this survey are available from the USGS website: <http://data.eon-geophysics.com>. Additional information is available from the USGS website: <http://www.usgs.gov>.



DESCRIPTION NOTES
This map was derived from data acquired during an airborne magnetic survey conducted in 2019 by EON Geosciences Inc. The survey was conducted in accordance with the standards of the International Geophysical Union (IGU) and the International Union of Pure and Applied Chemistry (IUPAC). The data were processed using the standard procedures for magnetic anomaly reduction and correction. The resulting magnetic anomaly map is presented in this report. The map is a derivative of the magnetic anomaly map and is presented in this report. The map is a derivative of the magnetic anomaly map and is presented in this report.

CALCULATED SECOND VERTICAL DERIVATIVE
The second vertical derivative of the magnetic field is the curvature of the magnetic field with respect to the vertical direction. Curvature of the magnetic field is a measure of the rate of change of the magnetic field with respect to the vertical direction. The second vertical derivative of the magnetic field is a measure of the rate of change of the magnetic field with respect to the vertical direction. The second vertical derivative of the magnetic field is a measure of the rate of change of the magnetic field with respect to the vertical direction.

The aerial images and maps are available from the USGS website: <http://data.eon-geophysics.com>. Additional information is available from the USGS website: <http://www.usgs.gov>.



SURVEY AREA
This map was prepared from data acquired during an aeromagnetic survey conducted by the Alaska Division of Geological & Geophysical Surveys (ADGGS) in 2019. The survey was conducted using acesat-1000 aircraft equipped with acesat-1000 magnetometer. The data was processed using acesat-1000 software. The map was prepared using ArcGIS 10.5.1. The map is a calculated second vertical derivative grid. The map is a calculated second vertical derivative grid. The map is a calculated second vertical derivative grid.

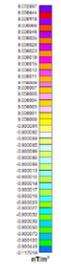
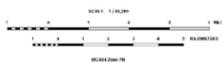


CALCULATED SECOND VERTICAL DERIVATIVE GRID
The second vertical derivative of the magnetic field is the rate of change of the magnetic field with respect to elevation. It is a measure of the magnetic field's curvature. It is a measure of the magnetic field's curvature. It is a measure of the magnetic field's curvature.

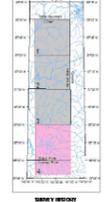
AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

CALCULATED SECOND VERTICAL DERIVATIVE GRID

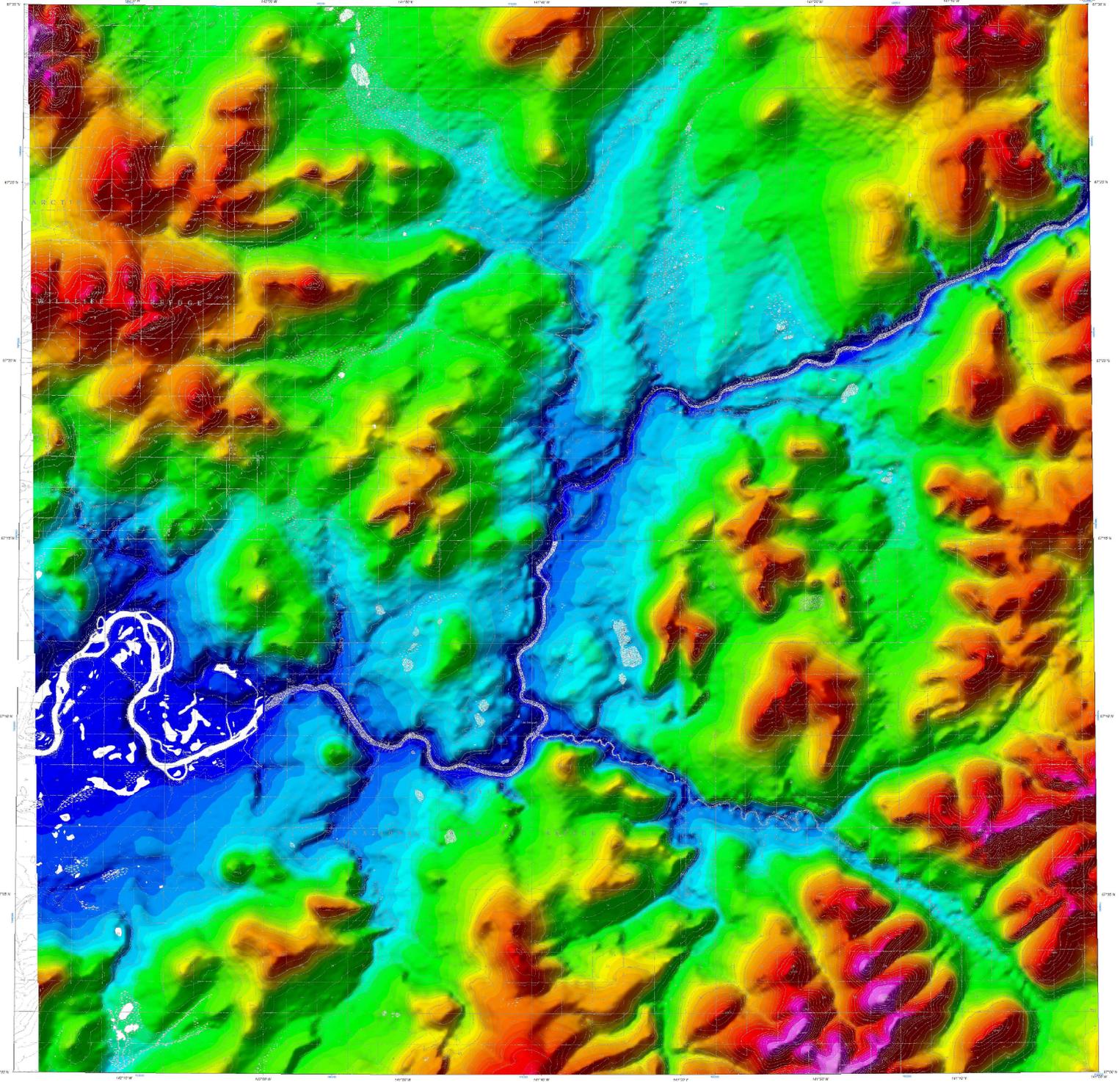
<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2019



LOCATION INDEX OF 1:63,360 SCALE MAP



ADGGS geophysical data for the area were collected and processed by EON Geosciences Inc. in 2019. The data was processed using acesat-1000 software. The map was prepared using ArcGIS 10.5.1. The map is a calculated second vertical derivative grid. The map is a calculated second vertical derivative grid. The map is a calculated second vertical derivative grid.



