IDITAROD ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

L.E. Burns, G.R.C. Graham, J.D. Barefoot, T.J. Naibert, and Fugro Airborne Surveys Corp.

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IDITAROD ELECTROMAGNETIC AND MAGNETIC AIRBORNE GEOPHYSICAL SURVEY DATA COMPILATION

L.E. Burns¹, G.R.C. Graham, J.D. Barefoot, T.J. Naibert, and Fugro Airborne Surveys Corp.

ABSTRACT

The Iditarod electromagnetic and magnetic airborne geophysical survey is located in the Iditarod, Innoko and McGrath mining districts, about 500 km southwest from Fairbanks, Alaska. The survey is adjacent to the Aniak, Beaver Creek, and Southern Dishna River geophysical surveys. Frequency domain electromagnetic and magnetic data were collected with the DIGHEM^V system from August to September 2010. A total of 6,223.8 line kilometers were collected covering 2,244.5 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. Whereas the Iditarod, Innoko and McGrath mining districts have a history of placer mining, the discovery of the Donlin Gold lode deposit has kept exploration activity high in the region. Active polymetallic prospects in the survey area are Cirque and Tolstoi. 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 supporting 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. Includes a geographically registered pdf (GeoPDF) for use with mobile devices such as GPS enabled smartphones and tablets, other devices, and programs
maps_prn_format	contractor	Printable maps in HPGL/2 printer file format with extension .prn
profiles_stacked	contractor	Distance-based profiles of the digitally recorded geophysical data are generated and plotted at an appropriate scale. The profiles display electromagnetic anomalies with their respective interpretive symbols. Printable in pdf format
vector_data	contractor and DGGS	Line path, data contours, and survey boundary in ESRI shapefile (SHP) format, ESRI Geodatabase format, and/or AutoCAD dxf format
video_flightpath	contractor	Survey flight path downward facing video

REFERENCES

Akima, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures:

Journal of the Association of Computing Machinery, v. 17, n. 4, p. 589–602.

Burns, L.E., Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc., 2011, Iditarod survey area:

Magnetic and electromagnetic line, grid, and vector data and maps, Innoko, Iditarod, and McGrath mining districts, Iditarod and Ophir quadrangles, western Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2011-2, 39 sheets, scale 1:63,360, 1 DVD.

<http://doi.org/10.14509/22842>

Burns, L.E., Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc., 2015, Iditarod survey area:

Airborne magnetic and electromagnetic data in line, grid, vector, and map formats, and descriptive project report, Innoko, Iditarod, and McGrath mining districts, Iditarod and Ophir quadrangles, western Alaska: Alaska Division of Geological & Geophysical Surveys Geophysical Report 2011-4, 12 sheets.

<http://doi.org/10.14509/27081>

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

Figure 2. Flight path with orthometric image.

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

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

Figure 5. Calculated First Vertical Derivative Grid with orthometric image. The first vertical derivative grid was calculated from the diurnally-corrected, IGRF-corrected total magnetic field grid using a FFT base frequency domain filtering algorithm. The resulting first vertical derivative grid provides better definition and resolution of near- surface magnetic units and helps to identify weak magnetic features that may not be evident on the total field data.

Figure 6. Analytic Signal Grid with orthometric image. Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the squares of the three orthogonal gradients. Mapped highs in the calculated analytic signal of magnetic parameter locate the anomalous source body edges and corners (such as contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts, regardless of structural dip, and independent of the direction of the induced and/or remanent magnetizations.

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

Figure 8. 56,000 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

Figure 9. 7,200 Hz coplanar apparent resistivity grid with orthometric image. The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 7,200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7,200 Hz using the pseudo-layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique.

Figure 10. 900 Hz coplanar Apparent Resistivity Grid with orthometric image. The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 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/10.14509/30222>.

Map Title	Description
iditarod_residualmag_topo_map_1of3.pdf	residual magnetic field grid with topographic base map
iditarod_residualmag_topo_map_2of3.pdf	residual magnetic field grid with topographic base map
iditarod_residualmag_topo_map_3of3.pdf	residual magnetic field grid with topographic base map
iditarod_residualmag_contours_plss_map_1of3.pdf	residual magnetic field grid with data contours and public land survey system base layer
iditarod_residualmag_contours_plss_map_2of3.pdf	residual magnetic field grid with data contours and public land survey system base layer
iditarod_residualmag_contours_plss_map_3of3.pdf	residual magnetic field grid with data contours and public land survey system base layer
iditarod_calculated1vd_topo_map_1of3.pdf	calculated first vertical derivative grid with topographic base map
iditarod_calculated1vd_topo_map_2of3.pdf	calculated first vertical derivative grid with topographic base map
iditarod_calculated1vd_topo_map_3of3.pdf	calculated first vertical derivative grid with topographic base map
iditarod_analyticssignal_topo_map_1of3.pdf	analytic signal grid with topographic base map
iditarod_analyticssignal_topo_map_2of3.pdf	analytic signal grid with topographic base map
iditarod_analyticssignal_topo_map_3of3.pdf	analytic signal grid with topographic base map
iditarod_analyticssignal_contours_plss_map_1of3.pdf	analytic signal grid with data contours and public land survey system base layer
iditarod_analyticssignal_contours_plss_map_2of3.pdf	analytic signal grid with data contours and public land survey system base layer
iditarod_analyticssignal_contours_plss_map_3of3.pdf	analytic signal grid with data contours and public land survey system base layer
iditarod_tiltderivative_contours_topo_map_1of3.pdf	magnetic tilt derivative grid with data contours and topographic base map
iditarod_tiltderivative_contours_topo_map_2of3.pdf	magnetic tilt derivative grid with data contours and topographic base map
iditarod_tiltderivative_contours_topo_map_3of3.pdf	magnetic tilt derivative grid with data contours and topographic base map
iditarod_residualmag_shaded_tiltderivative_contours_topo_map_1of3.pdf	color shaded residual magnetic field grid with magnetic tilt derivative data contours and topographic base map
iditarod_residualmag_shaded_tiltderivative_contours_topo_map_2of3.pdf	color shaded residual magnetic field grid with magnetic tilt derivative data contours and topographic base map
iditarod_residualmag_shaded_tiltderivative_contours_topo_map_3of3.pdf	color shaded residual magnetic field grid with magnetic tilt derivative data contours and topographic base map
iditarod_res56khz_topo_map_1of3.pdf	56,000 Hz apparent resistivity grid with topographic base map
iditarod_res56khz_topo_map_2of3.pdf	56,000 Hz apparent resistivity grid with topographic base map
iditarod_res56khz_topo_map_3of3.pdf	56,000 Hz apparent resistivity grid with topographic base map
iditarod_res56khz_contours_plss_map_1of3.pdf	56,000 Hz apparent resistivity grid with data contours and public land survey system base layer
iditarod_res56khz_contours_plss_map_2of3.pdf	56,000 Hz apparent resistivity grid with data contours and public land survey system base layer
iditarod_res56khz_contours_plss_map_3of3.pdf	56,000 Hz apparent resistivity grid with data contours and public land survey system base layer

Table 1, continued. Copies of the following maps are included at the end of this booklet. The low-resolution, page-size maps included in this booklet are intended to be used as a search tool and are not the final product. Large-scale, full-resolution versions of each map are available to download on this publication's citation page: <http://doi.org/10.14509/30222>.

