

KUSKOKWIM AIRBORNE MAGNETIC AND RADIOMETRIC SURVEY, NORTHERN KAIYUH MOUNTAINS, ALASKA

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

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2025
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KUSKOKWIM AIRBORNE MAGNETIC AND RADIOMETRIC SURVEY, NORTHERN KAIYUH MOUNTAINS, ALASKA

Logan A. Fusso¹, Eric I. Petersen¹, Abraham M. Emond², and EON Geosciences Inc.³

ABSTRACT

The Kuskokwim airborne magnetic and radiometric survey, northern Kaiyuh Mountains, Alaska, is within the Nulato Quadrangle west of Fairbanks, Alaska. Magnetic and radiometric data were collected with a helicopter between June 4 and 17, 2024, by EON Geosciences Inc. The survey contains a single block covering 1,975 km², which includes an infill block with tighter line spacing located in the northcentral portion of the block. A total of 6,459 line-kilometers were collected. The magnetometer was installed inside the stinger attached to the helicopter nose. The airborne gamma-ray spectrometer was mounted on the interior floor of the helicopter cabin. The block was flown with a line spacing of 400 m and the northcentral infill block was flown with 200 m spacing. Tie-lines for magnetic leveling were flown at 1,600 m spacing. The data and metadata are available from the Alaska Division of Geological & Geophysical Surveys website: <https://doi.org/10.14509/31493>.

PURPOSE

The data from the Kaiyuh airborne magnetic and radiometric survey will be used for improving the understanding of the region's geology and mineral potential and to promote resource exploration. This survey is part of the continuous regional magnetic data coverage of Alaska.

SURVEY OVERVIEW DESCRIPTION

This document provides an overview of the survey and includes text and figures of select primary and derivative products from this survey. A table is provided showing digital data packages available for download 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.

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² Aqua Geo Frameworks, 10848 Ridge Road, Fort Laramie, Wyoming 82212; *formerly DGGS*

³ 4018 Boulevard Cote Vertu Ouest, Saint-Laurent, Quebec H4R 1V4, Canada

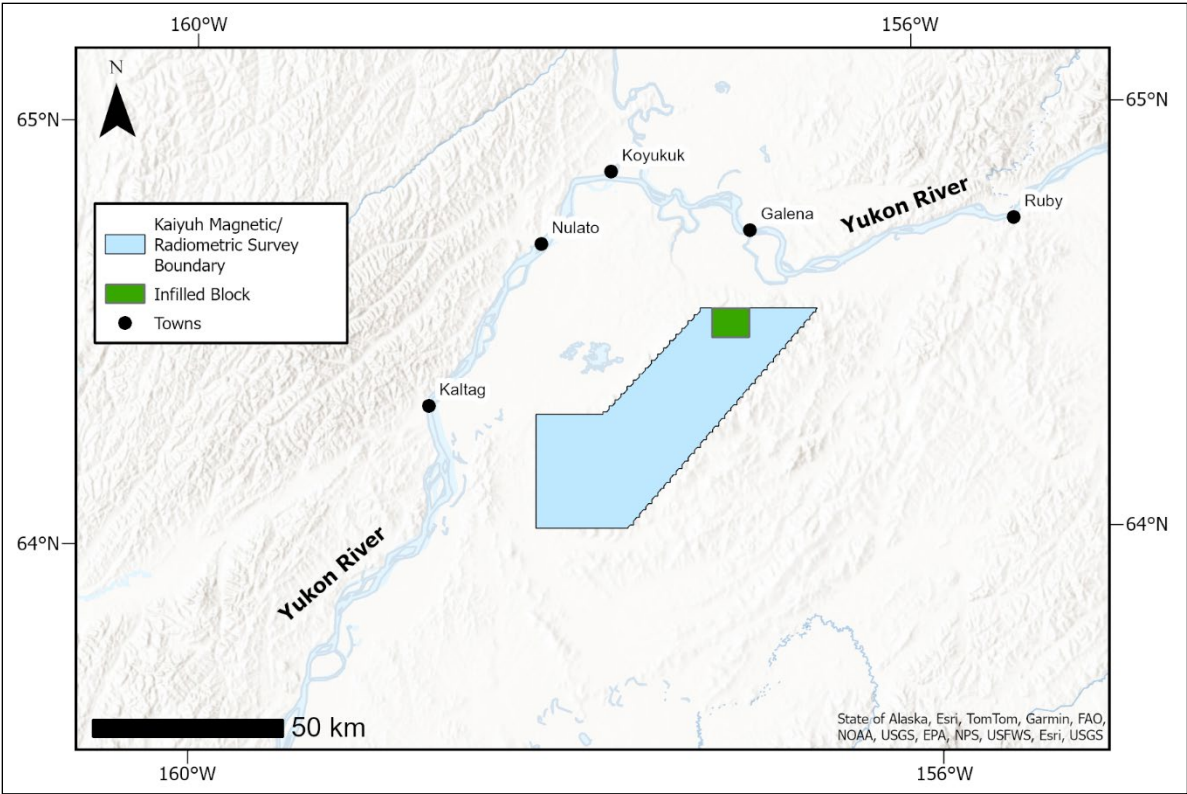
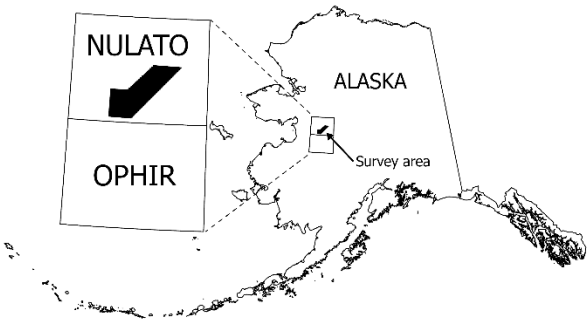


Figure 1. Top. The Kaiyuh airborne magnetic and radiometric survey, Alaska, location map with nearby towns. **Right.** The Kaiyuh airborne magnetic and radiometric survey, Alaska, location shown in Interior Alaska with relevant 1:250,000-scale quadrangles.



AVAILABLE DATA

Data Type	Provider	Description
ascii_data	contractor	ASCII format line data, other ASCII data
databases_geosoft	contractor	Geosoft format database of final line data, other Geosoft format databases
documents	contractor	Project report, calibration reports
grids_geosoft	contractor	Oasis montaj Geosoft GRD format gridded data

Data Type	Provider	Description
grids_tif	contractor	Geographically registered data value rasters of gridded data, GeoTiff format
kmz	DGGS	keyhole markup language (kml) kmz archive files of project data. Viewable in Google Earth and other compatible programs
maps_pdf_format	DGGS	Printable and geographically registered maps in pdf format. Compatible with mobile device navigation and desktop mapping applications
vector_data	contractor	Line path and survey boundary in Esri shapefile (shp) format

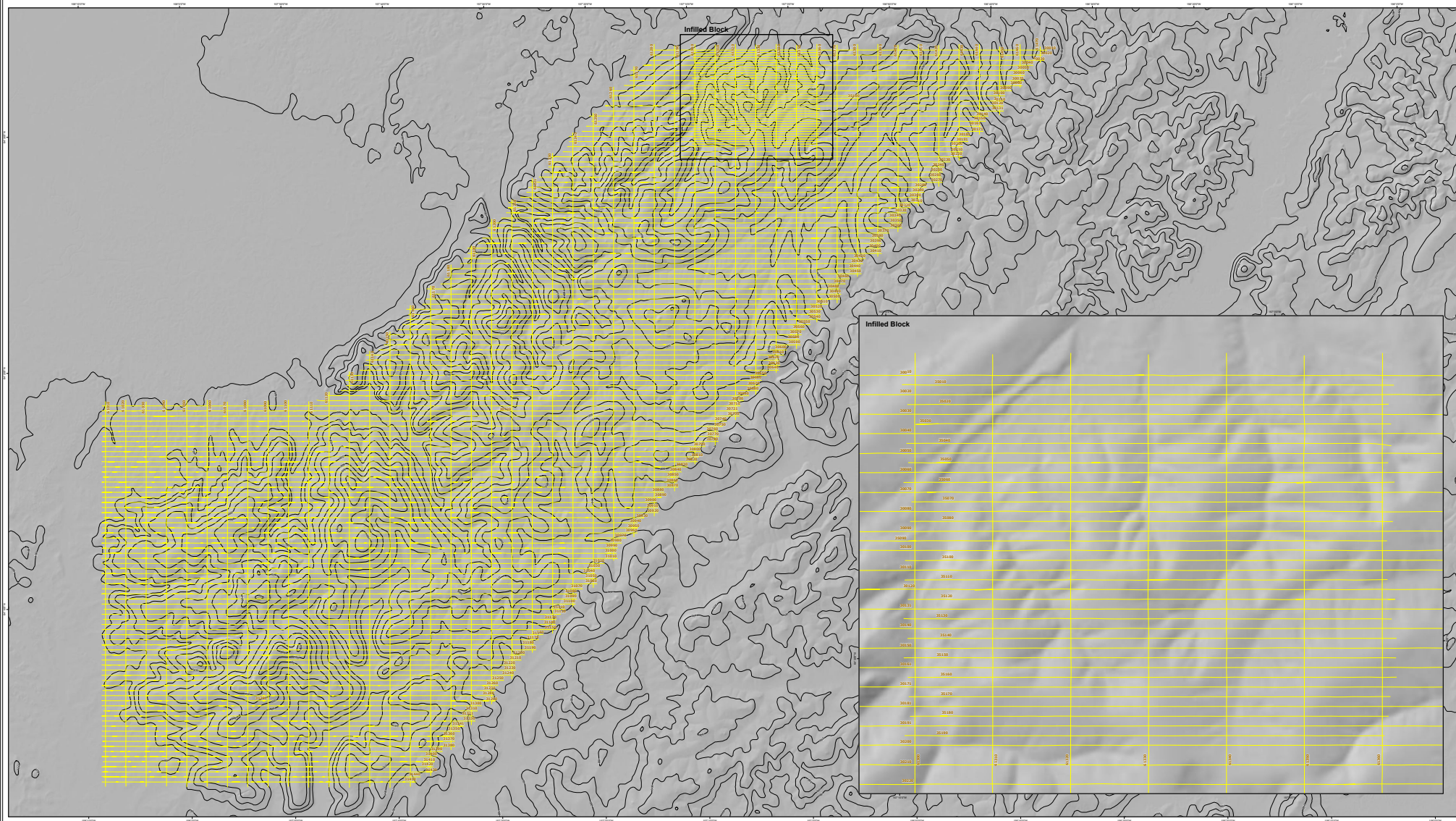
Table 1. Copies of the following maps are included at the end of this booklet in portable document format (PDF). All maps use WGS84 datum and UTM zone 4N projection. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: doi.org/10.14509/31493.

