

NORTHEAST FAIRBANKS ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

L.E. Burns, G.R.C. Graham, J.D. Barefoot, Fugro Airborne Surveys Corp., and Stevens
Exploration Management Corp.

Geophysical Report 2018-11

2019
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
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Suggested citation:

Burns, L.E., Graham, G.R.C., Barefoot, J.D., Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp., 2019, Northeast Fairbanks electromagnetic and magnetic airborne geophysical survey data compilation: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2018-11. <http://doi.org/10.14509/30062>



NORTHEAST FAIRBANKS ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

L.E. Burns¹, G.R.C. Graham¹, J.D. Barefoot¹, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.

ABSTRACT

The Northeast Fairbanks electromagnetic and magnetic airborne geophysical survey is located in interior Alaska in the Fairbanks and Circle mining districts, about 60 kilometers northeast of Fairbanks, Alaska. The survey is adjacent to the Fairbanks, Headwaters of the Litte Chena, and Circle geophysical surveys. Frequency domain electromagnetic and magnetic data were collected with the DIGHEM^V system from September to November 2005. A total of 3259.6 line kilometers were collected covering 1166.1 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 Fairbanks and Circle mining districts have a long history of large-scale placer Au mining. 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

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., 2006, Project Report and Profile data of the 2005 Geophysical Surveys of the northeast

Fairbanks, east Richardson, Liscum, and Black Mountain areas, interior Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2006-4, 1 p. <http://doi.org/10.14509/14566>

Burns, L.E., Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp., 2006, Line, grid,

and vector data and plot files for the airborne geophysical survey data of northeast Fairbanks area, Fairbanks and Circle mining districts, interior Alaska: Alaska Division of Geological & Geophysical

Surveys Geophysical Report 2006-3, 21 sheets, 1 DVD. <http://doi.org/10.14509/14522>

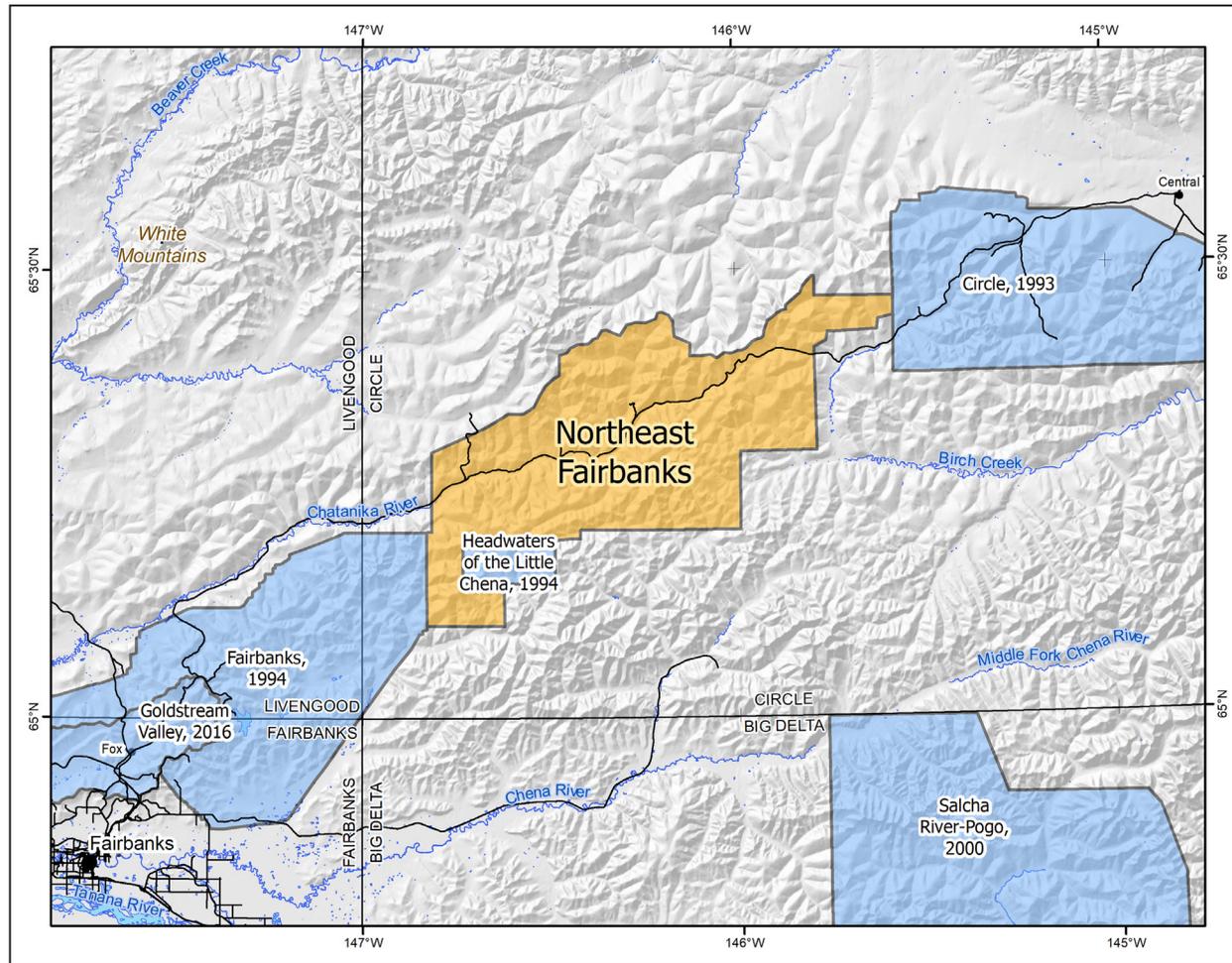


Figure 1. Alaska survey location map. Northeast Fairbanks electromagnetic and magnetic airborne geophysical survey location shown in interior Alaska (inset). Regional survey location map. Northeast Fairbanks survey area shown with adjacent DGGS geophysical surveys, landmarks, relevant 1:250,000-scale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



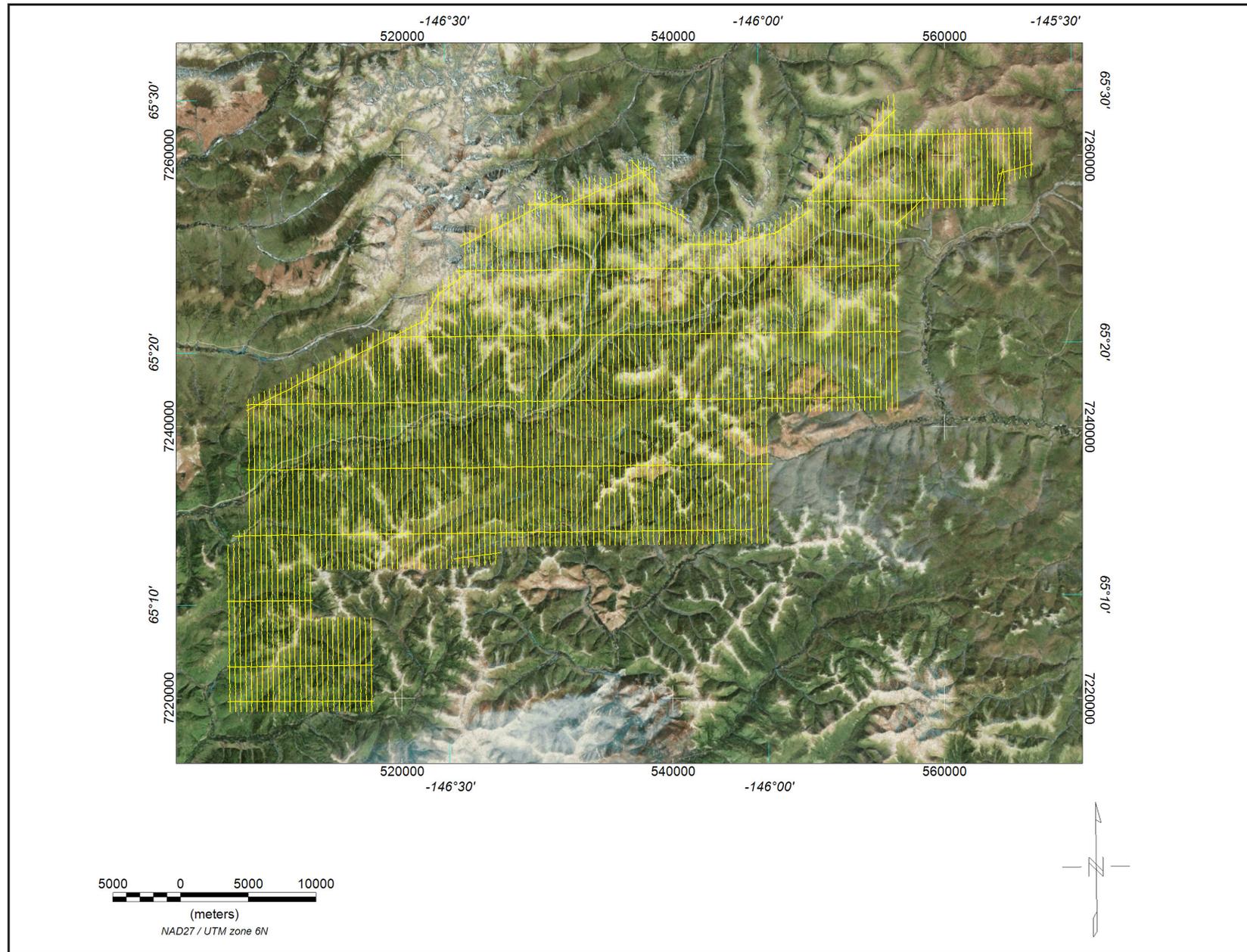


Figure 2. Flight path with orthometric image.

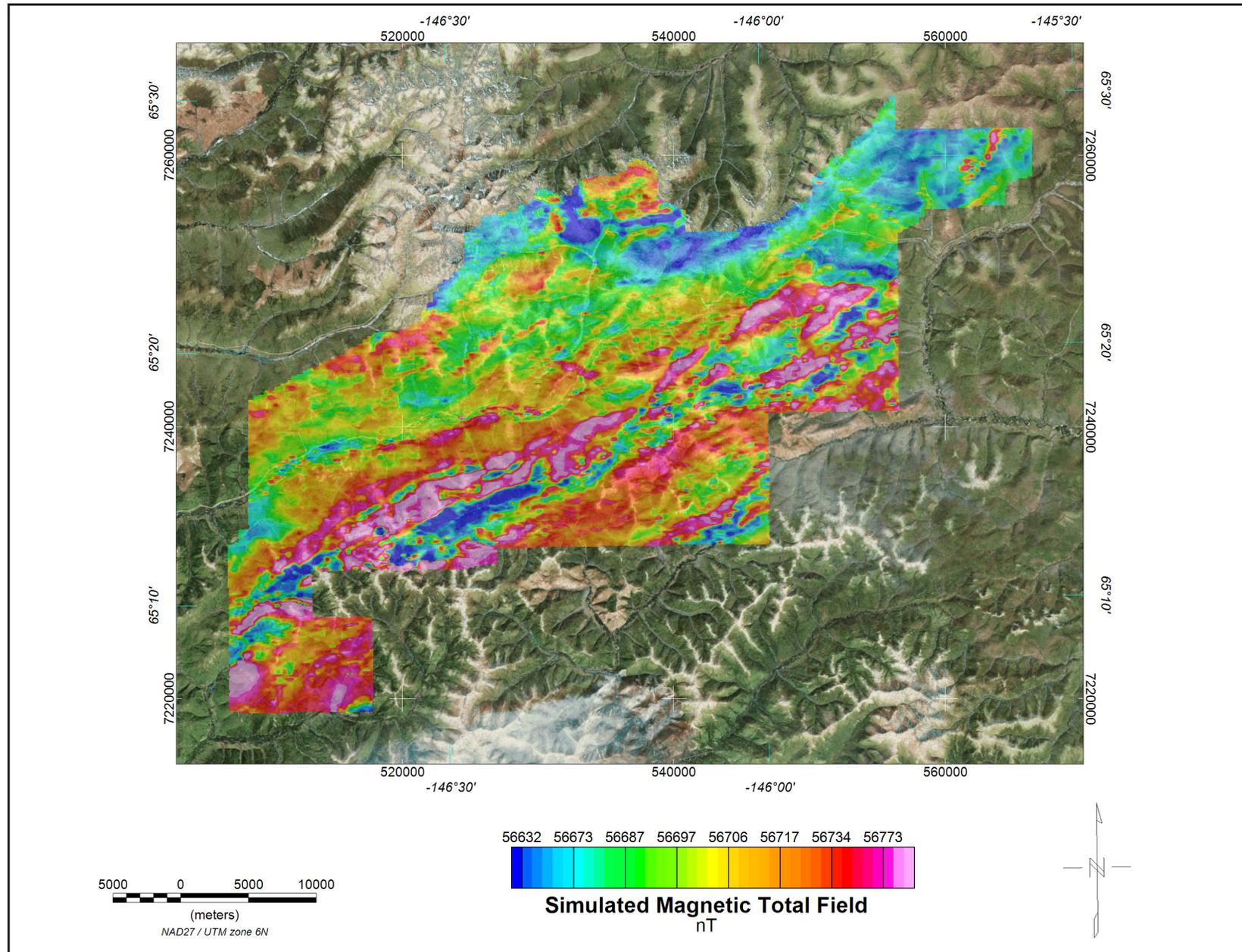


Figure 3. Simulated magnetic total field grid with orthometric image. The magnetic total field data were processed using digitally recorded data from a Scintrex cesium CS2 magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtracting the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2005, updated to October, 2005), (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.

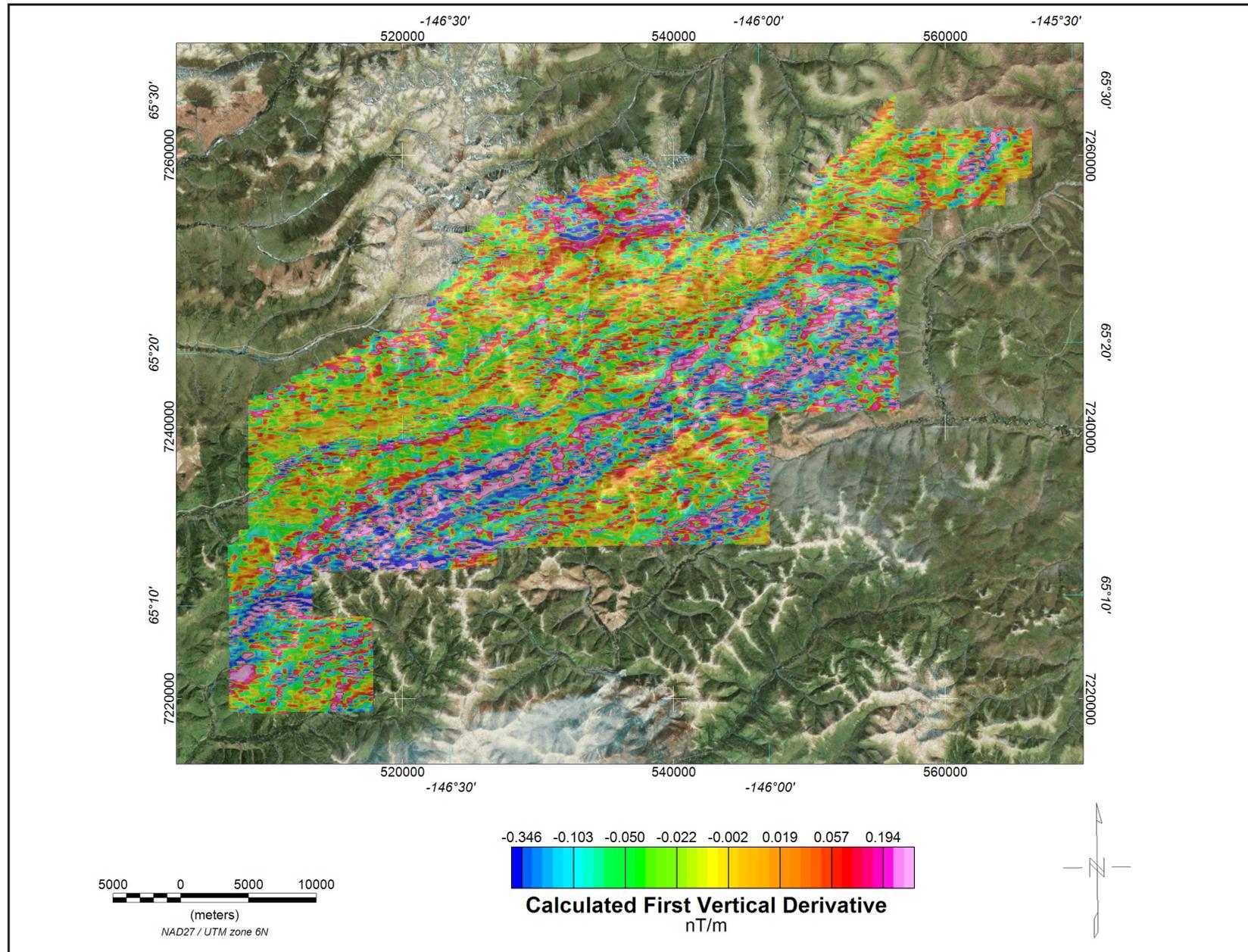


Figure 4. Calculated first vertical derivative grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides 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.