Map Title	Description
iditarod_res7200hz_topo_map_1of3.pdf	7,200 Hz apparent resistivity grid with topographic base map
iditarod_res7200hz_topo_map_2of3.pdf	7,200 Hz apparent resistivity grid with topographic base map
iditarod_res7200hz_topo_map_3of3.pdf	7,200 Hz apparent resistivity grid with topographic base map
iditarod_res7200hz_contours_plss_map_1of3.pdf	7,200 Hz apparent resistivity grid with data contours and public land survey system base layer
iditarod_res7200hz_contours_plss_map_2of3.pdf	7,200 Hz apparent resistivity grid with data contours and public land survey system base layer
iditarod_res7200hz_contours_plss_map_3of3.pdf	7,200 Hz apparent resistivity grid with data contours and public land survey system base layer
iditarod_res900hz_topo_map_1of3.pdf	900 Hz apparent resistivity grid with topographic base map
iditarod_res900hz_topo_map_2of3.pdf	900 Hz apparent resistivity grid with topographic base map
iditarod_res900hz_topo_map_3of3.pdf	900 Hz apparent resistivity grid with topographic base map
iditarod_res900hz_contours_plss_map_1of3.pdf	900 Hz apparent resistivity grid with data contours and public land survey system base layer
iditarod_res900hz_contours_plss_map_2of3.pdf	900 Hz apparent resistivity grid with data contours and public land survey system base layer
iditarod_res900hz_contours_plss_map_3of3.pdf	900 Hz apparent resistivity grid with data contours and public land survey system base layer
iditarod_emanomalies_residualmag_detailed_topo_map_1of6.pdf	detailed electromagnetic anomalies with residual magnetic field grid and topographic base map
iditarod_emanomalies_residualmag_detailed_topo_map_2of6.pdf	detailed electromagnetic anomalies with residual magnetic field grid and topographic base map
iditarod_emanomalies_residualmag_detailed_topo_map_3of6.pdf	detailed electromagnetic anomalies with residual magnetic field grid and topographic base map
iditarod_emanomalies_residualmag_detailed_topo_map_4of6.pdf	detailed electromagnetic anomalies with residual magnetic field grid and topographic base map
iditarod_emanomalies_residualmag_detailed_topo_map_5of6.pdf	detailed electromagnetic anomalies with residual magnetic field grid and topographic base map
iditarod_emanomalies_residualmag_detailed_topo_map_6of6.pdf	detailed electromagnetic anomalies with residual magnetic field grid and topographic base map
iditarod_interpretation_plss_map_1of6.pdf	interpretation based on the geophysical data with public land survey system base layer
iditarod_interpretation_plss_map_2of6.pdf	interpretation based on the geophysical data with public land survey system base layer
iditarod_interpretation_plss_map_3of6.pdf	interpretation based on the geophysical data with public land survey system base layer
iditarod_interpretation_plss_map_4of6.pdf	interpretation based on the geophysical data with public land survey system base layer
iditarod_interpretation_plss_map_5of6.pdf	interpretation based on the geophysical data with public land survey system base layer
iditarod_interpretation_plss_map_6of6.pdf	interpretation based on the geophysical data with public land survey system base layer

Scale 1:100,000. Contour interval 100 feet. Data from 1997 to 2001. Data from 1997 to 2001.

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RESIDUAL MAGNETIC FIELD OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD AND OPHIR QUADRANGLES

by
Lauri E. Burns, Pogo Alaska Survey Corp., and Pogo Geoservices, Inc.
2011

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digital magnetic data from a Pogo D1344 magnetometer with a Sinter CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010), updated for date of flight and estimated variations, (3) leveled to the tie line data, and (4) interpolated onto a regular 60 m grid using a modified 1997 technique. All grids were then resampled from the 60 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

NOTE: The values in this report are presented in the units of the International System of Units (SI). The units are in the SI system.

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 Pogo Geoservices, Inc. Alaska geophysical data for the area were acquired and processed by Pogo Alaska Survey Corp. in 2010 and 2011. The survey history is shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geophysical & Geophysical Mineral Inventory Program. All data and maps produced in date from this survey are available in digital format on DVD for a nominal fee. DGGG, 3354 Colville Road, Fairbanks, Alaska, 99701. DGGG website (www.dggg.alaska.gov/pub/). Maps are also available on paper through the DGGG office, and are available online at the website in Adobe Acrobat PDF file format.

DESCRIPTIVE NOTES

The geophysical data were acquired with a DGGG+ Electromagnetic (EM) system and a Pogo D1344 cesium magnetometer with a Sinter CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 600 Hz monitors and video camera. Flights were performed with an AS-300-B3 Super helicopter at a mean terrain clearance of 200 feet along the AS-300-B3 survey flight lines with a spacing of 1/2 mile. The flight lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System (GPS) receiver was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential corrections to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 UTM zone 42 system. 1997 North American datum using a central meridian (CM) of 159° a north constant of 0 and an east constant of 800,000. Position accuracy of the presented data is better than 10m with respect to the UTM grid.

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex C3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-83 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of 0.25 mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 1 cm. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) datum, 1927 American datum using a central meridian (CM) of 159° 0' north constant of 0 and no east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESIDUAL MAGNETIC FIELD OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Scintrex C3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2010, updated for date of flight and altimeter variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then reprojected from the 80 m cell size down to a 25 m cell size to produce the maps and grid grids contained in this publication.

Alaska, 1983, is a new method of interpolation and smooth curve fitting. The method is described in the publication of Geophysical Research, v. 11, no. 4, p. 588-590.

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 Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously, from DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3354 College Road, Fairbanks, Alaska, 99709-3757, and are downloadable for free from the DGGGS website (www.dgggs.alaska.gov/pubs). Maps are also available on paper through the DGGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.

The geophysical data were acquired with a DIGHWEM Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Sairtrex CS3 cesium magnetometer. The EM system was towed by a ship on the surface of the water at a height of 100 feet. In addition the system included a Fugro D1344 GPS receiver, a Fugro D1344 GPS navigation system, 50/60 Hz monitors and video camera. Flights were made at a mean terrain clearance of 200 feet (61 m) (Coffey *et al.*, 1997). The horizontal spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines.

A Novate CEM-62 Global Positioning System was used for navigation. The helicopter position was determined by a GPS receiver. The post-flight differential positioning to a known location was better than 5m. Flight path positions were projected to a datum of 1983. The datum is better, 1927 North American datum using a central meridian (CM) at 159° north constant. The accuracy of the presented data is better than

PARTS OF IDITAROD AND OPHIR QUADRANGLES
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The magnetic total field data were processed using a digital recorded data from a Fugro D1344 magnetometer with a Sincrotr CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 1995), (3) upward reduced to flight altitude (diurnal variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this report.

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All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee of \$100.00. The DVD includes the following files: 99709-3707r, and are downloadable for free from the DGGGS website (www.dgggs.alaska.gov/pubs). Maps are also available on paper through the DGGGS office, and are viewable online at the website in Adobe Acrobat .PDF file format.

[illegible]

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetic gradiometer. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2015, updated for date of flight and 100-metre variations), (3) leveled to the line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Adams, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures, *Journal of the Association*

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

This map was compiled and drawn under contract between the State of Alaska Department of Natural Resources, Division of Geological & Geophysical Surveys (DGG&S), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro GeoServices, Inc. in 2006 and 2011. Previously flown DGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project is part of the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee. DGG&S, 310 College Road, Fairbanks, Alaska 99709-3707, are and are downloadable for free from the DGG&S website (www.dggs.alaska.gov/pubs). Maps are also available on paper through the DGG&S office, and are available online at the website in Adobe Acrobat PDF file format.

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

The geophysical data were acquired with a DGRM Eromagnetometer (EM) system and a Furo D544 magnetic fluxgate sensor mounted on a Cessna 441 Q3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video cameras. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The flight lines were spaced at 1000 ft and the data were collected at intervals of approximately 3 miles.

The magnetic total field data were processed using a digitally recorded data from a Schlumberger D13-64 magnetometer with a Sinterex CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IIRF corrected (IIRF model: 20 years), (3) leveled to the magnetic time date, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

..... 100 nT
..... 20 nT
..... 4 nT
..... 2 nT

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

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

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

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

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

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Fugro D3344 cesium magnetometer with a Schintrex CS3 cesium magnetometer. The aircraft was flown at a height of 100 feet. In addition the aircraft was equipped with a Fugro D3344 GPS altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were made at a mean terrain clearance of 200 feet with a maximum clearance of 300 feet. The spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines.

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Sinterch CS3 cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IGRF corrected (IGRF model 2000) and updated for magnetic field variations (IGRF variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this report.

Aizma, 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.

_____ 100 nt
_____ 20 nt
_____ 4 nt
_____ 2 nt

DESCRIPTIVE NOTES

The geospatial data is collected using a DIGIMAX electromagnetic (EM) system and a Fugro D1355 ocean magnetometer with a Sinterex CSS2 cesium beam atomic clock and a Sinterex SCS2000 pressure float at a height of 100 feet. In addition the system includes a Sinterex SCS2000 depth sounder, Sinterex SCS2000 sidescan sonar, Sinterex GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed in the Gulf of Mexico at a mean terrain clearance of 200 feet (61 m) and a track spacing of 100 m. The track spacing of a quarter of a mile, tie lines were flown perpendicular to the flight lines at 100 m spacing.

A Novatel OEM4-22 Global Positioning System was used for navigation. The helicopter position was determined by GPS. The system provides differential positioning to a relative accuracy of better than 5m. Flight path positions were provided to the Sinterex GPS navigation system. The system is based on the GPS system, 1927 North American datum using a datum shift of 100 m. The datum shift is 0 of 0 and an east constant of 500,000. Positional accuracy is better than 5m. The datum shift is 10m with respect to the UTM grid.

COLOR BAR HISTOGRAM

Approximately 98% of the first vertical derivative of the magnetic field for the Moran Survey Area dataset lie within the range displayed on the color bar. Data values actually range from -10.337 nT/m (dark blue) to about 9.423 nT/m (magenta).

**FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD
OF THE IDITAROD SURVEY AREA,
INNOKO, IDITAROD, and McGRATH MINING DISTRICTS,
WESTERN ALASKA**

PARTS OF IDITAROD AND OPHIR QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2014

FIRST VERTICAL DERIVATIVE OF

THE MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D13-3000 magnetometer. The data were sampled every 100 m and collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations, (2) subtracted for the Earth's main field station magnetic data, (3) IGRF corrected (IGRF model 2010), updated for data of flight and altimeter variations, (4) corrected for magnetic declination and interpolated onto a regular 80 m grid using a modified Alani (1970) technique. All grids were then resampled to a 40 m grid. The magnetic data were then used to produce the maps and final grids contained in this publication. The first vertical derivative grid was calculated using a 10 m derivative kernel. The second derivative grid was calculated using a FFT based frequency domain filtering algorithm. The first vertical derivative grid was used for definition and resolution of near-surface magnetic units and helps to identify weak magnetic features that may not be apparent on the total field grid.

Alani, B. H., 1970, A new method of interpolation of magnetic data based on local procedures. *Journal of the Association of Professional Geophysicists*, 15, 1-10.

SURVEY HISTORY

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

The maps produced from this survey are available in digital format on DVD for a nominal fee through DGGS, 3354 Calaca Road, Fairbanks, Alaska, 99709-3000. The maps are also available online at DGGS website (www.dggs.alaska.gov/pubs). Maps are also available on paper through the DGGS office, and can be viewed online at the website in Adobe Acrobat PDF file format.

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a Sinter CS cesium sensor. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) 200 corrected (IGRF model 2010), updated for scale of flight, and altimeter variations, (3) leveled to the line data, and (4) resampled onto a regular 60 m grid using a modified Alamo (1970) technique. All grids were then resampled from the 60 m cell size down to a 2.5 m cell size to produce the maps and final grids contained in this publication. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FFT based 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.

Alamo, H. 1970. A new method of interpretation grid growth curve (IGC) based on least-squares fitting of the IGC. *Geophysical Computing*, v. 17, no. 1, p. 88-102.

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 Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously, from 1992 surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3354 College Road, Fairbanks, Alaska, 99709-3757, and are downloadable for free from the DGGGS website (www.dggs.alaska.gov/pubs). Maps are also available on paper through the DGGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.

COLOR BAR HISTOGRAM

Approximate 95% of the first vertical derivative of the magnetic field for the Iditarod Survey Area dataset lie within the range displayed on the color bar. Data values actually range from -10.337 nT/m (dark blue) to about 9.423 nT/m (magenta).

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Sinter CS cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from radio and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-83 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 1 cm. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) datum, 1927 American datum using a central meridian (CM) of 159° 0' north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning. The horizontal accuracy was better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a north constant of 1,000,000 and a scale factor of 0.999993. The accuracy of the presented data is better than 10m with respect to the UTM grid.

COLOR BAR HISTOGRAM

Approximately 98% of the first vertical derivative of the magnetic field for the Moran Survey Area dataset lie within the range displayed on the color bar. Data values actually range from -10.337 nT/m (dark blue) to about 9.423 nT/m (magenta).

**FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD
OF THE IDITAROD SURVEY AREA,
INNOKO, IDITAROD, and McGRATH MINING DISTRICTS,
WESTERN ALASKA**

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

FIRST VERTICAL DERIVATIVE OF THE MAGNETIC FIELD

THE MAGNETIC FIELD

The magnetic total field data were processed using digitally recorded data from a Fugro D130 magnetic field recording system. The data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) IGRF corrected using the 2010, 10-year magnetic field model (International Geomagnetic Reference Field and Altitude Variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the magnetic field grid used in this publication. The first vertical derivative grid was calculated from the processed total magnetic field grid using a FTB based frequency domain filtering algorithm. The resulting first vertical derivative grid improves both definition and resolution of near-surface magnetic units and helps to identify weak magnetic features that may

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

LOCATION INDEX

SURVEY HISTORY

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

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

**ANALYTIC SIGNAL
OF THE IDITAROD SURVEY AREA,
INNOKO, IDITAROD, and McGRATH MINING DISTRICTS,
WESTERN ALASKA**

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system and a Fugro D134 cesium magnetometer with a Sinterex CS3 cesium gradiometer. The survey track was flown at an altitude of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with a Cessna 350-B3 aircraft equipped at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The flight lines were then perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4—G2L Global Positioning System was used for navigation. The helicopter position was measured every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

ANALYTIC SIGNAL

ANALYTIC SIGNAL

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

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 (DGG&S), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro GeoServices, Inc. in 2008 and 2011. Previously flown DGG&S survey, adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee. The data, including the 2008 and 2011 Fugro GeoServices, Inc. 99709-3707, are and downloadable for free from the DGG&S website (www.dgg&s.alaska.gov/pub). Maps are also available on paper through the DGG&S office, and are available online at the website in Adobe Acrobat PDF file format.

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex C3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet, in addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-83 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 1 cm. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) ellipsoid, 1927 American datum using a central meridian (CM) of 156° 30' north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

ANALYTIC SIGNAL OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

ANALYTIC SIGNAL

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

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 Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously, from DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3354 College Road, Fairbanks, Alaska, 99709-3757, and are downloadable (DGGGS) free from the DGGGS website (www.dgggs.alaska.gov/pub/). Maps are also available on paper through the DGGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system and a FOCUS 1344 cesium magnetometer with a Sincro CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS, and a video camera. Flights were performed with an AS-350B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The flight lines were perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

ANALYTIC SIGNAL

ANALYTIC SIGNAL

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

SURVEY HISTORY

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

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

DESCRIPTIVE NOTES

The geophysical data were acquired with a DINEOF+ Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scripps CS3 cesium sensor. The EM and cesium sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, gyro Hz monitors and video cameras. Flights were performed with an AS-300-B3 Squire helicopter at a mean terrain clearance of 200 feet along the AS-300-B3 survey flight lines with a spacing of 0.25 miles. The flight lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System (GPS) receiver was used to record the flight path. The GPS data were derived every 0.5 seconds using post-flight differential corrections to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 UTM zone 4J system. The UTM projection uses a central meridian (CM) of 150°W, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

ANALYTIC SIGNAL

Analytic signal is the total amplitude of all directions of magnetic gradient calculated from the sum of the measured magnetic field components. Mapped right in the calculated analytic signal of magnetic parameter inside the aeromagnetic source study slope and corners (e.g., contacts, fault/shear zones, etc.). Analytic signal maxima are located directly over faults and contacts regardless of structural dip, and independently of the direction of the induced and/or remnant magnetizations.

ANALYTIC SIGNAL AND DATA CONTOURS OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD AND OPHIR QUADRANGLES

by
Lauri E. Burns, Fugro Alaska Survey Corp., and Fugro GeoServices, Inc.
2011

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 Fugro GeoServices, Inc. Alaska geophysical data for the area were acquired and processed by Fugro Alaska Survey Corp. in 2010 and 2011. The survey area is shown in the location map by dashed lines, survey lines, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Mineral Inventory Program.

All data and maps produced to date from this survey are available as digital format on DVD for a nominal fee. The DVD contains the following information: survey, DGGGS, 3354 Contact Data, Fugro Alaska Survey, DGGGS website (www.dgggs.alaska.gov/public). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat PDF file format.

ANALYTIC SIGNAL CONTOURS

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Sinter CS cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video cameras. Flights were performed with an AS-350-83 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 1 cm. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) datum, 1927 datum. Horizontal datum using a central meridian (CM) of 159° a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

ANALYTIC SIGNAL

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

ANALYTIC SIGNAL AND DATA CONTOURS OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

ANALYTIC SIGNAL CONTOURS

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 Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously, from DGGGS surveys adjacent to the current survey are shown on the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

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PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Fugro D3344 cesium magnetometer with a Schintrex CS3 cesium magnetometer. The aircraft was flown at an altitude of 100 feet, in addition the aircraft was equipped with a Fugro D3344 GPS altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were made at a mean terrain clearance of 200 feet with a maximum clearance of 300 feet. The spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines.

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

_____		2.50 nT/metre
_____		0.50 nT/metre
_____		0.10 nT/metre
_____		0.05 nT/metre

This map has been compiled and drawn under contract with the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro GeoServices, Inc. in 2008 and 2011. Previously flown DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The map was prepared for the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee of \$100.00. The DVD includes the following files: 99709-3707r, and are downloadable for free from the DGGGS website (www.dgggs.alaska.gov/pubs). Maps are also available on paper through the DGGGS office, and are viewable online at the website in Adobe Acrobat .PDF file format.

