NYAC MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

Burns, L.E., Barefoot, J.D., Woods, R-E, WGM Mining and Geological Consultants, Inc., and Dighem Surveys and Processing

Geophysical Report 2019-4

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DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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NYAC MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

Burns, L.E.,[1] Barefoot, J.D.[1], Woods, R-E[1], WGM Mining and Geological Consultants, Inc., and Dighem Surveys and Processing

ABSTRACT

This geophysical survey is located in southwestern Alaska in the Nyac mining district near Bethel, about 520 kilometers west of Anchorage, Alaska. The data for this magnetic-only survey were collected from August to September 1993. A total of 1366 line kilometers were collected covering 502 square kilometers. Line spacing was 400 meters (m). Data were collected 30 m above the ground surface from a helicopter towed sensor platform ("bird") on a 30 m long line.

PURPOSE

This airborne geophysical survey is part of a program to acquire data on Alaska's most promising mineral belts and districts. The information acquired is aimed at catalyzing new private sector exploration, discovery, and ultimate development and production. The purpose of the survey was to map the magnetic properties of the survey area, which has a been an important producer of placer gold since 1908. Other gold and base-metal anomalies, altered zones, favorable lithologies, and structural zones are known to exist throughout the survey area.

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

Funding was provided by the Alaska State Legislature as part of the DGGS Airborne Geophysical/Geological Mineral Inventory (AGGMI) program.

[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 and DGGS	Project and field reports, survey background information, gridded data explanations, other documentation
grids_ermapper	contractor and DGGS	Geographically registered gridded data, ER Mapper ERS format
grids_geosoft	contractor and DGGS	Geosoft-format binary grids, these grids can be viewed in ESRI ArcMap using a free plugin from Geosoft, or with the free viewer available from Geosoft.
images_registered	DGGS	GeoTiff format images of all 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
maps_prn_format	contractor	Printable maps in HPGL/G printer file format with extension .prn
profiles_stacked	contractor	Distance-based profiles of the digitally recorded geophysical data are generated and plotted at an appropriate scale. Printable in pdf format.
vector_data	contractor and DGGS	Line path, data contours, and survey boundary in ESRI shapefile (SHP) format, ESRI Geodatabase format, and/or AutoCAD dxf format.

REFERENCES

Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, n. 4, p. 589–602.

Alaska Division of Geological & Geophysical Surveys, WGM, Inc., and Dighem, 1994, Clear mylar version of RI 94-3: Total field magnetics of the Nyac mining district: Alaska Division of Geological & Geophysical Surveys Public Data File 94-18, 1 sheet, scale 1:63,360. http://doi.org/10.14509/1643

Alaska Division of Geological & Geophysical Surveys, WGM, Inc., and Dighem, 1994, Filtered total field VLF contours of Nyac mining district: Alaska Division of Geological & Geophysical Surveys Public Data File 94-17, 1 sheet, scale 1:63,360. http://doi.org/10.14509/1642

Alaska Division of Geological & Geophysical Surveys, WGM, Inc., and Dighem, 1994, Flight lines of Nyac mining district: Alaska Division of Geological & Geophysical Surveys Public Data File 94-16, 1 sheet, scale 1:63,360. http://doi.org/10.14509/1641

Burns, L.E., Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp., 2004, Line, gridded, and vector data, and selected plot files from the aeromagnetic survey of the Nyac mining district, central Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2004-4, 1 DVD. http://doi.org/10.14509/3338

DGGS Staff, Dighem, and WGM, Inc., 1994, CD-ROM digital archive files of 1993 survey data for Nome, Circle, Nyac, and Valdez Creek mining districts: Alaska Division of Geological & Geophysical Surveys Public Data File 94-15, 22 p., 1 DVD. http://doi.org/10.14509/1640

DGGS Staff, WGM, Inc., and Dighem, 1994, Digital gridded data of total field magnetics for entire survey of Nyac mining district: Alaska Division of Geological & Geophysical Surveys Public Data File 94-34, 1 DVD. http://doi.org/10.14509/1660

DGGS Staff, WGM, Inc., and Dighem, 1994, Total field magnetics of the Nyac mining district: Alaska Division of Geological & Geophysical Surveys Report of Investigation 94-3, 1 sheet, scale 1:63,360. http://doi.org/10.14509/2489

McConnell, D.L., 1994, Final summary of 1993 airborne geophysical surveys of the Nome, Circle, Nyac, and Valdez Creek areas: Alaska Division of Geological & Geophysical Surveys Public Data File 94-36, 327 p., 4 sheets, scale 1:63,360. http://doi.org/10.14509/166