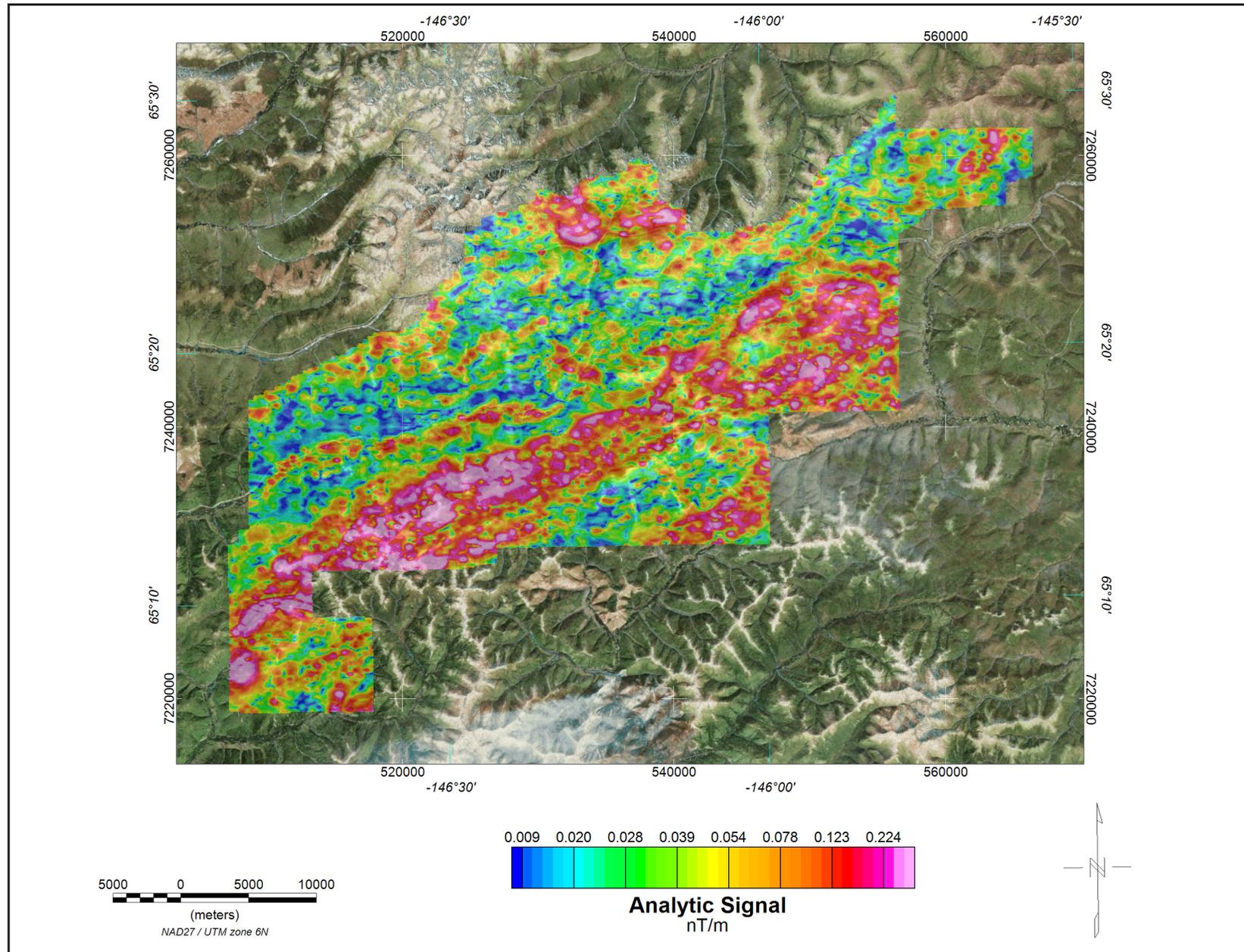


Figure 5. Analytic signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source 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.

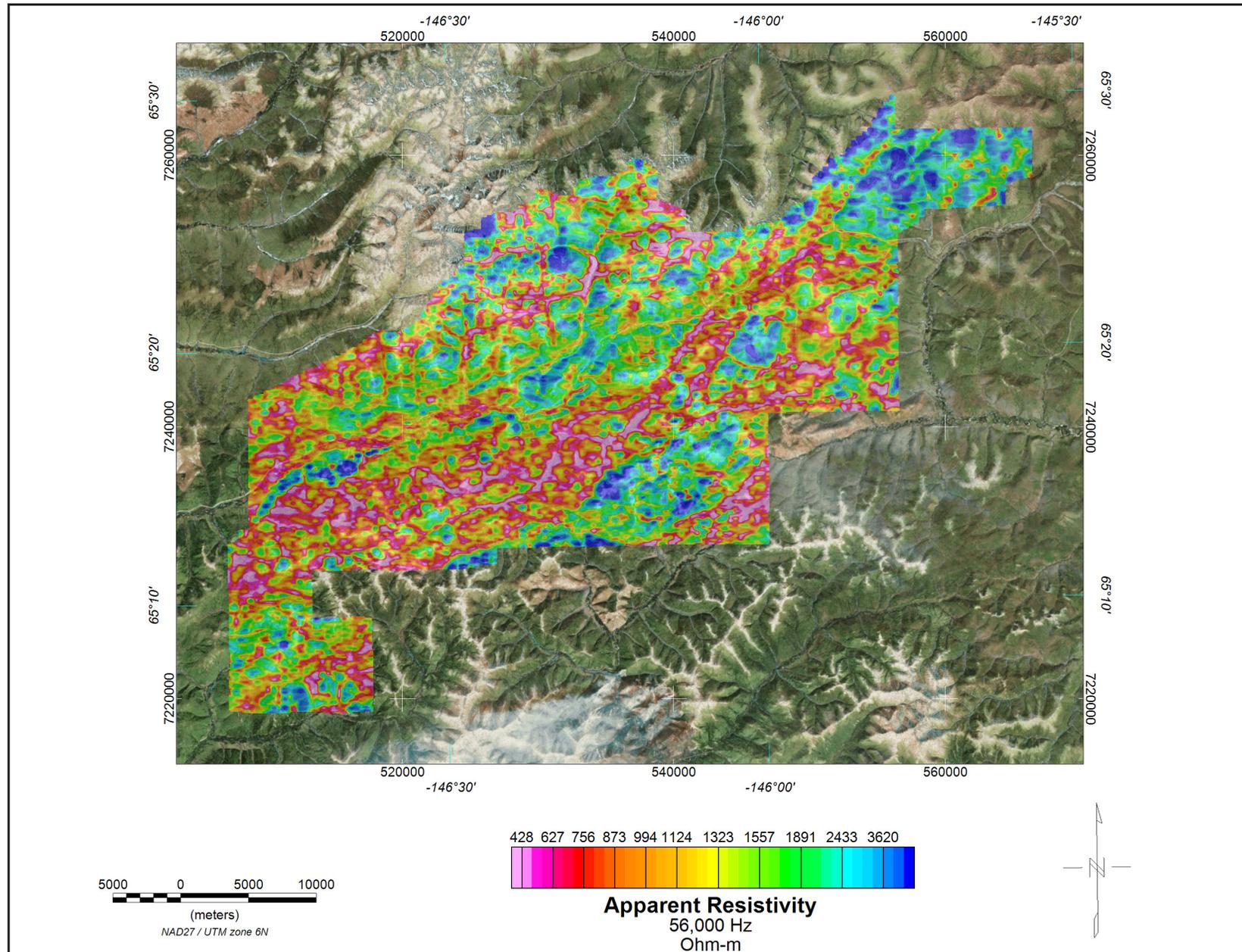


Figure 6. 56,000 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 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.

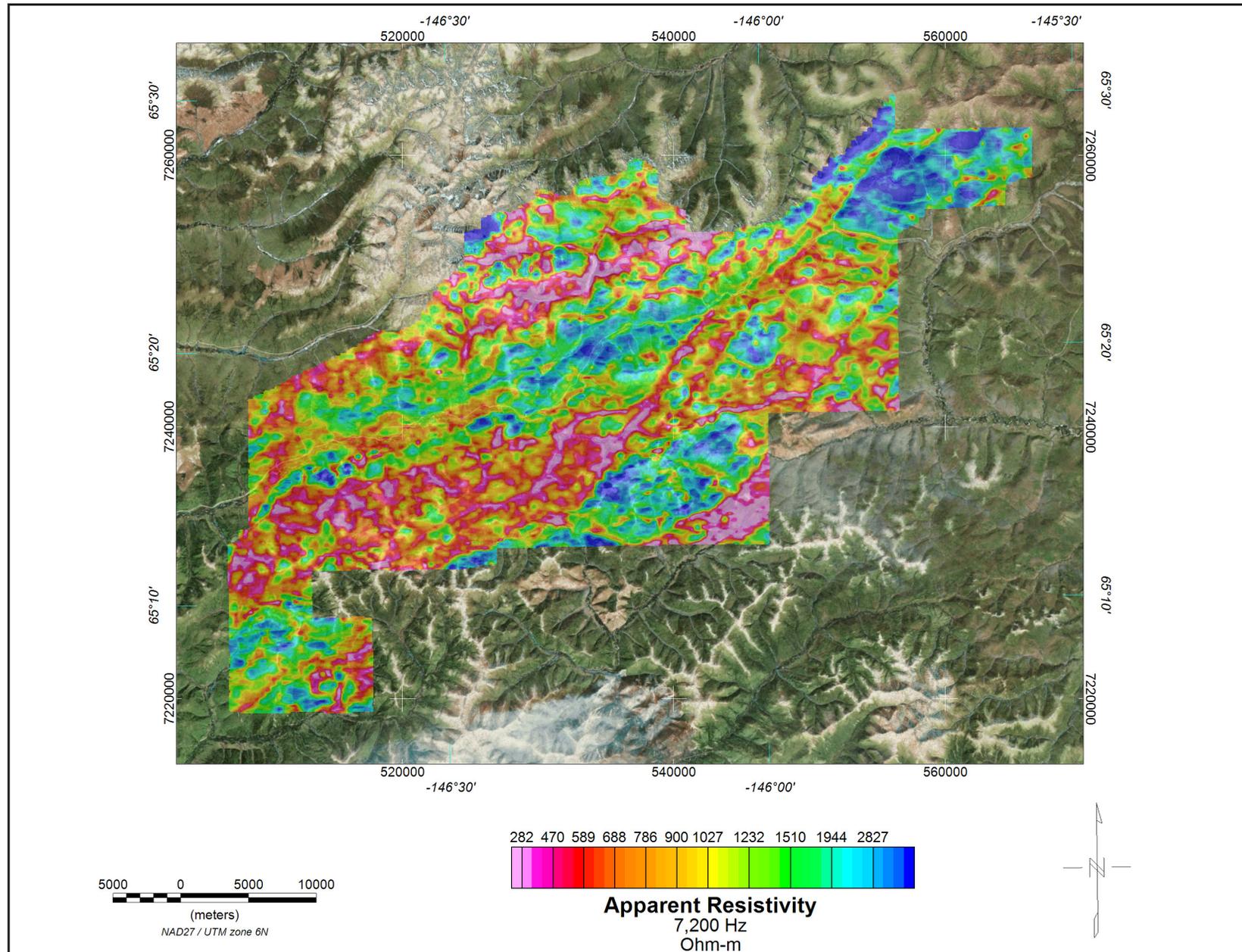


Figure 7. 7,200 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 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.

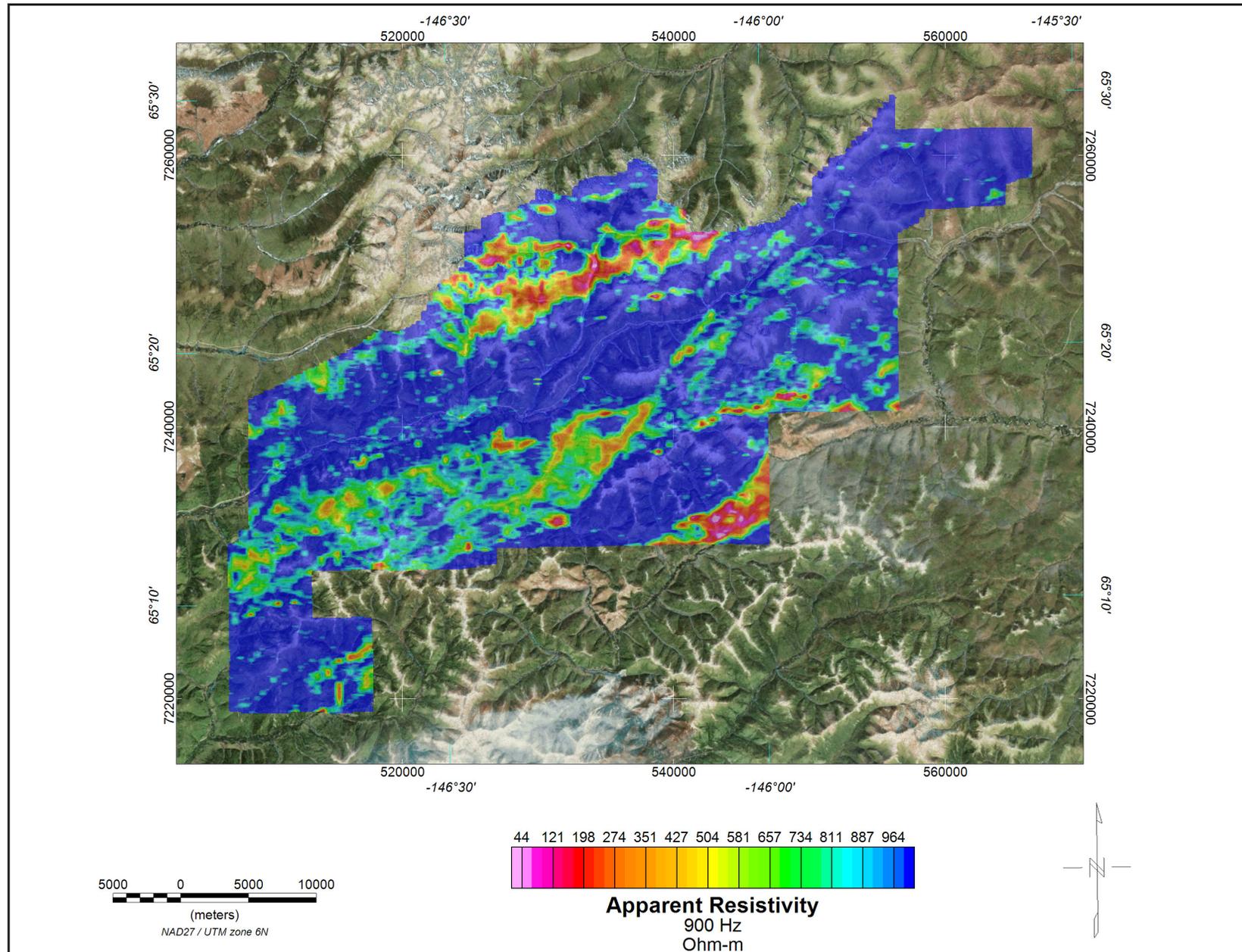
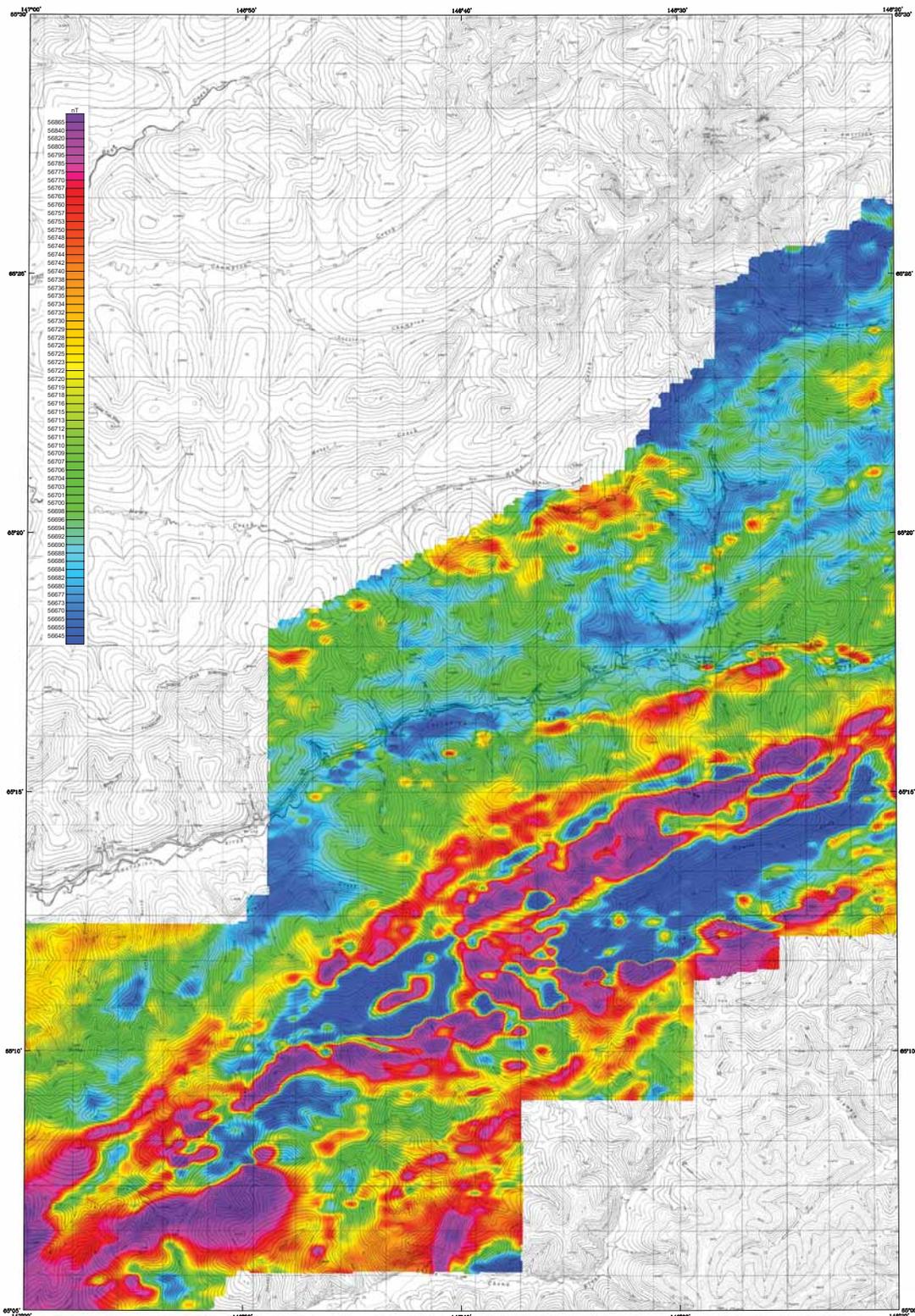


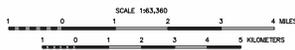
Figure 8. 900 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 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/10.14509/30062>.