SURVEY LOCATION

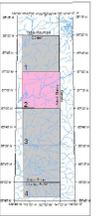


DIGITAL TERRAIN MODEL GRID

<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2017



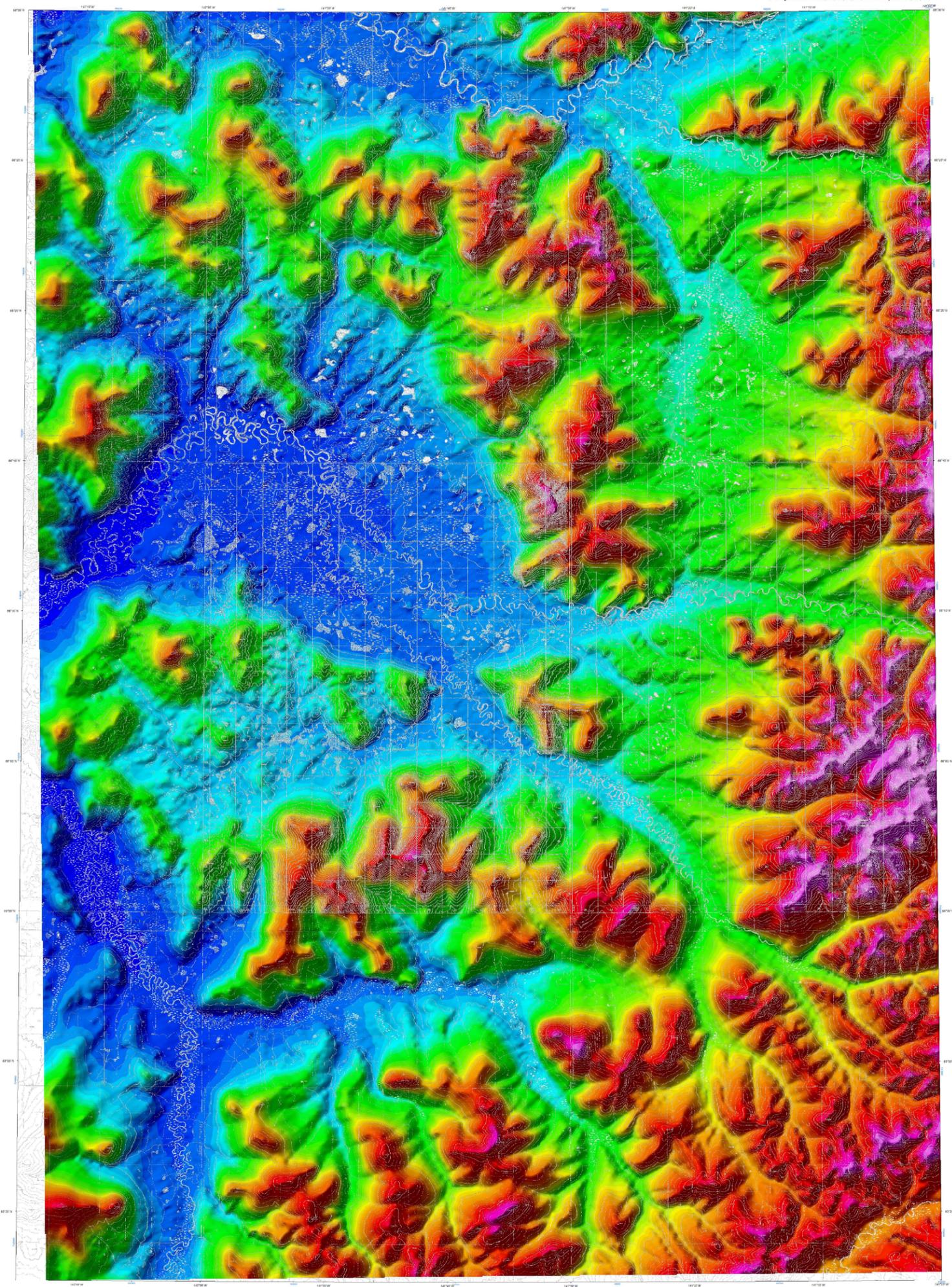
LOCATION INDEX OF 1:63,300 SCALE MAP



DISCLAIMER
This map was derived from the original data, as presented in the report prepared by EON Geosciences Inc. from June 28, 2017, to July 14, 2017. The map is not a substitute for a field survey. The map is provided as a reference only. The map is not to be used for any purpose other than that for which it was prepared. The map is not to be used for any purpose other than that for which it was prepared. The map is not to be used for any purpose other than that for which it was prepared.

GENERAL REMARKS
The digital terrain model (DTM) grid was derived from contour data provided by the Alaska Department of Natural Resources (ADNR). The DTM grid was derived from contour data provided by the Alaska Department of Natural Resources (ADNR). The DTM grid was derived from contour data provided by the Alaska Department of Natural Resources (ADNR). The DTM grid was derived from contour data provided by the Alaska Department of Natural Resources (ADNR).

DATA SOURCE
The digital terrain model (DTM) grid was derived from contour data provided by the Alaska Department of Natural Resources (ADNR). The DTM grid was derived from contour data provided by the Alaska Department of Natural Resources (ADNR). The DTM grid was derived from contour data provided by the Alaska Department of Natural Resources (ADNR). The DTM grid was derived from contour data provided by the Alaska Department of Natural Resources (ADNR).



SURVEY LOCATION

PROJECT NOTES

This map was prepared from data supplied by the Alaska Department of Natural Resources, Division of Geology, and the Alaska Department of Environmental Conservation, Division of Environmental Science. The data was processed and digitized by the Alaska Division of Geological & Geophysical Surveys. The map is a preliminary product and should not be used for any purpose other than general information. The map is not a substitute for a field visit.



USGS
United States Geological Survey

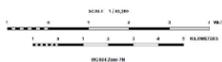
PROJECT NOTES

The digital terrain model (DTM) was derived from a 1:250,000 scale topographic map of the Porcupine River region, Alaska. The DTM was processed and digitized by the Alaska Division of Geological & Geophysical Surveys. The map is a preliminary product and should not be used for any purpose other than general information. The map is not a substitute for a field visit.

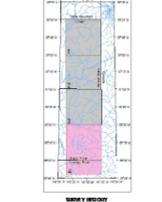
AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

DIGITAL TERRAIN MODEL GRID

<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2017



LOCATION INDEX OF 1:63,360 SCALE MAP



PROPERTY RIGHTS

All data and maps produced from this survey are the property of EON Geosciences Inc. and are not to be used for any purpose other than general information. The map is not a substitute for a field visit.



SURVEY LOCATION



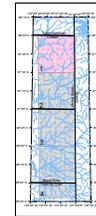
AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

FLIGHTLINES

<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2019

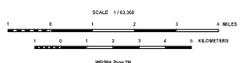


LOCATION INDEX OF 1:63,360 SCALE MAP



DESCRIPTIVE NOTES

This map was derived from data acquired during an aeromagnetic survey conducted by EON Geosciences Inc. from 2006 to 2008. The data was collected at 10 to 15 m altitude, a Constant 24000 datum value magnetic intensity of 48,000 nT, and a magnetic declination of 10 degrees. The flight path was recorded following a grid flight pattern with a constant 100 m spacing between flight lines. The data was processed using a variety of methods, including a variety of magnetic field correction algorithms, a variety of magnetic field reduction algorithms, and a variety of magnetic field reduction algorithms. The resulting magnetic field data was then used to generate this map. The map is presented in a variety of formats, including a variety of map scales and a variety of map projections. The map is presented in a variety of formats, including a variety of map scales and a variety of map projections. The map is presented in a variety of formats, including a variety of map scales and a variety of map projections.



Aeromagnetic geophysical data for the area were acquired and processed by EON Geosciences Inc. under contract with the State of Alaska, Department of Natural Resources, Bureau of Geology & Geophysical Services (BGGGS) Project funded by the US Geological Survey, Mineral Resources Program.

All data and maps produced from the survey are downloadable from the BGGGS website (<http://www.alaska.gov/bgggs>). Download and use at your own risk. The State of Alaska is not responsible for any errors or omissions in this report. For more information, contact the BGGGS office at 3330 College Road, Fairbanks, Alaska 99707-6000, phone 907-455-0000, email alaska@alaska.gov.



