LADUE ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

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Geophysical Report 2019-20

2020
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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LADUE ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

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ABSTRACT

The Ladue electromagnetic and magnetic airborne geophysical survey is located in eastern Alaska in the Fortymile mining district, about 325 kilometers southeast of Fairbanks. Frequency domain electromagnetic and magnetic data were collected with the DIGHEM^{V} system in August 2010. A total of 5,471.1 line kilometers were collected covering 1,928.9 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 and conductive properties of the survey area. The Fortymile mining district contains the oldest placer gold camp in Alaska, but mineral exploration has been impeded by thick vegetation. Prospects in the area include Pika, Taurus, and Fishhook. 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

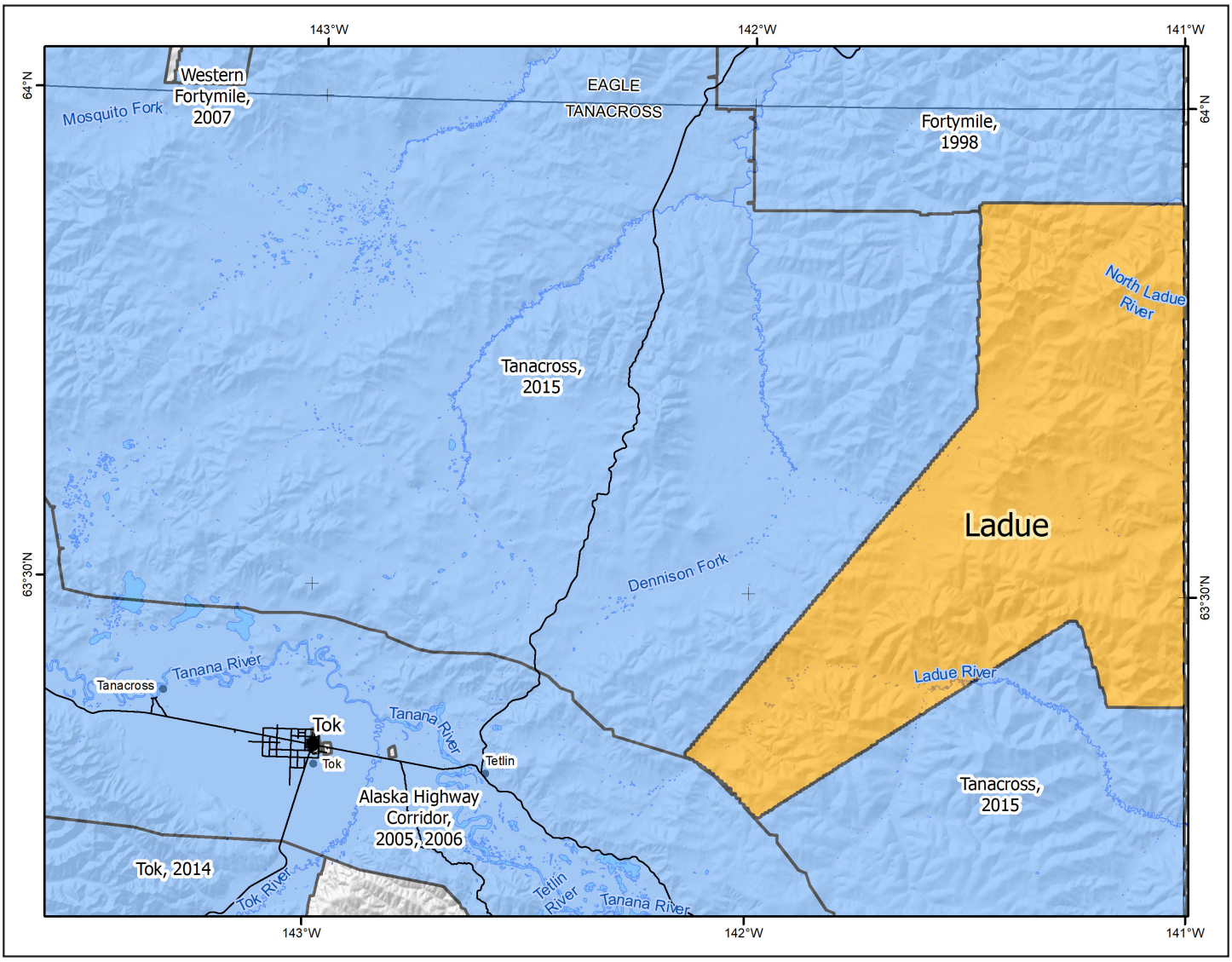
AVAILABLE DATA

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 grids, these grids can be viewed in ESRI ArcMap using a free plugin from Geosoft or 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 and DGGS	Printable maps in pdf format
maps_prn_format	contractor	Printable maps in HPGL/2 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. The profiles display electromagnetic anomalies with their respective interpretive symbols. 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
video_flightpath	contractor	Survey flight path downward facing video

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.

Burns, L.E., Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc., 2011, Ladue survey area: Magnetic and electromagnetic line, grid, and vector data and Maps, Fortymile mining district, Tanacross Quadrangle, eastern Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2011-1, 26 sheets, scale 1:63,360, 1 DVD. http://doi.org/10.14509/22562



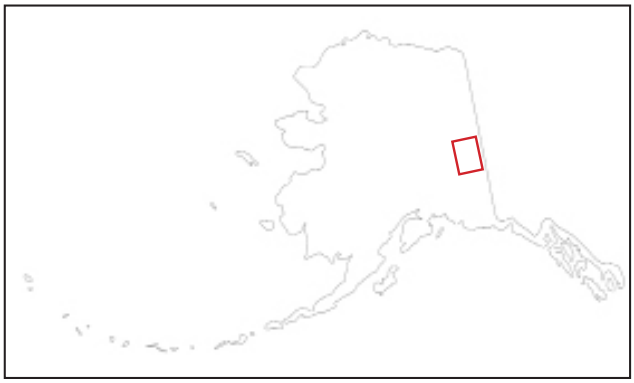


Figure 1. Ladue electromagnetic and magnetic airborne geophysical survey location shown in western Alaska (inset). Ladue survey area shown with adjacent DGGS geophysical surveys, landmarks, relevant 1:250,000-scale quadrangle boundaries, mountain ranges, rivers, and elevation hillshade.

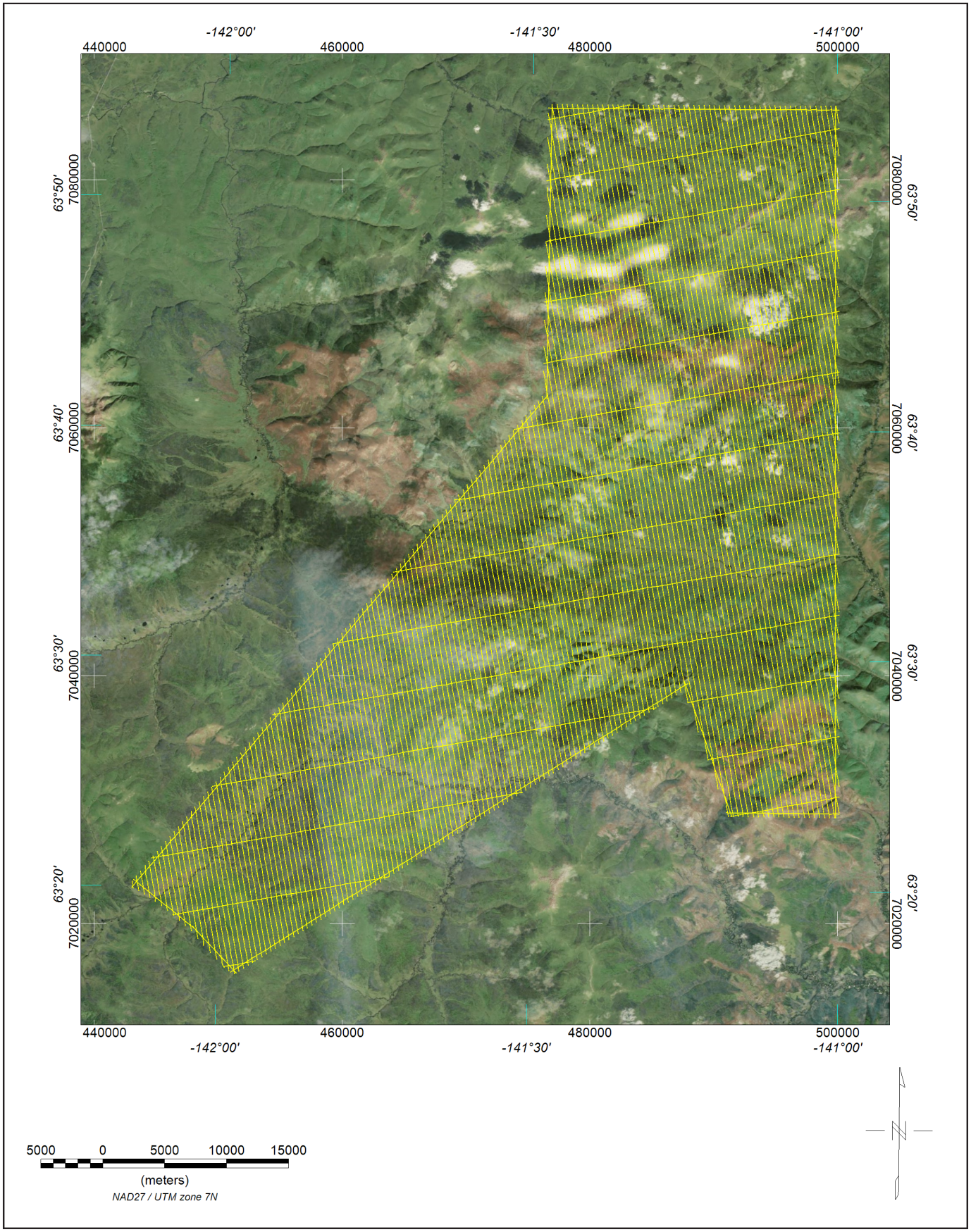


Figure 2. Flight path with orthometric image.

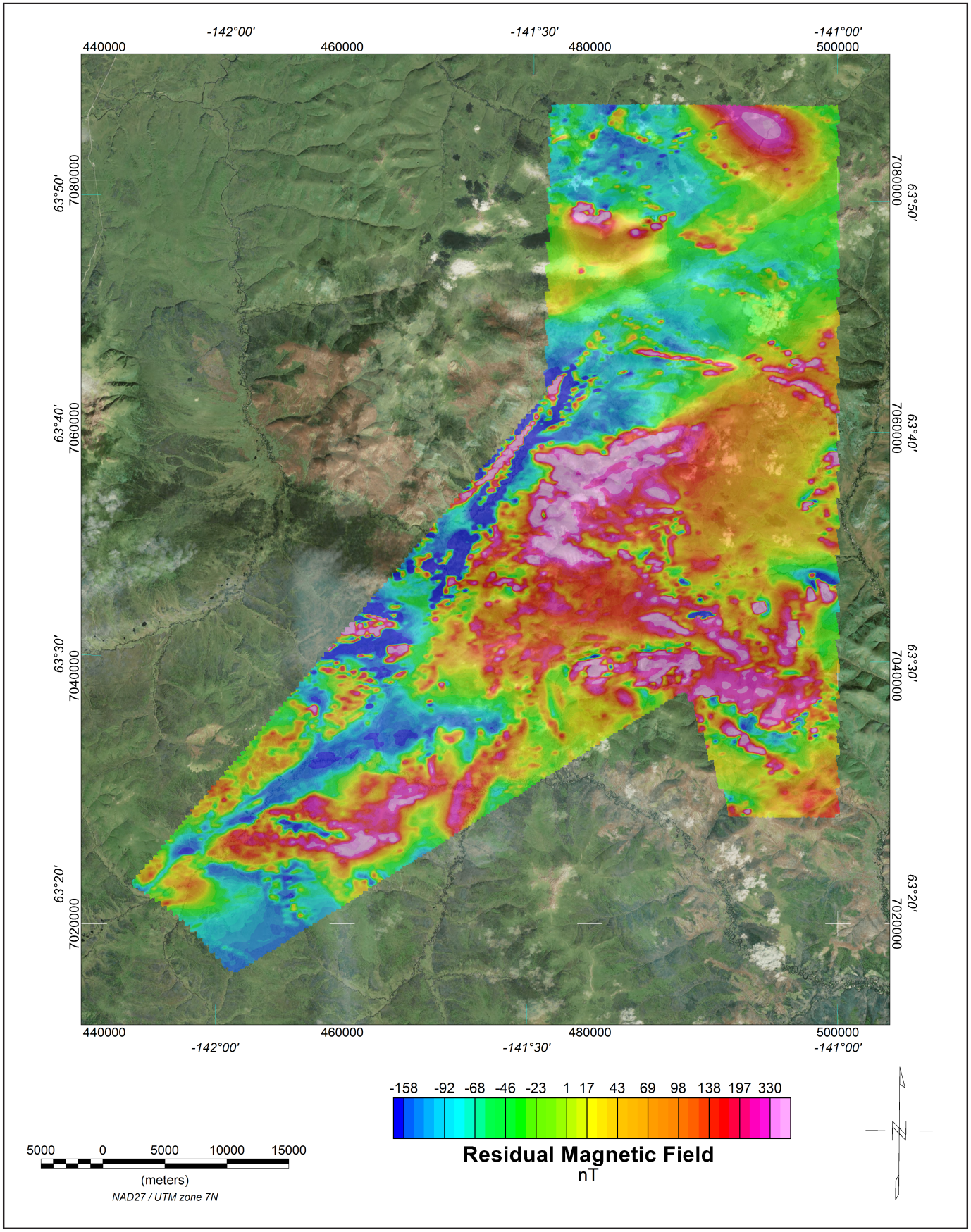


Figure 3. Residual Magnetic Field Grid with orthometric image. The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

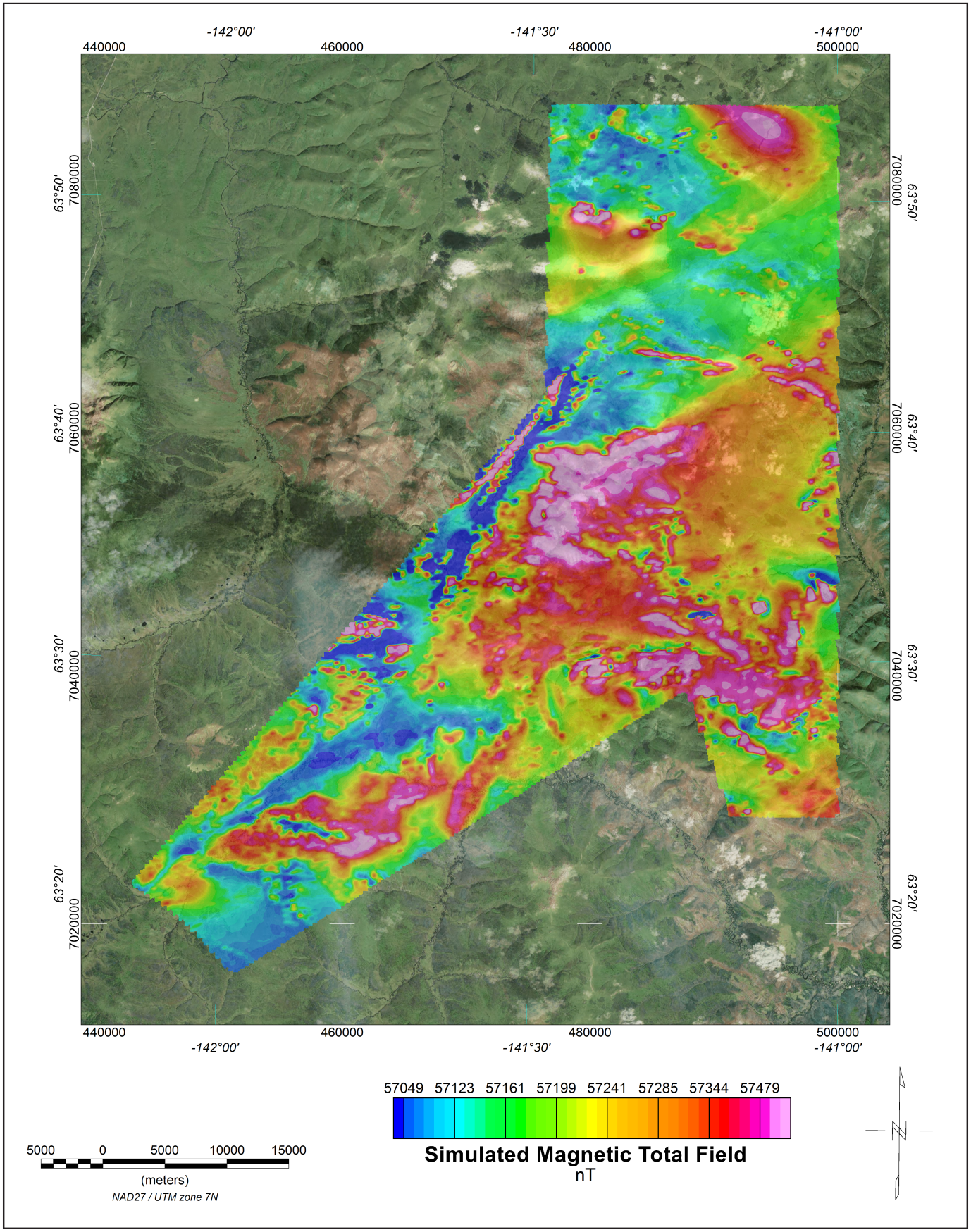


Figure 4. Simulated Magnetic Total Field Grid with orthometric image. The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, (4) a constant value of approximately 57,000 nT was added to all data, and (5) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

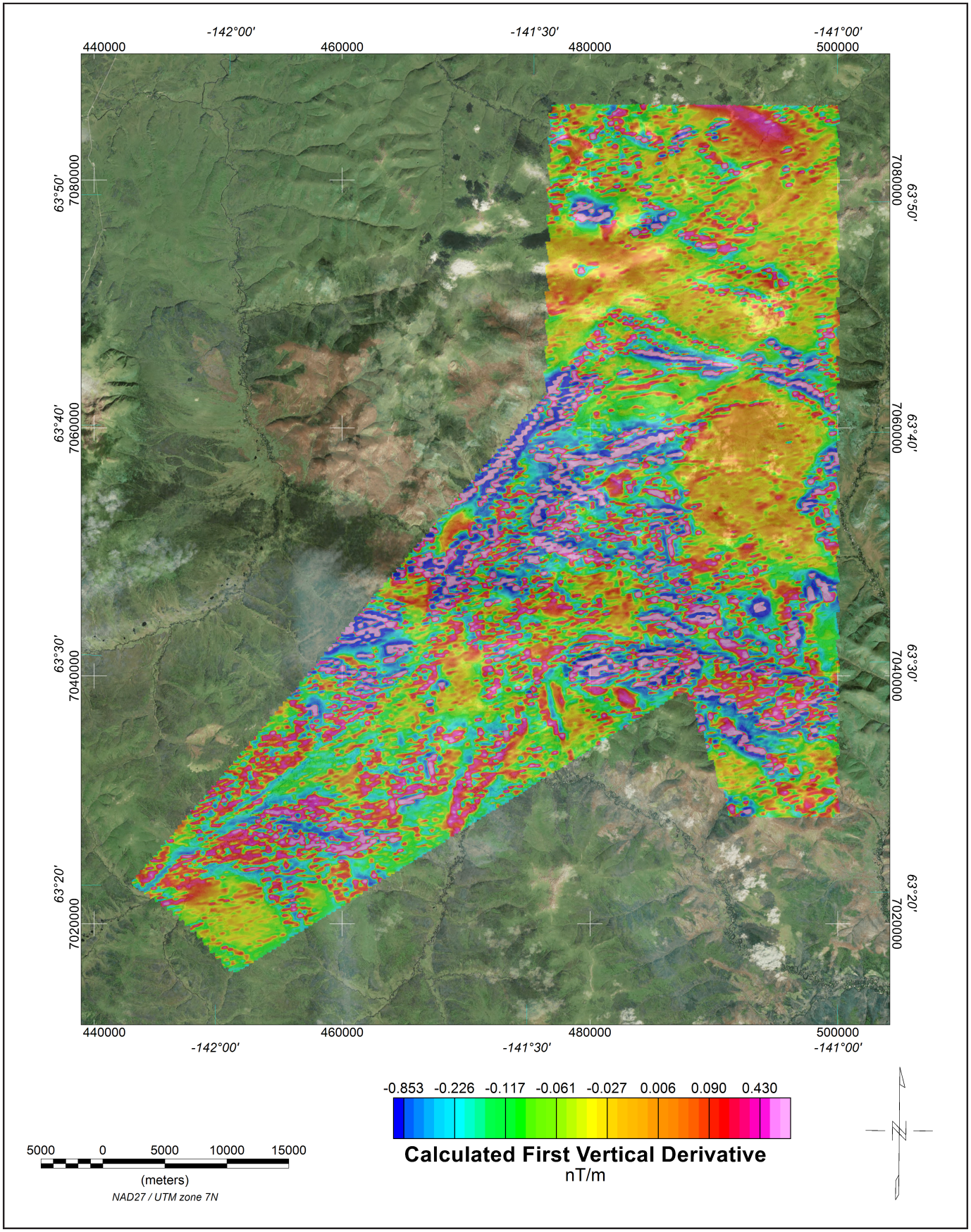


Figure 5. Calculated first vertical derivative grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides 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.

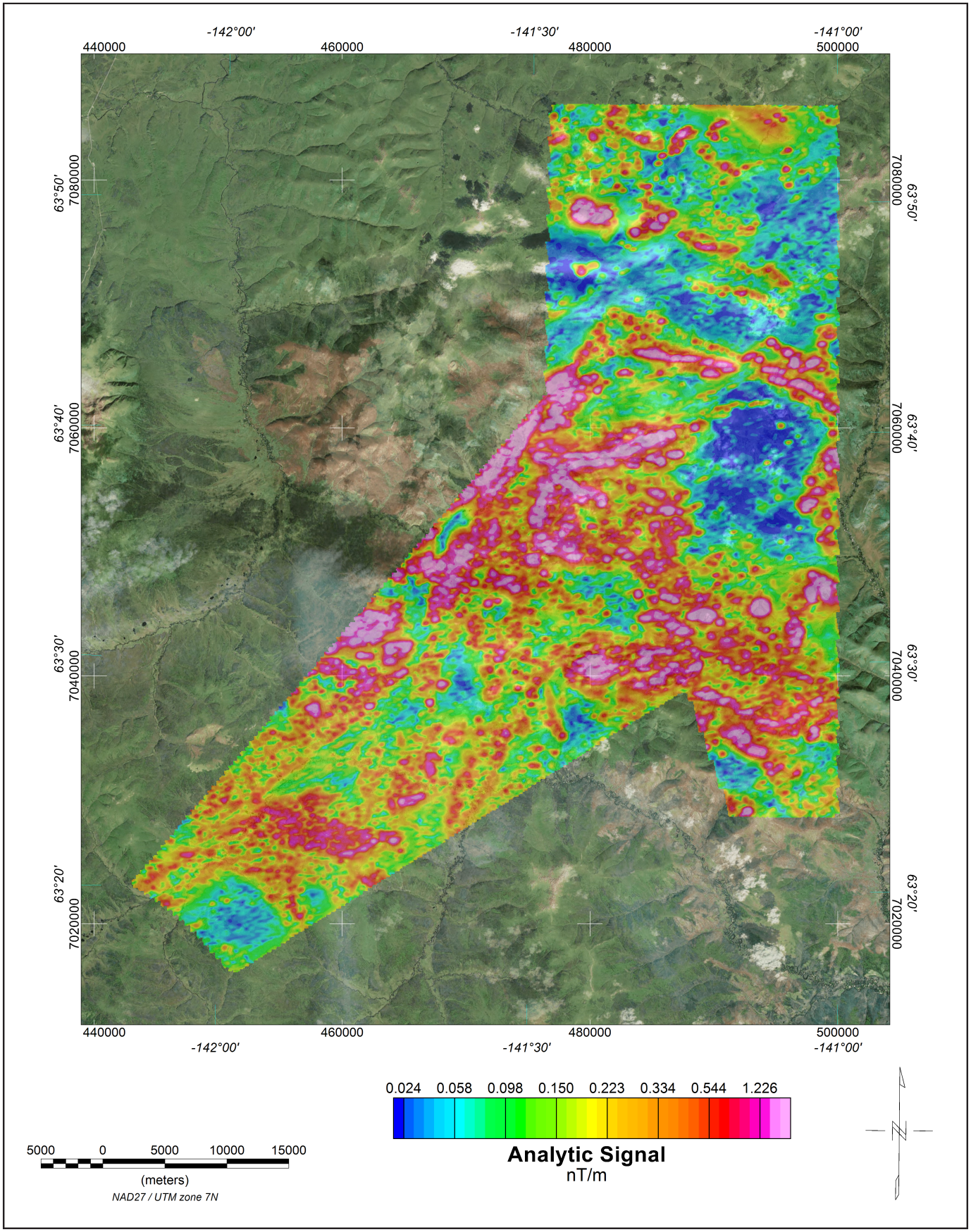


Figure 6. Analytic signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source 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.