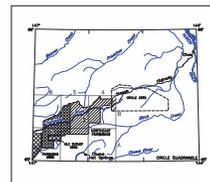
Map Title	Description
northeastfairbanks_sim_magtf_topo_map_1of2.pdf	simulated magnetic total field grid with topographic base map
northeastfairbanks_sim_magtf_topo_map_2of2.pdf	simulated magnetic total field grid with topographic base map
northeastfairbanks_sim_magtf_contours_plss_map_1of2.pdf	simulated magnetic total field grid and contours with public land survey system base layer
northeastfairbanks_sim_magtf_contours_plss_map_2of2.pdf	simulated magnetic total field grid and contours with public land survey system base layer
northeastfairbanks_res56khz_topo_map_1of2.pdf	56,000 Hz apparent resistivity grid with topographic base map
northeastfairbanks_res56khz_topo_map_2of2.pdf	56,000 Hz apparent resistivity grid with topographic base map
northeastfairbanks_res56khz_contours_plss_map_1of2.pdf	56,000 Hz apparent resistivity grid with contours and public land survey system base layer
northeastfairbanks_res56khz_contours_plss_map_2of2.pdf	56,000 Hz apparent resistivity grid with contours and public land survey system base layer
northeastfairbanks_res7200hz_topo_map_1of2.pdf	7,200 Hz apparent resistivity grid with topographic base map
northeastfairbanks_res7200hz_topo_map_2of2.pdf	7,200 Hz apparent resistivity grid with topographic base map
northeastfairbanks_res7200hz_contours_plss_map_1of2.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
northeastfairbanks_res7200hz_contours_plss_map_2of2.pdf	7,200 Hz apparent resistivity grid with contours and public land survey system base layer
northeastfairbanks_res900hz_topo_map_1of2.pdf	900 Hz apparent resistivity grid with topographic base map
northeastfairbanks_res900hz_topo_map_2of2.pdf	900 Hz apparent resistivity grid with topographic base map
northeastfairbanks_res900hz_contours_plss_map_1of2.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
northeastfairbanks_res900hz_contours_plss_map_2of2.pdf	900 Hz apparent resistivity grid with contours and public land survey system base layer
northeastfairbanks_emanomalies_sim_magtf_detailed_topo_map_1of5.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
northeastfairbanks_emanomalies_sim_magtf_detailed_topo_map_2of5.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
northeastfairbanks_emanomalies_sim_magtf_detailed_topo_map_3of5.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
northeastfairbanks_emanomalies_sim_magtf_detailed_topo_map_4of5.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
northeastfairbanks_emanomalies_sim_magtf_detailed_topo_map_5of5.pdf	EM anomaly map with simulated magnetic total field grid contours and topographic base map
northeastfairbanks_interpretation_plss_map_1of2.pdf	interpretation based on geophysical data with public land survey system base layer
northeastfairbanks_interpretation_plss_map_2of2.pdf	interpretation based on geophysical data with public land survey system base layer



Base from U.S. Geological Survey Sheet A-4 1985 A-4 1985
N-T 1982 N-T 1976 (contiguous) Zone



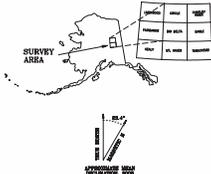
LOCATION INDEX



TOTAL MAGNETIC FIELD OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Survey Corp., and Stevens Exploration Management Corp.
2005



DESCRIPTIVE NOTES

The geophysical data were acquired with a SIPHEM[®] Electromagnetic (EM) system and a Sinterex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a real-time GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) 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.

An Airtech G224 NAVSTAR / GPS-based Global Positioning System was used for navigation. The helicopter position was updated 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 4) spheroid, 1927 North American datum using a central meridian (CM) of 147° a north constant of 0 and a scale constant of 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

TOTAL MAGNETIC FIELD

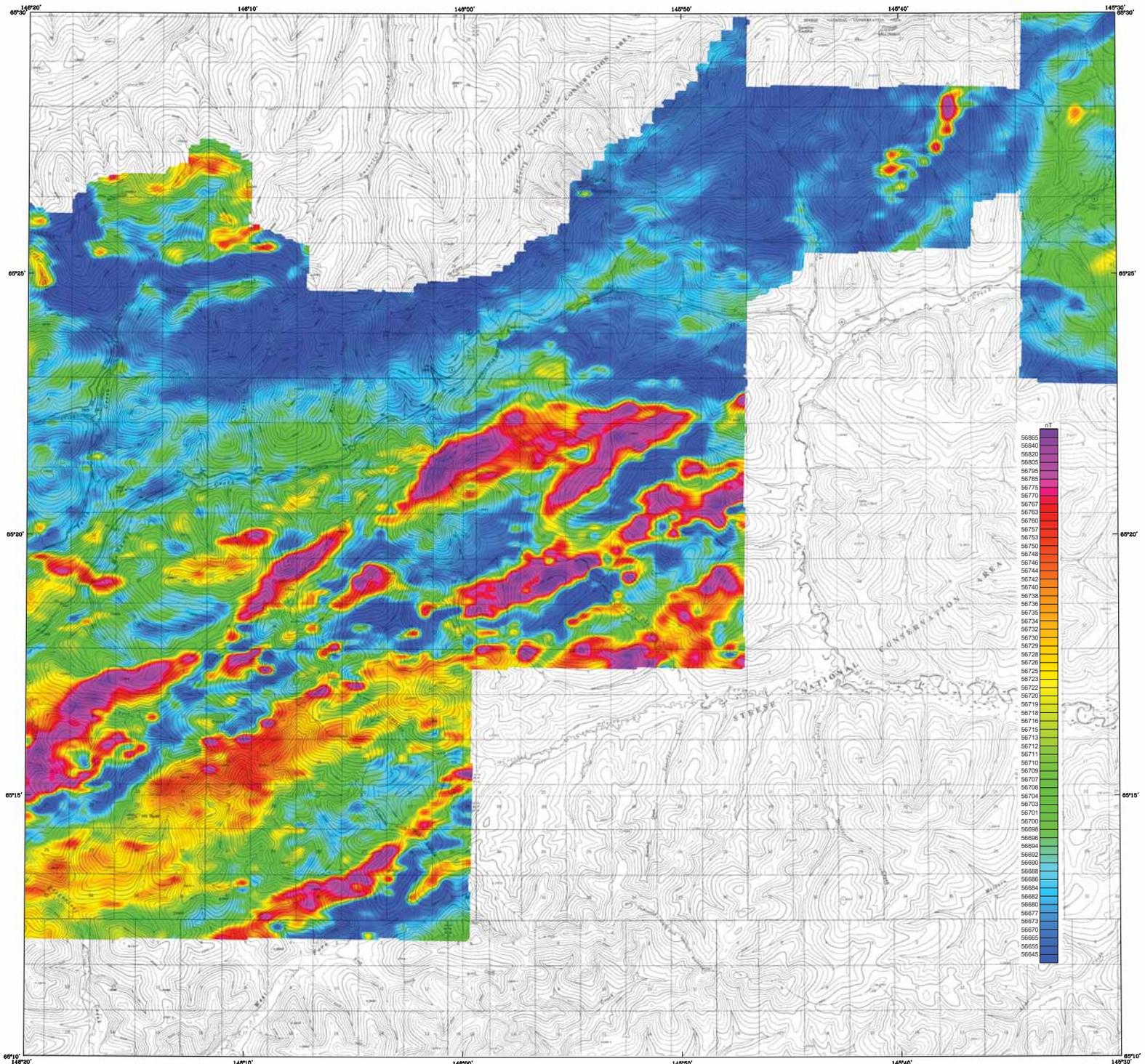
The magnetic total field contours were produced using digitally recorded data from a Sinterex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations for IGRF gradient, 2005, updated to October 2005, using ultrimeter adjusted IGRF, (3) leveled to the tie line data, and (4) interpolated onto a regular 60 m grid using a modified Akima (1970) technique.

AKIMA, H. 1970. A 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.

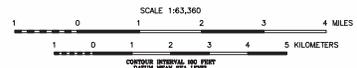
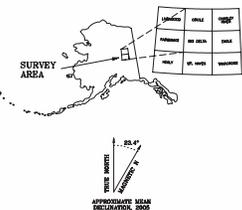
SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the new area were acquired and processed by Fugro Airborne Survey Corp. in 2005.

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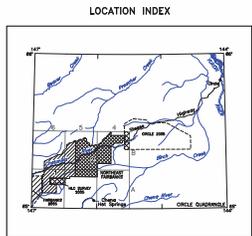


Draw from U.S. Geological Survey Circle 4-A, 1976; 4-A, 1980; 2-A, 1981; 9-A, 1982; Quadrangle, Alaska



TOTAL MAGNETIC FIELD OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA PARTS OF CIRCLE QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sinterox cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition to the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (or) 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.

An Ashtech GC24 NAVSTAR / GLONAVSS 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 6) spheroid, 1927 North American datum using a central meridian (CM) of 147° 15 north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

TOTAL MAGNETIC FIELD

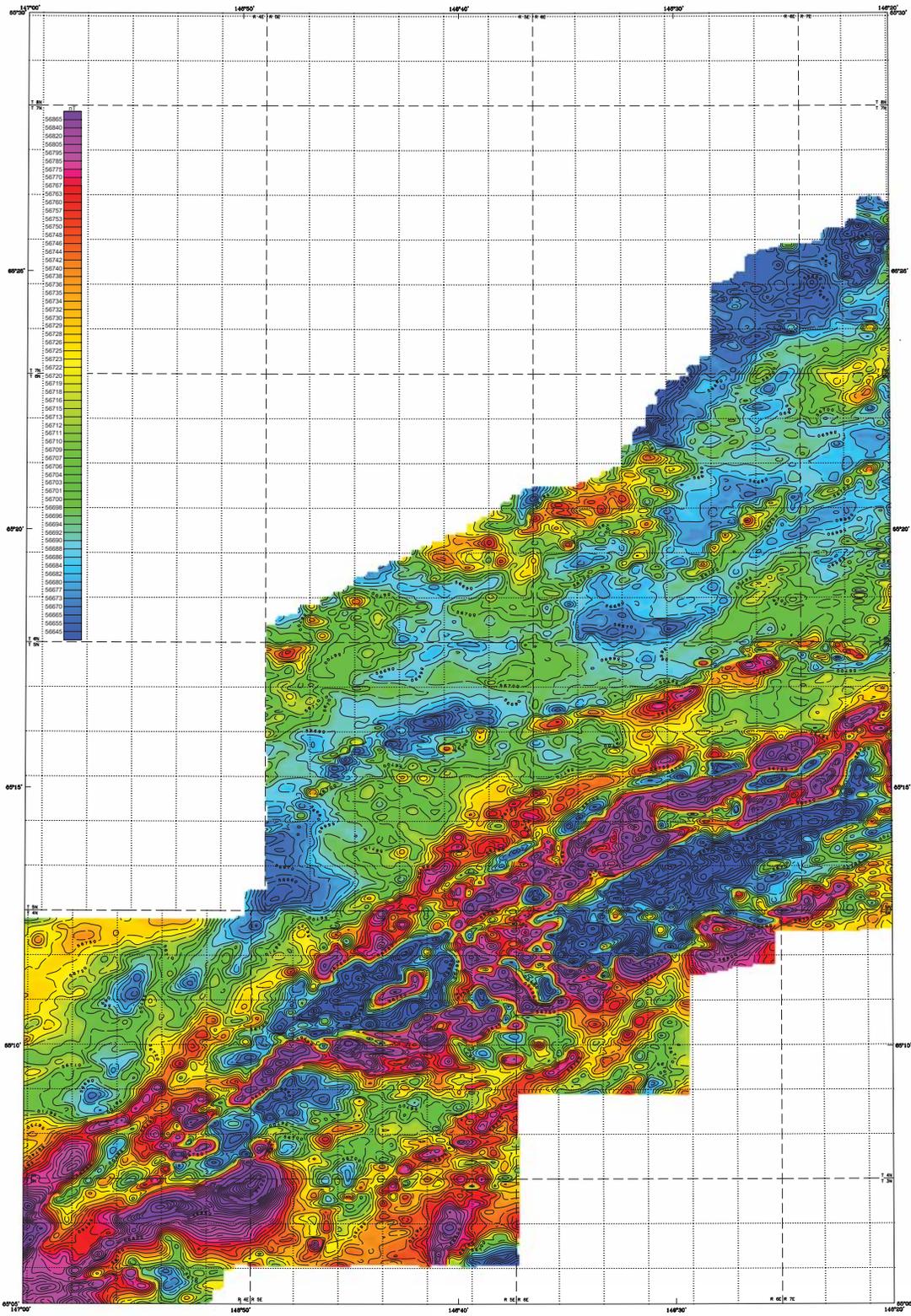
The magnetic total field contours were produced using digitally recorded data from a Sinterox cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to October 2005) using altimeter adjusted IGRF, (3) leveled to the tie line data, and 4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

Akima, H., 1970. A new method of interpolation and smooth curve fitting based on local extremities. *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 (DGGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the new area were acquired and processed by Fugro Airborne Surveys Corp. in 2006.

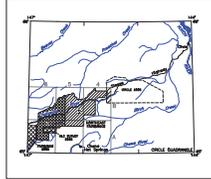
This map and other products from this survey are available by mail order in person from DGGGS, 3354 College Road, Fairbanks, Alaska, 99709-3707. Published maps are also available for viewing or downloading as Adobe Acrobat Files (*.pdf) on our Web site (<http://www.dgggs.dnr.state.ak.us/pubs/>).



Derives modified from U.S. Geological Survey Circle A-4, 1983, A-6, 1985, B-1, 1986, B-2, 1978 (Geological Survey, Alaska)

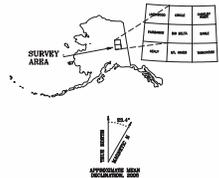


LOCATION INDEX



TOTAL MAGNETIC FIELD OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA PARTS OF CIRCLE QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Survey Corp., and Stevens Exploration Management Corp.
2008



DESCRIPTIVE NOTES

The geophysical data were acquired with a BICHEM® Electromagnetic (EM) system and a Scintrex cesium magnetometer. The EM field magnetic sensor was flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Saabhel helicopter at a mean terrain clearance of 200 feet above N-S (0°) 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.

An Airtech COCA NAVSTAR / GPS-based Global Positioning System was used for navigation. The helicopter position was better than 5 m. Flight positions were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of 147° a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to October 2005) using altimeter adjusted IGRF; (3) leveled to the tie line data, and (4) interpolated onto a regular 50 m grid using a modified Akima (1970) technique.

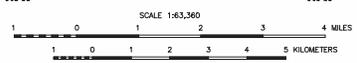
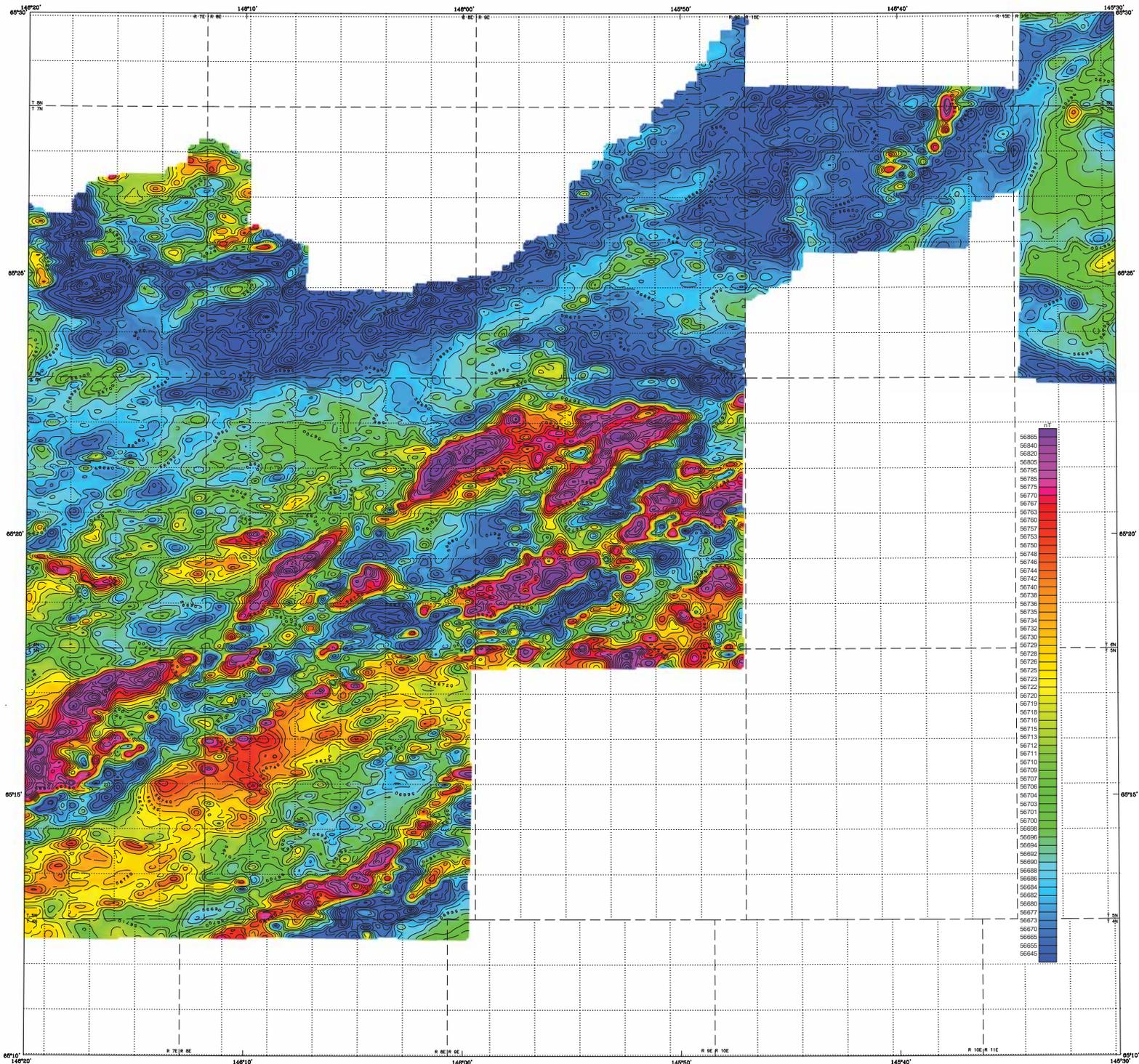
Adapted from 1975 A-6, the method of magnetic field strength being used is the procedure outlined in the publication of Geological Survey, U.S. G.S. 688-689.

