

EAGLE AIRBORNE MAGNETIC AND RADIOMETRIC GEOPHYSICAL SURVEY
Emond, A.M., and MPX Geophysics LTD

Geophysical Report 2021-2

2021
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS



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EAGLE AIRBORNE MAGNETIC AND RADIOMETRIC GEOPHYSICAL SURVEY

Emond, A.M.,¹ and MPX Geophysics LTD

ABSTRACT

The Eagle airborne magnetic and radiometric geophysical survey covers parts of the Charley River, Eagle, and Tanacross quadrangles near Eagle, Alaska (fig. 1). Magnetic and radiometric data were collected with a fixed-wing aircraft May 24 to June 27, 2021 by MPX Geophysics LTD. A total of 26,926 line kilometers were collected covering 9,731 square kilometers. The magnetometer was mounted to a rear-facing fixed boom (“tail stinger”). The radiometric crystals were located in the cabin of the aircraft. The Eagle survey was flown with a line spacing of 400 meters (m) and a mean ground clearance of 330 m.

PURPOSE

The data from the Eagle airborne magnetic and radiometric geophysical survey will be used for improving the understanding of the geology and mineral potential, promoting resource exploration, and be a part of the continuous regional magnetic data coverage of the Yukon Tanana Uplands.

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.

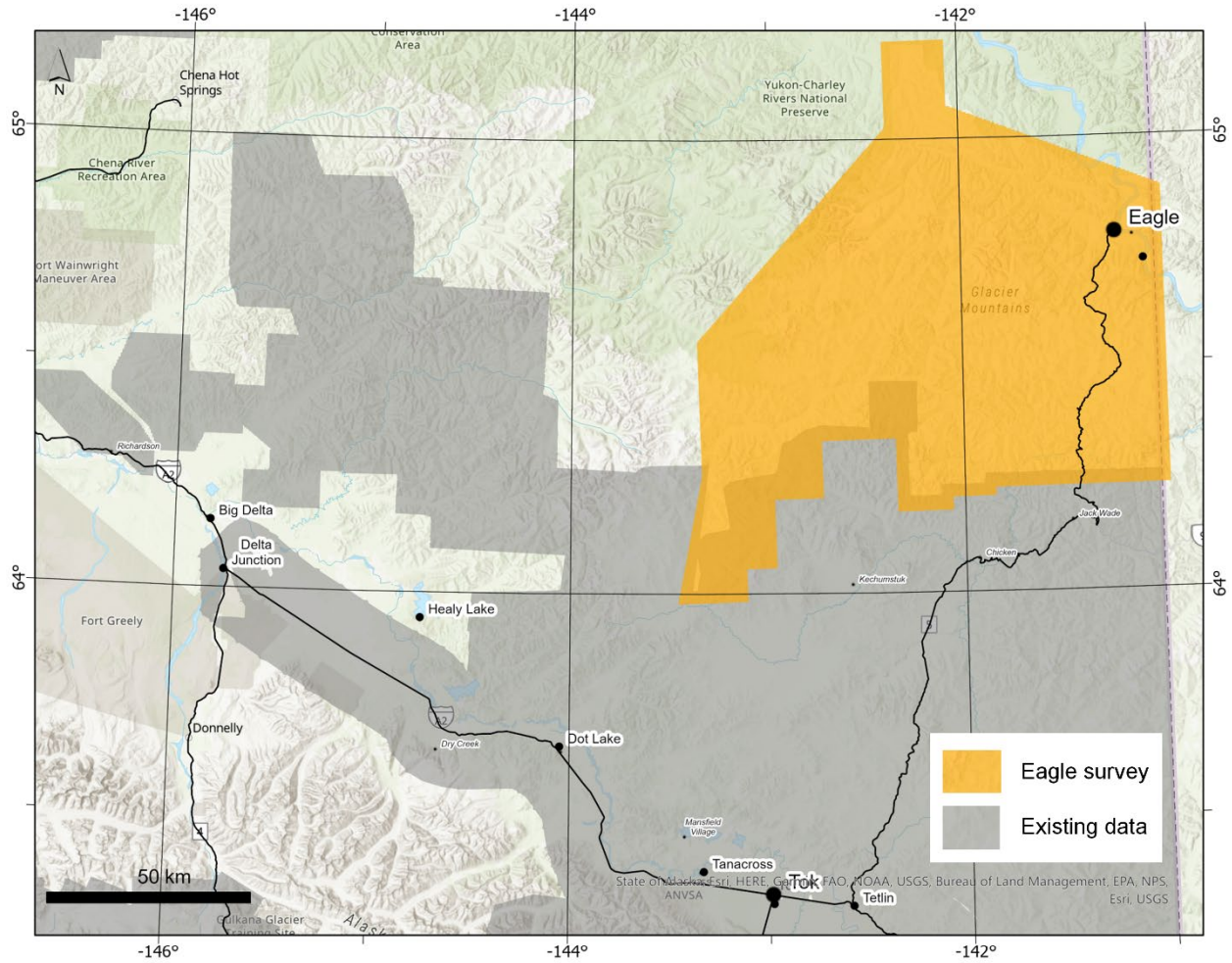
ACKNOWLEDGMENTS

This work was supported by the Bureau of Land Management grant L18AC00019 and the U.S. Geological Survey’s Earth MRI program grant G20AC00160. The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

¹ Alaska Division of Geological & Geophysical Surveys, 3354 College Road, Fairbanks, Alaska 99709-3707

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
grids_ermapper	contractor	Geographically registered gridded data, ER Mapper ERS format
grids_geosoft	contractor	Geosoft-format gridded data
images_registered	contractor	RGB GeoTiff format images of gridded data
kmz	contractor	keyhole markup language (kml) kmz archive files of project data. Viewable in Google Earth and other compatible programs
maps_pdf_format	contractor	Printable and geographically registered maps in pdf format. Compatible with mobile device navigation and desktop mapping applications
maps_geosoft_format	contractor	maps as Geosoft packed map files
maps_jpg_format	contractor	Printable maps jpg format
photos_flightpath	contractor	Survey flight path downward facing photos with GPS location in exif data
vector_data	contractor	Line path and survey boundary in ESRI shapefile (SHP) format



Top. Eagle survey location map with major roads, towns, and 1:250,000-scale USGS quadrangle boundaries. Prior DGGs surveys shown in gray. **Right.** Eagle airborne geophysical survey location shown in interior Alaska with relevant 1:250,000-scale quadrangles.



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: <https://doi.org/10.14509/30755>. All maps have a USGS topographic map basemap.