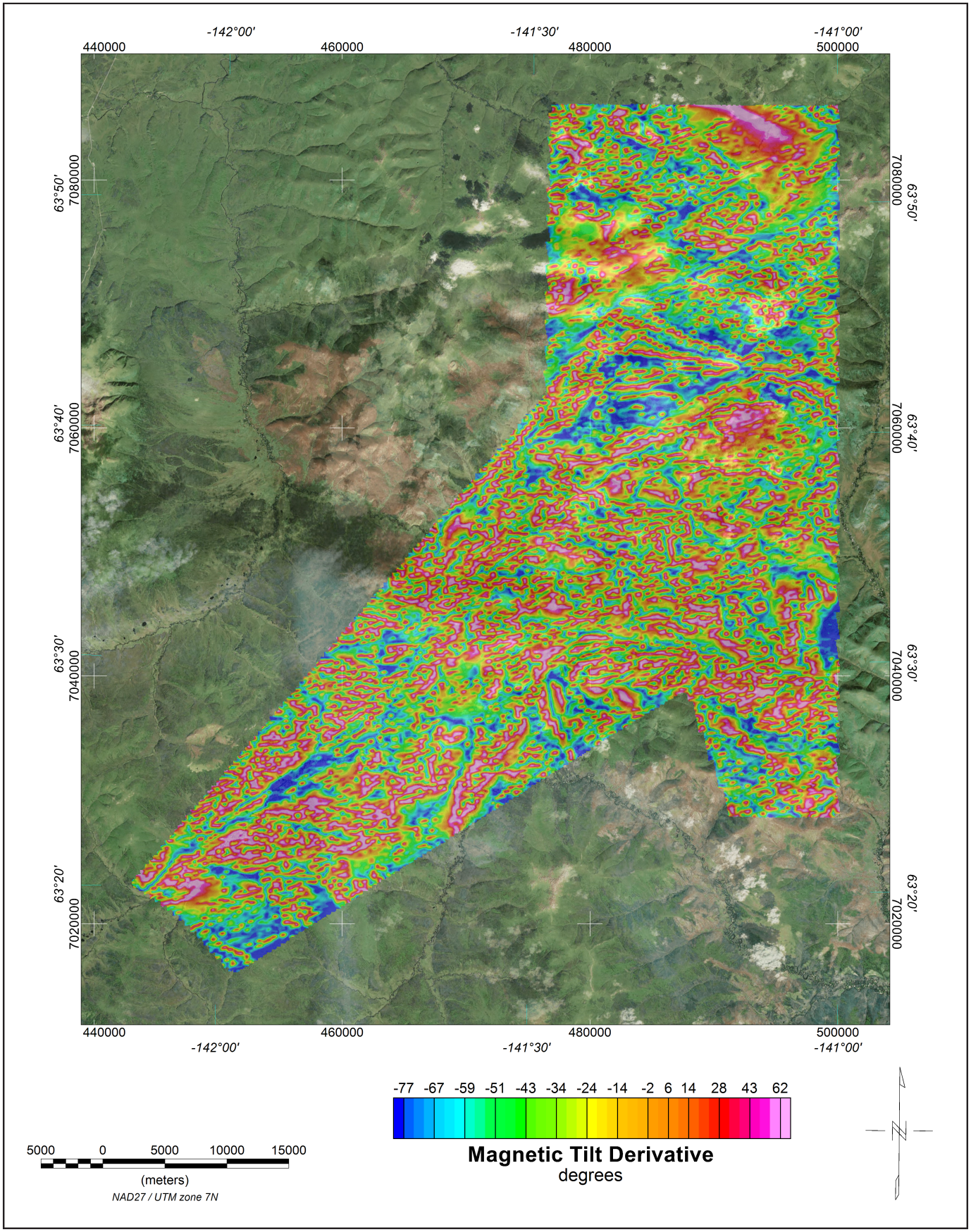


Figure 7. Magnetic tilt derivative grid with orthometric image. The tilt derivative is the angle between the horizontal gradient and the total gradient, which is useful for identifying the depth and type of source. The tilt angle is positive over the source, crosses through zero at, or near, the edge of a vertical sided source, and is negative outside the source region. It has the added advantage of responding equally well to shallow and deep sources and is able to resolve deeper sources that may be masked by larger responses from shallower sources.

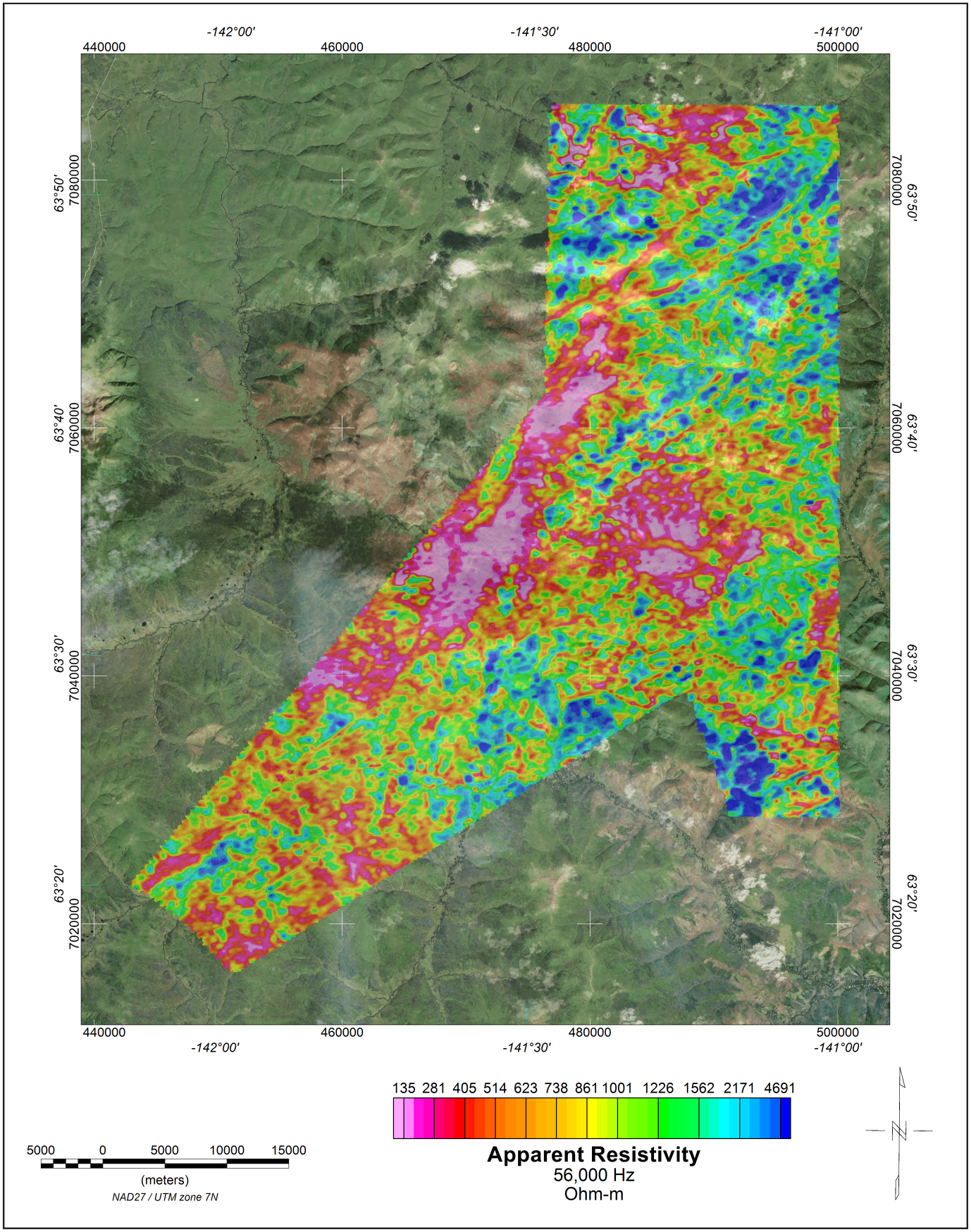


Figure 8. 56,000 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

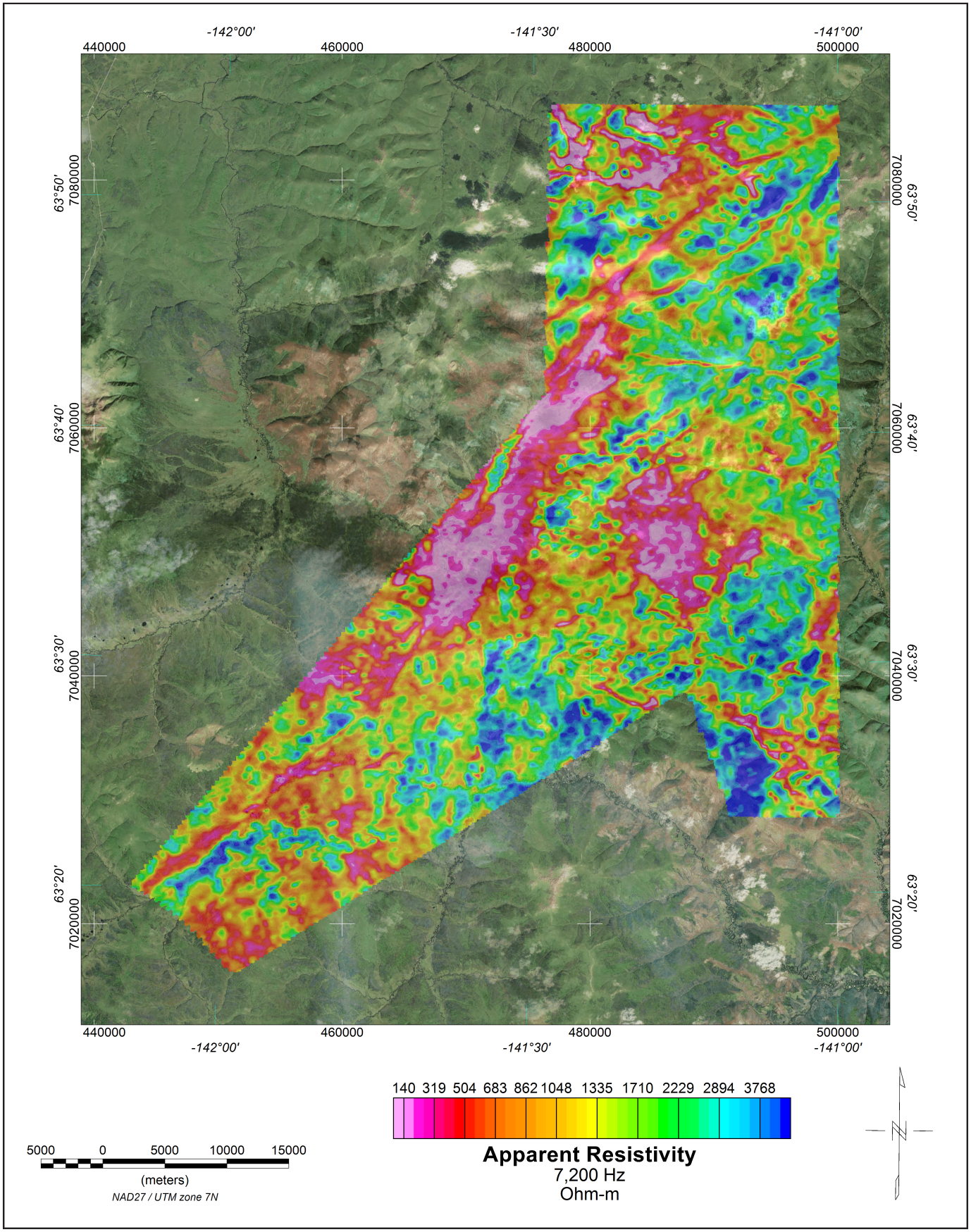


Figure 9. 7,200 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7,200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

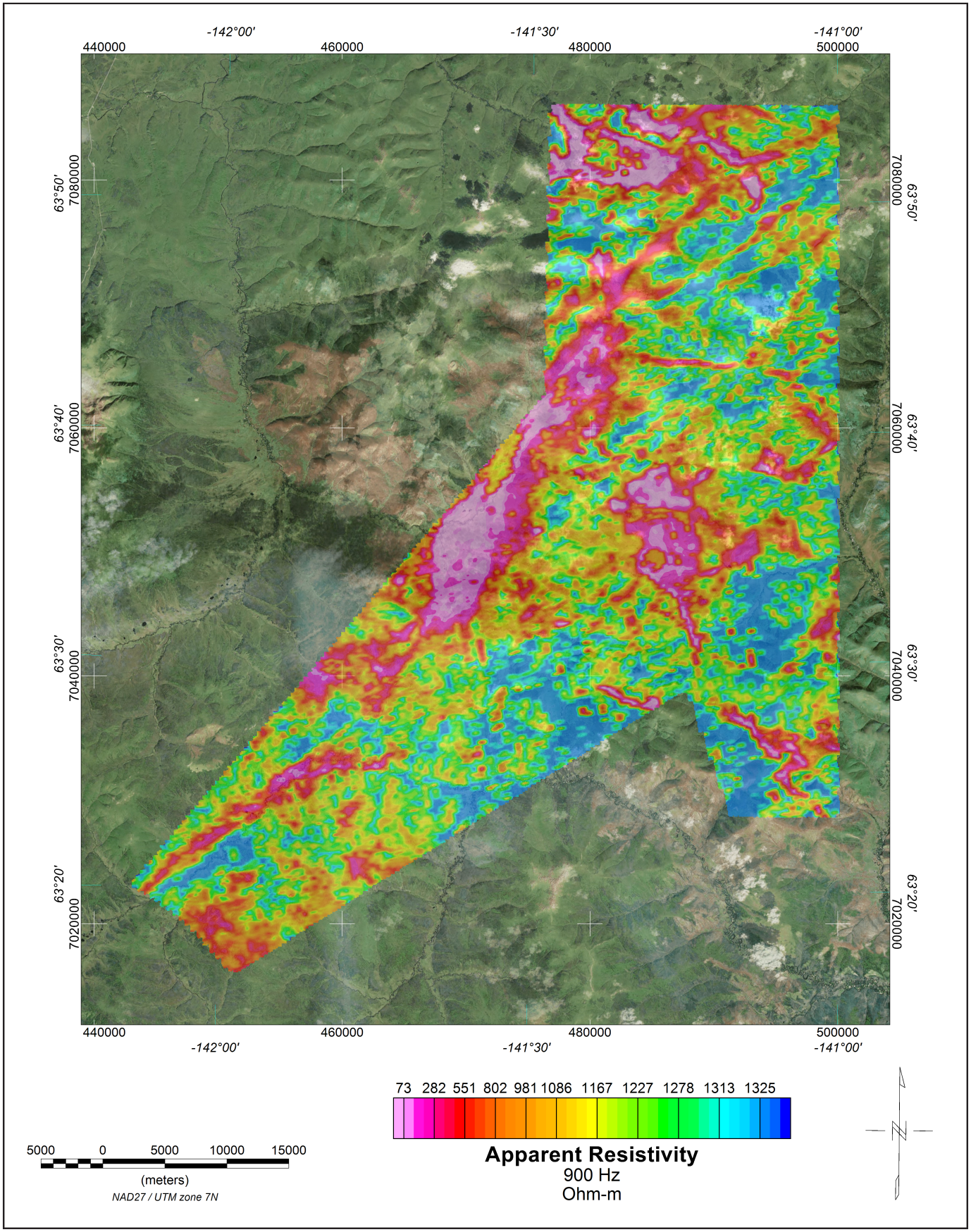


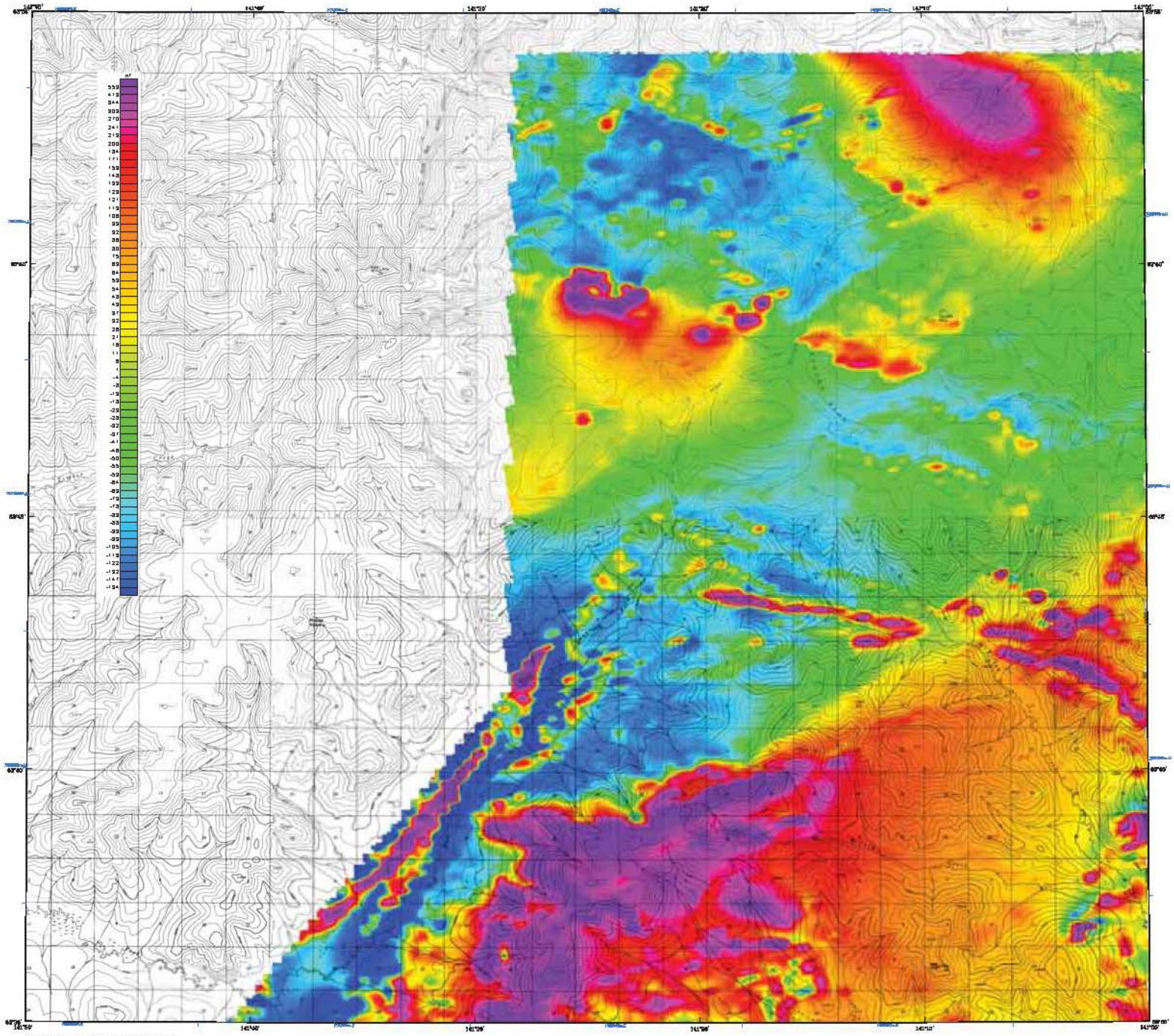
Figure 10. 900 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM^{V} EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

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/10.14509/30261

Map Title	Description
ladue_residualmag_topo_map_1of2.pdf	residual magnetic field grid with topographic base map
ladue_residualmag_topo_map_2of2.pdf	residual magnetic field grid with topographic base map
ladue_residualmag_contours_plss_map_1of2.pdf	residual magnetic field grid and contours with public land survey system base layer
ladue_residualmag_contours_plss_map_2of2.pdf	residual magnetic field grid and contours with public land survey system base layer
ladue_calculated1vd_topo_map_1of2.pdf	calculated first vertical derivative grid with topographic base map
ladue_calculated1vd_topo_map_2of2.pdf	calculated first vertical derivative grid with topographic base map
ladue_analyticsignal_topo_map_1of2.pdf	EM anomaly map with simulated magnetic total field grid contours and public land survey system base layer
ladue_analyticsignal_topo_map_2of2.pdf	EM anomaly map with simulated magnetic total field grid contours and public land survey system base layer
ladue_analyticsignal_contours_plss_map_1of2.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
ladue_analyticsignal_contours_plss_map_2of2.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
ladue_tiltderivative_contours_topo_map_1of2.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
ladue_tiltderivative_contours_topo_map_2of2.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
ladue_residualmag_shaded_tiltderivative_contours_topo_map_1of2.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
ladue_residualmag_shaded_tiltderivative_contours_topo_map_2of2.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
ladue_res56khz_topo_map_1of2.pdf	56,000 Hz apparent resistivity grid with topographic base map
ladue_res56khz_topo_map_2of2.pdf	56,000 Hz apparent resistivity grid with topographic base map
ladue_res56khz_contours_plss_map_1of2.pdf	56,000 Hz apparent resistivity grid with contours and public land survey system base layer

Table 1, continued. 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/10.14509/30261

Map Title	Description
ladue_res56khz_contours_plss_map_2of2.pdf	56,000 Hz apparent resistivity grid with contours and public land survey system base layer
ladue_res7200hz_topo_map_1of2.pdf	7,200 Hz apparent resistivity grid with topographic base map
ladue_res7200hz_topo_map_2of2.pdf	7,200 Hz apparent resistivity grid with topographic base map
ladue_res7200hz_contours_plss_map_1of2.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
ladue_res7200hz_contours_plss_map_2of2.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
ladue_res900hz_topo_map_1of2.pdf	900 Hz apparent resistivity grid with topographic base map
ladue_res900hz_topo_map_2of2.pdf	900 Hz apparent resistivity grid with topographic base map
ladue_res900hz_contours_plss_map_1of2.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
ladue_res900hz_contours_plss_map_2of2.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
ladue_interpretation_plss_map_1of2.pdf	interpretation based on geophysical data with public land survey system base layer
ladue_interpretation_plss_map_2of2.pdf	interpretation based on geophysical data with public land survey system base layer
ladue_interpretation_residualmag_plss_map_1of2.pdf	interpretation based on geophysical data with residual magnetic field grid and public land survey system base layer
ladue_interpretation_residualmag_plss_map_2of2.pdf	interpretation based on geophysical data with residual magnetic field grid and public land survey system base layer
ladue_emanomalies_residualmag_detailed_topo_map_1of4.pdf	detailed electromagnetic anomaly map with simulated magnetic total field grid and topographic base map
ladue_emanomalies_residualmag_detailed_topo_map_2of4.pdf	detailed electromagnetic anomaly map with simulated magnetic total field grid and topographic base map
ladue_emanomalies_residualmag_detailed_topo_map_3of4.pdf	detailed electromagnetic anomaly map with simulated magnetic total field grid and topographic base map
ladue_emanomalies_residualmag_detailed_topo_map_4of4.pdf	detailed electromagnetic anomaly map with simulated magnetic total field grid and topographic base map



SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

RESIDUAL MAGNETIC FIELD OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

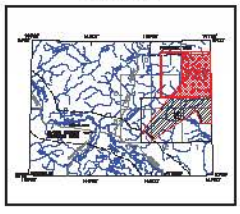
PART OF TANACROSS QUADRANGLE

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Satrinx CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video cameras. Flights were performed with an AS–350–B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW–SE (350°) 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 3 miles.