MAGNETIC CONTOUR INTERVAL	
.....	250 nT
.....	50 nT
.....	10 nT
.....	5 nT

SURVEY HISTORY

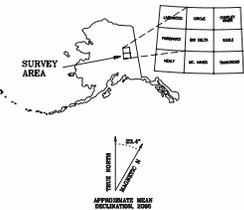
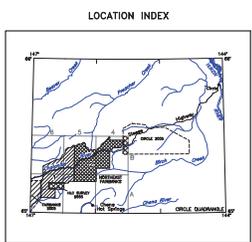
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**TOTAL MAGNETIC FIELD
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2006



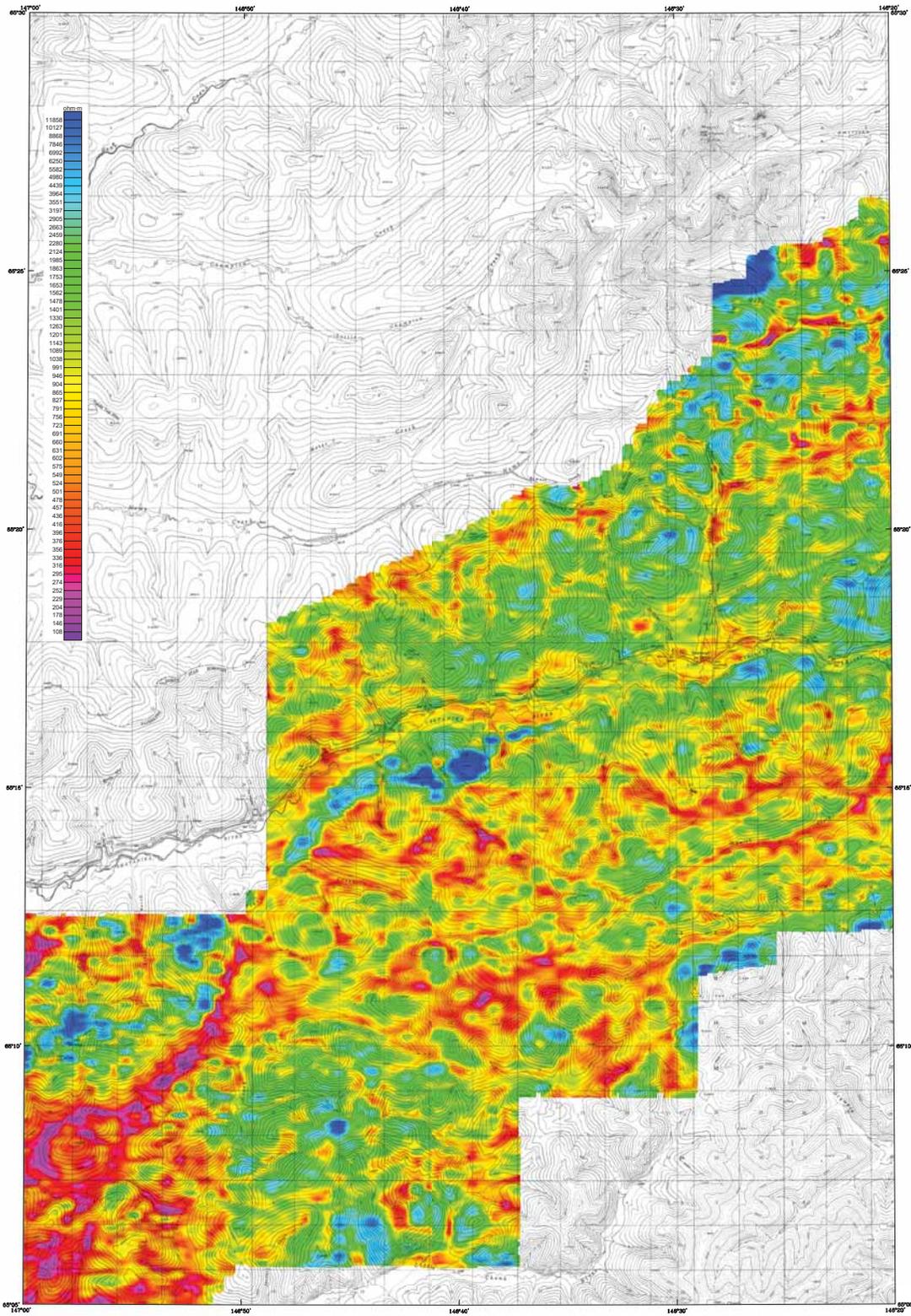
DESCRIPTIVE NOTES
The geophysical data were acquired with a DIGEM[®] Electromagnetic (EM) system and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, a GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) 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.
An Ashtech G224 NAVSTAR / GLOPASS 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 6) spheroid, 1927 North American datum using a central meridian (CM) of 147° 0 north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

TOTAL MAGNETIC FIELD
The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to October 2005) using altimeter adjusted IGRF, (3) leveled to the tie line data, and 4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.
Akima, H., 1970. A new method of interpolation and smooth curve fitting based on local procedures. *Journal of Association of Computing Machinery*, v. 17, no. 4, p. 589-602.

MAGNETIC CONTOUR INTERVAL

.....	250 nT
.....	50 nT
.....	10 nT
.....	5 nT

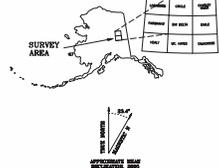
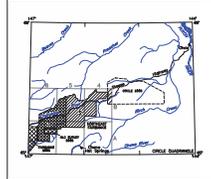
SURVEY HISTORY
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Base from U.S. Geological Survey, Ortho A-N, 1983, A-N, 1983, B-C, 1982, D-A, 1976, Orthographic, Alaska



LOCATION INDEX



56,000 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

by
Laurel E. Barnes, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sinterex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a real-time differential GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) 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.

An Ashtech G224 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was surveyed every 0.5 seconds using post-flight differential positioning to a remote station or better than 5 m. Flight path positions were projected onto the Clarke 1866 UTM zone 0 (spaced, 1927 North American datum using a central meridian (CM) of 147°, 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

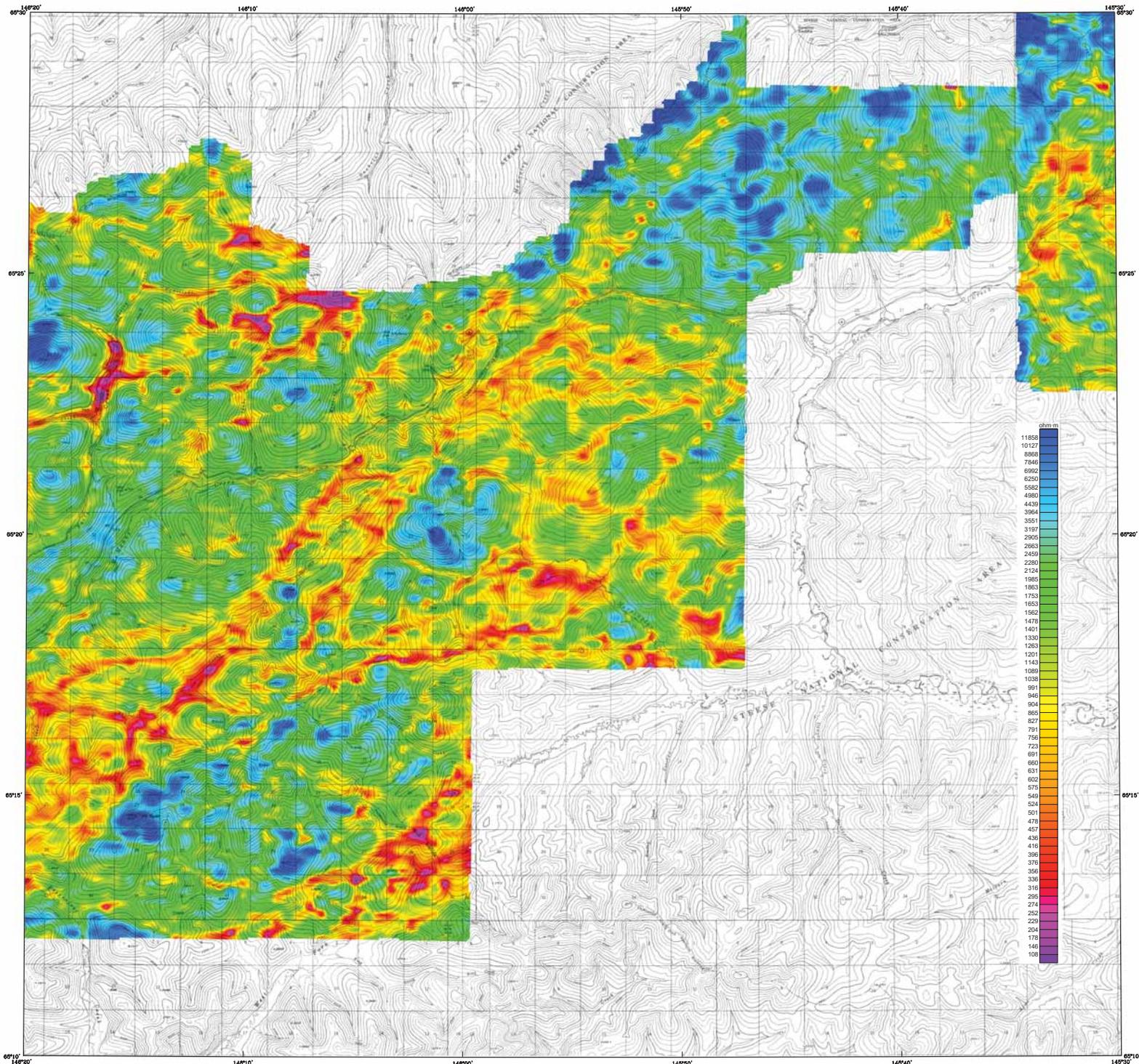
The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. The vertical coplanar coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar quadrants operated at 100, 750, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to buried conductors, conductive overburden, and cultural sources. Apparent resistivity is presented 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.

AKIMA, H. 1970. A new method of interpolation. *Int. J. Numer. Anal. Geophys.* 4: 31-41.

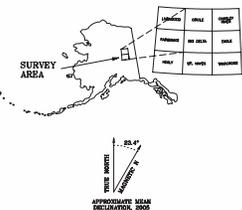
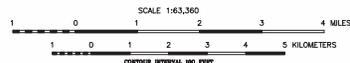
SURVEY HISTORY

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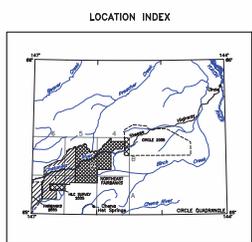


Base from U.S. Geological Survey Circle 4-4, 1976; 4-4, 1980; 8-4, 1981; 9-4, 1982; and 10-4, 1982, Fairbanks, Alaska.



**56,000 Hz COPLANAR APPARENT RESISTIVITY
OF THE NORTHEAST FAIRBANKS AREA,
FAIRBANKS AND CIRCLE MINING DISTRICTS,
INTERIOR ALASKA**
PARTS OF CIRCLE QUADRANGLE

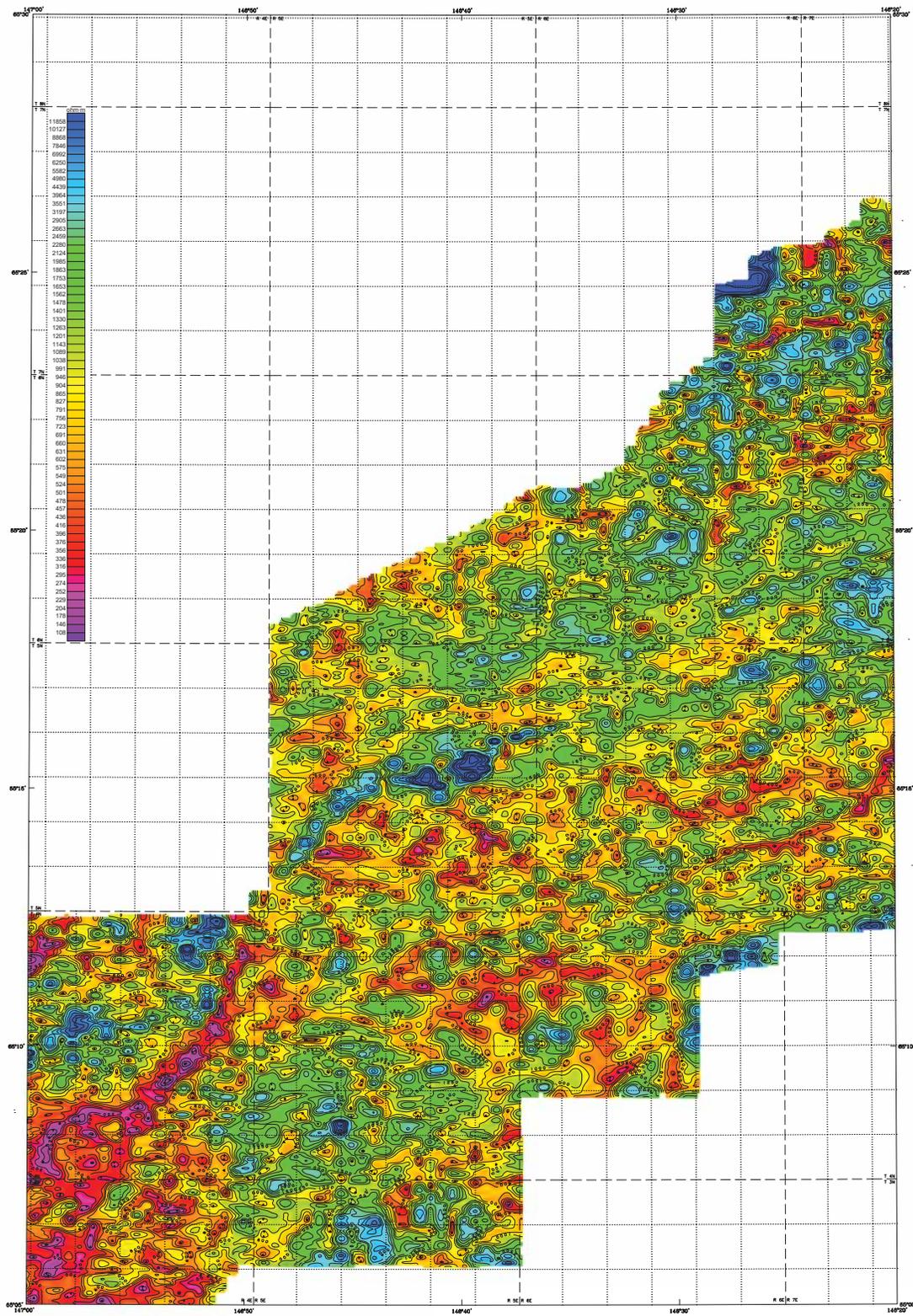
by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006



DESCRIPTIVE NOTES
The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sointrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition to the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (O⁺) 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. An Ashtech GC24 NAVSTAR / GLONAVSS 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 6) spheroid, 1927 North American datum using a central meridian (CM) of 147° 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[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 500, 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 80 m grid using a modified Aluma (1970) technique.
Aluma, H., 1970, A new method of interpolation and smooth curve fitting based on local polynomial control of the acceleration of Computing Machinery, v. 17, no. 4, p.589-602.

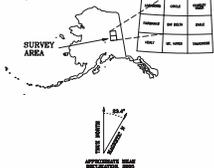
SURVEY HISTORY
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Profile collected from U.S. Geological Survey Grids A-4, 188, 3-4, 385, 3-4, 385, 3-4, 376, Fairbanks, Alaska



LOCATION INDEX



56,000 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

by
Laurel E. Barnes, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sinterex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a real-time GPS navigation system, 80/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet above N-S (0°) 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.