Map Title	File Name
Flight path	Kaiyuh_flightpath.pdf
Magnetics	
Computed Analytic Signal of the Residual Magnetic Field	Kaiyuh_mag_analyticsignal.pdf
Calculated 1st Vertical Derivative	Kaiyuh_mag_c1vd.pdf
Calculated 2nd Vertical Derivative	Kaiyuh_mag_c2vd.pdf
Residual Magnetic Intensity	Kaiyuh_mag_residual.pdf
Tilt Derivative	Kaiyuh_mag_tiltderivative.pdf
Radiometrics	
Natural Air Absorbed Dose Rate	Kaiyuh_rad_naadr.pdf
Potassium	Kaiyuh_rad_pct_k.pdf
Thorium	Kaiyuh_rad_equiv_th.pdf
Uranium	Kaiyuh_rad_equiv_u.pdf
Ratio Uranium/Thorium	Kaiyuh_rad_ratio_u_th.pdf

Map Title	File Name
Ratio Thorium/Potassium	Kaiyuh_rad_ratio_u_k.pdf
Ratio Uranium/Potassium	Kaiyuh_rad_ratio_u_k.pdf
Radiometric Ternary Map	Kaiyuh_rad_ternary.pdf

ACKNOWLEDGMENTS

This work was supported by the U.S. Geological Survey's Earth MRI program grants G22AC00475 and G23AC00408 with additional funding by Doyon, Limited.



Flight path
Kuskokwim airborne magnetic and radiometric survey, northern Kaiyuh Mountains, Alaska

Fusso, L.A., Peterson, E.J., Goswami, A.B., and GON Geosystems Inc.,
2025

SCALE 1:100,000

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Flight Paths, Survey Line Number Labelled

Alaska Contours

Small-scale contours for
Alaska. Contour intervals
vary from 50 feet to 100
feet.

Note: All survey line numbers are shown. Infill line numbers for the Infilled Block are shown only within the inset map. Line numbers are displayed to the north of labeled lines (to the west for N-S oriented lines). Labels are situated at the east end of E-W oriented lines; note that in some cases multiple lines may be oriented along the same line of latitude, one picking up where the previous line ended.

This work was supported by the United States Geological Survey's Earth Mapping Resources Initiative (Earth MRI), grants G22AC00475 and G23AC00408. Additional survey lines were funded over the Infilled Block by Doyon Limited, increasing the data density in that area (shown in detail by inset).

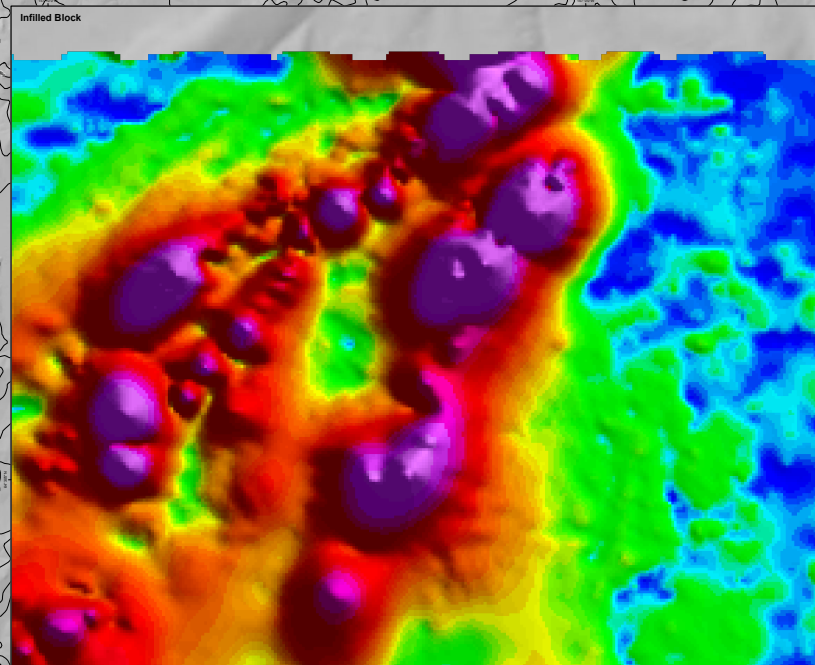
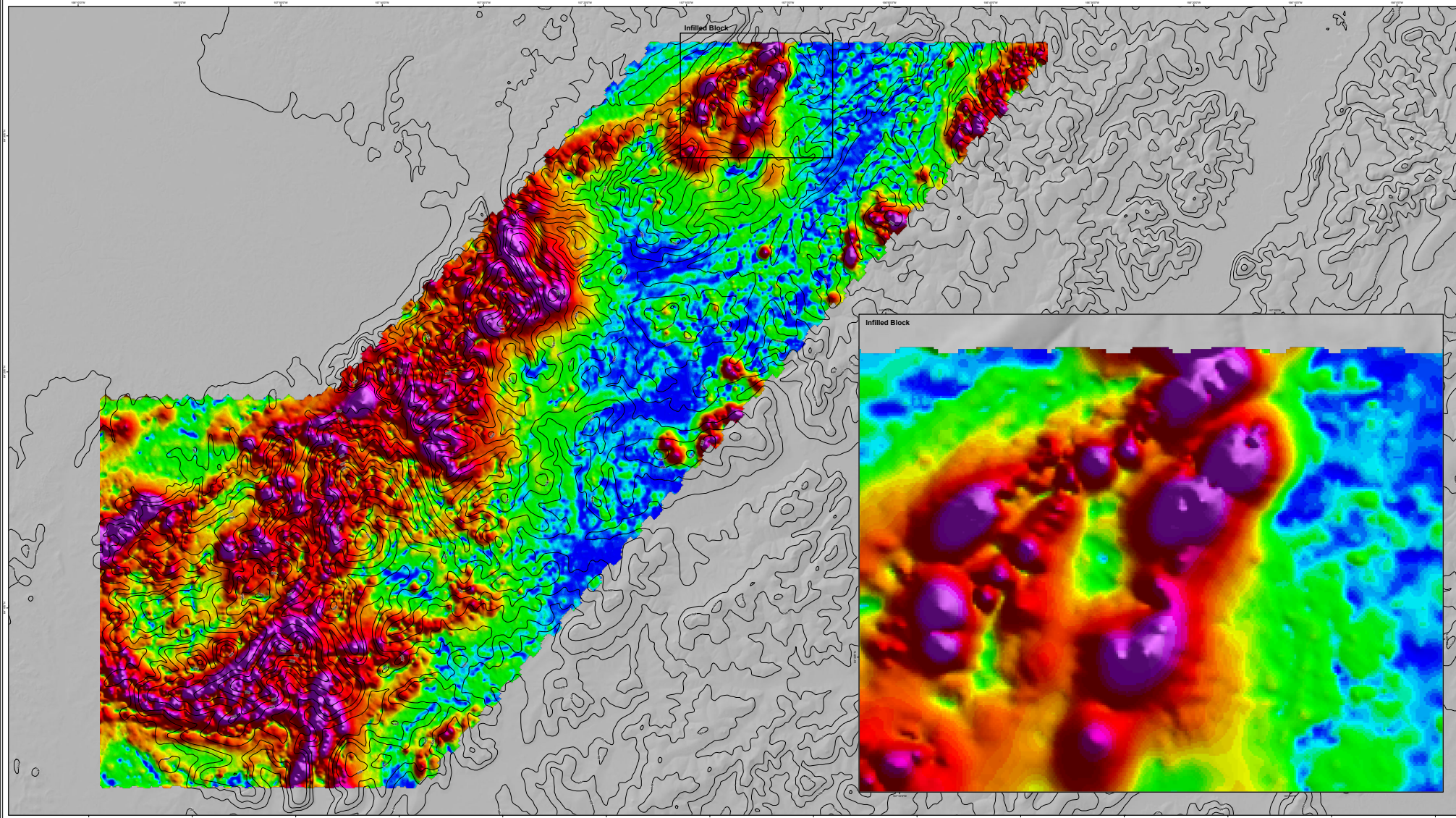
Base map: streams and waterbodies from:
National Hydrography Dataset, U.S. Geological Survey,
Reston, Virginia, 2002–2015.
Base map: bathymetry and contours from:
U.S. Geological Survey, EROS Data Center, 2013.
Digital elevation - Interferometric Synthetic Aperture
Radar (IFSAR) - Alaska
Projection:
Universal Transverse Mercator Zone 48
Datum:
WGS 1984
Geography by:
E.J. Peterson and A.E. Magrath (2025)

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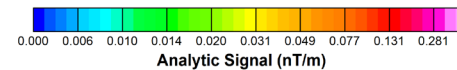
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Analytic Signal
Kuskokwim airborne magnetic and radiometric survey, northern Kaiyuh Mountains, Alaska

Fusso, L.A., Peterson, E.J., Goswami, A.B., and GON Geosciences Inc.,
2025



This map is a derivative of a collection of data products generated by the U.S. Geological Survey, Alaska Division of Geological & Geophysical Surveys (ADGGS). The data products are the result of a collaborative effort between ADGGS and the U.S. Geological Survey, Reston, Virginia. The data products are the result of a collaborative effort between ADGGS and the U.S. Geological Survey, Reston, Virginia. The data products are the result of a collaborative effort between ADGGS and the U.S. Geological Survey, Reston, Virginia.