SURVEY LOCATION



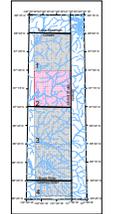
AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

FLIGHTLINES

<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2019



LOCATION INDEX OF 1:63,360 SCALE MAP

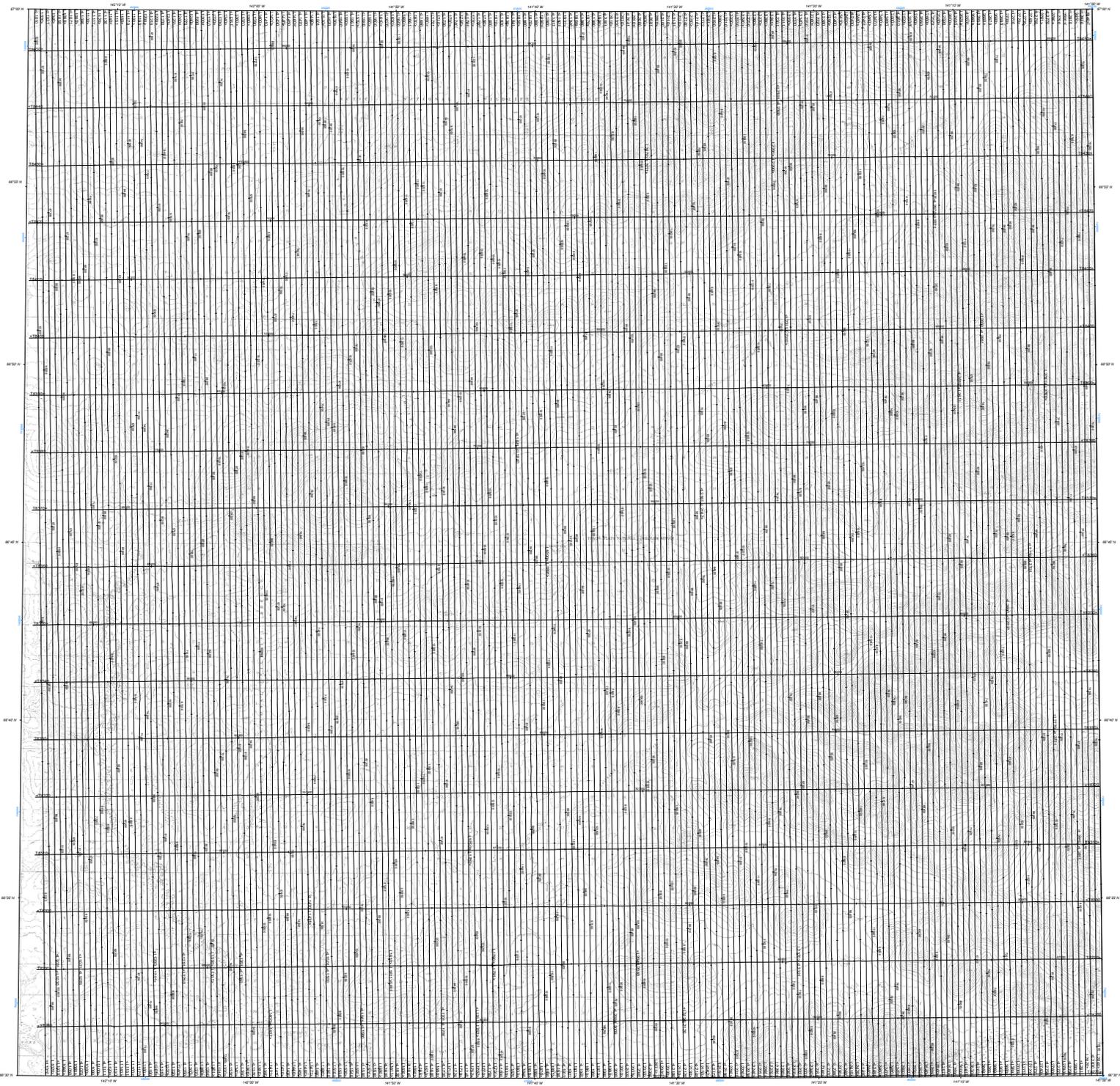


DESCRIPTIVE NOTES

This map was derived from data acquired from an aeromagnetic survey conducted by EON Geosciences, Inc. from May 2 to June 28, 2017 using a Boeing 737-800 aircraft equipped with a GEM System magnetometer. The survey was conducted at an altitude of 10,000 feet above mean sea level (AMSL) and a ground speed of 400 knots. The data was collected in a push-broom configuration and was processed using a standard magnetic reduction procedure. The resulting magnetic intensity data was gridded at a resolution of 100 meters. The map shows magnetic intensity contours at 100 nT intervals. The map is oriented with magnetic north. The map is a derivative of the data and does not represent the original data. The map is a derivative of the data and does not represent the original data. The map is a derivative of the data and does not represent the original data.



SURVEY HISTORY
Airborne geophysical data for the area were obtained and processed by EON Geosciences, Inc. under contract with the State of Alaska, Department of Geology, pursuant to a contract for the Alaska Geophysical Survey, Marine-Subsidence Program.
All data and maps produced from this report are downloadable from the USGS website (<http://www.usgs.gov>). Products are also available in digital format. For more information, contact the USGS office, 3240 College Road, Fairbanks, Alaska 99775-4300, phone 907-457-5000, email alaska@usgs.gov.



SURVEY LOCATION



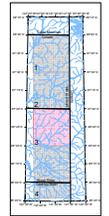
AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

FLIGHTLINES

<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2019



LOCATION INDEX OF 1:63,360 SCALE MAP

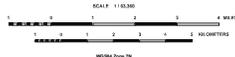


SURVEY HISTORY

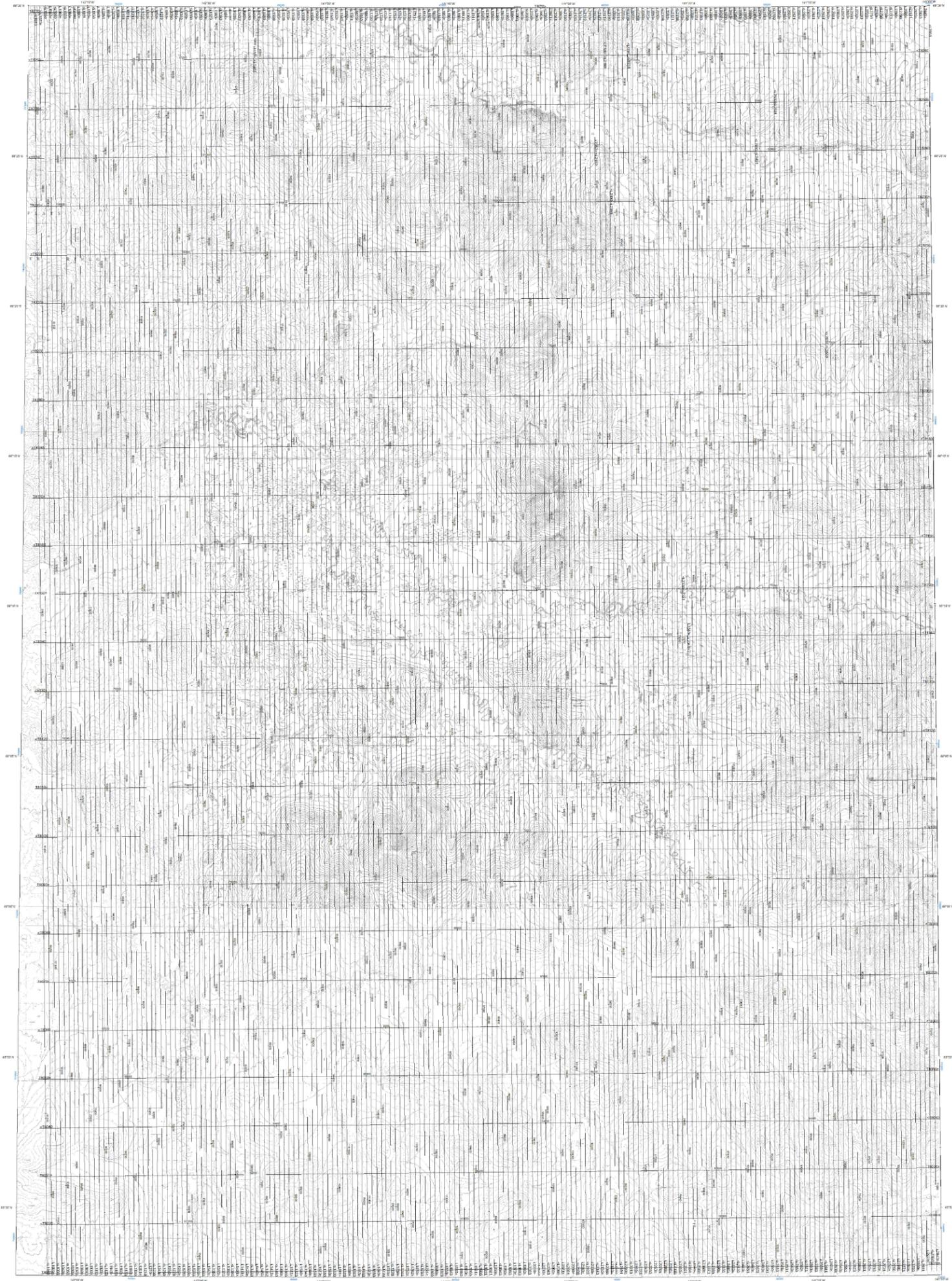
Airborne geophysical data for the area were acquired and processed by EON Geosciences Inc. under contract with the State of Alaska, Department of Geology, pursuant to the Alaska Statewide Geophysical Survey Program. The survey was conducted by EON Geosciences Inc. under contract with the State of Alaska, Department of Geology, pursuant to the Alaska Statewide Geophysical Survey Program.