An Ashtech G224 NAVSTAR / GLOMASS Global Positioning System was used for navigation. The helicopter position was recorded every 15 seconds using post-flight differential positioning to a remote station.

Positions were projected onto the Clarke 1866 UTM zone 6 (approx. 1927 North American datum using a central meridian (CM) of 147°) a north constant of 3 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[®] EM system measured inphase and quadrature components at five frequencies. The vertical coplanar coil-pair operated at 100 and 2000 Hz, while the horizontal coplanar coil-pair operated at 800, 2000 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 80 m grid using a modified Akima (1970) technique.

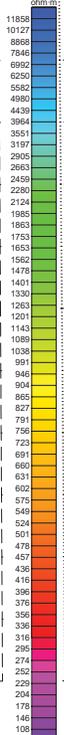
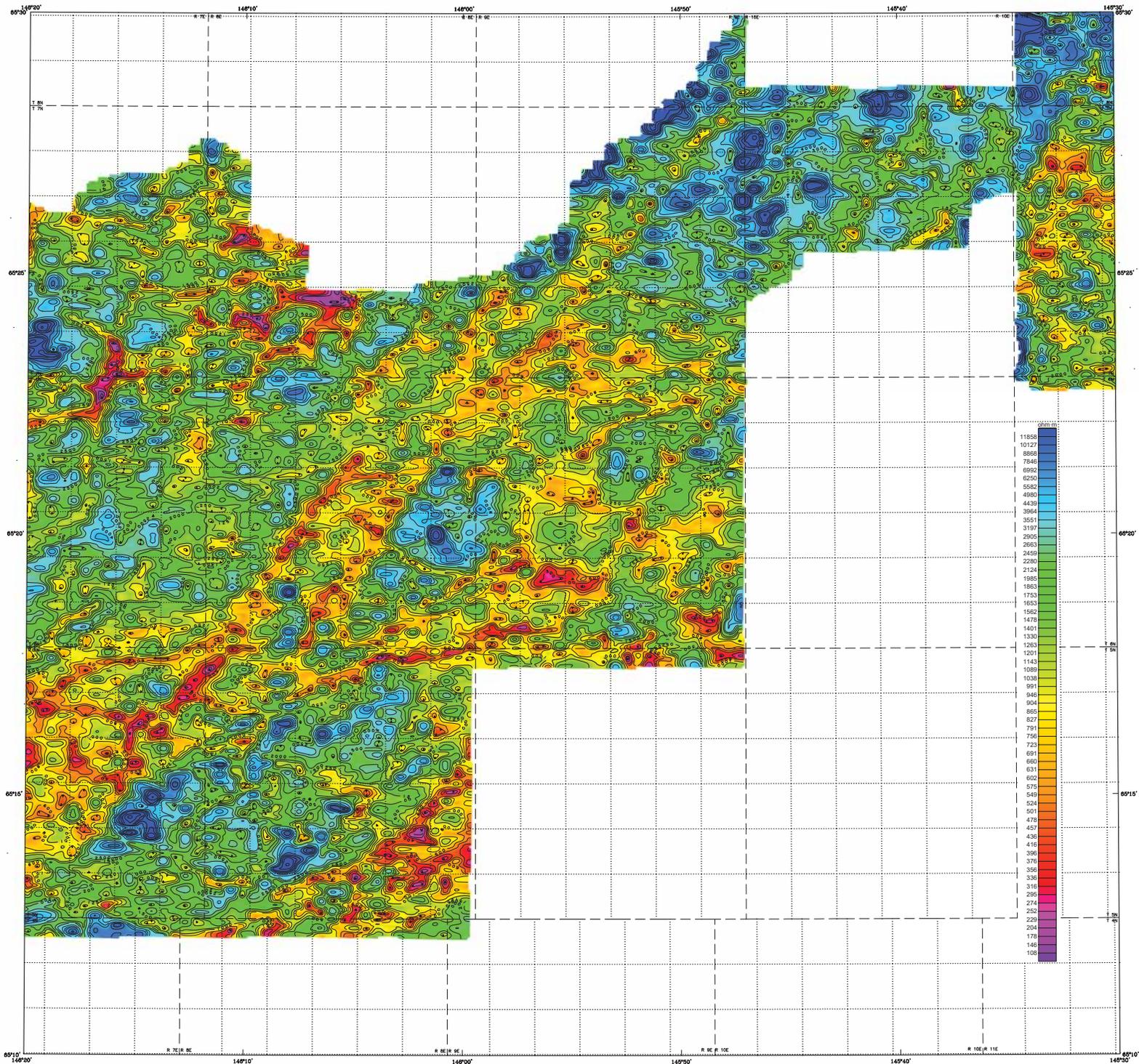
Alma, H. 1970. A new method of interpolation and its use in terrain sampling. *Mathematics*, v. 17, pp. 238-245.



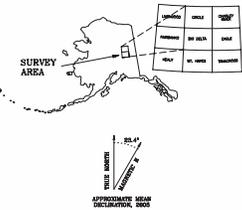
SURVEY HISTORY

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Position within State U.S. Geological Survey Circle A-4, 1970; A-A, 1980; B-4, 1980; B-5, 1980; Quadrangle, Alaska.



56,000 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006

DESCRIPTIVE NOTES

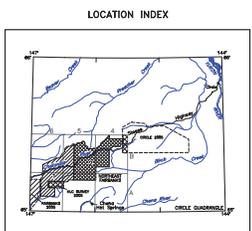
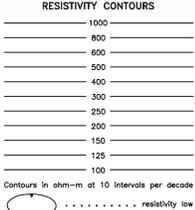
The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sointrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (or) 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.

An Ashtech G24 NAVSTAR / GLONAVSS 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 10 m. Flight path positions were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of 147° 0' 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[®] EM system measured inphase and quadrature components of five frequencies. Two vertical coplanar coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 500, 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 80 m grid using a modified Akima (1970) technique.

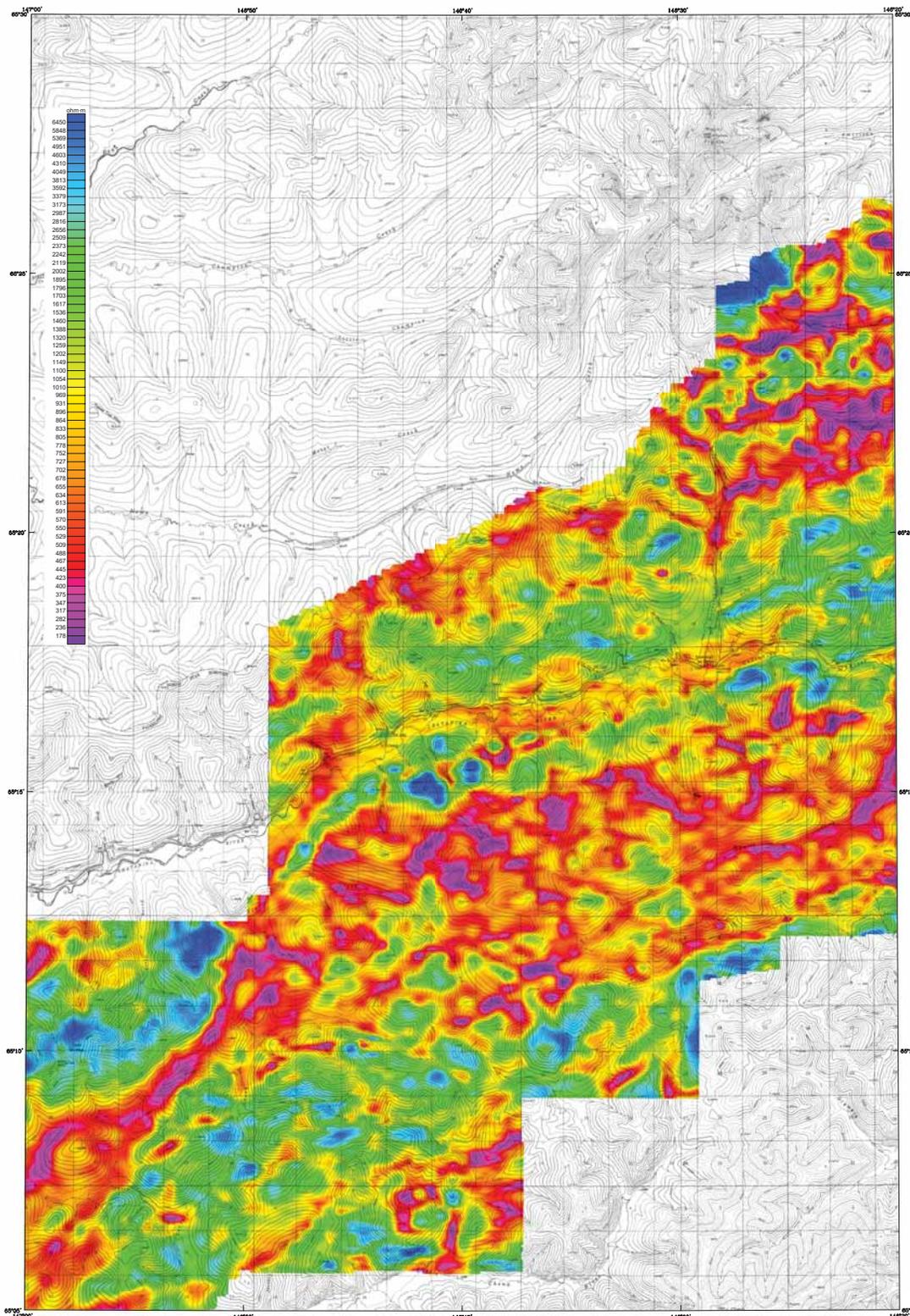
Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures, Journal of the Association of Computing Machinery, v. 17, no. 4, p.589-602.



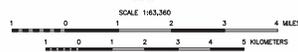
SURVEY HISTORY

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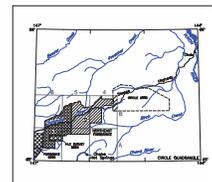
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Base from U.S. Geological Survey Charts A-4, 1985, A-8, 1985, B-2, 1982, B-4, 1979, and others.



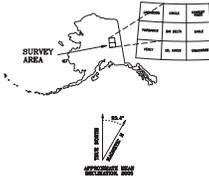
LOCATION INDEX



7200 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

by
Laurel E. Burns, Fugro Alaska Surveys Corp., and Stevens Exploration Management Corp., 2006



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sointrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/80 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) 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.

An Aerich 5024 NAVSTAR / GROUND Based 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 1966 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 147°, 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

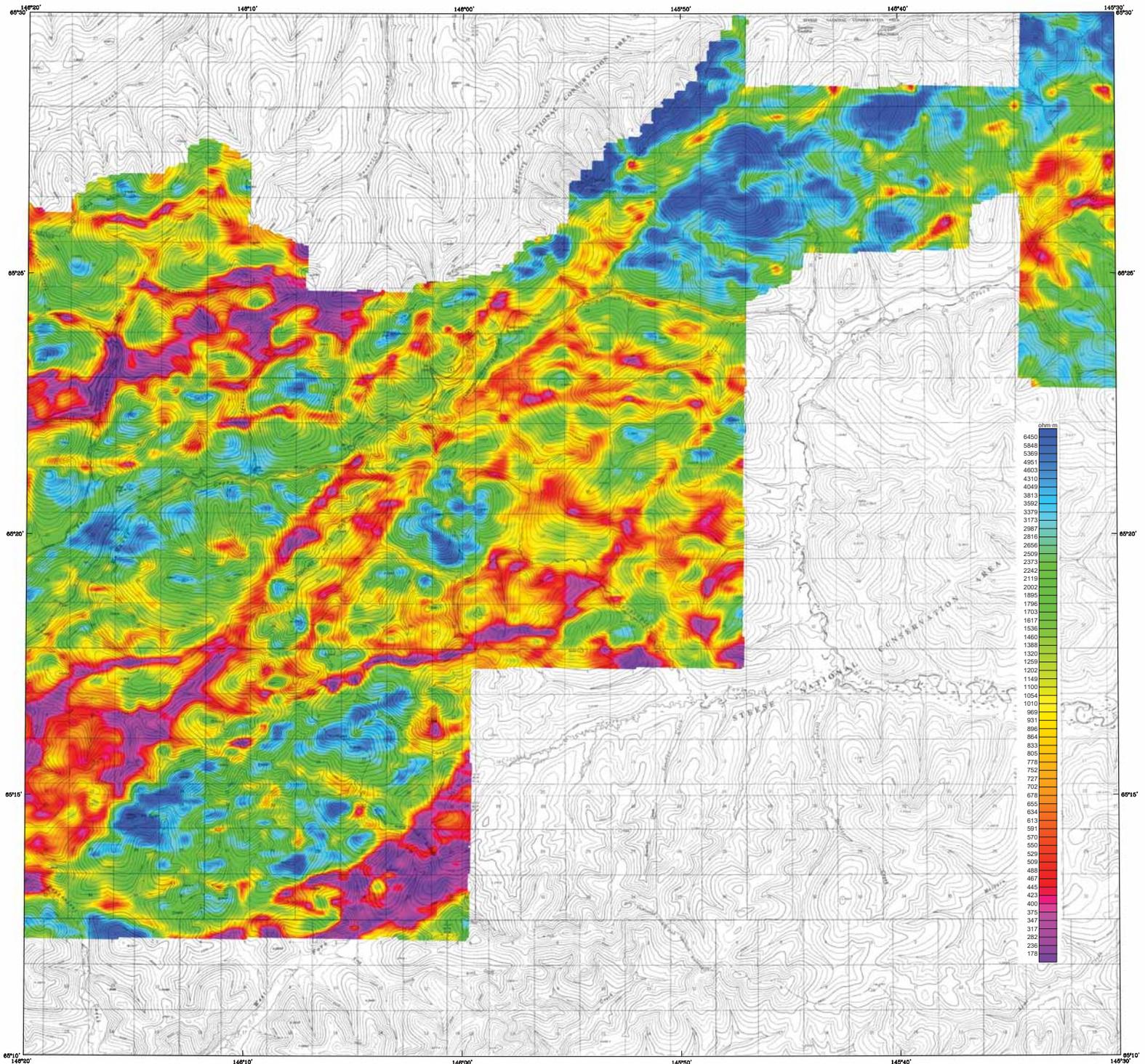
The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coplanar coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 800, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to 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.

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SURVEY HISTORY

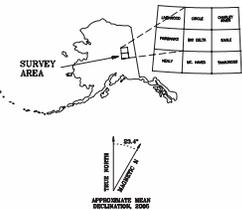
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From U.S. Geological Survey Circle 4-A, 1896; 4-B, 1896; B-4, 1897; B-5, 1897; Quadrangles, Alaska.

SCALE 1:63,360

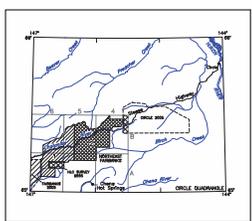


7200 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2005

LOCATION INDEX



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sointrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet, in addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of approximately 3 miles. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles. An Ashtech G24 NAVSTAR / GLONAV 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 6) spheroid, 1927 North American datum using a central meridian (CM) of 147° 0 north constant of 0 and an east constant of 500,000. Positional accuracy of the present data is better than 10 m, with respect to the UTM grid.

RESISTIVITY

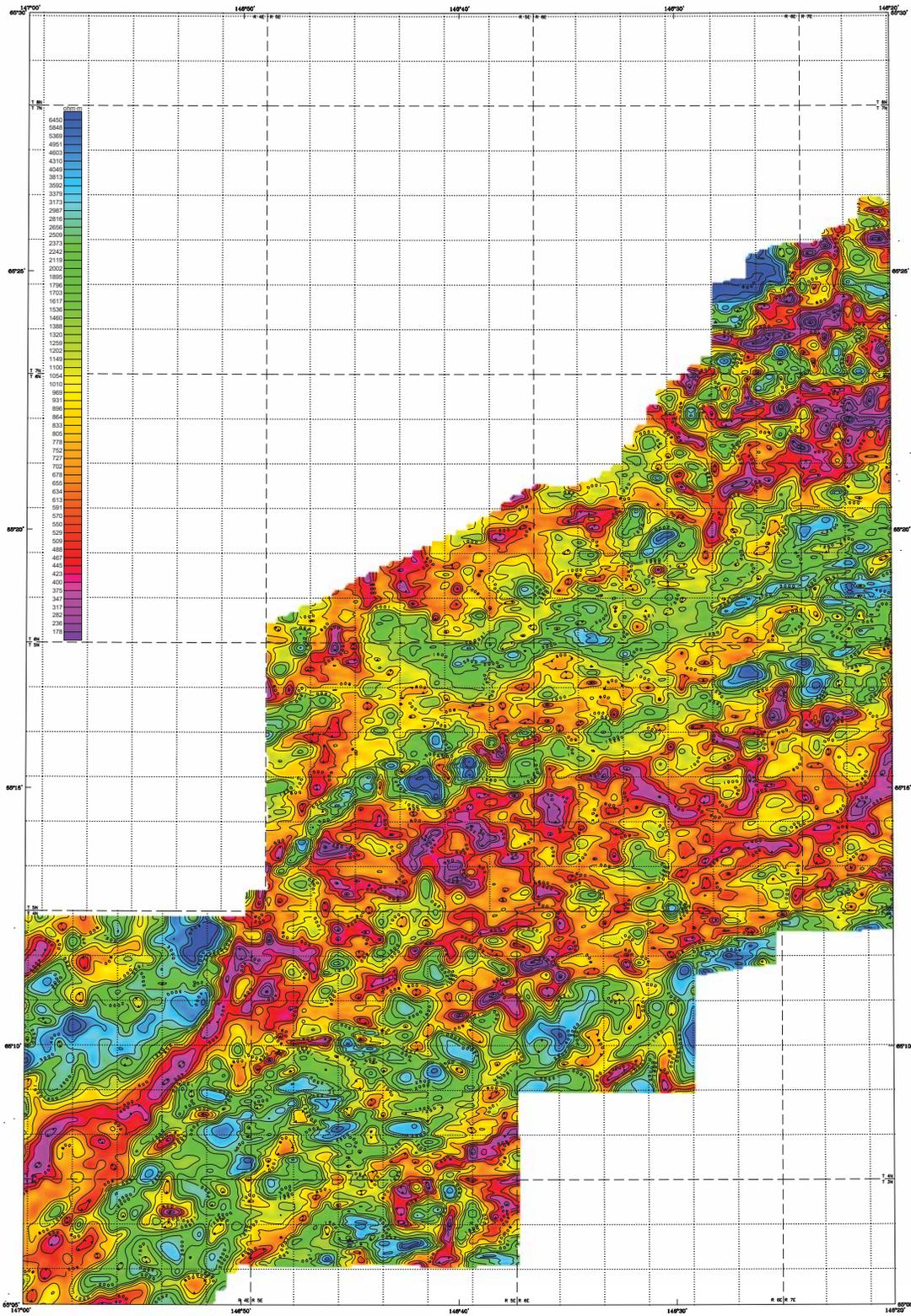
The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies, two vertical coaxial coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to 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 80 m grid using a modified Akima (1970) technique.

