

Kuskokwim airborne magnetic and radiometric geophysical survey, McGrath, Alaska

Logan A. Fusso, Eric I. Petersen, Abraham M. Emond, and EON Geosciences Inc.

GPR 2026-2



EON Geosciences Piper Navajo C-FION, used for the 2025 portion of the McGrath survey, pictured here.

The Geophysical Report (GPR) series provides airborne survey data, maps, acquisition details, and occasionally limited interpretive modeling. These publications are reviewed for clarity and consistency but do not undergo technical peer review.

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Kuskokwim airborne magnetic and radiometric geophysical survey, McGrath, Alaska

Logan A. Fusso¹, Eric I. Petersen¹, Abraham M. Emond^{1*}, and EON Geosciences Inc.²

INTRODUCTION

The Kuskokwim airborne magnetic and radiometric geophysical survey, McGrath, Alaska, covers parts of the Norton Bay, Nulato, Ruby, Unalakleet, Ophir, Medfra, Holy Cross, Iditarod, and McGrath quadrangles (fig. 1). EON Geosciences Inc. collected magnetic and radiometric data with four fixed wing aircraft from June 23 to September 5, 2024, then from June 14 to July 26, 2025. A total of 86,319 line-kilometers were acquired. Magnetic data were collected with a Geometrics G-822A cesium-vapour split-beam sensor; Radiometric data were collected with two (2) Radiation Solutions RS-500 series multi-channel gamma-ray spectrometers, model RSX-5, with 512 channels, for a total crystal volume of 33.6 liters downward-looking and 8.4 upward-looking (for atmospheric radon detection). The McGrath survey was flown with a line spacing of 400 meters (m) and a nominal ground clearance of 100 m. The data from the McGrath airborne magnetic and radiometric geophysical survey will improve understanding of the geology and mineral potential and promote resource exploration of the central Kuskokwim River region of Alaska. These data and accompanying discussion are released as a DGGs Geophysical Report and are available from the DGGs website at <https://doi.org/10.14509/31804>.

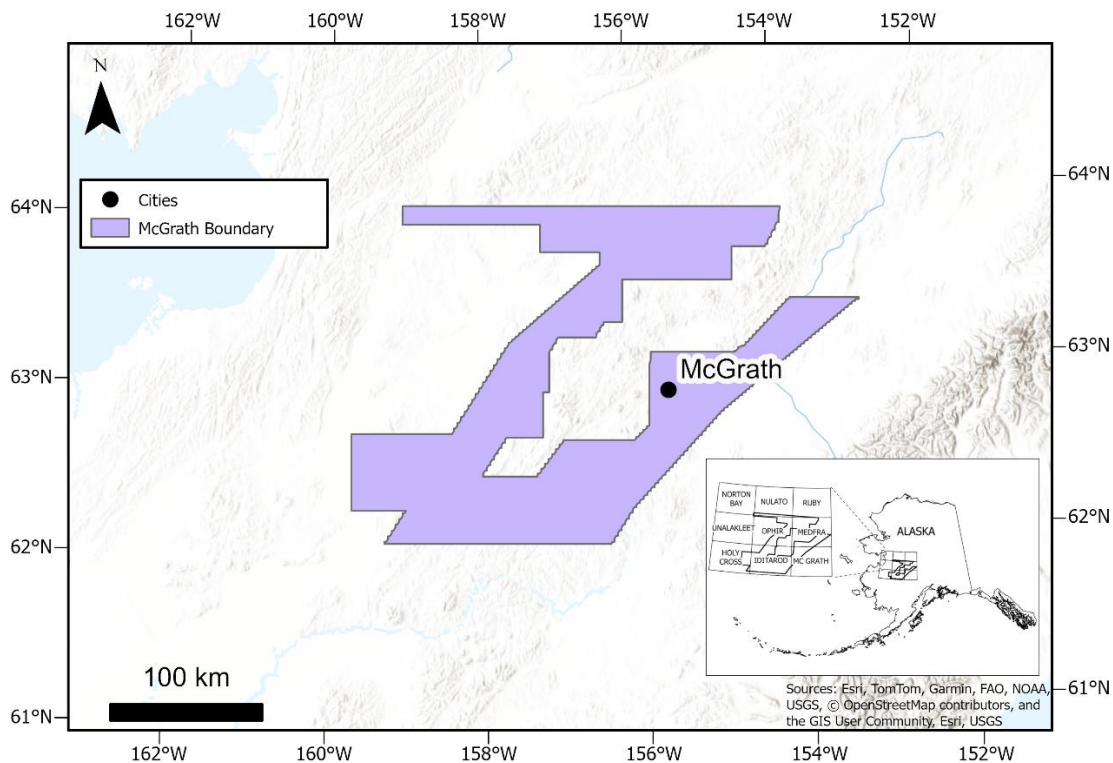


Figure 1. Location map of the McGrath geophysical survey boundary. The inset map shows the survey location within Alaska, with the relevant 1:250,000-scale quadrangle labeled.

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DATA PRODUCTS

This document provides an overview of the survey and includes text and figures of selected primary and derivative products. Table 1 lists available data packages. Table 2 provides a catalog of full-scale maps available for downloading. Please consult the metadata, project report, and digital data packages for more information and data.

Table 1. Data available for download

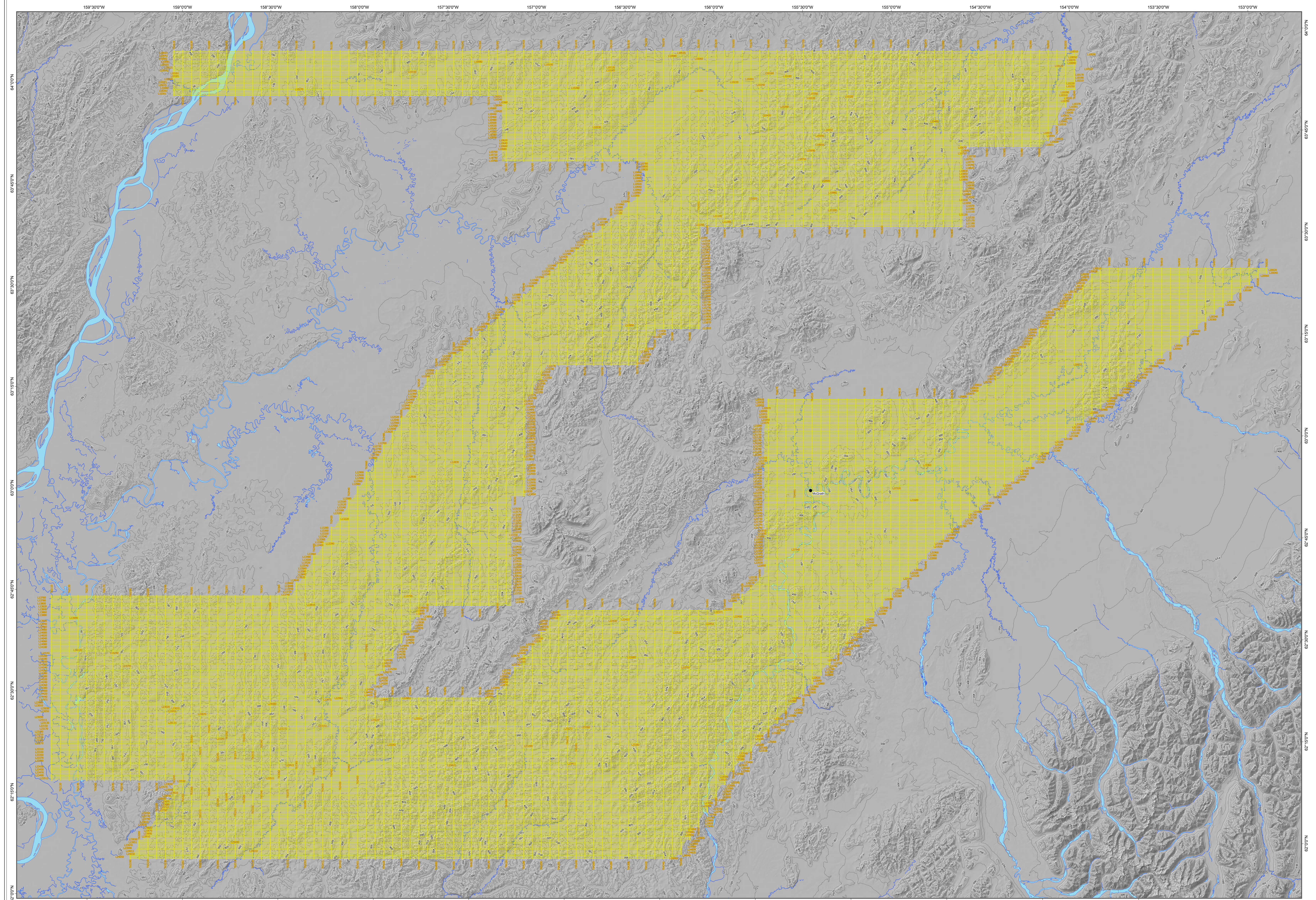
Data Package	Description
ascii_data	ASCII format line data, other ASCII data
databases_geosoft	Geosoft format database of final line data, other Geosoft format databases
documents	Project report, calibration reports
grids_geosoft	Oasis montaj Geosoft GRD format gridded data
grids_tif	Geographically registered data value rasters of gridded data, GeoTiff format
kmz	keyhole markup language (kml) kmz archive files of project data.
maps_pdf	Printable and geographically registered maps in PDF format.
vector_data	Line path and survey boundary in Esri shapefile (shp) format

Table 2. Full-scale printable maps are available in Portable Document Format (*.pdf) with a resolution of 300 dpi. See Appendix A for previews of these maps in reduced-resolution page-sized format. The page-sized format is intended for reference and search purposes only.

Map Title	File Name
Flight path	mcgrath_flightpath.pdf
Magnetics	
Analytic Signal	mcgrath_mag_analyticsignal.pdf
Calculated 1st Vertical Derivative	mcgrath_mag_c1vd.pdf
Calculated 2nd Vertical Derivative	mcgrath_mag_c2vd.pdf
Residual Magnetic Intensity	mcgrath_mag_residual.pdf
Tilt Derivative	mcgrath_mag_tiltderivative.pdf
Radiometrics	
Thorium	mcgrath_rad_equiv_th.pdf
Uranium	mcgrath_rad_equiv_u.pdf
Natural Air Absorbed Dose Rate	mcgrath_rad_naadr.pdf
Potassium	mcgrath_rad_pct_k.pdf
Ratio Potassium/Uranium	mcgrath_rad_ratio_k_u.pdf
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Ternary Map	mcgrath_rad_ternary.pdf

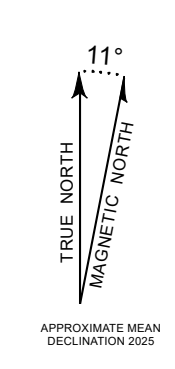
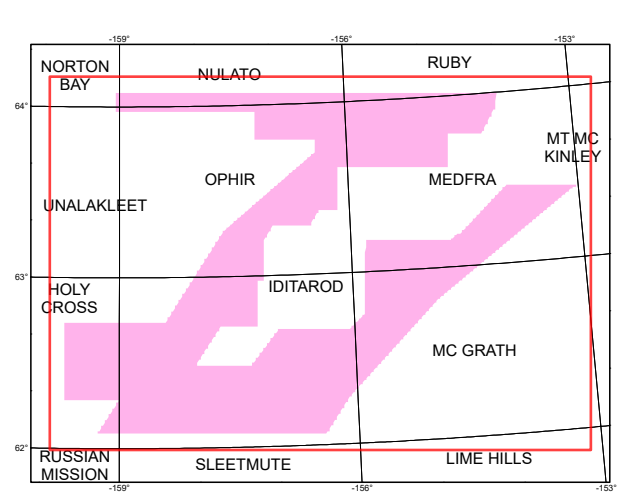
ACKNOWLEDGMENTS

This work was funded by the United States Geological Survey Earth Mapping Resources Initiative (Earth MRI) grants G22AC00475 and G23AC00408. The authors thank Eon Geosciences for their expertise in geophysical data collections. The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the opinions or policies of the U.S. Geological Survey. Mention of trade names or commercial products does not constitute their endorsement by the U.S. Geological Survey.