Flown flight path

Magnetic Data

Residual Magnetic Intensity in nT

Calculated analytic signal of the residual magnetic field in nT/m

Computed 1st vertical derivative of the residual magnetic field in nT/m

Radiometric Data

Total Air Absorbed Dose Rate in nGy/h

Equivalent concentration of Potassium (K) as percent K

Equivalent concentration of Thorium (Th) in ppm

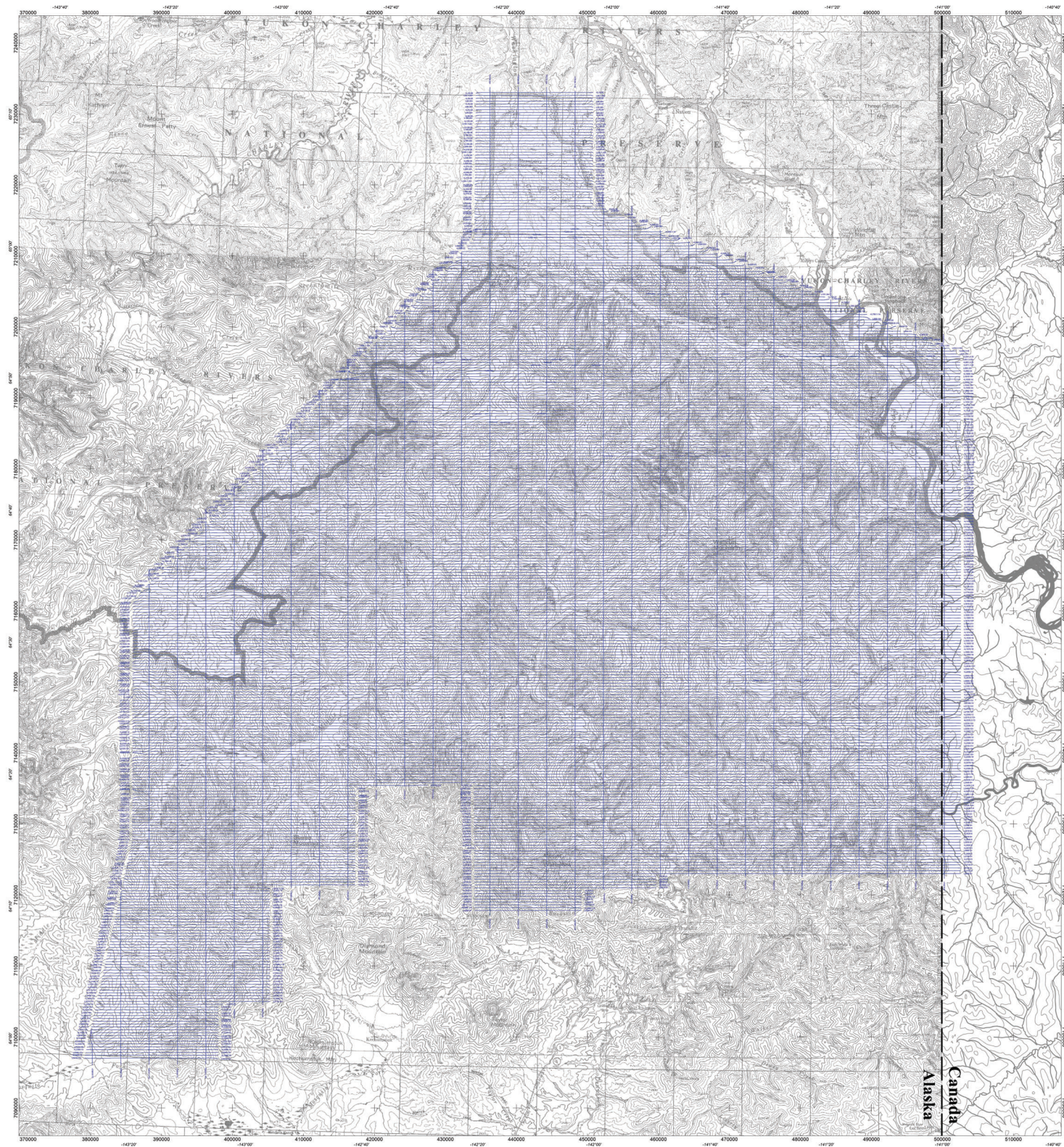
Equivalent concentration of Uranium (U) in ppm

Uranium Thorium Ratio

Potassium Thorium Ratio

Ternary Grid: percent K - equivalent U - equivalent Th

Residual Magnetic Intensity in nT



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LEGEND

Survey Date: May-June 2021
 Fixed-Wing Aircraft Type: Piper Navajo PA31
 Registration: C-GQVP

SURVEY PARAMETERS:
 Mean Terrain Clearance: 330 m (aircraft and sensors)
 Traverse Line Direction/Spacing: 90°(E-W) / 400 m
 Control Line Direction/Spacing: 180°(N-S) / 4000 m

AIRBORNE SYSTEMS:

MAGNETOMETER: Scintrex CS-3
 Configuration: Tail-Stinger
 Sampling Rate: 20 readings/second
 Sensitivity: 0.01 nT

GAMMA-RAY SPECTROMETER:
 RSX-5 multi-channel NaI sensors with 33.6 L "downwards looking" and 8.4 L "upwards looking".
 Sampling Rate: 1 reading/second

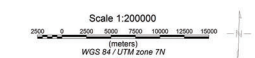
NAVIGATION: Novatel LI/L2 GPS
 Real-time differentially corrected
 Sampling Rate: 10 readings/second

ALTIMETERS:
 Setra 276 Pressure Transducer
 Sampling Rate: 10 readings/second
 Radar: Bendix King KRA-10A
 Sampling Rate: 20 readings/second

BASE STATION MAGNETOMETER:
 GEM GSM-19TW
 Sampling Rate: 1 reading/second
 Sensitivity: 0.022 nT

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Flown Flight Path
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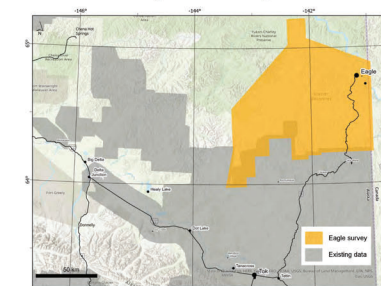
Flown Direction (<); Line Type (L/T); Line Number - Version : Flight Number

Base maps: USGS 1:250,000-scale topographic map and scanned Canada topographic map

Location of the Eagle survey in Alaska and in relation to USGS 1:250,000-scale quadrangles



