

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.

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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>

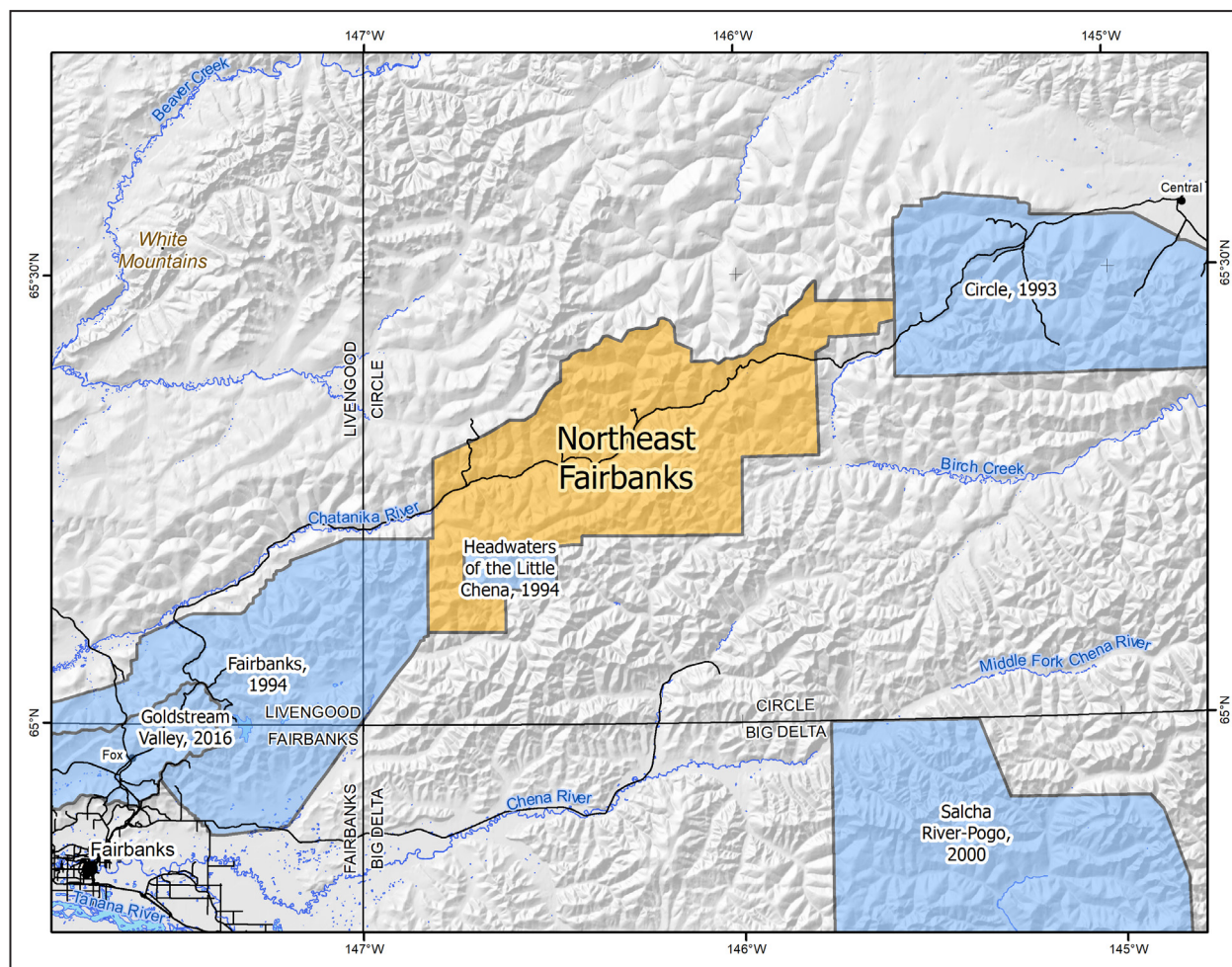


Figure 1. Alaska survey location map. Northeast Fairbanks electromagnetic and magnetic airborne geophysical survey location shown in interior Alaska (inset). Regional survey location map. Northeast Fairbanks survey area shown with adjacent DGGs geophysical surveys, landmarks, relevant 1:250,000-scale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



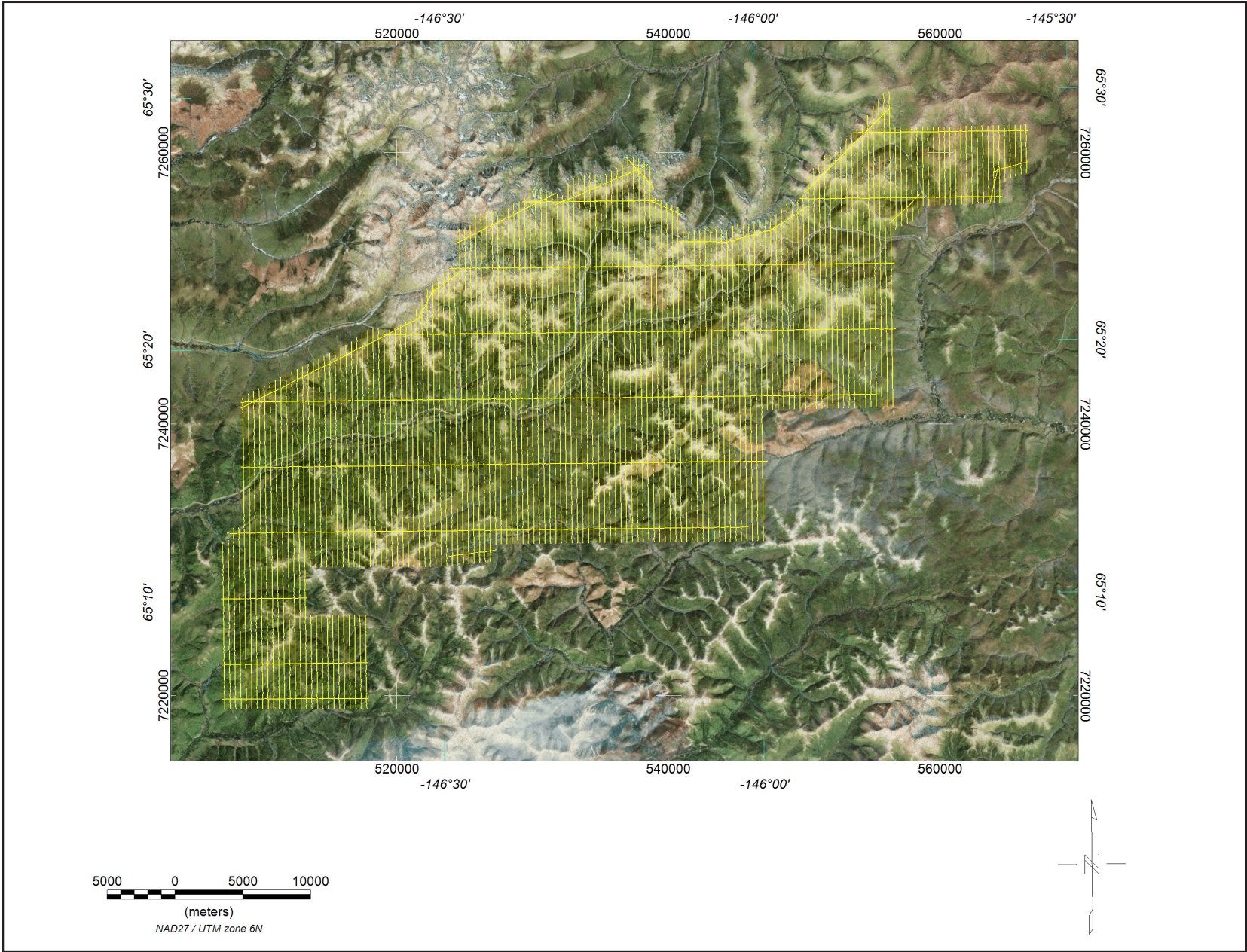


Figure 2. Flight path with orthometric image.

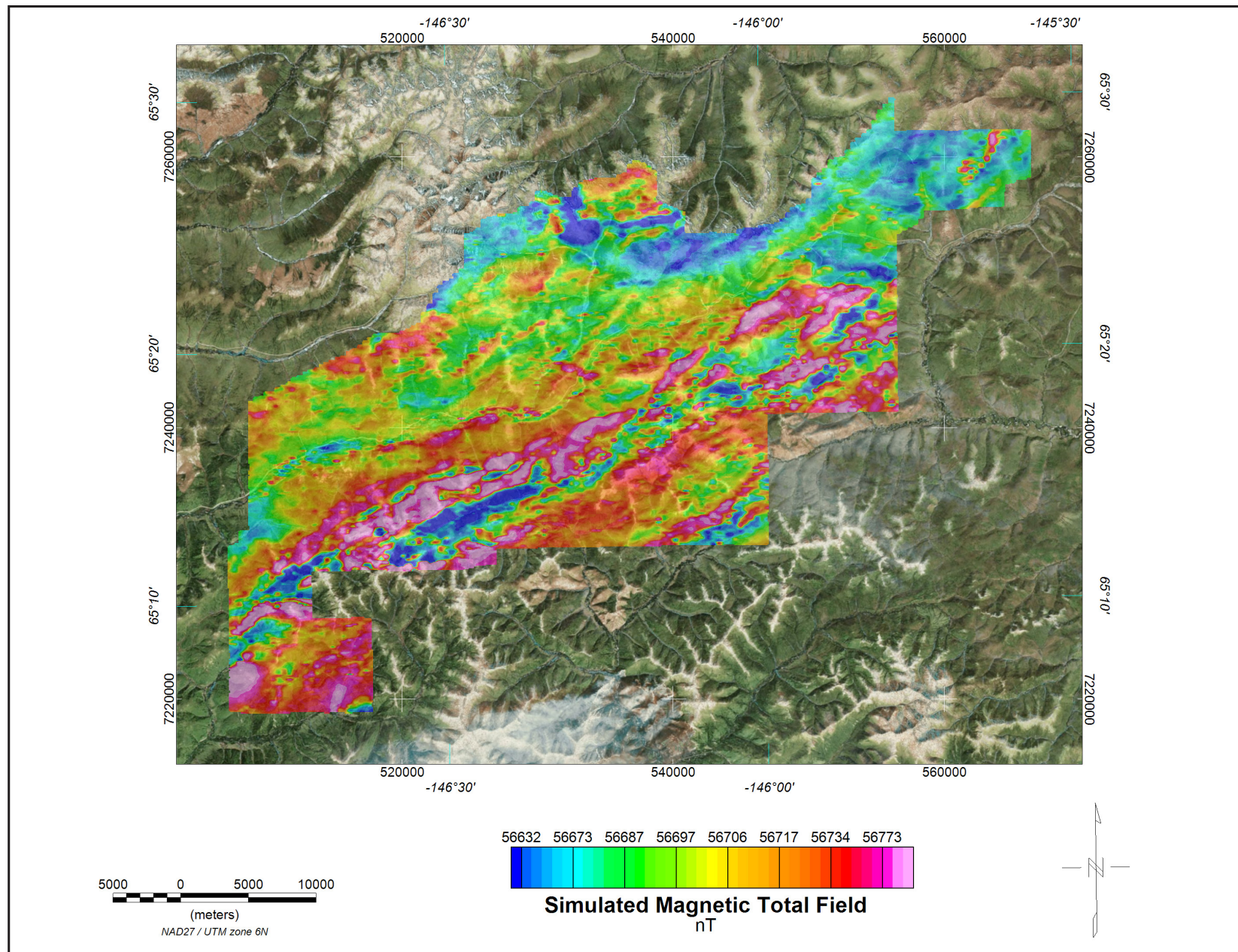


Figure 3. Simulated magnetic total field grid with orthometric image. The magnetic total field data were processed using digitally recorded data from a Scintrex cesium CS2 magnetometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations 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.