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

SURVEY HISTORY

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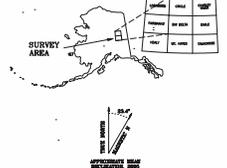
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Derives modified from U.S. Geological Survey Circle A-1, 1985, 3-4, 1985, 3-4, 1985, 3-4, 1976, Washington, Alaska



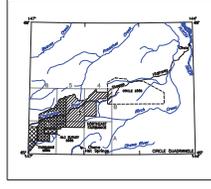
LOCATION INDEX



7200 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

by
Laurel E. Barnes, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006



DESCRIPTIVE NOTES

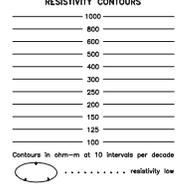
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An Ashtech G224 NAVSTAR / GLONAVSS Global Positioning System was used for navigation. The helicopter position was recorded every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 15 meters. Data positions were projected onto the Clarke 1966 UTM zone 6) apparent 1927 North datum using a central meridian (CM) of 147° 24' north constant of 3 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[®] EM system measured inphase and quadrature components at five frequencies: vertical-coil coil-pairs operated at 100 and 2000 Hz, while three horizontal-coil-pairs operated at 800, 2000 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.

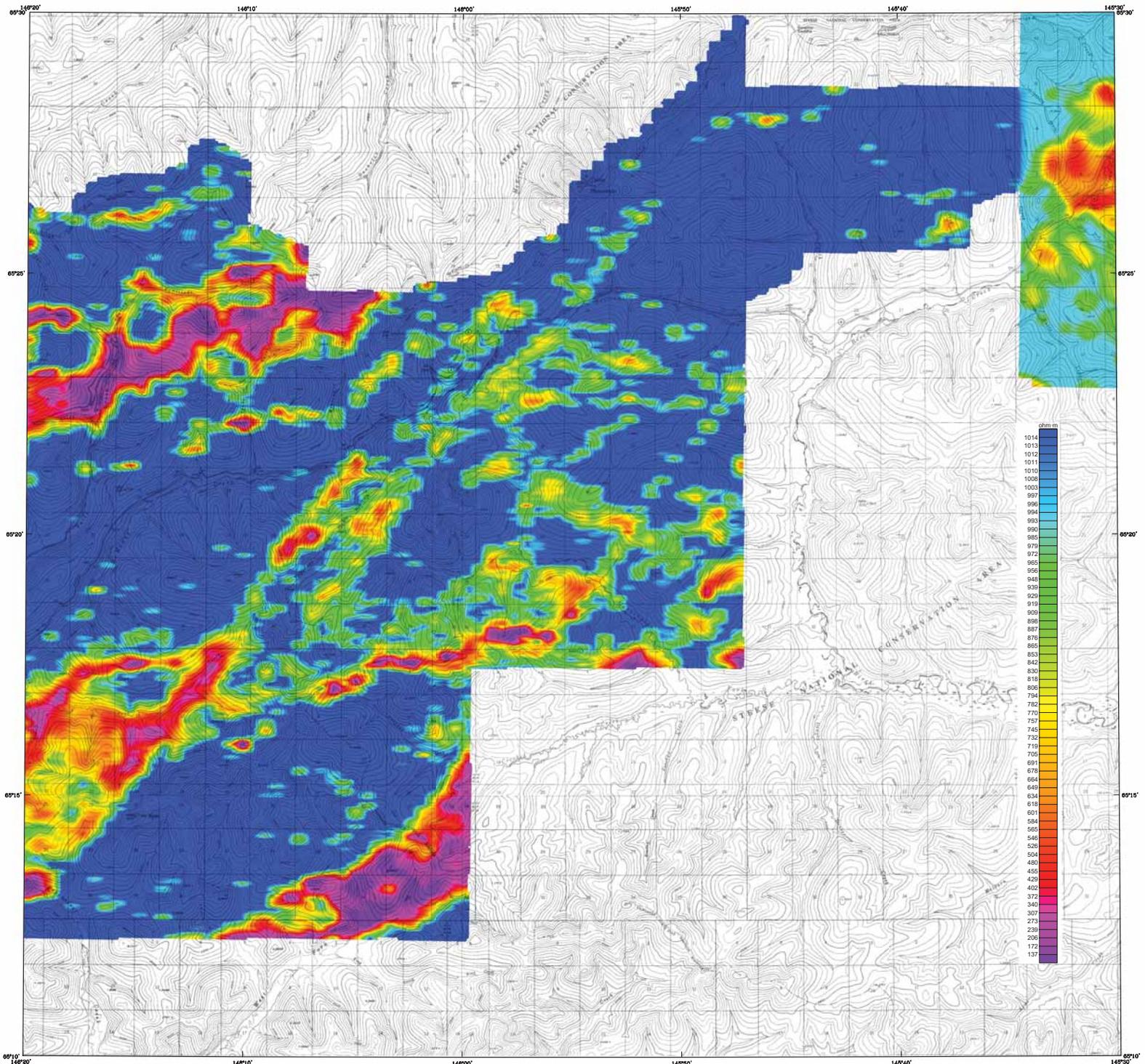
Alma, H., 1970. A new method of interpolation and its use in the design of a computer program. *Computing*, v. 11, pp. 238-245.



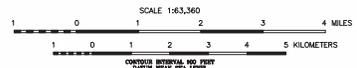
SURVEY HISTORY

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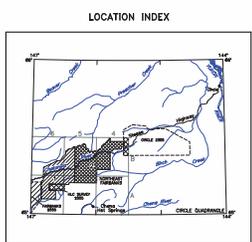
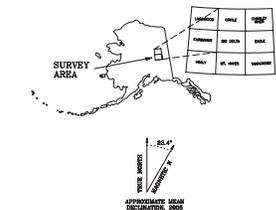


From State U.S. Geological Survey Circle 4-A, 1970; 4-A, 1980; 5-A, 1982; 9-A, 1988; Quadrangle, Alaska.



**900 Hz COPLANAR APPARENT RESISTIVITY
OF THE NORTHEAST FAIRBANKS AREA,
FAIRBANKS AND CIRCLE MINING DISTRICTS,
INTERIOR ALASKA**
PARTS OF CIRCLE QUADRANGLE

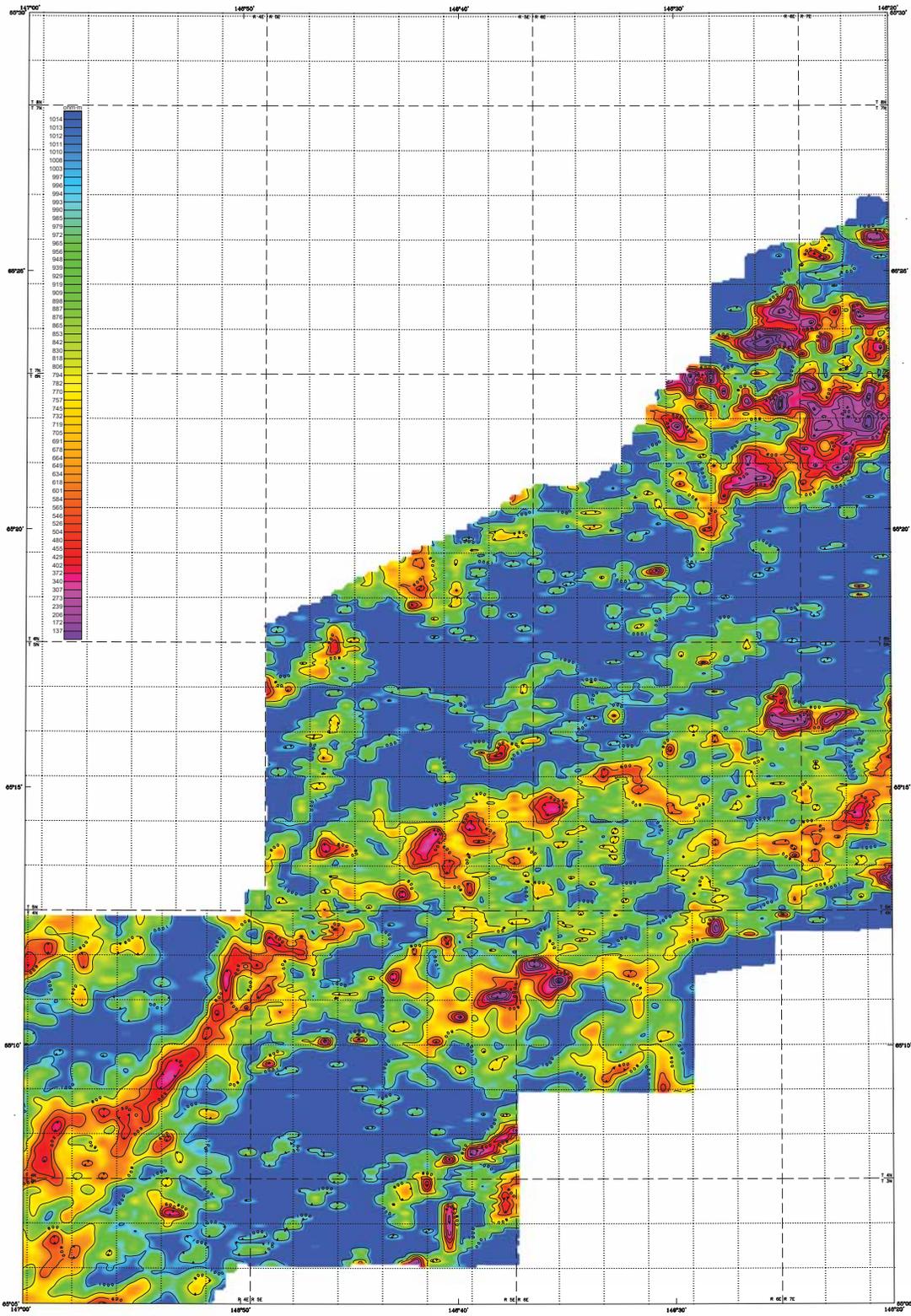
by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006



DESCRIPTIVE NOTES
The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sointrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (O) 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. An Ashtech GC24 NAVSTAR / GLOMAGS 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 Circle 1966 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of 147°, 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[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coplanar coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 900, 7000 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 Aluma (1970) technique.
Aluma, H., 1970, A new method of interpolation and smooth curve fitting based on local polynomial splines of the association of Computing Machinery, v. 17, no. 6, p.589-602.

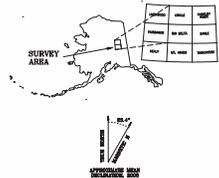
SURVEY HISTORY
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGG), and Stevens Exploration Management Corp. Airborne geophysical data for the new area were acquired and processed by Fugro Airborne Surveys Corp. in 2006.
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Derives modified from U.S. Geological Survey Circle A-8, 1983, A-8, 1983
U.S. Title No. 2, 1975 (Washington, Alaska)

SCALE 1:63,360
0 1 2 3 4 5 MILES
0 1 2 3 4 5 KILOMETERS

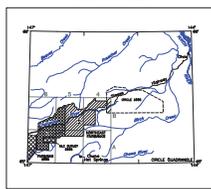
LOCATION INDEX



900 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

by Laurel E. Burns, Fluoro Airborne Surveys Corp., and Stevens Exploration Management Corp., 2006



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sointrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (or) 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.

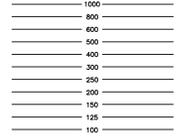
An Airtech COCA NAVSTAR / GOMOS Digital Positioning System was used for navigation. The helicopter position was determined by GPS using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 UTM zone 6j spheroid, 1927 North American datum using a central meridian (CM) of 147° 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[®] EM system measured inphase and quadrature components at five frequencies. The vertical coplanar coil-poles operated at 1500 and 5000 Hz while three horizontal coplanar coil-poles operated at 900, 7500 and 50,000 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 (1976) technique.

Alma, H. 1976. *Handbook of mathematical geophysics*. Vol. 1. Applied Science Publishers, New York, 308 pp.

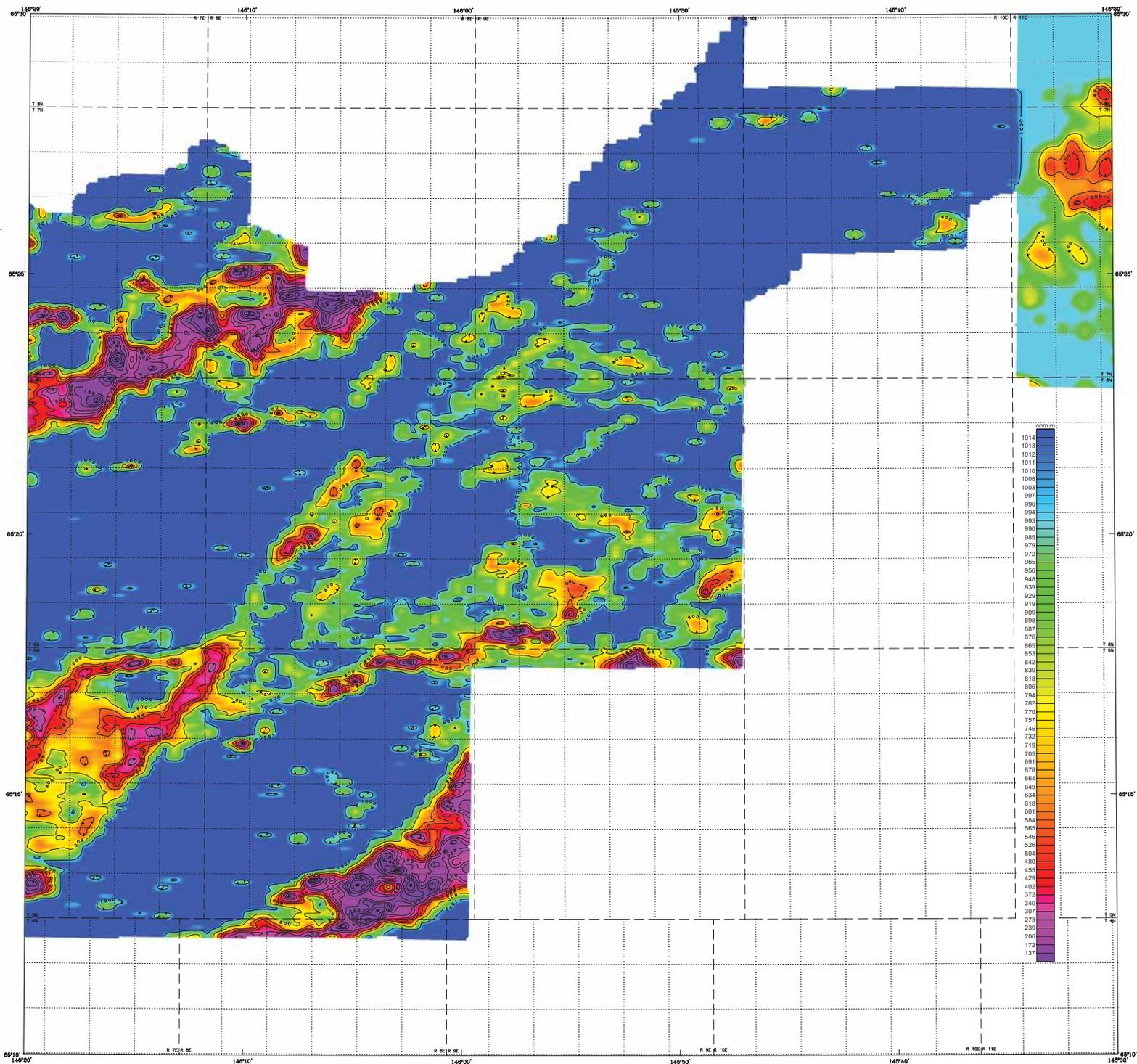
RESISTIVITY CONTOURS



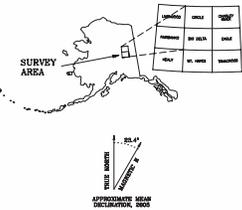
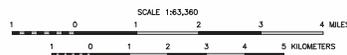
SURVEY HISTORY

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 Stevens Exploration Management Corp. Alaska geophysical data for the new area were acquired and processed by Fluoro Airborne Surveys Corp. in 2006.

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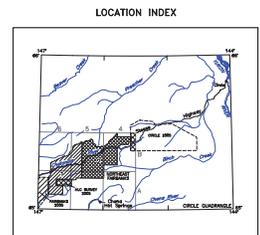
Position adjusted from U.S. Geological Survey Circle A-4, 1970; A-5, 1980; B-4, 1980; B-5, 1980; Circle Quadrangle, Alaska.