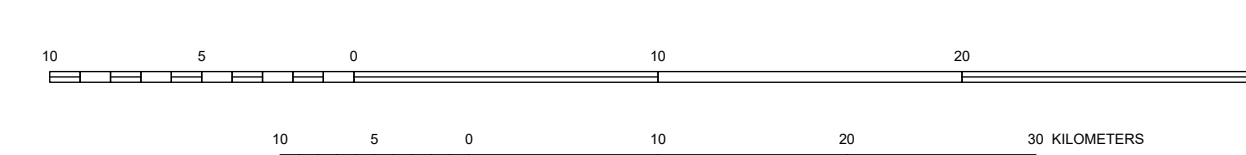


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2026



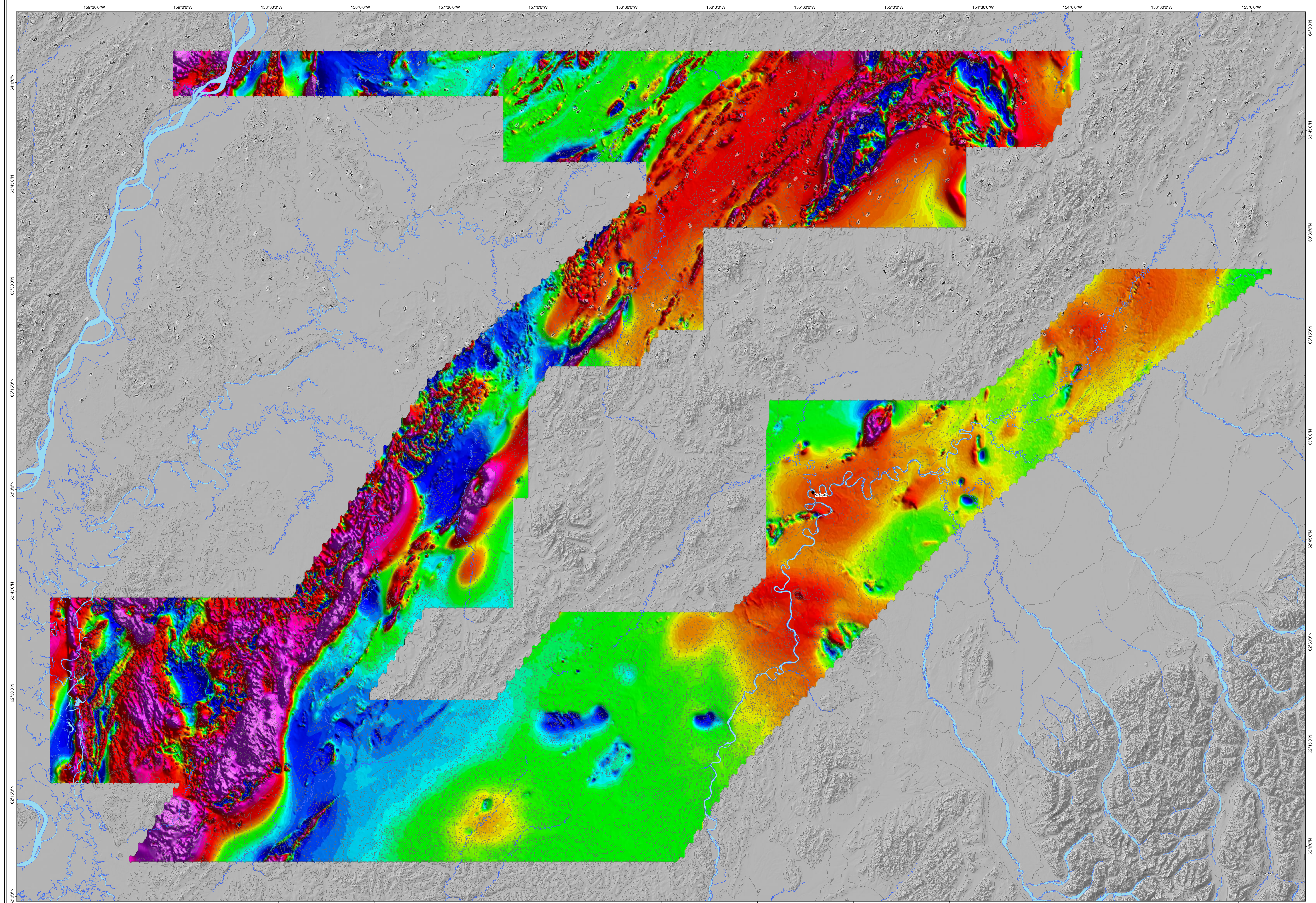
XXXXX — Flight Paths, Survey Line Number Labeled

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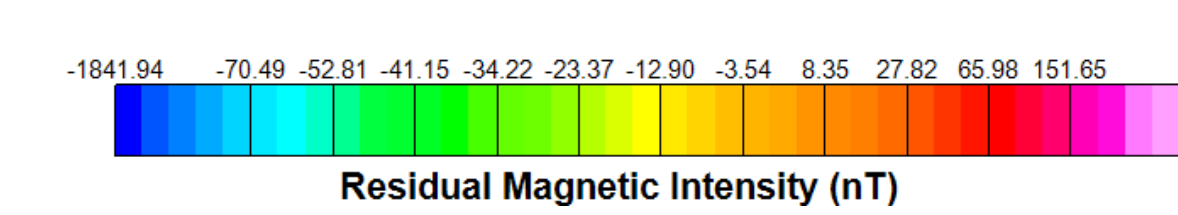
Note: All survey line numbers are shown. Survey line numbers are displayed at the start of each line, indicating the direction flown. Note that in some cases multiple lines may be oriented along the same line of latitude or longitude, one picking up where the previous line ended. This could be due to inclement weather during collection causing multiple flights for a single line; inclement space weather causing magnetic diurnals during collection; or flight paths flown out of contract specification requiring a re-flight. This work was supported the United States Geological Survey Earth Mapping Resources Initiative (Earth MRI) grants G23AC00408 and G24AC00629.

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ESRI Basemaps - ESRI, USGS
Basemap contours from:
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Projection:
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Datum:
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Cartography by:
E.I. Petersen and A.E. Macpherson (2025)





Residual Mag
Kuskokwim airborne magnetic and radiometric survey, McGrath, Alaska
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Fusso, L.A.¹, Petersen E.I.¹, Emond, A.M.², and EON Geosciences, Inc.³
2026

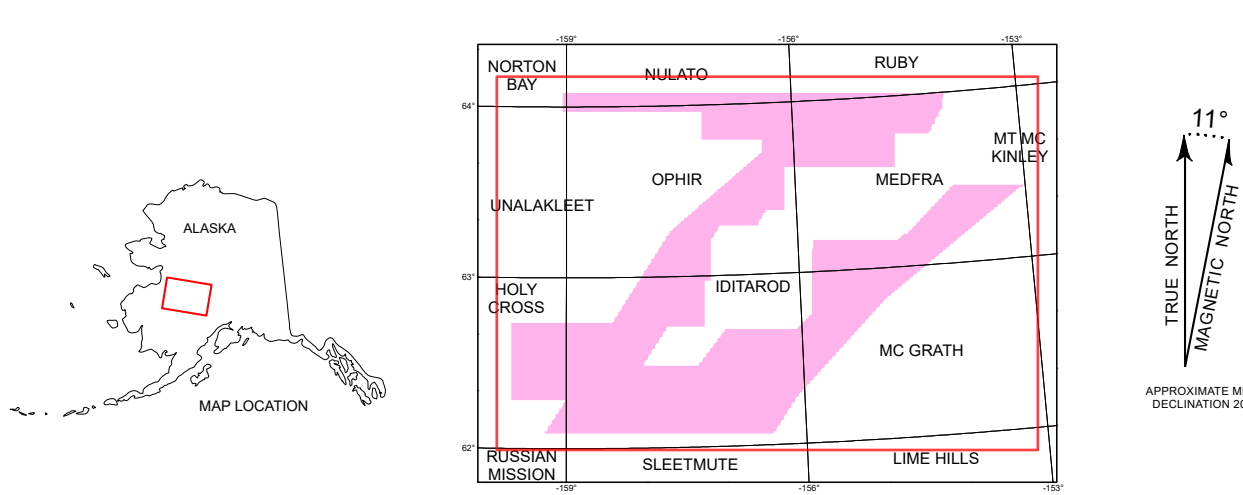


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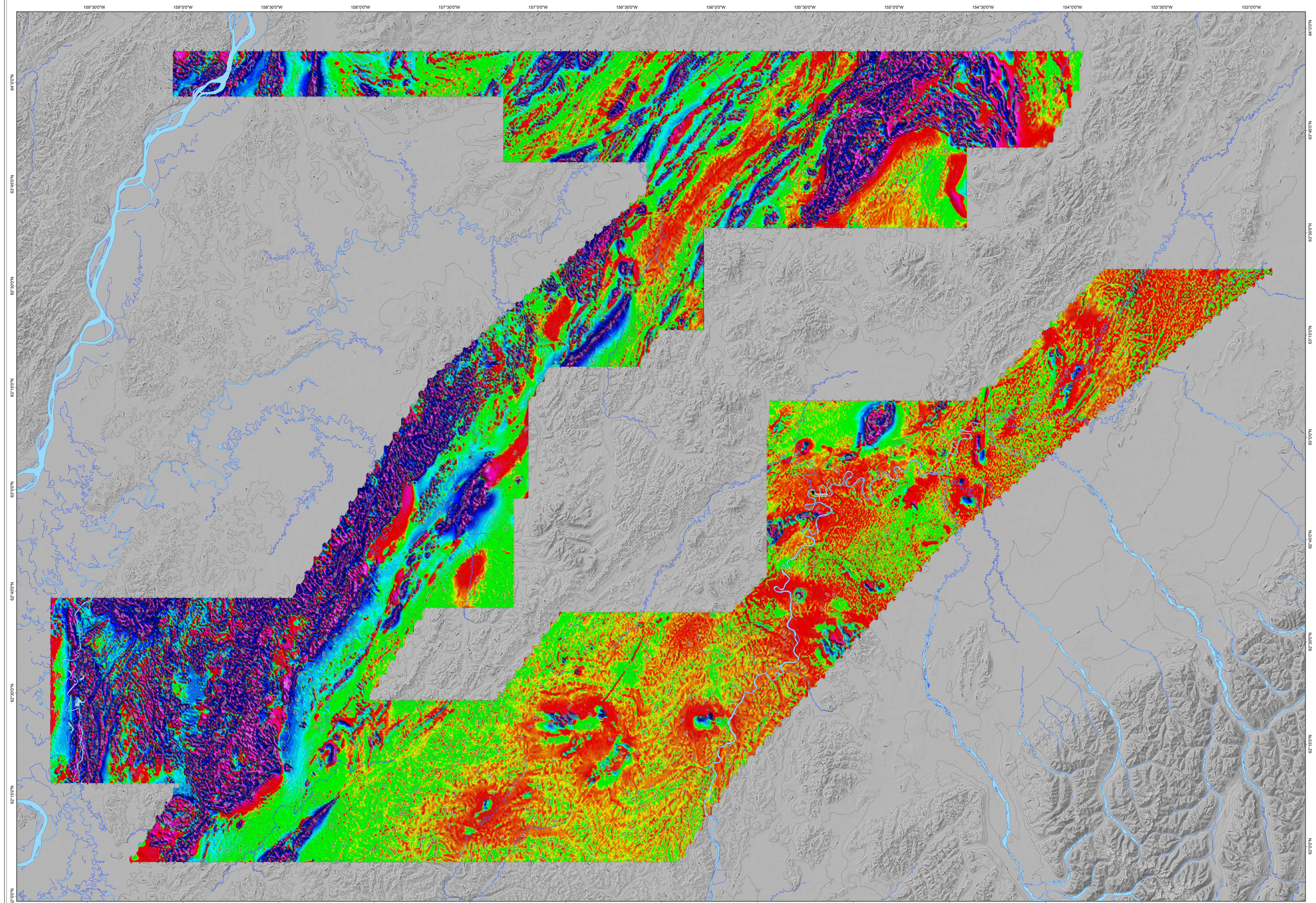
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Projection:
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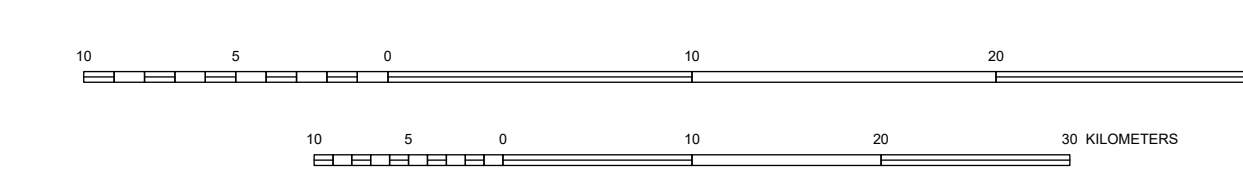
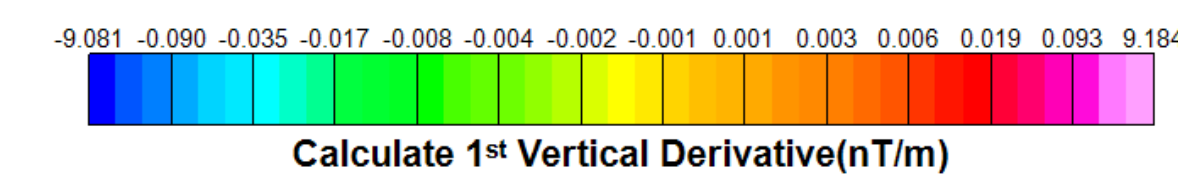
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Calculated 1st Vertical Derivative
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Fusso, L.A.¹, Petersen E.I.¹, Emond, A.M.², and EON Geosciences, Inc.³
2026