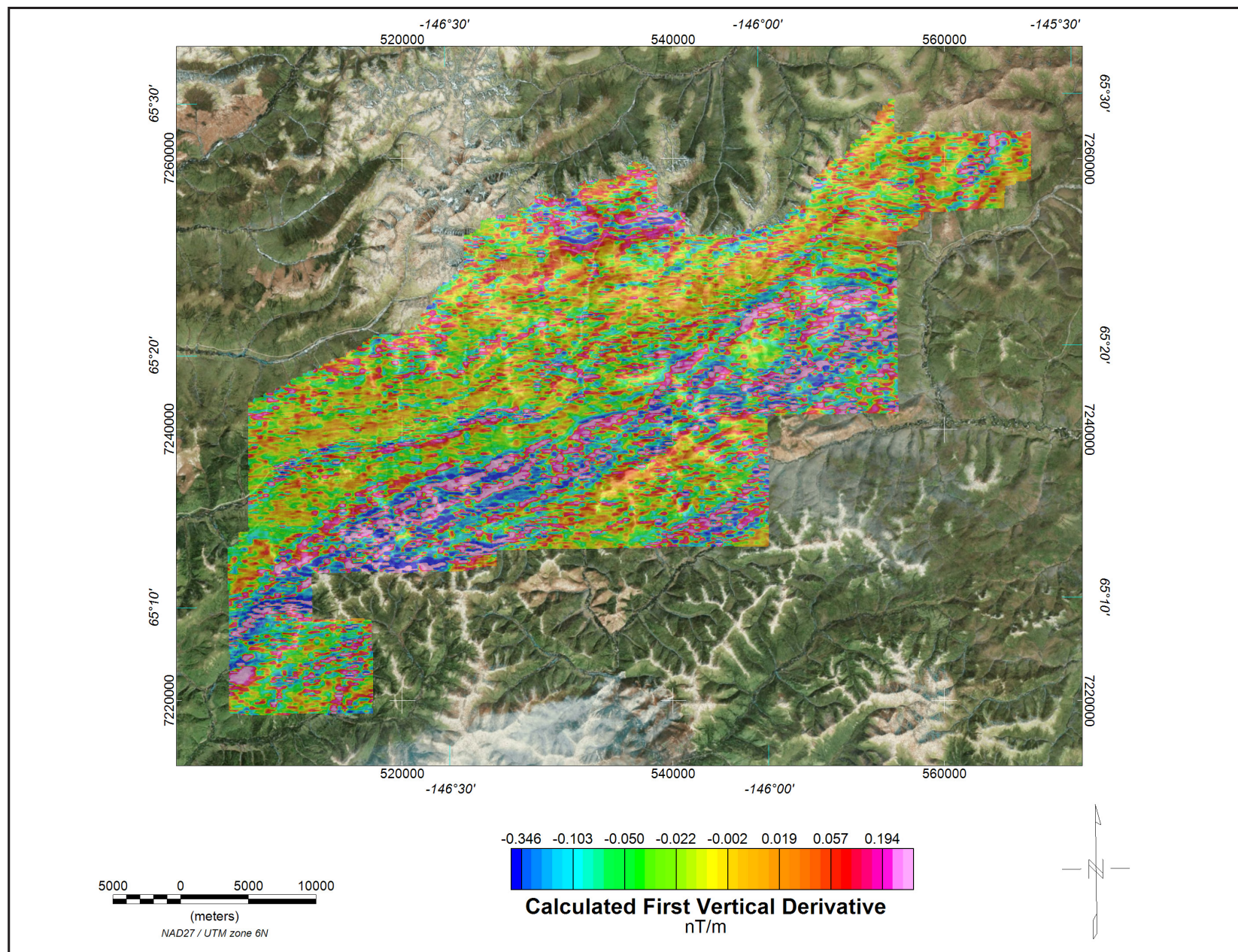


Figure 4. Calculated first vertical derivative grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides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

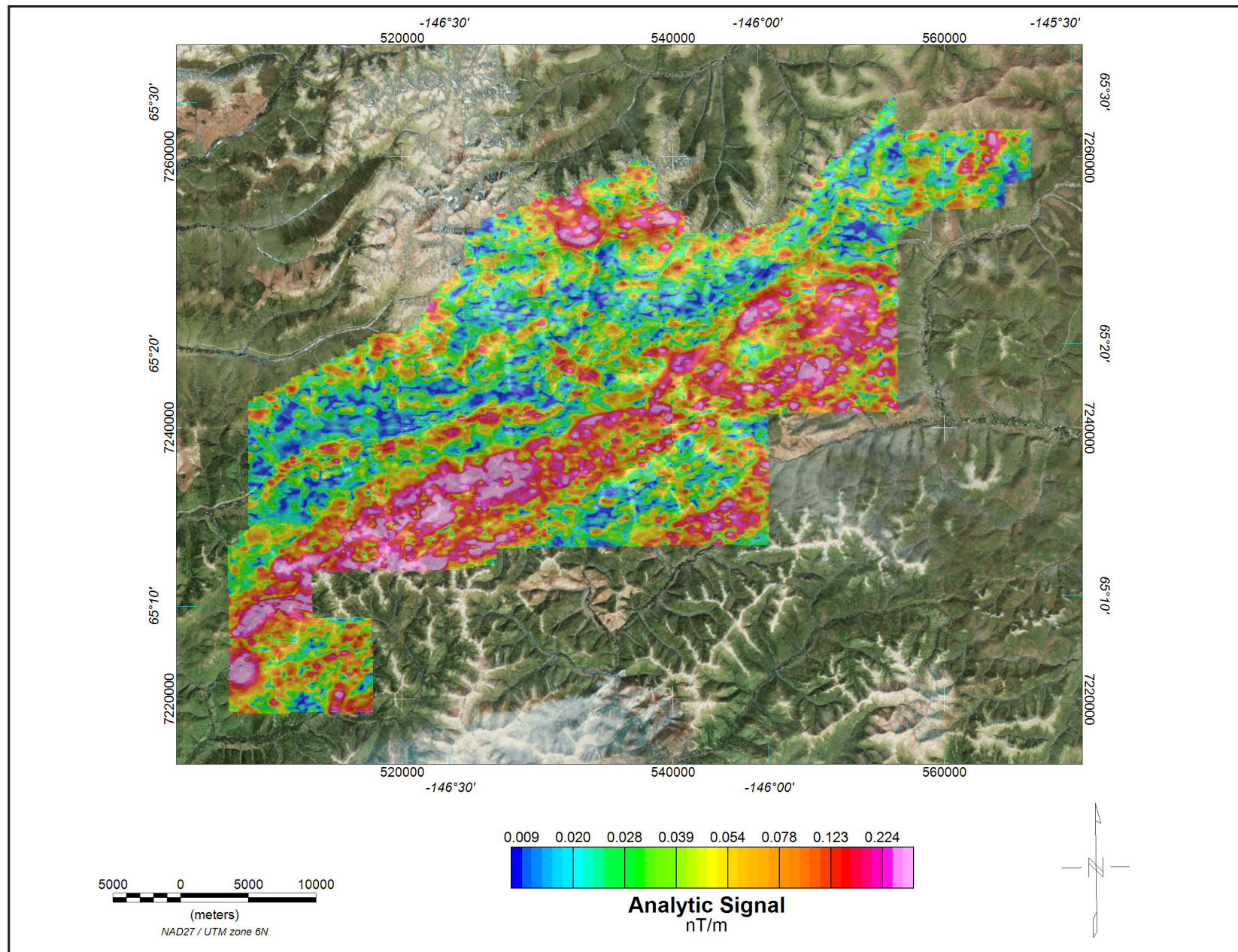


Figure 5. Analytic signal grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source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

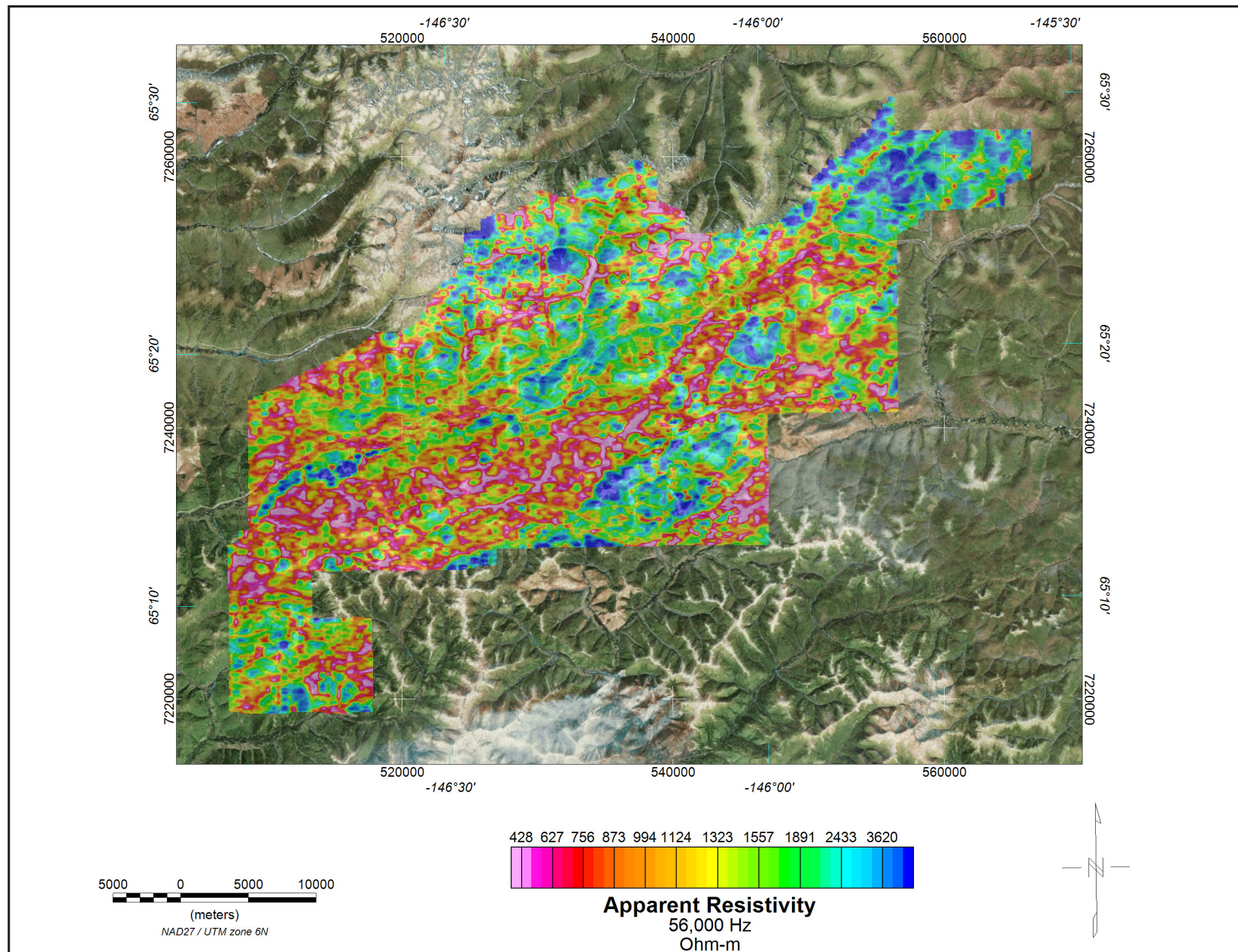


Figure 6. 56,000 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and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

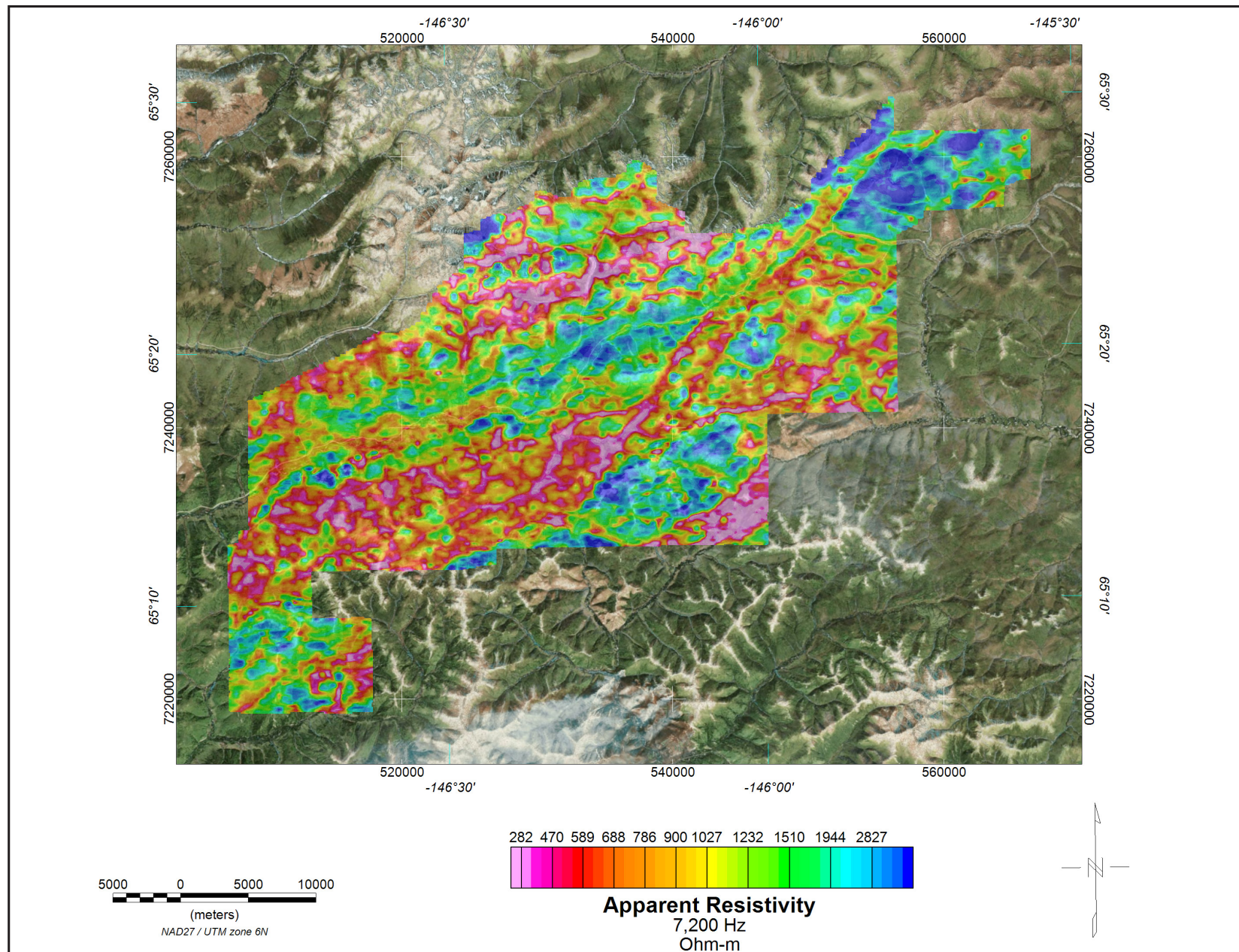


Figure 7. 7,200 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000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