A Novatel DL14–GL Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post–flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

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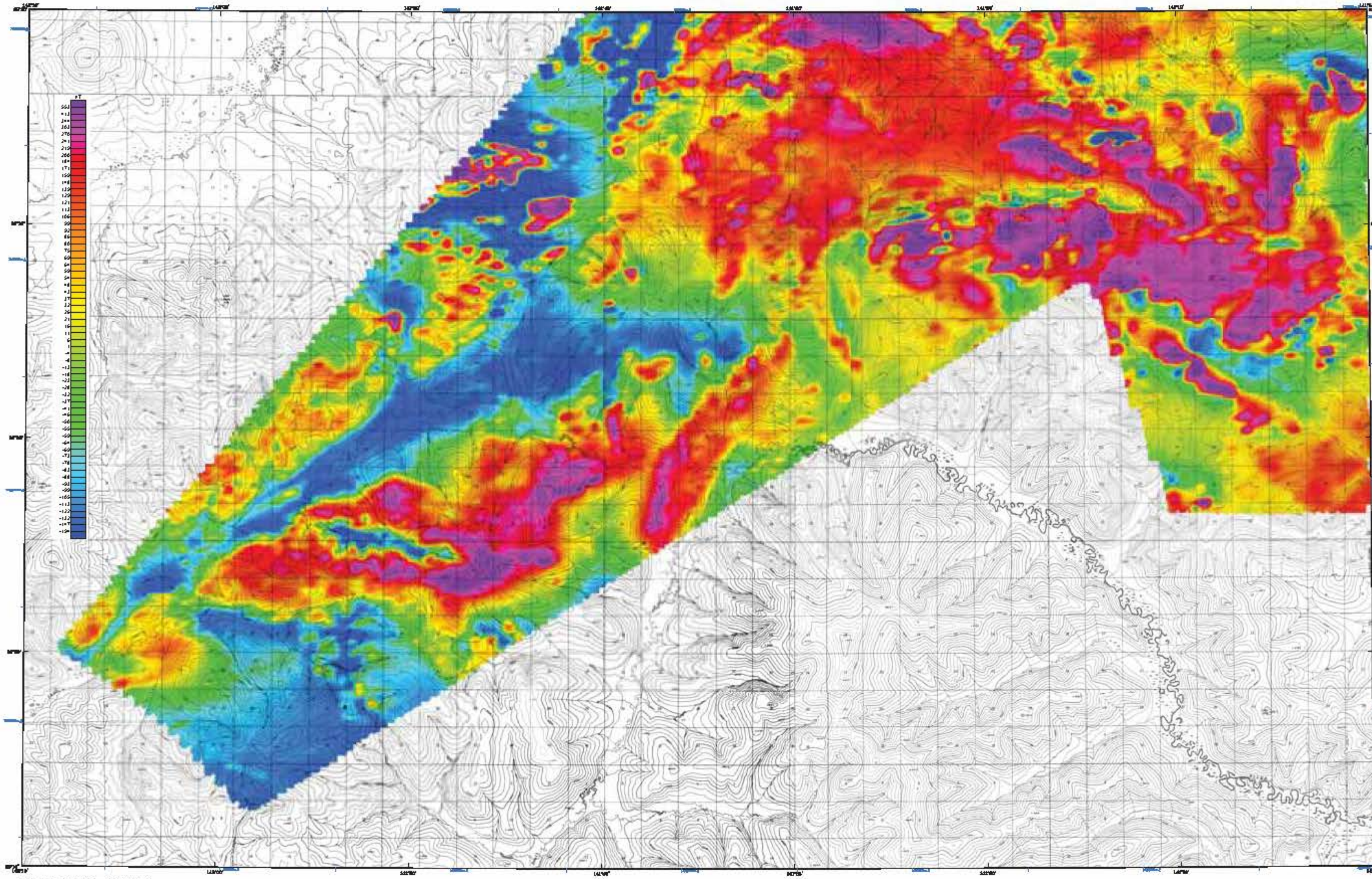

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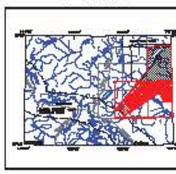

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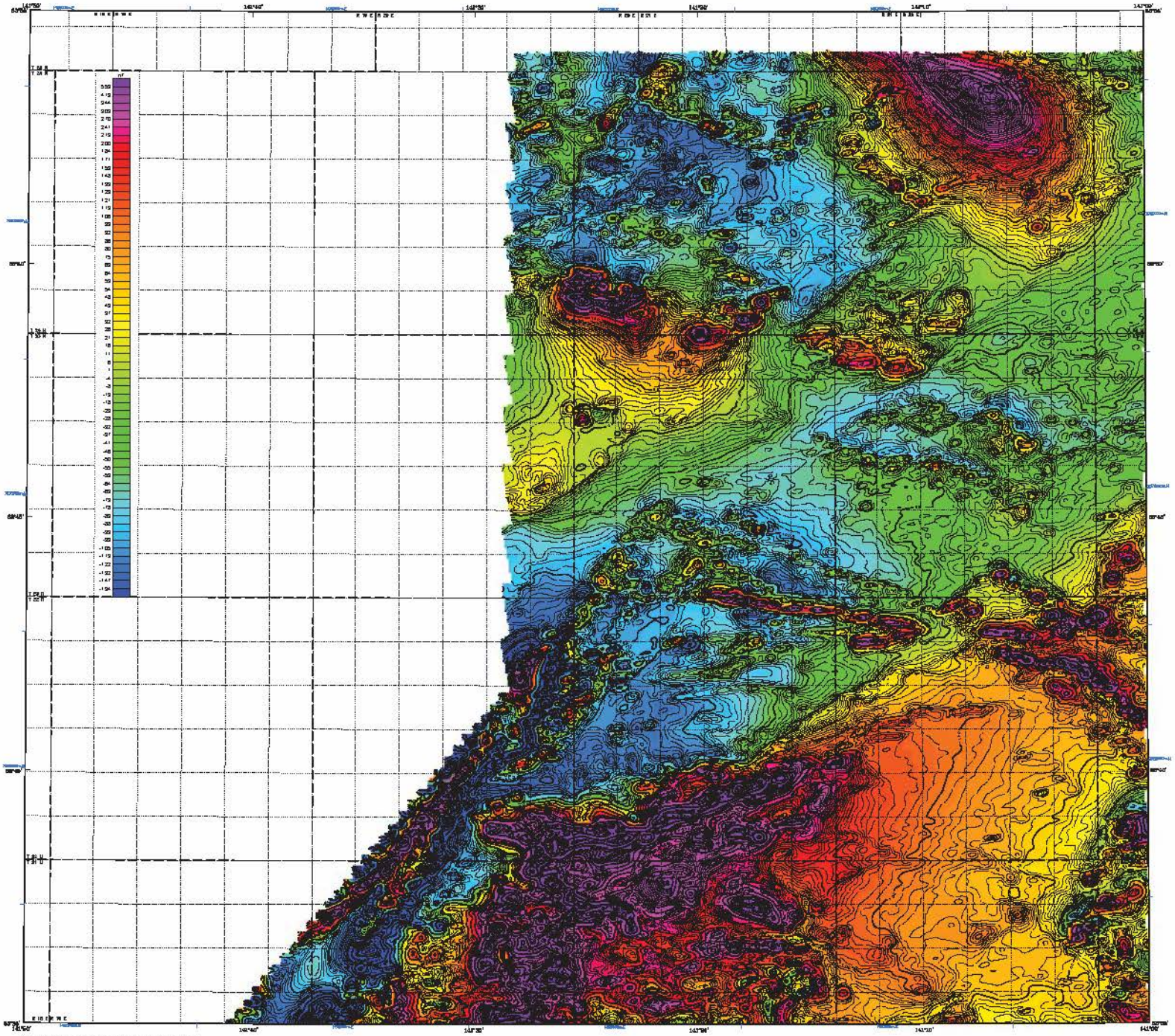

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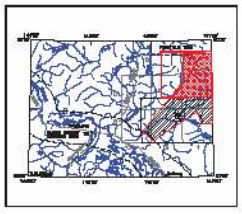
LOCATION INDEX



RESIDUAL MAGNETIC FIELD AND DATA CONTOURS OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS2 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 300 feet along NW–SE (330°) 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 3 miles.

A Novatel OEM4–G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) ellipsoid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. 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 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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 CONTOURS

250 nT

50 nT

10 nT

5 nT

SURVEY HISTORY

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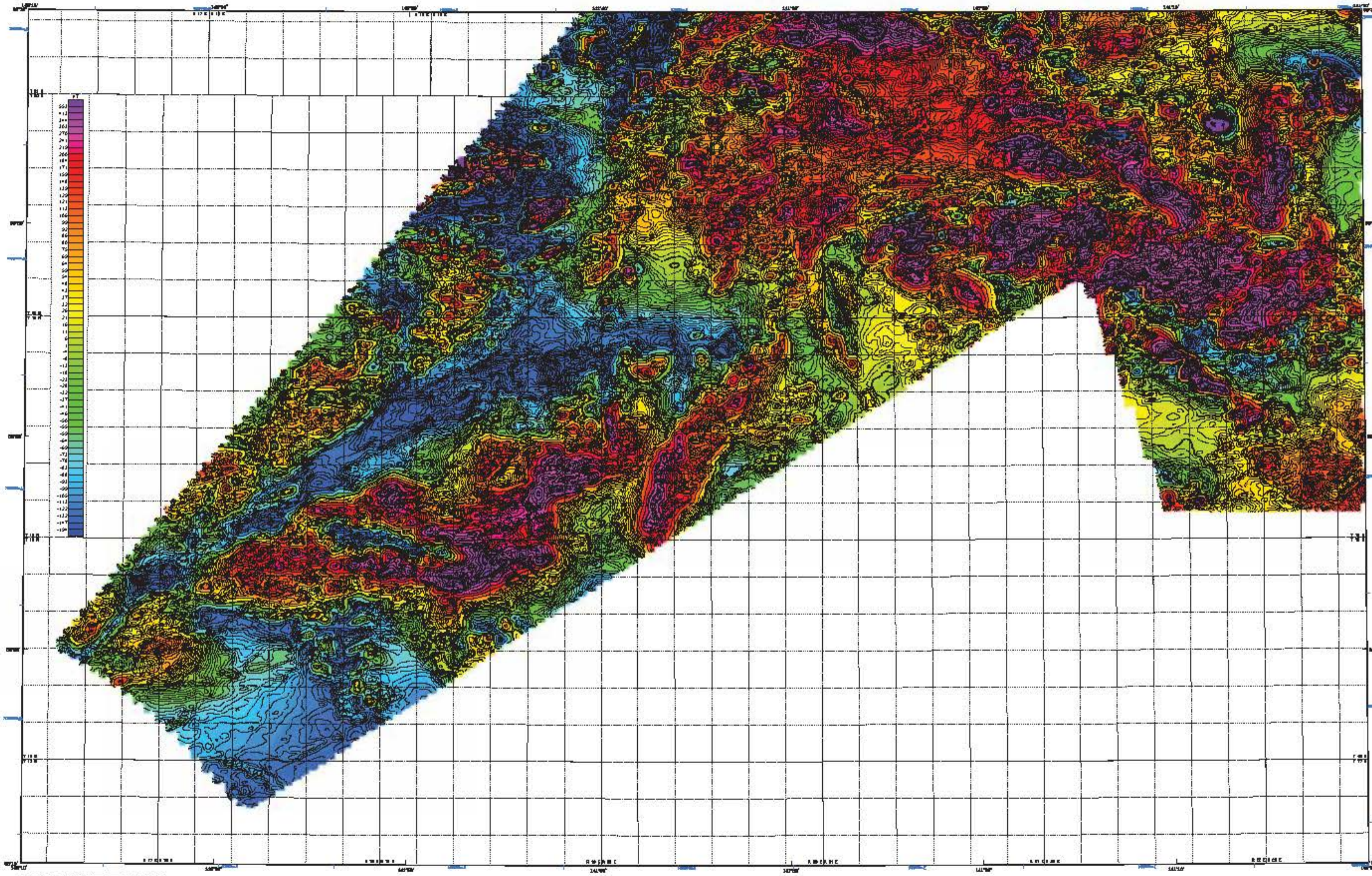
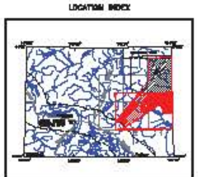


LOCATION INDEX



RESIDUAL MAGNETIC FIELD AND DATA CONTOURS OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2011

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (330°) 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 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was defined every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. 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 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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MAGNETIC CONTOURS

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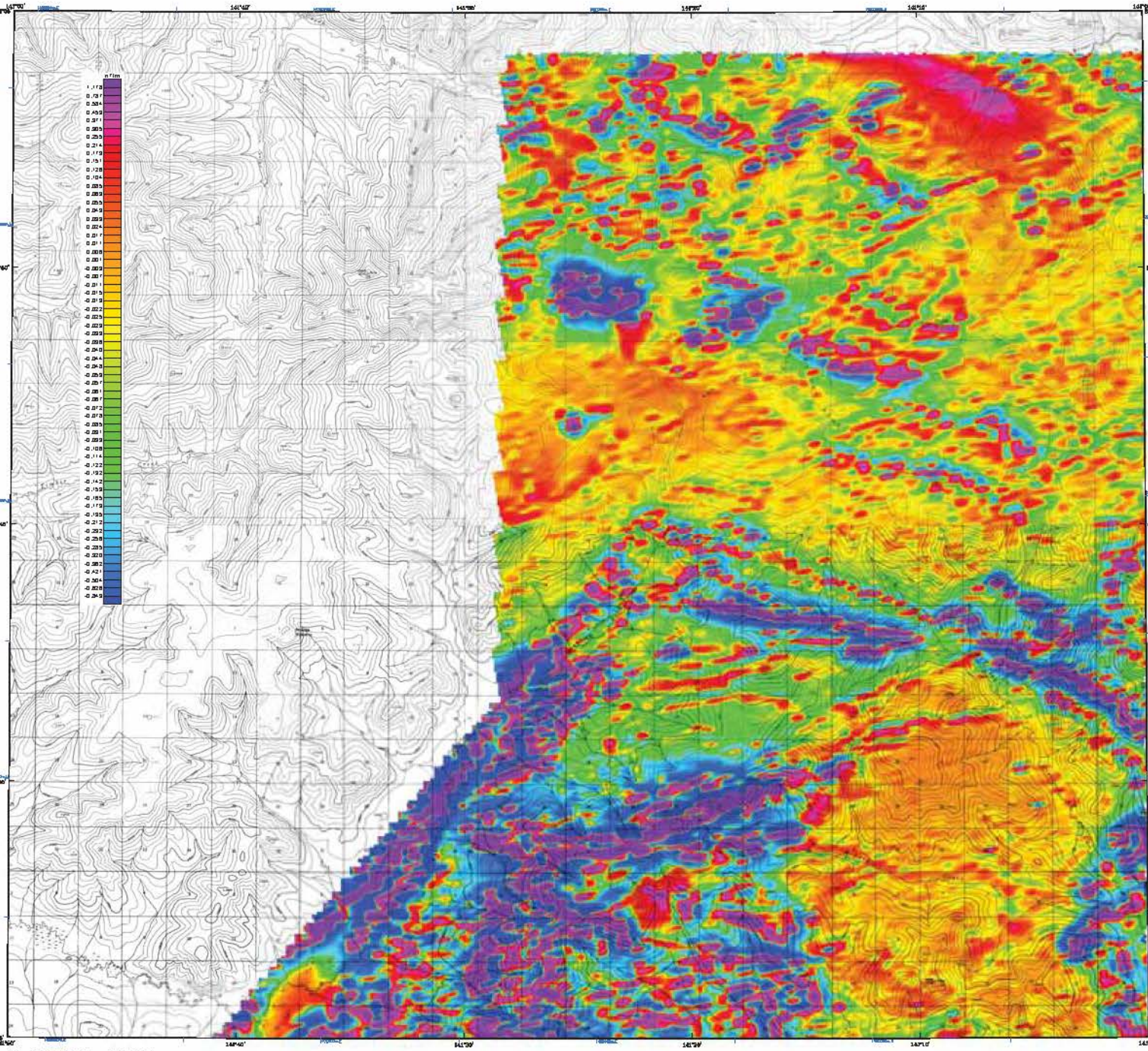


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 KILOMETERS

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

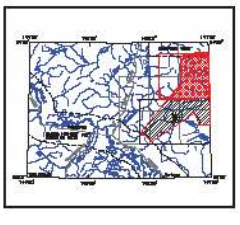
PART OF TANACROSS QUADRANGLE

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

LOCATION INDEX



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COLOR BAR HISTOGRAM

Approximately 98% of the first vertical derivative of the magnetic field for the Moran Survey Area dropped to within the range displayed on the color bar. Data values actually range from −23,000 nT/m (dark blue) to about 21,500 nT/m (magenta).

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. 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 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 50 m grid using a modified Akima (1978) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication. 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.

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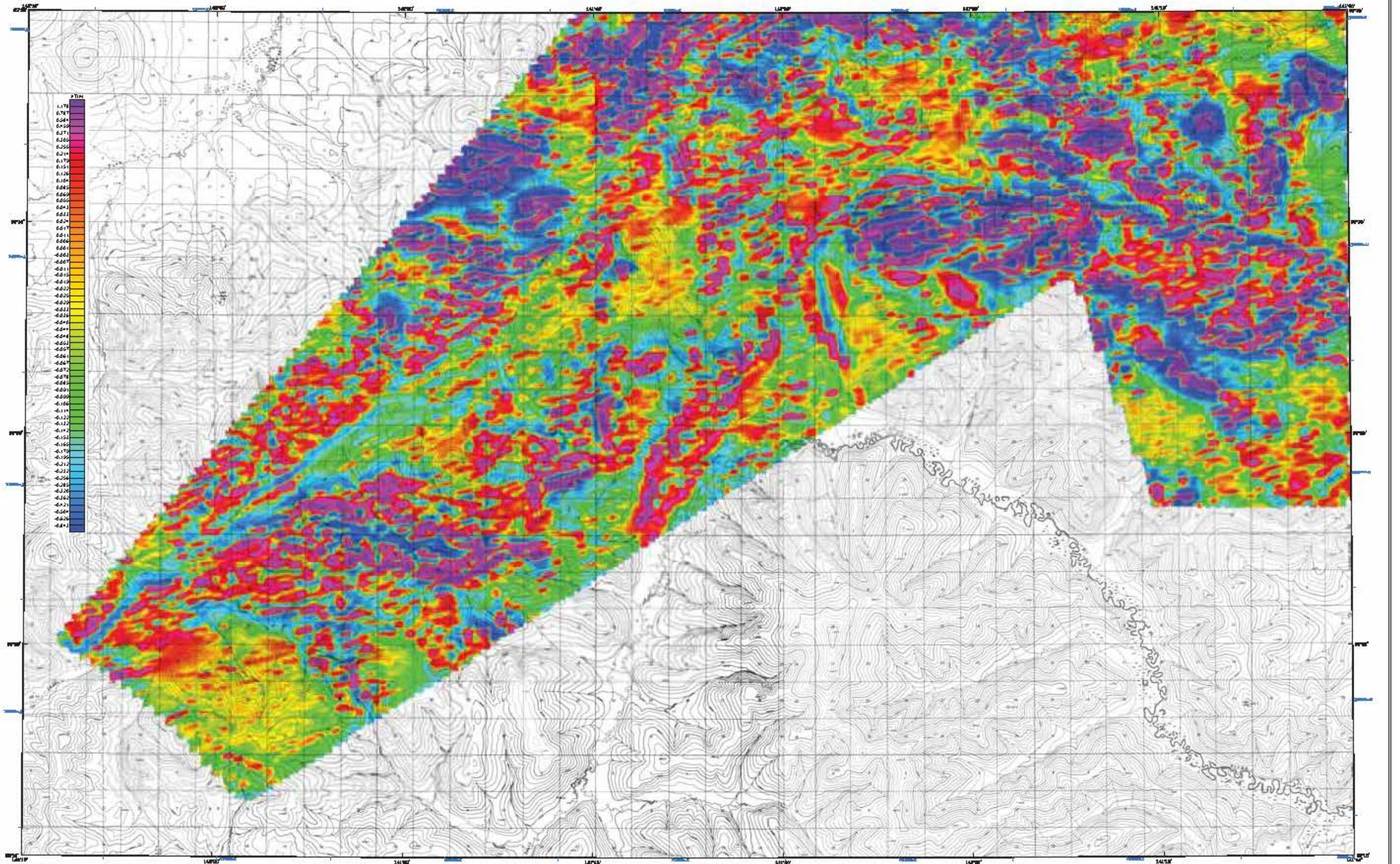


FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

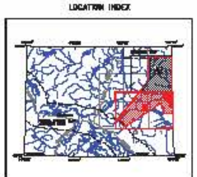
PART OF TANACROSS QUADRANGLE

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

LOCATION INDEX



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COLOR BAR HISTOGRAM

Approximately 99% of the first vertical derivative of the magnetic field for the [illegible] Survey Area dataset is within the range displayed on the color bar. Grid values actually range from −[illegible] nT/m (dark blue) to about 21.[illegible] nT/m (magenta).

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

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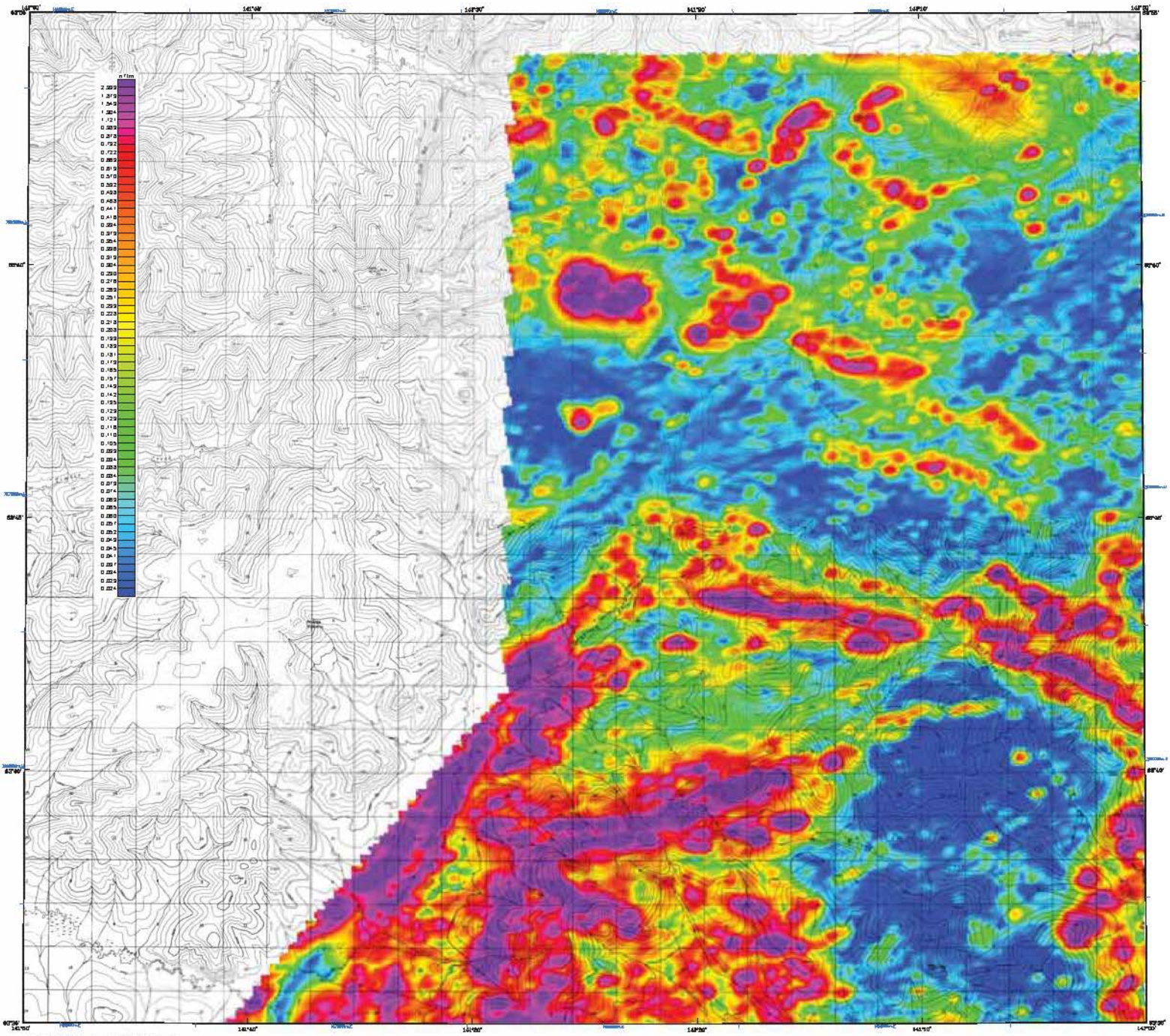


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

CONTOUR INTERVAL 200 FEET
DATUM: NORTH AMERICAN 1927

ANALYTIC SIGNAL OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

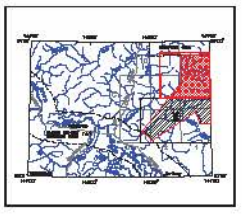
PART OF TANACROSS QUADRANGLE

by

Lionel E. Stone, Fugro Airborne Surveys Corp., and Fugro Geodetics, Inc.