Regional Location Map

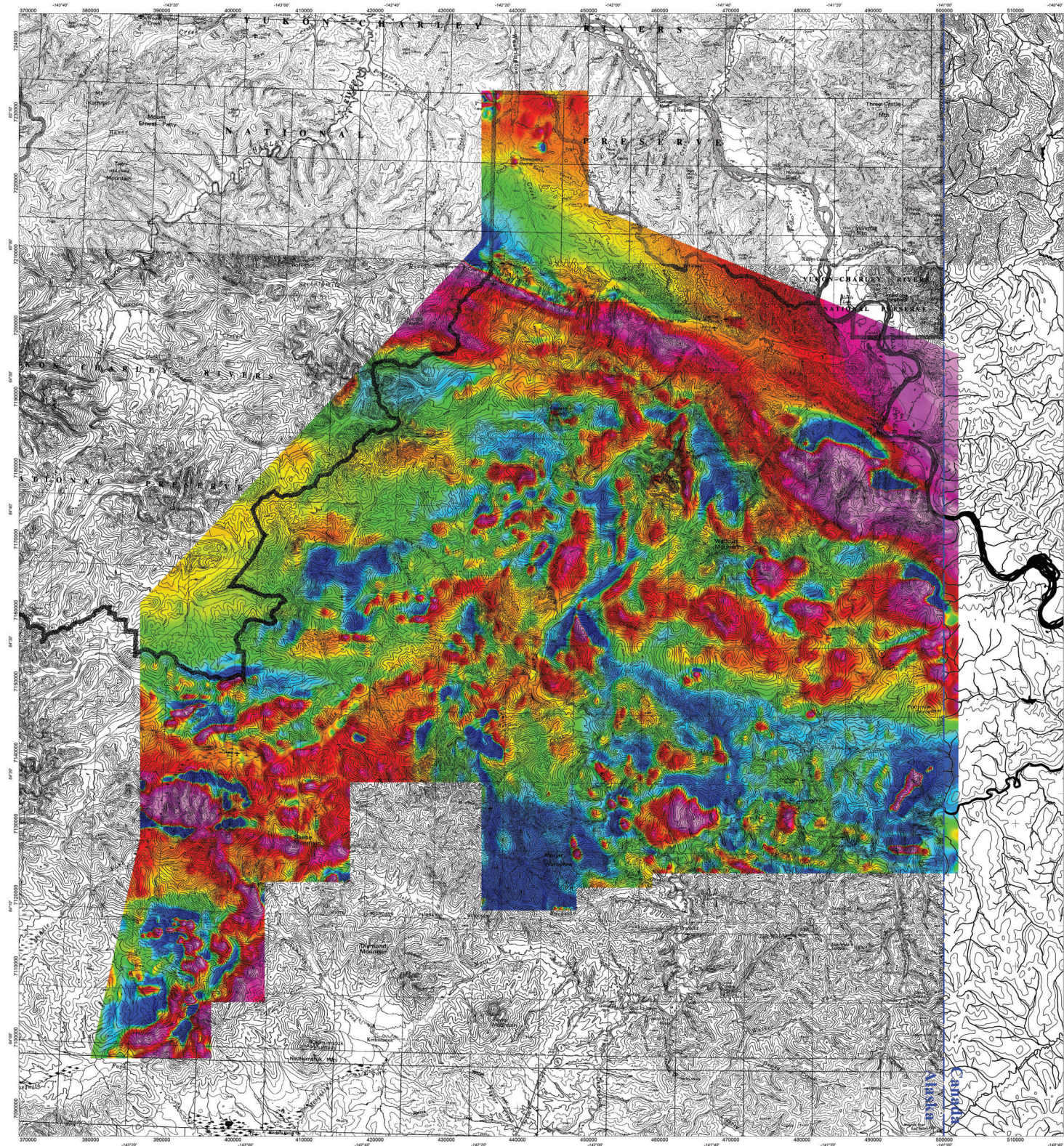


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Eagle airborne magnetic and radiometric geophysical survey

Flown Flight Path Map

Geophysical Report 2021-2



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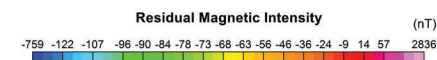
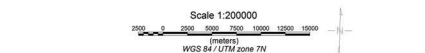
NAVIGATION: Novatel LI/L2 GPS
 Real-time differentially corrected
 Sampling Rate: 10 readings/second

ALTIMETERS:
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 Sampling Rate: 10 readings/second
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 Sampling Rate: 1 reading/second
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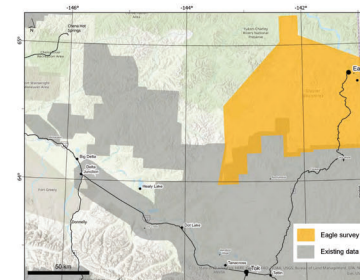


Base maps: USGS 1:250,000-scale topographic map and scanned Canada topographic map

Location of the Eagle survey in Alaska and in relation to USGS 1:250,000-scale quadrangles



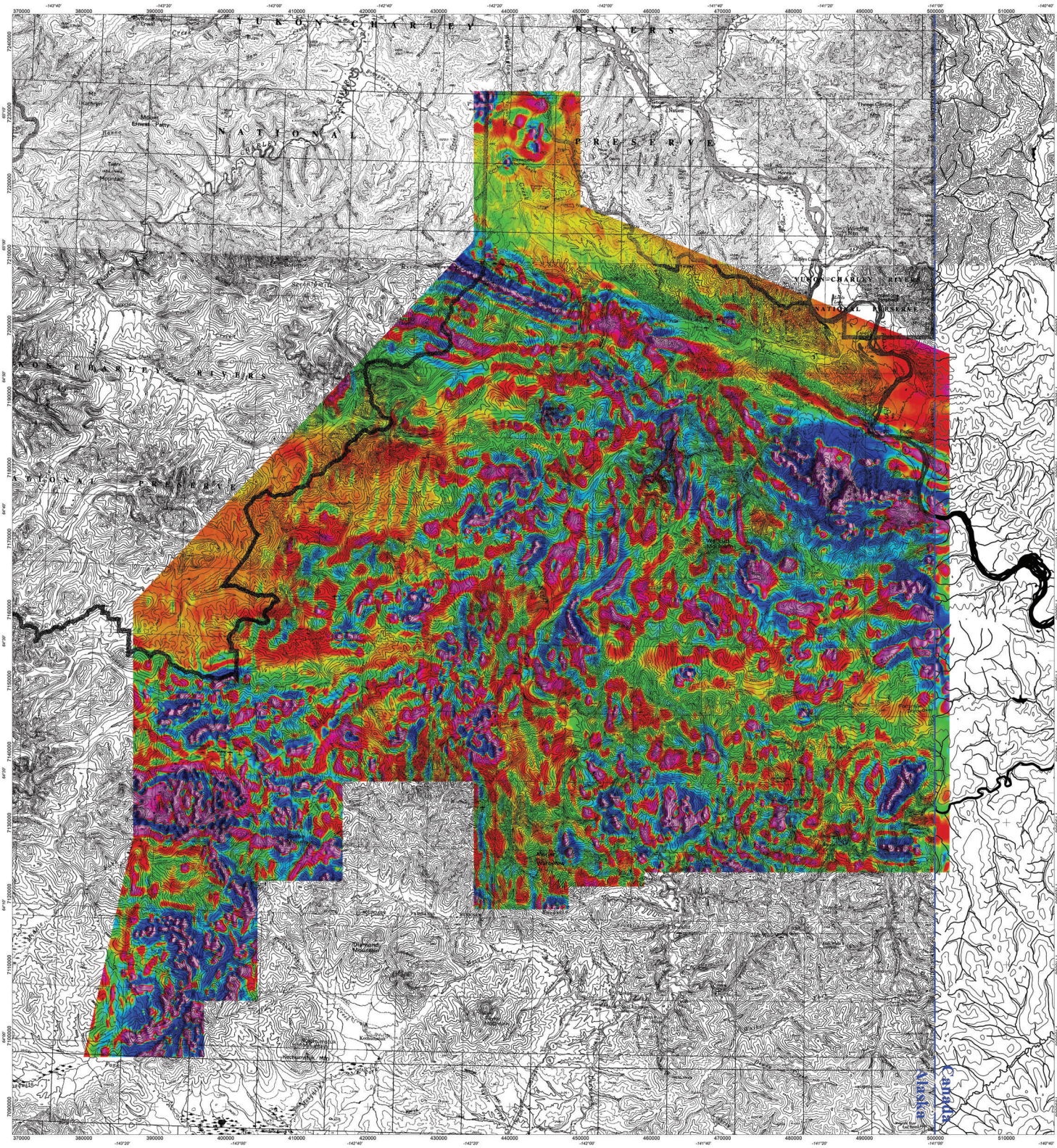
Regional Location Map



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Eagle airborne magnetic and radiometric geophysical survey

Residual Magnetic Intensity Map

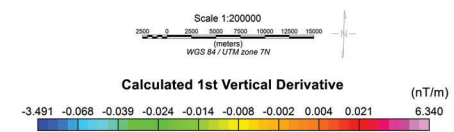


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LEGEND	
Survey Date:	May-June 2021
Fixed-Wing Aircraft Type:	Piper Navajo PA31
Registration:	C-GQVP
SURVEY PARAMETERS:	
Mean Terrain Clearance:	330 m (aircraft and sensors)
Traverse Line Direction/Spacing:	90°(E-W) / 400 m
Control Line Direction/Spacing:	180°(N-S) / 4000 m
AIRBORNE SYSTEMS:	
MAGNETOMETER: Scintrex CS-3	GAMMA-RAY SPECTROMETER:
Configuration: Tail-Stinger	RSX-5 multi-channel NaI sensors with 33.6 L "downwards looking" and 8.4 L "upwards looking".
Sampling Rate: 20 readings/second	Sampling Rate: 1 reading/second
Sensitivity: 0.01 nT	
NAVIGATION: Novatel LI/L2 GPS	ALTIMETERS:
Real-time differentially corrected	Setra 276 Pressure Transducer
Sampling Rate: 10 readings/second	Sampling Rate: 10 readings/second
BASE STATION MAGNETOMETER:	Radar: Bendix King KRA-10A
GEM GSM-19TW	Sampling Rate: 20 readings/second
Sampling Rate: 1 reading/second	
Sensitivity: 0.022 nT	