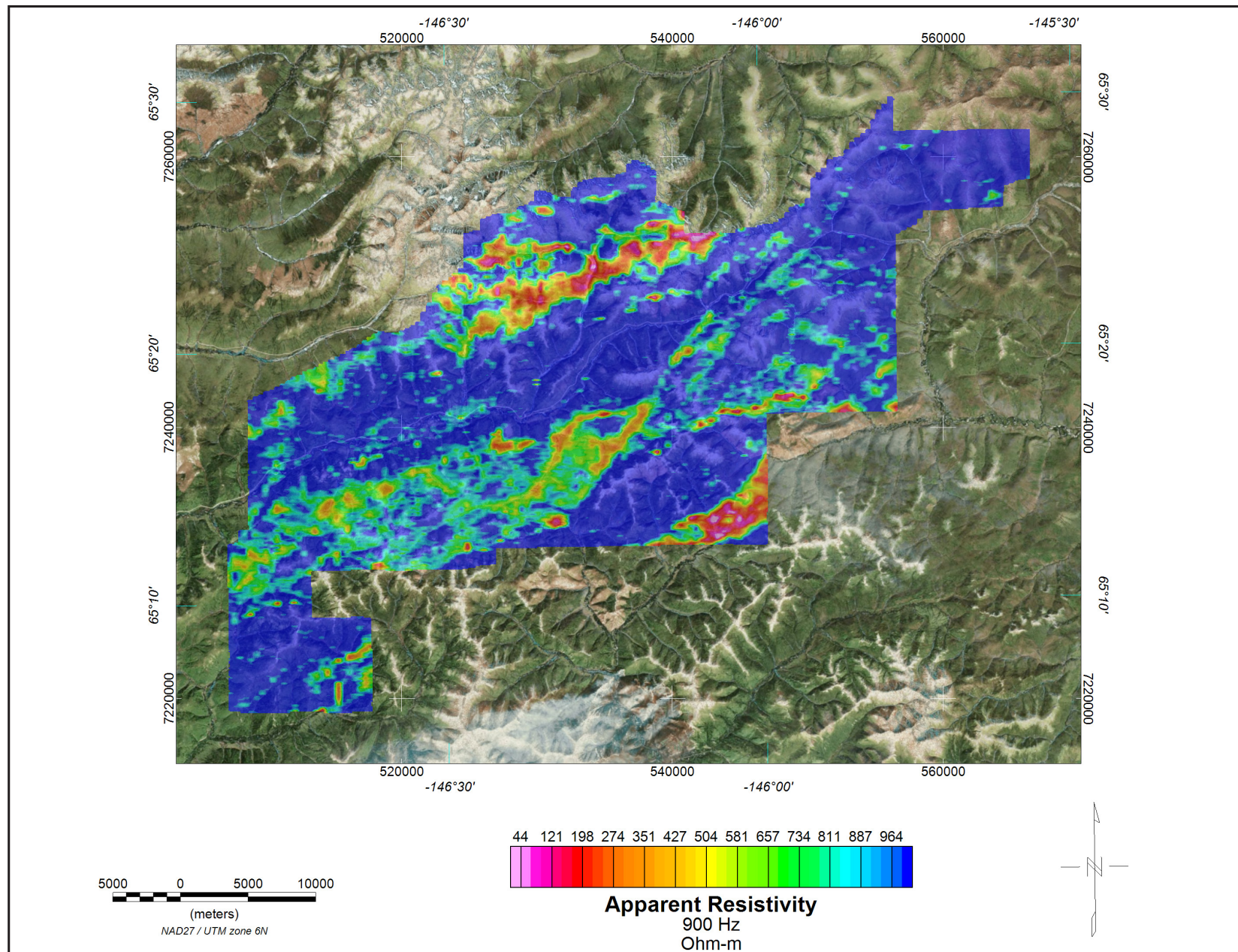
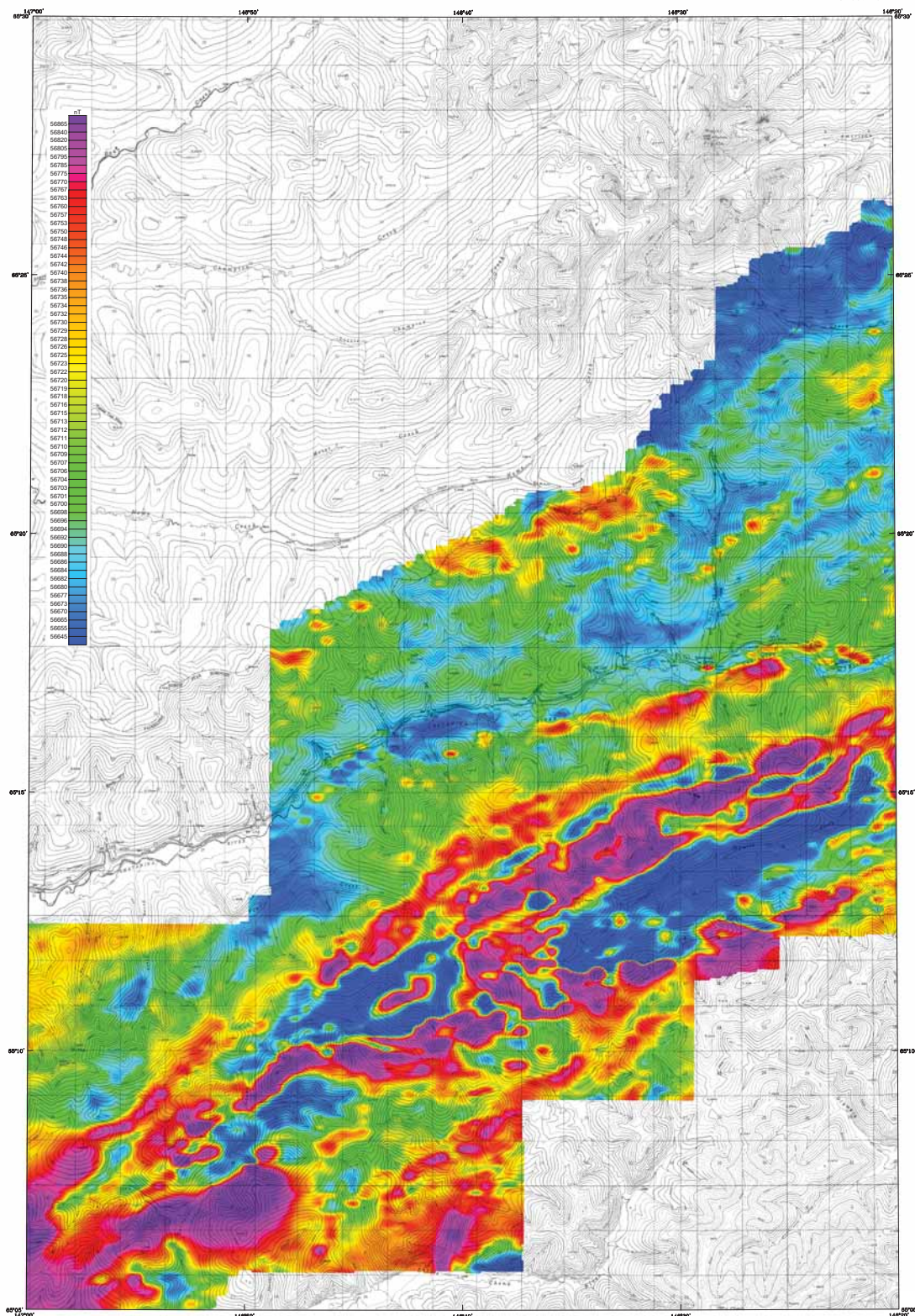


Figure 8. 900 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM^V EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1,000 and 5,500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 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-1, 1985, 2-A, 1985
 2-C, 1985, 2-D, 1985 (Geological Atlas)



DESCRIPTIVE NOTES

The geophysical data were acquired with a BIGHAM® Electromagnetic (EM) system and a Sinterx cesium magnetometer. The EM system 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 Aerotach 0024 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 relative accuracy of 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 OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

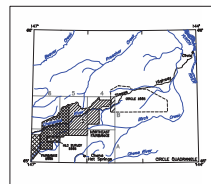
by
 Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
 2006

TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Sinterx 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 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.

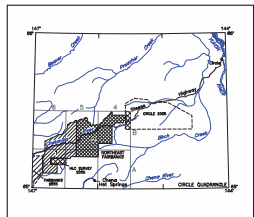
Alaska, 1970, in the *Journal of the Association of Computing Machinery*, v. 15, no. 4, p. 588-592.

LOCATION INDEX



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 Surveys Corp. in 2005. This map and other products from this survey are available for mail order in person from DGGS, 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.dggs.dnr.state.ak.us/pub/>).



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

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.

The geophysical data were collected with a DIGHEM Electromagnetic (EM) system and a SolTrac cesium magnetometer. The EM and magnetic sensors were towed by a 100-m cable. The data were recorded on a tape recorder data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and a 1000 Hz 12-bit A/D converter. The data were collected on AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey lines. The survey lines were spaced at 1000 ft (0.31 mile). The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

An Aestech GQ24 NAVSTAR / GLOSSAR Global Positioning System (GPS) was used to determine the helicopter position was derived every 0.5 seconds using post-flight differential positioning to a set of ground stations. The GPS data were collected at positions were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum. The datum was set to a height of 1000 ft, a constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10 m.

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PARTS OF CIRCLE QUADRANGLE

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

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.

Aikma, 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.

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

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by
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2008

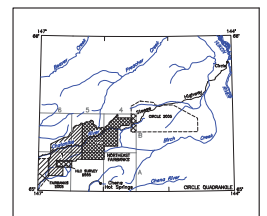
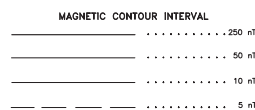
DESCRIPTION

The geophysical data were acquired with a DICHWY Electromagnetic (EM) system and a Sinterex cesium magnetometer. The EM and magnetic sensors were connected to a computer system that recorded the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz magnetic anomaly gradient system, and a magnetic compass. The data were collected using a computer system with an AS350B-2 Suroi helicopter at a mean terrain elevation of 1000 m. The flight lines were spaced at 100 m flight lines with a spacing of a quarter of a degree in the north-south direction. The flight lines intersect at intervals of approximately 10 miles.

An Ashtech GG24 NAVSTAR / GLOMAG Global Positioning System was used for navigation. The system was used to record the position of the helicopter using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were recorded using a GPS receiver (Trimble 4700) with a 100 Hz update rate. The system was used to record the position of the helicopter using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were recorded using a GPS receiver (Trimble 4700) with a 100 Hz update rate. The system was used to record the position of the helicopter using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path positions were recorded using a GPS receiver (Trimble 4700) with a 100 Hz update rate.

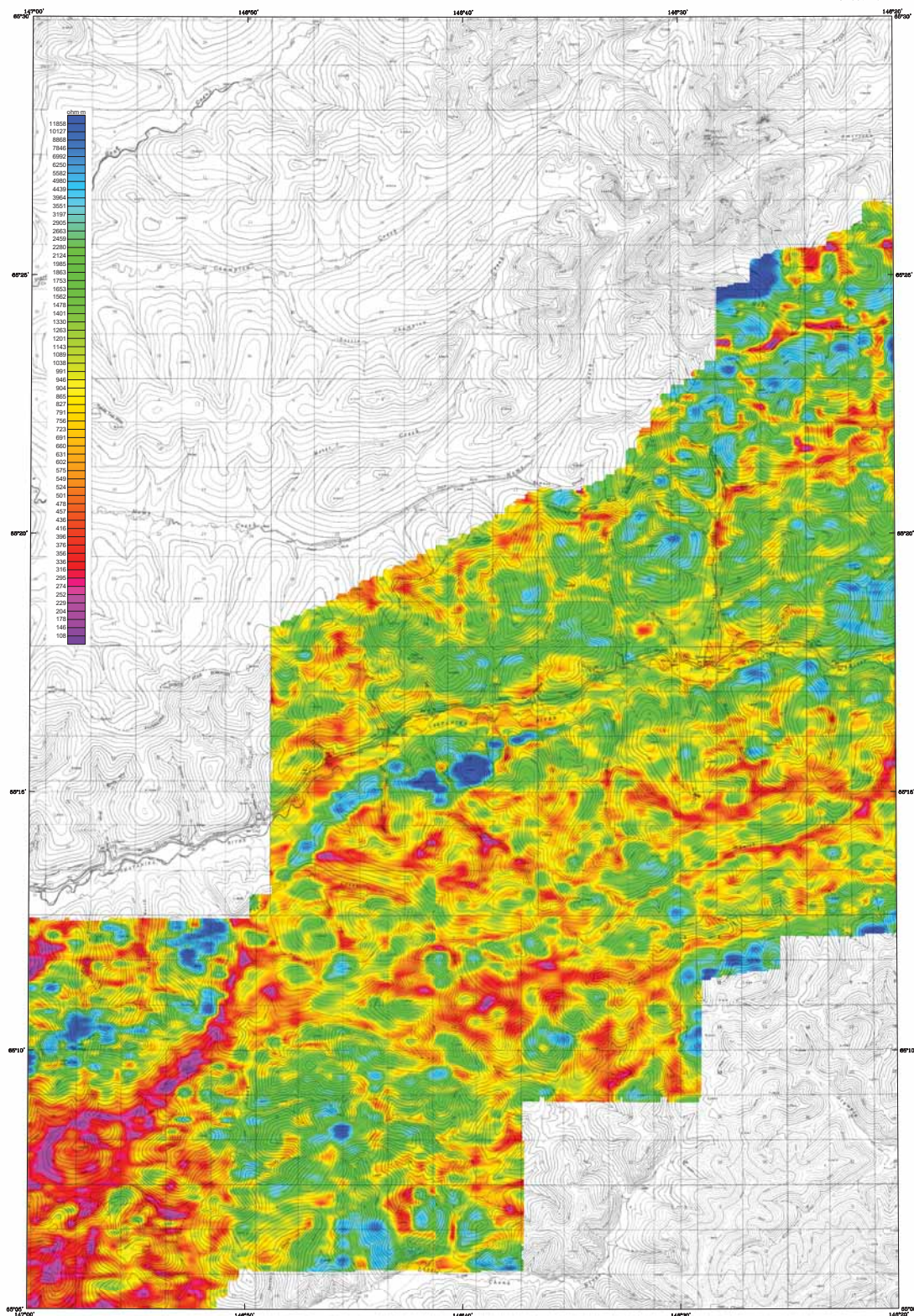
The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS2 magnetometer, with a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted 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 the Association of Computing Machinery*, v. 17, no. 4, p. 589-602.