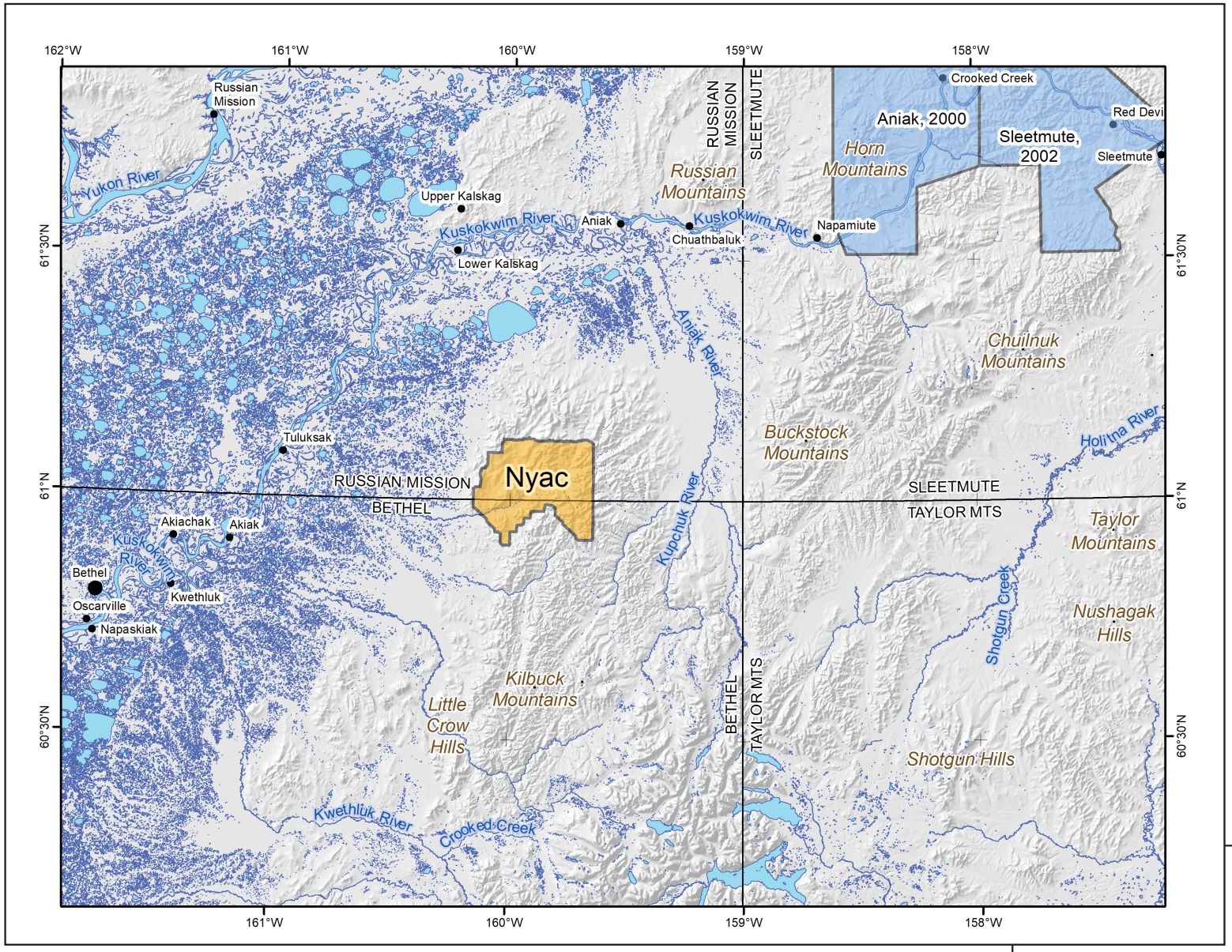


Figure 1. Location of Nyac aeromagnetic geophysical survey area, southwestern Alaska (inset). Nyac survey area shown with nearby DGGS geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, glaciers, and elevation hillshade