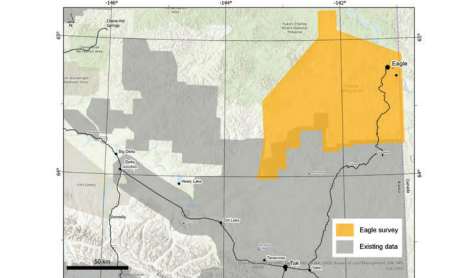
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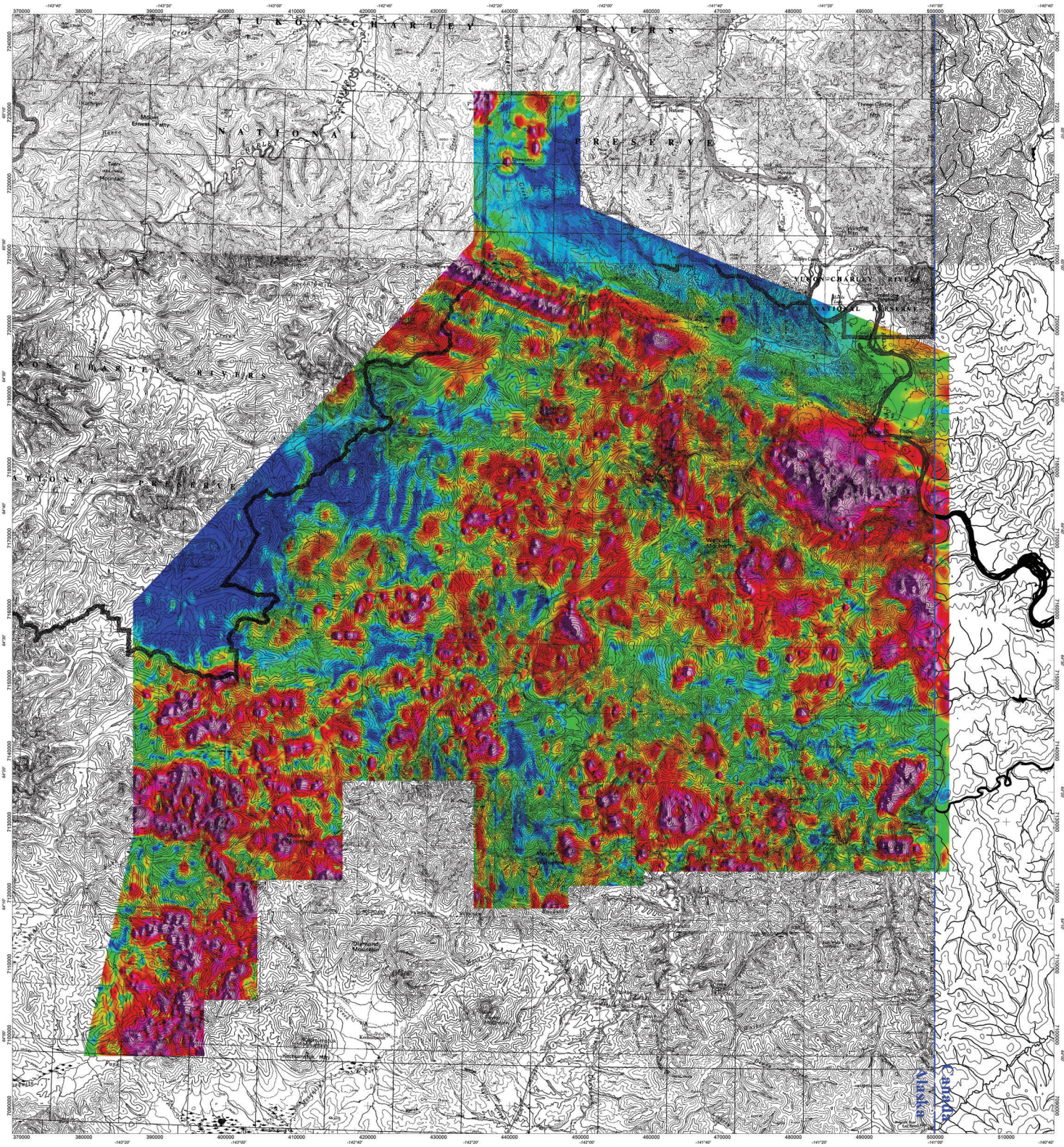
Location of the Eagle survey in Alaska and in relation to USGS 1:250,000-scale quadrangles



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Eagle airborne magnetic and radiometric geophysical survey

Calculated Magnetic 1st Vertical Derivative Map

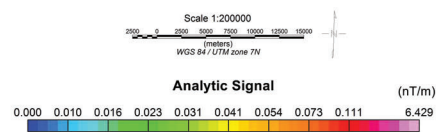


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Sensitivity: 0.01 nT	
NAVIGATION: Novatel LI/L2 GPS	ALTIMETERS:
Real-time differentially corrected	Setra 276 Pressure Transducer
Sampling Rate: 10 readings/second	Sampling Rate: 10 readings/second
BASE STATION MAGNETOMETER:	Radar: Bendix King KRA-10A
GEM GSM-19TW	Sampling Rate: 20 readings/second
Sampling Rate: 1 reading/second	
Sensitivity: 0.022 nT	

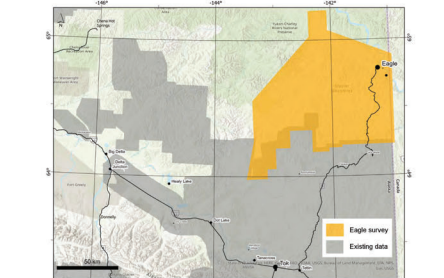
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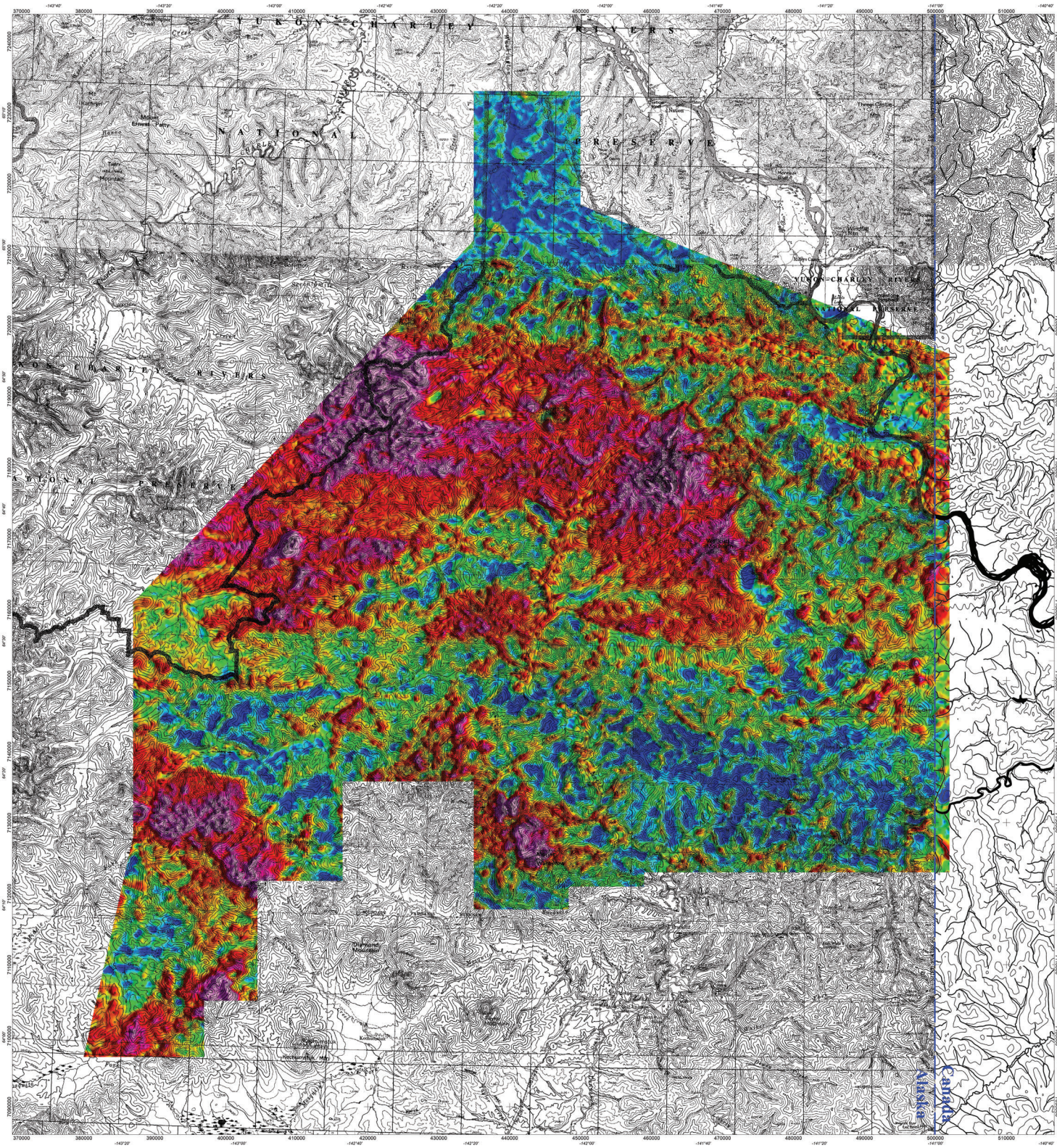
Location of the Eagle survey in Alaska and in relation to USGS 1:250,000-scale quadrangles