[illegible]

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

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

This map has been scanned and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro GeoServices, Inc. in 2006 and 2011. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The map is available to the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

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

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM V Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex C3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet, in addition the survey recorded data from radar and laser altimeters. GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-83 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of 0.25 mile, the lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 1m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) reference, 1927 North American datum using a central meridian (CM) of 159° a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

MAGNETIC TILT DERIVATIVE AND DATA CONTOURS OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD AND OPHIR QUADRANGLES
by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2011

MAGNETIC TILT DERIVATIVE

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

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 Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously, from DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3354 College Road, Fairbanks, Alaska, 99709-3757, and are downloadable for free from the DGGGS website (www.dgggs.alaska.gov/pubs). Maps are also available on paper through the DGGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

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

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

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 Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired on the Fugro Fugro Fugro Fugro Fugro Fugro Fugro and 2011. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The map was prepared by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee of \$100.00. The data are available for the years 1979-2011, and are downloadable for free from the DGGS website (www.dggs.alaska.gov/pub/). Maps are also available on paper through the DGGS office, and are available online at the website in Adobe Acrobat, PDF file format.

DESCRIPTIVE NOTES

The geophysical data were acquired with a Digikey® Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scripps CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from radar and laser altimeters, GPS, and video cameras. Flights were performed with an AS-300B3 Super helicopter at a mean terrain clearance of 200 feet along 100-25 (N47) survey flight lines with a spacing of 0.5 kilometers. The flight lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System (GPS) receiver was used to record the survey location. The GPS data were processed every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 UTM zone 42 system. The horizontal position accuracy is a central meridian (CM) of 195° a north constant of 0 and an east constant of 800,000. Position accuracy of the presented data is better than 10m with respect to the UTM grid.

RESIDUAL MAGNETIC FIELD

The magnetic total field data were processed using magnetic reduction software (Fugro D1344 magnetometer with a Scripps CS3 cesium sensor). Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the hourly recorded base station magnetic data, (2) GRS corrected (GRS model 2015), updated for date of flight and altimeter variations, (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Akai (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

NOTE: This map is a composite of geophysical data from the following sources: 1) 158°15'W to 158°45'W, 67°15'N to 67°45'N.

PARTS OF IDITAROD AND OPHIR QUADRANGLES

by
Laural E. Burns, Fugro Alaska Surveys Corp., and Fugro Geoservices, Inc.
2011

Sun Azimuth: 0 degree
Sun Inclination: 45 degrees

MAGNETIC TILT DERIVATIVE

The tilt derivative is the angle between the horizontal gradient & the total gradient, which is useful for identifying the depth & type of source. The tilt angle is positive over the source, crosses through zero at, or near, the edge of a vertical tilted source, and is a measure of the source's magnetic field. The tilt angle is a derivative of the magnetic field and is a measure of the source's magnetic field. The tilt angle is a derivative of the magnetic field and is a measure of the source's magnetic field.

MAGNETIC TILT DERIVATIVE CONTOURS

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 Fugro Geoservices, Inc. All Alaska geophysical data for the area were acquired and processed by Fugro Alaska Surveys Corp. in 2010 and 2011. The survey history is shown in the location map by dashed lines, survey lines, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available as digital format on DVD for a nominal fee. Contact DGGGS, 3354 Corbett Road, Fairbanks, Alaska, 99709, for more information. For the full survey history, see the DGGGS website (www.dgggs.alaska.gov/public). Maps are also available on paper through the DGGGS office, and are available online at the website in Adobe Acrobat PDF file format.

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

Sun Azimuth: 0 degree
Sun Inclination: 45 degrees

MAGNETIC TILT DERIVATIVE

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

MAGNETIC TILT DERIVATIVE CONTOURS

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

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system and a Fugro D1344 cable-mounted magnetometer system (see Figure 1). The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and a magnetic compass. The flight was performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The flight lines were perpendicular to the strike-slip fault at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

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 Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously flown DGGS surveys adjacent to the current survey area are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

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

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was fixed within 0.5 seconds post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

by
Lauri E. Bums, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2014

Aldine, 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. 582-602.

RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless resistivity calculations due to small signals where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying correlated over more than one survey line.

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

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3554 College Road, Fairbanks, Alaska, 99707, and www.dggs.alaska.gov/pubs/. The DGGS website (www.dggs.alaska.gov/pubs/) and maps are also available on paper through the DGGS office, and are viewable online at the website in Adobe Acrobat .PDF file format.

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Sirtex C3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from radio and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-83 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 cm. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) meridian, 197° 45' 00" W, using a datum of 1960.000. Positional accuracy of 0 and an east constant of 500,000. Positional accuracy of 0 and an east constant of 500,000. Positional accuracy of 0 and an east constant of 500,000.

RESISTIVITY

The DIGHEM EM system measured inphase and quadrature components at five frequencies. Two vertical coiled coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 800, 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 56,000 Hz using the Alcorn (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Altitude, in feet, is the average elevation of the ground surface of the survey area. The elevation of the ground surface is the average elevation of the ground surface of the survey area.

56,000 Hz COPLANAR APPARENT RESISTIVITY OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

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 Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously, from DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3354 College Road, Fairbanks, Alaska, 99709-3757, and are downloadable free from the DGGGS website (www.dgggs.alaska.gov/pubs). Maps are also available on paper through the DGGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.

RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless resistivity calculations due to small signals when the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying correlated over more than one survey line.

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system and a FIM 1344 cesium magnetometer with a Sincro CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS, and a video camera. Flights were performed with an AS-350B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The flight lines were perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

The DIGHEM[®] EM system measured inphase and quadrature components of the magnetic field. The vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 17200 and 56,000 Hz. EM data were sampled at 0.1 m intervals along the EM profile. The data were collected from conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the partial induction equation (Kohner and Korte, 1982) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then modified from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this report.

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

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

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

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

DESCRIPTIVE NOTES

The geophysical data are collected by a DIGIMAX Electromagnetic (EM) system and a Fugro D1355 cesium magnetometer with a Solaire CS85 cesium fluxgate compass mounted on a ship's hull at a depth of 10 m and a height of 100 feet. In addition the ship has a Raytheon AN/APAR-67 radar, two Hughes 9000 altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were made over the study area at an altitude of 100 ft at a mean terrain clearance of 200 feet. The flight track was spaced at 100 m intervals, resulting in a spacing of a quarter of a mile; tie lines were flown perpendicular to the flight lines every 10 miles.

A Novatel OEMA-02L Global Positioning System was used for navigation. The helicopter position was determined by GPS. The accuracy of differential positioning to a relative accuracy of better than 5m. Flight path positions were provided by a GPS receiver with a vertical accuracy, 1927 North American datum using a WGS84 datum (CHS 1984). The horizontal error of 0 and an east constant of 500,000. Positional accuracy is less than 10m. Altitude is better than 10cm with respect to the UTM grid.

RESISTIVITY

The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coplanar-coplanar electrode pairs and two sets of 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 clastic and clastic fill. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 56,000 Hz using the Petersen-Dyer half space model. The data are interpreted using a resistivity and conductance model. A 100 m (328 ft) depth resolution is achieved using the IGHEM[®] technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Adams, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures. *Journal of the Association*

RESISTIVITY ALTITUDE LIMITS

in areas where the EM bird height exceeded 150 m, reliability was not calculated. This avoids meaningless resistivity calculations due to small signals where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying correlated over more than one survey line.

Contours in cm^{-1} at 10 intervals per decade

LOCATION INDEX

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 and Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previous editions of this map were adjusted to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Department of Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee. DGGS, 3350 College Ave., Anchorage, Alaska 99503-9709-3707, or are downloadable for free from the DGGS website (www.dggs.alaska.gov/pubs). Maps are also available on paper through the DGGS Acrobust, and are available online at the website in Adobe Acrobat PDF file format.

**56,000 Hz COPLANAR APPARENT RESISTIVITY AND DATA CONTOURS
OF THE IDITAROD SURVEY AREA,
INNOKO, IDITAROD, and McGRATH MINING DISTRICTS,
WESTERN ALASKA**

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Sirtex C33 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the mounted data from radio and laser altimeters, GPS navigation system, 50/60 Hz monitors and video cameras. Flights were performed with an AS-350-83 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) 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 2 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 cm. Flight path locations were projected onto the Clarke 1866 (UTM zone 4) datum, 1927 datum datum using a central meridian (CM) of 159° 0' north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM[®] EM system measured in-phase and quadrature components at five frequencies. Two vertical coiled coil-pairs oriented at 1000 and 5500 Hz with three horizontal coplanar coil-pairs oriented 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 in-phase 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. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Altitude is based on the mean elevation of the terrain from the 1:63,360 map. A 10' cell size was used.

RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. The voids meaningless resistivity calculations due to small signals where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying correlated over more than one survey line.

RESISTIVITY CONTOURS

1000
800
600
500
400
300
200
150
125
100

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 (DGGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously, from 1992 surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3354 College Road, Fairbanks, Alaska, 99709-3757, and are downloadable for free from the DGGGS website (www.dgggs.alaska.gov/pubs). Maps are also available on paper through the DGGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.

PARTS OF IDITAROD AND ORHIR QUADRANGLES

SURVEY HISTORY

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Sinter CS3 cesium fluxgate compass mounted on a survey vessel towed at a height of 100 feet. In addition the ship was equipped with a Raytheon RSC-1000 altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were made at an altitude of 800 ft above the water at a mean terrain clearance of 200 feet. The flight track was spaced at intervals of 100 m or approximately one quarter of a mile. The flight lines were parallel and approximately 1 km apart.

A Novatel OEM4—G2L Global Positioning System was used for navigation. The helicopter position was determined by differential positioning to a relative accuracy of better than 5m. Flight path positions were determined by differential positioning to a relative accuracy of better than 1 m. The datum used was the North American datum, 1927 North American datum using a semi-major axis of 6378137 m, minor axis of 6356583 m and an east constant of 500,000. Positional accuracy of the presented data is better than 1 m.

The DIGHEM[®] EM system measured inphase and quadrature components of the magnetic field in the vertical plane. The coplanar 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 m intervals along the profile. The EM data were processed by computer, conductive overburden, and cultural sources were apparent. Residuals were generated from the inphase and quadrature component of the coplanar 56,000 Hz using the method of Korte (1970) and the horizontal coplanar data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Aizma, 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.

1000
800
600
500
400
300
250
200
150
125
100

Contours in ohm-m at 10 intervals per decade

SURVEY HISTORY

This map has been compiled and drawn under contract to the Alaska Department of Natural Resources, Division of Geological & Geophysical Surveys (DGG&S), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro GeoServices in 2005 and 2011. Previously flown DGG&S surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The project is part of the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee of \$35.00. The maps are also available on the DGG&S website (www.dggs.alaska.gov/pubs/). Maps are also available on paper through the DGG&S office, and are available online at the website in Adobe Acrobat PDF file format.

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system and a Fugro D1344 ocean bottom seismograph (OBS) system and a digital sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and an Inertial Flight system. Flights were performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The flight lines were flown in a grid pattern with flight lines at intervals of approximately 3 miles.

A Novatel OEM4—G2L Global Positioning System was used for navigation. The helicopter position was measured every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil-pairs operated at 1000 and 3500 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 components of the coplanar 7200 Hz using the Tzschentz-layer half-space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Aldine, 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. 582-602.

**7200 Hz COPLANAR APPARENT RESISTIVITY
OF THE IDITAROD SURVEY AREA,
INNOKO, IDITAROD, and McGRATH MINING DISTRICTS,
WESTERN ALASKA**

PARTS OF IDITAROD AND OPHIR QUADRANGLES

by
Laurel E. Burns, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2014

RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless resistivity calculations due to small signals where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying correlated over more than one survey line.

SURVEY HISTORY

This map was compiled and drawn under contract between the State of Alaska Department of Natural Resources, Division of Geological & Geophysical Surveys (DGG&S), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro GeoServices, Inc. in 2008 and 2011. Previously flown DGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project is part of the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee. DGG&S, 310 College Road, Fairbanks, Alaska 99709-3707, and are downloadable for free from the DGG&S website (www.dggs.alaska.gov/pubs). Maps are also available on paper through the DGG&S office, and are available online at the website in Adobe Acrobat PDF file format.

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Sirtex C3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from radio altimetry, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-33 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 cm. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 American datum using a central meridian (CM) of 156° 30' north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM EM system measured inphase and quadrature components at five frequencies. Two vertical coiled 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-over half approach. From the data, the apparent resistivity was calculated and the data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Altitude, in feet, is the average elevation of the ground surface of the survey area. The elevation of the ground surface is the average elevation of the survey area.

7200 Hz COPLANAR APPARENT RESISTIVITY OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

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 Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously, from 1992-1993, surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3354 College Road, Fairbanks, Alaska, 99709-3757, and are downloadable free from the DGGGS website (www.dgggs.alaska.gov/pubs). Maps are also available on paper through the DGGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.

RESISTIVITY ALTITUDE LIMITS

In areas where the EM loop height exceeded 150 m, resistivity was not calculated. This avoids meaningless resistivity calculations due to small signals where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank spaces in the grids were created where zones of high flying correlated over more than one survey line.

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

The DIGHEM[®] EM system measured inphase and quadrature components of the frequencies. The vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 17200 and 56,000 Hz. EM data were sampled at 0.1 m intervals along the EM profile. The data were collected from conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7200 Hz using the partial inductance method. The data were then interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then modified from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this report.

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.

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

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

The geophysical data were acquired with a DIGIMBY Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Saintrix CS3 cesium fluxgate magnetometer. The survey track was flown at a height of 100 feet. In addition the aircraft was equipped with a Fugro D1344 altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were made at a mean terrain clearance of 200 feet with a maximum clearance of 300 feet. The spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines of the previous survey.

A Novatel OEMA-62L Global Positioning System was used for navigation. The helicopter position was determined by a differential GPS system. The differential positioning to a relative accuracy of better than 5m. Flight path positions were determined by a differential GPS system. The spheroid, 1927 North American datum using a semi-major axis of 6,378,137 m and a flattening of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 5m.

[illegible]

The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coplanar coil-pairs were used, and a custom-made 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 conductivity at depths of 100 to 200 m. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7200 Hz using the pseudogeometric half space model. The data were integrated into resistivity maps and contour maps. Alamo (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Adams, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: *Journal of the Association*

in areas where the EM bird height exceeded 150 m, reliability was not calculated. This avoids meaningless resistivity calculations due to small signals where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying correlated over more than one survey line.

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

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee of \$100.00. The DVD contains the following files: 99709-3717, and are downloadable for free from the DGGS website (www.dggs.alaska.gov/pubs). Maps are also available on paper through the DGGS office, and can be viewed online at the website in Adobe Acrobat PDF file format.

7200 Hz COPLANAR APPARENT RESISTIVITY AND DATA CONTOURS OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex C3 cesium sensor. The EM and magnetic surveys were flown at a height of 100 feet, in addition the magnetic data from radio and laser altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-83 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) 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 2 miles. A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 1 cm. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) projection, 1927 datum, Alaska Albers using a central meridian (CM) of 159° a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM[®] EM system measured in-phase and quadrature components at five frequencies. Two vertical coiled coil-pairs oriented at 1000 and 5000 Hz with three horizontal coplanar coil-pairs oriented 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 in-phase and quadrature component of the coplanar 7200 Hz using the pseudo-layer half approximation. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Alaska is shown in red on the map of the United States of America. Alaska is shown in red on the map of the United States of America.

RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. The voids meaningless resistivity calculations due to small signals where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying correlated over more than one survey line.

RESISTIVITY CONTOURS

1000
800
600
500
400
300
200
150
125
100

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 (DGGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously, from 1992, surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program. All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3354 College Road, Fairbanks, Alaska, 99709-3757, and are downloadable for free from the DGGGS website (www.dggs.alaska.gov/pubs). Maps are also available on paper through the DGGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system and a Fugro 1344 cesium magnetometer with a Sincro CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimetry, GPS, and a digital video/60°-hz monitors on video camera. Flights were performed with an AS-350B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The flight lines were perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM[®] EM system measured inphase and quadrature components at frequencies of 1000 and 5000 Hz. Three horizontal coplanar coil-pairs operated at 1000 and 5000 Hz, three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 sec intervals. EM data were collected from 1000 m² conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 7200 Hz using the pseudo-soundings approach (Baker *et al.*, 1976) and interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Aizma, 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

SURVEY HISTORY

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

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

The geophysical data were acquired with a DHX44 Magnetometric (EM) system and a Fugro D1355 magnetic sensor. The EM and magnetic sensors were towed at a height of 100 feet. In addition the ship was equipped with a GPS receiver and a laser sensor. GPS navigation system, 50/60 Hz AC power, video camera, and a computer system were performed with an AS-350-B3 Squirrel helicopter. The survey track was a series of parallel lines along NAD-83 (3407) survey flight lines with a spacing of a quarter of a mile. The line lengths were approximately 1.5 miles. The survey was at intervals of approximately 3 miles.