DESCRIPTIVE NOTES

This file was derived from data acquired during an aeromagnetic survey conducted by EON Geosciences Inc. from March 2 to June 28, 2017 using a GEM-3000 magnetometer. The survey was conducted in accordance with the Alaska Statewide Geophysical Survey Program. The survey was conducted by EON Geosciences Inc. under contract with the State of Alaska, Department of Geology, pursuant to the Alaska Statewide Geophysical Survey Program.



All data and maps produced from this survey are disseminated from the USGS website. All data and maps are available on paper from the USGS office, 3200 Longview Avenue, Fort Collins, Colorado 80525-8540. All data and maps are available on CD-ROM from the USGS office, 3200 Longview Avenue, Fort Collins, Colorado 80525-8540.



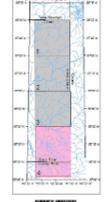
AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

FLIGHTLINES

<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2019

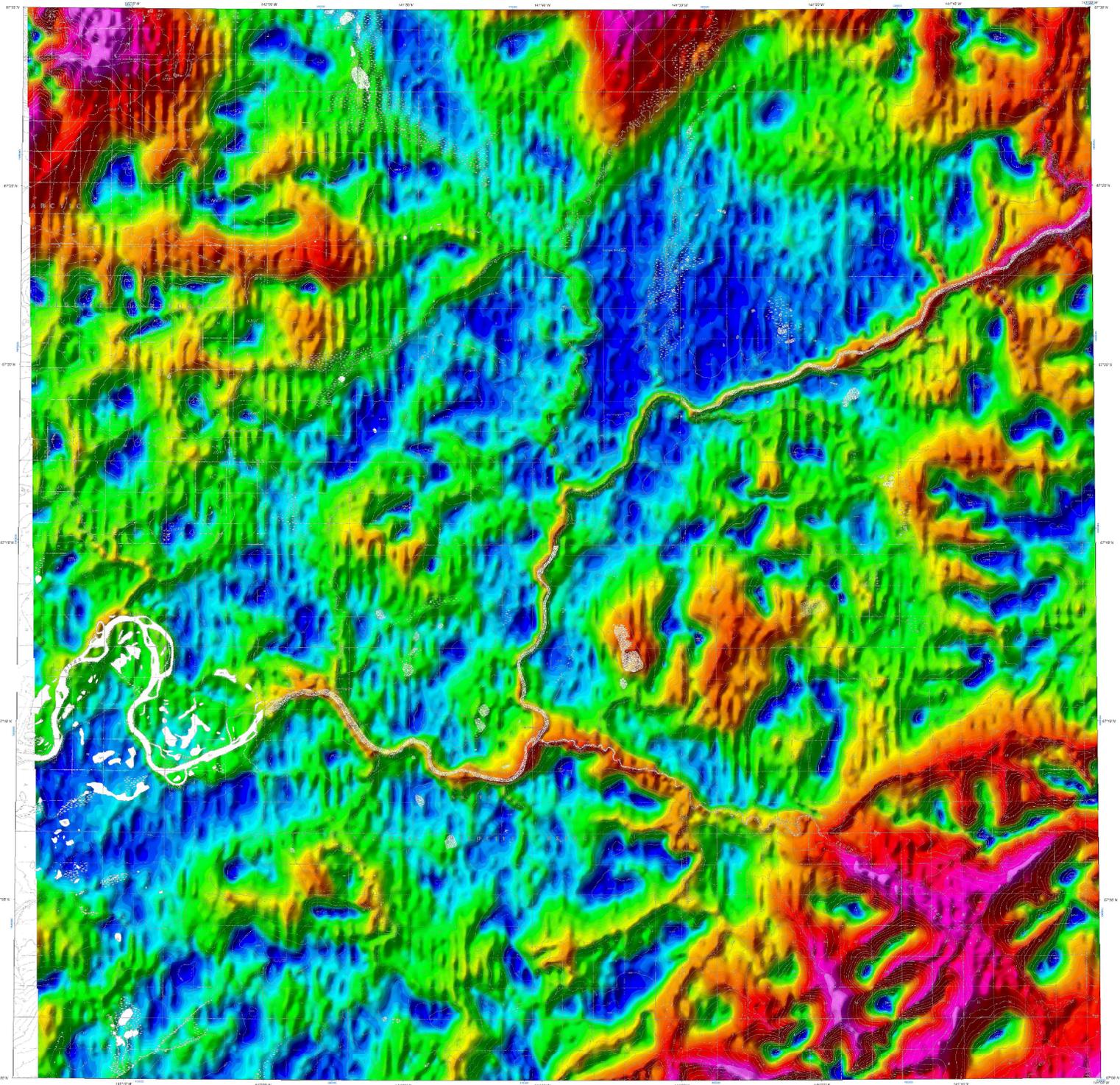


LOCATION INDEX OF 1:50,000 SCALE MAP



DISCLAIMER
This report was prepared from data supplied by the contractor and is not a product of the USGS. The USGS does not warrant the accuracy or completeness of the data or the results of the survey. The USGS is not responsible for any errors or omissions in this report. The contractor is responsible for the accuracy and completeness of the data and the results of the survey. The USGS is not responsible for any errors or omissions in this report. The contractor is responsible for the accuracy and completeness of the data and the results of the survey.

SURVEY SUMMARY
This report was prepared by EON Geosciences Inc. for the USGS. The survey was conducted in the Porcupine River region, Alaska, in 2019. The survey area covers approximately 147°00' W to 147°30' W longitude and 67°00' N to 67°30' N latitude. The survey was conducted using an airborne magnetic geophysical survey system. The data was collected along flightlines and is presented in this report. The USGS is not responsible for any errors or omissions in this report. The contractor is responsible for the accuracy and completeness of the data and the results of the survey.