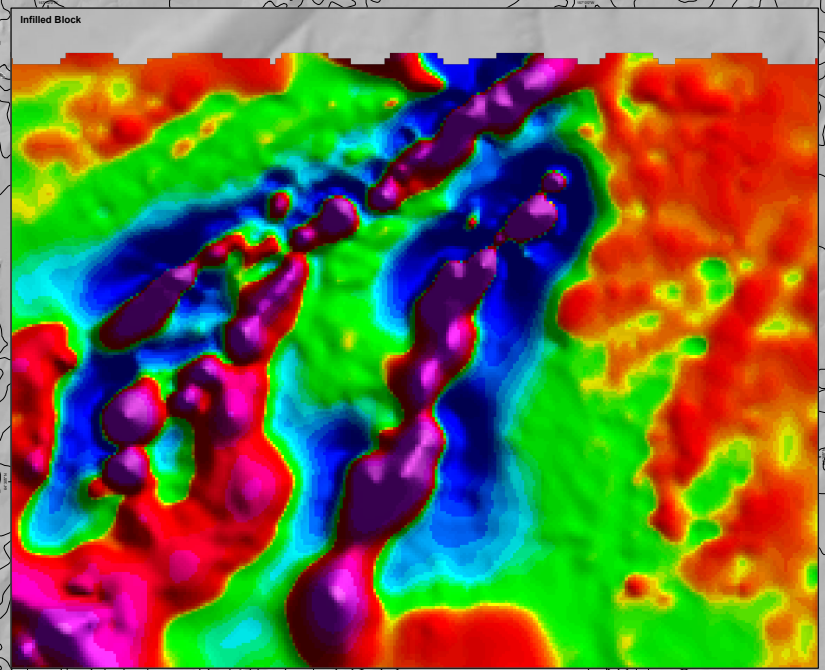
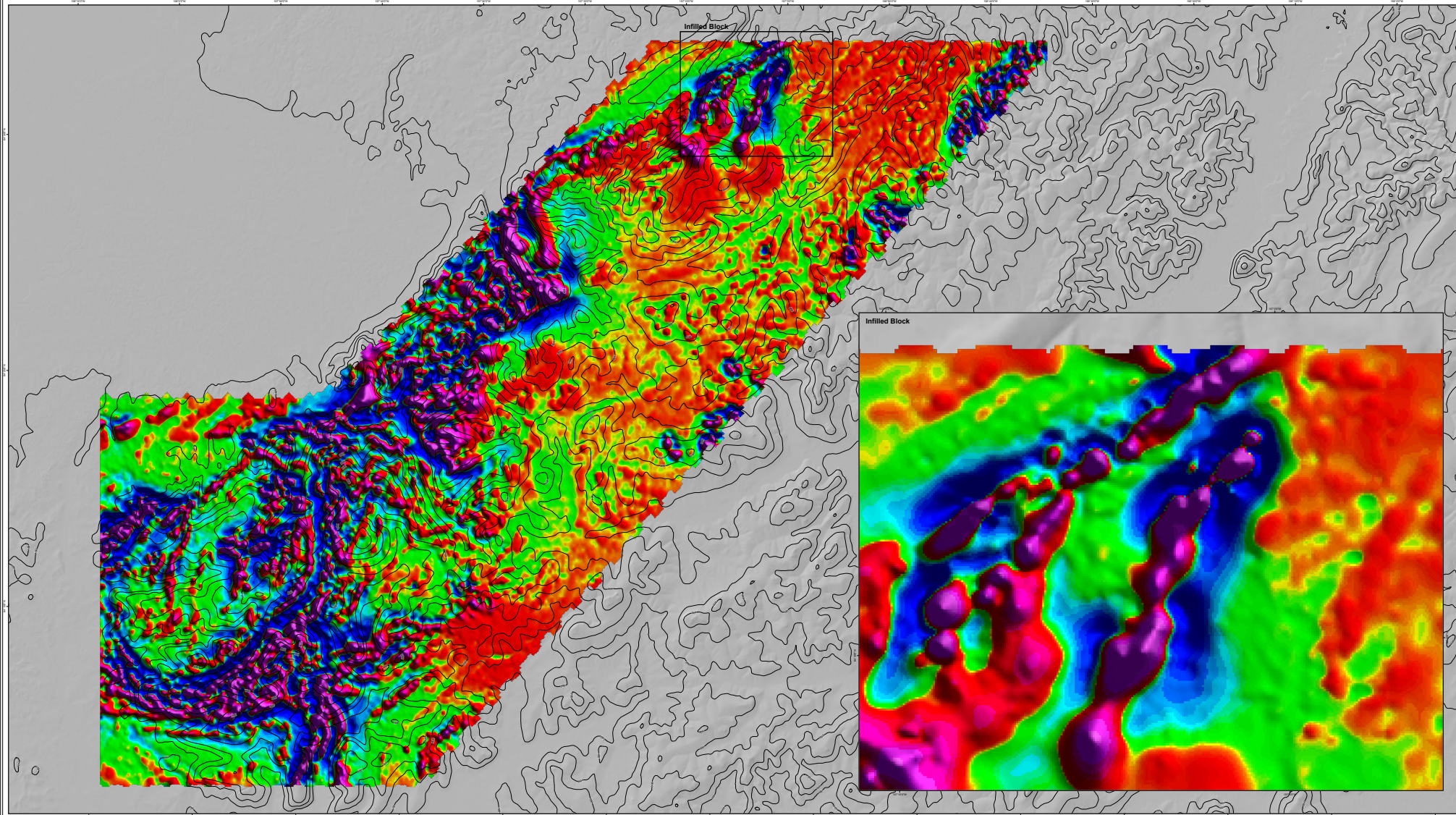
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SCALE 1:100,000
ANALYTIC SIGNAL, nT/m
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This map is a derivative of a collection of data products generated by the U.S. Geological Survey, Alaska Division of Geological & Geophysical Surveys (ADGGS). The data products are the result of a collaborative effort between ADGGS and the U.S. Geological Survey, Reston, Virginia. The data products are the result of a collaborative effort between ADGGS and the U.S. Geological Survey, Reston, Virginia. The data products are the result of a collaborative effort between ADGGS and the U.S. Geological Survey, Reston, Virginia.

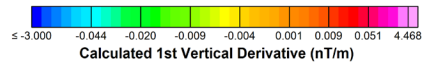
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Base map hillshade and contours from:
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Digital elevation - Interferometric Synthetic Aperture
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Datum:
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Geography by:
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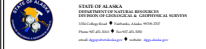


Calculated 1st Vertical Derivative
Kuskokwim airborne magnetic and radiometric survey, northern Kaiyuh Mountains, Alaska

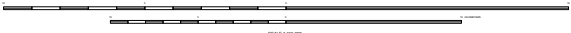
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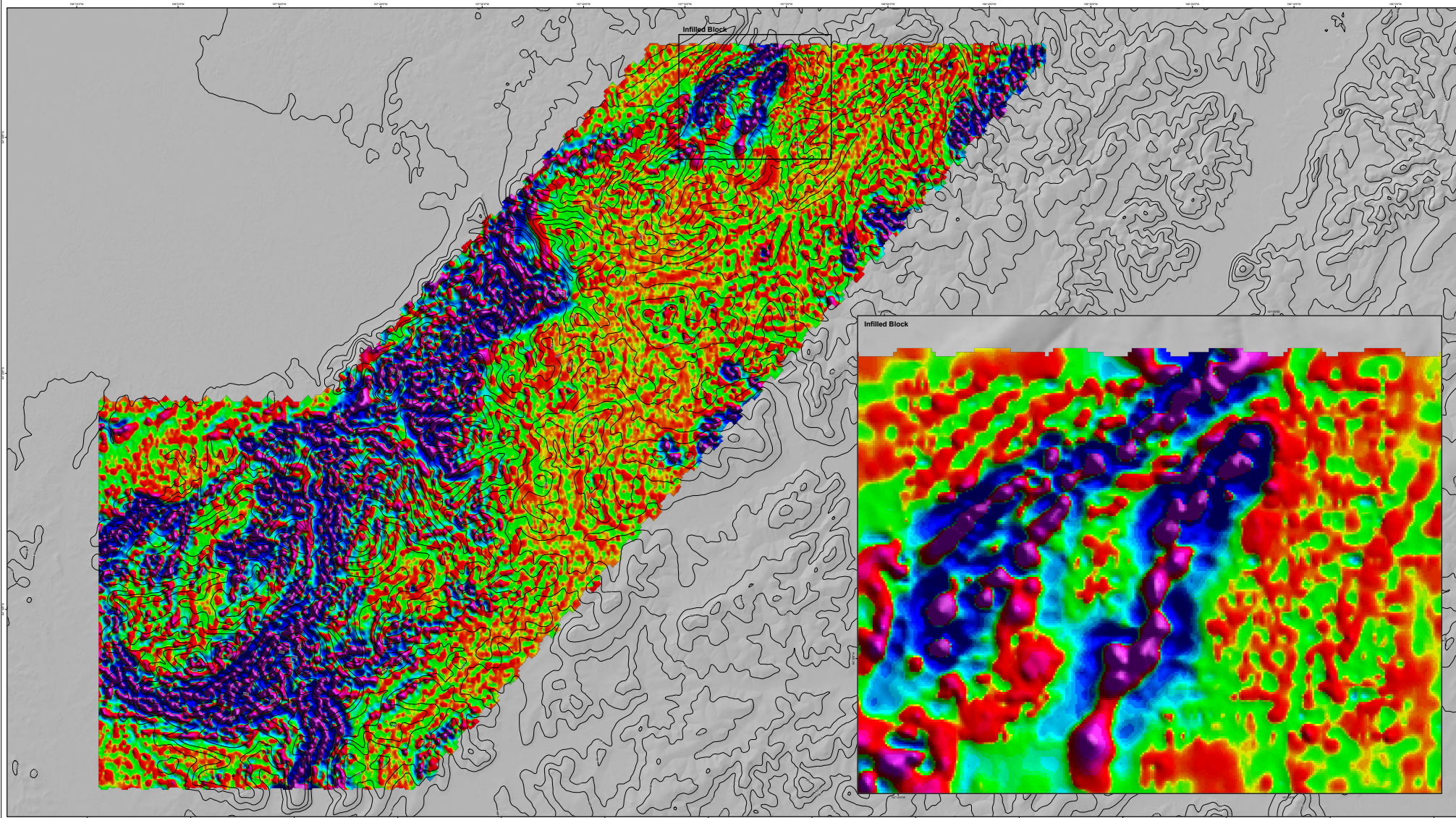
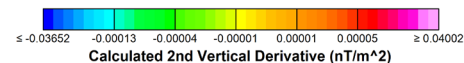
SECTION OF	INSULATED	RUBY
UNLARGEST	OTHER	MEDIAL



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PROJECTION: UTM
DATUM: NAD 83
ELEVATION: Meters
MAGNETIC ANOMALY: nT/m
RADIOMETRIC ANOMALY: cps/m²

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Digital elevation - Interferometric Synthetic Aperture
Radar (IFSAR) - Alaska
Projection:
Universal Transverse Mercator Zone 48
Datum:
WGS 1984
Geography by:
E.J. Peterson and A.E. Magnesson (2025)

Fussao, L.A.¹, Petersen, E.L.¹, Emord, A.M.², and EON Geosciences Inc.