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Eagle airborne magnetic and radiometric geophysical survey

Magnetic Analytic Signal Map

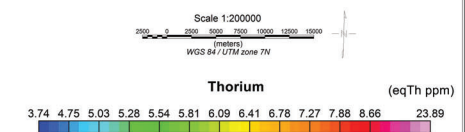


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LEGEND	
Survey Date:	May-June 2021
Fixed-Wing Aircraft Type:	Piper Navajo PA31
Registration:	C-GQVP
SURVEY PARAMETERS:	
Mean Terrain Clearance:	330 m (aircraft and sensors)
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Sensitivity: 0.01 nT	
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Sampling Rate: 10 readings/second	Sampling Rate: 10 readings/second
BASE STATION MAGNETOMETER:	Radar: Bendix King KRA-10A
GEM GSM-19TW	Sampling Rate: 20 readings/second
Sampling Rate: 1 reading/second	
Sensitivity: 0.022 nT	

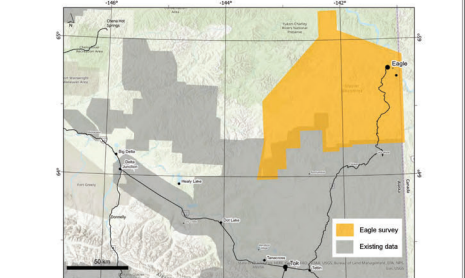
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Location of the Eagle survey in Alaska and in relation to USGS 1:250,000-scale quadrangles

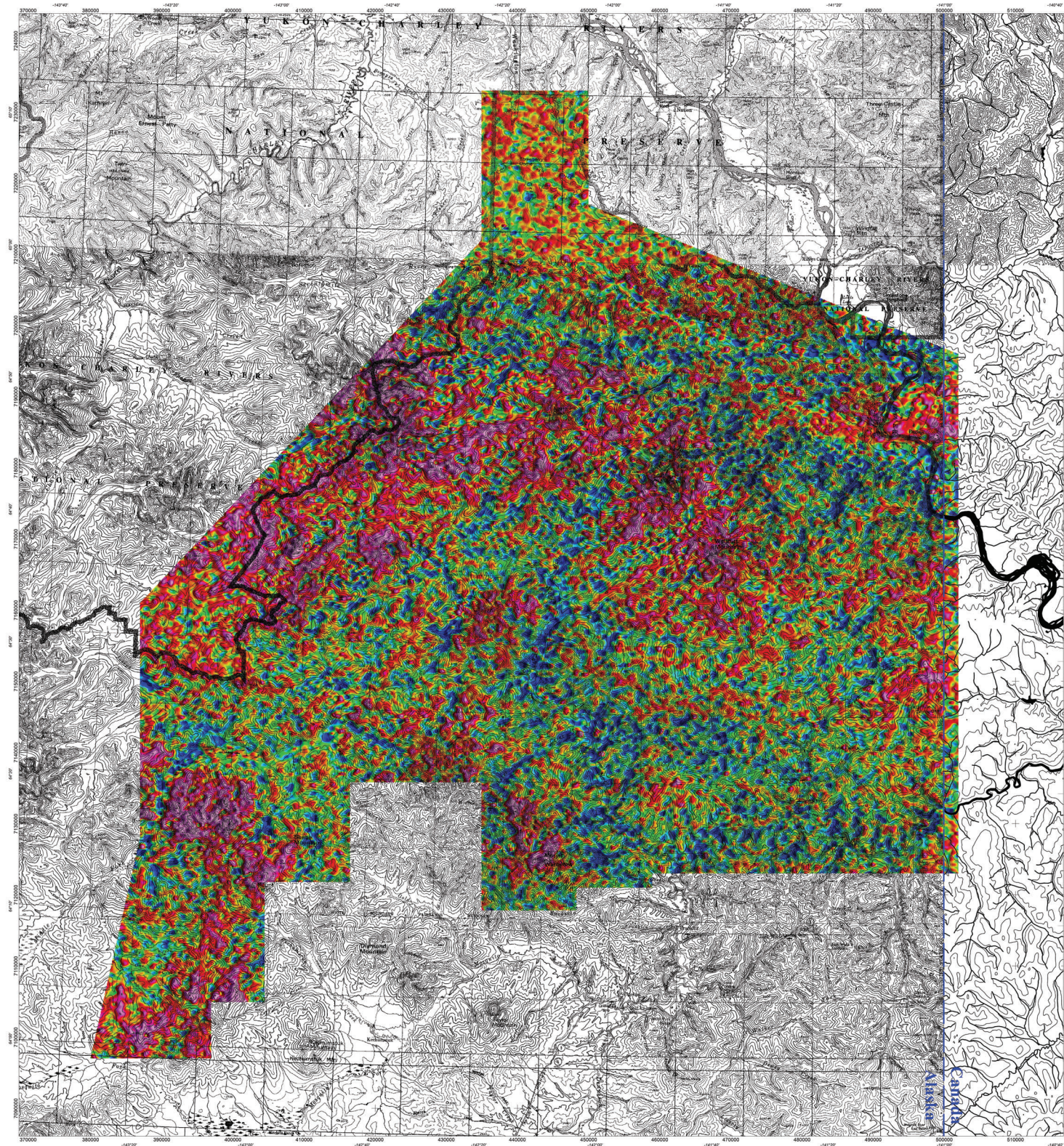


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Eagle airborne magnetic and radiometric geophysical survey

Thorium Map

Geophysical Report 2021-2



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LEGEND

Survey Date: May-June 2021
 Fixed-Wing Aircraft Type: Piper Navajo PA31
 Registration: C-GQVP

SURVEY PARAMETERS:
 Mean Terrain Clearance: 330 m (aircraft and sensors)
 Traverse Line Direction/Spacing: 90°(E-W) / 400 m
 Control Line Direction/Spacing: 180°(N-S) / 4000 m

AIRBORNE SYSTEMS:

MAGNETOMETER: Scintrex CS-3
 Configuration: Tail-Stinger
 Sampling Rate: 20 readings/second
 Sensitivity: 0.01 nT

GAMMA-RAY SPECTROMETER:
 RSX-5 multi-channel NaI sensors with 33.6 L "downwards looking" and 8.4 L "upwards looking".
 Sampling Rate: 1 reading/second