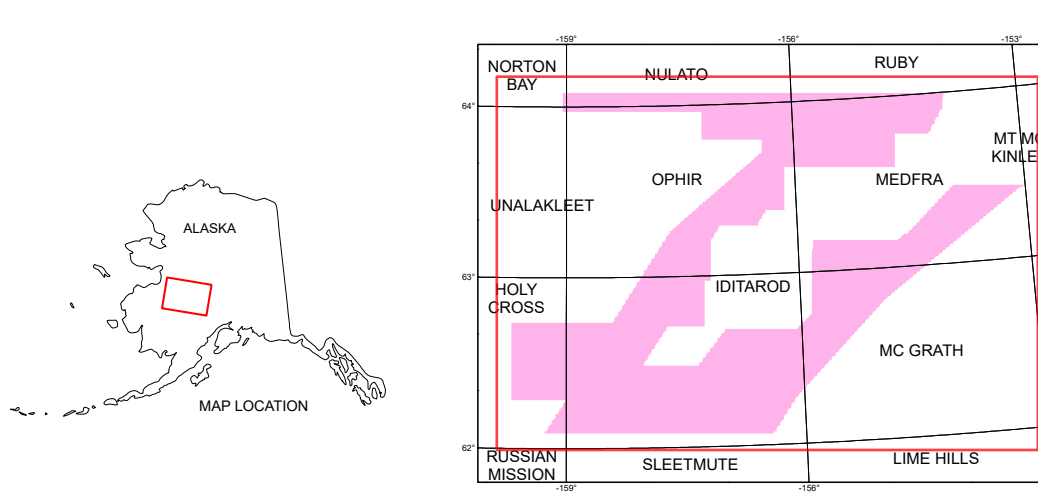


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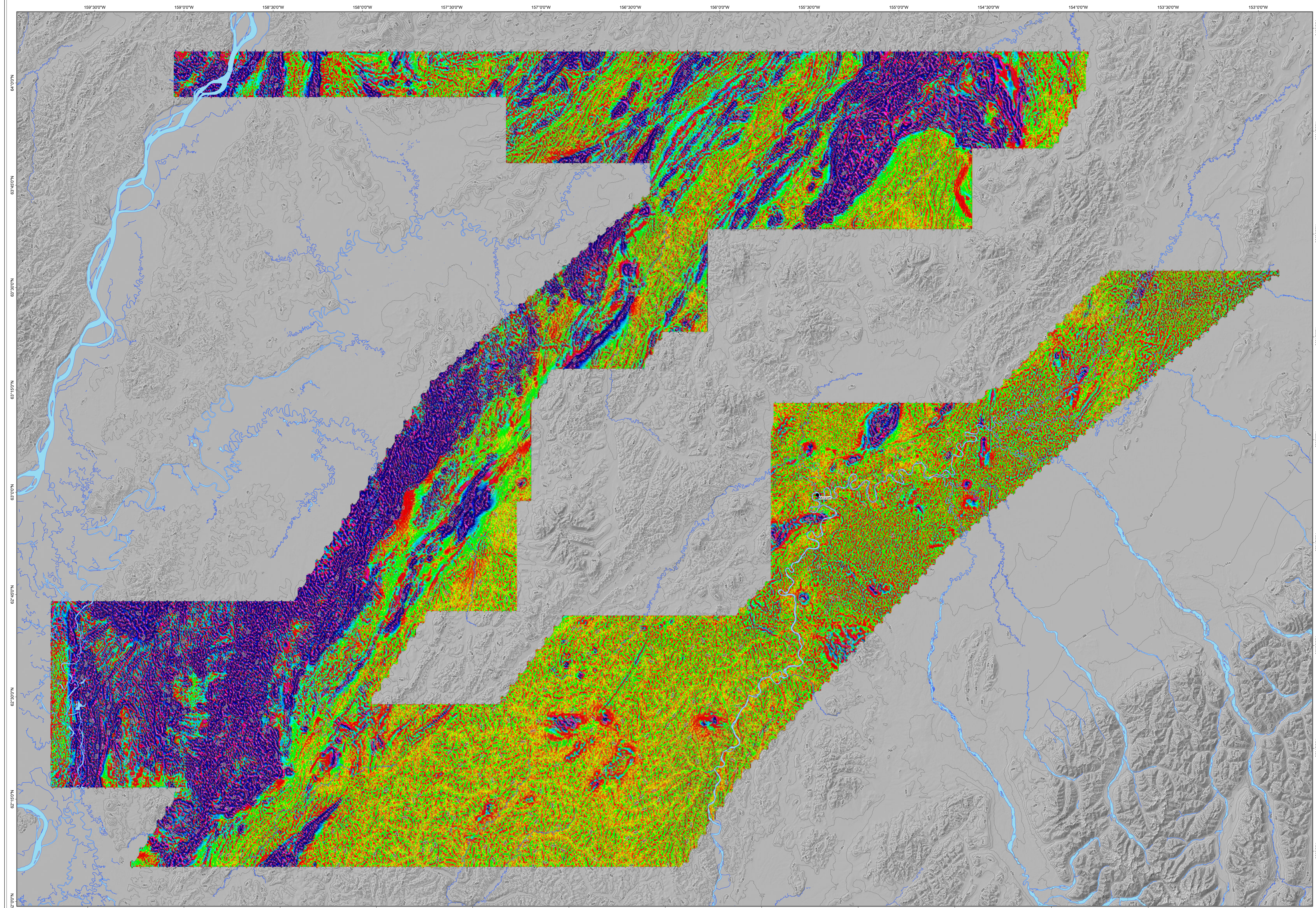
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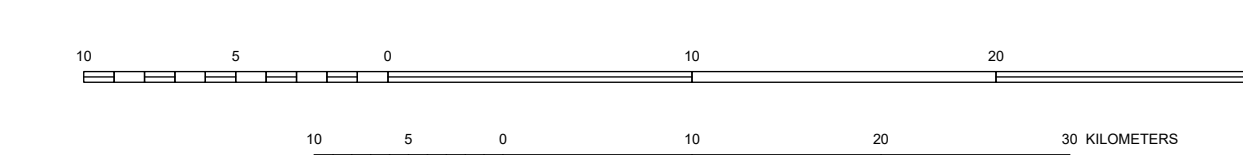
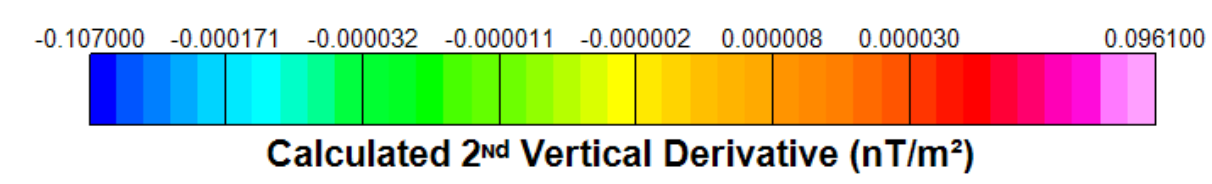


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WGS 1984
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2026

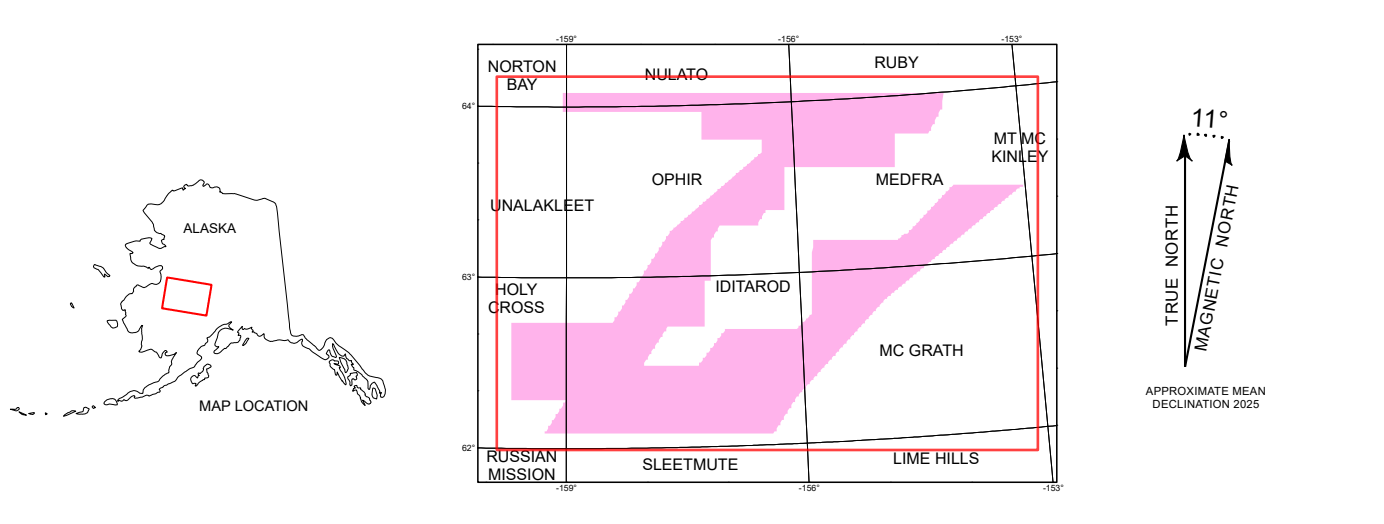


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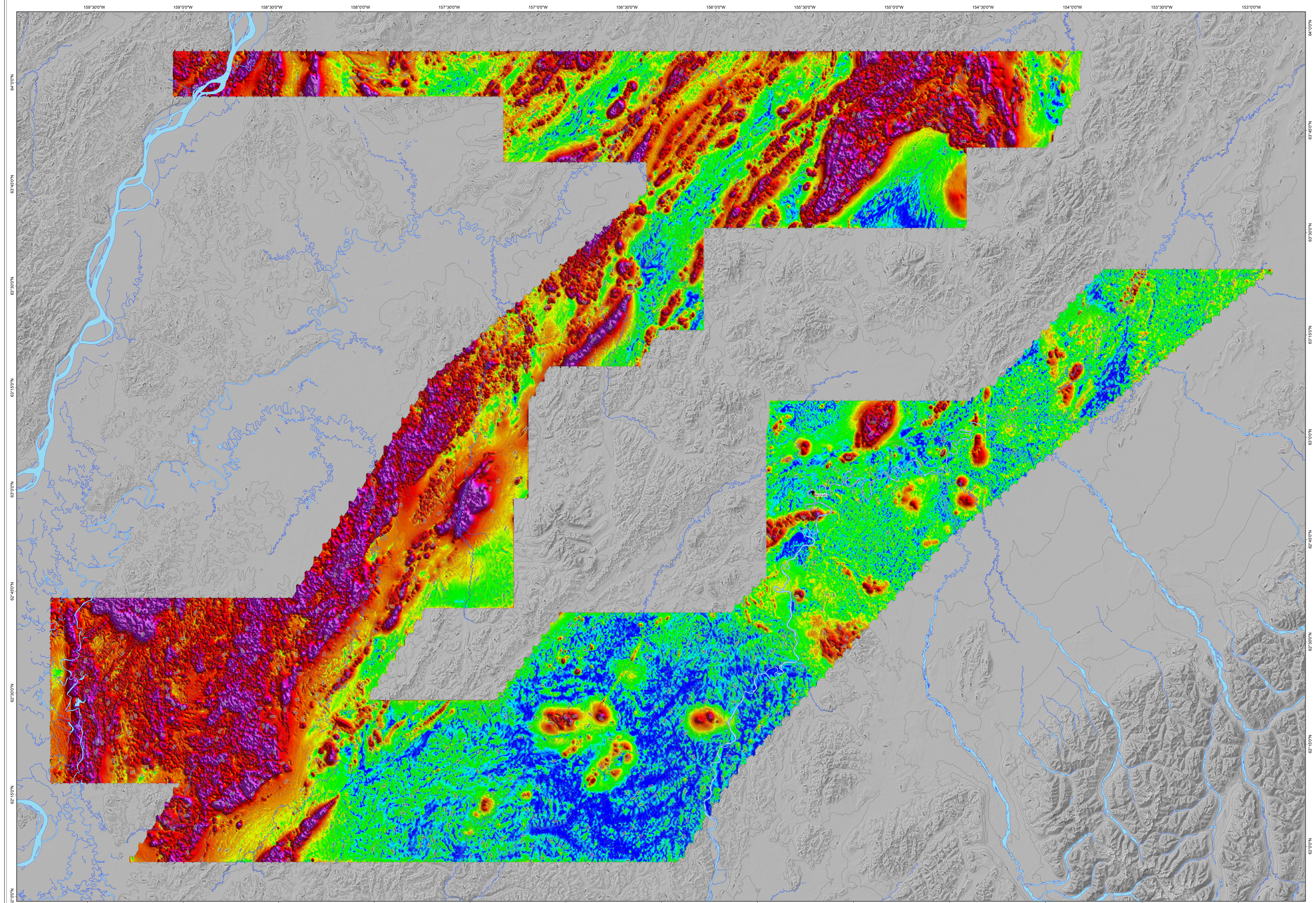
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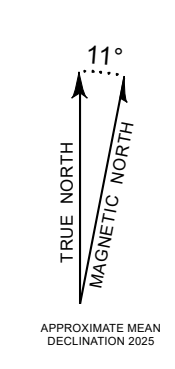
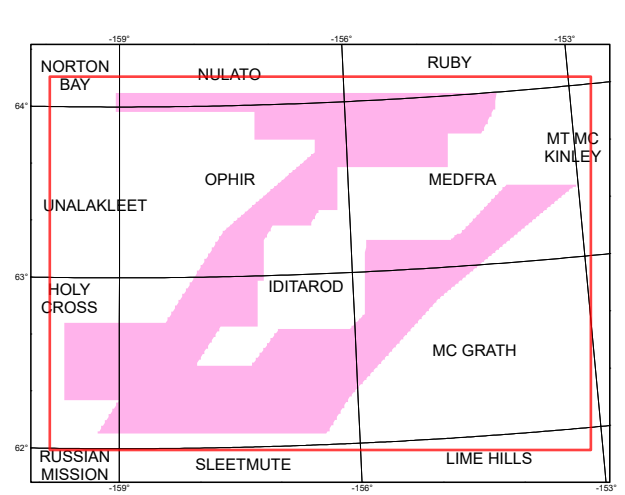
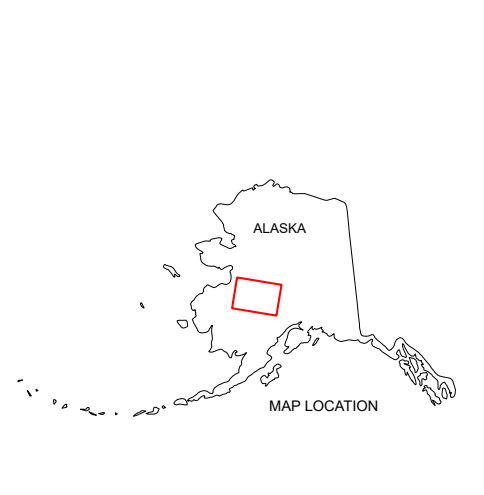
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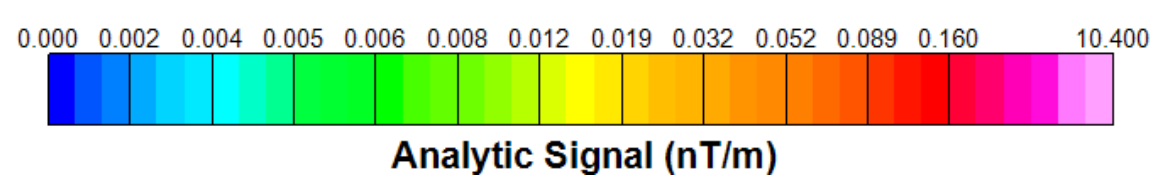


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Analytic Signal
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 by
 Fusso, L.A.¹, Petersen E.I.¹, Emond, A.M.², and EON Geosciences, Inc.³
 2026