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Basemap streams and waterbodies from:
National Hydrography Dataset, U.S. Geological Survey
Region, Viora, 2002–2016

Basemap hillshade and contours from:
U.S. Geological Survey, EROS Data Center, 2013,
Digital elevation – Interferometric Synthetic Aperture
Radar (IFSAR) – Alaska

Projection:
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Cartography by:
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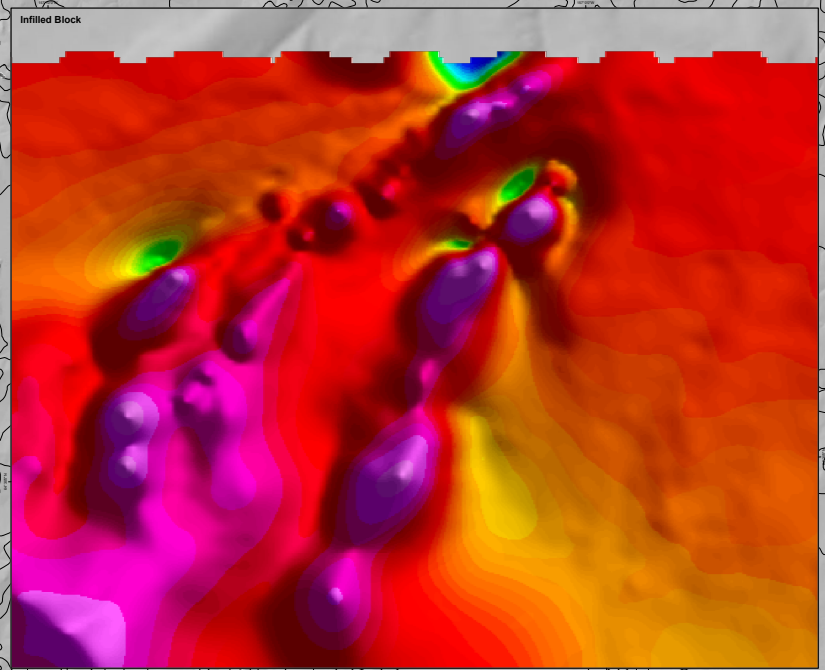
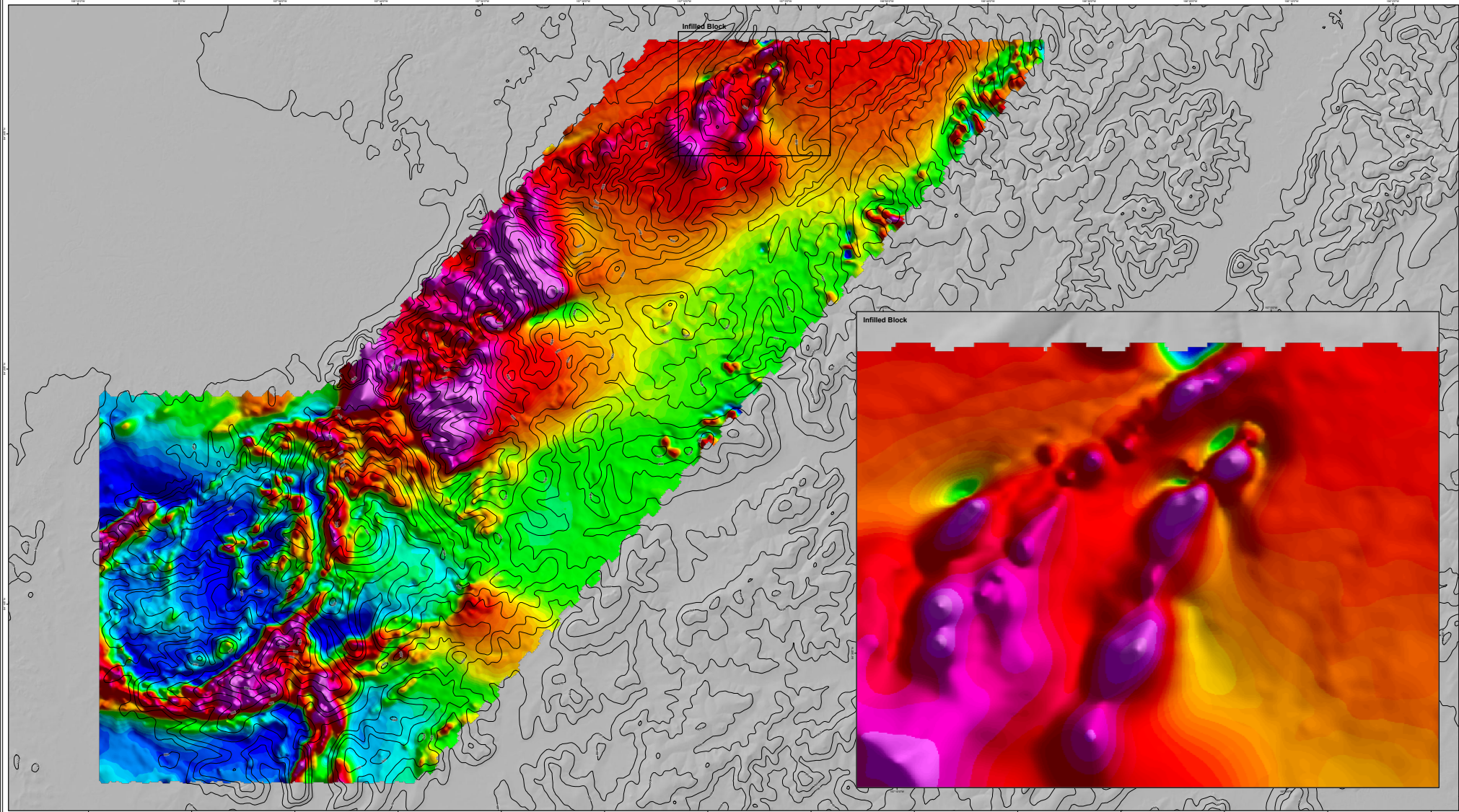


SCALE 1:110,000
GEOLOGICAL MAP OF WESTERN
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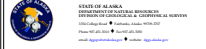


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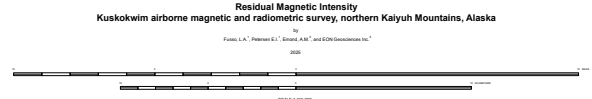




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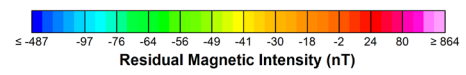


SECTION OF	INSULATED	RUBY
UNLARGEST	OTHER	MEDIAL



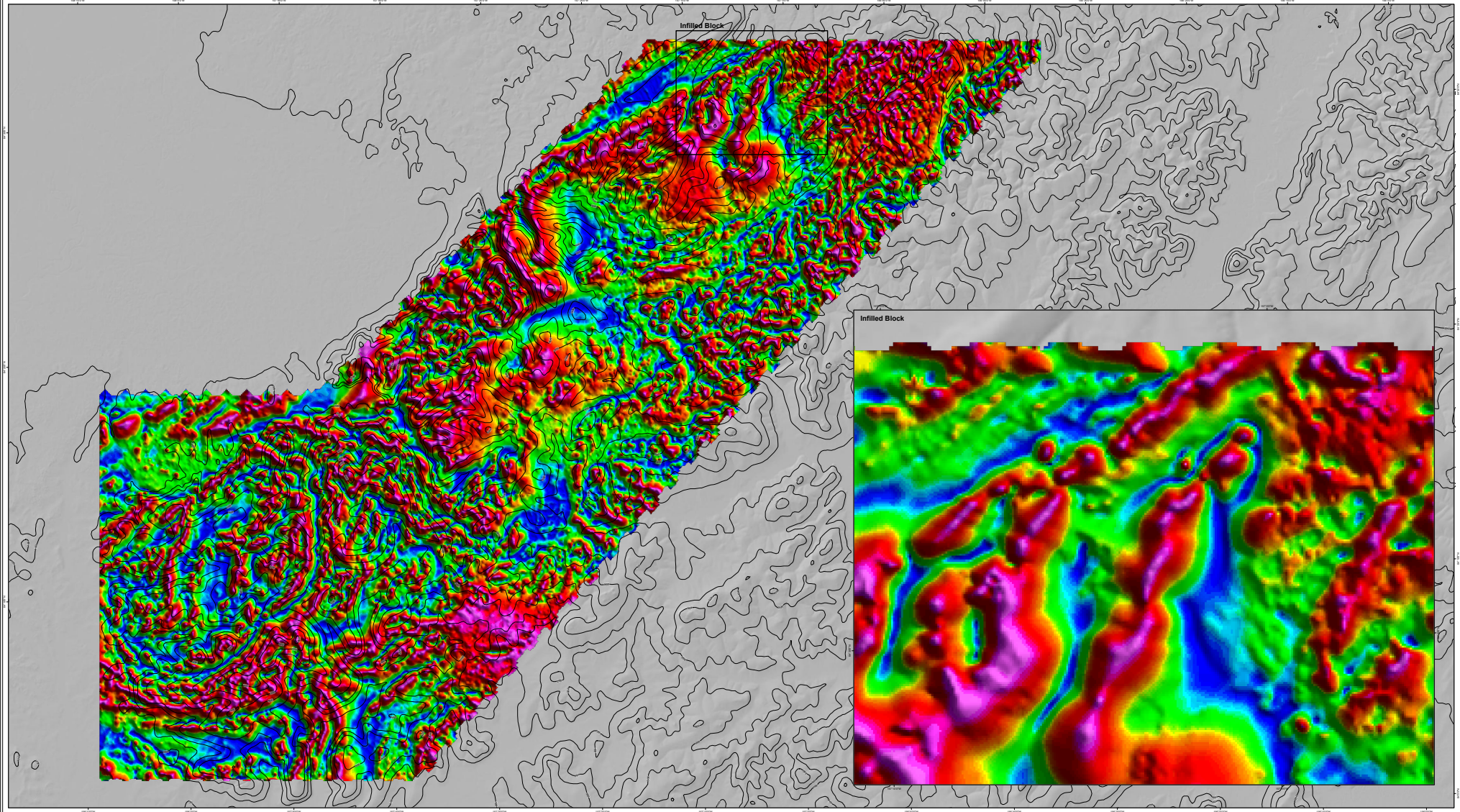
Residual Magnetic Intensity
Kuskokwim airborne magnetic and radiometric survey, northern Kaiyuh Mountains, Alaska

Fusso, L.A., Peterson, E.J., Goss, A.H., and EON Geosciences Inc.,
2025



This work was supported by the United States Geological Survey's Earth Mapping Resources Initiative (Earth MRI), grants G22AC00475 and G23AC00408. Additional survey lines were funded over the Infilled Block by Doyon Limited, increasing the data density in that area (shown in detail by inset).