2011

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW–SE (330°) 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 3 miles.

A Novatel GSM4–GIL Glegal Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post–flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

ANALYTIC SIGNAL

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 (e.g., contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independently of the direction of the induced and/or remanent magnetizations.

SURVEY HISTORY

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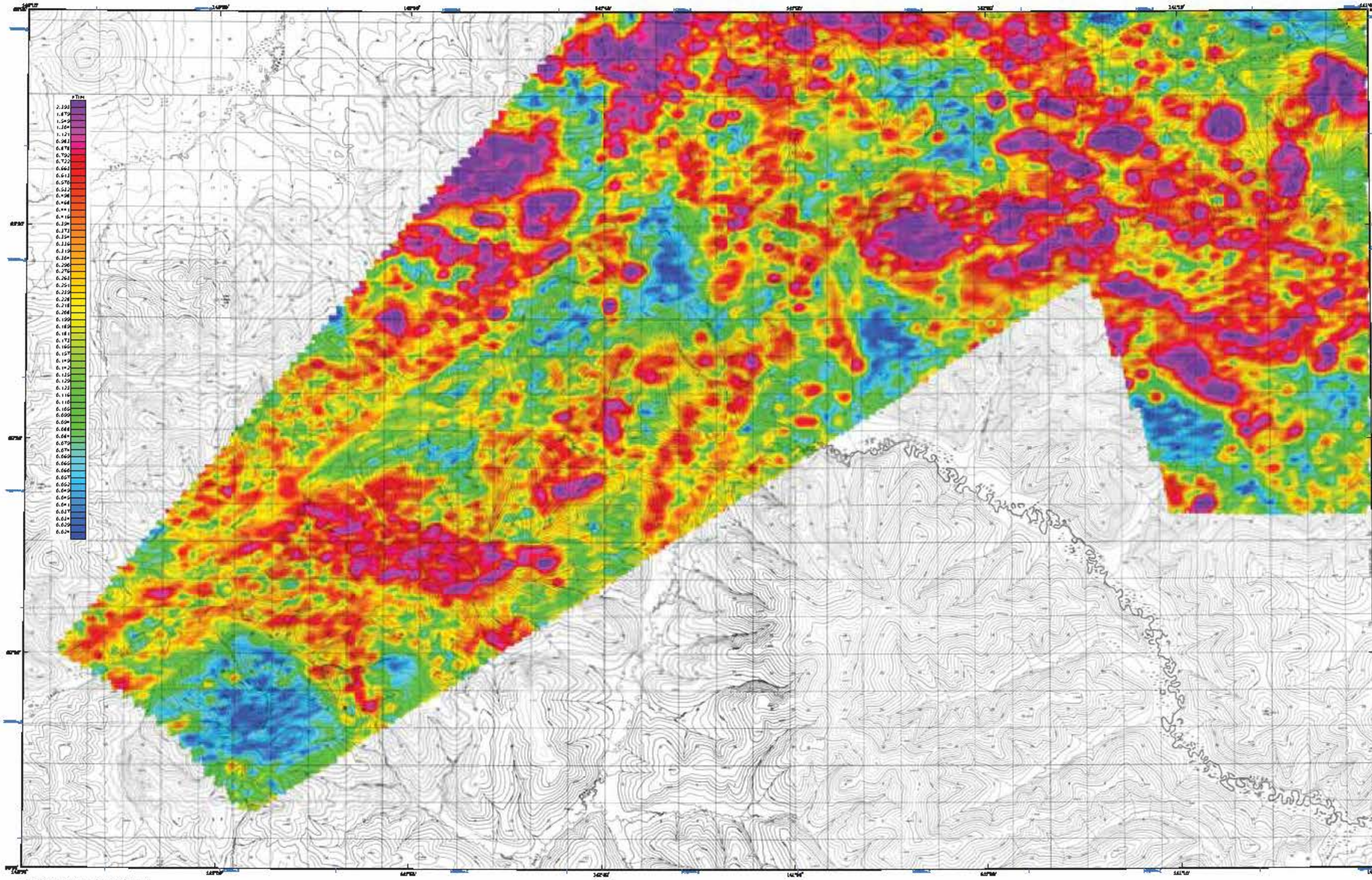

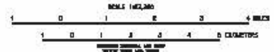

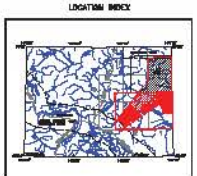

ANALYTIC SIGNAL OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2011

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (140°) 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 3 miles.

A Novatel OEM4-DGL Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

ANALYTIC SIGNAL

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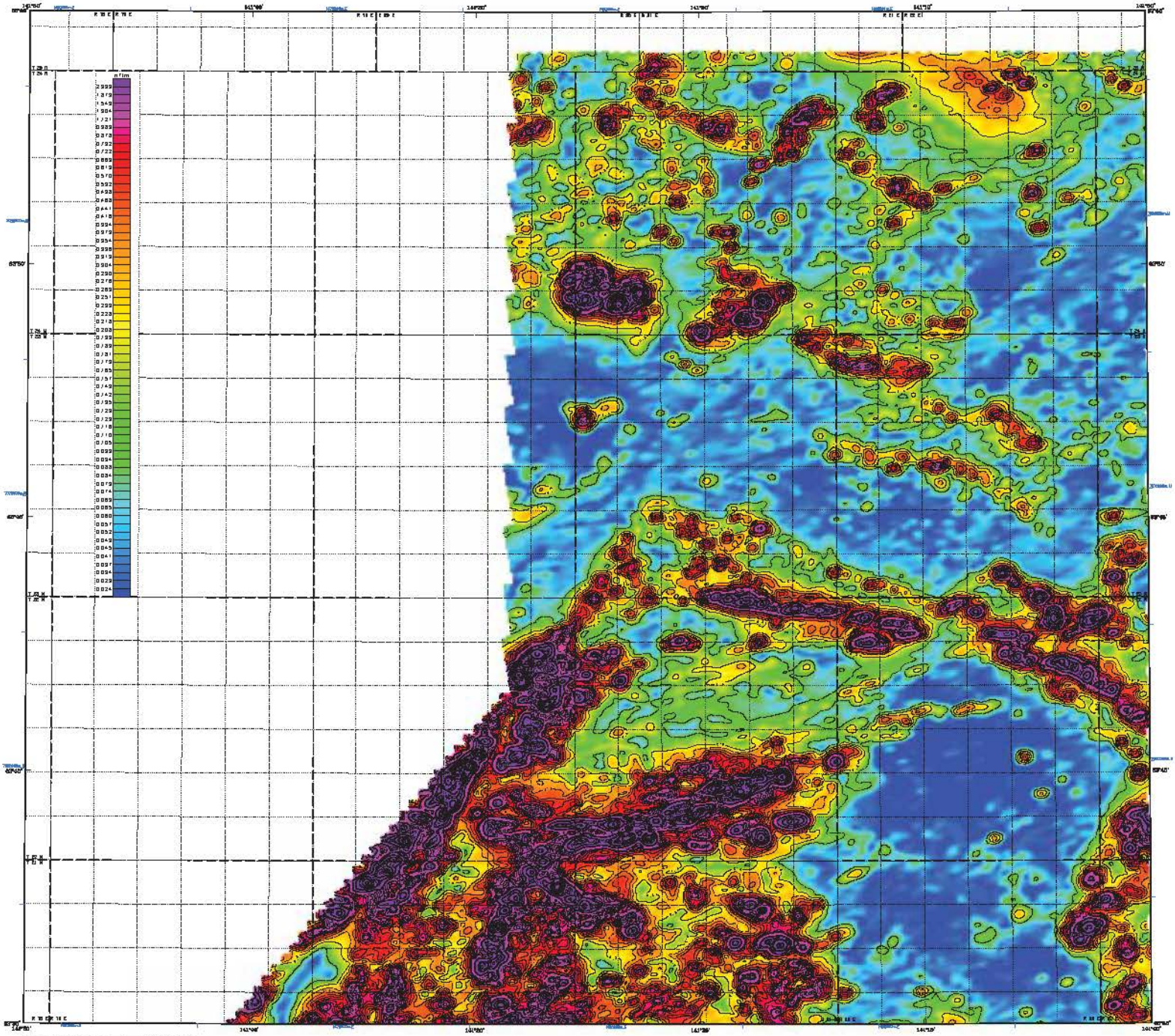
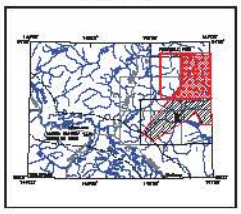


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 KILOMETERS

LOCATION INDEX



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PART OF TAMACROSS QUADRANGLE

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

DESCRIPTIVE NOTES

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A Novatel DL-V4–GSL Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post–flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

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ANALYTIC SIGNAL CONTOURS

5.00 nT/metre

1.00 nT/metre

0.50 nT/metre

0.10 nT/metre

SURVEY HISTORY

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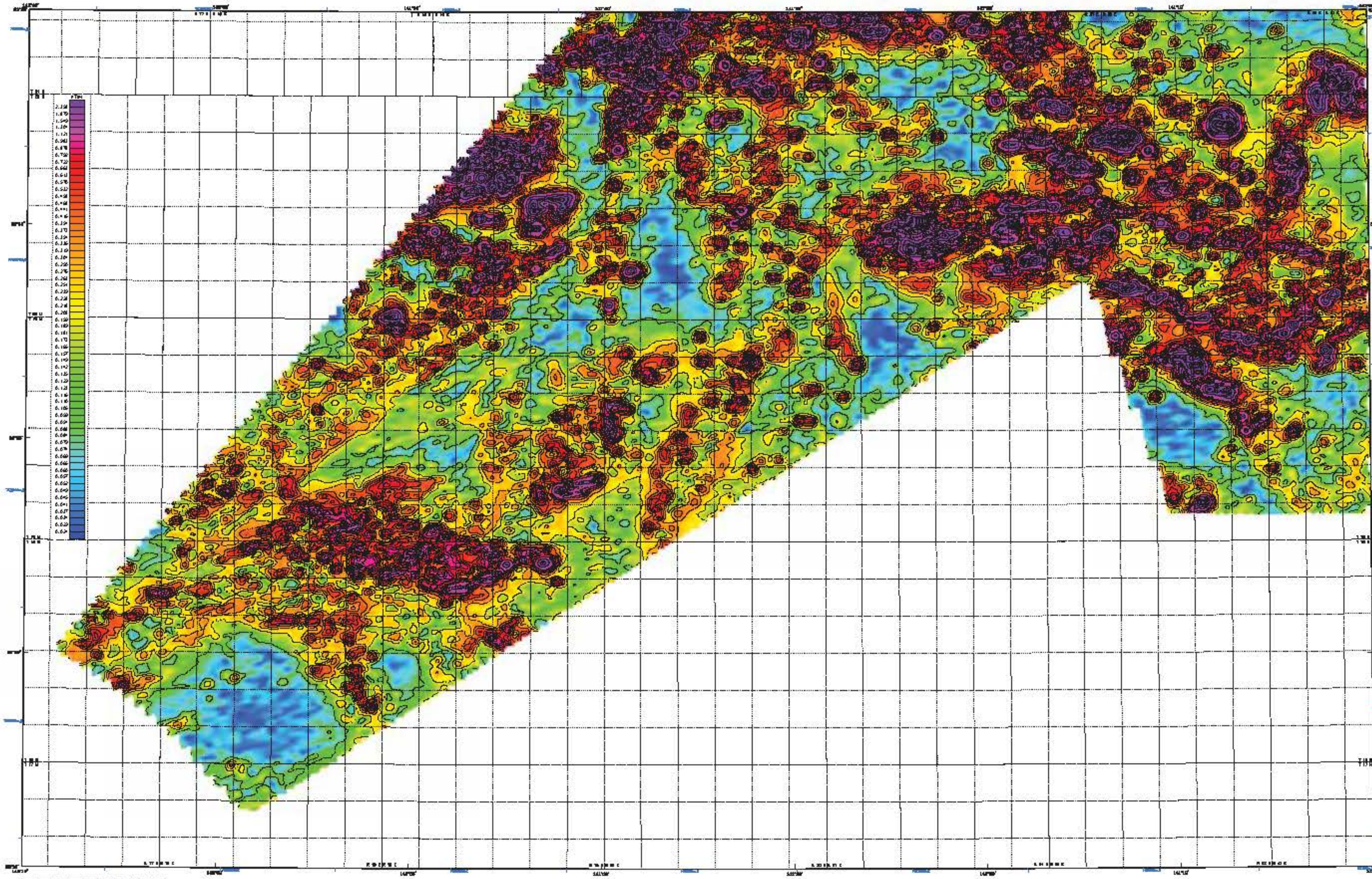

SCALE 1:63,360

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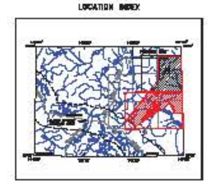

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A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, 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.

ANALYTIC SIGNAL

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 (e.g. contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independently of the direction of the induced and/or remanent magnetizations.

ANALYTIC SIGNAL CONTOURS

2.50 nT/metre

1.00 nT/metre

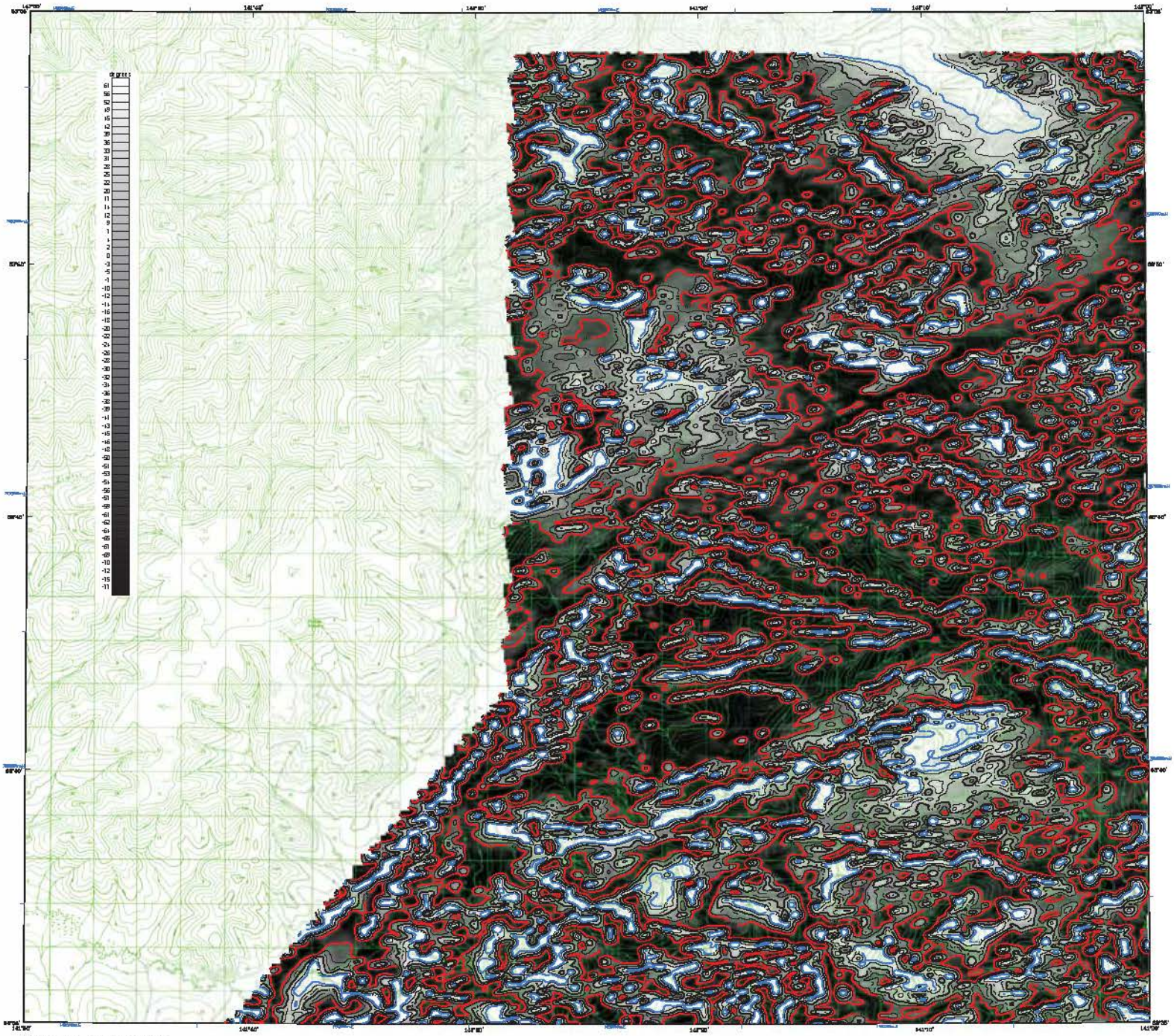
0.25 nT/metre

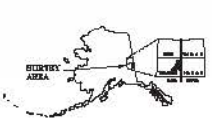
0.10 nT/metre

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3354 College Road, Fairbanks, Alaska, 99709-3707, and are downloadable for free from the DGGS website (www.dggs.alaska.gov/pubs). Maps are also available on paper through the DGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.





SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

MAGNETIC TILT DERIVATIVE AND DATA CONTOURS OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

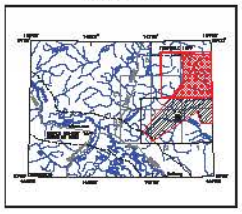
PART OF TANACROSS QUADRANGLE

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW–SE (332°) 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 3 miles.

A Novatel OEM4–G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post–flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

MAGNETIC TILT DERIVATIVE

The tilt derivative is the angle between the horizontal gradient & the total gradient, which is useful for identifying the depth & type of source. The tilt angle is positive over the source, crosses through zero at, or near, the edge of a vertical sided source, and is negative outside the source region. It has the added advantage of responding equally well to shallow and deep sources and is able to resolve deeper sources that may be masked by larger responses from shallower sources.

MAGNETIC TILT DERIVATIVE CONTOURS

+45 degrees

+30 degrees

+15 degrees

0 degrees

-15 degrees

-30 degrees

-45 degrees

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

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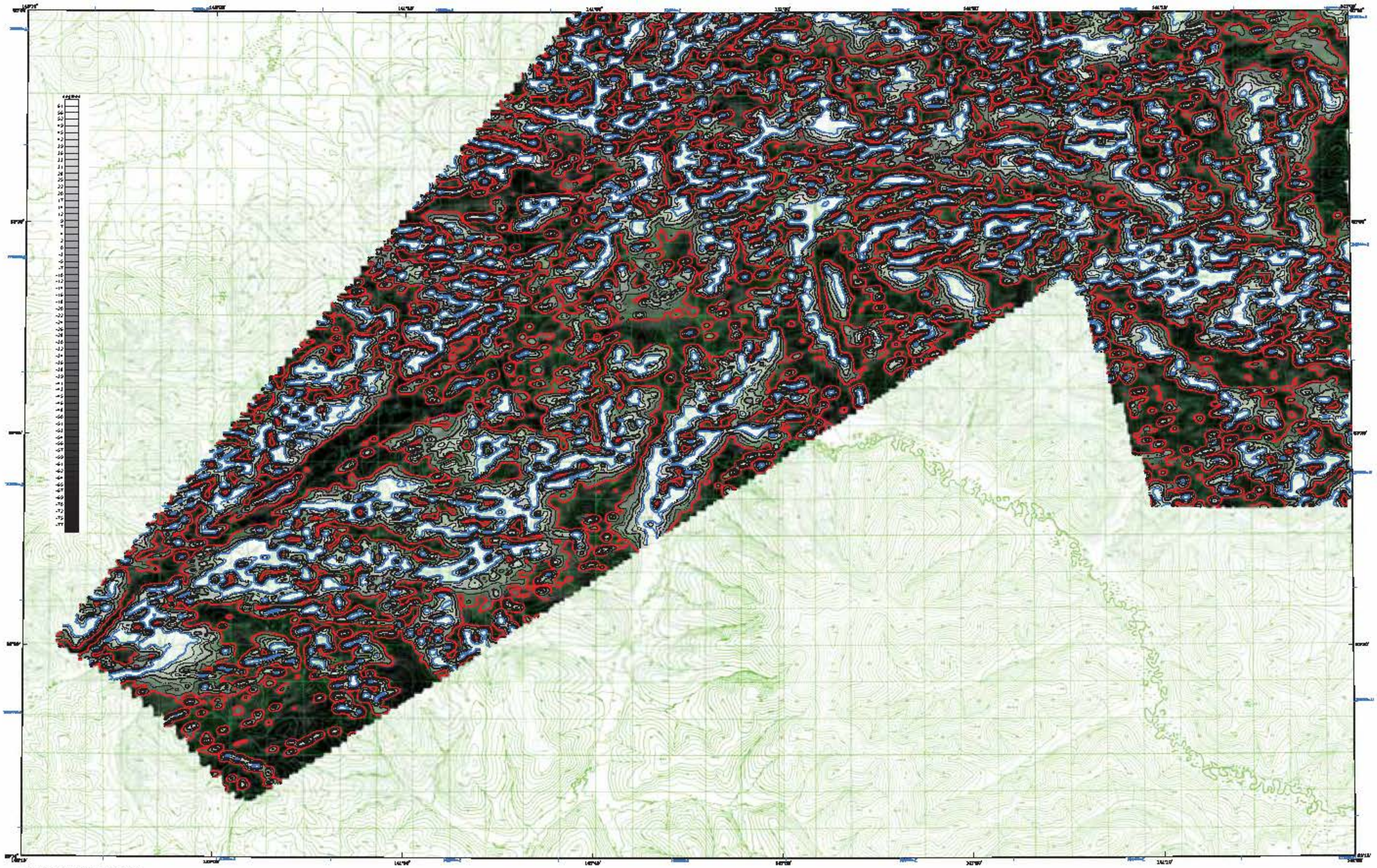

SCALE 1:63,360

MAGNETIC TILT DERIVATIVE AND DATA CONTOURS OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2011

LOCATION INDEX

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (350°) 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 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

MAGNETIC TILT DERIVATIVE

The tilt derivative is the angle between the horizontal gradient & the total gradient, which is useful for identifying the depth & type of source. The tilt angle is positive over the source, crosses through zero at, or near, the edge of a vertical sided source, and is negative outside the source region. It has the added advantage of responding equally well to shallow and deep sources and is able to resolve deeper sources that may be masked by larger responses from shallower sources.