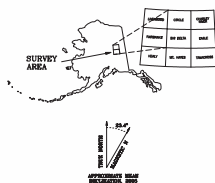


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Base Map: U.S. Geological Survey, Ortho A-H, 1983; A-H, 1985
B-C, 1985; D-F, 1975; Geomagnetic, Alaska



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

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

DESCRIPTIVE NOTES

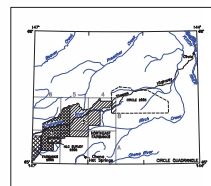
The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sinterex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a real-time differential GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (7°) 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 updated every 0.5 seconds using post-flight differential positioning to a reference station. The reference station ground positions were projected onto the Clarke 1966 UTM zone 6 (spatial, 1977 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 the horizontal coplanar coil-pairs operated at 600, 700 and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system response is to both conductive overburden, and cultural sources. Apparent resistivity is presented 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.

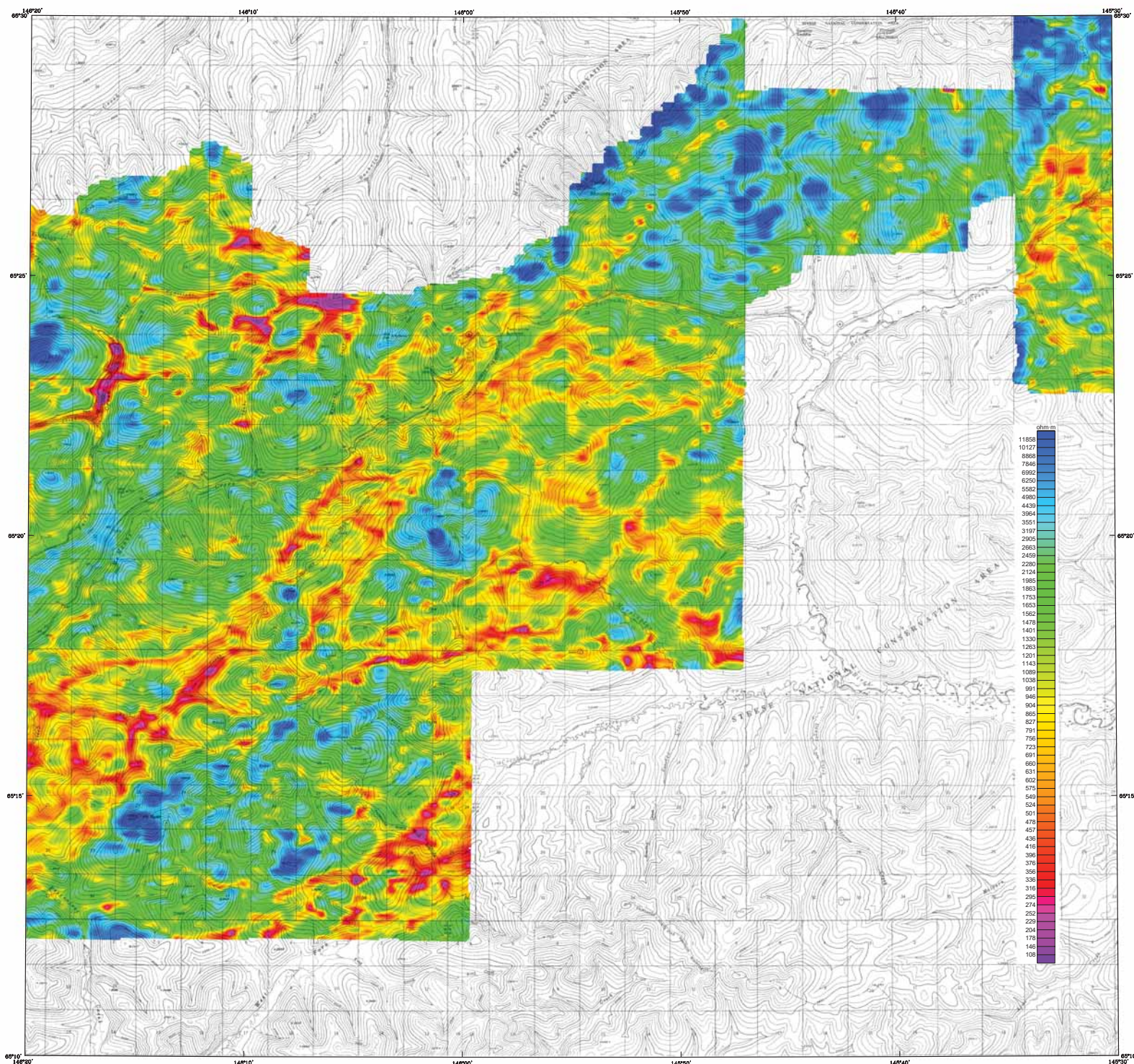
AKIMA, H. 1970. A new method of interpolation. *Int. J. Numer. Anal. in Geomechanics*, v. 1, no. 4, 310-320.

LOCATION INDEX



SURVEY HISTORY

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Base from U.S. Geological Survey Circle 4-4, 1970; 4-4, 1980;
5-4, 1984; 5-4, 1982; and 1984, Alaska.



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 (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 / 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°, 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.

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

PARTS OF CIRCLE QUADRANGLE

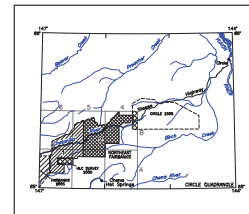
by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006

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.

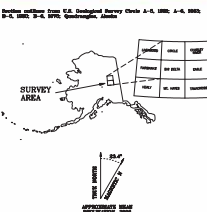
Aluma, H., 1970, A new method of interpolation and smooth curve fitting based on local generalized average of the neighborhood of Computing Machinery, v. 17, no. 4, p. 589-602.

LOCATION INDEX



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 Airborne Surveys Corp. in 2005. This map and other products from this survey are available by mail order in person from DGGS, 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.dggs.dnr.state.ak.us/pubs/>).



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

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sintercess cesium magnetometer. The EM and magnetic sensors were towed by a helicopter. The EM system recorded the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and a 1000 Hz antenna. The helicopter used was an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey lines. The flight altitude was 1000 feet. The flight lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

An Aantech GG24 NAVSTAR / GLONASS Global Positioning System (GPS) was used. The GPS helicopter position was derived every 0.5 seconds using post-flight differential positioning to a ground station. The GPS data were used to correct positions were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum. The datum was defined by a semi-major axis constant of 0 and an east constant of 500,000. Position accuracy of the presented data is better than 10 m.

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 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.

Contours in ohm-m at 10 intervals per decade

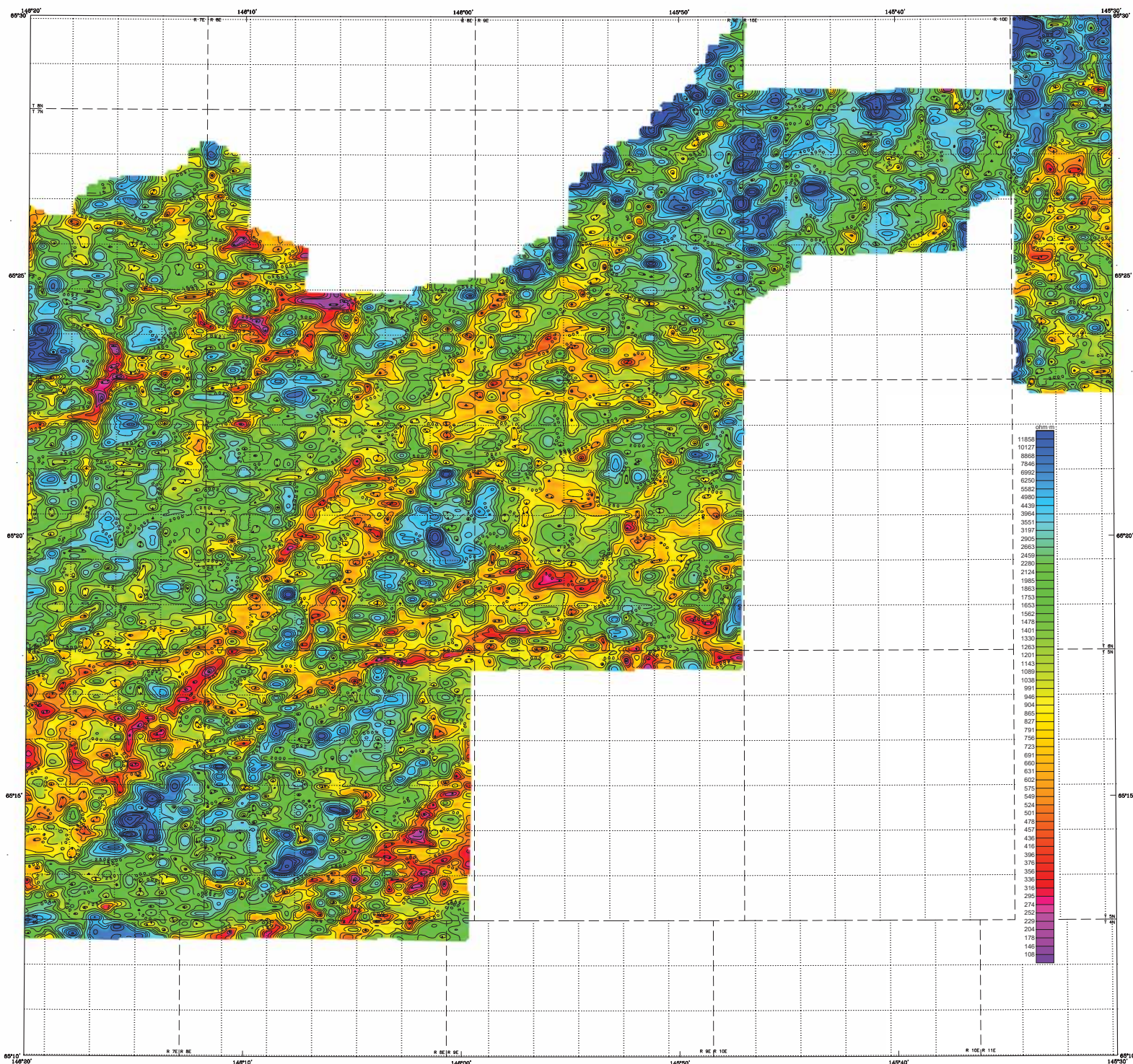
1000
800
600
500
400
300
250
200
150
125
100

reality loss

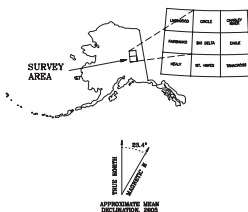
SURVEY HISTORY

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 Sitka Environmental Management Corp. Airborne geophysical data for the new area were acquired and processed by Fugro Airborne Surveys Corp. in 2005.

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Section 1666 from U.S. Geological Survey Circle 4-4, 1970; 4-5, 1981;
5-4, 1981; 5-5, 1986. Quadrangle, Alaska.



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 AS3500-2 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 / 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 18N) 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.

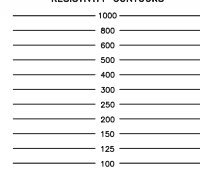
RESISTIVITY

The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coplanar coils operated at 1000 and 5000 Hz while three horizontal coplanar coils operated at 600, 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.