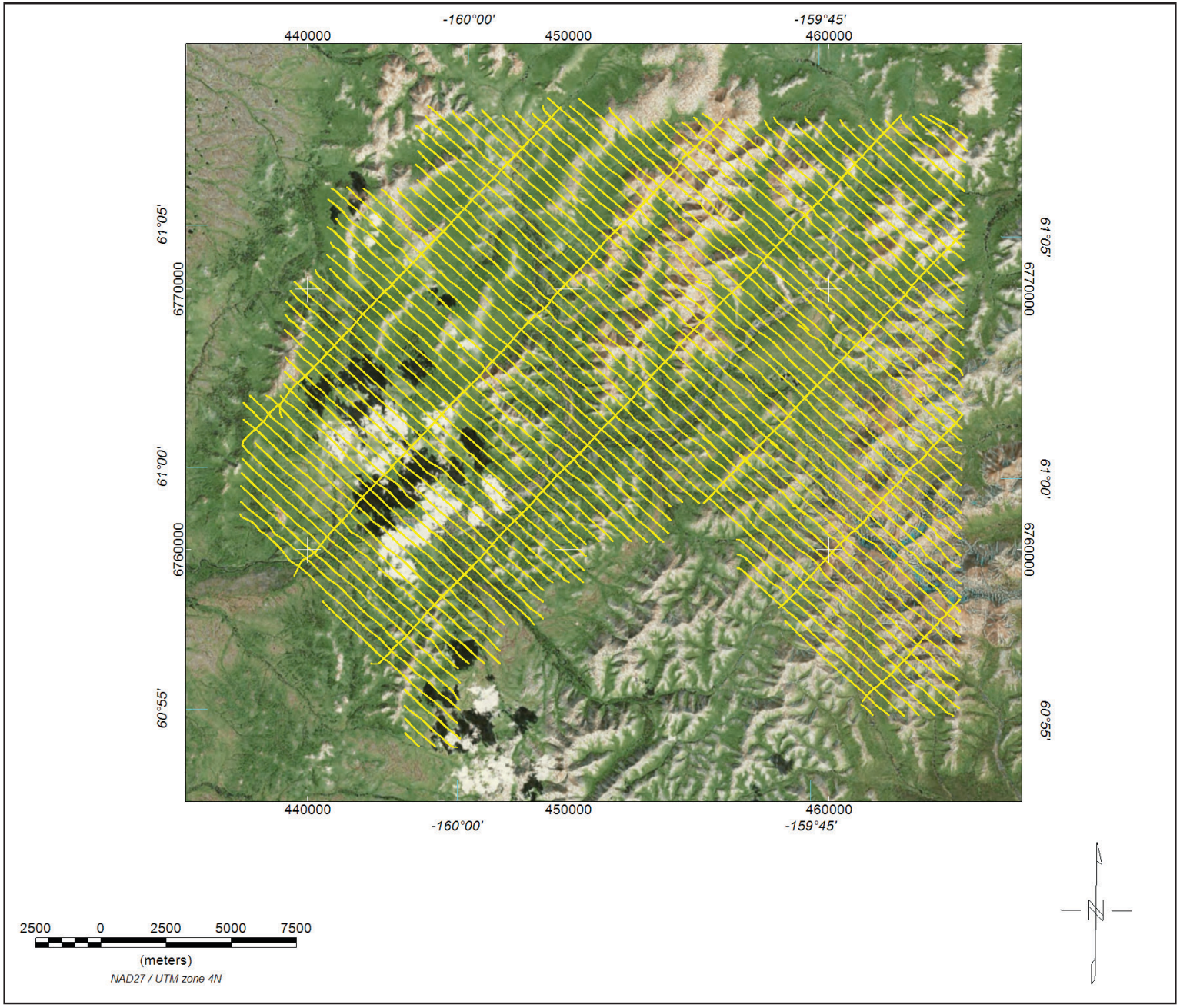


Figure 2. Flight path with orthometric image.

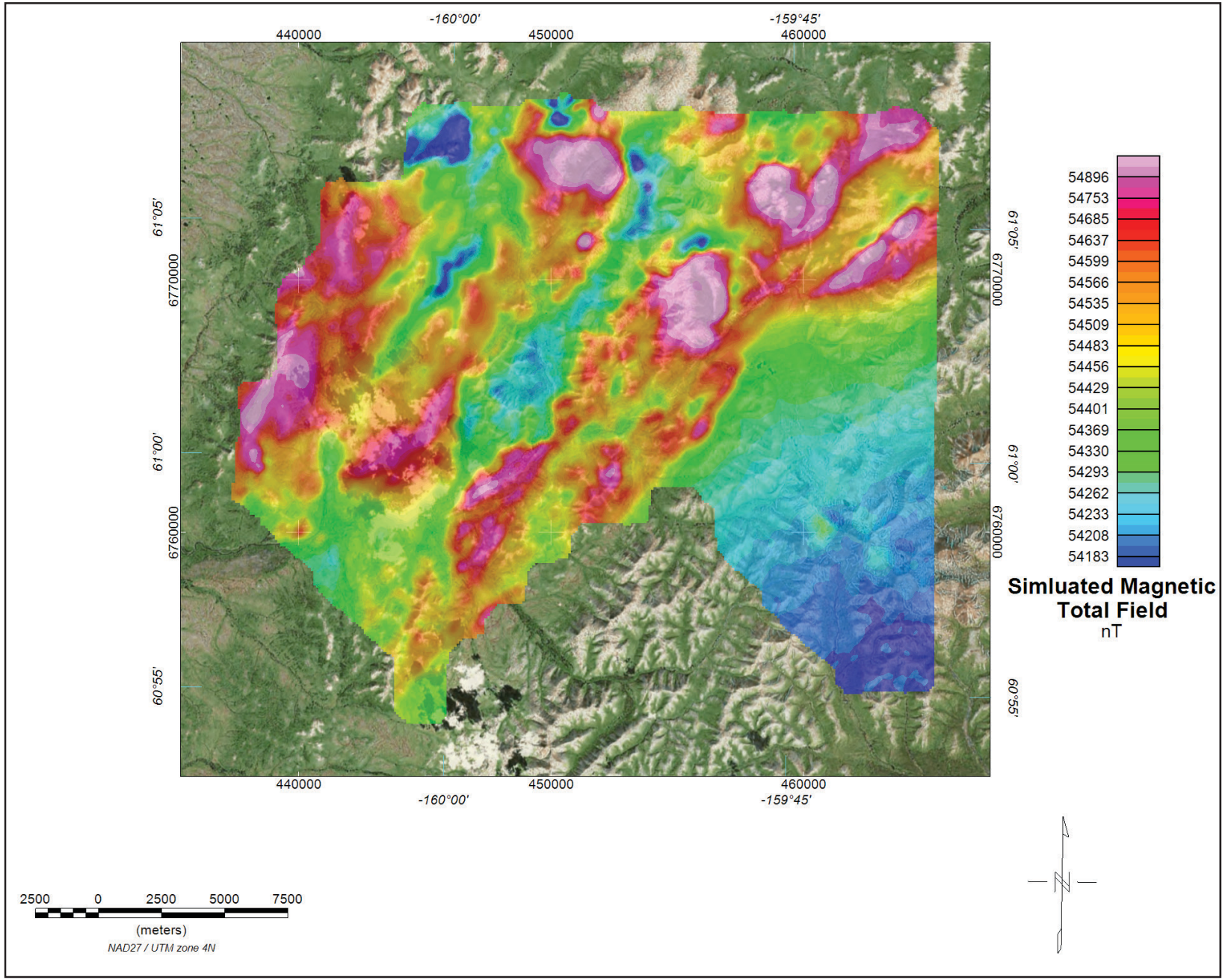


Figure 3. The simulated magnetic total field data were created using digitally recorded data from a Scintrex cesium CS2 magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 1987, updated August, 1993, updated for date of flight and altimeter variations), (3) leveled to the tie line data, (4) a constant value of approximately 54,000 nT was added to all data, and (5) interpolated onto a regular 100 m grid using a modified Akima (Akima 1970) technique.