MAGNETIC TILT DERIVATIVE CONTOURS

- +45 degrees
- +30 degrees
- +15 degrees
- 0 degrees
- -15 degrees
- -30 degrees
- -45 degrees

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

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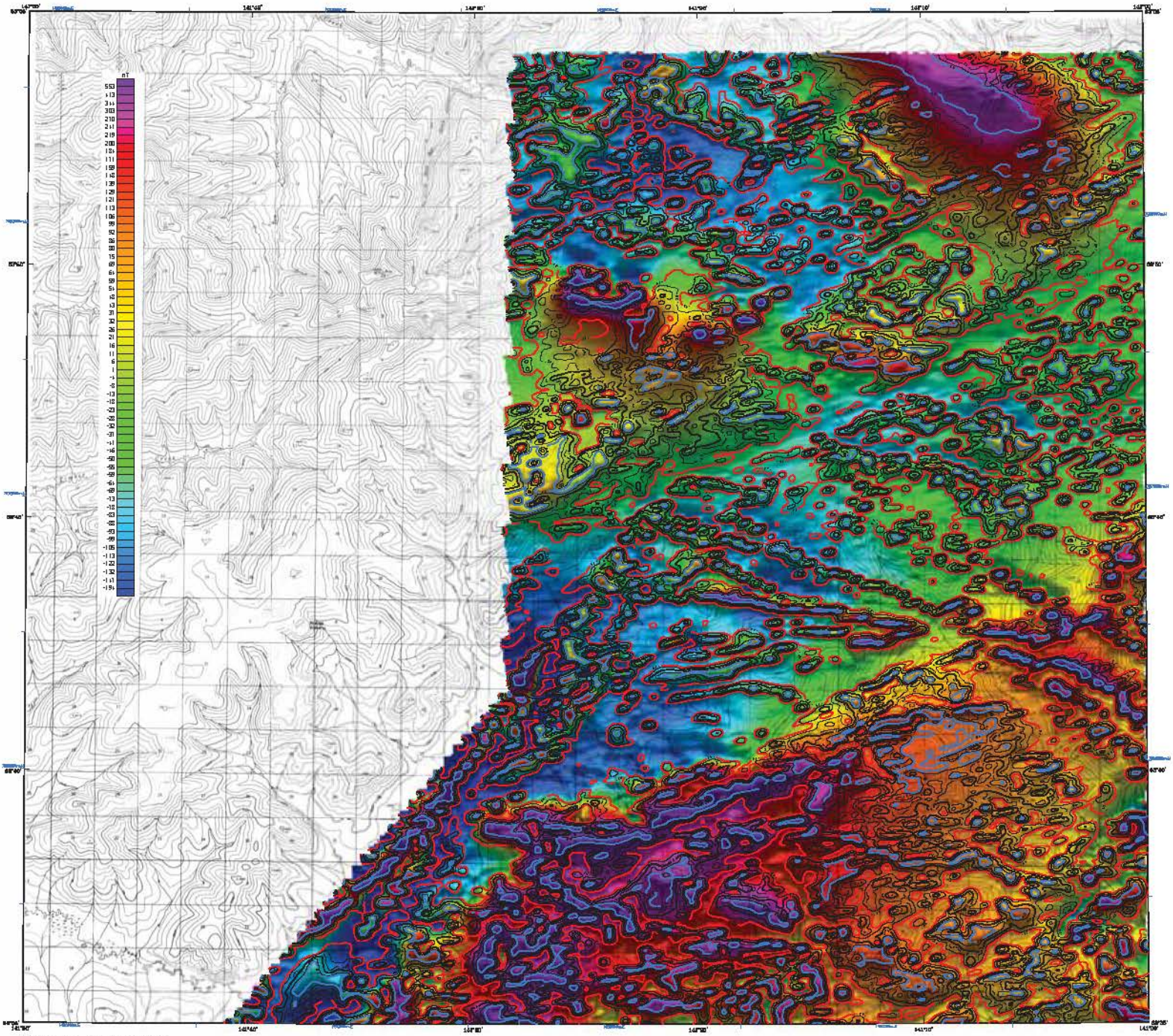


Base data: U.S. Geological Survey Seamless D-1, 2003; D-2, 2003; D-3, 2003; D-4, 2003 Washington, Alaska

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

ALASKAN STEREOGRAPHIC PROJECTION
NORTH AMERICAN DATUM 1983

COLOR SHADOW RESIDUAL MAGNETIC FIELD WITH MAGNETIC TILT DERIVATIVE DATA CONTOURS OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by

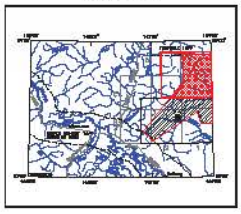
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

Sun Azimuth: 355 degrees

Sun Inclination: 45 degrees

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system and a Fugro CS44 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 300 feet along NW–SE (332°) 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 3 miles.

A Novatel OEM4–G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro CS1344 magnetometer with a Scintrex CS3 cesium sensor. 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 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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 TILT DERIVATIVE

The tilt derivative is the angle between the horizontal gradient & the total gradient, which is useful for identifying the depth & type of source. The tilt angle is positive over the source, crosses through zero at, or near, the edge of a vertical sided source, and is negative outside the source region. It has the added advantage of responding equally well to shallow and deep sources and is able to resolve deeper sources that may be masked by larger responses from shallower sources.

MAGNETIC TILT DERIVATIVE CONTOURS

- +45 degrees
- +30 degrees
- +15 degrees
- 0 degrees
- -15 degrees
- -30 degrees
- -45 degrees

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

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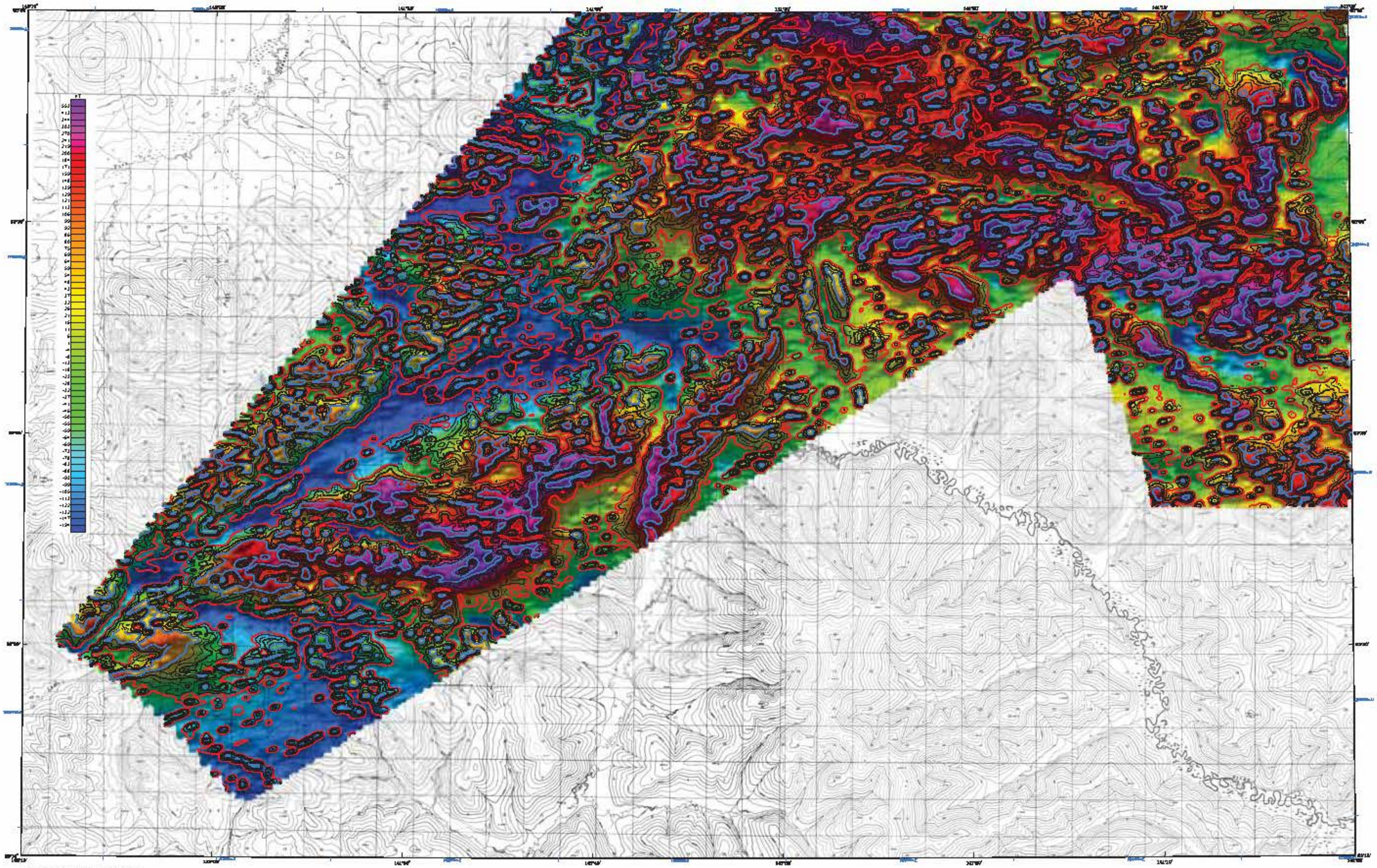

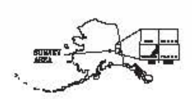

COLOR SHADOW RESIDUAL MAGNETIC FIELD WITH MAGNETIC TILT DERIVATIVE DATA CONTOURS OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2011

Sun Azimuth: 355 degrees
Sun Inclination: 45 degrees

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW–SE (330°) 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 3 miles.

A Novatel OEMV-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. 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 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids published in this publication.

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 TILT DERIVATIVE

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MAGNETIC TILT DERIVATIVE CONTOURS

blue line	+45 degrees
black line	+30 degrees
black line	+15 degrees
black line	0 degrees
black line	−15 degrees
black line	−30 degrees
red line	−45 degrees

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

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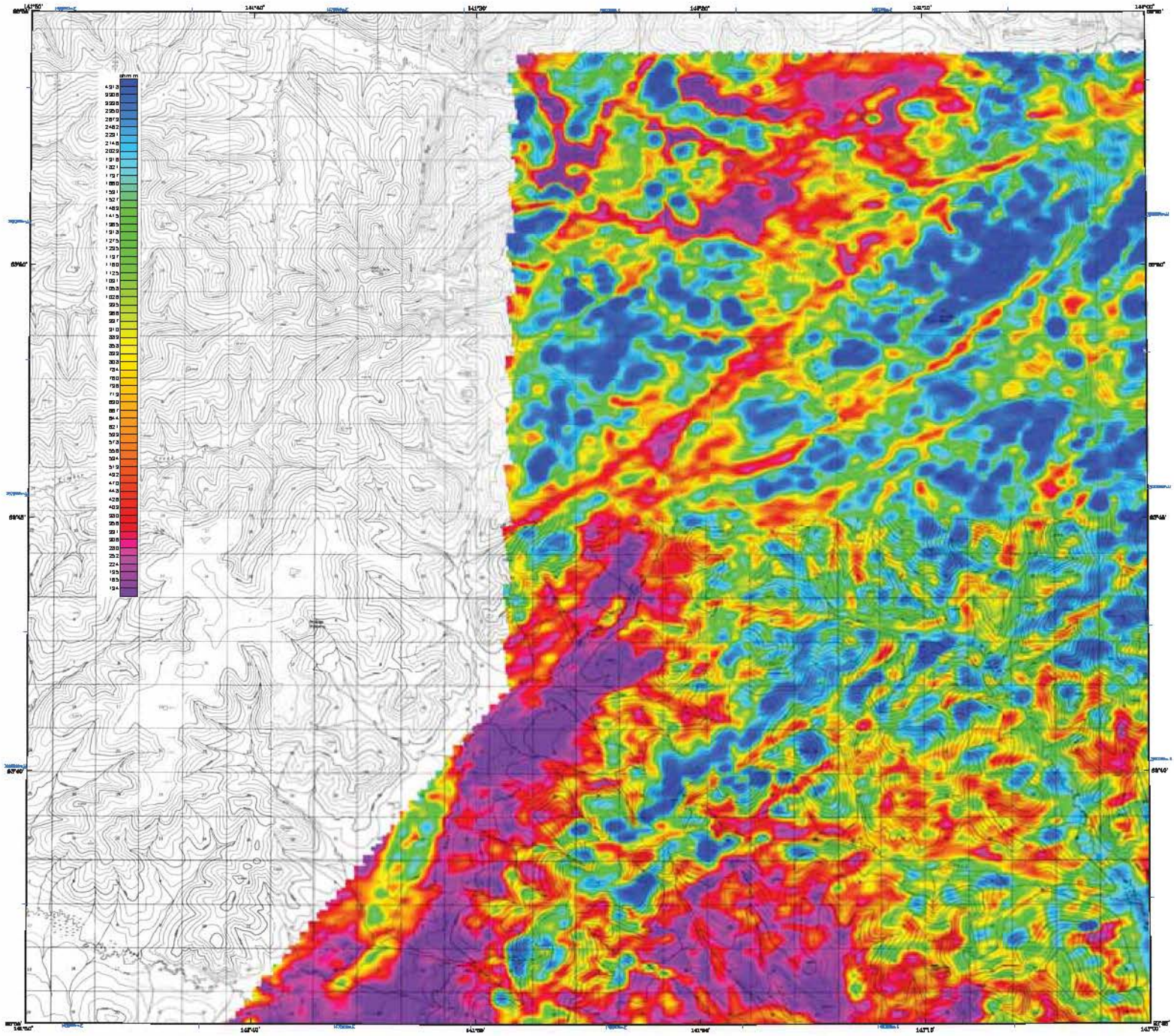


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 KILOMETERS

56,000 Hz COPLANAR APPARENT RESISTIVITY OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Sainbrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW–SE (360°) 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 3 miles.

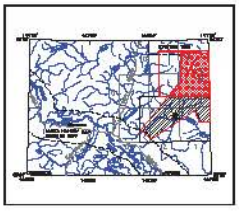
A Novatel OEM4–G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 3m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north correction of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies, two vertical coaxial coil-pairs operated at 1000 and 3000 Hz and three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system response to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half spaces model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 23 m cell size to produce the maps and final grids contained in this publication.

Akima, Hi. 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



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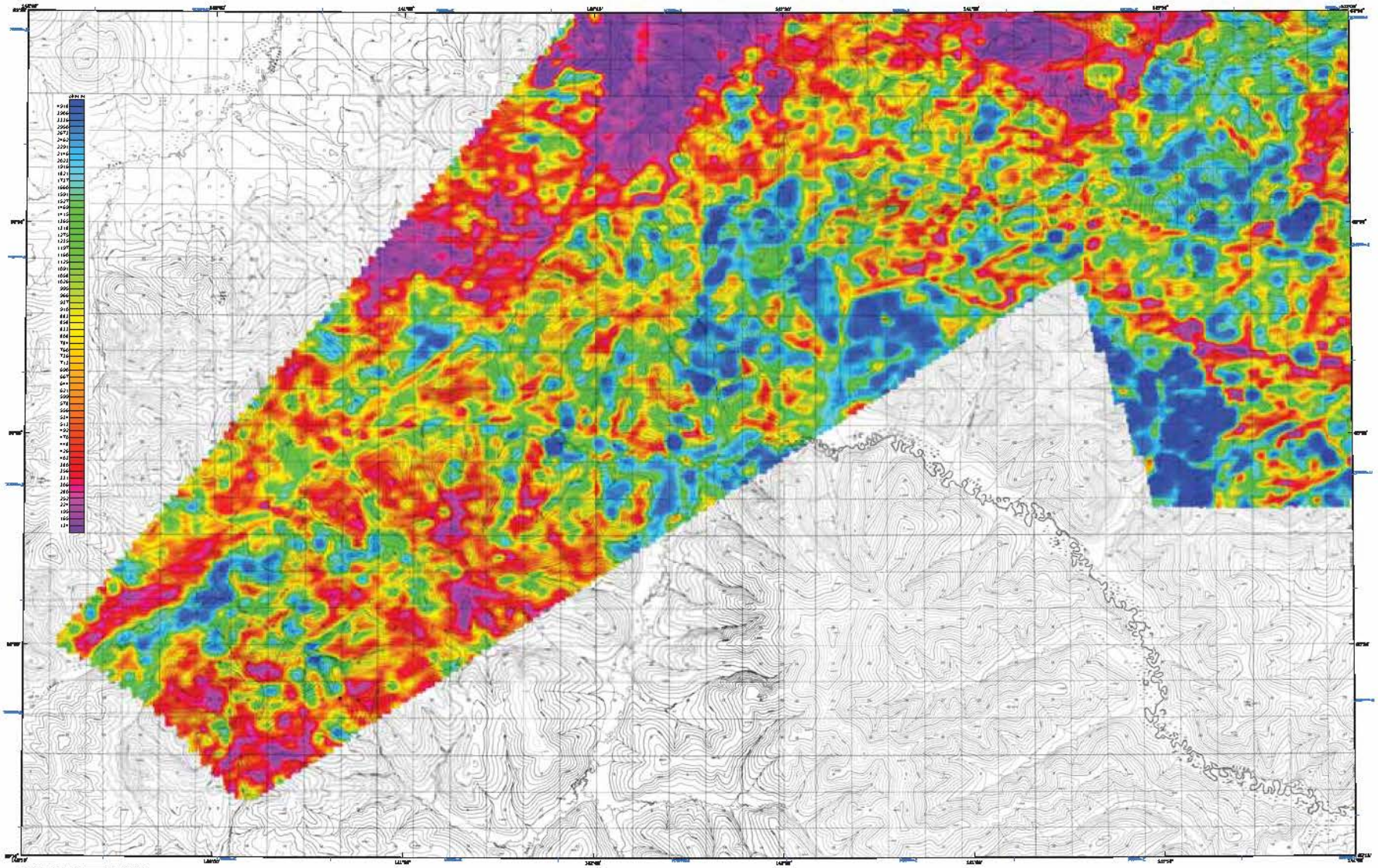

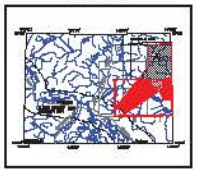

56,000 Hz COPLANAR APPARENT RESISTIVITY OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by

Laurel B. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system and a Fugro CL344 cesium magnetometer with a Sintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 meters. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 3D/3D fluxmeters and video camera. Flights were performed with an AS-350-B3 AStAR helicopter at a mean ground speed of 130 km/hr (80 mi/hr) at a nominal terrain clearance of 100 m (328 ft). Flight line spacing of a quarter of a mile. The flight lines were flown perpendicular to the flight lines are interpolated at approximately ¼ miles.

A Novatel GEM4-GG Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (ITM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141° a north variation of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously flown DGGS surveys adjacent to the current survey are shown in this location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

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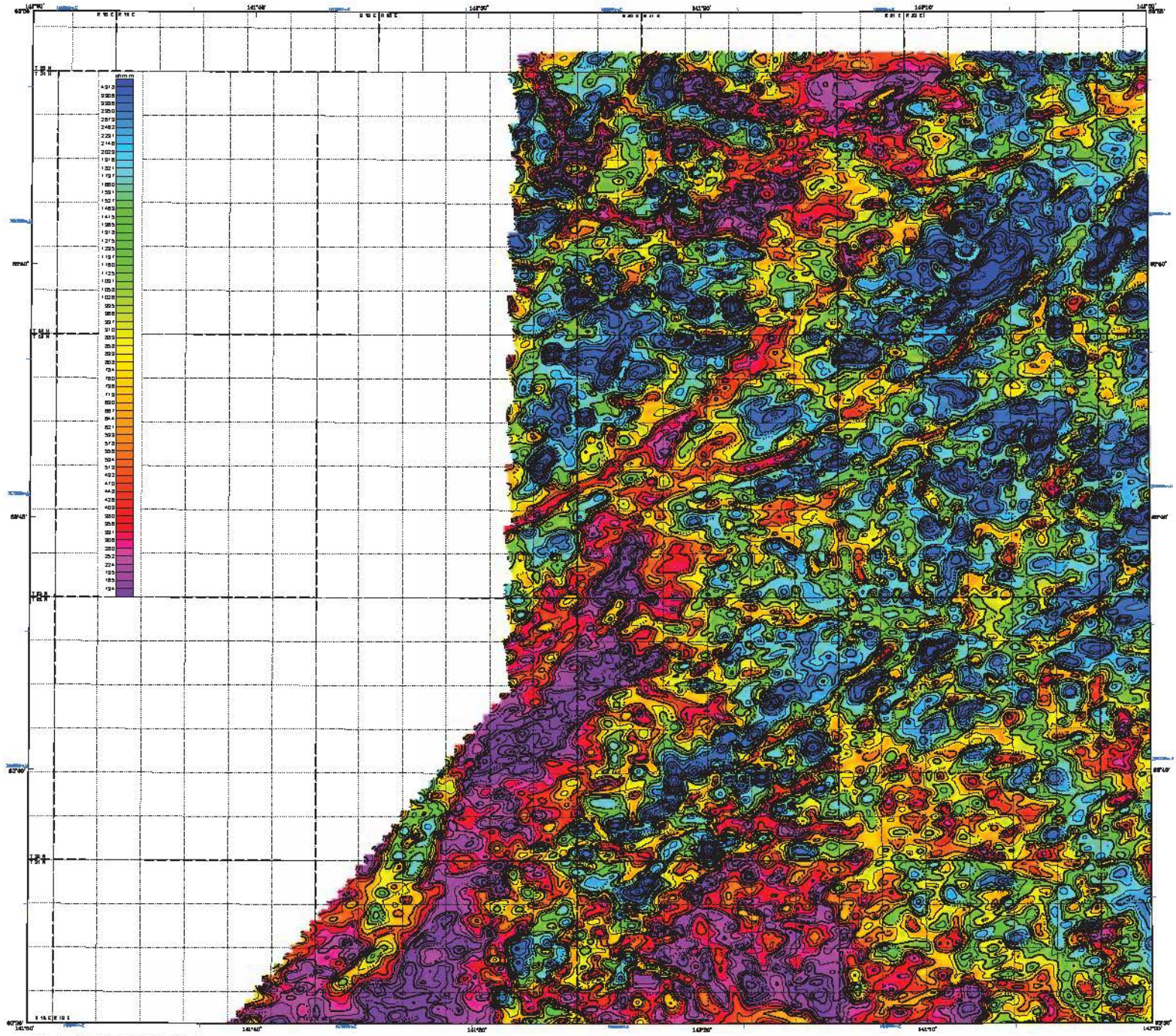


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

56,000 Hz COPLANAR APPARENT RESISTIVITY AND DATA CONTOURS OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

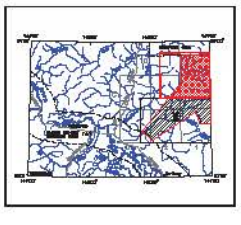
PART OF TANACROSS QUADRANGLE

by

Lowell S. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW–SE (330°) 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 3 miles.

A Novatel DGPS-CDL Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,000 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature components of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1978) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Akima, H., 1978, 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.