Base map: streams and waterbodies from: National Hydrography Dataset, U.S. Geological Survey, Reston, Virginia, 2002-2015.
Base map: hillshade and contours from: U.S. Geological Survey, 3DDEM Data Center, 2013.
Projection: Universal Transverse Mercator Zone 48N
Datum: WGS 1984
Cartography by: E.J. Peterson and A.E. Magnusson (2025)



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SECTION OF	INSULATED	RUBY
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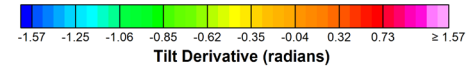
Location of map area



Tilt Derivative Kuskokwim airborne magnetic and radiometric survey, northern Kaiyuh Mountains, Alaska

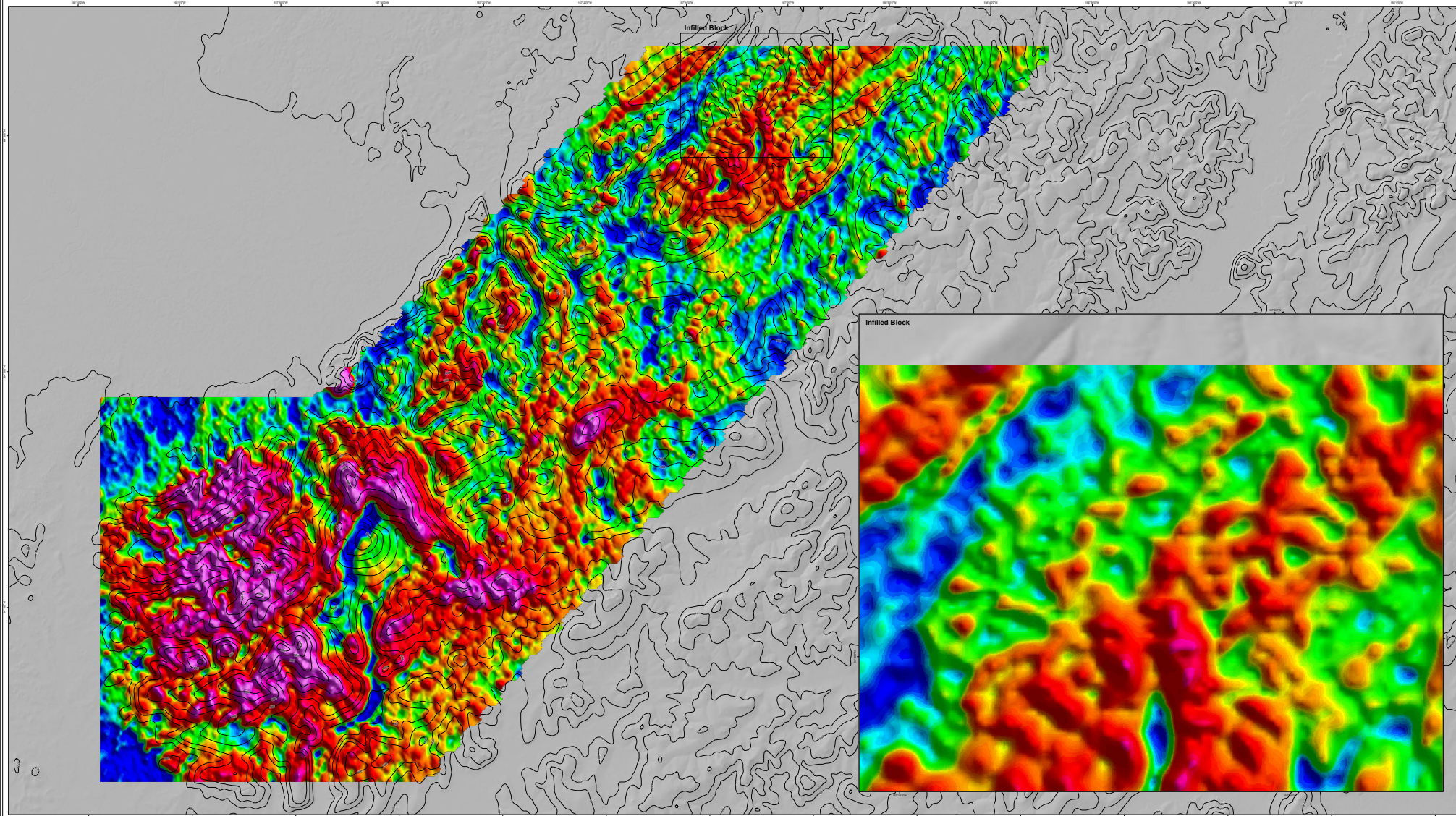
Fusso, L.A., Peterson, E.J., Goswami, A.B., and EON Geosciences Inc.,
2025

SCALE 1:100,000
UNITS: METERS, KILOMETERS
PROJECTION: Universal Transverse Mercator Zone 18N
DATUM: WGS 1984
ELEVATION: Meters
MAGNETIC INTENSITY: Nanotesla (nT)
RADIOMETRIC INTENSITY: Counts per second (cps)



This work was supported by the United States Geological Survey's Earth Mapping Resources Initiative (Earth MRI), grants G22AC00475 and G23AC00408. Additional survey lines were funded over the Infilled Block by Doyen Limited, increasing the data density in that area (shown in detail by inset).

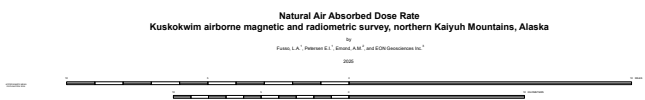
Base map streams and waterbodies from:
National Hydrography Dataset, U.S. Geological Survey,
Reston, Virginia, 2022-2019.
Base map hillshade and contours from:
U.S. Geological Survey, 3DDEM Data Center, 2013.
Digital elevation - Interferometric Synthetic Aperture
Radar (IFSAR) - Alaska
Projection:
Universal Transverse Mercator Zone 18N
Datum:
WGS 1984
Cartography by:
E.J. Peterson and A.E. Margheim (2025)



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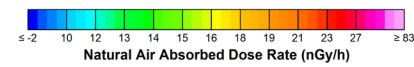


SECTION OF	INSULATED	RUBY
UNLAKED	OTHER	MEDICAL



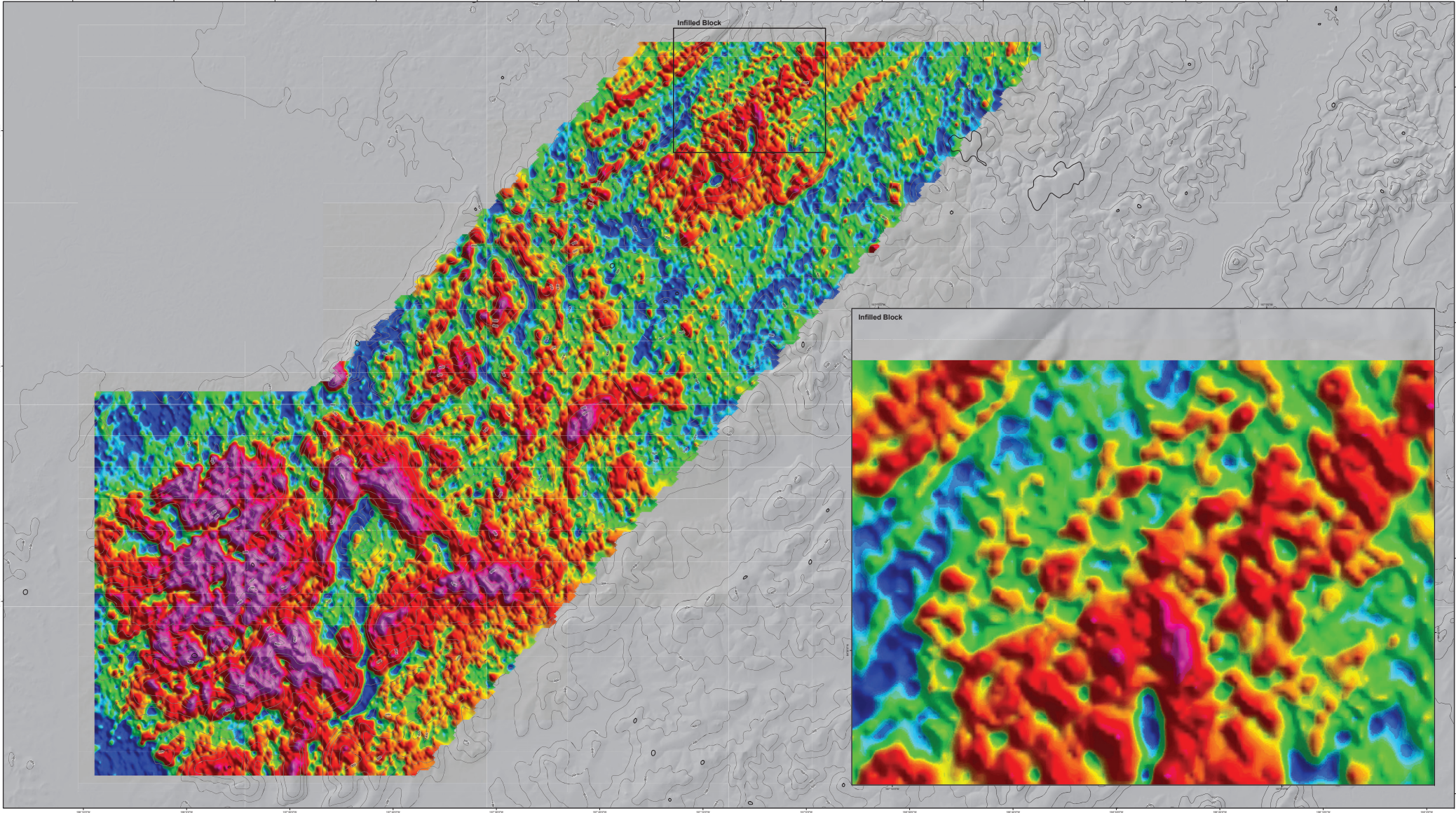
Natural Air Absorbed Dose Rate
Kuskokwim airborne magnetic and radiometric survey, northern Kaiyuh Mountains, Alaska

Fusso, L.A., Peterson, E.J., Goswami, A.B., and EON Geosciences Inc.,
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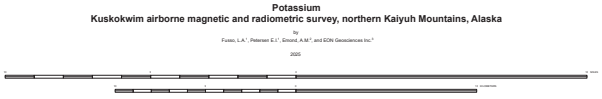
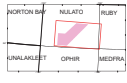


This work was supported by the United States Geological Survey's Earth Mapping Resources Initiative (Earth MRI), grants G22AC00475 and G23AC00408. Additional survey lines were funded over the Infilled Block by Coyote Limited, increasing the data density in that area (shown in detail by inset).