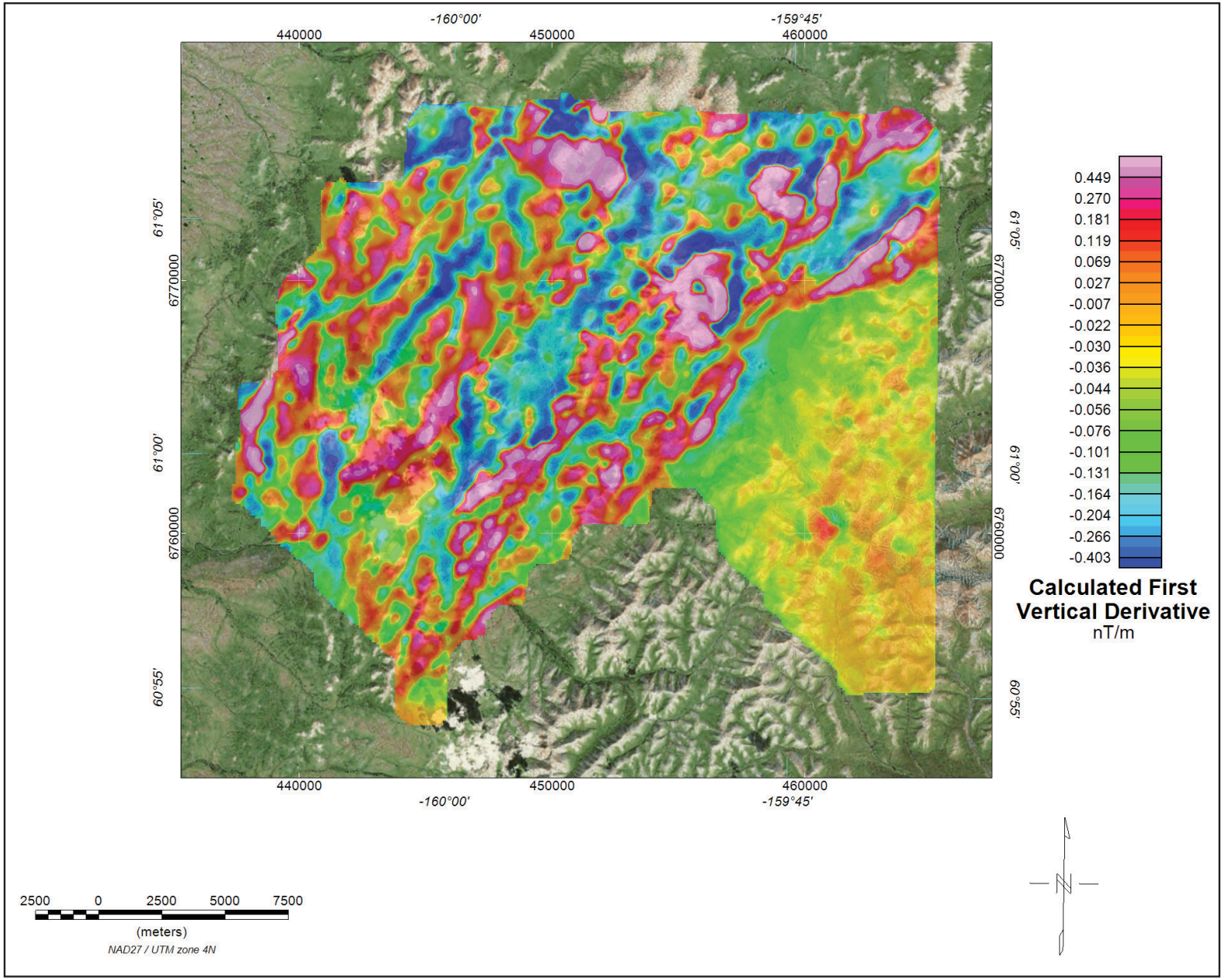


Figure 4. The calculated first vertical derivative data were created using digitally recorded data from a Scintrex cesium CS2 magnetometer. Data were collected at a sampling interval of 0 .1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 1987, updated August, 1993, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 100 m grid using a modified Akima (1970) technique. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near- surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