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

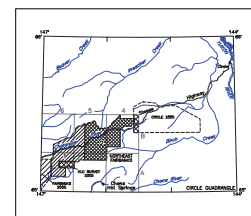
RESISTIVITY CONTOURS



Contours in ohm-m at 10 intervals per decade

..... resistivity low

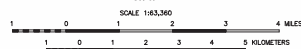
LOCATION INDEX



SURVEY HISTORY

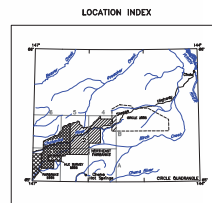
This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGG), and Stevens Exploration Management Corp. Airborne geophysical data for the new area were acquired and processed by Fugro Airborne Surveys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

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PARTS OF CIRCLE QUADRANGLE

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



The geophysical data were acquired with a DIGIMET Electromagnetic Induction (EMI) Solid State sodium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet, in addition to a Global Positioning System (GPS) real-time GPS navigation system, 50/60 Hz filters and monitors and a 1000 Hz data logger. The aircraft used was an AS350B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (0°) survey flight lines. The flight lines were spaced at 1/2 mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

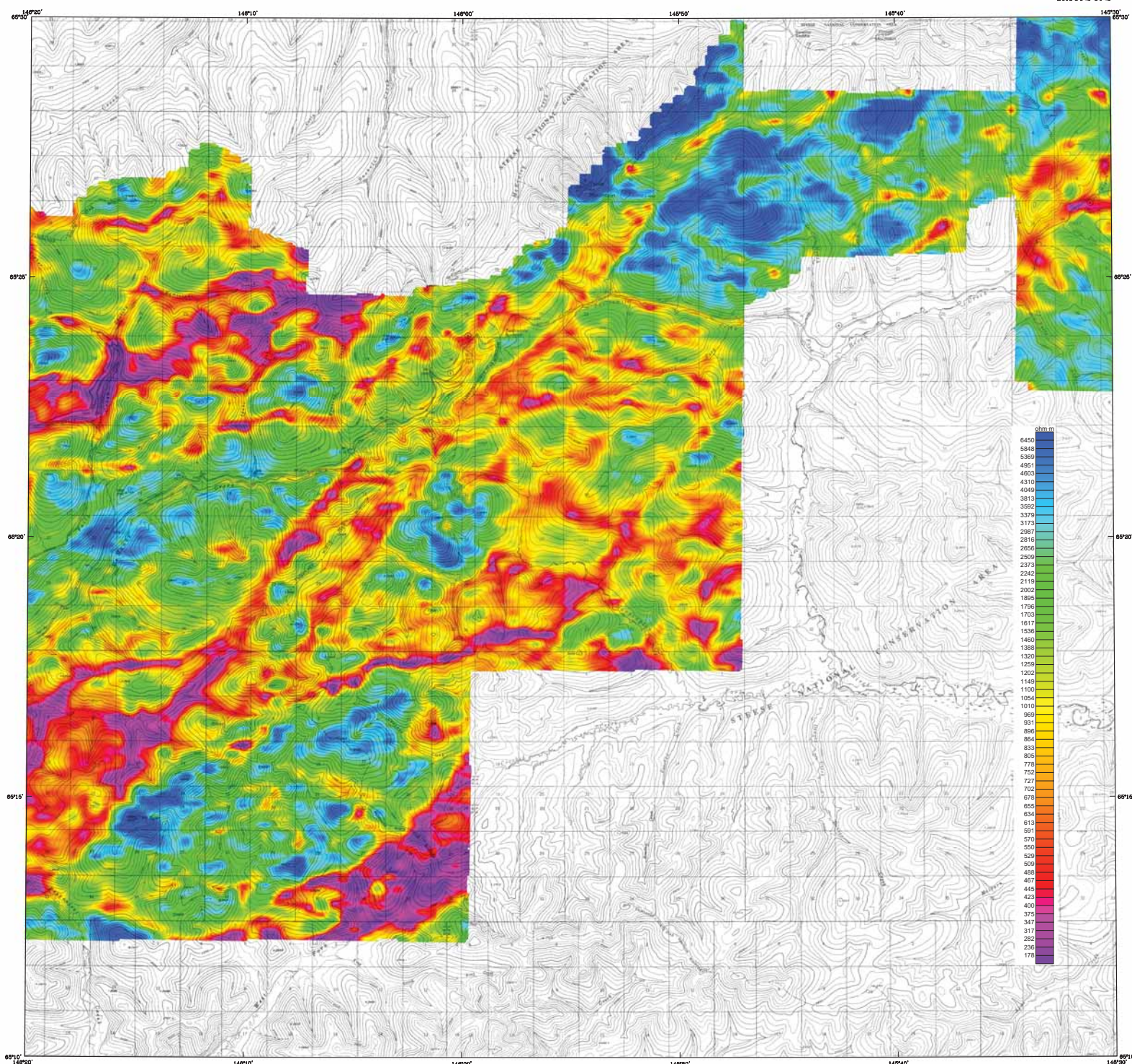
An Ashtech GG24 NAVSTAR / GLONASS Global Positioning System (GPS) receiver was used. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relay station. The GPS data were used to determine positions were projected onto the Clarke 1866 UTM zone 6) spheroid, 1928, with American datum. The datum was the Clarke (CM) datum, with a constant of 0 and an east constant of 500,000. The datum was used to convert the GPS data to within 10 m, with respect to the UTM grid.

The DIQHEM[®] 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.

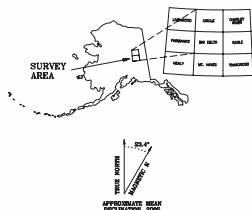
SURVEY HISTORY

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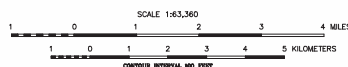
Derive from U.S. Geological Survey Circle 4-4, 1979, 4-5, 1981;
B-4, 1981; B-5, 1982; Quadragram, Alaska.



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 / GLOMASS 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° 30' 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.



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

PARTS OF CIRCLE QUADRANGLE

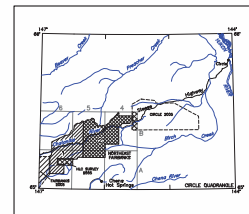
by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2005

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.

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

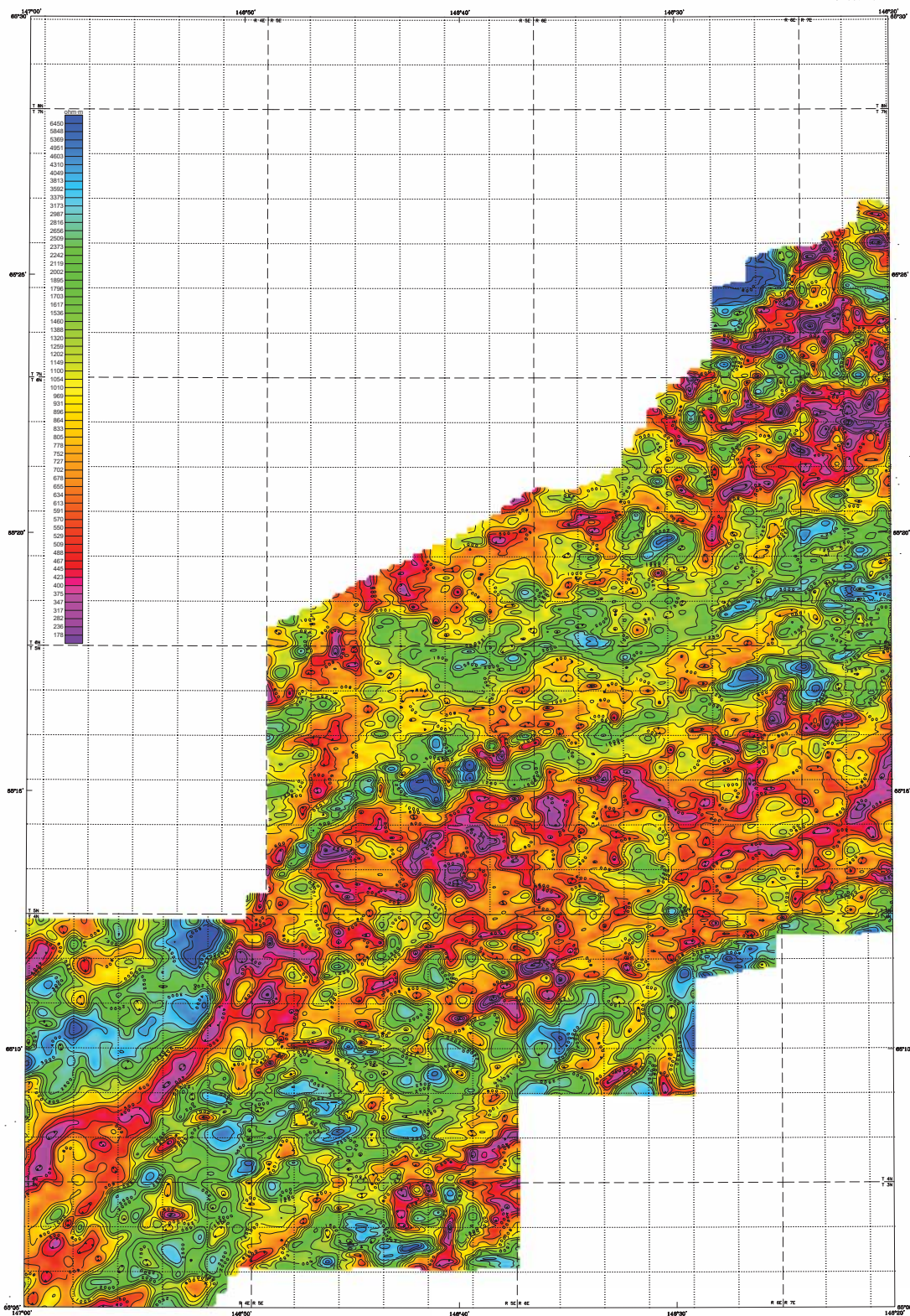
LOCATION INDEX



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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Resistivity contours from U.S. Geological Survey Data A-1, 1985, A-4, 1985, B-1, 1985, B-4, 1975, and Alaska, Alaska

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

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 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 system 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-3 helicopter at a mean terrain clearance of 200 feet along N-S (or E-W) 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.

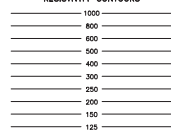
An Ashtech G224 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was recorded every 0.2 seconds using post-flight differential positioning to a reference station. The data were projected onto the Clarke 1966 (UTM zone 18) datum. The data were projected using 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.

RESISTIVITY

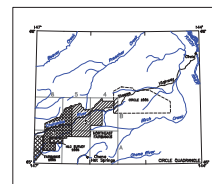
The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coil-coil pairs operated at 1000 and 5200 Hz, while three horizontal coil-coil pairs operated at 800, 1200, and 16,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to both conductive and resistive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature components 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 a new curve fitting technique. *Mathematics*, 17, 1, 103-108.