Base map: streams and waterbodies from: National Hydrography Dataset, U.S. Geological Survey, Reston, Virginia, 2002-2015.
Base map: hillshade and contours from: U.S. Geological Survey, 3DDEM Data Center, 2013.
Base map: Digital elevation - Interferometric Synthetic Aperture Radar (IFSAR) - Alaska
Projection: Universal Transverse Mercator Zone 48
Date: WGS 1984
Cartography by: E.J. Peterson and A.E. Margheim (2025)



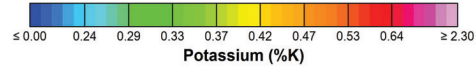
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Potassium
Kuskokwim airborne magnetic and radiometric survey, northern Kaiyuh Mountains, Alaska

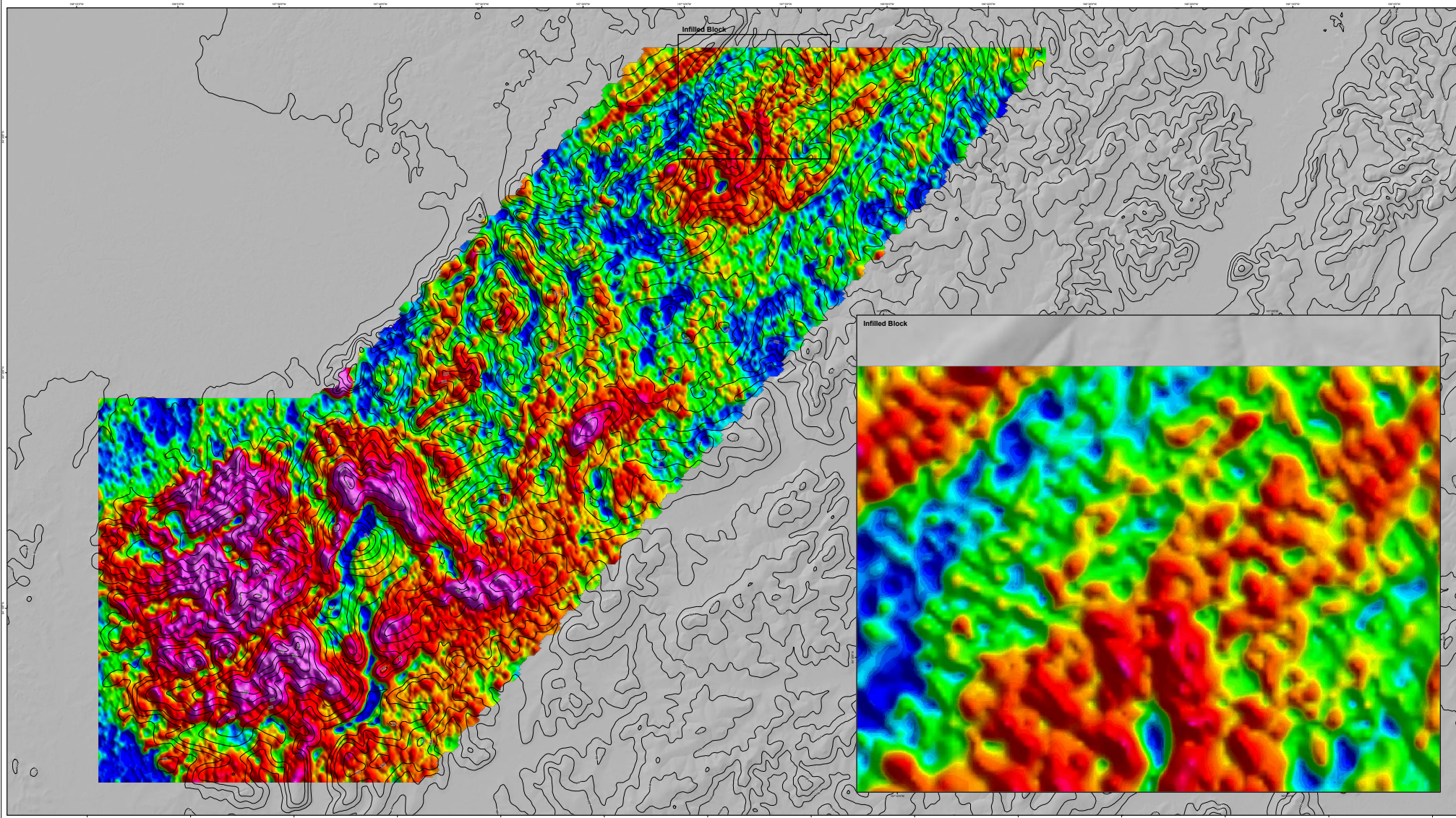
Form: L.A., Proven: C.I., Good: A.M., and G.D. Geoscience Inc.
2005

Scale: 1:10,000
Datum: NAD 83
Projection: UTM
Units: Meters

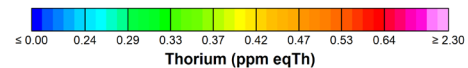


This work was supported by the United States Geological Survey's Earth Mapping Resources Initiative (Earth MRI), grants G22AC00475 and G22AC00498. Additional survey lines were funded over the Infilled Block by Dayon Limited, increasing the data density in that area (shown in detail by inset).

Base map streams and waterbodies from: National Hydrography Dataset, U.S. Geological Survey, Reston, Virginia, 2002-2015.
Base map hillshades and contours from: U.S. Geological Survey, 3D Data Center, 2013.
Digital elevation - Interferometric Synthetic Aperture Radar (IFSAR), Alaska
Projection: Universal Transverse Mercator Zone 48
Datum: NAD 83
Cartography by: E.J. Peterson and A.E. Maguire (2025)



by
Furus, L.A.¹, Petersen E.S.¹, Enrard, A.M.², and EON Chemicals Inc.
1070



This work was supported by the United States Geological Survey's Earth Mapping Resources Initiative (Earth MRI), grants G22AC00475 and G23AC00408. Additional survey lines were funded over the Infilid Block by Doyon Limited, increasing the data density in that area (shown in detail by inset).

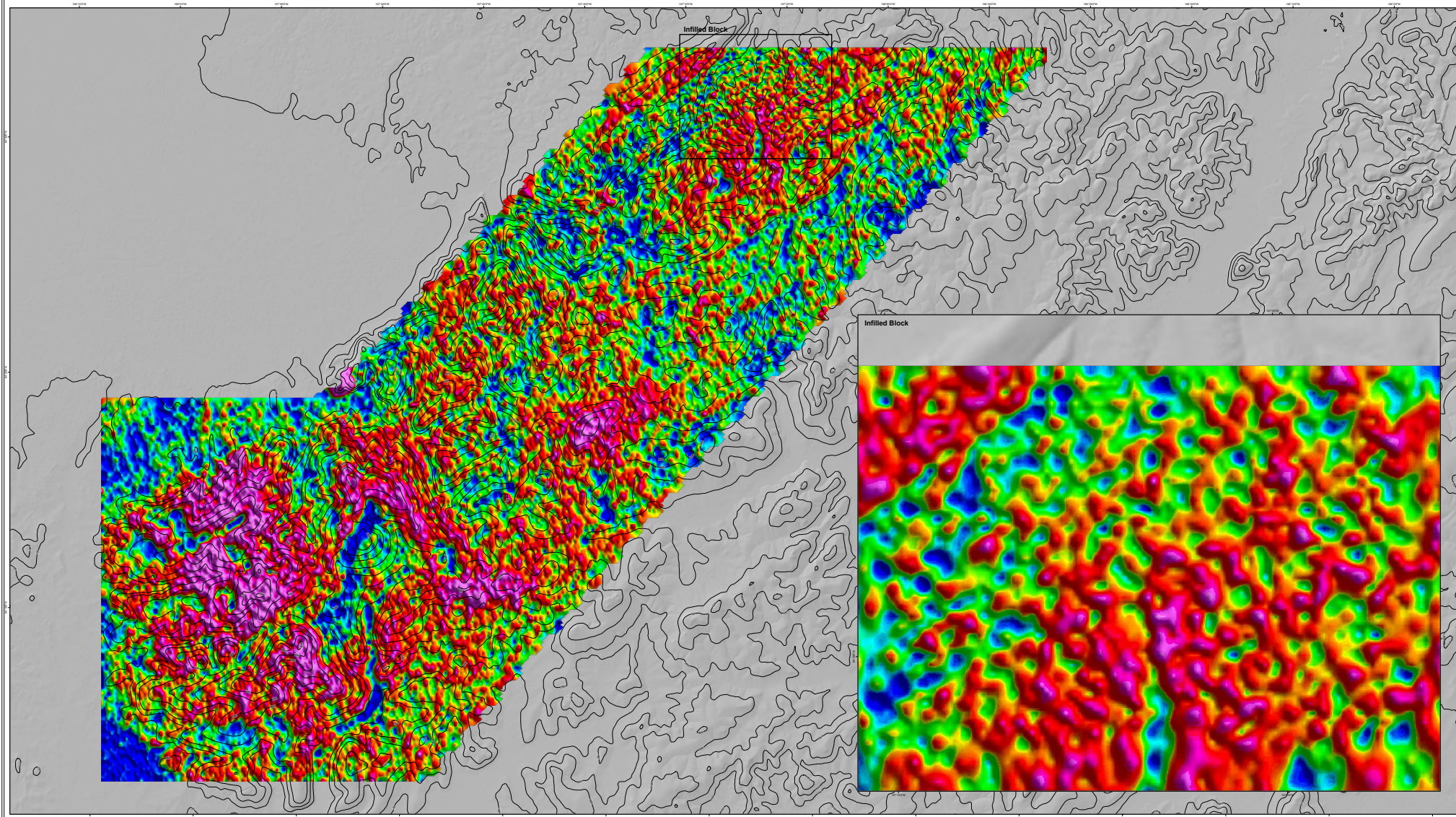
Basemap streams and waterbodies from:
National Hydrography Dataset, U.S. Geological Survey
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Basemap hillshade and contours from:
U.S. Geological Survey, EROS Data Center, 2013,
Digital elevation - Interferometric Synthetic Aperture
Radar (IFSAR) - Alaska

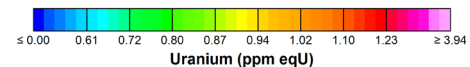
Projection:
Universal Transverse Mercator Zone 4N

Datum:
WGS 1984

Cartography by:
E.J. Peterson and A.E. Macpherson (2025)



Fussio, L.A.¹, Petersen E.L.¹, Enond, A.M.², and EON Geosciences Inc.