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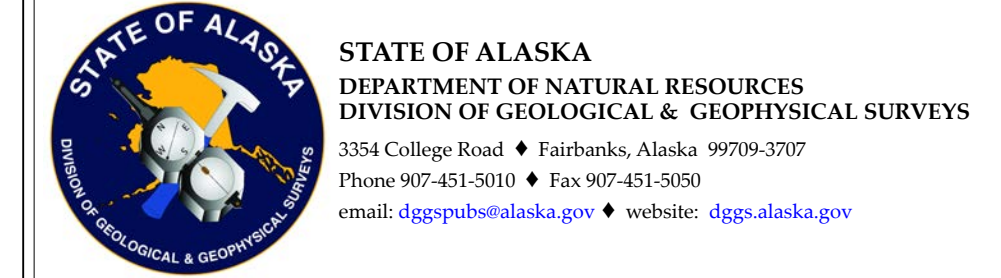
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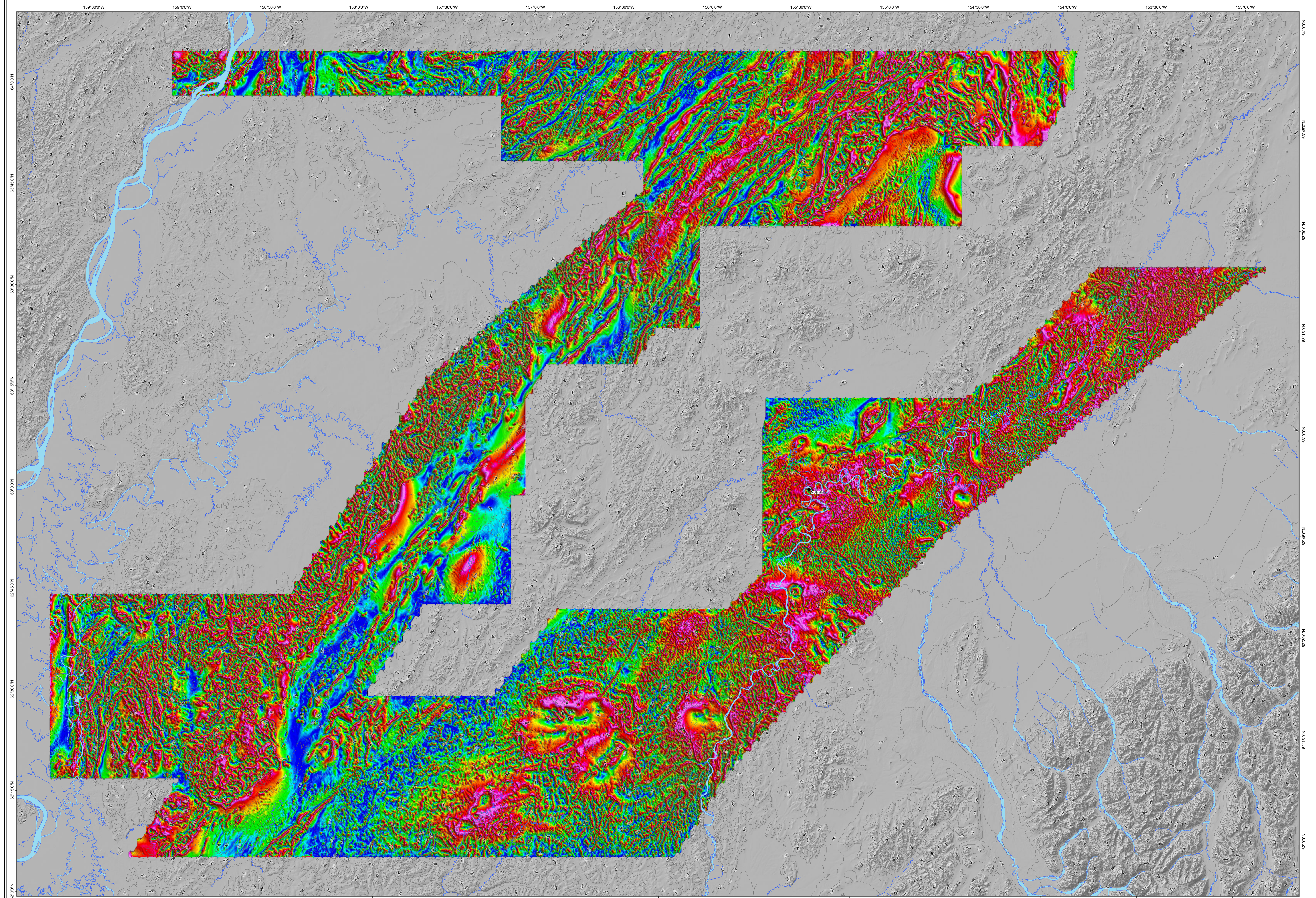
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Projection:
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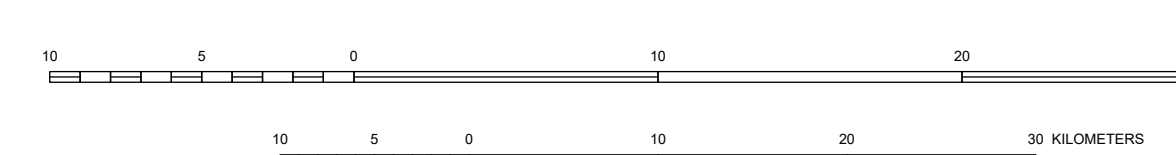
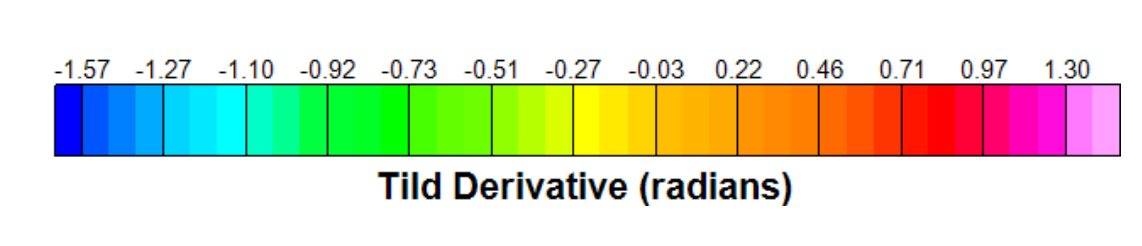
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Cartography by:
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Tilt Derivative
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 2026

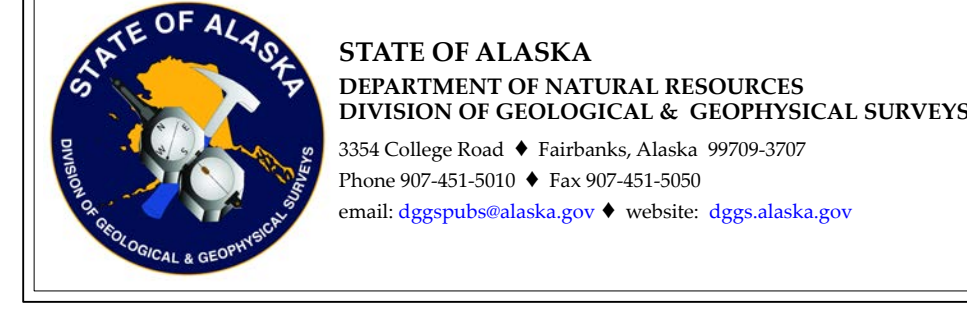
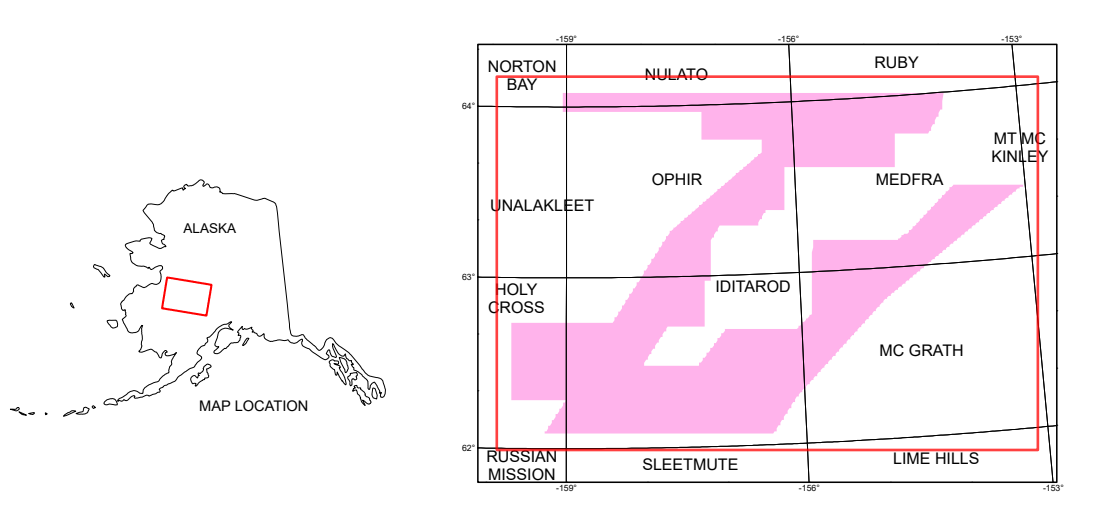


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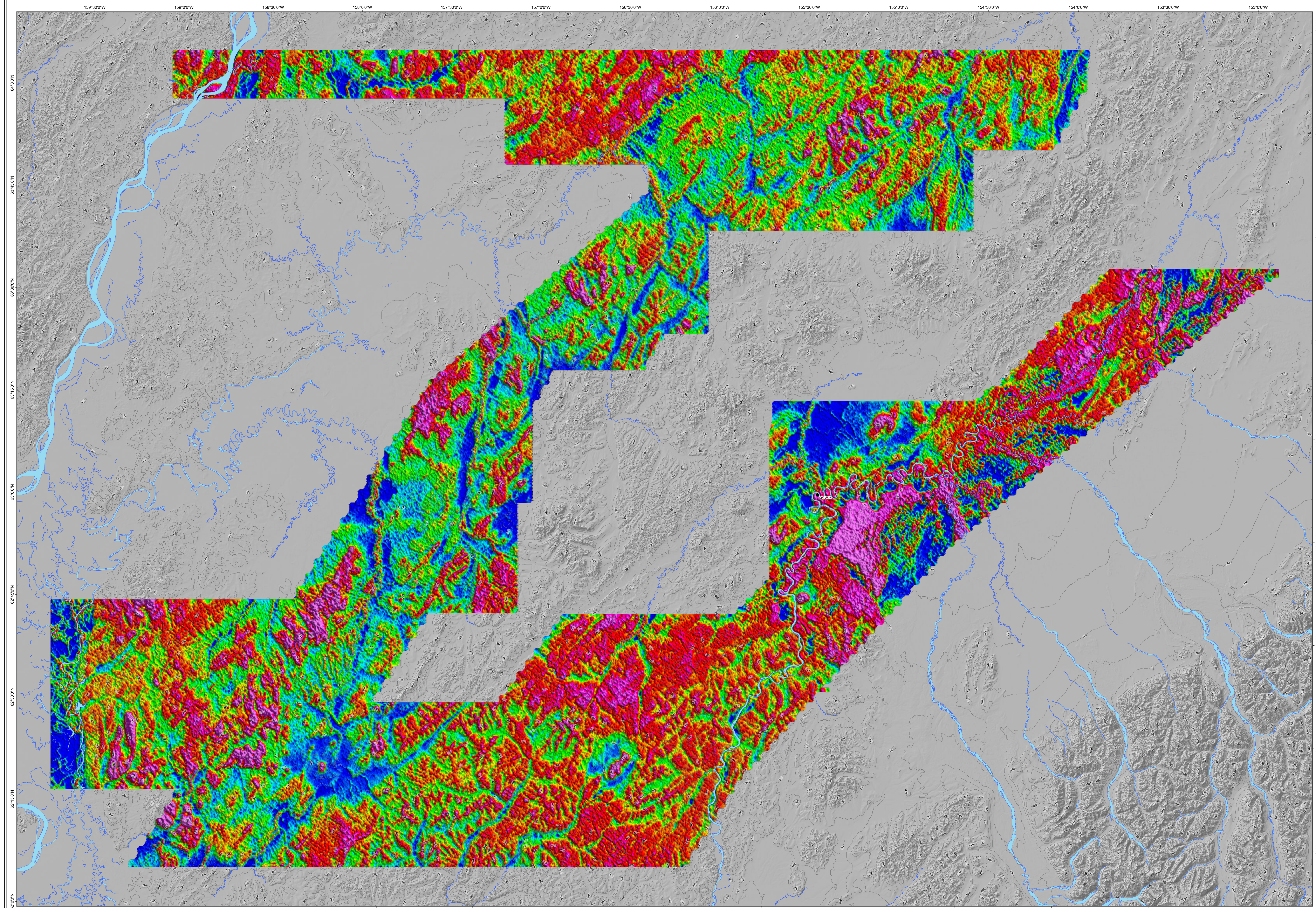
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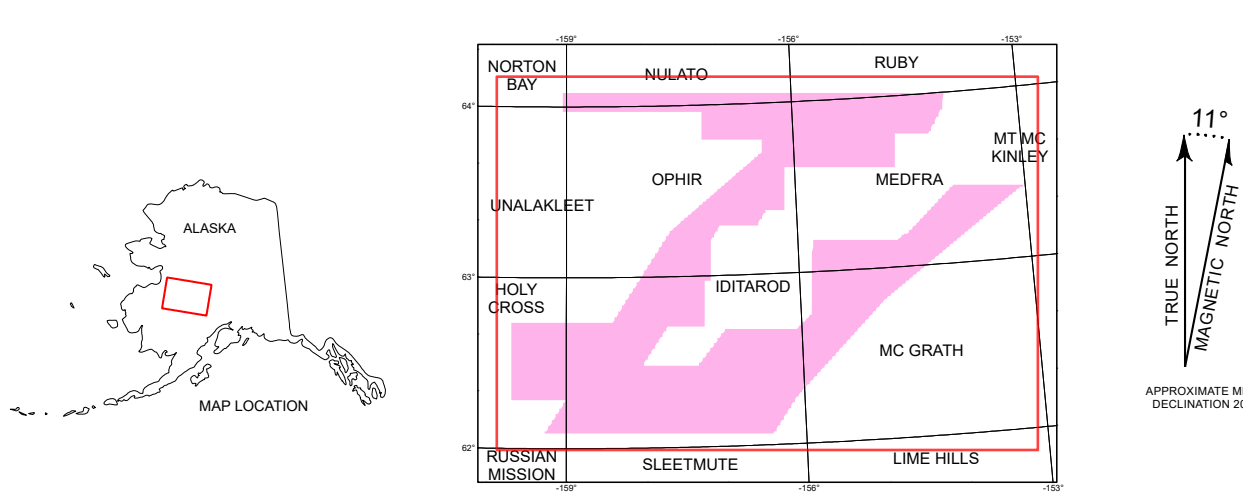


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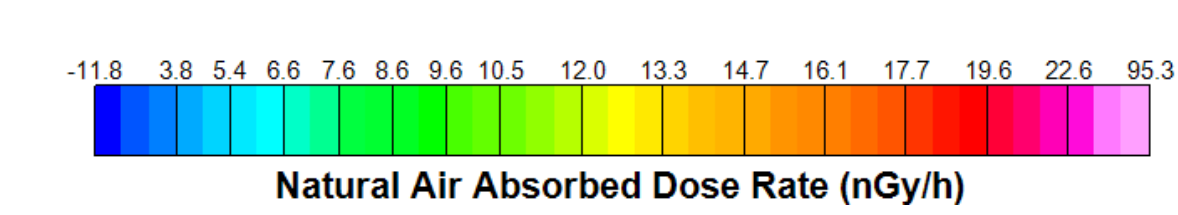