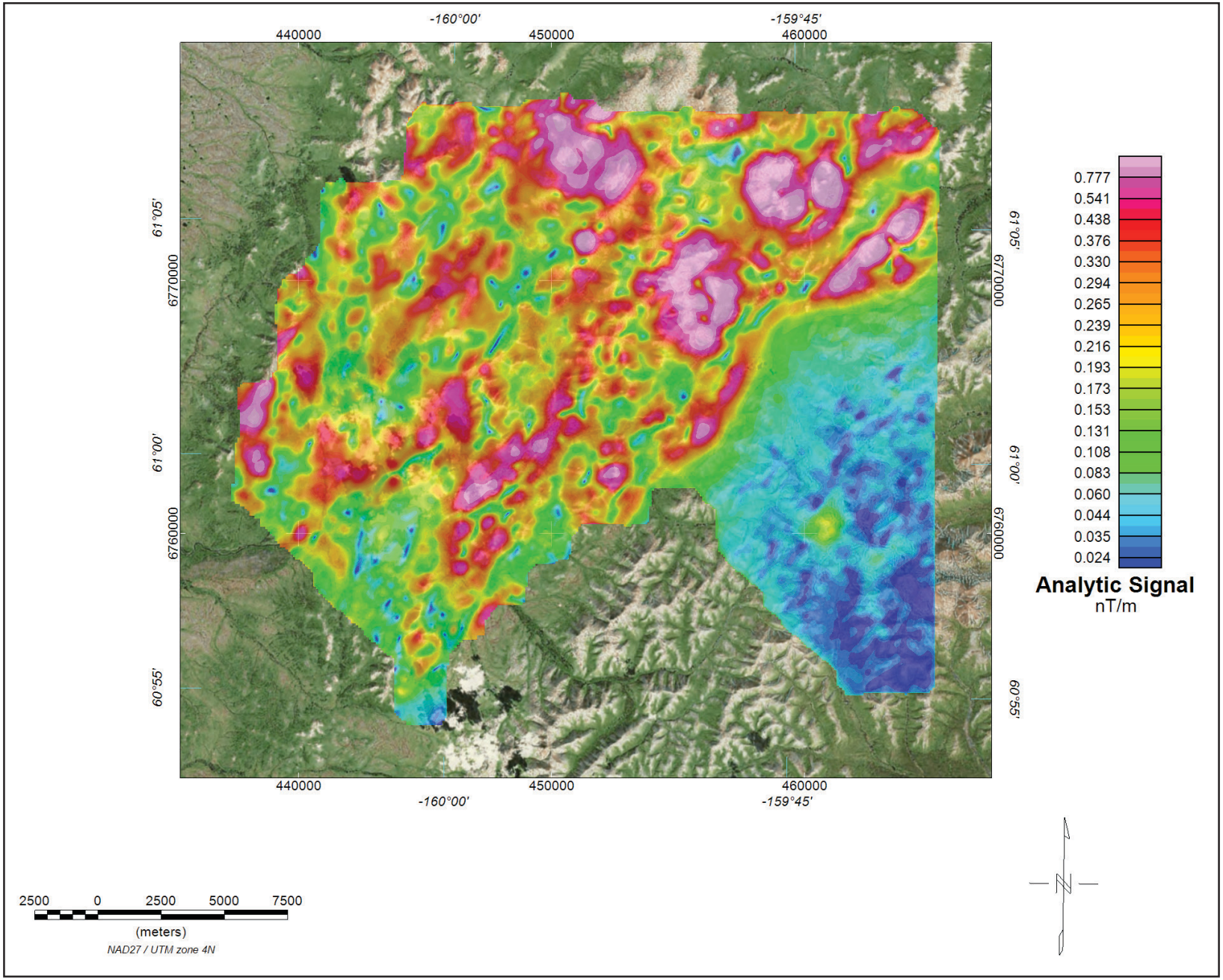
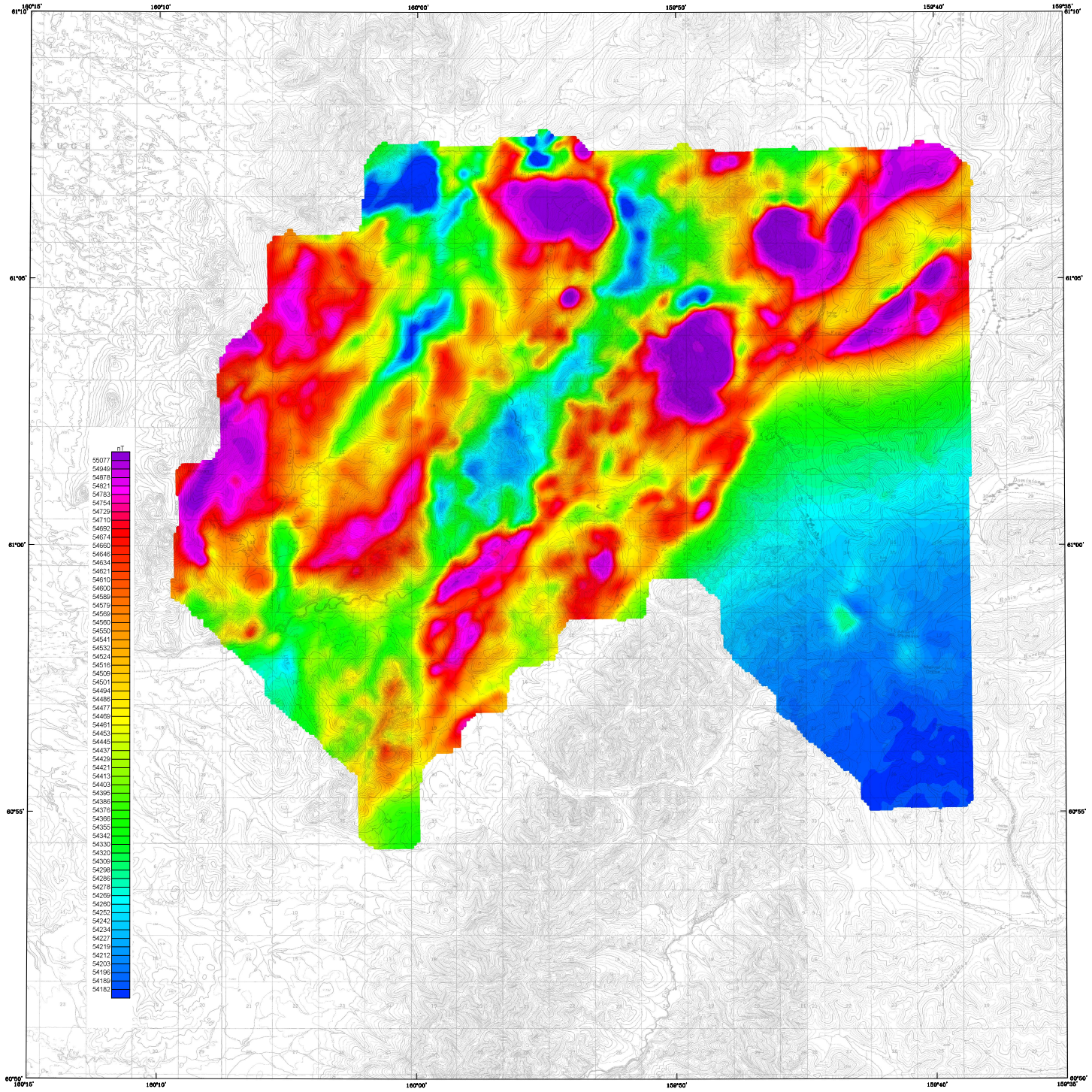


Figure 5. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (such as contacts, fault/shear-zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independent of the direction of the induced and/or remanent magnetizations.

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/10.14509/30169.