RESISTIVITY CONTOURS

1000
800
600
500
400
300
200
150
125
100

Contours in ohm-m at 10 intervals per decade

Resistivity low

SURVEY HISTORY

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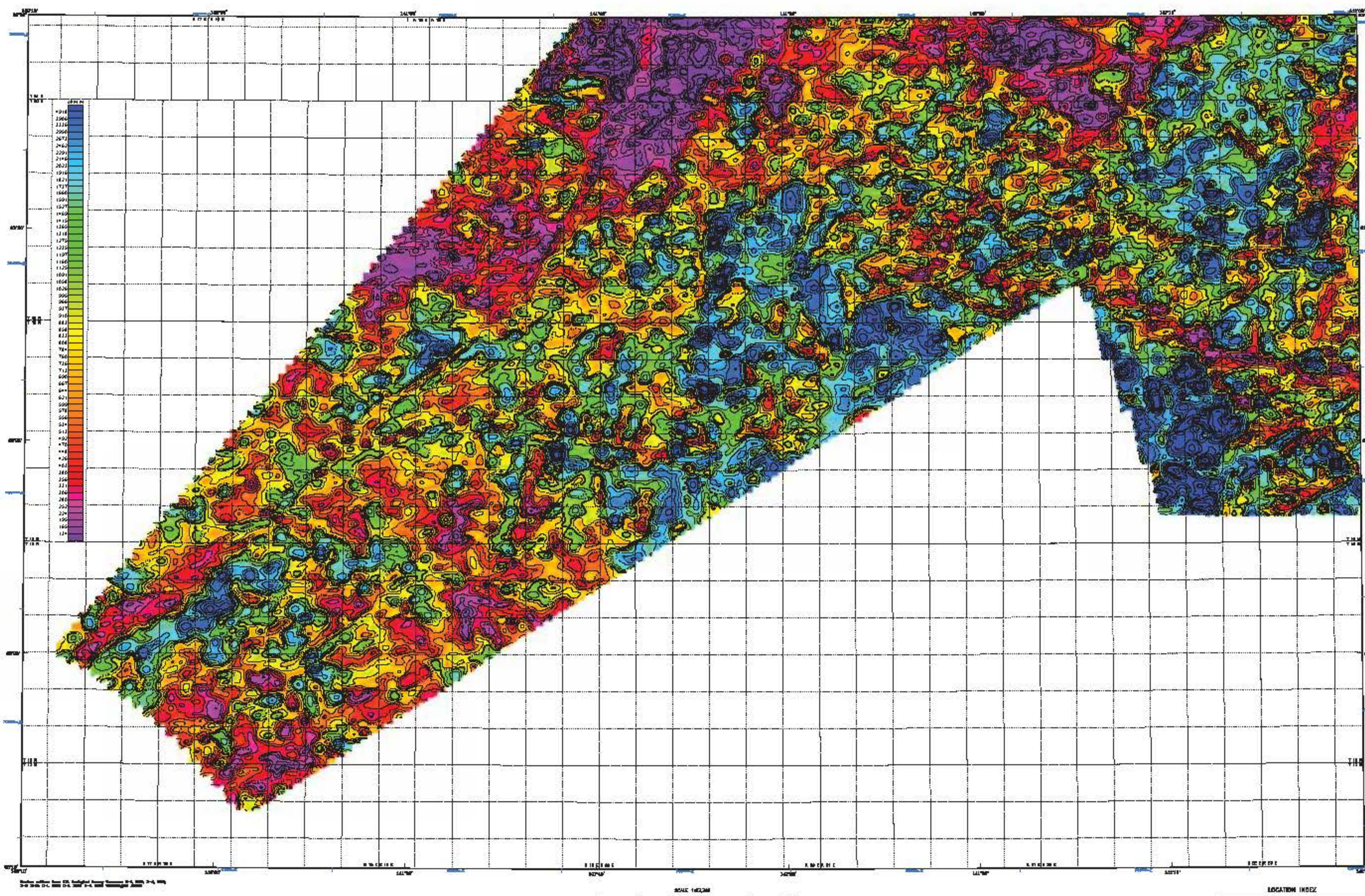

SCALE 1:63,360

56,000 Hz COPLANAR APPARENT RESISTIVITY AND DATA CONTOURS OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2011

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (360°) 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 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components of five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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.

RESISTIVITY CONTOURS

SURVEY HISTORY

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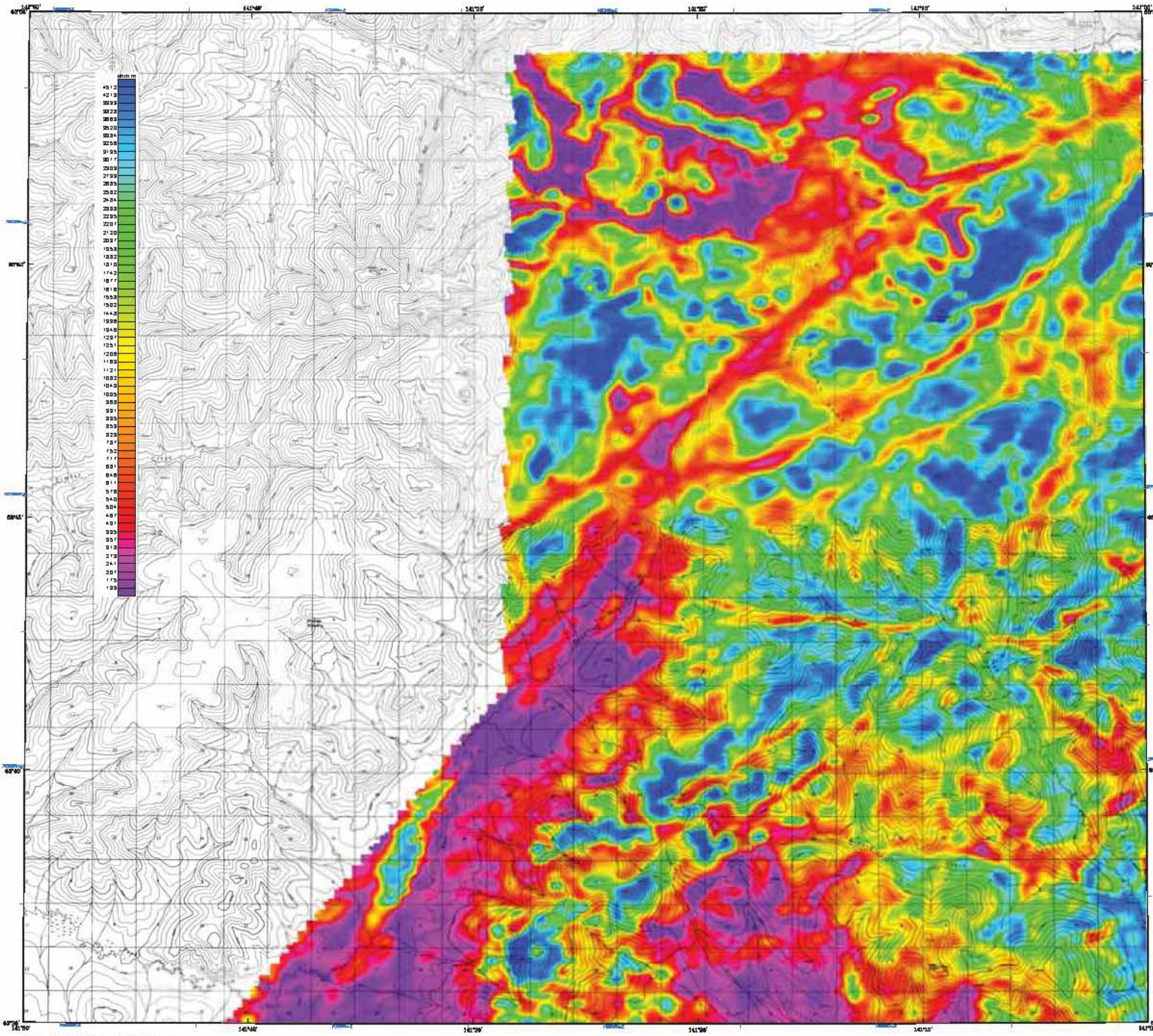


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 6 KILOMETERS

CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

7200 Hz COPLANAR APPARENT RESISTIVITY OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

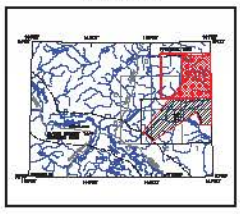
PART OF TANACROSS QUADRANGLE

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system and a Fugro P1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW–SE (350°) 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 3 miles.

A Novatel OEM4–G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post–flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components of five frequencies, two vertical coaxial coil–pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil–pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7200 Hz using the pseudo–layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1978) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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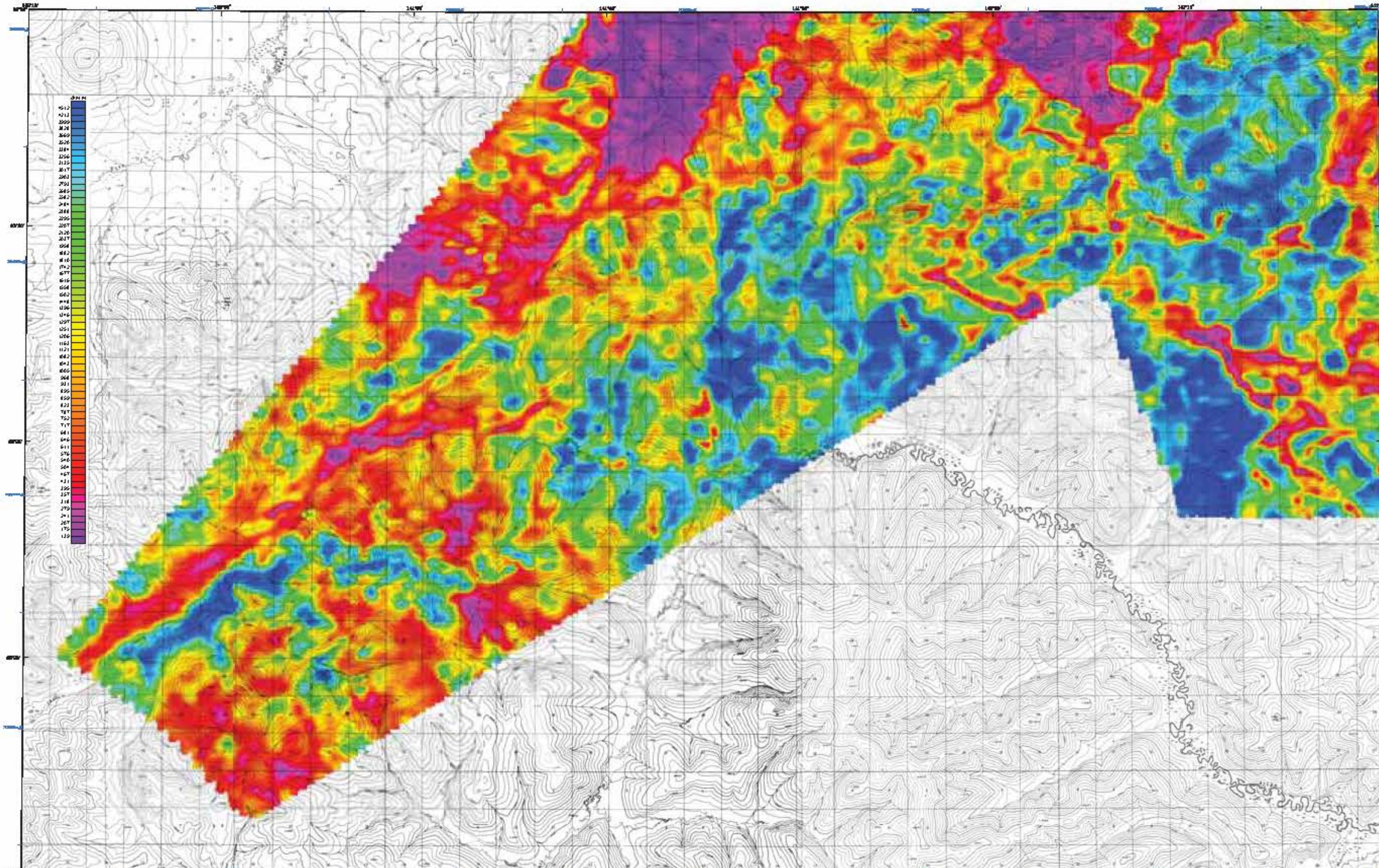

SCALE 1:63,360

7200 Hz COPLANAR APPARENT RESISTIVITY OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

DESCRIPTIVE NOTES

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A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, 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.

RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 64 m grid using a modified Akima (1970) technique. All grids were then resampled from the 64 m cell size down to a 50 m cell size to produce the maps and final grids contained in this publication.

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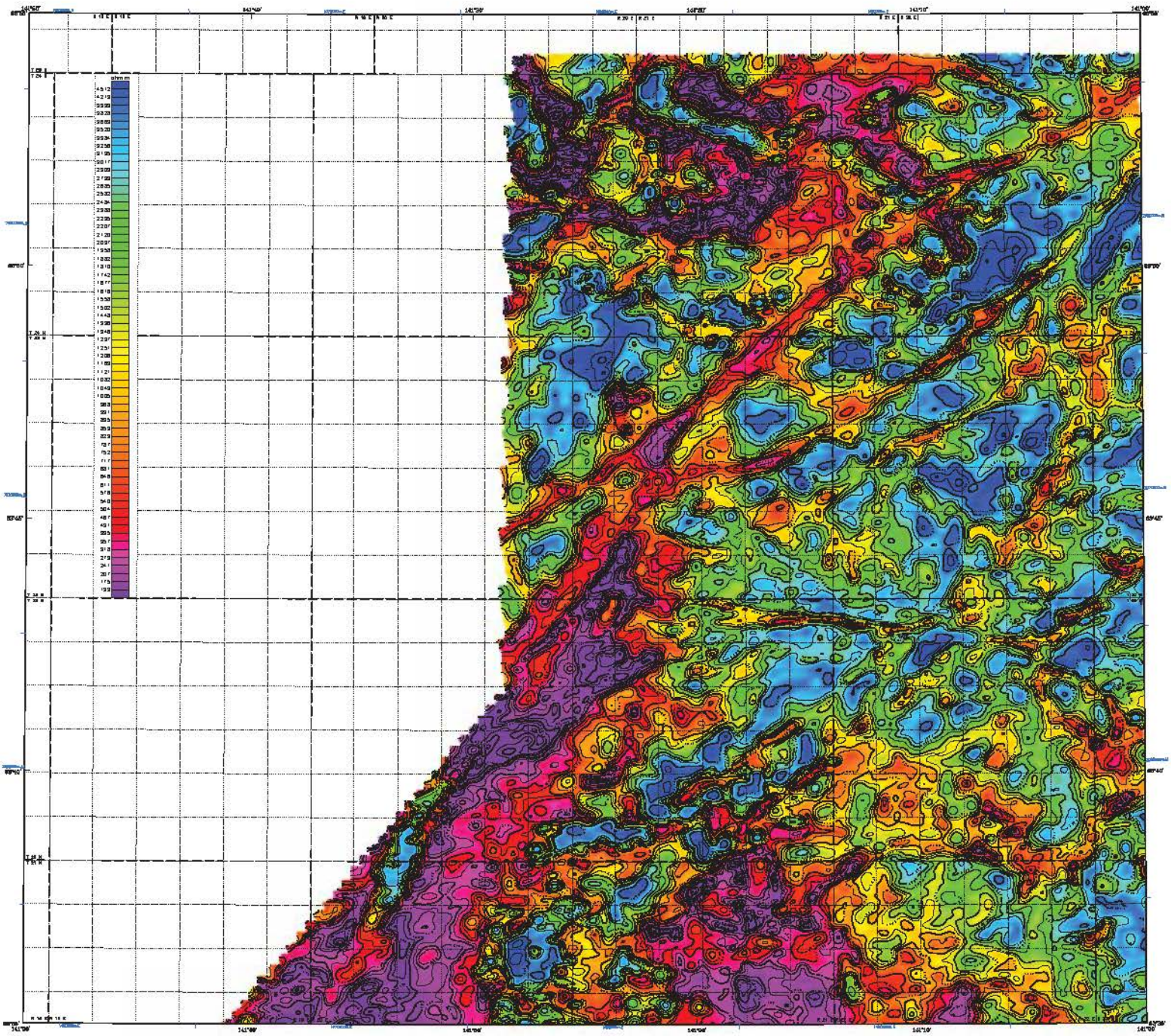


SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

7200 Hz COPLANAR APPARENT RESISTIVITY AND DATA CONTOURS OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

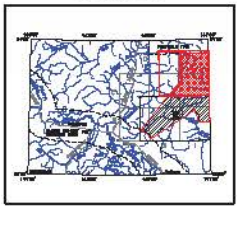
PART OF TANACROSS QUADRANGLE

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Sch'rex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW–SE (320°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4–G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post–flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies, two vertical coaxial coil–pairs operated at 1400 and 5566 Hz while three horizontal coplanar coil–pairs operated at 800, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7200 Hz using the pseudo–layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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.

RESISTIVITY CONTOURS

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

. . . . . resistivity low

SURVEY HISTORY

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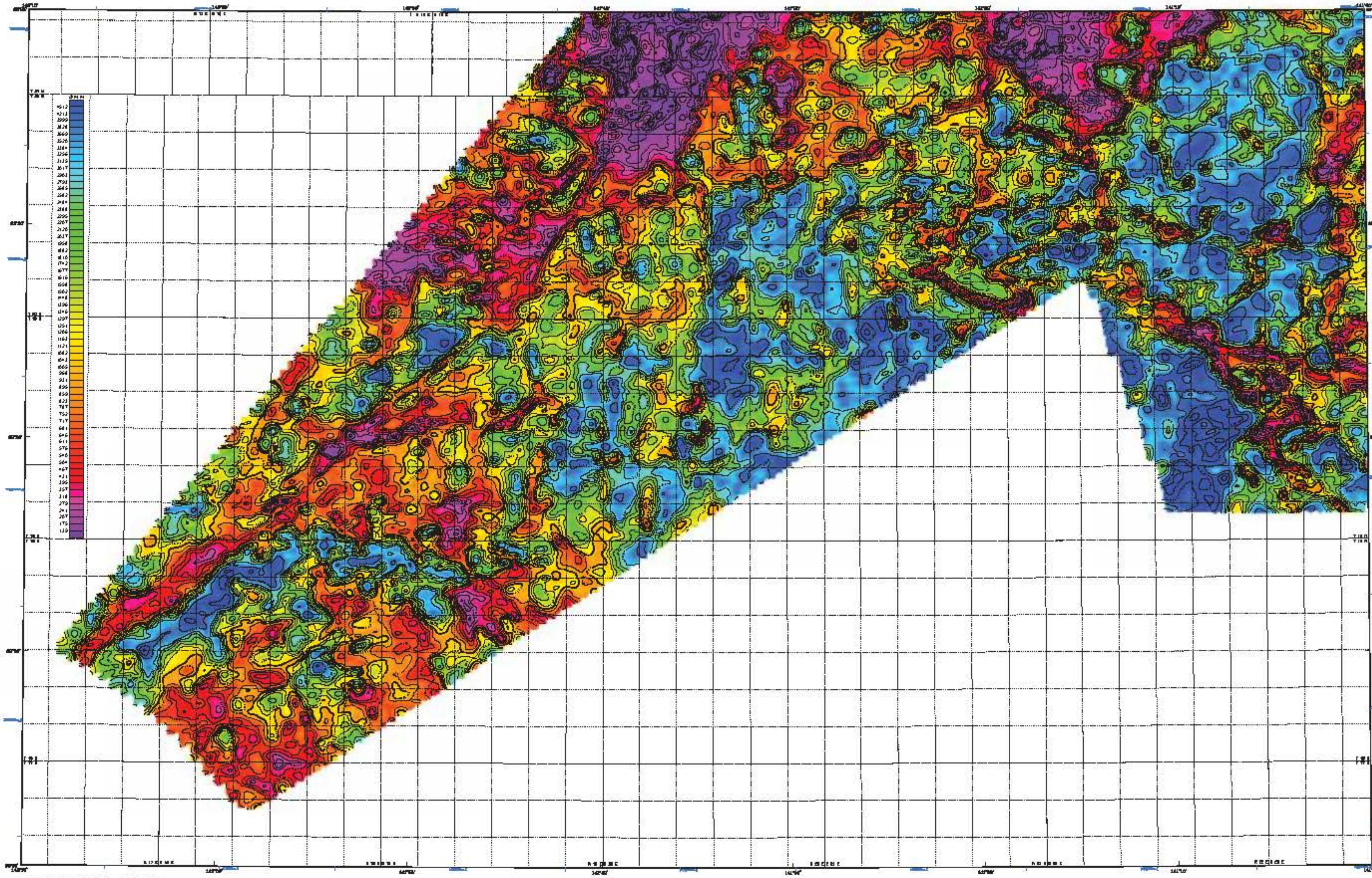

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

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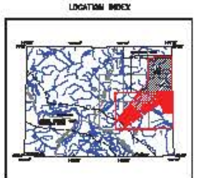
PART OF TANACROSS QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2011

LOCATION INDEX



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The geophysical data were acquired with a DIGHEM® Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (240°) 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 3 miles.

A Novatel OEM4-DGL Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM® EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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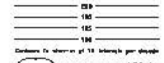

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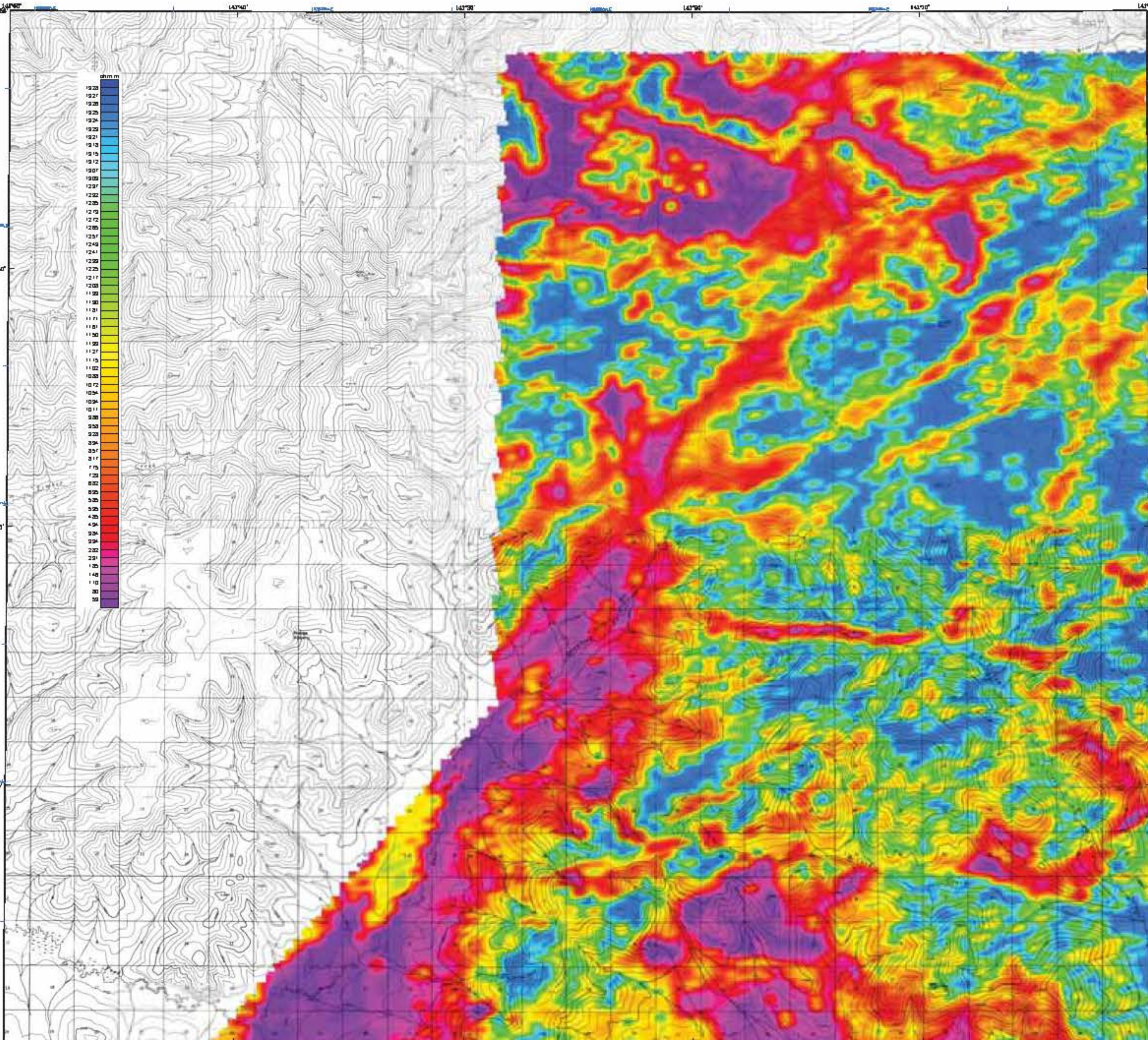