Natural Air Absorbed Dose Rate
Kuskokwim McGrath airborne magnetic and radiometric survey, McGrath, Alaska

by
 Fusso, L.A.¹, Petersen E.I.¹, Emond, A.M.², and EON Geosciences, Inc.³

2026

SCALE 1:400,000
 CONTOUR INTERVAL 100 METERS



Affiliations:
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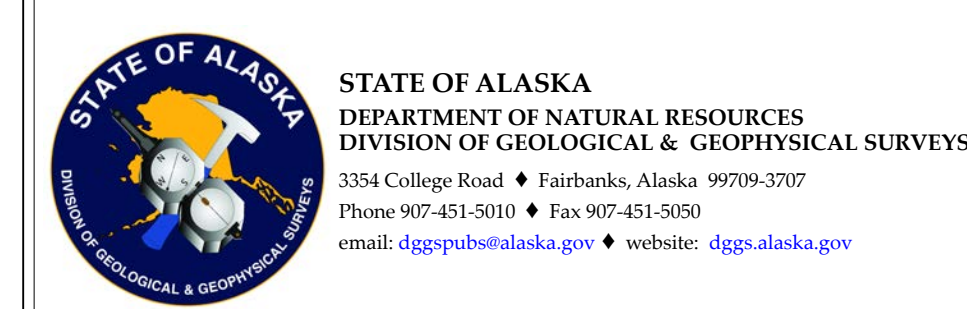
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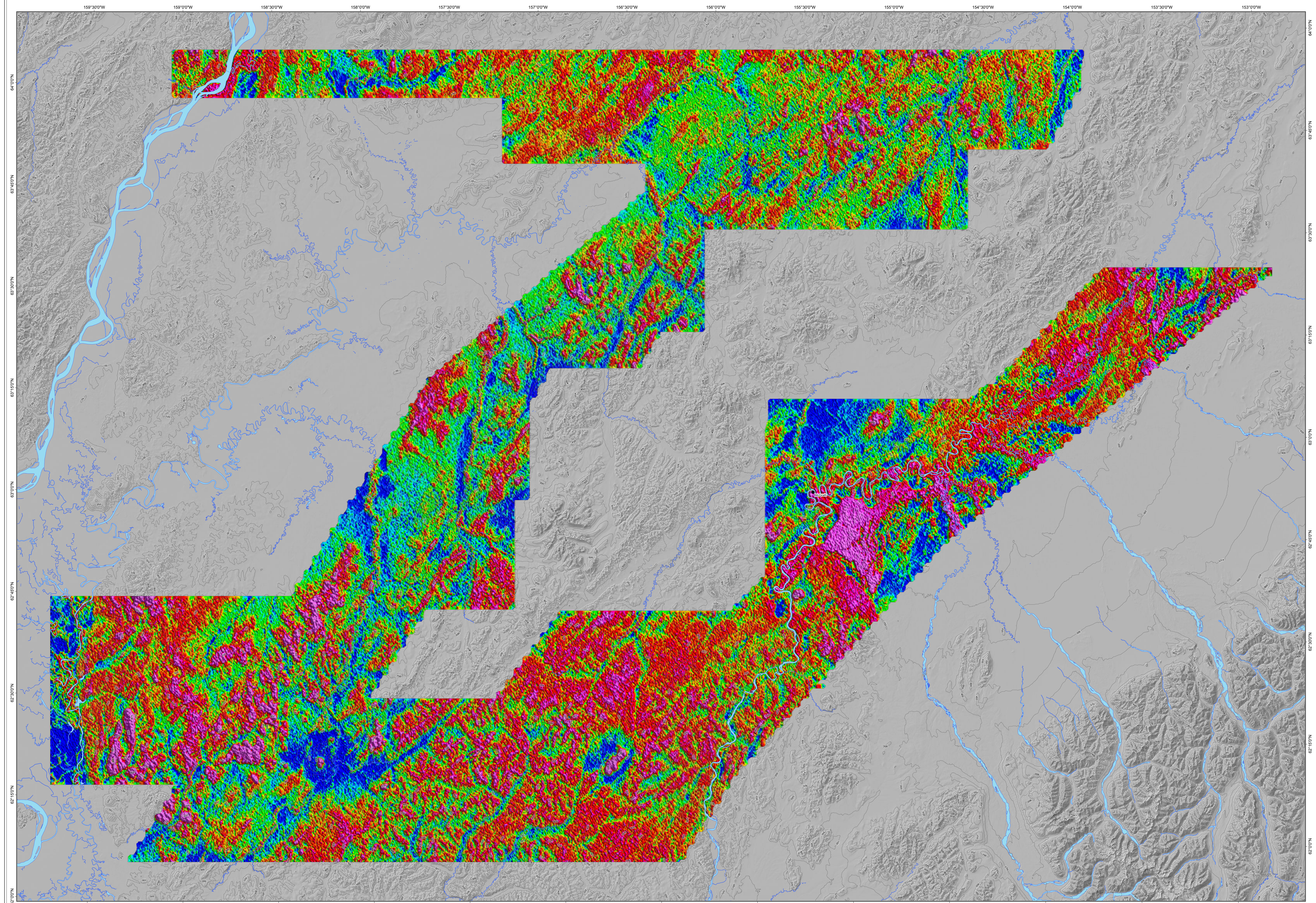
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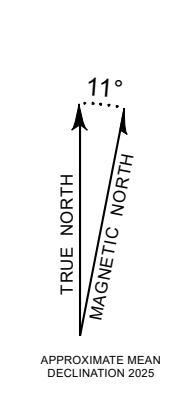
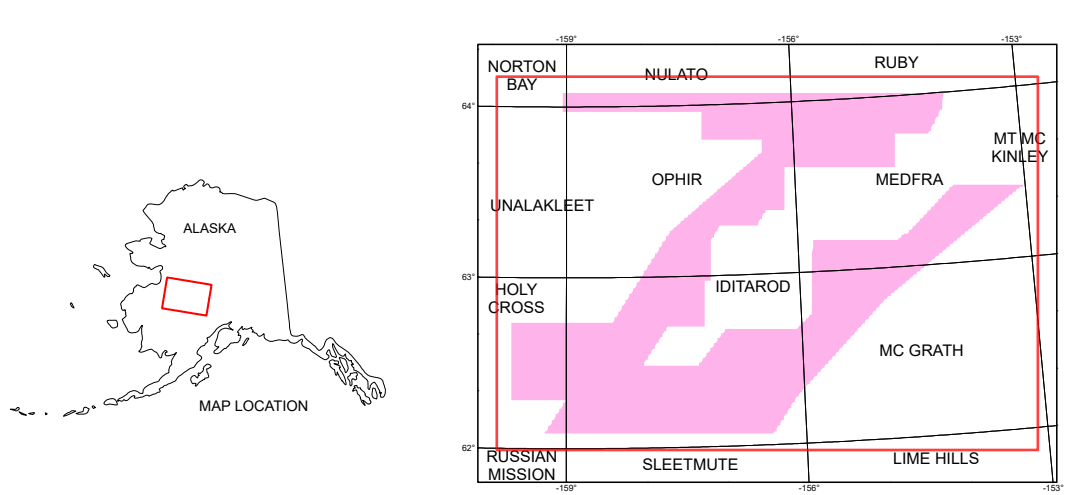
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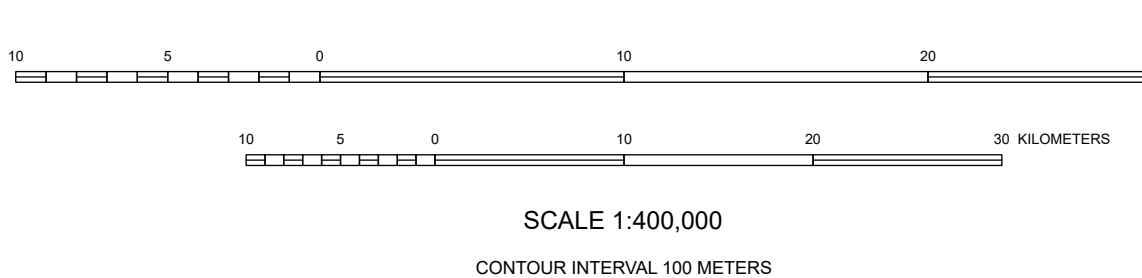
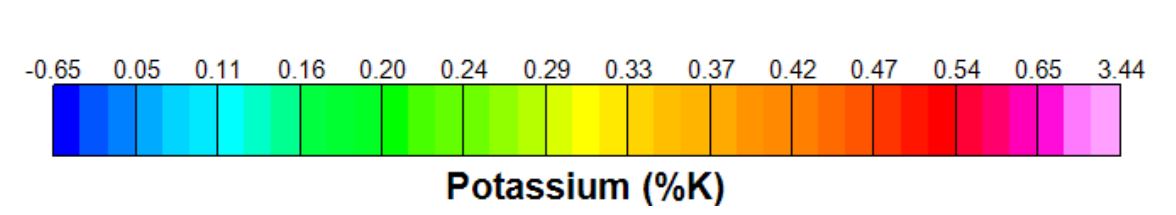
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Potassium
Kuskokwim airborne magnetic and radiometric survey, McGrath, Alaska

by
 Fusso, L.A.¹, Petersen E.I.¹, Emond, A.M.², and EON Geosciences, Inc.³
 2026



Affiliations:
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³ EON Geosciences Inc., 4018 boul. Côte-Vertu, St-Laurent, QC, Canada H4R 1V4