A Novatel OEM4-C2L Global Positioning System (GPS) receiver was used to provide real-time data. A derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 1 m. The GPS receiver was mounted and projected onto the Clarke 1866 (UTM zone 4) datum. The Clarke 1866 datum is a spheroid of mean spheroidal (CM) of 159', a north constant of 159', and a semi-major axis of 159'. The accuracy of the presented data is better than 10 m with respect to the UTM grid.

by
Lauri E. Bums, Fugro Airborne Surveys Corp., and Fugro GeoServices, Inc.
2014

The DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coaxial coil pairs operated at 1000 and 3500 Hz induced horizontal coplanar coil pairs operating at 900, 1200, 1600, and 2000 Hz. Data were collected at 2-second intervals. The EM system responds to bedrock, conductive clastic rocks, and cultural sources. Apparent resistivity is generated from the inphase and quadrature components using the Schlumberger and Wenner–layer half space model. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Aldine, 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 ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless resistivity calculations due to small signals where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying correlated over more than one survey line.

This map has been compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological and Geophysical Surveys (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Geveys Corp. in 2010 and 2011. Pre-flight altitudes were 10,000 feet.

The current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The status of the survey is indicated by the color of the lines. The Alaska Department of Natural Resources, Division of Geological and Geophysical Mineral Inventory Program.

Map materials were derived from the survey are available in digital format on DVD for a nominal fee through DGGS, 3354 College Road, Fairbanks, Alaska, 99707, and the website www.dggs.state.ak.us. The DGGS website (www.dggs.state.ak.us/pub/index.htm). Maps are also available on paper through the DGGS office, and are viewable online at the website in Adobe Acrobat PDF format.

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Sirtex C3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from radar and digital altimeters, GPS navigation system, 50/60 Hz monitors and video camera. Flights were performed with an AS-350-83 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 cm. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) datum, 1927 American datum using a central meridian (CM) of 159° a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM EM system measured inphase and quadrature components at five frequencies. Two vertical coiled coil-pairs operated at 1000 and 5000 Hz while three horizontal coplanar coil-pairs operated at 800, 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 800 Hz using the pseudo-orthogonal method. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Altitude, in feet, is the average of the elevation of the ground surface and the elevation of the topography.

900 Hz COPLANAR APPARENT RESISTIVITY OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This avoids meaningless resistivity calculations due to small signals where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank spaces in the grids were created where zones of high flying correlated over more than one survey line.

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 Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously, from DGGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3354 College Road, Fairbanks, Alaska, 99709-3757, and are downloadable for free from the DGGGS website (www.dgggs.alaska.gov/pubs). Maps are also available on paper through the DGGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEMY Electromagnetic (EM) system and a Fugro D1344 central magnetic induction system with a central induction sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition the survey recorded data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and an altimeter. The flight was performed with an AS-350-B3 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) survey flight lines with a spacing of a quarter of a mile. The lines were perpendicular to the strike-slip fault lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) spheroid, 1927 North American datum using a central meridian (CM) of 159°, a north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

RESISTIVITY

The DIGHEM[®] EM system measured inphase and quadrature components of the frequencies. The vertical coaxial coil-pairs operated at 1000 and 5500 Hz while three horizontal coplanar coil-pairs operated at 900, 17200 and 56,000 Hz. EM data were sampled at 0.1 m intervals along the profile. The EM data were collected from conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the partial inductance method. The EM data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then modified from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this report.

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

SURVEY HISTORY

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

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

Scale 1:163,300
 1 inch = 1.3 miles
 1 centimeter = 0.4 miles

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scripps CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey recorded data from radar, global positioning system (GPS), and video cameras. Flights were performed with an AS-350B3 Super Puma helicopter at a mean terrain clearance of 200 feet along 100- to 200-foot survey flight lines with a spacing of 100 feet between flight lines. The flight lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G2L Global Positioning System receiver for navigation was used. The system was derived every 0.5 seconds using post-flight differential corrections to a relative accuracy of better than 5 m. Flight path positions were projected onto the Clarke 1866 UTM zone 4J coordinate system. The map was produced using a central meridian (CM) of 156° 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.

RESISTIVITY

The DIGHEM[®] EM system measured in-phase and quadrature components of the frequency, two vertical coiled coil-pairs operated at 1000 and 5500 Hz while three horizontal coiled coils operated at 800, 2200 and 55,000 Hz. The data were sampled at 0.1 second intervals. The EM system responds to subsurface conductive structures. Apparent resistivity is generated from the in-phase and quadrature component of the response. The data were interpreted into a regular 80 m grid with a modified Alaska 1983 datum. All data were then resampled from the 80 m cell size down to a 20 m cell size to provide the maps and their grids contained in this publication.

Alaska, 1983, is the datum for the purpose of the publication of geophysical data. The datum is the intersection of the equator and the meridian of longitude 156° 30' W, 4 m. 1983 datum.

RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. This includes mesophase helicopter fly higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying correlated over more than one survey line.

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 Fugro GeoServices, Inc. All geophysical data for the area were acquired and processed by Fugro Alaska Survey Corp. in 2010 and 2011. The map was compiled from data surveys and to the current survey are shown in the location map by dashed lines, survey lines, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Mineral Inventory Program.

All data and maps produced in data from this survey are available as digital format on DVD for a nominal fee. Contact: DGGG, 3354 College Road, Fairbanks, Alaska, 99775. For more information, visit the DGGG website (www.dggg.alaska.gov/public). Maps are also available on paper through the DGGG office, and are available online at the website in Adobe Acrobat PDF format.

900 Hz COPLANAR APPARENT RESISTIVITY AND DATA CONTOURS OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

RESISTIVITY CONTOURS

Contours in ohm-m at 10 intervals per decade

..... resistivity low

RESISTIVITY ALTITUDE LIMITS

In areas where the EM bird height exceeded 150 m, resistivity was not calculated. The voids meaningless resistivity calculations due to small signals where the helicopter flew higher to avoid cultural objects or for safety reasons. Blank areas in the grids were created where zones of high flying correlated over more than one survey line.

RESISTIVITY

The DIGHEM[®] EM system measured in-phase and quadrature components at five frequencies. Two vertical coplanar coil-pairs oriented at 1000 and 5000 Hz with three horizontal coplanar coil-pairs oriented at 900, 700 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 in-phase and quadrature component of the coplanar 900 Hz using the pseudo-layer-half approximation. The data were interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Alaska is shown as a red silhouette on the map of the United States of America.

DESCRIPTIVE NOTES

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Fugro D1344 cesium magnetometer with a Scintrex C3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition, the survey collected data from radar and laser altimeters, GPS navigation system, 50/60 Hz monitors and video cameras. Flights were performed with an AS-350-83 Squirrel helicopter at a mean terrain clearance of 200 feet along NW-SE (340°) 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 2 miles.

A Novatel OEM4-G2L Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5 cm. Flight path positions were projected onto the Clarke 1866 (UTM zone 4) datum, 1927 Alaska Altimeter using a central meridian (CM) of 159° 30' north constant of 0 and an east constant of 500,000. Positional accuracy of the presented data is better than 10m with respect to the UTM grid.

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 Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Surveys Corp. in 2010 and 2011. Previously, from 1992 surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGGS, 3354 College Road, Fairbanks, Alaska, 99709-3757, and are downloadable free from the DGGGS website (www.dgggs.alaska.gov/pubs). Maps are also available on paper through the DGGGS office, and are viewable online at the website in Adobe Acrobat PDF file format.

PARTS OF IDITAROD AND OPHIR QUADRANGLES

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

The geophysical data were acquired with a DIGHEM[®] Electromagnetic (EM) system and a Fugro D3344 cesium magnetometer with a Schintrex CS3 cesium magnetometer. The EM system was towed in a line of tow at a height of 100 feet. In addition the system included a Fugro D3344 GPS system, a Fugro D3344 altimeter, GPS navigation system, 50/60 Hz monitors and video camera. Flights were made at a mean terrain clearance of 200 feet with a maximum clearance of 300 feet. The spacing of a quarter of a mile. The lines were flown perpendicular to the flight lines.

The DIGHEM[®] EM system measured inphase and quadrature components at frequencies of 1000 and 5000 Hz. Three horizontal coplanar coil-pairs operated at 1000 and 5000 Hz, three horizontal coplanar coil-pairs operated at 900, 7200 and 56,000 Hz. EM data were sampled at 0.1 sec intervals. EM data were collected from 1000 m² of conductors, conductive overburden, and cultural sources. Apparent resistivity is generated from the inphase and quadrature component of the coplanar 900 Hz using the pseudo-soundings approach. The apparent resistivity is interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

Aizma, H., 1970, A new method of interpolation and smooth curve fitting based on local procedures: *Journal of the Association of Canadian Machine*, v. 17, no. 4, p. 559-602.