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Basemap streams and waterbodies from:
National Hydrography Dataset, U.S. Geological Survey
Region, Viora, 2002–2016

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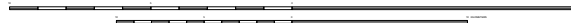
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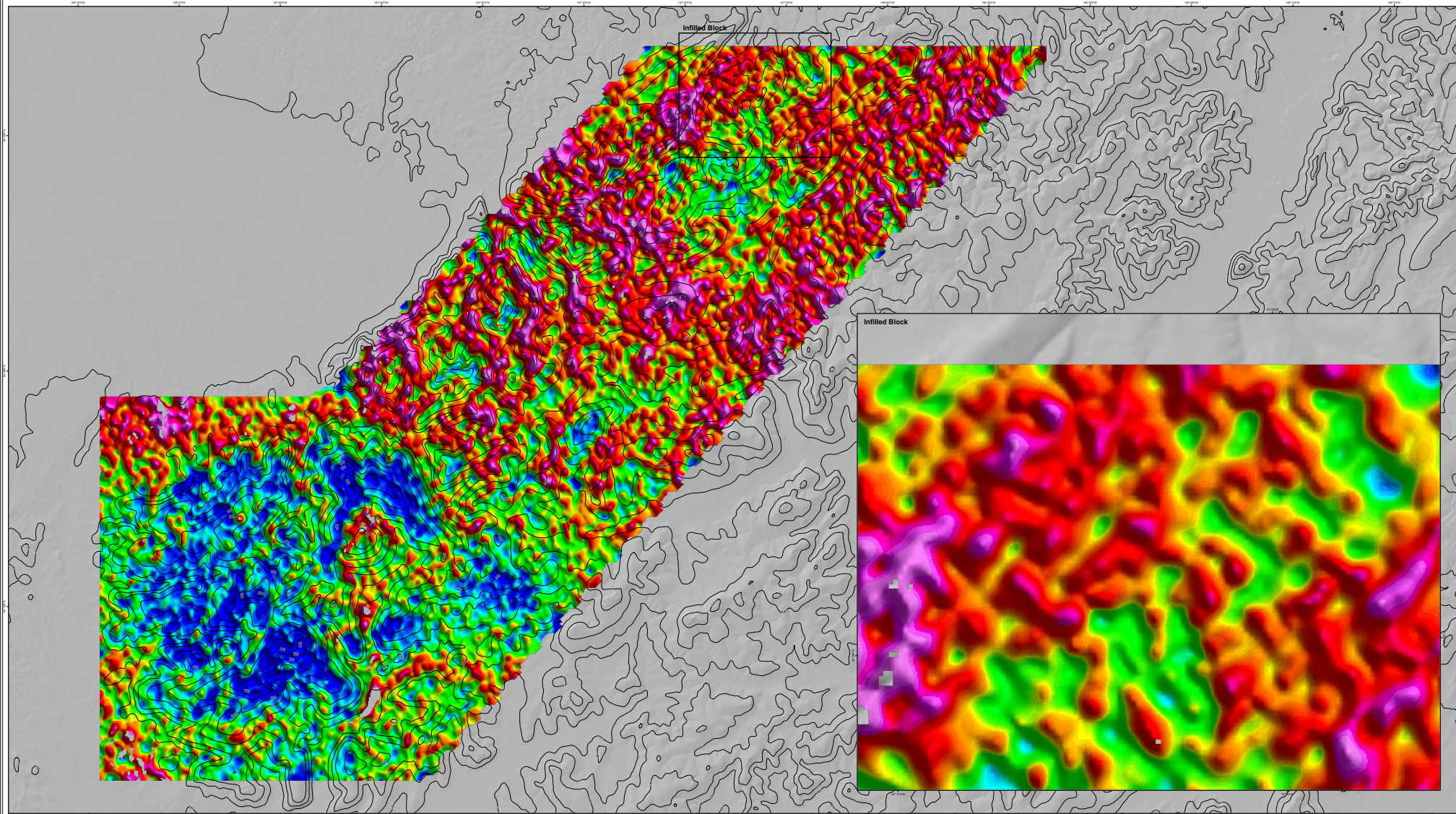
Dates:
VGS 1984

Cartography by:
E.J. Peterson and A.E. Macpherson (2025)



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SECTION OF	INSULATED	RUBY
UNLARGEST	OTHER	MEDIAL

Location of map area

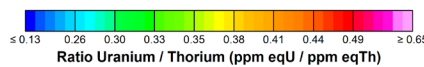


Ratio Uranium / Thorium

Kuskokwim airborne magnetic and radiometric survey, northern Kaiyuh Mountains, Alaska

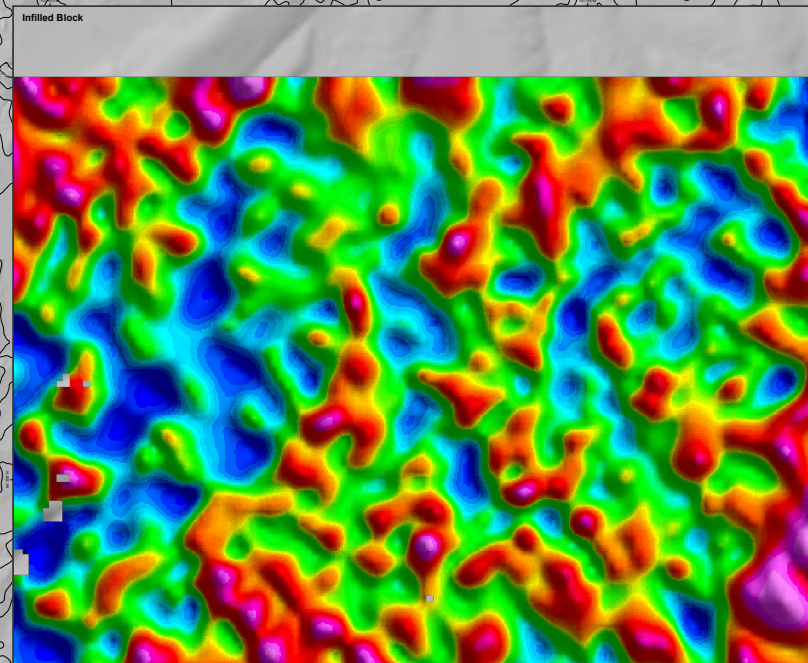
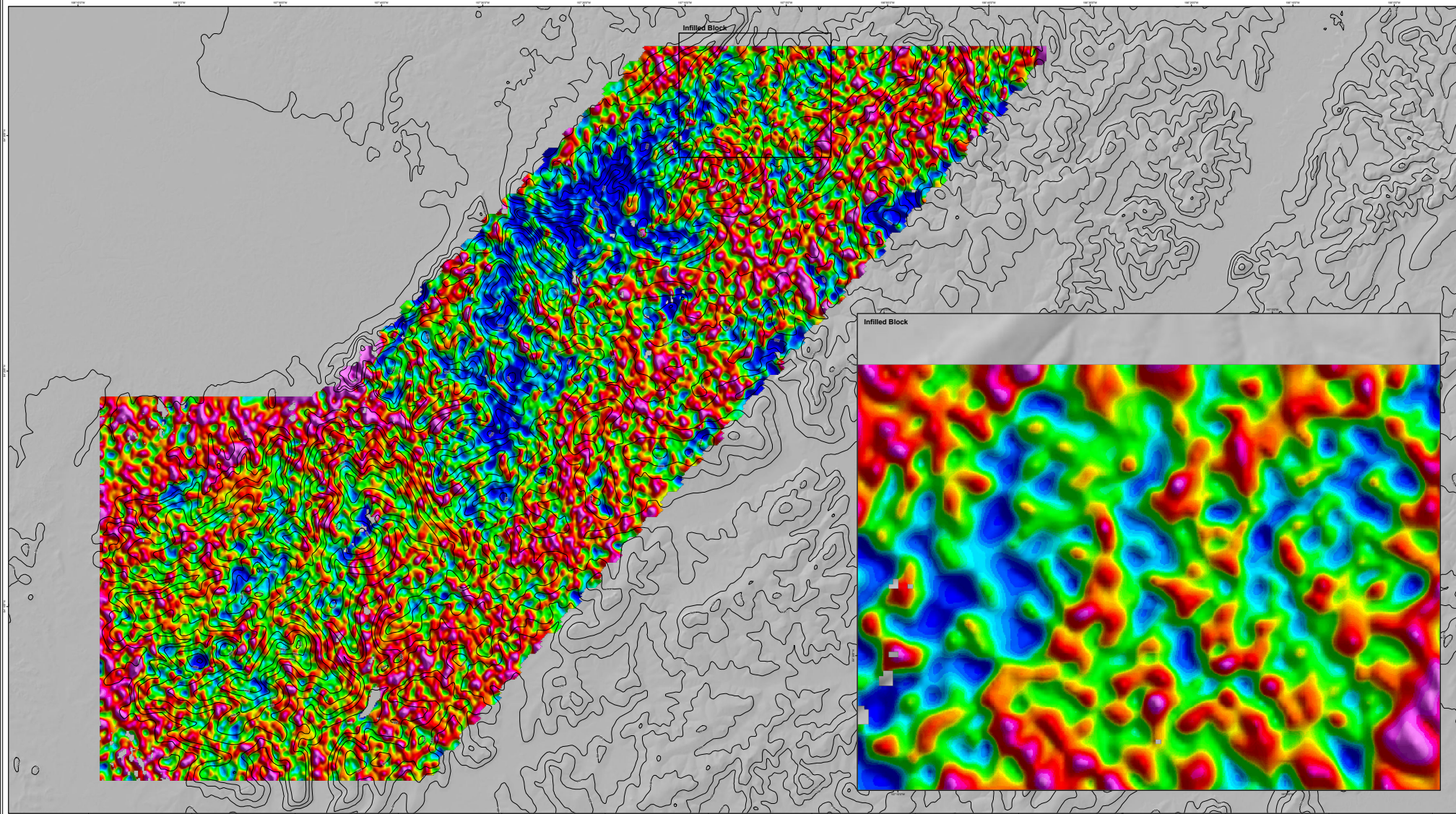
Fusso, L.A., Peterson, E.J., Goswami, A.B., and EON Geosciences Inc., 2025

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Base map: streams and waterbodies from: National Hydrography Dataset, U.S. Geological Survey, Reston, Virginia, 2002-2015.
Base map: hillshade and contours from: U.S. Geological Survey, 3DDEM Data Center, 2013.
Digital elevation - Interferometric Synthetic Aperture Radar (IFSAR) - Alaska
Projection: Universal Transverse Mercator Zone 48
Datum: WGS 1984
Geography by: E.J. Peterson and A.E. Magnusson (2025)



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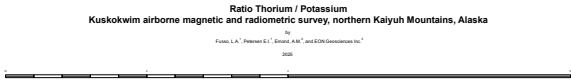


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SECTION OF	INSULATED	RUBY
UNLAKELAND	OTHER	MEDICAL

Location of survey area

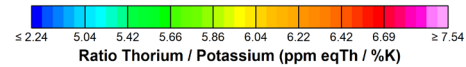


Ratio Thorium / Potassium

Kuskokwim airborne magnetic and radiometric survey, northern Kaiyuh Mountains, Alaska