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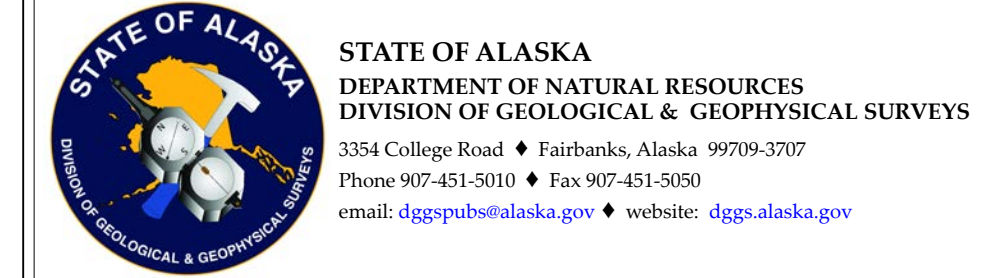
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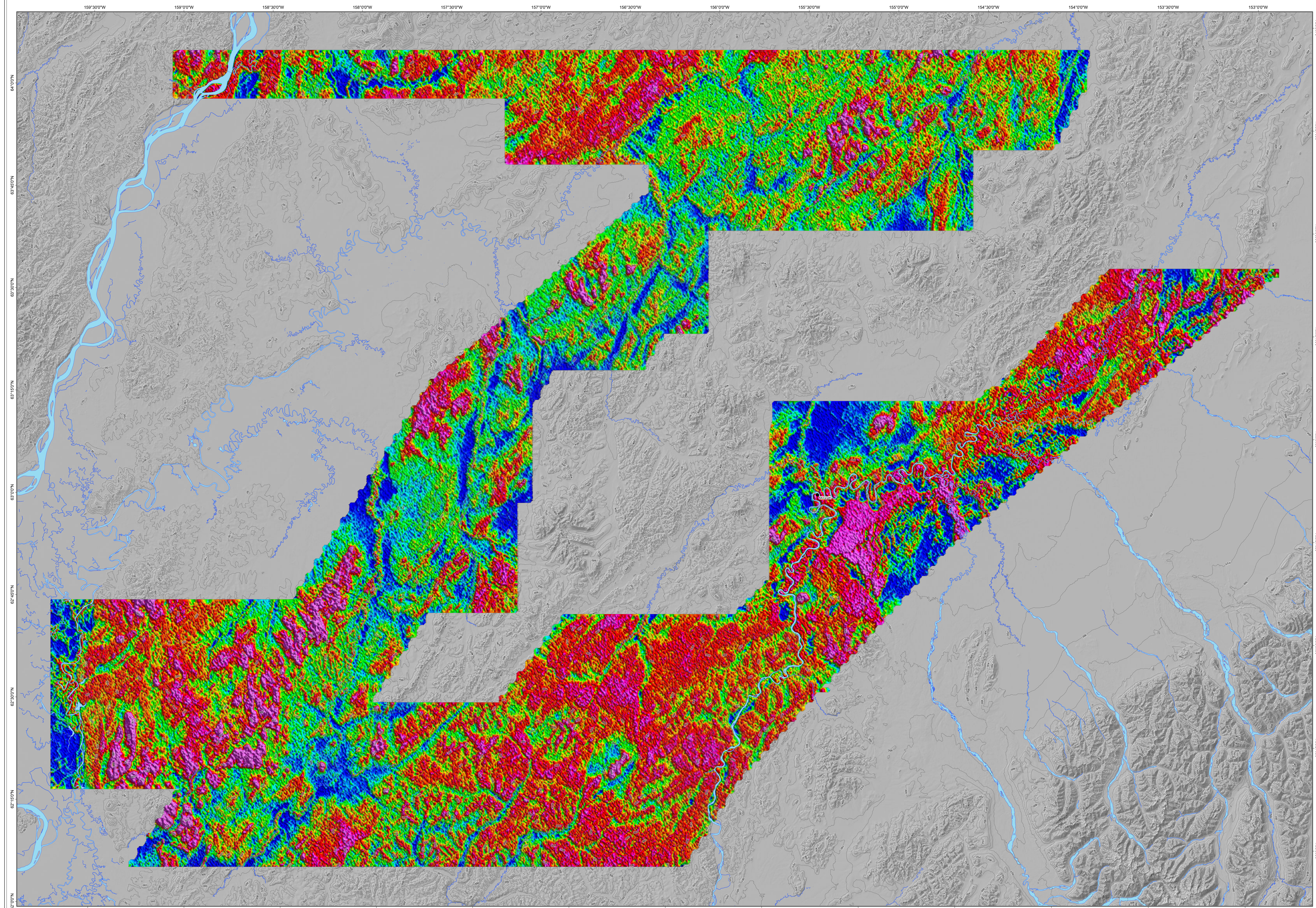
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Projection:
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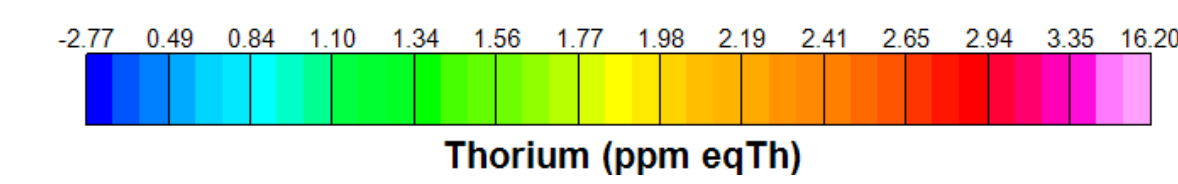
Datum:
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Cartography by:
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Thorium
Kuskokwim airborne magnetic and radiometric survey, McGrath, Alaska
 by
 Fusso, L.A.¹, Petersen E.I.¹, Emond, A.M.², and EON Geosciences, Inc.³
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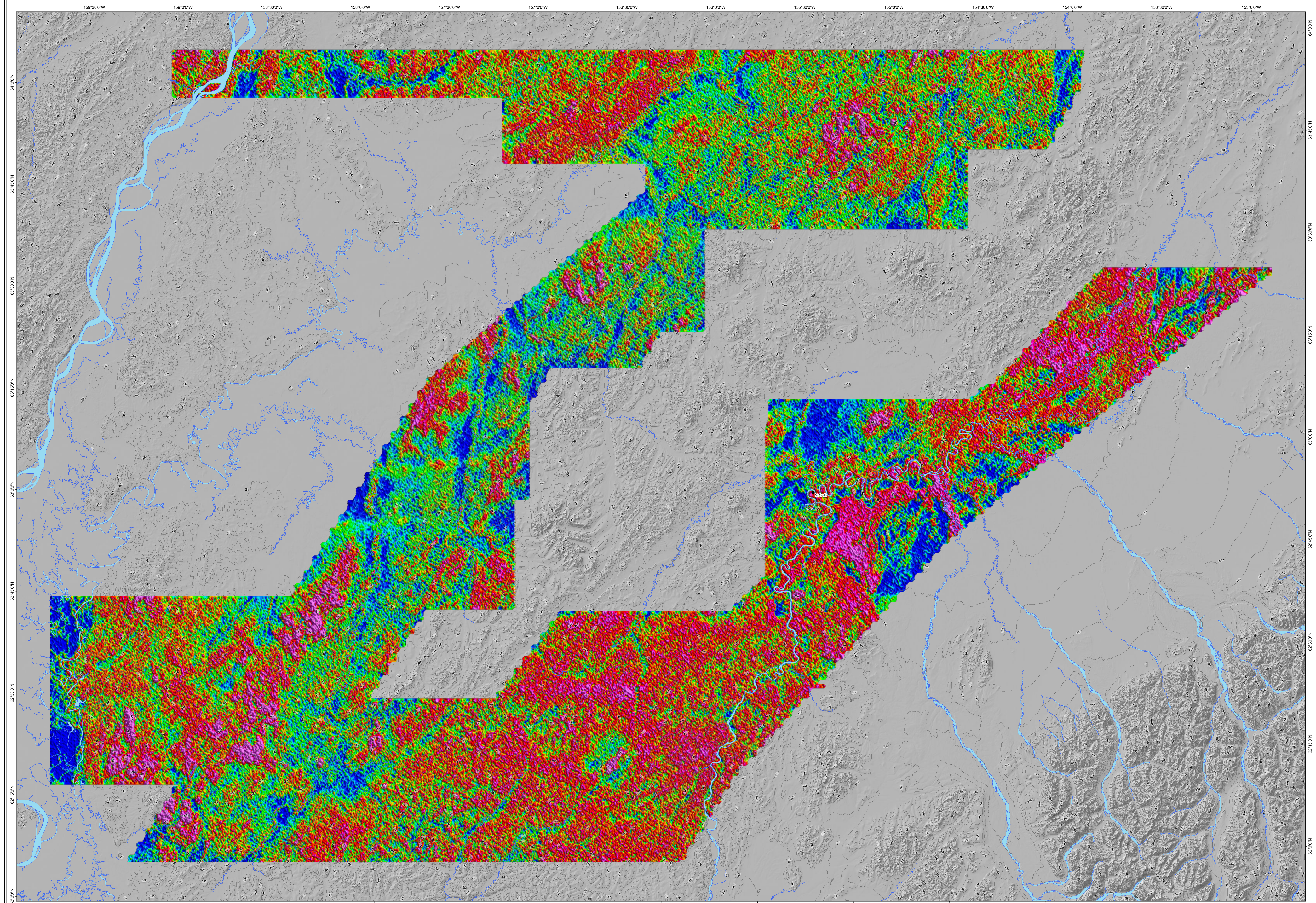
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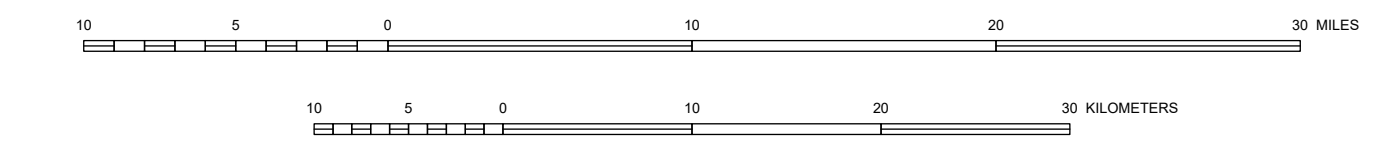
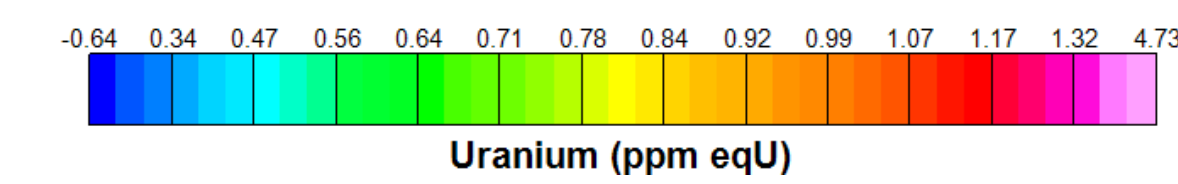
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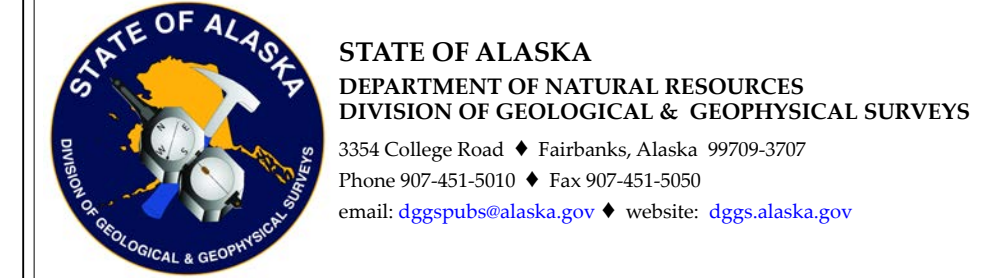
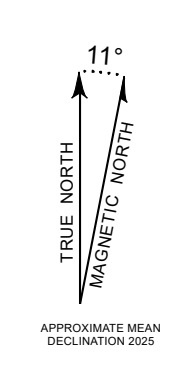
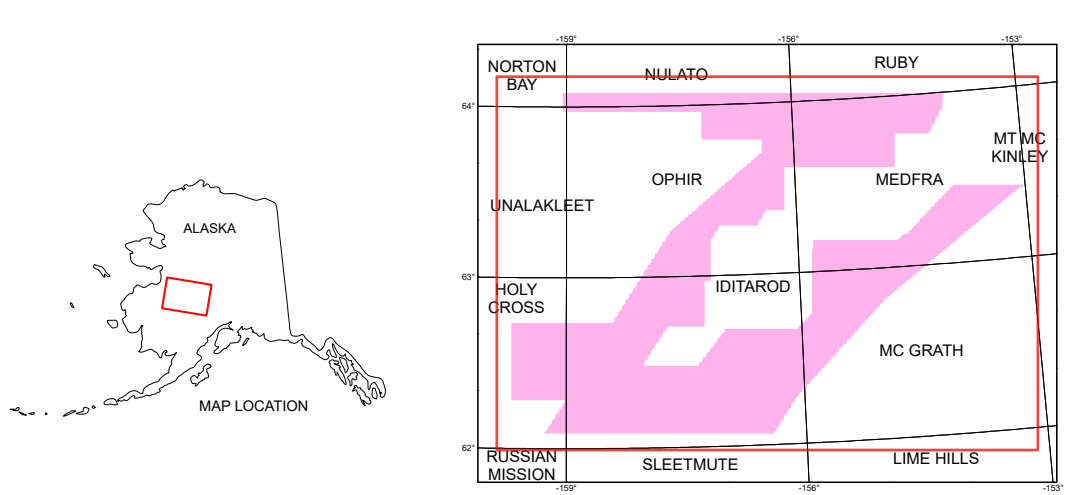


Uranium
Kuskokwim airborne magnetic and radiometric survey, McGrath, Alaska
 by
 Fusso, L.A.¹, Petersen E.I.¹, Emond, A.M.², and EON Geosciences, Inc.³
 2026



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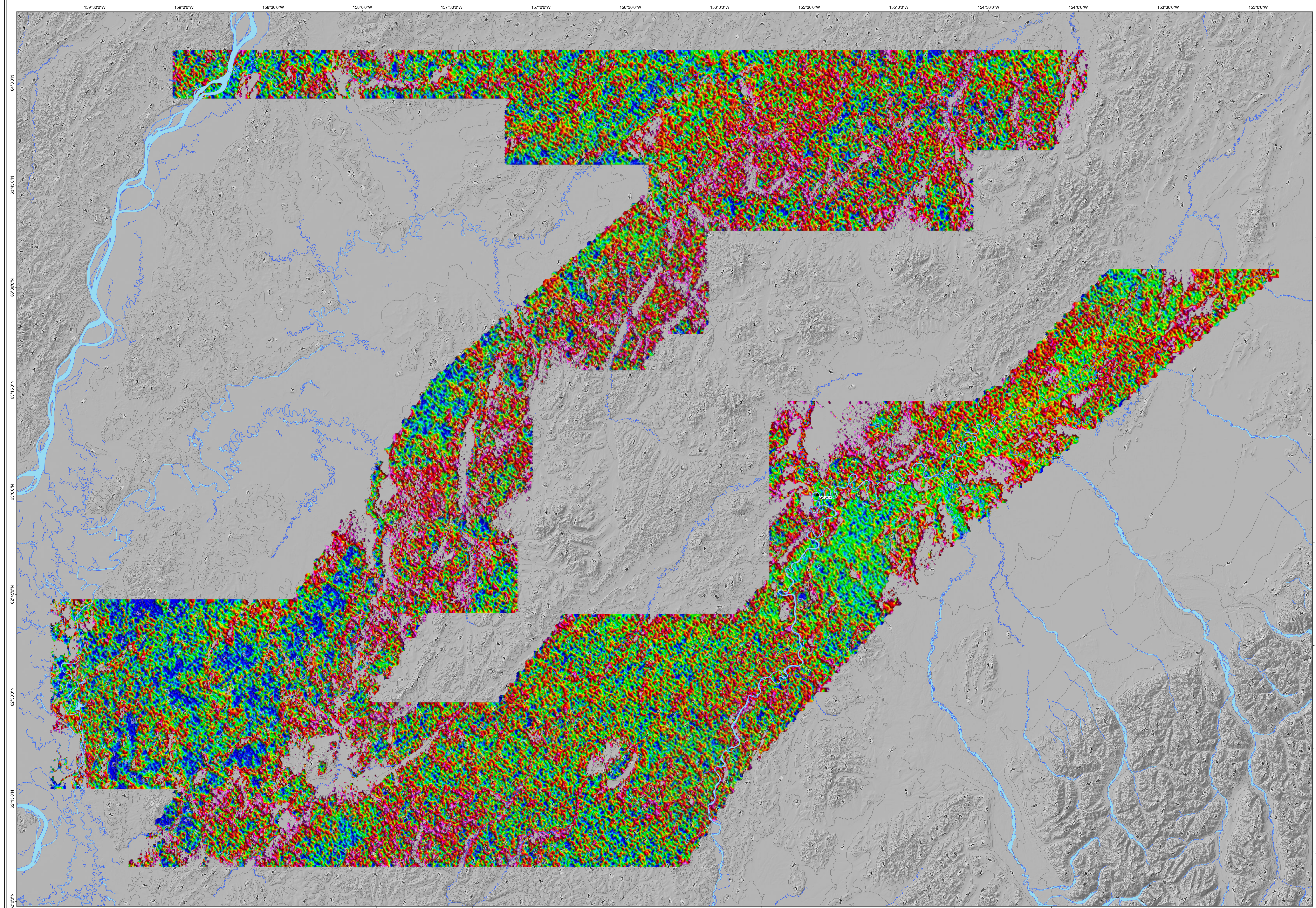
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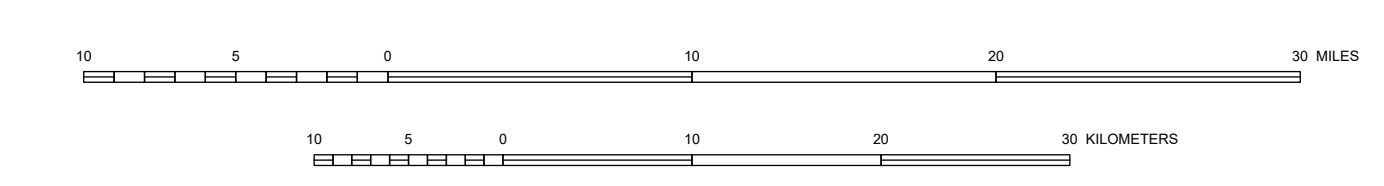
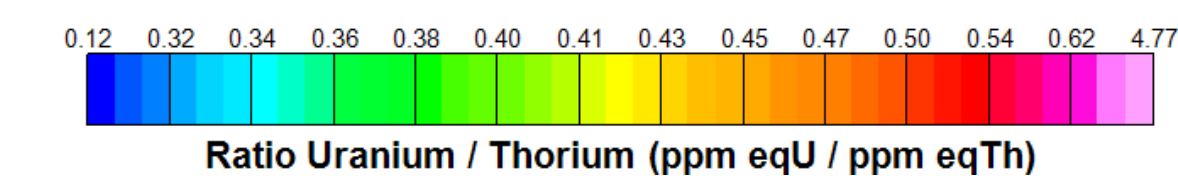
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Projection:
 Universal Transverse Mercator Zone 4N
Datum:
 WGS 1984
Cartography by:
 E.I. Petersen and A.E. Macpherson (2025)