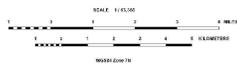
SURVEY LOCATION



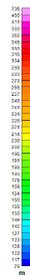
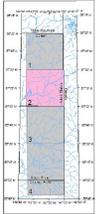
AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

GROUND CLEARANCE GRID

<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2017



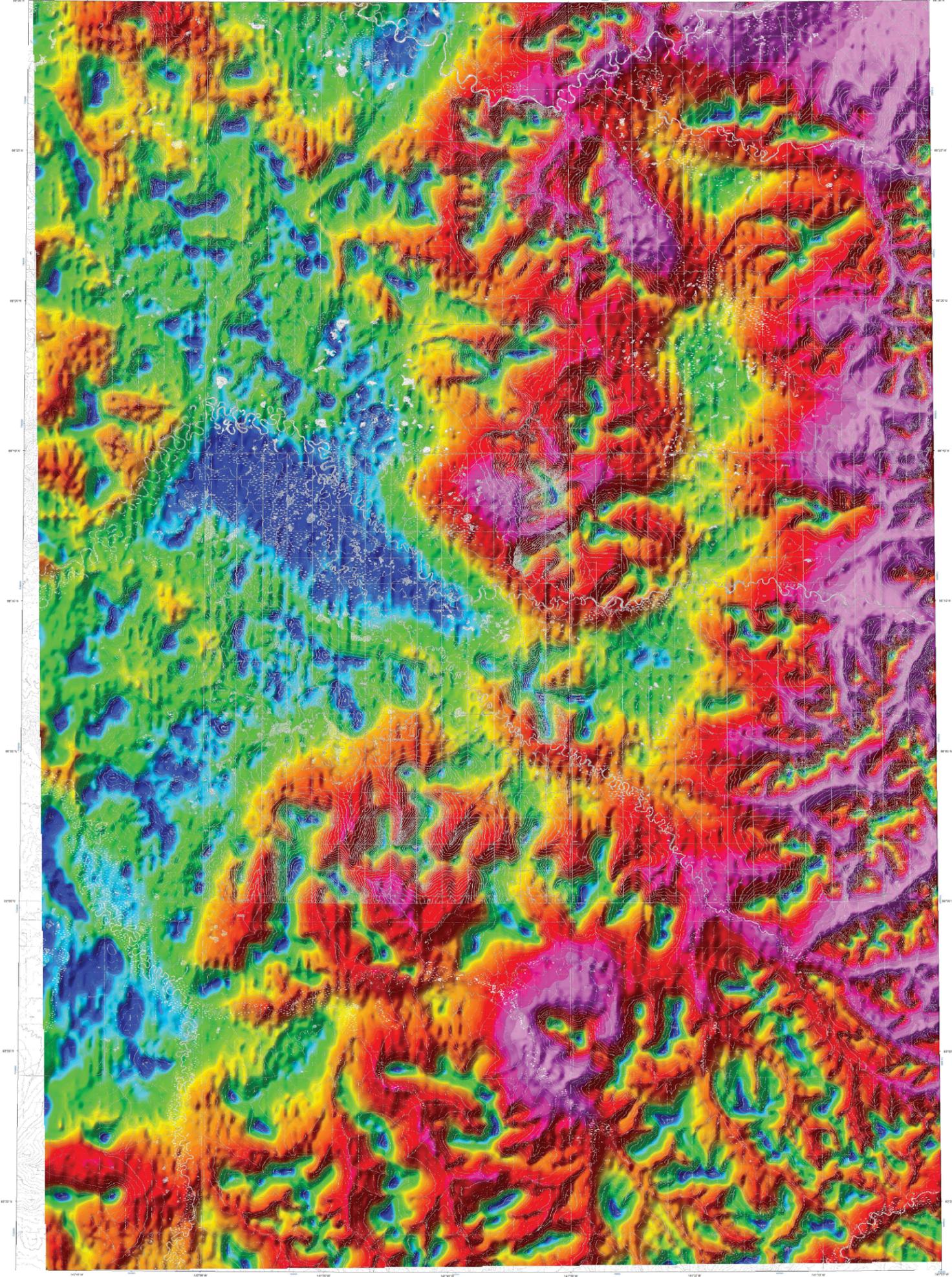
LOCATION INDEX OF 1:63,300 SCALE MAP



DISCLAIMER
This map was derived from data acquired during an aeromagnetic survey conducted by EON Geosciences Inc. from June 28, 2017, through August 17, 2017, using a modified Sikorski HO4S helicopter. The magnetic intensity measurements were collected at a height of approximately 100 meters above the terrain. The data were processed using a standard magnetic reduction procedure. The map is intended for general informational purposes only and should not be used for navigation or other critical applications. The Alaska Division of Geological & Geophysical Surveys is not responsible for any errors or omissions in this map.

GENERAL INFORMATION
The general character of the magnetic field in this area is generally uniform, with some local anomalies. The magnetic intensity is generally in the range of 40,000 to 50,000 gamma. The magnetic field is affected by the Earth's magnetic field, which is in turn affected by the solar wind and the Earth's magnetic field. The magnetic field is also affected by the Earth's magnetic field, which is in turn affected by the solar wind and the Earth's magnetic field. The magnetic field is also affected by the Earth's magnetic field, which is in turn affected by the solar wind and the Earth's magnetic field.

STATE OF ALASKA
Magnetic geophysical data for the state were acquired and processed by EON Geosciences Inc. under contract with the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys. The data were processed using a standard magnetic reduction procedure. The map is intended for general informational purposes only and should not be used for navigation or other critical applications. The Alaska Division of Geological & Geophysical Surveys is not responsible for any errors or omissions in this map.



SURVEY NOTES
This map was prepared from data acquired during an airborne magnetic geophysical survey conducted by EON Geosciences Inc. in 2017. The survey was conducted in accordance with the Alaska Division of Geological & Geophysical Surveys (ADGGS) standards for magnetic geophysical surveys. The data were processed and reduced to magnetic intensity using standard geophysical processing techniques. The map was prepared using ArcGIS software. The map is a georeferenced map with a scale of 1:63,360. The map is a georeferenced map with a scale of 1:63,360. The map is a georeferenced map with a scale of 1:63,360.

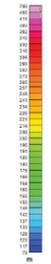
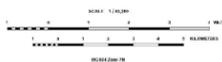


GROUND CLEARANCE
The ground clearance of the magnetic field is a critical factor in the interpretation of magnetic geophysical data. The ground clearance is the vertical distance between the magnetic field and the ground surface. The ground clearance is a function of the magnetic field strength and the ground surface elevation. The ground clearance is a function of the magnetic field strength and the ground surface elevation. The ground clearance is a function of the magnetic field strength and the ground surface elevation.