Map Title	Description
nyac_sim_magtf_topo_map	Simulated magnetic total field grid with topographic base map
nyac_sim_magtf_contours_plss_map	Simulated magnetic total field grid with contours and Public Land Survey System base layer
nyac_interpretation_plss_map	Scanned interpretation map with Public Land Survey System base layer
nyac_vlf_contours_plss_map	Scanned filtered total field VLF with contours and Public Land Survey System base layer



Base from U.S. Geological Survey topographic bases
Bethel D-3,3-4; Russian Mission A-3,3-4; Kwethluguk, Alaska, 1954, 1979

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM MEAN SEA LEVEL

TRUE NORTH
20°
MAGNETIC N

APPROXIMATE MEAN
DECLINATION, 1994

TOTAL MAGNETIC FIELD OF THE NYAC MINING DISTRICT, SOUTHWESTERN ALASKA

PARTS OF BETHEL AND RUSSIAN MISSION QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

2004

DESCRIPTIVE NOTES

The geophysical data were acquired with a Scintrex cesium CS2 magnetometer, and a Herz VLF system installed in an AS350B-1 Squirrel helicopter. In addition, the survey recorded data from a radar altimeter, GPS navigation system, and video camera. Flights were performed at a mean terrain clearance of 500 feet along survey flight lines with a spacing of a quarter of a mile. Tie lines were flown perpendicular to the flight lines at intervals of approximately three miles.

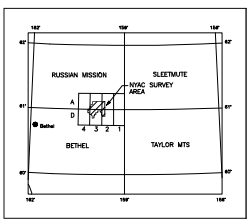
A Sercel Real-Time Differential Global Positioning System (RT-DGPS) was used for both navigation and flight path recovery. The helicopter position was derived every 0.5 seconds using both real-time and post-processing differential positioning to a relative accuracy of better than 10 m. Flight path positions were projected onto the Clarke 1866 (UTM) spheroid, 1927 North American datum using a Central Meridian (CM) of 159°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m with respect to the UTM grid.

TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) leveled to the tie line data, and (3) interpolated onto a regular 100 m grid using a modified Akima (1970) technique. The regional variation (or IGRF gradient, 1985, updated to August, 1993) was removed from the leveled magnetic data.

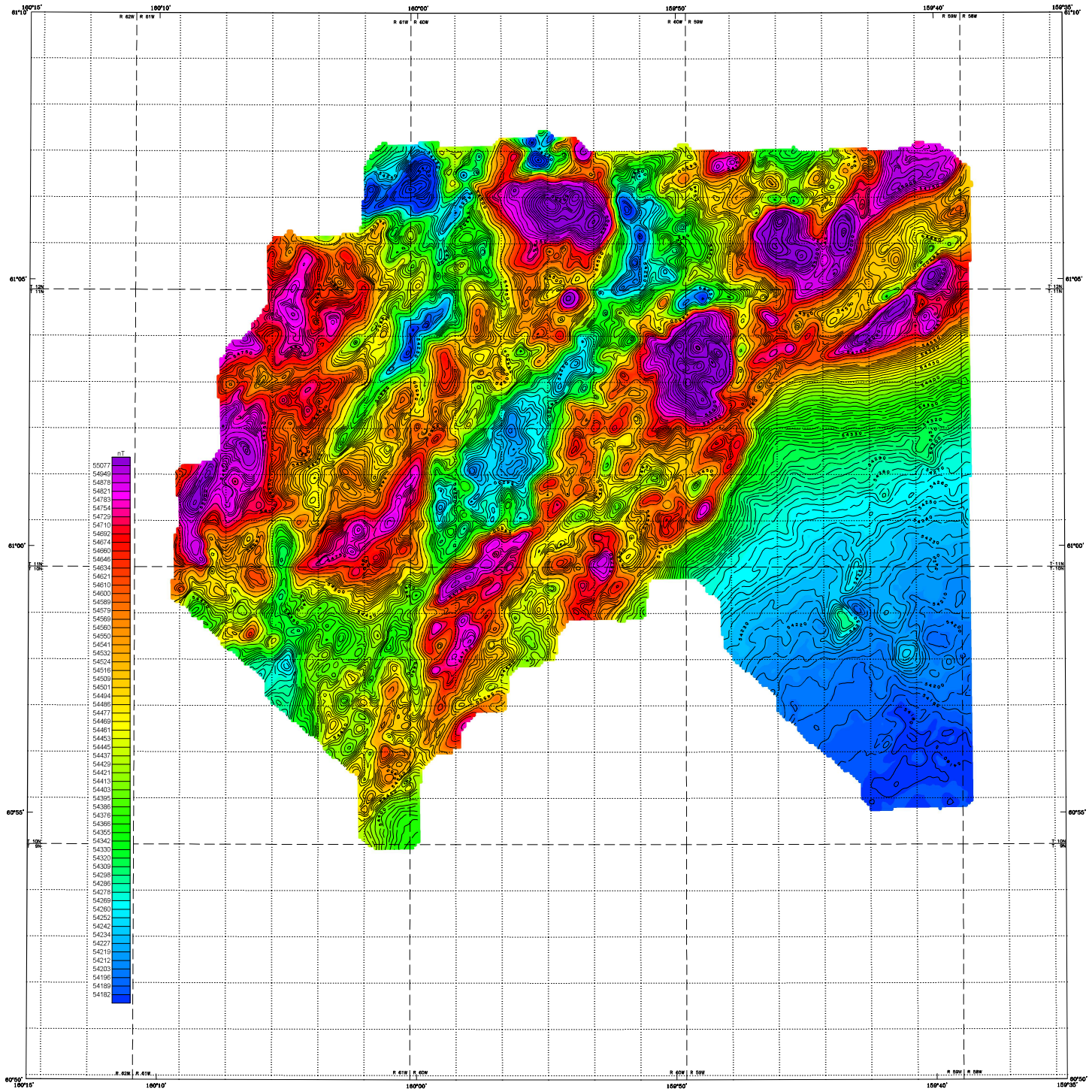
Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589–602.