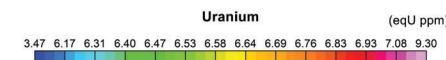
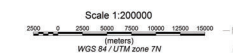
NAVIGATION: Novatel LI/L2 GPS
 Real-time differentially corrected
 Sampling Rate: 10 readings/second

ALTIMETERS:
 Setra 276 Pressure Transducer
 Sampling Rate: 10 readings/second
 Radar: Bendix King KRA-10A
 Sampling Rate: 20 readings/second

BASE STATION MAGNETOMETER:
 GEM GSM-19TW
 Sampling Rate: 1 reading/second
 Sensitivity: 0.022 nT

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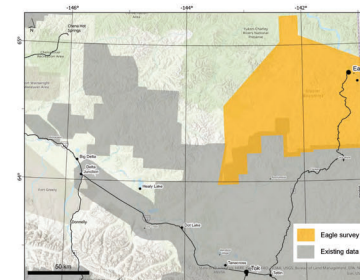


Base maps: USGS 1:250,000-scale topographic map and scanned Canada topographic map

Location of the Eagle survey in Alaska and in relation to USGS 1:250,000-scale quadrangles



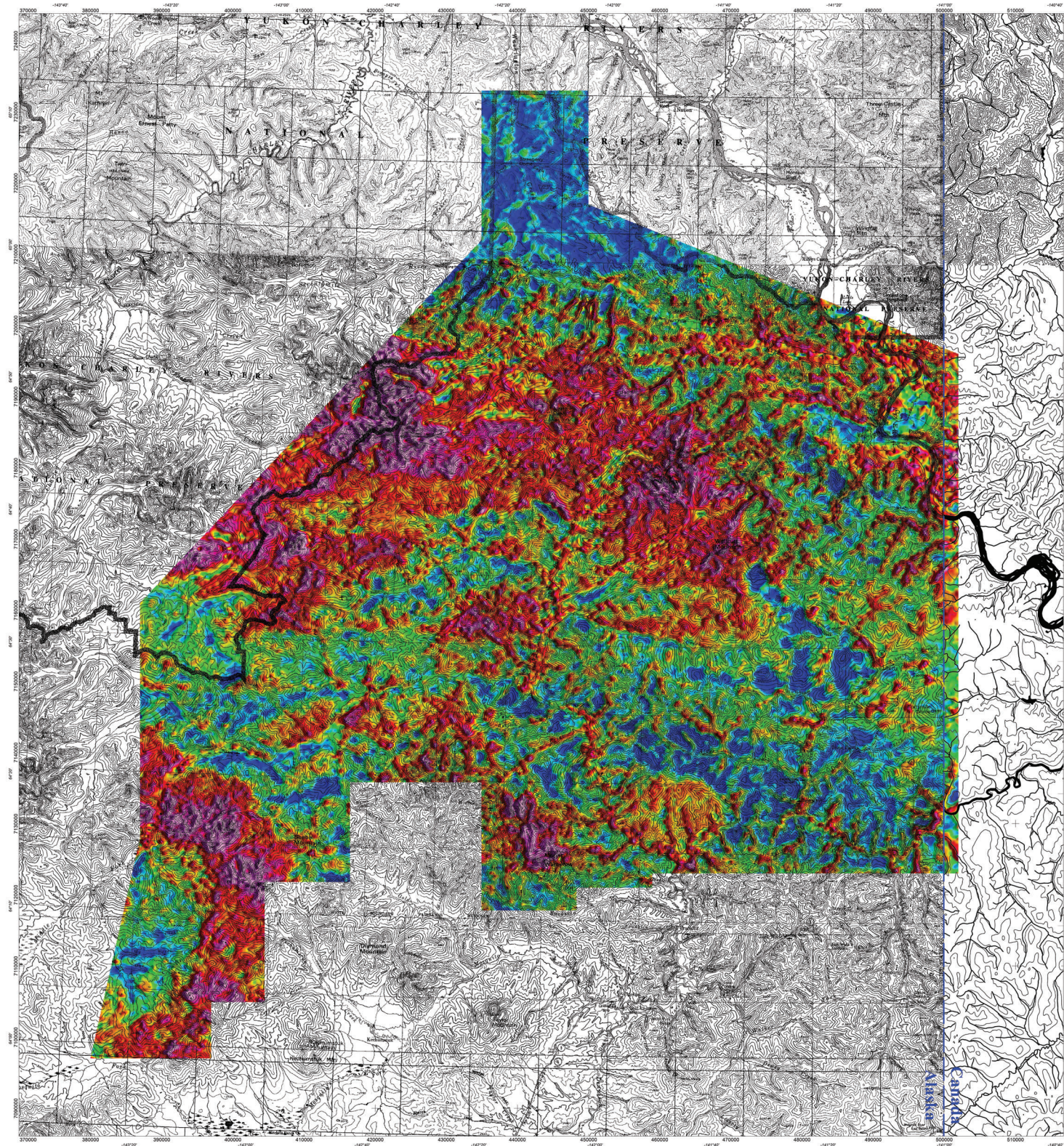
Regional Location Map



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Eagle airborne magnetic and radiometric geophysical survey

Uranium Map



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 Sampling Rate: 1 reading/second

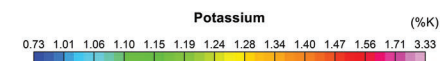
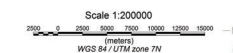
NAVIGATION: Novatel LI/L2 GPS
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ALTIMETERS:
 Setra 276 Pressure Transducer
 Sampling Rate: 10 readings/second
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 Sampling Rate: 20 readings/second

BASE STATION MAGNETOMETER:
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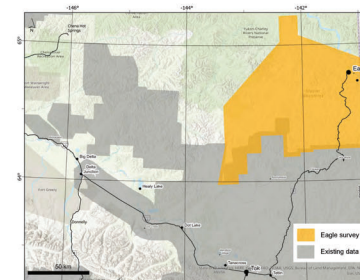


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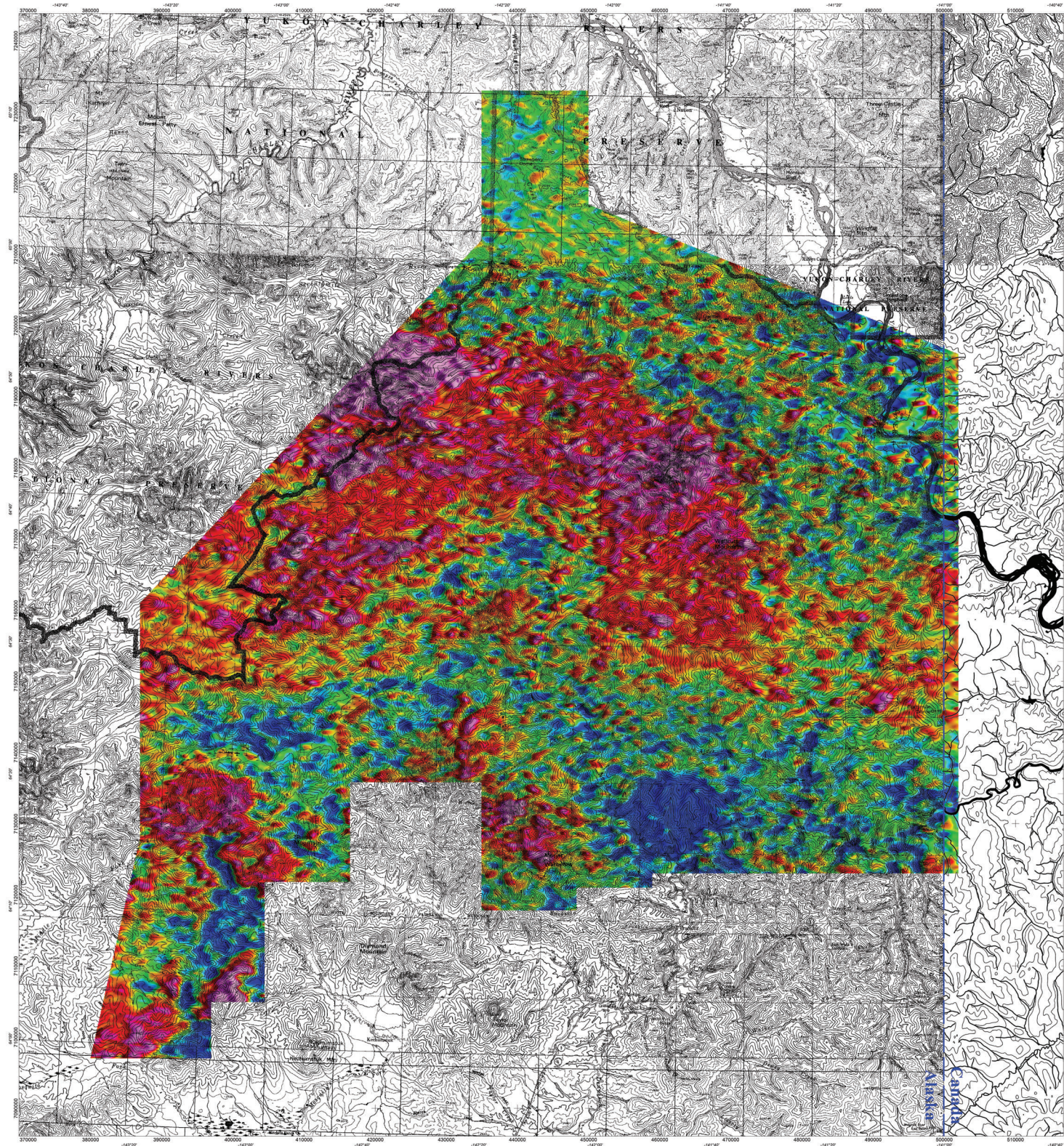
Regional Location Map



ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

Eagle airborne magnetic and radiometric geophysical survey

Potassium Map



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 Registration: C-GQVP

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AIRBORNE SYSTEMS:

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 Sensitivity: 0.01 nT

GAMMA-RAY SPECTROMETER:
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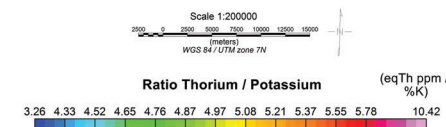
NAVIGATION: Novatel LI/L2 GPS
 Real-time differentially corrected
 Sampling Rate: 10 readings/second

ALTIMETERS:
 Setra 276 Pressure Transducer
 Sampling Rate: 10 readings/second
 Radar: Bendix King KRA-10A
 Sampling Rate: 20 readings/second

BASE STATION MAGNETOMETER:
 GEM GSM-19TW
 Sampling Rate: 1 reading/second
 Sensitivity: 0.022 nT

This work was supported by the Bureau of Land Management grant L18AC00019 and the U.S. Geological Survey's Earth MRI program grant G20AC00160.

Emond, A.M., and MPX Geophysics LTD, 2021. Eagle airborne magnetic and radiometric geophysical survey: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2021-2. <https://doi.org/10.14509/30755>

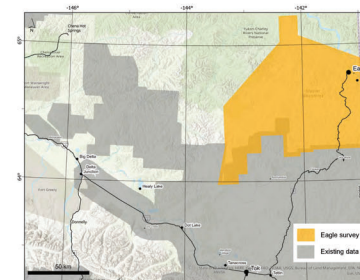


Base maps: USGS 1:250,000-scale topographic map and scanned Canada topographic map

Location of the Eagle survey in Alaska and in relation to USGS 1:250,000-scale quadrangles



Regional Location Map

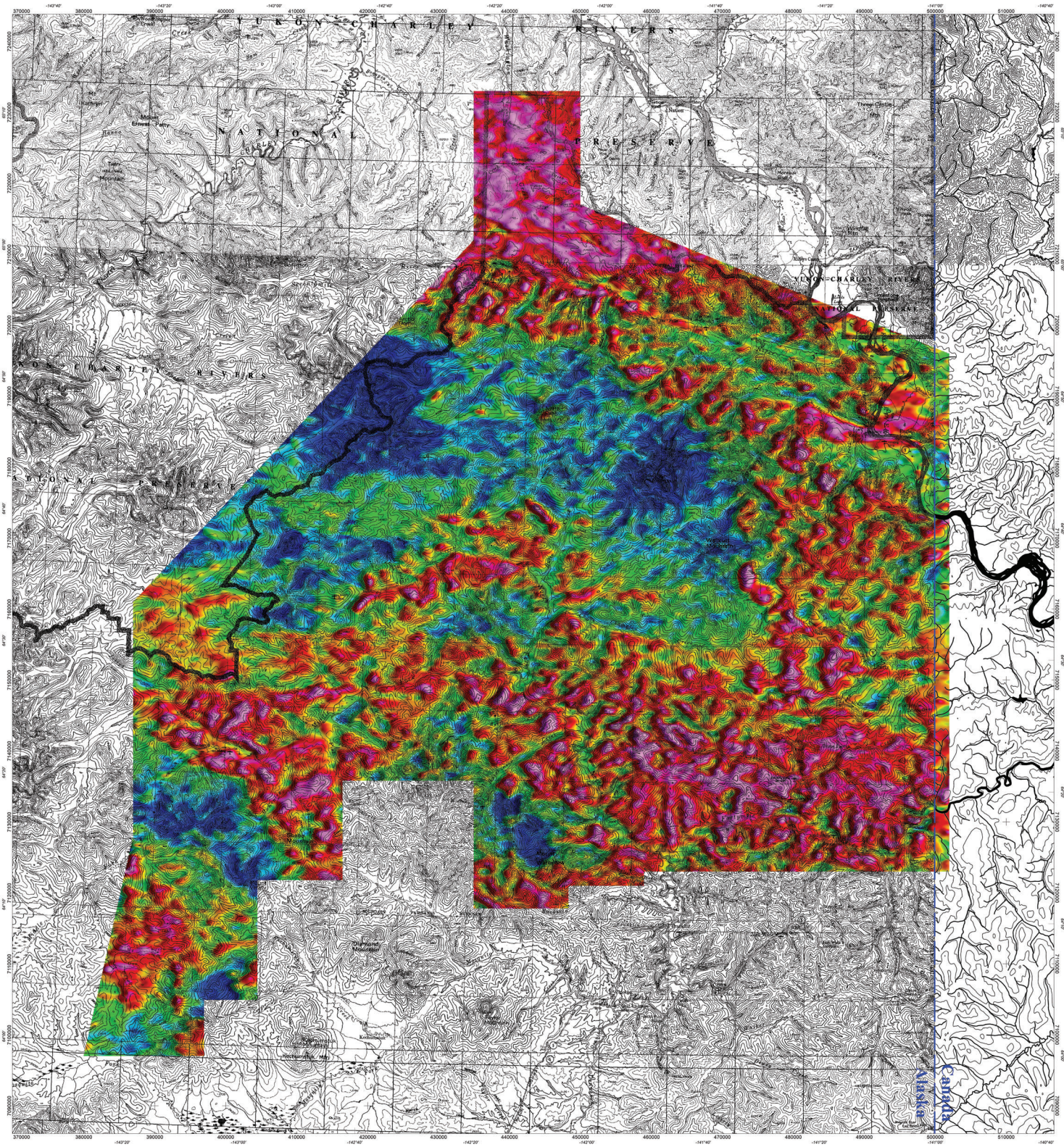


ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

Eagle airborne magnetic and radiometric geophysical survey

Ratio Thorium / Potassium Map

Geophysical Report 2021-2



ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
 Address: 3354 College Rd, Fairbanks, AK 99709, United States of America
 Phone: +1 907-451-5000
 Website: <https://dgg.s.alaska.gov/>

LEGEND

Survey Date: May-June 2021
 Fixed-Wing Aircraft Type: Piper Navajo PA31
 Registration: C-GQVP