SCALE 1:63,360

1 0 1 2 3 4 MILES

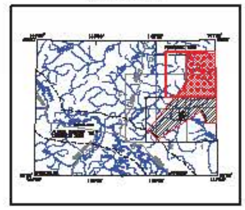
1 0 1 2 3 4 5 KILOMETERS

900 Hz COPLANAR APPARENT RESISTIVITY OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2011

LOCATION INDEX



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A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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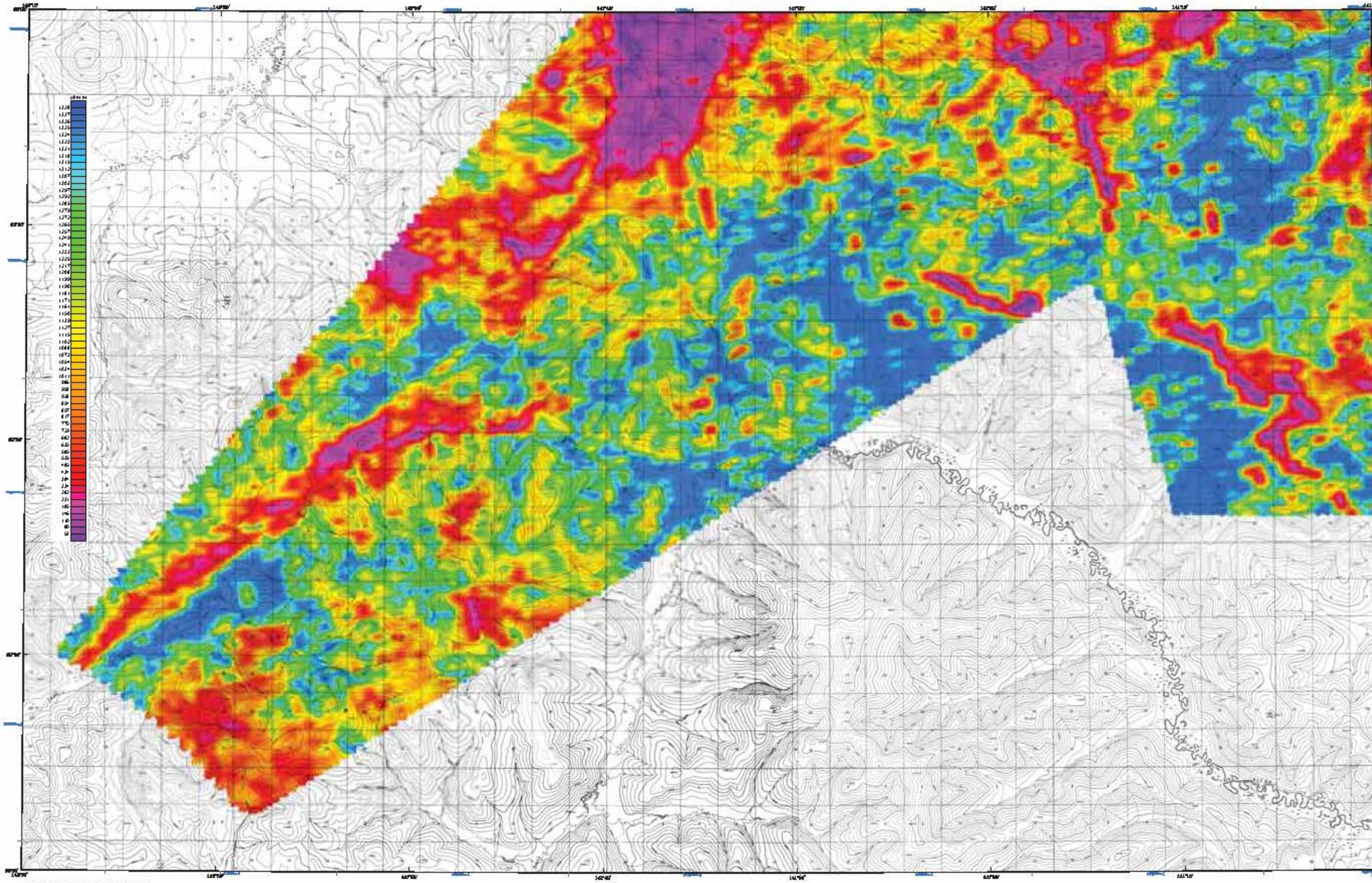

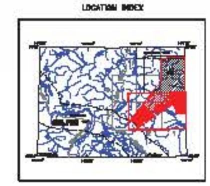

900 Hz COPLANAR APPARENT RESISTIVITY OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2011

DESCRIPTIVE NOTES

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A Novatel OEM4-DGL Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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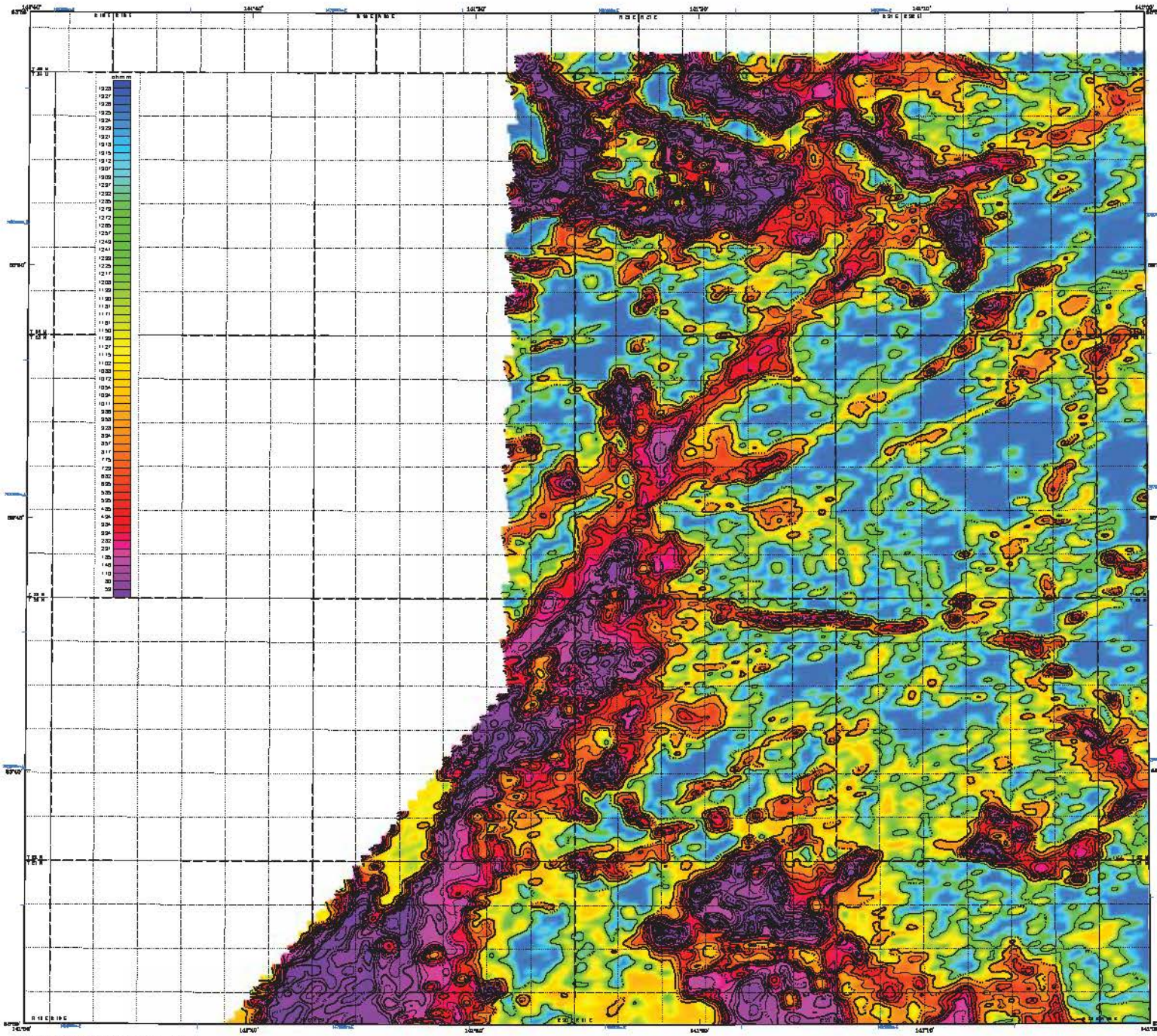

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 KILOMETERS

900 Hz COPLANAR APPARENT RESISTIVITY AND DATA CONTOURS OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by

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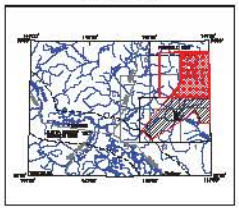
2011

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM^V Electromagnetic (EM) system and a Fugro DT344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation systems, 50/60 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Eurocopter helicopter at a mean terrain clearance of 200 feet along NW–SE (330°) 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 3 miles.

A Novatel DGPS–GEL Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post–flight differential positioning to a relative accuracy of better than 3m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil–pairs operated at 1,000 and 3,900 Hz while three horizontal coplanar coil–pairs operated at 900, 7,200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature components of the coplanar 900 Hz using the pseudo–layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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.

RESISTIVITY CONTOURS

1000
900
800
700
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

resistivity low

SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

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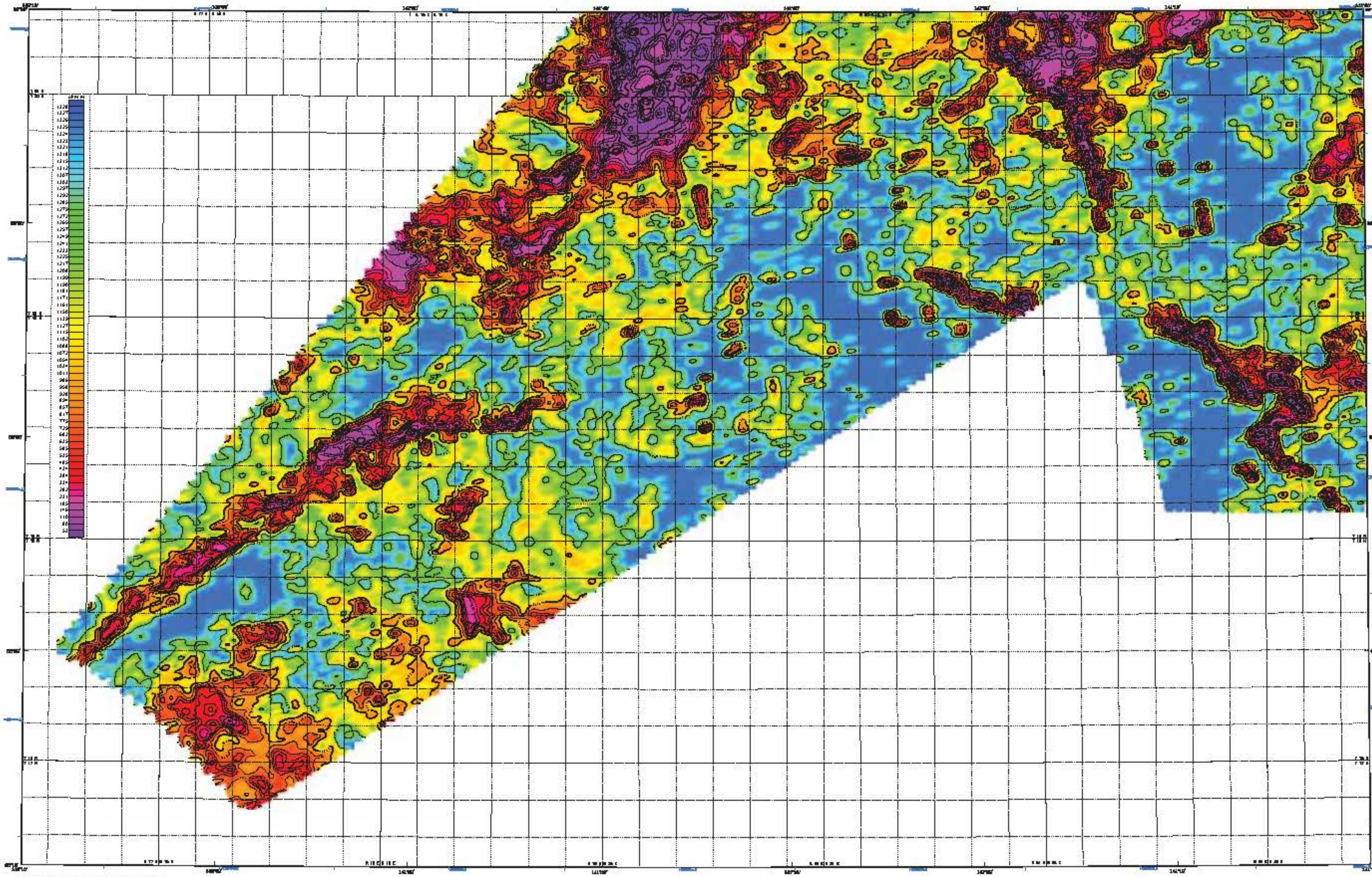
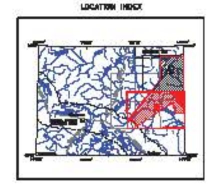


900 Hz COPLANAR APPARENT RESISTIVITY AND DATA CONTOURS OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2011

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[V] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (330°) 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 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM[V] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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.

RESISTIVITY CONTOURS

Contours in ohm-m at 10 intervals per decade

resistivity low

SURVEY HISTORY

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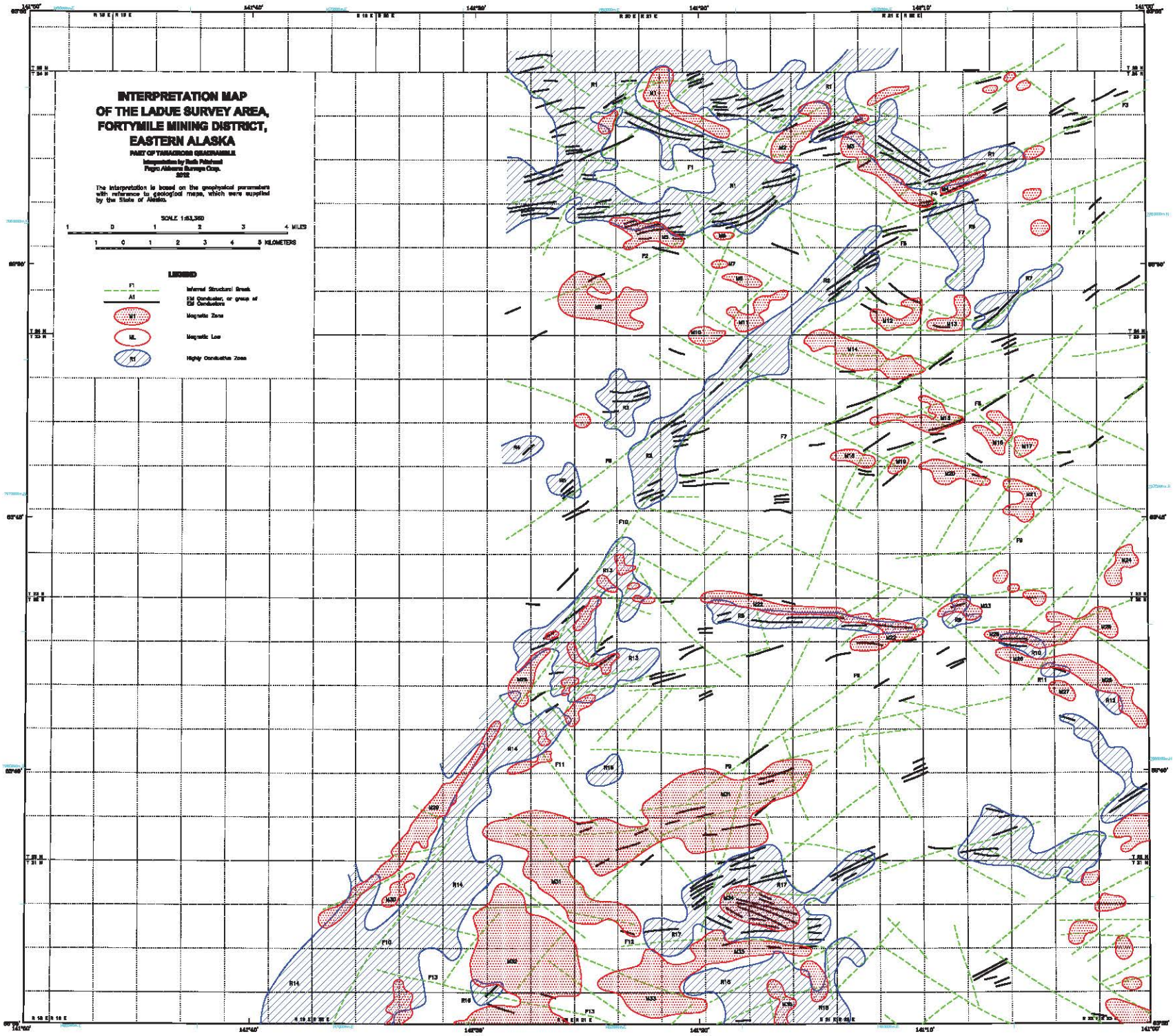
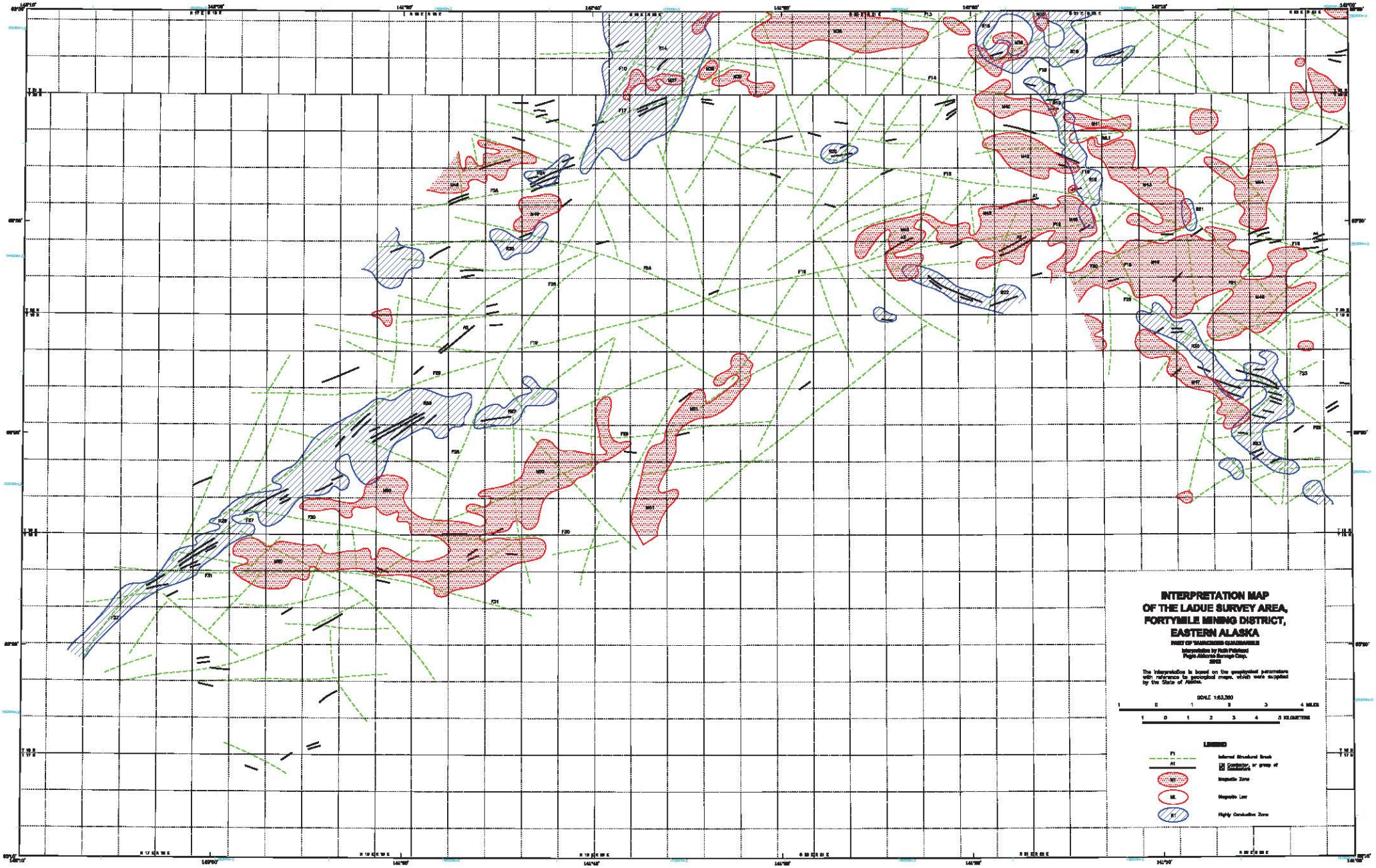

INTERPRETATION MAP
OF THE LADUE SURVEY AREA,
FORTYMILE MINING DISTRICT,
EASTERN ALASKA
PART OF TANACROSS QUADRANGLE
Interpretation by Ruth Felstead
Fugro Airborne Surveys Corp.
2012
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.
SCALE 1:63,360
1 0 1 2 3 4 MILES
1 0 1 2 3 4 5 KILOMETERS
LEGEND
Inferred Structural Break
Elt Conductor, or group of Elt Conductors
Magnetic Zone
Magnetic Low
Highly Conductive Zone



INTERPRETATION MAP OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF FAIRBANKS QUADRANGLE

Interpretation by Rob Pritchard
Fugro Airborne Surveys Corp.
2012

The interpretation is based on the aeromagnetic parameters with reference to 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 KILOMETERS