LOCATION INDEX



SURVEY HISTORY

The map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys, and Stevens Exploration Management Corp. The map was produced by Fugro Airborne Surveys and supercedes the earlier full color version released by DGGS in 1994. Airborne geophysical data for the area were acquired and processed in 1993 under contract between DGGS and WGM, Mining and Geological Consultants, Inc. The subcontractor acquiring and processing the data was DIGHEM, a division of CGG Canada Ltd. Other products from this survey are available from DGGS, 3354 College Road, Fairbanks, Alaska, 99709-3707.



Section outlines from U.S. Geological Survey topographic bases
Bethel D-2,3,4; Russian Mission B-2,3,4 Quadrangles, Alaska, 1954, 1979

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

TRUE NORTH
MAGNETIC NORTH

APPROXIMATE MEAN DECLINATION, 1964

TOTAL MAGNETIC FIELD OF THE NYAC MINING DISTRICT, SOUTHWESTERN ALASKA

PARTS OF BETHEL AND RUSSIAN MISSION QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

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Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no. 4, p. 589-602.

MAGNETIC CONTOUR INTERVAL

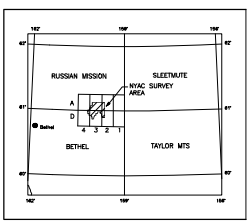
250 nT

50 nT

10 nT

5 nT

LOCATION INDEX



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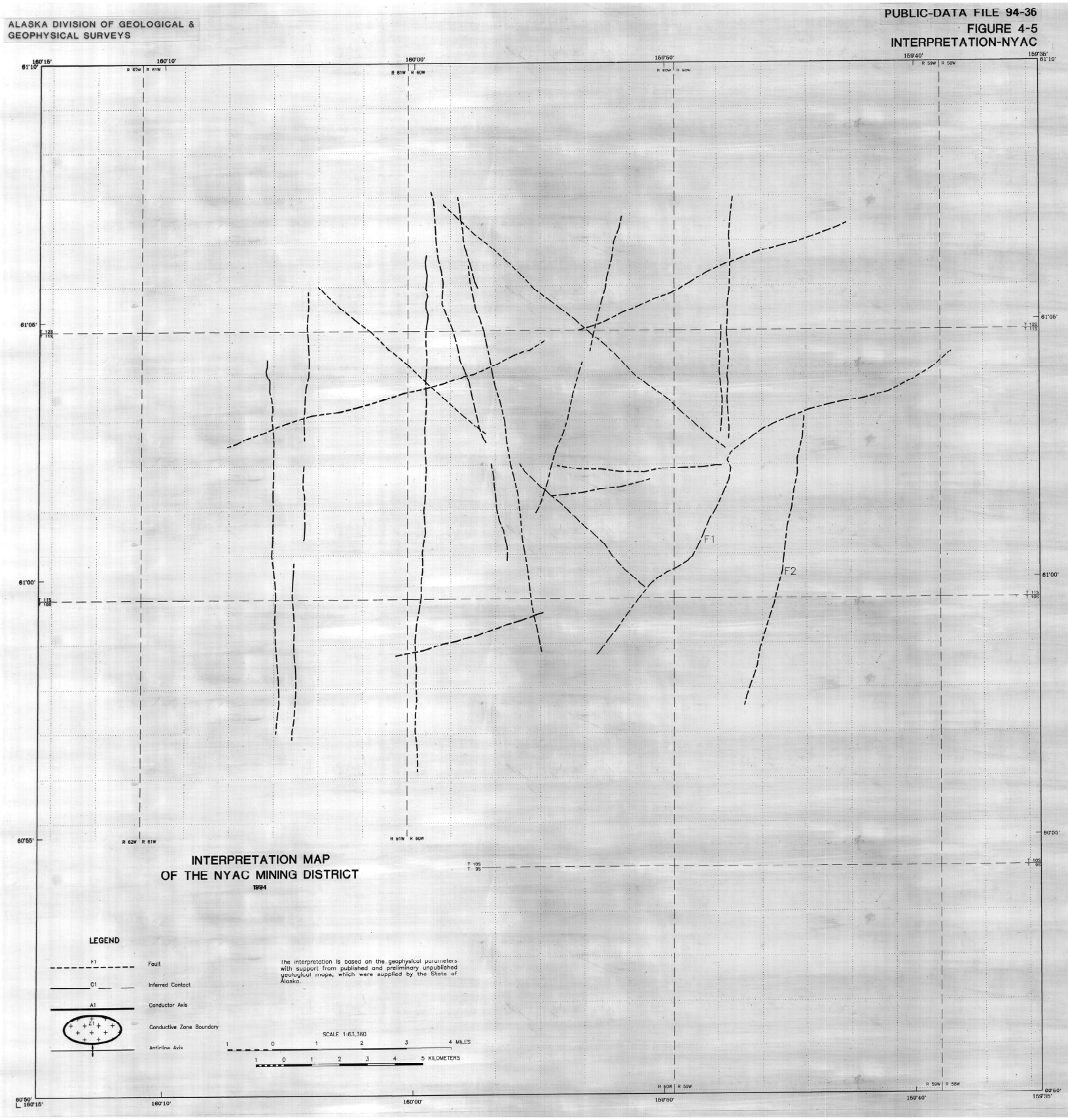
ALASKA DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