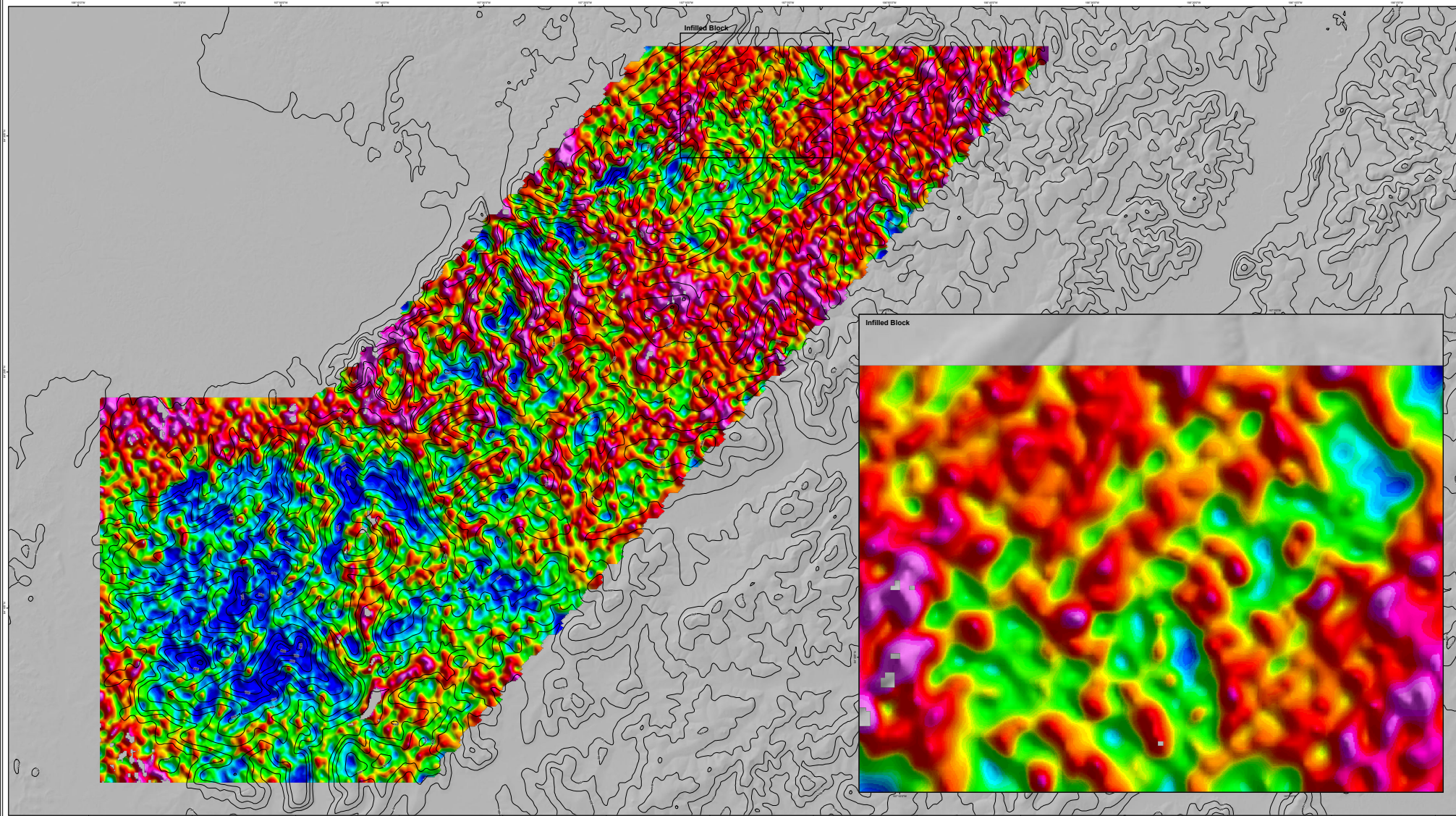
Fusso, L.A., Peterson, E.J., Goswami, A.B., and EON Geosciences Inc., 2025

ADGGS Project of Radiometric & Geophysical Survey, 2023 (Project No. 2023-001)
Data collected by EON Geosciences Inc. and ADGGS. Data processed by EON Geosciences Inc. and ADGGS. Data released by ADGGS. Data released by ADGGS.



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Base map: streams and waterbodies from: National Hydrography Dataset, U.S. Geological Survey, Reston, Virginia, 2002-2015.
Base map: hillshade and contours from: U.S. Geological Survey, 3DDEM Data Center, 2013.
Digital elevation - Interferometric Synthetic Aperture Radar (IFSAR) - Alaska
Projection: Universal Transverse Mercator Zone 48N
Datum: WGS 1984
Geography by: E.J. Peterson and A.E. Margheim (2025)



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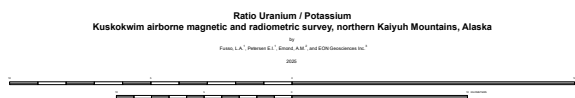


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SECTION OF	INSULATED	RUBY
UNLAKELAND	OTHER	MEDICAL

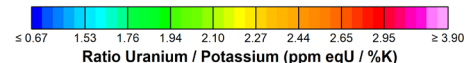
Location of survey area



Ratio Uranium / Potassium
Kuskokwim airborne magnetic and radiometric survey, northern Kaiyuh Mountains, Alaska

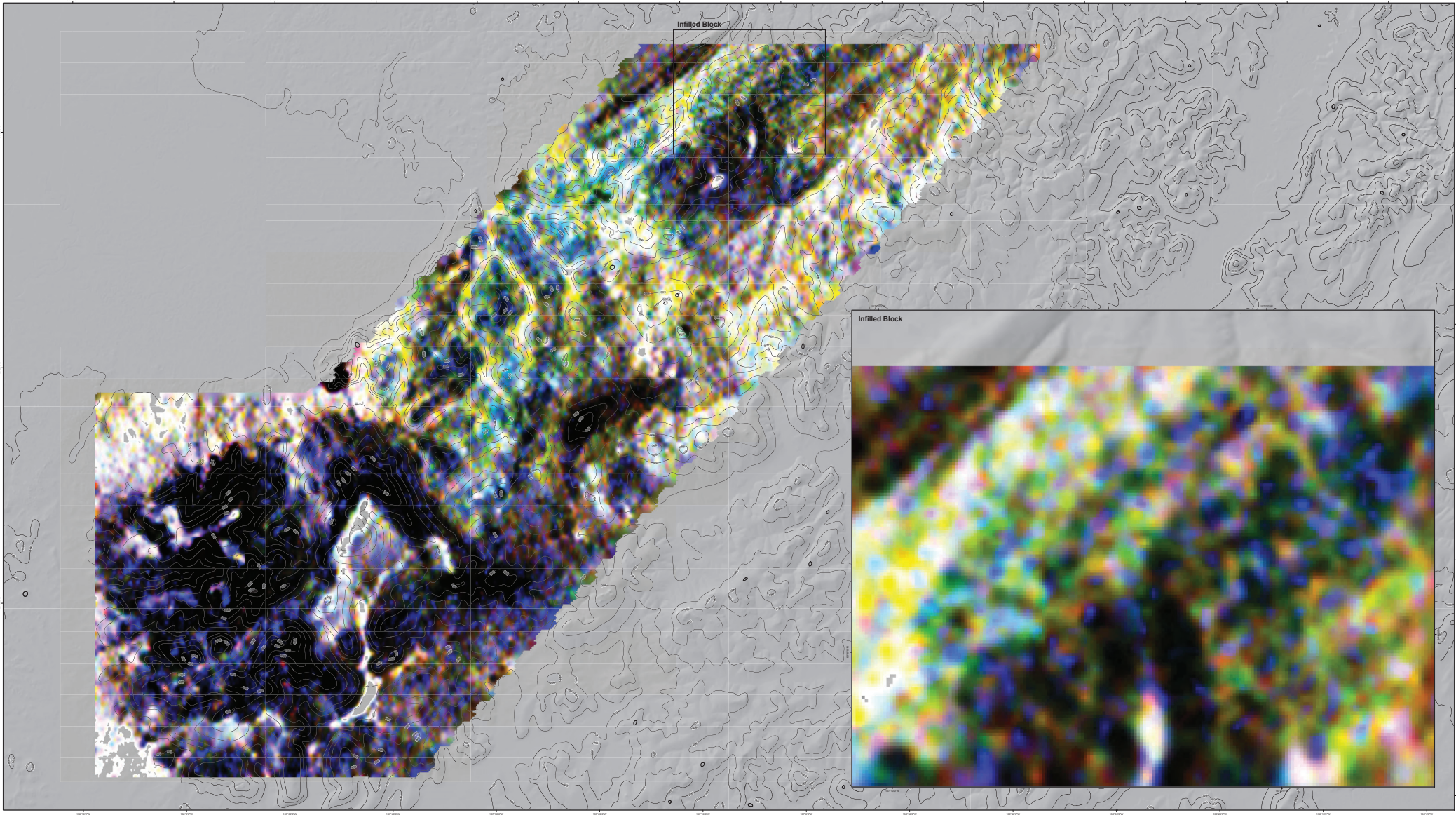
Fusso, L.A., Peterson, E.J., Goswami, A.B., and EON Geosciences Inc.,
2025

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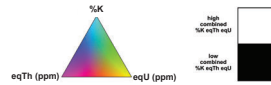
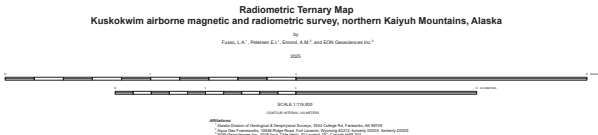


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Base map streams and waterbodies from:
National Hydrography Dataset, U.S. Geological Survey,
Reston, Virginia, 2002-2015.
Base map hillshade and contours from:
U.S. Geological Survey, 3DDEM Data Center, 2013.
Digital elevation - Interferometric Synthetic Aperture
Radar (IFSAR) - Alaska
Projection:
Universal Transverse Mercator Zone 48
Datum:
WGS 1984
Geography by:
E.J. Peterson and A.E. Magnusson (2025)



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Base map streams and waterbodies from: National Hydrography Dataset, U.S. Geological Survey, Reston, Virginia, 2010-2019
Base map hillshades and contours from: U.S. Geological Survey, 3DDEM Data Center, 2013
Digital elevation - Interferometric Synthetic Aperture Radar (IFSAR), Alaska
Projection: Universal Transverse Mercator Zone 48
Datum: NAD83
Cartography by: E.J. Peterson and A.E. Maphurson (2025)