SURVEY PARAMETERS:
 Mean Terrain Clearance: 330 m (aircraft and sensors)
 Traverse Line Direction/Spacing: 90°(E-W) / 400 m
 Control Line Direction/Spacing: 180°(N-S) / 4000 m

AIRBORNE SYSTEMS:

MAGNETOMETER: Scintrex CS-3
 Configuration: Tail-Stinger
 Sampling Rate: 20 readings/second
 Sensitivity: 0.01 nT

GAMMA-RAY SPECTROMETER:
 RSX-5 multi-channel NaI sensors with 33.6 L "downwards looking" and 8.4 L "upwards looking".
 Sampling Rate: 1 reading/second

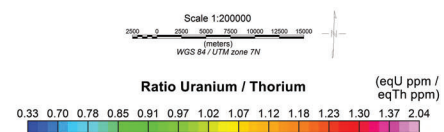
NAVIGATION: Novatel LI/L2 GPS
 Real-time differentially corrected
 Sampling Rate: 10 readings/second

ALTIMETERS:
 Setra 276 Pressure Transducer
 Sampling Rate: 10 readings/second
 Radar: Bendix King KRA-10A
 Sampling Rate: 20 readings/second

BASE STATION MAGNETOMETER:
 GEM GSM-19TW
 Sampling Rate: 1 reading/second
 Sensitivity: 0.022 nT

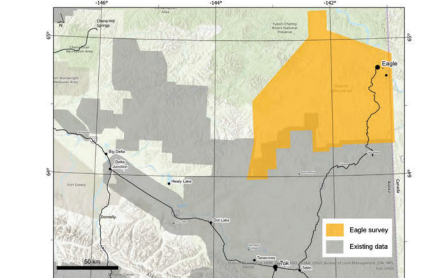
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Location of the Eagle survey in Alaska and in relation to USGS 1:250,000-scale quadrangles

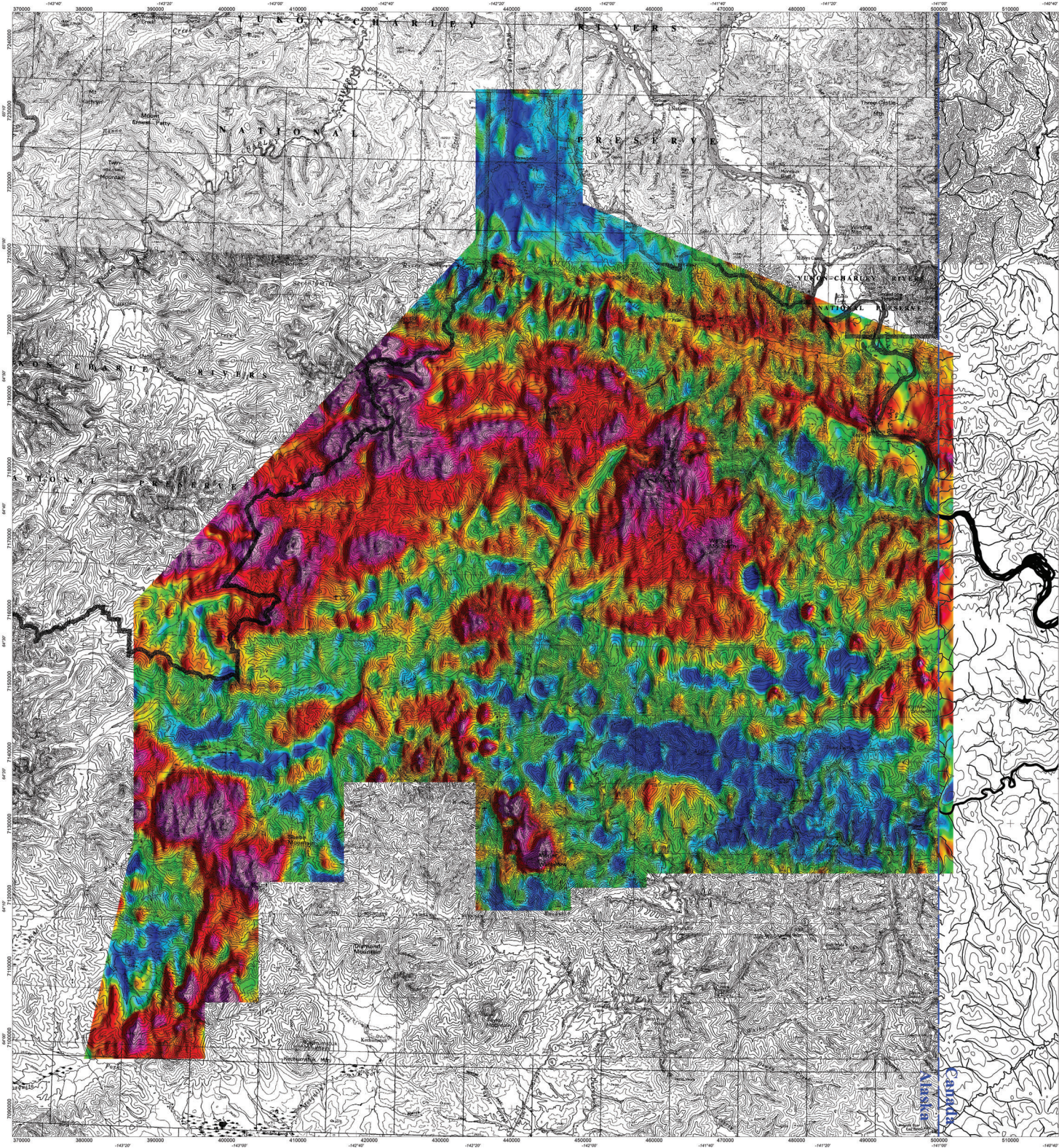


ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

Eagle airborne magnetic and radiometric geophysical survey

Ratio Uranium / Thorium Map

Geophysical Report 2021-2

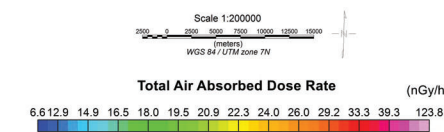


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LEGEND	
Survey Date:	May-June 2021
Fixed-Wing Aircraft Type:	Piper Navajo PA31
Registration:	C-GQVP
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Traverse Line Direction/Spacing:	90°(E-W) / 400 m
Control Line Direction/Spacing:	180°(N-S) / 4000 m
AIRBORNE SYSTEMS:	
MAGNETOMETER: Scintrex CS-3	GAMMA-RAY SPECTROMETER:
Configuration: Tail-Stinger	RSX-5 multi-channel NaI sensors with 33.6 L "downwards looking" and 8.4 L "upwards looking".
Sampling Rate: 20 readings/second	Sampling Rate: 1 reading/second
Sensitivity: 0.01 nT	
NAVIGATION: Novatel LI/L2 GPS	ALTIMETERS:
Real-time differentially corrected	Setra 276 Pressure Transducer
Sampling Rate: 10 readings/second	Sampling Rate: 10 readings/second
BASE STATION MAGNETOMETER:	Radar: Bendix King KRA-10A
GEM GSM-19TW	Sampling Rate: 20 readings/second
Sampling Rate: 1 reading/second	
Sensitivity: 0.022 nT	

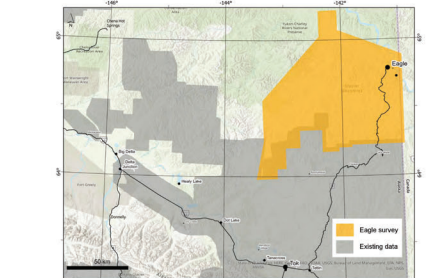
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Location of the Eagle survey in Alaska and in relation to USGS 1:250,000-scale quadrangles



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Eagle airborne magnetic and radiometric geophysical survey

Total Air Absorbed Dose Rate Map