RESISTIVITY CONTOURS

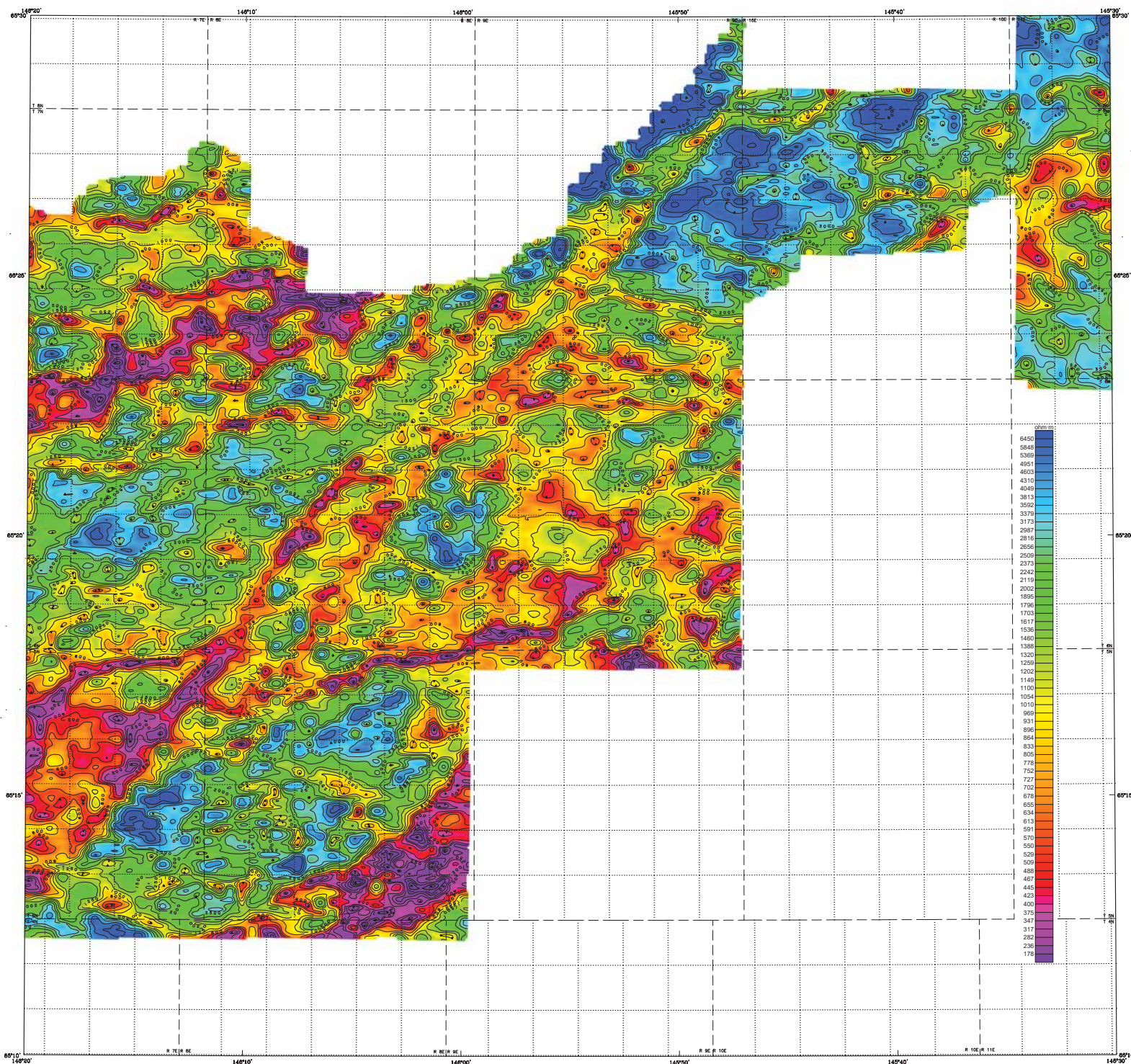


Contours in ohm-m. at 10 intervals per decade
..... reliability low

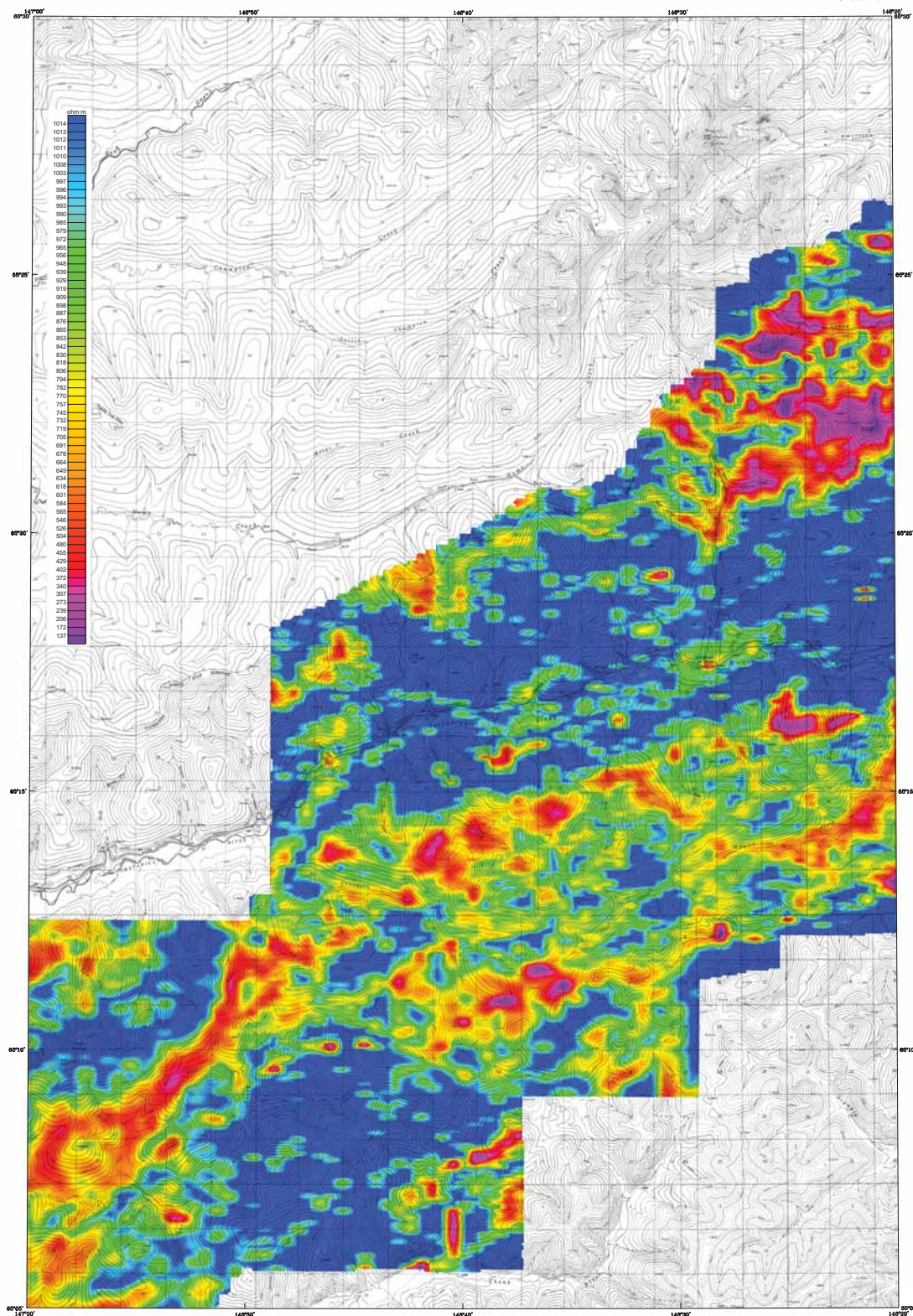


SURVEY HISTORY

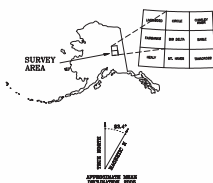
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Section outlines from U.S. Geological Survey Circles 4-4, 1970; 4-5, 1982; 4-6, 1984; 4-7, 1986; 4-8, 1988; 4-9, 1990; 4-10, 1992; 4-11, 1994; 4-12, 1996; 4-13, 1998; 4-14, 2000; 4-15, 2002; 4-16, 2004; 4-17, 2006; 4-18, 2008; 4-19, 2010; 4-20, 2012; 4-21, 2014; 4-22, 2016; 4-23, 2018; 4-24, 2020; 4-25, 2022; 4-26, 2024; 4-27, 2026; 4-28, 2028; 4-29, 2030; 4-30, 2032; 4-31, 2034; 4-32, 2036; 4-33, 2038; 4-34, 2040; 4-35, 2042; 4-36, 2044; 4-37, 2046; 4-38, 2048; 4-39, 2050; 4-40, 2052; 4-41, 2054; 4-42, 2056; 4-43, 2058; 4-44, 2060; 4-45, 2062; 4-46, 2064; 4-47, 2066; 4-48, 2068; 4-49, 2070; 4-50, 2072; 4-51, 2074; 4-52, 2076; 4-53, 2078; 4-54, 2080; 4-55, 2082; 4-56, 2084; 4-57, 2086; 4-58, 2088; 4-59, 2090; 4-60, 2092; 4-61, 2094; 4-62, 2096; 4-63, 2098; 4-64, 2100; 4-65, 2102; 4-66, 2104; 4-67, 2106; 4-68, 2108; 4-69, 2110; 4-70, 2112; 4-71, 2114; 4-72, 2116; 4-73, 2118; 4-74, 2120; 4-75, 2122; 4-76, 2124; 4-77, 2126; 4-78, 2128; 4-79, 2130; 4-80, 2132; 4-81, 2134; 4-82, 2136; 4-83, 2138; 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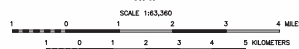
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DESCRIPTIVE NOTES

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 radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS300B-2 Squirrel helicopter at a mean terrain clearance of 200 feet along N-S (or E-W) 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 3 m. Flight path positions were projected onto the Clarke 1866 UTM zone 18 projection. 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.



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

PARTS OF CIRCLE QUADRANGLE

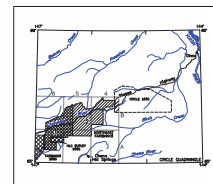
by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006

RESISTIVITY

The DIGHEM[®] EM system measured in-phase and quadrature components at five frequencies: two vertical coaxial coil-pairs operated at 1000 and 5000 Hz with 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 surface conductors, including overburden, and cultural sources. Apparent resistivity is the complex ratio of the voltage to the current in the coil-pairs. The data were interpolated onto a regular 80 m grid using a modified Alamo (1970) technique.

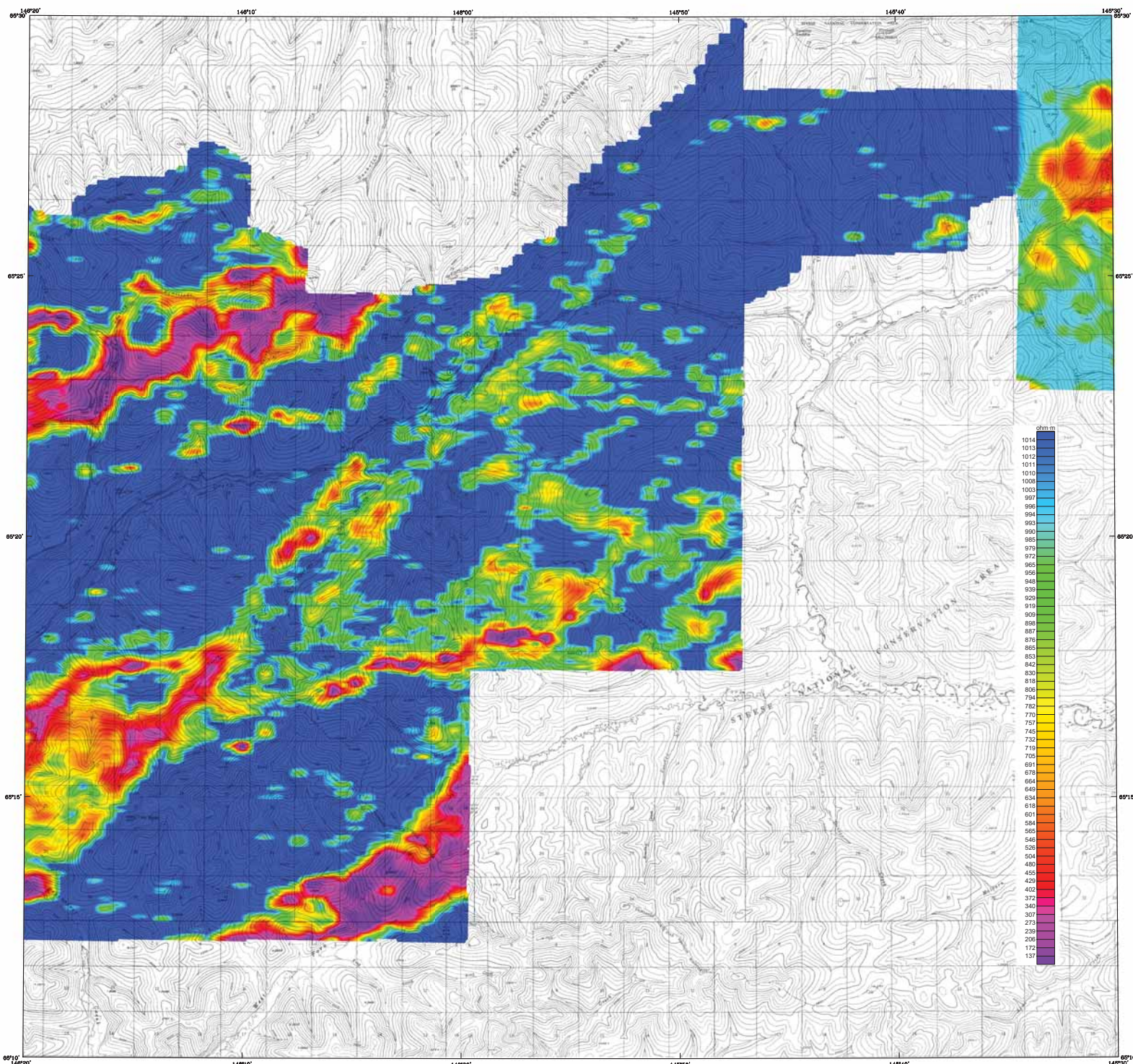
Alamo, L.L. 1970. A new method of interpolation and smooth curve fitting based on the minimum variance principle. *Journal of the American Association of Petroleum Geologists*, v. 11, no. 4, p. 858-865.

LOCATION INDEX



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 Airborne Surveys Corp. in 2005. This map and other products from this survey are available by mail order in person from DGGS, 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.dggs.dnr.state.ak.us/pubs/>).



From U.S. Geological Survey Circle 4-4, 1970; 4-4, 1980;
5-4, 1980; 5-4, 1980; 5-4, 1980; 5-4, 1980.



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 G24 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°, 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.

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 NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA

PARTS OF CIRCLE QUADRANGLE

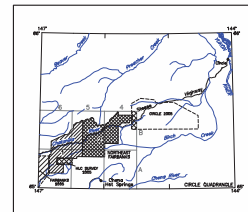
by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Stevens Exploration Management Corp.
2006

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, 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 Alma (1970) technique.

Alma, H., 1970, A new method of interpolation and smooth curve fitting based on local polynomial density of the distribution of Computing Machinery, v. 17, no. 4, p. 589-602.

LOCATION INDEX



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. This map and other products from this survey are available by mail order to a person from DGGG, 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.dggg.dnr.state.ak.us/pubs/>).



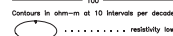
RESISTIVITY CONTOURS

The geophysical data were acquired with a GIGHEM Electromagnetic (EM) system and a Sinterex cesium magnetometer. The EM and magnetic sensors were towed by a helicopter. The helicopter recorded the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and a 1000 Hz magnetic sensor. The survey was flown by AS350B-2 Squirrel helicopter at a mean terrain elevation of 1000 m. The survey was flown along flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight direction of the helicopter.

An Ashtech GG24 NAVSTAR GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds and the position was corrected for the GPS clock relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 spheroid and the datum was corrected by applying a central meridian (CM) of 147°. A constant of 0 and an east constant of 506,000. The datum was corrected by applying a scale factor than 10 m, with respect to the UTM grid.

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 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.