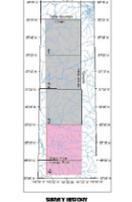
AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

GROUND CLEARANCE GRID

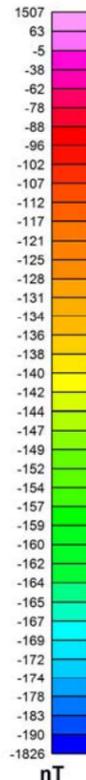
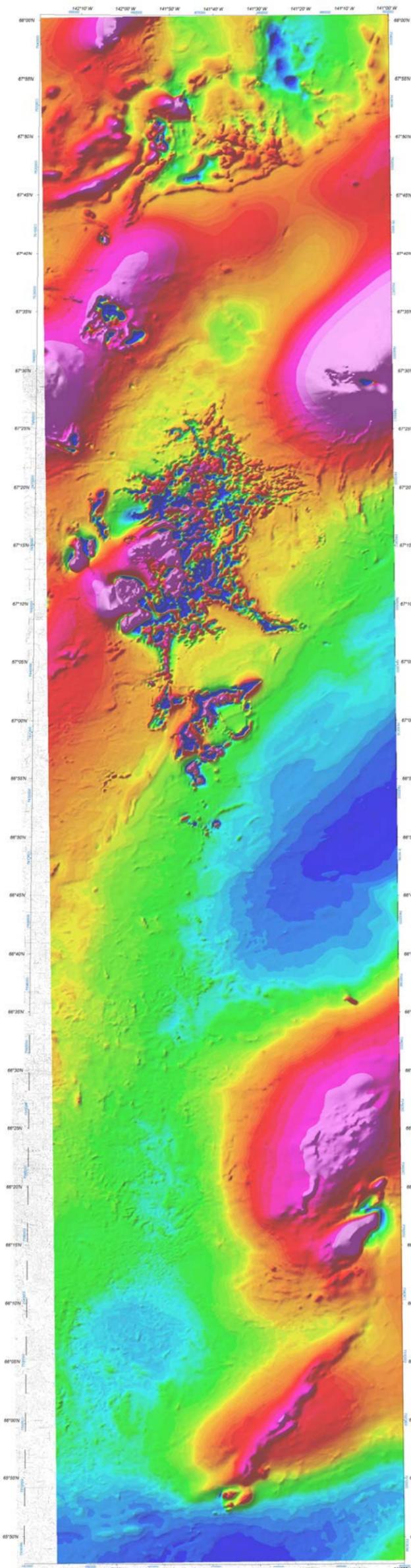
<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2017



LOCATION INDEX OF 1:63,360 SCALE MAP



SURVEY NOTES
All data and maps produced from this survey are the property of EON Geosciences Inc. and are not to be distributed outside of the project. The data are the property of EON Geosciences Inc. and are not to be distributed outside of the project. The data are the property of EON Geosciences Inc. and are not to be distributed outside of the project.



DESCRIPTIVE NOTES

This map was derived from data acquired during an atmospheric survey carried out by EON Geosciences Inc. from May 28 to June 28, 2017 using a Piper PA-31 Navajo aircraft (registration C-FYCN). The magnetic data were recorded at 1 Hz using a Geometrics G-822A cesium vapor magnetometer mounted in the tail boom of the aircraft. GNSS positioning data were recorded at 1 Hz using a NovAtel DL-V3 GNSS receiver. The flight path was recorded following pre-flight orbital corrections which improve positioning accuracy to the sub-meter level. Additional on-board equipment included a RedFlight Systems 150-200 radar altimeter, a Vaisala PTB110 barometric altimeter, and a vertically mounted video camera. Ground based systems included two CGM Systems GEM 150 Overhauser magnetometers and a NovAtel DL-V3 GNSS receiver.

The nominal traverse and control line separations were, respectively, 300 m and 200 m. Traverse lines were oriented N070E with orthogonal control lines. The aircraft flew a predetermined cruise surface calculated with a nominal terrain clearance of 100 m, resulting in an average terrain clearance of 233 m.

RESIDUAL MAGNETIC INTENSITY

The residual magnetic field represents the component of the total magnetic field related directly to the magnetic properties of the Earth's crust. The data presented here were derived from the recorded data by (1) application of a lag to compensate for system latency, (2) correction against discrete spikes and high-frequency residual component noise, (3) application of a height correction derived from the International Geomagnetic Reference Field (IGRF) computed for flight and dipole stations, (4) application of a closure correction system from the magnetic base station data, (5) analysis of the remaining differences between the traverse and control line values of the intersection points to obtain a correction profile that results in mutually leveled line data, (6) application of a micro-levelling correction to further reduce residual noise, and (7) removal of the IGRF values defined at the average mean sea level height of 660.0 m for a base date of June 1st 2017 to obtain the residual magnetic intensity. The final residual magnetic field was then gridded at a cell size of 60 m, using data from the traverse lines only.

SURVEY HISTORY

Airborne geophysical data for the area were acquired and processed by EON Geosciences Inc. under contract with the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS). Project funded by the US Geological Survey, Mineral Resources Program.

All data and maps produced from this survey are downloadable from the DGGGS website (<http://dgggs.alaska.gov>). Products are also available in digital format and maps are available on paper from the DGGGS office, 3354 College Road, Fairbanks, Alaska, 99709-3367 (phone 907-451-5010, email dgggs@alaska.gov).