This map has been compiled and drawn under contract by the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGG&G), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired and processed by Fugro Airborne Geophysics Corp. in 2010. The data were then processed by DGG&G to the current survey are shown in the location map by dashed lines, survey name, and date of acquisition. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee of \$350.00. 355-356-357-358-359-360-361-362-363-364-365-366-367-368-369-370-371-372-373-374-375-376-377-378-379-380-381-382-383-384-385-386-387-388-389-390-391-392-393-394-395-396-397-398-399-400-401-402-403-404-405-406-407-408-409-410-411-412-413-414-415-416-417-418-419-420-421-422-423-424-425-426-427-428-429-430-431-432-433-434-435-436-437-438-439-440-441-442-443-444-445-446-447-448-449-450-451-452-453-454-455-456-457-458-459-460-461-462-463-464-465-466-467-468-469-470-471-472-473-474-475-476-477-478-479-480-481-482-483-484-485-486-487-488-489-490-491-492-493-494-495-496-497-498-499-500-501-502-503-504-505-506-507-508-509-510-511-512-513-514-515-516-517-518-519-520-521-522-523-524-525-526-527-528-529-530-531-532-533-534-535-536-537-538-539-540-541-542-543-544-545-546-547-548-549-550-551-552-553-554-555-556-557-558-559-560-561-562-563-564-565-566-567-568-569-570-571-572-573-574-575-576-577-578-579-580-581-582-583-584-585-586-587-588-589-590-591-592-593-594-595-596-597-598-599-600-601-602-603-604-605-606-607-608-609-610-611-612-613-614-615-616-617-618-619-620-621-622-623-624-625-626-627-628-629-630-631-632-633-634-635-636-637-638-639-640-641-642-643-644-645-646-647-648-649-650-651-652-653-654-655-656-657-658-659-660-661-662-663-664-665-666-667-668-669-670-671-672-673-674-675-676-677-678-679-680-681-682-683-684-685-686-687-688-689-690-691-692-693-694-695-696-697-698-699-700-701-702-703-704-705-706-707-708-709-710-711-712-713-714-715-716-717-718-719-720-721-722-723-724-725-726-727-728-729-730-731-732-733-734-735-736-737-738-739-740-741-742-743-744-745-746-747-748-749-750-751-752-753-754-755-756-757-758-759-760-761-762-763-764-765-766-767-768-769-770-771-772-773-774-775-776-777-778-779-780-781-782-783-784-785-786-787-788-789-790-791-792-793-794-795-796-797-798-799-800-801-802-803-804-805-806-807-808-809-810-811-812-813-814-815-816-817-818-819-820-821-822-823-824-825-826-827-828-829-830-831-832-833-834-835-836-837-838-839-840-841-842-843-844-845-846-847-848-849-850-851-852-853-854-855-856-857-858-859-860-861-862-863-864-865-866-867-868-869-870-871-872-873-874-875-876-877-878-879-880-881-882-883-884-885-886-887-888-889-890-891-892-893-894-895-896-897-898-899-900-901-902-903-904-905-906-907-908-909-910-911-912-913-914-915-916-917-918-919-920-921-922-923-924-925-926-927-928-929-930-931-932-933-934-935-936-937-938-939-940-941-942-943-944-945-946-947-948-949-950-951-952-953-954-955-956-957-958-959-960-961-962-963-964-965-966-967-968-969-970-971-972-973-974-975-976-977-978-979-980-981-982-983-984-985-986-987-988-989-990-991-992-993-994-995-996-997-998-999-1000-1001-1002-1003-1004-1005-1006-1007-1008-1009-1010-1011-1012-1013-1014-1015-1016-1017-1018-1019-1020-1021-1022-1023-1024-1025-1026-1027-1028-1029-1030-1031-1032-1033-1034-1035-1036-1037-1038-1039-1040-1041-1042-1043-1044-1045-1046-1047-1048-1049-1050-1051-1052-1053-1054-1055-1056-1057-1058-1059-1060-1061-1062-1063-1064-1065-1066-1067-1068-1069-1070-1071-1072-1073-1074-1075-1076-1077-1078-1079-1080-1081-1082-1083-1084-1085-1086-1087-1088-1089-1090-1091-1092-1093-1094-1095-1096-1097-1098-1099-1100-1101-1102-1103-1104-1105-1106-1107-1108-1109-1110-1111-1112-1113-1114-1115-1116-1117-1118-1119-1120-1121-1122-1123-1124-1125-1126-1127-1128-1129-1130-1131-1132-1133-1134-1135-1136-1137-1138-1139-1140-1141-1142-1143-1144-1145-1146-1147-1148-1149-1150-1151-1152-1153-1154-1155-1156-1157-1158-1159-1160-1161-1162-1163-1164-1165-1166-1167-1168-1169-1170-1171-1172-1173-1174-1175-1176-1177-1178-1179-1180-1181-1182-1183-1184-1185-1186-1187-1188-1189-1190-1191-1192-1193-1194-1195-1196-1197-1198-1199-1200-1201-1202-1203-1204-1205-1206-1207-1208-1209-1210-1211-1212-1213-1214-1215-1216-1217-1218-1219-1220-1221-1222-1223-1224-1225-1226-1227-1228-1229-1230-1231-1232-1233-1234-1235-1236-1237-1238-1239-1240-1241-1242-1243-1244-1245-1246-1247-1248-1249-1250-1251-1252-1253-1254-1255-1256-1257-1258-1259-1260-1261-1262-1263-1264-1265-1266-1267-1268-12

PARTS of EDITAROD D-2, D-3 and OPHIR A-2, A-3 QUADRANGLES

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DIGHEM™ EM system measured inphase and quadrature components at five frequencies. Two vertical coil-coil pairs operated at 1000 and 5500 Hz while three horizontal coil-coil pairs operated at 1000, 7200, and 56,000 Hz. EM data were sampled at 0.1 second intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the contour map by the letter and number symbols. The primary method of determination of the type of conductor is based on EM anomaly shapes of the coil-coil and coil-spring 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.

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a 100 m/s sampling rate. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) 105% corrected (105% multiplier), (3) corrected for magnetic declination (1970-2010, updated for date of flight and instrument variations), (3) leveled to the tie line data, and (4) interpolated onto a regular 80 m grid using a modified Alma (1970) technique. All grids were then resampled to a 20 m cell size down to a 25 m cell size to produce the map and final grids contained in this publication.

This map is being compiled and drawn under contract between the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data were collected by Fugro GeoServices, Inc. and processed by Fugro Airborne Survey Corp. In 2009 and 2011. Previously flown DGGS surveys adjacent to the current survey are shown in the location of the new survey. The map was prepared for publication. The project was funded by the Alaska State Legislature as part of the Alaska Airborne Geological and Geophysical Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee. The DGGS website (www.dggs.state.ak.us) contains the following information: 99709-3707, and are downloadable for free from the DGGS website (www.dggs.state.ak.us/pubs). Maps are also available on paper through the DGGS office, or can be viewed online at the website in Adobe Acrobat file format.

The geophysical data were acquired using a Geophysical Systems Incorporated Electromagnetic (EM) system and a cesium magnetometer with a Sclintech sensor. The EM and magnetic fluxgate sensors were mounted on a survey recorded data from dual antennas, GPS navigation system, monitors and video camera, mounted on a small aircraft flying at a mean terrain clearance along NW-SE (340°) survey flight spacing of a quarter of a mile between down perpendicular tracks at intervals of approximately 300 m. A Novatel OEM4-C2L Global Positioning System (GPS) receiver was derived every 0.5 seconds using differential positioning to a relative accuracy better than 5m. Flight path parameters were derived from a spherical, 1927 North American or Canadian datum, with a spheroidal central meridian (CM) of 159°, a semi-major axis of 6378137 m, and a flattening of 0 and an east constant of 500,000 m. The datum is offset 10m with respect to the UTM, and

[illegible]

PARTS of EDITAROD D-1, D-2 and OTHER A-1, A-2 QUADRANGLES

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

To determine the location of EM anomalies or their boundaries, the DMS-10 EM system requires two components of the EM frequencies. Two vertical coils—coil pairs operated at 1000 and 3500 Hz while three horizontal coilpair—coil pairs operated at 900, 7200, and 5400 Hz. The EM system was sampled at 100 Hz intervals. The EM system responds to bedrock conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the electromagnetic map by the characteristic symbol. The location of the EM system is determined by the type of conductor is based on EM anomaly shapes of the coilpair— and coilpair—coil responses, together with the topographic map and the geologic map. The power line monitor and the flight track were assumed to locate cultural sources.

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetometer with a 253 m (163 mi) track. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic values, (2) age corrected (age 2010, updated for date of flight and magnetic declination), (3) leveled to the line data, and (4) interpolated onto a regular 80 m grid using a modified Akers (1970) technique. All grids were then resampled from the 80 m cell size down to a 25 m cell size to produce the maps and final grids contained in this publication.