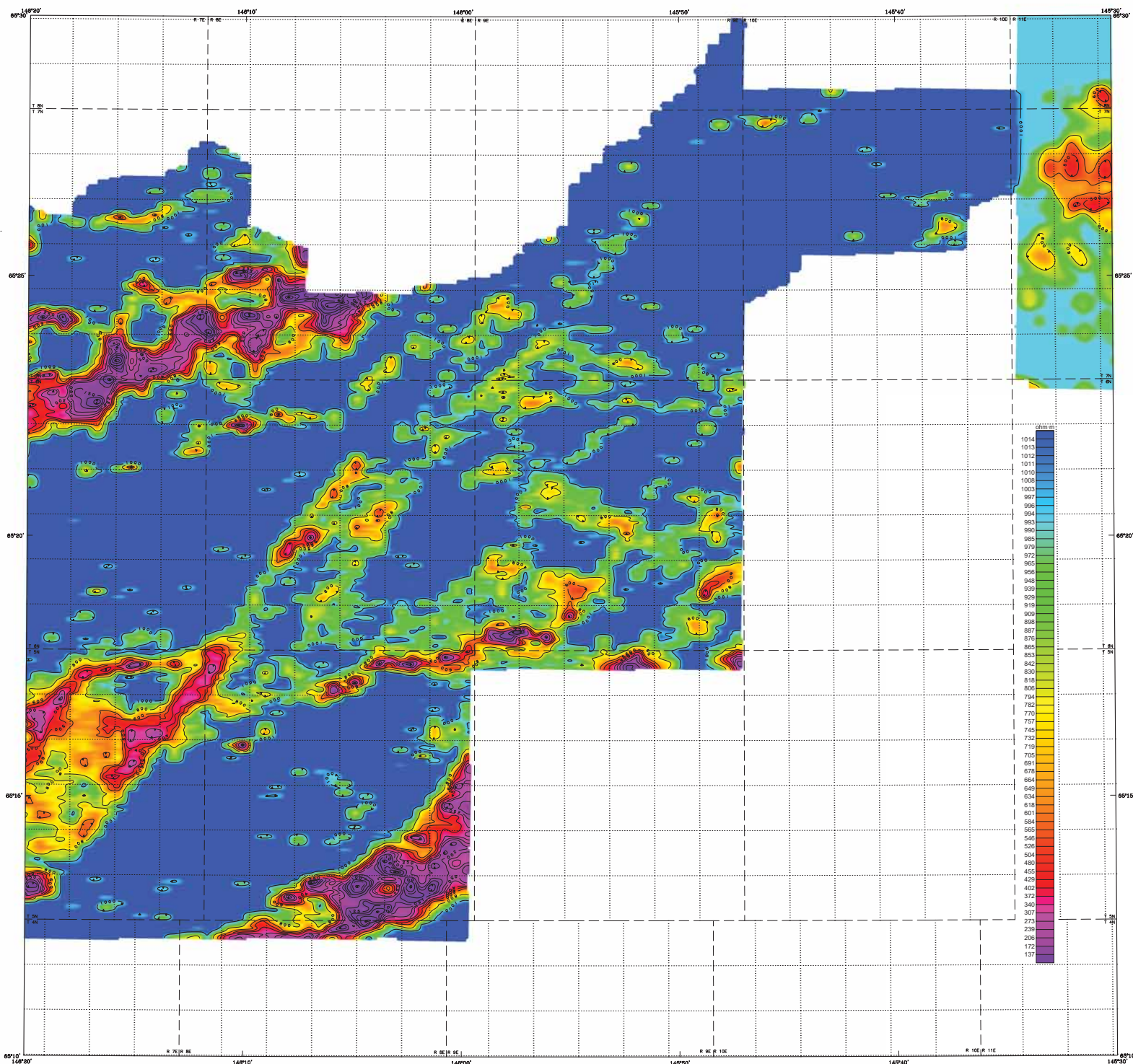
Aikins, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: *Journal of the Association of Computing Machinery*, v. 17, no. 4, p. 589-602.



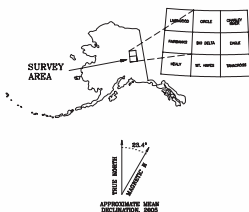
SURVEY HISTORY

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geology and Geophysics (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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Section outlines from U.S. Geological Survey Circle 4-4, 1970; 4-5, 1981;
5-4, 1981; 5-5, 1985. 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

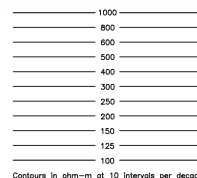
The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Sointrex cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from a radar altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights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

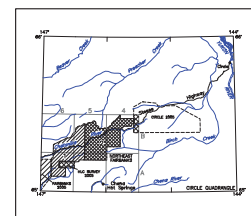
RESISTIVITY CONTOURS



Contours in ohm-m at 10 intervals per decade

..... resistivity low

LOCATION INDEX



SURVEY HISTORY

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

TRUE NORTH
MAGNETIC NORTH
MAGNETIC DECLINATION

APPROXIMATE MAGNETIC DECLINATION

ELECTROMAGNETIC ANOMALIES

Anomaly Identifier

Depth is greater than

- 15 m
- 30 m
- 45 m
- 60 m

Interpretive symbol

Inphase and quadrature of coaxial cell is greater than

· 5 ppm

·· 10 ppm

| Antimony | Conductance |
|----------|----------------------|
| ● | >100 siemens |
| ● | 50–100 siemens |
| ● | 20–50 siemens |
| ● | 10–20 siemens |
| ● | 5–10 siemens |
| ○ | 1–5 siemens |
| ○ | <1 siemens |
| ✱ | Questionable anomaly |
| Δ | EM magnetic response |

| Interpretive symbol | Conductor ("model") |
|---------------------|---|
| B | Bedrock conductor |
| D | Narrow bedrock conductor ("thin wire") |
| S | Conductive cover ("horizontal thin sheet") |
| H | Broad conductive rock unit, deep conductive weathering, thick conductive cover ("half space") |
| E | Edge of broad conductor ("edge of half space") |
| L | Laterally continuous cover line |

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM system measured in-phase and quadrature components at five frequencies: 100, 200, 400, 800, and 1600 Hz. The EM system also measured coil-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 also measured magnetic field conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by an interpretive symbol attached to the anomaly. The symbol shapes of the coil-coil and coplanar-coil responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track video were examined

TOTAL MAGNETIC FIELD

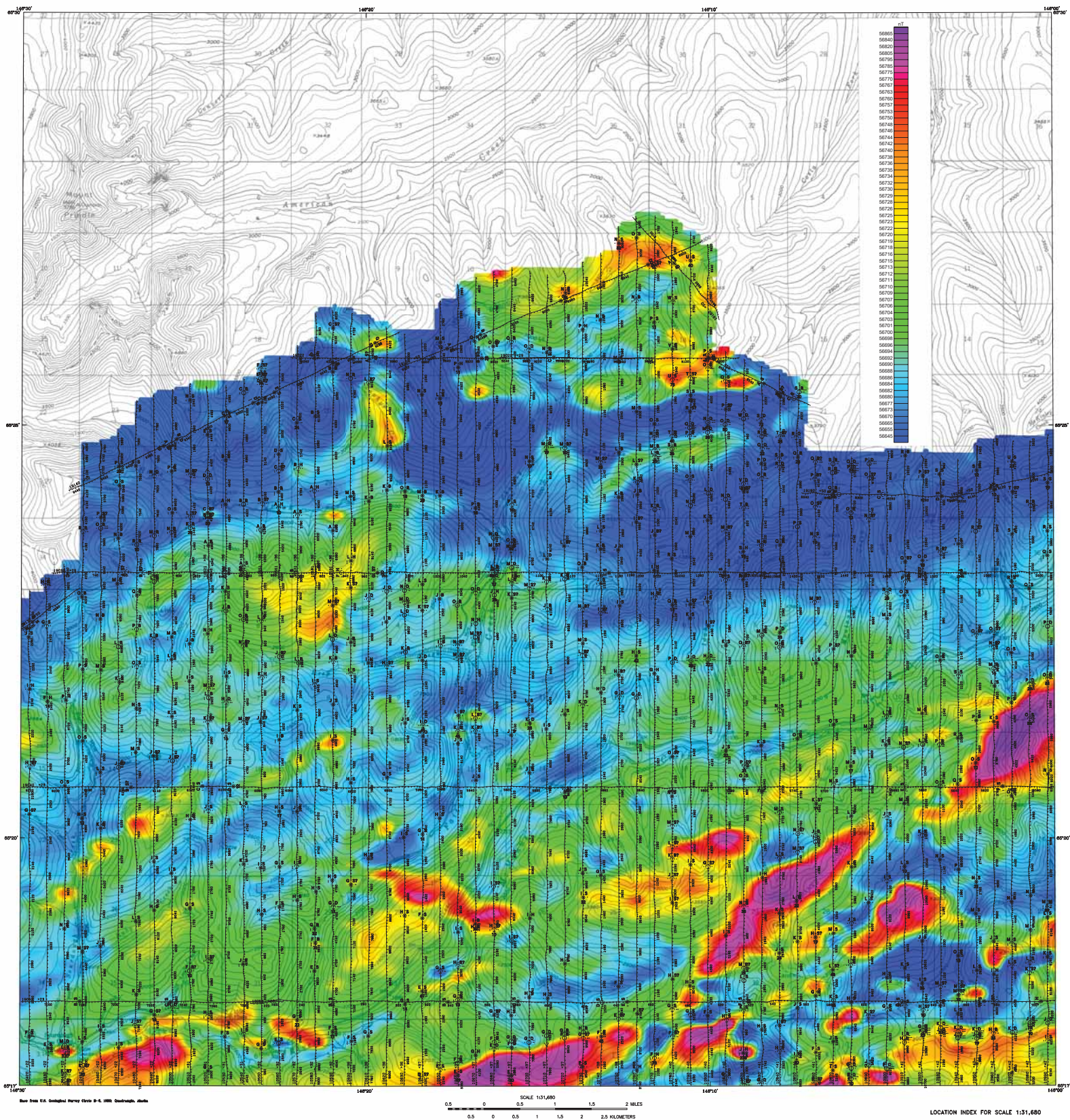
The magnetic total field contours were produced using digitally recorded data from a Scintrex cesium CS-3 magnetometer with a sample interval of 0.5 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) adjusted for regional variations (or IGRF gradient, 2005, updated to October 2006) using altimeter adjusted IGRF CS3 leveled data, (3) linearly interpolated, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

SURVEY HISTORY

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 nest 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 8-5 QUADRANGLE

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

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM™ EM system measured dipole and quadrature components at five frequencies, two vertical coil-pair sets oriented at 1000 and 500 Hz while three horizontal coil-pair sets oriented at 300, 7500, and 15000 Hz. The EM system responds to bedrock conductors, conductive structures, and cultural features. The type of conductor is indicated on the aeromagnetic map by the shape of the conductive and/or quadrature response, together with conductor and magnetic patterns and topography. The power line monitor and the flight track view 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 2005) 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.

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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 AS350B-2 Super helicopter at a mean terrain clearance of 200 feet along N-S (CP) survey flight lines with a spacing of 0.5 miles. The flight lines were flown perpendicular to the flight lines at intervals of approximately 0.5 miles.

An Ashtech G224 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using real-time differential positioning. The relative accuracy of better than 5 m. Flight path data were projected onto the Clarke 1866 (UTM zone 6) spheroid, 1927 North American datum using a central meridian (CM) of 147° 00' 00" west, constants of 6 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

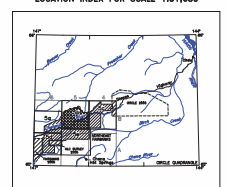
Conductance
 >100 siemens
 50-100 siemens
 20-50 siemens
 10-20 siemens
 5-10 siemens
 1-5 siemens
 <1 siemens
 Conductable anomaly
 EM magnetic response

Interpretive symbol
 B Bedrock conductor
 S Surface bedrock conductor ("tie data")
 C Conductive cover ("horizontal tie data")
 H Broad conductive rock unit, deep conductive anomaly ("thick waste")
 E Edge of broad conductor ("edge of half space")
 L Culture, e.g., power line, metal building or fence

Area indicates the
 FIB conductor has a thickness >10 m
 100-1000 m
 100-1000 m
 Dip direction

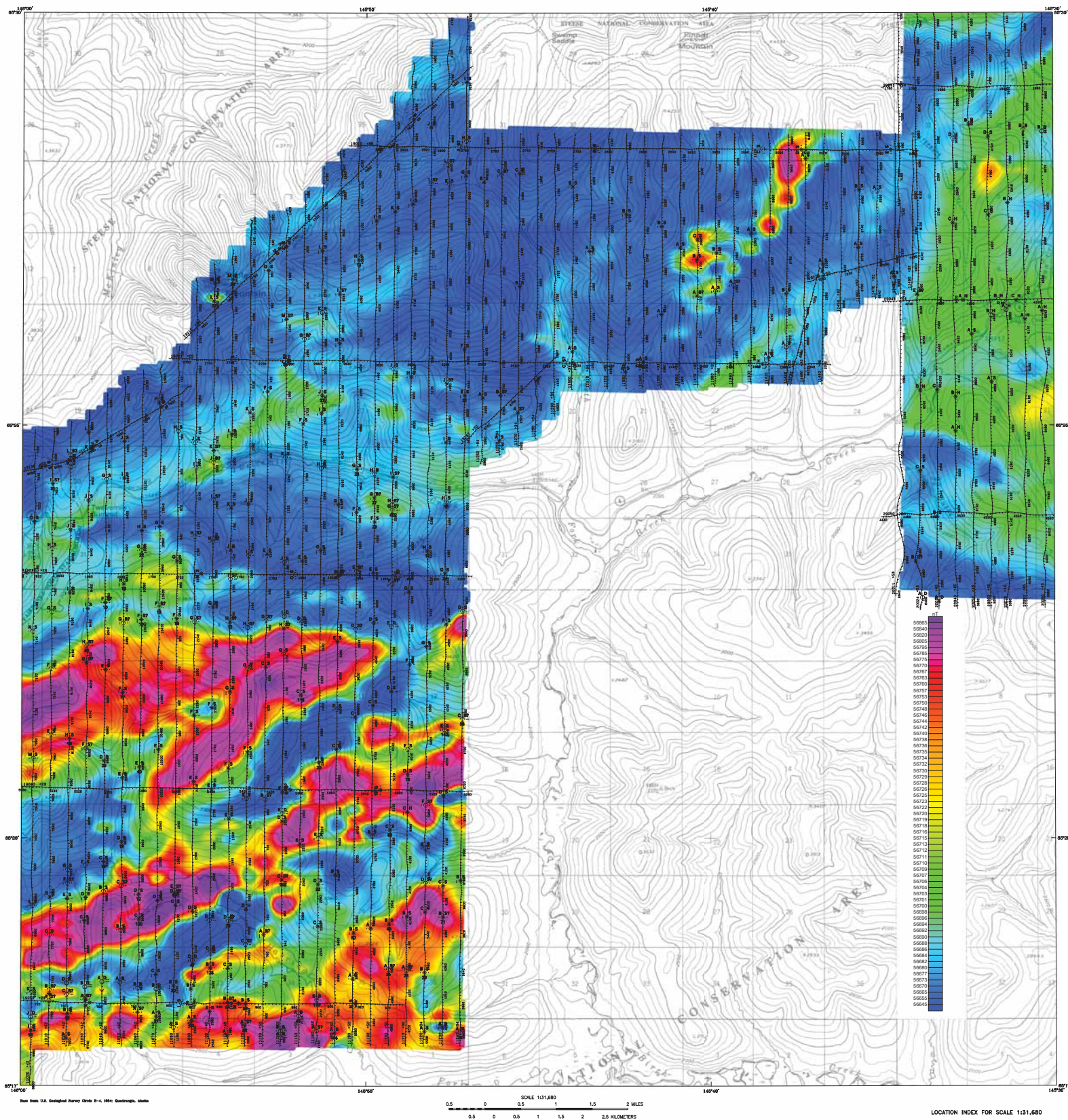
Depth is greater than
 10 m
 20 m
 30 m
 40 m
 50 m
 60 m
 70 m
 80 m
 90 m
 100 m
 110 m
 120 m
 130 m
 140 m
 150 m
 160 m
 170 m
 180 m
 190 m
 200 m
 210 m
 220 m
 230 m
 240 m
 250 m
 260 m
 270 m
 280 m
 290 m
 300 m
 310 m
 320 m
 330 m
 340 m
 350 m
 360 m
 370 m
 380 m
 390 m
 400 m
 410 m
 420 m
 430 m
 440 m
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 470 m
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 730 m
 740 m
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 760 m
 770 m
 780 m
 790 m
 800 m
 810 m
 820 m
 830 m
 840 m
 850 m
 860 m
 870 m
 880 m
 890 m
 900 m
 910 m
 920 m
 930 m
 940 m
 950 m
 960 m
 970 m
 980 m
 990 m
 1000 m

LOCATION INDEX FOR SCALE 1:31,680



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 Airborne Surveys Corp. in 2005.



TOTAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE NORTHEAST FAIRBANKS AREA, FAIRBANKS AND CIRCLE MINING DISTRICTS, INTERIOR ALASKA PART OF CIRCLE B-4 QUADRANGLE

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

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-pair pairs operated at 1000 and 5000 Hz while three horizontal coil-pair pairs operated at 200, 750, and 1500 Hz. The EM data were averaged on 10-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 response. Determination of the type of conductor is based on EM anomaly shapes of the resistive- and inductive-responses, together with conductor and magnetic patterns and topography. The power line monitor and the flight track view 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 2005) 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.

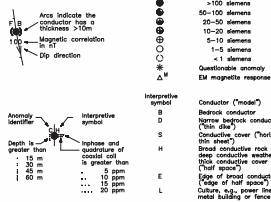
Aina, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures, *Journal of the Association of Computing Machinery*, v. 17, no. 4, p. 584-592.

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

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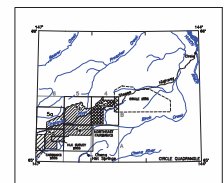
ELECTROMAGNETIC ANOMALIES

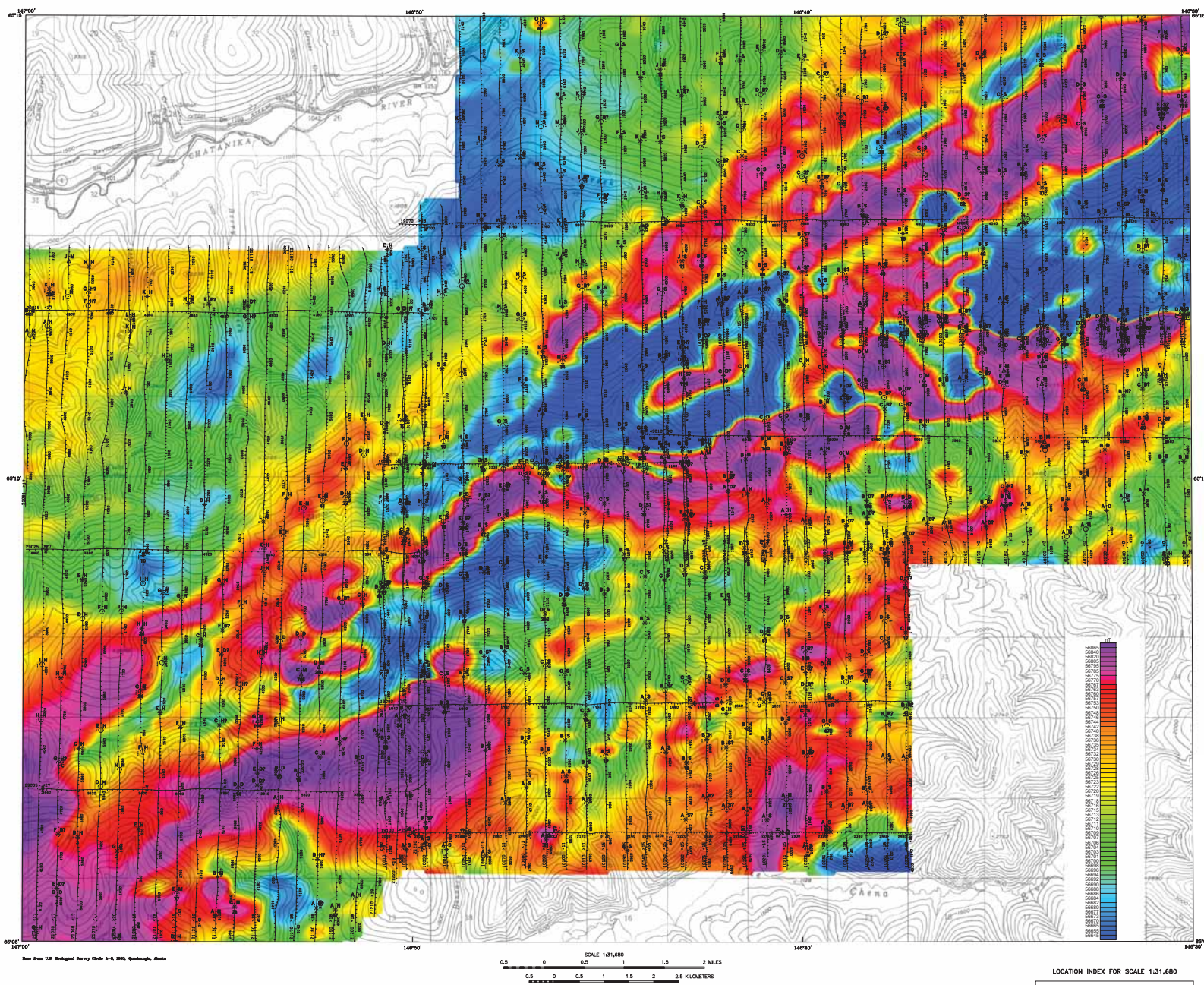


DESCRIPTIVE NOTES

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 100-foot diameter GPS station, a 200-foot diameter GPS station and a video camera. Flights were performed with an AS2500-2 Scintrex 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 was used for navigation. The helicopter position was derived every 0.1 seconds using post-flight differential positioning to a relative accuracy of better than 5 m. Flight path locations 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.



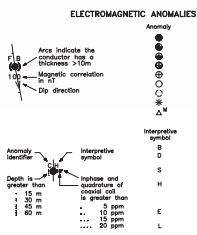


Base from U.S. Geological Survey 1:50,000, 1960s, Fairbanks, Alaska



DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGEM[®] Electromagnetic (EM) system and a Sinterflex 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 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 a quarter of a mile. The lines were flown perpendicular to the flight lines of 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 Clarke 1866 (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 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.



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

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

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHAM[®] EM system measured sphere and quadrature components at five frequencies. Two vertical coil-coil pairs operated at 1000 and 5000 Hz while three horizontal coil-coil pairs operated at 300, 7200, and 36,000 Hz. EM data were collected 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 coil- and quadrature-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.

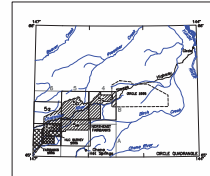


TOTAL MAGNETIC FIELD

The magnetic total field contours were produced using digitally recorded data from a Sinterflex 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.

Alkema, R., 1970. A new method of interpolating and smoothing curves using least squares procedure. *Journal of the Association of Computing Machinery*, v. 17, no. 4, p. 589-592.

LOCATION INDEX FOR SCALE 1:31,680



SURVEY HISTORY

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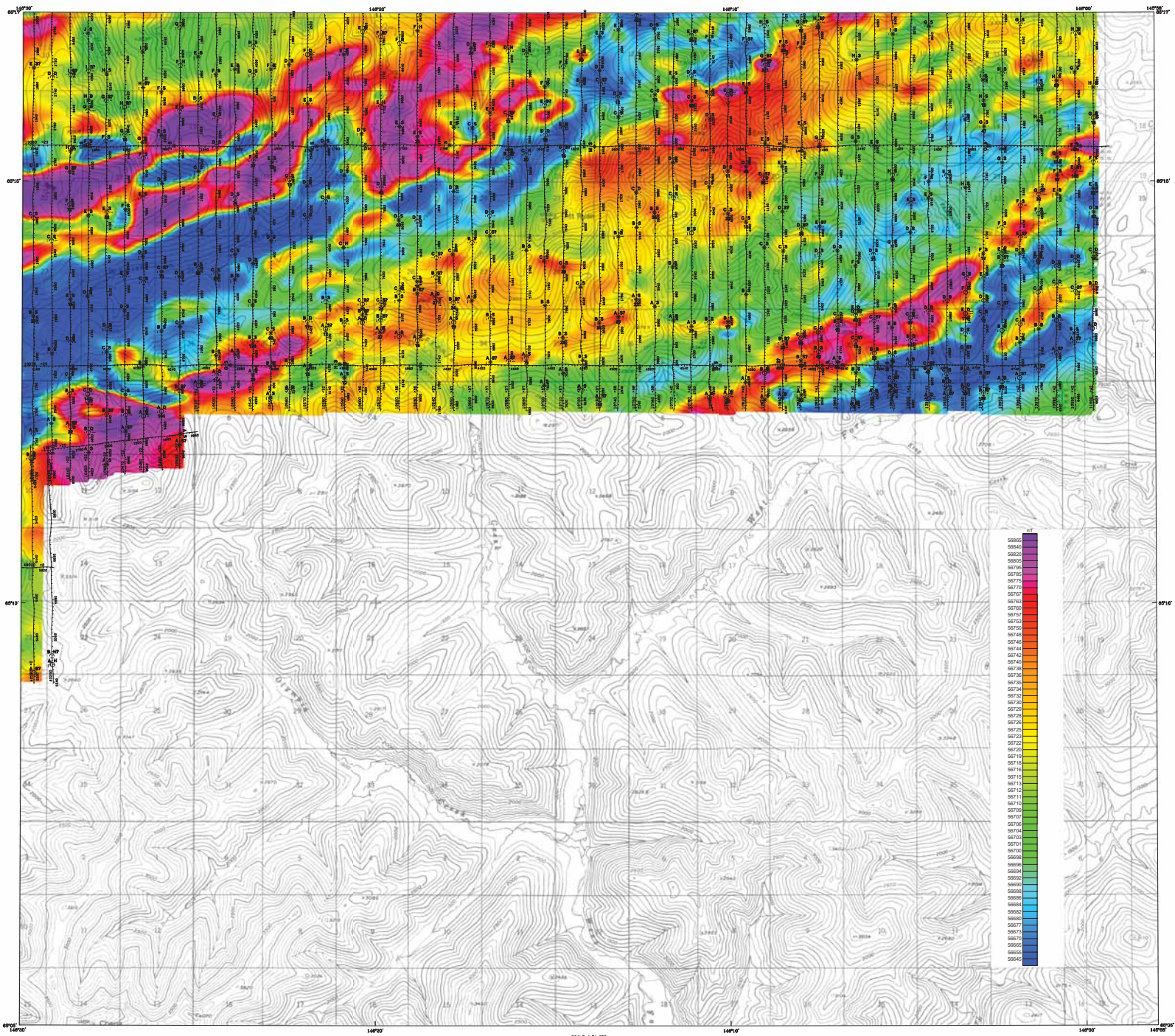


Fig. 1. Total Magnetic Field Map, A-4, A-5, B-4, and B-5.

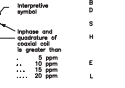


DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHV[®] Electromagnetic (EM) system and a Schreyer cesium magnetometer. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from a laser altimeter, GPS navigation system, 50/60 Hz monitors and video cameras. Flights were performed with an AS350B3[®] helicopter at a mean terrain clearance of 200 feet along N-S (T) survey flight lines with a spacing of 1/4 mile and E-W survey flight lines at intervals of approximately 3 miles. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

An Ashbach G24 NAVSTAR / GLONASS Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using differential positioning. The flight path positions were projected onto the Circle 155B (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 500,000. Positional accuracy of the presented data is better than 10 m, with respect to the UTM grid.

ELECTROMAGNETIC ANOMALIES



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
Laural E. Burns, Fugro Alaska Survey Corp., and Stevens Exploration Management Corp.
2008

ELECTROMAGNETICS

To determine the location of EM anomalies and their boundaries, the DIGHV[®] EM system measured in-phase and quadrature components of the frequency, two vertical three horizontal, resistivity data oriented at 300, 7000, and 30,000 Hz. The EM system responds to bedrock conductors, conductive structures, and cultural sources. The type of conductor is indicated on the interpretive map by the interpretive symbol attached to each EM anomaly. Classification of the type of conductor is based on EM anomaly shape, the type of conductor, and the resistivity response. The power line monitor and the flight track video were eliminated to locate cultural sources.

The magnetic total field contours were produced using digitally recorded data from a Schreyer 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 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 the principle of least squares. *Journal of the Association of Computing Machinery*, v. 17, no. 4, p. 589-602.

TOTAL MAGNETIC FIELD

SURVEY HISTORY

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