900 Hz COPLANAR APPARENT RESISTIVITY OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006



DESCRIPTIVE NOTES

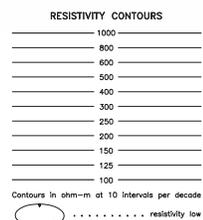
The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sointrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (O) 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.

An Ashtech G224 NAVSTAR / GLONASS 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 6) spheroid, 1927 North American datum using a central meridian (CM) of 147° 0' 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[®] EM system measured inphase and quadrature components of five frequencies. Two vertical coplanar coil-pairs operated at 1000 and 5000 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 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.

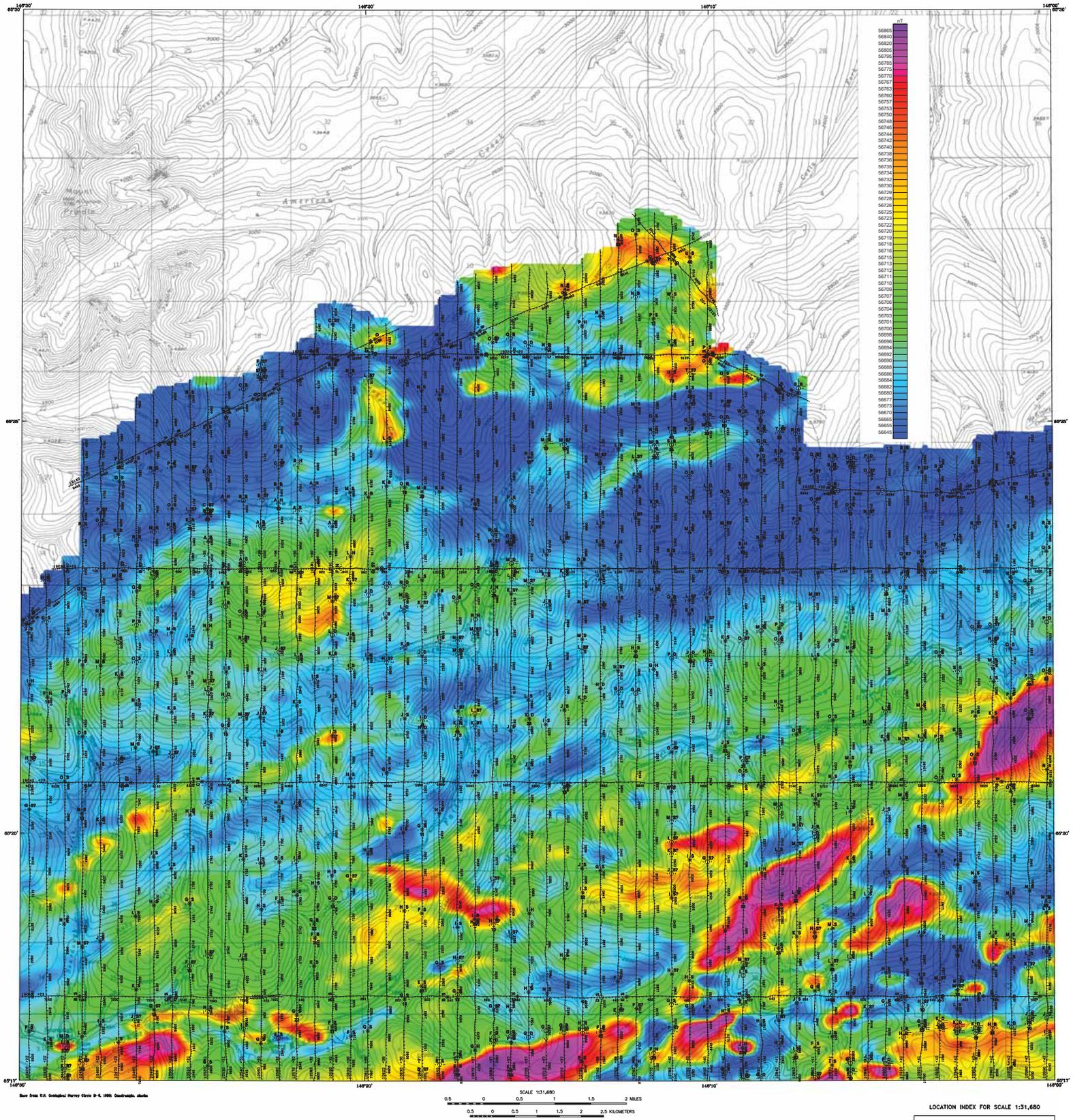
Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures, Journal of the Association of Computing Machinery, v. 17, no. 4, p.589-602.



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 (DGGGS), and Stevens Exploration Management Corp. Airborne geophysical data for the new area were acquired and processed by Fugro Airborne Surveys Corp. in 2005.

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Scale 1:31,680
0.5 0 0.5 1 1.5 2 MILES
0.5 0 0.5 1 1.5 2.5 KILOMETERS

TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PART OF CIRCLE B-S QUADRANGLE

Laurel E. Burns, Fugro Alaska Surveys Corp., and Stevens Exploration Management Corp., 2006



DESCRIPTIVE NOTES
The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system and a Scintrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition to the survey recorded data from a color calibrated digital video camera. Flights were performed with an AS350-B3 Super helicopter at a mean terrain clearance of 200 feet along N-S (CP) survey flight lines with a spacing of approximately 0.1 miles. The lines were flown perpendicular to the flight lines at intervals of approximately 0.1 miles.

- ELECTROMAGNETIC ANOMALIES**
- Conductance
 - Area indicate the conductor top a thickness of 1m
 - Magnetic correlation
 - Flip direction
 - Conductor (Profile)
 - Bedrock conductor
 - Shale bedrock conductor (200 m)
 - Conductor cover (horizontal to the west)
 - Shale conductive rock with clay conductive overburden (Half space)
 - Edge of bedrock conductor (Major of half space)
 - Culture, e.g. power line, metal building or fence

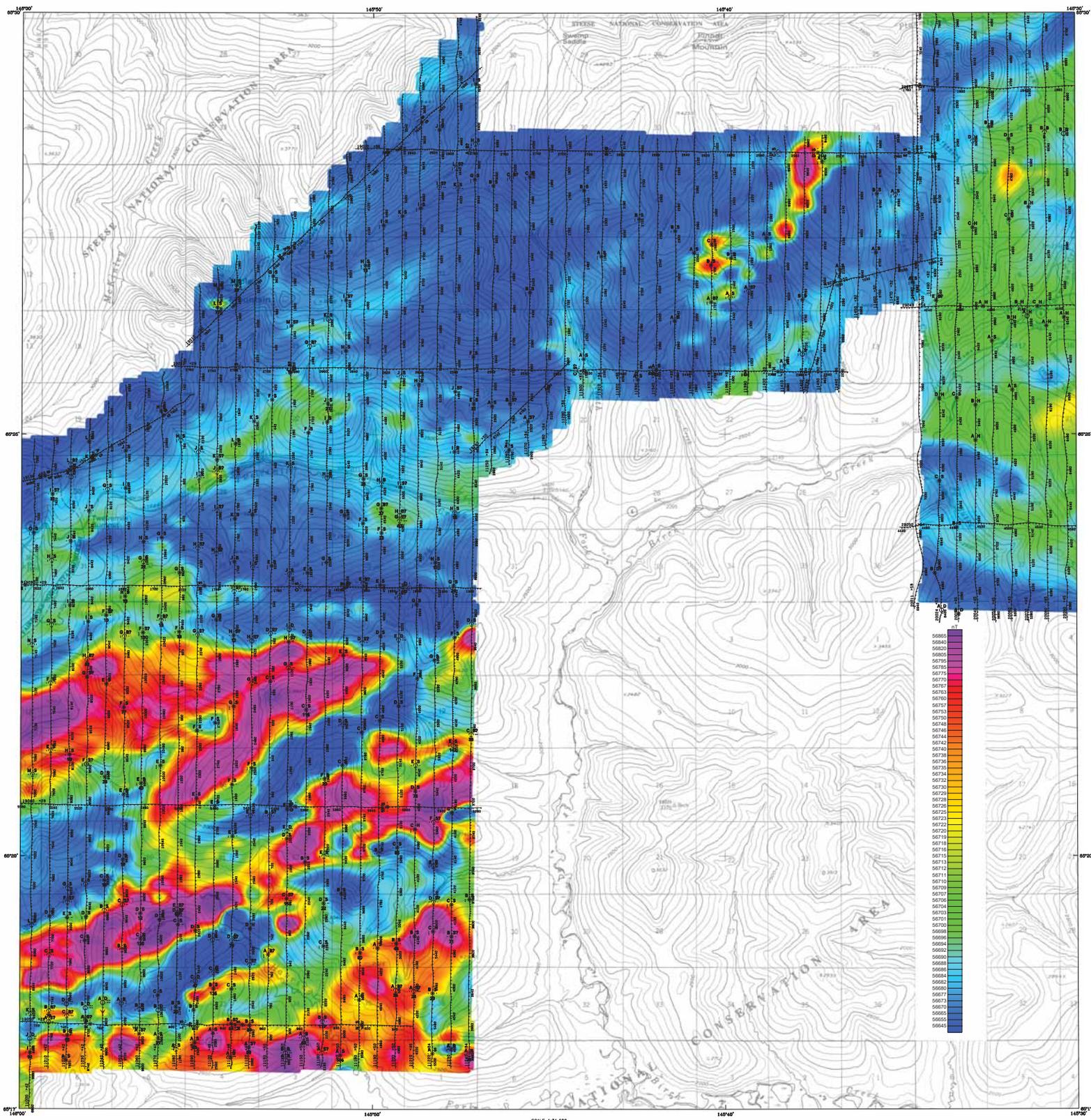
- EMAGNETIC ANOMALIES**
- Anomaly
 - Conductance
 - >100 siemens
 - 50-100 siemens
 - 20-50 siemens
 - 10-20 siemens
 - 5-10 siemens
 - 1-5 siemens
 - <1 siemens
 - Conductance anomaly
 - EM magnetic response

ELECTROMAGNETICS
To determine the location of EM anomalies or their boundaries, the DIGHEM EM system measured dipole and quadrature components at low frequencies. Two vertical coils were operated at 1000 and 2000 Hz. These low frequency dipole and quadrature data, sampled at 300, 700, and 1000 Hz, were processed at 0.1 second intervals. The EM system responds to bedrock conductors, conductive structures, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the conductive symbol assigned to each EM anomaly. The determination of the type of conductor is based on EM anomaly shapes of the conductive and quadrature responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

TOTAL MAGNETIC FIELD
The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to October 2006) using altimeter adjusted IGRF, (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Aina (1970) technique.

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 Stevens Exploration Management Corp. Airborne geophysical data for the new area were acquired and processed by Fugro Alaska Surveys Corp. in 2005.

This map and other products from this survey are available by mail order in person from DGGS, 3354 Collier Road, Fairbanks, Alaska 99709-3707. Published maps are also available for viewing or downloading on Adobe Acrobat files (.pdf) on our Web site (<http://www.dggs.dr.state.ak.us/pubs/>).



Base Data: U.S. Geological Survey Circle 3-4, 1984 Quadrangle, Alaska

SCALE 1:31,680
0.5 1 1.5 2 MILES
0.5 0.5 1 1.5 2 2.5 KILOMETERS

LOCATION INDEX FOR SCALE 1:31,680

TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

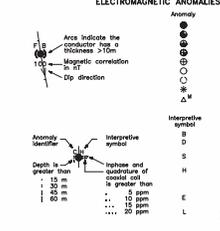
PART OF CIRCLE 3-4 QUADRANGLE

Laural E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp., 2006



DESCRIPTIVE NOTES
The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system and a Sottinex cesium magnetometer. The EM and magnetic sensors were flown at a height of 1000 to 2000 feet above the ground. In addition to the survey records data from a video camera, a Global Positioning System (GPS) was used to record the location of the aircraft. Flights were performed with an AS250C-2 Sottinex helicopter at a mean terrain clearance of 200 feet along N-S (0°) 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.

An Ashtech G24 NAVSTAR / GLONASS Global Positioning System (GPS) was used to determine the helicopter position was derived every 10 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 6) spheroid, 1927 North American datum using a central meridian (CM) of 147° 0' north, constants 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.



ELECTROMAGNETIC ANOMALIES

Conductance
 >100 siemens
 50-100 siemens
 20-50 siemens
 10-20 siemens
 5-10 siemens
 1-5 siemens
 <1 siemens
 Quantifiable anomaly
 EM magnetic response

Interpretive symbol
 B
 D
 S
 H
 E
 L

Conductor (Mode)
 Resistor conductor
 Narrow bedrock conductor
 Thin sheet
 Conductor cover (horizontal thin sheet)
 Broad conductive rock with thin conductive member (thin sheet)
 Type of broad conductor (edge of half space)
 Culture, e.g. power line, metal building or fence

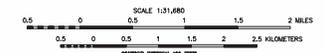
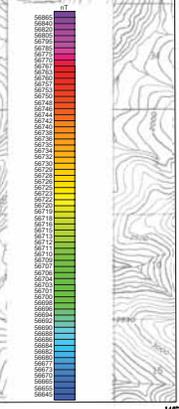
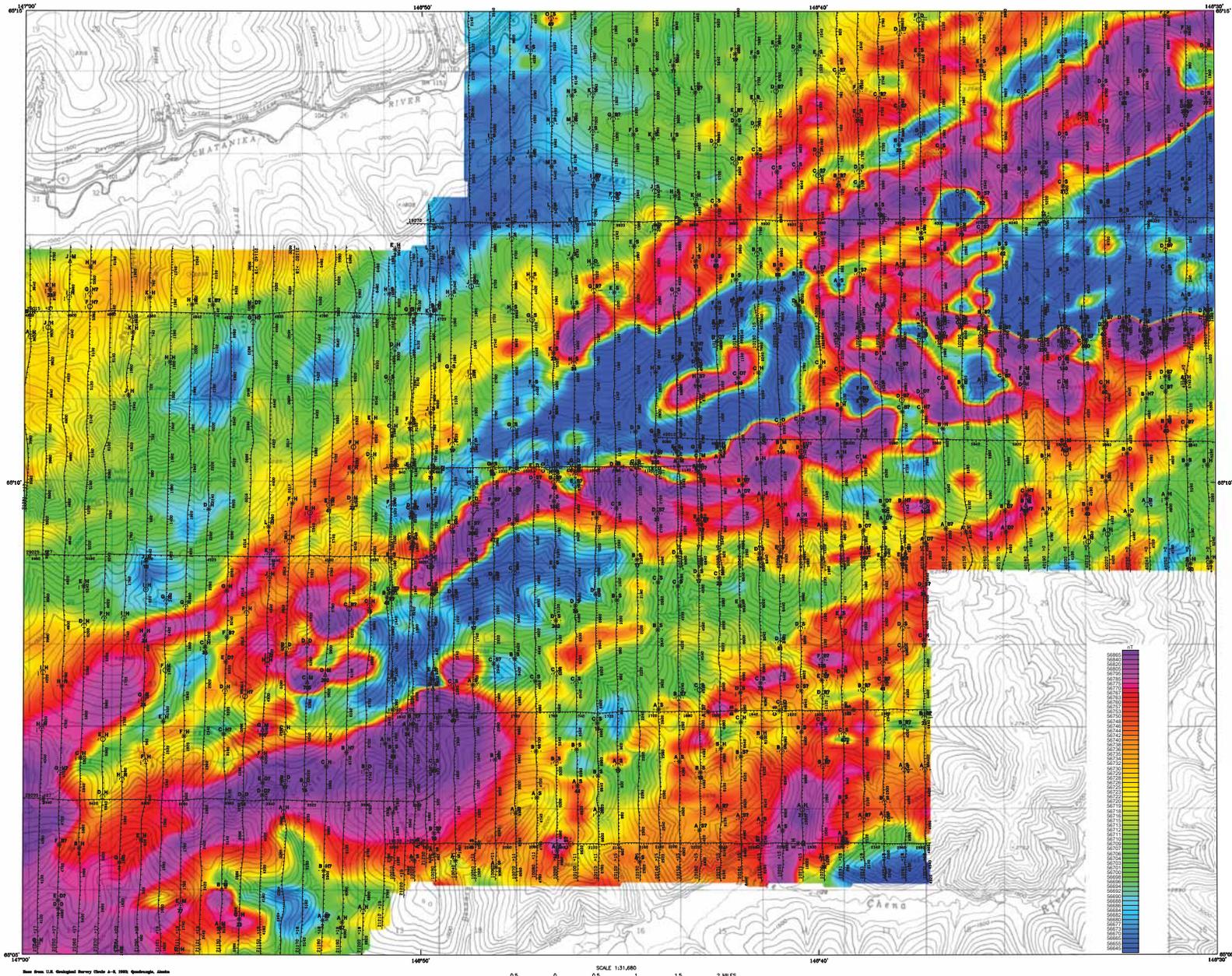
ELECTROMAGNETICS
To determine the location of EM anomalies or their boundaries, the DIGHEM EM system measured phase and quadrature components of five frequencies, two vertical coil-coil pairs operated at 1000 and 500 Hz above three horizontal coil-coil pairs operated at 200, 7500, and 30,000 Hz. EM data were processed on a per-line basis. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by the interpretive symbol attached to each EM response. Determination of the type of conductor is based on EM anomaly shapes of the position- and cross-sectional responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined to locate cultural sources.

TOTAL MAGNETIC FIELD
The magnetic total field contours were produced using digitally recorded data from a Sottinex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to October 2005) using datum adjusted IGRF (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

Alaska, N. 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. 588-592.