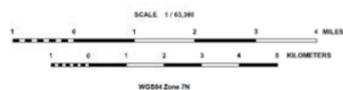
SURVEY LOCATION

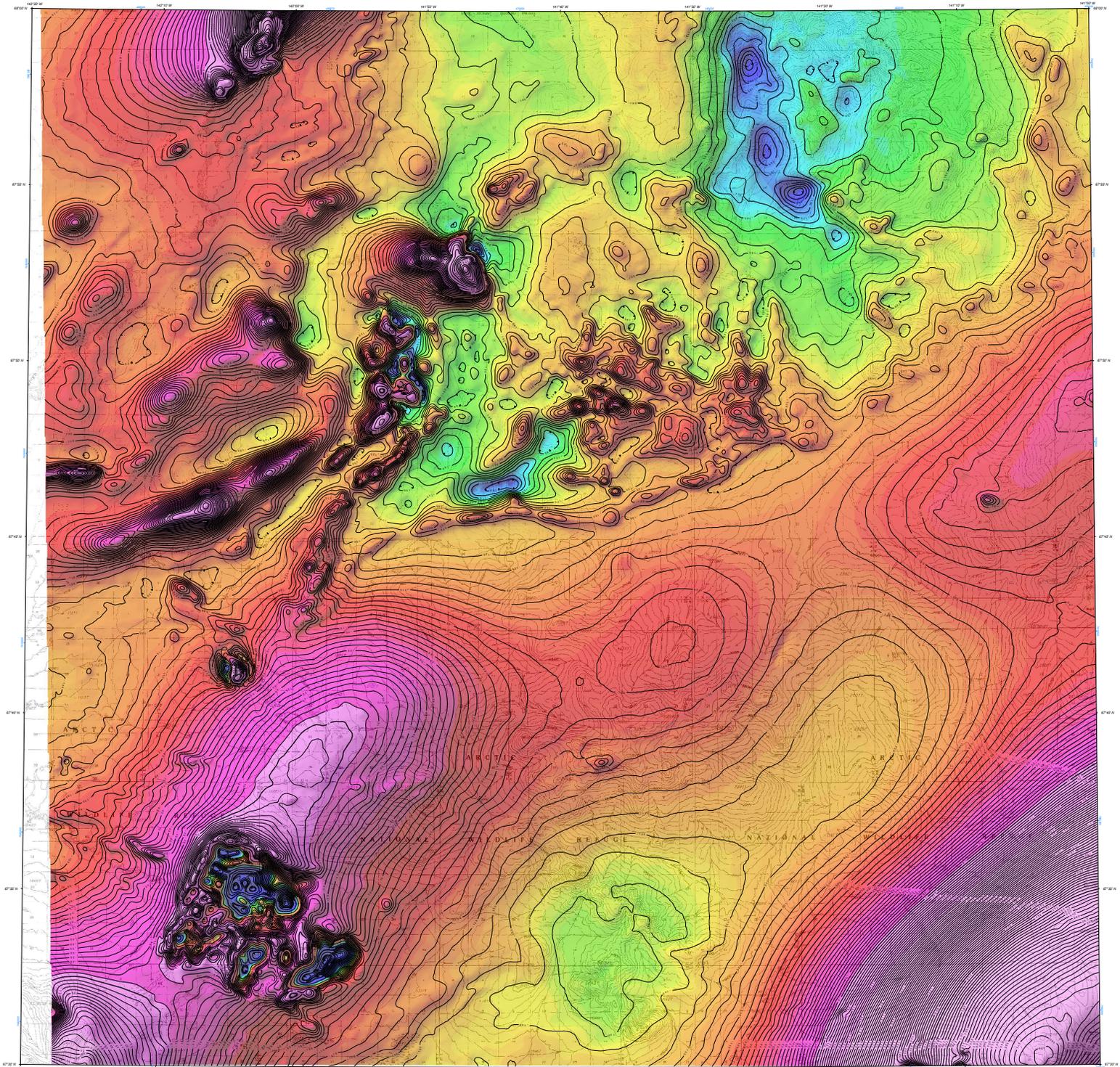


**AIRBORNE MAGNETIC GEOPHYSICAL SURVEY
OF THE PORCUPINE RIVER REGION, ALASKA**

RESIDUAL MAGNETIC INTENSITY GRID

<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2019





SURVEY LOCATION



AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

RESIDUAL MAGNETIC INTENSITY GRID AND CONTOURS

<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2019



CONTOUR LEGEND

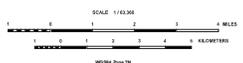


DESCRIPTIVE NOTES

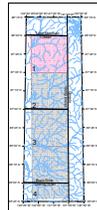
This map was derived from data acquired during an aeromagnetic survey conducted by EON Geosciences Inc. from 2005 to 2008. The data were collected at 10 m intervals in a Gnomonic 2400m x 2400m grid. The data were processed to produce a residual magnetic intensity grid and contours. The contours were generated using a contour interval of 100 m. The contours were labeled with their respective magnetic intensity values. The contours were generated using a contour interval of 100 m. The contours were labeled with their respective magnetic intensity values. The contours were generated using a contour interval of 100 m. The contours were labeled with their respective magnetic intensity values.

RESIDUAL MAGNETIC INTENSITY

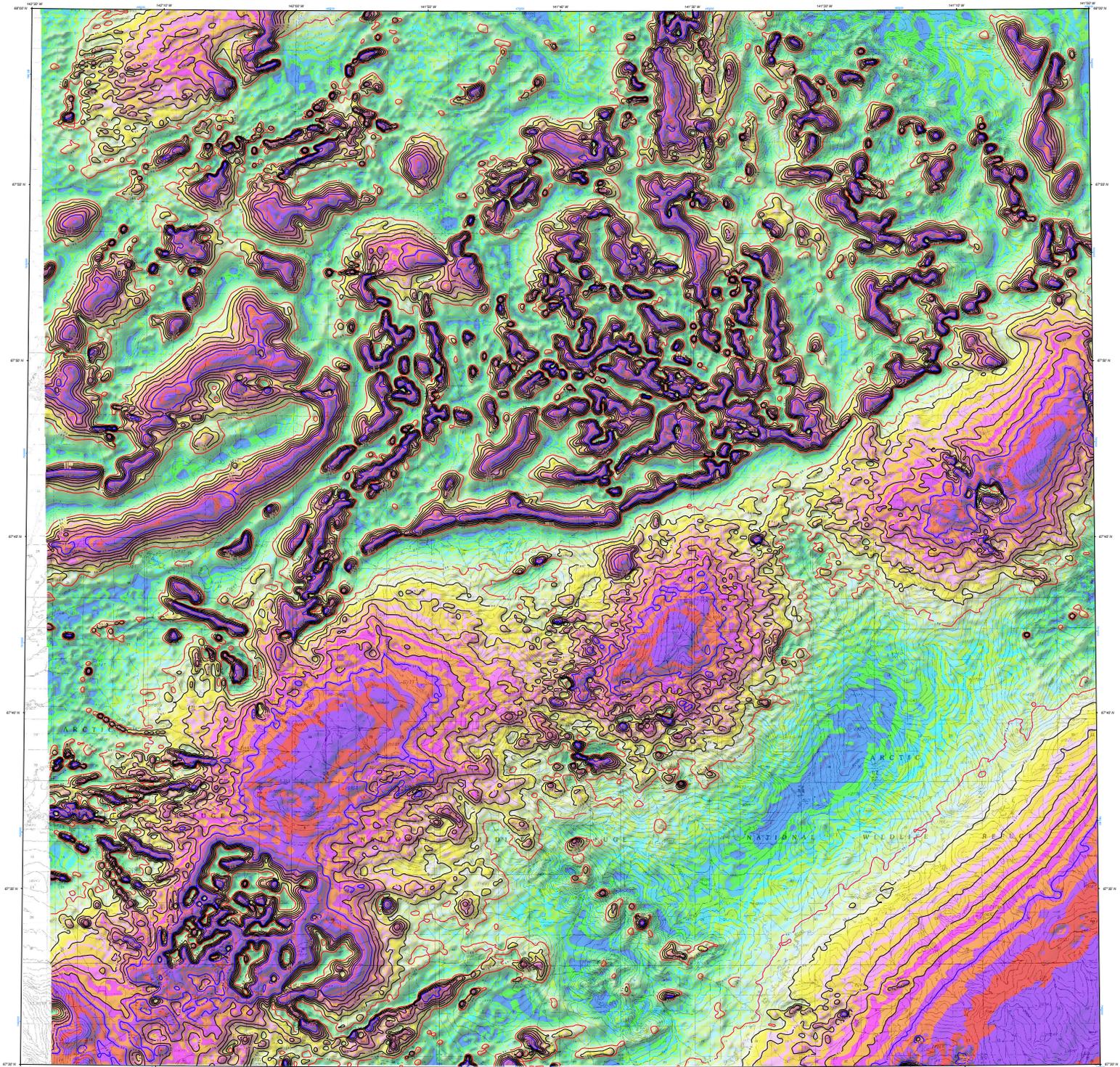
The residual magnetic intensity is the difference between the total magnetic field measured on the ground and the magnetic field of the Earth's crust. The residual magnetic intensity is the difference between the total magnetic field measured on the ground and the magnetic field of the Earth's crust. The residual magnetic intensity is the difference between the total magnetic field measured on the ground and the magnetic field of the Earth's crust. The residual magnetic intensity is the difference between the total magnetic field measured on the ground and the magnetic field of the Earth's crust.



LOCATION INDEX OF 1:63,360 SCALE MAP



Alaska Geophysical Data for the area were acquired and processed by EON Geosciences Inc. under contract with the State of Alaska, Department of Natural Resources, Bureau of Geology & Geophysical Services (BGGGS). Project funded by the US Geological Survey Mineral Resources Program. All data and maps produced from this survey are disseminated from the BGGGS website (<http://www.bgggs.alaska.gov>). Contact with BGGGS is at: Geology-Field, Evaluation, Alaska Resource Report 987-645-0000.



SURVEY LOCATION



AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

TILT DERIVATIVE GRID AND CONTOURS

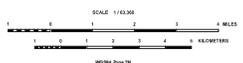
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by EON Geosciences Inc. 2019

DESCRIPTIVE NOTES

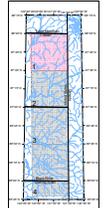
This map was derived from data acquired during an aeromagnetic survey conducted by EON Geosciences Inc. from 2016 to 2018. The survey was conducted at 10 m altitude, a Constant 24000 datum, using a dual-frequency magnetometer equipped with a real-time kinematic (RTK) GPS receiver. The flight path was recorded following grid flight, offset from contours which represent magnetic intensity by the Air Force. Data collection was completed on 10/10/2018. The survey was processed using a VESPA 3700 software application and a 100000 m resolution grid. Contour interval is 100 nT. The map was processed using the USGS National Magnetic Anomaly Model (N-MAM) software and a 100000 m resolution grid. The map was processed using the USGS National Magnetic Anomaly Model (N-MAM) software and a 100000 m resolution grid.