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

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

All data and maps produced to date from this survey are available for use by the public. The data are available through DGGS, 3354 College Road, Fairbanks, Alaska 99709-3707, and are downloadable for free from the DGGS website (www.dggs.alaska.gov/pubn). Maps are available for purchase. The map data and metadata are viewable online at the website in Adobe Acrobat PDF file format.

SCALE 1:51,800
0 0.5 1 1.5 2 MILES
0 0.5 1 1.5 2 KILOMETERS

RESIDUAL MAGNETIC FIELD AND DETAILED ELECTROMAGNETIC ANOMALIES OF THE IDITAROD SURVEY AREA, INNOKO, IDITAROD, and McGRATH MINING DISTRICTS, WESTERN ALASKA

PARTS OF IDITAROD B-3, B-4, B-5, C-3, C-4, and C-5, QUADRANGLES

Laurel E. Burns, Pugo Albers Survey Corp., and Pugo Geoservices, Inc.

2011

ELECTROMAGNETICS

To determine the location of EM anomalies or their boundaries, the DDEM EM system measured magnetic and quadrature components of five frequencies, two vertical conductive coils spaced at 1000 and 5000 Hz with time-varying magnetic field components at 20, 2000, 10000, and 50000 Hz. The EM system responses to various conductors, conductive overburden, and cultural sources. The type of conductor is indicated on the electromagnetic map by the interpretive symbol attached to each EM anomaly. Where shapes of the conductors and estimated responses, together with conductive and magnetic patterns and knowledge, the power line monitor and the flight track data were examined to locate cultural sources.

ELECTROMAGNETIC ANOMALIES

Area Area indicates the location of the anomaly. Symbol Area indicates the location of the anomaly. Legend Area indicates the location of the anomaly.	Conductor model Area indicates the location of the anomaly. Legend Area indicates the location of the anomaly.

DESCRIPTIVE NOTES

The geophysical data were acquired with a DDEM EM system and a Pugo D1344 cesium magnetometer with a Schriber CS3 cesium sensor. The EM and magnetic sensors were flown at a height of 100 feet. In addition to the survey, recorded data from radio, GPS, laser altimeter, GPS navigation system, and data loggers, monitors and video cameras. Flights were performed with an AS-350B3 Super helicopter at a mean terrain clearance of 200 feet along the AS-350B3 survey flight lines, with a minimum clearance of 100 feet. The flight lines were flown perpendicular to the flight lines at intervals of approximately 3 miles.

A Novatel OEM4-G21, Global Positioning System was used for navigation. The helicopter position was derived every 0.5 seconds using post-flight differential positioning to a relative accuracy of better than 5m. Flight path positions were calculated using the Clarke 1866 datum, zone 42, datum.

The central meridian (CM) of 159° is a north constant of 0 and an east constant of 500,000. Position accuracy of the presented data is better than 10m with respect to the UTM grid.

LOCATION INDEX FOR 1:51,800

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 Pugo Geoservices, Inc. All previous geophysical data for the area were acquired and processed by Pugo Geoservices, Inc. in 2010 and 2011. The current survey was flown in 2011 and is the result of the current survey area shown in the location map by shaded lines, survey name, and date of publication. The project was funded by the Alaska State Department of Natural Resources, Division of Geological & Geophysical Surveys.

All data and maps produced to date from this survey are available online at www.dgggs.alaska.gov/. Data from this survey were digitized from hard copy to digital format through DGGGS, 555A College Road, Fairbanks, Alaska, 99707-3707, and are available online at www.dgggs.alaska.gov/. Data are also available online at the Alaska Division of Geological & Geophysical Surveys website at www.dgggs.alaska.gov/.

The geospatial data were acquired with a DGHM-4000 Electromagnetic (EM) system and a Fugro D11000 cesium magnetometer with a Schlöter CS3 cesium magnetometer. The EM system was towed by a ship on the surface of the ocean at a height of 100 feet, in addition the cesium magnetometer was towed by a ship at a depth of 1000 feet. The EM system, GPS navigation system, 50/60 Hz monitors and video camera. Flights were conducted in a series of parallel tracks at a mean terrain clearance of 200 feet. The flight lines were spaced at a quarter of a mile. The lines were oriented in the direction of the flight lines at intervals of approximately ninety degrees.

A Novatel OEM4-02 Global Positioning System was used for navigation. The helicopter position was determined by a differential GPS system. The differential positioning to a relative accuracy of 10 cm. Flight path was projected onto a map of the 48 contiguous United States, 1927 North American datum using a datum shift of 1000 feet. The datum shift of 0 and an east constant of 500,000. Positioning accuracy was determined by a 100 meter error with respect to the UTM grids.

[illegible]

PARTS of IDITAROD R-2, R-3, C-2, and C-3 QUADRANGLES

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

To determine the location of EM anomalies or their boundaries, the DIGHEM[®] EM system measured inphase and quadrature components at five frequencies. Two vertical coil-coupled coils operated at 1000 and 5500 Hz while three horizontal capacitor-coupled coils operated at 900, 7200, and 56,000 Hz. EM data were collected in a 100-m wide, 100-m long grid. The EM data were compared to bedrock contours, conductive overburden, and cultural sources. The type of conductor is indicated on the aeromagnetic map by a distinctive symbol attached to each EM anomaly. Determination of the type of conductor is based on EM energy ratios and correlation of EM anomalies with geological features with conductor and magnetic patterns and topography. The power line monitor and the flight track view were examined

The magnetic total field data were processed using digitally recorded data from a Fugro D1344 magnetic field recording system. Data were collected at a sampling interval of 0.1 seconds. The magnetic data were (1) corrected for diurnal variations by subtraction of the digitally recorded base station magnetic data, (2) core corrected (RRF model, 2010, updated for data of flight and altimeter variations), (3) leveled to the line data, and (4) interpolated onto a regular 80 m grid using a modified Akima (1970) technique. All grids were then resampled to a 10 m cell size down to a 25 m cell size to produce the maps and final grid contained in this publication.

This map has been compiled and drawn under contract from the State of Alaska, Department of Natural Resources, Division of Geological & Geophysical Survey (DGGS), and Fugro GeoServices, Inc. Airborne geophysical data for the area were acquired as part of the Fugro GeoServices contract for 2008 and 2011. Previously flown DGGS surveys adjacent to the current survey are shown in the location map by dashed lines, survey name, and date of publication. The project was funded by the Alaska State Lands Department, Alaska Geospatial Information & Geophysical Mineral Inventory Program.

All data and maps produced to date from this survey are available in digital format on DVD for a nominal fee through DGGS, 3354 College Road, Fairbanks, Alaska 99709-3707, and are downloadable for free from the Alaska State Lands Department website at <http://www.alaska.gov/dnrm>. The maps are also available on paper through the DGGS office, and are viewable online at the website <http://www.alaska.gov/dnrm>.

**INTERPRETATION MAP
OF THE IDITAROD SURVEY AREA,
INNOKO, IDITAROD, and
McGRATH MINING DISTRICTS,
WESTERN ALASKA**

PARTS OF IDITAROD AND OTHER QUADRANGLES

Interpretation by Ruth Peckham

Flaga Alaska Bureau Corp.

2012

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

SCALE 1:63,360

LEGEND

- F1 Inferred Structural Break
- A1 EM Conductor, or group of EM Conductors
- (M) Magnetic Zone
- (ML) Magnetic Low
- (A) Broad Magnetic Feature
- (B) Approximate outline of a large resistive zone
- (C) Approximate outline of broad magnetic zone defined by a change in magnetic texture
- (H) Highly Conductive Zone

**INTERPRETATION MAP
ON RESIDUAL MAGNETIC FIELD
OF THE IDITAROD SURVEY AREA,
INNOKO, IDITAROD, and
McGRATH MINING DISTRICTS,
WESTERN ALASKA**

PARTS OF IDITAROD AND OTHER QUADRANGLES

Interpretation by Ruth Palphrad
Pugot Alaska Surveys Corp.
2012The interpretation is based on the geophysical parameters
with reference to geological maps, which were supplied
by the State of Alaska.

SCALE 1:63,360

1 0 1 2 3 4 MILES

1 0 1 2 3 4 KILOMETERS

LEGEND

--- F1	Inferred Structural Break
--- A1	EM Conductor, or group of EM Conductors
--- M1	Magnetic Zone
--- M2	Magnetic Low
--- A	Broad Magnetic Feature
--- B	Approximate outline of a large resistive zone
--- C	Approximate outline of broad magnetic zone defined by a change in magnetic texture
--- D	Highly Conductive Zone