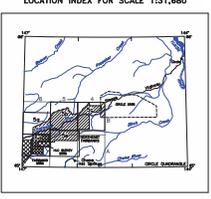
SURVEY HISTORY
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGG), and Stevens Exploration Management Corp. Airborne geophysical data for the new area were acquired and processed by Fugro Airborne Surveys Corp. in 2005.

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TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA PART OF CIRCLE A-6 QUADRANGLE

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006



DESCRIPTIVE NOTES

The geophysical data were acquired with a BIGHEM[®] Electromagnetic (EM) system and a Siroflex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a radar altimeter, GPS navigation system, 500/60 Hz monitor and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (D) survey flight lines with a spacing of approximately 3 miles. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

An Ahtech GQ24 NAVSTAR / GLONASS 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 Circle 1985 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of 147° 30 north constant of 0 and an east constant of 300,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

- ELECTROMAGNETIC ANOMALIES**
- Anomaly
 - Arcs indicate the conductor has a thickness >10m
 - Magnetic correlation
 - Dip direction
 - Anomaly identifier
 - Depth is greater than
 - 15 m
 - 30 m
 - 45 m
 - 60 m
 - Intensity symbol
 - Intensity
 - Intensity and location of coastal site
 - is greater than
 - 5 ppm
 - 10 ppm
 - 15 ppm
 - 20 ppm

- Conductivity**
- >100 siemens
 - 50-100 siemens
 - 20-50 siemens
 - 10-20 siemens
 - 5-10 siemens
 - 1-5 siemens
 - <1 siemens
 - Questionable anomaly
 - EM magnetic response
- Conductor ("bedrock")**
- Bedrock conductor
 - Native copper conductor ("hot spot")
 - Conductive layer ("horizontal line sheet")
 - Broad conductive rock unit, deep conductive weathering, local conductive zone
 - "Chlor" source?
 - Edge of target conductor
 - Large target conductor
 - Culture, e.g., sewer line, metal building or fence

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the BIGHEM[®] EM system measured dipole and quadrature components of the frequency. Two vertical coil-coil pairs operated at 1000 and 5000 Hz while three horizontal coil-coil pairs operated at 300, 7000, and 35,000 Hz. EM data were reported 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 aeromagnetic map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly shapes of the conductive and quadrature responses, together with conductor and magnetic patterns and topography. The power law monitor and the flight track video were examined to locate cultural sources.

TOTAL MAGNETIC FIELD

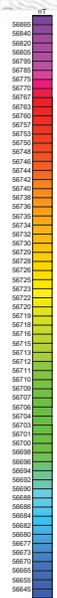
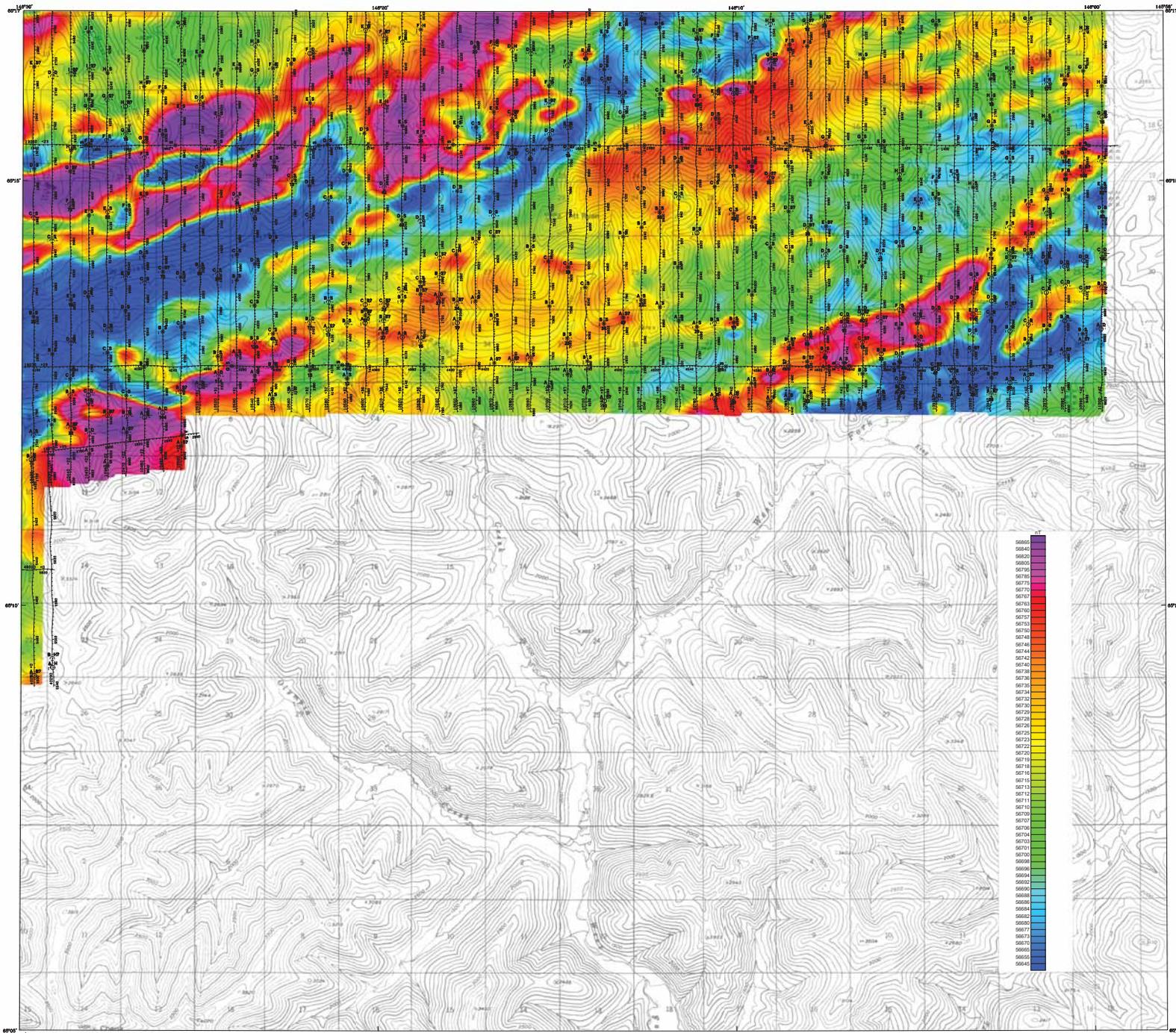
The magnetic total field contours were produced using digitally recorded data from a Siroflex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to October 2005) using altimeter adjusted IGRF, (3) leveled to the tie line data, and (4) interpolated onto a regular 50 m grid using a modified Akima (1970) technique.

Alkins, W., 1970. A new method of interpolating grid smooth curve fitting based on line procedure. *Journal of the Association of Computing Machinery*, v. 17, no. 4, p. 582-592.

SURVEY HISTORY

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SCALE 1:31,680
0 0.5 1 1.5 2 MILES
0.5 1 1.5 2 2.5 KILOMETERS

TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

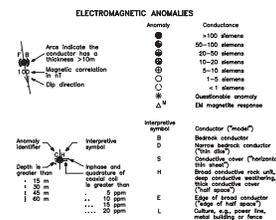
PARTS OF CIRCLE A-4, A-5, B-4 AND B-5 QUADRANGLES

by Laurel E. Burns, Fugro Airborne Survey Corp., and Stevens Exploration Management Corp., 2008



DESCRIPTIVE NOTES
The geophysical data were acquired with a DIXIE™ Electromagnetic (EM) system and a Schriber cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a GPS receiver, GPS navigation system, 50/60 Hz monitor and video camera. Flights were performed with an Airbus® 330-300 aircraft at a flight terrain clearance of 200 feet along N-S (0°) survey flight lines with a spacing of 1/4 to 3/8 of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 5 miles.

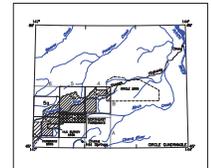
An Ashbach G24 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using a real-time kinematic (RTK) system to a relative accuracy of better than 5 m. Flight path positions were projected onto the Circle 1986 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of 147° 00' 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.



ELECTROMAGNETICS
To determine the location of EM anomalies or their boundaries, the DIXIE™ EM system measured in-phase and quadrature components of the frequency, two vertical and three horizontal coplanar coils oriented at 300, 700, and 1600 Hz. The coils were spaced at 1000 and 2000 Hz and 1000 Hz were spaced at 1000 and 2000 Hz and 1000 Hz were spaced at 1000 and 2000 Hz. The EM system response to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the interpretive map by the interpretive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM anomaly slopes of the in-phase and quadrature response, together with geological and other information. The power the monitor and the flight track video were examined to locate cultural sources.

TOTAL MAGNETIC FIELD
The magnetic total field contours were produced using digitally recorded data from a Schriber cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to October 2005) using altitude adjusted IGRF, (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

Alaska, 1983, a new method of interpretation and ground truth (GPS based) to local structures, normal to the determination of magnetic location, p. 11, 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 Survey (DGG&G), and Stevens Exploration Management Corp. acquired geophysical data for the area were flown in 2002, processed by Fugro Airborne Survey in 2003.

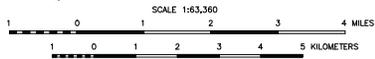
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**INTERPRETATION MAP
OF THE NORTHEAST FAIRBANKS AREA,
FAIRBANKS AND CIRCLE MINING DISTRICTS,
INTERIOR ALASKA**

PARTS OF CIRCLE QUADRANGLE

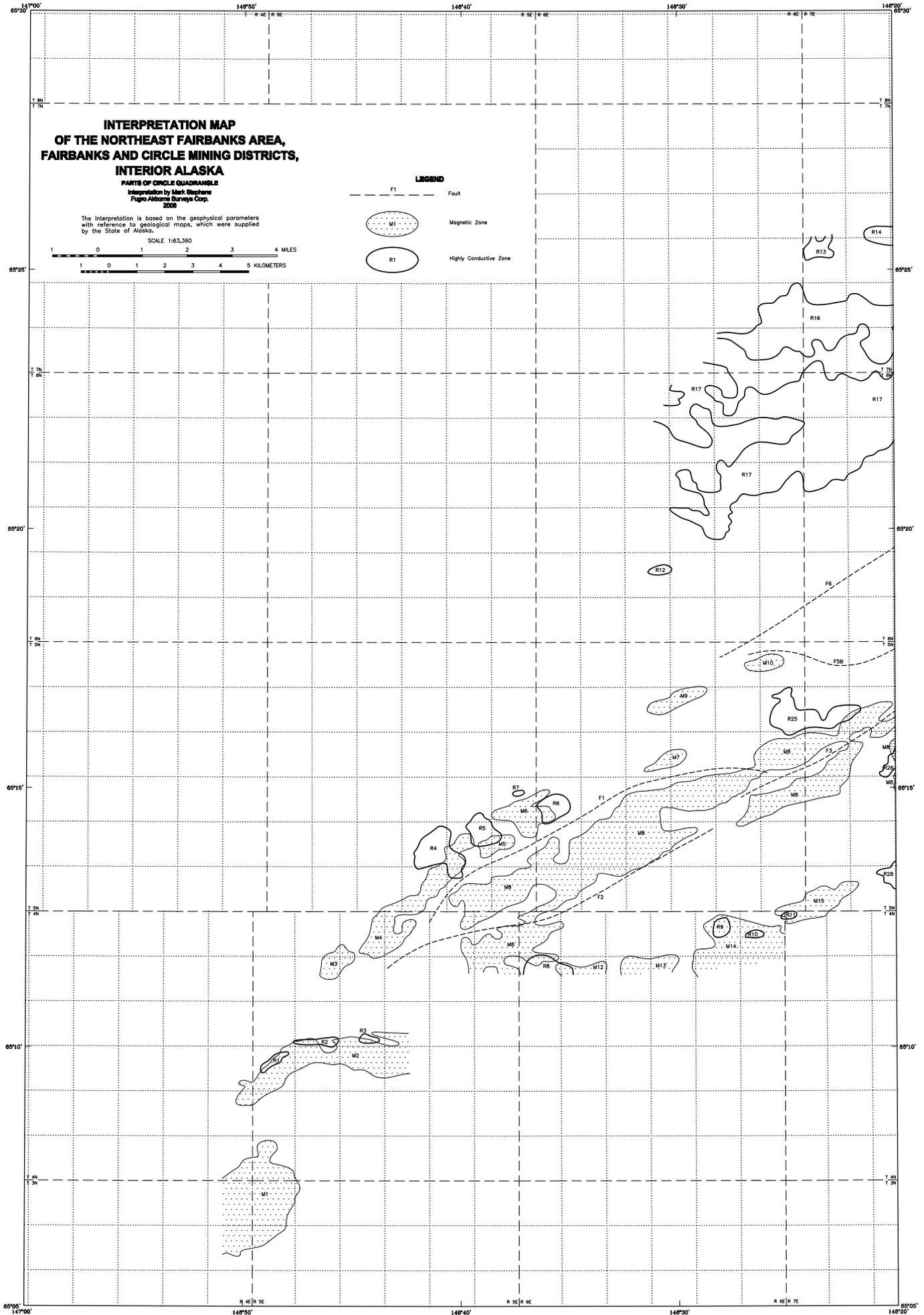
Interpretation by Mark Stephens
Fugro Altagis Surveys Corp.
2006

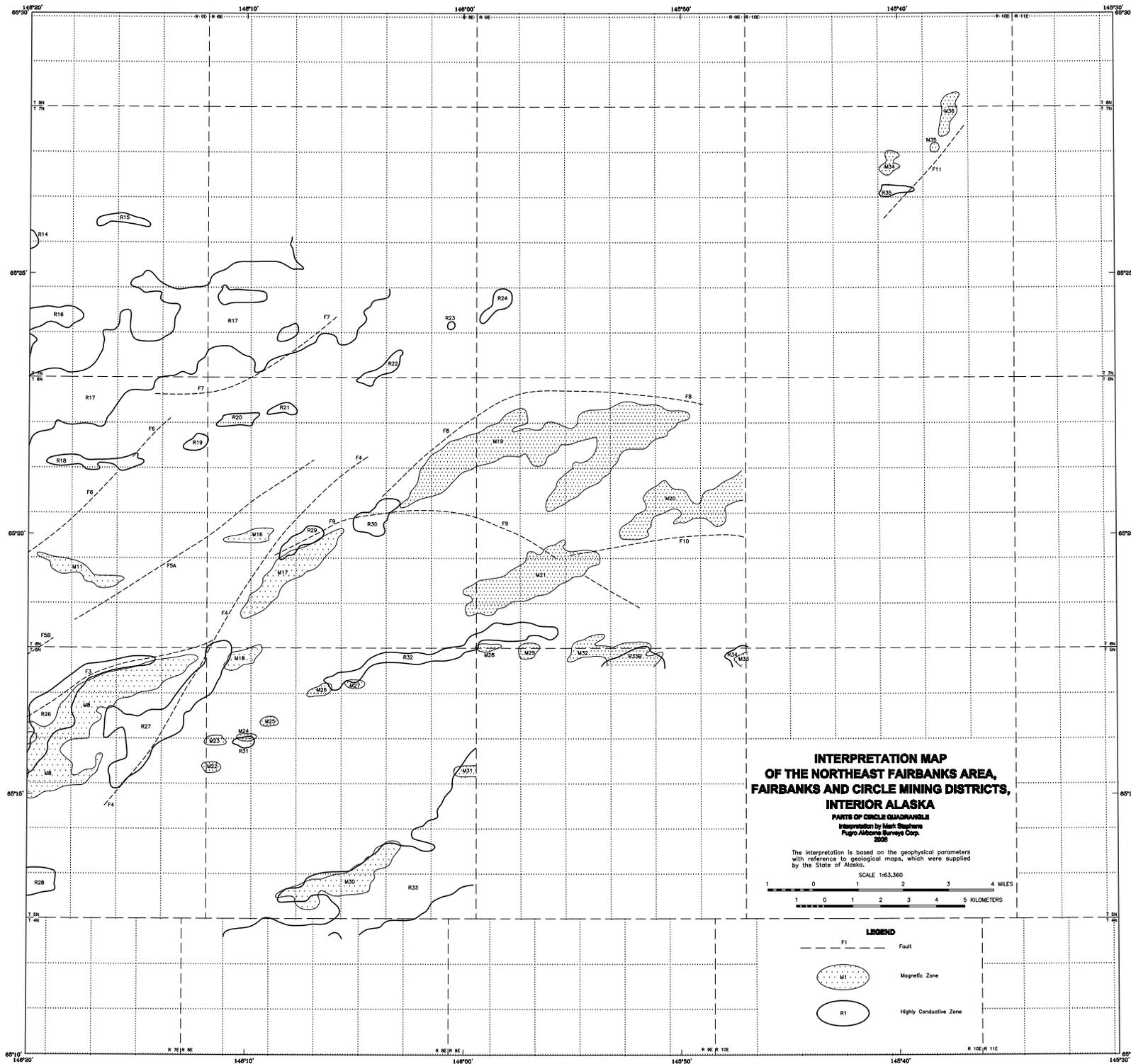
The interpretation is based on the geophysical parameters with reference to geological maps, which were supplied by the State of Alaska.



LEGEND

- F1 Fault
- M1 Magnetic Zone
- R1 Highly Conductive Zone





**INTERPRETATION MAP
OF THE NORTHEAST FAIRBANKS AREA,
FAIRBANKS AND CIRCLE MINING DISTRICTS,
INTERIOR ALASKA**

PARTS OF CIRCLE QUADRANGLE
Interpretation by Mark Stephans
Fugro Alaskan Surveys Corp.
2006

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