Ratio Uranium / Thorium
Kuskokwim airborne magnetic and radiometric survey, McGrath, Alaska

by
Fusso, L.A.¹, Petersen E.I.¹, Emond, A.M.², and EON Geosciences, Inc.³
2026

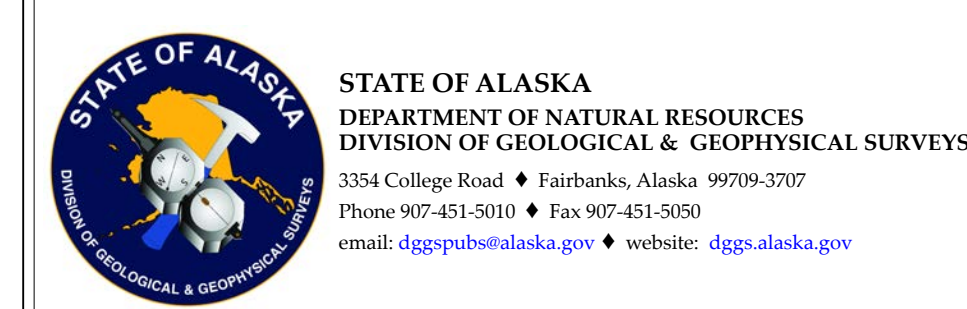
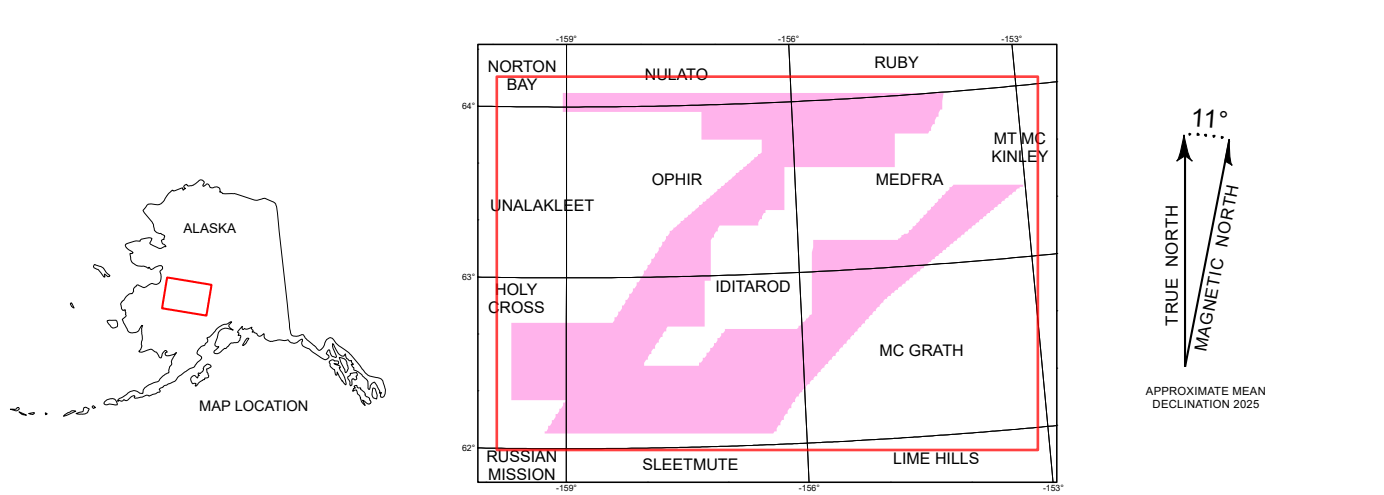


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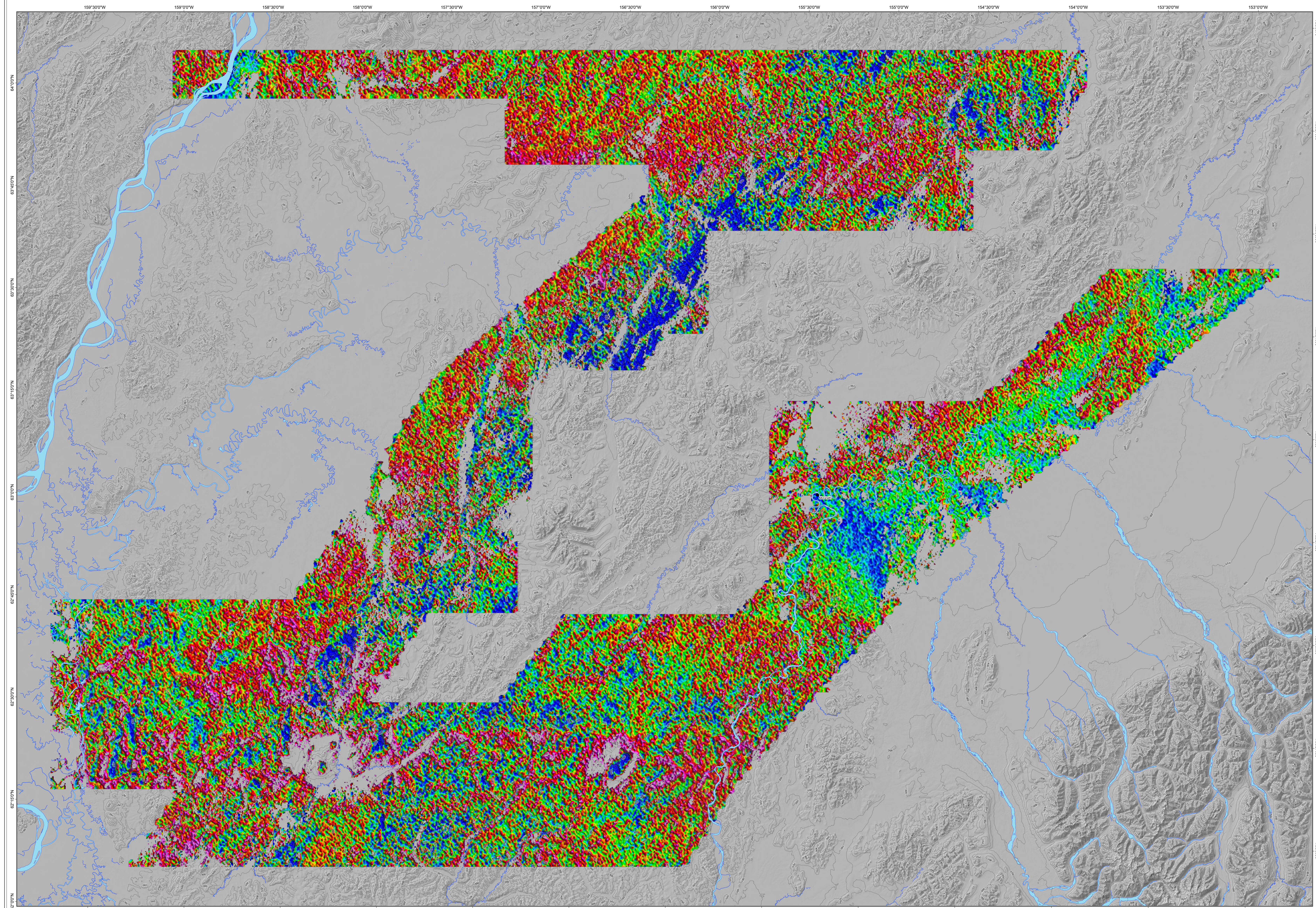
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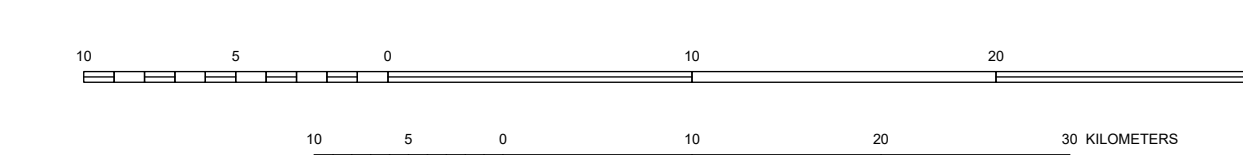
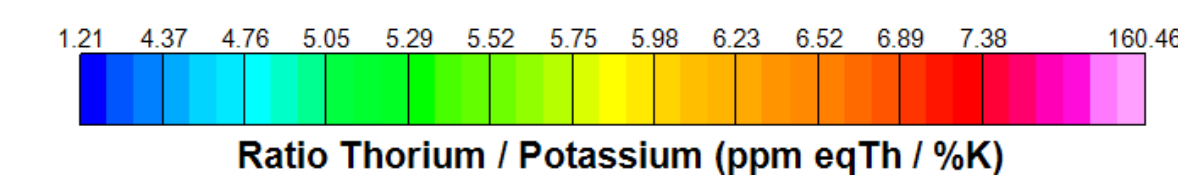


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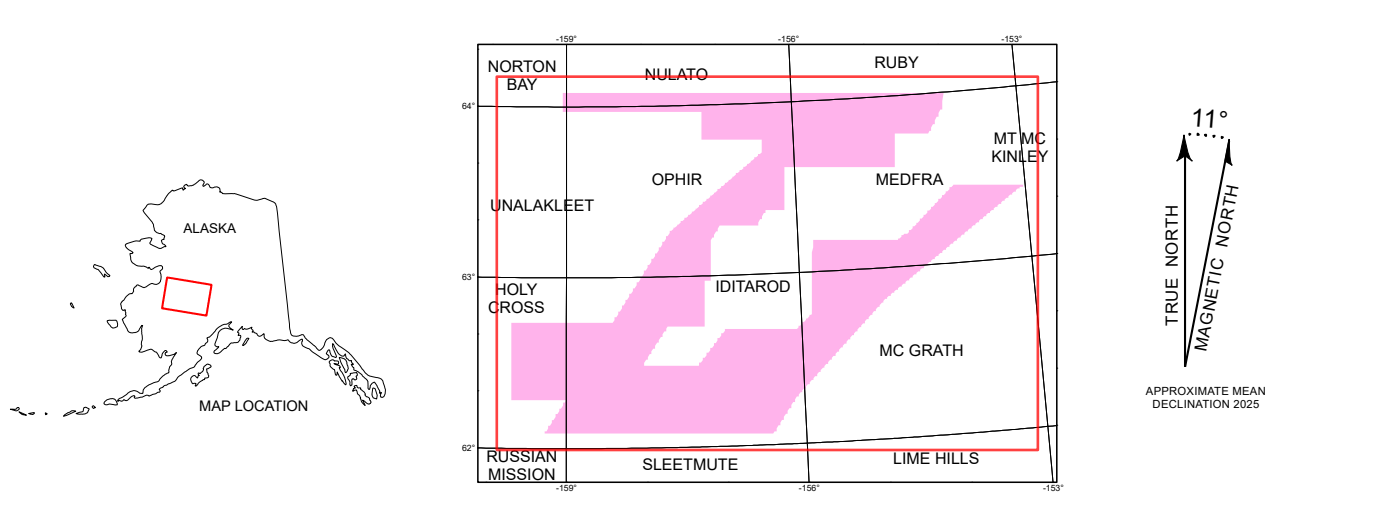
Ratio Thorium / Potassium
Kuskokwim airborne magnetic and radiometric survey, McGrath, Alaska