PUBLIC-DATA FILE 94-36
FIGURE 4-5
INTERPRETATION-NYAC



INTERPRETATION MAP OF THE NYAC MINING DISTRICT

1994

LEGEND

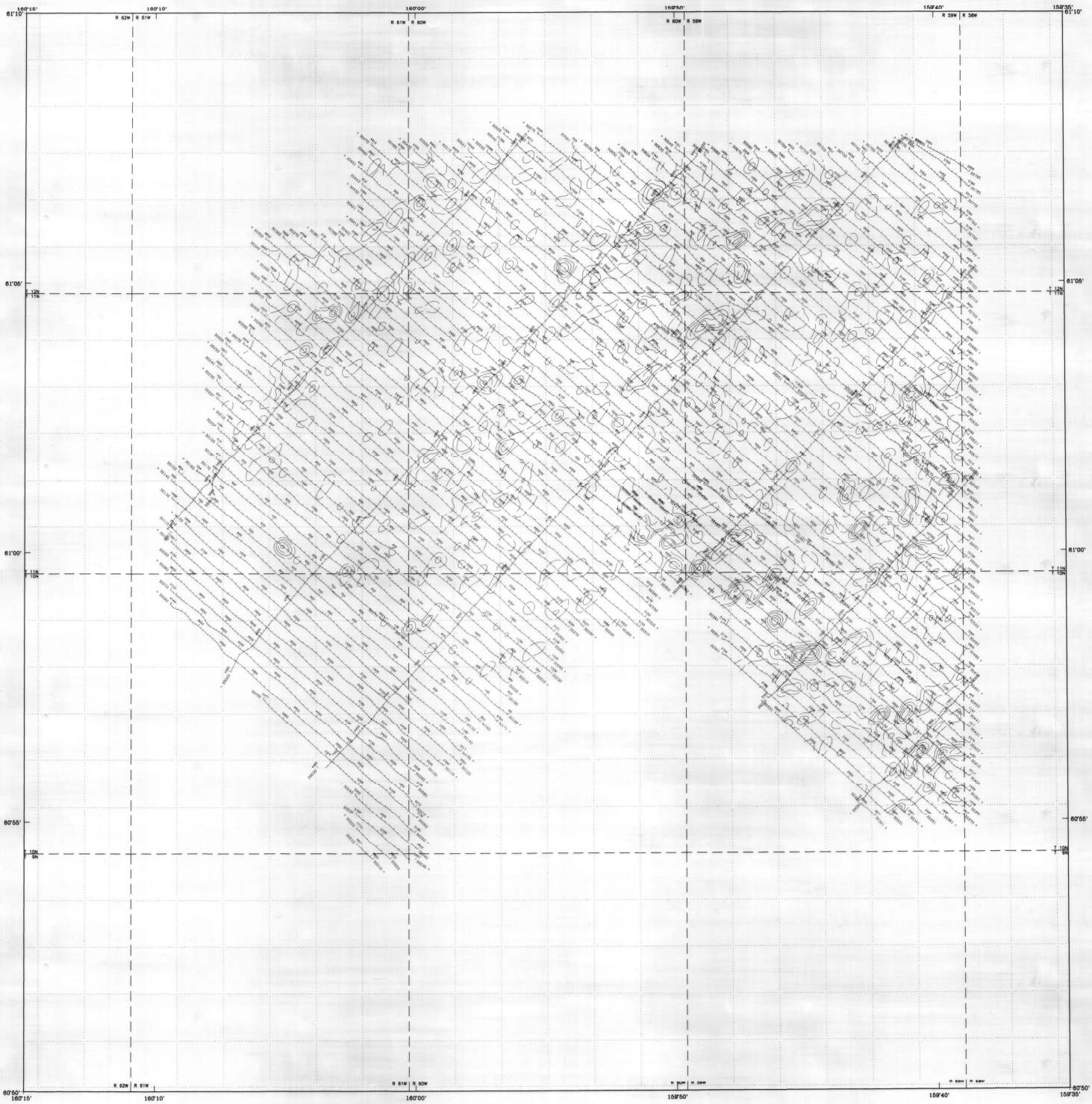
- F1 — Fault
- C1 — Inferred Contact
- A1 — Conductor Axis
- Conductive Zone Boundary
- Anticline Axis

The interpretation is based on the geophysical parameters with support from published and preliminary unpublished geological maps, which were supplied by the State of Alaska.

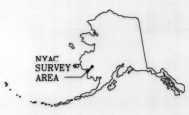
SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS



Base from USGS Bethel D-2,3,4; Russian Mission D-2,3,4; Quadrangles, Alaska, 1954, 1979



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

TRUE NORTH
MAGNETIC N
22°
APPROXIMATE MEAN DECLINATION, 1994

FILTERED TOTAL FIELD VLF OF THE NYAC MINING DISTRICT

1994

DESCRIPTIVE NOTES

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FILTERED VLF

The Herz Industries Totem 2A-VLF system recorded the total and vertical quadrature EM field at a sample interval of 0.1 seconds. Filtered total field data from the transmitter station at Seattle, Washington (NLK-24.8 kHz) were interpolated onto a regular 100 m grid using a modified Akima (1970) technique.

Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: Journal of the Association of Computing Machinery, v. 17, no.4, p.589-602.

VLF CONTOURS

Contours in percent

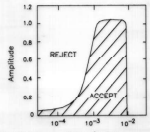
10

2

1

STATION

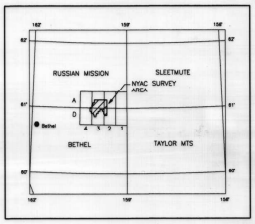
Frequency response of VLF-EM filter



No Valid Data

NLK Seattle (Wash.) 24.8 kHz -- Lines 30010-30150 -- Lines 30160-30790

LOCATION INDEX



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