LEGEND

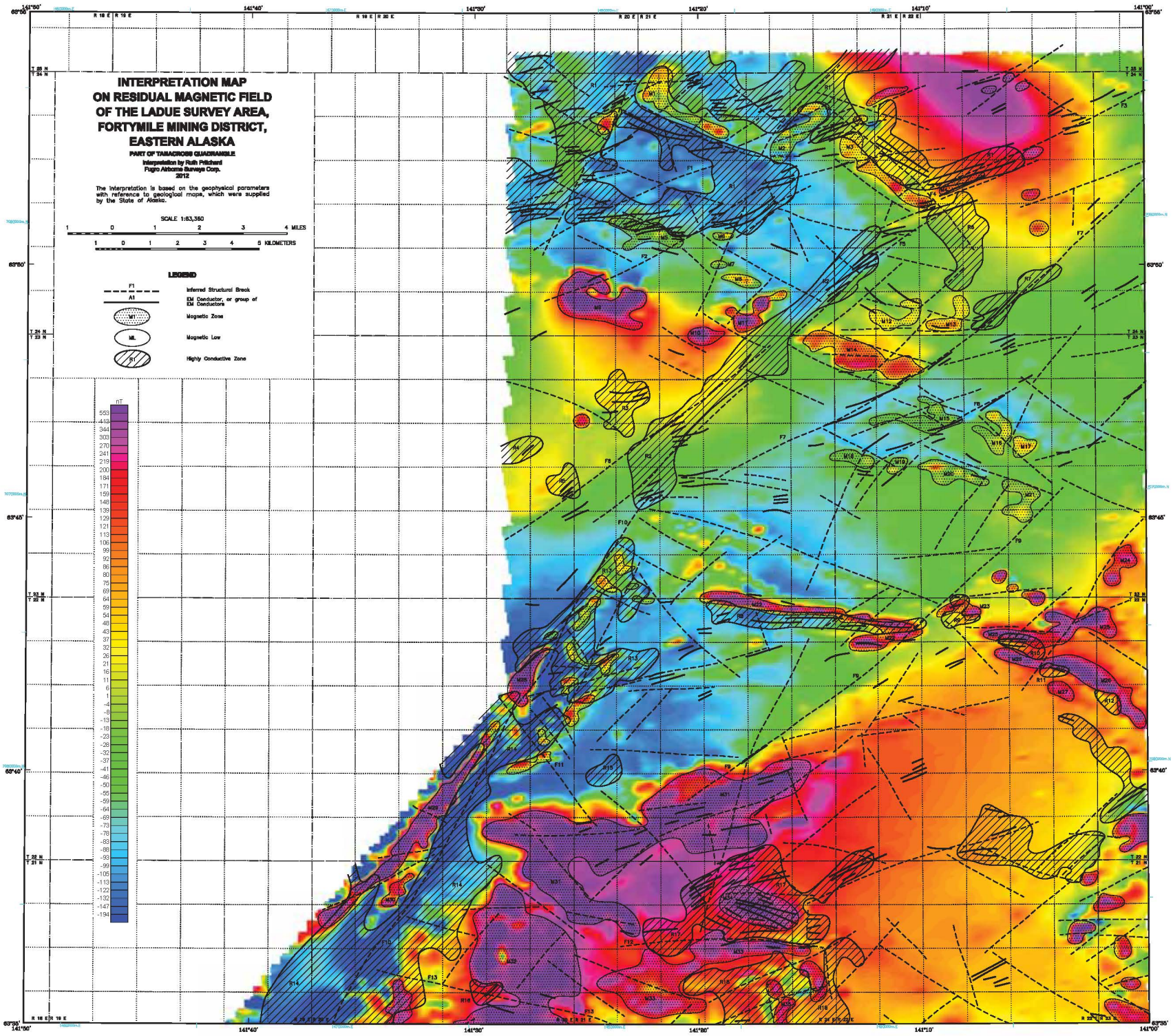
F1 — Inferred Structural Break

A1 — Conductor, or group of conductors

M1 — Magnetic Zone

ML — Magnetic Low

R1 — Highly Conductive Zone


INTERPRETATION MAP
ON RESIDUAL MAGNETIC FIELD
OF THE LADUE SURVEY AREA,
FORTYMILE MINING DISTRICT,
EASTERN ALASKA
PART OF TANACROSS QUADRANGLE
Interpretation by Ruth Pritchard
Fugro Airborne Surveys Corp.
2012
The interpretation is based on the geophysical parameters with reference to 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
LEGEND
F1
Inferred Structural Break
A1
EM Conductor, or group of EM Conductors
M1
Magnetic Zone
ML
Magnetic Low
R1
Highly Conductive Zone
nT
553
443
344
303
270
241
219
200
184
171
159
148
139
129
121
113
106
99
92
86
80
75
69
64
59
54
48
43
37
32
26
21
16
11
6
1
-4
-8
-13
-18
-23
-28
-32
-37
-41
-46
-50
-55
-59
-64
-69
-73
-78
-83
-88
-93
-99
-105
-113
-122
-132
-147
-194
141°50'
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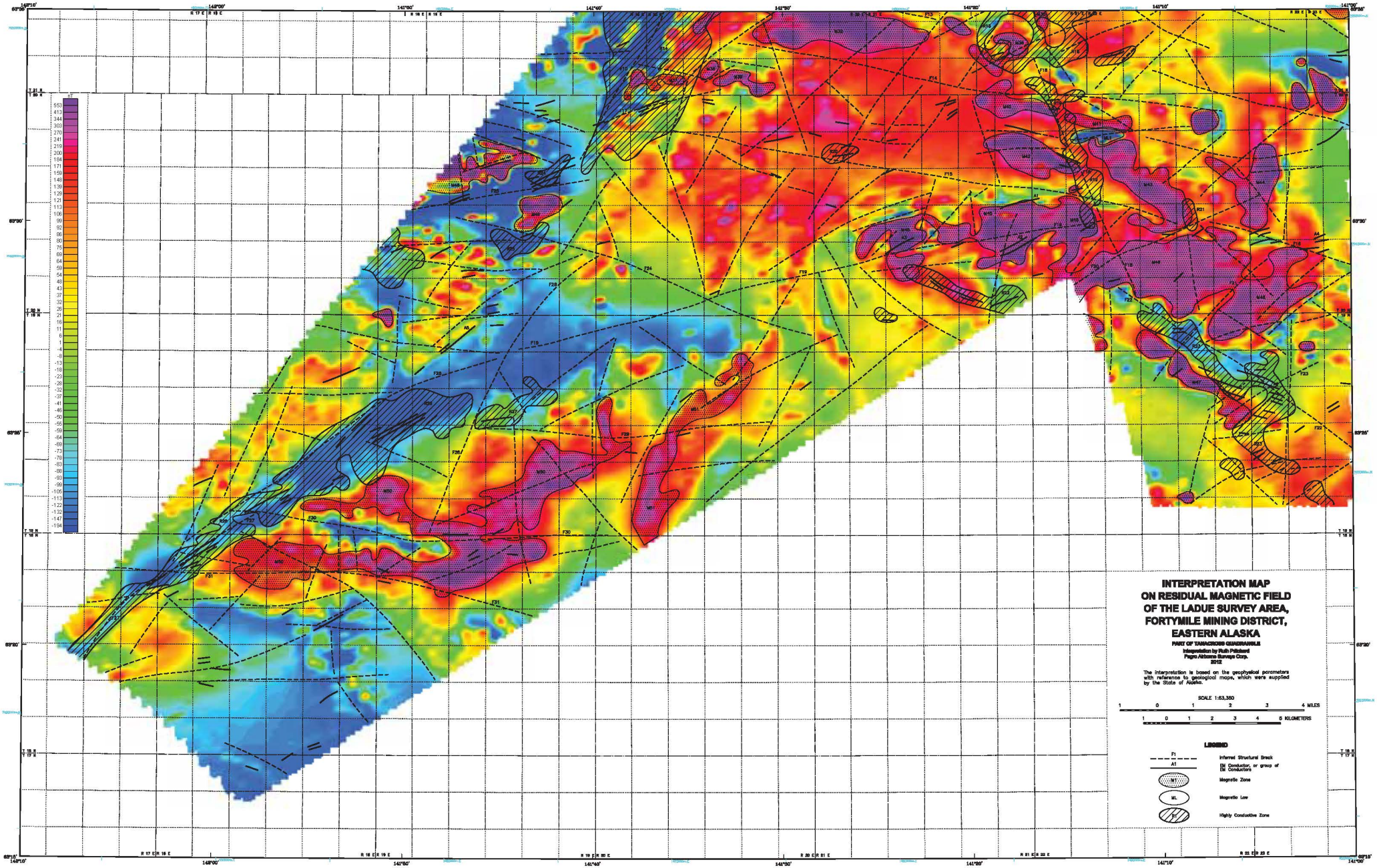
63°40'
63°35'



INTERPRETATION MAP ON RESIDUAL MAGNETIC FIELD OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PART OF TANACROSS QUADRANGLE

Interpretation by Ruth Pritchard
Pagro Airborne Surveys Corp.
2012

The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.

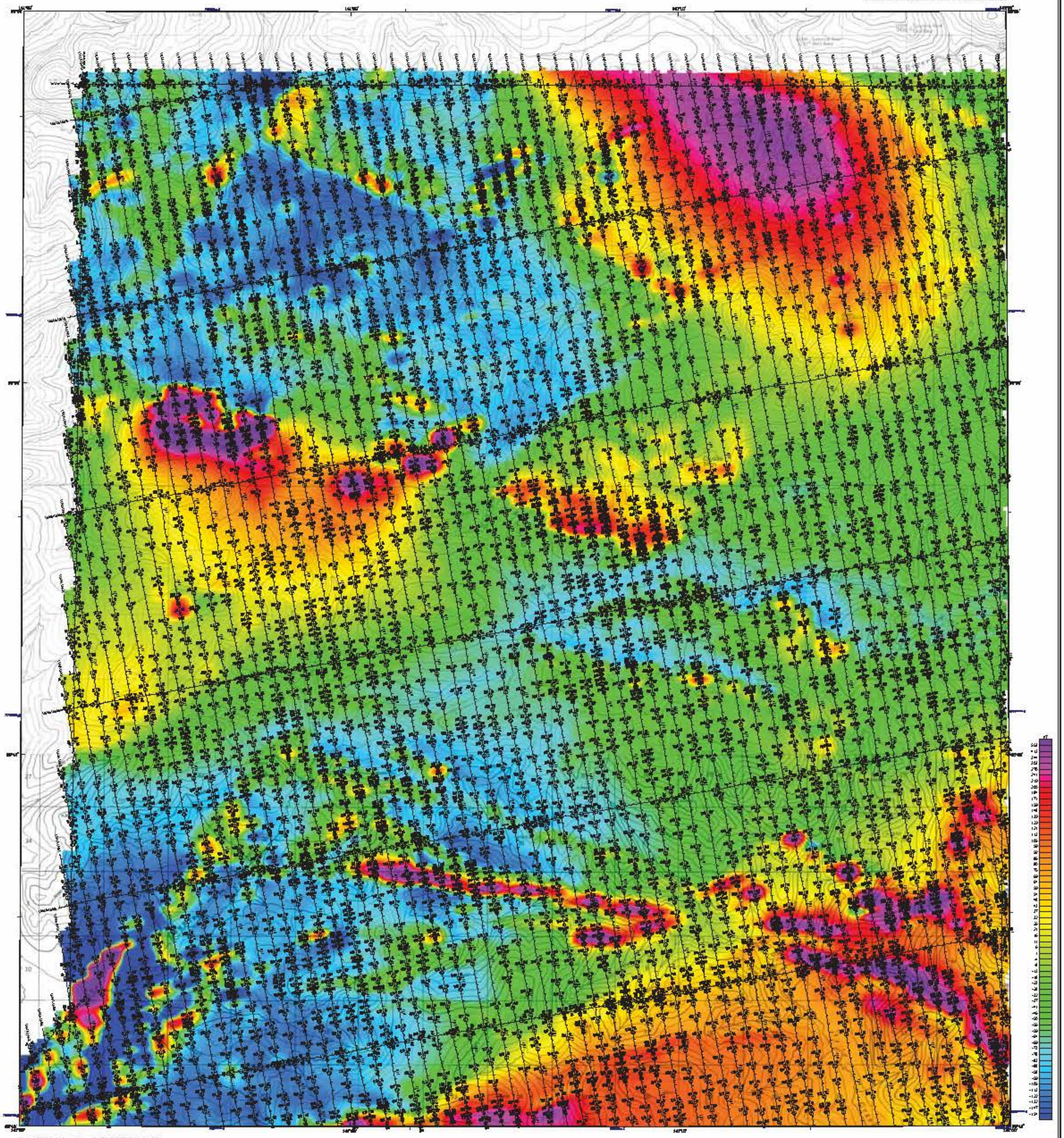
SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 5 KILOMETERS

LEGEND

- F1 / A1 — Inferred Structural Break
- EM Conductor, or group of EM Conductors
- M1 — Magnetic Zone
- ML — Magnetic Low
- H1 — Highly Conductive Zone



RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PARTS of TANACROSS C-1 and D-1 QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (329°) 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 3 miles.

A Novatel OEMV-3 Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

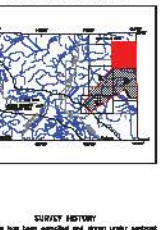
ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial-coil pairs operated at 1000 and 5500 Hz while three horizontal coplanar-coil pairs operated at 900, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the electromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the coaxial- and coplanar-coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex CS3 cesium sensor. 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 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 50 m grid using a modified Akima (1970) technique. All grids were then resampled from the 50 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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.



SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

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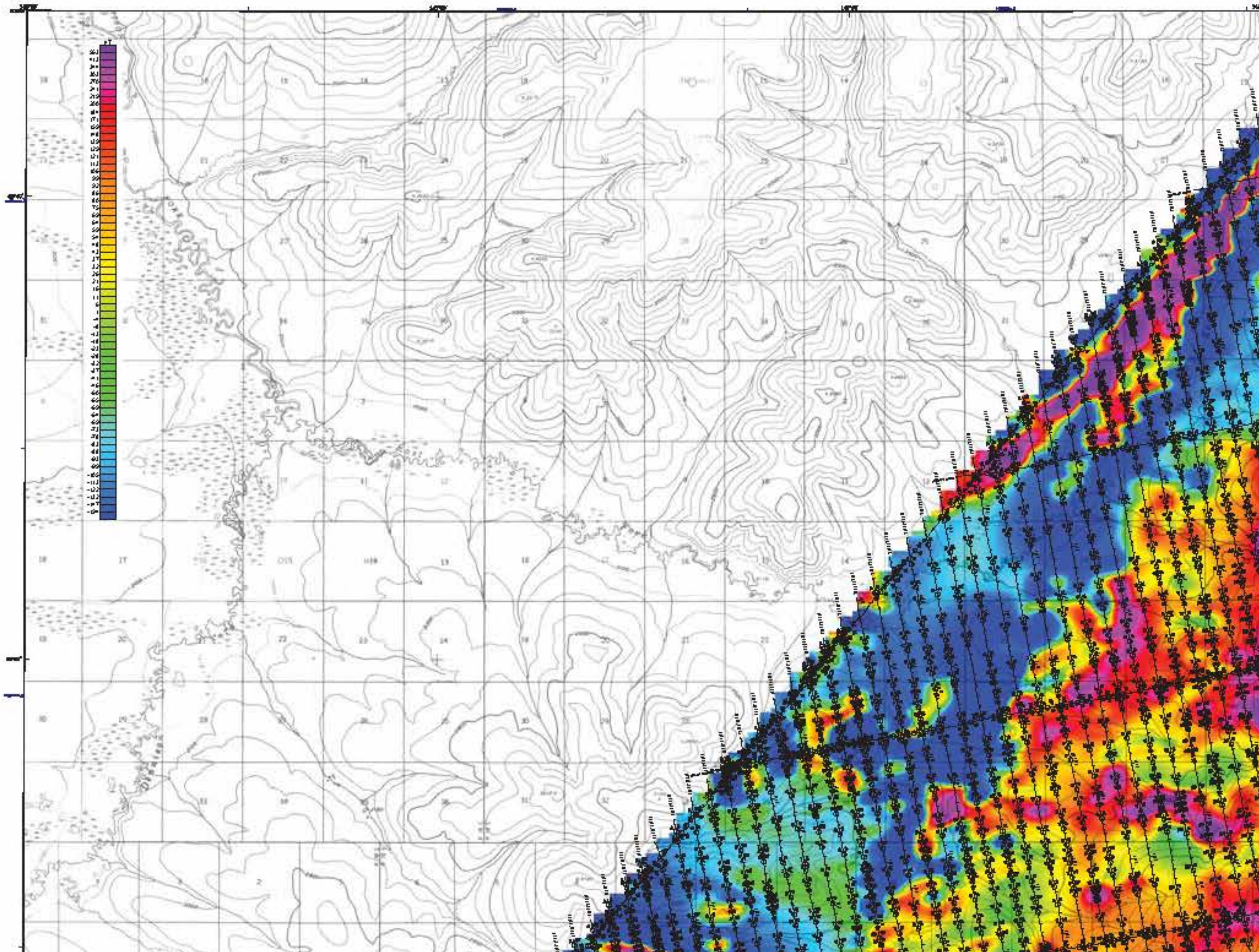


RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

PARTS of TANACROSS B-3 and C-3 QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2011

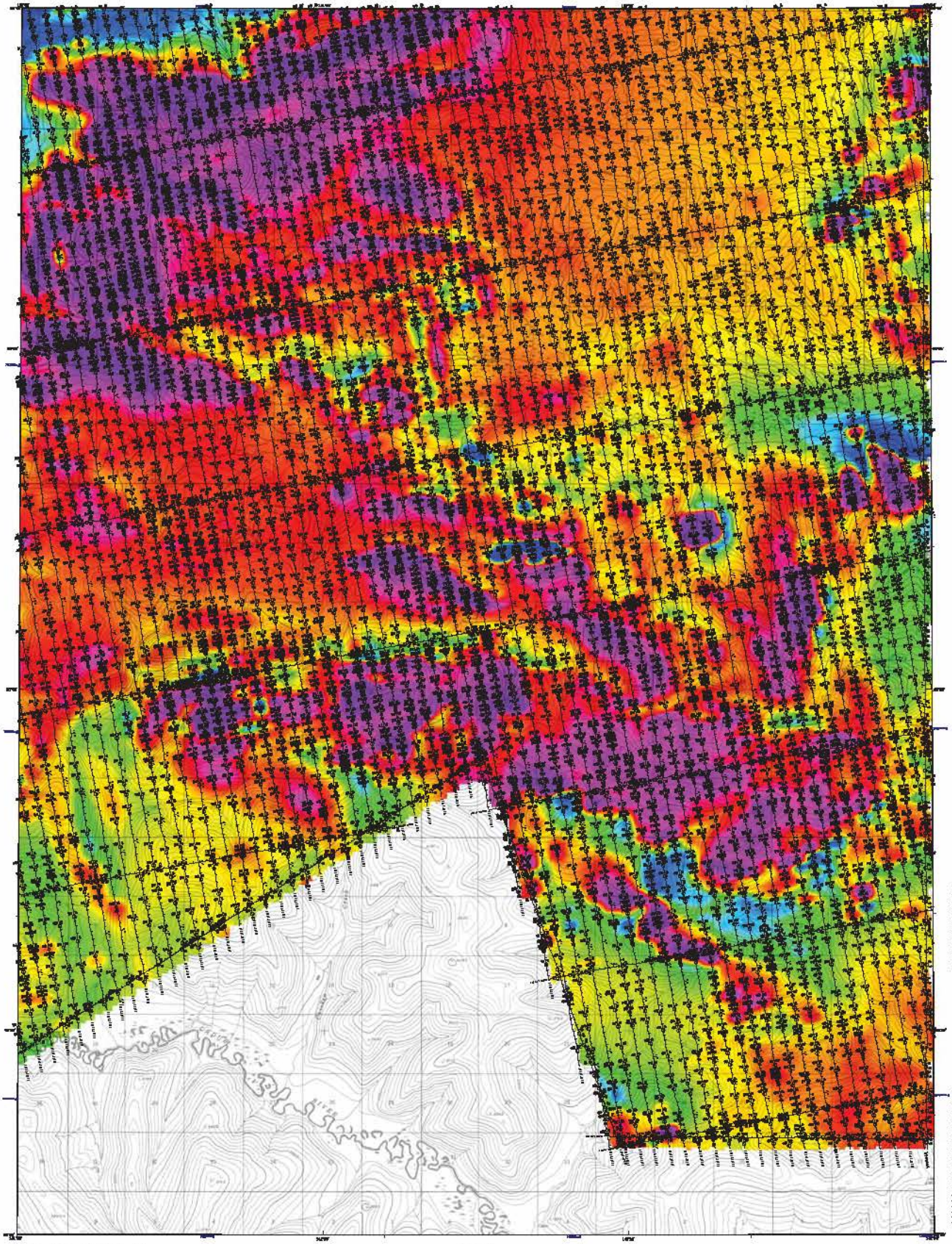
DESCRIPTIVE NOTES

ELECTROMAGNETIC ANOMALIES

ELECTROMAGNETICS

RESIDUAL MAGNETIC FIELD

SURVEY HISTORY



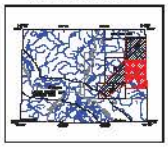
RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

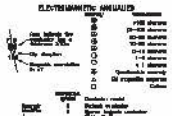
PARTS of TANACROSS B-1 and C-1 QUADRANGLES

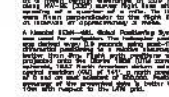
by

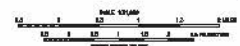
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

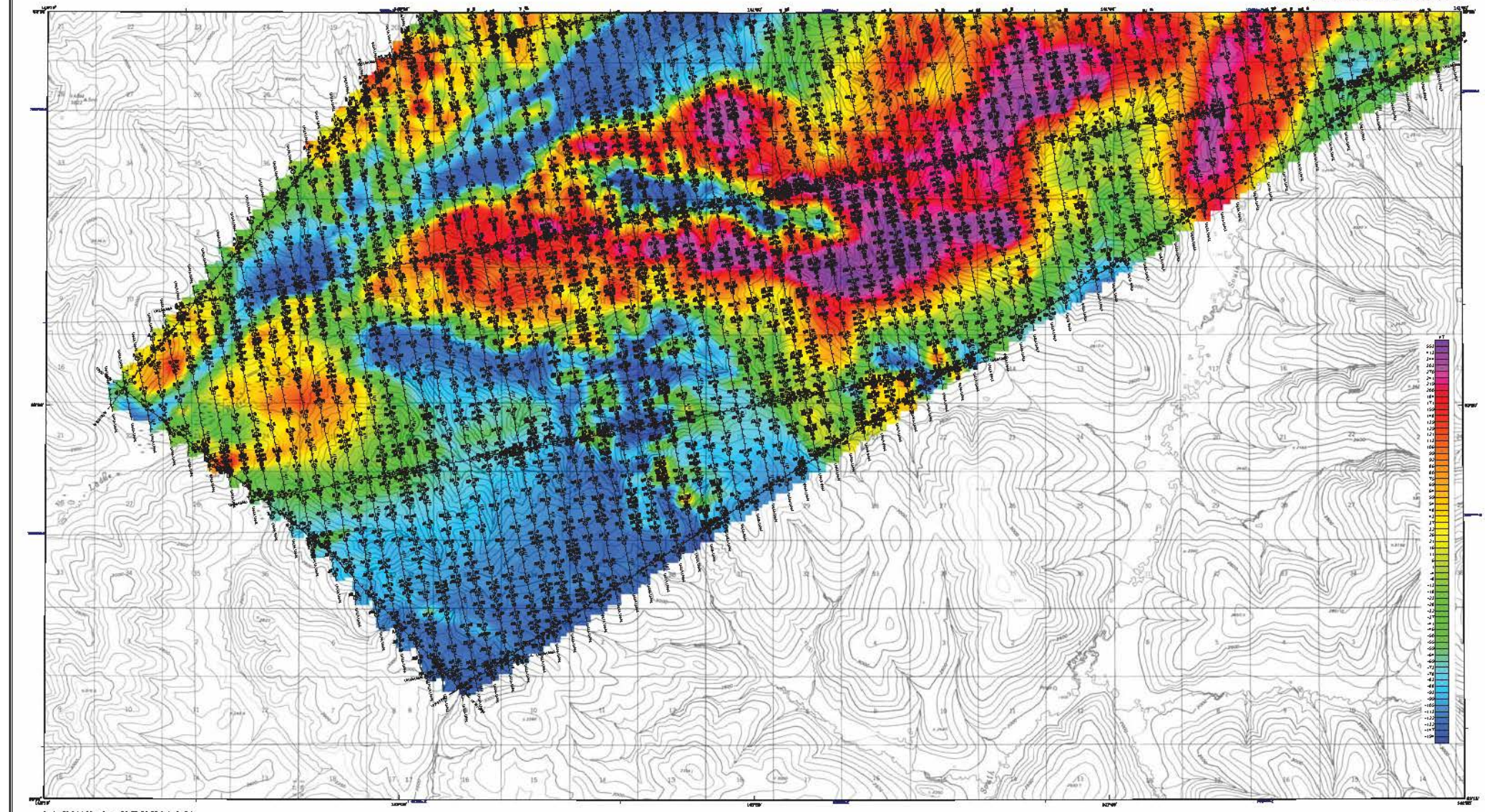
2011











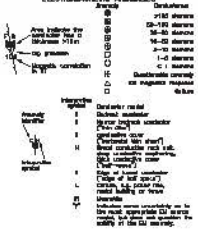
RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE LADUE SURVEY AREA, FORTYMILE MINING DISTRICT, EASTERN ALASKA

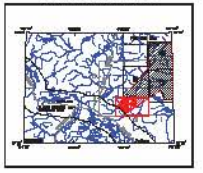
PARTS of TANACROSS B-2 and B-3 QUADRANGLES

by

Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.

2011





DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system and a Fugro DIGHEM cesium magnetometer with a Sentrec GSS cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet, in addition the survey recorded data from radar and laser altimeters, GPS navigation system, SG/BO fiducial numbers and video images. Flight lines were flown with a NS-SS-EW flight line orientation at a mean terrain clearance of 300 feet along NW-SE (300°) survey lines flown with a spacing of a quarter of a mile. The tie lines were flown perpendicular to the flight lines at intervals of approximately 2 miles.

A Novatel GPS-L-2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Alaska 1983 (NAD zone 7) spheroid, 1927 North American datum using a central meridian (CM) of 141° (a north variation of 0 and an east constant of 500,000). Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

ELECTROMAGNETIC ANOMALIES

Amplitude — Conductance
- >150 siemens
- 75–150 siemens
- 30–75 siemens
- 15–30 siemens
- 5–15 siemens
- 1–5 siemens
- < 1 siemens

Conductivities normally on magnetic material in bure

Interpretive symbols
- Conductive material (Bedrock conductor (thin sheet))
- Conductive material (Surficial conductor (flat lying, broad conductive zone (thicknesses less than sheet)))
- Edge of bedrock conductor (Edge of half space)
- Cultural, e.g., power line, metal building or fence
- Unknown (Interpretive source uncertainties as to the most appropriate EM source model, bulk terrain, and question the validity of the EM anomaly.)

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM EM system measured in-phase and quadrature components at five frequencies. Two vertical coaxial coil pairs operated at 1,000 and 5000 Hz, three horizontal coplanar coil pairs operated at 900, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the electromagnetic map by the interpretive symbol attached to each EM anomaly. Boundaries of the type of conductor is based on EM anomaly shape of the conductor and culture, magnetic signature with conductor and magnetic patterns and topography. The operator and the flight track video was examined to locate cultural sources.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro DIGHEM magnetometer with a Sentrec GSS cesium sensor. 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 2010) updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 20 m cell size to produce the maps and final grids contained in this publication.

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SURVEY HISTORY

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