by
 Fusso, L.A.¹, Petersen E.I.¹, Emond, A.M.², and EON Geosciences, Inc.³
 2026



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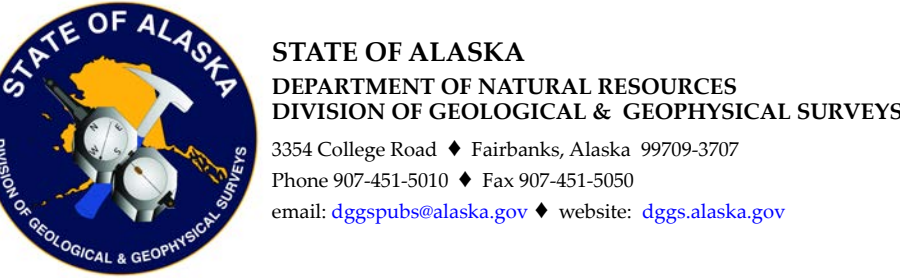
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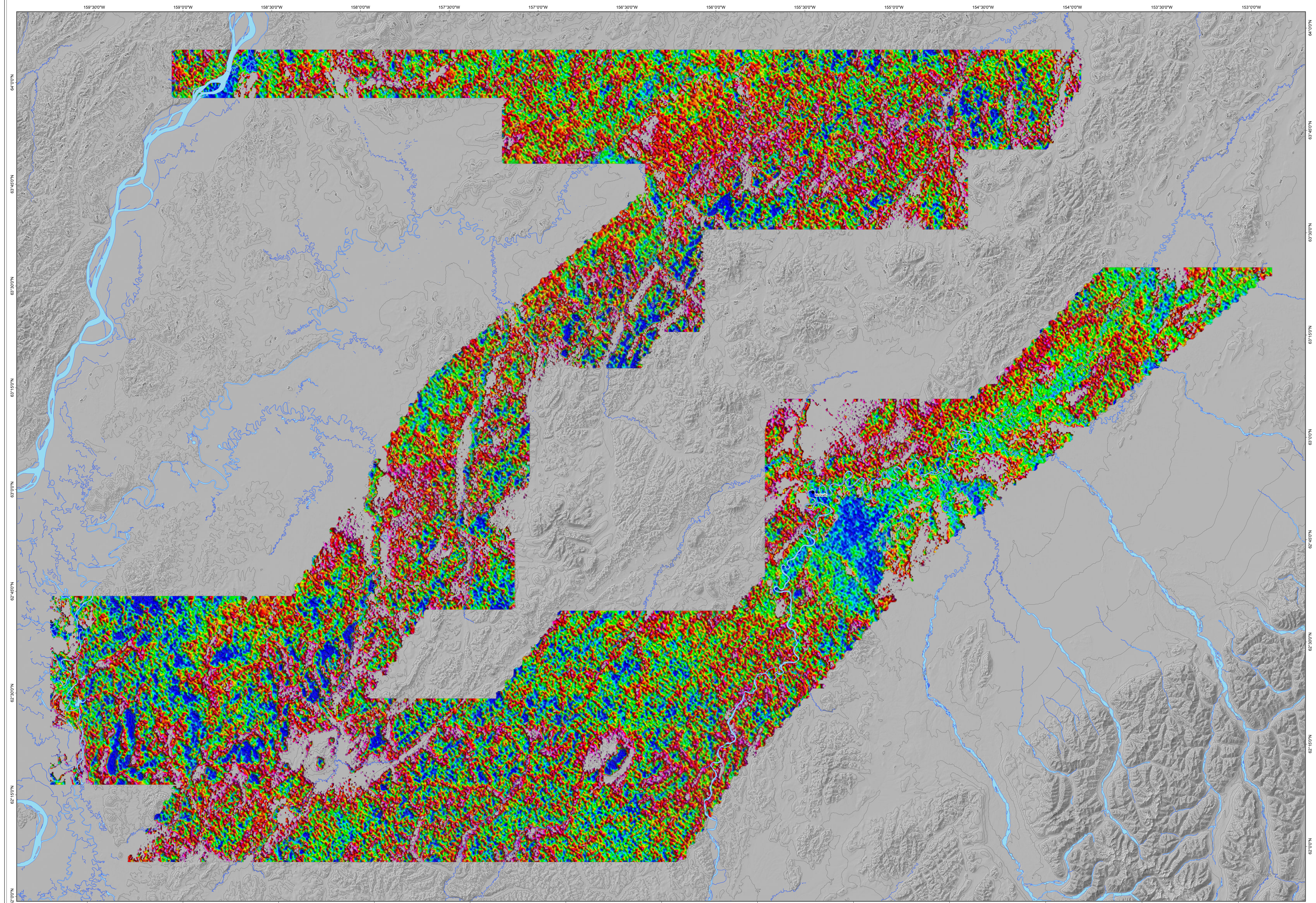
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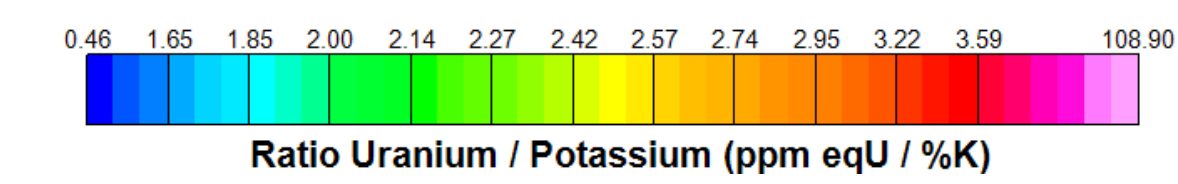
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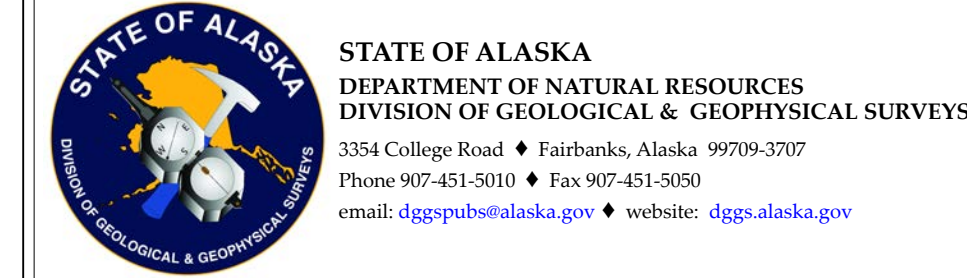
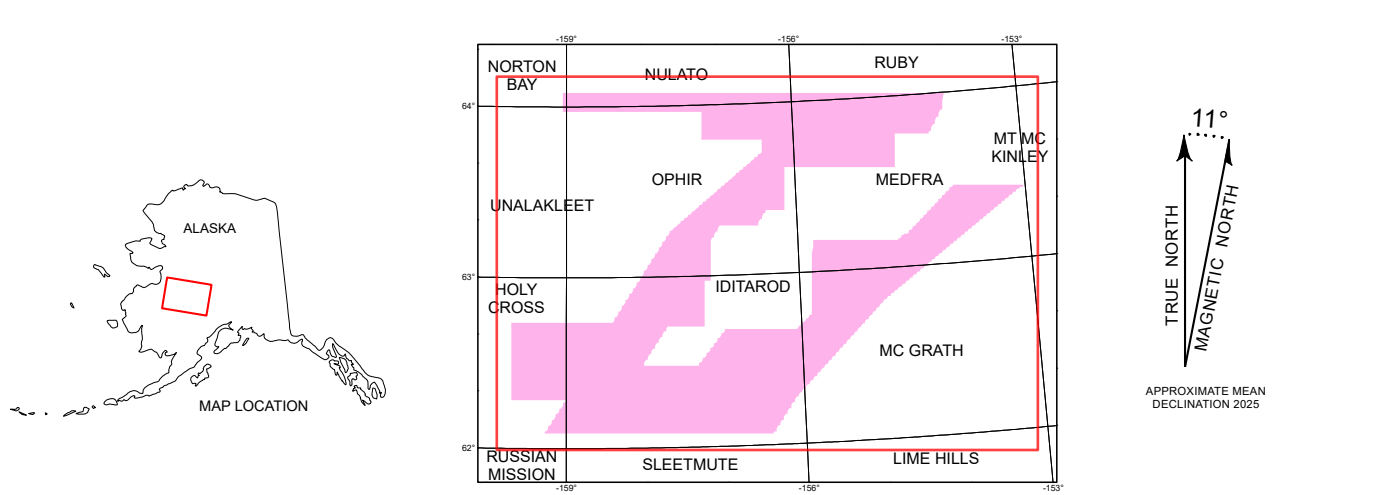


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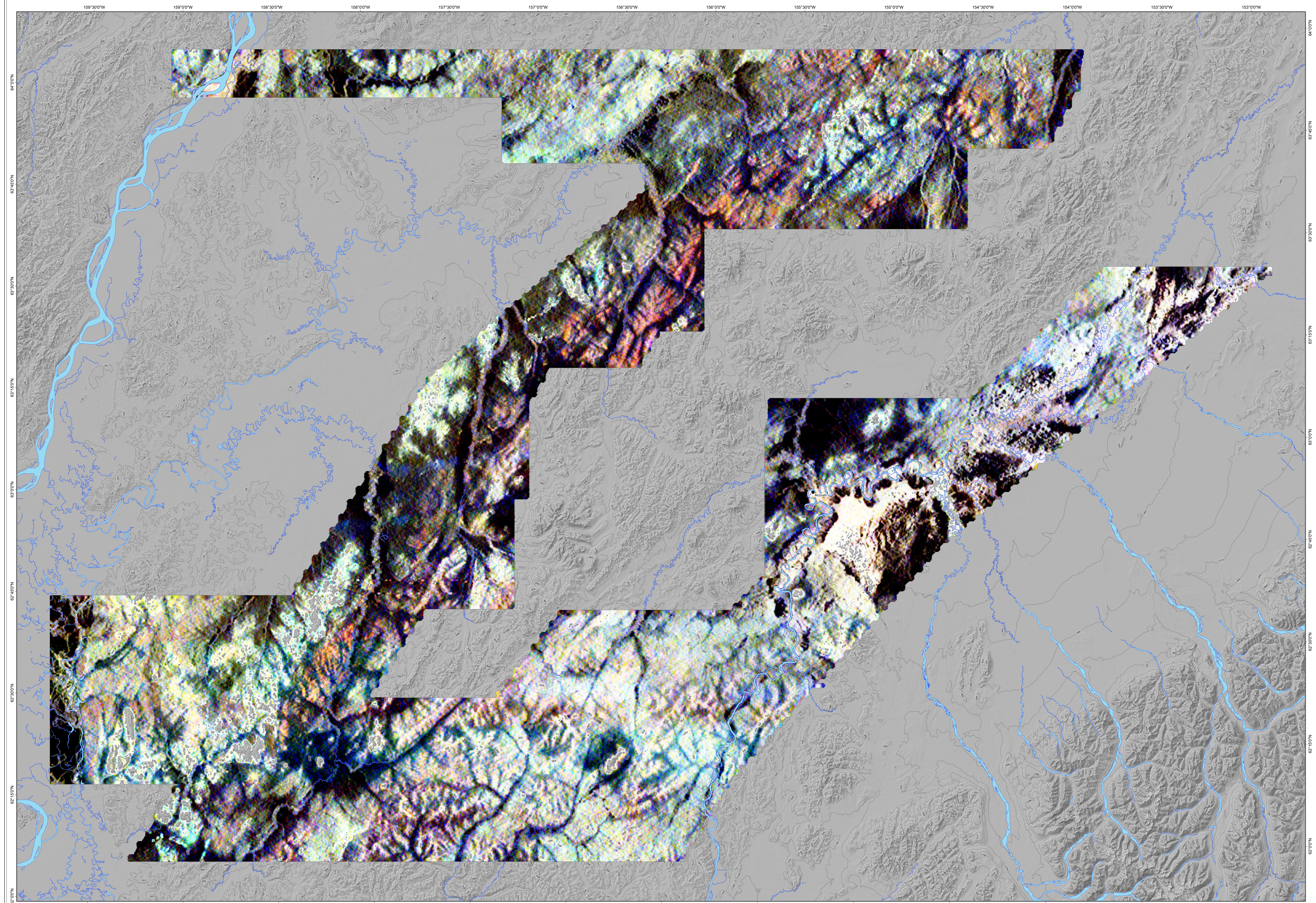
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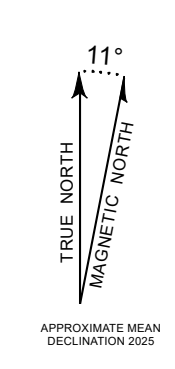
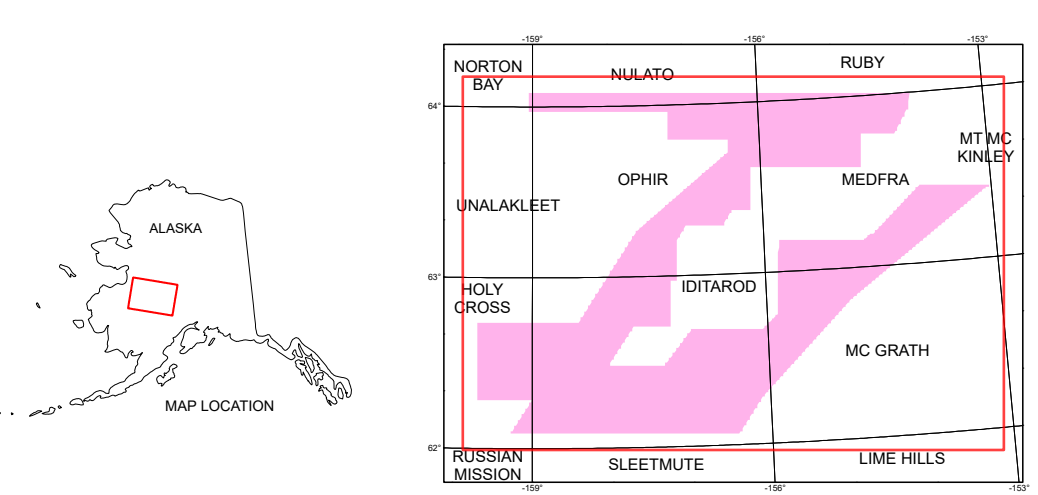


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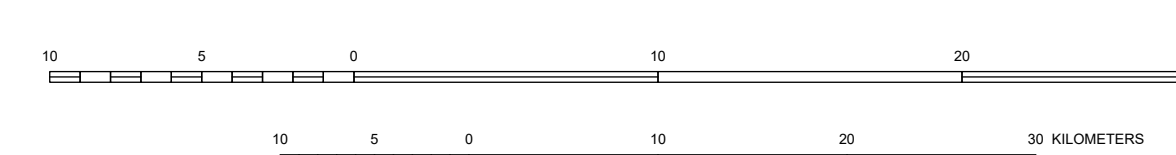
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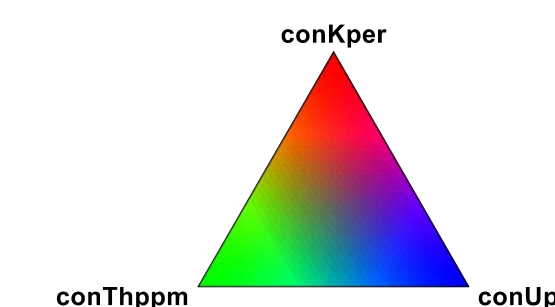
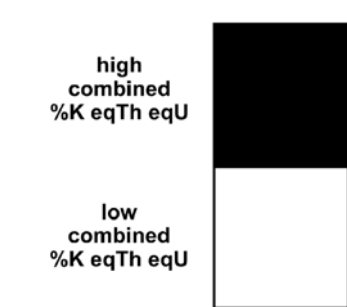


Radiometric Ternary Map
Kuskokwim airborne magnetic and radiometric survey, McGrath, Alaska

by
Fusso, L.A.¹, Petersen E.I.¹, Emond, A.M.², and EON Geosciences, Inc.³
2026



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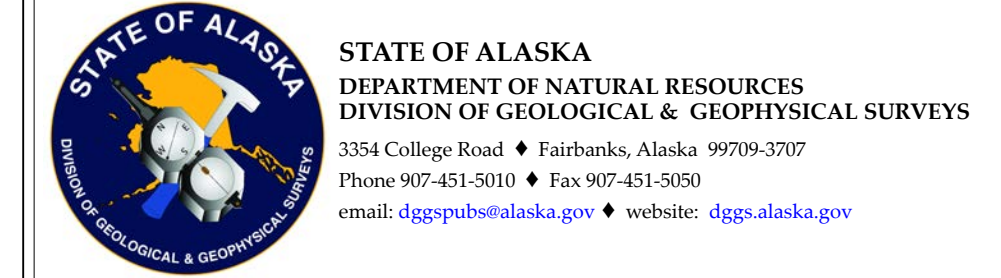
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