TILT DERIVATIVE OF THE MAGNETIC FIELD

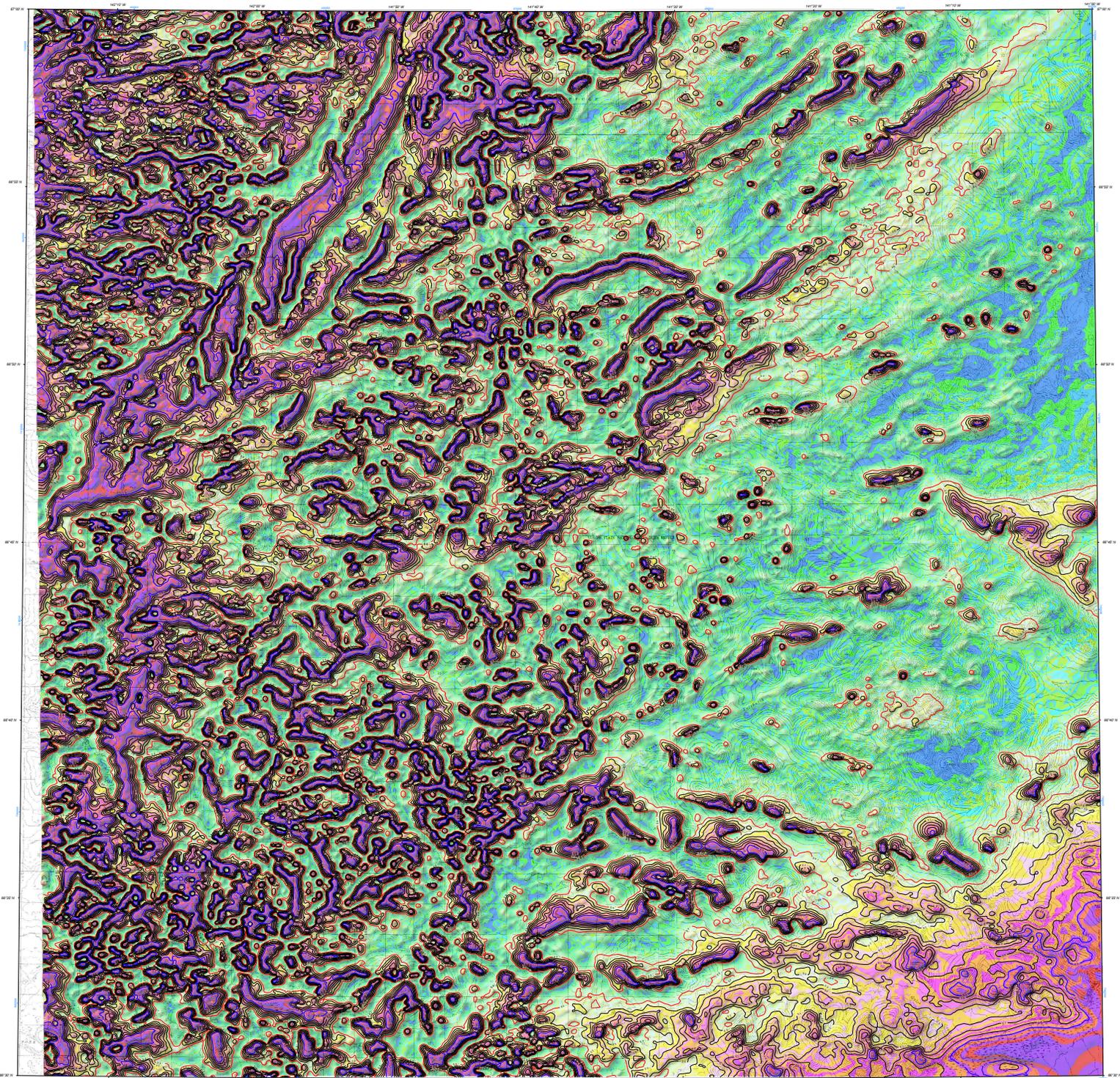
The tilt derivative of the magnetic field is a vector in the vertical direction and is related to the horizontal gradient. Computation of the tilt derivative is independent of magnetic intensity and sign. It is related to the horizontal gradient of the magnetic intensity. The tilt derivative is a vector in the vertical direction and is related to the horizontal gradient. Computation of the tilt derivative is independent of magnetic intensity and sign. It is related to the horizontal gradient of the magnetic intensity. The tilt derivative is a vector in the vertical direction and is related to the horizontal gradient. Computation of the tilt derivative is independent of magnetic intensity and sign. It is related to the horizontal gradient of the magnetic intensity.



LOCATION INDEX OF 1:63,360 SCALE MAP



All data and maps produced from this survey are disseminated from the USGS website (<http://www.dmr.alaska.gov>). Contact the USGS Alaska Division, Geology and Geophysics, 4300 Airport Way, Anchorage, Alaska 99508. Phone: 907-455-1344. Fax: 907-455-1345. Email: alaska@usgs.gov



SURVEY LOCATION



AIRBORNE MAGNETIC GEOPHYSICAL SURVEY OF THE PORCUPINE RIVER REGION, ALASKA

TILT DERIVATIVE GRID AND CONTOURS

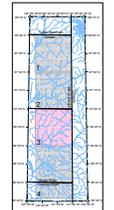
<http://doi.org/10.14509/29737>
by EON Geosciences Inc.
2019



CONTOUR LEGEND



LOCATION INDEX OF 1:63,360 SCALE MAP

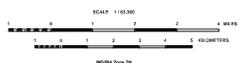


SURVEY HISTORY

Airborne geophysical data for the area were acquired and processed by EON Geosciences Inc. under contract with the State of Alaska, Department of Geological Survey, under a contract with the U.S. Geological Survey, Alaskan Seismicity Program.

DESCRIPTIVE NOTES
This map was derived from data acquired in an aeromagnetic survey conducted by EON Geosciences Inc. from March 2 to June 28, 2017 using a GEM-3M magnetometer. The magnetic field was measured at 10 m altitude using a GEM-3M magnetometer mounted on a fixed-wing aircraft. The data were processed using a standard aeromagnetic processing pipeline including detrending, leveling, and reduction to magnetic equator. The resulting magnetic field was then differentiated to produce the tilt derivative grid. The contours were generated using a contouring algorithm. The map was produced using ArcGIS software. The map is a derivative of the original data and is not a substitute for the original data. The map is intended for informational purposes only. The map is not to be used for navigation or other purposes. The map is the property of the U.S. Geological Survey and is not to be distributed outside the agency without the express written permission of the U.S. Geological Survey.

TILT DERIVATIVE OF THE MAGNETIC FIELD
The tilt derivative of the magnetic field is a measure of the rate of change of the magnetic field in a particular direction. It is calculated as the partial derivative of the magnetic field with respect to the horizontal distance. The tilt derivative is a vector quantity and is represented by a color scale. The color scale ranges from purple (high tilt) to blue (low tilt). The tilt derivative is a useful tool for identifying magnetic anomalies and for understanding the underlying geology. The tilt derivative is calculated using a finite difference method. The map is a derivative of the original data and is not a substitute for the original data. The map is intended for informational purposes only. The map is not to be used for navigation or other purposes. The map is the property of the U.S. Geological Survey and is not to be distributed outside the agency without the express written permission of the U.S. Geological Survey.



USGS Zone 16

All data and maps produced from this survey are disseminated from the USGS website. Maps are available to view from the USGS office. Data are available from the USGS website. <http://www.usgs.gov>

